



**Audit & Assessment of Quality of Service  
Of  
Cellular Mobile Telephone Service  
For  
Telecom Regulatory Authority of India  
North Zone – Himachal Pradesh Service Area  
(July 2015 – September 2015)**

**Prepared by:-  
TÜV SÜD SOUTH ASIA PVT. LTD,  
C-153/1, Okhla Industrial Estate,  
Phase-1, New Delhi – 110020  
Telephone 011- 30889611  
Fax: 011-30889595**

## 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 **Himachal Pradesh 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 (wire line) and Broadband service, a circle would be audited once in a year.

## **2. OBJECTIVES AND METHODOLOGY**





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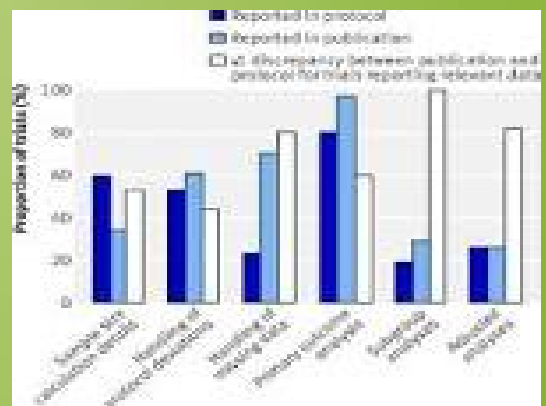
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

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 Himachal Pradesh circle

Sl. No.	Name of Service Provider	Dates of live measurement Audit			Audit Location/Address
		GSM Operators	July-15	August-15	
1	AIRCEL	6 to 8 Jul-15	5 to 7 Aug-15	14 to 16 Sep-15	3rd Floor Keothal Complex Khalini Shimla.
2	AIRTEL	22 to 24 Jul-15	21, 24 & 25 Aug-15	8 to 10 Sep-15	Bharti Airtel Campus, Plot No 21, Rajiv Gandhi Information and Technology Park, Chandigarh, 160101
3	BSNL	29 to 31 Jul-15	5 to 7 Aug-15	14 to 16 Sep-15	BSNL Shimla
4	IDEA	14 to 16 Jul-15	13, 14 & 17 Aug-15	9 to 11 Sep-15	Idea Cellular Limited, Phase -7 Industrial Area, Mohali
5	RCOM GSM	ND*	24 to 26 Aug-15	10, 11 & 14 Sep-15	Reliance Communications Ltd., Phase-8, Industrial Area, Mohali
6	TATA GSM	6 to 8 Jul-15	6 to 8 Aug-15	14 to 16 Sep-15	Tata Teleservices Ltd Charu sood Building Chota Shimla, Kasumpti
7	VODAFONE	20 to 22 Jul-15	5 to 7 Aug-15	14 to 16 Sep-15	130 durga cottage SDA complex Kasumpti Shimla
<b>CDMA Operators</b>					
8	RCOM CDMA	22 to 24 Jul-15	24 to 26 Aug-15	10, 11 & 14 Sep-15	Reliance Communications Ltd., Phase-8, Industrial Area, Mohali
9	TATA CDMA	6 to 8 Jul-15	6 to 8 Aug-15	14 to 16 Sep-15	Tata Teleservices Ltd Charu sood Building Chota Shimla, Kasumpti

\*ND: Not done: Data not provided by RCOM (GSM) due to TTI sever issue .

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 HP Circle in the quarter ended September- 2015, as the same has already been done during QE March 2015.**

### 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 HP Circle in the quarter ended September- 2015, as the same has already been done during QE March 2015.**

## **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:**

### (1) Cellular Mobile

(i) From monthly PMR audit it was concluded that performance of BSNL, Aircel, Tata GSM and Tata CDMA in the Himachal Pradesh service area was not satisfactory for some of the Network related Parameters. The audit with respect to the parameter **‘Worst affected cell> 3% TCH Drop’** revealed that quarterly average performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** was **16.09%, 4.89%, 9.02% and 3.57%** respectively. The performance of Aircel and Tata (GSM) was way beyond the benchmark. In fact, Tata (GSM) is having only five sites with 15 cells which are resulting in poor performance, remaining network are on ICR with other service provider. Apart from this, **BSNL** also failed to meet the benchmarks of the parameters **BTS accumulated Down Time, Worst affected BTS due to down time and CDR** with its performance score of **3.21%, 7.96% and 2.26%** respectively.

(ii) The three days live assessment, revealed that the performance of all operators (except **BSNL, Aircel, Tata GSM and Tata CDMA**) was within the benchmarks for all the three months of the quarter. **BSNL** failed to meet the benchmarks of the parameters **BTS accumulated Down Time, SDCCH congestion , TCH congestion and Worst affected cells** , whereas **Aircel, Tata (GSM) and Tata (CDMA)** could not meet the benchmark of the parameter

**Worst affected cells > 3 % TCH drops**. The average performance of **BSNL** for parameters **BTS accumulated down Time, SDCCH congestion, TCH congestion and Worst affected cells** was **2.04 %**, **2.78%**, **4.11%** and **3.89%** respectively. Further, in respect of parameter '**Worst affected cells > 3 % TCH drops**', average performance of **Aircel, Tata (GSM)** and **Tata (CDMA)** was **16.24%**, **14.81%** and **3.21%** respectively. The performance of **Aircel and Tata (GSM)** was way beyond the benchmark of <3%.

Similar non-compliance of **BSNL, Aircel, Tata (GSM)** and **Tata (CDMA)** was also observed during monthly audit.

(iii) With regard to the **Customer Service Quality Parameters**, 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  $\leq 0.1$  %. Only **Vodafone** failed to meet the benchmark for **Pre-paid** with its performance level as **0.16%**.

All service providers are in compliance with respect to the parameter accessibility of call center. However, **BSNL and RCOM (GSM)** have not met the benchmark of '**calls answered by Operators (voice to voice) within 90 seconds**' with their achieved performance as **75.75%** and **93.27%** respectively. The performance of BSNL was way below the benchmark of >95%.

The results for three days live measurements reveal that all operators have met the benchmark for the parameter '**Call connection to operators (Voice to voice) within 90 seconds**' except **BSNL** have not met the benchmark with its performance as **52.17%** against the benchmark of  $\geq 95\%$ . The performance of BSNL is way below the benchmark in live testing also.

(iv) From the analysis of drive test results, it was concluded that **BSNL and Tata (GSM)** remained under performed with respect to the parameters **Voice Quality**. BSNL also could not meet the benchmark **CDR** in Mandi SSA. The defaulting Service providers need to take corrective actions to improve the voice quality in 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	BSNL	September -15	20:00 - 21:00
4	IDEA	September -15	20:00 - 21:00
5	VODAFONE	September -15	20:00 - 21:00
6	RCOM GSM	September -15	20:00 - 21:00
7	TATA GSM	September -15	20:00 - 21:00
<b>CDMA Operators</b>			
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 Himachal Pradesh 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	1	8	735	Ericsson	Ericsson
2	AIRTEL	6	17	1498	Ericsson	Ericsson
3	BSNL	5	18	1223	Ericsson	Ericsson, NSN & ZTE
4	VODAFONE	1	9	835	NSN	NSN
5	IDEA	2	7	1109	Ericsson	Ericsson
6	RCOM GSM	2	12	752	Huawei & Ericsson	ZTE
7	TATA GSM	1	1	5	NSN	NSN
<b>CDMA Operators</b>						
8	RCOM CDMA	1	NA	287	Lucent	Lucent
9	TATA CDMA	1	1	130	Ericsson	ZTE

5.1.3 QOS PERFORMANCE OF MONTHLY PMR – JULY 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE - JULY 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	0.27%	0.09%	<b>3.98%</b>	0.04%	0.09%	0.29%	0.00%	0.08%	0.04%
	b) Worst affected BTSs due to downtime	<=2%	Jul-15	1.37%	0.13%	<b>12.58%</b>	0.00%	0.00%	0.13%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Jul-15	99.35%	98.52%	96.24%	99.90%	98.90%	98.71%	98.87%	99.02%	97.69%
	b) SDCCH/PAGING Channel congestion	<=1%	Jul-15	0.14%	0.39%	0.95%	0.02%	0.16%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Jul-15	0.42%	0.29%	1.83%	0.10%	0.46%	0.06%	0.00%	0.00%	0.08%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Jul-15	1.73%	0.72%	<b>2.94%</b>	0.71%	1.36%	0.60%	1.35%	0.11%	0.25%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jul-15	<b>16.41%</b>	2.20%	<b>5.92%</b>	2.63%	2.03%	0.02%	<b>14.84%</b>	0.44%	<b>3.46%</b>
	c) Connections with good voice quality	>=95%	Jul-15	95.05%	98.55%	NP	97.58%	96.01%	98.04%	98.08%	99.75%	98.10%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Jul-15	0	0	0	0	0	0	0	0	0

NP- Not Provided: BSNL having no direct counter to provide the data for the parameter "Connections with good voice quality", hence they have not provided data for this parameter.

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

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE – AUGUST 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	0.25%	0.09%	<b>3.64%</b>	0.03%	0.11%	0.17%	0.00%	0.16%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Aug-15	1.23%	0.13%	<b>9.33%</b>	0.00%	0.00%	0.80%	0.00%	0.35%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Aug-15	98.73%	98.55%	98.26%	99.83%	98.39%	98.67%	99.27%	98.95%	98.39%
	b) SDCCH/PAGING Channel congestion	<=1%	Aug-15	0.07%	0.20%	0.92%	0.07%	0.21%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Aug-15	1.04%	0.48%	1.74%	0.17%	0.89%	0.07%	0.00%	0.00%	0.03%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Aug-15	1.79%	0.69%	1.95%	0.83%	1.48%	0.60%	1.13%	0.10%	0.23%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Aug-15	<b>16.59%</b>	2.04%	<b>5.91%</b>	2.69%	2.13%	0.02%	<b>6.45%</b>	0.46%	<b>3.68%</b>
	c) Connections with good voice quality	>=95%	Aug-15	95.04%	98.48%	NP	97.39%	95.93%	98.04%	97.67%	99.75%	98.14%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Aug-15	0	0	0	0	0	0	0	0	0

NP- Not Provided: BSNL having no direct counter to provide the data for the parameter "Connections with good voice quality", hence they have not provided data for this parameter.

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

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE – SEPTEMBER 15 MONTH												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	0.29%	0.09%	2.02%	0.01%	0.12%	0.11%	0.00%	0.17%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Sep-15	1.22%	0.13%	1.96%	0.00%	0.00%	0.40%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95 %	Sep-15	98.22%	97.82%	98.10%	99.82%	98.36%	98.70%	99.43%	98.99%	99.06%
	b) SDCCH/PAGING Channel congestion	<=1%	Sep-15	0.09%	0.21%	0.85%	0.19%	0.12%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-15	1.58%	0.53%	1.90%	0.18%	0.93%	0.07%	0.00%	0.01%	0.03%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Sep-15	1.50%	0.65%	1.88%	0.68%	1.61%	0.60%	0.65%	0.09%	0.20%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Sep-15	15.27%	1.64%	2.84%	2.90%	2.24%	0.04%	5.78%	0.40%	3.56%
	c) Connections with good voice quality	>=95 %	Sep-15	95.25%	98.48%	NP	97.49%	96.01%	98.10%	98.96%	99.76%	98.14%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Sep-15	0	0	0	0	0	0	0	0	0

NP- Not Provided: BSNL having no direct counter to provide the data for the parameter "Connections with good voice quality", hence they have not provided data for this parameter.

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

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE-SEPT-15) OF HIMACHAL PRADESH CIRCLE												
PMR Generation Data		Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	RCOM CDMA	TATA CDMA
S/N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Network Service Quality Parameter</b>												
1	<b>Network Availability</b>											
	a) BTS Accumulated Downtime	<=2%	Quarterly	0.27%	0.09%	3.21%	0.03%	0.11%	0.19%	0.00%	0.14%	0.02%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	1.27%	0.13%	7.96%	0.00%	0.00%	0.44%	0.00%	0.12%	0.00%
2	<b>Connection Establishment (Accessibility)</b>											
	a) CSSR (Call Setup Success Rate)	>=95 %	Quarterly	98.77%	98.30%	97.53%	99.85%	98.55%	98.69%	99.19%	98.99%	98.38%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.10%	0.27%	0.91%	0.09%	0.16%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	1.01%	0.43%	1.82%	0.15%	0.76%	0.07%	0.00%	0.00%	0.05%
3	<b>Connection maintenance (Retainability)</b>											
	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.67%	0.69%	2.26%	0.74%	1.48%	0.60%	1.04%	0.10%	0.23%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	16.09%	1.96%	4.89%	2.74%	2.13%	0.03%	9.02%	0.43%	3.57%
	c) Connections with good voice quality	>=95 %	Quarterly	95.11%	98.50%	NP	97.49%	95.98%	98.06%	98.24%	99.75%	98.13%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Quarterly	0	0	0	0	0	0	0	0	0

NP- Not Provided: BSNL having no direct counter to provide the data for the parameter "Connections with good voice quality", hence they have not provided data for this parameter.

