Malaysian Communications and Multimedia Commission

Public Inquiry Report

Review of Access Pricing

16 February 2023

This Public Inquiry Report was prepared in fulfilment of sections 55, 56, 61, 65, 104 and 106 of the Communications and Multimedia Act 1998

Malaysian Communications and Multimedia Commission
MCMC Tower 1, Jalan Impact, Cyber 6
63000 Cyberjaya
Selangor Darul Ehsan.
Tel: +60 3 86 88 80 00 Fax: +60 3 86 88 10 00
www.mcmc.gov.my

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Abbreviations

2G	Second Generation Wireless Technology
3G	Third Generation Wireless Technology
4G	Fourth Generation Wireless Technology
5G	Fifth Generation Wireless Technology
AA	Apparatus Assignment
BAK	Bill and Keep
BEREC	Body of European Regulators for Electronic Communications
BUDK	Building Digital UK
CAGR	Compound Annual Growth Rate
CAPEX	Capital Expenditure
CAPM	Capital Asset Pricing Model
CDS	Credit Default Swap
CMA	Communications and Multimedia Act 1998
CW	Civil Works
DBP	Detailed Business Plan
DR	Domestic Roaming
DTT	Digital Terrestrial Television
DTTB	Digital Terrestrial Television Broadcasting
DWDM	Dense Wave Division Multiplexer
EC	European Commission
ED	Economic Depreciation
EPE	Edge Provider Edge
EPMU	Equal-Proportional Mark Up
EPC	Evolved Packet Core
ER	Edge Routers
ERP	Equity Risk Premium
EC	European Commission
EU	European Union

FAC	Fully Allocated Cost
FDA	Fully Depreciated Assets
FFLAS	Fixed Fibre Local Access Services
FTTH	Fibre to the Home
FTR	Fixed Termination Rate
GBV	Gross Book Value
GLC	Government Linked Company
HD	High Definition
HDD	Horizontal Directional Drilling
HSBA	High Speed Broadband Access
HSBB	High Speed Broadband
HVAC	Heating, Ventilation and Air-Conditioning
IBCA	In-Building Common Antenna Systems
IWG	Industry Working Group
JENDELA	Jalinan Digital Negara
KPI	Key Performance Indicators
LRIC	Long Run Incremental Cost
LRIC+	LRIC with Common Cost Mark-up
LTE	Long Term Evolution
MCMC	Malaysian Communications and Multimedia Commission
MCT	Mobile Call Termination
MERS999	Malaysian Emergency Response Service 999
MIMO	Multiple-Input Multiple-Output
MMS	Multimedia Message Service
MNO	Mobile Network Operator
MOCN	Multi-Operator Core Network
MSA	Mandatory Standard on Access
MSAN	Multi-Service Access Node
MSAP	Mandatory Standard on Access Pricing
MSQoS	Mandatory Standard on Quality of Service

MTR	Mobile Termination Rate
MVNO	Mobile Virtual Network Operator
NPE	Network Provider Edge
NOC	Network Operation Centre
NSA	Non-Standalone
OECD	Economic Corporation and Development
OLT	Optimal Line Terminal
O&M	Operation and Maintenance
OPEX	Operating Expenditure
OPR	Overnight Policy Rate
OSA	One Stop Agency
PCRF	Policy and Charging Rules Function
PI	Public Inquiry
PI Paper	Public Inquiry Paper on Review of Access Pricing
PI Report	Public Inquiry Report on Review of Access Pricing
POI	Point of Interconnect
QoS	Quality of Service
RAB	Regulatory Asset Base
R&D	Research and Development
RAN	Radio Access Network
RAO	Reference Access Offer
RFR	Risk-free Rate
RM	Ringgit Malaysia
ROI	Return on Investment
ROW	Right of Way
SA	Standalone
SBC	State Backed Company
SG	Service Gateway
SLA	Service Level Agreement

SMS	Short Message Service
SWN	Single Wholesale Network
TDD	Time Division Duplex
TCO	Total Cost of Ownership
USP	Universal Service Provision
UST	Universal Service Target
VDSL	Very-high-bit-rate Digital Subscriber Line
WACC	Weighted Average Cost of Capital
WLLC	Wholesale Local Leased Circuit

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SUMMARY OF MCMC's FINAL VIEWS ON ACCESS PRICES

In this Public Inquiry ("**PI**"), the MCMC has undertaken the development of cost models in order to calculate the costs for the facilities and services in the Access List. The costing methodologies used to calculate the costs of the various services and the proposed prices were fully described in the Public Inquiry Paper on Review of Access Pricing ("**PI Paper**") (issued on 5 October 2022).

The PI Paper set out the MCMC's preliminary views on the regulation of access pricing and invited comments in response to 47 general and specific questions. After consideration of the submissions received in response to the PI Paper as presented in this Public Inquiry Report on Review of Access Pricing ("**PI Report**"), the following table summarises the MCMC's final views on regulatory pricing of the services in the Access List.

Table 1: Summary of MCMC's Final Views

Service	MCMC's final view
Fixed Network Origination Service	Price regulation
Fixed Network Termination Service	Price regulation
Interconnect Link Service	Price regulation
Domestic Connectivity to International Services	Price regulation
Wholesale Local Leased Circuit Service	Price regulation
Trunk Transmission Service	Price regulation
End-to-End Transmission Service	Price regulation
IP Transit Service	No price regulation
Layer 2 HSBB Network Service with QoS	Price regulation
Layer 3 HSBB Network Service	Price regulation
Network Co-Location Service	No price regulation
Duct and Manhole Access	Price regulation

Service	MCMC's final view
Mobile Network Origination Service	Price regulation
Mobile Network Termination Service	Price regulation
MVNO Access Service	No price regulation
Domestic Inter-Operator Roaming Service	Price regulation
4G EPC with 5G RAN Access	No price regulation
5G SA Access	No price regulation
Infrastructure Sharing	No price regulation
Digital Terrestrial Broadcasting Multiplexing Service	Price regulation

1. Introduction

1.1. Public Inquiry Process

In its Public Inquiry Paper on the Review of Access Pricing ("**PI Paper**") issued on 5 October 2022, the Malaysian Communications and Multimedia Commission ("**MCMC**") detailed the approach and methodology it proposed to adopt within this Public Inquiry:

(a) to determine which facilities and services in the Access List should be subject to ex-ante price regulation;
(b) to determine cost-based prices for each facility or service in the Access List; and
(c) to set cost-based prices for some facilities and services in the Access List.

The MCMC noted that under section 55(1) of the Communications and Multimedia Act 1998 ("**CMA**"), the MCMC may, from time to time, make a determination on any matter specified in the CMA. This Public Inquiry relates to access to services under Part VI, Chapter 3 of the CMA.

Given the long-term consequences of access regulation, for this Public Inquiry the MCMC adopted a consultative approach as provided for under the legislation in order to obtain maximum input from both industry and the public. This approach was also designed to promote transparency in the exercise of the MCMC's powers.

The PI Paper set out the MCMC's preliminary views as to which facilities and services should be subject to price regulation and, where relevant, the proposed regulatory prices for the period 2023 to 2025. The PI Paper invited comments on the appropriateness of setting the proposed prices and on the methodology used to calculate the prices. The PI Paper specifically sought comments through 47 questions.

The PI Paper presented:

(a) the legislative context and purpose of the Public Inquiry;
(b) the scope of the Public Inquiry;
(c) the proposed outputs of the Public Inquiry; and
(d) the process of the Public Inquiry.

The Public Inquiry closed at noon on Tuesday, 17 January 2023.

1.2. MCMC's Legislative Obligations

Part VI of the CMA contains provisions on economic regulation including access to services. Section 149 within Chapter 3, Part VI requires Access Providers to provide access to facilities and services on reasonable terms and conditions, which, in the MCMC's view, include the prices that an Access Provider sets.

In addition to Part VI, section 198 under Chapter 4, Part VIII of the CMA contains provisions on consumer protection including the following principles on rate setting:

(a) rates must be fair and, for similarly situated persons, not unreasonably discriminatory;
(b) rates should be oriented toward costs and, in general, cross-subsidies should be eliminated;
(c) rates should not contain discounts that unreasonably prejudice the competitive opportunities of other providers;
(d) rates should be structured and levels set to attract investment into the communications and multimedia industry; and
(e) rates should take account of the regulations and recommendations of the international organisations of which Malaysia is a member.

As explained in the PI Paper, the MCMC views that it is required to undertake a Public Inquiry under section 55 of the CMA in order to set prices for facilities or services in the Access List because determination of these prices is very likely to be of significant interest to all sectors of the economy, including providers and potential providers of these services as well as end users of communications services.

The MCMC is now required to make any determinations arising out of this Public Inquiry no later than 3 March 2023, which is 45 days after the close of public comments on the PI Paper. The MCMC proposes to issue a new Commission Determination that will reflect the MCMC's final views as expressed in this PI Report in respect of the pricing of some of the facilities and services in the Access List for the period 2023 to 2025.

1.3. Consultation Process

The MCMC has consulted widely and openly with all interested stakeholders during this Public Inquiry, including:

(a) publication of the PI Paper on 5 October 2022 and a request for comment, including publicity on the MCMC website;
(b) presentation of the economic cost models to licensees during October to November 2022 and consideration of comments received;
(c) making available on request public versions of the economic cost models used in determining the proposed prices in the PI Paper; and
(d) clarifications in response to stakeholders in relation to specific items raised in the PI Paper during the consultation period.

The MCMC adopted a different procedure for the model viewing process for this PI. Previously model viewings have occurred prior to the publication of the PI Paper. However, this time the model viewing process occurred after the publication of the PI Paper. Interested parties were invited to provide initial feedback on the models in October and November 2022. Revised versions of the models, incorporating stakeholder feedback and documenting any amendments with change logs, were provided to interested parties between 12 to 15 December 2022. These revised models delivered updated results. The MCMC invited parties to comment on these updated results in their response to the PI Paper.

1.4. Submissions received

At the close of the Public Inquiry period at 12:00 noon on 17 January 2023, the MCMC had received 16 written submissions from the following parties.

Table 2: Submissions Received

No.	Submitting party	Referred to in this PI Report as
1	Allo Technology Sdn Bhd	Allo
2	Measat Broadcast Network Systems Sdn Bhd	Astro
3	Celcom Axiata Bhd and Digi Telecommunications Sdn Bhd	CelcomDigi
4	Digital Nasional Bhd	DNB
5	edotco Malaysia Sdn Bhd	Edotco
6	Fibrecomm Network (M) Sdn Bhd	Fibrecomm

No.	Submitting party	Referred to in this PI Report as
7	irix Sdn Bhd	irix
8	Maxis Broadband Sdn Bhd	Maxis
9	MyTV Broadcasting Sdn Bhd (on behalf of itself, Altel Communications Sdn Bhd and Net2One Sdn Bhd)	MyTV, Altel and Net2One
10	Persatuan Penyedia Infrastruktur Telekomunikasi Malaysia	PPIT
11	Sarawak Digital Economy Corporation Bhd	SDEC
12	TT dotCom Sdn Bhd	TT dotCom
13	Telekom Malaysia Bhd	TM
14	U Mobile Sdn Bhd	U Mobile
15	XOX Com Sdn Bhd	XOX
16	YTL Communications Sdn Bhd	YTL

Having thoroughly reviewed and assessed the submissions received on the PI Paper against its own preliminary views, the MCMC now presents this PI Report within the 30-day requirement of the closing date of submissions, as stipulated under section 65 of the CMA.

1.5. Structure of this PI Report

The remainder of this PI Report is structured broadly to follow the PI Paper to provide a consistent context for the MCMC's specific questions for comment. The 47 questions in the PI Paper are duplicated in each section with a summary of the comments received (in alphabetical order of the submitting parties). The MCMC then sets out the rationale of its final views on each issue:

Section 2: Principles in Setting Access Pricing

Section 3: Cost Modelling General Issues

Section 4: Key Modelling Issues

2. Principles in Setting Access Pricing

2.1. Overview

Part B of the PI Paper was concerned with the general principles relevant to regulatory pricing. After some brief background on the legislative objectives in Section 5.1, Section 5.2 of the PI Paper sets out the general guidelines to be used by the MCMC in determining which services should be subject to ex-ante price regulation and the criteria by which regulated prices should be set. These included the recovery of appropriate costs and the promotion of economic efficiency. In addition, in Section 5.2.3 of the PI Paper, a time horizon of 3 years was proposed for the regulated prices.

The MCMC sought comment on these issues.

2.2. Summary of submissions received

Question 1:

Do you think that the criteria for ex-ante determination of access prices presented remain appropriate?

Submissions received

2.2.1 Allo is of the opinion that the criteria for ex-ante regulation remains appropriate and relevant.

2.2.2 Astro viewed that the criteria for ex-ante determination of access prices remain appropriate. However, Astro commented that from the Access Seeker perspective, ex-ante is needed specifically for smaller operators that are unable to enter into reciprocal Access Agreements yet. Astro highlighted that the criteria used by the MCMC for ex-ante are aligned with European Union ("**EU**") Commission recommendation.

2.2.3 CelcomDigi commented that the criteria for ex-ante regulation remains appropriate due to the presence of high barriers to entry and the absence of a trend towards effective competition.

2.2.4 CelcomDigi highlighted that the appropriateness of ex-ante intervention or whether to intervene is a separate judgment to be made, by taking the full circumstances into account. According to CelcomDigi, where competition exists, even if it is thought to be less than fully effective, it deserves encouragement and may merit forbearance on the part of the MCMC.

2.2.5 DNB agreed that regulated ceilings to prices are needed in markets where there is no effective competition.

2.2.6 Edotco commented that the MCMC's overall level of pricing regulation in the market is still too high even though the MCMC's approach to the ex-ante determination of access prices.

2.2.7 Edotco highlighted that given the extensive Access List, the extremely detailed Mandatory Standard on Access ("**MSA**") in global terms, and the fact that Malaysia has had sector competition for more than 25 years, Edotco believes that the MCMC should generally refrain from regulating prices.

2.2.8 Edotco also commented that instead of price regulation, the MCMC should channel the focus to ongoing market failure and the market segments where the MCMC has re-introduced service exclusivity.

2.2.9 Edotco anticipated the need for a thorough assessment and policies to resolve the market distortions that such interventions result in, given the experience of foreign markets that have imposed exclusive mandates/monopolies (such as the NBN network in Australia).

2.2.10 Fibrecomm is of the view that the criteria for ex-ante determination of access prices presented is inappropriate given that fibre services in Malaysia are still growing. Fibrecomm also added that ex-ante determination deters providers to take on high-cost projects due to geographical and/or other condition.

2.2.11 Maxis agreed that ex-ante regulation remains appropriate prior to market failure such as presence of high barriers to entry and absence of a trend towards effective competition for uncompetitive market, namely for fixed telecommunications poles, alongside ducts and manholes. Maxis added that this is due to an incumbent operator holding a significant market share with full control of its facilities and services. Maxis also provided the cost of building an

underground fibre infrastructure alongside the cost estimates for poles which is approximately 30-40% less than the cost estimate for ducts and manholes.

2.2.12 Maxis is of the view that ex-ante regulation of prices is not appropriate in competitive markets, specifically for Mobile Virtual Network Operator ("**MVNO**") and domestic roaming services. Maxis added that it may create unnecessary restriction where market forces have facilitated the provision of these services. Maxis submitted that one operator has demonstrated success in domestic roaming services and is becoming one of the major Mobile Network Operator ("**MNO**") as well as an effective competitor to existing operators. In fact, Maxis highlighted that for the past few years, the operator has successfully entered into an agreement with various operators for the domestic roaming service and currently also focusing on expanding their own network.

2.2.13 Maxis commented with regard to international regulatory precedent for MVNO Access and domestic roaming, most countries are generally against MVNO Access and domestic roaming price regulation and allow prices to be determined through commercial negotiations between the Access Seeker and Access Provider. Maxis added, in some cases where prices are regulated, it is due to lack of competition.

2.2.14 Maxis added information that most countries are generally against regulating prices for MVNO Access such as Australia, New Zealand, UK and Austria, Spain, Czech Republic. Maxis also commented that, domestic roaming services are also not regulated in some countries namely in Australia, New Zealand, UK, Austria, France and Italy. Maxis commented that those countries allow prices to be determined through commercial negotiations between the Access Seekers and Access Providers.

2.2.15 Maxis also highlighted that the European Commission ("**EC**") recently excluded the mobile market in its recommendation on relevant markets for ex-ante regulation.

2.2.16 Maxis submitted that MNOs in Malaysia are having allocated spectrums and typically plan and deploy their respective network progressively via a long-term plan including investing in respective network expansion to improve network coverage. Thus, Maxis viewed that regulating MVNO Access and domestic roaming services in a competitive market, may discourage MNOs from investing

in infrastructure namely in expanding coverage, increasing capacity and improving network quality.

2.2.17 Maxis is of the view that the pricing structure proposed for MVNO prices is not appropriate as it should not be done on a price per GB basis but should consider the network quality and coverage as well. Hence, Maxis viewed regulation of prices of MVNO Access and domestic roaming services should be removed and the MCMC should intervene in the event of clear uncompetitive outcomes found after conducting the relevant competition assessment. Maxis also added that in order to charge MVNO Access, some level of coverage charge such as 'as per base station' should be incorporated.

2.2.18 MyTV, Altel and Net2One was agreeable that ex-ante regulations remain appropriate as it may assist the MCMC in dealing with the licensees that are providing bottleneck facilities or services. However, the companies added that the rigidity in the application of the regulation or methods in finalising the access prices should be avoided by the MCMC to ensure the ex-ante regulation is appropriate and effective.

2.2.19 MyTV commented that rigidity in choosing appropriate cost models and assumptions made based on hypothetical efficient providers' networks through benchmarking may lead to inefficient ex-ante regulation in addressing real issues faced by licensees.

2.2.20 MyTV also commented that the proposed access prices in the PI Paper failed to echo the true landscape of Digital Terrestrial Television ("**DTT**") service in Malaysia, whereas the background of DTT service was not appropriately weighed and costs calculated are incorrect. Hence, MyTV added that the proposed access prices for DTT services was derived from the cost-based prices that are not reflective of the service in Malaysia.

2.2.21 MyTV highlighted that, in a situation where the final access prices fail to cover the actual base cost of providing DTT service in Malaysia, MyTV elects that the access prices will be commercially negotiated with its customers and remains reasonable.

2.2.22 PPIT is of the view that ex-ante pricing is inappropriate for infrastructure sharing services due to no 'unfair first move advantage' exists in their nature of business as their revenue are mainly generated from leasing infrastructure to the Access Seeker. PPIT commented that Individual State Backed Company ("**SBC**") have maintained Access Agreements and Master Licence Agreements that are transparent and fair to all Access Seekers, and in a manner consistent with local and national regulations.

2.2.23 PPIT also added that the approach was inappropriate as there are no high barriers to entry in the market and SBCs do not have a monopoly on licences to build and maintain tower infrastructure. Lastly, PPIT highlighted that the ex-ante pricing will not promote trend towards effective competition. PPIT also commented that their pricing are published in the Reference Access Offer ("**RAO**") and hence, it will enhance the effective competition in infrastructure sharing services.

2.2.24 SDEC was agreeable that the criteria for ex-ante determination of access prices presented remain appropriate.

2.2.25 TM is of the view that price-setting is rarely applied to an Access Provider to services in markets where there is sufficient competition, and where the Access Provider is deemed to have not significant market power for those services. Thus, TM added that the MCMC should not seek to apply price regulation where there is sufficient competition.

2.2.26 TM also considered that the fibre network is still evolving in Malaysia, as such the MCMC should circumspect as to which services should be price-regulated.

2.2.27 TT dotCom commented that the industry continues to be burdened to ensure that the prices are not set by Access Provider, financial reports must be in compliance with the accounting separation provided to the MCMC with detailed information and adherence to statutory provisions that prohibit any form of tying and linking services with other services. Thus, TT dotCom urges the MCMC to review all access regime instruments beyond Mandatory Standard on Access Pricing ("**MSAP**") to ensure its effectiveness.

2.2.28 U Mobile agreed with the criteria for ex-ante regulation for most of the services under the Access List due to lack of effective competition in the provision of

those services. U Mobile stated that there are a few factors such as the existence of bottleneck monopolies, the case with network termination, high barriers to entry and limited competitive choice primarily in the fixed network that made the ex-ante pricing determination remain appropriate in this industry.

2.2.29 U Mobile emphasized that the MVNO pricing should not be regulated under the ex-ante determination as the barriers to entry are not unduly high and the service is available from all the main mobile operators.

2.2.30 U Mobile commented that most of the countries with available MVNO services such as Australia, Hong Kong, Netherlands, New Zealand, Singapore, Thailand and United Kingdom do not regulate MVNO pricing. Thus, U Mobile does not see a possibility to introduce the MVNO pricing in Malaysia.

2.2.31 YTL is of the view that ex-post regulation will be effective in a perfectly competitive market, where the market would self-regulate. However, YTL added that the situation is not the same in Malaysia as the Access Provider and Access Seeker are not evenly matched.

2.2.32 YTL strongly recommended ex-ante regulations to regulate predictive behaviour of dominant players and to facilitate quick and efficient access. YTL commented that with the presence of dominant players in the market with the ability and means to delay access through several means such as protracting negotiation, postponing discussion and imposing unreasonable charges. These predatory behaviour by dominant players with a significant share in the market exert unfair control over facilities and services that are crucial for the operation of other operators.

2.2.33 XOX submitted that, the criteria set forth remains appropriate. However, XOX suggested that the MCMC should provide more specifics regarding the second condition, which stipulates that "rates should be oriented towards costs". XOX also added that Access Providers have a myriad of costs in their operations, thus the broad parlance could lead to different interpretations of what costs are taken into consideration.

2.2.34 An operator stated that, even with the ex-ante determination, there are also some providers charging higher prices than the MSAP pricing to the Access Seeker on the grounds that the core network was designed based on a higher

service level at 99.992%. Thus, the operator commented that it should be avoided by setting the maximum regulated prices.

2.2.35 The same operator also commented that all Access Providers now have the option of avoiding their Access obligations by arguing that their services do not correspond to those listed in the Access List. Thus, the operator further suggests in a situation that Access Provider intends to provide facilities or services beyond the specification of Access List determination, the said facilities and services should be priced as per MSAP and not higher.

Discussion

2.2.36 The MCMC notes that stakeholders in general agree with ex-ante regulation of prices in an environment of clear market dominance, but some reservations were expressed about the MCMC's proposed regulation of MVNO, domestic roaming and towers. With respect to towers (infrastructure sharing) the MCMC has decided not to regulate prices, for the reasons outlined in the PI Paper.

2.2.37 With respect to MyTV's comments on the costing of Digital Terrestrial Television Broadcasting ("**DTTB**") services, the MCMC addresses these in Section 10.

2.2.38 With regard to MVNO services, the MCMC appreciates that these services are not commonly regulated in other jurisdictions. The MCMC believes that the presence of MVNOs in the Malaysian market is beneficial to the long-term interests of end-users, as they offer consumers additional choices and there is the potential for innovation in service offerings. However, given the relative size of MVNOs vis-à-vis MNOs the MCMC perceives a danger of inequitable treatment in commercial negotiations leading to potential price squeezes which may compel some MVNOs to exit the market. The MCMC is encouraged that MNOs have expressed willingness to continue to engage in commercial negotiations and therefore will not regulate MVNO prices at this time. However the MCMC will continue to monitor the market for any evidence of uncompetitive outcomes.

2.2.39 Finally, with respect to domestic roaming services, the MCMC is concerned about a clear lack of roaming agreements which would facilitate better outcomes for consumers. Domestic roaming agreements are commonplace in competitive markets in many countries, yet in Malaysia the MCMC is aware of coverage limitations in certain geographic areas which could easily be remedied by

satisfactory roaming agreements. The MCMC notes Maxis' comments that regulating domestic roaming services may discourage MNOs from investing in infrastructure to expand coverage, increase capacity and improve network quality. This suggests that MNOs do not perceive it is in their interests to reach agreement on domestic roaming and may engage in anti-competitive behaviour creating barriers to such agreements. However, seamless roaming across the country would be very convenient for consumers and businesses, potentially supporting economic and social gains. As such, the MCMC considers that it is in the long-term interests of end-users to introduce ex-ante regulation of domestic roaming services.

2.2.40 The MCMC is concerned to hear that some Access Providers are charging higher prices than the MSAP pricing to the Access Seeker on the basis that the core network was designed based on a higher service level at 99.992%. In other words, the Access Provider is seeking to differentiate services from the regulated service thus attempting to justify prices which differ from MSAP. In the current MSAP, the MCMC has attempted to increase transparency regarding the service levels which should be associated with the regulated prices. The MCMC encourages Access Seekers to discuss with the MCMC any difficulties with Access Providers caused by service level differentiation, if and when these arise.

MCMC's final view

2.2.41 The MCMC confirms that ex-ante pricing is appropriate for services in the Access List.

Question 2:

Do you think that the approach to pricing which has been adopted is appropriate? Are there any other criteria that should be considered?

Submissions received

2.2.42 Allo as a medium sized company commented that the approach is quite inexpedient and stated that lowering the price will reduce the profit margin, subsequently resulting in difficulties for Allo to maintain a good revenue due to the high costing of servicing and installing the services.

2.2.43 Altel is of the view that the adopted concept should open to a level of proposed prices by the MCMC that is practicable within the industry and will benefit the Access Seekers and ultimately promote the long-term benefit to the end users. However, Altel commented that the proposed regulated prices mainly for the Fifth Generation Wireless Technology ("**5G**") access are too high and believes that 5G access should also be treated similarly with Fourth Generation Wireless Technology ("**4G**") access. Hence, Altel proposed that if the cost models do not produce practicable regulated prices, the MCMC should consider a retail minus approach.

2.2.44 CelcomDigi viewed that the approach to pricing which has been adopted by the MCMC is generally appropriate. However, CelcomDigi added that it will also depend on how the method is put into practice and may need to be further improved to reflect the complexity of certain wholesale service situations.

2.2.45 CelcomDigi highlighted that the aim set by the MCMC is setting prices that resemble as closely as possible to those that would arise from a competitive market. However, in a situation where competition may not be fully effective, this is generally unachievable through regulatory intervention in wholesale service pricing based on costs.

2.2.46 CelcomDigi has no issue with the MCMC establishing a single fee for each of the following three years, for example, mobile voice call termination as there is no significant change in circumstances of these services.

2.2.47 CelcomDigi added, that this is different from MVNO services where, the potential complexity of the negotiated range of services between the Access Seeker and the Access Provider cannot be reasonably expressed in a single voice minute, message or data capacity rate, as it will inevitably and arbitrarily constrain and distort the range and content of commercial outcomes that the parties might otherwise have agreed.

2.2.48 DNB agreed that the regulated prices should enable the Access Provider to recover efficiently incurred costs plus an appropriate Return on Investment ("**ROI**"). DNB also added that regulated prices should be able to promote economic efficiency by setting regulated price caps.

2.2.49 Edotco concurred with the basis of the regulatory pricing approach, where regulated monopolies exist at state-level, i.e. SBC, then determining prices that resemble as closely as possible to those that would arise from a competitive market are complex and challenging.

2.2.50 Fibrecomm commented that the pricing needs to include other third-party, one-off or recurring cost, such as right of way ("**ROW**") from local authority or private entity.

2.2.51 Fibrecomm also mentioned that there should be multiple tiered structure to allow for return of investments on rural/geographically challenging areas or the use of (if or upon availability) new technology or methods.

2.2.52 Maxis agreed that the approach to pricing which has been adopted is appropriate, primarily for the 'appropriate cost recovery' and 'promotion of economic efficiency in investments' in order to set maximum regulated prices for facilities and services in the Access List.

2.2.53 Maxis also proposed explicit modelling of tax in area where there are significant capital allowances primarily in 5G and Fixed services.

2.2.54 Maxis commented that Long Run Incremental Cost ("**LRIC**") approach is critical to pursue efficiencies in network investments specifically for the single wholesale where there is no market competition involved.

2.2.55 Maxis further highlighted that the models must have clear and detailed product descriptions including Service Level Agreement ("**SLA**") or Key Performance Indicators ("KPI") committed to ensure model accuracy. Maxis also commented that the MCMC should remove ex-ante price regulation for MVNO Access and domestic roaming services.

2.2.56 MyTV stated that some of the assumptions failed to mirror the situation of the DTTB service in Malaysia including the assumption made by the MCMC for the demands of DTTB. MyTV highlighted that demand assumptions remain the same for three years of regulatory duration and demands are limited only to the analogue migration which appears to be incorrect as MyTV has been engaging with its counterparts and interests have been conveyed to MYTV to have new broadcasters onboard. MyTV also claimed that the demand information provided was overlooked in the calculation of the proposed access prices.

2.2.57 MyTV also commented that the costing methodology developed for the DTTB service has the basis of Capital Expenditure ("**CAPEX**") asset, which MyTV considers to be not reflective of the current situation in the Malaysian landscape, hence, produced a great difference of costs between the hypothetical service provider and the actual service provider.

2.2.58 MyTV highlighted that it would be unable to recover costs if the MCMC continues to apply the proposed access pricing. MyTV suggested that the costing model should be based on Operation Expenditure ("**OPEX**") based model, which ROI and payback period are crucial determining factors as the approach is based on the stand taken by the government through the MCMC when digitalization of broadcasting landscape was decided in 2012. PPIT was agreeable to the general theoretical approach to pricing specifically for the appropriate cost recovery and promotion of economic efficiency in investments.

2.2.59 SDEC agreed that the approach to pricing which has been adopted is appropriate.

2.2.60 TM disagreed with the statement of "in a fully competitive market, prices will tend towards marginal cost" in the context of telecom networks as stated in section 5.2.2.2 of the PI Paper. TM added, this is due to telcos incurring large costs at the outset in achieving initial coverage for the network.

2.2.61 TM also highlighted that telcos cost would be largely sunk if prices for telecom services inclined to marginal costs since they would be unable to recoup these coverage expenses.

2.2.62 TM commented that the definition of reasonable efficiency used by the MCMC in the context of TM must be unique compared to definitions used in other countries. TM added, it is because TM is a Government-Linked Company ("**GLC**") and the initiatives that have been contributed in the industry are not the same with the perspective of commercial operator.

2.2.63 TM acknowledged the need to be efficient, but there are two issues in this line of thought. First, the reductions in production costs must be in the context of the expected Quality of Service ("**QoS**") and secondly, TM can incur other costs that may not be viewed as efficient from a commercial perspective, but are reasonably efficient from the perspective of a GLC that is supporting the domestic economy.

2.2.64 TM pointed out that page 7 of the PI Paper recognised the issue on retaining quality was highlighted but further details were not available in the entire PI Paper.

2.2.65 TM highlighted that the MCMC has assumed far lower levels of OPEX than what TM incurs in its network-attributable OPEX. According to TM, the "network-attributable OPEX", means the sum of direct network OPEX, indirect network OPEX and a portion of business overhead OPEX.

2.2.66 TM submitted that TM will be looking at the level of modelled network costs as a directive from the MCMC for TM to reduce costs to those specified levels and highlighted that TM incurs additional costs in TM's network operations and maintenance since the MCMC imposed a wide range of Mandatory Standards for Quality of Service **("MSQoS")**. As such, TM viewed that the MCMC should not remove large amounts of TM's cost base compared to other countries where such obligation does not exist.

2.2.67 TT dotCom is of the opinion that the approach taken may not be appropriate. Thus, TT dotCom suggested that the MCMC should take into account many other factors that need evaluation before coming up with the calculations used such as types and costs of different respective technologies, size of bandwidth, length of contract tenure and volume of purchase.

2.2.68 U Mobile agreed that theoretical approach to pricing outlined in Section 5.2.2 is reasonable and consistent with international best practice. However, according to U Mobile, the broader question of whether or when the onerous procedure of calculating termination costs should be abandoned in favour of Bill and Keep **("BAK")** is not addressed in this part.

2.2.69 U Mobile stated that as voice and messaging traffic become an ever-smaller proportion of the total and the costs of determining the price, measuring the traffic and billing it continue to rise, it seems inevitable that the costs will outweigh the benefits. U Mobile also suggested that the correct course of action would be for the MCMC to conduct a Regulatory Impact Analysis before undertaking any further exercises of this kind and, if the costs outweigh the benefits, to move to BAK.

2.2.70 YTL is of the view where the mandatory prices should be set at levels that ensure adequate cost recovery, promote efficient use of resources and encourage innovation.

2.2.71 YTL added that the pricing framework should foster healthy competition in the industry where the prices should consider all the factors and without favour or basis for both Access Provider and Access Seeker.

2.2.72 XOX commented that the current approach is appropriate. However, XOX also submitted that rather than concentrating only on cost minimisation, the MCMC also should consider examining a scenario where higher weightage is given to "allocative efficiency" and "dynamic efficiency" in order to produce more incentive to innovate.

Discussion

2.2.73 In general submitters agreed that the MCMC's proposed approach to pricing was appropriate, but a number of operators suggested that additional considerations were also important.

2.2.74 Maxis and TM noted the importance of quality of service. Maxis suggested that models must have clear product descriptions including committed SLA or KPI to ensure model accuracy. TM noted that any reductions in production costs must be in the context of the expected quality of service. Further, TM remarked that it incurs additional costs in network operations and maintenance since the MCMC imposed a wide range of MSQoS. TM claimed that the MCMC mentioned QoS only once in the PI Paper on page 7 but provided no further details.

2.2.75 The MCMC would like to clarify that it has taken into account QoS considerations to the extent possible within a cost modelling framework. As stated in the PI Paper (on page 69) the fixed model calculates the number of required network elements by dimensioning a network with capacity that will meet service demands each year at an appropriate QoS. The revised fixed model included further refinements relating to the QoS.

2.2.76 TM also remarked that it should be considered unique when comparing its efficiency to commercial operators from other countries because it is a GLC. TM suggests that this status affects the level of efficiency it can reasonably be

expected to attain. The MCMC believes that it has accommodated a reasonable level of efficiency in respect to the fixed modelling for the following reasons:

(a) An operator entering the market today would build a fibre network to deliver fixed services. It would not build a copper network, yet the fixed model encompasses a lower level of efficiency by including a legacy copper network in addition to a fibre network for fixed service provision;

(b) The fixed model deploys a hypothetical network yet it uses a scorched node approach which effectively constrains the modeller from adopting a high efficiency standard, as would be implicit in a scorched earth approach; and

(c) Apart from its GLC status, TM is also a Public Listed Company and as such seeks to maximise shareholder value, as do other listed companies. This goal is emphasized many times in TM's annual reports.

2.2.77 The MCMC notes U Mobile's points concerning the advantages of a BAK regime. Under a BAK model, the operators make no interconnection payments to each other. This can occur under the following circumstances:

(a) incoming and outgoing traffic is equally balanced, in which case the net interconnect payment (outpayments less inpayments) is zero – this can occur even if the marginal cost of voice termination is non-zero; and
(b) termination rates are set to zero, implying that the marginal cost of voice termination is zero.

2.2.78 The MCMC is aware that BAK has more commonly been used in jurisdictions with receiving party pays models, such as the United States and Canada, however it has also now been implemented in several countries that use calling party pays. The MCMC considers that the appropriateness of such a regime for Malaysian market conditions should be explored in the future.

MCMC's final view

2.2.79 The MCMC confirms that:

(a) The pricing approach outlined in the PI Paper will be applied for the final models;

(b) The appropriateness of a BAK regime for Malaysia will be considered in future; and

(c) QoS considerations will be taken into account in the modelling to the extent that this is possible.

Question 3:

Do you have any comments on the appropriateness of setting regulated prices for the period up to and including 2025?

Submissions received

2.2.80 Allo commented that the pricing set by each telcos will not spike abruptly as they compete in providing a better pricing. This is the main reason it supported the approach.

2.2.81 Astro agreed with the MCMC's proposal of setting regulated prices for a period of three years (including 2025) as the market is very dynamic and suggested that the MCMC include an automatic extension of 2025 price to be applicable in the event that a new MSAP is not issued by end of 2025 as to avoid any uncertainties and disputes between Access Seeker and Access Provider.

2.2.82 CelcomDigi agreed with the approach of setting regulated prices for three years that the MCMC has adopted in the past and proposes to continue for the current MSAP is appropriate.

2.2.83 CelcomDigi highlighted that a shorter period would create avoidable uncertainty and suggested to involve both the MCMC and the industry in major reviews more frequently. CelcomDigi commented that a regulatory period beyond 2025 should not be considered as it would rely on forecasts of services beyond reasonable horizons for an industry which is dynamic and volatile.

2.2.84 CelcomDigi also commented that a three-year period might be altered only in cases where there is a serious uncertainty in demand due to the introduction or rapid displacement of a service.

2.2.85 CelcomDigi recommended that the MCMC considers setting a shorter periodic 5G price review of no less than fifteen months after the effective date of the MSAP which regulates 5G prices, in line with the mid-point review which have been agreed by DNB.

2.2.86 CelcomDigi added that in the case of 5G, if a three-year period for regulated prices is considered to be appropriate by the MCMC, then this might be best implemented with the second-year and third-year price levels as indicative only.

2.2.87 DNB agreed that the period up to and including 2025 is appropriate for well-established wholesale services and suggested the MCMC to take into account the need to consider a longer time period for 5G services in order to recover efficiently incurred cost.

2.2.88 DNB added that this will enable the MCMC to consider regulated pricing options in which wholesale 5G prices are set below annualised cost in short term to stimulate take up and use of 5G mobile data and there is opportunity for demand side risk sharing.

2.2.89 Allo was agreeable for the pricing to be regulated but reminded the MCMC to consider the cost, difficulty and concern from all services providers.

2.2.90 Edotco submitted that setting regulated prices through to 2025 is concerning, especially since prices used to develop the costing model are pre-pandemic costs from 2020. Edotco added that fixing the indicative costs from 2023 to 2025 as indicated in the MSAP PI in a high inflation environment means that there is a substantial reduction of the costs which may be paid by Access Seekers and hence under-recovery of costs. Thus, Edotco suggested to set annual indicative regulated prices in the MSAP only until 2024 and revisit the suitability of those prices earlier than the previous reviews.

2.2.91 Fibrecomm stated that the current pricing has been used to set the models and be the base for ROI calculations by providers and any change in price would disrupt the recovery rate of existing infrastructures, induce unnecessary impairment and affect the value of the industry of a whole.

2.2.92 Maxis agreed with the appropriateness of setting regulated prices for the period up to and including 2025 as it would provide regulatory certainty for network

operators and service providers for business planning and cost recovery purposes.

2.2.93 Maxis also would like to propose a two-year price review period for 5G services, to mitigate concerns about the accuracy of forecasts in a highly uncertain area.

2.2.94 Maxis added that the MCMC should specifically state that in the event of government's 5G strategy significantly changes, the MSAP procedure may need to be restarted and a new costing assessment conducted.

2.2.95 MYTV, Altel and Net2One are of the view that a three-year period is appropriate for the setting of regulated prices. However, MYTV views that the calculation of costs-based price for DTT service should reflect the situation of the service in the Malaysian landscape. Hence, MyTV added that there is a need to show an effective operator's ROI and payback period's implications as part of their proposed access pricing or MSAP.

2.2.96 PPIT commented that infrastructure sharing was considered as a long term service provision. Thus, PPIT highlighted that the period of three years is too short to be adopted to the nature of Infrastructure Sharing Services.

2.2.97 PPIT added that, providing a short period as recommended by the MCMC would compel infrastructure service provider to adjust all their prices depending on current cost structures, disregarding when the CAPEX was incurred. Thus, PPIT admited that, it may lead to under recovery of committed historical costs, in cases where there is a downtrend in costs.

2.2.98 PPIT also commented that the common business model adopted for the tower services is generally over the long term of ten years or more. In fact, PPIT added that the SBCs used at least six to ten years as its basis of ROI.

2.2.99 SDEC agreed with the MCMC's proposal of setting regulated prices for a period of three years.

2.2.100 TM commented that the proposed three year regulatory period is consistent with previous MSAP processes. TM also added that the proposed period is appropriate given that 5G is still a nascent service and more accurate cost information and benchmarks could be gathered for the next review in three years' time.

2.2.101 TT dotCom is of the opinion that the practical period for validity of the upcoming MSAP should be at least five years due to the reason that the industry required to conduct Access Agreement negotiation, dispute resolution (if any), Access Agreement conclusion and registration of the Access Agreement with the MCMC.

2.2.102 TT dotCom also commented that the proposed three-year period for MSAP implementation could affect the company's overall business such as the investment for expansion of business that usually requires long term planning between five to ten years. In addition, TT dotCom added that, the three year period could also affect the investors' view of the telecommunication industry in terms of price changes due to frequent review made by the MCMC.

2.2.103 U Mobile considered that three years represents a reasonable compromise between providing regulatory certainty and reliable forecasting in a dynamic market. Nevertheless, U Mobile suggested that any proposed changes over that timescale be set in the context of both past years' data and forecasts, as well as extending current forecasts and modelling somewhat further than those three years.

2.2.104 YTL suggested that the access pricing should be adjusted based on a predictable and consistent MSAP revision schedule of every five years with thorough study and analysis for a better market dynamics reflection and asset cost depreciation.

2.2.105 XOX proposed a biennial review in light of the industry's rapid growth and the innovations it is generating, particularly with the inception of 5G.

Discussion

2.2.106 In general, stakeholders agreed with the proposed regulatory period, although there was some disagreement in relation to 5G and tower services. The MCMC is aware of the need for regulatory certainty on the one hand, and, on the other hand, the dynamic nature of the market which makes longer-term demand forecasting challenging. As such, the MCMC considers that a three-year time horizon is a reasonable compromise.

2.2.107 With respect to PPIT's concern that infrastructure sharing involves long-term services, the MCMC is cognisant of the average duration of contracts for such services. The MCMC's decision not to price regulate tower services provides flexibility to service providers. With regards to Edotco's point about the current

inflationary environment and the potential impact on prices over time, the MCMC notes that the Risk-free Rate ("**RFR**") applied in the Weighted Average Cost of Capital ("**WACC**") calculation encompasses inflationary expectations. The MCMC has taken care to ensure that the latest information on the RFR is included in its estimate of this parameter. Further details are provided in Section 5. The MCMC would also like to clarify that it has used the latest available data in the cost modelling and did not rely on pre-pandemic data.

2.2.108 CelcomDigi, Maxis and XOX suggested that in relation to 5G services an earlier price review (such as in two years' time) may be appropriate, on the basis that there is some uncertainty surrounding 5G wholesale service provision, and the associated demand levels. However, TM indicates that three years would allow time for more 5G benchmarks to emerge together with more robust cost data. Finally, DNB recommended a regulatory period longer than three years in order to accommodate cost recovery for new 5G services.

2.2.109 The MCMC agrees that there is considerable uncertainty regarding many aspects of the wholesale 5G Services. In the absence of detailed granular cost and benchmark information, the modelling exercise has been extremely challenging. As such, the MCMC will review the need for 5G price regulation after one year from the publication of MSAP. The MCMC intends to monitor developments and react as required.

MCMC's Final Views

2.2.110 The MCMC confirms that it will apply a three-year regulatory period, so that the regulated prices will apply from 2023 to 2025.

2.2.111 The MCMC confirms that with respect to wholesale 5G Services, it will monitor developments, and review the appropriateness of setting regulated prices after a one year period.

3. Cost Modelling General Issues

3.1. Overview

Sections 6 and 7 of the PI Paper described the methodologies the MCMC was proposing to adopt in order to determine cost-based prices. The PI Paper sought comments on the structure and use of each methodology.

Section 6 of the PI Paper was concerned with the available costing methodologies including Fully Allocated Cost ("**FAC**"), LRIC, LRIC with Common Cost Mark-Up ("**LRIC+**"), pure LRIC, Stand Alone Costs and Step-by-Step. It proposed the use of LRIC+ as the basis for setting prices for 4G and 5G mobile services. It also proposed to use the LRIC+ approach, with asset price adjustments to reflect the presence of fully-depreciated assets for the fixed services. It proposed a bottom-up model based on current asset costs for Digital Terrestrial Broadcasting Multiplexing Service and Infrastructure Sharing.

Section 7 of the PI Paper proposed the use of bottom-up models incorporating titled annuities as the appropriate depreciation method for all services, the allocation of common costs using Equal Proportionate Mark Up ("**EPMU**"), the inclusion of licence and spectrum fees, the definition of relevant increments, the use of the scorched node approach, model calibration and reconciliation, the use of glide paths and the relevance of the cost models for arbitration of disputes. Section 7 also discussed exceptions and adjustments to LRIC-based prices relating to co-location, duct, manhole and infrastructure sharing and Universal Service Provision ("**USP**") subsidies and installation charges.

3.2. Summary of submissions received

Question 4:

Do you have any comments on the proposed costing methodologies?

Submissions received

3.2.1 Allo commented that the consideration of serving the customer in terms of sales and installation of services was excluded from the costing methodologies.

3.2.2 Altel agreed with the methodology. However, Altel added that it appears from the manual that 5G services using own core by the service operator for Stand

alone ("**SA**") has not been included in the costing (only consideration of costing by DNB core).

3.2.3 DNB agreed with the 5G LRIC model as the model represents efficiently incurred costs plus an appropriate ROI, which is not inflated so as to give supernormal profits to DNB. However, DNB believed that the bottom-up LRIC+ approach used by the MCMC was not appropriate for setting regulated 5G prices. This is because, DNB stated that the model will inevitably overlook certain costs, as it uses a scorched node approach which ignores real-life considerations and wrongly assumes that DNB's network grows linearly.

3.2.4 DNB disagreed with the calculation used by the MCMC to sets the 5G price caps through the model. Hence, DNB suggested the MCMC to consider an alternative the LRIC+ price caps that are set out in the Table 104 of PI Paper.

3.2.5 Edotco was supportive of the MCMC's proposed methodology in relation to infrastructure namely, simple, bottom-up model based on current asset costs, despite limitations on the cost variation per site.

3.2.6 CelcomDigi generally agreed with the costing methodologies that the MCMC suggests for determining the cost of the Access List services, as it was applied for fixed services, 4G mobile services, and infrastructure sharing services.

3.2.7 CelcomDigi questioned, whether the MCMC should treat 5G for cost modelling purposes as if it were an established mobile service like 4G, or more akin to an infrastructure project.

3.2.8 CelcomDigi argued that a building-block approach based on an agreed or independently assessed Regulatory Asset Base ("**RAB**"), would be the appropriate approach to adopt if 5G is to be treated as an infrastructure project for initial cost modelling purposes. Even though the approach was deemed to be challenging, CelcomDigi highlighted that the MCMC through RAB approach could satisfy whether the costs claimed have been efficiently incurred.

3.2.9 CelcomDigi concluded that at this point of 5G services evolution in Malaysia, the RAB approach is favoured for 5G services since it provides a better means of capturing the longer-term infrastructure aspects of 5G.

3.2.10 Fibrecomm commented that the proposed costing methodologies for fixed network or services type should take into consideration small or medium size licensees and the various deployment challenges and costs associated with non-typical infrastructure such as fibre cable over high voltage pylons, highways and railways. Fibrecomm also believed that the concept of Fully Depreciated Assets ("**FAD**") should not apply to fibre services for the same reasons.

3.2.11 Maxis agreed with the proposed costing methodologies specifically on the use of LRIC+ for the promotion of efficiency as well as to ensure consistency from the previous MSAP. Maxis stated that the use of LRIC+ is crucial to enhance efficiencies in 5G services as there is a single network operator in the market.

3.2.12 Maxis further agreed on the use of LRIC+ for fixed and mobile including 4G and 5G services. While, for infrastructure sharing, Maxis agreed with the bottom up model. However, Maxis opined that MCMC should not regulate and apply LRIC+ to MVNO Access and domestic roaming services.

3.2.13 PPIT is aware and agreed on the costing methodology that has been proposed for Infrastructure sharing services that is a 'simple, bottom-up model based on current assets costs' whereby it was similar to the previous PI Paper in 2017. However, PPIT commented that the flaws of this practice was the average or median values will definitely not be the actual costs incurred and will exclude new or next generation technologies, custom built and alternative structures.

3.2.14 PPIT also highlighted that, there are various charges, for instance, land assessment charges, permits fee and replacement cost were excluded in the cost model. In fact, PPIT added that the rental that was claimed as a pass through cost does not reflect the SBCs' operations.

3.2.15 PPIT commented that during the data collection process, there was a lack of clarity on the definition of costs required, whether the approach is based on historical cost namely gross book value ("**GBV**"), 2022 historical costs or current market cost that led to a mix of submissions from all SBCs.

3.2.16 PPIT believed that the cost input in the model should be based on current asset cost (accounting for various tower configuration) plus inflation and environmental changes such as new technology.

3.2.17 TM is agreeable with LRIC+ methodology, as it ensures a suitable level of cost recovery. However, TM commented that the implementation of LRIC+ on the mobile network model is producing annualized network costs that are higher than what existing operators in the market are reporting in their annual reports.

3.2.18 TM highlighted that the adjustment for FDA in fixed access is an approach that has been increasingly applied for legacy copper services in the EU, but specifically not for fibre services.

3.2.19 TT dotCom commented that the Access Pricing regulation should only be applied to dominant players or to competitors with strong market position to influence the supply of services of the related markets. TT dotCom added that, the dominant players, who have the ability to manipulate pricing to their advantage will drive this market trend. As a result, it is quite challenging for non-dominant players to compete, and any actions taken by them will be insignificant comparatively.

3.2.20 U Mobile is agreeable with the proposed costing methodologies. However, U Mobile also recommended that the MCMC adopt Pure LRIC for the next Access Pricing Review in 2025. This is because, U Mobile stated that Pure LRIC represents a better fit with the principle of incremental costing, where only those costs that are incurred as a result of adding the service in question to the regulated firm's output (or avoided by removing it) are included.

3.2.21 U Mobile added that, the "pure" approach is more likely to deliver the benefits LRIC costing alluded to in the penultimate paragraph of section 5.2.2 of the PI Paper, because an operator with market power would not be able to derive an advantage over smaller operators by choosing to forego contributions to fixed shared and common costs in their pricing of on-net calls as a means of driving those smaller operators out of the market.

3.2.22 U Mobile further highlighted that the pure LRIC approach should be applied most clearly to termination services (fixed and 4G mobile), but similar issues arise for fixed infrastructure services, where a monopolistic fixed operator could use wholesale prices that are inflated to cover fixed shared and common costs to leverage their dominance in a regulated access market into more competitive retail markets, for example where those access services, or similar ones, are an

input to more complex retail services in competitive markets, such as systems integration and private networking for corporate clients.

3.2.23 YTL agreed with the adoption of LRIC+ model across all services. YTL added that it will ensure owners of legacy networks are adequately compensated for incurred costs while providing an incentive to invest.

3.2.24 XOX suggested a hybrid LRIC bottom-up also applies for 4G+5G model, given that the expected demand for 5G is still contingent upon end-user adoption rate, and recent market trends do not indicate signs of 5G adoption accelerating in Malaysia.

Discussion

3.2.25 In general, operators were supportive of the MCMC's proposed costing methodologies. The MCMC notes that CelcomDigi and DNB did not favour the LRIC+ approach for 5G services, however other MNOs were supportive of it. The MCMC continues to believe that the LRIC+ approach is more suitable than the RAB approach for a new 5G network in which actual costs could reasonably be expected to be close to current replacement costs, which is the efficient standard applied in LRIC modelling. This may be contrasted with the RAB approach which is typically applied to legacy utility networks.

3.2.26 With respect to PPIT's points, the MCMC agrees that its approach to modelling infrastructure sharing costs is based on averages and as such may not reflect actual costs of certain infrastructure, particularly in different geographic areas and for various custom-built structures. To attempt to capture the many different features of such structures would involve a very complex model. The MCMC sought to avoid these complexities by adopting an averaging approach. Moreover, the MCMC stresses that the resultant prices are indicative only.

3.2.27 Fibrecomm and TT dotCom raise the issue of the challenges faced by smaller operators, indicating that regulated pricing should only apply to larger dominant operators, or perhaps that asymmetric rates may be appropriate. The MCMC's view is that smaller operators typically target niche markets, and have in general lower cost structures than their larger counterparts. As such, it is not clear to the MCMC that asymmetric rates are required. While, the MCMC agrees that in principle, if an operator is not dominant in a market then pricing regulation may

not be necessary, based on CMA, the MCMC is obliged to impose symmetric obligations on all operators.

3.2.28 Finally, U Mobile suggests that a pure LRIC approach may be optimal for fixed and Mobile Termination Rate ("**MTR**"), on the grounds that large dominant fixed operators have considerable flexibility in price-setting to recover common costs at the wholesale level and then offer comparatively low prices for some retail products (predatory pricing) to the detriment of smaller competitors. The MCMC agrees that such a scenario is highly undesirable and unlikely to be in the long-term interests of end-users. The MCMC intends to monitor markets closely for such behaviour and in future will consider pure LRIC as one potential tool to address these issues.

MCMC's Final View

3.2.29 The MCMC confirms that it will apply the costing approaches outlined in the PI Paper.

4. Key Modelling Issues

4.1. Overview

In Section 7 of the PI Paper a number of key modelling choices are summarised and considered, including top-down / bottom-up modelling, various options for depreciation methods. The MCMC considered the features of the alternative possibilities for model implementation and presented initial proposals for comment by stakeholders.

4.2. Summary of submissions received

Question 5:

Do you have any comments on the proposed approach for allocating costs to services?

Submissions received

4.2.1 Altel is agreeable to adopt a bottom-up approach but pointed out that the key to accurate bottom-up model is accurate cost inputs and believable assumptions and network design and dimensioning. Altel also requested the MCMC to revisit and re-verify data inputs, cost inputs, assumptions and network dimensioning used in the 5G service as the model produces high prices. Altel also supports the MCMC's decision to include appropriate common cost in the cost model and agrees with the MCMC's approach to include the cost of licence and spectrum fees in the model.

4.2.2 CelcomDigi agreed with the proposed approach for allocating costs to services, namely to reflect cost causation and to use routing tables based on asset usages, as in previous MSAP reviews.

4.2.3 CelcomDigi urged the MCMC to revise the part at the end of section 7.4 of the PI Paper that states "Consistent with previous practice in costing Access List services, the MCMC proposes to include appropriate common costs in the cost models an apportion these to services using the EPMU approach to ensure that this cost is not transferred to consumers" as the passage was deemed inconsistent with CelcomDigi query to the MCMC.

4.2.4 DNB submitted their concerns related to the cost of transmission network and core network that it did not fully recover in the initial MSAP model. However, the issue has been solved in the MCMC's revised model.

4.2.5 Fibrecomm commented that the proposed approach for allocating cost to services should take into consideration small or medium size licensees and the various deployment challenges and cost associated with non-typical infrastructure such as fibre cable over high voltage pylons, highways and railways.

4.2.6 Fibrecomm also highlighted that the models should include checks to ensure that the expenditures expressed by asset are then all recovered by the assumed services that was excluded from the model.

4.2.7 Maxis is agreeable that bottom-up models are appropriate and an e EPMU approach and routing tables for cost allocation can be used.

4.2.8 Maxis expressed concerns about the lack of transparency on the proposed modelling approach for the 5G core network. Maxis added, that the MCMC should further explain the details of the top down modelling assumptions for the costing of 5G core network.

4.2.9 Maxis further commented that the regulatory precedent and economic theory favours "original" economic depreciation ("**ED**") for services with increasing demand such as 5G and High Speed Broadband ("**HSBB"**) core traffic which is likely to lead later cost recognition on a total cost basis than the methodology used by the MCMC. Hence, Maxis questioned the use of a tilted annuity approach and highlighted that ED is the most appropriate approach based on international regulatory consensus.

4.2.10 Maxis fully supported the MCMC's decision to include appropriate common costs in the models by using EPMU approach. Maxis also commented that the data in the released fixed model show the high costs and unnecessary network elements in incumbent fixed operator's original data, which Maxis proposed to be fine-tuned.

4.2.11 Maxis is agreeable with the approach used by applying the appropriate routing factors for allocation of costs to services. Maxis added that services are allocated

a share of each of the various network component costs in proportion to their use of them, including indirect costs such as management systems and motor transport. Maxis also agreed with the approach to adopt the principle of cost causation to allocate costs within the cost models.

4.2.12 MyTV commented that the entire costs of MyTV should be fully allocated for the DTT service as it is the only service MyTV is currently providing.

4.2.13 PPIT commented that the determined routing factors do not reflect the SBC's operation model. PPIT added that generally SBCs only provide one power supply and one cable gantry per tower site, while other assets are usually provided by the tenants. Thus, according to PPIT, it is inappropriate to assume a consistent routing factor for all operators as different operators have different operating models.

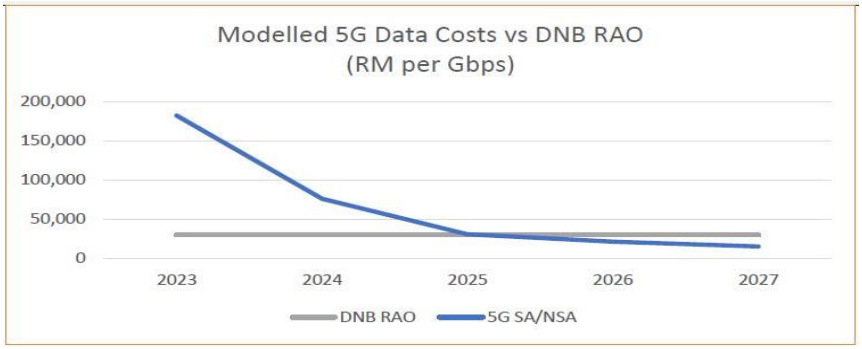
4.2.14 TM highlighted that the models should include checks to ensure that the expenditures expressed by asset are all recovered by the assumed services as to ensure that cost recovery occurs. TM commented that such checks are not included in the models.

4.2.15 U Mobile is agreeable with the proposed approach to allocating costs to services. However, whilst U Mobile would recognise that using tilted annuities as a proxy for ED is consistent with the approach adopted in earlier reviews, U Mobile is concerned on an issue raised in the fifth paragraph of section 7.3 in the PI Paper. U Mobile commented that whilst this issue is raised in the context of operational costs in the PI Paper, the same point applies to the recovery of capital costs over time.

4.2.16 U Mobile further added that whilst this issue is less acute in situations where volumes are relatively stable and are large enough to enable network capacity to be adjusted to meet them, the 5G network faces just this issue. U Mobile noted that DNB has recognised this and set prices that are intended to reflect the lifecycle costs of its network. The MCMC however has applied a single-year methodology, tilted annuities, that yields uncompetitively high estimated costs in the early years, as shown in Figure 1.

4.2.17 U Mobile suggested the MCMC to either apply ED or adjust the modelled costs to avoid clear departure from the intended aim of replicating the behaviour of a reasonably efficient firm in an effectively competitive market.

Figure 1: Modelled 5G data costs vs DNB's RAO (RM per Gbps)



4.2.18 YTL commented that access to services and facilities does not always incur incremental cost as the Access Seeker already possesses surplus capacity with little to no additional costs involved. Thus, YTL suggested the MCMC to consider the effect of depreciation on these assets, that have long been recovered.

4.2.19 YTL submitted that the valuation of assets at currently inflated costs will lead to over-valuation and over cost recovery since the MSAP has been extended twice. As a result, YTL has urged the MCMC to reconsider the book values of these investments instead of the current value.

4.2.20 YTL agreed with LRIC+ model for fixed, 4G and 5G services, yet opines that care must be given to correctly account for depreciation to ensure fair costing for the benefit of end users. YTL also agreed with the use of EPMU model.

4.2.21 XOX submitted that the proposed approach is appropriate, as retail billing system, marketing and sales cost should not be included.

Discussion

4.2.22 In general, operators agreed with the MCMC's proposed approach for allocating costs to services. Fibrecomm, TM and MyTV all stress the importance of actual cost recovery. YTL notes that over-recovery may occur if all assets are valued at current cost rather than book value.

4.2.23 To avoid over-recovery, the MCMC has removed FDA in the fixed network, using information largely provided by TM. Furthermore, the MCMC has carefully scrutinised all actual costs provided to inform estimates of common costs. Only those costs which the MCMC judges as efficient have been considered in the models.

4.2.24 In response to CelcomDigi's query on section 7.4 of the PI Paper, the MCMC clarifies that the intended meaning is that the MCMC proposes to include appropriate common costs in the cost models and apportion these to services using the EPMU approach. The MCMC emphasises that only appropriate common costs are included in order to ensure that inefficient costs are not transferred to end-users.

4.2.25 Maxis and U Mobile express concerns about the approach to depreciation in the 5G model, recommending that the tilted annuity methodology be replaced with true ED. This is further discussed in Section 8.2.

4.2.26 PPIT's specific points are addressed in Section 9.2.

MCMC's final view

4.2.27 The MCMC confirms that it will apply the approach outlined in the PI Paper for the allocation of costs to services.

Question 6:

Do you have any comments on the choice of costing methodology adopted?

Submissions received

4.2.28 Fibrecomm commented that the proposed approach for allocating cost to services should take into consideration small/medium size licensees and the various deployment challenges and cost associated with non-typical infrastructure such as fibre cable over high voltage pylons, highways and railways.

4.2.29 Fibrecomm highlighted that the scorched node approach might not be appropriate due to the optimistic nature on cost optimisation that might not reflect actual circumstances.

4.2.30 Maxis is agreeable that licence and spectrum fees represent a cost to network operators and should therefore be included in the cost models.

4.2.31 Maxis requestedthe MCMC to consider a coverage layer and capacity to be added in the modelling of 5G services so that pricing structure can be more closely aligned to the cost drivers.

4.2.32 Maxis also is of the view that if DNB is highly inefficient in building 5G network, the MCMC should consider a scorched earth approach for future MSAP.

4.2.33 MyTV, Altel and Net2One highlighted that the MCMC has to properly consider the increasing overhead costs in Malaysia. For instance, in 2022, the Overnight Policy Rate ("**OPR**") has increased four times which may affect office rentals, etc. The companies also stated that the application of minimum wage and increase in costs of living may also contribute to the rise of overheads.

4.2.34 PPIT commented that the bottom-up model approach is more flexible and better fitted to the MCMC's guidelines in modelling for an efficient operator instead of top-down approach.

4.2.35 PPIT mentioned that tilted annuity is preferred over other depreciation methods including straight line and simple annuity as it represents a proxy for ED, in that it provides an estimate of the revenue that would be required to produce a net present value for the investment in a capital asset over that asset's lifetime that is equal to the cost of capital. Further, PPIT added that this method also accounts for changes in asset prices over time.

4.2.36 PPIT highlighted that the licence and spectrum fees should be included in the models as appropriate. Thus, PPIT concluded that, PPIT members were agreeable with the costing methodology proposed by the MCMC including the bottom-up models, depreciation method (tilted annuity) and the treatment of licence fees.

4.2.37 TM raised concerns with the application of the scorched node approach in the revised v6 fixed model. TM highlighted that the scorched node is the approach

nominated in section 7.8 of the PI Paper and means that network locations are preserved but site functions can be optimised. TM added that the role of an individual site could be optimised to, for example, 'switch + Multi-Service Access Node ("**MSAN**")/OLT', or 'MSAN-only' or 'OLT-only'.

4.2.38 TM also highlighted that the updated v6 fixed model does not take into account the regional core nodes that contain routers in TM's network. Additionally, TM commented that the model is also excluding most of the fibre distribution cabinet locations with fewer than a third of TM's actual deployments captured.

