



**Audit & Assessment of Quality of Service
Of
Cellular Mobile Telephone Service
For
Telecom Regulatory Authority of India
North Zone – Himachal Pradesh Service Area
(April 2015 – June 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 20th March, 2009 and the Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated 6th 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



2. OBJECTIVES AND METHODOLOGY

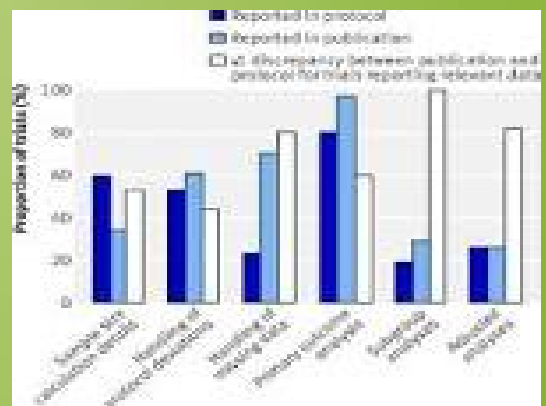
The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband service providers against the parameters notified by TRAI.

The audit and assessment of Quality of Service was carried out by **TUV SUD South Asia across all the Circles/Service areas of North and West Zones for Cellular Mobile Service. Apart from this, QoS audit for Basic (Wire line) and Broadband Services was also undertaken for Punjab, Rajasthan and Gujarat circles during the quarter April 2015 – June 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
		April-15	May-15	June-15	
GSM Operators					
1	AIRCEL	6 to 8 Apr-15	4 to 6 May-15	8 to 10 Jun-15	3rd Floor Keothal Complex Khalini Shimla.
2	AIRTEL	16, 17 & 20 Apr-15	11 to 13 May-15	9 to 11 Jun-15	Bharti Airtel Campus, Plot No 21, Rajiv Gandhi Information and Technology Park, Chandigarh, 160101
3	BSNL	13 to 15 Apr-15	14 to 16 May-16	10 to 12 Jun-15	BSNL Shimla
4	IDEA	13 to 15 Apr-15	11 to 13 May-15	3 to 5 Jun-15	Idea Cellular Limited, Phase -7 Industrial Area, Mohali
5	RCOM GSM	3, 6 & 7 Apr-15	13 to 15 May-15	--	Reliance Communications Ltd., Phase-8, Industrial Area, Mohali
6	TATA GSM	13, 14 & 16 Apr-15	6 to 8 May-15	3 to 5 Jun-15	Tata Teleservices Ltd Charu sood Building Chota Shimla, Kasumpti
7	VODAFONE	1 to 3 Apr-15	11 to 13 May-15	1 to 3 Jun-15	130 durga cottage SDA complex Kasumpti Shimla
CDMA Operators					
8	RCOM CDMA	3, 6 & 7 Apr-15	13 to 15 May-15	10 to 12 Jun-15	Reliance Communications Ltd., Phase-8, Industrial Area, Mohali
9	TATA CDMA	13, 14 & 16 Apr-15	6 to 8 May-15	3 to 5 Jun-15	Tata Teleservices Ltd Charu sood Building Chota Shimla, Kasumpti

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

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

The data generated by monthly PMR and 3-days live measurements audit for the period April 2015 to June 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 June- 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 June- 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 on an average, performance of the operators in the Himachal Pradesh service area was satisfactory for Network related Parameters. However, the audit with respect to the parameter **‘Worst affected cell> 3% TCH Drop’** revealed that quarterly average performance of **Aircel, Tata (GSM) and Tata (CDMA)** was **11.77, 17.83% and 4.99%** 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.

(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 **TCH congestion and CDR**, 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 **TCH congestion and CDR** was **2.75% and 2.46%** respectively. Further, in respect of parameter **‘Worst affected cells> 3 % TCH drops’**, average performance of **Aircel, Tata (GSM) and Tata (CDMA)** was

11.88% ,12.59% and 5.61% respectively. The performance of **Aircel and Tata (GSM)** was way beyond the benchmark of <3%.

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

(iii) With regard to the **Customer Service Quality Parameters**, all service providers are in compliance with respect to the parameter accessibility of call center. However, **Airtel, 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 **94.43%, 51.90% and 94.33%** respectively. The performance of BSNL was way below the benchmark of >95%.

In case of live measurements also , **Airtel and BSNL** have not met the benchmark of '**calls answered by Operators (voice to voice) within 90 seconds**' with their performance as **94.04% and 43.38%** against the benchmark of >=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** and **Call drop rate**. The defaulting Service providers need to take corrective actions to improve their network quality.

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
GSM Operators			
1	AIRCEL	June -15	20:00 - 21:00
2	AIRTEL	June -15	19:00 - 20:00
3	BSNL	June -15	20:00 - 21:00
4	IDEA	June -15	21:00 - 22:00
5	VODAFONE	June -15	20:00 - 21:00
6	RCOM GSM	June -15	--
7	TATA GSM	June -15	20:00 - 21:00
CDMA Operators			
8	RCOM CDMA	June -15	20:00 - 21:00
9	TATA CDMA	June -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
GSM Operators						
1	AIRCEL	1	8	727	Ericsson	Ericsson
2	AIRTEL	6	17	1484	Ericsson	Ericsson
3	BSNL	5	18	1215	Ericsson	Ericsson, NSN & ZTE
4	VODAFONE	1	9	813	NSN	NSN
5	IDEA	2	7	1018	Ericsson	Ericsson
6	RCOM GSM	2	12	751	Huawei & Ericsson	ZTE
7	TATA GSM	1	1	5	NSN	NSN
CDMA Operators						
8	RCOM CDMA	1	NA	285	Lucent	Lucent
9	TATA CDMA	1	1	130	Ericsson	ZTE

5.1.3 QOS PERFORMANCE OF MONTHLY PMR – APRIL 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE - APRIL 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		
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Apr-15	0.29%	0.06%	1.87%	0.03%	0.05%	0.18%	0.00%	0.20%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	Apr-15	1.44%	0.00%	1.91%	0.00%	0.00%	0.67%	0.00%	0.35%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Apr-15	99.27%	99.15%	98.24%	97.60%	98.93%	98.67%	98.67%	99.10%	98.46%
	b) SDCCH/PAGING Channel congestion	<=1%	Apr-15	0.09%	0.15%	0.46%	0.03%	0.14%	0.03%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Apr-15	0.50%	0.11%	1.87%	0.11%	0.41%	0.06%	0.00%	0.00%	0.11%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Apr-15	1.42%	0.42%	1.47%	0.64%	1.24%	0.62%	1.68%	0.09%	0.54%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Apr-15	11.25%	1.19%	2.91%	2.19%	2.49%	0.11%	18.44%	0.24%	7.46%
	c) Connections with good voice quality	>=95%	Apr-15	95.47%	98.86%	NP	97.91%	96.08%	98.12%	97.70%	99.77%	98.17%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Apr-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 – MAY 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE – MAY 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		
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	May-15	0.29%	0.05%	1.96%	0.03%	0.15%	0.21%	0.00%	0.25%	0.11%
	b) Worst affected BTSs due to downtime	<=2%	May-15	1.41%	0.00%	1.98%	0.00%	0.00%	0.53%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	May-15	99.23%	99.23%	98.24%	99.88%	98.90%	98.71%	98.47%	99.09%	98.29%
	b) SDCCH/PAGING Channel congestion	<=1%	May-15	0.14%	0.13%	0.75%	0.06%	0.10%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	May-15	0.59%	0.08%	1.76%	0.12%	0.43%	0.07%	0.00%	0.00%	0.10%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	May-15	1.14%	0.40%	1.41%	0.57%	1.21%	0.57%	1.36%	0.09%	0.33%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	May-15	11.50%	1.30%	2.87%	2.59%	2.46%	0.12%	15.05%	0.29%	4.49%
	c) Connections with good voice quality	>=95%	May-15	95.60%	98.87%	NP	97.86%	96.07%	98.12%	98.03%	99.77%	98.13%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	May-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 – JUNE 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE – JUNE 15 MONTH												
<u>PMR Generation Data</u>		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	
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Jun-15	0.30%	0.06%	1.89%	0.07%	0.11%	**NP	0.00%	0.32%	0.11%
	b) Worst affected BTSs due to downtime	<=2%	Jun-15	1.38%	0.00%	1.98%	0.49%	0.00%	**NP	0.00%	0.70%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Jun-15	99.25%	99.09%	98.45%	99.78%	98.91%	**NP	98.93%	98.97%	98.15%
	b) SDCCH/PAGING Channel congestion	<=1%	Jun-15	0.26%	0.20%	0.63%	0.04%	0.08%	**NP	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Jun-15	0.57%	0.13%	1.77%	0.22%	0.46%	**NP	0.00%	0.00%	0.06%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Jun-15	1.16%	0.50%	1.67%	0.58%	1.20%	**NP	1.30%	0.10%	0.37%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Jun-15	12.56%	1.44%	2.91%	2.67%	2.37%	**NP	20.00%	0.26%	3.03%
	c) Connections with good voice quality	>=95%	Jun-15	95.60%	98.74%	*NP	97.65%	95.99%	**NP	98.10%	99.77%	98.15%
4	No. of POI's having >=0.5% POI congestion	<=0.5%	Jun-15	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.

5.1.6 QOS PERFORMANCE OF QUARTERLY PMR –AVERAGE OF QE- JUNE 15 (APRIL TO JUNE 2015 MONTHS AUDITED DATA)

QUARTERLY QOS PERFORMANCE (AVERAGE OF QE-JUNE-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		
Network Service Quality Parameter												
1	Network Availability											
	a) BTS Accumulated Downtime	<=2%	Quarterly	0.29%	0.06%	1.91%	0.04%	0.10%	0.20%	0.00%	0.26%	0.08%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	1.41%	0.00%	1.96%	0.16%	0.00%	0.60%	0.00%	0.35%	0.00%
2	Connection Establishment (Accessibility)											
	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.25%	99.16%	98.31%	99.09%	98.91%	98.69%	98.69%	99.05%	98.30%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.16%	0.16%	0.61%	0.04%	0.11%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.55%	0.11%	1.80%	0.15%	0.43%	0.07%	0.00%	0.00%	0.09%
3	Connection maintenance (Retainability)											
	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.24%	0.44%	1.52%	0.60%	1.22%	0.60%	1.45%	0.09%	0.41%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	11.77%	1.31%	2.90%	2.48%	2.44%	0.12%	17.83%	0.26%	4.99%
	c) Connections with good voice quality	>=95%	Quarterly	95.56%	98.82%	NP	97.81%	96.05%	98.12%	97.94%	99.77%	98.15%
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.

NB: Calculation for RCOM (GSM) is done on the basis of two months (April & May 15) average data.

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 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.

- **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 were found to be meeting the TRAI specified benchmark**. The lowest call drop rate (average 0.09 %) 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 all the operators (except **Aircel, Tata GSM and Tata CDMA**) met the benchmark for this parameter in all the three months of the quarter. The performance of **Aircel, Tata (GSM) and Tata (CDMA)** on an average was **11.77, 17.83% and 4.99%** 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) – APRIL 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE - APRIL 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		
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.28%	0.03%	1.97%	0.04%	0.04%	0.20%	0.00%	0.36%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.59%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.54%	99.00%	97.31%	97.72%	99.00%	98.64%	98.34%	99.15%	98.30%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.02%	0.22%	0.20%	0.03%	0.08%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.27%	0.15%	2.69%	0.16%	0.34%	0.07%	0.00%	0.00%	0.03%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.22%	0.43%	2.52%	0.64%	1.19%	0.66%	1.65%	0.07%	0.54%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	11.75%	1.35%	2.97%	2.30%	2.61%	0.00%	15.56%	0.51%	8.37%
	c) Connections with good voice quality	>=95%	Live data	95.39%	98.85%	NP	97.95%	96.01%	98.12%	97.94%	99.77%	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.