### 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 circle.

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 Himachal Pradesh circle, **all the operators (except BSNL) were found meeting benchmarks** of the above parameters 'BTS accumulated downtime' and 'worst affected BTSs due to down time' in all the three months of the quarter. Only **BSNL** failed to meet the benchmarks by achieving the score of **3.21% and 7.96%** for the above BTS related parameters.

- **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 the operators were found to be calculating the parameter as per the TRAI's specified norms.

**All the operators were found meeting the benchmark on 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 the congestion parameters.** There was no congestion on individual POI links between a service provider vis-à-vis other service providers.

- **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 except BSNL were found to have met the TRAI specified benchmark of <=2%. BSNL could achieve its score as 2.26%. The lowest call drop rate (average 0.10 %) was for RCOM (CDMA) 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 with respect to this parameter revealed that **Aircel, BSNL, Tata GSM and Tata CDMA** failed to meet the benchmark for this parameter in all the three months of the quarter. The performance of **Aircel, BSNL, Tata (GSM) and Tata (CDMA)** on an average was **16.09%, 4.89%, 9.02% and 3.57%** respectively. The performance of **Aircel and Tata (GSM)** was way beyond the benchmark. In fact, Tata (GSM) is having only five sites with 15 cells which are resulting in poor performance, remaining network are on ICR with other service provider.

- (iii) Connections with good voice quality:

The audit results for this parameter indicates that **all operators have met the benchmark during the quarter.** BSNL has not provided the data for this parameter as they are not able to fetch the system generated data.

**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 HIMACHAL PRADESH CIRCLE – JULY 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	0.29%	0.05%	1.82%	0.02%	0.12%	**NP	0.00%	0.09%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.08%	0.00%	0.00%	**NP	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.62%	98.83%	98.03%	99.94%	99.01%	**NP	98.69%	99.01%	98.11%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.12%	0.11%	1.43%	0.00%	0.19%	**NP	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.15%	0.22%	1.97%	0.06%	0.34%	**NP	0.00%	0.00%	0.05%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.61%	0.72%	2.67%	0.70%	1.44%	**NP	1.10%	0.13%	0.20%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	15.18%	1.80%	2.93%	2.73%	2.08%	**NP	13.33%	0.66%	3.08%
	c) Connections with good voice quality	>=95%	Live data	95.10%	98.54%	NP	97.59%	96.03%	**NP	98.13%	99.75%	98.15%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	**NP	0	0	0

NP- Not Provided: BSNL having no direct counter to provide the data for the parameter "Connections with good voice quality", hence they have not provided data for this parameter.

\*\*NP: Data not provided by RCOM (GSM) due to TTI sever issue in the month of July 2015

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

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE- AUGUST 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	0.25%	0.10%	2.42%	0.05%	0.07%	0.20%	0.00%	0.20%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.33%	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	99.13%	98.48%	95.12%	99.91%	98.60%	98.61%	98.98%	98.99%	98.91%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.13%	0.29%	4.58%	0.02%	0.12%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.65%	0.47%	4.88%	0.09%	0.72%	0.06%	0.00%	0.00%	0.02%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.27%	0.64%	0.57%	0.80%	1.47%	0.59%	1.54%	0.09%	0.24%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	17.52%	2.14%	5.84%	2.80%	2.09%	0.00%	20.00%	0.35%	3.40%
	c) Connections with good voice quality	>=95%	Live data	95.00%	98.47%	NP	97.53%	95.89%	98.04%	97.75%	99.76%	98.19%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0

NP- Not Provided: BSNL having no direct counter to provide the data for the parameter “Connections with good voice quality”, hence they have not provided data for this parameter.

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

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE- SEPTEMBER 15 MONTH												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	0.23%	0.10%	1.89%	0.01%	0.18%	0.14%	0.00%	0.16%	0.00%
	b) Worst affected BTSs due to downtime	<=2 %	Live data	0.00%	0.00%	0.16%	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	99.13%	97.73%	94.52%	99.88%	98.51%	98.73%	100%	99.08%	99.20%
	b) SDCCH/PAGING Channel congestion	<=1 %	Live data	0.10%	0.07%	2.33%	0.01%	0.08%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2 %	Live data	0.67%	0.61%	5.48%	0.12%	0.78%	0.08%	0.00%	0.00%	0.01%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2 %	Live data	1.51%	0.61%	0.75%	0.68%	1.61%	0.57%	0.97%	0.07%	0.16%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3 %	Live data	16.03%	1.38%	2.89%	2.89%	2.14%	0.09%	11.11%	0.35%	3.16%
	c) Connections with good voice quality	>=95%	Live data	95.23%	98.49%	NP	97.59%	95.78%	98.08%	98.51%	99.76%	98.16%
4	No. of POI having >=0.5% congestion		Live data	0	0	0	0	0	0	0	0	0

\*NP- Not Provided: BSNL having no direct counter to provide the data for the parameter "Connections with good voice quality", hence they have not provided data for this parameter.

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

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE – SEPT 15) – HP CIRCLE												
Live measurement Data		Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	0.26%	0.08%	2.04%	0.03%	0.12%	0.17%	0.00%	0.15%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.19%	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%	Quarterly	99.29%	98.35%	95.89%	99.91%	98.71%	98.67%	99.49%	99.03%	98.74%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.12%	0.16%	2.78%	0.01%	0.13%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.49%	0.43%	4.11%	0.09%	0.61%	0.07%	0.00%	0.00%	0.03%
<b>Connection maintenance (Retainability)</b>												
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.46%	0.66%	1.33%	0.73%	1.51%	0.58%	1.20%	0.10%	0.20%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	16.24%	1.77%	3.89%	2.81%	2.10%	0.05%	14.81%	0.45%	3.21%
	c) Connections with good voice quality	>=95%	Quarterly	95.11%	98.50%	NP	97.57%	95.90%	98.06%	98.13%	99.76%	98.17%
4	No. of POI having >=0.5% congestion		Quarterly	0	0	0	0	0	0	0	0	0

NP- Not Provided: BSNL having no direct counter to provide the data for the parameter "Connections with good voice quality", hence they have not provided data for this parameter.

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

The three days live assessment, revealed that the performance of all operators (except **BSNL, Aircel, Tata GSM and Tata CDMA**) was within the benchmarks for all the three months of the quarter. **BSNL** failed to meet the benchmarks of the parameters **BTS accumulated Down Time, SDCCH congestion , TCH congestion and Worst affected cells** , whereas **Aircel, Tata (GSM) and Tata (CDMA)** could not meet the benchmark of the parameter **Worst affected cells> 3 % TCH drops**'. The average performance of **BSNL** for parameters **BTS accumulated down Time, SDCCH congestion, TCH congestion and Worst affected cells** was **2.04 % , 2.78%, 4.11% and 3.89% respectively**. Further, in respect of parameter '**Worst affected cells> 3 % TCH drops**', average performance of **Aircel, Tata (GSM) and Tata (CDMA)** was **16.24% ,14.81%% and 3.21%** respectively. The performance of **Aircel and Tata (GSM)** was way beyond the benchmark of <3%.

Similar non-compliance of **BSNL, Aircel, Tata (GSM) and Tata (GSM)** was also observed during 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- Himachal Pradesh Circle- July 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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		July-15	728	1488	1216	826	1028	751	5	286	130
	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	1438.10	997.68	36038.81	215.74	700.72	462.50	0.00	179.03	37.17
	c) BTS Accumulated Downtime	<=2%	July-15	0.27%	0.09%	3.98%	0.04%	0.09%	0.29%	0.00%	0.08%	0.04%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		July-15	10	2	153	0	0	1	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	July-15	1.37%	0.13%	12.58%	0.00%	0.00%	0.13%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	July-15	99.35%	98.52%	96.24%	99.90%	98.90%	98.71%	98.87%	99.02%	97.69%
	b) SDCCH/PAGING Congestion	<=1%	July-15	0.14%	0.39%	0.95%	0.02%	0.16%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	July-15	0.42%	0.29%	1.83%	0.10%	0.46%	0.06%	0.00%	0.00%	0.08%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	July-15	1.73%	0.72%	2.94%	0.71%	1.36%	0.60%	1.35%	0.11%	0.25%
	b) Worst affected cells>3% TCH drop	<=3%	July-15	16.41%	2.20%	5.92%	2.63%	2.03%	0.02%	14.84%	0.44%	3.46%
	c) % of connections with good voice quality	>=95%	July-15	95.05%	98.55%	NP	97.58%	96.01%	98.04%	98.08%	99.75%	98.10%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		July-15	356	96	208	66	62	0	2	4	15
	e) Total no. of cells (Sector) in the licensed service area		July-15	2169	4365	3524	2493	3060	2250	15	857	422
<b>No. of POI's having &gt;=0.5% POI congestion</b>												
4	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
<b>Network Data</b>												
5	a) Equipped Capacity of Network in Erlang		July-15	31209	64086	74000	18539	40416	40000	165	28000	17302
	b) Total traffic in TCBH in erlang (Avg.)		July-15	15470	55362	32476	14967	16325	24827	5	2013	2524
	c) Total no. of customers served (as per VLR) on last day of the month		July-15	585847	2475195	1125917	605023	795918	1337436	408	87508	22862

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live measurement - HP Circle- July 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	726	1488	1216	819	1023	NP	5	286	390
	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	149.47	55.01	1592.00	9.11	86.18	NP	0.00	19.40	0.00
	c) BTS Accumulated Downtime	<=2%	Live data	0.29%	0.05%	1.82%	0.02%	0.12%	NP	0.00%	0.09%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	1	0	0	NP	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.08%	0.00%	0.00%	NP	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.62%	98.83%	98.03%	99.94%	99.01%	NP	98.69%	99.01%	98.11%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.12%	0.11%	1.43%	0.00%	0.19%	NP	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.15%	0.22%	1.97%	0.06%	0.34%	NP	0.00%	0.00%	0.05%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.61%	0.72%	2.67%	0.70%	1.44%	NP	1.10%	0.13%	0.20%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	15.18%	1.80%	2.93%	2.73%	2.08%	NP	13.33%	0.66%	3.08%
	c) % of connections with good voice quality	>=95%	Live data	95.10%	98.54%	NP	97.59%	96.03%	NP	98.13%	99.75%	98.15%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	329	79	103	68	64	NP	2	6	13
	e) Total no. of cells (Sector) in the licensed service area		Live data	2168	4371	3527	2494	3061	NP	15	857	422
<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	NP	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	NP	0	0	0

NP: Data not provided by RCOM (GSM) due to TTI sever issue in the month of July 2015

TABLE: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Himachal Pradesh Circle - August 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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		Aug-15	733	1489	1222	831	1058	752	5	286	130
	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	1343.42	989.40	33104.67	174.33	875.11	949.65	0.00	349.65	20.38
	c) BTS Accumulated Downtime	<=2%	Aug-15	0.25%	0.09%	3.64%	0.03%	0.11%	0.17%	0.00%	0.16%	0.02%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Aug-15	9	2	114	0	0	6	0	1	0
e) Worst affected BTSs due to downtime	<=2%	Aug-15	1.23%	0.13%	9.33%	0.00%	0.00%	0.80%	0.00%	0.35%	0.00%	
2	<b>Connection Establishment (Accessibility)</b>											
	a) CSSR (Call Setup Success Rate)	>=95%	Aug-15	98.73%	98.55%	98.26%	99.83%	98.39%	98.67%	99.27%	98.95%	98.39%
	b) SDCCH/PAGING Congestion	<=1%	Aug-15	0.07%	0.20%	0.92%	0.07%	0.21%	0.03%	0.00%	0.00%	0.00%
c) TCH congestion	<=2%	Aug-15	1.04%	0.48%	1.74%	0.17%	0.89%	0.07%	0.00%	0.00%	0.03%	
3	<b>Connection Maintenance (Retainability)</b>											
	a) Call Drop Rate (CDR)	<=2%	Aug-15	1.79%	0.69%	1.95%	0.83%	1.48%	0.60%	1.13%	0.10%	0.23%
	b) Worst affected cells>3% TCH drop	<=3%	Aug-15	16.59%	2.04%	5.91%	2.69%	2.13%	0.02%	6.45%	0.46%	3.68%
	c) % of connections with good voice quality	>=95%	Aug-15	95.04%	98.48%	NP	97.39%	95.93%	98.04%	97.67%	99.75%	98.14%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Aug-15	360	89	208	68	66	0	1	4	16
e) Total no. of cells (Sector) in the licensed service area		Aug-15	2173	4372	3526	2516	3082	2251	15	857	422	
4	<b>No. of POI's having &gt;=0.5% POI congestion</b>											
	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
5	<b>Network Data</b>											
	a) Equipped Capacity of Network in Erlang		Aug-15	31539	65138	74000	18838	40607	40000	165	28000	17302
	b) Total traffic in TCBH in erlang (Avg.)		Aug-15	15545	58391	34007	15480	17181	25357	3	2513	1670
c) Total no. of customers served (as per VLR) on last day of the month		Aug-15	588964	2366584	1125585	592718	786163	1323066	269	85221	21134	



TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live measurement - HP Circle- August 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	729	1488	1216	826	1028	752	5	286	130
	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	128.78	110.35	2122.33	31.62	49.89	106.95	0.00	41.42	0
	c) BTS Accumulated Downtime	<=2%	Live data	0.25%	0.10%	2.42%	0.05%	0.07%	0.20%	0.00%	0.20%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	4	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.33%	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	99.13%	98.48%	95.12%	99.91%	98.60%	98.61%	98.98%	98.99%	98.91%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.13%	0.29%	4.58%	0.02%	0.12%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.65%	0.47%	4.88%	0.09%	0.72%	0.06%	0.00%	0.00%	0.02%
3	<b>Connection Maintenance (Retainability)</b>											
	a) Call Drop Rate (CDR)	<=2%	Live data	1.27%	0.64%	0.57%	0.80%	1.47%	0.59%	1.54%	0.09%	0.24%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	17.52%	2.14%	5.84%	2.80%	2.09%	0.00%	20.00%	0.35%	3.40%
	c) % of connections with good voice quality	>=95%	Live data	95.00%	98.47%	NP	97.53%	95.89%	98.04%	97.75%	99.76%	98.19%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	381	94	206	70	64	0	3	3	14
	e) Total no. of cells (Sector) in the licensed service area		Live data	2175	4374	3524	2515	3076	2253	15	857	422
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

TABLE: 5

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Himachal Pradesh Circle- Sept. 15 month												
S/N	Name of Parameter	Bench- mark	Audit Period	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	735	1498	1223	835	1109	752	5	287	130
	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	1519.07	933.90	17822.99	81.96	971.78	620.67	0.00	341.13	10.03
	c) BTS Accumulated Downtime	<=2%	Sep-15	0.29%	0.09%	<b>2.02%</b>	0.01%	0.12%	0.11%	0.00%	0.17%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Sep-15	9	2	24	0	0	3	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Sep-15	1.22%	0.13%	1.96%	0.00%	0.00%	0.40%	0.00%	0.00%	0.00%
<b>Connection Establishment (Accessibility)</b>												
2	a) CSSR (Call Setup Success Rate)	>=95%	Sep-15	98.22%	97.82%	98.10%	99.82%	98.36%	98.70%	99.43%	98.99%	99.06%
	b) SDCCH/PAGING Congestion	<=1%	Sep-15	0.09%	0.21%	0.85%	0.19%	0.12%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Sep-15	1.58%	0.53%	1.90%	0.18%	0.93%	0.07%	0.00%	0.01%	0.03%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Sep-15	1.50%	0.65%	1.88%	0.68%	1.61%	0.60%	0.65%	0.09%	0.20%
	b) Worst affected cells>3% TCH drop	<=3%	Sep-15	<b>15.27%</b>	1.64%	2.84%	2.90%	2.24%	0.04%	<b>5.78%</b>	0.40%	<b>3.56%</b>
	c) % of connections with good voice quality	>=95%	Sep-15	95.25%	98.48%	NP	97.49%	96.01%	98.10%	98.96%	99.76%	98.14%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Sep-15	334	72	100	62	71	1	1	3	15
	e) Total no. of cells (Sector) in the licensed service area		Sep-15	2189	4381	3529	2132	3190	2253	15	860	422
<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	31742	65336	74000	19027	42155	40000	165	28000	17302
	b) Total traffic in TCBH in erlang (Avg.)		Sep-15	16837	59706	35429	15823	17693	26845	2	2715	886
	c) Total no. of customers served (as per VLR) on last day of the month		Sep-15	565245	2502312	1136685	603686	815993	1321255	249	85383	21507

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live measurement - HP Circle- Sept 15 month												
S/N	Name of Parameter	Bench- mark	Average of 3 Days	AIRCEL	AIRTEL	BSNL	VODAFONE	IDEA	RCOM GSM	TATA GSM	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	733	1493	1222	832	1061	752	5	287	130
	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	122.12	103.46	1658.69	6.57	139.63	75.37	0.00	32.52	0.00
	c) BTS Accumulated Downtime	<=2%	Live data	0.23%	0.10%	1.89%	0.01%	0.18%	0.14%	0.00%	0.16%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	2	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.16%	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	99.13%	97.73%	<b>94.52%</b>	99.88%	98.51%	98.73%	100.00%	99.08%	99.20%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.10%	0.07%	<b>2.33%</b>	0.01%	0.08%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.67%	0.61%	<b>5.48%</b>	0.12%	0.78%	0.08%	0.00%	0.00%	0.01%
<b>Connection Maintenance (Retainability)</b>												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.51%	0.61%	0.75%	0.68%	1.61%	0.57%	0.97%	0.07%	0.16%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	<b>16.03%</b>	1.38%	2.89%	2.89%	2.14%	0.09%	<b>11.11%</b>	0.35%	<b>3.16%</b>
	c) % of connections with good voice quality	>=95%	Live data	95.23%	98.49%	NP	97.59%	95.78%	98.08%	98.51%	99.76%	98.16%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	351	61	102	62	68	2	2	3	13
	e) Total no. of cells (Sector) in the licensed service area		Live data	2187	4385	3529	2131	3169	2253	15	860	422
<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

## **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 SERVICES (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	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	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		HP	3815	117558	143511	24109	26465	12563	35608	11681	12953
	B) No. of bills disputed including billing complaints during the quarter		HP	0	11	39	3	24	0	21	9	0
	C)% of billing complaints during the quarter	<= 0.1%	HP	0.00%	0.01%	0.03%	0.01%	0.09%	0.00%	0.06%	0.08%	0.00%
<b>Metering &amp; Billing Credibility -Pre Paid</b>												
2	A) Total No. of Pre-paid customers at the end of the quarter		HP	1036895	2690590	1399430	765237	1462703	50172	660428	169522	33740
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		HP	8	32	159	202	1319	0	1062	153	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	HP	0.00%	0.001%	0.01%	0.03%	0.09%	0.000%	0.16%	0.09%	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		HP	8	43	198	660	1343	0	1083	162	0
	B) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 4 weeks during the quarter		HP	8	43	198	660	1343	0	1083	162	0
	C) No. of billing complaints for Post paid customers/Charging/Credit/Validity complaints for pre-paid customers resolved within 6 weeks during the quarter		HP	8	43	198	660	1343	0	1083	162	0
	D) % of billing complaints (for post paid customer) / Charging/Credit/Validity (for Pre paid customer) resolved within 4 weeks	>=98% within 4 weeks	HP	100.00%	100.00%	100.00%	100.00%	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	HP	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	HP	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE SEPTEMBER 15												
Quarterly CSD Audit Data		Bench- mark	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)
S/ N	Name of Parameter			GSM Operators						CDMA Operators		
<b>Response time to customers for assistance</b>												
4	A) Total no of calls attempted to customer care/Call center		HP	2017148	1259641	76334	1337722	913518	11249	1245289	56441	35361
	B) Total no. of calls successfully established to customer care/Call center.		HP	1985848	1259625	76334	1326303	903908	11141	1245289	55728	34313
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	HP	98.45%	100.00%	100.00%	99.15%	98.95%	99.04%	100.00%	98.74%	97.04%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		HP	332823	1003898	418673	441692	597299	8108	393684	72092	4908
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		HP	321677	956316	317163	431957	557082	8064	392597	70185	4867
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts )	>=95%	HP	96.65%	95.26%	75.75%	97.80%	93.27%	99.46%	99.72%	97.35%	99.16%
<b>Termination/closure of service</b>												
5	A) Total No. of requests for Termination / Closure of service received during the quarter		HP	45	390	1523	232	112	155	273	28	156
	B) No. of requests for Termination /Closure of service complied within 7 days during the quarter		HP	45	390	1523	232	112	155	273	28	156
	C) % of Termination/ Closure of service within 7 days	<=7days	HP	100.00%	100.00%	100.00%	100.00%	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		HP	52	74	707	72	23	28	829	4	46
	B) No. of Payments/ Refunds Cleared during the quarter		HP	52	74	707	72	23	28	829	4	46
	C)Time taken for refunds of deposits after closures.	100% within 60 days	HP	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

NB: Accessibility of call center / Customer care data of RCOM GSM are based on one month data i.e. August 15 as July-15 & September-15 month's data were not provided by RCOM GSM 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	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	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		HP	61080	19203	2519	11897	NP	202	35779	NP	202
	B) Total no. of calls successfully established to customer care/Call center.		HP	60799	19203	2519	11827	NP	201	35779	NP	201
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	HP	99.54%	100.00%	100.00%	99.41%	NP	99.50%	100.00%	NP	99.50%
2	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		HP	9456	29867	13354	11897	14750	257	12906	1104	128
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		HP	9294	29622	6967	11816	14373	257	12891	1095	128
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 sec.*100 / Total call attempts )	>=95%	HP	98.29%	99.18%	52.17%	99.32%	97.44%	100.00%	99.88%	99.18%	100.00%

NP: RCOM (GSM & CDMA) has not provided data for the parameter "Accessibility of call center / Customer care" due to TTI server issue.

### 5.3.3 KEY FINDINGS ON CUSTOMER SERVICE DELIVERY (CSD) PARAMETERS

#### 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  $\leq 0.1\%$ . Only **Vodafone** failed to meet the benchmark for **Pre-paid** with its performance level as **0.16%**.

#### 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 were found to have 100 % resolved the billing complaints within stipulated period of 4 weeks and within 6 weeks.

#### 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 are in compliance with respect to the parameter accessibility of call center. However, **BSNL and RCOM (GSM)** have not met the benchmark of '**calls answered by Operators (voice to voice) within 90 seconds**' with their achieved performance as **75.75% and 93.27%** respectively. The performance of BSNL was way below the benchmark of  $>95\%$ .

#### 4. Termination/Closure of Service

In case of this parameters also, all service providers have settled the **closure/termination** within the benchmark of 7 days.

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

All operators were found to have complied with the benchmark of 100% refund of deposits within 60 days of closure.

#### Live Measurement

The results for three days live measurements reveal that all operators have met the benchmark for the parameter '**Call connection to operators (Voice to voice) within 90 seconds**' except **BSNL** have not met the benchmark with its performance as **52.17%** against the benchmark of  $\geq 95\%$ . The performance of BSNL is way below the benchmark in live testing also.



## **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 Himachal Pradesh 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	AIRTEL	BSNL	IDEA	RCOM GSM	RCOM CDMA	TATA GSM	TATA CDMA	VODAFONE	AIRCEL
AIRTEL	H.P	---	100%	100%	100%	100%	100%	100%	100%	100%
BSNL	H.P	100%	---	100%	100%	100%	100%	100%	100%	100%
IDEA	H.P	100%	100%	---	100%	100%	100%	100%	100%	100%
RCOM GSM	H.P	100%	100%	100%	---	100%	100%	100%	100%	100%
RCOM CDMA	H.P	100%	100%	100%	100%	---	100%	100%	100%	100%
TATA GSM	H.P	100%	100%	100%	100%	100%	---	100%	100%	100%
TATA CDMA	H.P	100%	100%	100%	100%	100%	100%	---	100%	100%
VODAFONE	H.P	100%	100%	100%	100%	100%	100%	100%	---	100%
Aircel	H.P	100%	100%	100%	100%	100%	100%	100%	100%	---

The result of the testing revealed that the inter connection performance among the operators were comfortably meeting the benchmark.

## 6.2 CUSTOMER CARE / HELPLINE ASSESSMENT:

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

In case of calls answered by operators (voice to voice) within 90 seconds when test calls were made to the call centers, the calls answered by operators in case of Aircel, RCOM (GSM) and RCOM (CDMA), were 98%, 98% and 96% respectively.

## 6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLAINTS:

Performance (live calling for billing complaints)										
	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	HP	8	46	150	130	150	0	150	50	0
Total No. of calls Answered	HP	6	35	116	116	123	0	125	30	0
Cases resolved within 4 weeks	HP	6	35	116	116	123	0	125	30	0
%age of cases resolved	HP	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 by calling the number of complainants. However, in some cases, the number of customers contacted for verification was very less due to less number of billing complaints. During live calling, most of the subscribers reported that there complaints have been resolved satisfactorily.

**6.4 LEVEL -1 CALLING ASSESSMENT:**

LEVEL 1 LIVE CALLING															
Month	Circle Name	SSA Name	SDCA Name	Emergency No.	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)	
JUL-15	H.P	KANGRA	DEHRA	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	
			JAWALA JI	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√
			PALAMPUR	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√
			DHARMSHALA	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√
			BANIKHET	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√
			CHAMBA	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√
AUG-15	H.P	SHIMLA	SHIMLA	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	
			THEOG	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√
			IGMC SHIMLA	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√
			NARKANDA	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√
			RAMPUR	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√
			NATHPA	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√
SEP-15	H.P	MANDI	SUNDARNAGAR	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	
			REWALSAR	100, 101, 108 ,1091,1073,1098	4,5,5,4,4,4	√	√	√	√	√	√	√	√	√	√

To assess the availability and efficiency of level 1 services such as police, fire, ambulance (emergency services) offered by various mobile service providers, the calls were made from mobile phones provided by the service providers during drive test. In these SDCAs of Himachal Pradesh service area, these services were found functional in the networks of all the service providers.

