TRAI Audit Wireless Report for MPCG Circle

WEST ZONE

QE September 2016

Prepared by:

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Submitted to:

TRAI
Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

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2 INTRODUCTION

2.1 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 December 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated October 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).

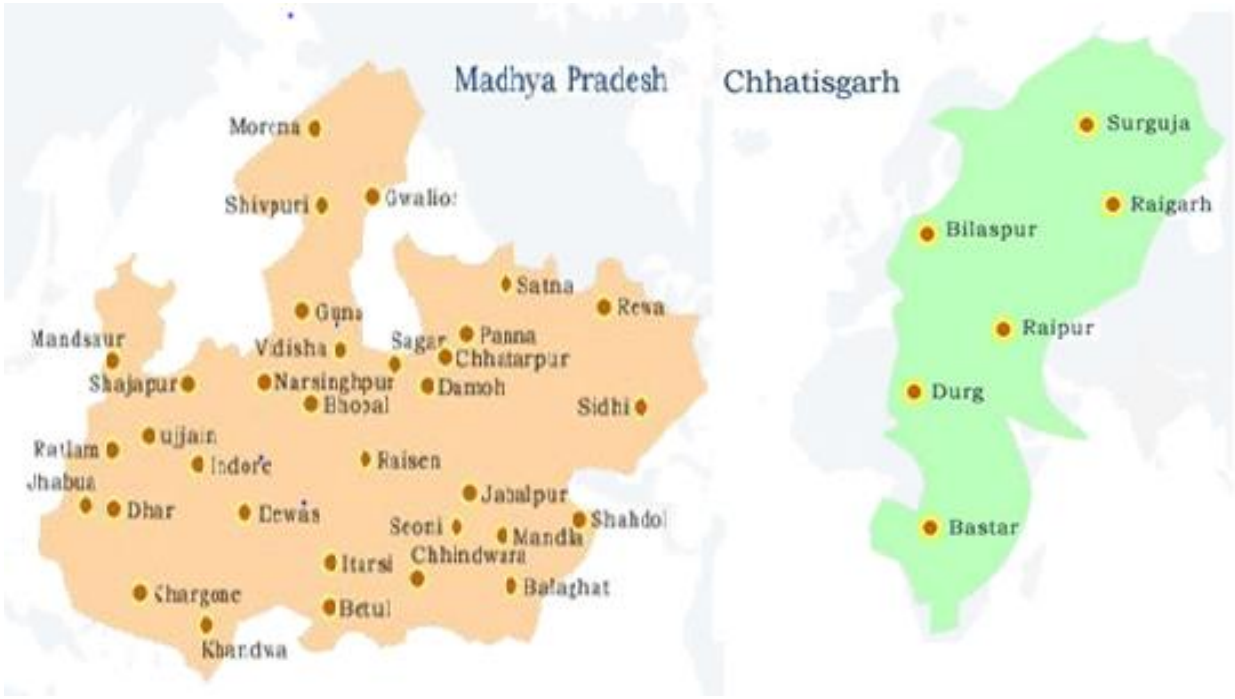
2.2 OBJECTIVES

The primary objective of the Audit module is to-

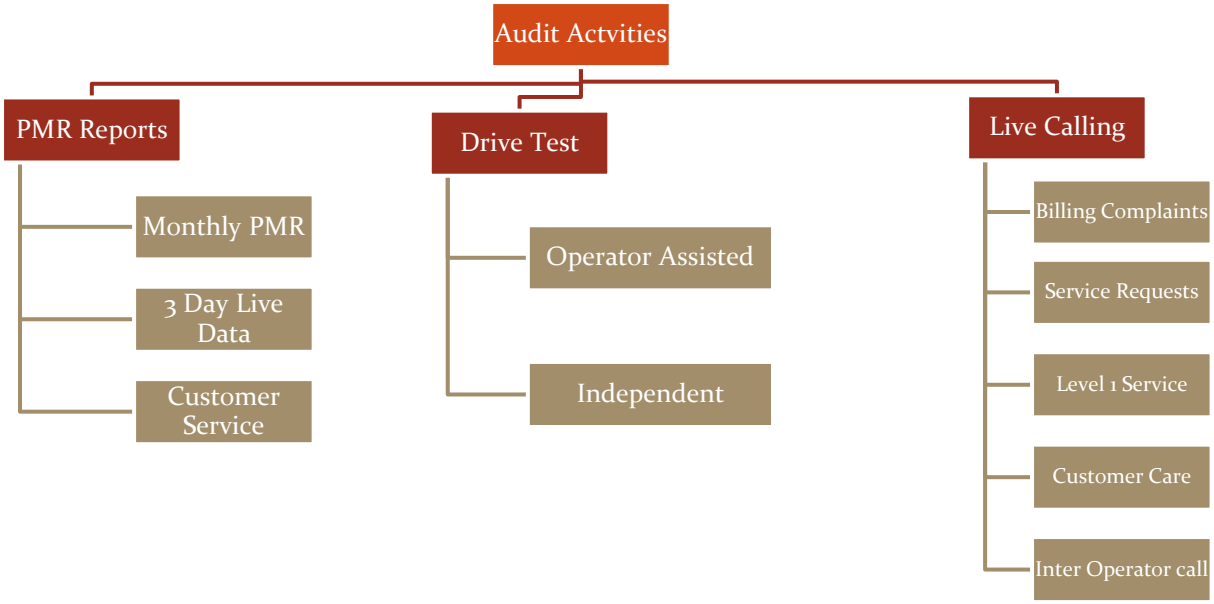
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report covers the audit results of the audit conducted for Cellular Mobile (Wireless) services in MPCG circle.

2.3 COVERAGE

The audit was conducted in MPCG circle covering all the SSAs (Secondary Switching Areas).



2.4 FRAMEWORK USED

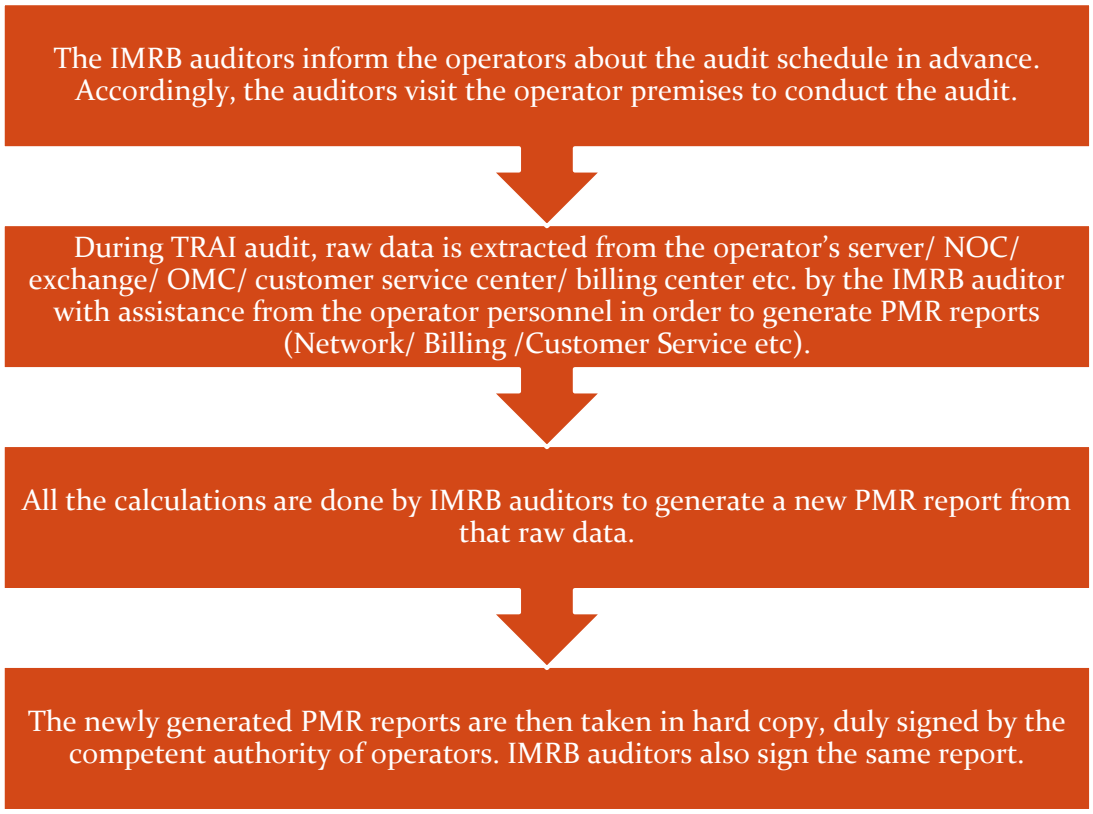


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 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, July 2016 audit data was collected in the month of August 2016.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending September 2016 (JAS'16) was collected in the month of October 2016.

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

- Monthly PMR (Network Parameters & Wireless Data Services) – 2G & 3G
- 3 Day Live Measurement Data (Network Parameters & Wireless Data Services) – 2G & 3G
- Customer Service Data

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR 2G

This involved calculation of the various 2G 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 IMRB representative with the assistance of the operator at the operator's premises for the month of July, August and September 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

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

All the parameters have been described in detail along with key findings of the parameters in section 5 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.3 AUDIT PARAMETERS – NETWORK 2G

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

Network Related

Network Parameters - 2G		
Parameter Category	**Parameter**	**Benchmark**
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 Chl. Congestion (%age)	**≤ 1%**
	TCH Congestion (%age)	**≤ 2%**
Connection Maintenance (Retainability)	**Call Drop Rate (%age)**	**≤ 2%**
	Worst affected cells having more than 3% TCH drop	**≤ 3%**
	%age of connection with good voice quality	**≥ 95%**
	Point of Interconnection (POI)	**≤ 0.5%**

2.4.1.4 MONTHLY PMR 3G

This involved calculation of the various 3G 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 IMRB representative with the assistance of the operator at the operator's premises for the month of July, August and September 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- Node Bs accumulated downtime
- Worst affected Node Bs due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

- RRC Congestion
- Circuit Switched RAB Congestion
- Point of Interconnection

Connection Maintenance

- Circuit Switched Voice Drop rate
- Worst affected cells having more than 3% Circuit switched Voice drop rate

Voice Quality

- % Connections with good Circuit Switched Voice Quality

All the parameters have been described in detail along with key findings of the parameters in section 5 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.5 AUDIT PARAMETERS – NETWORK 3G

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

Network Related

Network Parameters - 3G		
Network Availability	Node Bs downtime (not available for service)	≤ 2%
	Worst affected Node Bs due to downtime	≤ 2%
Connection Establishment (Accessibility)	Call Set-up Success Rate (within licensee's own network)	≥ 95%
	RRC Congestion	≤ 1%
	Circuit Switched RAB Congestion	≤ 2%
Connection Maintenance (Retainability)	Circuit Switched voice drop rate	≤ 2%
	Worst affected cells having more than 3% Circuit switched voice drop rate	≤ 3%
	%age of connection with good circuit switched voice quality	≥ 95%
	Point of Interconnection (POI)	0.5%

2.4.1.6 MONTHLY PMR – WIRELESS DATA SERVICES (2G & 3G)

The PMR report for wireless data service (2G and 3G) is extracted at the operator premises and verified every month of the quarter. This includes three parameters-

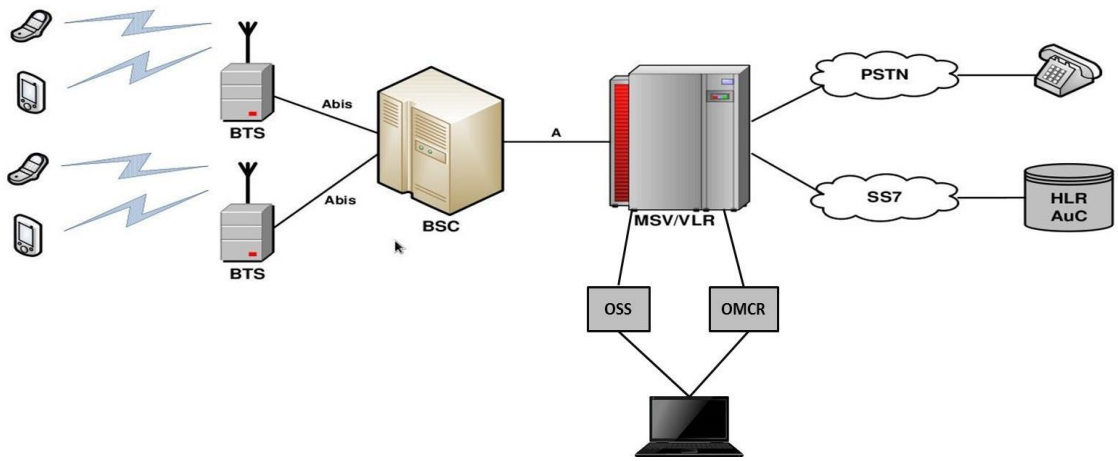
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

2.4.1.7 AUDIT PARAMETERS – WIRELESS DATA SERVICES (2G & 3G)

Wireless Data Service		
Service Activation	Activation done within 4 hours	≥ 95%
PDP Context activation success rate	PDP Context activation success rate	≥ 95%
Drop Rate	Drop Rate	≤ 5%

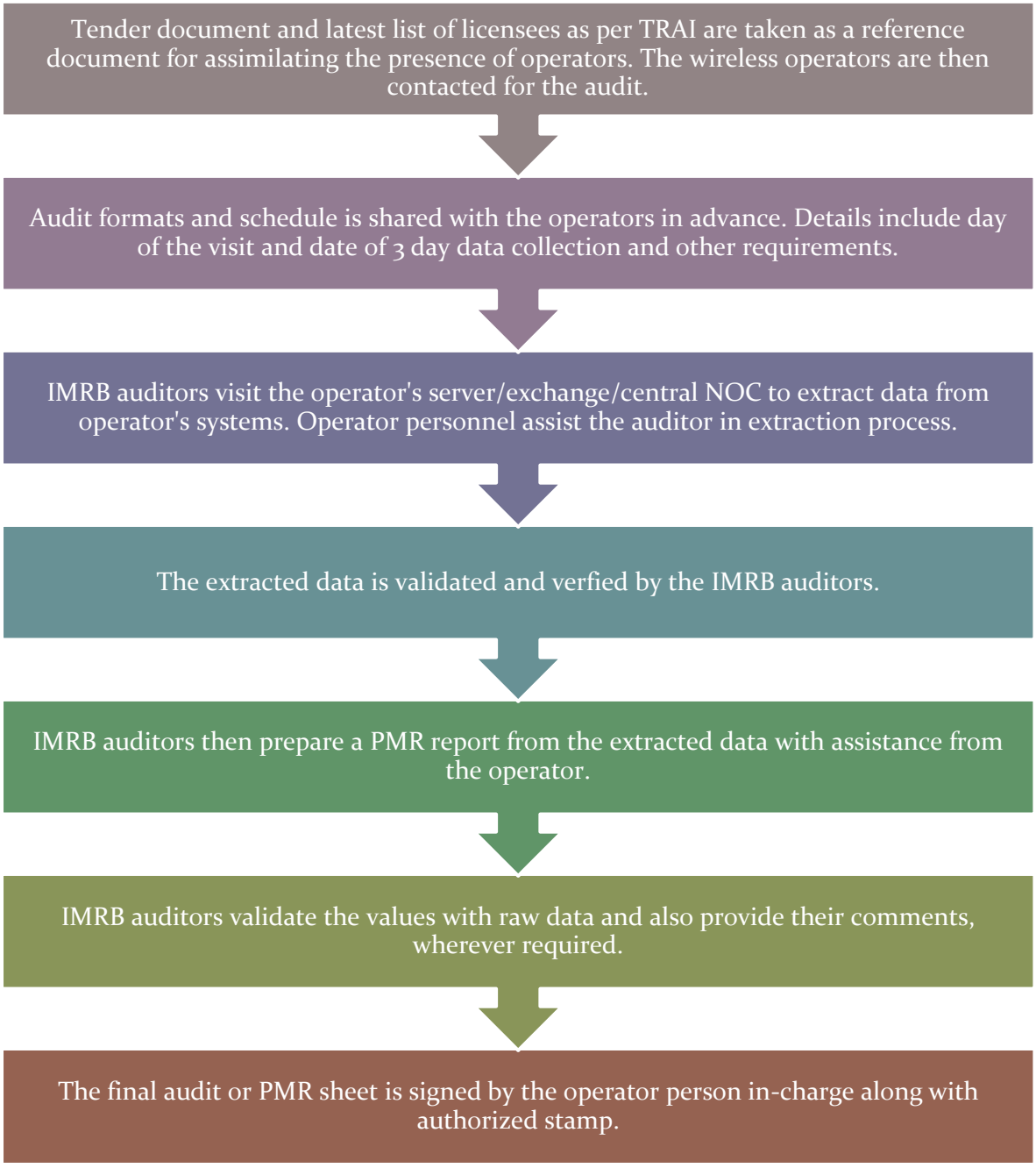
2.4.1.8 POINT OF DATA EXTRACTION

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



2.4.1.9 STEP BY STEP AUDIT PROCEDURE

The key steps followed for extraction of reports at the operator premises are given below.



Data has been extracted and calculated as per the counter details provided by the operators. The details of counters have been provided in section 8.15 of the report. The calculation methodology for each parameter has been stated in the table given below.

2.4.1.10 CALCULATION METHODOLOGY – NETWORK PARAMETERS 2G

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	SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) 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 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
TCH Congestion	
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) 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
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

2.4.1.11 CALCULATION METHODOLOGY – NETWORK PARAMETERS 3G

Parameter	Calculation Methodology
Node Bs Accumulated Downtime	Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100
Worst Affected Node Bs Due to Downtime	(Number of Node Bs having accumulated downtime greater than 24 hours in a month / Number of Node B in Licensed Service Area) * 100
Call Setup Success Rate	(RRC Established / Total RRC Attempts) * 100
RRC Congestion	RRC / RAB Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish RRC/ RAB made on day 1 C1 = Average RRC/ RAB Congestion % on day 1 A2 = Number of attempts to establish RRC/ RAB made on day 2 C2 = Average RRC/ RAB Congestion % on day 2 An = Number of attempts to establish RRC/ RAB made on day n Cn = Average RRC/ RAB Congestion % on day n
Circuit Switched RAB Congestion	
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) 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
Circuit Switched Voice Drop Rate	No. of voice RAB normally released / (No. of voice RAB normally released + RAB abnormally released) x 100
Worst Affected Cells having more than 3% Circuit Switched Voice Drop Rate	Number of cells having CSV drop rate > 3% during CBBH in a month / Total number of cells in the licensed area) x 100
Connections with good Circuit switched voice quality	1- (Number of Faulty Transport Blocks In Uplink downlink After Selection Combining Speech / Total number of Transport Blocks In Uplink downlink After Selection Combining Speech)) x 100

2.4.1.12 3 DAY 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.

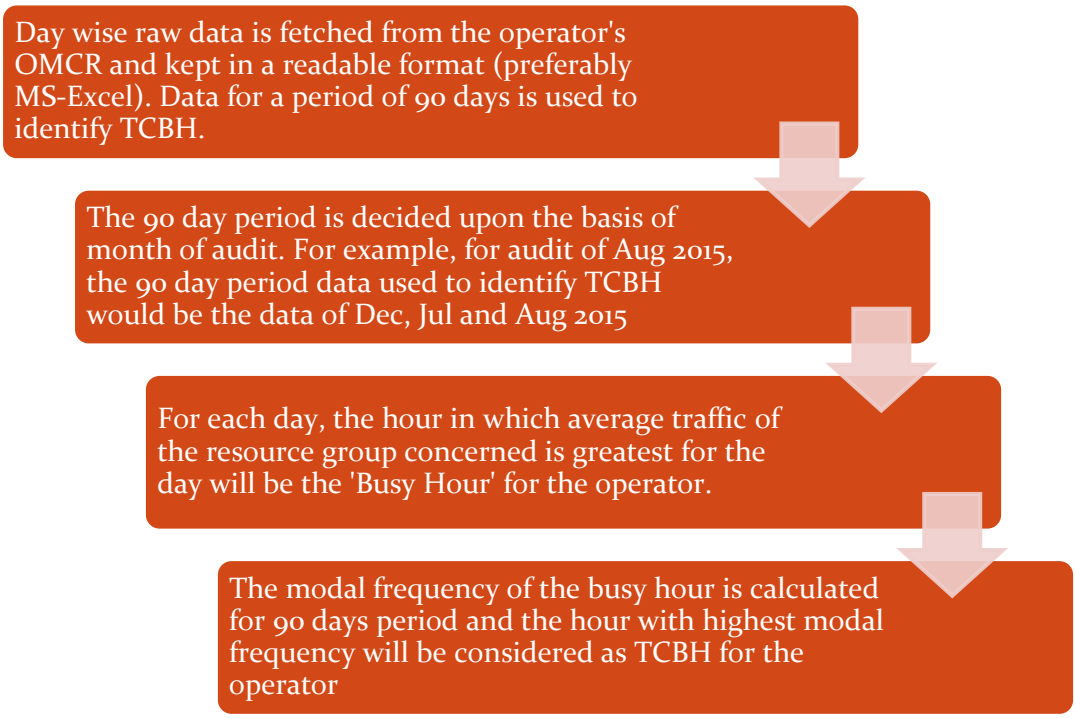
The 3 day live measurement was conducted for network parameters (2G & 3G) and wireless data services (2G & 3G).

S. No.	Name of Service Provider	Date of Live Measurement Audit		
GSM		**Jul-16**	**Aug-16**	**Sep-16**
1	Aircel	July 05, 06, 07	Aug 01, 02, 03	Sep 06, 07, 08
2	Airtel	July 04, 05, 06	Aug 02, 03, 04	Sep 07, 08, 09
3	Idea	July 04, 05, 06	Aug 02, 03, 04	Sep 07, 08, 09
4	BSNL	July 05, 06, 07	Aug 01, 02, 03	Sep 06, 07, 08
5	Rcom	July 04, 05, 06	Aug 02, 03, 04	Sep 07, 08, 09
6	TATA	July 05, 06, 07	Aug 01, 02, 03	Sep 06, 07, 08
7	Vodafone	July 05, 06, 07	Aug 01, 02, 03	Sep 06, 07, 08
CDMA Operators				
9	TATA	July 05, 06, 07	Aug 01, 02, 03	Sep 06, 07, 08
3G Operators				
10	Airtel	July 05, 06, 07	Aug 02, 03, 04	Sep 07, 08, 09
11	BSNL	July 05, 06, 07	Aug 01, 02, 03	Sep 06, 07, 08
12	Reliance	July 04, 05, 06	Aug 02, 03, 04	Sep 07, 08, 09
13	IDEA	July 04, 05, 06	Aug 02, 03, 04	Sep 07, 08, 09
14	TATA	July 05, 06, 07	Aug 01, 02, 03	Sep 06, 07, 08

2.4.1.13 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.

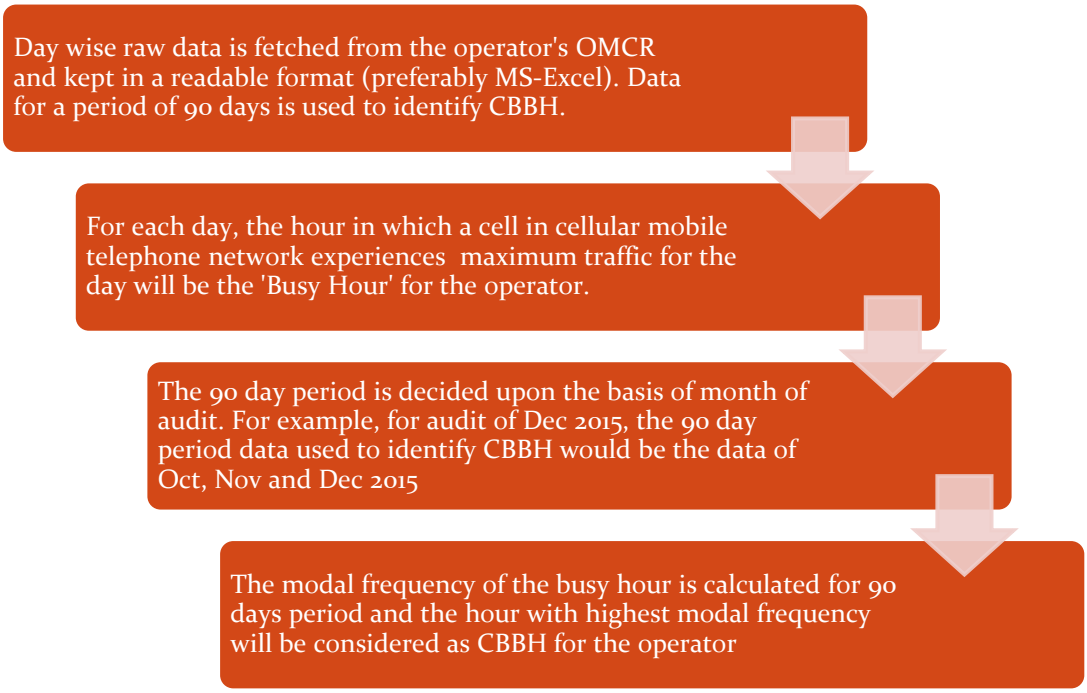
Step by step procedure to identify TCBH for an operator:



2.4.1.14 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:



2.4.1.15 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 September 2016 (JAS'16) was collected in the month of October 2016. To extract the data for customer service parameters for the purpose of audit, IMRB 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 (postpaid 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 section 6 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.16 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%

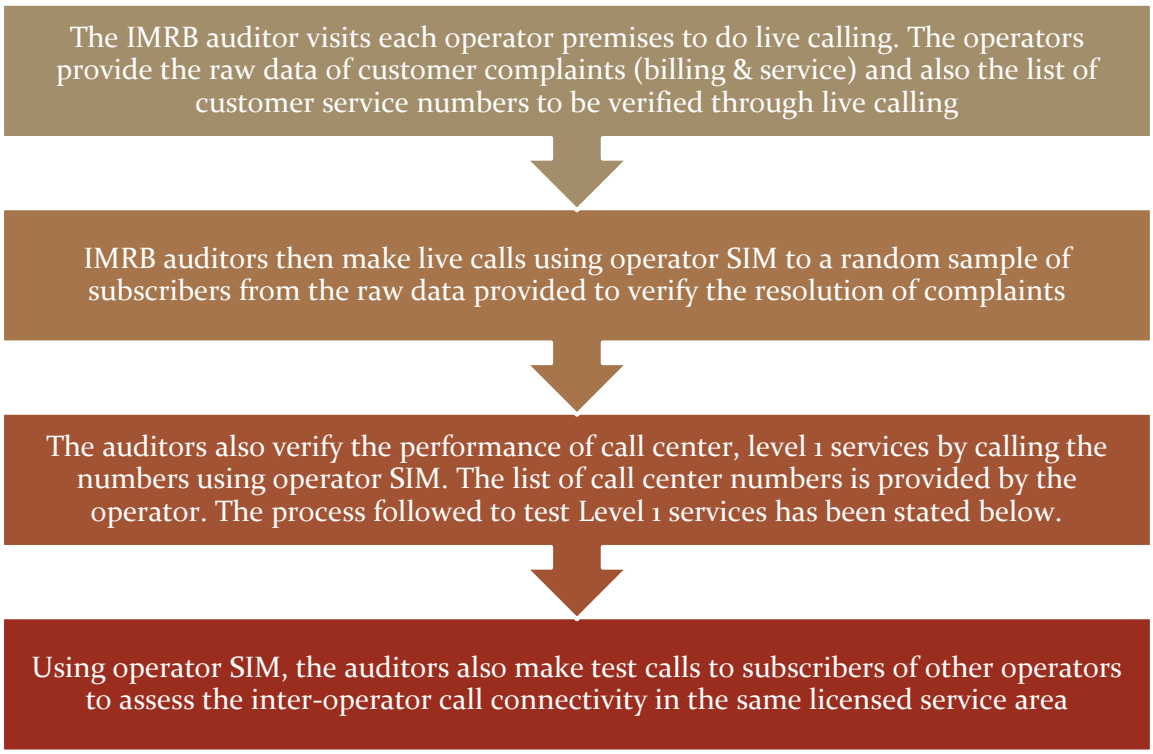
2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

Parameter	Calculation Methodology
Metering and billing credibility - Postpaid	Total billing complaints received during the relevant billing cycle / Total bills generated during the relevant billing cycle *100
Metering and billing credibility – Prepaid	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 (Postpaid + Prepaid)	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

2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of various customer service parameters by doing test calls to the subscribers/ specific numbers. Below is a step wise procedure of live calling.



Live calling activity was carried out during the period of September 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 August 2016 was considered for live calling activity conducted in September 2016.

A detailed explanation of each parameter is explained below.

2.4.2.2 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 IMRB 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 December, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 6.1.1.

TRAI benchmark-

Resolution of billing/ charging complaints - 98% within 4 weeks, 100% within 6 weeks

2.4.2.3 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 IMRB auditors.

2.4.2.4 LEVEL 1 SERVICE

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 300 test calls were made per service provider in the quarter.

In JAS'16, IMRB has tried contacting the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

- On visiting the operator's premises (Exchange/Central Server etc.), auditors ask the operator authorized personnel to provide a list of Level 1 services being active in their service. The list should contain a description of the numbers along with dialing code.
- Operators might provide a long 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 Code	Description
100	Police
101	Fire
102	Ambulance
104	Health Information Helpline
108	Emergency and Disaster Management Helpline
138	All India Helpine for Passangers
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
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	Educationa & 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

2.4.2.5 CUSTOMER CARE

Live calling is done to verify response time for customer assistance is done to verify the performance of call center 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.

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

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.

2.4.3 VOICE DRIVE TEST – 2G & 3G

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as the name suggests, is conducted to measure the performance of an operator 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.

IMRB conducted two types of drive tests 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 IMRB conducts the drive test on solitary basis and uses its own hardware. Operators generally do not have any knowledge of the drive test being conducted.
A detailed explanation of the two methodologies has been provided below.

2.4.3.2 OPERATOR ASSISTED DRIVE TEST – VOICE 2G & 3G

SSAs are selected according to the total no. of SSAs on that region and audited in each quarter, at least 1 SSA in each month it may be more depends on the total no. of drive on that circle. The drive tests were conducted for all operators in the circle, for both 2G and 3G voice services. As per TRAI instructions, the 2G drive was done in 2G only mode, while 3G drive test was conducted in dual mode (3G on priority).

As per the new directive given by TRAI headquarters, drive test in the quarter were conducted at a SSA level. SSAs have been defined in two categories by TRAI as per the criticality of the SSA.

1. Normal SSA
2. Difficult SSA

During the drive test in normal SSA, the methodology adopted for the drive test is:

- 3 consecutive days were selected for drive test in selected SSA and SSA list was finalized by TRAI office New Delhi.
- On an average, a minimum of 80 kilometers was covered each day, covering a minimum distance of 250kms in 3 days.
- 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 Office New Delhi.
- 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-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - 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 30-50 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. For 3G, the gap between two calls was 30 seconds.
- Height of the antenna was kept uniform in case of all service providers.

In drive test for difficult SSAs, the methodology adopted for the drive test is:-

- Drive test was conducted for 6 consecutive days in selected SSAs and SSA list was finalized by TRAI office New Delhi.
- On an average, a minimum of 80 kilometers was covered each day, covering a minimum distance of 500kms in 6 days.

Rest of the activities for drive test in difficult SSAs are same as drive test for normal SSAs.

2.4.3.3 INDEPENDENT DRIVE TEST – 2G & 3G

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

- A minimum of 80 kilometers was traversed during the independent drive test in a SSA on each day and SSA list was finalized by TRAI office New Delhi.
- 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-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - 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 30-50 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. For 3G, the gap between two calls was 30 seconds.
- Height of the antenna was kept uniform in case of all service providers.

2.4.3.4 PARAMETERS EVALUATED DURING VOICE DRIVE TEST – 2G & 3G

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)] x 100
- Voice quality (GSM)
    - ✓ Total RxQual Samples– A
    - ✓ RxQual samples with 0-5 value – B
    - ✓ %age samples with good voice quality = B/A x 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 x 100
    - ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 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) x 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) x 100

2.4.4 WIRELESS DATA DRIVE TEST – 2G & 3G

The data drive test is conducted at stationary places called hotspots in a SSA for all the days the voice drive test is conducted in the same SSA.

2.4.4.1 METHODOLOGY

The measurement setup is used to conduct test calls for measuring successful data transmission download and upload attempts, minimum download speed, average throughput and latency is given in figure given below.

The basic measurement set-up consists of a Test-Device and a Test-Server with specified software and hardware. Test calls are established between the Test-Device and Test-Server and measurements are made for the respective QoS parameters. These parameters are measured in a stationary mode. Service Activation/Provisioning, PDP Context Activation Success Rate and Drop rate are reported from the actual network counters/database.

- To assess the quality of the connection between an end user and an Internet Service Provider (ISP), ideally the Test-Server is placed as near as possible to the gateway providing the interconnection between access network and ISP network. The location of the test-server is as near as possible to the gateway providing the interconnection between access network and ISP network implies that the measurements will not reflect the influence in the QoS of the ISP network, between that gateway and the gateway interconnecting with the Internet.

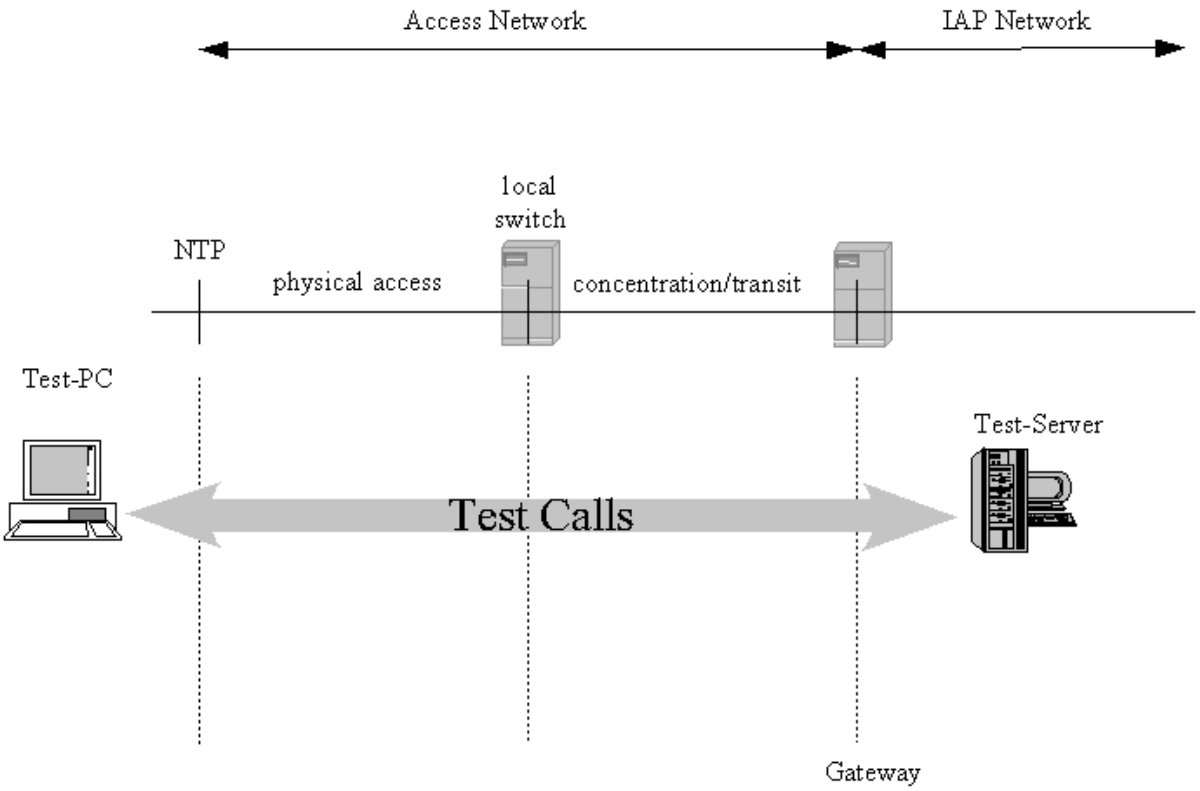


Figure for Measurement set-up

2.4.4.2 REQUIREMENTS FOR THE TEST-SERVER

For all tests, a dedicated test server is used as a well-defined reference. The test server may be located centrally for all the licensed service areas (LSA) or for a number of LSAs or in each LSA (not more than one in each LSA). Under no circumstances a commercial server (e.g. www.yahoo.com) is used, since the test conditions for such a server may change over time making later reproduction of the results impossible. The test server is identified by an IP address and not by its fully qualified Domain Name (FQDN) in order to avoid issues with Domain Name Server (DNS) lookup and including the DNS caching strategies of the used operating system into the measurement.

- The Transmission Control Protocol (TCP) settings of the server tested against, is also recorded. Since the number of host operating systems for internet servers is larger than on the client side, no detailed recommendation concerning the TCP settings of the server is given.

However, the TCP stack of the reference server should at least be capable of the following:

- Maximum Segment Size between 1380 Bytes and 1460 Bytes.
- TCP RX Window Size > 4096 Bytes
- SACK (Selective Acknowledgement) enabled.
- TCP Fast Retransmit.
- TCP Fast Recovery enabled.
- Delayed ACK enabled (200ms).

2.4.4.3 TEST FILES

The test file consist of incompressible data i.e. a data file that is already compressed, e.g. like a zip or jpg file. The test file has at least twice the size (in Kbit) of the theoretically maximum data transmission rate per second (in Kbit/s) of the Internet access under consideration.

2.4.4.4 REPRESENTATIVENESS OR NUMBER OF TEST CALLS

- The choice of adequate test calls, i.e. geographical locations of origin and destination of calls as well as traffic variations, is a crucial point with respect to the comparability and validation of the statistics are calculated for the measured parameters. For each parameter, it is ensured that the samples are aggregated over all classes of customers for fairness in reflecting the QoS actually perceived by the user and the statistics are preserved to substantiate the same.
- The necessary number of samples (test calls) are 1067 for each of the category "A" and "Metro" licensed service area (LSA), 600 for each of the category "B" LSA and 384 for each of the category "C" LSA for all the parameters.

2.4.4.5 PARAMETERS EVALUATED DURING DATA DRIVE TEST AT HOTSPOTS

2.4.4.5.1 SUCCESSFUL DATA TRANSMISSIONS DOWNLOAD ATTEMPTS

The successful data download attempts is defined as the ratio of successful data downloads to the total number of data download attempts in a specified time period. A data transmission is successful if a test file is downloaded completely and with no errors.

Measurement:

The percentage that is the sum total of successful data downloads, divided by the sum total of all attempts to download a test file is provided. The statistics are calculated from test calls made according to the measurement set-up and taking into account the representativeness requirements. The successful data download is measured by downloading a test file. An attempt to transmit the test file is considered unsuccessful if it takes longer than 60 seconds.

Successful data transmission download attempts =

$$\frac{\text{Total Successful download attempts}}{\text{Total download attempts}} \times 100$$

2.4.4.5.2 SUCCESSFUL DATA TRANSMISSION UPLOAD ATTEMPTS

The successful data upload attempts is defined as the ratio of successful data uploads to the total number of data upload attempts in a specified time period. A data upload is successful if a test file is uploaded completely and with no errors.

Measurement:

The percentage that is the sum total of successful data uploads, divided by the sum total of all attempts to upload a test file should be provided. The statistics are calculated from test calls made according to the measurement set-up and taking into account the representativeness requirements. The successful data upload is measured by uploading a test file. An attempt to transmit the test file is considered unsuccessful if it takes longer than 60 seconds.

Successful data transmission upload attempts = $\frac{\text{Total Successful upload attempts}}{\text{Total upload attempts}} \times 100$

2.4.4.5.3 MINIMUM DOWNLOAD SPEED

The download speed is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device.

Measurement:

The minimum download speed is calculated from test calls made according to the measurement set-up. Test calls are to be made to weigh the results according to the patterns of real traffic. Minimum download speed is the average of the lower 10% of all such test calls.

Minimum download speed (average of lower 10% of all test calls) =

$$\frac{\text{Download speed } (A1+A2+A3+A4+A5+A6)}{6} \times 100$$

Note- A1, A2, A3, A4 A5 & A6 are download speeds at 6 hotspots

2.4.4.5.4 AVERAGE THROUGHPUT FOR PACKET DATA

It is defined as the rate at which packets are transmitted in a network. In a mobile network the download speed varies depending on the number of users in a particular location. Even though a service provider may be advertising certain speed, the actual speed may vary as per the number of users in the network and there could be customer dissatisfaction on account of relatively slow speed. Hence, there is a need to prescribe an average throughput to protect the interest of consumers. The service providers need to constantly upgrade their network to meet average throughput benchmark.

- The throughput is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device.
- The service provider will advertise the throughput being offered to its customers as per their category or plan and it should be meted out as per their commitment.

Measurement:

The average throughput for packet data should be calculated from all the test calls made according to the measurement setup.

Test calls are made to weigh the results according to the patterns of real traffic. Average throughput is calculated as the average of all such test calls.

Average Throughput for Packet data = Average of download attempts in Kbit/ average download time in secs

2.4.4.5.5 LATENCY

Latency is the amount of time taken by a packet to reach the receiving endpoint after being transmitted from the sending point. This time period is termed the "end-to-end delay" occurring along the transmission path. Latency generally refers to network conditions, such as congestion, that may affect the overall time required for transit.

Measurement:

Latency is measured with the test server for ping connected directly to the server on the same Intranet domain.

Latency (Percentage of successful pinged) = $\frac{\text{Total number of successful ping}}{\text{Total number of ping sent to the Test Server}} \times 100$

2.5 OPERATORS COVERED 2G AND 3G

Name of Operator	Number of Subscriber as per VLR-2G
Aircel	170
Airtel	11829376
BSNL	2243414
Idea	23542022
Reliance GSM	NDR
Tata CDMA	114089
Tata GSM	3544872
Vodafone	5116675
Name of Operator	**Number of Subscriber as per VLR-3G**
Airtel 3G	999588
BSNL 3G	8148
Idea 3G	11829376
Reliance 3G	NDR
Tata 3G	3544872

September'16 VLR data was considered for the number of subscribers.

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 CRITICAL FINDINGS

PMR and 3day live consolidated 2G (Network Parameters)

- Vodafone failed to meet the benchmark for Worst Affected Cells having more than 3% TCH drop during PMR audit.

PMR and 3Days live consolidated 3G (Network Parameters)

- All operators met the TRAI benchmark for all parameters during PMR as well as 3days live audit.

Wireless Data Services 2G & 3G

- All the operators met the benchmark as per PMR data as well as live measurement for Activation done within 4 hours except Airtel 2G and TATA GSM.
- All operators met the benchmark for drop rate as per audit as well as live data except Aircel 2G
- Aircel 3G and TATA3G failed to meet the benchmark for activation data for PMR.

Live Calling

- As per the consumers (live calling exercise) all operators failed to meet the benchmark only, TATA CDMA was able to meet the benchmark of resolving 98% complaints within 4 weeks.
- For the IVR aspect, all operators met the benchmark of 95% with all operators recording 100% for the parameter except idea.
- All operators failed to meet the TRAI benchmark for level 1 service.
- Aircel, Airtel, BSNL, Idea and Reliance GSM failed to meet the benchmark for Percentage of calls answered by the operators (Voice to Voice) within 90 seconds.

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Idea and Reliance GSM failed to meet the TRAI benchmark for the parameter.
- Airtel failed to meet the benchmark in complaints resolved in 6 weeks.
- Airtel failed to meet the benchmark for providing credit or waiver within one week in case of complaints received
- Reliance GSM did not meet the benchmark of answering 95% calls within 90 seconds

Drive Test (Operator Assisted) Voice 2G

- BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations for Voice Quality in , Dewas, Indore, Seoni and Khargon SSA
- BSNL 2G failed to meet the benchmark in indoor locations for Voice Quality in Chhindwara and R SSA
- BSNL 2G failed to meet the benchmark for voice quality in Dewas, Khandwa, Ratlam, Panna, Raipur, Seoni and Raigarh SSA in outdoor location.
- BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations for CSSR in Dewas SSA and outdoor location in Raipur and Raigarh SSA.

- BSNL 2G failed to meet the benchmark in outdoor locations for call drop rate in Dewas, Indore, Khandwa, Khrgaon, Ratlam, Panna, Seoni, Raigarh and Raipur SSA.

Drive Test (Operator Assisted) Voice 3G

- BSNL 3G failed to meet the benchmark in outdoor as well as indoor locations for Voice Quality in and Khargone SSA, however failed in outdoor locations in Khandwa, Raigarh and indoor location in Jabalpur, Chhindwara SSA.
- BSNL 3G failed to meet the benchmark for CSSR in outdoor location in Indore, Khargaon SSA
- BSNL 3G failed to meet the benchmark for Call Drop Rate in outdoor location in Khandwa, Khargaon, Jabalpur and Panna, however failed in indoor location in Ratlam and Jabalpur SSA.

4 EXECUTIVE SUMMARY

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

4.1 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 2G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.44%	0.52%	97.46%	0.31%	0.00%	0.78%	0.78%	98.66%
Airtel	0.16%	0.24%	98.63%	0.06%	0.66%	1.03%	2.30%	96.94%
BSNL	1.91%	1.44%	97.32%	0.47%	1.20%	1.15%	1.78%	NA
Idea	0.21%	1.04%	97.40%	0.26%	1.24%	0.86%	2.41%	97.73%
Reliance GSM	0.56%	1.49%	95.89%	0.10%	0.68%	0.20%	0.76%	98.61%
Tata CDMA	0.24%	0.39%	98.47%	NA	0.36%	0.19%	2.87%	99.12%
Tata GSM	0.03%	0.01%	99.46%	0.29%	0.23%	0.66%	2.65%	98.57%
Vodafone	0.19%	1.22%	99.60%	0.10%	0.40%	0.47%	5.10%	98.65%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

Following are the parameter wise observations for wireless operators for MPCG circle:

BTSs Accumulated Downtime:

All operators met the benchmark. Minimum BTS Accumulated downtime was recorded for TATA GSM at 0.03%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Tata GSM at 0.01%.

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.60%.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion, while Airtel recorded the best SDCCH / Paging Channel Congestion at 0.06%.

TCH Congestion:

All the operators met the benchmark for TCH congestion, while Aircel performed the best on TCH congestion at 0.00%.

Call Drop Rate:

All the operators met the benchmark for the parameter. Minimum call drop rate was recorded for TATA CDMA at 0.19. %

Worst Affected Cells Having More than 3% TCH Drop:

Vodafone failed to meet the benchmark. Best performance was recorded for Reliance GSM at 0.76%.

Voice Quality

All operators met the benchmark. Best performance was recorded for TATA CDMA at 99.12%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis PMR data.

4.1.1 PMR DATA - JULY FOR 2G

Name of Service Provider Month July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.57%	0.78%	97.47%	0.41%	0.00%	0.75%	0.78%	98.38%
Airtel	0.19%	0.37%	98.62%	0.07%	0.67%	1.03%	2.44%	97.03%
BSNL	1.93%	1.46%	97.28%	0.63%	1.06%	1.19%	1.63%	NA
Idea	0.21%	1.00%	97.49%	0.25%	1.15%	0.88%	2.37%	97.73%
Reliance GSM	0.43%	1.60%	95.59%	0.15%	0.77%	0.21%	0.72%	98.57%
Tata CDMA	0.29%	0.47%	98.20%	NA	0.00%	0.33%	3.56%	99.24%
Tata GSM	0.04%	0.03%	99.33%	0.14%	0.66%	0.66%	2.88%	98.55%
Vodafone	0.26%	1.71%	99.45%	0.13%	0.55%	0.84%	4.12%	98.59%

4.1.2 PMR DATA – AUGUST FOR 2G

Name of Service Provider Month August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.37%	0.78%	97.14%	0.43%	0.00%	0.65%	0.78%	99.20%
Airtel	0.16%	0.19%	98.65%	0.06%	0.73%	1.06%	2.30%	96.85%
BSNL	1.92%	1.29%	97.40%	0.45%	1.13%	1.11%	1.64%	NA
Idea	0.25%	1.39%	97.33%	0.23%	1.29%	0.90%	2.45%	97.65%
Reliance GSM	0.71%	1.46%	95.89%	0.09%	0.60%	0.20%	0.74%	98.60%
Tata CDMA	0.27%	0.23%	98.46%	NA	0.00%	0.19%	2.71%	99.08%
Tata GSM	0.02%	0.00%	99.52%	0.01%	0.00%	0.65%	2.55%	98.73%
Vodafone	0.21%	1.57%	99.61%	0.09%	0.39%	0.84%	6.02%	98.60%

4.1.3 PMR DATA - SEPTEMBER FOR 2G

Name of Service Provider Month September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.37%	0.00%	97.77%	0.09%	0.00%	0.96%	0.78%	98.27%
Airtel	0.14%	0.15%	98.64%	0.05%	0.56%	1.02%	2.17%	96.93%
BSNL	1.89%	1.57%	97.28%	0.34%	1.40%	1.14%	2.06%	NA
Idea	0.16%	0.73%	97.39%	0.30%	1.27%	0.80%	2.41%	97.80%
Reliance GSM	0.54%	1.41%	96.18%	0.07%	0.67%	0.19%	0.83%	98.66%
Tata CDMA	0.16%	0.47%	98.75%	NA	1.07%	0.04%	2.33%	99.12%
Vodafone	0.11%	0.38%	99.73%	0.07%	0.27%	0.71%	5.14%	98.77%

4.2 3 DAY DATA – CONSOLIDATED FOR 2G

A three day live measurement was conducted to measure the QoS provided by the operators. The table provided below gives a snapshot of the performance of all operators during live measurement.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.14%	0.26%	98.50%	0.63%	0.00%	0.96%	0.95%	97.96%
Airtel	0.17%	0.00%	98.70%	0.07%	0.69%	0.99%	2.36%	97.00%
BSNL	1.86%	1.01%	96.56%	0.53%	1.10%	1.18%	2.14%	NA
Idea	0.16%	0.02%	97.47%	0.22%	1.17%	0.83%	2.27%	97.76%
Reliance GSM	0.68%	1.02%	95.61%	0.16%	0.83%	0.20%	0.70%	98.60%
Tata CDMA	1.62%	0.16%	98.46%	NA	0.37%	0.33%	2.66%	99.14%
Tata GSM	0.27%	0.00%	99.47%	0.41%	0.04%	0.68%	1.68%	98.61%
Vodafone	0.06%	0.35%	99.52%	0.12%	0.48%	0.45%	4.97%	98.61%

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

BTSs Accumulated Downtime:

All the operators met the benchmark. Minimum BTS Accumulated downtime was recorded for Vodafone at 0.06%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark with Airtel TATA GSM recording 0.00% worst affected BTS due to downtime.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for vodafone with 99.52%.

SDCCH/ Paging Chl. Congestion:

All the operators met the benchmark on SDCCH / Paging Channel Congestion, while Airtel recorded the best SDCCH / Paging Channel Congestion at 0.07%.

TCH Congestion:

All the operators met the benchmark for TCH congestion, while Aircel performed the best with 0.00% TCH congestion.

Call Drop Rate:

All the operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance GSM at 0.20%.

Worst Affected Cells Having More than 3% TCH Drop:

All the operators met the benchmark for the parameter. Best performance was recorded for Reliance GSM 0.70%.and vodafone could not meet the benchmark.

Voice Quality

All operators met the benchmark. Best performance was recorded for TATA CDMA at 99.14%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis 3 day live data.

4.2.1 3 DAY DATA - JULY FOR 2G

Name of Service Provider 3 Day July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.43%	0.78%	98.72%	1.77%	0.00%	0.65%	0.78%	96.78%
Airtel	0.24%	0.00%	98.68%	0.14%	1.12%	0.98%	2.48%	97.05%
BSNL	1.73%	0.69%	96.50%	0.79%	1.10%	0.92%	2.69%	NA
Idea	0.27%	0.02%	97.50%	0.21%	0.99%	0.84%	2.31%	97.77%
Reliance GSM	0.72%	1.60%	95.16%	0.33%	1.14%	0.21%	0.76%	98.51%
Tata CDMA	0.38%	0.00%	98.63%	NA	0.00%	0.43%	3.09%	99.13%
Tata GSM	0.04%	0.00%	99.36%	0.62%	0.12%	0.69%	0.28%	98.59%
Vodafone	0.00%	0.20%	99.22%	0.24%	0.78%	0.79%	4.17%	98.64%

4.2.2 3 DAY DATA – AUGUST FOR 2G

Name of Service Provider 3 Day August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.00%	0.00%	98.40%	0.05%	0.00%	1.09%	1.04%	98.36%
Airtel	0.18%	0.00%	98.67%	0.03%	0.46%	1.05%	2.39%	96.93%
BSNL	2.00%	1.29%	96.42%	0.52%	1.15%	1.22%	1.64%	NA
Idea	0.15%	0.02%	97.29%	0.18%	1.35%	0.91%	2.32%	97.67%
Reliance GSM	0.88%	1.46%	95.79%	0.09%	0.70%	0.21%	0.64%	98.61%
Tata CDMA	0.01%	0.00%	98.08%	NA	0.00%	0.19%	2.48%	99.16%
Tata GSM	0.01%	0.00%	99.53%	0.01%	0.00%	0.60%	2.49%	98.74%
Vodafone	0.01%	0.84%	99.65%	0.07%	0.38%	0.29%	5.49%	98.57%

4.2.3 3 DAY DATA - SEPTEMBER FOR 2G

Name of Service Provider 3 Day September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.00%	0.00%	98.40%	0.05%	0.00%	1.09%	1.04%	98.36%
Airtel	0.10%	0.00%	98.75%	0.05%	0.50%	0.95%	2.21%	97.01%
BSNL	1.70%	0.69%	96.77%	0.29%	1.06%	1.03%	2.76%	NA
Idea	0.07%	0.02%	97.61%	0.26%	1.15%	0.76%	2.17%	97.83%
Reliance GSM	0.43%	0.00%	95.88%	0.06%	0.64%	0.19%	0.70%	98.68%
Tata CDMA	0.08%	0.47%	98.67%	NA	1.10%	0.03%	2.41%	99.15%
Tata GSM	0.03%	0.00%	99.53%	0.60%	0.01%	0.60%	2.26%	98.81%
Vodafone	0.03%	0.00%	99.70%	0.06%	0.29%	0.74%	5.26%	98.65%

4.3 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.16%	0.25%	99.83%	0.01%	0.01%	0.26%	1.75%	98.65%
BSNL 3G	1.49%	1.43%	97.95%	0.61%	0.09%	0.35%	1.06%	NA
Idea 3G	0.09%	0.23%	99.65%	0.09%	0.14%	0.50%	1.58%	99.15%
Reliance 3G	0.23%	0.95%	98.08%	0.07%	0.01%	0.09%	0.29%	99.87%
Tata 3G	0.46%	0.00%	99.04%	0.05%	0.36%	0.35%	1.53%	99.07%

Node Bs downtime:

All operators met the benchmark. Best performance was recorded by Idea 3G with 0.09% downtime.

Worst affected Node Bs due to downtime:

All the operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for TATA 3G at 0.00%.

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for Airtel 3G with 99.83%.

RRC Congestion:

All the operators met the benchmark for RRC Congestion. The minimum RRC Congestion was observed for Airtel 3G with 0.01%.

Circuit Switched RAB Congestion:

All operators met the benchmark for the parameter. Minimum Circuit Switched RAB Congestion was recorded for Reliance 3G at 0.02%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance 3G at 0.09%.

Worst affected cells having more than 3% Circuit switched voice drop rate:

All operators met the benchmark for the parameter. Best performance was recorded for Reliance 3G at 0.29%.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for Reliance 3G at 99.87%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis PMR data.

4.3.1 PMR DATA - JULY FOR 3G

Name of Service Provider Month July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.18%	0.47%	99.86%	0.00%	0.01%	0.27%	1.81%	98.75%
BSNL 3G	1.58%	1.33%	98.19%	0.80%	0.12%	0.30%	0.81%	NA
Idea 3G	0.11%	0.29%	99.66%	0.09%	0.14%	0.49%	1.29%	99.17%
Reliance 3G	0.33%	0.66%	96.03%	0.08%	0.01%	0.09%	0.26%	99.87%
Tata 3G	1.55%	0.00%	98.89%	0.10%	0.39%	0.35%	1.73%	97.74%

4.3.2 PMR DATA – AUGUST FOR 3G

Name of Service Provider Month August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.14%	0.00%	99.86%	0.00%	0.01%	0.26%	1.79%	98.63%
BSNL 3G	1.47%	1.60%	97.86%	0.64%	0.07%	0.38%	1.23%	NA
Idea 3G	0.09%	0.29%	99.63%	0.12%	0.17%	0.48%	1.52%	99.16%
Reliance 3G	0.10%	0.45%	98.56%	0.10%	0.01%	0.09%	0.34%	99.87%
Tata 3G	0.01%	0.00%	99.03%	0.04%	0.43%	0.40%	1.74%	99.73%

4.3.3 PMR DATA - SEPTEMBER FOR 3G

Name of Service Provider Month September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.17%	0.28%	99.79%	0.02%	0.03%	0.25%	1.66%	98.56%
BSNL 3G	1.44%	1.36%	97.78%	0.40%	0.08%	0.36%	1.13%	NA
Idea 3G	0.07%	0.13%	99.67%	0.08%	0.11%	0.52%	1.90%	99.14%
Reliance 3G	0.27%	1.71%	99.65%	0.04%	0.01%	0.07%	0.27%	99.88%
Tata 3G	0.02%	0.00%	99.18%	0.02%	0.26%	0.40%	1.33%	99.75%

4.4 3 DAY DATA – CONSOLIDATED FOR 3G

A three day live measurement was conducted to measure the QoS provided by the operators. The table provided below gives a snapshot of the performance of all operators during live measurement.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.19%	0.00%	99.84%	0.01%	0.03%	0.25%	1.85%	98.68%
BSNL 3G	1.61%	1.35%	97.34%	0.69%	0.22%	0.39%	1.15%	NA
Idea 3G	0.68%	0.00%	99.68%	0.06%	0.12%	0.49%	1.53%	99.16%
Reliance 3G	0.13%	0.38%	96.69%	0.07%	0.02%	0.10%	0.30%	99.87%
Tata 3G	0.07%	0.00%	98.91%	0.09%	0.29%	0.36%	1.73%	99.74%

Node Bs downtime:

All operators met the benchmark for the parameter. Best performance was recorded for TATA 3G at 0.07%.

