



Malaysian Communications and Multimedia Commission

Public Inquiry Report

Review of Access Pricing

20 December 2017

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

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SUMMARY OF MCMC’s FINAL VIEWS ON ACCESS PRICES

In this Public Inquiry 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 PI Paper (issued on 6 October 2017).

The PI Paper set out the MCMC’s preliminary views on the regulation of access pricing and invited comments in response to 32 general and specific questions. After consideration of the submissions received in response to the PI Paper as presented below in this 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
Mobile Network Origination Service	Price regulation
Mobile Network Termination Service	Price regulation
Interconnect Link Service	Price regulation
Wholesale Local Leased Circuit Service	Price regulation
Infrastructure Sharing	No price regulation
Domestic Connectivity to International Services	Price regulation
Network Co-Location Service	No price regulation
Full Access Service	No price regulation
Line Sharing Service	No price regulation
Bitstream Services, including (a) Bitstream with Network Service and (b) Bitstream without Network Service	No price regulation
Sub-loop Service	No price regulation
Digital Subscriber Line Resale Service	No price regulation
Digital Terrestrial Broadcasting Multiplexing Service	Price regulation

Service	MCMC's final view
Wholesale Line Rental Service	No price regulation
Layer 2 HSBB Network Service with QoS	Price regulation
Trunk Transmission Service	Price regulation
Duct and Manhole Access	Price regulation
Layer 3 HSBB Network Service	Price regulation
End-to-End Transmission Service	Price regulation
MVNO Access	No price regulation

1. Introduction

1.1. Public Inquiry Process

In its Public Inquiry Paper on the Review of Access Pricing (PI Paper) issued on 6 October 2017, the 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 2018 to 2020. 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 32 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 Monday 20th November 2017.

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 4 January 2018, 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 2018 to 2020.

1.3. Consultation process

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

- (a) informal consultation with a broad range of licensees prior to the release of the PI Paper, as set out in Section 1 of the PI Paper;

- (b) presentation of the economic cost models to licensees during June 2017 and consideration of comments received;
- (c) publication of the PI Paper on 6 October 2017 and a request for comment, including publicity on the MCMC website;
- (d) making available on request public versions of the economic cost models used in determining the proposed prices in the PI Paper; and
- (e) clarifications in response to stakeholders in relation to specific items raised in the PI Paper during the consultation period.

1.4. Submissions received

At the close of the Public Inquiry period at 12.00 noon on 20 November 2017, the MCMC had received written submissions from the following parties.

No.	Submitting party	Documents
1.	Altel Communications Sdn Bhd (Altel)	1 submission (12 pages)
2.	Asia Pacific Carriers Coalition	1 submission (19 pages)
3.	Celcom Axiata Berhad (Celcom)	1 submission (69 pages)
4.	Digi Telecommunications Sdn Bhd (Digi)	1 submission (25 pages)
5.	edotco Malaysia Sdn Bhd (edotco)	1 submission (21 pages)
6.	Fibrecomm Network (Malaysia) Sdn Bhd (Fibrecomm)	1 submission (2 pages)
7.	Maxis Berhad (Maxis)	1 submission (85 pages)
8.	Media Prima Berhad (Media Prima)	1 submission (5 pages)
9.	MYTV Broadcasting Sdn Bhd (MYTV)	1 submission (22 pages)
10.	Persatuan Penyedia Infrastruktur Telekomunikasi Malaysia (PPIT)	1 submission financial (31 pages) 1 submission legal and Regulatory (10 pages) Annexure A (36 pages) Annexure B (39 pages) Annexure C (36 pages)
11.	Sacofa Sdn Bhd (Sacofa)	1 submission (7 pages)
12.	TT dotcom Sdn Bhd (TIME)	1 submission (5 pages)
13.	Telekom Malaysia Berhad (TM)	1 submission confidential (68 pages)

No.	Submitting party	Documents
		1 submission non-confidential (68 pages)
14.	U Mobile Sdn Bhd (U Mobile)	1 submission (8 pages)
15.	webe Digital Sdn Bhd (webe)	1 submission (9 pages)
16.	YTL Communications Sdn Bhd (YTL)	1 submission (10 pages)

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 32 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: Mobile Virtual Network Operators (MVNOs)

Section 5: Weighted Average Cost of Capital (WACC)

Section 6: Fixed Services

Section 7: Mobile Services

Section 8: Infrastructure Sharing

Section 9: Digital Terrestrial Broadcasting Multiplexing Service

Section 10: Next Steps

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

Altel, APCC, Celcom, Digi, Maxis, Sacofa, TM, U Mobile, webe and YTL believe that the criteria for ex-ante determination of access prices remain appropriate, while PPIT disagreed with the MCMC's reasoning for establishing ex-ante regulation.

APCC pointed out that the criteria test used by the MCMC for determination of ex-ante prices is also the test applied by the European Commission and Ofcom. They believe that the inclusion of non-transitory and high barriers to entry is necessary because the facilities and services in the Access List are generally services which have high prices due to inherent monopolies. This is particularly so for the provision of core network facilities where a state sanctioned monopoly has been appointed. In such instances, regulatory intervention is crucial. APCC also agreed to the inclusion of "where there is no trend towards effective competition" as a criterion for ex-ante regulation. This is especially true in Malaysia which imposes high foreign equity restrictions as a condition for acquiring licences.

Celcom supports the position in the PI Paper that emphasises preference for commercial negotiations over regulatory intervention. Only in cases where commercial negotiations result in undesirable outcomes, maximum price regulation is needed. Celcom pointed out

that there have been various successful commercial negotiations for MVNO Access, Infrastructure Sharing, Duct Sharing and RAN Sharing on a reciprocal basis. In the mobile market, Celcom recommends regulation only for mobile termination. However, in the fixed market, obtaining access to facilities such as duct and manhole and high speed broadband service have been challenging and warrant ex-ante price regulation.

Digi is of the view that setting maximum prices for essential facilities in the Access List would help provide commercial certainty in the market and aid commercial negotiations. Regulatory intervention in the form of ex-ante regulation is significant in the case of essential facilities or services with high barriers to entry, when market structures do not tend towards effective competition or where ex-post regulation is insufficient to adequately address the identified market failure. This is particularly important for wholesale services such as termination, transmission-related services, fixed access services, line sharing services, HSBB services and bitstream services.

Maxis highlighted that in the fixed broadband market, the incumbent operator holds a strong market share and has full control of all the essential facilities and/or services. Therefore, there are key risks that the Access Provider may deliberately prolong commercial negotiations in order to protect its market share and to gain unfair first mover advantage. Such a situation makes it difficult for the Access Seeker to become competitive and ex-post intervention may not be sufficient. However, in competitive markets like mobile services, commercial negotiation should continue and ex-ante regulation for services such as MVNO access is not appropriate.

MYTV understands the objective of price regulation and the MCMC's role to safeguard public interest and promote competition. However, MYTV views that the DTT services are to be provided by MYTV to broadcasters or CASPs only and does not affect the general public. MYTV opines that the MCMC's intervention to regulate prices to ensure terms and conditions are reasonable will create a stifling business environment to both MYTV and CASPs. Instead, MYTV and CASPs should be allowed to engage in commercial negotiations as MYTV and CASPs may have different commercial interests from one another. MYTV highlighted that DTT services are their only source of income, while CASPs have multiple sources such as advertisements, sponsorships, pay TV subscriptions and content royalty fees, which they enjoy without any intervention on prices. MYTV also has to contend with commercial negotiations with TM as the service is not subject to price regulation. On the one hand, MYTV is hampered with high commercial costs from TM, while on the other hand, its revenue is suppressed with price regulation. MYTV pointed out that the terms and conditions, including prices of other licensees such as Measat Broadcast Network System and TM Net are not subject to any regulation and MYTV believes that they should be accorded the same treatment. In conclusion, MYTV indicated its preference for commercial negotiations.

PPIT is of the view that the MCMC's approach in using the market dominance study carried out in 2014 to invoke price regulation is not just and equitable as only four out of thirteen state backed companies (SBCs) were found to be dominant. SBCs have been promoting sharing of infrastructure on an equal and non-discriminatory basis. Even the dominant SBCs such as Sacofa have adopted a collaborative approach when it comes to commercial dealings. PPIT also pointed out that the MCMC has failed to consider the countervailing buyer power of the telcos. PPIT also highlighted that no other country in the world has deemed it appropriate to mandate prices. PPIT cited countries such as India, New Zealand, USA, Hong Kong and Brazil, Sweden, France, Singapore, Norway, Germany, Jordan, the Netherlands, China and Canada as examples of countries that have not mandated prices.

TIME highlighted that while the rationale for ex-ante regulation remains, the industry continues to be burdened as the costs do not reflect specific Access Provider's costs, especially WACC. Industry also submits reports on Accounting Separation that provide the MCMC with detailed information as to whether there is price discrimination and there are statutory provisions that prohibit tying and linking. As such, the MCMC is urged to review its access instrument vis-à-vis the regulatory burden it imposes onto the industry players.

TM noted that the intent of ex-ante regulation is to produce prices consistent with a competitive market. As such, any calculations should be forward-looking rather than backward-looking.

webe believes that it is important that the costing exercise considers all aspects of cost and impact. The pricing should not deprive the desire for investment and should continue to encourage service providers to invest in network expansion. At the same time, careful measures are required to reduce investment redundancy and enhance competition to increase network efficiency.

YTL supports ex-ante regulation as Access Providers sometimes delay negotiations by imposing requirements on small operators to place large orders or specify minimum or guaranteed quantities.

Discussion

The MCMC has considered carefully the comments and issues raised by the respondents to the PI Paper. The responses have assisted in confirming and clarifying the principles that should apply to the setting of prices for the services in the Access List.

With all ex-ante regulatory price controls, a balance needs to be struck between the needs of end users and the needs of service providers. At this point in time, the more rapid

increase in demand for data services with a consequential reduction in demand for voice services needs to be recognised. The MCMC believes that it has used its best endeavours in striking the appropriate balance between the differing needs throughout this process.

The MCMC notes the comments from respondents regarding the criteria for the imposition of ex-ante regulation and the general agreement that the criteria for ex-ante determination of access prices remain appropriate. The MCMC recognises the desire for agreements to be reached through commercial negotiations where this is possible; however, the overall objective of imposing regulatory remedies where market failure is identified is supported by the proposed criteria:

- (a) Presence of high barriers to entry; and
- (b) Absence of a trend towards effective competition.

The MCMC therefore feels that it is important to impose ex-ante price regulation on the services in the Access List which meet these criteria.

In response to Celcom's concerns, the MCMC notes that not all operators, especially the smaller ones which do not own infrastructure and duct, would be in a position to enter into reciprocal arrangements concerning Infrastructure Sharing, Duct Sharing and RAN Sharing. In consideration of comments from TIME, TM and webe, the MCMC agrees that the forward-looking costs of a reasonably efficient operator are the most appropriate and this is why the LRIC+ costing methodology has been chosen and appropriate WACCs determined.

PPIT's concerns that the use of the market dominance study carried out in 2014 to invoke price regulation is not just and equitable, there is a countervailing buyer power of the telcos and that dominant SBCs have adopted a collaborative approach to commercial arrangements are well noted by the MCMC, as well as the information about countries where no such price regulation is imposed.

The MCMC notes MYTV's concerns about its position in the market and its inability to secure alternative revenue streams. However, the DTT broadcast service meets the key criteria identified, and as such, the MCMC believes that there is a clear need for price regulation.

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

All submissions, with the exception of TIME have expressed support for the approach to pricing that has been adopted by the MCMC.

APCC agrees with the establishment of price ceilings via regulated price control and it does not believe that ex-post remedies will be sufficient. APCC also supports the MCMC's approach in balancing the principles of appropriate cost recovery and the need to promote economic efficiency in investments.

Celcom is in broad agreement with the criteria proposed by the MCMC but pointed out the models may not have achieved these objectives.

In respect of the fixed model, despite the stated objectives, Celcom noted a number of characteristics which run contrary to the objectives as follows:

- (a) The access network has not been optimised sufficiently. The MCMC has used actual data provided by the incumbent instead of estimating the costs of an efficient operator;
- (b) For certain services, there is a limited scope for market entry and results in unjustifiably high prices for access seekers and end users;
- (c) There is an understatement of demand growth for broadband services and this may result in misallocation in costs and result in inefficient and distortive pricing;
- (d) There is a lack of clarity on categories of cost included in determining charges and this hinders the consultation process, which is essential to ensure a fair outcome; and
- (e) Some of the charges are higher than the current charges and no explanation has been provided. Celcom cited interconnect links as an example.

In respect of the mobile model, Celcom is concerned with the large number of conceptual, technical, mathematical and referencing errors in the model. There appears to be no process for an independent check of the models.

Digi highlighted that it is exceptionally important that the information data used to derive the wholesale prices reflect reasonable costs. This will ensure the long-term interest of customers and send a positive encouragement to the mobile industry to continue its interests for investment and reinvestment.

Maxis believes that the adopted principles should lead to a level of proposed prices by the MCMC that is workable within the industry and will benefit the Access Seekers and ultimately promote the Long-Term Benefit of End Users. Maxis welcomed the MCMC's

explanation that stranded and legacy assets have been excluded from the fixed model. However, Maxis is of the view that the proposed regulated prices for services such as Fixed Termination, End-to-End Transmission and HSBB Services are still too high. Maxis pointed out that the proposed regulated price for Layer 3 for HSBB Network Service with Network Service is higher than the retail price offered by TM and End-to-End Transmission prices are higher than market prices in Malaysia. Maxis proposed that if the cost models do not produce workable regulated prices, the MCMC should consider a retail minus approach.

While PPIT agreed with the criteria in the PI Paper, they believe that proposing regulation solely based on a market dominance study is inappropriate. They also highlighted that on average, passive infrastructure leasing costs only comprise about 6% of the local operator's operating costs and price regulation is not going to have a material impact to consumers. PPIT also pointed out that SBCs are required to publish Reference Access offers (RAO) and they have been negotiating commercially. To date, there has not been any significant disputes or arbitration required to mediate any commercial misalignment. SBCs have also maintained Access Agreements and Master Licence Agreements that are transparent and fair to all access seekers. Since 2005, there have not been any major price revisions in spite of rising costs of infrastructure provision and maintenance. In addition, discounts are granted for telcos whose agreements have entered into their 8th years and there is an ongoing negotiation for additional discounts for post 10th year's commercial terms. PPIT vehemently disagreed with the comments in the PI Paper that unreasonable price terms and conditions could potentially force telcos to exercise market power.

TIME pointed out that the approach adopted by the MCMC is not appropriate and proposed that the MCMC takes into consideration other factors such as types of technology, size of bandwidth, contract tenure and volume purchased.

TM requested the MCMC to be mindful of ensuring incentives are maintained for efficient long-term investment. TM highlighted that the type of investment undertaken by fixed operators are typically capital intensive, involving significant proportions of long-lived assets. To embark on such projects, fixed operators must have confidence that they will achieve a fair rate of returns over time. TM pointed out that the MCMC has altered its approach to costing wholesale access services over the last three regulatory periods and this led to uncertainty and has resulted in TM not recovering its cost in the medium to long-term.

webe opines that it is important to consider the latest technology employed when deriving dynamic efficiency to motivate service providers to adopt the latest available technology.

YTL believes that the discrepancy between on-net and off-net pricing has a tendency of confining users to larger networks with bigger customer base. Hence, an adjustment would encourage users to switch to networks that currently have smaller base.

Discussion

The MCMC notes the agreement of almost all respondents to the proposals that the regulated prices should be based on the key criteria of:

- (a) Appropriate Cost Recovery; and
- (b) Promotion of Economic Efficiency in Investments.

The MCMC notes Celcom's comments regarding the fixed network model but confirms that the data used within the model has not been taken at face value from TM and has been subject to variations to bring it in line with the expectations for an efficient fixed network operator. This applies to actual costs including the exclusion of legacy assets, price trends, service volumes, service volume forecasts and international benchmarks, where appropriate. The comments from Celcom and Maxis regarding proposed regulated prices being higher than current prices are dealt with in connection with individual services later in this PI Report. The MCMC notes Celcom's comments about errors within the mobile model and also deals with these specifically later in this PI Report.

In response to TIME's comments that regulated prices should reflect issues such as types of technology, size of bandwidth, contract tenure and volume purchased, the MCMC considers that the use of the LRIC+ costing methodology adopted calculates the costs of an efficient operator using the most appropriate forward-looking technology to calculate the costs of services. Such costs should therefore be applied on a non-discriminatory basis and not subject to discounts based on contract duration of volumes purchased.

The costing methodology adopted by the MCMC at each stage of implementing regulatory price controls aims to permit appropriate cost recovery over the implementation period. The move to the LRIC+ methodology for the wholesale Access Network Services should therefore continue to support the necessary long-term investment decisions of TM or other network operators.

The MCMC acknowledges the comments from PPIT regarding the successful use of commercial negotiations and agreements, long-term price stability as well as the lack of disputes or need for arbitration.

The impact of on-net and off-net tariffs in mobile networks is recognised as a reason for customers to be attracted to larger networks as noted by YTL. The MCMC believes that

adoption of LRIC+ termination rates will help to bring all services' prices in line with costs and help to reduce such discrepancies.

Question 3:

Do you have any comments on the appropriateness of setting regulated prices for the period up to and including 2020?

Submissions received

The views about setting regulated prices for three years' time horizon were divided. On the one hand, some operators agreed with the three-year time horizon and cited the fast evolving technology and business and regulatory certainty as reasons for maintaining the three-year period. On the other hand, TIME and YTL proposed a 5-year time horizon, while one operator proposed a six-year time horizon.

APCC submitted that the three-year period is in line with best practices and suggested that the MCMC should expressly maintain the option to intervene before the end of the three-year period if the situation calls for it.

Celcom said that it is in broad agreement with the proposed time horizon if the MCMC would consider a shallow glide path of the rates as this would soften the impact on industry. Celcom expressed support for the MCMC's decision to change the depreciation method from economic depreciation to tilted annuity. Celcom also stated that setting prices up to 2020 requires reasonable forecast and expressed dissatisfaction over the use of dummy data in the fixed model.

Maxis agreed with the three-year time horizon but proposed another alternative of a six-year time horizon as it will provide longer certainty for network operators and services providers. Maxis also proposed to include a caveat in MSAP that the regulated prices will continue to apply in the event that MSAP expires before a new determination is issued by the MCMC.

PPIT believes that the time horizon proposed by the MCMC is short and unreasonable and requested a longer time horizon. A refresh of price estimates over a short period would compel SBCs and other tower operators to adjust their prices depending on current cost structures. The increased investment towards more innovative and environmentally friendly passive infrastructure such as bamboo towers and carbon fibres could well reduce the current costs of SBCs in the future, resulting in under-recovery of committed historical costs.

PPIT also pointed out that a CAPEX intensive business model takes a longer payback period of around 8 to 10 years. Therefore, the rate of return for telecommunications towers is rarely calculated at a short period of three years. SBCs have generally been using seven years as its basis for rate of return. The towers are predominantly passive infrastructure and their cost elements will not have meaningful variations, except in instances involving the land the tower is built on. The common business model for telecommunications towers is 10 years or more. The licence agreements between SBCs and mobile operators have 8 to 10 years' tenure.

TIME proposed a validity period of at least five years as it has been the MCMC's practice in the past to extend the timeline of MSAP. TIME also believes that the three-year time horizon could affect the company's overall business and affect investors' view of the telecommunications industry.

TM agrees with the three-year period and highlighted that some regulators reset prices annually. Since regulatory prices are based on demand forecasts, major discrepancies between actual and forecast can lead to inefficient pricing that will undermine the regulatory objectives. TM believes that the MCMC should progressively move towards non-price regulation for competitive services such as competitive transmission routes.

YTL believes that a five-year period may be more appropriate as the revisions of RAO and execution of access agreements take time. For services that are subject to fast evolving technology, a glide path or scale rates would be appropriate.

U Mobile suggested that the proposed mobile termination rates for 2018 be applied retrospectively.

Discussion

The MCMC recognises the differing views from the respondents but needs to balance the impact of the more rapidly changing technologies with the need for long-term stability within the sector. At this point in time, the MCMC believes that the potential impact of changes in customer behaviour and demand for services means that a three-year regulatory period is more realistic and will mitigate concerns expressed about the accuracy of forecasts in the trends for voice and data services in both the fixed and mobile networks in Malaysia.

The comments from PPIT regarding the longer term investment programmes associated with the provision of tower services are noted; but the MCMC believes that such long-term requirements can be accommodated, even if the current price regulation only covers a three-year period, primarily to cater for the demand driven services.

The proposal from Celcom for a shallower glide path would lead to ongoing over-recovery of costs by the mobile operators and therefore not an arrangement which the MCMC would support. Similarly, the proposal by U Mobile for the rates to be applied retrospectively does not follow international practice and presents unforeseen financial obligations on all operators across the industry.

On balance, the MCMC believes that the three-year time horizon presents the most appropriate time horizon given the uncertainties highlighted by respondents.

2.3. MCMC's final view

The MCMC is convinced that the criteria that was used for access pricing continue to be relevant. In addition, the MCMC continues to view that it is appropriate to set regulated prices until 2020

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 FAC, LRIC, LRIC+, pure LRIC, SAC and Step-by-Step. It proposed the continued use of LRIC with common cost mark-up (LRIC+) as the basis for setting prices for fixed core and 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 access 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, HSBB and USP subsidies and installation charges.

3.2. Summary of submissions received

Question 4:

Do you have any further comments on the proposed costing methodologies?

Submissions received

Celcom proposed that the MCMC use a step-by-step approach that was previously adopted for the fixed access network. The bottom-up approach is appropriate only for contestable elements of networks where there is a prospect of entry from an actual or potential competitor as it sends the right build or buy signal. For non-contestable network elements, a top-down approach should be used with prices based on historical cost. The bottom-up approach adopted by the MCMC should adjust for any windfall gains which arise as a result of moving from a top-down historical cost model to a bottom-up CCA model using tilted annuities. Since a large proportion of the incumbent's assets are old, it means that moving

from an accounting approach to tilted annuities will allow the incumbent to over-recover its costs.

Celcom noted that the MCMC had excluded the fully-depreciated assets. However, apart from that, no other adjustments have been made. Celcom views that adjusting only for fully-depreciated assets is insufficient.

Celcom pointed out some inaccuracies in the PI Paper. The MCMC had stated that Ofcom had used Stand Alone Costs in the UK, when in actual fact Ofcom had used Distributed Stand Alone Costs. The PI Paper also stated that regulators do not use top-down modelling of regulated firms. While it is true that regulators do not build top-down models, some regulators have used, with modifications, the output from top-down models to set charges in the access network.

Celcom supports the MCMC's use of LRIC+ instead of pure LRIC.

Digi is of the view that BULRIC+ is the appropriate costing methodology for fixed and mobile interconnection services. There is a range of benefits of LRIC+, including allowing efficient access providers to fully recover the costs of providing services and promoting legitimate business interests of the providers. The outcome from this approach will enable the mobile operators to invest and reinvest to expand coverage and ensure service reliability and data quality.

Digi considers BULRIC+ to be more appropriate for the fixed access network as compared to the Regulatory Asset Base approach. However, since the fixed model was populated with dummy data, Digi found it challenging to analyse and provide valuable feedback as it was unable to verify model calculations and comment on the reasonableness of forecast assumptions.

On Infrastructure Sharing, Digi agrees with the MCMC's views that the different models in which the infrastructure may be shared requires different treatment. Digi also supported the inclusion of "infrastructure to be shared by a stand-alone business" into the Access Pricing as it will ensure cost-based wholesale prices and avoid excessive prices that will be detrimental to the long-term interest of customers.

Maxis fully supports the use of the LRIC+ methodology for mobile services, as it provides a reasonable balance between ensuring that the Access Seekers pay only for the costs incurred by a reasonably efficient operator. LRIC+ is suitable in the Malaysian context as it allows for the mark-up of fixed and common cost. European Regulators prefer pure LRIC as historically, mobile termination prices have been significantly higher than the rates in Malaysia.

Maxis also supported the use of LRIC+ for fixed services. However, concern was raised about the output of the Fixed Core model which is still high compared to other countries, particularly the European countries such as UK, the Netherlands, Belgium, Germany and Spain. Maxis also benchmarked fixed termination rates against mobile termination rates and pointed out that in other countries such as Switzerland, Oman, Saudi Arabia, New Zealand, Indonesia, Australia, Germany, Spain, Belgium, the Netherlands and the UK, fixed termination prices are usually significantly lower than mobile termination rates. This contrasts starkly with the situation in Malaysia.

Maxis highlighted that the proposed regulated prices for Layer 3 HSBB Network Service with Network Service are substantially high and are close to TM's retail prices. For the 10 Mbps service, it is higher than TM's retail prices. In the absence of data in the Fixed Cost Model, Maxis noted that it is unable to verify the data input, assumptions and network dimensioning used by the MCMC.

For Instructure Sharing, Maxis is agreeable to using a bottom-up model. However, Maxis disagrees with the MCMC's approach of using purely current asset costs. Instead, the use of combined/blended historical asset costs and current asset costs were proposed. This is important to reflect the actual cost for most of the existing towers that have been built many years ago. Maxis also questioned the scale of the Tower Operators used by the MCMC and proposed to test sensitivity on the impact of volume as tower companies vary significantly in size and scale.

Maxis stated that the output of the Tower Model is not much different from the existing prices. Maxis highlighted that the SBCs commonly give certain amount of discounts to Access Seekers after several years and proposed that the same approach is adopted by the MCMC. Maxis also proposed that the MCMC review and regulate prices of other types of towers such as monopole, monopole tree etc. The Tower Operators are also building BTS Hotel Solutions using lamp poles and the MCMC is urged to regulate prices of these types of towers. Further, there are fewer lattice tower sites built by SBCs nowadays. Finally, Maxis also suggested the regulation of prices for in-building coverage antennae (IBCA) system in order to control exorbitant prices imposed by IBCA providers such as KLIA2.

TIME believes that access prices should only be applicable to dominant players or players with sufficient market power.

TM recommended the use of pure LRIC for mobile services. There should be no common costs mark-up as these can be recovered from retail services. European countries such as Austria, Belgium, the Czech Republic, Denmark, France, Germany, Greece, Italy, Portugal, Spain, Sweden and the UK were cited as examples. TM is facing a different

market situation as fixed voice revenues are declining due to increased use of OTT applications. The fixed operator in Malaysia is also constrained in its ability to recoup common costs at the retail level. TM pointed out that the MCMC has also incorporated an inefficient and outdated technology in its mobile LRIC model (namely 2G), thereby artificially increasing the price of mobile services. For the fixed services, the MCMC has arbitrarily written down some of TM's "old" fixed assets while there are no such markdowns for old 2G equipment in the mobile model.

The MCMC's proposed approach to use LRIC+ for fixed access services with some asset prices at current costs, while others are subject to price adjustments to reflect fully-depreciated assets imply that TM can afford to price wholesale products at relatively low levels, thereby creating barriers to new infrastructure market entry. However, a key purpose of ex-ante regulation is to address entry barriers. TM demonstrated that without markdowns, fixed termination rates only increased by less than 10%, while there was significant increase of more than 40% in Layer 3 HSBB with network service. The key rationale for use of LRIC is to determine efficient prices for uncompetitive or bottleneck service but the MCMC's proposed approach encompassing written down values of "old" assets cannot deliver prices that objectively reflect efficient cost. In practice, the MCMC's decision to depart from the traditional LRIC approach has led to significant write down of many network and non-network assets that make up a substantial portion of total cost (30-35%). The MCMC's approach of arbitrarily selecting assets and writing them down by as much as 90% in order to match 2016 estimated depreciation with actual depreciation, does not provide any allowance for work-in-progress in 2016 for future investment during the regulatory period. Such an approach will have a chilling effect on investment and is completely contrary to the Long-Term Benefit of End Users (LTBE).

TM pointed out that it is not uncommon to mark-down selected asset values to reconcile LRIC results with historic book value depreciation. For example, the European Commission had adopted a modified approach to asset valuation but this approach was rejected by the regulator in New Zealand on the grounds that it was irrelevant for the New Zealand context. TM pointed out that similarly, it is irrelevant for Malaysia as it is in a similar situation to New Zealand where the Government has committed to a Public Private Partnership (PPP) arrangement with fixed network providers to deploy high speed broadband infrastructure. The MCMC has followed the European approach but the European Commission's recommendation is only for civil assets.

webe proposed that the technology in forward-looking mobile model should be consistent with the fixed model where legacy costs were excluded. Other inconsistencies webe noted are as follows:

- For fixed termination, voice traffic is not split by the use of submarine cable as the cost of submarine component is not significant;
- For Interconnect Link Service, the costs are increasing due to increasing costs of cables and related civil infrastructure;
- Trunk Transmission Service – because of significant cost of submarine cable, the Trunk Transmission Service is separated between Peninsular Malaysia and Sabah and Sarawak. The proposed pricing is decreasing because the decreasing cost of transmission equipment and increasing traffic in core network. The pricing for installation is increasing because of increasing labour cost.
- End-to-End Transmission Service – because of the significant cost of submarine cable, the transmission price is split between within Peninsular Malaysia and Sabah and Sarawak.

YTL agrees with the methodology. However, it appears from the manual that 4G services using the 2.3GHz and 2.6GHz TDD LTE spectrums have not been included in the costing.

Discussion

Respondents have presented a range of views about the proposed costing methodologies based on bottom-up and LRIC+ methodologies. In determining the appropriate costing methodology, the MCMC has sought to promote efficiency and competition whilst representing the best interests of both the end users as well as the network operators. The adoption of a consistent approach to modelling both fixed and mobile technologies is important and it should be recognised that where pure LRIC has been adopted, this has been applied to both mobile and fixed technologies.

Celcom disagrees with using a bottom-up approach for the fixed access network and proposed two alternative solutions to modelling the fixed access network. One involved using a top-down model of TM's fixed access network with historical values and the second using a step-by-step approach.

A top-down model of TM's access network would also be based on real data from TM's access network. The MCMC therefore does not perceive that this approach would be methodologically better than the approach used by the MCMC. The MCMC assumes that the only reason why Celcom would prefer a top-down model with historical values is that it would lead to lower costs of access network services. On the other hand, Celcom agrees to use a bottom-up model with current values for the core network (which also leads to lower costs of services). This appears to be cherry picking. The MCMC is of the view that the methodology should not be selected based on the desired level of resulting costs and that it is fair to use the same methodology consistently for modelling both the fixed access and core networks.

The MCMC has also decided not to use the step-by-step approach, as though it is theoretically correct, its practical implementation requires arbitrary assumptions to be made. Firstly, under this approach, the costs of the access network are equal to the maintenance and replacement expenses for the access network. However, these expenses fluctuate significantly between years and not every access network element is maintained or replaced every year. So, average values over a long enough period, which is longer than the modelling period, would be necessary. Long-term estimates of future maintenance and replacements in the fixed access network are highly arbitrary and cannot be properly verified by the MCMC. Therefore, the MCMC prefers to base its model on the number of physical units of network equipment (for example, kilometres of cables) which are obtained from the network inventory systems and can be verified.

