TRAI Audit Wireless Report for MPCG Circle

WEST ZONE

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Submitted to:

TRAI
Telecom Regulatory Authority of India

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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).

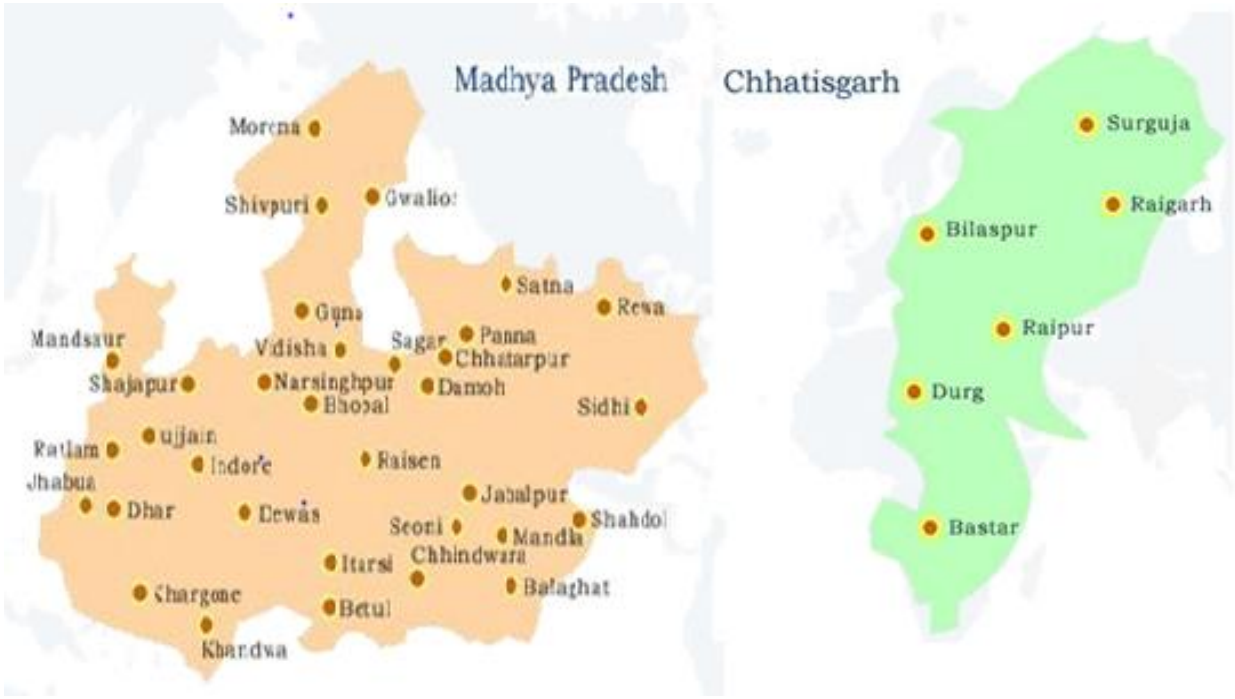
2.2 OBJECTIVES

The primary objective of the Audit module is to-

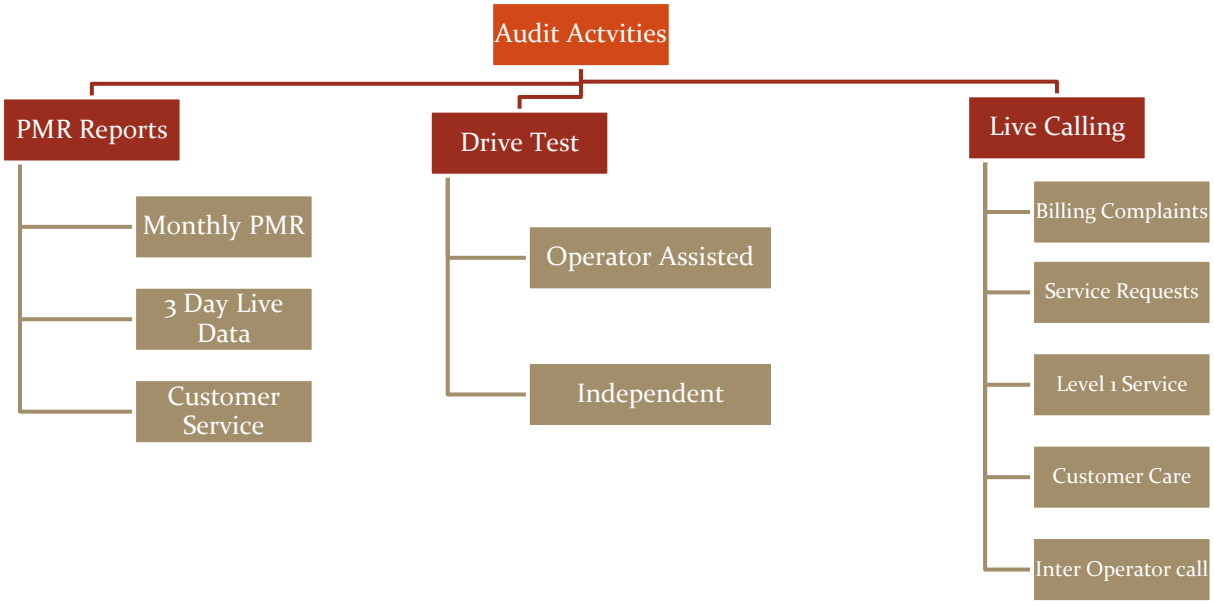
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report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

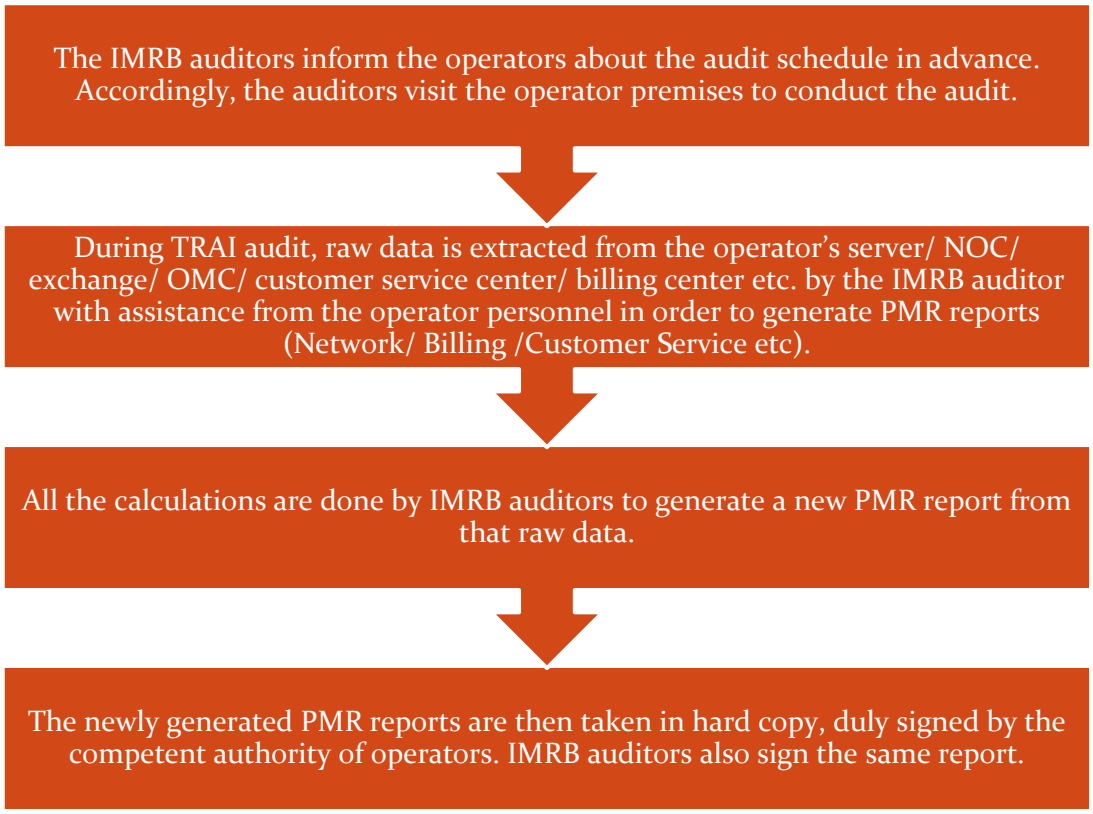


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

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, April 2016 audit data was collected in the month of May 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 June 2016 (AMJ'16) was collected in the month of July 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 April, May and June 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 April, May and June 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-

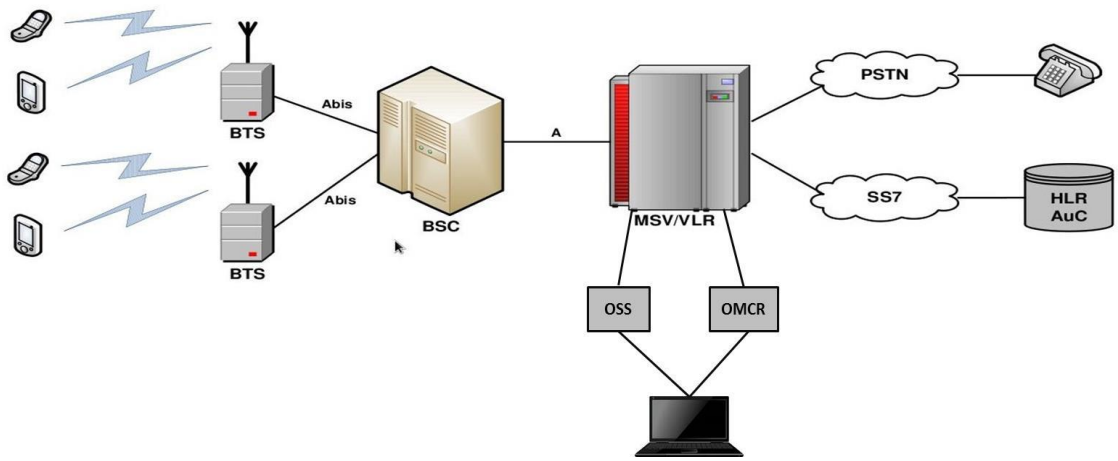
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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%

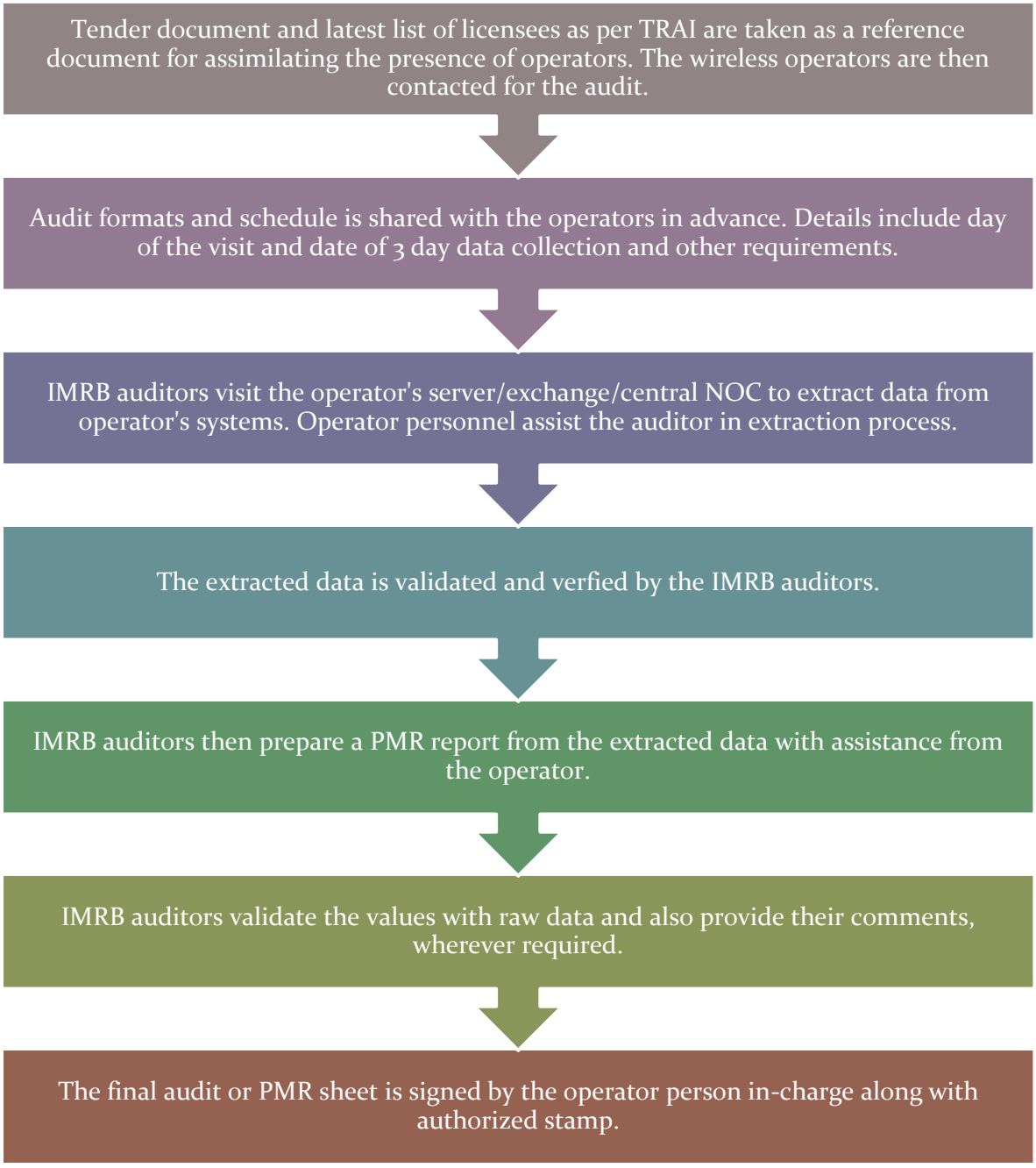
2.4.1.8 POINT OF DATA EXTRACTION

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.

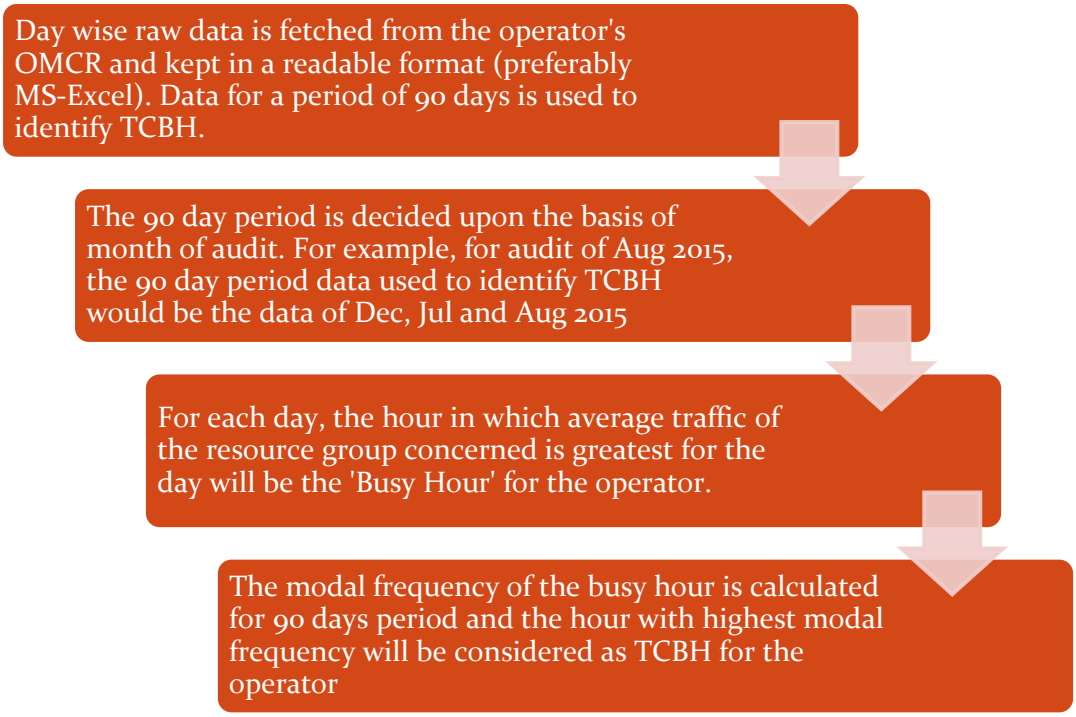
The 3 day live measurement was conducted for network parameters (2G & 3G) and wireless data services (2G & 3G).

S. No.	Name of Service Provider	Date of Live Measurement Audit		
GSM		Apr-16	May-16	Jun-16
1	Aircel	April 07, 08, 09	May 02, 03, 04	June 01, 02, 02
2	Airtel	April 07, 08,10	May 03, 04, 05	June 01, 02, 03
3	BSNL	April 05, 06, 07	May 02, 03, 04	June 04, 06, 07
4	IDEA	April 05, 06, 08	May 03, 04, 05	June 01, 02, 03
5	RCOM GSM	April 04, 05, 06	May 03, 04, 05	June 05, 06, 07
6	Tata GSM	April 05, 06, 07	May 04, 05, 06	June 04, 06, 07
7	Videocon	April 02, 03, 04	Service Closed	Service Closed
8	VODAFONE	April 04, 05, 06	May 02, 03, 05	June 01, 02, 03
CDMA Operators				
9	Reliance	April 04, 05, 06	May 05, 06, 07	Service Closed
10	TATA	April 05, 06, 07	May 05, 06, 07	June 04, 06, 07
3G Operators				
11	Airtel	April 07, 08,10	May 03, 04, 05	June 01, 02, 03
12	BSNL	April 05, 06, 07	May 02, 03, 04	June 04, 06, 07
13	IDEA	April 05, 06, 08	May 03, 04, 05	June 01, 02, 03
14	Reliance	April 04, 05, 06	May 03, 04, 05	June 05, 06, 07

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.

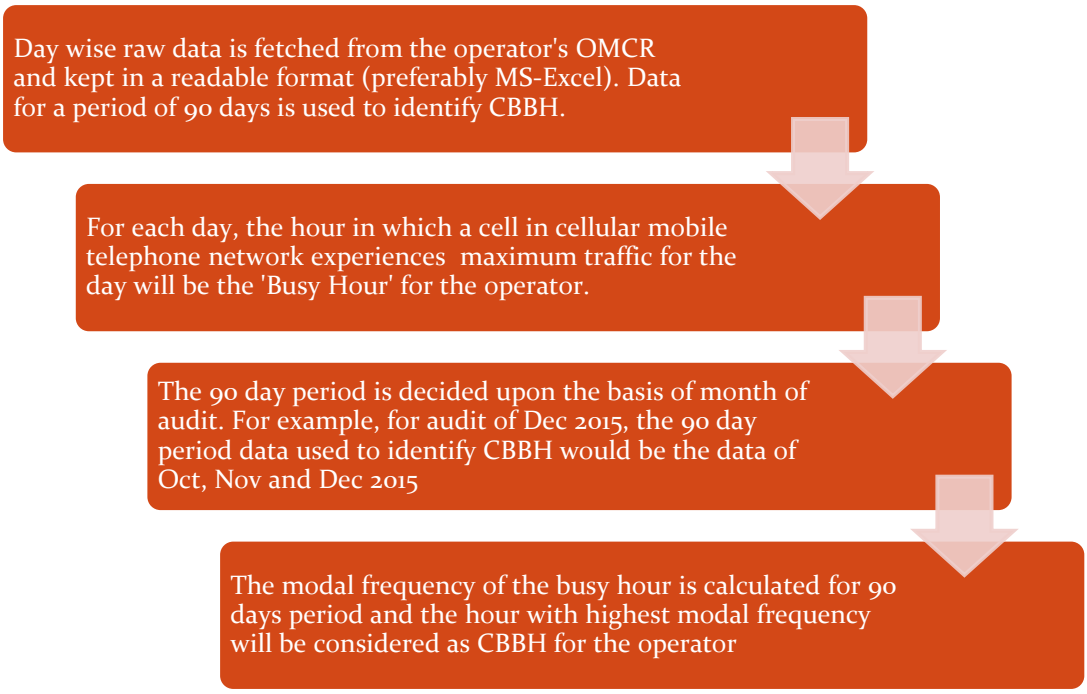
Step by step procedure to identify TCBH for an operator:



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 June 2016 (AMJ'16) was collected in the month of July 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%

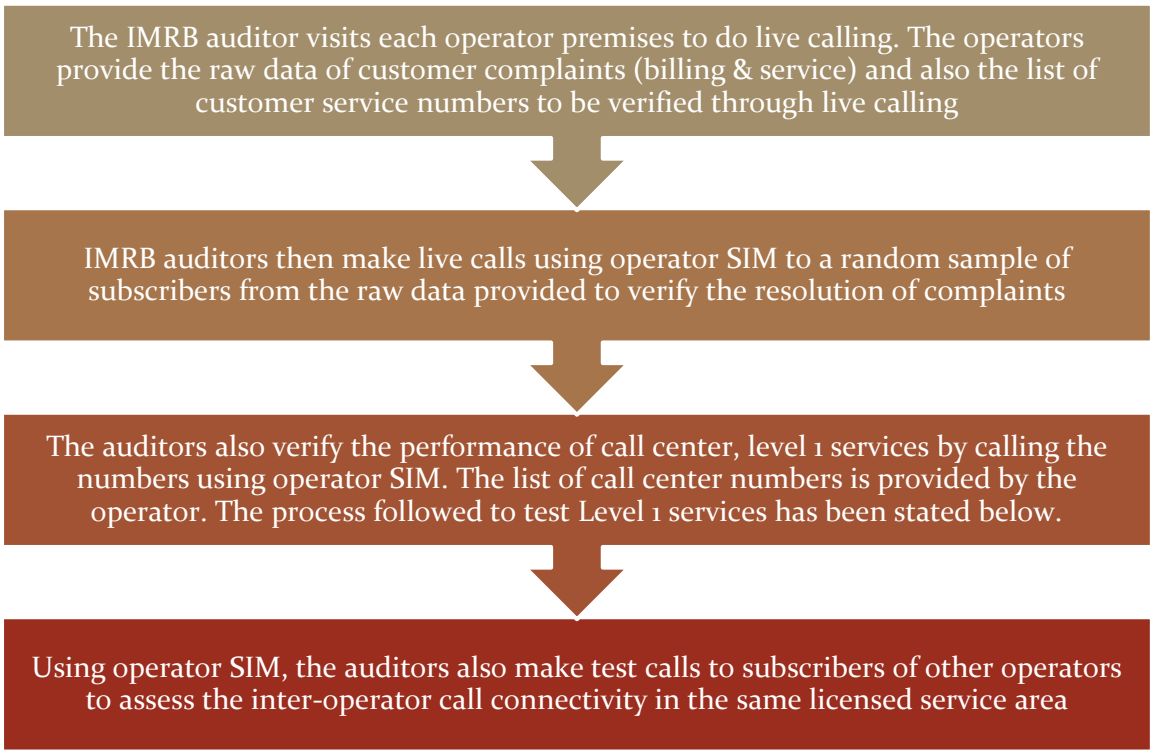
2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

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 June 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 May 2016 was considered for live calling activity conducted in June 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 AMJ'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.

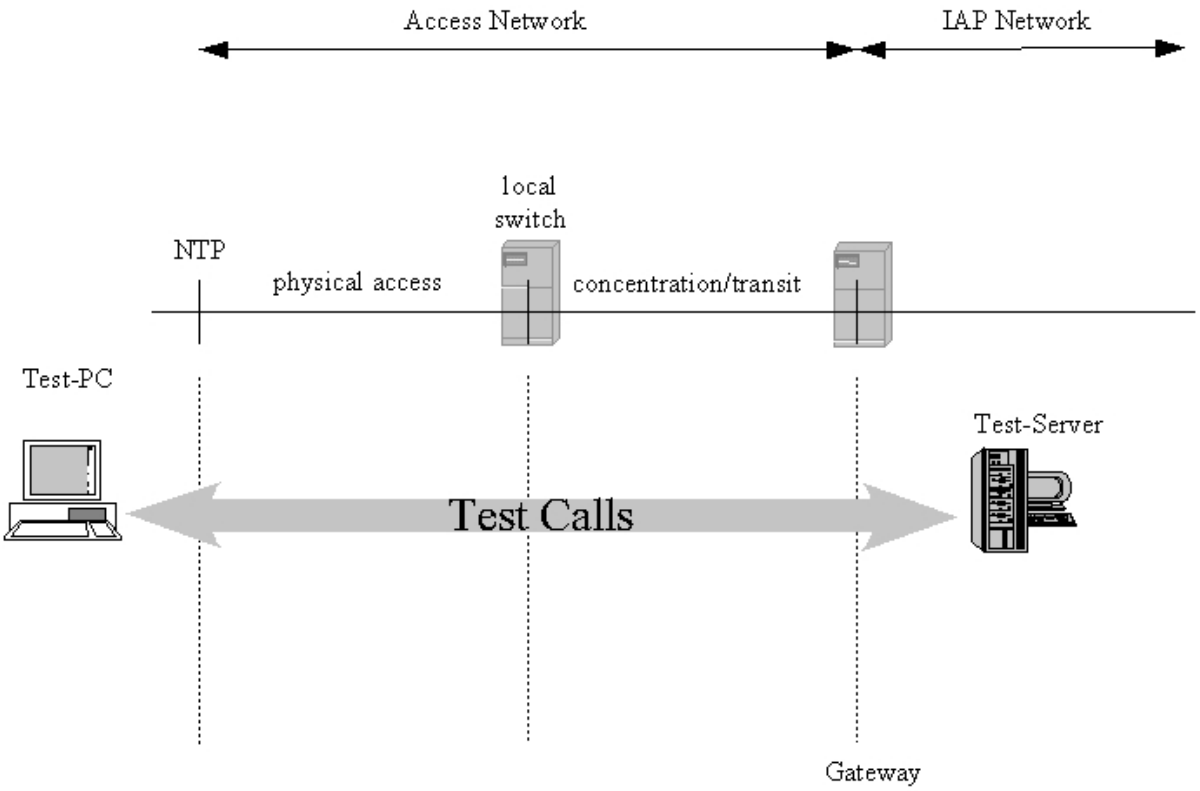


Figure for Measurement set-up

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	180
Airtel	11644601
BSNL	2250980
Idea	23360012
Reliance CDMA	1994415
Reliance GSM	9288405
Tata CDMA	132611
Tata GSM	3028346
Videocon	Service Closed
Vodafone	5389259
Name of Operator	**Number of Subscriber as per VLR-3G**
Airtel 3G	984839
BSNL 3G	7911
Idea 3G	23360012
Reliance 3G	NDR
Tata 3G	699930

June'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 2G and 3G operators met TRAI benchmark for wireless data services audit.

Live Calling

- As per the consumers (live calling exercise) all operators failed to meet the benchmark only, TATA CDMA & GSM were able to meet the benchmark of resolving 98% complaints within 4 weeks.
- The benchmark for resolving 100% complaints within 6 weeks was not met by Airtel, BSNL and Reliance GSM.
- Aircel, Tata CDMA, Tata GSM and Idea failed to meet the TRAI benchmark for level 1 service.
- Aircel, BSNL 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 Vodafone failed to meet the TRAI benchmark for the parameter.
- For the prepaid customers, Idea failed to meet the benchmark of charging disputes
- Idea failed to meet the benchmark in complaints resolved in 4 weeks and Vodafone failed for complaints resolved within 6 weeks.
- Vodafone failed to meet the benchmark for providing credit or waiver within one week in case of complaints received
- Airtel, Reliance CDMA & GSM and Tata 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 Bhopal and Vidisha SSA
- BSNL 2G failed to meet the benchmark in indoor locations for Voice Quality in Satna and Rewa SSA
- BSNL 2G failed to meet the benchmark for voice quality in Guna, Rewa, Sidhi, Gwalior, Morena and Shivpuri SSA in outdoor location.
- BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations for CSSR in Nrsingpur SSA and outdoor location in Gwalior and Shivpuri SSA.
- BSNL 2G failed to meet the benchmark in outdoor locations for call drop rate in Guna, Narsinghpur, Rewa, Sidhi, Shivpuri and Gwalior 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 Bhopal and Vidisha SSA, however failed in outdoor locations in Raisen and indoor location in Shadhol SSA.
-
- BSNL 3G failed to meet the benchmark for CSSR in outdoor location in Bhopal SSA
- BSNL 3G failed to meet the benchmark for Call Drop Rate in outdoor location in Bhopal, Raisen, Vidisha and Sidhi, however failed in indoor location in Rewa and Shadhol 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	0.33%	0.78%	97.90%	0.72%	0.00%	0.84%	0.78%	99.12%
Airtel	0.21%	0.52%	98.80%	0.14%	0.86%	0.68%	1.71%	97.60%
BSNL	1.89%	1.49%	96.86%	0.53%	1.33%	1.13%	1.85%	NA
Idea	0.12%	0.42%	97.60%	0.39%	1.23%	0.60%	1.39%	98.08%
Reliance CDMA	0.03%	0.11%	98.25%	NA	0.91%	0.13%	0.63%	99.00%
Reliance GSM	0.33%	1.56%	96.23%	0.17%	0.81%	0.17%	0.68%	98.58%
Tata CDMA	0.12%	0.39%	97.84%	NA	0.00%	0.46%	2.30%	98.63%
Tata GSM	0.05%	0.02%	99.38%	0.12%	0.08%	0.53%	2.50%	98.83%
Videocon	0.17%	0.57%	98.82%	0.09%	0.19%	0.53%	2.36%	98.70%
Vodafone	0.15%	0.55%	99.31%	0.22%	0.69%	NA	3.24%	98.91%

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 Reliance CDMA 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 0.02%.

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for TATA GSM with 99.38%.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion, while Videocon recorded the best SDCCH / Paging Channel Congestion at 0.09%.

TCH Congestion:

All the operators met the benchmark for TCH congestion, while Aircel and TATA CDMA 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 Reliance CDMA at 0.13%.

Worst Affected Cells Having More than 3% TCH Drop:

Vodafone failed to meet the benchmark. Best performance was recorded for Reliance CDMA at 0.63%.

Voice Quality

All operators met the benchmark. Best performance was recorded for Aircel 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 - APRIL FOR 2G

Month								
Name of Service Provider Month January	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	0.29%	0.78%	97.85%	0.63%	0.00%	0.88%	0.26%	99.13%
Airtel	0.15%	0.42%	98.95%	0.09%	0.58%	0.60%	1.55%	97.63%
BSNL	1.88%	1.49%	96.70%	0.51%	1.32%	1.16%	1.78%	NA
Idea	0.10%	0.26%	97.78%	0.47%	1.15%	0.54%	1.10%	98.14%
Reliance CDMA	0.02%	0.00%	98.38%	NA	0.66%	0.09%	0.61%	99.04%
Reliance GSM	0.38%	1.98%	96.58%	0.11%	0.70%	0.16%	0.62%	98.59%
Tata CDMA	0.16%	0.70%	96.03%	NA	0.00%	0.35%	2.27%	97.60%
Tata GSM	0.05%	0.00%	99.46%	0.09%	0.06%	0.50%	2.28%	98.89%
Videocon	0.17%	0.57%	98.82%	0.09%	0.19%	0.53%	2.36%	98.70%
Vodafone	0.11%	0.35%	99.44%	0.16%	0.56%	0.53%	2.65%	98.93%

4.1.2 PMR DATA – MAY FOR 2G

Month								
Name of Service Provider Month May	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%	0.00%	98.12%	0.64%	0.00%	0.67%	1.04%	99.14%
Airtel	0.29%	0.86%	98.74%	0.24%	1.07%	0.71%	1.67%	97.63%
BSNL	1.92%	1.47%	96.60%	0.58%	1.23%	1.25%	1.97%	NA
Idea	0.14%	0.45%	97.84%	0.44%	1.09%	0.58%	1.46%	98.12%
Reliance CDMA	0.04%	0.22%	98.12%	NA	1.17%	0.17%	0.66%	98.97%
Reliance GSM	0.21%	0.88%	96.26%	0.20%	0.71%	0.17%	0.70%	98.62%
Tata CDMA	0.07%	0.00%	98.94%	NA	0.00%	0.50%	2.21%	99.12%
Tata GSM	0.06%	0.07%	99.31%	0.24%	0.13%	0.54%	2.43%	98.82%
Videocon	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed
Vodafone	0.19%	0.81%	99.24%	0.36%	0.76%	0.56%	2.95%	98.85%

4.1.3 PMR DATA - JUNE FOR 2G

Month								
Name of Service Provider Month June	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	0.26%	1.56%	97.72%	0.89%	0.00%	0.99%	1.04%	99.09%
Airtel	0.19%	0.28%	98.72%	0.08%	0.94%	0.73%	1.92%	97.56%
BSNL	1.87%	1.52%	97.28%	0.50%	1.45%	0.32%	1.81%	NA
Idea	0.13%	0.55%	97.18%	0.27%	1.46%	0.69%	1.62%	97.98%
Reliance CDMA	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed
Reliance GSM	0.41%	1.82%	95.86%	0.21%	1.03%	0.19%	0.70%	98.54%
Tata CDMA	0.14%	0.47%	98.56%	NA	0.00%	0.50%	2.42%	99.17%
Tata GSM	0.04%	0.00%	99.36%	0.03%	0.06%	0.95%	2.78%	98.52%
Videocon	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed
Vodafone	0.16%	0.49%	99.26%	0.15%	0.74%	0.65%	4.13%	98.95%

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	0.27%	0.00%	98.33%	0.08%	0.00%	0.33%	0.64%	99.65%
Airtel	0.24%	0.00%	98.83%	0.16%	0.93%	0.65%	1.61%	97.63%
BSNL	1.92%	1.04%	96.96%	0.47%	1.13%	1.16%	1.63%	NA
Idea	0.14%	0.00%	97.63%	0.48%	1.23%	0.61%	1.40%	98.09%
Reliance CDMA	0.03%	0.00%	98.70%	NA	0.76%	0.15%	0.66%	99.01%
Reliance GSM	0.37%	0.00%	96.42%	0.16%	0.84%	0.18%	0.66%	98.57%
Tata CDMA	0.13%	0.00%	98.13%	NA	0.00%	0.52%	1.00%	98.23%
Tata GSM	0.10%	0.00%	99.43%	0.12%	0.11%	0.62%	2.36%	99.06%
Videocon	0.40%	0.00%	99.02%	0.04%	0.02%	0.38%	0.14%	99.22%
Vodafone	0.04%	0.00%	99.37%	0.25%	0.58%	0.57%	1.39%	98.66%

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 Reliance CDMA at 0.03%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark with most of the operators 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 TATA GSM with 99.43%.

SDCCH/ Paging Chl. Congestion:

All the operators met the benchmark on SDCCH / Paging Channel Congestion, while Videocon recorded the best SDCCH / Paging Channel Congestion at 0.04%.

TCH Congestion:

All the operators met the benchmark for TCH congestion, while Aircel and TATA CDMA 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 CDMA at 0.15%.

Worst Affected Cells Having More than 3% TCH Drop:

All the operators met the benchmark for the parameter. Best performance was recorded for Videocon 0.14%.

Voice Quality

All operators met the benchmark. Best performance was recorded for Aircel at 99.65%.

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 - APRIL FOR 2G

3 Day								
Name of Service Provider 3 Day January	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	0.22%	0.00%	100.00%	0.08%	0.00%	0.00%	0.09%	99.85%
Airtel	0.19%	0.00%	98.98%	0.14%	0.95%	0.60%	1.56%	97.58%
BSNL	1.96%	1.49%	96.70%	0.42%	1.32%	1.13%	1.72%	NA
Idea	0.15%	0.00%	97.78%	0.60%	1.14%	0.60%	1.34%	98.10%
Reliance CDMA	0.03%	0.00%	99.13%	NA	0.21%	0.10%	0.59%	99.06%
Reliance GSM	0.53%	0.00%	96.55%	0.12%	0.71%	0.17%	0.75%	98.56%
Tata CDMA	0.01%	0.00%	95.90%	NA	0.00%	0.36%	0.71%	96.20%
Tata GSM	0.01%	0.00%	99.38%	0.09%	0.10%	0.51%	2.03%	98.89%
Videocon	0.40%	0.00%	99.02%	0.04%	0.02%	0.38%	0.14%	99.22%
Vodafone	0.00%	0.00%	99.50%	0.18%	0.45%	0.55%	0.22%	98.65%

4.2.2 3 DAY DATA – MAY FOR 2G

3 Day								
Name of Service Provider 3 Day May	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	0.42%	0.00%	96.55%	0.08%	0.00%	0.60%	1.04%	99.19%
Airtel	0.36%	0.00%	98.72%	0.27%	0.99%	0.70%	1.65%	97.64%
BSNL	1.92%	1.47%	96.64%	0.35%	1.06%	1.21%	1.92%	NA
Idea	0.15%	0.00%	97.78%	0.60%	1.14%	0.60%	1.34%	98.10%
Reliance CDMA	0.03%	0.00%	98.28%	NA	1.32%	0.20%	0.73%	98.97%
Reliance GSM	0.23%	0.00%	95.89%	0.17%	0.84%	0.19%	0.66%	98.57%
Tata CDMA	0.01%	0.00%	99.20%	NA	0.00%	0.49%	1.04%	99.23%
Tata GSM	0.01%	0.00%	99.42%	0.12%	0.10%	0.51%	2.38%	99.87%
Videocon	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed
Vodafone	0.01%	0.00%	99.26%	0.40%	0.65%	0.60%	0.31%	98.63%

4.2.3 3 DAY DATA - JUNE FOR 2G

3 Day								
Name of Service Provider 3 Day June	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	0.16%	0.00%	98.43%	0.08%	0.00%	0.52%	0.78%	99.90%
Airtel	0.17%	0.00%	98.81%	0.07%	0.85%	0.66%	1.61%	97.66%
BSNL	1.87%	0.16%	97.53%	0.63%	1.00%	0.34%	1.25%	NA
Idea	0.12%	0.01%	97.33%	0.25%	1.40%	0.64%	1.52%	98.09%
Reliance CDMA	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed
Reliance GSM	0.35%	0.00%	96.81%	0.20%	0.96%	0.17%	0.56%	98.59%
Tata CDMA	0.02%	0.00%	99.30%	NA	0.00%	0.45%	1.25%	99.25%
Tata GSM	0.01%	0.00%	99.50%	0.16%	0.12%	0.51%	2.67%	99.87%
Videocon	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed
Vodafone	0.03%	0.00%	99.35%	0.18%	0.65%	0.57%	3.62%	98.70%

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	0.23%	0.78%	99.82%	0.01%	0.02%	0.33%	1.76%	98.98%
BSNL 3G	1.63%	1.45%	97.53%	0.74%	0.27%	0.35%	1.22%	NA
Idea 3G	0.07%	0.07%	99.63%	0.11%	0.15%	0.50%	1.52%	99.16%
Reliance 3G	0.08%	0.07%	97.67%	0.11%	0.02%	0.07%	0.21%	99.89%
Tata 3G	0.04%	0.00%	98.82%	0.20%	0.48%	0.30%	0.31%	98.19%

Node Bs downtime:

All operators met the benchmark. Best performance was recorded by Idea 3G with 0.07% downtime.

Worst affected Node Bs due to downtime:

All the operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Reliance and Idea 3G at 0.07%.

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for Airtel 3G with 99.82%.

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 Airtel 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 0.07%.

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 0.21%.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for Reliance 3G at 99.89%.

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 - APRIL FOR 3G

Name of Service Provider Month January	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%	0.44%	99.84%	0.00%	0.01%	0.45%	1.75%	99.28%
BSNL 3G	1.62%	1.50%	97.38%	0.69%	0.24%	0.35%	1.42%	NA
Idea 3G	0.05%	0.02%	99.63%	0.09%	0.11%	0.56%	1.80%	99.16%
Reliance 3G	0.06%	0.00%	97.61%	0.09%	0.02%	0.07%	0.18%	99.90%
Tata 3G	0.03%	0.00%	99.53%	0.03%	0.00%	0.31%	1.63%	96.17%

4.3.2 PMR DATA – MAY FOR 3G

Name of Service Provider Month May	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	0.28%	1.13%	99.82%	0.01%	0.04%	0.32%	1.67%	98.99%
BSNL 3G	1.71%	1.42%	97.36%	0.71%	0.44%	0.37%	1.54%	NA
Idea 3G	0.09%	0.07%	99.59%	0.15%	0.20%	0.49%	1.55%	99.15%
Reliance 3G	0.07%	0.00%	97.60%	0.14%	0.02%	0.06%	0.18%	99.90%
Tata 3G	0.05%	0.00%	98.06%	0.43%	0.95%	0.30%	1.40%	99.74%

4.3.3 PMR DATA - JUNE FOR 3G

Name of Service Provider Month June	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	0.23%	0.76%	99.80%	0.00%	0.02%	0.25%	1.84%	98.84%
BSNL 3G	1.55%	1.42%	97.84%	0.82%	0.15%	0.32%	0.78%	NA
Idea 3G	0.08%	0.11%	99.66%	0.09%	0.13%	0.45%	1.21%	99.17%
Reliance 3G	0.11%	0.20%	97.79%	0.12%	0.03%	0.09%	0.26%	99.88%
Tata 3G	0.03%	0.00%	98.86%	0.14%	0.49%	0.35%	0.31%	98.65%

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	0.29%	0.00%	99.82%	0.00%	0.03%	0.34%	1.65%	99.25%
BSNL 3G	1.65%	1.50%	96.39%	0.74%	0.94%	0.49%	2.13%	NA
Idea 3G	0.08%	0.00%	99.67%	0.10%	0.14%	0.54%	1.75%	99.16%
Reliance 3G	0.08%	0.00%	97.46%	0.11%	0.03%	0.08%	0.19%	99.89%
Tata 3G	0.02%	0.00%	99.20%	0.19%	0.28%	0.31%	0.30%	98.42%

Node Bs downtime:

All operators met the benchmark for the parameter. Best performance was recorded for Idea and Reliance 3G at 0.04%.

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 Reliance 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 99.82%.

RRC Congestion:

All the operators met the benchmark for RRC Congestion. The minimum RRC Congestion was observed for Airtel 3G with 0.00%.

Circuit Switched RAB Congestion:

All operators met the benchmark for the parameter. Minimum Circuit Switched RAB Congestion was recorded for Airtel 3G at 0.03%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance 3G at 0.08%.

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.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for Reliance 3G. 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 - APRIL FOR 3G

Name of Service Provider 3 Day January	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	0.31%	0.00%	99.85%	0.01%	0.03%	0.28%	1.48%	99.47%
BSNL 3G	1.54%	1.26%	96.22%	0.86%	1.90%	0.50%	2.21%	NA
Idea 3G	0.07%	0.00%	99.65%	0.10%	0.15%	0.60%	2.03%	99.15%
Reliance 3G	0.08%	0.00%	97.75%	0.05%	0.01%	0.09%	0.15%	99.89%
Tata 3G	0.02%	0.00%	99.64%	0.05%	0.00%	0.32%	0.75%	97.20%

4.4.2 3 DAY DATA – MAY FOR 3G

Name of Service Provider 3 Day May	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	0.31%	0.00%	99.79%	0.01%	0.03%	0.52%	1.80%	99.17%
BSNL 3G	1.70%	1.62%	96.47%	0.68%	0.45%	0.48%	2.09%	NA
Idea 3G	0.07%	0.00%	99.65%	0.10%	0.15%	0.60%	2.03%	99.15%
Reliance 3G	0.10%	0.00%	96.69%	0.18%	0.04%	0.08%	0.18%	99.89%
Tata 3G	0.02%	0.00%	98.50%	0.50%	0.70%	0.29%	0.74%	99.80%

4.4.3 3 DAY DATA - JUNE FOR 3G

Name of Service Provider 3 Day June	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	0.24%	0.00%	99.84%	0.00%	0.02%	0.22%	1.67%	99.16%
BSNL 3G	1.70%	1.62%	96.47%	0.68%	0.45%	0.48%	2.09%	NA
Idea 3G	0.09%	0.00%	99.70%	0.11%	0.11%	0.42%	1.19%	99.16%
Reliance 3G	0.05%	0.00%	97.94%	0.09%	0.04%	0.08%	0.25%	99.88%
Tata 3G	0.02%	0.00%	99.45%	0.01%	0.13%	0.31%	0.28%	98.25%

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%	98.02%	3.85%	NDR	96.40%	2.91%
Airtel	97.69%	99.44%	3.58%	NDR	NDR	NDR
BSNL	NDR	NDR	NDR	NA	NDR	NDR
Idea	100.00%	99.59%	1.07%	NDR	99.79%	1.07%
Reliance CDMA	100.00%	NDR	NDR	100.00%	NDR	NDR
Reliance GSM	100.00%	99.96%	4.29%	100.00%	99.87%	4.49%
Tata CDMA	100.00%	96.56%	1.35%	NDR	NDR	NDR
Tata GSM	100.00%	99.80%	2.28%	NDR	NDR	NDR
Videocon	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed
Vodafone	100.00%	99.87%	3.38%	NDR	NDR	NDR

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.

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 Reliance 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 measurement. Minimum Drop Rate was recoded for Idea in PMR as well as Live data.

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	NDR	99.42%	0.03%	NDR	NDR	NDR
BSNL 3G	NDR	NDR	NDR	NDR	98.22%	3.45%
Idea 3G	NDR	99.29%	0.50%	NDR	99.29%	0.50%
Reliance 3G	NDR	98.54%	0.70%	NDR	98.42%	0.73%
Tata 3G	NDR	99.98%	2.48%	NDR	NDR	NDR

NDR: No data received

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

Activation done within 4 hours:

No data for 3G activation available for any of the operators.

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.

Drop Rate:

All operators met the benchmark for drop rate as per audit as well as live measurement.

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 seconds	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel	NA	NA	100.00%	94.00%	55.00%	NA
Airtel	83.33%	83.33%	100.00%	100.00%	100.00%	78.00%
BSNL	88.00%	88.00%	100.00%	86.00%	100.00%	86.00%
Idea	54.00%	100.00%	100.00%	97.00%	66.00%	97.00%
Reliance CDMA	NA	NA	NA	NA	NA	NA
Reliance GSM	88.00%	88.00%	100.00%	86.00%	100.00%	81.00%
Tata CDMA	100.00%	NA	100.00%	100.00%	93.67%	NA
Tata GSM	100.00%	100.00%	100.00%	96.00%	63.67%	100.00%
Videocon	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed
Vodafone	97.96%	100.00%	100.00%	96.00%	100.00%	NA

NA- Not applicable

Resolution of billing complaints

As per the consumers (live calling exercise) only TATA CDMA & GSM were able to meet the benchmark of resolving 98% complaints within 4 weeks.

The benchmark for resolving 100% complaints within 6 weeks was not met by Airtel and Reliance GSM.

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.

Customer Care / Helpline Assessment (voice to voice)

All operators met the benchmark of answering 95% voice to voice calls within 90 seconds. Except Aircel and Reliance GSM.

Level 1 Service

As per the live calling results, Aircel, Idea, TATA CDMA & GSM 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.

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 seconds
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel	0.00%	0.00%	NA	NA	NA	98.44%	99.85%
Airtel	0.09%	0.01%	100.00%	100.00%	100.00%	100.00%	61.76%
BSNL	0.01%	0.05%	99.92%	100.00%	100.00%	99.46%	97.99%
Idea	0.62%	0.11%	81.26%	100.00%	100.00%	96.74%	98.27%
Reliance CDMA	0.09%	0.01%	100.00%	100.00%	100.00%	99.26%	90.95%
Reliance GSM	0.09%	0.03%	100.00%	100.00%	100.00%	99.90%	90.37%
Tata CDMA	0.00%	0.00%	NA	NA	NA	100.00%	98.79%
Tata GSM	0.00%	0.00%	100.00%	100.00%	100.00%	97.78%	93.63%
Videocon	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed	Service Closed
Vodafone	0.27%	0.04%	100.00%	99.97%	99.97%	100.00%	99.39%

Metering and Billing Credibility – Post-paid Subscribers

For the billing disputes of post-paid subscribers, it was observed that Idea and Vodafone 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 Idea in complaints resolved in 4 weeks and Vodafone 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.

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

Airtel, Reliance CDMA & GSM and Tata 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%	Service Closed	100.00%	100.00%	100.00%	Service Closed	100.00%
Airtel	100.00%	NA	100.00%	100.00%	Service Closed	100.00%	100.00%	100.00%	Service Closed	100.00%
BSNL	100.00%	100.00%	NA	100.00%	Service Closed	100.00%	100.00%	100.00%	Service Closed	100.00%
Idea	100.00%	100.00%	100.00%	NA	Service Closed	100.00%	100.00%	100.00%	Service Closed	100.00%
Reliance CDMA	NA	NA	NA	NA	Service Closed	NA	NA	NA	Service Closed	NA
Reliance GSM	100.00%	100.00%	100.00%	100.00%	Service Closed	NA	100.00%	100.00%	Service Closed	100.00%
Tata CDMA	100.00%	100.00%	100.00%	100.00%	Service Closed	100.00%	NA	100.00%	Service Closed	100.00%
Tata GSM	100.00%	100.00%	100.00%	100.00%	Service Closed	100.00%	100.00%	NA	Service Closed	100.00%
Videocon	NA	NA	NA	NA	Service Closed	NA	NA	NA	Service Closed	NA
Vodafone	100.00%	100.00%	100.00%	100.00%	Service Closed	100.00%	100.00%	100.00%	Service Closed	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 PMR DATA FOR 2G

Circle	Operator	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						POI	
		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		Point of Interconnection (POI)	
		≤ 2%	≤ 2%	≤ 2%	≤ 2%	≥ 95%	≥ 95%	≤ 1%	≤ 1%	≤ 2%	≤ 2%	≤ 2%	≤ 2%	≤ 3%	≤ 3%	≥ 95%	≥ 95%	≤ 0.5%	≤ 0.5%
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
MPCG	Aircel	0.34	0.33	0.78	0.78	97.90	97.90	0.72	0.72	0.00	0.00	0.85	0.84	0.78	0.78	99.12	99.12	0.00	0.00
	Airtel	0.22	0.21	0.60	0.52	98.83	98.80	0.15	0.14	0.84	0.86	0.66	0.68	1.65	1.71	97.62	97.60	0.00	0.00
	BSNL	1.90	1.89	1.73	1.49	96.84	96.86	0.56	0.53	1.21	1.33	1.17	1.13	2.40	1.85	97.41	NA	0.00	0.00
	Idea	0.12	0.12	0.42	0.42	97.60	97.60	0.39	0.39	1.23	1.23	0.60	0.60	1.39	1.39	98.08	98.08	0.00	0.00
	RCOM CDMA	0.03	0.03	0.07	0.11	98.05	98.25	0.00	NA	1.04	0.91	0.12	0.13	0.46	0.63	99.29	99.00	0.00	0.00
	RTL	0.40	0.33	1.56	1.56	96.23	96.23	0.18	0.17	0.81	0.81	0.17	0.17	0.69	0.68	98.59	98.58	0.00	0.00
	TTL CDMA	0.14	0.12	0.47	0.39	99.10	97.84	0.00	NA	0.01	0.00	0.34	0.46	2.55	2.30	99.13	98.63	0.00	0.00
	TTL GSM	0.05	0.05	0.00	0.02	99.36	99.38	0.25	0.12	0.11	0.08	0.54	0.53	2.47	2.50	98.82	98.83	0.00	0.00
	Videocon	0.12	0.17	0.57	0.57	98.82	98.82	0.09	0.09	0.17	0.19	0.53	0.53	2.34	2.36	98.70	98.70	0.00	0.00
	Vodafone	0.16	0.15	0.55	0.55	99.31	99.31	0.22	0.22	0.69	0.69	0.58	NA	3.24	3.24	98.87	98.91	0.00	0.00

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

Circle	Operator	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						POI	
		Node Bs downtime (not available for service)		Worst affected Node Bs due to downtime		Call Set-up Success Rate		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		Point of Interconnection (POI)	
		≤ 2%	≤ 2%	≤ 2%	≤ 2%	≥ 95%	≥ 95%	≤ 1%	≤ 1%	≤ 2%	≤ 2%	≤ 2%	≤ 2%	≤ 3%	≤ 3%	≥ 95%	≥ 95%	≤ 0.5%	≤ 0.5%
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
MPCG	Airtel	0.24	0.23	0.78	0.78	99.83	99.82	0.01	0.01	0.02	0.02	0.37	0.33	1.73	1.76	99.55	98.98	0.00	0.00
	BSNL	1.77	1.63	1.50	1.45	96.67	97.53	0.77	0.74	0.52	0.27	0.40	0.35	1.97	1.22	96.38	NA	0.00	0.00
	IDEA	0.07	0.07	0.07	0.07	99.63	99.63	0.11	0.11	0.15	0.15	0.50	0.50	1.52	1.52	99.16	99.16	0.00	0.00
	RTL	0.07	0.08	0.10	0.07	97.67	97.67	0.09	0.11	0.04	0.02	0.07	0.07	0.20	0.21	99.89	99.89	0.00	0.00
	Tata	0.04	0.04	0.00	0.00	98.61	98.82	0.25	0.20	0.61	0.48	0.30	0.30	1.54	0.31	99.83	98.19	0.00	0.00

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 2G and 3G operators met TRAI benchmark for wireless data services audit.