Worst affected Node Bs due to downtime:

All the operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel 3G, Idea 3G and TATA 3G at 0.00%.

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for Airtel 3G with 99.84%.

RRC Congestion:

All the operators met the benchmark for RRC Congestion. The minimum RRC Congestion was observed for Airtel 3G with 0.01%.

Circuit Switched RAB Congestion:

All operators met the benchmark for the parameter. Minimum Circuit Switched RAB Congestion was recorded for Reliance 3G at 0.02%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance 3G at 0.10%.

Worst affected cells having more than 3% Circuit switched voice drop rate:

All operators met the benchmark for the parameter. Best performance was recorded for Reliance 3G at 0.30%

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for Reliance 3G at 99.87%.

All the service providers were measuring this parameter as per the TRAI guidelines that have been stated in parameter description section.

Below are the month wise summary tables for each network parameter basis 3 day live data.

4.4.1 3 DAY DATA - JULY FOR 3G

Name of Service Provider 3 Day July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.20%	0.00%	99.82%	0.01%	0.04%	0.25%	2.29%	98.69%
BSNL 3G	1.72%	1.33%	97.71%	0.80%	0.16%	0.32%	0.82%	NA
Idea 3G	0.15%	0.00%	99.65%	0.11%	0.16%	0.51%	1.24%	99.17%
Reliance 3G	0.12%	0.71%	95.97%	0.08%	0.02%	0.11%	0.18%	99.87%
Tata 3G	0.15%	0.00%	98.99%	0.10%	0.30%	0.33%	1.75%	99.75%

4.4.2 3 DAY DATA – AUGUST FOR 3G

Name of Service Provider 3 Day August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.16%	0.00%	99.87%	0.00%	0.01%	0.27%	1.78%	98.78%
BSNL 3G	1.79%	1.36%	96.31%	0.88%	0.44%	0.63%	2.86%	NA
Idea 3G	0.06%	0.00%	99.66%	0.04%	0.10%	0.47%	1.58%	99.16%
Reliance 3G	0.06%	0.47%	94.48%	0.11%	0.01%	0.10%	0.46%	99.86%
Tata 3G	0.00%	0.00%	98.43%	0.17%	0.43%	0.39%	1.47%	99.72%

4.4.3 3 DAY DATA - SEPTEMBER FOR 3G

Name of Service Provider 3 Day September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.21%	0.00%	99.84%	0.02%	0.03%	0.24%	1.50%	98.61%
BSNL 3G	1.44%	1.36%	97.99%	0.39%	0.06%	0.34%	0.73%	NA
Idea 3G	1.76%	0.00%	99.73%	0.04%	0.09%	0.49%	1.75%	99.14%
Reliance 3G	0.20%	0.00%	99.63%	0.03%	0.01%	0.07%	0.24%	99.88%
Tata 3G	0.07%	0.00%	99.32%	0.02%	0.14%	0.36%	NA	99.76%

4.5 WIRELESS DATA PMR & 3 DAY LIVE – CONSOLIDATED FOR 2G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel	100.00%	97.42%	4.99%	100.00%	99.08%	5.73%
Airtel	93.90%	99.43%	3.89%	95.77%	99.60%	4.09%
BSNL	NDR	97.87%	NDR	NDR	NDR	NDR
Idea	99.97%	99.62%	1.35%	NDR	99.60%	1.30%
Reliance GSM	100.00%	99.05%	2.33%	100.00%	99.97%	3.38%
Tata CDMA	97.67%	96.79%	1.46%	NDR	96.87%	1.49%
Tata GSM	93.75%	99.97%	1.84%	NDR	99.98%	1.86%
Vodafone	100.00%	99.86%	3.98%	NDR	99.88%	3.85%

NDR: No data received from operators

Following are the parameter wise observations for wireless operators for MPCG circle:

Activation done within 4 hours:

All the operators met the benchmark as per PMR data as well as live measurement for Activation done within 4 hours except Airtel and TATA GSM .Aircel and Vodafone showed best performance.

PDP Context activation success rate:

All operators met the benchmark for PDP context activation success rate for as per audit as well as live measurement. Maximum PDP Context activation success rate was recorded for TATA GSM for PMR as well as Live data.

Drop Rate:

All operators met the benchmark for drop rate as per audit as well as live data except Aircel.

4.6 WIRELESS DATA PMR & 3 DAY LIVE – CONSOLIDATED FOR 3G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Airtel 3G	93.90%	99.69%	0.03%	95.77%	99.62%	0.03%
BSNL 3G	NDR	97.56%	4.98%	NDR	95.71%	NDR
Idea 3G	99.99%	99.14%	0.60%	NDR	99.37%	0.59%
Reliance 3G	100.00%	99.54%	3.09%	100.00%	98.45%	0.10%
Tata 3G	93.75%	99.94%	2.69%	NDR	95.96%	2.86%

NDR: No data received

Following are the parameter wise observations for wireless operators for MPCG circle:

Activation done within 4 hours:

Aircel 3G and TATA3G failed to meet the benchmark for activation data for PMR with Reliance 3G showing best performance.

PDP Context activation success rate:

All operators met the benchmark for PDP context activation success rate for TATA 3G performing best for PMR data and Airtel 3G for Live data.

Drop Rate:

All operators met the benchmark for drop rate as per audit as well as live measurement with Airtel 3G performing best for both PMR and Live data.

Below are the month wise summary tables for each network parameter basis PMR and Live data.

4.7 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Response time to customer for assistance		Level 1 Service	Service Requests
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 90	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel	NA	NA	100.00%	90.00%	55.00%	NA
Airtel	84.00%	100.00%	100.00%	87.00%	71.33%	92.00%
BSNL	69.00%	100.00%	100.00%	84.00%	78.33%	81.00%
Idea	77.00%	100.00%	94.00%	93.00%	68.00%	78.00%
Reliance GSM	90.00%	100.00%	100.00%	88.00%	76.00%	89.00%
Tata CDMA	100.00%	100.00%	100.00%	100.00%	41.33%	NA
Tata GSM	NA	NA	100.00%	99.00%	36.00%	73.97%
Vodafone	81.67%	100.00%	100.00%	97.00%	33.33%	NDR

NA- Not applicable

Resolution of billing complaints

As per the consumers (live calling exercise) no operator could meet yhe benchmark of resolving 98% complaints within 4 weeks.

The benchmark for resolving 100% complaints within 6 weeks was achieved by all operators.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all operators met the benchmark of 95% with all operators recording 100% for the parameter except idea.

Customer Care / Helpline Assessment (voice to voice)

TATA CDMA, TATA GSM and Vodafone met the benchmark of answering 95% voice to voice calls within 90 seconds. .

Level 1 Service

As per the live calling results, all operators failed to meet the TRAI benchmark for level 1 service.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. Airtel showed best performance with 92%.

4.8 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Billing Complaints		Response time to customer for assistance	Customer care	
	Postpaid Subscribers	Prepaid Subscribers	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	% of cases where credit/wavier is received within one week	Percentage of calls answered by the IVR	Percentage of calls answered by the operators (voice to voice) within 90
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel	0.00%	0.00%	NA	NA	NA	98.77%	99.19%
Airtel	0.07%	0.07%	99.96%	99.96%	99.96%	100.00%	97.93%
BSNL	0.02%	0.06%	99.93%	100.00%	100.00%	99.69%	96.09%
Idea	0.48%	0.10%	100.00%	100.00%	100.00%	98.35%	98.72%
Reliance GSM	0.12%	0.03%	100.00%	100.00%	100.00%	99.72%	92.83%
Tata CDMA	0.00%	0.00%	NA	NA	NA	100.00%	99.30%
Tata GSM	0.00%	0.00%	100.00%	100.00%	100.00%	97.44%	98.24%
Vodafone	0.05%	0.05%	100.00%	100.00%	100.00%	100.00%	99.25%

Metering and Billing Credibility – Post-paid Subscribers

For the billing disputes of post-paid subscribers, it was observed that Idea and Reliance GSM failed to meet the TRAI benchmark for the parameter. Aircel and Tata GSM & CDMA had the best performance with 0.00% billing disputes.

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, Idea failed to meet the benchmark of charging disputes. Aircel, Tata CDMA and GSM performed the best with 0.00% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks respectively except Airtel in complaints resolved in 6 weeks.

Response Time to customer for assistance - % of cases in which advance waiver is received within one week

All the operators met the TRAI benchmark of providing credit or waiver within one week in case of complaints received except Vodafone.

Customer Care Percentage of calls answered by the IVR

All the operators met the TRAI benchmark of answering 95% IVR calls except Airtel.

Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds

Reliance GSM did not meet the benchmark of answering 95% calls within 90 seconds.

4.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment										
Inter operator call Assessment To↓ From→	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Aircel	NA	100.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	NS	100.00%
Airtel	100.00%	NA	100.00%	100.00%	NS	100.00%	100.00%	100.00%	NS	100.00%
BSNL	100.00%	100.00%	NA	100.00%	NS	100.00%	100.00%	100.00%	NS	100.00%
Idea	100.00%	100.00%	100.00%	NA	NS	100.00%	100.00%	100.00%	NS	100.00%
Reliance CDMA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Reliance GSM	100.00%	100.00%	100.00%	100.00%	NS	NA	100.00%	100.00%	NS	100.00%
Tata CDMA	100.00%	100.00%	100.00%	100.00%	NS	100.00%	NA	100.00%	NS	100.00%
Tata GSM	100.00%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	NA	NS	100.00%
Videocon	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Vodafone	100.00%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	NS	NA

Maximum Problem faced by the calling operator to other operator. The orange colour denotes performance below circle average.

In the inter-operator call assessment, most of the operators did not face any problems in connecting to other operators.

4.10 COMPARISON BETWEEN IMRB AND OPERATOR'S DATA FOR PMR 2G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	BTSs Accumulated downtime (not available for service)		Worst affected BTSs due to downtime		Call Set-up Success Rate		SDCCH/ Paging Chl. Congestion		TCH Congestion		Call drop rate		Worst affected cells having more than 3%		Connection with good voice quality			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Aircel	0.44%	0.44%	0.52%	0.52%	97.46%	97.46%	0.31%	0.31%	0.00%	0.00%	0.83%	0.78%	0.78%	0.78%	98.62%	98.66%	0.00%	0.00%
Airtel	0.17%	0.16%	0.27%	0.24%	98.63%	98.63%	0.06%	0.06%	0.69%	0.66%	1.04%	1.03%	2.35%	2.30%	96.94%	96.94%	0.00%	0.00%
BSNL	1.91%	1.91%	1.65%	1.44%	96.84%	97.32%	0.46%	0.47%	1.10%	1.20%	1.14%	1.15%	2.27%	1.78%	97.78%	NA	0.00%	0.00%
Idea	0.21%	0.21%	1.04%	1.04%	97.40%	97.40%	0.26%	0.26%	1.24%	1.24%	0.86%	0.86%	2.41%	2.41%	97.73%	97.73%	0.33%	0.00%
RTL	0.33%	0.56%	1.49%	1.49%	95.89%	95.89%	0.10%	0.10%	0.68%	0.68%	0.20%	0.20%	0.72%	0.76%	98.61%	98.61%	0.00%	0.00%
TATA CDMA	0.25%	0.24%	0.70%	0.39%	98.90%	98.47%	0.00%	NA	0.00%	0.36%	0.33%	0.19%	2.84%	2.87%	99.10%	99.12%	0.00%	0.00%
TATA GSM	0.03%	0.03%	0.00%	0.01%	99.36%	99.46%	0.08%	0.29%	0.11%	0.23%	0.58%	0.66%	2.68%	2.65%	98.58%	98.57%	0.00%	0.00%
Vodafone	0.20%	0.19%	1.22%	1.22%	99.60%	99.60%	0.10%	0.10%	0.40%	0.40%	0.80%	0.80%	5.59%	5.10%	98.65%	98.65%	0.00%	0.00%

4.11 COMPARISON BETWEEN IMRB AND OPERATOR'S DATA FOR PMR 3G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	Node Bs downtime (not available for service)		Worst affected Node Bs due to downtime		CSSR		RRC Congestion		Circuit Switched RAB Congestion		Call drop rate		Worst affected cells having more than 3% Circuit switched		%Circuit Switch Voice Quality (CSV quality)			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Airtel 3G	0.16%	0.16%	0.38%	0.25%	99.85%	99.83%	0.00%	0.01%	0.01%	0.01%	0.26%	0.26%	1.79%	1.75%	99.35%	98.65%	0.00%	0.00%
BSNL 3G	1.65%	1.49%	1.62%	1.43%	97.17%	97.95%	0.73%	0.61%	0.47%	0.09%	0.40%	0.35%	1.90%	1.06%	97.77%	NA	0.00%	0.00%
Idea 3G	0.09%	0.09%	0.23%	0.23%	99.65%	99.65%	0.09%	0.09%	0.14%	0.14%	0.50%	0.50%	1.57%	1.58%	99.15%	99.15%	0.00%	0.00%
Reliance 3G	0.24%	0.23%	0.94%	0.95%	98.08%	98.08%	0.07%	0.07%	0.01%	0.01%	0.08%	0.09%	0.29%	0.29%	99.88%	99.87%	0.00%	0.00%
Tata 3G	0.02%	0.46%	0.00%	0.00%	98.95%	99.04%	0.09%	0.05%	0.41%	0.36%	0.35%	0.35%	1.59%	1.53%	99.74%	99.07%	0.00%	0.00%

Value calculated by Operator and IMRB match		Value calculated by Operator and IMRB do not match	

5 CRITICAL FINDINGS

PMR and 3day live consolidated 2G (Network Parameters)

- Vodafone failed to meet the benchmark for Worst Affected Cells having more than 3% TCH drop during PMR audit.

PMR and 3Days live consolidated 3G (Network Parameters)

- All operators met the TRAI benchmark for all parameters during PMR as well as 3days live audit.

Wireless Data Services 2G & 3G

- All the operators met the benchmark as per PMR data as well as live measurement for Activation done within 4 hours except Airtel 2G and TATA GSM.
- All operators met the benchmark for drop rate as per audit as well as live data except Aircel 2G
- Aircel 3G and TATA3G failed to meet the benchmark for activation data for PMR.

Live Calling

- As per the consumers (live calling exercise) all operators failed to meet the benchmark only, TATA CDMA was able to meet the benchmark of resolving 98% complaints within 4 weeks.
- For the IVR aspect, all operators met the benchmark of 95% with all operators recording 100% for the parameter except idea.
- All operators failed to meet the TRAI benchmark for level 1 service.
- Aircel, Airtel, BSNL, Idea and Reliance GSM failed to meet the benchmark for Percentage of calls answered by the operators (Voice to Voice) within 90 seconds.

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Idea and Reliance GSM failed to meet the TRAI benchmark for the parameter.
- Airtel failed to meet the benchmark in complaints resolved in 6 weeks.
- Airtel failed to meet the benchmark for providing credit or waiver within one week in case of complaints received
- Reliance GSM did not meet the benchmark of answering 95% calls within 90 seconds

Drive Test (Operator Assisted) Voice 2G

- BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations for Voice Quality in , Dewas, Indore, Seoni and Khargon SSA
- BSNL 2G failed to meet the benchmark in indoor locations for Voice Quality in Chhindwara and R SSA
- BSNL 2G failed to meet the benchmark for voice quality in Dewas, Khandwa, Ratlam, Panna, Raipur, Seoni and Raigarh SSA in outdoor location.

- BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations for CSSR in Dewas SSA and outdoor location in Raipur and Raigarh SSA.
- BSNL 2G failed to meet the benchmark in outdoor locations for call drop rate in Dewas, Indore, Khandwa, Khrgaon, Ratlam, Panna, Seoni, Raigarh and Raipur SSA.

Drive Test (Operator Assisted) Voice 3G

- BSNL 3G failed to meet the benchmark in outdoor as well as indoor locations for Voice Quality in and Khargone SSA, however failed in outdoor locations in Khandwa, Raigarh and indoor location in Jabalpur, Chhindwara SSA.
- BSNL 3G failed to meet the benchmark for CSSR in outdoor location in Indore, Khargaon SSA
- BSNL 3G failed to meet the benchmark for Call Drop Rate in outdoor location in Khandwa, Khargaon, Jabalpur and Panna, however failed in indoor location in Ratlam and Jabalpur SSA.

6 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 2G

6.1 BTS ACCUMULATED DOWNTIME

6.1.1 PARAMETER DESCRIPTION

- The parameter of network availability would be measured from following sub-parameters

    1. BTSs Accumulated downtime (not available for service)
    2. Worst affected BTSs due to downtime

1. **Definition - BTSs (Base Transceiver Station) accumulated downtime** (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software up gradation. For measuring the performance against the benchmark for this parameter the downtime of each BTS lasting more than 1 hour at a time in a day during the period of a month were considered.

2. **Computation Methodology –**
   BTS accumulated downtime (not available for service) = 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

3. **TRAI Benchmark –**

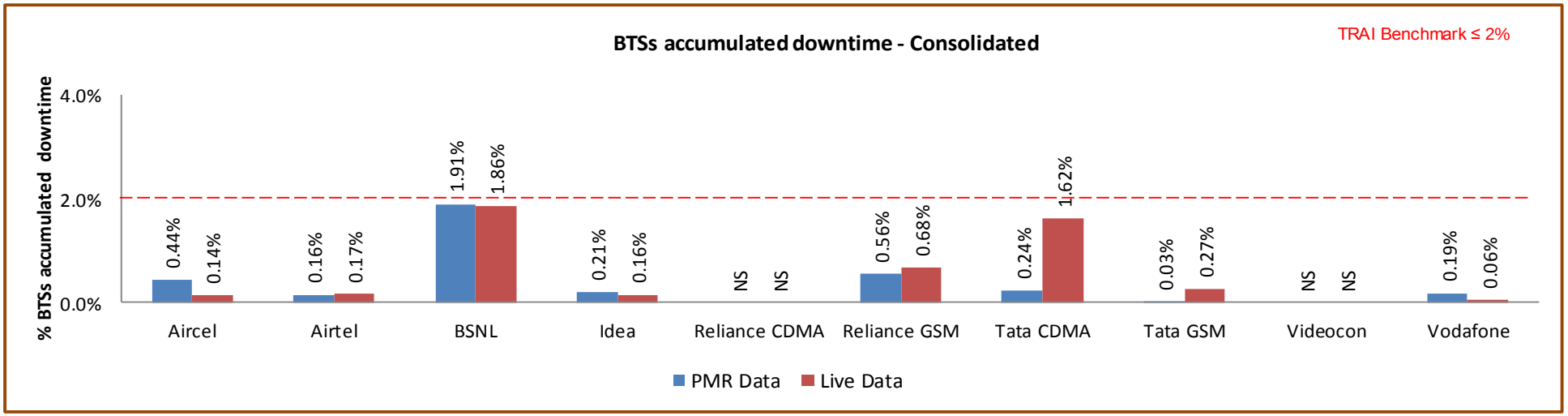
    a. BTSs Accumulated downtime (not available for service) ≤ 2%

4. **Audit Procedure –**

    - The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited
    - All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

- Any outage as a result of force majeure were not considered at the time of calculation
- Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
- List of operating sites with cell details and ids are taken from the operator.
- When there is any outage a performance report gets generated in line with that cell resulting and master base of the Accumulated downtime and worst affected BTS due to downtime.

6.1.2 KEY FINDINGS - CONSOLIDATED

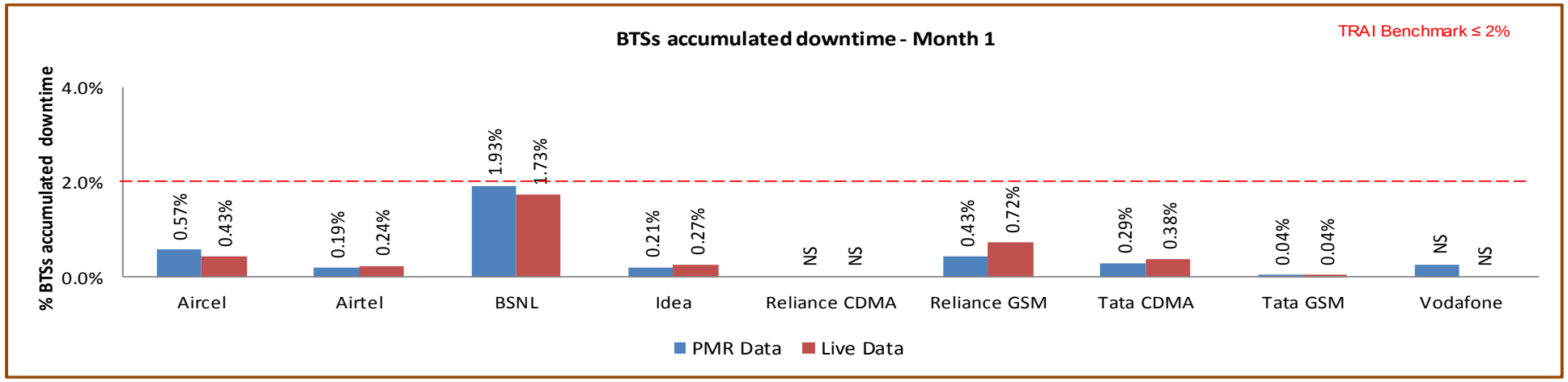


Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

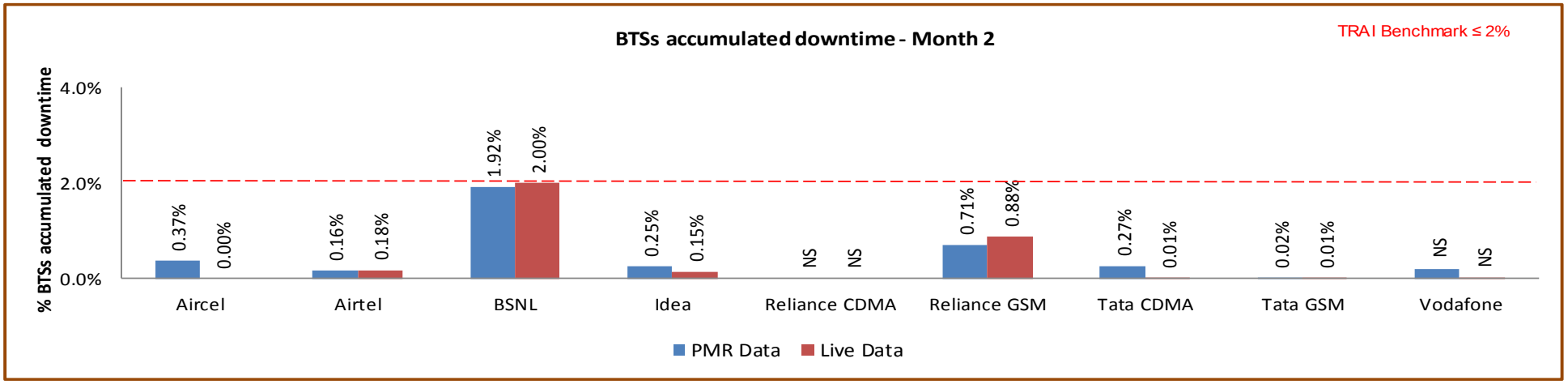
6.1.2.1 KEY FINDINGS – MONTH 1

a



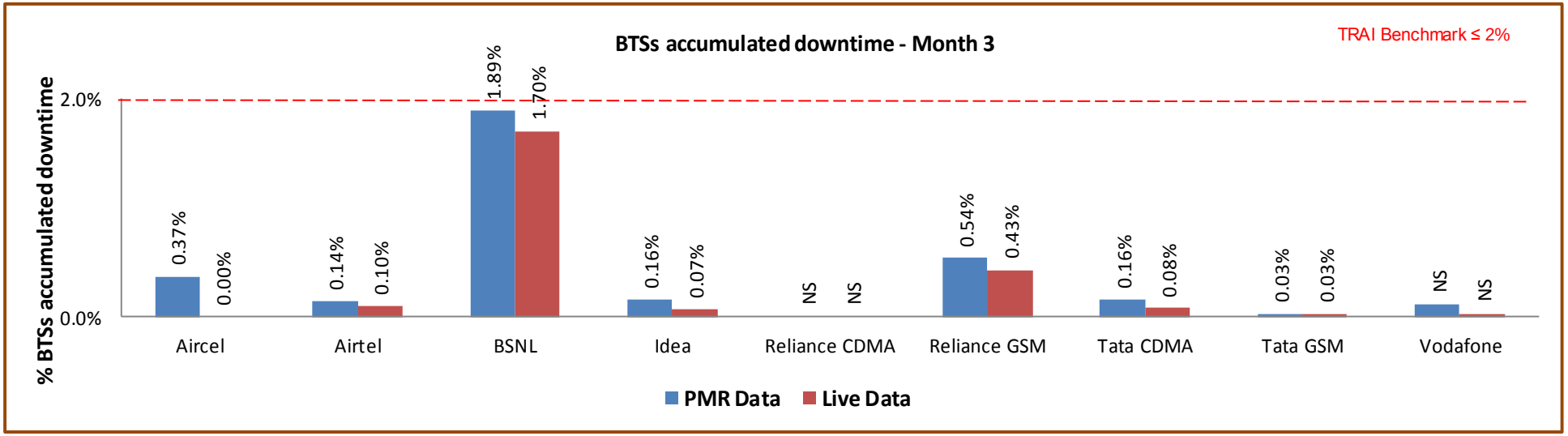
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.2 KEY FINDINGS – MONTH 2



Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.3 KEY FINDINGS – MONTH 3



Data Source: Operations and Maintenance Center (OMC) of the operators

6.2 WORST AFFECTED BTS DUE TO DOWNTIME

6.2.1 PARAMETER DESCRIPTION

- **Definition – Worst Affected BTS due to downtime** shall basically measure percentage of BTS having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.

  For measuring the parameter "Percentage of worst affected BTSs due to downtime" the downtime of each BTS lasting for more than 1 hour at a time in a day during the period of a month was considered.

- **Computation Methodology –**

  Worst affected BTSs due to downtime = (Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100

- **TRAI Benchmark –**

  a. Worst affected BTSs due to downtime ≤ 2%

- **Audit Procedure –**

  i. The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

  ii. All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

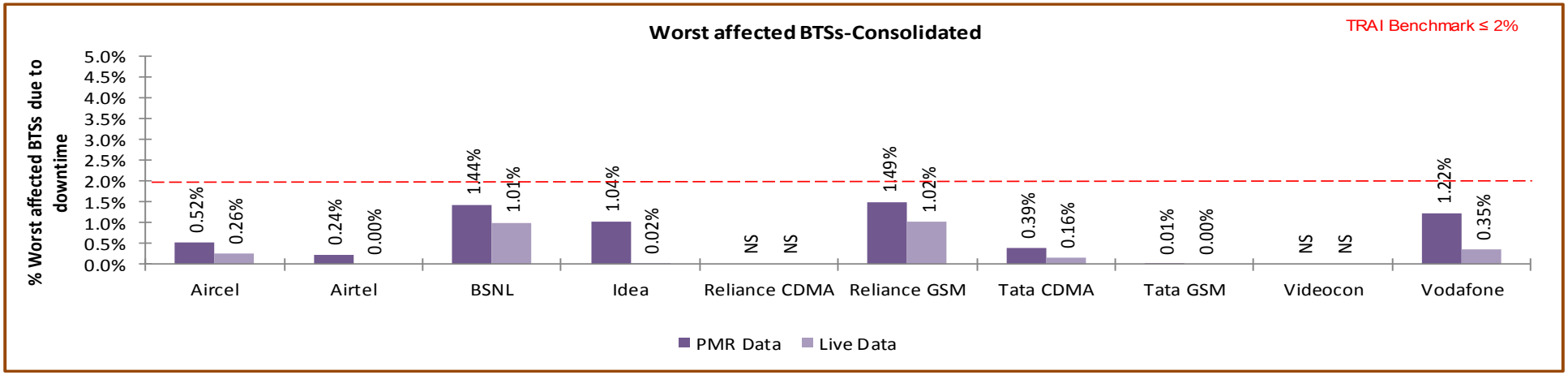
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  iv. Any outage as a result of force majeure was not considered at the time of calculation.

  v. List of operating sites with cell details and ids are taken from the operator.

  vi. All the BTS having down time greater than 24 hours is assessed and values of BTS accumulated downtime is computed in accordance.

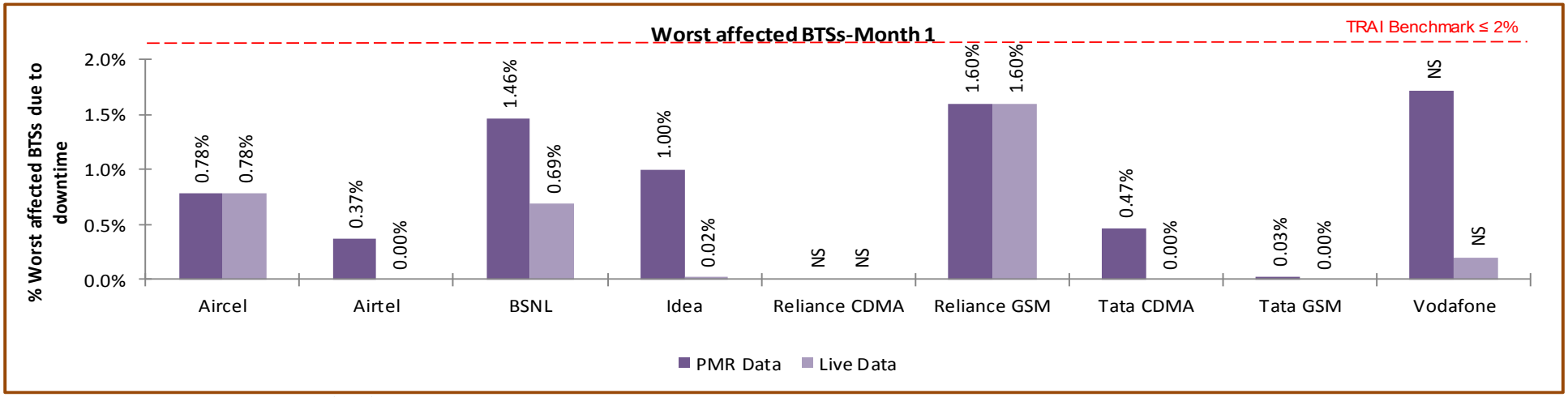
6.2.2 KEY FINDINGS – CONSOLIDATED



Data Source: Operations and Maintenance Center (OMC) of the operators

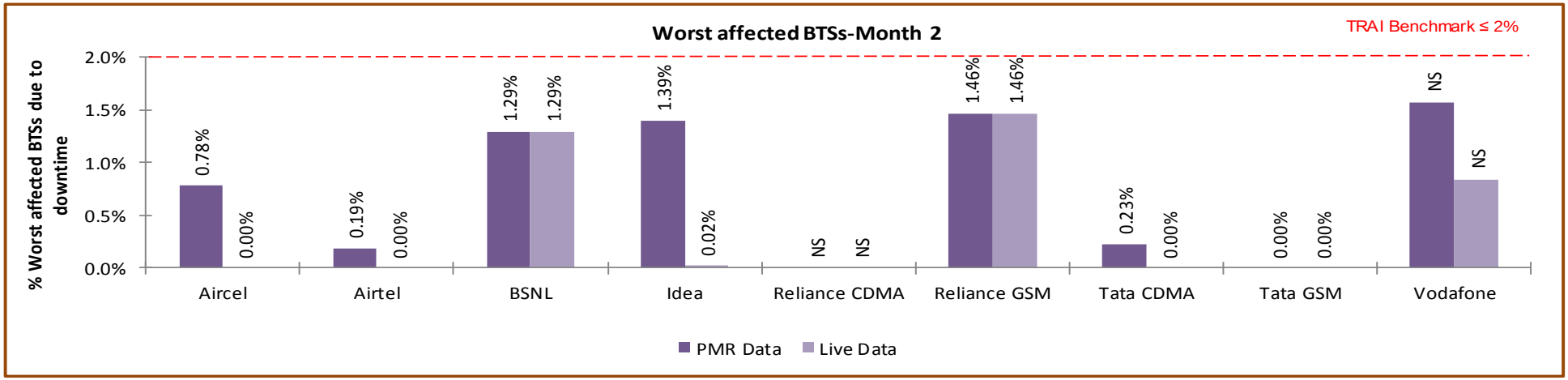
All operators met the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

6.2.2.1 KEY FINDINGS – MONTH 1



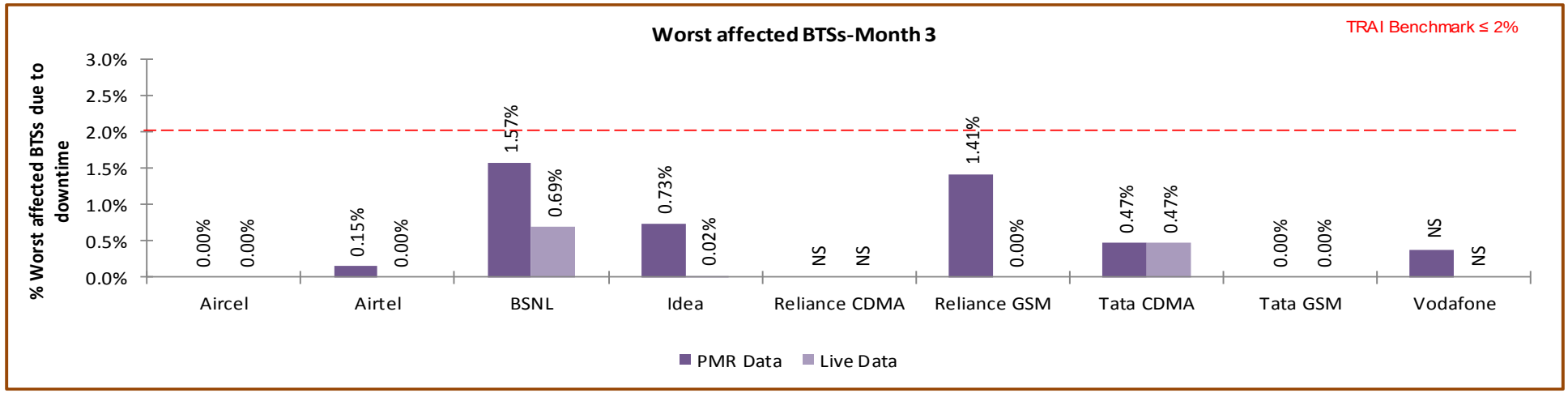
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2



Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.3 KEY FINDINGS – MONTH 3



Data Source: Operations and Maintenance Center (OMC) of the operators

6.3 CALL SET UP SUCCESS RATE

6.3.1 PARAMETER DESCRIPTION

1. **Definition:** The ratio of successful calls established to total calls is known as Call Set-Up Success Rate (CSSR).
2. **Computation Methodology-**

   (Calls Established / Total Call Attempts) * 100

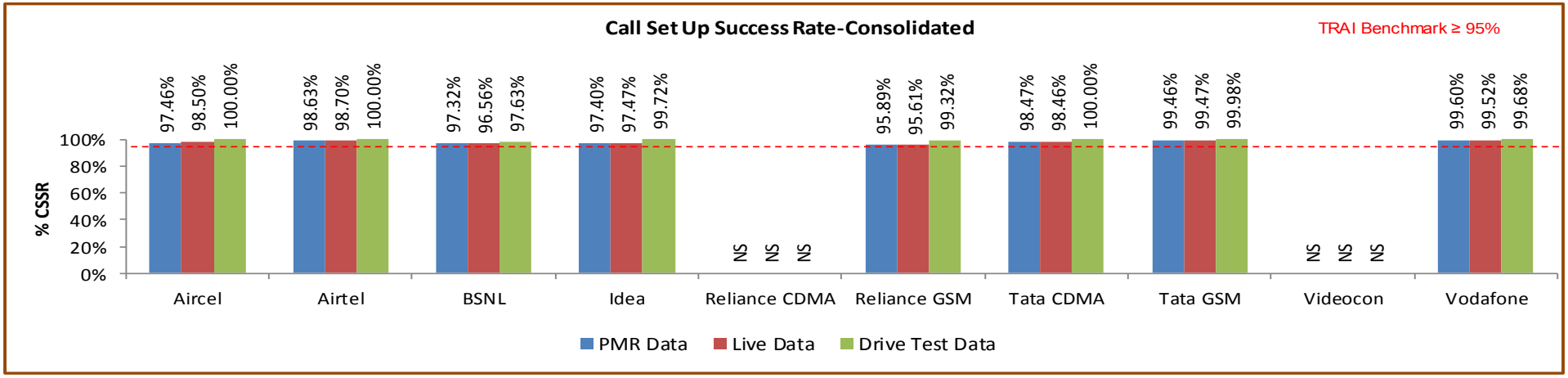
   Call Established means the following events have happened in call setup:-

   - call attempt is made
   - the TCH is allocated
   - the call is routed to the outward path of the concerned MSC

3. **TRAI Benchmark ≥** 95%
4. **Audit Procedure –**

   - The cell-wise data generated through counters/ MMC available in the switch for traffic measurements
   - CSSR calculation should be measured using OMC generated data only
   - Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
   - Counter data is extracted from the NOC of the operators.
   - Total calls established include all calls established excluding Signaling blocking, TCH Drop and TCH blocking.
   - The numerator and denominator values are derived from adding the counter values from the MSC.

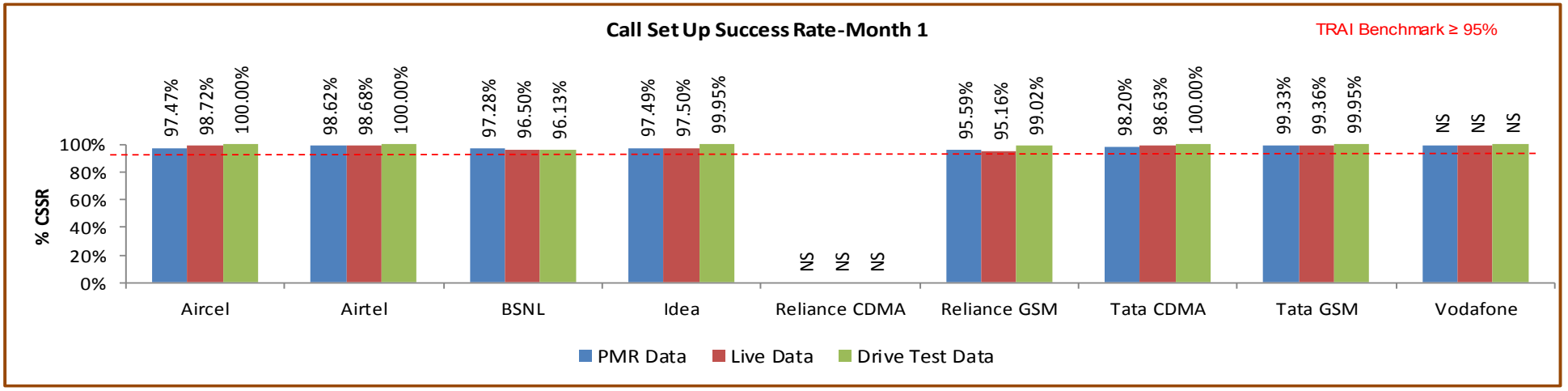
6.3.2 KEY FINDINGS - CONSOLIDATED



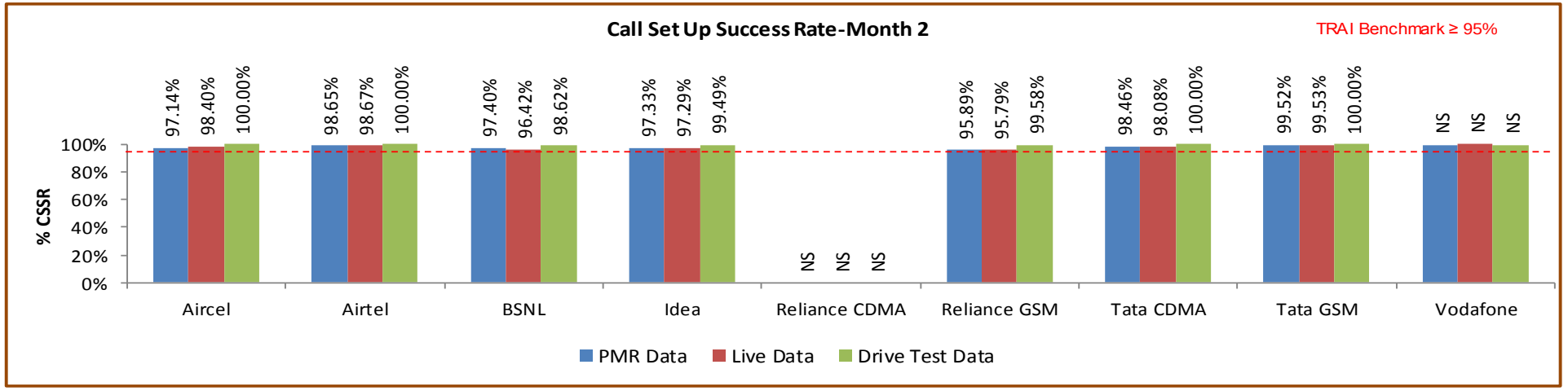
Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for both PMR and Live data.

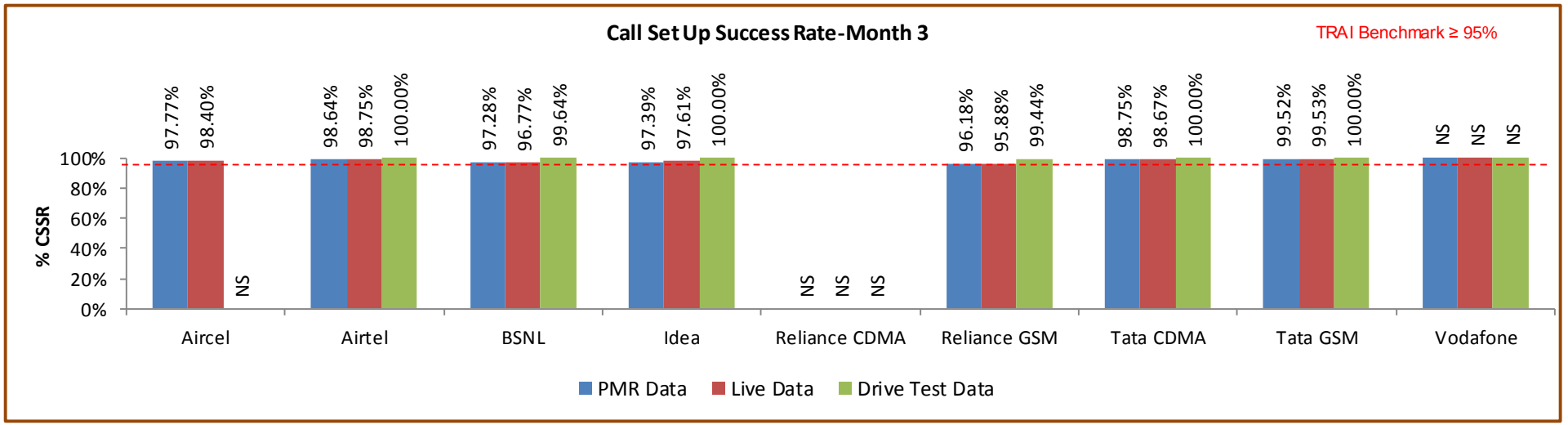
6.3.2.1 KEY FINDINGS – MONTH 1



6.3.2.2 KEY FINDINGS – MONTH 2



6.3.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

6.4 NETWORK CHANNEL CONGESTION- PAGING CHANNEL /TCH CONGESTION/POI

6.4.1 PARAMETER DESCRIPTION

1. **Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:

   - SDCCH Level: Stand-alone dedicated control channel
   - TCH Level: Traffic Channel
   - POI Level: Point of Interconnect

2. **Computational Methodology:**

   - **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - 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
     - 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
   - **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - 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

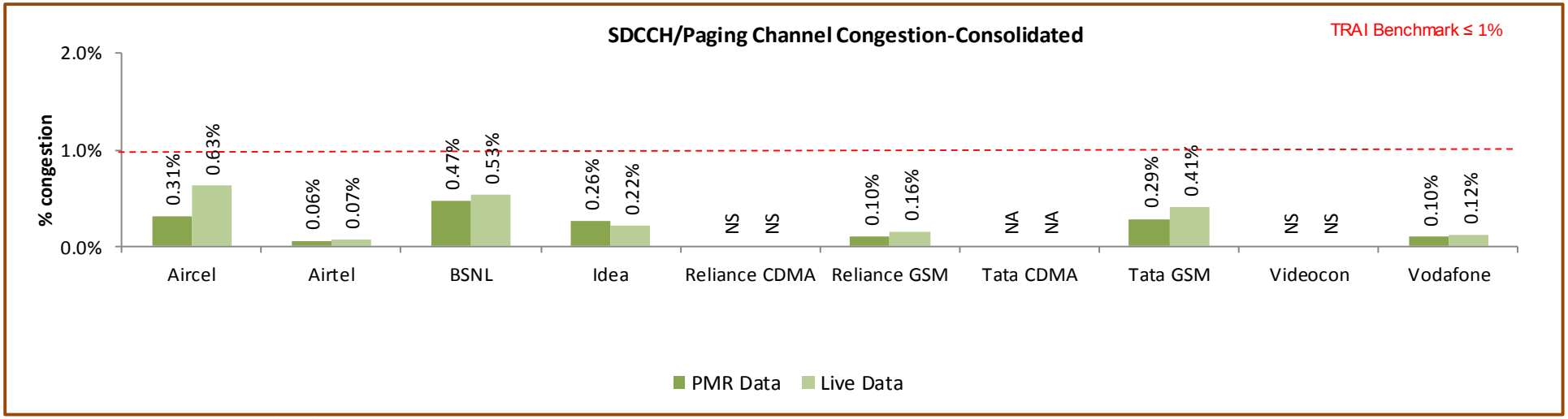
3. **Benchmark:**

   - SDCCH Congestion: ≤ 1%, TCH Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

4. **Audit Procedure –**

   - Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) would be conducted
   - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

6.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)

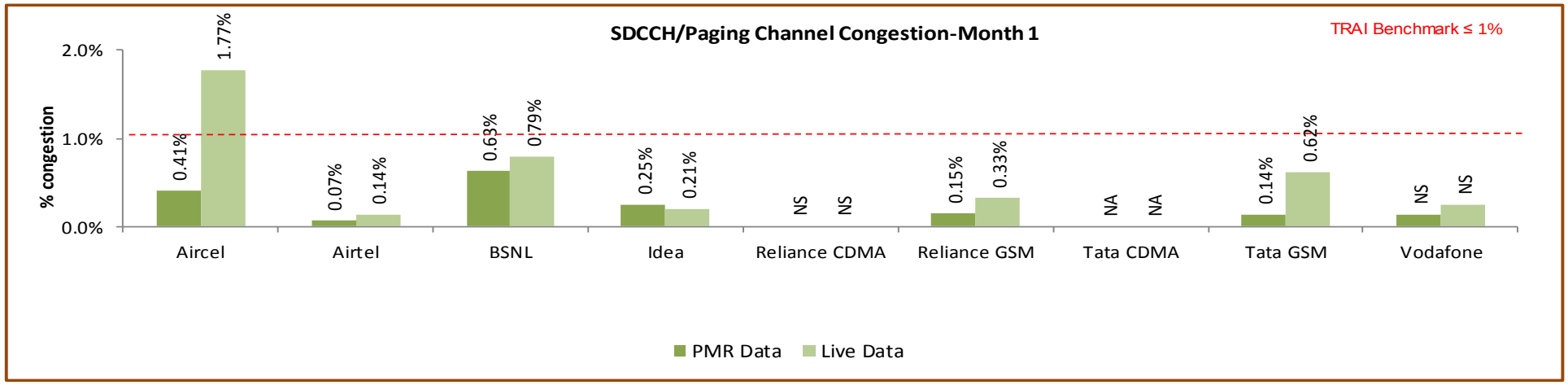


Data Source: Network Operations Center (NOC) of the operators

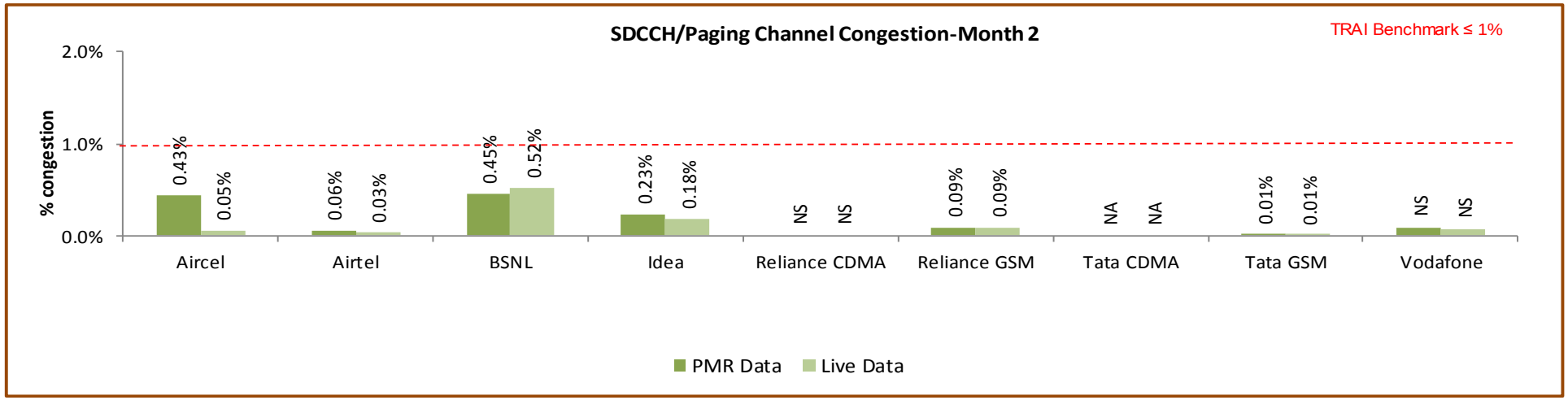
All operators met the benchmark as per PMR/audit data.

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

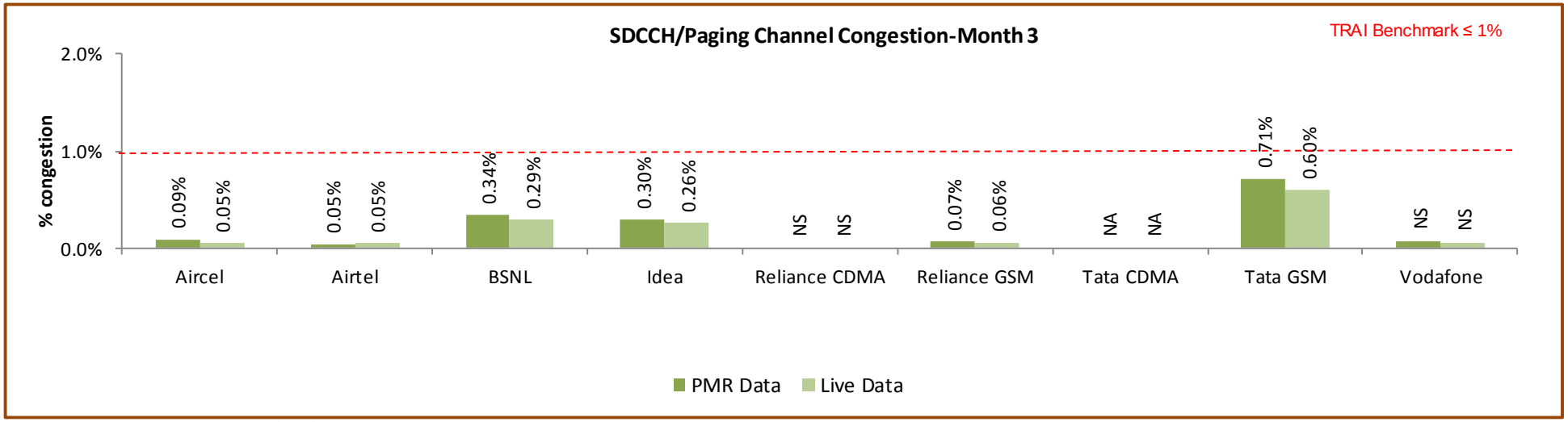
6.4.2.1 KEY FINDINGS – MONTH 1



6.4.2.2 KEY FINDINGS – MONTH 2

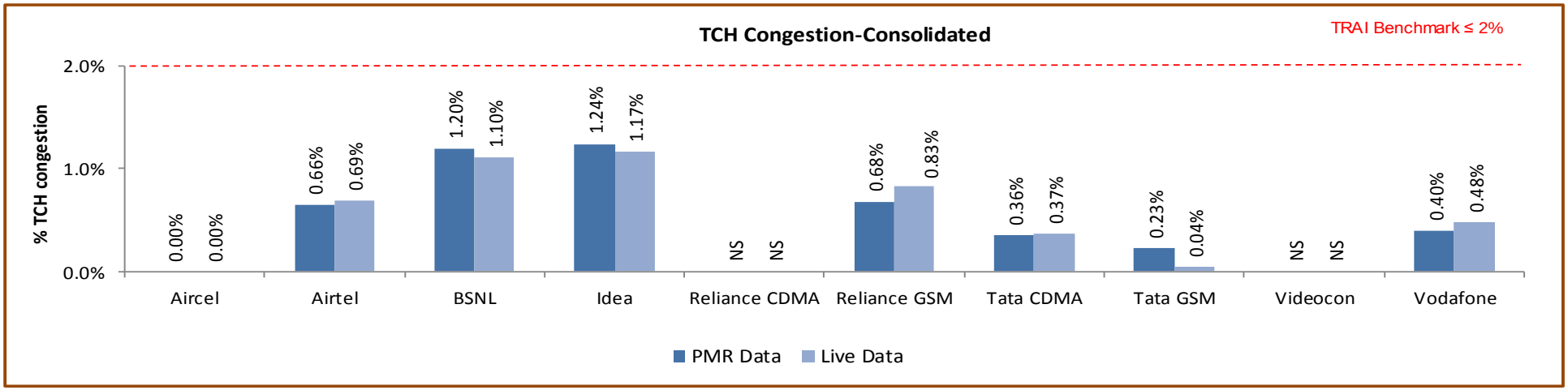


6.4.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

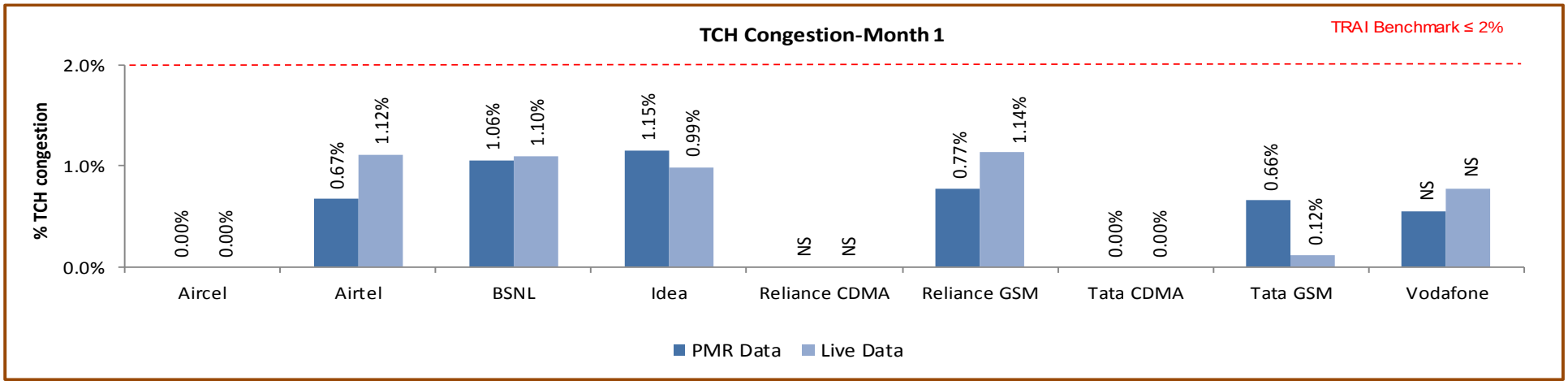
6.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)



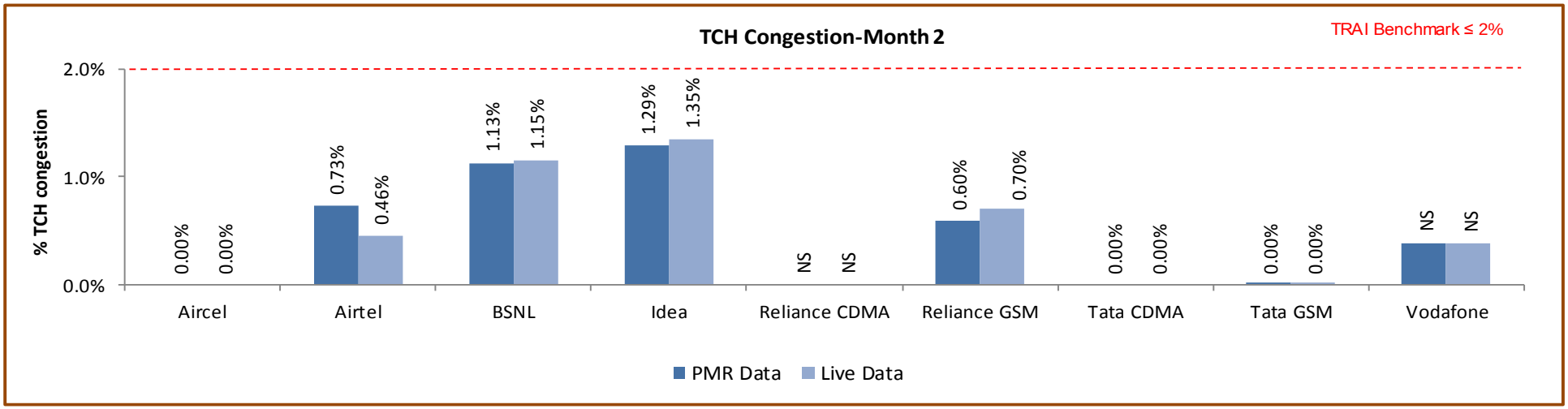
Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for both PMR and Live data.