4.2.39 U Mobile confirmed that the approach to the costing methodologies is aligned with standard practice.

4.2.40 YTL is agreeable with the use of scorched node and to use existing network as the basis for the costing for both the fixed and mobile networks with adjustments made for efficiency and to correctly reflect depreciation.

4.2.41 XOX suggested to allow some measure of flexibility in employing the average, marginal, or incremental cost structure due to the rigidity of insisting on a single cost structure could stifle competition, especially in the MVNO segment where customer behaviour is different.

Discussion

4.2.42 The MCMC thanks submitters for the constructive feedback on the costing methodology and notes that in general there was agreement with the MCMC's proposed approach.

4.2.43 MyTV, Altel and Net2One raised concerns about ongoing inflationary pressure. The MCMC notes that inflationary expectations are reflected in the RFR, a component of the WACC. Further information is provided in Section 5. TM raised concerns about the application of the scorched node approach rather than the approach itself. The MCMC believes that a scorched node or a modified scorched node approach is more appropriate for an incumbent fixed operator as it captures the most of the cost incurred by the operator to ensure network coverage. However, some efficiency adjustments are necessary. Adjustments made by the MCMC mainly involved the location of Optical Line Terminal ("**OLT**"). The MCMC does not believe that these adjustments had a severe impact on the results. For example, the number of modelled OLT assets in 2023

is just 4.2% lower than TM actuals in 2022. This is indicative that the model incorporates a modest efficiency gain.

MCMC's final view

4.2.44 The MCMC confirms that it will apply the costing methodologies as presented in the PI Paper.

Question 7:

Do you have any comments on the model calibration and reconciliation?

Submissions received

4.2.45 CelcomDigi highlighted that reconciliation needs to consider the MCMC's assessment about whether actual network deployment reflects efficient practice, both at the time of deployment and at the time of reconciliation.

4.2.46 DNB commented that the question is relevant for the established services considered in the inquiry but is not yet relevant for 5G services.

4.2.47 Fibrecomm submitted that the diverse number of ways network can be deployed might cause the calibration to be invalid for certain conditions. Thus, Fibrecomm suggested that there should be considerations for different network deployment based on complexities and location.

4.2.48 Fibrecomm urged the MCMC to review for the OPEX level to reflect the actual situation in Malaysia as it was not in line with large network deployment and maintenance.

4.2.49 Maxis highlighted that the MCMC should provide evidence of calibration and cost reconciliation for fixed services specifically data input provided by TM. Maxis added that it is important for the other operators to verify the accuracy of the data input, assumptions and network dimensions used by the MCMC in the fixed cost model.

4.2.50 Maxis also commented that the MCMC should explain the steps taken to ensure that any inefficiency of the incumbent is not replicated as part of the calibration process.

4.2.51 Maxis further highlighted that the MCMC should direct TM and DNB to publicly report their return on capital for regulated services for a greater transparency as well as enable better calibration and reconciliation.

4.2.52 MyTV, Altel and Net2One submitted that most of MyTV's cost is OPEX-based costs, which mainly are distribution costs, satellite costs, facilities cost and operation and maintenance costs. The model calibration needs to weigh these MyTV's actual costs to ensure the bottom-up model is reflective of the real situation faced by MyTV as a DTT service provider.

4.2.53 MyTV, Altel and Net2One agreed with the practice adopted but noted that the aspect of scale and capacity of the new/small operator may not be the same as another operator. MyTV, Altel and Net2One further added that if typical calibration aspects are used, the new/small operator may not be able to recuperate some of the sunk and common costs.

4.2.54 TM highlighted that since there are multiple significant differences between the model results and TM's actual fixed network infrastructure, TM doubts the extent to which calibration and reconciliation have actually been carried out. In addition, TM stated that the modelled OPEX, for instance, is substantially lower than the actual TM OPEX.

4.2.55 TM commented that modelled GBV is also considerably less. TM added that poles are an example of an asset count that has been calibrated, however other asset counts, such as, fibre distribution cabinets ("**FDC**") locations do not appear to have been calibrated.

4.2.56 TM has major concerns on the calibration or reconciliation of the modelled cost base with actual operators in 4G model. TM viewed that the modelled OPEX (direct network plus indirect) in particular is significantly exceeds the total business OPEX of all three major mobile operators namely Maxis, Celcom and Digi.

4.2.57 TM is of the opinion that the draft model had RM 1.2 billion of modelled OPEX, which is more reasonable level of cost for an efficient mobile network operator

in Malaysia. TM also added that the conclusion made by the MCMC where it is reasonable to allow significant over-recovery of expenditures by mobile operators is highly dubious and contradicts cost modelling best practices.

4.2.58 TM highlighted that mobile Access Seekers are being made to pay far more than the cost base of all actual Malaysian mobile operators where the mobile Access Seekers are effectively being made to allow mobile operators to recover retail costs as well as all inefficient business costs through wholesale services. As such, TM expected the modelling aberration is to be revised in the final 4G model as TM viewed that modelled OPEX should be significantly reduced to far below the total business OPEX of the mobile operators.

4.2.59 U Mobile submitted that, whilst U Mobile is agreeable that the process of calibration is necessary, account should be taken of the possibility that, in a market that has been determined to have less-than-effective competition, there may be inefficiencies in actual operators' practices and their resulting costs. As such, U Mobile requested that the MCMC take this into account in reconciling to top-down accounting costs.

4.2.60 U Mobile also noted that the MCMC did not request equipment quantities from the operators and so it would not have been possible to determine whether the network dimensioning rules built into the models yielded comparable quantities to those deployed in actual operator networks. U Mobile pointed that this is particularly important where different operators may be using equipment from different suppliers with different capacities and costs. In this situation, U Mobile added, simply averaging the cost per item over different operators may produce a highly misleading result.

4.2.61 XOX proposed a biennial review up to 2025 as the retail cost per subscriber may be held constant and the overall level of retail costs will then vary linearly with the number of subscribers.

Discussion

4.2.62 CelcomDigi, Maxis and U Mobile emphasized the importance of ensuring that any reconciliation and calibration process did not lead to replication of actual inefficiencies in models.

4.2.63 TM opined that the fixed model had many divergences with the actual fixed infrastructure, to the extent that it doubted any calibration and reconciliation had occurred. Fibrecomm also was concerned that actual OPEX costs should be reflected in the model.

4.2.64 TM expressed doubts that the 4G model reflected the costs of an efficient mobile operator in Malaysia. TM concludes that the MCMC is allowing significant over-recovery of expenditures by mobile operators which it states is highly dubious and contradicts cost modelling best practices.

4.2.65 The MCMC would like to clarify that it has taken several steps, including detailed benchmarking, to ensure that inefficiencies are not captured in models, and that the intent of the reconciliation / calibration process is to use reported data from Malaysian operators as a reference point. The fact that the models are not a perfect match with operators' networks and costs is indicative that the MCMC has not simply developed models of actual networks, uncritically accepting all actual operator data. To do so would defeat the purpose of LRIC modelling. In other words, if the modelling approach is to be firmly based on replicating actual networks with actual data then a top-down model with historic data would be appropriate. This is not the approach that the MCMC has applied.

4.2.66 With regards to TM's claim that the 4G model allows significant over-recovery, the MCMC notes that this is a truly forward-looking mobile model. In Malaysia the MNOs still maintain Second Generation Wireless Technology ("**2G**") networks, yet the MCMC modelled a 4G-only network. A hypothetical operator would not build a 2G model today. In contrast, the MCMC elected for the fixed model to include both the copper and fibre networks, despite the fact that a hypothetical operator would not build a copper network today. Effectively, a higher efficiency standard has been applied to the mobile sector than to the fixed. Yet TM appears to complain that the MCMC is allowing over-recovery for mobile operators through including inefficiencies, and under-recovery for the fixed operator through not adhering to TM actuals. Further information in response to TM's claims concerning modelled mobile OPEX is provided in Section 7.2.

4.2.67 MyTV, Altel and Net2One have also expressed concerns about actual OPEX costs vis-à-vis DTTB modelled costs. Once again, the MCMC has used actual costs as

a reference point, but has developed a bottom-up model of an efficient operator. Further details are provided in Section 10.2.

4.2.68 Finally, with respect to U Mobile's point about equipment quantities, the bottom-up approach calculates equipment quantities using information on demand forecasts, network dimensioning and capacities. The MCMC would not expect the outcome of this process to directly reconcile with equipment quantities of a particular operator.

MCMC's Final Views

4.2.69 The MCMC confirms that:

(a) reconciliation and calibration processes will be applied for the final models; and

(b) care will be taken to ensure that there is no replication of actual inefficiencies in models.

Question 8:

Do you have any comments on the appropriateness of using glide paths and the method by which the glide paths have been calculated?

Submissions received

4.2.70 CelcomDigi commented that the approach adopted by the MCMC to extend glide paths no later than 2025 seems to generally balance the factors that need to be taken into account.

4.2.71 CelcomDigi added that when using LRIC+ cost models, which is the MCMC's preference for costing many Access List services, there may be situations where glide paths are less appropriate. In such circumstances, the outputs of such cost models should carefully be considered and not used directly as regulated prices as there may be other alternatives that are appropriate in some circumstances.

4.2.72 Fibrecomm commented that the glide paths approach in the current assumptions, might lead to selling price below actual cost within the next few years making the industry less sustainable.

4.2.73 Maxis agreed on the use of glide paths on price caps for fixed services but should not apply to transmissions services and recommended the MCMC to follow ComReg's approach. Maxis was also agreeable on the use of glide paths for MTRs.

4.2.74 Maxis submitted that MVNO and DR services should not be price regulated and proposes to remove any ex-ante price regulation of these services. Maxis added, the MCMC should incorporate the glide path into MVNO and roaming services if the proposed regulated prices maintained.

4.2.75 MyTV, Altel and Net2One is agreeable and suggested the MCMC to apply glide paths, as the proposed access prices for DTT is significantly lower than the current MSAP by up to 80%. The application of glide paths will avoid significant disruption to existing Access Providers and their finances, as well as can be a tool for the MCMC to check whether the proposed prices are appropriate.

4.2.76 TM viewed the glide path that is leading to prices below cost prior to 2025, should be avoided, and, in such years, the glide path should revert back to the modelled costs to ensure cost recovery is achievable in these years. This is because, TM highlighted some of the modelled cost in certain services in 2025 is higher than the current price by using glide paths approach.

4.2.77 U Mobile is agreeable that glide paths can provide an opportunity for industry players to adjust to a new level of prices, where the market has clearly moved faster than anticipated to reduce unit costs. For instance, in the case of mobile, the burgeoning data usage has had this effect. However, U Mobile commented that, there is a danger that a linear reduction in the price over the time period may keep prices out of alignment with costs for longer than necessary to reap the economic benefits of aligning price more closely with costs. In this circumstance, U Mobile suggested that it would be better to front-load the glide path, so that the rate is brought into closer alignment with costs earlier on; for example, glide over two years rather than three.

4.2.78 YTL agreed with the use of glide path to smoothen the process of new prices implementation that would be sharply higher or lower than existing prices.

4.2.79 XOX submitted that if the glide path follows a cost model with linear interpolation up to 2025, XOX would suggests the MCMC to allow review & adjustments regarding the projections for intervening years due the actualised output of the industry could be different.

Discussion

4.2.80 In general, operators agreed that glide paths should be applied as a means of smoothing prices where there are significant changes in modelled prices compared to current prices. However, not all operators agreed that a linear calculation was appropriate in all circumstances. The MCMC concludes that operators would prefer glide paths to be applied on a case-by-case basis with reference to the relativities of prices and market dynamics.

MCMC's Final Views

4.2.81 The MCMC has decided to carefully review, firstly, whether glide paths should be applied for each regulated service, and, secondly, whether a linear calculation is appropriate.

Question 9:

Do you have any comments on the appropriateness of using the cost model results in arbitrating disputes over access pricing?

Submissions received

4.2.82 Astro agreed with the MCMC adopting the cost model to settle access pricing disputes. However, Astro believes that the most significant challenge is ensuring that Access Seekers can obtain access to a natural monopoly network at a cost that enables it to provide high-speed and high-quality services to its customers in a way that fosters competition in Malaysia.

4.2.83 Astro also recommended that in addition to cost models, the MCMC should also rely on other approaches when arbitrating disputes. The recommendation is to include international benchmark references that would ensure the prices used in Malaysia are cost-oriented. In addition, the Access Seeker should pass a 'retail

minus' test to ensure that efficient operators such as Astro can compete on a level playing field against incumbent operators.

4.2.84 Astro agreed that the installation charges should be based on the labour cost, however, Astro is of the view that the installation charges are very high as opposed to the current charges.

4.2.85 Astro sought clarification from the MCMC whether the labour cost is calculated based on the hourly rate of technician or an engineer performing the installation.

4.2.86 CelcomDigi commented that the decision of whether to use cost model results in arbitrating access pricing disputes will depend on the nature of particular disputes and hence the relevance of the cost model as well as the proposed manner of use that the MCMC has in mind.

4.2.87 CelcomDigi is of the view that if the MCMC has determined a maximum access price, there is no need to go behind the determination and to reconsider the cost model. CelcomDigi added that the dispute may well involve complicated particulars in circumstances where a cost model, which by definition is a simplification of reality, is unable to provide assistance.

4.2.88 Edotco is of the view that if there are issues faced by the parties relating to access pricing, it has to be resolved commercially between the parties.

4.2.89 Edotco submitted that multiple times using the average cost model results in any MSAP for towerco access highly problematic as every tower is differently sized, positioned and loaded (and different state charges apply). Therefore, Edotco highlighted that the MCMC should exercise caution in the use of such prices in arbitrating disputes over access pricing.

4.2.90 Fibrecomm commented that the model does not consider costs in the same granularity as actual operator accounts. Hence, Fibrecomm added that the model will not be appropriate for all disputes and in such cases where it is not appropriate, operator data will remain the best source of insight.

4.2.91 Maxis recommends that the MCMC should consider the nature and circumstances of the dispute, review, and update the model as necessary in accordance with its statutory requirements in order to analyse the impact on the proposed regulated prices.

4.2.92 Maxis added that the MCMC should closely monitor the Access Provider's retail prices to ensure that retail offerings do not directly or indirectly (through bundling, discounts and rebates) foreclose others from competing effectively at a retail level by 'squeezing' the margin within which the Access Seeker has to operate.

4.2.93 Maxis also suggested that the MCMC should use margin squeeze tests in conjunction with the cost models during disputes to verify that access prices set via cost models are non-discriminatory.

4.2.94 MyTV, Altel and Net2One commented that the proposed cost model result in the PI Paper did not reflect the current landscape of DTT service in Malaysia, where the proposed access prices differ greatly with the existing costs borne by MyTV. Thus, MyTV, Altel and Net2One is of the view it is inappropriate to apply the result to arbitrate any dispute over access pricing for DTT service.

4.2.95 MyTV, Altel and Net2One clarified that in an arbitration, there may be dispute on the services that are being or going to be provided, where the cost model results may only be used as a reference to the dispute. Parties to an arbitration should not refer the cost model results to be absolute and final, as there may be additional facilities or services which they are disputed on, and these additional facilities or services may require additional costs to the cost model results.

4.2.96 MyTV, Altel and Net2One however does not object other licensees' views should they think it is appropriate to use the cost model results for any services in arbitrating disputes, and MyTV, Altel and Net2One believes it is reasonable for the MCMC to use the cost model results in arbitrating disputes. MyTV, Altel and Net2One suggested the MCMC to seek further information pertaining to the specifics of the disputes to ensure the appropriate cost is determined depending on the circumstances.

4.2.97 PPIT commented that using the cost model results in arbitrating disputes over access pricing was inappropriate since there is no mandated prices for Infrastructure Sharing Services.

4.2.98 PPIT commented that the proposed model is developed based on average services costs of all operators. As such, it would only be practical if the CAPEX

and OPEX range of individual operators are close to the specified averages or if they were sufficiently uniform across all SBCs.

4.2.99 PPIT mentioned that some variances could impede the applicability of the proposed model in pricing arbitration such as tower height, geography, discounts, tenure, quantum of mark ups applicable among customers and type of services included in scope.

4.2.100 TM reminded that the cost models may not accurately represent actual operator networks and costs although the model can provide some insight into the cost base of a generic operator in Malaysia. Also, the model does not consider costs in the same granularity as actual operator accounts. As a result, TM concluded that the model will not be appropriate for all disputes and in cases where it is not appropriate, operator data will remain the best source of insight.

4.2.101 U Mobile agreed that the cost models could provide a useful input to ex-post dispute resolution, in addition to their role in setting prices ex-ante for 4G and 5G services. However, U Mobile suggested that for MVNO pricing, the modelled costs should only be used to inform the discussion in cases where a dispute has arisen and not for ex-ante price setting.

4.2.102 YTL highlighted that the use of the cost models for the determination of disputes is a good approach, however YTL commented that the lack of fine granular costing at the QoS has become the major compliance gap in MSAP. YTL suggested that MSAP framework should be updated to reflect pricing for higher QoS in order to close the gap and to ensure MSAP is effectively enforced going forward.

4.2.103 YTL also raised the issues on the Access Lists mandates transmission services availability of 99.9% to 99.992%. YTL added whether the Access Providers are able to refuse the MSAP pricing if the Access Provider declare its service at 99.995%.

4.2.104 XOX submitted that the current approach in employing the cost model is appropriate.

Discussion

4.2.105 In general operators agreed that the cost models may potentially be useful as part of a dispute resolution process, but this is highly dependent on the particular circumstances. Respondents suggested that the cost models may be used for reference purposes in conjunction with other approaches, such as:

(a) Benchmarking;
(b) Margin squeeze tests; and
(c) Reviewing actual operator data

4.2.106 Edotco and PPIT expressed some concerns about the use of the infrastructure sharing model for dispute resolution on the basis that the averaging process would invalidate the results for particular structures.

4.2.107 The MCMC thanks operators for this constructive feedback, and agrees that use of the cost models should be subject to the context of the dispute. The MCMC also agrees that additional approaches such as those listed above could be used in conjunction with the cost models.

MCMC's Final Views

4.2.108 The cost models will be used, where appropriate, to assist in dispute resolution.

4.2.109 Additional approaches will also be applied to assist with dispute resolution, on a case-by-case basis.

Question 10:

Do you have any comments on the approach to setting prices for installation charges?

Submissions received

4.2.110 CelcomDigi agreed with the approach to setting installation charges but raised concerns when it is applies to the fixed model. CelcomDigi added that, the unit installation charges are listed as capital expenditures in the "Unit.CAPEX" table, which may be appropriate for those installation charges that are capitalized as part of network equipment installation.

4.2.111 CelcomDigi highlighted that for End-to-End Transmission Service and Trunk Transmission Service, the relevant installation costs for regulatory purposes are the costs associated with the turning up of the transmission service, most often on existing transmission infrastructure, for the provision of the service to an Access Seeker. This cost is much less on average than an initial installation cost and is normally treated as an operational cost.

4.2.112 CelcomDigi requested that the MCMC to clarify the assumptions and calculations in identifying efficiently incurred costs and justify its treatment of these costs as CAPEX, instead of OPEX.

4.2.113 CelcomDigi also commented that the MCMC should avoid double-counting installation costs, whereby the installation cost that are capitalized for installing a complete transmission system are already recovered by the Access Provider through the annual capital charge for the service. Thus, CelcomDigi added that, the costs are being recovered twice if the same costs are also introduced as the regulated installation charge.

4.2.114 Fibrecomm commented that the approach to setting prices for installation charges should refer to the MCMC Fixed Model LRIC plus model output + margin, whereby fully loaded manpower cost need to be included in the calculation (insurances, taxes, EPF, etc.).

4.2.115 Maxis is of the opinion that the overhead costs should not be taken into account for determining the HSBB installation charge.

4.2.116 Maxis also proposed that the MCMC should model the actual value of the USP subsidy for a typical operator and offset against the capital values in the model by excluding the amount of government funding. In addition, Maxis suggested that the MCMC might adopt Ofcom's modelling strategy for subsidies.

4.2.117 TM emphasized that the assumed costs of labour for installation charges must be fully loaded. For example, TM highlighted that TM must include not only staff salary, but also other staff costs including insurance, contributions to pension funds etc. and an allocation of business overheads.

4.2.118 U Mobile agreed with the suggested approach for regulating installation charges, mainly in generating direct costs (labour and materials) that do not need a LRIC

approach. However, U Mobile highlighted that, it is important that the MCMC scrutinise such charges to ensure that the costs are efficiently incurred.

4.2.119 YTL is agreeable with the approach to setting prices for installation charges taken by the MCMC.

4.2.120 XOX commented that the benchmark information on the time and materials involved in the installation process, together with local labour costs should be transparent to all parties involved in price setting.

Discussion

4.2.121 In general, most operators agree with the MCMC's proposed approach to calculating the installation charges. CelcomDigi expressed concern about the potential of double counting installation costs in the model and required a justification for treating these costs as capital costs and not operational costs. XOX added that time and materials involved in the installation process should be transparent to all parties.

4.2.122 There are two parts of the installation costs. There are installation costs that are included in the LRIC+ cost calculation. These costs relate to installation cost of assets such as User Provider Edge, routers and fibre cables. These costs have been excluded from the installation charge. The installation one-off charge accounts for the activities required for provisioning the service. This may include activities such as (but not limited to):

(a) route design;
(b) site surveying;
(c) wiring and equipment configuration;
(d) testing; and
(e) documentation and handover.

4.2.123 While the costs of deploying and operating the associated assets are already part of the LRIC+ cost, the MCMC recognises that additional effort is needed to provide connectivity between the end points and commission the service. The MCMC believes that calculating this cost separately instead of including it in the LRIC+ cost provides more transparency and flexibility. The labour cost and man-hours assumptions for non-recurring charges are included in the model.

4.2.124 Both Fibrecomm and TM highlighted that the labour cost should be based on fully loaded salaries. The MCMC agrees with this and acknowledges that this has been taken into account in the final model.

4.2.125 In response to Maxis' comments, the MCMC is of the view that business overhead costs should be included in HSBB installation and gateway costs, as the business overhead is common to all activities of the operator. The MCMC has considered the optimal approach to allowing for the impact of USP subsidies on capital value and is aware that a number of alternative approaches are possible. It is important to note that the LRIC approach is forward-looking hence previous subsidies may not be a reliable indicator of future subsidies. On balance, the MCMC believes that the most pragmatic approach is to assume that USP contributions offset the USP subsidy for a hypothetical operator.

MCMC's Final Views

4.2.126 The MCMC confirms that it has maintained the approach outlined in the PI Paper for calculating the non-recurring installation charges including overhead costs.

5. Weighted Average Cost of Capital (WACC)

5.1. Overview

Part C of the PI Paper presented the MCMC's proposed approach to calculating WACCs for the different services in the Access List. Section 8 included a discussion of the WACC formula to be used and detailed the common parameters namely the RFR, Equity Risk Premium ("**ERP**") and Tax Rate including the proposed rates for each.

Section 9 presented the calculation of WACC values for the fixed network services, Section 10 presented the calculation of WACC values for the mobile network services, Section 11 presented the calculation of WACC values for 5G services, Section 12 presented the calculation of WACC values for infrastructure sharing services and Section 13 presented the calculation of WACC values for the DTT transmission services. The proposed WACC values were then summarised in Sections 14 and 15.

5.2. Summary of Submissions Received

Question 11:

Do you have any comments on the approach to calculating the appropriate levels of WACC?

Submissions received

5.2.1 CelcomDigi agreed with the formula used by the MCMC. However, CelcomDigi had reservations about the assumptions used.

5.2.2 DNB agreed with the use of pre-tax WACC. However, referring to the statement made by the MCMC on page 31 of the PI Paper, DNB viewed that the level of risk faced by DNB now is likely similar to the level of risk associated with the supply of a major fibre to the home ("**FTTH**") network in its early stages. Therefore, DNB viewed that DNB's WACC should be higher rather than lower than the WACC for other well-established services.

5.2.3 DNB commented that the level of government funding expected for DNB is modest (around 8% in the form of equity), thus government participation should

have little impact on DNB's WACC. DNB further commented that DNB had carried out a benchmark exercise in which it has compiled the post-tax WACC estimates of several financial analysts during the first half of 2022. Based on the estimates, the average post-tax WACC is 7.6% and the average pre-tax WACC is 10.0%, which is just over 1% higher than the MCMC estimate.

5.2.4 DNB submitted that a pre-tax WACC for 5G in excess of 10% is consistent with the pre-tax WACC of 9.6% for electricity and 9.9% for gas. DNB highlighted that the demand for these services is highly predictable and the investment risk is substantially lower than that for 5G.

5.2.5 Edotco submitted that it supported the approach as the computation of WACC in terms of arithmetic and process is consistent with a standard WACC calculation.

5.2.6 Fibrecomm submitted that it is using the same formula for calculating the basic WACC. Fibrecomm also included illiquidity discount that increases the basic WACC to a higher adjusted WACC amount which is closer to the result from empirical study where the discount for illiquidity and size typically ranges from 15% to 30%. Fibrecomm viewed that WACC calculation should include higher margin due to potential delay in collection from Access Seeker.

5.2.7 Maxis agreed for a separate WACC for the different services. However, Maxis proposed using post-tax WACC, similar to the approach used for cost modelling in New Zealand, instead of using the pre-tax WACC approach. Maxis opined that pre-tax WACC proposed by the MCMC makes the implicit assumption that tax is payable at statutory rate and with immediate timing, but due to the availability of capital allowances that defer or reduce tax payments, such an approach materially overstates the implicit tax costs.

5.2.8 MyTV, Altel and Net2One agreed that the calculation of WACC is appropriate.

5.2.9 PPIT agreed with the proposed approach in adopting the Capital Asset Pricing Model ("**CAPM**") to calculate capital costs. PPIT also agreed that fixed and telcos, tower companies and DTT transmission operators would have differing risk and as such would require distinct WACC estimates.

5.2.10 TM noted that the WACC formula applied is consistent with that used in most other countries. TM agreed with the improved approach as compared to the

previous MSAP, specifically in respect to the removal of the downward adjustment to the WACC applied for HSBB services in the previous MSAP process.

5.2.11 U Mobile agreed that the CAPM methodology, as set out in the preface to Part C of the PI Paper, is appropriate.

5.2.12 XOX suggested to explore different weightage levels for corporate bond funding versus government funding, as the level of risk is different for the latter.

5.2.13 YTL agreed with the approach taken in estimating the WACC. However, YTL commented that the calculation of WACC is not straightforward and even financial institutions can differ on the calculation. YTL highlighted that there are different investment cycles in the industry, for example, cycles for wireless investments tend to be shorter relative to fixed networks. YTL commented that WACC must account for such variances.

Discussion

5.2.14 Twelve submissions agreed with the MCMC's proposed approach for calculating the WACC. However, Maxis proposed that the MCMC should apply a post-tax WACC rather than a pre-tax WACC.

5.2.15 Maxis notes that the pre-tax WACC formula assumes that the operator will pay tax on its net income at the headline tax rate and at the time that the income is received. However, Maxis suggests that this assumption is inappropriate due to the availability of capital allowances which may lead to financial benefits not captured in a pre-tax approach, such as tax deferrals as well as the ability to offset capital expenditure against taxable profits via an investment tax allowance of 100% of qualifying capital expenditure.

5.2.16 The MCMC notes that its proposed approach to WACC estimation is commonly applied by telecommunications regulators in many other jurisdictions, and has also been applied in previous MSAPs. Other stakeholders have expressed similar sentiments in their submissions. Maxis also concedes that a pre-tax approach is often used in telecommunications regulation, but refers to the New Zealand Commerce Commission's recent fibre price-setting exercise as an example of a regulator adopting a post-tax approach.

5.2.17 The MCMC has reviewed the references cited by Maxis in support of its position. The New Zealand Commerce Commission has introduced an RAB framework for pricing Fixed Fibre Local Access Services ("**FFLAS"**) and was obliged to ensure that its tax methodology was appropriate for all regulated fibre providers subject to price-quality regulation and Information Disclosure requirements over time. The MCMC considers that this is largely an accounting approach and as such the context is quite different to that of a LRIC model in which prices for one regulatory period are based on economic or forward-looking costs using a model of a hypothetical efficient operator. As the MCMC is setting prices using the LRIC approach rather than an RAB approach the MCMC considers that a pre-tax WACC remains appropriate.

5.2.18 The MCMC also notes that the Commerce Commission itself drew a distinction between the LRIC approach it had previously applied in the 2015 price regulation of unbundled copper local loop and unbundled bitstream services, and the RAB approach, and clearly states that a pre-tax approach was appropriate for its earlier LRIC calculation[1].

5.2.19 For these reasons the MCMC believes that it remains appropriate to apply a pre-tax WACC.

MCMC's final view

5.2.20 The MCMC confirms that it will proceed with the approach to estimating WACC as outlined in the PI Paper.

5.2.21 The MCMC confirms its initial proposal to apply a pre-tax WACC.

Question 12:

Do you have any comments on the proposed common parameters to be included in the WACC calculations?

[1] Commerce Commission (2019), Fibre regulation emerging views: Technical Paper, 21 May 2019. See paragraphs 926 – 928.

Submissions received

5.2.22 CelcomDigi considered Damodaran, an academic at the NYU Stern School of Business provides a better and more widely accepted indicator of the Malaysian RFR **,** thus recommended the MCMC to use the rate of 3.82%. CelcomDigi also believed that Damodaran's estimate of the ERP of 4.41% is a better and safer assumption that would be used in global capital markets. CelcomDigi highlighted that this rate falls within the range of estimates submitted by Malaysian operators.

5.2.23 CelcomDigi is concerned about the MCMC's benchmarking methodology for asset beta and highlighted double counting the country risk. CelcomDigi commented that a company in a higher risk country such as Malaysia would expect a lower credit rating when the country risk is ignored. Country risk is already addressed in other parts of the WACC formula such as the RFR. As such, CelcomDigi viewed that the country risk is included twice, thus resulting in an overestimate of the risk profile and WACC.

5.2.24 Fibrecomm commented that only ERP parameter which is used in its WACC calculation differs from the PI Paper parameter. Fibrecomm had referred to Damodaran's ERP for Malaysia (2019 study) which is a higher rate at 7.63%.

5.2.25 Maxis disagreed with the RFR, ERP and tax approach proposed by the MCMC. Maxis proposed the RFR to be averaged over a one-year period instead of three-month period and to use post-tax WACC instead of pre-tax WACC approach. Maxis also requested the MCMC to provide clarification and transparency on the method used to evaluate ERP provided by the operators or service providers and to re-visit and re-verify the data inputs used.

5.2.26 Maxis recommended the following parameters for WACC calculation as per Table 3 below:

Table 3: Maxis' proposed values for WACC calculation

Common Parameters	MCMC's values	Maxis' proposed values
Risk-free Rate	4.09%	3.80%
Equity Risk Premium	5.99%	4.24%

5.2.27 MyTV, Altel and Net2One perceived the parameters to the calculation is sufficient.

5.2.28 PPIT commented that aside from the corporate tax rate of 24%, the estimates for RFR and ERP are not in-line with its estimates. PPIT viewed that the RFR of 4.09% which is based on average daily yield of ten-year Malaysian Government Bonds for June to August 2022 should be updated as the interest rate continues to be volatile. PPIT commented that based on the three-month average daily yield from October to December 2022, the RFR is 4.28%.

5.2.29 PPIT further commented that the ERP should be higher than the proposed 5.7%. PPIT clarified that although the ERP of S&P 500 is estimated to be around 5.9%, there is Country Risk Premium ("**CRP**") that needs to be factored in. PPIT suggested to adopt CRP of 2.1% for Malaysia which is consistent with Damodaran's estimate. This will result in an equity premium of 8.0%.

5.2.30 TM agreed with the three-month trailing daily average proposed for the RFR, since it reflects current market trends without being distorted by a single spot rate. TM highlighted that the RFR for the months of October, November and December 2022 has increased to 4.26% from 4.09% calculated for June, July and August 2022.

5.2.31 TM viewed that the MCMC's benchmarks of ERP values in Table 5 of the PI Paper provide weak comparators as it is unclear why the specific case of New Zealand is referred to individually, but a group of European regulators (no specification on how many and which regulators) are referenced in aggregate.

5.2.32 TM further commented that it is unclear how the MCMC derived the values in the "European regulators" row of Table 5 of the PI Paper from the Body of European Regulators for Electronic Communications ("**BEREC**") document referred to in footnote 5 of the PI Paper. TM further explained that the page referred to in the footnote (page 24) in the BEREC document describes the approach to deriving debt premium and cost of debt rather than the ERP.

5.2.33 U Mobile viewed that the approach of calculating the RFR by reference to Malaysian Government bonds is appropriate, provided that doing so does not introduce an element of risk associated with Malaysia, as compared to, for example, central bank bonds in large, developed countries, such as the US Federal Reserve or the European Central Bank. U Mobile clarified that this might

lead to an element of double counting of country risk later in the WACC calculation. U Mobile further explained that another reason for not using local Government bonds is because trading in these instruments can be quite low in volume, leading to a concern that they may be somewhat illiquid, making an accurate assessment of their price difficult.

5.2.34 U Mobile submitted that an alternative approach would be to base the RFR on Federal Reserve or European Central Bank bond prices and make an adjustment for differences in the respective rates of inflation in the comparator country/region and Malaysia. However, current instability in those regions as a result of the war in Ukraine and other inflationary factors had caused the rates to be volatile, thus balancing the adopted approach may be preferred.

5.2.35 XOX suggested incorporating an updated projection on the RFR. XOX commented that the inflation and interest rates have been increasing recently, therefore the MCMC's estimate is higher than the submission data based on historical rates.

5.2.36 YTL supported the proposed approach and noted that the rates will be revised closer to the end of the PI. YTL viewed that this will allow the MCMC to consider the effects of the recent increase in OPR.

Discussion

Risk-free Rate

5.2.37 In the PI Paper the MCMC proposed to use the RFR for the three-month average daily yield of ten-year Malaysian Government bonds for June to August 2022. The MCMC's reason for adopting this approach is to ensure that the most recent information and inflation expectations are captured while reducing the impact of any very short-term fluctuations. As such, the MCMC noted in the PI Paper that it would update the RFR as close as possible to the date of the final Public Inquiry Report.

5.2.38 The MCMC notes that its proposed approach to estimation of the RFR was widely supported in submissions. TM, PPIT, XOX and YTL also explicitly supported an update of the MCMC's RFR assumption using the most recent available data – that is, as close as possible to the date of the PI Report.

5.2.39 The MCMC disagrees with Maxis' proposal that the RFR should be averaged over a one-year period instead of a three-month period. If capital markets are efficient then current yields reflect anticipated future earnings, including inflation expectations. This means that current RFR better reflect likely future yields than longer-term historical averages. The MCMC accepts that markets are generally efficient and therefore considers that current yields should be the reference point for the regulatory RFR. However, in selecting a short-term (three-month) trailing average the MCMC has corrected for the impact of any temporary volatility caused by institutional and other factors.

5.2.40 The MCMC also disagrees with CelcomDigi's proposal to use the rate of 3.82% based on Damodaran data for the regulatory RFR. The date of the proposed value is not stated, and it is the MCMC's view for the reasons discussed above that information used to estimate the RFR must be up-to-date. As in many other countries the RFR in Malaysia has exhibited an upward trend in the last year, largely driven by inflationary expectations.

5.2.41 PPIT and TM provided estimates of the RFR of 4.28% and 4.26% (respectively) using data from October to December 2022. The MCMC has been able to obtain data for the full month of January, and hence the data for the final decision on the RFR is from November 2022 to January 2023. The average yield for this time-period is 4.10%. The MCMC notes that the January yields were in general lower than the October yields. The average yield in January was 3.90%, compared to 4.41% in October. This explains the difference between the PPIT / TM estimates and the MCMC's later estimate.

Equity Risk Premium

5.2.42 The MCMC applied 5.99% as the ERP in the WACC formula in the PI Paper, which represented both the mean and median value of estimates provided by stakeholders.

5.2.43 CelcomDigi and Maxis both considered that the MCMC's preliminary ERP was too high, recommending 4.41% and 4.24% respectively. However, Fibrecomm and PPIT believed that the ERP was too low, and recommended values of 7.63% and 8.0% respectively. A wide range of suggested values for the ERP was also observed in the PI Paper. These values were submitted by 13 Malaysian operators with a range from 3.75% to 8.20%.

5.2.44 CelcomDigi, Maxis, Fibrecomm and PPIT all cite Professor Damodaran as the source of their recommendations. Professor Damodaran publishes annual estimates by country of ERPs. His starting point is an implied equity risk premium for the S&P 500. He then adds a CRP using a sovereign default spread – either based on a sovereign rating or from the Credit Default Swap ("**CDS"**) market – in order to derive ERPs. The MCMC has reviewed Professor Damodaran's ERP estimates, dated January 2022 and January 2023, and has summarised these in the Table 4 below. Note that CRP 1 is based on a sovereign rating and this value is included in ERP1, while CRP 2 is based on the CDS market and the value is included in ERP2.

5.2.45 The MCMC notes that CelcomDigi and Maxis have both cited January 2022 estimates, with CelcomDigi referring to estimates which include an adjustment to the country default spread for the additional volatility of the equity market to derive a CRP, while Maxis refers to estimates with no such adjustment. Both CelcomDigi and Maxis believes that CRP 1 should be deducted from Damodaran's total ERP1 to derive an appropriate ERP for the regulatory WACC. They suggest that this deduction is necessary to avoid double counting on the basis that the RFRwhich is based on a Malaysian government bond yield, already accounts for the risk of investing in Malaysia beyond a pure risk-free investment.

5.2.46 Fibrecomm refers to a much earlier Damodaran study published in January 2019. The estimate it cites includes the adjustment for additional volatility of the equity market, and Fibrecomm does not deduct the CRP of 1.67%. PPIT's recommendation of 8.0% is consistent with the most recent Damodaran ERP estimate in January 2023, including an adjustment for additional volatility of the equity market but with no deduction of the CRP.

Table 4: Equity Risk Premium and Country Risk Premium – Malaysia

Approach	Total ERP1	Country Risk Premium 1	Total ERP2	Country Risk Premium 2
January 2022				
No adjustment for additional volatility of equity market	5.26%	1.02%	4.96%	0.72%

Approach	Total ERP1	Country Risk Premium 1	Total ERP2	Country Risk Premium 2
Including adjustment for additional volatility of equity market	5.43%	1.19%	4.96%	0.72%
January 2023				
No adjustment for additional volatility of equity market	7.41%	1.47%	7.24%	1.30%
Including adjustment for additional volatility of equity market	8.01%	2.07%	7.24%	1.30%

[Source: Damodaran]

5.2.47 Using CelcomDigi's and Maxis' approach but applying the more recent Damodaran data, the MCMC estimates that the recommended CelcomDigi and Maxis ERP values would both be 5.94%. This is very close to the MCMC's preliminary estimate of 5.99%.

5.2.48 In the PI Paper the MCMC acknowledged that there is no single accepted methodology for estimating the ERP, and therefore considered values based on alternative approaches, as is common among regulators. Maxis suggests that it would not expect much variation in ERP values across operators and service providers. The MCMC disagrees. There are a number of alternative approaches for estimating the ERP and wide variation may be observed in the results from one approach compared to the next. As an example, the regulatory ERP values in the BEREC 2022 WACC database, shown on page 23 of the December 2022 WACC report (BoR (22) 164), ranged from 4.55% (Croatia) to 7.37% (Romania). The MCMC notes, however, that the EC supports (in a non-binding WACC notice of 2019) estimation of a single ERP for the EU on the basis of empirical evidence that EU financial markets are sufficiently integrated that convergent ERPs are highly likely. This is consistent with the CAPM assumption that investors hold efficient portfolios.

5.2.49 One approach is based on surveys in which market participants provide forward-looking estimates of the ERP. Another methodology, endorsed by Maxis, is Damodaran's implied approach which is described above. However, Damodaran's results using his forward-looking approach are unlikely to be the

same as an alternative method which relies on ex-post examination of long-term historical returns. This approach encompasses calculation of average differences between historical returns on a proxy for the market portfolio and returns on a proxy for a risk-free asset. The underlying assumption is that the ERP is constant over the long-term and will remain so in future. This may be contrasted with the Damodaran approach which delivered noticeably higher ERPs in his January 2023 update compared to results from one year earlier. There is a large increase in the S&P 500 base premium from 4.24% in January 2022 to 5.94% in January 2023, as well as higher country risk spreads.

5.2.50 The MCMC has noted that a number of operators have expressed concerns about double counting of risk – particularly country risk – in the WACC. The MCMC would like to clarify that in general the RFR primarily captures inflationary expectations while the ERP reflects market risks. These are economy-wide parameters, in contrast with the WACC parameters relating specifically to the individual company business and leverage risk which are reflected in the equity beta and the debt premium (via a company credit rating). Thus, the WACC formula inherently avoids double counting.

5.2.51 CelcomDigi and Maxis support removal of the CRP from Damodaran's ERP estimate on the grounds of double counting with the RFR while conversely FibreComm and PPIT support inclusion of the CRP. The MCMC does not believe there is double counting for the reasons provided in the foregoing paragraph. At the same time, arguably it may not be necessary to include a CRP if we consider that country risk is diversifiable. If it is possible for investors to diversify then, consistent with the CAPM, it is inappropriate to apply any extra risk premium. The MCMC concludes that it is possible to make a reasonable case for excluding Damodaran's CRP, but on the basis of diversifiable risk rather than double counting. As such, the MCMC in reaching a final ERP estimate has considered submitters' recommended values based on Damodaran data, both including and excluding the CRP.

5.2.52 Finally, the MCMC notes that three of the submitters on the PI Paper accepted the MCMC's ERP estimation while TM was silent on the MCMC's preliminary ERP value, indicating only that additional benchmarks should be examined. The MCMC has considered additional benchmarks, as presented in the discussion above.

5.2.53 In relation to TM's query on footnote 5 of the PI Paper the reference is in relation to the approaches used by BEREC to ERP estimation, not the actual values. On further checking the page number, the MCMC identified a typographical error. The citation should have read page 44, not page 24. Meanwhile, the cited values in Table 5 may be found on page 21 of BEREC's RA Report Chapter 5 - WACC, BoR (21) 161. The MCMC has reviewed all of the ERP estimates provided by stakeholders, as well as benchmark information from overseas. Taking into account the new and / or additional information provided by stakeholders the updated median value is the same as the MCMC's initial estimate at 5.99%, while the average is higher at 6.54%, compared with 5.99% in the PI Paper. The MCMC notes that in December BEREC issued its 2022 report (BoR (22) 164) on the WACCs of European regulators. The median and mean values of the ERP have declined slightly compared to the values presented in the 2021 report (Table 5).

Table 5: Equity Risk Premium – Benchmarks, 2021 / 2022

	Median	Mean	Point estimate
Malaysian operators (PI Paper)	5.99%	5.99%	5.99%
Malaysian operators (PI Report)	5.99%	6.54%	
European regulators (BEREC, 2021)	5.71% - 5.86%	5.80% - 5.83%	-
European regulators (BEREC, 2022)	5.65% - 5.70%	5.50%	-
New Zealand Commerce Commission	6.71%	6.81%	6.91%

[Source: Malaysian operators; BEREC; Commerce Commission]

MCMC's Final Views

5.2.54 The MCMC confirms its initial proposal concerning the approach for estimating the RFR. Accordingly, the RFR has been estimated using a three-month trailing average daily yield of ten-year Malaysian Government bonds. The period over which this has been estimated is the most recent three-month period, namely November 2022 to January 2023. The updated RFR is 4.10%.

5.2.55 Additional data on the ERP values were provided in response to the PI Paper. The MCMC has taken this data into account as well as data provided earlier in the data collection stage. Given the wide range of values submitted on the ERP the MCMC has selected the median value of the available data provided by

stakeholders. This is 5.99% which is the same as the value assumed in the PI Paper.

Question 13:

Do you have any comments on the approach used for determining the asset beta and gearing assumptions for fixed services?

Submissions received

5.2.56 CelcomDigi agreed with the asset beta and gearing assumptions used by the MCMC for fixed services, after removing significant outlier fixed operators from the benchmark comparator set.

5.2.57 Fibrecomm commented that the proposed gearing estimates (0.40 d/e ratio) will deter financing via debt to meet WACC requirement. Fibrecomm believes that there should be different calculations for fixed and mobile services due to the nature of the business.

5.2.58 MyTV, Altel and Net2One agreed with the assumptions.

5.2.59 TM commented that it is not clear why TM is excluded from the peer group for fixed WACC as TM provided all the necessary data to allow its inclusion. TM also believes that it fulfilled the two criteria stated on page 34 of the PI Paper for inclusion of companies in the peer group. TM viewed that although TM may not satisfy the third criteria, this should not be an issue for the MCMC's calculation as the MCMC also used non-publicly available data from other companies. TM provided examples such as Ofcom that included BT in the peer group for fixed WACC calculation in 2021. Similarly, TM pointed out that Danish incumbent was also included in the calculations for the beta.

5.2.60 TM highlighted that page 37 of the PI Paper states that the resultant equity beta was 0.63. However, TM's calculation indicated the value is 0.68 which is the same as the value in Table 7 of the PI Paper. Therefore, TM highlighted that the calculations underpinning Table 9 and 11 of the PI Paper must be corrected.

5.2.61 U Mobile submitted that the quoted figures and methodology for ERP and the corporate tax rate appear to be reasonable and in line with comparator countries.

5.2.62 XOX commented that the current approach for determining the asset beta and gearing assumptions is appropriate.

5.2.63 YTL submitted that the comparison with companies from different countries where each country has different interest rates and regulatory regimes, might not be productive. YTL commented that asset beta and gearing can be determined from reviewing financial statements and gearing profile of the companies. YTL further highlighted that this information can also be procured from leading banks and investment houses locally. YTL opined that the values provided from reviewing local data will be more meaningful and contextual.

Discussion

5.2.64 Altel, MyTV, Net2One, CelcomDigi, U Mobile and XOX expressed support for or were satisfied with the methodology and / or assumptions used by the MCMC for the estimation of the asset beta and gearing for fixed services.

5.2.65 Fibrecomm indicated that the MCMC's proposed gearing estimate of 0.40 would deter debt financing. The methodology applied by the MCMC uses data from the comparator companies to estimate representative or notional gearing assumptions. The MCMC presumes that Fibrecomm's concern is that higher gearing levels typically increase the cost of debt, since the debt premium would be expected to increase if the company is more highly levered. The MCMC notes that 0.40 represents the "high" gearing estimate presented in the PI Paper whereas in fact it proposed to use the lower base case estimate of 0.33.

5.2.66 TM states that it is unclear why TM is excluded from the fixed comparator sample used in relation to the derivation of an appropriate beta and gearing for the fixed WACC calculation. YTL also emphasized the importance of taking into account local Malaysian data in determining appropriate fixed asset beta and gearing assumptions for the WACC.

5.2.67 The MCMC applied three criteria in compiling the comparator set for fixed services in the PI Paper, including the requirement that current and historical financial and business information of the comparator company is publicly

available. In its submission, TM admits that it does not meet this requirement, but suggests that this should not be an issue since the MCMC has used data which is not publicly available for other comparator companies. TM's assertion in this regard is incorrect. The MCMC confirms that only publicly available data was used in its compilation of an appropriate comparator sample. As stated in the PI Paper, the principal sources of data were company annual reports and FT.com.

5.2.68 As indicated in the PI Paper the sample group was selected to inform estimates of the beta and gearing parameters, and the results were then compared with estimates of TM's average gearing and five-year asset beta. In the 2017 PI the MCMC adopted a similar approach, comparing TM's beta and gearing with a regional comparator sample (excluding TM). In 2017, TM's gearing and asset beta were comparable with the sample averages and therefore the MCMC found it appropriate to apply TM values in the WACC. However, in the current PI the MCMC found that TM's asset beta was considerably higher, and above the upper bound of the regulatory range. The MCMC therefore opted to use average values from the comparator sample for both asset beta and gearing. In seeking to inform a decision as to whether or not to apply TM actual gearing and beta data in the WACC, it would be inappropriate to include TM in the comparator sample.

5.2.69 The MCMC acknowledges that an alternative approach would be to include TM in the sample of companies, assuming it meets the criteria used in sample selection, and rely only on the results of the benchmark for appropriate beta and gearing parameters. In this approach, TM's actual beta and gearing parameters become less relevant, as effectively the MCMC would no longer consider applying these directly in the WACC formula.

5.2.70 In its detailed examination of the published financial information of potential comparator companies, the MCMC noted that other Asian operators appear to provide more detailed current and historical financial and business information than TM. However, the MCMC judges that it is possible to obtain sufficient public data on TM's key relevant characteristics. For this reason the MCMC considers on balance that TM would meet its three criteria for inclusion in the sample for the alternative approach.

5.2.71 The MCMC also carefully examined whether any other Malaysian companies would meet the criteria, and finds that TIME dotcom has suitable characteristics

for inclusion, as it is publicly listed with current and historical financial information publicly available, as well as all revenues relating to fixed / broadband services (including retail and wholesale). It has a credit rating of AA2 (RAM) which is sufficiently close to TM's AAA rating for inclusion in the alternative sample. The inclusion of TM and TIME increases the number of companies from four in the final original sample of the PI Paper to six in the alternative sample as shown in Table 6 below.

Table 6: Characteristics of Alternative Sample

Company	Market capitalisation June 2022 (USDbn)	Revenue from fixed or broadband services / Total operating revenue	Credit rating (most recent available)	Notes
NTT (Japan)	104.56	65.72%	A1 (Moodys)	Included in the MCMC's PI Paper 2022 final sample
Telstra (Australia)	30.57	49.00%	A2 (Moodys)	Included in the MCMC's PI Paper 2022 final sample
Telkom Indonesia	26.99	39.10%	Baa1 (Moodys)	Included in the MCMC's PI Paper 2022 final sample
TIME	1.72	100.00%	AA2 (RAM)	New – Malaysian market
TM	4.33	84.00%	A3 (Moodys); A- (S&P); AAA (RAM)	New – Malaysian market
Sri Lanka Telecom	0.15	51.70%	AA (Fitch)	Included in the MCMC's PI Paper 2022 final sample

[Source: FT.com, operator reports]

5.2.72 The equity and asset betas, together with the gearing ratios, are listed in Table 7 below. The median and mean asset betas of the original and alternative sample are the same, while median and mean gearing is slightly lower in the alternative sample than the original sample.

Table 7: Alternative Fixed Comparator Sample – Beta and Gearing

Company	Levered (equity) beta	Unlevered (asset) beta	Gearing
NTT	0.46	0.27	0.41
Telstra	0.64	0.45	0.29
Telkom Indonesia	0.76	0.65	0.15
TIME	**0.15**	**0.15**	**0.03**
TM	**1.08**	**0.76**	**0.30**
Sri Lanka Telecom	0.86	0.45	0.48
Median (results from original sample in brackets)	0.70 (0.70)	0.45 (0.45)	0.29 (0.35)
Mean (results from original sample in brackets)	0.66 (0.68)	0.46 (0.46)	0.27 (0.33)

[Source: FT.com]

5.2.73 The MCMC notes that the inclusion of TIME in the sample has led to a much wider range of gearing than in the final sample used in the PI Paper. As such, the MCMC considers that the target or reference gearing should be based on the median rather than the average gearing of the alternative sample. Accordingly, the asset betas of the six companies of the alternative sample were re-levered using the median gearing ratio of 29%. The resultant equity beta was 0.64. This is lower than the estimated equity beta (following relevering) of the original sample of 0.68.

5.2.74 For the avoidance of doubt, the median and mean values presented in Table 7 of the PI Paper are those of levered and unlevered betas of the sample group. These values are not the results of relevering each sample company's beta using the median or mean gearing. The result of the relevering calculation is presented

in the text below the table. Note that this also applies for Table 13 of the PI Paper (mobile) with the relevering result presented below the table.

5.2.75 Thus, it is not the case that the relevered figure provided under Table 7 of the PI Paper should always agree with the figure in the table. Nevertheless, in the case of the final fixed comparator sample (which excluded Chunghwa) a typographical error was in the text and the MCMC confirms that the relevered value was 0.68 in the PI Paper.

MCMC's Final Views

5.2.76 The MCMC has decided to rely on the results of an expanded benchmark sample for appropriate beta and gearing parameters for the fixed WACC. The MCMC judges that two local companies, TM and TIME, are suitable for inclusion in the expanded sample.

5.2.77 The MCMC will rely solely on this approach and not consider applying TM's observed beta and gearing values directly in the WACC formula.

5.2.78 The MCMC calculates the equity beta using this approach to be 0.64 and the gearing ratio to be 29%. These values will be applied in the WACC formula for fixed services.

Question 14:

Do you have any comment on the approach used for determining the estimate for the debt premium for fixed services?

Submissions received

5.2.79 CelcomDigi is comfortable with the debt premium estimate used by the MCMC for fixed services.

5.2.80 Fibrecomm submitted that it is subject to prevailing interest rate which is normally higher than those subject to AA2/AA credit score. Fibrecomm commented that the MCMC's assumption based on AA2/AA credit score might be too optimistic.

5.2.81 Maxis proposed to use a fixed debt premium value of 0.66% which is a spread of AAA rated bond instead of 1.02% which is a spread between Government ten-year bond and corporate securities for bonds rated AA2/AA. Maxis viewed that the spread between Government ten-year bonds and corporate securities may be different for bond ratings provided by international ratings agencies. Given that the debt premium that the MCMC estimated for a provider of 4G mobile services with 25% market share is 1.03%, Maxis believes that it is not credible for a provider of fixed services with a substantial market share to have almost identical spread at 1.02%.

5.2.82 MyTV, Altel and Net2One viewed that the approach is correct.

5.2.83 Referring to page 40 of the PI Paper, TM commented that the MCMC did not provide justification on the assumption that a hypothetical fixed operator in Malaysia may expect an AA2/AA credit rating. TM viewed that the MCMC seemed to be compromising between TM's prime local credit rating and TM's lower international credit rating to arrive at a final credit rating of AA. However, it appears that the weightage is heavy towards the local credit rating. TM viewed that the international rating should still be given significant weight, since operators like TM raise capital on an international basis. TM highlighted that the AA international rating represents the best rating from the MCMC's peer group which is an unreasonable estimate to derive.

5.2.84 TM submitted that a more reasonable approach is to average the AAA local credit rating and the international A-rating. This gives an average spread of 1.69% compared to the proposed value of 1.02%.

5.2.85 U Mobile commented that the approach is consistent with the methodology adopted by the MCMC for the RFR, but the assumption that the sampled spread of values reflects those for corporates with a similar credit rating may be problematic, as it does not take into account of any sectoral variation. U Mobile viewed that the choice of an AA2/AA credit rating appears to be a compromise between local and international rating agencies, but the local rating i.e AAA with a spread of 0.66% might be more appropriate as a criterion, as this would be more consistent with the methodology and comparator set. Therefore, U Mobile recommended to amend the cost model.

5.2.86 XOX commented that the current approach determining the debt premium is appropriate.

Discussion

5.2.87 CelcomDigi, MyTV, Altel, Net2One, and XOX accepted the MCMC's approach for estimating the debt premium for fixed services. However, Maxis and U Mobile disagreed with the approach, with both recommending that the MCMC assume a higher AAA credit rating for the hypothetical operator which delivers a debt premium of 0.66.

5.2.88 Maxis considers that for consistency with the source of the ratings (RAM) the spread for a AAA rated bond should be applied rather than an AA2/AA rated bond. Maxis also notes that using a 1.02% spread for a AA2/AA rated bond would incorporate an element of country risk for Malaysia, which according to Maxis would already be captured in the use of a Malaysian RFR.

5.2.89 Maxis also compares the debt premium estimated by the MCMC for fixed services with the mobile services estimate of 1.03%. Maxis argues that it is not credible that the debt premium for a provider of fixed services with a substantial market share is almost identical at 1.02% to that of a provider of 4G mobile services with 25% market share is 1.03%.

5.2.90 The MCMC considers that Maxis has raised a valid point concerning these relativities. While the assumed gearing levels of the hypothetical fixed and mobile operators were very close in the PI Paper (at 33% and 31% respectively), it would be a reasonable expectation that the market would attach a higher premium to debt of the mobile operator compared to the fixed operator given the impact on company risk of the differing conditions in the Malaysian market. As such, a notional credit rating at least one place lower than the fixed operator would be appropriate for the hypothetical mobile operator.

5.2.91 The MCMC reviewed the debt premium assumptions of the mobile operator as presented in the PI Paper. In the PI Paper, the MCMC noted that Digi was the only mobile operator to have current bonds active in the market with a rating of AAA by RAM. However, during the last three months, there were insufficient trades on the secondary market of active Digi bonds to provide a reliable indication of the current debt premium. The MCMC therefore used information provided by MNOs to identify a suitable range for the debt premium for mobile

services: namely, between 0.66% and 1.38%. The MCMC selected 1.03% as the debt premium which was the average debt premium of three operators, and also close to the mid-point of the suitable range.

5.2.92 The MCMC's estimate in the PI Paper relied on actual data provided by three mobile operators in data submissions in June 2022. The MCMC has compared the spreads between Government ten-year bonds and corporate securities from May 2022 (that is, just prior to the data submissions) with current spreads. Across all A grade credit ratings there have been significant increases in spreads over this time-period, ranging between 15% and 48%. The MCMC concludes that the current spread for a credit rating of AA3 / AA1 would be appropriate for the reference point for the debt premium of the hypothetical mobile operator.

5.2.93 TM and FibreComm both indicated that the debt premium for fixed services should be higher than the value of 1.02% which was used by the MCMC in the PI Paper. FibreComm suggests that from its own experience the MCMC assumption may be optimistic. However, FibreComm does not provide any evidence to support this assertion.

5.2.94 TM asserts that the MCMC selected a notional AA2 / AA credit rating for the fixed operator with no justification. TM claims a more reasonable approach would be to average the AAA local credit rating and the international A- rating to give an average spread (and therefore debt premium) of 1.69% (compared to 1.02%).

5.2.95 As noted in the PI Paper, in 2021, TM had the following credit ratings from international and national sources:

(a) Standard & Poors (S&P): A-;
(b) Moodys: A3; baseline credit profile Baa1; and
(c) RAM Rating Services (Malaysian): AAA.

5.2.96 The MCMC took the above information into account in deciding upon an AA2 / AA credit rating for a hypothetical fixed operator in Malaysia. TM claims that the MCMC made this assumption with no justification and suggests that the MCMC should have adopted an averaging procedure which would deliver a lower credit rating than AA2 / AA (and hence a higher debt premium).

5.2.97 The MCMC does not agree that the assumption of an AA2 / AA credit rating was made with no justification. The MCMC carefully considered TM's capacity to meet

its financial obligations in reaching a decision on this issue. Under the Malaysian RAM rating classification, an entity rated AAA has a superior capacity to meet its financial obligations. This is the highest long-term credit rating assigned by RAM. TM in 2021 recorded an AAA RAM rating. However, the MCMC also took into account TM's 2021 ratings from S&P and Moodys. An S&P A investment grade is associated with a strong capacity to meet financial commitments while a Moodys A3 investment grade denotes an upper medium-grade rating and subject to low credit risk. In its 2021 Annual Report TM itself states (on page 21):

"We maintained strong credit ratings from multiple rating agencies despite the challenging landscape. This demonstrated our financial strength and capacity to meet all our financial obligations."

5.2.98 TM's proposal is the equivalent of an A RAM rating which encompasses only an adequate capacity to meet its financial obligations. The MCMC considers that a more appropriate compromise for a Malaysian hypothetical operator is a notional RAM credit rating which lies between TM's actual AAA RAM rating and the A international ratings. The MCMC confirms its preliminary view that this should be AA2 / AA credit rating.

MCMC's Final Views

5.2.99 The MCMC confirms its initial view that the hypothetical fixed operator should have a notional credit rating of AA2 / AA.

5.2.100 The MCMC confirms that the hypothetical mobile operator in the Malaysian market could reasonably be expected to have a lower credit rating than the fixed operator, and a notional credit rating of AA3 / AA1 will be assumed.

5.2.101 The MCMC has reviewed latest information available on debt premium. As at 20 January 2023, it observed that the spread between Government ten-year bonds and corporate securities at all credit ratings had increased from the values presented in Table 10 of the PI Paper. The updated spreads are shown in the Table 8 below, with the spreads from 30 August 2022 presented in parentheses. It is the MCMC's view that the latest available information on spreads is most relevant for the company debt premium and as such the updated spreads will be used in the final calculation of the WACC. The fixed debt premium in the WACC formula will therefore be 1.19%.

Table 8: Spread between Government Ten-Year Bonds and Corporate Securities, 20 January 2023

Credit rating	Spread
AAA	0.89 (0.66)
AA1 / AA+	1.04 (0.84)
AA2 / AA	1.19 (1.02)
AA3 / AA1	1.42 (1.24)
A1 / A+	1.80 (1.58)
A2 / A	2.35 (2.16)
A3 / A-	2.92 (2.71)
BBB	4.25 (3.96)
BB and below	5.77 (5.75)

[Source: Bank Negara Malaysia]

Question 15:

Do you have any comments on the proposed WACC for the fixed sector?

Submissions received

5.2.102 CelcomDigi proposed the following for the fixed sector as per Table 9 below:

Table 9: CelcomDigi Proposed WACC for Fixed Services

	MCMC	CelcomDigi
Risk-free Rate	4.09%	3.82%
Debt risk premium	1.02%	1.02%
Cost of Debt pre-tax	5.11%	4.84%
Cost of Debt post-tax	3.88%	3.68%

	MCMC	CelcomDigi
Equity Risk Premium	5.99%	4.41%
Levered beta(equity beta)	0.63	0.63
Cost of Equity pre-tax	10.35%	8.68%
Cost of Equity post-tax	7.86%	6.60%
Gearing	32.87%	32.87%
Post-tax WACC	6.56%	5.64%
Marginal rate of tax	24.0%	24.0%
Pre-tax WACC Nominal	**8.63%**	**7.42%**
Difference	**-1.21%**	

5.2.103 Fibrecomm commented that its current post-tax WACC is higher than the proposed WACC for the fixed sector due to higher ERP, debt equity ratio and asset beta.

5.2.104 Maxis proposed the following WACC for fixed services as per Table 10 below:

Table 10: Maxis Proposed WACC for Fixed Services

WACC parameters for Fixed Services	MCMC's values	Maxis' proposed values
Risk-free Rate	4.09%	3.80%
Equity Risk Premium	5.99%	4.24%
Debt Premium	1.02%	0.66%
WACC – pre tax	**8.61%**	**7.17%**

5.2.105 MyTV, Altel and Net2One agreed with the calculation of WACC for the fixed service.

5.2.106 TM commented that the high estimate should be used instead of the base case estimates on asset beta. TM strongly disagreed with the statement on page 38 of the PI Paper which stated that no regulatory risk was identified for TM which might contribute to an elevated risk profile. TM argued that it operates in a highly regulated environment where regulatory decisions had adverse impact to its business over the past few years. An example would be the previous Commission Determination on MSAP in 2018.

5.2.107 TM submitted that its own equity beta is closer to the value in the MCMC's high case (0.91). Therefore, TM viewed that an equity beta of around 0.9 would be appropriate for the assumed fixed WACC.

5.2.108 U Mobile commented that despite the methodological issues highlighted in the earlier sections above, the fixed network WACC appears to be reasonable.

