



**Audit & Assessment of Quality of Service  
Of  
Cellular Mobile Telephone Service**

**For  
Telecom Regulatory Authority of India  
North Zone – Delhi Service Area**

**(July 2015 – September 2015)**

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## PREFACE

The Telecom Regulatory Authority of India (TRAI) was established in 1997 by an Act of Parliament, called the Telecom Regulatory Authority of India Act, 1997, to regulate telecom services. The Authority's mission is to ensure that the interest of consumers are protected and at the same time to nurture conditions for growth of telecommunications, broadcasting and cable services in a manner and at a pace which will enable India to play a leading role in emerging global information society.

The Authority, in exercise of its functions as per the provisions in the TRAI Act, has been entrusted to measure the Quality of Service provided by the Service Providers from time to time and to compare them with the benchmarks so as to assess the level of performance. In pursuance of this, TRAI has appointed **M/s TUV-SUD South Asia Pvt. Ltd.** to carry out "Audit and Assessment of Quality of Service" provided by Basic (Wire line), Cellular Mobile and Broadband service providers in terms of the benchmarks specified in the respective regulations, in North and West Zones.

TUV-SUD South Asia carried out QoS audit as per the norms of TRAI in all the eight circles / services areas of the North Zone and four circles of the West Zone. This report details the performance of the various service providers in **Delhi Metro circle** against the QoS bench marks laid down by TRAI in the respective regulations.

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## **1. BACKGROUND**



## 1) BACKGROUND

Telecom Regulatory Authority of India has been entrusted to “lay down the standards of quality of service to be provided by the service providers and ensure the quality of service and conduct the periodical survey of such service provided by the service providers so as to protect interest of the consumers of telecommunication services” vide sub-clause (v) of clause (b) of sub-section (1) of section 11 of the Telecom Regulatory Authority of India Act, 1997 (24 of 1997).

The purpose of laying down Quality of Service Parameters is to:

- i) Create conditions for consumer satisfaction by making known the quality of service, which the Service provider is required to provide, and the user has a right to expect.
- ii) Measure the Quality of Service provided by the Service Providers from time to time and to compare them with the norms so as to assess the level of performance.
- iii) Generally protect the interests of consumers of telecommunication services.

TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wire line), Cellular Mobile (Wireless) and Broadband has commissioned **M/s TUV-SUD South Asia Pvt. Ltd.** for conducting audit and assessment of quality of service of service providers, in terms of the benchmarks specified in the “The Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 20<sup>th</sup> March, 2009 and the Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated 6<sup>th</sup> October, 2006 on zonal basis for **North Zone and West Zone** comprising of the following Telecom Circles/Metro Service Areas”:

**North Zone:** Delhi, Jammu & Kashmir, Himachal Pradesh, Punjab, Haryana, Rajasthan, Uttar Pradesh-East and Uttar Pradesh-West (including Uttarakhand). For the cellular mobile telephone service the service area of Delhi includes Ghaziabad, Faridabad, Noida and Gurgaon.

**West Zone:** Mumbai, Maharashtra (including Goa and excluding Mumbai), Gujarat and Madhya Pradesh (including Chhattisgarh).

The Audit exercise would assess the Quality of Service of telecom operators providing Basic (Wire line), Cellular Mobile (Wireless) and Broadband services by auditing the relevant QoS records maintained by the operators, conducting drive tests as well as live measurements and comparing them with quality of service benchmarks stipulated by TRAI. The audit would be carried out by **TUV-SUD South Asia** every quarter across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. However, in respect of Basic telephone service (wireline) and Broadband service, a circle would be audited once in a year.

## **2. OBJECTIVES AND METHODOLOGY**





## **2) OBJECTIVES AND METHODOLOGY:**

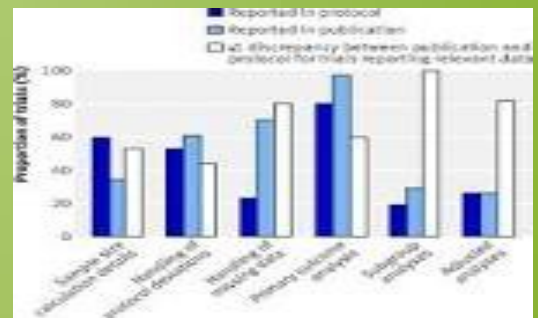
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

The audit and assessment of Quality of Service was carried out by **TUV SUD South Asia across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. Apart from this, QoS audit for Basic (Wire line) and Broadband Services was also undertaken for UP (E), UP (W), and MP&CG circles during the quarter July 2015 – September 2015.**

The Scope of work as per the Terms of Reference (TOR) includes the following:

- i) Preparation of Performance Monitoring reports (PMRs) and uploading in the system.
- ii) Live measurements of the performance of Service Providers (SPs) against the benchmarks for three days during each audit.
- iii) Monthly audit based on one month data of the SPs.
- iv) Drive test of the RF networks.
- v) Audit of the performance of call centers with respect to their accessibility and percentage of calls answered by the operators and random customer feedback by calling the customers to get feedback of the services provided by the service providers.
- vi) Transfer of data generated by the RF drive test/Live measurements / PMR/ monthly audit to the server located at TRAI premises on real time basis.

### 3. SAMPLE SIZE



### 3) **SAMPLE SIZE:**

#### 3.1 SAMPLING FOR CELLULAR MOBILE (WIRELESS) SERVICE PROVIDERS

- 100% of the Gateway MSC's (GMSC's) and Mobile Switching Centers (MSC's) of all the Cellular Mobile Service Providers or Unified Access Service Providers (UASP) were covered for audit in specified circles/service areas. Following are the various operators covered in Delhi Metro circle

Sl. No.	Name of Service Provider	Dates of live measurement Audit			Audit Location
GSM Operators		July-15	August-15	Sept-15	
1	AIRCEL	20 to 22 Jul-15	12 to 14 Aug-15	7 to 9 Sep-15	Aircel Ltd, Near Sarita Vihar Metro Station, New Delhi
2	AIRTEL	22 to 24 Jul-15	7, 10 & 11 Aug-15	3, 4 & 7 Sep-15	Plot No 16 Udhog Vihar Ph-4 Gurgaon Haryana.
3	MTNL	15 to 17 Jul-15	24 to 26 Aug-15	21 to 23 Sep-15	MTNL Exchange Karol Bagh Near Rajendra Place Metro Stn.New Delhi.
4	IDEA	21 to 23 Jul-15	24 to 26 Aug-15	22 to 24 Sep-15	Idea Cellular Limited, E-5, Sector-63, Noida (UP)
5	RCOM GSM	21, 24 & 25 Jul-15	24 to 26 Aug-15	17, 18 & 21 Sep-15	Reliance Center Maharaja Ranjit Singh Hotel, Maharaja Ranjit Singh Marg New Delhi.
6	VODAFONE	3, 6 & 7 Jul-15	21, 24 & 26 Aug-15	10, 11 & 14 Sep-15	A-19 Mohan Cooperative Industrial Estates, Mathura Road New Delhi.
CDMA Operators					
7	MTS	8 to 10 Jul-15	13, 14 & 17 Aug-15	8 to 10 Sep-15	A-194 Okhla Phase 1 New Delhi
8	RCOM CDMA	20, 21 & 24 Jul-15	19 to 21 Aug-15	17, 18 & 21 Sep-15	Reliance Center Maharaja Ranjit Singh Hotel, Maharaja Ranjit Singh Marg New Delhi.
9	TATA CDMA	16, 17 & 20 Jul-15	18 to 20 Aug-15	9 to 11 Sep-15	TTSL 2 A Old Iswar Nagar Near NFC New Delhi

For all the above operators, audit was conducted in all the three months of the Quarter ended Sept. 2015.

The data generated by monthly PMR and 3-days live measurements audit for the period July 2015 to September 2015 has been successfully uploaded to the server located at TRAI premises.

### 3.2 SAMPLING FOR BASIC (WIRE LINE) SERVICES

- The QoS audit for basic (wire line) service is to be done for the number of exchanges spread over in about 10% of SDCAs with each service providers in specified circles only **once in a year**. **Based on this criterion, QoS audit for basic (wire line) service was not required to be done for Delhi Circle in the quarter ended September- 2015, as the same has already been done during QE December 2014.**

### 3.3 SAMPLING FOR BROADBAND SERVICE PROVIDERS

- TUV-SUD South Asia has to conduct the audit and assessment of Quality of Service of Broadband Service only in respect of the service providers who are having broadband subscriber base of more than 10,000 subscribers in their licensed service area, for 5% of Point of Presence (PoPs) spread over in 10% SDCAs in specified Telecom Circle **only once in a year**. **Based on this criterion, the QoS audit for Broadband service was not required to be done for Delhi Circle in the quarter ended September- 2015, as the same has already been done during QE December 2014.**

#### **4. EXECUTIVE SUMMARY**



#### 4) **EXECUTIVE SUMMARY:**

The executive summary put in a nutshell the key findings of the Audit by providing: -

- “Service provider performance report” for Cellular mobile, Basic (wire line) and Broadband services , which gives a foretaste of the performance of various operators against the benchmark specified by TRAI, during the months in which the Audit was carried out by TUV-SUD Auditors.
- “Parameter wise critical findings” for Cellular mobile, Basic (wire line) and Broadband services: This indicates key observations and findings from different activities carried out during the Audit process.
- TUV-SUD conducted audit involved a 3 stage verification process which consisted of auditing the records of the service providers and verifying the data submitted to TRAI. The second step involved a three day live measurement of all the network parameters. On the basis of the three days live measurement, the auditors checked the busy hour of the day for the service provider and collected the data for this busy hour for the month in which the audit was conducted Finally, the performance of the service providers was also gauged by conducting drive tests in three select SSAs per service provider per quarter.
- The three stage audit / verification viz audit of the records, live measurements and drive tests of all the cellular mobile operators was repeated every month. In case of Basic (Wire line) and Broadband, this exercise is required to be carried out on quarterly basis.
- **Essence of compliance report of service providers with respect to the QoS:**

##### **Cellular Mobile:**

(i) Based on monthly audit, it was concluded that the performance of the service providers was fairly satisfactory for **Network Parameters** in Delhi Metro service area as they were found to have met the benchmarks of most of the parameters during the quarter. Only **Aircel** remained non-complied in respect of the parameter **‘Worst affected Cells > 3% TCH Drop’** with its quarterly average performance as **6.29%**.

(ii) From three days live assessment, it was found that the performance of all operators was satisfactory as they were largely complying with the benchmarks of all parameters except for the parameter **‘Worst affected Cell having > 3% TCH drop’** which could not be met by **Aircel** with its average performance as **6.38%** .

Aircel has shown the similar non compliance for this parameter in case of monthly audit.

(iii) With regard to the **Customer Service Quality Parameters**, service providers were found in well compliance of most of the parameters on Metering and Billing Credibility, Response Time to Customers, Termination of Service and Time taken for refunds. However, **Vodafone** failed to meet the benchmark of billing credibility for Post-paid with its performance as **0.13%**.

In case of the parameter **Accessibility to Call Center** and **Calls answered by Operators (voice to voice)**, most of the service providers were in compliance with the benchmarks. Only Aircel and MTNL are not in compliance with respect to the parameter **Accessibility of call center**. **Aircel** and **MTNL** failed to meet the benchmark with their performance as **91.40% and 89.31%**. Further, **Airtel and MTNL** could not meet the benchmark of **'calls answered by Operators (voice to voice) within 90 seconds'** having achieved their performed values as **88.85 and 93.26%** respectively against the benchmark of  $\geq 95\%$ .

In case of the parameters **Termination/closure**, all except **Aircel and Idea** have settled the **'closure/termination'** within the benchmark of 7 days. Only **Aircel** and **Idea** could not meet the benchmark with its achieved level as **99.71% and 99.996%** very narrowly below the benchmark of 100%. Further, In respect of parameter **Time taken Refund of Deposit**, most of the operators were found to have complied with the benchmark of 100% refund of deposits within 60 days of closure. Only **Idea, RCOM (GSM) and RCOM (CDMA)** could not meet the benchmark with their performance level as **99.96%, 99.77% and 99.06%** respectively against the benchmark of 100.

The results for three days live measurements reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center' and 'calls connection to operators (Voice to voice) within 90 seconds'. Only **MTNL** has not met the benchmark of **Accessibility** with its performance as **90.34%**, whereas **RCOM(GSM) and RCOM(CDMA)** lagged behind the benchmark of **'calls answered by Operators (voice to voice) within 90 seconds'** having achieved their performance as **89.74% and 90.97%** respectively against the benchmark of  $\geq 95\%$ .

(iv) With regard to **Drive Test**, it was concluded that the performance of the service providers with respect to the parameter **'Voice Quality'** remained main area of concern as **majority of operators namely Aircel, Idea, RCOM(GSM), Vodafone and MTNL** failed to comply with its bench mark. Apart from Voice Quality, **MTNL** also remained non-compliant in respect of other parameters also like **Call Drop rate, Call setup success rate and Blocked Call rate** and **RCOM (GSM)** could not do well in respect of the parameter **CSSR / Blocked Call Rate** in different areas of Delhi Service. These operators need to take corrective action to improve their networks.

## **5. PMR AUDIT REPORT**





## 5) PMR AUDIT REPORTS:

### 5.1 MONTHLY PMR:

#### 5.1.1 BUSY HOUR OF VARIOUS SERVICE PROVIDERS:

Sl. No.	Name of Service Provider	Month of Audit	Network TCBH Hour
<b>GSM Operators</b>			
1	AIRCEL	September-15	20:00 - 21:00
2	AIRTEL	September-15	19:00 - 20:00
3	MTNL	September-15	20:00 - 21:00
4	IDEA	September-15	20:00 - 21:00
5	RCOM GSM	September-15	19:00 - 20:00
6	VODAFONE	September-15	20:00 - 21:00
<b>CDMA Operators</b>			
7	MTS	September-15	20:00 - 21:00
8	RCOM CDMA	September-15	20:00 - 21:00
9	TATA CDMA	September-15	12:00 - 13:00

The TCBH reported by all the service providers matched the network busy hour calculated by TUV auditors for the Delhi metro circle.

#### 5.1.2 SWITCHES/BSC/BTS DETAILS OF SERVICE PROVIDERS:

Sl. No.	Name of Service Provider	No. of MSC + GMSC	No. of BSC	No. of BTS	NSS make	BSS make
<b>GSM Operators</b>						
1	AIRCEL	4	24	3889	NSN	NSN
2	AIRTEL	35	54	5988	Ericsson	Ericsson
3	MTNL	6	31	1121	NSN	NSN
4	IDEA	10	38	4911	NSN	NSN
5	RCOM GSM	4	14	2419	Huawei	Huawei
6	VODAFONE	15	56	5879	Ericsson	Ericsson
<b>CDMA Operators</b>						
7	MTS	1	6	1037	ZTE	ZTE
8	RCOM CDMA	7	NA	914	Lucent & ZTE	Lucent
9	TATA CDMA	8	8	1471	Huawei	Huawei

5.1.3 QOS PERFORMANCE OF MONTHLY PMR – JULY- 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE- JULY 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Jul-15	0.39%	0.01%	0.21%	0.05%	0.35%	0.15%	0.13%	0.16%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Jul-15	1.60%	0.00%	1.16%	0.00%	0.56%	0.57%	0.29%	0.10%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Jul-15	97.16%	99.81%	96.63%	97.77%	99.36%	99.09%	98.89%	96.93%	98.96%
	b) SDCCH/PAGING Channel congestion	<=1%	Jul-15	0.41%	0.05%	0.65%	0.76%	0.07%	0.04%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Jul-15	1.70%	0.10%	1.76%	1.65%	0.13%	0.26%	0.15%	0.08%	0.18%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Jul-15	1.18%	0.68%	1.85%	0.82%	0.34%	1.32%	0.68%	0.50%	0.46%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jul-15	<b>6.34%</b>	0.89%	2.55%	2.22%	0.07%	2.93%	1.12%	2.45%	2.49%
	c) Connections with good voice quality	>=95%	Jul-15	97.16%	99.10%	96.86%	98.26%	98.60%	96.92%	99.18%	99.77%	99.08%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Jul-15	0	0	0	0	0	0	0	0	0

5.1.4 QOS PERFORMANCE OF MONTHLY PMR – AUGUST- 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE - AUGUST 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Aug-15	0.38%	0.01%	0.14%	0.10%	0.24%	0.14%	0.14%	0.27%	0.06%
	b) Worst affected BTSs due to downtime	<=2%	Aug-15	1.58%	0.00%	0.27%	0.00%	0.12%	0.67%	0.19%	0.41%	0.14%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Aug-15	97.15%	99.84%	96.71%	97.96%	99.29%	98.42%	98.79%	97.49%	98.98%
	b) SDCCH/PAGING Channel congestion	<=1%	Aug-15	0.40%	0.05%	0.60%	0.72%	0.06%	0.15%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Aug-15	1.47%	0.03%	1.82%	1.45%	0.13%	0.77%	0.10%	0.04%	0.18%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Aug-15	1.20%	0.77%	1.84%	0.94%	0.28%	1.41%	0.75%	0.42%	0.47%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Aug-15	6.73%	1.05%	2.52%	2.53%	0.07%	2.91%	1.42%	1.83%	2.71%
	c) Connections with good voice quality	>=95%	Aug-15	97.04%	98.99%	96.96%	98.11%	98.56%	96.87%	99.18%	99.77%	99.10%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Aug-15	0	0	0	0	0	0	0	0	0

