



Suruhanjaya Komunikasi dan Multimedia Malaysia

Malaysian Communications and Multimedia Commission

**GUIDELINES TO THE COMMISSION DETERMINATION
ON THE MANDATORY STANDARDS FOR QUALITY OF
SERVICE
(WIRELESS BROADBAND ACCESS SERVICE)
DETERMINATION NO. 2 OF 2023**

(SKMM(T)06-SEIR/140.003/Jil. 3 (09))

29 December 2023

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DEFINITION

4G	Fourth generation of mobile networks
5G	Fifth generation of mobile networks
End user	A person who accesses the network in order to communicate via the services provided by the network
eNodeB	4G wireless access node that transmits and receives communications between the end user and the mobile network
gNodeB	5G wireless access node that transmits and receives communications between the end user and the mobile network
Klang Valley	Area centred in the Federal Territories of Kuala Lumpur and surrounding cities in the districts of the state of Selangor
Licensee	The service provider and the wholesale provider
National POI	A POI located in Klang Valley
Regional POI	A POI located in any states or federal territories in Malaysia
Service provider	An Applications Service Provider or a Network Service Provider who provides 4G and 5G wireless broadband access service to the end user
Test server	A server deployed by the Commission, the service provider or the wholesale provider located in Klang Valley for the purpose of conducting end-to-end quality of service measurements
UE	User equipment, a device allowing a user access to network service via radio interface
Wholesale provider	An Application Service Provider or a Network Service Provider who provides 5G network access to the service provider

ABBREVIATION

CIMS	Communication Infrastructure Management System
CDN	Content Delivery Network
ETSI	European Telecommunications Standards Institute
FTP	File Transfer Protocol
FWA	Fixed Wireless Access
GPS	Global Positioning System
HTTP	HyperText Transfer Protocol
IMT	International Mobile Telecommunications
KQI	Key Quality Indicators
POI	Point of Interconnection
PRB	Physical Resource Block
QoE	Quality of Experience
QoS	Quality of Service
RSRP	Reference Signal Receive Power
URL	Uniform Resource Locator
WGS	World Geodetic System

PART A: OBJECTIVE AND SCOPE

1. These guidelines are developed by the Malaysian Communications and Multimedia Commission (the "Commission") pursuant to Paragraph '9' of the Commission Determination on the Mandatory Standards for Quality of Service (Wireless Broadband Access Service), Determination No. 2 of 2023 ("**Mandatory Standards**").
2. These guidelines set out the measurement methodology, test parameters, reporting procedures, templates, and explanatory notes for the purpose of network quality assessment.
3. These guidelines are applicable for terrestrial wireless broadband access and fixed wireless access (FWA) services using 4G and 5G networks including 5G Non-Standalone (NSA) and 5G Standalone (SA).
4. All parties including but not limited to wholesale provider, service provider and any appointed third party shall conduct wireless broadband measurement and the report shall be provided to the Commission based on the guidelines set in this document.

PART B: KEY QUALITY INDICATORS (KQI) ASSESSMENT

5. The Mandatory Standards for Quality of Service (MSQoS) Wireless Broadband Access Service (Wireless BAS) establishes two (2) sets of Key Quality Indicators (KQI) which are **Mandatory KQI** and **Monitoring KQI**.
 - a. **Mandatory KQI:**

This quality indicator shall be monitored and mandated by the Commission. The Mandatory Key Quality Indicators shall also be monitored, reported, and rectified by the relevant Licensees based on the minimum requirements of the Mandatory Standards.
 - b. **Monitoring KQI:**

This quality indicator shall be monitored by the Commission. The Monitoring Key Quality Indicators shall also be monitored, reported, and rectified by the relevant Licensees based on the minimum requirements of the Mandatory Standards.

