TRAI Audit Wireless Report for North East Circle

EAST ZONE

QE March 2016

Prepared by:

IMRB | eTech

Submitted to:

TRAI
Telecom Regulatory Authority of India

1 TABLE OF CONTENTS

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).

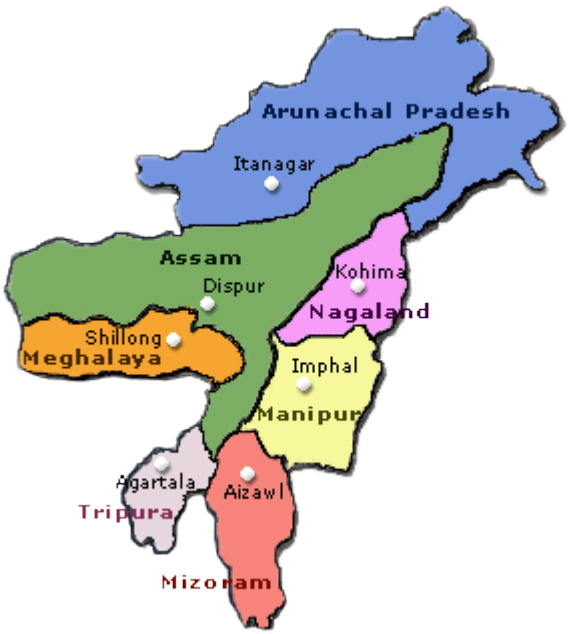
2.2 OBJECTIVES

The primary objective of the Audit module is to-

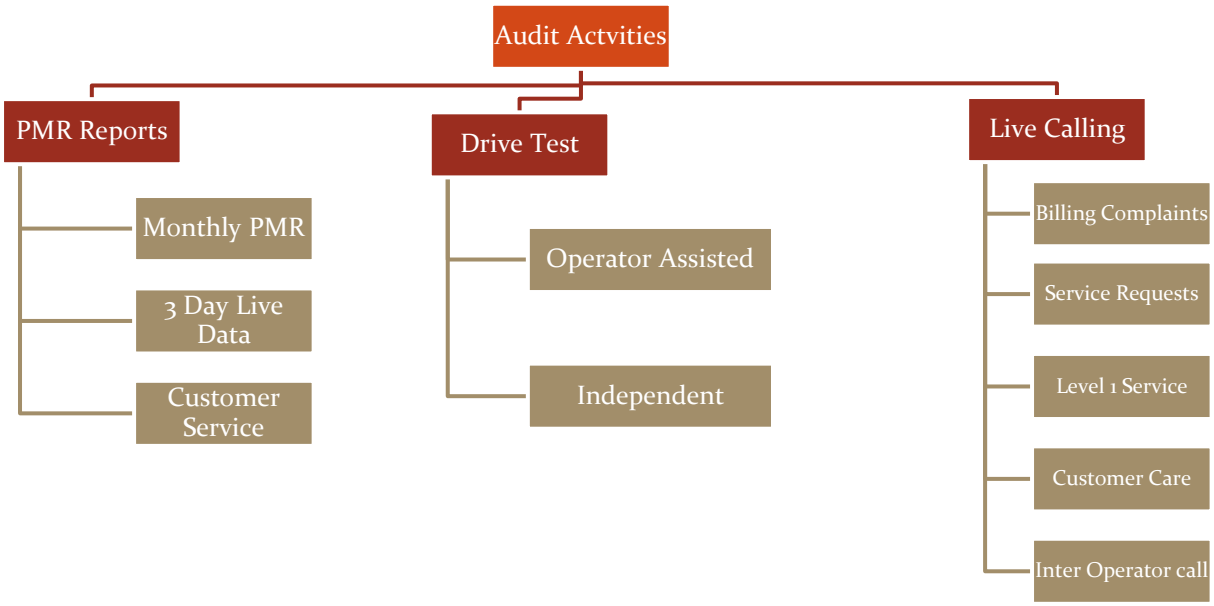
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report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

2.3 COVERAGE

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



2.4 FRAMEWORK USED

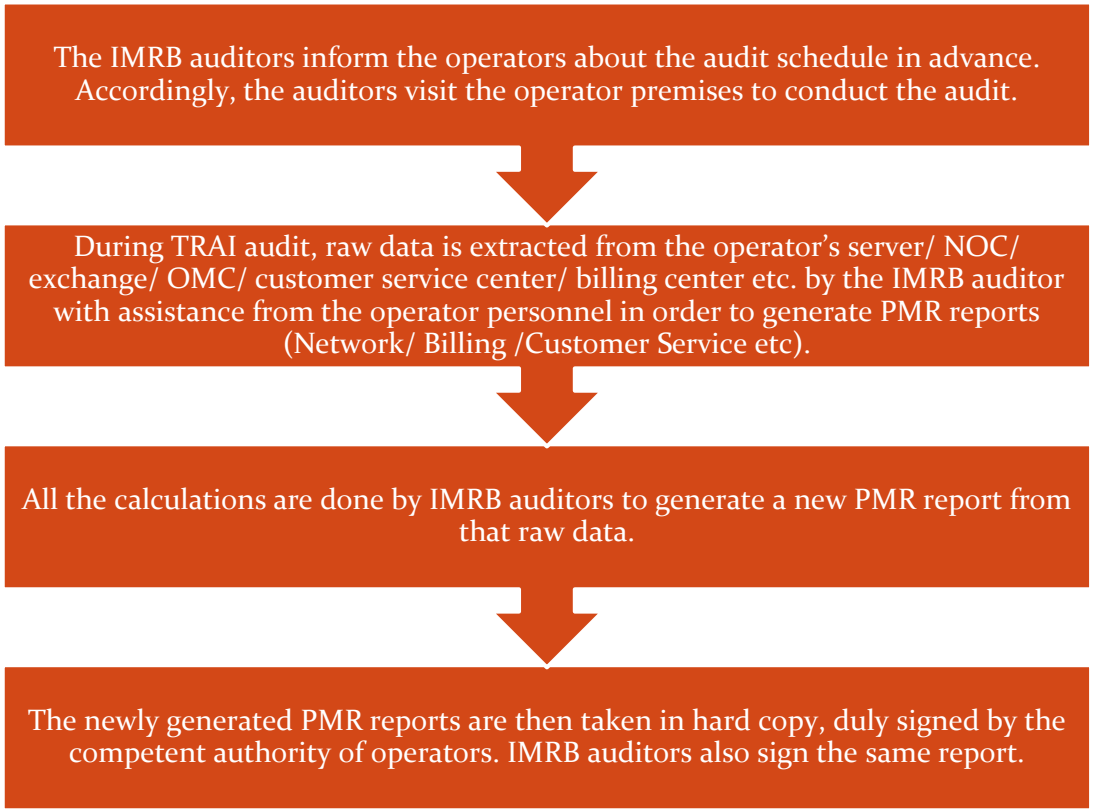


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

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, January 2016 audit data was collected in the month of February 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 March 2016 (JFM'16) was collected in the month of January 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 January, February and March 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 January, February and March 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-

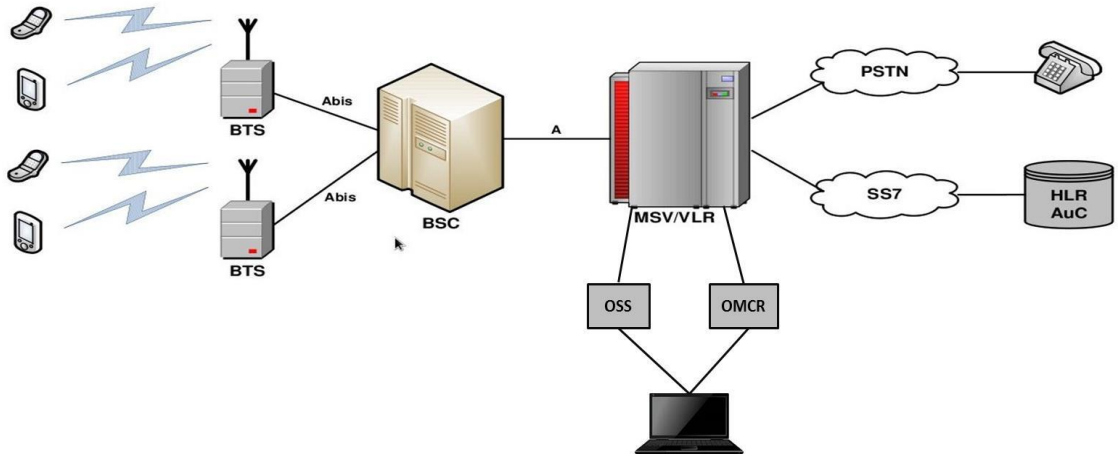
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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%

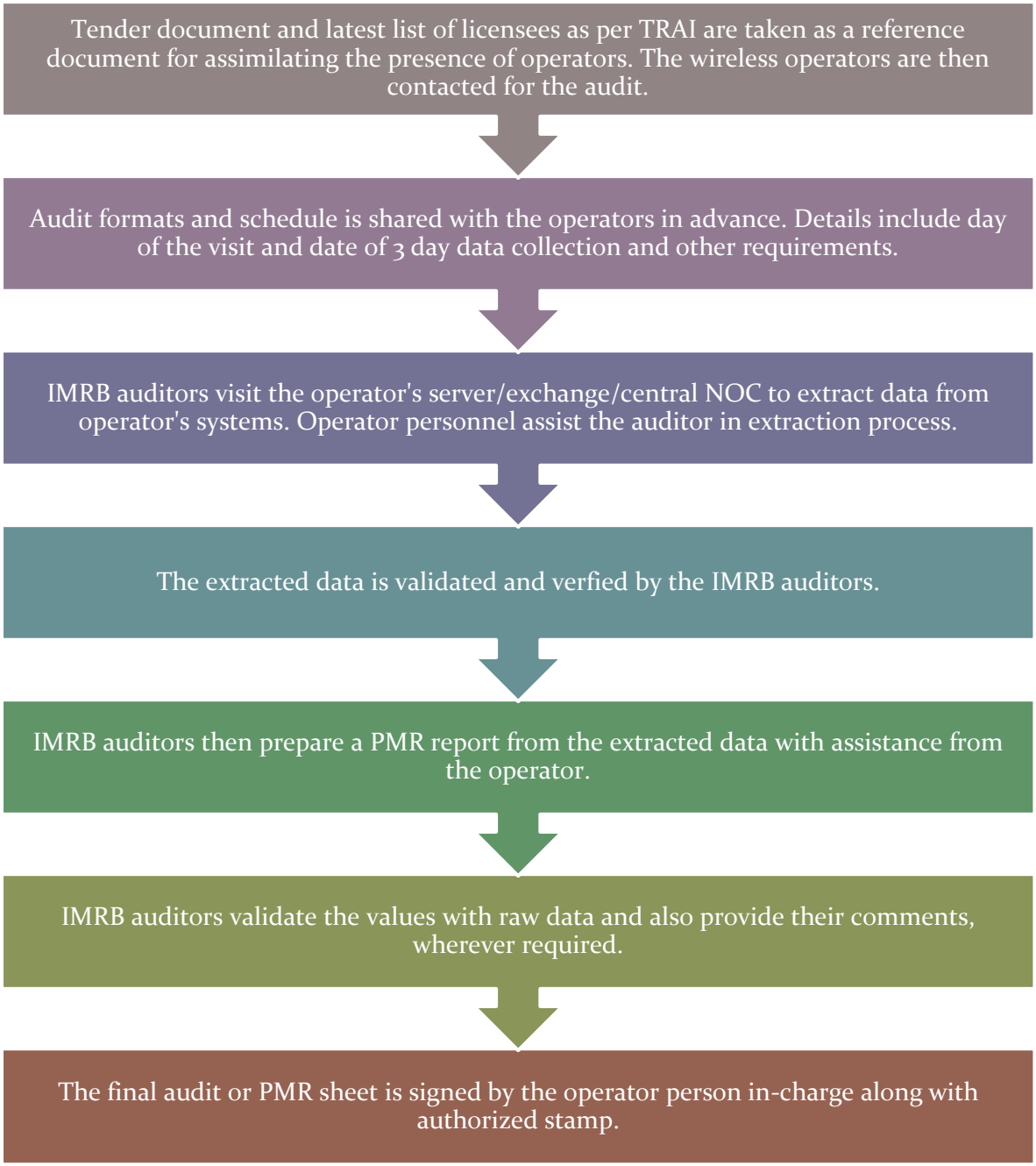
2.4.1.8 POINT OF DATA EXTRACTION

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 GENERIC 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 GENERIC 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.

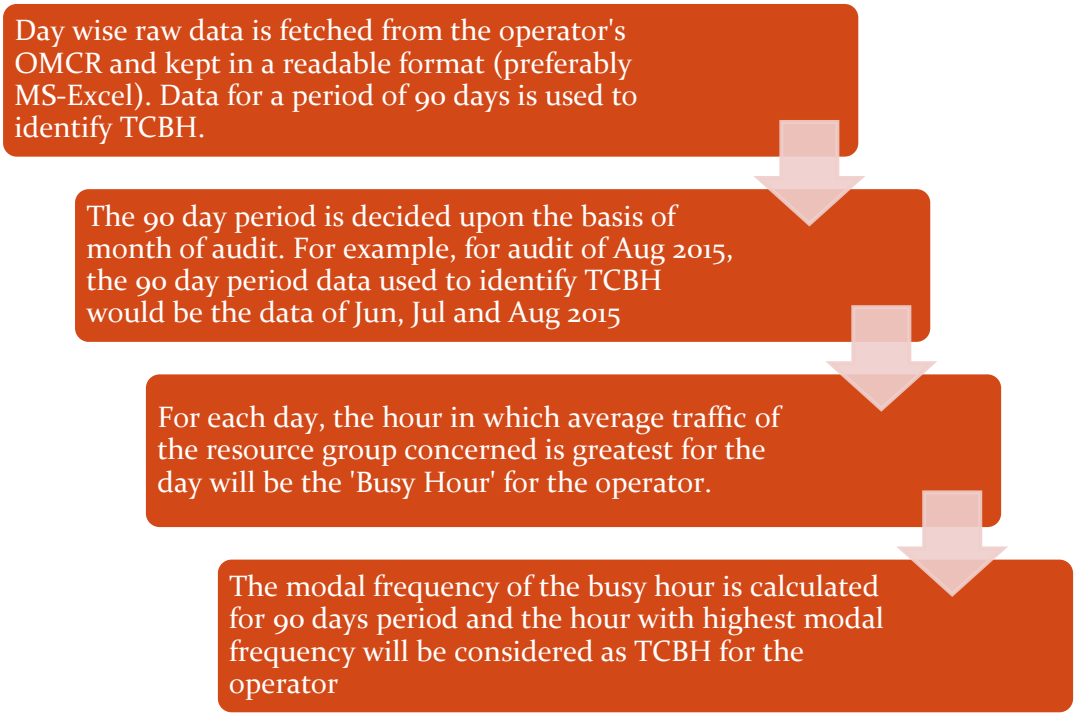
Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar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

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.

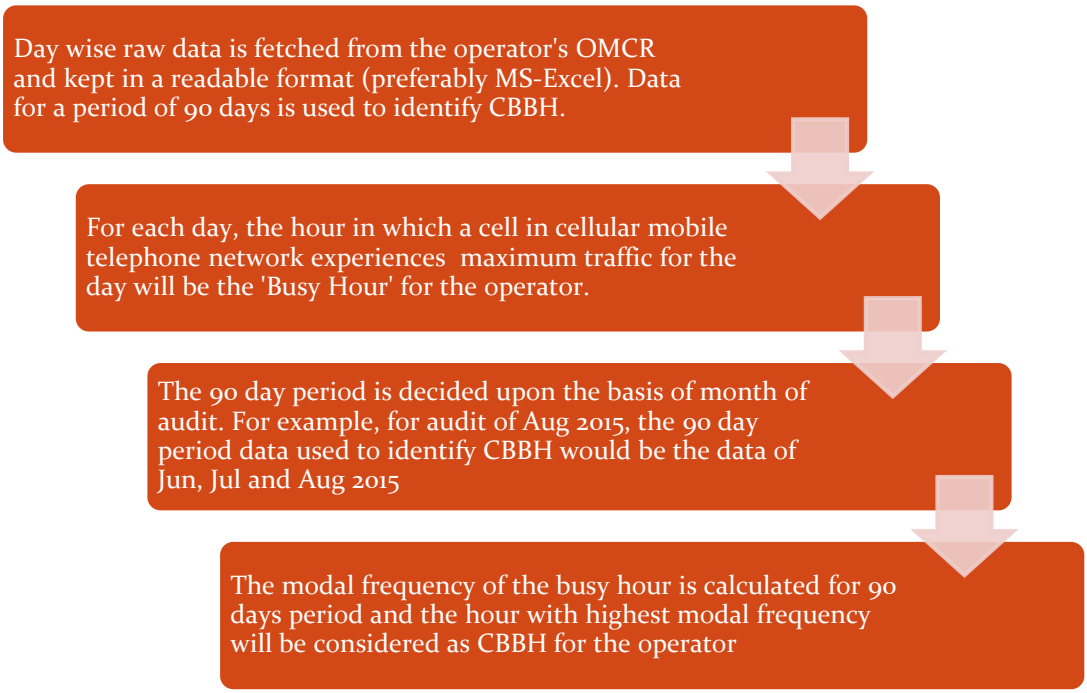
Step by step procedure to identify TCBH for an operator:



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 March 2016 (JFM'16) was collected in the month of January 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 GENERIC 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.

The IMRB auditor visits each operator premises to do live calling. The operators provide the raw data of customer complaints (billing & service) and also the list of customer service numbers to be verified through live calling

IMRB auditors then make live calls using operator SIM to a random sample of subscribers from the raw data provided to verify the resolution of complaints

The auditors also verify the performance of call center, level 1 services by calling the numbers using operator SIM. The list of call center numbers is provided by the operator. The process followed to test Level 1 services has been stated below.

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

Live calling activity was carried out during the period of March 2016. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of February 2016 was considered for live calling activity conducted in March 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 JFM'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 (No IDT conducted in this quarter)

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 as per TRAI instructions it 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. SSAs were defined as per BSNL and SSA list was finalized by regional TRAI office.
- 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.
- 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; SSAs are defined as per BSNL and SSA list was finalized by regional TRAI office.
- 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. The SSAs were defined as per BSNL and SSA list was finalized by regional TRAI office.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
    - 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 Rx Qual Samples– A
    - ✓ Rx Qual 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.

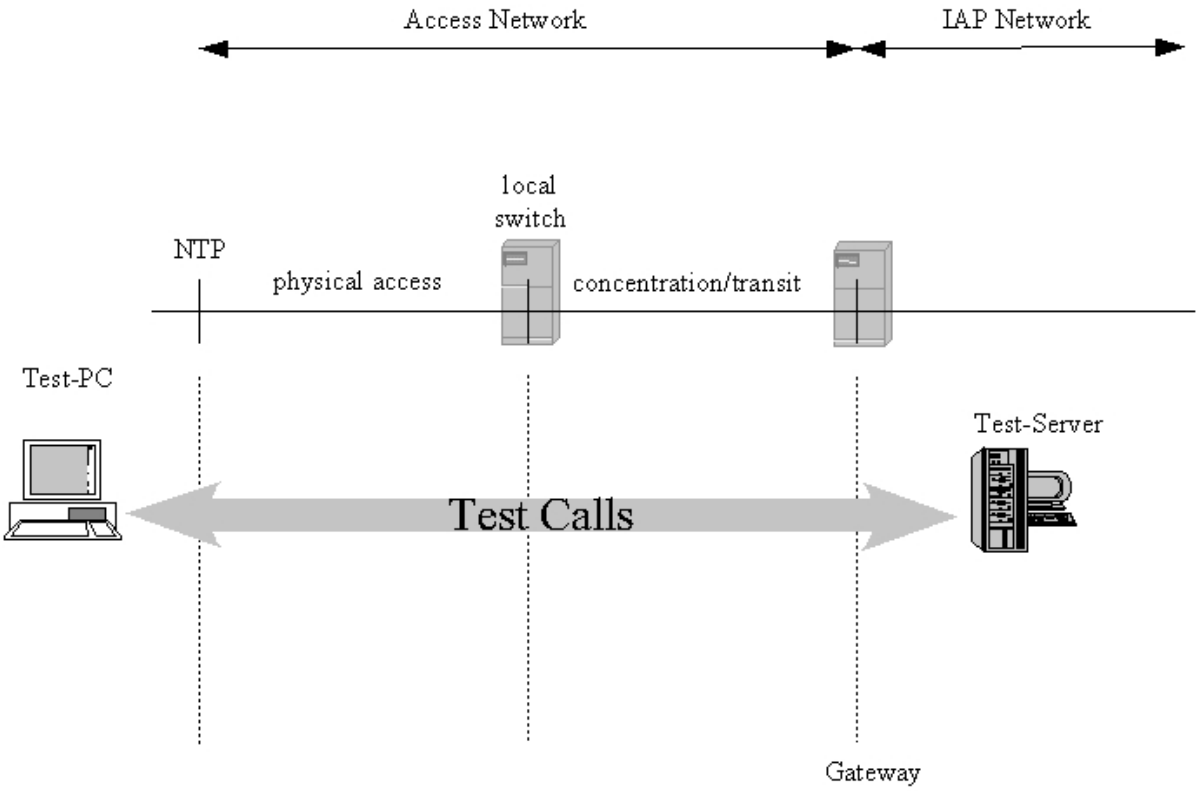


Figure for Measurement set-up

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	2083413
Airtel	3437485
BSNL NE 1 CDMA	4215
BSNL NE 1 GSM	8704
BSNL NE 2 CDMA	536
BSNL NE 2 GSM	NDR
Idea	486666
Reliance GSM	No Service
Vodafone	1457045
Name of Operator	**Number of Subscriber as per VLR-3G**
Aircel 3G	NDR
BSNL 3G	NDR
Reliance 3G	NDR

March'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 EXECUTIVE SUMMARY-2G

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

3.1 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	5.95%	37.48%	95.01%	0.84%	4.02%	1.67%	1.60%	92.70%
Airtel	0.98%	1.33%	95.58%	0.61%	1.12%	1.55%	1.64%	99.02%
BSNL NE 1 CDMA	1.55%	15.30%	98.52%	NA	NDR	1.13%	NDR	NDR
BSNL NE 1 GSM	3.59%	5.66%	95.56%	0.19%	NDR	1.59%	0.47%	NDR
BSNL NE 2 CDMA	5.49%	9.09%	97.12%	NA	NDR	0.75%	1.70%	100.00%
BSNL NE 2 GSM	0.44%	5.43%	89.73%	5.14%	11.56%	4.32%	10.09%	93.58%
Idea	1.87%	1.38%	95.23%	0.14%	1.21%	0.53%	1.55%	96.23%
Vodafone	6.98%	1.81%	98.63%	0.67%	1.37%	0.84%	2.86%	97.34%

NDR: No Data received

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators. Hence, it has been reported as NA for BSNL CDMA.

Following are the parameter wise observations for wireless operators for North East circle:

BTSs Accumulated Downtime:

Aircel, BSNL GSM NE2, BSNL CDMA (NE2) and Vodafone did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for BSNL GSM NE2 at 0.44%.

Worst Affected BTSs Due to Downtime:

Aircel, BSNL CDMA & GSM (NE1) and BSNL CDMA & GSM (NE2) failed to meet the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel at 1.33%.

Call Set-up Success Rate (CSSR):

BSNL GSM (NE2) failed to meet the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 98.63%.

SDCCH/ Paging Chl. Congestion:

BSNL GSM (NE2) failed to meet the benchmark on SDCCH / Paging Channel Congestion. Idea recorded the best SDCCH / Paging Channel Congestion.

TCH Congestion:

Aircel and BSNL GSM (NE2) failed to meet the benchmark for TCH congestion, while Airtel performed the best on TCH congestion.

Call Drop Rate:

BSNL GSM (NE2) failed to meet the benchmark for the parameter. Minimum call drop rate was recorded for Idea.