The second problem with the step-by-step approach is that it does not calculate costs separately for individual network elements and therefore it is difficult to derive distinct costs for different services on the basis of cost causation and resource usage. Celcom argues that the difficulty in allocating assets to elements of the network or to services, which allegedly make it difficult to derive service-specific costs, can be addressed on the basis of usage or other causal factors. The MCMC agrees that allocating assets to services can be done on the basis of usage. However, the problem with the step-by-step methodology is that the costs of different assets are mixed together into one overall figure. A single usage factor for a mix of assets does not allow precise allocation to services, which differ in their usage of the individual assets.

The MCMC accepts Celcom's argument that due to the manner in which straight line depreciation and tilted annuity work, it results in the following. In the earlier years of an asset's lifetime, the annuity charge is lower than the straight line depreciation plus cost of capital; and it is reversed in the later years. Hence, by adopting straight line depreciation plus cost of capital in the early years of an asset's lifetime and the annuity in the later years means that the higher cost options are chosen. Celcom adds that, because the fixed access network assets are more than halfway through their lifetime, moving from the top-down approach (which uses straight line depreciation plus cost of capital) to the bottom-up approach (which uses annuity) will allow operators to over-recover their costs. The MCMC agrees with Celcom but stresses that though the fixed access network prices were calculated based on a step-by-step approach with straight line depreciation, the prices were finally not regulated.

The MCMC notes Celcom's revisions to reflect the minor inaccuracies in the PI Paper.

The MCMC notes the comments from Maxis regarding the relationships between benchmark fixed and mobile rates in different parts of the world. These have resulted from the use of different costing methodologies as well as levels of fixed network

deployment and utilisation over time. However, there is a clear trend towards reducing prices for voice termination in all networks with the potential for a move to bill and keep at some point in the future.

The MCMC notes the statement from Maxis that the prices for HSBB services are high. However, the MCMC does not agree that HSBB service costs are higher than the retail prices offered by TM to its end users. Maxis reached this conclusion by adding the HSBB installation costs to the HSBB monthly rentals and splitting the installation costs over only 24 months. However, many customers keep their broadband line for a longer period of time so this calculation is not fully representative.

The MCMC notes the comments from TIME that such regulated rates should only apply to dominant operators, as in the case in many other jurisdictions. However, the MCMC would like to clarify that the legal framework under the CMA does not permit asymmetric regulation.

The MCMC recognises TM's situation, as is the case with both incumbent and mobile operators around the world, where volumes of network-provided voice services are reducing and replaced by OTT applications, but with a counterbalancing increase in demand for data services over such networks. The LRIC models developed by the MCMC take account of this change and apportion the appropriate amount of network infrastructure and cost to the respective services.

The reconciliation process adopted by the MCMC aligns the asset costs predicted by the fixed access network model and the financial records of TM to ensure that there is no over-recovery of costs. As the model is forward-looking, costs which TM currently recognises as work in progress and future investments are taken into account as necessary in future years and are therefore not excluded from the model and do not therefore have "a chilling effect on investment". Future investments in HSBB through the PPP arrangement are also dealt with through this process. A similar asset-based calibration was also carried out on the mobile model. However, the MCMC did not identify the need to exclude or significantly reduce value of certain asset types.

The MCMC notes that TM disagrees with the reconciliation process that was used which resulted in a mark-down of TM's assets. There was some misunderstanding and the MCMC clarifies as follows. The mark-down does not try to bring the depreciation calculated in the model in line with TM's actual depreciation charge. The mark-down tries to bring the Gross Book Value (GBV) reported by TM with the actual depreciation charge reported by TM. The calculation of the mark-down was done in the following manner.

TM provided the GBV of different asset groups and also the lifetimes of these assets in the data collection. The MCMC then calculated straight line depreciation from these GBVs (dividing the GBV by the asset lifetime, based on values provided by TM) and compared the total depreciation calculated in this manner with the total depreciation charge reported by TM. Consequently, it was observed that TM's reported depreciation charge was only half of the result obtained through the calculation. The only explanation of this situation is that there are some fully-depreciated assets, which are still in use. Such assets are included in the GBV but there is no depreciation charge calculated for them. The MCMC then calculated the percentage of these fully-depreciated assets by lowering the GBV by the mark-down so that the GBV divided by the asset lifetime is equal to the actual depreciation charge reported by TM. The percentage of mark-down was not set equally across all asset groups, but the MCMC selected some asset groups where it is more likely that there will be a high level of fully-depreciated assets and adjusted the GBV by mark-down only in these asset groups. If the MCMC applied the mark-down equally across all asset groups, the percentage of mark-down would have been 50% because the total depreciation charge reported by TM was only half of the total calculated depreciation.

Furthermore, the MCMC would like to stress that all inputs into this calculation are values provided by TM and therefore the percentage of mark-down is not dependent in any way on the model calculations. Even if the model calculated a completely different number of units of fixed asset elements and different annual costs of these assets than in the current model calculation, the mark-down would still be the same.

The percentage of the mark-down represents the percentage of the fully-depreciated assets which was used in the model to lower the number of assets when calculating the gross replacement costs (number of assets multiplied by the current price). In this way, the MCMC excluded the fully-depreciated assets from the model calculation.

The MCMC does not agree with webe's comment that legacy assets were excluded in the fixed model. The MCMC clarifies that fully-depreciated assets were excluded, but not all legacy assets, in the fixed model.

On webe's query over the difference of treatment of the submarine cable to fixed voice services and mobile voice services, this will be discussed in greater detail in Questions 19 and 24 respectively.

webe also pointed out the high costs of Interconnect Link Service and the change from the previous price. This was caused by the fact that the Interconnect Link Service was calculated as an independent, dedicated fibre cable using completely new routes. Based on the comments from the respondents, the MCMC realized that this is not realistic and

has revised the costing approach for the Interconnect Link Service. The discussion on this will be provided in Question 19.

The MCMC notes the comments from YTL about the use of 4G spectrum which are dealt with in Section 7.2 (under Question 21) of this PI Report.

Question 5:

Do you have any further comments on the elements of cost modelling which the MCMC proposes to adopt?

Top-down vs bottom-up models

Submissions received

Celcom, Maxis, PPIT and TM agrees with the MCMC's decision to use bottom-up modelling.

Celcom believes that bottom-up models are more suitable for contestable markets as opposed to non-contestable markets such as fixed access. The fixed access model as constructed by the MCMC does not provide a reasonable basis for setting wholesale services in Malaysia for HSBB or other access products. Celcom said that in Europe and elsewhere, regulators are moving away from using bottom-up models to set wholesale prices.

Maxis is agreeable to the MCMC's decision 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. Maxis requested the MCMC to revisit and re-verify data inputs, cost inputs, assumptions and network dimensioning used in the fixed model as the model produces high prices. Maxis also requested the MCMC to reconcile or benchmark operators' financial figures to avoid inaccurate estimates.

PPIT agreed with the use of a bottom-up approach and proposed to include some degree of top-down reconciliation to better reflect the costs of an efficient operator.

Discussion

The MCMC notes that respondents generally support the use of bottom-up models. The MCMC notes the comments from Celcom and Maxis regarding the suitability of bottom-up models and data verification but believes that the cost reconciliation and corrections which it has carried out to the final versions of the fixed access model provide consistent and reliable service costings.

Celcom disagrees with a bottom-up approach for the fixed access network and proposed two alternative solutions to modelling the fixed access network. The MCMC has responded to these comments in the previous Question 4.

Depreciation method

Submissions received

Celcom, Maxis, PPIT and TM support the MCMC's decision to use tilted annuity depreciation.

Celcom however, reserves its rights to comment on the actual implementation of the tilted annuity formula.

Maxis agrees with the consistent approach across all models. For mobile models, tilted annuities would represent more appropriate reflection of cost recovery since there is a significant level of uncertainty in the future trends of voice and data services. However, for the fixed network, where service demand hasn't reached mature levels, tiled annuities may artificially inflate unit costs. Maxis suggested that the MCMC undertake sensitivity analysis using economic depreciation for fixed access and fixed core.

PPIT prefers tilted annuity method as a proxy for economic depreciation as this approach takes account of the change of price trends.

Discussion

The MCMC notes the general support for the common use of tilted annuity depreciation in all the cost models. The MCMC notes the comments from Celcom about the implementation of the formula and has verified the method of calculation.

Maxis commented that for the fixed network, where service demand hasn't reached mature levels, tilted annuities may artificially inflate unit costs. The MCMC does not agree that the demand in the fixed network has not reached mature levels. In fact, it is the converse. Fixed network services are very mature and fixed voice services are already showing a declining trend, which is common for the end of the service lifecycle. Maxis is probably referring to the demand for FTTH services. However, from the perspective of demand, the FTTH service is a replacement for the already mature ADSL service. This aspect is handled in the fixed model, where it calculates the costs of these services based on migration from ADSL services to FTTH services. This means that in areas where FTTH is implemented, the customers are migrated to a fibre access network and the copper access network is no longer used. The full and mature demand from ADSL services is transferred to the

FTTH services in these areas, and hence, the FTTH network elements are highly utilised from the start.

Allocation of common cost

Submissions received

Celcom and Maxis support the MCMC's decision to include appropriate common cost in the cost model using the EPMU approach, while TM disagrees.

Maxis is of the view that it is important to recover common costs as these are integral to business. Maxis also agreed with the MCMC that Ramsey price mark-ups are theoretically ideal but difficult to implement.

TM believes that mobile operators can recover these at retail level, while TM is constrained in its ability to do so. This is due to declining fixed revenues as consumers increase usage of mobile and OTT.

Discussion

The MCMC notes the general support for the inclusion of common costs through EPMU rather than some form of Ramsey pricing. The MCMC also notes TM's view that common costs should be excluded from mobile wholesale costs but is of the opinion that it should adopt a technology neutral approach to regulation rather than discriminate arbitrarily between network technologies. It is likely that voice revenues will decline in all networks and all operators will be required to find alternative revenue sources.

Allocation of cost to services

Submissions received

Celcom and Maxis agree with the use of routing factors to allocate costs.

Celcom cautioned however, that the routing factors should be determined correctly. They pointed out that the fixed model does not show the actual routing factors, preventing operators from evaluating that these are applied correctly and are plausible.

Maxis believes that routing factors would reflect the use made of each network component. Maxis also agree with the principle of cost causation adopted by the MCMC.

Discussion

The MCMC notes the agreement to use cost causation through appropriate routing factors within the models.

Treatment of Licence and spectrum fees

Submissions received

Celcom, Digi, Maxis and PPIT agree with the MCMC's approach to include the cost of licence and spectrum fees in the model.

Celcom pointed out that the model only includes spectrum costs currently incurred by operators and there is no mention of spectrum fee for 700MHz. In addition, the amount of spectrum fee paid by mobile operators is far in excess of the RM180 million used in the model.

TM disagrees with the inclusion of licence and spectrum fees in the mobile model and suggested that the MCMC removes allowance for such fees.

Discussion

The MCMC notes the general agreement to include the cost of licence and spectrum fees in the models. The comments from Celcom regarding the inclusion of new spectrum bands and the overall cost of spectrum are discussed in Section 7.2 (in Question 21) of this PI Report. It is however the view of the MCMC that licences and radio spectrum (including mobile services and microwave) represent a fundamental base upon which operators provide both wholesale and retail services. As such, using the principle of cost causation, licence and spectrum fees should be included in all relevant cost models.

Defining the Increment

Submissions received

Maxis and Celcom agreed with the MCMC's decision to adopt a broad increment for the cost models, expressed on an average basis and incorporating all the network services. They are of the view that using marginal cost is inappropriate as it would not reflect costs like fixed and common costs.

Discussion

The MCMC notes that Maxis and Celcom are in agreement with the decision to adopt a broad increment, expressed on an average basis and incorporating all network services. They both agree that the use of marginal costing is not appropriate as this would exclude costs such as fixed and common.

Network Structure: Scorched earth versus scorched node

Submissions received

Celcom noted that the discussion in the PI Paper suggests that the scorched node assumption has been used in the fixed network model for nodes containing MSAN and other equipment higher up the network. It also states that equipment at any given node can be optimised. Celcom highlighted two concerns with these assumptions. Firstly, it appears that the lower level nodes, namely primary and secondary distribution points are not optimised. Secondly, while the discussion recognises optimisation of MSANs and other nodes, there is no indication of this having been done in the model.

There is no conclusion to the discussion on scorched node and scorched earth in the mobile network. Celcom is of the view that scorched node should be applied and the number of base station sites in the model should closely match the actual.

Digi submitted that modified scorched node should be adopted for the mobile cost model. Digi also believes that clusters of population should be identified for the total Malaysian territory using the most granular population figures from the Department of Statistics. It is also important for the MCMC to ensure that the geo-types are associated with different cell coverage radii based on spectrum allocation of the modelled operator. Digi agrees with the MCMC's approach to include licence and spectrum fees.

Maxis also supports the use of the scorched node approach as operators in Malaysia are competitive and adopt best practice engineering in the design of network topology. Scorched node allows for recouping of costs from appropriate existing nodes.

TM disagrees with the modified scorched node approach adopted by the MCMC for access nodes in the fixed network where the number of aggregation nodes and rings decreases with time. With this approach, the number of nodes accounts for coverage and not demand. The assumption that the MSAN cabinets will be decommissioned due to fibre expansion is unrealistic, at least within the modelling period. MSAN cabinets will still be required to provide copper-based services despite the declining demand. TM used the fixed model to calculate the change in service costs if a fixed number of access nodes is

assumed and submitted that the impact on prices is significant. Therefore, TM suggested that the MCMC keep the number of access and aggregation nodes fixed during the modelling period.

For the mobile network, TM recommends the scorched earth pure LRIC approach, with no common cost. When there are four operators, it is challenging to make assumptions on where existing efficient sites should be located. As such, a modified scorched node or scorched earth may be more practical.

Discussion

The MCMC does not agree with the statement from Celcom that in the fixed network model the MCMC used the scorched node approach without optimisation of the nodes. All nodes were adjusted to correspond to the number of access lines.

This is confirmed also by the comment from TM which says that the assumption that the MSAN cabinets will be decommissioned due to fibre expansion is unrealistic, at least within the modelling period. MSAN cabinets will still be required to provide copper-based services despite the declining demand.

The MCMC remains of the opinion that MSANs should be decommissioned in FTTH areas. It would be inefficient to have two parallel access networks in the same area – one copper using MSANs and one fibre using OLT. The fixed model calculates the costs of these services based on migration from ADSL services to FTTH services.

On the other hand, the MCMC accepts the point made by TM that in line with the scorched node approach the number of higher level nodes (aggregation node, core node) should not decrease with decreasing demand and the existing nodes should be modelled.

As discussed in the PI Paper, the mobile model is based on a notional operator with a 25% market share rather than any particular existing operator in Malaysia. The reconciliation has therefore been carried out based on the data which has been made available. As noted by Digi, the assumption about cell radii reflect the need for both coverage and capacity in the mobile networks and reflect the availability of radio spectrum in the various bands.

Question 6:

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

Submissions received

Celcom pointed out that the PI Paper leaves out a number of key issues. There is limited optimisation in the fixed model and little if any in the access network where trench, duct and cable lengths are taken from the incumbent operator. Similarly, in the mobile model, there appears to have been little calibration with the networks of actual mobile operators. Further, the equipment prices in the model are significantly lower than those Celcom pays. There is also limited discussion in the PI Paper on reconciliation. For example, no mention was made of annualisation rate. Finally, Celcom highlighted that the operating costs in the fixed model are those of TM's whereas it is more normal to base bottom-up model operating costs on a range of sources.

Digi agrees with the MCMC that a bottom-up model does not take into account all the costs necessarily incurred in providing services and submitted that it is important that common costs are recovered with an acceptable margin in the provision of termination service.

Maxis is generally supportive of the LRIC+ methodology for mobile, fixed access and fixed core. However, there are reservations on the implementation. Maxis expresses concern about the asymmetry of information between the mobile model and the fixed model. For the mobile model, the MCMC was in a position to contrast and compare at least three datasets, while only TM's input was used for the fixed model. There was also no evidence of cost reconciliation, nor an audit of the input data provided by TM. Maxis expresses concern that the results of calibration and reconciliation were not released on grounds of confidentiality.

TM submitted that calibration and reconciliation can be difficult when multiple operators offer the same services. Averaging the data across operators may not always result in feasible outcomes. TM noted that the data traffic assumption used in the mobile model does not reconcile with the operational performance described in the recent financial report.

YTL agrees with the methodology adopted but noted that the factor of scale and capacity of the new operator may not be the same as another operator. If standard calibration factors are used, the small operator may not be able to recover some of the sunk and common costs.

Discussion

The MCMC recognises the concerns of respondents about the levels of reconciliation which have been possible between the mobile and fixed models. As the mobile sector is much more competitive than the fixed then it has been possible to collect more comprehensive

data from a range of mobile operators. However, additional data has been collected from competing operators for key activities such as trenching and duct installation in order to confirm that the costs put forward by TM are realistic. In many cases, TM's costs were shown to be lower than those for the competing operators.

The MCMC also confirms Celcom's view that no efficiency adjustments in the usage of access network equipment were performed in the model calculations. However, as mentioned above, in the process of data collection, the MCMC verified whether the data submitted by TM was reasonable and corresponded to values provided by TM to the MCMC in other submissions unrelated to cost modelling. In several iterations, some of the input values were adjusted in cooperation with TM so that the data could be accepted as being reasonable to the satisfaction of the MCMC.

In response to Celcom's concerns, there are limits to creating theoretical models. The MCMC views that the creation of theoretical nets of cables (for example, concentric circles or squares) with some theoretical density covering the area around local exchange buildings would not deliver any realistic results.

In that regard, the only reasonable alternative would be to estimate cable routes using GIS data and locations of local exchange buildings and subscribers. Nonetheless, the MCMC is of the view that GIS modelling leads to a level of efficiency which cannot be achieved in reality. GIS modelling would estimate optimal routes constructed under the current situation. However, the fixed access network was constructed over a long period of time. During this time, as the towns and villages developed, the locations of subscribers also changed. It is not efficient to always dig new routes for cables in order to have the shortest connection between local exchange buildings and the subscriber locations. In reality, it is efficient to use the existing cable routes to the maximum extent possible and attach new locations to the existing cable routes, even if they are not direct connections and the lengths are not minimal. This is consistent with the scorched node approach, while the GIS modelling actually resembles the scorched earth approach. In addition, it is not always possible to construct the optimal route as found on the map due to digging permits and obstacles in the path, for example.

The MCMC understands the general view that incumbent operators are generally considered inefficient, and therefore, the idea of using real data from TM's network is less acceptable to the other operators. In balancing between the different perspectives, the MCMC does not believe that even an operator in a monopolistic position without any competitive pressure would use longer cable routes than necessary.

Based on the above reasons, the MCMC considers that using real data from the access network of TM is a reasonable approach.

Celcom highlighted that the operating costs in the fixed model are those of TM's whereas it is more normal to base bottom-up model operating costs on a range of sources. The MCMC confirms that the operating costs used in the model were based on data from TM. The MCMC considers this is the correct approach given the fact that the fixed model is a model of TM's fixed network. Unlike equipment prices, which are more or less comparable between countries, operating costs are country-specific. Using international benchmarks would not be appropriate in this case.

It has been necessary for the MCMC to respect the confidentiality of the information received from individual network operators. In the case of the mobile model, these have been anonymised as the model represents a notional operator with equipment prices that reflect an efficient operator rather than an individual operator such as Celcom. In the case of TM though, it has not been possible to share such data with the industry. The MCMC notes the comments from TM about the data volumes modelled within the mobile networks and addresses this issue further in Question 20 in the PI Report.

The MCMC notes the comments from YTL that the mobile model may not fully reflect the costs of a smaller operator but also recognises that such an operator is likely to have much lower levels of voice traffic and the use of the glide path will further help to mitigate the impact.

Question 7:

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

Altel, Celcom, Digi and TM agree with the use of glide paths.

Celcom noted that the discussion on use of glide path is not very clear. While the MCMC had stated that glide paths have been used in instance where the prices are sufficiently different from regulated prices, it has used glide paths for fixed and mobile termination but not for Interconnect Link Service, although the prices are about 40% higher. Celcom also stated that the mobile termination rates are too low and the gradient of glide path proposed by the MCMC is excessively steep. Such a steep gradient would result in serious disruption in the market place and may result in the waterbed effect. Celcom believes that a shallower gradient may be more appropriate.

Maxis firmly supports the minimum two years glide path approach used by the MCMC for mobile termination. Since the mobile origination and termination prices in Malaysia are

already among the lowest in the world, glide paths will soften the impact of sharp decrease in termination revenue. Maxis also requested the MCMC to perform a comparison between a linear interpolations method used by the MCMC with the geometric method used by some regulators.

Maxis believes that glide paths for fixed origination and termination services are inappropriate in light of near monopoly position held by TM in the fixed market and considering that the fixed origination and termination rates in Malaysia are high among the countries that they had benchmarked against Malaysia. Maxis also urged the MCMC not to consider symmetric termination prices between fixed and mobile.

TM agreed with the MCMC on the use of glide paths as it will not cause significant disruption to the finances of existing market players.

U Mobile highlighted that from the perspective of new operators, a glide path will mean that they will continue to pay a higher price when costs have declined. This is exacerbated by delays in the review process. U Mobile requested the MCMC to consider applying 2018 prices retrospectively.

One operator highlighted that glide paths should allow time for operators and customers to adjust to new price levels and structures and should minimise disruptions. As such, the MCMC was requested to consider a moderate reduction with a longer time horizon. They believe a six-year time horizon would be appropriate. ACCC was cited as an example of a regulator who had once considered a longer regulatory period to promote efficient use of, and investment in, the infrastructure used.

Discussion

The MCMC notes the range of comments received to the proposal to use glide paths to bring regulated prices into line with costs over time rather than by implementing them immediately. In adopting glide paths for termination services, the MCMC seeks to move towards the costs for each service. As noted by Maxis, the MCMC has no objective to bring the rates for fixed and mobile termination in line. The MCMC is of the view that glide paths are not necessary for other services.

The MCMC does not accept the argument that, because TM has a monopoly position, no glide path should be applied to fixed services. Although the issue of avoiding disruption to inward investment in the industry is more pressing in the case of sectors with greater prospect of competitive entry, it is still appropriate to afford TM and its investors both some protection from price shock and also, perhaps more importantly, to retain the incentives to innovate provided by the glide path mechanism.

The MCMC however recognises the issues as raised by U Mobile that throughout a glide path period, the rates being paid are above the costs and are so providing a subsidy to all terminating operators. This issue will be addressed under Question 26.

The MCMC takes note of the proposal made by an operator to use a six-year glide path. In the three year's glide path as proposed by the MCMC, the operators are already recovering above cost, and as pointed out by U Mobile above, operators will continue to pay higher price for termination. Therefore, the MCMC is of the view that a six-year time horizon from 2018 is not appropriate.

Question 8:

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

Submissions received

Celcom pointed out a number of reasons why it may not be appropriate to use the results of the fixed model in arbitration of disputes as follows:

- (a) The stakeholders were not in a position to comment due to the use of dummy data;
- (b) The absence of a manual explaining the approach adopted and assumptions used;
- (c) The model appears to suffer a significant number of shortcomings which will tend to bias the results upwards; and
- (d) The charges produced by the model are insufficiently granular.

Celcom surmised that the fixed model used in its current state put TM's customers and competitors at an unfair disadvantage.

Celcom believes that there should be no role for the MCMC to arbitrate price disputes for MVNO or other forms of mobile access since these are commercial services offered in a competitive market. Intervention should be limited to markets where bottlenecks exist and where operators have dominant position.

Digi is of the view that cost-based regulated prices for facilities and services can be a useful quantitative source to be used as a reference point during arbitration proceedings. However, the MCMC should consider the nature and context of dispute.

In principle, Maxis does not object to using the cost models to resolve disputes. However, the service should be modelled accurately. Maxis has concerns about the manner in which the fixed model has been developed and urged the MCMC to consider the nature of the

dispute and where relevant, review and adopt the model to evaluate the impact on the proposed regulated prices. Maxis is concerned that some fixed prices are higher than the retail prices and market reality. As the basis of dispute is often motivated by Access Seekers' inability to compete at retail level, it is imperative that the MCMC closely monitor the Access Providers' retail prices to ensure that the retail offerings do not foreclose others from competing effectively. Maxis proposed that the MCMC use the margin squeeze test in conjunction with cost models.

PPIT does not agree that the models be used to arbitrate pricing disputes. The proposed models are developed on an average basis and are unable to cater to individual circumstances. They believe that the arbitration process should be examined on a case-by-case basis and the resolution would depend on examination of individual factors that drive operating and capital costs away from the average. PPIT pointed out that there are many variations such as tower heights, geography, discounts, tenure, mark-ups and types of service included that affect OPEX and CAPEX.

In addition, despite towers being in similar localities, the landlords may charge different rents for the land sites. The soil conditions in Malaysia also vary significantly which affects costs. PPIT pointed out that for USP projects, the MCMC had accepted the range of RM745,545.45 to RM864,609.70 for constructing three-legged 76m light duty telecommunications towers. However, in the PI Paper, the average cost of 75m towers is only RM463,750.00.

PPIT also stated that the data gathering exercise appear to be selective as telcos were not required to provide data for the model. The model also does not account for leasing with additional sharing parties nor tenure of the lease. The MCMC also excluded some major costs for telecommunications towers which brought the price down significantly.

TM's main concern with the use of the cost model's results in arbitrating disputes is the use of marked down asset values that has led to an underestimate of TM's costs. As time elapses TM will undertake more capital investment, and therefore the underestimate becomes even more significant and may lead to the use of inappropriate benchmarks or pricing signals. If disputes arise after a considerable time from the time the models were developed, it may be necessary to make amendments to the models as key parameters or assumptions may have changed. TM does not favour the use of the cost model in the existing form for dispute resolution. TM also stressed that pricing decision should not solely rely on average costing model results but must include other dimensions such as volume, distance, location etc.

U Mobile thinks it is reasonable for the MCMC to use the cost model results in arbitrating disputes. However, depending on the circumstances, the MCMC may need to seek further

information pertaining to the specifics of the disputes to ensure the appropriate cost is determined.

webe is agreeable that the regulated prices should be the benchmark in arbitration of disputes.

YTL pointed out that the models appear not to have included the costing for 4G services using the 2.3GHz and 2.6GHz TDD LTE.

Discussion

The MCMC notes the concerns from respondents as to the potential limitations which the outputs of the models may present especially with disputes which are specific to individual locations and where it is not appropriate to use average costs or where projects may have been the subject of USP funding. The MCMC however is of the view that the cost models will continue to provide a useful input to such arbitration decisions where these are required.

Although Celcom believes that there should be no role for the MCMC in the arbitration of price disputes for MVNO or other forms of mobile access, it must be recognised that the MCMC has an overall responsibility for the regulation of the telecommunications sector and the imposition of good regulatory practice across the sector which includes the relationship between MVNOs and MNOs. In addition, MVNO Access is included in the Access List and is therefore subject to the oversight of the MCMC.

The MCMC accepts the comments by Maxis that a margin squeeze test could be used in addition to the cost model results in arbitrating disputes over prices.

The MCMC agrees in principle with the point made by TM that if disputes arise after a considerable period of time has elapsed from the time when the models were developed, it may be necessary to make amendments to the models as key parameters or assumptions may have changed.

Question 9:

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

Submissions received

Altel believes that the proposed installation charges for Interconnect Link, Trunk and End-to-End Transmission services are excessively high compared to the current prices. Since

installation cost is not an immediate expense, it cannot be set to recover capital cost for providing the service. In addition, since installation charges can vary depending on the nature of work required, it should be determined by making reference to the actual cost incurred.

Celcom in principle agrees with allowing efficiently incurred operating costs. However, the way in which the cost has been estimated in the fixed model may result in over-recovery. The installation cost has been estimated by multiplying the labour time involved by the cost but since the model was populated with dummy data, Celcom was unable to verify whether the time or cost is reasonable. TM has incentives to provide inflated figures and it is unclear whether cross checks have been made. In addition, the hourly rates provided by TM may include overheads, which would lead to double counting as mark-ups are already included in the model.

Digi agrees with the MCMC's approach to setting installation charges and matching it to direct operational costs incurred. This approach provides transparency on recovery of full costs of providing the service.

Maxis sought clarification on the direct operational costs efficiently incurred in putting the service into operation that is being used by the MCMC in the Fixed Cost Model. To Maxis's understanding the operational cost for installation only includes the cost of man power to install and turn on the service. Therefore, Maxis is surprised that the installation charges are much higher than previous charges. For UniFi services, the package offered by TM includes HyppTV everywhere, Installation and Activation, Wireless Modem and Cordless Phone. It implies that TM does not impose installation charges for its UniFi Service.

TM agrees with the overall principle of determining installation charges based on direct operational cost. In addition to the man hour cost, the direct operational cost should account for other installation-related costs such as transport for deploying technicians.

webe is of the view that it is acceptable that the price of installation is regulated but it should always be cost-oriented without inclusion of capital cost.

U Mobile sought clarification on how efficient direct operational cost is established for the proposed installation cost in the PI Paper.

Discussion

The MCMC notes that there is general agreement from respondents that installation charges should be charged separately based on the efficiently incurred non-capital costs by the operator which is providing the service. The MCMC notes the concerns of Altel,

Celcom and Maxis as to the level of the proposed installation charges. The costs were calculated based on the number of working hours per installation and average hourly rate of a technician performing the line installation. Both values were submitted by TM. Based on the feedback from other operators, the MCMC has decided to revisit these inputs and reduced the number of hours needed for the installation.

The MCMC notes Maxis's comment about the TM UniFI service which is a retail service and is therefore offered to customers as a package. As a wholesale service, the installation and ongoing costs would need to be presented and recovered separately.

3.3. MCMC's final view

The MCMC notes the general agreement on the proposed methodologies to derive cost-based prices: LRIC+ for the fixed and mobile networks, and a bottom-up model based on current costs for Digital Terrestrial Multiplexing Broadcasting Service and Infrastructure Sharing. There was also general agreement over the use of tilted annuity and broad increment, scorched node, allocation of cost through routing factor, allocation of common cost through EPMU and the inclusion of licence and spectrum fee in relevant cost models. The MCMC also continues to view that a glide path over a 3-year period for the fixed and mobile rates balances between the need to protect against price shock and to prevent over-recovery of costs by operators. Finally, the MCMC also views that the cost models will continue to be a useful input to arbitrate disputes, if required.

4. Mobile Virtual Network Operators (MVNOs)

4.1. Overview

Section 8 of the PI Paper discussed the potential approaches to regulating MVNOs and concluded that agreement through commercial negotiation was the MCMC's preferred approach.

4.2. Summary of submissions received

Question 10:

Do you have any further comments on the proposed approach to regulating MVNO Access?

Submissions received

Celcom, Digi, Maxis and webe are supportive of the MCMC's position not to regulate prices for MVNO Access. Celcom, Digi and Maxis pointed out that the mobile markets are competitive and MVNOs have managed to establish a presence in the market.

Maxis is of the view that MVNO Access is already over regulated in Malaysia (via Access List and MSA) as compared to many other countries in the world such as European jurisdictions. In addition, there are also requirements for wholesale offers in the forthcoming 700MHz spectrum tender. Maxis also carried out international benchmarking and provided examples of the EU, Argentina, Brazil, Chile, China and Mexico where MVNO access prices are unregulated.