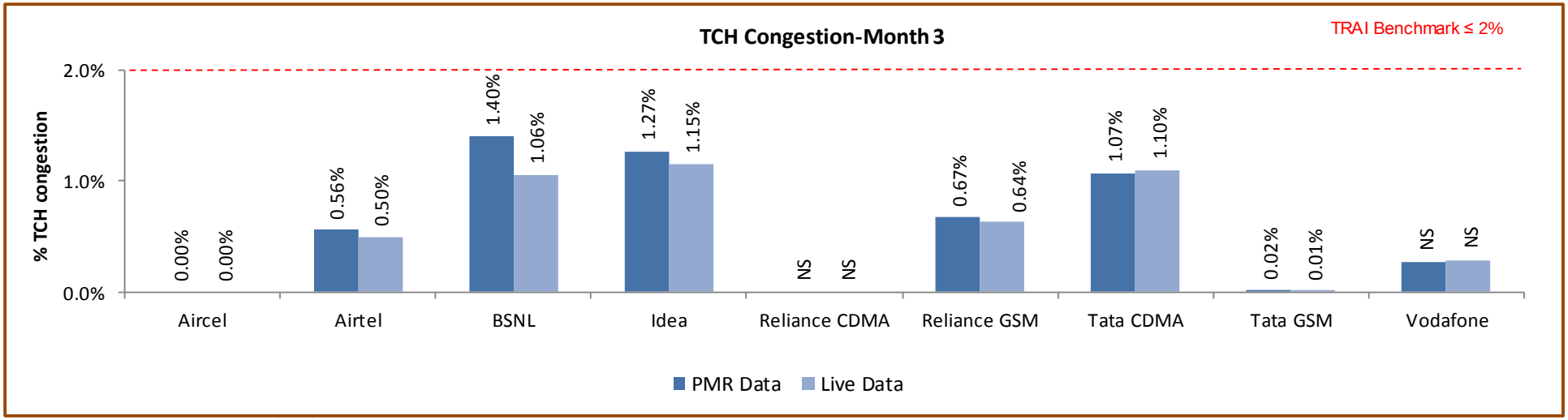
6.4.3.1 KEY FINDINGS – MONTH 1



6.4.3.2 KEY FINDINGS – MONTH 2



6.4.3.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

6.4.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED) – AVERAGE OF 3 MONTHS

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		16	92	158	269	NS	381	126	91	NS	0
No. of POIs not meeting benchmark		0	0	0	1	NS	0	0	1	NS	0
Total Capacity of all POIs (A) - in erlangs		6490	790266	573375	501414	NS	773664	84927	113940	NS	0
Traffic served for all POIs (B)- in erlangs		2	615784	94512	291512	NS	368049	40037	64046	NS	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	NS	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		16	92	128	266	NS	381	126	91	NS	0
No. of POIs not meeting benchmark		0	0	0	1	NS	0	0	1	NS	0
Total Capacity of all POIs (A) - in erlangs		6490	789454	334519	500415	NS	722736	84768	113940	NS	0
Traffic served for all POIs (B)- in erlangs		2	855445	92694	288989	NS	341227	25709	64046	NS	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	NS	0.00%

Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark of POI Congestion as per PMR/audit Data.

6.4.4.1 KEY FINDINGS – MONTH 1

5. POI Congestion										
Audit Results for POI Congestion- PMR data-July										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Vodafone**
Total number of working POIs		17	92	158	269	NS	641	54	54	0
No. of POIs not meeting benchmark		0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	261762	191125	164920	NS	499001	46288	46288	0
Traffic served for all POIs (B)- in erlangs		1	190276	31366	96381	NS	240639	27377	27377	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-July										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Vodafone**
Total number of working POIs		17	92	158	262	NS	641	54	54	0
No. of POIs not meeting benchmark		0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	261284	71852	164167	NS	448508	46130	46288	0
Traffic served for all POIs (B)- in erlangs		0	153194	29354	95161	NS	212730	13049	27377	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

6.4.4.2 KEY FINDINGS – MONTH 2

5. POI Congestion										
Audit Results for POI Congestion- PMR data-August										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Vodafone**
Total number of working POIs		16	92	158	265	NS	252	160	54	0
No. of POIs not meeting benchmark		0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		2153	263872	191125	166783	NS	135274	18672	47638	0
Traffic served for all POIs (B)- in erlangs		0	146195	31738	95480	NS	61695	8178	26741	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-August										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Vodafone**
Total number of working POIs		16	92	158	265	NS	250	160	54	0
No. of POIs not meeting benchmark		0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		2153	263460	191125	166134	NS	134494	18672	47638	0
Traffic served for all POIs (B)- in erlangs		1	146144	32475	94713	NS	62471	8178	26741	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

6.4.4.3 KEY FINDINGS – MONTH 3

5. POI Congestion										
Audit Results for POI Congestion- PMR data-September										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Vodafone**
Total number of working POIs		16	92	158	272	NS	251	164	164	0
No. of POIs not meeting benchmark		0	0	0	1	NS	0	0	1	0
Total Capacity of all POIs (A) - in erlangs		2153	264632	191125	169712	NS	139389	19967	20013	0
Traffic served for all POIs (B)- in erlangs		1	279312	31408	99651	NS	65715	4482	9928	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-September										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Vodafone**
Total number of working POIs		16	92	67	272	NS	251	164	164	0
No. of POIs not meeting benchmark		0	0	0	1	NS	0	0	1	0
Total Capacity of all POIs (A) - in erlangs		2153	264710	71542	170114	NS	139735	19967	20013	0
Traffic served for all POIs (B)- in erlangs		1	556106	30865	99115	NS	66026	4482	9928	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%

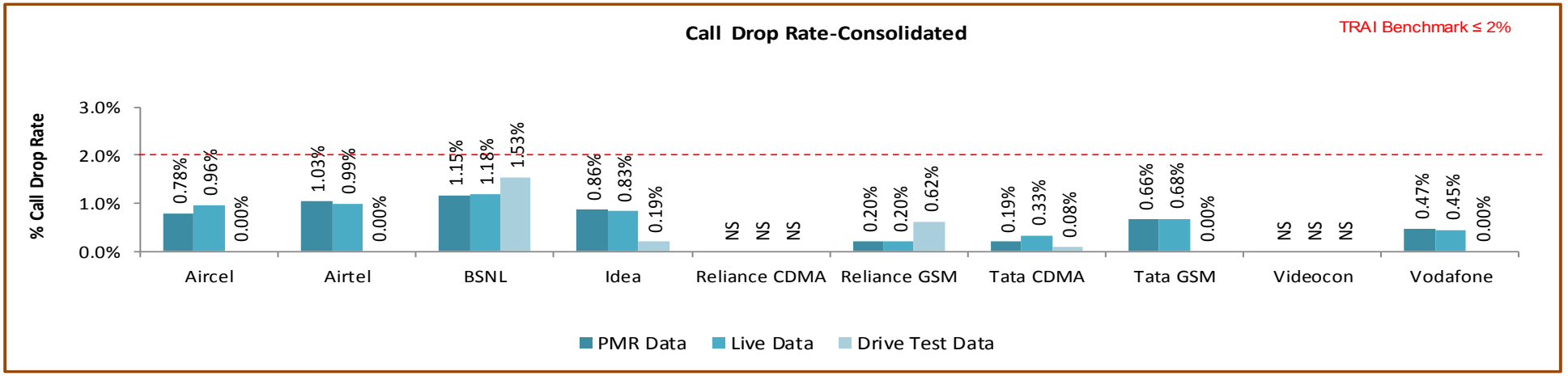
Data Source: Network Operations Center (NOC) of the operators

6.5 CALL DROP RATE

6.5.1 PARAMETER DESCRIPTION

1. **Definition -** The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released.
   - **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
   - **Total calls established** = All calls that have TCH allocation during busy hour
2. **Computational Methodology:** (**Total Calls Dropped** / **Total Calls Established) x 100**
3. **TRAI Benchmark –**
   - Call drop rate ≤ 2%
4. **Audit Procedure –**
   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used
   - The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

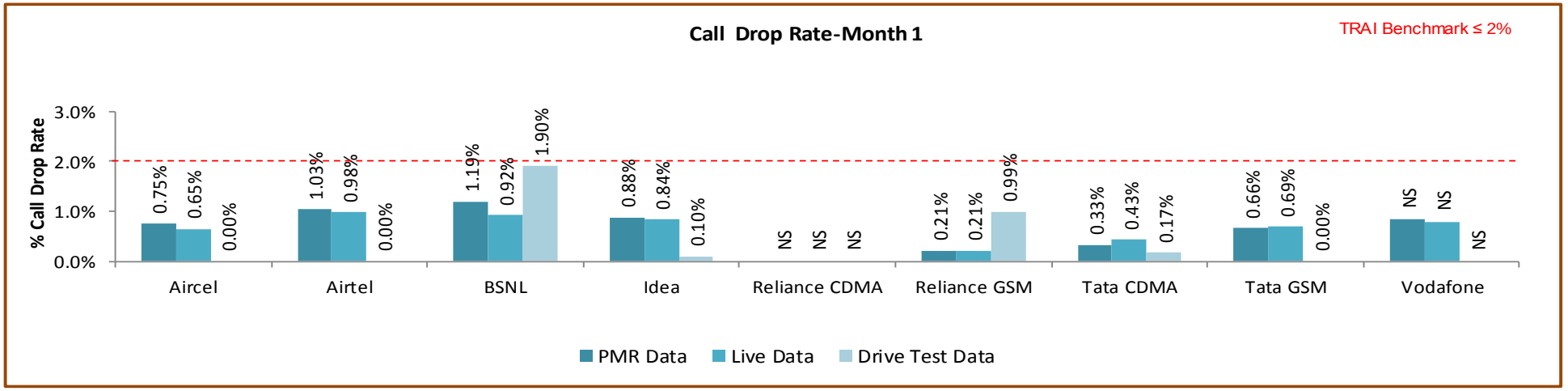
6.5.2 KEY FINDINGS - CONSOLIDATED



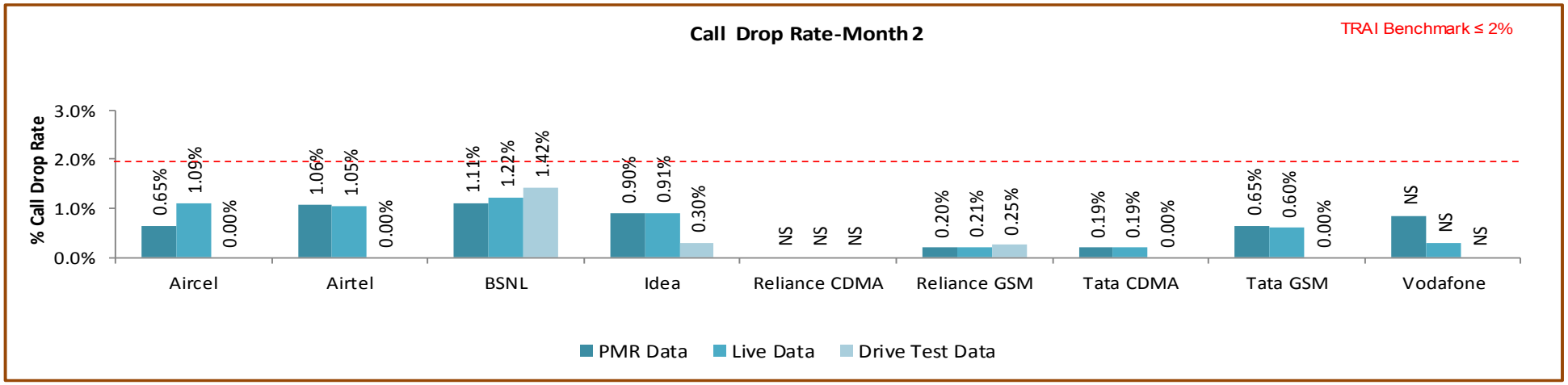
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for call drop rate during audit.

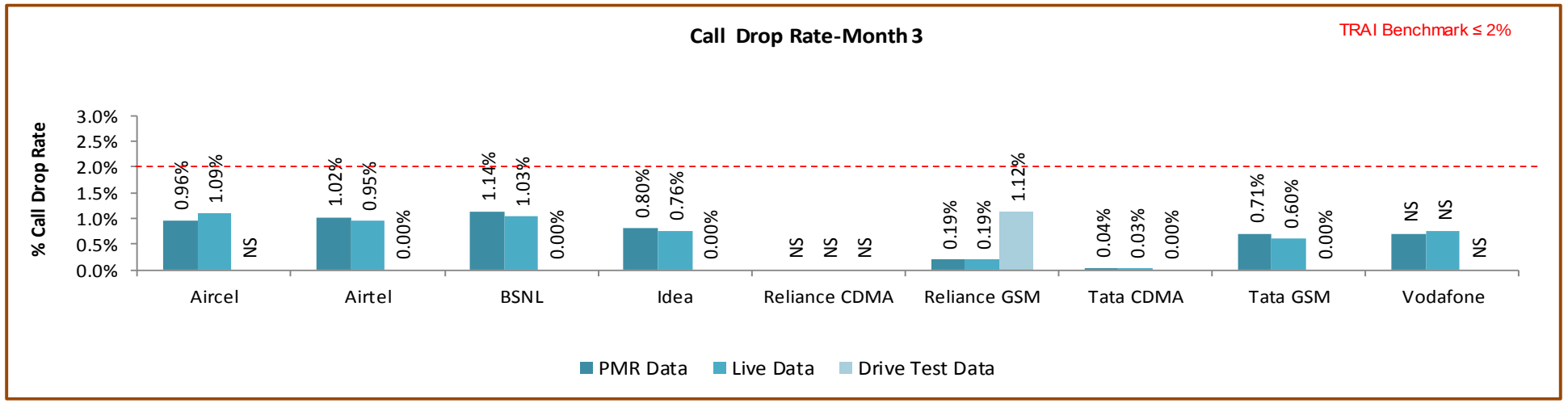
6.5.2.1 KEY FINDINGS – MONTH 1



6.5.2.2 KEY FINDINGS – MONTH 2



6.5.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

6.6 CELLS HAVING GREATER THAN 3% TCH DROP

6.6.1 PARAMETER DESCRIPTION

1. **Definition- Worst Affected Cells having more than 3% TCH drop** shall measure the ratio of total number of cells in the network to the ratio of cells having more than 3% TCH drop.

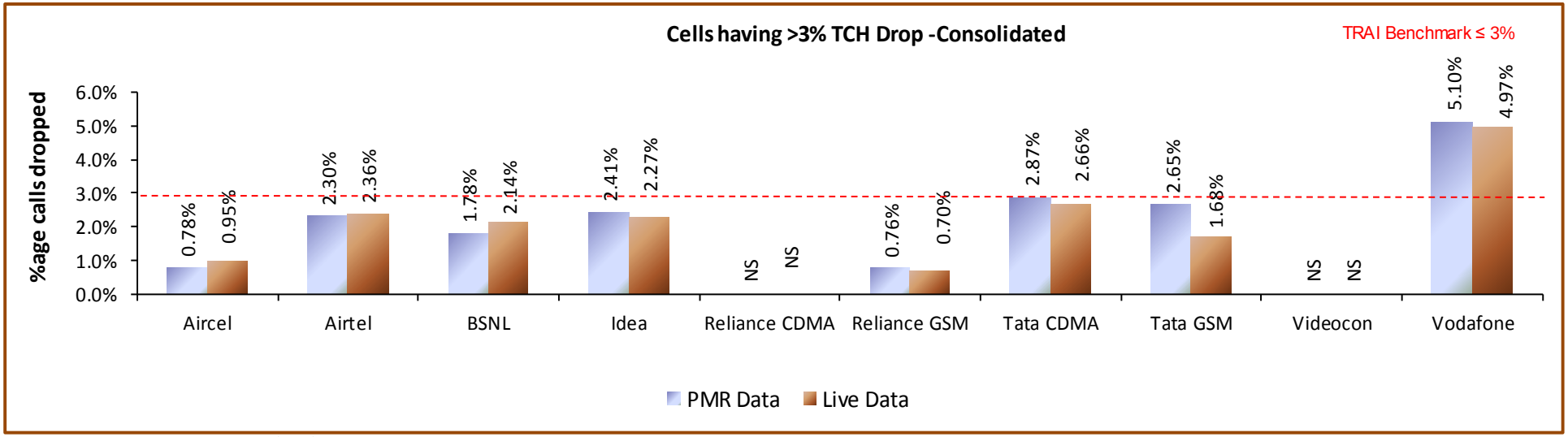
2. **Computational Methodology:** (**Total number of cells having more than 3% TCH drop during CBBH**/ **Total number of cells in the network) x 100**

3. **TRAI Benchmark** – Worst affected cells having more than 3% TCH drop rate ≤ 3%

4. **Audit Procedure** – Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

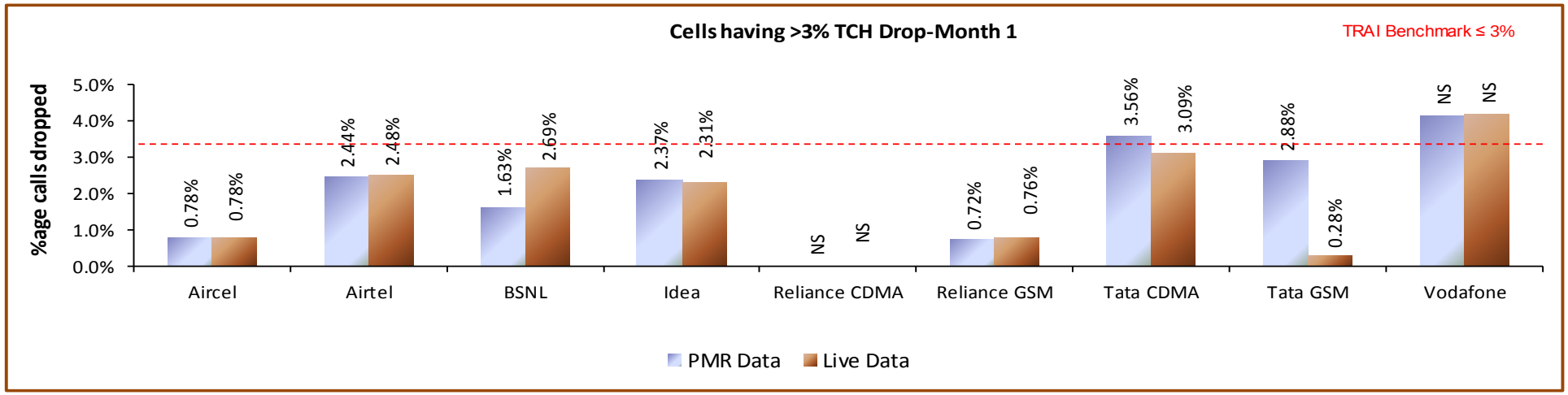
6.6.2 KEY FINDINGS - CONSOLIDATED



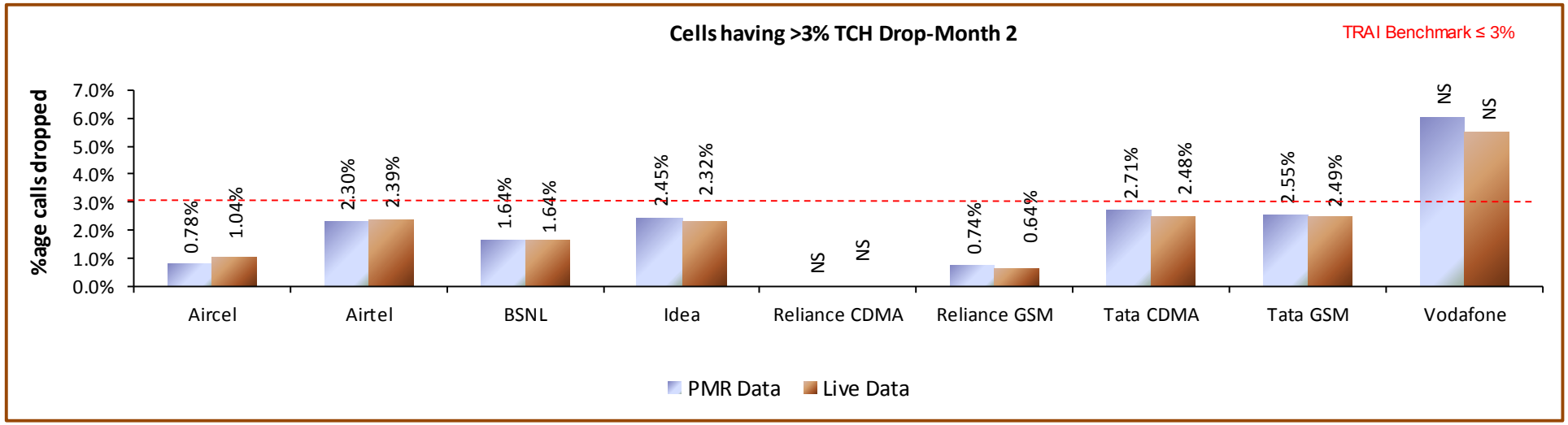
Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for both PMR and Live data. Vodafone did not meet benchmark during PMR data.

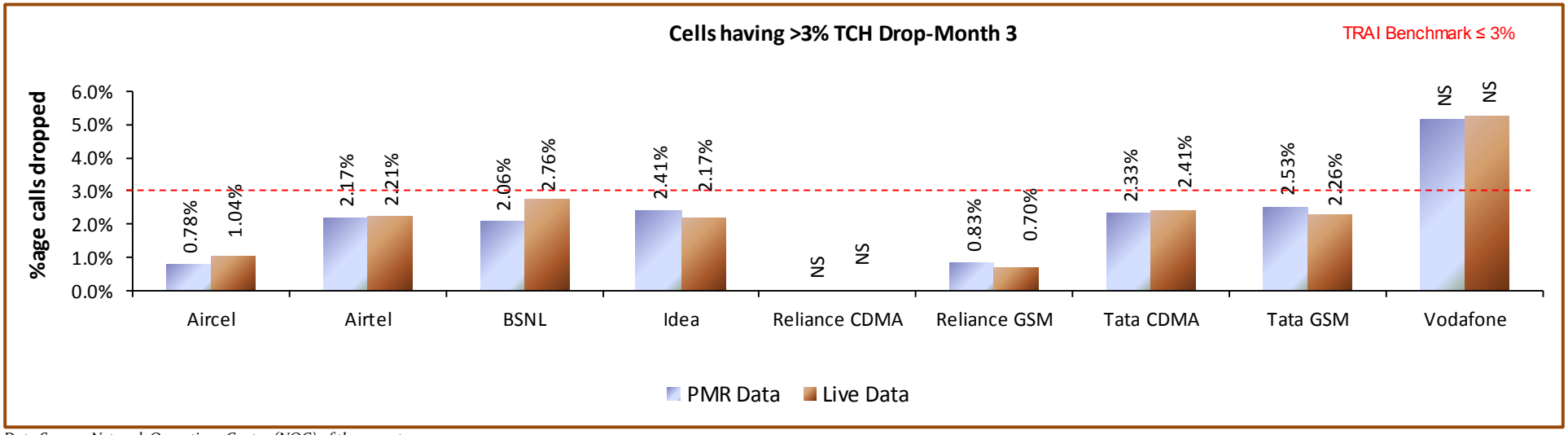
6.6.2.1 KEY FINDINGS – MONTH 1



6.6.2.2 KEY FINDINGS – MONTH 2



6.6.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

6.7 VOICE QUALITY

6.7.1 PARAMETER DESCRIPTION

1. **Definition:**

   - for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)
   - For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %

2. **Computational Methodology:**

   - **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**

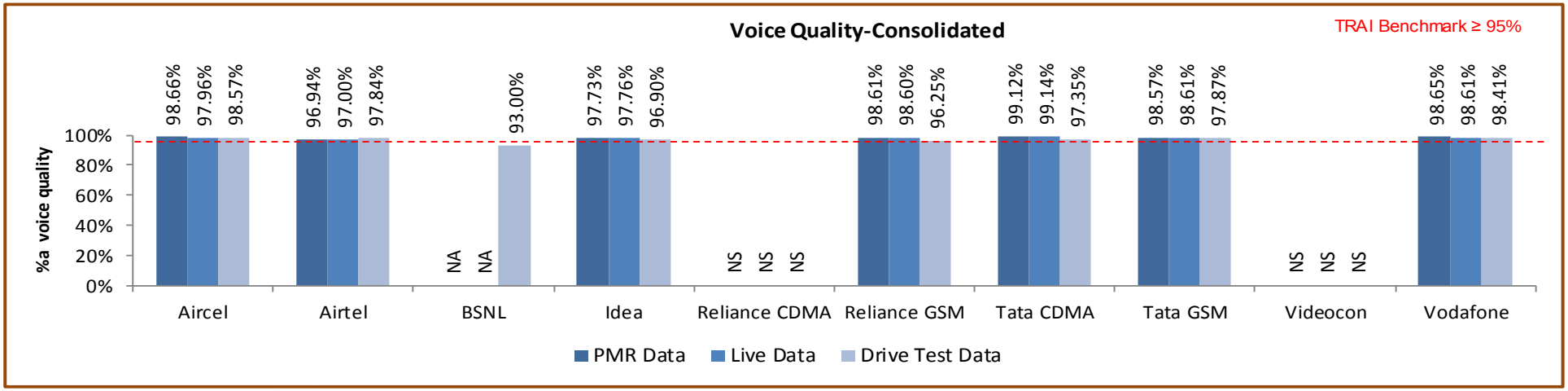
3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

   a. A sample of calls would be taken randomly from the total calls established.

   b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

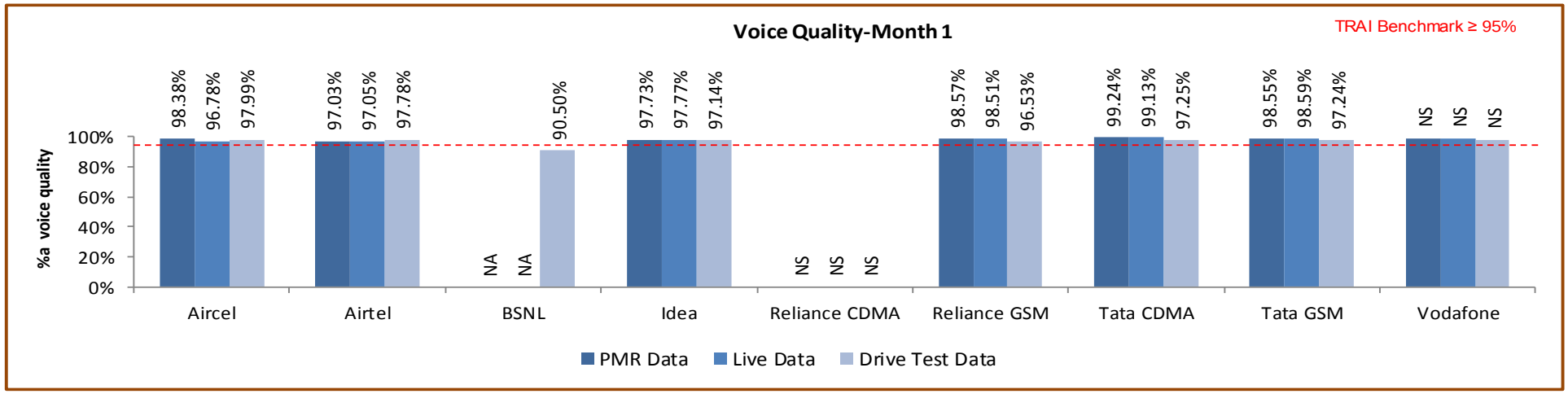
6.7.2 KEY FINDINGS



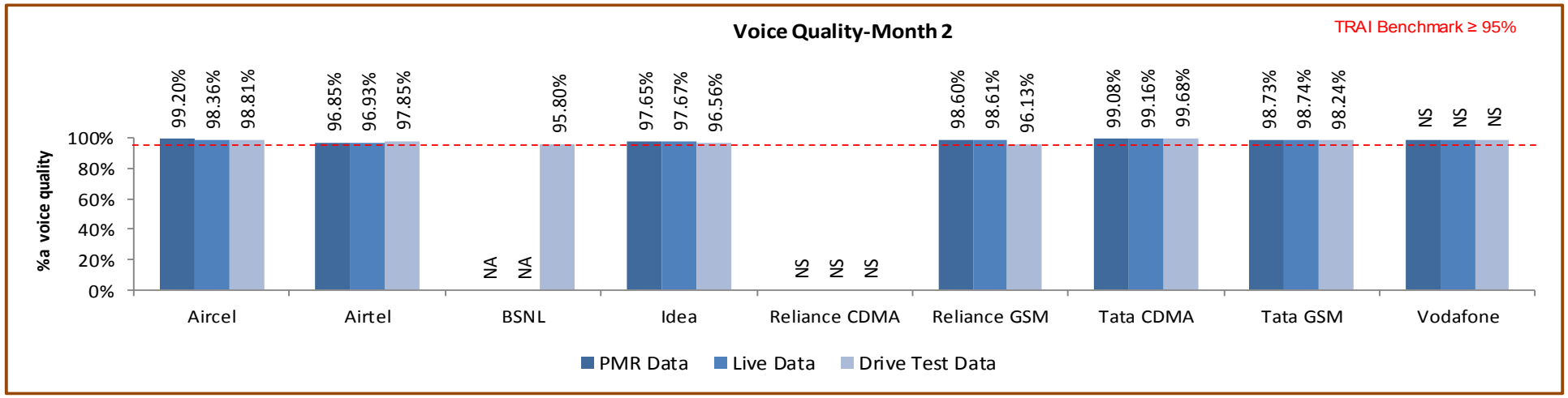
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for the parameter as per audit data. During drive test BSNL failed to meet the TRAI benchmark.

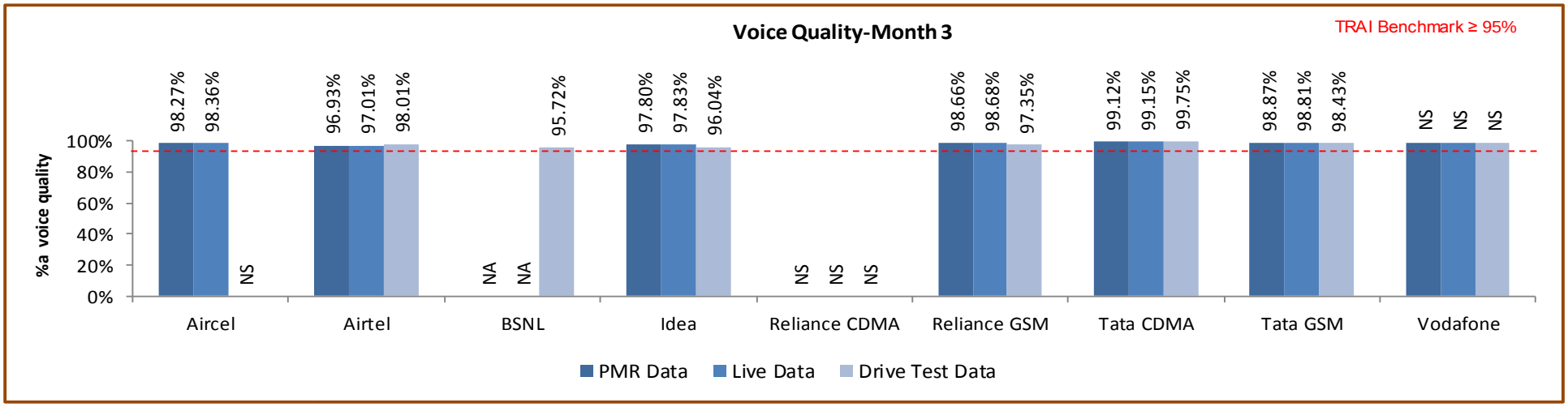
6.7.2.1 KEY FINDINGS – MONTH 1



6.7.2.2 KEY FINDINGS – MONTH 2



6.7.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

7 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 3G

7.1 NODE BS DOWNTIME

7.1.1 PARAMETER DESCRIPTION

- The parameter of network availability would be measured from following sub-parameters

  1. Node Bs downtime (not available for service)

  2. Worst affected Node Bs due to downtime

- **Definition - Node Bs downtime (not available for service):** In the case of 3G networks, instead of BTS the nomenclature is Node B. The measurement methodology for the parameter Node B Accumulated downtime (not available for service) will be similar to the existing parameter for BTSs Accumulated downtime (not available for service).

- **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.
- **Source of Data:** Network Operation Center (NOC) or a Central Server
- **Computation Methodology –**
  Node Bs downtime (not available for service) = Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100

3. TRAI Benchmark –

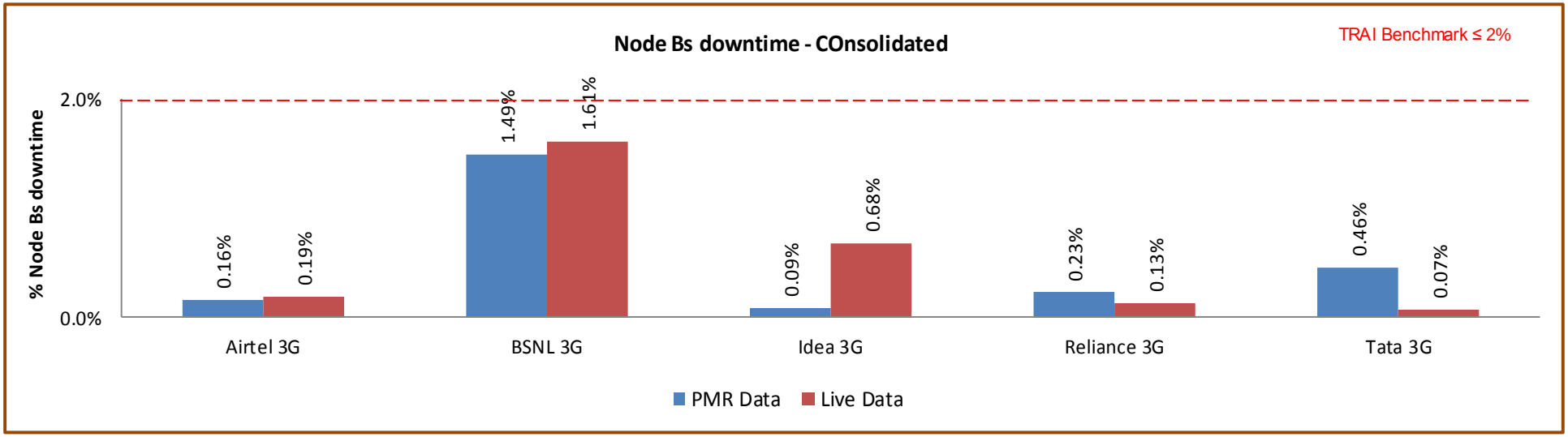
a. Node Bs downtime (not available for service) ≤ 2%

4. Audit Procedure –

- The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

- All the Node Bs in service area was considered. Planned outages due to network up gradation, routine maintenance were not considered.
- Any outage as a result of force majeure were not considered at the time of calculation
- Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
- List of operating sites with cell details and ids are taken from the operator.
    - When there is any outage a performance report gets generated in line with that cell resulting and master base of the Node Bs downtime and worst affected Node Bs due to downtime.

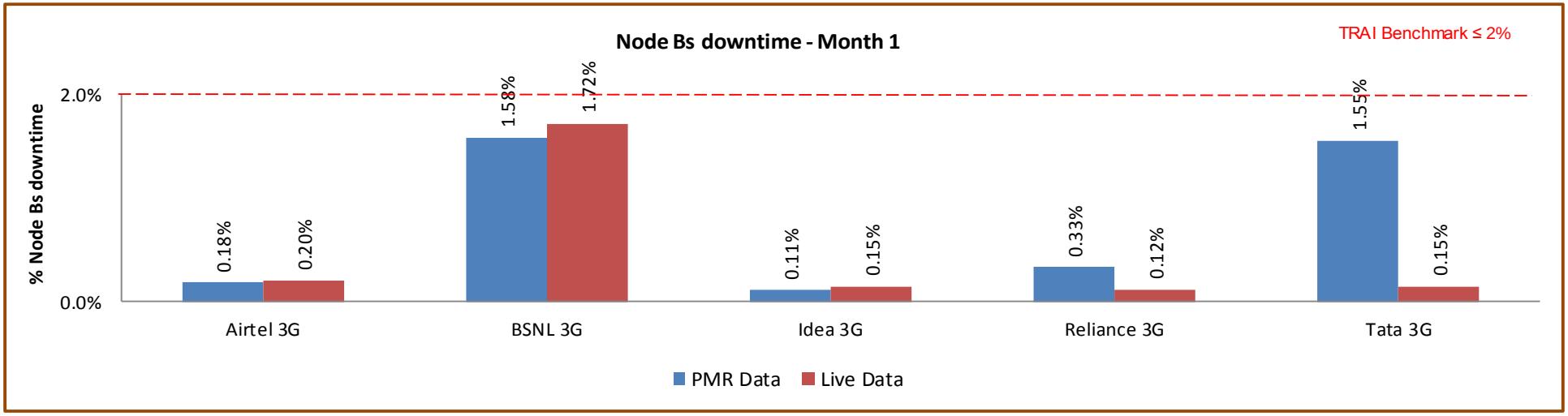
7.1.2 KEY FINDINGS - CONSOLIDATED



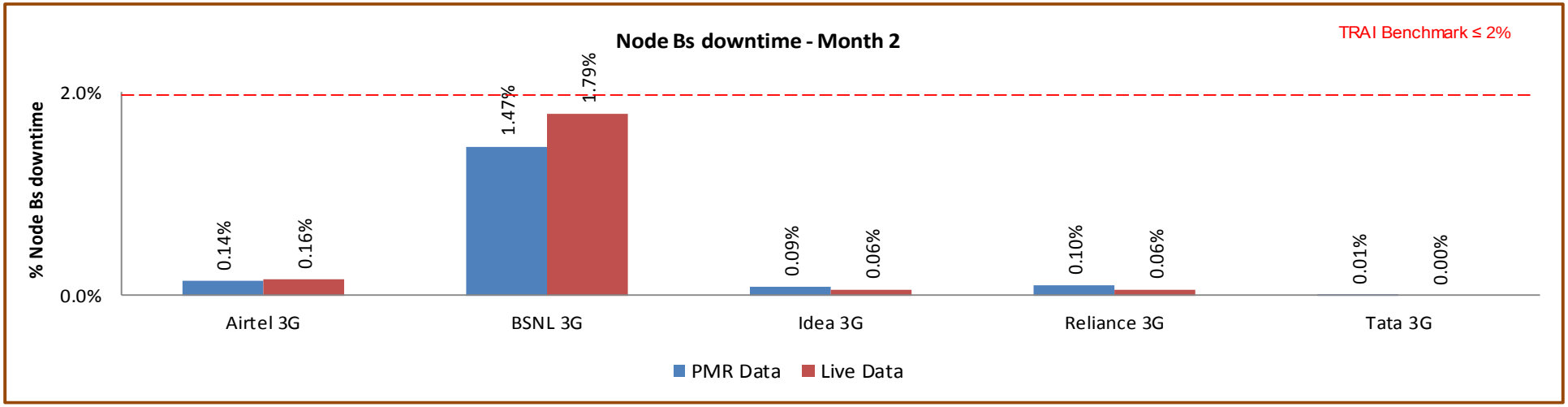
Data Source: Operations and Maintenance Center (OMC) of the operators

All the operators met the benchmark for the parameter as per PMR and Live data

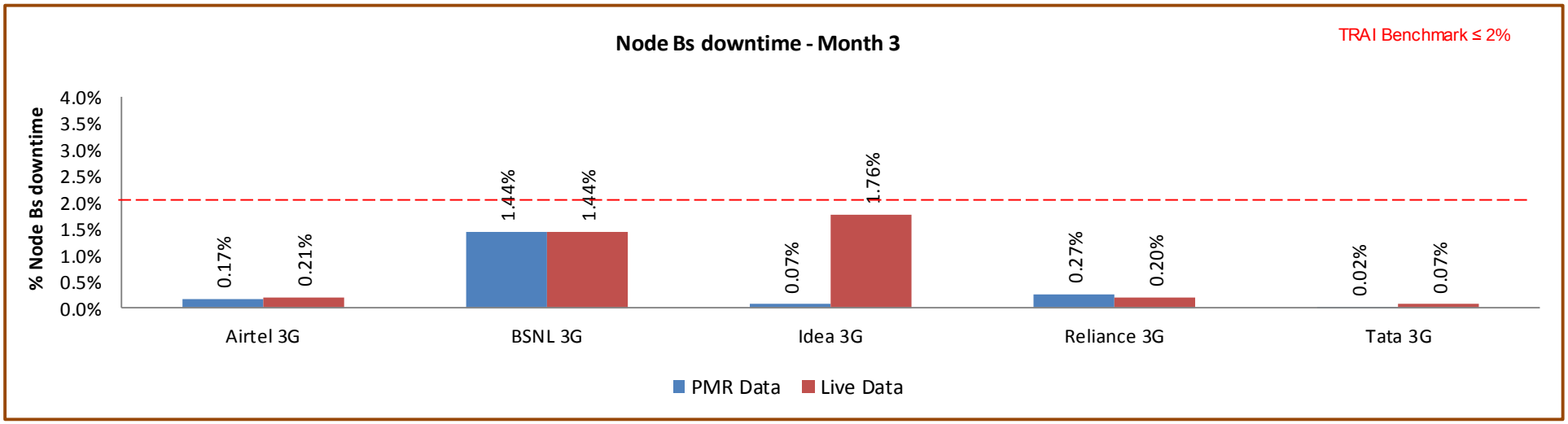
7.1.2.1 KEY FINDINGS – MONTH 1



7.1.2.2 KEY FINDINGS – MONTH 2



7.1.2.3 KEY FINDINGS – MONTH 3



Data Source: Operations and Maintenance Center (OMC) of the operators

7.2 WORST AFFECTED NODE BS DUE TO DOWNTIME

7.2.1 PARAMETER DESCRIPTION

- **Definition – Worst Affected Node Bs due to downtime** shall basically measure percentage of Node Bs having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.
  For measuring the parameter "Percentage of worst affected Node Bs due to downtime" the downtime of each Node B lasting for more than 1 hour at a time in a day during the period of a month was considered.

- **Computation Methodology – Worst affected Node Bs due to downtime = (Number of Node Bs having accumulated downtime greater than 24 hours in a month / Number of Node Bs in Licensed Service Area) * 100**

- **TRAI Benchmark –**

  b. Worst affected Node Bss due to downtime ≤ 2%

- **Audit Procedure –**

  i. The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited

  ii. All the Node Bs in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

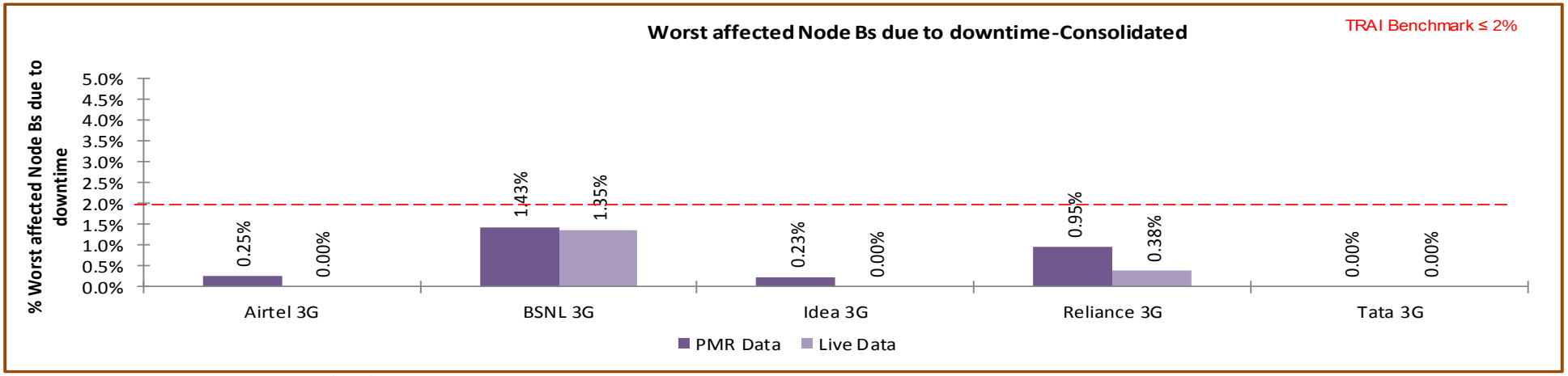
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  iv. Any outage as a result of force majeure was not considered at the time of calculation.

  v. List of operating sites with cell details and ids are taken from the operator.

  vi. All the Node Bs having down time greater than 24 hours is assessed and values of Node Bs accumulated downtime is computed in accordance.

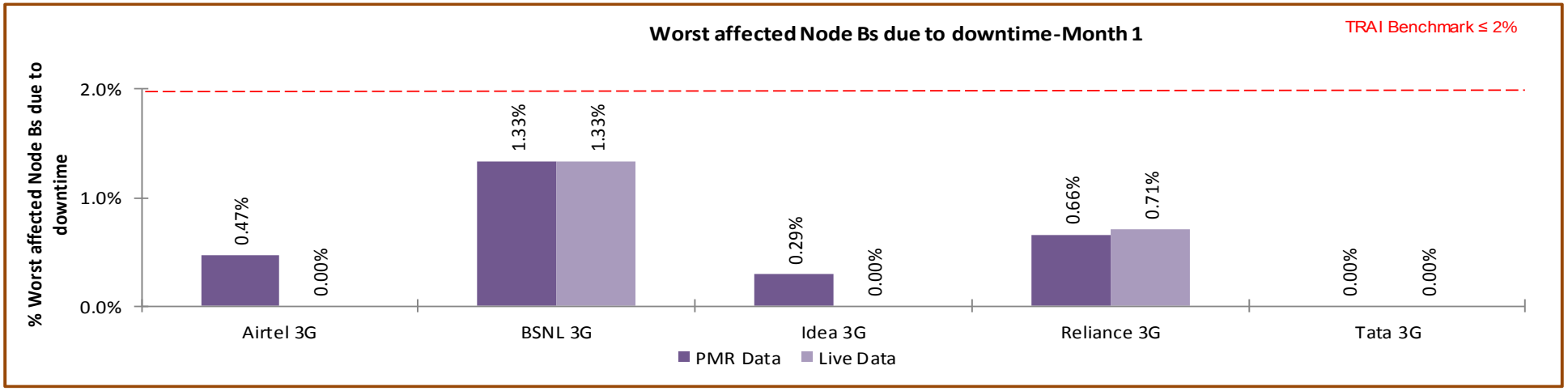
7.2.2 KEY FINDINGS – CONSOLIDATED



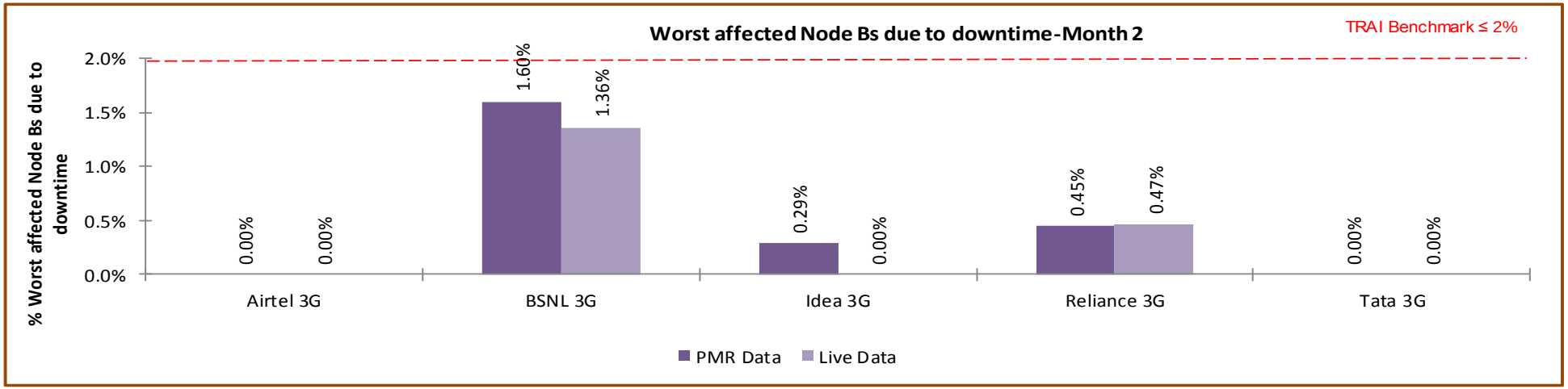
Data Source: Operations and Maintenance Center (OMC) of the operators

All the operators met the benchmark for both PMR and Live data

7.2.2.1 KEY FINDINGS – MONTH 1

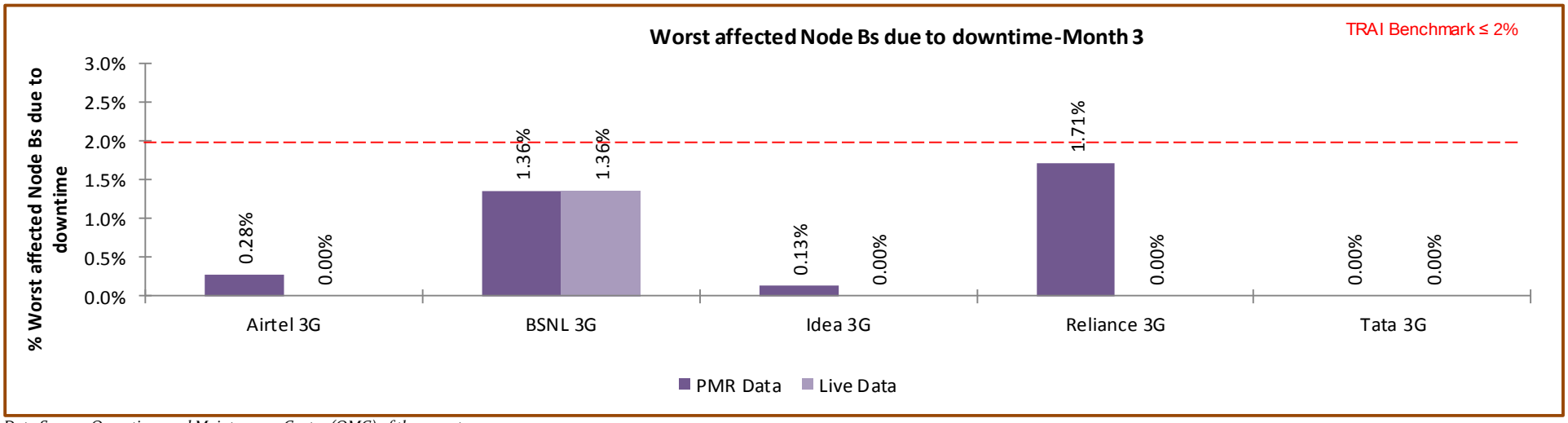


7.2.2.2 KEY FINDINGS – MONTH 2



Data Source: Operations and Maintenance Center (OMC) of the operators

7.2.2.3 KEY FINDINGS – MONTH 3



Data Source: Operations and Maintenance Center (OMC) of the operators

7.3 CALL SET UP SUCCESS RATE

7.3.1 PARAMETER DESCRIPTION

1. **Definition:** This parameter is same for 2G Networks as well as 3G Networks. However, the network elements involved in both the networks are different. Call Set-up Success Rate is defined as the ratio of Established Calls to Call Attempts. For establishing a call in 3G Networks, User Equipment (UE) accesses the Universal Terrestrial Radio Access Network (UTRAN) and establishes an RRC connection. Once RRC connection is established the Non Access Stratum (NAS) messages are exchanged between the UE and the Core Network (CN). The last step of the call setup is the establishment of a Radio Access Bearer (RAB) between the CN and the UE. However, any RAB abnormal release after RAB Assignment Response or Alerting/Connect message is to be considered as a dropped call.

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computation Methodology-**
   (RRC Established / Total RRC Attempts) * 100

   RRC Established means the following events have happened in RRC setup:-

   - RRC attempt is made
   - The RRC established
   - The RRC is routed to the outward path of the concerned MSC

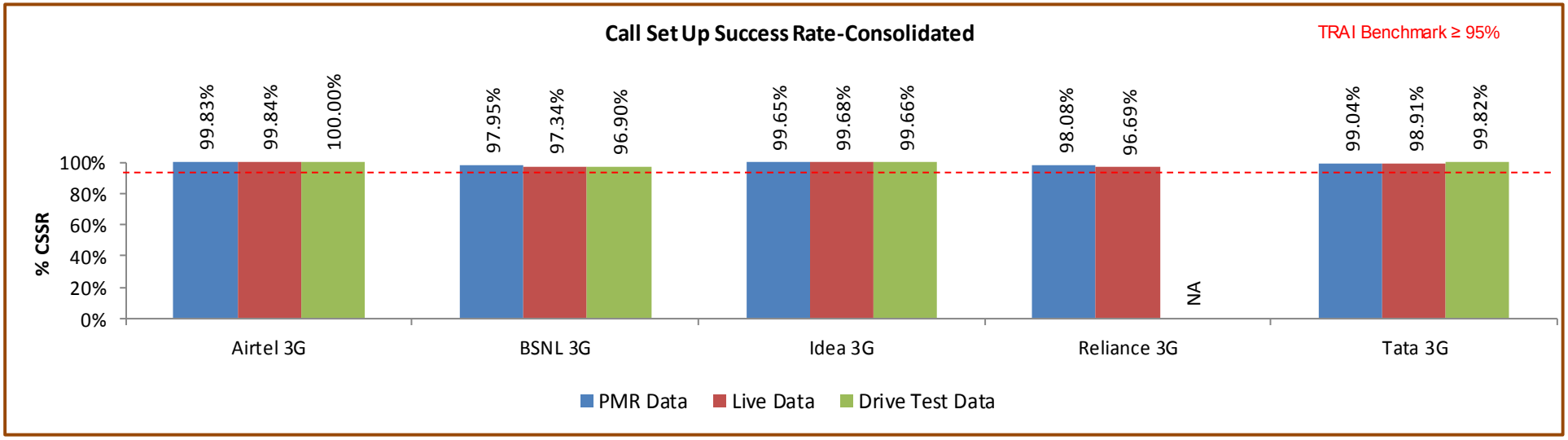
5. **TRAI Benchmark ≥** 95%

6. **Audit Procedure –**

   - The cell-wise data generated through counters/ MMC available in the switch for traffic measurements

- CSSR calculation should be measured using OMC generated data only
- Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
- Counter data is extracted from the NOC of the operators.
- Total calls established include all calls established excluding RAB congestion.
  - The numerator and denominator values are derived from adding the counter values from the MSC.

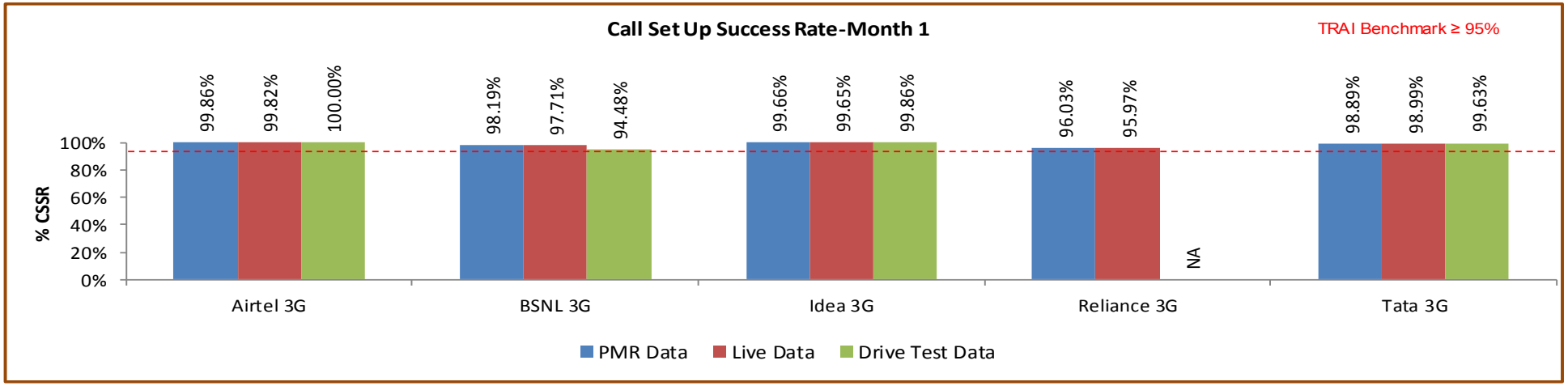
7.3.2 KEY FINDINGS - CONSOLIDATED



Data Source: Network Operations Center (NOC) of the operators

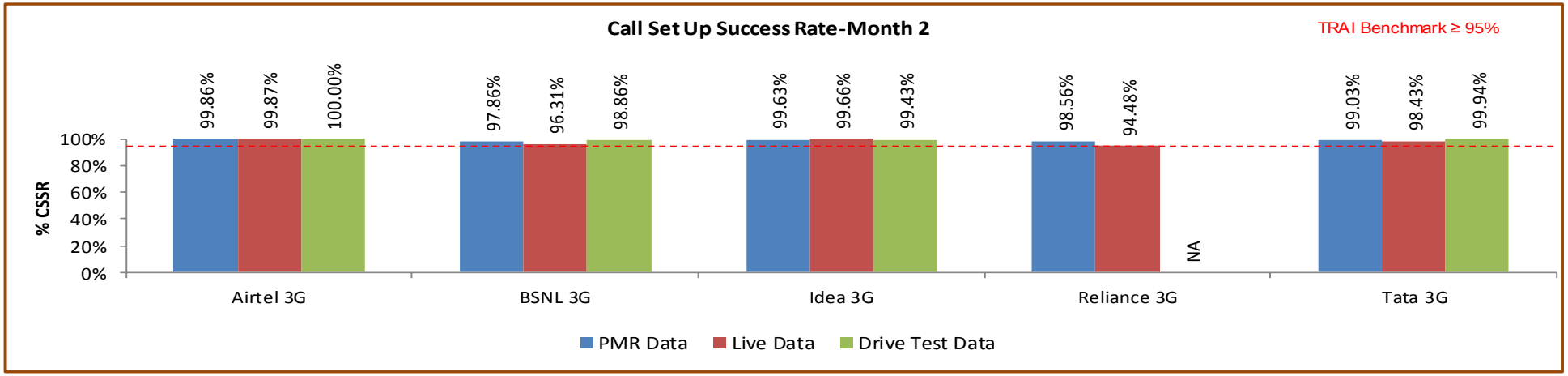
All the operators met the benchmark for the parameter as per PMR and Live data.