Live Calling

- As per the consumers (live calling exercise) all operators failed to meet the benchmark only, TATA CDMA & GSM were able to meet the benchmark of resolving 98% complaints within 4 weeks.
- The benchmark for resolving 100% complaints within 6 weeks was not met by Airtel, BSNL and Reliance GSM.
- Aircel, Tata CDMA, Tata GSM and Idea failed to meet the TRAI benchmark for level 1 service.
- Aircel, BSNL 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 Vodafone failed to meet the TRAI benchmark for the parameter.
- For the prepaid customers, Idea failed to meet the benchmark of charging disputes
- Idea failed to meet the benchmark in complaints resolved in 4 weeks and Vodafone failed for complaints resolved within 6 weeks.
- Vodafone failed to meet the benchmark for providing credit or waiver within one week in case of complaints received
- Airtel, Reliance CDMA & GSM and Tata 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 Bhopal and Vidisha SSA
- BSNL 2G failed to meet the benchmark in indoor locations for Voice Quality in Satna and Rewa SSA
- BSNL 2G failed to meet the benchmark for voice quality in Guna, Rewa, Sidhi, Gwalior, Morena and Shivpuri SSA in outdoor location.
- BSNL 2G failed to meet the benchmark in outdoor as well as indoor locations for CSSR in Nrsingpur SSA and outdoor location in Gwalior and Shivpuri SSA.

- BSNL 2G failed to meet the benchmark in outdoor locations for call drop rate in Guna, Narsinghpur, Rewa, Sidhi, Shivpuri and Gwalior 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 Bhopal and Vidisha SSA, however failed in outdoor locations in Raisen and indoor location in Shadhol SSA.
-
- BSNL 3G failed to meet the benchmark for CSSR in outdoor location in Bhopal SSA
- BSNL 3G failed to meet the benchmark for Call Drop Rate in outdoor location in Bhopal, Raisen, Vidisha and Sidhi, however failed in indoor location in Rewa and Shadhol 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 –**

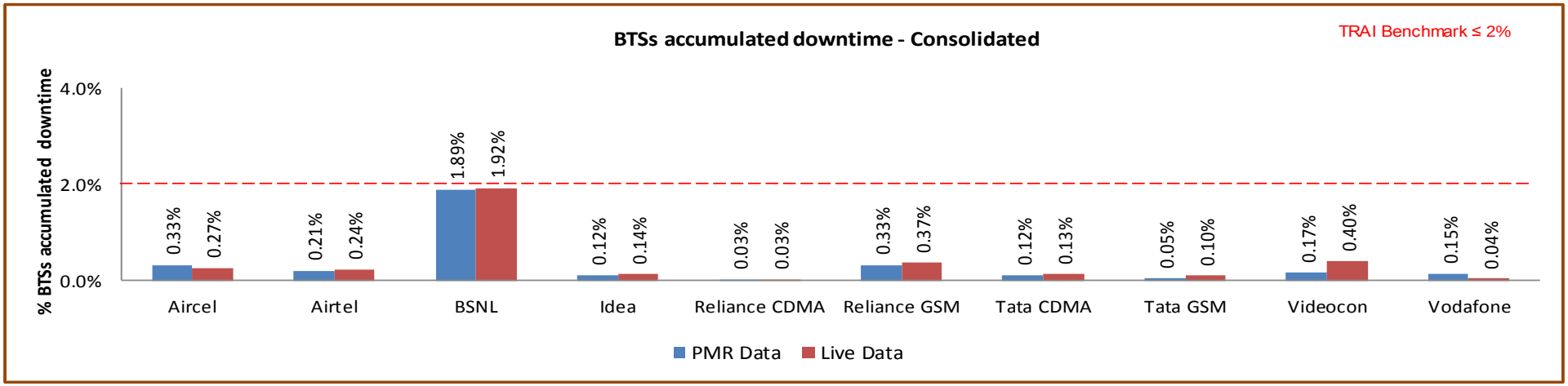
    a. BTSs Accumulated downtime (not available for service) ≤ 2%

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.

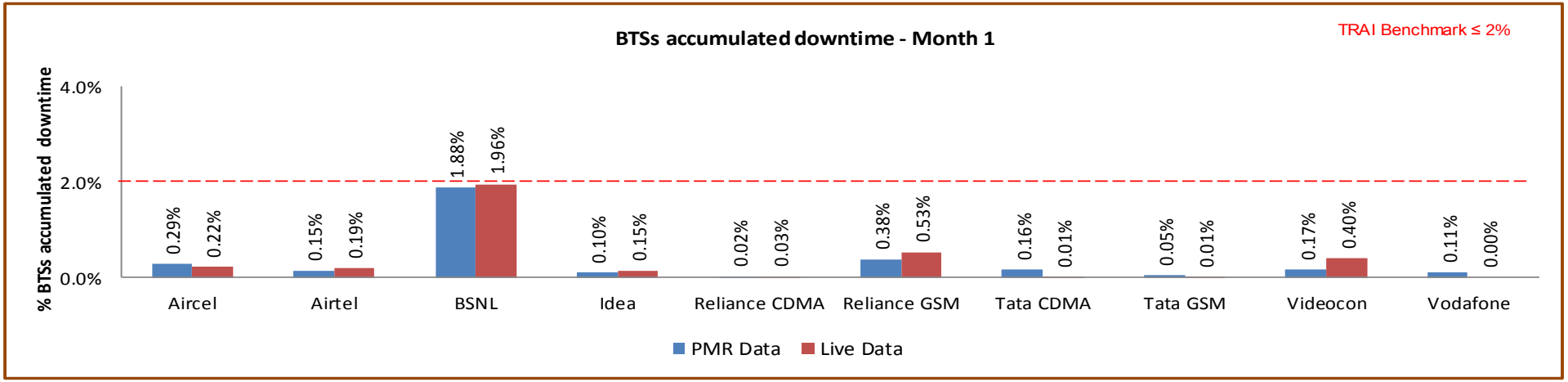
6.1.2 KEY FINDINGS - CONSOLIDATED



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

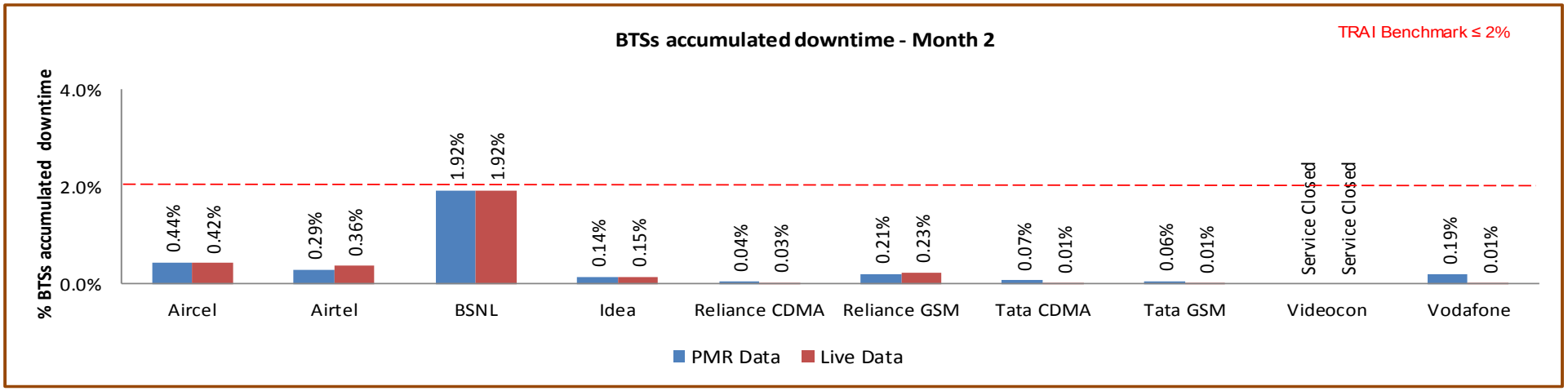
All operators met the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

6.1.2.1 KEY FINDINGS – MONTH 1



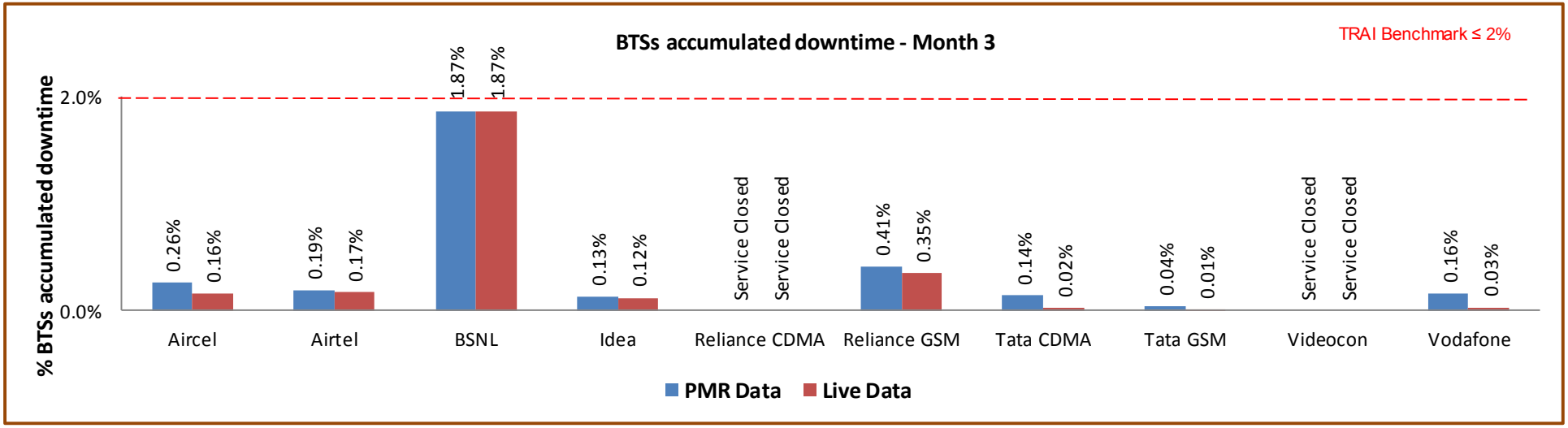
Data Source: Operations and Maintenance Center (OMC) of the operators

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.

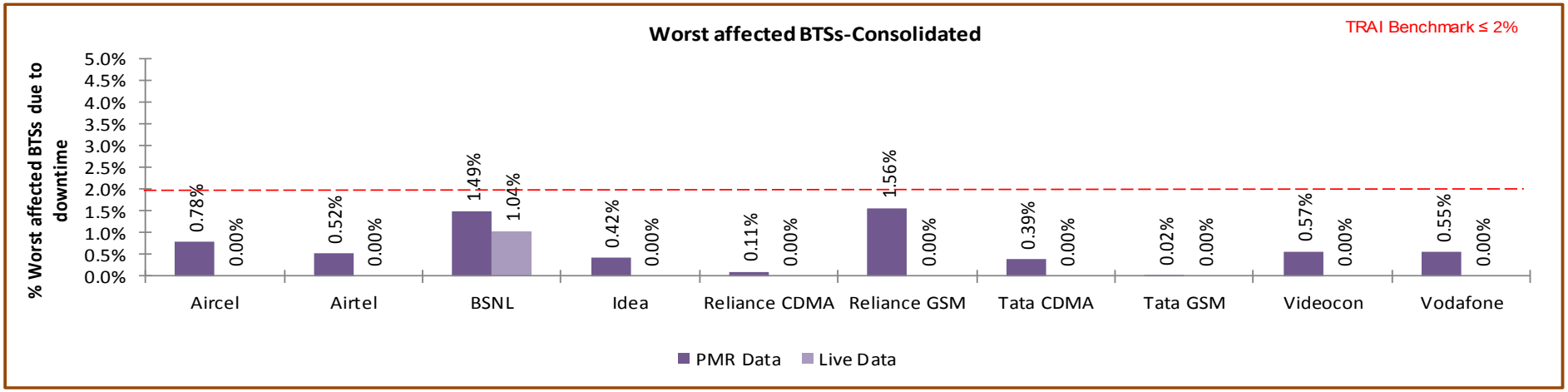
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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.

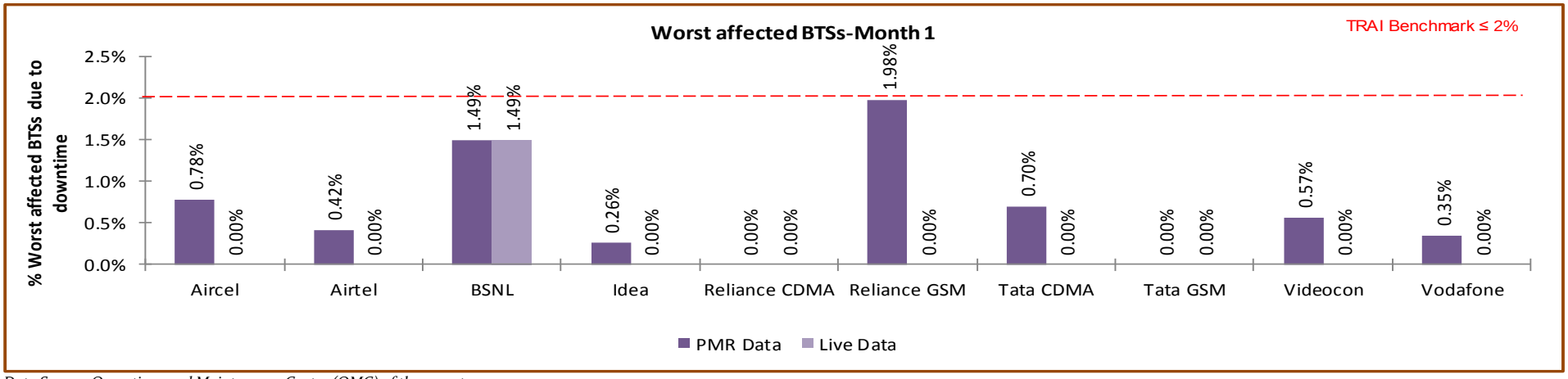
6.2.2 KEY FINDINGS – CONSOLIDATED



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

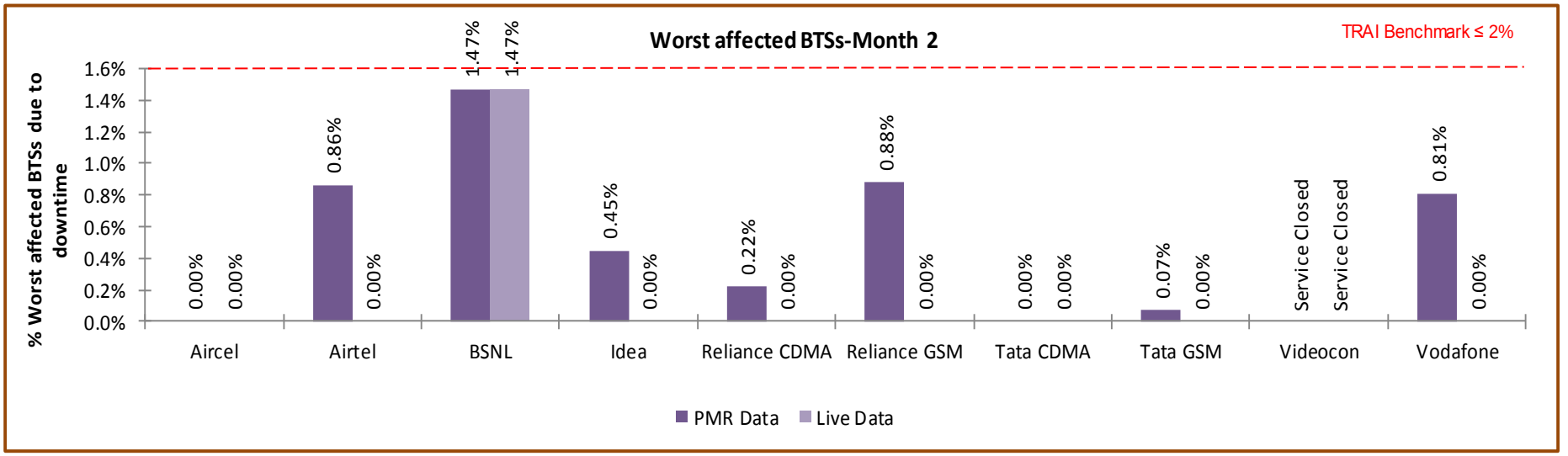
All operators met the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

6.2.2.1 KEY FINDINGS – MONTH 1

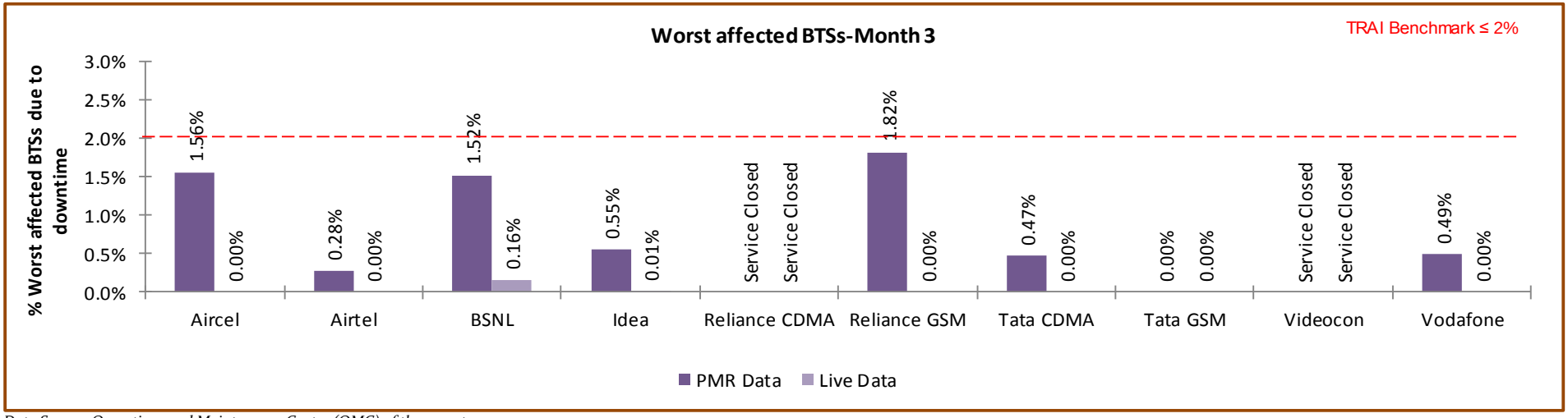


Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2



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

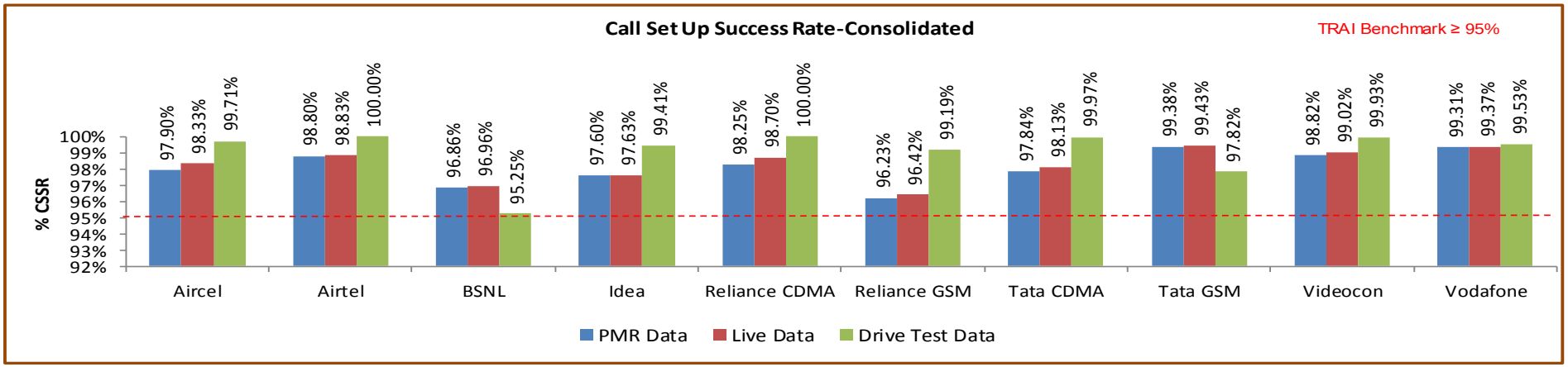
   Call Established means the following events have happened in call setup:-

   - 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.

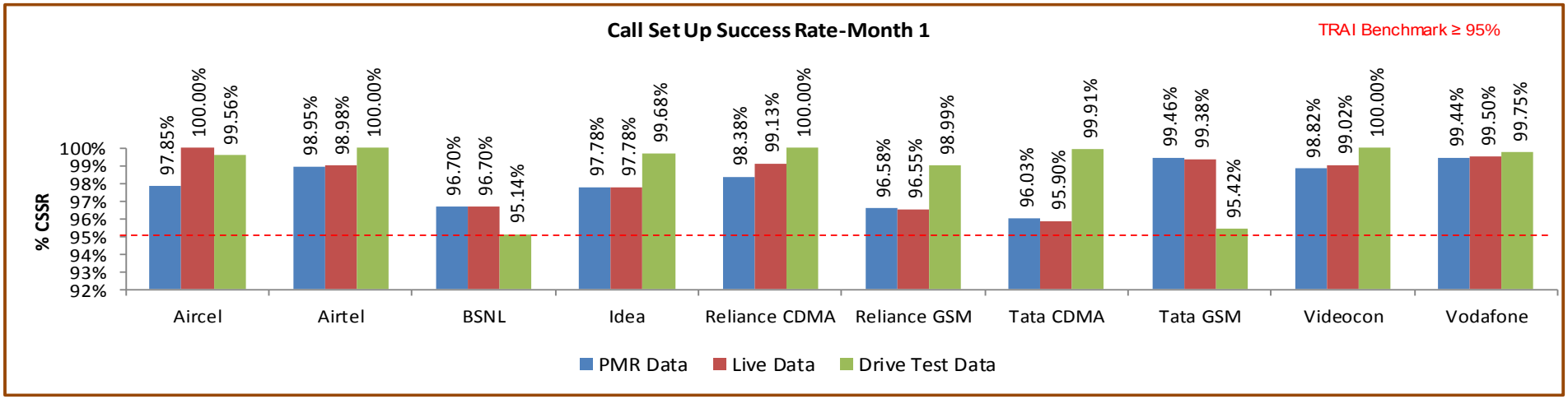
6.3.2 KEY FINDINGS - CONSOLIDATED



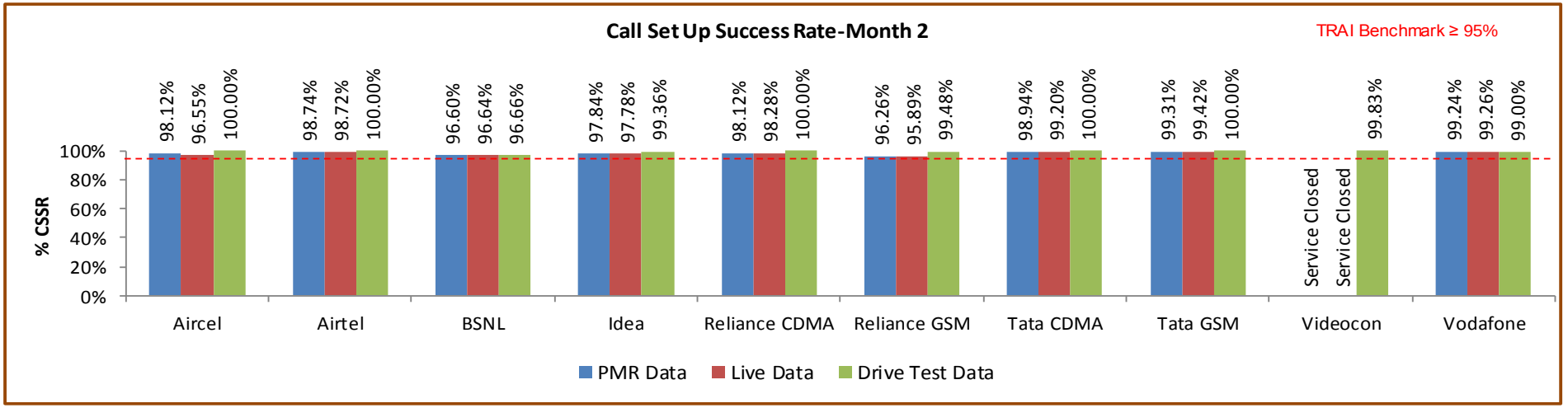
Data Source: Network Operations Center (NOC) of the operators

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

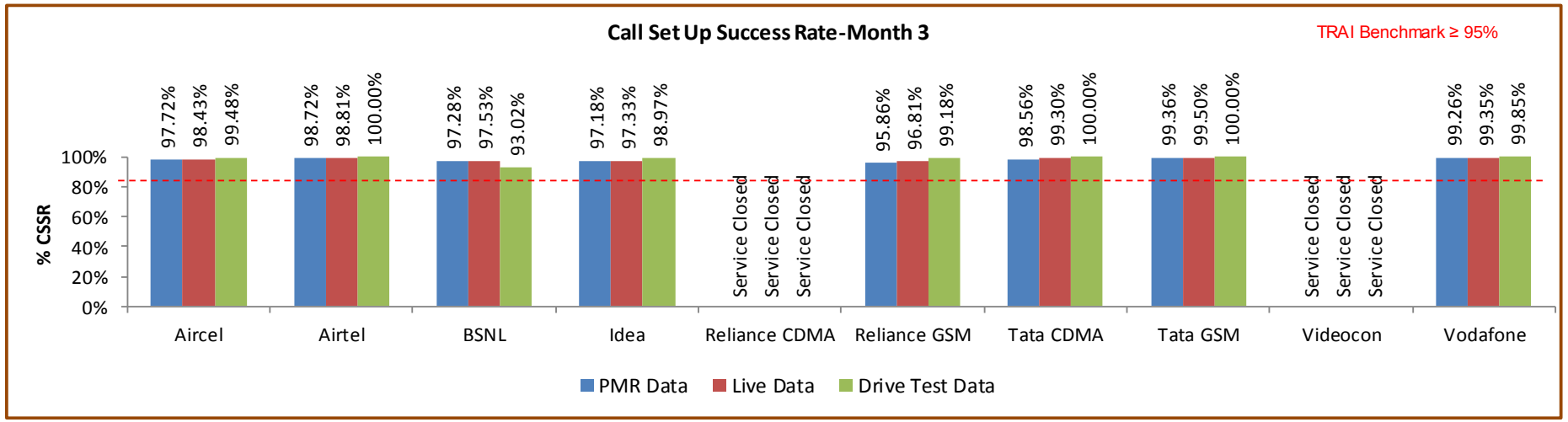
6.3.2.1 KEY FINDINGS – MONTH 1



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

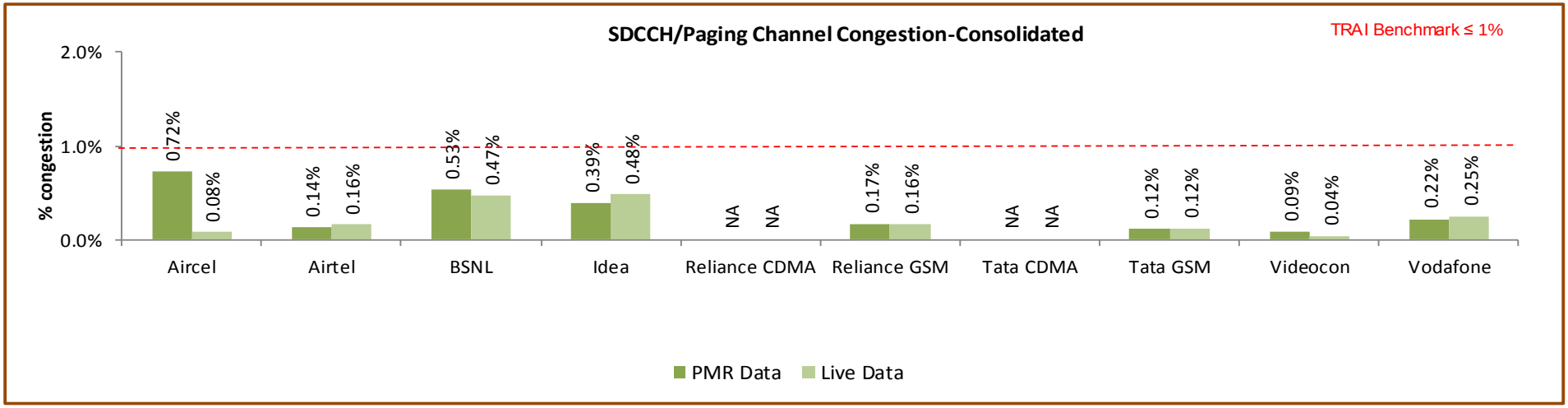
3. **Benchmark:**

   - 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)

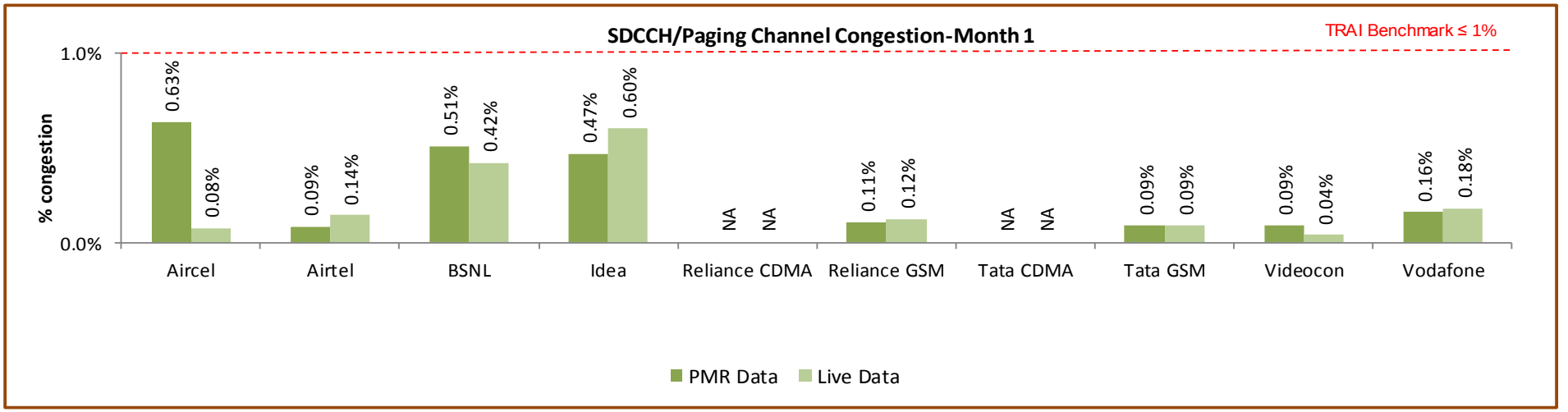


Data Source: Network Operations Center (NOC) of the operators

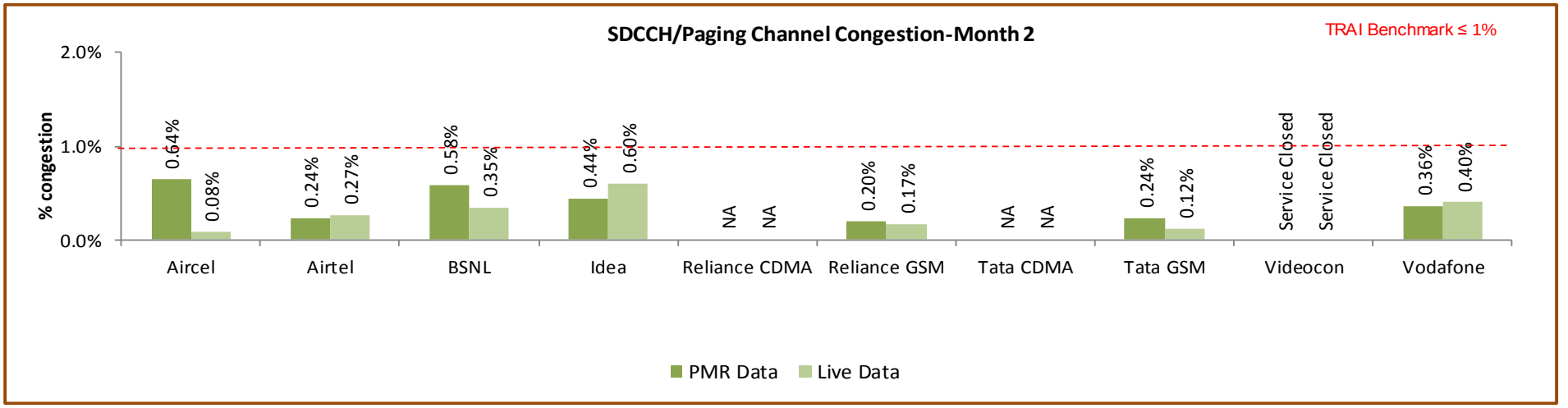
All operators met the benchmark as per PMR/audit data.

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

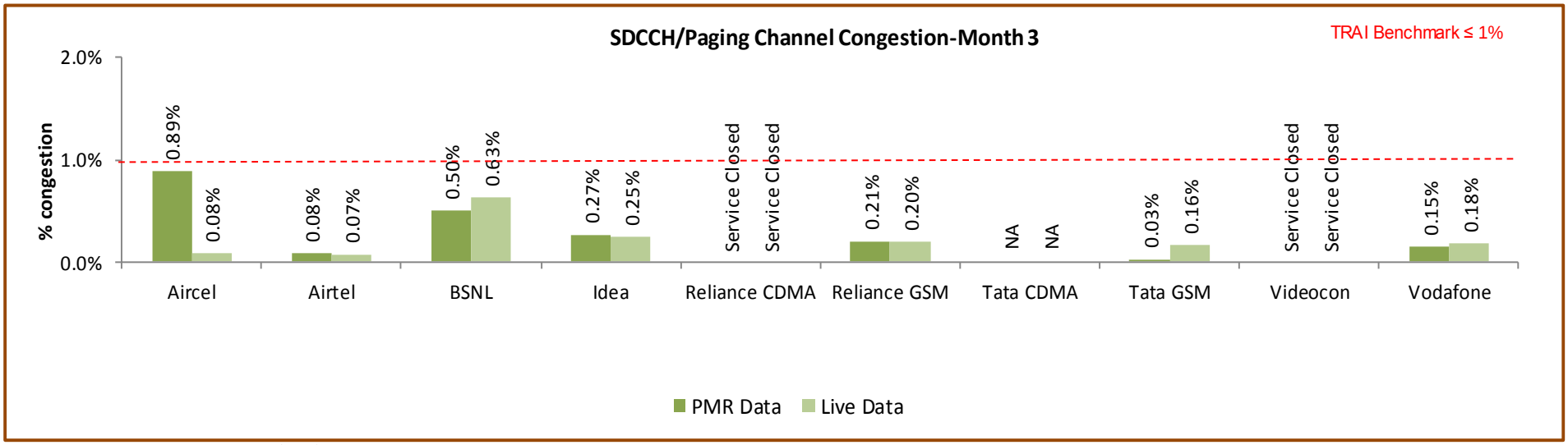
6.4.2.1 KEY FINDINGS – MONTH 1



6.4.2.2 KEY FINDINGS – MONTH 2

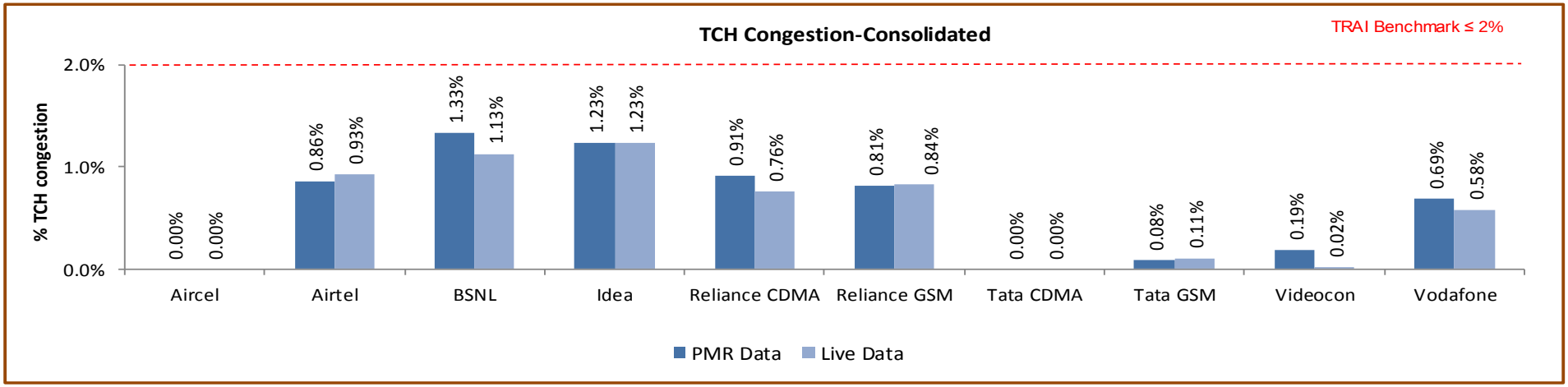


6.4.2.3 KEY FINDINGS – MONTH 3



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

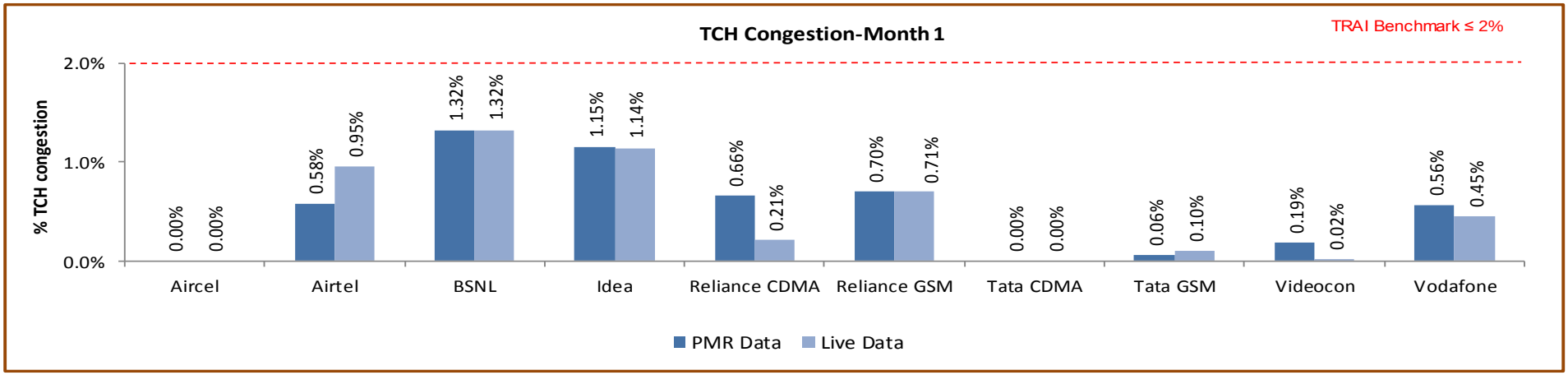
6.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)



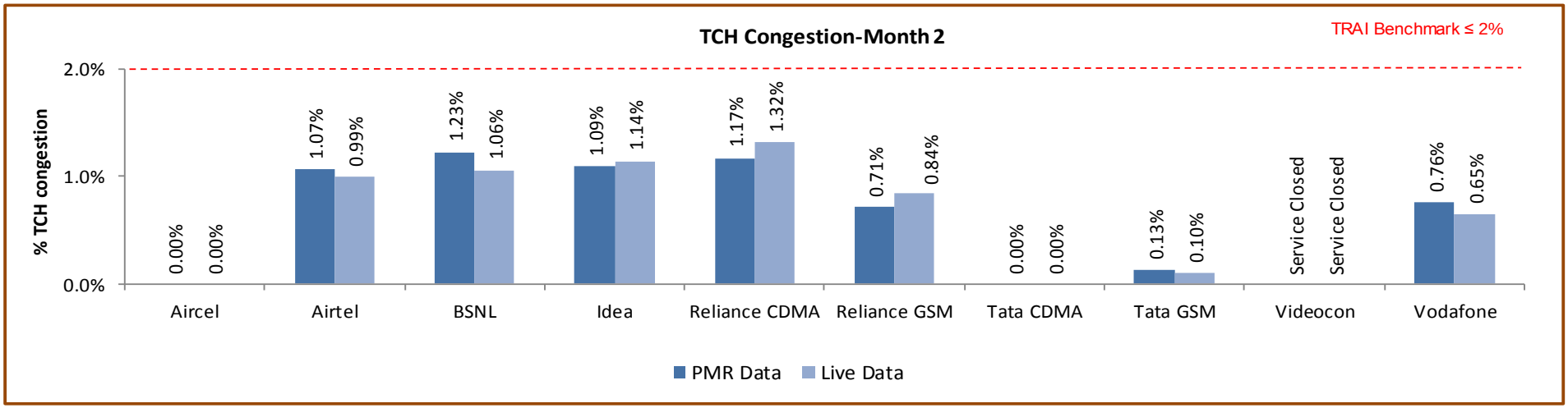
Data Source: Network Operations Center (NOC) of the operators

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

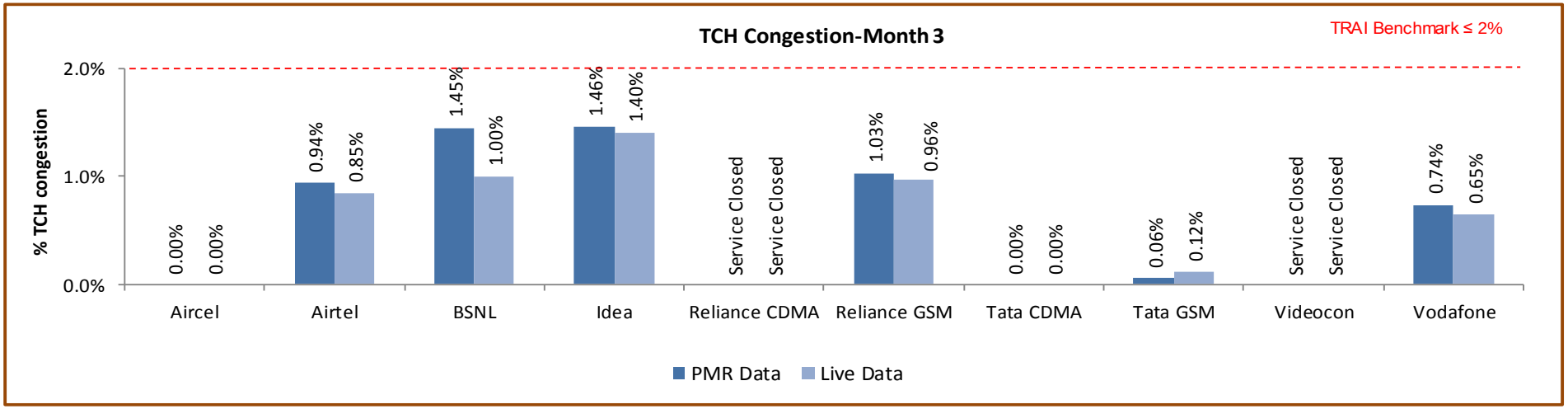
6.4.3.1 KEY FINDINGS – MONTH 1



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		17	94	157	271	44	337	54	54	36	NA
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		6551	783671	580348	496961	583275	690630	132702	134212	19920	NA
Traffic served for all POIs (B)- in erlangs		2	544415	95444	310688	250633	11675528	54552	58774	9427	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	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		51	282	470	811	85	878	162	162	36	NA
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		6551	783058	580348	492752	33814	544422	134201	134212	19905	NA
Traffic served for all POIs (B)- in erlangs		2	363282	93694	218955	15386	7719760	44154	58774	6881	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	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.

6.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-January											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	94	153	270	44	173	54	54	36	NA
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		2184	262580	185195	163326	15965	106121	44191	44191	19920	NA
Traffic served for all POIs (B)- in erlangs		1	160933	31874	105261	8563	57657	15528	15528	9427	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	94	153	270	43	174	54	54	36	NA
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		2184	262407	185195	162199	15798	106091	44191	44191	19905	NA
Traffic served for all POIs (B)- in erlangs		1	16335	30242	103876	7333	54125	15528	15528	6881	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	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

Audit Results for POI Congestion- PMR data-May											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	94	158	271	44	353	54	54	Service Closed	NA
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	Service Closed	NA
Total Capacity of all POIs (A) - in erlangs		2184	260474	191166	167954	567311	221141	43507	45005	Service Closed	NA
Traffic served for all POIs (B)- in erlangs		1	172755	32551	105739	242070	117435	24711	14313	Service Closed	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Service Closed	0.00%
Live Measurement Results for POI Congestion- 3 Day data-May											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	94	158	270	42	344	54	54	Service Closed	NA
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	Service Closed	NA
Total Capacity of all POIs (A) - in erlangs		2184	260056	191166	165199	18017	211883	45005	45005	Service Closed	NA
Traffic served for all POIs (B)- in erlangs		1	171090	32433	104876	8053	115468	14313	14313	Service Closed	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	Service Closed	0.00%

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

6.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-June											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	94	159	272	Service Closed	484	54	54	Service Closed	NA
No. of POIs not meeting benchmark		0	0	0	0	Service Closed	0	0	0	Service Closed	NA
Total Capacity of all POIs (A) - in erlangs		2184	260616	203987	165681	Service Closed	363367	45005	45016	Service Closed	NA
Traffic served for all POIs (B)- in erlangs		1	210727	31019	99688	Service Closed	11500436	14313	28933	Service Closed	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	Service Closed	0.00%	0.00%	0.00%	Service Closed	0.00%
Live Measurement Results for POI Congestion- 3 Day data-June											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Total number of working POIs		17	94	159	271	Service Closed	360	54	54	Service Closed	NA
No. of POIs not meeting benchmark		0	0	0	0	Service Closed	0	0	0	Service Closed	NA
Total Capacity of all POIs (A) - in erlangs		2184	260595	203987	165355	Service Closed	226448	45005	45016	Service Closed	NA
Traffic served for all POIs (B)- in erlangs		1	175857	31019	10203	Service Closed	7550167	14313	28933	Service Closed	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

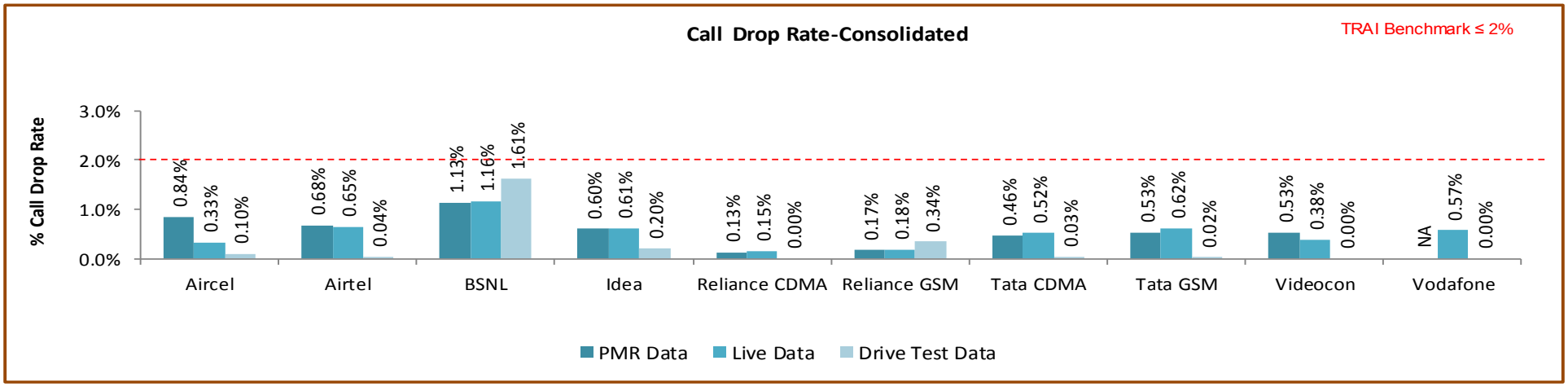
Data Source: Network Operations Center (NOC) of the operators

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.

