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ATTACHMENT A

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SERVICE QUALITY METRICS AND MEASUREMENTS

Quality of Service (QoS) Measures under consideration

QoS Measure

Network availability

Applicable Technology

POTS; VoIP

Description

This metric measures the percentage of time that the network is available for use by customers.

Measurement

Up time / Total time (up time + down time)

Minimum Standard

≥ 99.9%

Reporting Frequency

Compiled monthly; reported quarterly

Reference

This service measure was raised by Small Business Utility Advocates in their opening comments.

QoS Measure

Radio Access Network (RAN) availability

Applicable Technology

Wireless

Description

This metric measures the length of time all cell services are unavailable on the radio network.

Measurement

$\text{RAN availability rate} = (1 - (1 / \text{RAN unavailability time}^\dagger)) \times 100\%$

$^\dagger \text{RAN unavailability time} = \text{sum of cell unavailable time} / (\text{total number of cells in cluster} \times \text{reporting period counters in minutes} \times 60)$

Minimum Standard

≥ 99.9%

Reporting Frequency

Compiled monthly; reported quarterly

Reference

Haryadi, S. (2018, February 26). Measurement of Cellular Network's Availability and Reliability based on the Signaling Ladder Diagram.

IBM docs SSBNJ7 version 1.4.2

https://www.ibm.com/docs/SSBNJ7_1.4.2/vis_fw/ctnpm_vis_fw_LTE_CellAvailability_intro.html

QoS Measure

Service availability: 4G LTE mobile data

Applicable Technology

Wireless

Description

The percentage of time when 4G LTE mobile data service is available when outdoors and stationary. Customers should expect 4G LTE broadband service at a minimum user download speed of five megabits per second (5 Mbps) and a user upload speed of one megabit per second (1 Mbps) based on propagation modeling.

Measurement

Up time / Total time (up time + down time)

Minimum Standard

≥ 99.9%

Reporting Frequency

Compiled monthly; reported quarterly

Reference

FCC [Mobile LTE Coverage Map | Federal Communications Commission \(fcc.gov\)](https://www.fcc.gov/mobile-lte-coverage-map)

QoS Measure

Service availability: voice

Applicable Technology

Wireless

Description

The percentage of time when voice service is available when outdoors and stationary. Customers should expect to make and receive mobile voice calls and send and receive texts over the 4G LTE network, without regard to throughput speed.

Measurement

Up time / Total time (up time + down time)

Minimum Standard

≥ 99.9%

Reporting Frequency

Compiled monthly; reported quarterly

Reference

FCC [Mobile LTE Coverage Map](#) | [Federal Communications Commission \(fcc.gov\)](#)

QoS Measure

Call completion rate

Applicable Technology

VoIP; Wireless

Description

This metric measures the percentage of calls that are successfully completed without being dropped or disconnected.

Measurement

Completed calls / Total calls (completed calls + disconnected calls)

Minimum Standard

≥ 95% (*per CD, industry standard should be ≥99%*)

Reporting Frequency

Compiled monthly; reported quarterly

Reference

This service measure was raised by Small Business Utility Advocates in their opening comments.

QoS Measure

Call setup time

Applicable Technology

VoIP; Wireless

Description

This metric measures the time it takes for a call to be established from the moment the call is initiated.

Measurement

Average of (time (180 ringing) – time (session initiation protocol (SIP) invite request))

Minimum Standard

≤ 5 seconds (*per CD, industry standard should be ≤2.5 seconds*)

Reporting Frequency

Compiled monthly; reported quarterly

Reference

This service measure was raised by Small Business Utility Advocates in their opening comments.

QoS Measure

Call failure rate

Applicable Technology

VoIP; Wireless

Description

This metric measures the number of calls that are unable to initiate due to adverse network conditions such as traffic and congestion.

Measurement

(Number of calls attempted by end users – number of calls successfully initiated by the network) / total number of calls attempted by end users

Minimum Standard

<1%

Reporting Frequency

Compiled monthly; reported quarterly

Reference

This service measure was raised by the Public Advocates Office in their opening comments.

QoS Measure

Call drop rate

Applicable Technology

POTS; VoIP; Wireless

Description

This metric measures the amount of prematurely terminated calls on a telephone network.

Measurement

Number of calls ended prematurely / total number of calls placed over the network.

Minimum Standard

<1%

Reporting Frequency

Compiled monthly; reported quarterly

Reference

This service measure was raised by the Public Advocates Office in their opening comments.

QoS Measure

Call quality: determined by mean opinion score (MOS value)

Applicable Technology

POTS; VoIP; Wireless

Description

The Mean Opinion Score (MOS) is a commonly used measure of human-judged evaluation of video, audio, and audiovisual experience. MOS is rated on a scale of 1 (worst) to 5 (best).

Measurement

Average of all MOS provided during an assessment period.

Minimum Standard

≥ 3.5

Reporting Frequency

Compiled monthly; reported quarterly

Reference

This service measure was raised by Small Business Utility Advocates in their opening comments.

Additionally, this measure is recognized by the International Telecommunication Union (ITU)

[P.862 : Perceptual evaluation of speech quality \(PESQ\): An objective method for end-to-end speech quality assessment of narrow-band telephone networks and speech codecs \(itu.int\)](https://www.itu.int/rec/T-REC-P.862)

(END OF ATTACHMENT A)