Worst Affected Cells Having More than 3% TCH Drop:

BSNL GSM (NE2) failed to meet the benchmark. Best performance was recorded for BSNL GSM (NE1).

Voice Quality

Aircel and BSNL GSM (NE2) failed to meet the benchmark. Best performance was recorded for BSNL CDMA (NE2).

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.

3.1.1 PMR DATA - JANUARY 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	5.61%	32.59%	95.05%	0.66%	3.86%	1.66%	16.29%	93.01%
Airtel	1.04%	1.39%	95.57%	0.58%	1.12%	1.64%	1.63%	99.05%
BSNL NE 1 CDMA	1.66%	17.81%	98.45%	NA	NDR	1.11%	NDR	NDR
BSNL NE 1 GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL NE 2 CDMA	6.02%	8.33%	95.09%	NA	NDR	0.71%	2.59%	100.00%
BSNL NE 2 GSM	0.72%	5.95%	81.72%	6.34%	22.16%	5.74%	13.99%	89.24%
Idea	1.86%	1.53%	95.29%	0.15%	1.17%	0.52%	1.53%	96.37%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	10.05%	1.67%	98.46%	0.76%	1.54%	0.92%	2.94%	97.26%

3.1.2 PMR DATA – FEBUARY FOR 2G

Month								
Name of Service Provider Month February	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	5.84%	38.94%	94.39%	1.04%	4.26%	1.52%	14.99%	92.61%
Airtel	0.98%	1.28%	95.58%	0.57%	1.19%	1.58%	1.57%	99.05%
BSNL NE 1 CDMA	1.43%	13.01%	98.39%	NA	NDR	1.37%	NDR	NDR
BSNL NE 1 GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL NE 2 CDMA	4.95%	8.33%	96.90%	NA	NDR	0.85%	2.59%	100.00%
BSNL NE 2 GSM	0.54%	5.46%	89.01%	7.29%	10.99%	4.86%	13.38%	96.03%
Idea	1.80%	1.23%	95.24%	0.17%	1.22%	0.49%	1.60%	96.24%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	9.35%	1.89%	98.74%	0.33%	1.26%	0.85%	2.96%	97.23%

3.1.3 PMR DATA - MARCH FOR 2G

Month								
Name of Service Provider Month March	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	6.40%	40.98%	95.59%	0.83%	3.95%	1.85%	0.70%	92.50%
Airtel	0.90%	1.32%	95.60%	0.68%	1.06%	1.43%	1.71%	98.96%
BSNL NE 1 CDMA	1.57%	15.07%	98.72%	NA	NDR	0.94%	NDR	NDR
BSNL NE 1 GSM	3.59%	5.66%	95.56%	0.19%	NDR	1.59%	0.47%	NDR
BSNL NE 2 CDMA	5.50%	10.26%	99.38%	NA	NDR	0.62%	0.56%	100.00%
BSNL NE 2 GSM	0.06%	4.89%	98.47%	1.78%	1.53%	2.42%	2.90%	95.30%
Idea	1.95%	1.39%	95.15%	0.09%	1.24%	0.59%	1.51%	96.08%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	1.65%	1.86%	98.69%	0.92%	1.31%	0.76%	2.69%	97.54%

3.2 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	5.72%	32.79%	97.29%	0.66%	1.78%	1.48%	12.71%	92.70%
Airtel	0.95%	0.00%	96.08%	0.34%	0.57%	0.76%	1.61%	99.02%
BSNL NE 1 CDMA	2.06%	2.05%	98.40%	NA	NDR	1.10%	NDR	NDR
BSNL NE 1 GSM	2.83%	2.83%	96.40%	0.05%	NDR	1.44%	2.80%	NDR
BSNL NE 2 CDMA	6.57%	7.07%	97.19%	NA	NDR	0.72%	1.95%	100.00%
BSNL NE 2 GSM	0.98%	5.89%	95.30%	3.39%	5.17%	1.48%	4.76%	97.59%
Idea	1.97%	0.95%	97.35%	0.08%	0.74%	0.44%	1.54%	96.23%
Vodafone	1.87%	0.83%	98.97%	0.73%	1.03%	0.81%	2.17%	97.34%

NDR: No data received

NA: SDCCH/ Paging channel congestion not applicable for CDMA operators. Hence, it has been reported as NA for BSNL CDMA.

BTSs Accumulated Downtime:

Aircel, BSNL GSM & CDMA (NE1) and BSNL CDMA (NE2) did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel

Worst Affected BTSs Due to Downtime:

Aircel, BSNL GSM & CDMA (NE1) and BSNL CDMA & GSM (NE2) failed to meet the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel.

Call Set-up Success Rate (CSSR):

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

SDCCH/ Paging Chl. Congestion:

BSNL GSM (NE2) failed to meet the benchmark on SDCCH / Paging Channel Congestion. BSNL NE1 GSM recorded the best SDCCH / Paging Channel Congestion.

TCH Congestion:

BSNL GSM (NE2) failed to meet the benchmark for TCH congestion, while Airtel performed the best on TCH congestion.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Idea.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and BSNL GSM (NE2) failed to meet the benchmark. Best performance was recorded for Idea.

Voice Quality

Aircel failed to meet the benchmark. Best performance was recorded for BSNL CDMA (NE2).

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.

3.2.1 3 DAY DATA - JANUARY 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	6.19%	33.28%	97.47%	0.90%	1.55%	1.52%	13.52%	93.47%
Airtel	1.17%	0.00%	96.09%	0.25%	0.57%	0.78%	1.62%	99.15%
BSNL NE 1 CDMA	3.04%	2.74%	97.76%	NA	NDR	1.14%	NDR	NDR
BSNL NE 1 GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL NE 2 CDMA	7.78%	8.33%	95.98%	NA	NDR	0.64%	2.87%	100.00%
BSNL NE 2 GSM	1.08%	5.80%	93.91%	2.83%	6.09%	3.14%	2.39%	82.56%
Idea	1.98%	0.77%	97.18%	0.08%	0.75%	0.48%	1.56%	96.46%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	1.77%	0.89%	98.76%	0.96%	1.24%	0.84%	2.75%	97.40%

3.2.2 3 DAY DATA – FEBUARY FOR 2G

3 Day								
Name of Service Provider 3 Day February	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	5.42%	31.19%	97.11%	0.57%	1.99%	1.35%	11.18%	93.12%
Airtel	1.12%	0.00%	96.04%	0.38%	0.62%	0.80%	1.69%	99.10%
BSNL NE 1 CDMA	1.52%	2.05%	98.45%	NA	NDR	1.31%	NDR	NDR
BSNL NE 1 GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL NE 2 CDMA	4.44%	5.00%	96.21%	NA	NDR	0.87%	3.16%	100.00%
BSNL NE 2 GSM	0.90%	6.98%	95.06%	2.73%	6.36%	2.76%	8.45%	94.38%
Idea	1.94%	0.76%	98.12%	0.03%	0.41%	0.44%	1.57%	96.35%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	1.81%	0.83%	99.08%	0.27%	0.92%	0.81%	1.52%	97.22%

3.2.3 3 DAY DATA - MARCH FOR 2G

3 Day								
Name of Service Provider 3 Day March	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	5.56%	33.89%	97.28%	0.50%	1.80%	1.57%	13.43%	92.79%
Airtel	0.58%	0.00%	96.10%	0.38%	0.53%	0.69%	1.51%	99.12%
BSNL NE 1 CDMA	1.61%	1.37%	98.99%	NA	NDR	0.87%	NDR	NDR
BSNL NE 1 GSM	2.83%	2.83%	96.40%	0.05%	NDR	1.44%	2.80%	NDR
BSNL NE 2 CDMA	7.26%	7.69%	99.37%	NA	NDR	0.48%	0.56%	100.00%
BSNL NE 2 GSM	0.96%	4.89%	96.94%	4.62%	3.06%	0.62%	3.41%	99.21%
Idea	1.98%	1.31%	96.76%	0.13%	1.06%	0.41%	1.50%	96.26%
Reliance GSM	No Service	No Service	No Service	No Service	No Service	No Service	No Service	No Service
Vodafone	2.04%	0.76%	99.08%	0.95%	0.92%	0.80%	2.12%	97.65%

3.3 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%
Aircel 3G	5.47%	38.21%	97.13%	0.53%	0.72%	1.36%	1.14%	98.32%
BSNL 3G	0.73%	18.11%	95.01%	3.29%	2.16%	2.44%	10.52%	NDR
Reliance 3G	0.64%	0.66%	98.50%	0.55%	0.02%	0.81%	1.02%	99.81%

NDR: Data were not submitted by Airtel and Reliance

Following are the parameter wise observations for wireless operators for North East circle:

Node Bs downtime:

Aircel 3G failed to meet the benchmark. Minimum Node Bs downtime was recorded for Reliance 3G at 0.64%.

Worst affected Node Bs due to downtime:

Aircel 3G and BSNL 3G failed to meet the benchmark. Minimum Worst affected Node Bs due to downtime was recorded for Reliance 3G at 0.66%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Reliance 3G with 98.50%.

RRC Congestion:

BSNL3G failed to meet the benchmark for RRC Congestion. The maximum RRC Congestion was observed for Airtel with 0.53%.

Circuit Switched RAB Congestion:

BSNL 3G failed to meet the TRAI benchmark for Circuit Switched RAB Congestion.

Circuit Switched Voice Call Drop Rate:

BSNL 3G failed to meet the benchmark for Circuit Switched Voice Call Drop Rate. The maximum Circuit Switched Voice Call Drop Rate was observed for Reliance 3G.

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

BSNL 3G failed to meet the benchmark. Best performance was recorded for Reliance 3G.

Circuit Switch Voice Quality:

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

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.

3.3.1 PMR DATA - JANUARY FOR 3G

Month								
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	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	4.85%	33.26%	97.64%	0.13%	1.57%	1.20%	11.54%	97.91%
BSNL 3G	0.61%	32.22%	92.81%	4.10%	0.54%	2.53%	17.04%	NDR
Reliance 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

3.3.2 PMR DATA – FEBUARY FOR 3G

Month								
Name of Service Provider Month February	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%
Aircel 3G	5.05%	34.10%	96.60%	0.49%	0.46%	1.46%	13.91%	99.41%
BSNL 3G	0.59%	18.52%	95.93%	4.07%	4.04%	2.52%	12.87%	NDR
Reliance 3G	0.98%	1.29%	97.11%	0.98%	0.02%	1.42%	1.79%	99.78%

3.3.3 PMR DATA - MARCH FOR 3G

Month								
Name of Service Provider Month March	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%
Aircel 3G	6.35%	46.08%	97.14%	0.98%	0.14%	1.39%	0.44%	97.75%
BSNL 3G	0.98%	4.76%	96.28%	1.70%	1.91%	2.29%	2.38%	NDR
Reliance 3G	0.28%	0.00%	99.88%	0.11%	0.02%	0.00%	0.26%	99.85%

3.4 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%
Aircel 3G	5.18%	32.04%	97.27%	0.04%	0.01%	1.49%	1.39%	98.32%
BSNL 3G	0.67%	8.87%	95.35%	5.32%	2.38%	2.04%	5.83%	NDR
Reliance 3G	1.51%	0.66%	99.49%	0.11%	0.01%	0.59%	1.02%	99.84%

NDR: - No data received

Node Bs downtime:

Aircel 3G failed to meet the benchmark. Minimum Node Bs downtime was recorded for Idea at 0.67%.

Worst affected Node Bs due to downtime:

Aircel 3G and BSNL 3G failed to meet the benchmark. Minimum Worst affected Node Bs due to downtime was recorded for Idea at 0.66%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Aircel with 99.49%.

RRC Congestion:

BSNL 3G failed to meet the benchmark for RRC Congestion. The minimum RRC Congestion was observed for Aircel 3G with 0.04%.

Circuit Switched RAB Congestion:

BSNL 3G failed to meet the TRAI benchmark for Circuit Switched RAB Congestion.

Circuit Switched Voice Call Drop Rate:

BSNL 3G failed to meet the benchmark for Circuit Switched Voice Call Drop Rate. The maximum Circuit Switched Voice Call Drop Rate was observed for Reliance 3G with 0.59%.

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

BSNL 3G failed to meet the benchmark. Best performance was recorded for Reliance 3G at 1.02%.

Circuit Switch Voice Quality:

All operators met the benchmark. Best performance was recorded for Aircel at 97.92%.

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

3.4.1 3 DAY DATA - JANUARY FOR 3G

3 Day								
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%
Aircel 3G	4.57%	28.51%	98.63%	0.04%	0.01%	1.17%	1.64%	98.03%
BSNL 3G	0.51%	11.85%	91.38%	9.44%	2.06%	2.80%	7.78%	NDR
Reliance 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

3.4.2 3 DAY DATA – FEBUARY FOR 3G

3 Day								
Name of Service Provider 3 Day February	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%
Aircel 3G	4.03%	25.22%	96.90%	0.02%	0.02%	1.59%	2.17%	97.88%
BSNL 3G	0.48%	10.37%	97.17%	3.37%	2.83%	2.48%	7.02%	NDR
Reliance 3G	2.50%	1.29%	98.99%	0.19%	0.01%	1.16%	1.79%	99.83%

3.4.3 3 DAY DATA - MARCH FOR 3G

3 Day								
Name of Service Provider 3 Day March	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%
Aircel 3G	6.75%	41.29%	96.27%	0.04%	0.01%	1.65%	0.49%	97.88%
BSNL 3G	1.01%	4.76%	97.51%	3.16%	2.24%	0.85%	2.95%	NDR
Reliance 3G	0.47%	0.00%	99.98%	0.02%	0.01%	0.01%	0.26%	99.85%

3.5 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	99.54%	99.00%	1.16%	99.54%	99.00%	0.96%
Airtel	NDR	NDR	NDR	NDR	NDR	NDR
BSNL NE 1 CDMA	NDR	NDR	NDR	NDR	NDR	NDR
BSNL NE 1 GSM	NDR	NDR	NDR	NDR	NDR	NDR
BSNL NE 2 CDMA	NDR	NDR	NDR	NDR	NDR	NDR
BSNL NE 2 GSM	100.00%	95.53%	1.44%	100.00%	96.51%	1.34%
Idea	NDR	99.60%	0.20%	NDR	NDR	NDR
Vodafone	NDR	NDR	NDR	NDR	NDR	NDR

NDR: No data received from Operators

Following are the parameter wise observations for wireless operators for North East circle:

Activation done within 4 hours:

All operators met the benchmark for Activation done within 4 hours, however most of the operators not submitted data.

PDP Context activation success rate:

All operators met the benchmark for PDP Context activation success rate, however most of the operators not submitted data.

Drop Rate:

All operators met the benchmark for Drop Rate, however most of the operators not submitted data.

3.6 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%
Aircel 3G	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	NDR	NDR	NDR	NDR	NDR	NDR
Reliance 3G	100.00%	96.30%	1.34%	NDR	NDR	NDR

NDR:- No data received from operators

Following are the parameter wise observations for wireless operators for North East circle:

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

3.7 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	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel	71.00%	75.00%	100.00%	97.96%	79.43%	85.00%
Airtel	59.00%	59.00%	100.00%	100.00%	82.27%	63.00%
BSNL NE 1 CDMA	NDR	NDR	100.00%	96.25%	80.14%	NDR
BSNL NE 1 GSM	NDR	NDR	100.00%	91.18%	73.76%	80.00%
BSNL NE 2 CDMA	57.00%	57.00%	100.00%	69.74%	78.72%	63.00%
BSNL NE 2 GSM	82.00%	83.00%	100.00%	96.63%	77.30%	80.00%
Idea	86.00%	86.00%	100.00%	100.00%	84.40%	69.00%
Vodafone	62.00%	62.00%	100.00%	100.00%	80.14%	73.00%

NDR: Data to conduct live calling for resolution of complaints and service requests was not available at the central billing center of BSNL NE 1 CDMA & GSM. Hence, live calling for these parameters has not been conducted for the operator.

Resolution of billing complaints

As per the consumers (live calling exercise) none of the operators was able to meet the benchmark of resolving 98% complaints within 4 weeks and 100% complaints within 6 weeks.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all operators met the TRAI benchmark for Accessibility of Call Centre/ Customer Care-IVR of 95%.

Customer Care / Helpline Assessment (voice to voice)

BSNL GSM (NE1) and BSNL CDMA (NE2) failed to meet the benchmark for the parameter Customer Care / Helpline Assessment (voice to voice).

Level 1 Service

As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered. The details of live calling done for the level 1 service have been provided in the annexure for each operator.

It was also observed that a number of Category-I (i.e. mandatory) services were not being operated by most of the operators.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. Vodafone recorded the best performance at 92%.

3.8 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
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel	0.01%	0.01%	100.00%	100.00%	100.00%	96.15%	94.11%
Airtel	0.02%	0.01%	100.00%	100.00%	100.00%	100.00%	93.06%
BSNL NE 1 CDMA	0.13%	0.02%	100.00%	100.00%	100.00%	100.00%	98.61%
BSNL NE 1 GSM	NDR	NDR	NDR	NDR	100.00%	100.00%	97.26%
BSNL NE 2 CDMA	NDR	NDR	NDR	NDR	100.00%	100.00%	97.26%
BSNL NE 2 GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Idea	0.18%	0.04%	100.00%	100.00%	100.00%	100.00%	99.90%
Vodafone	0.07%	0.06%	100.00%	100.00%	100.00%	99.99%	100.00%

NDR: Data to conduct audit for metering and billing, resolution of billing complaints, response time for customer assistance and customer care was not available at the central billing center/ customer service center of BSNL. Hence, audit for these parameters has not been conducted for the operator.

Metering and Billing Credibility – Postpaid Subscribers

For the billing disputes of post-paid subscribers, it was observed that BSNL CDMA (NE1) and Idea failed to meet the TRAI benchmark for the parameter. Aircel had the best performance with 0.01% billing disputes.

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, all operators met the benchmark of charging disputes. Airtel performed the best with 0.01% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 100% complaints within 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.

Customer Care Percentage of calls answered by the IVR

All operators met the benchmark of 95% IVR call being attended

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

Aircel and Airtel failed to meet the TRAI specified benchmark of 95%. Vodafone recorded the best performance for the parameter.

3.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment									
Inter operator call Assessment To↓ From→	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Aircel	NA	98.00%	95.00%	95.00%	93.00%	96.00%	97.00%	97.00%	95.00%
Airtel	91.00%	NA	93.00%	93.00%	93.00%	94.00%	94.00%	95.00%	97.00%
BSNL NE 1 CDMA	91.00%	96.00%	NA	94.00%	95.00%	92.00%	98.00%	96.00%	96.00%
BSNL NE 1 GSM	89.00%	96.00%	95.00%	NA	97.00%	93.00%	96.00%	94.00%	97.00%
BSNL NE 2 CDMA	93.00%	96.00%	93.00%	93.00%	NA	91.00%	95.00%	96.00%	95.00%
BSNL NE 2 GSM	91.00%	96.00%	92.00%	92.00%	96.00%	NA	99.00%	96.00%	96.00%
Idea	93.00%	95.00%	96.00%	94.00%	97.00%	96.00%	NA	95.00%	98.00%
Reliance GSM	93.00%	96.00%	94.00%	92.00%	99.00%	93.00%	94.00%	NA	96.00%
Vodafone	94.00%	95.00%	92.00%	94.00%	95.00%	94.00%	96.00%	98.00%	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 faced problems in connecting to other operators.

3.10 PMR COMPARISON WITH IMRB AND OPERATORS DATA 2G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	BTSs Accumulated downtime (not available for service)		Worst affected BTSs due to downtime		Call Set-up Success Rate		SDCCH/ Paging Chl. Congestion		TCH Congestion		Call drop rate		Worst affected cells having more than 3%		Connection with good voice quality			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Aircel	6.08%	5.95%	37.50%	37.48%	95.01%	95.01%	0.84%	0.84%	4.02%	4.02%	1.68%	1.67%	16.31%	1.60%	92.71%	92.70%	0.00%	0.00%
Airtel	1.03%	0.98%	1.33%	1.33%	95.58%	95.58%	0.58%	0.61%	1.14%	1.12%	1.59%	1.55%	1.61%	1.64%	99.04%	99.02%	0.00%	0.00%
BSNL	2.43%	2.02%	6.84%	5.55%	96.31%	92.64%	1.97%	2.66%	2.69%	11.56%	2.56%	2.96%	5.25%	5.28%	94.27%	93.58%	0.00%	0.00%
Idea	1.91%	1.87%	1.38%	1.38%	95.23%	95.23%	0.14%	0.14%	1.21%	1.21%	0.53%	0.53%	1.55%	1.55%	96.23%	96.23%	0.00%	0.00%
Vodafone	1.67%	6.98%	1.81%	1.81%	98.63%	98.63%	0.67%	0.67%	1.37%	1.37%	0.84%	0.84%	2.86%	2.86%	97.34%	97.34%	0.00%	0.00%

3.11 PMR COMPARISON WITH IMRB AND OPERATORS DATA 3G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	Node Bs downtime (not available for service)		Worst affected Node Bs due to downtime		CSSR		RRC Congestion		Circuit Switched RAB Congestion		Call drop rate		Worst affected cells having more than 3% Circuit switched		%Circuit Switch Voice Quality (CSV quality)			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Aircel	5.53%	5.47%	37.81%	38.21%	97.13%	97.13%	0.53%	0.53%	0.72%	0.72%	1.35%	1.36%	12.87%	1.14%	98.36%	98.32%	0.00%	0.00%
BSNL	1.58%	0.73%	5.57%	18.11%	96.00%	95.01%	1.67%	3.29%	2.13%	2.16%	2.20%	2.44%	2.70%	10.52%	96.08%	NDR	0.00%	0.00%
RTL	0.74%	0.64%	0.88%	0.66%	98.20%	98.50%	0.51%	0.55%	0.03%	0.02%	0.89%	0.81%	1.23%	1.02%	99.80%	99.81%	0.00%	0.00%

4 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Aircel, BSNL GSM NE2, BSNL CDMA (NE2) and Vodafone failed to meet the benchmark for BTS Accumulated downtime.
- Aircel, BSNL CDMA & GSM (NE1) and BSNL CDMA & GSM (NE2) failed to meet the benchmark for worst affected BTSs due to downtime.
- BSNL GSM (NE2) failed to meet the benchmark for CSSR.
- BSNL GSM (NE2) failed to meet the benchmark on SDCCH / Paging Channel Congestion.
- Aircel and BSNL GSM (NE2) failed to meet the benchmark for TCH congestion.
- BSNL GSM (NE2) failed to meet the benchmark for the parameter call drop rate.
- BSNL GSM (NE2) failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.
- Aircel and BSNL GSM (NE2) failed to meet the benchmark for Voice Quality.

3 Day Live Measurement (Network Parameters) for 2G

- Aircel, BSNL GSM & CDMA (NE1) and BSNL CDMA (NE2) failed to meet the benchmark for BTS Accumulated downtime.
- Aircel, BSNL GSM & CDMA (NE1) and BSNL CDMA & GSM (NE2) failed to meet the benchmark for worst affected BTSs due to downtime.
- BSNL GSM (NE2) failed to meet the benchmark on SDCCH / Paging Channel Congestion.
- BSNL GSM (NE2) failed to meet the benchmark for TCH congestion.
- Aircel and BSNL GSM (NE2) failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.
- Aircel failed to meet the benchmark for Voice Quality.

PMR Consolidated (Network Parameters) for 2G

- Aircel 3G failed to meet the benchmark for Node Bs downtime.
- Aircel 3G and BSNL 3G failed to meet the benchmark for worst affected Node Bs due to downtime.
- BSNL 3G failed to meet the benchmark for RRC Congestion.
- BSNL 3G failed to meet the TRAI benchmark for Circuit Switched RAB Congestion
- BSNL 3G failed to meet the benchmark for Circuit Switched Voice Call Drop Rate.
- Aircel and BSNL 3G failed to meet the benchmark for worst affected cells having more than 3% Circuit switched voice drop rate.