6. Both the Mandatory KQI and Monitoring KQI shall be assessed via two (2) different methods depending on the parameters, which are:
 - a. End-to-end measurement:
On-field measurements are conducted using wireless broadband measurement software installed on user equipment (UE). This applies to Wireless BAS, including FWA measurement.
 - b. Network statistic data reporting:
Data is extracted from the Operations Support System (OSS) or Two-Way Active Measurement Protocol (TWAMP). The parameter includes network utilisation, availability and other 5G access network performance.
7. Mandatory KQI and Monitoring KQI for end-to-end measurement is a requirement for the service providers based on the type of network service provided, and the frequency bands of the network, as shown in Table 1 below. All KQIs depicted in Table 1 are measured for each location, except for the "Download throughput per area (all technology)" which will be measured for every state and federal territory. Service Accessibility, HTTP session time and Video Streaming Access Time will be under Monitoring KQI for year 2024 and to be under Mandatory KQI starting 2025 onwards.

Table 1: End-to-end measurement KQI

Key Quality Indicators	5G network (Using frequency bands 703-743 MHz, 758-798 MHz ¹ , 3.4-3.6 GHz & 26.5-28.1 GHz)	4G or 5G network (Using all frequency bands except 703-743 MHz, 758-798 MHz ¹ , 3.4-3.6 GHz & 26.5-28.1 GHz)
Download throughput	Monitoring	Mandatory
Upload throughput	Monitoring	Monitoring
Latency	Monitoring	Mandatory
Packet loss	Monitoring	Mandatory
Service Accessibility	Monitoring	Monitoring (2024) Mandatory (2025)
HTTP session time (web browsing)	Monitoring	Monitoring (2024) Mandatory (2025)
Video streaming access time	Monitoring	Monitoring (2024) Mandatory (2025)
Download throughput per area (all technology)	Mandatory	

¹ Subject to the latest spectrum policy on the use of this frequency band

8. Mandatory KQI and Monitoring KQI for network statistics data reporting is a requirement for the service providers and wholesale provider or any entity that provides 5G access network after the transition from a 5G single wholesale network to 5G dual network, based on the type of network service provided, and the frequency bands of the network, as shown in Table 2 below.

Table 2: Network statistic KQI

Key Quality Indicators	5G network (Using frequency bands 703-743 MHz, 758-798 MHz ¹ , 3.4-3.6 GHz & 26.5-28.1 GHz)	4G or 5G network (Using all frequency bands except 703-743 MHz, 758-798 MHz ¹ , 3.4-3.6 GHz & 26.5-28.1 GHz)
PRB utilisation	Monitoring	Mandatory
Transport utilisation	Monitoring	Mandatory
POI utilisation	Monitoring	<i>Not applicable</i>
Core network utilisation	Monitoring	Mandatory
Network availability (access and aggregation)	Monitoring	Mandatory
POI network availability	Monitoring	<i>Not applicable</i>
Core network availability	Monitoring	Mandatory

9. The Monitoring KQI for 5G access network statistics data reporting is required for 5G wholesale provider or any entities that provide 5G access network after the transition from a 5G single wholesale network to 5G dual network, as shown in Table 3 below.

Table 3: Access network statistic KQI for 5G wholesale network

Key Quality Indicators	5G wholesale network (Using frequency bands 703-743 MHz, 758-798 MHz ¹ , 3.4-3.6 GHz & 26.5-28.1 GHz)
Download throughput	Monitoring
Upload throughput	Monitoring
Latency	Monitoring
Packet loss	Monitoring
Service Accessibility	Monitoring

PART C: MEASUREMENT METHODOLOGY FOR QUALITY OF SERVICE AND QUALITY OF EXPERIENCE

10. This section explains the methodology and procedure of network quality assessment for end-to-end measurement and network statistic data reporting.

C.1 End-to-end measurement

11. The end-to-end measurement shall be conducted based on the KQI for Quality of Service (QoS) and Quality of Experience (QoE) as shown in Table 4.

Table 4: QoS and QoE KQIs

QoS	QoE
Download throughput Upload throughput Latency Packet loss Service accessibility	HTTP session time (web browsing) Video streaming access time

12. The end-to-end measurement for QoS shall be tested between user equipment and the test server located in Klang Valley, while for QoE shall be tested between user equipment and the respective Content Delivery Network (CDN) server.

