



AUDIT & ASSESSMENT OF QUALITY OF SERVICE

**NORTH ZONE – HIMACHAL PRADESH CIRCLE
CELLULAR MOBILE TELEPHONE SERVICE
(CMTS)
(JANUARY TO MARCH 2016)**

PREPARED BY:

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TABLE OF CONTENTS

1. INTRODUCTION.....	4
1.1. ABOUT TRAI.....	4
1.2. ABOUT PHISTREAM CONSULTING PRIVATE LIMITED.....	4
1.3. OBJECTIVES.....	4
1.4. COVERAGE.....	5
1.5. SSA LIST.....	6
1.6. FRAMEWORK USED.....	7
2. PMR REPORTS.....	8
2.1. MONTHLY PMR.....	8
2.2. AUDIT PARAMETER: NETWORK.....	10
2.3. DATA EXTRACTION POINTS.....	10
2.4. AUDIT PROCEDURE.....	11
2.5. NETWORK CALCULATION METHODOLOGY.....	11
2.6. 3G VOICE.....	12
2.7. 2G & 3G WIRELESS.....	14
3. 3 DAYS LIVE DATA.....	15
3.1. TCBH: SIGNIFICANCE AND SELECTION METHODOLOGY.....	15
3.2. CBBH: SIGNIFICANCE AND SELECTION METHODOLOGY.....	16
4. CUSTOMER SERVICE PARAMETERS.....	17
4.1. AUDIT PARAMETERS: CUSTOMER SERVICE.....	17
4.2. CALCULATION METHODOLOGY: CUSTOMER SERVICE PARAMETER.....	18
4.3. LIVE CALLING: SIGNIFICANCE AND METHODOLOGY.....	19
4.4. BILLING COMPLAINTS.....	19
4.5. SERVICE COMPLAINTS REQUESTS.....	20
4.6. LEVEL 1.....	20
4.7. PROCESS TO TEST LEVEL 1 SERVICE.....	20
4.8. CUSTOMER CARE.....	21
4.9. INTER OPERATOR CALL ASSESSMENT.....	22
5. DRIVE TEST: SIGNIFICANCE AND METHODOLOGY.....	23
5.1. OPERATOR ASSISTED DRIVE TEST.....	23
5.2. INDEPENDENT DRIVE TEST.....	24
5.3. PARAMETERS EVALUATED DURING DRIVE TEST.....	24
6. EXECUTIVE SUMMARY.....	26
6.1. OPERATORS COVERED.....	26
6.2. AUDIT SCHEDULE.....	27
6.3. 2G VOICE PMR DATA: JANUARY.....	27
6.4. 2G VOICE PMR DATA: FEBRUARY.....	28
6.5. 2G VOICE PMR DATA: MARCH.....	28
6.6. 2G VOICE PMR DATA: CONSOLIDATED.....	29
6.7. 2G VOICE 3 DAYS LIVE DATA.....	29
6.8. 2G VOICE 3 DAYS LIVE DATA: JANUARY.....	29
6.9. 2G VOICE 3 DAYS LIVE DATA: FEBRUARY.....	30
6.10. 2G VOICE 3 DAYS LIVE DATA: MARCH.....	30
6.11. 3 DAYS LIVE DATA: CONSOLIDATED.....	31
6.12. 3G VOICE PMR: CONSOLIDATED.....	31
6.13. 3G VOICE PMR: JANUARY.....	32
6.14. 3G VOICE PMR: FEBRUARY.....	32
6.15. 3G VOICE PMR: MARCH.....	33
6.16. 3G VOICE 3 DAYS LIVE DATA: CONSOLIDATED.....	34
6.17. 3G VOICE 3 DAYS LIVE DATA: JANUARY.....	34
6.18. 3G VOICE 3 DAYS LIVE DATA: FEBRUARY.....	35
6.19. 3G VOICE 3 DAYS LIVE DATA: MARCH.....	35
6.20. PMR MONTHLY 2G WIRELESS DATA - CONSOLIDATED.....	36
6.21. PMR MONTHLY 2G WIRELESS DATA - JANUARY.....	36
6.22. PMR MONTHLY 2G WIRELESS DATA - FEBRUARY.....	37

6.23.	PMR MONTHLY 2G WIRELESS DATA - MARCH	38
6.24.	PMR 3 DAY LIVE 2G WIRELESS DATA - CONSOLIDATED	38
6.25.	PMR 3 DAY LIVE 2G WIRELESS DATA - JANUARY	39
6.26.	PMR 3 DAY LIVE 2G WIRELESS DATA - FEBRUARY	39
6.27.	PMR 3 DAY LIVE 2G WIRELESS DATA – MARCH	40
6.28.	PMR MONTHLY 3G WIRELESS DATA - CONSOLIDATED	40
6.29.	PMR MONTHLY 3G WIRELESS DATA - JANUARY	41
6.30.	PMR MONTHLY 3G WIRELESS DATA - FEBRUARY	41
6.31.	PMR MONTHLY 3G WIRELESS DATA - MARCH	42
6.32.	PMR 3 DAY LIVE 3G WIRELESS DATA - CONSOLIDATED	42
6.33.	PMR 3 DAY LIVE 3G WIRELESS DATA - JANUARY	43
6.34.	PMR 3 DAY LIVE 3G WIRELESS DATA - FEBRUARY	43
6.35.	PMR 3 DAY LIVE 3G WIRELESS DATA - MARCH	44
6.36.	POI CONGESTION: CONSOLIDATED	44
6.37.	POI CONGESTION: JANUARY	45
6.38.	POI CONGESTION: FEBRUARY	45
6.39.	POI CONGESTION: MARCH	45
7.	CUSTOMER SERVICE DELIVERY	47
7.1.	BILLING AND CUSTOMER CARE.....	47
7.2.	LIVE CALLING DATA: CONSOLIDATED.....	48
7.3.	3 DAYS LIVE CALL CENTRE DATA	49
8.	L1 CALLING DATA.....	50
8.1.	HAMIRPUR	50
8.2.	MANDI.....	58
8.3.	KULLU.....	66
9.	OPERATOR ASSISTED DRIVE TEST	73
9.1.	FEBRUARY: HAMIRPUR SSA	73
9.2.	DISTANCE COVERED: HAMIRPUR SSA.....	73
9.3.	ROUTE MAP: HAMIRPUR SSA: DAY 1.....	74
9.4.	ROUTE MAP: HAMIRPUR SSA: DAY 2.....	75
9.5.	ROUTE MAP: HAMIRPUR SSA: DAY 3.....	76
9.6.	DRIVE TEST OUTCOME	77
9.7.	MARCH: MANDI SSA	78
9.8.	DISTANCE COVERED: MANDI SSA.....	78
9.9.	ROUTE MAP: MANDI SSA: DAY 1.....	78
9.10.	ROUTE MAP: MANDI SSA: DAY 2	79
9.11.	ROUTE MAP: MANDI SSA: DAY 3	80
9.12.	DRIVE TEST OUTCOME.....	80
9.13.	MARCH: KULLU SSA	81
9.14.	DISTANCE COVERED: KULLU SSA	81
9.15.	ROUTE MAP: KULLU SSA: DAY 1	81
9.16.	ROUTE MAP: KULLU SSA: DAY 2	82
9.17.	ROUTE MAP: KULLU SSA: DAY 3	82
9.18.	DRIVE TEST OUTCOME.....	83
10.	COUNTER DETAILS	84
10.1.	ERICSSON.....	85
10.2.	NSN (NOKIA SIEMENS NETWORK).....	86
10.3.	HUAWEI	86
11.	BLOCK SCHEMATIC DIAGRAM	88
11.1.	ERICSSON.....	88
11.2.	NSN	89
11.3.	HUAWEI	90
12.	ABBREVIATIONS.....	91
13.	ANNEXURE.....	92
14.	KEY FINDINGS.....	124

1. INTRODUCTION

1.1. ABOUT TRAI

TRAI's mission is to create and nurture conditions for growth of telecommunications in the country in a manner and at a pace that will enable India to play a leading role in the emerging global information society. One of the main objectives of TRAI is to provide a fair and transparent policy environment which promotes a level playing field and facilitates fair competition.

In pursuance of above objective, TRAI has been issuing regulations, order and directives to deal with the issues or complaints raised by the operators as well as the consumers. These regulations, order and directives have helped to nurture the growth of multi operator multi service - an open competitive market from a government owned monopoly. Also, the directions, orders and regulations issued cover a wide range of subjects including tariff, interconnection and quality of service as well as governance of the Authority.

TRAI initiated a regulation - The Standard of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service regulations, 2009 (7 of 2009) dated June 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated April 6, 2006 that provide the benchmarks for the parameters on customer perception of service to be achieved by service provider.

In order to assess the above regulations, TRAI has commissioned a third party agency to conduct the audit of the service providers and check the performance of the operators on the various benchmarks set by Telecom Regulatory Authority of India (TRAI).

1.2. ABOUT PHISTREAM CONSULTING PRIVATE LIMITED

Phistream Consulting Private Limited is an ISO:9001 certified company who are one of the pioneers in the field of technical audit, quality assurance and third party inspection services. Established more than a decade ago in 2004, we aspire to provide longer term savings based on year-on-year productivity. With our size, we are nimble and aspire to being a full service partner for providing consultancy services.

We have been helping our clients by determining the best solutions and enabling businesses to enjoy the benefits of top-notch support without distracting their team from the main business focus. Our business analysts have enough experience to get involved at the requirements gather stage through consulting work handing off a detailed requirements document to our operations staff who in turn can train our support and maintenance resources for ongoing engagement.

In keeping with our goal of being a one stop quality assurance and consulting partner, our specialists employ a strategy and consulting-based implementation methodology and capitalize on strong program governance to offer a wide range of services for various industry verticals.

1.3. OBJECTIVES

The primary objective of the Audit module is to:

- Audit and Assess the Quality of Services being rendered by Cellular Mobile (Wireless) service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).

- This report covers the audit results of the audit conducted for Cellular Mobile (Wireless) services in Himachal Pradesh circle.

1.4. COVERAGE

The audit was conducted in Himachal Pradesh Circle covering all SSAs (Secondary Switching Areas).



Image Source: Wikipedia

1.5. SSA LIST

S. No.	Circle	SSA Name	SDCA Name
1	HP	Hamirpur	Amb
2	HP	Hamirpur	Bilaspur
3	HP	Hamirpur	Hamirpur
4	HP	Hamirpur	Una
5	HP	Kandra (dharamsala)	Pangi (killar)
6	HP	Kangra (dharamsala)	Bharmour
7	HP	Kangra (dharamsala)	Chamba
8	HP	Kangra (dharamsala)	Churah (tissa)
9	HP	Kangra (dharamsala)	Dehra gopipur
10	HP	Kangra (dharamsala)	Kangra (dharamsala)
11	HP	Kangra (dharamsala)	Nurpur
12	HP	Kangra (dharamsala)	Palampur
13	HP	Kullu	Banjar
14	HP	Kullu	Kullu
15	HP	Kullu	Lahul (keylong)
16	HP	Kullu	Nirmand
17	HP	Kullu	Spiti (kaza)
18	HP	Kullu	Udaipur
19	HP	Mandi	Jogindernagar
20	HP	Mandi	Mandi
21	HP	Mandi	Sundernagar
22	HP	Shimla	Kalpa
23	HP	Shimla	Pooh
24	HP	Shimla	Rampur bushahar
25	HP	Shimla	Rohru
26	HP	Shimla	Shimla
27	HP	Shimla	Theog
28	HP	Solan	Arki
29	HP	Solan	Nahan
30	HP	Solan	Nalagarh
31	HP	Solan	Paonta
32	HP	Solan	Rajgarh
33	HP	Solan	Solan

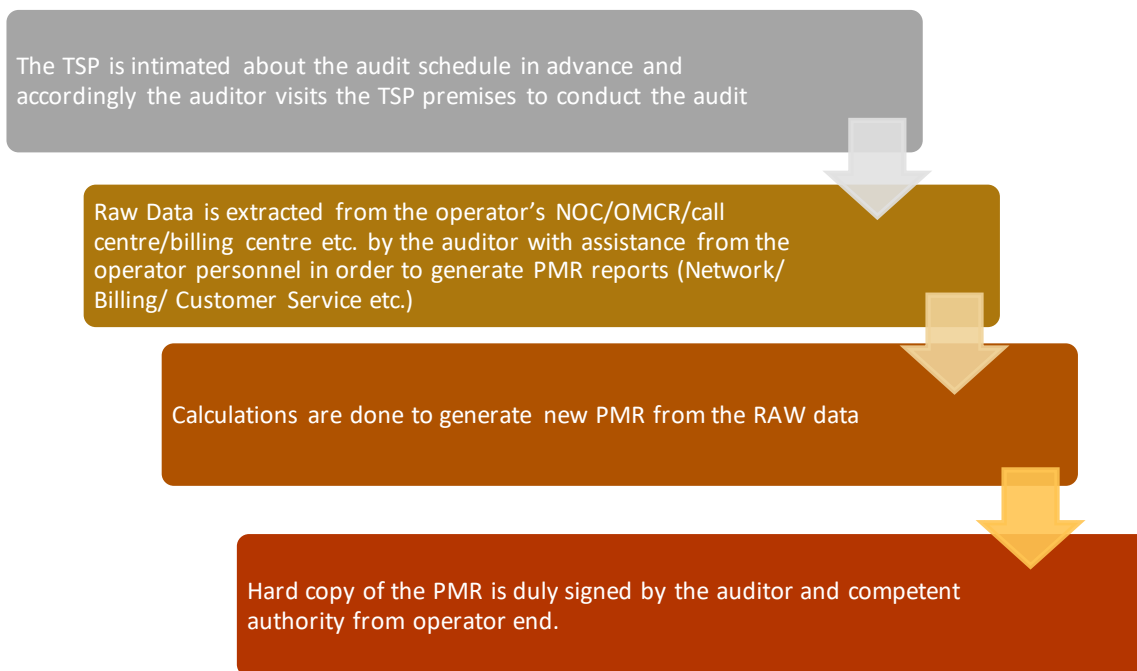
1.6. FRAMEWORK USED

Audit Activities

PMR Reports	Drive Test	CSD Audit	Wireline & Broadband	Inter Operator Call Assessment
Monthly PMR	Operator Assisted	Billing Complain	Billing Complain	
3 Days Live Data	Independent	Service request	Service Request	
Customer Service	Level 1 Service	Customer Service	Level 1 Service	
			Customer Service	

2. PMR REPORTS

Significance and methodology: PMR or Performance Monitoring Reports are generated to assess the various Quality of Service parameters involved in the mobile telephony service, which indicate the overall health of service for an operator.



The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, January 2016 audit data was collected in the month of February 2016.

The PMR report for customer service parameters is extracted from Customer Service Centre and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending March 2016 was collected in the month of March 2016.

The raw data extracted from operator's systems is used to create PMR in the following three formats:

- Monthly PMR (Network Parameters)
- 3 Day Live Measurement Data (Network Parameters)
- Customer Service Data

Let us understand these formats in details.

2.1. MONTHLY PMR

This involved calculation of the various Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the auditor with the assistance of the operator at the operator's premises for the month of January, February and March 2016. The performance of operators on various parameters was assessed against the benchmarks.

Parameters includes:

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

- SDCCH/Paging Channel Congestion
- TCH Congestion
- Point of Interconnection

Connection Maintenance

- Call Drop rate
- Worst affected cells having more than 3% TCH drop

Voice Quality

- % Connections with good voice quality

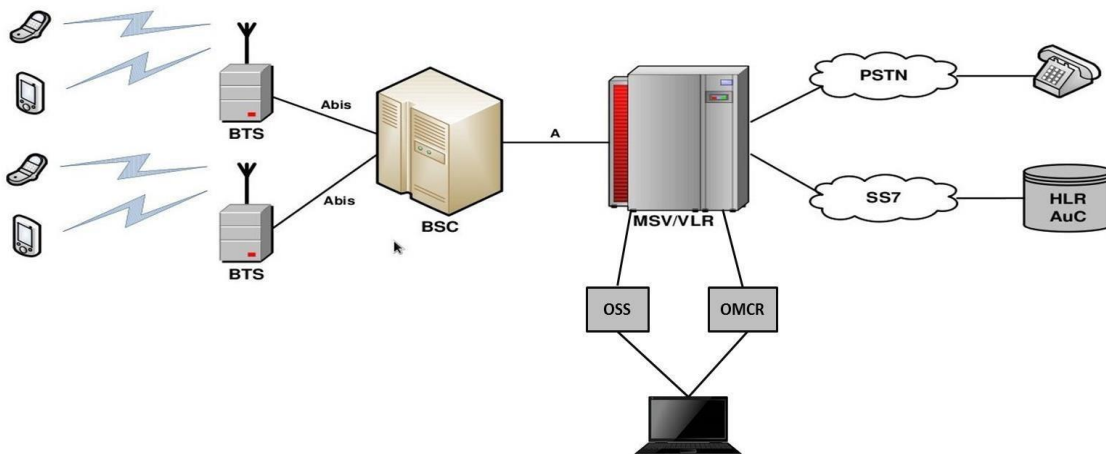
2.2. AUDIT PARAMETER: NETWORK

Let us now look at the various parameters involved in the audit reports.

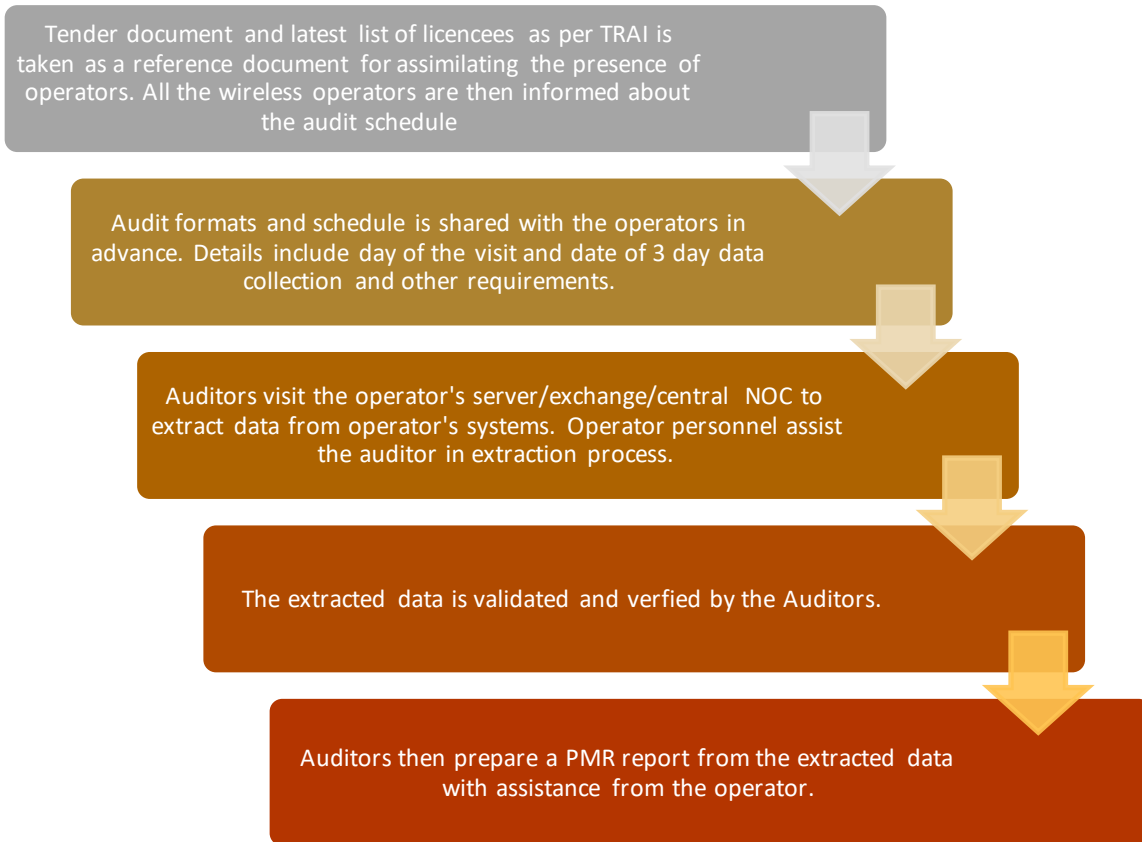
Network Availability	
BTSs Accumulated downtime (not available for service)	≤ 2%
Worst affected BTSs due to downtime	≤ 2%
Connection Establishment (Accessibility)	
Call Set-up Success Rate (within licensee's own network)	≅ 95%
SDCCH/ Paging Channel Congestion	≤ 1%
TCH Congestion	≤ 2%
Connection Maintenance (Retainability)	
Call Drop Rate	≤ 2%
Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%
Connections with good voice quality	≅ 95%
Point of Interconnection	
(POI) Congestion (on individual POI)	≤ 0.5%

2.3. DATA EXTRACTION POINTS

The data is extracted from a terminal/computer connected to OMCR & OSS on the operator network.