## 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 **Kangra (Dharamsala), Shimla and Mandi** in the months of July, August and September 2015 respectively. The total route Kms covered during the drive tests in the respective SSAs was **485 Kms, 518 Kms and 543 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 FERs 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: KANGRA SSA (JULY-15)

DRIVE TEST TABLE: 1

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VODAFONE		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	174	25	202	25	151	25	184	25	147	25	187	25	167	25	142	25	47	25	
		Highways	163	25	178	25	180	25	178	25	113	25	144	25	160	25	134	25	44	16	
		Within City	143	25	105	26	161	25	134	25	129	25	111	23	113	27	109	25	55	NC	
		<b>Overall SSA</b>	<b>480</b>	<b>75</b>	<b>485</b>	<b>76</b>	<b>492</b>	<b>75</b>	<b>496</b>	<b>75</b>	<b>389</b>	<b>75</b>	<b>442</b>	<b>73</b>	<b>440</b>	<b>77</b>	<b>385</b>	<b>75</b>	<b>146</b>	<b>41</b>	
2	Blocked Call Rate	Major Roads	0.00%	0.00%	1.49%	0.00%	1.99%	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%	
		Highways	0.00%	0.00%	0.00%	0.00%	1.67%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.25%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	1.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NC	
		<b>Overall SSA</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.62%</b>	<b>0.00%</b>	<b>1.63%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.45%</b>	<b>0.00%</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%	0.68%	0.00%	0.00%	0.00%	0.68%	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%	2.91%	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%	1.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NC	
		<b>Overall SSA</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>1.67%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.26%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</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	NA	NA	96.91%	100%	98.43%	100%
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.51%	99.93%	98.06%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.43%	100%	98.76%	NC
		<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>NA</b>	<b>NA</b>	<b>97.85%</b>	<b>99.98%</b>	<b>98.45%</b>	<b>100%</b>

AUDIT & ASSESSMENT OF QOS FOR QE-SEPTEMBER - 2015 -HIMACHAL PRADESH CIRCLE



S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VODAFONE		RCOM CDMA		TATA CDMA			
			OUTDOOR	INDOOR	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	96.60%	99.52%	96.00%	98.69%	<b>93.46%</b>	96.85%	95.51%	99.72%	<b>94.08%</b>	97.28%	97.28%	100%	96.75%	99.17%	NA	NA	NA	NA
Highways	96.43%	99.50%		96.03%	99.20%	<b>94.29%</b>	<b>92.77%</b>	96.52%	99.58%	<b>92.65%</b>	98.59%	96.26%	99.56%	96.21%	99.76%	NA	NA	NA	NA	NA	NA	
Within City	96.71%	99.13%		96.22%	97.80%	<b>94.89%</b>	95.52%	95.46%	98.47%	96.16%	99.66%	97.45%	100%	96.31%	99.73%	NA	NA	NA	NA	NA	NA	
<b>Overall SSA</b>	<b>96.58%</b>	<b>99.38%</b>		<b>96.08%</b>	<b>98.58%</b>	<b>94.21%</b>	<b>95.24%</b>	<b>95.80%</b>	<b>99.13%</b>	<b>94.34%</b>	<b>98.46%</b>	<b>96.99%</b>	<b>99.85%</b>	<b>96.45%</b>	<b>99.56%</b>	NA	NA	NA	NA	NA	NA	
<b>Service Coverage</b>																						
5	In door (>= -75dBm)	Major Roads	33.52%	26.40%	75.06%	91.69%	42.46%	92.71%	22.15%	0.30%	27.70%	13.50%	42.65%	96.80%	46.32%	98.92%	40.46%	94.19%	35.54%	100%	100%	
		Highways	31.39%	13.80%	69.24%	93.33%	44.09%	88.80%	19.15%	29.10%	20.78%	73.41%	37.18%	49.77%	47.00%	95.89%	41.52%	99.83%	31.12%	99.93%	99.93%	
		Within City	36.48%	20.70%	81.57%	53.79%	59.96%	88.83%	20.30%	72.00%	22.37%	13.42%	47.57%	74.64%	62.10%	94.10%	62.95%	79.07%	65.06%	NC	NC	
		<b>Overall SSA</b>	<b>33.67%</b>	<b>20.42%</b>	<b>75.05%</b>	<b>79.97%</b>	<b>48.85%</b>	<b>90.27%</b>	<b>20.57%</b>	<b>40.07%</b>	<b>23.68%</b>	<b>29.30%</b>	<b>42.14%</b>	<b>73.84%</b>	<b>50.66%</b>	<b>96.25%</b>	<b>47.36%</b>	<b>91.00%</b>	<b>45.73%</b>	<b>99.97%</b>	<b>99.97%</b>	
	In-vehicle (>= -85dBm)	Major Roads	60.61%	92.00%	90.96%	99.91%	82.28%	100%	67.87%	50.40%	74.73%	57.27%	86.11%	100%	81.83%	99.96%	77.74%	100%	76.00%	100%	100%	
		Highways	60.01%	81.70%	87.97%	99.97%	83.65%	100%	52.21%	97.40%	60.73%	88.04%	81.69%	97.58%	75.22%	99.97%	76.02%	100%	68.01%	100%	100%	
		Within City	68.61%	62.10%	95.17%	99.51%	90.87%	100%	74.29%	99.10%	70.54%	92.19%	90.85%	99.64%	91.17%	99.46%	86.25%	99.77%	84.22%	NC	NC	
		<b>Overall SSA</b>	<b>62.82%</b>	<b>78.56%</b>	<b>91.20%</b>	<b>99.80%</b>	<b>85.63%</b>	<b>100%</b>	<b>65.10%</b>	<b>85.03%</b>	<b>68.85%</b>	<b>76.95%</b>	<b>85.90%</b>	<b>99.07%</b>	<b>81.93%</b>	<b>99.79%</b>	<b>79.62%</b>	<b>99.92%</b>	<b>76.86%</b>	<b>100%</b>	<b>100%</b>	
	Outdoor- in city (>= -95dBm)	Major Roads	87.47%	99.80%	97.94%	100%	93.43%	100%	91.98%	99.50%	96.80%	96.84%	99.30%	100%	96.34%	100%	98.37%	100%	99.56%	100%	100%	
		Highways	87.57%	99.60%	98.29%	100%	94.54%	100%	90.82%	100%	84.81%	95.45%	98.26%	99.97%	95.08%	100%	99.11%	100%	92.76%	100%	100%	
		Within City	93.12%	99.50%	99.28%	100%	97.77%	100%	95.26%	100%	92.41%	99.26%	99.52%	100%	99.00%	99.90%	99.20%	100%	97.97%	NC	NC	
		<b>Overall SSA</b>	<b>89.21%</b>	<b>99.63%</b>	<b>98.44%</b>	<b>100%</b>	<b>95.29%</b>	<b>100%</b>	<b>92.73%</b>	<b>99.86%</b>	<b>91.49%</b>	<b>97.27%</b>	<b>99.02%</b>	<b>99.99%</b>	<b>96.59%</b>	<b>99.96%</b>	<b>98.86%</b>	<b>100%</b>	<b>96.95%</b>	<b>100%</b>	<b>100%</b>	
6	Call Setup Success Rate (>=95%)	Major Roads	100%	100%	98.51%	100%	97.35%	100%	99.46%	100%	100%	100%	100%	100%	98.80%	100%	100%	100%	100%	100%	100%	
		Highways	100%	100%	100%	100%	95.56%	100%	100%	100%	100%	100%	99.31%	<b>92.00%</b>	98.13%	100%	100%	100%	100%	100%	100%	
		Within City	100%	100%	100%	100%	97.52%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	NC	
		<b>Overall SSA</b>	<b>100%</b>	<b>100%</b>	<b>99.38%</b>	<b>100%</b>	<b>96.75%</b>	<b>100%</b>	<b>99.80%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>99.77%</b>	<b>97.26%</b>	<b>98.86%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>



S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VODAFONE		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	100%	100%	98.09%	100%	98.59%	100%	100%	100%	100%	100%	99.24%	100%	98.88%	100%	100%	100%	100%	100%	100%
		Highways	100%	100%	99.57%	100%	98.46%	100%	100%	100%	100%	100%	99.60%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	98.23%	100%	99.64%	100%	98.82%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	NC
		<b>Overall SSA</b>	<b>99.15%</b>	<b>100%</b>	<b>99.09%</b>	<b>100%</b>	<b>98.64%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>99.59%</b>	<b>100%</b>	<b>99.58%</b>	<b>0.00%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

NA: Not Applicable

NC: No Coverage

7.2 OPERATOR ASSISTED DRIVE TEST: SHIMLA SSA (AUGUST-15)

DRIVE TEST TABLE: 2

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VODAFONE		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	95	25	110	28	117	25	74	24	95	25	135	25	118	27	129	25	64	25	
		Highways	138	25	166	30	162	25	152	24	130	25	181	25	171	25	183	25	95	25	
		Within City	92	30	105	26	89	25	96	26	96	25	128	25	81	26	113	25	84	25	
		<b>Overall SSA</b>	<b>325</b>	<b>80</b>	<b>381</b>	<b>84</b>	<b>368</b>	<b>75</b>	<b>322</b>	<b>74</b>	<b>321</b>	<b>75</b>	<b>444</b>	<b>75</b>	<b>370</b>	<b>78</b>	<b>425</b>	<b>75</b>	<b>243</b>	<b>75</b>	
2	Blocked Call Rate	Major Roads	0.00%	0.00%	0.00%	0.00%	2.56%	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%	
		Highways	0.00%	0.00%	0.00%	0.00%	2.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.55%	0.00%	0.58%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.95%	0.00%	1.12%	0.00%	2.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		<b>Overall SSA</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.26%</b>	<b>0.00%</b>	<b>2.17%</b>	<b>0.00%</b>	<b>0.62%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.23%</b>	<b>0.00%</b>	<b>0.27%</b>	<b>0.00%</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%	0.91%	0.00%	1.75%	0.00%	0.00%	0.00%	1.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highways	0.00%	0.00%	1.20%	0.00%	1.90%	0.00%	0.00%	0.00%	0.77%	0.00%	1.11%	0.00%	0.00%	0.00%	0.55%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.96%	0.00%	<b>2.27%</b>	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%	
		<b>Overall SSA</b>	<b>0.00%</b>	<b>0.00%</b>	<b>1.05%</b>	<b>0.00%</b>	<b>1.94%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.62%</b>	<b>0.00%</b>	<b>0.45%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.24%</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	NA	NA	98.58%	100%	97.95%	99.69%
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	96.93%	100%	97.79%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.40%	100%	99.35%	99.98%
		<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>NA</b>	<b>NA</b>	<b>98.17%</b>	<b>100%</b>	<b>98.37%</b>	<b>99.88%</b>
(b) 0-5 ( with	Major Roads	95.81%	98.76%	<b>94.54%</b>	98.42%	96.23%	98.87%	96.40%	99.56%	97.32%	99.57%	96.49%	99.27%	97.30%	97.50%	NA	NA	NA	NA		