C.1.1 End-to-end Measurement Methodology

13. The diagram below depicts the overview of end-to-end measurement involving 4G or 5G network and 5G wholesale network:

Figure 1: End-to-end measurement diagram for 4G or 5G network

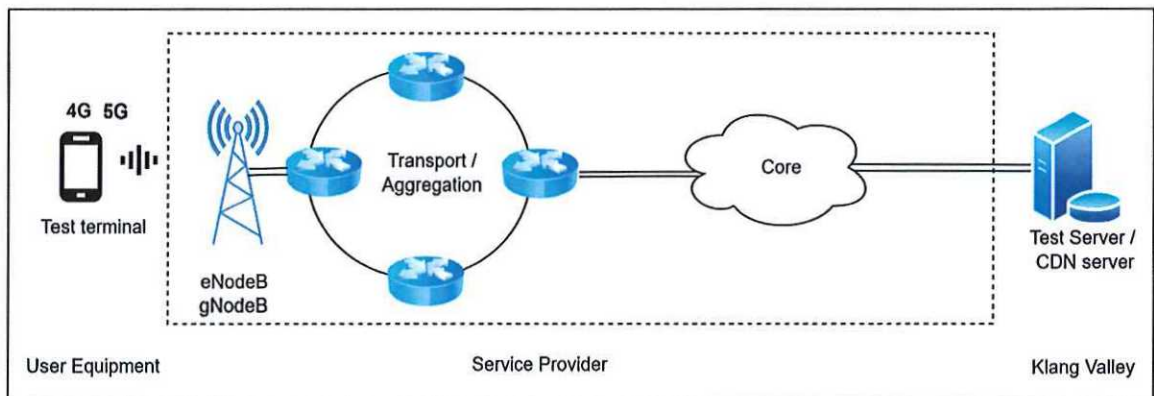
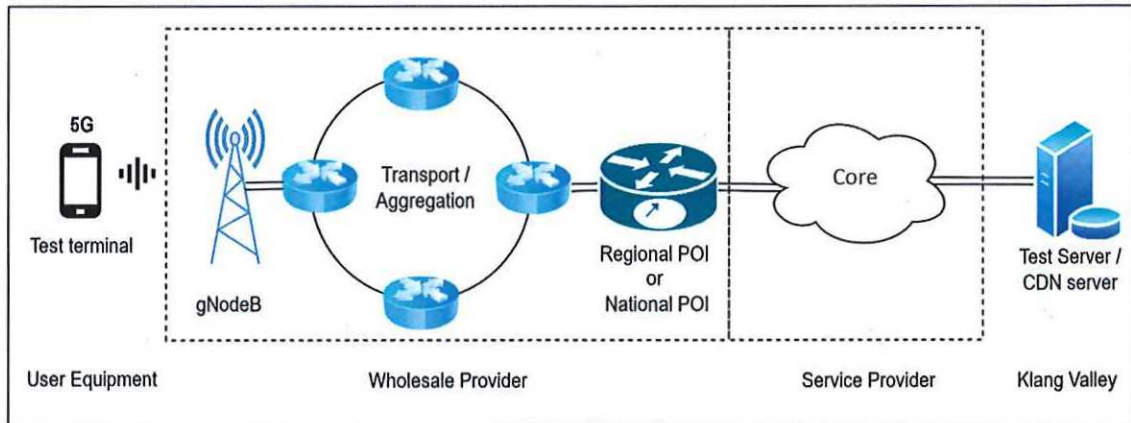