TM submitted that in jurisdictions with no regulation of MVNO Access, MVNOs can be subject to margin squeeze, making it difficult for them to compete with mobile operators. TM cited a study by the French Competition Authority that found that the poor performance of MVNOs in France was due to restrictive technical and pricing conditions imposed by network operators. TM also highlighted that regulation on MVNO Access was addressed in Norway, where the regulator imposed price controls on MVNO Access, requiring the incumbent mobile operator, Telenor to undergo a margin squeeze test at six-monthly intervals.

TM surmised that international precedents suggest that it is important to have regulatory principles of non-discrimination and transparency. However, relatively few countries have imposed price control and therefore, it may be appropriate for MVNO Access to be commercially negotiated, provided that the MCMC can test for margin squeeze and impose

suitable remedies. Rather than setting prices for MVNO Access, it would be more important for the MCMC to address the issue of domestic roaming. TM highlighted that many countries have mandated domestic roaming.

webe believes that there is an overlapping meaning for domestic roaming and MVNO, especially in their scenario where it relies 100% on a roaming partner for voice services. While pricing for MVNO can be commercially negotiated, there must be a mechanism for regulator to monitor and control margin squeeze.

4.3. MCMC's final view

The MCMC notes comments from respondents and the general agreement that, like in most countries around the world, the MVNO market should be based on commercial negotiations between mobile operators and their MVNOs. The MCMC agrees that the principles of non-discrimination and transparency should apply within the MVNO market in Malaysia and would expect all mobile operators to negotiate arrangements which follow these guiding principles.

TM identified the need for regulation of national roaming. However, the MCMC believes that such regulation could result in lower levels of investment and network roll-out at a time when greater capacity is required in order to maintain QoS levels. National roaming in order to reduce the number of so called "not spots" may be appropriate where there is clear evidence that additional network roll-out is not possible, although with more infrastructure sharing these locations should be limited.

The MCMC remains of the view that the MVNO arrangements should be made through commercial negotiations. The MCMC would draw on information from the mobile cost model in the event that the MCMC is required to intervene in disputes between the operators.

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 9 included a discussion of the WACC formula to be used and detailed the common parameters namely the Risk-Free Rate, Equity Risk Premium (ERP) and Tax Rate including the proposed rates for each.

Section 10 presented the calculation of WACC values for the fixed network services, including consideration of the impact of the HSBB funding programme, Section 11 presented the calculation of WACC values for the mobile network 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

Celcom views that the proposed estimates of WACC did not consider the range of estimation techniques which can be applied under the Capital Asset Pricing Model (CAPM) approach. Based on the choice of parameters used, the MCMC relied on spot observations. For example, beta estimates and gearing are based on current spot rates without due consideration of how these estimates would change if a longer period of time was taken into account. This is important as there could be short-term fluctuations in financial indicators over the next 3 years.

Further, Celcom opines that the use of estimates provided by licensees were unjustified. Firstly, no information was provided on how these parameters were derived or estimated. Secondly, the fact that an estimate provided by an operator is similar to an average of benchmarks is not proof that the estimate is reasonable. For example, the benchmarks considered for the fixed asset beta vary significantly between different countries, hence, benchmark countries must be considered carefully to ensure comparability. Thirdly, the benchmarks considered by the MCMC are flawed, as they do not represent the type of operator that is relevant for determining the WACC.

Digi agrees with the proposal to use separate WACCs for fixed, mobile and DTT services.

edotco supports the computation and process to derive the WACC that is consistent with a standard WACC calculation.

Maxis is principally in agreement with the MCMC on the approach used to calculate separate WACCs for fixed network service, mobile network service, tower services and DTT transmission services. It would have been ideal to have separate WACCs for the fixed access and fixed core networks, but benchmarks and comparisons are rare, and the incumbent itself is seen as a combined entity. Maxis is also agreeable to the WACC values proposed for mobile network service, tower services and DTT transmission services, but not for the fixed network services.

PPIT agrees with the proposed approach in adopting the CAPM, which is widely accepted. Further, PPIT also agrees that fixed, telcos, tower companies and DTT transmission operators have different risk profiles and require distinct WACC estimates.

TM agrees with the use of CAPM to estimate the WACC, and that the WACC is expected to vary across different types of investment projects. TM also agrees that typically fibre investment involves a higher risk profile, and highlights that in the minority of cases where regulation is applied in Europe, a risk premium is recommended. Nevertheless, for pragmatic reasons, TM agrees that separate WACCs should not be applied for separate lines of business. However, the MCMC should allow for the significant risk involved in HSBB investment in its WACC estimation. Finally, TM agrees that the estimated WACC should not be based solely on one operator's financial circumstances but reflect appropriate local benchmark data with consideration of relevant overseas comparators.

YTL is agreeable to the proposed approach.

Discussion

The MCMC notes that, with the exception of Celcom, there is a general consensus amongst the respondents to both the approach and the overall values of WACC proposed for mobile networks, infrastructure sharing and DTT services which reflect the different levels of risk experienced within the individual markets. Celcom comments that spot rates have been used which do not take account of fluctuations which may occur in the financial markets in the coming years. As with all forecasting, it is impossible to be fully accurate and so the MCMC does not think it is appropriate for it to attempt to second guess such changes. In setting the levels of WACC for the Malaysian market, the MCMC feels that it is appropriate to take account of the rates of local operators which reflect their individual financial situations and which are publicly declared to financial markets. The MCMC does

not believe that it is appropriate to use rates that are entirely based on conditions in other markets. Whilst recognising that the average of benchmarks does not prove that rates are correct such a comparison ensures that rates are not out of line with broad expectations. A similar point may be made with respect to the contributions of industry participants, whose views the MCMC seeks to take into account. Selecting appropriate sources for benchmarking rarely results in unanimity but the operators selected have only been used for comparison purposes rather than for the absolute setting of WACC rates.

Maxis and TM acknowledge that, whereas it could be desirable to set different rates of WACC for fixed access and core networks as the deployment of access network infrastructure for HSBB services potentially has a different risk profile. However, they recognise that TM operates as an integrated telco and as such the separation of such activities through different levels of WACC would be difficult at this point in time. Should functional or structural separation of TM occur in the future then such an approach may be more appropriate, though the difficulty in identifying suitable comparators is likely to remain.

Question 12:

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

Submissions received

Digi, edotco, Maxis and PPIT support the common parameters used, while Celcom submits that both the risk-free rate and the ERP are overstated. TM comments that the common parameters should be based on local data. YTL believes that a single ERP should not be used.

On the risk-free rate, Celcom opines that there was no consideration of whether the current rate of the government bond yield is representative of the risk-free rate on a forward-looking basis. The risk-free rate is often based on an average measured over a longer period of time to avoid using current measurements which can be affected by transitory effects that are not representative over the period of time of the WACC estimate. In fact, it is also not standard regulatory practice to use a 10-year government bond as a basis for setting the risk-free rate.

In that regard, Celcom views that short to medium term historic evidence should be used as a basis for setting the risk-free rate, for example, based on an average of the 1-year and 2-year historic averages. Based on the 10-year government bond yield, the averages over the last 1, 2 and 4-years are broadly similar to the proposed MCMC rate, but would

be slightly lower than 4% if averages of 2 or 4 years of historic data are used instead. However, if a shorter 5-year government bond, which is considered in other jurisdictions, is taken into account, then there will be even lower average yields for 1, 2 and 4-years.

Given the time value of money, the choice of maturity is an important consideration. The maturity should reflect the remaining useful life of assets and the length of the regulatory period. On the one hand, it should reflect the duration of the charge control. On the other hand, as a result of investments that may be made by operators and where the economic lifetimes are in excess of the charge control period, then a longer-term maturity may be appropriate. As such, a mixed approach of using long 10-year maturity and short 5-year maturity bonds have been used by Ofcom in the UK since 2005 until it has been suspended due to the impact of quantitative easing in the UK and Europe on the yields of short-term maturity bonds. As such, Celcom proposes the mix of yields of 5-year and 10-year maturity bonds for the purpose of estimating the WACC.

On the ERP, Celcom has identified two flaws in the MCMC's estimation: the use of the ERPs submitted by the operators and on the use of the Professor Damodaran's estimate.

It was unclear to Celcom on why the MCMC has removed the lowest estimate in the range of 2.89% to 10.94% provided by the operators, rather than adjusting the rate to be based on the long-term average. Secondly, the extent that the actual rate would be affected by the inclusion of this lower estimate is unclear, as the entire range of ERPs proposed by the operators was not specified.

Further, Celcom submits that the MCMC's consideration of Professor Damodaran's ERP estimate effectively double counts the country risk. When the MCMC considers a Malaysian government bond yield as the basis for the risk-free rate, the risk of investing in Malaysia, over and above a "pure" risk-free investment, has been taken into account. Based on its review of Professor Damodaran's ERP, Celcom submits that his calculation has already added the country risk premium. Hence, applying Professor Damodaran's ERP would be correct if the MCMC's WACC calculation was based on a global risk-free rate, such as the US 10-year government bond yield.

As the MCMC has not provided the details on how the average ERP submitted by the operators was determined, Celcom proposes that the ERP as determined by Professor Damodaran, without the addition of a specific country risk premium, should be used as the basis for determining the cost of equity. The latest published rate is 5.13%. The rate is consistent with the range of ERPs used by regulators in other jurisdictions, whilst the MCMC proposed ERP falls outside the range.

TM submits that the risk-free rate, tax rate and ERP should be set based on local Malaysian data, and TM notes that reliance has been made primarily on Malaysian data. In addition, for the LRIC model which is forward-looking, the risk-free rate should be set based on the local bond market from the time period closest to the date of the Determination.

YTL submits that the use of a single ERP masks the differences in the level of returns expected of service providers. Further, YTL believes that the WACC for Mobile Network Services should be higher for new operators due to the risks and state of competition in the market.

Discussion

The MCMC notes that there is agreement amongst the majority of the respondents to the proposed common parameters within the WACC calculations. Further, it is also noted that TM recognised that the rates were drawn from the Malaysian market.

In response to the comments raised by Celcom on the risk-free rate, the MCMC does not agree that the use of a 10-year rate is unusual practice and it was chosen as being a suitable compromise between the respective time horizons of the charge period and the assets under investment by operators. Equally, the MCMC is not convinced that consideration of the various averages put forward by Celcom leads to any clear justification for revising the estimate.

Celcom also raises an issue with the exclusion of outlier estimates of the ERP. In point of fact, both the highest and lowest estimates (2.89% and 10.94%) were excluded in determining a consensus value. Removing these two values reduces the average slightly, from 6.15% to 5.89%. The MCMC notes Celcom's point about the inclusion of an element of country risk in the value quoted from Professor Damodaran and accepts that the value of 5.13% is correct.

The MCMC notes that YTL is concerned about a single rate for all mobile operators irrespective of size. The mobile model developed by the MCMC is intended to identify the costs of a reasonably efficient notional operator and is intended to assist with setting only the voice origination and termination services rather than the whole spectrum of retail services as offered by mobile operators.

As a result of consideration of the points raised by respondents, the MCMC proposes to retain the value of 4.00% for the risk-free rate and to change the value of the ERP to 5.13%.

Question 13:

Do you have any comments on the WACC values proposed for the Fixed Network Services?

Submissions received

APCC supports the use of the WACC as a method of factoring the cost of raising capital into the equation when calculating the regulated prices of facilities and services. The use of WACC has been widely accepted by many national authorities globally.

APCC submits that the appropriate WACC value to be applied should be 8.08%, which is the method of calculation which considers the Government funding as a pure subsidy with zero return. APCC supports this with its understanding that there is no specified rate of return in TM's PPP, after the first few years. The WACC value of 8.08% is also consistent with the WACC values applied by national regulators in Italy, the UK, Spain, Germany and France. If the WACC of 8.08% is not accepted, APCC proposes that a just and equitable route is to require the disclosure of the rate of return and to have the rate of return factored into the WACC calculation for fixed services.

Celcom submits that the gearing and equity beta assumptions proposed for the Fixed Network Services are inappropriate.

Celcom notes that the gearing is based on TM's submission, though the MCMC did not justify why the rate can be considered the rate of an efficient fixed network operator. In reviewing the data on TM's gearing from Bloomberg, Celcom observes that over time from 2014 to 2017, there is a consistent upward trend. This suggests that in setting the WACC over the regulatory period, a higher gearing can be justified. This is also consistent with international benchmarks.

On the international benchmarks selected by the MCMC, Celcom highlights that Spark and Singtel are not appropriate comparators for fixed telecommunication operations in Malaysia. They are not the owners of the underlying network infrastructure as the assets and operations have been transferred to separate infrastructure companies, and are therefore, primarily retail operations. Both Spark's and Singtel's low levels of debt are likely to be the result of these companies owning fewer assets against which debt can be secured. The remaining companies from the MCMC's benchmarks suggest a gearing of approximately 30%. Further, based on Celcom's review of international regulators' decisions on WACC, the gearings range between 30% to 40%. Hence, Celcom proposes that a gearing of 30% to 35% is more reasonable as a basis for setting the WACC of Fixed Network Services in Malaysia.

On the fixed network beta, Celcom comments that the equity beta submitted by TM was used based on a comparison against a number of comparator companies. However, Celcom views that comparison against an average is not an appropriate way to justify TM's submission.

Celcom also reiterates that the benchmarks used are not suitable due to the nature of their businesses. As explained above, Spark and Singtel are different from TM; they do not own infrastructure and focus on retail operations. Most of the operators in the benchmark also operate mobile business, such as PLDT and Telstra, which makes them unsuitable for a fixed-only network operator WACC.

Based on Celcom's review of TM's current and historic average betas provided by Bloomberg, it notes that they are significantly different from the beta submitted by TM. For the current, 1-year, 2-year and 4-year averages, they range between 0.61 and 0.64, with the current on the lower end of the range. This is based on estimating the equity beta against the main Malaysian stock market index. Another method used by regulators in open economies, like Malaysia, for estimating equity beta is to measure the volatility of the stock against a global index, such as the MSCI World Index. Based on this, the equity beta derived for TM is significantly lower, ranging from 0.11 to 0.05.

Given the lack of explanation in the PI Paper, Celcom was unable to establish the marked difference between its own finding and the MCMC's proposed rate for asset beta. As such, Celcom also reviewed the asset beta of regulatory decisions in other jurisdictions. It notes that the average of those asset betas is similar to TM's asset beta (derived from its current equity beta measured against the local Malaysian stock market index). At the same time, the average is very different from the MCMC's proposed rate and is higher than Celcom's estimate of TM's equity beta against the MSCI World Index.

In view of the differences between Celcom's findings and TM's submission, the lack of information about TM's own estimate and the unsuitable set of benchmarks used, Celcom urges the MCMC to revise its estimate of the beta and to bring it in line with the actual beta of TM.

Based on its submissions on risk-free rate, ERP, gearing and equity beta above, Celcom calculated two fixed WACC figures and proposes an average WACC of 7.42% as a better reflection of the actual financial data of TM, international regulatory precedent and best practice in terms of deriving WACC.

On the impact of HSBB funding, Celcom notes that by taking into account the value of the assets acquired through the funding without specifying the rate of return actually payable to the funding agency, the MCMC is allowing TM to obtain super-normal profits to the

disadvantage of consumers and Access Seekers. In that regard, rather than to account for the funding through the WACC, Celcom proposes that the MCMC should deduct the amount of funding from the asset values taken into account when estimating the cost of services. Celcom disagrees that it would be difficult to identify the assets that benefited from the funding, and the payments to the funding agency should be considered as expenses incurred. However, if the MCMC maintains that the funding should not be deducted from the corresponding asset values, then the WACC should be adjusted in such a way that only the risk-free rate (which is the rate at which the Government is able to finance the funding) is considered for the Government funded portion of TM's assets.

Digi submits that the WACC proposed for the Fixed Network Services is overestimated, and views that a WACC of 8.08% which is used for sensitivity analysis is a closer reflection of WACC for a notional fixed operator. Furthermore, Digi opines that networks that have received direct or indirect Government funding or are backed by local or state government bodies will have lower levels of risk, and Digi notes that this is not reflected in the WACC values.

On gearing, Digi notes that it is based on TM's submission, which Digi views is inclusive of the Government's investment in HSBB. Therefore, it is likely understating the efficient long-run gearing level in TM's capital structure. Hence, Digi recommends to use benchmarks, such as from S&P Global Market Intelligence that cites TM's actual gearing to be in excess of 51%.

Finally, Digi notes TM's WACC that is declared in its quarterly reports, is 6.94% as of 30 June 2017, whilst the current pre-tax WACC of TM based on Bloomberg is at 6.4%, both of which are lower than the proposed WACC.

Maxis proposes an amendment to the estimation of the asset beta by excluding PLDT and Singtel from the list of benchmarks, thereby reducing the average levered beta to 0.65. With that adjustment, the cost of equity is amended to 8.95%.

In addition, Maxis proposes to exclude the amount funded by the Government from TM's asset base in order to ensure an economically efficient outcome. This is not achieved if only a small discount of 5% is applied to the implied cost of capital as proposed by the MCMC. The inaccurate treatment of the amount funded by the Government will lead to over-recovery of costs by TM at the expense of the Access Seekers.

With regard to the WACC for the Fixed Network Services, Maxis proposes to use TM's last reported pre-tax WACC value of 7.2%. As almost all of the data input, cost input, assumptions and network dimensioning are based on TM's network, the WACC should also

be based on TM's WACC. This value is in line with fixed services benchmarks, such as IDA's 7% for Netlink Trust Singapore and Australia's NBN Co at 7.2%.

TM submits that the asset beta is a key parameter of the WACC, and the best practice is to rely on the median value of the betas of relevant comparator companies. The use of a large sample of firms will reduce statistical error compared to the use of a single beta of one firm. Median values are typically preferred to averages which may be skewed by outlier values. Hence, TM recommends that the MCMC use the median value of the sample, which is 0.905, which is more consistent with the notional efficient operator concept. This will revise the WACC for Fixed Network Services to 11.93%.

TM views that the discount of 5% to the implied capital costs leads to double counting of the impact of the Government's contribution to HSBB. The asset beta in the WACC is a measure of systematic risk. In addition, TM highlights that in New Zealand, the regulator has considered that Government contribution is irrelevant to the pricing of wholesale services. TM also notes that in New Zealand there is no revenue sharing arrangement. On the other hand, TM highlights that the European Commission endorses the addition of risk premium to the WACC ranging from 2.5% to 4.8% as it considers that the risk involved in such ventures are not reflected in the asset beta. The median of the risk premium is 2.85% and should be considered as a benchmark by the MCMC.

U Mobile submits that the WACC of 8.08% should be used for Fixed Network Services. As neither TM nor MCMC has been able to ascertain the level of returns for the Government under the PPP or isolate the services, it raises doubt as to whether there is a return. Without evidence to indicate that the Government's contribution is based on a commercial basis, there can be an assumption that the RM12.2 billion is a subsidy given to TM with zero return. U Mobile concurs that TM would not have accepted the contribution and the Government would not have provided the funds if they could have been reasonably secured via commercial arrangements from the capital market.

Discussion

The MCMC notes the various comments received from respondents to the proposed level of WACC for Fixed Network Services which, with the exception of TM, indicate an over statement of the WACC figure. Furthermore, the figures published by TM to the market also appear to be lower than the initial calculated value. Nevertheless, the MCMC is not persuaded that relying on TM's own figures would lead to a better estimate of the efficient WACC.

On the specific points raised, the MCMC accepts the argument that benchmark comparators need to be selected and interpreted with care. However, it is not always

possible to find exact replicas of the regulated firm. In this case, one issue is that TM is unusual amongst fixed network operators in not having ownership and control of a fully mobile arm. It is impractical, therefore to exclude such companies from the sample and to do so would simply have the effect of cutting off this source of information. On the other hand, the MCMC is persuaded that operators who have separated from their retail arm, particularly Singtel and Spark, may unduly bias the sample.

TM also make the point that the median may be a preferable measure to the arithmetic mean, because of the latter's potential for being affected by outliers. An alternative would be to exclude obvious outliers.

The question of HSBB funding continues to invite controversy amongst respondents. Whilst the MCMC is not persuaded of the case for regarding the funding as a straightforward subsidy, or of assigning it a zero capital cost, it does accept that the use of a notional 5% discount is somewhat arbitrary. The MCMC is therefore inclined to accept Celcom's suggestion of assigning that portion of the capital base the risk-free rate, on the basis that this is a good estimate of the Government's capital cost. This results in a discount of around 6%.

Excluding the two benchmark operators mentioned above results in arithmetic mean of 0.77 for the beta and 30% for the gearing and median of 0.73 and 30% for beta and gearing respectively.

As a result of the above considerations, it is the view of the MCMC that the following parameters will be used in the final calculation of the WACC for the fixed network services:

Table 1: WACC Parameters for Fixed Network Services

Parameter	Value
Risk-free rate	4%
Equity Risk Premium	5.13%
Tax rate	24%
Gearing	30%
Beta	0.77

As a result of these revisions to the parameters following inputs from the various respondents, the WACC for the Fixed Network Services will be 8.77% before the Government of Malaysia's investment in HSBB is taken into account. However, taking the cost of capital for the Government's investment at the risk-free rate of 4%, this reduces to 8.27% as a weighted average.

Question 14:

Do you have any comments on the WACC values proposed for the Mobile Network Services?

Submissions received

Celcom is unable to comment on the individual parameters of the WACC values as the rationale behind the choice of the parameters was not made clear. Nevertheless, Celcom proposes amendments to the debt premium and gearing.

In relation to the debt premium, Celcom notes that the lower end of the range, i.e. 0.23% is inconceivably low for a mobile operator, as compared to the debt premium for the fixed network, estimates from Europe and those derived by Professor Damodaran. Therefore, Celcom proposes that the lower end of the range for estimating the debt premium for the mobile network WACC should be based on the fixed network debt premium while the upper end of the range should be maintained at the level proposed by the MCMC.

Celcom views that the gearing calculation used by the MCMC to determine the WACC for mobile services is flawed. Rather than use the gearing directly (financial debt/equity ratio) when calculating the WACC, the ratios of equity and debt as a share of the total value of the company must be used.

Hence, based on Celcom's submissions on risk-free rate, ERP, debt risk premium and gearing, Celcom provided two estimates of WACC for the Mobile Network Services. Taking an average of those two estimates, Celcom proposes a WACC of 9.97% for Mobile Network Services.

Digi and Maxis agree with the proposed WACC for Mobile Network Services.

TM submits that the MCMC's results where the WACC for Mobile Network Services is higher than for Fixed Network Services is inconsistent with current best practice that recognises that a mobile business is not inherently riskier than a traditional fixed business. The recent empirical study in 2017 on behalf of Ofcom found no evidence of differences in systematic risk between the two types of business and that the asset beta associated with mobile operations is likely to be similar to fixed operations. TM further explains that historically, WACCs for mobile services were higher than those of fixed services as, at that time, mobile businesses were relatively new compared to fixed services. Currently, mass market mobile revenue streams are more certain than those of fixed services threatened by OTT services. Hence, there is a trend in Europe of equal WACCs for fixed and mobile or where the WACCs for mobile are lower than those of fixed.

Based on TM's examination of the EBITDA margins of the three largest Malaysian mobile operators and regional comparators, two of the Malaysian mobile operators are amongst the four most profitable in the regional sample. This result is consistent with a lower risk profile and implies that the asset beta for the WACC for Mobile Services has been overstated.

TM further comments that the median beta from the MCMC's regional comparison for mobile services of 0.74 should be used, consistent with best practice. This will revise the WACC for Mobile Network Services to 11.41%. The difference between TM's proposed WACC for Fixed Network Services and Mobile Network Services is -0.52% which is consistent with current regulatory and benchmark trends.

YTL submits that the use of a single ERP masks the differences in the level of returns expected of service providers. Further, for new operators such as YTL that have not generated net profits due to initial start-up costs will have a higher beta causing its WACC to be higher than that of the industry. The use of an average industry WACC will lead to under-recovery, and proposes that the WACC for Mobile Network Services should be higher for new operators.

Discussion

The MCMC notes the various comments received from respondents to the proposed level of WACC for Mobile Network Services and notes that Digi and Maxis support the proposed figure whereas YTL wishes to see a high figure for new entrant operators such as itself.

Celcom has raised questions over the calculation of the gearing ratios and the debt premium. In relation to the gearing ratio, the MCMC would concur that a market-based calculation is preferable and this is what has been used in the calculation. In relation to the debt premium, the MCMC is unsure why Celcom would assert that some of the figures put forward are "inconceivably low", given that they reflect the experience of actual operators in Malaysia.

The MCMC notes TM's observation that there has been a trend towards convergence in fixed and mobile WACCs in Europe. However, the MCMC does not accept that this is, in itself, an argument for changing any of the parameters. The approach the MCMC has followed, in common with many other regulators, is to calculate the WACC on the basis of its constituent parameters, rather than from an overall observation of trends elsewhere.

The MCMC notes the point made by YTL that small and new entrant operators are likely to face higher capital costs than the larger operators, but is not persuaded that the value for

the notional operator should be set accordingly, as this would be likely to lead to over-recovery of costs by operators with market power, to the detriment of consumers.

After careful consideration of the comments from the respondents and taking into account the change to the ERP, the WACC for the Mobile Network Services will be 10.00%.

Question 15:

Do you have any comments on the WACC values proposed for the Towers Services?

Submissions received

Celcom finds it difficult to comment on infrastructure and DTT WACC estimates due to a lack of detail of how the estimates submitted have been derived. However, Celcom notes a few inconsistencies as follows.

Celcom notes that a wide range of gearing between 12.9% to 65.6% has been provided by the operators to the MCMC, and the clear outliers have not been removed. On the cost of debt, Celcom highlights that the upper range, i.e. 2.5% is rather high and may be the result of suboptimal financial structure. Hence, Celcom proposes that this value should not be considered in setting a WACC to determine efficient access prices.

Further, Celcom views that the operations of tower companies are similar to that of infrastructure companies and their WACC should therefore be closer to the WACC of a fixed infrastructure company than an integrated fixed (retail and infrastructure) or a mobile business. For example, the WACC of Openreach is set 15% lower than the rest of BT's business WACC.

Apart from that, Celcom comments that its submission on risk-free rate and ERP are equally valid in deriving the WACC for Towers Services. Based on corrections of these common parameters, Celcom proposes that the maximum WACC for Tower Services is 10.04%.

Digi views that the WACC for Tower Services has increased from the initial 10% to 12.11%. Digi submits that due to tower companies having direct solid support from state government bodies and lack of competition, the risk for them is mitigated. As a reference, based on Bloomberg, the current pre-tax WACC of a public listed tower company is 6.9%, which is much lower than the proposed WACC value. Further, Digi also notes a high debt premium for tower companies, and expresses its concern that the sample used does not reflect the presence of state-backing which mitigates the risk for tower companies.

edotco views that the WACC for Tower Services should be higher, and should be materially higher than that of the mobile operators, to reflect the higher risk of tower companies in the market. In its view, tower companies have a weaker commercial bargaining position, and to enable a fair return on investment, the WACC should be higher.

Maxis is agreeable to the proposed WACC value for Tower Services as appropriate for the efficient notional tower operator in Malaysia.

PPIT and Sacofa view that it is more appropriate to select benchmark companies from emerging markets as opposed to American and European tower companies. However, they note that the proposed leveraged beta used is coincidentally consistent with their suggestion. Further, PPIT and Sacofa are agreeable to the point value for WACC for Tower Services as it falls within their proposed range. Finally, PPIT and Sacofa suggest that there might be an error in the WACC computation and request the MCMC to review the WACC for Tower Services.

TM highlights that the comparator data for the beta and gearing of tower companies is extremely limited and might have limited meaning for the local environment. TM suggests that either a larger set of benchmark data be used or alternatively, to place sole reliance on local information for the estimation of the WACC for Tower Services.

U Mobile submits that the gearing of some of the operators are as high as 66%. In such instances, inefficient tower operators could set unreasonably high prices and over-recover costs to the detriment of Access Seekers.

Discussion

The MCMC notes the various comments from the respondents to the proposed level of WACC for Tower Services.

In particular, concerns were raised about the selection of comparators and the treatment of outliers. Although comparator companies were quoted for reference, the MCMC does not feel that there was undue reliance on this source.

Although outliers were excluded in the calculation of the debt premium, the raw average was mistakenly used for the gearing. When the two extreme values of zero and 65.62% are removed, the average of the remaining figures is 23.49%.

After careful consideration of the comments from the respondents, with the changes to the ERP and the gearing at 23.49%, the WACC for the Tower Services will be 10.08%.

Question 16:

Do you have any comments on the WACC values proposed for the DTT Transmission Services?

Submissions received

Celcom finds it difficult to comment on infrastructure and DTT WACC estimates due to a lack of detail of how the estimates submitted have been derived.

Celcom nevertheless suggests that its submission on risk-free rate and ERP are equally valid in deriving the WACC for DTT Transmission Services. Based on corrections of these common parameters, Celcom proposes that the maximum WACC for DTT Transmission Services is at 9.60%.

TM makes a general comment that the MCMC has partly relied on a 10-year old study for benchmark information for parameters of the WACC for DTT Transmission Services. It is highly unlikely that the data would be relevant and expect that the proposed WACC value will have a very high margin of error.

Discussion

After careful consideration of the comments from the respondents and taking into account the change to the ERP, the WACC for the DTT Transmission Services will be 9.51%.

Question 17:

Do you have any comments on the range of WACC values proposed?

Submissions received

Celcom refers to its responses in the earlier questions. In addition, Celcom notes that the impact of applying the Monte Carlo simulation on the proposed WACC estimates is unclear. The MCMC stated that its point estimates are the preferred values for setting the WACC however, for the fixed services, a lower end of the Monte Carlo simulation range was considered for sensitivity analysis. In that regard, Celcom sought clarification as to the circumstances where the MCMC would choose to deviate from the point estimates.

Digi agrees with the approach to use selected point values. However, the WACC for Fixed Services and Tower Services should be reviewed.

edotco views that the WACC for Tower Services should be materially higher than that of the Mobile Network Services. In addition, given the growth of mobile operators as against fixed operators, edotco expects that the WACC for Mobile Network Services and Fixed Network Services to be similar.

Maxis is largely agreeable to the proposed WACC values for mobile network services, tower services and DTT transmission services. However, Maxis proposes to use a lower WACC for fixed services, i.e. based on TM’s last reported pre-tax WACC value of 7.2% (derived from Bloomberg). This is also in line with benchmarks such as IDA’s 7% for Netlink Trust Singapore and Australia’s NBN Co at 7.2%.

TM does not agree with the use of the WACC value of 8.08% for sensitivity testing for fixed services. This value was calculated based on the assumption that the Government contribution to HSBG is a pure subsidy with zero return. As this is a revenue sharing arrangement, the ‘pure subsidy’ scenario is inappropriate.

U Mobile is agreeable to the proposed WACCs, apart for the WACC for Fixed Network Services, which should be lower.