5.1.5 QOS PERFORMANCE OF MONTHLY PMR – SEPTEMBER- 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE - SEPTEMBER 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Sep-15	0.34%	0.01%	0.15%	0.09%	0.23%	0.15%	0.10%	0.30%	0.06%
	b) Worst affected BTSs due to downtime	<=2%	Sep-15	1.23%	0.00%	0.62%	0.00%	0.12%	0.65%	0.00%	0.00%	0.20%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Sep-15	97.50%	99.85%	96.77%	98.19%	98.98%	98.38%	98.95%	97.77%	99.14%
	b) SDCCH/PAGING Channel congestion	<=1%	Sep-15	0.43%	0.04%	0.49%	0.68%	0.07%	0.20%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-15	1.40%	0.03%	1.81%	1.23%	0.15%	0.83%	0.13%	0.04%	0.07%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Sep-15	1.07%	0.75%	1.88%	0.78%	0.35%	1.30%	0.63%	0.39%	0.32%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Sep-15	5.81%	1.14%	2.63%	2.01%	0.08%	2.75%	1.30%	1.86%	2.20%
	c) Connections with good voice quality	>=95%	Sep-15	97.17%	99.05%	97.11%	98.11%	98.51%	97.17%	99.20%	99.76%	99.16%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Sep-15	0	0	0	0	0	0	0	0	0

**5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- SEPTEMBER 15 (JULY TO SEPT 2015 MONTHS AUDITED DATA)**

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE- SEPTEMBER 15) OF DELHI METRO CIRCLE												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.37%	0.01%	0.17%	0.08%	0.27%	0.15%	0.12%	0.24%	0.05%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	1.47%	0.00%	0.68%	0.00%	0.27%	0.63%	0.16%	0.17%	0.11%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	97.27%	99.83%	96.70%	97.97%	99.21%	98.63%	98.88%	97.40%	99.03%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.41%	0.05%	0.58%	0.72%	0.07%	0.13%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	1.52%	0.05%	1.80%	1.44%	0.14%	0.62%	0.13%	0.05%	0.14%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.15%	0.73%	1.86%	0.85%	0.32%	1.34%	0.69%	0.44%	0.42%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>6.29%</b>	1.03%	2.57%	2.25%	0.07%	2.86%	1.28%	2.05%	2.47%
	c) Connections with good voice quality	>=95%	Quarterly	97.12%	99.05%	96.98%	98.16%	98.56%	96.99%	99.19%	99.77%	99.11%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Quarterly	0	0	0	0	0	0	0	0	0

### 5.1.7 KEY FINDINGS ON MONTHLY PMR AUDIT REPORTS:

The audit of network related parameters for cellular mobile service providers was conducted at their respective MSCs in the circles.

TUV conducted audit for cellular mobile operators based on **three stage audit / verification viz audit of the records, live measurements and drive tests. This exercise has been repeated every month for CMSPs.**

#### **Network Service Quality Parameters:**

- **Network Availability**

- i. BTS Accumulated Downtime (Not Available for Service):
- ii. Worst affected BTSs due to downtime

For measuring the performance against the benchmark for this parameter, down time of each BTS lasting for more than 1 hour at a time in a day during the period of a month has been taken for computation.

In Delhi Metro circle, the audit with respect to this parameter revealed that **all the operators met the benchmark for this parameter.**

- **Connection Establishment (Accessibility)**

- i. Call Set-up Success Rate(CSSR)

CSSR includes complete signaling in the call set up process and does not aim to measure the performance of the called exchange or that of the Point of Interconnection (POI). CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

**All operators were in compliance on the benchmark for this parameter.**

- **Parameters related to Network Congestion:**

The parameters namely SDCCH / Paging Channel Congestion, TCH and POI are prescribed with the aim of measuring the congestion in the network.

In CDMA system, there is no direct counter defined for reporting Paging Channel Congestion as reported by Tata Teleservices. However, they have a defined counter for Paging Channel Occupancy Ratio (**PCH Average Using Ratio**) which is used to determine the Paging Channel Occupancy which on an average is < 50% on all sites in the network. When the value of this parameter is less than 100%, it is counted as 0% congestion. Thus, there is no congestion on the paging channel in CDMA system.

With respect to this parameter, the performance of the operators is quite satisfactory as **all operators met the TRAI specified benchmarks** on TCH/SDCCH/Paging Channel congestion parameters.

**There was no congestion on individual POI links between a service provider vis-à-vis other service.**

- **Connection Maintenance (Retainability)**

- i. Call Drop Rate:

This parameter gives a reliable measurement of the mobile network used by the service provider for maintaining a call once it has been correctly established. Failures in coverage, network congestion and network failures have important impact on this parameter.

The audit of this parameter revealed that all the service providers were measuring this parameter as per the TRAI guidelines. Also, **all the service providers were found to be meeting the TRAI specified benchmark**. The lowest call drop rate (average 0.32%) was for RCOM (GSM) during the quarter.

- ii. Worst affected cells having more than 3% TCH drops

Worst affected cells are defined as cells in which the call drop rate exceeds 3% during cell Bouncing Busy Hour (CBBH) or at any other hour of a day.

The audit results for this parameter indicate that all operators (**except Aircel**) have met the bench mark successfully during the quarter. Quarterly average performance of **Aircel** was **6.29 %**.

- iii. Connections with good voice quality:

The audit results for this parameter indicate that **all operators have met the benchmark during the quarter**.

- iv. No. of POI's having  $\geq 0.5\%$  POI congestion:

The audit with respect to this parameter revealed that **all the operators met the benchmark for this parameter** as there was no individual POI having congestion  $> 0.5\%$ .

**3-DAYS LIVE MEASUREMENT DATA VERIFICATION FOR  
CELLULAR MOBILE SERVICE PROVIDERS  
(NETWORK SERVICE QUALITY PARAMETER)**





## 5.2 LIVE MEASUREMENT DATA (3-DAYS) FOR CELLULAR MOBILE SERVICE PROVIDERS (NETWORK SERVICE QUALITY PARAMETER):

### 5.2.1 LIVE MEASUREMENT DATA (3-DAYS) – JULY- 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE – JULY 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.36%	0.01%	0.17%	0.02%	0.37%	0.21%	0.06%	0.11%	0.03%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.09%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.37%	99.83%	96.91%	98.01%	99.33%	99.13%	98.48%	97.69%	99.06%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.22%	0.04%	0.62%	0.53%	0.09%	0.02%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.75%	0.08%	1.69%	1.55%	0.10%	0.29%	0.40%	0.04%	0.12%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.14%	0.71%	1.82%	0.81%	0.34%	1.21%	0.75%	0.43%	0.40%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	6.35%	0.89%	2.57%	2.26%	0.08%	2.88%	1.03%	2.33%	1.94%
	c) Connections with good voice quality	>=95%	Live data	97.11%	99.06%	96.84%	98.21%	98.70%	97.08%	99.16%	99.77%	99.11%
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	0	0	0	0

**5.2.2 LIVE MEASUREMENT DATA (3-DAYS) – AUGUST- 15 MONTH:**

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE – AUGUST 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.42%	0.01%	0.20%	0.12%	0.27%	0.16%	0.24%	0.30%	0.08%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%	0.10%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.18%	99.81%	96.72%	98.38%	99.04%	98.29%	99.06%	97.58%	99.13%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.38%	0.06%	0.60%	0.67%	0.06%	0.17%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.17%	0.05%	1.71%	1.15%	0.14%	0.86%	0.07%	0.04%	0.05%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.24%	0.84%	1.70%	0.87%	0.39%	1.50%	0.66%	0.38%	0.40%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	7.16%	0.94%	2.67%	2.34%	0.09%	3.22%	1.22%	1.57%	2.55%
	c) Connections with good voice quality	>=95%	Live data	96.97%	98.92%	96.98%	98.10%	98.47%	96.89%	99.18%	99.77%	99.09%
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	0	0	0	0

**5.2.3 LIVE MEASUREMENT DATA (3-DAYS) – SEPTEMBER-- 15 MONTH:**

CELLULAR MOBILE TELEPHONE SERVICES DELHI METRO CIRCLE- SEPTEMBER 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.41%	0.01%	0.17%	0.07%	0.21%	0.13%	0.12%	0.20%	0.22%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.50%	99.86%	96.96%	98.42%	98.79%	98.48%	99.04%	97.44%	98.41%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.24%	0.03%	0.71%	0.62%	0.08%	0.20%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.54%	0.02%	1.71%	1.06%	0.16%	0.76%	0.02%	0.06%	0.81%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.35%	0.69%	1.82%	0.80%	0.36%	1.29%	0.59%	0.40%	0.41%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	5.64%	0.88%	2.71%	2.00%	0.13%	2.71%	1.21%	1.90%	2.19%
	c) Connections with good voice quality	>=95%	Live data	97.13%	99.02%	97.06%	98.05%	98.47%	97.16%	99.19%	99.76%	99.11%
4	No. of POI having >=0.5% congestion	<0.5%	Live data	0	0	0	0	0	0	0	0	0

**5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF JULY TO SEPTEMBER 2015 MONTHS AUDITED DATA)**

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE- SEPTEMBER 15) – DELHI CIRCLE												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.40%	0.01%	0.19%	0.07%	0.28%	0.17%	0.14%	0.20%	0.11%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.05%	0.00%	0.00%	0.03%	0.03%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	97.35%	99.83%	96.86%	98.27%	99.05%	98.63%	98.86%	97.57%	98.87%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.28%	0.04%	0.64%	0.61%	0.08%	0.13%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	1.15%	0.05%	1.70%	1.25%	0.13%	0.64%	0.16%	0.05%	0.33%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.24%	0.75%	1.78%	0.83%	0.36%	1.33%	0.67%	0.40%	0.40%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	<b>6.38%</b>	0.90%	2.65%	2.20%	0.10%	2.94%	1.15%	1.93%	2.23%
	c) Connections with good voice quality	>=95%	Quarterly	97.07%	99.00%	96.96%	98.12%	98.55%	97.04%	99.18%	99.77%	99.10%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Quarterly	0	0	0	0	0	0	0	0	0

**5.2.5 KEY FINDING ON 3 DAYS LIVE MEASUREMENTS:**

From three days live assessment, it was found that the performance of all operators was satisfactory as they were largely complying with the benchmarks of all parameters except for the parameter 'Worst affected Cell having > 3% TCH drop' which could not be met by **Aircel** with its average performance as **6.38%** .

Aircel has shown the similar non compliance for this parameter in case of monthly audit.

5.2.6 DETAILED NETWORK DATA ASSESSMENT OF CELLULAR MOBILE TELEPHONE SERVICES:

TABLE: 1

Detailed Network Data Assessment of Cellular Mobile Telephone Services - Delhi Metro Circle – July 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
1	<b>Network Availability</b>											
	a) Total no. of BTSs in the licensed service area		July-15	3811	6067	1121	4848	2485	5832	1039	981	1470
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		July-15	10935.50	376.08	1766.00	1756.13	6392.55	6485.66	1012.55	1162.18	379.63
	c) BTS Accumulated Downtime	<=2%	July-15	0.39%	0.01%	0.21%	0.05%	0.35%	0.15%	0.13%	0.16%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		July-15	61	0	13	0	14	33	3	1	0
e) Worst affected BTSs due to downtime	<=2%	July-15	1.60%	0.00%	1.16%	0.00%	0.56%	0.57%	0.29%	0.10%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>											
	a) CSSR (Call Setup Success Rate)	>=95%	July-15	97.16%	99.81%	96.63%	97.77%	99.36%	99.09%	98.89%	96.93%	98.96%
	b) SDCCH/PAGING Congestion	<=1%	July-15	0.41%	0.05%	0.65%	0.76%	0.07%	0.04%	0.00%	0.00%	0.00%
c) TCH congestion	<=2%	July-15	1.70%	0.10%	1.76%	1.65%	0.13%	0.26%	0.15%	0.08%	0.18%	
3	<b>Connection Maintenance (Retainability)</b>											
	a) Call Drop Rate (CDR)	<=2%	July-15	1.18%	0.68%	1.85%	0.82%	0.34%	1.32%	0.68%	0.50%	0.46%
	b) Worst affected cells>3% TCH drop	<=3%	July-15	6.34%	0.89%	2.55%	2.22%	0.07%	2.93%	1.12%	2.45%	2.49%
	c) % of connections with good voice quality	>=95%	July-15	97.16%	99.10%	96.86%	98.26%	98.60%	96.92%	99.18%	99.77%	99.08%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		July-15	701	138	82	306	5	416	47	71	127
e) Total no. of cells (Sector) in the licensed service area		July-15	11052	15535	3201	13782	6841	14211	3988	2891	5113	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>											
	No. of POI's having >=0.5% POI congestion		July-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		July-15	0	0	0	0	0	0	0	0	0
5	<b>Network Data</b>											
	a) Equipped Capacity of Network in Erlang		July-15	149418	312898	100000	183306	96000	283330	105811	140000	263351
	b) Total traffic in TCBH in erlang (Avg.)		July-15	109378	191873	24372	139239	89488	222149	13997	78817	104889
c) Total no. of customers served (as per VLR) on last day of the month		July-15	3551932	9968497	1168828	5569270	5386814	10040132	483143	2785050	1257804	

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live- Delhi Metro Circle- July 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators					CDMA Operators			
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Live data	3789	6043	1123	4814	2487	5820	1038	982	1466
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	994.08	35.47	138.00	77.35	657.87	871.38	44.45	76.63	27.72
	c) BTS Accumulated Downtime	<=2%	Live data	0.36%	0.01%	0.17%	0.02%	0.37%	0.21%	0.06%	0.11%	0.03%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	1	0	0	2	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.09%	0.00%	0.00%	0.03%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.37%	99.83%	96.91%	98.01%	99.33%	99.13%	98.48%	97.69%	99.06%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.22%	0.04%	0.62%	0.53%	0.09%	0.02%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.75%	0.08%	1.69%	1.55%	0.10%	0.29%	0.40%	0.04%	0.12%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.14%	0.71%	1.82%	0.81%	0.34%	1.21%	0.75%	0.43%	0.40%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	6.35%	0.89%	2.57%	2.26%	0.08%	2.88%	1.03%	2.33%	1.94%
	c) % of connections with good voice quality	>=95%	Live data	97.11%	99.06%	96.84%	98.21%	98.70%	97.08%	99.16%	99.77%	99.11%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	704	140	82	314	6	410	41	67	99
	e) Total no. of cells (Sector) in the licensed service area		Live data	11087	15664	3205	13871	6849	14256	3986	2894	5111
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

**TABLE: 3**

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Delhi Metro Circle - August 15 month												
S/ N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Aug-15	3865	6112	1122	4881	2472	5832	1043	967	1471
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Aug-15	10836	376	1200	3699	4466	6185	1092	1908	665
	c) BTS Accumulated Downtime	<=2%	Aug-15	0.38%	0.01%	0.14%	0.10%	0.24%	0.14%	0.14%	0.27%	0.06%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Aug-15	61	0	3	0	3	39	2	4	2
	e) Worst affected BTSs due to downtime	<=2%	Aug-15	1.58%	0.00%	0.27%	0.00%	0.12%	0.67%	0.19%	0.41%	0.14%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Aug-15	97.15%	99.84%	96.71%	97.96%	99.29%	98.42%	98.79%	97.49%	98.98%
	b) SDCCH/PAGING Congestion	<=1%	Aug-15	0.40%	0.05%	0.60%	0.72%	0.06%	0.15%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Aug-15	1.47%	0.03%	1.82%	1.45%	0.13%	0.77%	0.10%	0.04%	0.18%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Aug-15	1.20%	0.77%	1.84%	0.94%	0.28%	1.41%	0.75%	0.42%	0.47%
	b) Worst affected cells>3% TCH drop	<=3%	Aug-15	6.73%	1.05%	2.52%	2.53%	0.07%	2.91%	1.42%	1.83%	2.71%
	c) % of connections with good voice quality	>=95%	Aug-15	97.04%	98.99%	96.96%	98.11%	98.56%	96.87%	99.18%	99.77%	99.10%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Aug-15	756	166	81	354	5	436	57	52	139
	e) Total no. of cells (Sector) in the licensed service area		Aug-15	11231	15888	3198	13991	6804	14986	4024	2849	5119
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Aug-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Aug-15	0	0	0	0	0	0	0	0	0
<b>Network Data</b>												
5	a) Equipped Capacity of Network in Erlang		Aug-15	152486	328201	100000	187903	96000	287547	106392	140000	263613
	b) Total traffic in TCBH in Erlang (Avg.)		Aug-15	109573	207319	24480	139941	89425	223314	13446	78817	100502
	c) Total no. of customers served (as per VLR) on last day of the month		Aug-15	3633135	9795533	1154439	5551446	5203122	9891444	462506	2785050	1209427