Figure 2: End-to-end measurement diagram for 5G wholesale network



14. Table 5 below describes the test procedures for specific QoS and QoE end-to-end measurement.

Table 5: Test procedures for QoS and QoE measurement

Item	Description
Download throughput	a. Based on File Transfer Protocol (FTP) with the minimum file size of 1GB ² or 100MB ³ . b. File size is subjected to the Commission's discretion. c. Minimum sample for each location is 6 samples. d. Connection timeout and wait time shall be set for 20 seconds each. e. Test time duration shall be set at 20 seconds.
Upload throughput	a. Using File Transfer Protocol (FTP) with the minimum file size of 100MB ¹ or 10MB ² . b. File size is subjected to the Commission's discretion. c. Minimum sample for each location is 6 samples. d. Connection timeout and wait time shall be set for 20 seconds each. e. Test time duration shall be set at 20 seconds.
Latency	a. Measures the round-trip time (RTT) using Internet Control Message Protocol (ICMP). b. Standard packet size of 64 to 128 bytes with minimum of 100 samples for each location. c. Connection timeout and wait time shall be set for 10 seconds each. d. Test time duration shall be set at 10 seconds.
Packet loss	a. Measures the percentage of packet loss based on the latency test samples for each location.

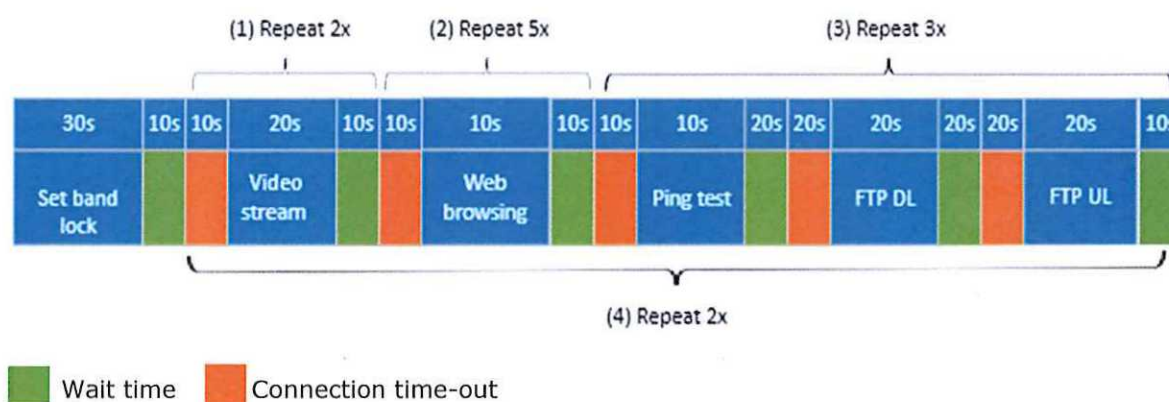
² Wireless Broadband Access and FWA service using 5G (operating in the IMT frequency band 703-743 MHz, 758-798 MHz, 3.4-3.6 GHz & 26.5-28.1 GHz)

³ Wireless Broadband Access and FWA service using 4G network (all allocated IMT frequency band) & 5G network (all allocated IMT frequency band other than 703-743 MHz, 758-798 MHz, 3.4-3.6 GHz & 26.5-28.1 GHz)

Item	Description
Service accessibility	a. Measures the successful attempt ratio based on samples for download, upload, web browsing and video streaming tests for each location.
HTTP session time (web browsing)	a. Test webpage shall be from 5 different web pages commonly used in Malaysia. b. Web page selection is subjected to the Commission's discretion. c. Connection timeout and wait time shall be set at 10 seconds each. d. Browsing duration shall be set at 10 seconds for each web page. e. Minimum samples at each location for each web page is 2 (10 samples in total).
Video streaming access time	a. The source of video streaming shall be a 4K video resolution from two different YouTube content with a duration of more than 1 minute. b. The higher picture quality setting shall be applied on YouTube application of the test UE. c. Connection timeout and wait time shall be set at 10 seconds each. d. Streaming duration shall be set at 20 seconds for each video source. e. Minimum samples at each location for each video content is 2 (4 samples in total).
Download throughput per area	a. All download throughput samples for all technology (4G and 5G) shall be averaged for each state and federal territories within a quarter.