7.3.2.1 KEY FINDINGS – MONTH 1

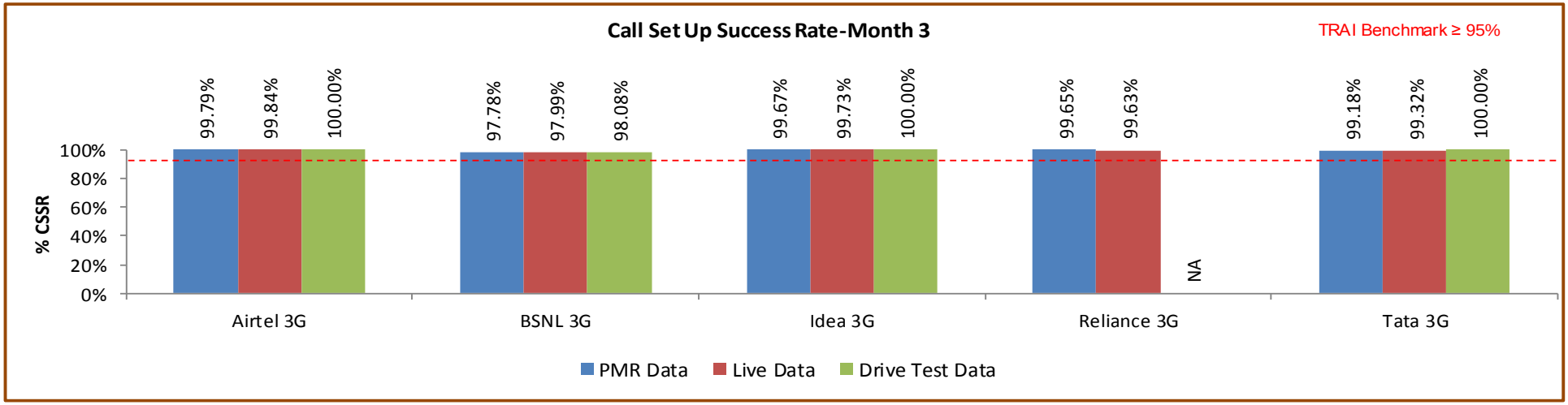


All the operators met the benchmark for PMR, Live data and Drive test.

7.3.2.2 KEY FINDINGS – MONTH 2



7.3.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

7.4 NETWORK CHANNEL CONGESTION- RRC CONGESTION/ CIRCUIT SWITCHED RAB CONGESTION

7.4.1 PARAMETER DESCRIPTION

1. **Definition (RRC Congestion):** This parameter has been amended to include RRC Congestion in 3G Networks.
2. **Definition (Circuit Switched RAB congestion):** Circuit Switched RAB congestion is similar to Traffic Channel Congestion. Therefore, the existing parameter has been amended to include RAB congestion in 3G Networks.
3. **Point of Interconnection (POI) Congestion:** This parameter denotes congestion at the outgoing traffic between two networks and is equally applicable for 2G networks and 3G networks.
    - RRC Level: Stand-alone dedicated control channel
    - RAB Level: Traffic Channel
    - POI Level: Point of Interconnect
4. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.
5. **Source of Data:** Network Operation Center (NOC) or a Central Server
6. **Computational Methodology:**
    - **RRC / RAB Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
        - Where:-A1 = Number of attempts to establish RRC/ RAB made on day 1
        - C1 = Average RRC / RAB Congestion % on day 1
        - A2 = Number of attempts to establish RRC / RAB made on day 2
        - C2 = Average RRC / RAB Congestion % on day 2
        - An = Number of attempts to establish RRC / RAB made on day n
        - Cn = Average RRC / RAB Congestion % on day n

- **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
    - 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

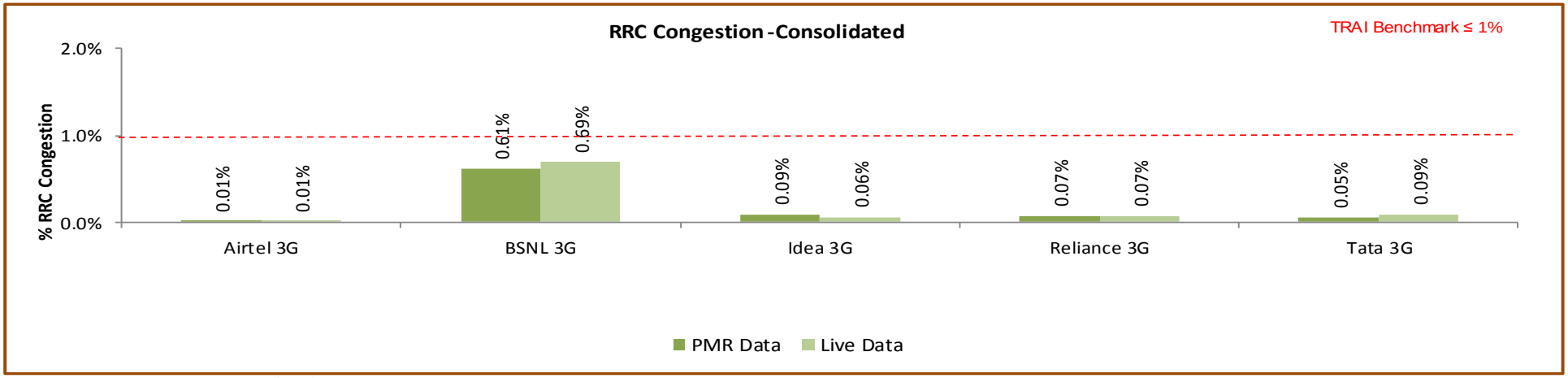
7. Benchmark:

- RRC Congestion: ≤ 1%, RAB Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

8. Audit Procedure –

- Audit of the details of RRC and RAB congestion percentages computed by the operator (using OMC–Switch data only) would be conducted
    - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only RRC

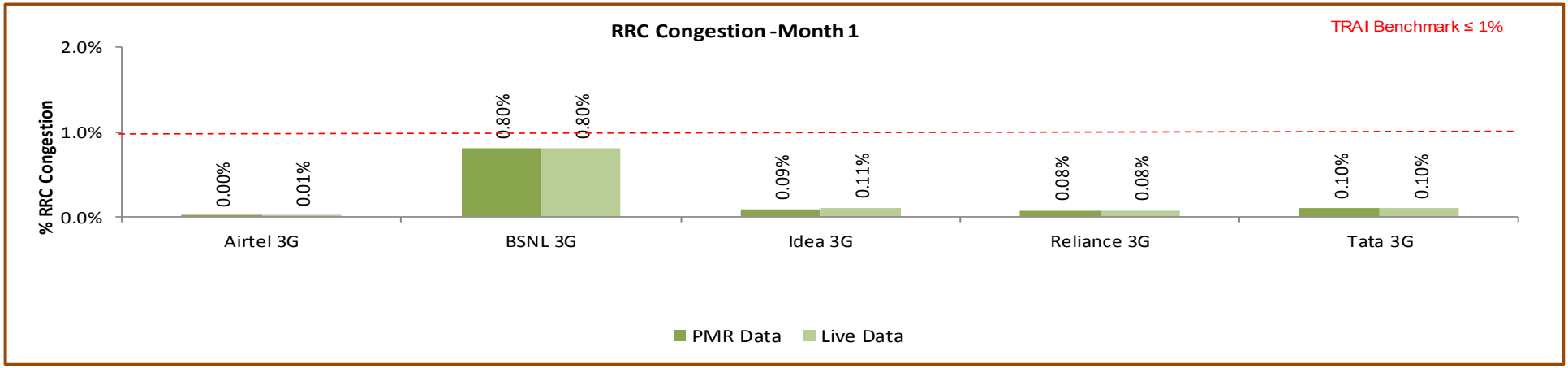
7.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



Data Source: Network Operations Center (NOC) of the operators

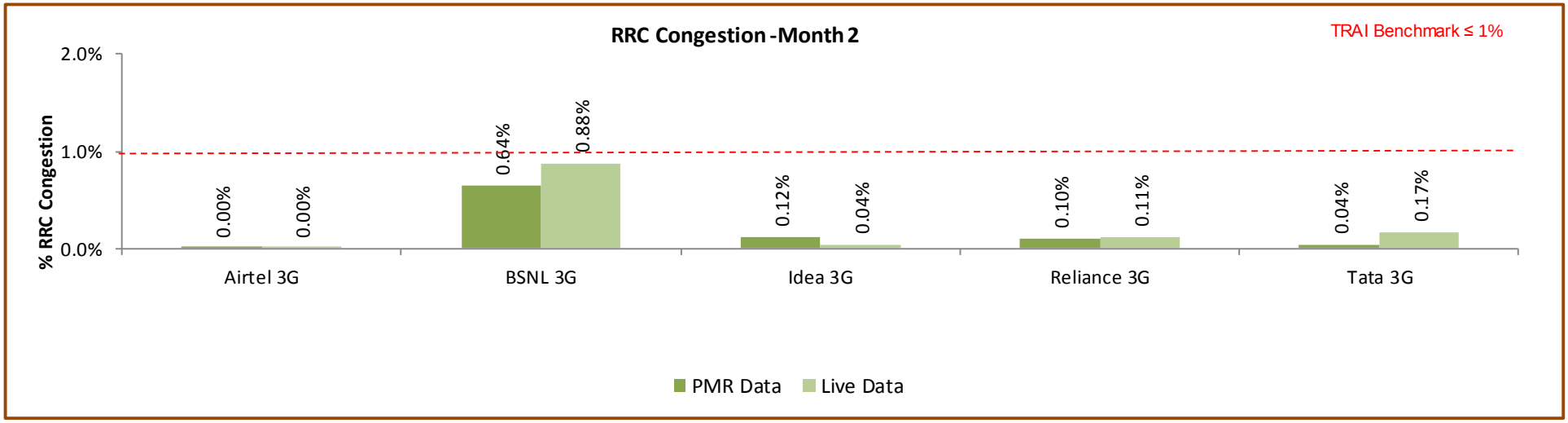
All the operators met the benchmark for the parameter as per PMR and Live data.

7.4.2.1 KEY FINDINGS – MONTH 1

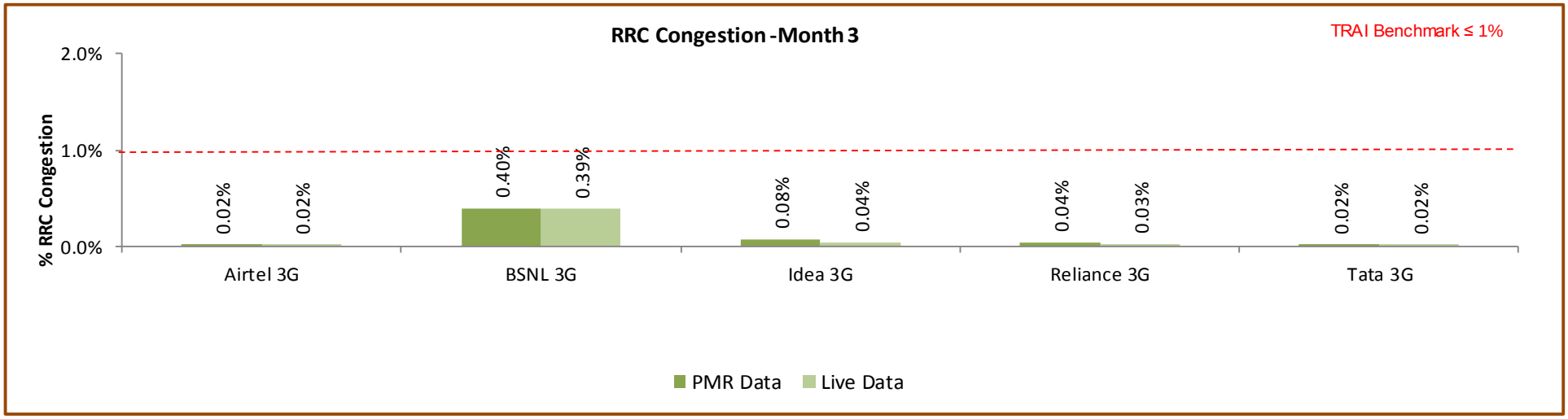


Data Source: Network Operations Center (NOC) of the operators

7.4.2.2 KEY FINDINGS – MONTH 2

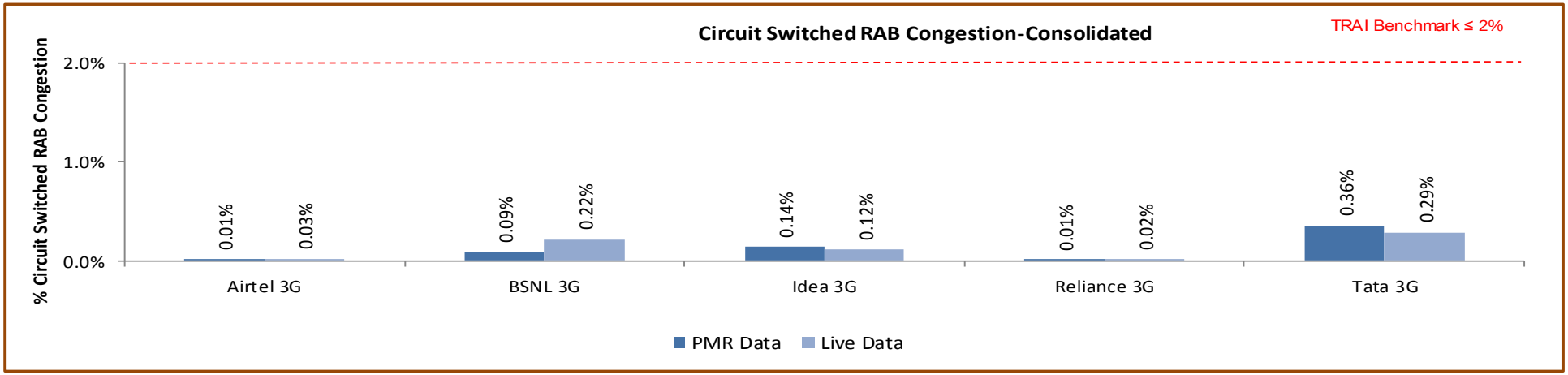


7.4.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

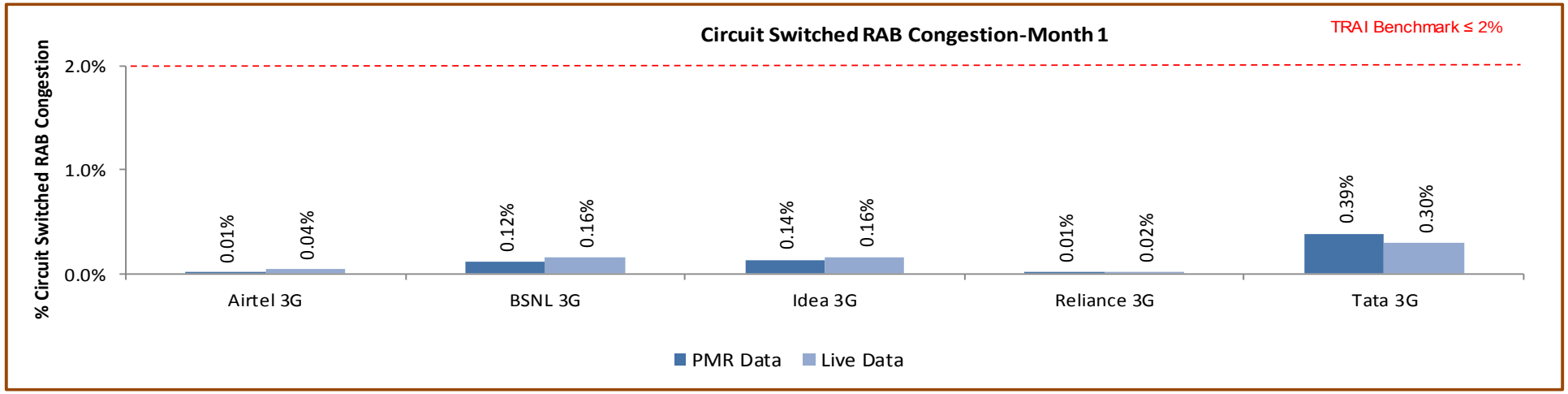
7.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)



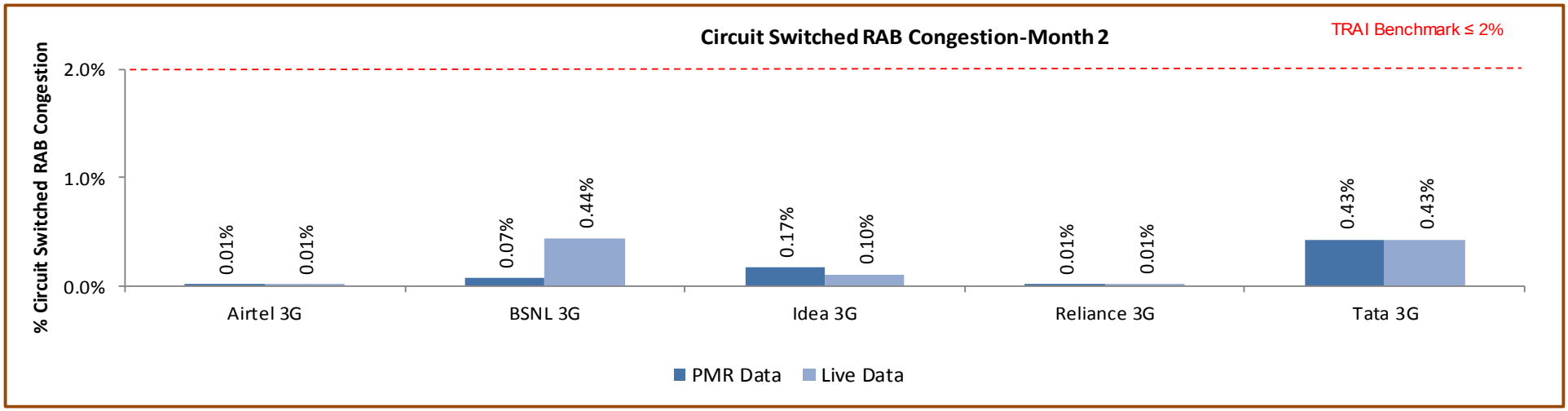
Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for the parameter as per PMR and Live data.

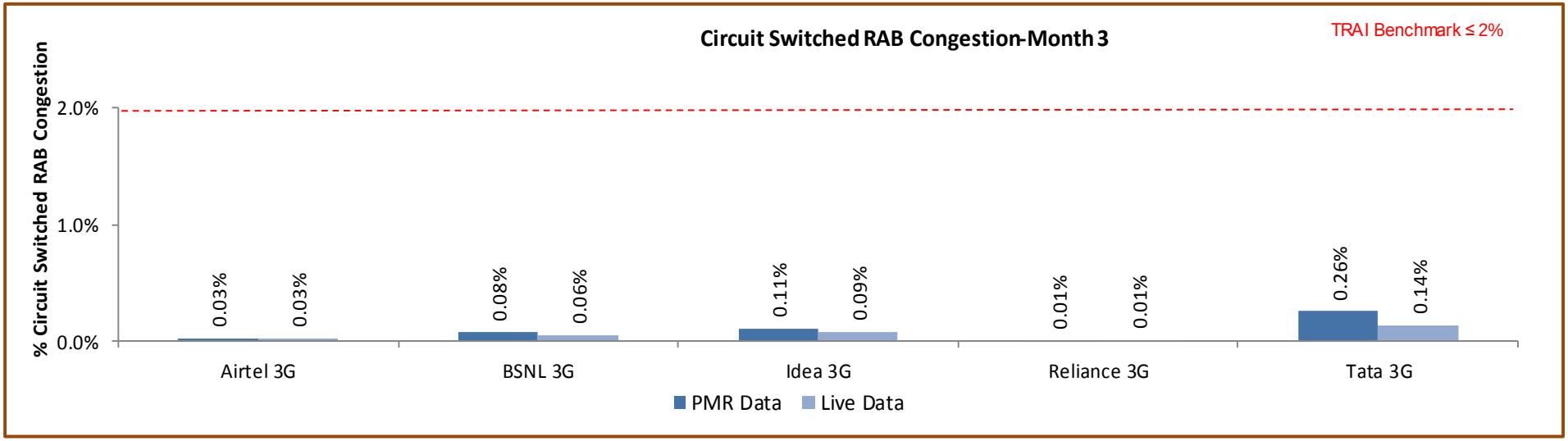
7.4.3.1 KEY FINDINGS – MONTH 1



7.4.3.2 KEY FINDINGS – MONTH 2



7.4.3.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

7.4.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED) – AVERAGE OF 3 MONTHS

5. POI Congestion						
Audit Results for POI Congestion- PMR data						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total number of working POIs		92	158	269	381	55
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		789483	573375	501414	773664	141737
Traffic served for all POIs (B)- in erlangs		482537	94512	291512	368049	67371
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total number of working POIs		92	158	266	381	55
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		788799	453792	500415	722736	141578
Traffic served for all POIs (B)- in erlangs		445319	91616	284989	341227	53044
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark of POI Congestion as per PMR/audit Data.

7.4.4.1 KEY FINDINGS – MONTH 1

5. POI Congestion						
Audit Results for POI Congestion- PMR data-July						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total number of working POIs		92	158	269	641	54
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		261762	191125	164920	499001	46288
Traffic served for all POIs (B)- in erlangs		190276	31366	96381	240639	27377
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-July						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total number of working POIs		92	158	262	641	54
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		261284	191125	164167	448508	46130
Traffic served for all POIs (B)- in erlangs		153194	30894	91161	212730	13049
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

7.4.4.2 KEY FINDINGS – MONTH 2

5. POI Congestion						
Audit Results for POI Congestion- PMR data-August						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total number of working POIs		92	158	265	252	54
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		263872	191125	166783	135274	47638
Traffic served for all POIs (B)- in erlangs		146195	31738	95480	61695	26741
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-August						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total number of working POIs		92	158	265	250	54
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		263460	71542	166134	134494	47638
Traffic served for all POIs (B)- in erlangs		146144	29827	94713	62471	26741
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

7.4.4.3 KEY FINDINGS – MONTH 3

5. POI Congestion						
Audit Results for POI Congestion- PMR data-September						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total number of working POIs		92	158	272	251	56
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		263848	191125	169712	139389	47810
Traffic served for all POIs (B)- in erlangs		146065	31408	99651	65715	13253
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-September						
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total number of working POIs		92	158	272	251	56
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		264055	191125	170114	139735	47810
Traffic served for all POIs (B)- in erlangs		145980	30894	99115	66026	13253
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

7.5 CIRCUIT SWITCHED VOICE DROP RATE

7.5.1 PARAMETER DESCRIPTION

1. **Definition** - The Call Drop Rate measures the inability of Network to maintain a call and is defined as the ratio of abnormal speech disconnects with respect to all speech disconnects (both normal and abnormal). In 3G Networks, a normal disconnect is initiated from the Mobile Switching Centre (MSC) at completion of the call by a RAB Disconnect message. An abnormal RAB disconnect can be initiated by either UTRAN or CN and includes Radio Link Failures, Uplink (UL) or Downlink (DL) interference or any other reason.

   - **Total No. of voice RAB abnormally released** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
   - **No. of voice RAB normally released** = All calls that have RAB allocation during busy hour

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computational Methodology:** **(No. of voice RAB normally released / (No. of voice RAB normally released + RAB abnormally released)x 100**

Key Performance Indicator Term	Definition
#RAB Normal Release(CSV)	Number of voice RAB normally Released
#RAB Abnormal Release(CSV)	Number of voice RAB abnormally Released

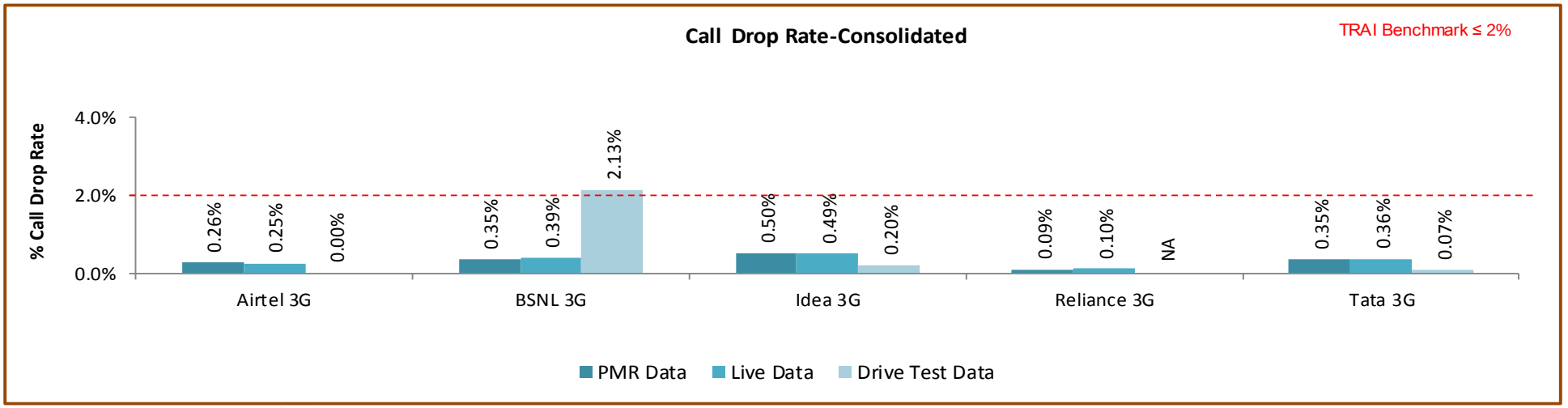
5. **TRAI Benchmark –**

   - Circuit switched voice drop rate ≤ 2%

6. **Audit Procedure –**

   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used
   - The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

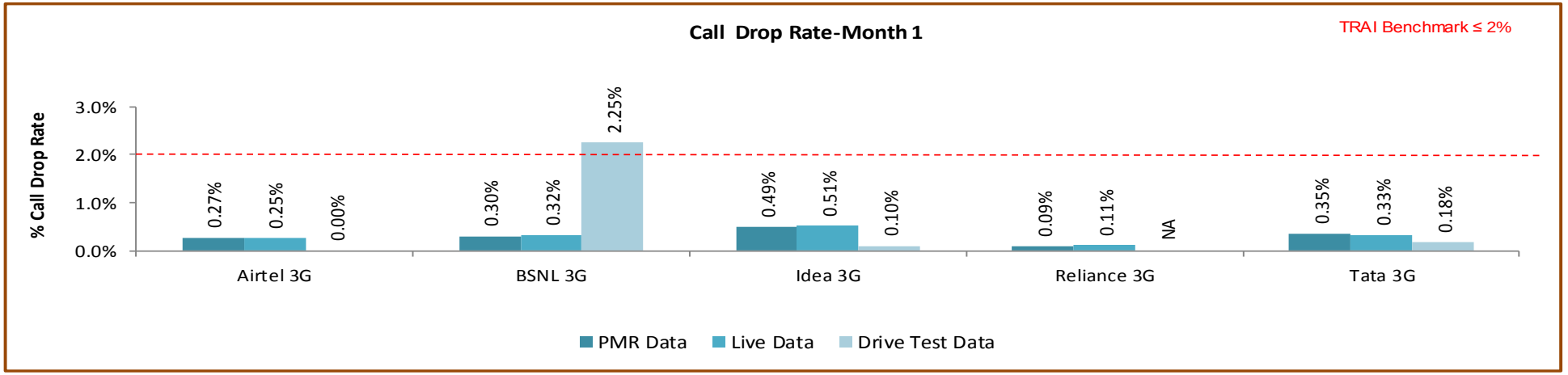
7.5.2 KEY FINDINGS - CONSOLIDATED



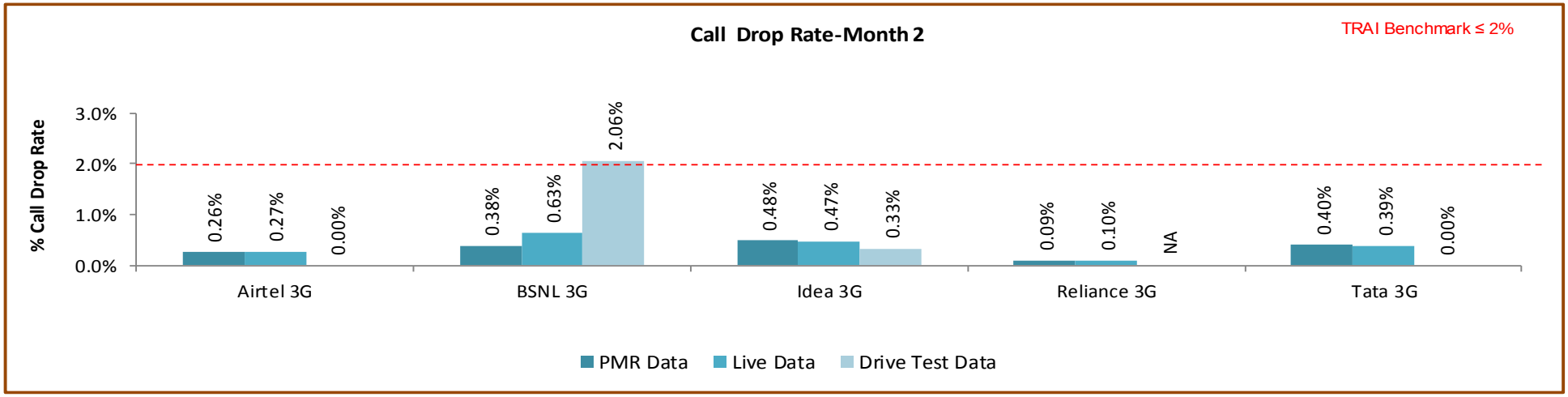
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for call drop rate during audit. BSNL failed to meet the benchmark during drive Test Data.

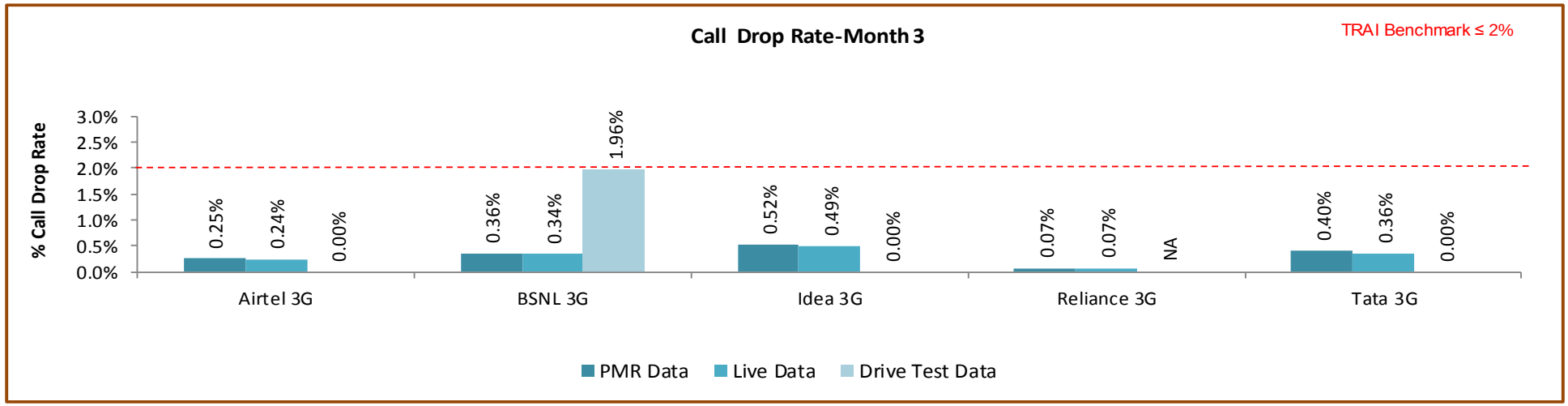
7.5.2.1 KEY FINDINGS – MONTH 1



7.5.2.2 KEY FINDINGS – MONTH 2



7.5.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

7.6 WORST AFFECTED CELLS HAVING MORE THAN 3% CIRCUIT SWITCHED VOICE DROP RATE

7.6.1 PARAMETER DESCRIPTION

1. **Definition- Cells having more than 3% circuit switch voice quality:** The existing parameter has been amended to cover 3G Networks to assess worst affected cells having more than 3% CSV Drop Rate.

2. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.

3. **Source of Data:** Network Operation Center (NOC) or a Central Server

4. **Computational Methodology:** (**Number of cells having CSV drop rate > 3% during CBBH in a month** / **Total number of cells in the licensed area) x 100**

5. **TRAI Benchmark** –

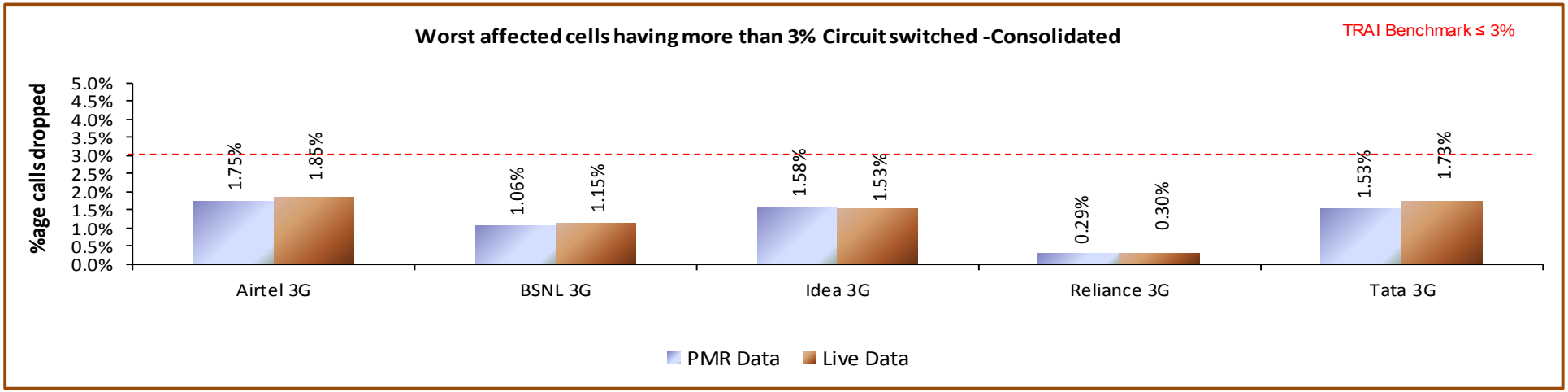
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

6. **Audit Procedure** –

   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

The operator should only be considering those calls which are dropped during Cell Bouncing Busy hour (CBBH) for all days of the relevant quarter.

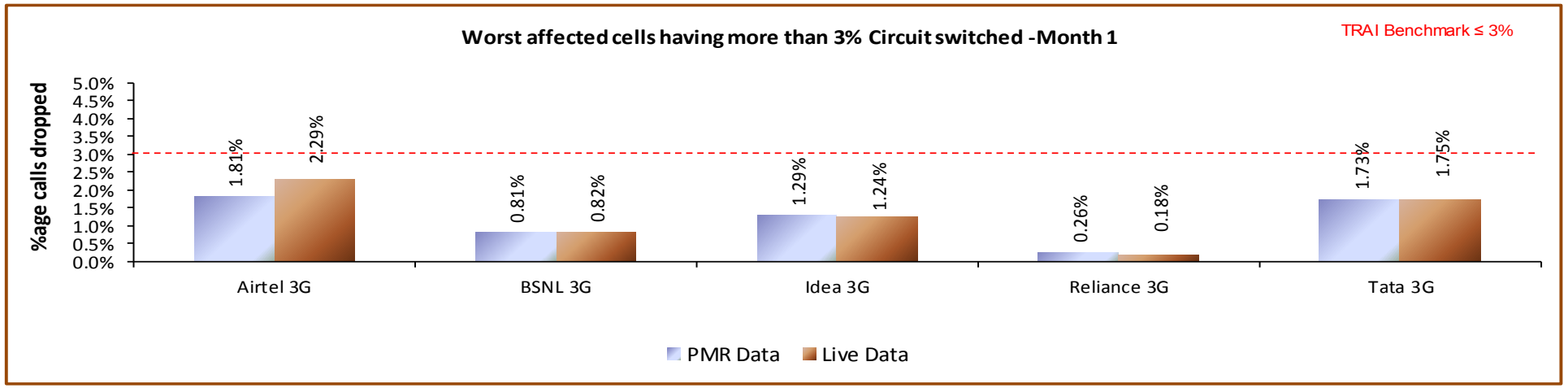
7.6.2 KEY FINDINGS - CONSOLIDATED



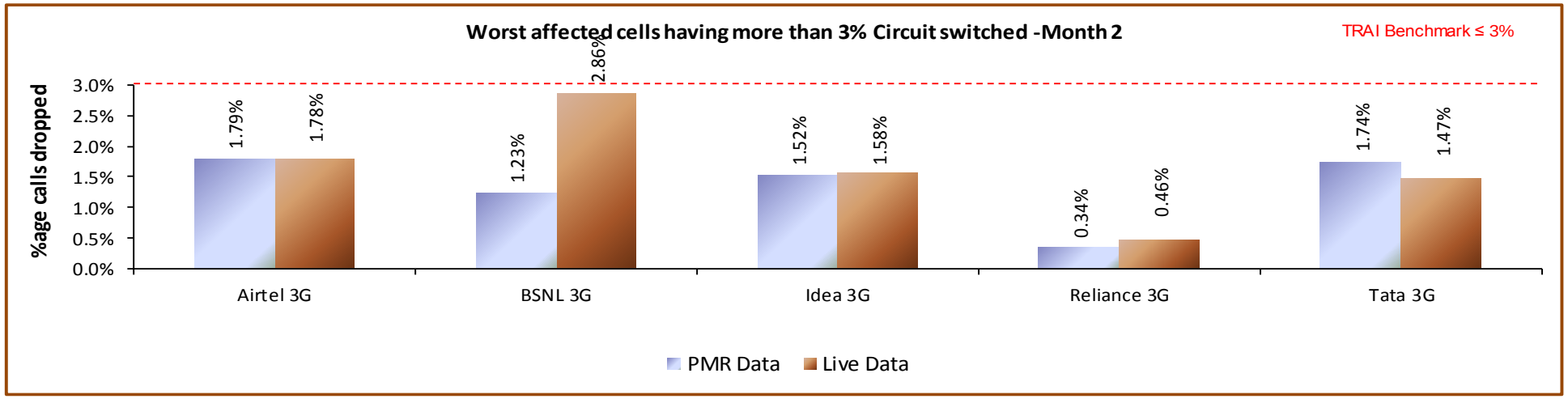
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark during audit for live calling.

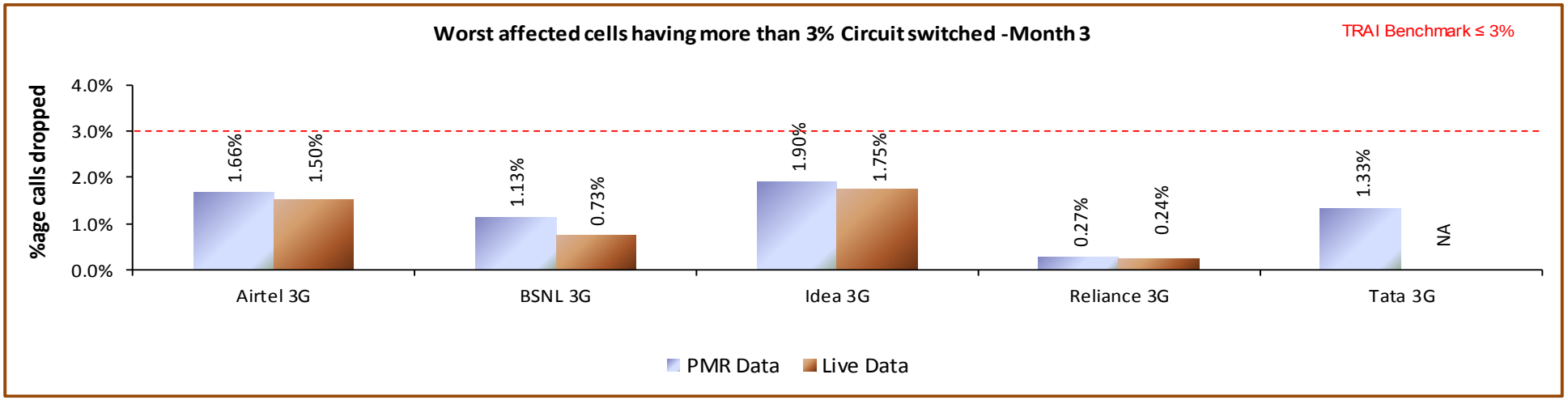
7.6.2.1 KEY FINDINGS – MONTH 1



7.6.2.2 KEY FINDINGS – MONTH 2



7.6.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

7.7 CIRCUIT SWITCH VOICE QUALITY

7.7.1 PARAMETER DESCRIPTION

5. **Definition:**

   - for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)
   - For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %

6. **Computational Methodology:**

   - **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**

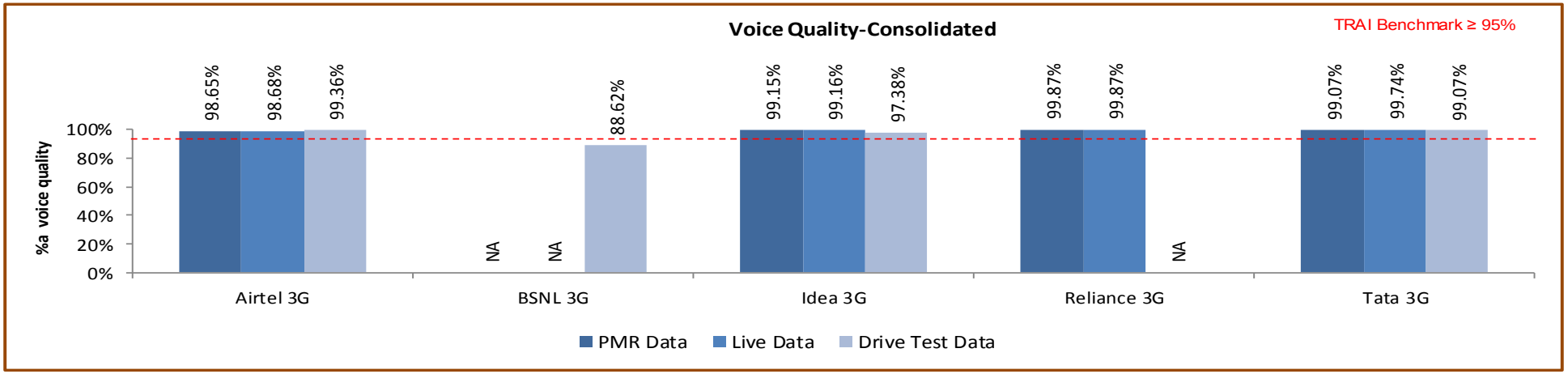
7. **TRAI Benchmark:** ≥ 95%

8. **Audit Procedure –**

   a. A sample of calls would be taken randomly from the total calls established.

   b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

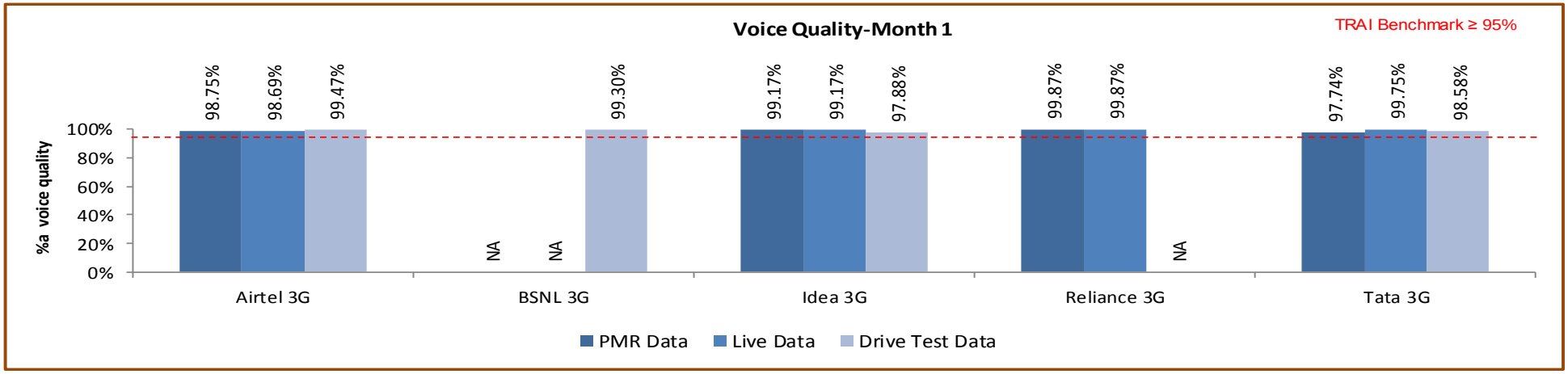
7.7.2 KEY FINDINGS



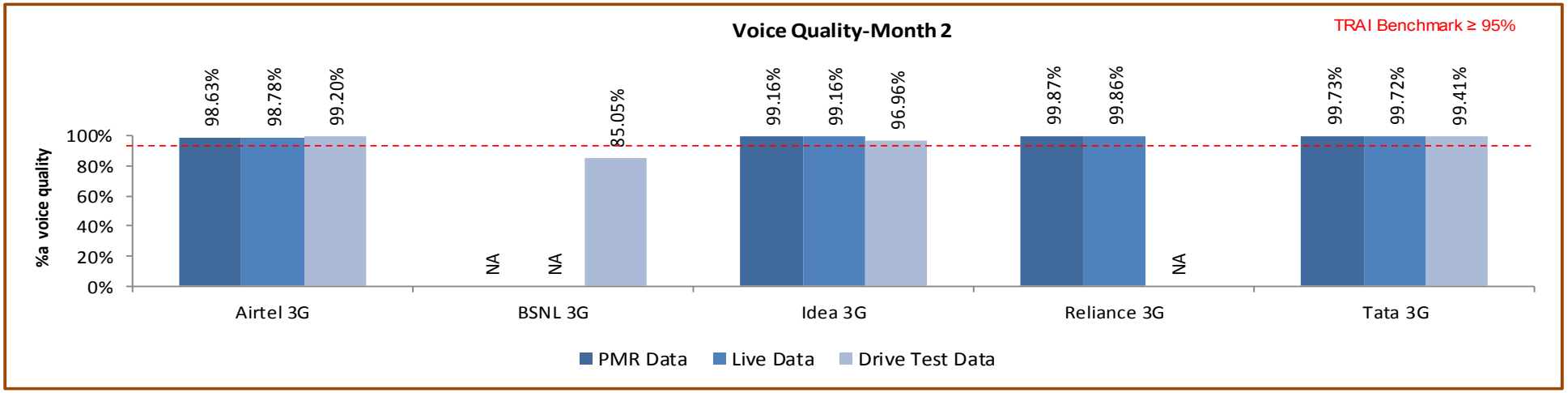
Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for the parameter as per PMR and Live data. BSNL 3G failed to meet the benchmark during drive test.

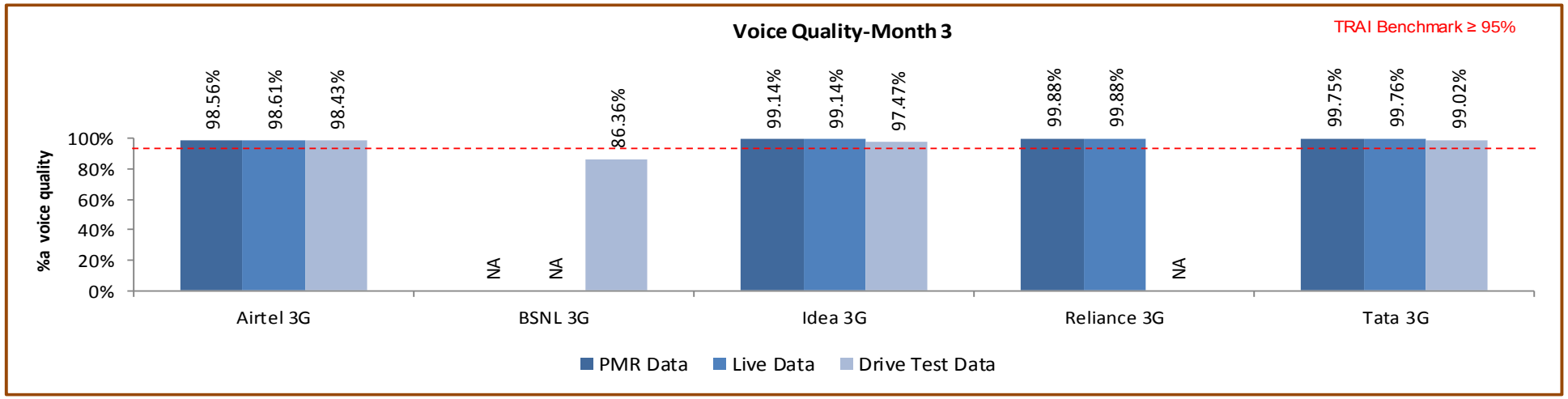
7.7.2.1 KEY FINDINGS – MONTH 1



7.7.2.2 KEY FINDINGS – MONTH 2



7.7.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Center (NOC) of the operators

8 PARAMETER DESCRIPTION & DETAILED FINDINGS - WIRELESS DATA SERVICES (2G & 3G)

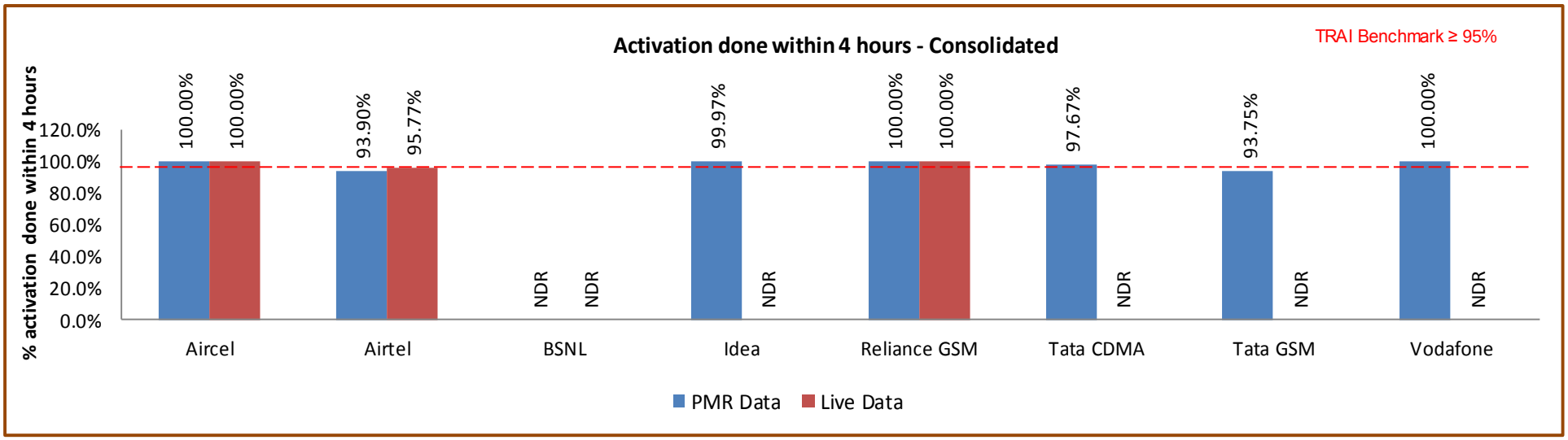
8.1 SERVICE ACTIVATION /PROVISIONING FOR 2G & 3G

8.1.1 PARAMETER DESCRIPTION

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. The service provider typically sends these settings to the subscriber's handset using SMS or WAP.

$$\textbf{\% activation done within 4 hours} = \frac{\text{Total Time Taken for Activation}}{\text{Total request time made}} \times 100$$

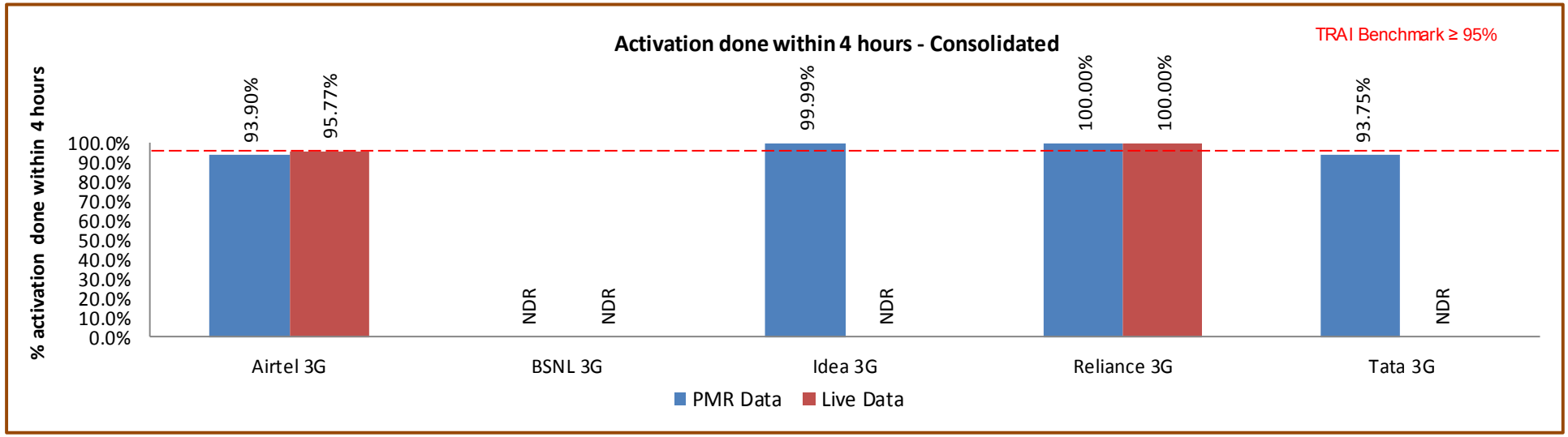
8.1.2 KEY FINDINGS 2G



Data Source: Network Operations Center (NOC) of the operators

Airtel failed to meet the benchmark for Activation done for 4 hours during PMR audit.

8.1.3 KEY FINDINGS 3G



Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for activation done within 4 hours during audit .Airtel & TATA failed to meet the benchmark for PMR Data.

8.2 PDP CONTEXT ACTIVATION SUCCESS RATE FOR 2G & 3G

8.2.1 PARAMETER DESCRIPTION

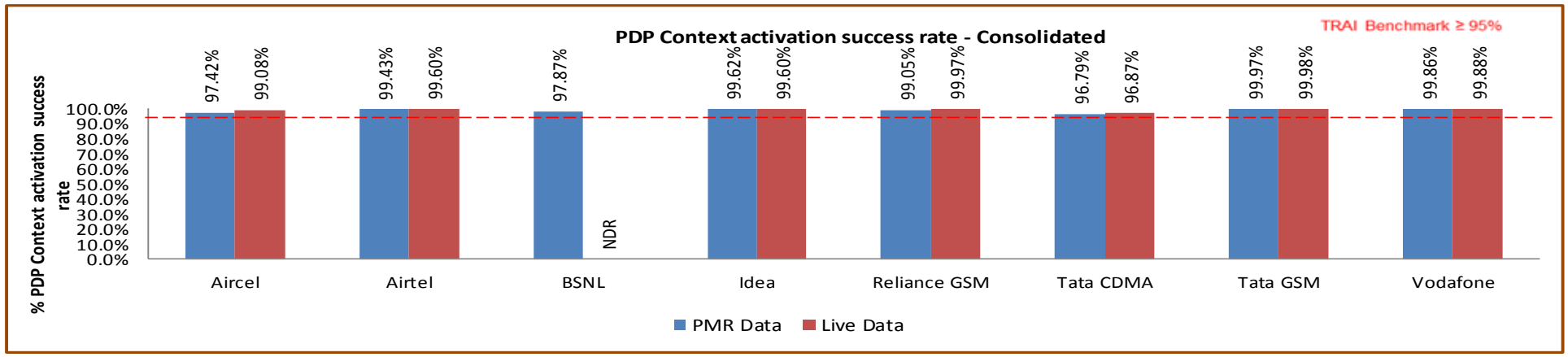
A Packet Data Protocol (PDP) context specifies access to an external packet-switching network. The data associated with the PDP context contains information such as the type of packet-switching network, the Mobile Station PDP (MS PDP) address that is the IP address, the reference of Gateway GPRS Support Node (GGSN), and the requested QoS. A PDP context is handled by the MS, Serving GPRS Support Node (SGSN) and GGSN and is identified by a mobile's PDP address within these entities. Several PDP contexts can be activated at the same time within a given MS.