Discussion

The MCMC notes the comments made about WACC ranges. The purpose of quoting them was to show the effects of the individual parameter ranges under discussion of the overall values of the WACCs. Whilst this does not provide statistical confidence bounds, it does provide useful upper and lower limits within which the point estimates may be considered.

5.3. MCMC’s final view

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 2 below.

Table 2: Final WACC Rates

	Towers	Mobile	Fixed	DTT
WACC	10.08%	10.00%	8.27%	9.51%

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 Public Inquiry 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. A summary of how the initial comments from operators were taken into account following the initial model viewing was also presented. Section 17 presented the MCMC's proposed prices for the fixed services.

6.2. Summary of submissions received

Question 18:

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

Methodology

Submissions received

APCC supports the adoption of a bottom-up LRIC+ methodology for fixed services on the condition that the costs of the network are adjusted by the value of the fully-depreciated assets. This is in line with the trend in a number of countries in the EU.

Celcom does not consider that there are sufficient reasons in the PI Paper for the MCMC to disregard the 'first-best' approach, which is the step-by-step approach. Firstly, the difficulty in allocating assets to networks or services can be addressed on the basis of usage or other causal factors. Secondly, detailed historical cost data should be readily available. Thirdly, the cost of high data requirements on TM cannot be compared with the higher costs borne by Access Seekers and end users as a result of implementing a sub-optimal approach. Celcom also comments that regulators in other jurisdictions have followed such an approach, and Celcom does not agree that the reasons given by the MCMC are legitimate barriers to implementing the 'first-best' approach.

Celcom finds that the MCMC's justification in the PI Paper to change to a bottom-up LRIC model based on the EC Recommendation as unconvincing. The recommendation refers to NGA investment whereas TM's network is largely copper-based, and to apply bottom-up costing principles to copper investments that are heavily depreciated is different from applying them to NGA investment. In addition, the recommendation refers to a hypothetically efficient operator, however, Celcom notes that TM's data is used almost without reservation. Finally, Celcom underscores that when regulation moves from a top-down or modified top-down approach to bottom-up approach, it is important that this does not result in windfall gains to the incumbent through over-recovery of costs.

Celcom's concern, as expressed in the PI Paper, is not that the bottom-up LRIC model leads to over-recovery of investment cost. In fact, Celcom's concern is that a network in which its assets are more than halfway through their asset lifetime (referring to TM's access network), a move from top-down approach to bottom-up approach will allow operators to over-recover their costs. This is the case even where fully-depreciated assets are excluded, as recognised by Ofcom in its 2005 examination of BT's copper local loop.

Likewise, Celcom asserts that its concern is not with tilted annuities methodology itself, but with the combination of using accounting methodologies in the early years of an asset's lifetime with tilted annuities in later years, for assets which are rising over time. In such circumstances, it is important to make an adjustment to eliminate any windfall gains that this combination method grants to the incumbent. Celcom also submits that there is little merit in showing the sensitivity using simple annuities as this is inappropriate for asset prices that change over time.

Celcom notes that dummy data has been used instead of real data, for confidential reasons. In response, Celcom reiterates that there are numerous publicly available bottom-up models published with real data. Most of the data used in the fixed model such as length of the access network, routing factors and times taken to install equipment, is not confidential; and confidential data such as equipment costs can be disguised.

On a related point, the MCMC's suggestion for operators to use their own data to populate the fixed model is unrealistic. Firstly, it is a major exercise for an alternative operator to estimate the length of TM's trenches and cables particularly for the access network. Secondly, whilst Celcom may be in a position to estimate data such as trench and equipment costs, equipment costs vary significantly between countries and between operators in the same country. Thirdly, crucial data such as the levels of calls and broadband is unknown. Fourthly, populating the model with dummy data does not allow third parties to verify that calculations within the model have been made correctly.

Maxis agrees with the approach to base the fixed network model in Malaysia on TM's network. However, Maxis expresses concern with the lack of data in the fixed cost model that inhibits proper assessment to be made. In that regard, Maxis suggests that the incumbent's costs be benchmarked against international operators' data. Further, Maxis submits that the problem of commercially sensitive and confidential data has been addressed in models of other countries, such as the UK, France, Spain, Sweden, Denmark, the Netherlands, Cyprus and Norway, through the use of disguised, rather than dummy data. This is critical for the fixed cost model as the incumbent will have a significant and non-replicable advantage in reviewing the model compared to other stakeholders. For other operators, with only dummy data, it is very difficult to verify model calculations and the reasonableness of forecast assumptions which increases the risk of model errors.

Maxis supports the use of LRIC+ costing methodology for fixed services, however, it expresses its concerns on the outputs of the model. For example, the fixed network termination prices are among the highest in its benchmark of countries, transmission-related prices are much higher than current market prices and HSBB Network Services prices are higher than the retail prices offered by TM to its end users. This seems to indicate that input costs, network dimensioning and modelling assumptions require further review by the MCMC.

Maxis firmly supports the approach to not include stranded assets in the fixed assets and to model a fully NGN fixed network without any legacy assets. It reiterates the approach of the ACCC to remove stranded assets when the NBN migrated to new fibre-based services. In Malaysia, Maxis submits that TM will no longer offer ADSL services for premises that have subscribed to HSBB, and suggests that a similar treatment as Australia be followed for the copper assets. Maxis further supports the reuse of 100% of civil infrastructure in the model, however, it suggests that the appropriate asset life be 35 years, which is the midpoint of BEREC's Regulatory Accounting Review's benchmark of 30 – 40 years. ACCC also uses the depreciation lifespan of 35 years.

TIME agrees to the use of the bottom-up model, however, disagrees to the use of LRIC+. It views that LRIC+ heavily discounts on the investments made in the earlier years on fibre and civil works. Further, the cost of fiberisation will not reduce at the same rate as equipment and may increase due to permits and labour costs. For the fixed network, TIME recommends the use of a FAC model for fibre investment.

TM, in its submission to Question 4, highlighted that the MCMC's approach in writing down many network and non-network assets departs from LRIC. In addition, this is done by arbitrarily selecting assets and writing down as much as 90% in order to match 2016 estimated depreciation with actual depreciation. TM submits that there is no rationale for markdowns of selected assets, particularly for the local fibre rings by 90%. These are the

fibre rings that connect outdoor MSAN cabinets to exchanges and should be treated as E/S fibre rings.

Discussion

The MCMC agrees with the APCC's view that bottom-up LRIC+ is the correct methodology for fixed services under the condition that the costs of the network are adjusted by the value of the fully-depreciated assets. This adjustment was done in the fixed network model which was used for the calculation of the costs of fixed services.

Celcom suggests that historical cost data should be available and high data requirements on TM should not prohibit the usage of the step-by-step approach. The MCMC confirms that these two reasons definitely did not prohibit the usage of the step-by-step approach because it actually does not use any historical cost data and does not result in high data requirements on TM. Discussion of Celcom's comments about the use of a top-down model or the step-by-step approach is provided in Question 4.

The MCMC notes the concerns expressed by Celcom on the effect of a change of methodology from a top-down approach with straight-line depreciation to a bottom-up approach with tilted annuities on the incumbent's assets, which are in the later years of their lifetimes. This discussion was covered in Question 4. The MCMC also agrees with Celcom's comment that showing sensitivity using simple annuity has little merit, because the assets in the model change prices, and tilted annuity is therefore the preferred method.

Many submissions highlighted that the fixed model populated with only dummy input data limits the evaluation or verification by stakeholders. The MCMC would like to stress that this is not true. Though it is not possible to evaluate the actual input values, it is possible to evaluate the model itself and all the calculations performed in the model. All calculation formulas are included in the model and third parties can follow all calculation steps from the input cells to the costs of the services. In addition, the model was accompanied by a model manual which describes all calculations in detail. On a related point, to address comments by Maxis, the MCMC confirms that it has reviewed and benchmarked the model inputs after the data was received from TM. Furthermore, the MCMC has also reviewed the model calculations and the routing factors.

The MCMC understands the desire of other stakeholders to see the real input values but it is unfortunately not possible due to confidentiality restrictions. Celcom argues that many of the input data should not be confidential. However, the MCMC must respect the confidentiality placed on data by its owners.

There was a suggestion that the MCMC should populate the model with some realistic input values (by using benchmarks or disguised values), however, this suggestion provides no further information to stakeholders. As mentioned above, the evaluation of the model calculations is possible and evaluation of real input values would not be possible, even where benchmarks or disguised values were entered into the model.

The MCMC confirms that the fixed model does not include costs of any stranded assets. As the number of assets is driven by the service volumes, assets which are not necessary to provide services are not included in the model. The model assumes replacement of copper cables in the access network and MSANs with fibre cables and OLT respectively due to the migration of customers from copper-based broadband services to fibre-based broadband services. Stranded assets are thus removed from the model. This corresponds to the comment from Maxis that TM will no longer offer ADSL services for premises that have subscribed to HSBB.

The MCMC agrees with Maxis to use 35 years (which is the midpoint of BEREC's Regulatory Accounting Review's benchmark of 30 – 40 years) as the lifetime of the civil infrastructure in the model.

The MCMC does not share the opinion of TIME that LRIC+ heavily discounts the previous fibre and civil investments made, which were expensive in the earlier rollout years, and that a FAC model should be used for fibre investment. The change in the value of assets is caused by the use of current cost in the model. However, current cost can also be used in a FAC model, therefore using a FAC model would not resolve this issue. In addition, the MCMC is of the view that it is correct to use service costs calculated on the basis of current cost of assets for price regulation.

The issues raised by TM regarding the mark-down of fixed assets are dealt with in Question 4 on costing methodologies. TM specifically disagrees with the mark-down of local fibre rings as they connect outdoor MSAN cabinets to exchanges and should be treated as E/S fibre rings. The MCMC agrees with TM and has changed the calculation of the local rings using E/S cable (access network fibre cable) instead of the transport network cable.

Service volumes

Submissions received

Celcom notes that data traffic is expected to increase by 14% which may be reasonable, in principle. However, Celcom comments that it is unclear whether the implied busy hour Kbps per subscriber matches TM's actual Kbps per subscriber. In addition, it is not possible

to observe how the forecast traffic growth rate of 14% per annum has been derived or how it has been implemented in the model.

On the service demand and traffic, Maxis agrees on the usage of TM's past, current and future volumes, however, suggests that the MCMC should clarify on how it verifies and confirms the accuracy of the data. Further, clarification should also be provided on how the input data is benchmarked with other jurisdictions. Maxis also provided its estimates on data traffic trends, which grows at 38%. Finally, Maxis expresses its concern that a service volume of 1 unit is used for those regulated services where there is no take-up, and suggests that, at a minimum, to use some initial service volume estimates and to perform sensitivity analyses to verify the reasonableness of the estimates and its outputs.

Discussion

As requested by Celcom, the MCMC provides further explanation regarding the data traffic in the fixed model. The expected increase of data traffic in the fixed model was estimated by TM as part of the data collection. The future traffic was estimated individually for each service and in total it gives the 14% increase. Therefore, the value of 14% as such was not estimated and also was not used in the calculation in the model. The MCMC is of the same opinion as Celcom that this increase seems to be reasonable, and accepted the expected traffic values submitted by TM.

Maxis provided an estimate of future data traffic growth in the fixed network of 38%. As Maxis did not provide any clear reason why the 38% growth should be better than the 14% growth expected by TM, the MCMC decided not to make any changes in this regard to the model.

The MCMC notes Maxis's concern regarding the use of service volume of 1 unit for services without take-up. The MCMC would like to assure Maxis that using the volume of 1 unit does not have any effect on the unit costs of the services. There is no network element, which would be used only by these services which have no take-up. Therefore, there is sufficient traffic or number of lines going through all network elements from services which have some real take-up and the costs of network elements per unit of service are based on reasonably utilized network elements. Adding an additional unit of the service which has no take-up to the existing traffic or number of lines enables the model to calculate the costs of each network element per unit of service under the existing total service demand. Conversely, by adding higher volumes to services without take-up would artificially increase the total traffic or number of lines in the model above the real service demand in the market.

Data inputs

Submissions received

Celcom notes that it is apparent that in almost all instances, the fixed model uses data from TM without any attempt to assess whether its network is efficient. Celcom provides a few examples: the trench length of TM's network may be greater than that of an efficient network; TM's copper network may be too long; and the mix of cable types in TM's network may be inappropriate. The objective of the bottom-up model is to model an efficient operator with the same coverage and demand as the incumbent. Using the incumbent's actual data, such as route lengths and operating costs, goes against this objective and means that there is insufficient optimisation in the model and so it falls short of best practice.

Celcom adds that routing for leased lines may be different from those for other traffic. A satisfactory model would need to capture actual leased line routings or to use end-to-end data on leased lines in order to work out optimal routings, and it is unclear to Celcom which approach has been adopted.

Maxis provides further inputs on the values that the MCMC has used in the model reconciliation section, where the average SMS size should be 160 characters, lifetime of drop cables and drop points is 20 years, lifetime of BTU at 7 years and the unit price for FTTH cabinets at RM12,000 (outdoor) or RM13,000 (indoor).

Discussion

The MCMC confirms the understanding of Celcom that routing factors for leased lines are different from those for other types of traffic. The other issues highlighted by Celcom regarding network optimisation and the use of TM's data are covered in Question 6 on costing methodology adopted.

The MCMC does not agree with Maxis that the average SMS length should be 160 characters, because 160 characters is the maximum length of an SMS and not the average length. Therefore, the MCMC decided not to change this value in the model.

The MCMC also does not agree with Maxis that the lifetime of a BTU should be 7 years. The MCMC is of the opinion that a BTU will be replaced more frequently due to increases in broadband speeds. Therefore, the MCMC decided not to change this value in the model.

The MCMC decided to change the unit price of fibre cabinets to RM12,500 as submitted by Maxis.

Further, the MCMC decided to increase the lifetime of transport network cables, drop points and drop cables to 25 years to be in line with the access network cables.

Network dimensioning

Submissions received

With respect to the discussion of network dimensioning in the PI Paper, Celcom says that it was limited and inaccurate. Celcom cites that the PI Paper mentioned the dimensioning of the access network; however, in reality there appears to be no dimensioning of the access network. It only shows duct, trench, copper and fibre cable lengths with some limited breakdown by part of the network for cable lengths. Celcom adds that as far as can be detected, there appears to be no attempt to verify whether the lengths are those of an efficient operator. The copper and fibre cable lengths are not even differentiated by the number of pairs.

Celcom views that the discussion on contention ratios appears to have confused dimensioning with allocation. Celcom clarifies that its concern is in the dimensioning of the broadband network. In this regard, the average busy hour usage or Mbytes per month is a reliable method. On the other hand, it is not obvious that using contention ratios will either estimate demand correctly or produce correct forecasts.

Celcom further opines that the MCMC's response on MSANs is unconvincing. The purpose of a bottom-up model is to model an efficient network, and the fact that the model produces the same results as in TM's actual network does not provide confidence that the approach is correct. In addition, it is implausible that data on the number of subscribers at individual MSAN sites and the cost of different sizes of MSANs cannot be obtained.

Celcom comments on the statement by the MCMC that DWDM is required to send the signal from the MSAN to the local ring fibre. The role of DWDM is not to transmit data, but to expand the capacity that can be transmitted on a given number of fibres. In a bottom-up model, it is argued that any form of WDM is used where it is cheaper to combine fewer fibres with such equipment than to install additional fibres. Hence, in the Swedish and Danish models, little WDM is used, and none (to Celcom's knowledge) use DWDM between the MSAN and aggregation switch, though some use Coarse Wavelength Division Multiplexing (CWDM). Celcom also provides further anecdotes in the UK which suggests that CWDM, which is cheaper than DWDM, is used at around 20% of MSAN sites while DWDM is used higher up in the network. Celcom concludes that the optimal amount of WDM and DWDM in a bottom-up model is likely to be less than in an operator's actual network.

Finally, on the allocation of chassis that is based on space occupied rather than on the cost of cards, Celcom comments an allocation on the basis of cost is more consistent with the established EPMU approach.

Maxis is unable to comment on the network dimensioning and suggests the MCMC to benchmark the scorched node network dimensioning used in the model with those in other countries, such as BT in the UK and Telstra in Australia.

Discussion

The issues highlighted by Celcom regarding the dimensioning of the access network, network optimisation and the use of TM data are covered in Question 6 on costing methodology adopted. In addition, the MCMC confirms Celcom's understanding that the fixed access network dimensioning is based on existing data from TM's access network. The number of equipment in the access network was divided by the corresponding number of access lines (number of access lines using the particular type of access network equipment) and this average use of equipment was multiplied by the expected number of access lines in each of the modelled years. The fixed model contains the formulas performing these calculations, and accompanying manual also describes the calculations in detail.

Celcom further mentions that in the dimensioning of the access network, the cables are not differentiated by number of pairs. While this is true, broad categories of cables (drop cable, drop side cable, exchange side cable) and their average prices, covering the different number of pairs in each of the categories, were used. The MCMC agrees that using average values instead of individual cable types differentiated by number of pairs is less precise, but more detailed data was not available. Further, as the largest contribution to the cost of the cable route is the trench and duct, the influence of the number of pairs (especially in the case of fibre optic cables) is not as significant. The MCMC would like to add that under the step-by-step approach, which is preferred by Celcom, even these broad categories could not be distinguished.

Based on Celcom's comments, it appears to the MCMC that there is still a lack of clarity in the usage of contention ratios in dimensioning as opposed to allocation. The contention ratio is the relationship between the nominal speed of a broadband line and the minimum guaranteed speed. This means that in the busy hour the customer must be able to use at least the nominal speed of his line multiplied by the contention ratio. The network should be dimensioned so that it can provide at least this minimum guaranteed speed to all customers. Therefore, this amount of traffic from broadband lines was used for network dimensioning. The same traffic was also used for allocation of costs.

On the MSAN sizes, the MCMC agrees with Celcom that using different MSAN sizes would be preferable over using an average MSAN size. However, it was not possible to obtain data about the different MSAN sizes from TM, and therefore, the MCMC used the average MSAN size. The MCMC has verified the result calculated using the average MSAN size against the total GBV of MSANs from TM to ensure that there was no significant effect. Therefore, the MCMC is of the opinion that it can use the average MSAN size in the model calculations even if it is not the most precise method of calculating the MSAN costs.

The MCMC agrees with Celcom's submission that CWDMs would be sufficient in the local rings. This change has now been incorporated into the final model calculation.

The MCMC does not agree with Celcom's submission that chassis should be allocated between individual cards based on their cost. While it is true that allocation based on cost is consistent with EPMU, this should only be done where there is no direct causal relationship. There is a strong causal relationship between chassis and cards because each card occupies a slot in the chassis. Therefore, this causal relationship should be used as a basis of the allocation and not the EPMU approach.

Network costing and service costing

Submissions received

On network costing and service costing, Celcom highlights that there was no information provided in the model on asset lifetimes and price rate changes, therefore it is difficult to assess whether the assumptions used are reasonable. In addition, Celcom is unclear on why operating cost information is also treated as confidential. Celcom further infers that TM's data and information may have been used without any cross-checks being carried out or benchmarking of data with other operators in Malaysia or other jurisdictions.

Maxis is unable to provide further input for the network cost including the equipment cost and economic lives, and requests for benchmarking with other jurisdictions' data. Likewise, for service costing, though Maxis agrees with the approach taken, with the lack of visibility of the data, Maxis urges comparison with the common network routing factors used in other countries.

Discussion

The MCMC notes the comments from Celcom and Maxis, and has already addressed the issues on confidentiality of data and the verification and benchmarking of the data.

Treatment of HSBB

Submissions received

Digi seeks clarification on how the 5% discount amount is assumed. In addition, Digi views that the operator receiving the funds from the Government should provide more clarity to the MCMC that they are indeed repaying the funding agency with full commercial returns on the projects undertaken. Digi also submits that the cost of capital should technically be lower due to the PPP.

On the treatment of HSBB subsidies, Maxis disagrees with the view of the MCMC to not exclude the RM2.7 billion contribution from the Government from the total calculated cost of access to Fixed Services. Maxis continues to view that a reduction in the asset base is an economically efficient approach; rather than to apply a small discount of 5% to the implied capital costs, as proposed by the MCMC. An ideal way is to exclude the Government contribution and to provide additional sensitivity analysis on the impact to the final prices. Maxis submits that the 5% discount measure, being such a significant approach, is not sufficiently justified in the PI Paper and requests further clarification for arriving at this quantum. Maxis notes that even when there is no return required, the WACC is at 8.08%. This is high in comparison with the WACC applied by IDA on Netlink Trust of 7%, where there is Government funding for fibre rollout, and that for Australia's NBN Co at 7.2%. In that regard, Maxis proposes that MCMC reconsider its approach on treatment of HSBB subsidies by firstly, excluding the amount funded by the Government from the total calculated costs for Fixed Services, particularly for Layer 2 and 3 HSBB Network Services; and secondly, using TM's last pre-tax WACC of 7.2%.

Discussion

Many submissions argue that applying the 5% discount on cost of capital is not enough to deal with the Government subsidy. The MCMC has reconsidered the situation around the Government subsidy and a final WACC value and, as discussed in the WACC section of this PI Report, have set the cost of capital for the Government's share of the investment in HSBB at the risk-free rate, i.e. 4%, resulting in a WACC of 8.27% overall.

MCMC's Final Views

The MCMC continues to view that it is appropriate to use LRIC+ to model the fixed access and core network. The MCMC also affirms that it is appropriate to adjust the fully-depreciated assets in the fixed network. In addition, the fixed model accounts for the migration effects from copper-based ADSL services to fibre-based FTTH services and therefore does not include stranded assets. The MCMC has taken note of the submissions

and has made the amendments to the model, where it is appropriate. Finally, the MCMC has decided that in taking account of the Government's contribution to the HSBB, the WACC for the fixed network services is set at 8.27%.

Question 19:

Do you have any comments on the proposed prices for the fixed services in the Access List?

Fixed Network Origination Service and Fixed Network Termination Service

Submissions received

Celcom supports the proposed charge level and structure for Fixed Network Origination and Termination Services, subject to the amendments made to the fixed model, as proposed by Celcom.

Digi notes that the absence of data in the fixed model has hampered the ability of Digi and other Access Seekers to fully evaluate the costs and allocation of fixed assets. Nevertheless, Digi submits that the cost of Fixed Network Termination Service should be consistently lower than the Mobile Network Termination Service as set by other regulators. Hence, Digi suggests that a benchmarking of TM's costs with other regulated fixed operators be carried out.

Maxis agrees with the approach taken to have a single Fixed Network Termination rate and a single Fixed Network Origination rate, without distinction between PSTN and IP calls or between local, single tandem, double tandem and submarine cable. However, Maxis comments that prices for both Fixed Network Origination Service and Fixed Network Termination Service are too high. According to Maxis's benchmarked countries, the proposed fixed termination rates are among the highest; and the fixed termination rates are generally lower than mobile termination rates. This is not the case in Malaysia.

webe submits that it is confusing that the cost of submarine cable is not a significant component for fixed voice traffic but it is significant for mobile voice traffic. It is only logical that with the declining trend of volume of fixed minutes, with the same operational cost, the cost per minute should increase. However, this is not reflected in the proposed methodology and in the prices.

Discussion

The MCMC confirms its decision to set only one fixed termination rate and one fixed origination rate without distinction between PSTN and IP calls or between local, single tandem, double tandem and submarine cable. This decision was welcomed by Celcom and Maxis.

The MCMC does not agree with the comments made by Digi and Maxis that the cost of the fixed termination service must be lower than the cost of the mobile termination service. It is true, that it usually is the case, but it does not mean that the cost models must be modified in order to achieve such a result. The MCMC is of the opinion 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.

On webe's query on why the submarine cable cost is not significant for fixed voice services (and therefore the fixed voice services are not split into services using and not using the submarine cable) while it is significant for mobile voice services (and therefore the mobile voice services are split into services using and not using the submarine cable). The reason is that the costs of the submarine cable between Peninsular Malaysia and Sabah and Sarawak in the fixed network are shared with data transmission services. As voice services consume a very low capacity compared to the data transmission services, the share of submarine cable costs allocated to fixed voice services is very low. Therefore, the cost of the submarine cable is not significant in relation to the other costs of the fixed voice services. Consequently, the total costs of fixed voice services within Peninsular Malaysia or Sabah and Sarawak and between Peninsular Malaysia and Sabah and Sarawak are almost the same. The MCMC has received further feedback during the Public Inquiry, and will discuss the submarine cable with respect to mobile services in Question 24.

webe also comments that with the declining trend of volume of fixed minutes and the same operational cost, the cost per minute should increase. The MCMC would like to explain that the voice traffic represents only a small part of the total traffic in the submarine cable and the decrease in voice minutes therefore causes only a small increase in per unit costs. If the voice traffic would represent for example 10% of the total traffic in the submarine cable and the amount of voice minutes would decrease by 50%, it would mean only a 5% decrease in total traffic volumes and a 5.2% increase in per unit costs under the assumption that data traffic would remain unchanged. However, data traffic is actually growing so in reality even if voice traffic is decreasing the total traffic in the submarine cable increases and therefore the per unit costs decrease.

MCMC's Final Views

The MCMC confirms its preliminary view and sets the final prices for the Fixed Network Origination Service and Fixed Network Termination Service as follows.

Table 3: Fixed Network Origination Service Final Prices

	2018	2019	2020
Outgoing national calls (Sen/min)	3.54	2.55	1.56

Table 4: Fixed Network Termination Service Final Prices

	2018	2019	2020
Incoming national calls (Sen/min)	3.21	2.33	1.45

Interconnect Link Service

Submissions received

Altel, in its submission to Question 9, also highlighted that the proposed installation charges for Interconnect Link Service is excessively high compared to the current prices.

APCC agrees with the decision to regulate the prices of Interconnect Link Service as such transmission services face high barriers to entry and remains a key input to all telecommunications services. However, the proposed regulated prices are almost a 10-fold increase and is highly disproportionate to the 2015 price in the Mandatory Standard on Access Pricing in 2012. Even taking into account the migration to bottom-up LRIC+ costing method, the increasing cost of cables and related civil infrastructure, APCC views that on balance this does not address such a substantial increase in prices. Hence, APCC proposes to maintain the previous method used which is based on the cost of trunk fibre.

Celcom views that the price for Interconnect Link Service is not cost reflective as it is 40 times greater than the current regulated charges, and should be reduced. It is plausible that the trench, duct and cable used have not been shared with other users. The installation charge also appears unrealistically high. One plausible reason is that the man hours provided by TM includes overheads which are separately applied in the fixed model. Celcom's own data shows that the average cost of installing an Interconnect Link is below the RM20,000 used in the model.

Maxis agrees to regulate the prices of Interconnect Link Service. However, Maxis highlights that within the 5 years' span, the cost of providing Interconnect Link Service

has increased by more than 43 times. Hence, Maxis recommends reviewing the input data, assumptions and network dimensioning.

TM also submits that there is a more than 4,000% price jump for Interconnect Link Service as compared to the most recent regulated price in the Mandatory Standard on Access Pricing. It is illogical that there is such a price increase as the network has been established since the emergence of mobile operators, has remain unchanged and is almost fully-depreciated. This price increase would also hinder operators to move into IP interconnection as they would enjoy higher revenue over legacy assets. Hence, TM proposes a consistent approach where the IP environment should be applicable and the price should be distance independent, as adopted for transmission services.

U Mobile submits that the proposed price of Interconnect Link Service has increased by 43-fold from the price in 2015, whilst the service has not changed. U Mobile sought clarification on the vast discrepancy. Further, in the last Access Pricing review in 2012, there was a downward trend of prices. Finally, the installation cost for Interconnect Link Service seems excessive and unjustifiable.

webe submits that there are inconsistencies of the cost elements in the calculation of different services. webe notes that there is a significant price jump of more than 4000% for Interconnect Link Service as compared to the regulated prices in 2015. The increase is not reasonable as this is not a new service and there has not been a change to the service. In addition, most of the equipment should be almost fully-depreciated. The price trend would not encourage service providers to move to IP interconnection as they could enjoy higher revenue over legacy assets. Finally, webe opines that a consistent approach should be adopted, i.e. that the proposed price should be distance independent as adopted for transmission service.

Discussion

APCC, Celcom, Maxis, TM, U Mobile and webe commented on the high costs of the Interconnect Link Service and the change from the previous price. This was caused by the fact that the Interconnect Link Service was calculated as an independent, dedicated fibre cable using a completely new route. Based on the comments from the respondents, the MCMC realized that this is not realistic and has now recalculated the cost of the Interconnect Link Service as a fibre link.

Altel, Celcom and U Mobile mentioned very high costs of installation of the Interconnect Link Service. The costs were calculated based on the number of working hours per installation and the average hourly rate of a technician performing the line installation.

Both values were submitted by TM. Based on this feedback, the MCMC has decided to revisit these inputs and reduced the number of hours needed for the installation.

TM and webe propose for the price of the Interconnect Link Service to be distance independent in line with the pricing structure of the transmission services. The MCMC does not agree with this proposal because the Interconnect Link Service does not represent transmission in the core network of the access provider but it represents a dedicated link between the core network of the access provider and the location of the access seeker. The costs of the Interconnect Link Service are therefore distance dependent.

MCMC’s Final Views

The MCMC confirms its preliminary view and sets the final prices for Interconnect Link Service as shown in the table below.

Table 5: Interconnect Link Service Final Prices

	2018	2019	2020
Interconnect Link Service monthly rental (RM/km/month)	31	32	34
Interconnect Link Service installation (RM/installation)	2,555	2,683	2,817

Wholesale Local Leased Circuit Service, Trunk Transmission Service and End-to-End Transmission Service

Submissions received

Altel, in its submission to Question 9, also highlighted that the proposed installation charges for Trunk Transmission Service and End-to-End Transmission Service are excessively high compared to the current prices.

APCC agrees with the decision to regulate the price of Wholesale Local Leased Circuit Services. APCC notes that there was no distinction between the prices in Peninsular Malaysia from those in Sabah and Sarawak, as in the Mandatory Standard on Access Pricing in 2012. There was no reason provided and APCC is concerned that such an approach means that the geographically averaged prices used would result in higher prices overall. In addition, based on global benchmarks, installation costs should not exceed USD 200, and the proposed installation prices are excessive and should be revised in line with international benchmarks. Finally, APCC submits that the current categories of prices are too wide and proposes the following segmentation: up to 1 Mbps, 1 Mbps – 10 Mbps, 10 Mbps – 100 Mbps, 100 Mbps – 500 Mbps, 500 Mbps – 1 Gbps and 1 Gbps – 10 Gbps.

Celcom submits that the price of Wholesale Local Leased Circuit Service is above efficient cost levels and should be reduced. In addition, the proposed scope of the regulated service should be clarified. The charges of the intermediate services between 1 Mbps and 1 Gbps should also be included. Similarly, Celcom views that the price for Trunk Transmission Service and End-to-End Transmission Service are above efficient cost levels and should be reduced. There should also be charges for intermediate services between 1 Mbps and 1 Gbps.

Digi supports the removal of distance and circuit-based pricing to capacity-based charging for Trunk Transmission Services. However, Digi proposes the prevalent bandwidth range, i.e. 5 Mbps, 10 Mbps, 20 Mbps, 100 Mbps, 200 Mbps, as there is a huge variance between 1 Mbps and 1 Gbps that are proposed by the MCMC. In addition, Digi submits that the proposed prices for 1 Gbps appears to be overstated and is higher than the current market rates.