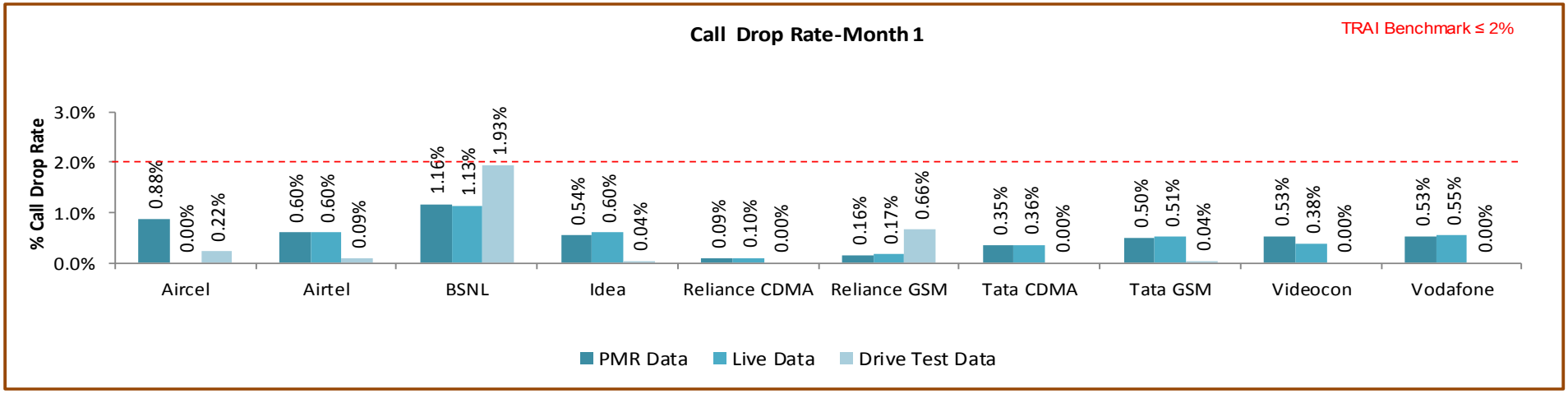
6.5.2 KEY FINDINGS - CONSOLIDATED



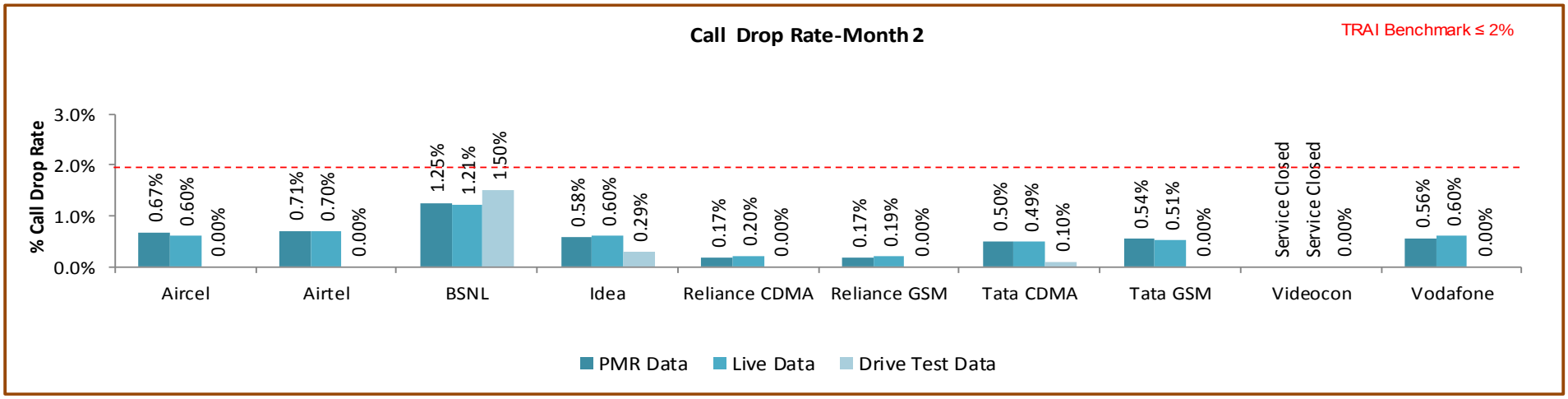
Data Source: Network Operations Center (NOC) of the operators

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

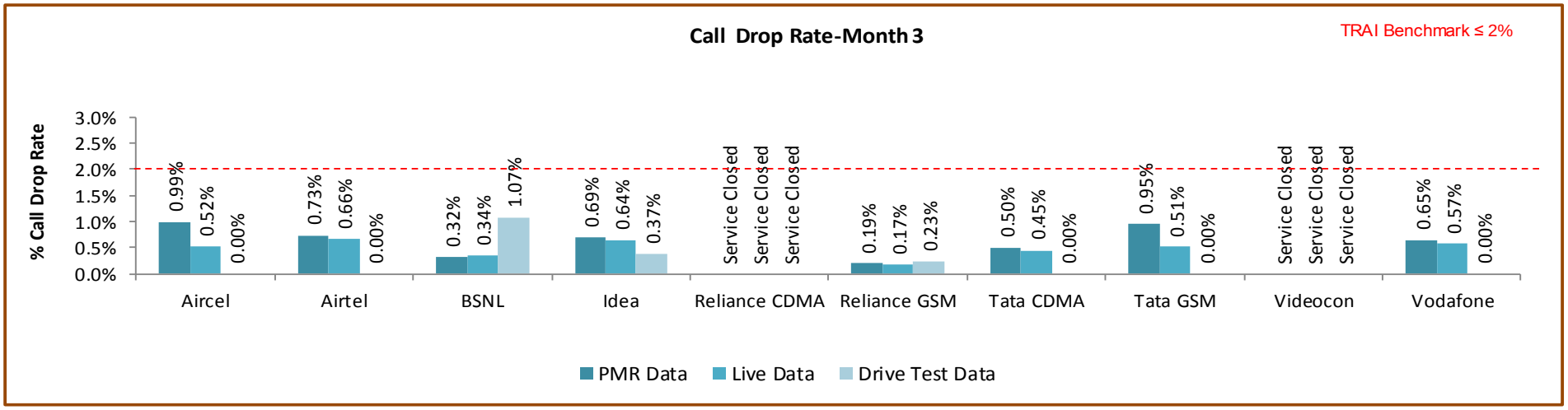
6.5.2.1 KEY FINDINGS – MONTH 1



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.

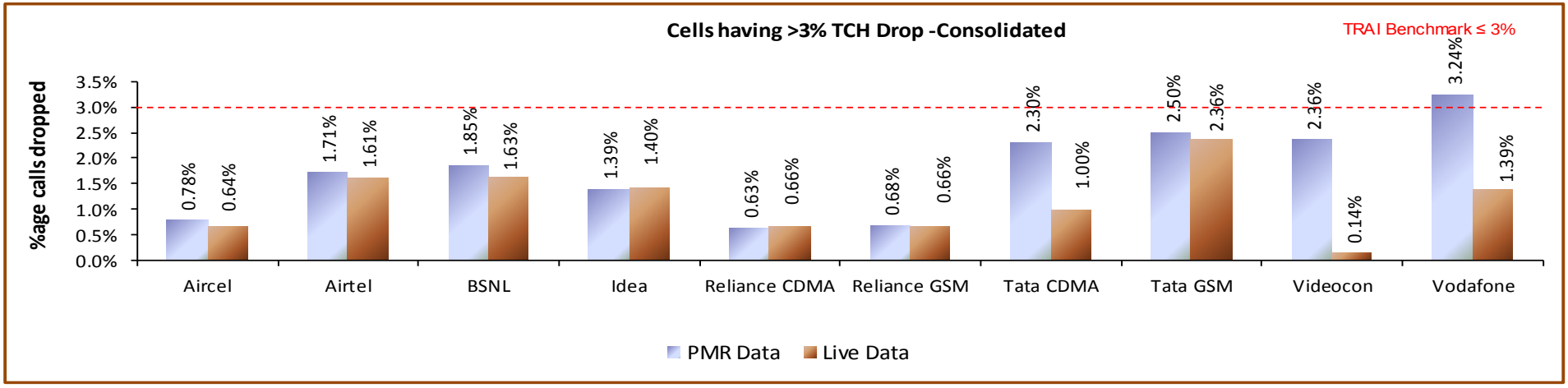
2. **Computational Methodology:** (**Total number of cells having more than 3% TCH drop during CBBH**/ **Total number of cells in the network) x 100**

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.

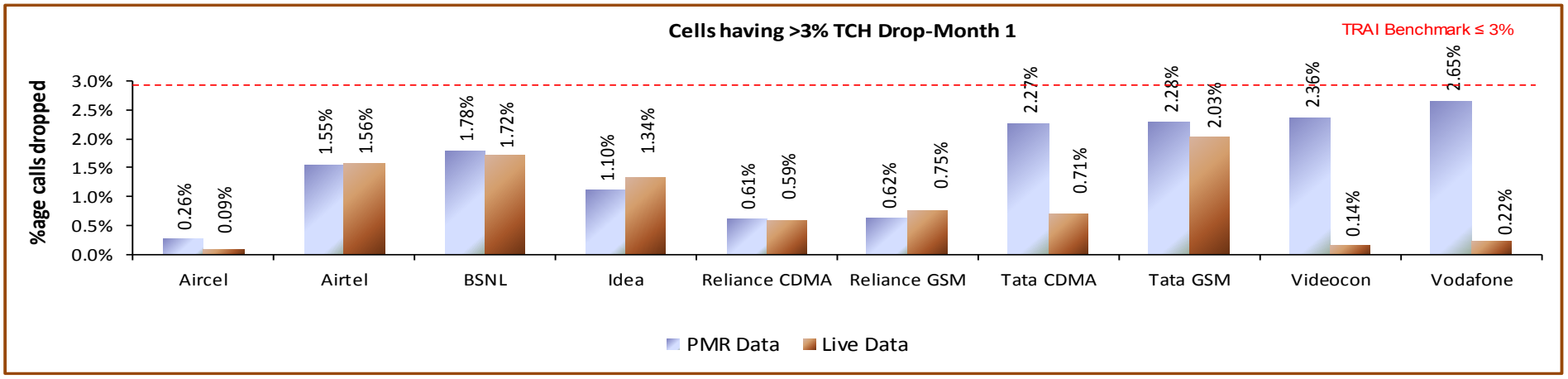
6.6.2 KEY FINDINGS - CONSOLIDATED



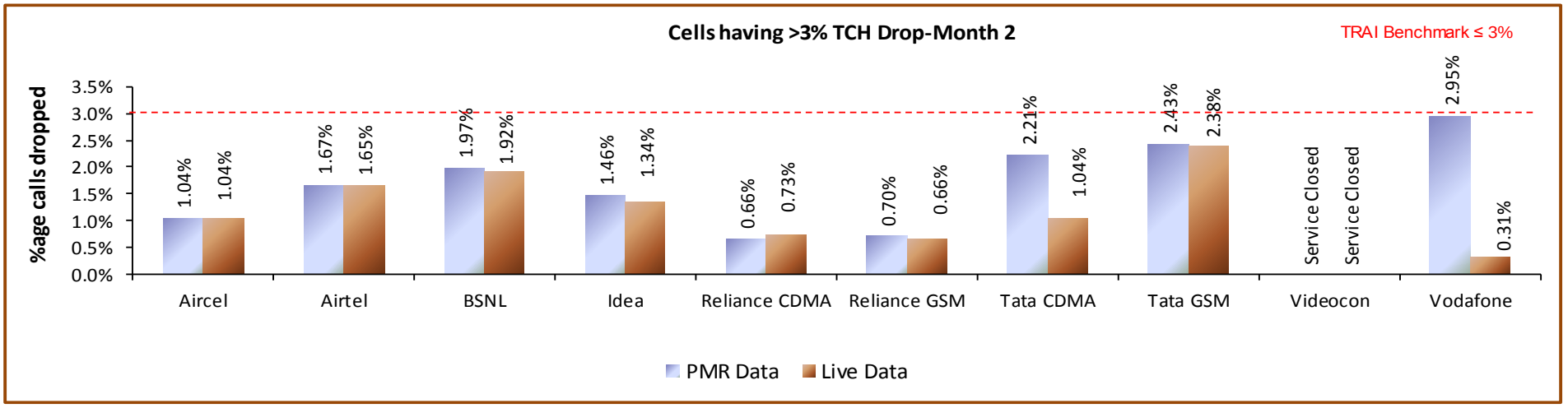
Data Source: Network Operations Center (NOC) of the operators

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

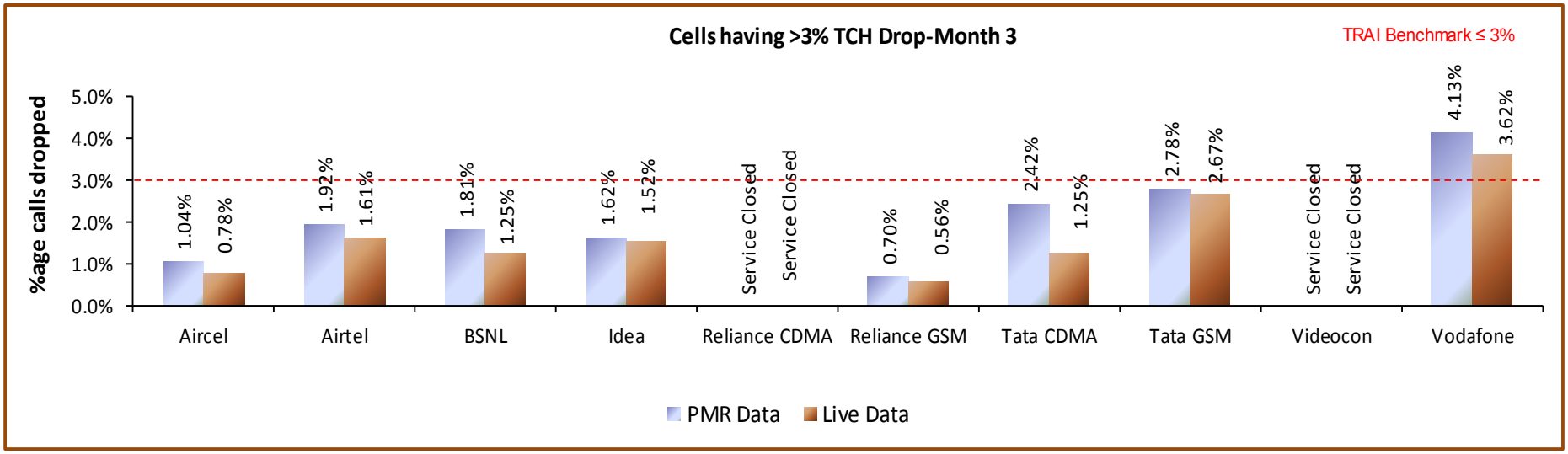
6.6.2.1 KEY FINDINGS – MONTH 1



6.6.2.2 KEY FINDINGS – MONTH 2



6.6.2.3 KEY FINDINGS – MONTH 3



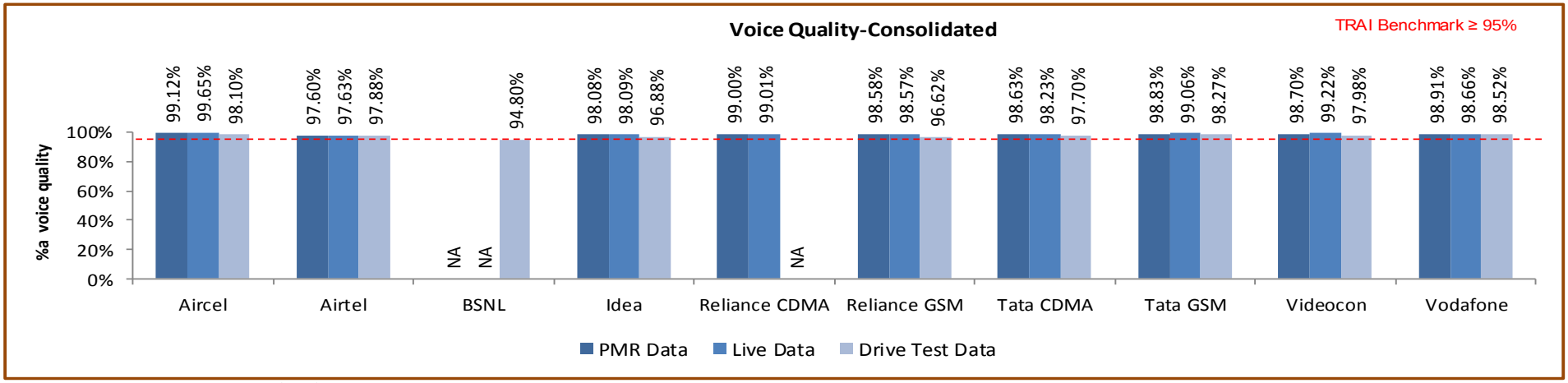
Data Source: Network Operations Center (NOC) of the operators

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.

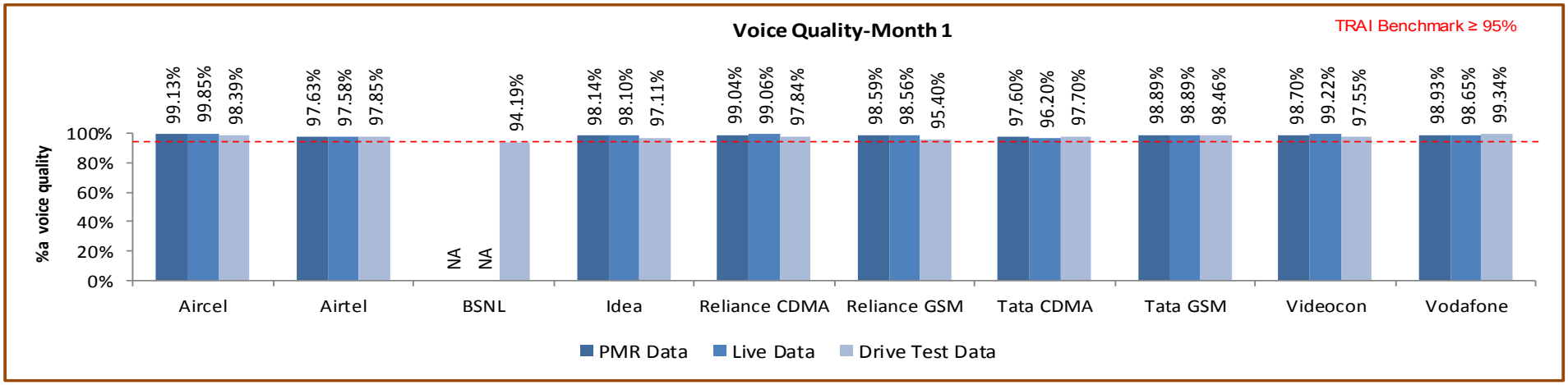
6.7.2 KEY FINDINGS



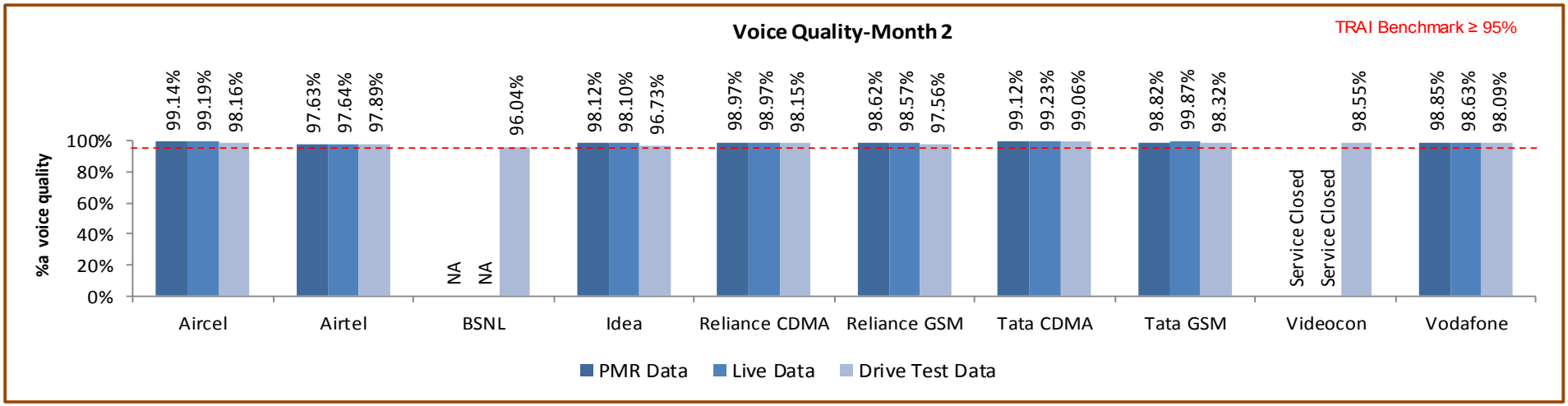
Data Source: Network Operations Center (NOC) of the operators

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

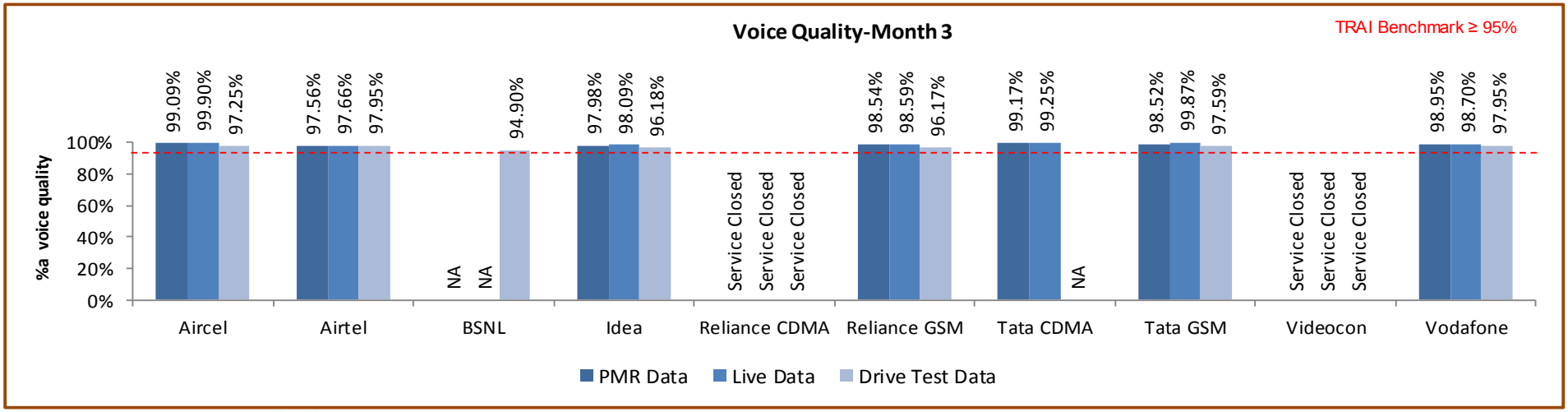
6.7.2.1 KEY FINDINGS – MONTH 1



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 –

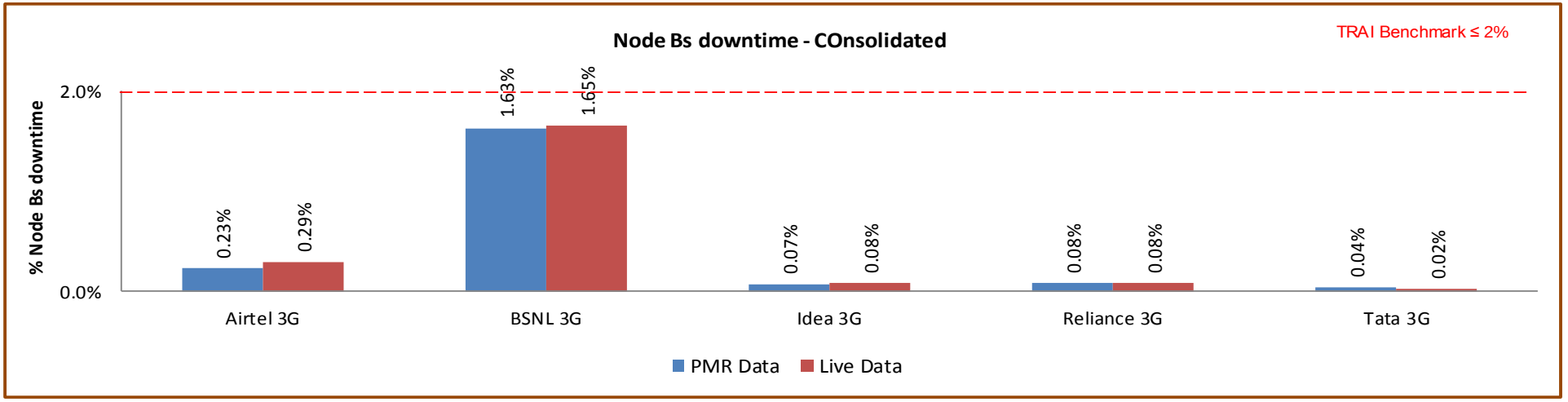
a. Node Bs downtime (not available for service) ≤ 2%

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.

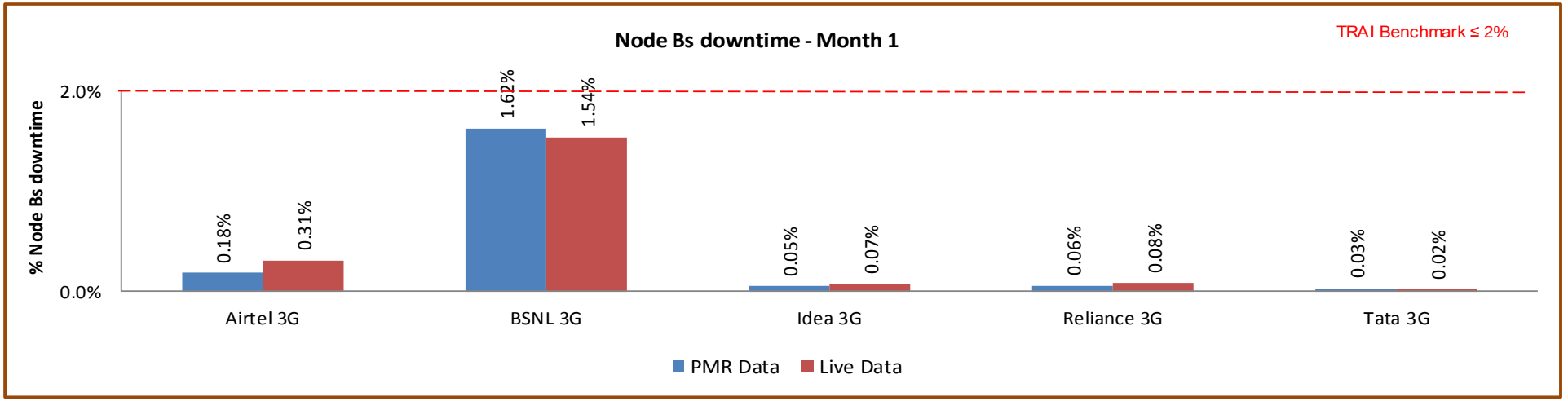
7.1.2 KEY FINDINGS - CONSOLIDATED



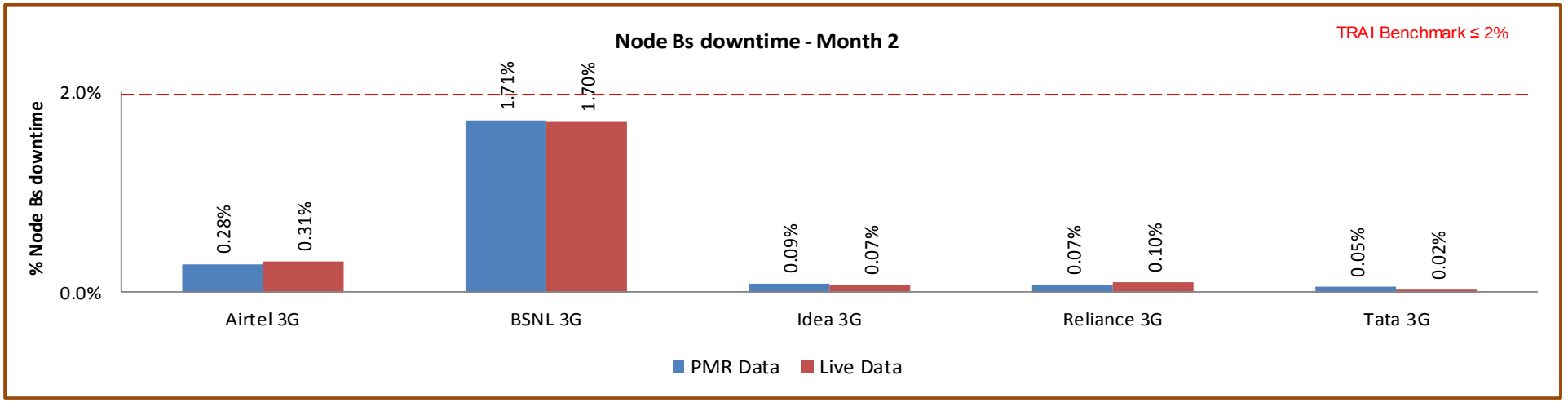
Data Source: Operations and Maintenance Center (OMC) of the operators

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

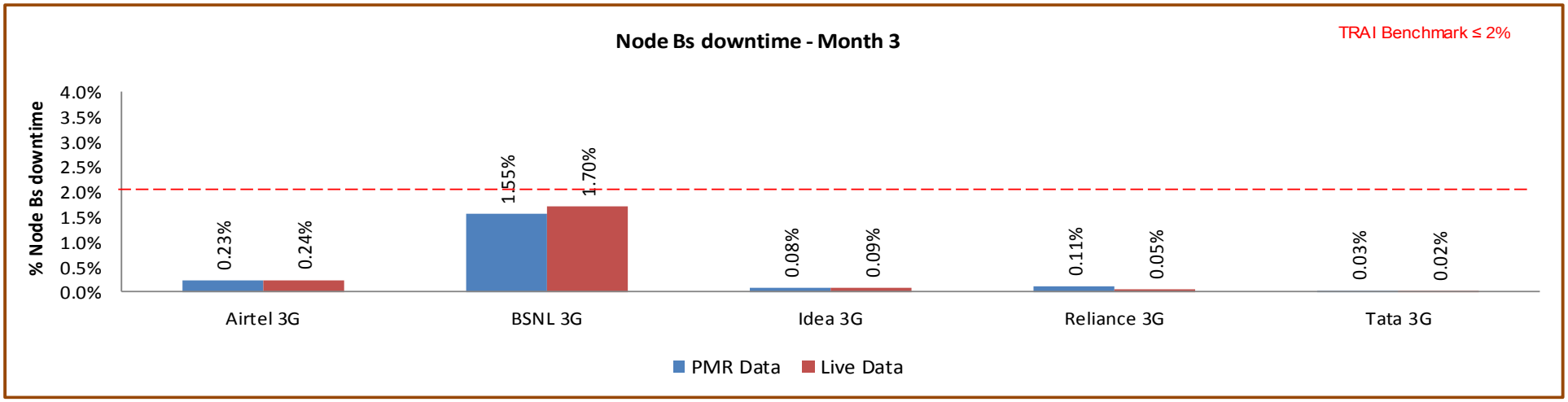
7.1.2.1 KEY FINDINGS – MONTH 1



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.

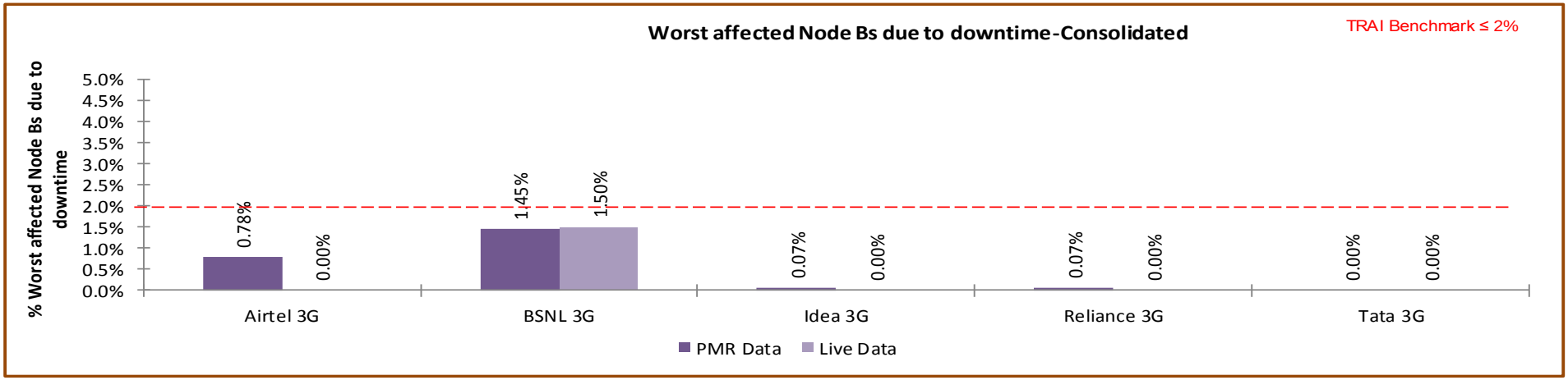
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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.

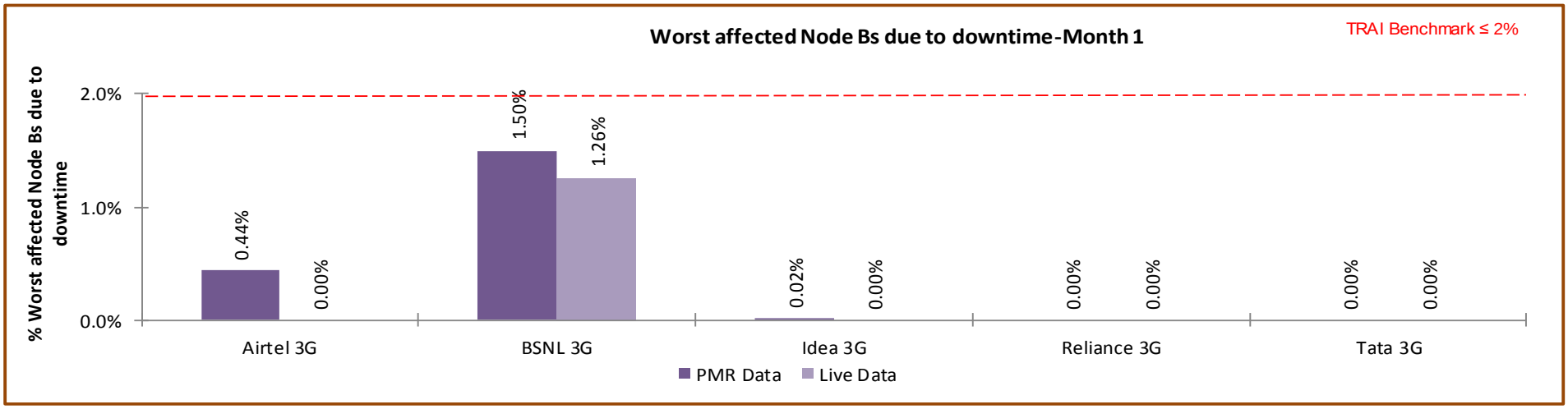
7.2.2 KEY FINDINGS – CONSOLIDATED



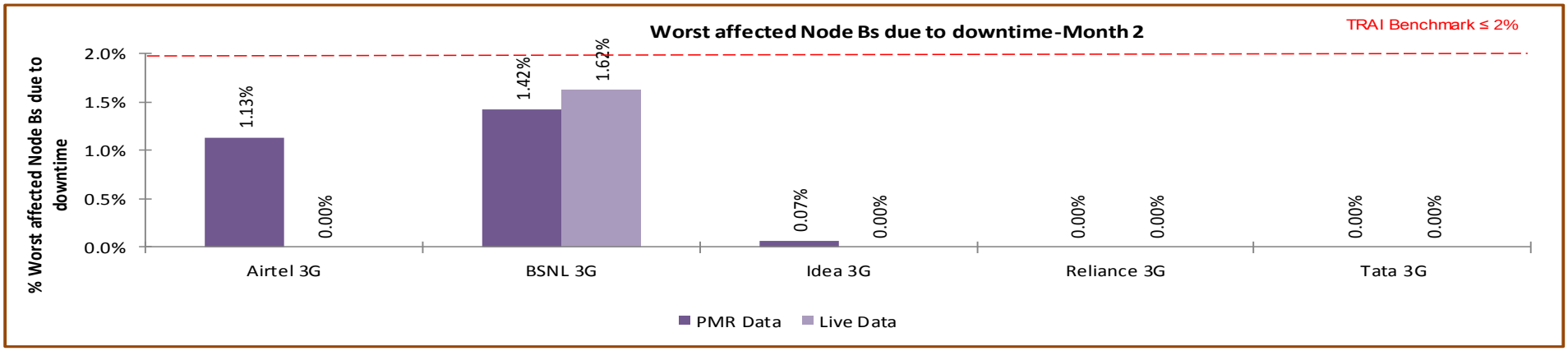
Data Source: Operations and Maintenance Center (OMC) of the operators

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

7.2.2.1 KEY FINDINGS – MONTH 1

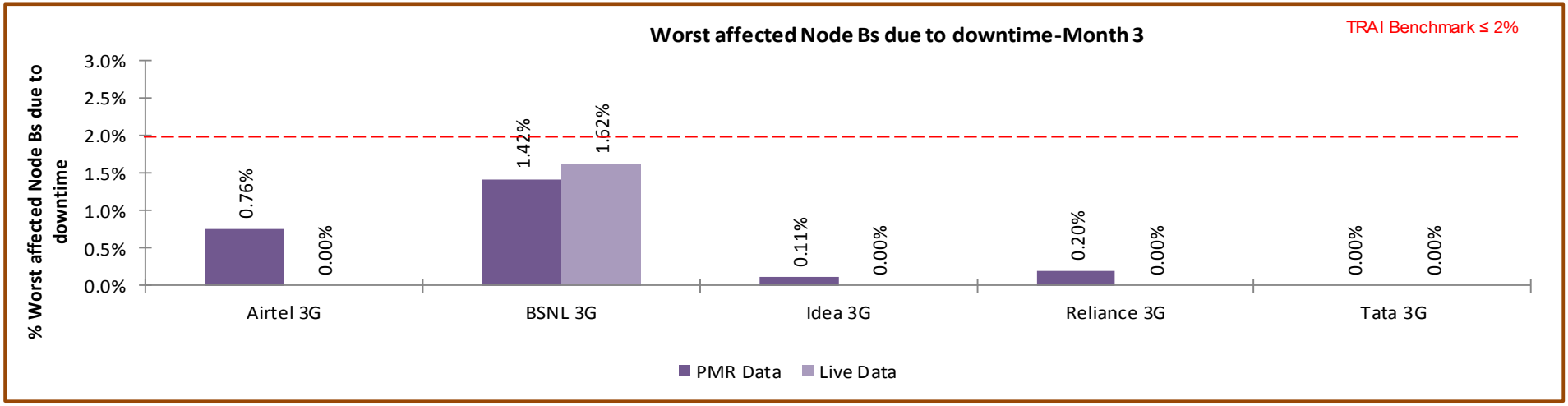


7.2.2.2 KEY FINDINGS – MONTH 2



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

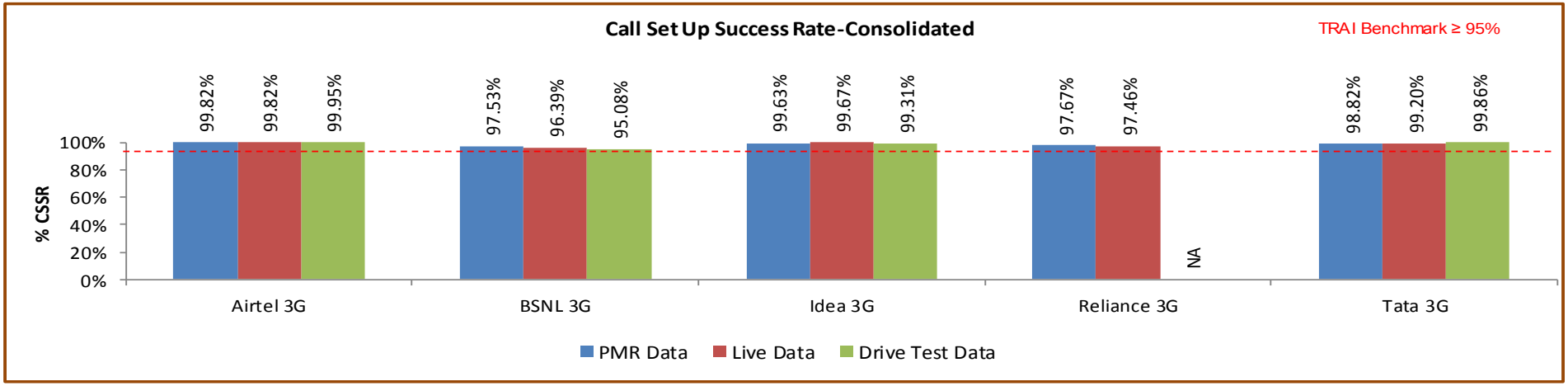
5. **TRAI Benchmark ≥** 95%

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.

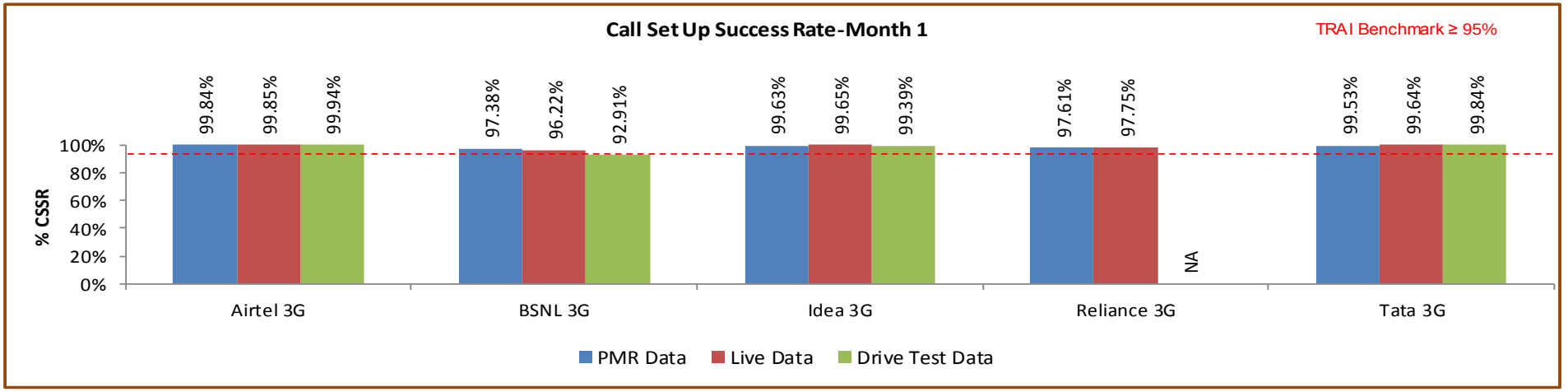
7.3.2 KEY FINDINGS - CONSOLIDATED



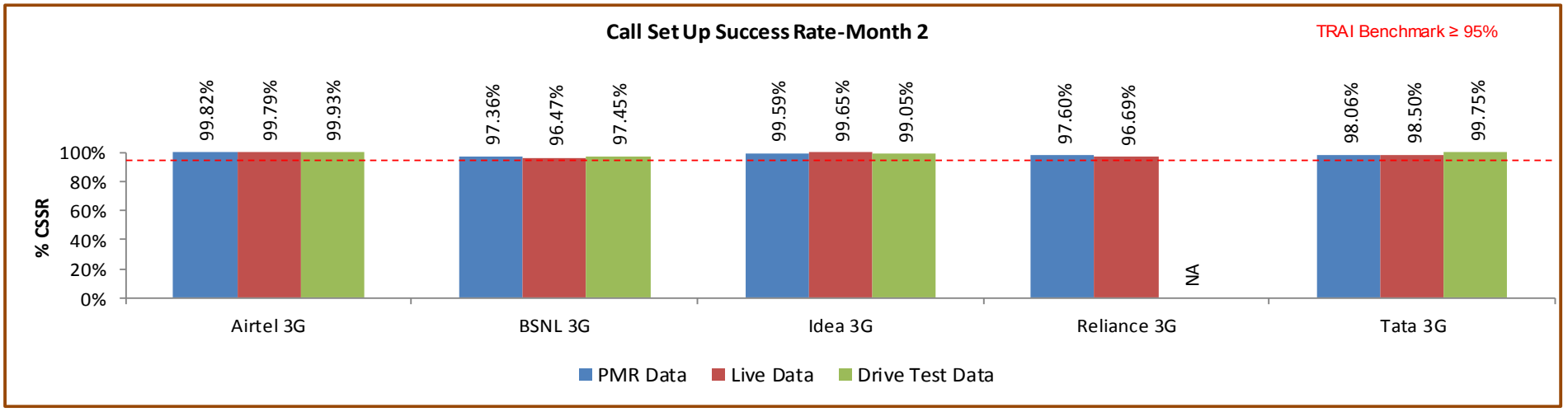
Data Source: Network Operations Center (NOC) of the operators

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

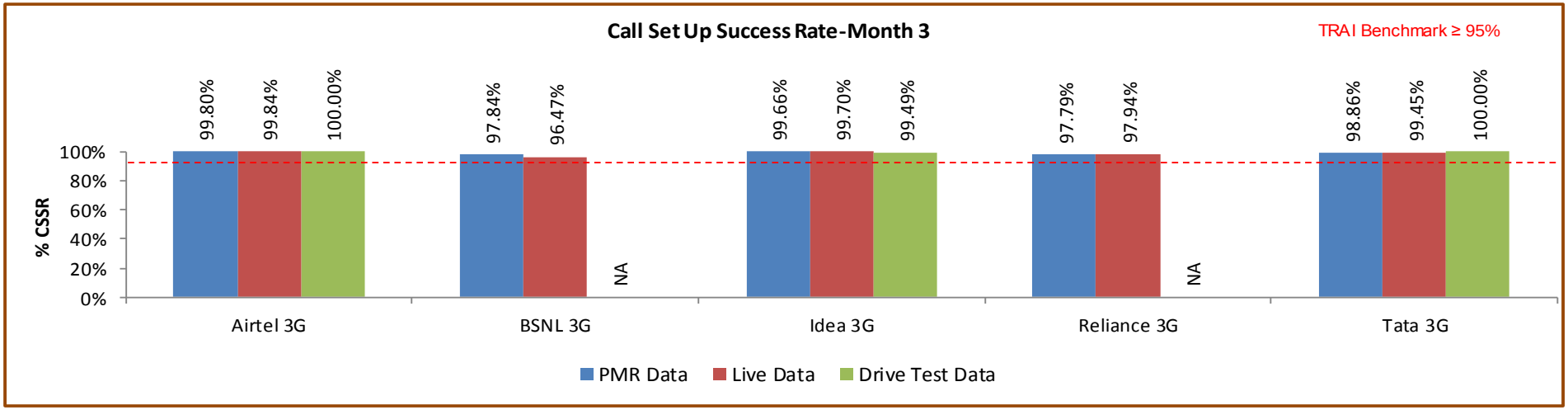
7.3.2.1 KEY FINDINGS – MONTH 1



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

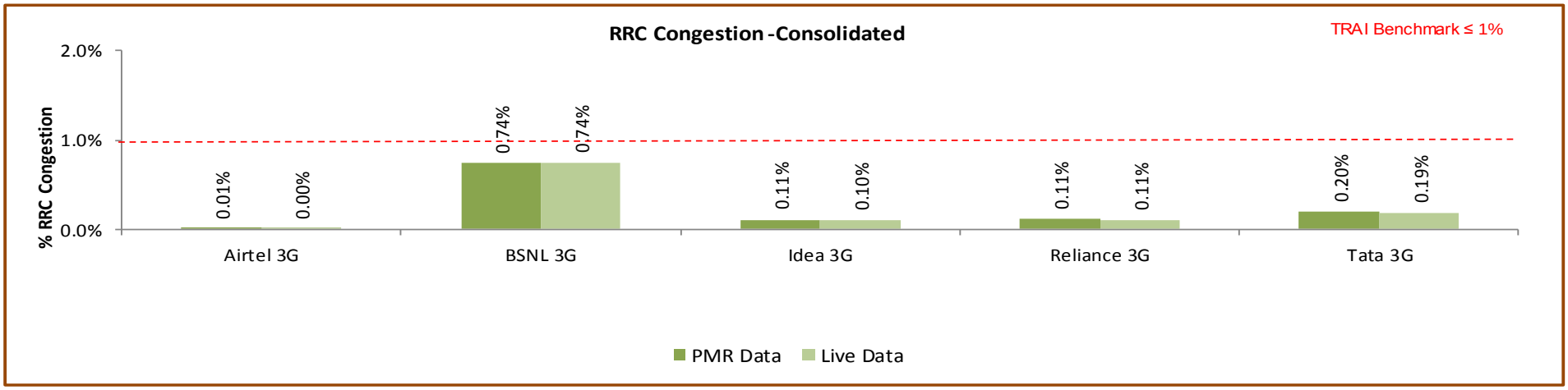
7. Benchmark:

- 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

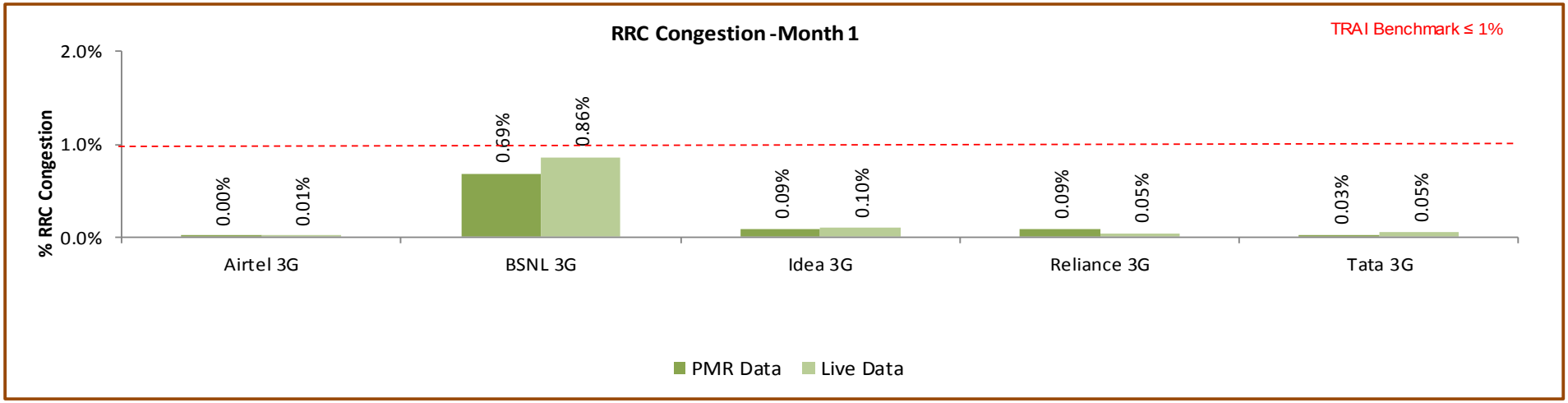
7.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



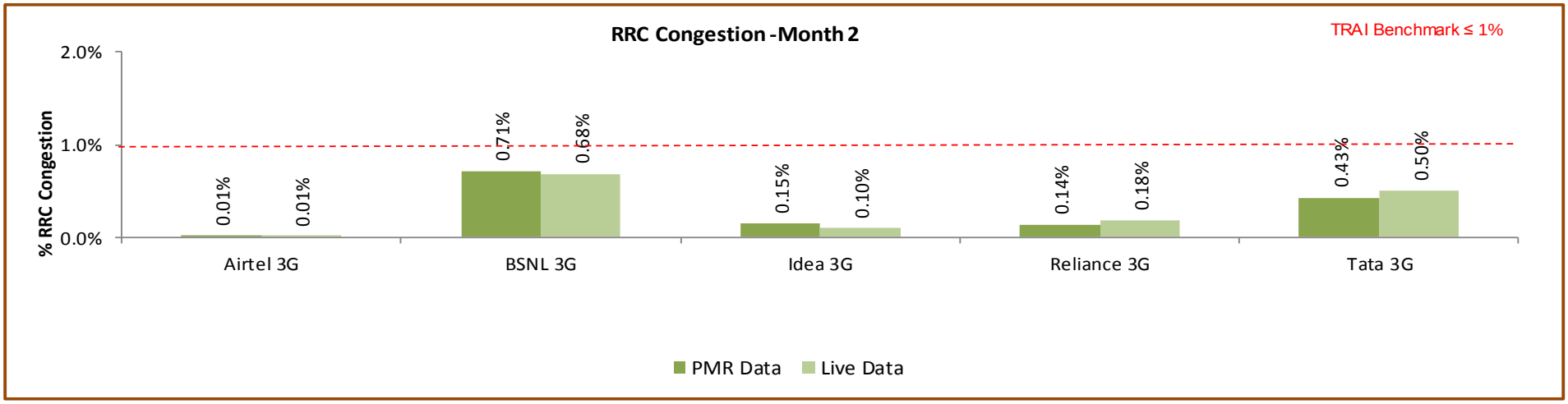
Data Source: Network Operations Center (NOC) of the operators