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

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE- MAY 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		
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.28%	0.01%	1.68%	0.01%	0.14%	0.25%	0.00%	0.19%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.33%	0.00%	0.00%	0.13%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.95%	99.10%	96.61%	99.93%	98.90%	98.85%	99.12%	99.04%	98.55%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.10%	0.21%	1.73%	0.04%	0.10%	0.04%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.86%	0.12%	3.39%	0.07%	0.43%	0.07%	0.00%	0.00%	0.06%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.23%	0.42%	2.65%	0.61%	1.18%	0.54%	0.53%	0.09%	0.25%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	11.17%	1.24%	2.96%	2.38%	2.74%	0.00%	13.33%	0.24%	3.55%
	c) Connections with good voice quality	>=95%	Live data	95.53%	98.86%	NP	97.87%	95.94%	98.12%	97.76%	99.76%	98.15%
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) – JUNE 15 MONTH:

CELLULAR MOBILE TELEPHONE SERVICES HIMACHAL PRADESH CIRCLE- JUNE 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	
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Live data	0.38%	0.04%	1.58%	0.01%	0.07%	**NP	0.00%	0.46%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	0.00%	**NP	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.71%	98.96%	97.82%	99.87%	99.14%	**NP	99.24%	99.00%	98.51%
	b) SDCCH/PAGING Channel congestion	<=1%	Live data	0.21%	0.25%	1.31%	0.02%	0.03%	**NP	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.06%	0.20%	2.18%	0.13%	0.22%	**NP	0.00%	0.00%	0.05%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Live data	1.27%	0.54%	2.20%	0.55%	1.19%	**NP	1.02%	0.11%	0.34%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Live data	12.71%	1.53%	2.90%	2.66%	2.12%	**NP	8.89%	0.31%	4.90%
	c) Connections with good voice quality	>=95%	Live data	95.60%	98.73%	*NP	97.84%	96.07%	**NP	97.76%	99.76%	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.

5.2.4 QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT AUDITED DATA (AVERAGE OF APRIL TO JUNE 2015)

QUARTERLY QOS PERFORMANCE OF 3-DAYS LIVE MEASUREMENT (AVERAGE OF QE – JUNE 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		
Network Service Quality Parameter												
Network Availability												
1	a) BTS Accumulated Downtime	<=2%	Quarterly	0.31%	0.03%	1.74%	0.02%	0.08%	0.23%	0.00%	0.34%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	Quarterly	0.00%	0.00%	0.31%	0.00%	0.00%	0.07%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Quarterly	99.07%	99.02%	97.25%	99.17%	99.01%	98.75%	98.90%	99.06%	98.45%
	b) SDCCH/PAGING Channel congestion	<=1%	Quarterly	0.11%	0.23%	1.08%	0.03%	0.07%	0.04%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Quarterly	0.73%	0.16%	2.75%	0.12%	0.33%	0.07%	0.00%	0.00%	0.05%
Connection maintenance (Retainability)												
3	a) CDR (Call Drop Rate)	<=2%	Quarterly	1.24%	0.46%	2.46%	0.60%	1.19%	0.60%	1.07%	0.09%	0.38%
	b) Worst affected cells>3% TCH drop (Call drop) rate	<=3%	Quarterly	11.88%	1.37%	2.94%	2.45%	2.49%	0.00%	12.59%	0.35%	5.61%
	c) Connections with good voice quality	>=95%	Quarterly	95.51%	98.81%	NP	97.89%	96.01%	98.12%	97.82%	99.76%	98.16%
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.

NB: Calculation for RCOM (GSM) is done on the basis of two months (April & May 15) average data.

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 **TCH congestion and CDR**, 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 **TCH congestion and CDR** was **2.75% and 2.46%** respectively. Further, in respect of parameter **'Worst affected cells> 3 % TCH drops'**, average performance of **Aircel, Tata (GSM) and Tata (CDMA)** was **11.88% ,12.59% and 5.61%** respectively. The performance of **Aircel and Tata (GSM)** was way beyond the benchmark of <3%.

Similar non-compliance of **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- April 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		
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		Apr-15	695	1473	1202	810	962	751	5	284	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		Apr-15	1440.75	588.47	16171.85	195.44	350.72	952.07	0.00	412.35	11.62
	c) BTS Accumulated Downtime	<=2%	Apr-15	0.29%	0.06%	1.87%	0.03%	0.05%	0.18%	0.00%	0.20%	0.01%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Apr-15	10	0	23	0	0	5	0	1	0
	e) Worst affected BTSs due to downtime	<=2%	Apr-15	1.44%	0.00%	1.91%	0.00%	0.00%	0.67%	0.00%	0.35%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Apr-15	99.27%	99.15%	98.24%	97.60%	98.93%	98.67%	98.67%	99.10%	98.46%
	b) SDCCCH/PAGING Congestion	<=1%	Apr-15	0.09%	0.15%	0.46%	0.03%	0.14%	0.03%	0.01%	0.00%	0.00%
	c) TCH congestion	<=2%	Apr-15	0.50%	0.11%	1.87%	0.11%	0.41%	0.06%	0.00%	0.00%	0.11%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	Apr-15	1.42%	0.42%	1.47%	0.64%	1.24%	0.62%	1.68%	0.09%	0.54%
	b) Worst affected cells>3% TCH drop	<=3%	Apr-15	11.25%	1.19%	2.91%	2.19%	2.49%	0.11%	18.44%	0.24%	7.46%
	c) % of connections with good voice quality	>=95%	Apr-15	95.47%	98.86%	NP	97.91%	96.08%	98.12%	97.70%	99.77%	98.17%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Apr-15	227	51	100	54	71	3	3	2	32
	e) Total no. of cells (Sector) in the licensed service area		Apr-15	2019	4298	3438	2466	2854	2250	15	849	422
No. of POI's having >=0.5% POI congestion												
4	No. of POI's having >=0.5% POI congestion		Apr-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Apr-15	0	0	0	0	0	0	0	0	0
Network Data												
5	a) Equipped Capacity of Network in Erlang		Apr-15	30560	62834	74000	18063	37485	40000	165	28000	17302
	b) Total traffic in TCBH in erlang (Avg.)		Apr-15	14798	56270	30443	14316	15383	28158	5	2712	2021
	c) Total no. of customers served (as per VLR) on last day of the month		Apr-15	559308	2400985	1115586	568444	748956	1325412	502	92845	25195

TABLE: 2

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live measurement - HP Circle- Apr 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		
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		Live data	662	1470	1190	810	952	751	5	282	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	135.05	33.37	1690.27	20.59	27.97	108.83	0.00	73.07	0.00
	c) BTS Accumulated Downtime	<=2%	Live data	0.28%	0.03%	1.97%	0.04%	0.04%	0.20%	0.00%	0.36%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	7	0	0	0	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.59%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	99.54%	99.00%	97.31%	97.72%	99.00%	98.64%	98.34%	99.15%	98.30%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.02%	0.22%	0.20%	0.03%	0.08%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	0.27%	0.15%	2.69%	0.16%	0.34%	0.07%	0.00%	0.00%	0.03%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.22%	0.43%	2.52%	0.64%	1.19%	0.66%	1.65%	0.07%	0.54%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	11.75%	1.35%	2.97%	2.30%	2.61%	0.00%	15.56%	0.51%	8.37%
	c) % of connections with good voice quality	>=95%	Live data	95.39%	98.85%	NP	97.95%	96.01%	98.12%	97.94%	99.77%	98.19%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	232	58	101	57	74	0	2	4	35
	e) Total no. of cells (Sector) in the licensed service area		Live data	1974	4308	3399	2465	2849	2250	15	845	422
No. of POI's having >=0.5% POI congestion												
4	No. of POI's having >=0.5% POI congestion		Live data	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		Live data	0	0	0	0	0	0	0	0	0

TABLE: 3

Detailed Network Data Assessment of Cellular Mobile Telephone Services- Himachal Pradesh Circle - May 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		
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		May-15	711	1476	1213	810	982	751	5	285	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		May-15	1553.87	580.45	17680.19	208.40	1060.19	1197.87	0.00	535.63	105.33
	c) BTS Accumulated Downtime	<=2%	May-15	0.29%	0.05%	1.96%	0.03%	0.15%	0.21%	0.00%	0.25%	0.11%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		May-15	10	0	24	0	0	4	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	May-15	1.41%	0.00%	1.98%	0.00%	0.00%	0.53%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	May-15	99.23%	99.23%	98.24%	99.88%	98.90%	98.71%	98.47%	99.09%	98.29%
	b) SDCCH/PAGING Congestion	<=1%	May-15	0.14%	0.13%	0.75%	0.06%	0.10%	0.03%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	May-15	0.59%	0.08%	1.76%	0.12%	0.43%	0.07%	0.00%	0.00%	0.10%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	May-15	1.14%	0.40%	1.41%	0.57%	1.21%	0.57%	1.36%	0.09%	0.33%
	b) Worst affected cells>3% TCH drop	<=3%	May-15	11.50%	1.30%	2.87%	2.59%	2.46%	0.12%	15.05%	0.29%	4.49%
	c) % of connections with good voice quality	>=95%	May-15	95.60%	98.87%	NP	97.86%	96.07%	98.12%	98.03%	99.77%	98.13%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		May-15	243	56	100	64	71	3	2	2	19
	e) Total no. of cells (Sector) in the licensed service area		May-15	2110	4320	3491	2467	2897	2250	15	854	422
No. of POI's having >=0.5% POI congestion												
4	No. of POI's having >=0.5% POI congestion		May-15	0	0	0	0	0	0	0	0	0
	Name of POI not meeting the benchmark		May-15	0	0	0	0	0	0	0	0	0
Network Data												
5	a) Equipped Capacity of Network in Erlang		May-15	31261	63599	74000	18458	37848	40000	165	28000	17302
	b) Total traffic in TCBH in erlang (Avg.)		May-15	15021	57603	33758	14955	15607	26993	6	2717	2109
	c) Total no. of customers served (as per VLR) on last day of the month		May-15	573032	2477382	1127924	601416	779172	1363030	20989	95423	26178

