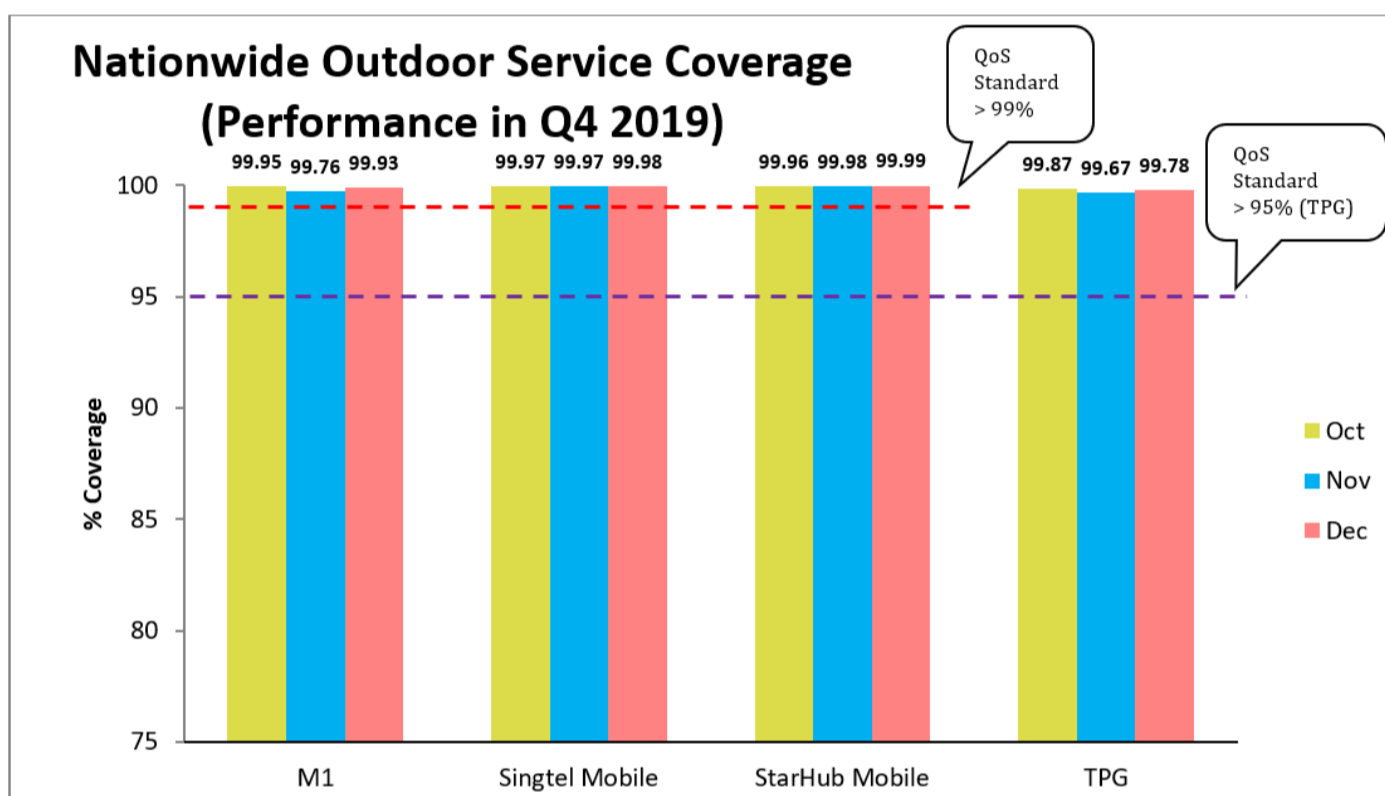


# Quality of Service Performance Results for October – December 2019

## 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.



\*For TPG, the Nation-wide Outdoor Service Coverage standard of > 95% and > 99% takes effect from 1 January 2019 and 1 January 2020 respectively.

\*\*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.

The In-building Service Coverage standard took effect for the following three mobile operators on 1 January 2019.

**IMDA's Performance Survey Period: Q4 2019**

<b>M1</b>	<b>Singtel Mobile</b>	<b>StarHub Mobile</b>
<b>No of buildings passed/ No of buildings tested Compliance standard &gt; 85% per building</b>		
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.

The In-building Service Coverage standard takes effect from 1 January 2020 for TPG. TPG's performance for Q1 2020 will be published in Q2 2020.

## 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: Q4 2019**

<b>M1</b>	<b>Singtel Mobile</b>	<b>StarHub Mobile</b>
<b>Compliance standard: &gt; 99% for all road and MRT tunnels</b>		
<b>Central Expressway (Road Tunnel)</b>		
Pass	Pass	Pass
<b>Kallang-Paya Lebar Expressway (Road Tunnel)*</b>		
Pass	Pass	Pass
<b>Fort Canning Tunnel (Road Tunnel)</b>		
Pass	Pass	Pass
<b>Woodsville Tunnel (Road Tunnel)</b>		
Pass	Pass	Pass
<b>Marina Coastal Expressway (Road Tunnel)</b>		
Pass	Pass	Pass

<b>M1</b>	<b>Singtel Mobile</b>	<b>StarHub Mobile</b>
<b>North South Line (MRT Tunnel)</b>		
Pass	Pass	Pass
<b>East West Line (MRT Tunnel)</b>		
Pass	Pass	Pass
<b>Changi Airport Line (MRT Tunnel)</b>		
Pass	Pass	Pass
<b>Circle Line (MRT Tunnel)</b>		
Pass	Pass	Pass
<b>North East Line (MRT Tunnel)</b>		
Pass	Pass	Pass
<b>Downtown Line (MRT Tunnel)</b>		
Pass	Pass	Pass

**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 TPG, the Road Tunnel Service Coverage standard takes effect from 1 January 2020. TPG has completed mobile coverage deployment at the Fort Canning, Woodsville and Sentosa Gateway tunnels. TPG's performance for Q1 2020 will be published in Q2 2020.

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.