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live - Delhi Metro Circle – August 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators					CDMA Operators			
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Live data	3833	6111	1122	4869	2469	5832	1038	968	1471
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	1147.89	34.48	162.00	435.30	472.93	676.45	179.32	211.40	83.12
	c) BTS Accumulated Downtime	<=2%	Live data	0.42%	0.01%	0.20%	0.12%	0.27%	0.16%	0.24%	0.30%	0.08%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	0	0	0	3	1	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	0.00%	0.05%	0.10%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.18%	99.81%	96.72%	98.38%	99.04%	98.29%	99.06%	97.58%	99.13%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.38%	0.06%	0.60%	0.67%	0.06%	0.17%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.17%	0.05%	1.71%	1.15%	0.14%	0.86%	0.07%	0.04%	0.05%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.24%	0.84%	1.70%	0.87%	0.39%	1.50%	0.66%	0.38%	0.40%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	7.16%	0.94%	2.67%	2.34%	0.09%	3.22%	1.22%	1.57%	2.55%
	c) % of connections with good voice quality	>=95%	Live data	96.97%	98.92%	96.98%	98.10%	98.47%	96.89%	99.18%	99.77%	99.09%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	803	150	85	330	6	476	49	45	131
	e) Total no. of cells (Sector) in the licensed service area		Live data	11214	15891	3195	14101	6793	14777	4030	2868	5119
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0



TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Delhi Metro Circle - Sept 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
<b>Network Availability</b>												
1	a) Total no. of BTSs in the licensed service area		Sep-15	3889	6153	1121	4911	2419	5879	1037	914	1471
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Sep-15	9598.41	384.32	1197.00	3260.85	4084.73	6140.49	723.96	1980.85	666.07
	c) BTS Accumulated Downtime	<=2%	Sep-15	0.34%	0.01%	0.15%	0.09%	0.23%	0.15%	0.10%	0.30%	0.06%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Sep-15	48	0	7	0	3	38	0	0	3
	e) Worst affected BTSs due to downtime	<=2%	Sep-15	1.23%	0.00%	0.62%	0.00%	0.12%	0.65%	0.00%	0.00%	0.20%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Sep-15	97.50%	99.85%	96.77%	98.19%	98.98%	98.38%	98.95%	97.77%	99.14%
	b) SDCCH/PAGING Congestion	<=1%	Sep-15	0.43%	0.04%	0.49%	0.68%	0.07%	0.20%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-15	1.40%	0.03%	1.81%	1.23%	0.15%	0.83%	0.13%	0.04%	0.07%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Sep-15	1.07%	0.75%	1.88%	0.78%	0.35%	1.30%	0.63%	0.39%	0.32%
	b) Worst affected cells>3% TCH drop	<=3%	Sep-15	5.81%	1.14%	2.63%	2.01%	0.08%	2.75%	1.30%	1.86%	2.20%
	c) % of connections with good voice quality	>=95%	Sep-15	97.17%	99.05%	97.11%	98.11%	98.51%	97.17%	99.20%	99.76%	99.16%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Sep-15	659	182	84	282	6	411	52	50	113
	e) Total no. of cells (Sector) in the licensed service area		Sep-15	11330	16011	3202	14065	6676	14952	3988	2690	5119
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	No. of POI's having >=0.5% POI congestion		Sep-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Sep-15	0	0	0	0	0	0	0	0	0
<b>Network Data</b>												
5	a) Equipped Capacity of Network in Erlang		Sep-15	156649	323660	100000	191881	96000	289799	105943	140000	263618
	b) Total traffic in TCBH in erlang (Avg.)		Sep-15	110215	208439	25088	139304	89682	226988	13429	77691	97256
	c) Total no. of customers served (as per VLR) on last day of the month		Sep-15	3765776	9980822	1200643	5527791	5212364	10059994	486214	2701447	1206256

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live - Delhi Metro Circle – Sept 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
				GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
1	<b>Network Availability</b>											
	a) Total no. of BTSs in the licensed service area		Live data	3860	6140	1124	4911	2429	5832	1037	916	1469
	b) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		Live data	1132.25	37.63	134.00	237.64	369.40	527.27	89.22	129.62	229.90
	c) BTS Accumulated Downtime	<=2%	Live data	0.41%	0.01%	0.17%	0.07%	0.21%	0.13%	0.12%	0.20%	0.22%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	0	0	0	0	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>											
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	97.50%	99.86%	96.96%	98.42%	98.79%	98.48%	99.04%	97.44%	98.41%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.24%	0.03%	0.71%	0.62%	0.08%	0.20%	0.00%	0.00%	0.00%
c) TCH congestion	<=2%	Live data	1.54%	0.02%	1.71%	1.06%	0.16%	0.76%	0.02%	0.06%	0.81%	
3	<b>Connection Maintenance (Retainability)</b>											
	a) Call Drop Rate (CDR)	<=2%	Live data	1.35%	0.69%	1.82%	0.80%	0.36%	1.29%	0.59%	0.40%	0.41%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	5.64%	0.88%	2.71%	2.00%	0.13%	2.71%	1.21%	1.90%	2.19%
	c) % of connections with good voice quality	>=95%	Live data	97.13%	99.02%	97.06%	98.05%	98.47%	97.16%	99.19%	99.76%	99.11%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	637	141	87	278	9	408	48	52	112
e) Total no. of cells (Sector) in the licensed service area		Live data	11296	15980	3203	13951	6727	15041	3981	2717	5118	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>											
	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

## **CUSTOMER SERVICE QUALITY (CSD) PARAMETERS**



### 5.3 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS-QE SEPT.-15:

#### 5.3.1 QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICE (JULY TO SEPT 2015 MONTHS AUDITED DATA):

QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE SEPTEMBER 15												
Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Customer Service Quality Parameters</b>												
<b>Metering &amp; Billing Credibility -Post Paid</b>												
1	A) No. of bills issued during the quarter		Delhi	201486	5176838	375552	2450284	588954	6375239	728	675734	380949
	B) No. of bills disputed including billing complaints during the quarter		Delhi	27	856	225	1594	523	8472	0	621	6
	C) % of billing complaints during the quarter	<= 0.1%	Delhi	0.01%	0.02%	0.06%	0.07%	0.09%	0.13%	0.00%	0.09%	0.002%
<b>Metering &amp; Billing Credibility -Pre Paid</b>												
2	A) Total No. of Pre-paid customers at the end of the quarter		Delhi	5731498	8794125	2136727	5328479	5086683	7766653	998046	2741058	2552993
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		Delhi	117	35	429	3542	4602	6507	81	836	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	Delhi	0.002%	0.00%	0.02%	0.07%	0.09%	0.08%	0.01%	0.03%	0.00%
<b>Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints</b>												
3	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		Delhi	144	891	654	21880	5125	14979	81	1457	6
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		Delhi	144	891	654	21865	5125	14979	81	1457	6

**QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE SEPTEMBER 15**

Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators						CDMA Operators		
	C) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 6 weeks during the quarter		Delhi	144	891	654	21880	5125	14979	81	1457	6
	D) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	>=98% within 4 weeks	Delhi	100.00%	100.00%	100.00%	99.93%	100.00%	100.00%	100.00%	100.00%	100.00%
	E) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 6 weeks	100% within 6 weeks	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
	F) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
<b>Response time to customers for assistance</b>												
	A) Total no of calls attempted to customer care/Call center		Delhi	27882509	3919788	1112823	23570320	6934689	25888740	3391576	981936	425325
	B) Total no. of calls successfully established to customer care/Call center.		Delhi	25484884	3919788	993881	23354547	6833080	25888740	3311491	963054	422085
4	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	Delhi	91.40%	100.00%	89.31%	99.08%	98.53%	100.00%	97.64%	98.08%	99.24%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		Delhi	4585614	7967384	568196	6542271	1136982	8083260	739954	241384	532624
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		Delhi	4364369	7078967	529896	6508643	1125193	7938379	705834	237068	515395
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts )	>=95%	Delhi	95.18%	88.85%	93.26%	99.49%	98.96%	98.21%	95.39%	98.21%	96.77%
5	<b>Termination/closure of service</b>											

QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE SEPTEMBER 15												
Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	VODAFONE	MTS	RCOM CDMA	TATA CDMA
S/ N	Name of Parameter			GSM Operators						CDMA Operators		
	A) Total No. of requests for Termination / Closure of service received during the quarter		Delhi	2402	24376	10	23393	3924	13259	8	6426	5449
	B) No. of requests for Termination / Closure of service complied within 7 days during the quarter		Delhi	2395	24376	10	23392	3924	13259	8	6426	5449
	C) % of Termination/ Closure of service within 7 days	<=7days	Delhi	99.71%	100.00%	100.00%	99.996%	100.00%	100.00%	100.00%	100.00%	100.00%
<b>Time taken for refunds of deposits after closures.</b>												
6	A) No. of Payments/ Refunds due during the quarter		Delhi	2409	3448	73	10707	1777	36770	0	1806	2135
	B) No. of Payments/ Refunds Cleared during the quarter		Delhi	2409	3448	73	10703	1773	36770	0	1789	2135
	C) Time taken for refunds of deposits after closures.	100% within 60 days	Delhi	100.00%	100.00%	100.00%	99.96%	99.77%	100.00%	100.00%	99.06%	100.00%

NB: Accessibility of call center / Customer care data of RCOM (GSM & CDMA) are based on one month data i.e. August 15 as July-15 & September-15 month's data were not provided by RCOM (GSM & CDMA) due to TTI server issue.

**5.3.2 3 DAYS LIVE CSD AUDITED DATA FOR CELLULAR MOBILE SERVICES (QE-SEPT. 2015):**

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES – QE – SEPTEMBER 15												
3 days live CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM (GSM)	VODAFONE	MTS	RCOM (CDMA)	TATA (CDMA)
S/ N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Response time to customers for assistance</b>												
1	A) Total no of calls attempted to customer care/Call center		Delhi	145445	113323	31288	192915	63292	837840	98279	8982	160814
	B) Total no. of calls successfully established to customer care/Call center.		Delhi	141872	113323	28267	189704	61626	837840	97580	8850	159762
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	Delhi	97.54%	100.00%	90.34%	98.34%	97.37%	100.00%	99.29%	98.53%	99.35%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		Delhi	822661	250342	17127	189704	18260	269785	19745	5584	16404
2	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		Delhi	821329	247798	16788	189283	16386	262952	18886	5080	16037
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts )	>=95%	Delhi	99.84%	98.98%	98.02%	99.78%	89.74%	97.47%	95.65%	90.97%	97.76%

## KEY FINDINGS:

### 1. Metering and billing credibility-(Post paid & Pre-paid)

The performance of the service providers with respect to the parameter metering and billing credibility for both post-paid and pre-paid is **well within the prescribed bench mark** of  $\leq 0.1\%$ . However, **Vodafone** failed to meet the benchmark for Post-paid with its performance as **0.13%**.

### 2. Resolution of Billing complaints and applying credits -

- i. Resolution of billing /charging complaints
- ii. Period of applying credit/waiver/adjustment to customer's account from the date of resolution of complaints

All operators have 100% resolved the billing complaints within stipulated period of 4/6 weeks and also have met the benchmark of 100% cases of credit/waiver in one week where customers were due for credit / adjustment.

### 3. Response Time to the Customer for assistance

- i. Accessibility of call centre/customer care
- ii. Percentage of calls answered by Operators (Voice to Voice)

All service providers (except **Aircel** and **MTNL**) are in compliance with respect to the parameter **Accessibility of call center**. **Aircel** and **MTNL** failed to meet the benchmark with their performance as **91.40%** and **89.31%**. Further, **Airtel** and **MTNL** could not meet the benchmark of **'calls answered by Operators (voice to voice) within 90 seconds'** having achieved their performed values as **88.85** and **93.26%** respectively against the benchmark of  $\geq 95\%$ .

### 4. Termination/Closure of Service

In case of this parameters also, all except **Aircel** and **Idea** have settled the **'closure/termination'** within the benchmark of 7 days. Only **Aircel** and **Idea** could not meet the benchmark with its achieved level as **99.71%** and **99.996%** very narrowly below the benchmark of 100%.

### 5. Time Taken for Refund of deposits after closures

Most of the operators were found to have complied with the benchmark of 100% refund of deposits within 60 days of closure. Only **Idea**, **RCOM (GSM)** and **RCOM (CDMA)** could not meet the benchmark with their performance level as **99.96%**, **99.77%** and **99.06%** respectively against the benchmark of 100%.

## Live Measurements

The results for three days live measurements reveal that all operators have met the benchmarks for the parameters 'Accessibility to call center' and 'calls connection to operators (Voice to voice) within 90 seconds'. Only **MTNL** has not met the benchmark of **Accessibility** with its performance as **90.34%**, whereas **RCOM(GSM)** and **RCOM(CDMA)** lagged behind the benchmark of **'calls answered by Operators (voice to voice) within 90 seconds'** having achieved their performance as **89.74%** and **90.97%** respectively against the benchmark of  $\geq 95\%$ .



## **6. LIVE CALLING ASSESSMENT**



## 6) LIVE CALLING ASSESSMENT:

### 6.1 INTER OPERATOR CALLS ASSESSMENT:

Inter operator call assessment with a sample of 2x50 test calls for each Service provider operating in Delhi Metro service area during the time 1100 to 1400 Hrs and 1600 to 1900 was carried out by TUV auditors. The test calls were made from one operator to another within the same licensed area to judge the ease of connectivity amongst the operators. While doing this exercise, the radio part, the switch part and POI in between the two operators are involved. Congestion in any of these network elements could result in congestion in the network.

INTER OPERATOR CALL ASSESSMENT BASED ON LIVE MEASUREMENT										
Calling Operators	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	RCOM CDMA	TATA CDMA	MTS	VODAFONE
AIRCEL	Delhi	---	100%	100%	100%	100%	100%	100%	100%	100%
AIRTEL	Delhi	100%	---	100%	100%	100%	100%	100%	100%	100%
MTNL	Delhi	100%	100%	---	100%	100%	100%	100%	100%	100%
IDEA	Delhi	100%	100%	100%	---	100%	100%	100%	100%	100%
RCOM GSM	Delhi	100%	100%	100%	100%	---	100%	100%	100%	100%
RCOM CDMA	Delhi	100%	100%	100%	100%	100%	---	100%	100%	100%
TATA CDMA	Delhi	100%	100%	100%	100%	100%	100%	---	100%	100%
MTS	Delhi	100%	100%	100%	100%	100%	100%	100%	---	100%
VODAFONE	Delhi	100%	100%	100%	100%	100%	100%	100%	100%	---

The result of the testing revealed that the inter connection performance among the operators was quite satisfactory as no problem was observed in interconnection from one operator to other operators.

## 6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:

LIVE CALLING TO CALL CENTRE										
Parameter	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM (GSM)	VODAFONE	MTS	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Delhi	100	100	100	100	100	100	100	100	100
Total no of calls attempted to customer care/Call center	Delhi	100	100	100	100	100	100	100	100	100
Total no. of calls successfully established to customer care/Call center	Delhi	100	100	100	100	98	100	100	98	100
% Accessibility of Call centre /customer Care (Total calls successfully established * 100 / Total call attempts)	Delhi	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	100.00%	98.00%	100.00%
Total Calls reached to agent desk for Voice to Voice (Total call attempt)	Delhi	100	100	100	100	98	100	100	98	100
Total number of calls answered by the operator (Voice to voice) within 90 seconds	Delhi	97	100	96	100	96	98	98	96	100
% age of calls answered by operator(voice to voice) (Total call successfully established within 90 Sec.*100 / Total calls attempts)	Delhi	97.00%	100.00%	96.00%	100.00%	98%	98.00%	98.00%	98%	100.00%

In case of calls answered by operators (voice to voice) within 90 seconds when test calls were made to the call centers, Airtel, MTNL, RCOM (GSM), Vodafone, MTS and RCOM (CDMA) could connect 97%, 96%, 98%, 98%, 98% and 98% of calls to the operator .