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S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VODAFONE		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			frequency hopping for GSM Operators)	Highways	96.04%	99.35%	95.50%	97.89%	92.05%	98.40%	97.65%	99.62%	92.84%	99.54%	96.51%	99.96%	97.81%	98.82%	NA	NA
	Within City	96.32%	99.50%	95.51%	98.42%	92.98%	96.35%	97.43%	99.52%	97.94%	99.68%	96.24%	99.60%	96.73%	99.26%	NA	NA	NA	NA	
	Overall SSA	96.06%	99.20%	95.25%	98.23%	93.50%	97.87%	97.36%	99.57%	96.05%	99.58%	96.43%	99.61%	97.37%	98.53%	NA	NA	NA	NA	
5	Service Coverage																			
	In door (>= -75dBm)	Major Roads	29.19%	52.00%	87.02%	99.80%	49.38%	65.00%	36.14%	53.10%	27.82%	67.98%	54.43%	69.43%	35.25%	48.10%	67.05%	99.96%	25.71%	45.92%
		Highways	24.58%	0.00%	77.62%	44.25%	39.73%	77.10%	56.78%	60.00%	43.38%	0.00%	41.99%	87.60%	40.38%	43.80%	57.52%	99.86%	35.51%	99.15%
		Within City	42.92%	67.90%	80.56%	99.65%	68.58%	58.30%	68.87%	36.70%	41.66%	0.00%	65.78%	76.18%	58.14%	92.50%	71.36%	84.18%	71.33%	51.38%
		Overall SSA	31.17%	42.55%	81.01%	80.42%	49.06%	67.19%	56.07%	49.68%	37.73%	40.43%	52.59%	77.68%	43.93%	61.87%	64.54%	94.56%	45.31%	64.66%
	In-vehicle (>= -85dBm)	Major Roads	63.39%	72.80%	99.47%	100%	87.33%	67.80%	75.47%	98.60%	77.85%	98.79%	89.93%	97.37%	76.45%	97.10%	87.12%	100%	62.08%	85.62%
		Highways	57.95%	25.80%	99.27%	81.53%	76.28%	99.80%	81.61%	98.00%	80.84%	0.00%	82.13%	99.20%	79.27%	89.90%	81.68%	100%	69.70%	100%
		Within City	81.08%	98.70%	99.20%	100%	96.43%	97.30%	89.90%	88.00%	83.50%	0.00%	94.72%	98.39%	91.98%	99.10%	93.65%	100%	87.34%	100%
		Overall SSA	66.15%	68.82%	99.30%	93.57%	84.07%	88.78%	82.72%	94.74%	80.79%	58.75%	88.12%	98.32%	82.04%	95.47%	86.87%	100%	73.79%	94.81%
	Outdoor- in city (>= -95dBm)	Major Roads	92.59%	99.50%	99.96%	100%	98.56%	99.70%	95.64%	100%	98.12%	99.02%	98.21%	100%	96.78%	100%	99.32%	100%	95.68%	99.99%
		Highways	90.86%	94.70%	99.90%	99.99%	95.28%	100%	96.50%	99.90%	94.22%	0.00%	97.63%	100%	96.65%	98.00%	97.54%	100%	98.19%	100%
		Within City	96.86%	99.90%	99.91%	100%	99.87%	99.70%	99.08%	100%	94.96%	0.00%	99.69%	99.93%	99.49%	100%	99.74%	100%	98.28%	100%
		Overall SSA	93.07%	98.21%	99.92%	100%	97.28%	99.81%	97.06%	99.97%	95.74%	58.89%	98.40%	99.98%	97.47%	99.36%	98.74%	100%	97.55%	99.99%
	6	Call Setup Success Rate (>=95%)	Major Roads	100%	100%	100%	100%	97.44%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Highways	100%	100%	100%	100%	97.53%	100%	100%	100%	100%	100%	98.90%	100%	100%	100%	100%	100%	100%
			Within City	100%	100%	99.05%	100%	98.88%	100%	97.92%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Overall SSA			100%	100%	99.74%	100%	97.83%	100%	99.38%	100%	100%	100%	99.55%	100%	100%	100%	100%	100%	100%	

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VODAFONE		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	98.46%	100%	99.18%	100%	95.39%	99.06%	100%	100%	100%	100%	99.57%	100%	100%	100%	100%	100%	100%	100%	100%
		Highways	98.74%	100%	99.43%	100%	95.97%	100%	99.64%	100%	100%	100%	99.33%	100%	100%	100%	100%	100%	100%	99.89%	100%
		Within City	98.41%	100%	99.35%	100%	98.97%	100%	98.88%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	98.56%	100%	99.33%	100%	96.54%	99.10%	99.50%	100%	100%	100%	99.59%	100%	100%	100%	100%	100%	100%	99.96%	100%

NA: Not Applicable

NC: No Coverage

7.3 OPERATOR ASSISTED DRIVE TEST: MANDI SSA (SEPTEMBER-15)

DRIVE TEST TABLE: 3

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VODAFONE		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	169	25	207	25	71	25	190	25	133	25	209	25	136	31	152	25	NC	25
		Highways	150	25	192	25	152	30	170	25	120	25	184	25	159	27	138	25	27	25
		Within City	106	25	123	25	127	25	118	25	160	25	117	25	117	23	120	25	143	25
		<b>Overall SSA</b>	<b>425</b>	<b>75</b>	<b>522</b>	<b>75</b>	<b>350</b>	<b>80</b>	<b>478</b>	<b>75</b>	<b>413</b>	<b>75</b>	<b>510</b>	<b>75</b>	<b>412</b>	<b>81</b>	<b>410</b>	<b>75</b>	<b>170</b>	<b>75</b>
2	Blocked Call Rate	Major Roads	0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	0.00%	0.75%	0.00%	0.48%	0.00%	0.74%	0.00%	0.00%	0.00%	NC	0.00%
		Highways	0.00%	0.00%	0.00%	0.00%	3.95%	0.00%	0.00%	0.00%	0.83%	0.00%	0.00%	0.00%	0.63%	0.00%	0.00%	0.00%	0.00%	0.00%
		Within City	0.00%	0.00%	0.00%	0.00%	2.36%	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%
		<b>Overall SSA</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.19%</b>	<b>0.00%</b>	<b>2.57%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.48%</b>	<b>0.00%</b>	<b>0.20%</b>	<b>0.00%</b>	<b>0.49%</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%	1.43%	0.00%	0.00%	0.00%	0.76%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%	0.00%	NC	0.00%
		Highways	0.00%	0.00%	1.04%	0.00%	4.11%	0.00%	0.00%	0.00%	0.84%	0.00%	0.54%	0.00%	0.00%	0.00%	0.72%	0.00%	0.00%	0.00%
		Within City	0.00%	0.00%	0.00%	0.00%	2.40%	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%
		<b>Overall SSA</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.38%</b>	<b>0.00%</b>	<b>2.93%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.49%</b>	<b>0.00%</b>	<b>0.39%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.00%</b>	<b>0.24%</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	NA	98.66%	99.86%	NC	99.98%
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.02%	99.90%	99.83%	99.94%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.32%	99.96%	98.39%	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>NA</b>	<b>98.66%</b>	<b>99.91%</b>	<b>98.57%</b>	<b>99.97%</b>
(b) 0-5 (	Major Roads	96.30%	98.96%	96.27%	97.48%	92.77%	95.33%	95.17%	97.37%	91.32%	99.45%	98.19%	98.97%	97.62%	99.45%	NA	NA	NA	NA	

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S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VODAFONE		RCOM CDMA		TATA CDMA	
			OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR	OUTDOOR	INDOOR
			with frequency hopping for GSM Operators)	Highways	96.29%	99.33%	96.03%	97.16%	<b>92.61%</b>	99.58%	95.07%	99.26%	96.67%	99.27%	97.70%	98.06%	95.98%	99.76%	NA	NA
	Within City	95.86%	99.40%	97.33%	97.66%	<b>94.75%</b>	99.78%	95.20%	99.32%	96.93%	99.72%	98.08%	99.44%	95.99%	96.28%	NA	NA	NA	NA	
	<b>Overall SSA</b>	<b>96.18%</b>	<b>99.23%</b>	<b>96.49%</b>	<b>97.43%</b>	<b>93.43%</b>	<b>98.31%</b>	<b>95.15%</b>	<b>98.66%</b>	<b>95.52%</b>	<b>99.47%</b>	<b>98.00%</b>	<b>98.83%</b>	<b>96.58%</b>	<b>98.61%</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>	
<b>Service Coverage</b>																				
5	In door (>= -75dBm)	Major Roads	15.96%	42.60%	70.97%	77.33%	17.40%	40.20%	23.81%	61.50%	28.23%	50.18%	23.83%	93.66%	37.51%	64.41%	35.94%	81.80%	NC	89.10%
		Highways	28.23%	80.30%	82.30%	79.67%	28.16%	57.60%	23.28%	31.40%	29.80%	92.53%	38.65%	90.72%	34.66%	28.95%	52.52%	98.41%	23.70%	24.90%
		Within City	50.66%	77.50%	88.21%	94.73%	37.82%	10.80%	29.06%	76.40%	69.52%	48.08%	56.23%	80.69%	48.01%	89.11%	64.92%	94.88%	50.74%	90.69%
		<b>Overall SSA</b>	<b>28.93%</b>	<b>66.88%</b>	<b>80.20%</b>	<b>83.84%</b>	<b>29.42%</b>	<b>42.10%</b>	<b>25.38%</b>	<b>56.49%</b>	<b>45.97%</b>	<b>64.56%</b>	<b>37.16%</b>	<b>88.28%</b>	<b>39.43%</b>	<b>58.99%</b>	<b>50.05%</b>	<b>91.67%</b>	<b>47.41%</b>	<b>66.71%</b>
	In-vehicle (>= -85dBm)	Major Roads	58.18%	99.40%	85.96%	99.96%	53.48%	99.50%	61.91%	98.20%	80.90%	93.29%	70.52%	99.86%	65.39%	98.70%	69.72%	100%	NC	100%
		Highways	76.75%	92.50%	92.70%	99.96%	67.58%	99.90%	55.14%	88.00%	81.30%	99.20%	80.49%	100%	69.60%	93.08%	83.62%	100%	80.82%	94.73%
		Within City	91.17%	99.60%	97.23%	99.98%	82.99%	99.20%	70.68%	95.60%	91.99%	99.17%	90.73%	99.74%	83.05%	98.89%	92.07%	100%	77.10%	100%
		<b>Overall SSA</b>	<b>72.75%</b>	<b>97.14%</b>	<b>91.74%</b>	<b>99.96%</b>	<b>70.23%</b>	<b>99.62%</b>	<b>62.85%</b>	<b>93.94%</b>	<b>85.66%</b>	<b>97.03%</b>	<b>79.07%</b>	<b>99.87%</b>	<b>72.08%</b>	<b>96.86%</b>	<b>80.96%</b>	<b>100%</b>	<b>77.56%</b>	<b>98.12%</b>
	Outdoor- in city (>= -95dBm)	Major Roads	96.11%	100%	98.72%	100%	86.40%	100.00%	95.01%	100%	96.62%	98.67%	95.57%	100%	85.79%	99.20%	97.39%	100%	NC	100%
		Highways	96.60%	99.90%	99.01%	100%	91.95%	100.00%	93.94%	99.30%	97.41%	99.20%	98.21%	100%	90.88%	97.63%	97.61%	100%	99.75%	99.95%
		Within City	99.51%	100%	99.90%	100%	98.03%	100.00%	98.25%	99.40%	97.58%	99.17%	99.60%	100%	97.04%	99.95%	99.98%	100%	97.59%	100%
		<b>Overall SSA</b>	<b>97.15%</b>	<b>99.97%</b>	<b>99.17%</b>	<b>100%</b>	<b>93.00%</b>	<b>100.00%</b>	<b>95.77%</b>	<b>99.57%</b>	<b>97.30%</b>	<b>99.00%</b>	<b>97.49%</b>	<b>100%</b>	<b>90.98%</b>	<b>98.87%</b>	<b>98.25%</b>	<b>100%</b>	<b>97.86%</b>	<b>99.98%</b>
6	Call Setup Success Rate (>=95%)	Major Roads	100%	100%	99.52%	100%	100.00%	100.00%	100%	100%	99.25%	100%	99.52%	100%	99.26%	100%	100%	100%	NC	100%
		Highways	100%	100%	100%	100%	96.05%	100.00%	100%	100%	99.17%	100%	100%	100%	98.11%	100%	100%	100%	100%	100%
		Within City	100%	100%	100%	100%	97.64%	100.00%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		<b>Overall SSA</b>	<b>100%</b>	<b>100%</b>	<b>99.81%</b>	<b>100%</b>	<b>97.43%</b>	<b>100.00%</b>	<b>100%</b>	<b>100%</b>	<b>99.52%</b>	<b>100%</b>	<b>99.80%</b>	<b>100%</b>	<b>99.03%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>	<b>100%</b>

S/N	Parameter	Classification of routes covered	AIRCEL		AIRTEL		BSNL		IDEA		TATA GSM		RCOM GSM		VODAFONE		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	98.76%	100%	99.12%	100%	97.54%	100.00%	100%	100%	99.65%	100%	100%	100%	100%	100%	100%	100%	100%	NC	100%
		Highways	99.18%	100%	100%	100%	97.22%	100.00%	100%	100%	99.23%	100%	99.01%	100%	98.21%	0.00%	100%	100%	100%	100%	100%
		Within City	99.64%	100%	99.38%	100%	99.31%	100.00%	97.90%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99.86%	100%
		Overall SSA	99.22%	100%	99.46%	100%	98.25%	100.00%	99.00%	100%	99.66%	100%	99.67%	100%	99.52%	66.67%	100%	100%	99.90%	100%	