5.2.109 XOX proposed to incorporate an updated projection on the RFR. XOX commented that the inflation and interest rates have recently been increasing, therefore the MCMC's estimate is higher than submission data based on historical rates.

Discussion

5.2.110 Altel, MyTV, Net2One and U Mobile agree with the fixed service WACC calculation whilst CelcomDigi and Maxis suggest that the estimate presented in the PI Paper is too high. Only TM argues that the MCMC's initial estimate is too low. Fibrecomm appears to suggest that the MCMC estimate may be low, commenting that its current post-tax WACC is higher than the proposed WACC.

5.2.111 XOX recommends an update of the RFR which the MCMC has now undertaken. CelcomDigi's recommended estimate is based on a different RFR. The MCMC has explained above the reasons for its final view on the value of the RFR.

5.2.112 Maxis' recommended a lower value as a result of applying an ERP, RFR and debt premium lower than the MCMC's estimated values. The MCMC has explained above the reasons for its final view on all of these parameters.

5.2.113 Fibrecomm indicates that a higher ERP, debt-equity ratio and asset beta lead to its current post-tax WACC being higher than the proposed WACC for the fixed sector. The MCMC notes that while it expects individual companies to compare company financial assumptions with those of a regulatory WACC, the nature of

the approach applied in determining notional gearing and asset betas will inevitably lead to differences.

5.2.114 TM opines that the MCMC should use a high estimate because TM faces regulatory risk – in particular it cites an adverse impact of a previous MSAP on its share price. TM notes that its own equity beta, as provided to the MCMC in its data submission (of 0.896 in 2021), is closer to the value in the MCMC's high case (0.91). TM considers on this basis that an equity beta of around 0.9 would be entirely appropriate for the assumed fixed WACC.

5.2.115 As stated in the PI Paper, the MCMC considered whether TM is likely to have higher systematic risk than the comparator set which might explain TM's relatively high asset beta. The MCMC found that the share market value of TM is likely to be affected by similar factors to those of the comparator companies. Regulatory risk is one of these factors, however all of the comparator companies are subject to this type of risk with TM's exposure unlikely to be significantly higher than its regional counterparts. TM suggests that share market reactions to MSAP pricing are an indication of elevated risk, yet MSAP is a regular process undertaken by the MCMC, well understood by TM and with well-established precedents. For these reasons, the MCMC does not accept that the high estimate of WACC is appropriate.

MCMC's Final Views

5.2.116 The MCMC confirms the final WACC parameters for fixed network services, as shown in the Table 11 below. These parameters deliver a pre-tax WACC for fixed services of 8.93%.

Table 11: WACC Parameters for Fixed Network Services

Parameter	Value
Risk-free rate	4.10%
Equity Risk Premium	5.99%
Debt premium	1.19%
Tax rate	24%
Gearing	29%

Equity Beta	0.64

Question 16:

Do you have any comments on the approach used for estimating the beta and gearing for the mobile sector?

Submissions received

5.2.117 CelcomDigi agreed with the asset beta and gearing assumptions used by the MCMC for the mobile sector.

5.2.118 Maxis viewed that the MCMC's proposed beta for mobile sector is too low and proposed an asset beta of 0.65 based on publicly listed betas for MNOs in Malaysia. Maxis did not have comments on gearing assumptions.

5.2.119 MyTV, Altel and Net2One commented that the estimation is sufficient.

5.2.120 TM observed that the peer group is much more sizeable than for the fixed WACC calculation. However, similar to the fixed model, the Malaysian operators such as Digi and Maxis, are not included in the mobile peer group. TM viewed that the peer group should include the Malaysian operators. If not, the MCMC should justify the reason for excluding them.

5.2.121 U Mobile commented that the methodology appears to be reasonable but is concerned about the large amount of variability within the comparator samples. U Mobile viewed that there is high risk for the mean value to be distorted by extreme values such as outliers due to the high variability in the sampled values. U Mobile believed that this can be mitigated by excluding such extreme values. However, this reduces the number of data points in an already small sample. Alternatively, U Mobile suggested a median value to be used so that extreme values have less impact. Given the potential for the sample to be distorted by outliers, U Mobile commented that the median values (low case) would be a safer option in this situation.

5.2.122 XOX viewed that the current approach for determining the beta and gearing ratio is appropriate.

5.2.123 YTL agreed with the general comparative approach taken. YTL commented that comparison between local operators will be more appropriate as it will capture the true asset and equity beta. YTL viewed that the local value will factor in cost of capital in Malaysia as well as regulatory and political environment. YTL highlighted that many local banks, investment houses and analyst have undertaken reviews of telecommunication companies in Malaysia from time to time. YTL commented that inputs from these local experts can be useful.

Discussion

5.2.124 Altel, MyTV, Net2One, CelcomDigi and XOX agreed with the MCMC's approach to estimating asset beta and gearing for the WACC for mobile services. U Mobile was also generally supportive of the approach, although recommended reliance on median values rather than average values in order to avoid distortion by outliers.

5.2.125 TM and YTL suggested that the peer group should include the two listed Malaysian mobile operators, while Maxis proposed that the peer group should only consist of the two Malaysian operators.

5.2.126 In the PI Paper, the MCMC considered using a Malaysian mobile operator only sample but decided on balance that results based on a larger sample of regional mobile operators would be more robust than reliance on only two operators.

5.2.127 Nevertheless, the MCMC notes that inclusion of the two publicly listed Malaysian mobile operators – Digi and Maxis – in the mobile comparator sample would be consistent with the alternative approach used in relation to the fixed network beta and gearing estimation. Accordingly, the MCMC has examined the key relevant characteristics of these two companies and considers that they meet the criteria for inclusion in the sample.

5.2.128 The PI Paper mobile comparator sample consisted of 21 companies. The MCMC found a median asset beta of 0.39 and an average of 0.48, with median gearing of 35% and mean gearing of 31%. The MCMC, using the alternative approach, has now expanded the sample to 23. The results are shown in the Table 12 below. With the addition of Digi and Maxis to the sample the median asset beta increased slightly to 0.41 and the average remained at 0.48, while median gearing remained the same at 35% and mean gearing of decreased slightly to 30%. After relevering average asset betas at the average gearing rate, the

resultant equity beta was almost identical to the equity beta used in the PI Paper – both results rounding to 0.69. This was the equity beta which the MCMC used in the PI Paper base case for mobile services.

Table 12: Mobile Comparator PI results versus Alternative Sample – Beta and Gearing

Company	Levered (equity) beta	Unlevered (asset) beta	Gearing
Median – original sample	0.61	0.39	35%
Median – alternative sample	0.61	0.41	35%
Mean – original sample	0.74	0.48	31%
Mean – alternative sample	0.74	0.48	30%

[Source: MCMC]

5.2.129 The MCMC believes it is appropriate to use the average asset beta and gearing results of the alternative sample in its calculation of the equity beta rather than the median results, for the same reason outlined in the PI Paper – that is, the average results are closer to benchmarks from other jurisdictions (presented in Table 14 of the PI Paper) than the median. The MCMC notes that it was unable to update the European benchmarks using the recently published BEREC report on regulatory WACCs as for the first time it has not included information on mobile WACCs.

MCMC's Final Views

5.2.130 The MCMC has decided to use the alternative sample, which includes two local mobile operators, as the basis of its estimates for gearing and beta for the hypothetical mobile operator.

5.2.131 The MCMC calculates the equity beta using this approach to be 0.69 and the gearing ratio to be 30%. These values will be applied in the WACC formula for mobile services.

Question 17:

Do you have any comments on the proposed WACC for mobile services?

Submissions received

5.2.132 CelcomDigi recommended different estimates of RFR and ERP which reduced the WACC for mobile services from 9.05% to 7.73% as per Table 13 below:

Table 13: RFR and ERP Estimated by CelcomDigi

	MCMC	CelcomDigi
Risk free rate	4.09%	3.82%
Debt risk premium	1.03%	1.03%
Cost of Debt pre-tax	5.12%	4.85%
Cost of Debt post-tax	3.89%	3.69%
Equity Risk Premium	5.99%	4.41%
Levered beta(equity beta)	0.69	0.69
Cost of Equity pre-tax	10.82%	9.03%
Cost of Equity post-tax	8.22%	6.86%
Gearing	31.12%	31.12%
Post-tax WACC	6.88%	5.87%
Marginal rate of tax	24.0%	24.0%
Pre-tax WACC Nominal	**9.05%**	**7.73%**
Difference	**-1.32%**	

5.2.133 MyTV, Altel and Net2One agreed with the proposed WACC for the mobile service.

5.2.134 TM submitted that the MCMC should include local operators as part of the benchmarks. TM commented that the WACC for mobile operators are at 7.97% (Maxis) and 8.77% (Digi) which are lower than the 9.04% derived by the MCMC.

5.2.135 U Mobile submitted that the mobile WACC calculation appears to be reasonable, subject to its comments in question 16 above.

5.2.136 XOX proposed to incorporate an updated projection on the RFR. XOX commented that the inflation and interest rates have recently been increasing, therefore the MCMC's estimate is higher than the data based on historical rates.

Discussion

5.2.137 Altel, MyTV, Net2One and U Mobile considered that the mobile WACC calculations were reasonable, while CelcomDigi and XOX recommended changes in common parameters (the RFR and the ERP). As noted previously the MCMC has updated the RFR, and has retained the ERP at the same value as estimated in the PI Paper.

5.2.138 TM presented WACCs for the 2021 financial year for Digi and Maxis, sourced from Bloomberg, and notes that these are lower than the MCMC's proposed mobile WACC from the PI Paper. The MCMC notes that TM has presented post-tax WACCs while the MCMC estimate is pre-tax. As such, once these post-tax WACCs are converted to pre-tax, TM has in fact demonstrated quite the opposite – namely that the MCMC's proposed mobile WACC is lower than actual Digi and Maxis WACCs for 2021. Furthermore, the MCMC has used more recent data for parameters such as the RFR and the debt premium than would have been applicable in relation to the Bloomberg 2021 estimate. The MCMC concludes that TM's benchmarks are inapplicable.

MCMC's Final Views

5.2.139 The MCMC confirms that it has applied a notional credit rating to the hypothetical mobile operator of AA3 / AA1, resulting in a debt premium of 1.42%.

5.2.140 The MCMC confirms that it has included the two local operators in its final comparator sample and the resultant parameters for mobile network services are as presented in Table 14 below.

5.2.141 These parameters deliver a pre-tax WACC for mobile services of 9.24%.

Table 14: WACC Parameters for Mobile Network Services

Parameter	Value
Risk-free rate	4.10%
Debt Premium	1.42%
Equity Risk Premium	5.99%
Tax rate	24%
Gearing	30%
Equity Beta	0.69

Question 18:

Do you have any comments on the approach used for estimating beta and gearing parameters for 5G?

Submissions received

5.2.142 CelcomDigi agreed that it will be inappropriate to use Digi, Maxis and TM as a comparator sample for DNB's beta and gearing parameters as DNB's risk level is different from the operators in competitive markets. CelcomDigi argued that DNB is funded by Government debt, supported by implicit Government guarantee and has monopoly status. Therefore, gearing might be taken as 100% (all debt). CelcomDigi opined that the MCMC's calculated cost of debt of 4.49% is too generous as compared to CelcomDigi's cost of debt (pre-tax) calculation of 4.22%.

5.2.143 DNB commented that it faces substantial demand-side risk given the uncertainty over future demand for 5G services, especially because DNB is a wholesale only operator with no mechanism to directly stimulate end-user demand for 5G. Risk sharing is also not available if the MCMC requires DNB to charge within the wholesale price caps proposed. DNB further commented that the risks involved also affect DNB's equity beta and debt premium.

5.2.144 In terms of equity betas, DNB highlighted that the MCMC relies on a single benchmark, i.e. Chorus in New Zealand for 2022 where the FTTH market had matured. DNB considered it more appropriate to use the 2019 or earlier

estimates for Chorus when the demand for FTTH was less certain as the 5G services in Malaysia is at embryonic stage. Taking this into consideration, DNB noted that the WACC for DNB rises from 6.63% to 8.79% as per Table 15 below:

Table 15: Adjusted WACC for DNB

An adjusted by DNB in section 4.92 Item	Chorus 2019	Chorus 2022
Asset beta (A)	0.5	0.25
Gearing (MCMC definition - B)	29%	50%
Tax rate Malaysia (C)	24%	24%
Equity beta (A(1+[(1-C)B)/(1-B)])	0.66	0.43
DNB cost of equity	8.01%	6.67%
DNB cost of debt	4.49%	4.49%
WACC	8.79%	6.63%

5.2.145 DNB commented that it did not submit to the MCMC that the debt premium it incurs is approximately 40 basis points above the RFR. DNB argued that the debt premium should be higher than 0.4% assumed by the MCMC given the risks explained above and that WACC should be evaluated since DNB is pioneering in implementing a single wholesale network model which faces substantial demand-side risk without risk sharing with the Access Seekers. DNB further argued that Australia NBN Co's debt premium was 3.5% per annum at early stage in 2010 and the average debt premium for the four mobile operators is 2.59% while one of the operators is at over 7%.

5.2.146 Maxis agreed with the approach of not relying on the beta and gearing information of Digi, Maxis and TM to form a comparator as DNB is a single wholesale provider for 5G. Maxis agreed that Chorus should be used as a comparator as it is a wholesale only provider, thus has similar risk profile to DNB. However, Maxis opined that the MCMC's gearing assumption is low as DNB's single wholesale provider status closely resembles a utility provider than a highly diversified telecom company. Thus, Maxis expected a gearing ratio of 70% based on international precedent.

5.2.147 MyTV, Altel and Net2One opined that the approach is appropriate.

5.2.148 TM highlighted that the gearing values for the three cases in Table 19 of the PI Paper are very different i.e. 17.4% for high case and 100% for low case. This

makes it even more important to choose the appropriate case as baseline for 5G WACC.

5.2.149 TM commented that since DNB is likely funded almost entirely with debt and has little or no equity, the gearing should be at or close to 100%. Thus, low case should be used. TM further commented that the MCMC's use of the values of Chorus (a fixed-only business) for the beta, gearing and WACC calculation is questionable. TM submitted that other businesses which are largely wholesale only and have publicly available reports such as Netlink Trust in Singapore (fixed infrastructure), NBN Co in Australia (fixed infrastructure) and CETIN in Eastern Europe (mobile infrastructure) should also be considered.

5.2.150 U Mobile commented that DNB is not funded from equity, therefore the WACC should be based on debt funding only, until such policy changes. U Mobile also highlighted that the operators are required to pay a minimum amount to DNB and the total investment made by DNB will be paid off over the course of ten years. U Mobile opined that this arrangement reduces the risk for DNB's owner(s), therefore the rate of return should be reduced accordingly.

5.2.151 XOX suggested an annual review up to 2025, as the pace of the industry and its associated innovations is accelerating, especially with the inception of 5G.

5.2.152 YTL submitted that since the Single Wholesale Network ("**SWN**") model is first-in-the-world and built in the context of Malaysia, YTL opined that the local data is more appropriate as compared to using data from Chorus. YTL further highlighted that Chorus is a fixed infrastructure business which is fundamentally different from DNB's 5G infrastructure business.

Discussion

5.2.153 Altel, MyTV, and Net2One agreed with the MCMC's proposed approach for estimating the beta and gearing of DNB However, CelcomDigi, Maxis, TM and U Mobile considered that the MCMC's proposed gearing of 50.35% was inappropriate. Three of these four operators opined that as DNB was fully debt financed, the appropriate assumption for gearing is 100%, while Maxis recommended 70% on the grounds that DNB's single wholesale provider status is more akin to a utility provider than a highly diversified telecom company. DNB states that it anticipates average gearing of 66% over the regulatory period and requests that the MCMC use this value in the WACC calculation.

5.2.154 TM and YTL raised concerns about the MCMC's reliance on a single comparator company which operates a wholesale fixed infrastructure business. YTL suggests local comparators would be more appropriate, but does not offer any specific recommendations in this regard. TM suggests that two other fixed infrastructure businesses should be considered (NetLink Trust from Singapore and NBNCo from Australia) as well as infrastructure provider CETIN from Eastern Europe. DNB suggests that any comparisons with Chorus should consider data from an earlier time-period when Chorus was at an earlier stage of development. It makes the same recommendation in relation to NBNCo.

5.2.155 The MCMC agrees that reliance on a single comparator company to guide beta and gearing estimates for the WACC is far from ideal. As the MCMC noted in the PI Paper there are no other comparable 5G wholesale mobile operators worldwide, hence the MCMC sought comparators from other telecommunications businesses. The MCMC identified only a wholesale only telecommunications Access Provider, namely Chorus New Zealand, as a comparator on the basis that it is a regulated provider of access services (albeit fibre), it faces little competition and offers essential input services to retailers.

5.2.156 The MCMC thanks TM for recommending three additional potential comparators. In previous research, the MCMC had already investigated the characteristics of both Netlink Trust and NBNCo and found that insufficient publicly available information was available for inclusion in a comparator sample despite the publication of annual reports.

5.2.157 The MCMC had not, however, considered the Eastern European company CETIN. Naturally, the MCMC would prefer to rely on Asia-Pacific comparators, but will consider all possible candidates for comparators, given the paucity of relevant data on wholesale only telecommunications businesses. Unfortunately the MCMC has been unable to find the required publicly available information for CETIN on FT.com, but has reviewed recent CETIN Annual Reports. The MCMC notes that the CETIN Group's main business is in Czechia, with smaller operations in Bulgaria, Hungary and Serbia. In all jurisdictions, it is a wholesale provider of fixed and mobile telecommunications infrastructure, with no retail businesses. As at 31 December 2021, using the book value of debt, the MCMC estimated CETIN's gearing at approximately 65%. Using benchmarking of "publicly traded peer companies" CETIN derived a pre-tax WACC for its main business unit in

Czechia of 6.6% for the 2020 financial year and 9.5% in the 2021 financial year. Individual components of these WACC estimates are not available.

5.2.158 It is interesting to note that CETIN has a relatively high level of debt, however as only partial information is available it is not possible for the MCMC to include CETIN in a comparator sample. The MCMC concludes that there is insufficient information available to enlarge the comparator sample.

5.2.159 CelcomDigi, Maxis, TM and U Mobile considered that the MCMC's proposed gearing of 50.35% was inappropriate. Three of these four operators opined that as DNB was fully debt financed the appropriate assumption for gearing is 100%, while Maxis recommended 70% on the grounds that DNB's single wholesale provider status is more akin to a utility provider than a highly diversified telecom company. DNB states that it anticipates average gearing of 66% over the regulatory period and requests that the MCMC use this value in the WACC calculation.

5.2.160 The MCMC finds it is difficult to reconcile information provided by DNB on its likely equity funding over the regulatory period with submissions by mobile operators. DNB has stated that the Government may provide 8% of funding in the form of equity, which implies that DNB anticipates a further 26% of equity funding from mobile operators during the period. However, CelcomDigi and U Mobile clearly state that DNB is not funded by equity. U Mobile also noted that operators are required to pay DNB a minimum amount per month once the 5G network is built. In any event, as DNB was established by the Ministry of Finance on a cost recovery basis - that is, not-for-profit - equity investors would have no expectation of a commercial return or dividend.

5.2.161 The MCMC concludes that it is not practical to attempt to benchmark the cost of equity for a hypothetical wholesale only 5G operator deploying a network with similar institutional arrangements to DNB for the following reasons:

(a) The business operation is at present still under development;
(b) Equity investment over the regulatory period is uncertain;
(c) Potential equity investors are aware that they will not receive a commercial return; and
(d) Insufficient relevant benchmark data is available.

5.2.162 In these circumstances, it is the MCMC's view that it is only possible to make an approximation of the business risk faced by such a company. Therefore, the MCMC will assume 100% debt funding, and apply the RFR plus a debt premium appropriate for the level of risk incurred by debtholders. The MCMC judges that the debt premium of the 5G operator should be based on an AAA credit rating, as the level of company risk is reasonably expected to be lower than both vertically integrated fixed and mobile operators in the Malaysian market.

MCMC's Final Views

5.2.163 The MCMC will assume the 5G operator is fully debt financed, and will approximate company risk using the RFR plus a debt premium based on an AAA credit rating.

Question 19:

Do you have any comment on the WACC estimate for 5G?

Submissions received

5.2.164 CelcomDigi viewed that there is a strong case for setting the pre-tax WACC estimate for 5G on the basis of 100% gearing and therefore estimated the pre-tax debt to be 4.22%. CelcomDigi also commented that if the gearing assumed by the MCMC is maintained, the pre-tax WACC estimate should be reduced from 6.62% to 5.86% as per Table 16 below:

Table 16: Pre-tax WACC Estimate by CelcomDigi

	MCMC	CelcomDigi
Risk-free Rate	4.09%	3.82%
Debt risk premium	0.40%	0.40%
Cost of Debt pre-tax	4.49%	4.22%
Cost of Debt post-tax	3.41%	3.21%

	MCMC	CelcomDigi
Equity Risk Premium	5.99%	4.41%
Levered beta (equity beta)	0.43	0.43
Cost of Equity pre-tax	8.77%	7.52%
Cost of Equity post-tax	6.67%	5.72%
Gearing	50.35%	50.35%
Post-tax WACC	5.03%	4.45%
Marginal rate of tax	24.0%	24.0%
Pre-tax WACC Nominal	**6.62%**	**5.86%**
Difference	**-0.76%**	

5.2.165 CelcomDigi further commented that this calculation is assuming the gearing and asset beta used are correct.

5.2.166 DNB viewed that the pre-tax WACC for 5G of 6.61% is too low. DNB commented that the MCMC's bottom-up estimate of pre-tax WACC for fixed and mobile services is 3% point below the post-tax WACC estimated by 13 financial analysts' adjustment to pre-tax level. As clarified by DNB in the earlier section, DNB also opined that the parameters used by the MCMC are inappropriate. DNB commented that investors face greater financial risks in 5G rollout funding than investors do in backing fixed and mobile services. DNB viewed that the pre-tax WACC for 5G should be more than 10% rather than 6.61% published in the PI Paper.

5.2.167 Maxis agreed to the use of DNB's debt premium and proposed changes to RFR, ERP and gearing as per Table 17:

Table 17: Maxis's Proposed Values for WACC Calculations for 5G Services

WACC parameters for 5G Services	MCMC's values	Maxis' proposed values
Risk-free Rate	4.09%	3.80%
Equity Risk Premium	5.99%	4.24%
Gearing	50.35%	70%
WACC – pre tax	**6.63%**	**5.58%**

5.2.168 MyTV, Altel and Net2One perceived the WACC is acceptable.

5.2.169 U Mobile reiterated that the arguments it provided in the earlier sections for 5G WACC should be reflected. U Mobile also commented that it agreed with the proposed approach for cost of debt, therefore the model should apply the Low Case (100% gearing).

5.2.170 XOX proposed to incorporate an updated projection on the RFR. XOX commented that the inflation and interest rates have recently been increasing, therefore the MCMC's estimate is higher than submission data based on historical rates.

5.2.171 YTL commented that information for Chorus may not be relevant as DNB has a different corporate structure with the Government involvement and this influences the cost of debt.

Discussion

5.2.172 Altel, MyTV and Net2One accepted the MCMC's preliminary WACC for 5G, however DNB asserted that the WACC is too low while the mobile operators submitted that the WACC is too high.

5.2.173 DNB disagreed with the MCMC's preliminary company-specific risk parameters – that is the beta and the debt risk premium. As regards the latter the MCMC had used 0.4% in its preliminary estimate based on earlier benchmark information provided by DNB. However, in its submission to the PI Paper DNB has clarified that it did not consider that it had proposed the use of 0.4% as the 5G debt premium, and that DNB risks were such that the debt premium should be significantly higher. DNB does not provide a recommended debt premium but notes that the average debt premium for four of the mobile operators is 2.59%

(from Table 16 of the PI Paper), and that NBNCo's debt premium was set at 3.50% when it commenced operations in 2010.

5.2.174 The MCMC has reviewed the debt premium of NBNCo, an Australian Government Business Enterprise responsible for building and operating the National Broadband Network. The relevant data in the spreadsheet referenced by DNB is labelled "nominal rate of return" which is calculated by the addition of 3.50% to the RFR. The MCMC noted that 3.50% is added to a RFR in every year in the spreadsheet - that is, 2008 or 2009 to 2021 or 2022. In other words, this value is constant over time, applied not only in the early years of the company's operations but also over a decade later. The MCMC also found that NBNCo held no debt until 2015, with financing previously provided by the Government. NBNCo states in its 2022 Annual Report that its nominal weighted average cost of issued and drawn debt as at 30 June 2022 is 2.47% and as at 30 June 2021 it was 2.79%.

5.2.175 Given these observations, together with the fact that it was not possible to find any explanation or justification of the 3.50% assumption, the MCMC considers that it is an inappropriate benchmark for the debt premium of a 5G wholesale operator in Malaysia.

5.2.176 DNB also contends that investors face greater financial risks in 5G rollout funding than investors do in backing fixed and mobile services. As such it considers that WACC benchmarks based on Celcom, Digi, Maxis and TM are relevant, and further that these provide an indication of a WACC floor value for DNB.

5.2.177 The risks identified by DNB encompass:

(a) The lack of examples of the successful adoption of a single wholesale network elsewhere in the world which raises investors' expectations of risk when compared with, for example, 4G services;

(b) Demand side risk, with DNB having no mechanism for directly stimulating end-user demand; and

(c) Risk of having to charge wholesale prices based on a per-Gbps consumed basis rather than DNB's RAO which involves risk sharing with Access Seekers.

5.2.178 However, CelcomDigi and Maxis argue that DNB's risk is considerably lower than that of vertically integrated operators in a competitive market and hence benchmarks based on listed local telecommunications companies are inappropriate.

5.2.179 The MCMC agrees that DNB's guaranteed monopoly status, coupled with the engagement of a reputable vendor which will essentially build and operate the network, would reduce investors' perceptions of risk. While the MCMC accepts that DNB is subject to demand side risk, it is apparent that the extent of this risk has been mitigated by DNB's pricing approach. Effectively, it has externalised some of the demand risk so that it is shared with Access Seekers. For these reasons, the MCMC confirms its preliminary position that the beta and gearing information of Celcom, Digi, Maxis and TM should not be relied upon to form the basis of a comparator sample for DNB.

MCMC's Final Views

5.2.180 The final WACC parameters to be applied for 5G services are shown in the Table 18 below. These parameters deliver a pre-tax WACC for 5G services of 4.99%.

Table 18: WACC Parameters for 5G Services

Parameter	Value
Risk-free Rate	4.10%
Equity Risk Premium	5.99%
Debt premium	0.89%
Tax rate	24%
Gearing	100%
Beta	N/A

Question 20:

Do you have any comments on the proposed approach for estimating betas and gearing for the infrastructure sharing sector?

Submissions received

5.2.181 MyTV, Altel and Net2One agreed with the proposed approach.

5.2.182 PPIT submitted that it agreed with the adoption of the unlevered (asset) beta of the six Malaysian tower companies which should reasonably represent the operating environment and systematic risks of other tower companies in Malaysia. Further, PPIT commented that the unlevered beta is also consistent with the Asia Pacific comparators. PPIT also agreed to the suggested gearing ratio.

5.2.183 TM observed that the peer group for infrastructure sharing calculation is much more sizeable than for fixed WACC calculation. TM commented that this is partly due to a difference in approach by way of relaxing the need for peer group members to be based in the Asia-Pacific region. TM further commented that the MCMC is strict in the approach for the fixed WACC but lax in the approach for the infrastructure sharing WACC.

5.2.184 U Mobile commented that the approach adopted appears to be reasonable.

Discussion

5.2.185 Altel, MyTV, Net2One and U Mobile agreed with the MCMC's proposed approach for estimating beta and gearing for the infrastructure sharing sector.

5.2.186 The MCMC disagrees with TM's contention that it has been lax in its approach for the infrastructure sharing WACC while adopting a strict approach in respect to the fixed WACC calculation. The basis for this criticism appears to be that the MCMC relaxed the criterion that comparator companies should be headquartered in the Asia-Pacific region for infrastructure sharing, while not adopting the same procedure for fixed comparator companies.

5.2.187 The MCMC has adopted a comprehensive, consistent and fully justifiable approach to beta and gearing estimation for the regulatory WACCs.

5.2.188 Firstly, the MCMC has considered relevant available data from the Malaysian market. This included information obtained from operator data submissions, supplemented by publicly available financial data from operator reports and

financial briefings, and publicly available data from other sources such as FT.com.

5.2.189 Secondly, in establishing a comparator sample the MCMC considers that regional (Asia-Pacific) companies are most relevant in an assessment of relative risk. In the first instance, the MCMC identified ten relevant Asia-Pacific companies for its fixed sample and seven for its towers (infrastructure sharing) sample. The MCMC then carefully examined information on each of the candidates for the comparator sample and discarded companies which clearly could not meet the MCMC's stated criteria for sample inclusion. This process led to the exclusion of five of the fixed candidate companies and two of the towers candidate companies.

5.2.190 Thirdly, the MCMC has undertaken comparisons of estimates of beta and gearing between the Asia-Pacific sample and the local market. The MCMC adopted this same approach for fixed, mobile and towers services. The results of the towers Asia-Pacific comparator sample are presented in Table 21 of the PI Paper.

5.2.191 However, the Malaysian towers market differs from the local fixed and mobile markets in that there are no listed towers companies. As the MCMC noted in the PI Paper the Malaysian tower company, Edotco, is a subsidiary of Axiata. Edotco's WACC is not directly observable as Axiata is a large listed entity which owns telecommunications companies in Malaysia and other Asian markets. While some information was provided by six Malaysian tower companies in data submissions, the MCMC noted a wide range of values for beta and gearing ratios (as illustrated in Table 22 of the PI Paper). The MCMC had particular concerns about relatively high local gearing ratios, likely the results of the use of book values for equity in the Malaysian ratios, whereas market value of equity is used in all comparator samples.

5.2.192 Another related issue was that, with no Malaysian listed tower companies, there was no reference point for the credit rating. Furthermore, a credit rating was available for only one of the seven initial Asia-Pacific candidate tower companies. In contrast, TM's credit ratings served as a reference point for the fixed comparator sample, and credit ratings were available for nine of the initial Asia-Pacific candidates fixed companies.

5.2.193 Given the issues with local and Asia-Pacific towers data, the MCMC sought to inform its final estimate with analysis which made use of both the Asia-Pacific sample and an extended sample encompassing a further five companies, four of which had publicly available credit ratings.

5.2.194 The MCMC notes that PPIT supports use of data provided by the six Malaysian tower companies, believing that it may reasonably reflect the operating environment and systematic risks of other tower companies in Malaysia. The MCMC notes that it has considered available local data in its approach but prefers to rely upon results from an extended comparator sample for the reasons summarised above.

MCMC's Final Views

5.2.195 The MCMC confirms its preliminary estimates of the beta and gearing for infrastructure sharing of 0.57 and 25.74% respectively.

Question 21:

Do you have any comments on the proposed approach for estimating the debt premium for the infrastructure sharing sector?

Submissions received

5.2.196 Edotco commented that the MCMC did not explore or provide rationale for the higher debt premium incurred by the Malaysian tower companies. The MCMC merely adopted the median as the base case rather than the mean as the base case. In the absence of detailed analysis, Edotco supported the mean as the base case as it reflects the high risk faced by tower companies.

5.2.197 MyTV, Altel and Net2One agreed with the proposed approach.

5.2.198 PPIT commented that the debt premium of 1.59% may be conservative considering the current volatile interest rate environment. PPIT highlighted that there had been four 25 basis points rate hike on the OPR in 2022, with more expected in the near future as the government continues to battle with rising inflation. PPIT sought clarification whether the upward trend had been factored into the model. PPIT commented that UOB research expects another 25bps rate

hike in January 2023 after the Monetary Policy Committee meeting, followed by another in March 2023 while RHB Investment Bank Research also expects another 25 to 75 basis points hike in the same year. Therefore, PPIT viewed that the MCMC should revisit the debt premium to consider the expected future movement in interest rate for the review period.

5.2.199 U Mobile commented that the approach adopted appears to be reasonable.

5.2.200 XOX suggested to review the average debt premium's unusually high value of its upper bound.

Discussion

5.2.201 Altel, MyTV, Net2One and U Mobile agreed with the MCMC's proposed approach for estimating an applicable debt premium for the infrastructure sharing sector. Edotco and PPIT indicated that the MCMC's proposed debt premium of 1.59% may be too conservative, and XOX expressed concern about the high value of the upper bound of the range of submitted values (3.50%).

5.2.202 The quantum of the debt premium is influenced by the credit or default risk of individual companies. The MCMC notes that estimation of the debt premium for towers is particularly challenging in the absence of local listed companies and a reference credit rating for a Malaysian tower company. As such, the MCMC has relied completely upon information from responses to data requests.

5.2.203 In response to PPIT's points about the volatile interest rate environment, it is important to note that it is the RFR which reflects inflationary expectations. The MCMC, in updating the RFR, has captured the most recent inflationary expectations. The debt premium of an individual firm compensates lenders for risk over and above the RFR. The business risk of a particular firm is typically influenced by company-specific factors such as the level of gearing. The question then becomes whether general market volatility has a material impact on the firm's level of business risk. On balance, the MCMC considers that even if a company has a relatively low level of gearing it may still be exposed to increasing business risk if interest rates are rising sharply.

5.2.204 As recommended by XOX, the MCMC has reviewed the upper bound of the range of submitted values. Compared to the other observations this value appears to

be an outlier. The MCMC's use of the median in preference to the mean of the submitted values addresses this issue in the PI Paper.

5.2.205 Consistent with treatment of the debt premium for fixed and mobile services, the MCMC has considered whether an increased spread would apply to infrastructure sharing, given that actual data was submitted over six months ago and in general debt premium have risen over this time-period. The MCMC notes that its preliminary estimate of the debt premium for infrastructure sharing companies was 1.59% which was close to the prevailing spread of 1.58 associated with A1 / A+ credit rating at that time. The current spread for this credit rating is 1.80. The MCMC judges that it is reasonable to apply this value in the WACC formula for infrastructure sharing.

MCMC's Final Views

5.2.206 The MCMC confirms that it has updated the debt premium for Infratructure Sharing Services and will apply the value of 1.80% in the WACC estimate.

Question 22:

Do you have any comment on the WACC estimate for infrastructure sharing?

Submissions received

5.2.207 CelcomDigi commented that the adjustments to the RFR and ERP mentioned earlier indicated that the MCMC's WACC for infrastructure sharing at 8.79% is too high and the more appropriate estimate should be 7.58% as indicated in Table 19 below:

Table 19: Pre-tax WACC Calculation by CelcomDigi

	MCMC	CelcomDigi
Risk-free Rate	4.09%	3.82%
Debt risk premium	1.59%	1.59%
Cost of Debt pre-tax	5.68%	5.41%
Cost of Debt post-tax	4.32%	4.11%
Equity Risk Premium	5.99%	4.41%

	MCMC	CelcomDigi
Levered beta (equity beta)	0.57	0.57
Cost of Equity pre-tax	9.87%	8.33%
Cost of Equity post-tax	7.50%	6.33%
Gearing	25.74%	25.74%
Post-tax WACC	6.68%	5.76%
Marginal rate of tax	24.0%	24.0%
Pre-tax WACC Nominal	**8.79%**	**7.58%**
Difference	**-1.21%**	

5.2.208 Edotco submitted that it is supportive to use mean rather than median for debt premium. Edotco commented that the debt premium for WACC should be 1.83% rather than 1.59%. This would increase the cost of debt in base case WACC in Table 24 of the PI Paper from 4.09% to 5.92%.

5.2.209 Maxis proposed changes to the RFR and ERP. The proposed WACC for infrastructure sharing are as per Table 20 as follows:

Table 20: Proposed WACC for Infrastructure Sharing Services by Maxis

WACC parameters for Infrastructure Sharing	MCMC's values	Maxis' proposed values
Risk-free Rate	4.09%	3.80%
Equity Risk Premium	5.99%	4.24%
WACC – pre tax	**8.77%**	**7.46%**

5.2.210 MyTV, Altel and Net2One agreed with the calculation of WACC for the service.

5.2.211 PPIT submitted that the WACC of 8.77% is too conservative and is not appropriate to be applied for the review period. PPIT highlighted that the WACC set in the 2017 review was 12.11%, which is significantly higher than the MCMC's proposed 8.77%. PPIT believed this is because the MCMC had not adjusted and normalize the parameters used in the calculation of WACC, as

raised in the above sections. PPIT proposed for the MCMC to revisit the WACC value of 8.77% based on PPIT's comments on the RFR, ERP and debt premium.

5.2.212 U Mobile commented that the low case looks more robust, given that it is based on median values in a sample that is riven with outliers. This gives 8.25%, compared to 8.77% in the base case where both are significantly lower than the previous PI (10.08%). U Mobile recommended for the low case to be used.

5.2.213 XOX proposed to incorporate an updated projection on the RFR. XOX commented that the inflation and interest rates have recently been increasing, therefore the MCMC's estimate is higher than the data based on historical rates.

Discussion

5.2.214 Altel, MyTV, and Net2One supported the MCMC's proposed WACC estimate for the infrastructure sharing sector. XOX proposed an update of the RFR, which the MCMC has now undertaken.

5.2.215 CelcomDigi, Maxis, and U Mobile proposed a lower WACC. In the case of CelcomDigi and Maxis, this was based on lower common parameters (the RFR and ERP). In this regard, the MCMC's decision and the reasons have already been discussed. U Mobile prefers the MCMC's low case WACC rests on the grounds that the sample has outliers and so median values of parameters should be applied. The MCMC notes that while the low case WACC presented in the PI Paper used the median gearing and asset beta of the comparator sample, it also applied a lower debt premium of 0.64% which was in fact the lower bound of the range of submitted values. The base case applied the median debt premium in order to correct for outliers.

5.2.216 Finally, Edotco supports a higher WACC on the basis that the mean debt premium should be applied in preference to the median. For the reasons outlined above the MCMC has opted to update the debt premium using as a reference point spreads on bonds with an A1 / A+ credit rating.

MCMC's Final Views

5.2.217 The MCMC confirms that the only changes to the preliminary infrastructure sharing WACC are driven by an updated RFR and debt premium. The final

parameters are confirmed in the Table 21 below. These parameters deliver a pre-tax WACC for infrastructure sharing services of 8.84%.

Table 21: WACC parameters for Infrastructure Sharing Services

Parameter	Value
Risk-free Rate	4.10%
Equity Risk Premium	5.99%
Debt premium	1.80%
Tax rate	24%
Gearing	25.74%
Beta	0.57

Question 23:
Do you have any comments on the WACC estimate for DTTB Multiplexing Service?

Submissions received

5.2.218 MyTV accepted the proposed calculation of WACC as the standard approach to cover financing cost for the provision of service. MyTV commented that although MyTV is internally financed by its shareholders, there is high possibility that MyTV may require external borrowings in the near future.

5.2.219 XOX proposed to incorporate an updated projection on the RFR. XOX commented that the inflation and interest rates have recently been increasing, therefore the MCMC's estimate is higher than submission data based on historical rates.

Discussion

5.2.220 In response to XOX, the MCMC confirms that the RFR has been updated.

5.2.221 No objections were received on the MCMC's proposed WACC base case gearing value of 22% and asset beta of 0.32 for DTTB services. The re-levered equity beta of 0.42 will therefore be used in the final DTTB WACC calculation.

5.2.222 Similarly, no submissions were made in relation to the debt risk premium for DTTB services. The MCMC therefore confirms its initial proposal which was to adopt the same debt premium as has been used for the fixed sector – that was 1.02% in the PI Paper, but has been updated now to 1.19%.

MCMC's Final Views

5.2.223 The final parameters to be used in the DTTB WACC are shown in the Table 22 below. These parameters deliver a pre-tax WACC for the DTTB service of 7.94%.

Table 22: WACC Parameters for DTT Multiplexing Service

Parameter	Value
Risk-free Rate	4.10%
Equity Risk Premium	5.99%
Debt premium	1.19%
Tax rate	24%
Gearing	22.35%
Beta	0.42

5.3. MCMC's Final Views

5.3.1 As a result of the revisions to a number of the parameters as proposed by the respondents to the PI Paper, the rates of WACC that will be used by the MCMC for calculating the costs of the services in the Access List are as shown in Table 23 below.

Table 23: Final WACC Rates

	Fixed	Mobile	5G	Infrastructure sharing	DTT Multiplexing
WACC	8.93%	9.24%	4.99%	8.84%	7.94%

6. Fixed Services

6.1. Fixed Services Cost Model

The MCMC developed a single fixed network cost model using the LRIC+ methodology to assess the costs of providing the fixed services in the Access List. The model was based on a network operator with similar scope and scale to that of TM. A form of the cost model with all commercially confidential data removed was made available on request to interested licensees during the PI period.

Part D of the PI Paper dealt with the fixed services. Section 16 provided a list of the services from the Access List which were costed in the model. It sets out the steps which the modelling process followed dealing with service demand and traffic, network dimensioning, network costing, service costing and model reconciliation. Section 17 presented the MCMC's proposed prices for the fixed services.

6.2. Summary of Submissions Received

Question 24:

Do you have any comments on the approach adopted for the fixed model?

Submissions received

6.2.1 With regard to Duct and Manhole Access, CelcomDigi considers that on balance, using a LRIC-based approach to cost calculation is necessary to give an Access Provider incentive to build out ducts and manholes with spare capacity for Access Seekers. However, there is a competitive incentive for an Access Provider not to provide spare capacity in its network build, thereby creating a bottleneck for its competitors. It is therefore necessary for the regulator to be vigilant in ensuring that an Access Provider does not act in an anti-competitive manner. CelcomDigi urges the MCMC to ensure that Access Providers do, in fact, make provision, without exception, for ducts and manholes to be used by Access Seekers.

6.2.2 A further matter that affects the market for duct and manhole access and its overall efficient functioning is the lack of comprehensive and centrally available online records on the location and availability of ducts and manholes on the part of some Access Providers. To some extent, this is a function of the age of the

ducts involved which were originally recorded on redline diagrams stored and maintained locally. In some cases, the issue may even be a problem for the Access Provider's administration and use of its own infrastructure. In view of this, CelcomDigi proposes that the matter be facilitated by the MCMC and the provision of current information online is imposed as a regulatory condition on Access Providers.

6.2.3 Fibrecomm submitted that the approach taken by the MCMC to calculate costs is too low and does not reflect the situation faced by Fibrecomm. Fibrecomm fears that the company will not be able to run a viable business due to the increasing costs as well as ongoing requirements to maintain a non-typical infrastructure. Fibrecomm also noted that additional costs, such as third-party charges by infrastructure owners for compliance to industry safety requirements have been neglected from the calculations.

6.2.4 Maxis provided comments covering the following key areas:

(a) Key calculations are carried out prior to input, not in the model that has been shared;
(b) Transparency of customer volumes;
(c) Routing factors;
(d) Core and access duct split;
(e) USP;
(f) Taxation; and
(g) Redacted data.

6.2.5 Maxis pointed out that the model documentation is not comprehensive. Maxis expressed its concern that much of the calculation that is relevant to deriving the costs have been carried out in preparing the input values which is not visible to them.

6.2.6 For physical access prices and for the access network, input unit capital costs are converted into an annual capital charge using the tilted annuity formula. The annual operating costs are a percentage of the capital costs. Volumes are cancelled during the calculation of these unit costs and considered not relevant.

6.2.7 Once the complexity of the model is removed, the annual unit cost of each element is simply calculated as below, inflated by the input annual cost inflation rate for the relevant network element:

Unit capital cost x(annuity factor+operating cost %)x(1+overhead markup %) x(1+USP markup %).

6.2.8 Maxis is of the view that the model could be greatly simplified to make the above formula obvious to users and to eliminate redundant intermediate steps in the calculation.

6.2.9 Cost inflation and asset lifetimes are assumptions directly input into the model but unit capital costs and unit operating costs cannot be simply derived and must have been modelled separately from base input data prior to input. The overhead mark-up percentage must also be the output from another model.

6.2.10 For example, to derive unit capital cost per metre of duct, Maxis expects that there must be a model that would include factors like labour rates per hour, grades of labour used, transport costs, costs of licences needed to carry out the construction work, time taken to install a duct in different locations, location mix, materials costs, and absorption rates for direct and indirect overheads.

6.2.11 Maxis requested that the MCMC shares such models with stakeholders for comment on the formula and input sources used in future MSAP consultations. Without such an assessment of these models the consultation on the price setting methodology will be incomplete, given that consultation is aimed to improve competition to benefit the consumer.

6.2.12 Maxis thanks the MCMC for addressing their earlier concerns of using dummy numbers, with the true data services' forecast volumes redacted from the model. These were later provided and now appear to be a reasonable order of magnitude figures; for example, the forecast for national leased lines for 1Mbps to 1Gbps is now 12,000, not 10 as in the earlier version of the model.

6.2.13 However, Maxis understands that the historic volume data is specific to TM and is therefore reasonable to redact. Maxis also notes that the forecast data is from the MCMC and therefore would not be commercially confidential. Maxis therefore requested that the MCMC share these forecasts or explain why the forecasts for these volumes would be confidential, when the HSBB and calls forecast volumes are not.

6.2.14 Maxis understands that the routing factors are not redacted and those that are shown are actually used in the calculation. Following provision of Maxis feedback

to the MCMC on the routing factors, the MCMC made some changes in the revised models. However, Maxis still do not fully understand how these factors were derived and think that some of them may still be incorrect, particularly for transmission services. Maxis requested that the methodology for the derivation of the routing factors, which are material to the calculation of costs of all services using the aggregation and core network are documented and shared with stakeholders.

6.2.15 Maxis have expected leased lines services to have identical core or aggregation routing factor to those for End-to-End and Trunk Transmission, with the differences between the services lying in the access element i.e. End-to-End Transmission, leased lines and Trunk Transmission should have the same routing factors across the core or aggregation network, and be differentiated only by having the costs of two, one and zero access lines respectively.

6.2.16 However, in the costing model the End-to-End Transmission Service and Trunk Transmission Services received double factors for certain equipment on the edge of the core (Network Provider Edge ("**NPE**") and Edge Provider Edge ("**EPE**")) whilst the leased lines receive a single factor. In the response to the queries received from stakeholders early January 2023, the MCMC stated that the End-to-End Transmission Service and Trunk Transmission Service use aggregation and Edge routers ("**ER**") twice as much as leased line services. However, Maxis claimed that this was not consistent with their understanding.

6.2.17 Additionally, in the MCMC's initial fixed cost model, the submarine cable appeared particularly anomalous. Following Maxis' feedback, this was changed in the MCMC's revised models. However, in the MCMC's revised model, the "allocation factors" are now 0.18 for a circuit without a submarine cable (except for end-to-end up to 1Gbps where it is still 0) and 0.29 for a circuit with a submarine cable. Maxis highlighted during a meeting with the MCMC that the routing factors require revision.

6.2.18 However, Maxis does not understand why the factor would not be 1 for a circuit with a submarine cable and 0 otherwise. The new factors would attribute too much cost to most transmission circuits without submarine cable and too little to those with a submarine cable. Maxis would like the MCMC to correct these attribution factors.

6.2.19 Although the unit costs for the duct access price is calculated independently of volumes, the treatment of duct in access services is volume dependent. The total duct length is split between core ("transport") and access ("mainline" and "lead-in") duct and the lengths are multiplied by the annual costs as derived above to give total costs.

6.2.20 The MCMC stated that "allocating 82% of the total duct costs to the access network is consistent with the data provided by TM" in its PI Paper at page 72 but also runs a "test case" where the duct costs are evenly attributed between access and core on the grounds that this "seems intuitive" as noted in PI Paper at page 81. In fact, both the 82% and 50% assumptions appear very low. Maxis provided feedback to the MCMC on this point, and in the revised models, the proportion of shared duct was updated to be 93%. Whilst Maxis believes that the 93% assumption to be more appropriate, Maxis stated that it now potentially overstates the portion of duct to be allocated to the access network.

6.2.21 Maxis, therefore, proposes that the MCMC revises its assumption of the proportion of access duct to 88%.

6.2.22 As discussed in Maxis' response to question 10, Maxis supported the removal of USP contribution costs as being a more appropriate approach than including the subsidy costs but not the impact on assets. However, Maxis believes that due to the high level of historic USP funding for fixed services, this still leads to a significant overstatement of asset values. The same argument would apply to other government types of funding for TM. The amount is substantial and Maxis considers that the actual value of the USP subsidy for a typical operator should be modelled and offset against the capital values in the model.

6.2.23 This is common practice in other regulatory jurisdictions. For example, Ofcom's treatment of Building Digital UK ("**BDUK**") grants, which are very similar in nature to the National Fiberisation and Connectivity Plan ("**NFCP**"), is to reduce the value of the network in line with the grants received. Maxis provided information on UK's BDUK programme and Ofcom's treatment of BDUK in its cost model to support its view.

6.2.24 Maxis commented that Malaysia offers significant tax deferrals for some capital investment projects of national and strategic importance involving heavy capital investment and high technology, alongside other tax incentives and investment

allowances. Maxis pointed out TM's deferred tax liability of RM1.5 billion relating to tax deferrals from TM's 2021 statutory accounts and commented that many economic regulators (for example Ofgem, Ofwat and the CAA in the UK) take this tax effect into account. Some telecom regulators have also taken this tax effect into account.[2]

6.2.25 By not taking this effect into account, Maxis submitted that the MCMC is implicitly assuming that tax is paid in the year to which it relates at the statutory rate and not deferred, thus, this approach is not consistent with the economic reality.

6.2.26 Maxis also highlighted that a more appropriate approach would be to incorporate a tax expense that consists of current tax payable plus a deferred tax component to reflect the depreciation timing difference. A deferred tax asset or liability is then recorded in the accounting balance sheet. The MCMC could then model the tax provision either on a pre-tax or post-tax WACC basis. Maxis expects that these tax deferrals would also be expected to apply to DNB.

6.2.27 Maxis provided information on investment incentives that will permanently reduce the tax costs payable by an operator in its official PI submission and enlightened that these cost reductions should be taken into account in the MCMC's cost model.

6.2.28 In the revised models, the MCMC updated the calculation of overheads for fixed services to include an operating cost overhead to account for indirect network costs. This overhead is set at an extremely high level[3], and Maxis highlighted that the MCMC have not provided any details of how this percentage is calculated.

6.2.29 Maxis asked that the MCMC conducts a review of this calculation to ensure that it has not double-counted costs already included as part of the direct operating costs or business overheads and provides full details of this review and how the operating cost overhead has been calculated in its PI Paper.

[2] Fibre regulation emerging views: Technical Paper, Commerce Commission New Zealand, 21 May 2019, Chapter 8.
[3] In the revised model, the value provided is 87.1% which is stated to be within 20% of the true value. Maxis pointed out that a value of even 67.1% is extremely high.

6.2.30 With regards to FDA, Maxis supports the MCMC's adjustments for FDA. Maxis submitted that it is not appropriate for the efficient operator to recover the costs of assets that are fully depreciated, as their costs have already been recovered over the useful economic lifetime of these assets. This is in line with standard international regulatory practice.[4]

6.2.31 On the network assumptions and cost data, Maxis stated that it was difficult to assess and validate the redacted data and assumptions used by the MCMC in the MCMC's initial fixed cost model.

6.2.32 Maxis thanked the MCMC for releasing a range of data for fixed model so that they could review and comment on whether the values of these are appropriate. The data released show the high costs and unnecessary network elements in incumbent fixed operator's original data.

6.2.33 Maxis appreciates the MCMC for revising the cost data for Optical Distribution Frame, Lead-in Duct, Mainline Duct, Lead-in Manhole, Mainline Duct, EPE 1G, EPE 10G, EPE Chassis, Transport Manhole and HSBB BTU Installation Cost, which is now more in line with the current industry practices and vendor prices.

6.2.34 However, Maxis also proposed further changes to the network assumptions and cost data used for fixed services cost model to reflect the current industry practices and vendor prices to ensure that Access Providers are not overcharging the Access Seekers. Maxis proposed further changes to the estimates for the network assumptions and cost data in the fixed cost model to support this view.

6.2.35 Maxis also particularly noted that the costs for exchange and technical buildings appear extremely high and understood that TM is currently significantly reducing its number of exchanges. Therefore, TM may not be using them for solely the provision of wholesale services. Maxis provided additional information in the UK about Ofcom's requirement on the allocation of space in exchange buildings and suggested that the MCMC consider allocating only a proportion of exchange and technical building costs to the regulated MSAP services by taking account of space used for other non-wholesale purposes and vacant space in exchange buildings.

[4] Analysys Mason, Report for Nkom, Modelling the costs of copper networks in the Norwegian context, 15 December 2017, Section 5.

6.2.36 Finally, Maxis thanked the MCMC for revising the Wholesale Local Leased Circuit ("**WLLC**") installation, Trunk Transmission installation and End-to-End Transmission installation costs based on the MNO's feedback. However, Maxis highlighted some concerns with the installation cost proposed by the MCMC in the current PI Paper for HSBB Network Services.

6.2.37 TM submitted its responses on demand modelling, OPEX modelling, CAPEX modelling and network modelling for all the fixed services that it deploys.

Demand Modelling

6.2.38 TM pointed out incorrect mapping of the submission for its transmission lines. TM notes that several of TM's demand categories have been mapped onto the three services modelled for WLLC over fibre.

6.2.39 TM emphasized that these three service groups are not provided using regulated WLLC services and that they should be categorized as commercial services. TM submitted that the three services should not therefore be used to simulate the characteristics of WLLC services.

6.2.40 TM also expressed its grave concern about how much the busy-hour Mbit/s forecast has significantly increased across all modelled services between the draft v5 fixed model and the revised v6 fixed model provided by the MCMC i.e. for broadband services and transmission services.

6.2.41 In 2022, a total of 31,282Gbit/s is now assumed to be required in the core network in the busy-hour whilst TM's actual throughput is much lower than the modelled Mbit/s in 2022.

6.2.42 TM is already concerned that the model only assumes recovery of a low level of cost, far below the actual costs that TM experiences in the real world. However, the model assumes a far higher broadband Mbit/s than TM is observing in practice and therefore the modelled cost per Mbit/s used to set a price per Mbit/s will be far too low. As a result, TM cannot hope to even achieve the cost recovery that the revised v6 fixed model allows, as TM cannot sell the volume of Mbit/s that this model assumes the network will carry.

6.2.43 TM further stated that the MCMC cannot naively accept demand forecasts from other operators as TM is the main provider of fixed broadband service in the

market (both retail and wholesale basis). Also, TM's network is built to a high standard of quality and TM has provided the actual traffic statistics on its network. TM stated that this should be used to calibrate the model. Using higher traffic than what is being utilised will result in severe losses to TM.

6.2.44 TM submitted that the Mbit/s forecast is driven by the assumed contention ratios. The draft v5 fixed model assumed a contention ratio of 50:1 for all broadband services whilst the revised v6 fixed model reduced the contention ratio for sub-100Mbit/s fibre or Very-high-bit-rate Digital Subscriber Line ("**VDSL**") services to 20. This has a massive impact on the modelled network, flooding the core with broadband Mbit/s throughput and significantly reducing the modelled cost per Mbit/s. This gives a blended-average contention ratio of approximately 33.

6.2.45 In November 2022, TM provided data demonstrating the assumed contention ratio experienced by Malaysian subscribers on its network where the value provided was relatively a stable measure. TM's actuals include significant volumes of copper, VDSL and fibre services. TM is of the view that the MCMC should therefore use this evidence provided by TM to set a reasonable contention ratio for the final model.

6.2.46 Given that TM carries a large proportion of the wholesale broadband traffic in Malaysia, TM also noted its observation that other Access Seekers are also utilising average contention ratios which are slightly lower than TM's assumed contention ratio provided by TM in November 2022.

6.2.47 Therefore, TM concluded that the MCMC's assumed contention ratios are not aligned to actual data of TM as well as Access Seekers. Similar to TM, most Access Seekers are also offering speeds of between 30Mbit/s and 800Mbit/s.

6.2.48 TM's proposed forecast (derived by adjusting the contention ratios) recognises TM's 2022 busy hour Mbit/s actuals as a starting point, growth in the forecast busy hour Mbit/s over the modelling period that follows a similar trend to the past growth.

6.2.49 TM provided comments on excessive busy-hour Mbit/s assumed in the core network for transmission services, as follows:

(a) In a stakeholder meeting, it was indicated that the Mbit/s per line for the Transmission Services is based on the midpoint of the speed range for the service. For example, the assumed Mbit/s per line for the "National leased line using 1Mbit/s to 1Gbit/s Ethernet access" service is 0.5Gbit/s (i.e., 500Mbit/s). A comment was made that actual Mbit/s data on these services was unavailable to the MCMC. This comment was incorrect as forecasts of both transmission lines/circuits and Mbit/s for a number of different transmission services were previously submitted by TM in May 2022;

(b) TM provided the comparison of the total transmission busy-hour Mbit/s forecast submitted by TM in May 2022 and the total in the revised v6 fixed model. TM submitted that the forecast in the revised v6 fixed model is significantly above TM's own submission, especially for the period 2023 to 2025 (the forthcoming regulatory period);

(c) The data provided in the May 2022 submission allows a Mbit/s per line for separate services to be calculated using actual historical data. TM has calculated the actual Mbit/s per line in 2021 for the modelled services where it can, using the appropriate categories i.e., the TM service (or services) whose lines were mapped onto the modelled services. A comparison of the values assumed in the revised v6 fixed model and the actual average for 2021 was submitted to the MCMC. TM opined that the actuals can differ greatly from the MCMC's assumed value. TM suggested the MCMC to follow the revisions based on the actual data it provided where all of these values should be taken together as a package of inputs. TM additionally submitted the adjusted mapping for its wholesale leased line services; and

(d) The most significant difference is for the "National leased line using 1Mbit/s to 1GMbit/s Ethernet access" service, where the average Mbit/s assumed by the MCMC (500Mbit/s) is greater than the actual Mbit/s per line, leading to a significant overestimate of the Mbit/s required for that service. TM highlighted that the MCMC should use the evidence provided by TM to improve the assumptions in the model to reflect the actual levels of transmission Mbit/s purchased by other operators over TM's network.

6.2.50 Finally, for its input on demand modelling, TM noted that the model assumes excessive assumption of "notional demand" where the model assumes 10 "notional" connections for a service in the absence of any existing demand.

TM notes that only one notional connection is actually required for the cost allocation, and some of the services have very high Mbit/s requirements per line.

OPEX Modelling

6.2.51 The estimated split of business overheads between network/wholesale and retail is cost-based. Other costs include outpayments and bad debt, which are out of scope in the context of the cost model and also should not attribute business overheads.

6.2.52 TM has reviewed the total OPEX in the revised v6 fixed model which captures the direct network OPEX, indirect OPEX (OPEX overhead), common network OPEX, business overhead OPEX, USP or licence mark-up on OPEX (this is effectively only for licences in the revised model, given that the USP component has been de-activated erroneously).

6.2.53 When compared to the submitted top-down information, TM is disappointed to see that large efficiency adjustments still appear to be made to the cost base. Assuming that the direct network OPEX, indirect OPEX (OPEX overhead), and common network OPEX are network costs and the remaining are network-attributable overheads, the modelled costs for 2022 onwards show a large decline compared to TM's historic costs for 2019 to 2021.

6.2.54 TM further elaborated the three operating cost categories in related to network (direct and indirect), network attributable overheads and wholesale customer-related to support its claim.

6.2.55 For network (direct and indirect) costs, TM commented on the presentation accompanying the revised v6 fixed model which indicated that direct OPEX is intended to capture maintenance and equipment energy costs whilst indirect OPEX accounts for the rental of vehicles/buildings required to operate the network, staff costs (salaries, medical insurance, provident funds), consultancy and outsourcing.

6.2.56 In November 2022, TM provided the MCMC with a very detailed breakdown of its operating costs for the years 2019, 2020 and 2021. This enabled TM to give the MCMC a comprehensive and complete insight into TM's actual cost base that reconciled back to its published financial statements.

6.2.57 TM commented that these correspond to categories in TM's network top-down OPEX breakdown. If aggregated and compared to the modelled network OPEX on a like-for-like basis, both direct and indirect are assumed to have a certain level of reduction in the model compared to TM's actuals. TM also noted that there is still some difference between the categories that are deemed allowable by the MCMC and the modelled costs.

6.2.58 TM notes that several of these categories are unlikely to be reducible. For example, electricity costs are unlikely to fall from 2021 levels, especially given the recent significant increases in energy tariffs.

6.2.59 Similarly, TM outsources many maintenance contracts using competitive tendering processes. TM has compiled evidence of these contracts which has been appended to TM's official PI submission to justify that the contracts are efficiently priced. TM strongly highlighted that it is unreasonable for the MCMC to assume TM can break existing contracts and negotiate lower rates unilaterally. Given the considerations above, TM insists that the MCMC calibrates direct OPEX to TM's levels without taking unjustified reductions as these costs are not reducible in reality.

6.2.60 TM is also concerned that the following significant top-down network cost categories appear to be ignored entirely in terms of the OPEX reconciliation:

(a) Network Operation Centre ("**NOC**");
(b) Network-related research and development ("**R&D**");
(c) Staff costs: Other benefits;
(d) Staff costs: Bonus;
(e) Cable maintenance; and
(f) Other costs which include staff communication costs.

6.2.61 TM urges that the MCMC includes the NOC cost within the model using an appropriate common network asset or the indirect OPEX mark-up. In the event that the MCMC disagrees with TM that this OPEX is already captured i.e. as the "IT.systems" asset, TM asserts that this is unacceptable as the annual OPEX of the "IT.systems" asset which is RM20 million in 2022 is significantly lower than TM's NOC OPEX. Therefore, TM finds it impossible that the NOC costs are currently included in the model.

6.2.62 TM also wishes to clarify that the NOC costs provided include staff costs and that these staff costs categories were not captured in the November 2022 submission.

6.2.63 For the NOC cost category provided in the November submission for the years 2019 to 2021, approximately 75% is staff costs for the NOC (covering salary, EPF, SOCSO, medical care, overtime and allowances), 10% is electricity costs and another 10% is rental costs.

6.2.64 Therefore, TM strongly recommends that either the OPEX for the IT.systems asset is significantly increased to reflect NOC OPEX or a separate asset called NOC is modelled and these costs included. Additionally, TM provided a summary document of the NOC facilities in its official PI submission.

6.2.65 TM also insisted that network R&D costs should be considered in the cost model if the MCMC desires for Malaysia to have world-leading networks and services for its population as an effective R&D function is required to help achieve that goal. TM recommends that this cost is included within the derivation of the indirect OPEX mark-up. TM provided a list of its R&D activities that have been undertaken since 2020 in its official PI submission to justify its input on network R&D costs.

6.2.66 TM noted that the MCMC is undertaking an unreasonably aggressive position as staff bonuses are not included in the OPEX calibration. TM commented that it is certainly not offering executive staff remuneration that can be deemed excessive in the context of other Malaysian companies, and therefore these costs are not inefficient and should be allowable.

6.2.67 TM does not believe that the MCMC has considered the other staff costs in the revised v6 fixed model. During the period 2019 to 2021, this cost category comprised of staff allowances, medical care and overtime as well as travel costs.

6.2.68 TM provided the outcome of a study with a reputable HR consultancy in 2020 where it is found that the 3 to 4 month benefits offered to non-executives are at-market rates and recommended no adjustments were required. The study indicated that it is a market practice in Malaysia to provide such benefits and that these allowances are provided for non-executive staff, including for the cost of living (e.g., financial support for the higher cost of living in urban areas), as well as other domestic and travel allowances.