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

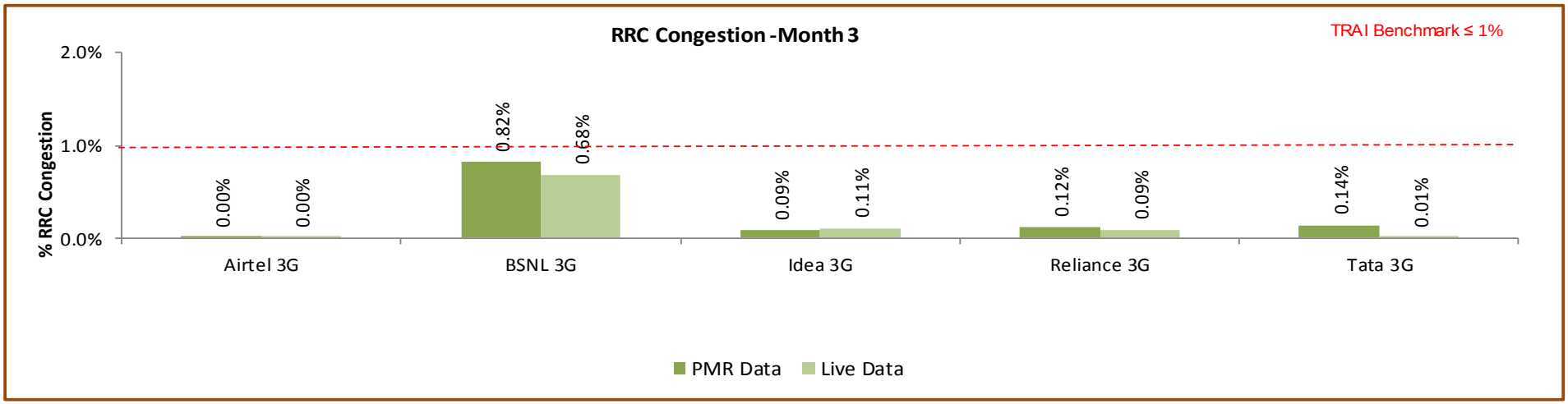
7.4.2.1 KEY FINDINGS – MONTH 1



7.4.2.2 KEY FINDINGS – MONTH 2

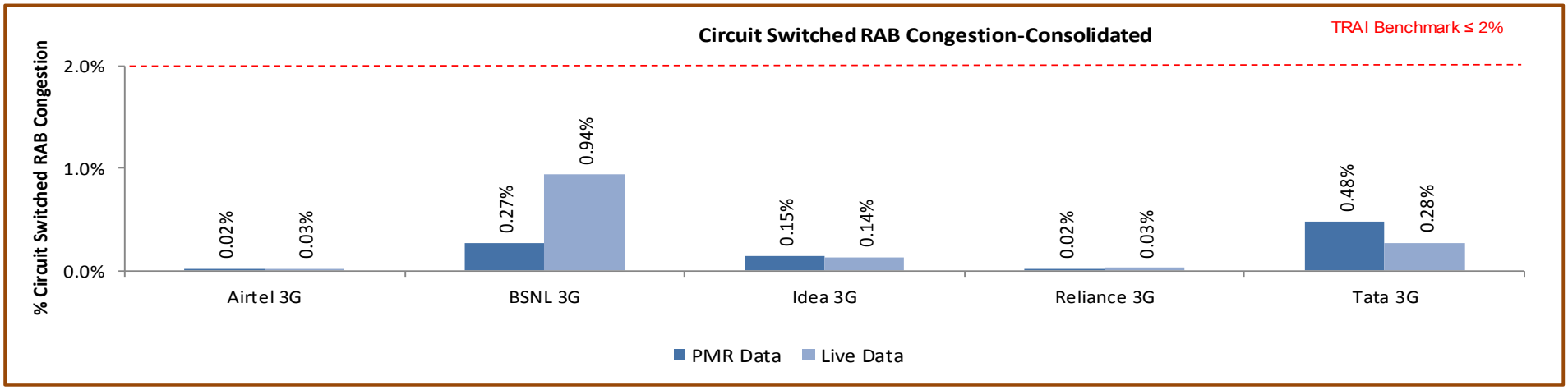


7.4.2.3 KEY FINDINGS – MONTH 3



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

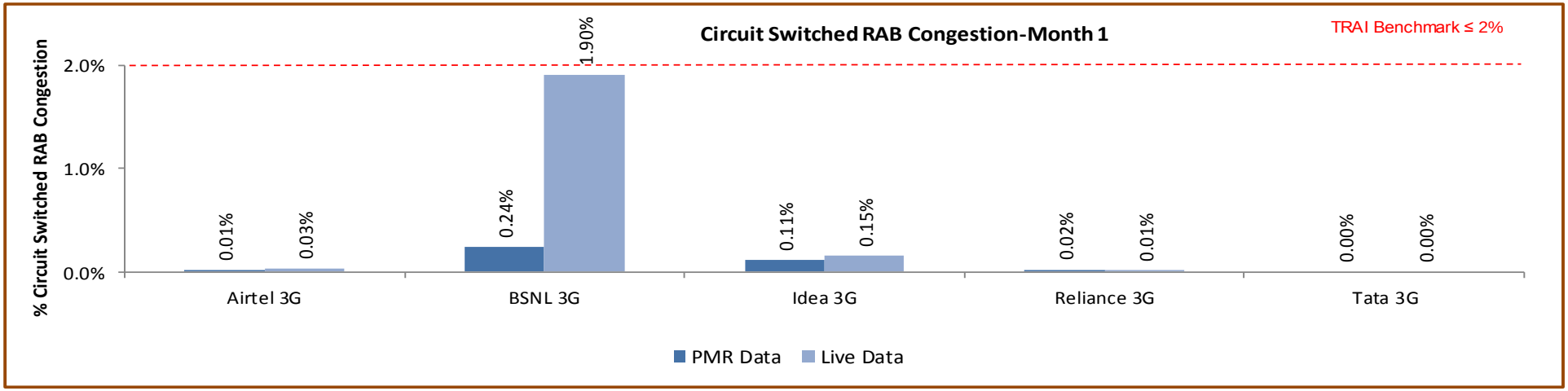
7.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)



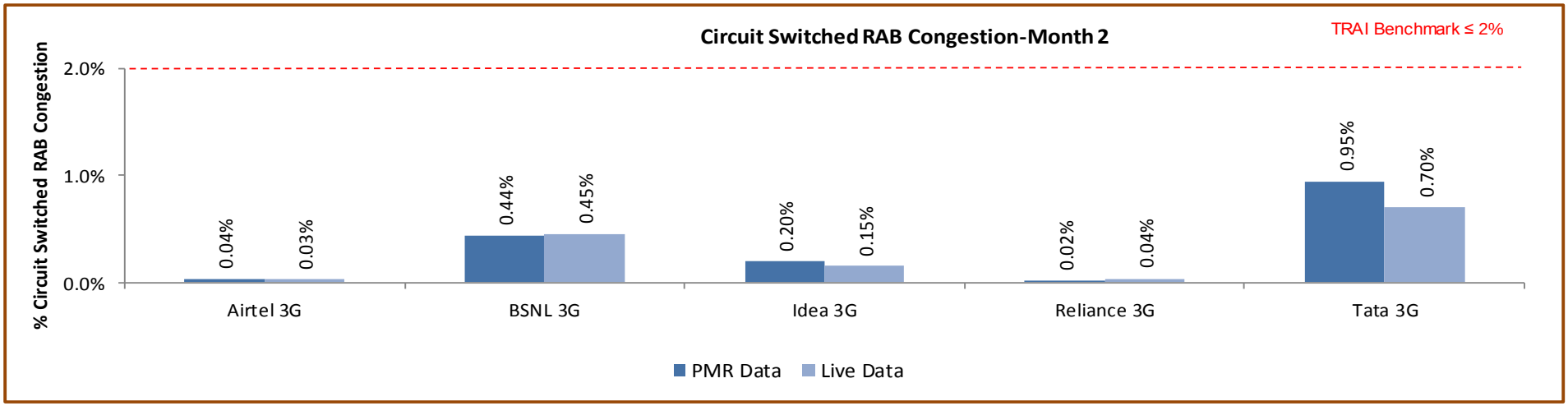
Data Source: Network Operations Center (NOC) of the operators

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

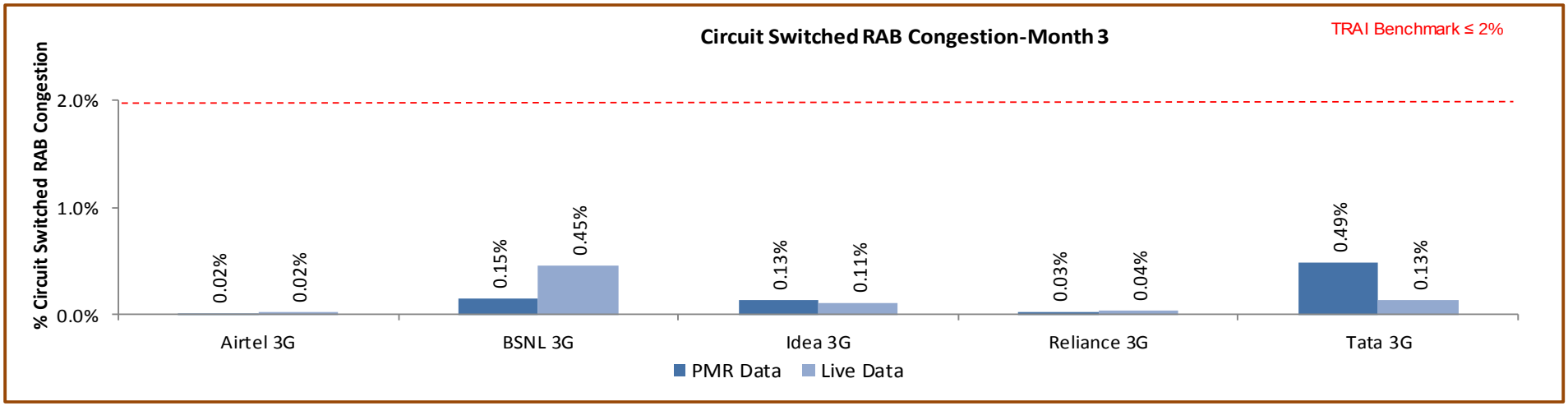
7.4.3.1 KEY FINDINGS – MONTH 1



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

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		282	470	813	NA	162
No. of POIs not meeting benchmark		0	0	0	NA	0
Total Capacity of all POIs (A) - in erlangs		783671	580348	496961	NA	133668
Traffic served for all POIs (B)- in erlangs		544415	95444	310688	NA	71143
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		282	201	811	NA	162
No. of POIs not meeting benchmark		0	0	0	NA	0
Total Capacity of all POIs (A) - in erlangs		786068	213586	492752	NA	133657
Traffic served for all POIs (B)- in erlangs		500307	89582	219955	NA	56523
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

Audit Results for POI Congestion- PMR data-January						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Total number of working POIs		94	153	270	NA	54
No. of POIs not meeting benchmark		0	0	0	NA	0
Total Capacity of all POIs (A) - in erlangs		262580	185195	163326	NA	44191
Traffic served for all POIs (B)- in erlangs		160933	31874	105261	NA	15528
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Total number of working POIs		94	67	270	NA	54
No. of POIs not meeting benchmark		0	0	0	NA	0
Total Capacity of all POIs (A) - in erlangs		262407	71100	162199	NA	44191
Traffic served for all POIs (B)- in erlangs		153360	30723	104876	NA	15528
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

Audit Results for POI Congestion- PMR data-May						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Total number of working POIs		94	158	271	0	54
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		260474	191166	167954	0	44461
Traffic served for all POIs (B)- in erlangs		172755	32551	105739	0	26683
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-May						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Total number of working POIs		94	67	270	0	54
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		263056	71243	165199	0	44461
Traffic served for all POIs (B)- in erlangs		171090	29430	104876	0	26683
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

Audit Results for POI Congestion- PMR data-June						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Total number of working POIs		94	159	272	NA	54
No. of POIs not meeting benchmark		0	0	0	NA	0
Total Capacity of all POIs (A) - in erlangs		260616	203987	165681	NA	45016
Traffic served for all POIs (B)- in erlangs		210727	31019	99688	NA	28933
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-June						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Total number of working POIs		94	67	271	NA	54
No. of POIs not meeting benchmark		0	0	0	NA	0
Total Capacity of all POIs (A) - in erlangs		260605	71243	165355	NA	45005
Traffic served for all POIs (B)- in erlangs		175857	29430	10203	NA	14313
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

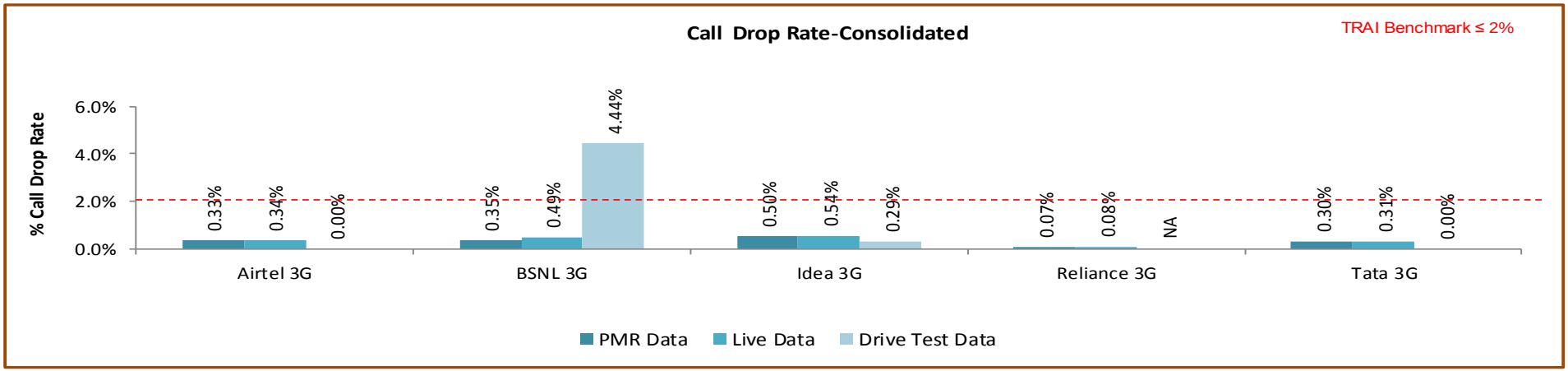
5. **TRAI Benchmark –**

   - 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.

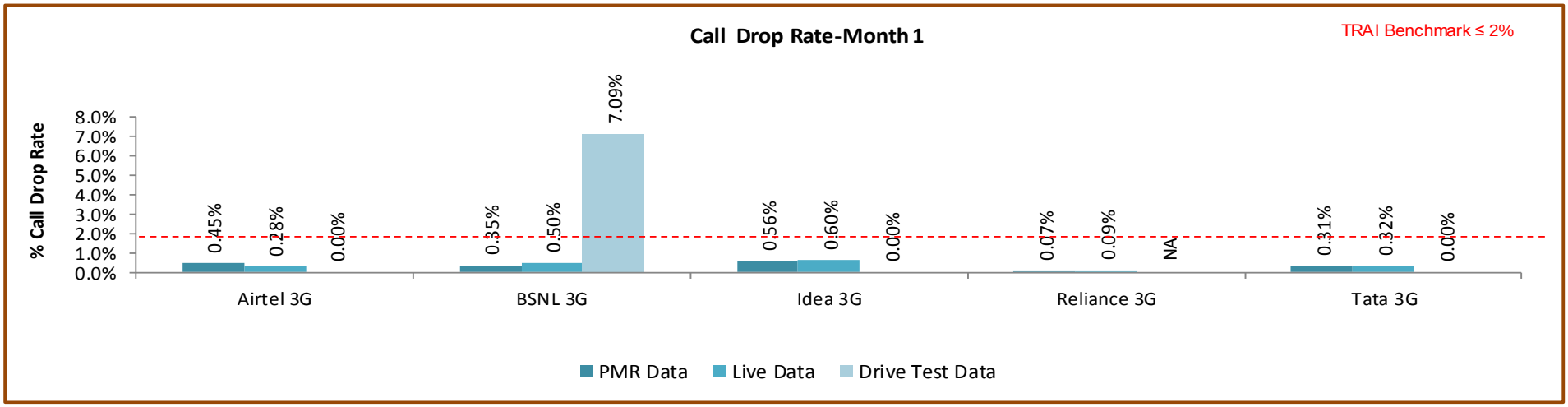
7.5.2 KEY FINDINGS - CONSOLIDATED



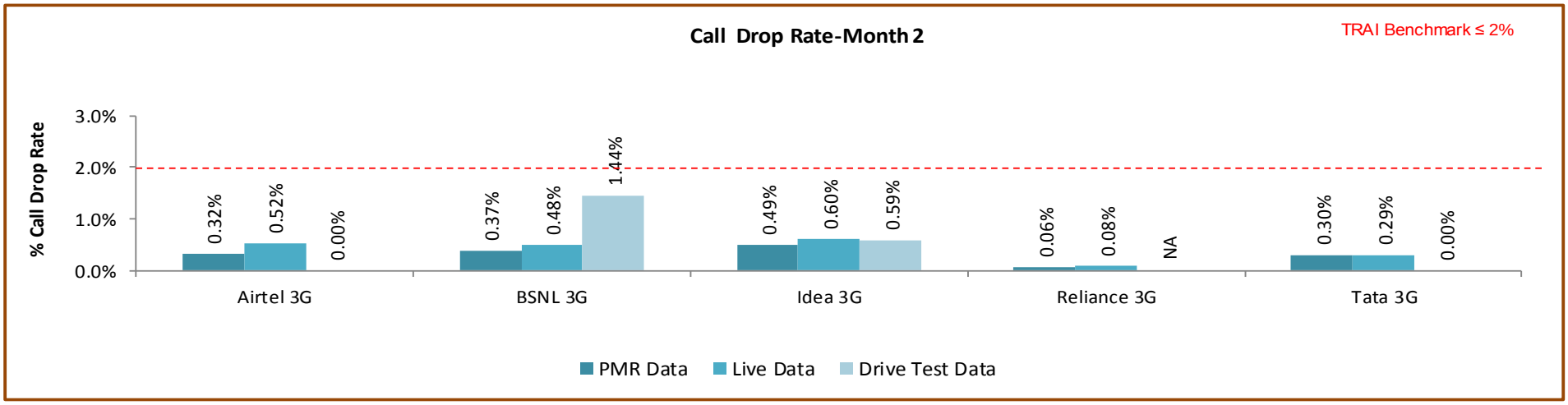
Data Source: Network Operations Center (NOC) of the operators

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

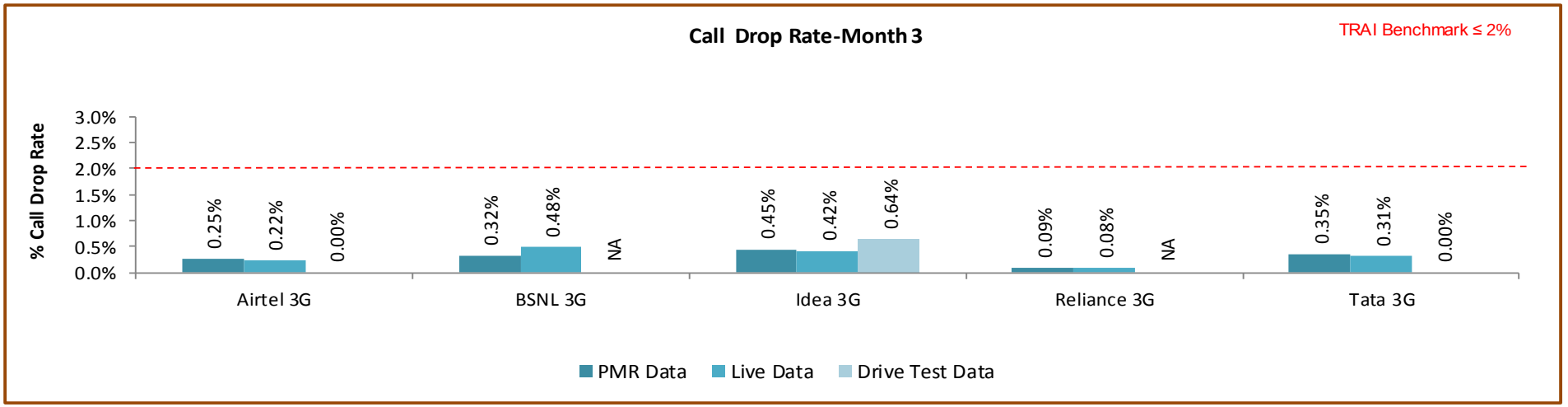
7.5.2.1 KEY FINDINGS – MONTH 1



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** –

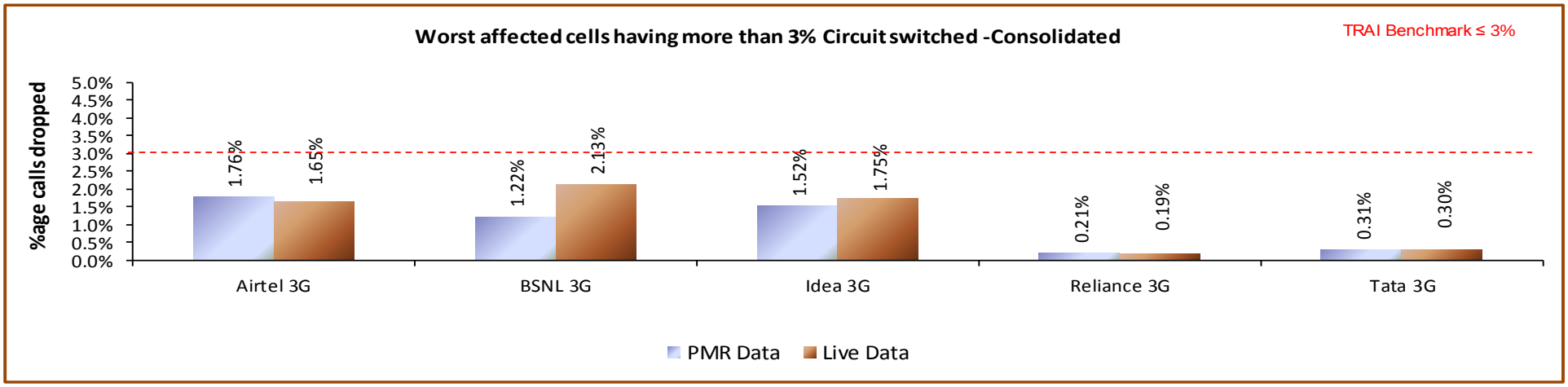
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

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.

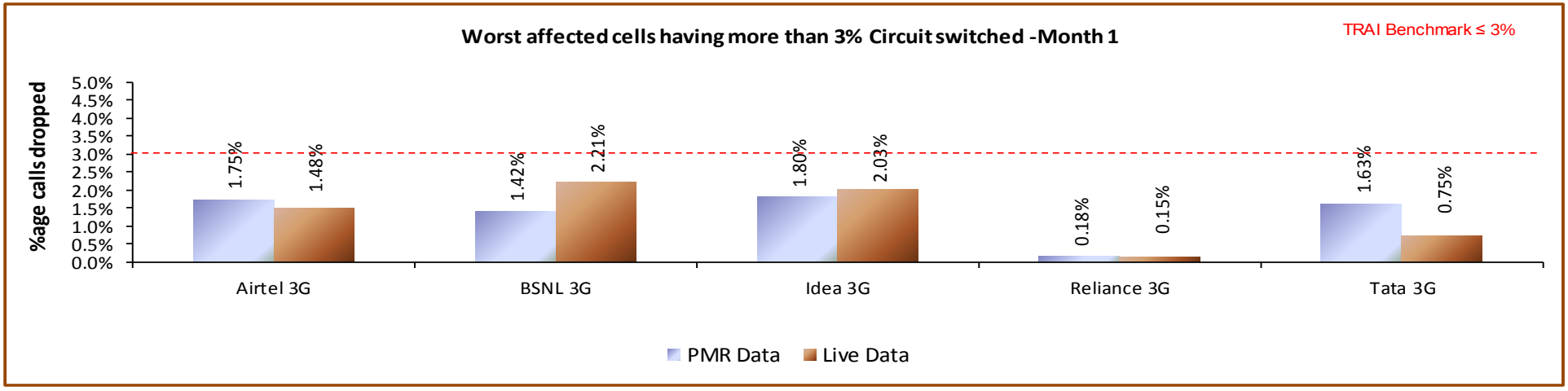
7.6.2 KEY FINDINGS - CONSOLIDATED



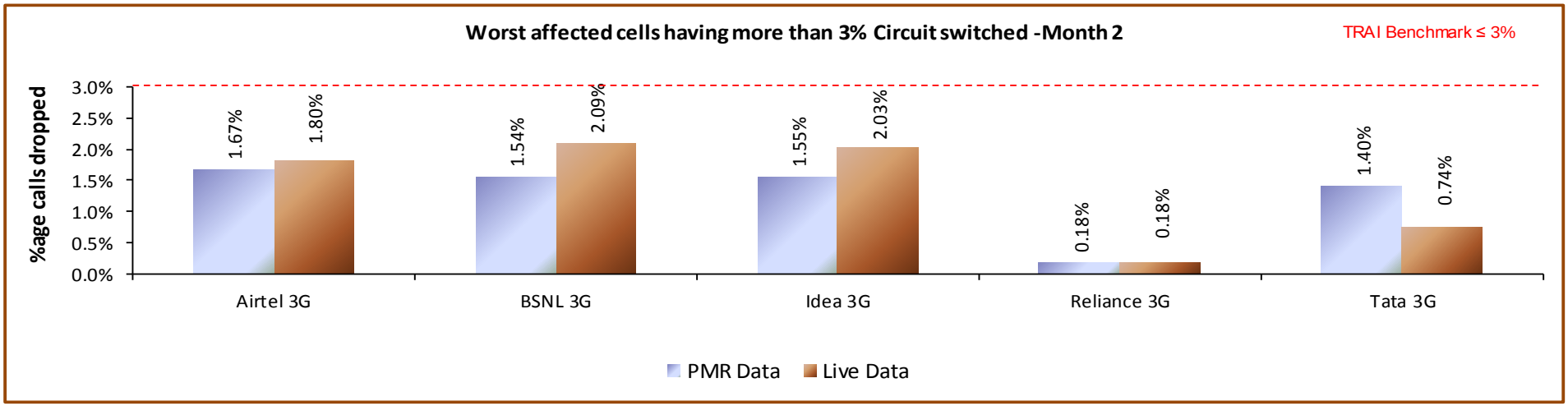
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark during audit for live calling.

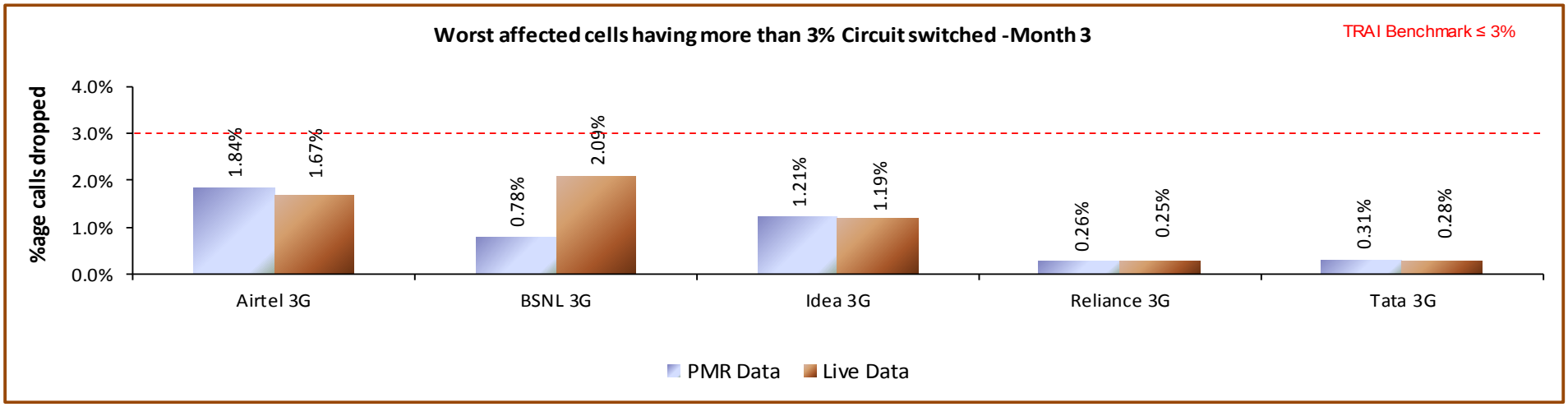
7.6.2.1 KEY FINDINGS – MONTH 1



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**

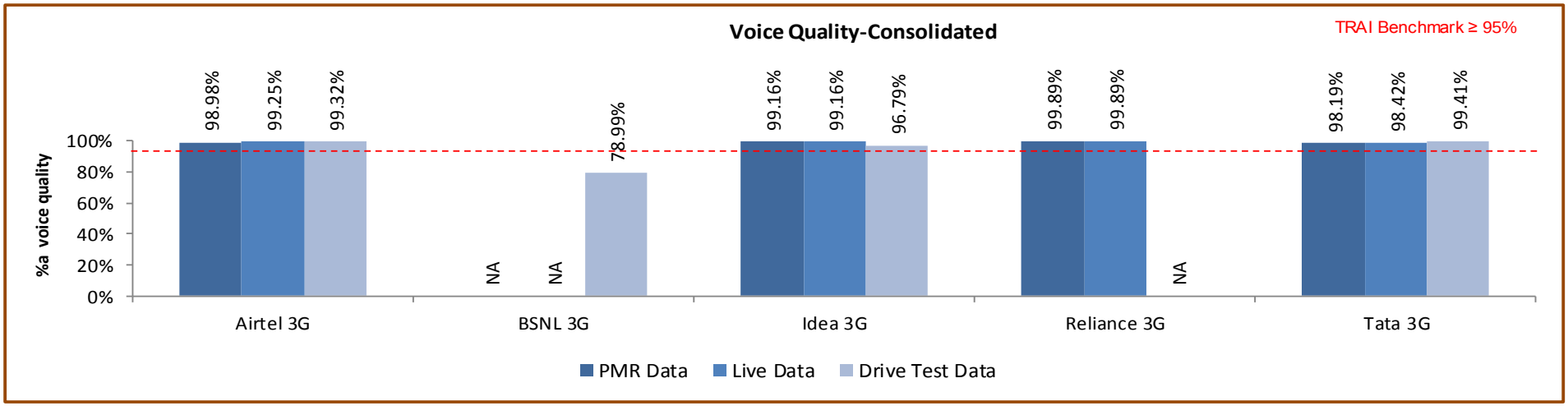
7. **TRAI Benchmark:** ≥ 95%

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.

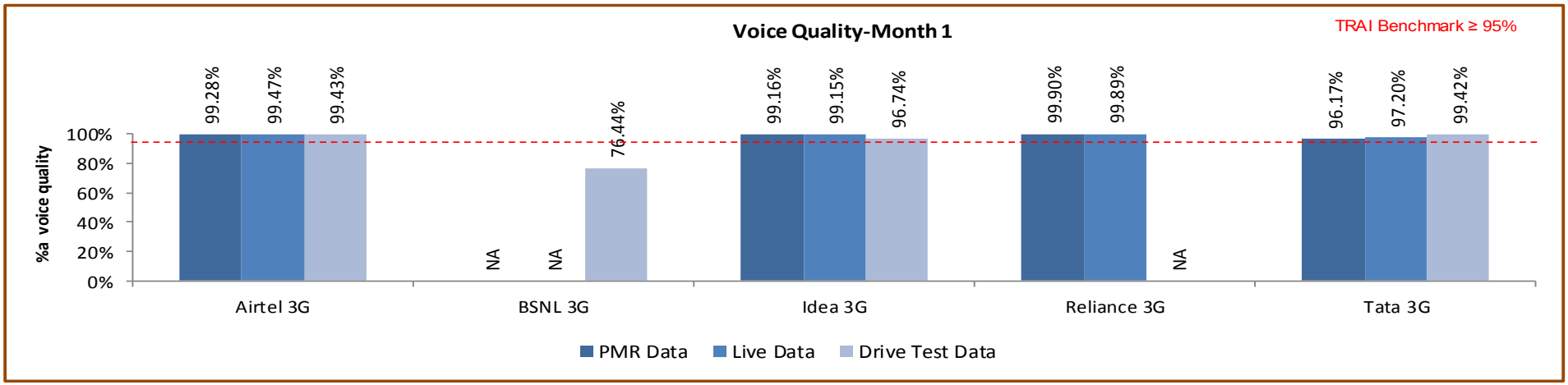
7.7.2 KEY FINDINGS



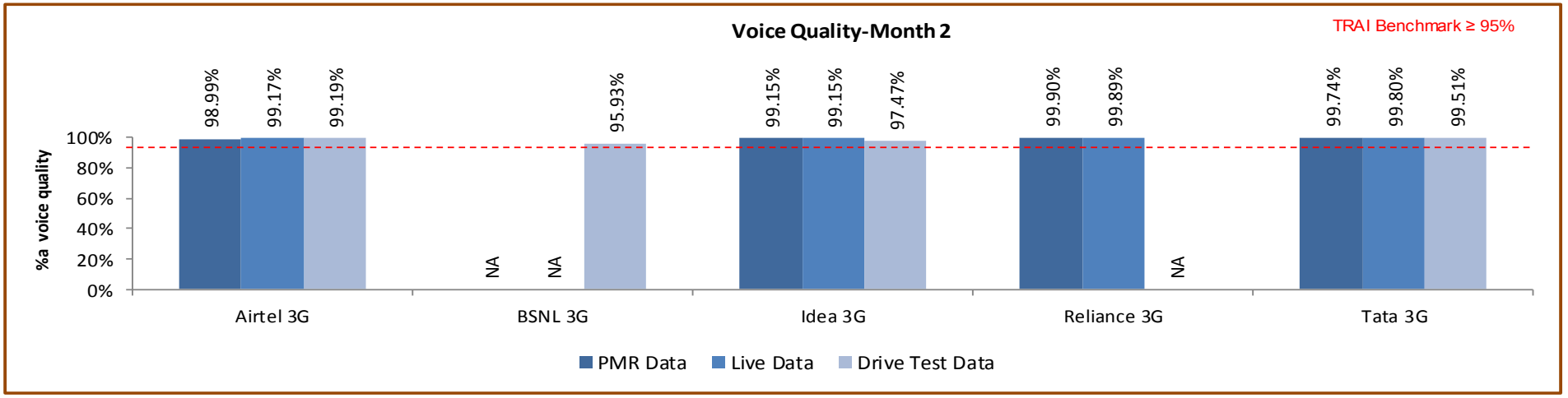
Data Source: Network Operations Center (NOC) of the operators

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.

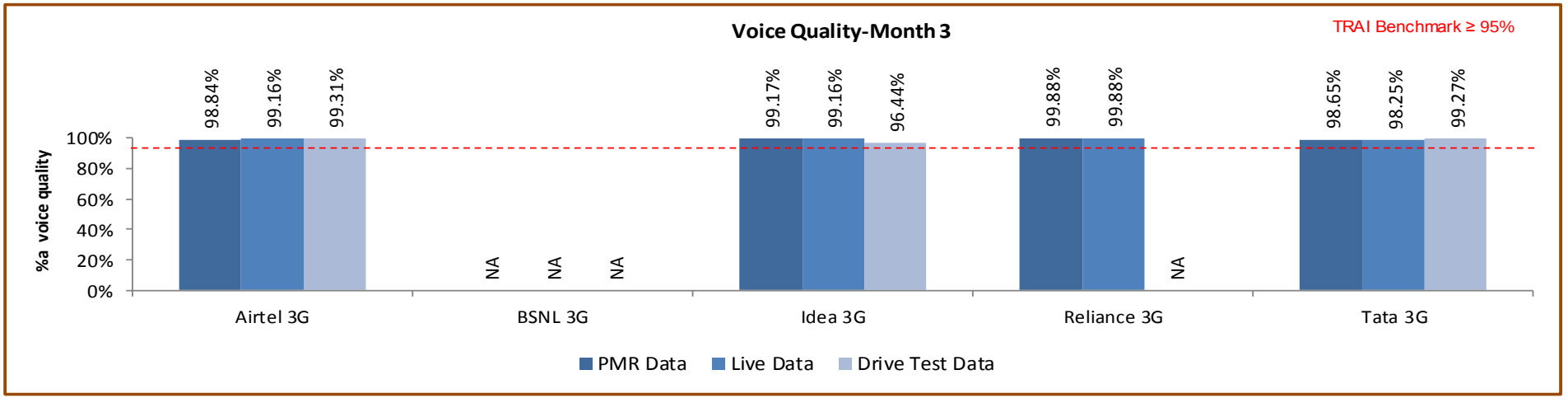
7.7.2.1 KEY FINDINGS – MONTH 1



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)

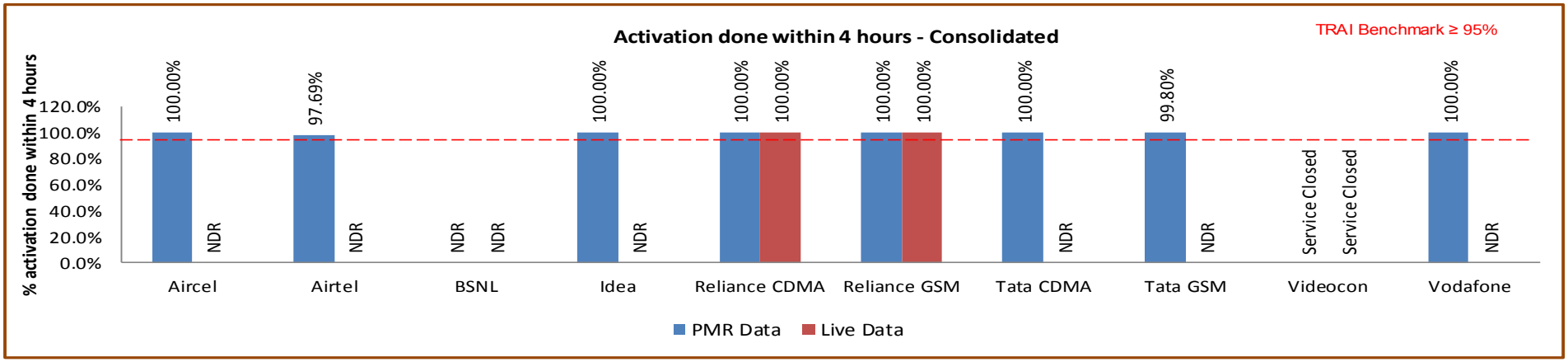
8.1 SERVICE ACTIVATION /PROVISIONING FOR 2G & 3G

8.1.1 PARAMETER DESCRIPTION

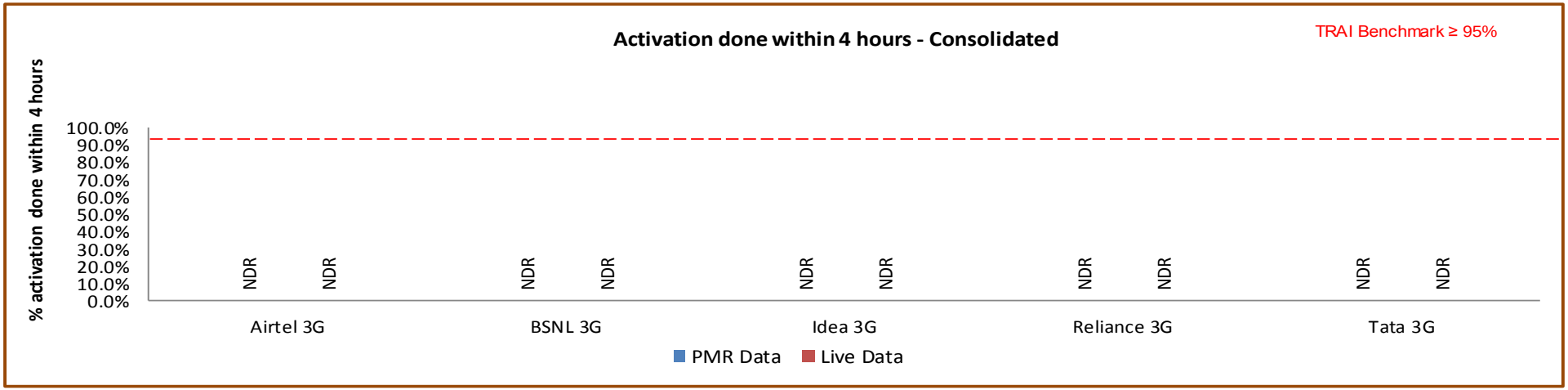
This refers to the activation of services after activation of the SIM. This involves programming the various databases with the customer's information and any gateways to standard Internet chat or mail services or any data services. The service provider typically sends these settings to the subscriber's handset using SMS or WAP.

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

8.1.2 KEY FINDINGS 2G



8.1.3 KEY FINDINGS 3G



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

8.2.1 PARAMETER DESCRIPTION

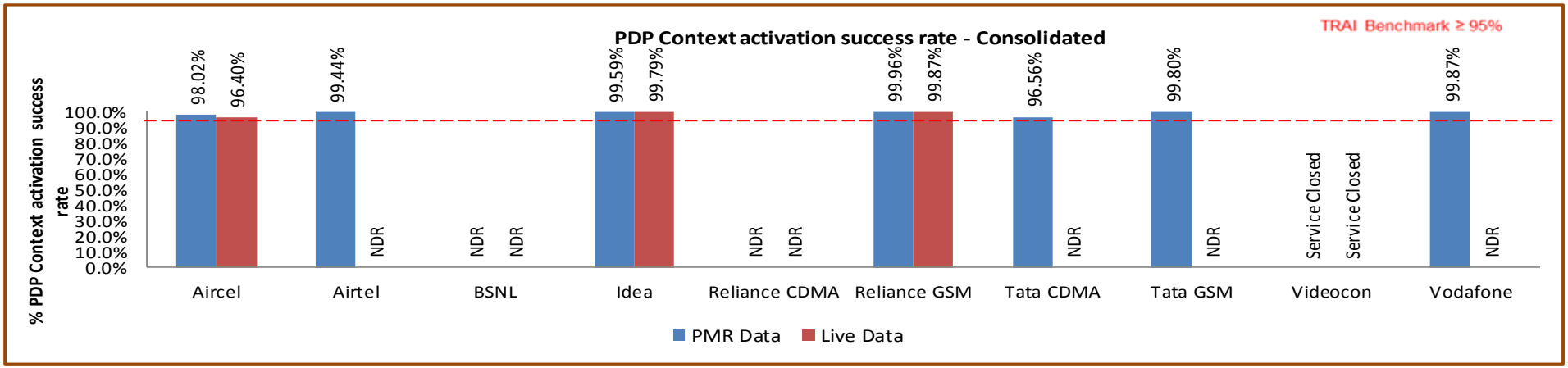
A Packet Data Protocol (PDP) context specifies access to an external packet-switching network. The data associated with the PDP context contains information such as the type of packet-switching network, the Mobile Station PDP (MS PDP) address that is the IP address, the reference of Gateway GPRS Support 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

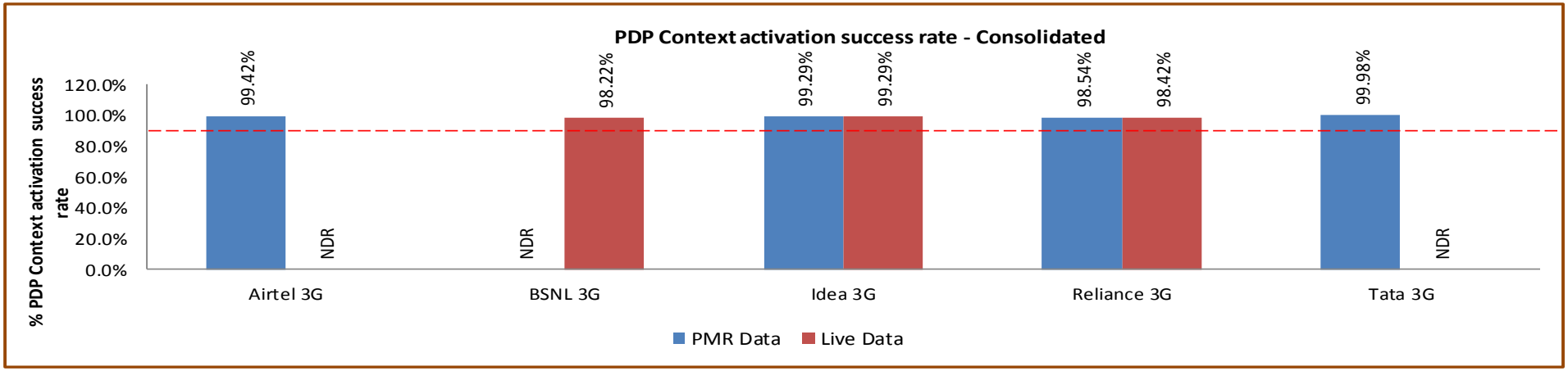
This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully and a report of PDP context activation success is generated at GGSN.

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

8.2.2 KEY FINDINGS 2G



8.2.3 KEY FINDINGS 3G



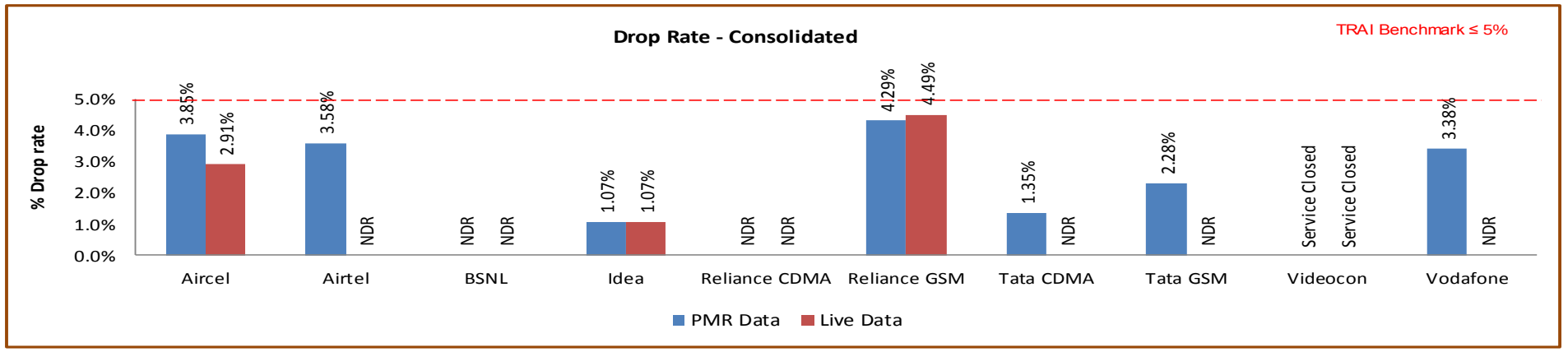
8.3 DROP RATE FOR 2G & 3G

8.3.1 PARAMETER DESCRIPTION

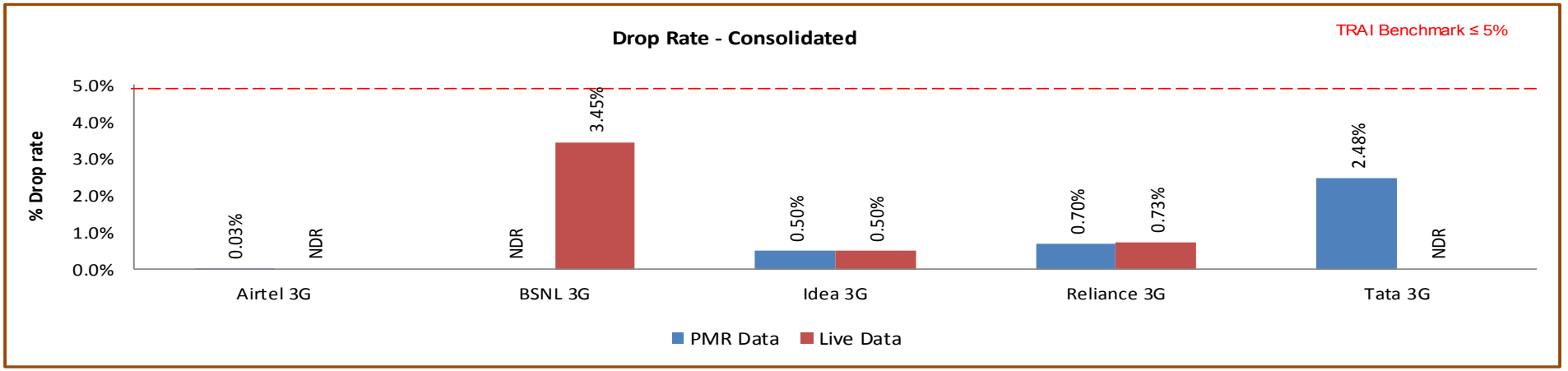
It measures the inability of Network to maintain a connection and is defined as the ratio of abnormal disconnects w.r.t. all disconnects (both normal and abnormal). An abnormal disconnect may happen because of Radio Link Failures, Uplink (UL) or Downlink (DL) interference, bad coverage, unsuccessful 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



8.3.3 KEY FINDINGS 3G



8.3.4 KEY FINDINGS – 2G

Wireless Data-PMR											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Activation done within 4 hours											
Total request time made		64	48052	NDR	2658479	34685	1450961	50	237	Service Closed	98988
Total Time Taken for Activation		64	46942	NDR	2658437	34685	1450950	50	237	Service Closed	98988
% activation done within 4 hours	≥ 95%	100.00%	97.69%	NDR	100.00%	100.00%	100.00%	100.00%	100.00%	Service Closed	100.00%
PDP Context activation success rate											
No. of data Session requested		3526615466	1644576094	NDR	184239457	NDR	76932110	16492920	10395814	Service Closed	NDR
No. of data Session Successful		3456764237	1635301518	NDR	183485061	NDR	76902360	15924851	10375071	Service Closed	NDR
PDP Context activation success rate	≥ 95%	98.02%	99.44%	NDR	99.59%	NDR	99.96%	96.56%	99.80%	Service Closed	99.87%
Drop Rate											
No. of Successful data calls		206368	11863420194	NDR	26417267798	NDR	7553175826	8007390	4038668769	Service Closed	109748236
No. of Dropped data Calls		7951	424445906	NDR	282506376	NDR	324170308	108011	92240535	Service Closed	3714711
Drop rate	≤ 5%	3.85%	3.58%	NDR	1.07%	NDR	4.29%	1.35%	2.28%	Service Closed	3.38%

Wireless Data-Live Data											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	Tata CDMA	Tata GSM	Videocon	Vodafone
Activation done within 4 hours											
Total request time made		NDR	NDR	NDR	NDR	3426	126366	NDR	NDR	Service Closed	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	3426	126366	NDR	NDR	Service Closed	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	100.00%	100.00%	NDR	NDR	Service Closed	NDR
PDP Context activation success rate											
No. of data Session requested		231350638	NDR	NDR	18278478	NDR	1272516	NDR	NDR	Service Closed	NDR
No. of data Session Successful		223011812	NDR	NDR	18240996	NDR	1270857	NDR	NDR	Service Closed	NDR
PDP Context activation success rate	≥ 95%	96.40%	NDR	NDR	99.79%	NDR	99.87%	NDR	NDR	Service Closed	NDR
Drop Rate											
No. of Successful data calls		12771	NDR	NDR	2702647519	NDR	1043936796	NDR	NDR	Service Closed	NDR
No. of Dropped data Calls		371	NDR	NDR	28813329	NDR	46871349	NDR	NDR	Service Closed	NDR
Drop rate	≤ 5%	2.91%	NDR	NDR	1.07%	NDR	4.49%	NDR	NDR	Service Closed	NDR

8.3.5 KEY FINDINGS – 3G

Wireless Data-PMR						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Activation done within 4 hours						
Total request time made		NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested		425905001	NDR	49434240	45708612	11037819
No. of data Session Successful		423432388	NDR	49082705	45042720	11035917
PDP Context activation success rate	≥ 95%	99.42%	NDR	99.29%	98.54%	99.98%
Drop Rate						
No. of Successful data calls		40065374905	NDR	3331901708	4835166986	513555709
No. of Dropped data Calls		10639538	NDR	16706815	33636200	12730178
Drop rate	≤ 5%	0.03%	NDR	0.50%	0.70%	2.48%
Wireless Data-Live Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Tata 3G
Activation done within 4 hours						
Total request time made		NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate						
No. of data Session requested		NDR	23396538	4926296	737199	NDR
No. of data Session Successful		NDR	22981008	4891184	725586	NDR
PDP Context activation success rate	≥ 95%	NDR	98.22%	99.29%	98.42%	NDR
Drop Rate						
No. of Successful data calls		NDR	93442277	292268796	772191702	NDR
No. of Dropped data Calls		NDR	3227443	1456317	5673789	NDR
Drop rate	≤ 5%	NDR	3.45%	0.50%	0.73%	NDR

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

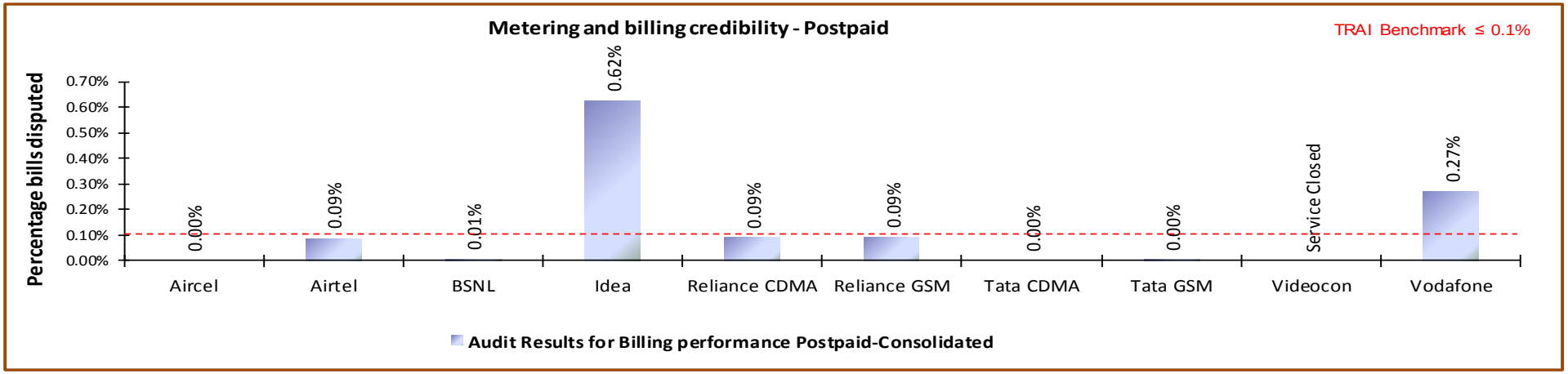
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th December, 2009 were covered. The types of billing complaints covered are listed below.

