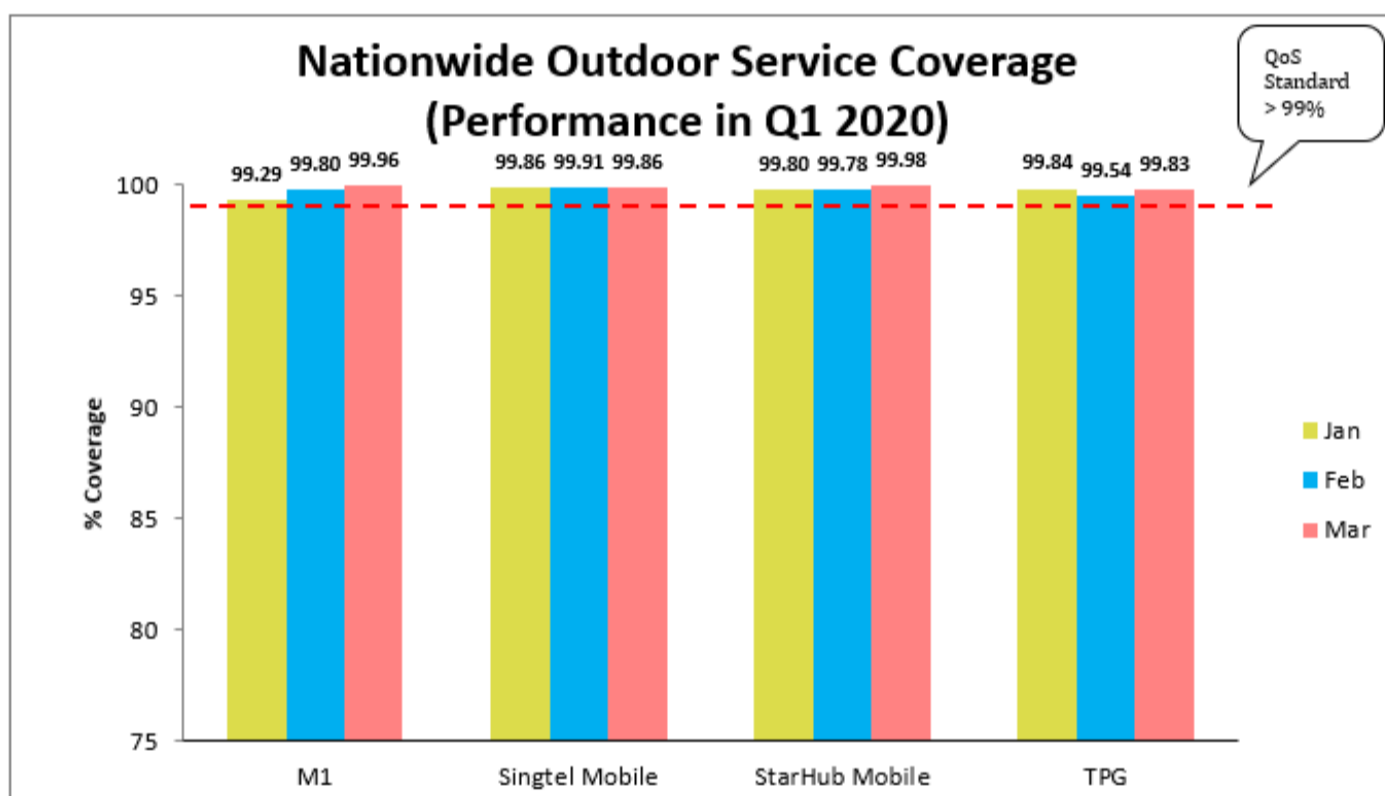


Quality of Service Performance Results for January – March 2020

Nationwide Outdoor Service Coverage

This indicator measures the Nationwide Outdoor Service Coverage for the 4G cellular mobile networks. Service coverage is determined by signal strength. The availability of service coverage is the ability of a cellular network to achieve the minimum signal strength of at least -109dBm. Under IMDA's 4G Service QoS framework, mobile operators are required to achieve Nationwide Outdoor Service Coverage of > 99%. In order to better measure the end users' experience*, IMDA uses mobile phones to collect the signal strength data points.