6.2.69 TM also brought in a specific allowance related to the Covid-19 pandemic, since parts of the TM workforce were deemed critical workers and had to interact with the population at closer quarters. TM considers that these allowances and other benefits are what a reasonably efficient operator (and particularly a company like TM that has GLC responsibilities) would offer to facilitate health protection and financial support to the workforce and ensure that the staff are satisfied and incentivised as far as possible.

6.2.70 As a result, TM is of the view that the MCMC should consider that these benefits and allowances are reasonable in the context of Malaysia and should not be excluded from a reasonably efficient cost base. TM reiterated the need to provide competitive remuneration to attract and retain the talent necessary to run a leading-edge network and innovate. TM further stated that as a GLC, TM also shares the burden with the Government to support gainful employment in this challenging period of high inflation.

6.2.71 With regards to the MCMC's statement about the level of operating expenses and overall asset values in Section 7.9 of the PI Paper, TM submitted that there are currently several divergences in the modelled cost base and, as of yet, the MCMC has not explained them. TM opined that if an adequate explanation is not provided on the divergence between TM actuals and modelled output, then the divergence must be reduced or removed by adjusting the modelled output.

6.2.72 TM urged the MCMC to reflect the wholesale customer-related cost in the model, as this cost did not seem to be captured at all. TM has substantial wholesale activities (to the benefit of Access Seekers in Malaysia) and should be allowed to recover the costs of providing these wholesale activities to wholesale customers for the wholesale services that it sells. This is entirely consistent with the principle of cost causation.

6.2.73 It should also be noted that wholesale customer-related expenses are incurred by TM to support the various obligations that the MCMC directs as part of the MSA Determination. It is inconsistent where on one hand, the MCMC wants Access Providers to improve on the wholesale standards, responsiveness and SLAs but does not allow the necessary wholesale-related costs to be captured.

6.2.74 TM recommended that the OPEX of an asset included within the common network mark-up be increased to adequately reflect the costs incurred by TM.

6.2.75 TM recommended that the modelling of business overheads is revised so that the overhead mark-up is applied to all costs, including indirect costs. TM also noted that the MCMC's inclusion in its derivation of the overhead mark-up is unclear. TM also commented that the current mark-up is barely recovering the categories included in the derivation of the mark-up i.e. vehicles, management and professional services, bank commissions, utilities, office supplies and maintenance and employee salaries.

6.2.76 TM noted that the revised v6 fixed model is producing significantly less overhead OPEX attributable to the network than can be derived from TM's top-down data. TM's overhead costs that are attributable to the network part of TM's business comprises of donation to Yayasan Telekom Malaysia (TM's scholarship programme), R&D (corporate related), sponsorship or corporate social responsibility and general staff training. TM is of the view that these overhead costs are unique to TM as a GLC as the costs revolves around TM's initiatives which contributes to the wider economy.

6.2.77 TM observed that in the model, the business overhead mark-up has been applied to the network CAPEX and direct OPEX but not to the indirect OPEX. This is not consistent with how business overheads are derived in the models built in other countries, where a mark-up for these costs is usually applied as the final stage on top of all costs.

6.2.78 TM recommends that the modelling of business overheads is revised so that the overhead mark-up is applied to all costs, including indirect costs. TM also noted that the top-down categories included by the MCMC in its derivation of the overhead mark-up is unclear as the current mark-up barely covers the categories such as vehicles, management and professional services, bank commissions, utilities, office supplies and maintenance and employee salaries.

6.2.79 TM provided details of the above categories excluding employee salaries for 2021 as comparison to the modelled "network-attributable overhead OPEX" to justify its remark.

6.2.80 TM further commented that the MCMC did not capture TM's two very large overhead OPEX categories in TM's overhead cost base which encompasses of employee costs and other support and maintenance costs. TM stated that the two costs are corporate-related and as such, a portion should be recoverable by

the network part of TM's business as network-attributable overheads. As a consequence, TM should not be assumed to be able to recover the costs of any corporate-related staff or maintenance through its network functions.

6.2.81 The MCMC has set the mark-up for USP to zero in the revised v6 fixed model, having been 6% in the draft v5 fixed model. In the January briefing presentation, it is justified on the basis that the "USP levy for a hypothetical operator will be offset by the receipt of USP funds". TM strongly disagrees with this assumption.

6.2.82 TM provided correspondences from the MCMC received in Q3 2022 which indicates that TM will not be able to offset the levy through the receipt of USP funds over the next few years. TM highlighted that only the mobile operators are able to claw back investments from JENDELA ("**Jalinan Digital Negara**") using USP funds. Therefore, TM requested that the final fixed model has the mark-up restored to the value assumed in the draft v5 fixed model.

6.2.83 TM observed that not all modelled overhead costs have been included in the passive access cost calculations. For example, the calculation of the costs related to pole assets used total annual cost, marked up for business overheads and USP. Total annual cost includes CAPEX and direct OPEX but not indirect OPEX and common network costs. TM submitted that the two costs should also be recoverable by these services, as they are also network-related overhead costs.

6.2.84 TM provided correction of multiple formula on its worksheet in relation to the calculation of the passive access costs which appears to be underestimated, at present.

CAPEX Modelling

6.2.85 TM also commented on the remaining shortcomings in the FDA adjustment. TM acknowledged the approach taken by the MCMC which is now closer to the best practice applied in EU Member States.

6.2.86 However, TM is also perplexed as to why the MCMC has not implemented TM's data for all categories since this data reflect the actual proportion of FDAs present in the network as of late 2022. Specifically, TM noted that the MCMC did not use the data provided by TM to adjust the copper and access Civil Works ("**CW**") asset categories but instead use values documented only as "Network Strategies assumption".

6.2.87 Based on clarification provided by the MCMC in a meeting with the industry, it was indicated that the assumption for the "access CW" category was derived by a comparison with top-down data. This does not make sense to TM since the proportion provided by TM (75%) automatically ensures consistency with TM's top-down data.

6.2.88 TM also recommended that no adjustment is applied to the fibre category, however, the MCMC has used the proportion derived from TM's data. TM still questions this assumption, since good practice in other countries (and recommended by the EC) has been to reflect the replacement cost of fibre network assets and make no adjustment for FDA since fibre networks are still relatively new.

6.2.89 In the revised v6 fixed model, TM is not clear about costing assumptions on fibre feeder cables used for copper cabinets. If this is a justification for why fibre should have FDAs removed, then it is still incorrect to apply the proportion since the model does not consider fibre feeders for copper cabinets. In any case, these fibre feeder assets will be removed from the network as part of the copper shutdown and thus from 2025 onwards (when copper shutdown has been completed), the proportion applied for fibre assets should be 100%. TM therefore emphasises again to the MCMC that this proportion should be set to 100%, consistent with best-practice fibre network cost modelling.

6.2.90 TM provided its proposed values to the MCMC to update the relevant costing assumptions cells.

6.2.91 TM also expressed its views on the reduction in assumed unit costs of certain assets between the draft v5 fixed model and the revised v6 fixed model. In particular, the CAPEX assumptions for the EPE and NPE assets have been reduced significantly with TM's cost submissions from actual procurement of the assets seemingly rejected in preference to benchmarks. TM is unclear if the benchmarks are Malaysia-specific or extracted from other sources and, if the latter is true, whether appropriate adjustments have been made for inflation and forex.

6.2.92 TM is particularly concerned about the low values for EPE or NPE assets. TM notes that whilst the prices may appear higher than those in the draft v5 fixed model these units can service higher capacities. For example, each 10G EPE card

in this contract has 20 ports, whereas the draft v5 fixed model assumed 4 ports per card and the revised v6 fixed model assumed 10 ports per card.

6.2.93 TM does not recognise the CAPEX values for EPE or NPE assets used in the revised v6 fixed model as the values are unreasonably low. TM expects the MCMC to use the values from TM's new contract as a primary input in deriving the unit costs for the final model since the values are Malaysia-specific, current (agreed only a few months ago) and competitively set given the tendering process and discounts applied in the subsequent supplementary agreements.

6.2.94 TM also provided a copy of its maintenance contract in its official PI submission to justify the maintenance of these assets. Based on TM's maintenance contract, TM concludes that the revised v6 fixed model must be understating network OPEX since the modelled network OPEX barely covers maintenance, and cannot therefore capture other direct network costs i.e. electricity and air-conditioning.

6.2.95 TM highlighted that the MCMC has assumed exceptionally low costs per metre of trenching that TM cannot achieve as the input values for the per-metre costs of trenching have been significantly decreased compared to the draft v5 fixed model. TM strongly disagrees with this revision and has investigated the costs of its own trenching activities in detail in order to provide the best possible evidence to the MCMC to justify that this reduction must be reversed.

6.2.96 TM has undertaken a deep investigation of the actual trenching costs incurred by TM in the year 2022 and has provided to the MCMC the summary of an extract of actual trench kilometres dug by trench method from TM's systems. Additionally, TM provided the summary of data from purchase orders raised in 2022 for trenching activities which includes the metres dug, the trench method and the associated trenching costs (as well as any reinstatement costs or milling) which have been extracted from its purchase orders to derive average unit costs paid for trenching per metre by trenching method.

6.2.97 The key observation is that a significant proportion of TM's trenching work uses Horizontal Directional Drilling **("HDD")** which is clearly a more expensive method. The use of HDD is frequently imposed by other parties and is not the choice of TM. The MCMC acknowledges this fact for CW in Malaysia in its own best-practice document (reference MCMC MTSFB TC G025-1:2020).

6.2.98 However, the cost per metre in the revised v6 fixed model can only be so low if the lower cost methods (open-cut trenching and micro-trenching) are being assumed to be used across almost the entire modelled network. This is not the situation that TM finds in real-life deployments where TM is not free to choose its trenching method and must abide by the requirements of other parties.

6.2.99 TM provided an example of a one-stop state government agency in Selangor co-ordinating permit approvals in relation to wayleaves. This agency amended TM's application to use HDD rather than micro-trenching. TM provided the permit approval document as an appendix in its official PI submission to support its views. TM would like the constraint to be reflected in the final fixed model by blending in a significant proportion of HDD trenching into the assumed trench unit cost.

6.2.100 TM recommended taking the blended average cost per metre which it proposed in its official PI submission which gives the final trenching cost when permit costs of RM21/m are included. Should the MCMC still seek to consider other sources for trench costs i.e. those submitted by other operators, then TM proposed that the MCMC should blend them together using a consistent mix of trench methods. TM expects that HDD will have been entirely (or almost entirely) absent from other benchmarks given the low value calculated.

6.2.101 TM would like the MCMC to be mindful that TM is the only fixed network operator with a nationwide footprint with its GLC obligations. As a result, TM does not have the luxury of cherry-picking deployments only in commercially viable areas with low roll-out costs and high revenue potential, unlike other operators in the market. TM hopes that the MCMC gives considerable weight to TM's unit cost dataset which it provided in its official PI submission since it reflects TM's most recent trench deployments as well as TM's real-world constraints in terms of trenching method selection.

6.2.102 TM submitted that any non-Malaysian cost benchmarks for trenching activities must be avoided since the costs of trenching are highly country-specific, driven by the labour and terrain of the country. Also, the benchmarks from other countries have little practical application in this context. TM highlighted the case in other jurisdictions i.e. in the Final Pricing Principle in New Zealand where the full focus for deriving trenching costs was using New Zealand-specific data to substantiate its views.

6.2.103 Apart from the above, TM also provided its inputs on the costing for its exchange buildings which was stated as inefficient in the MCMC's January 2023 presentation. The MCMC's January 2023 presentation indicated reduction of exchange building costs and this causes grave concern for TM as TM worries that the MCMC will make opaque and poorly justified or unjustified or unwarranted efficiency adjustments to this cost category.

6.2.104 TM stated that it is able to provide evidence that the modelled cost levels are more than likely being underestimated. TM considers the information in relation to the following to substantiate this claim:

(a) number of exchange buildings in the network;
(b) the absolute value associated with exchange buildings; and
(c) any potential adjustments with regard to the amount of space required by TM in its buildings on a forward-looking basis for network – related purposes.

6.2.105 TM emphasized that the MCMC has chosen and justified a modified scorched node approach for the fixed model. Therefore, whilst the functions present at nodes can be modified, the number of locations must be preserved in principle and thus, TM expects the number of exchange buildings modelled to be kept as is.

6.2.106 TM provided inputs on total value of exchange buildings and clarified that the category submitted by TM includes exchanges, data centres and transmission / satellite/submarine cable stations. TM highlighted that these are however not the only exchange building-related costs in the cost submission. The GBV of the categories, namely the Network Heating, Ventilation and Air Conditioning ("**HVAC"**), security systems, land and fixtures, fittings and office equipment as submitted to the MCMC are also relevant to the technical buildings.

6.2.107 TM noted that the category "Network HVAC and security systems" was included as a common network asset in the revised v6 fixed model, which was previously omitted in the draft v5 fixed model. However, the GBV is significantly lower and the MCMC did not justify the significant reduction.

6.2.108 To TM's knowledge, the category "Fixtures, fittings and office equipment" and the category "Land" are not included in the revised v6 fixed model. A significant portion is associated with technical buildings. TM also indicated that the revised

v6 fixed model's CAPEX is much lower than TM's actual GBV for these assets. Hence the modelling starting point of exchange building cost is being understated. Moreover, this represents the book value of TM's exchange building in historic cost terms. TM commissioned a valuation of these buildings for insurance purposes in August 2019 and the screenshot of the final valuation table was provided by TM in its official PI submission.

6.2.109 TM's valuation covers the building core, fit-out and civils, but excluding land in 2019 currency. This replacement cost valuation corresponds to the sum of TM's "Network HVAC and security systems", "Exchange buildings" and "Fixtures, fittings and office equipment" categories, totalling RM3.46 billion. Therefore, on this basis, revaluing TM's exchange building-related GBV in current cost terms leads to a substantial increase in capital value.

6.2.110 As described in Section 6.9 of the MCMC's PI Paper, the fixed model should be considering current costs "With respect to the fixed network while the MCMC's proposed methodology encompasses current costs, it also takes account of historical costs for the access network through application of the EC long-lived assets compromise approach." Therefore, the exchange building assets should be revalued into current costs.

6.2.111 Finally, although the MCMC did not ask for the data on floor space usage of TM's technical buildings, TM provided an estimate of this data available as of 2021 which indicated that the vast majority of the area in these buildings is used for network purposes, with only a slight percentage used for other purposes (retail/data centres).

6.2.112 TM stated that it is able to provide the profile of its technical buildings in terms of the number of floors. Almost three-quarters of TM's exchange buildings are single-floor in nature (i.e., ground floor only), meaning that there is little scope to reduce the size of these buildings going forward (such as by leasing out a floor).

6.2.113 Furthermore, TM uses separate floors in its larger buildings for the central core locations to separate equipment by purpose for more efficient logistics of operation. For example, one floor may contain MDFs, another power systems and batteries, another transmission equipment, and another office space. Therefore, TM does not consider there to be any need to reduce the assumed

cost of exchange buildings in the model with efficiency adjustments. The only adjustment that would appear warranted would be the slight reduction in the value, mentioned earlier, to reflect the floor space usage for non-network-related functions in the exchange buildings.

6.2.114 TM further elaborated on formula adjustments to the modelled exchange building costs. TM proposed removal of floor space that is not used for network purposes of the model.

6.2.115 TM noted that in relation to the poles CAPEX modelling is on out-of-date. TM submitted that the value used in the revised v6 fixed model were submitted to the MCMC by TM in its May 2022 data submission. However, TM provided a further submission on 15 November 2022 where a more recent cost value was provided. Therefore, TM request that the material cost is revised to reflect both (i) the current requirement for increased use of iron poles in network deployments and (ii) the recent rapid rise in material cost of iron poles. The installation maintains at RM115.

6.2.116 TM also appended the unit cost of poles by type over the last ten years and the blended average based on those poles deployed in-year in its official PI submission which indicated that the cost of an iron pole has increased significantly since 2020 whilst the use of iron poles has also increase. This had a significant impact on the unit cost of a pole and should be reflected in the fixed model. TM enclosed a screenshot of one of TM's current contracts with vendors and the cost of poles incurred following the completion of a procurement process via open tendering.

6.2.117 TM highlighted that the pricing for iron poles in these contracts is not fixed for a period of time, but rather uses an index to adjust for fluctuations in the price of steel and the exchange rate between MYR and USD and that both factors have been fluctuating significantly since 2020. TM provided the steel price index from January 2020 to January 2023 which showed that there is a steep increase in the index in 2021 and 2022 compared to 2020 that further explains the marked increase in the cost of iron poles. TM emphasized that the price schedule shows only a "basic" price whilst the price adjustment formula derives the final price. To illustrate, TM provided calculations of the final price daily for 2022 for Peninsular Malaysia.

6.2.118 TM requested that the modelled input pole material cost be more reflective of current market conditions, such as the average value for 2022 as displayed in its data for material cost of poles.

6.2.119 TM stressed that the adoption of an unjustified downward adjustments on pole prices by the MCMC will automatically be interpreted as an acknowledgement that TM can use cheaper concrete pole types at the expense of a longer roll-out time which will impact on TM's ability to cater to and react to the MCMC's requirements on the Demand List obligations introduced in the MSA. TM stated that TM will take this as an acknowledgement from the MCMC that more time can be taken to resolve pole-related issues.

Network Modelling

6.2.120 TM stressed a number of points in relation to network modelling, such as incorrect calibration of the mix of access and core civils, under-dimensioning of cabinets especially the FDC, incorrect omission of national submarine costs from the HSBB service, absence of growth in the duct or manhole network over the modelling period, certain utilisation factors which remain aggressively high, under-estimation of busy-hour voice, omitted routers for interconnection of broadband traffic, unrecognised subscriber capacity constraint of Edge routers, insufficient transmission links between the NPE and parent edge router and lack of direct backhaul links between OLT and parent node.

6.2.121 The MCMC has calibrated the access civils cost to be more than 80% of total civils costs.

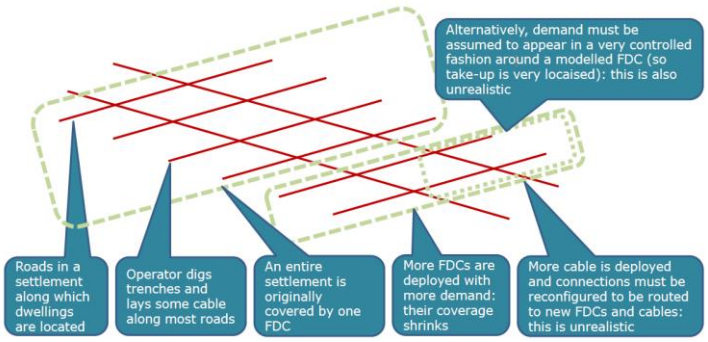
6.2.122 In its additional data submission in November 2022, TM provided the total GBV for both "Access network CW (trenches)" and "Transmission CW". The GBV of FDAs for those categories was also provided, meaning that the GBV excluding FDAs could also be derived. Therefore, model should be calibrated accordingly. This calibration step should only be taken after more reasonable trench costs have been assumed.

6.2.123 In the revised v6 fixed model, cabinets (specifically FDC) are dimensioned based on active subscribers. However, the number of cabinets should be modelled based on premises passed rather than active subscribers to leave sufficient capacity for future growth in take-up. TM consider this issue as still a material

deviation since the model deploys far fewer FDCs than TM has had to deploy in its actual network.

6.2.124 In reality, TM deploys FDCs in roadside cabinets which does not necessarily constitute the full capacity of the FDCs as it is depending on the density of the areas and availability of fibre routes connecting to distribution point serving the premises. TM provided its diagram on the deployment of the fibre network versus how the revised v6 fixed model is deploying the fibre network. Figure 2 shows how the revised v6 fixed model is deploying the fibre network.

Figure 2: How the Revised v6 Fixed Model deploys the Fibre Network



6.2.125 TM submitted that the MCMC model should therefore better reflect the realities of fibre network deployment, with network build occurring more substantially ahead of demand. This could be accomplished by using a utilisation factor time series for FDC deployment, where the utilisation factor increases over time to the value assumed in the revised v6 fixed model. The factor value for 2022 can be derived by calibrating to TM's actual FDC asset counts in 2022.

6.2.126 TM finally emphasized that failure by the MCMC to consider its JENDELA commitment and the costs involved in this regard will mean that the MCMC endorses a deployment approach where TM does not deploy FDCs ahead of demand, which goes against the MCMC's own JENDELA programme. This also implies that the MCMC accepts a much longer waiting time for TM to clear the demand list for HSBB services.

6.2.127 TM clarified the incorrect omission of national submarine costs from the HSBB service where the allocation factors for the two national submarine cable systems should be set to 1 for the three HSBB services as well as for the High Speed Broadband Access ("HSBA") service. This is because this cable system

can be used to carry internet traffic from the HSBB subscribers in East Malaysia to Peninsular Malaysia. Therefore, HSBA or HSBB services should be modelled as using this asset.

6.2.128 TM highlighted the absence of growth in the duct/manhole network over the modelling period as the access network trench/duct/manholes are still not increasing over time in the revised v6 fixed model (but cabling is still increasing). The number of trench or duct or manhole assets should be increasing if network coverage is increasing. TM, however, notes that improvement has been made to the pole assets added in the revised v6 fixed model where the newly modelled poles are therefore increasing over time.

6.2.129 TM submitted that a similar implementation should be assumed for the trench or duct or manhole assets as these network assets are also increasing in inventory. The above data indicates that a percentage increase of at least 1% in trenches would be reasonable.

6.2.130 TM reminded the MCMC that new developments require trenching from TM to cover these areas as these areas are not always commercially viable to cover, but TM as a GLC has the obligation to do so. As an example, TM explained about how the Government requested TM to take action through a letter from Istana Negara in April 2022 requesting the provision of Unifi infrastructure at Kampung Mukut, located on the southern tip of Pulau Tioman. The project has fewer than 100 households and lack of opportunities to fiberise the existing mobile tower.

6.2.131 TM further expressed its disappointment on the rejection it received from the MCMC for clawback 2019's proposal submission on the fibre network deployment in Kampung Mukut. Despite the rejection, TM was 'obliged' to deploy fibre network in Kampung Mukut using TM's own funds upon the Government's 'special' request.

6.2.132 TM submitted considerable commentary on the assumed utilization factors in the model which remained too aggressively high. Whilst the revised v6 fixed model does have more reasonable values for certain assets, the copper asset utilisation factors have been set to 100% (copper distribution cable, MSANs) making the network as small as possible during shutdown. It is impossible for a shutdown to be very efficient since the residual demand will be dispersed across the country and therefore some underutilized equipment remaining active is

inevitable. The utilisation factors from the draft v5 fixed model should, therefore, be restored for these assets.

6.2.133 In the revised v6 fixed model, busy-hour fixed voice traffic is still calculated assuming all days are busy days. TM pointed out that this is incorrect as busy-hour voice should be calculated using the number of busy-days and the proportion of traffic in busy-days. TM further added that the necessary input data has already been provided by TM and is already present in the MCMC's revised v6 fixed model but was not used by the MCMC.

6.2.134 TM previously commented on this point and whilst the MCMC did make the suggested changes, it is no longer used in the revised v6 fixed model and as such, the change whilst apparently accepted, appeared to be not implemented.

6.2.135 TM proposed that the MCMC makes changes according to TM's proposed formula with regard to demand forecasts in the final model.

6.2.136 TM also submitted that TM has provided the network and cost information on a number of routers in its network, including iMSE, iBSE and HSE routers in its initial submission. However, the v6 model only considers the Edge routers ("**ER**") where these are used for aggregating data traffic. However, these routers are also used to interconnect data traffic to other operator networks, including operators that are subscribing to the HSBA or HSBB Layer 3 services.

6.2.137 Therefore, TM recommend that two assets be added to the asset list for the modelled core network infrastructure. The HSE router network or cost information provided by TM can then be used to dimension and cost these assets as these routers are currently used by TM for interconnecting broadband traffic.

6.2.138 HSE routers were indicated on the network diagram included within the "1. Services" worksheet in TM's data submission. These new assets can then be labelled as "HSE.Chassis" and "HSE 100G ports". TM further noted that adding these assets would require changes on the following worksheets:

(a) addition of the assets to the named ranges "Full.resource.list" and "Traff.driven.NE" on the "Network Element Lists" worksheet;

(b) addition of network/cost inputs to the "Cost Data" and "Resource Capacities" worksheet;

(c) addition of allocation factors to the traffic-related tables on the "Allocation Factors" worksheet;

(d) addition of dimensioning calculations of HSE cards and chassis on the "Core Network" worksheet;

(e) extension of the asset list calculations on the "Network Summary", "CAPEX Trend" and "CAPEX Trend" worksheets; and

(f) extension of the costing calculations on the "Network Cost" and "LRIC plus" worksheets.

6.2.139 According to TM, the refinement to the model will ensure that the use of routers for interconnection with other operators will be captured in addition to their use for traffic aggregation in the network.

6.2.140 In general, TM strongly recommends that the asset lists for the access network and core network assets be extended on the "Network Element Lists" worksheet as the lists remain fully occupied. TM is of the view that good modelling practice should ensure availability of space entries for the addition of further assets, if required, to avoid the risk of calculation errors if a list needs to be extended throughout the model.

6.2.141 The revised v6 fixed model considers one type of service that is the edge router. The number of units required are dimensioned based on busy-hour Mbit/s. Whilst the asset is primarily capacity-driven, another constraint on the iBSE or iMSE chassis in TM's actual network is the number of served broadband termination points. TM proposed that similar constraint should be imposed on the modelled ER.

6.2.142 Moreover, to ensure the growth in broadband users can be accommodated and to ensure a resilient service for subscribers, iBSE or iMSE chassis in TM's actual network are deployed in pairs with each one in the pair loaded up to 50% capacity in terms of connected broadband users. In the event of a failure in any one unit in the pair, all the demand can be served by the remaining unit in the pair. This gives "local" resilience for the broadband service in the network.

6.2.143 TM also submitted the real-life assumption of the number of connected users per chassis, the number of ER chassis required in the model to serve the

modelled users in 2022 which should be increasing a certain value by 2025 rather than the same number of ER units in the revised v6 fixed model for all years between 2022 and 2027.

6.2.144 TM proposed that the MCMC refines the network design so that ER units are constrained not just in terms of the busy-hour traffic they need to carry but also the actual number of broadband users they serve according to these design rules, as they reflect a level of resilience that Malaysian broadband users expect.

6.2.145 TM also provided record of this good practice from their network planning documentation for the iBSE where the same is applied for iMSE units.

6.2.146 TM described about the insufficient transmission links between the NPE and parent edge router where all modelled Dense Wave Division Multiplexer ("**DWDM**") assets appear to be significantly lower than TM's actuals. TM felt that certain types of transmission links are being under-dimensioned.

6.2.147 For example, there should be two separate paths connecting an NPE back to parent ERs (for resilience purposes). TM is of the view that this resilience is currently not being modelled in the network design of the cost model. TM also added that additional ports should be deployed on the DWDM units at the NPE layer for this purpose.

6.2.148 Finally, TM highlighted the lack of direct backhaul links between OLT and parent node. TM has reviewed the modelled core network infrastructure compared to that submitted by TM and captured in the revised v6 fixed model. The fixed model considers three network layers of rings, which is consistent with the left-hand side of the diagram submitted by TM in its official PI submission. TM also submitted a diagram where TM's actual network has local rings, aggregation rings and core rings whilst the MCMC's model has aggregation rings, regional core rings and core rings.

6.2.149 However, TM noted that the HSBB or fibre-specific links on the right-hand side of the diagram are not being captured. These are the dedicated backhaul links between the OLT and NPE which are necessary due to the higher capacity requirements for fibre services. Each OLT in reality has a route back to two separate NPEs deployed for resilience rather than the one link implied in the diagram, which it submitted. In the revised v6 fixed model, 1+1 uplink port

redundancy is now included for OLT, but it now connects to the EPE, not the NPE.

6.2.150 TM indicated that some of the links are not co-located within the same building and therefore require additional core network cabling routes to be built. TM indicated where these routes should be added to the fixed cost model. TM also recommended renaming the said section in the fixed cost model as rings, spurs and nodes for clarity. These routes should then be allocated to fibre access services.

6.2.151 TT dotCom is agreeable on the bottom-up model. However, TT dotCom is disagreeable with the use of LRIC+ model which is incremental in nature and heavily discounts the previous fibre and civil investments made, which were expensive in the earlier rollout years. Additionally, the costs for fiberization will not reduce at the same rate as equipment and may instead increase due to other factors including permitting and labour costs. For fixed network, TT dotCom recommends the MCMC to consider the use of a FAC model for fibre investment.

6.2.152 U Mobile was pleased to see that in version 6 of the cost model the forecast number of fixed access lines in Malaysia was assumed to be fairly constant rather than forecasting a material decrease as had been the case in version 5. In addition, in version 5 large bandwidth FTTH products showed a reduction in demand whereas version 6 rectified this anomaly.

6.2.153 With regards the forecast demand for end-to-end transmission links, U Mobile believes that the figures should be higher. U Mobile noted that its current usage of this product is greater than the assumption for the market demand in the cost model. The picture conveyed by the forecast is of an operator going nowhere despite investing in an all-fibre access network. Significant traffic growth is assumed for mobile and U Mobile do not see why that would not be the case for fixed also. U Mobile stated that they have highlighted this point in their written submission to the MCMC on 17 November 2022 but the updated version 6 of the model did not reflect it.

6.2.154 Overall, U Mobile is of the view that the costs in the fixed model is too high. One example of this is exchange buildings. As the old copper based infrastructure is being decommissioned, typically the number of exchanges and the floor area per exchange location decreases. U Mobile noted that the MCMC's consultant

made reference to BT in the UK during an industry meeting and the plan to decommission 4,500 exchanges from its fixed network.

6.2.155 U Mobile also stated that the fixed cost model needs to reflect a similar trend to these other markets. Finally, during a meeting with MCMC, the MCMC's consultant flagged a concern about FDA still being captured in the fixed model. U Mobile shares this concern and believes it to be a contributing factor to the high resulting FTR values. U Mobile urges the MCMC to fully investigate this matter on behalf of the industry because the other stakeholders do not have access to TM's detailed asset information.

6.2.156 YTL commented that the bottom-up LRIC+ approach based on a scorched-node is appropriate. However, YTL noted that the use of replacement costs to value the cost of the network may result in an increase in costs as many of the fixed line assets are either legacy assets, well depreciated or have been funded by the Government via HSBB and Broadband to the General Population. The application of replacement costs in the valuation of the assets will cause overpricing of the network facilities and services eventually harming the Rakyat.

6.2.157 XOX suggested an annual review for the allocation of duct and trenching costs to the access and core networks as the model reconciliation could be incongruent with industry movement in the future.

Discussion

Demand Modelling

6.2.158 TM has made a number of assertions concerning appropriate demand assumptions for the fixed network. Firstly, the MCMC would like to clarify that, contrary to TM's allegation, the MCMC does not simply accept data from any operators naively. The MCMC seeks all available sources of relevant data to support its analysis, undertakes comparisons and benchmarking and then makes informed judgements. The MCMC further notes that TM, in relation to a number of data items, has over recent months provided so-called "refined" estimates which effectively have modified or changed the data received in its original data submission. The MCMC does not accept data from TM or any other operator without question, and where amendments to data have been made the MCMC investigates the underlying reasons.

6.2.159 For the avoidance of doubt, after careful consideration of all data sources the MCMC revised its demand forecasts as follows:

(a) For fibre based broadband services, the forecast for the number of broadband lines was increased. Previously, the MCMC forecast – based on assumptions for the household growth rate and household take-up – was modest and did not sufficiently capture the impact of migrating copper broadband subscribers to fibre broadband. The MCMC's subscriber demand model was subsequently revised, and re-based using the most recent data (Q3 2022) provided to the MCMC as well as demographic data for September 2022 from Statistics Malaysia. It was calibrated to be consistent with the migration from copper broadband. Traffic generated by the updated forecast is consistent with the average broadband line speed provided by TM; and

(b) For voice traffic, the forecasts were updated based on the most recent data on total call minutes and call durations provided to the MCMC (to Q3 2022).

6.2.160 The MCMC has revised the traffic demand for each transmission or leased line service. The new forecast is based on TM's actual data in 2020 to 2022. The average trend over the most recent 'two' years was used to forecast the traffic for each service over the regulatory period.

6.2.161 Demand for all TM's leased services, including wholesale and retail leased lines, are now mapped into the national leased line services included in the model. For the avoidance of doubt, the traffic demand of Metro Ethernet hub and spoke services were added to 'National leased line using 1Mbit/s to 1GMbit/s Ethernet access' service in the model.

6.2.162 Traffic demand for End-to-End Transmission Service was entirely based on TM data submitted after the revised model was reviewed.

6.2.163 For fibre-based Transmission Services for which TM has no 'existing' demand, such as trunk transmission and IP transit, only 'one' notional line has been assumed in the final model. The traffic carried by the line is an average of the maximum line speed. At least one service line is required to calculate the service.

6.2.164 For WLLC services only 'one' notional line was assumed for each service. The traffic carried by each line is assumed to be equal to similar wholesale leased lines provided by TM. At least one service line is required to calculate the service.

6.2.165 U Mobile claims that demand for End-to-End Transmission Services should be higher. The MCMC agrees that the demand for this service seems significantly lower than leased lines services. However, in the absence of further evidence, no adjustments have been made to the number of lines of this service.

6.2.166 The MCMC checked the total modelled demand in 2022 and found that is broadly consistent with TM data. The MCMC therefore considers that every effort has been taken to calibrate the demand forecasts with TM data, however notes that provision of accurate data at an earlier stage of the MSAP process would have facilitated the calibration and reduced the need for the MCMC to make assumptions which were subsequently refuted by TM.

Assumptions for Contention Ratios

6.2.167 The MCMC has reviewed all information provided on contention ratios. The MCMC noted that in its initial May 2022 submission TM presented only an average contention ratio, with no information on the contention ratio by broadband service category. The average contention ratio submitted by TM significantly underestimates the total broadband traffic, which subsequently leads to high costs for broadband and transmission services. After publishing the draft and the revised model, both Maxis and TM submitted recommendations for contention ratios. These served as a guide for the MCMC to optimise the contention ratios in the final model. Furthermore, the contention ratios were adjusted in two steps, including:

(a) forecasting total broadband traffic assuming an annual traffic growth of 28.5% starting from 2021. The base year total broadband traffic (2021) is derived from actual TM data; and

(b) adjusting the contention ratios year by year to match the traffic forecast over the regulatory period. The base contention ratios used in the model are:

a. 1:10 for broadband services up to 20 Mbit/s;

b. 1:20 for broadband services between 30-50 Mbit/s;

c. 1:33 for broadband services at 100 Mbit/s;

d. 1:80 for broadband services between 300-500 Mbit/s; and

e. 1:140 for broadband services at 800 Mbit/s.

6.2.168 The assumed traffic growth is well within international trends and is consistent with local trends. To match the traffic forecast, the contention ratios were assumed to decrease by 13% annually.

Utilisation of Copper Network

6.2.169 TM commented that the utilisation factors for the copper network are aggressively high and the MCMC acknowledges that while demand is likely to diminish at an accelerated pace over the first two years of the modelling period (2023-2024), TM is still obliged to maintain the under-utilised assets until the phase out of copper assets. The MCMC agrees to maintain the utilisation levels of copper related assets at a level equal to fibre based assets in the access network.

Modelling Inputs

6.2.170 Maxis raised concerns that some of the assumptions in the model are a result of calculations and modelling steps that are not included in the model. The MCMC ensures that all calculations essential for cost modelling are made inside the fixed model. No other models have been used to generate the inputs. The only exception is the calculation of the business overhead. This is calculated outside the model due to confidentiality reasons. However, the steps used to calculate the overhead cost can be found in a publicly available reference document.[5]

6.2.171 The additional assumption for the duct sharing ratio is not a result of a calculation outside the model. It is an adjustable assumption. This is initially set to 25% for consistency with the previous MSAP. Other input assumptions are either provided by TM or based on benchmark data where appropriate. The source of the assumptions is included in the model. It is also a common modelling practice to include the operating cost as a percentage of the capital cost. In this regard, calculations outside the model were restricted to sanity checks to ensure that the operational costs (provided as percentages of capital costs) are representative of the direct operational costs. The MCMC welcomes

[5] Ofcom 2011. Wholesale mobile voice call termination Modelling Annexes, Annex 9. Available at https://www.ofcom.org.uk/__data/assets/pdf_file/0026/53981/mct_statement_annex_6-10.pdf.

Maxis' recommendations for simplifying the model. However, the MCMC believes that maintaining the current structure of the model is important to allow stakeholders to track changes easily.

6.2.172 With regards to Maxis' concern about the extent of redaction in the model, the MCMC believes that this has been addressed sufficiently in the revised model. Confidential data has been adjusted within margins that allow a judgement of the model. Forecasts conducted by the MCMC have not been redacted in the model.

Routing Factors

6.2.173 The MCMC has updated the routing factors in the revised model upon further clarifications from stakeholders. The purpose of the routing factors is to determine how much a certain service uses a network element compared to another service. This underlies the basic methodology in determining the routing factors. For example, traffic of transmission services typically traverses two aggregation and two edge rings to connect two points while traffic of leased lines typically traverses aggregation and edge rings only once and is terminated in the core. Hence, transmission services utilise aggregation and Edge routers twice as much as other services.

6.2.174 For some services, the MCMC considered the fact that a proportion of subscribers is in East Malaysia and will use the domestic submarine cable. This includes voice, broadband and leased line services. The fraction of 0.18 included in the allocation table for these services represents an estimate for the proportion of subscribers in East Malaysia. The only exception is on-net voice services where the probability of the callers being in East Malaysia is 0.29. In the final model, the WLLC does not use the domestic submarine cable. The traffic cost of WLLC only consider a local connection (without submarine cable) to a Point of Interconnect ("**POI**"). The MCMC assumes that if the POI is located at a location where a domestic submarine cable is required, the service should be complemented by a trunk transmission service. A factor of 1 for submarine cable is only considered for submarine-cable specific transmission services that are differentiated from other transmission services not using a submarine cable.

Proportion of Access Ducts to Core Ducts

6.2.175 Maxis commented that the assumption that 93% of ducts are allocated to the access network might be overstated. It is important to note that this assumption is only used to adjust the proportion of access duct costs to core duct costs. The key issue is the proportion of the cost allocated to the access and core networks. This proportion has been compared to submissions by two Malaysian operators and international benchmark data to ensure that it is valid.

6.2.176 The MCMC believes that determining an accurate level of duct sharing between the access and core network is a difficult exercise which ideally requires measurements of how much space is occupied by the access and the core cables in shared ducts. As such, a high-level calibration based on a comparison between modelled costs and top-down data remains the only viable solution.

OPEX Modelling

6.2.177 TM in assessing OPEX and overhead allowances in the fixed model expresses disappointment that "large efficiency adjustments still appear to be made to the cost base". Conversely, Maxis noted that the fixed model's indirect costs had been set at an extremely high level which it suggests is indicative that double counting may have occurred of costs which have already been included as part of the direct operating costs or business overheads. Maxis has requested for full disclosure of the calculation of the operating cost overhead.

6.2.178 For the avoidance of doubt the MCMC clarifies that the following operational and overhead costs have been included in the fixed model, and provides the definition of each:

(a) Direct operational expenses – these are the operations and maintenance expenses which are directly associated with individual services, such as direct maintenance costs and electricity;

(b) Indirect operational expenses – this is a category of common costs associated with the network, including buildings and vehicle rentals, staff salaries, contribution to employee provident fund and insurance, charges for staff fixed and mobile connections, consultancy and outsourcing, and R&D cost related to improving network operations;

(c) Common network operational expenses – these costs relate to the running costs of assets required for network operations, such as the primary reference clock, technical buildings, IP synchronisation units, interconnect billing and network IT systems;

(d) Business overhead – this comprises common corporate expenses which must be allocated across various business units of the firm, such as corporate IT, insurance, managerial and other corporate staff; and

(e) Network licence overhead – a mark-up to reflect licence fees.

6.2.179 The direct operational expenses were calculated as a mark-up on the capital cost of assets. The value of the mark-up in each case was derived from either TM cost data or benchmark data. It should be noted that the MCMC preferred local benchmark data wherever available rather than data from other jurisdictions. Where TM's cost data was used to inform the estimates further checks were performed to ensure inefficiencies were not being included. And finally, the total direct OPEX was compared with TM's top-down data to ensure that it is reasonable.

6.2.180 The indirect operational expenses are added as a mark-up to the direct operational costs calculated in the model.

6.2.181 The direct operational costs calculated in the model account only for energy consumption and direct maintenance costs, including replacement of assets. The indirect OPEX is added as an overhead. The MCMC confirms that the proportion of indirect overhead cost was informed by top-down data submitted by TM.

6.2.182 The total cost across indirect network OPEX categories is divided over the actual direct network costs (as submitted by TM) to derive the indirect OPEX overhead. The proportions of direct, indirect and business overhead in the model is illustrated in Figure 3.

Figure 3: Proportion of Direct, Indirect and Business Overhead in the Final Fixed Model

6.2.183 TM has compared modelled OPEX and overhead costs to its actual costs and claims there is a large unjustified discrepancy. In relation to a number of specific categories of top-down data it provided TM claims that no efficiencies are possible. These categories are: staff costs, maintenance contracts, and the NOC. TM appears to be asking the MCMC to include its actual top-down operating and overhead costs in the model. The MCMC notes that it would be very unusual for a regulator to accept the proposition that an operator is fully efficient with no room for improvement.

6.2.184 As an example, in a survey of regulator's approaches for assessing OPEX for a bottom-up LRIC model for Traficom, the Finnish regulator, five approaches are listed[6]:

(a) Adjusted top down approach in which adjustments are made to the operator's top-down data to eliminate inefficiencies and / or differences between actual operations and the modelled operator;

[6] Analysys Mason (2015), Survey of the suitability of a bottom-up LRIC+ model for Finland, 30 April 2015.

(b) Benchmarking, using OPEX mark-ups applied in other countries;

(c) Bottom-up OPEX as a proportion of CAPEX;

(d) Bottom-up events-based calculation; and

(e) Bottom-up functional area calculation.

6.2.185 TM's position that total modelled OPEX and overhead should reconcile very closely with actual top-down data would also appear to contradict its reply to question 9 above. TM states that cost models are not necessarily reflective of actual operators and should not be used to assess actual operator networks and costs. TM cautions that models can only provide some insight into the cost base of a Malaysian operator.

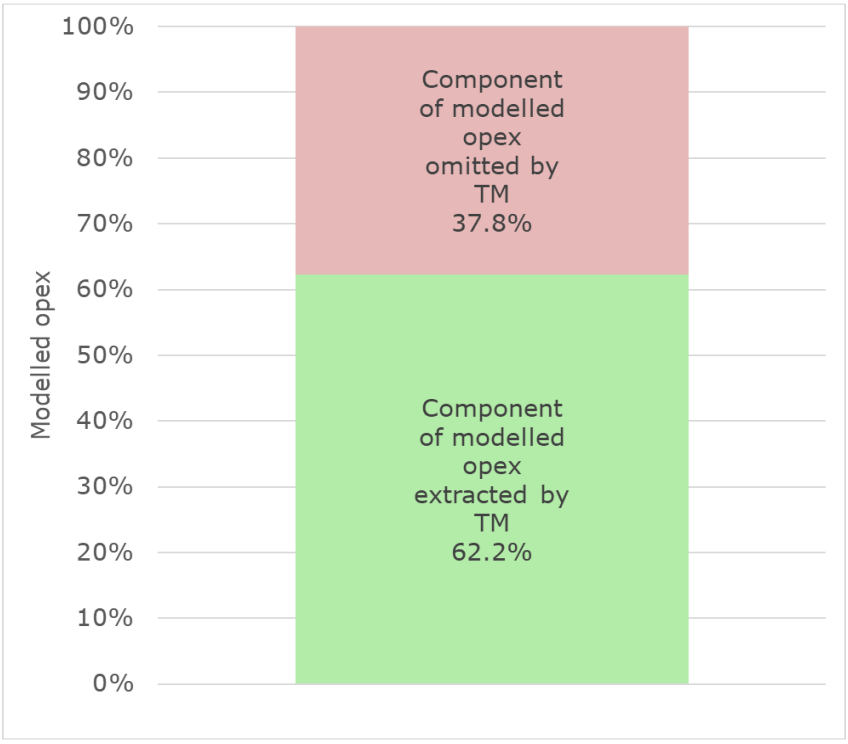
Modelled Network Attributable OPEX versus TM's Actual OPEX

6.2.186 The MCMC wishes to thank TM for providing the details of its comparison of TM's OPEX with various data sourced from the fixed model v6. In particular, the spreadsheet formula provided by TM was particularly helpful as it clearly identified the error made by TM in its use of data from the model and its misinterpretation of how the various mark-ups are applied to determine total costs, which comprise network costs plus overheads.

6.2.187 TM has assumed that the model applies the overhead mark-ups for common network costs and business overheads to direct OPEX. In fact, as the formula in the model shows, these mark-ups are applied to annualised costs – namely annualised CAPEX plus direct network OPEX. TM therefore grossly under-estimated the mark-up calculated by the model by omitting a large component of these costs.

6.2.188 The outcome of TM's calculation error is that TM under-estimated the quantum of modelled network attributable OPEX in version 6 by 37.8 % and this is reflected in Figure 4.

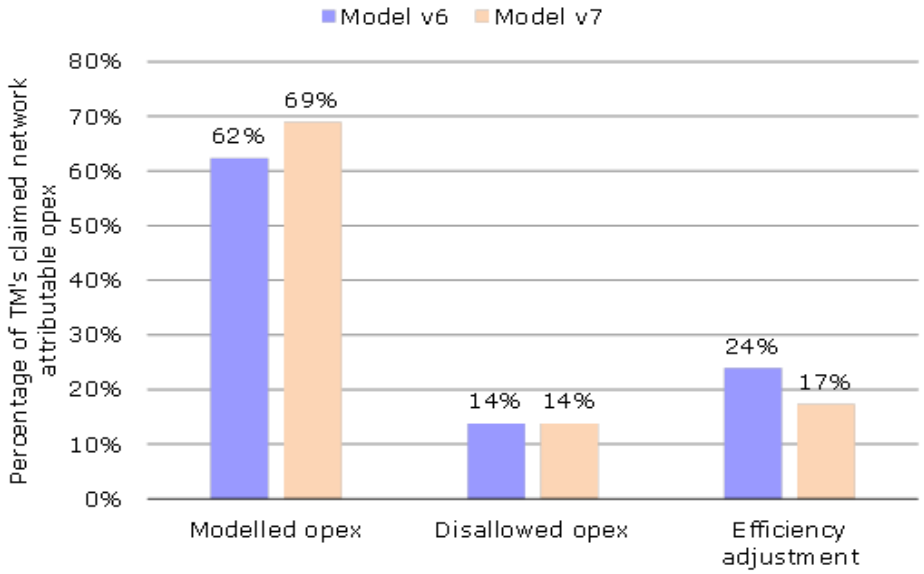
Figure 4: Breakdown of TM's Underestimate of Modelled Network Attributable OPEX in Fixed Model Version 6



6.2.189 The quantum of modelled network attributable OPEX increased in the final version of the model. The MCMC has compared the final modelled network attributable OPEX with TM's submitted value, and finds that over 69% of TM's submitted value has been included in the model.

6.2.190 For the avoidance of doubt, the MCMC confirms that the remaining 31% comprises 14% of costs that the MCMC did not consider were attributable to the regulated services, and approximately a further 17% of cost reductions were attributable to efficiency improvements. This is depicted in Figure 5 below. The MCMC provides reasons in the following subsections for its decisions regarding both of these reductions.

Figure 5: Breakdown of TM's Submitted Network Attributable Cost Model Versions 6 and 7



Indirect Costs

6.2.191 TM asserts that the assumed OPEX overhead is too low and does not account for all of TM's indirect OPEX costs. As illustrated above, the MCMC has not made substantial adjustments to the data provided by TM. In the MCMC's view, TM claims a very large amount of overhead operational cost that is difficult to verify. It is always possible that an operator chooses to classify costs as common costs for business reasons while having no relationship to the regulated services. As such, the MCMC could not simply accept TM's data without further scrutiny.

6.2.192 The MCMC welcomes TM's submissions including breakdowns of overhead costs. However, the MCMC notices that from 2019 to 2021, the proportion of indirect network OPEX to direct network OPEX proportion has fallen by approximately 12%. This trend has been taken into account in determining an efficient OPEX overhead, since a LRIC approach should be forward-looking. The MCMC also sees no justification to take the average indirect OPEX overhead cost over the three years provided. The MCMC believes that the lowest value for each indirect OPEX cost category is the most relevant for representing an efficient operator.

6.2.193 The MCMC clarifies that the only cost category excluded from the indirect network OPEX is the cable maintenance costs, as it is already an explicit line item in the LRIC+ calculation. However, the MCMC is of the view that the cost of the network operations centre is excessive and the potential for double

counting some of its cost components is high. The reason for the MCMC's view is that it undertook a bottom-up functional calculation to determine the required resources for operating the NOC. This calculation forms the basis of the adjustment that the MCMC has made to ensure an efficient cost for the NOC is included in the model. With regard to R&D costs, the MCMC acknowledges that R&D is essential to an operator's activities. However, R&D activities are typically project based and not ongoing operational activities. This is also evident from the data provided by TM. This is the reason that the MCMC has made an adjustment to the claimed cost encompassing an assumed average ongoing cost.

6.2.194 The MCMC acknowledges that some of the passive access costs did not include indirect OPEX. This, however, has been amended in the final model.

6.2.195 Overall, the MCMC has included the cost of all indirect OPEX categories after appropriate adjustments. Accepting all TM's costs 'as is' violates the purpose of a bottom-up LRIC model that represents an efficient operator. It is not the purpose of a LRIC model to match the actual costs of the modelled operator. In contrast, it provides incentive for an operator to improve its efficiency to reduce the divergences between its own costs and the modelled costs.

6.2.196 The MCMC has also undertaken benchmarking of indirect OPEX using local data from a fixed fibre deployment. The results are compared to version 7 of the model. It is clear from the benchmark comparison that indirect OPEX as a proportion of direct OPEX is significantly higher in both model versions than the local benchmark. It is the MCMC's view that these results indicate that, contrary to TM's statements, the approach used in the model does not reflect an inappropriate efficiency standard but encompasses a generous consideration for TM's GLC status.

Table 24: Benchmark Comparison of Ratio of Indirect OPEX to Direct OPEX and to Total OPEX

Source	Model v6	Model v7	Benchmark
Indirect OPEX / direct OPEX	82%	86%	46%
Indirect OPEX / (Total OPEX)	45%	46%	31%

Business Overheads

6.2.197 TM states that the derivation of the business mark-up is unclear. It is important to note that there are many approaches to deriving the business/administration overhead cost. The choice of the approach depends often on the type of data available. For the fixed model, the MCMC adopted an approach similar to the method followed by Ofcom in the UK.[7] This yielded a mark-up of 20.22%.

6.2.198 The costs included in the calculation of the business overhead includes all business overhead costs submitted by TM except the following costs which have been disallowed:

(a) Corporate advertising;
(b) Sponsorship costs; and
(c) Forex related costs.

6.2.199 The MCMC considers that corporate advertising and sponsorship – even though such activities are not endorsing retail products – still promote brand recognition to a firm's target market. The MCMC therefore prefers to exclude those costs from the calculation of the business overhead.

6.2.200 As input, the MCMC selected the year with the lowest business overhead costs. No adjustments have been made to the individual overhead cost categories. The MCMC does not agree with TM's proposition to apply the business overhead to the indirect OPEX overhead. The indirect OPEX consists largely of salaries (including benefits and bonuses) for staff, including executives, involved in network operations. TM's request basically leads to applying an overhead to an overhead. The reason for separating the indirect OPEX from the general business overhead in the model is to improve transparency and model reconciliation. The MCMC notes that some models do not include this distinction.

6.2.201 In conclusion the MCMC reiterates that it has carefully reviewed all costs in the business overheads category as submitted by TM. There is insufficient granularity in the categories for the MCMC to be confident that every category is applicable in part to the wholesale regulated services. It is entirely possible

[7] Ofcom 2011. Wholesale mobile voice call termination Modelling Annexes, Annex 9. Available at https://www.ofcom.org.uk/__data/assets/pdf_file/0026/53981/mct_statement_annex_6-10.pdf.

that some of these costs have been defined as common overheads for business reasons.

6.2.202 The MCMC also investigated potential benchmarks for common costs, and noted a benchmark analysis provided in a submission for a review of the Irish regulator's (ComReg's) 2020 access network model. The benchmark analysis claimed that ComReg's common cost mark-ups of between 20% and 29% compared unfavourably with those from the Swedish and Danish models which were cited as 4.49% and 1.31%[8] respectively. The MCMC notes that the Irish regulator queried these benchmarks and concluded that such comparisons are complicated as a result of inconsistencies across models between what is categorised as a common cost and what is categorised as a direct or indirect cost[9]. The MCMC concurs with this point of view, and as such has disregarded potential benchmarks from international models.

6.2.203 TM sought to include an additional category of overheads reflecting wholesale customer-related cost in the model. In the breakdown of OPEX provided by TM to the MCMC in November 2022 this cost category was named "sales and marketing for wholesale function". The MCMC was not persuaded that the costs of any sales and marketing activities in a non-contestable market should be allocated to the wholesale services. These are potentially open-ended and highly discretionary pursuits, in contrast to retail sales and marketing activities where the firm is competing with others for business. By attributing such discretionary activities to the regulated services there is an increased risk of margin squeezes at the retail level. For these reasons the MCMC has not included this cost category in its overhead calculations. In other words, for the above reasons, this is a non-allowable category.

Removal of the USP Mark-up

6.2.204 TM disagrees with the zero mark-up for USP which was applied in the revised v6 fixed model. TM asserts that it will be unable to offset the USP levy through the receipt of USP funds in the coming years.

[8] Analysys Mason (2021), Review of ComReg's 2020 access network model and price control consultation, Report for Sky Ireland, 8 January 2021. See Figure 5.
[9] Commission for Communications Regulation (2021), Regulated wholesale fixed access charges, review of the access model, 17 December 2021, see section 5.491.

6.2.205 The MCMC clarifies that the initial model included a 6% mark-up for USP contributions, however following further research it became apparent that, in including a consideration for USP contributions without any assessment of USP fund receipts, there was a risk of over-recovery which would not be in the long term interests of the end-users.

6.2.206 The MCMC concluded that if it were to retain the 6% mark-up then it would become necessary to exclude the benefits obtained through the distribution of such funding to the fixed operator. While there are various possible approaches (such as introducing changes to affected asset valuations, or using a pure financial adjustment), this would introduce further complexity to the model. For example, in 2020 TM received funding from the NFCP 5 project to migrate existing copper broadband subscribers to fibre-optic broadband access networks within the UST areas nationwide. As this was a two year project the timing overlaps with the calibration year of the MCMC's fixed model, hence the impact of the subsidy should be considered if the MCMC were to include an allowance for USP contributions.

6.2.207 The MCMC has applied the same approach to USP across all models. In reaching its decision on the treatment of USP in the models the MCMC has carefully reviewed USP disbursements in relation to individual operators. The MCMC acknowledges that it has relied on historical data to inform its decision, which may be an imperfect reflection of the future relationship between USP disbursements and receipts. However, on balance the MCMC decided it was reasonable to assume that over time the USP fund contributions balance out with USP receipts.

CAPEX Modelling

6.2.208 The MCMC welcomes the additional data submitted by TM providing information the FDA in each category. The MCMC reiterates that the submitted data lacks sufficient granularity and explanation. TM expects the MCMC to accept suggestions for the proportion of FDA for each asset by highlighting that the suggestions are consistent with the submitted top-down cost data. However, due to the lack of granularity, a whole range of values for FDA can be consistent with the top-down data. Therefore, some adjustments are necessary. For example, TM records do not differentiate between poles and ducts in the Access CW, leading to the assumption that both assets should have an equal proportion

of non-FDA. However, the deployment rate of poles in the past 11 years that has been submitted by TM is inconsistent with the proportion of FDA suggested by TM for Access CW. As such, the MCMC made an adjustment to the value based on the assumed lifetime of poles.

6.2.209 Following an extensive review of the cost of active electronics, the MCMC decided to update the costs of EPE, NPE and Edge routers. The MCMC received cost data from a number of Malaysian operators and compared the data with international benchmarks for modern equivalent assets. The MCMC selected the asset costs that come the closest to the modern equivalent assets, while still considering the capacity of the assets. It is important to highlight here that 58% of asset costs in the model are sourced from TM. The MCMC believes that it is appropriate to replace TM asset costs in cases where the cost is representative of a modern equivalent asset that allows a more cost-efficient network deployment. This includes also replacing assets that represent a capacity constraint, such as the multi-service edge router, with an asset that has a higher capacity in terms of connected broadband subscribers.

Ducts and Manholes

6.2.210 Duct and Manhole Access costs are determined based on the incurred annualised cost. Permitting fees have been included in the unit costs of ducts. As such, the calculated duct and manhole access costs are representative of actual costs. The MCMC has not received any further information on additional costs from the operators. The MCMC acknowledges that the cost of such infrastructure is increasing with time, which is also considered in the cost model.

6.2.211 TM raised the concern that ducts and manholes do not increase with increasing coverage in the model. The MCMC does acknowledge that duct and manhole assets should change with coverage. The draft model did not account for this due to lack of information. In urban areas with an existing legacy network, an efficient operator will more likely re-use ducts previously used for copper. As such, the MCMC expects that an increase in duct and manhole assets is likely to be small over the modelling period and agrees to account for this growth in the model.

6.2.212 TM argues that the MCMC has assumed exceptionally low costs metre of trenching. It is important to note that TM has provided an exceptionally high

cost at the start of the data collection. The initial cost was viewed by the MCMC to be representative of the most expensive trenching techniques rather than a blended average. This has led the MCMC to seek additional information on local trenching costs. The core network trenches assume now an average trenching cost based on data provided by Malaysian operators. The assumed costs are inclusive of permitting fees.

6.2.213 A substantial amount of cost input is provided as lump sum costs by TM. Despite the lack of detail provided by TM, the MCMC has undertaken analysis to determine whether these costs should be adjusted for efficiency. For example, the total cost of HVAC can be benchmarked against how much air conditioning capacity would be needed to cover the total area of TM's exchange buildings. Based on that, an estimate can be made for the cost of HVAC equipment and installations. After conducting this exercise, the MCMC is of the view that the TM's submitted costs are overstated, which led to an adjustment of the costs.

6.2.214 The MCMC does not agree with TM's position to consider the current value of its exchange building rather than the GBV (minus FDA). The idea of using modern equivalent assets involves networking assets, not buildings. Such a proposition would only be considered if a scorched earth approach is followed. However, even if a scorched earth approach is used, there will be efficiency adjustments to the actual number of nodes (buildings) and actual area usage which is likely to offset (if not exceed) any gains of using the current cost of the buildings.

6.2.215 The MCMC confirms that it accepted TM's modest revision to the space used in building and implemented this in the updated model.

6.2.216 The MCMC welcomes the updated pole costs submitted by TM that reflects the current requirement for increased use of iron poles in network deployment. However, the MCMC believes that the lifetime of poles should also be adjusted to reflect the substantially higher lifetime iron poles compared to concrete poles. Both parameters have been updated in the final model.

Network Modelling

6.2.217 TM is of the view that the FDC should be dimensioned based on passed premises. The MCMC disagrees with this suggestion, as this will allocate costs of unmet demand on active subscribers. The MCMC believes that an efficient operator will have reasonable demand forecasts that ensure cost recovery over a reasonable

amount of time. The utilisation factor for FDC already accounts for 25% margin for future growth while more FDCs are deployed to meet increasing demand. Deploying FDCs ahead of demand is a matter of delayed cost recovery rather than increased costs. This is typical for infrastructure investments.

6.2.218 The MCMC does not agree to set an allocation factor of '1' for the national submarine cable for HSBB and HSBA services. This essentially implies that all HSBB and HSBA traffic uses the national submarine cable. The MCMC believes that an allocation factor of '0.18' which is representative of the population in East Malaysia is appropriate.

6.2.219 The MCMC acknowledges that the proportion of voice traffic in busy days was not considered in the revised model. This has been amended in the final model. The busy hour voice traffic is calculated using the proportion of traffic in busy days of the years based on voice traffic profiles provided by TM.

6.2.220 TM recommended to add a number of router types in the model, including iBSE and HSE to interconnect data traffic to other operators. Firstly, the modelled network is not and should not be an exact replica of the existing network. Our understanding is that interconnection with other operators can also be accomplished using routers supporting the border gateway protocol, which is the case for the edge router selected in the model. The edge router selected in the revised and final model does not have tight constraints in terms of the number of served broadband termination points as the one suggested by TM. The MCMC also believes that port redundancy and utilisation factors used for the Edge routers account for the additional cost of network resilience.

6.2.221 The MCMC disagrees with TM's claim that the number of modelled DWDM assets appears to be significantly lower than TM's actuals. In fact, the difference is just 3%. In addition, it is the MCMC's view that a ring topology provides 1+1 path redundancy by nature.

6.2.222 The MCMC does not see a strict technical requirement in connecting OLT directly to NPE. As the model aims to reflect a cost efficient network, OLT are assumed to be co-located with the first level of aggregation routers (EPE). The selected routers provide sufficient capacity to handle OLT traffic. This also ensures that a 1+1 path redundancy is provided to OLT traffic through the ring topology.

Tax Deferrals and Investment Tax Credits

6.2.223 Maxis highlighted the potential financial benefits accruing to TM through significant tax deferrals for some capital investment projects of national and strategic importance involving heavy capital investment and high technology, alongside other tax incentives and investment allowances. In TM's 2021 statutory accounts, Maxis notes a deferred tax liability of RM1.5 billion relating to such tax deferrals. By not incorporating any consideration in the fixed model for such benefits, Maxis considers that the model is not consistent with economic reality. Maxis also provided evidence of other regulators' treatment of these types of benefits in cost models.

6.2.224 The MCMC has reviewed the statements in relation to deferred income in the 2021 TM Annual Report. TM states on page 53 of the 2021 Integrated Annual Report Financial Statements that "Deferred tax assets are recognised to the extent that it is probable that taxable profit will be available in the future, against which the deductible temporary differences or unutilised tax losses and tax credits (including investment allowances) can be utilised".

6.2.225 It is evident that TM has previously received investment allowances. A more explicit statement is made in the TM 2019 Financial Statements (on page 106) in relation to RM113.8 million of current receivables: "As at the end of previous financial year, this comprised tax credit in respect of prior years arising from the last mile broadband tax incentive granted to the Company for 5 years commencing 16 September 2008, to be offset against future tax payables. During the current financial year ended the balance of tax recoverable has been confirmed by the tax authorities for refund purposes and thus reclassified as current receivables".

6.2.226 The MCMC has identified two issues which should be considered in this context: firstly, the treatment of tax in a LRIC model, and, secondly, the treatment of subsidies in a LRIC model.