- 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.

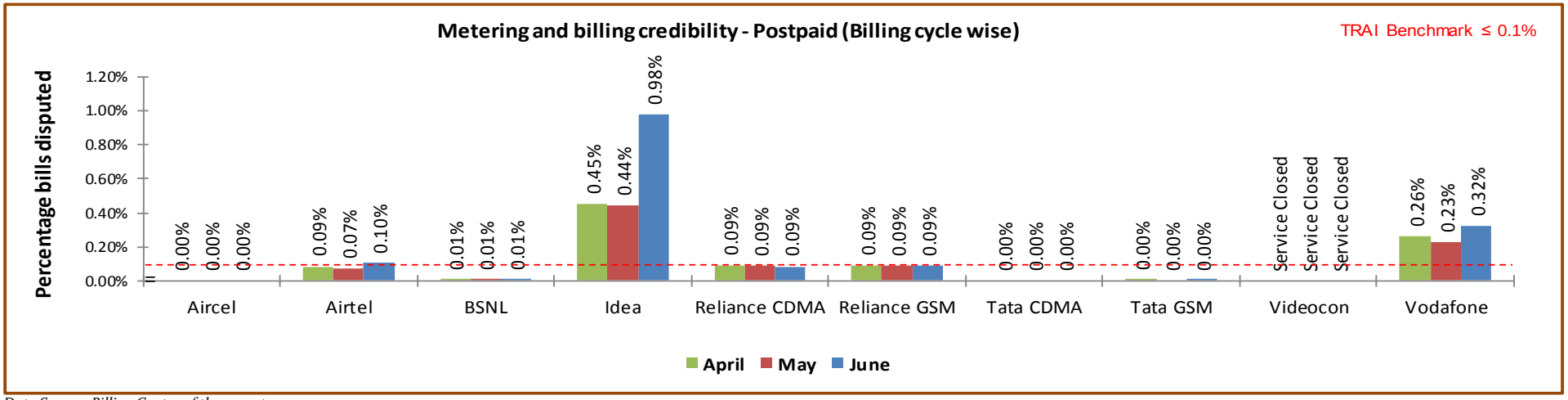
- Computational Methodology:
  - **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would 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)



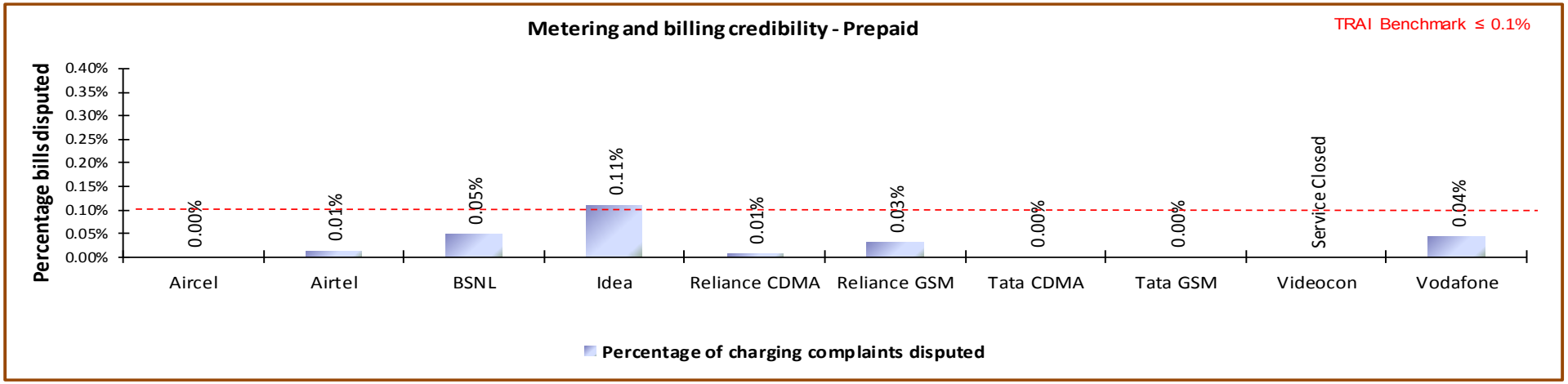
Data Source: Billing Center of the operators

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



Data Source: Billing Center of the operators

9.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

Idea failed to meet the benchmark for metering and billing credibility of prepaid subscribers.

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 =

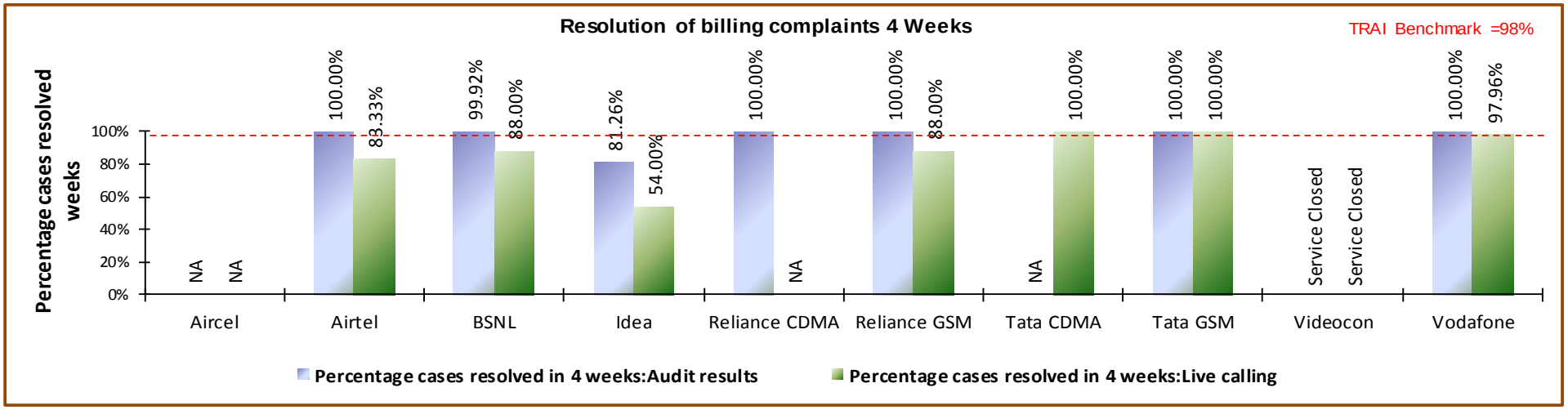
$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

- **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.

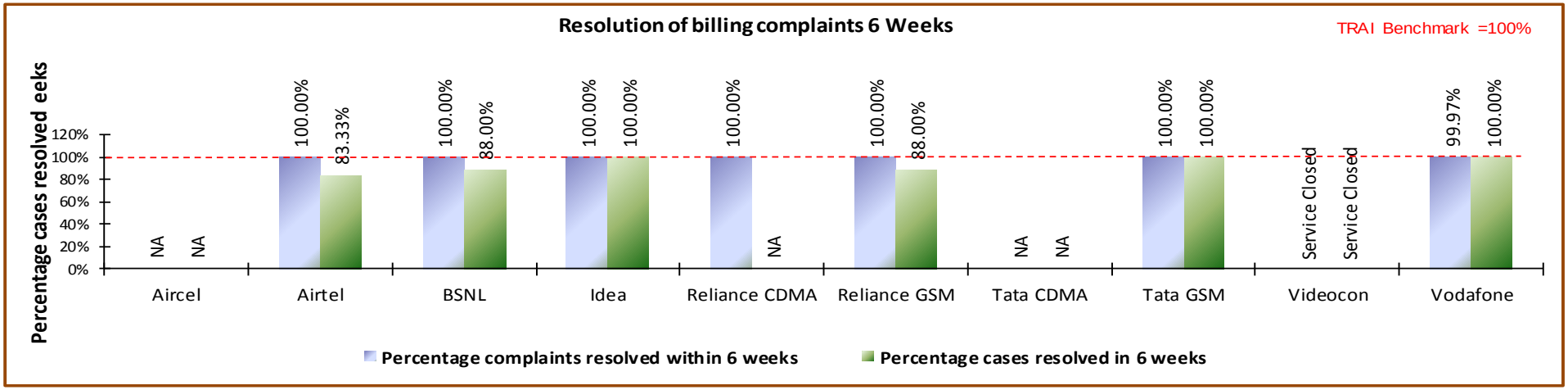
Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

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 Idea failed to 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

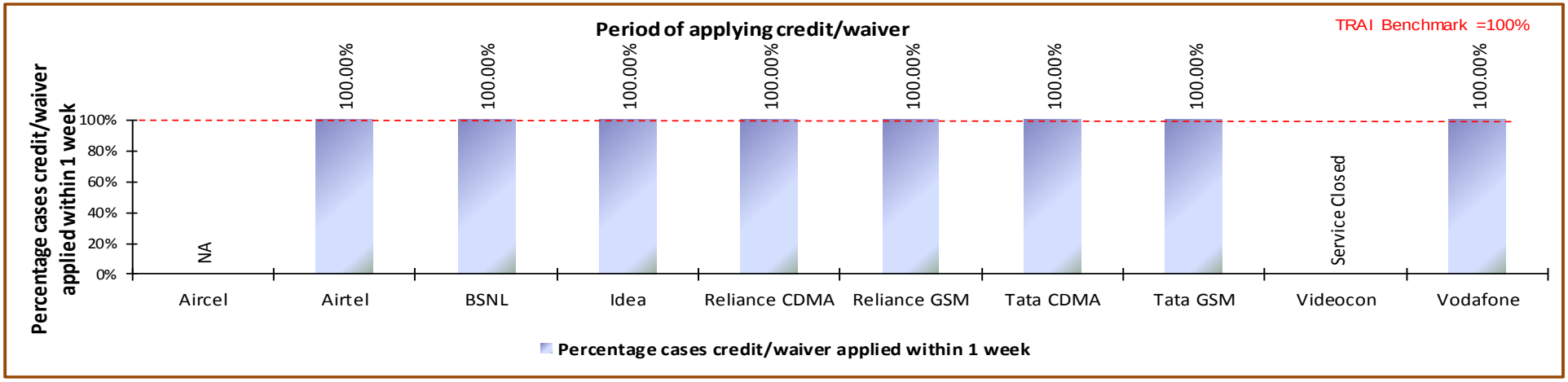
The benchmark for resolving 100% complaints within 6 weeks was not met by Vodafone during PMR audit and during live audit the benchmark for Percentage cases resolved in 6 weeks was not met by Airtel, BSNL and Reliance GSM.

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.

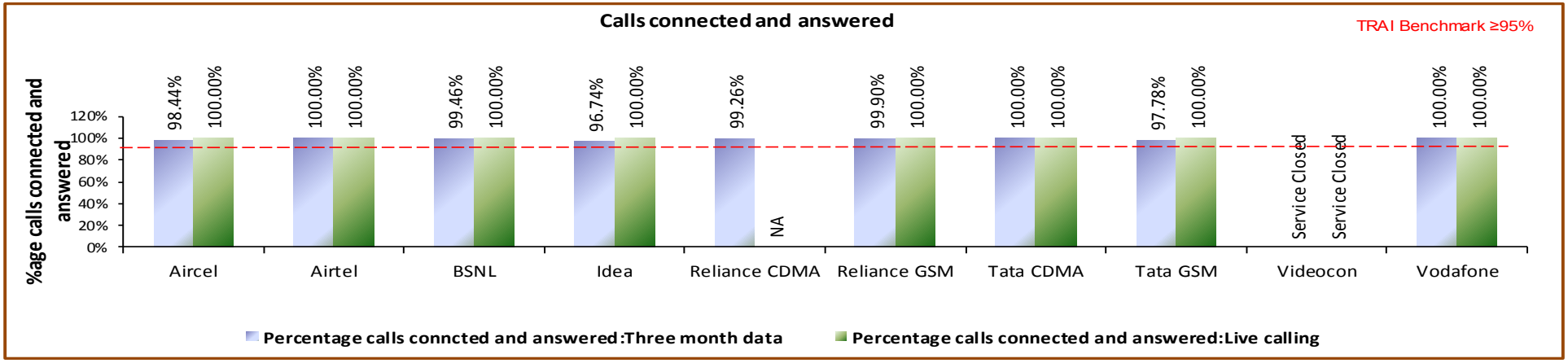
9.4 CALL CENTRE PERFORMANCE-IVR

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.

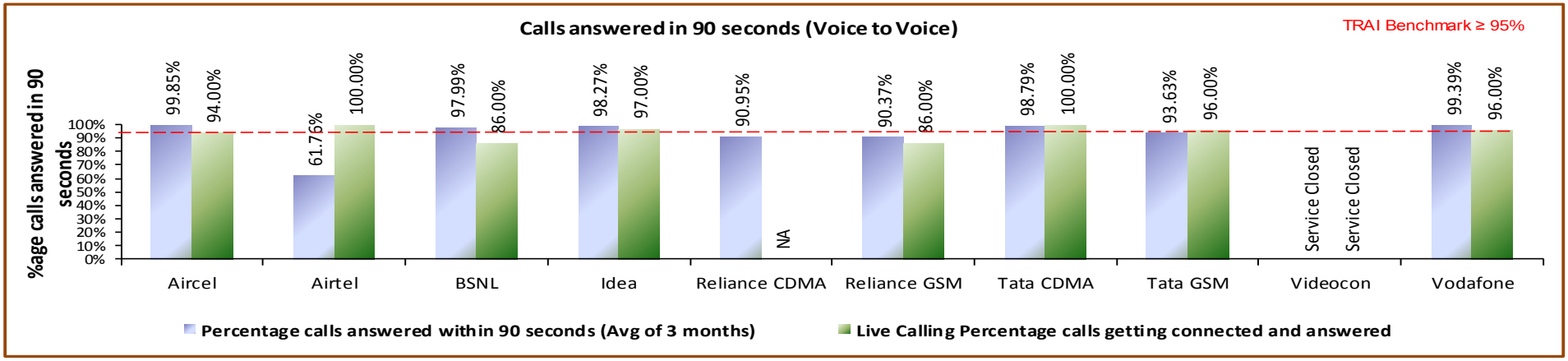
9.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

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

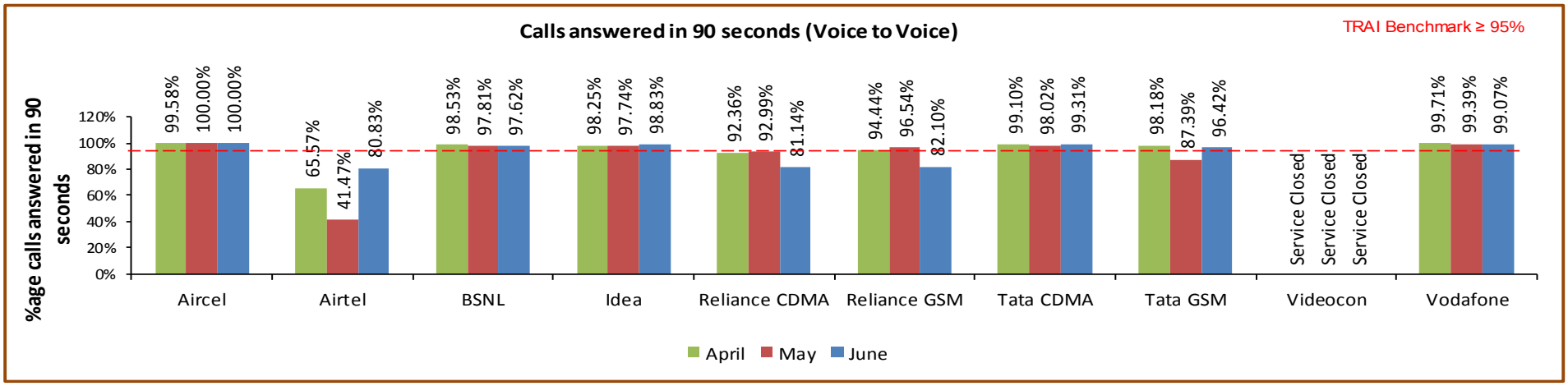
Benchmark: 95% calls to be answered within 90 seconds

9.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

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

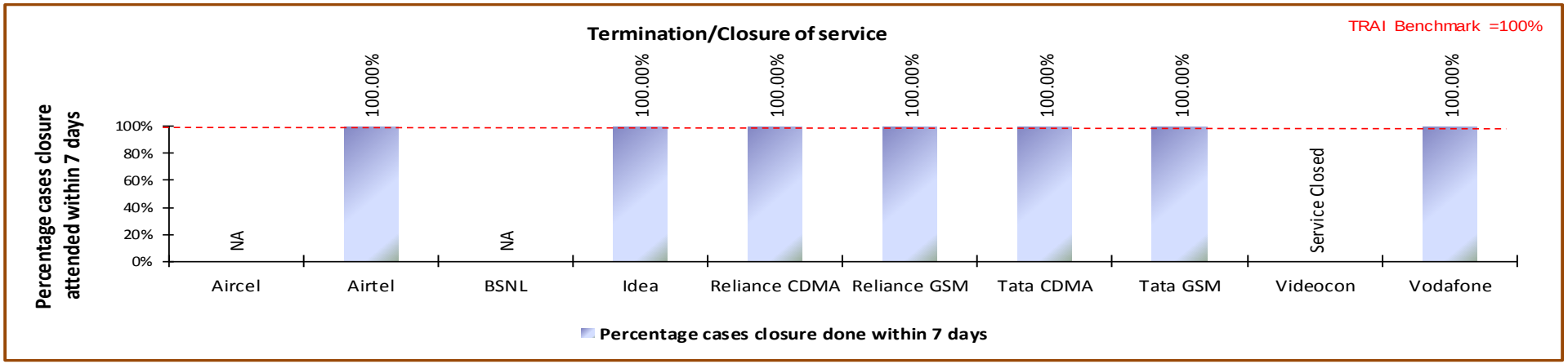


9.6 TERMINATION/CLOSURE OF SERVICE

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

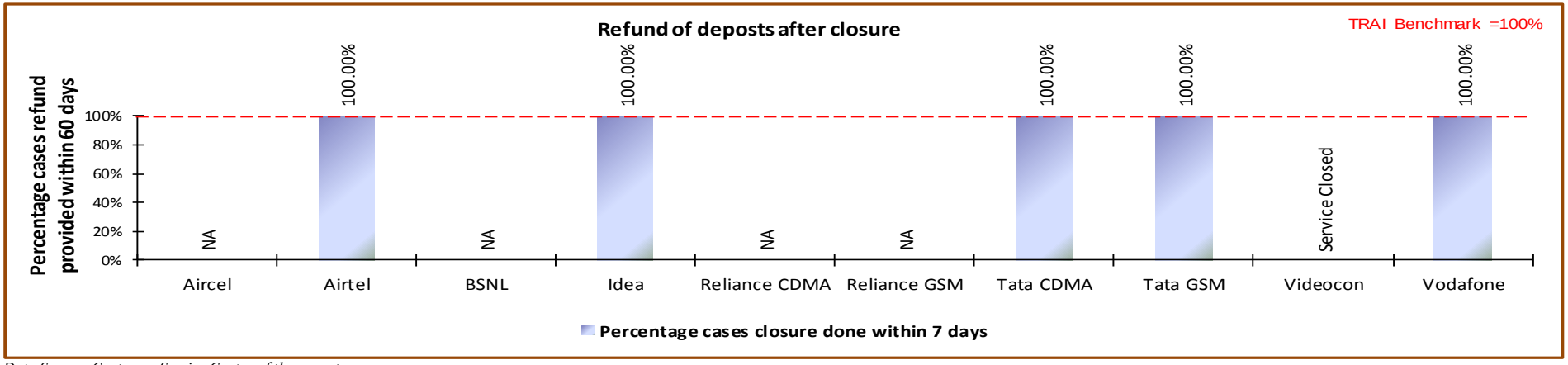
All operators met the TRAI benchmark for the parameter.

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

All operators met the TRAI benchmark for the parameter.

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 BHOPAL SSA

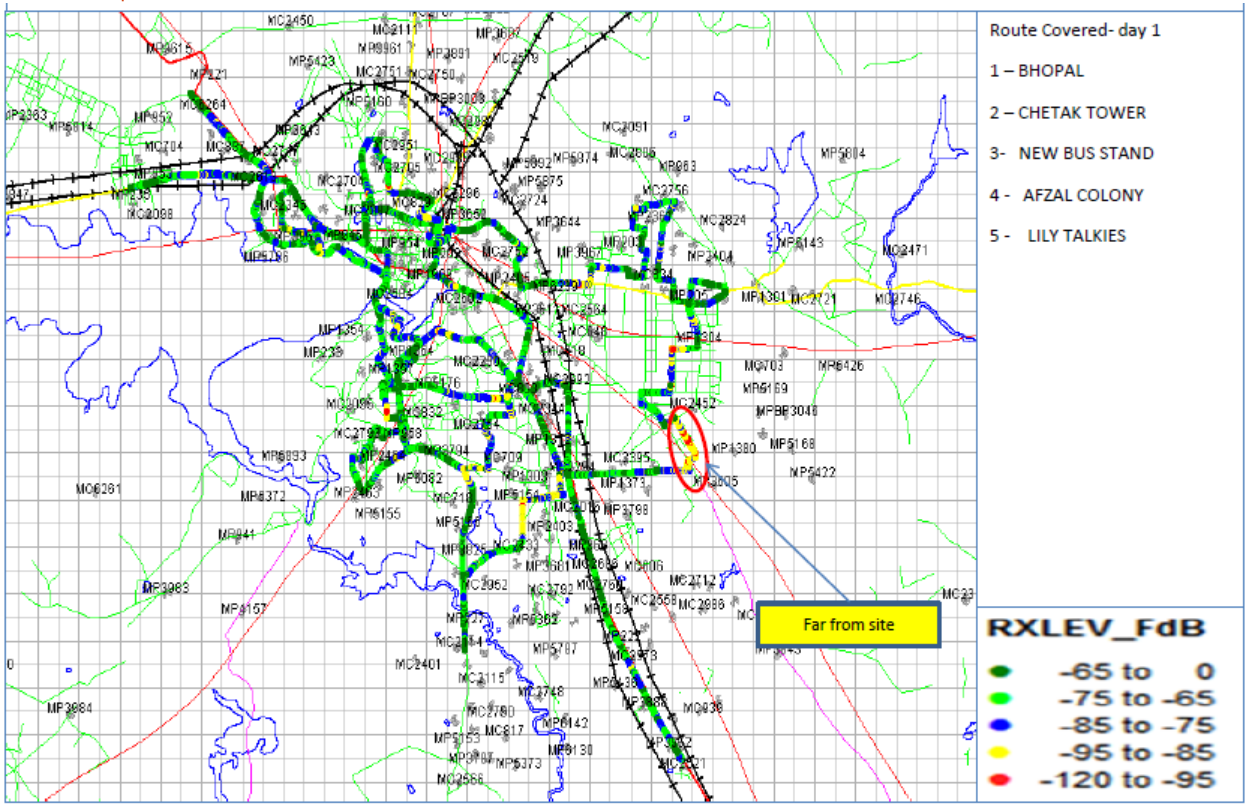
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
April	BHOPAL	06-04-2016	08-04-2016	260

10.1.1.1 Route Details – BHOPAL SSA

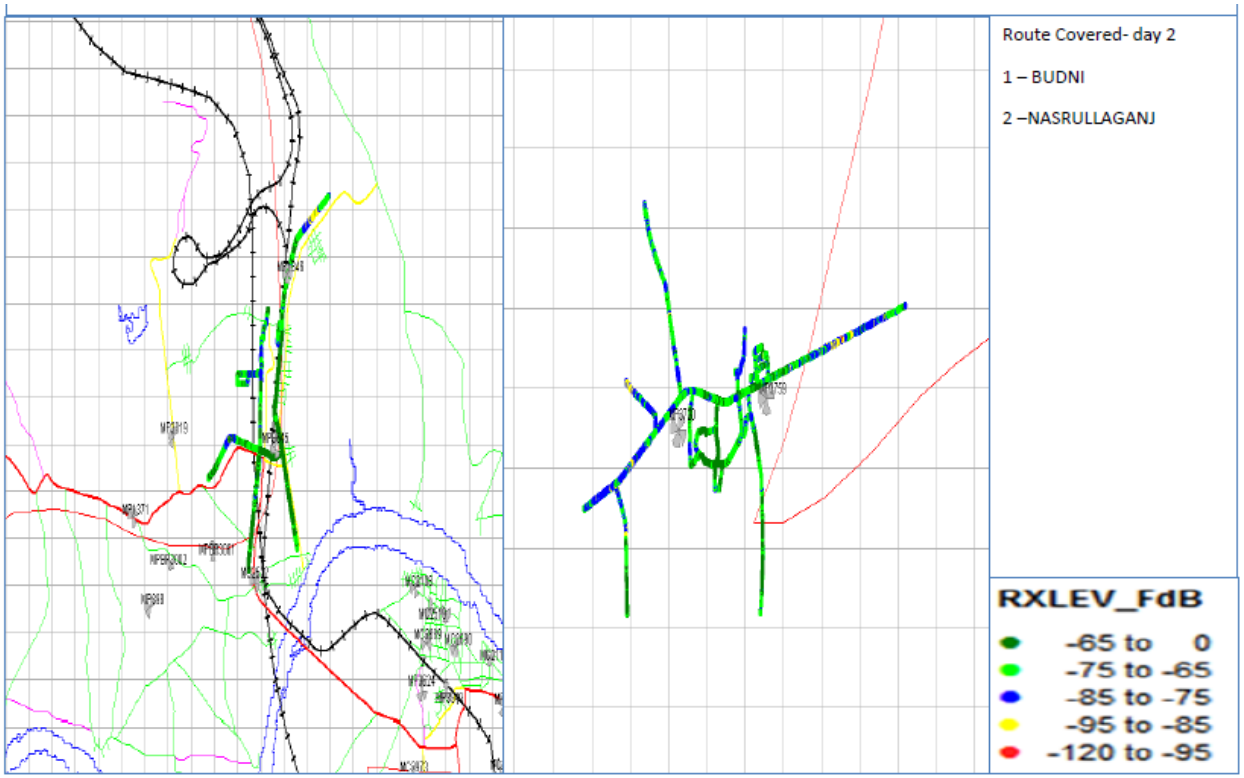
Category	Type of location	April		
		BHOPAL		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Mp nagar,hosjangabad road,vip road,link road - 1,2,3, bhopal railway station hamodia road ,bhel,saket nagar,AIIMS,KOLAR ROAD,	NAGPUR ROAD,HOSHANGABAD ROAD, PILLIKAR ROAD,ABHISHAK MILL ,BUDHNI CITY, NASULLAGANJ CITY,SALKANPUR ROAD,BAZAR,NAGAR NIGAM	INDORE ROAD,SABJI MANDI,BUS STAND,KILLA ROAD, INDORE ROAD,SEHORE BY PASS,CAKEKTER ROAD,MAIN MARKET,
	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.

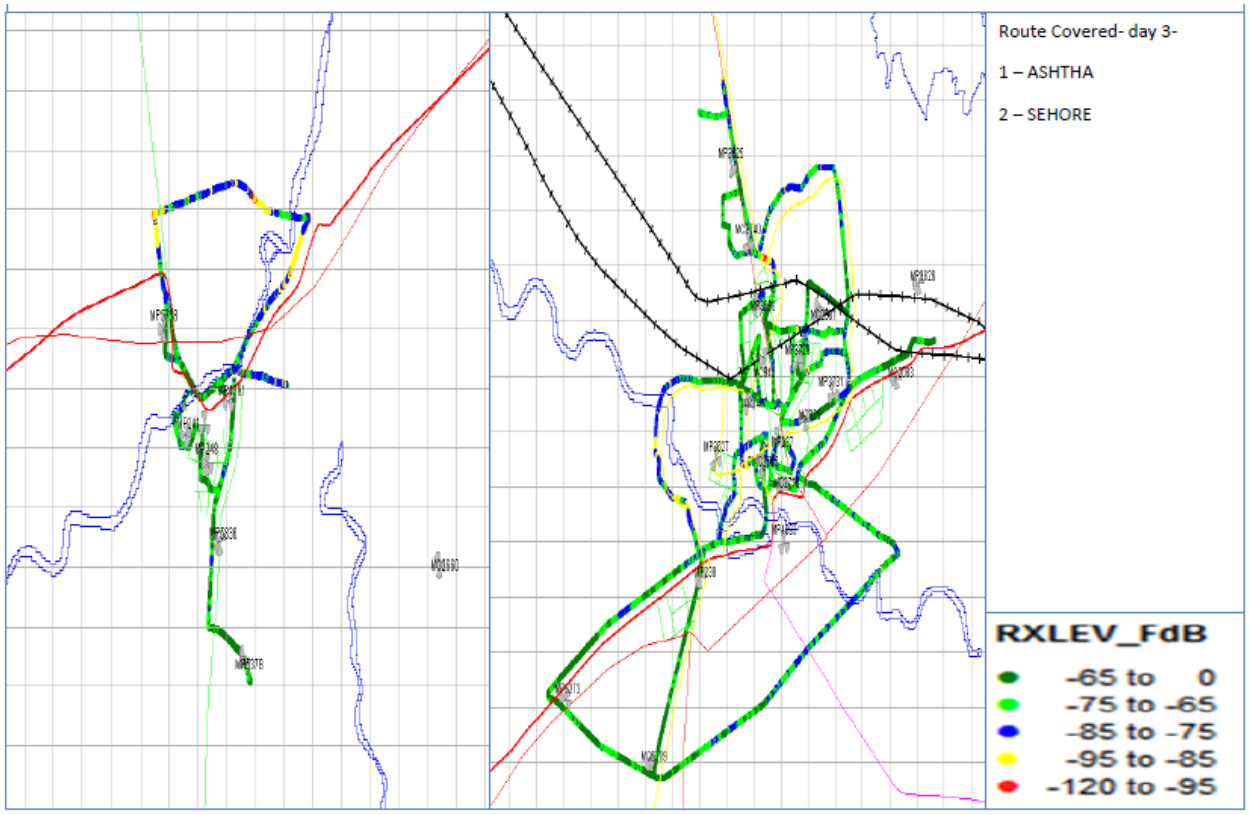
10.1.1.2 Route Map - BHOPAL DAY 1



10.1.1.3 Route Map - BHOPAL DAY 2



10.1.1.1 Route Map - BHOPAL DAY 3



10.1.1.2 Drive Test Results - BHOPAL SSA 2G

BHOPAL	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		89.23%	82.47%	89.68%	88.46%	51.75%	59.28%	85.84%	87.82%	74.09%	60.24%	100.00%	85.29%	100.00%	75.87%	99.99%	95.95%	98.46%	90.18%	98.97%	94.51%
0 to -85 dBm		99.56%	93.76%	100.00%	97.53%	96.17%	85.84%	99.23%	99.09%	99.19%	89.37%	100.00%	98.56%	100.00%	81.03%	100.00%	98.93%	100.00%	96.89%	100.00%	99.93%
0 to -95 dBm		100.00%	99.12%	100.00%	99.59%	99.91%	98.48%	100.00%	100.00%	100.00%	99.48%	100.00%	99.99%	100.00%	14.81%	100.00%	99.67%	100.00%	99.52%	100.00%	100.00%
Voice quality	≥ 95%	99.52%	96.62%	97.08%	97.62%	93.48%	92.86%	98.06%	95.08%	99.25%	97.08%	98.81%	95.05%	100.00%	99.28%	98.82%	98.39%	99.68%	97.41%	97.81%	96.10%
CSSR	≥ 95%	100.00%	99.06%	100.00%	100.00%	100.00%	96.09%	100.00%	99.61%	100.00%	100.00%	100.00%	98.40%	100.00%	99.73%	100.00%	99.34%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.94%	0.00%	0.00%	0.00%	3.91%	0.00%	0.39%	0.00%	0.00%	0.00%	1.60%	0.00%	0.27%	0.00%	1.31%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.95%	0.00%	0.25%	0.00%	0.68%	0.00%	0.00%	0.00%	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	99.71%	99.35%	94.73%	100.00%	99.34%	100.00%	100.00%	100.00%	98.84%	100.00%	100.00%	100.00%	99.29%	100.00%	100.00%	100.00%	99.60%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

All operators met the benchmark in indoor and outdoor 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 - BHOPAL SSA 3G

BHOPAL	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Reliance 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		100.00%	84.80%	8.75%	18.12%	100.00%	94.44%	NA	
0 to -85 dBm		100.00%	97.86%	32.85%	50.23%	100.00%	99.70%		
0 to -95 dBm		100.00%	99.54%	93.78%	80.59%	100.00%	100.00%		
Voice quality	≥ 95%	99.88%	98.90%	36.75%	77.29%	99.17%	95.29%		
CSSR	≥ 95%	100.00%	100.00%	100.00%	90.88%	100.00%	99.67%		
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.33%		
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	8.24%	0.00%	0.00%		
Hands off success rate		100.00%	100.00%	100.00%	99.37%	100.00%	100.00%		

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL 3G 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 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 - BHOPAL SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	100	100	Not received	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	100	100		100
Minimum download speed		77	102	23	116	95	87	59	73		114
Average throughput for Packet Data		125	123	22	151	126	121	60	59		189
Latency	<250ms	100	100	NA	100	100	100	100	100		100

All operators met the TRAI benchmark for data drive test.

10.1.1.2 Data Drive Test Results - BHOPAL 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		1091	67	1216	1
Average throughput for Packet Data		2016	67	1993	1
Latency	<250ms	100	NA	100	100

All operators met the TRAI benchmark for data drive test.

10.1.2 GUNA SSA

10.1.2.1 KILOMETERS TRAVELLED- ITARSI SSA

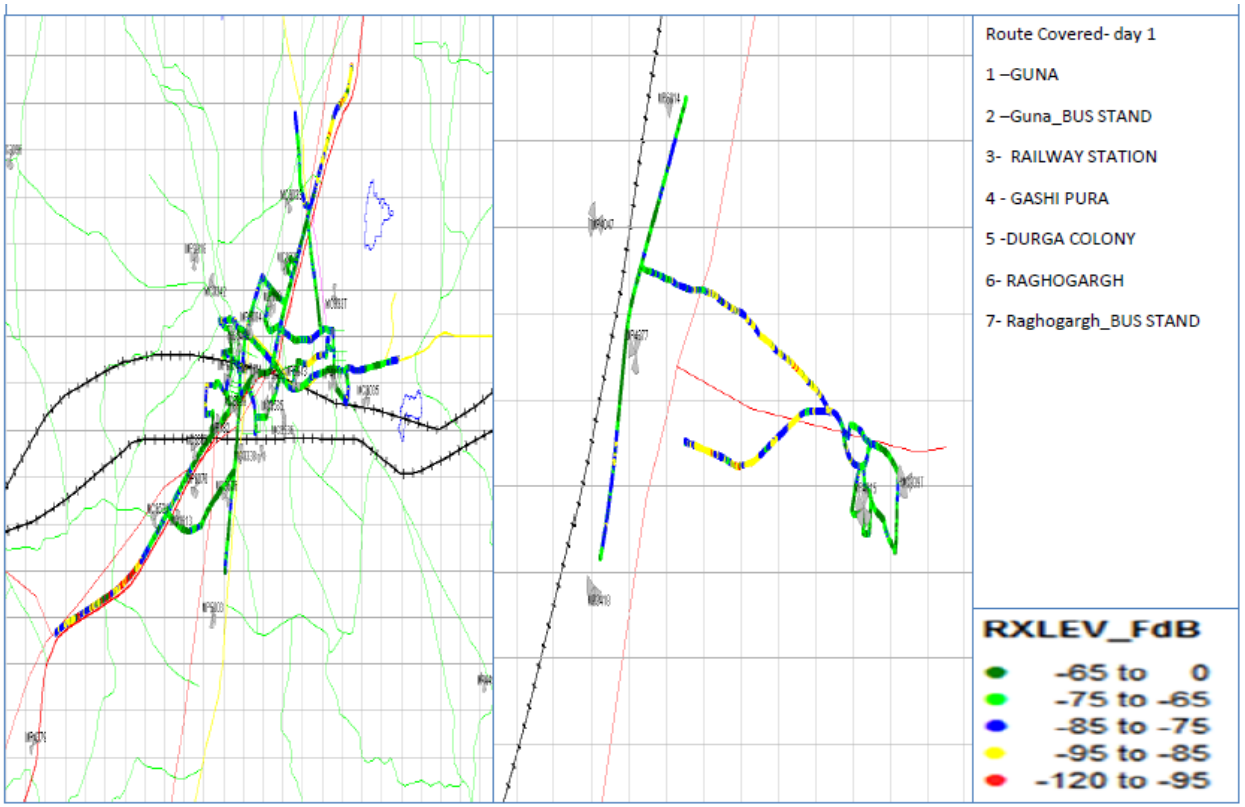
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
April	Guna	27-4-2016	29-4-2016	257

10.1.2.2 ROUTE DETAILS - GUNA SSA

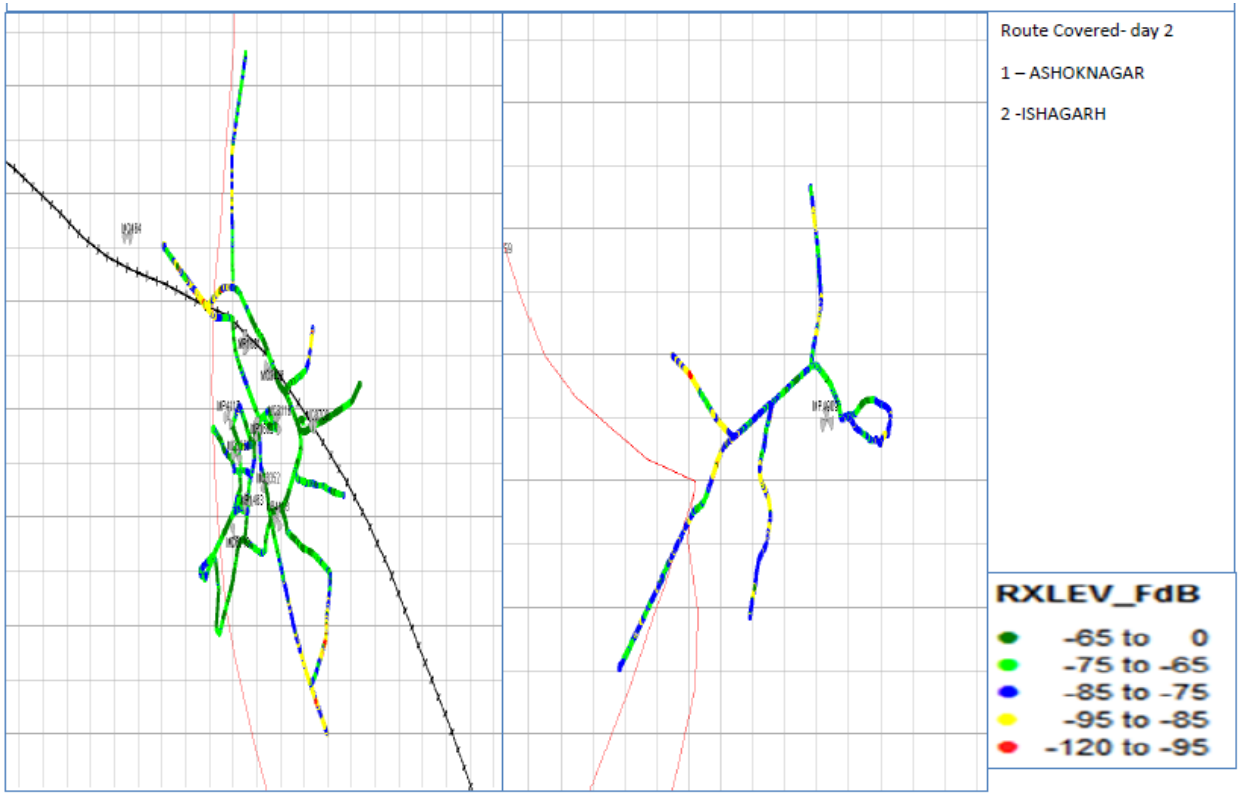
Category	Type of location	April		
		Guna		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	ASHOK NAGAR ROAD,BUS STAND,HOSPITAL GOV,ARON MANDI,	LAXMI GANJ PIPRA KHURD BUDHWALAJI PG COLLAGE	CHANDERI BUS STAND ROAD CHANDERI LALITPUR BY PASS CHANDERI KILLA CITY BY PASS ROAD,
	Highways			
	With in the City			
Indoor	Shopping complex	RAGHAOUGHAD BUS STAD, SABGI	GUNA ASHOK NAGAR ROAD KRISHNANI NAGAR	JAMA MASZID ROAD
	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.

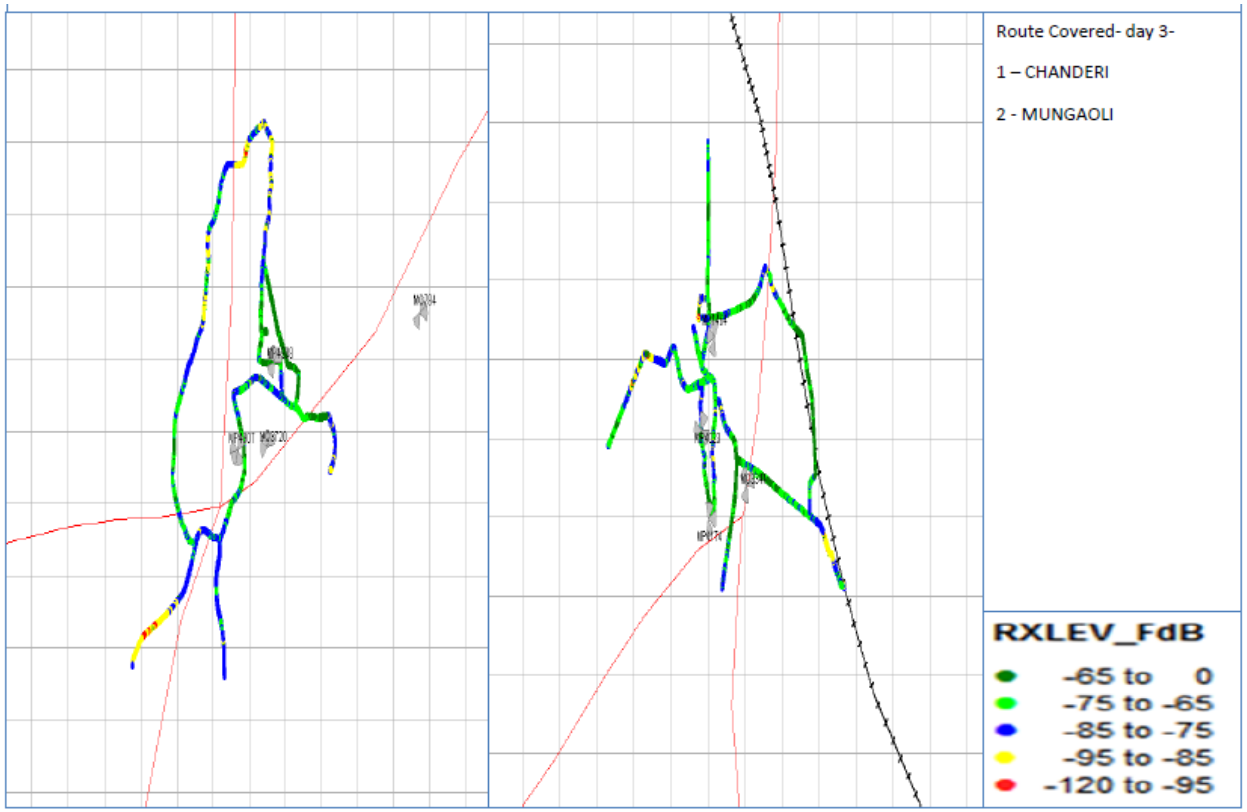
10.1.2.3 Route Map - GUNA DAY 1



10.1.2.4 Route Map - GUNA DAY 2



10.1.2.5 Route Map - GUNA DAY 3



10.1.2.6 Drive Test Results - GUNA SSA 2G

Guna	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		Not present		99.54%	65.05%	99.43%	80.94%	99.91%	81.64%	89.85%	44.59%	100.00%	75.45%	100.00%	68.09%	100.00%	54.53%	96.26%	65.28%	99.66%	87.61%
0 to -85 dBm				100.00%	89.90%	100.00%	97.57%	99.98%	96.78%	100.00%	80.95%	100.00%	96.93%	100.00%	89.03%	100.00%	69.44%	99.91%	85.54%	100.00%	98.77%
0 to -95 dBm				100.00%	98.96%	100.00%	99.91%	99.98%	99.86%	100.00%	99.35%	100.00%	99.97%	100.00%	98.68%	100.00%	70.17%	100.00%	97.78%	100.00%	99.91%
Voice quality	≥ 95%			97.16%	97.50%	97.58%	94.06%	98.82%	95.95%	99.89%	97.16%	95.14%	95.08%	100.00%	100.00%	99.55%	97.77%	99.53%	96.98%	99.12%	98.17%
CSSR	≥ 95%			100.00%	100.00%	98.33%	94.64%	100.00%	99.22%	100.00%	100.00%	100.00%	99.16%	100.00%	100.00%	100.00%	99.17%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	1.67%	4.36%	0.00%	0.78%	0.00%	0.00%	0.00%	0.84%	0.00%	0.00%	0.00%	0.62%	0.00%	0.21%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.22%	0.00%	3.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.21%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	99.41%	100.00%	99.08%	100.00%	100.00%	96.43%	97.66%	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

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

BSNL failed to meet the benchmark for call drop rate in outdoor location.

10.1.2.7 Drive Test Results - GUNA SSA 3G

Guna	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Reliance 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		100.00%	78.26%	NA		100.00%	95.31%	NA	
0 to -85 dBm		100.00%	95.10%			100.00%	99.37%		
0 to -95 dBm		100.00%	99.80%			100.00%	100.00%		
Voice quality	≥ 95%	99.99%	99.74%			98.92%	95.29%		
CSSR	≥ 95%	100.00%	100.00%			100.00%	97.80%		
%age Blocked calls		0.00%	0.00%			0.00%	2.20%		
Call drop rate	≤ 2%	0.00%	0.00%			0.00%	0.00%		
Hands off success rate		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 - GUNA SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	Not present	100	100	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100	100	100	100	100	100	100
Minimum download speed			102	23	110	63	63	59	70	69	141
Average throughput for Packet Data			124	22	143	115	93	60	76	136	189
Latency	<250ms		100	NA	100	100	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.2.2 Data Drive Test Results - GUNA 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	No Coverage
Succesful Data Transmission upload speed attempts	>75%	100		100	
Minimum download speed		1108		2108	
Average throughput for Packet Data		1910		2928	
Latency	<250ms	100		100	

All operators met the TRAI benchmark for data drive test.