Fibrecomm submits that the prices for Wholesale Local Leased Circuit Service, Trunk Transmission Service and End-to-End Transmission Service are comparatively low when compared to the current market price. Fibrecomm suggests that the prices should increase taking into consideration the cost of maintenance of equipment, cables and labour for installation, as maintenance and cost of labour increases each year. Finally, Fibrecomm seeks clarification whether the price is for 1 Mbps or for each Mbps, where if 5 Mbps is requested, the applicable price is the price of each Mbps multiplied by 5.

Maxis agrees with price regulation of Wholesale Local Leased Circuit Service, Trunk Transmission Service and End-to-End Transmission Service. However, Maxis proposes for more tiers to be included, as there could be potential conflict between the Access Providers and Access Seekers. For example, if 100 Mbps is subscribed, should the price be the price of 1 Mbps multiplied by 100 (RM12,600 per month) or 1 Gbps divided by 10 (RM2,859 per month). Hence, Maxis proposes the following tiers: 1 Mbps, 10 Mbps, 100 Mbps, 200 Mbps, 500 Mbps, 750 Mbps, 1 Gbps, 3 Gbps, 5 Gbps, 10 Gbps, 20 Gbps, 50 Gbps and 100 Gbps. Secondly, the proposed regulated prices are substantially high in comparison with the current market prices offered by Access Providers in Malaysia and regulated prices in the UK and Australia. Hence, Maxis proposes that the input data, assumptions and network dimensioning be reviewed.

Sacofa submits that as a fibre operator operating more than 11,000 km of fibre in Sarawak, it was not invited to submit data and comment on the cost model. It views that the proposed cost for Wholesale Local Leased Circuit Service, Trunk Transmission Service and End-to-End Transmission Service does not include operational and maintenance cost of fibre. Further, due to the geographical area, the proposed prices may not be sufficient to cover their operational and maintenance cost.

TIME disagrees to the proposed single price for a wide bandwidth range. Prices are dependent on the size of bandwidth, tenure of lease and location of customers. Hence, TIME proposes the consideration of additional parameters.

As regards to Trunk Transmission Service, TM requests clarification that the price of the service per 1 Mbps and per 1 Gbps is costed from exchange to exchange and does not include a connection to the POI.

With regard to End-to-End Transmission Service, TM notes that the 1 Mbps has been costed based on a copper line, and the cost of fibre access between 1 Mbps and 1 Gbps has not been considered. This may cause confusion during negotiation of Access Agreements, hence TM request that either the approach for End-to-End Transmission Service is changed to encompass 1 Mbps based on fibre access using UPE equipment or to explicitly clarify in the PI Report that the 1 Mbps is based on copper only.

TM notes that the Wholesale Local Leased Circuit Service has been modelled to include only the cost of access network elements, with no traffic driven elements. However, TM highlights that this service comprises of local access (equipment and fibre access), trunk and physical interconnection. Hence, TM sought clarification on the proposed price for this service. Further, TM notes that there is no bandwidth cap for the 1 Gbps using DWDM, and may lead to confusion during negotiation of Access Agreements. TM also urges that the Wholesale Local Leased Circuit Service using DWDM, which is a customised solution, should not be regulated.

On Wholesale Local Leased Circuit Service and End-to-End Transmission Service, U Mobile notes that the installation cost for both are exorbitant. The proposed prices for End-to-End Transmission Service also do not reflect current price in Malaysia or internationally. The price for 1 Mbps per month is at least 10 times higher than the commercial prices. U Mobile agrees to the regulation of the prices of these services and urges to review the accuracy of the cost data.

YTL submits that the prices should be clear and unambiguous. For example, for End-to-End Transmission Service, the prices provided are for 1 Mbps and 1 Gbps. As actual access requests may be for more or less than these quantities, YTL request for guidelines on the computation of prices. This applies to other services, as well.

Discussion

APCC mentioned the very high costs of the installation of the Wholesale Local Leased Circuit Service. Altel and U Mobile add that this is the case also for installations of transmission services. The costs were calculated based on the number of working hours

per installation and an average hourly rate of a technician performing the line installation. Both values were submitted by TM. Based on this feedback, the MCMC has decided to revisit these inputs and reduced the number of hours needed for the installation.

APCC noticed that the Wholesale Local Leased Circuit Services are not split between those in Peninsular Malaysia and those in Sabah and Sarawak. The MCMC decided not to make this distinction because the wholesale local leased circuits represent the local tail of a leased line and are therefore similar to access lines. None of the access network services are split into services in Peninsular Malaysia and services in Sabah and Sarawak.

Based on the request from Celcom and TM, the MCMC would like to clarify that the Wholesale Local Leased Circuit Service represents the tail segment of a leased circuit. It is provided via an access line and dedicated transmission equipment on this access line. The MCMC also clarifies that Wholesale Local Leased Circuit Service does not include trunk transmission and physical interconnection. If these two components are used, they should be charged separately as the Trunk Transmission Service or the Interconnect Link Service, as applicable.

APCC, Celcom, Digi, Maxis, TIME and YTL requested that charges for intermediate speeds between 1 Mbps and 1 Gbps for Wholesale Local Leased Circuit Service, Trunk Transmission Service and End-to-End Transmission Service should be provided. The MCMC has decided to add more granular segmentation by speed for Trunk Transmission Service and End-to-End Transmission Service. However, in the case of the Wholesale Local Leased Circuit Service, more granular segmentation would not make sense, since all the speeds within the currently defined ranges would have the same costs. The reason is that the wholesale local leased circuit is a line in the access network, the transmission equipment used on this line is dedicated to this line only and the capacity cannot be shared with other subscribers. As a result, the cost is the same for all speeds which can be handled by the same transmission equipment type. The speed ranges used by the MCMC represent the speeds which can be handled by the same transmission equipment type.

Celcom and Maxis also stated that the costs for the Wholesale Local Leased Circuit Service, Trunk Transmission Service and End-to-End Transmission Service are above the level of efficient cost and should be reduced. U Mobile also submitted that End-to-End Transmission Service prices are too high. On the other hand, Fibrecomm submitted that the same three services are low compared to market prices. The MCMC is of the opinion that the costs of the services should be calculated objectively reflecting the reality and the model should not be modified just in order to achieve the desired outcome. However, because none of the respondents provided any justification, the MCMC did not make any specific changes to these services based on this comment.

Fibrecomm and Sacofa commented that costs for the Wholesale Local Leased Circuit Service, Trunk Transmission Service and End-to-End Transmission Service are low and that they do not include operational and maintenance cost. The MCMC confirms that the operational and maintenance costs of fibre are included in the calculation and are increasing each year. However, the traffic increases even more which results in lower unit costs.

Fibrecomm and Maxis sought clarification on how prices for different speeds should be calculated. The MCMC would like to explain that for the Trunk Transmission Service, the costs increase linearly with the capacity (for example, costs of 5 Mbps is equal to 5 times costs of 1 Mbps). The MCMC decided to add more granular segmentation by speed for these services which should solve this concern expressed by Fibrecomm and Maxis.

The MCMC also clarifies, as requested by TM, that the Trunk Transmission Service includes costs only for transmission in core network. It does not include a connection to the POI.

TM proposed to change the calculation of the End-to-End Transmission Service so that the access segments use fibre access lines for all speeds or to explicitly clarify that the speed of 1 Mbps uses copper access lines in the access segments. The MCMC does not see any reason why the speed of 1 Mbps should use fibre access lines if copper access lines are sufficient and their costs are lower. Therefore, the MCMC clarifies that the End-to-End Transmission Service uses copper access lines for speed of 1 Mbps and fibre access lines for speeds higher than 1 Mbps.

TM commented that negotiation of access agreements could be difficult because there is no bandwidth cap on the Wholesale Local Leased Circuit Service from 1 Gbps using DWDM. The MCMC would like to explain that this service is provided using a DWDM terminal and the whole DWDM terminal is dedicated to the single line and the capacity of the DWDM terminal cannot be used for other subscribers. Therefore, the capacity cap of this service is the full capacity of the DWDM terminal.

MCMC's Final Views

The MCMC confirms its preliminary view to regulate the prices for Wholesale Local Leased Circuit Service, Trunk Transmission Service and End-to-End Transmission Service. The MCMC has decided to not regulate the prices of Trunk Transmission Service and End-to-End Transmission Service above 5 Gbps as there appears to be competitive supply. In the event that there are competition complaints or disputes arising, the MCMC would intervene, as appropriate. The final prices for Wholesale Local Leased Circuit Service, Trunk Transmission Service and End-to-End Transmission Service as follows.

Table 6: Wholesale Local Leased Circuit Service Final Prices

	2018	2019	2020
Wholesale Local Leased Circuit Service up to 1 Mbps (RM/month)	48	49	50
Wholesale Local Leased Circuit Service from 1 Mbps up to 1 Gbps (RM/month)	634	612	593
Wholesale Local Leased Circuit Service from 1 Gbps up to 10 Gbps (RM/month)	16,042	15,432	14,869
Wholesale Local Leased Circuit Service from 1 Gbps using DWDM (RM/month)	949	917	888

Table 7: Wholesale Local Leased Circuit Service Installation Costs

	2018	2019	2020
Wholesale Local Leased Circuit Service installation (RM/installation)	2,555	2,683	2,817

Table 8: Trunk Transmission Service Final Prices

	2018	2019	2020
Trunk Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 1 Mbps (RM/month)	9	8	7
Trunk Transmission Service between Peninsular Malaysia and Sabah and Sarawak 1 Mbps (RM/month)	37	34	31
Trunk Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 10 Mbps (RM/month)	86	78	71
Trunk Transmission Service between Peninsular Malaysia and Sabah and Sarawak 10 Mbps (RM/month)	371	340	315
Trunk Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 100 Mbps (RM/month)	863	776	710
Trunk Transmission Service between Peninsular Malaysia and Sabah and Sarawak 100 Mbps (RM/month)	3,712	3,404	3,149
Trunk Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 200 Mbps (RM/month)	1,726	1,551	1,421
Trunk Transmission Service between Peninsular Malaysia and Sabah and Sarawak 200 Mbps (RM/month)	7,423	6,808	6,298
Trunk Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 500 Mbps (RM/month)	4,314	3,878	3,552
Trunk Transmission Service between Peninsular Malaysia and Sabah and Sarawak 500 Mbps (RM/month)	18,558	17,019	15,745
Trunk Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 750 Mbps (RM/month)	6,472	5,817	5,327
Trunk Transmission Service between Peninsular Malaysia and Sabah and Sarawak 750 Mbps (RM/month)	27,837	25,529	23,617

	2018	2019	2020
Trunk Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 1 Gbps (RM/month)	8,836	7,942	7,273
Trunk Transmission Service between Peninsular Malaysia and Sabah and Sarawak 1 Gbps (RM/month)	38,007	34,855	32,245
Trunk Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 3 Gbps (RM/month)	26,508	23,825	21,820
Trunk Transmission Service between Peninsular Malaysia and Sabah and Sarawak 3 Gbps (RM/month)	114,022	104,565	96,734
Trunk Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 5 Gbps (RM/month)	44,180	39,709	36,367
Trunk Transmission Service between Peninsular Malaysia and Sabah and Sarawak 5 Gbps (RM/month)	190,036	174,275	161,224

Table 9: Trunk Transmission Service Installation Costs

	2018	2019	2020
Trunk Transmission Service installation (RM/installation)	426	447	469

Table 10: End-to-End Transmission Service Final Prices

	2018	2019	2020
End-to-End Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 1 Mbps (RM/month)	105	106	108
End-to-End Transmission Service between Peninsular Malaysia and Sabah and Sarawak 1 Mbps (RM/month)	134	133	132
End-to-End Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 10 Mbps (RM/month)	1,353	1,302	1,256
End-to-End Transmission Service between Peninsular Malaysia and Sabah and Sarawak 10 Mbps (RM/month)	1,638	1,565	1,500
End-to-End Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 100 Mbps (RM/month)	2,130	2,000	1,895
End-to-End Transmission Service between Peninsular Malaysia and Sabah and Sarawak 100 Mbps (RM/month)	4,979	4,628	4,334
End-to-End Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 200 Mbps (RM/month)	2,993	2,775	2,606
End-to-End Transmission Service between Peninsular Malaysia and Sabah and Sarawak 200 Mbps (RM/month)	8,690	8,032	7,483
End-to-End Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 500 Mbps (RM/month)	5,582	5,102	4,737

	2018	2019	2020
End-to-End Transmission Service between Peninsular Malaysia and Sabah and Sarawak 500 Mbps (RM/month)	19,825	18,243	16,930
End-to-End Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 750 Mbps (RM/month)	7,739	7,041	6,512
End-to-End Transmission Service between Peninsular Malaysia and Sabah and Sarawak 750 Mbps (RM/month)	29,104	26,753	24,802
End-to-End Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 1 Gbps (RM/month)	10,103	9,166	8,459
End-to-End Transmission Service between Peninsular Malaysia and Sabah and Sarawak 1 Gbps (RM/month)	39,274	36,079	33,430
End-to-End Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 3 Gbps (RM/month)	28,406	25,660	23,597
End-to-End Transmission Service between Peninsular Malaysia and Sabah and Sarawak 3 Gbps (RM/month)	115,919	106,399	98,511
End-to-End Transmission Service within Peninsular Malaysia and within Sabah and Sarawak 5 Gbps (RM/month)	46,078	41,543	38,144
End-to-End Transmission Service between Peninsular Malaysia and Sabah and Sarawak 5 Gbps (RM/month)	191,934	176,109	163,001

Table 11: End-to-End Transmission Service Installation Costs

	2018	2019	2020
End-to-End Transmission Service installation (RM/installation)	5,110	5,365	5,633

Domestic Connectivity to International Service

Submissions received

APCC agrees with the decision to regulate the price of Domestic Connectivity to International Service. APCC also submits that there is a lack of competition in submarine cable landing station services, with only TM providing such services and there is an artificial monopoly. Further, APCC alleges that access to the submarine cable landing station is conditional on the bundling of backhaul service. Hence, APCC urges the MCMC to investigate TM's abuse of its dominance.

Maxis agrees with price regulation of Domestic Connectivity to International Services. However, Maxis seeks clarification on this service and understands that it is for the cross connection from the Access Seeker's equipment in the submarine cable landing station into the Access Seeker's capacity in the respective submarine cable system. Maxis further

notes that it is more cost effective for an Access Seeker to use its own transmission from the cable landing station, subscribe to Network Co-Location to co-locate its transmission equipment in the cable landing station and subscribe to Domestic Connectivity to International Services; rather than be forced to take Transmission Services from the Access Provider.

TIME submits that the proposed price for Domestic Connectivity to International Service is tremendously low. It asserts that there is a huge cost for establishing a submarine cable landing station and other related expenses including land acquisition, approval fees, building and terminal equipment installation and maintenance, domain experts and physical cable landing, which runs up to millions of Ringgit annually.

TM reiterates its position provided during the Public Inquiry on Mandatory Standard on Access with respect to Domestic Connectivity to International Service (and Network Co-Location Service). TM highlights that due to significant national security risks and to avoid service disruptions, TM should retain control of its existing security measures. TM proposes that operators be allowed to apply various forms of interconnection services to balance between national interest and fair access.

Discussion

The MCMC confirms that the understanding of Maxis is correct and that the Domestic Connectivity to International Services is the cross connection from the access seeker's equipment in the submarine cable landing station into the access seeker's capacity in the respective submarine cable system.

Regarding the comment from TIME that the proposed price for Domestic Connectivity to International Services is tremendously low while the costs of establishing and operating a submarine cable landing station are very high, the MCMC has to explain, that the service called Domestic Connectivity to International Services includes only a tie cable connecting the equipment of access seeker located in the submarine cable landing station with the equipment of the access provider that connects to the submarine cable system. It does not include the co-location of the access seeker's equipment in the submarine cable landing station and it also does not include any costs of the international traffic. The co-location in the submarine cable landing station is charged separately (Network Co-Location Service based on one square metre in an international submarine cable landing station).

MCMC's Final Views

The MCMC confirms its preliminary view and sets the final prices for Domestic Connectivity to International Services in the following table.

Table 12: Domestic Connectivity to International Services Final Prices

	2018	2019	2020
Domestic Connectivity to International Services monthly rental (per 5 m) (RM/month)	3.17	3.33	3.49
Domestic Connectivity to International Services installation (RM/installation)	85	89	94

Layer 2 HSBB Network Service with QoS and Layer 3 HSBB Network Service

Submissions received

APCC agrees with the decision to regulate the price of Layer 2 HSBB Network Service with QoS and Layer 3 HSBB Network Service, and that the prices for the services should decrease over time due to the decreasing costs of the transmission equipment and increasing traffic in the core network.

Celcom perceives that the prices of HSBB services are above efficient cost levels and should be reduced. There is also a move to set prices on a per-subscriber basis rather than setting overall capacity charges, and only a narrow choice of products is included. In particular, Celcom submits that the current charging structure based on overall capacity should be maintained, with per-Mbps tariff tiers introduced for 100, 300 and 500 Mbps total capacity with no minimum commitment. This will reduce barriers to entry and expansion for relatively small Access Seekers such as Celcom. In addition, there is no distinction made between residential and business users, and Celcom indicates that both types of users have different needs. Finally, Celcom proposes an ex-ante margin squeeze to be applied to TM's HSBB offers.

Maxis supports the price regulation for both Layer 2 HSBB Network Service with QoS and Layer 3 HSBB Network Service, however views the prices for both as substantially high. Based on Maxis's analysis of the proposed price of RM133 per month (based on RM94 recurring charge and RM39 installation charge over 24 months), it is higher than TM's retail price of RM129 per month. Currently, there is a RM99 promotion for 10 Mbps, that is very close to the proposed recurring charge of RM94 per month. This would not allow the Access Seeker to be able to compete with TM. For the higher speed such as 30 Mbps, 50 Mbps and 100 Mbps, the proposed regulated prices are not above TM's retail prices, however, they cause a significantly negative margin to the Access Seeker of 63%, 21% and 19% respectively. In the UK, the regulated prices by Ofcom for the high speed fixed broadband is only between 12% to 17% of the operator's most popular retail prices, and this provides a margin of between 83% to 88% for the Access Seekers to recover their costs and compete against the incumbent's retail packages. In contrast, the proposed

regulated prices in Malaysia is more than 80% of the retail packages offered by TM to its end users.

Maxis submits that, in order to sustain competition, the regulated prices of HSBB Network Services are at the minimum 40% to 50% of the incumbent's retail prices. This is derived based on Ofcom's final statement of the "Fixed Access Market Reviews: Approach to the VULA Margin" published on 15 March 2015, where Ofcom requires BT to maintain a minimum margin of approximately £22 to £25 between the wholesale VULA prices and its own retail packages to end users based on its consumer's portfolio of fibre-based packages, rather than individual products or bundle.

Further, Maxis also submits that the structure of the regulated prices should follow that of TM's wholesale prices, to separate into port and bandwidth. This is also implemented by ACCC in Australia. This structure would provide flexibility to the Access Seeker to offer different forms of speeds to their end users.

Finally, as a fall back, Maxis proposes the MCMC to consider the retail minus approach in particular for the HSBB Network Services that are most important to the development of the country.

TM comments that Layer 3 HSBB Network Service without network service is not in the Access List and should not be included under the purview of this review. Further, TM has highlighted that the proposed pricing structure reflects retail pricing and is inappropriate at the wholesale level. Firstly, TM will not achieve cost recovery with this pricing structure as it makes no allowance for incremental cost in preparing and conditioning the local ring, aggregation core, BRAS and core ring to align with the structure. Secondly, the proposed pricing structure is not ready for immediate deployment as there needs to be modification to the back-end system. Thirdly, the structure encourages the Access Seeker to be positioned as a Reseller/End User than as a Service Provider.

TM also clarifies that the Layer 3 HSBB Network Service with network service should only be applicable for High Speed Internet and does not include value-added services such as VOD and IPTV, which are charged separately. Further, the prices are for Point of Interconnection (POI) at an Access Provider's premises (which includes access and core network) within Peninsular Malaysia only. For Sabah and Sarawak, the cost of submarine cable will be included. TM also proposes the pricing structure to be consistent with the current wholesale offering for HSBA based on port and bandwidth. To be in line with the pricing structure, TM proposes to remove contention ratio in the core network, as the Access Seeker will use contention ratio. Despite the above, TM maintains that the HSBB service should not be price regulated as there is already a significant wholesale HSBB market and is more than sufficient to provide competitive broadband service offerings for

the long-term benefit of end users. It is also best practice not to regulate where there is significant capital investment deployed for new network infrastructure and where service demand is still emerging.

Discussion

Many submissions requested that the pricing structure of HSBB services be changed to that of BTU port and bandwidth (of the Service Gateway). The MCMC therefore decided to develop a new pricing structure for Layer 2 HSBB Network Service with Quality of Service and Layer 3 HSBB Network Service comprising of BTU port and Service Gateway services. The Service Gateway component is split into Layer 2 and Layer 3. Further, the MCMC has also removed the contention ratio in the core network, as proposed by TM.

However, the MCMC did not introduce the separation of residential and business users which was requested by Celcom. Such a separation is not necessary because the access seeker can set the parameters of the HSBB service for its customers and there is no difference at the wholesale level. The BTU port costs and Service Gateway costs are the same regardless whether the line is used by residential or by business subscribers.

The MCMC does not agree with the proposal from Maxis that a retail minus approach should be used for pricing the HSBB services. Instead, the MCMC is of the opinion that cost-based prices compliant with margin squeeze test represent a better option and agrees with Celcom that margin squeeze tests can be applied to the HSBB offers of TM.

The MCMC notes the statement from Maxis that the prices for HSBB services are high. However, the MCMC does not agree that wholesale prices should be equal to 40%-50% of the incumbent's retail prices just because this was the result in the UK. The MCMC is of the opinion that the costs of the services should be calculated objectively reflecting the reality and the model should not be modified in order to achieve the desired outcome.

The MCMC confirms the statement made by TM that the HSBB services are applicable for high speed internet only and do not include value-added services such as VOD or IPTV.

Finally, the MCMC notes the submission made by TM that the prices for HSBB services should only be applicable to Peninsular Malaysia, and for the BTUs that are located in Sabah and Sarawak, the cost of submarine cable should be included. The MCMC has requested for further details from TM and has examined this aspect carefully. The information received indicates that there is currently a low number of BTU ports in Sabah and Sarawak and therefore, it is assumed that there is no justification to establish POI(s) in Sabah or/and Sarawak. As such, based on the current arrangement, the traffic is brought to the POI in Peninsular Malaysia through the submarine cable. However, it is the

understanding of the MCMC that TM has established a POI each in Sabah and Sarawak. In that regard, the MCMC expects that when the number of BTU ports reaches the appropriate level, it will be more efficient to open at least a POI in Sabah or Sarawak. The regulated price for Layer 3 Service Gateway set by MCMC reflects this efficient situation and does not include the cost of the submarine cable. Therefore, the same Service Gateway charges are applicable regardless of the location of the BTUs, and there should not be a separate submarine cable charge to the Access Seeker.

MCMC’s Final Views

The MCMC’s final view is that the prices for Layer 2 Network Service with QoS and Layer 3 HSBB Network Service will be regulated.

As Layer 3 HSBB Network Service allows an Access Seeker to select between two POI locations, the MCMC clarifies that the following Layer 3 HSBB Network Service prices are applicable where the POI is at the Access Provider’s premises. Where the Access Seeker requests that the POI be at the Access Seeker’s premises, then there is a necessity to acquire an additional transmission service.

Similarly, an Access Seeker would also need to acquire an additional transmission service for Layer 2 Network Service with QoS as the POI is located at the Access Seeker’s premises.

The MCMC sets the final prices for Layer 2 HSBB Network Service with QoS and Layer 3 HSBB Network Service as follows.

Table 13: Layer 2 HSBB Network Service with QoS Final Prices

	2018	2019	2020
BTU port (RM/port/month)	45	45	45
Layer 2 HSBB Service Gateway 100 Mbps (RM/month)	322	283	254
Layer 2 HSBB Service Gateway 200 Mbps (RM/month)	644	567	507
Layer 2 HSBB Service Gateway 500 Mbps (RM/month)	1,611	1,416	1,268
Layer 2 HSBB Service Gateway 750 Mbps (RM/month)	2,417	2,125	1,902
Layer 2 HSBB Service Gateway 1 Gbps (RM/month)	3,300	2,901	2,597
Layer 2 HSBB Service Gateway 3 Gbps (RM/month)	9,899	8,703	7,791
Layer 2 HSBB Service Gateway 5 Gbps (RM/month)	16,499	14,504	12,985
Layer 2 HSBB Service Gateway 10 Gbps (RM/month)	32,998	29,009	25,970
Layer 2 HSBB Service Gateway 20 Gbps (RM/month)	65,996	58,017	51,940
Layer 2 HSBB Service Gateway 50 Gbps (RM/month)	164,991	145,043	129,850
Layer 2 HSBB Service Gateway 100 Gbps (RM/month)	329,981	290,086	259,701

Layer 2 HSBB Service Gateway 200 Gbps (RM/month)	659,963	580,173	519,402
Layer 2 HSBB Service Gateway 500 Gbps (RM/month)	1,649,907	1,450,432	1,298,504

Table 14: Layer 2 HSBB Network Service with QoS Installation Costs

	2018	2019	2020
BTU port installation (RM/installation)	440	461	485
Service Gateway installation (RM/installation)	426	447	469

Table 15: Layer 3 HSBB Network Service Final Prices

	2018	2019	2020
BTU port (RM/port/month)	45	45	45
Layer 3 HSBB Service Gateway 100 Mbps (RM/month)	626	564	515
Layer 3 HSBB Service Gateway 200 Mbps (RM/month)	1,253	1,128	1,031
Layer 3 HSBB Service Gateway 500 Mbps (RM/month)	3,132	2,821	2,577
Layer 3 HSBB Service Gateway 750 Mbps (RM/month)	4,698	4,232	3,866
Layer 3 HSBB Service Gateway 1 Gbps (RM/month)	6,414	5,778	5,278
Layer 3 HSBB Service Gateway 3 Gbps (RM/month)	19,242	17,334	15,834
Layer 3 HSBB Service Gateway 5 Gbps (RM/month)	32,069	28,889	26,390
Layer 3 HSBB Service Gateway 10 Gbps (RM/month)	64,139	57,779	52,779
Layer 3 HSBB Service Gateway 20 Gbps (RM/month)	128,277	115,557	105,559
Layer 3 HSBB Service Gateway 50 Gbps (RM/month)	320,693	288,894	263,897
Layer 3 HSBB Service Gateway 100 Gbps (RM/month)	641,385	577,787	527,794
Layer 3 HSBB Service Gateway 200 Gbps (RM/month)	1,282,770	1,155,575	1,055,587
Layer 3 HSBB Service Gateway 500 Gbps (RM/month)	3,206,925	2,888,937	2,638,968

Table 16: Layer 3 HSBB Network Service Installation Costs

	2018	2019	2020
BTU port installation (RM/installation)	440	461	485
Service Gateway installation (RM/installation)	426	447	469

Duct and Manhole Access

Submissions received

APCC agrees with the decision to regulate the price of Duct and Manhole Access. However, APCC cautions that allowing exclusivity in the Mandatory Standard on Access in 2016 sets a precedent that exclusivity is allowed within the access regime and state-backed companies may claim such exclusivity and hence deny access. Hence, APCC urges the MCMC to remove all recognition of exclusivity in the access regime.

On the Duct and Manhole Access, Celcom submits that the prices are above the efficient cost levels and should be reduced. In addition, Celcom submits that there should not be ex-ante regulation on Duct and Manhole Access provided between mobile operators.

Digi supports the price regulation of Duct and Manhole Access, as this is an essential input to facilities and upstream elements. Multiple operators would have the ability to serve locations otherwise operated by a single operator; hence, reducing duplication of facilities, minimising disruption to the general public and increasing the speed of build-up of broadband networks including fibre-based transmission backhaul which is required for LTE networks.

edotco is an Access Seeker for Duct and Manhole Access. Based on its understanding, these essential facilities are already fully-depreciated and in many cases, it is questionable as to the level of maintenance undertaken. As such, edotco queries why the prices would increase over time.

Maxis agrees with the MCMC's decision to regulate the prices for Duct and Manhole Access. Maxis observes that the proposed prices for Duct and Manhole Access are much lower than those for Interconnect Link Service. It shows inconsistency in the fixed model and raises questions on accuracy of data input, cost input, assumptions and network dimensioning. The cost element for Interconnect Link Service is almost similar to the cost element for Duct and Manhole Access. Even with the fibre cable cost for Interconnect Link Service, the variance between the two proposed prices should not be as significant.

TIME views that the proposed price for Duct and Manhole Access as extremely low and does not reflect the actual high costs involved in commissioning ducts and manholes, including civil works, permitting fees, land acquisition (where applicable), labour and maintenance.

TM provides feedback that the prices for Duct and Manhole Access is under-estimated due to the enormous mark-down of assets by 90% and omission of civil works cost and new service provisioning costs for backend systems. The price for Duct and Manhole Access is inappropriate as it does not reflect the majority of exclusive areas in the new HSBB areas, where demand is more likely to emerge. The proposed pricing structure which segregates duct and manhole access is not operationally feasible due to the lack of inventory and billing system. TM proposes for the pricing structure to be based on distance inclusive of duct, manhole and cost of civil works. TM only submits that there are few countries in the world that regulates duct and manhole access, and provides a benchmark of a selection of those European countries, where the prices range from RM225 to RM412 per month per km. The proposed prices are lower than the benchmark prices. Finally, TM requests for

a grace period for new services and that the price for Duct to Manhole Access should not be regulated.

Discussion

Celcom stated that the costs for Duct and Manhole Access are above the level of efficient cost and should be reduced. However, because Celcom did not provide any justification, the MCMC did not make any specific change to this service based on this comment. The MCMC disagrees with Celcom’s view and clarifies that ex-ante prices for Duct and Manhole Access also apply to those provided by mobile operators.

edotco asks why prices for Duct and Manhole Access increase over time if ducts and manholes are already depreciated and there is no maintenance. The MCMC would like to explain that if all ducts and manholes were fully-depreciated and there really is no maintenance, then the costs of Duct and Manhole Access would be zero. However, there are still some ducts and manholes, which are not fully-depreciated and their cost has to be taken into account. There is also some maintenance of ducts and manholes. Both the installation of ducts and manholes and their maintenance are labour intensive which results in price increases over time.

The MCMC does not agree with Maxis that the costs of Duct and Manhole Access should be similar to the costs of the Interconnect Link Service. The price of Interconnect Link Service was already discussed above.

The MCMC agrees with TM and TIME that the costs of Duct and Manhole Access were too low because they did not include the costs of civil works. Further, the MCMC is agreeable to TM’s proposal that the pricing structure be based on distance inclusive of duct, manholes and cost of civil works. The MCMC has therefore changed the calculation in the model and has now calculated the costs of duct per km including the associated manholes and the costs of trenches in which the ducts and manholes are laid.

MCMC’s Final Views

The MCMC confirms its preliminary view and sets the final prices for Duct and Manhole Access in the following table.