6.2.227 With regard to the first issue, as discussed in Section 5, the common practice is to adopt a pre-tax WACC for LRIC models which means that there is no separate provision for tax. This may be contrasted with an RAB approach which typically uses a post-tax cost of capital and includes a building block for tax. The examples provided by Maxis relate to RAB modelling approaches. The MCMC does

acknowledge that TM's effective rate of tax may in actuality be lower than the standard corporate tax rate which has been assumed in the WACC calculation.

6.2.228 With regard to the second issue, the MCMC has considered whether investment tax allowances effectively amount to subsidies. The MCMC has omitted consideration of USP subsidies in the model on the basis that USP contributions provide for a balancing out effect. However, if investment tax allowances such as the last mile broadband tax incentive granted to TM be interpreted as pure subsidy, then there is no such balancing effect within the model and its assumptions. It should be noted that the MCMC's guiding principles for access pricing allow for recovery of legitimate costs. In effect, such subsidies reduce the amount of the cost base which TM must recover. If this is not reflected in the fixed model via an allowance for the subsidy to the hypothetical operator then the MCMC acknowledges that there is a risk that TM may be over-compensated, recovering more than legitimate costs.

6.2.229 The MCMC has been unable to obtain sufficient information on the quantum of investment tax allowances which have benefitted TM's broadband deployment, and thus is unable to determine the extent of this issue. As such the MCMC has decided to take a conservative and pragmatic approach with the assumption that no such benefits are available to the hypothetical modelled operator.

MCMC's Final Views

6.2.230 The MCMC will apply updated assumptions for demand, contention ratios and routing factors in the fixed model.

6.2.231 The MCMC will maintain the utilisation levels of copper related assets at a level equal to fibre based assets in the access network.

6.2.232 The MCMC confirms its approach to modelling CAPEX will be as applied in the revised model.

6.2.233 The MCMC confirms its approach to modelling OPEX will be as applied in the revised model.

6.2.234 The MCMC confirms that there will be no USP mark-up in the fixed model.

6.2.235 The MCMC has decided to retain the approach to calculating the duct and manhole access costs in the revised model. However, the MCMC will assume that ducts in the access network will grow by 1% annually.

6.2.236 The MCMC will assume that no investment tax allowances are available to the hypothetical operator.

Question 25:

Do you have any comments on the proposed prices for the fixed services in the Access List?

Submissions received

6.2.237 Astro is of the view that the cost efficiency should improve with volume. Hence, Astro recommends the MCMC to consider introducing the concept of volume tiering. For example, currently, the price of the Service Gateway ("**SG**") cost per Mbps is fixed at a particular price regardless of the volume subscribed (i.e. the price per one (1) Mbps for 30 Mbps is the same as the price per one (1) Mbps for 1000 Mbps.

6.2.238 Astro suggested that the price per one (1) Mbps should not be fixed and decreased in accordance with the volume subscribed to motivate Access Seeker to subscribe for more Mbps in growing their market and achieving economies of scale which should be a win-win situation for both parties.

6.2.239 Astro sought clarification from the MCMC as to whether the HSBB SG charge in the cost model shared by the MCMC is similar to the HSBB SG (non-recurring installation charge), determined in the previous MSAP. If it is referring to the same charge, Astro notes that the new set of proposed charges are very high as the charges exceeds the current MSAP's SG installation charges by 76%.

6.2.240 Astro understands that the source for SG installation cost was based on "per-site (exchange)". Therefore, Astro sought clarification as to where and how the "per-site (exchange)" is derived as this would avoid disputes between the Access Provider and the Access Seeker during negotiations, especially on determination of such charges. For an example, one Access Provider in particular has defined SG as OLT which would result in Astro, as the Access Seeker, being required to

pay a huge amount of SG activation charges. With the increase of the SG installation, it would result to higher barrier to entry for small or new Access Seekers.

6.2.241 CelcomDigi stated that the proposed price patterns for some the fixed services in the Access List require further explanation and possibly smoothing of the kind implemented through glide paths.

6.2.242 CelcomDigi also noted that there is a more fundamental issue than adopting a glide path approach and smoothing the model results, and that is whether the model assumptions and results are sound in the first place. In the overwhelming majority of jurisdictions in which cost modelling is used to determine network termination charges, MTRs are greater than fixed termination rates ("**FTR**"). CelcomDigi pointed out an example of case in various jurisdictions covered by the EU where the MTR and FTR amounts have been documented by BEREC.

6.2.243 For example, CelcomDigi pointed out all of the 27 EU Member States and 10 other European countries that are included in the BEREC assessment where the FTRs are below MTRs. The simple average of the lowest regulated FTRs of incumbents at the European level (all 37 countries/participants) was 0.2446 eurocent per minute. The simple average of MTRs at the European level (all 37 countries/participants) was 0.7460 eurocent per minute. This is a substantial difference and is the reverse of the relationship reflected in the MCMC's PI Paper.

6.2.244 CelcomDigi does not have the information about the costs and other operating data (relating mainly to TM) to be able to suggest reasons why the relationship between MTR and FTR in Europe where cost modelling has been rigorously practiced in this area for decades should be reversed in Malaysia. However, it is an important matter and one that CelcomDigi asks the MCMC to explore further. It may be that the utilization levels of the fixed networks considered by the MCMC in Malaysia are below what might be considered efficient levels. In any case there is a strong disconnect between Malaysian and international experience that requires explanation.

6.2.245 In addition, CelcomDigi is concerned that there were a very large number of changes to the values of cost and other parameters between the earlier version of the fixed model and the latest one. This suggests that many crucial values have not been fully evaluated and that there is considerable doubt about the

inputs to the fixed model. The MCMC should provide greater confidence that the Fixed Model inputs are suitable for efficient costing.

6.2.246 As a longer-term issue, CelcomDigi has raised with the MCMC the aim of using mobile costs for both fixed and mobile origination and termination because mobile is the most efficient means of managing and conveying voice traffic. CelcomDigi requests that the MCMC separately progresses this matter and consults with the industry in the process.

6.2.247 Fibrecomm submitted that the current proposed cost input might not reflect the realities of operating a large-scale network in Malaysia and hinders future expansion and/or network refresh as it will not allow for reasonable cost recovery. The proposed WACC is lower than Fibrecomm's existing WACC and this does not consider their anticipated investments to maintain their network.

6.2.248 According to Fibrecomm, the proposed fixed price would have a detrimental impact on the industry due to lower expected returns as well as increasing operation costs due to higher interest charges brought about by risk of reducing returns.

6.2.249 Maxis provided views on data services, network KPI and SLA and poles prices.

6.2.250 According to Maxis, costs for each service for the data services are modelled on a per line and per Mbps basis and then combined to give the price for each bandwidth for the service. Maxis was of the view that it is important that the prices available include higher bandwidth for which there is actual and potential demand during the market review period. If this is not done, then the prices for these high bandwidth services will not be reflective of costs. For example, if the highest price available is 5Gbps but demand emerges at 10Gbps, then Access Seekers would need to pay the price for two 5Gbps circuits. However, this price would be higher than that which would be set if 10Gbps were modelled separately, due to the double counting of the access element.

6.2.251 Maxis proposed that the MCMC specify the network SLA and KPI for the regulated services to avoid disputes between the Access Provider and the Access Seeker on compliance with the MSAP rate as happened previously in 2018 and to ensure high service quality provided to the end-users/customers, as follows:

(a) Network SLA for Core Network (from IP Core to NPE): 99.992% and above;

(b) Network SLA for Access Network (from EPE to CPE): 99.9%;

(c) Access network configuration: 1+1;

(d) Network Latency within Peninsular Malaysia: < 20ms;

(e) Network Latency within East Malaysia (Sabah & Sarawak): < 20ms;

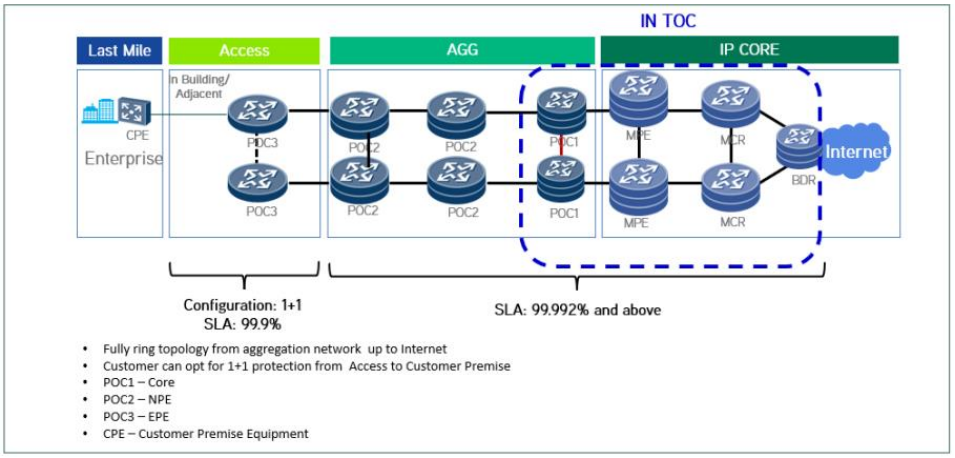
(f) Network Latency between Peninsular and East Malaysia (including submarine cable): < 40ms;

(g) Zero or more routes of redundancy; and

(h) Any other technical parameters specified or utilized by Access Provider from time to time including the above.

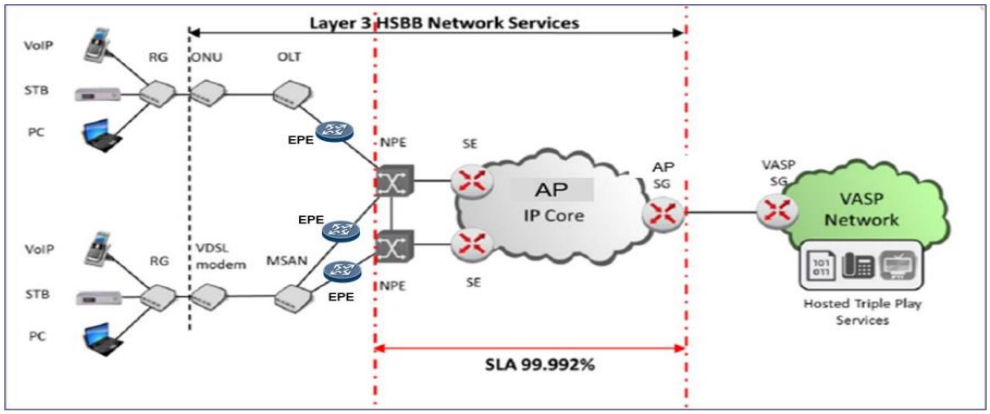
6.2.252 Maxis also proposed a high-level network diagram for End-to-End transmission as in Figure 6.

Figure 6: End-to-End Transmission Service – High Level Network Diagram with SLAs



6.2.253 In addition, Maxis proposed to include 99.992% SLA for core network (SG → NPE) for the regulated prices to avoid the disputes between AP and AS, for Layer-3 HSBB Network Services. The high-level network diagram is shown in Figure 7 below:

Figure 7: High-level Network Diagram for Layer 3 HSBB services



6.2.254 Maxis supported the MCMC's decision to regulate the prices for fixed telecommunications poles together with the ducts and manholes for completeness purposes as both have similar functionally, i.e. to carry the fibre cable.

6.2.255 SDEC raised a question if the proposed price is per km per month but did not further clarify which services it is referring to.

6.2.256 U Mobile notes that the layout of the pricing for the Layer 3 HSBB Network Service in both the current MSAP and the PI Paper are the same. However, the fixed network operators (TM and TT dotCom) use a different layout or structure and makes it difficult to compare and comment.

Discussion

6.2.257 With regard to SLA commitments, the MCMC confirms that the model includes full 1+1 path redundancy from first traffic aggregation nodes, where OLTs and aggregation routers are hosted, to network core routers. The path redundancy is ensured by uplink port redundancy of OLTs and routers and DWDM ring topology. However, MCMC wishes to emphasise that an accurate level of SLA cannot be determined in the model. Network availability and performance are determined by other aspects such as restoration times of faults and capacity management that are related to network operations.

6.2.258 The MCMC thinks that having a 1+1 redundancy in the access network, between end customer and OLT or first aggregation router, is not a standard practice. As

such, it is more appropriate to be negotiated between Access Seeker and Access Provider on request.

6.2.259 The MCMC notes CelcomDigi's observation that in many other jurisdictions, modelled FTRs are lower than modelled MTRs. CelcomDigi refers specifically to European rates, presenting average rates for mobile termination which are three times higher than fixed rates.

6.2.260 The MCMC has reviewed the status of these regulated services in the EU and found that in July 2021, maximum FTR and MTRs came into force across all countries. From 2024 the following maximum rates will apply:

(a) fixed termination – EUR 0.07 cents per minute; and
(b) mobile termination – EUR 0.2 cents per minute.

6.2.261 Over the transitional period from July 2021 until December 2023 a glide path is being used with the interim rates being country-dependent.

6.2.262 The above rates are cost-based, however previously it is clear that there have been problems in relation to charging above cost. The Commission states that the objective of its regulation is "to promote the integration of the single market by removing distortions between operators due to termination rates charged well above cost".

6.2.263 The EC noted that:

"High and strongly divergent termination rates … distorted competition between fixed and mobile operators, hindered market entry of smaller operators and innovation, and ultimately led to higher retail tariffs for businesses and households[10] .

6.2.264 In addition, the EC stated that "the further termination rates move away from incremental cost, the greater the competitive distortions" between fixed and mobile operators and where traffic is imbalanced.

[10] European Commission (2020), Commission Staff Working Document Accompanying the document Commission Delegated Regulation (EU) …/... supplementing Directive (EU) 2018/1972 of the European Parliament and of the Council by setting a single maximum Union-wide mobile voice termination rate and a single maximum Union-wide fixed voice termination rate, 18 December 2020, page 6. Available at https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52020SC0333

6.2.265 It is important to note that, unlike the MCMC modelling, the EC includes only incremental costs in modelling both fixed and MTRs, and so there is no consideration of joint and common costs (that is, a "pure LRIC" standard is applied). Apart from this difference in modelling approach, the MCMC has identified a number of other drivers which explain the relativities of the modelled Malaysian FTR and MTRs:

(a) There has been an explosion of mobile data volumes in recent years and this trend is accelerating so that the network dimensioning is dominated by data traffic – voice represents only a very small fraction of total traffic;

(b) In the mobile model much of the core network is modelled as a lump sum, as it is fairly common for the core to be covered by a single service contract with a supplier, encompassing many network elements. Unfortunately this provides little opportunity for core costs to be demand-driven. The core transport network is also modelled as a lump sum, for a similar reason;

(c) Unlike 2G and Third Generation Wireless Technology ("**3G**") technology, there are relatively few "voice only" network elements in a 4G network. Thus many of the network elements are shared between voice and data, with voice representing a very small portion of total traffic; and

(d) Fixed voice traffic continues to decline considerably over time, meaning that there is a lower base over which to allocate costs.

6.2.266 The MCMC notes that the final prices for FTRs in the 2017 PI Report were also higher than the MTRs, as illustrated in the Table 25 below. Similar queries to CelcomDigi's were raised at the time about this. The MCMC's response at the time was that the costs in both cases should be calculated objectively reflecting the reality even if the difference between the costs of fixed and mobile termination service are not as expected. The MCMC continues to hold this view. Furthermore, despite CelcomDigi's characterisation of European countries as rigorous practitioners of cost modelling for decades, the relativities of European rates were strongly divergent prior to 2021. A 2021 BEREC benchmark study, just prior to the implementation of the glide path rates, showed that over two-thirds (68%) of European countries had MTRs more than five times that of the FTR while in almost one quarter (24%) of countries the mobile rate was more than eight times the fixed rate. The 2021 BEREC benchmarking study also found that the regulated MTR in Finland was lower than the cost-oriented FTR.

Table 25: Fixed Network Termination Service and Mobile Network Termination Services: 2017 Final Prices

	2018	2019	2020
Fixed incoming national calls (Sen/min)	3.21	2.33	1.45
Mobile network termination service (Sen/min)	2.92	1.96	0.99

6.2.267 With regards to CelcomDigi's concern about the extent of changes to costs and other parameters between the earlier version of the fixed model and the revised version, the MCMC clarifies that many stakeholders provided additional data or refined their original data submissions subsequent to the first data submission. Thus, the data collection process was to a certain extent iterative, particularly as the MCMC sought detailed explanations from operators regarding initial data submissions which then necessitated the provision of further data.

Fixed Network Origination Service and Fixed Network Termination Service

Submissions received

6.2.268 YTL stated that there is an increase in the prices for the fixed network origination and termination services as compared to the MSAP 2017.

6.2.269 YTL added that if the same assets are being used, then there is no reason to support the increase. The licences for IMS and IP switches alone do not justify the increase and in fact, should have been appropriately depreciated. For too long, mobile termination is higher than the fixed termination even when the user behaviour has long shifted to a mobile centric use. Also, this shift is unlikely to reserve. YTL strongly urges the MCMC to eliminate the differential costing between the mobile and fixed termination.

Discussion

6.2.270 The MCMC observes that the modelled prices for fixed network origination and termination are lower than those from the previous MSAP. One of the reasons for the lower modelled mobile termination costs is that the costs are distributed over a relatively high volume of demand. In contrast the volume of fixed calls is declining, meaning that fixed costs are distributed over a small demand base.

MCMC's Final Views

6.2.271 The MCMC confirms that the fixed model has been updated and sets the final prices for the Fixed Network Origination Service and Fixed Network Termination Service as per Table 26 and Table 27 follows.

Table 26: Fixed Network Origination Service Final Prices

	2023	2024	2025
Outgoing national calls (Sen/min)	1.24	1.16	1.03

Table 27: Fixed Network Termination Service Final Prices

	2023	2024	2025
Incoming national calls (Sen/min)	1.24	1.16	1.03

Interconnect Link Service

Submissions received

6.2.272 YTL submitted that the proposed prices by the MCMC increases over the 2022 prices despite the same assets are being used to derive the 2017 prices. YTL believed that this could be due to the use of "replacement cost" in the valuation of the assets. YTL also added that it is important to note that many of the assets have already been depreciated, thus any revaluation will result in over-recovery thereby increasing the cost of service.

6.2.273 YTL urged that the MCMC reviews the revaluation of assets so that there is no price increase leading to over-recovery. YTL also submitted that the MSAP prices should state if the prices are for in-span or full span and that these should be included in the MSAP prices. Separate prices should be provided for "with" and "without" CPE to cover various scenarios to prevent Access Providers from skirting the MSAP framework.

Discussion

6.2.274 The MCMC agrees with YTL's suggestion to separate the price of the CPE. The costs are separated to cover the different possibilities of with or without CPE.

Since the cost is per km of fibre cable, the MCMC believes this provides sufficient flexibility to apply to in-span and full-span scenarios depending on how much fibre cost is incurred by the Access Provider.

MCMC's Final Views

6.2.275 The MCMC confirms it sets the Interconnect Link Service prices as per Table 28 as follows.

Table 28: Interconnect Link Service Final Prices

	2023	2024	2025
ILS link (RM/km/month per fibre pair)	52.60	49.90	47.40
ILS installation	2,327.10	2,396.90	2,468.80
1Gbps CPE (RM/month)	70.40	66.80	63.50
10Gbps CPE (RM/month)	377.50	358.60	340.70

Wholesale Local Leased Circuit Service, Trunk Transmission Service and End-to-End Transmission Service

Submissions received

6.2.276 CelcomDigi submitted that the MCMC should clarify the cost or volume relationships that are involved by the differences in monthly charges for service from 1 Mbps to 1 Gbps and for 1 Gbps to 10 Gbps. It is unclear why the model has provided such a rapid reduction in the unit cost for local leased lines with capacity from 1 or 10 Gbps when this is the reverse of the trend for circuit services below 1 Gbps. The explanation provided by the MCMC suggests that the difference is mainly to do with the technology used in the access tails of the service. However, this explanation suggests that the model is not using efficiently incurred costs for the tails.

6.2.277 CelcomDigi also submitted that they have raised an issue that the assumption of a uniform cost or volume relationship is a problem for the costs of the Layer 2 and Layer 3 HSBB Network Services and that it has been made in the case of the Trunk Transmission Service since it does not reflect actual cost increases that are associated with providing larger capacity services.

6.2.278 In addition, CelcomDigi stated that the assumptions of a uniform or linear cost or volume relationship that is a problem for the costs of the Layer 2 and Layer 3 HSBB Network Services and of Trunk Transmission Services have also been made in the case of the End-to-End Transmission Service. This does not reflect actual cost increases that are associated with providing larger capacity services. The MCMC has clarified that it uses a single value of cost per volume for core transmission. This indicates that the model is incomplete since it is an engineering fact that it is more efficient per unit to provide a larger transmission system than a smaller one.

6.2.279 CelcomDigi indicated that the cost model for transmission should be completed by adding an allocation of transmission costs based on a decreasing cost or volume relationship as transmission rates increase.

6.2.280 CelcomDigi and the industry understand that cost or volume relationships are non-linear. The issue is what non-linear relationship best reflects the relationship at present. Assuming linear relationships is clearly incorrect but it is unclear what non-linear relationship would be a better and represent a more appropriate assumption for any service category at any particular time.

6.2.281 The MCMC has used a non-linear relationship (logarithmic) in some previous cost models for transmission. Admittedly, cost or volume relationships are changing and the industry practice is showing that the non-linear relationship is becoming more pronounced over time.

6.2.282 CelcomDigi has undertaken research into the matter and has documented a number of examples of non-linear cost or volume relationships that have been adopted in various administrations. The examples from Australia, Fiji and Papua New Guinea all show non-linear relationships between cost and volume, with the cost per unit capacity decreasing as the capacity (Mbps) of the service increases.

6.2.283 CelcomDigi also provided evidence in its official PI submission that the current PI proposals for transmission costs are inconsistent with the Commission Determination on the MSAP, Determination No. 1 of 2012.

6.2.284 On this basis, CelcomDigi believes that the transmission model being relied upon by the MCMC for the current PI is incomplete and the allocation of costs to Transmission Services has not been appropriately calculated to better reflect

cost causation within the capacity categories of each service. CelcomDigi considers that the evidence provided is clear that some degree of nonlinearity is required to be reflected in the relationships between cost and volume. However, the available evidence leaves open the question of what the relationship should be in the determination for the next three years.

6.2.285 CelcomDigi also considers that the Australian results might form the safest and most appropriate guide because they have been greatly scrutinized via the robust public consultation processes followed by the Australian regulator, the Australian Competition and Consumer Commission. This would in turn lead to a logarithmic form of cost or volume relationship.

6.2.286 DNB submitted that it is a major user of high bandwidth trunk transmission links, both SA and End-to-End Transmission Services. DNB considers that the MCMC should include a regulated price for 10 Gbps Trunk and End-to-End Transmission Services and reviews its prices for Trunk Transmission Services as a function of bandwidth to reflect economy of scale effects in the cost of supply.

6.2.287 In rolling out its 5G network, DNB submitted that DNB needs high-speed transmission links at cost oriented prices. For example, DNB is likely to be the only user of 10 Gbps backhaul. DNB noted that the MCMC in its revised fixed services model now calculates costs for 10 Gbps links and requested that the MCMC includes regulated prices at this transmission speed.

6.2.288 DNB also noted the definition of 10 Gbps Transmission Services which is accommodated within the definition of Trunk Transmission Services as provided in the Commission Determination 6 of 2021 where it is open to DNB as an Access Seeker to request such a service.

6.2.289 DNB stressed the need to amend trunk transmission prices by bandwidth. DNB submitted that the cost of a 10 Gbps trunk transmission circuit is currently twice the cost of a 5 Gbps circuit in the revised fixed pricing model. These cost estimates ignore economy of scale effects. The long run incremental cost of supplying a 10 Gbps Trunk Transmission Service may be higher than that for supplying a 5 Gbps service. However, the cost is not double. The Access Provider's cost in buying, say, a 96 fibre cable may be double that of buying a

12 fibre cable but the Access Provider gets eight times the capacity. At the same time the cost of laying the two fibre links is likely to be similar [11].

6.2.290 In DNB's view, it would be to the long-term benefit of end-users if these economy of scale effects were shared between the Access Provider and the Access Seeker as they are not under the MCMC's current proposals. Finally, DNB notes that the MCMC has proposed a significant reduction in price across the period 2023 to 2035 for Trunk Transmission Services that utilise a domestic submarine cable and DNB welcomes this reduction by the MCMC.

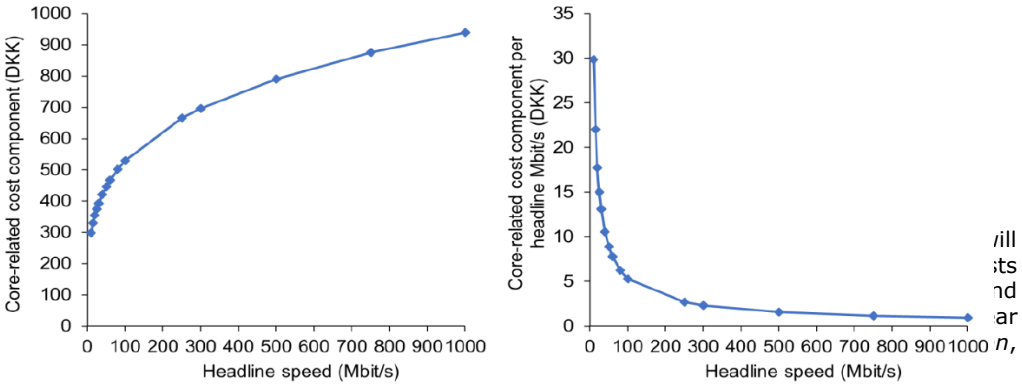
6.2.291 TM submitted that in general, the MCMC is applying unreasonable reductions to the modelled cost base i.e. CAPEX, OPEX and overheads.

6.2.292 Pricing by Mbit/s for regulated services is currently linear. So, the price for 10Mbit/s of capacity is currently ten times the price for 1Mbit/s of capacity. The MCMC should consider the use of alternative pricing relationships by speed, as has been implemented in other countries.

6.2.293 For example, in Denmark, the traffic-related costs of wholesale broadband services have historically been set using a power law relationship.

6.2.294 Figure 8 below using the most recent pricing file published by the Danish regulator[12].

Figure 8: Illustration of the Relationship between Core-Related Price Component and Headline Speed in Denmark; Total Cost (left) and Cost per Mbit/s (right) for Different Headline Speeds



[11] There are ma… cost between $… between $8,50… $30,000 per mil… foot depending… https://iesmart…

[12] See https://erhvervsstyrelsen.dk/lraic-fastnet-prisafgorelser-2020-og-2019, under "Bilag 3 - Prisudmøntning BSA & VULA"

6.2.295 TM submitted that it has a similar implementation in its RAO for Transmission Services and requested that this approach be maintained going forward.

6.2.296 TM also commented on the implementation of glide paths where there are certain services such as, WLLC, in which the modelled cost in 2025 is higher than the current price and a glide path is being used. Therefore, the glide path is leading to prices below modelled cost prior to 2025. TM stated that such outcomes should be avoided and the glide path should be set to ensure cost recovery is achievable in all future years. This requires the use of the modelled cost for the price in those years where this occurs.

6.2.297 TT dotCom is not agreeable with the proposed 'one price' for a wide bandwidth range especially for End-to-End Transmission Service. Prices are dependent on the size of bandwidth, tenure of lease and location of customers, amongst others. TT dotCom recommends the MCMC to consider additional parameters before firming up the price range.

6.2.298 MyTV, Altel and Net2One submitted that they are unable to secure the service based on the MSAP price as the costing methodology for End-to-End Transmission Service is based on microwave technology only and the network that is using STM-1 is not applicable. MyTV, Altel and Net2One is of the view that the rules, regulations and instruments under the Act are supposedly technology neutral and thus, this is indeed a barrier for MyTV, Altel and Net2One to expand as stated by the Organization for Economic Corporation and Development ("**OECD**") since the technology discovered is distorted by this price regulation.

6.2.299 MyTV, Altel and Net2One also commented that the proposed prices is not applicable for End-to-End Transmission for DTT service as it is not based on STM-1.

6.2.300 YTL submitted that there is a sharp increase of almost 70% in the proposed prices for WLLC for 1 Mbps to 1 Gbps. Since this is the most common bandwidth procured by the Access Seekers, the sharp increase will surely affect the cost of services provided by the Access Seekers.

6.2.301 YTL is of the view that the increase in prices is mainly due to the revaluation of the assets at current or replacement costs. YTL noted that this is unreasonable as it does not reflect the actual costs incurred by the Access Provider as asset prices are considered to be beyond the scope of the MSAP review which is based on the LRIC+ model using scorched node approach. The review should take into account the efficient use of the existing assets, factoring depreciate charges.

6.2.302 YTL also commented that the use of the replacement costs is not appropriate as it imposes additional costs on current Access Seekers for costs that are speculative and not certain to be incurred. It will therefore provide a "windfall" to the Access Providers. Future MSAP reviews will adequately capture any replacement cost or new investments when they are actually undertaken by Access Providers.

6.2.303 Additionally, a high percentage of the costs are attributable to ducts and pits. These are long term reusable assets with low annual depreciation charges.

6.2.304 An increase in WLLC prices also has implication for the pricing of End-to-End Transmission Services as WLLC is part and partial to it. YTLC proposes that the proposed regulated costs in the revised model v6 be relooked by the MCMC and reduced to reasonable levels.

6.2.305 YTL submitted that there is an all-round reduction in the proposed access pricing compared to the 2017 MSAP. The MCMC is urged to state SLA and QoS levels in the MSAP to prevent Access Providers from skirting the MSAP framework.

6.2.306 There is an increase in the proposed access prices for Trunk Transmission Services for capacities below 200 Mbps and this appears to be caused by higher prices for the two tail ends (WLLC). The increase in the tail end mainly comprises of the access network where ducts and pits constitute a high percentage of the access costs. As these are long term reusable assets, the annual depreciation charge should be minimal. The MCMC is urged to reconsider the pricing and adjust appropriately.

6.2.307 YTL believes that the increase in prices is mainly due to the revaluation of assets at current or replacement costs. These are unreasonable as it does not reflect the actual costs incurred by the Access Provider. Revaluation of asset prices is beyond the scope of this MSAP review which is based on the LRIC+ model using scorched node approach. The review should be looking at the efficient use of existing assets including the effect from depreciation.

6.2.308 YTL commented that the use of replacement cost is not appropriate as it imposes additional costs on current Access Seekers for cost that are speculative and not certain to be incurred. It will therefore provide a "windfall" to the Access Providers.

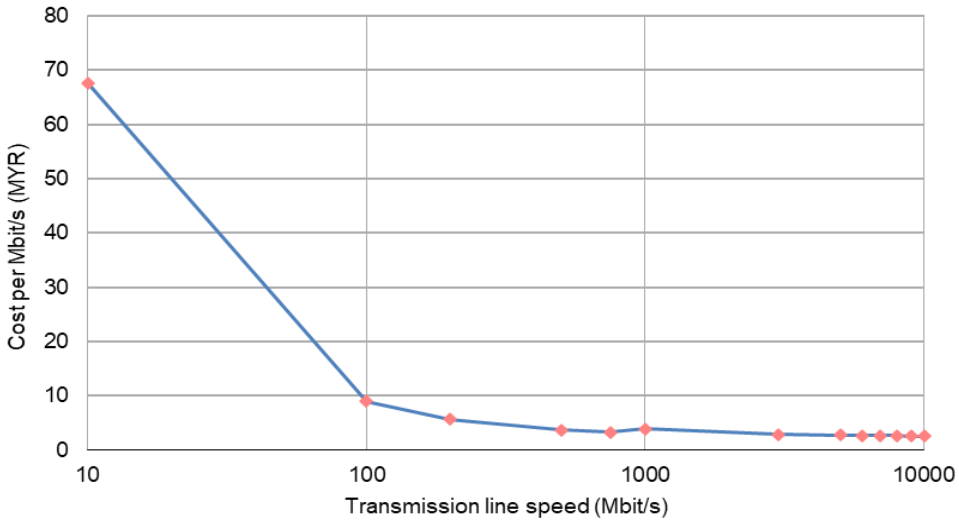
6.2.309 YTL hopes that the future MSAP review will adequately capture any replacement cost or new investments when they are actually undertaken by the Access Providers. End-to-End Transmission Services have high barriers to entry as the infrastructure is difficult to be duplicated. As a result, YTL opined that there should not be a drastic increase as this contribute to a negative impact on the fiberisation policy of the government besides leading to higher consumer prices.

Discussion

6.2.310 The MCMC acknowledges that some jurisdictions use a non-linear capacity-cost relationships for transmission and fibre broadband. However, the MCMC recognises that choosing an appropriate relationship is not a trivial task.

6.2.311 It is important to note that the cost-capacity relationship for end-to-end transmission is not purely linear in the model. The cost consists of a fixed cost (access line) and variable cost (capacity cost). The total cost is the sum of both parts. However, with increasing capacity the capacity-cost relationship becomes more linear as the cost of capacity dominates as shown in Figure 9. A disruption to this relationship occurs for subscribers with speeds at 1 Gbit/s or above as these users will require a different type of CPE.

Figure 9: End-to-End Transmission Cost Per Unit of Capacity



6.2.312 Trunk transmission and IP transit do not have a fixed access cost. The cost of these services comprised only of core related costs that are allocated based on capacity usage. The majority of the cost in the core is driven by capacity where the cost-volume relationship is largely linear. The MCMC acknowledges that a substantial proportion of this cost, consisting of CW and cables, is not driven by capacity but rather by coverage. As such, finding an accurate causal relationship between subscriber and traffic demand on one side and cost of CW and cable assets on the other side is a non-trivial exercise. Adopting non-linear relationships from other jurisdictions may not be accurate for Malaysian conditions.

6.2.313 One of the questions that arose during the modelling process is whether to allocate the cost of core CW and cables to the number of users or traffic. Allocating this cost to the number of users makes the cost-volume relationship non-linear. However, it does not reflect reality because adding new users does not drive the cost of CW and cables in the core if the infrastructure already exists. Users also require varying lengths of ducts and cables which makes an even distribution of costs unrealistic. As such, to a great extent the core CW and cables can be considered as common costs. This is the rationale behind the MCMC opting to allocate cost to capacity which results in a fixed capacity-cost relationship.

6.2.314 It is important to note that to ensure cost recovery, a non-linear cost-capacity relationship for core network services will apply a higher unit cost of capacity to low speed users while decreasing it for high-speed users. In other words, users

with high traffic will benefit from the economies of scale on the cost of low speed users. However, there is no evidence suggesting that adding a unit of capacity associated with a low speed subscriber will result in a higher incremental cost in core CW than adding a unit of capacity associated with a high-speed user.

6.2.315 The MCMC also believes that economies of scale are already embedded in the current price structure. As the total traffic in the core network is growing over the regulatory period, prices of transmission, leased lines and HSBB services are decreasing largely due to the effect of economy of scale.

6.2.316 Since the LRIC model is forward looking, it does not include TDM based traffic such as STM-1. Nevertheless, the MCMC is of the view that IP/Ethernet based technologies will prevail in the medium term. As such, the regulated prices may become relevant to MyTV, Altel and Net2One in the future.

6.2.317 With respect to YTL's comments on WLLC prices, the MCMC would like to highlight that WLLC costs have been revised in the final model. The final prices are lower than the previous MSAP. These cost reductions resulted from a review of the calculation of the cost of access fibre cable.

MCMC's Final Views

6.2.318 The MCMC confirms it sets the Wholesale Local Leased Circuit Service prices, Trunk Transmission Service prices and End-to-End Transmission Service prices as follows. It should be noted that the MCMC has applied glide paths for the final prices as shown in Tables 30, 33 and 36. The installation costs are provided in Tables 31, 34 and 37. For transparency, the MCMC has also provided the modelled prices without glide paths in Tables 29, 32 and 35.

Table 29: Wholesale Local Leased Circuit Service Modelled Prices without Glide Paths

	2023	2024	2025
Cost of the local circuit:			
Wholesale local leased circuit with copper access (RM/month)	36	35	0
Wholesale local leased circuit using 1Mbit/s to 1Gbit/s Ethernet (RM/month)	314	302	291

	2023	2024	2025
Wholesale local leased circuit using 1Gbit/s to 10Gbit/s Ethernet (RM/month)	683	650	620
Wholesale local leased circuit using DWDM (RM/month)	744	707	675

Table 30: Wholesale Local Leased Circuit Service Final Prices

	2023	2024	2025
Cost of the local circuit:			
Wholesale local leased circuit with copper access (RM/month)	43	35	0
Wholesale local leased circuit using 1Mbit/s to 1Gbit/s Ethernet (RM/month)	492	392	291
Wholesale local leased circuit using 1Gbit/s to 10Gbit/s Ethernet (RM/month)	10,119	5,370	620
Wholesale local leased circuit using DWDM (RM/month)	817	746	675
Cost of traffic over the Ethernet network:			
Wholesale local leased circuit with copper access (RM/Mbps/month)	1.97	1.64	0
Wholesale local leased circuit using 1Mbit/s to 10Gbit/s Ethernet (RM/Mbps/month)	0.96	0.87	0.78
Wholesale Local Leased Circuit Service from 1 Gbps using DWDM (RM/month)	0.70	0.66	0.60

Table 31: Wholesale Local Leased Circuit Service Installation Costs

	2023	2024	2025
Wholesale Local Leased Circuit Service installation (RM/installation)	3,422	3,525	3,631

Table 32: Trunk Transmission Service Modelled Prices without Glide Paths

	2023	2024	2025
Trunk transmission service (RM/month):			
10 Mbps	20	18	15

	2023	2024	2025
100 Mbps	202	175	152
200 Mbps	404	351	305
500 Mbps	1,010	876	762
750 Mbps	1,515	1,315	1,143
1 Gbps	2,020	1,753	1,524
3 Gbps	6,059	5,259	4,572
5 Gbps	10,098	8,765	7,620
Trunk transmission service with submarine cable (RM/month):			
10 Mbps	62	51	43
100 Mbps	618	514	429
200 Mbps	1,235	1,028	858
500 Mbps	3,088	2,571	2,145
750 Mbps	4,632	3,857	3,217
1 Gbps	6,176	5,142	4,290
3 Gbps	18,529	15,427	12,869
5 Gbps	30,881	25,712	21,448

Table 33: Trunk Transmission Service Final Prices

	2023	2024	2025
Trunk transmission service (RM/month):			
10 Mbps	52	34	15
100 Mbps	524	338	152
200 Mbps	1,049	677	305
500 Mbps	2,622	1,692	762
750 Mbps	3,932	2,538	1,143
1 Gbps	5,357	3,440	1,524
3 Gbps	16,071	10,322	4,572
5 Gbps	26,785	17,203	7,620

	2023	2024	2025
6 Gbps	32,142	20,643	9,145
7 Gbps	37,499	24,084	10,669
8 Gbps	42,856	27,524	12,193
9 Gbps	48,213	30,965	13,717
10 Gbps	53,570	34,405	15,241
Trunk transmission service with submarine cable (RM/month):			
10 Mbps	224	134	43
100 Mbps	2,242	1,336	429
200 Mbps	4,485	2,671	858
500 Mbps	11,212	6,678	2,145
750 Mbps	16,817	10,017	3,217
1 Gbps	22,927	13,608	4,290
3 Gbps	68,782	40,826	12,869
5 Gbps	114,632	68,040	21,448
6 Gbps	137,559	81,648	25,738
7 Gbps	160,485	95,256	30,028
8 Gbps	183,411	108,864	34,317
9 Gbps	206,338	122,472	38,607
10 Gbps	229,264	136,080	42,897

Table 34: Trunk Transmission Service Installation Costs

	2023	2024	2025
Trunk Transmission Service installation (RM/installation)	2,738	2,820	2,905

Table 35: End-to-End Transmission Service Modelled Prices without Glide Paths

	2023	2024	2025
End-to-end transmission service (RM/month):			
1 Mbps	57	55	0
10 Mbps	648	621	598
100 Mbps	830	779	735
200 Mbps	1,032	954	888
500 Mbps	1,637	1,480	1,345
750 Mbps	2,142	1,918	1,726
1 Gbps	3,385	3,053	2,765
3 Gbps	7,424	6,559	5,813
5 Gbps	11,463	10,064	8,861
6 Gbps	13,483	11,817	10,385
7 Gbps	15,502	13,570	11,909
8 Gbps	17,522	15,323	13,433
9 Gbps	19,541	17,076	14,957
10 Gbps	21,561	18,829	16,482

	2023	2024	2025
End-to-end transmission service with submarine cable (RM/month):			
1 Mbps	61	59	0
10 Mbps	689	655	626
100 Mbps	1,245	1,118	1,012
200 Mbps	1,863	1,632	1,441
500 Mbps	3,716	3,175	2,728
750 Mbps	5,260	4,461	3,800
1 Gbps	7,542	6,442	5,530
3 Gbps	19,894	16,727	14,110
5 Gbps	32,246	27,012	22,689
6 Gbps	38,422	32,154	26,979
7 Gbps	44,599	37,297	31,268
8 Gbps	50,775	42,439	35,558
9 Gbps	56,951	47,582	39,848
10 Gbps	63,127	52,724	44,137

Table 36: End-to-End Transmission Service Final Prices

	2023	2024	2025
End-to-end transmission service (RM/month):			
1 Mbps	82	55	0
10 Mbps	1,037	817	598
100 Mbps	1,508	1,122	735
200 Mbps	2,033	1,460	888
500 Mbps	3,606	2,476	1,345
750 Mbps	4,917	3,321	1,726
1 Gbps	6,561	4,663	2,765
3 Gbps	17,669	11,741	5,813
5 Gbps	28,383	18,622	8,861
6 Gbps	33,977	22,181	10,385
7 Gbps	39,571	25,740	11,909
8 Gbps	45,165	29,299	13,433
9 Gbps	50,759	32,858	14,957
10 Gbps	56,353	36,417	16,482
End-to-end transmission service with submarine cable (RM/month):			
1 Mbps	95	59	0
10 Mbps	1,209	917	626
100 Mbps	3,227	2,119	1,012
200 Mbps	5,469	3,455	1,441
500 Mbps	12,196	7,462	2,728
750 Mbps	17,801	10,801	3,800
1 Gbps	24,130	14,830	5,530
3 Gbps	70,377	42,243	14,110
5 Gbps	116,230	69,460	22,689
6 Gbps	139,394	83,186	26,979
7 Gbps	162,557	96,913	31,268

	2023	2024	2025
8 Gbps	185,720	110,639	35,557
9 Gbps	208,884	124,366	39,848
10 Gbps	232,047	138,092	44,137

Table 37: End-to-End Transmission Service Installation Costs

	2023	2024	2025
End-to-End Transmission Service installation (RM/installation)	6,571	6,768	6,971

Domestic Connectivity to International Service

Submissions received

6.2.319 The price proposed for Domestic Connectivity and International Service is extremely low. TT dotCom stated that the MCMC should consider the huge cost for establishing cable landing stations and other related expenses including land acquisition, approval fees, building and terminal equipment installation and maintenance, domain experts and physical cable landing which run into millions of ringgit on yearly basis. Proceeding with such 'low-price' structure will only result in service providers not being encouraged to provide such service and similarly stagnates their network coverage expansion, which in turn will jeopardise the nationwide broadband penetration and infrastructure development.

Discussion

6.2.320 In response to TT dotCom's comment on the low cost of the Domestic Connectivity and International Service, the MCMC wishes to highlight that the cost is only associated with the physical cabling. An Access Seeker is likely to seek other services such as co-location services in the landing station. The co-location cost takes into consideration the total cost of the submarine landing station.

MCMC's Final Views

6.2.321 The MCMC confirms it sets Domestic Connectivity to International Service prices as follows in Table 38.

Table 38: Domestic Connectivity to International Services Final Prices

	2023	2024	2025
Domestic Connectivity to International Services monthly rental (RM/month per 5 metre of fibre pair)	0.26	0.25	0.24
Domestic Connectivity to International Services installation (RM/installation)	137	141	145

IP Transit Service

Submissions received

6.2.322 irix observed that this particular regulatory proposal by the MCMC may change the prevailing market dynamics and will have a significant impact on their ability to service their current bank loan and ongoing ability to drive additional financing for their continued investment in their new Kuching-Singapore-Hong Kong cable system, SEA-H2X.

6.2.323 irix stated that the previous MSAP document by the MCMC in 2017 did not regulate the IP Transit pricing and as such, irix is concerned as the company has invested heavily in infrastructure development to support IP Transit as a core part of their product portfolio. irix is of the view that the MCMC has jeopardized irix's potential to grow revenues by setting price regulation for this service. irix also commented that the MCMC's proposed prices are significantly below where irix is currently positioning its IP Transit solution. As such, the proposed pricing by the MCMC would threaten irix's ability to offer such solutions in the market besides impacting the sustainability of irix as an organization, given the limited market opportunity available to them in Sarawak.

6.2.324 irix also provided details of its annual OPEX to show that they are already operating at significantly above the planned regulated rate and that they are constantly working on reducing their OPEX as part of their ongoing business improvement process.

6.2.325 irix finally concluded that it would appear unsustainable for irix to continue operating and delivering such services at the proposed price levels in the recent PI study and therefore, welcomes the removal of IP Transit pricing from the current PI on access pricing.

Discussion

6.2.326 The MCMC welcomes irix's input on regulating IP transit. The MCMC acknowledges that the cost is based on the incumbent's network which benefits from larger economies of scale. As such, they are likely to be not representative of irix's network costs.

6.2.327 The MCMC notes that only one submission was received on IP transit services, and considers it in the best interests of competition not to regulate IP transit pricing.

MCMC's Final Views

6.2.328 The MCMC has decided not to regulate the prices for IP transit service. The following Table 39 provides indicative prices only.

Table 39: IP Transit Service Indicative Prices

	2023	2024	2025
IP Transit with a speed up to 10Gbit/s (RM/month)	14,016	12,261	10,666
IP Transit with a speed from 10Gbit/s to 100Gbit/s (RM/month)	140,155	122,611	106,658

Layer 2 HSBB Network Service with QoS and Layer 3 HSBB Network Service

Submissions received

6.2.329 Celcom submitted that the MCMC has not explained why services above 1 Gbps have been removed from the table and what that means for such services. For example, are the prices no longer being regulated at all? The Commission Determination on the MSAP, Determination No. 1 of 2017 at least made it clear that these higher capacity services had a maximum price. On the other hand, both the 2017 and proposed 2020 tables make the assumption that the costs are proportionate to capacity (or value), for total cost allocation purposes. This

assumption is incorrect. The costs incurred by the Access Provider in providing a 1 Gbps service, for example, are not twice the cost of providing a 500 Mbps service.

6.2.330 Celcom stated that the same concerns that relate to Layer 2 service apply in the case of Layer 3.

Discussion

6.2.331 The MCMC acknowledges the need of some operators to include costs for HSBB services beyond 1 Gbps. The final model includes costs up to 5 Gbit/s. A discussion explaining the MCMC's rationale in assuming a linear cost-volume relationship is provided in paragraphs 6.2.310 to 6.2.313.

MCMC's Final Views

6.2.332 The MCMC confirms it sets Layer 2 and Layer 3 HSBB prices are appended as follows in Tables 40 and 41. The installation costs are available in Table 42. The MCMC notes that it has taken a policy decision to maintain port charges at the current price of RM45, as the modelled prices were very close to this amount.

Table 40: Layer 2 HSBB Network Service with QoS Final Prices

	2023	**2024**	**2025**
Termination unit port (RM/month)	45.00	45.00	45.00
Layer 2 service gateway costs (RM/month):			
100 Mbps	237.52	201.38	170.65
250 Mbps	593.80	503.45	426.63
500 Mbps	1,187.60	1,006.90	853.26
600 Mbps	1,425.12	1,208.28	1,023.91
700 Mbps	1,662.64	1,409.66	1,194.56
800 Mbps	1,900.16	1,611.04	1,365.21
1000 Mbps	2,375.20	2,013.80	1,706.51
2000 Mbps	4,750.40	4,027.60	3,413.02
3000 Mbps	7,125.60	6,041.39	5,119.54

5000 Mbps	11,876.00	10,068.99	8,532.56
10 Gbps	23,752.00	20,137.98	17,065.12
20 Gbps	47,504.00	40,275.96	34,130.25
50 Gbps	118,759.99	100,689.90	85,325.62
100 Gbps	237,519.99	201,379.79	170,651.24
200 Gbps	475,039.98	402,759.58	341,302.49
500 Gbps	1,187,599.94	1,006,898.96	853,256.21

Table 41: Layer 3 HSBB Network Service Final Prices

	2023	**2024**	**2025**
Termination unit port (RM/month)	45.00	45.00	45.00
Layer 3 service gateway costs (RM/month):			
100 Mbps	254.64	217.65	186.21
250 Mbps	636.59	544.12	465.52
500 Mbps	1,273.18	1,088.24	931.04
600 Mbps	1,527.82	1,305.89	1,117.24
700 Mbps	1,782.46	1,523.53	1,303.45
800 Mbps	2,037.10	1,741.18	1,489.66
1000 Mbps	2,546.37	2,176.48	1,862.07
2000 Mbps	5,092.74	4,352.95	3,724.15
3000 Mbps	7,639.11	6,529.43	5,586.22
5000 Mbps	12,731.85	10,882.38	9,310.37
10 Gbps	25,463.69	21,764.76	18,620.74
20 Gbps	50,927.39	43,529.53	37,241.48
50 Gbps	127,318.47	108,823.82	93,103.71
100 Gbps	254,636.95	217,647.64	186,207.41
200 Gbps	509,273.90	435,295.29	372,414.83
500 Gbps	1,273,184.74	1,088,238.21	931,037.06

Table 42: HSBB Network Service Installation Costs

	2023	2024	2025
HSBB BTU installation (RM/installation)	437	450	463
Service Gateway installation (RM/installation)	638	658	677

Duct and Manhole Access

Submissions received

6.2.333 Allo is of the opinion that the incremental is acceptable due to the increasing capital cost of civil infrastructure year by year and additional cost to be paid with OSA for each states in Malaysia.

6.2.334 In relation to the price proposed for duct and manhole, TT dotCom is of the opinion that the proposed price is extremely low and does not reflect the actual high costs involved in commissioning the ducts and manholes which should include CW, permitting fees, land acquisition (where applicable), labour and maintenance, amongst others.

6.2.335 YTL submitted that the proposed prices are more detailed and specific for ducts and manholes. This will promote fiberisation of the network, in particular base stations. As it stands, the prices are too high and will not encourage service providers to share mainline and transport ducts to lay trunk fibre. Ducts and manhole are long term assets, many of which are already fully depreciated. As such, YTL urged the MCMC to re-examine the cost of mainline and transport ducts and to require Access Providers to share the location of their ducts and manholes on request.

Discussion

6.2.336 The MCMC notes that operators' perceptions of proposed prices are contradictory, depending on whether the operator is an Access Seeker or Access Provider. The MCMC believes that providing access to ducts and manholes with reasonable costs is essential for reducing barriers to entry and avoiding replication of infrastructure.

6.2.337 The MCMC believes that it is more appropriate to provide detailed prices that differentiate between different types of ducts and manholes and distinguish between manhole space and duct space. As such, the total cost will also be determined by the number of manholes the Access Seeker wants to access along the line.

6.2.338 The MCMC emphasizes that the calculated cost is based on annualisation of actual costs after considering the proportion of FDA of the incumbent. However, operators differ in terms of the age of their infrastructure. As such, the cost may appear too low for operators with relatively new duct assets.

MCMC's Final Views

6.2.339 The MCMC confirms that it sets duct and manhole access prices as provided in Table 43 below. The MCMC confirms that the duct and manhole prices are additive per km. That is, the cost of access per km consists of the duct cost per km plus the total cost of manholes per km. Indicative pole prices have also been provided in Table 44.

Table 43: Duct and Manhole Access Final Prices

	2023	2024	2025
25% of Lead-in ducts and manhole (RM/month/km)	121.53	123.87	126.27
25% of Mainline ducts and manhole (RM/month/km)	140.46	143.18	145.96
25% of Inter-exchange ducts and manhole (RM/month/km)	245.5	250.41	255.42

Table 44: Pole Access Final Prices

	2023	2024	2025
50% of pole (RM/pole/month)	2.69	2.79	2.89

Network Co-Location Service

Submissions received

6.2.340 The MCMC did not receive any comments from the Access Providers for this service except from YTL that noted that the MCMC does not intend to regulate the prices for Network Co-Location Service and that the prices provided in the cost model are indicative prices.

MCMC's Final Views

6.2.341 The MCMC has decided not to regulate the prices for Network Co-Location Service. The updated cost model provides the following indicative prices for Network Co-Location Service as provided in Table 45.

6.2.342 The MCMC will continue to monitor provision of this service and will review the need for regulated price setting after a one year period.

Table 45: Network Co-Location Service Indicative Prices

	2023	2024	2025
Half copper cabinet (RM/month)	227	227	0
Half fibre distribution cabinet (RM/month)	402	392	382
Technical building (RM/month/m^2)	11	11	11
Submarine landing station (RM/month/m^2)	133	133	132
International submarine landing station (RM/month/m^2)	56	56	56
Satellite earth station (RM/month/m^2)	121	120	119
Electricity cost (RM/kWh)	0.59	0.60	0.62

7. Mobile Services

7.1. Overview

The MCMC developed a mobile cost model based on the LRIC+ methodology for assessing the cost of providing mobile origination and termination services, together with MVNO Access and Domestic Inter-Operator Roaming services. A "notional mobile operator" version of this model with 25% market share was used to calculate proposed prices for mobile origination and termination services.

Part E of the PI Paper concerned the mobile services. Section 18 described the assumptions about all inputs to the model, including service demands and traffic, the mobile network model, spectrum allocations and coverage, radio network costs, USP costs and cost mark-ups. The impact of different levels of assumed WACC values were described.

In determining suitable regulated prices for mobile origination and termination services, the MCMC had considered a number of issues including the likely trends in demand for voice, messaging and particularly data services. These issues were described and the MCMC's proposed prices were also presented in the PI Paper.

7.2. Summary of submissions received

Question 26:

Do you have any comments on the proposed market share assumption for the Notional Operator?

Submissions received

7.2.1 CelcomDigi was of the view that based on the MCMC Industry Performance Report 2021, MVNOs recorded market share of 16.3% which indicates that MVNOs have successfully established a healthy share in the mobile market in Malaysia. As such, the market share assumption of 25% may undervalue the actual costs incurred to provide mobile services.

7.2.2 TM disagreed with the assumption of 25% market share for the entire forthcoming regulatory period of the 4G model, in view of the merger of Digi and

Celcom. By 2025, modelled 4G network traffic levels on the notional operator will be significantly below than what should be expected on an average 4G mobile network in Malaysia which will lead to the modelled unit costs and prices of mobile services being overestimated. TM highlighted that the fixed model assumes traffic levels are much higher than TM's actuals from 2022 onwards, hence, the unit costs and prices of fixed services will be aggressively underestimated. TM argued the inconsistent approach to the cost modelling of fixed and mobile and considers this to be a significant inconsistency in the treatment of the different parts of the telecoms sector in Malaysia. This effect is magnified by the fact that Malaysian mobile operators have a Multi-operator Core Network ("**MOCN**") arrangement between them and as a result, the modelled Standalone ("**SA**") eNodeB network should in effect be carrying more than one operator's worth of traffic.

7.2.3 As a minimum, TM is of the view that the MCMC should assume a 33% market share from 2023 onwards, since there are now three major network operators in the country namely, the post-merger entity CelcomDigi, Maxis and U Mobile.

7.2.4 U Mobile highlighted that the market share assumption relates with how many network operators the market can support. The underpinning economic argument is that there is a minimum efficient scale in a market like this that has clear scale economies. Those scale economies, however, are subject to diminishing returns, so above a certain level of market share an operator is efficient enough to survive in the market. That share level will vary from country to country and so standard practice is to define it in terms of the number of viable operators actually in the market. The merger of Digi/Celcom demonstrates that the operators involved see further scale economies and fear that they may be driven out of business if they do not merge. Therefore, U Mobile was of the view that the assumed market share should be 33% and not 25%, where given scale economies the notional operator would incur lower costs and thus result in lower 4G regulated prices.

7.2.5 YTL disagreed with the assumption of 25% market and views that it does not reflect the reality of Malaysia. YTL highlighted that its notional network covers more than 90% of the population and the networks using 800MHz, 850MHz, 2.3GHz Time Division Duplex ("**TDD**") band and 2.6 GHz TDD band are not factored in the mobile costing, hence does not reflect true cost of an actual network in Malaysia. The assumption used for the number of carriers and

eNodeBs is a major detachment from reality and undervaluation of the network cost is evident in the very low of Mobile Origination and Mobile Termination prices. YTL was of the view that there is no differentiation made between big and small service providers for regulatory compliance purposes, hence proposed for factors like coverage requirements based on the Detailed Business Plan ("**DBP**") and average bandwidth speed of 35Mbps with stringent standards for drop-calls and call set-up rates to be factored in the model.

On the other hand, Altel was of the view that the proposed market share assumption is acceptable. Maxis agreed with the proposed market share assumption of 25% (including MVNO subscribers using the notional operator's network) to represent an efficient level of demand in a market with four major operators. XOX also agreed with the proposed assumption, given the merger of Digi-Celcom is expected to take place over a period of three years starting from 2023.

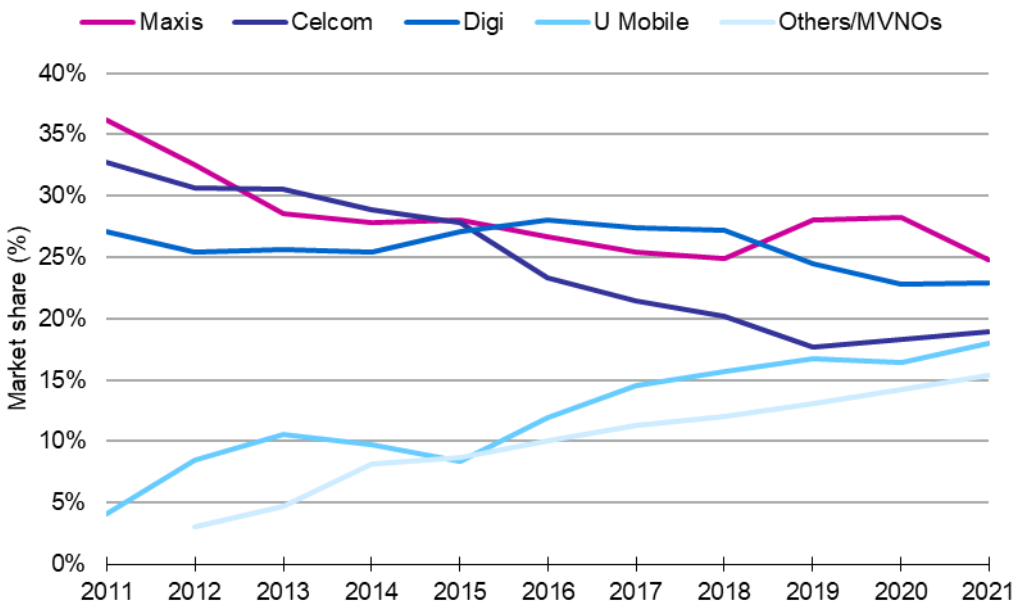
Discussion

7.2.6 There were two main viewpoints regarding the market share assumption for the hypothetical 4G operator. Altel, Maxis and XOX agreed with the MCMC's assumption of a 25% market share, while TM and U Mobile considered that the model should assume a 33% market share. Given the market performance of MVNOs, CelcomDigi suggested that a market share of 25% may understate the network costs. YTL disagreed with the 25% market share and considered that the spectrum holding of the hypothetical operator did not reflect a Malaysian operator.

7.2.7 The MCMC wishes to clarify that the market share assumption reflects the proportion of the total market carried by the hypothetical operator, which comprises its retail subscribers plus those of any MVNO that uses its network. In other words, it is the market share of the network provider. Note that it is assumed that roaming subscribers are not included within this market share – roaming traffic is treated in addition to that of the hypothetical operator's retail subscribers and the MVNO subscribers.

7.2.8 The assumption of 25% market share can be interpreted as the average in a market with four network providers as shown in Figure 10.

Figure 10: Mobile Market Share, 2011 to 2021



7.2.9 As noted by XOX, the merger of Celcom and Digi is expected to be conducted over a three-year period, commencing in 2023. The merger is therefore anticipated to be complete by the end of the regulatory period in 2025. The MCMC understands that the transition process for combining two separate mobile networks is a time-consuming and complex undertaking.

7.2.10 The assumed spectrum holding for the modelled operator is consistent with that used by several Malaysian mobile networks. The MCMC notes that there is variation in MNO spectrum holdings. Some MNOs such as YTL have allocations in other bands or use TDD spectrum however the MCMC considers these to be less representative of the spectrum allocations used by the majority of MNOs.

MCMC's Final Views

7.2.11 The MCMC considers that for most of the regulatory period from 2023 to 2025, there will effectively be four network providers in the Malaysian market. Assuming a market share of 33% for the entire current regulatory period would be, in the MCMC's opinion, premature.

7.2.12 The MCMC will retain the market share assumption of 25% for the hypothetical 4G operator.

Question 27:

Do you have any comments on the proposed assumptions for the Notional Operator's services and volumes?

Submissions received

7.2.13 CelcomDigi is of the view that for the purposes of cost modelling, it is considered reasonable to assume that all mobile voice and Short Message Service ("**SMS**") traffic will be carried on 4G mobile networks and the 4G data traffic should form the basis for the migration of traffic to DNB's 5G network, at least for the period until and including 2025. Since the migration of data traffic from 4G to 5G networks is uncertain, CelcomDigi proposed to adopt a migration rate that reflects a composite of the views expressed by operators. The 4G and 5G models are to be monitored closely against actual traffic, due to overall uncertainty. In addition, CelcomDigi suggested the MCMC to amend the regulated rates in the MSAP determination more frequently than at three yearly intervals, if such reviews yield material differences for pricing purposes.

7.2.14 Maxis supported the MCMC's assumption that a Notional Operator would have a 25% market share. However, Maxis was of the view that the total number of subscribers used by the MCMC for this Notional Operator is too high when compared to Maxis' own data and provided suggestion on the proposed changes. Maxis believed there is significant voice traffic that uses 2G network and strongly recommends for this to be reflected by dividing the modelled volumes between 2G and 4G. In addition, Maxis was of the view that the assumptions on the trend of data traffic between 4G and 5G underestimates the volume of traffic that will move to 5G services in later years and suggested changes on the forecast and to consider split of data traffic forecast between the 4G and 5G networks.

7.2.15 TM is of the view that cells 'Demand inputs' in the revised 4G model v4 indicated a relatively flat mobile subscription forecast, with a 1% Compound Annual Growth Rate ("**CAGR"**) between 2022–2027 when compared with the mobile subscription forecasts from major research companies[13] which indicate a CAGR ranging between 2.5%–5% for that period. As such, TM proposed for

[13]Global Data Malaysia Mobile Operator KPI Forecast, including Global Data, Omdia Malaysia Service Provider Market Report 2022 and GSMA.

subscriptions forecast to be revised since it is a fundamental key driver for 4G model.

7.2.16 In addition, TM compared the assumption in cells 'Demand inputs' on year-on-year change in mobile data usage per subscriber of 20% in the period 2022 – 2027 with two research companies. The equivalent CAGR for 2022–2027 from a forecast by Omdia is 18%[14], whilst the equivalent CAGR for the period 2022–2026 from a forecast by Analysys Mason's Research Division is 19%[15]. Therefore, this input appears reasonable to TM.