2.4. AUDIT PROCEDURE



Extracted data is calculated as per the counter details provided by the operators. The details of counters have been provided in the report. The calculation methodology for each parameter has been stated in the table given below:

2.5. NETWORK CALCULATION METHODOLOGY

Parameter	Calculation Methodology
BTS Accumulated Downtime	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100
Worst Affected BTS Due to Downtime	(Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100
Call Setup Success Rate	(Calls Established / Total Call Attempts) * 100

SDCCH/ Paging Channel Congestion	$\text{SDCCH / TCH Congestion\%} = [(A1 \times C1) + (A2 \times C2) + \dots + (An \times Cn)] / (A1 + A2 + \dots + An)$ <p>Where: A1 = Number of attempts to establish SDCCH / TCH made on day 1 C1 = Average SDCCH / TCH Congestion % on day 1 A2 = Number of attempts to establish SDCCH / TCH made on day 2</p>
TCH Congestion	<p>C2 = Average SDCCH / TCH Congestion % on day 2 An = Number of attempts to establish SDCCH / TCH made on day n Cn = Average SDCCH / TCH Congestion % on day n</p>
POI Congestion	$\text{POI Congestion\%} = [(A1 \times C1) + (A2 \times C2) + \dots + (An \times Cn)] / (A1 + A2 + \dots + An)$ <p>Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n</p>
Call Drop Rate	Total Calls Dropped / Total Calls Established x 100
Worst Affected Cells having more than 3% TCH drop	Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the LSA x 100
Connections with good voice quality	No. of voice samples with good voice quality / Total number of samples x 100

2.6. 3G VOICE

S. No.	Name of Parameter	Definition	Formula	Benchmark
1	Network Availability			
a.	Total no. of Node B's in LSA	Total no. of Node B's Licensed in LSA		
b.	Total downtime of all Node B's	When all the sector(s) of a Node B's are down for > 60 minutes at an instant in a whole day		
c.	No. of Worst Affected Node B's	Node B's having more than 24 hours of Downtime in 3 Days	<p>No. of Node B's having accumulated downtime of >24 hours in a month</p> $((\text{No. of Node B's having Accumulated Downtime of } > 24 \text{ hrs in a month}) / \text{Total no. of BTSs in the licensed service area}) * 100$	<=2%
d.	Node B's accumulated downtime	Node B's downtime more than 24 hr in 3 days	<p>Total no. of Node B's in the Licensed Service Area</p> <p>Sum of downtime of Node B's in a month in hours i.e. total outage time of all Node B's in hours in a month</p>	<=2%

			[(Sum of down time of Node B's in a month in hrs)/(24* no. of days in the month*no. of Node B's in the licensed service area)]*100	
2	Connection Establishment (Accessibility)			
a.	Call Setup Success Rate:	It is the % of total no. of call established to the total no. of call attempt	Total No. of Voice Call Attempts	≥95%
			Total No. of Voice Call Establishment	
			CSSR (Call Setup Success Rate = (Total No. of Voice Call Attempts/ Total No. of Voice Call Establishment)*100)	
b.	RRC Congestion:	RRC Congestion rate is the % of Total No. of RRC Failed Calls to the Total no. of RRC Assigned Calls	RRC Attempts (RRC Connection Access) (A)	≤1%
			RRC Failed (RRC Connection Access Failed) (B)	
			RRC Congestion (%) [B/A]*100	
c.	RAB Congestion:	RAB Congestion rate is the % of Total No. of RAB Failed Calls to the Total no. of RAB Assigned Calls	RAB Attempts (RAB Setup Access) (C)	≤2%
			RAB Failed (RAB Setup Access Failed) (D)	
			RAB Congestion (%) [D/C]*100	
3	Connection Maintenance (Retainability)			
a.	Circuit Sw itched Voice Drop Rate	It is the % of total no. of Dropped Calls to the total no. of Calls Established	Total Established Calls (A)	≤2%
			Calls Dropped after Establishment (B)	
			Call Drop Rate [B/A]*100	
b.	Worst affected cells having more than 3% Circuit Sw itched Voice Drop Rate:	It is the % of total no. of Cells having > 3% Circuit Sw itched Voice drop to the total no. cells	Total No. of Cells (Sector)	≤3%
			Total No. of Cells exceeding 3% Circuit Sw itched Voice Drop Rate in CBBH (Cell Bouncing Busy Hour)	
			% of cells having more than 3% Circuit Sw itched Voice Drop Rate [(No. of cells having Circuit Sw itched Voice Drop Rate > 3% during CBBH in 31 days*100) / Total no. of cells in the licensed service area]	
c.	Percentage of connections w ith Good Circuit Sw itched Voice Quality	It can be defined as the % of Good Voice Quality Samples to the total No. of Quality Samples	Percentage of connection w ith Good Circuit Sw itched Voice Quality	≥95%
4	Total No. of POI's in Month having ≥0.5% POI congestion	Total no. Of POI's w hich are exceeding the POI congestion more than 0.5 %.	Total No. of call attempts on POI	≤0.5%
			Total traffic served on all POIs (Erlang)	
			Total No. of circuits on all individual POIs	
			Total number of working POI Service Area wise	
			Capacity of all POIs	

			No. of all POI's having $\geq 0.5\%$ POI congestion	
			Name of POI not meeting the benchmark (having $\geq 0.5\%$ POI congestion)	

2.7. 2G & 3G WIRELESS

S. No.	Name of Parameter	Definition	Formula	Benchmark
1	Service Activation/ Provisioning	This refers to the activation of services after activation of the SIM. This involves programming the various databases with the customer's information and any gateways to standard Internet chat or mail services or any data services.	Total No. of Subscribers for Service Activation (A)	<i>Within 4 Hours with 95% Success Rate</i>
			Total Service Activations provided within 4 Hours (B)	
			Service Activation / Provisioning = $(B/A) * 100$	
2	PDP Context Activation Success Rate	PDP Context Activation Success Rate is the ratio of total number of successfully completed PDP context activations to the total attempts of context activation	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)	$\geq 95\%$
			Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)	
			PDP Context Activation Success Rate = $(B/A) * 100$	
3	Drop Rate	It measures the inability of Network to maintain a connection and is defined as the ratio of abnormal disconnects w.r.t. all disconnects.	RNC originated PS Domain lu Connection Setup Success (A)	$\leq 5\%$
			RNC originated PS Domain lu Connection Release (B)	
			Drop Rate = $(B/A) * 100$	

3. 3 DAYS LIVE DATA

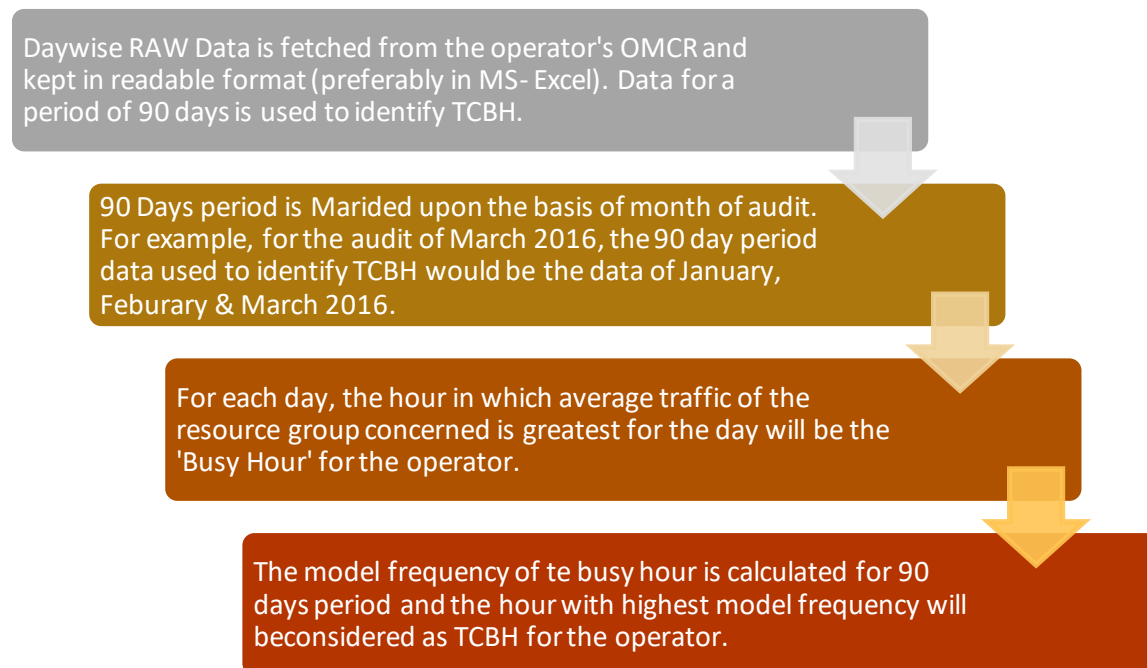
The main purpose of 3 day live measurement is to evaluate the network parameters on intraday basis. While the monthly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the network parameters discussed earlier. All the calculations are done on the basis of that raw data of 3 days.

The 3 day live data provides a sample of 9 days in a quarter (3 days each month of a quarter) with hourly performance, which enables the auditor to identify and validate intraday issues for an operator on the QoS network parameters. For example, network congestion being faced by an operator during busy/peak hours.

Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar to PMR report) to assess the various QoS parameters.

3.1. TCBH: SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), "Time Consistent Busy Hour" or "TCBH" means the one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and such Time Consistent Busy Hour shall be established on the basis of analysis of traffic data for a period of ninety days.



During audit, the auditors identified from the raw data that the TCBH for the operators in Jan – Feb – Mar 2016 was the time period as given below:

Aircel	Airtel	BSNL	Idea	RCOM GSM	RCOM CDMA	TTSL GSM	TTSL CDMA	Vodafone
19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00

3.2. CBBH: SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Cell Bouncing Busy Hour (CBBH) means the one hour period in a day during which a cell in cellular mobile telephone network experiences the maximum traffic.

Step by step procedure to identify CBBH for an operator:

Daywise RAW Data is fetched from the operator's OMCR and kept in readable format (preferably in MS- Excel). Data for a period of 90 days is used to identify CBBH.

For each day the hour in which a cell in cellular mobile telephone network experiences maximum traffic for the day will be the 'Busy Hour' for the operator.

The model frequency of the busy hour is calculated for 90 days period and the hour with highest model frequency will be considered as CBBH for the operator.

4. CUSTOMER SERVICE PARAMETERS

The data to generate PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending March 2016 was collected in the month of March 2016. To extract the data for customer service parameters for the purpose of audit, auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

The operators are duly informed in advance about the audit schedule.

The Customer Service Quality Parameters include the following:

- Metering and billing credibility (post-paid and prepaid)
- Resolution of billing/charging complaints
- Period of applying credit/waiver/adjustment to customer's account
- Response time to the customer for assistance
- Termination/closure of service
- Time taken for refund of security deposit after closures.

Most of the customer service parameters were calculated by averaging over the quarter; however billing parameters were calculated by averaging over one billing cycle for a quarter. All the parameters have been described in detail along with key findings of the parameter in the report.

The benchmark values for each parameter have been given in the table below.

4.1. AUDIT PARAMETERS: CUSTOMER SERVICE

Metering and Billing Credibility	Benchmark
No of billing complaints received - Post paid	≤ 0.1%
No. of billing complaints received- Prepaid	≤ 0.1%
Resolution of billing/ charging complaints within 4 weeks	98%
Resolution of billing/ charging complaints within 6 weeks	100%
Period of applying credit/ waiver within 1 week of resolution of complaint	100%
Response Time to the Customer form Assistance	
Accessibility of call centre/customer care	≥ 95%
Percentage of calls answered by the operators (voice to voice) within 90 seconds	≥ 95%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

4.2. CALCULATION METHODOLOGY: CUSTOMER SERVICE PARAMETER

Parameter	Calculation Methodology
Metering and billing credibility : Post-paid	Total billing complaints received during the relevant billing cycle / Total bills generated during the relevant billing cycle * 100
Metering and billing credibility : Pre-paid	Total charging complaints received during the quarter / Total number of subscribers reported by the operator at the end of the quarter * 100
Resolution of billing/ charging complaints (Post-paid + Pre-paid)	There are two benchmarks involved here: Billing or Charging Complaints resolved in 4 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100 Billing or Charging Complaints resolved in 6 weeks from date of receipt / Total billing or charging complaints received during the quarter) x 100
Period of applying credit waiver	Number of cases where credit waiver is applied within 7 days / total number of cases eligible for credit waiver * 100
Call centre performance IVR (Calling getting connected and answered by IVR)	Number of calls connected and answered by IVR / All calls attempted to IVR * 100
Call centre performance (Voice to Voice)	Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds / All calls attempted to connect to the operator) * 100 The calculation excludes the calls dropped before 90 seconds
Time taken for termination/ closure of service	Number of closures done within 7 days / total number of closure requests * 100
Time taken for refund for deposit after closures	Number of cases of refund after closure done within 60 days / total number of cases of refund after closure * 100

4.3. LIVE CALLING: SIGNIFICANCE AND METHODOLOGY

The auditor visits the operator premises for Live Calling. The operators provide the RAW data of customer complaints (billing and services) and also the list of customer service numbers to be verified through live calling

The auditor makes the live calls using operator SIM to a random sample of subscribers from the RAW data provided to verify the resolution of complaints

The auditor verifies the performance of call centre, level 1 services by calling the numbers using operator SIM. The list of call centre numbers is provided by the operator.

The auditors also make test calls to subscribers of other operators to assess the inter-operator call connectivity in the same licensed service area

Live calling activity was carried out during the period of March 2016. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of January 2016 was considered for live calling activity conducted in February 2016. A detailed explanation of each parameter is explained below:

4.4. BILLING COMPLAINTS

Live calling is done to verify Resolution of billing complaints within stipulated time. The process for this parameter is stated below:

- Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to the auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically.
- A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator.

Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th June, 2016 were considered as population for selection of samples.

TRAI Benchmark: Resolution of billing/ charging complaints: 98% within 4 weeks, 100% within 6 weeks.

4.5. SERVICE COMPLAINTS REQUESTS

“Service request” means a request made to a service provider by its consumer pertaining to his account, and includes:

- A request for change of tariff plan
- A request for activation or deactivation of a value added service or a supplementary service or a special pack
- A request for activation of any service available on the service provider’s network
- A request for shift or closure or termination of service or for billing details

All the complaints other than billing were covered. A total of 100 calls per service provider for each service in licensed service area were done by the auditors.

4.6. LEVEL 1

Level 1 is used for accessing special services like emergency services, supplementary services, inquiry and operator-assisted services.

Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator SIMs. A total of 150 test calls were made per service provider in the quarter.

While most of the Level 1 services are toll free, it has been observed that some Level 1 services may not be toll free. In January, February and March’15, auditor has tried contacting the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

4.7. PROCESS TO TEST LEVEL 1 SERVICE

- During the operator assisted drive test, auditors ask the operator authorized personnel to make 5 calls in each SDCA on the Level 1 Service numbers provided by TRAI. The list contains a description of the numbers along with dialling code.
- Operators might also provide a list of L1 services. To identify emergency L1 service numbers, auditors check if there is any number that starts with code ‘10’ in that list. If auditors find any emergency number in addition to the below list, that number is also tested during live calling.
- On receiving the list, auditors verify it if the below given list of numbers are active in the service provider’s network.
- If there are any other additional numbers provided by the operator, auditors also do live calling on those numbers along with below list.
- If any of these numbers is not active, then we would write the same in our report, auditors write in the report.
- Post verifying the list, auditors do live calling by equally distributing the calls among the various numbers and update the results in the live calling sheet.

L1 Number Details
100 Police
101 Fire
102 Ambulance
104 Health Information Helpline

108 Emergency and Disaster Management Helpline
138 All India Helpline for Passengers
149 Public Road Transport Utility Service
181 Chief Minister Helpline
182 Indian Railway Security Helpline
1033 Road Accident Management Service
1037 Public Grievance Cell DoT HQ as 'Telecom Consumer Grievance Redressal Helpline'
1056 Emergency Medical Services
106X State of the Art Hospitals - AIIMS
1063 Public Grievance Cell DoT Hq
1064 Anti Corruption Helpline
1070 Relief Commission for Natural Calamities
1071 Air Accident Helpline
1072 Rail Accident Helpline
1073 Road Accident Helpline
1077 Control Room for District Collector
1090 Call Alart (Crime Branch)
1091 Women Helpline
1097 National AIDS Helpline to NACO
1099 Central Accident and Trauma Services (CATS)
10580 Educational & Vocational Guidance and Counselling
10589 Mother and Child Tracking (MCTH)
10740 Central Pollution Control Board
10741 Pollution Control Board
1511 Police Related Service for all Metro Railway Project
1512 Prevention of Crime in Railway
1514 National Career Service(NCS)
15100 Free Legal Service Helpline
155304 Municipal Corporations
155214 Labour Helpline
1903 Sashastra Seema Bal (SSB)
1909 National Do Not Call Registry
1912 Complaint of Electricity
1916 Drinking Water Supply
1950 Election Commission of India

4.8. CUSTOMER CARE

Live calling is done to verify response time for customer assistance is done to verify the performance of call centre in terms of:

- Calls getting connected and answered by operator's IVR.
- % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more

The process for this parameter is stated below:

- Overall sample size is 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1100 HRS to 1400 HRS and 50 calls between 1600 HRS to 1900 HRS.

- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

4.9. INTER OPERATOR CALL ASSESSMENT

A total of 100 calls per service provider to all the other service providers in a licensed service area were done for the purpose of audit.

Inter Operator Call Assessment	Aircel	Airtel	BSNL	Idea	Reliance GSM	Reliance CDMA	TTSL GSM	TTSL CDMA	Vodafone
Aircel	-	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	100%	100%	100%	100%	100%	100%	100%
BSNL	100%	100%	-	100%	100%	100%	100%	100%	100%
Idea	100%	100%	100%	-	100%	100%	100%	100%	100%
Reliance GSM	100%	100%	100%	100%	-	100%	100%	100%	100%
Reliance CDMA	100%	100%	100%	100%	100%	-	100%	100%	100%
TTSL GSM	100%	100%	100%	100%	100%	100%	-	100%	100%
TTSL CDMA	100%	100%	100%	100%	100%	100%	100%	-	100%
Vodafone	100%	100%	100%	100%	100%	100%	100%	100%	-

5. DRIVE TEST: SIGNIFICANCE AND METHODOLOGY

Drive test, as the name suggests, is conducted to measure the outdoor coverage in a moving vehicle in a specified network coverage area.

The main purpose of the drive test is to check the health of the mobile network of various operators in the area in terms of coverage (signal strength), voice quality, call drop rate, call set up success rate etc.

To assess the indoor coverage, the test is also conducted at two static indoor locations in each SSA, such as Malls, office buildings, shopping complexes, government buildings etc.

There are two types of drive test as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test

The main difference between the two is that in the operator assisted, operators participate in the drive test along with their hardware, software, phones etc. while in the independent drive test PhiStream conducts the drive test on solitary basis and uses its own hardware. Operators generally do not have any knowledge of the independent drive test being conducted.

5.1. OPERATOR ASSISTED DRIVE TEST

Himachal Pradesh circle consist of total 6 SSA's and each SSA needs to be audit in the span of 12 months.

The methodology adopted for the drive test:

- 3 consecutive days drive test in each SSA. SSA would be defined as per DOT guidelines and month wise SSA list is finalized by regional TRAI office.
- On an average, a minimum of 80 kilometres are covered each day
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads and we can start from the point from where we had left last day (if possible).
- The route was classified as – Within City, Major Roads, Highways, Shopping complex/ Mall and Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30 km/hr.
- The holding period of each test call was 120 seconds.
- A test call was generated 10 seconds after the previous test call is completed.

- Height of the antenna was kept uniform in case of all service providers.

5.2. INDEPENDENT DRIVE TEST

The number of independent drive tests to be conducted and their locations are decided basis TRAI recommendation.

- A minimum of 80 kilometres was traversed during the independent drive test in a SSA. The SSA would be defined as per BSNL and SSA list will be finalized by regional TRAI office.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as – Within city, Major Roads, Highways, Shopping complex/ Mall and Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30 km/hr.
- The holding period of each test call was 120 seconds.
- A test call was generated 10 seconds after the previous test call is completed.
- Height of the antenna was kept uniform in case of all service providers.