15. A single cycle of test sequence for QoS and QoE is shown in Figure 3. The test shall be repeated at least 2 cycles for each location:

Figure 3: Testing sequence for QoS and QoE



16. The UE or test terminal setting is set differently for 5G wholesale network and 4G or 5G network. The measurement shall be conducted as stated in Table 6.

Table 6: UE or test terminal measurement configuration

5G network (Using frequency bands 703-743 MHz, 758-798 MHz ¹ , 3.4-3.6 GHz & 26.5-28.1 GHz)	4G or 5G network (Using all frequency bands except 703-743 MHz, 758-798 MHz ¹ , 3.4-3.6 GHz & 26.5-28.1 GHz)
a. All test terminals shall be locked to 5G frequency bands 703-743 MHz, 758-798 MHz, 3.4-3.6 GHz & 26.5-28.1 GHz. b. For location where there is only one 5G network, shared by Entity A and Entity B, the measurement shall be conducted in sequential manner for each service provider. c. For locations where two different 5G networks are available, provided by Entity A and Entity B, the measurement shall be conducted concurrently only for 1 service provider from different entity.	a. All test terminals shall exclude frequency bands 703-743 MHz, 758-798 MHz, 3.4-3.6 GHz & 26.5-28.1 GHz. b. The measurement shall be conducted concurrently for multiple service provider testing.

17. The measurement tools used for the tests shall comply with the relevant recommendations from European Telecommunications Standards Institute (ETSI)'s standards or equivalent.
18. The test logs produced by the tools must be compatible with the Commission's requirement for the purpose of the Commission's verification and analysis.
19. Geographical positioning will be based on the Global Positioning System (GPS) and the WGS-84 digital map or its equivalent.
20. Serving site identification, network configurations and frequency bands for each test location shall be recorded as required in the reporting template presented within this guideline.
21. All test log files shall be kept accordingly for at least 24 months from the date of report submission and shall be presented to the Commission as and when required.

22. The measurement shall be performed at outdoor or indoor common areas, by way of drive test, stationary test or walk test.
23. The Commission may at its discretion, performed measurement to the test server hosted by the Commission, wholesale provider or service provider for audit purposes, where deemed necessary.
24. All tests may be performed at any day of the week.

C.1.2 Measurement Location Conditions

25. The Commission may list out the locations prior to the measurement exercise. Locations measured by service providers shall not be the same unless requested by the Commission for retesting or verification of network improvements.
26. The measurement location may be selected based on the following conditions:
 - a. Outdoor measurement conditions: Residential areas, industrial areas, tourism areas, educational institutions, business districts, highways, federal roads, state roads⁴, railways, and public facilities (airports, train stations, healthcare facilities, etc.).
 - b. Indoor measurement conditions: Indoor common areas for residential, tourism, educational institutions, business districts, government, exhibition, and public facilities (airports, train stations, healthcare, etc.).
 - c. Special consideration shall be given, subjected to the Commission's discretion for areas where limited access or space is required to provide network services, such as tunnels, private areas, basements, buildings above 12 floors, etc.
27. Every service provider shall select at least 200 distinctive locations for 4G or 5G (all allocated IMT frequency bands) and 50 distinctive locations for 5G wholesale network or dual network, for end-to-end measurement in each quarter, nationwide, subject to availability of service in that particular region or state.

⁴ Source from www.jkr.gov.my

28. The test locations shall be evenly distributed across all 6 regions, covering all states and federal territories. Meaning, at least 41 to 42 locations are to be measured for each region in every quarter. Every state or federal territories must have a minimum of 50 locations measured within a year. If 5G wireless broadband service is not widely available in a particular state at that point of time, measurement shall be performed on other state or region to meet the minimum test locations.
29. The regions shall be categorized as below:
 - Northern: Perak, Pulau Pinang, Kedah and Perlis.
 - Central: Selangor, Negeri Sembilan, Wilayah Persekutuan Putrajaya, Kuala Lumpur and Labuan.
 - Southern: Johor and Melaka.
 - Eastern: Pahang, Kelantan, and Terengganu.
 - Sabah: Sabah.
 - Sarawak: Sarawak.