7.2.17 TM highlighted that the migration profile between the 4G and 5G networks is questionable, as the 4G network appears to be emptying of traffic over time, with 4G data traffic halving in volume between 2024 and 2027, hence the assumption is not efficient for a network that is not going to be shut down and will persist beyond the next regulatory period.

7.2.18 TM recommended that the inputs in cells 'Demand inputs' be revised so that the total 4G data megabytes remains broadly flat at 3 billion gigabytes for the modelling period, with the additional forecasted data loaded onto the 5G network. This will be consistent with forecasts published by market research companies including Global Data (which assumes 47% of traffic will be on the 4G network by 2027).

7.2.19 TM is of the view that the 5G adoption rate will be very much dependent on the availability and affordability of the 5G device and ecosystem and proposes a revised migration profile and revised total traffic by network.

7.2.20 U Mobile is of the view that the approach adopted is reasonable and highlighted an important assumption in the model is the split of data traffic between 4G and 5G, where U Mobile believed that the forecast rapid take up of 5G data usage over the plan period, so that by 2025 it represents 60% of all data traffic is reasonable and no changes are required.

[14] This forecast is available from https://omdia.tech.informa.com/OM026376/Cellular-Data-Traffic-Forecast Report-2022-27.
[15] This forecast is available from https://www.analysysmason.com/research/content/regional-forecasts-/wireless-traffic-forecast-rdnt0/.

7.2.21 XOX suggested reviewing the rate increase for mobile data traffic which currently set at 20% annually, given that the inception of 5G will usher in more data-dependent services that could accelerate the usage.

Discussion

7.2.22 With regard to the forecast subscriber demand used as a model input, while Maxis believed that the 25% market share was an appropriate assumption, the actual subscriber numbers was too high. TM noted that the assumed growth in subscribers was low in comparison with forecasts from industry analysts.

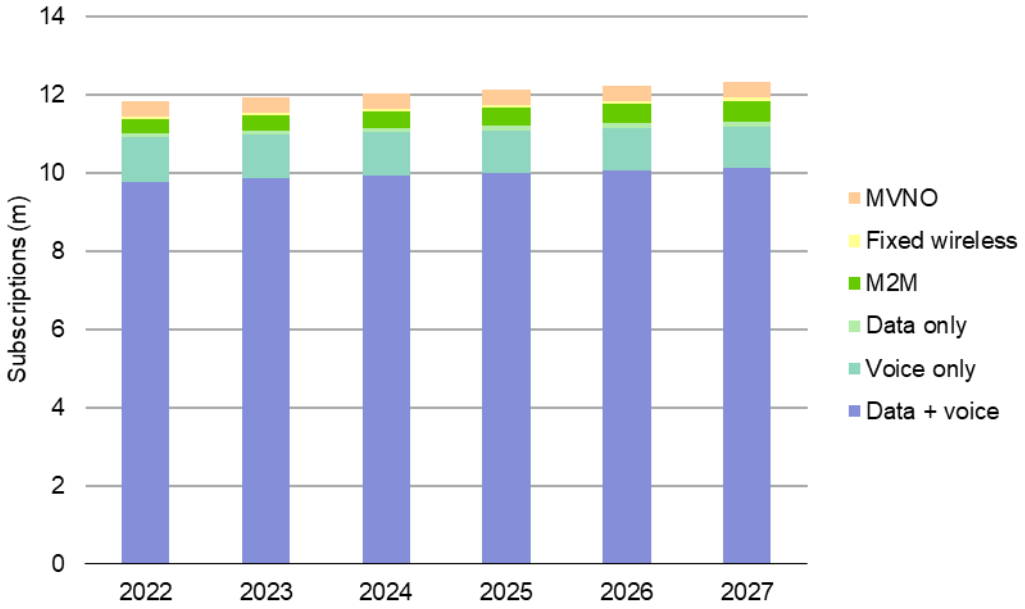
7.2.23 TM stated that the MCMC's assumed growth in data traffic per subscriber is reasonable and is consistent with forecasts from industry analysts. XOX noted that the introduction of 5G could accelerate data usage beyond that assumed by the MCMC.

7.2.24 On the mix of traffic between 4G and 5G, CelcomDigi considered that it was appropriate to assume that all voice and messaging traffic would use 4G, with a portion of data traffic using 5G. Maxis noted that there continued to be significant level of voice traffic using 2G.

7.2.25 CelcomDigi and TM noted that the migration of traffic from 4G to 5G is uncertain. TM also questioned the assumed split in data traffic between 4G and 5G, due to the declining traffic volume being carried by the 4G network. Maxis believed that the assumed proportion of data traffic on 5G is too low in the model's later years. U Mobile considered that the split between 4G and 5G data traffic was reasonable.

7.2.26 The MCMC has reviewed its market model given stakeholder comments. This has resulted in some refinements in the splits by customer segment and in the annual growth rates. The assumed population growth rate over the period 2023 to 2027 has been increased from 0.3% to 0.4%, comparable to the rate experienced in 2019 as illustrated in Figure 11. The annual growth in total mobile subscribers over this period has also increased, to around 0.9%.

Figure 11: Forecast Subscriber Demand for the Hypothetical Modelled Operator



7.2.27 Information collected by the MCMC on mobile data traffic up to Q3 2022 suggested that the growth rate in average data traffic per subscription has eased over the preceding twelve months, to be significantly lower than the 20% growth assumed for data + voice subscriptions. The MCMC believes that this may be only a short-term effect, due to factors such as the return to more normal societal behaviour after the cessation of the movement control orders which occurred over 2020 and 2021, however it does indicate that the growth in data traffic per subscriber assumed for 2022 should be eased. The deployment of 5G is also anticipated to encourage the development of new and innovative data services, which will further stimulate demand.

7.2.28 There was considerable variation in views on the migration of data traffic to 5G, indicative of the uncertainty associated with take-up of 5G services. The MCMC's original assumption on the mix of 4G and 5G data traffic was a composite of information provided by stakeholders, with the 5G share increasing to 80% by 2027. However, this resulted in a steep decline in total traffic being carried on the modelled 4G network.

7.2.29 The MCMC notes that the mobile termination results are particularly sensitive to this assumption, given the dominance of data in the network traffic mix. Given the uncertainty associated with this assumption, the MCMC is extremely concerned about its impact on the model results.

7.2.30 Under the LRIC approach, the 4G network is assumed to be built anew each year. Thus, in a situation in which traffic declines, each year the LRIC modelled network of an efficient operator would require less capacity. In contrast, a real-life Malaysian operator, who is planning to continue investment in its 4G network, would initiate strategies that would ensure that its 4G network assets would continue to achieve a reasonable level of utilisation.

7.2.31 For this reason, the MCMC considers that it is appropriate to adjust the migration of data traffic to 5G, to ensure a more managed decline in the volume of 4G data traffic carried on the modelled network as shown in Table 46. These adjustments also consider the views of MNOs on the migration of data traffic to 5G.

Table 46: Assumptions for the Proportion of Data Traffic Carried by 5G

	2023	2024	2025	2026	2027
Original assumption	15%	30%	60%	70%	80%
Revised assumption	15%	30%	45%	56%	65%

7.2.32 It is noted that some MNOs continue to have a significant number of subscribers using 2G services, however the MCMC anticipates that this will decline over the next few years. In *The Mobile Economy Asia Pacific 2022* the GSMA projected that by 2025 just 2% of Malaysian subscribers will still be using 2G, suggesting that an efficient operator is unlikely to continue with a nation-wide 2G network. The MCMC therefore considers that it is reasonable for the model to be based on a 4G-only operator for the regulatory period 2023 to 2025.

MCMC's Final Views

7.2.33 The hypothetical operator used for the cost model will continue to have a 4G-only network. This is consistent with analysts' expectations for the decline in 2G subscribers over the regulatory period.

7.2.34 The MCMC has reviewed its market model and made some refinements in response to stakeholder comments. The assumed population growth rate has been increased to 0.4% per year and the market segmentation assumptions have been adjusted.

7.2.35 With regard to traffic forecasts, the MCMC has decided to:

(a) retain the 20% growth assumption for data traffic per subscription for 2023 onwards, but reduce the assumed 2022 growth rate to 10%; and

(b) adjust the assumption for 5G data traffic migration,

This is shown in Table 47 below.

Table 47: Assumptions for the Proportion of Data Traffic Carried by 5G

	2023	2024	2025	2026	2027
% of data traffic on 5G	15%	30%	45%	56%	65%

Question 28:

Do you have any comments on the proposed approach to the radio spectrum and coverage assumptions?

Submissions received

7.2.36 Altel is of the view that the assumption is acceptable while Maxis disagreed with the exclusion of 2G network technology and proposes for this to be included as it was of the view that it is not feasible to entirely shutdown the 2G network at least within the regulatory period due to the continuing substantial legacy of 2G technology. Maxis shared an example of Ofcom in UK decided to include 2G technology in its 2018-2021 Mobile Call Termination ("**MCT**") model as MCT providers confirmed they had no plans to turn off their 2G networks[16] which supports the rationale for 2G network costs to be included to accurately reflect the costs of an efficient operator in the model.

7.2.37 In addition, Maxis is of the view that 1800MHz should be used as the coverage band for all geotypes, including rural and remote as 1800MHz is the primary frequency used by Maxis as the base layer. Maxis also supported the adjustments made to cell radii for 1800MHz, 2100MHz and 2600MHz and adjustments to average radius, macrocell coverage site for urban and suburban based on MNO feedback. However, Maxis was of the view that the average radius

[16] Ofcom 2018 Mobile Call Termination Market Review 2018-2021 Final Statement, Section 5.

used for rural and remote geotypes is too high, as compared to Maxis own data and proposed changes to be made for rural and remote geotypes.

7.2.38 Maxis highlighted that the routing factors proposed in model are inaccurate and proposed changes to the routing factors for voice, domestic roaming and MVNO respectively, and agreeable to the routing factors for the other elements as proposed in the model. Maxis noted that several core network elements have not been included in this model, although some of it were included in 2017 cost model, as such Maxis suggested for the relevant network elements to be included. As for the coverage area, Maxis was of the view that the assumptions are too low when compared to the actual coverage achieved by Maxis' network.

7.2.39 TM observed that the modelled network includes more than 8,000 4G coverage sites, of which more than 3,000 are located outside of urban areas and is of the view that fraction of these sites are under Phase 1 of JENDELA which the investments are being paid for through the USP fund, and therefore this CAPEX should not be captured in the model. This could be achieved by assuming a fraction of the sites have zero CAPEX or to set the USP mark-up to be 0% as already being implemented and should be retained in the 4G model. In addition, TM was of the view that the spectral efficiency of the modelled 4G network is significantly less as compared with version 3 of the 4G model and suggest that a higher value be used.

7.2.40 TM also highlighted concerns that excess eNodeB equipment is being deployed on the modelled network by assuming that the same eNodeB specification is deployed on all sites. TM was of the view that some efficiency considerations can be made such as whilst urban sites will likely require almost a full carrier deployment, suburban/rural/remote sites a with a lower traffic density could be deployed with a smaller carrier deployment at lower cost. Since eNodeB macrocells are now highly expensive assets, the model should be able to capture the potential cost efficiencies arising from deploying cheaper eNodeB configurations tailored to the likely lower traffic requirements outside of urban areas.

7.2.41 U Mobile is of the view that 900MHz band should be used in all geotypes as it is more efficient for coverage and the use of 1800MHz spectrum would be driven by a subsequent need for extra capacity in high demand areas. The coverage assumptions in version 4 of the model have changed significantly and the overall network area has reduced by approximately one third and causes slight increase

in costs. U Mobile also was of the view that the incremental JENDELA rural coverage in the hypothetical operator model should have been included and MCMC needs to further assess the assumed hypothetical operator's network coverage to reflect the reality on the ground.

7.2.42 XOX suggested reviewing the geographical area coverage assumptions biennially up to 2025, as the suburban and rural sprawl could be subject to unforeseen changes.

7.2.43 YTL is of the view that the cost of mobile network is understated as it assumes four operators only and the model should consider six national operators. In addition, the 800MHz, 2.3GHz TDD and 2.6GHz TDD bands are not considered in the cost model.

Discussion

7.2.44 Two stakeholders provided comments on the choice of frequency bands for coverage. Maxis agreed with using 1800MHz for coverage in urban and suburban geotypes but disagreed with the choice of 900MHz for rural and remote geotypes. U Mobile suggested that 900MHz be used for coverage across all geotypes. YTL supported the inclusion of 800MHz, 2.3GHz TDD and 2.6GHz TDD bands within the model. TM claimed that the revised spectral efficiency assumptions were too low.

7.2.45 With regard to the coverage area, Maxis and U Mobile noted that this was too low. XOX suggested that the coverage assumptions be reviewed more frequently, due to urban developments. TM noted that the cost of some rural sites was being supported through USP funds, but that the approach used by the MCMC in which the USP levy is set to zero should offset this.

7.2.46 Maxis reiterated that the hypothetical modelled operator should have a combined 2G/4G network and proposed some changes to the cell radii for rural and remote geotypes. It also suggested some changes to the routing factors for voice, domestic roaming and MVNO services and noted that some additional network elements should be added to the model.

7.2.47 TM suggested that efficiency would be improved by less expensive eNodeB configurations being deployed in areas with lower traffic densities.

7.2.48 The MCMC has assumed that the hypothetical 4G operator will use the 1800MHz frequency band for the coverage layer in urban and suburban areas, while 900MHz is used in rural and remote geotypes. The MCMC considers that this would be an appropriate assumption for an efficient operator, given the characteristics and anticipated traffic densities of the different geotypes. There are other regulatory precedents, for example Ofcom's 2018 LRIC model (cited by Maxis in connection with the use of 2G technology) in which 800MHz was used for Long Term Evolution ("**LTE**") coverage in rural geotypes, while 1800MHz was used for coverage in urban and suburban geotypes.

7.2.49 The spectrum bands assumed to be allocated to the hypothetical 4G operator namely 900MHz, 1800MHz, 2100MHz and 2600MHz were considered by the MCMC to be representative of those used by Malaysian MNOs. The MCMC notes that some MNOs, such as YTL, use other bands or TDD spectrum, however the MCMC did not consider that it was necessary to model all possible combinations of spectrum bands.

7.2.50 Feedback received from the MNOs on the MCMC's original spectral efficiency assumptions suggested that these were too high. These assumptions, which were based on GSMA information, were subsequently revised to be an average of information provided by CelcomDigi and Maxis. Note that the revised assumptions are higher than those used by the EC in its 2019 model, as well as the model used for the 2018 MSAP. The revised assumptions are provided in Table 48 below.

Table 48: 4G Spectral Efficiency Assumptions (bit/s/Hz)

Source	Sub 1GHz spectrum	Over 1GHz spectrum
Original model assumption	2.50	3.75
European Commission model (2019), 5MHz channel	1.06	1.06
MSAP 2018	0.95	0.95
Revised model assumption	1.18	1.42

7.2.51 The MCMC has reviewed the routing factor information provided by Maxis, however it is felt that it would be inappropriate to modify the MVNO Access and domestic roaming routing factors without providing an opportunity for feedback on these assumptions from other stakeholders. It is noted that Maxis was the only stakeholder to supply feedback on routing factors. The MCMC has however adjusted the routing factor for the interconnect billing system as this has incorrectly been set to non-zero for MVNO and domestic roaming on-net traffic.

7.2.52 With regard to the network elements that Maxis suggested be added to the model:

(a) Home Location Subscriber or Register is a network asset used in 2G networks, as is noted by Maxis in its submission. The model includes an HSS which performs this function within a 4G network;

(b) Mobile Number Portability was not included within the previous MSAP. The MCMC believes this to be largely a subscriber-driven cost rather than traffic-driven;

(c) Signalling Transfer Unit is a 2G network asset, as is noted by Maxis, and is not required in a 4G network; and

(d) For the SS7 and Perimeter Firewall (Signalling FW), SMS A2P Firewall and Internet Firewall and Network Address Translation (Gi-LAN), the MCMC believes that it would be inappropriate to add these network elements to the model without providing an opportunity for other stakeholders to comment. The MCMC considers that these costs may already be included within core or transport costs, thus there is a risk that adding these assets may result in double counting. Maxis was the only operator to suggest these assets be added.

7.2.53 Coverage data provided by the MNOs has been reviewed, incorporating additional information provided by Maxis. There appear to be some significant differences in the extent of MNOs' mobile footprints, in terms of square kilometres, the MCMC's previous assumption was more indicative of an MNO with a lower than typical coverage area. The MCMC therefore considers that increasing the coverage area of the hypothetical 4G operator is justified.

Table 49: Revised Coverage Assumption (sq km)

Geotype	2023	2024	2025	2026	2027
Urban	9,917	9,917	9,917	9,917	9,917
Suburban	17,088	17,088	17,088	17,088	17,088
Rural	42,688	42,688	42,688	42,688	42,688
Remote	38,998	38,998	38,998	38,998	38,998
Total coverage	108,692	108,692	108,692	108,692	108,692

7.2.54 The MCMC recognises that the mobile coverage area will evolve over time. Increasing population and expansion of urban areas will result in greater traffic density in areas previously classified as suburban, rural or remote. Furthermore, MNOs may expand their coverage to previously unserved areas.

7.2.55 As the MCMC notes above, 2G is anticipated to be a declining proportion of subscribers over the 2023 to 2025 regulatory period. The MCMC does not consider that Ofcom's choice of a combined 2G/3G/4G modelled network for the 2018 to 2021 regulatory period is necessarily relevant to be applied for a period some years later.

7.2.56 After MNO feedback on its original cell radii assumptions, the MCMC made a number of adjustments, to align with that feedback. Benchmark information from other regulatory models was also examined. It is to be noted that the MCMC's assumptions for rural cell radii are broadly comparable to that used by the EC in its 2019 model. The MCMC also notes that the hypothetical operator is assumed to use 900MHz for coverage in rural and remote areas, which has a greater radius than the 1800MHz band used by some operators.

7.2.57 The unit cost for the eNodeB is a median based on data provided to MCMC by three MNOs in their responses to the information requests. These costs were relatively comparable, despite differences in the specifications. The MCMC was satisfied that this estimate represents a typical unit cost for a Malaysian operator.

MCMC's Final Views

7.2.58 The MCMC will continue to assume 1800MHz for coverage in urban and suburban areas with 900MHz to be used in rural areas. The spectrum allocation of the modelled operator will not change.

7.2.59 The spectral efficiency assumptions will not change.

7.2.60 The routing factors for the network assets will not be amended, with the exception of the routing factors for the interconnect billing system, which has been adjusted.

7.2.61 The modelled operator will continue to have a 4G only network, and thus any 2G assets will not be added to the modelled network. Other network assets suggested by Maxis will not be added to the modelled network. Coverage assumptions have been updated, as in Table 49.

Question 29:

Do you have any comments on the busy hour traffic assumptions?

Submissions received

7.2.62 Altel is of the view that the assumption on the busy hour traffic is acceptable while CelcomDigi requested explanation on the assumptions on how busy hour traffic were derived as the cost models are sensitive to changes in busy-hour traffic assumptions.

7.2.63 Maxis agreed with the busy hour traffic assumptions used by the MCMC.

7.2.64 TM is of the view that the 4G model assumes that there are 260 voice busy-days, but that all voice traffic occurs on those days and the remaining 105 days have no voice traffic which can be interpreted from cells 'Conversion factors'!G38:M38. TM stated that it should also be noted that the busy-days are applied to derive the busy hourMbit/s in the 4G model, but not the fixed model.

7.2.65 U Mobile was of the view that the assumptions are reasonable, although it is approximately 10% higher than U Mobile's network experience and suggested

the MCMC to consider reducing the assumption. XOX suggested reviewing the assumption of data of 6% during busy hour traffic, as it could change given the inception of 5G.

Discussion

7.2.66 Several stakeholders namely, Altel, Maxis and U Mobile believed that the busy hour assumptions used in the model were reasonable. CelcomDigi noted that the model was sensitive to these assumptions, while XOX noted that busy hour traffic may be affected with the introduction of 5G. TM suggested that the assumption of 260 voice busy days implied that there was no voice traffic on other days. CelcomDigi requested more information on the derivation of the assumptions.

7.2.67 Information provided by the MNOs on the proportion of the daily traffic in the busy hour exhibited some variation for voice and messaging but was fairly consistent for data traffic (Table 50). In the case of both voice and messaging, there tended to be one or two outliers, with the other MNOs being relatively consistent. For both voice and data, the MCMC assumed the median, however for messaging one MNO was removed from the sample as its response appeared inconsistent with that from the other MNOs. The median of the adjusted sample was used for messaging.

Table 50: Proportion of Daily Traffic in the Busy Hour

Source	Voice	Messaging	Data
MNO range	6-16%	5-11%	6-7%
European Commission 2019 model	7.8%	n.a.	7.7%
MSAP 2018	9.3%	7.0%	7.0%
Model assumption	7.0%	10.0%	6.0%

7.2.68 The MCMC recognises that the introduction of 5G may result in changes to data busy hour traffic, however voice and messaging traffic is expected to be less affected.

Question 30:

Do you have any comments on the design and cost assumptions for the 4G mobile model?

Submissions received

7.2.69 Altel is of the view the assumption is acceptable while CelcomDigi is of the view that the design and cost assumptions for the 4G mobile model particularly in determining the MTR is a complex process and requires not only a comprehensive costing analysis but equally important, a careful consideration of welfare and competition effects of the mandated prices. CelcomDigi stated that based on a GSMA study on cost modelling best practices for mandating MTR, the key issues that needs to be considered in arriving at the estimated costs to provide mobile termination service includes among others, are network expansion objectives and investment incentives[17]. According to the study, setting MTR at cost could restrict network rollouts and reduced incentives to rural or less profitable areas. Since CelcomDigi and other MNOs have invested heavily to enhance network coverage and capacity across Malaysia to serve end user demands, CelcomDigi suggested that the MCMC consider the rationale recommended by the GSMA and was of the view that the MTR should be maintained at 0.99 sen per minute.

7.2.70 Maxis believed that the assumption that 78% of rooftop and other sites are owned is an understatement since based on Maxis data, a more appropriate assumption would be 95%. Maxis was also agreeable with the MCMC's proposed annualised fees for the radio network and the revision of the radio network costs are also supported by Maxis' own price book. Maxis also supported the MCMC for adding construction permit costs to the installation costs and adding annual permit fees to the operational costs for owned sites, and this is in line with Maxis' own data on permitting fees.

7.2.71 However, Maxis is of the view that some of the data used in the 4G cost model may not be accurate and proposed amendments for Cost Data Input' sheet since the SMSC costs specified in the model are significantly low, and additional fees/costs incurred such as OSA fees, PE Report and Assessment Fees were not included in the model. These fees are the actual total amount paid on yearly

[17] GSMA.The Setting of Mobile Termination Rates: Best Practice in Cost Modelling

basis by Maxis to the appointed One Stop Agency ("**OSA**") by the State Government and the Local Council at the respective states for own-build sites and Maxis proposed changes to be made to the model to incorporate these costs. In addition, Maxis was agreeable to the spectrum fees cost included in the revised 4G model as it is in line with Maxis spectrum fees.

7.2.72 SDEC suggested having a separate pricing for East and West Malaysia due to averaging out the costs incurred mainly from the companies located in West Malaysia is not applicable and lower compared to the costs of operating a network in Sabah and Sarawak. SDEC also was of the view that it is better for the cost to be segregated based on few profiles i.e. urban, sub-urban, rural and remote areas.

7.2.73 TM is of the view that the main change between the draft and revised 4G models has been a massive increase in the assumed costs of eNodeB macrocells of the revised model. TM stated that it has already pointed out that the modelled 4G network OPEX far exceeds the actual total business OPEX of all the major Malaysian operators. In the merger completion announcement, Axiata and Telenor committed the merged entity synergy of RM8 billion[18] and analysts estimated that the synergy will come mainly from network related CAPEX and cost optimisation from the enlarged scale of operations and procurement. TM believed that not only is the baseline CAPEX and OPEX of the 4G model over-inflated, but the synergy from the merger of the two largest players in the market is expected to further drive network costs down. TM was of the view that the 4G mobile model does not reflect the costs of running a mobile business in Malaysia, let alone an efficient mobile network in Malaysia and suggested the MCMC to undertake much more validation of its bottom-up model with top-down data from operators, otherwise the bottom-up model is meaningless.

7.2.74 U Mobile highlighted that version 4 of the cost model includes several updated cost assumptions which it requires further explanation and justification, particularly on the Policy and Charging Rules Function ("**PCRF"**) CAPEX cost increase, site tenure, site sharing and spectral efficiency. XOX proposed for more transparency to be provided regarding the 22.18% mark-up for fixed and common costs overheads.

7.2.75 YTL is of the view that the cost of spectrum in the model is understated and raised concern that the notional operator model does not reflect the reality of a

[18] See https://axiata.listedcompany.com/newsroom/Media_Release-Celom_Digi_Merger_Completion.pdf.

typical national mobile operator which resulted under costing of the mobile network and hence impacts the cost of Mobile Origination and Mobile Termination prices. YTL suggested the true cost of a typical mobile network operator to be re-examined.

Discussion

7.2.76 CelcomDigi noted that the process for developing cost-based prices is a complex task, requiring numerous inputs and decisions regarding assumptions. However, it encouraged the MCMC to consider factors other than cost, including welfare and competition effects, suggesting that the current mobile termination of 0.99 sen per minute be retained.

7.2.77 Various model assumptions were queried by stakeholders, including:

(a) Site assumptions for tenure and sharing (Maxis and U Mobile);
(b) Unit costs for some assets, namely SMSC (Maxis), PCRF (U Mobile) and eNodeBs (TM);
(c) Costs claimed to be omitted, including OSA fees, PE Report and Assessment Fees (Maxis);
(d) Spectral efficiency (U Mobile);
(e) spectrum cost (YTL);
(f) overhead mark-up (XOX); and
(g) separate pricing for East and West Malaysia (SDEC).

7.2.78 TM also claimed that the total network OPEX was too high.

7.2.79 The MCMC notes that there have been significant changes in the Malaysian mobile market since the previous MSAP and believes that it is inappropriate to continue to use MTRs estimated in 2018 for the regulatory period 2023 to 2025. Since that time, 5G is being rolled out, a higher proportion of subscribers now use 4G, 4G coverage has expanded and 3G networks have been shut down. Therefore the MSAP 2018 costs, which were based on a 2G/3G/4G network, would not be appropriate for the short- to medium-term as they would not reflect the market reality.

7.2.80 The MCMC is mindful of welfare and competition effects due to changes in regulated pricing. For that reason, glide paths are being implemented for mobile termination, to reduce the impact of price changes on Access Providers.

7.2.81 The previous site tenure assumption was based on an average over data provided by MNOs, with the proportion of owned sites being 20%, 78% and 50% for tower, rooftop and other sites respectively. The MCMC observed that there was significant variation between MNOs regarding site tenure. Further information was subsequently provided by another MNO. Within this enlarged sample, three MNOs had a relatively high value, with owned rooftop sites comprising over 85% of total rooftop sites while the other two MNOs were below 70%. The MCMC considers that the hypothetical 4G operator is more representative of the former subgroup, and thus an average taken over this subgroup would be more appropriate. A similar situation exists in regard to tenure of other sites. The subgroup averages for rooftop sites and other sites are 91% and 94% respectively.

7.2.82 The model assumes that a specified proportion of owned tower sites are shared with other operators. An average of the MNO data provided was used to estimate this proportion, with the result being 20%. The MCMC has assumed that there is no sharing for rooftop or other sites, and that sharing is incorporated within the sites leasing costs.

7.2.83 The SMSC unit costs provided by MNOs spanned an extremely wide range, which reflected an equally wide range of asset capacities. Based on the required capacity for the network, and recognising the projected decline in messaging traffic the MCMC selected a unit cost which was believed would deliver an appropriate capacity at an economic price.

7.2.84 The original PCRF unit cost was based on the lowest unit cost provided by the MNOs. The MCMC subsequently reviewed this asset and increased its cost and capacity to be similar to that of another MNO.

7.2.85 The unit cost assumed for the eNodeB is the median (with some rounding) of the unit costs provided by three MNOs. The MCMC recognises that this single asset comprises a large proportion of annualised costs. The MCMC notes that an operator may choose to deploy eNodeBs with a lower configuration in rural areas, however identified that the differential in unit costs is likely to be less than the variation in the typical costs that were provided by the MNOs. Therefore the MCMC considers that using a standard eNodeB across all geotypes would be a reasonable approach.

7.2.86 In the previous version of the model, the MCMC included permit fees to the owned site costs. These comprised including a construction permit fee within the installation cost and an annual permit fee within the operational cost, with the data being sourced from the infrastructure sharing model. It incorporates the following charges, averaged across all States:

(a) OSA;
(b) Local Council;
(c) Special permit for usage of agricultural land / Land Department & Survey Sarawak;
(d) Civil Aviation Authority Malaysia;
(e) Utility Corridor Division / State Government Utility Corridor; and
(f) State Agency Safety & Security Audit.

7.2.87 The MCMC understands that these charges will include the fees for OSA, PE Report and Assessment noted by Maxis.

7.2.88 The spectral efficiency assumptions used by the model are discussed in detail under question 28 above.

7.2.89 The spectrum costs input to the models were calculated by the MCMC based on the assumed spectrum holding of the hypothetical modelled operator and the price component fees defined in the Ministerial Determinations No 8 of 2021 (900MHz), No 9 of 2021 (1800MHz), No 11 of 2016 (2100MHz) and No 17 of 2021 (2600MHz) and annual fees.

7.2.90 The overhead mark-up used in the model is a mark-up on annualised costs. For estimating the mark-up, the MCMC modified an approach used by Ofcom in 2011 for mobile termination[19]. Note that more recently, Ofcom has used pure LRIC for mobile termination, in which overhead costs are not included. Four MNOs provided sufficient top-down data to estimate the mark-up for 2021. The estimate of the mark-up also includes an assumption for the WACC. The MCMC has updated the estimate for the overhead mark-up using the revised WACC (see section 5.3). The MCMC's revised estimate is 21.88%, with the range across the four MNOs being 19.58% to 23.58%.

[19] Ofcom (2011), Wholesale mobile voice call termination Modelling Annexes.

7.2.91 While the MCMC recognises that the underlying costs for some network elements may differ between East and West Malaysia, it has a strong preference for geographically averaged pricing to be applied to regulated wholesale products. In particular, for voice traffic the cost of the submarine cable is not considered to be significant, as the bulk of its costs are allocated to data traffic.

7.2.92 TM notes that the network OPEX estimated by the model was high. In a comprehensive review of the mobile model, the MCMC found that the quantities of a very small number of network assets had been overstated, due to a definitional change regarding certain input data that had been implemented in the previous version of the model. As a result, annualised network costs and network OPEX were also overstated. This has now been corrected.

7.2.93 However, in its comparison of the modelled OPEX for 2022 with recent MNO financial statements, TM did not identify that the modelled OPEX assumes that an annual cost for 5G Access would be incurred for 2022, whereas such a cost would not have been present within the MNO financial statements.

MCMC's Final Views

7.2.94 Concerns over welfare and competition effects should be alleviated through the MCMC's use of glide paths for mobile termination.

7.2.95 In regard to various inputs and assumptions used within the model, the MCMC will make no change for the following:

(a) Site sharing for owned tower sites;
(b) Unit costs for SMSC and PCRF;
(c) Spectral efficiency;
(d) Spectrum costs; and
(e) geographically averaged pricing for mobile services.

7.2.96 The MCMC understands that the model already includes the fees for OSA, PE Report and Assessment.

7.2.97 The MCMC has made the following adjustments to the model:

(a) Increase the proportion of owned sites to 91% for rooftop sites and 94% for other sites, from 78% and 50% respectively, with tower sites being unchanged at 20%; and

(b) the overhead mark-up decreased from 21.92% to 21.88%.

7.2.98 The MCMC has corrected an error in the model which overstated annualised network costs. The adjustment has resulted in a decrease in network OPEX.

Question 31:

Do you have any comments on the service costs calculated by the mobile model?

Submissions received

7.2.99 CelcomDigi recommended that the MCMC commission an independent audit of the models and release the results of the audit to the industry to provide an assurance that the formula for roaming and MVNO data services within the model are accurate and change its pricing decisions to reflect corrected model results, where necessary. Since the 4G model assumes that some demand is removed each year from 4G to 5G, this means that some unit prices in the 4G model are increasing over time, instead of decreasing, as would be expected with increasing demand, hence CelcomDigi was of the view that regulated prices cannot be set directly from the model but should be adjusted to take account of 4G and 5G costs.

7.2.100 In addition, CelcomDigi is of the view that it is unrealistic that the service costs assume the 4G network can be substantially reduced in size between 2024 and 2025, hence the model results must be adjusted in the regulated prices to take proper account of the transition from 4G to 5G. CelcomDigi was also of the view that as data traffic gradually move to 5G, 4G remains to be the dominant Radio Access Technology to provide voice services to mobile users, hence 4G will continue to be an important element in mobile connectivity. CelcomDigi will continue to invest in 4G network in the years to come, incurring OPEX and CAPEX to maintain network quality and expand coverage. It is essential that the 4G mobile model allocates higher costs to voice to ensure adequate investment incentives to MNOs to maintain and continue enhancing the network that supports voice. More importantly, CelcomDigi highlighted that it is necessary to ensure that the QoS to end users is not jeopardised.

7.2.101 Maxis proposed the MCMC to adjust the cost models to produce a more accurate estimate of service cost by incorporating Maxis views as provided under questions 26 to 32.

7.2.102 TM supported the inclusion of 5G traffic in the cost base of the 4G model as the notional operator should have the benefits of economies of scale on its billing and IT system. TM is of the view that the assumption is reasonable since the notional operator would not have a separate system to manage this 5G traffic that it is also conveying (via the 5G operator) for its subscriber base.

7.2.103 U Mobile highlighted its concern on version 4 of the 4G model which shows a data cost per GB that is over three times higher than the previous version, however there is no explanation for this. In addition, U Mobile observed that the 5G traffic using the Non-Standalone ("**NSA**") product does not appear to have been added to the volumes using the 4G EPC in the 4G model and instead, a calculation has been added to the 4G model that appears to cost 5G traffic at the rates calculated by the 5G model.

7.2.104 XOX suggested reviewing the service costs under a scenario where 5G adoption is slower than expected, as the current assumption in the model projects a lower level of utilisation on the 4G network.

7.2.105 YTL observed that there is an increase in prices compared to MSAP 2017. Since the prices are based on the same assets used in 2017 study, YTL believed that there is no reason to support the increase. The licences for IMS and IP switches alone do not justify the increase and in fact, should have been appropriately depreciated. YTL further observed that mobile termination has been higher than fixed termination for quite some time even the user behaviour has shifted to mobile centric use and strongly urged the MCMC to eliminate differential costing between Mobile and fixed termination.

Discussion

7.2.106 CelcomDigi raises a number of concerns regarding the challenges for setting cost-based prices in a market that is undergoing a substantial structural change. In particular, the migration of data traffic from 4G to 5G, but also the approach for MVNO Access and domestic roaming.

7.2.107 Maxis requests that the cost model more closely follows Maxis inputs for a number of inputs discussed in questions 26 to 32.

7.2.108 U Mobile considers that the cost for data appears high and that the cost for 5G data omits the cost for 4G EPC.

7.2.109 TM suggests that the cost of the billing and IT systems should also be allocated to 5G traffic.

7.2.110 YTL claims that there is no reason to support an increase in price from MSAP 2017, that the MTR has been higher than the FTR and that differential costing between fixed and mobile termination should be eliminated.

7.2.111 XOX suggests that the MCMC examine a scenario in which 5G migration is slower than expected.

7.2.112 In regard to Maxis' request that the cost model should be more closely aligned to Maxis data, the MCMC notes that its assumptions and inputs are based on its consideration of information provided by all stakeholders. The MCMC considers that this is preferable to basing the model on a single MNO as it wishes to ensure that the assumptions reflect an efficient operator, but also a realistic view of the Malaysian operating environment. Many of the model inputs are estimates, typically averages or medians. However, in several instances the MCMC selected a representative input as there may be other factors which could place a higher (or lower) weighting on data points used to derive the assumption. Under questions 26 to 32 above the MCMC provides more information on the derivation of specific assumptions and the reasons for the values used.

7.2.113 The MCMC recognises the significant challenges for setting cost-based prices in an environment which is in the very early stages of significant structural changes. Uncertainty over the migration to 5G increases the margins of error for the forecast demand carried on the 4G network, and thus also for the estimated network costs. Given this uncertainty, the MCMC decided that a conservative view of 5G migration would be prudent, and thus its assumptions are somewhat lower than views expressed by some stakeholders and expectations in early adopter countries such as South Korea.

7.2.114 This issue can only be resolved in time, once more information becomes available on the impact of 5G on 4G networks in Malaysia. The MCMC will continue to monitor market behaviour.

7.2.115 The MCMC notes that there is considerable support by MNOs for continuation of the status quo in respect to MVNO Access and domestic roaming, in which prices

are set by commercial negotiation. A more detailed discussion of these services is provided in the responses to question 32 below.

7.2.116 As previously noted in question 30, the MCMC identified an error in the previous version of the model which had the effect of overstating annualised network costs, and thus inflating the model result. After the MCMC corrected this error, the cost for data has been reduced substantially, which has also flowed through to the estimates for MVNO Access and domestic roaming data.

7.2.117 The MCMC agrees with TM that it is appropriate for the costs for IT systems and billing to be allocated to 5G traffic as well as 4G traffic. In fact, this was already implemented in the previous version of the model.

7.2.118 The previous version of the model assumed that the hypothetical operator would use the 5G core provided by the wholesale 5G operator. After reviewing the assumptions associated with the hypothetical operator's use of 5G, the MCMC considers that it is appropriate to assume that the operator uses its own core for 5G traffic. Given that 5G access prices are not being regulated, the MCMC considers that it is appropriate to base the cost of 5G access on the prices within DNB's RAO.

7.2.119 The MCMC wishes to note that in the 2017 MSAP, the MTRs were lower than the FTRs. The MCMC outlined its views in regard to BAK in question 2 above, however similar views also apply to the more general case of symmetric pricing, in which there is no difference between fixed and MTRs, but the rates are non-zero. The MCMC considers that the suitability of such a regime for Malaysian market conditions should be explored in the future.

7.2.120 The MCMC is concerned about the high level of uncertainty regarding the migration of traffic to 5G. This affects not only the 5G cost model, but also the 4G model as the reduction in traffic volumes has a significant effect on the network and costs of the hypothetical 4G operator. While the MCMC has explored alternative scenarios, selecting a suitable assumption for the purposes of regulatory pricing remains a challenge. Under question 27 above, the MCMC discusses its adjustment to the migration of data traffic to 5G, to ensure a more managed decline in the volume of 4G data traffic carried on the modelled network, in addition to considering the views of MNOs.

MCMC's Final Views

7.2.121 The MCMC has corrected an error in the model, which inflated annualised network costs. This correction has also reduced the cost of data services.

7.2.122 The MCMC is assuming that the hypothetical 4G operator will use its own core for 5G traffic and the cost of this core is to be included within the mobile model. The unit cost is based on benchmark information provided by the MNOs. For 5G Services, the model uses costs based on DNB's RAO.

7.2.123 The MCMC considers that it may be appropriate to explore BAK or symmetric rates for fixed and mobile termination in the future.

Question 32:

Do you have any comments on the proposed regulated prices for mobile services?

Submissions received

7.2.124 Altel supported the MCMC's proposal on the removal of SMS and Multimedia Message Service ("**MMS**") services as technology will drive service revolution which is even now resulting in a decline in messaging usage.

7.2.125 CelcomDigi provided its views on the proposed regulated prices, as follows:

Regulated Prices for 4G Mobile Origination and Termination Services

7.2.126 According to CelcomDigi, it was of the view that the way the MCMC has modelled the costs when data traffic is being progressively reduced is problematic and potentially misleading. A glide path of this duration balances the Access Providers' needs to adjust to lower revenues with the continued, but progressively decreasing, imposition of above-cost access prices on Access Seekers. Therefore, if this were a situation in which all traffic, including all data traffic, remained on the network being modelled, a three-year glide path would probably be an appropriate result to balance the competing interests. However, that is not the situation at all. Therefore, further adjustments to the modelled outcomes as outlined below will be necessary if the MCMC's pricing proposals are to be fair and reasonable in the actual circumstances that the industry will

experience. CelcomDigi added that the situation faced by all mobile operators in Malaysia is unique and requires a unique approach to cost modelling.

7.2.127 CelcomDigi is of the view that bottom-up LRIC cost models are at best to model the costs of a network generated by the demand, capacity, unit cost, optimum utilisation and other efficiency assumptions that have been adopted. It is further assumed that Access Providers who are unable to meet these theoretically efficient cost outcomes will have an incentive to do so, or else bear the additional costs that they incur and this can be done in various ways, including expanding operations to achieve improved scale efficiencies.

7.2.128 However, CelcomDigi highlighted that this is not available to mobile operators in Malaysia since the main service they might use to promote growth in mobile data which will progressively be transferred to the 5G network and accounted for in the 5G model. The 4G model assumes that the reduced sites that are required to handle the lower overall traffic will or can be achieved immediately. The modelled coverage remains constant, because the number of sites needed for coverage is very much smaller than the number of sites required to accommodate the modelled traffic. This will not be the case in Malaysia as MNOs continue to invest in 4G network, incurring OPEX and CAPEX to maintain network quality and expand coverage of the main network to carry voice traffic to the end users. Moreover, it will not be possible for CelcomDigi or any of the other 4G mobile network operators to reduce their network costs so rapidly over the three years covered by the MCMC's price proposals.

7.2.129 CelcomDigi proposed ways which an allowance and adjustment can be made for the realities of network operation and contraction in realistic timescales, such as to model the traffic-handling capacity of the 4G mobile network whereby the data traffic continues to be handled by 4G and 5G networks, while costing services on the basis of reduced data traffic. This option would model the realistic case where the mobile operators, uncertain of the take-up of 5G services, will keep capacity in their networks to accommodate all data traffic. Another possible option is to reduce the utilisation factors in the 4G model substantially for each year in which data traffic is transferred to 5G. This would reflect the reality that utilisation will decrease as data traffic is transferred and that there will be a substantial delay before other efficiency stabilisation measures, including capacity decommissioning and removal of network operating costs, can take effect.

7.2.130 In addition, CelcomDigi emphasized that the MCMC should be cautious about making decisions based on the 4G model alone, where many of the outputs in later years are determined by artefacts of the modelling process and there is great uncertainty about the volumes of data that will be transferred from 4G to 5G networks. CelcomDigi highlighted that where unique circumstances have arisen in other jurisdictions, the relevant cost models have been modified. For example, the cost models for Saudi Arabia make special provision for network equipment installed by operators at the Hajj pilgrimage sites even though the network is underutilised for much of the year, because it is efficient for the operators to leave the equipment in place. In addition to this, based on the data produced by Helgi Analytics[20], since 2015 Malaysia's MTR is the lowest compared with other countries in the region and more significantly, the data shows that there has been a slower rate of decline applied in the MTR in other regions. As such, CelcomDigi urged the MCMC to consider maintaining the MTR at 0.99 sen per minute until the uncertainty of matters highlighted above are resolved and where the effects of 4G and 5G co-existence is more evident.

Regulated Prices for MVNO services

7.2.131 CelcomDigi considered that terms and conditions for MVNO access including prices, should continue to be determined by commercial negotiation as this approach reflects the diversity of arrangements and potential complexity that applies to MVNO operations. Also, there has been no market failure warranting regulatory intervention on price terms and based on the MCMC Industry Performance Report 2021, MVNO subscriptions have increased by 24.2% in 2021 compared with 2020 and recorded market share of 16.3% out of total mobile subscriptions in 2021 which indicates a healthy and functioning wholesale/MVNO market.

7.2.132 CelcomDigi further was of the view that there is need to adopt a holistic approach of regulation rather than a piecemeal technocratic approach of individual issue and in case of unwarranted price regulation that may distort market function and inadvertently negatively impacting both markets. In addition, CelcomDigi proposed the MCMC to consider Infocomm Development Authority of Singapore's MVNO negotiation principles rather than adopting prescriptive access obligations. The mobile market should not be subject to ex-ante regulations and CelcomDigi quoted the GSM Association in its paper entitled "Competition in the

[20] National Regulator, Mobile operators, Press monitoring, Helgi Analytics (2019).

Mobile Market - in Developed and Developing Countries", where there is a requirement for affirmative demonstration of a market failure for regulation to be legally permissible.

7.2.133 CelcomDigi also was of the view that another assessment of whether MVNO access should be regulated is by way assessing competition in the retail mobile market, as has been used by the Commerce Commission (New Zealand) and Ofcom when applying "indirect constraints" to uncompetitive networks if there is sufficient competition between the networks at retail, even if one of them does not compete at wholesale, then wholesale regulation is not required. CelcomDigi was of the view that the MCMC should forbear on price regulation for MVNO access prices. Due to complexities of MVNO arrangements, CelcomDigi urged caution on setting regulated prices for MVNO access. Ranges of MVNO categories requires important factors for consideration including custom made support from the MNOs to allow the MVNO to establish business differentiation. As such, CelcomDigi was of the view that the price regulation would distort market development and would restrict a provider's ability to give MVNOs offers according to their requirement.

7.2.134 According to CelcomDigi, current and future MVNOs continue to have the option of seeking services directly from other MNOs. MNOs, includingCelcomDigi as a leading host to MVNOs, have a strong commercial incentive to ensure that MVNOs remain competitively attractive and that migration to other MNOs does not occur. Furthermore, to mitigate credit risks to CelcomDigi as the host operator, the arrangement with the MVNOs is designed to promote substantial commercial incentives, in order to ensure MVNOs continue to compete for and retain their customers. In this regard, CelcomDigi is particularly concerned that setting a per unit price for data will substantially affect the business case for an MVNO and may lead to some MVNOs exiting the market. This result would be the opposite of the result that the MCMC is trying to achieve through price regulation. If the MCMC adjusts the 4G cost model outputs using glide paths to smooth the implementation of new maximum access prices for 4G mobile origination and termination, then the MCMC should also adjust the model output prices for MVNO voice services, particularly for MVNO voice off-net prices, which need to reflect actual termination and origination charges for each year. CelcomDigi urged the MCMC to interpret the cost model outputs in the same way for all related services. CelcomDigi was of the view that setting access prices for MVNOs directly from the 4G model is inappropriate and the proposed prices are

increasing in some cases, but this is purely an artefact of the 4G model, in which demand is "disappearing" to 5G.

7.2.135 CelcomDigi highlighted that the MCMC must take this into account and amend final regulated prices, if any are eventually recommended, to properly include the effects of 5G. As the MVNO description in the Access List includes 5G services, the prices must also take account of 5G costs, but this can only be done once the 5G model is fully stable. In the interim, the MCMC should treat the calculated 5G costs as tentative at best. The MCMC proposed regulated access prices for MVNO services are maximum prices and if literally applied, they preclude commercial agreements where the prices might be structured differently.

7.2.136 CelcomDigi highlighted its concern that it could inadvertently not conform to the MCMC's regulatory requirements in a commercial agreement with an MVNO since each commercial agreement includes a bundle of services at a single price, based in part on assumptions about the future mix of traffic. Should the MCMC be concerned that situations may arise where there is a material imbalance in the negotiating power of MNOs and MVNOs, it may seek to address that imbalance through setting guidelines, rather than prices which might potentially include:

(a) Non-discrimination between MVNOs and equivalence of third party MVNO conditions with the conditions for the MNO's own retail business;
(b) Not to set wholesale prices on a SAor similar cost basis;
(c) Limitations on the period for which service commitments may be imposed;
(d) Commercial arbitration arrangements; and
(e) Strict limits on how MVNO customer data may be used by the MNO.

7.2.137 CelcomDigi expected that such guidelines, if any, would be subject to separate industry consultation. In the Access List, the MCMC defines the MVNO service as including 5G services from mobile host operators. However, in the PI Paper the proposed MVNO service prices are generated solely from the 4G mobile cost model. The 5G costs must be taken into account but the latest form of the 5G cost model is still a work in progress and 5G model results should not just be inserted into the 4G cost model, as currently proposed by the MCMC.

7.2.138 CelcomDigi was of the view that commercial negotiations for domestic roaming are more suitable for parties to reach a mutually beneficial arrangements based on the operator's business viability. Mandating price for domestic roaming service could also result in lower levels of investment and network roll-out. At a time when greater capacity is required to maintain QoS levels, domestic roaming would only be appropriate in areas where there is clear evidence that additional network roll-out is not possible.

7.2.139 CelcomDigi was also of the view that since the MCMC has moved to impose a price cap regime, the net effect of this will be to limit innovation in the terms of access that may otherwise have resulted from commercial negotiation. CelcomDigi highlighted that there are no impediments/bottleneck that warrants for regulatory intervention in the current commercial environment, and it is proven that competent operators, such as U Mobile, who have implemented domestic roaming service or Radio Access Network ("**RAN**") sharing can grow and ultimately become a strong fourth player in the market with own network.

7.2.140 CelcomDigi raised similar objections for the proposed domestic roaming charges, as in the case of MVNO access prices, particularly on adoption of the model results without adjusting in any way for the glide path smoothing that has been applied in the case of 4G mobile origination and termination.

7.2.141 Maxis was of the view that setting significantly low MTRs may have a consequential impact to Malaysia IDD termination rates and outgoing cash out to other countries. As discussed in question 1, Maxis believed ex-ante regulation is not appropriate for MVNO Access and Domestic Inter-Roaming services.

7.2.142 According to TM, it has reviewed the current published retail prices for mobile data services in Malaysia as of January 2023 for the retail packages across Celcom, Digi and Maxis. For each of their main packages, TM has calculated the price per gigabyte and then has calculated the arithmetic average for each operator across its packages. TM was of the view that the MCMC has not done any top-down checks of the implied wholesale prices from the 4G model with real retail prices, since by using the revised model outputs, the MCMC would be almost certainly imposing a margin squeeze situation on the mobile market. Domestic roaming 4G wholesale prices are intended to be volumetric, meaning that wholesale operators will pay for every gigabyte that their subscriber

consumes on the host network, regardless of the time of day of the usage. When setting volumetric prices in this manner, these kinds of comparisons are crucial.

7.2.143 TM stated that in comparison, 5G wholesale prices are being structured as "pipe access", allowing Access Seekers to manage the usage of their subscribers within that pipe. Mobile Access Seekers such as TM will make crippling losses on their subscribers if the output costs from the revised v4 4G model become prices, since if subscribers consume too much traffic, then the wholesale outpayments will outstrip the retail revenues, rendering the Access Seeker uncompetitive in the market. TM therefore urged the MCMC to revisit and recalibrate the 4G model cost base down to more sensible levels.

7.2.144 U Mobile recommended that MVNO Access Prices be removed from the list of proposed regulated prices for mobile services. In addition, U Mobile proposed front loading the glide paths rather than using a straight line over the three-year period. XOX suggested for the regulated price for Voice & SMS to be reviewed, should the transition to mobile data be slower than expected, causing the proposed prices to be higher than actual demand. YTL was of the view that the MCMC should take concrete steps to eliminate the differential costing between mobile and fixed termination.

Discussion

Mobile Origination and Termination

7.2.145 CelcomDigi suggests that the Malaysian environment requires a unique approach for cost modelling and offers several suggestions for model upgrades to allow for the risk and challenges facing the MNOs over the regulatory period. CelcomDigi also suggested retaining the current 0.99 sen per minute rate until the relationship between 4G and 5G becomes more established.

7.2.146 Maxis notes that setting low MTRs may affect Malaysia IDD termination rates and outgoing payments to other countries.

7.2.147 U Mobile suggests that the glide paths should be front-loaded rather than straight lines over the three-year regulatory period.

7.2.148 YTL states that differential pricing for fixed and mobile termination should be eliminated, while Altel supported the removal of SMS and MMS from price regulation.

7.2.149 The MCMC notes stakeholders' concerns over the potential impact of significant structural changes on the market. The launch of a wholesale only 5G operator is unique worldwide and there is little precedent on how this will affect the market. Accordingly, various modelling assumptions made by the MCMC have been conservative when compared with some industry expectations, and to reflect the likely strategies that the hypothetical operator may employ. These assumptions, which in the MCMC's view are compatible with some suggestions made by CelcomDigi, include:

(a) Proportion of data traffic migrating to 5G; and
(b) Calibrating the migration of data traffic migrating to 5G to ensure that the hypothetical operator does not experience a huge decline in traffic that would cause a significant reduction in network capacity.

7.2.150 The MCMC does not consider that it is appropriate to continue with the existing MTR of 0.99 sen per minute. This rate was set in 2017, based on a 2G/3G/4G network, and when expectations in regard to data traffic were more modest than the traffic being carried in 2022. The MCMC considers that over the past five years costs will have changed: technology is shifting from 2G/3G/4G to 4G/5G, and voice traffic has declined while data traffic continues to increase.

7.2.151 Based on the results from its cost model, retention of the current MTR would mean that MNOs would continue to generate revenue that is significantly above cost. The MCMC believes that prolonging this situation would be inappropriate.

7.2.152 Differences between the termination rates in other countries are key factors influencing net payments for international (outpayments less inpayments). The MCMC does not consider that it is appropriate to increase the termination rate above cost for all traffic in order to reduce the differential between termination rates in other countries.

7.2.153 The MCMC observes that the use of front-loaded glide paths would result in a more rapid progression toward the model-derived prices. In the MCMC's opinion, there appears to be no strong rationale for doing so, particularly given the

uncertainties associated with the mobile market over the short term. Therefore the MCMC prefers to use straight line glide paths.

7.2.154 As noted above in the discussion for question 2 and 31, the MCMC considers that the suitability of BAK or non-differential pricing for Malaysian market conditions should be explored in the future.

MVNO Access

7.2.155 Continuation of the existing situation in which commercial negotiation is used for MVNO Access is endorsed by CelcomDigi, Maxis and U Mobile.

7.2.156 CelcomDigi notes that a reductive approach applied to MVNO Access does not take into account the benefits associated with the packages that are currently offered to MVNO Access Seekers. CelcomDigi also notes that if MVNO prices are to be regulated, they should incorporate any glide paths associated with MTRs which were applied externally to the model.

7.2.157 The MCMC recognises that there is considerable support by MNOs for continuing the status quo with respect to MVNO Access, namely commercial negotiation of prices.

7.2.158 Agreements between MNOs and MVNOs typically involve a package of benefits. These packages may include discounted pricing for volume or term commitments, or differential pricing based on whether the MVNO is thick or thin, namely how much of the service functionality or service branding is to be the responsibility of the MVNO itself rather than the MNO. The resultant pricing may therefore be a complex combination of the various options available to the Access Seeker.

7.2.159 Incorporating these options within a cost model would require detailed information on the cost savings available through such discounting, as well as the costs of other benefits available through MVNO packages. In the absence of such information, the MCMC is able only to estimate an overall cost per unit demand.

7.2.160 In 2021 there were 13 MVNO licensees, serving 16.3% of the mobile market share using the networks of Celcom, Digi and Maxis. With the CelcomDigi merger

the MCMC notes that competition for MVNO Access has lessened, however, there remains a possibility that other MNOs may choose to enter this market.

7.2.161 The MCMC therefore considers that commercial negotiation is still appropriate for MVNO Access, but that ongoing market monitoring will be required. The MCMC would also be available to discuss potential problems in this market.

Domestic Roaming

7.2.162 CelcomDigi and Maxis support the use of commercial negotiation for domestic roaming. As in the case of MVNO Access, CelcomDigi suggested that any glide paths associated with MTR should also be applied to domestic roaming. TM estimated that the wholesale data cost for domestic roaming was higher than the retail rate for mobile data.

7.2.163 The MCMC recognises the support of MNOs for the use of commercial negotiation for domestic roaming. The MCMC is concerned that competition for this service may be limited. Access Seekers requiring domestic roaming are obliged to use an Access Provider with a network at the desired coverage location. In some locations there may only be a single Access Provider, in which case the MCMC perceives that there is a potential for anti-competitive behaviour.

7.2.164 The MCMC notes that regulating prices for domestic roaming does not prevent Access Providers from offering discounted prices, for example via volume or term commitments.

7.2.165 With regard to the data cost for domestic roaming, this was affected by an error in the model, described above, which inflated annualised network costs. Correction of this error has reduced the cost of domestic roaming data. The model has also been amended to calculate separate costs for 4G and 5G data services with domestic roaming.

MCMC's Final Views

7.2.166 The MCMC will use the results from the cost model to estimate regulated prices for mobile origination and termination, as well as for domestic roaming data services only. The MCMC will not set regulated prices for domestic roaming voice and messaging services.

7.2.167 Straight line glide paths for mobile origination and termination will be used to derive the final prices from the costs per unit demand calculated by the model. The starting point for the glide paths will be the current mobile origination and termination rate, namely 0.99 sen per minute.

7.2.168 The MCMC has updated the mobile model, and the following prices were obtained for mobile network origination and termination. The MCMC subsequently applied a glide path to these modelled prices for the final prices.

Table 51: Mobile Network Origination Service without Glide Path

	Units	2023	2024	2025
National	Sen/min	0.06858	0.07027	0.07318

Table 52: Mobile Network Termination Service without Glide Path

	Units	2023	2024	2025
National	Sen/min	0.06858	0.07027	0.07318

Table 53: MVNO Access Service

	Units	2023	2024	2025
Voice on-net	sen / min	0.12819	0.13166	0.13742
Voice off-net	sen / min	0.13716	0.14054	0.14636
SMS on-net	sen / msg	0.08408	0.10665	0.13532
SMS off-net	sen / msg	0.08410	0.10666	0.13534
MMS on-net	sen / msg	50.45017	63.98750	81.19475
MMS off-net	sen / msg	50.45734	63.99460	81.20190
Data – 4G	RM / GB	1.59031	1.60160	1.67832

	Units	2023	2024	2025
Data – 5G	RM / GB	1.84506	1.49942	1.41334

Table 54: Domestic Inter-Operator Roaming Service

	Units	2023	2024	2025
Voice on-net	sen / min	0.12820	0.13167	0.13743
Voice off-net	sen / min	0.13716	0.14055	0.14637
SMS on-net	sen / msg	0.08408	0.10665	0.13532
SMS off-net	sen / msg	0.08410	0.10666	0.13534
MMS on-net	sen / msg	50.45017	63.98750	81.19475
MMS off-net	sen / msg	50.45734	63.99460	81.20190
Data – 4G	RM / GB	1.59046	1.60175	1.67849
Data – 5G	RM / GB	1.84506	1.49942	1.41334

7.2.169 The MCMC sets the final prices for Mobile Network Origination Service, Mobile Network Termination Service and Domestic Inter-Operator Roaming data Services as follows. MVNO prices are provided as indicative only. It should be noted that the MCMC has decided only to regulate prices for the Domestic Inter-Operator Roaming data services, hence the other roaming service prices listed are indicative only. Final prices for the Mobile Network Origination and Mobile Network Termination Services include a glide path. For domestic roaming final prices, as well as the indicative prices for MVNO Access, the voice off-net rates incorporate the final prices (with glide path) for the Mobile Network Termination Service.

Table 55: Mobile Network Origination Service Final Prices

	Units	2023	2024	2025
National	Sen/min	0.68439	0.37879	0.07318

Table 56: Mobile Network Termination Service Final Prices

	Units	2023	2024	2025
National	Sen/min	0.68439	0.37879	0.07318

Table 57: MVNO Access Service Indicative Prices

	Units	2023	2024	2025
Voice on-net	sen / min	0.12819	0.13166	0.13742
Voice off-net	sen / min	0.75297	0.44906	0.14636
SMS on-net	sen / msg	0.08408	0.10665	0.13532
SMS off-net	sen / msg	0.08410	0.10666	0.13534
MMS on-net	sen / msg	50.45017	63.98750	81.19475
MMS off-net	sen / msg	50.45734	63.99460	81.20190
Data – 4G	RM / GB	1.59031	1.60160	1.67832
Data – 5G	RM / GB	1.84506	1.49942	1.41334

Table 58: Domestic Inter-Operator Roaming Service Final Price for data and indicative prices for other services

	Units	2023	2024	2025
Voice on-net	sen / min	0.12820	0.13167	0.13743
Voice off-net	sen / min	0.75298	0.44906	0.14637
SMS on-net	sen / msg	0.08408	0.10665	0.13532
SMS off-net	sen / msg	0.08410	0.10666	0.13534
MMS on-net	sen / msg	50.45017	63.98750	81.19475
MMS off-net	sen / msg	50.45734	63.99460	81.20190
Data – 4G	RM / GB	1.59046	1.60175	1.67849
Data – 5G	RM / GB	1.84506	1.49942	1.41334

8. 5G Services

8.1. Overview

The MCMC developed a 5G cost model based on the LRIC+ methodology for assessing the cost of providing two forms of 5G Services:

- 4G Evolved Packet Core ("**EPC**") with 5G RAN Access ("NSA"); and
- 5G SA Access

The MCMC considers that from a techno-economic perspective, the cost modelling approach for 5G should be similar to developing a LRIC cost model for a 4G network, as the service definitions are similar, and the RAN differs mainly in the capacity. Bottom-up LRIC modelling of the 5G core is feasible and is typically based on approaches used to price cloud computing services. However, at the same time, the MCMC noted that 5G core networks are in their infancy and their techno-economic characteristics are yet to be well established. As such, the MCMC opted to develop a LRIC model encompassing transparent bottom-up costs where feasible, while the 5G core is costed top-down using actual DNB costs.

Part F of the PI Paper concerned the 5G services. Section 19 described the assumptions and inputs to the model, including service demand and traffic, spectrum allocations and coverage, radio network costs and cost mark-ups. The impact of different levels of assumed WACC values were described.

8.2. Summary of submissions received

Question 33:

Do you have any comments on the proposed modelling approach for 5G?

Submissions received

8.2.1 Altel proposed to extend the modelling approach as the current proposal concerns the assumption of DNB core only. Altel submitted that MNOs can have their own core too under the SA. Altel further recommended that the 5G network model to be reassessed to take into account all modes with different operational scenario.

8.2.2 CelcomDigi is of the view that since DNB's 5G network is a large national infrastructure project that provides services on a monopoly basis and which involves a large upfront investment, it is best considered as an infrastructure project, with costs modelled on the basis of a RAB and a building block approach. They believe the reasons offered by the MCMC in the PI Paper for choosing a LRIC+ cost model methodology are weak, and are largely based on a preference for LRIC+ in other areas. The MCMC also did not acknowledge in the PI Paper about the uncertainty of DNB's ability to compete in retail markets and requested that the MCMC make a definitive statement on the issue. Alternatively, CelcomDigi urged the MCMC to apply a rigorous and comprehensive accounting separation requirement for DNB to ensure that there is no possibility that DNB can use its monopoly position in the wholesale 5G market to cross-subsidise the provision of any services in the 5G retail market. Further, CelcomDigi believes that accounting separation may need to be augmented by a level of functional and organisational separation based on a rigorously administered Code of Conduct.