5.3. PARAMETERS EVALUATED DURING DRIVE TEST

The parameters which were captured during the drive test include. Below are the parameters which are captured for the GSM and CDMA operators.

- Coverage-Signal strength (GSM)
 - Total calls made (A)
 - Number of calls with signal strength between 0 to -75 dBm
 - Number of calls with signal strength between 0 to -85 dBm
 - Number of calls with signal strength between 0 to -95 dBm
- Coverage-Signal strength (CDMA)
 - Total Ec/Io BINS (A)
 - Total Ec/Io BINS with less than -15 (B)
 - Low Interference = $[1 - (B/A)] \times 100$
- Voice quality (GSM)
 - Total RxQual Samples – A
 - RxQual samples with 0-5 value – B
 - %age samples with good voice quality = $B/A \times 100$

- Voice quality (CDMA)
 - Total FER BINs (forward FER) – A
 - FER BINs with 0-2 value (forward FER) – B
 - FER BINs with 0-4 value (forward FER) – C
 - %age samples with FER bins having 0-2 value (forward FER) = $B/A \times 100$
 - %age samples with FER bins having 0-4 value (forward FER) = $C/A \times 100$
 - No. of FER samples with value $> 4 = [A-C]$
- Call setup success rate
 - Total number of call attempts – A
 - Total Calls successfully established – B
 - Call success rate (%age) = $(B/A) \times 100$
- Blocked calls
 - 100% - Call Set up Rate
- Call drop rate
 - Total Calls successfully established – A
 - Total calls dropped after being established – B
 - Call Drop Rate (%age) = $(B/A) \times 100$

6. EXECUTIVE SUMMARY

The objective assessment of Quality of Service (QoS) carried out gives an insight into the overall performance of various operators in the Himachal Pradesh Circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

6.1. OPERATORS COVERED

Name of Operator	Number of Subscriber (Up to March 31, 2016)
BSNL	1566258
Airtel	2315704
Aircel	566436
Idea	786117
Reliance CDMA	176515
Reliance GSM	1567783
TATA CDMA	18656
TATA GSM	152
Vodafone	600608

TSP	No. of Cells	BTS	BSC	MSC+GMSC	Node B	RNC
AIRCEL	2193	735	8	2	NA	NA
AIRTEL	4650	1600	16	6	1424	5
BSNL	3615	1241	18	4+1	300	6
IDEA	3449	1152	7	3	600	2
RCOM CDMA	860	287	DNA	1	NA	NA
RCOM GSM	2250	751	12	2	170	2
TTSL CDMA	422	130	1	1	NA	NA
TTSL GSM	15	5	1	1	NA	NA
VODAFONE	2542	835	10	1	NA	NA

Note: Node B & RNC is marked as Not Applicable (N.A.) for the services providers who do not have 3G services licence in the circle.

6.2. AUDIT SCHEDULE

Operator	(3 Days Live) January 2016	January 2016	February 2016	March 2016
Airtel	8 th Jan 2016	6 th Feb 2016	10 th Mar 2016	8 th Apr 2016
Vodafone	13 th Jan 2016	16 th Feb 2016	15 th Mar 2016	13 th Apr 2016
Idea	11 th Jan 2016	9 th Feb 2016	9 th Mar 2016	11 th Apr 2016
Reliance	21 st Jan 2016	5 th Feb 2016	11 th Mar 2016	21 st Apr 2016
BSNL	14 th Jan 2016	10 th Feb 2016	16 th Feb 2016	14 th Apr 2016
Aircel	16 th Jan 2016	7 th Feb 2016	15 th Mar 2016	16 th Apr 2016
Tata Teleservices	19 th Jan 2016	10 th Feb 2016	7 th Mar 2016	19 th Apr 2016

Note: Audit schedule mentioned above is for the PMR audit for the last month. 3 day live monitoring for the current month was carried along with the PMR audit.

Colour codes to read the report:

	Not meeting the benchmark
NA	Data not applicable
DNA	Data not available at TSP premises

6.3. 2G VOICE PMR DATA: JANUARY

Network Parameters		Jan-16									
		Benchmark	Name of Service Provider								
			AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.17%	0.04%	1.94%	0.08%	0.10%	0.13%	0.00%	0.00%	0.02%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.68%	0.06%	1.86%	0.17%	0.35%	0.93%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	99.68%	97.66%	98.01%	99.39%	98.09%	95.15%	99.38%	99.82%	99.79%
	SDDCH/Paging chl. Congestion	≤ 1%	0.03%	0.57%	0.56%	0.04%	NA	0.23%	0.00%	0.00%	0.03%
	TCH Congestion	≤ 2%	0.14%	0.48%	1.99%	0.19%	0.93%	1.92%	0.02%	0.00%	0.21%
Connection Maintenance (Retainability)	Call Drop Rate (%age)	≤ 2%	1.20%	0.69%	1.76%	1.11%	0.10%	0.27%	0.09%	1.91%	0.72%
	Worst Affected cell having more than 3% TCH drop	≤ 3%	9.92%	1.47%	2.84%	2.06%	0.47%	0.31%	1.35%	6.88%	2.45%
	%age of connection with good voice quality	≥ 95%	95.34%	98.44%	DNA	97.26%	99.08%	96.60%	98.08%	98.24%	97.72%

6.4. 2G VOICE PMR DATA: FEBRUARY

Network Parameters		Feb-16									
		Benchmark	Name of Service Provider								
			AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.16%	0.04%	1.99%	0.08%	0.06%	0.07%	0.00%	0.00%	0.02%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.41%	0.06%	1.94%	0.00%	0.00%	0.53%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	99.69%	98.44%	98.07%	99.40%	98.19%	95.74%	99.44%	99.68%	99.86%
	SDDCH/Paging chl. Congestion	≤ 1%	0.02%	0.19%	0.58%	0.06%	NA	0.19%	0.00%	0.00%	0.01%
	TCH Congestion	≤ 2%	0.13%	0.41%	1.93%	0.13%	0.92%	1.14%	0.01%	0.00%	0.14%
Connection Maintenance (Retainability)	Call Drop Rate (%age)	≤ 2%	1.17%	0.70%	0.14%	1.11%	0.10%	0.26%	0.08%	0.32%	0.65%
	Worst Affected cell having more than 3% TCH drop	≤ 3%	10.04%	1.06%	2.83%	1.73%	0.44%	0.37%	1.27%	2.76%	2.43%
	%age of connection with good voice quality	≥ 95%	95.33%	98.33%	DNA	97.57%	99.21%	96.61%	98.12%	97.98%	97.71%

6.5. 2G VOICE PMR DATA: MARCH

Network Parameters		Mar-16									
		Benchmark	Name of Service Provider								
			AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.14%	0.06%	1.99%	0.09%	0.03%	0.07%	0.01%	0.00%	0.03%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.27%	0.19%	1.93%	0.35%	0.00%	0.53%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	99.59%	98.16%	98.02%	98.66%	99.07%	95.98%	99.38%	99.57%	99.84%
	SDDCH/Paging chl. Congestion	≤ 1%	0.37%	0.32%	0.74%	0.18%	NA	0.24%	0.00%	0.00%	0.33%
	TCH Congestion	≤ 2%	0.22%	0.56%	1.98%	0.36%	0.03%	0.82%	0.01%	0.00%	0.16%
Connection Maintenance (Retainability)	Call Drop Rate (%age)	≤ 2%	1.19%	0.67%	0.12%	1.08%	0.16%	0.29%	0.09%	0.14%	0.65%
	Worst Affected cell having more than 3% TCH drop	≤ 3%	10.66%	0.37%	2.82%	2.01%	0.70%	1.04%	1.43%	1.29%	2.43%
	%age of connection with good voice quality	≥ 95%	95.26%	98.36%	95.04%	96.59%	99.86%	96.75%	98.12%	97.34%	97.69%

6.6. 2G VOICE PMR DATA: CONSOLIDATED

Network Parameters		Consolidated									
		Benchmark	Name of Service Provider								
			AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.15%	0.05%	1.97%	0.09%	0.06%	0.09%	0.00%	0.00%	0.02%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.45%	0.11%	1.91%	0.17%	0.12%	0.67%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	99.65%	98.09%	98.03%	99.15%	98.45%	95.62%	99.40%	99.69%	99.83%
	SDDCH/Paging chl. Congestion	≤ 1%	0.14%	0.36%	0.63%	0.09%	NA	0.22%	0.00%	0.00%	0.12%
	TCH Congestion	≤ 2%	0.16%	0.48%	1.97%	0.22%	0.63%	1.29%	0.01%	0.00%	0.17%
Connection Maintenance (Retainability)	Call Drop Rate (%age)	≤ 2%	1.19%	0.69%	0.67%	1.10%	0.12%	0.27%	0.09%	0.79%	0.67%
	Worst Affected cell having more than 3% TCH drop	≤ 3%	10.21%	0.97%	2.83%	1.93%	0.53%	0.57%	1.35%	3.64%	2.44%
	%age of connection with good voice quality	≥ 95%	95.31%	98.38%	95.04%	97.14%	99.38%	96.66%	98.11%	97.85%	97.71%

6.7. 2G VOICE 3 DAYS LIVE DATA

A three day live measurement was conducted to measure the QoS provided by the operators. It was seen from the live data collected, that the performance of the operators across all parameters more or less corroborated with the audit data collected.

6.8. 2G VOICE 3 DAYS LIVE DATA: JANUARY

Network Parameters		Jan-16									
		Benchmark	Name of Service Provider								
			AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.04%	0.01%	2.31%	0.11%	0.17%	0.19%	0.00%	0.00%	0.03%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.00%	0.00%	0.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	99.70%	98.40%	97.73%	99.15%	97.59%	94.18%	99.45%	100.00%	99.72%
	SDDCH/Paging chl. Congestion	≤ 1%	0.03%	0.24%	0.13%	NA	NA	0.24%	0.00%	0.00%	0.01%
	TCH Congestion	≤ 2%	0.13%	0.38%	2.27%	0.47%	0.99%	2.04%	0.00%	0.00%	0.28%
Connection Maintenance (Retainability)	Call Drop Rate (%age)	≤ 2%	1.17%	0.69%	1.49%	1.01%	0.10%	0.27%	0.08%	0.00%	0.06%
	Worst Affected cell having more than 3% TCH drop	≤ 3%	9.44%	1.40%	8.56%	2.24%	0.27%	0.33%	1.03%	4.44%	2.43%
	%age of connection with good voice quality	≥ 95%	95.39%	98.42%	DNA	96.32%	97.94%	96.33%	98.07%	97.95%	97.69%

6.9. 2G VOICE 3 DAYS LIVE DATA: FEBRUARY

Network Parameters		Feb-16									
		Benchmark	Name of Service Provider								
		AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE	
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.04%	0.16%	1.95%	0.10%	0.07%	0.13%	0.00%	0.00%	0.01%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.00%	0.00%	0.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	99.73%	98.41%	98.09%	99.50%	98.23%	95.92%	99.45%	100.00%	99.84%
	SDDCH/Paging chl. Congestion	≤ 1%	0.06%	0.17%	0.43%	0.22%	NA	0.12%	0.00%	0.00%	0.00%
	TCH Congestion	≤ 2%	0.08%	0.47%	1.91%	0.08%	0.91%	1.89%	0.00%	0.00%	0.16%
Connection Maintenance (Retainability)	Call Drop Rate (%age)	≤ 2%	1.26%	0.85%	0.13%	1.10%	0.08%	0.26%	0.10%	0.55%	0.67%
	Worst Affected cell having more than 3% TCH drop	≤ 3%	10.58%	0.92%	8.56%	1.91%	0.31%	0.41%	1.42%	4.44%	2.36%
	%age of connection with good voice quality	≥ 95%	95.34%	97.78%	DNA	97.58%	99.25%	96.61%	98.07%	97.77%	97.73%

6.10. 2G VOICE 3 DAYS LIVE DATA: MARCH

Network Parameters		Mar-16									
		Benchmark	Name of Service Provider								
		AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE	
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.05%	0.35%	1.96%	0.11%	0.03%	0.09%	0.00%	0.00%	0.05%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.00%	0.00%	0.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	99.58%	98.62%	98.27%	97.71%	99.08%	96.48%	99.43%	100.00%	99.86%
	SDDCH/Paging chl. Congestion	≤ 1%	0.02%	0.94%	0.45%	0.35%	NA	0.17%	0.00%	0.00%	0.00%
	TCH Congestion	≤ 2%	0.22%	0.32%	1.73%	1.04%	0.02%	0.47%	0.00%	0.00%	0.14%
Connection Maintenance (Retainability)	Call Drop Rate (%age)	≤ 2%	1.26%	0.69%	0.12%	1.08%	0.09%	0.30%	0.10%	0.00%	0.68%
	Worst Affected cell having more than 3% TCH drop	≤ 3%	11.48%	0.42%	8.58%	1.64%	0.54%	0.96%	1.26%	0.00%	2.41%
	%age of connection with good voice quality	≥ 95%	95.17%	98.37%	96.73%	97.44%	99.85%	96.86%	98.09%	96.68%	97.72%

6.11. 2G VOICE 3 DAYS LIVE DATA: CONSOLIDATED

Network Parameters		Consolidated									
		Benchmark	Name of Service Provider								
			AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.04%	0.17%	2.07%	0.11%	0.09%	0.14%	0.00%	0.00%	0.03%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.00%	0.00%	0.16%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	99.67%	98.48%	98.03%	98.79%	98.30%	95.52%	99.44%	100.00%	99.81%
	SDDCH/Paging chl. Congestion	≤ 1%	0.04%	0.45%	0.34%	0.28%	NA	0.18%	0.00%	0.00%	0.00%
	TCH Congestion	≤ 2%	0.14%	0.39%	1.97%	0.53%	0.64%	1.47%	0.00%	0.00%	0.19%
Connection Maintenance (Retainability)	Call Drop Rate (%age)	≤ 2%	1.23%	0.74%	0.58%	1.06%	0.09%	0.28%	0.09%	0.18%	0.47%
	Worst Affected cell having more than 3% TCH drop	≤ 3%	10.50%	0.91%	8.57%	1.93%	0.37%	0.57%	1.24%	2.96%	2.40%
	%age of connection with good voice quality	≥ 95%	95.30%	98.19%	96.73%	97.11%	99.01%	96.60%	98.08%	97.47%	97.72%

6.12. 3G VOICE PMR: CONSOLIDATED

Network Parameters		Consolidated				
		Benchmark	Name of Service Provider			
			AIRTEL	BSNL	IDEA	RCOM GSM
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.20%	1.29%	0.12%	0.17%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.19%	1.68%	0.12%	0.59%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	98.73%	97.51%	99.03%	99.11%
	RRC Congestion:	≤ 1%	0.15%	0.63%	0.35%	0.28%
	RAB Congestion:	≤ 2%	0.03%	0.49%	0.13%	0.00%
Connection Maintenance (Retainability)	Circuit Switched Voice Drop Rate	≤ 2%	0.80%	0.94%	1.51%	0.32%
	Worst affected cells having more than 3% Circuit Switched Voice Drop Rate:	≤ 3%	1.35%	2.68%	2.08%	0.58%
	Percentage of connections with Good Circuit Switched Voice Quality	≥ 95%	98.58%	99.07%	97.78%	98.86%

6.13. 3G VOICE PMR: JANUARY

Jan-16						
Network Parameters		Name of Service Provider				
		Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.23%	1.26%	0.05%	DNA
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.23%	1.68%	0.18%	DNA
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	98.56%	97.31%	98.84%	DNA
	RRC Congestion:	≤ 1%	0.19%	0.58%	0.32%	DNA
	RAB Congestion:	≤ 2%	0.03%	0.53%	0.14%	DNA
Connection Maintenance (Retainability)	Circuit Switched Voice Drop Rate	≤ 2%	0.88%	0.92%	1.52%	DNA
	Worst affected cells having more than 3% Circuit Switched Voice Drop Rate:	≤ 3%	1.41%	2.69%	2.19%	DNA
	Percentage of connections with Good Circuit Switched Voice Quality	≥ 95%	98.51%	DNA	97.89%	DNA

6.14. 3G VOICE PMR: FEBRUARY

Feb-16						
Network Parameters		Name of Service Provider				
		Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.18%	1.32%	0.08%	0.22%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.15%	1.67%	0.17%	0.00%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	98.92%	97.72%	99.19%	98.62%
	RRC Congestion:	≤ 1%	0.07%	0.69%	0.30%	0.48%
	RAB Congestion:	≤ 2%	0.02%	0.46%	0.14%	0.00%
Connection Maintenance (Retainability)	Circuit Switched Voice Drop Rate	≤ 2%	0.76%	0.95%	1.41%	0.60%
	Worst affected cells having more than 3% Circuit Switched Voice Drop Rate:	≤ 3%	1.31%	2.68%	1.70%	1.09%
	Percentage of connections with Good Circuit Switched Voice Quality	≥ 95%	98.58%	99.07%	97.92%	99.93%

6.15. 3G VOICE PMR: MARCH

Mar-16						
Network Parameters		Name of Service Provider				
		Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.19%	DNA	0.23%	0.11%
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.21%	DNA	0.00%	1.18%
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	98.69%	DNA	99.04%	99.59%
	RRC Congestion:	≤ 1%	0.17%	DNA	0.43%	0.08%
	RAB Congestion:	≤ 2%	0.05%	DNA	0.12%	0.00%
Connection Maintenance (Retainability)	Circuit Switched Voice Drop Rate	≤ 2%	0.76%	DNA	1.60%	0.03%
	Worst affected cells having more than 3% Circuit Switched Voice Drop Rate:	≤ 3%	1.33%	DNA	2.34%	0.06%
	Percentage of connections with Good Circuit Switched Voice Quality	≥ 95%	98.66%	DNA	97.53%	97.80%

6.16. 3G VOICE 3 DAYS LIVE DATA: CONSOLIDATED

Consolidated						
Network Parameters		Name of Service Provider				
		Benchmark	AIRTEL	IDEA	BSNL	RCOM GSM
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.77%	0.11%	DNA	DNA
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.00%	0.00%	DNA	DNA
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	98.76%	99.06%	97.05%	DNA
	RRC Congestion:	≤ 1%	0.19%	0.45%	0.60%	DNA
	RAB Congestion:	≤ 2%	0.06%	0.19%	0.48%	DNA
Connection Maintenance (Retainability)	Circuit Switched Voice Drop Rate	≤ 2%	0.72%	1.61%	1.02%	DNA
	Worst affected cells having more than 3% Circuit Switched Voice Drop Rate:	≤ 3%	1.38%	2.17%	2.69%	DNA
	Percentage of connections with Good Circuit Switched Voice Quality	≥ 95%	98.58%	97.57%	99.71%	DNA

6.17. 3G VOICE 3 DAYS LIVE DATA: JANUARY

Jan-16						
Network Parameters		Name of Service Provider				
		Benchmark	AIRTEL	IDEA	BSNL	RCOM GSM
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.78%	0.14%	0.00%	DNA
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.00%	0.00%	0.00%	DNA
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	98.65%	99.00%	97.07%	DNA
	RRC Congestion:	≤ 1%	0.28%	0.25%	0.58%	DNA
	RAB Congestion:	≤ 2%	0.08%	0.10%	0.55%	DNA
Connection Maintenance (Retainability)	Circuit Switched Voice Drop Rate	≤ 2%	0.74%	1.48%	0.96%	DNA
	Worst affected cells having more than 3% Circuit Switched Voice Drop Rate:	≤ 3%	1.41%	2.55%	2.70%	DNA
	Percentage of connections with Good Circuit Switched Voice Quality	≥ 95%	98.53%	97.56%	DNA	DNA

6.18. 3G VOICE 3 DAYS LIVE DATA: FEBRUARY

Feb-16						
Network Parameters		Name of Service Provider				
		Benchmark	AIRTEL	IDEA	BSNL	RCOM GSM
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.78%	0.17%	0.00%	DNA
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.00%	0.00%	0.00%	DNA
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	98.65%	99.16%	97.02%	DNA
	RRC Congestion:	≤ 1%	0.28%	0.29%	0.62%	DNA
	RAB Congestion:	≤ 2%	0.08%	0.19%	0.42%	DNA
Connection Maintenance (Retainability)	Circuit Switched Voice Drop Rate	≤ 2%	0.70%	1.52%	1.07%	DNA
	Worst affected cells having more than 3% Circuit Switched Voice Drop Rate:	≤ 3%	1.24%	1.87%	2.68%	DNA
	Percentage of connections with Good Circuit Switched Voice Quality	≥ 95%	98.60%	98.26%	99.71%	DNA