NA: Not Applicable

**7.4 DETAIL OF THE ROUTES COVERED DURING THE DRIVE TESTS:**

**DRIVE TEST TABLE: 4**

Name of SSA	Day 1		Day 2		Day 3	
	Name of SDCA & KM Covered	Route Covered	Name of SDCA & KM Covered	Route Covered	Name of SDCA & KM Covered	Route Covered
<b>Kangra</b>	Jwala Ji ,Dehra , Kangra , Palampur , Dharamshala/ 155 Km	Jawalaji- Dehra Gopipur -Kangra - Tanda- Palampur- Dari-Dharamshala	Dharmashala , Kangra City , Nurpur ,Jwali / 160 Km	Dharamshala City-Kangra City -Gaggal- Nurpur- Jassure - Jawali	Nurpur , Lahru ,Dalhaugi , Chamba/ 170 Km	Nurur- Banikhet- Dalhousie Road-Bathari- Chamba City - Mehla
<b>Shimla</b>	Shimla , Theog / 165 Km	Khalini ,Kasumpti ,Mehli ,Jiwanoo Colony ,Theog	Theog , Rampur /163 Km	Theog-Narkanda-Kumarsain-Rampur-Jeori	Shimla Shogi , Rampuri /190 Km	Wakanaghat-Ghanahati-Summer Hill- Shanti-Jubalhatti-Sanjuli
<b>Mandi</b>	Sundarnagar , Mandi /188 Km	Sundernagar ,Chailchowk ,Pandoh	Mandi , Koti / 175 Km	Mandi ,Jogindernagar ,Machiyal ,Kotli	Mandi ,Awahdevi / 180 Km	Mandi , Rewalsar , Sarkghat , Awah Devi



**7.4 SSA WISE DRIVE TEST OBSERVATION:**

**DRIVE TEST TABLE: 5**

**DRIVE TEST OBSERVATION OF KANGRA SSA – JULY 15**

S. No	Name of SP	Route Covered in Day 1	Day 1 Observation	Route Covered in Day 2	Day 2 Observation	Route Covered in Day 3	Day 3 Observation
1	AIRCEL	Jwala Ji ,Dehra, Kangra , Palampur, Dharamshala	Poor Rx Level and Rx Quality Near Darang, Darkata.	Dharmashala, Kangra City, Nurpur,Jwala	Poor Rx Level and Rx Quality Observed Between Nurpur to Hatli,	Nurpur,Lahru,Dalhaugi, Chamba	Poor Rx level and Rx Quality Observed in All Covered SDCA's On Day 3.
2	AIRTEL		Poor Rx Level and Rx Quality Near Ranital, Dhaloon.		Poor Rx Level and Rx Quality Near Nurpur.Poor Rx Quality Near Khandwal, Dharamsala.		Poor Rx Level and Rx Quality Near Dalhousie, Nurpur.
3	BSNL		Poor Rx Level and Rx Quality Near Darkata, Dehra, Jwalamukhi Temple.		Poor Rx Level and Rx Quality Near Jonta, Kottla. Poor Rx Quality In All Covered SDCA's on Day 2.		Poor Rx Quality In All Covered SDCA's on Day 3.
4	TATA GSM		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.
5	TATA CDMA		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.
6	IDEA		Poor Rx Level and Rx Quality in All Covered SDCA's on Day 1.		Poor Rx Level and Rx Quality in All Covered SDCA's on Day 2.		Poor Rx Level and Rx Quality in All Covered SDCA's on Day 3.
7	RCOM GSM		Poor Rx Level and Rx Quality In Ranital, Barwara.		Poor Rx Quality Near Riat.		Poor Rx Level and Rx Quality Near Kakira, Niari.
8	RCOM CDMA		Poor Rx Quality Near Ranital, Poor Rx Quality Near Sadarpur.		Poor Rx Quality Near Talara, Bhatoli.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.
9	VODAFONE		Poor Rx Level and Rx Quality Near Dakarta,		Overall Good Coverage and Quality In Covered SDCA's On Day 2.		Overall Good Coverage and Quality In Covered SDCA's On Day 3.

DRIVE TEST TABLE: 6

DRIVE TEST OBSERVATION OF SHIMLA SSA – AUGUST 15

S. No	Name of SP	Route Covered in Day 1	Day 1 Observation	Route Covered in Day 2	Day 2 Observation	Route Covered in Day 3	Day 3 Observation
1	AIRCEL	Shimla, Thoeg,	Poor Rx Level and Rx quality Near Kufri, Kathua SDCA.	Rampur, Thoeg	Poor Rx Level and Rx Quality Near Dhargaura, Rampur, Kumarsain.	Shogi, Sanjoli	Poor rx Level and rx Quality Near Jubbarhatti, Shogihite.
2	AIRTEL		Poor Rx Quality In Kufri, Theog and Circular Road.		Poor Rx Quality Near Rampur and Theog.		Poor Rx Level and rx Quality Near Ghanatti.
3	BSNL		Poor Rx Level and rx Quality in All Covered SDCA's on Day 1.		Poor Rx Level and Rx Quality Near Rampur, Shoga, Jhakhari.		Poor Rx Level and rx Quality in All Covered SDCA's on Day 1.
4	TATA GSM		Oveall Good Coverage and Quality In Covered SDCA On Day 1.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		Poor Rx Quality in Covered SDCA's On Day 3.
5	TATA CDMA		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.
6	IDEA		Poor Rx Level and Rx quality Near Theog Bazar, Fagu.		Poor Rx Level and Rx Quality Near Braglijadaun, Kachin Ghatti, Soidhar.		Poor Rx Level and Rx quality Naer Jubbarhatti and Taradev.
7	RCOM GSM		Oveall Good Coverage and Quality In Covered SDCA On Day 1.		Poor Rx Level and Rx Quality Near Nogli, Kufri, Sandhu, Jhakdi.		Poor Rx level and Rx Quality Near Ghanati.
8	RCOM CDMA		Poor Rx Level and Rx Quality Kufri.		Poor Rx Level and Rx Quality Dhargaura, Dhomrhi.		Poor Rx Quality Near Ghannatti.
9	VODAFONE		Poor Rx Level and Rx Quality Near Fagu. Poor Rx Quality Near Baluganj.		Poor Rx Level and Rx Quality Near Shilaru, Theog.		Poor Rx Level and Rx Quality Near Jubarhatti.

DRIVE TEST TABLE: 7

DRIVE TEST OBSERVATION OF MANDI SSA – SEPTEMBER 15

S. No	Name of SP	Route Covered in Day 1	Day 1 Observation	Route Covered in Day 2	Day 2 Observation	Route Covered in Day 3	Day 3 Observation
1	AIRCEL	Sundernagar, Mandi	Poor Rx Level and Rx Quality Near Pndoh, Shiva Badhar.	Mandi, Jogindernagar	Poor Rx Level and Rx Quality Near Shakrog.	Mandi, Sarakghat	Poor Rx Level and Rx Quality Near Rewalsar.
2	AIRTEL		Poor Rx Level and Rx Quality Near Shiva Badhar, Chail Chowk and Between Shiva Badhar and Gohar.		Poor Rx Level and Rx Quality Between Shakrog and Joginder Nagar.		Poor Rx Level and Rx Quality Near Rewalsar, Dhamrol, Gari Bhadarpur.
3	BSNL		Poor Rx Level and Rx Quality in All Covered SDCA's on Day 1.		Poor Rx Level and Rx Quality in All Covered SDCA's on Day 2.		Poor Rx Level and Rx Quality in All Covered SDCA's on Day 3.
4	TATA GSM		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.
5	TATA CDMA		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.
6	IDEA		Poor Rx Level and Rx Quality in All Covered SDCA's on Day 1.		Poor Rx Level and Rx Quality in All Covered SDCA's on Day 2.		Poor Rx Level and Rx Quality in All Covered SDCA's on Day 3.
7	RCOM GSM		Poor Rx Level and Rx Quality Near Sainj. Poor Rx Quality Near Chail Chowk.		Poor Rx Level and Rx Quality Near Batdhar.		Poor Rx Level and Rx Quality Near Rakohai, Talyhar, Dhalwan.
8	RCOM CDMA		Poor Rx Level and Rx Quality Near Pandoh.		They Have Coverage Only In Major SDCA's with Poor Level and Quality at Outers.		Poor Rx level and Rx Quality Near Janaid.
9	VODAFONE		Poor Rx Level and Rx Quality Near Shiva Badhar.		Poor Rx Level and Rx Quality Near Katendi.		Poor Rx Level and Rx Quality Near Chamboh.

**DRIVE TEST TABLE: 8**

**NO NETWORK COVERAGE STATUS OF DRIVE TEST – JULY TO SEPTEMBER 15**

S No	Month of Drive Test	Circle	Name of Operators	SSA	Status of no network coverage area	ICR Status
1	July'15		AIRCEL		No Coverage Area	ICR With Vodafone At Jot
			AIRTEL		No Coverage Area	No
			BSNL		No Coverage Area	No
			IDEA		No Coverage Area	No
			RCOM (GSM)		Teesa, Dalhousie, khajjaar	NO
			VODAFONE		No Coverage Area	No
			TATA GSM		No Coverage Area	ICR Coverage With Reliance And Aircel at Jot Chamba,Banikhet Jassor.
			RCOM (CDMA)		No Coverage Areas At Nurpur ,Banikhet, Near Chamba, Teesa, Khajjar.	No
			TATA (CDMA)		No Coverage Area At Nurpur, Jasoor, Banikhet-, Khajjaar, Teesa.	ICR Coverage With Reliance And Aircel at Jot Chamba,Banikhet Jassor
2	Aug'15		AIRCEL		No Coverage Area	No
			AIRTEL		No Coverage Area	No
			BSNL		No Coverage Area	No
			IDEA		No Coverage Area	No
			RCOM (GSM)		No Coverage Area	No
			VODAFONE		No Coverage Area	ICR With IDEA
			TATA GSM		No Coverage Area	ICR With Aircel And Reliance in Whole Ssa
			RCOM (CDMA)		No Coverage at Narkanda, Nathpa, Jhakri, Jivanno Colony.	ICR With Reliance.
			TATA (CDMA)		No Coverage at Mehli, Narkanda, Nathpa, Jhakri, Jivanno Colony.	ICR With Aircel And Reliance in Whole SSA

S No	Month of Drive Test	Circle	Name of Operators	SSA	Status of no network coverage area	ICR Status
3	Sep'15		AIRCEL		No Coverage Area	ICR With Reliance
			AIRTEL		No Coverage Area	No
			BSNL		No Coverage Area	No
			IDEA		No Coverage Area	No
			RCOM (GSM)		No Coverage Area	No
			VODAFONE		No Coverage Area	ICR With Reliance, Idea, Aircel
			TATA GSM		No Coverage Area	ICR With Aircel And Reliance in Whole SSA
			RCOM (CDMA)		Rewalsar Near Awahdevi	No
			TATA (CDMA)		Rewalsar Near Awahdevi Sarkaghat	ICR With Reliance And Aircel in Whole SSA

## 7.5 KEY FINDINGS ON DRIVE TEST:

The key observations derived from the results of the drive tests are as under –

- (i) Tata (GSM), is operating its services with its own 05 no. of BTSs only, however is on ICR with Reliance (GSM) in most of the HP licensed service area.
- (ii) **Drive test in July-15:** Drive tests were conducted across the **Kangra SSA**. The drive test results revealed that performance of the service providers was satisfactory as most of the service providers were largely meeting the benchmarks. Only, **BSNL and Tata (GSM)** failed to meet the benchmark of **Voice Quality** with their performance as **94.21% and 94.34% respectively**.
- (iii) **Drive Test in August -15:** Drive tests were conducted across **Shimla SSA**. In this SSA, only **BSNL** lagged behind the benchmarks for parameter **Voice Quality** with its performance as **93.50 %**. The performance of other service providers was satisfactory.
- (iv) **Drive Test in September-15:** Drive tests were conducted in **Mandi SSA**. In this SSA also, **BSNL** could not meet the benchmark of the parameters **Voice Quality (93.50%) and CDR (2.93%)**. The performance of other service providers was well within the norms.