8.2.3 If the MCMC decides that it must continue with a LRIC+ approach, it is critical that Access Providers recover reasonable costs that have been efficiently incurred. In the case of the 5G network, the early years show inefficient costs associated with significant, albeit progressively declining under-utilisation. The assumptions in the MCMC's 4G and 5G cost models about the migration of forecast 4G data traffic to the 5G network clearly indicate that the 5G network only starts to approach reasonable utilisation in year 2025 and beyond. Therefore, CelcomDigi recommends that the MCMC take the modelled output from 2025 or later, when efficient utilisation is considered to be likely, as the maximum price per Gbps per month for 5G data. This approach would encourage earlier demand, earlier utilisation and improved earlier efficiency in the provision of the 5G Services.

8.2.4 CelcomDigi also raised several issues on the proposed modelling issues and assumptions:

(a) The common cost markup of 24.17% for 5G is excessive for a wholesale only monopoly business of the kind conducted by DNB. CelcomDigi has undertaken a study of its own general overhead costs for the period 2020–2022 inclusive, and then adjusted those costs to reduce costs in categories not relevant to DNB as a wholesale operator. The results indicate a common

cost markup for 5G wholesale purposes of 20–25% below that for 4G integrated operator levels would be more appropriate; and

(b) The MCMC has adopted a pre-tax nominal WACC of 6.62% for 5G (compared to DNB's 8%) but recognises that it could be as low as 4.49%. A WACC of 6.62% does not reflect the low risk and implicit guarantee from the Government. It is closer to the risk profile of the competitive MNOs, and that is inappropriate given that it is a monopoly business with guaranteed investment recovery.

8.2.5 CelcomDigi also highlighted an inconsistency between the commercial offer from DNB and the approach to price regulation by the MCMC, whereby the MCMC is proposing a maximum price per capacity used approach on a pay per usage basis while DNB's price is based on target capacity commitment at a notional rate of RM 30,000 per Gbps per month. However, DNB's rate may be varied up or down by DNB to reflect changes in the amount of capacity included in the target capacity category. In this variation, the cost to an Access Seeker for the target capacity remains constant. CelcomDigi seeks the MCMC to reconcile DNB's RAO with the MSAP approach.

8.2.6 DNB proposes a different costing methodology for setting regulated prices as it believes that there are important differences between 4G and 5G services which mean that the MCMC's proposed approach to setting DNB's prices should not necessarily be based on use of a bottom-up LRIC model. The main differences are as follows:

(a) DNB's 5G network is designed to meet a Government mandate to reach 80% of the population with download speeds of 100 Mbps at the cell edge by the end of 2024. In contrast mobile operators invest in 4G infrastructure in response to end-user demand. Given its mandate, modelling DNB's 5G network costs on a demand-lead basis inevitably leads to an underestimate of DNB's efficiently incurred costs;

(b) DNB supplies 5G services at wholesale only, on a non-discriminatory basis to mobile operators. It is not vertically integrated like the mobile operators who supply 4G services to end-users on a competitive basis; and

(c) DNB is rolling out its network from scratch unlike the mobile operators who have operated in Malaysia for several decades and supplied 4G services since 2013. DNB contended that a bottom-up LRIC model for 5G will omit significant costs for a new operator unlike when applying this approach to established 4G services.

8.2.7 DNB provided examples of other jurisdictions such as Australia, Bahrain, Brunei, New Zealand, United Kingdom and Singapore where regulators had rejected LRIC modelling as the best way to regulate single wholesale networks and used rate of return regulation instead.

8.2.8 Maxis provided the following comments and proposed modelling for 5G:

5G LRIC vs FAC or RAB

8.2.9 Maxis is agreeable to the MCMC's approach of using LRIC as the costing methodology for 5G services as it encourages efficiency in future years. However, they emphasized that the approach should be continued so long as there is a single wholesale network. In the event that there is a major change in Government policy for 5G, such as the authorisation of a second 5G network rollout, or permission to use existing bands for 5G services, then the MSAP process may need to be redone, and an additional costing study carried out.

5G Core Network Costs

8.2.10 Maxis strongly believes that the wholesale service "4G EPC with 5G RAN" should not include any core network related costs, as DNB's wholesale offer is currently from RAN to POI. According to Maxis, MNOs, including Maxis intend to use their own core network and urged the MCMC to model this service as a RAN-only service. The MCMC suggested that the modelled hypothetical efficient operator's 5G core functionality is required for both NSA and SA services.

8.2.11 Maxis believes that modelling for core network is strictly not correct due to reasons explained above including:

(a) DNB and Malaysian MNOs clearly agreed in multiple interactions or workshops that DNB will not be providing any core services to Malaysian MNOs as part of "4G EPC with 5G RAN" service;

(b) The network diagram in DNB's RAO clearly shows no core elements provided by DNB;

(c) DNB's product specification in RAO clearly specify RAN-only elements; and

(d) All existing 5G commercialization trials happening between Maxis and DNB are occurring using Maxis core.

8.2.12 Maxis believes that the MCMC should model a separate product for those MNOs requiring 5G SA Core from DNB. The proposed product set to be modelled would be:

(a) a 5G RAN Access product, where MNOs only use 5G RAN Access for SA or NSA and their own SA or NSA core network, this being the base product; and

(b) a 5G Core product where MNOs also need to purchase access to DNB's 5G core network. This 5G Core product should take an allocation of the common costs calculated by the MCMC.

8.2.13 Maxis referred to subsection 6.15.18 of the MSA on Modularity for 5G services, where the MCMC has stated that an operator is allowed to seek access to unbundled services. Hence, Maxis believes that there should be consistency in this regard.

Model Accuracy and Clear Product Description

8.2.14 Maxis submitted that modelling should clearly define 5G products and/or services and cover all the services provided by DNB in the DNB RAO Schedule 1. If DNB introduces new additional 5G services, the services must be clearly defined with clear pricing (including taking an allocation of common costs calculated by the MCMC) and without hidden charges. Maxis recommended that the MCMC review the introduction of new 5G services and pricing as per subsection 6.15.22 of MSA Product Committee process.

Coverage and Capacity

8.2.15 Maxis proposed that the MCMC consider modelling a separate coverage and capacity charge for the relevant 5G wholesale services to reflect the dynamics of a greenfield RAN build as reflective of the build by DNB. The greenfield or new

technology RAN developments (such as 5G) are planned and designed to firstly address the coverage requirements followed by any capacity requirements. Therefore, Maxis questioned why the MCMC used coverage network costs divided by annual projected 5G throughput as the proposed regulated price for relevant 5G wholesale services. It could be argued that this approach is not cost causal, as 5G throughput demand is not actually driving the nationwide 5G network build costs, which are primarily related to coverage network build in the initial two to three years of deployment. Therefore, Maxis proposed that the MCMC consider modelling separate coverage and capacity charges for the relevant 5G Wholesale services to comply with the MCMC's own regulatory accounting principles of cost causality.

8.2.16 Maxis proposed that the MCMC model a separate coverage and capacity as follows:

(a) Separately calculate the costs for the coverage and the capacity network. This would be easy to implement with the MCMC's existing model structure;

(b) Calculate a 'coverage' charge, equal to the total modelled cost of the coverage model divided by the number of Access Seekers purchasing wholesale access to the coverage network. This could be varied as the number of Access Seekers purchasing wholesale access varies and would include a basic capacity allowance; and

(c) Calculate a unit charge for the capacity network, to be charged for all usage beyond the basic capacity allowance included within the coverage network. The capacity charges should include cost erosions taking account of tech advancements/efficiencies, allowing these costs to be passed on to customers.

Pricing Mobile Networks Based Solely on GB or Gbps is not Appropriate

8.2.17 Maxis submitted that pricing mobile services solely on GB/Gbps is not appropriate for the following reasons:

(a) Retail Customer Value is determined by coverage as much as by GBs consumed: Maxis provided examples of four packages available to customers with different number of sites, population coverage and usage in GB. When customers are offered packages with same amount of GB but varying

population coverage, some customers would value the package with higher population coverage. As for others, when there are packages with same population coverage but different amount of GB, the customer may opt for the package with lower GB as it is sufficient for their usage. Based on that, Maxis surmised that the value delivered to and perceived by customers is not determined entirely by the number of GBs;

(b) Network cost is determined far more by coverage than by GBs supported;

(c) Wholesale Pricing should reflect both Customer Value and Cost to Implement: Maxis believes that it is destructive and destabilizing to a market if the wholesale price does not correlate with the underlying cost to implement, as such a service may become either unprofitable or excessively profitable as volumes change;

(d) Competition on quality is only possible if price can vary: A network provider should be allowed to provide both a 'base' service at a lower price point (as in DNB's RAO) and a premium service at a higher price point on an equitable and non-discriminatory basis. If investing in higher quality cannot attract a higher wholesale price due to a regulated fixed price, the network owner has no incentive to invest further and so a forced wholesale price also acts as a barrier to further network improvement; and

(e) A minimum commitment can serve as a proxy for a coverage price: Maxis believes that a wholesale price for cellular service should comprise at least two parts, – a price for coverage, a price for GBs, and potentially a price for quality. Therefore, Maxis proposed a two-tier coverage and capacity pricing in line with cost-causality principle for a greenfield deployment of 5G network, which is reflective of customer perceived value of coverage vs capacity and which key industry operators have arrived at consensus with DNB during last year's Access Agreement negotiations.

5G Top-Down Elements

8.2.18 Maxis noted that for the 5G core network, and for a number of other network elements (including Edge data centre, Operation and Maintenance ("**O&M**") for network, network security, maintenance CAPEX) the MCMC appear to have used a top-down costing approach, with little transparency on how the overall costs for each element are calculated. Maxis expressed concern about the lack of

transparency provided by the MCMC on their approach to modelling for these network elements. Maxis therefore proposed that the MCMC explain their modelling assumptions for the costing of 5G Other costs in further detail.

8.2.19 TM acknowledged the difficulty in modelling a monopoly operator. However, TM has concerns with the transparency of the model provided for consultation. In particular, the total annualised cost by asset is pasted, making sensitivity testing of the model difficult. Future versions of the model should have the annualised cost per unit pasted, which is then multiplied by the number of assets to give the total annualised cost of the asset. In this way, the network can undergo sensitivity testing and the impact can be analysed in the resulting cost base.

8.2.20 U Mobile noted that DNB RAO makes it clear that the network is intended to support two versions of SA, one using DNB's 5G core and the other using the Access Seeker's 5G core. DNBs 'National 5G Wholesale Network Product' thus has three variants: the two SA versions and NSA. Assuming all three utilise different network elements, the MCMC model should calculate the costs for all three. The multiple services and features that DNBs network is intended to support are as follows:

(a) NSA and SA architecture, in each case via MOCN;

(b) data carriage and seamless fall-back to LTE network (NSA and SA);

(c) Voice-over-NR and seamless fall-back to LTE network (NSA and SA);

(d) Voice over Long Term Evolution and seamless fall-back to LTE network (NSA and SA) and 2G network (NSA only);

(e) Malaysian Emergency Response Service 999 ("**MERS999**") on the DNB 5G Access Network (including upgrades in accordance with applicable law) but, for clarity, the Access Seeker remains responsible for supporting MERS999 on its own Network; and

(f) 5G QoS Identifier mappings (as defined by the Planning Committee) including mapping of QCI9 and 5QI9 to BE - Best Effort in 5G Access.

8.2.21 While U Mobile acknowledged that some of these are voice services, the MCMC's cost models assume that no voice traffic use the 5G network. If DNB intends to

offer these capabilities/services, operators need to know whether they will be separately priced and at what levels, or whether they will be included in the capacity charges currently envisaged. U Mobile requested the MCMC to investigate these points and ensure the models capture the relevant products/services likely to be offered during the period 2023 to 2025 and estimate their costs accordingly. Further, U Mobile doesn't understand why NSA data traffic is not assumed to use 4G core network resources and costed accordingly since by definition, this traffic is meant to do so.

Discussion

8.2.22 Submissions on the approach to modelling 5G services have traversed many issues. The MCMC thanks stakeholders for this feedback and acknowledges that there is currently some uncertainty regarding the structure of the 5G market which has yet to be resolved.

LRIC versus FAC or RAB for 5G

8.2.23 CelcomDigi, DNB and Maxis provided views on the higher-level theoretical issues associated with modelling a wholesale only 5G operator. Maxis supported the MCMC's LRIC approach while CelcomDigi and DNB proposed an RAB approach. The LRIC approach is typically applied in mature markets and reflects economically efficient (forward-looking) costs of providing the regulated product. In contrast, RAB is generally used for networks, typically electricity businesses, which have significant legacy costs. DNB has provided a number of examples of telecoms regulators selecting an RAB or Rate of Return approach for pricing wholesale services rather than LRIC. However, all of these examples encompass companies with established infrastructure and costs, unlike DNB which is in the midst of deploying its new network. One of the main reasons for regulators adopting an RAB approach for established networks in preference to a LRIC approach is that costs from a LRIC model reflect modern equivalent assets and as such may over-compensate incumbents with largely depreciated legacy networks. This is not an issue for DNB whose asset costs could reasonably be expected to approximate current costs. Furthermore, one of the first tasks involved in implementing an RAB model is to specify and value an appropriate initial asset base. This would be a challenging task for a network which is still under development. Conversely, this is not an issue for a LRIC model which entails building a new network from scratch.

8.2.24 The MCMC concludes that on both theoretical and pragmatic grounds a LRIC approach is more suitable to the particular circumstances of a single wholesale 5G operator in Malaysian than an RAB approach.

Treatment of New Services

8.2.25 U Mobile and Maxis raised concerns about potential new services which have not been included in the MCMC's model. The MCMC notes the importance of a clear definition of 5G products to ensure appropriate regulatory remedies, as well as to facilitate the development of future products and services. It is possible that the products and pricing structures may evolve over time in response to developments in the 5G market. U Mobile described a number of potential services that DNB may offer in the future, however such services have not been included within the model due to the lack of robust demand forecasts, no timelines for commercial release and no established service definitions and costing.

8.2.26 The MCMC encourages prices listed in RAO to be transparent, easily comprehensible and complete.

Core Network

8.2.27 Altel, Maxis and U Mobile expressed concerns about the treatment of core network related costs in the model. In particular, where MNOs are using their own core networks and subscribing to the wholesale service "4G EPC with 5G RAN" as defined in the DNB RAO the appropriateness of the inclusion of DNB's core network costs was questioned.

8.2.28 After a review of the potential products that may be purchased by an Access Seeker, the MCMC acknowledges that the Access Seeker may wish to select a base 5G RAN service, either NSA or SA, to be combined with the Access Seeker's own 4G EPC. Other Access Seekers may wish to combine the base 5G RAN with an optional 5G Core add-on from the Access Provider. The 5G RAN service should not include 5G core costs, with the exception of costs associated with the network management function which is required for network operation. Core network transport will need to be used to deliver network management functionality, and thus it is appropriate for a portion of transport costs to be allocated to the 5G RAN product. Core costs should be allocated to the 5G Core product.

8.2.29 It should be noted that the 5G model encompasses the products offered by the hypothetical 5G operator. It does not include the cost of core network components, such as 4G EPC, which would be part of the Access Seeker's own network. The MCMC recognises that an Access Seeker would incur these costs, however such costs are not being recovered through the wholesale products offered by the hypothetical 5G operator.

8.2.30 The 5G Core product is not in the Access List and thus will not be subject to price regulation. The MCMC notes that the likely demand for the 5G Core add-on is extremely uncertain and that many MNOs intend to use their own core to deliver a 5G retail service. Core network costs for the hypothetical 5G operator are largely fixed, and thus the cost per unit demand for 5G Core is expected to be sensitive to the demand forecasts, particularly in years where demand is low.

Modelling Assumptions

8.2.31 CelcomDigi stated that the overhead mark-up used for 5G is too high. This issue is explored in detail in the responses to question 38.

8.2.32 CelcomDigi stated that the WACC for 5G is too high and not reflective of the low risk associated with such a business. This issue is discussed in depth in Section 5.

Pricing Structure

8.2.33 Maxis raised a number of issues relating to pricing structure. The MCMC recognises that the proposed regulated pricing structure differs from that used by DNB's commercial offer. To some extent, this is driven by differences in the approaches used in the underlying cost analyses. The LRIC-based approach derives prices based on cost per unit of demand. This could be re-structured, for example, as a target capacity commitment or term commitments, however the MCMC notes that such price packaging would be expected to result in a reduction in network or administrative costs that are incurred by the Access Provider. Such cost reductions would need to be incorporated within the proposed prices.

8.2.34 In addition, the MCMC notes that section 6.15.18 of the MSA states that "an Access Provider may supply a 5G service on a bundled basis, but shall allow an Access Seeker to acquire a 5G service on an unbundled basis, at the Access Seeker's option." DNB's pricing structure appears to incorporate some level of

bundling, through target capacity and multi-year contracts, however, it is up to Access Seeker's to opt for unbundled services.

8.2.35 Results from the previous version of the 5G cost model indicated that the initial years were characterised by an under-utilisation of the installed network assets, as a result of low demand and deployment that may not reflect the behaviour of an efficient operator. Various suggestions on potential actions to increase efficiency have been proposed by stakeholders and have been considered by the MCMC.

8.2.36 In the early years of the model timeframe, costs are driven by rollout commitments, with much of the resultant network capacity being under-utilised given the assumed level of demand. The LRIC approach requires that an economically efficient operator deploy sufficient assets to satisfy the network drivers, primarily demand and coverage targets. Under-utilisation of deployed assets would incur additional costs that would flow through to higher prices. The MCMC's investigation of inputs to the 5G model identified that an economically efficient operator could make certain deployment choices in the earlier years which would reduce costs and result in a network that still achieves the coverage targets and has sufficient capacity for the level of demand. These choices could potentially include:

(a) reduction in activated spectrum;
(b) lower capacity base stations in the initial years; and
(c) increased use of microwave for backhaul in the initial years.

8.2.37 The MCMC has investigated options other than tilted annuity for use as a proxy for ED. The modified tilted annuity approach takes into account demand growth, reducing depreciation in the early years when demand is low. This approach has been used by a number of European regulators.

8.2.38 An alternative approach, suggested by Maxis, for addressing the high cost-based prices in the early years was a pricing structure which incorporates separate prices for coverage and capacity. The MCMC's preference is to implement initiatives, such as those listed above, which would be employed by an efficient operator. This does not, however, preclude the introduction of coverage and capacity prices. The MCMC believes that coverage/capacity pricing may not be necessary as the 5G market matures, however, notes that some Access Seekers

may wish to structure their retail services using wholesale products with characteristics such as coverage in addition to purely bandwidth (or traffic volume).

Top-Down Costs

8.2.39 Certain costs within the model are top-down, largely fixed costs, with little disaggregation into network components. This is largely due to the nature of the information provided to the MCMC. The MCMC has attempted to disaggregate such costs where possible. Many of the inputs are also confidential and thus, it has not been possible to provide a fully working copy of the model to stakeholders.

MCMC's Final Views

8.2.40 The MCMC has determined that the 5G cost model will estimate the cost per unit demand for two products:

(a) 5G RAN Access – to include the cost of 5G RAN plus a component of core costs relating to network management only; and
(b) 5G Core – to include the cost of the hypothetical modelled operator's core network, and excluding RAN costs.

8.2.41 The MCMC has implemented several adjustments to the model and its assumptions with the aim of deploying the network more efficiently given the low level of demand in the initial years. This creates an outcome that better reflects LRIC methodology. As a result, costs have reduced in the early years of the model. These adjustments include:

(a) Activating only half of the hypothetical operator's spectrum allocation up to 2024, with the full spectrum allocation being activated from 2025 onwards, thus reducing Apparatus Assignment ("**AA**") fees incurred;
(b) Deploying lower capacity base stations in those years in which less spectrum is activated, reducing RAN costs;
(c) Changing maintenance CAPEX from a lump sum to a per-site cost, thus reducing the total costs during years in which the network is being rolled out; and

(d) Introduction of a modified tilted annuity approach for depreciation which loads more costs on later years when demand increases – this is an alternative proxy for ED.

8.2.42 The MCMC chose not to assume a higher proportion of microwave in the initial years of the model, although notes that this may be an appropriate strategy. Assumptions regarding the use of a reduced spectrum amount together with lower capacity base stations resulted in substantial cost savings in the model.

8.2.43 Separate coverage and capacity pricing has not been introduced.

Question 34:

Do you have any comments on the MCMC's proposed use of data in the 5G model?

Submissions received

8.2.44 DNB noted that the MCMC's pricing model is largely based on cost data supplied by DNB which in turn relies largely on the quotation used by Ericsson in its successful bid to build and operate DNB's 5G network. DNB supported this approach as it claims they represent efficiently incurred costs.

8.2.45 However, DNB notes that the MCMC initially misinterpreted some of these inputs in constructing its original pricing model. DNB is grateful to the MCMC for modifying its assumptions in the light of DNB's comments in its revised model. DNB noted the key adjustments that the MCMC has made as follows:

(a) Some CAPEX items were double-counted in the model when considering the RAN CAPEX per site. DNB informed the MCMC of this issue as part of the consultation process and this double counting has been eliminated in the revised model;

(b) The MCMC included site acquisition and setup CAPEX in the original model. However, these CAPEX costs do not exist as DNB rents all its sites from tower companies. These CAPEX costs have been removed from revised model;

(c) In its response to the MCMC's data request DNB supplied a blended rate for site rental. This blended rate combined the rental price for shared and

unshared sites. However, the MCMC originally assumed in the model that this blended rate applies only to unshared sites and therefore reduced the rental per annum for shared sites by 50%. This led to a significant underestimation of site rental costs which has been adjusted in the revised model;

(d) The MCMC assumed a 77% utilisation of cell sites in calculating network capacity. In its own network dimensioning, DNB assumes 60%. In the revised model, cell site utilisation has been reduced to 60%; and

(e) DNB's DBP, together with information supplied to the MCMC in response to its data request, includes a major CAPEX item – 'maintenance'. This CAPEX item (of RM 548 million) is substantial and covers investment in capital equipment which is required to monitor and maintain DNB's 5G service level commitments and replacement of rectifiers, batteries, and RAN equipment including the purchase of equipment to be held in case of theft of network components. The MCMC model originally omitted this cost, but it has been included in the revised model.

8.2.46 XOX suggested a hybrid LRIC bottom-up model for 5G, given that the expected demand for 5G is still contingent upon end-user adoption rate, and recent market trends do not indicate signs of 5G adoption accelerating in Malaysia.

8.2.47 Maxis agreed with the MCMC's overall approach to modelling on a coverage and capacity basis. However, Maxis believes that the model takes a simplistic approach in modelling total area divided by cell radius coverage estimates. Maxis believes that this approach is more appropriate for a mature network and is not suited for a network such as 5G, which is still being rolled out and experiencing rapid demand changes over the deployment profile. Maxis emphasized the importance of defining the target performance of the coverage and capacity networks and proposed that the MCMC in its PI Report formally and clearly sets out the network KPI that it is modelling for the average efficient hypothetical 5G operator.

8.2.48 Maxis recommended that as best practice, a more appropriate approach for the MCMC to use to design a mobile coverage network would be the following:

(a) Set the KPI or SLA and coverage target (for example 80% population coverage by 2024, 95% of areas > 100Mbps); and

(b) Then use network prediction and/or simulation tools to calculate the number of sites required.

8.2.49 Maxis noted that the MCMC has assumed all sites are rolled out with maximum capacity initially. Maxis believes otherwise and expects sites to be deployed with a minimum necessary specification to meet coverage requirements, and then upgraded as required based on capacity demand. Maxis proposed that the MCMC initially use a lower number of streams and 100MHz, and only upgrade as necessary to meet capacity at individual sites. Maxis is of the view that this adjustment will significantly reduce average per site costs. Maxis also proposed that the capacity requirement is based on a clearly specified SLA, and that the network capacity is built in an efficient manner by carrying out upgrades in stages based on current demand, rather than deploying unnecessary capacity up front.

Data Transparency

8.2.50 Maxis pointed out that a number of inputs have been redacted and model flow has been broken, which means industry participants were unable to usefully test the model. Maxis believes that the MCMC could populate models with an approximate range of values, so that it is possible to meaningfully challenge the quantum of these assumptions. This is consistent with international best practice by telecoms regulators.

8.2.51 U Mobile is of the opinion that the methodology appears to be reasonable. However, they noted that operators have limited visibility of the input data set because much of the data has been redacted. U Mobile requested the MCMC to re-examine the input data and cost values in the 5G model and only redact specific data points which are commercially sensitive, and which have not already been shared with the network operators during 2022 as part of DNB's minority equity sale exercise. By taking this approach, the network operators would have greater visibility of the 5G model workings and hence greater confidence in the model outputs. This will in turn benefit all stakeholders. For example, U Mobile believes that RAN CAPEX and OPEX, microwave CAPEX and core network CAPEX costs should be un-redacted.

Asset Lifetimes

8.2.52 In the revised models, the MCMC reduced the asset life for RAN equipment to five years. Following Maxis' meeting with the MCMC, Maxis understands that the MCMC intends to change this assumption to ten years. Maxis supports this proposed change, as it is consistent with Maxis' financial treatment of RAN assets for Maxis's own-build network.

8.2.53 Maxis proposed to change the financial lifetimes for fibre (last mile) and trunk fibre assumed by the MCMC from ten years to twenty years, consistent with Maxis financial treatment of these assets.

Fibre & Microwave Backhaul Cost

8.2.54 Maxis believes that an efficient network operator would make greater use of microwave services for backhaul, given the significantly lower cost. Maxis would particularly expect this to be the case in more rural areas, given that the forecast demand per site in early years is extremely low in these areas. As such, Maxis recommended that the MCMC model a similar technology mix, especially for the first three years.

8.2.55 Maxis also noted that Transport costs should only include that from RAN to POI (not RAN to core as per 5G cost model). In addition, submarine cable applies only to East Malaysia traffic. In the model its applied to 100% of the traffic, which does not represent the agreed and operationalised/tested topology with key operators. Furthermore, MNOs East Malaysia 5G traffic is handed off locally via Regional POIs to MNOs, so in this case DNB does not carry back the MNO traffic to West Malaysia.

AA Costs

8.2.56 Maxis noted that the AA costs appears to be high when compared to Maxis' estimates. This is driven by high use of spectrum in early years when it is not being fully utilised. Maxis believes that an efficient network operator would use spectrum more efficiently, deploying spectrum at 20MHz (for 700MHz) and 100MHz (for 3.5GHz) in initial years to reduce AA fees.

Maintenance CAPEX

8.2.57 Maxis commented that in the revised models, the MCMC included a new cost item, maintenance CAPEX. From Maxis' meeting with the MCMC, Maxis understands that this includes replacement of RAN equipment, rectifiers, batteries and spares. Maxis does not believes that it is appropriate to include this cost item in the MCMC's cost model. In a LRIC model, a network is specified which can support the relevant service demand. The CAPEX incurred to build the network is recovered over the useful asset lives of the relevant network elements, including an allowance for replacement CAPEX in addition to the recovery of CAPEX over useful asset lives leads to over-recovery of the costs of these assets. Maxis therefore strongly recommended that the MCMC remove this cost item, as it is not consistent with the principle of efficient cost recovery that is adopted under the LRIC approach. Additionally, Maxis also noted that the values included for maintenance CAPEX appears to be extremely high. In 2023, maintenance CAPEX is modelled to be RM92.3 million, or 5% of the total cost stack for 5G services. Considering that all the assets deployed would be under a year old in 2023, it does not seem feasible that the CAPEX costs of replacement would be so high.

Operation and Maintenance for Network

8.2.58 Maxis pointed out that the O&M for network appears high for a RAN only wholesale provider at RM82.9 million, or 2.5% of the total cost stack for 5G services in 2023. Maxis also disagreed with the MCMC's explanation that the O&M for network represents the vendor's charges for the whole nationwide 5G network. Maxis believes that it is inappropriate for the MCMC to be charging an overhead mark-up on any costs that are purely passed through to the vendor, who will already be recovering their own overheads as part of the charge to the efficient operator. If the efficient operator is outsourcing maintenance to its vendor, then Maxis proposed reducing the overhead mark-up for 5G to a more reasonable 12%.

Network Security

8.2.59 According to Maxis, network security cost at RM29.5 million or 1.6% of the total cost stack for 5G services in 2023 and over RM100 million for five years is also too high. Network security cost for 5G include the authentication server

(provided by DNB). However, each MNO uses their own security gateways to encrypt communication between DNB sites and the MNO core. This security gateway should be excluded from DNB costs. Other network security elements for 5G Core should also be excluded since MNOs like Maxis deploy their own 5G Core.

Edge Data Centre

8.2.60 Maxis disagreed with the inclusion of edge data centre cost at RM 29.5 million for 5G services in 2023 as not all Access Seekers are obliged to take up this network element.

USP

8.2.61 Maxis is supportive of the MCMC's approach not to have a separate levy for USP.

Discussion

8.2.62 The MCMC appreciates DNB's assistance in clarifying many aspects of its network. This has greatly improved the robustness of the 5G cost model to ensure that it better represents a 5G network deployed in Malaysia. Many of the inputs and assumptions used in the model are based on DNB data, and as such are confidential. The confidential information was redacted in the version of the model distributed for comment. The MCMC recognises that DNB may have previously shared some of this information with MNOs, however in the absence of explicit confirmation of the scope of the shared information, the MCMC adopted a conservative approach with regard to redaction of confidential data.

8.2.63 The approach used by the cost model in dimensioning the coverage network, namely, dividing coverage area by cell area is a standard approach commonly used in regulatory cost models. The MCMC recognises that this is a simplification of an operator's network planning process which typically uses network simulation tools and sophisticated geographical analyses to estimate cell counts and dimension a mobile network. Any telecommunications regulatory cost model represents a mathematical approximation of a real-life network. The implementation of more complex network design algorithms or approaches will increase the resources required to develop and maintain the model, but may not necessarily result in a commensurate improvement in accuracy for the purposes

of regulatory pricing – especially when many of the inputs and assumptions have a high degree of uncertainty, as is the case for the 5G model.

8.2.64 Various model inputs and assumptions, such as cell radius, were devised to achieve 100Mbit/s minimum at the cell's edge 90% of the time with the rollout assumptions achieving 80% population coverage by 2024.

8.2.65 The MCMC has identified several adjustments to the model, which represent a higher level of efficiency, therefore reducing per-site costs and under-utilisation of the network. These adjustments, outlined above in the discussion for question 33, include activating only half of the spectrum allocation and deploying lower capacity base stations in the initial years when demand is low.

8.2.66 RAN asset lifetimes are being set to ten years. The MCMC had previously reduced these to five years, however considers that this should be more comparable with the asset lives used in the 4G model. Maxis suggested that asset lifetime for backhaul fibre increased from ten to twenty years, however in the information Maxis provided for the 4G model, the lifetime for backhaul fibre was less than ten years. A similar increase was suggested for transport fibre, however eight years was assumed in the 4G model, which has not been queried by stakeholders.

8.2.67 Maxis suggested that a hypothetical efficient operator would make greater use of microwave in the initial years of the model as this would reduce costs. The MCMC investigated this suggestion, assuming a higher proportion of microwave was applied to the more lightly trafficked areas, and found that it only had a relatively small impact on the model results for the initial years. Subsequently, this assumption was not implemented.

8.2.68 The MCMC has determined that the 5G RAN product would require the network management function, which is a component of the core. Network management requires some use of transport capacity. Therefore, it is appropriate that the transport network cost be allocated to the 5G RAN product as well as the 5G Core product.

8.2.69 While the submarine cable is a separate asset within the model, it is treated similarly to the transport network. Further information on the handling of traffic for the submarine cable and the transport network would be helpful to improve

the accuracy of the cost allocation for these assets in future regulatory processes.

8.2.70 The initial version of the model assumed that the full spectrum allocation for the hypothetical operator was activated. As the MCMC intends to now assume that only half of the spectrum will be activated in the initial years when demand is low, the AA fees will be reduced.

8.2.71 A new asset, maintenance CAPEX, was added to the revised cost model. This represents investment in capital equipment required to monitor and maintain the modelled operator's 5G service level commitments, plus replacement of rectifiers, batteries, and RAN equipment including spares. Benchmark information suggests some variation in treatment of spares for regulatory purposes: some regulatory models have an explicit input for the cost of spares, while others have an assumed percentage uplift in costs due to spares (which may be zero or non-zero). Other regulatory models include an allowance for spares within the unit costs of network elements. The MCMC considers that an efficient operator would have some allowance for spares, which requires the identification of a reasonable level of costs.

8.2.72 The MCMC initially assumed a lump sum cost for maintenance CAPEX based on information provided by DNB. The MCMC considers that it would be preferable to model maintenance CAPEX as a per-site cost as this would establish a cost-volume relationship which would scale the resultant cost with the size of the network. Costs in the initial years of the 5G rollout would therefore be reduced. Based on benchmark information, the MCMC has assumed a maintenance CAPEX cost of RM7,761 per site, with a cost trend declining by 3% per year.

8.2.73 In regard to network O&M, the MCMC has retained its original assumption, which is based on DNB's information. The MCMC anticipates that this cost may reduce over time as 5G technology matures, however limited benchmark information is currently available. The MCMC notes that this asset is modelled as a per-site cost, and thus asset costs will scale as the network is rolled out.

8.2.74 Maxis suggested that the security gateway should be excluded from the service costs, as this is provided by the Access Seekers. Excluding this component would reduce the cost of the network security asset, which would then comprise only

the authentication server. Benchmark costs for the authentication server were provided to the MCMC.

8.2.75 Maxis states that not all Access Seekers will require use of the Edge data centre. The MCMC currently assumes that the total cost of this asset will be allocated to all services. The MCMC has not been provided with any information regarding the proportion of demand or Access Seekers that would require this asset as this asset has been treated by DNB as an overhead.

MCMC's Final Views

8.2.76 The MCMC has made the following decisions in regard to the 5G model:

(a) Increase the RAN asset lifetime from five to ten years;
(b) Retain an asset lifetime of ten years for backhaul fibre and transport fibre;
(c) No change to the allocation of costs for transport fibre and submarine cable due to the lack of data regarding use of these assets;
(d) Activate only half of the spectrum allocation in the initial years, thus reducing AA fees;
(e) Maintenance CAPEX to be modelled as a per-site cost, with this cost based on benchmark information;
(f) Network security cost redefined to comprise only the authentication server, and excluding the security gateway, with benchmark data used for the unit cost; and
(g) No change to the allocation of costs for the Edge data centre due to the absence of evidence regarding use of this asset;

Question 35:

Do you have any comments on the proposed demand forecast?

Submissions received

8.2.77 CelcomDigi stated that since the roll out of 5G services are at an early stage, it does not have better estimates to suggest at this stage, and neither has any other stakeholder. However, CelcomDigi noted that there is a high probability of significant error, which would justify a review and revision on a more frequent timetable than three years in the case of 5G mobile service.

8.2.78 CelcomDigi also questioned the division of demand by 4G EPC with 5G RAN and 5G SA. The MCMC has made the assumption that, in each year, 10% of demand will be carried on 5G SA. For the next few years, at least, only established MNOs in Malaysia will be Access Seekers for the DNB wholesale 5G broadband service and they will all seek 4G EPC with 5G RAN. The demands in 2022 and 2023, and possibly later, should therefore be only on 4G EPC with 5G RAN in the model. An assumption of some demand on 5G SA could be made for later years, but a constant 10% seems unlikely.

8.2.79 CelcomDigi noted that the MCMC's modellers suggested that the assumption of a common busy-hour for 4G EPC services and 5G SA services could be varied. The current 5G cost model assumes the most extreme case – that the two busy hours are the same, leading to the largest and most expensive network to be costed. At the very least, the MCMC should consider an extensive sensitivity analysis to this assumption.

8.2.80 In general, CelcomDigi surmised that the 5G cost model is still immature and not yet suitable as a basis for regulatory decisions. This is not unreasonable considering that the model is for the unique situation of a wholesale 5G operator providing access to a whole industry of mobile operators. Therefore, CelcomDigi urged the MCMC to delay a final decision on 5G costs by separating the 5G section from the PI. This would allow more extensive consultation with the mobile industry over the 5G model and inputs and give greater assurance that the 5G cost model is fit for purpose. They noted that a short delay would not affect the rollout or implementation of 5G services, given that initial Access Agreements have been signed with DNB. On the other hand, setting 5G regulated prices at the wrong values could seriously affect the development of the 5G market.

8.2.81 DNB noted the following:

(a) The MCMC's demand forecast is based the projection of the growth for mobile services generally, as provided by the Malaysian mobile operators, and its own view of what portion of that future traffic will move to 5G;

(b) There is only one projection, and it does not reflect the high level of uncertainty over how fast demand for DNB's 5G network will grow. The

growth of the market is largely outside of DNB's control and relies instead on DNB's Access Seekers stimulating end-user demand;

(c) This demand projection is of little relevance in determining DNB's efficiently incurred costs. These are determined, at least through to 2025, by DNB's rollout mandate;

(d) The MCMC's pricing model has modelled this mandate to roll out to 80% of the population by the end of 2024;

(e) The regulated price caps which the MCMC proposes are designed to constrain DNB's charges and are set out in Table 104 of the PI Paper. These are highly sensitive to the demand projection assumed. For example, if the low Industry Working Group ("**IWG**") projection of demand were realised by 2025, then the regulated price cap would need to be three times higher than if the high IWG projection were realised. This is a very substantial difference;

(f) Given the demand uncertainty, it is very unlikely that the MCMC's proposed price caps for 5G will be set at a level which will allow DNB to recover its annualised costs. It may lead to over or under recovery;

(g) This means that, at the next review of access prices in three years' time, when the true demand for 5G will be much clearer, the MCMC might need to set new regulated LRIC price caps which are very different from those it currently estimates; and

(h) Such changes would cause major commercial disruption to both DNB and its Access Seekers.

8.2.82 DNB concluded that the regulated price caps calculated by the MCMC on this basis are unlikely to allow DNB to recover its efficiently incurred costs given that the projection of demand will, almost certainly, be inaccurate.

8.2.83 Maxis submitted that the MCMC's demand forecast is not clearly specified, and so it is difficult to comment on the assumptions. While it is stated that traffic reaches 11,776 Gbps by 2027, it is unclear whether this is measured at a core or polygon level. Maxis believes that the traffic is most likely to represent a radio traffic figure and if that is the case, the MCMC's traffic estimate is not unreasonable, although there is a high level of uncertainty around this figure.

Maxis proposed that the MCMC update the model using the Maxis forecast split of data traffic between the 4G and 5G networks, which will impact total forecast 5G traffic. Maxis also urged the MCMC to provide clear definitions of Heavy or Middle or Light profiles that are used in the model and how they map to the dense urban, urban, suburban and rural geotypes. Maxis also requested the MCMC to share with the industry, the areas classified under dense urban, urban, suburban and rural in order for the industry to evaluate.

8.2.84 Regardless, due to the MCMC's over-specified coverage network, Maxis views that the capacity requirement is below the capacity of the coverage network over the whole period modelled (2023-2027) for all usage profiles. For the Medium and Light areas, the projected traffic demand and hence the site capacity requirements remain below half the capacity of the coverage network even by 2027. Maxis submitted figures to illustrate this issue. Based on the illustrations, Maxis believes that the capacity is not representative of the network that a hypothetical efficient operator would build. They believe that the MCMC should revise the network design to more appropriately match the expected demand over the forecast period.

8.2.85 Maxis also endorsed applying a smoothing adjustment (approach similar to a glide path) to the volumes (or capacity) in early years in order to address the issue of artificially high prices in these years due to the low demand. Maxis believes that it would be appropriate for the MCMC to calculate prices for 2023 to 2025 on the basis of mature network volumes, and so use the 2025 volumes for all three of these years. Maxis also submitted that there is international precedent for this in both Austria and Germany in relation to setting wholesale capacity-based charging for wholesale mobile access.

8.2.86 U Mobile observed that in version 7 of the cost model, the demand for 5G data is reduced by around 15%. U Mobile disagrees with this change. 2022 5G data usage has been primarily impacted by operators' late signing of Access Agreements until October 2022. This should not materially impact the market demand for 5G data services and data usage in the 2023 to 2025 period. U Mobile therefore urged the MCMC to reverse this model change and keep to the demand profile in version 6.

8.2.87 In addition, U Mobile noted that the model assumes 90% of 5G data usage will be NSA throughout the model period. U Mobile believes that the percentage will

trend down over time as more 5G SA applications become commercially available. U Mobile therefore requested the MCMC to consider modelling data usage with a downward trend in % NSA usage. With respect to the magnitude of the trend, U Mobile suggested the MCMC ascertain from DNB or Ericsson what planning assumptions were used to dimension their 5G network over the ten year plan period.

8.2.88 XOX suggested reviewing the demand forecast annually, as recent market trends do not indicate signs of 5G adoption accelerating in Malaysia.

Discussion

8.2.89 In general, stakeholders expressed reservations about the model demand forecasts, on the basis that the rate of growth is uncertain at this stage of market development. The MCMC acknowledges that with the market for 5G services being in its infancy, there is a high degree of uncertainty in relation to the demand forecasts and the market structure. This can only be resolved in time, as the market becomes more established.

8.2.90 In response to feedback received regarding the 4G model, the MCMC has refined its mobile market model. However, the MCMC considers that it would be prudent for the 4G and 5G models to incorporate differing 5G migration assumptions due to the uncertainty regarding market behaviour once 5G services are available. Within the 4G model, the MCMC has taken a conservative view of the shift of traffic to 5G, as it notes that MNOs may seek to maintain a certain level of traffic on their own networks in order to achieve a reasonable ongoing utilisation of network assets. For the 5G model, the MCMC has chosen to retain the demand forecasts used in the previous version – reducing demand to the level assumed in the 4G model would create some considerable risk that the 5G network would be under-dimensioned. Nonetheless, the MCMC notes that uncertainty with respect to the likely level of demand on the network will only be reduced once information on the adoption of 5G services becomes available.

8.2.91 The MCMC recognises that there are two main drivers of network cost, demand and coverage, with the relative influences of these two drivers changing over time. In the initial years coverage is the main driver while demand is low.

8.2.92 The MCMC has determined, after discussions with DNB, that there should be no difference in the cost per unit demand for the NSA and SA products. Therefore disaggregating the total demand into these two components is not essential. Note that demand for these products within the model represents radio traffic.

8.2.93 By aggregating the NSA and SA products, the busy hour assumptions used within the model then reflect the combined busy hour which will reduce the potential risk of network over-dimensioning.

8.2.94 The 5G cost model has been heavily influenced by the information provided by DNB. While the cost model is based on DNB's Heavy/Middle/Light profiles used within the financial information supplied to the MCMC, it is noted that the lack of a clear definition creates difficulties for both the MCMC and stakeholders to evaluate costs against the widely recognised geotype categories (dense urban, urban, suburban and rural). More detailed information would have been helpful.

8.2.95 It is recognised that the modelled network had excess capacity in the initial years. The MCMC has identified several actions that an efficient network operator would employ which would reduce the amount of excess capacity, and thus costs, in the initial years when demand is low. These actions include activating only half of the spectrum allocation and installing lower capacity base stations.

MCMC's Final Views

8.2.96 The MCMC has determined that the cost model will not distinguish between the NSA and SA products. The cost per unit demand will be the same for both products.

8.2.97 Several changes have been made to the model that will reduce the amount of under-utilised capacity in years when demand is low. These changes include:

(a) Activating only half of the hypothetical operator's spectrum allocation up to 2024, with the full spectrum allocation being activated from 2025 onwards, thus reducing AA fees incurred; and
(b) Deploying lower capacity base stations in those years in which less spectrum is activated, reducing RAN costs.

8.2.98 No changes to the 5G demand forecasts have been implemented.

Question 36:

Do you have any comments on the assumptions for spectrum allocation and coverage?

Submissions received

8.2.99 Altel agreed with the listed 5G spectrum band as below:

(a) 700 MHz – 2 × 40 MHz; and
(b) 3.5 GHz – 200 MHz unpaired.

8.2.100 Altel noted that millimetre wave has not been mentioned by the MCMC in this MSAP and agreed that this shouldn't be considered at the moment. Altel believes that the 26/28 GHz should follow after the main usage of 3.5 GHz due to complementary nature of the band which is suitable as a capacity band for hotspot and high throughput use cases. This band has very poor coverage and penetration properties and as such should not have any coverage commitment tied to the deployment.

8.2.101 As for the cell radius, Altel is agreeable to the proposed assumption and the coverage plan should be designed using the base of 3.5 GHz spectrum. However, the coverage simulation needs to be produced based on signal level at -98 dBm. This parameter is important to ensure good QoS.

8.2.102 Finally, Altel stated that the provided related network coverage table should be presented in percentage of population area as well so that it provides better virtualisation of the area rollout deployment.

8.2.103 CelcomDigi questioned the spectral efficiencies used in the 5G mode. Although the MCMC has sourced these values from the GSMA, CelcomDigi believes they are conservative. CelcomDigi believes that in addition to spectrum band, spectral efficiency should also take account of geotype, uplink and downlink format (including the Uplink/Downlink ratio, technology solutions deployed and evolution (e.g. Massive MIMO) and peak (theoretical) and average values.

8.2.104 CelcomDigi has worked with its network equipment vendors to develop the following tables for spectral efficiency that they believe should be incorporated

in the 5G model. CelcomDigi recommended that these values be used in the 5G model.

Table 59: Peak Spectral Efficiency

	700M		**3500M**	
	FDD		**TDD**	
	DL 4*4 (4R UE)	**UL 1*4**	**DL64*4 (4R UE)**	**UL**
	Efficiency (bps/Hz)	**Efficiency (bps/Hz)**	**Efficiency (bps/Hz)**	**Efficiency (bps/Hz)**
Dense Urban/Urban	4.13	1.34	12.1	5.0
Suburban/Rural	3.11	0.95	7.3	3.6

Bits/second/Hz	**32T/4 Layer**	**32T/8 Layer**	**32T/16 Layer**	**64T/4 Layer**	**64T/8 Layer**	**64T/16 Layer**
Dense Urban	8.8	11.4	13.2	8.97	13.59	16.59
Urban	7.9	10	11.6	7.22	10.54	12.47
Suburban	5.8	7	8.2	6.08	8.26	9.32
Rural	4.2	5.4	5.9	5	6.4	7

8.2.105 According to CelcomDigi, the above values were derived from simulation results with the following assumptions:

(a) 100 MHz bandwidth;

(b) UE 2T4R; 30 average users;

(c) full buffer;

(d) configuration of seven sites,

(e) 21 cells;

(f) Multi-user MIMO;

(g) TDD downlink or uplink ratio of 4:1; and

(h) Full buffer traffic.

8.2.106 DNB noted that the MCMC's assumptions about 5G spectrum assignment and the cell size which is possible in different geo-types are broadly the same as DNB's assumptions. But it noted the following:

(a) The MCMC originally used a scorched earth approach when calculating the number of cell sites required, in which real-world constraints on where a cell site can be located and what percentage of its coverage is unused are not considered. DNB's estimate allows for these effects. DNB provided examples of how other international regulators i.e ComReg in Ireland, DBA in Denmark, TRA in Oman, Anacom in Portugal and Ancom in Romania have dealt with this problem; and

(b) The MCMC used an omni-hexagonal approach for dimensioning the network. However, DNB's network has been planned using a three-sector approach, which requires a denser network. The revised the MCMC model uses the three-sector approach.

8.2.107 As a result, the original cost model estimated 6,839 sites, which is an underestimation of the number of cell site required for 80% population coverage. The revised model has been calibrated (with changes to the coverage of different geo-types) and estimates a total of 7,507 sites, which is close to DNB's estimate of 7,509 sites.

8.2.108 A further issue revolves around the fees paid for spectrum. The MCMC's original model significantly underestimated the cost of spectrum. For 2025, the MCMC's original model estimated a charge of RM 800 per year per site. DNB provided its estimation on AA fees calculation for all sites based on spectrum bands.

8.2.109 Maxis believes that the MCMC's revised spectral efficiency values are more appropriate than those initially proposed. However, Maxis believes that the values by the MCMC are still 10% lower than those obtained from the 5G vendor data. As such, Maxis encouraged the MCMC to find further ways to improve these values.

8.2.110 Maxis also highlighted that the coverage the KPI being modelled for the coverage network are not specified in the PI Paper, although they were provided to Maxis in response to queries that were raised with the MCMC. For transparency, Maxis proposed that the MCMC formally and clearly sets out the network KPI that it is modelling for the average efficient hypothetical 5G operator.

8.2.111 TM is of the view that the full spectrum allocation should not be activated until the later years when greater traffic volumes are present on the network. The MCMC could capture this by having an input time series of active spectrum by band. This would allow the activation of the spectrum to be tested in the model. In its current network deployment, DNB has only activated 20MHz of its 700MHz and 100MHz of its 3500MHz spectrum holdings. This demonstrates that its remaining spectrum holdings will only be activated in later years in line with the demand.

8.2.112 U Mobile submitted that during the one-to-one meeting with the MCMC, it was stated that 3.5GHz rather than 700MHz spectrum was used to calculate the number of sites for coverage because there is a need to provide 100Mbps service at the cell edge. However, U Mobile noted that in DNB's RAO, the 100Mbps user downlink throughput target is only a KPI metric rather than a SLA metric and as such not meeting it has no direct financial consequences for DNB. The only SLA metric in the RAO relates to 5G site availability. U Mobile therefore suggested that the MCMC the forecast number of 700MHz sites in DNB's network by the end of 2024 when the 80% population coverage requirement is due to be met. They believe that this figure will help validate this important model assumption.

8.2.113 In addition, U Mobile observed that Version 7 of the cost model reduces the cell area factor from 2.60 to 1.95 to reflect the use of 3-sector cells for calculating coverage area. U Mobile believes that the model should assume single-sector cells for coverage and only increase sectors if this is needed for capacity (sectorising is a means of tripling the capacity of a base station by dividing its coverage using directional antennae). However, U Mobile reckoned that this may not be practical and it is common practice to roll out 3-sector base stations, rather than reconfiguring later when capacity demands have grown. U Mobile requested the MCMC to confirm that DNB will only be deploying 3-sector macro base stations during the initial phase where it needs to cover 80% of the country's population by the end of 2024 given the importance of this assumption on the costs.

8.2.114 U Mobile also noted that version 7 of the cost model assumed increasing spectral efficiency year on year rather than a flat profile in version 6 and U Mobile agreed with this change.

8.2.115 In addition, the MCMC had indicated that savings could be made if initially only 100MHz of DNBs 200MHz of 3.5GHz and the 40MHz assigned 700MHz spectrum is only used when needed. U Mobile recommended that this change is made to the 5G model as it will reduce annual operating costs in the initial years, when demand is low.

8.2.116 XOX suggested reviewing the spectrum coverage assumptions biennially up to 2025, as the suburban and rural sprawl could be subject to unforeseen changes.

Discussion

8.2.117 The MCMC confirms that it has assumed that the hypothetical 5G operator will be deploying its network using a spectrum allocation in the 700 MHz and 3.5 GHz frequency bands. The MCMC recognises that DNB has been allocated mmWave spectrum and that 5G services may be deployed using this band at some future time, however the timing for this is uncertain.

8.2.118 As noted above, the MCMC has determined that in the initial years of the model, only half of the full spectrum allocation will be activated until demand increases.

8.2.119 Two operators (CelcomDigi and Maxis) provided recommendations in relation to appropriate spectral efficiency assumptions. The MCMC has reviewed these assumptions, taking into account information from MNOs as well as other sources such as vendors and regulators. As 5G is a relatively new technology, it is likely that there is a degree of uncertainty with regard to the future trends in spectral efficiency in real-life situations. Information collected by the MCMC exhibits some variation, which is not unexpected, especially given that the original source data may be collected from environments that differ from that in Malaysia. As time progresses, more information will become available and uncertainty will reduce as the technology matures and be more widely deployed, particularly in the local market.

8.2.120 It is noted that CelcomDigi's most recent inputs have been disaggregated by geotype. These inputs appear to be broadly consistent with Ofcom data used by the MCMC (Table 60) as one of the inputs to its spectral efficiency assumptions. The MCMC recognises that spectral efficiency will be affected by various factors – including geotype, technology solution, frequency band and uplink/downlink format. The MCMC is uncertain whether CelcomDigi's table of average spectral

efficiencies applies to 3.5GHz or an average of 700MHz and 3.5GHz, as this is not specified.

Table 60: 5G Average Spectral Efficiency per Cell (bit/s/Hz)

	2023	2024	2025
Low band (below 2GHz) for macro cells	1.5 to 3	3 to 5	5 to 6
Mid-band (2GHz to 10GHz) for macro cells	3 to 11	11 to 12	11 to 12
mmWave (above 24GHz) for small cells	10 to 12	12 to 13	13 to 16

[Source: Ofcom]

8.2.121 DNB raised a number of issues regarding model parameters and assumptions. As noted by DNB, the MCMC modified its original approach for calculating the number of cell sites, which provided a result that was more consistent with DNB's actual site count. With regard to the AA fees, the MCMC has checked the information provided by DNB and determined that DNB incorrectly assumed that the application fee and fixed fee were both per channel, rather than per band, thus overstating the total AA fee. For example, if the hypothetical operator uses two channels in the 3.5GHz band, then it will only pay one application fee and one fixed fee for the two channels.

8.2.122 Note that the assumptions used in the model (for example cell radius) were devised to achieve 100Mbit/s minimum at the cell's edge 90% of the time. The MCMC understands that this is achieved with 3.5GHz spectrum and thus coverage is determined in the model by the 3.5GHz band rather than 700MHz.

8.2.123 In response to U Mobile's query about the deployment of 3-sector macro base stations, the MCMC has assumed that 3-sector cells will be used to determine coverage area. The use of single-sector cells in the initial years was considered but rejected, given that it is common industry practice to deploy 3-sector base stations, avoiding future re-configuration. The MCMC understands that DNB is deploying 3-sector base stations.

8.2.124 The MCMC recognises that future 5G coverage may need to change in response to population growth and urban developments. Coverage may also change if targets change or in response to changes in the market structure. Even if population coverage targets are not increased, it is likely that over time demographic trends will require expansion of the footprint of the 5G network to

encompass previously uncovered areas, or densification as areas previously categorised as rural or suburban become more densely populated. This may become more relevant beyond 2025 or after the initial network rollout, due to lead times for such demographic and environmental changes. Thus, coverage assumptions in future regulatory processes are likely to require updating.

MCMC's Final Views

8.2.125 The MCMC considers that it is premature for the hypothetical 5G operator to deploy services using mmWave bands within the regulatory timeframe of the cost model. This situation may change as demand for 5G services increases.

8.2.126 The MCMC does not intend to make any changes to the spectral efficiency assumptions.

8.2.127 The model will assume that 3-sector base stations are deployed.

8.2.128 The MCMC recognises that assumptions regarding coverage expressed as a percentage of the population may need to change in future regulatory processes, in response to market and environmental characteristics.

Question 37:

Do you have any comments on any of the other proposed assumptions applied in the 5G model?

Submissions received

8.2.129 Altel is of the view that the assumptions listed need to make reference to the deployment of the LTE at 2600MHz band as per the MCMC's Communication Infrastructure Management System database.

8.2.130 DNB noted that the MCMC has included a number of assumptions in its model which have been derived from international benchmarks, industry experience, or first principles. DNB agrees with several of the MCMC's original assumptions, such as the makeup of backhaul technologies or the proportions of sites which are towers or rooftops. Others have been corrected in the MCMC's revised model. These include:

(a) Utilisation of network equipment of 77%. DNB believes that utilisation is significantly lower than this and has requested that the MCMC set utilisation at 60%. This has been done in the revised model; and

(b) The routing factors for SA and NSA 5G traffic. Originally different, the routing factors were used for the transport and core networks. However, there are no significant differences in the way traffic is routed in the two modes. DNB noted that the revised model no longer uses different routing factors.

8.2.131 However, there are still a few assumptions included in the revised model which DNB considers require clarification if the MCMC model is to give a reasonable estimate of efficiently incurred costs:

(a) The MCMC originally assumed that annual operating costs of the transport network would be 129% of the capital costs of network equipment. This operating cost has been removed from the revised model. But it is unclear where OPEX related to the transport network is included; and

(b) For other network equipment, particularly in the RAN, annual operating costs were assumed to be 10% of the capital cost in the MCMC's original model. However, based on information supplied by DNB, the MCMC has included in the revised model a number of additional cost categories – including power, network security, and data centres, and has removed the 10% uplift. It is unclear, however, if the additional categories include costs associated with the core network – and as such these costs may have been inadvertently removed.

8.2.132 To be sure that the model gives a reasonable estimate of costs, DNB considers that clarification is needed on these two points.

8.2.133 Maxis pointed out that the MCMC model assumptions stated that 69% of sites are shared, however, based on Maxis' review of the 5G model, only approximately 47% of total 5G sites are shared. Based on the JENDELA 4Q 2021 report, there are 25,000 towers providing 4G LTE coverage up to 94.03% as of 30 September 2021 and Maxis believes that these towers can be shared for 5G services to speed up 5G network deployment compared with slower own build towers.

8.2.134 Maxis highlighted that the MCMC assumed site sharing applies only to greenfield sites. Maxis is of the view that both brownfield and greenfield sites can be shared. DNB stated they allocated RM7 billion to cover network infrastructure costs from other parties comprising primarily tower rental and fibre leasing over 10-year period. Maxis believes that other MNOs existing towers and fibre optics cables can be used to deploy 5G at a fraction of the cost of building new ones. Therefore, Maxis believes that approximately 90% of DNB's tower sites should be shared.

8.2.135 TM submitted that the MCMC appears to be calibrating the 5G model cost base to align with existing commercial offers available from DNB (outputting a cost per Gbit/s of approximately RM30 000 per month in 2025). This is in stark contrast to the fixed network modelling, where the MCMC is making extreme cost efficiency adjustments effectively to the TM cost base. The MCMC should be taking a far more balanced approach with fair and reasonably efficient cost assumptions in all three models (fixed, 4G and 5G). TM also emphasized that there should be consistency between the 4G and 5G models where possible and cited site rental as an example. Given the modelling granularity visible to TM, it is not possible for TM to verify whether this is the case.

8.2.136 U Mobile noted that with regards site tenures, whilst version 7 of the cost model included a change, it assumes only 3,560 of 7,507 sites are shared and yet there is a comment in the Change Log worksheet saying that 100% of sites are assumed leased from towerco's. U Mobile believes a far greater proportion of sites should be shared as there is a vibrant towerco industry operating across all areas of Malaysia and DNB is deploying network in areas where these firms already operate. U Mobile recommended that the MCMC request actual site tenure data from DNB and use it in the 5G model. Using more shared sites will reduce the hypothetical operator's annual operating costs.

Discussion

8.2.137 In response to feedback on the initial model, the revised 5G model incorporated several changes which sought to increase clarity or address misinterpretations of information previously provided to the MCMC. These changes include:

(a) Change in the treatment of transport operating cost – this was previously an input expressed as a percentage (129%) of the transport capital cost,

representing a lump sum. This is now modelled explicitly and driven by the number of fibre and microwave links;

(b) The model now has a number of individual cost elements – including power and network security – the costs of which had previously been bundled within RAN unit costs. Power, which includes both site and core power costs is now represented as a per-site cost; and

(c) The Edge data centre is now treated as a separate asset within the model, rather than within overhead costs, as was originally assumed.

8.2.138 With regard to Maxis' queries on site sharing, the MCMC previously assumed only tower sites were shared without sharing of rooftop sites. No other types of sites are included within the model. The MCMC notes that the information provided by stakeholders for the 4G and 5G models exhibited some variation with respect to the proportion of sites being shared. While the MCMC recognises that some MNOs have a greater proportion of shared sites, the existing site sharing assumption has been retained. The MCMC notes that in the future, requirements for densification particularly in urban areas may involve use of mmWave spectrum and other site types.

8.2.139 TM suggested that the MCMC is calibrating the 5G model cost base to align with existing commercial offers available from DNB and contrasts this with the MCMC's approach to the fixed network modelling, in which TM claims that the MCMC is making extreme cost efficiency adjustments vis-a-vis the TM cost base. The MCMC assures TM that it has not calibrated the 5G model results to DNB's RAO pricing. The fact that the initial model's medium term (2025) results are comparable to DNB's current commercial offer is an outcome that is not unexpected given that many of the input data and assumptions are similar. Beyond 2025, however, the initial model results are considerably lower than DNB's prices. As discussed above, the MCMC is modifying certain assumptions to achieve efficiency gains and cost reductions. As TM is aware, the MCMC had extremely limited benchmark data available for 5G networks. This is in sharp contrast to fixed networks for which multiple local and overseas sources of data are available in relation to efficient costs of deploying and maintaining fibre networks.

MCMC's Final Views

8.2.140 No change to the site sharing assumptions have been implemented.

Question 38: Do you have any comments on the proposed cost mark-ups?

Submissions received

8.2.141 DNB submitted that the revised the MCMC cost model estimates a mark-up on incremental costs of 21.92% instead of 24.17% in the original model. DNB understands that these estimates are based on the mark-ups currently required by the mobile operators in Malaysia to recover their wholesale fixed and common costs.

8.2.142 DNB is of the view that using this benchmark leads to a significant underestimate of the mark-up required for 5G services. DNB expects that its fixed and common costs would be significantly higher during the first years of operation than those of mature mobile operators as DNB is a start-up organisation which is rolling out its 5G network from scratch. DNB therefore suggested that there are additional costs be added to DNB's fixed and common costs before calculating a revised mark-up. These additional costs include:

(a) DNB's start-up costs. DNB came into being in February 2021 and it was not until November 2022, 21 months later, that five of the six mobile operators in Malaysia signed up to its RAO. In the meantime, DNB has incurred substantial setup costs. For example DNB:

- has created the DNB organisation and incurred operating costs such as professional fees, office rental, general & administrative cost, and staff cost and corporate CAPEX such as fitout and IT setup;
- contributed to the debate on whether a single wholesale network was the best option;
- agreed its mandate with the MCMC; and
- negotiated a satisfactory RAO with its Access Seekers.

8.2.143 Based on this analysis DNB estimated that a further funds in exceptional costs should be added to the 24% mark-up. DNB's argument is as follows:

(a) In its detailed business plan (P55), DNB provided the ten year Total Cost of Ownership ("**TCO**") of running its basic coverage network of 7,509 sites;

(b) This estimate excludes any fixed and common costs – which are assigned to corporate costs; and

(c) DNB provided its 24% mark-up cost to the network operating cost.

8.2.144 However, DNB noted that rather than increasing the mark-up, the MCMC has decreased it in the revised model. Using this revised mark-up means that DNB would not fully recover its efficiently incurred costs. DNB views that it is important to set it in context. The ten-year TCO of building six 5G access networks to reach 80% of the Malaysian population is likely to be four to five times higher than the cost of deploying and operating DNB's SWN.

8.2.145 Based on this analysis DNB asks the MCMC to include its necessary start-up costs in estimating DNB's efficiently incurred costs.

8.2.146 Maxis requested the MCMC to fully disclose the full calculation performed to arrive at the figure of 21.92%. Only with this information are stakeholders able to fully assess whether the MCMC's proposed cost mark-up is appropriate.

8.2.147 Maxis also pointed out that in the MCMC's cost model, it is stated that the overhead mark-up is 'a percentage of total capital costs', but the overhead percentage is actually applied to both capital and operating costs. If the overhead percentage was calculated on the basis of just capital costs, it is inappropriate to apply it to both the capital and operating costs of the hypothetical operator, and the MCMC should either correct their calculation of the overhead percentage or only apply that percentage to capital costs.

8.2.148 Maxis viewed the proposed mark-up percentage appears to be high compared to precedent for wholesalers. Given DNB is operating a single network, with no retail arm, and a 100% market share, one might expect its mark-up to be substantially lower than that for an average mobile network operator.