Table 17: Duct and Manhole Access Final Prices

	2018	2019	2020
Duct and manhole access - 25% of duct (RM/month/km)	316	332	349

Full Access Service, Line Sharing Service, Sub-loop Service, Bitstream Services, Digital Subscriber Line Resale Service and Wholesale Line Rental Service

Submissions received

APCC disagrees with the decision of the MCMC to not regulate the price for Full Access Service, Digital Subscriber Line Resale Service and Bitstream Services. All the services satisfy the three criteria test: high, non-transitory barriers to entry; no trend towards effective competition; and ex-post regulatory measures would be ineffective to remedy the injury. Furthermore, for the Full Access Service, the moratorium specified in the Ministerial Direction on High-Speed Broadband and Access List, Direction No. 1 of 2008, has already lapsed; and the regulation of Full Access Service prices are more crucial today given its utility and involvement in the HSBB network today.

Maxis proposes that the MCMC continue to regulate the prices of Full Access Service, Line Sharing Service, Sub-loop Service, Digital Subscriber Line Resale Service, Wholesale Line Rental Service, Bitstream with Network Service and Bitstream without Network Service. It views that these services provide important additional options for the Access Seeker to provide alternative and competitive fixed broadband services to end users. Currently, TM still has a significant Streamyx customer base relying on copper technology (1,352 thousands) as compared to UniFi subscribers (1,007 thousands).

Finally, TM supports the non-price regulation for Full Access Service, Sub-loop Service, Digital Subscriber Line Resale Service, Wholesale Line Rental Service, Bitstream with and without Network Service and Network Co-Location.

Discussion

The MCMC has taken note of the submission from APCC and Maxis. However, in determining which services on the Access List the MCMC should consider for price regulation, the MCMC has taken into account the current and likely future take-up and demand for such services. Services such as Full Access Service, Line Sharing Service and Digital Subscriber Line Resale Service are now historic copper-based services which are being replaced in Malaysia by HSBB fibre-based services. In order to encourage the take-up of current technologies, the MCMC has decided not to price regulate these services.

MCMC's Final Views

The MCMC has decided not to regulate the prices for Full Access Service, Line Sharing Service, Sub-loop Service, Bitstream Service with Network Service, Bitstream Service without Network Service, Digital Subscriber Line Resale Service and Wholesale Line Rental

Service. The updated cost model provides the following indicative prices for the respective services.

Table 18: Full Access Service Indicative Prices

	2018	2019	2020
Full Access Service monthly rental (RM/month)	20	20	21
Full Access Service installation (RM/installation)	214	224	235

Table 19: Line Sharing Service Indicative Prices

	2018	2019	2020
Line Sharing Service monthly rental (RM/month)	10	10	11
Line Sharing Service installation (RM/installation)	107	112	118

Table 20: Sub-loop Service Indicative Prices

	2018	2019	2020
Sub-loop Service monthly rental (RM/month)	10	11	11
Sub-loop Service installation (RM/installation)	107	112	118

Table 21: Bitstream with Network Service Indicative Prices

	2018	2019	2020
Bitstream with Network Service 1 Mbps (RM/month)	24	25	25
Bitstream with Network Service 2 Mbps (RM/month)	25	26	26
Bitstream with Network Service 4 Mbps (RM/month)	27	27	28
Bitstream with Network Service 8 Mbps (RM/month)	31	30	31
Bitstream with Network Service installation (RM/installation)	334	351	368

Table 22: Bitstream without Network Service Indicative Prices

	2018	2019	2020
Bitstream without Network Service (RM/month)	23	24	25
Bitstream without Network Service installation (RM/installation)	334	351	368

Table 23: Digital Subscriber Line Resale Service Indicative Prices

	2018	2019	2020
Digital Subscriber Line Resale Service 1 Mbps (RM/month)	24	25	25
Digital Subscriber Line Resale Service 2 Mbps (RM/month)	25	26	26
Digital Subscriber Line Resale Service 4 Mbps (RM/month)	27	28	28
Digital Subscriber Line Resale Service 8 Mbps (RM/month)	32	31	32
Digital Subscriber Line Resale Service installation (RM/installation)	334	351	368

Table 24: Wholesale Line Rental Service Indicative Prices

	2018	2019	2020
Wholesale Line Rental Service monthly rental (RM/month)	23	24	25
Wholesale Line Rental Service installation (RM/installation)	237	249	262

Network Co-Location Service

Submissions received

APCC disagrees with the decision of the MCMC to not regulate the price for Network Co-Location Service. It satisfies the three criteria test: high, non-transitory barriers to entry; no trend towards effective competition; and ex-post regulatory measures would be ineffective to remedy the injury. In addition, APCC urges the MCMC to continue to regulate prices for Network Co-Location Service as it did in the Mandatory Standard on Access Pricing in 2012, given that the landscape has not undergone any substantial changes since then. In addition, it is widely accepted that Network Co-Location Service is subjected to price regulation in many jurisdictions, such as in Singapore.

Maxis proposes for the MCMC to continue to regulate the prices for Network Co-Location Service as it is important for the Access Seeker to subscribe to other Facilities and Services such as Trunk Transmission Service, Domestic Connectivity to International Service, Layer 3 HSBB Network Service without Network Service. If the prices are not regulated, the Access Provider may impose higher prices to the Access Seeker which may be intentionally done in order to protect their retail business and to slow down competition.

U Mobile comments that there was no explanation offered as to why Network Co-Location Service is not price regulated. In any regard, the prices for the various types of spaces do not reflect current practice. In many of the places leased by operators, commercial prices prevail which tend to be higher than the regulated prices in Mandatory Standard on Access Pricing in 2012. U Mobile suggests that it would be prudent to specify the types of spaces that are considered bottleneck in nature, and the prices should logically be lower than the commercially set prices.

Discussion

The MCMC notes the comments from APCC, Maxis and U Mobile that it should regulate the prices for Co-Location Services. The MCMC is concerned that a number of different operators with different cost structures offer Network Co-Location Services and the imposition of regulated prices would require some operators to offer services at below cost

prices. The MCMC therefore feels that it is more appropriate to allow commercial negotiations to be used for these services.

MCMC’s Final Views

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.

Table 25: Network Co-Location Service Indicative Prices

	2018	2019	2020
Co-location of half of copper cabinet (RM/month)	84	85	86
Co-location of half of fibre cabinet (RM/month)	188	185	182
Co-location of one square metre in technical building (RM/month)	72	75	79
Co-location of one square metre in domestic submarine cable landing station (RM/month)	872	915	959
Co-location of one square metre in international submarine cable landing station (RM/month)	368	386	405
Co-location of one square metre in earth station (RM/month)	380	399	418
kWh of electricity consumed by co-located equipment (RM/kWh)	0.8583	0.9013	0.9463

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. 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. The changes made as a result of the comments received after the initial model viewing were also outlined.

In determining suitable regulated prices for mobile origination and termination services, the MCMC had considered a number of issues: the likely trends in demand for voice, SMS and particularly data services, the impact of using economic depreciation rather than tilted annuities, the use of single rates rather than the previous local and national rates and whether the costs for use of the submarine cable should be averaged into single national rates or charged additionally to the specific services which use the submarine cable. These issues were described and the MCMC’s proposed prices were also presented in the PI Paper.

7.2. Summary of submissions received

Question 20:

Do you have any comments on the proposed assumptions for the Notional Operator’s services and volumes?

Submissions received

Celcom, Digi and Maxis view that the notional operator’s share of 25% does not represent the Malaysian mobile market. The assumed market share was too large, resulting in understated cost and the mobile operators not being compensated sufficiently in accordance to the actual cost incurred to provide the mobile termination services. According to Celcom and Digi, the current approach in the model attributes no role to the MVNOs. Celcom suggests some compromise where the notional operator’s market share is between 20-25%. However, Digi proposes that the MCMC adopt a forward-looking

approach and model a 20% market share, taking into account the numerous MVNOs that have an approximately 10% market share in 2016. Maxis highlighted that the total prepaid market subscriber assumption for the notional operator is too aggressive and does not represent a 25% market share in the mobile model. Maxis also views that the forecast of data traffic per subscriber per month used in the model for 2019 and 2020 is too aggressive as compared to the operators' inputs. Maxis suggested that the MCMC use the operators' inputs to represent the actual trend in the Malaysian market.

On the other hand, TM and webe are of the opinion that the average data usage per subscriber is understated in the mobile model. webe highlighted that both Celcom and Maxis in their published annual reports, stated usage of more than 3GB per month in Quarter 1 of 2017, making the 1.3GB basis for 2016 too low. TM highlighted that Celcom reported a data usage of 6.2GB per month in Quarter 2 of 2017 (an increase of 120% from previous year), while Digi and Maxis reported 6GB (doubled from the previous year) and 5.6GB (an increase of 97% from the previous year) respectively for Quarter 3 of 2017. The level of usage is significantly higher than the model's assumption. The mobile operators' retail pricing structure also provides an indication of mobile subscriber usage. TM is convinced that the mobile data traffic assumed in the mobile model is significantly lower compared to international benchmarks for countries comparable to Malaysia as well as the financial reports of the Malaysian mobile operators. Increasing the data traffic assumption to better represent traffic demand will have a dramatic result on the model results for mobile origination and termination rates. TM suggests that the MCMC replace the operators' data with values based on the operator's published data.

YTL views that the analysis using a notional operator distorts pricing for emerging players offering voice services. This is because the model does not take into account the 2.3GHz and 2.6GHz TDD spectrum, hence the prices are set solely on the homogeneity assumed in the 4 mobile operator model. This may lead to under-recovery of cost unless different access prices are recommended for the difference in spectrum allocated. YTL added that the 2.3GHz and 2.6GHz have higher operational cost as more base stations are required to achieve equivalent coverage of the notional operator operating on 900MHz and 1800MHz in addition to the 3G and 4G spectrums. YTL has achieved 80% coverage but with lower volumes of traffic. As 2.6GHz spectrum is subject to targets set by the MCMC, the targeted coverage implies CAPEX and OPEX expenditure irrespective of the traffic achieved. Hence, there is under-utilized capacity.

Discussion

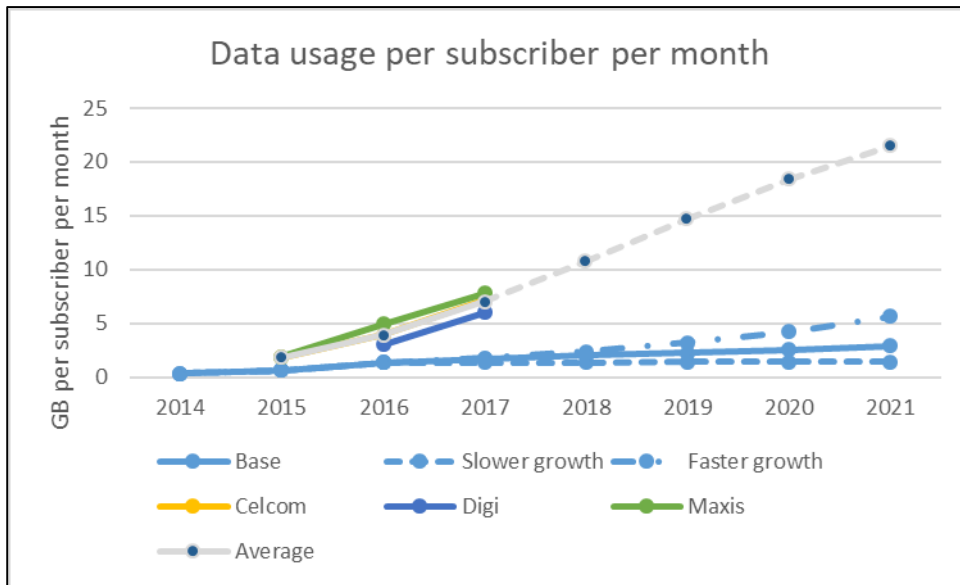
Celcom, Digi and Maxis assert that the MCMC has taken insufficient account of the role of MVNOs in the Malaysian market and Celcom offers the opinion that, although Celcom agrees that a fifth national operator should not be assumed, a market share somewhere

between 20% and 25% should be used. The MCMC does not agree with the assertion that insufficient account was taken of MVNOs. In fact, the total market figures based on inputs from the four MNOs were adjusted to take account of MVNOs' share of the market. It is a characteristic of MVNOs, however, that although they compete with MNOs at the retail level of the market, they do not have their own networks and instead use those of the MNOs. It is reasonable, therefore, to assume that the Notional Operator would take a share of this business and that its network would be correspondingly loaded.

Equally, although Maxis asserts that the assumed growth of prepaid subscribers is too aggressive and does not reflect actual conditions in the market, the assumptions were based on the inputs provided by Maxis and the other operators, adjusted to include the shares of smaller operators and MVNOs. The MCMC recognises that there must be some degree of uncertainty around projections of future market conditions, but is not persuaded that the assumed subscriber levels are over-stated.

The views expressed by operators on the subject of data usage reveal a divergence between Maxis, on the one side and webe and TM on the other. Whilst Maxis invites the MCMC to consider its inputs to the modelling exercise and takes a less optimistic view of data growth, webe and TM point to data published by the operators that points rather starkly in the opposite direction (see the graph below). The MCMC is persuaded that the data inputs provided by the operators represent a significant under-estimate compared to the data published by them to the markets, both in terms of the starting levels and of the rate of growth. The MCMC is therefore minded to adopt a more aggressive forecast for data usage in line with the average of the reported figures and its projection, as shown in Figure 1.

**Figure 1: Average Data Usage per Subscriber
(based on model inputs and operators' published data)**



MCMC's Final Views

The MCMC will revise the base case inputs to the model in line with the table below.

Table 26: Revision of Mobile Data Growth Assumptions

<i>GB per subscriber per month</i>								
Scenario	2014	2015	2016	2017	2018	2019	2020	2021
<i>Old</i>								
Base	0.30	0.63	1.32	1.72	2.00	2.26	2.55	2.91
Slower growth	0.30	0.63	1.32	1.34	1.36	1.38	1.40	1.41
Faster growth	0.30	0.63	1.32	1.77	2.37	3.16	4.23	5.66
New	0.3	1.8	3.9	7.0	10.7	14.7	18.4	21.5

Question 21:

Do you have any comments on the proposed approach to the radio spectrum and coverage assumptions?

Submissions received

Celcom supports the MCMC's position to include the cost of coverage and spectrum fees in the model. Celcom agrees that the allocation of costs according to routing factors is a satisfactory approach. However, Celcom is concerned that 700MHz spectrum costs have

not been included in the model. The amount paid by mobile operators far exceeds the RM180 million used in the model. Celcom suggests that the model is adjusted to reflect such costs. Celcom provided some data on the one-off payment, application fee and irrevocable bank guarantee to substantiate this claim.

According to Digi, the model assumes a very different distribution of traffic between technologies (2G, 3G, 4G) to that experienced by Malaysian operators. Digi views that the traffic split between technology should not be based on population coverage as it is largely dependent on the customer's device usage and traffic consumption. Digi suggests that the model be updated based on actual traffic data and forecasts.

Maxis is of the view that the spectrum assignment for the notional operator represent the best-case scenario in the Malaysian market i.e. the current maximum spectrum assignment. This may not be accurate as it has the potential to understate the number of sites required, particularly for GSM. Maxis added that with refarming, spectrum for the 900MHz was reduced to 2x10 MHz. It is also not necessarily true that an efficient operator will pay the full market price for 2x10 MHz but settle for 2x5 MHz, more so when 1800MHz and 2100MHz are fully market valued. Maxis views that the LRIC should not model a legacy situation. Maxis proposes for the MCMC to use the current minimum spectrum assignments for the notional operator i.e. 2x5 MHz for 900MHz, 2x15 MHz for 1800MHz and 2100MHz and 2x10 MHz for 2600MHz.

TM views that spectrum and coverage network costs should be excluded from the mobile model if the increment for LRIC+ is the service being costed. If the MCMC had defined the increment to be the whole network, then spectrum cost is included. However, if the increment is defined to be the whole network, there is little to distinguish the LRIC+ model from the FAC model.

YTL views that the coverage assumptions are not appropriate for voice and SMS services provided using only higher frequencies via 4G. The analysis only takes into account the service providers that have a combination of 900MHz, 1800MHz, 2.3GHz and 2.6GHz spectrum, but omits service providers that provide voice and SMS services only on higher spectrum namely 2.3GHz and 2.6GHz (VoLTE). The higher spectrum bands require 14 times more base stations compared to lower spectrum bands and thus have significantly higher cost.

Discussion

The MCMC accepts that the costs of spectrum included in the model did not fully reflect those of the operators, particularly in the area of 2100MHz spectrum. This has now been corrected. With respect to the prospective allocation of 700MHz spectrum, some operators

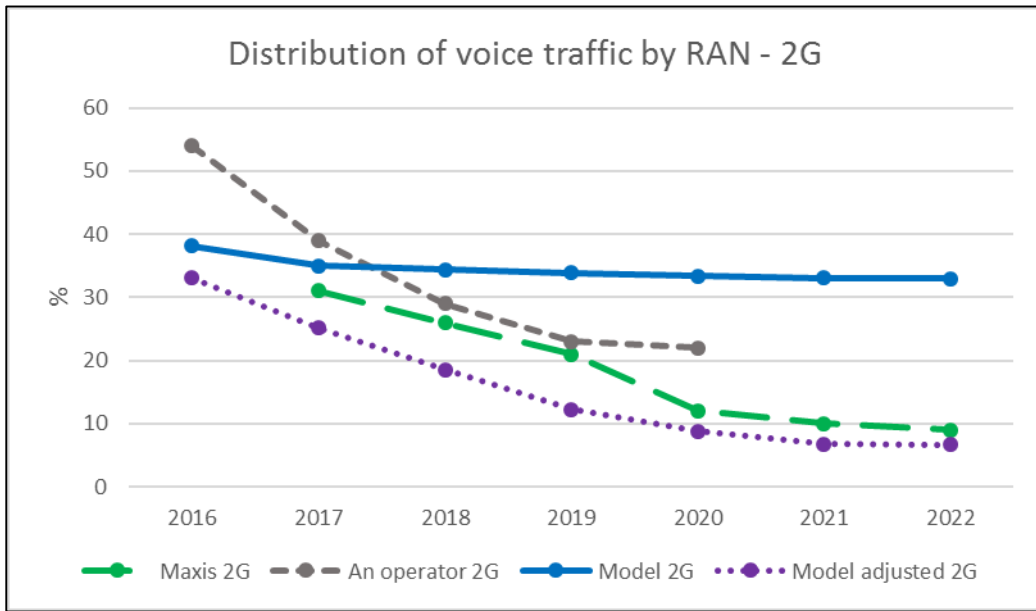
suggest that the costs of this should also be included. However, it is difficult to do this without knowing the take-up of spectrum in this band. Furthermore, access to this spectrum band would, other things being equal, be expected to result in substantial reductions in the number of base stations required to achieve a given level of coverage as against the higher-frequency bands currently available. However, the extent to which such savings could be realised in practice will depend on the extent to which coverage has already been achieved by the time the spectrum becomes available. The model inputs currently assume that the notional operator achieves long-term plateau in rural coverage levels of 40% for 2G and 3G, by 2019, but only 25% for 4G by that time. There would appear to be significant scope for savings from switching to 700MHz from that point onwards. The model has therefore been amended to show 4G rural coverage rising at a somewhat faster rate from 2019 onwards, reaching 50% rural coverage by 2021, instead of 40%.

Maxis suggested that the model should reflect a forward-looking position in terms of the allocation of spectrum and proposed 2x5 MHz for 900MHz for 2G, instead of 2x10MHz to reflect spectrum refarming. Maxis's proposal appears to be inconsistent as it suggests not to reflect this in the use of the refarmed spectrum for 4G, as is the case in the model. Equally, the MCMC does not accept the argument that the total assignment of 1800MHz spectrum should be reduced to 2x15 MHz and has continued to assume a total allocation of 2x20 MHz, with 5MHz of that assigned to 2G.

The MCMC does not agree with YTL's suggestion that the notional operator should be based on the spectrum assignment of a 4G-only operator, as this would not be consistent with the notional operator concept, reflecting an operator with 25% share of the market. Furthermore, 4G was primarily introduced to enable faster mobile data speeds, with voice as something of an afterthought. It would therefore be somewhat perverse to regulate a multi-technology industry on this basis alone.

Digi's argument that the distribution of traffic between 2G, 3G and 4G should not be as currently calculated by the model, based on population coverage and other factors, but based on inputs from operators. The problem with this is that only one operator was initially able to provide a split of voice traffic in this way. Maxis, however, provided a proposed split of voice traffic in response to the Public Inquiry. Maxis also argued that VoLTE is at a very early stage in its introduction in Malaysia and the effect is not expected to be more than negligible in the near term. The traffic proportions for voice are shown in the three graphs below, which show the proportions in the model, together with the proposals from an operator and Maxis.

Figure 2: Distribution of Voice Traffic by 2G RAN



It may be seen that the operator and Maxis are in reasonable agreement that the proportion of voice traffic carried on 2G will decline from a level that is fairly close to that in the model now and at a faster rate than the model calculations suggest. On the other hand, their views are far apart when it comes to the respective roles of 3G and 4G. This appears to stem from a far higher starting proportion of 3G traffic in the operator’s network than in Maxis’s network. A second difference is, as suggested by their respective comments, a view on the part of Maxis that 4G voice will take off 2-3 years later than the operator’s expectation.

Figure 3: Distribution of Voice Traffic by 3G RAN

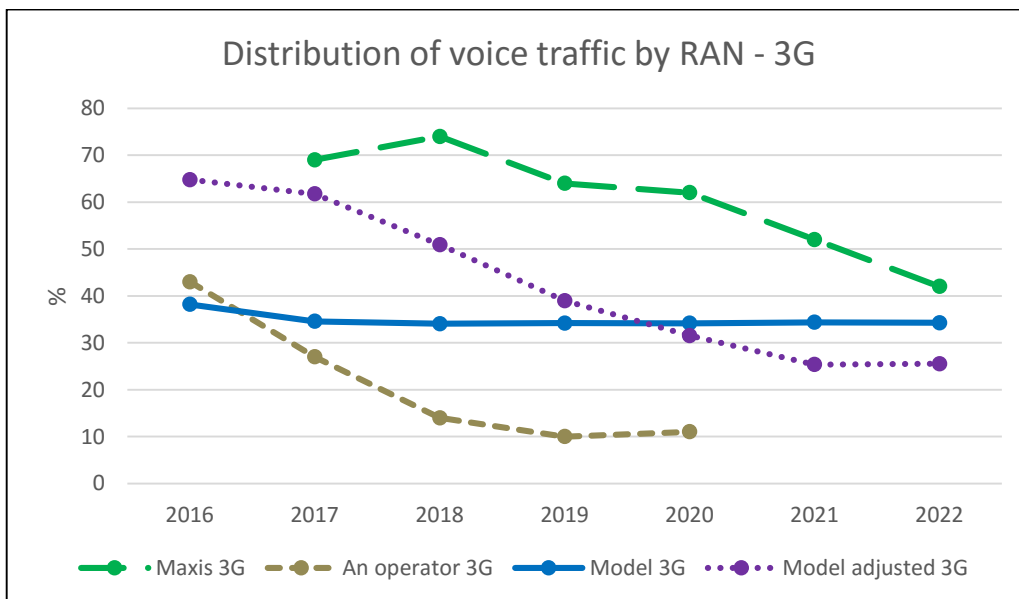
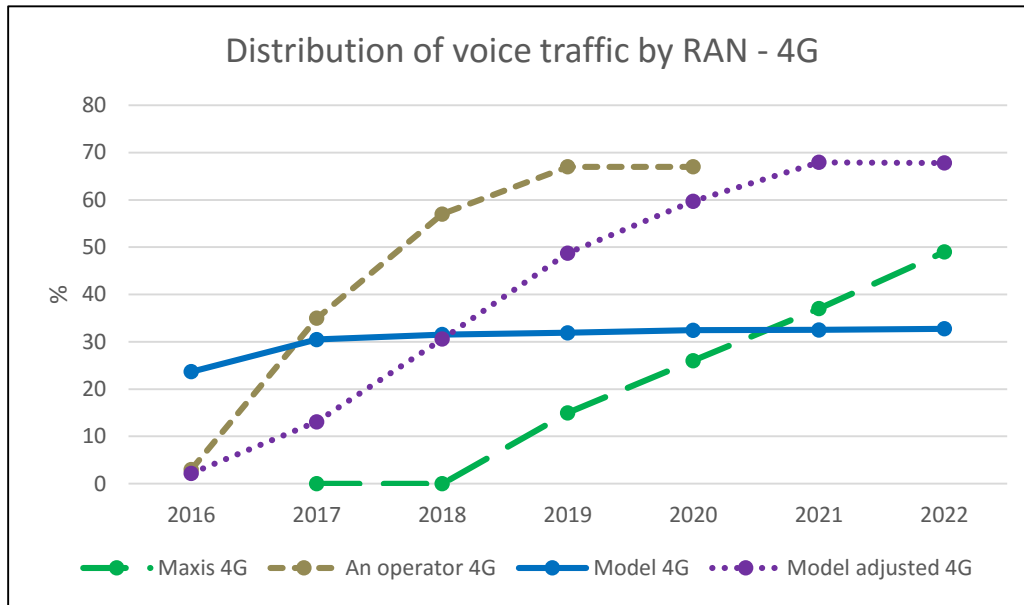


Figure 4: Distribution of Voice Traffic by 4G RAN



The MCMC is not persuaded that the Malaysian operators are generally likely to roll-out 4G as rapidly as the operator suggests.

However, the MCMC is persuaded by Digi’s argument that network selection by devices for voice is likely to be influenced by preferences for faster data networks where these are available. The MCMC has therefore adjusted the criteria used in the model for distributing traffic by technology to account for this factor. The adjusted percentages now applied in the model are also shown in Figures 2 to 4 above.

With regard to the proportion of data traffic on each RAN, Digi is incorrect to suggest that the model allocates this purely with reference to population coverage. The MCMC would like to clarify that additional factors relating to the relative speed of the respective RANs for data and limitations in 2G network capacity are taken into account, resulting in profiles that are reasonably similar to those proposed by Digi.

TM’s suggestion that spectrum and coverage costs should be excluded from the model is only applicable with pure LRIC methodologies, which the MCMC has discounted as being unsuitable for use in Malaysia.

MCMC’s Final Views

The MCMC proposes to apply the following spectrum assignments in the model:

Table 27: Spectrum Assignments applied in the Model

Spectrum band	Spectrum block	Usage
700MHz	2x10 MHz	4G
900MHz	2x10 MHz	Split between 2G and 4G
1800MHz	2x20 MHz	4G
2100MHz	2x15 MHz	3G
2600MHz	2x10 MHz	4G

Question 22:

Do you have any comments on the design assumptions for the mobile model?

Submissions received

Celcom notes that the PI Paper did not provide full discussion of all the design assumptions. A major area of concern for Celcom is the dimensioning and allocation of costs between voice and data for 2G and 3G. This is because 2G and 3G voice are circuit switched while data is packet switched. Celcom highlighted several concerns with regards to the model as follows:

- (a) The model does not allow operators to recover costs of stranded assets where, for example, 2G traffic reduces from one year to another and so less capacity is required.
- (b) The model takes an optimistic view that data is 8.5 times more efficient to carry than voice. Celcom takes a more conservative view that on EDGE, data is three times more efficient. The model assumes that one-time slot can carry 34 Kbps of data whereas in Celcom's experience 25 Kbps is more reasonable. On a 3G carrier, in principle, it can carry up to 128 voice calls per carrier, but the actual number of calls which can be delivered is around 54 per carrier, depending on the number of sectors used and the use of adjacent sectors on nearby sites. HSPA+ can carry 4 times more data than voice, and this was not taken into consideration in the model. As a result, the 3G network is incorrectly dimensioned and the proportion of cost attributed to voice is too low.
- (c) The model does not take into account the efficiency difference between voice and data traffic on 2G and 3G and the proportion of cost attributable to these services. The model understates the equipment required to deliver traffic in the 3G network

as the model is data focused. Since voice is carried less efficiently than data on both 2G and 3G, more cost should be allocated to voice.

- (d) The model calculates voice channels per carrier but does not use the calculation elsewhere. It appears that the MCMC understands the constraints on the number of voice calls but is unwilling to address this in the model.
- (e) There is inconsistency in the way the network is dimensioned namely the calculation on "CarrierbitRate3G" which calculates the bit rate per carrier in UMTS, however, what is being modelled is a mix of 3G technologies, hence implying a higher bit rate per carrier.
- (f) Celcom notes that there is error in the calculation of 3G capacity as the model used total number of 3G sites instead of number of upgraded 3G cell sites.
- (g) The mobile network provides separate downlink and uplink capacity for data just as it does for voice. Since the proportion of downstream data is higher than upstream, the network should be dimensioned for the downstream data requirement. This will then increase the percentage of costs which should be allocated to voice.
- (h) Incorrect routing factors as the model assumes all calls and all data use 2G, 3G and 4G specific network components however the voice and data mix on 2G, 3G and 4G are very different.

Digi agrees with the MCMC's approach of averaging cost data provided by the mobile operators to derive a common cost mark-up which is adopted in the model.

Maxis is agreeable to the percentage of traffic in the busy hour for data but proposes a slightly higher percentage of traffic in the busy hour for voice i.e. 10%, as it reflects more closely the pattern of subscribers' traffic in Malaysia. Maxis also proposes a slightly higher voice bit rate for 2G RAN to 12.2 Kbps in order to meet the requirement on Commission Determination on the Mandatory Standards for Quality of Service (Public Cellular Service), Determination No. 1 of 2015 with regards to call setup success rate, dropped call rate, etc. Maxis fully supports the inclusion of spectrum costs and licence fees in the model as they form part of the total costs of operating a network. Maxis proposed some revision to the spectrum cost and highlighted that the 2100MHz spectrum cost recently issued by the MCMC in October 2017 should be included in the model. In addition to the spectrum and licence costs, Maxis views that numbering fees should also be included in the mobile cost model for an accurate presentation of the total costs as an interconnect service cannot exist without a licence and numbering block to deliver calls. Maxis also views that the

EPMU mark-up of 25% is too low, and instead would like to propose the use of 36%, close to the EU Models in which the common and fixed cost are approximately 40-60% of the total costs.

TM is of the view that the average cost of the passive infrastructure in the mobile model should reflect changes in geographic weighting. However, the cost in the model has been clearly averaged with no transparency for this process. The mobile assumptions do show a mix of site changes over the period of 2017 to 2020, with a greater proportion of rural sites as coverage expands, therefore, the average cost of the passive infrastructure should reflect this change in geographic weighting but this is ignored by the cost assumption in the model.

webe expressed concern that 2G is still being costed in the model as this equipment could potentially be fully-depreciated. Similar to fixed services, most service providers have upgraded their network to NGN which should drive prices down further.

YTL highlighted that the design model does not take into account spectrum costs incurred through the payment of apparatus assignment (AA) fees. For service providers with higher frequencies, AA fees are substantial as more base stations are required for equivalent coverage as the national operator.

