

QOS STANDARDS FOR 4G SERVICES

This is applicable to Facilities-Based Operators (“**FBOs**”) providing 4G services. Please note that all FBOs providing 4G services will be required to submit to IMDA their QoS performance for the indicators as set out below, on a quarterly basis. For consistency, IMDA will apply the same QoS standards for the 4G performance survey conducted by IMDA.

	Performance Indicators (for Compliance ¹)	QoS Standards	Effective Date (for incumbent operators ²)	Effective Date (for new operator ³)
	Service Coverage⁴			
(a)	Nation-wide outdoor coverage ⁵	>95% coverage with signal strength of -109dBm or better	1 July 2016	1 January 2019
		>99% coverage with signal strength of -109dBm or better (average across all outdoor space)	1 July 2017	1 January 2020

¹ For each instance of non-compliance, a financial penalty of up to S\$50,000 may be imposed for each standard. For aggravating cases, for example, for continual or serious breaches, IMDA may increase the quantum of the financial penalty to beyond S\$50,000.

² The incumbent operators are M1 Limited, Singtel Mobile Singapore Pte Ltd and StarHub Mobile Pte Ltd.

³ The new operator here refers to TPG Telecom Pte Ltd, who has been awarded the New Entrant Spectrum Lot and issued the corresponding spectrum rights following the close of the 2016 Spectrum Auction.

⁴ The 4G service coverage will be computed as follows:

$$\text{Coverage probability} = \frac{\sum_j t_j}{\sum_i t_i} * 100\%$$

where $\sum_j t_j$ is the sum of the time (ms), when RSRP ≥ -109 dBm, and $\sum_i t_i$ is the total measurement time (ms), where RSRP was measured.

⁵ The nation-wide outdoor service coverage shall be tested with a minimum total sample of 100,000 test signal strength readings every month. FBOs’ test routes should include all major and small roads and expressways, including parks and open spaces that are reasonably accessible by foot or vehicle.

FBOs shall take any complaint from end users seriously, and follow up to investigate each complaint and make reasonable efforts to improve service coverage for their end users.

	Performance Indicators (for Compliance ¹)	QoS Standards	Effective Date (for incumbent operators ²)	Effective Date (for new operator ³)
	Service Coverage⁴			
(b)	Tunnels coverage	For monitoring on a quarterly basis and publication >99% coverage with signal strength of -109dBm or better in all road and MRT tunnels ⁶	Prior to 1 July 2018 1 July 2018	- 1 January 2020 (for road tunnels) 1 January 2022 (for underground MRT stations/ lines)
(c)	In-building coverage ⁷	For monitoring on a monthly basis and publication >85% coverage with signal strength of -109dBm or better in each building ⁸	1 January 2018 1 January 2019	- 1 January 2020

⁶ All roads and MRT tunnels in Singapore include any upcoming, new road and MRT tunnels, regardless of the length of the tunnels.

⁷ Areas which are optional to be included in the in-building service coverage indicator: bomb shelters, storerooms, toilets within an individual premises, lifts, plant rooms, M&E rooms, lift motor rooms, lift houses, water tank areas, warehouses, ventilation facilities, vaults, in-building carparks located at second level basement and below, all in-home basements of private landed residential properties, mechanical and plant facilities/rooms and emergency stairways. IMDA will leave it to FBOs to commercially negotiate in good faith with building owners for coverage at these areas.

FBOs shall take any complaint from end users seriously, and follow up to investigate each complaint and make reasonable efforts to improve service coverage for their end users in a timely manner. IMDA generally expects each complaint to be resolved within six months from the time of the complaint.

⁸ For assessment of compliance, 100% of the buildings tested per month shall have >85% coverage with signal strength of -109 dBm or better in each building. To be clear, even though the standard is >85% coverage for each building, it is unacceptable for an entire unit to fall within the 15% uncovered areas within a building such that it has absolutely no coverage.

FBOs may seek IMDA's approval to exempt an entire building (including single-tenanted buildings) from the QoS framework on a case-by-case basis if (i) the building is vacated or marked to be demolished; (ii) FBOs have yet to be allowed to deploy base stations at HDB blocks; or (iii) FBOs can show that there are constraints that render further measures to improve service coverage technically infeasible.

For cases where (i) the building owners refuse to grant access for the FBOs to take mobile coverage measurements or install their equipment; (ii) the building owners reject the FBOs' proposal to enhance mobile coverage; or (iii) FBOs can show that building owners' requests are unreasonable, the FBOs may also seek IMDA's approval for exemption if the building owners are not required to comply with the Code of Practice for Info-communication Facilities in Buildings ("COPIF"). The FBOs shall seek IMDA's assistance if the building owners are required to comply with the COPIF.

For in-unit service coverage, FBOs will be relieved up-front from the requirement to improve service coverage if (i) the individual unit owner denies or rejects all the FBOs' proposals to enhance in-unit service coverage; or (ii) the individual unit rejects the installation of equipment within the unit to improve in-unit coverage.