## 6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLAINTS:

Performance (live calling for billing complaints)										
	Circle Name	AIRCEL	AIRTEL	MTNL	IDEA	RCOM (GSM)	VODAFONE	MTS	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	Delhi	144	148	200	150	126	120	81	121	6
Total No. of calls Answered	Delhi	69	105	165	102	111	100	63	101	6
Cases resolved within 4 weeks	Delhi	69	105	165	102	111	100	63	101	6
%age of cases resolved	Delhi	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

To test the Service Providers performance on billing related complaints and their resolutions, TUV-SUD auditors conducted a customer feedback calling for about random 100 nos. of customers. However, in some cases, the number of customers contacted for verification was very less due to less number of billing complaints. During live calling, some of the customers did not attend the calls, so shortfall was made good by taking other complaints to make verification of 100 Complaints. Some of the complainants reported that they didn't exactly remember about the resolution of complaints. However, majority of the customers reported that the billing complaints were resolved to their satisfaction.

**6.4 LEVEL -1 CALLING ASSESSMENT:**

LEVEL 1 LIVE CALLING																	
Month	Circle Name	SSA Name	Name of SDCA	Emergency No.	No. of calls made	AIRCEL	AIRTEL	MTNL	IDEA	RCOM GSM	RCOM CDMA	TATA CDMA	MTS	VODAFONE			
July'15	Delhi	Gurgaon & Faridabad	Faridabad	100	5	√	√	√	√	√	√	√	√	√			
				101	5	√	√	√	√	√	√	√	x	√	√		
				102	5	√	√	√	√	√	√	√	√	x	√	√	
			Gurgaon	181	5	√	√	√	√	√	√	√	√	√	√	√	√
				1091	5	√	√	√	√	√	√	√	√	√	√	√	√
				1098	5	√	√	√	√	√	√	√	√	√	√	√	√
			Gurgaon	1070	5	√	√	√	√	√	√	x	x	√	√	√	√
				1073	5	x	√	√	x	x	x	x	x	x	√	√	√
				1056	5	x	x	x	x	x	x	x	x	x	x	x	x
Aug'15	Delhi	Noida & Ghaziabad	Ghaziabad	100	5	√	√	√	√	√	√	√	√	√			
				101	5	√	√	√	√	x	√	√	√	√	√		
				102	5	√	√	√	√	√	√	√	√	√	√	√	
			Noida	181	5	√	√	√	√	√	√	√	√	√	√	√	√
				1091	5	x	√	√	x	√	√	√	√	√	√	√	x
				1098	5	√	√	√	√	√	√	√	√	√	√	√	x
			Greater Noida	1070	5	√	√	√	x	x	x	x	√	√	√	√	√
				1073	5	√	x	x	x	x	x	x	√	√	√	√	√
				1056	5	x	x	x	x	x	x	x	x	x	x	x	x
Sep'15	Delhi	SDMC	SDMC	100	6	√	√	√	√	√	√	√	√	√			
				101	6	√	√	√	√	√	√	√	√	√	√		
				102	6	√	√	√	√	√	√	√	√	√	√	√	
			SDMC	108	6	x	x	x	x	x	x	x	x	x	√	x	
				181	6	√	√	√	√	√	√	√	√	√	√	√	√
				1070	6	√	√	√	√	√	√	√	√	√	√	√	√
			SDMC	1073	6	x	x	√	x	√	√	√	√	x	√	√	√
				1091	6	√	√	√	√	√	√	√	√	√	√	√	√
				1098	6	√	√	√	√	√	√	√	√	√	√	√	√
1056	6	x	x	x	x	x	x	x	x	x	x	x	x				

To assess the availability and efficiency of level 1 services such as police, fire, ambulance (emergency services) offered by various mobile service providers, a number of calls were made from mobile phones provided by them during the drive test. In Delhi Metro service area, the emergency services as mentioned in the above table were largely found functional except for some of the service providers, level-1 calling was not matured at some of the places and have been ticked as "X".

## 7. DRIVE TEST



## 7) OPERATOR ASSISTED DRIVE TEST

In terms of TRAI's letter dated 21<sup>st</sup> January, 2014, the drive tests were conducted for three consecutive days in one select SSA each month in each service area. Thus, the drive tests were carried out in three SSA's namely **Gurgaon / Faridabad, Noida & Ghaziabad and South Delhi (Municipal Area)** in the months of July, August and September 2015 respectively, the total route Kms covered during the drive tests in respective SSAs was **333 KMs, 330 KMs and 317 KMs** respectively. The performance of the operators has been highlighted below in the tables. The drive test was conducted simultaneously for all the operators following the same route of drive tests. The holding period for all test calls was 120 seconds. The drive test vehicle across all routes plied at a speed of about 30-50 km per hour.

For measuring voice quality, Rx Qual samples on a scale from 0 to 7 for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. As per the QoS norms, Rx Qual between 0- 5 for GSM operators and between 0-4% FER value for CDMA operators is considered to be good, where as Rx Qual beyond this benchmark is considered to be bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in dBm at street level with strength  $\geq -75$  dBm for in-door coverage and  $\geq -85$  dBm for in-vehicle.

7.1 OPERATOR ASSISTED DRIVE TEST: GURGAON / FARIDABAD (MUNICIPAL AREA) – JULY15

DRIVE TEST TABLE: 1

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Roads	232	31	245	30	213	32	226	30	231	30	209	30	218	30	232	30	303	30	
		Highways	141	30	160	30	126	31	150	30	163	30	161	30	153	30	165	30	171	34	
		Within City	130	30	161	30	148	30	158	30	168	30	158	30	185	30	178	30	200	31	
		<b>Overall SSA</b>	<b>503</b>	<b>91</b>	<b>566</b>	<b>90</b>	<b>487</b>	<b>93</b>	<b>534</b>	<b>90</b>	<b>562</b>	<b>90</b>	<b>528</b>	<b>90</b>	<b>556</b>	<b>90</b>	<b>575</b>	<b>90</b>	<b>674</b>	<b>95</b>	
2	Blocked Call Rate	Major Roads	2.16%	0.00%	1.63%	0.00%	2.46%	0.00%	0.00%	0.00%	6.93%	0.00%	0.96%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highways	0.00%	0.00%	0.63%	0.00%	0.79%	3.23%	0.67%	0.00%	9.82%	0.00%	0.62%	0.00%	0.00%	0.00%	0.00%	0.00%	0.58%	0.00%	
		Within City	0.00%	0.00%	1.24%	0.00%	4.73%	3.33%	0.63%	0.00%	11.31%	0.00%	0.00%	0.00%	0.54%	0.00%	0.00%	0.00%	0.00%	0.00%	
		<b>Overall SSA</b>	<b>0.99%</b>	<b>0.00%</b>	<b>1.24%</b>	<b>0.00%</b>	<b>2.73%</b>	<b>2.15%</b>	<b>0.37%</b>	<b>0.00%</b>	<b>9.07%</b>	<b>0.00%</b>	<b>0.57%</b>	<b>0.00%</b>	<b>0.18%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.15%</b>	<b>0.00%</b>	
3	Dropped Call Rate (<=2%)	Major Roads	0.44%	0.00%	0.42%	0.00%	7.69%	0.00%	0.44%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highways	0.00%	0.00%	0.00%	0.00%	2.44%	0.00%	0.00%	0.00%	2.04%	0.00%	0.00%	0.00%	0.65%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.65%	0.00%	10.22%	3.33%	0.00%	0.00%	1.34%	0.00%	0.00%	0.00%	0.00%	0.00%	1.12%	0.00%	0.00%	0.00%	
		<b>Overall SSA</b>	<b>0.20%</b>	<b>0.00%</b>	<b>0.36%</b>	<b>0.00%</b>	<b>7.05%</b>	<b>1.09%</b>	<b>0.19%</b>	<b>0.00%</b>	<b>0.98%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.18%</b>	<b>0.00%</b>	<b>0.35%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	
4	Percentage connections with good voice quality (=>95%)																				
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.89%	99.71%	95.93%	97.44%	97.62%	99.88%	
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.88%	99.97%	96.81%	97.58%	97.76%	98.39%	
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.73%	100%	97.71%	93.02%	98.51%	100%	
		<b>Overall SSA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>99.18%</b>	<b>99.90%</b>	<b>96.69%</b>	<b>96.45%</b>	<b>97.91%</b>	<b>99.45%</b>	

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SIN	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
(b) 0-5 ( with frequency hopping for GSM Operators)	Major Roads		93.41%	96.64%	95.72%	98.84%	91.47%	95.18%	92.09%	97.60%	93.42%	98.15%	94.81%	94.77%	NA	NA	NA	NA	NA	NA
	Highways		92.93%	99.01%	95.45%	98.18%	93.73%	78.55%	91.28%	96.35%	92.73%	99.12%	95.25%	98.53%	NA	NA	NA	NA	NA	NA
	Within City		94.20%	96.73%	94.14%	99.67%	90.97%	99.55%	94.11%	97.57%	91.76%	98.62%	95.05%	95.92%	NA	NA	NA	NA	NA	NA
	Overall SSA		93.48%	97.55%	95.28%	98.89%	91.93%	90.92%	92.46%	97.18%	92.72%	98.57%	95.01%	96.39%	NA	NA	NA	NA	NA	NA
<b>Service Coverage</b>																				
5	In door (>= -75dBm)	Major Roads	92.60%	97.49%	98.40%	100%	49.82%	75.05%	76.25%	97.84%	81.32%	100%	83.84%	98.86%	88.54%	93.69%	66.95%	99.02%	71.44%	99.65%
		Highways	96.62%	100%	98.04%	100%	53.73%	66.14%	80.20%	99.34%	82.78%	67.16%	93.58%	99.65%	89.17%	100%	81.70%	100%	77.11%	94.75%
		Within City	94.65%	87.08%	98.31%	100%	48.20%	96.42%	82.97%	87.19%	65.33%	99.97%	87.21%	99.42%	96.38%	100%	83.76%	100%	81.67%	100%
		Overall SSA	94.29%	94.55%	98.27%	100%	50.35%	79.21%	79.46%	94.58%	76.37%	90.41%	87.75%	99.33%	91.38%	97.95%	76.04%	99.90%	75.81%	98.18%
	In-vehicle (>= -85dBm)	Major Roads	97.79%	100%	99.46%	100%	88.90%	95.65%	95.41%	99.90%	97.51%	100%	97.61%	99.87%	98.80%	100%	94.73%	100%	96.35%	100%
		Highways	98.96%	100%	98.81%	100%	89.00%	97.25%	97.51%	100%	96.63%	98.80%	98.93%	99.94%	95.45%	100%	97.87%	100%	99.31%	100%
		Within City	98.54%	99.97%	99.30%	100%	86.64%	100%	97.73%	99.39%	91.85%	100%	97.99%	99.95%	100%	100%	99.16%	100%	99.75%	100%
		Overall SSA	98.33%	99.99%	99.23%	100%	88.25%	97.67%	96.74%	99.75%	95.38%	99.65%	98.12%	99.92%	98.33%	100%	96.90%	100%	98.07%	100%
	Outdoor- in city (>= -95dBm)	Major Roads	99.25%	100%	99.77%	100%	99.06%	99.16%	99.31%	99.97%	100%	100%	99.42%	100%	100%	100%	100%	100%	100%	100%
		Highways	99.53%	100%	99.02%	100%	98.23%	99.91%	99.56%	100%	100%	100%	99.70%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.59%	100%	99.85%	100%	98.71%	100%	99.65%	99.98%	100%	100%	99.50%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	99.42%	100%	99.58%	100%	98.74%	99.70%	99.49%	99.98%	100%	100%	99.53%	100%	100%	100%	100%	100%	100%	100%
6	Call Setup Success Rate (>=95%)	Major Roads	97.41%	96.77%	97.55%	100%	97.65%	100%	100%	100%	93.07%	100%	99.04%	100%	100%	100%	100%	100%	100%	
		Highways	99.29%	100%	98.13%	100%	97.62%	96.77%	99.33%	100%	90.18%	100%	99.38%	100%	100%	100%	100%	100%	99.42%	100%
		Within City	99.23%	100%	96.27%	100%	92.57%	100%	99.37%	100%	88.69%	100%	100%	100%	99.46%	100%	100%	100%	100%	
		Overall SSA	98.41%	98.90%	97.35%	100%	96.10%	98.92%	99.63%	100%	90.93%	100%	99.43%	100%	99.82%	100%	100%	100%	99.85%	100%



S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
7	Hand Over Success Rate (HOSR)	Major Roads	99.06%	100%	98.22%	100%	81.96%	96.00%	99.76%	100%	98.43%	100%	98.36%	100%	100%	100%	100%	100%	100%	100%	100%
		Highways	98.77%	100%	98.60%	100%	87.43%	100%	99.42%	100%	97.51%	100%	98.69%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.43%	100%	98.97%	100%	77.99%	100%	99.59%	100%	98.25%	100%	99.17%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	99.05%	100%	98.56%	100%	82.45%	97.25%	99.60%	100%	98.11%	100%	98.70%	100%	100%	100%	100%	100%	100%	100%	100%

NA-Not Applicable

The service providers having block call rate more than 3% have been shaded in yellow colour.

7.2 OPERATOR ASSISTED DRIVE TEST: NOIDA / GHAZIABAD – AUGUST 15

DRIVE TEST TABLE: 2

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Roads	165	30	142	30	130	30	135	30	132	32	146	30	160	30	160	30	170	30	
		Highways	130	30	116	31	109	31	106	30	113	30	126	30	129	30	117	30	109	30	
		Within City	227	30	216	30	258	6	254	30	244	33	235	31	232	30	237	30	259	30	
		<b>Overall SSA</b>	<b>522</b>	<b>90</b>	<b>474</b>	<b>91</b>	<b>497</b>	<b>67</b>	<b>495</b>	<b>90</b>	<b>489</b>	<b>95</b>	<b>507</b>	<b>91</b>	<b>521</b>	<b>90</b>	<b>514</b>	<b>90</b>	<b>538</b>	<b>90</b>	
2	Blocked Call Rate	Major Roads	0.61%	0.00%	1.41%	0.00%	1.54%	0.00%	0.00%	0.00%	0.76%	3.13%	2.74%	0.00%	1.25%	3.33%	0.00%	0.00%	0.00%	0.00%	
		Highways	1.54%	0.00%	0.00%	0.00%	2.75%	6.45%	0.94%	0.00%	5.31%	0.00%	1.59%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.92%	
		Within City	1.32%	0.00%	0.46%	0.00%	6.98%	0.00%	0.00%	0.00%	1.64%	3.03%	2.55%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.77%	
		<b>Overall SSA</b>	<b>1.15%</b>	<b>0.00%</b>	<b>0.63%</b>	<b>0.00%</b>	<b>4.63%</b>	<b>2.99%</b>	<b>0.20%</b>	<b>0.00%</b>	<b>2.25%</b>	<b>2.11%</b>	<b>2.37%</b>	<b>0.00%</b>	<b>0.38%</b>	<b>1.11%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.56%</b>	<b>0.00%</b>	
3	Dropped Call Rate (<=2%)	Major Roads	0.00%	0.00%	0.00%	0.00%	0.81%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.63%	3.45%	0.63%	0.00%	0.59%	0.00%	
		Highways	0.00%	0.00%	0.00%	0.00%	10.89%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	3.93%	0.00%	0.39%	0.00%	0.42%	0.00%	0.00%	0.00%	0.43%	0.00%	0.42%	0.00%	0.78%	0.00%	
		<b>Overall SSA</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>4.63%</b>	<b>0.00%</b>	<b>0.20%</b>	<b>0.00%</b>	<b>0.21%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.39%</b>	<b>1.12%</b>	<b>0.39%</b>	<b>0.00%</b>	<b>0.56%</b>	<b>0.00%</b>	
4	Percentage connections with good voice quality (=>95%)																				
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	95.72%	99.67%	98.65%	100%	99.04%	100%
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.85%	99.91%	98.31%	80.60%	96.96%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.29%	99.94%	97.60%	98.78%	98.47%	100%
		<b>Overall SSA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>96.52%</b>	<b>99.84%</b>	<b>98.13%</b>	<b>91.43%</b>	<b>98.35%</b>	<b>100%</b>