TABLE: 4

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live measurement - HP Circle- May 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		
Network Service Quality Parameter												
1	Network Availability											
	a) Total no. of BTSs in the licensed service area		Live data	704	1476	1204	810	967	751	5	284	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	143.25	15.45	1454.89	8.18	97.60	135.08	0.00	37.85	0.35
	c) BTS Accumulated Downtime	<=2%	Live data	0.28%	0.01%	1.68%	0.01%	0.14%	0.25%	0.00%	0.19%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	4	0	0	1	0	0	0
e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.33%	0.00%	0.00%	0.13%	0.00%	0.00%	0.00%	
2	Connection Establishment (Accessibility)											
	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.95%	99.10%	96.61%	99.93%	98.90%	98.85%	99.12%	99.04%	98.55%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.10%	0.21%	1.73%	0.04%	0.10%	0.04%	0.00%	0.00%	0.00%
c) TCH congestion	<=2%	Live data	0.86%	0.12%	3.39%	0.07%	0.43%	0.07%	0.00%	0.00%	0.06%	
3	Connection Maintenance (Retainability)											
	a) Call Drop Rate (CDR)	<=2%	Live data	1.23%	0.42%	2.65%	0.61%	1.18%	0.54%	0.53%	0.09%	0.25%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	11.17%	1.24%	2.96%	2.38%	2.74%	0.00%	13.33%	0.24%	3.55%
	c) % of connections with good voice quality	>=95%	Live data	95.53%	98.86%	NP	97.87%	95.94%	98.12%	97.76%	99.76%	98.15%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	235	54	103	59	79	0	2	2	15
e) Total no. of cells (Sector) in the licensed service area		Live data	2100	4330	3485	2467	2887	2250	15	851	422	
4	No. of POI's having >=0.5% POI congestion											
	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- June 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		
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		Jun-15	727	1484	1215	813	1018	NP	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		Jun-15	1573	598	16564	392	781	NP	0	661	106
	c) BTS Accumulated Downtime	<=2%	Jun-15	0.30%	0.06%	1.89%	0.07%	0.11%	NP	0.00%	0.32%	0.11%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Jun-15	10	0	24	4	0	NP	0	2	0
	e) Worst affected BTSs due to downtime	<=2%	Jun-15	1.38%	0.00%	1.98%	0.49%	0.00%	NP	0.00%	0.70%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Jun-15	99.25%	99.09%	98.45%	99.78%	98.91%	NP	98.93%	98.97%	98.15%
	b) SDCCH/PAGING Congestion	<=1%	Jun-15	0.26%	0.20%	0.63%	0.04%	0.08%	NP	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Jun-15	0.57%	0.13%	1.77%	0.22%	0.46%	NP	0.00%	0.00%	0.06%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	Jun-15	1.16%	0.50%	1.67%	0.58%	1.20%	NP	1.30%	0.10%	0.37%
	b) Worst affected cells>3% TCH drop	<=3%	Jun-15	12.56%	1.44%	2.91%	2.67%	2.37%	NP	20.00%	0.26%	3.03%
	c) % of connections with good voice quality	>=95%	Jun-15	95.60%	98.74%	NP	97.65%	95.99%	NP	98.10%	99.77%	98.15%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Jun-15	268	62	102	66	70	NP	3	2	13
	e) Total no. of cells (Sector) in the licensed service area		Jun-15	2134	4336	3518	2467	2966	NP	15	856	422
No. of POI's having >=0.5% POI congestion												
4	No. of POI's having >=0.5% POI congestion		Jun-15	0	0	0	0	0	NP	0	0	0
	Name of POI not meeting the benchmark		Jun-15	0	0	0	0	0	NP	0	0	0
Network Data												
5	a) Equipped Capacity of Network in Erlang		Jun-15	31057	64012	74000	18199	38900	NP	165	NP	17302
	b) Total traffic in TCBH in erlang (Avg.)		Jun-15	15614	58206	32985	15887	16707	NP	6	NP	
	c) Total no. of customers served (as per VLR) on last day of the month		Jun-15	582493	2479898	1132178	609876	797415	NP	547	NP	24824

TABLE: 6

Detailed Network Data Assessment of Cellular Mobile Telephone Services-3 days live measurement - HP Circle- Jun 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		
Network Service Quality Parameter												
Network Availability												
1	a) Total no. of BTSs in the licensed service area		Live data	711	1479	1214	810	982	NP	5	285	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	195.48	38.86	1384.07	7.89	49.89	NP	0.00	95.10	0.00
	c) BTS Accumulated Downtime	<=2%	Live data	0.38%	0.04%	1.58%	0.01%	0.07%	NP	0.00%	0.46%	0.00%
	d) No. of BTSs having accumulated downtime of >24 hours in a month		Live data	0	0	0	0	0	NP	0	0	0
	e) Worst affected BTSs due to downtime	<=2%	Live data	0.00%	0.00%	0.00%	0.00%	0.00%	NP	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)												
2	a) CSSR (Call Setup Success Rate)	>=95%	Live data	98.71%	98.96%	97.82%	99.87%	99.14%	NP	99.24%	99.00%	98.51%
	b) SDCCH/PAGING Congestion	<=1%	Live data	0.21%	0.25%	1.31%	0.02%	0.03%	NP	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	Live data	1.06%	0.20%	2.18%	0.13%	0.22%	NP	0.00%	0.00%	0.05%
Connection Maintenance (Retainability)												
3	a) Call Drop Rate (CDR)	<=2%	Live data	1.27%	0.54%	2.20%	0.55%	1.19%	NP	1.02%	0.11%	0.34%
	b) Worst affected cells>3% TCH drop	<=3%	Live data	12.71%	1.53%	2.90%	2.66%	2.12%	NP	8.89%	0.31%	4.90%
	c) % of connections with good voice quality	>=95%	Live data	95.60%	98.73%	NP	97.84%	96.07%	NP	97.76%	99.76%	98.15%
	d) Total No. of cells exceeding 3% TCH drop (call drop)		Live data	270	66	102	66	62	NP	1	3	21
	e) Total no. of cells (Sector) in the licensed service area		Live data	2121	4337	3515	2467	2938	NP	15	854	422
No. of POI's having >=0.5% POI congestion												
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

CUSTOMER SERVICE QUALITY (CSD) PARAMETERS



5.3 CUSTOMER SERVICE QUALITY PARAMETERS MEASUREMENT FOR CMTS-QE JUNE-15:

5.3.1 QUARTERLY CUSTOMER SERVICE DELIVERY (CSD) AUDITED DATA FOR CELLULAR MOBILE SERVICES (APRIL TO JUNE 2015 MONTHS AUDITED DATA):

QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE JUNE 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		
Customer Service Quality Parameters												
Metering & Billing Credibility -Post Paid												
1	A) No. of bills issued during the quarter		HP	4145	120517	145223	20650	24110	11880	34823	12906	13451
	B) No. of bills disputed including billing complaints during the quarter		HP	0	32	51	6	20	0	18	11	1
	C)% of billing complaints during the quarter	<= 0.1%	HP	0.00%	0.03%	0.04%	0.03%	0.08%	0.00%	0.05%	0.09%	0.01%
Metering & Billing Credibility -Pre Paid												
2	A) Total No. of Pre-paid customers at the end of the quarter		HP	975568	2597183	1328046	724799	1428752	53100	643234	168797	34065
	B) Total No. of complaints relating to charging, Credit and Validity during the quarter		HP	7	24	275	137	1281	0	510	134	0
	C) % of Pre-paid Charging Complaints	<= 0.1%	HP	0.00%	0.001%	0.02%	0.02%	0.09%	0.000%	0.08%	0.08%	0.00%
Resolution of Billing/Charging Complaints and Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints												
3	A) No. of Billing/Charging/Credit/Validity Complaints received during the quarter		HP	7	56	326	477	1301	0	528	145	1
	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	7	56	326	477	1301	0	528	145	1
	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	7	56	326	477	1301	0	528	145	1
	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%	100%	100%	100%	100%	100%	100%	100%	100%
	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%	100%	100%	100%	100%	100%	100%	100%	100%
	F) % of Period of applying credit/Waiver/Adjustment to customers account from the date of resolution of complaints	<=1 week	HP	100%	100%	100%	100%	100%	100%	100%	100%	100%

QUARTERLY CSD DATA FOR CELLULAR MOBILE TELEPHONE SERVICES - QE JUNE 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		
Response time to customers for assistance												
4	A) Total no of calls attempted to customer care/Call center		HP	1959695	619976	94128	1238308	1778152	12584	1381057	125072	12584
	B) Total no. of calls successfully established to customer care/Call center.		HP	1949151	619847	94128	1227341	1759605	12487	1381057	124269	12487
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	HP	99.46%	99.98%	100%	99.11%	98.96%	99.23%	100%	99.36%	99.23%
	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		HP	351174	988625	594384	434664	673556	9061	365226	123957	5717
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		HP	342877	933571	308462	428107	635386	9042	364389	119057	5680
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 Sec.*100 / Total call attempts)	>=95%	HP	97.64%	94.43%	51.90%	98.49%	94.33%	99.79%	99.77%	96.05%	99.35%
Termination/closure of service												
5	A) Total No. of requests for Termination / Closure of service received during the quarter		HP	33	433	1450	206	60	150	200	20	284
	B) No. of requests for Termination /Closure of service complied within 7 days during the quarter		HP	33	433	1450	206	60	150	200	20	284
	C) % of Termination/ Closure of service within 7 days	<=7days	HP	100%	100%	100%	100%	100%	100%	100%	100%	100%
Time taken for refunds of deposits after closures.												
6	A) No. of Payments/ Refunds due during the quarter		HP	44	95	1136	42	32	54	200	16	64
	B) No. of Payments/ Refunds Cleared during the quarter		HP	44	95	1136	42	32	54	200	16	64
	C)Time taken for refunds of deposits after closures.	100% within 60 days	HP	100%	100%	100%	100%	100%	100%	100%	100%	100%

NB: Accessibility of call center / Customer care data of RCOM (GSM & CDMA) are based on average of two months' data i.e. April & May 15 as June-15 month data was not provided by RCOM (GSM & CDMA) due to TTI server issue.

5.3.2 3 DAYS LIVE CSD AUDITED DATA FOR CELLULAR MOBILE SERVICES (QE –JUNE 2015):

CSD 3 DAYS LIVE DATA FOR CELLULAR MOBILE TELEPHONE SERVICES – QE – JUNE 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		
Response time to customers for assistance												
1	A) Total no of calls attempted to customer care/Call center		HP	75546	38462	1099	43278	NP	483	46877	NP	483
	B) Total no. of calls successfully established to customer care/Call center.		HP	75235	38432	1099	42888	NP	477	46877	NP	477
	C) % Accessibility of Call centre /customer Care (Total calls successfully established *100/ Total call attempts)	>=95%	HP	99.59%	99.92%	100%	99.10%	NP	98.76%	100%	NP	98.76%
2	D) Total Calls reached to operator for Voice to Voice (Total call attempts)		HP	12635	34292	20689	14240	23190	283	12827	3947	225
	E) Total number of calls answered by the operator (Voice to voice) within 90 seconds		HP	12116	32248	8974	13717	22680	282	12808	3904	220
	F) % age of calls answered by operator (voice to voice) (Total calls successfully established within 90 sec.*100 / Total call attempts)	>=95%	HP	95.89%	94.04%	43.38%	96.33%	97.80%	99.65%	99.85%	98.91%	97.78%

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 $\leq 0.1\%$.

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, **Airtel, 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 **94.43%, 51.90% and 94.33%** 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 **Airtel** and **BSNL** have not met the benchmark with their performance as **94.04%** and **43.38%** 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	AIRCEL	AIRTEL	BSNL	IDEA	VODAFONE	RCOM GSM	TATA GSM	RCOM CDMA	TATA CDMA
AIRCEL	HP	--	100%	100%	100%	100%	100%	100%	100%	100%
AIRTEL	HP	100%	--	100%	100%	100%	100%	100%	100%	100%
BSNL	HP	100%	100%	--	100%	100%	100%	100%	100%	100%
IDEA	HP	100%	100%	100%	--	100%	100%	100%	100%	100%
VODAFONE	HP	100%	100%	100%	100%	--	100%	100%	100%	100%
RCOM GSM	HP	100%	100%	100%	100%	100%	--	100%	100%	100%
TATA GSM	HP	100%	100%	100%	100%	100%	100%	--	100%	100%
RCOM CDMA	HP	100%	100%	100%	100%	100%	100%	100%	--	100%
TATA CDMA	HP	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	100	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%	100%	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, and RCOM (CDMA), were 98% and 96% respectively.