C.2 Network Statistics Data Reporting

30. Two types of network statistic data shall be reported to the Commission which are:
 - a. Network utilisation and network availability data, for 4G or 5G network deployed by the service providers and 5G wholesale network deployed by the 5G wholesale provider or any entities that provide 5G access network using any network sharing model after the transition to dual network; and
 - b. 5G access network statistic data, by 5G wholesale provider or any entities that provide 5G access network using any network sharing model after the transition to dual network.

C.2.1 Network Utilisation and Availability

31. Service providers and wholesale provider are required to monitor, record and submit the network utilisation and network availability data to the Commission, obtained from the actual network monitoring.
32. An approved rectification plan shall be provided to the Commission within 14 days after the submission of the report, for any part of the network utilisation which do not comply with the required standards. In any specific month within the reporting period, where any part of the network utilisation exceeded the standards threshold, improvement plan of the network capacity shall be provided. For example, the network utilisation for transport A in month 1

exceeded the threshold, but fall below the threshold in month 2, improvement plan of transport A still need to be performed to avoid any future network congestion.

33. For POI network utilisation rectification process, which involves more than one (1) party, service providers and wholesale provider shall provide a joint improvement plan within 14 days after the submission of the report.
34. Partial network failure which causes the service not able to be fully functional or intermittent in nature, shall be consider as part of network unavailability.
35. The Commission may at its discretion, acquire a more granular set of data or data within specific period, on network utilisation and availability. These data should be made available to the Commission by the service providers or wholesale provider.

C.2.2 5G Access Network Statistic

36. 5G access network statistic measures the performance of the 5G wholesale network or dual network, including download, upload, latency, packet loss, and service accessibility between end user and POI, and shall be calculated via network statistic.
37. The 5G access network statistics data reporting is applicable to 5G wholesale network or 5G dual network, operating in allocated IMT frequency bands 703–743 MHz, 758–798 MHz¹, 3.4–3.6 GHz and 26.5–28.1 GHz.
38. Wholesale provider or any entities that provide 5G access network are required to monitor, record, and submit the 5G access network performance data to the Commission.
39. Any region with regional or state POI, the network statistics shall be calculated between the end user and the regional or state POI. For any region without regional POI, the test shall be calculated between the end user and the national POI.
40. The network statistics data shall be aggregated monthly. The Commission may at its discretion, acquire a more granular set of data or raw data based on hourly period. These data should be made available to the Commission by the 5G wholesale provider or any entities that provide 5G access network.
41. The network statistics data shall be separated by service provider for each KQI.

C.3 Service Prioritisation, Misrepresentation and Exemption

42. A validation procedure shall be applied to avoid any service/application prioritisation to ensure the test is conducted in a fair manner representing real user experience. These prioritisations include but not limited to the following:
 - a. SIM-based prioritisation.
 - b. Service based prioritisation such as, application, port number, IP address, type of service, etc.
43. Any service provider or wholesale provider found to perform any alteration to the network configuration or manipulation of test results or network statistics at any location, shall be considered as non-compliance to the Mandatory Standards for each of the location.
44. Any data provided to the Commission shall not be misrepresented. Any misrepresentation of data or false reporting shall be considered as non-compliance to the Mandatory Standards for each location or sites.
45. A service provider or wholesale provider shall be exempted from compliance with the mandatory standard or provisions of this document to the extent it is unable to comply for any specific location due to damage to network facility caused by force majeure or by third parties on condition that the event is reported in time. Any exemption is subjected to the Commission discretion.

PART D: REQUIREMENT FOR REPORT SUBMISSION

46. All reports that are required to be submitted to the Commission should be sent to address and/or email as below. The Commission shall notify the service providers and wholesale provider of any changes to the reporting address or email.