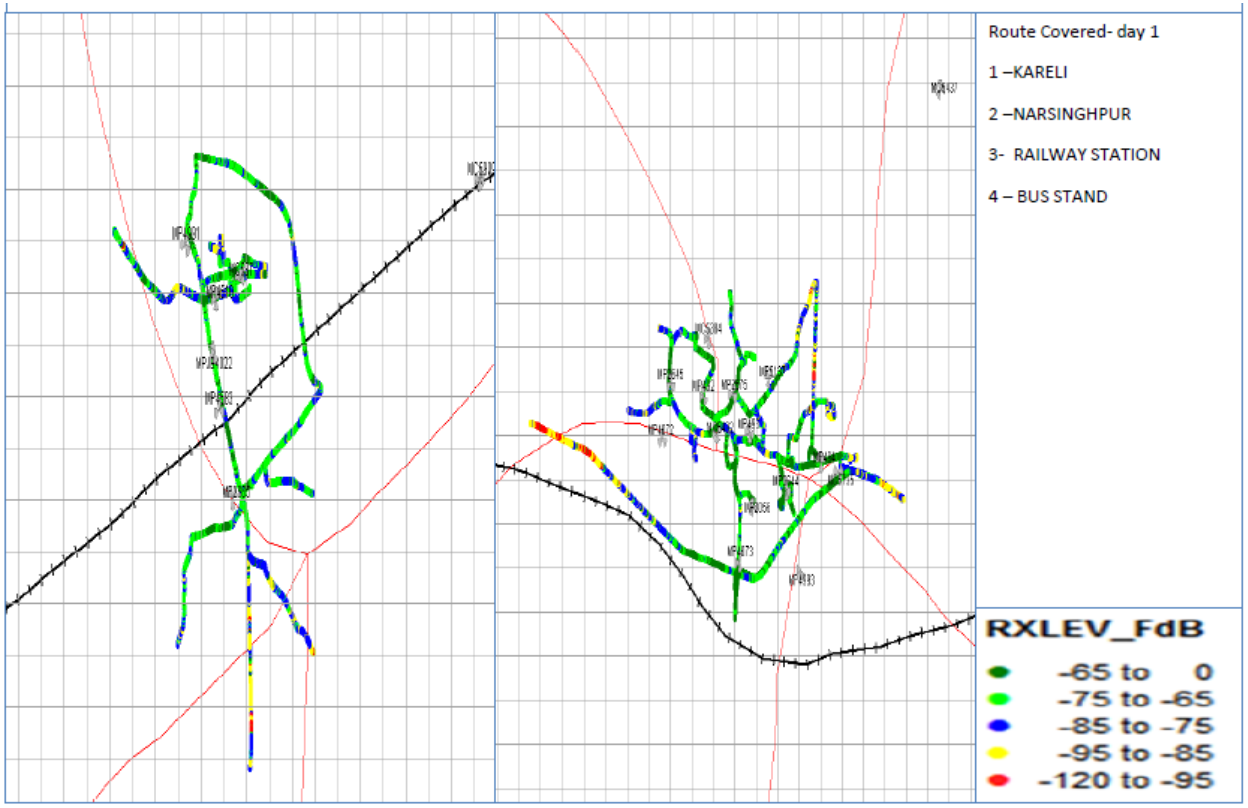
10.1.3 NARSIGHAPUR SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
April	Narsighapur	20-4-2016	22-4-2016	260

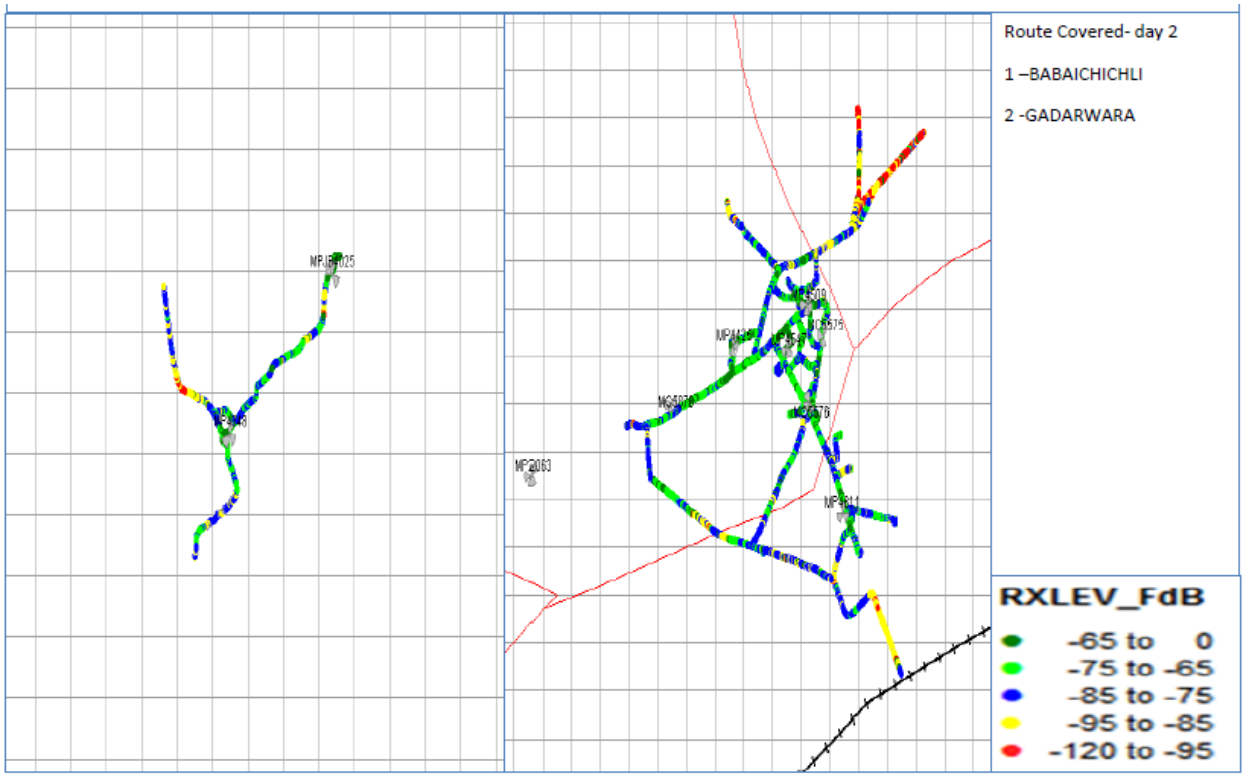
10.1.3.1 Route Details – NARSIGHAPUR SSA

Category	Type of location	April		
		Narsighapur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1) Gotegaon Road, Karel Road, Bus Stand, Railway Station , Nagar palika, Doctor's Colony 2) Narsinghpur Road, gadarwara	1) Kareli Road, Jamada Road, Amgaon Road Bus Stand, Railway Station, Chichili road 2) Gadarwara Road, Sukha	1) Narsinghpur Road, Shahpura Road, Bus stand, Railway Station
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

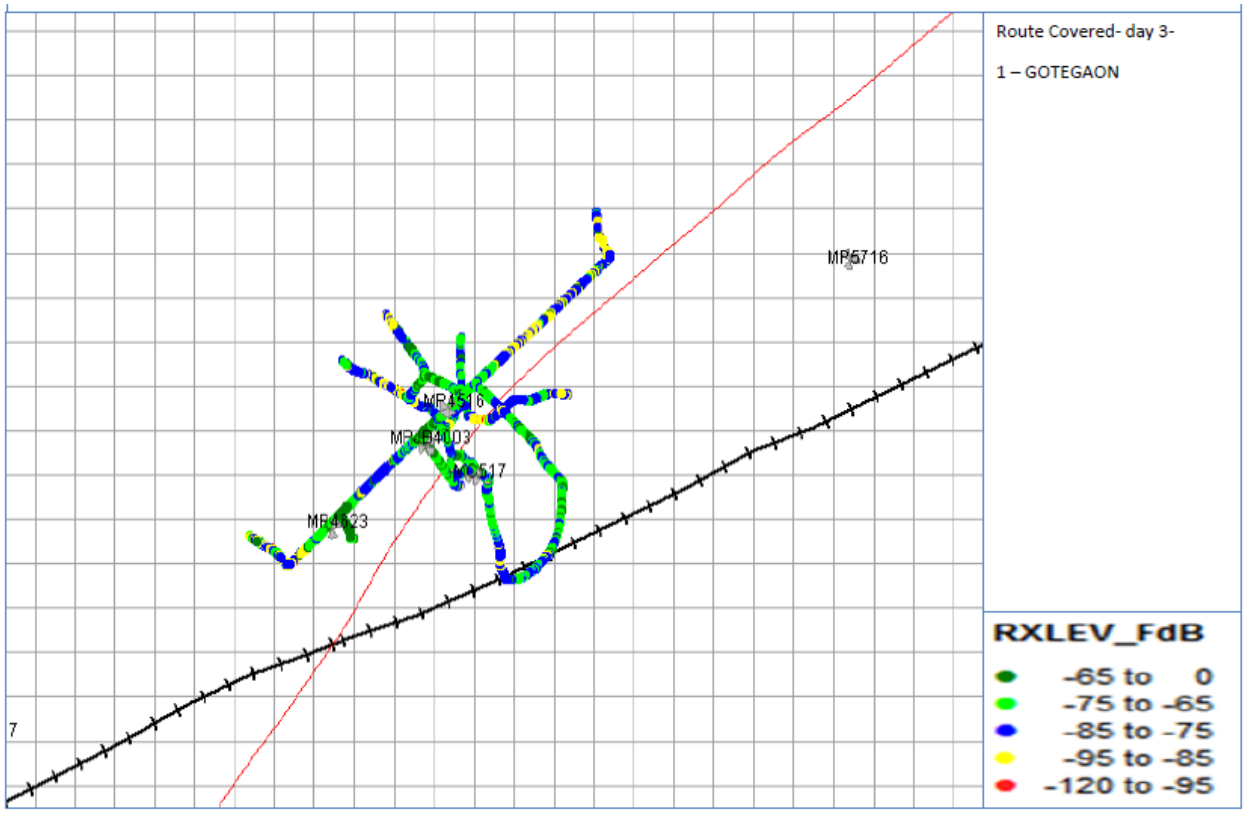
10.1.3.2 Route Map - NARSIGHAPUR DAY 1



10.1.3.3 Route Map - NARSIGHAPUR DAY 2



10.1.3.4 Route Map - NARSIGHAPUR DAY 3



10.1.3.1 Drive Test Results - NARSIGHAPUR SSA 2G

Narsighapur	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		89.79%	87.68%	63.37%	59.84%	31.29%	13.79%	78.27%	68.25%	55.63%	61.97%	66.87%	69.09%	0.89%	18.83%	91.64%	87.21%	82.13%	66.12%	93.21%	73.21%
0 to -85 dBm		99.58%	96.49%	99.15%	88.91%	96.36%	76.78%	99.01%	97.00%	87.28%	88.44%	99.73%	93.69%	77.97%	57.90%	99.57%	96.77%	99.29%	91.41%	99.99%	95.19%
0 to -95 dBm		100.00%	99.84%	100.00%	98.22%	99.52%	98.04%	99.99%	99.84%	100.00%	99.10%	100.00%	99.91%	99.98%	95.71%	100.00%	99.77%	100.00%	99.08%	100.00%	99.69%
Voice quality	≥ 95%	99.36%	98.90%	99.29%	97.99%	99.33%	96.46%	97.90%	97.67%	98.08%	95.74%	97.16%	96.31%	99.87%	99.74%	99.66%	99.36%	99.70%	98.85%	98.98%	99.44%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	88.52%	89.87%	100.00%	99.76%	100.00%	100.00%	100.00%	98.46%	100.00%	100.00%	100.00%	99.52%	100.00%	100.00%	100.00%	99.29%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	11.48%	9.27%	0.00%	0.24%	0.00%	0.00%	0.00%	1.54%	0.00%	0.00%	0.00%	0.48%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	5.40%	0.00%	0.25%	0.00%	0.00%	0.00%	1.34%	0.00%	0.00%	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%	98.76%	100.00%	99.30%	100.00%	100.00%	98.39%	96.17%	100.00%	100.00%	100.00%	99.86%	100.00%	99.85%	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 except BSNL.

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 - NARSIGHAPUR SSA 3G

Narsighapur	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Reliance 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		76.86%	70.59%	NA		96.25%	89.15%	NA	
0 to -85 dBm		100.00%	93.87%			100.00%	99.24%		
0 to -95 dBm		100.00%	99.55%			100.00%	99.99%		
Voice quality	≥ 95%	99.99%	99.00%			99.39%	95.86%		
CSSR	≥ 95%	100.00%	100.00%			100.00%	99.73%		
%age Blocked calls		0.00%	0.00%			0.00%	0.27%		
Call drop rate	≤ 2%	0.00%	0.00%			0.00%	0.00%		
Hands off success rate		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

10.1.3.1 Data Drive Test Results - NARSIGHAPUR SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100		100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100		100	100	100	100	100	100	100
Minimum download speed		76	101		145	75	74	74	109	45	118
Average throughput for Packet Data		81	124		171	99	123	84	109	189	182
Latency	<250ms	100	100		100	100	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.3.2 Data Drive Test Results - NARSIGHAPUR 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	NA
Succesful Data Transmission upload speed attempts	>75%	100		100	
Minimum download speed		1166		1389	
Average throughput for Packet Data		1456		1935	
Latency	<250ms	100		100	

All operators met the TRAI benchmark for data drive test.

10.1.4 RAISEN SSA

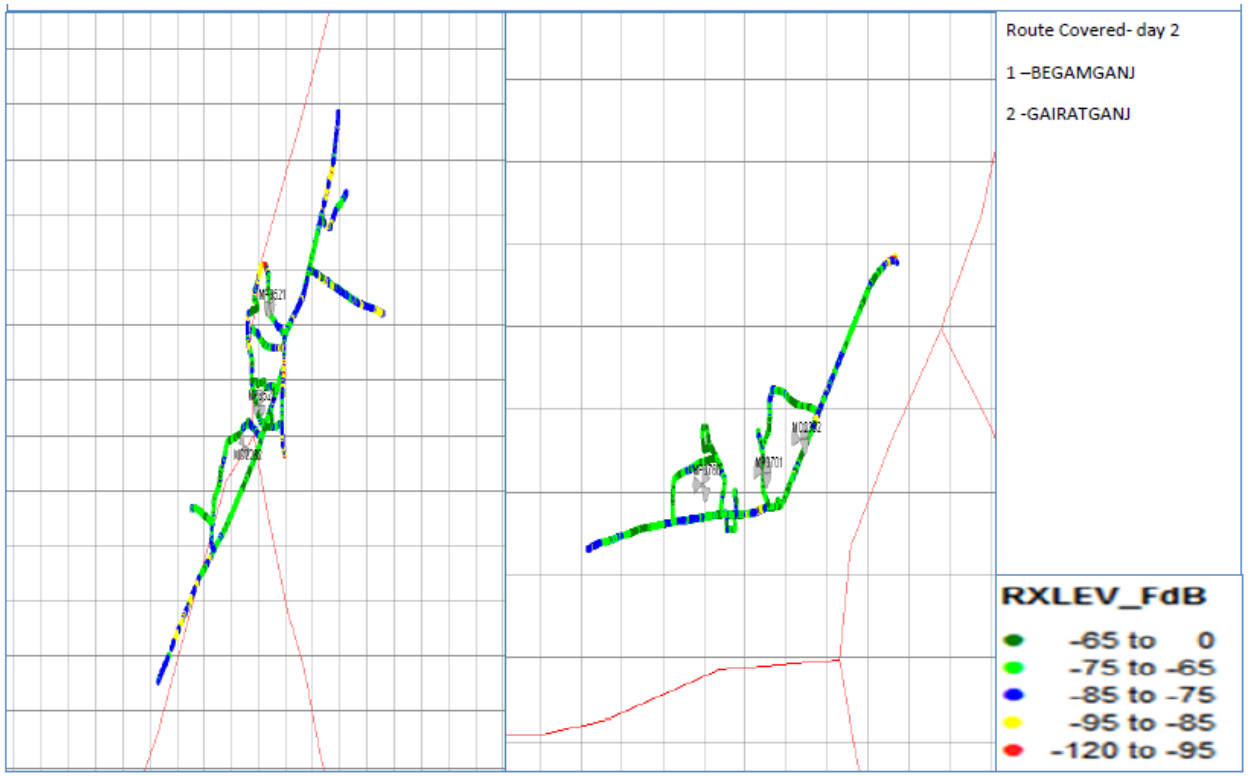
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
April	RAISEN	14-04-2016	16-04-2016	250

10.1.4.1 Route Details –RAISEN SSA

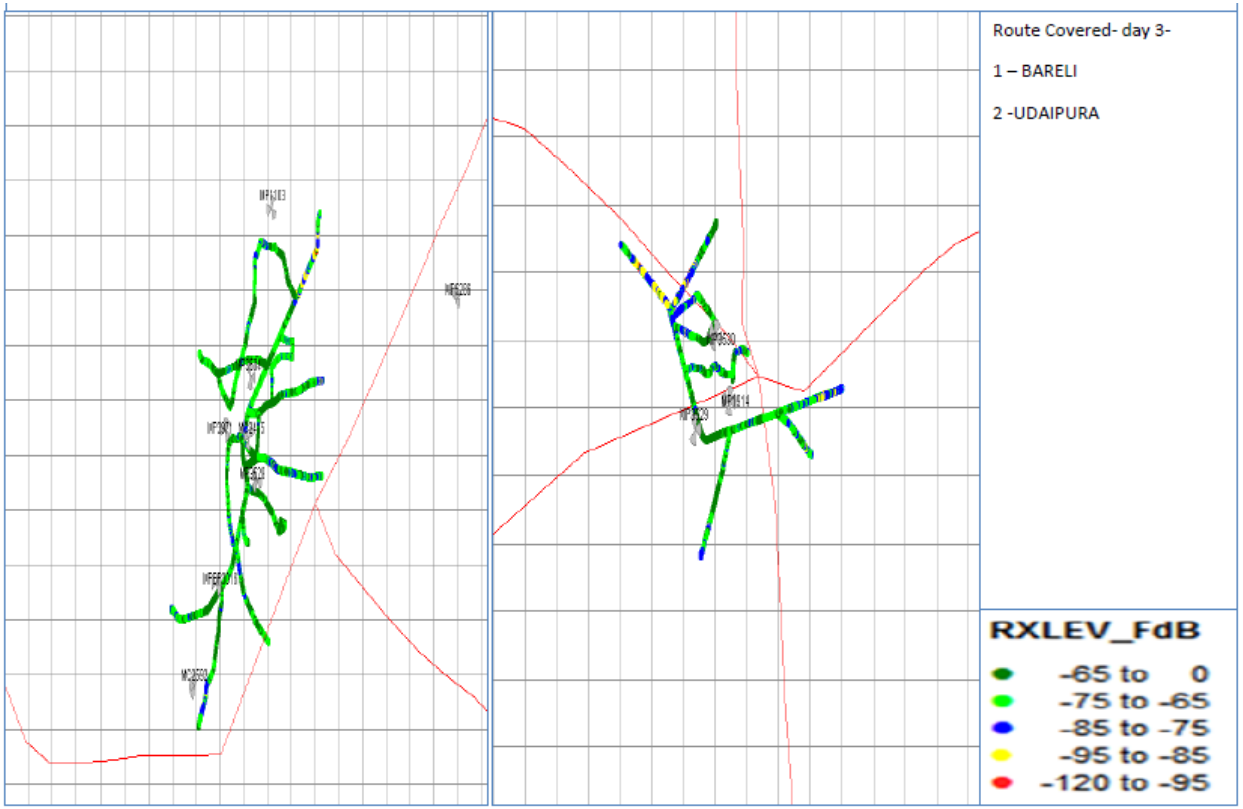
Category	Type of location	April RAISEN		
		Day 1	Day 2	Day 3
Outdoor	Major Roads		SILWANI BUS STAND ,MANDI, Cmo colony,dall mill colony,verma colony,saket nagar	CHANDERI BUS STAND ROAD CHANDERI LALITPUR BY PASS CHANDERI KILLA CITY BY PASS ROAD, JAMA MASZID ROAD
	Highways	GARATGANJ ROAD,NEW POLICE LINE,OLD BUS STAND, SAGAR ROAD, KHIKIYA ROAD.TAKRI ROAD,RAMNAGAR,SYAMNA GR,		
	With in the City			
Indoor	Shopping complex			
	Office complex			

10.1.4.1 Route Map - RAISEN DAY 1

10.1.4.2 Route Map - RAISEN DAY 2



10.1.4.1 Route Map - RAISEN DAY 3



10.1.4.2 Drive Test Results - RAISEN SSA 2G

RAISEN	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.90%	88.33%	78.75%	72.38%	34.37%	38.72%	78.95%	84.55%	90.63%	71.24%	99.94%	82.14%	100.00%	68.09%	92.20%	69.26%	95.18%	78.24%	97.07%	83.22%
0 to -85 dBm		100.00%	97.18%	94.69%	91.39%	95.61%	81.19%	98.12%	98.52%	98.59%	92.32%	100.00%	97.88%	100.00%	89.03%	92.20%	93.21%	99.82%	94.96%	98.86%	98.34%
0 to -95 dBm		100.00%	99.71%	97.18%	98.82%	99.37%	97.48%	99.99%	99.98%	98.59%	99.09%	100.00%	99.96%	100.00%	98.68%	100.00%	98.90%	100.00%	99.49%	100.00%	96.64%
Voice quality	≥ 95%	99.43%	99.17%	99.25%	98.65%	94.41%	95.56%	98.74%	97.04%	100.00%	98.81%	97.82%	95.20%	100.00%	98.00%	98.45%	97.22%	97.01%	98.13%	99.36%	98.65%
CSSR	≥ 95%	100.00%	98.95%	100.00%	100.00%	100.00%	97.54%	100.00%	99.74%	100.00%	100.00%	100.00%	99.68%	100.00%	100.00%	100.00%	99.13%	100.00%	100.00%	100.00%	99.40%
%age Blocked calls		0.00%	1.05%	0.00%	0.00%	0.00%	2.46%	0.00%	0.26%	0.00%	0.00%	0.00%	0.32%	0.00%	0.00%	0.00%	0.87%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.32%	0.00%	0.00%	0.00%	0.00%	0.00%	0.98%	0.00%	0.00%	0.00%	0.29%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	98.93%	100.00%	99.87%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.32%	100.00%	100.00%	100.00%	100.00%

Voice Quality

BSNL 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.

10.1.4.3 Drive Test Results - RAISEN SSA 3G

April									
RAISEN	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Reliance 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		100.00%	65.54%	NA	9.84%	99.99%	88.64%	NA	
0 to -85 dBm		100.00%	91.19%		21.87%	100.00%	99.42%		
0 to -95 dBm		100.00%	99.30%		45.88%	100.00%	99.99%		
Voice quality		100.00%	99.95%		87.36%	99.50%	99.01%		
CSSR	≥ 95%	100.00%	99.56%		97.74%	100.00%	99.69%		
%age Blocked calls	≥ 95%	0.00%	0.44%		0.00%	0.00%	0.31%		
Call drop rate		0.00%	0.00%		2.26%	0.00%	0.00%		
Hands off success rate	≤ 2%	100.00%	100.00%		97.40%	100.00%	100.00%		

Voice Quality

BSNL 3G 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 except BSNL in outdoor location.

10.1.4.1 Data Drive Test Results - RAISEN SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	100	100	100	100
Minimum download speed		61	102	23	147	129	95	59	58	44	140
Average throughput for Packet Data		88	124	22	189	133	120	60	56	186	187
Latency	<250ms	100	100	NA	100	100	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.4.2 Data Drive Test Results - RAISEN 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	No Coverage
Succesful Data Transmission upload speed attempts	>75%	100	100	100	
Minimum download speed		1199	79	1096	
Average throughput for Packet Data		1603	80	1905	
Latency	<250ms	100	NA	100	

All operators met the TRAI benchmark for data drive test.

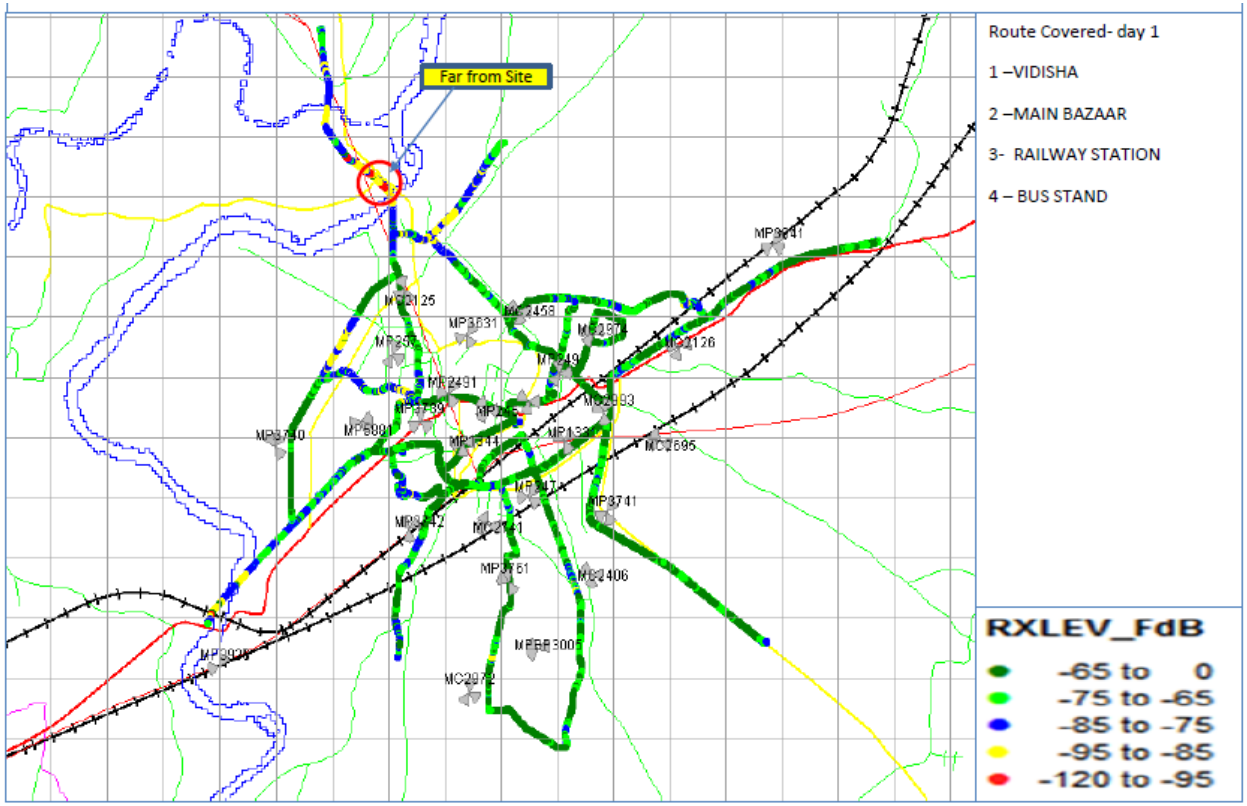
10.1.5 VIDISHA SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
April	Vidisha	11-04-2016	13-04-2016	262

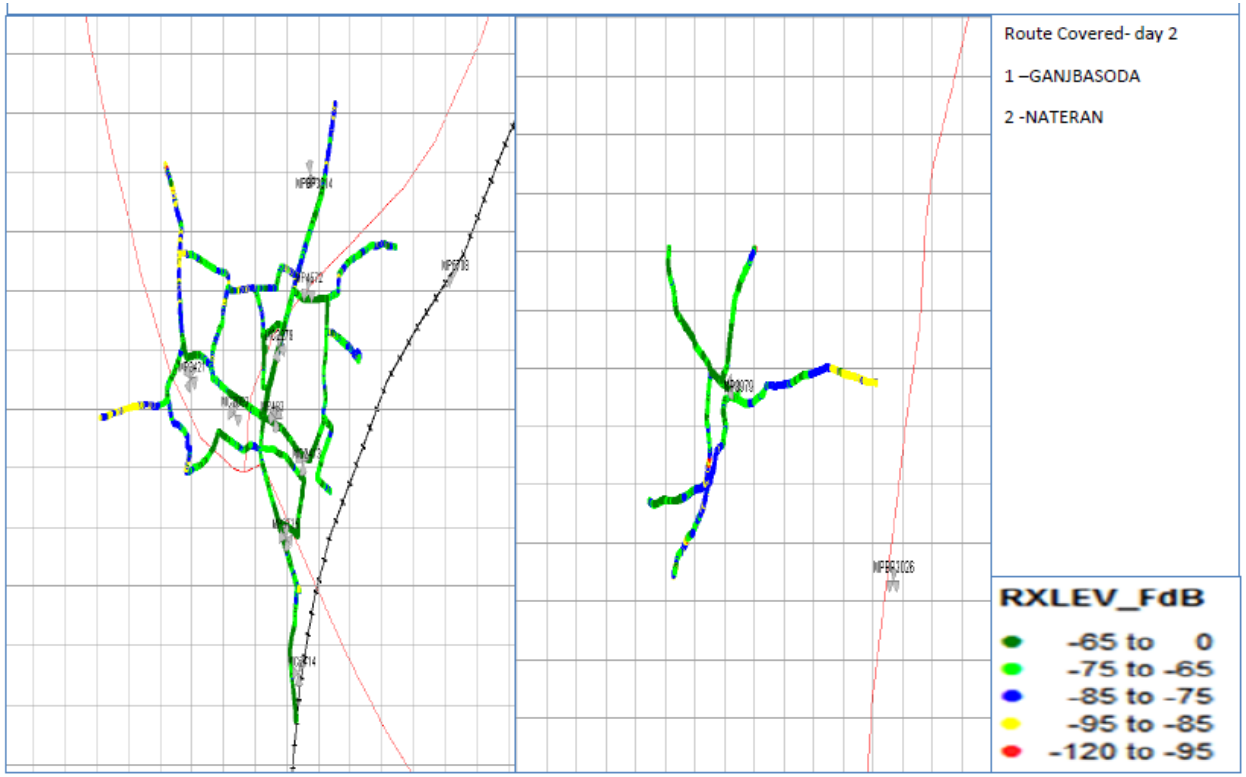
10.1.5.1 Route Details –VIDISHA SSA

Category	Type of location	April		
		Vidisha		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Bhopal Road, Sagar Road, Vidisha Baipass, Teela khedi,	Vidisha Road, Bhopal Road, Sironj Road	Bina Road,Lateri Road,Bhopal, Bhawani Nagar Road,Chandi Chowk,Bus Stand
	Highways	Bhopal Road, Bina Road, Sagar Road	Tomer Market ,Bhavsagar Market,	Bina Road,Lateri Road,Bhopal Road
	With in the City	Bus Stand, Main Market, Kiri Mohalla , Arihant Vihar , Durga Nagar,Puran Pura,Daulatpur,Mukharji Nagar,Indira Nagar	Bus Stand, Swroop Nagar,Arihant Nagar, Radha Krishna Puram, Lal Bag,Rangrezpura	Main Market,Bus Stand , Bhawani Nagar Road,Chandi Chowk,Bus
Indoor	Shopping complex			
	Office complex			

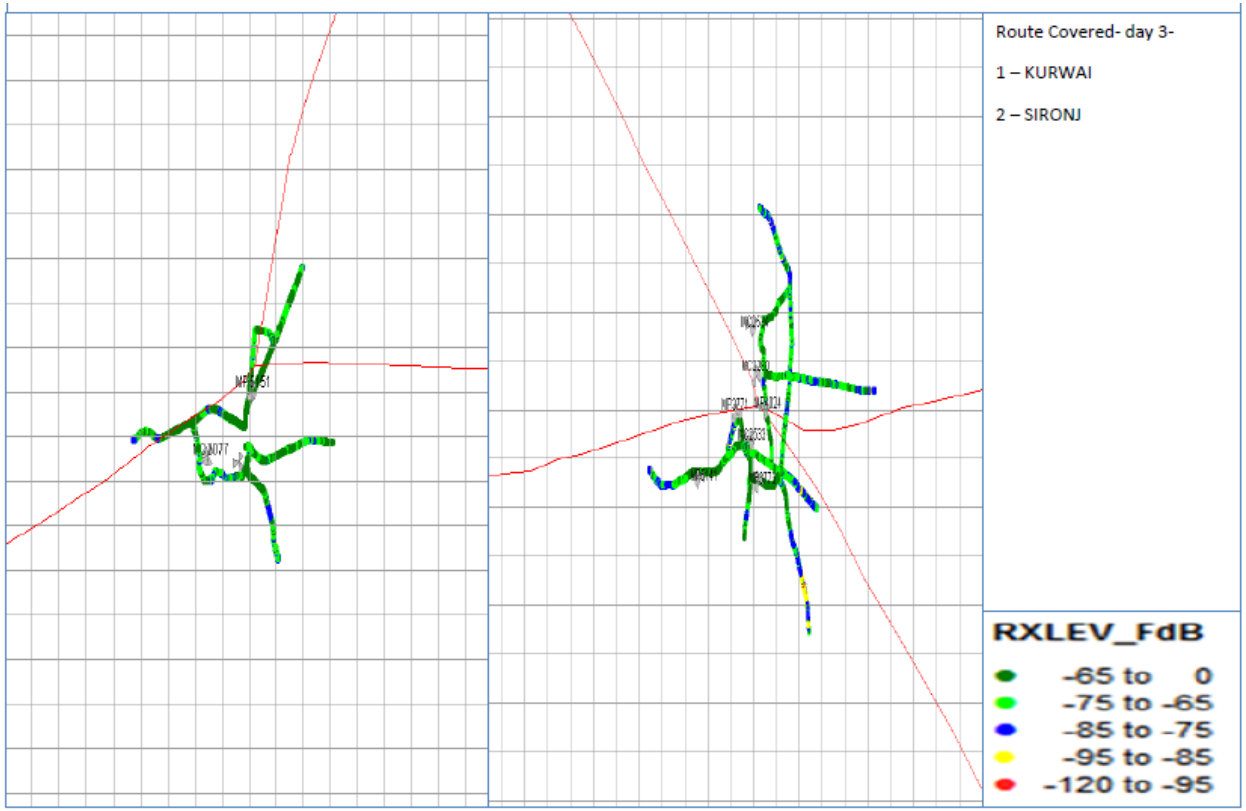
10.1.5.2 Route Map - VIDISHA DAY 1



10.1.5.3 Route Map - VIDISHA DAY 2



10.1.5.4 Route Map - VIDISHA DAY 3



10.1.5.5 Drive Test Results - VIDISHA SSA 2G

Vidisha	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		93.82%	92.26%	86.66%	77.30%	82.0%	47.36%	100.00%	87.70%	73.29%	49.37%	100.00%	89.54%	100.00%	83.65%	100.00%	41.62%	96.40%	83.46%	96.08%	81.80%
0 to -85 dBm		99.86%	98.58%	99.77%	95.64%	99.07%	80.51%	100.00%	98.44%	91.17%	83.97%	100.00%	98.77%	100.00%	93.83%	100.00%	83.29%	99.97%	94.69%	99.90%	97.87%
0 to -95 dBm		99.97%	99.79%	99.98%	99.80%	100.00%	99.33%	100.00%	99.96%	100.00%	97.70%	100.00%	100.00%	100.00%	100.00%	100.00%	98.86%	100.00%	99.70%	100.00%	99.88%
Voice quality	≥ 95%	99.52%	98.50%	98.85%	98.07%	90.72%	93.48%	98.19%	95.35%	100.00%	98.90%	96.64%	95.06%	100.00%	100.00%	100.00%	98.02%	99.75%	95.57%	98.63%	99.44%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	97.42%	100.00%	100.00%	100.00%	100.00%	100.00%	98.68%	100.00%	100.00%	100.00%	99.72%	100.00%	100.00%	100.00%	99.72%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	2.58%	0.00%	0.00%	0.00%	0.00%	0.00%	1.32%	0.00%	0.00%	0.00%	0.28%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.26%	0.00%	0.00%	0.00%	0.00%	0.00%	1.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	99.05%	100.00%	100.00%	100.00%	96.42%	100.00%	99.24%	100.00%	100.00%	100.00%	97.96%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	97.56%	100.00%

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 in outdoor as well as indoor locations.

10.1.5.6 Drive Test Results - VIDISHA SSA 3G

April	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Reliance 3G	
Vidisha		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		96.24%	77.86%	0.02%	12.50%	100.00%	90.36%	NA	
0 to -85 dBm		100.00%	94.80%	50.87%	35.93%	100.00%	99.27%		
0 to -95 dBm		100.00%	99.89%	99.18%	71.19%	100.00%	100.00%		
Voice quality	≥ 95%	100.00%	99.92%	94.75%	76.19%	99.13%	97.61%		
CSSR	≥ 95%	100.00%	100.00%	100.00%	91.87%	100.00%	99.66%		
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.34%		
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	7.59%	0.00%	0.00%		
Hands off success rate		100.00%	100.00%	NA	97.97%	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 - VIDISHA SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	100	100	100	100
Minimum download speed		57	102	22	172	76	83	59	82	44	129
Average throughput for Packet Data		114	125	21	210	124	125	66	72	186	186
Latency	<250ms	100	100	NA	100	100	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.5.2 Data Drive Test Results - VIDISHA 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		1230	81	1501	1
Average throughput for Packet Data		1407	81	2193	1
Latency	<250ms	100	NA	100	100

All operators met the TRAI benchmark for data drive test.

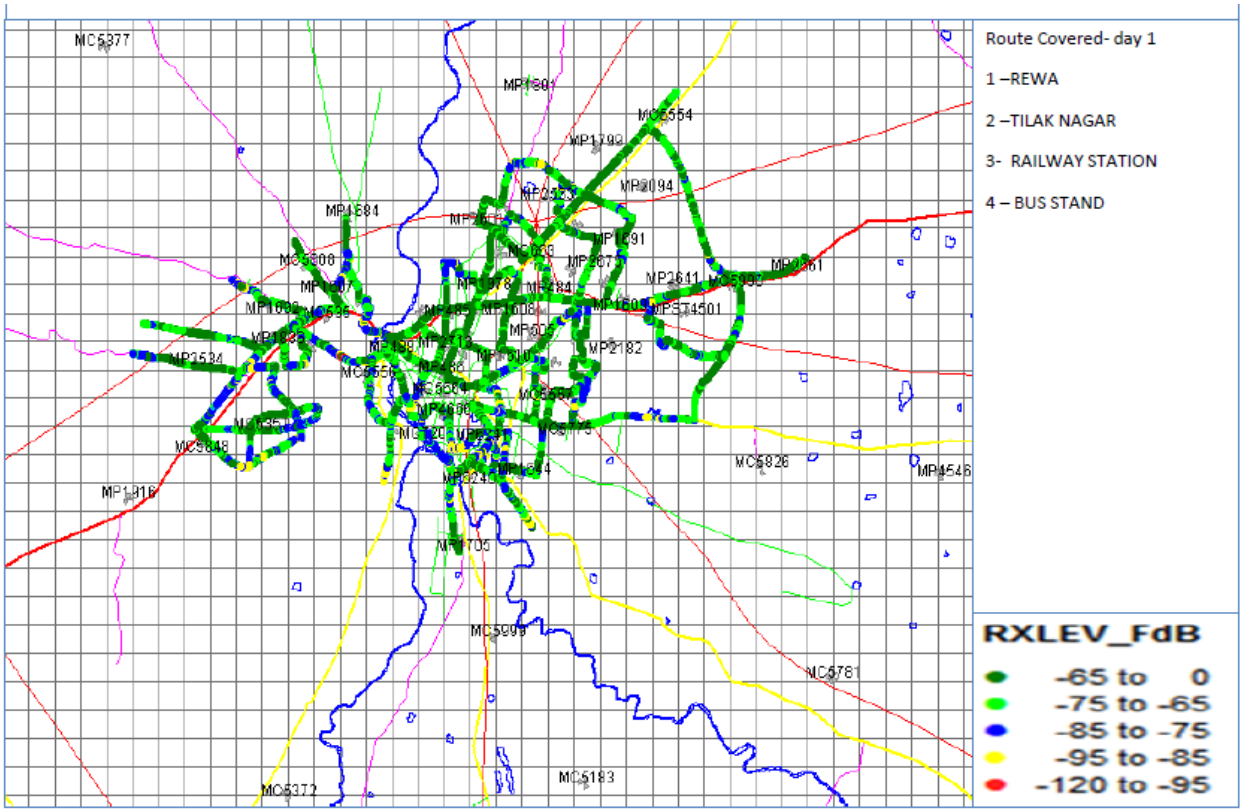
10.1.6 REWA SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
May	Rewa	12-05-2016	14-05-2016	253

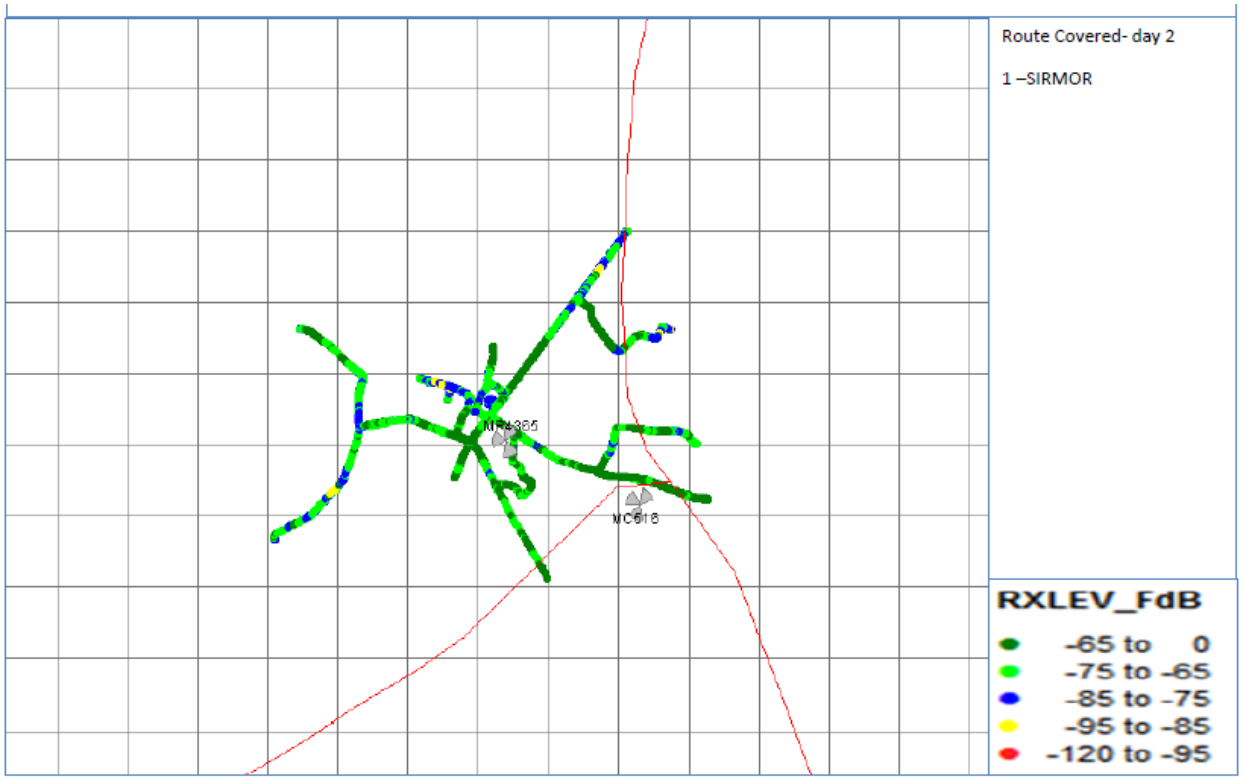
10.1.6.1 Route Details –REWA SSA

Category	Type of location	May		
		Rewa		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1) Satna Road, Maihar Road, Allahabad Road, Shirmaur Road, Bandsagar Road,	1) Rewa Road, Patehra Road, Behkund Road, Bus Stand	1) Rewa Road, Deosar Road, Allahabad Road, Bus Stand, Govt. Hospital
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

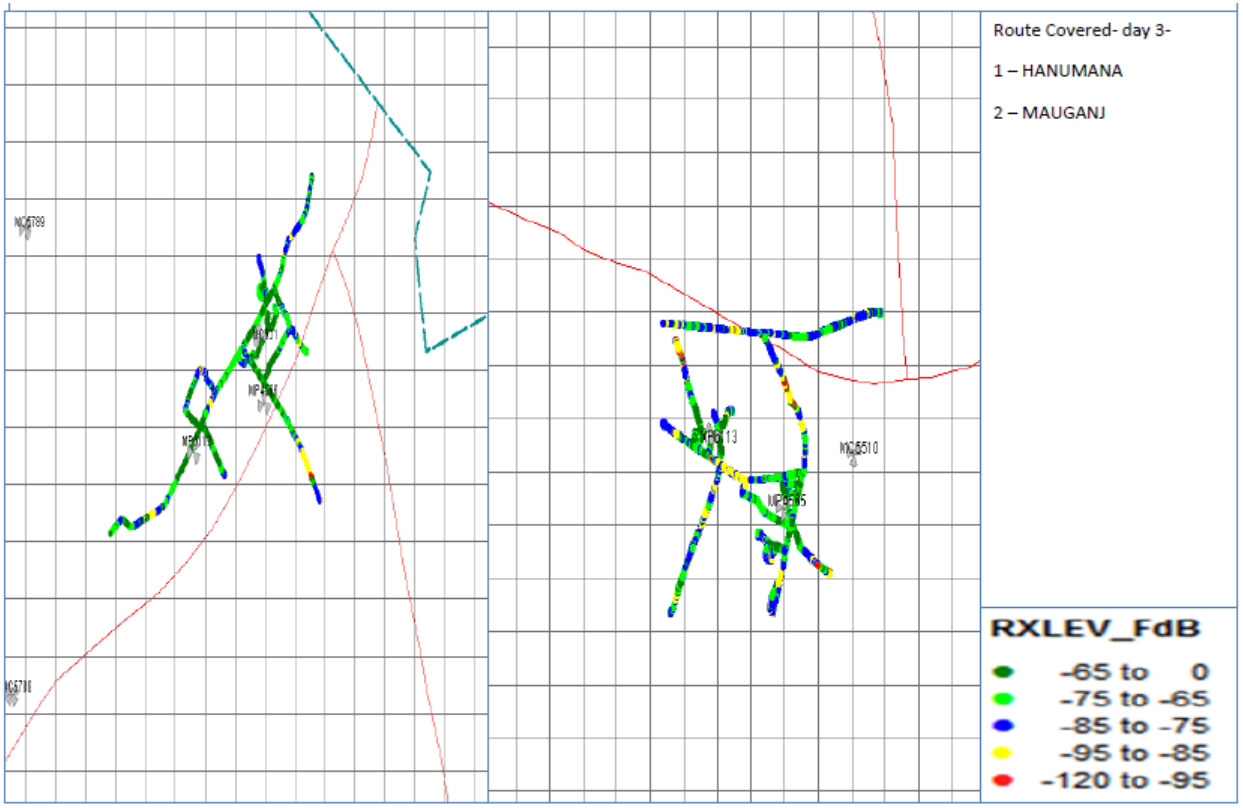
10.1.6.2 Route Map - REWA DAY 1



10.1.6.3 Route Map - REWA DAY 2



10.1.6.4 Route Map - REWA DAY 3



10.1.6.5 Drive Test Results - REWA SSA 2G

Rewa	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		Not present		73.70%	76.78%	21.20%	29.46%	95.44%	69.55%	68.94%	51.11%	100.00%	80.36%	83.02%	46.80%	99.45%	87.51%	94.61%	86.09%	99.91%	81.99%
0 to -85 dBm				99.96%	95.55%	74.65%	84.30%	99.96%	92.00%	99.61%	83.60%	100.00%	97.49%	92.59%	81.55%	99.99%	96.93%	99.90%	94.54%	100.00%	97.09%
0 to -95 dBm				100.00%	99.74%	99.84%	99.55%	99.99%	99.15%	100.00%	99.29%	100.00%	99.94%	96.92%	98.19%	100.00%	99.68%	100.00%	98.81%	100.00%	99.73%
Voice quality	≥ 95%			98.43%	97.45%	99.46%	97.41%	99.64%	95.81%	98.82%	97.08%	99.74%	95.95%	99.85%	98.28%	99.81%	97.92%	99.62%	98.65%	98.71%	99.44%
CSSR	≥ 95%			100.00%	100.00%	100.00%	95.96%	100.00%	99.43%	100.00%	100.00%	100.00%	98.50%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.45%
%age Blocked calls				0.00%	0.00%	0.00%	4.04%	0.00%	0.57%	0.00%	0.00%	0.00%	1.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.26%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	2.20%	0.00%	0.57%	0.00%	0.00%	0.00%	0.00%	0.00%	0.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	95.15%	100.00%	98.29%	100.00%	100.00%	100.00%	97.44%	99.48%	99.85%	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

10.1.6.6 Drive Test Results - REWA SSA 3G

May	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Reliance 3G	
Rewa		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		100.00%	59.17%	11.85%	7.89%	100.00%	83.18%	NA	
0 to -85 dBm		100.00%	83.68%	97.87%	28.62%	100.00%	97.97%		
0 to -95 dBm		100.00%	97.18%	100.00%	95.02%	100.00%	99.91%		
Voice quality	≥ 95%	100.00%	99.08%	99.76%	97.00%	99.97%	97.65%		
CSSR	≥ 95%	100.00%	100.00%	95.65%	97.87%	100.00%	98.23%		
%age Blocked calls		0.00%	0.00%	4.35%	2.55%	0.00%	1.77%		
Call drop rate	≤ 2%	0.00%	0.00%	4.76%	1.32%	0.00%	1.08%		
Hands off success rate		100.00%	100.00%	100.00%	95.59%	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 indoor location

10.1.6.1 Data Drive Test Results - REWA SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	Not present	100	100	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100	100	100	100	100	100	100
Minimum download speed			101	86	146	85	98	74	77	49	125
Average throughput for Packet Data			125	194	178	118	135	74	77	186	189
Latency	<250ms		100	100	100	100	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.6.2 Data Drive Test Results - REWA SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	NDR	100	100
Succesful Data Transmission upload speed attempts	>75%	100	NDR	100	100
Minimum download speed		1326	NDR	3175	2427
Average throughput for Packet Data		1421	NDR	4183	2427
Latency	<250ms	100	NDR	100	100

All operators met the TRAI benchmark for data drive test.