3 Day Live Measurement (Network Parameters) for 2G

- Aircel 3G did not meet the benchmark for Node Bs downtime.
- Aircel 3G and BSNL 3G failed to meet the benchmark for worst affected Node Bs due to downtime.
- BSNL 3G failed to meet the benchmark for RRC Congestion.
- BSNL 3G failed to meet the TRAI benchmark for Circuit Switched RAB Congestion
- BSNL 3G failed to meet the benchmark for Circuit Switched Voice Call Drop Rate.
- Aircel and BSNL 3G failed to meet the benchmark for worst affected cells having more than 3% Circuit switched voice drop rate.

Live Calling

- As per the consumers (live calling exercise) none of the operators was able to meet the benchmark of resolving 98% complaints within 4 weeks and 100% complaints within 6 weeks.
- As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered. The details of live calling done for the level 1 service have been provided in the annexure for each operator.
- BSNL GSM (NE1) and BSNL CDMA (NE2) failed to meet the benchmark for the parameter Customer Care / Helpline Assessment (voice to voice)

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that BSNL CDMA (NE1) and Idea failed to meet the TRAI benchmark for the parameter.

Customer Care

- Aircel and Airtel failed to meet the TRAI benchmark of Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds

Drive test (Voice 2G)

- In Mezoram SSA Vodafone 2G did not meet the benchmark in outdoor locations; however BSNL 2G NE1 GSM did not meet the benchmark in indoor as well as outdoor locations.
- In Mezoram SSA BSNL 2G NE1 GSM failed to meet the benchmark for CSSR in indoor as well as outdoor locations.
- In Mezoram SSA Vodafone 2G failed to meet the benchmark for call drop rate in outdoor locations.

- In Meghalaya SSA BSNL NE1 GSM and Vodafone failed to meet the benchmark for voice quality in outdoor locations.
- In Meghalaya SSA Vodafone 2G failed to meet the benchmark for CSSR in outdoor locations, however BSNL NE1 GSM failed to meet the benchmark in indoor as well as outdoor locations.

Drive test (Voice 3G)

- In Mezoram SSA Airtel 3G failed to meet the benchmark for voice quality in outdoor locations.
- In Mezoram SSA Aircel 3G failed to meet the benchmark for CSSR in outdoor locations, however BSNL 3G failed to meet the benchmark in indoor as well as outdoor locations.
- In Mezoram SSA BSNL 3G and Vodafone 3G failed to meet the benchmark for call drop rate in outdoor locations.
- In Meghalaya SSA Airtel 3G, Aircel 3G and BSNL 3G failed to meet the benchmark for voice quality in outdoor locations.
- In Meghalaya SSA BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor locations.
- In Meghalaya SSA Aircel 3G failed to meet the benchmark for call drop rate in outdoor locations, however BSNL 3G failed in indoor as well as outdoor locations.

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

5.1 BTS ACCUMULATED DOWNTIME

5.1.1 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 –**

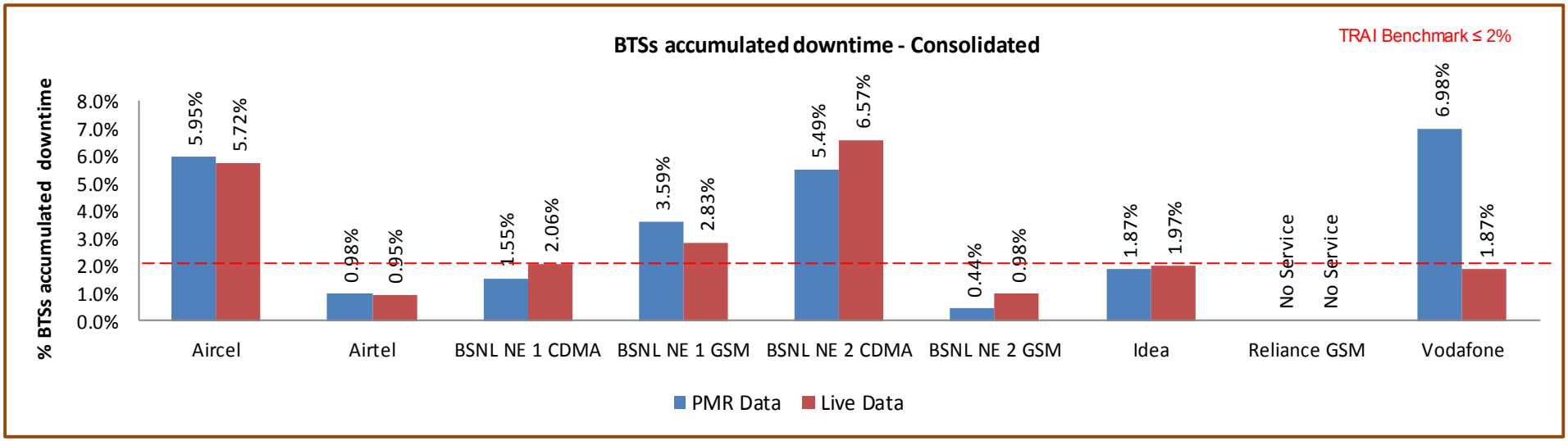
    a. BTSs Accumulated downtime (not available for service) ≤ 2%

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.

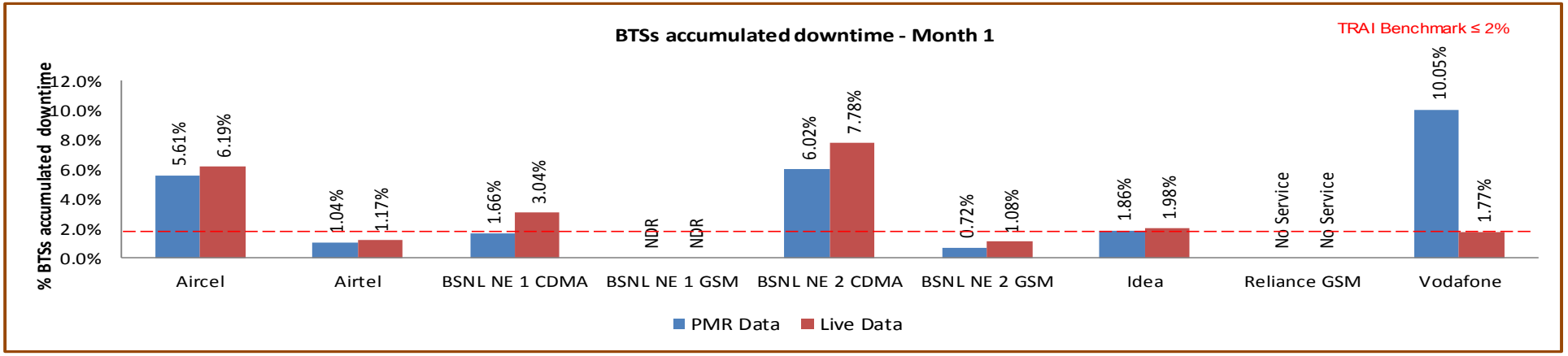
5.1.2 KEY FINDINGS - CONSOLIDATED



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

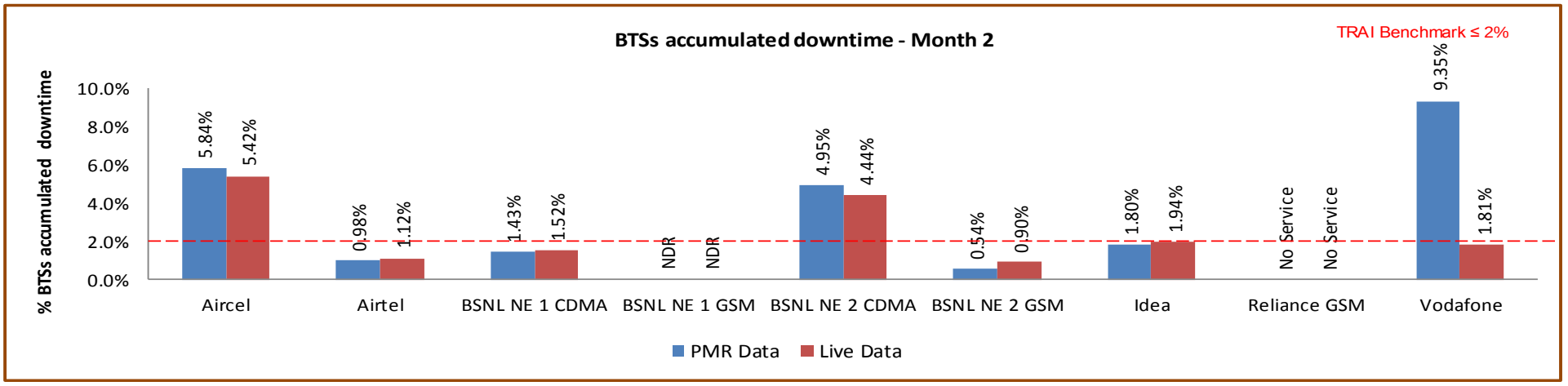
Aircel, BSNL GSM NE1, BSNL CDMA (NE2) and Vodafone did not meet the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

5.1.2.1 KEY FINDINGS – MONTH 1



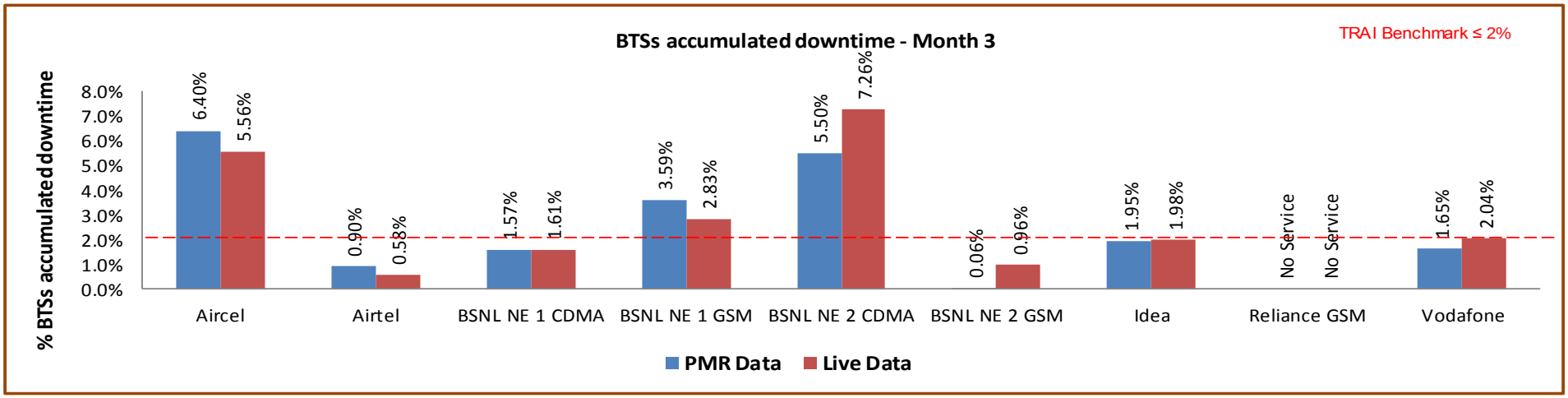
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.2 KEY FINDINGS – MONTH 2



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

5.1.2.3 KEY FINDINGS – MONTH 3



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

\

5.2 WORST AFFECTED BTS DUE TO DOWNTIME

5.2.1 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.

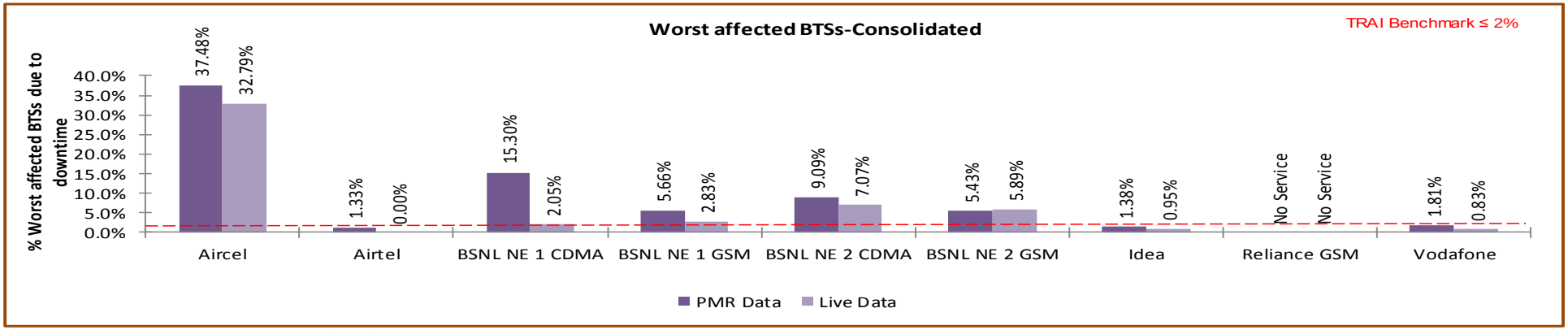
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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.

5.2.2 KEY FINDINGS – CONSOLIDATED

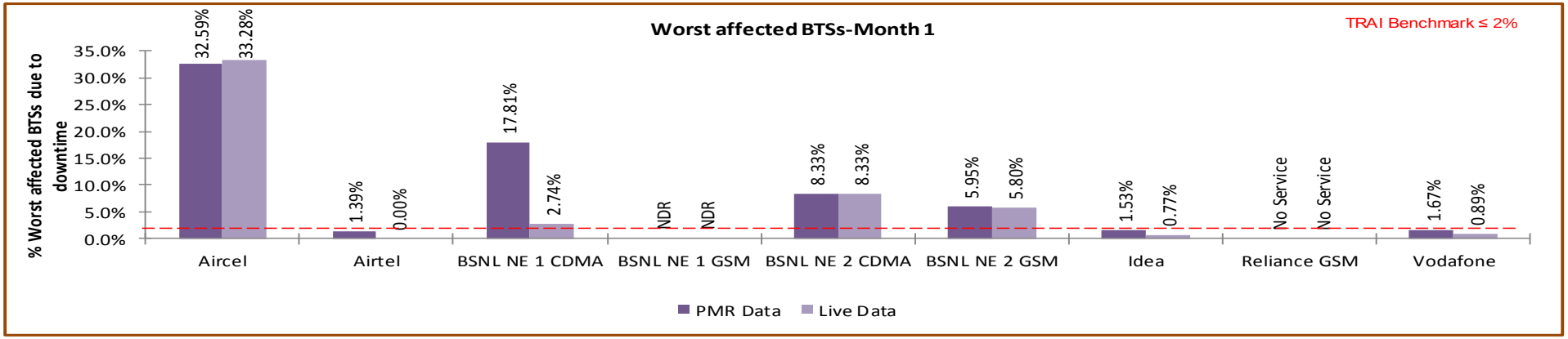


Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel, BSNL NE1 GSM & CDMA and BSNL NE2 GSM & CDMA did not meet the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

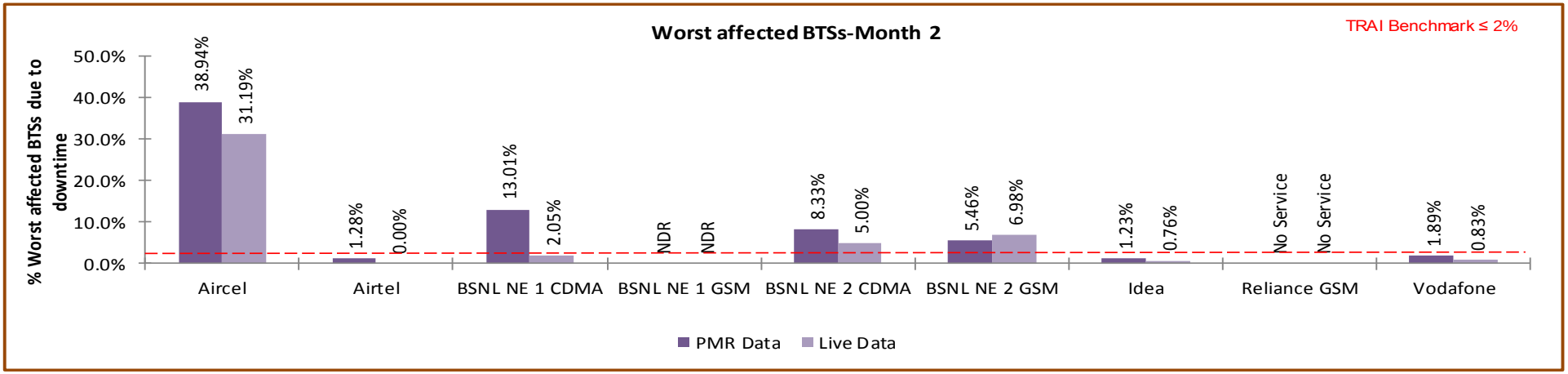
Significant difference was observed between PMR & live measurement data for Aircel and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.2.2.1 KEY FINDINGS – MONTH 1



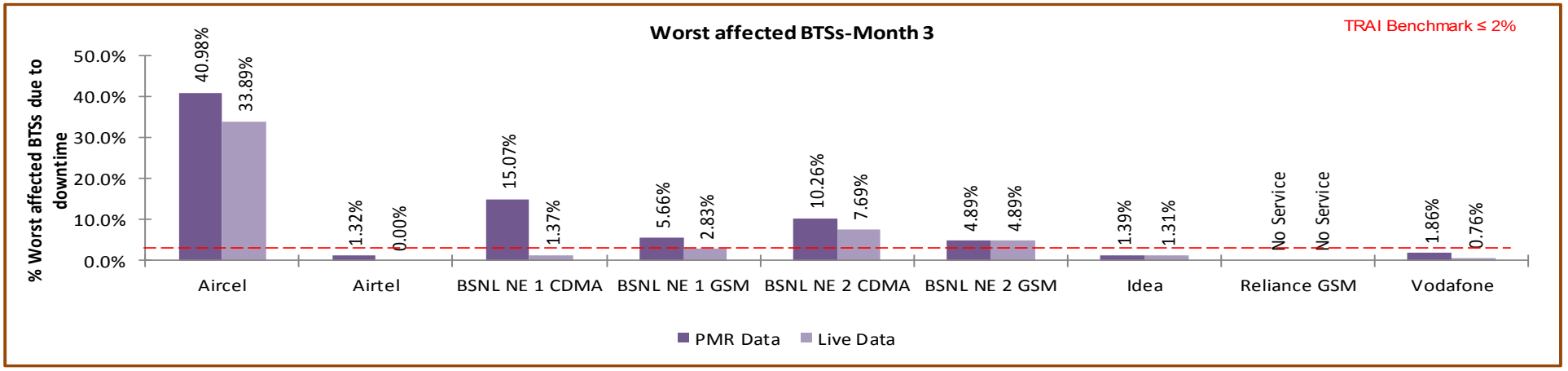
Data Source: Operations and Maintenance Center (OMC) of the operators

5.2.2.2 KEY FINDINGS – MONTH 2



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

5.2.2.3 KEY FINDINGS – MONTH 3



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

5.3 CALL SET UP SUCCESS RATE

5.3.1 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

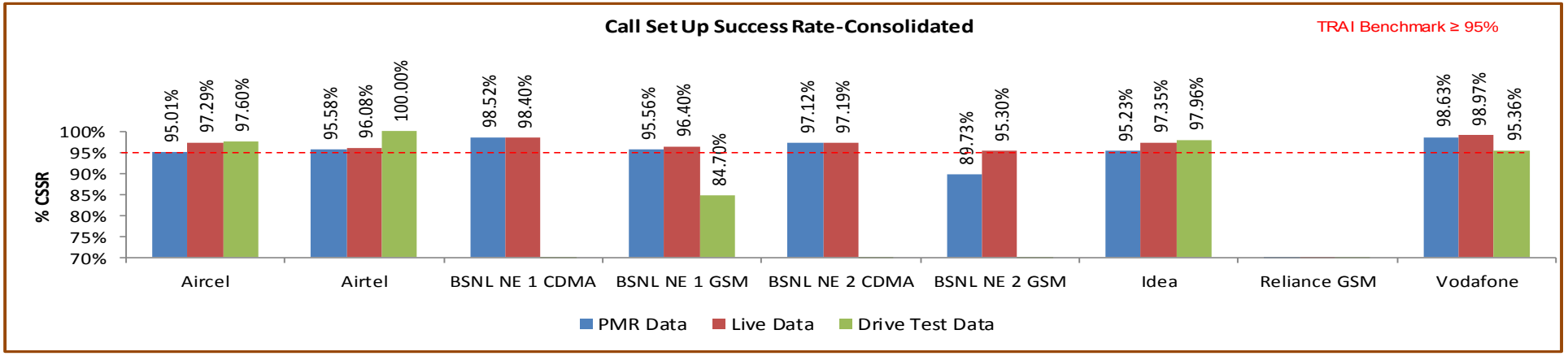
   Call Established means the following events have happened in call setup:-

   - 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.

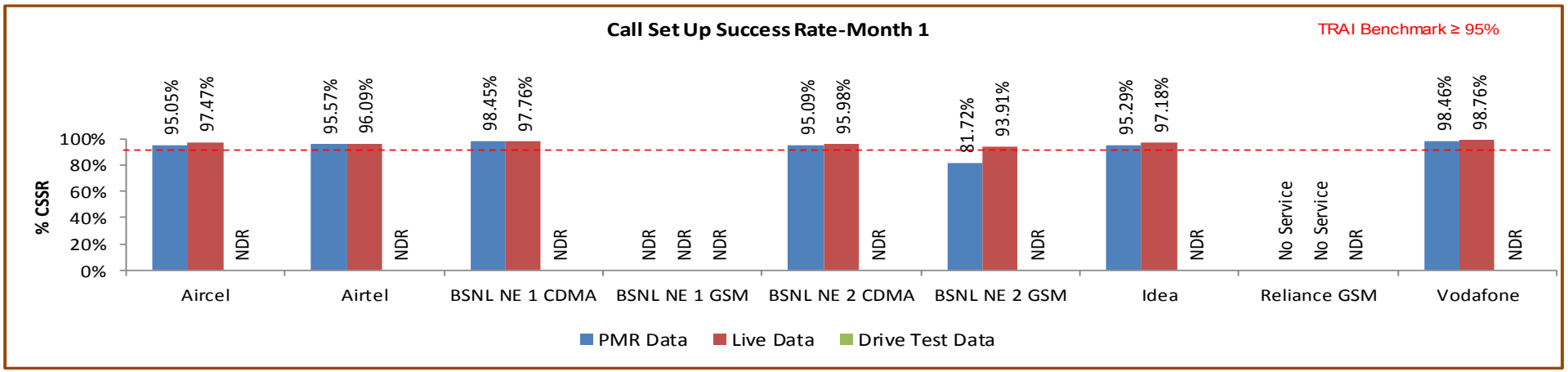
5.3.2 KEY FINDINGS - CONSOLIDATED



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

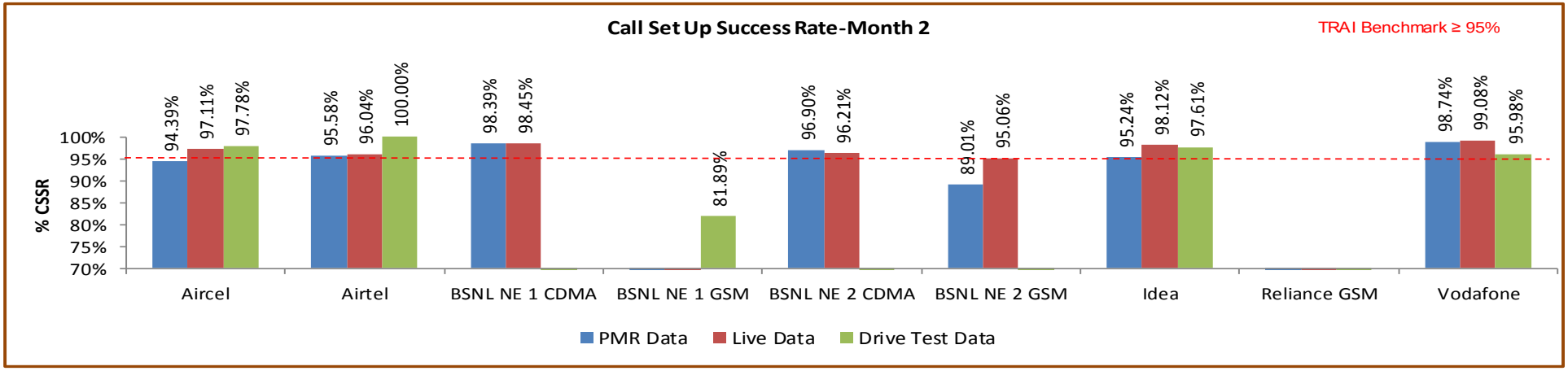
BSNL NE2 GSM failed to meet the TRAI benchmark as per audit/PMR data. During drive test BSNL NE 1 GSM failed to meet the benchmark.