Malaysian Communications and Multimedia Commission
MCMC Tower 1, Jalan Impact, Cyber 6,
63000 Cyberjaya
Selangor Darul Ehsan

Email: networkreport.qos@mcmc.gov.my

47. These reports shall be in the form as described below, in pdf and Microsoft Excel formats. Each report shall be accompanied by a declaration signed by the Chief Executive Officer (or any Chief Officer) of the Licensees, duly authorised by the board of directors, stating that each report is true and accurate.
48. The wholesale provider and service providers shall submit the reports based on the following timeline stated in Table 9 below:

Table 9: Reporting Timeline

No	Item	Reporting Period	Submission Date	Report Template
1	Wireless BAS Measurement Report	Quarterly	By 30 th of the following month of each quarter	Annex 1
2	Network Utilisation Report	Quarterly	By 30 th of the following month of each quarter	Annex 2
3	Network Availability Report	Quarterly	By 30 th of the following month of each quarter	Annex 3
4	Access Network Statistics Report	Quarterly	By 30 th of the following month of each quarter	Annex 4

49. The Wireless BAS end-to-end measurement report submitted shall include all relevant information regarding the test conducted including but not limited to:
- Time and date for each test conducted for each location.
 - Information on the measurement system used for the test.
50. Service providers and wholesale provider shall provide proof of network improvement or rectifications and any relevant information for verification by the Commission including access to raw data and real-time network data.
51. Service providers and wholesale provider shall keep the report for at least 24 months from the date of report submission.

D.1. Subjected Areas for Mandatory Standards

52. The Mandatory Standards for Wireless BAS shall be enforced in all states and federal territories in Malaysia.
53. The standards for end-to-end measurement conducted by any party shall be enforced per location except for the parameter on download throughput per area (all technology).
54. The standards for network utilisation shall be enforced for each network node including each transport, POI and core network. The PRB network utilisation shall be enforced for each gNodeB or eNodeB.
55. The standards for network availability shall be enforced for all access and aggregation network. Network availability for each POI and core network shall be enforced separately.

PART E: EFFECTIVE DATE

56. These guidelines shall come into effect on 1 April 2024, and shall continue to be effective unless modified, varied, or revoked by the Commission as stated in the Commission Determination on Mandatory Standards for Quality of Service (Wireless Broadband Access Service), Determination No.2 of 2023.

Format for End-to-end Measurement Report

Table 10: End-to-end measurement report

No	Date and Time	Location Name	Latitude, Longitude	State	[1] Serving Site ID	[2] Serving Site Technology and frequency bands	[3] PRB Utilisation (%)	[4] Backhaul Type	Backhaul capacity (Mbps)	[5] Backhaul Utilisation (%)	Avg. Signal Strength (RSRP in dBm)	[6] Avg. DL Speed (Mbps)	[7] Avg. UL Speed (Mbps)	[8] Avg. Round-Trip Time (ms)	[9] Packet Loss (%)	Avg. HTTP session time (s)	Avg. Video streaming access time (s)	[10] Service Accessibility (%)
1																		
2																		
...																		
n																		

Notes:

- [1] Site identification name (same as CIMS data)
- [2] Frequency band configuration for each base station
- [3] Average PRB utilisation eNodeB/gNodeB utilisation during test hour
- [4] Microwave or fibre or satellite backhaul
- [5] Average backhaul utilisation during test hour
- [6] Based on application throughput downlink average
- [7] Based on application throughput uplink average
- [8] Based on successful ping transmitted and received
- [9] Based on ping transmitted but was not received at sender
- [10] Based on successful attempt ratio of all download, upload, web browsing and video streaming tests

Format for Network Utilisation Report

Table 11: PRB utilisation report

No.	Service Provider	Serving Site ID	Serving Sector ID	Coordinate (Longitude & Latitude)	[1] Serving Site Type	State	[2] Frequency Configuration	[3] PRB Utilisation (%)			Network Improvement / Rectification
								1st Month	2nd Month	3rd Month	
1											
2											
...											
n											