Measurement

This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully and a report of PDP context activation success is generated at GGSN.

$$\textbf{PDP Context Activation Success Rate (\%)} = \frac{\text{Number of successfully completed PDP context activations}}{\text{Total attempts of context activation}} \times 100$$

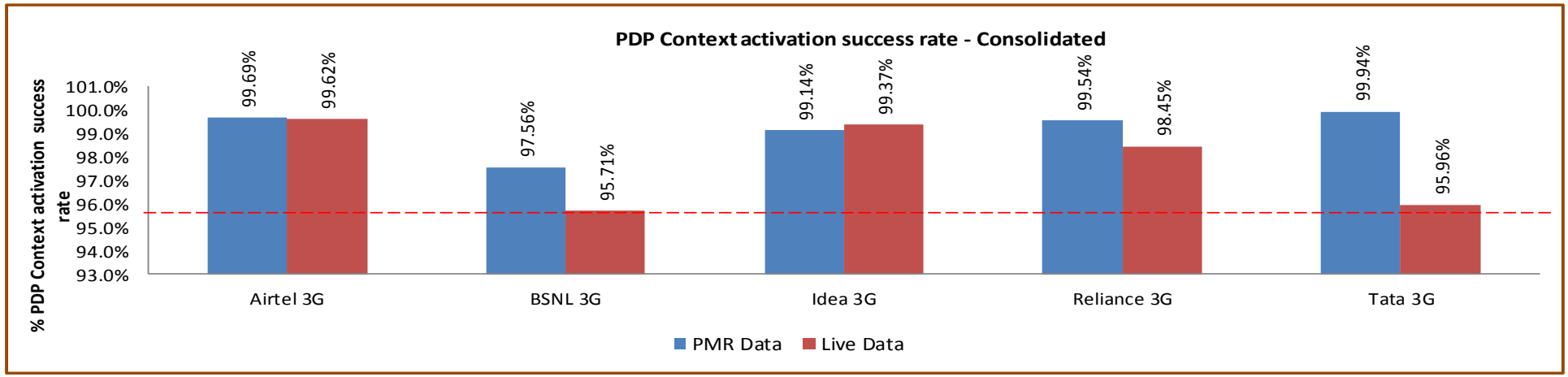
8.2.2 KEY FINDINGS 2G



Data Source: Network Operations Center (NOC) of the operator

All operators met the benchmark for PDP context activation success rate during audit.

8.2.3 KEY FINDINGS 3G



All operators met the benchmark for PDP context activation success rate during audit.

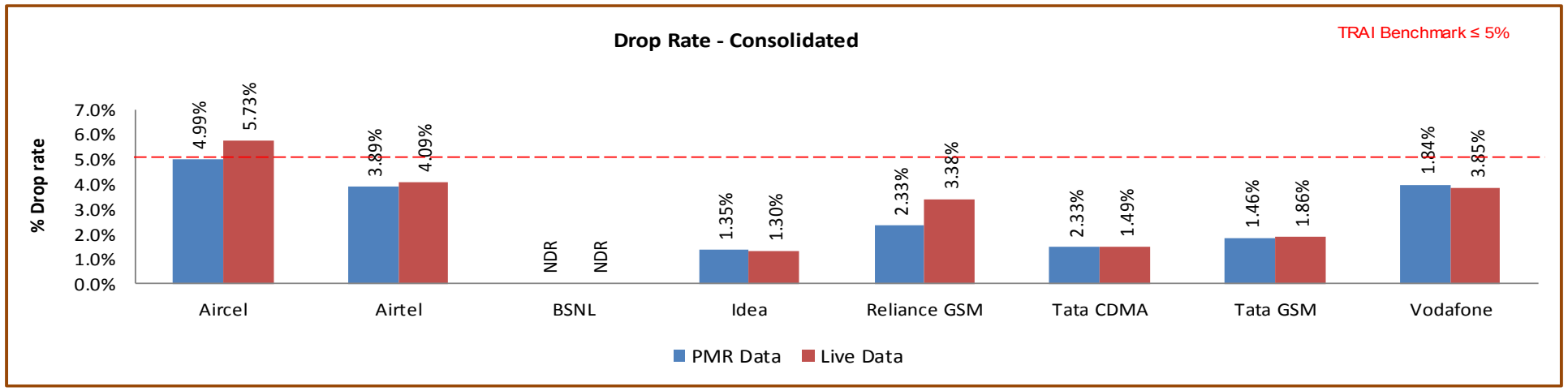
8.3 DROP RATE FOR 2G & 3G

8.3.1 PARAMETER DESCRIPTION

It measures the inability of Network to maintain a connection and is defined as the ratio of abnormal disconnects w.r.t. all disconnects (both normal and abnormal). An abnormal disconnect may happen because of Radio Link Failures, Uplink (UL) or Downlink (DL) interference, bad coverage, unsuccessful handovers or any other reason. The drop rate is to be measured for all generations of the technologies separately.

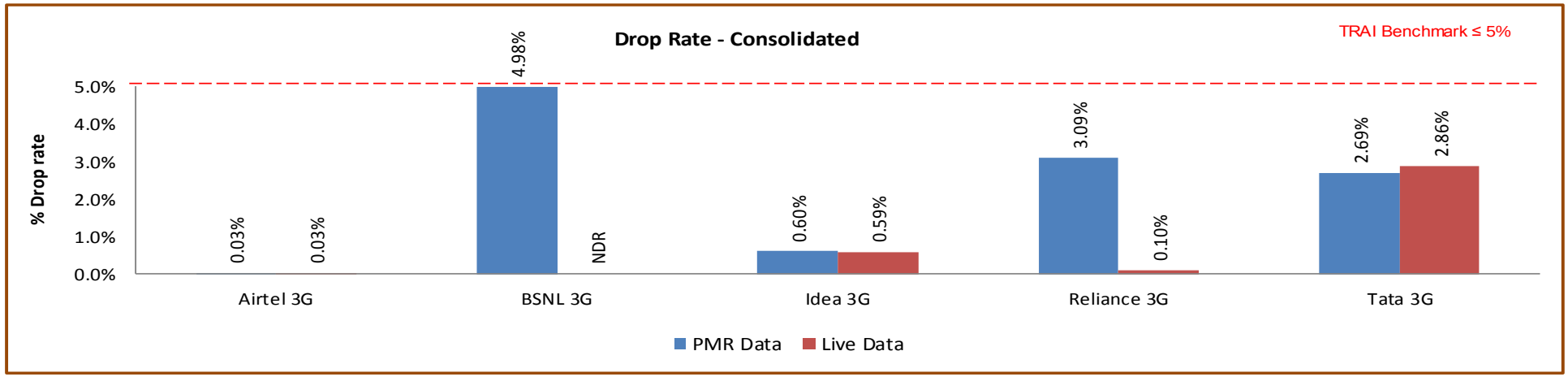
$$\textbf{Drop rate} = \frac{\text{No. of Dropped data Calls}}{\text{No. of Successful data calls}} \times 100$$

8.3.2 KEY FINDINGS 2G



All operators met the benchmark for drop rate during audit Aircel failed to meet the benchmark for live data.

8.3.3 KEY FINDINGS 3G



All operators met the benchmark for drop rate during audit.

9 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

9.1 METERING AND BILLING CREDIBILITY

The billing complaints for postpaid are calculated by averaging over one billing cycle in a quarter. For example, there are three billing cycles in a quarter, the data for each billing cycle is calculated separately and then averaged over.

The charging complaints for prepaid are calculated by taking all complaints in a quarter.

9.1.1 PARAMETER DESCRIPTION

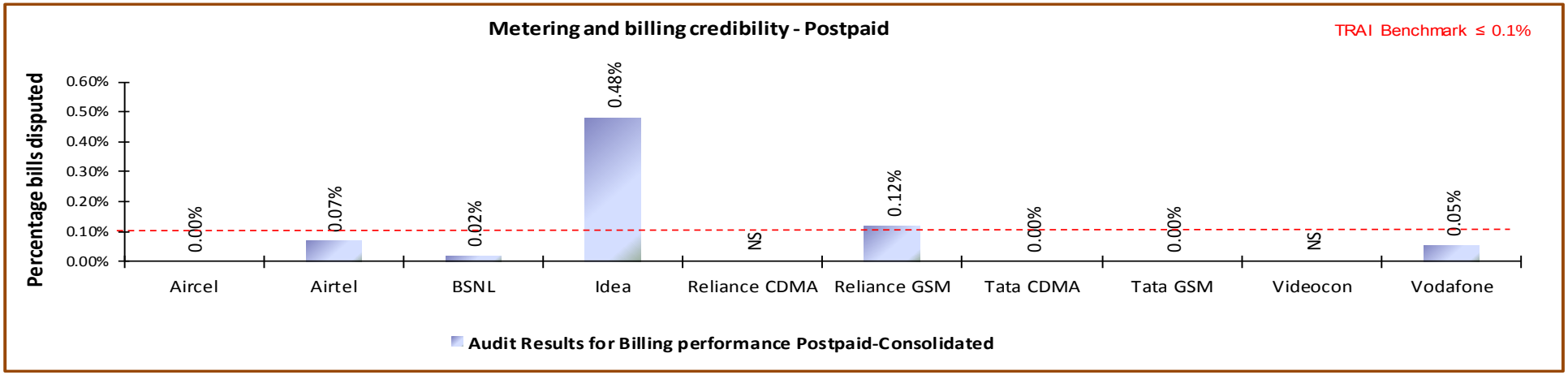
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th December, 2009 were covered. The types of billing complaints covered are listed below.

- Payments made and not credited to the subscriber account
- Payment made on time but late payment charge levied wrongly
- Wrong roaming charges
- Double charges
- Charging for toll free services
- Local calls charged/billed as STD/ISD or vice versa
- Calls or messages made disputed
- Validity related complaints
- Credit agreed to be given in resolution of complaint, but not accounted in the bill
- Charging for services provided without consent
- Charging not as per tariff plans or top up vouchers/ special packs etc.
- Overcharging or undercharging

In addition to the above, any billing complaint which leads to billing error, waiver, refund, credit, or any adjustment is also considered as valid billing complaint for calculating the number of disputed bills.

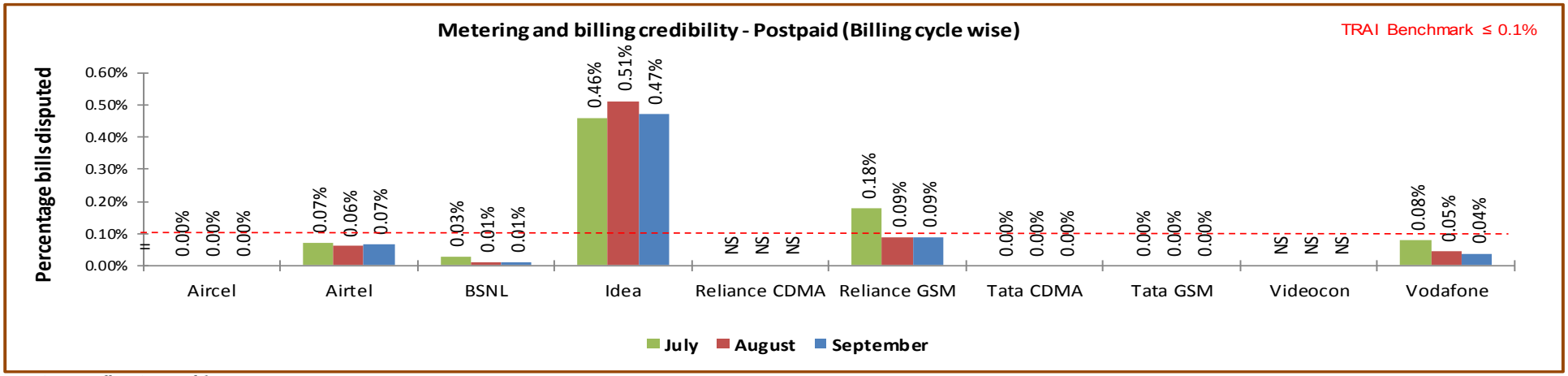
- Computational Methodology:
  - **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated
  - **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.
  - **Charging complaints per 100 subscribers (Prepaid)** = (Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter) * 100
- TRAI Benchmark: <= 0.1%
- Audit Procedure:
  - Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted
    - For Postpaid, the total billing complaints would be audited by averaging over billing cycles in a quarter
    - For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

9.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



Data Source: Billing Center of the operators

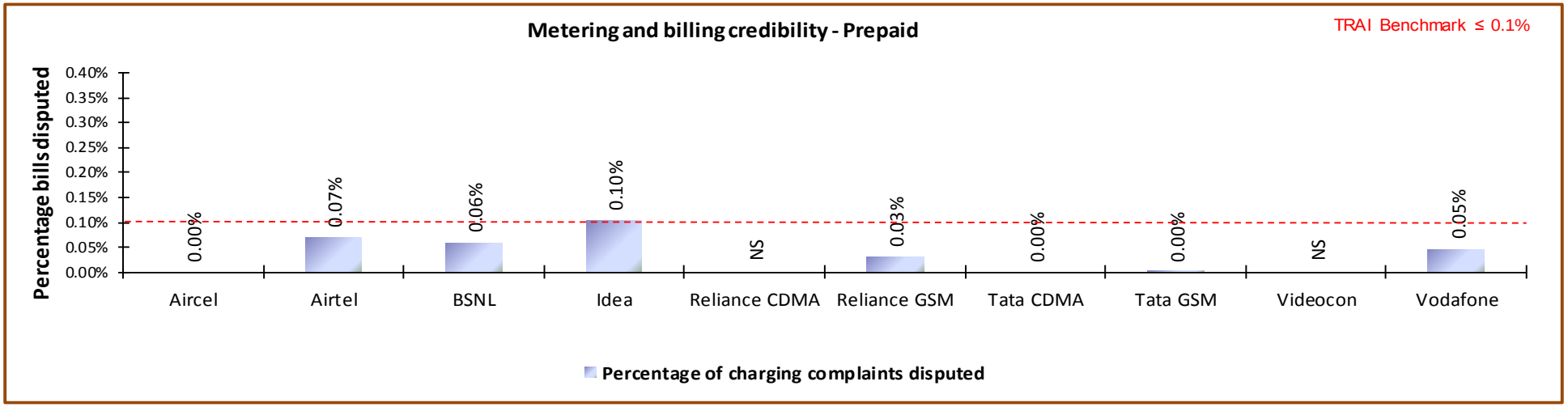
Idea and Reliance GSM failed to meet the benchmark of 0.1% post-paid metering and billing credibility.



Data Source: Billing Center of the operators

Idea and Reliance GSM failed to meet the benchmark of 0.1% post-paid metering and billing credibility.

9.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

All operators meet the benchmark of 0.1% prepaid metering & billing credibility.

9.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

9.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed to -calculate resolution of billing complaints.

Resolution of billing complaints within 4 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 4 weeks =

$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 4 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

Resolution of billing complaints within 6 weeks:

%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

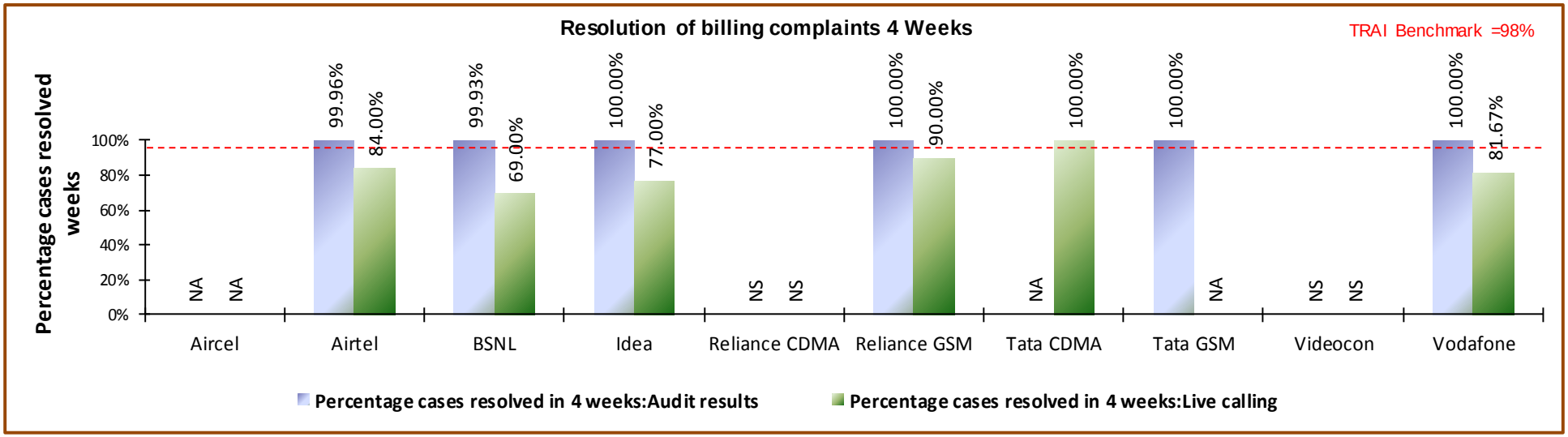
$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

- **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally. Complaints raised by the consumers to operator are only considered as part of the calculation.

- The complaints that get marked as invalid by the operator are not considered for calculation as those complaints cannot be considered as resolved by the operator.
- *** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.

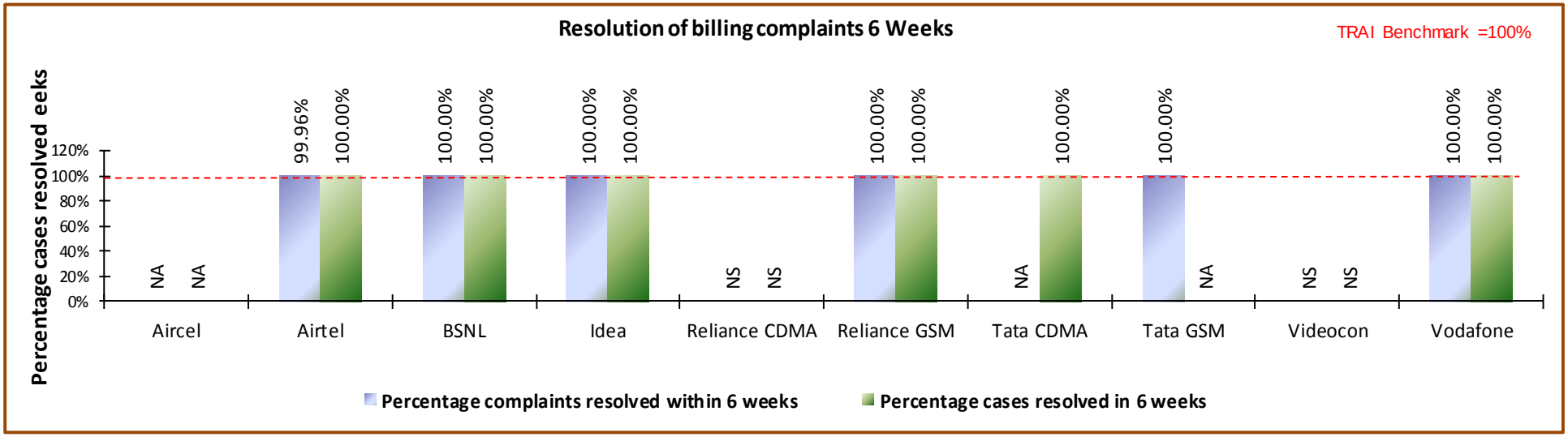
Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

9.2.2 KEY FINDINGS - WITHIN 4 WEEKS



As per the consumers (live calling exercise) Airtel, BSNL, Reliance GSM, Vodafone and Idea failed to meet the benchmark for Percentage cases resolved in 4 weeks during live Calling and all operators meet the benchmark for Percentage cases resolved in 4 weeks during quarterly audit results.

9.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

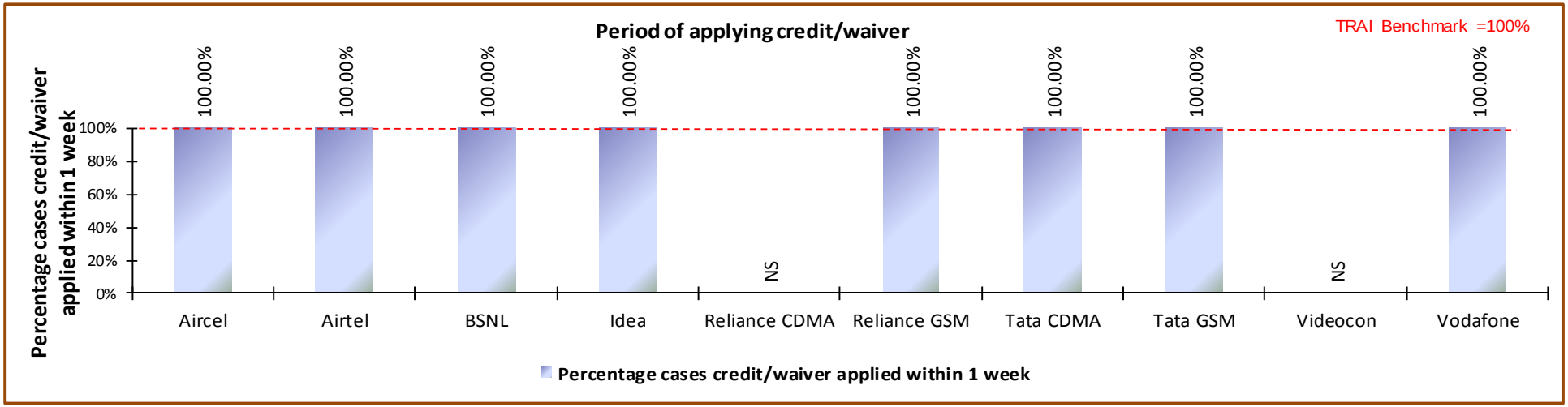
The benchmark for resolving 100% complaints within 6 weeks was not met by all operators during PMR audit and during live audit.

9.3 PERIOD OF APPLYING CREDIT/WAVIER

9.3.1 PARAMETER DESCRIPTION

- Computational Methodology: **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**
- TRAI Benchmark: Period of applying credit waiver within 7 days: 100%
- Audit Procedure: Operator to provide details of:-
  - List of all eligible cases along with
    - Date of applying credit waiver to all the eligible cases.
    - Date of resolution of complaint for all eligible cases

9.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

All operators met the benchmark for this parameter.

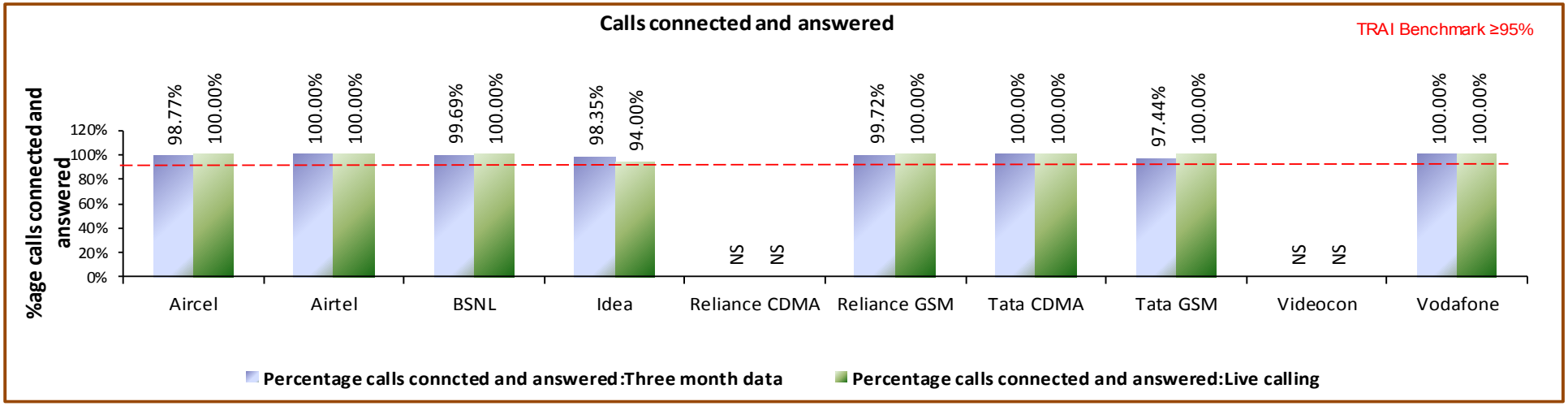
9.4 CALL CENTRE PERFORMANCE-IVR

9.4.1 PARAMETER DESCRIPTION

- Computational Methodology: **Call centre performance IVR = (Number of calls connected and answered by IVR/ All calls attempted to IVR) * 100**
- TRAI Benchmark: >= 95%
- Audit Procedure: Operators provide details of the following from their central call centre/ customer service database:
  - Total calls connected and answered by IVR
  - Total calls attempted to IVR

  - Also live calling is done to test the calls connected and answered by IVR

9.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

As per PMR and live audit data, all operators met the TRAI benchmark.

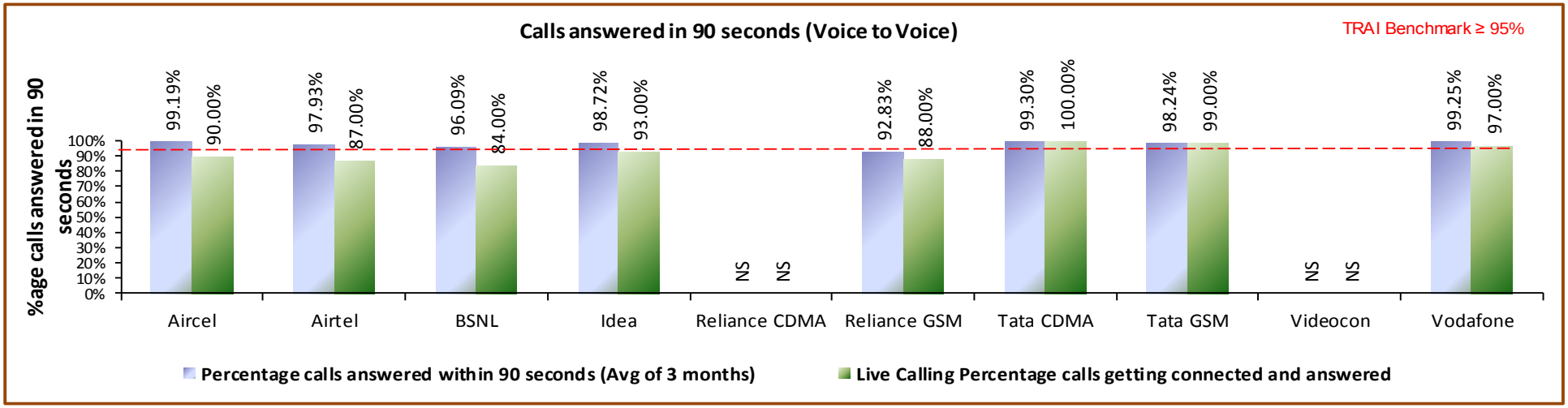
9.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

9.5.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100
- Audit Procedure:
  - Operators provide details of the following from their central call centre/ customer service database:
    - Total calls connected and answered by operator within 90 seconds
    - Total calls attempted to connect to the operator
  - Also live calling was done to test the calls answered within 90 seconds by the operator

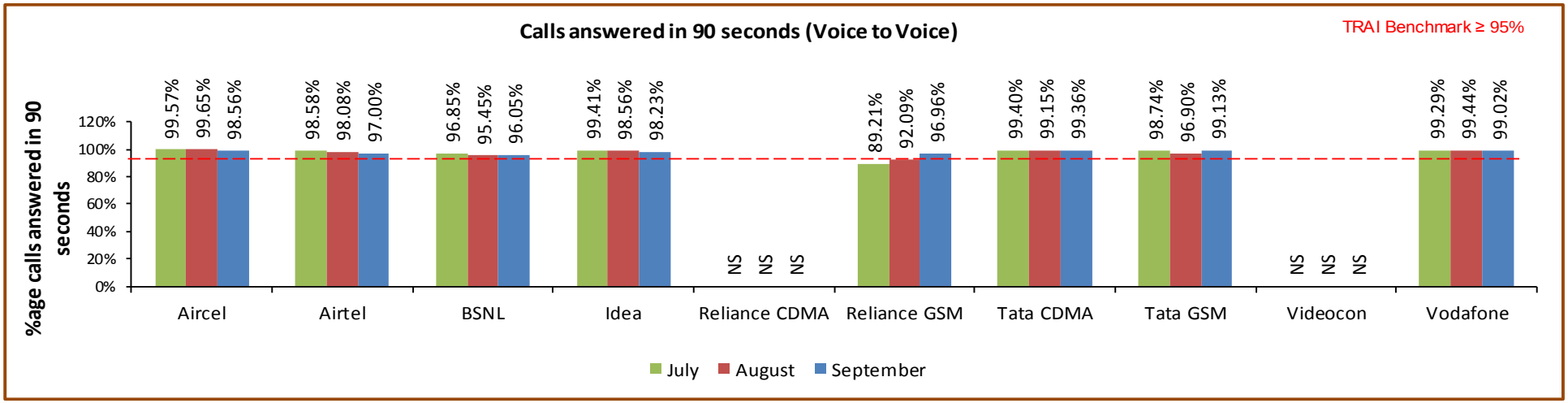
Benchmark: 95% calls to be answered within 90 seconds

9.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Reliance GSM did not meet the benchmark of answering 95% calls within 90 seconds and Airtel, Aircel, BSNL, idea, Reliance GSM did not meet the benchmark of Live calling Percentage calls getting connected and answered.

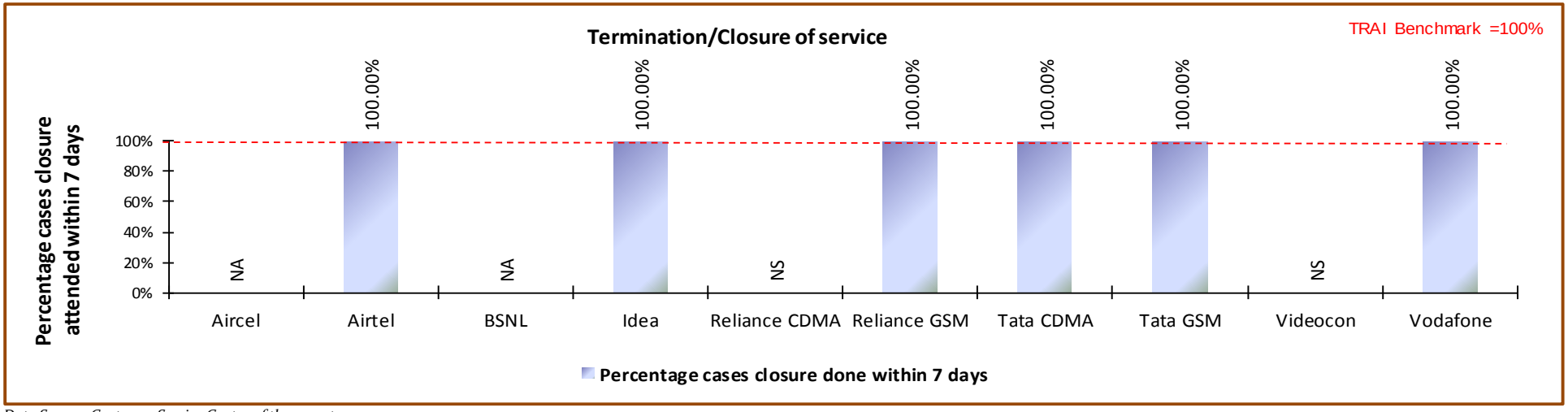


9.6 TERMINATION/CLOSURE OF SERVICE

9.6.1 PARAMETER DESCRIPTION

- Computational Methodology: **Time taken for closure of service = (number of closures done within 7 days/ total number of closure requests) * 100**
- TRAI Benchmark: Termination/Closure of Service: <=7 days
- Audit Procedure:
  - Operator provide details of the following from their central billing/CS database:
    - Date of lodging the closure request (all requests in given period)
    - Date of closure of service

9.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

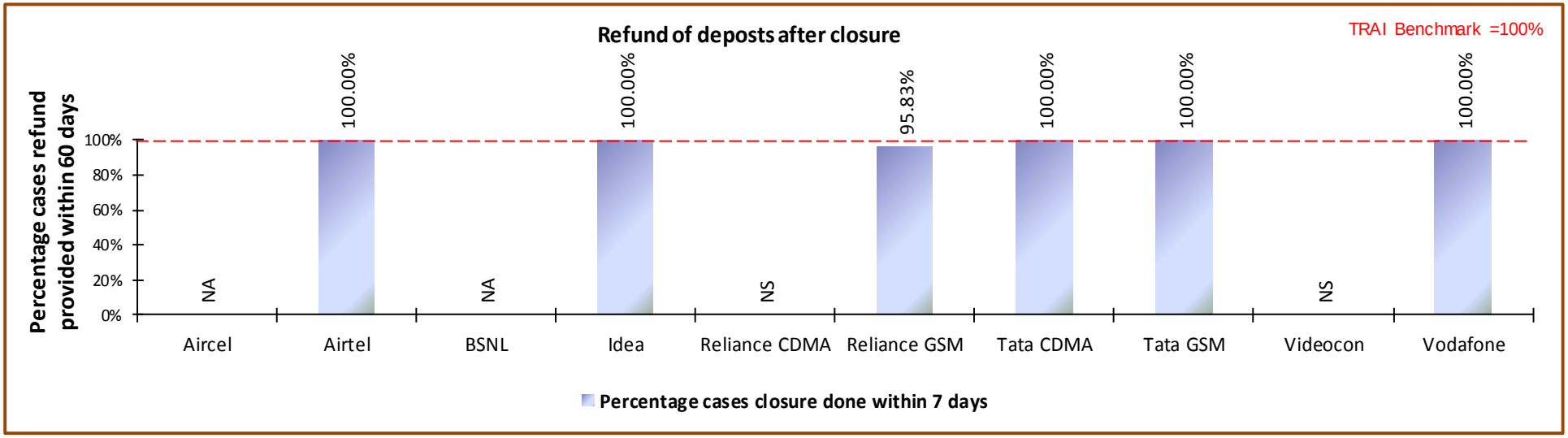
All operators met the TRAI benchmark for the parameter.

9.7 REFUND OF DEPOSITS AFTER CLOSURE

9.7.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **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**
  - Any case where the operators need to return the amount back to consumers post closure of service in form of cheque/cash is considered to be refund.
- TRAI Benchmark:
  - Time taken for refund for deposit after closures: 100% within 60 days
- Audit Procedure:
  - Operator provide details of the following from their central billing/refund database:
    - Dates of completion of all 'closure requests' resulting in requirement of a refund by the operator.
    - Dates of refund pertaining to all closure request received during the relevant quarter

9.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Reliance GSM did not meet the parameter refund of deposit after closure.

10 DETAILED FINDINGS - DRIVE TEST DATA

10.1 OPERATOR ASSISTED DRIVE TEST - VOICE

The drive test was conducted simultaneously for all the operators present in the MPCG circle. As per the new directive given by TRAI headquarters, drive test in the quarter were conducted at a SSA level. SSAs have been defined in two categories by TRAI as per the criticality of the SSA.

3. Normal SSA
4. Difficult SSA

The drive test in Normal SSA was conducted for three days with minimum distance of 250 kilometers over three days. The drive test in difficult SSAs was conducted for six days with minimum distance of 500 kilometers over six days. The selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected post discussion with TRAI regional teams. The holding period for all test calls was 120 seconds and 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 > -75 dbm for indoor, -85 dbm for in-vehicle and > -95 dbm outdoor routes.

The schedule and operators involved in the operator assisted drive test for MPCG circle are given below.

2G	3G
Aircel	Airtel 3G
Airtel	BSNL 3G
BSNL	Idea 3G
Idea	Reliance 3G
Reliance CDMA	TATA 3G
Reliance GSM	
TATA CDMA	
TATA GSM	
Videocon	
Vodafone	

10.1.1 CHHATARPUR SSA

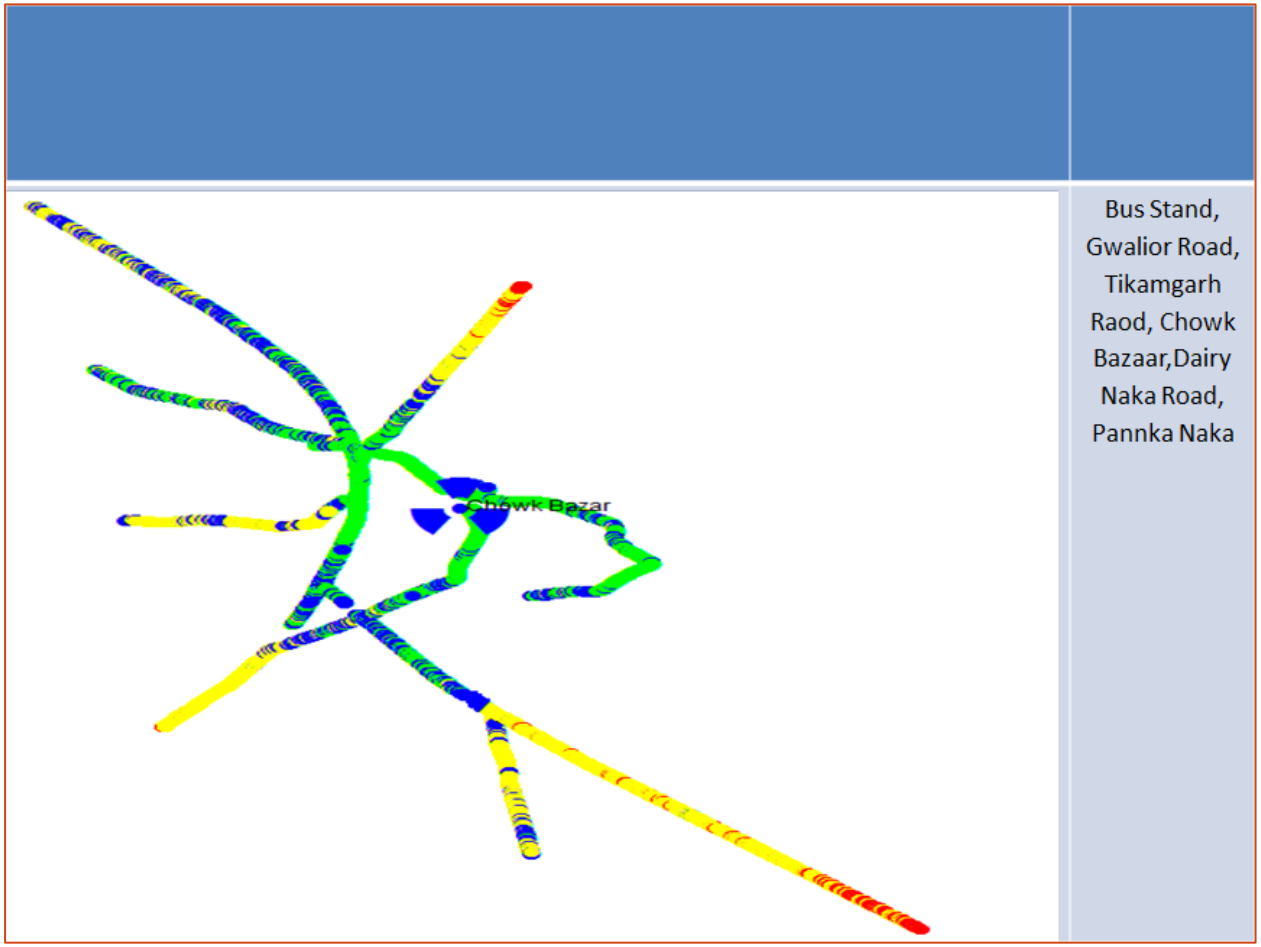
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
July	CHHATARPUR	05-07-2016	07-07-2016	274

10.1.1.1 Route Details – CHHATARPUR SSA

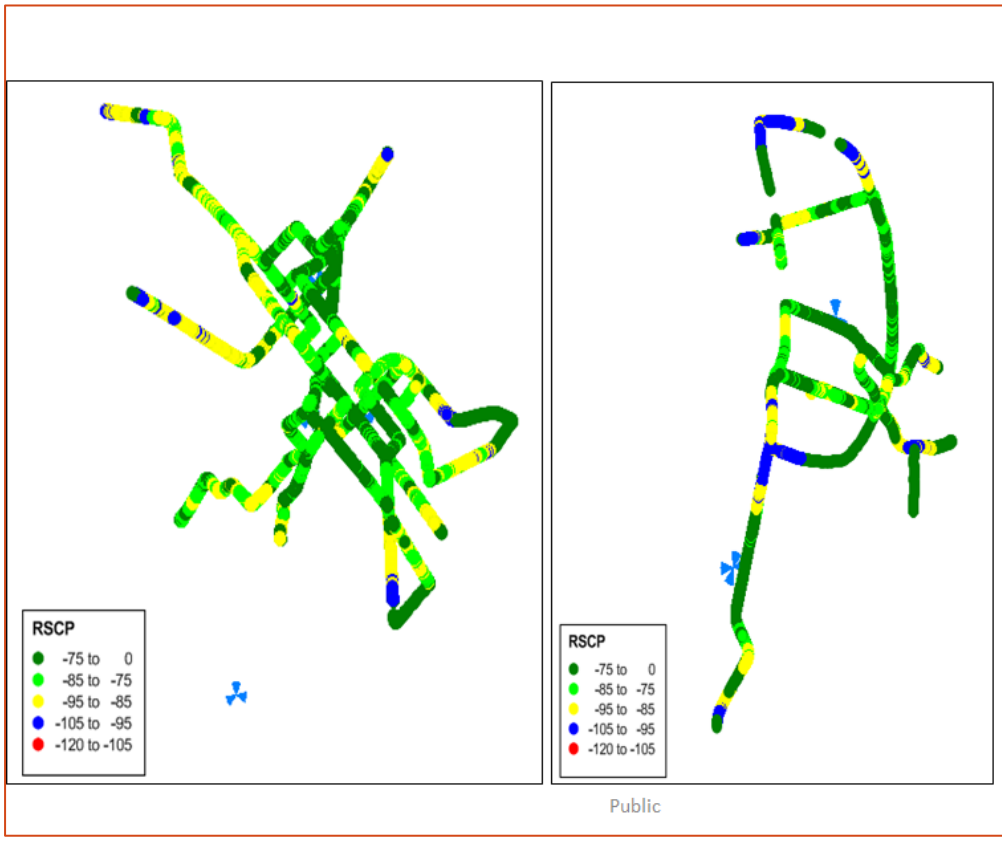
Category	Type of location	July CHHATARPUR		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Chhatrashal Chowk, Vishwathnath Colony, Jhansi Road, Sagar Road, Panna Road	Cus Stand, Sahu Colony, Chhatarpur Road, Jhansi Road, Jatara Road ,	Mahavir Colony , Niwari Road , AMBEDKAR SQ., Gaughat Road
	Highways	Jhansi Road, Sagar Road, Panna Road	Chhatarpur Road, Jhansi Road, Jatara Road	Niwari Road , Malthon Road, Sagar Road, Chhatarpur Road
	With in the City	Bus Stand, Main Market, Toria Mohalla,Chowk Bazar, Chaubey Colony, Panna Naka, Shanti Nagar	Bus Stand, Tiwari Mohalla, Sahu Mohalla, virendra collony	Main Market,Bus Stand , Dixit Mohlla, Mahavir Colony , Civil Lines, Brahmin Colony
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

10.1.1.2 Route Map - CHHATARPUR DAY 1



10.1.1.3 Route Map - CHHATARPUR DAY 2



Public

Route Covered-day 2

Route Detail:

1) NOWGOAN

Within City- Bus Stand, Tiwari Mohalla, Sahu Mohalla, virendra collony

Highway – Chhatarpur Road, Jhansi Road, Jatara Road

Major Road – Cus Stand, Sahu Colony, Chhatarpur Road, Jhansi Road, Jatara Road ,

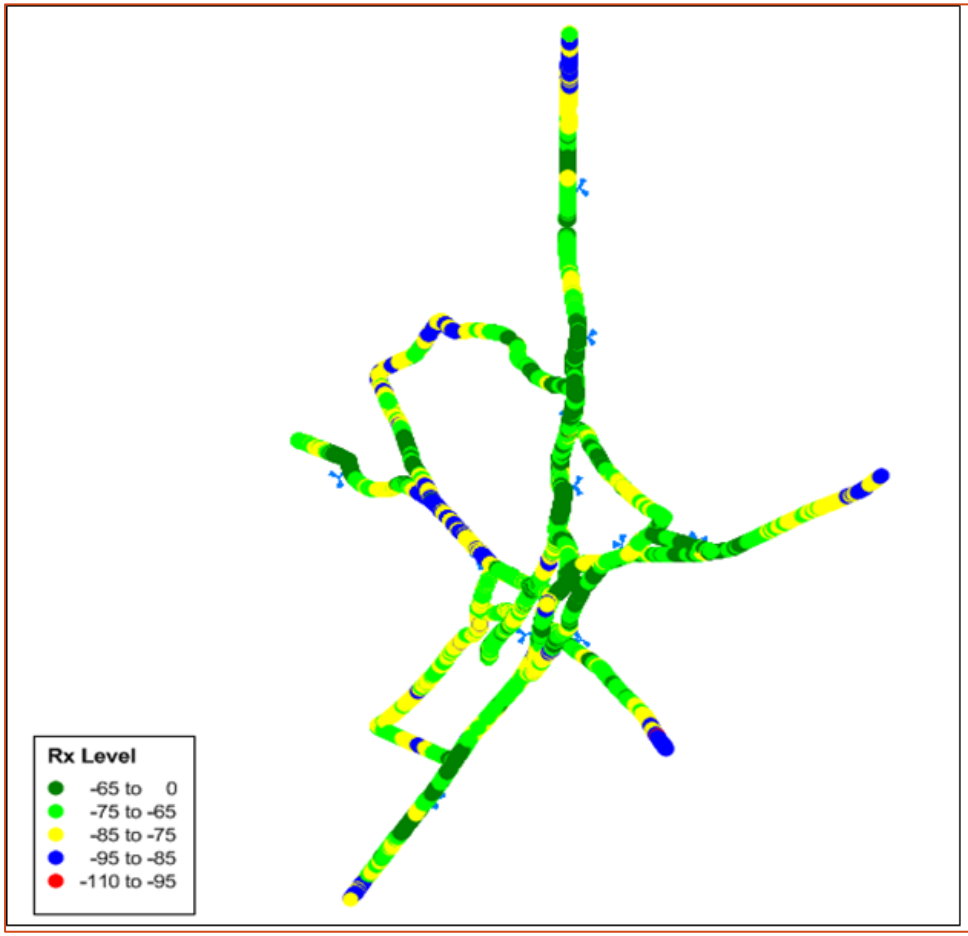
Road

2) **Khajuraho**

Within City- Bus stand, Main Market, Vidhyadher Nagar,Manjoor Nagar

Major Road- Bus Stand, Chhatarpur road , Rajnagar Road

10.1.1.1 Route Map - CHHATARPUR DAY 3



Route Covered-day 3

Route Detail:

1) TIKAMGARH

Highway- Niwari Road , Malthon Road, Sagar Road, Chhatarpur Road

Major Road- Mahavir Colony , Niwari Road , AMBEDKAR SQ., Gaughat Road

Within City- Main Market,Bus Stand , Dixit Mohlla, Mahavir Colony , Civil Lines, Brahmin Colony

10.1.1.2 Drive Test Results - CHHATARPUR SSA 2G

CHHATTARPUR	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		92.77%	84.68%	98.12%	78.45%	99.84%	63.00%	96.21%	73.43%	47.88%	63.14%	99.83%	52.78%	44.93%	61.39%	87.29%	85.49%
0 to -85 dBm		99.88%	93.81%	99.97%	95.51%	100.00%	72.34%	100.00%	94.96%	71.89%	87.77%	100.00%	78.26%	91.88%	92.96%	99.16%	98.24%
0 to -95 dBm		100.00%	98.90%	100.00%	99.78%	100.00%	91.64%	100.00%	99.94%	73.74%	99.24%	100.00%	95.24%	99.90%	99.74%	100.00%	99.95%
Voice quality	≥ 95%	99.18%	96.40%	98.95%	97.78%	93.96%	95.39%	99.52%	95.56%	95.32%	97.63%	95.20%	96.77%	99.40%	97.29%	99.33%	97.71%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	95.09%	100.00%	100.00%	100.00%	99.12%	100.00%	100.00%	100.00%	100.00%	100.00%	99.42%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	4.91%	0.00%	0.00%	0.00%	0.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.58%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	1.03%	0.00%	0.31%	0.00%	0.29%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	97.42%	100.00%	99.64%	100.00%	99.32%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

All operators met the benchmark in indoor locations except BSNL.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR in indoor as well as outdoor locations.

Call Drop Rate

All operators met the benchmark in indoor and outdoor locations.

10.1.1.1 Drive Test Results - CHHATARPUR SSA 3G

CHHATTARPUR	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Tata 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.74%	58.23%	Not Participated		72.37%	83.62%	36.33%	37.72%
0 to -85 dBm		100.00%	84.35%			99.79%	98.58%	99.89%	80.75%
0 to -95 dBm		100.00%	98.34%			100.00%	100.00%	100.00%	94.29%
Voice quality	≥ 95%	100.00%	99.81%			100.00%	98.09%	99.99%	99.37%
CSSR	≥ 95%	100.00%	100.00%			100.00%	99.71%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%			0.00%	0.29%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%			0.00%	0.29%	0.00%	0.00%
Hands off success rate		100.00%	100.00%			100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

All operators met the benchmark in indoor and outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations and BSNL failed to meet the benchmark for CSSR in outdoor location.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations and BSNL failed to meet the benchmark for Call Drop Rate in outdoor location.

10.1.1.1 Data Drive Test Results - CHHATARPUR SSA-2G

July									
Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	100	100
Minimum download speed		98	102	23	126	69	75	84	72
Average throughput for Packet Data		121	125	28	172	93	75	84	169
Latency	<250ms	100	100	NA	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.1.2 Data Drive Test Results - CHHATARPUR SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	NP	100	100
Succesful Data Transmission upload speed attempts	>75%	100		100	100
Minimum download speed		1189		1298	2357
Average throughput for Packet Data		1359		1888	2357
Latency	<250ms	100		100	100

All operators met the TRAI benchmark for data drive test.

10.1.2 DEWAS SSA

10.1.2.1 KILOMETERS TRAVELLED- DEWAS SSA

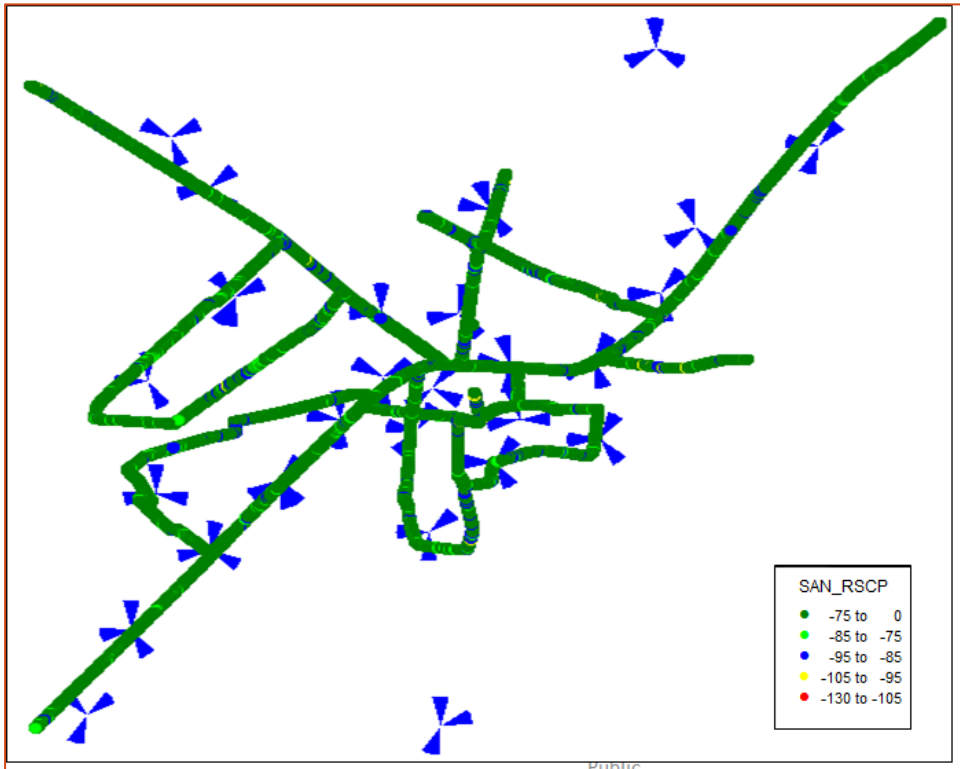
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
July	Dewas	14-07-2016	16-07-2016	254

10.1.2.2 ROUTE DETAILS - DEWAS SSA

Category	Type of location	July Dewas		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Station Road Dewas, Bhagat Singh park, Laxmi Nagar, Radhaganj, Dewas Bus Stand, Pitha Road, Gomti Nagar, Novelty Chouraha, Todi Mohalla, AB Road Dewas, Ram Nagar, Mishrilal Nagar, Ujjain-Dewas Road, Vijay nagar, Rajaram Nagar, Awas Nagar, Bhopal Chowraha.	Nemawar Road, Bus Stand, Patwari Mohalla, Govt. Higher Sec School, Narmada Colony, Ajad marg panwar colony, Agarda-Khategaon Road	Sonkotch Bus Stand, Govt. collage Sonkatch, Molana Azad Marg, Pragati nagar, Agriculture Mandi, Gandharvpuri phata, Sagar Road, Sanwer area
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any findings in this report. IMRB submits detailed operator wise Drive Test reports separately.

10.1.2.3 Route Map - DEWAS DAY 1



Route Covered-day 1

Route Detail:

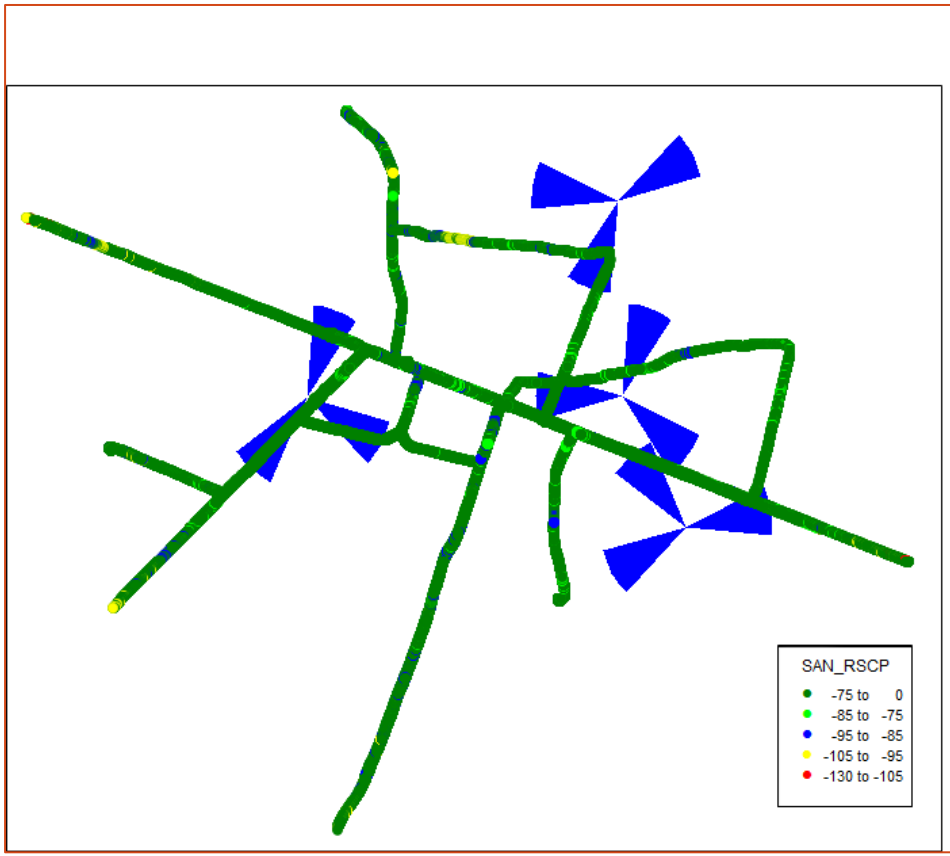
1) Dewas

Within City – Bus Stand, Main Market, Karamchariy colony, Moti Bunglow, Ram Nagar, Old dewas, MIG housing board colony

Highway –Bhopal road, Indore road, Ujjain road, Maksi road

Major Road- AB road, MG road, Ram Nagar, Adarsh Nagar, Mendki road, Ganga Nagar

10.1.2.4 Route Map - DEWAS DAY 2



Route Covered-day 2

Route Detail:

1) Khategaon

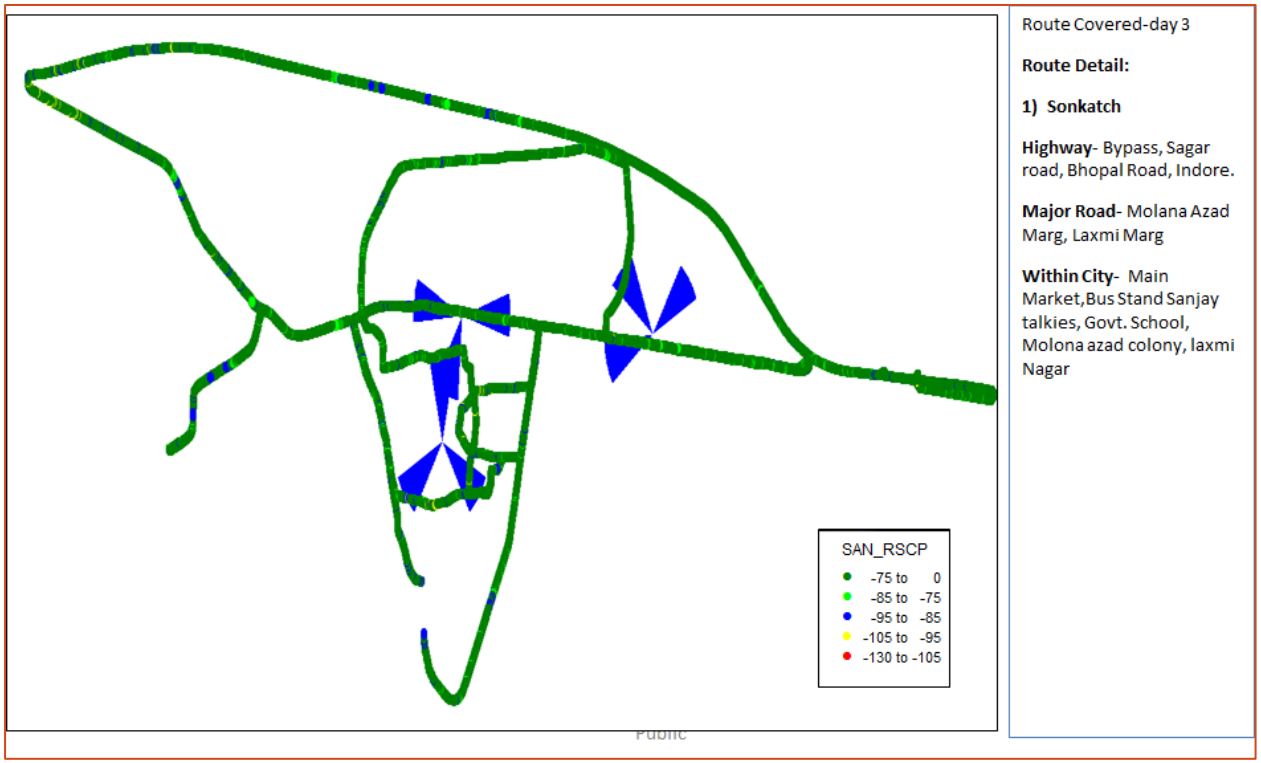
Within City- Bus Stand, Imli Bazar, Tilak Marg, JP colony, Nemawar road, Patwari Mohalla.