5.3.2.1 KEY FINDINGS – MONTH 1

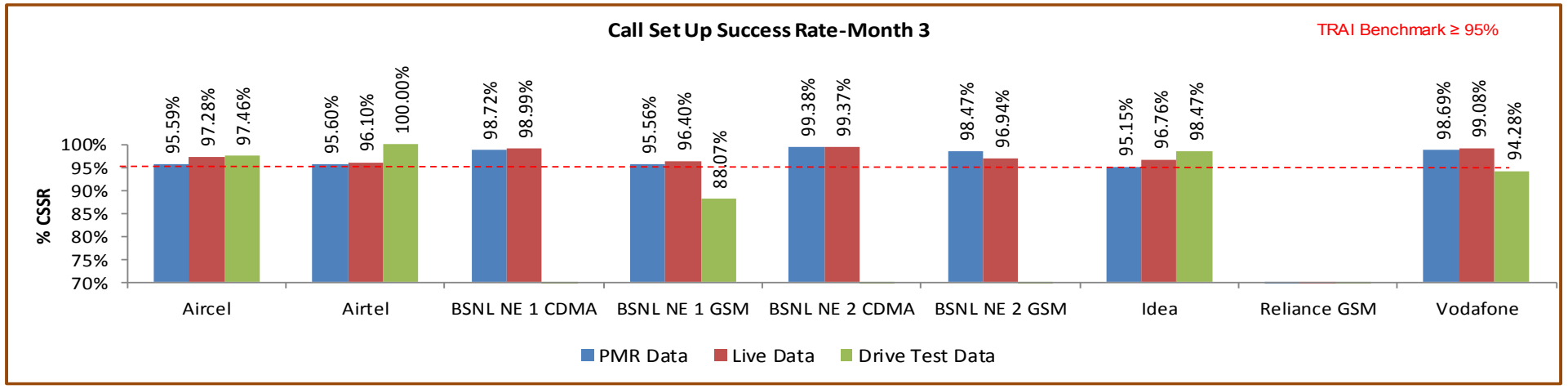


Data Source: Network Operations Center (NOC) of the operators

5.3.2.2 KEY FINDINGS – MONTH 2



5.3.2.3 KEY FINDINGS – MONTH 3



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

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

5.4.1 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

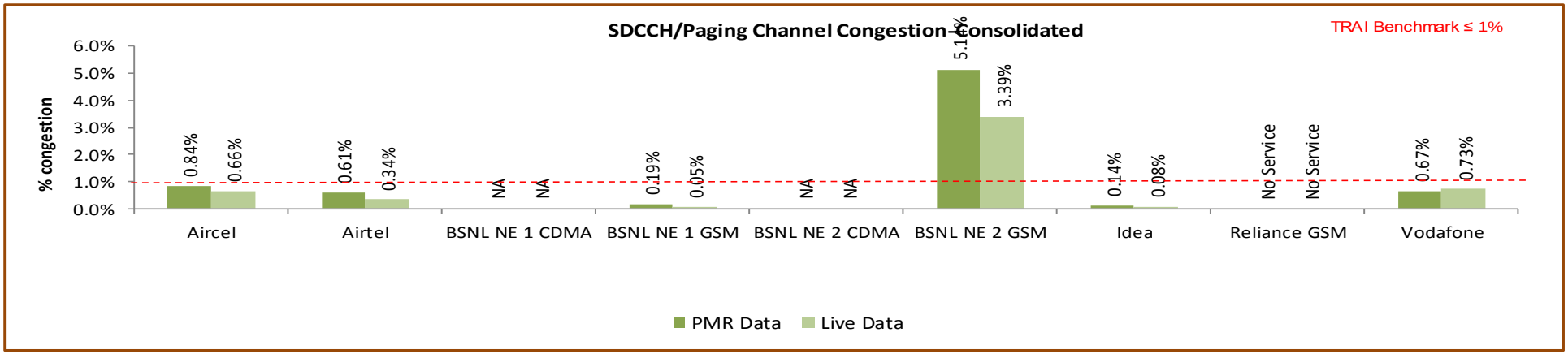
3. Benchmark:

- 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

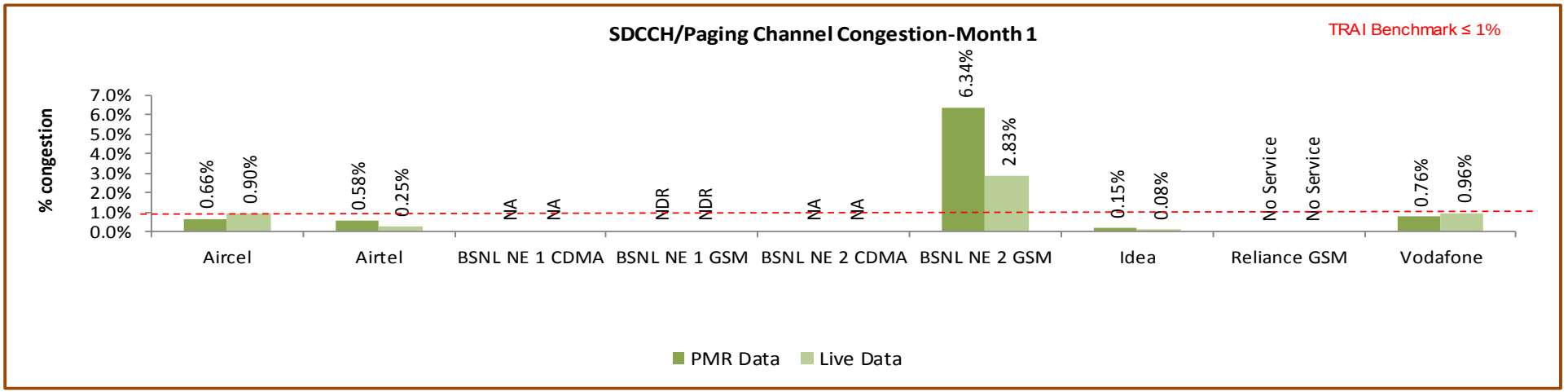
5.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)



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

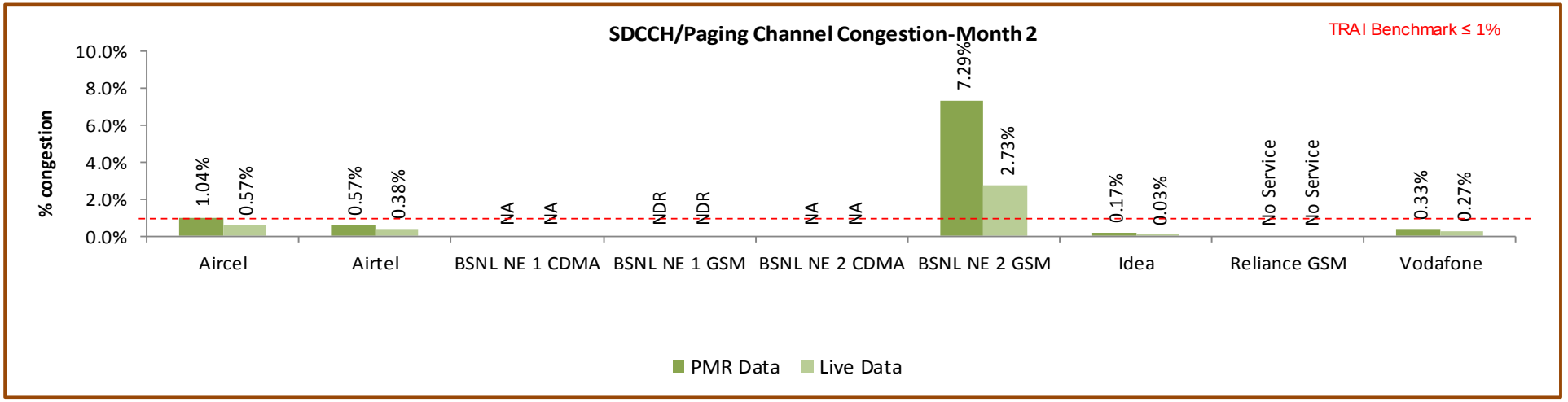
BSNL NE2 GSM failed to meet the benchmark as per PMR/audit Data.

5.4.2.1 KEY FINDINGS – MONTH 1



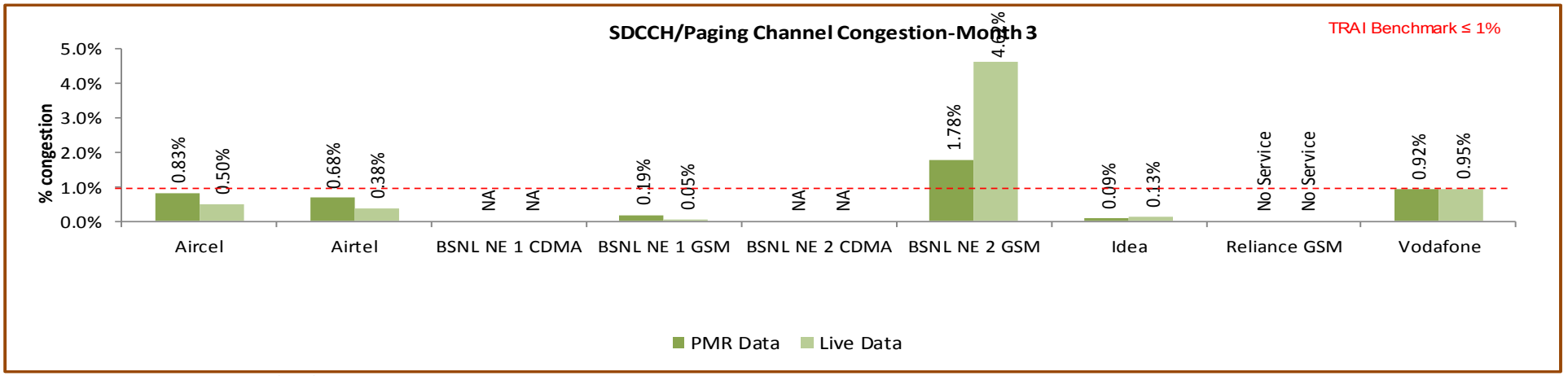
Data Source: Network Operations Center (NOC) of the operators

5.4.2.2 KEY FINDINGS – MONTH 2



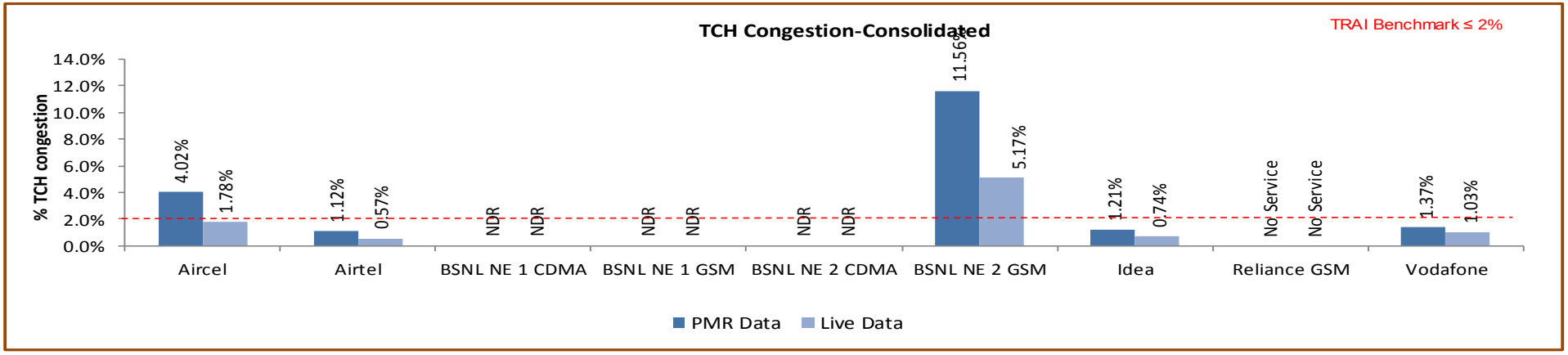
Data Source: Network Operations Center (NOC) of the operators

5.4.2.3 KEY FINDINGS – MONTH 3



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

5.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

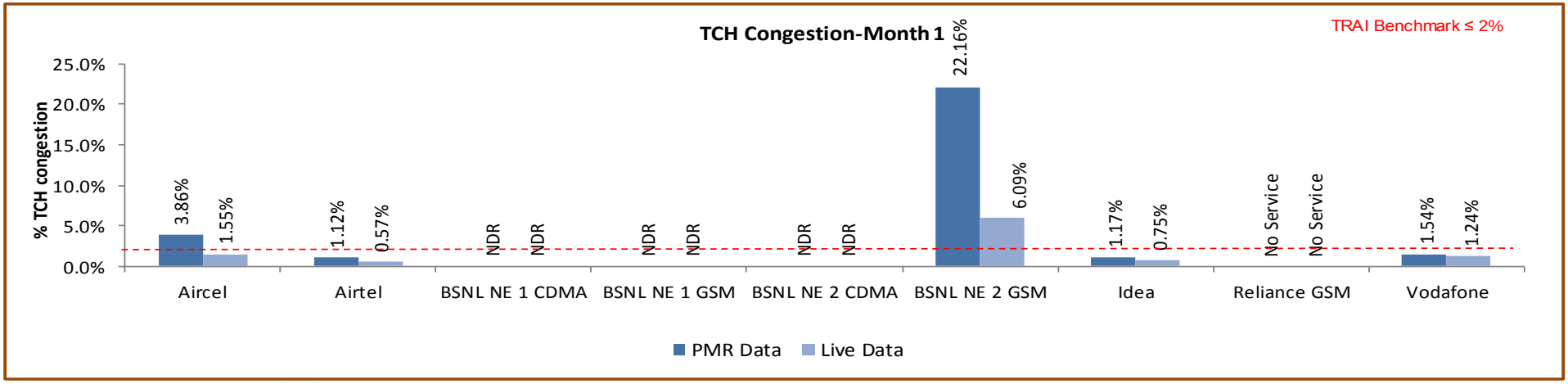


Data Source: Network Operations Center (NOC) of the operators

Aircel and BSNL NE2 GSM failed to meet the benchmark as per audit/PMR report.

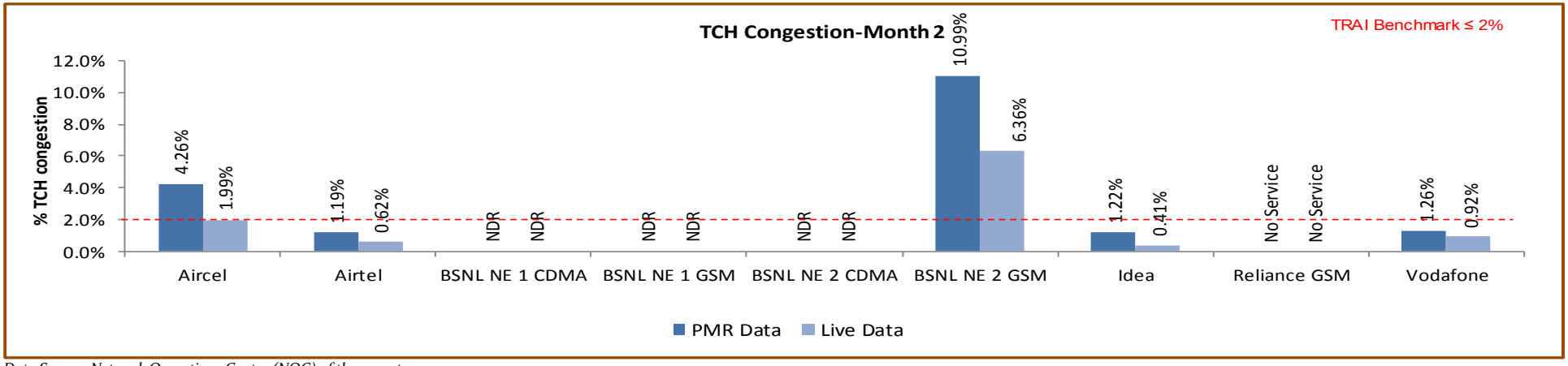
Significant difference was observed between PMR & live measurement data for Aircel, BSNL NE2 GSM and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.4.3.1 KEY FINDINGS – MONTH 1



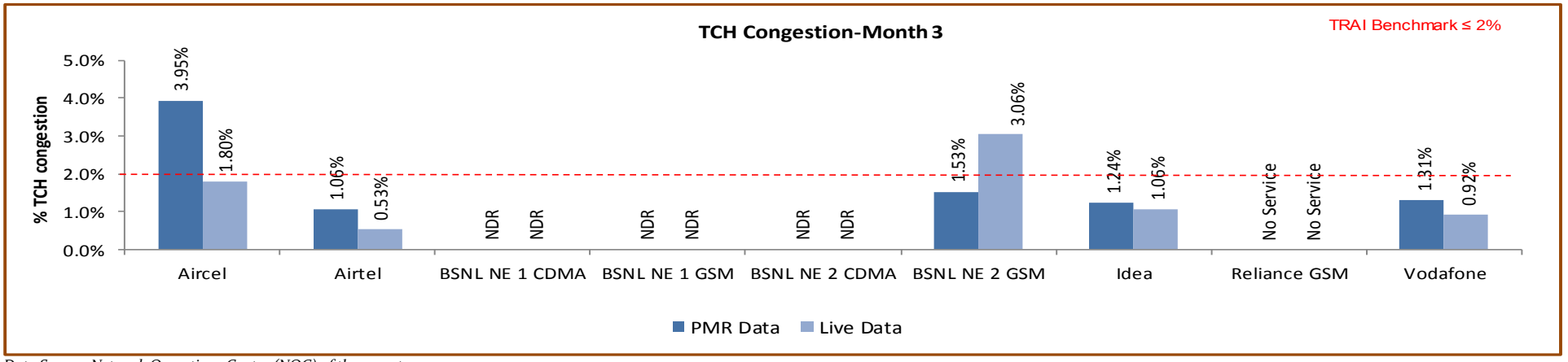
Data Source: Network Operations Center (NOC) of the operators

5.4.3.2 KEY FINDINGS – MONTH 2



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

5.4.3.3 KEY FINDINGS – MONTH 3



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

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

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	39	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		136623	214203	0	0	0	0	53092	No Service	92602917
Traffic served for all POIs (B)- in erlangs		83095	65527	0	0	0	0	29759	No Service	27911116
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	39	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		136623	196808	0	0	0	0	52655	No Service	2987191
Traffic served for all POIs (B)- in erlangs		77833	63537	0	0	0	0	29201	No Service	725707
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

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

5.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-January										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45533	71753	0	0	0	0	17620	No Service	30852838
Traffic served for all POIs (B)- in erlangs		27534	21711	0	0	0	0	9240	No Service	11969796
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45533	70670	0	0	0	0	17577	No Service	995253
Traffic served for all POIs (B)- in erlangs		24639	20549	0	0	0	0	8859	No Service	229333
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

5.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-February										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45533	73525	0	0	0	0	17592	No Service	30852838
Traffic served for all POIs (B)- in erlangs		27159	22105	0	0	0	0	10237	No Service	7082647
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45533	73525	0	0	0	0	17432	No Service	995253
Traffic served for all POIs (B)- in erlangs		26486	22105	0	0	0	0	10184	No Service	242850
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

5.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-March										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45557	68925	0	0	0	0	17880	No Service	30897241
Traffic served for all POIs (B)- in erlangs		28402	21711	0	0	0	0	10282	No Service	8858673
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45557	52613	0	0	0	0	17646	No Service	996685
Traffic served for all POIs (B)- in erlangs		26708	20883	0	0	0	0	10158	No Service	253524
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

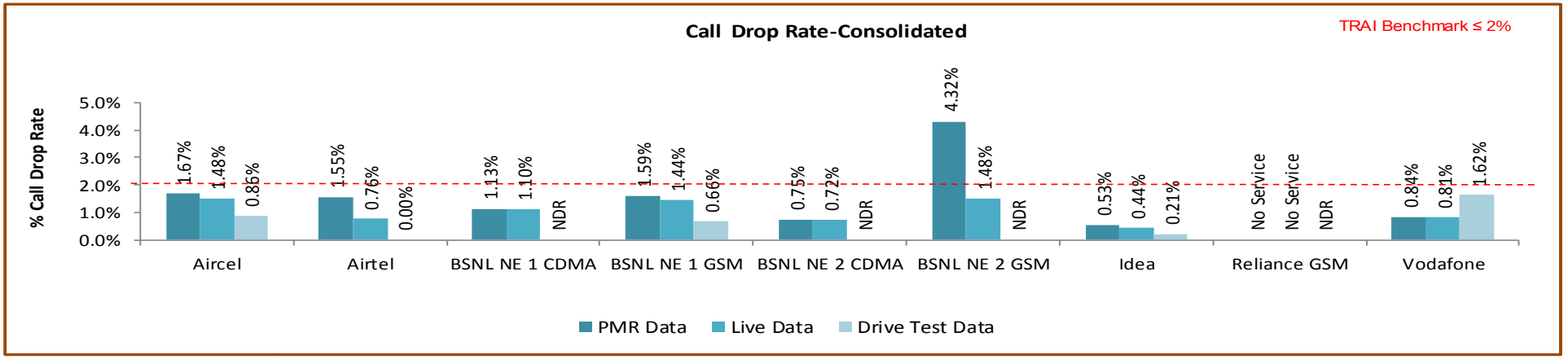
Data Source: Network Operations Center (NOC) of the operators

5.5 CALL DROP RATE

5.5.1 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.