6.3 LIVE CALLING ASSESSMENT FOR BILLING COMPLAINTS:

TELEPHONIC INTERVIEW FOR BILLING COMPLAINTS										
Parameter	Circle Name	AIRCEL	AIRTEL	BSNL	IDEA	RCOM (GSM)	TATA (GSM)	VODAFONE	RCOM (CDMA)	TATA (CDMA)
Total No. of calls Attempted	HP	7	150	51	138	130	0	18	140	1
Total No. of calls Answered	HP	2	120	37	100	110	0	18	120	0
Cases resolved within 4 weeks	HP	2	120	37	100	110	0	18	120	0
%age of cases resolved	HP	100%	100%	100%	100%	100%	100%	100%	100%	100%

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	SSA Name	Name of SDCA	Emergency No.	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	RCOM CDMA	TATA GSM	TATA CDMA	VODAFONE		
April'15	Kullu	Kullu	100	2	√	√	√	√	√	√	√	√	√		
			101	2	√	√	√	√	√	√	√	√	√	√	
			108	2	√	√	√	√	√	√	√	√	√	√	√
			1073	2	√	√	√	√	√	√	√	√	√	√	√
			1091	2	√	√	√	√	√	√	√	√	√	√	√
			1098	2	√	√	√	√	√	√	√	√	√	√	√
		Manali	100	2	√	√	√	√	√	√	√	√	√	√	√
			101	2	√	√	√	√	√	√	√	√	√	√	√
			108	2	√	√	√	√	√	√	√	√	√	√	√
			1073	2	√	√	√	√	√	√	√	√	√	√	√
			1091	2	√	√	√	√	√	√	√	√	√	√	√
			1098	2	√	√	√	√	√	√	√	√	√	√	√
		Naggar	100	2	√	√	√	√	√	√	√	√	√	√	√
			101	2	√	√	√	√	√	√	√	√	√	√	√
			108	2	√	√	√	√	√	√	√	√	√	√	√
			1073	2	√	√	√	√	√	√	√	√	√	√	√
			1091	2	√	√	√	√	√	√	√	√	√	√	√
			1098	2	√	√	√	√	√	√	√	√	√	√	√
May'15	Hamirpur	Hamirpur	100	2	√	√	√	√	√	√	√	√	√		
			101	2	√	√	√	√	√	√	√	√	√	√	
			108	2	√	√	√	√	√	√	√	√	√	√	
			1073	2	√	√	√	√	√	√	√	√	√	√	
			1091	2	√	√	√	√	√	√	√	√	√	√	
			1098	2	√	√	√	√	√	√	√	√	√	√	
		Kuthera	100	2	√	√	√	√	√	√	√	√	√	√	√
			101	2	√	√	√	√	√	√	√	√	√	√	√
			108	2	√	√	√	√	√	√	√	√	√	√	√
			1073	2	√	√	√	√	√	√	√	√	√	√	√
			1091	2	√	√	√	√	√	√	√	√	√	√	√
			1098	2	√	√	√	√	√	√	√	√	√	√	√

LEVEL 1 LIVE CALLING															
Month	SSA Name	Name of SDCA	Emergency No.	No. of calls made	AIRCEL	AIRTEL	BSNL	IDEA	RCOM GSM	RCOM CDMA	TATA GSM	TATA CDMA	VODAFONE		
June'15	Solan	Una	100	2	√	√	√	√	√	√	√	√	√		
			101	2	√	√	√	√	√	√	√	√	√	√	
			108	2	√	√	√	√	√	√	√	√	√	√	
			1073	2	√	√	√	√	√	√	√	√	√	√	
			1091	2	√	√	√	√	√	√	√	√	√	√	
			1098	2	√	√	√	√	√	√	√	√	√	√	
		Solan	100	2	√	√	√	√	√	√	√	√	√	√	√
			101	2	√	√	√	√	√	√	√	√	√	√	√
			108	2	√	√	√	√	√	√	√	√	√	√	√
			1073	2	√	√	√	√	√	√	√	√	√	√	√
			1091	2	√	√	√	√	√	√	√	√	√	√	√
			1098	2	√	√	√	√	√	√	√	√	√	√	√
		Baddi	100	2	√	√	√	√	√	√	√	√	√	√	√
			101	2	√	√	√	√	√	√	√	√	√	√	√
			108	2	√	√	√	√	√	√	√	√	√	√	√
			1073	2	√	√	√	√	√	√	√	√	√	√	√
			1091	2	√	√	√	√	√	√	√	√	√	√	√
			1098	2	√	√	√	√	√	√	√	√	√	√	√
Barodiwaola	100	2	√	√	√	√	√	√	√	√	√	√	√		
	101	2	√	√	√	√	√	√	√	√	√	√	√		
	108	2	√	√	√	√	√	√	√	√	√	√	√		
	1073	2	√	√	√	√	√	√	√	√	√	√	√		
	1091	2	√	√	√	√	√	√	√	√	√	√	√		
	1098	2	√	√	√	√	√	√	√	√	√	√	√		

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 21st 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 **Kullu, Hamirpur and Solan** in the months of April, May and June 2015 respectively. The total route Kms covered during the drive tests in the respective SSAs was **415 Kms, 445 Kms and 390 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 ≥ -75 dBm for in-door coverage and ≥ -85 dBm for in-vehicle.

7.1 OPERATOR ASSISTED DRIVE TEST: KULLU SSA (APRIL-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	104	30	106	30	124	30	118	30	94	30	138	30	114	30	80	30	9	30	
		Highways	86	30	158	30	115	30	68	30	76	30	113	30	82	30	62	30	75	16	
		Within City	108	30	153	30	130	30	74	30	66	30	120	30	172	30	116	30	102	0	
		Overall SSA	298	90	417	90	369	90	260	90	236	90	371	90	368	90	258	90	186	46	
2	Blocked Call Rate	Major Roads	0.00%	0.00%	0.00%	0.00%	3.23%	0.00%	0.85%	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%	2.61%	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%	0.77%	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	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	2.17%	0.00%	0.38%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
3	Dropped Call Rate (<=2%)	Major Roads	0.00%	0.00%	0.00%	0.00%	4.17%	0.00%	0.85%	0.00%	0.00%	0.00%	0.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highways	0.00%	0.00%	0.63%	0.00%	2.68%	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%	0.65%	0.00%	0.78%	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	
		Overall SSA	0.00%	0.00%	0.48%	0.00%	2.49%	0.00%	0.39%	0.00%	0.00%	0.00%	0.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
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	99.33%	100%	99.81%	99.88%
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.93%	99.94%	97.62%	100%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.72%	99.72%	96.62%	NC
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.65%	99.89%	97.17%	99.92%

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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	OUTDOOR	INDOOR
			(b) 0-5 (with frequency hopping for GSM Operators)	Major Roads	98.88%	99.16%	96.27%	97.92%	93.78%	97.95%	96.33%	98.46%	98.74%	98.78%	99.29%	99.32%	97.23%	98.94%	NA	NA	NA	NA
Highways	98.80%	99.22%		97.20%	99.05%	94.31%	98.78%	96.05%	99.78%	98.75%	99.26%	99.44%	99.71%	96.59%	99.39%	NA	NA	NA	NA	NA	NA	
Within City	98.12%	99.48%		95.81%	99.35%	92.54%	97.72%	96.91%	96.14%	98.24%	99.61%	98.99%	99.97%	96.16%	99.73%	NA	NA	NA	NA	NA	NA	
Overall SSA	98.58%	99.28%		96.38%	98.77%	93.51%	98.13%	96.46%	98.55%	98.58%	99.23%	99.23%	99.67%	96.59%	99.37%	NA	NA	NA	NA	NA	NA	
Service Coverage																						
5	In door (>= - 75dBm)	Major Roads	25.21%	51.20%	80.14%	99.80%	28.54%	91.90%	15.56%	74.00%	46.13%	78.55%	54.47%	99.49%	27.69%	21.55%	43.91%	100%	30.60%	84.62%		
		Highways	46.82%	38.20%	52.35%	87.39%	45.15%	87.30%	30.31%	93.20%	48.99%	81.18%	63.63%	82.97%	45.84%	81.59%	59.69%	100%	24.57%	91.35%		
		Within City	60.09%	55.10%	91.64%	74.76%	47.25%	81.00%	44.15%	47.70%	70.75%	70.73%	76.16%	91.54%	74.19%	74.45%	76.32%	99.26%	58.42%	NC		
		Overall SSA	43.98%	48.20%	75.53%	87.30%	40.35%	86.79%	29.03%	74.37%	54.99%	76.76%	64.38%	91.41%	53.43%	60.96%	62.28%	99.76%	43.40%	86.96%		
5	In-vehicle (>= -85dBm)	Major Roads	65.91%	99.50%	90.42%	100%	70.95%	98.30%	49.37%	99.30%	90.02%	98.12%	87.83%	100%	59.13%	91.54%	80.13%	100%	45.97%	100%		
		Highways	84.09%	94.60%	73.69%	99.53%	85.96%	99.10%	67.78%	99.90%	89.51%	98.66%	93.01%	98.69%	79.81%	98.82%	82.57%	100%	60.81%	91.35%		
		Within City	90.54%	97.00%	98.82%	95.44%	80.83%	99.60%	83.48%	79.80%	96.74%	98.39%	97.50%	99.89%	95.71%	97.13%	89.99%	100%	74.53%	NC		
		Overall SSA	80.03%	97.03%	88.21%	98.31%	79.14%	98.99%	65.66%	95.08%	91.95%	98.40%	92.57%	99.54%	80.85%	96.03%	85.14%	100%	67.58%	96.99%		
5	Outdoor- in city (>= - 95dBm)	Major Roads	94.77%	100%	97.99%	100%	93.02%	100%	87.72%	100%	98.59%	98.33%	98.75%	100%	85.49%	99.93%	99.45%	100%	59.95%	0.00%		
		Highways	99.45%	99.90%	96.79%	100%	98.99%	100%	93.77%	100%	98.54%	99.28%	99.85%	100%	98.08%	100%	99.39%	100%	93.17%	0.00%		
		Within City	96.30%	100%	99.98%	99.97%	98.74%	100%	98.22%	96.60%	98.49%	99.29%	99.99%	100%	99.68%	99.92%	99.93%	100%	96.25%	NC		
		Overall SSA	96.71%	99.97%	98.36%	99.99%	96.91%	100%	92.84%	99.23%	98.54%	98.99%	99.48%	100%	94.96%	99.95%	99.65%	100%	93.20%	0.00%		
6	Call Setup Success Rate (>=95%)	Major Roads	100%	100%	100%	100%	96.77%	100%	99.15%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%		
		Highways	100%	100%	100%	100%	97.39%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	
		Within City	100%	100%	100%	100%	99.23%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	NC	

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	
			Overall SSA	100%	100%	100%	100%	97.83%	100%	99.62%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
7	Hand Over Success Rate (HOSR)	Major Roads	100%	100%	100%	100%	97.20%	100%	100%	100%	100%	100%	98.05%	100%	100%	100%	100%	100%	100%	100%	100%
		Highways	100%	100%	100%	100%	97.26%	100%	100%	100%	100%	100%	99.39%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.57%	100%	99.71%	100%	98.67%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	NC
		Overall SSA	99.81%	100%	99.87%	100%	97.91%	100%	100%	100%	100%	100%	99.36%	100%	100%	100%	100%	100%	100%	100%	100%