6.19. 3G VOICE 3 DAYS LIVE DATA: MARCH

Mar-16						
Network Parameters		Name of Service Provider				
		Benchmark	AIRTEL	IDEA	BSNL	RCOM GSM
Network Availability	Sum of downtime of BTSs in a month in hrs. in the licensed service area	≤ 2%	0.74%	0.03%	0.00%	DNA
	No. of BTSs having accumulated downtime of >24 hours in a month	≤ 2%	0.00%	0.00%	0.00%	DNA
Connection Establishment (Accessibility)	Call Set-up Success Rate (Within Licensee own network)	≥ 95%	98.97%	99.00%	DNA	DNA
	RRC Congestion:	≤ 1%	0.02%	0.81%	DNA	DNA
	RAB Congestion:	≤ 2%	0.01%	0.27%	DNA	DNA
Connection Maintenance (Retainability)	Circuit Switched Voice Drop Rate	≤ 2%	0.74%	1.84%	DNA	DNA
	Worst affected cells having more than 3% Circuit Switched Voice Drop Rate:	≤ 3%	1.48%	2.09%	DNA	DNA
	Percentage of connections with Good Circuit Switched Voice Quality	≥ 95%	98.61%	96.88%	DNA	DNA

6.20. PMR MONTHLY 2G WIRELESS DATA - CONSOLIDATED

Consolidated Cellular Mobile Telephone Services											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Service Quality Parameter											
1 Service Activation/ Provisioning											
i)	Total No. of Subscribers for Service Activation (A)		88303	DNA	154	3070	543	46564	16	1	4121
ii)	Total Service Activations provided within 4 Hours (B)		88221	DNA	154	3070	543	46564	16	1	4119
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	99.89%	DNA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.97%
2 PDP Context Activation Success Rate											
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		116213548	11183579	76757747	38632560	DNA	DNA	8263820	315	624660190
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		115636942	11182477	76342663	38241316	DNA	DNA	7980948	315	621112713
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	99.53%	99.99%	99.59%	98.99%	98.40%	99.17%	96.58%	99.84%	99.44%
3 Drop Rate											
i)	RNC originated PS Domain lu Connection Setup Success (A)		539715300	2380189597	DNA	997738553	1154730	327897504	381749	82709	DNA
ii)	RNC originated PS Domain lu Connection Release (B)		4581294	25988811	DNA	6747552	2764	15803204	3167	315	DNA
iii)	Drop Rate = (B/A) * 100	<=5%	0.85%	1.09%	1.25%	0.68%	0.24%	4.82%	0.83%	0.38%	DNA

6.21. PMR MONTHLY 2G WIRELESS DATA - JANUARY

Jan-16 Cellular Mobile Telephone Services											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Service Quality Parameter											
1 Service Activation/ Provisioning											
i)	Total No. of Subscribers for Service Activation (A)		100149	DNA	177	DNA	884	49436	DNA	DNA	4393
ii)	Total Service Activations provided within 4 Hours (B)		100108	DNA	177	DNA	884	49436	DNA	DNA	4390
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	99.96%	DNA	100.00%	DNA	100.00%	100.00%	DNA	DNA	99.93%
2 PDP Context Activation Success Rate											
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		119573941	DNA	101319603	DNA	DNA	DNA	DNA	464	618247585
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		119356870	DNA	100091770	DNA	DNA	DNA	DNA	464	617536344
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	99.82%	DNA	98.79%	DNA	99.48%	98.58%	DNA	100.00%	99.88%
3 Drop Rate											
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	DNA	1311850	348678535	377146	94956	DNA
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	DNA	2828	16780887	3122	338	DNA
iii)	Drop Rate = (B/A) * 100	<=5%	0.86%	DNA	DNA	DNA	0.22%	4.81%	0.83%	0.36%	DNA

6.22. PMR MONTHLY 2G WIRELESS DATA - FEBRUARY

Feb-16											
Cellular Mobile Telephone Services											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Service Quality Parameter											
1 Service Activation/ Provisioning											
i)	Total No. of Subscribers for Service Activation (A)		64022	DNA	154	135	436	50045	16	1	3893
ii)	Total Service Activations provided within 4 Hours (B)		63866	DNA	154	135	436	50045	16	1	3893
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	99.76%	DNA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
2 PDP Context Activation Success Rate											
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		105665173	DNA	59554882	43385218	DNA	DNA	7934538	279	580454307
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		105626560	DNA	59549715	42922549	DNA	DNA	7667863	279	575950456
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	99.96%	DNA	99.99%	98.93%	98.24%	99.15%	96.64%	100.00%	99.22%
3 Drop Rate											
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	DNA	1161642	321276462	354543	87405	DNA
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	DNA	2995	15445755	2751	349	DNA
iii)	Drop Rate = (B/A) * 100	<=5%	0.85%	DNA	1.20%	DNA	0.26%	4.81%	0.78%	0.40%	DNA

6.23. PMR MONTHLY 2G WIRELESS DATA - MARCH

Mar-16											
Cellular Mobile Telephone Services											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Service Quality Parameter											
1 Service Activation/ Provisioning											
i)	Total No. of Subscribers for Service Activation (A)		100739	DNA	132	6005	308	40212	DNA	DNA	4076
ii)	Total Service Activations provided within 4 Hours (B)		100688	DNA	132	6005	308	40212	DNA	DNA	4075
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	99.95%	DNA	100.00%	100.00%	100.00%	100.00%	DNA	DNA	99.98%
2 PDP Context Activation Success Rate											
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		123401531	11183579	69398756	33879902	DNA	DNA	8593101	203	675278677
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		121927396	11182477	69386505	33560083	DNA	DNA	8294032	202	669851339
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	98.81%	99.99%	99.98%	99.06%	97.48%	99.79%	96.52%	99.51%	99.20%
3 Drop Rate											
i)	RNC originated PS Domain lu Connection Setup Success (A)		539715300	2380189597	DNA	997738553	990697	313737516	413559	65766	DNA
ii)	RNC originated PS Domain lu Connection Release (B)		4581294	25988811.28	DNA	6747552	2470	15182970	3627	259	DNA
iii)	Drop Rate = (B/A) * 100	<=5%	0.85%	1.09%	1.30%	0.68%	0.25%	4.84%	0.88%	0.39%	DNA

6.24. PMR 3 DAY LIVE 2G WIRELESS DATA - CONSOLIDATED

Consolidated											
Cellular Mobile Telephone Services											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Service Quality Parameter											
1 Service Activation/ Provisioning											
i)	Total No. of Subscribers for Service Activation (A)		DNA	1223	1	1223	74	5198	DNA	DNA	DNA
ii)	Total Service Activations provided within 4 Hours (B)		DNA	1223	1	1223	74	5198	DNA	DNA	DNA
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	DNA	100.00%	100.00%	100.00%	100.00%	100.00%	DNA	DNA	DNA
2 PDP Context Activation Success Rate											
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		11032930	4615460	9285942	3770473	DNA	DNA	867480	32	61612982
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		11032271	4587275	9133780	3715150	DNA	DNA	836964	32	61424156
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	99.99%	99.39%	98.57%	98.29%	98.22%	99.76%	96.48%	100.00%	99.71%
3 Drop Rate											
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	DNA	134058	32734009	32044	8955	DNA
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	DNA	329	1575885	246	51	DNA
iii)	Drop Rate = (B/A) * 100	<=5%	0.89%	DNA	1.03%	DNA	0.25%	4.82%	0.76%	0.55%	DNA

6.25. PMR 3 DAY LIVE 2G WIRELESS DATA - JANUARY

Jan-16											
Cellular Mobile Telephone Services											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Service Quality Parameter											
1 Service Activation/ Provisioning											
i)	Total No. of Subscribers for Service Activation (A)		DNA	1223	1	1223	DNA	DNA	DNA	DNA	DNA
ii)	Total Service Activations provided within 4 Hours (B)		DNA	1223	1	1223	DNA	DNA	DNA	DNA	DNA
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	DNA	100%	100.00%	100.00%	DNA	DNA	DNA	DNA	DNA
2 PDP Context Activation Success Rate											
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		11715747	4615460	10181968	2925485	DNA	DNA	DNA	56	59643350
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		11715320	4587275	9999573	2843024	DNA	DNA	DNA	56	59611059
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	100.00%	99.39%	98.21%	97.18%	98.57%	99.68%	DNA	100.00%	99.95%
3 Drop Rate											
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	DNA	142037	33715423	DNA	14605	DNA
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	DNA	346	1603556	DNA	85	DNA
iii)	Drop Rate = (B/A) * 100	<=5%	DNA	DNA	DNA	DNA	0.24%	4.76%	DNA	0.58%	DNA

6.26. PMR 3 DAY LIVE 2G WIRELESS DATA - FEBRUARY

Feb-16											
Cellular Mobile Telephone Services											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Service Quality Parameter											
1 Service Activation/ Provisioning											
i)	Total No. of Subscribers for Service Activation (A)		DNA	DNA	0	DNA	74	5198	DNA	DNA	DNA
ii)	Total Service Activations provided within 4 Hours (B)		DNA	DNA	0	DNA	74	5198	DNA	DNA	DNA
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	DNA	DNA	NIL	DNA	100.00%	100.00%	DNA	DNA	DNA
2 PDP Context Activation Success Rate											
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		10691521	DNA	10913280	DNA	DNA	DNA	DNA	28	60079070
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		10690747	DNA	10639190	DNA	DNA	DNA	DNA	28	60033560
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	99.99%	DNA	97.49%	DNA	98.63%	99.85%	DNA	100.00%	99.92%
3 Drop Rate											
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	DNA	126925	34026470	27485	10176	DNA
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	DNA	314	1635538	208	59	DNA
iii)	Drop Rate = (B/A) * 100	<=5%	0.88%	DNA	0.76%	DNA	0.25%	4.81%	0.76%	0.58%	DNA

6.27. PMR 3 DAY LIVE 2G WIRELESS DATA – MARCH

Mar-16											
Cellular Mobile Telephone Services											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
Network Service Quality Parameter											
1	Service Activation/ Provisioning										
i)	Total No. of Subscribers for Service Activation (A)		DNA	DNA	3	1223	DNA	DNA	DNA	DNA	DNA
ii)	Total Service Activations provided within 4 Hours (B)		DNA	DNA	3	1223	DNA	DNA	DNA	DNA	DNA
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	DNA	DNA	100.00%	100%	DNA	DNA	DNA	DNA	DNA
2	PDP Context Activation Success Rate										
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		10691521	DNA	6762578	4615460	DNA	DNA	867480	11	65116526
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		10690747	DNA	6762578	4587275	DNA	DNA	836964	11	64627849
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	99.99%	DNA	100.00%	99.39%	97.46%	99.74%	96.48%	100.00%	99.25%
3	Drop Rate										
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	DNA	133212	30460133	36602	2083	DNA
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	DNA	328	1488562	283	10	DNA
iii)	Drop Rate = (B/A) * 100	<=5%	0.90%	DNA	1.30%	DNA	0.25%	4.89%	0.77%	0.48%	DNA

6.28. PMR MONTHLY 3G WIRELESS DATA - CONSOLIDATED

Consolidated						
Cellular Mobile Telephone Services						
S. No.	Name of Parameter	Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Service Quality Parameter						
1	Service Activation/ Provisioning					
i)	Total No. of Subscribers for Service Activation (A)		DNA	12	1223	DNA
ii)	Total Service Activations provided within 4 Hours (B)		DNA	12	1223	DNA
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	DNA	100.00%	100.00%	DNA
2	PDP Context Activation Success Rate					
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		DNA	3381123	3770473	DNA
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		DNA	3378145	3715150	DNA
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	DNA	99.91%	98.29%	98.30%
3	Drop Rate					
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	546144

ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	3925
iii)	Drop Rate = (B/A) * 100	<=5%	DNA	1.36%	DNA	0.52%

6.29. PMR MONTHLY 3G WIRELESS DATA - JANUARY

Jan-16						
Cellular Mobile Telephone Services						
S. No.	Name of Parameter	Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Service Quality Parameter						
1	Service Activation/ Provisioning					
i)	Total No. of Subscribers for Service Activation (A)		DNA	302	DNA	DNA
ii)	Total Service Activations provided within 4 Hours (B)		DNA	302	DNA	DNA
iii)	Service Activation / Provisioning = (B/A) * 100	<i>Within 4 Hours with 95% Success Rate</i>	DNA	100.00%	DNA	DNA
2	PDP Context Activation Success Rate					
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		DNA	101319603	DNA	DNA
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		DNA	100091770	DNA	DNA
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	DNA	98.79%	DNA	DNA
3	Drop Rate					
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	DNA
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	DNA
iii)	Drop Rate = (B/A) * 100	<=5%	DNA	0.63%	DNA	DNA

6.30. PMR MONTHLY 3G WIRELESS DATA - FEBRUARY

Feb-16						
Cellular Mobile Telephone Services						
S. No.	Name of Parameter	Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Service Quality Parameter						
1	Service Activation/ Provisioning					
i)	Total No. of Subscribers for Service Activation (A)		DNA	339	135	50045
ii)	Total Service Activations provided within 4 Hours (B)		DNA	339	135	50045
iii)	Service Activation / Provisioning = (B/A) * 100	<i>Within 4 Hours with 95% Success Rate</i>	DNA	100.00%	100.00%	100.00%
2	PDP Context Activation Success Rate					
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		DNA	26274648	26897661	DNA
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		DNA	26270442	26363001	DNA
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	DNA	99.98%	98.01%	97.90%
3	Drop Rate					
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	9141089

ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	62608
iii)	Drop Rate = (B/A) * 100	<=5%	DNA	0.81%	DNA	0.68%

6.31. PMR MONTHLY 3G WIRELESS DATA - MARCH

Mar-16						
Cellular Mobile Telephone Services						
S. No.	Name of Parameter	Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Service Quality Parameter						
1	Service Activation/ Provisioning					
i)	Total No. of Subscribers for Service Activation (A)		DNA	DNA	6005	40212
ii)	Total Service Activations provided within 4 Hours (B)		DNA	DNA	6005	40212
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	DNA	DNA	100.00%	100.00%
2	PDP Context Activation Success Rate					
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		3273343	DNA	22927504	DNA
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		3270178	DNA	22447644	DNA
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	99.90%	DNA	97.91%	98.00%
3	Drop Rate					
i)	RNC originated PS Domain lu Connection Setup Success (A)		32992555	DNA	81151732	10033821
ii)	RNC originated PS Domain lu Connection Release (B)		215233	DNA	1918105	73273
iii)	Drop Rate = (B/A) * 100	<=5%	0.65%	DNA	2.36%	0.73%

6.32. PMR 3 DAY LIVE 3G WIRELESS DATA - CONSOLIDATED

Consolidated						
Cellular Mobile Telephone Services						
S. No.	Name of Parameter	Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Service Quality Parameter						
1	Service Activation/ Provisioning					
i)	Total No. of Subscribers for Service Activation (A)		DNA	12	1223	DNA
ii)	Total Service Activations provided within 4 Hours (B)		DNA	12	1223	DNA
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	DNA	100.00%	100.00%	DNA
2	PDP Context Activation Success Rate					
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		DNA	3381123	3770473	DNA
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		DNA	3378145	3715150	DNA
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	DNA	99.91%	98.29%	98.30%
3	Drop Rate					
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	546144
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	3925
iii)	Drop Rate = (B/A) * 100	<=5%	DNA	1.36%	DNA	0.52%

6.33. PMR 3 DAY LIVE 3G WIRELESS DATA - JANUARY

Jan-16						
Cellular Mobile Telephone Services						
S. No.	Name of Parameter	Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Service Quality Parameter						
1 Service Activation/ Provisioning						
i)	Total No. of Subscribers for Service Activation (A)		DNA	DNA	1223	DNA
ii)	Total Service Activations provided within 4 Hours (B)		DNA	DNA	1223	DNA
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	DNA	DNA	100.00%	DNA
2 PDP Context Activation Success Rate						
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		DNA	DNA	4615460	DNA
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		DNA	DNA	4587275	DNA
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	DNA	DNA	99.39%	98.57%
3 Drop Rate						
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	142037
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	346
iii)	Drop Rate = (B/A) * 100	<=5%	DNA	DNA	DNA	0.24%

6.34. PMR 3 DAY LIVE 3G WIRELESS DATA - FEBRUARY

Feb-16						
Cellular Mobile Telephone Services						
S. No.	Name of Parameter	Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Service Quality Parameter						
1 Service Activation/ Provisioning						
i)	Total No. of Subscribers for Service Activation (A)		DNA	12	DNA	DNA
ii)	Total Service Activations provided within 4 Hours (B)		DNA	12	DNA	DNA
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	DNA	100.00%	DNA	DNA
2 PDP Context Activation Success Rate						
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		DNA	3381123	DNA	DNA
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		DNA	3378145	DNA	DNA
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	DNA	99.91%	DNA	DNA
3 Drop Rate						
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	DNA
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	DNA
iii)	Drop Rate = (B/A) * 100	<=5%	DNA	1.36%	DNA	DNA

6.35. PMR 3 DAY LIVE 3G WIRELESS DATA - MARCH

Mar-16						
Cellular Mobile Telephone Services						
S. No.	Name of Parameter	Benchmark	AIRTEL	BSNL	IDEA	RCOM GSM
Network Service Quality Parameter						
1	Service Activation/ Provisioning					
i)	Total No. of Subscribers for Service Activation (A)		DNA	DNA	1223	DNA
ii)	Total Service Activations provided within 4 Hours (B)		DNA	DNA	1223	DNA
iii)	Service Activation / Provisioning = (B/A) * 100	Within 4 Hours with 95% Success Rate	DNA	DNA	100%	DNA
2	PDP Context Activation Success Rate					
i)	Total No. of PDP Context Activation Requests (from SGSN to GGSN) (A)		DNA	DNA	2925485	DNA
ii)	Total No. of PDP Context Activation Success (path created b/w SGSN and GGSN) (B)		DNA	DNA	2843024	DNA
iii)	PDP Context Activation Success Rate = (B/A) * 100	>=95%	DNA	DNA	97.18%	98.02%
3	Drop Rate					
i)	RNC originated PS Domain lu Connection Setup Success (A)		DNA	DNA	DNA	950250
ii)	RNC originated PS Domain lu Connection Release (B)		DNA	DNA	DNA	7503
iii)	Drop Rate = (B/A) * 100	<=5%	DNA	DNA	DNA	0.79%

6.36. POI CONGESTION: CONSOLIDATED

Consolidated											
Monthly TRAI Network Performance Report of Cellular Mobile Telephone Service - Network Service											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
1	Total No. of POI's in Month having <= 0.5% POI congestion										
	Total No. of call attempts on POI		6825640	22443679	17893228	31779	424748	6808715	1537732	48452	5237788
	Total traffic served on all POIs (Erlang)		171341	752736	353873	73667	8874	122456	28535	833	228113
	Total No. of circuits on all individual POIs		437855	1257248	557232	148034	63518	437311	180660	5429	811589
	Total number of working POI Service Area wise		840	37	899	220	394	667	1698	30	1820
	Capacity of all POIs		406591	1244676	501509	141540	49008	402646	150090	4450	537968
	No. of all POI's having >=0.5% POI congestion		0	0	0	0	0	0	0	0	0
Name of POI not meeting the benchmark (having >=0.5% POI congestion)		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	

6.37. POI CONGESTION: JANUARY

Jan-16											
Monthly TRAI Network Performance Report of Cellular Mobile Telephone Service - Network Service											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
1	Total No. of POI's in Month having <= 0.5% POI congestion										
	Total No. of call attempts on POI		6261765	22215428	17119736	2833	469632	7024560	1550164	53753	319156
	Total traffic served on all POIs (Erlang)		168139	761914	350285	6518	9260	123695	28972	854	319156
	Total No. of circuits on all individual POIs		448725	1292287	552150	13423	64914	449314	182730	5673	828656
	Total number of working POI Service Area wise		899	37	870	20	403	682	1850	31	1860
	Capacity of all POIs		416262	1279364	496935	12835	51564	412631	151814	4650	793259
	No. of all POI's having >=0.5% POI congestion		0	0	0	0	0	0	0	0	0
Name of POI not meeting the benchmark (having >=0.5% POI congestion)		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	