**AUDIT & ASSESSMENT OF QOS FOR QE-SEPTEMBER 2015-DELHI METRO CIRCLE**

SIN	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
	(b) 0-5 ( with frequency hopping for GSM Operators)	Major Roads	91.57%	96.75%	95.97%	99.83%	92.42%	96.96%	89.67%	96.68%	91.78%	90.00%	94.34%	99.72%	NA	NA	NA	NA	NA	NA	NA
		Highways	90.37%	93.59%	94.96%	98.59%	89.34%	98.72%	90.14%	99.00%	88.61%	99.08%	92.48%	99.61%	NA	NA	NA	NA	NA	NA	NA
		Within City	93.24%	99.07%	95.69%	99.75%	90.39%	99.86%	91.76%	96.28%	92.08%	99.60%	93.43%	99.56%	NA	NA	NA	NA	NA	NA	NA
		Overall SSA	92.04%	97.08%	95.64%	99.51%	90.78%	98.54%	90.81%	97.27%	91.21%	96.06%	93.46%	99.63%	NA	NA	NA	NA	NA	NA	NA
<b>Service Coverage</b>																					
5	In door (>= -75dBm)	Major Roads	95.47%	99.74%	84.93%	100%	67.05%	89.80%	75.85%	99.25%	85.64%	99.41%	92.20%	100%	83.73%	100%	97.22%	100%	93.06%	100%	
		Highways	89.11%	87.35%	75.34%	100%	57.76%	99.60%	72.25%	93.36%	71.59%	100%	88.95%	100%	77.38%	100%	90.19%	100%	76.26%	100%	
		Within City	91.17%	98.48%	98.52%	100%	69.51%	38.60%	72.93%	77.58%	77.84%	92.94%	89.64%	98.75%	78.19%	98.18%	81.77%	100%	90.16%	100%	
		Overall SSA	91.91%	96.34%	85.60%	100%	66.47%	76.29%	73.65%	89.71%	78.54%	97.32%	90.16%	99.60%	79.61%	99.39%	88.26%	100%	88.27%	100%	
	In-vehicle (>= -85dBm)	Major Roads	98.62%	100%	94.62%	100%	94.36%	100%	97.77%	100%	98.39%	99.96%	97.96%	100%	99.32%	100%	99.93%	100%	99.57%	100%	
		Highways	98.45%	100%	91.59%	100%	90.25%	99.70%	95.73%	99.93%	93.07%	100%	97.87%	100%	96.92%	100%	98.57%	100%	96.60%	100%	
		Within City	97.91%	100%	99.39%	100%	92.32%	89.20%	94.27%	99.17%	96.31%	99.97%	97.35%	99.69%	95.90%	100%	97.98%	100%	98.88%	100%	
		Overall SSA	98.26%	100%	94.95%	100%	92.55%	96.35%	95.60%	99.68%	96.14%	99.98%	97.67%	99.90%	97.17%	100%	98.68%	100%	98.64%	100%	
	Outdoor- in city (>= -95dBm)	Major Roads	99.66%	100%	99.57%	100%	99.43%	100%	99.94%	100%	100%	100%	99.28%	100%	100%	100%	100%	100%	100%	100%	
		Highways	99.52%	100%	99.39%	100%	98.58%	99.90%	99.76%	100%	100%	100%	99.03%	100%	100%	100%	100%	100%	100%	100%	
		Within City	99.23%	100%	99.72%	100%	99.29%	99.90%	99.19%	100%	100%	100%	98.99%	99.87%	99.89%	100%	100%	100%	100%	100%	
		Overall SSA	99.43%	100%	99.56%	100%	99.19%	99.93%	99.53%	100%	100%	100%	99.08%	99.96%	99.95%	100%	100%	100%	100%	100%	
6	Call Setup Success Rate (>=95%)	Major Roads	99.39%	100%	98.59%	100%	95.38%	100%	100%	100%	99.24%	96.88%	97.26%	100%	98.75%	96.67%	100%	100%	100%	100%	
		Highways	96.92%	100%	98.28%	96.77%	92.66%	93.55%	99.06%	100%	94.69%	100%	98.41%	100%	100%	100%	100%	100%	99.08%	100%	
		Within City	97.36%	100%	99.54%	100%	88.76%	100%	100%	100%	98.36%	96.97%	97.45%	100%	100%	100%	100%	100%	99.23%	100%	
		Overall SSA	97.89%	100%	98.95%	98.90%	91.35%	97.01%	99.80%	100%	97.75%	97.89%	97.63%	100%	99.62%	98.89%	100%	100%	99.44%	100%	

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
7	Hand Over Success Rate (HOSR)	Major Roads	98.48%	100%	98.66%	100%	82.96%	100%	100%	100%	97.23%	96.30%	100%	100%	99.96%	100%	100%	100%	100%	100%	100%
		Highways	99.48%	100%	98.80%	100%	84.78%	14.81%	97.75%	100%	95.44%	100%	99.67%	100%	99.96%	100%	100%	100%	100%	100%	100%
		Within City	98.93%	100%	96.73%	100%	85.63%	100%	99.80%	100%	95.92%	100%	98.89%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	98.96%	100%	97.83%	100%	84.65%	81.30%	99.40%	100%	96.23%	96.30%	99.39%	100%	99.98%	100%	100%	100%	100%	100%	100%

NA-Not Applicable

The service providers having block call rate more than 3% have been shaded in yellow colour.

7.3 OPERATOR ASSISTED DRIVE TEST: SOUTH DELHI (MUNICIPAL AREA) - SEPTEMBER 15

DRIVE TEST TABLE: 3

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA		
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	
1	Call Attempts	Major Roads	207	30	210	30	203	30	207	30	173	30	168	30	244	31	216	30	243	35	
		Highways	12	30	14	32	14	33	16	30	17	31	13	30	14	30	14	30	14	31	
		Within City	292	31	267	30	280	31	283	30	271	32	314	31	301	30	297	30	339	30	
		<b>Overall SSA</b>	<b>511</b>	<b>91</b>	<b>491</b>	<b>92</b>	<b>497</b>	<b>94</b>	<b>506</b>	<b>90</b>	<b>461</b>	<b>93</b>	<b>495</b>	<b>91</b>	<b>559</b>	<b>91</b>	<b>527</b>	<b>90</b>	<b>596</b>	<b>96</b>	
2	Blocked Call Rate	Major Roads	0.97%	0.00%	2.86%	0.00%	8.87%	3.33%	1.93%	0.00%	4.05%	0.00%	0.60%	0.00%	0.41%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highways	8.33%	0.00%	7.14%	0.00%	7.14%	0.00%	0.00%	3.33%	11.76%	3.23%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	1.50%	0.00%	11.42%	0.00%	1.06%	0.00%	2.21%	6.25%	0.96%	0.00%	1.00%	3.33%	0.00%	0.00%	0.00%	0.00%	
		<b>Overall SSA</b>	<b>0.59%</b>	<b>0.00%</b>	<b>2.24%</b>	<b>0.00%</b>	<b>10.28%</b>	<b>1.06%</b>	<b>1.38%</b>	<b>1.11%</b>	<b>3.25%</b>	<b>3.23%</b>	<b>0.81%</b>	<b>0.00%</b>	<b>0.72%</b>	<b>1.10%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	
3	Dropped Call Rate (<=2%)	Major Roads	0.00%	0.00%	0.00%	0.00%	16.48%	0.00%	2.60%	0.00%	0.60%	0.00%	0.61%	0.00%	0.82%	0.00%	0.46%	0.00%	0.00%	0.00%	
		Highways	0.00%	0.00%	0.00%	0.00%	25.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.69%	0.00%	0.38%	0.00%	15.85%	0.00%	1.81%	0.00%	1.89%	0.00%	0.00%	0.00%	0.67%	0.00%	0.67%	0.00%	0.00%	0.00%	
		<b>Overall SSA</b>	<b>0.40%</b>	<b>0.00%</b>	<b>0.21%</b>	<b>0.00%</b>	<b>16.36%</b>	<b>0.00%</b>	<b>2.06%</b>	<b>0.00%</b>	<b>1.35%</b>	<b>0.00%</b>	<b>0.20%</b>	<b>0.00%</b>	<b>0.72%</b>	<b>0.00%</b>	<b>0.57%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	
4	Percentage connections with good voice quality (=>95%)																				
	(a) 0-4 (w/o frequency hopping for CDMA Operators)	Major Roads	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.82%	99.94%	97.04%	100%	95.60%	99.99%
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	93.30%	100%	97.55%	100%	99.24%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.68%	100%	96.43%	99.14%	96.81%	98.72%
		<b>Overall SSA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>98.16%</b>	<b>99.98%</b>	<b>96.70%</b>	<b>99.64%</b>	<b>96.41%</b>	<b>99.60%</b>

AUDIT & ASSESSMENT OF QOS FOR QE-SEPTEMBER 2015-DELHI METRO CIRCLE



SIN	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			(b) 0-5 ( with frequency hopping for GSM Operators)	Major Roads	93.02%	97.92%	95.79%	99.65%	<b>90.99%</b>	97.91%	<b>87.23%</b>	97.07%	<b>90.50%</b>	99.51%	<b>94.60%</b>	99.26%	NA	NA	NA	NA
Highways	90.17%	98.44%		96.78%	95.26%	<b>93.66%</b>	99.65%	<b>90.26%</b>	98.86%	<b>89.21%</b>	99.62%	<b>88.73%</b>	99.61%	NA	NA	NA	NA	NA	NA	NA
Within City	91.46%	97.71%		95.44%	96.52%	<b>91.07%</b>	99.30%	<b>89.71%</b>	99.46%	<b>91.29%</b>	99.65%	<b>93.69%</b>	98.73%	NA	NA	NA	NA	NA	NA	NA
Overall SSA	<b>92.08%</b>	<b>98.05%</b>		<b>95.64%</b>	<b>97.13%</b>	<b>91.10%</b>	<b>98.98%</b>	<b>88.76%</b>	<b>98.43%</b>	<b>90.93%</b>	<b>99.59%</b>	<b>93.94%</b>	<b>99.20%</b>	NA	NA	NA	NA	NA	NA	NA
<b>Service Coverage</b>																				
5	In door (>= -75dBm)	Major Roads	90.85%	95.92%	96.52%	100%	42.81%	70.86%	53.68%	24.55%	72.27%	100%	84.71%	99.83%	86.84%	0.48%	81.02%	100%	85.09%	78.37%
		Highways	91.84%	95.61%	98.15%	100%	36.55%	54.55%	25.83%	94.48%	91.07%	99.71%	79.50%	99.97%	92.02%	99.58%	86.12%	89.88%	97.02%	100%
		Within City	83.53%	93.91%	97.05%	99.27%	48.10%	81.93%	49.53%	99.70%	73.56%	97.09%	80.32%	100%	83.75%	10.00%	85.48%	100%	93.04%	90.88%
		Overall SSA	<b>86.76%</b>	<b>95.16%</b>	<b>96.87%</b>	<b>99.94%</b>	<b>45.62%</b>	<b>68.74%</b>	<b>49.62%</b>	<b>72.88%</b>	<b>73.57%</b>	<b>98.49%</b>	<b>81.72%</b>	<b>99.93%</b>	<b>85.31%</b>	<b>37.01%</b>	<b>83.76%</b>	<b>96.71%</b>	<b>90.00%</b>	<b>89.36%</b>
	In-vehicle (>= -85dBm)	Major Roads	97.64%	100%	99.07%	100%	85.43%	99.40%	84.90%	96.21%	92.53%	100%	95.95%	100%	97.62%	100%	98.89%	100%	97.01%	100%
		Highways	98.16%	99.96%	99.25%	100%	84.14%	95.88%	81.03%	100%	98.38%	100%	94.84%	100%	100%	100%	99.38%	100%	100%	100%
		Within City	97.32%	99.85%	99.19%	99.29%	87.89%	98.69%	84.93%	100%	94.42%	99.95%	95.78%	100%	99.58%	100%	99.28%	100%	99.72%	100%
		Overall SSA	<b>97.47%</b>	<b>99.94%</b>	<b>99.14%</b>	<b>99.94%</b>	<b>86.77%</b>	<b>97.94%</b>	<b>84.71%</b>	<b>98.73%</b>	<b>93.82%</b>	<b>99.97%</b>	<b>95.81%</b>	<b>100%</b>	<b>98.75%</b>	<b>100%</b>	<b>99.13%</b>	<b>100%</b>	<b>98.66%</b>	<b>100%</b>
	Outdoor- in city (>= -95dBm)	Major Roads	99.29%	100%	99.64%	100%	98.49%	100%	97.91%	99.83%	100%	100%	98.69%	100%	100%	100%	100%	100%	99.85%	100%
		Highways	99.46%	100%	99.63%	100%	98.94%	100%	98.51%	100%	100%	100%	98.42%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.32%	100%	99.70%	100%	98.28%	100%	98.35%	100%	100%	100%	99.06%	100%	100%	100%	100%	100%	99.98%	100%
		Overall SSA	<b>99.31%</b>	<b>100%</b>	<b>99.68%</b>	<b>100%</b>	<b>98.38%</b>	<b>100%</b>	<b>98.21%</b>	<b>99.94%</b>	<b>100%</b>	<b>100%</b>	<b>98.93%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>99.93%</b>	<b>100%</b>
6	Call Setup Success Rate (>=95%)	Major Roads	98.55%	100%	97.14%	100%	<b>93.60%</b>	96.67%	<b>92.75%</b>	100%	95.95%	100%	98.21%	100%	99.59%	100%	100%	100%	100%	100%
		Highways	<b>91.67%</b>	100%	<b>92.86%</b>	100%	<b>85.71%</b>	100%	100%	96.67%	<b>88.24%</b>	96.77%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.66%	96.77%	98.50%	100%	<b>88.21%</b>	100%	97.88%	100%	97.79%	<b>93.75%</b>	98.73%	100%	99.00%	96.67%	100%	100%	100%	100%

SIN	Parameter	Classification of routes covered	AIRCEL		AIRTEL		MTNL		IDEA		RCOM GSM		VODAFONE		MTS		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			Overall SSA	99.02%	98.90%	97.76%	100%	90.34%	98.94%	95.85%	98.89%	96.75%	96.77%	98.59%	100%	99.28%	98.90%	100%	100%	100%
7	Hand Over Success Rate (HOSR)	Major Roads	99.65%	100%	97.32%	100%	75.69%	100%	94.79%	100%	96.27%	100%	99.28%	100%	100%	100%	100%	100%	100%	100%
		Highways	100%	100%	100%	100%	76.19%	100%	100%	100%	94.87%	100%	95.24%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.23%	100%	98.31%	100%	72.83%	51.28%	97.67%	100%	96.71%	100%	98.22%	100%	99.98%	100%	100%	100%	100%	100%
		Overall SSA	99.42%	100%	98.01%	100%	74.12%	51.78%	96.59%	100%	96.48%	100%	98.50%	100%	99.99%	100%	100%	100%	100%	100%

NA-Not Applicable

The service providers having block call rate more than 3% have been shaded in yellow colour

7.4 DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS:

DRIVE TEST TABLE: 4

DRIVE TEST ROUTE OF JULY TO SEPTEMBER 15 – DELHI METRO CIRCLE

Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered
Faridabad and Gurgaon	July'15	Faridabad/ 118 Km	<p>Within City:- Bata Chowk -&gt; Sec-11 -&gt; Sihi Village -&gt; HUDA Market Sec-9 -&gt; HUDA Market Sec-15 -&gt;Old Faridabad Market -&gt;Sec-29 HUDA Market -&gt;Sec-32 -&gt; Sec-35.</p> <p>Major Route:- Faridabad Bypass Road -&gt; Chandrawali -&gt; NHPC Chowk -&gt; Sihi Village (Balabhgarh)-&gt; HUDA Market Sec-9 -&gt; Sec-15 -&gt;Old Faridabad Market -&gt; Sec-28 -&gt; Sec-32 -&gt; Green Field Colony -&gt; Manav Rachna International University -&gt; Bhadkal Road -&gt; Ghomchi Mod -&gt; India Chowk -&gt; Bata Chowk.</p> <p>High Way:- Mohan Estate -&gt; Badarpur -&gt; Faridabad Sec-32 -&gt; Daultabad Village -&gt;Neelam Chawk -&gt;Bata Chowk -&gt; Escorts -&gt; Ballabhgarh Mandi -&gt;Jhar Santhil.</p>	Gurgaon/ 110 Km	<p>Within City:- Sikandarpur Metro Station -&gt; MG Road Metro Station -&gt; Qutub Enclave -&gt; Golf Course Road -&gt; Hamilton Estate -&gt; Chakkar Pur Village -&gt; Genpact -&gt; DLF Phase -V -&gt; South City -I -&gt; Sec-31 -&gt;Sec- 40 -&gt; Jhansa Village -&gt; Sec-45 -&gt; Wazirabad -&gt; Suncity Sec- 54 -&gt; DLF PH- V -&gt; Sushant Lok PH- II.</p> <p>Major Route:- Cyber City -&gt; Sikandar Pur -&gt; Sec- 27 -&gt; Sec- 43 -&gt; Sec- 55 -&gt; Sec- 56 -&gt; Tigra Village -&gt;Shamashpur -&gt; Sec-46 -&gt;Tikri Village -&gt; Salempur Village -&gt; Rajeev Chawk.</p> <p>High Way:- Rajeev Chawk -&gt; NH8 -&gt; Manesar -&gt; Hero Honda Chawk -&gt; IFFCO Chawk -&gt; Atlas Chawk -&gt; Ambiance Mall.</p>	Gurgaon/ 105 Km	<p>Within City:- Palam Vihar ( Dharma Colony )-&gt; Ansal Plaza -&gt; Sec-23 -&gt; Sec-22 -&gt; Udyog Vihar Ph-V, IV &amp; II -&gt; Kapashera Bordar.</p> <p>Major Route:- Gurgaon Sec-9 -&gt; Sec-4 -&gt; Sec-5 -&gt; Sec-7 -&gt; Basai-Patodi Road -&gt; Sec-6 -&gt;Sec-5 -&gt;Railway Road -&gt; Rajendra Park -&gt; New Palam Vihar -&gt; Choma Village -&gt; Brijwasan -&gt; Kapashera Road -&gt; Dundahera Village -&gt; Sec-21/22 -&gt; Shetla Mata Mandir Road -&gt; Palam Vihar.</p> <p>High Way:- Vasant Kunj -&gt; Sultanpur Metro Station -&gt; Ghitorni Metro Station -&gt; Arjungarh Metro Station -&gt; Guru Dronacharya Metro Station -&gt; Sikandarpur Metro Station -&gt; IFFCO Chowk -&gt; Gohra Chowk -&gt; Sec-17 -&gt; Bus Stand Old Gurgaon -&gt; Sec-10A -&gt; Kadipur -&gt; Patodi Road -&gt; Basai Road -&gt; Sec-9.</p>
			<p>Within City:- Delhi Gate -&gt; Ghantaghar -&gt; Nehru housing -&gt; Maliwada -&gt; Raj Nagar -&gt; Kavi Nagar -&gt; Loha Mandi -&gt;Delhi Gate -&gt; Kaushambi -&gt; Sec-IV -&gt; Vaishali -&gt; Indrapuram.</p>		<p>Within City:- Sec-15 Metro Station Noida -&gt; Sec-1 -&gt; Sec-6 -&gt; Sec-5 -&gt; Sec-11 -&gt; Sec-10 -&gt; Sec-9 -&gt; Sec-19 -&gt; Sec-18 -&gt; Sec-16 -&gt; Sec-26 -&gt; Sec-25 -&gt; Chada Shahadat Pur -&gt; Sec-55 -&gt; Sec-58 ( Mamura ) -&gt; Sec-63 -&gt; Sec-66 -&gt; Sec-71 -&gt; Sec-73 -&gt; Sec-50 -&gt;</p>		<p>Within City:- Pari Chowk -&gt; Phi-II -&gt; Radisson Elli -&gt; Eco Tech-I -&gt; D-14 Greater Noida Phase-II -&gt; Victory World School ( Swarn Nagri ) -&gt; Alpha-II -&gt; Beta-I -&gt; Gamma-II.</p> <p>Major Route:- Pari Chawk -&gt; Ansal</p>