NA: Not Applicable

NC: No Coverage

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

7.2 OPERATOR ASSISTED DRIVE TEST: HAMIRPUR SSA (MAY-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	124	30	153	30	161	30	115	31	59	30	152	30	90	32	158	30	29	30	
		Highways	185	30	179	30	176	30	179	30	147	30	208	30	191	31	199	30	36	16	
		Within City	92	30	141	30	98	30	112	30	114	30	106	30	107	31	113	30	107	30	
		Overall SSA	401	90	473	90	435	90	406	91	320	90	466	90	388	94	470	90	172	76	
2	Blocked Call Rate	Major Roads	0.00%	0.00%	0.65%	0.00%	1.86%	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%	1.70%	0.00%	0.00%	0.00%	0.00%	0.00%	0.48%	0.00%	0.52%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.71%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.93%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.00%	0.00%	0.42%	0.00%	1.38%	0.00%	0.00%	0.00%	0.00%	0.00%	0.21%	0.00%	0.52%	0.00%	0.00%	0.00%	0.00%	0.00%	
3	Dropped Call Rate (<=2%)	Major Roads	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.11%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highways	0.00%	0.00%	0.00%	0.00%	2.31%	0.00%	0.00%	0.00%	1.36%	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%	2.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.94%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.00%	0.00%	0.00%	0.00%	1.63%	0.00%	0.00%	0.00%	0.00%	0.63%	0.00%	0.00%	0.00%	0.52%	0.00%	0.00%	0.00%	0.00%	
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	97.38%	100%	98.59%	99.94%	
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.64%	99.94%	91.67%	100%	
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.69%	100%	97.45%	99.92%	
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	97.80%	99.98%	96.46%	99.94%	
(b) 0-5 (with	Major Roads	95.87%	99.30%	97.37%	97.10%	83.07%	99.78%	96.11%	92.65%	92.56%	97.92%	96.18%	99.63%	95.15%	99.55%	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
5	frequency hopping for GSM Operators)	Highways	95.25%	97.05%	93.51%	99.33%	82.76%	99.33%	93.88%	95.37%	94.01%	99.57%	95.12%	99.06%	95.74%	99.13%	NA	NA	NA	NA
		Within City	96.71%	99.73%	95.93%	99.03%	90.64%	99.71%	95.83%	95.49%	97.23%	99.51%	97.33%	100%	95.91%	99.27%	NA	NA	NA	NA
		Overall SSA	95.76%	98.69%	95.43%	98.69%	84.18%	99.61%	95.14%	94.64%	94.67%	98.99%	95.99%	99.55%	95.66%	99.32%	NA	NA	NA	NA
		Service Coverage																		
5	In door (>= -75dBm)	Major Roads	11.76%	7.30%	72.70%	59.70%	33.72%	16.00%	51.52%	26.40%	12.55%	0.10%	34.82%	65.60%	29.66%	60.22%	34.75%	88.43%	10.07%	79.93%
		Highways	16.79%	4.30%	75.60%	99.80%	38.66%	14.90%	54.16%	46.50%	29.45%	19.76%	39.72%	81.50%	44.17%	97.78%	40.71%	60.06%	52.44%	0.00%
		Within City	34.13%	49.60%	87.93%	98.80%	56.97%	60.30%	68.88%	94.20%	12.33%	99.23%	60.95%	69.80%	58.87%	88.46%	57.53%	99.94%	53.11%	25.84%
		Overall SSA	18.60%	20.41%	78.58%	88.78%	40.08%	30.39%	57.38%	58.99%	18.78%	39.30%	43.26%	72.49%	45.27%	80.09%	42.76%	82.79%	45.70%	41.33%
	In-vehicle (>= -85dBm)	Major Roads	53.50%	52.30%	89.97%	96.28%	73.22%	97.20%	84.15%	93.00%	45.84%	96.25%	77.18%	98.54%	64.63%	96.07%	68.98%	99.97%	37.77%	100%
		Highways	58.37%	38.40%	93.75%	100%	80.30%	97.06%	89.80%	93.50%	77.05%	96.95%	77.16%	98.84%	80.77%	99.73%	76.92%	81.48%	84.38%	99.47%
		Within City	67.98%	89.20%	97.46%	100%	88.14%	100%	94.64%	99.90%	62.31%	99.23%	92.67%	99.70%	93.33%	99.34%	85.12%	100%	81.20%	100%
		Overall SSA	58.67%	60.01%	93.76%	99.01%	78.73%	98.09%	89.33%	95.82%	63.09%	97.47%	80.89%	99.03%	80.90%	98.16%	76.24%	93.79%	74.53%	99.89%
	Outdoor- in city (>= -95dBm)	Major Roads	88.42%	98.40%	98.32%	100%	97.26%	100%	98.28%	98.90%	82.29%	99.08%	97.21%	99.87%	92.22%	99.77%	98.11%	100%	96.78%	100%
		Highways	91.81%	96.50%	99.30%	100%	96.59%	100%	99.00%	99.90%	98.52%	99.18%	98.02%	100%	96.80%	100%	98.45%	99.52%	99.79%	100%
		Within City	95.67%	100%	99.60%	100%	99.11%	100%	99.86%	100%	84.09%	99.23%	99.50%	100%	99.24%	99.97%	98.53%	100%	98.95%	100%
		Overall SSA	91.45%	98.31%	99.09%	100%	97.38%	100%	99.01%	99.64%	88.96%	99.16%	98.12%	99.96%	96.52%	99.90%	98.36%	99.84%	98.76%	100%
6	Call Setup Success Rate (>=95%)	Major Roads	100%	100%	99.35%	100%	98.14%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Highways	100%	100%	100%	100%	98.30%	100%	100%	100%	100%	100%	99.52%	100%	99.48%	100%	100%	100%	100%	100%
		Within City	100%	100%	99.29%	100%	100%	100%	100%	100%	100%	100%	100%	100%	99.07%	100%	100%	100%	100%	100%
		Overall SSA	100%	100%	99.58%	100%	98.62%	100%	100%	100%	100%	100%	99.79%	100%	99.48%	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	98.65%	100%	100%	100%	97.01%	100%	99.16%	100%	100%	100%	100%	100%	100%	0.00%	100%	100%	100%	100%	100%
		Highways	99.12%	100%	100%	100%	98.15%	100%	97.57%	100%	100%	100%	100%	99.70%	100%	100%	100%	100%	100%	100%	100%
		Within City	100%	100%	100%	100%	97.41%	100%	99.16%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Overall SSA	99.19%	100%	100%	100%	97.57%	100%	98.45%	100%	100%	100%	100%	99.86%	100%	100%	85.00%	100%	100%	100%	100%

NA: Not Applicable

NC: No Coverage

7.3 OPERATOR ASSISTED DRIVE TEST: SOLAN SSA (JUNE-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	88	30	118	25	53	25	55	25	62	30	95	25	66	25	80	25	13	30
		Highways	103	30	125	30	162	30	96	30	125	30	169	30	139	30	174	30	49	30
		Within City	169	30	132	25	137	30	145	25	156	30	152	30	194	30	157	30	128	NC
		Overall SSA	360	90	375	80	352	85	296	80	343	90	416	85	399	85	411	85	190	60
2	Blocked Call Rate	Major Roads	0.00%	0.00%	0.85%	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%	0.00%	0.00%
		Highways	0.00%	0.00%	0.80%	0.00%	2.47%	0.00%	1.04%	0.00%	0.00%	0.00%	0.59%	0.00%	0.00%	0.00%	0.57%	0.00%	0.00%	0.00%
		Within City	0.00%	0.00%	0.00%	0.00%	2.19%	0.00%	0.69%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NC
		Overall SSA	0.00%	0.00%	0.53%	0.00%	1.99%	0.00%	0.68%	0.00%	0.00%	0.00%	0.24%	0.00%	0.00%	0.00%	0.24%	0.00%	0.00%	0.00%
3	Dropped Call Rate (<=2%)	Major Roads	0.00%	0.00%	0.00%	0.00%	1.89%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Highways	0.00%	0.00%	1.61%	0.00%	3.16%	0.00%	0.00%	0.00%	0.80%	0.00%	0.60%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Within City	0.00%	0.00%	0.00%	0.00%	2.24%	0.00%	0.00%	0.00%	0.64%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
		Overall SSA	0.00%	0.00%	0.54%	0.00%	2.61%	0.00%	0.00%	0.00%	0.58%	0.00%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	
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	97.56%	99.97%	96.29%	97.12%
		Highways	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.86%	99.64%	98.23%	99.80%
		Within City	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	99.35%	100%	97.63%	NC
		Overall SSA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	98.79%	99.86%	97.70%	98.50%
(b) 0-5 (with	Major Roads	98.45%	98.54%	95.77%	97.90%	91.88%	99.90%	97.12%	99.61%	96.01%	93.04%	98.12%	99.76%	93.41%	99.67%	NA	NA	NA	NA	

AUDIT & ASSESSMENT OF QOS FOR QE-JUNE - 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
	frequency hopping for GSM Operators)	Highways	98.23%	99.69%	95.46%	98.29%	89.75%	98.57%	95.56%	97.64%	95.23%	95.95%	98.04%	99.37%	95.09%	98.84%	NA	NA	NA	NA
		Within City	96.21%	99.82%	95.81%	99.17%	93.80%	98.74%	95.91%	99.67%	95.75%	99.64%	96.74%	100%	95.62%	99.78%	NA	NA	NA	NA
		Overall SSA	97.39%	99.41%	95.69%	98.44%	91.63%	99.03%	96.11%	98.89%	95.60%	96.30%	97.58%	99.70%	95.16%	99.42%	NA	NA	NA	NA
Service Coverage																				
5	In door (>= -75dBm)	Major Roads	56.30%	60.80%	91.35%	99.18%	52.29%	6.20%	37.16%	25.80%	48.71%	0.00%	53.71%	79.19%	52.85%	95.08%	57.33%	75.16%	75.23%	48.49%
		Highways	39.63%	79.80%	90.25%	99.02%	54.66%	60.10%	29.88%	85.90%	27.87%	4.45%	46.36%	93.49%	69.98%	97.90%	61.71%	96.49%	48.89%	52.05%
		Within City	51.28%	87.70%	95.38%	99.41%	69.82%	69.20%	48.96%	35.30%	23.91%	32.73%	65.20%	85.13%	73.65%	93.19%	89.79%	88.89%	86.45%	NC
		Overall SSA	49.24%	76.49%	92.69%	99.19%	60.18%	47.11%	39.46%	51.16%	32.01%	10.68%	54.97%	86.28%	69.70%	95.41%	71.44%	87.23%	75.93%	50.32%
	In-vehicle (>= -85dBm)	Major Roads	83.71%	94.00%	98.36%	99.97%	86.93%	52.80%	90.38%	99.40%	59.15%	79.56%	83.47%	99.51%	82.57%	99.81%	86.78%	99.80%	96.48%	100%
		Highways	69.16%	99.80%	99.00%	100%	84.54%	94.60%	77.45%	99.80%	50.15%	52.81%	82.86%	99.64%	91.34%	100%	88.34%	100%	89.29%	62.81%
		Within City	85.09%	99.90%	99.21%	100%	92.82%	96.90%	92.21%	94.00%	88.83%	98.88%	95.60%	98.47%	98.72%	99.69%	98.85%	99.60%	98.63%	NC
		Overall SSA	80.09%	98.05%	98.90%	99.99%	88.09%	82.92%	86.72%	97.88%	65.25%	69.95%	87.67%	99.20%	94.31%	99.83%	92.00%	99.80%	96.06%	80.88%
	Outdoor- in city (>= -95dBm)	Major Roads	94.55%	100%	99.81%	100%	97.70%	99.70%	98.97%	99.90%	79.98%	97.85%	97.93%	100%	97.23%	99.99%	99.24%	100%	100%	100%
		Highways	91.89%	100%	99.91%	100%	98.65%	99.50%	95.39%	100%	78.58%	96.54%	98.22%	100%	99.03%	100%	98.77%	100%	99.29%	91.31%
		Within City	98.15%	100%	99.83%	100%	98.87%	100%	99.49%	100%	95.98%	99.43%	99.96%	99.97%	99.93%	100%	100%	100%	99.98%	NC
		Overall SSA	95.36%	100%	99.85%	100%	98.60%	99.73%	97.96%	99.97%	84.68%	97.54%	98.79%	99.99%	99.29%	100%	99.33%	100%	99.80%	95.53%
6	Call Setup Success Rate (>=95%)	Major Roads	100%	100%	99.15%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Highways	100%	100%	99.20%	100%	97.53%	100%	98.96%	100%	100%	100%	99.41%	100%	100%	100%	99.43%	100%	100%	100%
		Within City	100%	100%	100%	100%	97.81%	100%	99.31%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	NC
		Overall SSA	100%	100%	99.47%	100%	98.01%	100%	99.32%	100%	100%	100%	100%	99.76%	100%	100%	99.76%	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	100%	100%	100%	100%	97.70%	100%	99.08%	100%	100%	100%	99.10%	100%	100%	100%	100%	100%	100%	100%	100%
		Highways	100%	100%	98.43%	100%	97.40%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
		Within City	99.34%	100%	100%	100%	98.27%	100%	99.74%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	NC
		Overall SSA	99.67%	100%	99.51%	100%	97.87%	100%	99.68%	100%	100%	100%	100%	99.85%	100%	100%	100%	100%	100%	100%	100%