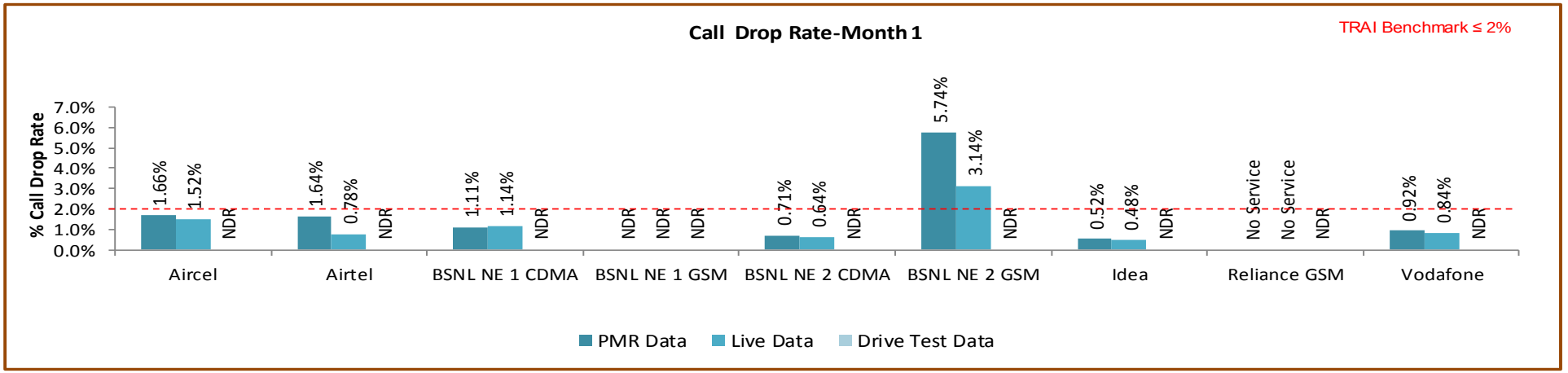
5.5.2 KEY FINDINGS - CONSOLIDATED



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

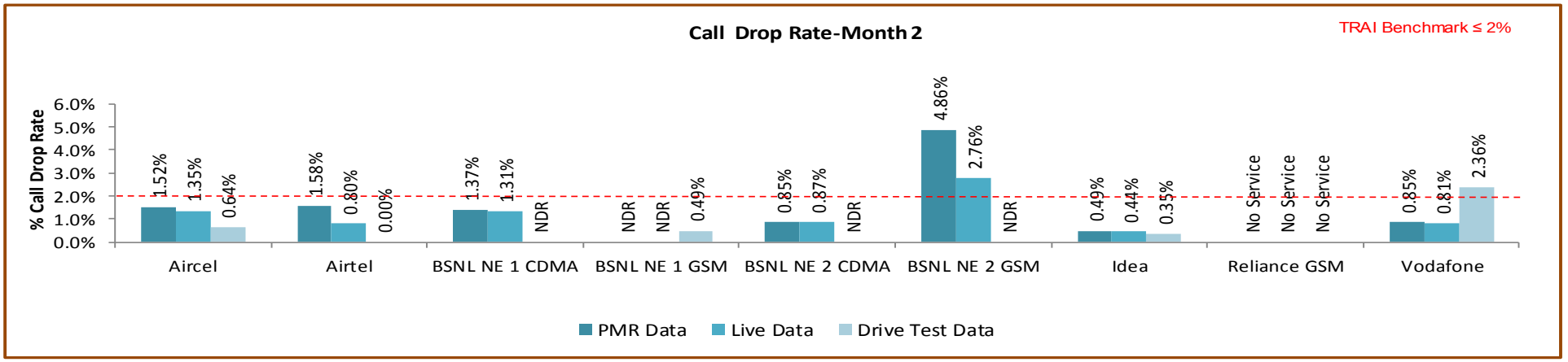
BSNL NE2 GSM failed to meet the benchmark for call drop rate during audit.

5.5.2.1 KEY FINDINGS – MONTH 1



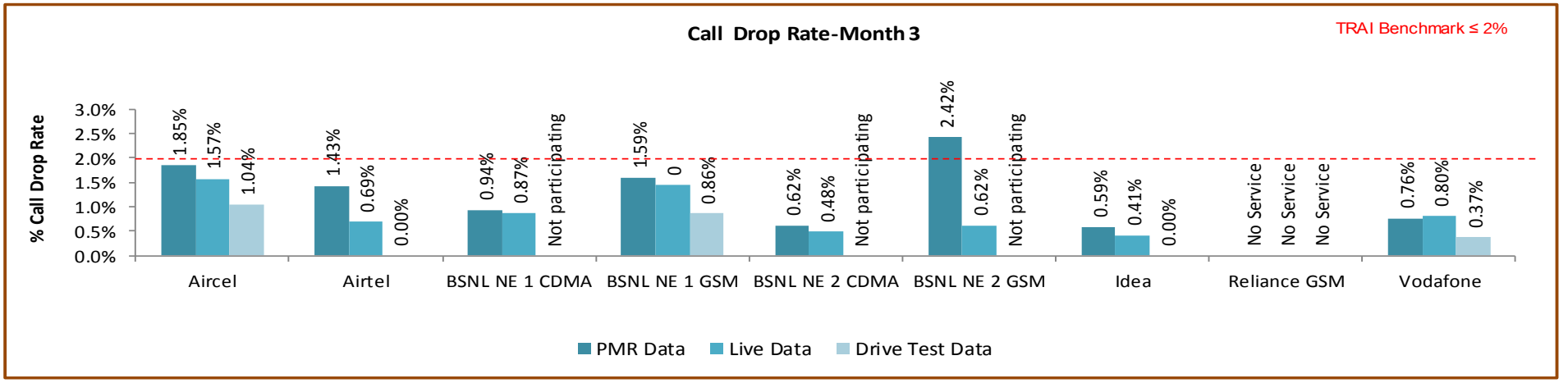
Data Source: Network Operations Center (NOC) of the operators

5.5.2.2 KEY FINDINGS – MONTH 2



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

5.5.2.3 KEY FINDINGS – MONTH 3



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

5.6 CELLS HAVING GREATER THAN 3% TCH DROP

5.6.1 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 –**

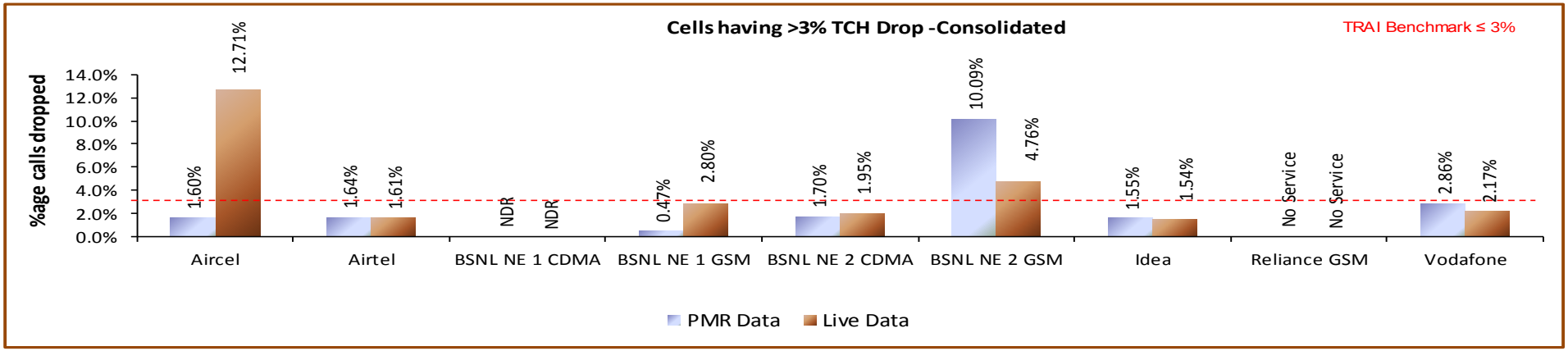
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

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.

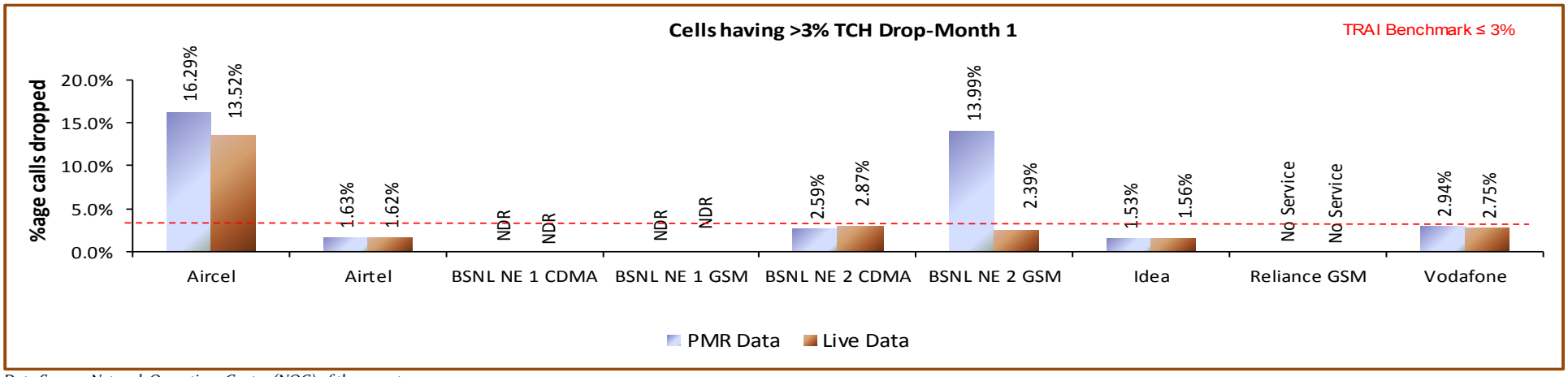
5.6.2 KEY FINDINGS - CONSOLIDATED



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

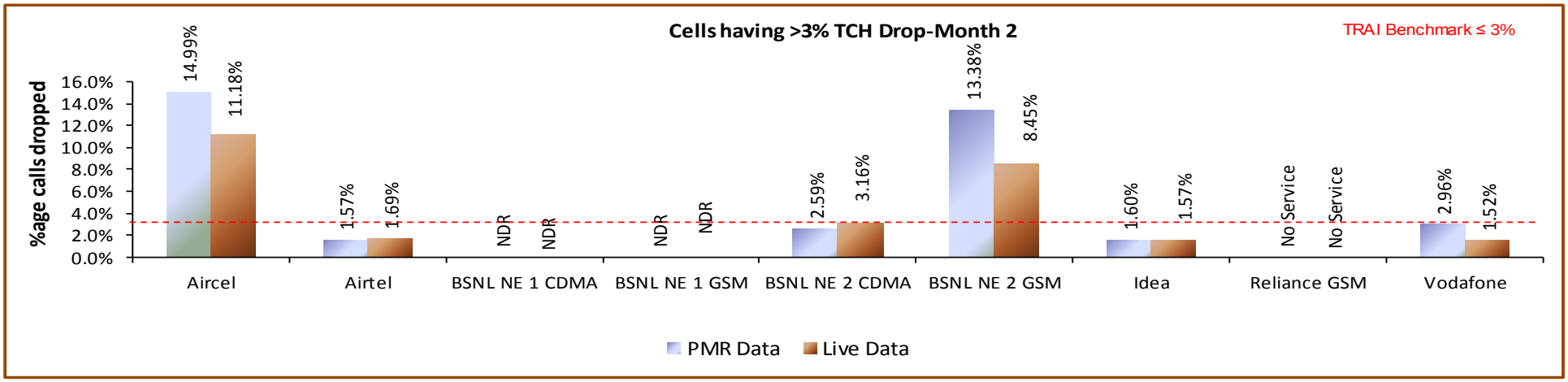
Aircel and BSNL NE2 GSM failed to meet the benchmark.

5.6.2.1 KEY FINDINGS – MONTH 1



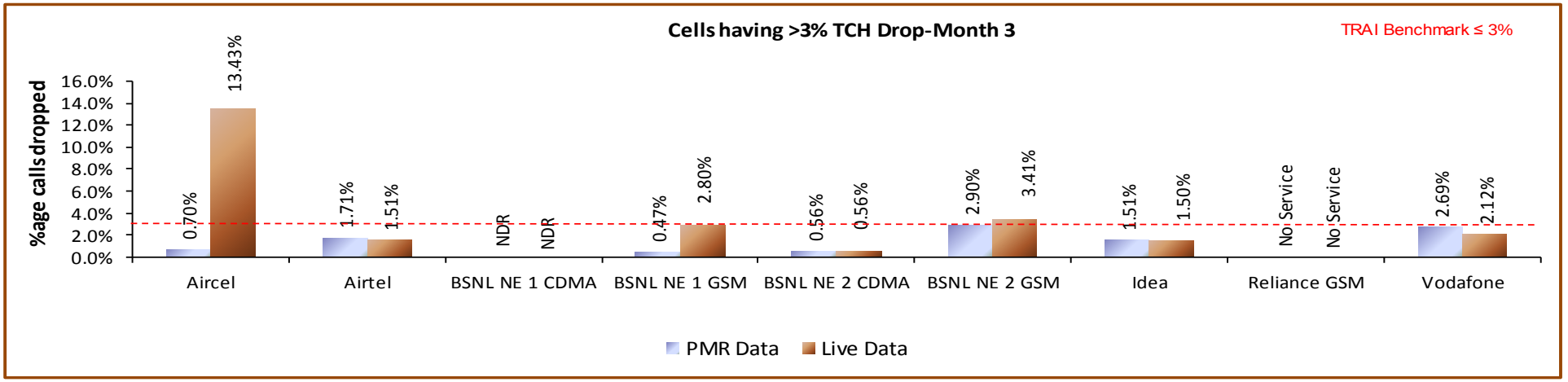
Data Source: Network Operations Center (NOC) of the operators

5.6.2.2 KEY FINDINGS – MONTH 2



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

5.6.2.3 KEY FINDINGS – MONTH 3



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

5.7 VOICE QUALITY

5.7.1 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**

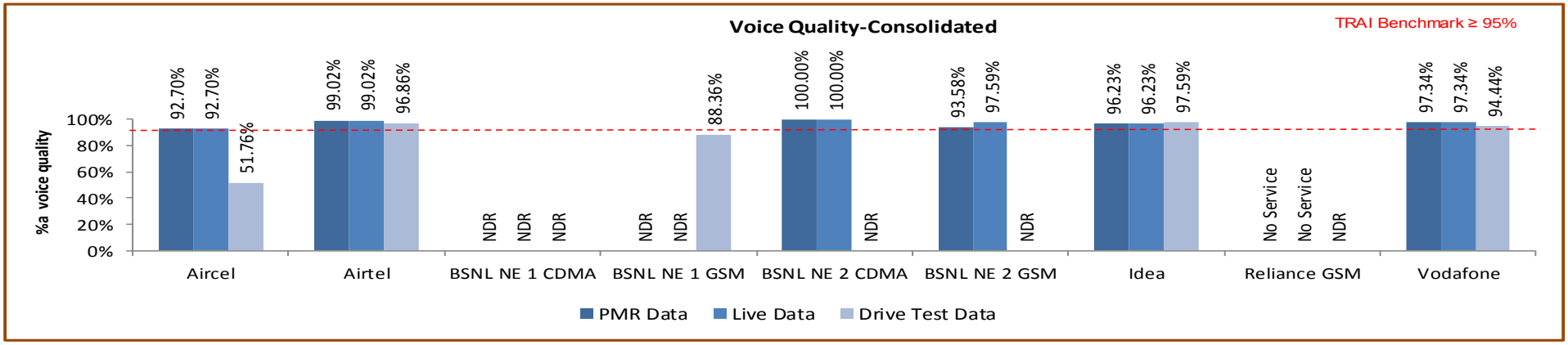
3. **TRAI Benchmark:** ≥ 95%

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.

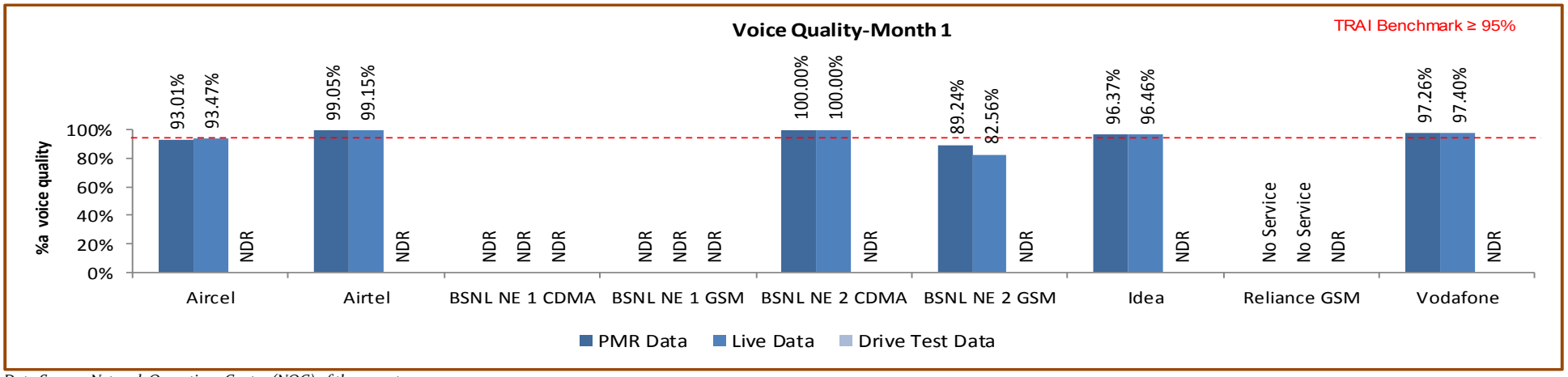
5.7.2 KEY FINDINGS



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

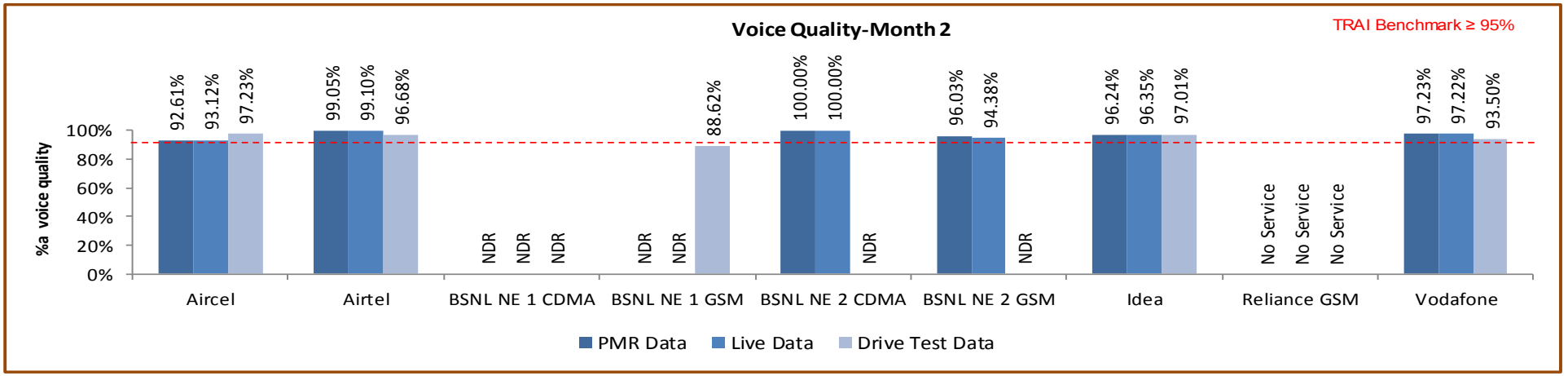
Aircel and BSNL NE2 GSM were not able to meet the benchmark for Voice quality as per PMR data. During drive test Aircel, Vodafone and BSNL NE 1 GSM failed to meet the benchmark.

5.7.2.1 KEY FINDINGS – MONTH 1



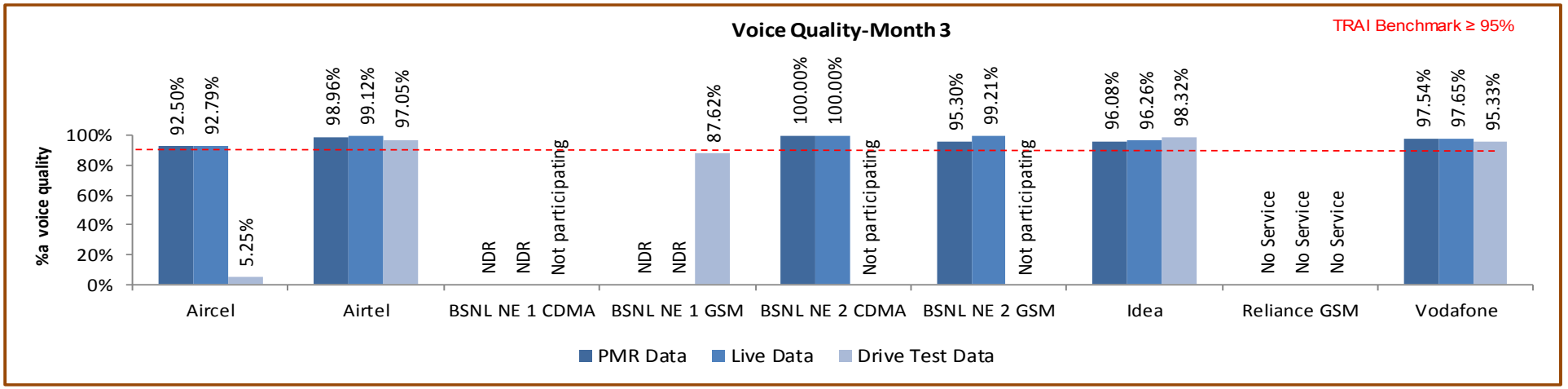
Data Source: Network Operations Center (NOC) of the operators

5.7.2.2 KEY FINDINGS – MONTH 2



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

5.7.2.3 KEY FINDINGS – MONTH 3



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

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

6.1 NODE BS DOWNTIME

6.1.1 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 –

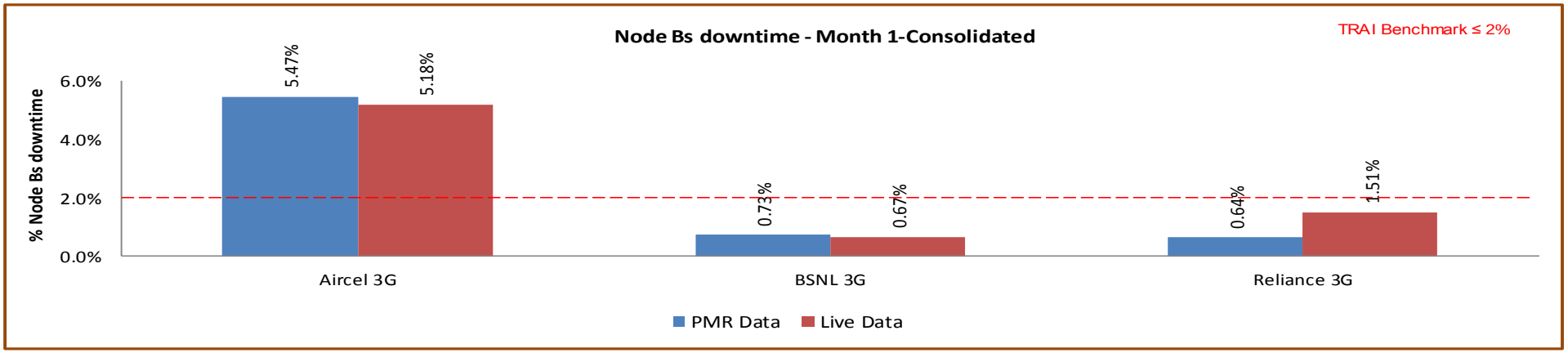
a. Node Bs downtime (not available for service) ≤ 2%

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.