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

**The detail of Network coverage and Intra Circle Roaming (ICR) status of different service providers at various locations in the three SSAs is given in table-8.**

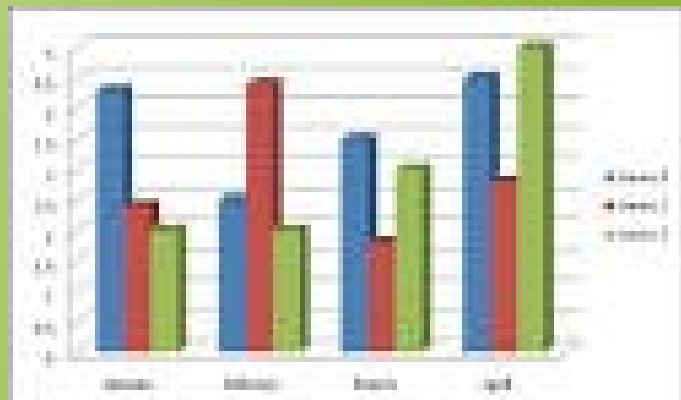
*Thus from the above, it was concluded that **BSNL and Tata (GSM)** remained under performed with respect to the parameters **Voice Quality**. **BSNL** also could meet the benchmark **CDR** in Mandi SSA. The defaulting Service providers need to take corrective actions to improve the voice quality in their networks.*

## 8. GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

**AVERAGED QUARTERLY PMR**

**V/S**

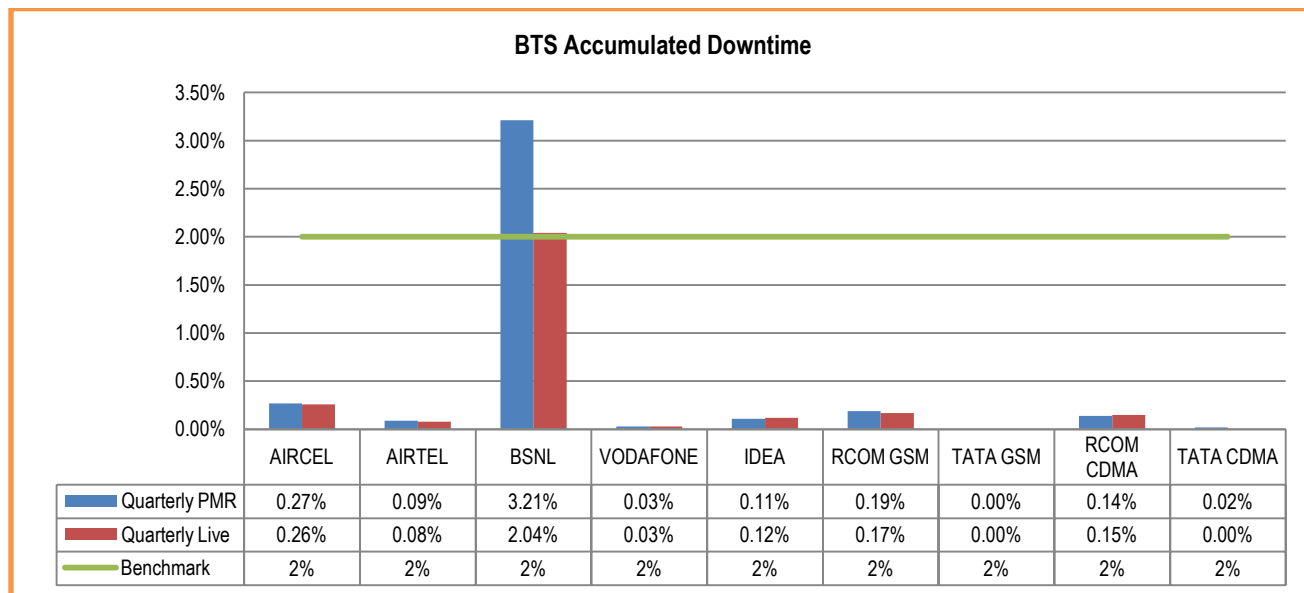
**AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT**



## 8. GRAPHICAL REPRESENTATION (CMTS):

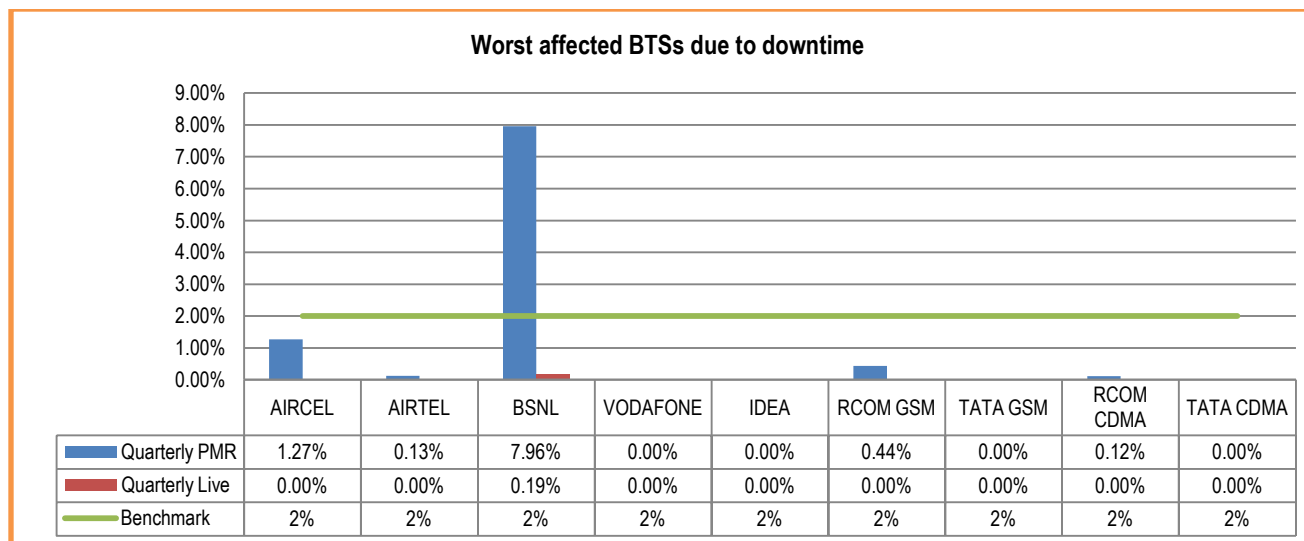
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

### 1) BTS ACCUMULATED DOWNTIME :



All operators are meeting the benchmarks except BSNL.

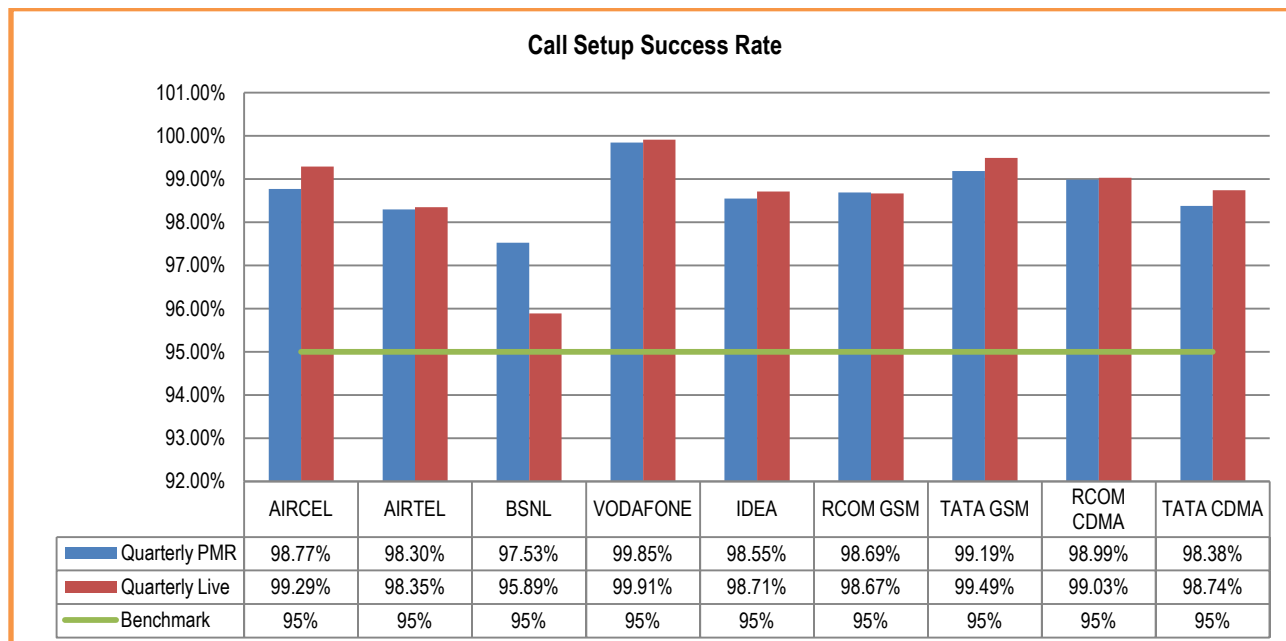
### 2) WORST AFFECTED BTSS DUE TO DOWNTIME :



All operators are meeting the benchmarks except BSNL (During monthly PMR).

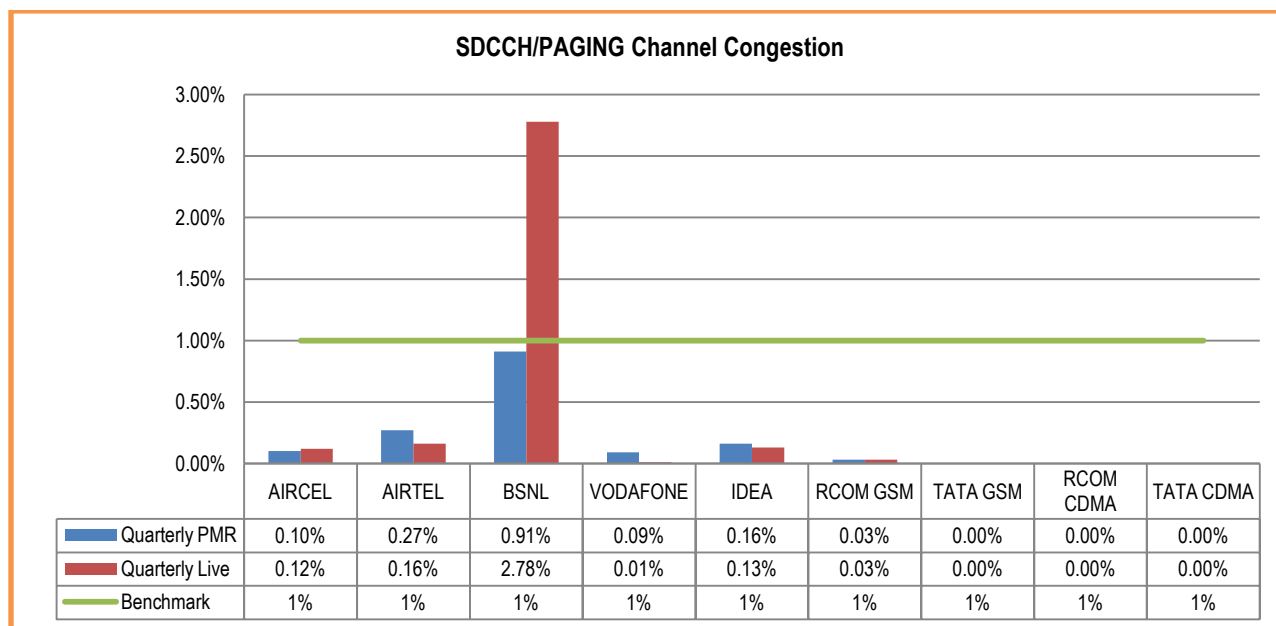


3) CALL SETUP SUCCESS RATE :



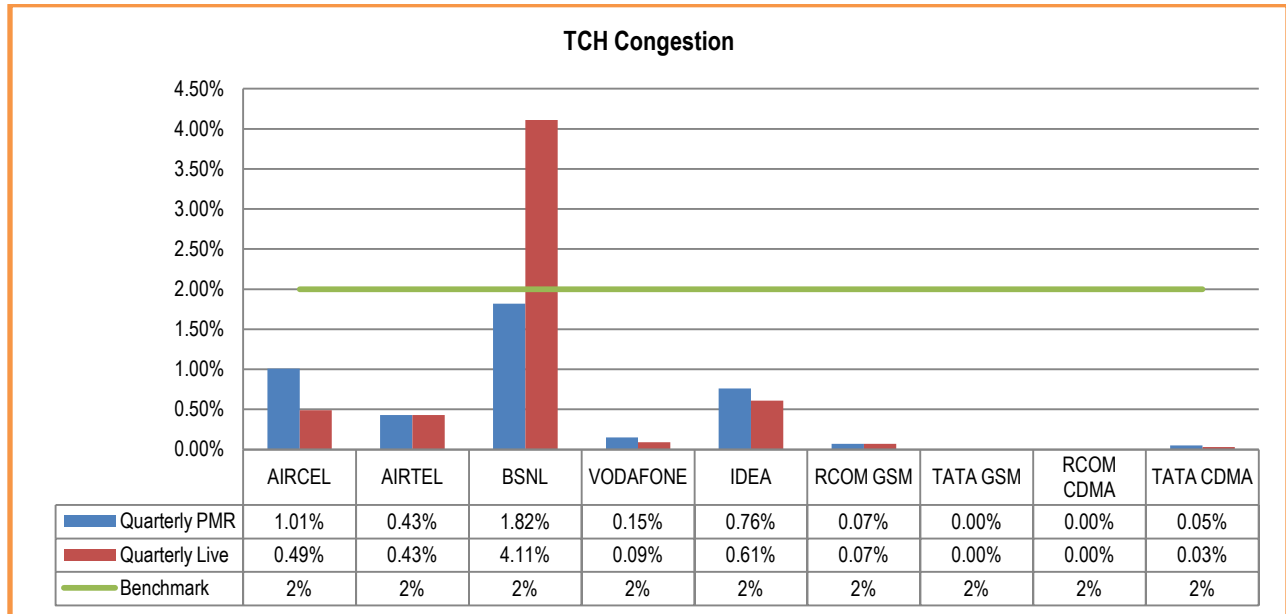
All operators are meeting the benchmarks.

