QOS STANDARDS FOR 2G PUBLIC CELLULAR MOBILE TELEPHONE SERVICE

This is applicable to **Facilities-Based Operators ("FBOs") providing 2G Public Cellular Mobile Telephone Service ("PCMTS").** Please note that all FBOs providing 2G PCMTS will be required to submit to IDA their QoS performance for the "Compliance Indicators" and "Monitoring Indicators" as set out below, on a quarterly basis. For consistency, IDA will apply the same QoS standards for the 2G PCMTS performance survey conducted by IDA.

(A)	Performance Indicators (for Compliance[1])	QoS standards
(1)	**Service coverage**[2]	
(a)	- On street level coverage	>95%
(b)	- In-building coverage (within and outside of CDB)	> 85% (for public access areas[3])
(B)	**Performance Indicators (for Monitoring)**	**QoS standards**
(1)	**Network Availability**[4]	For monitoring
	Base Stations (BS)	
	Mobile Switching Centre (MSC)	
(a)	Total outage time (hrs/min) in a month	
(b)	No. of day with >15min outage	
(c)	Worst outage time over 24hr period in a month	

1 For each instance of non-compliance, a financial penalty of S$5,000 per standard per month may be imposed.

2 The on-street level service coverage shall be > 95% for each defined test route. Test routes will include all major and small roads and expressways but excludes all car parks. The in-building service coverage shall be > 85% per building that includes all public access areas of buildings within CBD and outside CBD, including the first basement level.

3 Public access areas refer to areas that are generally accessible to the public without any restriction. For the purpose of in-building radio coverage, the public access areas within a building are classified into three categories:

(a) Main Lobby Area

(b) High Traffic Area

(i) Podium floors of tower building;

(ii) Multi-storey car parks (above level ground); and

(iii) Basement levels where services are made available to the public (e.g. shops, food courts, supermarkets)]

(c) Basement Car Park Area (refers to car parks at basement level 1 where the above (b)(iii) does not apply)

4 Network availability is a measure of the degree to which the BSs/MSCs are operable and not in a state of failure or outage at any given point of time. It measures the downtime of the BS and the MSC over a month but excludes all planned service downtime for any maintenance or software upgrades.

(2) (a) (b) (c)	**Network Congestion During Busy Hour**[5] Total number of base stations/cells as at end period % of network congestion for the busiest cell during busy hour % of cells with >5% reduced GOS during busy hour	For monitoring
(3) (a)	**Success rate for PSTN and Mobile Originated Calls**[6] Success rate for PSTN and mobile originated calls during busy hour in the busiest/worst cell locality	For monitoring
(4) (a) (b) (c)	**Average Call Set-up Time for**[7] Land to mobile calls Mobile to land calls Mobile to mobile calls	For monitoring
(5) (a) (b)	**Drop call rate of PSTN and mobile originated calls during busy hour**[8] Drop call rate of PSTN and mobile originated calls Localities where drop call rates exceeds 5%	For monitoring
(6)	**Complaints on coverage per 1000 subscribers**	For monitoring

Note: The "busy hour" refers to the one-hour of the day with the highest traffic Erlang based on 24-hour daily measurement, for the whole month including weekends and public holidays.

[5] The acceptable congestion level experienced within the network should be such that not more than 5% of cells should be experiencing > 5% reduced GoS during busy hour and/or at any one time.

[6] A successful call attempt refers to a call from a calling party who is successfully switched through to the called party, or receives busy tone when the called party is engaged speaking.

[7] The average call set-up time refers to the total time taken for setting up a call i.e., from the time when the last key is depressed to the time when a tone or signal from the network for successful connection. The call set-up time shall include all time taken for encryption and authentication features, but shall exclude additional delay caused by any call forwarding features.

[8] The drop call rates refer to the percentage of actual calls originated from the PSTN and mobile phones that are terminated abnormally. This include calls that failed due to : (a) mobile subscribers moving into poor cell coverage areas; (b) subscribers moving into cells that are experiencing congestion; and (c) calls that are not properly terminated.