6.38. POI CONGESTION: FEBRUARY

Feb-16											
Monthly TRAI Network Performance Report of Cellular Mobile Telephone Service - Network Service											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
1	Total No. of POI's in Month having <= 0.5% POI congestion										
	Total No. of call attempts on POI		7104272	21446265	16653831	2837	394932	6620892	1558794	44616	475886
	Total traffic served on all POIs (Erlang)		167451	720797	341140	6659	8742	121574	28006	827	11552
	Total No. of circuits on all individual POIs		418006	1196010	533745	13418	60726	418668	176581	5307	775407
	Total number of working POI Service Area wise		783	37	841	20	377	638	1595	29	1740
	Capacity of all POIs		388364	1184050	480371	12830	47726	385790	146699	4350	25588
	No. of all POI's having >=0.5% POI congestion		0	0	0	0	0	0	0	0	0
Name of POI not meeting the benchmark (having >=0.5% POI congestion)		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	

6.39. POI CONGESTION: MARCH

Mar-16											
Monthly TRAI Network Performance Report of Cellular Mobile Telephone Service - Network Service											
S. No.	Name of Parameter	Benchmark	AIRCEL	AIRTEL	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM	VODAFONE
1	Total No. of POI's in Month having <= 0.5% POI congestion										
	Total No. of call attempts on POI		7110882	23669344	19906116	89668	409680	6780692	1504237	46986	14918321
	Total traffic served on all POIs (Erlang)		178432	775497	370195	207824	8621	122100	28628	818	353630
	Total No. of circuits on all individual POIs		446834	1283447	585800	417260	64914	443953	182670	5307	830704
	Total number of working POI Service Area wise		837	37	986	620	403	682	1650	29	1860
	Capacity of all POIs		415148	1270613	527220	398955	47735	409518	151758	4350	795057
	No. of all POI's having >=0.5% POI congestion		0	0	0	0	0	0	0	0	0
Name of POI not meeting the benchmark (having >=0.5% POI congestion)		NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	NIL	

7. CUSTOMER SERVICE DELIVERY

7.1. BILLING AND CUSTOMER CARE

Name of Service Provider	Metering and Billing credibility		Billing Complaints			Termination & Closures	Time taken for refund of deposits after closures: Benchmark	Response time to customer for assistance	
	Postpaid Subscribers	Prepaid Subscribers	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	%age of where credit/waiver is received within one week	% of Termination/ Closure of service within 7 days (100 %)	Cleared over a period of <60 days (100%)	%age of calls answered by the IVR	%age of call answered by the operators (voice to voice) within 90 seconds
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	= 100%	= 100%	= 100%	= 100%	≥ 95%	≥ 95%
AIRCEL	0.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.53%	96.85%
AIRTEL	0.02%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.87%	94.58%
BSNL	0.01%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.52%
IDEA	0.02%	0.03%	100.00%	100.00%	100.00%	100.00%	100.00%	99.17%	99.78%
RCOM-GSM	0.09%	0.09%	100.00%	100.00%	100.00%	100.00%	100.00%	99.58%	96.87%
RCOM-CDMA	0.08%	0.05%	100.00%	100.00%	100.00%	100.00%	100.00%	96.91%	97.73%
TTSL-GSM	0.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.78%	99.75%
TTSL-CDMA	0.00%	0.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.78%	99.73%
VODAFONE	0.09%	0.05%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.70%

Name of Service Provider	Customer Care & Grievances Redressal	
	% of Complaints addressed at call center level	% of Complaints addressed by Appellate Authority
AIRCEL	100.00%	NIL
AIRTEL	100.00%	100.00%
BSNL	98.84%	NIL
IDEA	51.42%	NIL
RCOM-GSM	100.00%	100.00%
RCOM-CDMA	100.00%	100.00%
TTSL-GSM	97.33%	75.00%
TTSL-CDMA	100.00%	NIL
VODAFONE	7.65%	NIL

7.2. LIVE CALLING DATA: CONSOLIDATED

Name of Service Provider	Metering and Billing (Service Request)				Response time to customer for Assistance	
	Total Calls Attempted	No. of Subscribers reached	Complaints/ Request attended to satisfaction	% of Complaints/ Request attended to satisfaction	Accessibility of call centre / Customer care	%age of call answered by the operators (voice to voice) within 90 seconds
Benchmark					≥ 95%	≥ 95%
AIRCEL	0	0	0	100	100%	100%
AIRTEL	58	31	27	87.10%	100%	100%
BSNL	76	35	24	68.57%	100%	98%
IDEA	0	0	0	100	100%	100%
RCOM-GSM	99	99	99	100%	98%	98%
RCOM-CDMA	74	74	74	100%	98%	98%
TTSL-GSM	0	0	0	100%	100%	100%
TTSL-CDMA	0	0	0	100%	100%	100%
VODAFONE	0	0	0	100%	100%	100%

7.3. 3 DAYS LIVE CALL CENTRE DATA

Response time to customer assistance						
OPERATOR	Total no of calls attempted to customer care/Call center	Total no. of calls successfully established to customer care/Call center	% age of Accessibility of Call centre	Total Calls reached to operator for (Voice to Voice)	Total number of calls answered by the operator (Voice to voice) within 90 seconds	% age calls answered by the operator within 90 seconds
	AVERAGE					
OPERATOR			>=95%			>=95%
AIRCEL	30136	29640	98.35%	11540	11279	97.74%
AIRTEL	18651	18651	100.00%	36050	33029	91.62%
BSNL	2376	2376	100.00%	1027	1027	100.00%
IDEA	36566	36297	99.26%	13109	12777	97.47%
RCOM-GSM	54807	54554	99.54%	12188	11985	98.33%
RCOM-CDMA	3506	3378	96.35%	1561	1518	97.25%
TTSL-GSM	301	297	98.67%	190	190	100.00%
TTSL-CDMA	301	297	98.67%	145	145	100.00%
VODAFONE	29861	29861	100.00%	11277	11262	99.87%

8. L1 CALLING DATA

L1 Calling data covers all the SDCA covered across the one operator assisted drive tests:

- Hamirpur: 4th Feb to 6th Feb 2016
- Mandi: 29th Feb to 2nd March 2016
- Kullu: 28th March to 30th March 2016

8.1. HAMIRPUR

S.No.	EMERGENCY NUMBER	AIRTEL				
		CALLS MADE	Hamirpur	Una	Bilaspur	Amb
1	100	5	√	√	√	√
2	101	5	√	√	√	√
3	102	5	√	√	√	√
4	104	5	x	x	x	x
5	108	5	√	√	√	√
6	138	5	√	√	√	√
7	149	5	x	x	x	x
8	181	5	x	x	x	x
9	182	5	√	√	√	√
10	1033	5	√	√	√	√
11	1037	5	x	x	x	x
12	1056	5	x	x	x	x
13	1060	5	x	x	x	x
14	1063	5	x	x	x	x
15	1064	5	x	x	x	x
16	1070	5	x	x	x	x
17	1071	5	x	x	x	x
18	1072	5	x	x	x	x
19	1073	5	x	x	x	x
20	1077	5	x	x	x	x
21	1090	5	x	x	x	x
22	1091	5	√	√	√	√
23	1097	5	x	x	x	x
24	1099	5	x	x	x	x
25	10580	5	x	x	x	x
26	10589	5	x	x	x	x
27	10740	5	x	x	x	x
28	10741	5	x	x	x	x
29	1511	5	x	x	x	x
30	1512	5	x	x	x	x
31	1514	5	x	x	x	x
32	15100	5	x	x	x	x
33	155304	5	x	x	x	x
34	155214	5	x	x	x	x
35	1903	5	√	√	√	√
36	1909	5	√	√	√	√
37	1912	5	x	x	x	x
38	1916	5	x	x	x	x
39	1950	5	√	√	√	√

		BSNL
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S.No.	EMERGENCY NUMBER	Hamirpur	Una	Bilaspur	Amb
1	100	√	√	√	√
2	101	√	√	√	√
3	102	√	√	√	√
4	104	x	x	x	x
5	108	√	√	√	√
6	138	√	√	√	√
7	149	x	x	x	x
8	181	x	x	x	x
9	182	√	√	√	√
10	1033	√	√	√	√
11	1037	x	x	x	x
12	1056	x	x	x	x
13	1060	x	x	x	x
14	1063	x	x	x	x
15	1064	√	√	√	√
16	1070	√	√	√	√
17	1071	x	x	x	x
18	1072	x	x	x	x
19	1073	x	x	x	x
20	1077	x	x	x	x
21	1090	x	x	x	x
22	1091	√	√	√	√
23	1097	√	√	√	√
24	1099	x	x	x	x
25	10580	x	x	x	x
26	10589	x	x	x	x
27	10740	x	x	x	x
28	10741	x	x	x	x
29	1511	x	x	x	x
30	1512	x	x	x	x
31	1514	x	x	x	x
32	15100	√	√	√	√
33	155304	x	x	x	x
34	155214	x	x	x	x
35	1903	√	√	√	√
36	1909	√	√	√	√
37	1912	x	x	x	x
38	1916	x	x	x	x
39	1950	√	√	√	√

S.No.	EMERGENCY NUMBER	CALLS MADE	IDEA			
			BILASPUR	UNA	HAMIRPUR	AMB
1	100	5	√	√	√	√
2	101	5	√	√	√	√
3	102	5	√	√	√	√
4	104	5	x	x	x	x
5	108	5	√	√	√	√
6	138	5	x	x	x	x
7	149	5	x	x	x	x
8	181	5	x	x	x	x
9	182	5	x	x	x	x
10	1033	5	√	√	√	√
11	1037	5	x	x	x	x
12	1056	5	x	x	x	x
13	1060	5	x	x	x	x
14	1063	5	x	x	x	x
15	1064	5	x	x	x	x
16	1070	5	√	√	√	√
17	1071	5	x	x	x	x
18	1072	5	√	√	√	√
19	1073	5	√	√	√	√
20	1077	5	√	√	√	√
21	1090	5	x	x	x	x
22	1091	5	√	√	√	√
23	1097	5	√	√	√	√
24	1099	5	x	x	x	x
25	10580	5	x	x	x	x
26	10589	5	x	x	x	x
27	10740	5	x	x	x	x
28	10741	5	x	x	x	x
29	1511	5	x	x	x	x
30	1512	5	x	x	x	x
31	1514	5	x	x	x	x
32	15100	5	x	x	x	x
33	155304	5	x	x	x	x
34	155214	5	x	x	x	x
35	1903	5	√	√	√	√
36	1909	5	√	√	√	√
37	1912	5	√	√	√	√
38	1916	5	x	x	x	x

39	1950	5	√	√	√	√
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S.No.	RCOM CDMA				
	EMERGENCY NUMBER	Hamirpur	Amb	UNa	Bilaspur
1	100	√	√	√	√
2	101	√	√	√	√
3	102	√	√	√	√
4	104	√	√	√	√
5	108	√	√	√	√
6	138	x	x	x	x
7	149	x	x	x	x
8	181	x	x	x	x
9	182	x	x	x	x
10	1033	√	√	√	√
11	1037	x	x	x	x
12	1056	x	x	x	x
13	1060	x	x	x	x
14	1063	x	x	x	x
15	1064	x	x	x	x
16	1070	√	√	√	√
17	1071	x	x	x	x
18	1072	x	x	x	x
19	1073	x	x	x	x
20	1077	√	√	√	√
21	1090	x	x	x	x
22	1091	√	√	√	√
23	1097	x	x	x	x
24	1099	x	x	x	x
25	10580	x	x	x	x
26	10589	x	x	x	x
27	10740	x	x	x	x
28	10741	x	x	x	x
29	1511	x	x	x	x
30	1512	x	x	x	x
31	1514	x	x	x	x
32	15100	x	x	x	x
33	155304	x	x	x	x
34	155214	x	x	x	x
35	1903	x	x	x	x
36	1909	√	√	√	√
37	1912	√	√	√	√
38	1916	x	x	x	x
39	1950	x	x	x	x

S.No.	RCOM GSM				
	EMERGENCY NUMBER	Hamirpur	Amb	UNa	Bilaspur
1	100	√	√	√	√
2	101	√	√	√	√
3	102	√	√	√	√
4	104	√	√	√	√
5	108	√	√	√	√
6	138	x	x	x	x
7	149	x	x	x	x
8	181	x	x	x	x
9	182	x	x	x	x
10	1033	√	√	√	√
11	1037	x	x	x	x
12	1056	x	x	x	x
13	1060	x	x	x	x
14	1063	x	x	x	x
15	1064	x	x	x	x
16	1070	√	√	√	√
17	1071	x	x	x	x
18	1072	x	x	x	x
19	1073	x	x	x	x
20	1077	√	√	√	√
21	1090	x	x	x	x
22	1091	√	√	√	√
23	1097	x	x	x	x
24	1099	x	x	x	x
25	10580	x	x	x	x
26	10589	x	x	x	x
27	10740	x	x	x	x
28	10741	x	x	x	x
29	1511	x	x	x	x
30	1512	x	x	x	x
31	1514	x	x	x	x
32	15100	x	x	x	x
33	155304	x	x	x	x
34	155214	x	x	x	x
35	1903	x	x	x	x
36	1909	√	√	√	√
37	1912	√	√	√	√
38	1916	x	x	x	x
39	1950	x	x	x	x

S.No.	TATA GSM				
	EMERGENCY NUMBER	HAMIRPUR	BILASPUR	UNA	AMB
1	100	√	√	√	√
2	101	√	√	√	√
3	102	√	√	√	√
4	104	x	x	x	√
5	108	√	√	√	√
6	138	x	x	x	√
7	149	√	√	√	√
8	181	x	x	x	√
9	182	x	x	x	√
10	1033	x	x	x	√
11	1037	x	x	x	√
12	1056	x	x	x	√
13	1060	x	x	x	√
14	1063	x	x	x	√
15	1064	x	x	x	√
16	1070	x	x	x	√
17	1071	x	x	x	√
18	1072	x	x	x	√
19	1073	x	x	x	√
20	1077	x	x	x	√
21	1090	x	x	x	√
22	1091	√	√	√	√
23	1093	√	√	√	√
24	1099	x	x	x	√
25	10580	x	x	x	√
26	10589	x	x	x	√
27	10740	x	x	x	√
28	10741	x	x	x	√
29	1511	x	x	x	√
30	1512	x	x	x	√
31	1514	x	x	x	√
32	15100	x	x	x	√
33	155304	x	x	x	√
34	155214	x	x	x	√
35	1903	√	√	√	√
36	1909	x	x	x	√
37	1912	x	x	x	√
38	1916	x	x	x	√
39	1950	x	x	x	√

S.No.	VODAFONE			
	EMERGENCY NUMBER	NadauN	UNa	Amb
1	100	√	√	√
2	101	√	√	√
3	102	√	√	√
4	104	x	x	x
5	108	x	x	x
6	138	x	x	x
7	149	x	x	x
8	181	x	x	x
9	182	x	x	x
10	1033	√	√	√
11	1037	√	√	√
12	1056	x	x	x
13	1060	x	x	x
14	1063	x	x	x
15	1064	x	x	x
16	1070	x	x	x
17	1071	x	x	x
18	1072	x	x	x
19	1073	x	x	x
20	1077	x	x	x
21	1090	x	x	x
22	1091	x	x	x
23	1097	x	x	x
24	1099	x	x	x
25	10580	x	x	x
26	10589	x	x	x
27	10740	x	x	x
28	10741	x	x	x
29	1511	x	x	x
30	1512	x	x	x
31	1514	x	x	x
32	15100	x	x	x
33	155304	x	x	x
34	155214	x	x	x
35	1903	x	x	x
36	1909	x	x	x
37	1912	x	x	x
38	1916	x	x	x
39	1950	x	x	x

8.2. MANDI

SR. N.	EMERGENCY NUMBER	AIRTEL			
		CALLS MADE	MANDI	JOGINDAR NAGAR	SUNDER NAGAR
1	100	5	√	√	√
2	101	5	√	√	√
3	102	5	√	√	√
4	104	5	x	x	x
5	108	5	√	√	√
6	138	5	√	√	√
7	149	5	x	x	x
8	181	5	x	x	x
9	182	5	√	√	√
10	1033	5	√	√	√
11	1037	5	√	√	√
12	1056	5	x	x	x
13	1060	5	x	x	x
14	1063	5	x	x	x
15	1064	5	x	x	x
16	1070	5	x	x	x
17	1071	5	x	x	x
18	1072	5	x	x	x
19	1073	5	x	x	x
20	1077	5	x	x	x
21	1090	5	x	x	x
22	1091	5	x	x	x
23	1097	5	x	x	x
24	1099	5	x	x	x
25	10580	5	x	x	x
26	10589	5	x	x	x
27	10740	5	x	x	x
28	10741	5	x	x	x
29	1511	5	x	x	x
30	1512	5	x	x	x
31	1514	5	x	x	x
32	15100	5	x	x	x
33	155304	5	x	x	x
34	155214	5	x	x	x
35	1903	5	x	x	x
36	1909	5	x	x	x
37	1912	5	x	x	x
38	1916	5	x	x	x
39	1950	5	x	x	x

SR. N.	BSNL			
	EMERGENCY NUMBER	SHIMLA	RAMPUR	KALPA
1	100	√	√	√
2	101	√	√	√
3	102	√	√	√
4	104	X	X	X
5	108	√	√	√
6	138	√	√	√
7	149	X	X	X
8	181	X	X	X
9	182	√	√	√
10	1033	√	√	√
11	1037	X	X	X
12	1056	X	X	X
13	1060	X	X	X
14	1063	X	X	X
15	1064	X	X	X
16	1070	√	√	√
17	1071	X	X	X
18	1072	X	X	X
19	1073	X	X	X
20	1077	X	X	X
21	1090	X	X	X
22	1091	X	X	X
23	1097	√	√	√
24	1099	X	X	X
25	10580	X	X	X
26	10589	X	X	X
27	10740	X	X	X
28	10741	X	X	X
29	1511	X	X	X
30	1512	X	X	X
31	1514	X	X	X
32	15100	√	√	√
33	155304	X	X	X
34	155214	X	X	X
35	1903	√	√	√
36	1909	√	√	√
37	1912	X	X	X
38	1916	X	X	X
39	1950	√	√	√

SR. N.	IDEA			
	EMERGENCY NUMBER	MANDI	JOGINDAR NAGAR	AWAHADEVI
1	100	√	√	√
2	101	√	√	√
3	102	√	√	√
4	104	×	×	×
5	108	√	√	√
6	138	×	×	×
7	149	×	×	×
8	181	×	×	×
9	182	×	×	×
10	1033	√	√	√
11	1037	×	×	×
12	1056	×	×	×
13	1060	×	×	×
14	1063	×	×	×
15	1064	×	×	×
16	1070	√	√	√
17	1071	×	×	×
18	1072	√	√	√
19	1073	√	√	√
20	1077	√	√	√
21	1090	×	×	×
22	1091	√	√	√
23	1097	√	√	√
24	1099	×	×	×
25	10580	×	×	×
26	10589	×	×	×
27	10740	×	×	×
28	10741	×	×	×
29	1511	×	×	×
30	1512	×	×	×
31	1514	×	×	×
32	15100	×	×	×
33	155304	×	×	×
34	155214	×	×	×
35	1903	√	√	√
36	1909	√	√	√
37	1912	√	√	√
38	1916	×	×	×
39	1950	√	√	√

SR. N.	RCOM CDMA			
	EMERGENCY NUMBER	MANDI	JOGINDER NAGAR	SUNDER NAGAR
1	100	√	√	√
2	101	√	√	√
3	102	√	√	√
4	104	√	√	√
5	108	√	√	√
6	138	√	√	√
7	149	x	x	x
8	181	x	x	x
9	182	√	√	√
10	1033	√	√	√
11	1037	x	x	x
12	1056	x	x	x
13	1060	x	x	x
14	1063	x	x	x
15	1064	x	x	x
16	1070	x	x	x
17	1071	x	x	x
18	1072	√	√	√
19	1073	x	x	x
20	1077	√	√	√
21	1090	x	x	x
22	1091	√	√	√
23	1097	x	x	x
24	1099	x	x	x
25	10580	x	x	x
26	10589	x	x	x
27	10740	x	x	x
28	10741	x	x	x
29	1511	x	x	x
30	1512	x	x	x
31	1514	x	x	x
32	15100	x	x	x
33	155304	x	x	x
34	155214	x	x	x
35	1903	√	√	√
36	1909	√	√	√
37	1912	√	√	√
38	1916	√	√	√
39	1950	√	√	√