NA: Not Applicable

7.4 SSA WISE DRIVE TEST OBSERVATION:

DRIVE TEST TABLE: 5

DRIVE TEST OBSERVATION OF KULLU SSA – APRIL 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	Kullu, Nagar, Manali, Palchan, Bhuntar.	No Issue.	Manali, Manala.	Poor Rx Coverage and Rx Quality Near Bhekli, Bhuntar.	Banjar, Aut, Kullu.	Poor Rx Level and Rx Quality Near Balichowk.
2	AIRTEL		Poor Rx Quality Near Palchhan, Aleo Town, Naggar.		Poor Rx Level and Rx Quality Near Bhuntar, Kolobehar, Jalugran, and Poor Rx Quality Near Banongi, Kakhnal.		Poor Rx Level and Rx Quality Near Banjara, and Poor quality Near Kullu.
3	BSNL		Poor Rx Level and Rx Quality Near Palchhan, Pangan, Archandi.		Poor Rx Level and Rx Quality Near Jari, Jalugran.		Poor Rx Quality Near Chansari, Spangini.
4	TATA GSM		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.
5	TATA CDMA		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.
6	IDEA		Poor Rx Level and Rx Quality Near Palchhan, Aleo, Pangan, Archandi.		Poor Rx Level and Rx Quality Near Pangan, Jalugran and Kasul.		Poor Rx Level and Rx Quality Near Surat, Balochowk, Spangini and Banjara.
7	RCOM GSM		Poor Rx Level and Rx Quality Observed Near Palchhan.		Poor Rx Level and Rx Quality Observed Near Charrounala.		Poor Rx Level and Rx Quality Observed Near Aut Tunnel & Largee.
8	RCOM CDMA		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.
9	VODAFONE		Poor Rx Level and Rx Quality Observed Near Ptlikulnagar.		Poor Rx Level and Rx Quality Observed Near Kakhnal, Bhuntar, Jari and Jalugran.		Poor Rx Level and Rx Quality Near Nipanjan, Bali Chowk and Spangini.

DRIVE TEST TABLE: 6

DRIVE TEST OBSERVATION OF HAMIRPUR SSA – MAY 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	Bharwain, Dolatpur, Kuneran, Kuthera, Una	Poor Rx Level and Rx Quality Observed Near Daulatpur and Panjwar, and Poor Rx Quality Near Bharwain and Gagret.	Tiswa, Sujanpur, Nadaun, Hamirpur.	Poor Rx Level and Rx Quality Observed Near Nadaun and Sujanpur.	Barsar, Jhanduta, Bilaspur, Bota, Pipludhar.	Poor Rx Level and Rx Quality Observed Near Barsar, Jhanduta and Bota.
2	AIRTEL		Poor Rx Level and Rx Quality Observed Near Mubarakpur, Bharwain, and Poor Rx Quality Near Kuneran.		Poor Rx Level and Rx Quality Near Sujanpur, and Poor quality Near Hamirpur.		Poor Rx Quality Observed Near Una, Piplu dhar, Jhanduta,
3	BSNL		Poor Rx Quality Observed in all SDCA's.		Poor Rx Level Observed Near Kakrana, and Poor Rx Quality Observed in all SDCA's.		Poor Rx Quality Observed in all SDCA's.
4	TATA GSM		Poor Rx Level and Rx Quality Near Mubarakpur, and Poor Rx Quality Near Bharwain.		Poor Rx Quality Observed Near Sujanpur.		Poor Rx Quality Near Piplu Dhar.
5	TATA CDMA		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.
6	IDEA		Poo Rx Quality Near Gagret, Kuthera Jasvala, Panjwar, Una.		Poor rx Level and Rx Quality Near Tiswa and Sujanpur.		Poor Rx Level and Rx quality Observed Near Piplu Dhar and Una.
7	RCOM GSM		Poor Rx Level and Rx Quality Near Jorbad Karluhi.		Poor Rx Level and Rx Quality Near Kaloh.		Poor Rx Quality Near Piplu Dhar.
8	RCOM CDMA		No Coverage Found Between Barsali to Panjwar.		No Coverage Found at Kaloha and Dib. Poor Rx Level and Rx Quality Observed Near Kaloor.		No Coverage Found Near Lamlehri to Samoor.
9	VODAFONE		Poor Rx Level and Rx Quality Observed Near Mubarakpur, Kuthera Jasvalan.		Poor Rx Level and Rx Quality Near Tiswa and Sujanpur.		Poor Rx Level and Rx Quality Near Piplu Dhar and Bota.

DRIVE TEST TABLE: 7

DRIVE TEST OBSERVATION OF SOLAN SSA – JUNE 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	Nalagarh, Baddi, Parwano, Soaln.	Poor rx Quality Observed Near Baddi.	Sarahana, Nahan, Pipliwala, Poanta.	Poor Rx Level and Rx Quality Observed Near Nahan.	Arki, Chaprauli Soaln.	Poor Rx Level and Rx Quality Observed Near Chaprauli.
2	AIRTEL		Poor Rx Quality Observed Near Hariipur, Parwanao.		Poor rx Level and Rx Quality Observed Near Nahan, and Poor Rx Quality Near Kolar, Maira and Pipliwala.		Poor Rx Level and Rx Quality Observed Near Chaprauli, and Poor Rx Quality Near soaln.
3	BSNL		Poor Rx Level and Rx Quality Observed Near Malpur, and Poor Rx Quality Near Mannpurate, Baddi stand.		Poor Rx Quality Observed Near Banethi, Silli, Nahansdoof.		Poor Rx Level and Rx Quality Observed Near Maan, Kunihar, Subathu, Deothi.
4	TATA GSM		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		
5	TATA CDMA		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		They have coverage Only In SDCA's & Major Towns with Poor Level and Quality at Outers.		
6	IDEA		Poor Rx Level and Rx Quality Observed Near Manav Bharti University and Dharamपुरi.		Poor Rx Level and Rx Quality Observed Near Lohasa chowki, Pipliwala.		Poor Rx Level and Rx Quality Near Mann, kunihar.
7	RCOM GSM		No Issue.		Poor Rx Level and Rx Quality Near Dosarka, Jogi ban.		Poor Rx Level and Rx Quality Near Sabathu.
8	RCOM CDMA		Poor Rx Lvel and Rx Quality Near Jabli.		Poor Rx Level and Rx Quality Near Nahan Ponta Road.		No Coverage Found Near Kunihar.
9	VODAFONE		Poor Rx Quality Observed in Baddi Area.		Poor Rx Level and Rx quality Observed Near Banethi, and Poor Rx Quality Near Nahan.		Poor Rx Level and Rx Quality Near Mann, Dodhighat.

DRIVE TEST TABLE: 8

NO NETWORK COVERAGE STATUS OF DRIVE TEST – APRIL TO JUNE 15

S No	Month of Drive Test	Circle	Name of Operators	SSA	Status of no network coverage area	ICR Status
1	Apr'15		AIRCEL	Kullu	Near Churrour Nallah towards Bhunter to Manikaran,	NO
			AIRTEL		Near Churrour Nallah towards Bhunter to Manikaran,	NO
			BSNL		Near Churrour Nallah towards Bhunter to Manikaran, Near gulaba Toward rohtang	NO
			IDEA		Gulaba , Malana, Near Kasol,Near Churrour Nallah towards Bhunter to Manikaran,	NO
			RCOM (GSM)		Largi,chong,Churrour Nallah, Kasol, jari	NO
			VODAFONE		'Near Churrour Nallah towards Bhunter to Manikaran, Near Kasol, Near Sainj, Balichowki	NO
			TATA GSM		Largi,chong,Churrour Nallah, Kasol, jari, Near Balichowki	Reliance GSM
			RCOM (CDMA)		Palchan To Gulaba, Kalath to Patlikul, Fogal , Haripur, Raison,Chong,Churrour Nallah	NO
			TATA (CDMA)		Koithi, Solang nala, gulaba, Near Patlikul, Manikaran Malana , Jari, Kasol,Aut, Largi, Sainj, Banzar, Jibhi,Balichowki	NO
2	May'15		AIRCEL	Hamirpur	No Coverage at Bhater, Shitla, Aloh	NO
			AIRTEL		No Coverage at Bhater, Shitla, Amba da paddar,	NO
			BSNL		No coverage at Panjeeri Near Kaloha, Dhundla to Kakarna, Arnla(BANGANA UNA HIGHWAY)	NO
			IDEA		No Coverage at Bhater,Ptthipur, Aloh, Amba DA Paddar, Channi Devi , Lohara, Koharchan, Salohi,.	NO
			RCOM (GSM)		No Coverage at Bhater, Shitla, Aloh, Krluhi,Lohara, Chani devi, Pirthipur, Hari Ka taal,Panjawar, ishpur,near Neheriyen, Near Kaloh,Nalti , Chandpur	NO
			VODAFONE		Lathayani,Pirthipur,Bhater,Jorbar, Near Nehriyan, Kaloha To Nadaun, Galod, Shahtalai	Reliance GSM (Bangana to Barsar)
			TATA GSM		No Coverage at Bhater, Shitla, Aloh, Krluhi,Lohara, Chani devi, Pirthipur, Hari Ka taal,Panjawar, ishpur,near Neheriyen, Near Kaloh,Nalti , Chandpur	Reliance GSM
			RCOM (CDMA)		Mubarakpur to Amlehar ,Barsali To Punjawar, Near Kaloha, Lamlehri, Masoor, Suhmani	NO
			TATA (CDMA)		No coverage in Amlad, Panjal, Nakloh,Daulatpur chowk,Jodbad,Chambi,Jawar, Kaloha, Rakker, Kuhna,Piplu,Dumkhar,Bangana,Lathyani,Shahtalai, Ghagas	NO

S No	Month of Drive Test	Circle	Name of Operators	SSA	Status of no network coverage area	ICR Status
3	Jun'15		AIRCEL	Solan	Near Barotiwala, Near Kasauli, Ganghut	NO
			AIRTEL		banethi, Near Nawni,	NO
			BSNL		near kasauli, dharpur, Badog Bypass	NO
			IDEA		Near Barotiwala, Near Kasauli	NO
			RCOM (GSM)		Near kasauli, Near parwanu, Near kunihar, jabbali, Badog Bypass, Nahan (Nahan Ponta sahib road)	NO
			VODAFONE		Near Barotiwala, No Coverage in kasauli Road, khudiyar, near ucha gaun , dosarka	NO
			TATA GSM		near kasauli, Near parwanu, Near kunihar, jabbali, Badog Bypass, Nahan (Nahan Ponta sahib road)	Reliance GSM
			RCOM (CDMA)		kunhai, kolar, dharpur, Near kunihar, j Badog Bypass	NO
TATA (CDMA)	Nayangar, subathu, Ganghut, Gamjhun, Kunihaar. Arki, Barog Bypass	NO				

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 April-15:** Drive tests were conducted across the **Kullu 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** failed to meet the benchmark of **Call Drop Rate (2.49%) and Voice Quality (93.51%)**.
- (iii) **Drive Test in May -15:** Drive tests were conducted across **Hamirpur SSA**. In this SSA, only **BSNL** and **Tata (GSM)** lagged behind the benchmarks for parameter **Voice Quality** with their performance as **84.18 % (outdoor) and 94.67% (outdoor)** respectively. **Idea** remained under performed during indoor drive test with its performance as **94.64%**.
- (iv) **Drive Test in June-15:** Drive tests were conducted in **Solan SSA**. In this SSA also, **BSNL** could not meet the benchmark of the parameters **Call drop rate (2.61%) and Voice Quality (91.63%)**. 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.