4) SDCCH/PAGING CHANNEL CONGESTION :



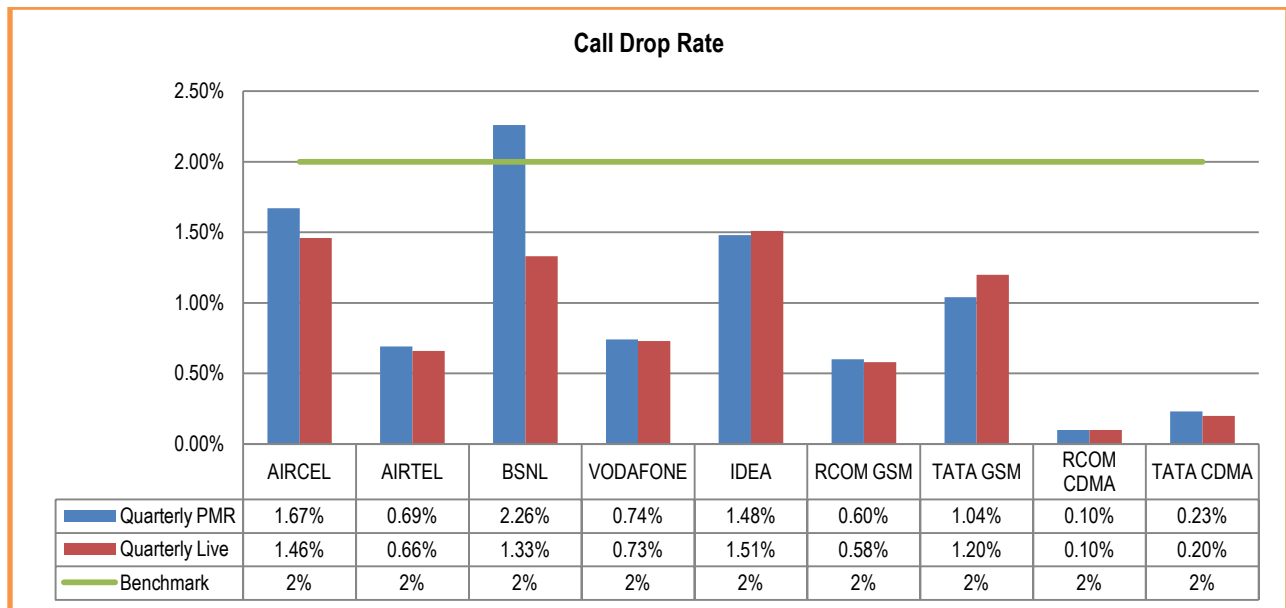
All operators are meeting the benchmarks except BSNL (during 3 days live audit).

5) TCH CONGESTION :



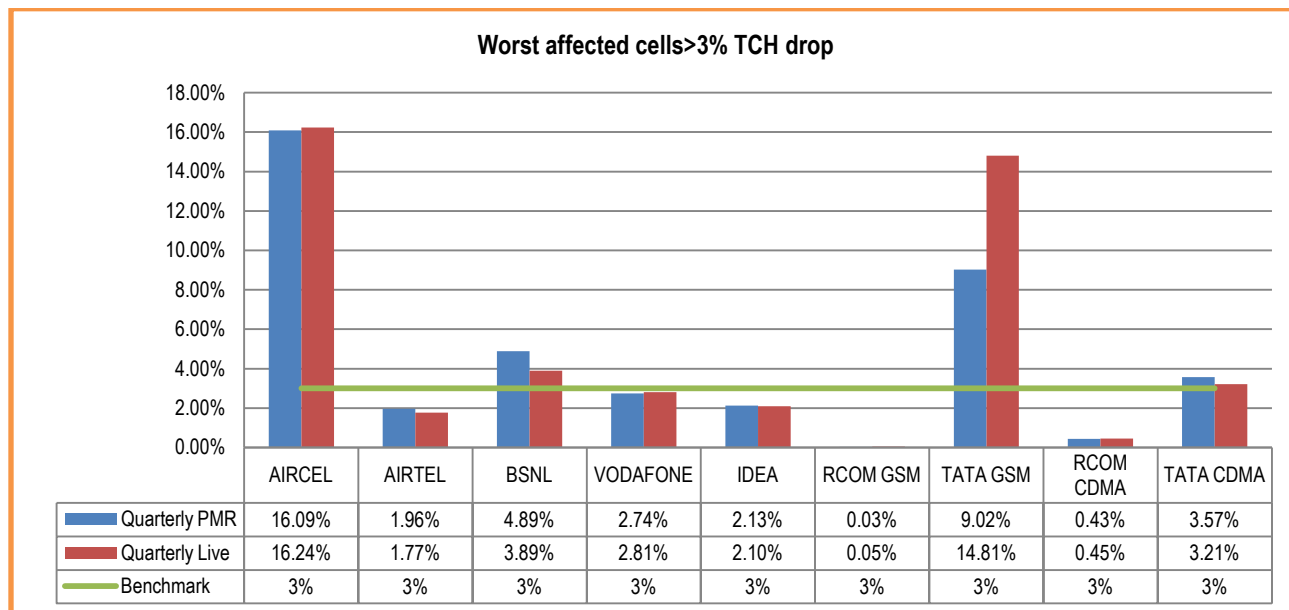
All operators are meeting the benchmarks except BSNL (during 3 day live measurement).

6) CALL DROP RATE :



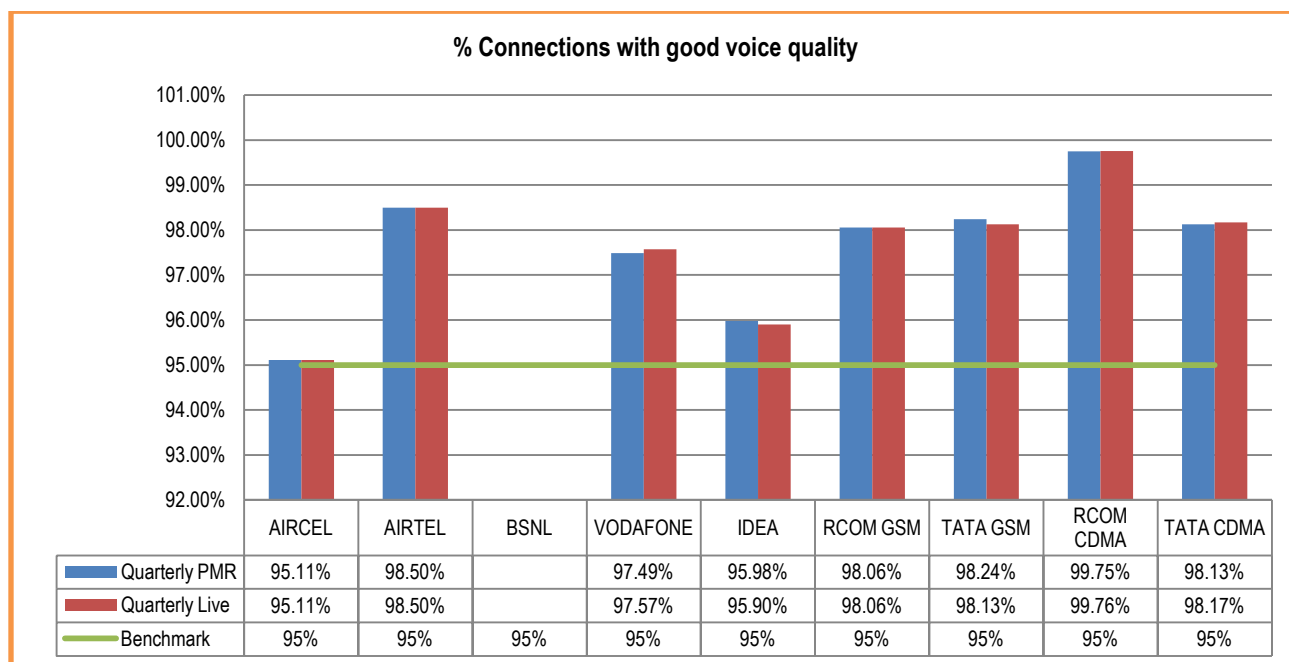
All operators are meeting the benchmarks except BSNL (during monthly PMR).

7) WORST AFFECTED CELLS>3% TCH DROP :



All operators are meeting the benchmarks except Aircel, BSNL, Tata GSM and Tata CDMA.

8) PERCENTAGE OF CONNECTIONS WITH GOOD VOICE QUALITY :



All operators are meeting the benchmarks. BSNL has not provided the data as they are not able to fetch the system generated data.

## 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
Benchmark		≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%	≤ 0.5%
AIRCEL	Reported	0.27	1.28	98.77	0.10	1.01	1.67	16.09	95.12	0
	Verified	0.27%	1.27%	98.77%	0.10%	1.01%	1.67%	16.09%	95.11%	0
AIRTEL	Reported	0.09	0.13	98.46	0.29	0.40	0.70	2.07	98.51	0
	Verified	0.09%	0.13%	98.30%	0.27%	0.43%	0.69%	1.96%	98.50%	0
BSNL	Reported	2.62	5.47	97.53	0.93	1.87	2.26	3.94	64.43	0
	Verified	3.21%	7.96%	97.53%	0.91%	1.82%	2.26%	4.89%	NP	0
VODAFONE	Reported	0.03	0.00	99.85	0.09	0.15	0.74	2.58	97.49	0
	Verified	0.03%	0.00%	99.85%	0.09%	0.15%	0.74%	2.74%	97.49%	0
IDEA	Reported	0.11	0.00	98.55	0.09	0.47	1.00	2.13	95.98	0
	Verified	0.11%	0.00%	98.55%	0.16%	0.76%	1.48%	2.13%	95.98%	0
RCOM GSM	Reported	0.20	0.44	98.70	0.03	0.07	0.60	0.01	98.06	0
	Verified	0.19%	0.44%	98.69%	0.03%	0.07%	0.60%	0.03%	98.06%	0
TATA GSM	Reported	0.00	0.00	99.19	0.00	0.00	1.04	9.02	98.24	0
	Verified	0.00%	0.00%	99.19%	0.00%	0.00%	1.04%	9.02%	98.24%	0
RCOM CDMA	Reported	0.14	0.12	98.99	0.00	0.00	0.10	0.43	99.75	0
	Verified	0.14%	0.12%	98.99%	0.00%	0.00%	0.10%	0.43%	99.75%	0
TATA CDMA	Reported	0.02	0.00	98.38	0.00	0.05	0.23	3.57	98.13	0
	Verified	0.02%	0.00%	98.38%	0.00%	0.05%	0.23%	3.57%	98.13%	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.
- Tata (GSM & CDMA) and Aircel have not met the benchmark for the parameter “Worst affected cells>3% TCH drop”.
- BSNL has not met the benchmark for the parameters “BTS Accumulated Downtime”, “Worst affected BTSs due to downtime”, “CDR (Call Drop Rate) and “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
Benchmark		<= 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	0.00	0.00	100.00	100.00	100.00	98.45	96.65	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	100.00%	98.45%	96.65%	100.00%	100.00%
AIRTEL	Reported	0.01	0.00	100.00	100.00	100.00	100.00	95.26	100.00	100.00
	Verified	0.01%	0.00%	100.00%	100.00%	100.00%	100.00%	95.26%	100.00%	100.00%
BSNL	Reported	0.00	0.02	100.00	100.00	100.00	100.00	75.75	100.00	100.00
	Verified	0.03%	0.01%	100.00%	100.00%	100.00%	100.00%	75.75%	100.00%	100.00%
IDEA	Reported	0.01	0.03	100.00	100.00	100.00	99.15	97.80	100.00	100.00
	Verified	0.01%	0.03%	100.00%	100.00%	100.00%	99.15%	97.80%	100.00%	100.00%
RCOM (GSM)	Reported	0.09	0.09	100.00	100.00	100.00	98.90	93.27	100.00	100.00
	Verified	0.09%	0.09%	100.00%	100.00%	100.00%	98.95%	93.27%	100.00%	100.00%
TATA (GSM)	Reported	0.00	0.00	100.00	100.00	100.00	99.04	99.46	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	100.00%	99.04%	99.46%	100.00%	100.00%
VODAFONE	Reported	0.00	0.00	100.00	100.00	100.00	100.00	99.72	100.00	100.00
	Verified	0.06%	0.16%	100.00%	100.00%	100.00%	100.00%	99.72%	100.00%	100.00%
RCOM (CDMA)	Reported	0.08	0.09	100.00	100.00	100.00	98.82	97.35	100.00	100.00
	Verified	0.08%	0.09%	100.00%	100.00%	100.00%	98.74%	97.35%	100.00%	100.00%
TATA (CDMA)	Reported	0.00	0.00	100.00	100.00	100.00	100.00	99.16	100.00	100.00
	Verified	0.00%	0.00%	100.00%	100.00%	100.00%	97.04%	99.16%	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.
- BSNL and RCOM GSM 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 - pre paid”.