8.2.149 Maxis cited the example 2018 WLA Market Review carried out by Ofcom where it was concluded that the general management costs applicable to Openreach, an entity that, like DNB, operates solely as a network operator, represented 10-30% of the modelled operating costs. As the MCMC applies the mark-up to both capital and operating costs, while Ofcom applies their mark-up solely to operating costs, the Ofcom mark-up is significantly lower than that used by the MCMC. Maxis believes that an appropriate mark-up to be applied to DNB would be no more than half the current value, being 12%.

8.2.150 TM questioned the assumption in the revised model that the service variants with 4G EPC versus SA access have the same unit cost. Whilst TM understands that the expectation is that the price will be the same for both options, the cost model should determine whether the costs could differ. The costs should be calculated separately and not imposed as is the case in the revised model.

8.2.151 U Mobile noted that version 7 of the cost model removed the 6% USP levy fee assumption which was included in the earlier version of the model.

8.2.152 XOX requested the MCMC to provide more transparency regarding the 24.17% mark-up for cost overheads.

Discussion

8.2.153 In the revised version of the 5G cost model, the MCMC assumed an overhead mark-up of 21.92%, which was also used in the revised 4G cost model. This represents an average mark-up estimated from data provided by the MNOs CelcomDigi, Maxis and U Mobile.

8.2.154 In the 5G cost model, this mark-up is applied to annualised costs. Hence, the approach used by the MCMC for estimation of the mark-up takes into account both capital and operating costs, together with an assumed WACC.

8.2.155 The MCMC found that there is little benchmark information available for comparable wholesale-only operators. As is noted by Maxis, Ofcom applied a mark-up of 10-30% for Openreach, a fixed network wholesale operator, but that mark-up is applied only to operating costs, not annualised costs. For the Australian wholesale fixed operator nbn, indirect costs averaged 33.3% of annual operating costs over the period from 2016-7 to 2021-2.

8.2.156 After an investigation of overhead mark-ups in other jurisdictions, the MCMC found that while similar approaches are used, there can be significant variations with regard to the scope of indirect costs and the application of the mark-up, both of which will influence the estimate for the mark-up. In some instances certain assets may be included explicitly within the cost models while in other examples those same assets may be bundled within the overhead mark-up. Furthermore the resultant mark-up can be applied to operating costs (as in the examples above) or annualised costs, which will have a bearing on the estimation approach for the mark-up. The MCMC's conclusion was that benchmark comparisons with international precedents can be misleading, due to definitional inconsistencies, and may not necessarily be appropriate for the Malaysian situation.

8.2.157 The MCMC is mindful that the LRIC+ approach assumes that the hypothetical modelled operator is efficient, and that basing the overhead mark-up on a single actual operator may not represent an efficient operator. Therefore, the MCMC's preference is to base the overhead mark-up on benchmark data from a larger sample, namely existing Malaysian MNOs for which costs are more established, and using a consistent estimation methodology across all data.

8.2.158 However, given the hypothetical 5G operator provides only wholesale services and that various functions are outsourced to a vendor, the MCMC considers that it is justified for the overhead mark-up to be lower than the average MNO mark-up used in the 4G model. In addition, the 5G WACC should be used to estimate the mark-up for the hypothetical 5G operator, rather than the 4G WACC, to account for the different level of risk.

8.2.159 In regard to the underlying costs of the two service variants – 5G RAN with 4G EPC and 5G SA – information provided to the MCMC confirmed that DNB's costs for the two services did not differ.

MCMC's Final Views

8.2.160 The MCMC has determined a revised estimate of the overhead mark-up using MNO data, adjusted to reflect cost savings that would be achieved by a wholesale-only operator. These reductions took into account information supplied by CelcomDigi and Maxis, as well as the 5G WACC. The resultant sample range for the overhead mark-up is 12.93% to 15.99%.

8.2.161 The MCMC selected the upper limit of this range to be used within the 5G cost model, namely 15.99%. It was recognised that this would be a more conservative assumption than the midpoint of the range.

Question 39:

Do you have any comments on the service costs calculated by the 5G model?

Submissions received

8.2.162 Altel highlighted the following concerns and suggestion:

(a) The current monthly 5G access service cost is calculated based on the daily peak for each polygon, then take the peak of that month as the monthly cost per Gbit/s. The 4G & 5G mobile networks are generally built based on the average throughput capacity, hence, it is better to calculate based on the daily average for each polygon, and take the average of the month as the monthly 5G access service cost per Gbit/s for that month; and

(b) A different monthly access service cost for private network (Non-Public Network including SA Non-Public Network and Public Integrated Network Non-Public Network) should be considered for 5G access services.

8.2.163 CelcomDigi reiterated that the service costs do not reflect the costs of an appropriately utilised, and therefore efficient, network. This is especially true for the early years, 2023 and 2024, and thereafter becomes progressively less of a problem as significant proportions of the data traffic are migrated to the 5G network. Therefore, CelcomDigi proposed that the MCMC recommend a price cap for 2025 or beyond. The other important point is that the overall approach to service costs (maximum price for capacity used) is completely different to the target capacity fixed revenue approach adopted in DNB's draft RAO, and consistency needs to be achieved at the earliest time. CelcomDigi stated that the MNOs cannot comply at the same time with incompatible pricing obligations.

8.2.164 DNB stated that the MCMC's revised model has incorporated most of the proposed changes to bring the costs estimates much closer to DNB's actual and projected costs. However, DNB believes that the mark-up for fixed and common costs in the revised model is too low and its WACC is significantly higher than

that used by the MCMC in its revised model. DNB also noted that some of the sources for the assumptions used in the revised model remain opaque and need clarifying.

8.2.165 Maxis believes that the MCMC should adjust its cost models accordingly to responses they had provided for questions 33 to 38 to produce a more accurate estimate of service costs. Based on subsection 6.18.15 of MSA on Modularity principle, Access Seekers should only pay for services that they require on an unbundled basis.

8.2.166 Additionally, Maxis also questioned whether the MCMC has carried out reconciliation and calibration of the 5G model. Maxis recommended that the MCMC performs calibration against the 4G Mobile model and DNB data, and clearly note in the MSAP PI Report the steps it has undertaken in this regard and the degree of comfort it has achieved. Maxis highlighted its concern that there were significant differences between the first and second version of the MCMC's 5G cost model which are unlikely to arise in a well-calibrated model.

8.2.167 U Mobile expressed concern about the use of the tilted annuity methodology which has resulted in high unit costs in the early years of operation, because the network is poorly utilised, and much lower costs in later years. Ideally, U Mobile suggested that the MCMC use ED to calculate the 5G network costs. However, if considerations of ease of calculation and consistency outweigh methodological correctness, then adjustment should be made to the price profile to take into account of the shortcomings of the selected methodology. For example, the MCMC could consider a volume-weighted average over model years, with a tilt to reflect asset cost declines.

8.2.168 U Mobile also questioned why the MCMC structured the 5G model such that both 5G SA and 5G NSA utilise the 5G core, and therefore have the same LRIC costs. By definition, 5G NSA data does not use the 5G core network infrastructure and therefore the unit cost should be different to 5G SA. In addition, U Mobile stated that each network operator has deployed (or is deploying) their own 5G core so most 5G SA traffic will not actually utilise DNBs 5G core. U Mobile suggested that the LRIC model is amended to reflect these realities.

Discussion

8.2.169 The MCMC notes that over time, additional 5G products may be developed for offerings to Access Seekers. Such products may have different cost profiles than the 5G products currently within the model, however costs of shared network assets would need to be appropriately allocated. With no timeline for commercial release, no clear service definitions and a lack of robust demand forecasts, the MCMC considers that the incorporation of such products is premature and would introduce additional sources of uncertainty within the model results.

8.2.170 As noted previously, the MCMC is introducing assumptions that are more compatible with the network deployment strategy of an efficient operator, which reduce the under-utilised capacity and network costs.

8.2.171 Stakeholders have indicated that the usage-based pricing derived in the MCMC's model differs from the target capacity pricing within DNB's RAO, however stakeholders' views on a preferred pricing structure is not clear. The MCMC recognises that DNB, as a wholesale-only 5G operator, is unique and that there is little precedent on the structure of wholesale 5G products and pricing. This situation may change as the market evolves.

8.2.172 Note that section 6.15.18 of the MSA states that "an Access Provider may supply a 5G service on a bundled basis, but shall allow an Access Seeker to acquire a 5G service on an unbundled basis, at the Access Seeker's option." It appears that DNB's pricing structure does incorporate some level of bundling – through target capacity and multi-year contracts which may or may not be compatible with Access Seekers' requirements for unbundled services.

8.2.173 The 5G cost model has undergone a number of changes from the original version. This has been as a result of stakeholder discussion and feedback, in which further information has been provided and information that was unclear or ambiguous has been clarified and confirmed. Extensive calibration and checking has taken place, using DNB data and data used for the 4G model as well as suitable international and industry benchmarks. The lack of other 5G regulatory cost models has been a particular challenge.

8.2.174 One key change has been the treatment of the 5G core. After discussions with DNB, the MCMC established that core costs – with the exception of costs associated with network management – should not be allocated to either the NSA or SA products.

8.2.175 As noted above, the MCMC has introduced a modified tilted annuity option as a proxy for ED. This approach takes into account demand growth, thus reducing the cost in the initial years when demand is low.

MCMC's Final Views

8.2.176 No additional products, other than 5G Access and 5G Core, will be incorporated within the cost model at this time, due to the considerable uncertainty associated with new and innovative products.

Question 40:

Do you have any comments on the 5G sensitivity analysis?

Submissions received

8.2.177 Altel believes that 5G sensitivity analysis test should be generated based on Altel response for question 39.

8.2.178 CelcomDigi noted that the sensitivity analyses are based on a test for +/- 10% movements. However, the key parameters and assumptions in the early years of the 5G network operation are such that the level of single-factor and multi-factor potential error is well beyond +/- 10%. Beyond an assurance that the model is connected and working, CelcomDigi takes no further comfort from the sensitivity analyses in this case. CelcomDigi would much prefer an assurance of continued monitoring and more frequent review than the MSAP triennium.

8.2.179 DNB notes that the MCMC's sensitivity analysis for 5G, as set out in Tables 99 to 103 of the PI Paper uses incorrect central values. In addition, in at least one case, the sensitivity analysis on demand for DNB's 5G network set out in Table 100, does not range widely enough. Table 100 looks at the impact of varying demand by 10% in either direction. If the high and low demand projections of the IWG are taken into account, then this sensitivity analysis should look at variations in demand of around 50% in either direction. As such, DNB suggested revising the sensitivity analyses in the light of these comments.

8.2.180 Maxis noted that it would have been substantially easier for Maxis and other Access Seekers to test model sensitivities if the MCMC had not redacted a

number of inputs and broken the model flow in the version of the 5G model provided.

8.2.181 U Mobile stated that the approach adopted appears to be reasonable.

8.2.182 XOX proposed that the MCMC carry out a biennial review up to 2025, as the average mark-up was calculated using data from the four major mobile operators. Depending on the merger status of Digi-Celcom, the sensitivity analysis of four operators could be adjusted.

Discussion

8.2.183 The MCMC recognises that given the immaturity of the 5G market, there is considerable uncertainty regarding various model inputs and assumptions. This uncertainty for individual inputs may be greater than that explored within the MCMC's sensitivity analysis. Furthermore, there may be multiplicative effects involved for combinations of inputs.

8.2.184 A key objective of a sensitivity analysis is to identify parameters and assumptions that have a significant impact on the model results. The sensitivity analysis in the PI Paper established that, as expected, variations in inputs such as demand, coverage, overheads and the WACC have a considerable impact on the model results.

8.2.185 A more realistic view of the potential uncertainty could extend the bounds of the sensitivity analysis to +/- 50% (or more), however the MCMC recognises that this would provide an even greater range for the model outputs, but little reassurance that any proposed regulated price will be appropriate for the market.

8.2.186 As many of the model inputs are based on confidential information supplied by DNB, the MCMC is unable to provide a non-redacted version of the model for stakeholders to test.

MCMC's Final Views

8.2.187 It is the MCMC's view that it would be preferable to have more certainty over many of the inputs and assumptions to the model. This can only be achieved

once more concrete information regarding demand and supply becomes available, as the 5G market becomes more established.

Question 41:

Do you have any comments on the proposed regulated prices for 5G?

Submissions received

8.2.188 Altel reiterated that the calculation for 5G service cost does not refer to the practice as highlighted in their response for question 39. Altel urged the MCMC to ensure the services cost is according to industry standard practice.

8.2.189 CelcomDigi reaffirmed its view that the first two years of the three years are of little use, because they do not relate to costing of an efficiently operating network. They also noted that the service quality assumptions in the model are not transparent and stated that Access Seekers as well as DNB need to know the service performance levels that underly the regulated pricing to ensure that Access Seekers receive what they are paying for.

8.2.190 DNB compared the LRIC base price caps estimated by the MCMC in its original pricing model with the price caps from its revised model. DNB noted that:

(a) the price difference between SA and NSA modes disappears; and
(b) the overall price caps are substantially higher in the revised model.

8.2.191 DNB requested the MCMC to further adjust these price caps to reflect its comments on mark-ups and WACC. If the MCMC makes these adjustments, DNB estimates that DNB's efficiently incurred costs and LRIC based price caps would increase by a further 11%.

8.2.192 DNB also questioned whether the MCMC's proposed LRIC pricing is the best way to recover DNB's efficiently incurred costs. DNB believes that adopting the adjusted LRIC based price caps is not in the public interest for three main reasons. When compared with the MCMC price caps, RAO prices:

(a) are much better at stimulating end-user demand for 5G services in the first few years of 5G provision;

(b) provide Access Seekers with greater planning certainty; and
(c) are more in line with international regulatory practices.

8.2.193 DNB evaluated two options to determine which is likely to be in the public interest.

(a) Offer 1: DNB charges the prices set out in its RAO where an Access Seeker commits to a target capacity over a 10 year minimum term and pays for all of it at RM 30,000 per Gbps per month regardless of how much it uses. Once it exceeds the target capacity, the Access Seeker pays for additional capacity at a volume discount rate to purchase each additional Gbps of capacity required. This volume discount rate is adjusted every three years to ensure that DNB recovers only its costs plus its WACC. This rate falls as demand grows, average cell utilisation increases and technology improvements enable DNB to expand the capacity of its 7,509 site network at modest marginal cost.

(b) Offer 2: Access Seekers pay charges from DNB up to the price cap set using the MCMC pricing model. Under this option Access Seekers purchase 5G access capacity on a pay per use price per Gbps per month as estimated by the MCMC in Table 104 of the PI Paper. There is no target capacity commitment required from the Access Seeker. The offer is subject to a minimum term of five years, as determined through the MSA PIand is revised every three years by the MCMC following a PI. For DNB to recover efficiently incurred costs it will need to set its prices equal to the price caps determined by the MCMC.

8.2.194 DNB noted that five of the six main Access Seekers committed to a 10 year contract with DNB to take Offer 1 in early November 2022.

8.2.195 DNB compared the prices in DNB's RAO and the MCMC revised price cap and believes that given the relative prices, Access Seekers have much stronger incentives under Offer 1 than Offer 2 to set low retail prices which will stimulate take-up of 5G services. DNB also highlighted that Offer 1 transfers demand risk to Access Seekers by requiring them to purchase a target capacity of at least 800 Gbps from DNB. This creates strong incentives for Access Seekers to promote 5G services to end users and hence stimulate fast take-up. In contrast, Offer 2 leaves all demand risk with DNB, even though it has no way, as a

wholesale only provider of 5G services, to stimulate end-user demand. As such, DNB surmised that Offer 1 meets one of Government's main policy objective, which is to enable fast take-up as DNB is offering mobile data at a cost per GB which is six to eight times lower than 4G technology.

8.2.196 DNB is of the view that Offer 1 provides greater planning certainty for Access Seekers as the prices set for a 10 year period as opposed to the price caps estimated by the MCMC's pricing model which depends on demand which is highly uncertain. This could mean that the MCMC pricing model at the next review of access prices in three years' time could change radically from those now proposed under Offer 2.

8.2.197 DNB believes that Offer 1 is more in line with international regulatory practices as compared to Offer 2. DNB carried out a comparison with other similar wholesale telecommunications operators such as NBNCo in Australia, Netco in Bahrain, UNN in Brunei, Chorus in New Zealand, Openreach in the UK, and Netlink in Singapore and noted that in all cases the regulator has chosen to control their wholesale prices on a rate of return basis rather than using a LRIC pricing model. At the same time, the standard approach around the world in regulating national monopolies such as energy and water utilities is to use rate of return regulation. As such, DNB concluded that Offer 2 is clearly not consistent with the international practice of using rate of return price regulation for monopoly wholesale only providers. In contrast Offer 1, in which DNB is constrained to recover only its WACC in addition to its efficiently incurred costs, follows international practice.

8.2.198 DNB considers public interest is best served if the MCMC caps RAO prices using a rate of return regulation. If the MCMC continues to use the LRIC approach to setting the regulated price caps then, these caps will have no effect on the prices paid by Access Seeker under DNB's RAO over the next three years. DNB estimates that this would require it to charge at 7% less than the cost recovery price in 2025, 25% less in 2026 and 29% less in 2027. This would make it difficult for DNB to fund its 5G network using a bond offer as originally planned by the Government. Investors would be concerned that regulation was forcing DNB into making a loss and demand for bonds would be limited or non-existent. DNB would then likely need to seek financial assistance from the Government to make up the shortfall. In addition, it will deter the mobile operators from taking the planned equity stake in DNB. Such a stake would be unattractive if DNB

were constrained by regulatory price caps from recovering its efficiently incurred costs.

8.2.199 Based on the above analysis, DNB asks the MCMC to set regulated price caps for its RAO based 5G prices using rate of return regulation rather than relying on a year-by-year price cap calculated using a LRIC-based pricing model.

8.2.200 Maxis submitted that the MCMC should consider modelling a separate coverage and capacity charge for the relevant 5G wholesale services to reflect the dynamics of a greenfield RAN build as reflective of the build by DNB. Maxis reiterated that greenfield or new technology RAN developments (such as 5G) are planned and designed to firstly address the coverage requirements followed by any capacity requirements. This is standard practice followed by MNOs across the world, and coverage network costs are not primarily traffic-sensitive in a real-world setting.

8.2.201 Therefore, Maxis questioned why the MCMC uses coverage network costs divided by annual projected 5G throughput as the proposed regulated price for relevant 5G wholesale services. It could be argued that this approach is not cost causal, as 5G throughput demand is not actually driving the nationwide 5G network build costs, which are primarily related to coverage network build in the initial two to three years of deployment.

8.2.202 Maxis proposed that the MCMC consider modelling separate coverage and capacity charges for the relevant 5G wholesale services to comply with the MCMC's own regulatory accounting principles of cost causality. In order to model a separate coverage and capacity, the MCMC could:

(a) Separately calculate the costs for the coverage and the capacity network. This would be easy to implement with the MCMC's existing model structure;

(b) Calculate a 'coverage' charge, equal to the total modelled cost of the coverage model divided by the number of Access Seekers purchasing wholesale access to the coverage network. This could be varied as the number of Access Seekers purchasing wholesale access varies, and would include a basic capacity allowance; and

(c) Calculate a unit charge for the capacity network, to be charged for all usage beyond the basic capacity allowance included within the coverage network.

The capacity charges should include cost erosions taking into account tech advancements/efficiencies, allowing these costs to be passed on to customers.

8.2.203 TM stated that the MCMC appears to be calibrating the 5G model cost base to align with existing commercial offers available from DNB (outputting a cost per Gbit/s of approximately RM30,000 per month in 2025). This goes against its own principles of reasonable efficient cost standards as set out in the PI Paper. The MCMC should be adhering to its established principles in all three models (not just 5G, but the fixed and 4G models as well).

8.2.204 U Mobile is concerned that the level and changing profile of proposed regulated prices is very different to the commercially agreed 5G data pricing from DNB. Given the increasing importance of 5G services during the 2023-2025 period, and beyond, U Mobile believes it is appropriate for the MCMC to comment on how the MSAP and 5G Access Agreements should be interpreted.

8.2.205 U Mobile noted that the modelled costs in the early years are significantly above the current RAO prices. This raises an important point of principle. On the face of it, DNB is a regulated monopoly with the attendant risk of monopolistic pricing behaviour in which one would expect the price to be set at a higher level by the monopolist, in order to extract a monopoly rent and with the effect of restricting usage of the service to a lower level than would be the case in a competitive market.

8.2.206 However, since DNB has published a RAO and entered into contracts with the main operators already and so there is the opportunity to compare these prices with the costs produced by the modelling exercise. To the extent that the modelled costs are correct, there is little evidence of monopoly rent-seeking by DNB and consequently no justification for the MCMC taking the unusual step of setting aside the contractually agreed price and imposing a different price profile.

8.2.207 To the extent that the modelled costs are above those set and agreed by DNB, the MCMC would only be justified in imposing these if there were a significant risk that the prices were intended to have an exclusionary effect – i.e. to deter the network operators or new entrants from deploying 5G by pricing below costs. In a reasonably competitive market, this would only be possible beyond the

short term for a firm that is able to cross-subsidise its prices in a competitive sector from one in which it was able to extract monopoly rents. This is clearly not the case for DNB, which is essentially a single-product firm. There is thus no case for imposing regulatory prices that are above the existing contractual prices.

8.2.208 However, should the MCMC decide to set regulated prices, U Mobile believes that the MCMC must modify the raw output costs from version 7 of the model to address the abnormally high data costs in 2023 and 2024 as the network is built out and usage is low. U Mobile proposed that the MCMC undertake a smoothing exercise or introduce some form of glide path before putting forward the proposed regulated prices for 5G data.

8.2.209 U Mobile also noted that DNB has entered into Access Agreements with network operators that are long term and have a large minimum monthly spend commitment. Both these factors need to be recognised in the MCMCs calculations for the appropriate regulated prices in the 2023 MSAP. The output from the 5G LRIC cost model does not factor in this commercial reality.

8.2.210 XOX suggested a biennial review up to 2025, as the pace of the industry—and its associated innovations—is accelerating, especially with the inception of 5G.

Discussion

8.2.211 The development of the 5G cost model, together with stakeholder feedback, have highlighted the considerable uncertainty associated with the introduction of 5G and the challenges in deriving cost-based prices. Given the market is in its early stages, with the market structure being reviewed, many of the cost model inputs and assumptions are subject to relatively wide margins of error.

8.2.212 Nonetheless, this uncertainty may lead to potential for regulatory error and a risk of market distortion if pricing is inappropriate or market behaviour differs significantly from the current assumptions.

8.2.213 Discussions associated with the previous questions have outlined the MCMC's views on model adjustments to increase efficiency and reduce costs in the initial years of the model, which are characterised by low demand and subsequent under-utilisation of network assets.

8.2.214 As noted above, the MCMC has not calibrated the model results to DNB's RAO pricing. The fact that the previous model's medium term (2025) results are comparable to DNB's current commercial offer is an outcome that is not unexpected given that many of the input data and assumptions are similar.

8.2.215 The MCMC has encountered many challenges in developing a cost model for a 5G wholesale only operator deploying a network in the early stages of market development. On the demand side, there is no historical information available to inform forecasts, and 5G applications are still at an emerging stage. On the supply side, there is a paucity of disaggregated cost data, uncertainty regarding a number of cost drivers and little information about future products. It is notable that DNB and Access Seekers presented divergent views on whether core network related costs should be included in the wholesale service 4G EPC with 5G RAN. Ultimately, on the advice of DNB, the MCMC attributed a portion of these costs, relating to the network management function, to both the 4G EPC service and the SA service, leading to identical prices for both services in the final version of the model. The MCMC has used all available data in finalising the cost model, but acknowledges that a potentially significant margin of error may apply to model results caused by data limitations.

8.2.216 The issues encountered in the development of the 5G LRIC model would not have been solved had the MCMC adopted an RAB or rate of return approach in its modelling. Such an approach has heavy information requirements for successful implementation. With the present stage of DNB's development and with the information currently available, an accurate determination of the initial RAB would not have been possible. In addition, it would not be reasonable at this time to attempt to specify justifiable allowed capital and operating expenditure for future years, in the absence of any actual historical data.

8.2.217 The MCMC has decided that, given all of the uncertainties described above, it is not practical to regulate 5G wholesale prices for the regulatory period 2023 to 2025 at this time. Effectively, this forbearance is in the interest of dynamic efficiency as it will provide DNB with an opportunity to fully establish its network and for new services and demand to emerge. For the avoidance of doubt, this decision should not be interpreted as a signal that 5G wholesale services will be unregulated in perpetuit. The MCMC intends to review the decision in one year's time.

8.2.218 With a monopoly Access Provider, Access Seekers have no options for alternatives. The MCMC has already noted concerns voiced from operators regarding the compatibility of pricing per unit of demand (as per the LRIC model output) with the pricing approach reflected in the DNB RAO. Although all but one MNO has completed agreements with DNB using the RAO, the MCMC notes that several stakeholders in the MSAP review have suggested alternative forms of pricing structures for 5G products. It is not clear to the MCMC that DNB's RAO pricing is at a level sufficiently unbundled for Access Seekers' requirements. DNB's RAO requires Access Seekers to commit to a minimum spend for a 10 year term, which appears to offer little flexibility.

8.2.219 It should also be noted that the MCMC intends to monitor the development of this market closely in the intervening years.

MCMC's Final Views

8.3.1 The MCMC confirms that it will not apply price regulation to 5G access services with 4G EPC and the 5G SA service during this regulatory period. The following Table 61 contains indicative pricing only.

8.3.2 The MCMC will review the need for regulated price setting for 5G in one year's time.

Table 61: Indicative 5G Access Cost per Unit Demand

Service	Units	2023	2024	2025
5G access with 4G EPC	RM/Gbps/month	106,326	44,226	19,028
SA	RM/Gbps/month	106,326	44,226	19,028

9. Infrastructure Sharing

9.1. Overview

The MCMC developed a bottom-up infrastructure sharing model using tilted annuities as the annualisation method to calculate the costs and prices for Infrastructure Sharing on the Access List. A public version of the cost model was made available to interested licensees during the PIperiod. (There was no confidential version).

Part G of the PI Paper concerned Infrastructure Sharing, in particular towers and in-building common antenna systems. Section 20 of the PI Paper described the infrastructure sharing model, and sought comment on its completeness.

The MCMC proposes to publish indicative prices for lattice type towers for 45, 60, 75 and 90 metres in height. Regarding In-Building Common Antenna Systems ("**IBCA**"), the MCMC acknowledged that these can vary considerably in size and scale and proposed to consider any disputes where it is asked to intervene on a case-by-case basis. The information provided by the mobile operators as part of the current costing exercise would form a part of the initial information base and would be supplemented by data gathered during the dispute to enable the MCMC to reach a conclusion.

9.2. Summary of submissions received

Question 42:

Do you have any comments on the approach to the modelling of tower costs?

Submissions received

9.2.1 CelcomDigi agreed with the MCMC's approach to the modelling of tower costs, where it should primarily reflect the average level of costs for a smaller number of variants of a basic service, but with flexibility to substitute different elements cost where required, or to exclude elements of cost where they are passed through.

9.2.2 Edotco commented the lifespan of smaller structures, i.e. rooftop, smart lamp pole, small cells, etc. are not in line with the market, where these structures have shorter life span of less than ten years. Edotco highlighted that the MCMC

has excluded civil and construction costs which may result in under-representation of costs. Edotco added that the commercial circumstances on individual SBCs vary significantly from the average parameters which can result in inequitable outcome when computing averages.

9.2.3 Edotco further added that the MCMC should only include those structures which have 10 or more data points in the PI Paper, as it is unclear whether the data points are representative. Edotco suggested that only three lattice structure and lamp pole structures with more than 10 data points should be included.

9.2.4 Maxis agreed with the MCMC's bottom-up approach for the modelling of tower costs. Maxis also supported the MCMC's approach to model costs for all types of tower structures commonly used by Access Seekers, as tower companies have a wide variety of different tower types and sizes which would drive a large variation in unit costs. Maxis commented that the MCMC should also apply ex-ante regulation to prices of fixed telecommunication poles, alongside duct and manholes.

9.2.5 Maxis proposed amendments to the routing factors to more accurately reflect their understanding of an efficient network design. Maxis is also of the view that the MCMC should regulate prices for IBCA system.

9.2.6 PPIT is not agreeable with the MCMC's proposal on a single determined access price for each individual structure as it is inequitable to apply single determined prices based on average cost of all players given differing size and scale between operators in the industry, and may be biased in favour of operators with better economics of scale. PPIT added that MNOs also have different operating models, cost structure and recovery pattern as compared with tower companies. The differences in these elements may have skewed cost inputs to be unrepresentative to the cost of SBCs.

9.2.7 PPIT commented that a single determined price is impractical as the costs vary significantly among the SBCs, depending on its location. Setting of single pricing would lead to under-recovery of cost for certain SBCs, which may cause under-development in certain states or locations. PPIT clarified that the OPEX, i.e. maintenance costs, rental costs, and permit fees, CAPEX and corporate overheads of SBCs vary between locations of sites. As the MCMC's proposed model assumes a standard configuration of towers, it does not take into account

the variances in location. Thus, it is inappropriate as the usage of the model for arbitration purposes without any appeal to the circumstances may influence construction and installation costs.

9.2.8 PPIT highlighted that as the MCMC has omitted rental for tower sites and USP fees in the model, the prices are not representative. PPIT proposed for these costs to be incorporated as these are the actual costs to SBCs, which would otherwise lead to understating of cost and prices. PPIT also suggested inclusion of land cost in the CAPEX if the tower site is assumed to be owned by the operator, as well as to reincorporate the 6% USP mark-up in the model.

9.2.9 PPIT commented that there is a lack of clarity in the MCMC's definition of site set up costs which may lead to an understatement of cost in the proposed model. PPIT added that there needs to be clarity in the definition of category to avoid understating of site preparation and build costs, which is supposed to be included as part of site set up costs.

9.2.10 In addition, PPIT commented that there is no evidence of other countries attempting to regulate prices for Infrastructure Sharing. A research paper entitled "Pricing and costing practices in telecommunications: The Brazilian experience and challenges" by Sergio Franklin and Nelio Pizzolato of July 2013 stated that the services to which access is mandated in the Brazilian regulatory framework are fixed call origination/termination service, transit service, mobile call origination/termination service, wholesale leased lines and local loop unbundling, while Infrastructure Sharing is not mandated in Brazil.

9.2.11 PPIT further quoted an article by Kalyan Prabat dated 9 January 2023 in the Economic Times, where currently in India, tower installation costs have increased manifold, primarily due to exorbitant permission fees being charged by municipal corporations and local authorities across the country. The article explained that multiple levies under the guise of renewal fees, sharing fees, development charges coupled with property demands are being imposed on tower companies with the sole aim of revenue maximisation for the Government exchequer. Thus, PPIT reiterated that the omission of assessment charges by local council and permit fees from the proposed model will understate the pricing.

9.2.12 TM commented that they are in position to maintain current commercial arrangements.

9.2.13 TT dotCom is of the view that the approach taken may not be appropriate. TT dotCom clarified that the MCMC should take into consideration on many factors in the calculation, i.e. types of tower structure and design, location, length of contract tenure and volume of purchase, local authorities' fees and approvals, customer requirements, tenancy model, number of tenants per structure, etc.

9.2.14 U Mobile emphasized that site costs are significant elements of 4G and 5G mobile models and a significant cost input for operators. U Mobile understands that the relevant cost inputs for the two mobile models are derived in some way from the data provided by the mobile operators and DNB, whereas those for the towers model is derived from a wider range of sources. However, U Mobile suggested the MCMC to provide evidence of reconciliation of the two data sets, given the high degree of overlap.

Discussion

9.2.15 Submitters raised many varied issues regarding the MCMC's approach to modelling tower costs. The MCMC notes that a number of stakeholders have expressed preferences for infrastructure sharing prices to continue to be commercially negotiated, as is common in many other countries.

Use of Averages

9.2.16 The averaging approach adopted by the MCMC was in general supported by CelcomDigi and Maxis, however Edotco and PPIT expressed a number of reservations about this. In particular there was concern that the results may not reflect the true cost of service provision in certain locations, and for individual providers with smaller operations, unable to reap the benefits of economies of scale.

9.2.17 The MCMC acknowledges that cost modelling using average data may not deliver results which accurately reflect the costs of a particular company deploying non-standard or customised infrastructure and / or deploying towers in rural or remote locations or other sites which are relatively inaccessible. A very complex modelling approach would be required in order to capture a high number of possible tower configurations and locations, and this may still be subject to a

considerable margin of error. It would simply not be feasible to set prices for every possible combination of tower structure, height and ancillary services. Given these considerations, the MCMC judged that the best approach was to focus on standard structures and to gather as much data as possible from both large and small tower operators to inform its averaging approach.

9.2.18 The MCMC agrees with Edotco that ideally more than ten datapoints would be optimal, however very little data was provided for some important structures (such as street furniture). The MCMC decided to take a pragmatic approach and work with the data provided. It should be noted that the MCMC encouraged operators to provide additional data and sought many clarifications following the return of data in response to the initial data request.

9.2.19 In response to U Mobile's concern regarding site cost data supplied for the mobile and tower models, the MCMC confirms that it undertook cross-referencing of said data.

Permit Fees

9.2.20 PPIT claims that permit fees were omitted in the model, however the MCMC did include these in the revised version of the model. The MCMC noted that there are fees associated with the construction of a new structure, as well as annual permit fees for the structure, which include fees for local council, state government and national government agencies. These fees vary by state, as shown in the Table 62 below.

Table 62: Permit fees

	Tower new construction	**Tower annual renewal**	**Rooftop new construction**	**Rooftop annual renewal**
Average	10,896	7,978	8,427	5,388
Median	11,050	8,150	8,550	5,084
Maximum	20,050	17,950	13,760	10,000
Minimum	1,130	1,100	1,000	0

[Source: MCMC]

9.2.21 The MCMC has assumed that the permit fees for construction are included within the site set-up costs. An item for annual permit fees was added, with the costs being the average across all states:

(a) Towers and smart street poles – RM7,978; and
(b) Rooftops – RM5,388.

Other Site Set-up Costs

9.2.22 The MCMC notes PPIT's concern about a lack of clarity on the components of set-up costs. The MCMC disaggregated site set-up costs by structure type. This was a very challenging exercise as there was significant variation in the responses to the data request. For the avoidance of doubt, in addition to permit fees these costs included site acquisition, planning, and land assessment, with the assumptions being:

(a) Tower – RM20,000, based on the median of the highest responses from the tower companies; and
(b) Rooftop and other – RM4,750, based on the median of the lowest responses from the tower companies.

9.2.23 The MCMC has capitalised these costs.

USP and Licence Mark-up

9.2.24 The USP levy was indeed set to zero in the revised model. The MCMC clarifies that it is assumed that the hypothetical modelled tower company would receive USP contributions equal to the amount paid for the USP levy.

9.2.25 With regard to the network licence mark-up, the model applies this to revenue, whereas for an actual operator it would be applied to eligible net revenue. Thus this mark-up (retained as 0.5%) should be considered a maximum.

Site Rental

9.2.26 The model does allow for site rental and assumes a 10% increase every three years. The input rental for the model is for the base year of 2022, so a rental increase of 10% would be expected in 2025. This is equivalent to a CAGR of 3.23%. The annual rental cost trend was set to this value.

MCMC's Final Views

9.2.27 The MCMC confirms its initial position on this issue as published in the PI Paper – namely, not to apply price regulation to infrastructure sharing services, and to treat the modelled prices as indicative only.

Question 43:

Do you have any comments on the sensitivities and outputs from the towers cost model?

Submissions received

9.2.28 CelcomDigi commented that the MCMC's sensitivity analysis is in terms of a range of WACC values. The range is unduly narrow and the sensitivity assessment is less useful as a result. CelcomDigi is of the view that a pre-tax nominal WACC value for tower sharing of 7.58% would be appropriate, but this value is outside the narrow range adopted for sensitivity assessment.

9.2.29 Edotco suggested that care is needed to be taken in the adoption of any lower WACC for tower companies. Such rate should not be artificially reduced given the lower WACC for SBCs who are owned by the state government and are backed/guaranteed by the Government.

9.2.30 Maxis recommended the MCMC to undertake sensitivity analysis for IBCA system provided by the third-party Access Provider.

9.2.31 PPIT expressed their concerns over the accuracy of the assumptions used and application of inputs. PPIT highlighted that there are mix of book value and current market cost which would have affected the accuracy and applicability of output of the proposed model. PPIT further added that the commercial circumstances of individual SBCs may vary significantly from the average parameters specified and would result in an inequitable outcome to those SBCs who experience adverse circumstances vis à vis the conditions specified above.

9.2.32 TM clarified that the current rates offered by the tower operators in the market are as low as RM4,000 which implies that their cost levels are lower than that. TM added it is possible that the reality is close to the sensitivities resulting in lower unit costs.

9.2.33 U Mobile agreed that the approach adopted by the MCMC is reasonable.

Discussion

9.2.34 Comments relating to the appropriate value of the WACC for infrastructure sharing services have been addressed in Section 5.

9.2.35 With respect to PPIT's concern about the use of both book values and current market cost, the MCMC took care to confirm that appropriate costs were used in the model through cross-checking of data submissions, and follow-up questions.

Question 44:

Do you have any comments on the proposed indicative prices for infrastructure sharing?

Submissions received

9.2.36 CelcomDigi commented that they have been unable to reconcile the proposed indicative prices with the actual incurred costs for Infrastructure Sharing. This indicates that the variety and complexity of Infrastructure Sharing arrangements means the indicative prices are of little use. As such, CelcomDigi urged the MCMC to use these indicative prices with careful consideration of the specific circumstances of tower sharing in each case.

9.2.37 DNB highlighted that the MCMC did not propose to set regulated price and indicative prices for access to street furniture. DNB is of the view this is unreasonable given that this PI concerns pricing through to year 2025, and it is important for the MCMC to provide regulated or indicative prices for such access to street furniture in the next Review of Access Pricing.

9.2.38 DNB further suggested the MCMC to consider some aspects in providing indicative prices for street furniture in the upcoming Review of Access Pricing, such as prices currently paid by mobile operators in Malaysia on street furniture access for 4G services, prices currently paid by mobile operators in other countries on street furniture access for 5G services, and assessment on incremental costs to the owners of street furniture in granting access to DNB.

9.2.39 Edotco disagrees with the inclusion of indicative prices for the four types of tower structures in MSAP. It is unclear how useful the indicative price will be for an

Access Seeker, due to the bespoke nature of tower installations and the need for customisation. Edotco further added that the inclusion of indicative prices will have a negative impact as towers may only be developed in less expensive areas, i.e. lower cost in urban areas compared to higher cost in non-urban areas, as well as the MNOs may seek cheaper rentals in the lower cost urban areas. This could lead to under expansion to rural areas, which is inconsistent with the Government's policies.

9.2.40 Edotco emphasized that the markets are already competitive and characterised by the successful negotiation of terms in this market, which includes the price.

9.2.41 Edotco further raised their concerns on the use of national indicative prices which are significantly lower than the costs/prices in East Malaysia. In Sabah and Sarawak, the costs for building and commissioning towers are 30% to 40% higher, and the OPEX for 45 metre and 76 metre towers vary about 15% to 20% from West Malaysia. Therefore, should the MCMC continue to include the indicative prices in the MSAP, Edotco is of the view that the MCMC should set differentiated prices for East Malaysia and West Malaysia which reflect the different cost basis.

9.2.42 Edotco further highlighted that some of costs are excluded in the model, which are strengthening and replacement batteries, utilities (water and sewerage), periodic inspection for operations and health and safety, periodic maintenance of rusty bolts, repainting, service for part failure and faults, spare parts, generator testing and maintenance, general and administrative cost includes planning, accounting, legal and human resources, insurance and OSA fees and local council permit fees. Edotco believes that the exclusion of civil and construction costs from the model may result in under-representation of the costs.

9.2.43 Edotco clarified that there is additional in material CAPEX associated, which arises due to additional tenants. Thus, any proposals to apply tenant discount from annualised cost is inappropriate. There is also additional in rental costs due to additional tenants, as the landlords increase the rental costs for particular sites which are shared with additional MNOs. Edotco highlighted that such practice becomes more common now.

9.2.44 Edotco further explained that there is a need for tower companies to ensure the small and medium-sized enterprises ("**SME**") specialising in the business to stay afloat especially with the higher costs and inflation in the country. As such, Edotco is constantly being asked to expedite payments to the SME's contractor/sub-contractor providing mobilisation fee as well as concessions and tenant discounts which will impact Edotco's costs.

9.2.45 Edotco is of the view that these costs need to be included in the costing model, namely Construction Industry Development Board's ("**CIDB**") levy fees, Department of Irrigation and Drainage's fees for land built on top of underground water cable and inspection fee imposed by OSA in Kelantan. Edotco further highlighted that permit fees and charges from the state governments are currently rising.

9.2.46 PPIT commented that regulation of access prices should not apply to SBCs and is of the view that passive infrastructure should not be subjectto regulated prices due to lack of clarity around proposed regulated prices, as the MCMC has indicated in the PI Paper that tower companies/operators are free to offer different configurations or services and reflect this adjustment to the base price in the model. PPIT is of the view that this will inevitably pave the way for potential disputes as there are many variables that could be argued against the standard tower configurations, some of which may not even be able to be modelled.

9.2.47 PPIT clarified that the proposed approach would lead to over emphasis on cost driven by build versus buy decisions. The implementation of price regulation ignites the possibility of selectively choosing to focus on towers that are located in lower cost urban areas.

9.2.48 PPIT acknowledged that the CAPEX and OPEX in constructing and maintaining tower assets in non-urban areas are higher than the average CAPEX and OPEX, which may potentially cause under-expansion of services in those areas. This goes against the spirit of the broader national agenda which aims to increase coverage and last mile access, both of which are highly dependent on infrastructure services being able to penetrate non-urban areas.

9.2.49 PPIT highlighted that most MNOs have decided to scale back on developing their own infrastructure due to administrative burden and economic reasons.

Mandatory access prices modelled at cost recovery level is expected to exacerbate the situation as it would further shift burden of risk from Access Seekers to Access Providers. PPIT added that any downward revision of costs may lead to under recovery of costs which will deter further innovations and investments in the industry. Therefore, PPIT is of the view the SBCs and infrastructure sharing should not be subjected to ex-ante pricing regulation and should be allowed to continue operating on a free market basis.

9.2.50 PPIT commented that it is perplexing where the indicative prices in the PI Report on Review of Access Pricing 2017 was much higher from the indicated price quoted in the current PI Paper. PPIT however acknowledged that the market has been depressed due to the Covid-19, but should the prices be applied, reasonable cost recovery cannot be achieved by tower owners. Besides, the costs incurred and recoverable in the previous Review of Access Pricing 2017 should be similarly recoverable now, but with the reduction, it may take a longer period to recover the costs.

9.2.51 PPIT is concerned that the prices proposed by the MCMC to be intended as indicative prices, and Access Providers and Access Seekers are allowed to offer or agree for a lower or higher price in relation to the proposed prices. PPIT is of the view that such possibilities are not dissimilar to the existing arrangement implemented in the market, and the implementation of the regulated price may result in a major re-organisation in the tower industry.

9.2.52 SDEC proposed separate prices for East Malaysia and West Malaysia due to the impact of averaging the costs incurred using data mainly from the companies located in West Malaysia which is not applicable to Sabah and Sarawak. For instance, Sarawak only has a small number of tower companies compared to West Malaysia.

9.2.53 TM commented that the current commercial prices offered by the tower operators are lower than the MCMC's proposed prices in the PI Paper, which indicates that their costs are in a lower range. TM therefore agreed with the MCMC's view to not regulate the prices for Infrastructure Sharing and proposed maintaining the current arrangement on a commercial basis, as there is no market failure currently.

9.2.54 U Mobile submitted that the indicative prices which assume a single tenant in version 3 of the model are too high. U Mobile suggested the prices to be reduced by 10% to 15%, and the prices for 45 metre tower should also be reduced by 20%.

Discussion

9.2.55 Edotco believes that a number of costs have been omitted from the model. The MCMC would like to clarify that it accepted feedback from stakeholders on the initial version of the model, and then carefully undertook a number of model modifications and refinements. Some of these, such as the inclusion of permit fees, have already been discussed above. Additional modifications included:

(a) The CIDB levy was implemented within the model. This represents 0.125% of construction costs for contracts of over RM500,000;

(b) Cost of gensets was added to the model for lattice towers, monopoles and lampoles (but not for rooftop booms or smart street poles);

(c) Land assessment fees were included in set-up costs; and

(d) Installation costs were confirmed with stakeholders as generally capital in nature and as such were removed as a separate cost item and included within the structure capital costs.

9.2.56 As a result of these modifications the MCMC is confident that the model captures key operating costs, based on available data from stakeholders.

9.2.57 With regard to DNB's points on street furniture, the MCMC was provided with scant data from stakeholders on these structures. This obviously created difficulties for the modelling process. Obtaining benchmark data on these structures from other jurisdictions also proved challenging. The MCMC will revisit the issue of street furniture access and pricing, should issues arise in the market.

9.2.58 Edotco and PPIT expressed concerns about the usefulness of indicative prices, and even indicated that their use may be counter-productive. These concerns emanate largely from the averaging approach employed in the modelling. Edotco, PPIT and SDEC raised particular concerns based on tower location. While the MCMC agrees that geographically differentiated pricing may address some

of the averaging issues, there are a number of other dimensions which it would not capture. Furthermore, on a purely practical level, there was insufficient data provided by stakeholders to support geographically differentiated pricing.

9.2.59 U Mobile suggested that costs based on a single tenant are too high. Again, the MCMC recognises that there are many possible permutations of pricing arrangements with some based on number of tenants. As such it is not possible to reflect all such possibilities within the model. As noted in the PI Paper, indicative per-tenant prices may be derived by applying suitable discounts to the single-tenant price, based on the levels of discount currently applied in the SBC price list.

9.2.60 TM notes that the fact that commercially agreed prices are lower in general than the modelled prices supports the conclusion that there is no market failure. The MCMC welcomes the evidence provided by TM in this regard which supports the MCMC's conclusion that there should be no price regulation of infrastructure sharing services.

9.2.61 The MCMC continues to believe that the modelled prices are suitable as indicative or reference prices. This gives tower companies flexibility to offer or agree prices below the reference price, although, for the avoidance of doubt, this would not affect the MCMC's duties and powers to take action where it identifies that such prices were exclusionary in intention or effect. Should such concerns arise, the MCMC would be likely to seek further cost justification from the tower company concerned.

MCMC's Final Views

9.2.62 The updated cost model provides the following indicative prices for Infrastructure Sharing (Towers) in Table 63 below:

Table 63: Infrastructure Sharing (Towers) Indicative Prices

Structure	Units	2023	2024	2025
Lattice - 45m	RM/year	68,513	72,297	76,342
Lattice - 60m	RM/year	74,296	78,600	83,251
Lattice - 76m	RM/year	80,504	85,367	90,589
Lattice - 90m	RM/year	98,742	105,247	112,258

Question 45:
Do you have any comments on the approach to modelling in-building common antenna systems?

Submissions received

9.2.63 Edotco agreed with the MCMC's view that IBCA system can vary considerably in size and scale and the MCMC is minded to consider any disputes where the MCMC is asked to intervene on a case-by-case basis. Edotco would be pleased to provide supplemental data to the MCMC should any dispute arises. Edotco is of the view that this is the best approach as each IBCA site and project is unique and a customised solution is provided according to the Access Seeker's request.

9.2.64 Edotco clarified that based on review of their recent projects, the average reference costs in the PI Paper are too low and one annualised average price did not address the wide variety of sites. As highlighted by Edotco earlier, each site and project is unique and therefore, Edotco reiterated that the proposed prices in Table 110 in PI Paper are too low.

9.2.65 DNB commented that the MCMC's revised IBCA system annualised costs are averaged over IBCA system, which vary considerably in size and scale. DNB is of the view that the main objective should be to ensure the existing IBCA system is upgraded to provide 5G access so that end users can enjoy 5G seamless coverage both outdoors and in public buildings. DNB proposed the MCMC to conduct a review and analysis on indicative costs for upgrading existing IBCA system to be 5G capable so as to provide greater clarity to DNB, which can minimise the likely grounds for pricing disputes.

9.2.66 Maxis commented that the arrangement on Third-Party operators offering IBCA facilities to the mobile operators may impact the end users due to the exorbitant prices imposed by the Third Party IBCA operator to the Access Seeker. As such, Maxis recommended the MCMC to regulate the prices for IBCA system to avoid possibility and repetition of exorbitant prices imposed by the Third Party IBCA operators, e.g. in KLIA2 to the Access Seekers. Maxis also proposed the MCMC to use the common IBCA prices that is commonly used by the mobile operators for their IBCA facilities.

9.2.67 Further, Maxis suggested the MCMC to undertake sensitivity analysis for the prices of IBCA system provided by the Third-Party Access Provider, in order to avoid the exorbitant charges imposed by the Third-Party Access Provider to the Access Seeker.

9.2.68 MyTV, Altel, Net2One and U Mobile agreed that the model for IBCA system is appropriate and reasonable.

9.2.69 TM clarified that IBCA cost is subject to overall design and number of antennas required in the building which may vary based on build up area. Thus, TM agreed with the MCMC's view not to regulate prices for Infrastructure Sharing and suggested to maintain the current arrangement on a commercial basis as there is no market failure at the moment.

Discussion

9.2.70 MyTV, Altel, Net2One and U Mobile agreed that the model for IBCA systems is appropriate and reasonable, and Edotco and TM noted that costs may vary considerably depending on the particular features involved. Maxis was the only operator which recommended regulation of prices, citing previous experience of unjustifiably high pricing.

9.2.71 The MCMC accepts that there may be wide variation in the size and scale of IBCA facilities with considerable customisation necessary. As such the modelled price should be regarded as indicative only.

MCMC's Final Views

9.2.72 The MCMC is not persuaded that price regulation of IBCA systems is necessary at this stage, but will intervene on a case-by-case basis if and when disputes arise.

Table 64: Infrastructure Sharing (In-Building Common Antenna System) Indicative Prices

Site	Units	2023	2024	2025
IBCA - owned	RM/year	128,701	129,934	131,191
IBCA - leased	RM/year	92,240	93,809	95,409

10. Digital Terrestrial Television (DTT) Broadcasting service

10.1. Overview

The MCMC developed a bottom-up cost model for the new DTT broadcasting service using tilted annuities as the annualisation method. The cost model with all commercially confidential data removed was made available on request to interested licensees during the PI period.

Part H of the PI Paper concerned the DTT broadcasting service. Section 21 of the PI Paper described the DTT model, including treatment of High Definition, Standard Definition and radio channels, channel take-up and costs, and sought comment on the modelling approach.

The MCMC proposed to set regulated prices for the DTT service.

10.2. Summary of submissions received

Question 46:

Do you have any comments on the approach to the modelling of the DTTB multiplex costs?

Submissions received

10.3.1 MyTV asserted that the suitable hybrid model should be based on OPEX-based model with 30 years' concession, in which ROI and payback period are crucial determining factors. This approach is based on the stand taken by the Government through the MCMC when digitalisation of broadcasting landscape was decided in year 2012. MyTV is of the view that calculation of costs should take into account MyTV's DBP that submitted to the MCMC in year 2019 to ensure consistency.

10.3.2 MyTV submitted that the price reductions up to 80% after three years of service are unreasonable, given the high sunk cost of the industry, and it will make the project becomes unfeasible due to very long ROI.

10.3.3 MyTV further commented that the MCMC should draw clear reference to the source of those benchmarking/assumptions, i.e. which market/country that was

benchmarked against. This reference will ensure the regulatory process remains transparent to the industry and the public. MyTV added that economic characteristics of the service in Malaysia should be elaborated further, which includes consideration on broadcasting industry's practice in Malaysia. In the broadcasting industry, the broadcasters lease sites or towers as it is more efficient to lease the existing sites as compared to building its own infrastructure.

10.3.4 MyTV is not agreeable with the MCMC's views, which stated channel demand is limited to existing replacement of analogue. MyTV clarified that demands beyond the said replacement are forecasted to increase, especially for HD, based on the emergence of new digital broadcasters. Thus, MyTV disagreed with the number of demands for medium take-up scenario suggested in the PI Paper and they are constant for the three-year regulatory duration. MyTV emphasized that it is important to ensure the number of channel demands are appropriate as it entails the number of multiplex used by a DTT service provider.

10.3.5 MyTV highlighted there are number of discrepancies that have vitally affected the overall calculation. For instance, MyTV has rolled out 46 distribution sites in Malaysia. Out of the 46 sites, MyTV has sites that are using 100% satellite for its distribution network and 31 out of the 32 STM-1 distributed sites are also supported with satellite network as back up. However, calculation in the PI Paper assumed that the distribution cost was based on only 32 sites, without any satellite network. MyTV commented that the cost for distribution network does not reflect the current situation of DTT landscape in Malaysia, as STM-1 distribution network is only one part of the whole distribution network for DTT. The cost of this satellite distribution network was also not factored into the total calculation. As such, MyTV is concerned on the great difference between the cost per channel calculated in this exercise and MyTV's actual cost.

10.3.6 MyTV has also provided to the MCMC on their actual costs in comparison with the MCMC's existing formulas/costing methodology, which includes inputs on demand, cost input, network input, network dimensioning and OPEX.

10.3.7 XOX suggested to maintain an open channel for revision, should MyTV or broadcasters propose a different approach from the current average cost pricing which is more likely to maximise the consumer's welfare.

Discussion

10.3.8 The MCMC thanks stakeholders for their submissions and the provision of additional data for the DTTB model.

10.3.9 The MCMC is aware that MyTV's actual business model consists of significant outsourcing, and therefore understands the argument put forward by MyTV that an OPEX-based model could better reflect its current commercial position. The MCMC is tasked with ensuring recovery of reasonably efficiently incurred costs with a reasonable rate of return on capital employed. It must simultaneously promote economic efficiency in investment decisions, encompassing incentives for Access Providers to reduce costs and improve efficiency, encouraging innovation and ensuring the right build/buy decisions are made. Thus the starting point is the current capital and operational costs of a hypothetical operator providing the regulated services, using a bottom-up approach. While the actual costs of service providers form an input to this process, it is important for the MCMC to incorporate efficient / forward-looking costs in the model.

10.3.10 With respect to comments by MyTV regarding the MCMC's estimated 80% price reductions, the MCMC notes that the model has been further refined using the additional data provided. As such the estimated price reductions from the model are significantly lower than 80%. In addition, glide paths have been introduced to avoid price shocks.

10.3.11 MyTV sought further clarification of sources of benchmarks and assumptions which have been used in the model, and emphasized the importance of local market conditions. The MCMC confirms that some unit costs, including transmitter costs, satellite terminals and encoders, were sourced from vendors. The MCMC believes that hardware costs, such as those for TV broadcasting transmitters and satellite terminals, are not subject to significant variance across markets. This applies also to satellite capacity from GEO/MEO satellite which typically costs between USD150-350 per Mbit/s depending on contract duration, dish size and amount of capacity. Data provided by MyTV at the start of modelling lacked sufficient granularity to build a bottom-up model. Therefore, sourcing cost data from vendors and service providers was unavoidable. These units costs have been refined in the final model, taking into account the most recent input from MyTV.

10.3.12 The costs that are market dependent are either sourced from MyTV or from the Malaysian market. The revised and final model both assume that infrastructure, such as sites and towers, are leased rather than built. Lease costs are based on results from infrastructure sharing and co-location models that were developed concurrently with this model.

10.3.13 The MCMC has noted additional information provided for model demand scenarios. The MCMC confirms that the demand scenario used to produce regulated prices is now based on these demand assumptions provided by MyTV.

10.3.14 With respect to the number of distribution sites, the revised model already includes the cost for satellite terminals at 31 distribution sites. The cost of capacity in the final models has been updated to carry the traffic of up to two STM-1 links at the same time in case of a failure. This is essentially more than the capacity contracted by MyTV. It is important to note that the terrestrial distribution cost has also been doubled to account for 1+1 path redundancy.

10.3.15 The MCMC welcomes the information and detailed model comments provided by MyTV on demand, cost input, network input, network dimensioning and OPEX. This information has been used to update some of the inputs of the final model.

MCMC's final views

10.3.16 The MCMC confirms that it will apply the approach to the modelling of the DTTB multiplex costs which has been used in the PI Paper.

10.3.17 The MCMC confirms that additional input and data from stakeholders has been reviewed and applied where appropriate in the final cost model.

Question 47:

Do you have any comments on the proposed DTTB regulated services and prices?

Submissions received

10.3.18 MyTV is of the view that the proposed access prices fail to reflect the legitimate costs of a DTT service provider has incurred in Malaysia. MyTV commented that the development on the costing methodology shall be based on concession and

OPEX-based analysis to best reflect the situation of DTT service in the Malaysia, and it is crucial to show an effective operator's ROI and implications on payback period in the proposed access prices for DTTB.

10.3.19 MyTV believes that applying an infrastructure sharing approach is not alien as it is a common practice in other jurisdictions. MyTV explained ITU has acknowledged that in general, there is a need to find balance between optimised and efficient networks, and incurring additional costs. The majority of networks in countries which have introduced DTTB have relied to a large extent on reusing existing infrastructure already used for analogue TV. MyTV agreed with OECD's statement, in which ex-ante regulation can create barriers to expand as it can distort the choice of technologies that are explored and adopted.

10.3.20 MyTV emphasized that the price regulation should address the current situation in Malaysia with underlying background and issues. Even though it was stated that the costing approach was similar to the approach in PI on Review of Access Pricing 2017, the current proposed price for DTTB resulted a significant reduction between 66% to 80% for HD channel and SD channel respectively, which MyTV perceived to be unreasonable.

10.3.21 MyTV is of the view that an efficient DTT operator in Malaysia would not take less than four years to be able to offer the service by the said reduction of more than 60% from the previous access prices, as the analogue switch-off was only executed in year 2019.

10.3.22 MyTV further highlighted that in the previous PI Report on Review of Access Pricing 2017, the MCMC has removed the reference to SD or HD channels and replaced them with two-part structure of a fixed channel and a variable bandwidth cost. MYTV agreed with the MCMC's previous final view in year 2017 that it accommodates the needs of newer broadcasters who may be buying by number of channels and incumbent like Media Prima who may be interested to buy a multiplex. MYTV however views that the current proposed structure of the access price does not offer the flexibility, even though price per Mbit/s is provided. The calculation of bandwidth which is lower than SD or in between SD and HD are unable to be offered to the broadcasters as the cost per channel is unavailable. Hence, MyTV reiterated that the cost structure for DTT service should remain as per current MSAP for clarity and flexibility.

10.3.23 MyTV commented that the channel price has reduced significantly due to the inappropriate calculation of the OPEX, as cost for distribution and contribution network are not properly calculated and some parameters used were too low and illogical, i.e. cost per transmitter was quoted at RM220,000 per transmitter. MyTV clarified that they are unable to offer the access price to broadcasters to sustain its position in the industry, if the final access price for DTTB is far too low as compared to MyTV's cost base price. MyTV added that reasonable cost-based prices will be commercially negotiated where broadcasters are able to enjoy the service and MyTV may have appropriate returns.

10.3.24 XOX recommended the MCMC to review the regulated prices biennially up to year 2025, as the adoption rate of Ultra High Definition could be different from the projection.

Discussion

10.3.25 Regarding MyTV's comments on infrastructure sharing, the MCMC believes that sharing of passive infrastructure is essential to reduce barriers for expanding services. However, re-using existing active infrastructure is neither realistic nor sustainable. Transmission technologies such as Synchronous Digital Hierarchy / Synchronous optical Networking are considered legacy. It is questionable whether the network can be maintained in the long term. As such, a switch over to modern transmission technologies is expected in the foreseeable future. The MCMC believes that the model should be forward looking in this regard.

10.3.26 The MCMC notes the view expressed by MyTV that an efficient DTT operator in Malaysia would not take less than four years to be able to offer the service by the said reduction of more than 60% from the previous access prices. The MCMC understands from this comment that a significant cost reduction by MyTV is feasible over the regulatory period. The MCMC believes that applying glide path to the new prices may ensure a reasonable cost recovery over the modelling period.

10.3.27 MyTV requested that the cost structure for the DTT Broadcasting service should remain as per the current MSAP for clarity and flexibility. The MCMC acknowledges the fact that pricing by channel type does not provide sufficient flexibility as broadcasters may use different encoding standards for their channels. As such, the MCMC agrees to represent the cost in terms of channels

and Mbit/s. It is important to note that while channel cost have reduced significantly, the cost of Mbit/s has increased. This results from revising the way in which the costs are allocated to traffic-driven and site-driven costs. However, the combined cost of channel and capacity for SD, HD and radio remains comparable to current prices.

10.3.28 MyTV expressed concern about the calculation of the OPEX and various cost assumptions. The cost of transmitters and antennas has been updated in the final model to reflect MyTV's actual cost. However, the MCMC notes that satellite and terrestrial transmission costs paid by MyTV are relatively high. The MCMC is of the view that transmission costs based on regulated transmission prices and more reasonable satellite costs are necessary to incentivise efficient business operation.

MCMC's Final Views

10.3.29 The MCMC confirms that the final DTT Broadcasting prices have been derived following careful consideration and use (where appropriate) of the additional information and views provided by stakeholders.

10.3.30 For the avoidance of doubt, the MCMC has calculated the cost of a service which consists of the channel charge plus the cost of bandwidth (BW) as follows:

Channel price = channel charge (RM) + BW charge (RM/Mbps) X channel BW (Mbps)
For example, providing a SD TV channel with 2 Mbps bandwidth in 2025 will cost:
SD price = 1,028,018 (RM) + 812,377 (RM/Mbps) X 2Mbps = 2,652,772 RM/year

10.3.31 The MCMC confirms that the final regulated prices for DTT Broadcasting are shown in the Table 65 below. The MCMC has applied glide paths in reaching these final prices.

10.3.32 For transparency, the MCMC has also provided the modelled prices without glide paths in Table 66 below.

Table 65: Digital Terrestrial Broadcasting Multiplexing Final Prices

	Units	2023	2024	2025
Channel charge (per channel)	RM/year	4,876,006	2,952,012	1,028,018
Bandwidth charge (per 1 Mbit/s)	RM/year	466,126	639,251	812,377

Table 66: Digital Terrestrial Broadcasting Multiplexing Modelled Prices without Glide Paths

	Units	2023	2024	2025
Channel charge (per channel)	RM/year	1,130,482	1,058,413	1,028,018
Bandwidth charge (per 1 Mbit/s)	RM/year	1,112,970	923,354	812,377

11. Next Steps

This section identifies the next steps in the regulatory process following on from this PI Report and the subsequent Commission Determination on Mandatory Standard on Access Pricing (MSAP) ("**the Determination**").

The impact of the Determination on the Access Agreements currently in place between operators are anticipated to be as follows:

- All Access Agreements shall be amended as soon as practicable to comply with the Determination and shall be submitted for registration by the MCMC as required under section 150 of the CMA.
- Parties to Access Agreements shall apply the access prices in the Determination once the Determination comes into effect.

Any service provider that offers the regulated facilities or services in the Determination must modify its RAO no later than 6 months from the Effective Date of the MSA.

MCMC

16 February 2023