**DRIVE TEST ROUTE OF JULY TO SEPTEMBER 15 – DELHI METRO CIRCLE**

Name of SSA	Drive test Period	Day 1		Day 2		Day 3	
		Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered	Name of SDCA Covered	Route Covered
			<p>Major Route:- Dilshad Garden -&gt; Apsara Boarder -&gt; Chikampur -&gt; Prakash Industrial Area -&gt; OM Nagar -&gt; Mohan Nagar -&gt; Main Market Sahibabad -&gt; Industrial Area Sahibabad -&gt; Delhi Gate.</p> <p>High Way:- Delhi Gate -&gt; Hapur Road -&gt; NH24.</p>		<p>Noida City Center Metro Station.</p> <p>Major Route:- Noida Sec-15 Metro Station -&gt; Sec-2 -&gt; Sec-4 -&gt; Sec-12 -&gt; Sec-22 -&gt; Sec-25 -&gt; Sec-26 -&gt; Sec-26 -&gt; Sec-29 -&gt; Sec-37 -&gt; Sec-18 -&gt; Sec-19 -&gt; Sec-16 -&gt; Sec-15.</p> <p>High Way:- Noida City Center Metro Station -&gt; Sec-51 -&gt; Sec-52 -&gt; Sec-61 -&gt; Mamura Mandi -&gt; Mamura Chawk -&gt; Fortis Hospital -&gt; NH-24 -&gt; Sec-62 -&gt; Sec-58 -&gt; Shopprix Mall -&gt; Gijhor Village -&gt; Sec-34 -&gt; Golf Course Metro Station.</p>		<p>Plaza Mall -&gt; Ishaan Institute Of Management -&gt; Suraj Pur -&gt; Crown Plaza -&gt; Housing Complex -&gt; NEPZ Noida -&gt; Bhangel -&gt; Sec -93 -&gt; ADM Complex Sec -49 -&gt; Sec-41 -&gt; Sec-37 -&gt; Botonical Garden Metro Station.</p> <p>High Way:- Sec-15 Noida -&gt; Sec-16 -&gt; Sec-18 -&gt; Sec-37 -&gt; Sec-44 -&gt; Amity University -&gt; Housing Complex Ph-II -&gt; Panchsheel Balak Inter College -&gt; Stellar-135 -&gt; Metlife -&gt; Sec-138 -&gt; Sec-145 -&gt; Kaundli Village -&gt; Sec-148A-Safipur Village -&gt; Pari Chowk.</p>
<b>SDMC</b>	Sep'15	SDMC/112	<p>Govindpuri, Chirag Delhi, Khanpur, Tigri Colony, Gurudwara, Batra Hospital, Tuglakabad Fort, C-Lal Chowk, Kalkaji, Masjid Mod, BRT, PGDAV Collage, Ashram, Prahladpur, Majidia Hospital, NFC, Sukhdev Vihar, Harkesh Nagar, Apollo, Mohan Estate, Badarpur, DDA Kalkaji Janta Flats, Tuglabad Ext., Okhla Ph-2, Govindpuri, Modi Mill, East Of Kailash, Garhi Village, Lajpat Nagar Mod, Andrews Ganj, Ayurvigyan Nagar, Gargi Collage, Nehru Place, GK-2, Alaknanda Apartment, Crown Plaza, Okhla PH-1, Tekhan Village, Govindpuri Metro.</p>	SDMC/103	<p>Govindpuri, Chirag Delhi, Khanpur, Tigri Colony, Gurudwara, Batra Hospital, Tuglakabad Fort, C-Lal Chowk, Kalkaji, Masjid Mod, BRT, PGDAV Collage, Ashram, Prahladpur, Majidia Hospital, NFC, Sukhdev Vihar, Harkesh Nagar, Apollo, Mohan Estate, Badarpur, DDA Kalkaji Janta Flats, Tuglabad Ext., Okhla Ph-2, Govindpuri, Modi Mill, East Of Kailash, Garhi Village, Lajpat Nagar Mod, Andrews Ganj, Ayurvigyan Nagar, Gargi Collage, Nehru Place, GK-2, Alaknanda Apartment, Crown Plaza, Okhla PH-1, Tekhan Village, Govindpuri Metro.</p>	SDMC/102	<p>Jasola Apollo, Jasola Village, Kalindi Kunj, Sahin Bagh, Abul Fazal Enclave, Jamia Nagar, Jamia Collage, Bharat Nagar (Nfc), C_D_A_B Block Nfc, Ashram, Bhogal, Hazrat Nizamuddin, Moolchand, Adchini Village, Chattarpur, Satbari Village, Chatarpur Pahadi, Lado Sarai, Maidan Garhi, Saket G Block, Pusho Vihar, District Court Complex, Malviya Nagar, B_C_A Block Malviya Nagar, Khidji Ext., Khirki Village, Geetanjali, Begumpur, Khel Gaon Hauzkhass, Niti Bagh, Kotla Mubarkpur, Defence Colony, Govindpuri.</p>

**7.5 SSA WISE DRIVE TEST OBSERVATION:**

**DRIVE TEST TABLE: 5**

**DRIVE TEST OBSERVATION OF GURGAON / FARIDABAD – JULY 15**

S. NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	Faridabad	Poor Rx Level and Rx Quality Near Sec-14. Poor Rx Quality Near Pali Faridabad Road, Mathura Road (Near Springfield Colony), Ashok Enclave, at Ballabhgarh and Sonabad.	Gurgaon	Poor Rx Quality Near Rajiv Chawk, Tula Ram Chawk.	Gurgaon	Poor Rx Quality Near Sikanderpur.
2	AIRTEL		Poor Rx Quality Near Surajkund Road Near Greenfield Colony, NHPC, Sec-16,17.		Poor Rx Level and Rx Quality Near Sushant Lok, NH-8 Near Ambience Mall, Nirvana.		Poor Rx Quality Near Kapashera, Sheetla Mata Mandir.
3	MTNL		Poor Rx Level and Rx Quality Near Dabua Colony, Sec-21, Balabhgarh.Rx Quality Near Sarai Chowk, Sec-17, Khilosain.		Poor Rx Quality Observed in Most of Covered Area.		Poor Rx Level and Rx Quality Near Sec-4, and Poor Rx Quality in Most of Covered Area.
4	TATA CDMA		Poor Rx Level and Rx Quality Near pali Road, Samaypur Ballabhgarh Road.		Poor Rx Quality Shushant Lok PH-2 Gurgaon to Tigra Road.		Poor Rx Quality Near Inayatpur Ols Delhi Gurgaon Road.
5	IDEA		Poor Rx Level and Rx Quality Near Faridabad Sec-29, Pali Chowk, Sec-21, Sec-30, Charm Wood Village.		Poor Rx Level and Rx Quality Near Sec-29, Sankar Chowk, Sushant Lok, Manesar Toll.		Poor Rx Level and Rx Quality Near Kapashera, Gurgaon Sec-19, Sec-23, Sikandarpur, Sec-93, Sec-17, Sec-13.
6	RCOM GSM		Poor Rx Level and Rx Quality Near Green Field Colony, Sec-9, Uncha Gaon, Pali, Aggarsen Chowk.		Poor Rx Level and Rx Quality Near Phase-2 sec-18, DLF PH-1 E Block, Phase-4, South City-1, Sec-45, Sushant Lok, Sec-45, Sec-53, Khandsa Village.		Poor Rx Level and Rx Quality Near Kapashera, Phase-2 Sec-18, Laxman Vihar Phase-2, Rajiv Nagar, Sec-10 A.
7	RCOM CDMA		Poor Rx Level and Rx Quality Near Ballabhgarh, Sainik Colony, Sec-21.		Poor Rx Level and Rx Quality Near Sec-56, Sec-48, Narvana.		Poor Rx Quality Near Palam Vihar-2, Kapashera, Sec-9.
8	MTS		Poor Rx Quality Patches Observed Near Sec-21.		Overall Good Coverage and Quality on Day-2.		Poor Rx Level and Rx Quality Near Sikanderpur.
9	VODAFONE		Poor Rx Level and Rx Quality Near Sec-29, Ballabhgarh, Escort Group Plant.		Poor rx Level and Rx Quality Near Sec-27, Sushantlok Ph-1, Rajnagar NH-8, Sec-47.		Poor Rx Level and Rx Quality Near Arlangarh, Rampura, Basal Village.

**DRIVE TEST TABLE: 6**

**DRIVE TEST OBSERVATION OF NOIDA & GHAZIABAD (AUGUST-15)**

S. NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	Ghaziabad	Poor Rx Level and Rx Quality Near Oberio, Shastri Nagar, Indergadhi Gaziabad and Shipra Suncity. Poor Rx Quality Near Bonjha, Buledsher Road, Vashundra.	Noida	Poor Rx Level and Rx Quality Near Mamura Village, Sec-35 Noida. Poor Rx Quality Near Sec-27.	Greater Noida	Poor Rx Level and Rx Quality Near AWHO G. Noida. Poor Rx Quality Near Sharda Hospital Micro and Knowledge Park G.Noida.
2	AIRTEL		Poor Rx Level and Rx Quality Near Sahibabad Industrial Area, Vaishali. Poor Rx Quality Near Indrapuram.		Poor Rx Level and Rx Quality Near Noida Sec-23. Poor Rx Quality Near Sec-20 Noida.		Poor Rx Level and Rx Quality Near Gamma-1.
3	MTNL		Poor Rx Level and Rx Quality Near Lathmaar Colony, Sahibabad, Shipra Suncity, Gazipur Village, Bulendsher Road.		Poor Rx level and Rx Quality Near Noida Sec-63, Rajat Vihar. Poor Rx Quality Observed in Most of the Covered Area.		Poor Rx Level and Rx Quality Near Noida Expressway, Sec-137, AWHO G. Noida. Poor Rx Quality in G. Noida Area.
4	TATA CDMA		Poor FER Near Shipra Sun City, Maliwara, GT Road.		Poor FER at Chijrasi Village Sec-63 Road,		Poo FER Near Sec-37 Noida.
5	IDEA		Poor Rx Level and Rx Quality Near Kavi Nagar, Police Line.		Poor Rx Quality Near Rajat Vihar, Sec-63.		Poor Rx Quality Near Gamma-1 G. Noida.
6	RCOM GSM		Poor Rx Level and Rx Quality Near Delhi Hapur Bypass Road, Shipra Suncity, Vaishali Sec-5. Poor Rx Quality Near Jhandapur, Makanpur.		Poor Rx Quality Near Chowra, Prem Vihar Khora Colony, Noida Sec-60, Sec-50, Sec-51, Sec-9, Challera Bhangar.		Poor Rx Level and Rx Quality Observed in most of the area of G. Noida.
7	RCOM CDMA		Overall Good Rx Level and Rx Quality on Day-1.		Poor Rx Level and Rx Quality Near Sec-50 and Sec-63 and Sec-64.		Poor Rx Quality in most of the Area of Alpha, Betta and Gamma Sector G. Noida.
8	MTS		Poor Rx Quality Near Mohan Nagar, Indrapuram NH-24, Dilshad Colony.		Poor Rx Quality Near Sec-63 and Sec-15.		Poor Rx Quality Near Gamma Sector Main Road, Suraipur Village Main Road, Knowledge Park G. Noida, Noida PH-2.
9	VODAFONE		Poor Rx Level and Rx Quality Near Ahinsa Khand Indrapuram, Budh Vihar NH-24.		Poor Rx Quality Patches observed in most of the Area of Covered SDCA's.		Poor Rx Level and Rx Quality In Gamma and Betta Sector.

DRIVE TEST TABLE: 7

**DRIVE TEST OBSERVATION OF SOUTH DELHI (MUNICIPAL AREA) – SEPTEMBER 15**

S. NO	Name of SP	SDCA Covered in Day 1	Day 1 Observation	SDCA Covered in Day 2	Day 2 Observation	SDCA Covered in Day 3	Day 3 Observation
1	AIRCEL	SDMC	Poor Rx Level and Rx Quality Near Nangal Raya, Hayat Hotel, RK Puram.	SDMC	Poor Rx Level and Rx Quality Near Sanwal Nagar, Govindpuri Metro, East of Kailash, Tuglakabad.	SDMC	Poor Rx Quality Near Tuglakabad.
2	AIRTEL		Poor Rx Level and Rx Quality Near Arju Nagar.		Poor Rx Level and Rx Quality Near Okhle PH-1, Alaknanda. Poor Rx Quality Near C.R Park, Greater Kailash, Mandakini Enclave.		Poor Rx Level and Rx Quality Near Lado Sarai, Saket.
3	MTNL		Poor Rx Level and Rx Quality Near Sadar Bazar Delhi Cantt, Hauz Khas, Munrika. Poor Rx Quality Observed in Most of the Area of Covered SDCA's.		Poor Rx Level and Rx Quality Near Tuglakabad, Kalkaji, Sadiq Nagar. Poor Rx Quality Near Nehru Place, Azad Camp, Anandlok.		Poor Rx Level and Rx Quality Near Satberi, Apollo Hospital, Okhla Vihar, Abufazal Enc.Poor Rx Quality Near Adhchini Village, Sirifourt.
4	TATA CDMA		Poor Rx Level and Rx Quality Dada Satram Mamtani Marg Janakpuri, Cariappa Marg Cantt, Dhaula Kuan To Sanjay Vihar NH-8 Cantt.		Poor Rx Quality Near Sapna Park Kalka Devi Marg, TUM Road Okhla Ph-2.		Poor Rx Quality Near Kalindikunj Jasola.
5	IDEA		Poor Rx Level and Rx Quality Near Army Collage, Shekawati Cinema (Arjun Nagar). Poor Rx Quality Near Venkateshwar College, Deer Park.		Poor Rx Level and Rx Quality Near Ph-3 Industrial Area, Tuglakabad Road, Anand Lok, Lady Sri ram College, Deshbandhu College. Poor Rx Quality Near Kalkaji Temple, CR Park.		Poor Rx Level and Rx Quality Near Jasola Vihar, Chattarpur Temple. Poor Rx Quality Near Ashram Chowk, Qutub Minar.
6	RCOM GSM		Poor Rx Level and Rx Quality Near Delhi Cantt., Vasant Kunj. Poor Rx Quality Near Janak Cinema, Vasant Vihar, JNU.		Poor Rx Level and Rx Quality Near GK-2 M Block, Kalkaji D-Block, Lal Kuan. Poor Rx Quality Near Okhla PH-2, CR Park, Okhla Ph-2, Rajaram Marg Ambedkar Nagar.		Poor Rx Level and Rx Quality Near Lajpat Nagar, Abul Fazal Enclave 2, Jasola Vihar, C Block Kalkaji, Chattarpur.
7	RCOM CDMA		Poor Rx Level and Rx Quality Near Nangal Rai.		Poor Rx Level and Rx Quality Near Tuglakabad Ext., GK2.		Overall Good Coverage and Quality in Covered SDCA's.
8	MTS		Poor Rx Level and Rx Quality Near Munirika Outer Ber Sarai. Poor Rx Quality Near Gopinath Bazar, Delhi Cantt.		Poor Rx Level and Rx Quality Near sarita Vihar.		Overall Good Coverage and Quality in Covered SDCA's.
9	VODAFONE		Poor Rx Level and Rx Quality Near Hari Nagar, Delhi Cantt Area, Arjun Nagar, Qutub ISTN Area, Lado Sarai, South Moti Bagh, Safdarjaung Enclave.		Poor Rx level and Rx quality Near Lajpat Nagar, Okhla pH-3, Ph-1, Sant Nagar, Lal Kuan Tuglakabad.		Poor Rx Level and Rx Quality Near Defence Colony, Shivalik Malviyanagar, Abul Fazal Enclave.