Highway – Kannod road, nemawar road

Major Road – Bus Stand, Tilak Marg, Dubey Mohalla,

JP colony.

10.1.2.5 Route Map - DEWAS DAY 3



10.1.2.6 Drive Test Results - DEWAS SSA 2G

Dewas	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		90.05%	82.65%	79.89%	91.13%	99.58%	94.44%	100.00%	73.95%	46.54%	69.73%	95.13%	93.72%	87.29%	85.49%
0 to -85 dBm				98.89%	98.12%	99.34%	99.57%	99.68%	99.18%	100.00%	93.65%	99.75%	93.69%	99.98%	98.96%	99.16%	98.24%
0 to -95 dBm				100.00%	99.96%	100.00%	100.00%	99.71%	99.94%	100.00%	99.64%	100.00%	99.21%	100.00%	99.49%	100.00%	99.95%
Voice quality	≥ 95%			97.58%	97.67%	93.18%	88.50%	98.99%	96.77%	97.19%	97.02%	97.29%	96.79%	99.22%	96.82%	99.33%	97.71%
CSSR	≥ 95%			100.00%	100.00%	98.33%	94.12%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.42%
%age Blocked calls				0.00%	0.00%	1.67%	5.88%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.58%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	0.89%	0.00%	0.00%	1.61%	1.69%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	100.00%	100.00%	99.70%	100.00%	97.60%	100.00%	100.00%	100.00%	99.51%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL failed to meet the benchmark for voice quality in outdoor& Indoor locations.

Call Set Success Rate (CSSR)

BSNL failed to meet the benchmark for CSSR in outdoor location.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations

10.1.2.7 Drive Test Results - DEWAS SSA 3G

Dewas	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Tata 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.10%	72.05%	37.52%	26.83%	99.95%	95.14%	99.14%	49.52%
0 to -85 dBm		100.00%	94.87%	67.36%	60.38%	100.00%	99.04%	100.00%	78.40%
0 to -95 dBm		100.00%	99.89%	100.00%	89.94%	100.00%	99.98%	100.00%	92.69%
Voice quality	≥ 95%	99.91%	99.81%	100.00%	99.90%	99.82%	98.14%	100.00%	97.96%
CSSR	≥ 95%	100.00%	100.00%	100.00%	99.41%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.59%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.59%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations.

10.1.2.1 Data Drive Test Results - DEWAS SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	NS	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100	100	100	100	100
Minimum download speed			102	37	95	85	530	92	72
Average throughput for Packet Data			125	71	139	128	903	106	169
Latency	<250ms		100	NA	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.2.2 Data Drive Test Results - DEWAS SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100
Minimum download speed		1212	419	1127	713
Average throughput for Packet Data		1347	503	2089	1584
Latency	<250ms	100	NA	100	100

All operators met the TRAI benchmark for data drive test.

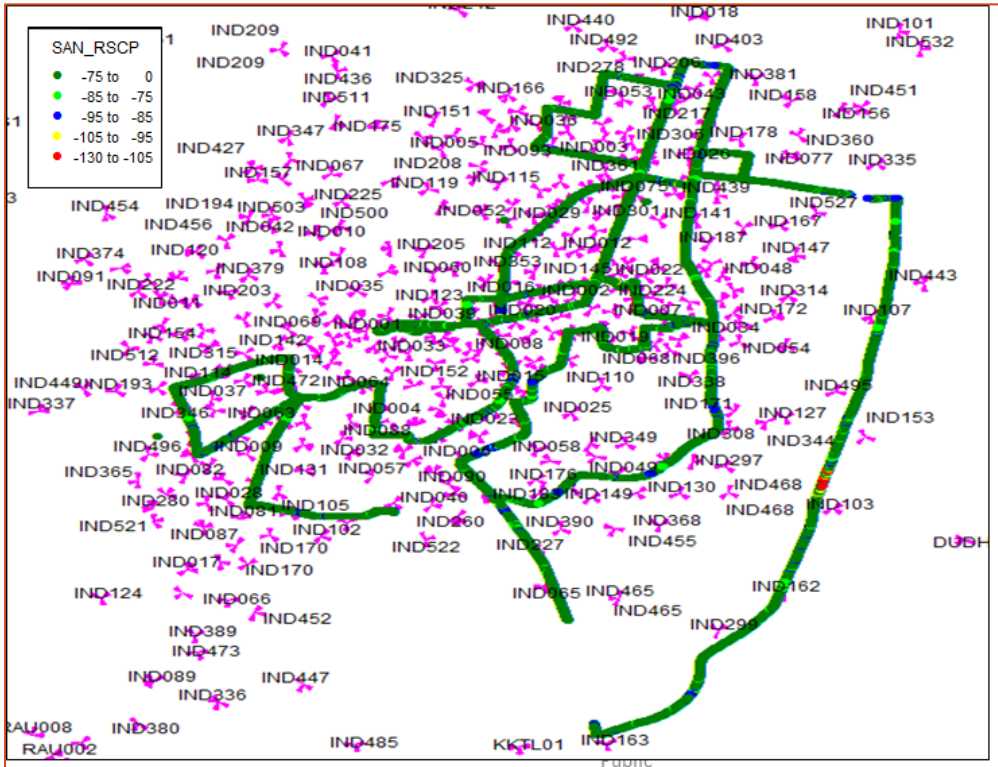
10.1.3 INDORE SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
July	Indore	07-11-2016	13/7/2016	265

10.1.3.1 Route Details – INDORE SSA

Category	Type of location	July Indore Day 1	Day 2	Day 3
Outdoor	Major Roads	Rajwada, Vijay nagar, Bapat Square, Tilak nagar, Shri Nagar Ext, Palasiya, MG Road, Patnipura, LIG Square, Race Course Road, MY Square, Banwarkua, Footikothi, Sudama nagar, Tejaji Nagar, Bhicholi Mardana.	Danagali, Gokulganj, Malgunj Road, Railway Station Mhow, Krishanganj, Devpuri colony, Kodariya, Shantinagar	Sanwer Village, Kesaripura, Dargah Chowk, Biloda Naytha, Govt. School sanwer, Khan River Over bridge, Sanwer Bypass.
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

10.1.3.2 Route Map - INDORE DAY 1



Route Covered-day 1

Route Detail:

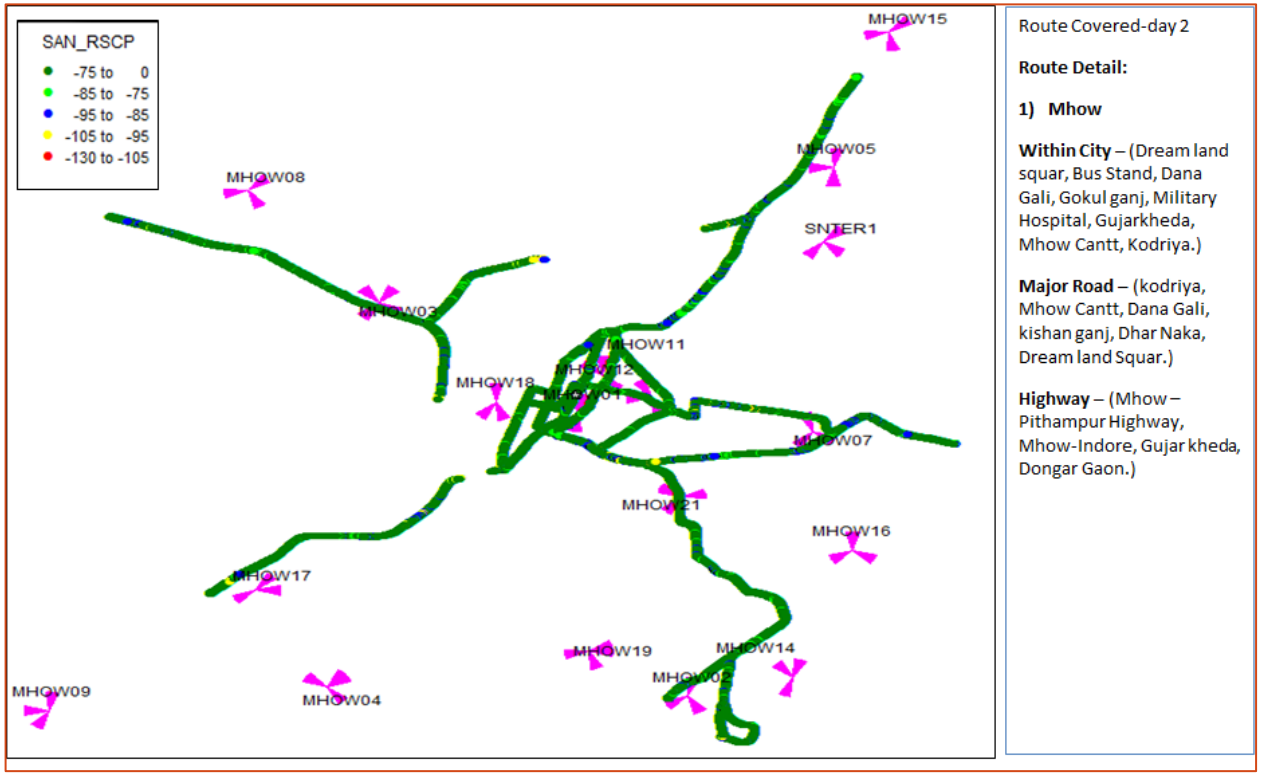
1) Indore

Within City – (Shagun tower, Radisson, Bombay Hospital, khajrana, kanadia , musakhedi, IT park, navlakha, chawani, Tilak nagar, Saket, Palasia,M.G. road, Regal, Jail raod,Malwa Mill,Patnipura, Bapat square,sch 114, LIG,)

Major road - (Palasia, Regal, Rnt marg, Chawani, Sapna Sangeeta, Transport nagar, Collectrate, Mhow naka, Chandan Nagar,Sudama Nagar,Choithram mandi)

Highway – (IT park, Tejaji nagar, Bicholi mardana, Bhandari resort, Best price Bypass, Radisson, Dewas Naka, Orbi Mall)

10.1.3.3 Route Map - INDORE DAY 2



Route Covered-day 2

Route Detail:

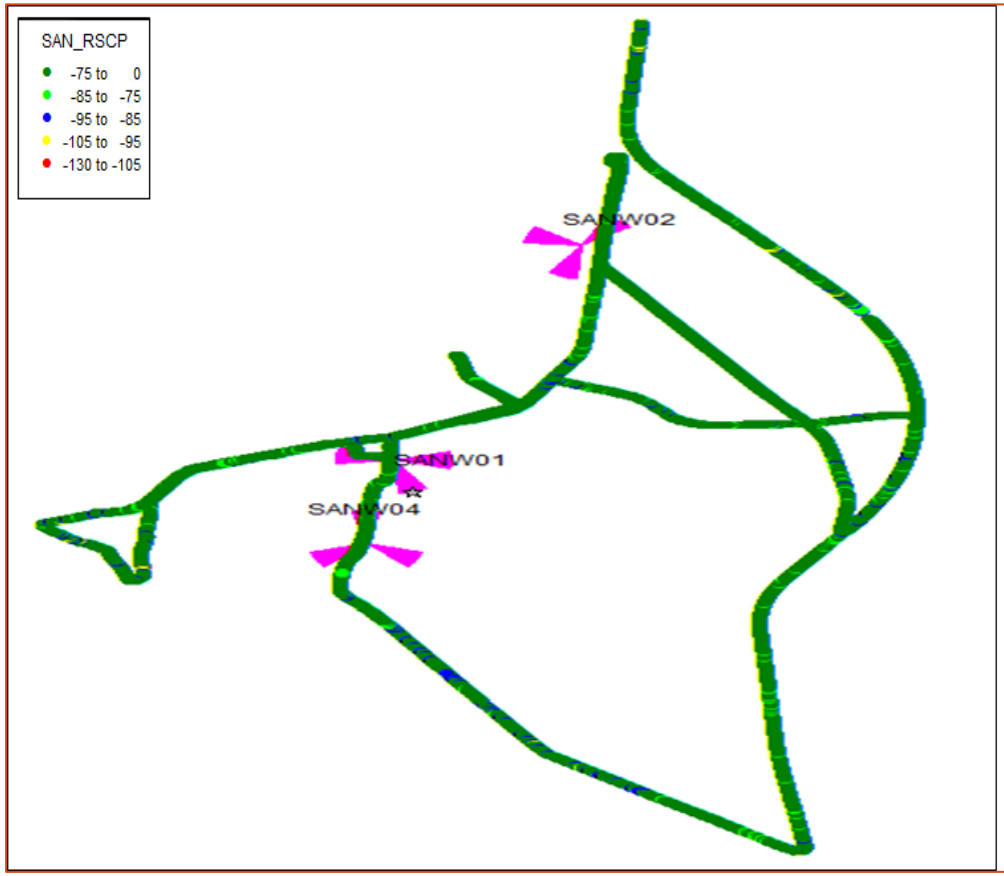
1) Mhow

Within City – (Dream land squar, Bus Stand, Dana Gali, Gokul ganj, Military Hospital, Gujarkheda, Mhow Cantt, Kodriya.)

Major Road – (kodriya, Mhow Cantt, Dana Gali, kishan ganj, Dhar Naka, Dream land Squar.)

Highway – (Mhow – Pithampur Highway, Mhow-Indore, Gujar kheda, Dongar Gaon.)

10.1.3.4 Route Map - INDORE DAY 3



Route Covered-day 3

Route Detail:

1) Sanwer

Within City- (Sanwer Main road, Main Market, Bus Stand, Tehsil office, Bank of india office, chota kashripura.)

Major Road- (kayastha khedi, Sanwer Main Market, Sanwer Bypass road.)

Highway- (Indore-Ujjain Highway)

10.1.3.1 Drive Test Results - INDORE SSA 2G

Indore	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		89.40%	89.04%	95.60%	82.63%	98.33%	95.47%	100.00%	70.18%	85.80%	60.35%	97.95%	94.08%	99.85%	95.86%
0 to -85 dBm				99.56%	98.71%	99.55%	96.35%	100.00%	99.35%	100.00%	93.69%	98.81%	89.62%	98.83%	99.04%	100.00%	99.52%
0 to -95 dBm				100.00%	99.91%	100.00%	99.92%	100.00%	99.93%	100.00%	99.78%	99.99%	99.93%	99.14%	99.74%	100.00%	99.93%
Voice quality	≥ 95%			98.30%	97.05%	85.24%	84.10%	98.20%	96.46%	99.57%	95.25%	96.96%	96.88%	99.17%	96.67%	98.46%	97.22%
CSSR	≥ 95%			100.00%	100.00%	96.67%	95.01%	100.00%	99.71%	100.00%	98.76%	100.00%	100.00%	100.00%	99.69%	100.00%	99.76%
%age Blocked calls				0.00%	0.00%	1.67%	4.99%	0.00%	0.29%	0.00%	1.24%	0.00%	0.00%	0.00%	0.31%	0.00%	0.24%
Call drop rate	≤ 2%			0.00%	0.00%	1.69%	4.63%	0.00%	0.00%	0.00%	1.26%	0.00%	0.58%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	99.53%	90.91%	87.12%	100.00%	100.00%	100.00%	99.26%	100.00%	100.00%	100.00%	97.72%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor location except BSNL.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations except BSNL in outdoor location.

10.1.3.2 Drive Test Results - INDORE SSA 3G

Indore	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Tata 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		82.52%	80.37%	4.15%	28.85%	99.82%	95.86%	31.77%	38.03%
0 to -85 dBm		99.75%	97.71%	33.03%	62.88%	100.00%	99.27%	75.42%	69.58%
0 to -95 dBm		100.00%	99.99%	80.04%	89.53%	100.00%	99.96%	94.63%	90.07%
Voice quality	≥ 95%	99.98%	98.07%	100.00%	99.31%	100.00%	95.64%	99.93%	97.56%
CSSR	≥ 95%	100.00%	100.00%	100.00%	95.92%	100.00%	99.40%	100.00%	99.01%
%age Blocked calls		0.00%	0.00%	0.00%	4.08%	0.00%	0.60%	0.00%	1.14%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	2.45%	0.00%	0.30%	0.00%	0.77%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

All operators met the benchmark except BSNL in outdoor locations.

10.1.3.1 Data Drive Test Results - INDORE SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	NS	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100	100	100	100	100
Minimum download speed			102	38	117	87	562	58	102
Average throughput for Packet Data			125	63	157	128	1091	115	152
Latency	<250ms		100	NA	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.3.2 Data Drive Test Results - INDORE SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100
Minimum download speed		1170	366	1841	1037
Average throughput for Packet Data		1370	452	2543	3023
Latency	<250ms	100	100	100	100

All operators met the TRAI benchmark for data drive test.

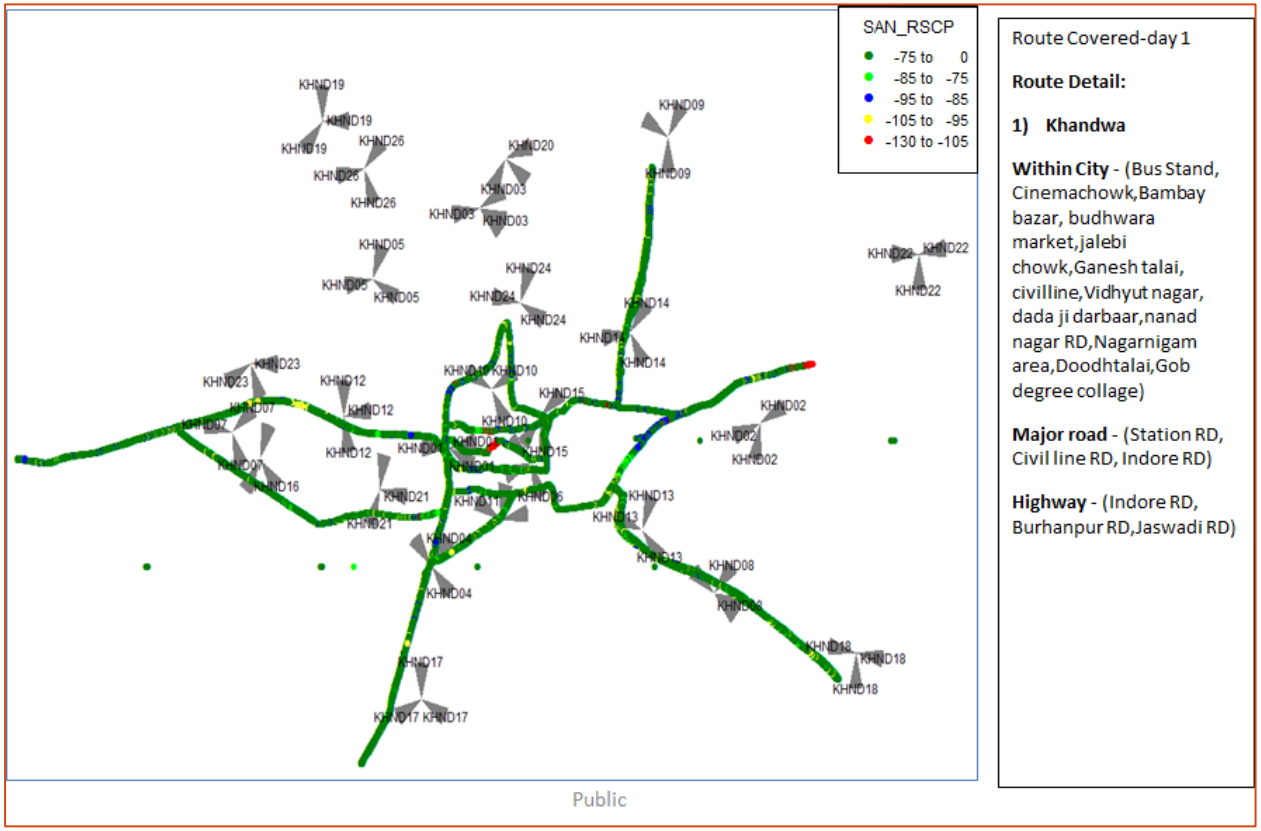
10.1.4 KHANDWA SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
July	KHANDWA	25-07-2016	27-07-2016	252

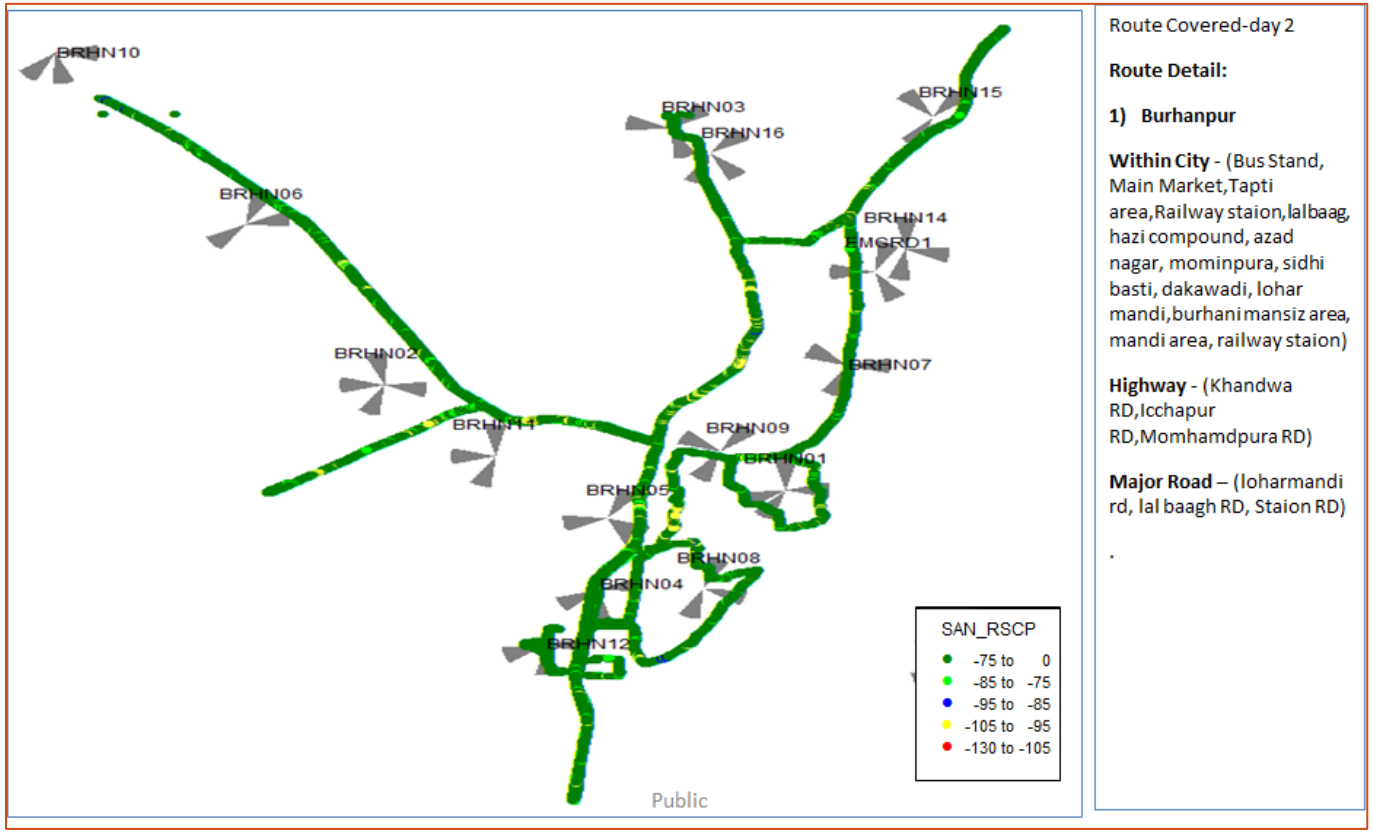
10.1.4.1 Route Details –KHANDWA SSA

Category	Type of location	July KHANDWA Day 1	Day 2	Day 3
Outdoor	Major Roads	Bombay Bazar, Railway station, Shanti Niketan Colony, Chhegaon Makhan road,Brampuri colony, Itwara Bazar, Gandhi chowk, Ghanta Ghar Chowk, Ganesha Talai, Wamanrao Deo Marg, Narmada Puram colony, Dhanwatri Nagar, GULMOHAR COLONY-PANDHNA ROAD, Gash Pura, Somotra Nagar Colony- Civil Line, Bus Stand	Burhanpur Railway station, Abhilasha Colony, Lalbagh Road, State bank Colony - Burhanpur, Shri nagar colony, Guru Govind Singh Colony, Sindibasti, LAL BAGH Area, Shiv Colony, Police line, Industrial Area, Transport Nagar, Sardar Patel Colony, MOMIN PURA, Gandhi Chauk, Burhanpur Bus Stand, SHANWARA, Jama Masjid Area, Forest compound, Nagar Wadi, Balaji Nagar, Sunder Nagar, Sanjay Nagar, Gita Datta Nagar	Main RD punsa, BSNL office RD, Udaipur RD, Indore RD, Outer Bypass, Indore RD, Bus stand, Punsa Local, Market, singhji coloney, govt quaters
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

10.1.4.1 Route Map - KHANDWA DAY 1



10.1.4.2 Route Map - KHANDWA DAY 2



Route Covered-day 2

Route Detail:

1) Burhanpur

Within City - (Bus Stand, Main Market,Tapti area,Railway staion,lalbaag, hazi compound, azad nagar, mominpura, sidhi basti, dakawadi, lohar mandi,burhani mansiz area, mandi area, railway staion)

Highway - (Khandwa RD,Icchapur RD,Momhamdpura RD)

Major Road – (loharmandi rd, lal baagh RD, Staion RD)

.

10.1.4.1 Route Map - KHANDWA DAY 3

10.1.4.2 Drive Test Results - KHANDWA SSA 2G

Khandwa	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		87.67%	65.80%	95.45%	76.98%	94.63%	85.70%	98.57%	67.49%	2.31%	21.30%	97.93%	93.82%	92.90%	86.71%
0 to -85 dBm				91.22%	92.35%	99.90%	96.54%	99.90%	96.62%	100.00%	91.25%	25.95%	60.27%	99.70%	99.21%	99.90%	98.73%
0 to -95 dBm				99.45%	99.41%	100.00%	99.95%	100.00%	99.62%	100.00%	99.45%	67.41%	95.45%	99.92%	99.82%	100.00%	99.94%
Voice quality	≥ 95%			99.42%	98.31%	97.48%	88.86%	99.06%	96.41%	99.05%	95.27%	97.54%	98.20%	99.30%	96.41%	99.01%	98.02%
CSSR	≥ 95%			100.00%	100.00%	100.00%	97.02%	100.00%	100.00%	100.00%	98.43%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	0.00%	2.98%	0.00%	0.00%	0.00%	1.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.59%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	97.47%	100.00%	100.00%	100.00%	97.22%	100.00%	100.00%	100.00%	99.24%	100.00%	100.00%

Voice Quality

BSNL failed to meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations.

10.1.4.3 Drive Test Results - KHANDWA SSA 3G

Khandwa	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Tata 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		75.04%	72.91%	46.83%	27.08%	99.95%	96.46%	1.81%	22.83%
0 to -85 dBm		100.00%	87.88%	47.17%	49.99%	100.00%	99.49%	56.31%	68.95%
0 to -95 dBm		100.00%	99.01%	92.71%	85.08%	100.00%	99.98%	100.00%	94.70%
Voice quality		100.00%	99.63%	100.00%	97.73%	100.00%	97.63%	99.94%	98.68%
CSSR	≥ 95%	100.00%	100.00%	100.00%	97.39%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls	≥ 95%	0.00%	0.00%	0.00%	3.27%	0.00%	0.00%	0.00%	0.00%
Call drop rate		0.00%	0.00%	0.00%	3.36%	0.00%	0.00%	0.00%	0.00%
Hands off success rate	≤ 2%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations except BSNL in outdoor location.

10.1.4.1 Data Drive Test Results - KHANDWA SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	NS	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100	100	100	100	100
Minimum download speed			102	26	112	86	75	77	141
Average throughput for Packet Data			125	44	149	96	80	115	189
Latency	<250ms		100	NA	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.4.2 Data Drive Test Results - KHANDWA SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100
Minimum download speed		1185	536	1136	978
Average throughput for Packet Data		1279	587	1689	2124
Latency	<250ms	100	NA	100	100

All operators met the TRAI benchmark for data drive test.

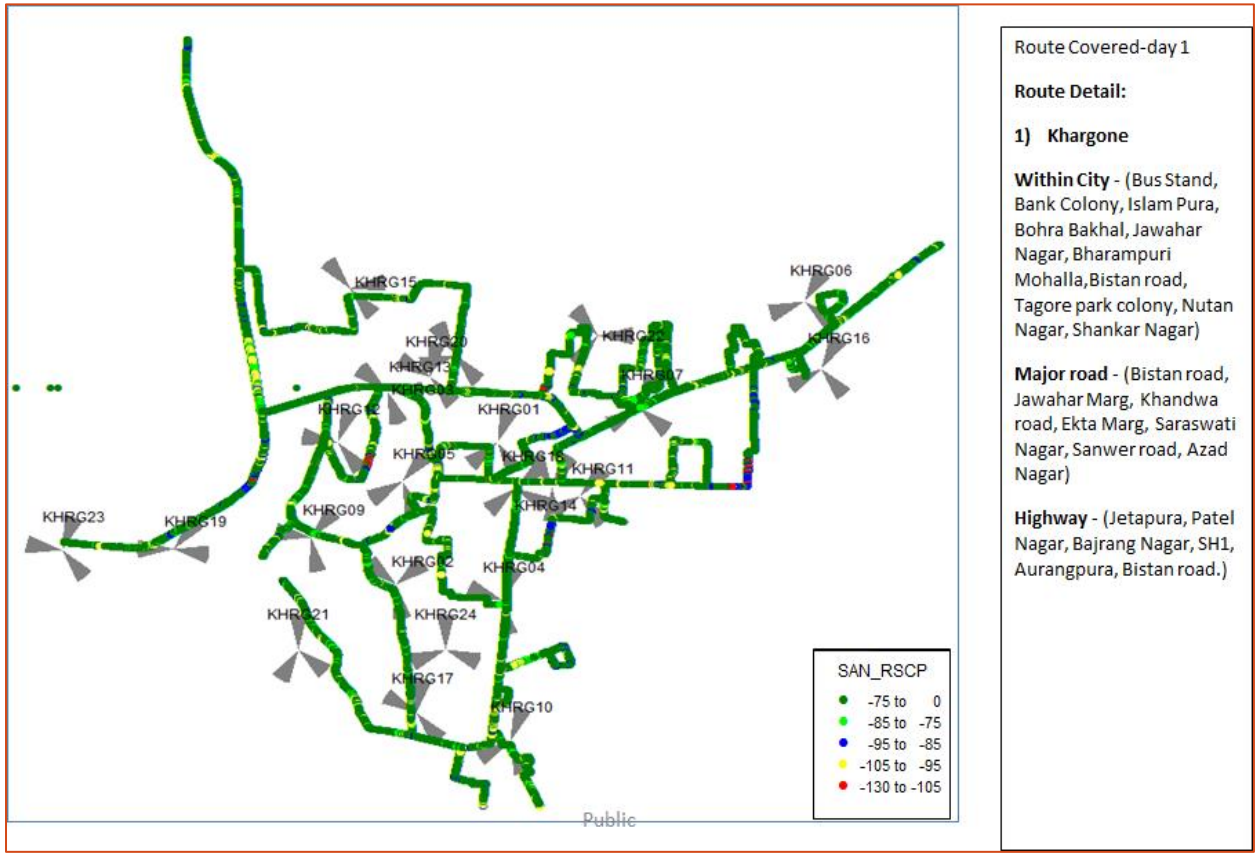
10.1.5 KHARGONE SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
July	KHARGONE	28-07-2016	30-07-2016	266

10.1.5.1 Route Details –KHARGONE SSA

Category	Type of location	July KHARGONE Day 1	Day 2	Day 3
Outdoor	Major Roads	BSNL telephone Exchange, Mochipura, Ekta marg, Sangay Nagar, Gandhi nagar, Brij Vihar Colony, Kunda Nagar, Vishwa Shakha Nagar, Gawshinde Nagar, Ramkrishna Colony, Ganga Nagar, Shri Krishna Talkies Chouraha, Tikal Path, Bank Colony, Rahimpura, Julwaniya Road, Kasarawad Road.	Bus Stand Maheshwar, Jai stambh squre, Mahalakshmi Nagar, Panchwati Colony , Bazar Chowk, Mahatma Gandi Marg, Mominpura, Itawadi, Dhamnod Road	Bus Stand Barwani, Club Road, Ranipura, MG Road, Ranjit Chowk, Zanda Chowk, Laxmi Talkies Square, Satpura Estate, Ekta Nagar , Anand Nagar, Navalpura, Mahavir Nagar , Subhash Marg, Thikari Road, Kukhsi Highway.
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

10.1.5.2 Route Map - KHARGONE DAY 1



Route Covered-day 1

Route Detail:

1) Khargone

Within City - (Bus Stand, Bank Colony, Islam Pura, Bohra Bakhal, Jawahar Nagar, Bharampuri Mohalla,Bistan road, Tagore park colony, Nutan Nagar, Shankar Nagar)

Major road - (Bistan road, Jawahar Marg, Khandwa road, Ekta Marg, Saraswati Nagar, Sanwer road, Azad Nagar)

Highway - (Jetapura, Patel Nagar, Bajrang Nagar, SH1, Aurangpura, Bistan road.)

10.1.5.3 Route Map - KHARGONE DAY 2

Route Covered-day 2

Route Detail:

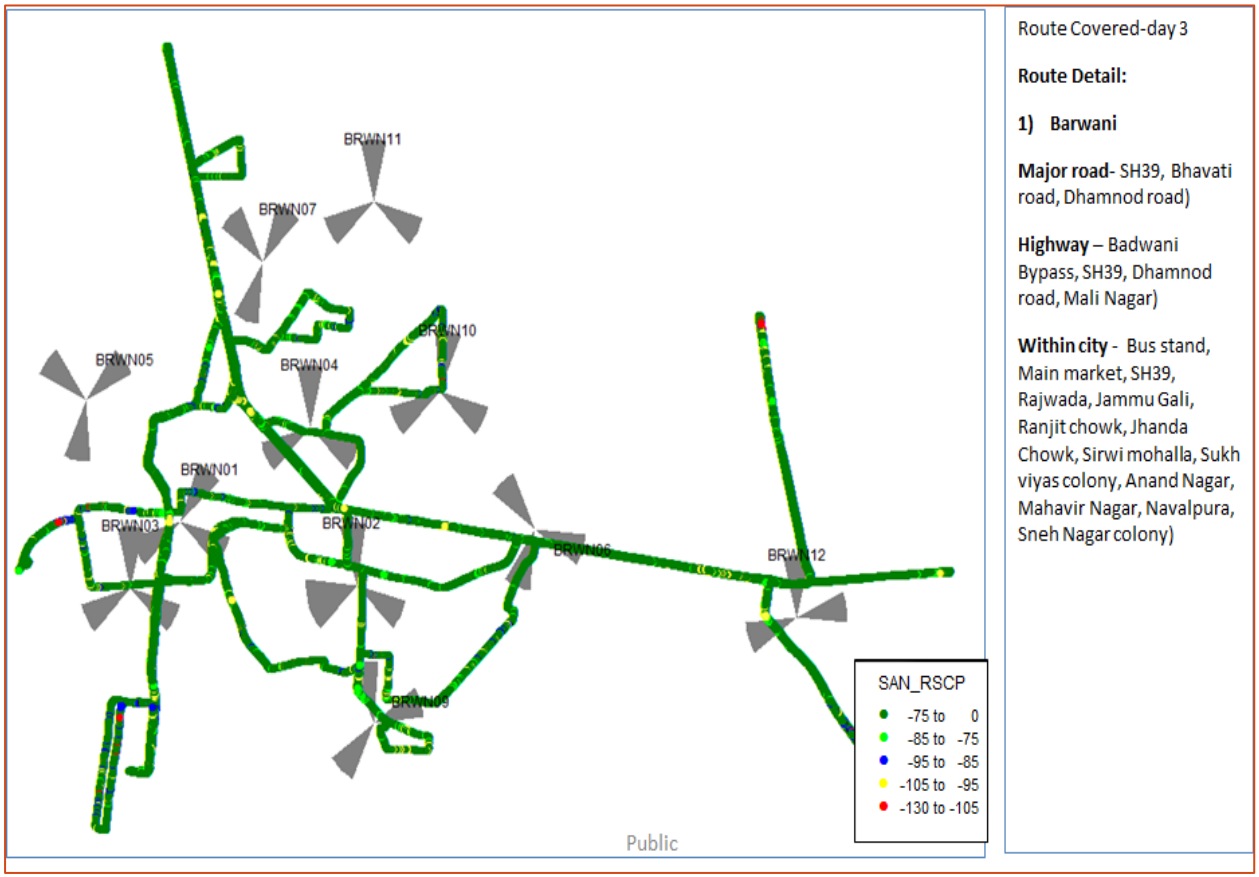
1) Maheshwar

Within City - (Bus Stand, Main Market,Mominpura, Malaxminagar, Itawadi, Panchwanti Colony, Maheshwar fort)

Highway - (Dhamnod road, Mahetwada road, Mominpura)

Major Road – Mahatma Gandi marg, Mahetwada road, Mominpura, vallabh vihar colony)

10.1.5.4 Route Map - KHARGONE DAY 3



Route Covered-day 3

Route Detail:

1) Barwani

Major road- SH39, Bhavati road, Dhamnod road)

Highway – Badwani Bypass, SH39, Dhamnod road, Mali Nagar)

Within city - Bus stand, Main market, SH39, Rajwada, Jammu Gali, Ranjit chowk, Jhanda Chowk, Sirwi mohalla, Sukh viyas colony, Anand Nagar, Mahavir Nagar, Navalpura, Sneh Nagar colony)

10.1.5.5 Drive Test Results - KHARGONE SSA 2G

KHARGONE	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		98.50%	74.38%	97.4%	84.09%	96.64%	84.44%	98.84%	76.60%	98.48%	21.85%	95.35%	90.87%	92.00%	86.86%
0 to -85 dBm				99.98%	94.36%	100.00%	97.93%	99.92%	96.23%	100.00%	97.00%	100.00%	53.78%	99.98%	98.83%	99.75%	98.92%
0 to -95 dBm				100.00%	99.62%	100.00%	99.91%	100.00%	99.69%	100.00%	99.93%	100.00%	87.93%	100.00%	99.91%	100.00%	99.96%
Voice quality	≥ 95%			98.55%	97.82%	94.47%	91.76%	98.26%	97.62%	98.63%	98.18%	100.00%	96.68%	97.87%	96.57%	98.69%	97.22%
CSSR	≥ 95%			100.00%	100.00%	96.67%	96.62%	100.00%	100.00%	100.00%	98.50%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	3.33%	3.38%	0.00%	0.00%	0.00%	1.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	2.23%	0.00%	0.00%	0.00%	1.22%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	92.11%	98.75%	97.80%	99.51%	100.00%	99.65%	100.00%	100.00%	100.00%	100.00%	100.00%	99.67%

Voice Quality

BSNL failed to meet the benchmark in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations.

Call Drop Rate

All operators met the benchmark except BSNL in outdoor locations.

10.1.5.6 Drive Test Results - KHARGONE SSA 3G

July	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Tata 3G	
KHARGONE		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		86.70%	71.36%	31.32%	15.63%	99.85%	95.81%	NS	
0 to -85 dBm		100.00%	94.28%	64.96%	47.33%	100.00%	99.17%		
0 to -95 dBm		100.00%	100.00%	70.35%	82.44%	100.00%	99.99%		
Voice quality	≥ 95%	99.98%	99.92%	100.00%	99.42%	99.39%	98.54%		
CSSR	≥ 95%	100.00%	100.00%	100.00%	81.43%	100.00%	100.00%		
%age Blocked calls		0.00%	0.00%	0.00%	2.50%	0.00%	0.00%		
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	3.26%	0.00%	0.00%		
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%		

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations except BSNL 3G

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations except BSNL 3G in outdoor location.

10.1.5.1 Data Drive Test Results - KHARGONE SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	NS	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100	100	100	100	100
Minimum download speed			102	45	130	87	72	74	66
Average throughput for Packet Data			125	67	164	90	81	110	171
Latency	<250ms		100	NA	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.5.2 Data Drive Test Results - KHARGONE SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100	NA
Succesful Data Transmission upload speed attempts	>75%	100	100	100	
Minimum download speed		1195	427	1042	
Average throughput for Packet Data		1209	447	1787	
Latency	<250ms	100	NA	100	

All operators met the TRAI benchmark for data drive test.

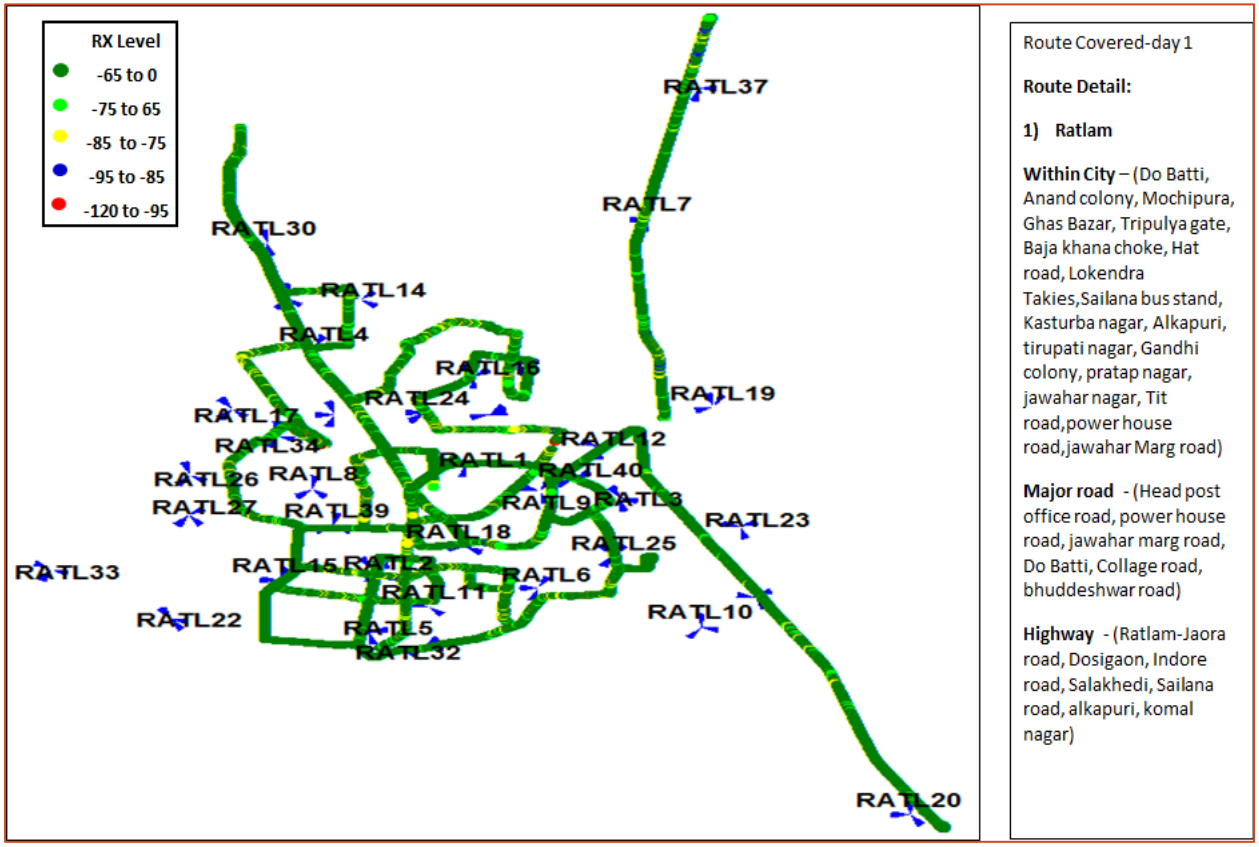
10.1.6 RATLAM SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
July	RATLAM	19-07-2016	21-07-2016	261

10.1.6.1 Route Details –RATLAM SSA

Category	Type of location	July RATLAM		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Station Road Ratlam, New Road, Do Batti Chowraha, Jhali Talab, Anand Colony, Shanti Nagar, Lokandra Taklies, Chandani Chowk, Tejaji Nagar, Ashok nagar, Palace Road, College Road, Manak Chowk, Azad Chowk, Sahar Sarai , Rajendra nagar, Shastri Nagar, Ram Mandir, Dongre Nagar, Jawahar Nagar, Indira nagar, Gandhi Nagar, Barbad Hanuman Mandir, Jaora Road, Sailana Road.	Station Road, Laxmi Bai Road,Somwariya road,neem chowk bazar road,pipli bazar, Shabnam Takies, Tal naka, New Dhan mandi road, Dadavadi road, railway station road, ravan darwaza road,pipli bazar, Ringnod-jaora road, NH79 Ratlam- Neemuch Highway, Bema khadi	Ranipura, bus stand, main market, Dharola road, Ranipura, bus stand, Main Market, Vikramgarh a lot railway station , Ranipura, Bus stand, barod road
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

10.1.6.2 Route Map - RATLAM DAY 1



Route Covered-day 1

Route Detail:

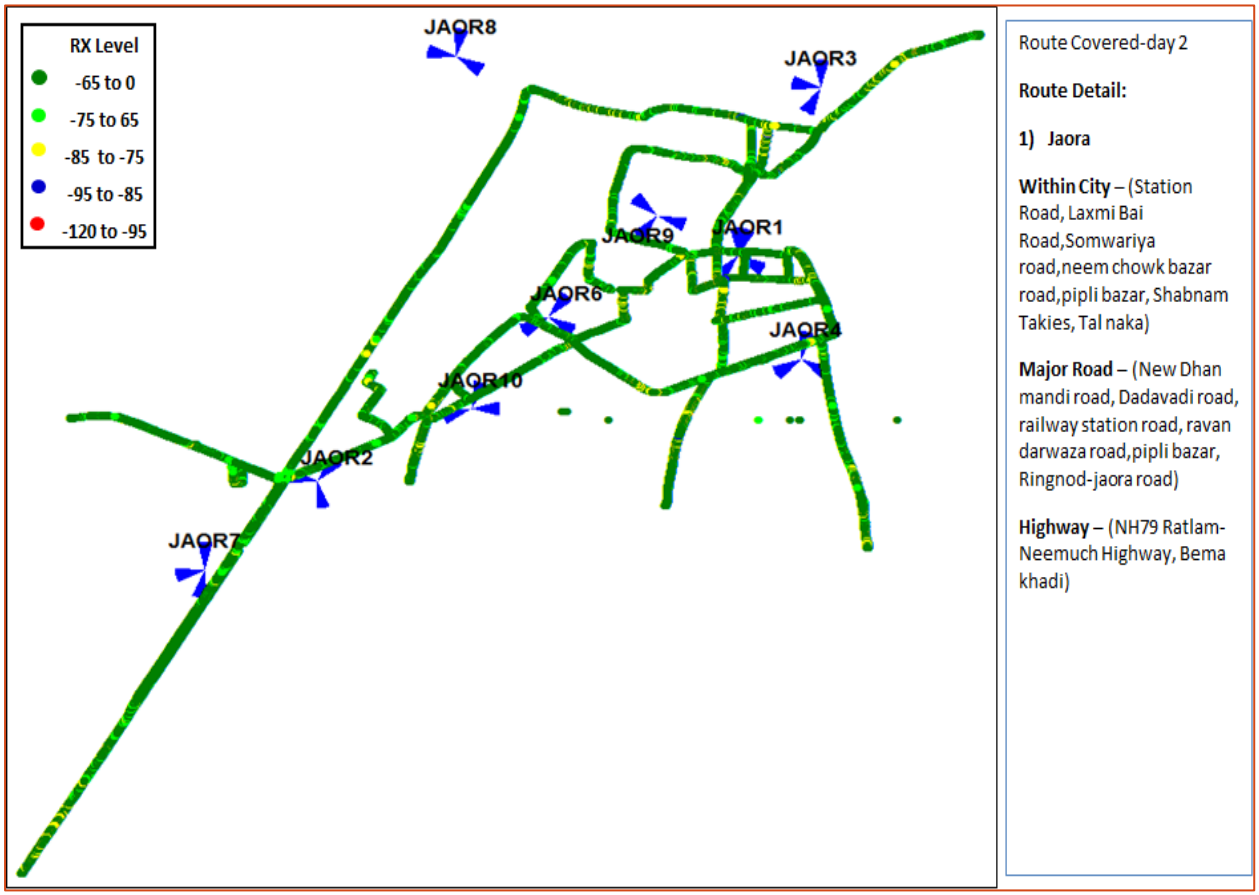
1) Ratlam

Within City – (Do Batti, Anand colony, Mochipura, Ghas Bazar, Tripulya gate, Baja khana choke, Hat road, Lokendra Takies,Sailana bus stand, Kasturba nagar, Alkapuri, tirupati nagar, Gandhi colony, pratap nagar, jawahar nagar, Tit road,power house road,jawahar Marg road)

Major road - (Head post office road, power house road, jawahar marg road, Do Batti, Collage road, bhuddeshwar road)

Highway - (Ratlam-Jaora road, Dosigaon, Indore road, Salakhedi, Sailana road, alkapuri, komal nagar)

10.1.6.3 Route Map - RATLAM DAY 2



Route Covered-day 2

Route Detail:

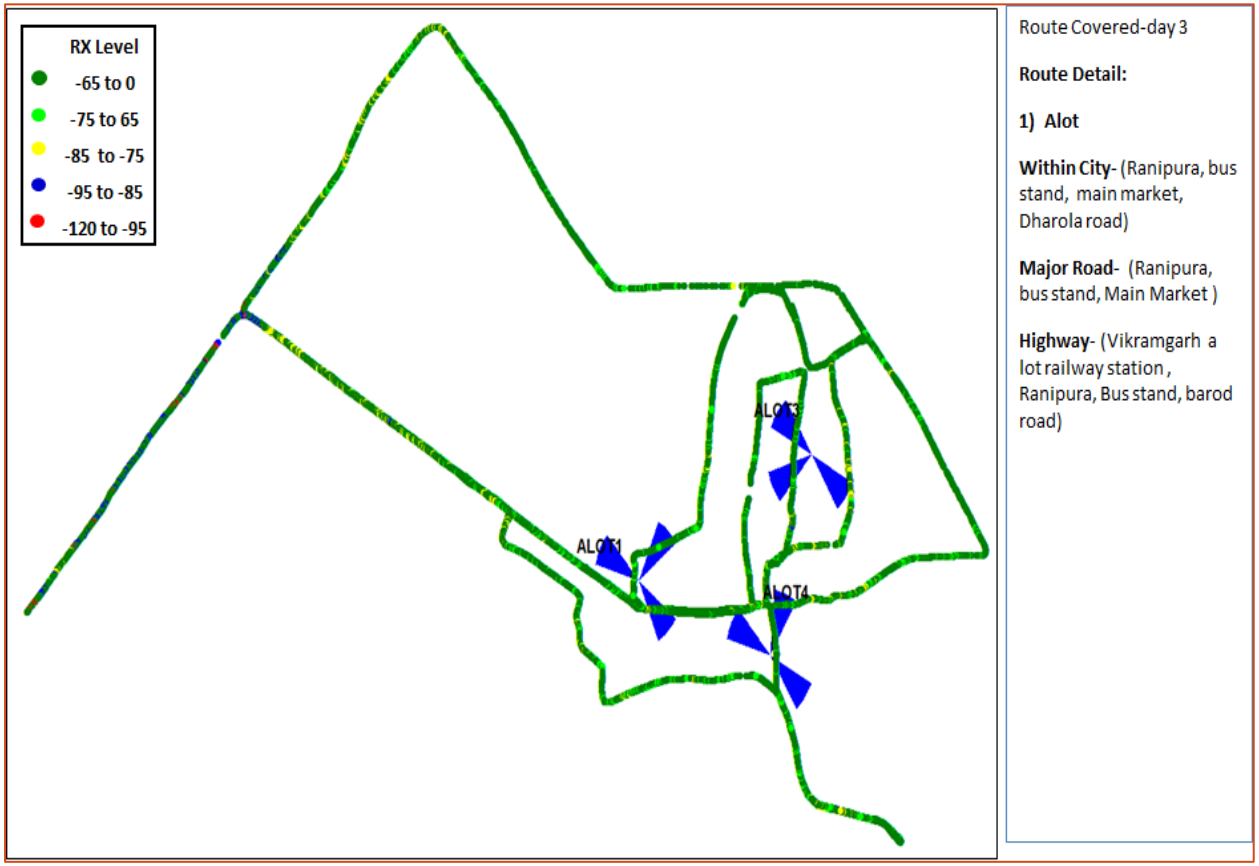
1) Jaora

Within City – (Station Road, Laxmi Bai Road,Somwariya road,neem chowk bazar road,pipli bazar, Shabnam Takies, Tal naka)

Major Road – (New Dhan mandi road, Dadavadi road, railway station road, ravan darwaza road,pipli bazar, Ringnod-jaora road)

Highway – (NH79 Ratlam-Neemuch Highway, Bema khadi)

10.1.6.4 Route Map - RATLAM DAY 3



Route Covered-day 3

Route Detail:

1) Alot

Within City- (Ranipura, bus stand, main market, Dharola road)

Major Road- (Ranipura, bus stand, Main Market)

Highway- (Vikramgarh a lot railway station , Ranipura, Bus stand, barod road)

10.1.6.5 Drive Test Results - RATLAM SSA 2G

RATLAM	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		97.39%	84.51%	75.23%	75.87%	100.00%	81.26%	98.49%	94.66%	100.00%	72.51%	100.00%	39.69%	99.87%	91.64%	100.00%	93.41%
0 to -85 dBm		100.00%	93.92%	97.82%	97.50%	100.00%	98.06%	100.00%	99.46%	100.00%	92.41%	100.00%	69.86%	100.00%	98.60%	100.00%	99.48%
0 to -95 dBm		100.00%	99.32%	99.85%	99.77%	100.00%	99.99%	100.00%	99.94%	100.00%	99.20%	100.00%	94.72%	100.00%	99.81%	100.00%	99.98%
Voice quality	≥ 95%	99.43%	99.09%	99.31%	97.26%	95.05%	89.69%	98.70%	96.68%	99.55%	95.18%	97.87%	97.43%	99.94%	97.57%	97.91%	98.39%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	98.33%	95.42%	100.00%	100.00%	100.00%	98.28%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	1.67%	4.58%	0.00%	0.00%	0.00%	1.72%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	3.32%	0.00%	0.40%	0.00%	1.05%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	93.49%	100.00%	99.71%	100.00%	99.38%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark except BSNL in outdoor locations

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations except BSNL in outdoor location

10.1.6.6 Drive Test Results - RATLAM SSA 3G

July	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Tata 3G	
RATLAM		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		96.96%	65.61%	5.04%	13.77%	99.50%	96.28%	27.76%	32.56%
0 to -85 dBm		100.00%	92.84%	76.87%	42.76%	100.00%	99.48%	99.56%	64.43%
0 to -95 dBm		100.00%	98.50%	100.00%	82.86%	100.00%	100.00%	100.00%	94.03%
Voice quality	≥ 95%	99.99%	98.31%	100.00%	99.04%	99.82%	97.47%	99.78%	98.27%
CSSR	≥ 95%	100.00%	100.00%	97.50%	97.97%	100.00%	100.00%	100.00%	99.45%
%age Blocked calls		0.00%	0.00%	2.50%	2.03%	0.00%	0.00%	0.00%	0.62%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	4.15%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations except BSNL in outdoor location

10.1.6.1 Data Drive Test Results - RATLAM SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	100	100
Minimum download speed		78	102	49	128	86	76	49	82
Average throughput for Packet Data		86	125	82	161	128	82	98	198
Latency	<250ms	100	100	NA	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.6.2 Data Drive Test Results - RATLAM SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100
Minimum download speed		1216	439	1088	770
Average throughput for Packet Data		1307	468	1893	1996
Latency	<250ms	100	NA	100	100

All operators met the TRAI benchmark for data drive test.