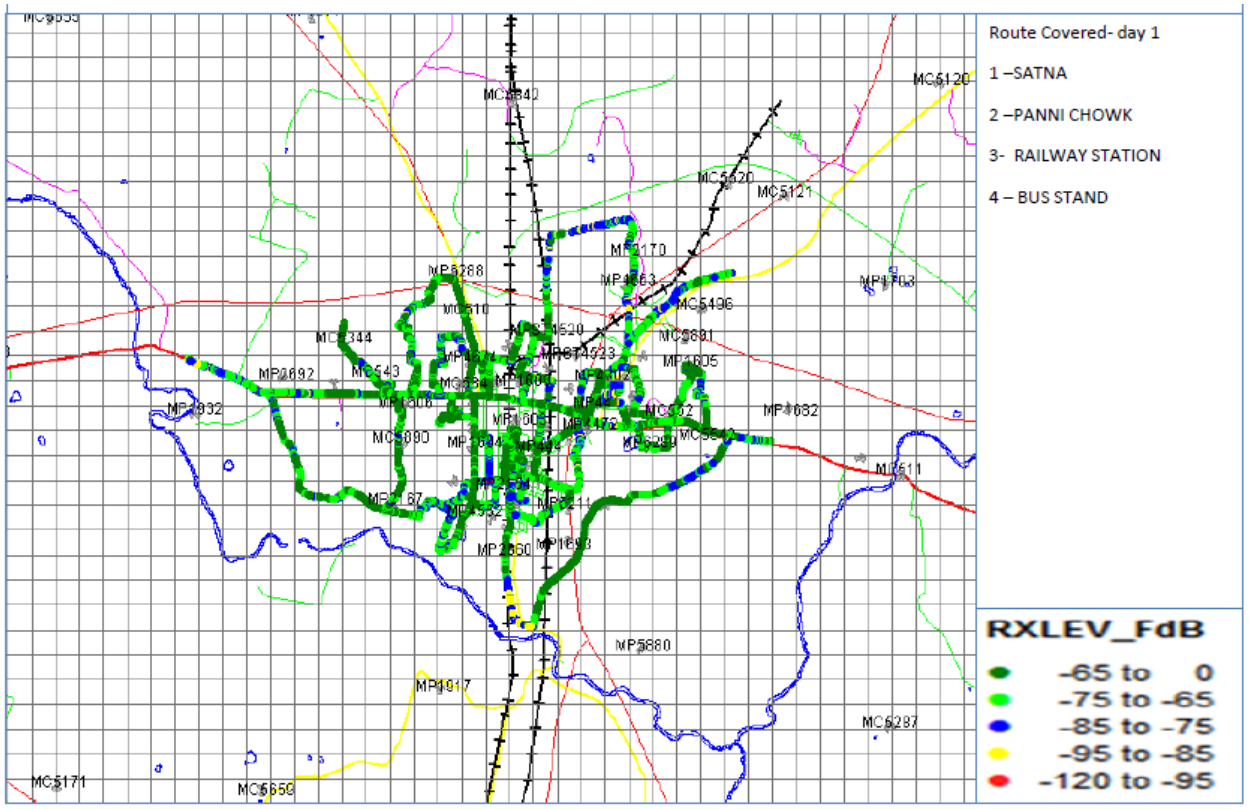
10.1.7 SATNA SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
May	Satna	09-05-2016	11-05-2016	268

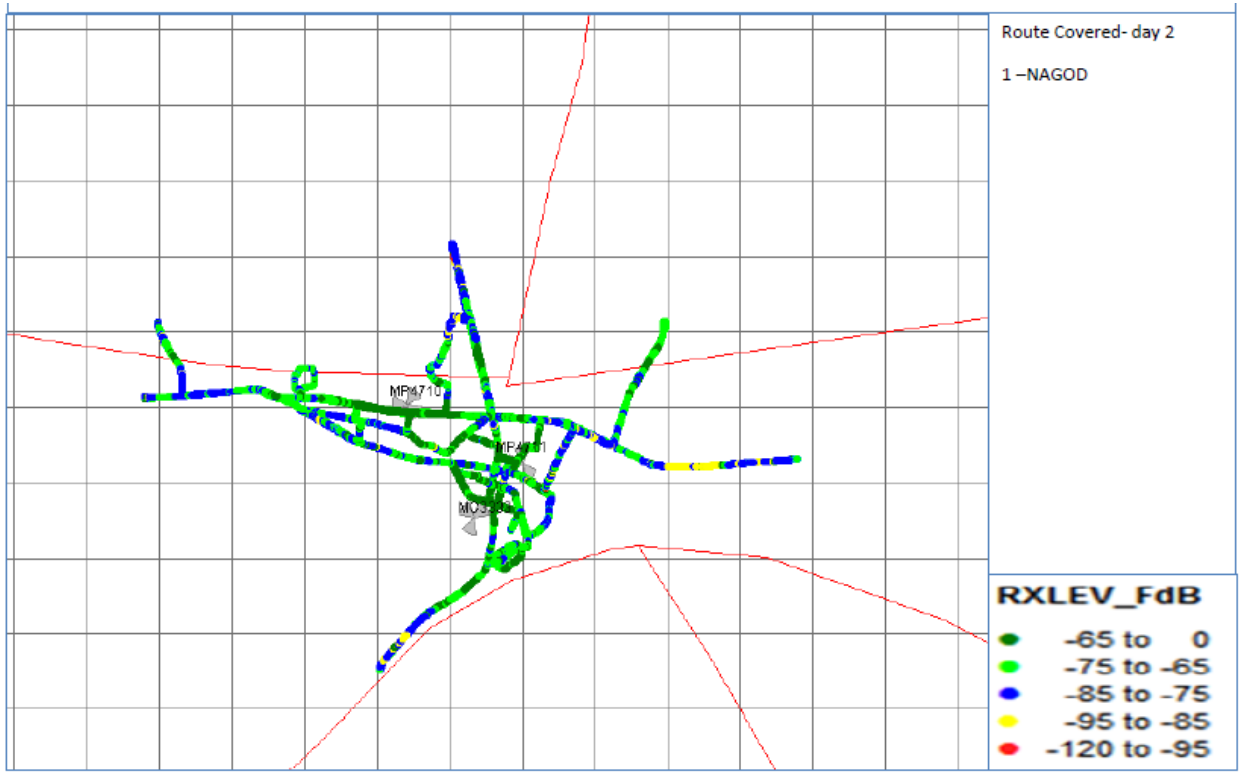
10.1.7.1 Route Details –SATNA SSA

Category	Type of location	May		
		Satna		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1) Rewa Road, Nagod Road ,Bus Stand,Maihar Road, Police Station ,	1) Satna Road, Panna Road, Bus Stand	1) Railway Station, Rewa road, Katni Road, Satna Road, Bus Stand, Sharda
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

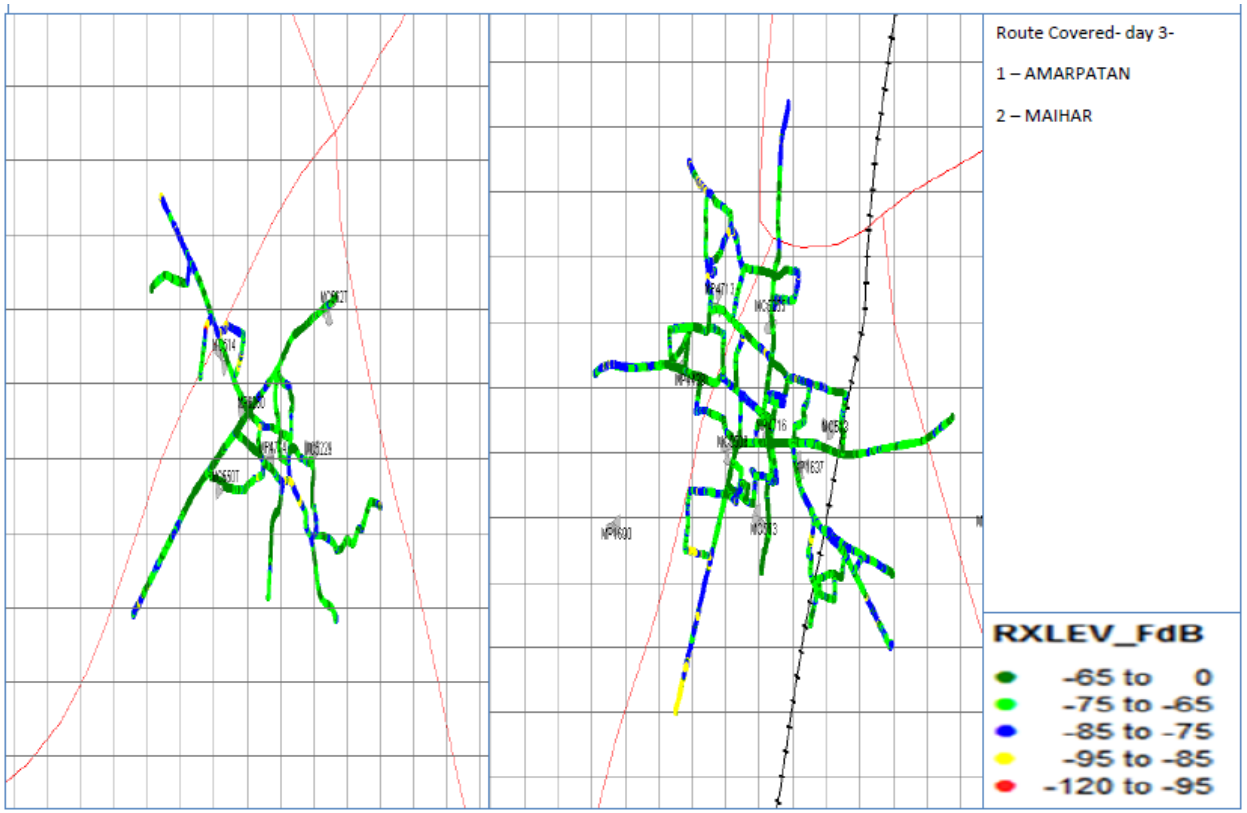
10.1.7.2 Route Map - SATNA DAY 1



10.1.7.3 Route Map - SATNA DAY 2



10.1.7.4 Route Map - SATNA DAY 3



10.1.7.5 Drive Test Results - SATNA SSA 2G

Satna	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.08%	88.34%	90.56%	79.17%	41.94%	34.14%	93.02%	76.42%	98.85%	69.76%	99.43%	82.10%	97.39%	20.56%	95.37%	86.40%	97.52%	91.04%	99.95%	73.64%
0 to -85 dBm		100.00%	96.79%	100.00%	97.45%	95.04%	89.10%	99.91%	97.05%	100.00%	94.04%	100.00%	97.93%	100.00%	48.42%	99.72%	96.61%	99.93%	97.89%	100.00%	91.64%
0 to -95 dBm		100.00%	99.68%	100.00%	99.84%	95.59%	99.51%	99.99%	99.82%	100.00%	99.91%	100.00%	100.00%	100.00%	84.97%	100.00%	99.76%	100.00%	99.83%	100.00%	96.70%
Voice quality	≥ 95%	99.42%	98.07%	98.87%	97.84%	93.21%	95.54%	98.67%	96.80%	98.65%	96.68%	99.37%	97.05%	99.85%	98.28%	99.02%	97.37%	99.38%	98.34%	98.45%	99.44%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	97.30%	96.01%	100.00%	99.47%	100.00%	100.00%	98.36%	99.72%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.02%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	2.70%	3.99%	0.00%	0.53%	0.00%	0.00%	1.64%	0.28%	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.00%	0.74%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	1.31%	0.00%	0.27%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	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%	97.82%	100.00%	98.49%	100.00%	100.00%	100.00%	98.22%	100.00%	100.00%	100.00%	99.76%	100.00%	100.00%	100.00%	99.51%

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

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

10.1.7.6 Drive Test Results - SATNA SSA 3G

May	B'mark	Airtel 3G		BSNL 3G		Idea 3G		Reliance 3G	
Satna		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.79%	59.77%	NA		92.86%	79.50%	NA	
0 to -85 dBm		100.00%	87.12%			99.98%	96.55%		
0 to -95 dBm		100.00%	98.57%			100.00%	99.91%		
Voice quality	≥ 95%	99.99%	98.85%			98.85%	98.14%		
CSSR	≥ 95%	100.00%	100.00%			100.00%	98.88%		
%age Blocked calls		0.00%	0.00%			0.00%	1.12%		
Call drop rate	≤ 2%	0.00%	0.00%			0.00%	0.28%		
Hands off success rate		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)

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 - SATNA SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	100	100	100	100
Minimum download speed		57	102	86	143	72	99	79	110	50	91
Average throughput for Packet Data		124	125	194	183	110	121	79	110	186	164
Latency	<250ms	100	100	97	100	100	100	100	100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.7.2 Data Drive Test Results - SATNA 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		1334		3050	2074
Average throughput for Packet Data		1406		3832	2073
Latency	<250ms	100		100	100

All operators met the TRAI benchmark for data drive test.

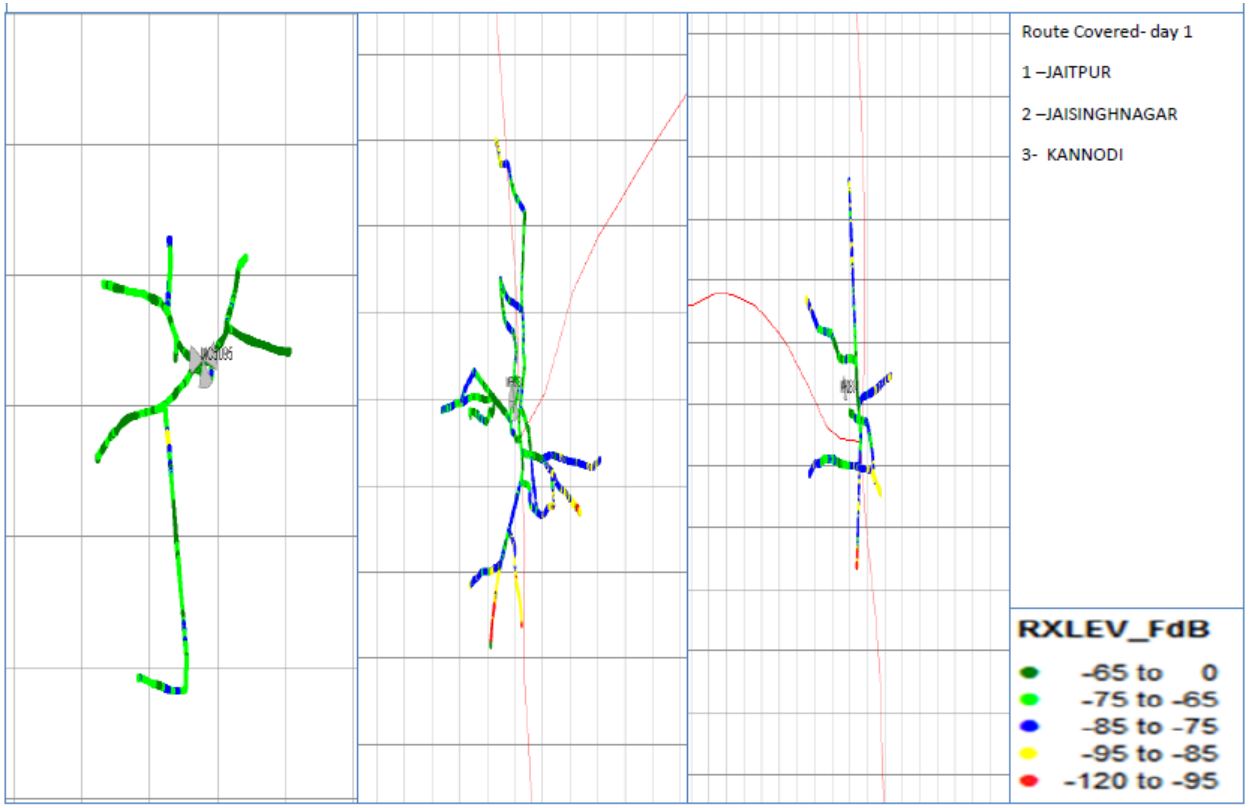
10.1.8 SHADHOL SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
May	Shadhol	16-5-2016	18-5-2016	262

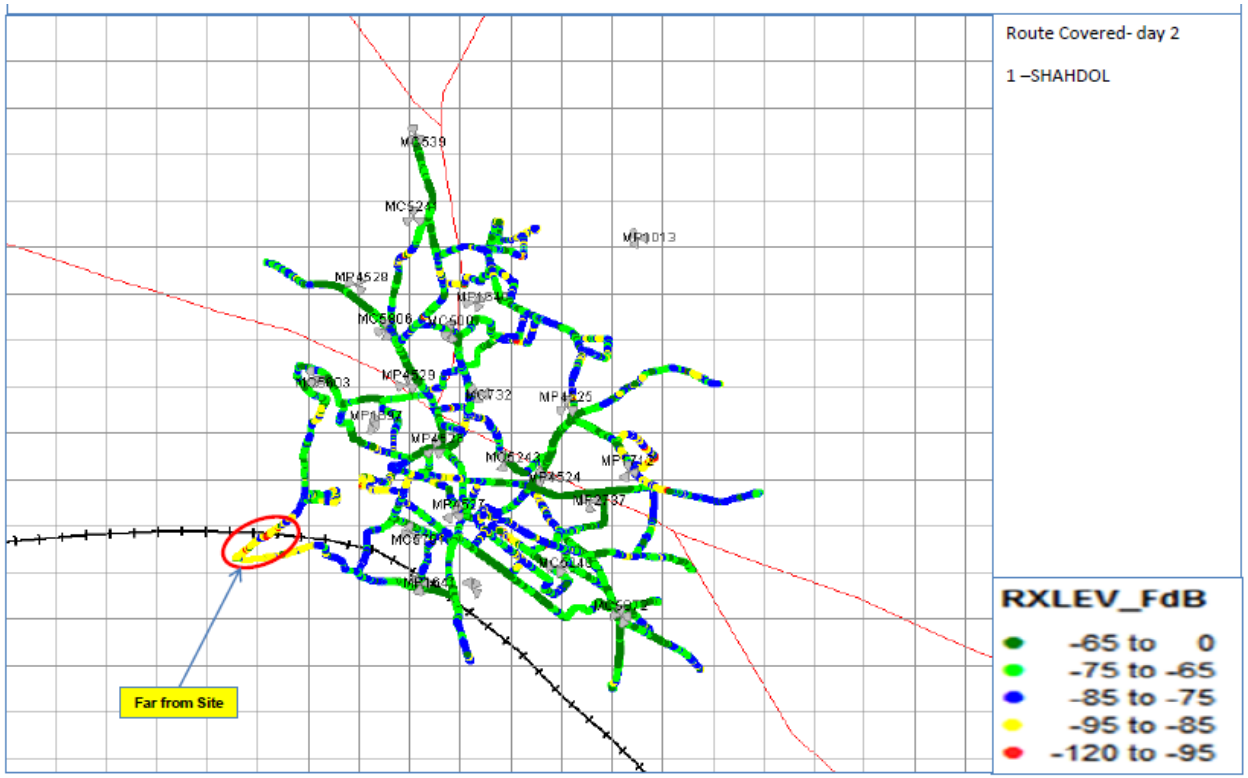
10.1.8.1 Route Details –SHADHOL SSA

Category	Type of location	May		
		Shadhol		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1) Rewa Road, Shadhol Road ,Bus Stand,Amjhor Road, Police	1) Rewa Road, Jabalpur Road, Kotma Road, Police station, Bus Stand,	1) Burhar Road, Anupur Road, Manendargarh Road , Bus stand, Police Station, Railway
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

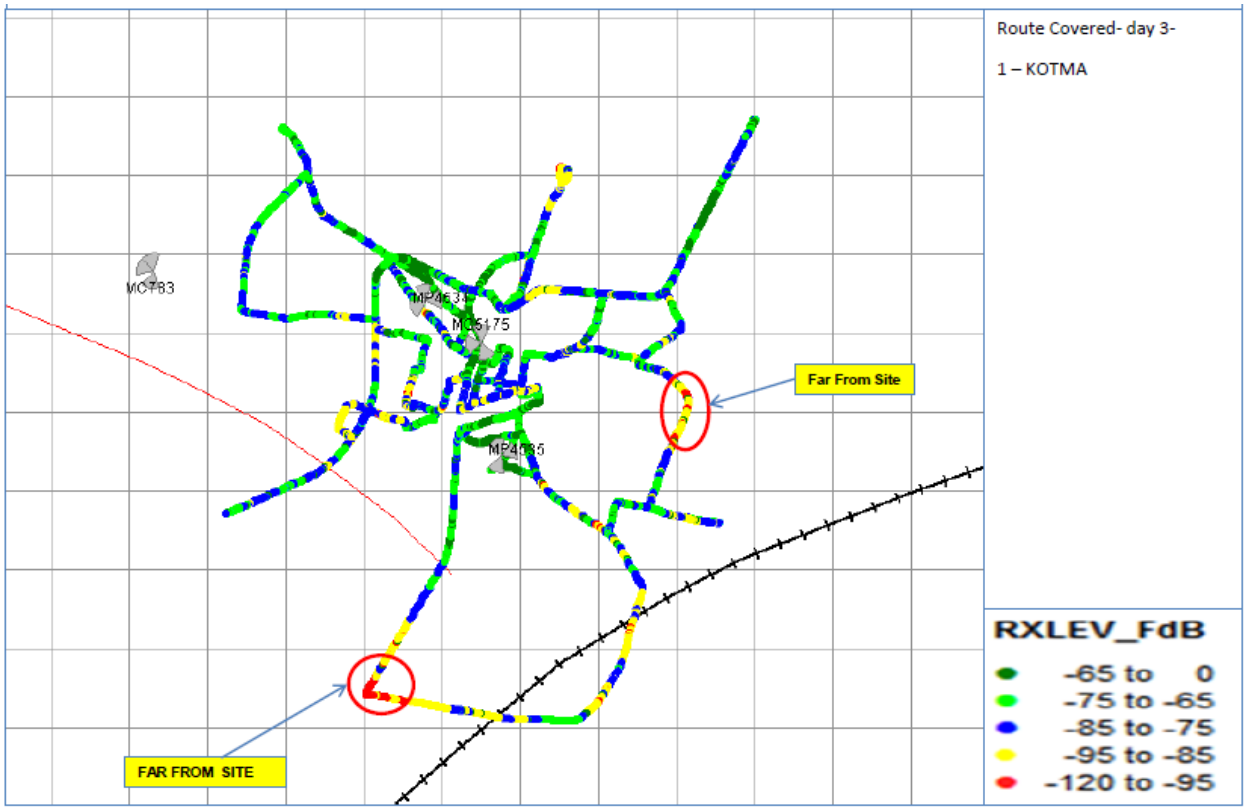
10.1.8.2 Route Map - SHADHOL DAY 1



10.1.8.3 Route Map - SHADHOL DAY 2



10.1.8.4 Route Map - SHADHOL DAY 3



10.1.8.5 Drive Test Results - SHADHOL SSA 2G

Shadhol	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.95%	89.50%	78.92%	61.37%	41.94%	34.14%	65.16%	83.81%	41.59%	60.54%	100.00%	67.54%	0.02%	38.96%	97.52%	84.92%	95.15%	83.79%	90.11%	68.09%
0 to -85 dBm		100.00%	96.98%	97.76%	90.98%	95.04%	89.10%	96.15%	95.63%	93.31%	92.37%	100.00%	93.88%	62.58%	76.48%	99.93%	96.49%	99.99%	94.01%	99.90%	93.30%
0 to -95 dBm		100.00%	99.75%	100.00%	99.31%	95.59%	99.51%	99.98%	99.68%	100.00%	99.78%	100.00%	99.90%	99.87%	99.31%	100.00%	99.82%	100.00%	99.25%	100.00%	99.79%
Voice quality	≥ 95%	99.53%	99.00%	98.87%	98.25%	95.16%	95.54%	98.56%	95.71%	98.16%	97.99%	100.00%	98.20%	99.85%	98.28%	99.92%	97.97%	99.95%	98.13%	99.53%	99.44%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	98.46%	97.38%	100.00%	99.45%	100.00%	100.00%	100.00%	99.76%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.94%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	1.54%	2.62%	0.00%	0.55%	0.00%	0.00%	0.00%	0.24%	0.00%	0.00%	0.00%	0.00%	0.00%	0.32%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	1.56%	1.08%	0.00%	0.56%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	99.82%	100.00%	97.03%	100.00%	98.93%	100.00%	100.00%	100.00%	99.77%	100.00%	99.94%	100.00%	99.45%	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

10.1.8.6 Drive Test Results - SHADHOL SSA 3G

May	B'mark	Airtel		BSNL		Idea		Reliance 3G	
Shadhol		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		56.49%	43.55%	65.22%	26.99%	99.29%	68.36%	NA	
0 to -85 dBm		99.93%	74.25%	87.14%	61.04%	100.00%	92.42%		
0 to -95 dBm		100.00%	96.91%	100.00%	95.93%	100.00%	99.73%		
Voice quality	≥ 95%	100.00%	98.92%	94.79%	95.04%	99.94%	96.93%		
CSSR	≥ 95%	100.00%	99.69%	100.00%	97.38%	100.00%	99.36%		
%age Blocked calls		0.00%	0.31%	1.54%	2.62%	0.00%	0.64%		
Call drop rate	≤ 2%	0.00%	0.00%	1.56%	1.08%	0.00%	0.32%		
Hands off success rate		100.00%	100.00%	100.00%	97.03%	100.00%	100.00%		

Voice Quality

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

10.1.8.1 Data Drive Test Results - SHADHOL SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	91	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	95	100	100	100	100	100	100	100
Minimum download speed		71	102	96	132	94	116	79	77	44	61
Average throughput for Packet Data		138	125	198	162	119	136	79	77	186	174
Latency	<250ms	100	100	94	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 - SHADHOL SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	NDR	100	100
Succesful Data Transmission upload speed attempts	>75%	100	NDR	100	100
Minimum download speed		1183	NDR	1908	3914
Average throughput for Packet Data		1378	NDR	2695	3914
Latency	<250ms	100	NDR	100	100

All operators met the TRAI benchmark for data drive test.

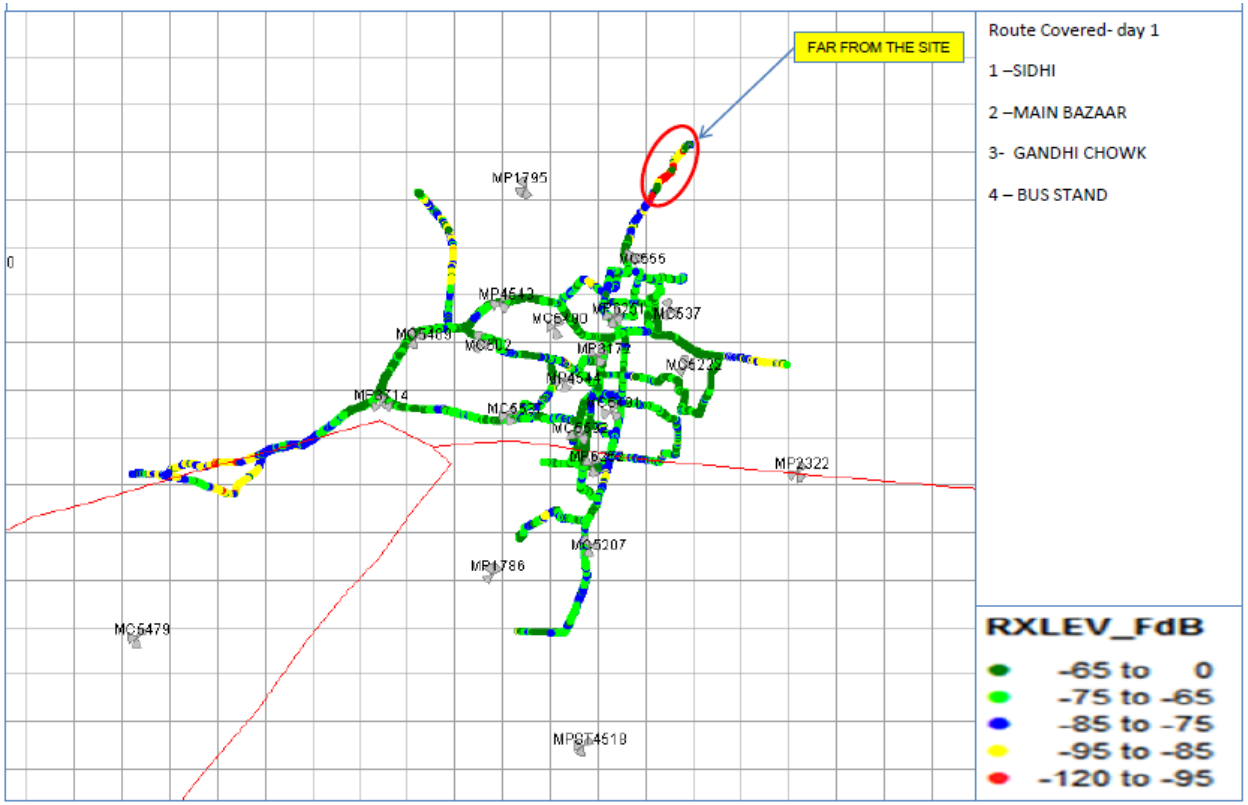
10.1.9 SIDHI SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
May	Sidhi	03-05-2016	05-05-2016	254

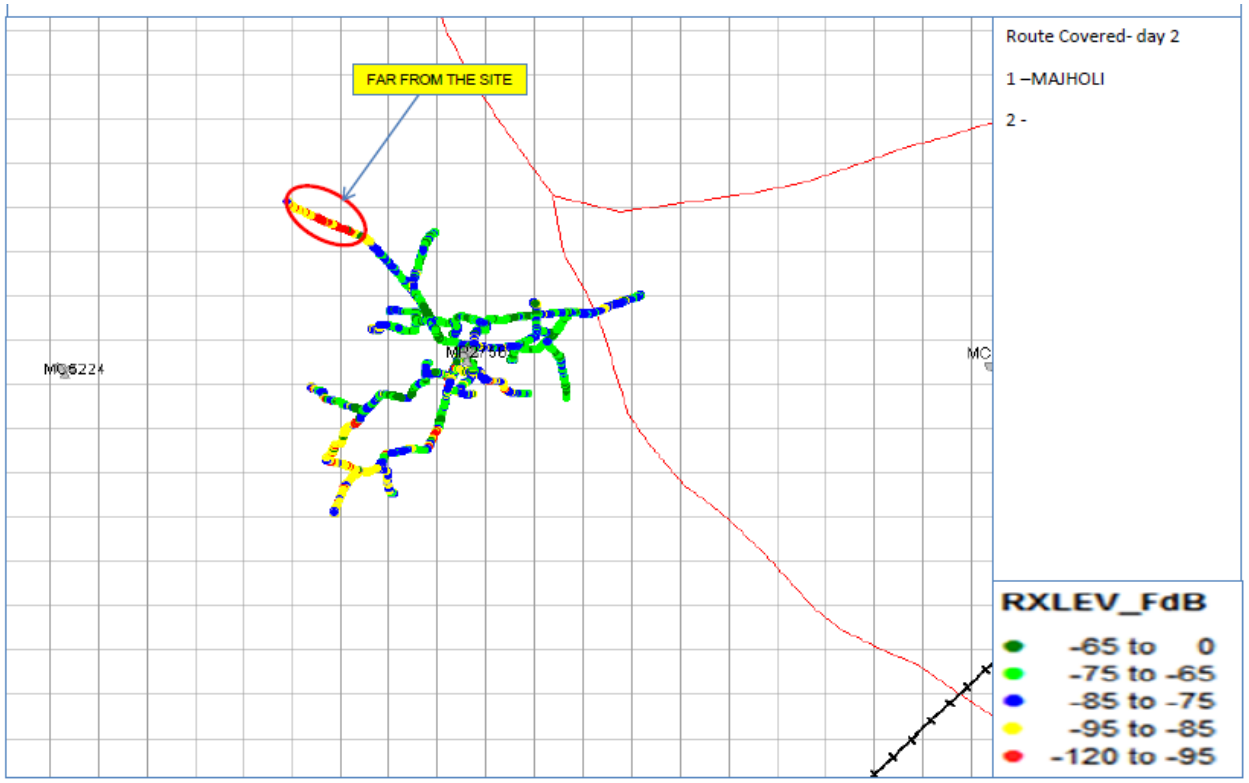
10.1.9.1 Route Details –SIDHI SSA

Category	Type of location	May		
		Sidhi		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1) Patpara Road, Churhat Road,Bus Stand, Railway Station , Rampur Road, Police Station, Khajuri	1) Kotma Road, Bhaiswahi Road, Bus Stand	1) Anpara Road, Bargawa Road, Bus stand, Railway Station, Gayatri Mandir
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

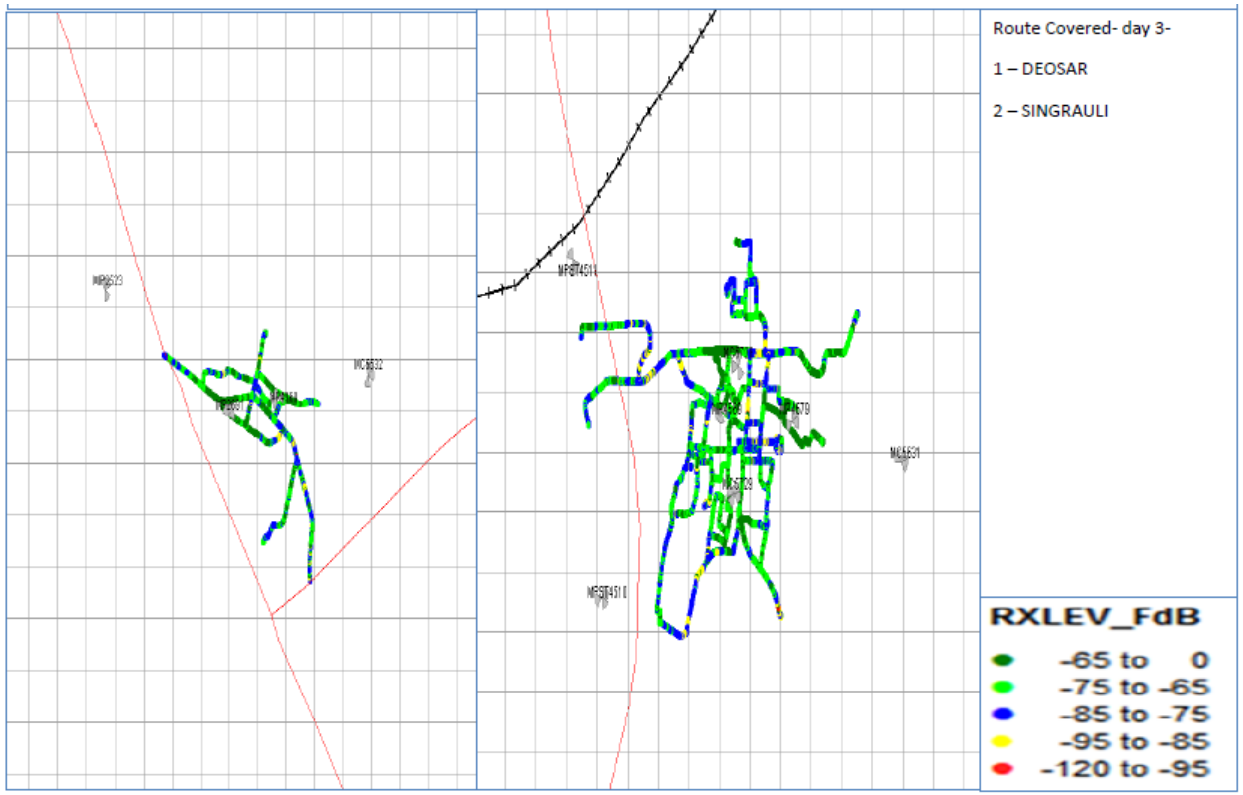
10.1.9.2 Route Map - SIDHI DAY 1



10.1.9.3 Route Map - SIDHI DAY 2



10.1.9.4 Route Map - SIDHI DAY 3



10.1.9.5 Drive Test Results - SIDHI SSA 2G

Sidhi	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		94.05%	88.41%	94.89%	68.52%	99.05%	46.93%	65.18%	59.35%	100.00%	54.96%	98.40%	75.18%	NA		96.03%	89.42%	94.02%	81.14%	73.36%	71.91%
0 to -85 dBm		99.95%	96.49%	99.92%	91.76%	100.00%	80.99%	94.85%	86.50%	100.00%	88.53%	100.00%	96.15%			99.95%	97.80%	99.90%	92.30%	95.37%	95.13%
0 to -95 dBm		100.00%	99.69%	100.00%	98.98%	100.00%	96.22%	99.83%	98.83%	100.00%	99.40%	100.00%	99.95%			100.00%	99.88%	100.00%	98.79%	99.74%	99.63%
Voice quality	≥ 95%	99.29%	97.28%	98.17%	97.65%	98.92%	95.86%	99.02%	96.82%	99.75%	98.39%	99.33%	98.44%			99.58%	99.29%	99.18%	98.48%	99.51%	99.44%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	96.11%	98.33%	98.97%	100.00%	100.00%	100.00%	99.73%			100.00%	100.00%	100.00%	100.00%	100.00%	98.98%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	3.06%	1.67%	1.03%	0.00%	0.00%	0.00%	0.27%			0.00%	0.00%	0.00%	0.32%	0.00%	1.02%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	2.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%			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%	93.88%	100.00%	98.81%	100.00%	100.00%	100.00%	98.81%			100.00%	100.00%	100.00%	100.00%	100.00%	98.31%

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

BSNL 3G failed to meet the benchmark in outdoor locations

10.1.9.6 Drive Test Results - SIDHI SSA 3G

May	B'mark	Airtel		BSNL		Idea		Reliance 3G	
Sidhi		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		95.21%	65.40%	8.66%	3.22%	99.70%	88.46%	NA	
0 to -85 dBm		100.00%	90.23%	73.46%	23.33%	100.00%	97.59%		
0 to -95 dBm		100.00%	98.12%	99.88%	65.64%	100.00%	99.87%		
Voice quality	≥ 95%	100.00%	99.79%	99.61%	95.60%	99.95%	96.25%		
CSSR	≥ 95%	100.00%	100.00%	100.00%	95.00%	100.00%	99.08%		
%age Blocked calls		0.00%	0.00%	0.00%	5.83%	0.00%	0.92%		
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	2.65%	0.00%	1.39%		
Hands off success rate		100.00%	100.00%	100.00%	93.59%	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

10.1.9.1 Data Drive Test Results - SIDHI SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	97	100	100	100	NA	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	97	100	100	100		100	100	100
Minimum download speed		57	101325	86	120	88	109		86	68	113
Average throughput for Packet Data		118	125	194	158	119	143		86	138	181
Latency	<250ms	100	100	97	100	100	100		100	100	100

All operators met the TRAI benchmark for data drive test.

10.1.9.2 Data Drive Test Results - SIDHI SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Succesful Data Transmission download speed attempts	>80%	100	NDR	100	NA
Succesful Data Transmission upload speed attempts	>75%	100	NDR	100	
Minimum download speed		1186	NDR	4054	
Average throughput for Packet Data		1423	NDR	5445	
Latency	<250ms	100	NDR	100	

All operators met the TRAI benchmark for data drive test.

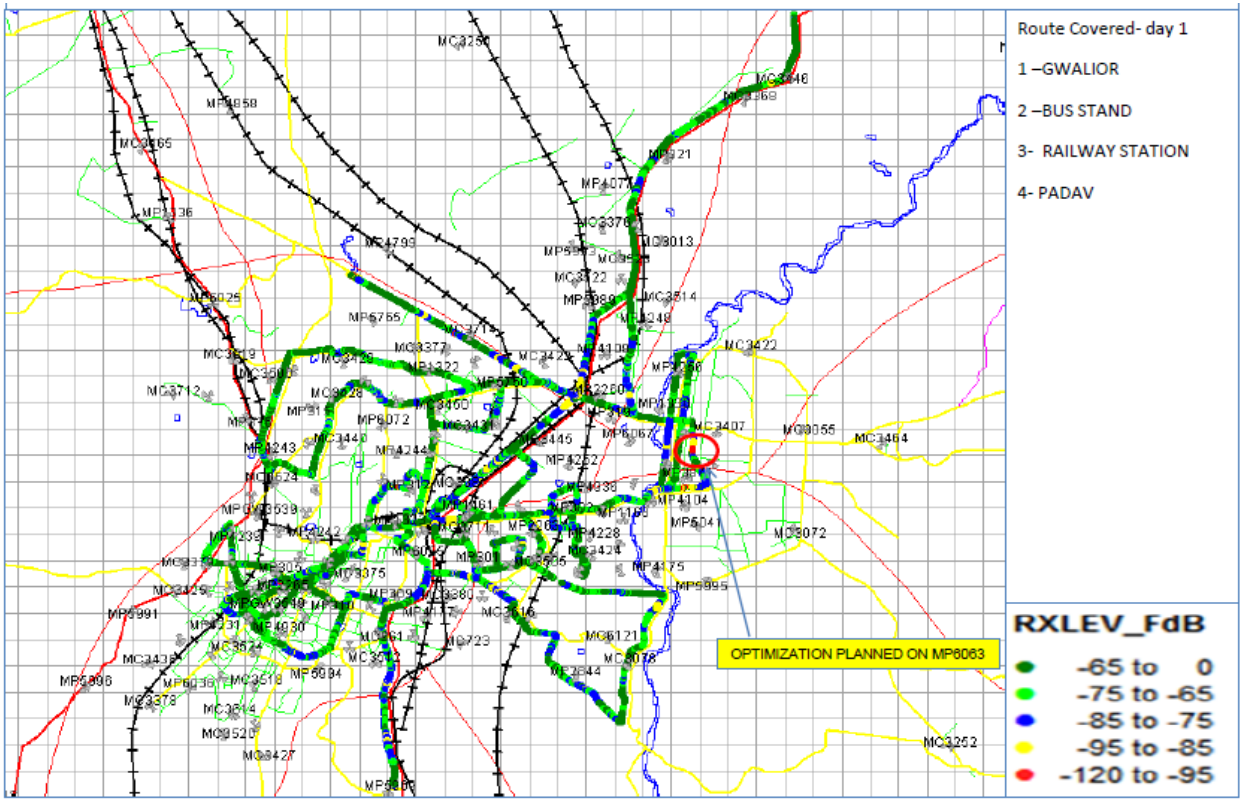
10.1.10GWALIOR SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
June	Gwalior	06-06-2016	08-06-2016	262

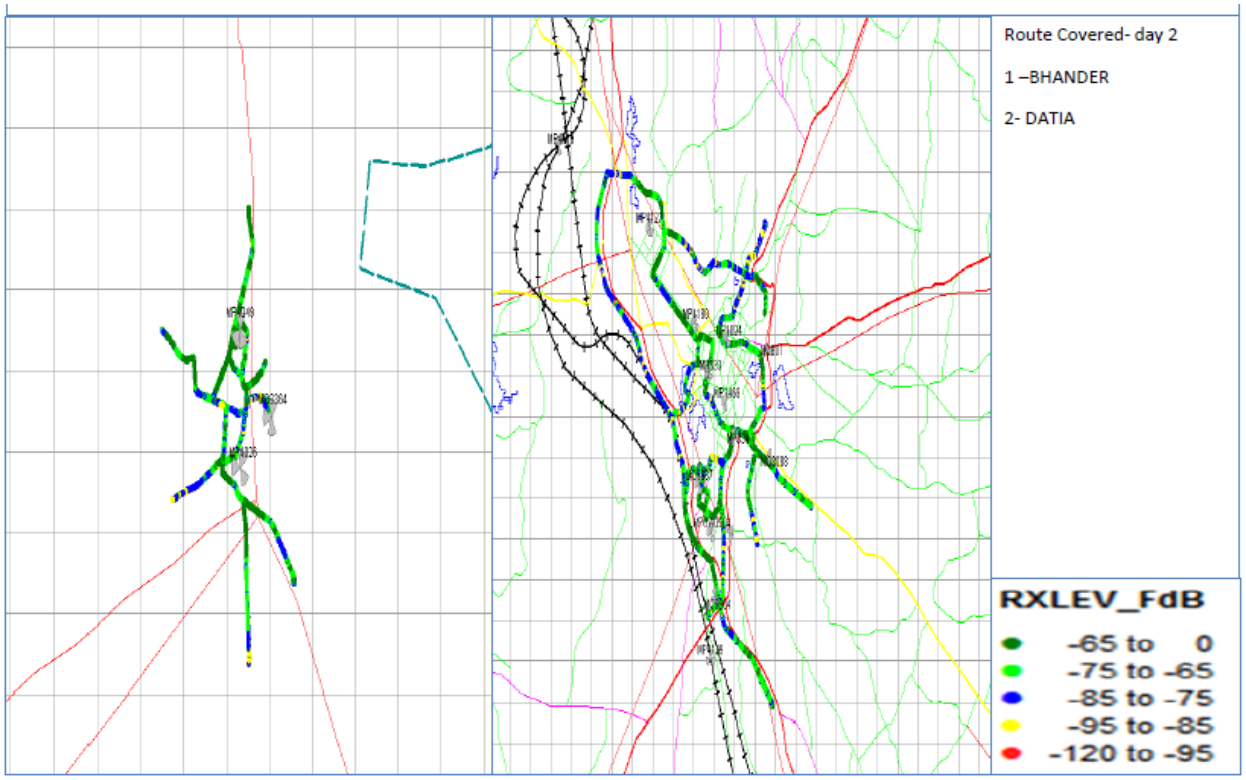
10.1.10.1 Route Details – GWALIOR SSA

Category	Type of location	June		
		Gwalior		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Railway Station, Bus Stand, Bhind Road, Morena Road, Jhansi Road, Shivpuri Road, Bada Market, Thatipur, City Center, Chetakpuri	1) Bus Stand, Datia Road, Sikandarpur 2) Jhansi Road, Gwalior Raod, Bhander Road, Bada Bazaar, Chota Bazaar,Pitambra mandir, Bus Stand	Jhansi Road, Gwalior Road, Main Market, Bus stand, Railway Station, Bhitarwar Road
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

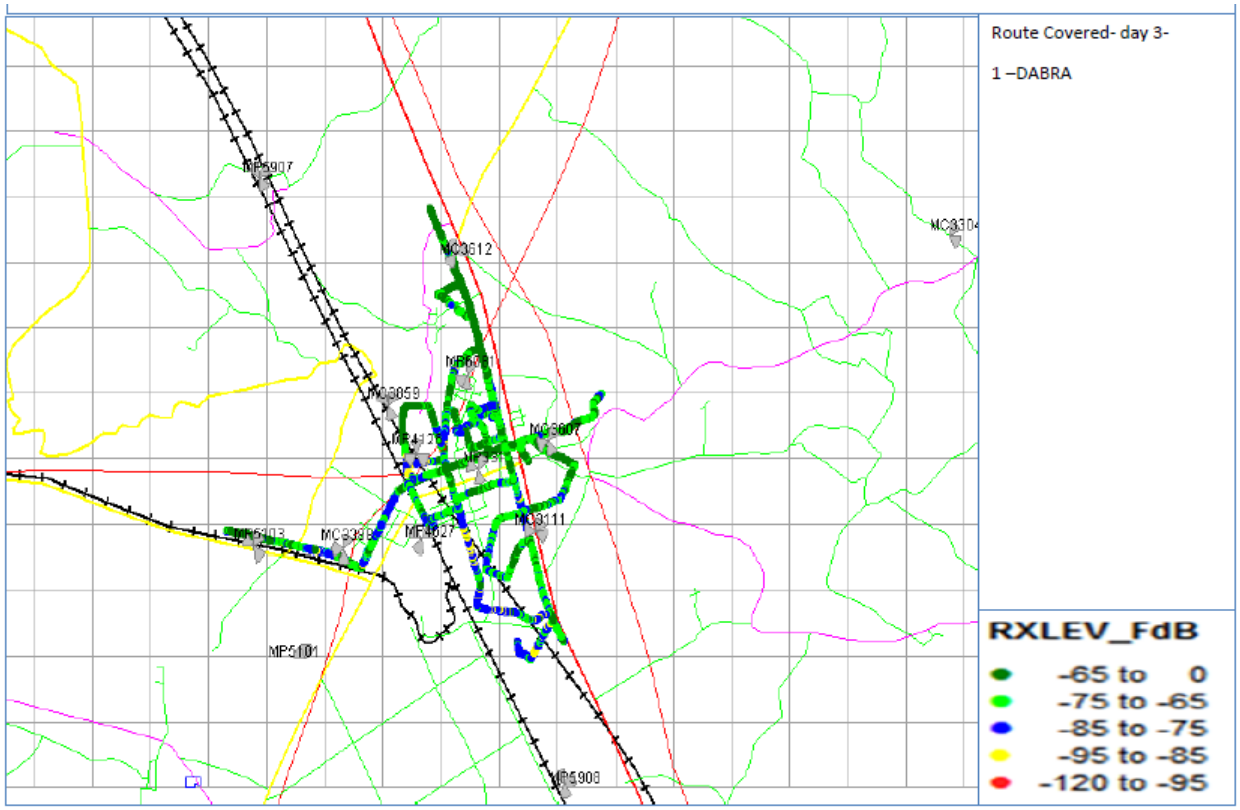
10.1.10.2 Route Map - GWALIOR DAY 1



10.1.10.3 Route Map - GWALIOR DAY 2



10.1.10.4 Route Map - GWALIOR DAY 3



10.1.10.5 Drive Test Results – GWALIOR SSA 2G

Gwalior	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		Not present		90.25%	73.55%	97.93%	82.35%	99.33%	84.28%	Service Closed		57.97%	85.45%	99.81%	85.56%	86.66%	79.80%	Service Closed		99.83%	97.21%
0 to -85 dBm				98.29%	94.48%	99.95%	97.81%	100.00%	96.98%			99.89%	97.15%	99.99%	97.63%	98.25%	96.18%			99.99%	99.69%
0 to -95 dBm				99.90%	99.27%	100.00%	99.98%	100.00%	99.66%			100.00%	99.99%	100.00%	99.89%	99.98%	99.62%			100.00%	99.96%
Voice quality	≥ 95%			99.51%	97.71%	99.05%	94.79%	98.38%	96.78%			95.55%	95.38%	95.62%	96.00%	99.58%	96.80%			98.67%	97.90%
CSSR	≥ 95%			100.00%	100.00%	100.00%	91.60%	100.00%	98.72%			100.00%	98.70%	100.00%	100.00%	100.00%	100.00%			100.00%	99.78%
%age Blocked calls				0.00%	0.00%	0.00%	8.40%	0.00%	1.28%			0.00%	1.30%	0.00%	0.00%	0.00%	0.23%			0.00%	0.22%
Call drop rate	≤ 2%			0.00%	0.00%	1.64%	0.96%	0.00%	0.64%			0.00%	0.22%	0.00%	0.00%	0.00%	0.00%			0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	98.01%	100.00%	98.75%			100.00%	97.35%	100.00%	100.00%	100.00%	98.83%			100.00%	100.00%

Voice Quality

All the operators met the benchmark except 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 except BSNL in outdoor location

Call Drop Rate

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

10.1.10.6 Drive Test Results - GWALIOR SSA 3G

June	B'mark	Airtel		BSNL		Idea		Reliance 3G	
Gwalior		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		96.94%	64.54%	NA		99.14%	90.03%	NA	
0 to -85 dBm		100.00%	90.18%			100.00%	98.35%		
0 to -95 dBm		100.00%	99.19%			100.00%	100.00%		
Voice quality	≥ 95%	100.00%	99.41%			99.60%	96.28%		
CSSR	≥ 95%	100.00%	100.00%			100.00%	99.36%		
%age Blocked calls		0.00%	0.00%			0.00%	0.64%		
Call drop rate	≤ 2%	0.00%	0.00%			0.00%	0.64%		
Hands off success rate		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 - GWALIOR SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	Not present	100	100	100	Service Closed	100	100	100	Service Closed	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100		100	100	100		100
Minimum download speed			102	24	77		64	74	85		132
Average throughput for Packet Data			125	22	116		118	74	85		182
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 - GWALIOR 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		1299		3452	2339
Average throughput for Packet Data		1341		4016	2339
Latency	<250ms	100		100	100

All operators met the TRAI benchmark for data drive test.