## 7.6 KEY FINDINGS ON DRIVE TEST:

The drive tests conducted across different routes of **Delhi/NCR** region such as **Gurgaon / Faridabad (Municipal area), Noida / Ghaziabad and South Delhi (Municipal Area)** given above in table-4, during three months of the quarter ended September, 2015, revealed that the performance of some of the service providers was not satisfactory as they remained non-complaints for different parameters in different areas of Delhi/NCR. The **overall non-compliance of the service providers on SSA level** with respect to the different parameters is summarized as follows:

### July -2015: Gurgaon / Faridabad (Municipal area),

1. **MTNL:** Call Drop Rate: **7.05%** (outdoor), Voice Quality: **91.93%** (outdoor) / **90.92%** (Indoor),
2. **Aircel, Idea, RCOM (GSM):** Remained under performed for parameter **Voice Quality** with their performance as **93.48%** (outdoor), **92.46%** (outdoor), **92.72%** (outdoor) respectively.
3. **RCOM(GSM):** Call setup success rate: **90.93%**, Blocked Call rate: **9.07%**

### August-2015: Noida / Ghaziabad Area

1. **MTNL:** Call Drop Rate: **4.63%** (outdoor), Voice Quality: **90.78%** (outdoor), Call Setup success rate (CSSR): **91.35%** (outdoor) and Blocked call rate: **4.63%** (outdoor).
2. **Aircel, Idea, RCOM (GSM), Vodafone and RCOM (CDMA) :** Remained under performed for parameter **Voice Quality** with their performance as **92.04%** (outdoor), **90.81%** (outdoor) and **91.21%** (outdoor), **93.46%** and **91.43 %** (Indoor) respectively

### September-2015: South Delhi (Municipal Area)

1. **MTNL:** Call drop rate: **16.36%** (outdoor), Voice Quality: **91.10%** (outdoor), CSSR: **90.34%** (outdoor) and Blocked Call rate: **10.28%** (outdoor)
2. **Aircel, Idea, RCOM (GSM) & Vodafone:** Remained under performed for parameter **Voice Quality** with their performance as **92.08%** (outdoor), **88.76%** (outdoor), **90.93%** and **93.94%** (outdoor) respectively.
3. **RCOM (GSM):** Blocked Call rate: **3.25% (outdoor) / 3.23% (indoor).**
4. **Idea:** CDR: **2.06% (outdoor)**

The deficiencies with respect to adequate coverage and voice quality, encountered during the drive tests for different Service providers at various places as shown in the drive tests plots, are detailed in the above drive test table.-5, 6 & 7.

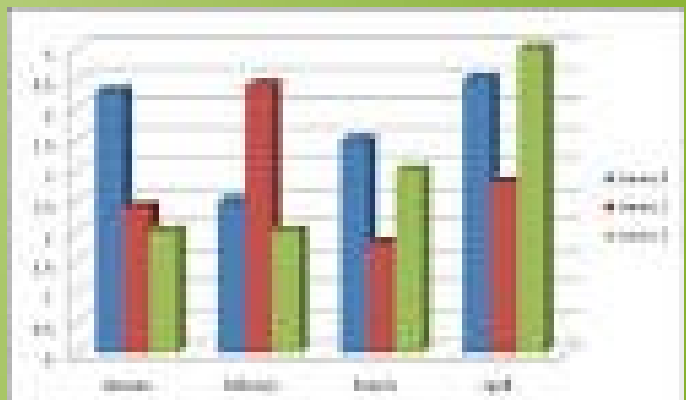
*From the above, it was concluded that the performance of the service providers with respect to the parameter 'Voice Quality' remained main area of concern as majority of operators namely Aircel, Idea, RCOM(GSM), RCOM(CDMA), Vodafone and MTNL failed to comply with its bench mark. Apart from Voice Quality, MTNL also remained non-compliant in respect of other parameters also like Call Drop rate, Call setup success rate and Blocked Call rate and RCOM (GSM) could not do well in respect of the parameter CSSR / Blocked Call Rate in different areas of Delhi Service. These operators need to take corrective action to improve their networks.*

## GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

### AVERAGED QUARTERLY PMR

V/S

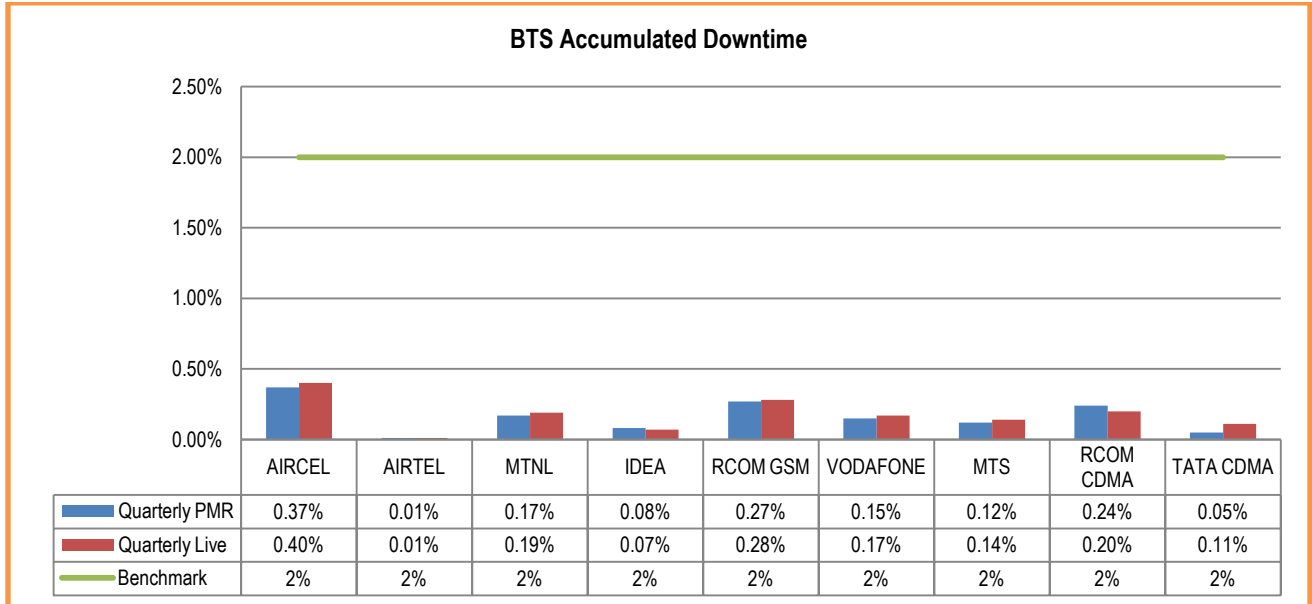
### AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



**8) GRAPHICAL REPRESENTATION:**

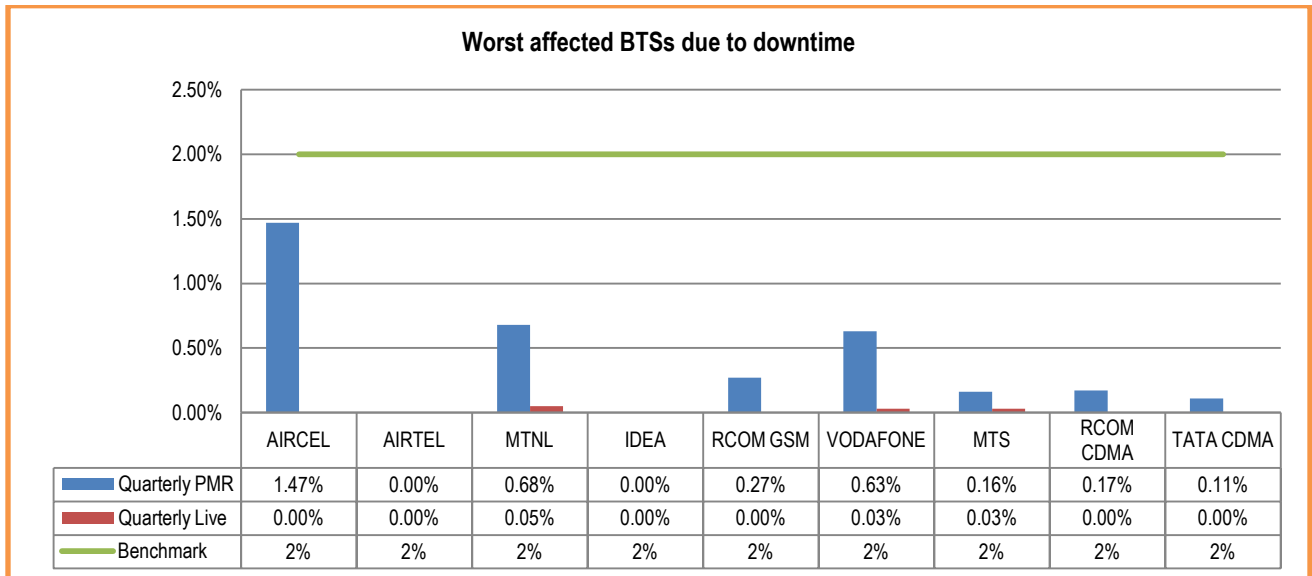
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

**1. BTS ACCUMULATED DOWNTIME :**



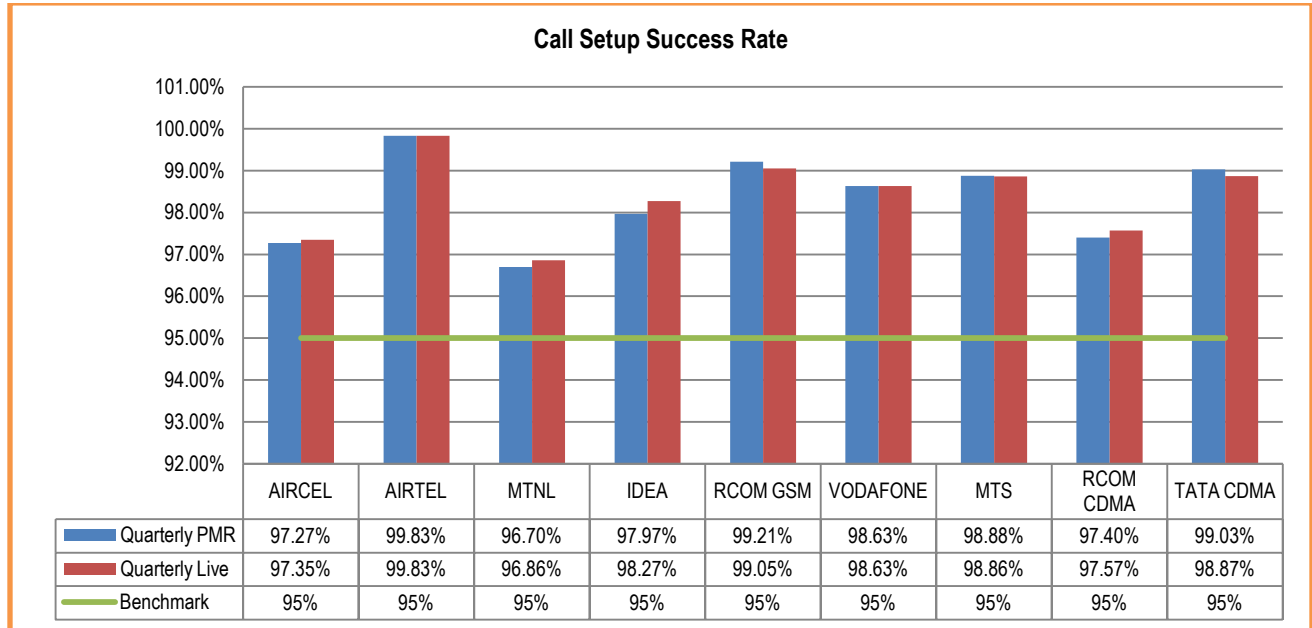
All operators are meeting the benchmarks.

**2. WORST AFFECTED BTSs DUE TO DOWNTIME :**



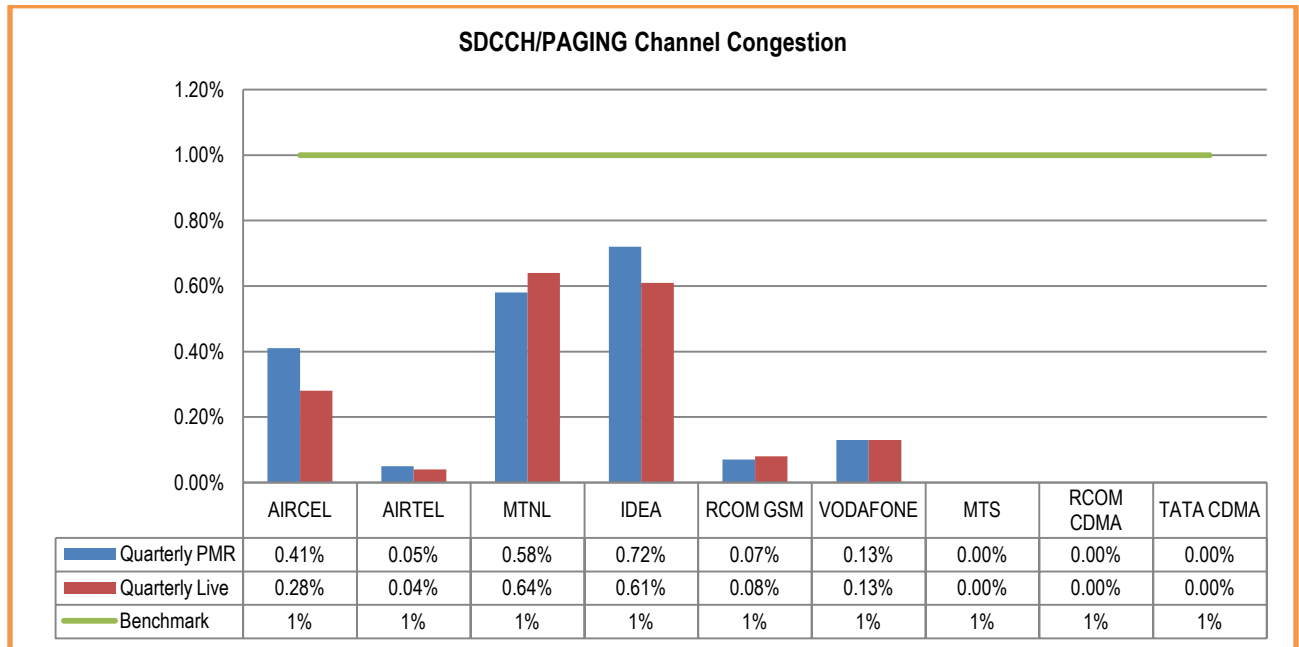
All operators are meeting the benchmarks.

**3. CALL SETUP SUCCESS RATE :**



All operators are meeting the benchmarks.