SR. N.	RCOM GSM			
	EMERGENCY NUMBER	MANDI	JOGINDER NAGAR	SUNDER NAGAR
1	100	√	√	√
2	101	√	√	√
3	102	√	√	√
4	104	√	√	√
5	108	√	√	√
6	138	√	√	√
7	149	x	x	x
8	181	x	x	x
9	182	√	√	√
10	1033	√	√	√
11	1037	x	x	x
12	1056	x	x	x
13	1060	x	x	x
14	1063	x	x	x
15	1064	x	x	x
16	1070	x	x	x
17	1071	x	x	x
18	1072	√	√	√
19	1073	x	x	x
20	1077	√	√	√
21	1090	x	x	x
22	1091	√	√	√
23	1097	x	x	x
24	1099	x	x	x
25	10580	x	x	x
26	10589	x	x	x
27	10740	x	x	x
28	10741	x	x	x
29	1511	x	x	x
30	1512	x	x	x
31	1514	x	x	x
32	15100	x	x	x
33	155304	x	x	x
34	155214	x	x	x
35	1903	√	√	√
36	1909	√	√	√
37	1912	√	√	√
38	1916	√	√	√
39	1950	√	√	√

SR. N.	EMERGENCY NUMBER	TATA GSM		
		MANDI	SUNDERNAGAR	JOGINDER NAGAR
1	100	5	5	5
2	101	5	5	5
3	102	5	5	5
4	104	5	5	5
5	108	5	5	5
6	138	x	x	x
7	149	x	x	x
8	181	x	x	x
9	182	x	x	x
10	1033	x	x	x
11	1037	x	x	x
12	1056	x	x	x
13	1060	x	x	x
14	1063	x	x	x
15	1064	x	x	x
16	1070	x	x	x
17	1071	x	x	x
18	1072	x	x	x
19	1073	x	x	x
20	1077	x	x	x
21	1090	x	x	x
22	1091	5	5	5
23	1093	√	√	√
24	1099	x	x	x
25	10580	x	x	x
26	10589	x	x	x
27	10740	x	x	x
28	10741	x	x	x
29	1511	x	x	x
30	1512	x	x	x
31	1514	x	x	x
32	15100	x	x	x
33	155304	x	x	x
34	155214	x	x	x
35	1903	5	5	5
36	1909	x	x	x
37	1912	x	x	x
38	1916	x	x	x
39	1950	x	x	x

SR. N.	TATA CDMA			
	EMERGENCY NUMBER	MANDI	JOGINDER NAGAR	SUNDERNAGAR
1	100	√	√	√
2	101	√	√	√
3	102	√	√	√
4	104	X	X	X
5	108	√	√	√
6	138	√	√	√
7	149	X	X	X
8	181	X	X	X
9	182	X	X	X
10	1033	√	√	√
11	1037	X	X	X
12	1056	X	X	X
13	1060	X	X	X
14	1063	X	X	X
15	1064	√	√	√
16	1070	X	X	X
17	1071	X	X	X
18	1072	√	√	√
19	1073	X	X	X
20	1077	X	X	X
21	1090	X	X	X
22	1091	√	√	√
23	1097	X	X	X
24	1099	X	X	X
25	10580	X	X	X
26	10589	X	X	X
27	10740	X	X	X
28	10741	X	X	X
29	1511	X	X	X
30	1512	X	X	X
31	1514	X	X	X
32	15100	√	√	√
33	155304	X	X	X
34	155214	X	X	X
35	1903	√	√	√
36	1909	X	X	X
37	1912	X	X	X
38	1916	X	X	X
39	1950	X	X	X

SR. N.	VODAFONE			
	EMERGENCY NUMBER	MANDI	JOGINDER NAGAR	AWAHADEVI
1	100	√	√	√
2	101	√	√	√
3	102	√	√	√
4	104	x	x	x
5	108	x	x	x
6	138	x	x	x
7	149	x	x	x
8	181	x	x	x
9	182	x	x	x
10	1033	√	√	√
11	1037	√	√	√
12	1056	x	x	x
13	1060	x	x	x
14	1063	x	x	x
15	1064	x	x	x
16	1070	x	x	x
17	1071	x	x	x
18	1072	x	x	x
19	1073	x	x	x
20	1077	x	x	x
21	1090	x	x	x
22	1091	x	x	√
23	1097	x	x	x
24	1099	x	x	x
25	10580	x	x	x
26	10589	x	x	x
27	10740	x	x	x
28	10741	x	x	x
29	1511	x	x	x
30	1512	x	x	x
31	1514	x	x	x
32	15100	x	x	x
33	155304	x	x	x
34	155214	x	x	x
35	1903	x	x	x
36	1909	x	x	x
37	1912	x	x	x
38	1916	x	x	x
39	1950	x	x	x

8.3. KULLU

SR. NO	EMERGENCY NUMBER	AIRTEL		
		KULLU	MANIKARAN	BANJAR
1	100	√	√	√
2	101	√	√	√
3	102	√	√	√
4	104	√	√	√
5	108	√	√	√
6	138	√	√	√
7	149	√	√	√
8	181	√	√	√
9	182	√	√	√
10	1033	√	√	√
11	1037	√	√	√
12	1056	√	√	√
13	1060	√	√	√
14	1063	√	√	√
15	1064	√	√	√
16	1070	√	√	√
17	1071	√	√	√
18	1072	√	√	√
19	1073	√	√	√
20	1077	√	√	√
21	1090	√	√	√
22	1091	√	√	√
23	1097	×	×	×
24	1099	√	√	√
25	10580	×	×	×
26	10589	√	√	√
27	10740	×	×	×
28	10741	√	√	√
29	1511	×	×	×
30	1512	√	√	√
31	1514	√	√	√
32	15100	×	×	×
33	155304	×	×	×
34	155214	√	√	√
35	1903	√	√	√
36	1909	√	√	√
37	1912	√	√	√
38	1916	√	√	√
39	1950	√	√	√

SR. NO	BSNL				
	EMERGENCY NUMBER	KULLU	MANALI	MANIKARAN	BANJAR
1	100	√	√	√	√
2	101	√	√	√	√
3	102	√	√	√	√
4	104	√	√	√	√
5	108	√	√	√	√
6	138	x	x	x	x
7	149	x	x	x	x
8	181	x	x	x	x
9	182	√	√	√	√
10	1033	√	√	√	√
11	1037	x	x	x	x
12	1056	x	x	x	x
13	106	x	x	x	x
14	1063	x	x	x	x
15	1064	√	√	√	√
16	1070	√	√	√	√
17	1071	x	x	x	x
18	1072	x	x	x	x
19	1073	√	√	√	√
20	1077	x	x	x	x
21	1090	x	x	x	x
22	1091	√	√	√	√
23	1097	√	√	√	√
24	1099	x	x	x	x
25	10580	x	x	x	x
26	10740	x	x	x	x
27	10589	x	x	x	x
28	10741	x	x	x	x
29	1511	x	x	x	x
30	1512	x	x	x	x
31	1514	x	x	x	x
32	15100	√	√	√	√
33	155304	x	x	x	x
34	155214	x	x	x	x
35	1903	√	√	√	√
36	1909	√	√	√	√
37	1912	√	√	√	√
38	1916	x	x	x	x
39	1950	√	√	√	√

SR. NO	IDEA			
	EMERGENCY NUMBER	MANALI	BANJAR	KULLU
1	100	√	√	√
2	101	√	√	√
3	102	√	√	√
4	104	x	x	x
5	108	√	√	√
6	138	x	x	x
7	149	x	x	x
8	181	x	x	x
9	182	x	x	x
10	1033	√	√	√
11	1037	x	x	x
12	1056	x	x	x
13	1060	x	x	x
14	1063	x	x	x
15	1064	x	x	x
16	1070	√	√	√
17	1071	x	x	x
18	1072	√	√	√
19	1073	√	√	√
20	1077	√	√	√
21	1090	x	x	x
22	1091	√	√	√
23	1097	√	√	√
24	1099	x	x	x
25	10580	x	x	x
26	10589	x	x	x
27	10740	x	x	x
28	10741	x	x	x
29	1511	x	x	x
30	1512	x	x	x
31	1514	x	x	x
32	15100	x	x	x
33	155304	x	x	x
34	155214	x	x	x
35	1903	√	√	√
36	1909	√	√	√
37	1912	√	√	√
38	1916	x	x	x
39	1950	√	√	√

SR. NO	RCOM CDMA			
	EMERGENCY NUMBER	KULLU	BANJAR	MANIKARAN
1	100	√	√	√
2	101	√	√	√
3	102	√	√	√
4	104	√	√	√
5	108	√	√	√
6	138	√	√	√
7	149	x	x	x
8	181	x	x	x
9	182	√	√	√
10	1033	√	√	√
11	1037	x	x	x
12	1056	x	x	x
13	1060	x	x	x
14	1063	x	x	x
15	1064	x	x	x
16	1070	√	√	√
17	1071	x	x	x
18	1072	√	√	√
19	1073	x	x	x
20	1077	√	√	√
21	1090	x	x	x
22	1091	√	√	√
23	1097	x	x	x
24	1099	x	x	x
25	10580	x	x	x
26	10589	x	x	x
27	10740	x	x	x
28	10741	x	x	x
29	1511	x	x	x
30	1512	x	x	x
31	1514	x	x	x
32	15100	x	x	x
33	155304	x	x	x
34	155214	x	x	x
35	1903	√	√	√
36	1909	√	√	√
37	1912	√	√	√
38	1916	√	√	√
39	1950	√	√	√

RCOM GSM			
EMERGENCY NUMBER	KULLU	BANJAR	MANIKARAN
100	√	√	√
101	√	√	√
102	√	√	√
104	√	√	√
108	√	√	√
138	√	√	√
149	x	x	x
181	x	x	x
182	√	√	√
1033	√	√	√
1037	x	x	x
1056	x	x	x
1060	x	x	x
1063	x	x	x
1064	x	x	x
1070	√	√	√
1071	x	x	x
1072	√	√	√
1073	x	x	x
1077	√	√	√
1090	x	x	x
1091	√	√	√
1097	x	x	x
1099	x	x	x
10580	x	x	x
10589	x	x	x
10740	x	x	x
10741	x	x	x
1511	x	x	x
1512	x	x	x
1514	x	x	x
15100	x	x	x
155304	x	x	x
155214	x	x	x
1903	√	√	√
1909	√	√	√
1912	√	√	√
1916	√	√	√
1950	√	√	√

SR. NO	TATA CDMA			
	EMERGENCY NUMBER	KULLU	BANJAAR	SUNDERNAGAR
1	100	√	X	X
2	101	√	X	X
3	102	√	X	X
4	104	X	X	X
5	108	√	X	X
6	138	√	X	X
7	149	X	X	X
8	181	X	X	X
9	182	X	X	X
10	1033	√	X	X
11	1037	X	X	X
12	1056	X	X	X
13	1060	X	X	X
14	1063	X	X	X
15	1064	√	X	X
16	1070	X	X	X
17	1071	X	X	X
18	1072	√	X	X
19	1073	X	X	X
20	1077	X	X	X
21	1090	X	X	X
22	1091	√	X	X
23	1097	X	X	X
24	1099	X	X	X
25	10580	X	X	X
26	10589	X	X	X
27	10740	X	X	X
28	10741	X	X	X
29	1511	X	X	X
30	1512	X	X	X
31	1514	X	X	X
32	15100	√	X	X
33	155304	X	X	X
34	155214	X	X	X
35	1903	√	X	X
36	1909	X	X	X
37	1912	X	X	X
38	1916	X	X	X
39	1950	X	X	X

SR. NO	TATA GSM			
	EMERGENCY NUMBER	KULLU	BANJAAR	SUNDERNAGAR
1	100	5	5	5
2	101	5	5	5
3	102	5	5	5
4	104	5	5	5
5	108	5	5	5
6	138	x	x	x
7	149	x	x	x
8	181	x	x	x
9	182	x	x	x
10	1033	x	x	x
11	1037	x	x	x
12	1056	x	x	x
13	1060	x	x	x
14	1063	x	x	x
15	1064	x	x	x
16	1070	x	x	x
17	1071	x	x	x
18	1072	x	x	x
19	1073	x	x	x
20	1077	x	x	x
21	1090	x	x	x
22	1091	x	x	x
23	1093	x	x	x
24	1099	x	x	x
25	10580	x	x	x
26	10589	x	x	x
27	10740	x	x	x
28	10741	x	x	x
29	1511	x	x	x
30	1512	x	x	x
31	1514	x	x	x
32	15100	x	x	x
33	155304	x	x	x
34	155214	x	x	x
35	1903	x	x	x
36	1909	x	x	x
37	1912	x	x	x
38	1916	x	x	x
39	1950	x	x	x

9. OPERATOR ASSISTED DRIVE TEST

The drive test was conducted simultaneously for all the operators present in the Himachal Pradesh circle. As per the new directive given by TRAI headquarters, drive test for the month of January, February and March, 2016 were conducted at a SSA level. Drive test was conducted for three days in each SSA and the selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected on basis of the complaints received from the customers. The auditors were present in vehicles of every operator. The holding period for all test calls was 120 seconds and the gap between calls was 10 seconds.

For measuring voice quality RxQual samples for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. RxQual greater than 5 meant that the sample was not of appropriate voice quality and for CDMA operators FERs of more than 4 were considered 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 with strength > -75dbm for indoor, -85 dbm for in-vehicle and > -95 dbm outdoor routes. Below is the schedule and operators involved in the drive test for the Himachal Pradesh circle.

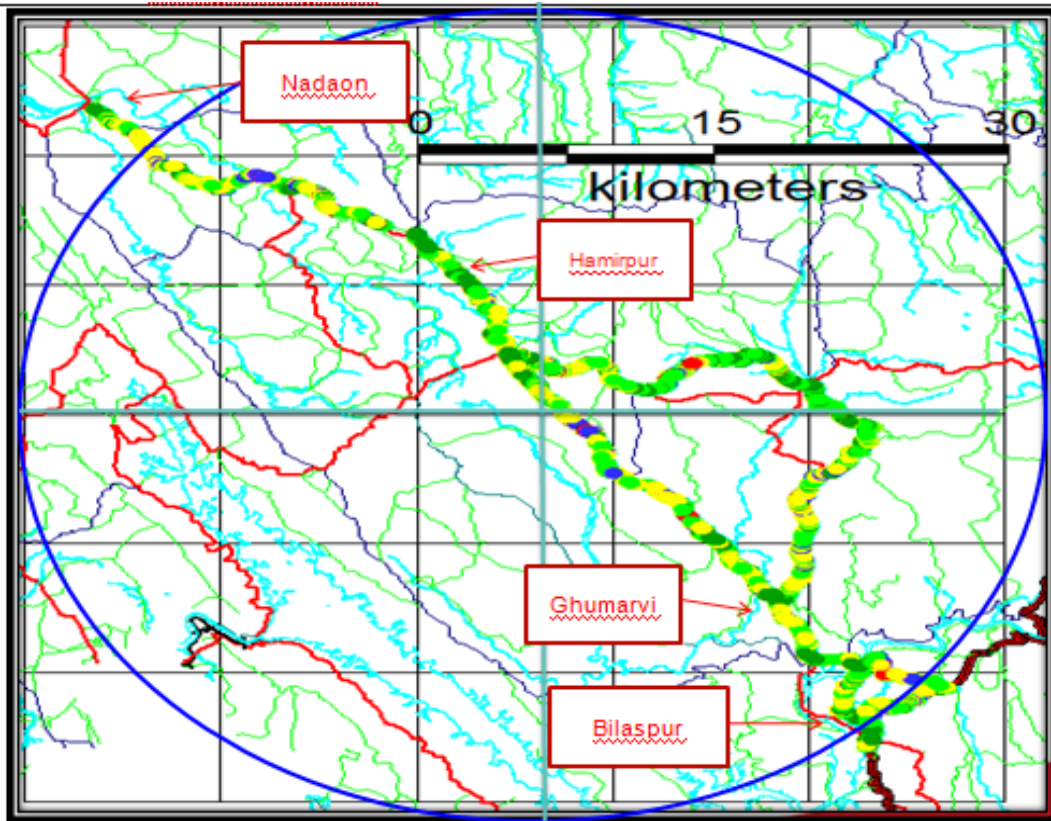
9.1. FEBRUARY: HAMIRPUR SSA

Month	Name of SSA covered	Drive Test Schedule
February 2016	HAMIRPUR	February 4, 2016 to February 6, 2016

9.2. DISTANCE COVERED: HAMIRPUR SSA

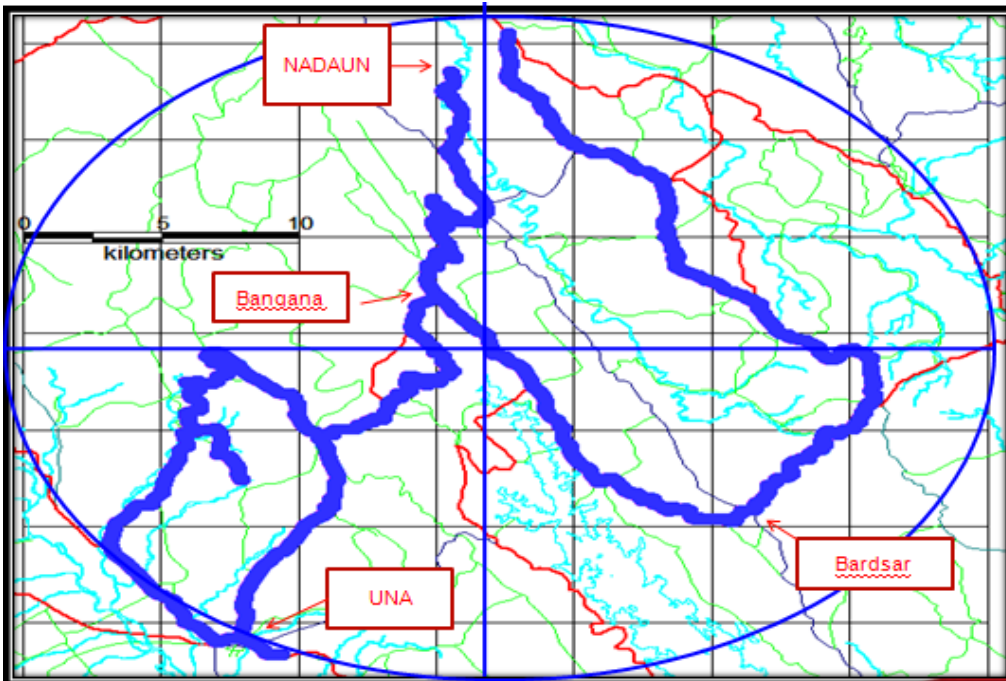
Drive Test Distance Covered	Day 1	Day 2	Day 3
HAMIRPUR SSA	200 km	200 km	200 km

9.3. ROUTE MAP: HAMIRPUR SSA: DAY 1



SSA- Route Covered–
Nadaon-
Hamirpur-
Bilaspur

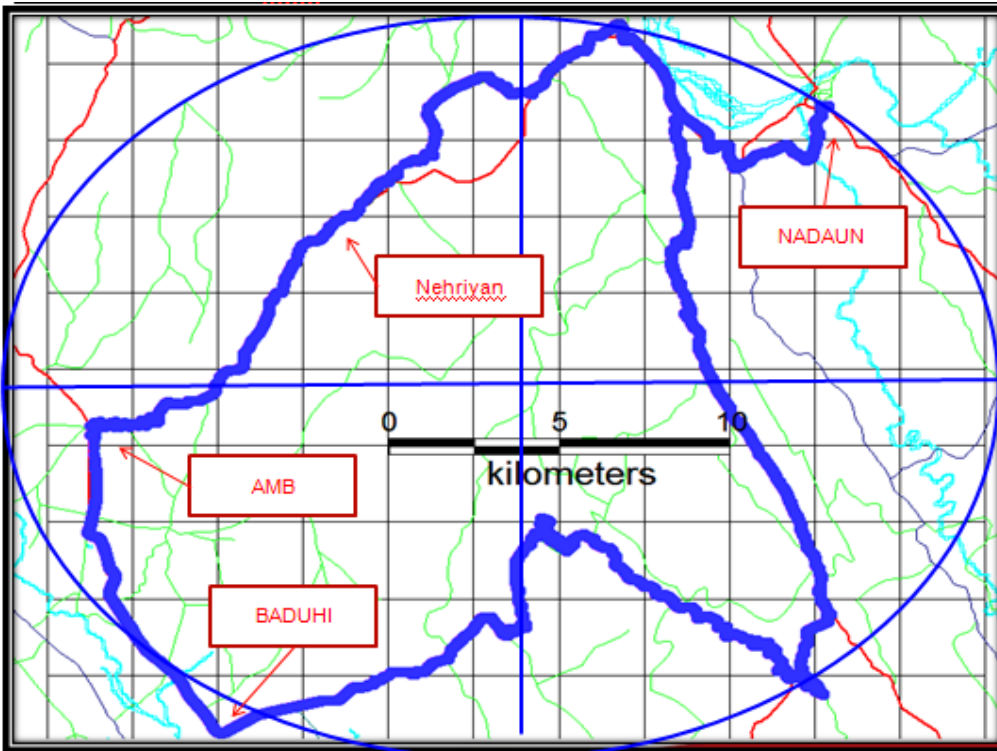
9.4. ROUTE MAP: HAMIRPUR SSA: DAY 2



SSA- Route Covered—

1. NADAUN
2. BARDSAR
3. BANGANA
4. UNA

9.5. ROUTE MAP: HAMIRPUR SSA: DAY 3



- SSA- Route Covered-
- 1-NADAUN
 - 2-BANGANA
 - 3-BADUHI
 - 4-AMB
 - 5-Nehriyan

9.6. DRIVE TEST OUTCOME

	Aircel	Airtel	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL	Vodafone
Total Calls Attempt (A)	476	534	468	520	590	677	356	530
Total Calls Blocked (B)	1	3	6	5	1	1	0	1
Blocked Call Rate in % (B*100/A)	0.21%	0.56%	1.28%	0.96%	0.17%	0.15%	0.00%	0.19%
Total Calls Established (C)	475	531	456	515	589	676	355	521
Total Calls Drop (D)	0	0	9	0	0	1	1	0
Dropped Calls Rate in % (D*100/C)	0.00%	0.00%	1.97%	0.00%	0.00%	0.15%	0.28%	0.00%
Call Setup Success Rate in % (C*100/A)	99.79%	99.44%	97.44%	99.04%	99.83%	99.85%	99.72%	98.30%
Handover Success Rate % (total HO Success * 100/Total HO attempt)	98.36%	96.96%	94.80%	100.00%	100.00%	99.53%	100.00%	98.70%