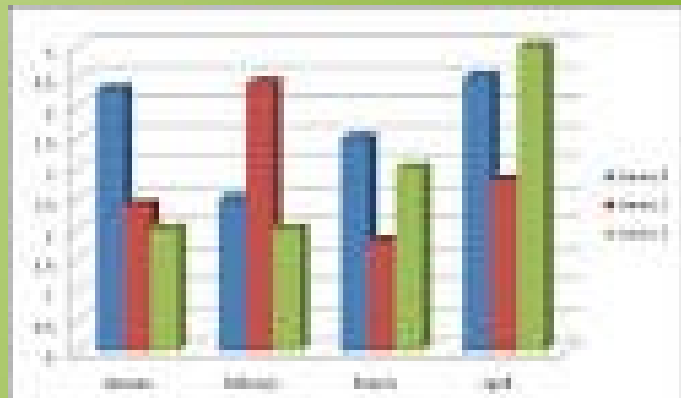
*Thus from the above, it was concluded that **BSNL and Tata (GSM)** remained under performed with respect to the parameters **Call drop rate and Voice Quality** . The defaulting Service providers need to take corrective actions to improve their network quality.*

8. GRAPHICAL REPRESENTATION (CELLULAR MOBILE SERVICE PROVIDERS)

AVERAGED QUARTERLY PMR

V/S

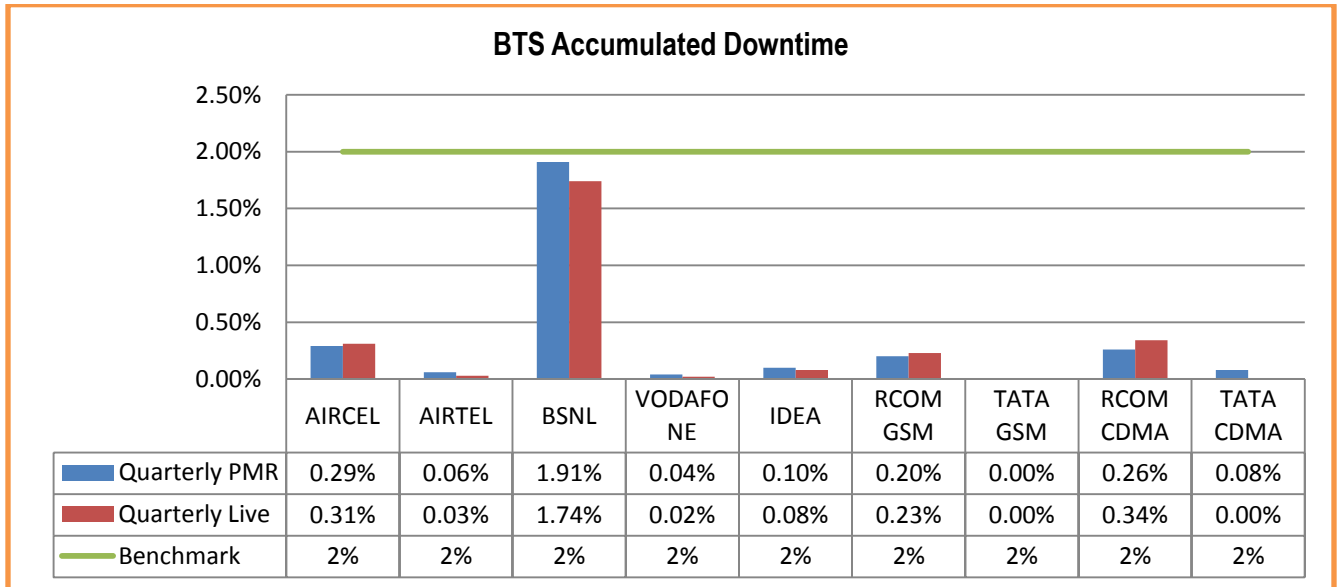
AVERAGED QUARTERLY 3-DAYs LIVE MEASURMENT



8. GRAPHICAL REPRESENTATION (CMTS):

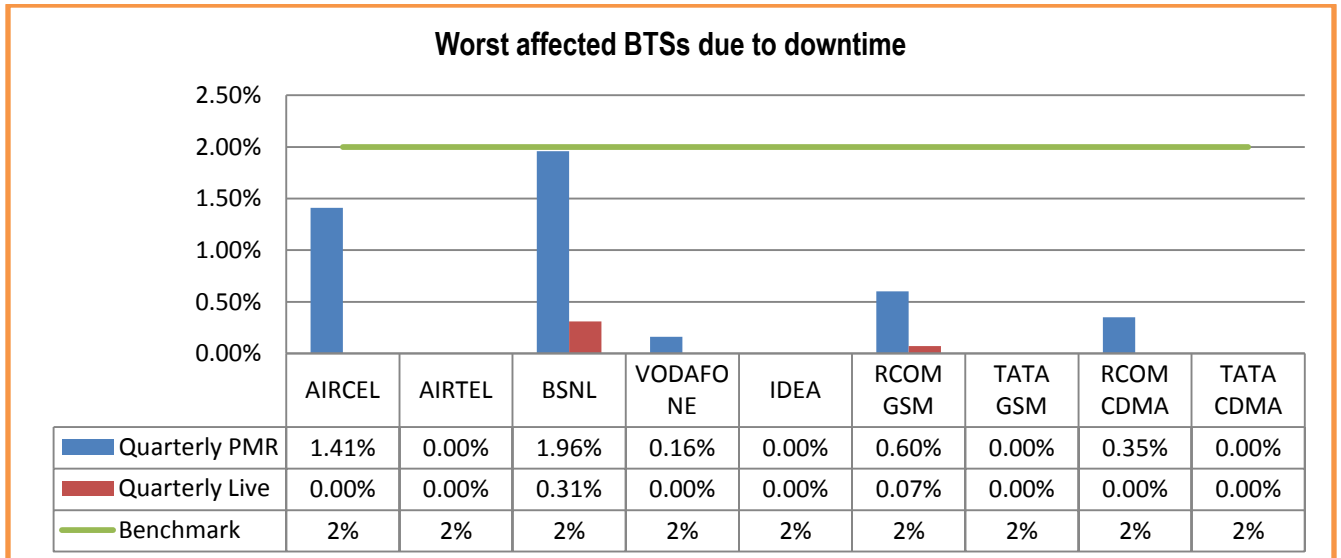
Graphical Representation of Performance of the Cellular Mobile Service Providers (PMR) V/S 3-Days Live Measurement (Quarterly Average Data):

1) BTS ACCUMULATED DOWNTIME :



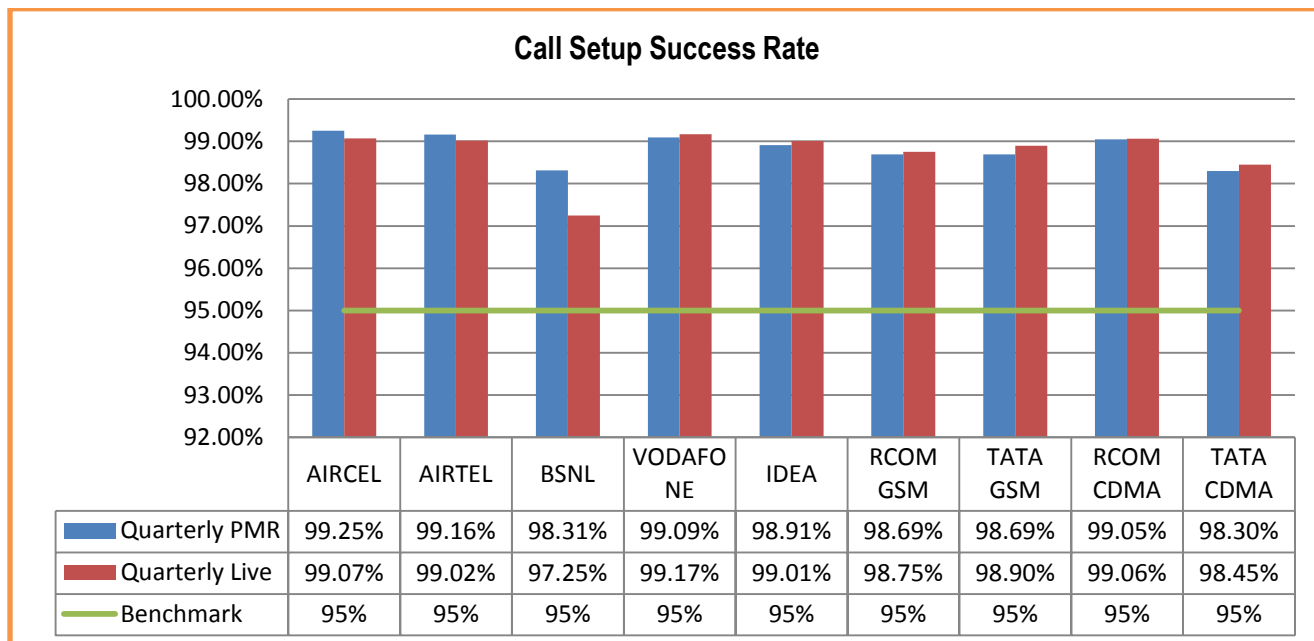
All operators are meeting the benchmarks.

2) WORST AFFECTED BTSS DUE TO DOWNTIME :



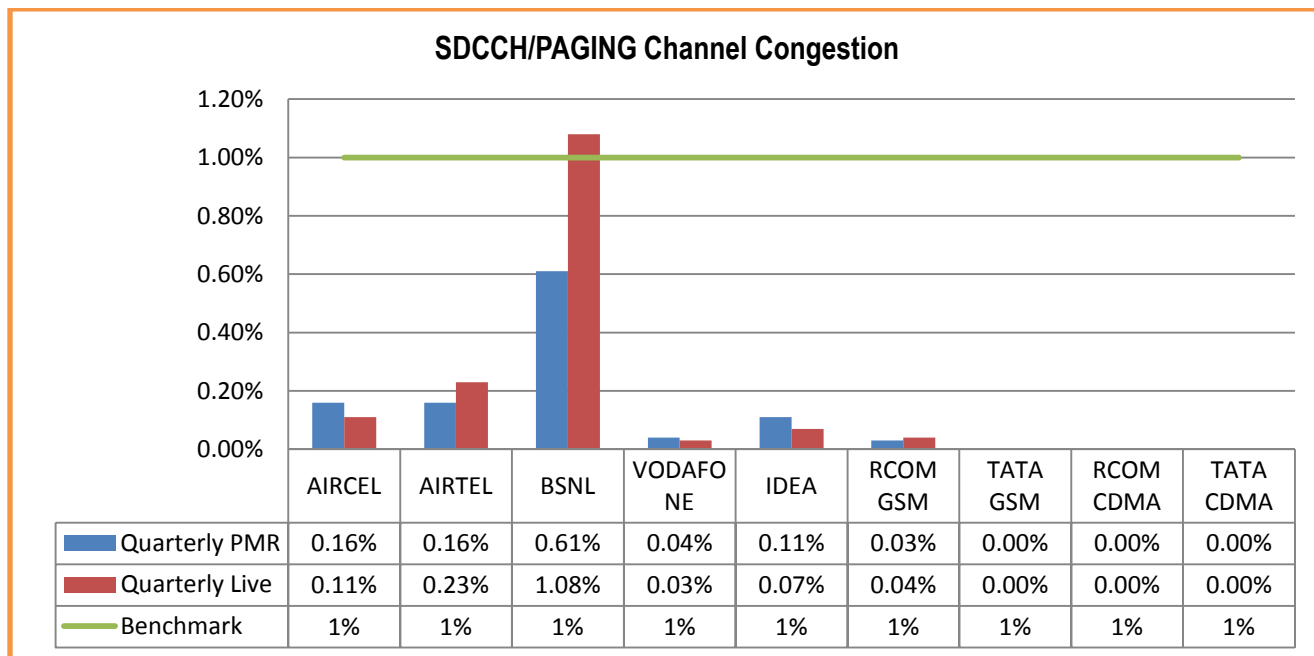
All operators are meeting the benchmarks.