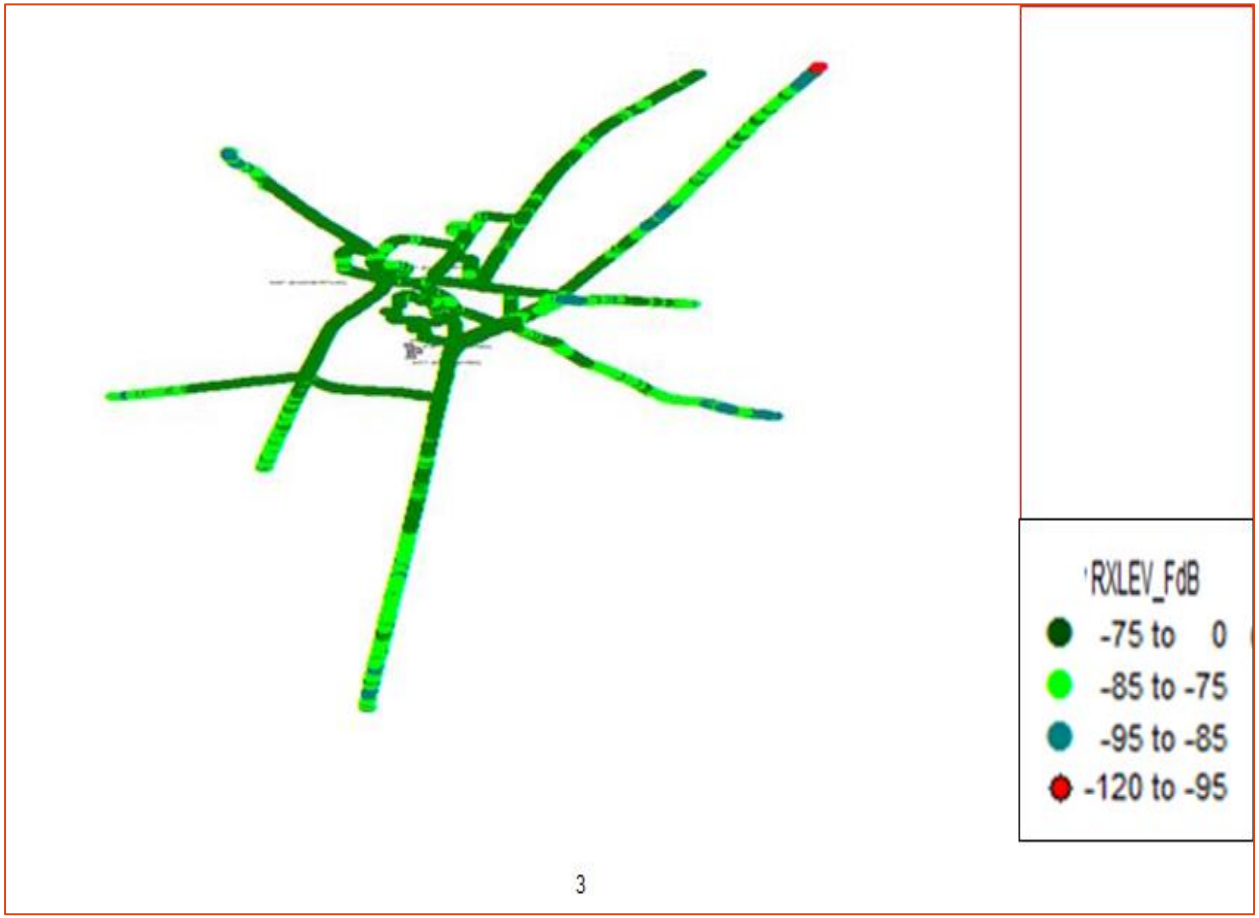
10.1.7 CHHINDWARA SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
August	CHHINDWARA	22-08-2016	24-08-2016	250

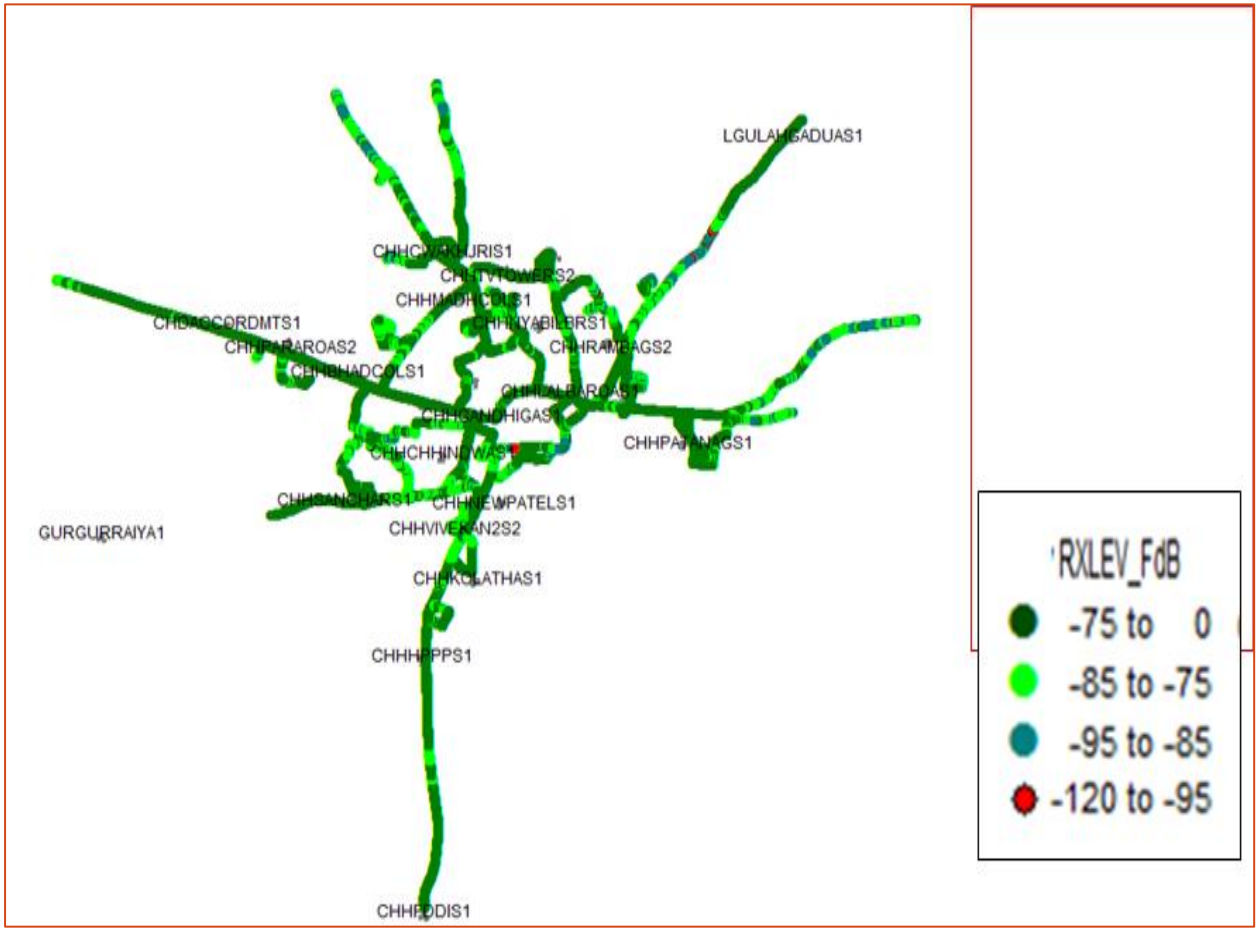
10.1.7.1 Route Details –CHHINDWARA SSA

Category	Type of location	August CHHINDWARA		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Mohagaon Road, Mokshadham Road, Khandseoni Road	Gorya Road, Partala Road,Ramgari Road,Dungariya Road	Bamhani Road, Kalamagaon Road, pardi Road
	Highways	Nagpur highway, Jabalpur Highway,Sagar Highway	Jabalpur Highway, Nagpur Highway, Narsinghpur Highway	JABALPUR Highway, Nagpur HIGHWAY
	With in the City	Gafoor Colony,Sausar Railway station,BSNL Campus, BUS Statnd, swata chowk,Gajana Colony	BUS Stand, BSNL OFFICE, Railways station,Madhuwan Colony, Karan Hotel,Naya Bail Bazar,Satyam Shivam Colony,Ganesh Colony,Police line,Pahada cOlony, Old Chhapa Khaana,Triloki Nagar,Kola Dhana,Shanti Colony,DMR Office,Sanchar Colony,Patel Nagar,Polo Ground, Panchsheel Nagar	GuruNanak Ward,Pandhari WARD,Gaytri Colony,Nandpur,MPEB Colony,Meghanath Ward,Ravidas WARD, Railway station, Bus Stop
Indoor	Shopping complex			
	Office complex			

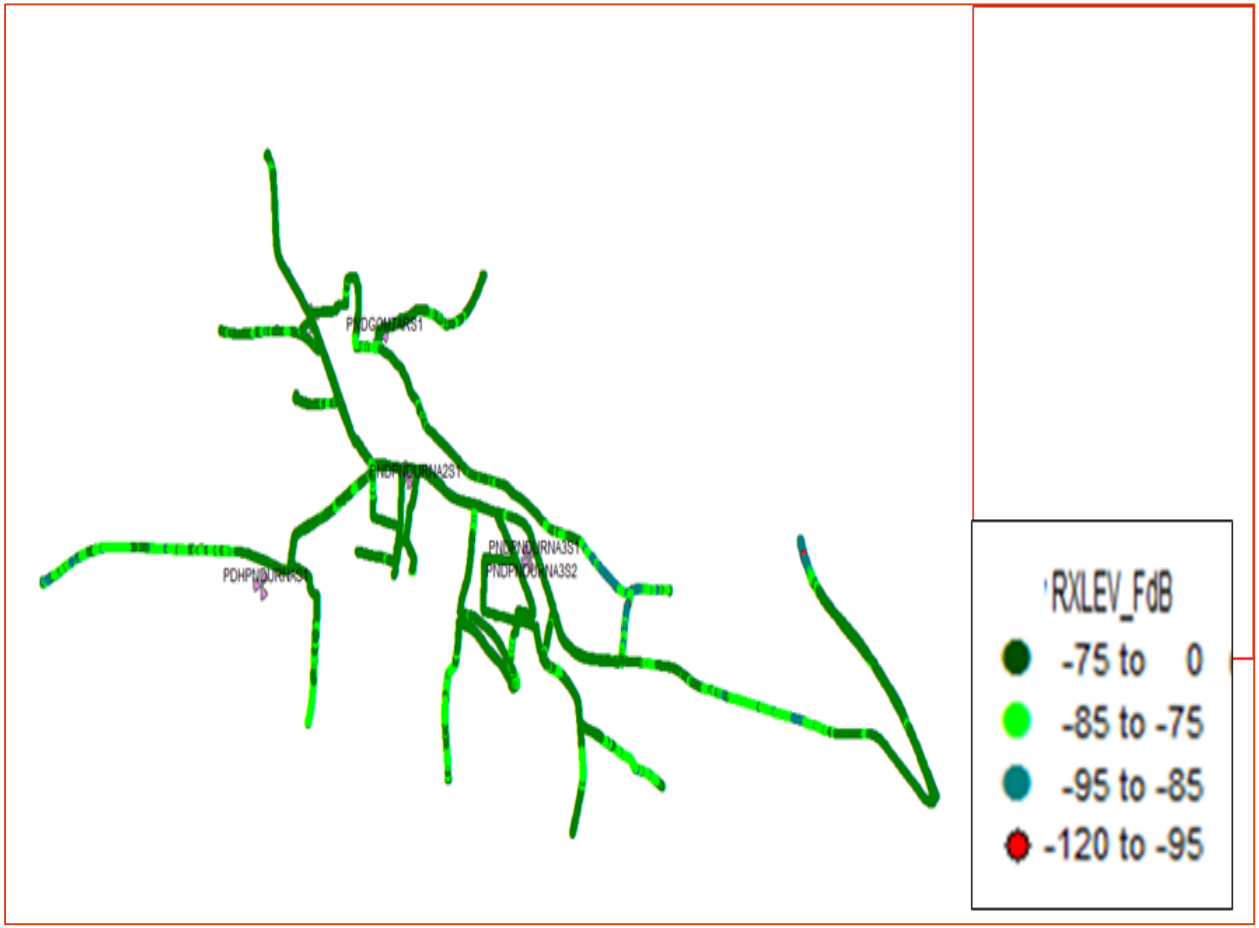
10.1.7.2 Route Map - CHHINDWARA DAY 1



10.1.7.3 Route Map - CHHINDWARA DAY 2



10.1.7.4 Route Map - CHHINDWARA DAY 3



10.1.7.5 Drive Test Results - CHHINDWARA SSA 2G

Chhindwara	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		97.76%	87.51%	75.34%	65.38%	36.71%	34.87%	94.33%	88.19%	100.00%	78.07%	No Service		96.35%	79.55%	100.00%	73.38%
0 to -85 dBm		99.99%	95.78%	94.69%	92.29%	93.54%	86.42%	99.97%	98.86%	100.00%	94.91%			99.40%	91.97%	100.00%	95.33%
0 to -95 dBm		100.00%	99.69%	99.86%	99.52%	99.99%	99.50%	100.00%	99.97%	100.00%	99.50%			99.98%	98.62%	100.00%	99.89%
Voice quality	≥ 95%	99.44%	99.07%	97.93%	97.42%	96.58%	95.37%	94.89%	95.74%	97.18%	95.56%			98.22%	97.49%	99.37%	97.83%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	99.05%	100.00%	99.74%	100.00%	99.74%			100.00%	100.00%	100.00%	99.44%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.95%	0.00%	0.26%	0.00%	0.26%			0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.29%	0.00%	0.77%	0.00%	0.26%			0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	87.96%	100.00%	98.49%	100.00%	99.64%			100.00%	100.00%	100.00%	100.00%

Voice Quality

IDEA 2G failed to meet the benchmark in indoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations.

10.1.7.6 Drive Test Results - CHHINDWARA SSA 3G

August	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Tata 3G	
Chhindwara		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.14%	79.62%	34.25%	14.33%	100.00%	79.24%	99.97%	98.52%
0 to -85 dBm		100.00%	94.83%	30.85%	20.30%	100.00%	97.29%	100.00%	99.18%
0 to -95 dBm		100.00%	99.32%	24.29%	30.69%	100.00%	100.00%	100.00%	99.68%
Voice quality	≥ 95%	99.85%	99.19%	97.81%	70.60%	99.62%	98.18%	99.99%	99.58%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	99.39%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.61%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	2.25%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	99.01%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark except BSNL in outdoor locations

Call Set Success Rate (CSSR)

BSNL 3G failed to meet the benchmark in indoor locations

Call Drop Rate

BSNL 3G failed to meet the benchmark in outdoor locations

10.1.7.1 Data Drive Test Results - CHHINDWARA SSA-2G

August									
Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	NA	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100		100	100
Minimum download speed		81	102	22	124	74		76	112
Average throughput for Packet Data		112	124	24	158	122		76	156
Latency	<250ms	100	100	NA	100	100		100	100

All operators met the TRAI benchmark for data drive test.

10.1.7.2 Data Drive Test Results - CHHINDWARA SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100
Minimum download speed		1221	90	2395	2943
Average throughput for Packet Data		1228	75	3133	5886
Latency	<250ms	100	100	100	100

All operators met the TRAI benchmark for data drive test.

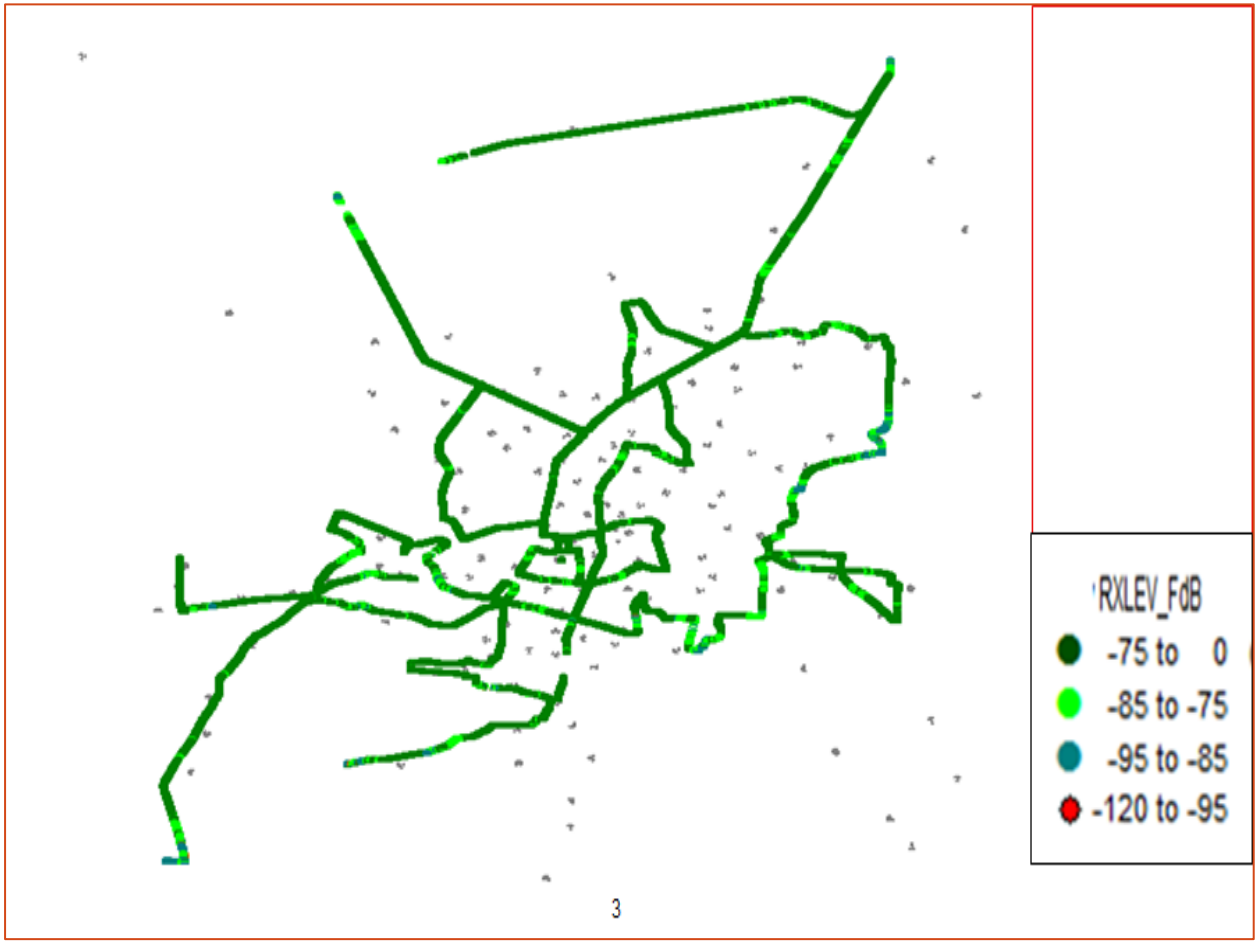
10.1.8 JABALPUR SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
August	Jabalpur	08-03-2016	08-05-2016	266

10.1.8.1 Route Details –JABALPUR SSA

Category	Type of location	August Jabalpur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Katangi Road, Katni Road, Bargi Road, Vijay Nagar, Yadav Colony, Damoh Naka, Adhartal,Kanchanpur,Kanchghar,Indra Market, Civil Line, Sadar, Gorakhpur, Madan Mehal, Shastri Nagar, Medical, Russel Chowk, Napier Town, Shastri Brige, Ranital, Garha	Jabalpur Road, Katangi Road, Tendu Kheda Road, Shahpura Road, Police Station, Bus Stand,	Maihar Road, Jabalpur Road, Chandia Road, Ghanta Ghar, Railway Station, Bus Stand, Police Station, Madhav Nagar, Mission Chowk, Subhash Chowk, Azad Chowk, Shastri Nagar
Outdoor	Highways			
Outdoor	With in the City			
Indoor	Shopping complex			
Indoor	Office complex			

10.1.8.2 Route Map - JABALPUR DAY 1



10.1.8.3 Route Map - JABALPUR DAY 2

10.1.8.4 Route Map - JABALPUR DAY 3

10.1.8.5 Drive Test Results - JABALPUR SSA 2G

Jabalpur	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		98.98%	86.35%	41.94%	34.14%	52.15%	73.14%	62.17%	69.89%	51.13%	36.21%	91.15%	87.46%	65.91%	80.41%
0 to -85 dBm				100.00%	98.50%	95.04%	89.10%	89.07%	86.94%	94.19%	93.44%	51.21%	76.29%	98.80%	96.67%	95.05%	95.84%
0 to -95 dBm				100.00%	99.95%	95.59%	99.51%	99.90%	99.72%	100.00%	99.88%	98.28%	98.33%	99.95%	99.65%	99.84%	99.39%
Voice quality	≥ 95%			98.81%	96.51%	93.60%	95.54%	98.16%	96.16%	98.49%	96.80%	NA	NA	99.73%	97.17%	98.83%	97.22%
CSSR	≥ 95%			100.00%	100.00%	100.00%	98.79%	100.00%	99.53%	100.00%	98.93%	100.00%	100.00%	100.00%	100.00%	100.00%	99.77%
%age Blocked calls				0.00%	0.00%	0.00%	1.21%	0.00%	0.47%	0.00%	1.07%	0.00%	0.00%	0.00%	0.00%	0.00%	0.23%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	2.21%	0.00%	0.24%	0.00%	0.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	96.50%	100.00%	99.25%	100.00%	99.64%	100.00%	99.85%	100.00%	99.89%	100.00%	99.33%

Voice Quality

All operators met the benchmark except BSNL 2G indoor locations

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

BSNL 2G failed to meet the benchmark in outdoor locations

10.1.8.6 Drive Test Results - JABALPUR SSA 3G

August	B'mark	Airtel		BSNL		Idea		Tata 3G	
Jabalpur		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		92.91%	45.21%	0.07%	17.99%	70.46%	87.39%	82.97%	98.06%
0 to -85 dBm		99.87%	76.85%	4.64%	46.98%	93.48%	96.90%	98.35%	98.86%
0 to -95 dBm		100.00%	94.80%	92.30%	76.53%	99.66%	99.73%	99.89%	99.61%
Voice quality	≥ 95%	98.83%	98.18%	64.10%	91.47%	98.48%	95.21%	99.91%	99.31%
CSSR	≥ 95%	100.00%	100.00%	100.00%	98.28%	100.00%	99.23%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	1.72%	0.00%	0.77%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	2.92%	0.00%	0.77%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations, except BSNL in indoor and outdoor location.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

BSNL 3G failed to meet the benchmark in outdoor locations

10.1.8.1 Data Drive Test Results - JABALPUR SSA-2G

August									
Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	NS	100	95	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	97	100	100	100	100	100
Minimum download speed			102	125	98	99	82	100	140
Average throughput for Packet Data			125	125	142	136	82	100	178
Latency	<250ms		100	100	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.8.2 Data Drive Test Results - JABALPUR SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	NA	100	100
Succesful Data Transmission upload speed attempts	>75%	100		100	100
Minimum download speed		1170		2216	4040
Average throughput for Packet Data		1648		2944	4040
Latency	<250ms	100		NA	100

All operators met the TRAI benchmark for data drive test.

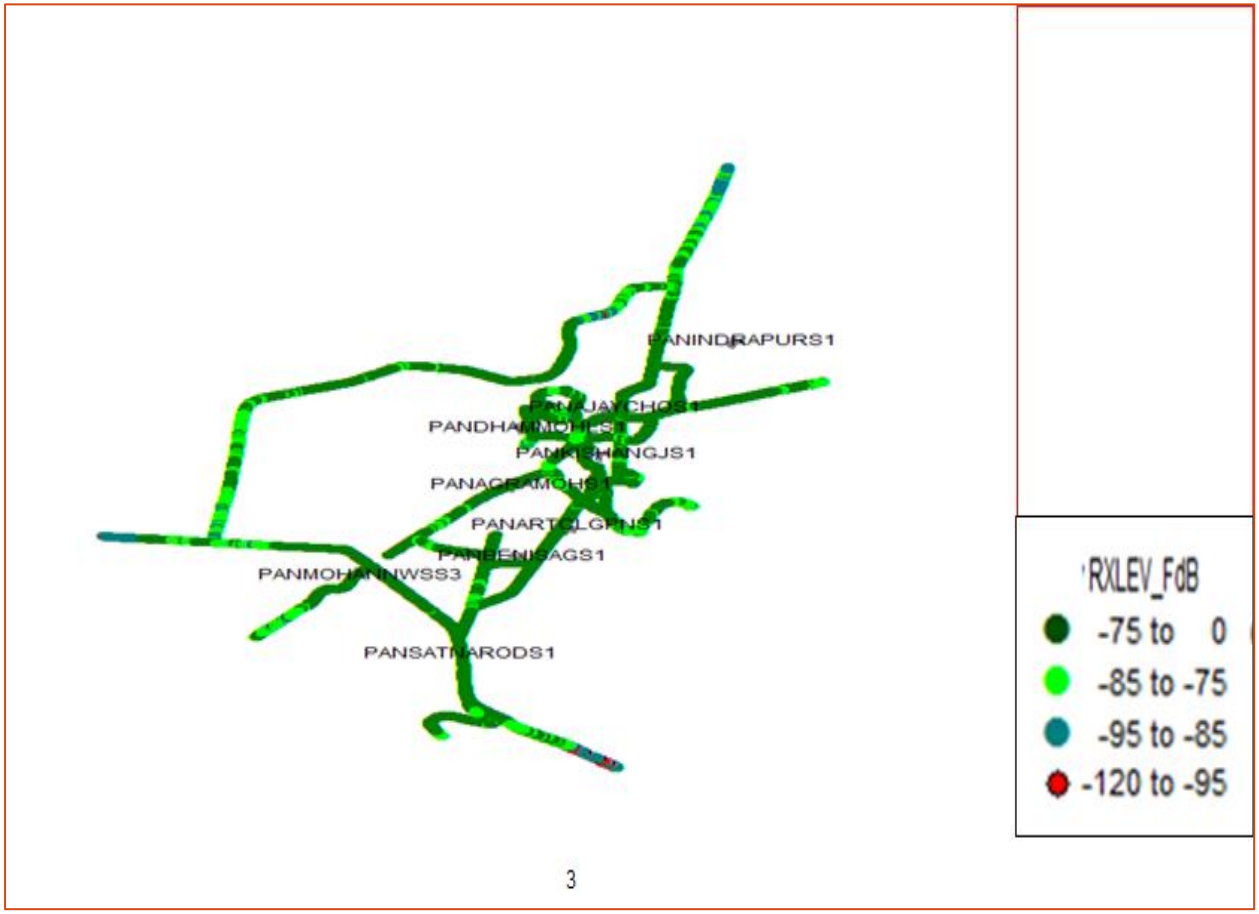
10.1.9 PANNA SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
August	Panna	30/8/2016	09-01-2016	255

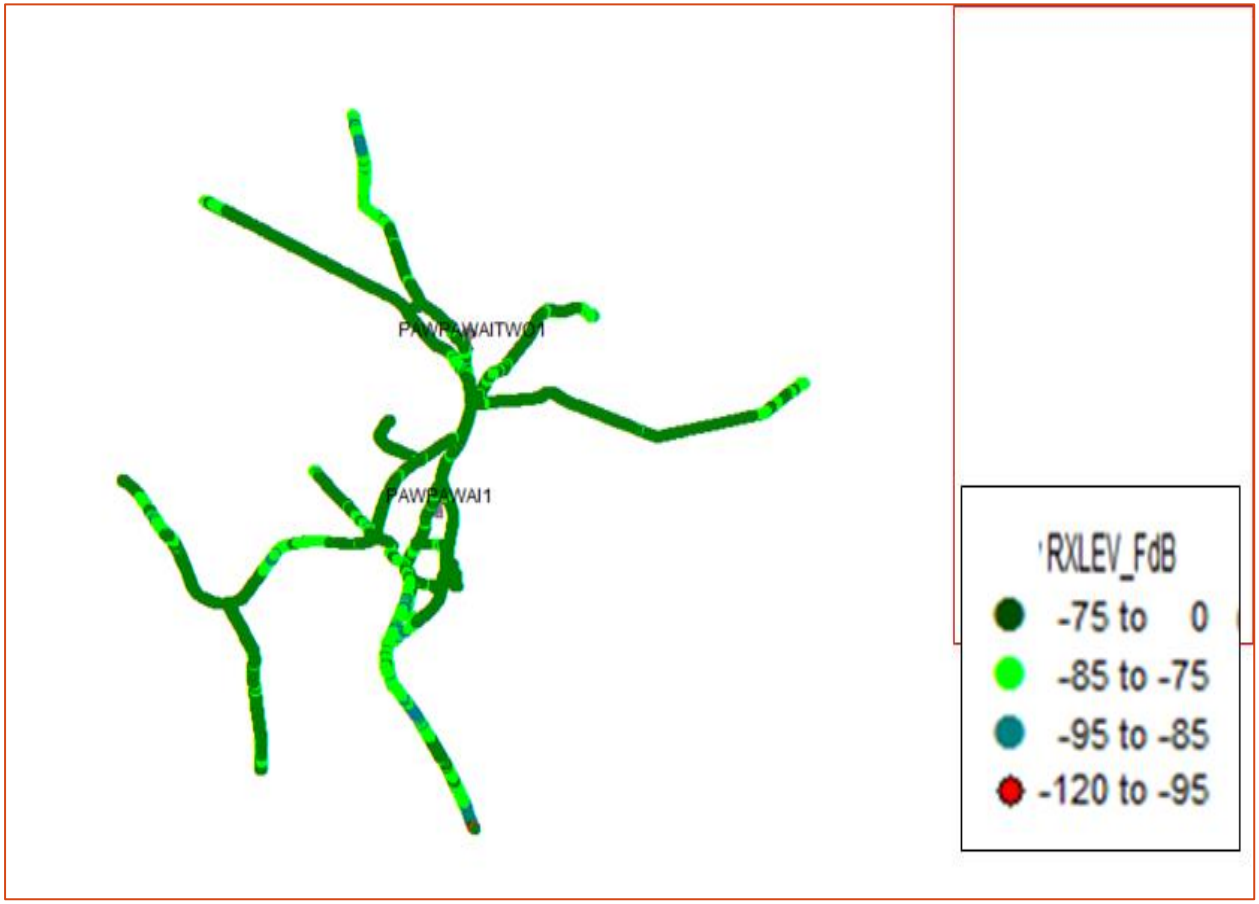
10.1.9.1 Route Details –PANNA SSA

Category	Type of location	August		
		Panna		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Ajaygarh Road,Nagod Road,Amanganj Road,Khajraho Road,Bus Stop,DISTRICT HOSPITAL,Radhika Colony,Tikuriya Mohalla,Benisagar Mohalla,Guest House,Panna	Amanganj Road,Katni Road,Bus Stop	Amanganj Road,Paderi Road,Luhargaon Road,Bus Stop,Govt. H S School Gunour
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

10.1.9.2 Route Map - PANNA DAY 1



10.1.9.3 Route Map - PANNA DAY 2



10.1.9.4 Route Map - PANNA DAY 3

10.1.9.5 Drive Test Results - PANNA SSA 2G

Panna	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.92%	81.90%	91.30%	65.50%	41.94%	34.14%	66.17%	52.34%	70.93%	68.64%	No Service		72.82%	51.27%	67.46%	65.06%
0 to -85 dBm		100.00%	92.72%	99.90%	92.23%	95.04%	89.10%	91.07%	89.90%	98.16%	92.13%			98.48%	90.53%	90.47%	88.53%
0 to -95 dBm		100.00%	99.00%	100.00%	99.72%	95.59%	99.51%	99.84%	99.03%	100.00%	98.95%			99.81%	98.89%	99.96%	98.77%
Voice quality	≥ 95%	99.39%	98.39%	98.29%	98.42%	93.60%	95.54%	99.17%	97.40%	99.69%	98.03%			99.37%	96.86%	99.59%	98.60%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	98.79%	100.00%	99.53%	100.00%	99.51%			100.00%	100.00%	100.00%	99.09%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	1.21%	0.00%	0.47%	0.00%	0.49%			0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	2.21%	0.00%	0.00%	0.00%	0.50%			0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	96.50%	100.00%	100.00%	100.00%	98.68%			100.00%	100.00%	100.00%	100.00%

Voice Quality

BSNL 2G failed to meet the benchmark in indoor locations

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

BSNL 3G failed to meet the benchmark in outdoor locations

10.1.9.6 Drive Test Results - PANNA SSA 3G

August	B'mark	Airtel		BSNL		Idea		Tata 3G	
Panna		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		100.00%	39.29%	Not Participated		99.92%	80.06%	NA	
0 to -85 dBm		100.00%	74.61%			100.00%	95.67%		
0 to -95 dBm		100.00%	93.43%			100.00%	99.51%		
Voice quality	≥ 95%	100.00%	99.48%			100.00%	98.08%		
CSSR	≥ 95%	100.00%	100.00%			100.00%	99.12%		
%age Blocked calls		0.00%	0.00%			0.00%	0.88%		
Call drop rate	≤ 2%	0.00%	0.00%			0.00%	0.00%		
Hands off success rate		NA	100.00%			100.00%	100.00%		

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations.

10.1.9.1 Data Drive Test Results - PANNA SSA-2G

August									
Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	NA	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100		100	100
Minimum download speed		110	102	125	113	96		120	66
Average throughput for Packet Data		129	125	125	169	137		120	162
Latency	<250ms	100	100	100	100	100		100	100

All operators met the TRAI benchmark for data drive test.

10.1.9.2 Data Drive Test Results - PANNA SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	Not participating	100	NA
Succesful Data Transmission upload speed attempts	>75%	100		100	
Minimum download speed		1473		2769	
Average throughput for Packet Data		2155		3626	
Latency	<250ms	100		100	

All operators met the TRAI benchmark for data drive test.

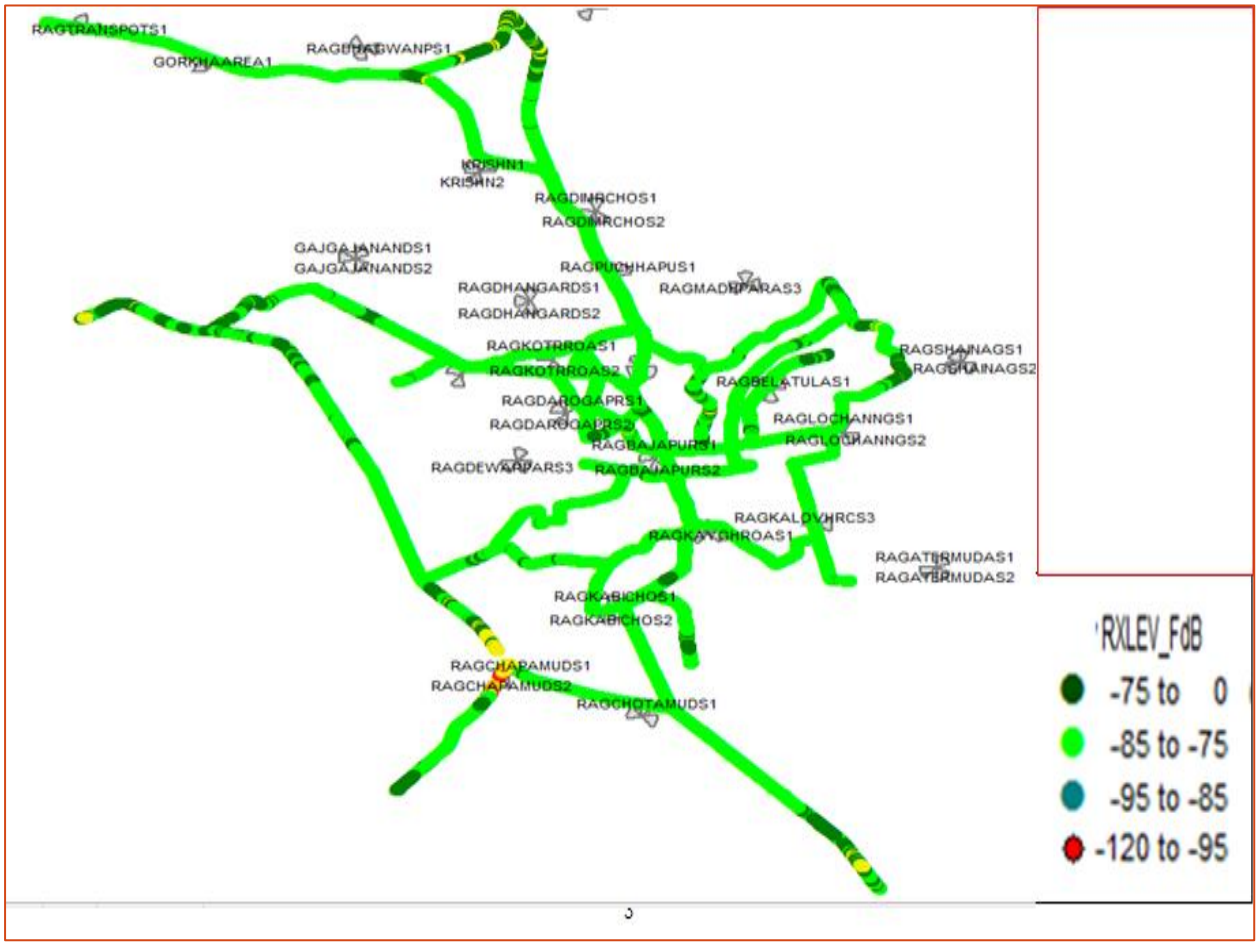
10.1.10 RAIPUR SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
August	RAIPUR	08-08-2016	13-08-2016	502

10.1.10.1 Route Details – RAIPUR SSA

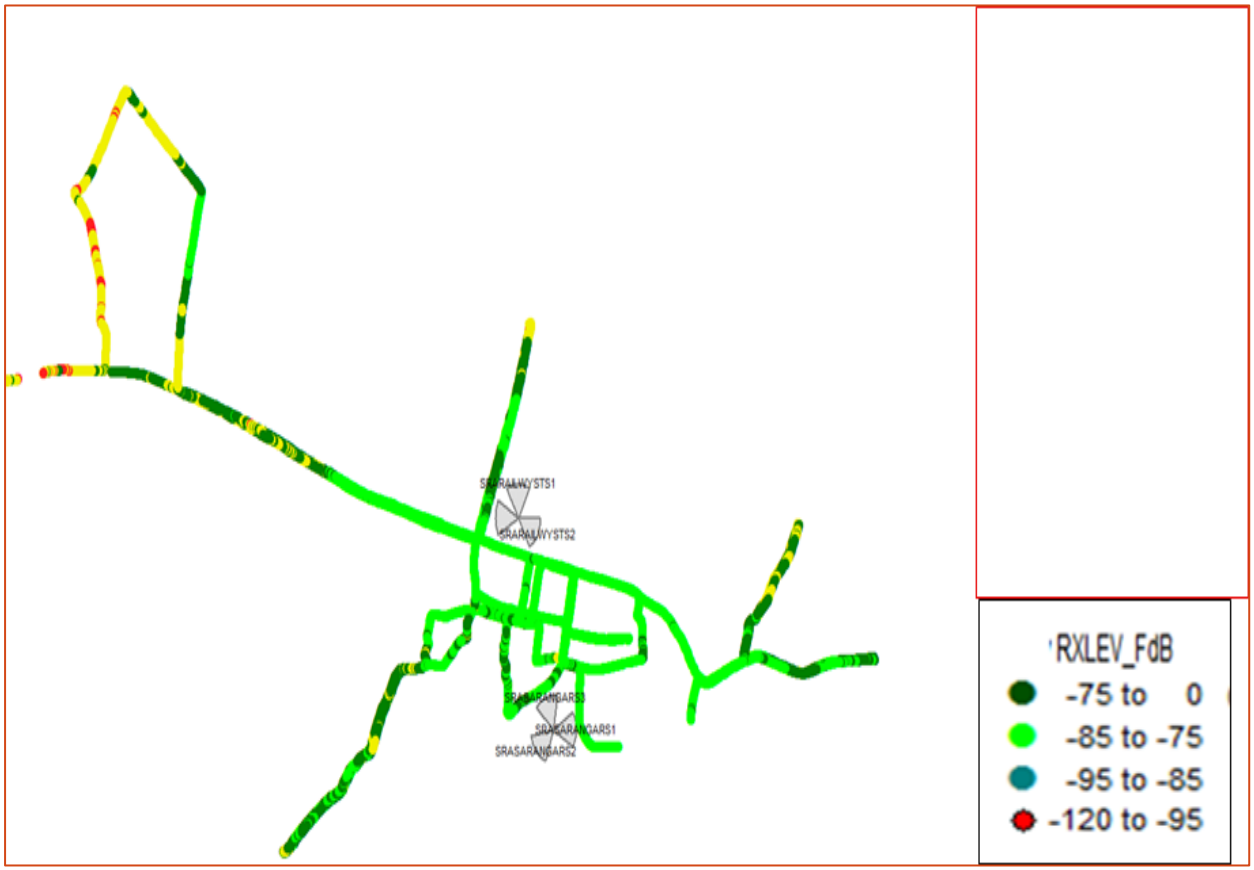
Category	Type of location	August RAIPUR					
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Outdoor	Major Roads	GE Road , Shankar Nagar , Rajendra nagar , Amlidhi , MG Road , Sadar Bazar , Gol Bazar , DDU Nagar , Ring Road 1 , Ring Road 2 , Telibandha , Shyam Nagar , Avanti Vihar , Pandri , Vidhansabha Road , Ashoka Ratan , Civil Lines , Sunder Nagar , Dagania , PachpediNaka , Police Line , MMI Hospital , Katora Talab , Lakhe Nagar , Station Road , Devendranagar , Fafadhi and Jail Road.	Itwari bazar , Banyapara, Brahmanpara , Shantichowk , Sihava chowk , Bus stand , Batena , Gujrati colony , Housing Board colony , Hatkeshar , Subhashnagar , VIP bazar , Bhatgaon , Gokullpur , Ambedkar chowk , shivaji chowk ,and Golbazar	Busstand , Priyanka colony , Pachari Talab , Sabjimarket , Sarojini Chowk , Galaxy School , Kurud Mandi , Dhamtari Road and Raipur Road	Bus stand , Kharora Road , GE Reoad , Mahamaya talab , Nakhi talab , Lodhipara , Brahmanpara , Govt School , Police station , Railway Station Road , Narayan Bagh.	Busstand , Panchsheel nagar , Kokadi , MG Road , Sadar Road , Krishna Nagar , Civil Lines , Irrigation colony , Jain colony , Bajpai colony , Bilha Road , Bhatapara Road and Raipur.	Hatnipara, Railway station , Parshuram Ward , Mathadevalaya Ward , Avrethipara , Patpar , Bhatapara Mandi , Gurunanak ward , Hatbandh Road , Nandghat Road , Baloda Bazar , Road .
	Highways						
	With in the City						
Indoor	Shopping complex						
	Office complex						

10.1.10.2 Route Map - RAIPUR DAY 1



10.1.10.3 Route Map - RAIPUR DAY 2

10.1.10.4 Route Map - RAIPUR DAY 3



10.1.10.5 Drive Test Results – RAIPUR SSA 2G

RAIPUR	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.33%	81.46%	86.05%	72.07%	50.59%	69.04%	62.95%	65.07%	99.11%	59.03%	39.85%	68.41%	91.14%	87.61%	76.18%	80.03%
0 to -85 dBm		100.00%	91.39%	99.69%	92.57%	97.93%	91.44%	98.91%	94.12%	100.00%	94.17%	89.44%	94.53%	98.90%	97.32%	98.36%	98.23%
0 to -95 dBm		100.00%	99.30%	100.00%	99.20%	99.98%	99.23%	99.97%	99.75%	100.00%	99.81%	100.00%	99.90%	99.96%	99.71%	100.00%	99.98%
Voice quality	≥ 95%	99.46%	98.92%	98.90%	98.08%	99.01%	98.51%	98.79%	95.92%	98.90%	95.13%	99.75%	99.67%	99.88%	98.87%	98.99%	96.93%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	98.37%	97.63%	100.00%	99.26%	100.00%	99.62%	100.00%	100.00%	100.00%	100.00%	100.00%	99.45%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	1.63%	1.04%	0.00%	0.74%	0.00%	0.38%	0.00%	0.00%	0.00%	0.00%	0.00%	0.55%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.83%	1.37%	0.00%	0.15%	0.00%	0.26%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	96.58%	100.00%	99.42%	#DIV/0!	98.26%	100.00%	99.97%	100.00%	99.88%	100.00%	100.00%

Voice Quality

All the operators met the benchmark.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations.

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations

10.1.10.6 Drive Test Results - RAIPUR SSA 3G

August	B'mark	Airtel		BSNL		Idea		Tata 3G	
RAIPUR		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		76.86%	82.87%	67.09%	30.29%	77.74%	75.27%	96.75%	92.63%
0 to -85 dBm		98.23%	96.01%	88.99%	65.71%	99.99%	94.55%	99.61%	96.39%
0 to -95 dBm		100.00%	99.46%	99.40%	95.75%	100.00%	99.74%	99.93%	99.03%
Voice quality	≥ 95%	99.98%	99.28%	99.95%	96.17%	98.96%	97.17%	99.99%	99.15%
CSSR	≥ 95%	100.00%	100.00%	98.80%	98.25%	100.00%	99.65%	100.00%	99.84%
%age Blocked calls		0.00%	0.00%	0.00%	0.71%	0.00%	0.35%	0.00%	0.19%
Call drop rate	≤ 2%	0.00%	0.00%	1.22%	1.64%	0.00%	0.35%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	99.81%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations

10.1.10.1 Data Drive Test Results - RAIPUR SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	NP	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100		100	100	100	100	100
Minimum download speed		78	102		161	82	73	86	119
Average throughput for Packet Data		105	124		188	87	92	114	171
Latency	<250ms	100	100		100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.10.2 Data Drive Test Results - RAIPUR SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	NP	100	100
Succesful Data Transmission upload speed attempts	>75%	100		100	100
Minimum download speed		1225		2236	1326
Average throughput for Packet Data		2115		2964	2181
Latency	<250ms	100		100	100

All operators met the TRAI benchmark for data drive test.

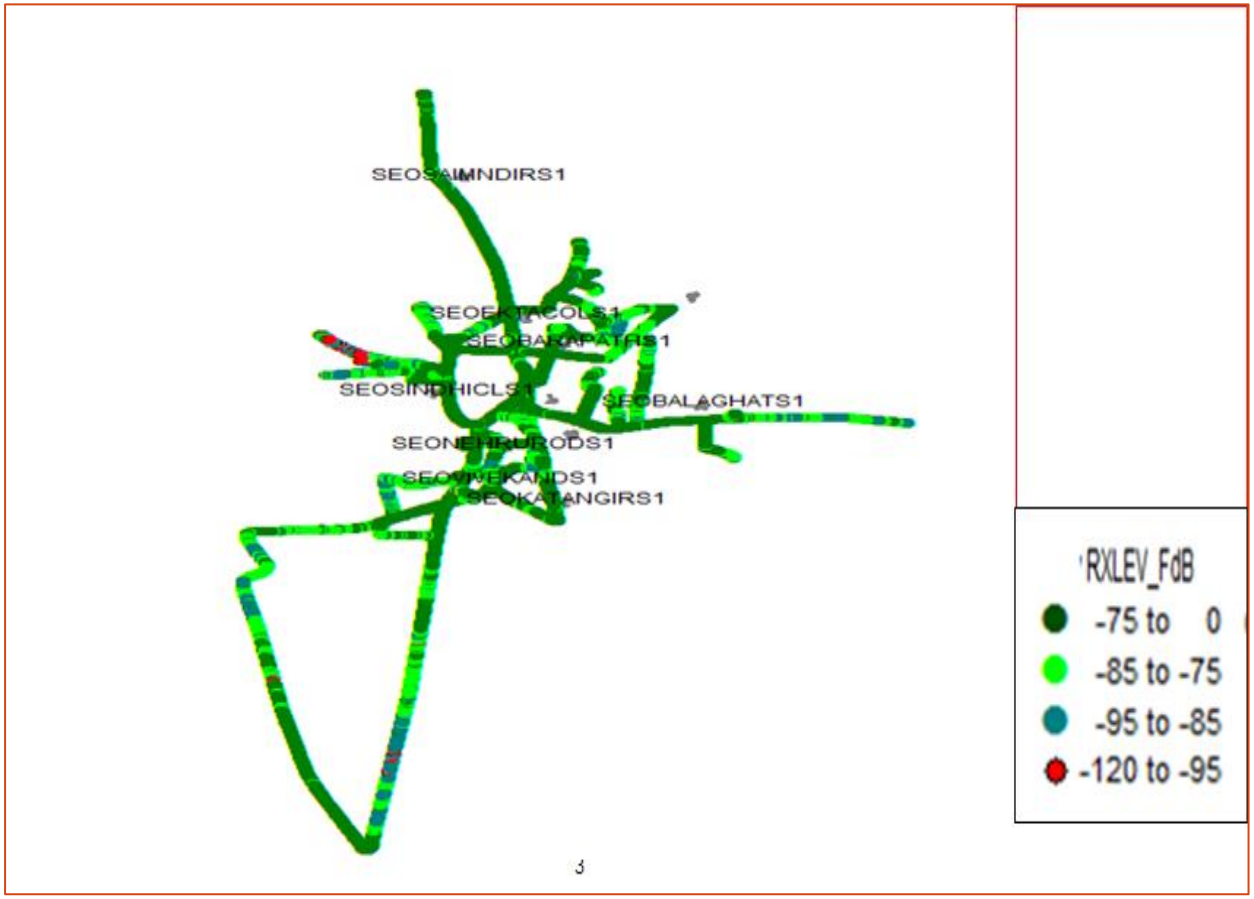
10.1.11SEONI SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
August	Seoni	25-08-2016	27-08-2016	250

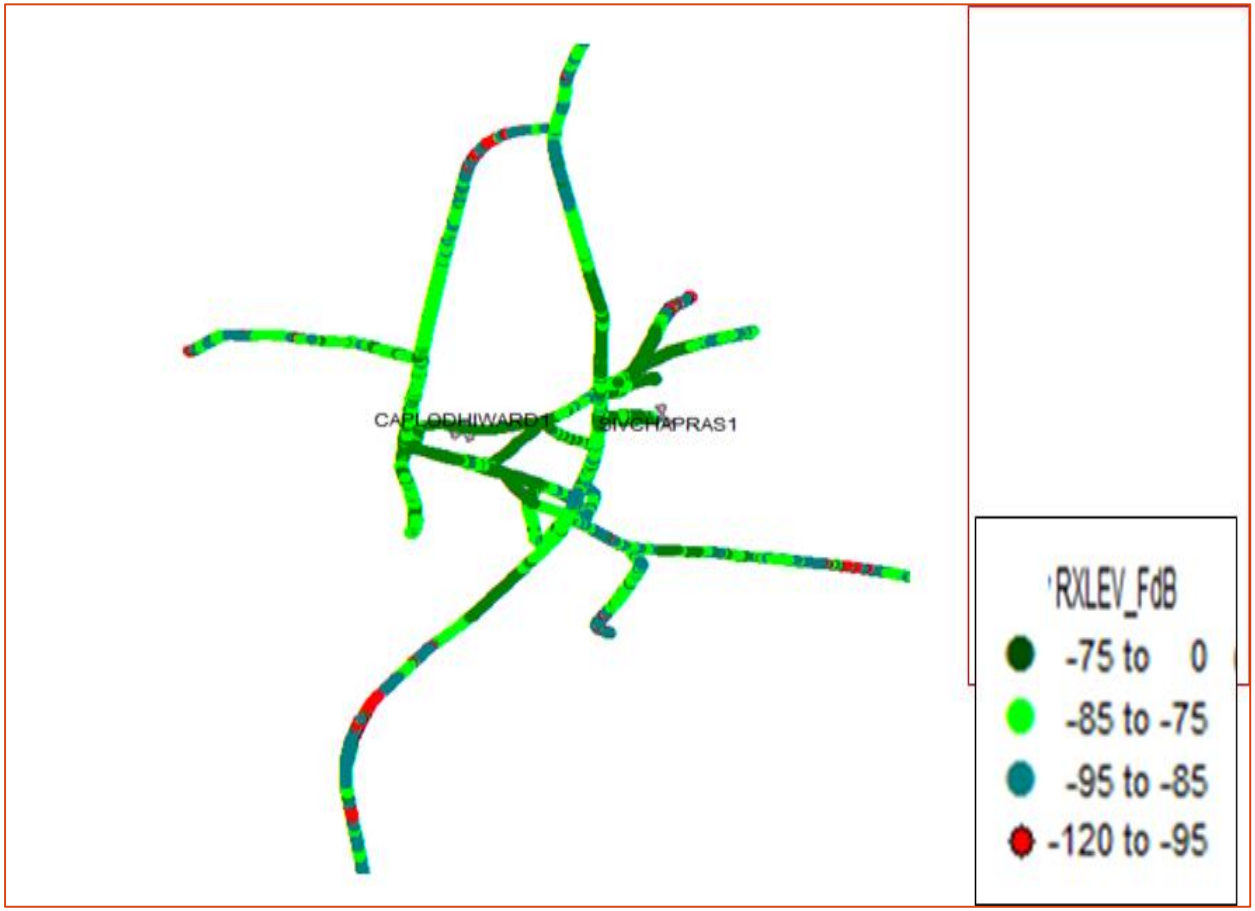
10.1.11.1 Route Details – SEONI SSA

Category	Type of location	August Seoni		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1) Chhapara Road,Chourai Road,Mohgaon Road,Nainpur Road,Barghat Road,Railway Station,Bus Stop,Dev talab,Bara Pathar,Shanti Nagar	1) Seoni Road ,Lakhnadon Road,Sharda Colony,Bus Stop,Maharana Pratab colony,Governme nt Guest house	Chhapara Road,Narsinghpur Road,Dhuma Road,Mandla road,Bus Stop,Raghunath colony,Government College,Government Guest house,,
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

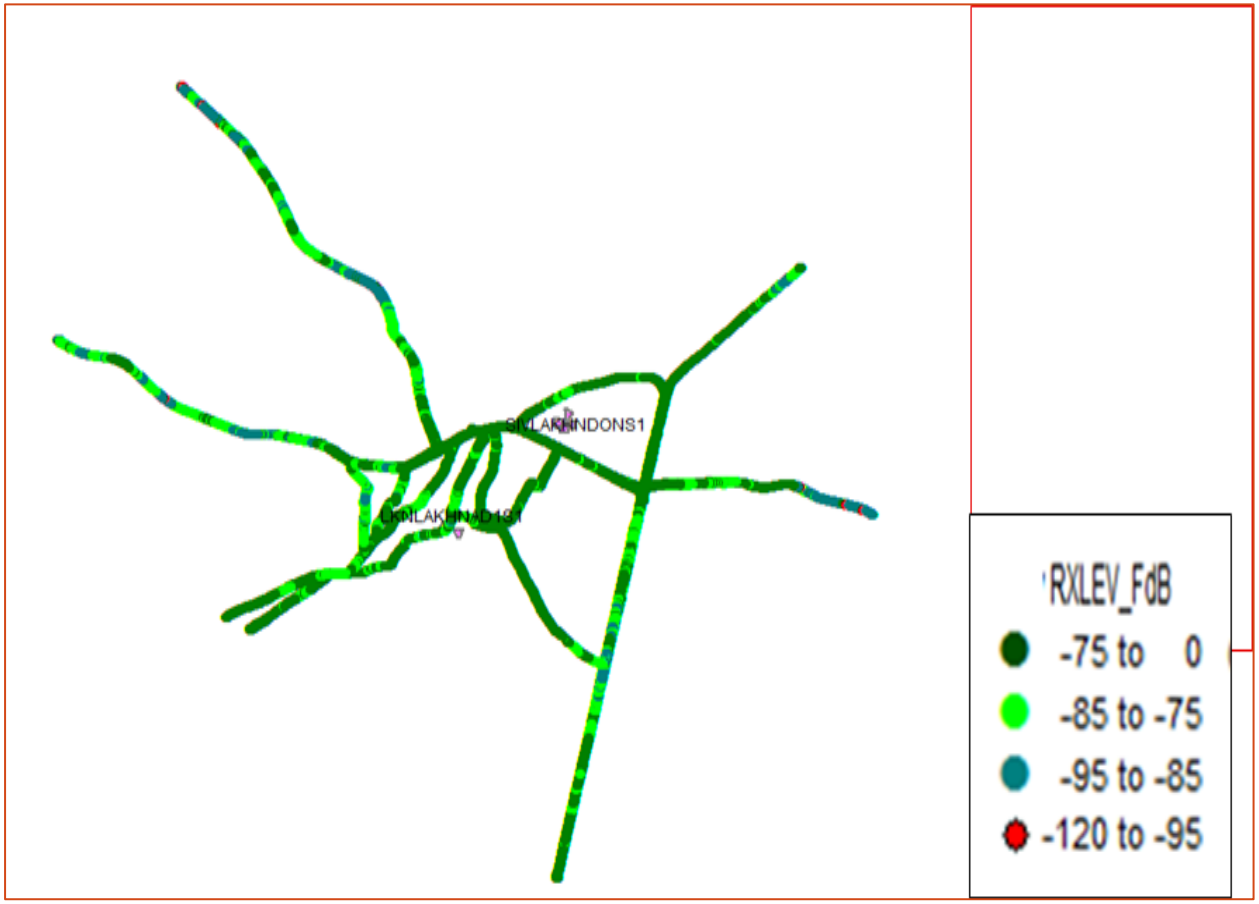
10.1.11.2 Route Map - SEONI DAY 1



10.1.11.3 Route Map - SEONI DAY 2



10.1.11.4 Route Map - SEONI DAY 3



10.1.11.5 Drive Test Results - SEONI SSA 2G

SEONI	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		95.77%	87.61%	49.24%	64.10%	85.85%	59.57%	69.86%	57.08%	98.83%	68.64%	99.38%	41.36%	53.63%	62.42%	64.86%	55.89%
0 to -85 dBm		99.62%	95.25%	96.55%	91.79%	99.69%	87.64%	91.71%	90.78%	100.00%	93.33%	100.00%	78.72%	76.84%	90.36%	99.00%	86.70%
0 to -95 dBm		99.98%	99.46%	99.82%	99.25%	100.00%	99.18%	99.99%	99.16%	100.00%	99.73%	100.00%	98.64%	99.11%	98.73%	100.00%	98.01%
Voice quality	≥ 95%	98.80%	98.59%	98.29%	98.65%	89.07%	91.98%	99.22%	96.29%	96.29%	95.23%	NA	NA	98.68%	98.78%	99.30%	97.90%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	98.93%	100.00%	98.88%	100.00%	99.65%	100.00%	100.00%	100.00%	100.00%	100.00%	99.28%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.12%	0.00%	0.35%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	2.14%	0.00%	0.76%	0.00%	0.35%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	98.28%	100.00%	99.82%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations except BSNL in indoor & outdoor location

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations except BSNL in outdoor location.