Discussion

Celcom offers the opinion that where assets have been acquired, but are no longer needed, for example because traffic has moved from 2G to 3G and 4G, operators should continue to be allowed to recover costs for them via the termination rate. It further asserts that, because the network dimensioning section of the model shows fewer 2G transponders are required in later years, that the model, in effect, strands these assets. In the MCMC's view, it is an inevitable consequence of technological change and competition that some assets will not be fully utilised for their full technical life and firms operating in an effectively competitive market would not expect to be able to recover the full cost of obsolete assets in the face of competition from firms with newer and more efficient assets. It is partly for this reason that tilted annuities is used as the depreciation methodology, in that it can reflect a profile where the economic value of assets reduces over time. It would be unreasonable, therefore, for operators to expect to be able to recover the cost of obsolete assets indefinitely from Access Pricing.

Nevertheless, the model does, in fact, allow for the notional operator to recover costs from obsolete assets to some degree, in that the costing section of the model is configured so that the quantity of assets of each type for costing purposes reduces only to the extent that assets are retired at the end of their planned life, under conditions where the

requirement for them is reducing. It might be argued that this introduces an element of inefficiency to the notional operator that might not be sustainable under competitive conditions, but in the MCMC's view, it represents a reasonable compromise and is likely to represent the actual practice of operators under conditions where technological transitions are gradual.

webe makes the converse point that 2G assets should be excluded from the model, because 2G is essentially an obsolete technology. The MCMC recognises that there is a clear trend towards replacement of 2G and that this has been announced, or has already taken place in several other countries in the region. However, the MCMC considers that since 2G is still being used in Malaysia, it is appropriate to reflect a steady transition to new technologies over time.

Whilst the MCMC would agree with Celcom that uplink and downlink traffic are handled separately in the RANs to some degree, the operators, including Celcom, were unable to provide a breakdown between the two. Furthermore, both uplink and downlink traffic consume base station resources and so the MCMC does not agree that applying an arbitrary scaling to the total to represent only notional downlink traffic is reasonable.

Celcom make a number of assertions and observations under this heading, in the context of their overall view that the model allocates too much of the cost of RAN to data services and not enough to voice services. These are examined in turn below.

(a) Voice services on 2G and 3G are circuit switched

This remark is somewhat puzzling in this context, given that switching does not take place in the RAN, but in the core network, which is assumed for the notional operator to be a modern common packet core network, using a soft switch.

(b) Treatment of voice and data on the 2G network

However, it appears from the context that Celcom's concern is actually that data traffic is assumed to be handled more efficiently than voice, which Celcom agrees to be the case, although it takes issue with the extent to which this is so. In the case of 2G, Celcom propose an efficiency differential of 3x between data and voice on a network equipped with EDGE technology, in preference to the differential for 8.5x, which it says applies in the model.

The problem with this is that, in order to put the revised assumption into effect, it is necessary to assume either that EDGE networks offer a lower data rate than they do, or that voice traffic can be carried more efficiently. It is not clear exactly which

assumption Celcom would like to change in order to achieve this, or whether it proposes some kind of arbitrary adjustment factor to achieve the preferred ratio. However, one parameter Celcom mentioned is the TRX non-homogeneity factor, which is applied to reflect the likelihood that traffic demands are unevenly distributed, leading to a necessity to provide more capacity in total than an averaged approach, as applied in the model, would lead one to expect. Whilst it is difficult to gauge how large this effect might be, a figure of 0.7 may be considered conservative. Ofcom, for example, used a figure of 0.5 in their 2011 model.

(c) Treatment of voice and data on the 3G network

Celcom identifies what it describes as “a number of concerns with the way in which the 3G radio network is dimensioned”.

These concerns appear to comprise of a mixture of conceptual and calculation issues. The primary conceptual issue for Celcom appears to be that the model does not separately dimension the 3G infrastructure for voice and data traffic. The MCMC accepts that the approach used is to some degree an oversimplification, in that the bandwidth demands caused by voice and data traffic are combined and used to dimension 3G capacity on the basis of bandwidth. Celcom makes the further, unwarranted, observation that this is “presumably because the MCMC understands that recognising this constraint could significantly increase the cost of voice termination”.

In fact, given the predominance of data in the mix of traffic in Malaysia, even in the early years of the modelled period, makes it unlikely that voice would be the primary driver for 3G capacity and so this is unlikely to have any effect. For example, in the base year, using the figure of 64 channels per carrier suggested by Celcom and applying an adjustment based on the erlang table, the capacity of the 3G coverage network (1 sector and 1 carrier per site) is over 350 thousand erlangs, but the demand is under 100 thousand erlangs. On the other hand, the MCMC accepts that it is inappropriate to combine the voice and data traffic to drive dimensioning based on data capacity and that capacity requirements based on bandwidth should be based on data traffic only. The model has been amended to reflect this.

Celcom also points out an inconsistency in the way traffic-carrying capacity is calculated at different stages in the 3G RAN calculations sheet and this has now been corrected. The additional errors identified by Celcom concerning the calculation of capacity following upgrades have also been corrected.

Celcom makes a further assertion that the model incorrectly applies routing factors with the result that 2G, 3G and 4G specific equipment costs are divided by the whole traffic and not by the specific traffic streams that use them. Celcom gives the example of the respective cell site equipment. As far as the MCMC can see, this is simply incorrect. The denominator used for the relevant calculations is the RAN-specific figures summarised on the Equipment Outputs sheet.

Celcom identified calculation errors affecting busy hour calculations in the network summary sheet. These have been corrected. In relation to the bit rate for voice on 2G, the figure of 10 Kbps has been changed to 13.2 Kbps, which is the correct figure (not 14 Kbps, as Celcom suggests) and in preference to 12.2 Kbps, as Maxis suggests. The MCMC has also corrected errors pointed out by Celcom affecting the weighting of voice traffic expressed in Mbps between 2G, 3G and 4G, the calculation of voice Mbps in the core and the routing factors for MGW and MSS for data services, which should have been set to zero.

With regard to Maxis's suggestion to include numbering fees, it is not usual practice to include these in network cost models, because the cost of numbers is specific to subscribers, rather in the same way that fixed access lines are. It is not appropriate, therefore to recover these costs from origination and termination services.

Maxis also suggests that the EPMU mark-up values should be increased to the levels used by regulators in the EU, where mark-ups are applied, which of course they are not when pure LRIC, the methodology mandated for use in the EU, is used. The mark-ups in use in the model were calculated on the basis of the top-down cost figures submitted by the operators. Although the levels calculated for different operators varied, the MCMC does not consider that it would be appropriate to assume that operators were less efficient than the data they have supplied suggests, purely on the basis of a benchmark.

The MCMC is also not persuaded to change the assumption in the model about the percentage of voice traffic occurring in the busy hour, because the existing figure is based on inputs provided by the operators generally and not just by Maxis.

The MCMC does not accept TM's argument that the model fails to take account of the changing proportion of services using passive infrastructure over time. In the absence of data relating services to urban versus suburban and rural sites directly, the model looks at the proportions of sites that carry different combinations of 2G, 3G and 4G traffic and weights the allocations of passive infrastructure accordingly. Since the mix of traffic varies considerably among these technologies, this provides a reasonable proxy.

With regard to YTL's comments about AA fees, the MCMC has adjusted the cost assumptions in the model to cover all spectrum fees.

MCMC's Final Views

The MCMC has corrected a number of calculation errors in the model that were pointed out by the respondents. It is not, however, persuaded that the design assumptions or cost allocation methodologies used in the model are incorrect, or that they require change.

Question 23:

Do you have any comments on the service costs calculated by the mobile model?

Submissions received

Celcom believes that the mobile industry in Malaysia is highly competitive, and hence regulation should only be applied to mobile termination rates and not to other services such as origination, SMS, MMS and data. Maxis has no objection to the mobile cost model producing service cost for a range of mobile services and fully supports the MCMC's approach to regulate prices for Mobile Origination and Termination services only. The other services should be left to commercial negotiations as these services are no longer significant in view of application-based services gaining popularity.

Celcom believes that the model is not able to provide reliable results. If the model is corrected as follows: WACC is revised to 9.97%; 4G bandwidth reduced from 62 Kbps to 13.65 Kbps; spectrum charges included for 700MHz and additional 2100MHz included; and issues on network dimensioning, equipment numbers, routing factors, etc. are addressed; then, this will increase the mobile termination rates from 1.58 sen per minute to more than 4 sen per minute.

Maxis agrees to the use of tilted annuities as a means to annualise the capital costs for voice termination as it is a mature service in Malaysia and this approach is a closer approximation to reality for mobile services.

TM views that the estimated service cost is overstated as a result of inefficient use of 2G technology in the model, understatement of mobile data traffic and extremely high cost of core network buildings. Core network accounts for half of the total cost, of which 83% are from core network buildings. Comparing the model's input costs for core network building against the financial reports of the operators suggest that the value used may include buildings other than those just for the core network i.e. buildings associated with retail and other operations. Similar to a selection of fixed assets with long lifetimes, for

consistency the MCMC should also mark-down long lived assets in the mobile model such as core network buildings, core and backhaul fibre, power supply, some site-related cost, IBCA cost, RAN equipment, microwave equipment, etc. If these assets with lives of at least 20 years were marked down, there is a significant reduction in the model results. The 2G technology has been running for 22 years, thus the notional operator must have been operating 2G technology for 22 years. Therefore, some long lived assets that are still in use must have be written off, such assets could include passive infrastructure which could even be shared with 3G and 4G technology.

webe has no doubt that the demand for data service will see continuous growth during the modelled period but the model assumptions are unrealistically low in respect to mobile data usage per subscriber. webe is also of the view that the voice service cost is over-estimated.

YTL notes that the service costs in the mobile model are based on the notional operator with a combination of both low and high frequency spectrum bands. As voice services leverage mainly on the lower spectrum bands i.e. 900MHz, the cost of coverage is much lower as compared to the operator that uses only higher frequencies i.e. 2.3GHz and 2.6GHz. Hence, the mobile model does not fully capture the cost of operators that use only high frequency spectrum for voice services.

An Operator pointed out that the multi-RAN handsets have a preference for the highest speed networks for data traffic. The technology choice for voice traffic is determined by the network that the handset connects to for data purposes. Both are biased towards higher speed technology. The operator also highlighted that the 2G network is still relevant as it remains the primary fall back for voice services in 3G/4G networks. In addition, where dual SIM handsets are used, the second SIM is normally configured for 2G network usage. Thus, the operator's challenge is in converting 25% of its subscriber base to data user. The operator proposed the technology split for both voice and data from 2016 to 2020 in which by 2020 most of the traffic for voice and data will be on the 4G network. The operator estimates that by adjusting the technology split, the mobile model should reflect a 27% increase in unit cost.

Discussion

The MCMC has reviewed the calculation of core network costs in the model in light of TM's comments about the cost of core network buildings. It appears likely that operators have given a total cost for this item, rather than a unit cost, and so, the model may have incorrectly multiplied this by the number of core network sites required for the network. An adjustment has been made to correct this.

The points made by respondents about data service growth, 4G-only operators and the split of traffic between 2G, 3G and 4G have already been addressed in the earlier questions.

MCMC's Final Views

The MCMC has made an adjustment to the model to correct the over-estimation of core network building costs.

Question 24:

Do you have any comments on the 3G/4G only operator, local/national call rates and submarine cable issues?

Submissions received

Submarine cable issues

Altel and webe are of the view that similar to the Fixed Network Origination and Termination Service, the mobile model should not make distinction in prices by the use of submarine cable as there is sharing of capacity with data traffic. webe agrees that it is difficult to distinguish the cost of terminating calls to nearby versus distanced called party and that commercial pricing is evolving towards a flat structure. With the emergence of NGN, it has become more borderless. webe is surprised that the position taken for submarine cable differs between fixed and mobile and opines that a similar position should be adopted for both services as the submarine cable that carries mobile and fixed services are the same. In the situation where mobile traffic outweighs the fixed traffic, the cost for mobile calls using the submarine cable should not be treated differently to the cost for fixed calls.

Maxis is agreeable to retain the current rates using the submarine cable to allow the Access Provider to recover its cost of providing the service with submarine cable to the Access Seeker who chooses to establish only one POI with the Access Provider. Maxis believes that there is a significant cost difference between local and national origination/termination with submarine cable. However, U Mobile views that MTR with submarine cable should decrease in 2018 compared to the last regulated rate of 15.73 sen, with the launch of SKR1M that provides for 4Tbps via 3,800 km of cable which links 6 locations in Peninsular Malaysia and Sabah and Sarawak. This should translate to lower wholesale prices. Access Seekers who utilize this service should not have to bear the inefficiencies in this area, due to uncertainties or irregularities in the cost provided by operators of submarine cables.

TIME is of the view that the MCMC needs to standardize the prices for mobile origination and termination to be coherent with the pricing structure for fixed origination and termination. For mobile origination and termination services, submarine cable connectivity is included whereas it is absent for fixed origination and termination services. TIME recommends that prices of origination and termination with submarine cable be incorporated for the fixed network. Additionally, the capacity for submarine cable connectivity between Peninsular Malaysia and Sabah and Sarawak is now expanded with the deployment of SKR1M. With the incorporation of submarine cable cost in fixed origination and termination services, healthier competition is being introduced in the mobile and fixed markets.

Local/national call rates

Digi and Maxis are agreeable to combine local and national rates into a single rate within Peninsular Malaysia and within Sabah/Sarawak as there is no significant cost difference between these two categories.

2G services and 3G/4G only operator

Celcom views that since operators have a mix of 2G, 3G and 4G networks and customers have access to 2G and 2G/3G handsets there is no rationale for modelling a 3G/4G only operator.

Maxis views that 2G services will continue to be provided for the current regulatory period and hence should not be excluded from the model. The planned switch-off date has yet to be decided in Malaysia, and major operators have no immediate plans to switch-off their 2G networks as there is still a significant number of 2G and 3G handsets amongst end users in rural areas, which still need services to be provided. Maxis agrees to the data traffic by RAN, however, the voice traffic by RAN may not accurately represent the actual roll-out of VoLTE services in the Malaysian market. VoLTE services in Malaysia is at the very early stage and traffic is still small. According to Maxis, to date, only Digi and U Mobile have soft-launched their VoLTE services in late 2016. Maxis provided a forecast of the proportions of voice traffic by RAN with VoLTE-enabled in 2019 which indicates that most of the traffic is still on the 2G and 3G network, with LTE picking up slowly and reaching 49% by 2022.

TM stated that it could not find any reference within the PI Paper on 3G/4G only operators. Nonetheless, the LRIC methodology requires the use of modern equivalent assets modelled on an economically efficient operator. No new entrant would deploy 2G network as 3G and 4G are more spectral efficient thus provide greater traffic capacity. If LRIC is the approach, the notional modelled operator should not utilise 2G technology. The model

suggests that 2G equipment is continuing to be installed as the model shows that there is an increase in 2G microcells in 2017 and 2018 and decline thereafter and base station controllers increase from 2017 to 2021 and remain constant thereafter. The model results suggest an expansion of 2G network rather than transition to 3G and 4G networks. Thus, the 2G network assets continue to incur replacement and operating cost for the lifetime of the model whereas the MCMC's statement that smartphone penetration reached 80% in 2016 suggests a deliberate routing of voice traffic over 2G by the notional operator rather than a transition to 3G and 4G. TM views that 2G technology should be removed from the mobile model so that both fixed and mobile models consistently use forward-looking technology.

YTL expressed concern that the model does not capture the cost of 4G operators using only higher frequencies to provide VoLTE.

Discussion

The MCMC has received significant additional information about the costs of submarine cable transmission during the course of the Public Inquiry and this has now been reflected in the model. The new data suggest a substantially lower cost than was previously calculated, with the effect that calls using the submarine cable are just over one sen per minute more expensive than those without it. In consequence, the MCMC is able to accept the suggestion of Altel, webe and TIME that the treatment of the submarine cable should be the same for mobile as for fixed and the rates averaged together.

The MCMC agrees with Maxis's argument that 2G is likely to remain a feature of the mobile telephony industry in Malaysia over the course of the regulatory period.

MCMC's Final Views

The MCMC has revised its cost estimates for calls using the submarine cable and its proposed regulatory treatment of these services.

The MCMC continues to be of the view that 2G should be included in the model, because it appears likely to remain a part of the mix of technologies in Malaysia over the regulatory period.

Question 25:

Do you have any comments on the sensitivity analysis?

Submissions received

Maxis largely agrees with the sensitivity analysis done by the MCMC.

Celcom believes that sensitivity testing should be used to ensure that the model is working correctly. However, sensitivity tests should not be considered in setting rates as the model has many errors. Celcom notes that in the model, data usage per subscriber grew from 0.65 GB per subscriber to 1.36 GB per subscriber between 2015 and 2016. Hence, the comparison of data usage in Malaysia in 2016 with other countries in 2015 is likely to be misleading.

TM suggests that the MCMC explore a sensitivity analysis for mobile data with a more realistic assumption for data traffic in 2017. This will provide greatly improved insight into the sensitivity of the mobile origination and termination results to the data traffic assumptions. The "high growth" scenario clearly under-estimates the projected data traffic. TM suggests that the MCMC consider to test the impact of using the same WACC for fixed on mobile services as part of the sensitivity testing as there is empirical evidence that the risk profile of mobile operators is similar to fixed operators. TM also suggested that the MCMC use more comparable data to benchmark data usage from neighbouring countries e.g. Singapore and Korea show substantial increase of 25% and 32% respectively in 2017.

Discussion

The points about calculation errors and the usage of mobile data services have been addressed in earlier questions. TM's point about the WACC is relevant to the WACC section, however, the MCMC is not convinced that sufficient evidence has been brought forward by TM to support their contention that fixed and mobile operators face the same risks.

MCMC's Final Views

The MCMC does not consider it necessary to make any further changes to the sensitivity analysis.

Question 26:

Do you have any comments on the proposed regulated prices?

Submissions received

Altel, TM, U Mobile and webe concur with the MCMC on a single rate for local and national calls as well as the convergence of mobile origination and termination rates over the period to 2020. U Mobile views that the continued downward trend for voice traffic over the regulatory period will result in lower unit costs.

Altel and webe added that similar to the Fixed Network Origination and Termination Service, the mobile model should not separate the submarine cable cost as this capacity is also shared with data traffic. In addition, Altel observes that the glide path approach is not adopted for the Mobile Call Origination and Termination with submarine cable. In consonance with the costing methodology adopted in the PI Paper, an increase in capacity should effect a reduction of the unit costs. As such, Altel believes that over time, as the costs of the network elements reduce, the regulated rates for Mobile Call Origination and Termination with submarine cable should decline over the years as the network becomes more efficient.

U Mobile proposes that the regulated prices for mobile origination and termination should be more reflective of cost to ensure that there is no over-recovery or extension of inefficiencies of the previous years into the regulatory period beginning 2018. The rates in the mobile model indicate that voice termination for 2018 and 2019 should be 1.97 sen and 1.74 sen respectively, before arriving at 1.58 sen in 2020. U Mobile proposes that if a glide path is used, the price should be set at 2.20 sen in 2018 and 2019 and suggest that these rates be used retrospectively for 2016 and 2017 which is a practical downward step from 3.65 sen in 2015 to 1.58 sen in 2020.

Celcom views that the model is unable to produce reliable results. The figures shown understate the costs of an efficient operator. Once the identified issues in the model are corrected, the mobile termination rates should increase from 1.58 sen to more than 4 sen.

Maxis agrees with the MCMC's views to set regulated prices for voice interconnection for origination and termination services. Maxis supports LRIC+ costing methodology and the glide path approach and pointed out that even with LRIC+ methodology, the mobile termination rate in Malaysia is amongst the lowest. Hence, Maxis requests the MCMC to be firm on the use of LRIC+ instead of pure LRIC as proposed by certain operators.

TM supports the MCMC's proposal not to regulate SMS and MMS services as technology will drive service innovation which is already resulting in a decline in SMS traffic. In such a dynamic environment, regulating prices may result in market distortions. TM also notes that the model estimated a unit cost for mobile calls with submarine cable that is significantly higher than the previous regulated rate and suggests that the previous rate

be used for the period of 2018 to 2020. TM believes that the previous regulated rate for the submarine cable was derived from the fixed model used at that time. TM suggests that rather than using outdated cost data, the MCMC could employ the same approach and incorporate the per minute submarine cable costs from its fixed model, which as noted by the MCMC is insignificant for fixed voice origination and termination. Therefore, the mobile origination and termination rates should also not differentiate between calls with and without submarine cable. The MCMC's model appears to assume only voice traffic is utilising the submarine cable, hence the entire cost is allocated to voice. It is unlikely that the submarine cable does not carry any mobile data traffic. TM did a sensitivity of the model by setting the submarine cable routing for data traffic to be the average of incoming and outgoing mobile voice traffic i.e. to carry less than 1% of the data traffic, the outcome was a relatively small difference between the rates with and without submarine cable and significantly lower than 24.1 sen per minute. If the data traffic of the modelled operator was increased, the differential results with and without submarine cable is even lower. This will be further reduced if the submarine cable's operating cost is reduced by 50% with SKR1M. TM suggests that the MCMC review the approach on the submarine cable to set a non-zero routing factor for data traffic or per minute cost derived from the fixed model and reflect SKR1M's discounted prices into the model.

YTL re-emphasizes that the proposed regulated prices do not capture the cost of 4G only operator that provides mobile voice services (VoLTE) using only higher frequencies.

An operator proposes to adopt a cautious approach to the proposed glide path for mobile interconnection rates as a reduction of 17% in 2018, 23% in 2019 and 32% in 2020 will have a significant impact on the mobile operator's finances. This is compounded with the intense market pressure whereby the mobile industry has been recording negative growth in the previous years. The operator proposes a gradual transition to provide for greater regulatory certainty for their future plans and investments i.e. a 17% reduction in 2018, followed by 23% in 2020 and 32% in 2022. Alternatively, the MCMC is requested to consider deferment of the new rates to 2019 to alleviate significant financial disruptions.

Discussion

The MCMC notes that several operators make the point that the submarine cable system is likely to be used for mobile data traffic as well as for voice. This aspect is related to the earlier discussion on submarine costs where the MCMC has accepted the argument to treat the submarine cable in a similar way for fixed and mobile voice calls.

The MCMC appreciates the point made by U Mobile that the continuation of the previous rates may have led to some over-recovery of costs. However, as a matter of principle, the MCMC does not consider it best practice to implement such changes retrospectively,

as part of the reason for setting rates over a period of time is to provide an element of certainty for operators and investors. Such uncertainty would be significantly undermined by the application of changes retrospectively. Furthermore, although a part of the adverse impact of over-recovery is felt by the shareholders of operators who are net out-payers, the primary issue of concern is the potential for consequent detriment to consumers and the MCMC doubts whether it would be practicable for this detriment to be set right retrospectively for consumers.

The MCMC notes the general view in favour of glide paths. The suggestion of using geometric, rather than linear interpolation, as proposed by one operator would tend to lead to a faster initial rate of change, with slower change later in the period. This would have the advantage of reducing the net over-recovery during the glide path period, but must be set against the relatively rapid rate of change proposed.

MCMC’s Final Views

The MCMC is not persuaded to change its view expressed in the PI Paper on the glide path, nor to apply the mobile origination and termination rates retrospectively.

7.3. MCMC’s final view

The MCMC continues to view that mobile origination and termination should be set using the inputs for a notional operator with 25% market share. Prices at this level provide the right incentives for market competition, investment in new technologies and service innovation that lead to greater usage of new technologies. Likewise, the MCMC is not persuaded that there is a need to regulate prices for SMS, MMS or video services.

The MCMC sets the final prices for Mobile Network Origination Service and Mobile Network Termination Service as follows.

Table 28: Mobile Network Origination Service Final Prices

	Units	2018	2019	2020
National	Sen/min	2.94	1.97	0.99

Table 29: Mobile Network Termination Service Final Prices

	Units	2018	2019	2020
National	Sen/min	2.92	1.96	0.99

8. Infrastructure Sharing

8.1. 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. The cost model with all commercially confidential data removed was made available on request to interested licensees during the Public Inquiry period.

Part F of the PI Paper concerned Infrastructure Sharing, in particular towers and in-building common antenna systems. Section 19 of the PI Paper described the infrastructure sharing model, including changes made after the initial model viewing, and sought comment on its completeness.

The MCMC proposed to set regulated prices for lattice type towers of 60m, 75m and 90m and provided "reference" prices for In-Building Common Antenna (IBCA) systems which would be taken into account in any requested interventions.

8.2. Summary of submissions received

Question 27:

Do you have any comments on the approach to the modelling of tower costs?

Submissions received

Digi supports the proposal to regulate tower prices to avoid excessive wholesale price offering.

Celcom expressed concern that the model does not show all types of towers used. Celcom currently uses towers ranging from 150-400 feet. Celcom views that the model may not have captured a full range of cost drivers as a 24m lattice costs RM82,686 whereas an 18m lattice costs RM107,395. It is difficult to justify lower prices for higher towers. Celcom is also concerned with some underlying assumptions used as it appears unlikely that power supply costs will increase by 10% per year.

edotco has serious concerns on the imposition of access pricing regulation to tower companies and the MCMC should consider whether ex-ante price regulation is prudent. According to edotco, regulators globally have refrained from regulating in this area except on an ex-post basis given the complexity and bespoke nature of towers and infrastructure solutions. edotco views that there is no compelling case for price regulation of

Infrastructure Sharing and tower companies so ex-post access pricing regulation remains the optimal approach for Malaysia.

edotco raised some issues and they are summarised as below:

- (a) The proposed access pricing regime would actively discourage investment and infrastructure sharing (tower companies) in Malaysia;
- (b) The proposed force-fitting of single determined access prices on bespoke infrastructure solutions is unworkable administratively, divorced from commercial realities and undermines competition;
- (c) The proposed access pricing regime will create market distortions by discriminating against independent tower companies versus MNOs because the proposed regime would not apply where tower access is swapped between and among the MNOs; and
- (d) Access pricing regulation of Infrastructure Sharing should only apply to dominant licensees.

From edotco's perspective, imposing regulated prices on towers even on a small subset of tower types, may negatively impact Malaysia's move to micro and picocells and the future deployment of these next-generation 5G services.

Similarly, TM suggests that the MCMC revise its approach for sampling CAPEX costs for the various tower configurations. Due to the large number of tower configurations and some configurations being relatively uncommon, the averaging process used to derive the model inputs may result in cost estimates that are unrepresentative of Malaysian towers. Rejecting potential outliers could result in all of the company's towers being ignored, if that tower company only offered a single size by type combination that is not used by other companies. TM highlighted that no information was provided on the number of towers either included or omitted from the analysis, hence TM cannot ascertain if the data sample would truly represent Malaysian towers as within the tower model, various cost elements have been averaged. TM also noted some inconsistencies in regard to the relationship between tower size and CAPEX as a 20m monopole is less than 60% of the CAPEX for a 6m or a 12m monopole. The 6m, 12m and 30m monopoles have virtually the same CAPEX. TM expects that the CAPEX and height to have a straight line relationship, although there could be some economies of scale for certain monopole sizes. The average CAPEX for monopoles suggests that the majority of monopoles are at least 36m, which are quite tall and could be the outcome of a non-representative or poorly weighted sample.

PPIT views that Infrastructure Sharing should be left to commercial negotiation as there has not been any market failure to constitute a requirement for mandated prices. Although 4 licensees have been declared dominant in certain states, there has not been any action

from them that are detrimental to consumers. Tower sharing markets constitute different variations and variables, and having reference prices will lead to detrimental effects on revenue and the need to revise the business models and financial commitments with banks and financial institutions.

PPIT highlighted that the basis of setting prices is similar between dominant and non-dominant SBCs. Telcos have entered into 15-20 years' agreements since 2005 which suggest that the agreed basis and terms indicate that the licensees have not exercised their market power, if any, to the detriment of the consumers and that the agreements entered into are reasonable. If prices are mandated, not only SBCs will be impacted but also independent tower companies. The modelling of the tower cost and the proposed prices are averaging too many variations which include location, structure types, design and height. The model also excluded substantial costs e.g. cost elements of the Telcos who are also major providers; civil and preliminary works involved for telecommunications tower sites and the variation orders that may be involved, especially in rural areas; and other ancillary cost such as new permit renewal fees which are outside the control of tower companies. The MCMC needs to be minded that it has accepted much higher tower costs in awarding USP projects compared to that in the model and these are 3-legged light duty telecommunication towers with lower specification as compared to heavy duty towers.

edotco and PPIT highlighted that the model may have either omitted certain cost or the values used are too low. In addition, the modelling of the tower costs and the proposed prices are averaging too many variations. Effective price setting should take these variances into consideration. According to edotco, the proposed total annualised tower site costs is 40% below their cost modelling for 3 or more tower tenants depending on the location. It is also important that the MASP provide certainty post 2020 in the event that the MCMC does not determine new prices before the MSAP expires. This is because unlike call termination in which rates continue to fall due to lower equipment cost, tower company's cost which are directly related to tower material costs (CAPEX and OPEX) and other cost such as permit fees and rentals are rising faster than the rate of inflation. edotco and PPIT highlighted several concerns with regard to the model as follows: -

USP cost and subsidies

USP cost and subsidies have been unfairly treated in the model. If revenues are offset in the operating cost, contributions to USP fund should also be accounted for in the model. It is detrimental to reduce costs in this manner as they have a material impact. edotco shared that its USP contributions are 10 times the quantum of the payments it received. PPIT highlighted that not all SBCs receive the USP award. Phase 3 was only obtained by 2 SBCs and Phase 2 to less than 5 SBCs. The others are non SBCs recipients, some of whom do not own towers. All SBCs contribute 6% of gross revenue towards USP. It is

also unfair to assume the subsidy is applicable across all tower companies, without consideration of contributions, in the model.

Per tenant pricing

In terms of per tenant pricing, edotco pointed out that not all tenants are equal. Tenants who require more space or use of resources as compared to the standard configuration would be charged additional fees. In addition, increased rental is based on the number of operators who are tenants on a particular site during the duration of tenancy, from a minimum of RM500 per additional tenant per month to an average of RM2,000 per tenant per month. The Landlord is aware of the number of tenants through site access requests. Such cost is not included in the model to reflect the commercial realities.

PPIT highlighted that the apportioning of total costs per site to the sharing tenants remains ambiguous. If the total cost is divided by the number of tenants, this will create inefficiency in the industry as SBCs would not be incentivised to win new work and promote Infrastructure Sharing. Additionally, there will be incremental OPEX cost from landlords, USP contributions and the cost cannot be fully recovered under the equal sharing mechanism. PPIT shared the current sharing mechanism fees imposed to licensees and suggest to maintain the same sharing mechanism to promote efficiency.

Geographical location

edotco views that some form of geographic de-averaging of CAPEX and OPEX is required with respect to East and West Malaysia as prices to design, build and commission towers in Sabah and Sarawak are 30-40% higher. The OPEX for 45m to 76m towers vary by 15-20% between East and West Malaysia. If data is inadequate, the MCMC should undertake a detailed study to verify the cost and address the issue before regulating prices.