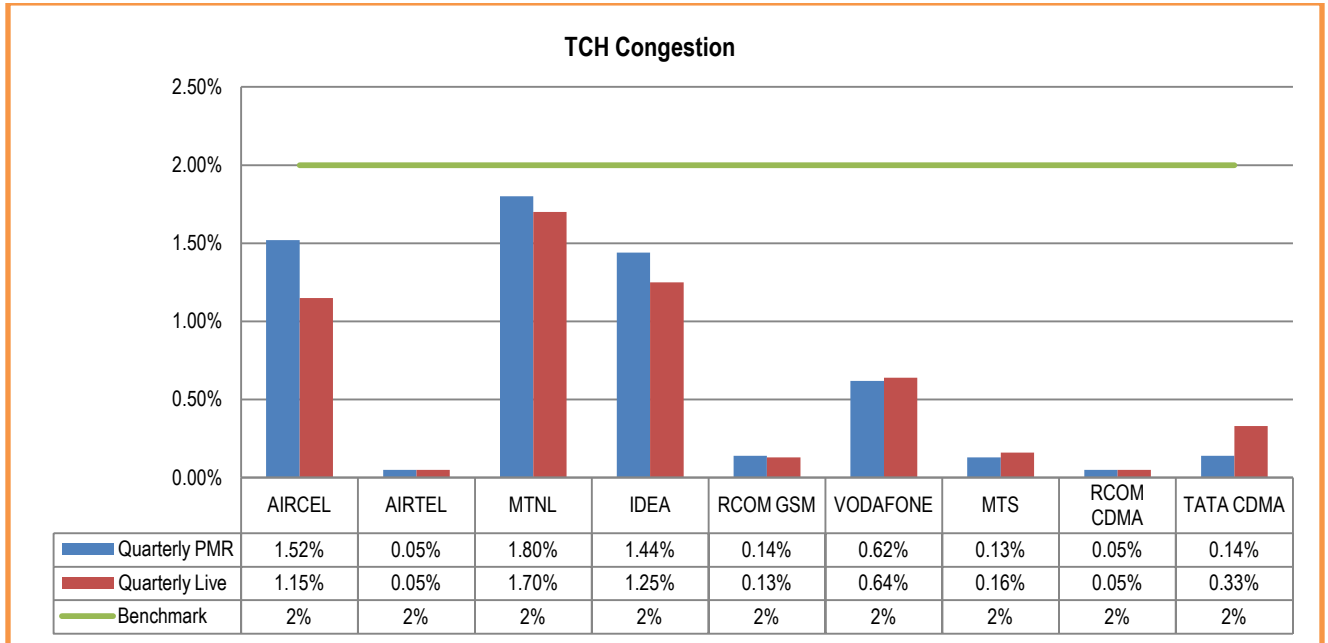
**4. SDCCH/PAGING CHANNEL CONGESTION :**



All operators are meeting the benchmarks.

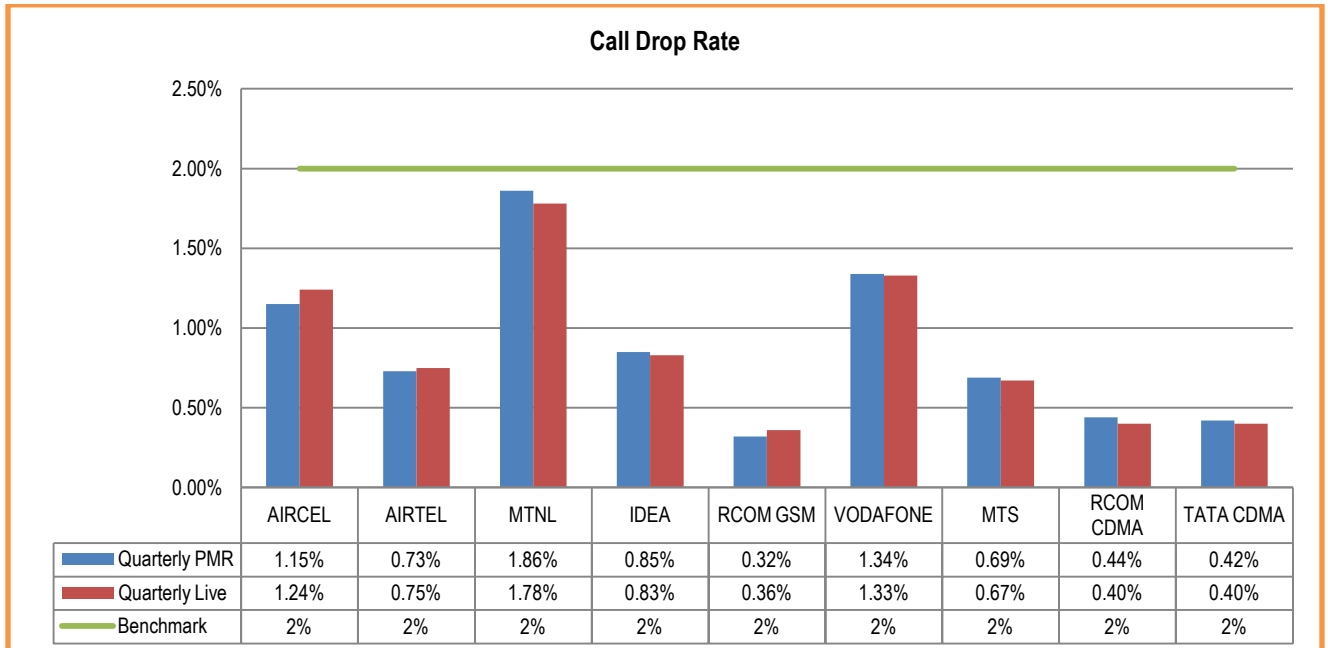


**5. TCH CONGESTION :**



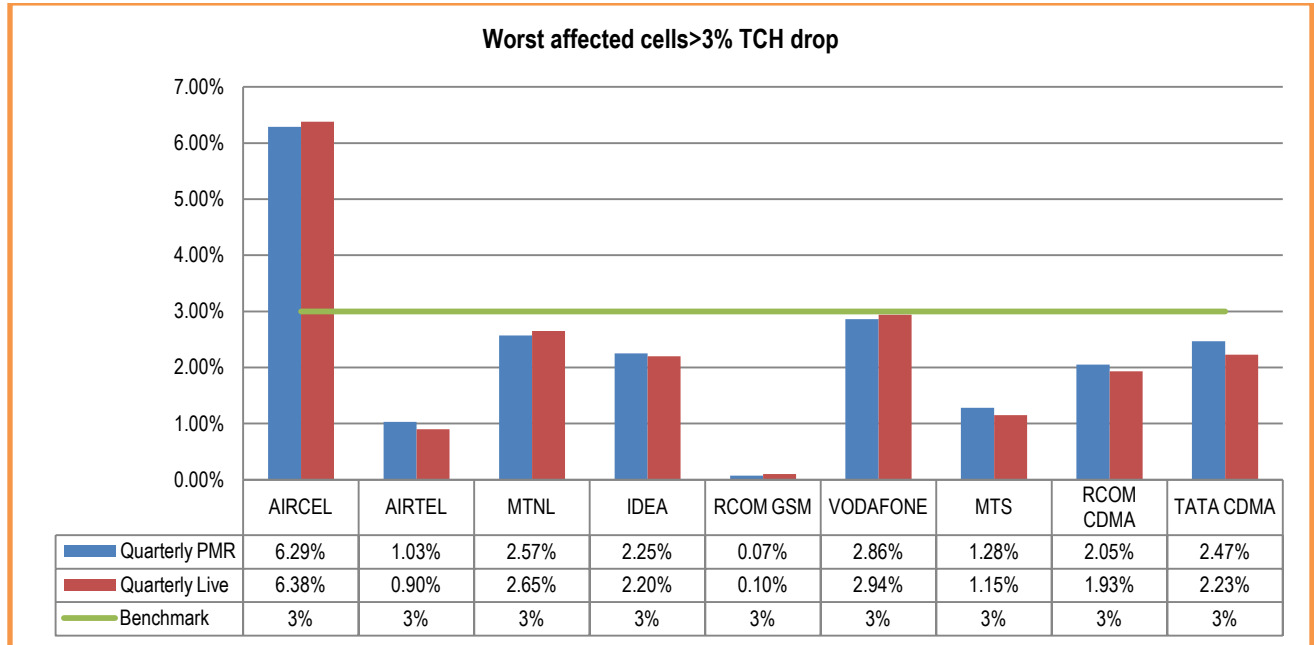
All operators are meeting the benchmarks.

**6. CALL DROP RATE :**



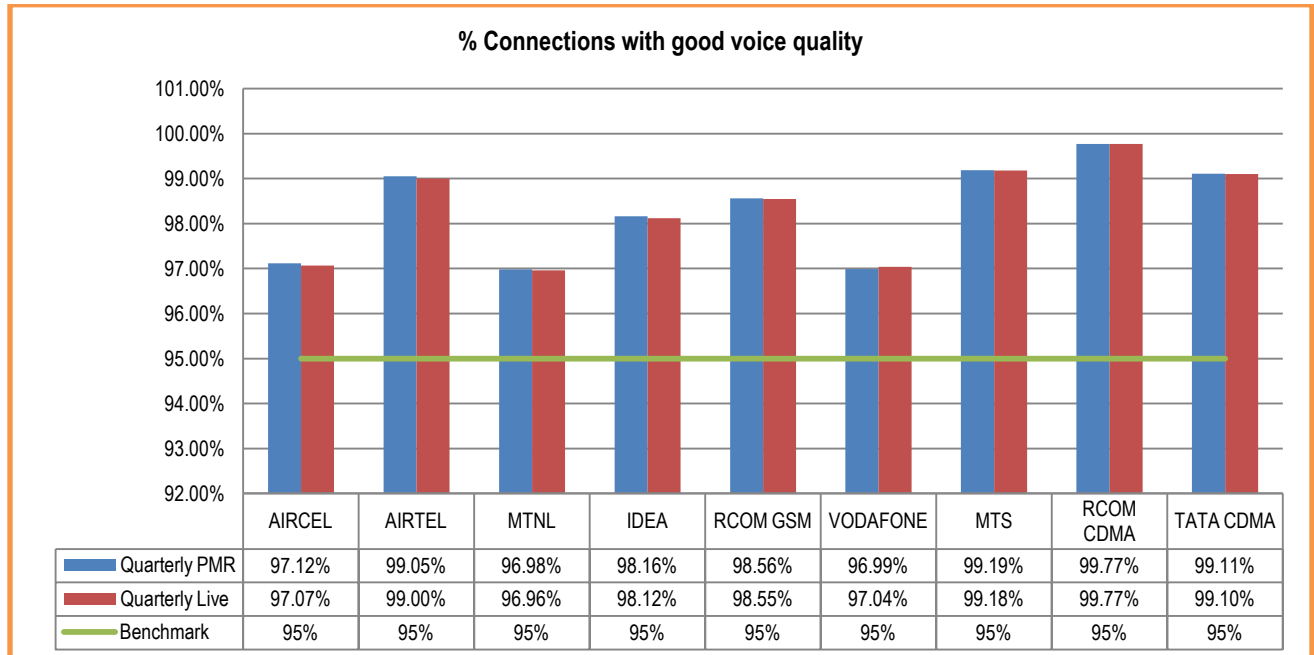
All operators are meeting the benchmarks.

**7. WORST AFFECTED CELLS>3% TCH DROP :**



All operators are meeting the benchmarks except Aircel.

**8. PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY :**



All operators are meeting the benchmarks.

**9) PMR VERIFICATION TABLE:**

**(i) NETWORK RELATED PARAMETERS:**

Name of Service Provider	Parameter	BTS Accumulated Downtime	Worst affected BTSs due to downtime	CSSR (Call Setup Success Rate)	SDCCH/PAGING Channel congestion	TCH congestion	CDR (Call Drop Rate)	Worst affected cells>3% TCH drop (Call drop) rate	Connections with good voice quality	No. of POI's having >=0.5% POI congestion
<b>Benchmark</b>		≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%	≤ 0.5%
AIRCEL	Reported	0.37	1.47	97.27	0.41	1.52	1.15	6.29	97.12	0
	Verified	0.37%	1.47%	97.27%	0.41%	1.52%	1.15%	6.29%	97.12%	0
AIRTEL	Reported	0.01	0.00	99.83	0.05	0.06	0.73	0.99	99.05	0
	Verified	0.01%	0.00%	99.83%	0.05%	0.05%	0.73%	1.03%	99.05%	0
MTNL	Reported	0.17	0.68	96.70	0.58	1.73	1.86	2.57	96.98	0
	Verified	0.17%	0.68%	96.70%	0.58%	1.80%	1.86%	2.57%	96.98%	0
IDEA	Reported	0.08	0.00	97.97	0.72	1.45	0.85	2.25	98.16	0
	Verified	0.08%	0.00%	97.97%	0.72%	1.44%	0.85%	2.25%	98.16%	0
RCOM GSM	Reported	0.23	0.18	99.21	0.07	0.13	0.32	0.07	98.56	0
	Verified	0.27%	0.27%	99.21%	0.07%	0.14%	0.32%	0.07%	98.56%	0
VODAFONE	Reported	0.16	0.68	98.63	0.13	0.63	1.34	2.86	96.99	0
	Verified	0.15%	0.63%	98.63%	0.13%	0.62%	1.34%	2.86%	96.99%	0
MTS	Reported	0.12	0.16	98.88	0.00	0.13	0.69	1.29	99.19	0
	Verified	0.12%	0.16%	98.88%	0.00%	0.13%	0.69%	1.28%	99.19%	0
RCOM CDMA	Reported	0.22	0.17	97.40	0.00	0.05	0.44	2.02	99.77	0
	Verified	0.24%	0.17%	97.40%	0.00%	0.05%	0.44%	2.05%	99.77%	0
TATA CDMA	Reported	0.05	0.11	99.03	0.00	0.14	0.42	2.47	99.11	0
	Verified	0.05%	0.11%	99.03%	0.00%	0.14%	0.42%	2.47%	99.11%	0

- The above data is averaged for three months of the quarter ending September-2015.
- The PMR data provided by the service providers is largely matching with verified (audited) data. However the variation in data has been indicated by yellow colour.
- Aircel has not met the benchmark for the parameter “Worst affected cells>3% TCH drop”.

(ii) CUSTOMER SERVICE DELIVERY (CSD) RELATED PARAMETER:

Name of Service Provider	Parameter	Metering and billing credibility - post paid	Metering and billing credibility - pre paid	Resolution of billing /charging complaints	Resolution of billing /charging complaints	Period of applying credit/ waiver/ adjustment to customer's account from the date of resolution of complaints	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 90 seconds	%age requests for Termination / Closure of service	Time taken for refund of deposits after closures
<b>Benchmark</b>		<= 0.1%	<= 0.1%	98% within 4 weeks	100% within 6 weeks	within 1 week of resolution of complaint	>=95%	≥ 95%	100% within <=7days	100% within 60 days
AIRCEL	Reported	0.01	0.00	100.00	100.00	100.00	91.40	95.18	99.71	100.00
	Verified	0.01%	0.00%	100.00%	100.00%	100.00%	91.40%	95.18%	99.71%	100.00%
AIRTEL	Reported	0.02	0.00	100.00	100.00	100.00	100.00	88.85	100.00	100.00
	Verified	0.02%	0.00%	100.00%	100.00%	100.00%	100.00%	88.85%	100.00%	100.00%
MTNL	Reported	0.05	0.02	100.00	100.00	100.00	95.01	99.86	100.00	100.00
	Verified	0.06%	0.02%	100.00%	100.00%	100.00%	89.31%	93.26%	100.00%	100.00%
IDEA	Reported	0.07	0.07	99.94	100.00	100.00	99.08	99.49	99.99	99.96
	Verified	0.07%	0.07%	99.93%	100.00%	100.00%	99.08%	99.49%	100.00%	99.96%
RCOM (GSM)	Reported	0.09	0.09	100.00	100.00	100.00	98.61	98.96	100.00	99.77
	Verified	0.09%	0.09%	100.00%	100.00%	100.00%	98.53%	98.96%	100.00%	99.77%
VODAFONE	Reported	0.00	0.00	100.00	100.00	99.99	100.00	98.21	100.00	100.00
	Verified	0.13%	0.08%	100.00%	100.00%	100.00%	100.00%	98.21%	100.00%	100.00%
MTS	Reported	0.00	0.00	100.00	100.00	100.00	97.02	98.62	100.00	100.00
	Verified	0.00%	0.01%	100.00%	100.00%	100.00%	97.64%	95.39%	100.00%	100.00%
RCOM (CDMA)	Reported	0.09	0.03	100.00	100.00	100.00	98.08	98.21	100.00	99.06
	Verified	0.09%	0.03%	100.00%	100.00%	100.00%	98.08%	98.21%	100.00%	99.06%
TATA (CDMA)	Reported	0.00	0.00	100.00	100.00	100.00	99.24	96.77	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	100.00%	99.24%	96.77%	100.00%	100.00%

- The above data is average for three months of the quarter ending September-2015.
- The PMR data provided by the service providers is largely matching with verified (audited) data. However the variation in data has been indicated by yellow colour.
- Aircel has not met the benchmark for the parameters “%age requests for Termination / Closure of service”.
- Aircel and MTNL have not met the benchmark for the parameter “Accessibility of call centre/ customer care”.
- Airtel and MTNL have not met the benchmark for the parameter “% call answered by operators (voice to voice) within 90 sec”.
- Vodafone has not met the benchmark for the parameter “Metering and billing credibility - post paid”.
- Idea, RCOM GSM and RCOM CDMA have not met the benchmark for the parameter “Time taken for refund of deposits after closures”.