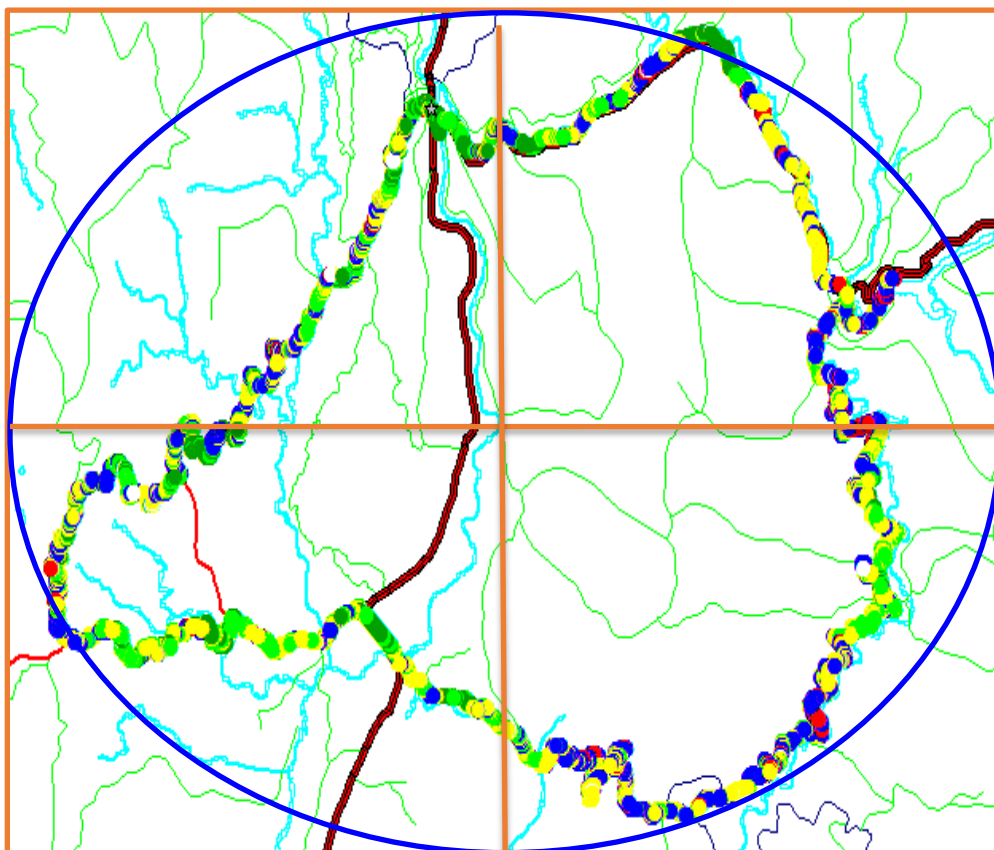
9.7. MARCH: MANDI SSA

Month	Name of SSA covered	Drive Test Schedule
March 2016	MANDI	February 29, 2016 to March 02, 2016

9.8. DISTANCE COVERED: MANDI SSA

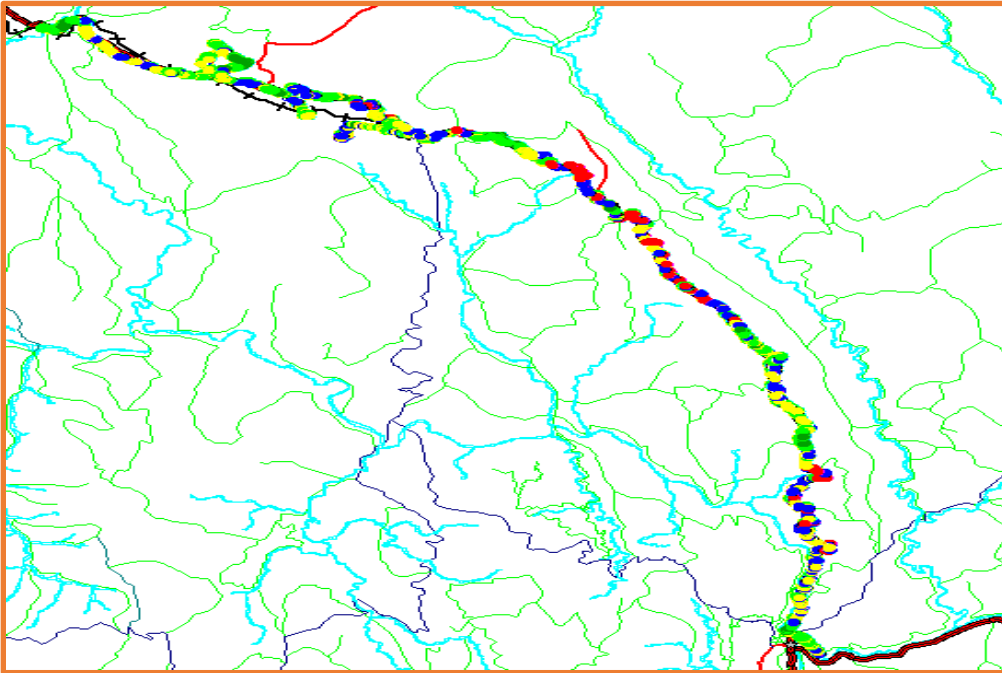
Drive Test Distance Covered	Day 1	Day 2	Day 3
MANDI SSA	130 km	120 km	110 km

9.9. ROUTE MAP: MANDI SSA: DAY 1



- SSA- Route Covered–
- MANDI
 - 1 MANDI**
 - 2 CHAILCHOWK**
 - 3 NERCHOWK**
 - 4 REWALSAR**

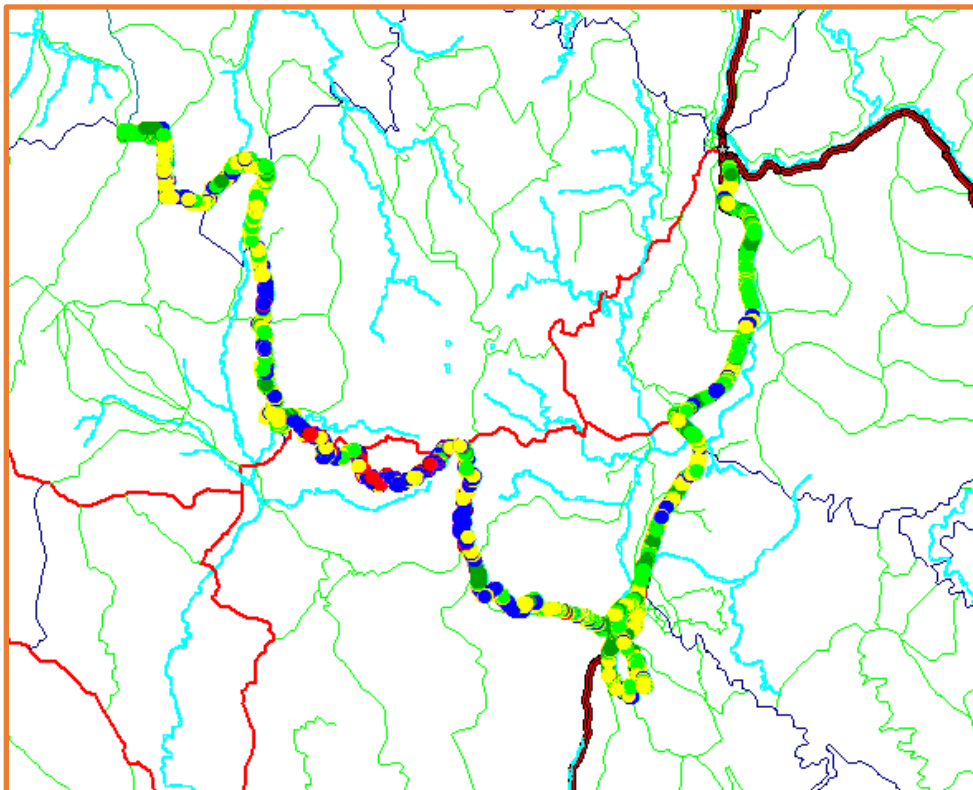
9.10. ROUTE MAP: MANDI SSA: DAY 2



SSA- Route
Covered— Mandi

1. Mandi

9.11. ROUTE MAP: MANDI SSA: DAY 3



SSA- Route Covered-
MANDI

- 1 SUNDARNAGAR
- 2 SARKAGHAT
- 3 AVAHDEVI

9.12. DRIVE TEST OUTCOME

	Aircel	Airtel	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL	Vodafone
Total Calls Attempt (A)	424	467	685	462	479	667	357	451
Total Calls Blocked (B)	2	1	15	4	0	1	0	1
Blocked Call Rate in % (B*100/A)	0.47%	0.21%	2.19%	0.87%	0.00%	0.15%	0.00%	0.22%
Total Calls Established (C)	422	466	670	458	479	666	357	450
Total Calls Drop (D)	0	1	1	0	0	1	0	0
Dropped Calls Rate in % (D*100/C)	0.00%	0.21%	1.49%	0.00%	0.00%	0.15%	0.00%	0.00%
Call Setup Success Rate in % (C*100/A)	99.53%	99.79%	97.81%	99.13%	100.00%	99.85%	100.00%	99.78%
Handover Success Rate % (total HO Success * 100/Total HO attempt)	98.56%	98.99%	99.30%	100.00%	100.00%	99.86%	100.00%	99.50%

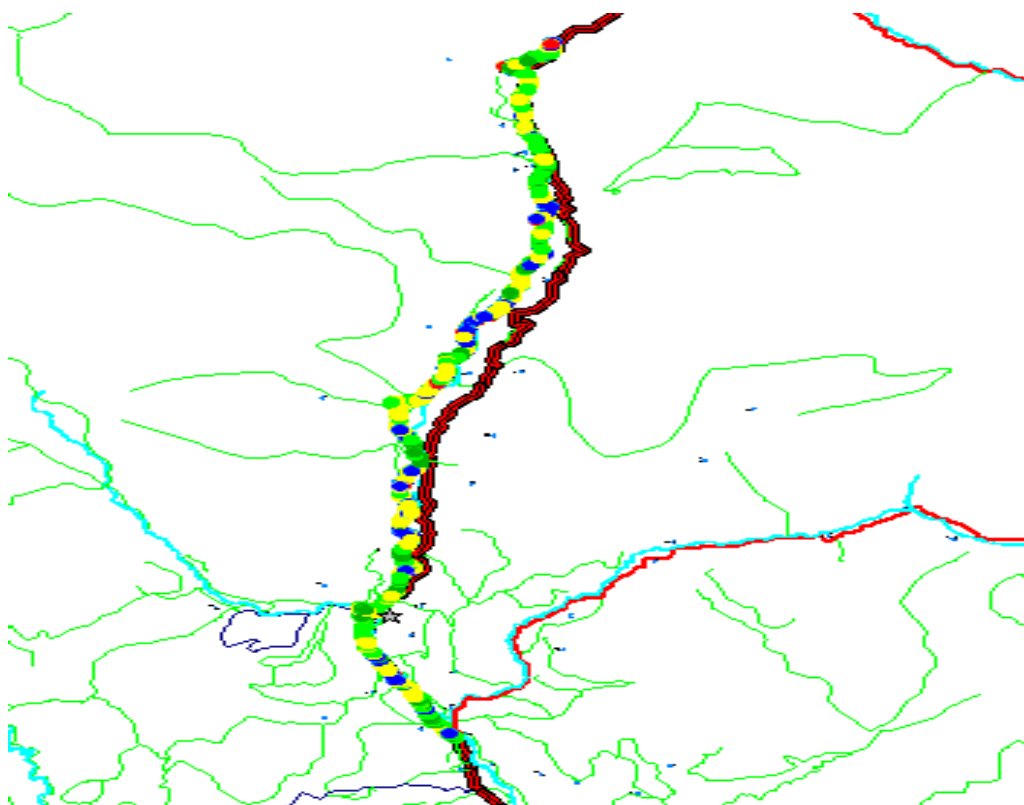
9.13. MARCH: KULLU SSA

Month	Name of SSA covered	Drive Test Schedule
March 2016	KULLU	March 28, 2016 to March 30, 2016

9.14. DISTANCE COVERED: KULLU SSA

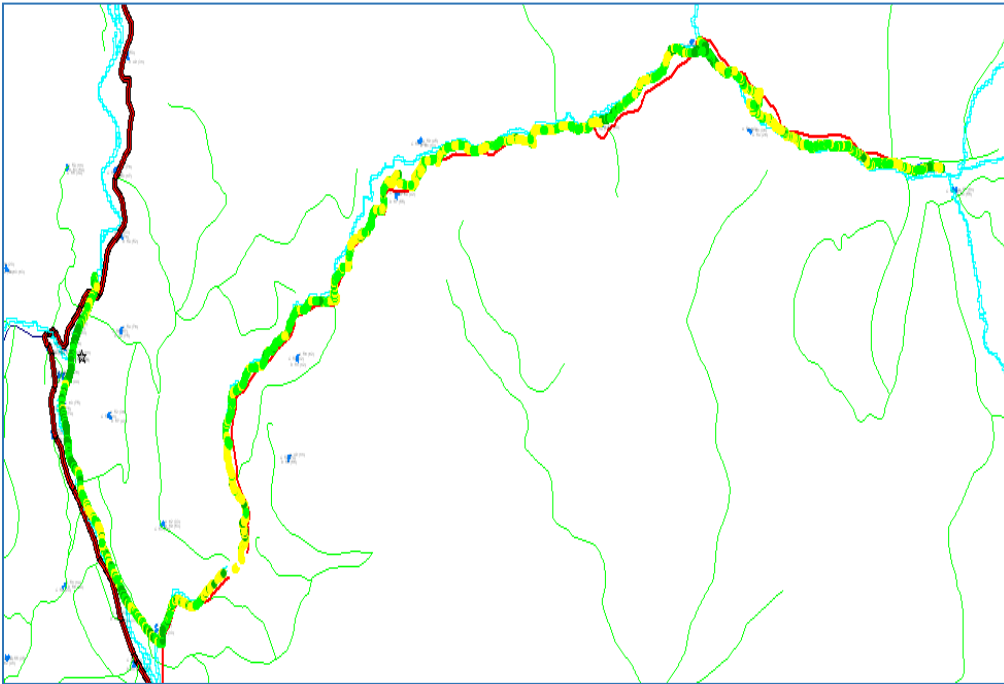
Drive Test Distance Covered	Day 1	Day 2	Day 3
KULLU SSA	90 km	70 km	80 km

9.15. ROUTE MAP: KULLU SSA: DAY 1



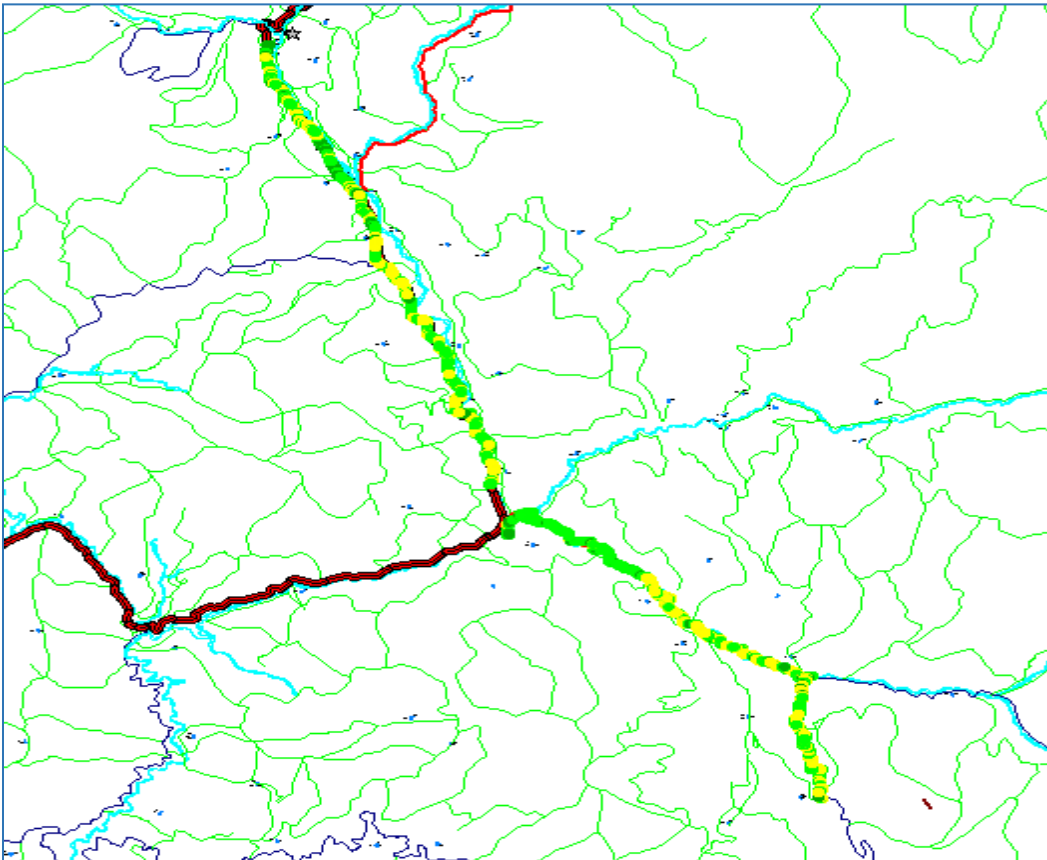
SSA- Route Covered–
BHUNTER
TO
GULABA

9.16. ROUTE MAP: KULLU SSA: DAY 2



SSA- Route Covered—
KULLU
TO
BARCHANNI

9.17. ROUTE MAP: KULLU SSA: DAY 3



SSA- Route Covered—
BHUNTER
TO
ZIBHI

9.18. DRIVE TEST OUTCOME

	Aircel	Airtel	BSNL	IDEA	RCOM CDMA	RCOM GSM	TTSL CDMA	TTSL GSM
Total Calls Attempt (A)	374	429	194	412	216	387	141	280
Total Calls Blocked (B)	0	0	1	0	0	1	0	2
Blocked Call Rate in % (B*100/A)	0.00%	0.00%	0.52%	0.00%	0.00%	0.26%	0.00%	0.71%
Total Calls Established (C)	374	429	192	412	216	386	141	280
Total Calls Drop (D)	0	2	0	0	0	1	0	1
Dropped Calls Rate in % (D*100/C)	0.00%	0.47%	0.00%	0.00%	0.00%	0.26%	0.00%	0.36%
Call Setup Success Rate in % (C*100/A)	100.00%	100.00%	98.97%	100.00%	100.00%	99.74%	100.00%	100.00%
Handover Success Rate % (total HO Success * 100/Total HO attempt)	99.26%	99.05%	99.30%	98.30%	100.00%	100.00%	100.00%	100.00%

10. COUNTER DETAILS

S. No.	KPI	Formula with Counter Description
1	CSSR= (No of established Calls / No of Attempted Calls)%	<i>No of established Calls</i> = ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)]+[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)])/ <i>No of Attempted Calls</i> = ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Changeable)])
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	<i>SDCCH Failure</i> = ([Channel Assignment Failures (All Channels Busy or Channels Unconfigured) in Immediate Assignment Procedure (SDCCH)] + [Failed Internal Intra-Cell Handovers (No Channel Available) (SDCCH)] + [Number of Unsuccessful Incoming Internal Inter-Cell Handovers (No Channel Available) (SDCCH)] + [Failed Incoming External Inter-Cell Handovers (No Channel Available) (SDCCH)])/ <i>SDCCH attempts</i> = ([Channel Assignment Requests in Immediate Assignment Procedure (SDCCH)] + [Internal Intra-Cell Handover Requests (SDCCH)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)])
3	TCH congestion= (TCH Failures /TCH Attempts)%	<i>TCH Failures</i> = ((Failed TCH Seizures due to Busy TCH (Signaling Channel))+([Failed Assignments (First Assignment, No Channel Available in Assignment Procedure)]+[Failed Assignments (First Assignment, No Channel Available in Directed Retry Procedure)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Assignment)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Directed Retry)])/ <i>TCH Attempts</i> = ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Changeable)])
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	<i>The total no of dropped calls</i> = ([Call Drops on Radio Interface in Stable State (Traffic Channel)] + [Call Drops on Radio Interface in Handover State (Traffic Channel)] + [Call Drops Due to No MR from MS for a Long Time (Traffic Channel)] + [Call Drops due to Abis Terrestrial Link Failure (Traffic Channel)] + [Call Drops due to Equipment Failure (Traffic Channel)] + [Call Drops due to Forced Handover (Traffic Channel)] + [Call Drops due to local switching Start Failure] + [Call Drops due to Failures to Return to Normal Call from local switching])/Total no of calls

		<p><i>successfully established (where traffic channel is allotted) = ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)] +[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)])</i></p>
5	<p>Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area</p>	<p>Above formula with counters being used in CBBH.</p>
6	<p>Connection with good quality voice= (Connection with good quality voice/Total voice samples)%</p>	<p><i>Connection with good quality voice = ((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)) /Total voice samples= ((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHF (Receive Quality Rank 6)+Number of MRs on Downlink TCHF (Receive Quality Rank 7)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 6)+Number of MRs on Downlink TCHH (Receive Quality Rank 7))</i></p>

10.1. ERICSSON

SI No.	KPI	Ericsson
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR (No of established Calls / No of Attempted Calls)=(TCA SSALL/TASSALL)*100
2	SDCCH congestion=(SDCCH Failure/SDCCH attempts)%	SDCCH congestion (SDCCH Failure/SDCCH attempts)% = (CCONGS/CCALLS)*100
3	TCH congestion=(TCH Failures /TCH Attempts)%	TCH congestion (TCH Failures /TCH Attempts)% = (CNRELCONG+TNRELCONG)/TASSALL)*100
4	Call Drop Rate=(The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	Call Drop Rate (Total no dropped calls/No of established calls)% = (TNDROP)/TCA SSALL*100
5	Call Drop Rate=(No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.