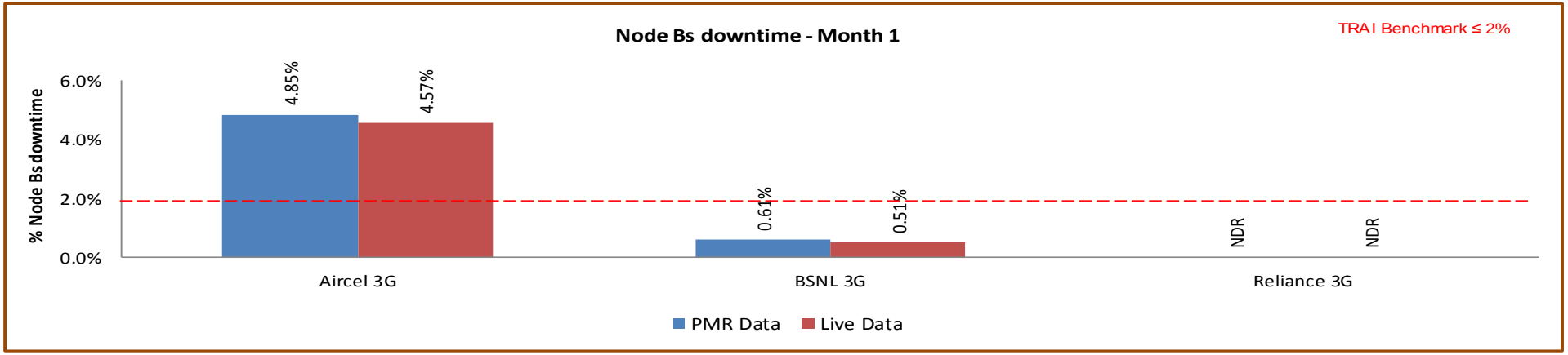
6.1.2 KEY FINDINGS - CONSOLIDATED



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

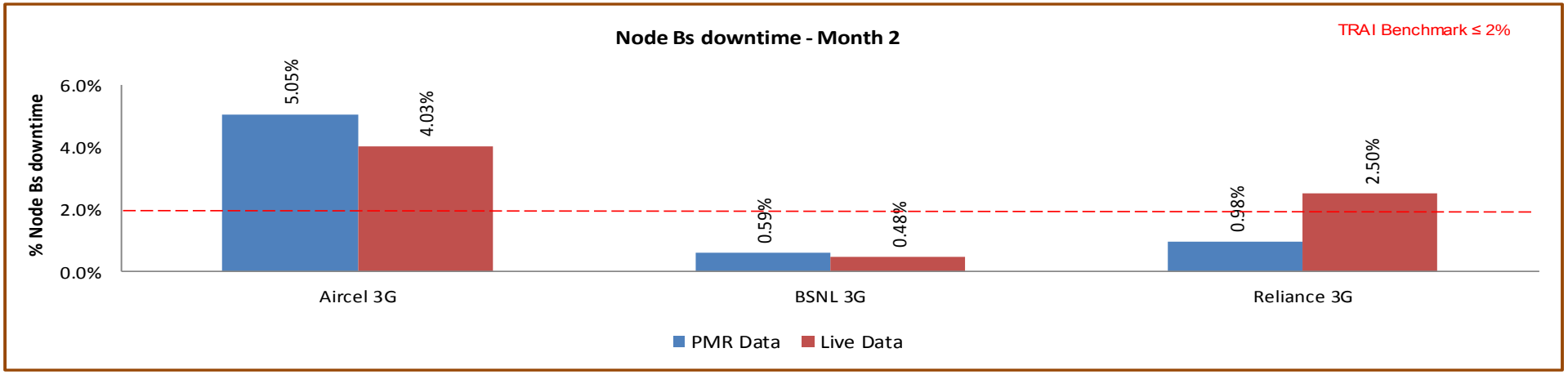
Aircel failed to meet the TRAI benchmark.

6.1.2.1 KEY FINDINGS – MONTH 1



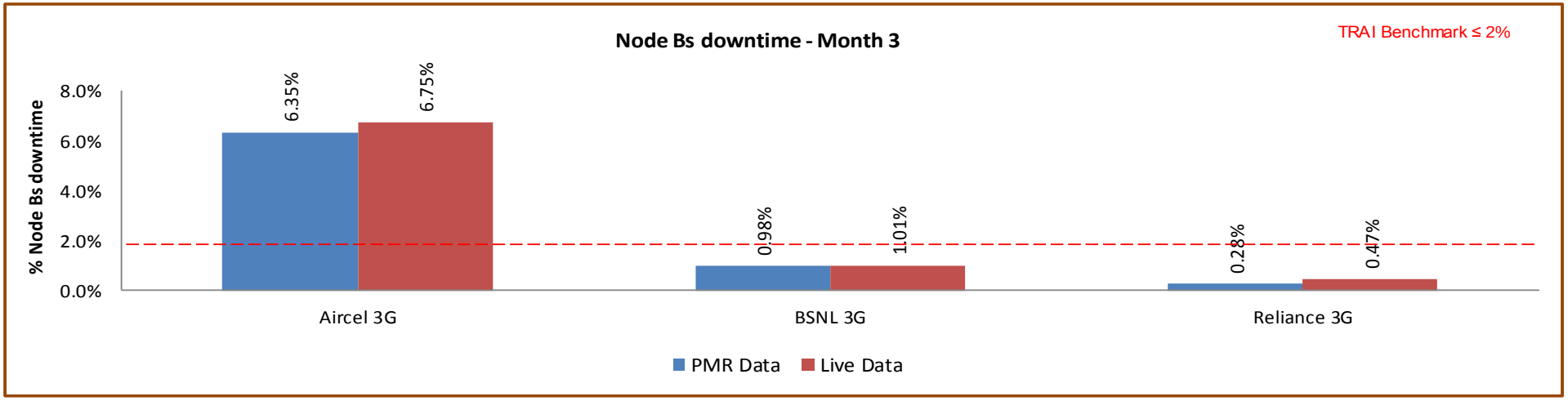
Data Source: Operations and Maintenance Center (OMC) of the operators

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 NODE BS DUE TO DOWNTIME

6.2.1 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.

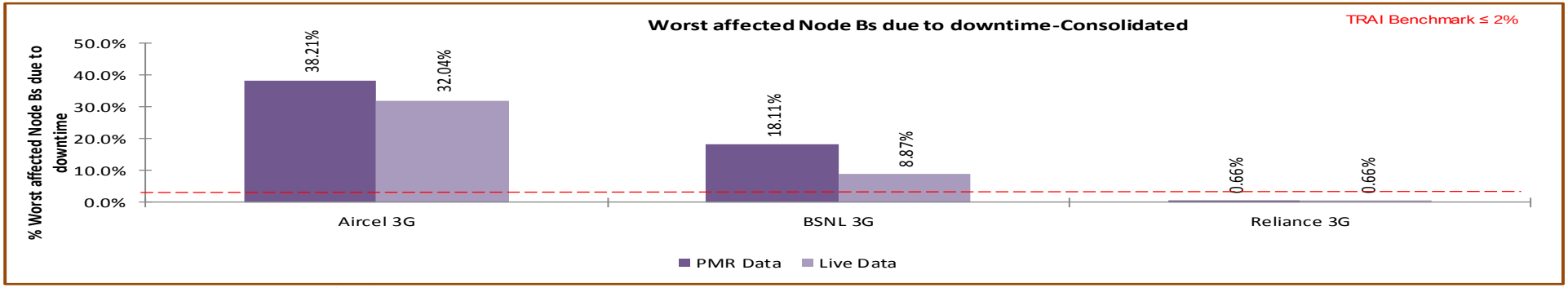
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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.

6.2.2 KEY FINDINGS – CONSOLIDATED

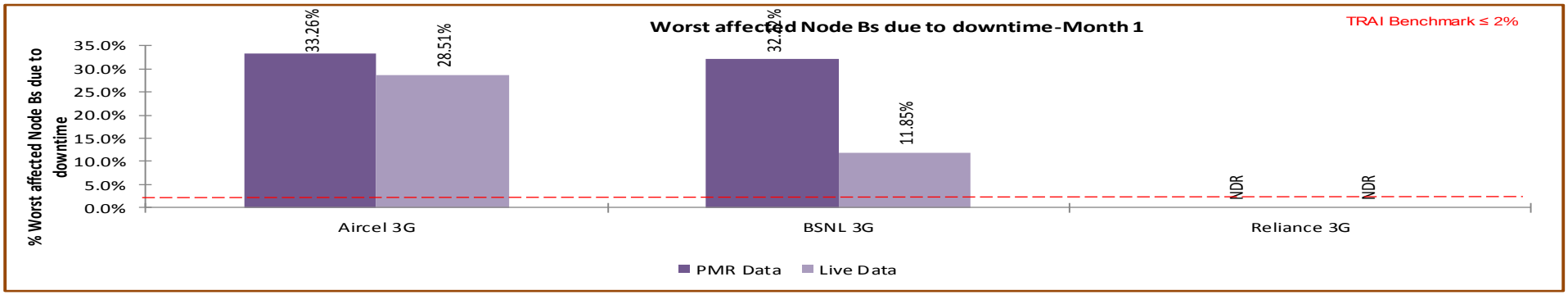


Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel and BSNL did not meet the benchmark as per audit/PMR data.

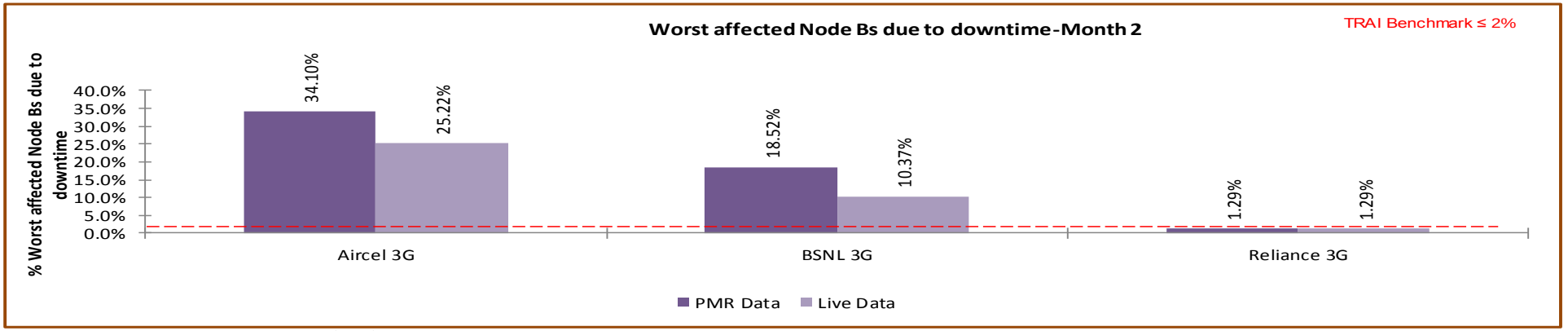
Significant difference was observed between PMR & live measurement data for Aircel and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.2.2.1 KEY FINDINGS – MONTH 1



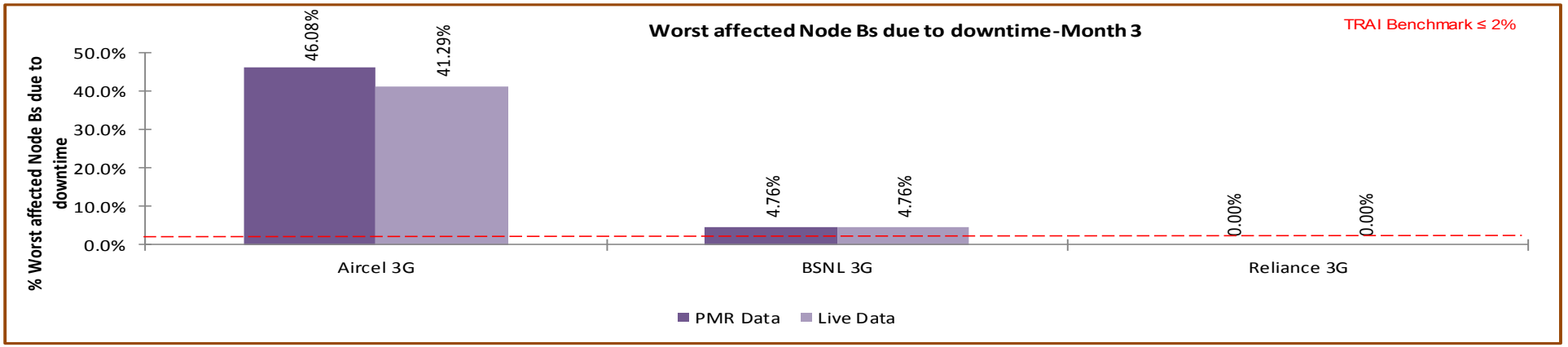
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2



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

6.2.2.3 KEY FINDINGS – MONTH 3



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

6.3 CALL SET UP SUCCESS RATE

6.3.1 PARAMETER DESCRIPTION

1. **Definition:** 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

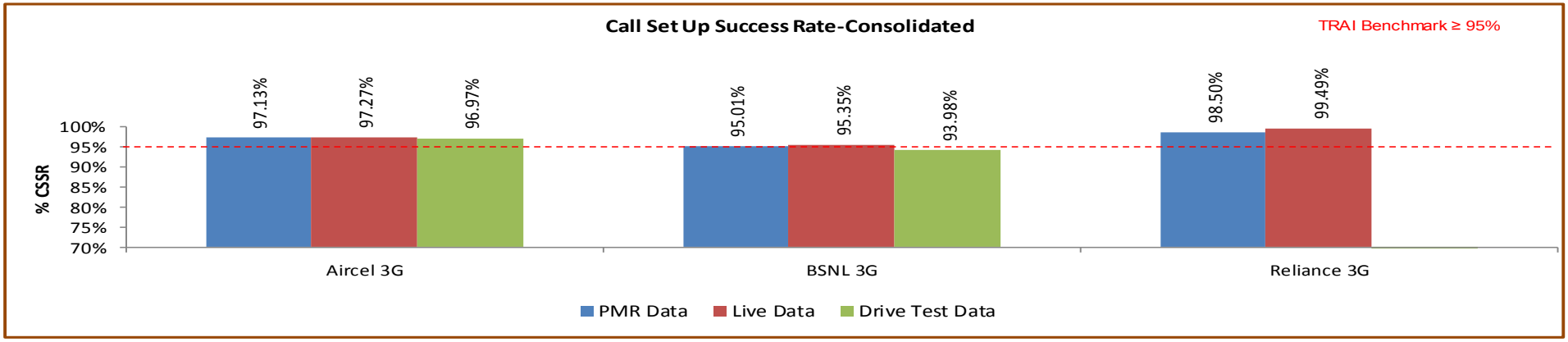
5. **TRAI Benchmark ≥** 95%

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.

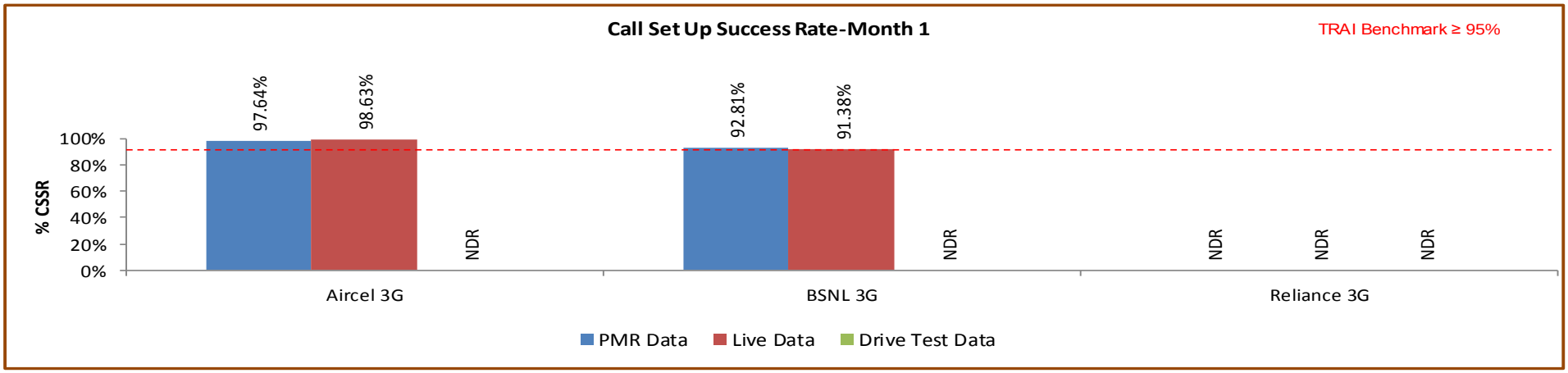
6.3.2 KEY FINDINGS - CONSOLIDATED



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

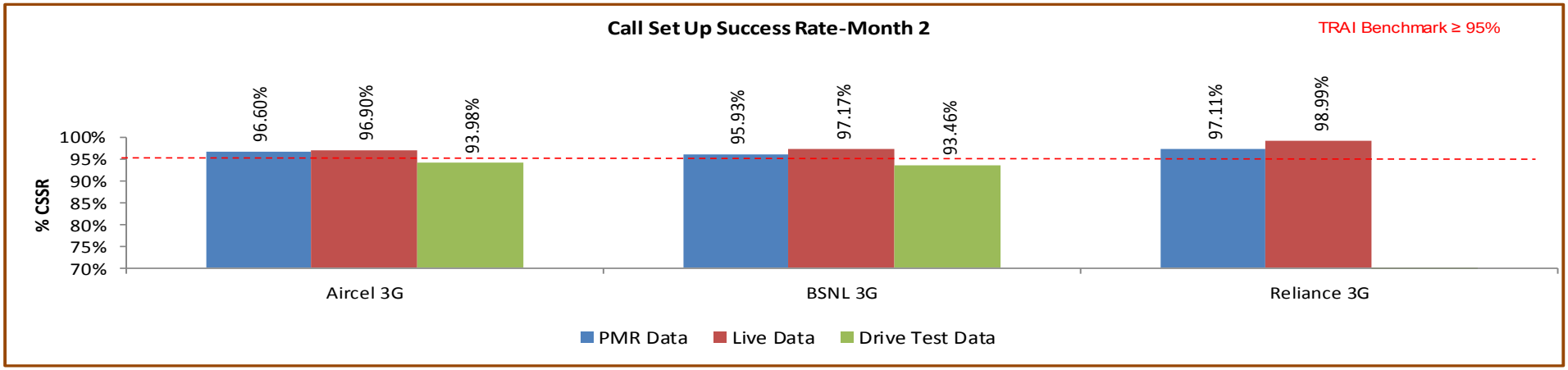
BSNL 3G failed to meet the TRAI benchmark as per audit/PMR data.

6.3.2.1 KEY FINDINGS – MONTH 1



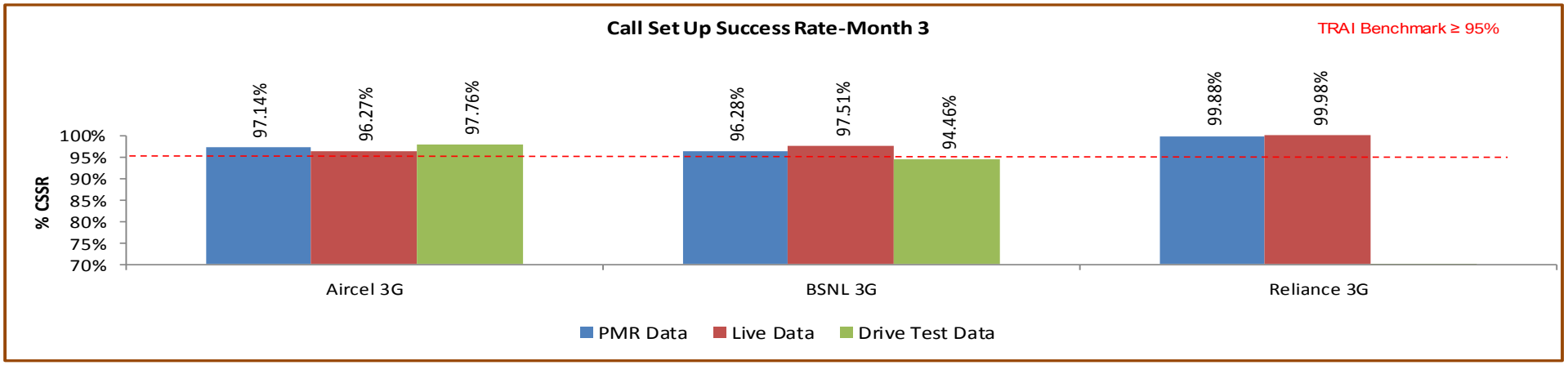
Data Source: Network Operations Center (NOC) of the operators

6.3.2.2 KEY FINDINGS – MONTH 2



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

6.3.2.3 KEY FINDINGS – MONTH 3



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

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

6.4.1 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

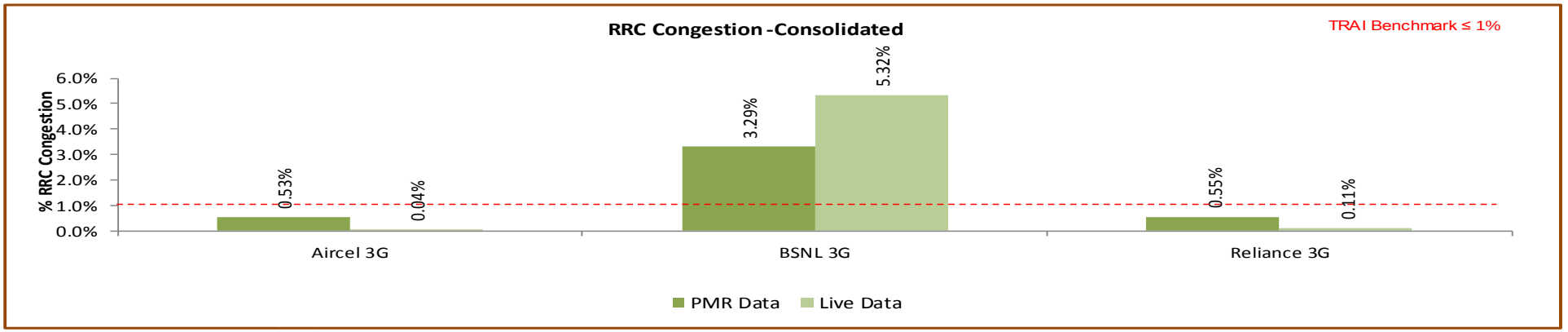
7. Benchmark:

- 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

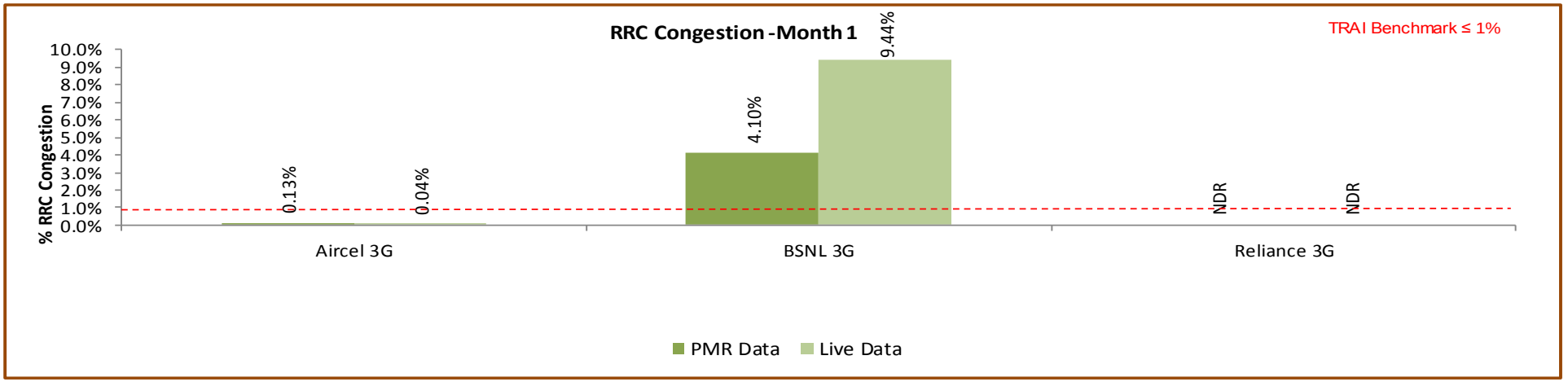
6.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



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

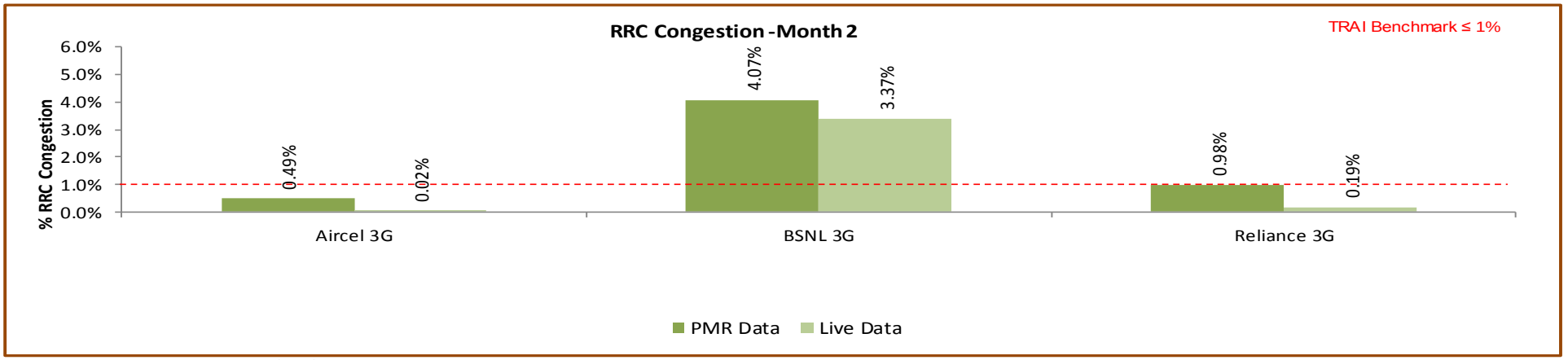
BSNL failed to meet the TRAI benchmark.