3) CALL SETUP SUCCESS RATE :



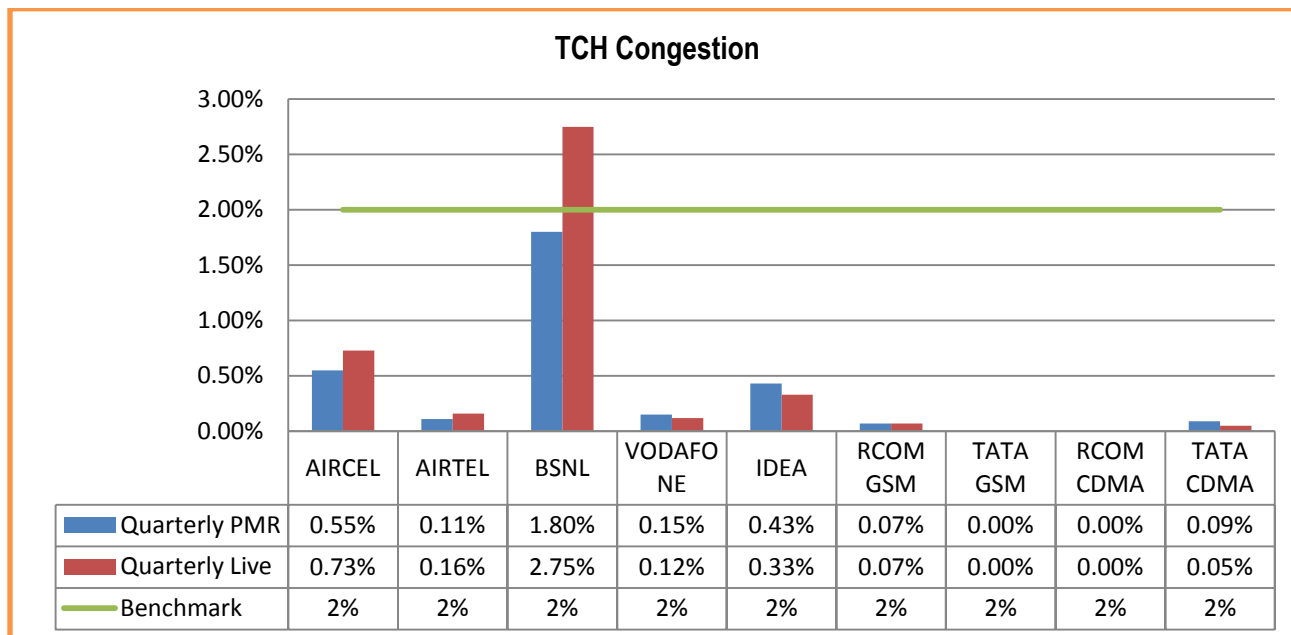
All operators are meeting the benchmarks.

4) SDCCH/PAGING CHANNEL CONGESTION :



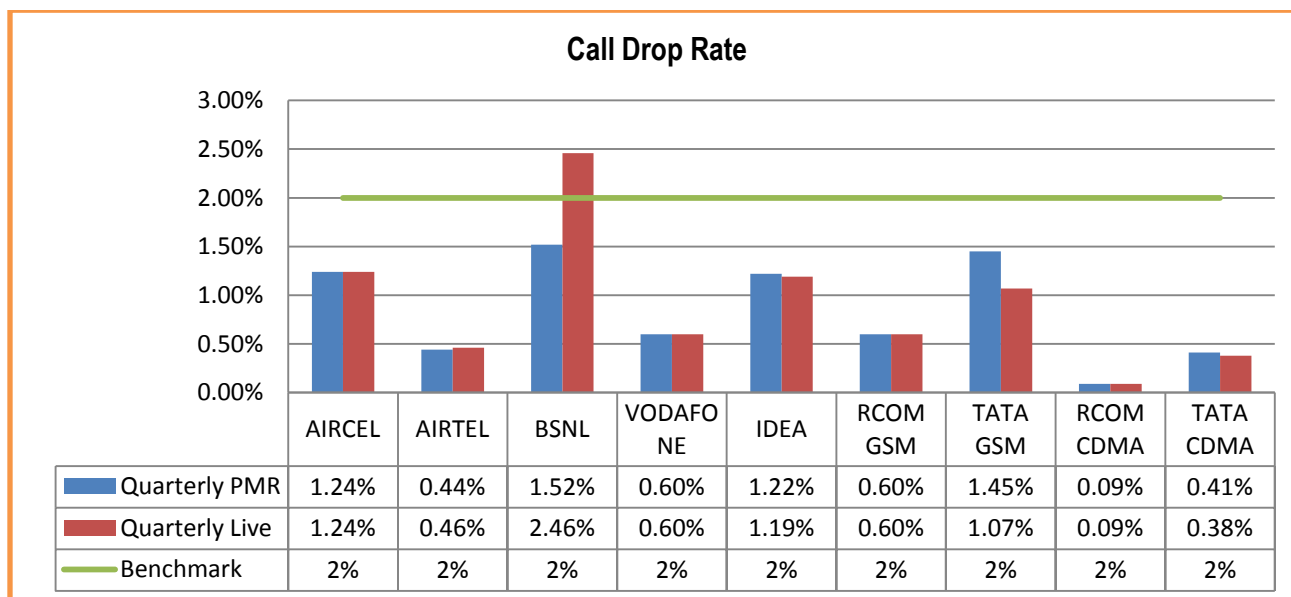
All operators are meeting the benchmarks except BSNL (during 3 days live audit).

5) TCH CONGESTION :



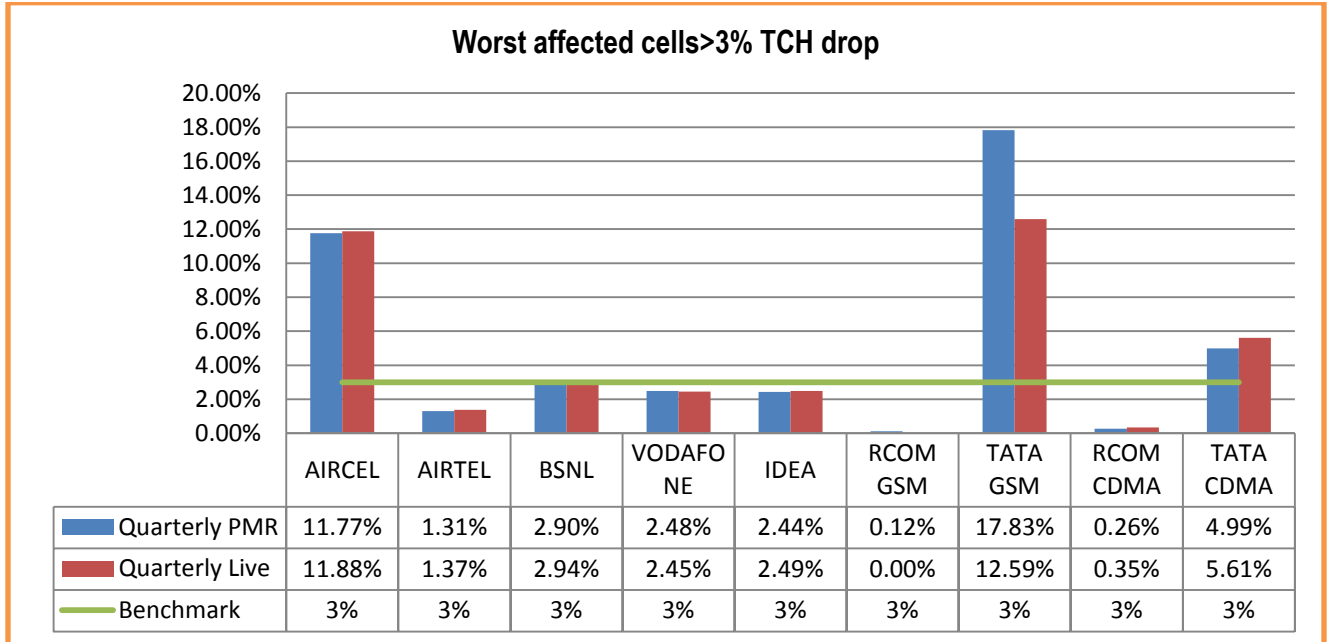
All operators are meeting the benchmarks except BSNL (during 3 day live measurement).

6) CALL DROP RATE :



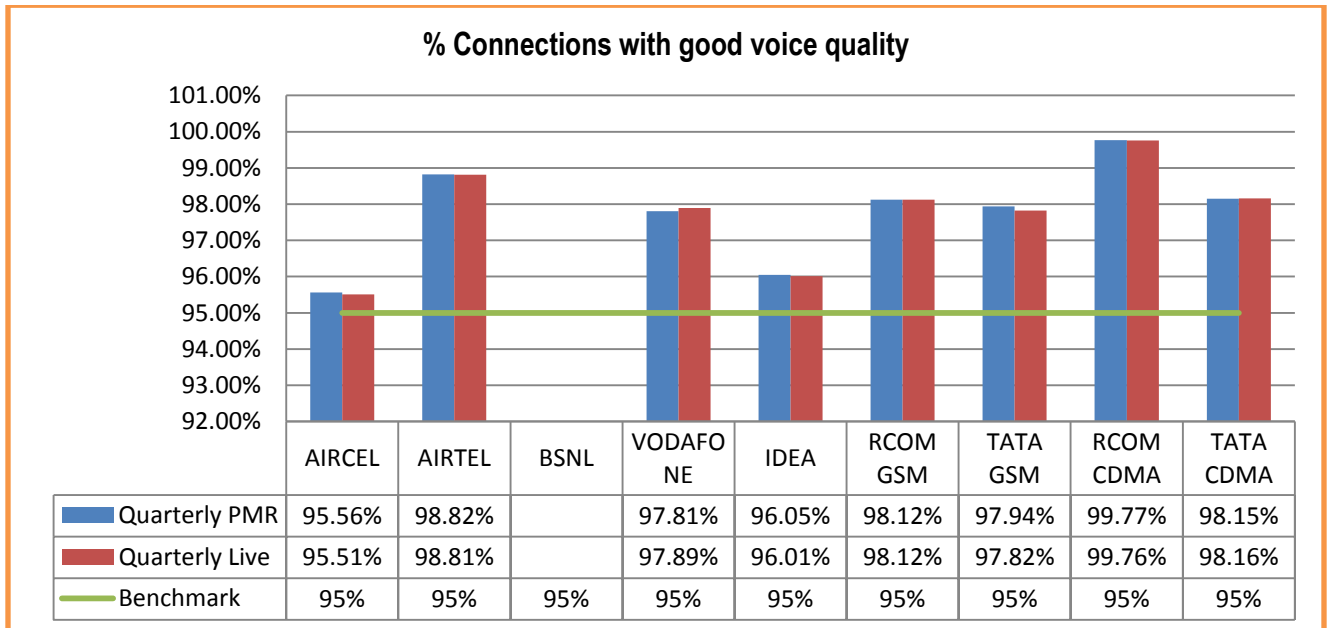
All operators are meeting the benchmarks except BSNL (during 3 day live measurement).

7) WORST AFFECTED CELLS>3% TCH DROP :



All operators are meeting the benchmarks except Aircel, Tata GSM & 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.