6	Connection with good quality voice=(Connection with good quality voice/Total voice samples)%	Connection with good quality voice (Connection with good quality voice samples 0-5 /Total voice samples)= 100 * (QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL) / (QUAL70DL + QUAL60DL + QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL)
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Ericsson Counters

Counter	Counter Description
TCASSALL	Number of assignment complete messages on TCH for all MS classes
TASSALL	Number of first assignment attempts on TCH for all MS classes.
CNRELCONG	Number of released connections on SDCCH due to TCH or Transcoder (TRA) congestion.
TNRELCONG	Number of released TCH signalling connections due to transcoder resource congestion during immediate assignment on TCH
CCONGS	Congestion counter for SDCCH. Stepped per congested allocation attempt.
CCALLS	Channel allocation attempt counter on SDCCH.
TNDROP	The total number of dropped TCH Connections.
QUAL00DL	Number of quality 0 reported on downlink.
QUAL10DL	Number of quality 1 reported on downlink.
QUAL20DL	Number of quality 2 reported on downlink.
QUAL30DL	Number of quality 3 reported on downlink.
QUAL40DL	Number of quality 4 reported on downlink.
QUAL50DL	Number of quality 5 reported on downlink.
QUAL60DL	Number of quality 6 reported on downlink.
QUAL70DL	Number of quality 7 reported on downlink

10.2. NSN (NOKIA SIEMENS NETWORK)

S No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	$CSSR = 100 - 100 * ((SDCCH_BUSY_ATT) - (TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL) + (SDCCH_RF_OLD_HO) + (SDCCH_USER_ACT) + (SDCCH_BCSU_RES_ET) + (SDCCH_NETW_ACT) + (SDCCH_BTS_FAIL) + (SDCCH_LAPD_FAIL) + (BLCK_8I_NOM) / ((CH_REQ_MSG_REC) + (PACKET_CH_REQ)) - ((GHOST_CCCH_RES) - (REJ_SEIZ_ATT_DUE_DIST))$
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	$SDCCH\ congestion = (sdcch_busy_att - .tch_seiz_due_sdcch_con) / ((CH_REQ_MSG_REC) + (PACKET_CH_REQ)) - ((GHOST_CCCH_RES) - (REJ_SEIZ_ATT_DUE_DIST))$
3	TCH congestion= (TCH Failures /TCH Attempts)%	$TCH\ congestion = BLCK_8I_NOM / ((TCH_NORM_SEIZ) + (MSC_I_SDCCH_TCH_AT) + (BSC_I_SDCCH_TCH_AT))$
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	$TCH\ Drop = (drop_after_tch_assign) - (tch_re_est_release) / ((TCH_NORM_SEIZ) + (MSC_I_SDCCH_TCH_AT) + (BSC_I_SDCCH_TCH_AT))$
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice= (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5) / (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5+FREQ_DL_QUAL6+FREQ_DL_QUAL7)

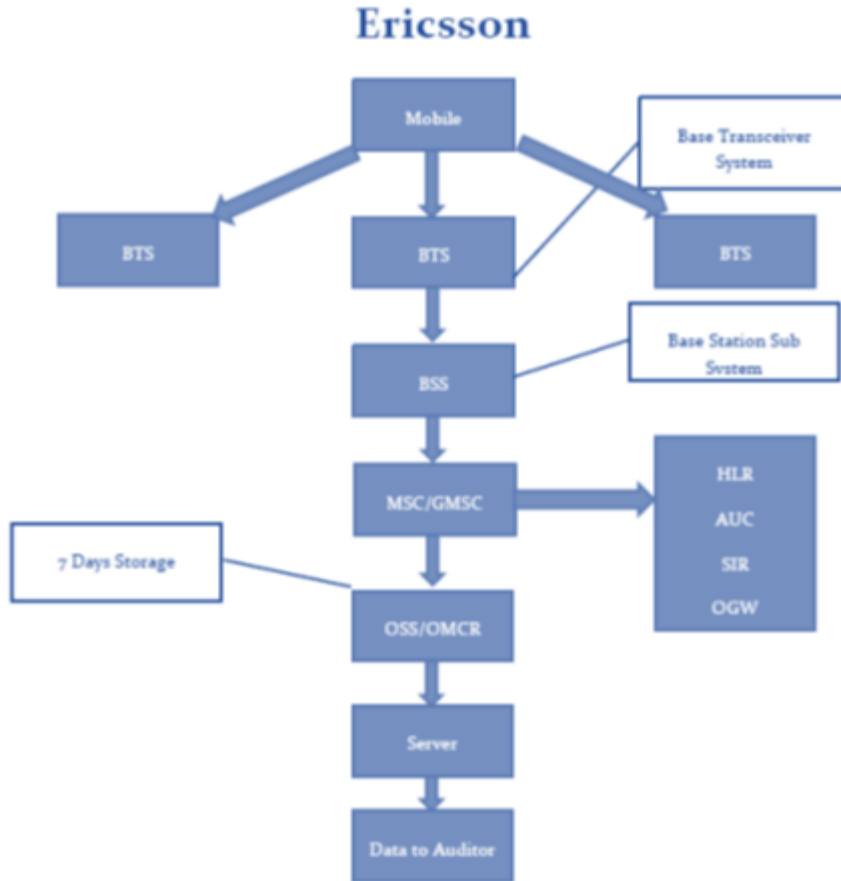
10.3. HUAWEI

S.NO	KPI	HUAWEI FORMULA
1	CALL SETUP SUCCESES (NUM)	[Successful CS IS-95 Orig Call Setups + Successful CS IS-2000 Orig Call Setups + Successful CS IS-95 Term Call Setups + Successful CS IS-2000 Term Call Setups] ([1157628567] + [1157628587] + [1157628568] + [1157628588])

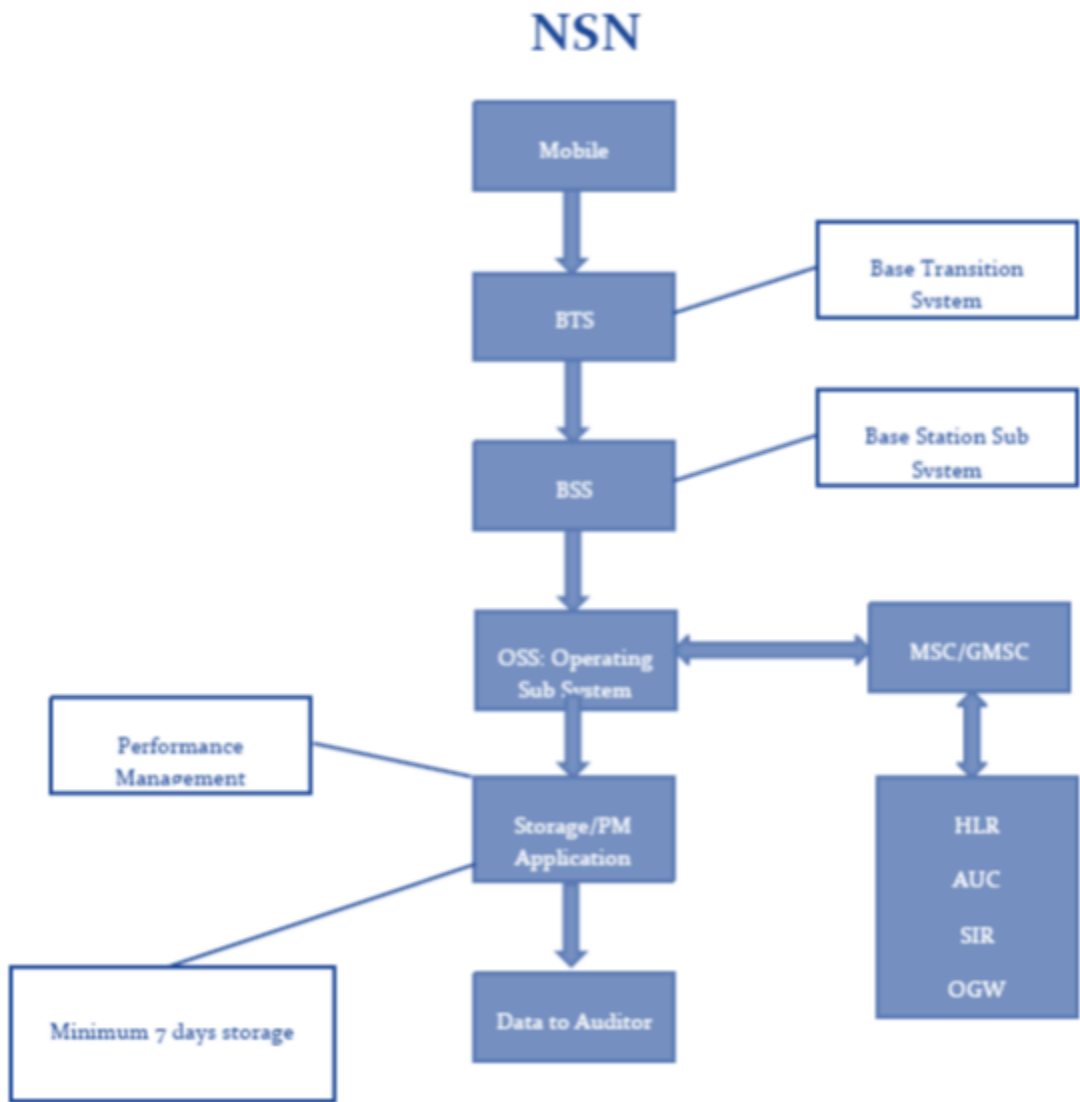
2	CALL SETUP SUCCES (DEN)	[CS IS-95 Orig Attempts + CS IS-2000 Orig Attempts + CS IS-95 Term Attempts + CS IS-2000 Term Attempts] ([1157628553] + [1157628573] + [1157628554] + [1157628574])
3	CALL SETUP SUCCESS RATE (%)	CALL SETUP SUCCES (NUM) / CALL SETUP SUCCES (DEN) * 100\
4	CALL DROP RATE (NUM)	[CS IS-95 Call Drops (Too many Erasure frames) + CS IS-2000 Call Drops (Too many Erasure frames) + CS IS-95 Call Drops (No reverse frame received) + CS IS-2000 Call Drops (No reverse frame received) + CS IS-95 Call Drops (Abis interface abnormal) + CS IS-2000 Call Drops (Abis interface abnormal) + CS IS-95 Call Drops (A2 interface abnormal) + CS IS-2000 Call Drops (A2 interface abnormal) + CS IS-95 Call Drops (HHO fail) + CS IS-2000 Call Drops (HHO fail) + CS IS-95 Call Drops (Other causes) + CS IS-2000 Call Drops (Other causes)] ([1157628608] + [1157628614] + [1157628609] + [1157628615] + [1157628610] + [1157628616] + [1157628611] + [1157628617] + [1157628612] + [1157628618] + [1157628613] + [1157628619])
5	CALL DROP RATE(DEN)	[Successful CS IS-95 Orig Call Setups + Successful CS IS-2000 Orig Call Setups + Successful CS IS-95 Term Call Setups + Successful CS IS-2000 Term Call Setups + CS IS-95 Successful Incoming Hard HOs + CS IS-2000 Successful Incoming Hard HOs] [1157628619] x 100 / ([1157628567] + [1157628587] + [1157628568] + [1157628588] + [1157628569] + [1157628589])
6	Call DROP Rate	CALL DROP RATE (NUM) / CALL DROP RATE(DEN) * 100\
7	RF BLOCK RATE (NUM)	{[(TCH Assignment Requests-CS Orig-IS95[Times] + TCH Assignment Requests-CS Orig-IS2000[Times] + TCH Assignment Requests-CS Term-IS95[Times] + TCH Assignment Requests-CS Term-IS2000[Times]) - (Successful TCH Assignments-CS Orig-IS95[Times] + Successful TCH Assignments-CS Orig-IS2000[Times] + Successful TCH Assignments-CS Term-IS95[Times] + Successful TCH Assignments-CS Term-IS2000[Times])]} / [(1157628621 + 1157628628 + 1157628635 + 1157628642)]
8	RF BLOCK RATE (DEN)	{[(TCH Assignment Requests-CS Orig-IS95[Times] + TCH Assignment Requests-CS Orig-IS2000[Times] + TCH Assignment Requests-CS Term-IS95[Times] + TCH Assignment Requests-CS Term-IS2000[Times])]} / [(1157628621 + 1157628628 + 1157628635 + 1157628642)]
9	RF BLOCK RATE	RF BLOCK RATE (NUM) / RF BLOCK RATE (DEN) * 100
10	Call Quality (RFER)	CS Reverse Link Average FER of Carrier[%

11. BLOCK SCHEMATIC DIAGRAM

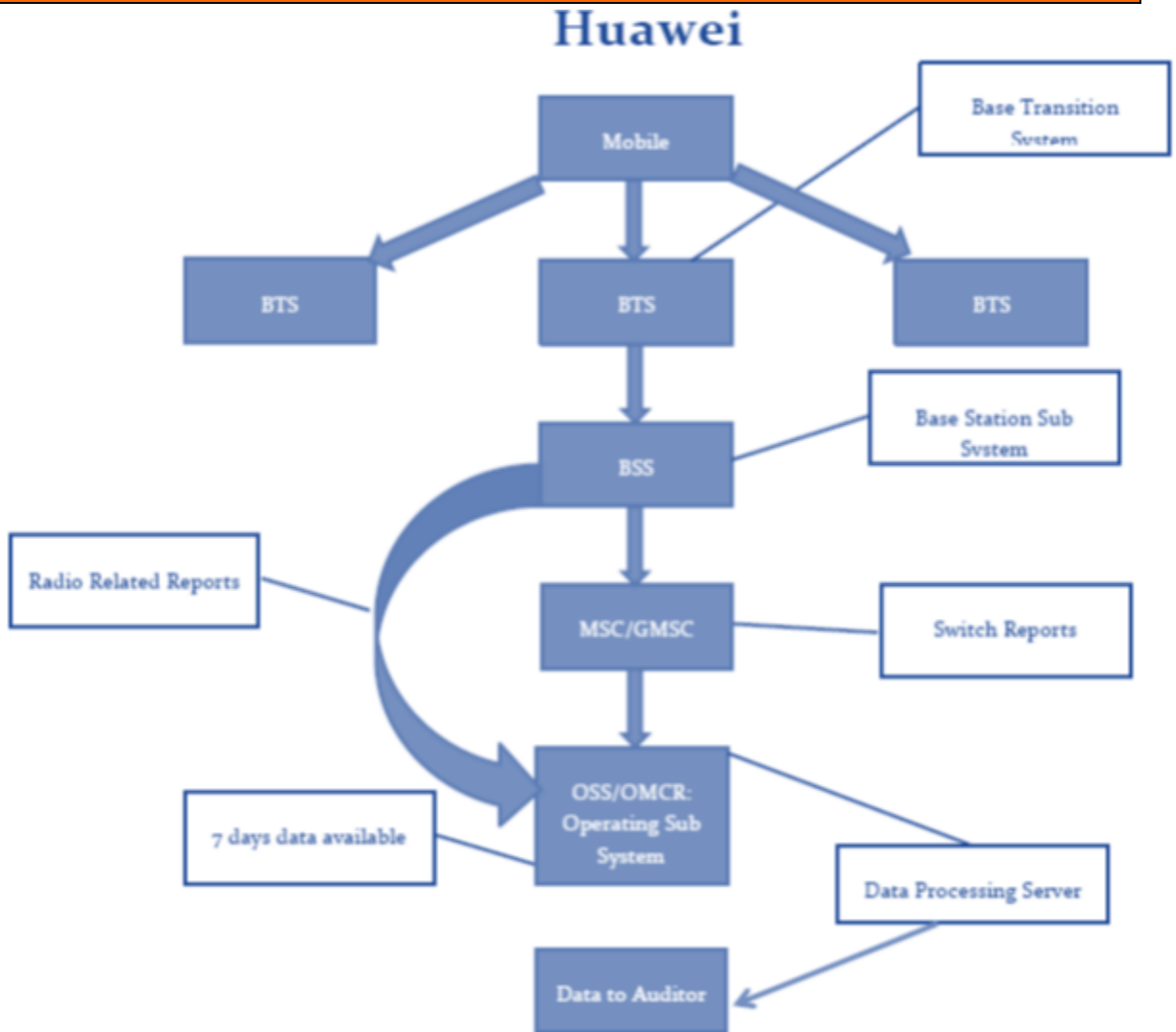
11.1. ERICSSON



11.2. NSN



11.3. HUAWEI



12. ABBREVIATIONS

Following terms/abbreviations have been used in this report. This section provides meaning of the abbreviations used in the report.

- TRAI – Telecom Regulatory Authority of India
- PCPL – Phistream Consulting Private Limited
- QoS – Quality of Service
- JFM'16 – Refers to the quarter of January, February and March 2016
- SSA – Secondary Switching Area
- NOC – Network Operation Center
- OMC – Operations and Maintenance Center
- MSC – Mobile Switching Center
- PMR – Performance Monitoring Reports
- TCBH – Time Consistent Busy Hour
- CBBH - Cell Bouncing Busy Hour
- BTS – Base Transceiver Station
- CSSR – Call Setup Success Rate
- TCH – Traffic Channel
- SDCCH – Standalone Dedicated Control Channel
- CDR – Call Drop Rate
- FER – Frame Error Rate
- SIM – Subscriber Identity Module
- GSM – Global System for Mobile
- CDMA – Code Division Multiple Access
- NA – Not Applicable
- NC – Non Compliance
- POI – Point of Interconnection
- IVR – Interactive Voice Response
- STD – Standard Trunk Dialing
- ISD – International Subscriber Dialing