10.1.11.6 Drive Test Results - SEONI SSA 3G

August	B'mark	Airtel		BSNL		Idea		Tata 3G	
SEONI		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		81.09%	81.01%	Not Participated		100.00%	85.99%	98.31%	98.46%
0 to -85 dBm		99.78%	97.71%			100.00%	97.86%	99.81%	99.10%
0 to -95 dBm		100.00%	99.94%			100.00%	99.94%	100.00%	99.67%
Voice quality	≥ 95%	99.96%	99.63%			100.00%	95.97%	99.74%	99.55%
CSSR	≥ 95%	100.00%	100.00%			100.00%	98.71%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%			0.00%	1.29%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%			0.00%	0.87%	0.00%	0.00%
Hands off success rate		100.00%	100.00%			NA	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations

10.1.11.1 Data Drive Test Results - SEONI SSA-2G

August									
Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	97	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	98	100	100	100	100	100
Minimum download speed		67	102	128	112	108	85	125	77
Average throughput for Packet Data		105	125	NA	154	128	85	125	111
Latency	<250ms	100	100	100	100	100	100	100	100

All operators met the TRAI benchmark for data drive test

10.1.11.2 Data Drive Test Results - SEONI SSA-3G

August					
Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	Not participating	100	100
Succesful Data Transmission upload speed attempts	>75%	100		100	100
Minimum download speed		1490		1832	2767
Average throughput for Packet Data		2073		2739	2767
Latency	<250ms	100		100	100

All operators met the TRAI benchmark for data drive test.

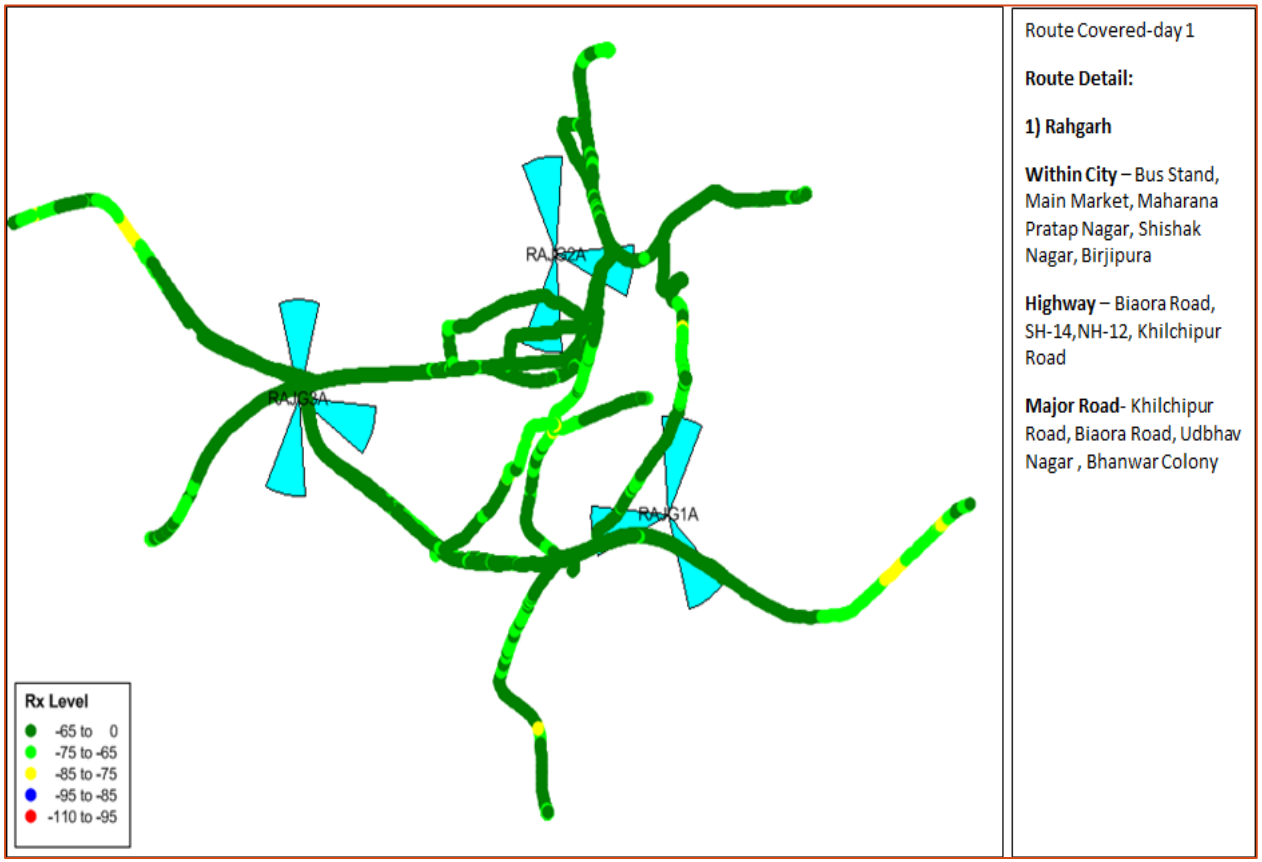
10.1.12 RAIGARH SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
September	RAIGARH	13-09-2016	15-09-2016	265

10.1.12.1 Route Details – RAIGARH SSA

Category	Type of location	September RAIGARH		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Bus Stand, Main Market, Maharana Pratap Nagar, Shishak Nagar, Birjipura, Biaora Road, SH-14,NH-12, Khilchipur Road, Khilchipur Road, Biaora Road, Udbhav Nagar , Bhanwar Colony	Bus Stand, Apna Nagar, Jalkheda, Bhaver Ganj , Main Market, Biaora Bypass , NH-12, Guna Road, SH-14 , Apna Nagar, Jalkheda , Bhaver Ganj	Main Market , Teachers Colony, Champi Mohalla, Bus Stand, Suraj Pur, Teachers Colony, Champi Mohalla, Bus Stand, Suraj Pur, Highway-NH-12, Bhopl Road, Rajgarh Road
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

10.1.12.2 Route Map - RAIGARH DAY 1



Route Covered-day 1

Route Detail:

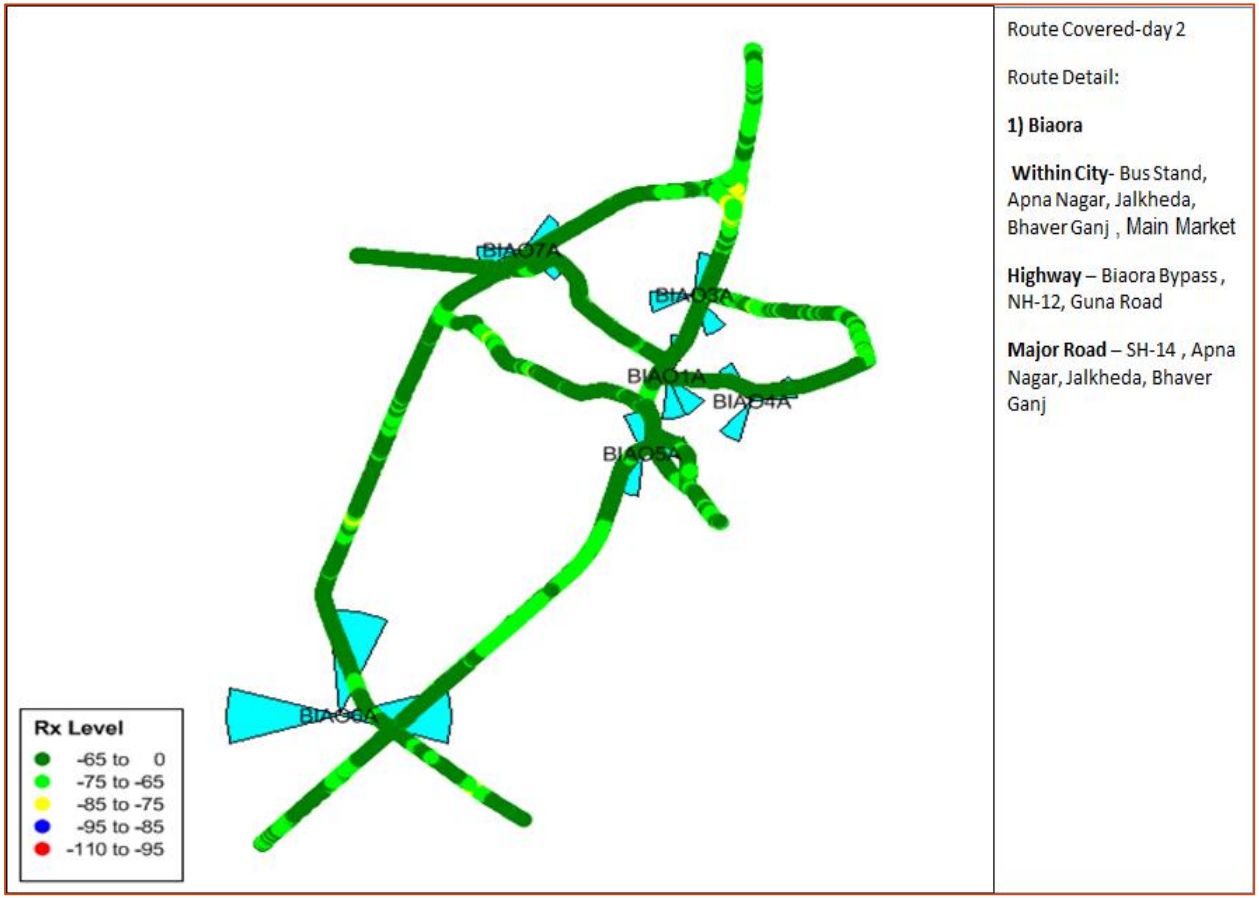
1) Rahgarh

Within City – Bus Stand, Main Market, Maharana Pratap Nagar, Shishak Nagar, Birjipura

Highway – Biaora Road, SH-14,NH-12, Khilchipur Road

Major Road- Khilchipur Road, Biaora Road, Udbhav Nagar , Bhanwar Colony

10.1.12.3 Route Map - RAIGARH DAY 2



Route Covered-day 2

Route Detail:

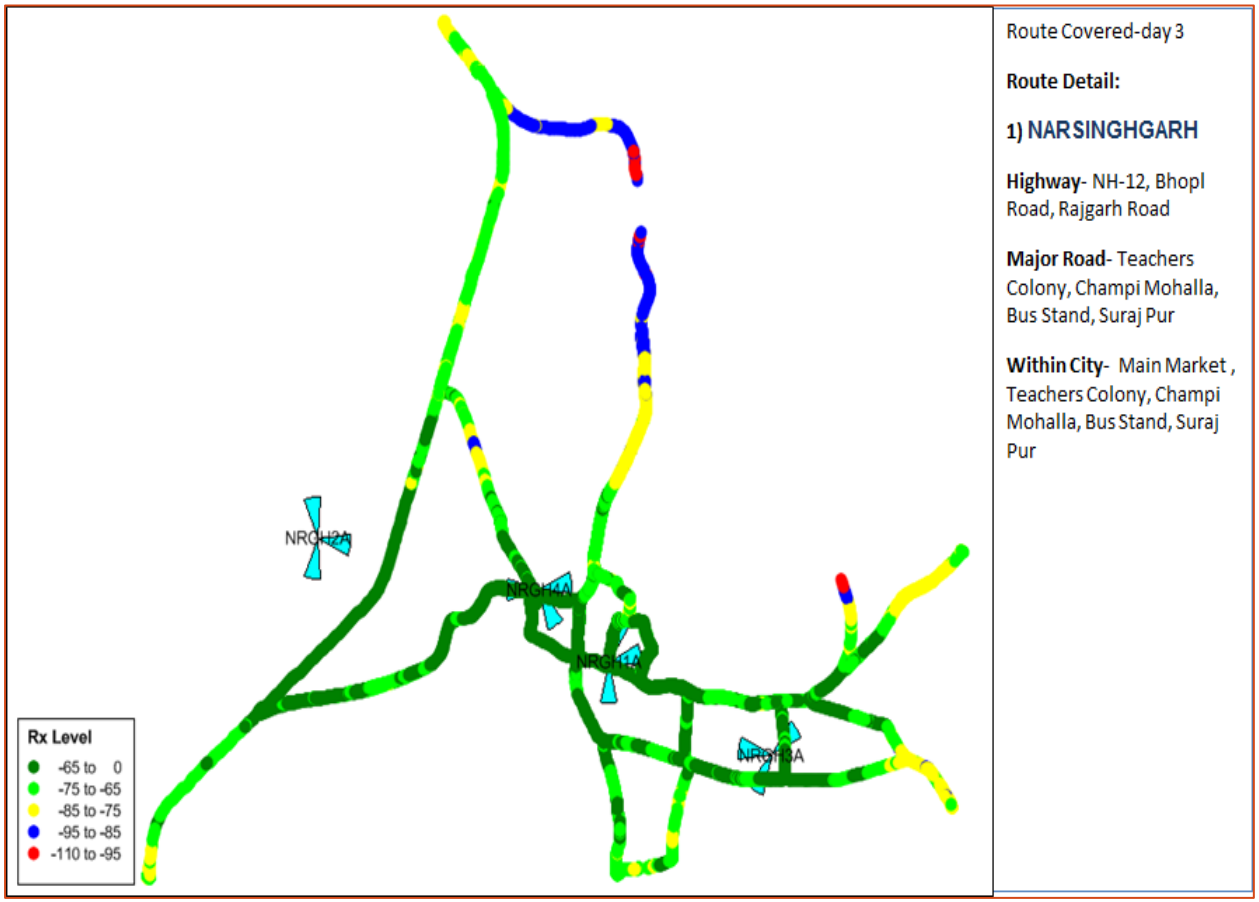
1) Biaora

Within City- Bus Stand, Apna Nagar, Jalkheda, Bhaver Ganj , Main Market

Highway – Biaora Bypass , NH-12, Guna Road

Major Road – SH-14 , Apna Nagar, Jalkheda, Bhaver Ganj

10.1.12.4 Route Map - RAIGARH DAY 3



Route Covered-day 3

Route Detail:

1) NARSINGHGARH

Highway- NH-12, Bhopl Road, Rajgarh Road

Major Road- Teachers Colony, Champi Mohalla, Bus Stand, Suraj Pur

Within City- Main Market , Teachers Colony, Champi Mohalla, Bus Stand, Suraj Pur

10.1.12.5 Drive Test Results - RAIGARH SSA 2G

Raigarh	B'mark	Aircel		Airtel		BSNL		Idea		Reliance GSM		Tata CDMA		Tata GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Service		66.36%	62.84%	21.26%	29.58%	79.41%	71.80%	95.44%	65.16%	52.89%	70.72%	94.76%	79.55%	99.60%	82.26%
0 to -85 dBm				93.84%	89.64%	98.66%	80.34%	89.67%	91.82%	98.01%	94.26%	99.14%	96.29%	99.89%	92.29%	100.00%	96.39%
0 to -95 dBm				100.00%	99.17%	100.00%	98.63%	99.89%	99.24%	100.00%	99.71%	100.00%	99.94%	100.00%	99.14%	100.00%	99.78%
Voice quality	≥ 95%			98.83%	97.78%	97.66%	95.15%	99.08%	95.61%	95.53%	97.52%	99.90%	99.73%	98.36%	98.45%	98.96%	98.12%
CSSR	≥ 95%			100.00%	100.00%	100.00%	99.53%	100.00%	100.00%	100.00%	99.17%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.83%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.68%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	99.67%	100.00%	98.70%	100.00%	98.98%	100.00%	98.00%	100.00%	99.87%	100.00%	99.55%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations

10.1.12.6 Drive Test Results - RAIGARH SSA 3G

September	B'mark	Airtel		BSNL		Idea		Tata 3G	
Raigarh		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		75.51%	80.07%	0.00%	7.34%	92.46%	86.83%	97.93%	93.66%
0 to -85 dBm		97.36%	93.97%	41.90%	28.01%	99.89%	98.16%	99.32%	94.77%
0 to -95 dBm		100.00%	99.12%	57.90%	69.18%	100.00%	99.99%	100.00%	96.33%
Voice quality	≥ 95%	100.00%	98.10%	91.11%	85.34%	99.02%	97.06%	99.95%	98.86%
CSSR	≥ 95%	100.00%	100.00%	100.00%	98.48%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	1.92%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	1.96%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	99.32%	100.00%	100.00%	100.00%	100.00%

Voice Quality

All operators met the benchmark in outdoor as well as indoor locations except BSNL in outdoor location.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor as well as indoor locations

Call Drop Rate

All operators met the benchmark in outdoor as well as indoor locations

10.1.12.1 Data Drive Test Results - RAIGARH SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	NS	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100	100	100	100	100
Minimum download speed			102	22	95	100	73	89	158
Average throughput for Packet Data			125	25	138	104	88	117	188
Latency	<250ms		100	NA	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.12.2 Data Drive Test Results - RAIGARH SSA-3G

September					
Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100
Minimum download speed		1223	93	4765	1266
Average throughput for Packet Data		1731	72	7299	1565
Latency	<250ms	100	100	100	100

All operators met the TRAI benchmark for data drive test.

11 ANNEXURE – CONSOLIDATED-2G

11.1 NETWORK AVAILABILITY

1. Network Availability											
Audit Results for Network Availability- PMR data											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		384	29866	11369	32024	NS	12352	1280	8816	NS	17946
Sum of downtime of BTSs in a month (in hours)		1249	36303	161879	49266	NS	51475	2301	1941	NS	25967
BTSs accumulated downtime (not available for service)	≤ 2%	0.44%	0.16%	1.91%	0.21%	NS	0.56%	0.24%	0.03%	NS	0.19%
Number of BTSs having accumulated downtime >24 hours		2	71	164	332	NS	184	5	1	NS	219
Worst affected BTSs due to downtime	≤ 2%	0.52%	0.24%	1.44%	1.04%	NS	1.49%	0.39%	0.01%	NS	1.22%
Live Measurement Results for Network Availability- 3 Day live data											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		384	29866	7260	31949	NS	12353	1281	8131	NS	17924
Sum of downtime of BTSs in a month (in hours)		40	3721	9733	3787	NS	6016	1493	1594	NS	742
BTSs accumulated downtime (not available for service)	≤ 2%	0.14%	0.17%	1.86%	0.16%	NS	0.68%	1.62%	0.27%	NS	0.06%
Number of BTSs having accumulated downtime >24 hours		1	0	73	6	NS	126	2	0	NS	62
Worst affected BTSs due to downtime	≤ 2%	0.26%	0.00%	1.01%	0.02%	NS	1.02%	0.16%	0.00%	NS	0.35%

Data Source: Operations and Maintenance Center (OMC) of the operators

11.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

2. Connection Establishment (Accessibility)											
Audit Results for CSSR, SDCCH and TCH congestion- PMR data											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
CSSR	≥ 95%	97.46%	98.63%	97.32%	97.40%	NS	95.89%	98.47%	99.46%	NS	99.60%
SDCCH/Paging channel congestion	≤ 1%	0.31%	0.06%	0.47%	0.26%	NS	0.10%	NA	0.29%	NS	0.10%
TCH congestion	≤ 2%	0.00%	0.66%	1.20%	1.24%	NS	0.68%	0.36%	0.23%	NS	0.40%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
CSSR	≥ 95%	98.50%	98.70%	96.56%	97.47%	NS	95.61%	98.46%	99.47%	NS	99.52%
SDCCH/Paging channel congestion	≤ 1%	0.63%	0.07%	0.53%	0.22%	NS	0.16%	NA	0.41%	NS	0.12%
TCH congestion	≤ 2%	0.00%	0.69%	1.10%	1.17%	NS	0.83%	0.37%	0.04%	NS	0.48%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of call attempts		688	4633	4725	4696	NS	4728	2535	4553	NS	5074
Total number of successful calls established		688	4633	4613	4683	NS	4696	2535	4552	NS	5058
CSSR	≥ 95%	100.00%	100.00%	97.63%	99.72%	NS	99.32%	100.00%	99.98%	NS	99.68%
%age blocked calls		0.00%	0.00%	2.37%	0.28%	NS	0.68%	0.00%	0.02%	NS	0.32%

Data Source: Network Operations Center (NOC) of the operators and Data Source: Drive test reports submitted by operators to auditors

11.3 Connection Maintenance (Retainability)

3. Connection Maintenance (Retainability)											
Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data											
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of calls established		5103	868991916	2073374364	1709076842	NS	379500141	20128078	95371272	NS	720738338
Total number of calls dropped		40	8977657	23809227	14681613	NS	762548	39143	631766	NS	3409450
Call drop rate	≤ 2%	0.78%	1.03%	1.15%	0.86%	NS	0.20%	0.19%	0.66%	NS	0.47%
Total number of cells in the network		1152	92830	37067	95332	NS	37875	3870	26490	NS	53842
Total number of cells having more than 3% TCH		9	2140	660	2298	NS	288	111	703	NS	2744
Worst affected cells having more than 3% TCH	≤ 3%	0.78%	2.30%	1.78%	2.41%	NS	0.76%	2.87%	2.65%	NS	5.10%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data											
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of calls established		522	86399235	79758809	165996237	NS	36353593	2655254	9625155	NS	56760409
Total number of calls dropped		5	859322	943957	1376326	NS	74209	8887	65675	NS	256370
Call drop rate	≤ 2%	0.96%	0.99%	1.18%	0.83%	NS	0.20%	0.33%	0.68%	NS	0.45%
Total number of cells in the network		1152	92762	22703	93685	NS	37932	3870	26490	NS	53805
Total number of cells having more than 3% TCH		11	2190	486	2123	NS	265	103	446	NS	2677
Worst affected cells having more than 3% TCH	≤ 3%	0.95%	2.36%	2.14%	2.27%	NS	0.70%	2.66%	1.68%	NS	4.97%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data											
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of calls established		688	4633	4626	4684	NS	4697	2535	4552	NS	5069
Total number of calls dropped		0	0	71	9	NS	29	2	0	NS	0
Call drop rate	≤ 2%	0.00%	0.00%	1.53%	0.19%	NS	0.62%	0.08%	0.00%	NS	0.00%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

11.4 VOICE QUALITY

4. Voice quality											
Audit Results for Voice quality -PMR Data											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of sample calls		414794	287667058303	NA	177312546826	NS	50455894080	283751105	13748923521	NS	66512528849
Total number of calls with good voice quality		409250	278858321832	NA	173286325613	NS	49754955754	281257915	13552173242	NS	65614945545
%age calls with good voice quality	≥ 95%	98.66%	96.94%	NA	97.73%	NS	98.61%	99.12%	98.57%	NS	98.65%
Live measurement results for Voice quality-3 Day data											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of sample calls		33415	28293204564	NA	17188478798	NS	4889704769	318886074	1353223157	NS	5153849994
Total number of calls with good voice quality		32735	27443992343	NA	16803352172	NS	4821139795	316156618	1334364800	NS	5082250304
%age calls with good voice quality	≥ 95%	97.96%	97.00%	NA	97.76%	NS	98.60%	99.14%	98.61%	NS	98.61%
Drive test results for Voice quality (Average of three drive tests) - DT data											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of sample calls		1469182	9551279	868103	7050299	NS	3569847	4180637	9148807	NS	9806326
Total number of calls with good voice quality		1448206	9344526	807316	6831412	NS	3436054	4069755	8953601	NS	9650850
%age calls with good voice quality	≥ 95%	98.57%	97.84%	93.00%	96.90%	NS	96.25%	97.35%	97.87%	NS	98.41%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

4. Voice quality											
Audit Results for Voice quality -PMR Data											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of sample calls		414794	287667058303	NA	177312546826	NS	50455894080	283751105	13748923521	NS	66512528849
Total number of calls with good voice quality		409250	278858321832	NA	173286325613	NS	49754955754	281257915	13552173242	NS	65614945545
%age calls with good voice quality	≥ 95%	98.66%	96.94%	NA	97.73%	NS	98.61%	99.12%	98.57%	NS	98.65%
Live measurement results for Voice quality-3 Day data											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of sample calls		33415	28293204564	NA	17188478798	NS	4889704769	318886074	1353223157	NS	5153849994
Total number of calls with good voice quality		32735	27443992343	NA	16803352172	NS	4821139795	316156618	1334364800	NS	5082250304
%age calls with good voice quality	≥ 95%	97.96%	97.00%	NA	97.76%	NS	98.60%	99.14%	98.61%	NS	98.61%
Drive test results for Voice quality (Average of three drive tests) - DT data											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**Tata CDMA**	**Tata GSM**	**Videocon**	**Vodafone**
Total number of sample calls		1469182	9551279	868103	7050299	NS	3569847	4180637	9148807	NS	9806326
Total number of calls with good voice quality		1448206	9344526	807316	6831412	NS	3436054	4069755	8953601	NS	9650850
%age calls with good voice quality	≥ 95%	98.57%	97.84%	93.00%	96.90%	NS	96.25%	97.35%	97.87%	NS	98.41%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

11.5 POI CONGESTION

5. POI Congestion											
Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		16	92	158	269	NS	381	126	91	NS	0
No. of POIs not meeting benchmark		0	0	0	1	NS	0	0	1	NS	0
Total Capacity of all POIs (A) - in erlangs		6490	790266	573375	501414	NS	773664	84927	113940	NS	0
Traffic served for all POIs (B)- in erlangs		2	615784	94512	291512	NS	368049	40037	64046	NS	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	NS	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		16	92	128	266	NS	381	126	91	NS	0
No. of POIs not meeting benchmark		0	0	0	1	NS	0	0	1	NS	0
Total Capacity of all POIs (A) - in erlangs		6490	789454	334519	500415	NS	722736	84768	113940	NS	0
Traffic served for all POIs (B)- in erlangs		2	855445	92694	288989	NS	341227	25709	64046	NS	0
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	NS	0.00%

Data Source: Network Operations Center (NOC) of the operators

12 ANNEXURE – CONSOLIDATED-3G

12.1 NETWORK AVAILABILITY

1. Network Availability						
Audit Results for Network Availability- PMR data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
(Number of Node Bs in the network in the licensed service area		15606	3564	17724	3270	4552
Sum of downtime (i.e. total outage time) of Node Bs		18835	39612	11714	5656	15547
Node Bs downtime (not available for service)	≤ 2%	0.16%	1.49%	0.09%	0.23%	0.46%
Number of Node Bs having accumulated downtime of >24 hours in a month		39	51	41	31	0
Worst affected Node Bs due to downtime	≤ 2%	0.25%	1.43%	0.23%	0.95%	0.00%
Live Measurement Results for Network Availability- 3 Day live data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
(Number of Node Bs in the network in the licensed service area		15354	2891	16850	3145	4522
Sum of downtime (i.e. total outage time) of Node Bs		2109	3352	8294	286	228
Node Bs downtime (not available for service)	≤ 2%	0.19%	1.61%	0.68%	0.13%	0.07%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	39	0	12	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	1.35%	0.00%	0.38%	0.00%

Data Source: Operations and Maintenance Center (OMC) of the operators

12.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

2. Connection Establishment (Accessibility)						
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
CSSR	≥ 95%	99.83%	97.95%	99.65%	98.08%	99.04%
RRC Congestion	≤ 1%	0.01%	0.61%	0.09%	0.07%	0.05%
Circuit Switched RAB Congestion	≤ 2%	0.01%	0.09%	0.14%	0.01%	0.36%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
CSSR	≥ 95%	99.84%	97.34%	99.68%	96.69%	98.91%
RRC Congestion	≤ 1%	0.01%	0.69%	0.06%	0.07%	0.09%
Circuit Switched RAB Congestion	≤ 2%	0.03%	0.22%	0.12%	0.02%	0.29%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Total number of RRC attempts (A)		4439	3000	4469	NA	2769
Total number of RRC established (B)		4439	2907	4454	NA	2772
Call setup success rate (B/A*100)	≥ 95%	100.00%	96.90%	99.66%	NA	100.11%
%age blocked calls		0.00%	3.10%	0.34%	NA	-0.11%

Data Source: Network Operations Center (NOC) of the operators and Data Source: Drive test reports submitted by operators to auditors

CONNECTION MAINTENANCE (RETAINABILITY)

3. Connection Maintenance (Retainability)						
Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data						
	Benchmark	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		99550133	387794314	253973001	27437342	25973239
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		260617	1341004	1259958	23502	91880
Call drop rate (B/A*100)	≤ 2%	0.26%	0.35%	0.50%	0.09%	0.35%
Total no. of cells in the licensed service area (B)		48309	10987	55292	9791	9975
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		846	117	875	29	153
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.75%	1.06%	1.58%	0.29%	1.53%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data						
	Benchmark	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		10049183	31733864	25054529	2647563	4301254
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		25530	122298	122923	2576	15399
Call drop rate (B/A*100)	≤ 2%	0.25%	0.39%	0.49%	0.10%	0.36%

Total no. of cells in the licensed service area (B)		47482	8916	54967	9367	5093
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		878	102	842	28	88
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.85%	1.15%	1.53%	0.30%	1.73%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data						
Call drop rate	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		4439	2953	4454	NA	2768
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	63	9	NA	2
Call drop rate (B/A*100)	≤ 2%	0.00%	2.13%	0.20%	NA	0.07%

Data Source: Network Operations Center (NOC) of the operators

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

12.3 VOICE QUALITY

Audit Results for Voice quality -PMR Data						
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		382391126870	NA	341233943317	166710740464	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		377211984261	NA	338345134362	166501989184	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.65%	NA	99.15%	99.87%	99.07%
Live measurement results for Voice quality-3 Day data						
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		35666920293	NA	33539237390	15882817302	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		35197867966	NA	33255969029	15862441968	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.68%	NA	99.16%	99.87%	99.74%
Drive test results for Voice quality (Average of three drive tests) - DT data						
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Tata 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		19406702	1253500	23643830	NA	13922196
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		19282579	1110911	23024416	NA	13793068
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.36%	88.62%	97.38%	NA	99.07%

Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

12.4 POI CONGESTION

Audit Results for POI Congestion- PMR data						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Total number of working POIs		92	158	269	381	55
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		789483	573375	501414	773664	141737
Traffic served for all POIs (B)- in erlangs		482537	94512	291512	368049	67371
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Total number of working POIs		92	158	266	381	55
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		788799	453792	500415	722736	141578
Traffic served for all POIs (B)- in erlangs		445319	91616	284989	341227	53044
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

Data Source: Network Operations Center (NOC) of the operators

13 ANNEXURE – CUSTOMER SERVICES

13.1 `METERING AND BILLING CREDIBILITY

Billing performance

Audit Results for Billing performance Postpaid-Consolidated											
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)											
Metering and billing credibility - Postpaid											
Total bills generated during the period		9	1181810	883029	1625658	NS	641823	15498	141922	NS	534138
Total number of bills disputed		0	792	152	7823	NS	783	0	0	NS	288
Total number of valid billing complaints		0	164	152	1605	NS	574	0	0	NS	288
Total complaints considered invalid		0	628	0	6218	NS	209	0	0	NS	0
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.07%	0.02%	0.48%	NS	0.12%	0.00%	0.00%	NS	0.05%
July											
Total bills generated during the first billing cycle		3	390064	294987	533198	NS	233906	5181	47718	NS	175893
Total number of bills disputed in first billing cycle		0	285	84	2453	NS	418	0	0	NS	138
Total number of valid billing complaints (billing cycle 1)		0	58	84	557	NS	209	0	0	NS	138
Total complaints considered invalid (billing cycle 1)		0	227	0	1896	NS	209	0	0	NS	0
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.07%	0.03%	0.46%	NS	0.18%	0.00%	0.00%	NS	0.08%
August											
Total bills generated during the second billing cycle		3	394459	294716	542388	NS	180478	5189	47701	NS	178385
Total number of bills disputed in second billing cycle		0	239	37	2781	NS	161	0	0	NS	81
Total number of valid billing complaints (billing cycle 2)		0	64	37	886	NS	161	0	0	NS	81
Total complaints considered invalid (billing cycle 2)		0	175	0	1895	NS	0	0	0	NS	0
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.06%	0.01%	0.51%	NS	0.09%	0.00%	0.00%	NS	0.05%

Data Source: Billing Center of the operators

September											
Total bills generated during the third billing cycle		3	397287	293326	550072	NS	227439	5128	46503	NS	179860
Total number of bills disputed in third billing cycle		0	268	31	2589	NS	204	0	0	NS	69
Total number of valid billing complaints (billing cycle 3)		0	42	31	162	NS	204	0	0	NS	69
Total complaints considered invalid (billing cycle 3)		0	226	0	2427	NS	0	0	0	NS	0
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.07%	0.01%	0.47%	NS	0.09%	0.00%	0.00%	NS	0.04%
Metering and billing credibility - Prepaid											
Performance prepaid	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of charging complaints (valid) - sum of 3 months		0	5172	7524	4004	NS	8623	0	1	NS	9282
Total complaints considered invalid (sum of 3 months)		0	21711	0	18083	NS	0	0	0	NS	0
Total number of charging complaints (sum of 3 months)		0	26883	7524	22087	NS	8623	0	1	NS	9282
Total no of customers served (Sum of 3 months)		20691	38567784	12775400	21497925	NS	28760227	171289	5932939	NS	20214006
Percentage of charging complaints disputed	≤ 0.1%	0.00%	0.07%	0.06%	0.10%	NS	0.03%	0.00%	0.00%	NS	0.05%

Data Source: Billing Center of the operators

Resolution of Billing Complaints											
Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of billing/charging complaints		0	27675	7676	29910	NS	9406	0	7	NS	12536
Total number of complaints resolved in favour of customer		0	5336	7676	5609	NS	9197	0	7	NS	9567
Total complaints considered invalid		0	22339	0	24301	NS	209	0	0	NS	2969
Number of complaints resolved in 4 weeks		0	5334	7671	5609	NS	9197	0	7	NS	9567
Percentage complaints resolved within 4 weeks	≥ 98%	NA	99.96%	99.93%	100.00%	NS	100.00%	NA	100.00%	NS	100.00%
Number of complaints resolved in 6 weeks		0	5334	7676	5609	NS	9197	0	7	NS	9567
Percentage complaints resolved within 6 weeks	100.00%	NA	99.96%	100.00%	100.00%	NS	100.00%	NA	100.00%	NS	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		0	5336	7676	5609	NS	9197	0	7	NS	5949
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	NS	100.00%
Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total Number of calls made		0	100	100	100	NS	100	2	NA	NS	60
Number of cases resolved in 4 weeks		0	84	69	77	NS	90	2	NA	NS	49
Percentage cases resolved in 4 weeks	≥ 98%	NA	84.00%	69.00%	77.00%	NS	90.00%	100.00%	NA	NS	81.67%
Number of cases resolved in 6 weeks		0	100	100	100	NS	100	2	NA	NS	60
Percentage cases resolved in 6 weeks	100.00%	NA	100.00%	100.00%	100.00%	NS	100.00%	100.00%	NA	NS	100.00%

Data Source: Billing Center of the operators

13.2 CUSTOMER CARE

Customer Care

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of call attempts to customer care for assistance		10829	3366156	4674264	81550074	NS	15145254	NA	969463	NS	11993393
Number of calls getting connected and answered (electronically)		10696	3366156	4659672	80206255	NS	15103044	NA	944668	NS	11993393
Percentage calls getting connected and answered	≥ 95%	98.77%	100.00%	99.69%	98.35%	NS	99.72%	100.00%	97.44%	NS	100.00%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total Number of calls received (3 months)		867	3914612	2070021	12440877	NS	3536881	31866	1605813	NS	4143348
Total Number of calls answered within 90 seconds (3 months)		860	3833740	1989156	12281291	NS	3283125	31643	1577621	NS	4112310
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	99.19%	97.93%	96.09%	98.72%	NS	92.83%	99.30%	98.24%	NS	99.25%
Audit results for customer care (voice-to-Voice)- Monthly data											
July											
Total calls received (Month 1)		233	1418893	650141	3949568	NS	1109899	10661	563900	NS	1472925
Total calls answered within 90 seconds (Month 1)		232	1398728	629666	3926103	NS	990170	10597	556800	NS	1462509
% calls answered within 90 seconds (Month 1)	≥ 95%	99.57%	98.58%	96.85%	99.41%	NS	89.21%	99.40%	98.74%	NS	99.29%
Audit results for customer care (voice-to-Voice)- Monthly data											
August											
Total calls received (Month 2)		286	1313395	719524	4223811	NS	1236025	10653	540698	NS	1320722
Total calls answered within 90 seconds (Month 2)		285	1288190	686768	4163056	NS	1138210	10562	523957	NS	1313363
% calls answered within 90 seconds (Month 2)	≥ 95%	99.65%	98.08%	95.45%	98.56%	NS	92.09%	99.15%	96.90%	NS	99.44%

September											
Total calls received (Month 3)		348	1182324	700356	4267498	NS	1190957	10552	501215	NS	1349701
Total calls answered within 90 seconds (Month 3)		343	1146822	672722	4192132	NS	1154745	10484	496864	NS	1336438
% calls answered within 90 seconds (Month 3)	≥ 95%	98.56%	97.00%	96.05%	98.23%	NS	96.96%	99.36%	99.13%	NS	99.02%
Live calling results for customer care (IVR)											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	NS	100	100	100	NS	100
Number of calls getting connected and answered (electronically)		100	100	100	94	NS	100	100	100	NS	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	94.00%	NS	100.00%	100.00%	100.00%	NS	100.00%
Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total Number of calls received		100	100	100	100	NS	100	100	100	NS	100
Total Number of calls getting connected and answered		90	87	84	93	NS	88	100	99	NS	97
Live Calling Percentage calls getting connected and answered	≥ 95%	90.00%	87.00%	84.00%	93.00%	NS	88.00%	100.00%	99.00%	NS	97.00%

Data Source: Customer Service Center of the operators

13.3 TERMINATION / CLOSURE OF SERVICE

Termination / closure of service											
Audit results for termination / closure of service-Consolidated											
Termination	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of closure request		NA	4192	NA	9729	NS	1056	484	1606	NS	10829
Number of requests attended within 7 days		NA	4192	NA	9729	NS	1056	484	1606	NS	10829
Percentage cases in which termination done within 7 days	100.00%	NA	100.00%	NA	100.00%	NS	100.00%	100.00%	100.00%	NS	100.00%

Source: Customer Service Center of the operators Data

13.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated											
Refund	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of cases requiring refund of deposits		NA	157	NA	2561	NS	4345	69	184	NS	6087
Total number of cases where refund was made within 60 days		NA	157	NA	2561	NS	4164	69	184	NS	6087
Percentage cases in which refund was receive within 60 days	100.00%	NA	100.00%	NA	100.00%	NS	95.83%	100.00%	100.00%	NS	100.00%

Data Source: Billing Center of the operator

13.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

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Live calling results for resolution of service requests										
Resolution of service requests	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total Number of calls made	NA	100	100	100	NS	100	NA	73	NS	NDR
Number of cases resolved to satisfaction	NA	92	81	78	NS	89	NA	54	NS	NDR
Percentage cases resolved in four weeks	NA	92.00%	81.00%	78.00%	NS	89.00%	NA	73.97%	NS	NDR

Data Source: Live calls made by auditors from operator's network

13.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services											
Level 1 services		Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total no. of calls made		300	300	300	300	NS	300	300	300	NS	300
Calls answered		165	214	235	204	NS	228	124	108	NS	100
% of calls connected	≥ 95%	55.00%	71.33%	78.33%	68.00%	NS	76.00%	41.33%	36.00%	NS	33.33%

13.7 LEVEL 1 SERVICE CALLS MADE

All the numbers given in mandatory list in Section 2.4.2.4.1 were tested. The following table provides the numbers that are activated for each operator. A tick (✔) for an operator signifies that the number was active for the operator.

Live calls were made to the active numbers to test the calls answered. The details of the same have been given below for each operator.

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	10
101	Fire	Y		17	10
102	Ambulance	Y		18	10
104	Health Information Helpline	Y		18	10
108	Emergency and Disaster Management Helpline	Y		18	10
138	All India Helpline for Passengers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		18	9
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service				
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services				
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		17	10
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities				

1071	Air Accident Helpline		N		
1072	Rail Accident Helpline				
1073	Road Accident Helpline	Y		17	10
1077	Control Room for District Collector	Y		18	9
10120	Call Alert (Crime Branch)	Y		18	10
10121	Women Helpline				
10127	National AIDS Helpline to NACO	Y		18	10
101212	Central Accident and Trauma Services (CATS)	Y		18	9
10580	Educational & Vocational Guidance and Counselling				
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board				
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway				
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		17	9
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		18	9
112012	National Do Not Call Registry	Y		18	10
11212	Complaint of Electricity	Y		17	10
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		17	10
	Total	17		300	165
Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected

100	Police	Y		11	8
101	Fire	Y		11	8
102	Ambulance	Y		12	8
104	Health Information Helpline	Y		12	8
108	Emergency and Disaster Management Helpline	Y		11	8
138	All India Helpline for Passengers	Y		11	7
1412	Public Road Transport Utility Service				
181	Chief Minister Helpline	Y		11	8
182	Indian Railway Security Helpline	Y		11	8
1033	Road Accident Management Service				
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services	Y		11	8
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		11	8
1064	Anti-Corruption Helpline	Y		12	7
1070	Relief Commission for Natural Calamities	Y		11	8
1071	Air Accident Helpline	Y		11	8
1072	Rail Accident Helpline	Y		11	8
1073	Road Accident Helpline	Y		11	8
1077	Control Room for District Collector	Y		11	8
10120	Call Alert (Crime Branch)	Y		11	8
10121	Women Helpline	Y		11	8
10127	National AIDS Helpline to NACO	Y		11	8
101212	Central Accident and Trauma Services (CATS)	Y		11	8

10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		11	8
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway				
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		11	8
155154	Municipal Corporations		N		
155214	Labour Helpline	Y		11	8
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		11	8
11212	Complaint of Electricity	Y		11	8
11216	Drinking Water Supply	Y		11	8
11250	Election Commission of India	Y		11	8
	Total	27		300	214

BSNL

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		12	10
101	Fire	Y		12	9
102	Ambulance	Y		12	9
104	Health Information Helpline	Y		12	9
108	Emergency and Disaster Management Helpline	Y		12	9
138	All India Helpine for Passangers	Y		12	9
1412	Public Road Transport Utility Service				
181	Chief Minister Helpline	Y		12	9

182	Indian Railway Security Helpline	Y		12	9
1033	Road Accident Management Service	Y		12	9
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		11	9
1071	Air Accident Helpline	Y		12	9
1072	Rail Accident Helpline	Y		12	9
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		12	9
10121	Women Helpline	Y		11	9
10127	National AIDS Helpline to NACO	Y		11	9
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		11	9
10741	Pollution Control Board	Y		12	9
1511	Police Related Service for all Metro Railway Project	Y		12	9
1512	Prevention of Crime in Railway	Y		11	9
1514	National Career Service(NCS)	Y		11	9
15100	Free Legal Service Helpline	Y		11	9

155154	Municipal Corporations	Y		11	9
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		11	9
11212	Complaint of Electricity	Y		11	9
11216	Drinking Water Supply	Y		11	9
11250	Election Commission of India	Y		11	9
	Total	26		300	235

Idea

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		16	11
101	Fire	Y		16	11
102	Ambulance	Y		16	11
104	Health Information Helpline	Y		16	11
108	Emergency and Disaster Management Helpline	Y		16	11
138	All India Helpine for Passangers				
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		16	11
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals				
1063	Public Grievance Cell DoT Hq	Y		15	10
1064	Anti Corruption Helpline		N		

1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		16	11
1072	Rail Accident Helpline	Y		15	11
1073	Road Accident Helpline	Y		16	11
1077	Control Room for District Collector	Y		16	11
10120	Call Alart (Crime Branch)	Y		15	11
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		16	10
101212	Central Accident and Trauma Services (CATS)	Y		16	11
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		16	11
155154	Municipal Corporations				
155214	Labour Helpline				
11203	Sashastra Seema Bal (SSB)	Y		16	10
112012	National Do Not Call Registry	Y		15	11
11212	Complaint of Electricity	Y		16	10
11216	Drinking Water Supply	Y		16	10
11250	Election Commission of India				
	Total	19		300	204
Reliance GSM					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		25	19
101	Fire				
102	Ambulance	Y		25	19
104	Health Information Helpline	Y		25	19
108	Emergency and Disaster Management Helpline	Y		25	19
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		25	19
182	Indian Railway Security Helpline				
1033	Road Accident Management Service	Y		25	19
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		25	19
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		25	19
1077	Control Room for District Collector	Y		25	19
10120	Call Alart (Crime Branch)	Y		25	19
10121	Women Helpline				
10127	National AIDS Helpline to NACO	Y		25	19

101212	Central Accident and Trauma Services (CATS)	Y		25	19
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
	Total	12		300	228

TATA CDMA

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		19	8
101	Fire	Y		19	8
102	Ambulance	Y		19	8
104	Health Information Helpline	Y		18	7
108	Emergency and Disaster Management Helpline	Y		19	8
138	All India Helpine for Passangers	Y		19	8

1412	Public Road Transport Utility Service				
181	Chief Minister Helpline	Y		19	8
182	Indian Railway Security Helpline	Y		19	8
1033	Road Accident Management Service				
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		19	7
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		18	8
10121	Women Helpline	Y		19	8
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		19	8
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		19	8

1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		19	7
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	8
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		18	7
	Total	16		300	124
TATA GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	6
101	Fire	Y		17	6
102	Ambulance	Y		17	6
104	Health Information Helpline	Y		16	6
108	Emergency and Disaster Management Helpline	Y		17	6
138	All India Helpine for Passangers	Y		17	6
1412	Public Road Transport Utility Service				
181	Chief Minister Helpline	Y		16	6
182	Indian Railway Security Helpline	Y		17	6
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		

1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		17	6
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		17	6
10121	Women Helpline	Y		16	6
10127	National AIDS Helpline to NACO	Y		17	6
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		16	6
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		17	6
155154	Municipal Corporations	Y		17	6
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		16	6
11212	Complaint of Electricity	Y		17	6
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		16	6
	Total	18		300	108

Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		16	6
101	Fire	Y		16	5
102	Ambulance	Y		16	6
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		15	5
138	All India Helpline for Passengers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		16	6
182	Indian Railway Security Helpline	Y		16	5
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		16	6
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		15	6
1073	Road Accident Helpline	Y		15	5
1077	Control Room for District Collector	Y		16	5
10120	Call Alert (Crime Branch)	Y		16	5
10121	Women Helpline	Y		16	5
10127	National AIDS Helpline to NACO		N		

101212	Central Accident and Trauma Services (CATS)	Y		16	5
10580	Educational & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board				
10741	Pollution Control Board				
1511	Police Related Service for all Metro Railway Project	Y	N	16	5
1512	Prevention of Crime in Railway	Y		16	5
1514	National Career Service(NCS)	Y		16	5
15100	Free Legal Service Helpline	Y		15	5
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		16	5
11212	Complaint of Electricity	Y		16	5
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
	Total	19		300	100

Data Source: Live calls made by auditors from operator's network

14 COUNTER DETAILS

Sl No.	KPI	Formula with Counter Description
1	CSSR= (No of established Calls / No of Attempted Calls)%	***No of established Calls =*** ([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)]))/***No of Attempted Calls =*** ([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)%	***SDCCH Failure=*** ([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)])/***SDCCH attempts =*** ([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)%	***TCH Failures=*** ((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)])/***TCH Attempts =*** ([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

4	**Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)**	***The total no of dropped calls=*** **([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 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)])**
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 =*** **((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))**

14.1.1 ERICSSON

Ericsson provides network support to Aircel, Airtel, Idea, BSNL and Reliance GSM in the circle.

Sl No.	KPI	Ericsson
1	**CSSR= (No of established Calls / No of Attempted Calls)%**	CSSR (No of established Calls / No of Attempted Calls)=(TCASSALL/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)/TCASSALL*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)

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.

14.1.2 NSN (NOKIA SIEMENS NETWORKS)

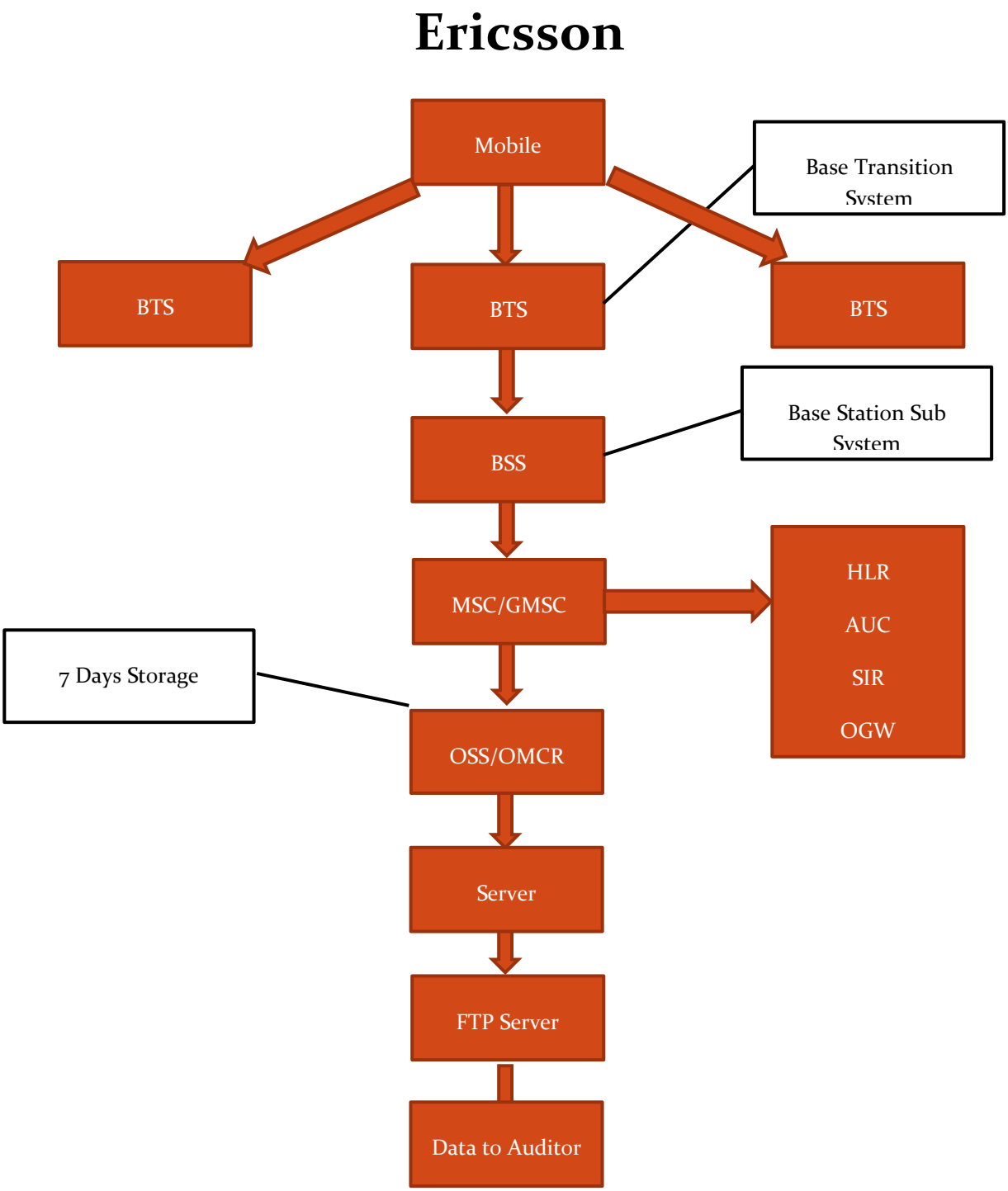
NSN provides network support to Vodafone in the circle.

Sl 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_RESET)+(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)

14.2 BLOCK SCHEMATIC DIAGRAMS

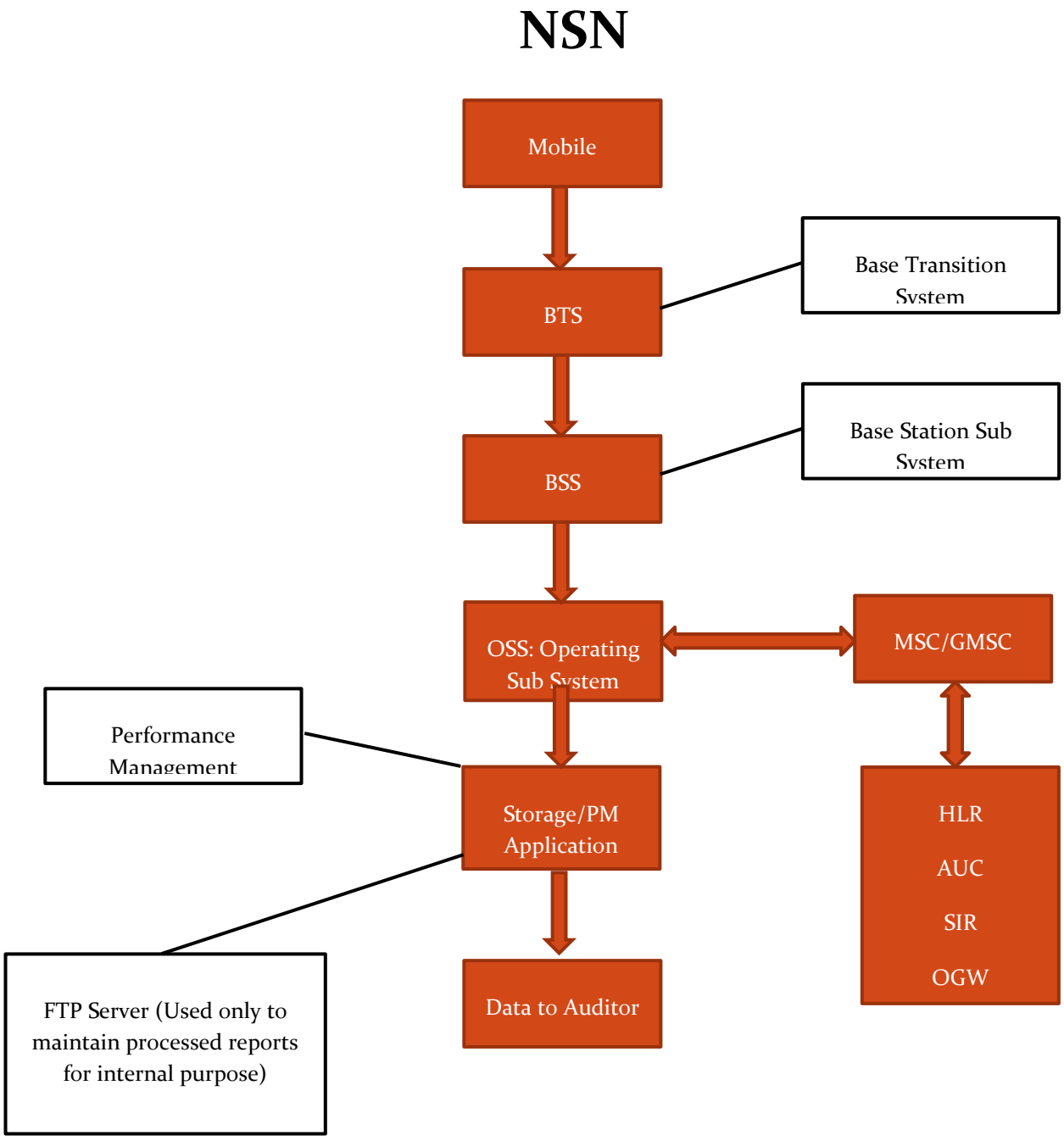
14.2.1 ERICSSON

Ericsson provides network support to Aircel, Airtel, Idea, BSNL and Reliance GSM in the circle.



14.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.



15 ABBREVIATIONS

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

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. JAS'16 – Refers to the quarter of July , August and September 2016
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

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