PPIT adds that the geographical location and specific configuration of towers are tailored to the expansion needs of Telcos, however, the proposed model relies on a standard configuration. Hence, the usage of the model for arbitration purposes without any reflection to circumstances that may influence construction and installation costs is inappropriate. PPIT pointed out that based on the data request template, the CAPEX cost for Sabah and Sarawak is marked 200-300% higher than Peninsular Malaysia, whereas some respondents in the PI Paper have indicated tower cost to vary by about 15-20% between Peninsular Malaysia and Sabah and Sarawak.

OPEX and CAPEX cost

- (a) edotco highlighted that the property rental cost of RM18,598 for towers is too low, as on average the property rental for towers is RM3,000 per month which translates to RM36,000 per year. In addition, the one stop agency fee and local authority permit to tower companies have increased almost 3 times in some states.
- (b) edotco views that there are a number of missing OPEX cost which include strengthening and replacement of batteries, utilities (water, 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 which include planning, accounting, legal and human resource, insurance and one stop agency fee and local authority permit fees.
- (c) edotco also pointed out that fees related to one-stop-agency and local authority permits in Terengganu have increased from RM4,000 to RM5,000 to RM15,000 per year and this trend may be followed by other states as well.
- (d) edotco views that discounts provided for longer term contracts which are subjected to commercial negotiations should not be prohibited by the MSAP and subject to a short phase-out period.
- (e) PPIT highlighted that the proposed model averaged OPEX per tower to establish common system charges. However, SBCs have different levels of OPEX and this varies greatly between states due to the difference in tower configurations, terrain and charges by local authorities in the individual states. Effective price setting should take this variance into consideration. PPIT also highlighted that the average cost of the 10 SBCs and Asiaspace were higher than that produced in the model for a sample of 60 m lattice. They would have expected a narrower gap with the inclusion of Stealth Solutions and edotco.
- (f) PPIT highlighted that the CAPEX cost in the model is lower than the weighted average and PPIT suspects that civil and construction cost have been wholly omitted from the model. The basic site comprises of both these costs. The CAPEX cost will further increase with a variation order and this has not been accounted into the model. PPIT provided additional data for civil and construction cost for outdoor and rooftop for 60m, 75m and 90m.

Maxis agrees to the use of a bottom-up costing methodology but is of the view that the combined/blended approach of the historical asset costs and current asset cost should

apply in the model. This is to reflect the actual cost and to avoid over-recovery by tower operators as most of the existing towers have been constructed since many years ago. Maxis views that there is a need to test sensitivity on the impact on volume as tower companies vary significantly in size and scale, with most being state-based while some are wider in scale across states. The proposed regulated prices are not very different from the existing prices offered except that SBCs give discounts over a long tenure. Maxis recommends that the MCMC adopt the approach of discounting as practised currently by the SBC tower operators. Maxis suggests that the MCMC review the regulatory price for other types of tower structure that are significantly used by Access Seekers namely monopole, monopole tree, lamp pole and BTS Hotel solutions to avoid exorbitant charges. Tower operators are now more focused on 15m, 18m, and 24m lamp poles and 30m and 45m monopoles. The MCMC should regulate prices for these tower types and not only lattice.

Discussion

Operators' comments span a considerable range of views, from those, such as Digi and Maxis, who propose that price regulation is needed to overcome excessive wholesale pricing, to PPIT, who maintain, as the MCMC understands it, that the willingness of operators to enter into long-term contracts provides evidence that market power has not been exercised to the detriment of consumers. Unfortunately, the MCMC is unable to agree with this line of reasoning, given that, in the hypothetical case where the tower company could exercise such power, its customers (operator) might have little choice but to enter into such agreements. On the other hand, the MCMC does recognise that operators have the option to build, or share, towers in many cases, though there are likely to be exceptions to this in some places. Perhaps a stronger argument is that advanced by PPIT in favour of differentiating the degree of price control between dominant and non-dominant operators, although the MCMC does not accept that this should necessarily be reflected in a cost model. PPIT further asserts that those operators who have been declared dominant have not been guilty of actions that are detrimental to consumers. Whilst the MCMC would agree that no such specific action has been brought to light in the context of this Public Inquiry, the possibility of detriment to consumers also potentially arises from more general exercise of market power, for example, in charging excessive prices.

A number of respondents appear to favour de-averaging of the model and, implicitly of regulated prices, to cover Sabah and Sarawak versus West Malaysia, states, different structure types, or different underlying OPEX and property costs. Whilst the MCMC would accept that all of these dimensions and possibly others are likely to affect the cost of a particular tower, it was the MCMC's intention to obtain an understanding of the overall cost levels.

edotco and PPIT complain of costs potentially omitted from the model, or being assessed at too low a level, whereas Maxis observe that the costs produced by the model are broadly in line with prices offered in the market. The MCMC points out that the costs entered into the model are based on the inputs provided by operators, who were encouraged to provide a full set of costs and to add any category of cost that they felt had been omitted from the data request.

The MCMC notes the comments from edotco and PPIT regarding the complexities associated with calculating the costs of multi-tenanted sites, the practice of landlords charging additional rent when new tenants are added and the danger of encouraging inefficiencies. The PI Paper did not propose an equal cost sharing mechanism, and the MCMC continues to be of the view that a costing exercise of this kind is unlikely to shed very much light on which schemes for sharing tower costs amongst tenants are reasonable and which are otherwise. The model contains an assumption of three tenants on average, based on the data provided by operators. The MCMC recognises that adding further tenants may result in an increase in leasing costs, or that sites with fewer than three may have lower leasing costs. The access regime allows flexibility in negotiating price structures around this, including also discounts for longer tenure, provided that these are equitable and non-discriminatory.

Finally, a number of operators comment on the treatment of USP contributions and subsidies. These comments include that the level of contributions can be quite significant in relation to the benefits received and that not all operators benefit from subsidies to the same degree, or at all. As was pointed out in the PI Paper, the levy operates as a fairly transparent kind of tax that, in a similar way to value-added tax, can be recovered from customers. This can be taken into account by the MCMC in assessing the commercial details of any disputed arrangement and so it is not necessary to include it in the cost model.

On the other hand, subsidies do affect the level of costs faced by operators in a direct way. Although this is done on an averaged basis in the model to give a view of the level of costs faced by operators overall, it is open to the MCMC to make adjustments in any particular case, for example by removing this item where the operator in question is not in receipt of any subsidies, or increasing it appropriately where it does receive them.

MCMC's Final Views

The MCMC notes the general comments from edotco and PPIT and their arguments that the imposition of regulated pricing would have a detrimental impact on the development of the towers sector in the future, would distort the market and discourage investment, especially for the deployment of next-generation 5G services. The MCMC also notes the

statements that commercial negotiations have been used successfully within the market and that there is no evidence of market failure, even in states where licensees have been declared as dominant.

Having considered carefully the variety of comments from respondents, the MCMC is not minded to pursue a more detailed general set of costs, as some respondents proposed. On the other hand, the MCMC would be likely to require further detailed specific costing in the event of a dispute resolution, or other interventions.

Question 28:

Do you have any comments on the sensitivities and outputs from the towers cost model?

Submissions received

TM highlighted that it is unable to comment due to the lack of transparency in the model approach.

Celcom views that the sensitivity relating to annuity method is of little value since there is no economic rationale for simple annuities to be considered. Celcom believes price tilt assumptions and justification of the choices made in the base case and asset lifetimes would be useful to have sensitivities on. Celcom also highlighted that the lifetimes used in the tower model appear not to be in line with best practice, for example 15 years for outdoor structures but only 10 years for a rooftop structure. Celcom notes the Ofcom model assumes a cell site life of 18 years.

Digi views that tower companies should yield a lower WACC as compared to other services as they have lower debt premiums and lower risk levels due to solid support from state government. Digi suggests the use of benchmarks from within the same region rather than operators out of the region namely the US and the EU. This is to ensure that the actual scenario is not distorted.

Maxis views that the sensitivity analysis on towers is sufficient but recommends that the MCMC undertakes costing and sensitivity analysis for other types of towers such as monopole, monopole tree, lamp pole and BTS Hotel solutions. It is important to avoid exorbitant charges imposed by third party access provider to the access seeker.

PPIT express concern over the accuracy of the assumptions used and the application of inputs derived purely by estimates. In calculating averages, the MCMC has deliberately excluded inputs that run into hundreds of thousands of Ringgit due to the assumption of

double counting. The omission of civil and construction costs from the model may result in under-representation of costs. PPIT also highlighted that the commercial circumstances of individual SBCs may vary significantly from the average parameters specified and result in inequitable outcome.

Discussion

The comments submitted by respondents in answer to this question appear to a considerable degree to reprise issues raised in the context of earlier questions, for example urging a more de-averaged approach, or the suitability of comparator operators for WACC parameters. These points are discussed in response to Questions 27 and 15 above.

Celcom raised the additional point that the asset lifetimes used in the model differ from and are generally shorter than those used by Ofcom in their (mobile) model. The MCMC does not accept that this difference represents any departure from best practice, which is, in the MCMC's view, to take account of local conditions when selecting such parameters. The MCMC does not believe that sensitivities on price tilt or asset lifetime would shed very much additional light, given that price tilt, for example, has a fairly straightforward relationship with price.

MCMC's Final Views

The MCMC does not propose to run any further sensitivities.

Question 29:

Do you have any comments on the proposed regulated prices?

Submissions received

TM highlighted that it is unable to comment due to the lack of transparency in the model approach.

Celcom agrees to price regulation for towers but believes that further analysis is required as the costs of some structure type decreases with the increase in structure height.

Digi supports ex-ante regulation on tower pricing, however seeks clarity on costing for more prevalent tower heights i.e. <45 m (monopole) and 45 m (lattice). Regulating prices for these tower heights should also be considered by the MCMC. Digi comments that if mark-ups are applicable on top of the prices indicated, it will result in much higher prices

than the current market rates. Allowing mark-ups within a commercial regime will not be effective in ensuring that prices provided are cost-based and competitive.

edotco questions the value of publishing a set of reference prices which apply to less than 20% of tower configurations, which then can be varied by a governed set of complex rules. edotco is strongly of the view that ex-post regulation is optimal except perhaps in relation to dominant licensees. The approach of setting annualised total cost per site per year for a standard allocation covering 3 sharing operators, is incorrect and overly simplistic as the standard allocation of tenants to towers is less than 2 on towers that are owned and managed by edotco Malaysia. edotco highlighted the key factors in determining prices to tenants include CAPEX and OPEX cost, fees and charges, occupied space, power, length of lease, additional service request, etc. edotco argues that cost for towers have an increasing price index, hence, does not agree on the reduction of the passive elements of the cost structure to 6% per annum. edotco also does not consider that the proposed prices are reflective of cost of providing lattice towers especially for multiple tenants nor are they de-averaged by location and structure height. The proposed regulated prices will discourage investment and infrastructure sharing especially since the tilted annuities model caters for 1 to 2 tenants per site. As such, when there are 3 to 4 tenants, edotco loses total income under the proposed MCMC model. This loss is further topped up with the increase in additional costs of having multiple tenancies at the site (increased rental, tower strengthening, permit fee, civil work, etc.) which are not included in the tower costing model.

Maxis notes that the proposed regulated prices are not very different from the existing prices offered except that SBCs adopt discount structures. Maxis recommends that the MCMC adopt the approach of discounting as practised currently by the SBCs i.e. 25% from the eighth year and 35% from the eleventh year. Maxis suggests that the MCMC review the regulatory price for other types of tower structure that are significantly used by Access Seekers namely monopole, monopole tree, lamp pole and BTS Hotel solutions to avoid exorbitant charges. The proposed regulatory prices should not be used by the Tower Operators to increase their prices.

PPIT highlighted that the proposed regulated prices are increasing from 2018 to 2020, however, the prices offered by SBCs to the Telcos are reducing in line with the agreed pricing methodology. Also, the proposed prices are only valid for lattice type with heights 60m, 75m and 90m. PPIT is concerned that the proposed prices are neither a ceiling nor a floor price but a reference price and licensees are allowed to negotiate subject to approval by the MCMC. Implementing the regulated prices may result in major re-organisation of the tower industry due to the many variations in types and heights of towers. If the prices will have to be referred to the MCMC for decision, this could delay the roll-out and be a deterrent to building more telecommunication towers. In addition,

mandating prices for 3 years is highly risky to investors as compared to adopting long-term prices.

PPIT emphasized that the SBCs collectively disagree with the proposed approach to regulation due to the lack of clarity around the proposed regulated prices and over emphasis on cost-driven “buy and build” decision and ignores the possibility of Telcos selectively choosing to focus on towers that are located in lower cost urban areas. The higher CAPEX and OPEX to construct and maintain towers in non-urban areas may potentially lead to under-expansion of service to those areas. This is against the spirit of the national agenda to increase coverage and last mile access which is highly dependent on infrastructure services being able to penetrate to non-urban areas. The move to regulate price will also dis-incentivise investment in new infrastructure. Setting threshold values (30% above the model input cost for individual cost items and 20% overall increase in annualised cost) above the reference cost is too restrictive and stringent as any additional cost should be recovered provided it can be justified.

Sacofa highlighted that currently it does not provide batteries and generators. OPEX for generators (25 kVA) costs RM7-10k per month. The cost included in the MCMC tower model i.e. RM43,635 is insufficient to cover the generator cost.

U Mobile views that due to the fragmented nature of the tower rental industry and a multitude of factors affecting this sector, it is impossible to produce a pricing structure that fits every situation or configuration. U Mobile suggests that the MCMC streamline the processes and introduce a clear and transparent pricing structure for tower providers throughout the country to induce efficiencies which will lower cost and benefit end users. This needs to be done soonest as network operators often are obliged to seek access and pay rentals without options from designated providers such as SBCs or designated network facilities providers in a particular locale. Commercial arrangements in the form of discounts are offered, but so is the pass-through of increasingly (unwarranted) cost. U Mobile highlighted the following:

- (a) Proposed prices for 2018 are high compared to current levels;
- (b) The trend in current arrangements has been a gradual decline unlike the model;
- (c) The data built into the model may not have been provided on the same basis;
- (d) Issue of exclusivity needs to be removed if prices are to be regulated effectively;
- (e) The model averages prices in various regions and hence is not suitable; and
- (f) The proposed tower type and height does not cover the large proportion of the towers leased by telcos e.g. 30m and 45m lattice towers. Moving forward, there will be an increasing trend towards smaller structures like lamp poles. These need to be regulated as telcos often do not have alternative providers, but at the same time, are governed by the need to meet coverage/service obligation.

webe notes that it is important that the principle of cost-based pricing is applied to towers as tower cost is a significant portion of the total cost to provide end services to consumers at large. webe expressed concern that the proposed prices are on a per site basis, however, the cost per access seeker is not clearly mentioned in the PI Paper. webe highlighted that the appointment of second and following tenants are not based on a straight line basis but at a pre-determined percentage. webe supports the initiative to set a price ceiling for tower rental but is of the view that the costing for towers should be based on a duration of more than 7 years as rental of towers are long-term arrangements. The longer tenure will enable Access Providers and Access Seekers to negotiate for volume discounts.

YTL agrees that the regulated prices should clearly state the provisioning of space including space to install base station i.e. cabin space and not merely space to install antennas on towers.

Discussion

The MCMC notes the point made by Maxis and webe that the length of contracts in this sector is significantly greater than the envisaged price control period and that this might create undue risks, or distort appropriate pricing practices in the market.

The MCMC also notes the points made by Digi about the application of prices to other structure types, such as monopoles. The cost of these has been included in the average, but separate costs were not quoted, because of a lack of data points in the sample. The MCMC recognises, however, that these structures may have lower costs than the average and would not expect operators to increase prices purely on the basis that they are lower than the average. Furthermore, mark-ups to cover fixed and common costs have not been included in the model, because it is not necessary to share such costs with other services in the case of tower companies, and so, all costs can be included in the calculation. No further mark-ups to prices would therefore be expected.

The MCMC also notes that several respondents reiterate the point about price de-averaging, including PPIT, despite its acknowledgment that the modelled costs might represent no more than a reference. It is difficult in consequence to understand how PPIT can sustain the argument that this would lead to a major reorganisation of the towers industry.

The MCMC further notes the point made by PPIT that an average price might result in cherry-picking on the part of operators in their build or buy decisions and a detrimental effect on universal service objectives. However, the MCMC emphasises again that the

proposal was not that it should set an average price, but rather that legitimate cost variations of this kind might be set in the context of an averaged reference cost.

PPIT also suggests that its prices are on a downward trend, in contrast to the upward tilt in the model. Whilst the MCMC accepts that this may be true, the assumptions input to the model were those provided by the operators. It is also an incorrect interpretation of what is proposed in the PI Paper that negotiation would only take place with the MCMC's approval. Tower operators and their customers are free to negotiate with each other and the MCMC would only become involved in the process if this process fails to reach agreement.

U Mobile raises a number of additional issues around exclusivity of access and availability of options. Whilst they are clearly an important element of the pricing mix, and may indeed be indicators of sub-optimal functioning of the market, they require further examination and a wider evidence base and are not best suited to being addressed by this current review.

MCMC's Final Views

Whilst the MCMC shares some of the concerns raised by the operators about the efficient functioning of the market, in some instances, it is not persuaded that ex-ante regulation of prices in this sector is likely to lead to an improved outcome, taking into account the complexities of the services and pricing structures in operation in the market. Nevertheless, the MCMC will continue to monitor developments in the sector, with a view to intervening should instances of ineffective competition become apparent.

The updated cost model provides the following indicative prices for Infrastructure Sharing (Towers).

Table 30: Infrastructure Sharing (Towers) Indicative Prices

Annualised total cost per site for Lattice	2018	2019	2020
60 m (RM/year)	124,457	130,388	136,671
75 m (RM/year)	128,493	134,689	141,253
90 m (RM/year)	145,534	152,847	160,601

Question 30:

Do you have any comments on the approach to modelling in-building common antenna system?

Submissions received

Altel concurs with the approach to modelling IBCA system.

edotco pointed out that IBCA systems are not only deployed by MNOs but also by them. Hence it is inaccurate to depend solely on the mobile model, especially if access to such facility is done on a reciprocal basis between operators. If the prices for these services are used as reference, this would create unreal expectations and hence, should not be included. edotco deploys IBCA systems in hospitals, arenas, shopping centres, buildings, office complexes, hotels, Government departments, etc. and the CAPEX ranges from RM440,000 to RM790,000 to deploy between 150-400 antennas while the OPEX is between RM12,000 to RM42,000 per year. Each site and project is unique and customised solutions are needed. As a result, the reference price is too low and one annualised price does not even address the variability of sites. edotco requested for the details of the costs included in the model and sought the MCMC's views on the essential facilities that are subjected to access regulation in this area. If the focus of regulation is excessive rental charged by building owners, then the MCMC should model the cost of building owners providing access to licensees for IBCA systems.

According to Maxis, the current approach for IBCA systems in Malaysia is that the systems are installed by the mobile operator who then allows access to other mobile operators on a reciprocal basis. This approach has been proven effective and efficient in terms of cost efficiency and quality of services. However, there are also third parties offering IBCA facilities to mobile operators for example Skai in KLIA2, which raises concern on quality of service and exorbitant prices. For the benefit of the industry, Maxis suggests that the MCMC set maximum regulated prices for IBCA systems in order to control exorbitant prices imposed by IBCA provider. Maxis shared the IBCA prices commonly used by the mobile operators for their IBCA facilities and suggested the MCMC use those prices. Maxis also suggests that sensitivity analysis be carried out for IBCA systems provided by third party access providers.

TM doubts the value of the IBCA mobile model results as inputs for potential future disputes as IBCA facilities vary in size and scale. The specific case may be different from the modelled IBCA. The MCMC will need more detailed data supplied by the mobile operators showing the variation in cost in order to facilitate potential future disputes involving IBCA facilities.

U Mobile views that the cost in the model does not elaborate on the size of the building and the type of IBCA system. Large buildings will have more antennas and cover a wider area which requires a method of sharing that allows the operators to recover their cost while extending access to other seekers. The price per antenna in the model far exceeds

the current average of approximately RM50 per antenna. A typical IBCA system would have 50 antennas; thus the proposed prices should be approximately 3 times the current price paid by industry.

YTL agrees for the inclusion of IBCA in access pricing. Since there are many variations in the deployment of in-building infrastructure and building vary in size and shape, a convenient way to price is by area covered by the system and efficient use of spectrum allowed i.e. multiple-input multiple-output, also known as MIMO, etc. Access pricing should have an in-built mechanism for the calculation of costs for sharing and inclusion of new parties.

Discussion

The MCMC notes the comments offered by edotco and Maxis that apart from the mobile operators, other providers also provide IBCA services. The MCMC also accepts the point made by TM, edotco and U Mobile that the costs available from the mobile model do not elaborate on the variations of cost with the size and nature of installations.

The suggestions made by Maxis, U Mobile and YTL about how potential access prices might be structured to take account of cost variations and factors such as the addition of new tenants are also noted.

Finally, the MCMC accepts the point made by Maxis that the most common arrangement for IBCA in Malaysia is for reciprocal access amongst mobile operators.

MCMC’s Final Views

The MCMC is not persuaded that there is sufficient cause to set ex-ante price controls on IBCA pricing in Malaysia. Nevertheless, the MCMC provides the following indicative prices for Infrastructure Sharing (In-Building Common Antenna Systems).

**Table 31: Infrastructure Sharing (In-Building Common Antenna System)
Indicative Prices**

Annualised total cost per site	2018	2019	2020
IBCA (RM/year)	74,200	76,400	78,700

9. Digital Terrestrial Television (DTT) Broadcasting service

9.1. 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 Public Inquiry period.

Part G of the PI Paper concerned the DTT broadcasting service. Section 20 of the PI Paper described the DTT model, including treatment of High Definition (HD), Standard Definition (SD) and radio channels, channel take-up and Set-Top Box (STB) costs and the changes made after model viewing, and sought comment on its completeness.

The MCMC proposed to set regulated prices for the DTT service.

9.2. Summary of submissions received

Question 31:

Do you have any comments on the approach to the modelling of the DTT multiplex costs?

Submissions received

Media Prima comments that the costs of STBs should not be included in the cost of DTT multiplex as they were part of the requirements of the tender document and should not be included as part of the cost structure for a Common Integrated Infrastructure Provider (CIIP).

MYTV submits that its commitment of 2 million STBs is an integral part of MYTV's bid to the tender which is linked to the channel demands, the channel rates offered and its revenue stream. MYTV comments that the moratorium period is important as a lot of work has gone into development of SIRIM-approved STBs, and would allow MYTV to sell these SIRIM-approved STBs to set-off against its contribution of 2 million STBs. There is currently an influx of IDTVs in the market that impacts on the take-up of STBs. MYTV points out that the IDTVs will not be able to cater for pay TV channels or provide HbbTV services. Hence, MYTV's STBs are the best choice for broadcasters and it is gravely unfair that MYTV is unable to recoup the costs of the STBs that have been developed based on the broadcasters' requirements. In that regard, MYTV considers that STBs should be included in the cost model.

MYTV provides additional information of a loan facility and requests that the annual financing costs be included in the cost model. In addition, MYTV revised its forecast, by increasing the number of SD channels and reducing the number of HD channels. MYTV submits that there are currently only two HD channels that have been taken up and it does not envision that there will be any further demand for HD channels. Finally, MYTV clarified that radio service is a supplementary service provided to broadcasters who have committed to lease the entire multiplexer. In that regard, MYTV submits that radio service should be excluded and the cost of radio services should be reallocated to SD and HD channels.

Question 32:

Do you have any comments on the proposed regulated prices?

Submissions received

Media Prima submits that the proposed price is high and higher than what it pays currently. In addition, Media Prima suggests that the MCMC benchmark the costs and the WACC of a relevant operator, such as Arqiva in the UK.

With the evolution of technology to compress data and the requirement of different types of content, such as sports, news, drama and movies, this influences the data capacity (bit rate) required. For example, news programmes do not require high bit rate whilst sports programmes require higher bit rate. Further, there is also the capability to reduce the range of guard interval, and hence, increase the number of channels in the multiplexer. In that regard, Media Prima views that news programmes might not need 2.5 Mbps and a HD channel might not require 7 Mbps for better quality. As such, Media Prima proposes to the MCMC to also regulate the price per multiplexer or lump sum capacity to provide the Access Seeker with greater flexibility to manage the quality for themselves.

Media Prima comments that the price for radio channels is unreasonable, as it pays around that amount for four radio stations, Hot, Kool, One and Fly.

Further, Media Prima suggests to the MCMC to review the price for the Average channel cost. For example, it highlights that 6 multiplexers and 240 transmitters were used. Media Prima also submitted some price information on 5kW, 1.5kW, 250W and 100W transmitters.

MYTV submits that the cost calculated per channel for SD, HD and radio is not related to the ratio of bandwidth utilisation. By using radio as the point of reference, the ratio is as follows: 40 (SD): 240 (HD): 1 (Radio). From this ratio, it can be seen that the cost output

for a radio channel is incorrect as it does not vary so much from the price of an SD channel, whereas an SD channel uses 40 times more bandwidth than a radio channel. It is therefore expected that the price of SD and HD are higher than the proposed price. Finally, MYTV suggests that it is assisting broadcasters to obtain additional revenue from advertisers and their focus should be on the additional revenue rather than to obtain lower prices.

Discussion

The MCMC notes the opposing views offered by MYTV and Media Prima on the subject of STBs. In the MCMC's view, Media Prima is correct in pointing out that the offer of providing STB was part of the tendering exercise and that the expectation was that bidders would not seek to recover this in higher prices charged to customers.

The MCMC also notes the point made by MYTV that radio channels are only sold in conjunction with SD or HD TV channels. However, it is clear that they are not bundled with such channels at no additional charge. The MCMC is therefore not persuaded that the costs of radio channels should be incorporated into regulated prices for HD and SD channels.

Both Media Prima and MYTV offer comments about the relative bandwidth requirements of different types of channels and Media Prima make the point that different types of programming may suit different bandwidths on a more finely graduated scale than a simple SD/HD distinction. Media Prima also makes the observation that additional bandwidth within a multiplex might be released by adopting narrower guard intervals and suggests that broadcasters should be permitted to pay for a whole multiplex and to have the opportunity to configure the bandwidth it provides to suit their requirements. These observations tend to lead to a conclusion that it would be inappropriate to set specific prices for SD, HD and radio along the lines of the costs set out in the PI Paper. Allowing some degree of flexibility for MYTV and broadcasters to agree on the price structures within the constraints to prevent excessive pricing would seem to offer the best opportunity for innovation by broadcasters in matching their bandwidth consumption to the needs of viewers and listeners.

The MCMC notes the additional information provided by MYTV, including updated forecasts and details of financing arrangements. The MCMC does not propose to take the financing costs directly into account, as these are the type of costs covered by the WACC.

MYTV submitted a revised channels forecast showing a lower take-up as part of its response to the Public Inquiry. As MYTV did not provide any justification for the revised forecast, the MCMC decided not to make any changes. In addition, the MCMC has issued several new licences to broadcasters in the recent past and is of the view that the revised

forecast is unduly pessimistic. As a result, the original forecast has been retained in the model.

MCMC’s Final Views

Based on the comments received from the respondents, the MCMC has removed the reference to HD and SD channels in the price structure and replaced them with a two-part structure of a fixed channel and a variable bandwidth costs. This accommodates the needs of newer broadcasters who may be buying by number of channels or Media Prima who may be interested in buying a multiplex. In addition, it takes into consideration the development of compression technologies that reduces the amount of bandwidth required per channel.

Broadcasters may in that regard agree with MYTV on the price per channel basis based on their bandwidth requirements. They have the flexibility to negotiate on the payable charge for the SD or HD channel, so long as it does not exceed both the per-channel and per-unit-bandwidth prices. Likewise, prices for a whole multiplex can also be agreed upon provided that it does not exceed the price calculated through the channel and bandwidth pricing mechanism.

9.3. MCMC’s final view

The MCMC confirms its preliminary view and sets the final prices of Digital Terrestrial Broadcasting Multiplexing Services, made up of per-channel and per-unit-bandwidth costs, as shown in Table 32. The broadcasters can negotiate the SD or HD channel or the entire multiplex based on the per-channel and per-unit-bandwidth costs.

Table 32: Digital Terrestrial Broadcasting Multiplexing Final Prices

Annualised total cost per channel	2018	2019	2020
Per-channel cost (RM per year)	6.1 million	7.4 million	6.8 million
Bandwidth cost per Mbps (RM per year)	332,000	390,000	293,000

10. 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 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 Reference Access Offer no later than 30 days from the date on which the Determination takes effect.

Any service providers that offer regulated facilities or services which are included in the Determination but do not currently have a Reference Access Offer must produce one no later than 6 months from the date on which the Determination takes effect.

MCMC

20 December 2017

Annexure - Abbreviations

2G	Second generation wireless technology
3G	Third generation wireless technology
4G	Fourth generation wireless technology
AA	Apparatus Assignment
BEREC	Body of European Regulators for Electronic Communications
BTS	Base Transceiver Station
BTU	Broadband Termination Unit
BULRIC	Bottom-up Long Run Incremental Cost
CAPEX	Capital Expenditure
CAPM	Capital Asset Pricing Model
CCA	Current Cost Accounting
CIIP	Common Integrated Infrastructure Provider
CMA	Communications and Multimedia Act
CWDM	Coarse Wavelength Division Multiplexing
DTT	Digital Terrestrial Television
DWDM	Dense Wavelength Division Multiplexing
EDGE	Enhanced Data-Rates for GSM Evolution
EPMU	Equal Proportionate Mark Up
ERP	Equity Risk Premium
EU	European Union
FAC	Fully Allocated Cost
FTTH	Fibre to the Home
Gbps	Gigabits per second
GBV	Gross Book Value
GIS	Geographic Information System
HD	High Definition
HLR	Home Location Register
HSBB	High Speed Broadband
IBCA	In-Building Common Antenna Systems
IPTV	Internet Protocol Television
Kbps	Kilobits per second
LRIC	Long Run Incremental Cost
LTBE	Long-Term Benefit of End users
LTE	Long Term Evolution wireless technology
Mbps	Megabits per second
MCMC	Malaysian Communications and Multimedia Commission

MGW	Media Gateway
MMS	Multimedia Message Service
MNO	Mobile Network Operator
MSAN	Multi-Service Access Node
MSS	Mobile Softswitch
MTR	Mobile Termination Rate
MVNO	Mobile Virtual Network Operator
NBV	Net Book Value
NPO	National Policy Objective
Ofcom	The Office of Communications of the UK
OLT	Optical Line Termination
OPEX	Operating Expenditure
OTT	Over The Top
PI	Public Inquiry
POI	Point of Interconnect
PPP	Public Private Partnership
PSTN	Public Switched Telecommunications Network
QoS	Quality of Service
RAO	Reference Access Offer
RAN	Radio Access Network
RM	Malaysian Ringgit
SBC	State-backed Company
SD	Standard Definition
SIM	Subscriber Identity Module
SMS	Short Message Service
STB	Set-top Box
Tbps	Terabytes per second
TDD	Time Division Duplex
TRX	Transceiver
UPE	User Provider Edge
USP	Universal Service Provision
VOD	Video On Demand
VoLTE	Voice over Long Term Evolution wireless technology
WACC	Weighted Average Cost of Capital
WDM	Wavelength Division Multiplexing