Notes:

[1] Type of serving site is specified for outdoor and indoor

[2] Frequency band configuration for each gNodeB or eNodeB

[3] Percentage of downlink PRB utilisation over one (1) busy hour of each day for every serving sector of a gNodeB or eNodeB averaged over one (1) month period

Table 12: Backhaul/transport network utilisation report

No.	Service Provider	[1] Transport ID	[2] Applicable Serving Site ID	Coordinate (Longitude & Latitude)	State	Transport Type (Microwave/ Fiber)	[3] Bandwidth Capacity (Mbps)	Bandwidth Utilisation (%)						Network Improvement/ Rectification
								1st Month		2nd Month		3rd Month		
								[4] Uplink	[5] Downlink	[4] Uplink	[5] Downlink	[4] Uplink	[5] Downlink	
1														
2														
...														
n														

Notes:

[1] All transport network for access, aggregation, trunked and metro

[2] If the transport network connects to a specific gNodeB or eNodeB

[3] Total bandwidth capacity (in Mbps) of each transport

[4] Percentage of average uplink network utilisation over one (1) busy hour window of each day, averaged over one (1) month

[5] Percentage of average downlink network utilisation over one (1) busy hour window of each day, averaged over one (1) month

Table 13: POI network utilisation report

No.	Service Provider	POI Network ID	Regional/National	Coordinate (Longitude & Latitude)	State	POI Network Capacity (Mbps)	POI Network Utilisation (%)						Network Improvement/Rectification
							1st Month		2nd Month		3rd Month		
							[1] Uplink	[2] Downlink	[1] Uplink	[2] Downlink	[1] Uplink	[2] Downlink	
1													
2													
...													
n													

Notes:

[1] Percentage of average uplink network utilisation over one (1) busy hour window of each day, averaged over one (1) month

[2] Percentage of average downlink network utilisation over one (1) busy hour window of each day, averaged over one (1) month

Table 14: Core network utilisation report

No	Service Provider	Core Network Function/Element	Coordinate (Longitude & Latitude)	State	Core Network Capacity			Core Network Utilisation on throughput and subscriber (%)									Network Improvement/Rectification
					Uplink	Downlink	Subs	1st Month			2nd Month			3rd Month			
								[1] Uplink	[2] Downlink	[3] Subs	[1] Uplink	[2] Downlink	[3] Subs	[1] Uplink	[2] Downlink	[3] Subs	
1																	
2																	
...																	
n																	

Notes:

[1] Percentage of average uplink network utilisation over one (1) busy hour window of each day, averaged over one (1) month

[2] Percentage of average downlink network utilisation over one (1) busy hour window of each day, averaged over one (1) month

[3] Percentage of simultaneous active users over total capacity of users in over one (1) busy hour window of each day, averaged over one (1) month

Format for Network Availability Report

Table 15: Network availability report (Access and Aggregation)

No.	Service Provider	Total access network (gNodeB or eNodeB)	Total access network downtime (minutes)	% Network Availability (Access and Aggregation)	Network Improvement/ Rectification
1					

Table 16: POI availability report

No.	Service Provider	POI ID	Total POI downtime (minutes)	State	% POI Network Availability	Network Improvement/ Rectification
1						
2						
...						
n						

Table 17: Core network availability report

No.	Service Provider	Core Network Function / Element	Total downtime (minutes)	State	% Core Network Availability	Network Improvement/ Rectification
1						
2						
...						
n						

Format for 5G Access Network Statistics Report

Table 18: 5G wholesale access network statistics report

No.	Service Provider	Base station ID (gNodeB)	Serving Site Type (indoor/outdoor)	Cluster ID	State	Download Throughput (Mbps)	Upload Throughput (Mbps)	Latency (ms)	Packet loss (%)	Service Accessibility (%)
1										
2										
...										
n										

Notes:

Access network statistics report shall be provided for each service providers.

The access network statistics report shall be average over one (1) month, within each quarter.