6.4.2.1 KEY FINDINGS – MONTH 1



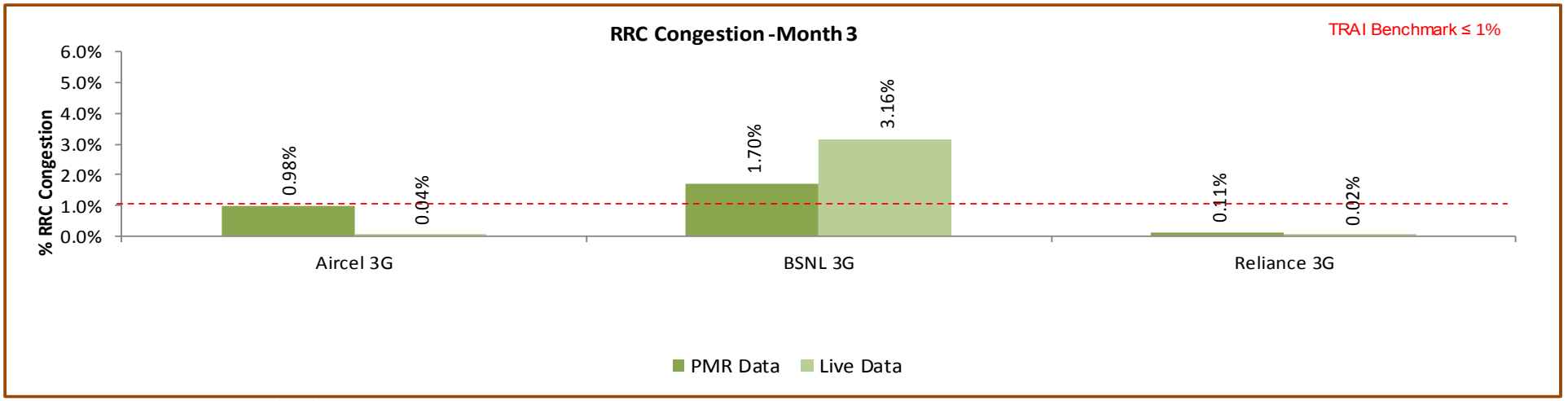
Data Source: Network Operations Center (NOC) of the operators

6.4.2.2 KEY FINDINGS – MONTH 2



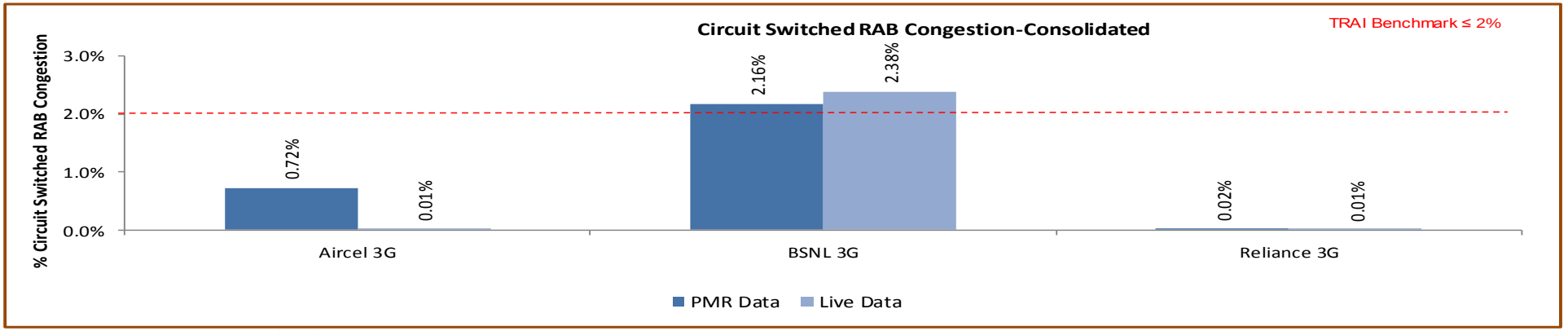
Data Source: Network Operations Center (NOC) of the operators

6.4.2.3 KEY FINDINGS – MONTH 3



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

6.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)

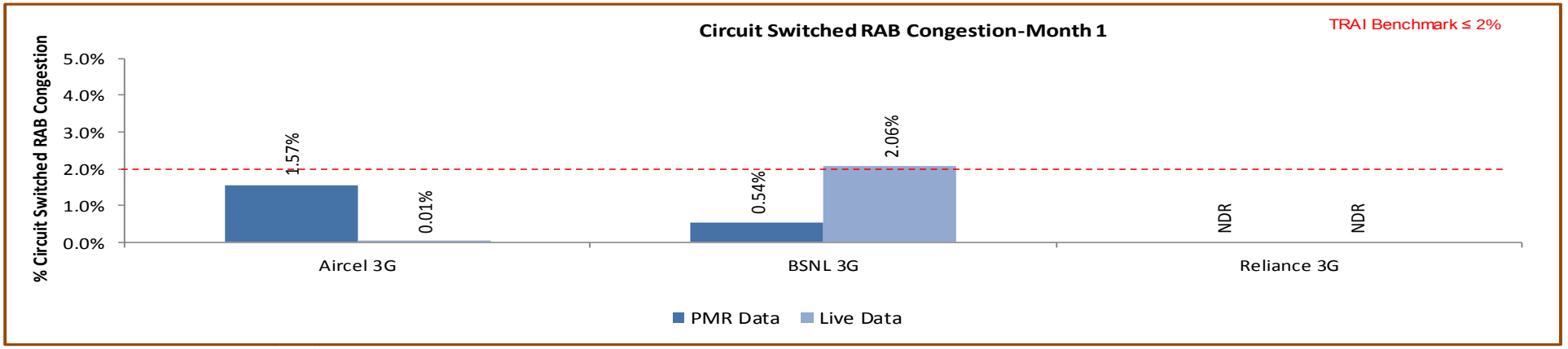


Data Source: Network Operations Center (NOC) of the operators

BSNL failed to meet the benchmark as per audit/PMR report.

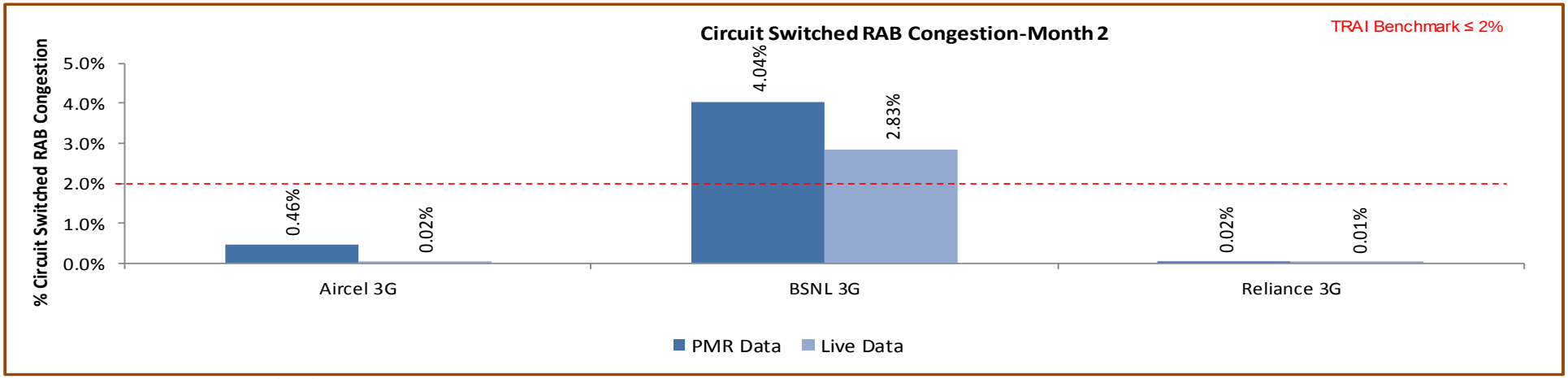
Significant difference was observed between PMR & live measurement data for BSNL and Aircel. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.4.3.1 KEY FINDINGS – MONTH 1



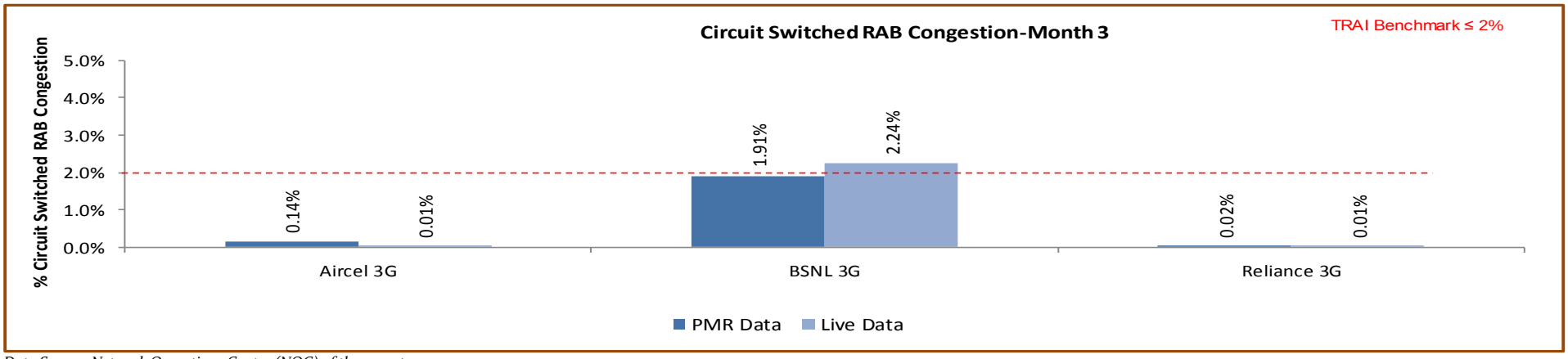
Data Source: Network Operations Center (NOC) of the operators

6.4.3.2 KEY FINDINGS – MONTH 2



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

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 3G**	**BSNL 3G**	**Reliance 3G**
Total number of working POIs		39	0	11
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		136598	0	11325
Traffic served for all POIs (B)- in erlangs		82601	0	2663
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data				
POI congestion	**Benchmark**	**Aircel 3G**	**BSNL 3G**	**Reliance 3G**
Total number of working POIs		39	0	11
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		136583	0	11325
Traffic served for all POIs (B)- in erlangs		77253	0	2663
POI congestion	≤ 0.5%	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				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	11
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		136598	0	11325
Traffic served for all POIs (B)- in erlangs		82601	0	2663
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	11
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		136583	0	11325
Traffic served for all POIs (B)- in erlangs		77253	0	2663
POI congestion	≤ 0.5%	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-February				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	13
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		45533	0	6948
Traffic served for all POIs (B)- in erlangs		27534	0	1392
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	13
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		45533	0	6948
Traffic served for all POIs (B)- in erlangs		26486	0	1392
POI congestion	≤ 0.5%	0.00%	0.00%	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-March				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	8
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		45533	0	4377
Traffic served for all POIs (B)- in erlangs		27534	0	1271
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	8
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		45517	0	4377
Traffic served for all POIs (B)- in erlangs		26708	0	1271
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

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

6.5 CIRCUIT SWITCHED VOICE DROP RATE

6.5.1 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

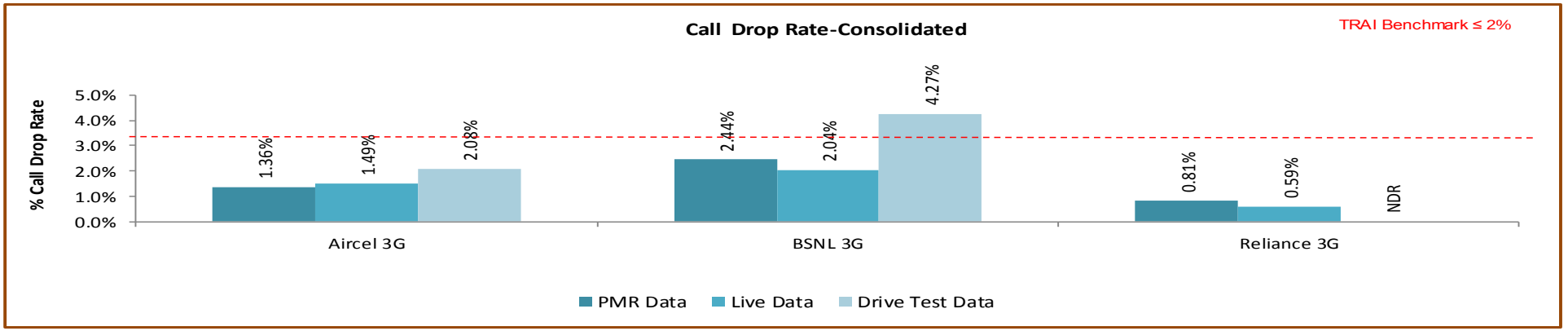
5. **TRAI Benchmark –**

   - 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.

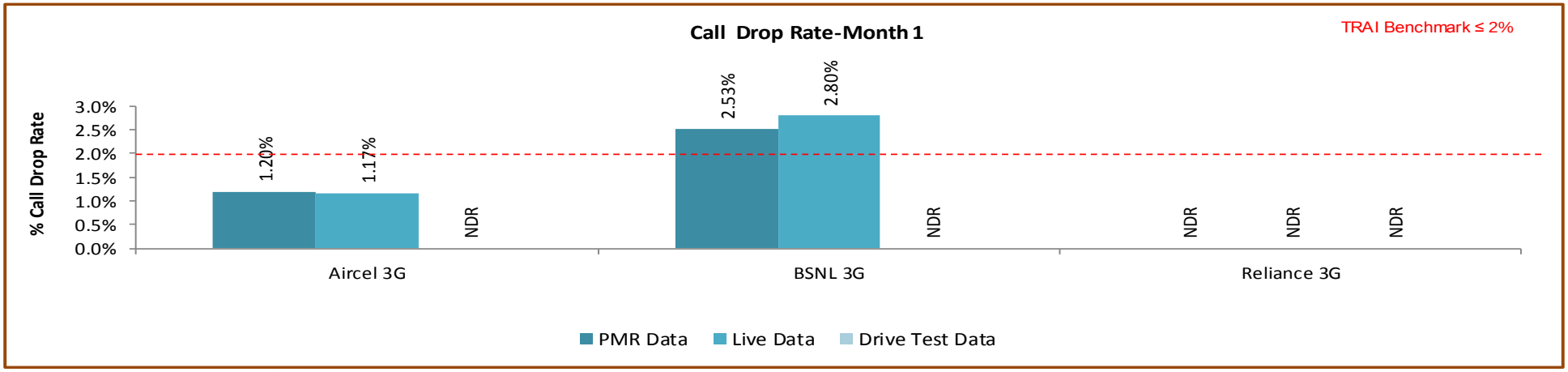
6.5.2 KEY FINDINGS - CONSOLIDATED



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

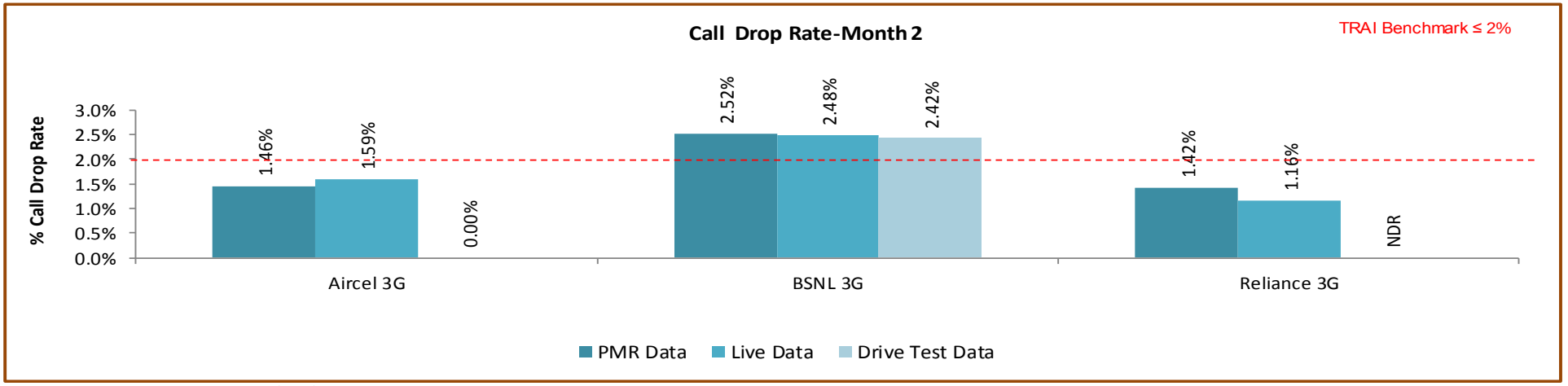
BSNL failed to meet the benchmark for call drop rate during audit.

6.5.2.1 KEY FINDINGS – MONTH 1



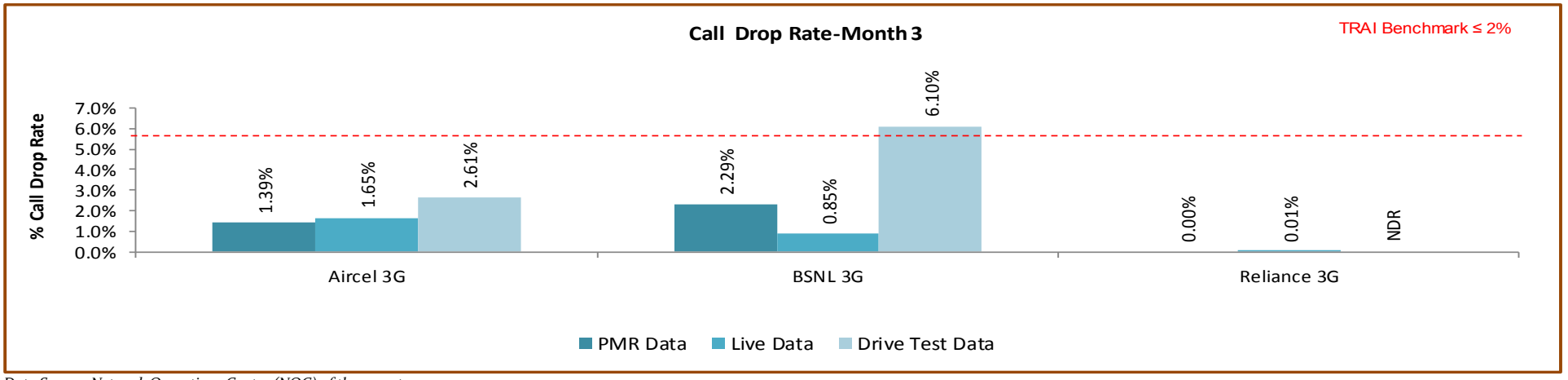
Data Source: Network Operations Center (NOC) of the operators

6.5.2.2 KEY FINDINGS – MONTH 2



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

6.5.2.3 KEY FINDINGS – MONTH 3



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

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

6.6.1 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** –

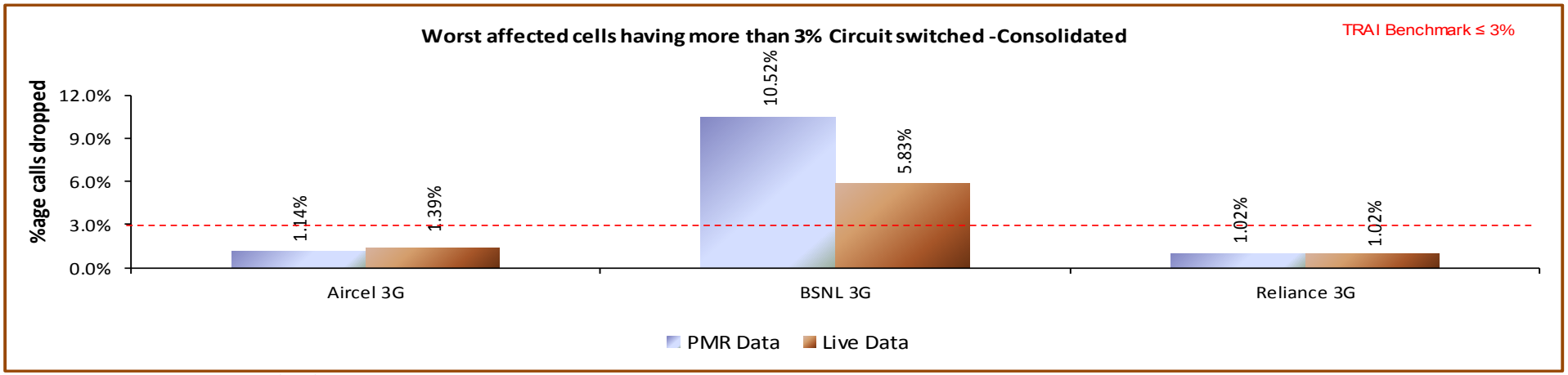
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

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.

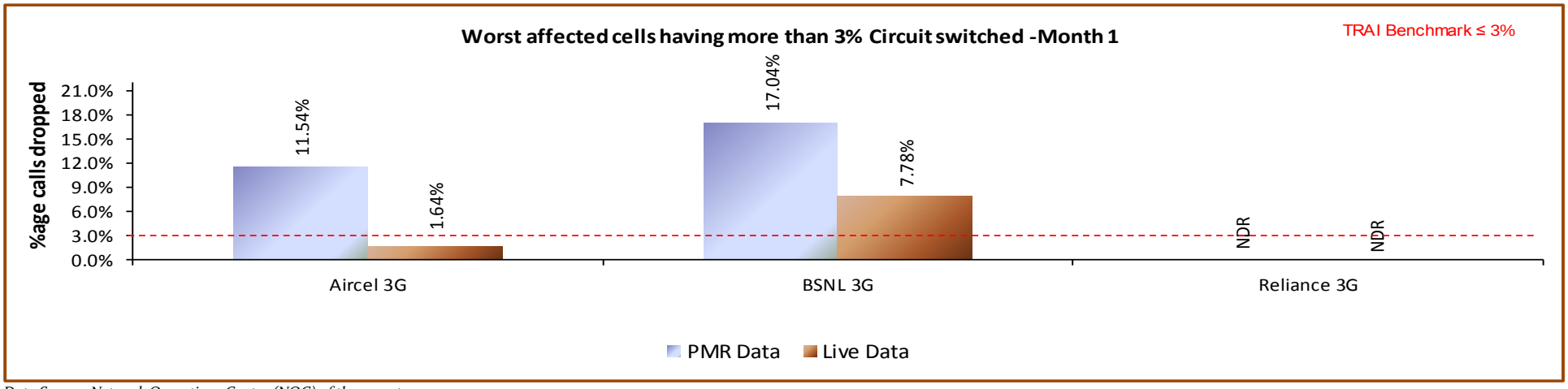
6.6.2 KEY FINDINGS - CONSOLIDATED



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

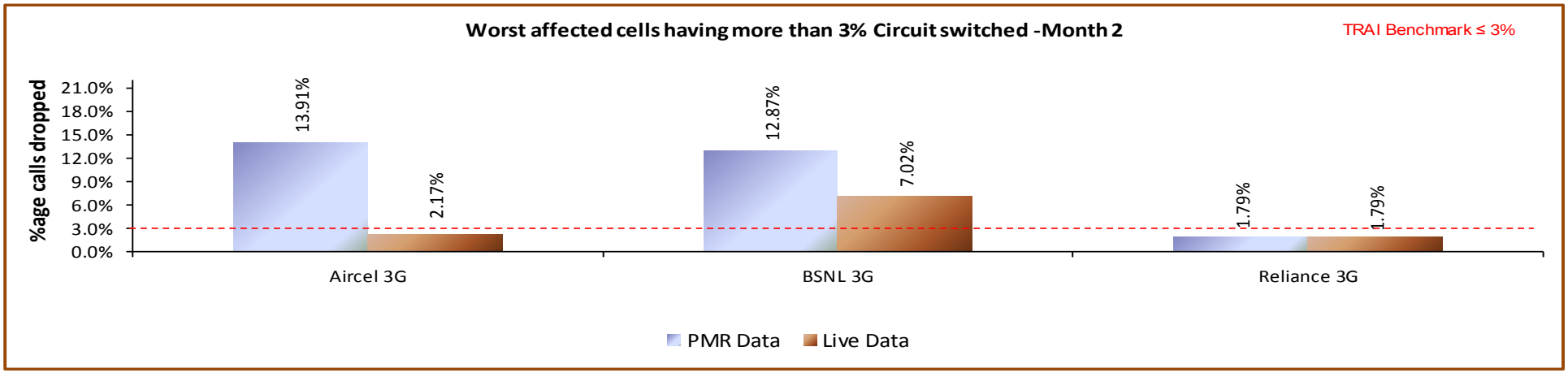
BSNL did not meet the benchmark during audit.