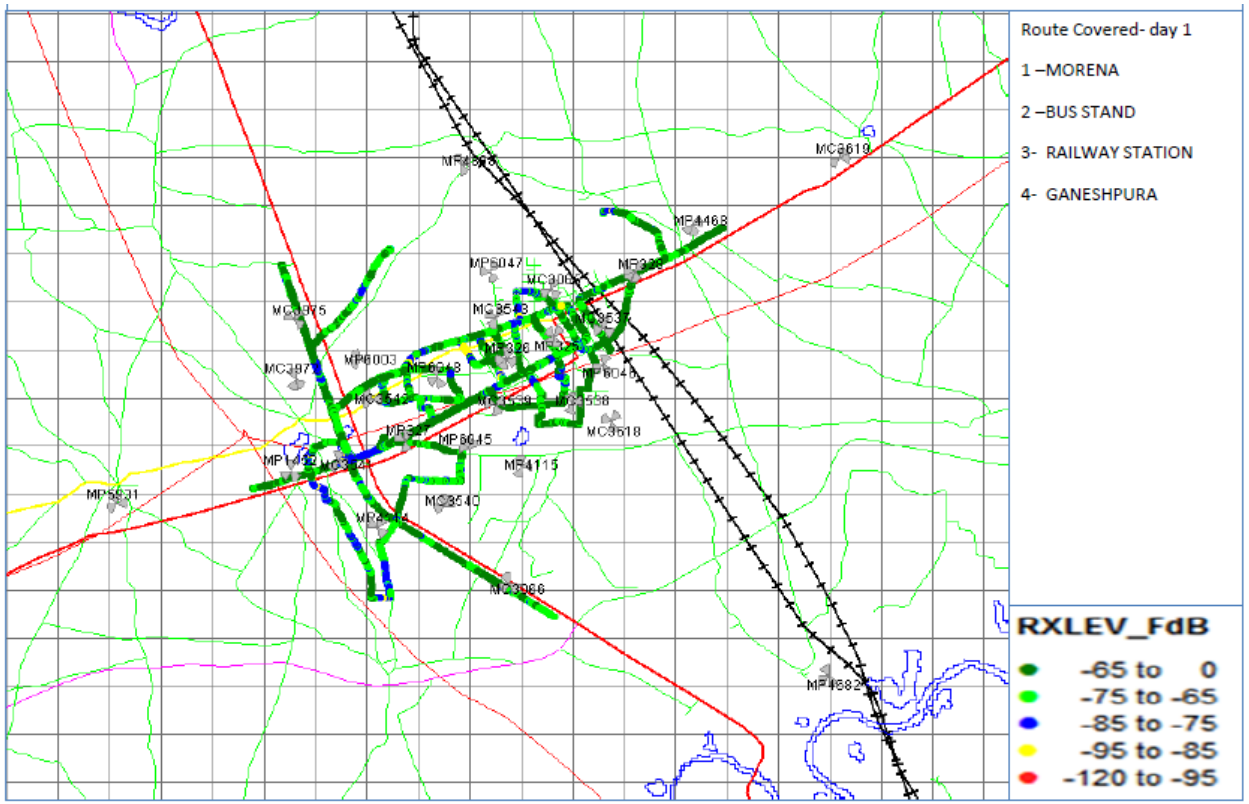
10.1.11MORENA SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
June	Morena	09-06-2016	11-06-2016	267

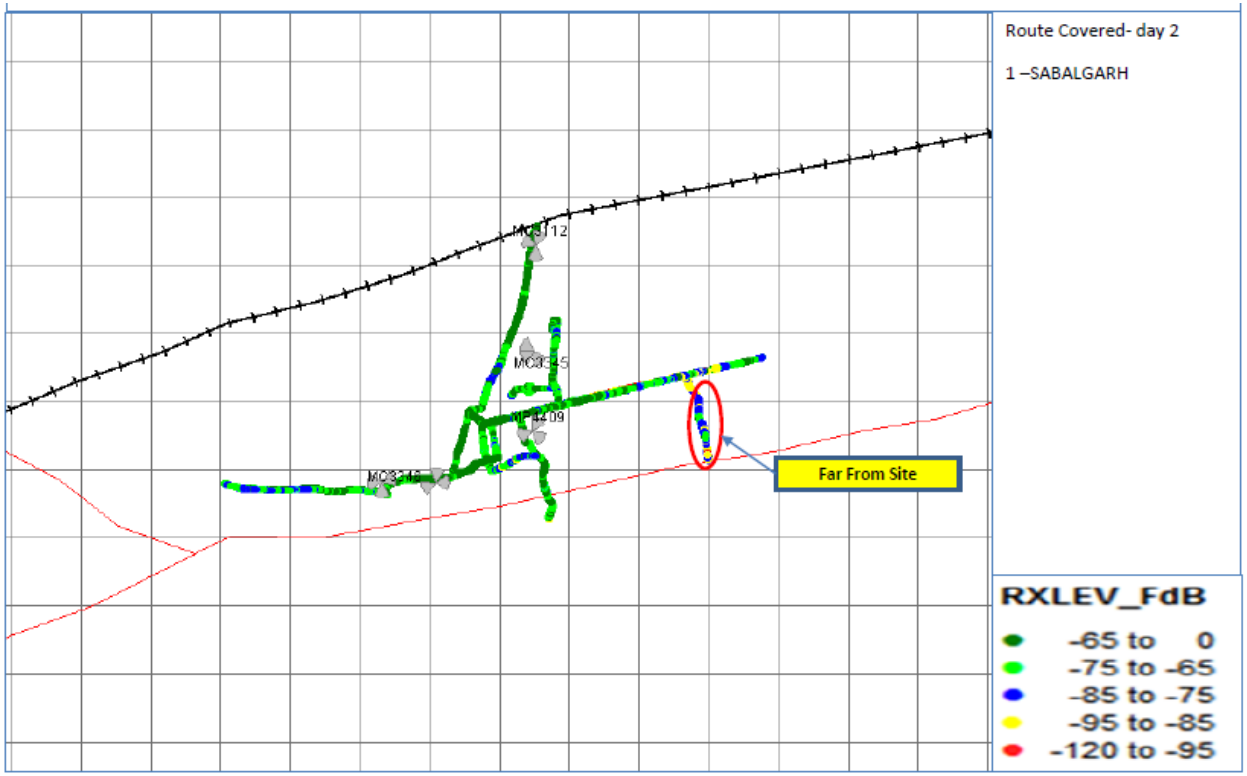
10.1.11.1 Route Details – MORENA SSA

Category	Type of location	June		
		Morena		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Bus Stand, Railway Station, Gwalior Road, Agra Road, Ambah road, Joura road, Juvaji ganj, Keshav Colony	Mian Market, Bus Stand, Police Station, Morena Road	Bus Stand, Itawa road, Gwalior Road, Ater Road, Gol Bazaar, Manpura Road, Shanti Nagar
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

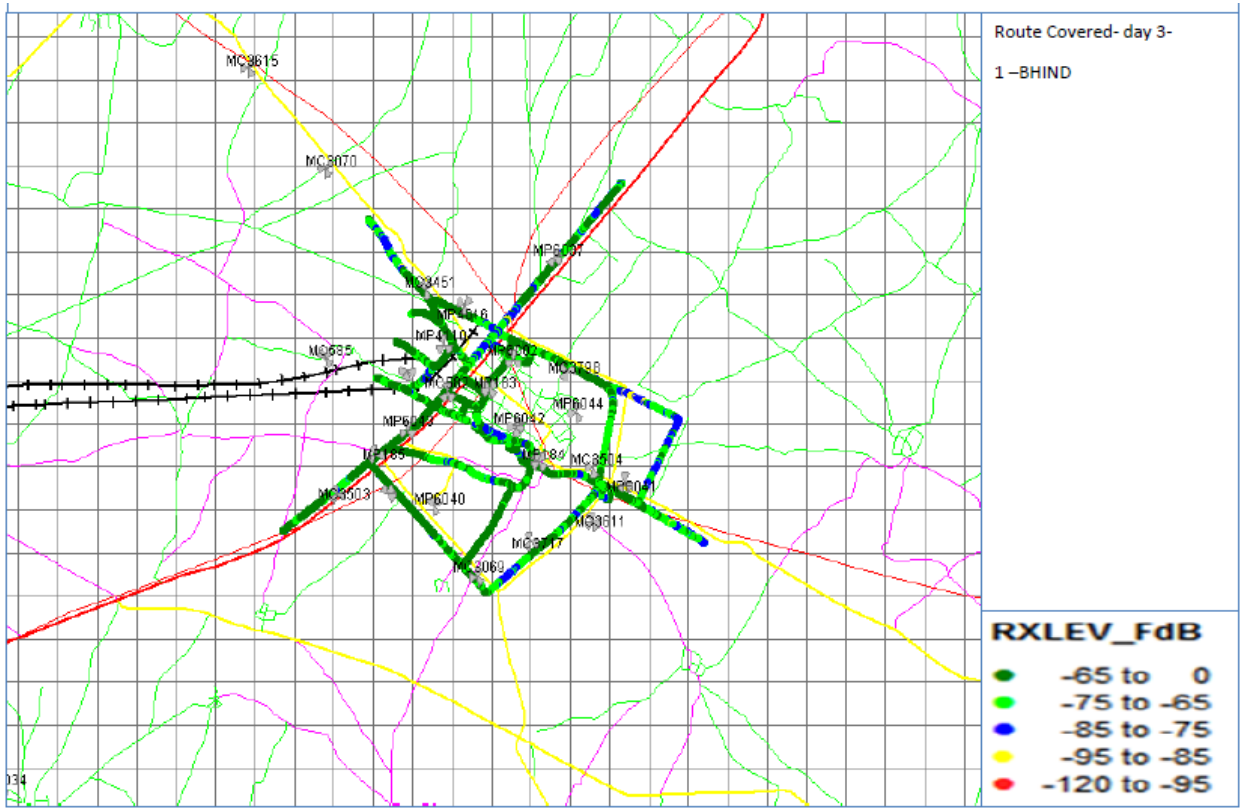
10.1.11.2 Route Map - MORENA DAY 1



10.1.11.3 Route Map - MORENA DAY 2



10.1.11.4 Route Map - MORENA DAY 3



10.1.11.5 Drive Test Results - MORENA SSA 2G

MORENA	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		Not present		99.83%	85.61%	99.97%	72.62%	89.34%	87.79%	Service Closed		100.00%	89.87%	100.00%	81.65%	41.85%	68.95%	Service Closed		95.42%	96.37%
0 to -85 dBm				100.00%	97.45%	100.00%	96.06%	99.22%	98.02%			100.00%	99.09%	100.00%	97.32%	93.74%	93.91%			99.90%	99.65%
0 to -95 dBm				100.00%	99.66%	100.00%	100.00%	100.00%	99.78%			100.00%	100.00%	100.00%	99.99%	99.78%	99.78%			100.00%	99.96%
Voice quality	≥ 95%			99.45%	98.04%	97.90%	93.71%	97.66%	97.22%			98.17%	95.55%	95.28%	98.26%	98.38%	97.76%			99.36%	97.71%
CSSR	≥ 95%			100.00%	100.00%	98.39%	95.79%	100.00%	98.29%			100.00%	98.87%	100.00%	100.00%	100.00%	100.00%			100.00%	100.00%
%age Blocked calls				0.00%	0.00%	1.61%	4.21%	0.00%	1.71%			0.00%	1.13%	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%	0.29%			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%			0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	97.25%	100.00%	98.31%			100.00%	96.32%	100.00%	100.00%	100.00%	98.38%			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

10.1.11.6 Drive Test Results - MORENA SSA 3G

June	B'mark	Airtel		BSNL		Idea		Reliance 3G	
MORENA		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		100.00%	74.42%	NA		100.00%	92.18%	NA	
0 to -85 dBm		100.00%	95.52%			100.00%	98.72%		
0 to -95 dBm		100.00%	100.00%			100.00%	99.94%		
Voice quality	≥ 95%	100.00%	97.97%			99.69%	95.49%		
CSSR	≥ 95%	100.00%	100.00%			100.00%	99.50%		
%age Blocked calls		0.00%	0.00%			0.00%	0.50%		
Call drop rate	≤ 2%	0.00%	0.00%			0.00%	1.50%		
Hands off success rate		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

10.1.11.1 Data Drive Test Results - MORENA SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	Not present	100	100	100	Service Closed	100	100	100	Service Closed	100
Succesful Data Transmission upload speed attempts	>75%		100	100	100		100	100	100		100
Minimum download speed			102	23	78		68	79	85		66
Average throughput for Packet Data			125	22	123		133	79	86		159
Latency	<250ms		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 - MORENA 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		1345		984	2359
Average throughput for Packet Data		1339		1846	2359
Latency	<250ms	100		100	100

All operators met the TRAI benchmark for data drive test.

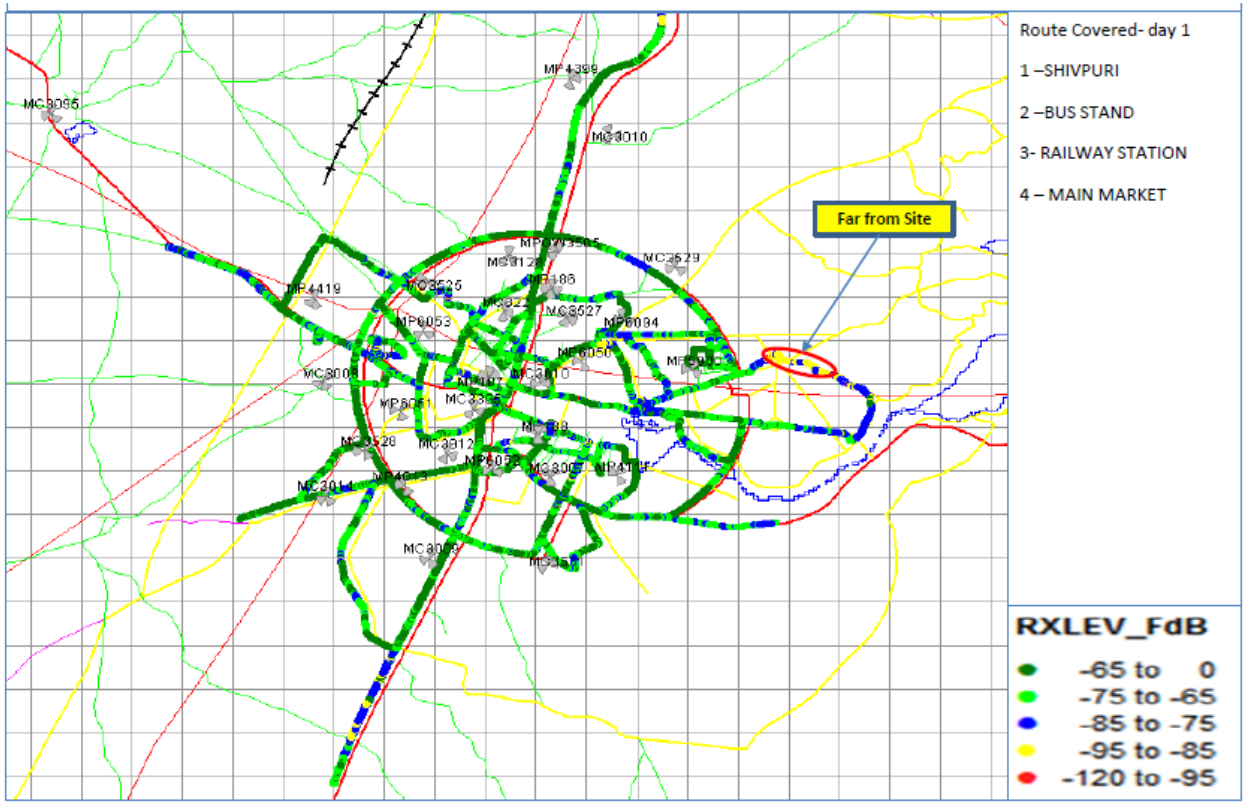
10.1.12SHIVPURI SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
June	Shivpuri	01-06-2016	03-06-2016	254

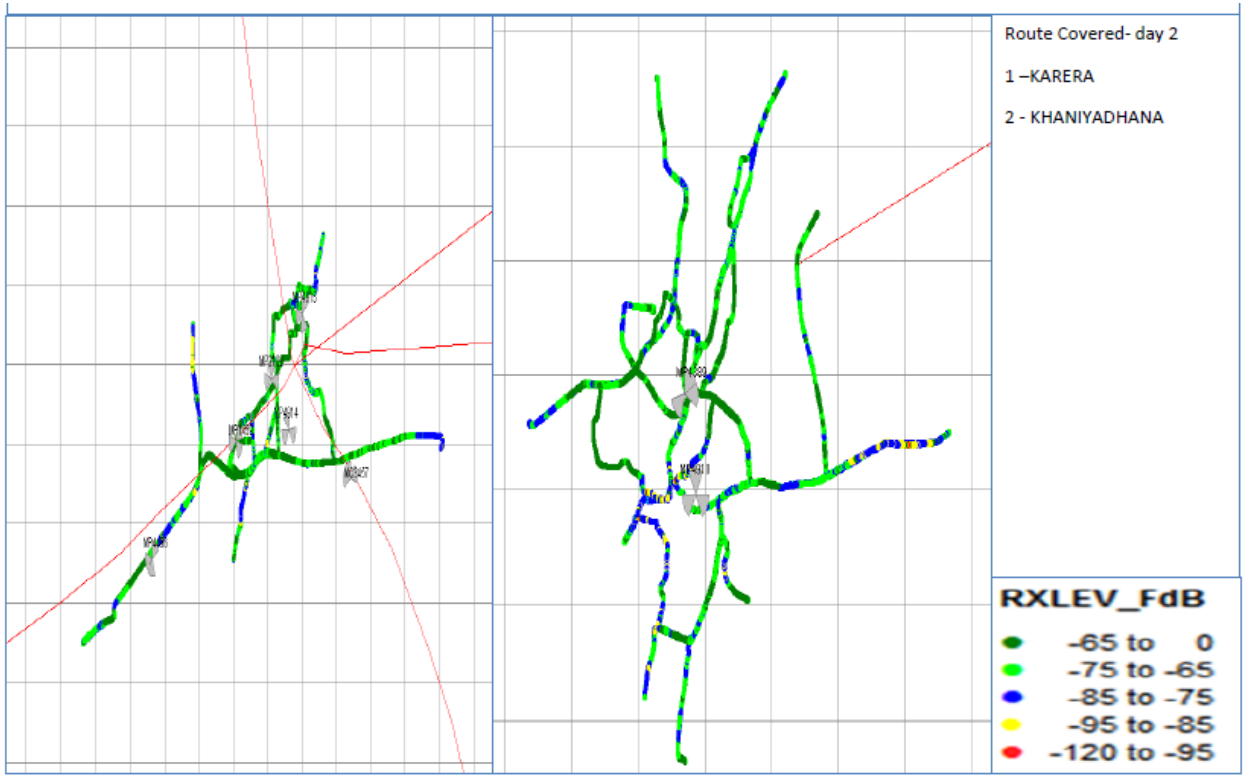
10.1.12.1 Route Details – SHIVPURI SSA

Category	Type of location	June		
		Shivpuri		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	1) Gwalior Road, Chatri Road,Bus Stand, Railway Station RD, AB Road, Police Station, Guna Road, Vivakand Conony	1) Kotwali Road, Jhansi-Shivpuri RD, Bada Bazar, New Colony, Bus Stand 2) Pichore Road, Main Market, Bus Stand	1)Bus Stand, Shivpuri Road,Chota Bazaar
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

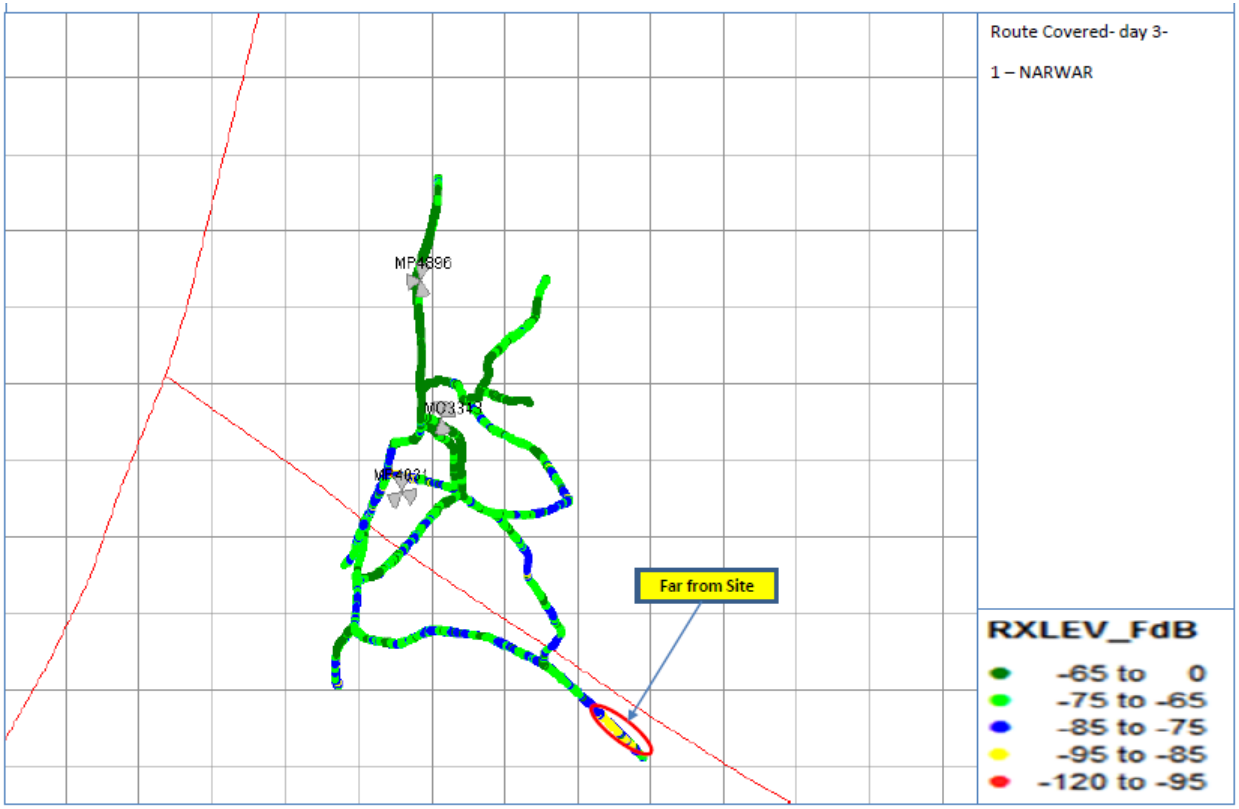
10.1.12.2 Route Map - SHIVPURI DAY 1



10.1.12.3 Route Map - SHIVPURI DAY 2



10.1.12.4 Route Map - SHIVPURI DAY 3



10.1.12.5 Drive Test Results - SHIVPURI SSA 2G

Shivpuri	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		Tata CDMA		Tata GSM		Videocon		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	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.96%	84.89%	87.49%	77.85%	65.39%	49.39%	99.86%	52.53%	Service Closed		97.89%	80.91%	12.38%	35.33%	32.54%	80.89%	Service Closed		98.81%	91.80%
0 to -85 dBm		100.00%	95.38%	99.69%	96.38%	98.42%	81.67%	100.00%	89.01%			100.00%	96.51%	60.08%	69.84%	86.07%	94.26%			99.99%	98.98%
0 to -95 dBm		100.00%	99.52%	100.00%	99.80%	100.00%	97.32%	100.00%	98.87%			100.00%	99.23%	99.19%	96.23%	99.81%	99.57%			100.00%	99.96%
Voice quality	≥ 95%	99.65%	96.98%	97.75%	97.74%	99.55%	93.33%	97.02%	95.63%			100.00%	97.37%	95.20%	96.77%	99.34%	97.65%			99.49%	97.66%
CSSR	≥ 95%	100.00%	99.42%	100.00%	100.00%	100.00%	88.14%	100.00%	99.45%			100.00%	99.53%	100.00%	100.00%	100.00%	100.00%			100.00%	99.75%
%age Blocked calls		0.00%	0.58%	0.00%	0.00%	0.00%	11.19%	0.00%	0.55%			0.00%	0.47%	0.00%	0.00%	0.00%	0.00%			0.00%	0.25%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	2.72%	0.00%	0.28%			0.00%	0.47%	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%	92.41%	100.00%	100.00%			100.00%	99.44%	100.00%	100.00%	100.00%	98.85%			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 except BSNL in outdoor location

Call Drop Rate

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

10.1.12.6 Drive Test Results - SHIVPURI SSA 3G

June	B'mark	Airtel		BSNL		Idea		Reliance 3G		Tata 3G	
Shivpuri		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		88.89%	46.52%	NA		100.00%	99.55%	NA		NA	
0 to -85 dBm		100.00%	85.92%			100.00%	99.79%				
0 to -95 dBm		100.00%	99.52%			100.00%	100.00%				
Voice quality	≥ 95%	100.00%	99.60%			100.00%	96.31%				
CSSR	≥ 95%	100.00%	100.00%			100.00%	99.42%				
%age Blocked calls		0.00%	0.00%			0.00%	0.58%				
Call drop rate	≤ 2%	0.00%	0.00%			0.00%	0.00%				
Hands off success rate		100.00%	100.00%			#DIV/0!	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

10.1.12.1 Data Drive Test Results - SHIVPURI SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	98	100	Service Closed	100	100	100	Service Closed	100
Succesful Data Transmission upload speed attempts	>75%	100	100	98	100		100	100	100		100
Minimum download speed		111	102	23	125		68	75	84		74
Average throughput for Packet Data		132	124	28	164		115	75	84		146
Latency	<250ms	100	100	100	100		100	100	100		100

All operators met the TRAI benchmark for data drive test.

10.1.12.2 Data Drive Test Results - SHIVPURI 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	NA
Succesful Data Transmission upload speed attempts	>75%	100		100	
Minimum download speed		1183		1555	
Average throughput for Packet Data		1287		3241	
Latency	<250ms	100		100	

All operators met the TRAI benchmark for data drive test.

11 ANNEXURE – CONSOLIDATED-2G

11.1 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	29877	11261	31914	3610	12306	1284	8835	1743	17867
Sum of downtime of BTSs in a month (in hours)		948	46652	158034	28981	750	30446	1173	3456	2242	20033
BTSs accumulated downtime (not available for service)	≤ 2%	0.33%	0.21%	1.89%	0.12%	0.03%	0.33%	0.12%	0.05%	0.17%	0.15%
Number of BTSs having accumulated downtime >24 hours		3	156	168	135	4	192	5	2	10	98
Worst affected BTSs due to downtime	≤ 2%	0.78%	0.52%	1.49%	0.42%	0.11%	1.56%	0.39%	0.02%	0.57%	0.55%
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	29889	11261	31914	3610	12269	1284	8835	1743	17843
Sum of downtime of BTSs in a month (in hours)		75	5178	15535	3152	75	3252	123	615	499	552
BTSs accumulated downtime (not available for service)	≤ 2%	0.27%	0.24%	1.92%	0.14%	0.03%	0.37%	0.13%	0.10%	0.40%	0.04%
Number of BTSs having accumulated downtime >24 hours		0	0	117	1	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	1.04%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

11.2 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%	97.90%	98.80%	96.86%	97.60%	98.25%	96.23%	97.84%	99.38%	98.82%	99.31%
SDCCH/Paging channel congestion	≤ 1%	0.72%	0.14%	0.53%	0.39%	NA	0.17%	NA	0.12%	0.09%	0.22%
TCH congestion	≤ 2%	0.00%	0.86%	1.33%	1.23%	0.91%	0.81%	0.00%	0.08%	0.19%	0.69%
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%	98.33%	98.83%	96.96%	97.63%	98.70%	96.42%	98.13%	99.43%	99.02%	99.37%
SDCCH/Paging channel congestion	≤ 1%	0.08%	0.16%	0.47%	0.48%	NA	0.16%	NA	0.12%	0.04%	0.25%
TCH congestion	≤ 2%	0.00%	0.93%	1.13%	1.23%	0.76%	0.84%	0.00%	0.11%	0.02%	0.58%
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		1038	5362	5687	5599	3891	5338	2885	5546	4205	5500
Total number of successful calls established		1035	5362	5417	5566	3891	5295	2884	5425	4202	5474
CSSR	≥ 95%	99.71%	100.00%	95.25%	99.41%	100.00%	99.19%	99.97%	97.82%	99.93%	99.53%
%age blocked calls		0.29%	0.00%	4.75%	0.59%	0.00%	0.81%	0.03%	2.18%	0.07%	0.47%

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)

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		5091	1087957020	1499046249	2084239928	76296456	437596445	6818754	213159730	53210152	NA
Total number of calls dropped		43	7396932	16884697	12460374	98352	760426	31444	1140388	281365	NA
Call drop rate	≤ 2%	0.84%	0.68%	1.13%	0.60%	0.13%	0.17%	0.46%	0.53%	0.53%	NA
Total number of cells in the network		1152	92689	35535	94999	10883	37739	4302	26475	5322	53627
Total number of cells having more than 3% TCH		9	1588	659	1323	69	255	99	662	126	1739
Worst affected cells having more than 3% TCH	≤ 3%	0.78%	1.71%	1.85%	1.39%	0.63%	0.68%	2.30%	2.50%	2.36%	3.24%
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		606	107329072	128906109	210918260	7517313	42177806	5053966	21313006	30001259	5534155
Total number of calls dropped		2	701548	1494099	1293356	11216	73818	26368	132995	113504	31657
Call drop rate	≤ 2%	0.33%	0.65%	1.16%	0.61%	0.15%	0.18%	0.52%	0.62%	0.38%	0.57%
Total number of cells in the network		1152	92692	35535	95929	10901	37636	4302	26475	5322	53621
Total number of cells having more than 3% TCH		7	1488	578	1342	72	247	43	625	7	743
Worst affected cells having more than 3% TCH	≤ 3%	0.64%	1.61%	1.63%	1.40%	0.66%	0.66%	1.00%	2.36%	0.14%	1.39%

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

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		1035	5362	5387	5566	3891	5295	2905	5547	4205	5498
Total number of calls dropped		1	2	87	11	0	18	1	1	0	0
Call drop rate	≤ 2%	0.10%	0.04%	1.61%	0.20%	0.00%	0.34%	0.03%	0.02%	0.00%	0.00%

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

11.4 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		393652	316057118532	NA	188427939610	NA	53955855046	NA	25080224648	4539564914	NA
Total number of calls with good voice quality		390188	308486820220	NA	184805299246	NA	53192071690	NA	24787991998	4480505491	NA
%age calls with good voice quality	≥ 95%	99.12%	97.60%	NA	98.08%	99.00%	98.58%	98.63%	98.83%	98.70%	98.91%

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

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		44199	31343310338	NA	19109585069	NA	5297025801	NA	2037491205	2332297461	NA
Total number of calls with good voice quality		44044	30600864908	NA	18745503395	NA	5221498827	NA	2018328308	2314134445	NA
%age calls with good voice quality	≥ 95%	99.65%	97.63%	NA	98.09%	99.01%	98.57%	98.23%	99.06%	99.22%	98.66%
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		2200245	11724047	938792	5138042	NA	1386511	92619	11994886	8645286	9754804
Total number of calls with good voice quality		2158397	11475636	889995	4977552	NA	1339593	90488	11786964	8470377	9610215
%age calls with good voice quality	≥ 95%	98.10%	97.88%	94.80%	96.88%	NA	96.62%	97.70%	98.27%	97.98%	98.52%

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

11.5 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		17	94	157	271	44	337	54	54	36	NA
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		6551	783671	580348	496961	583275	690630	132702	134212	19920	NA
Traffic served for all POIs (B)- in erlangs		2	544415	95444	310688	250633	11675528	54552	58774	9427	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	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		51	282	470	811	85	878	162	162	36	NA
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	NA
Total Capacity of all POIs (A) - in erlangs		6551	783058	580348	492752	33814	544422	134201	134212	19905	NA
Traffic served for all POIs (B)- in erlangs		2	363282	93694	218955	15386	7719760	44154	58774	6881	NA
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

12 ANNEXURE – CONSOLIDATED-3G

12.1 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		14375	3390	16194	2856	3987
Sum of downtime (i.e. total outage time) of Node Bs		24958	41000	8629	1746	1157
Node Bs downtime (not available for service)	≤ 2%	0.23%	1.63%	0.07%	0.08%	0.04%
Number of Node Bs having accumulated downtime of >24 hours in a month		112	49	11	2	0
Worst affected Node Bs due to downtime	≤ 2%	0.78%	1.45%	0.07%	0.07%	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		13867	1467	16194	2825	3987
Sum of downtime (i.e. total outage time) of Node Bs		2882	1744	906	160	58
Node Bs downtime (not available for service)	≤ 2%	0.29%	1.65%	0.08%	0.08%	0.02%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	22	0	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	1.50%	0.00%	0.00%	0.00%

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

12.2 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%	99.82%	97.53%	99.63%	97.67%	98.82%
RRC Congestion	≤ 1%	0.01%	0.74%	0.11%	0.11%	0.20%
Circuit Switched RAB Congestion	≤ 2%	0.02%	0.27%	0.15%	0.02%	0.48%
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%	99.82%	96.39%	99.67%	97.46%	99.20%
RRC Congestion	≤ 1%	0.00%	0.74%	0.10%	0.11%	0.19%
Circuit Switched RAB Congestion	≤ 2%	0.03%	0.94%	0.14%	0.03%	0.28%
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)		3831	1809	4461	NA	2101
Total number of RRC established (B)		3829	1720	4430	NA	2098
Call setup success rate (B/A*100)	≥ 95%	99.95%	95.08%	99.31%	NA	99.86%
%age blocked calls		0.05%	4.92%	0.69%	NA	0.14%

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

12.3 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)		94180802	387273390	260610108	35727359	52181898
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		313363	1347478	1306096	26484	158995
Call drop rate (B/A*100)	≤ 2%	0.33%	0.35%	0.50%	0.07%	0.30%
Total no. of cells in the licensed service area (B)		44268	9321	52258	8532	24085305
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		777	114	794	18	74766
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.76%	1.22%	1.52%	0.21%	0.31%

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

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)		9287642	18954145	26672313	3721378	3072512
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		31355	91991	144798	3122	9635
Call drop rate (B/A*100)	≤ 2%	0.34%	0.49%	0.54%	0.08%	0.31%
Total no. of cells in the licensed service area (B)		42628	4401	52371	8463	244761
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		704	94	915	16	726
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.65%	2.13%	1.75%	0.19%	0.30%
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)		3829	1781	4430	NA	2071
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	79	13	NA	0
Call drop rate (B/A*100)	≤ 2%	0.00%	4.44%	0.29%	NA	0.00%

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

12.4 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		234591262485	NA	349298457016	208219646465	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		232190055827	NA	346351261302	207994415118	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.98%	NA	99.16%	99.89%	98.19%
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		15544820292	NA	35682460782	21759310828	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		15427867199	NA	35381496998	21735072383	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.25%	NA	99.16%	99.89%	98.42%
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		20658430	900710	18907266	NA	10502260
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		20517389	711457	18300294	NA	10440577
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.32%	78.99%	96.79%	NA	99.41%

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

12.5 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		282	470	813	NA	162
No. of POIs not meeting benchmark		0	0	0	NA	0
Total Capacity of all POIs (A) - in erlangs		783671	580348	496961	NA	133668
Traffic served for all POIs (B)- in erlangs		544415	95444	310688	NA	71143
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		282	201	811	NA	162
No. of POIs not meeting benchmark		0	0	0	NA	0
Total Capacity of all POIs (A) - in erlangs		786068	213586	492752	NA	133657
Traffic served for all POIs (B)- in erlangs		500307	89582	219955	NA	56523
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

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	1130254	884544	1558792	218246	530589	15597	144401	Service Closed	507257
Total number of bills disputed		0	994	54	9773	193	478	0	3	Service Closed	1376
Total number of valid billing complaints		0	257	54	2820	134	312	0	2	Service Closed	581
Total complaints considered invalid		0	737	0	6953	59	166	0	1	Service Closed	795
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.09%	0.01%	0.62%	0.09%	0.09%	0.00%	0.00%	Service Closed	0.27%
April											
Total bills generated during the first billing cycle		3	369532	291668	510378	76131	172474	5268	48373	Service Closed	165411
Total number of bills disputed in first billing cycle		0	316	16	2316	71	159	0	2	Service Closed	432
Total number of valid billing complaints (billing cycle 1)		0	39	16	268	71	154	0	2	Service Closed	213
Total complaints considered invalid (billing cycle 1)		0	277	0	2048	0	5	0	0	Service Closed	219
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.09%	0.01%	0.45%	0.09%	0.09%	0.00%	0.00%	Service Closed	0.26%

Data Source: Billing Center of the operators

May											
Total bills generated during the second billing cycle		3	376992	296678	520405	73076	177330	5119	47826	Service Closed	168553
Total number of bills disputed in second billing cycle		0	279	15	2299	63	158	0	0	Service Closed	384
Total number of valid billing complaints (billing cycle 2)		0	35	15	399	63	158	0	0	Service Closed	156
Total complaints considered invalid (billing cycle 2)		0	244	0	1900	0	0	0	0	Service Closed	228
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.07%	0.01%	0.44%	0.09%	0.09%	0.00%	0.00%	Service Closed	0.23%
June											
Total bills generated during the third billing cycle		3	383730	296198	528009	69039	180785	5210	48202	Service Closed	173293
Total number of bills disputed in third billing cycle		0	399	23	5158	59	161	0	1	Service Closed	560
Total number of valid billing complaints (billing cycle 3)		0	183	23	2153	0	0	0	0	Service Closed	212
Total complaints considered invalid (billing cycle 3)		0	216	0	3005	59	161	0	1	Service Closed	348
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.10%	0.01%	0.98%	0.09%	0.09%	0.00%	0.00%	Service Closed	0.32%

Data Source: Billing Center of the operators

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	100	5978	4323	193	8277	0	0	Service Closed	6796
Total complaints considered invalid (sum of 3 months)		0	4888	0	19235	234	0	0	0	Service Closed	1983
Total number of charging complaints (sum of 3 months)		0	4988	5978	23558	427	8277	0	0	Service Closed	8779
Total no of customers served (Sum of 3 months)		20691	37841449	12391952	21386305	6241271	27563349	183534	6136938	Service Closed	20433444
Percentage of charging complaints disputed	≤ 0.1%	0.00%	0.01%	0.05%	0.11%	0.01%	0.03%	0.00%	0.00%	Service Closed	0.04%

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	5799	6032	37020	1006	17505	0	3	Service Closed	9968
Total number of complaints resolved in favour of customer		0	207	6032	31178	620	8755	0	3	Service Closed	7301
Total complaints considered invalid		0	5592	0	5842	386	8750	0	0	Service Closed	2667
Number of complaints resolved in 4 weeks		0	207	6027	25336	620	8755	0	3	Service Closed	7301
Percentage complaints resolved within 4 weeks	≥ 98%	NA	100.00%	99.92%	81.26%	100.00%	100.00%	NA	100.00%	Service Closed	100.00%
Number of complaints resolved in 6 weeks		0	207	6032	31178	620	8755	0	3	Service Closed	7299
Percentage complaints resolved within 6 weeks	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	Service Closed	99.97%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		0	207	0	5842	386	8750	0	3	Service Closed	3409
Percentage cases in which credit/waiver was received within 1 week	100%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	Service Closed	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	6	100	100	0	100	2	43	Service Closed	49
Number of cases resolved in 4 weeks		0	5	88	54	0	88	2	43	Service Closed	48
Percentage cases resolved in 4 weeks	≥ 98%	NA	83.33%	88.00%	54.00%	NA	88.00%	100.00%	100.00%	Service Closed	97.96%
Number of cases resolved in 6 weeks		0	5	88	100	0	88	2	43	Service Closed	49
Percentage cases resolved in 6 weeks	100.00%	NA	83.33%	88.00%	100.00%	NA	88.00%	NA	100.00%	Service Closed	100.00%

Data Source: Billing Center of the operators

13.2 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		9064	3466560	4429334	83971578	1694045	16076982	0	1155220	Service Closed	12082812
Number of calls getting connected and answered (electronically)		8923	3466560	4405304	81231721	1681498	16060257	0	1129562	Service Closed	12082812
Percentage calls getting connected and answered	≥ 95%	98.44%	100.00%	99.46%	96.74%	99.26%	99.90%	100.00%	97.78%	Service Closed	100.00%

Data Source: Customer Service Center of the operators

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)		654	4654076	1969762	12005655	447052	3010393	35034	1974484	Service Closed	4893925
Total Number of calls answered within 90 seconds (3 months)		653	2874316	1930101	11797711	406582	2720641	34611	1848634	Service Closed	4864166
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	99.85%	61.76%	97.99%	98.27%	90.95%	90.37%	98.79%	93.63%	Service Closed	99.39%
Audit results for customer care (voice-to-Voice)- Monthly data											
April											
Total calls received (Month 1)		237	1474708	644144	3794835	164673	855830	10677	588072	Service Closed	1585954
Total calls answered within 90 seconds (Month 1)		236	967006	634705	3728468	152085	808260	10581	577370	Service Closed	1581359
% calls answered within 90 seconds (Month 1)	≥ 95%	99.58%	65.57%	98.53%	98.25%	92.36%	94.44%	99.10%	98.18%	Service Closed	99.71%
Audit results for customer care (voice-to-Voice)- Monthly data											
May											
Total calls received (Month 2)		189	1683423	674632	4197982	214073	993931	12315	725537	Service Closed	1718558
Total calls answered within 90 seconds (Month 2)		189	698096	659880	4103181	199072	959529	12071	634064	Service Closed	1708109
% calls answered within 90 seconds (Month 2)	≥ 95%	100.00%	41.47%	97.81%	97.74%	92.99%	96.54%	98.02%	87.39%	Service Closed	99.39%

Data Source: Customer Service Center of the operators

June											
Total calls received (Month 3)		228	1495945	650986	4012838	68306	1160632	12042	660875	Service Closed	1589413
Total calls answered within 90 seconds (Month 3)		228	1209214	635516	3966062	55425	952852	11959	637200	Service Closed	1574698
% calls answered within 90 seconds (Month 3)	≥ 95%	100.00%	80.83%	97.62%	98.83%	81.14%	82.10%	99.31%	96.42%	Service Closed	99.07%
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	0	100	100	100	Service Closed	100
Number of calls getting connected and answered (electronically)		100	100	100	100	0	100	100	100	Service Closed	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	Service Closed	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	0	100	100	100	Service Closed	100
Total Number of calls getting connected and answered		94	100	86	97	0	86	100	96	Service Closed	96
Live Calling Percentage calls getting connected and answered	≥ 95%	94.00%	100.00%	86.00%	97.00%	NA	86.00%	100.00%	96.00%	Service Closed	96.00%

Data Source: Live calling made by the auditors

13.3 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		0	4048	0	9396	772	769	273	1094	Service Closed	7429
Number of requests attended within 7 days		0	4048	0	9396	772	769	273	1094	Service Closed	7429
Percentage cases in which termination done within 7 days	100.00%	NA	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	Service Closed	100.00%

Data Source: Customer Service Center of the operators

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		0	205	0	2875	0	0	54	114	Service Closed	4768
Total number of cases where refund was made within 60 days		0	205	0	2875	0	0	54	114	Service Closed	4768
Percentage cases in which refund was receive within 60 days	100.00%	NA	100.00%	NA	100.00%	NA	NA	100.00%	100.00%	Service Closed	100.00%

Data Source: Billing Center of the operators

13.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

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	0	100	100	300	0	100	0.00%	19	Service Closed	0
Number of cases resolved to satisfaction	0	78	86	291	0	81	0.00%	19	Service Closed	0
Percentage cases resolved in four weeks	NA	78.00%	86.00%	97.00%	NA	81.00%	NA	100.00%	Service Closed	NA

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	0	300	300	300	Service Closed	300
Calls answered		165	300	300	198	0	300	281	191	Service Closed	300
% of calls connected	≥ 95%	55.00%	100.00%	100.00%	66.00%	NA	100.00%	93.67%	63.67%	Service Closed	100.00%

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

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		18	10
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	10
138	All India Helpline for Passengers		N		
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	10
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		18	9
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services	Y		18	10
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		18	10

1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		18	10
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
1090	Call Alert (Crime Branch)	Y		17	10
1091	Women Helpline	Y		18	10
1097	National AIDS Helpline to NACO		N		
1099	Central Accident and Trauma Services (CATS)	Y		18	9
10580	Educational & Vocational Guidance and Counselling	Y		18	10
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		17	10
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		17	10
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		17	9
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry	Y		17	9
1912	Complaint of Electricity	Y		18	9
1916	Drinking Water Supply		N		
1950	Election Commission of India		N		
Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		22	22

101	Fire	Y		22	22
102	Ambulance	Y		22	22
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpline for Passengers		N		
149	Public Road Transport Utility Service	Y		22	22
181	Chief Minister Helpline	Y		21	21
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		22	22
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		21	21
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		21	21
1077	Control Room for District Collector		N		
1090	Call Alert (Crime Branch)	Y		22	22
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	Y		21	21
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		

10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		21	21
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		21	21
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry		N		
1912	Complaint of Electricity	Y		21	21
1916	Drinking Water Supply		N		
1950	Election Commission of India	Y		21	21

BSNL

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Not provided			
101	Fire				
102	Ambulance				
104	Health Information Helpline				
108	Emergency and Disaster Management Helpline				
138	All India Helpline for Passengers				
149	Public Road Transport Utility Service				
181	Chief Minister Helpline				
182	Indian Railway Security Helpline				
1033	Road Accident Management Service				

1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'
1056	Emergency Medical Services
106X	State of the Art Hospitals
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 Alert (Crime Branch)
1091	Women Helpline
1097	National AIDS Helpline to NACO
1099	Central Accident and Trauma Services (CATS)
10580	Educational & Vocational Guidance and Counselling
10589	Mother and Child Tracking (MCTH)
10740	Central Pollution Control Board
10741	Pollution Control Board
1511	Police Related Service for all Metro Railway Project
1512	Prevention of Crime in Railway
1514	National Career Service(NCS)
15100	Free Legal Service Helpline
155304	Municipal Corporations
155214	Labour Helpline

1903	Sashastra Seema Bal (SSB)
1909	National Do Not Call Registry
1912	Complaint of Electricity
1916	Drinking Water Supply
1950	Election Commission of India

Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	11
101	Fire	Y		17	11
102	Ambulance	Y		17	11
104	Health Information Helpline	Y		17	11
108	Emergency and Disaster Management Helpline		N		
138	All India Helpline for Passengers	Y		16	11
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		16	11
1033	Road Accident Management Service	Y		17	11
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	Y		17	11
1063	Public Grievance Cell DoT Hq	Y		17	11
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		N		
1077	Control Room for District Collector		N		
1090	Call Alert (Crime Branch)		N		
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	Y		17	11
1099	Central Accident and Trauma Services (CATS)	Y		17	11
10580	Educational & Vocational Guidance and Counselling		N		
10589	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	11
1514	National Career Service(NCS)	Y		17	11
15100	Free Legal Service Helpline	Y		17	11
155304	Municipal Corporations	Y		16	11
155214	Labour Helpline	Y		16	11
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry		N		
1912	Complaint of Electricity	Y		17	11
1916	Drinking Water Supply		N		
1950	Election Commission of India	Y		16	11
Reliance GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		19	19
101	Fire	Y		19	19
102	Ambulance	Y		19	19

104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		19	19
138	All India Helpline for Passengers		N		
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		18	18
182	Indian Railway Security Helpline	Y		19	19
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		19	19
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
1090	Call Alert (Crime Branch)		N		
1091	Women Helpline	Y		19	19
1097	National AIDS Helpline to NACO		N		
1099	Central Accident and Trauma Services (CATS)	Y		19	19
10580	Educational & Vocational Guidance and Counselling	Y		18	18
10589	Mother and Child Tracking (MCTH)	Y		19	19
10740	Central Pollution Control Board	Y		19	19

10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		19	19
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		19	19
1903	Sashastra Seema Bal (SSB)	Y		18	18
1909	National Do Not Call Registry		N		
1912	Complaint of Electricity	Y		18	18
1916	Drinking Water Supply		N		
1950	Election Commission of India		N		
TATA CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		15	15
101	Fire	Y		15	14
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		15	14
138	All India Helpline for Passengers		N		
149	Public Road Transport Utility Service	Y		15	14
181	Chief Minister Helpline	Y		15	14
182	Indian Railway Security Helpline	Y		15	14
1033	Road Accident Management Service	Y		15	14
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		

1056	Emergency Medical Services	Y		15	14
106X	State of the Art Hospitals	Y		15	14
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		15	14
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		15	14
1073	Road Accident Helpline	Y		15	14
1077	Control Room for District Collector		N		
1090	Call Alert (Crime Branch)		N		
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	Y		15	14
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		15	14
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		15	14
1514	National Career Service(NCS)	Y		15	14
15100	Free Legal Service Helpline	Y		15	14
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		15	14
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry	Y		15	14
1912	Complaint of Electricity		N		

1916	Drinking Water Supply		N		
1950	Election Commission of India	Y		15	14
TATA GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		16	10
101	Fire	Y		16	11
102	Ambulance	Y		16	10
104	Health Information Helpline	Y		16	10
108	Emergency and Disaster Management Helpline		N		
138	All India Helpline for Passengers		N		
149	Public Road Transport Utility Service	Y		16	10
181	Chief Minister Helpline	Y		16	10
182	Indian Railway Security Helpline	Y		16	10
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	10
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	10
1073	Road Accident Helpline	Y		16	10
1077	Control Room for District Collector		N		
1090	Call Alert (Crime Branch)		N		

1091	Women Helpline	Y		16	10
1097	National AIDS Helpline to NACO	Y		16	10
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		15	10
10741	Pollution Control Board	Y		15	10
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		16	10
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		15	10
155304	Municipal Corporations	Y		16	10
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry	Y		16	10
1912	Complaint of Electricity		N		
1916	Drinking Water Supply		N		
1950	Election Commission of India	Y		15	10
Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	18
101	Fire	Y		18	18
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	18

138	All India Helpline for Passengers		N		
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		18	18
182	Indian Railway Security Helpline	Y		18	18
1033	Road Accident Management Service	Y		18	18
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		17	17
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		18	18
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		18	18
1077	Control Room for District Collector		N		
1090	Call Alert (Crime Branch)	Y		18	18
1091	Women Helpline	Y		17	17
1097	National AIDS Helpline to NACO		N		
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		17	17
10741	Pollution Control Board	Y		18	18
1511	Police Related Service for all Metro Railway Project		N		

1512	Prevention of Crime in Railway	Y		17	17
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)	Y		18	18
1909	National Do Not Call Registry		N		
1912	Complaint of Electricity	Y		17	17
1916	Drinking Water Supply	Y		17	17
1950	Election Commission of India		N		

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)

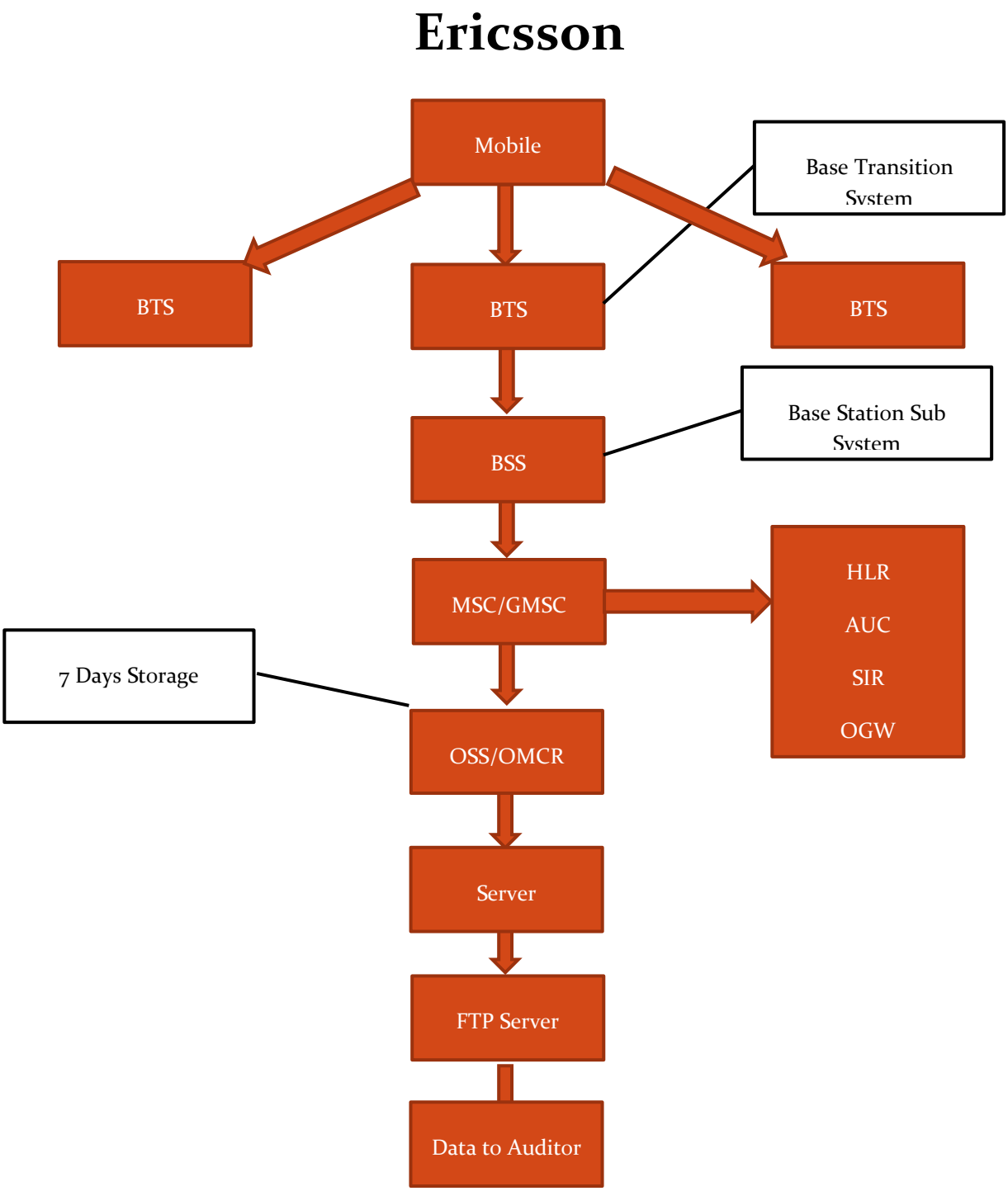
NSN provides network support to Vodafone in the circle.

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

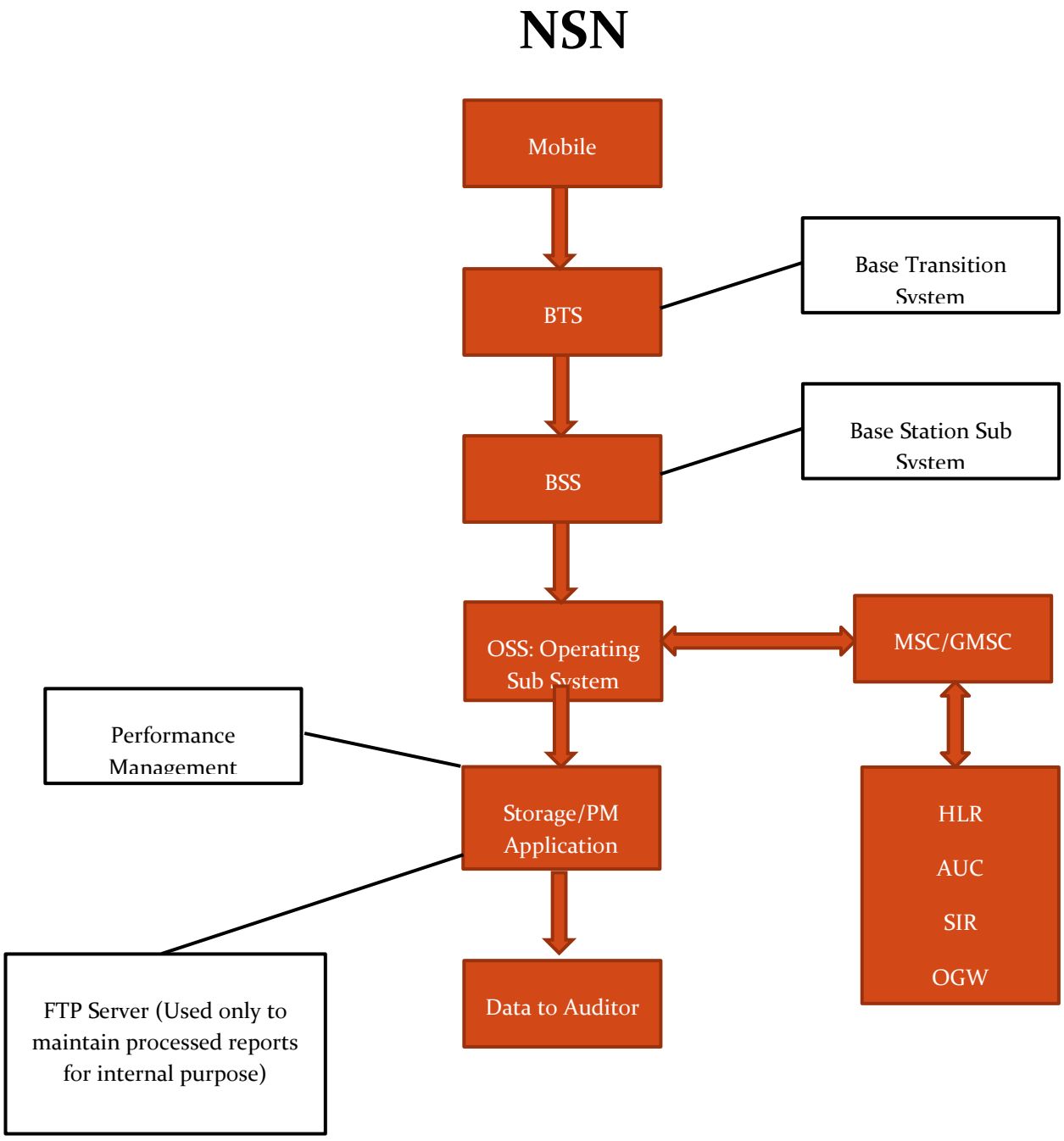
14.2.1 ERICSSON

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. AMJ'16 – Refers to the quarter of April , May and June 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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