*Based on IMDA's coverage performance surveys which included nationwide outdoor drive test and areas such as housing estates/town centres, outdoor recreational areas and above ground MRT tracks.

Note: End users' individual experience may differ due to different models of handset used, handset settings, number of users in the vicinity, etc.

In-building Service Coverage

This indicator measures in-building service coverage for the 4G cellular network. Under IMDA's 4G QoS framework, mobile operators are required to achieve a service coverage of > 85% per building. Service coverage is measured at randomly selected buildings and at publicly accessible areas within the tested buildings as a proxy for the coverage in the entire building to avoid disturbing residents in their units. For buildings that have failed IMDA's compliance standard, mobile operators will have a period of four months to improve the coverage within the buildings. IMDA will audit the buildings again after the four-month period.

IMDA's Performance Survey Period: Q1 2020

M1	Singtel Mobile	StarHub Mobile	TPG
No of buildings passed/ No of buildings tested Compliance standard > 85% per building			
60/60	60/60	60/60	60/60

Note: The same sixty buildings were tested across the three mobile operators. The performance of each of the mobile operator varies for each of the building tested. End users' individual experience may differ due to different models of handset used, handset settings, number of users in the vicinity, etc.

Tunnel Service Coverage

This indicator measures the service coverage for the 4G cellular mobile network within road and MRT tunnels. Tunnel service coverage measures the percentage of data points collected in a tunnel from a 4G cellular mobile network that achieve a minimum signal strength of at least -109dBm. The tunnel areas surveyed by IMDA include all road and MRT tunnels in Singapore. Under IMDA's 4G Service QoS framework, mobile operators are required to achieve a service coverage of > 99% for all road and MRT tunnels. In order to better reflect end users' experience, IMDA uses mobile phones to collect the signal strength data points.

IMDA's Performance Survey Period: Q1 2020

M1	Singtel Mobile	StarHub Mobile	TPG
Compliance standard: > 99% for all road and MRT tunnels			
Central Expressway (Road Tunnel)			
Pass	Pass	Pass	_*
Kallang-Paya Lebar Expressway (Road Tunnel)*			
Pass	Pass	Pass	_*
Fort Canning Tunnel (Road Tunnel)			
Pass	Pass	Pass	Pass
Woodsville Tunnel (Road Tunnel)			
Pass	Pass	Pass	Pass
Marina Coastal Expressway (Road Tunnel)			
Pass	Pass	Pass	_*
Sentosa Gateway Tunnel (Road Tunnel)			
Pass	Pass	Pass	Pass
North South Line (MRT Tunnel)			
Pass	Pass	Pass	NA

M1	Singtel Mobile	StarHub Mobile	TPG
East West Line (MRT Tunnel)			
Pass	Pass	Pass	NA
Changi Airport Line (MRT Tunnel)			
Pass	Pass	Pass	NA
Circle Line (MRT Tunnel)			
Pass	Pass	Pass	NA
North East Line (MRT Tunnel)			
Pass	Pass	Pass	NA
Downtown Line (MRT Tunnel)			
Pass	Pass	Pass	NA

Note: End users' individual experience may differ due to different models of handset used, handset settings, number of users in the vicinity, etc. The tunnel service coverage results are based on IMDA's coverage performance surveys.

*For the Central Expressway, Kallang-Paya Lebar Expressway and Marina Coastal Expressway tunnels, TPG has requested more time to complete its deployment. IMDA has provided TPG until end 2020 – mid 2021 to complete the works in the different tunnels.

The MRT Tunnel Service Coverage standard for TPG takes effect from 1 January 2022.