6.6.2.1 KEY FINDINGS – MONTH 1



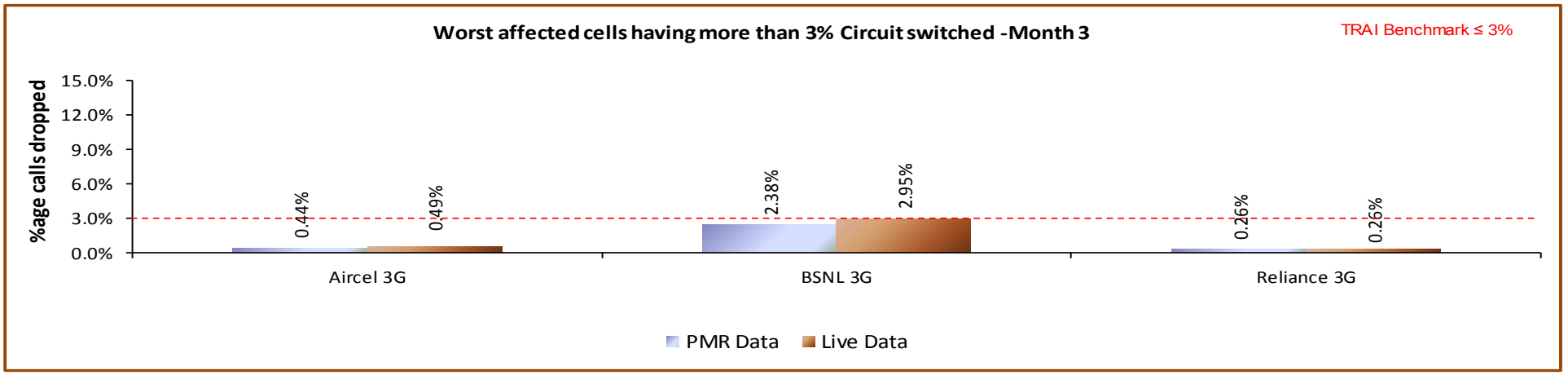
Data Source: Network Operations Center (NOC) of the operators

6.6.2.2 KEY FINDINGS – MONTH 2



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

6.6.2.3 KEY FINDINGS – MONTH 3



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

6.7 CIRCUIT SWITCH VOICE QUALITY

6.7.1 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**

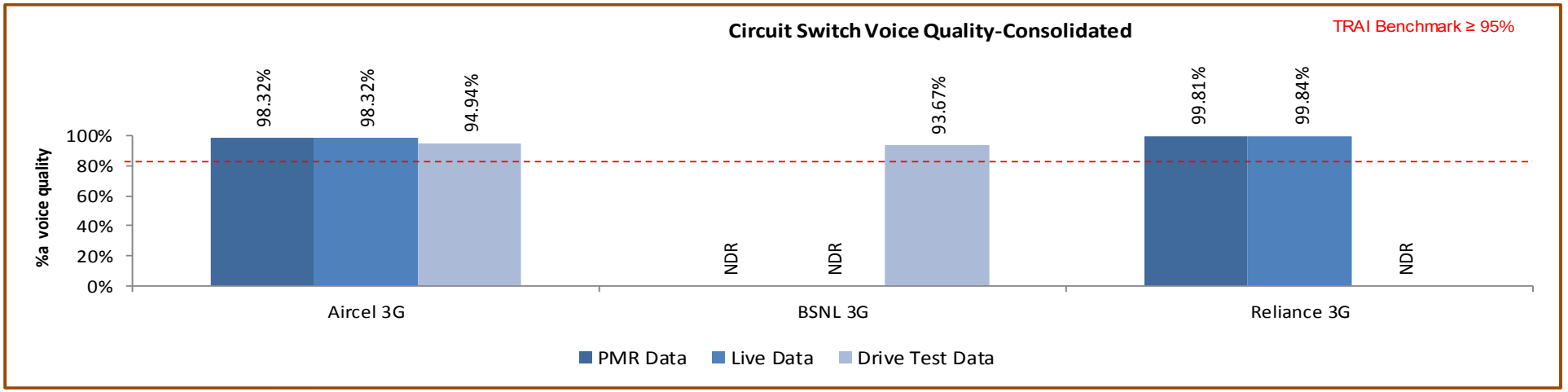
7. **TRAI Benchmark:** ≥ 95%

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.

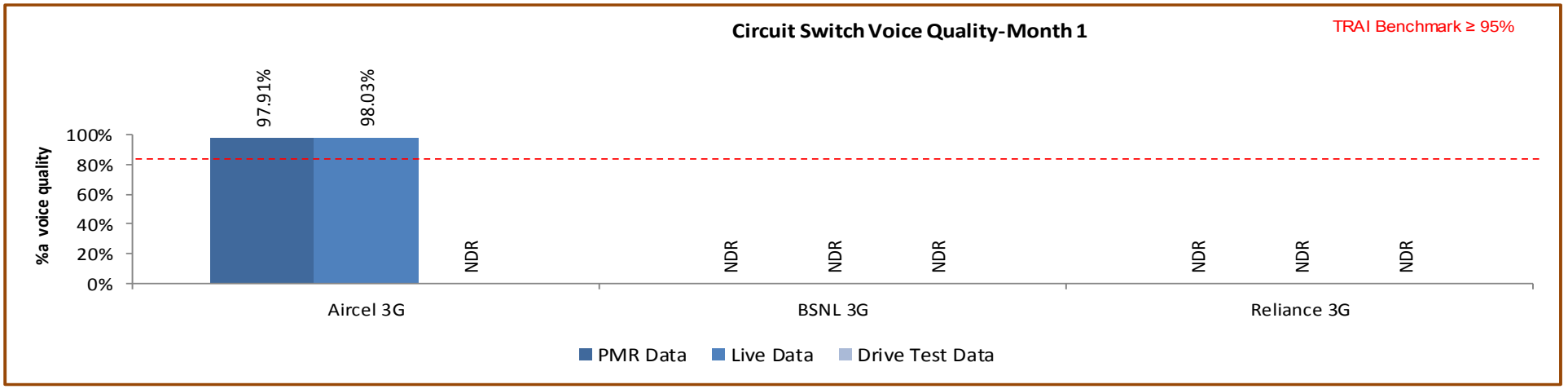
6.7.2 KEY FINDINGS



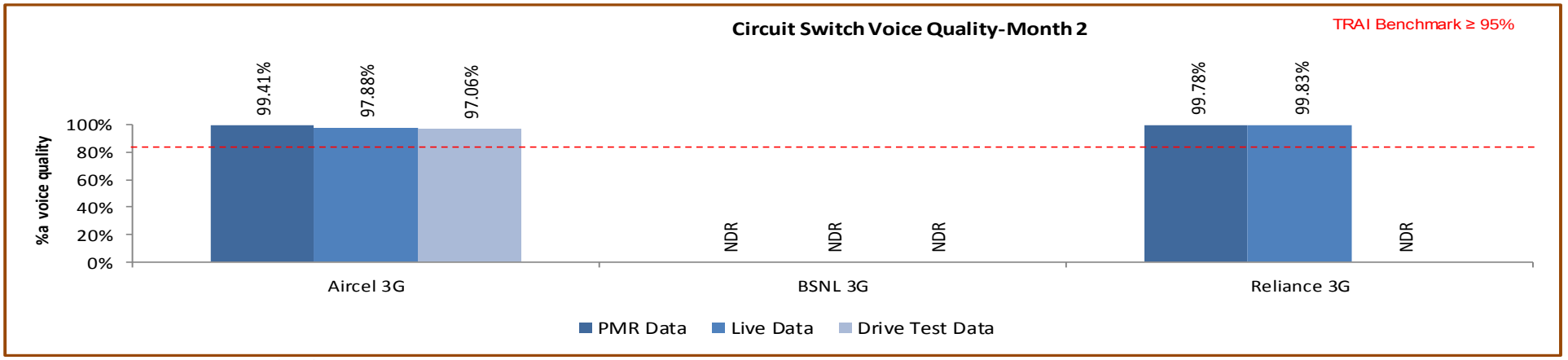
Data Source: Network Operations Center (NOC) of the operators

During drive test Aircel 3G and BSNL 3G failed to meet the TRAI benchmark.

6.7.2.1 KEY FINDINGS – MONTH 1

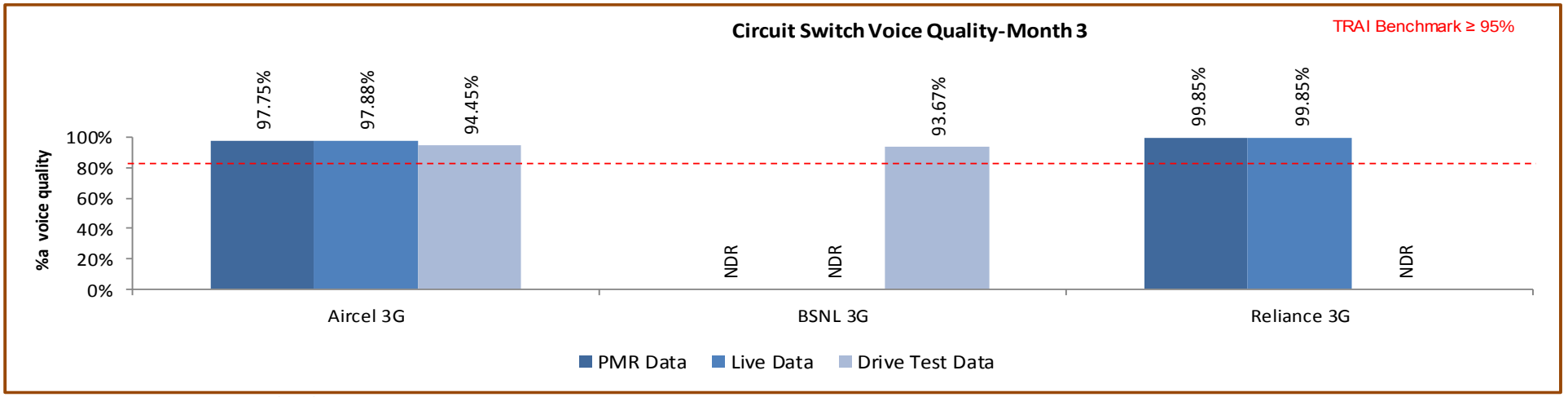


6.7.2.2 KEY FINDINGS – MONTH 2



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

6.7.2.3 KEY FINDINGS – MONTH 3



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

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

7.1 SERVICE ACTIVATION /PROVISIONING FOR 2G & 3G

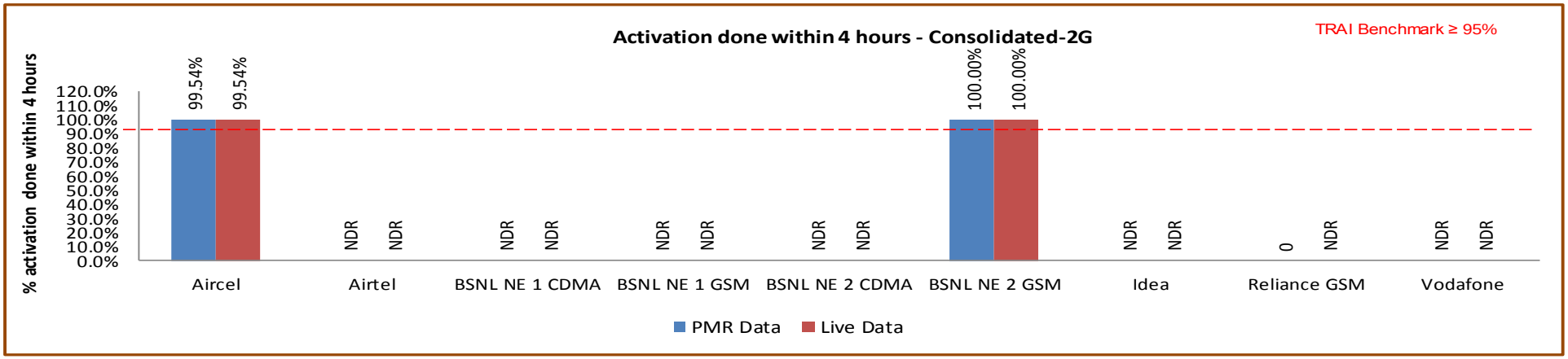
7.1.1 PARAMETER DESCRIPTION

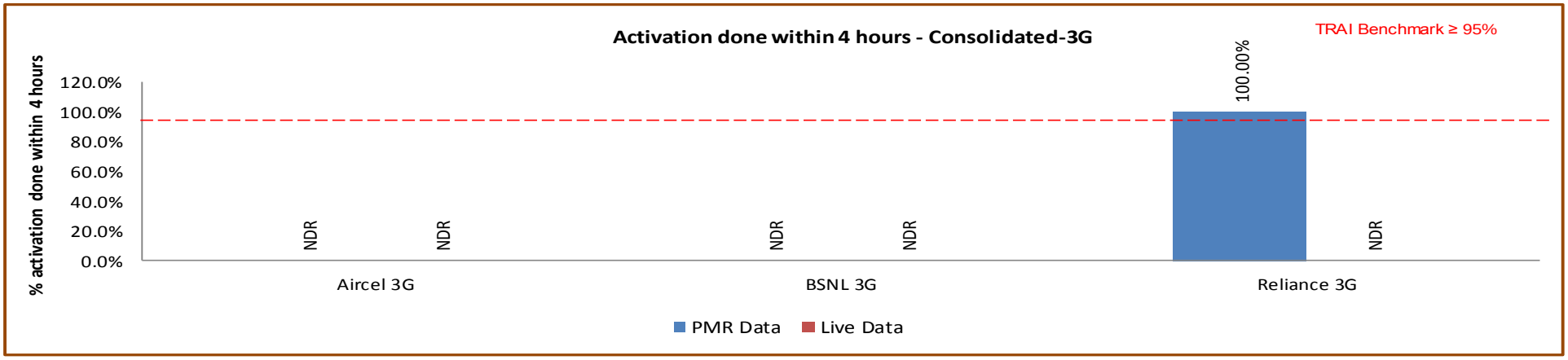
This refers to the activation of services after activation of the SIM. This involves programming the various databases with the customer's information and any gateways to standard Internet chat or mail services or any data services. The service provider typically sends these settings to the subscriber's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

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

Benchmark: >=95%

7.1.2 KEY FINDINGS





All operators met the TRAI benchmark; however most of the operators were not submitted data.

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

7.2.1 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

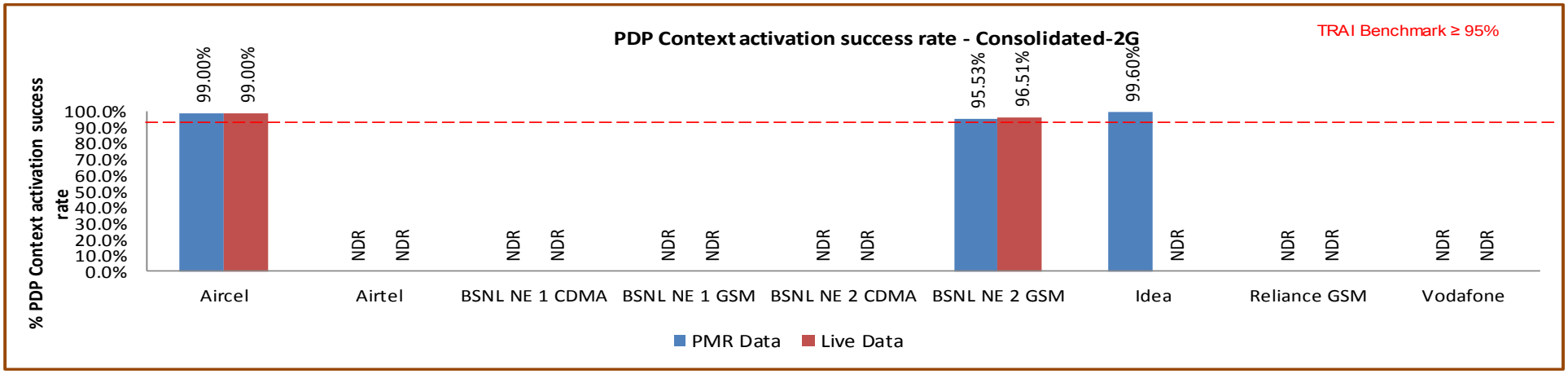
This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully and a report of PDP context activation success is generated at GGSN.

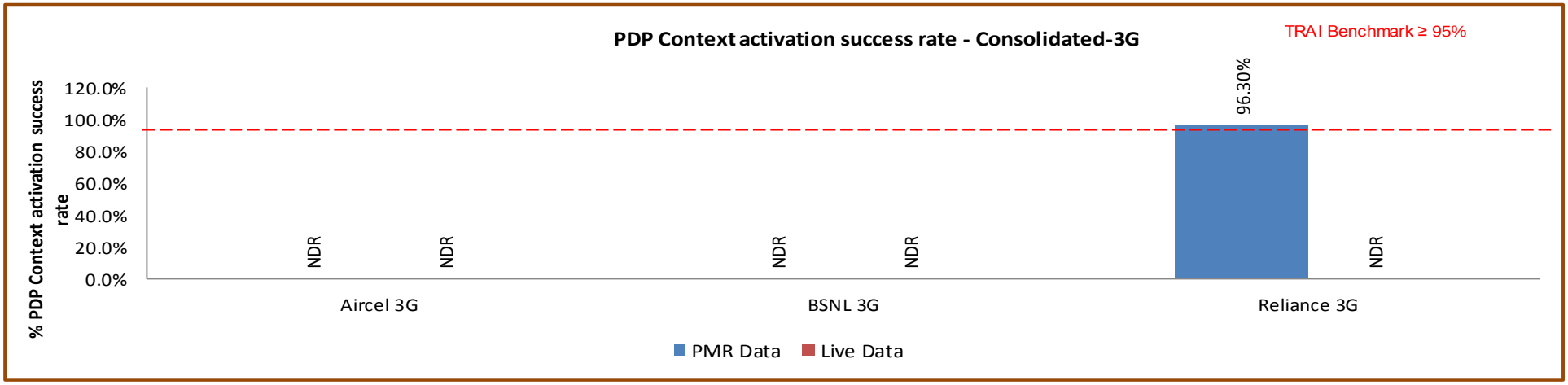
PDP Context Activation Success Rate (%) =

$$\frac{\text{Number of successfully completed PDP context activations}}{\text{Total attempts of context activation}} \times 100$$

Benchmark: >=95%

7.2.2 KEY FINDINGS





All operators met the benchmark; however most of the operators were not submitted data.

7.3 DROP RATE FOR 2G & 3G

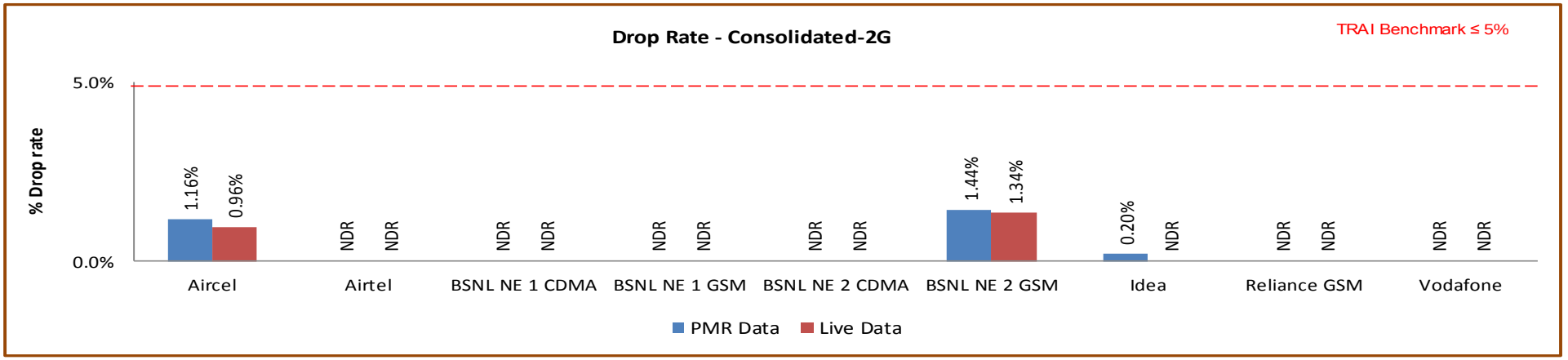
7.3.1 PARAMETER DESCRIPTION

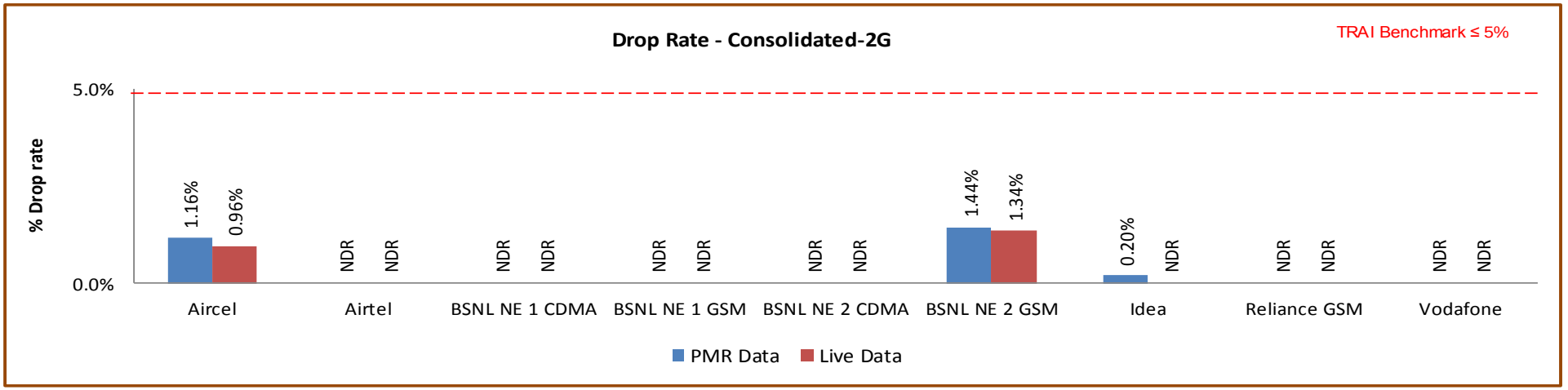
It measures the inability of Network to maintain a connection and is defined as the ratio of abnormal disconnects w.r.t. all disconnects (both normal and abnormal). An abnormal disconnect may happen because of Radio Link Failures, Uplink (UL) or Downlink (DL) interference, bad coverage, unsuccessful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

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

Benchmark : >=5%

7.3.2 KEY FINDINGS





All operators met the benchmark; however most of the operators were not submitted data.

8 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

8.1 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.

8.1.1 PARAMETER DESCRIPTION

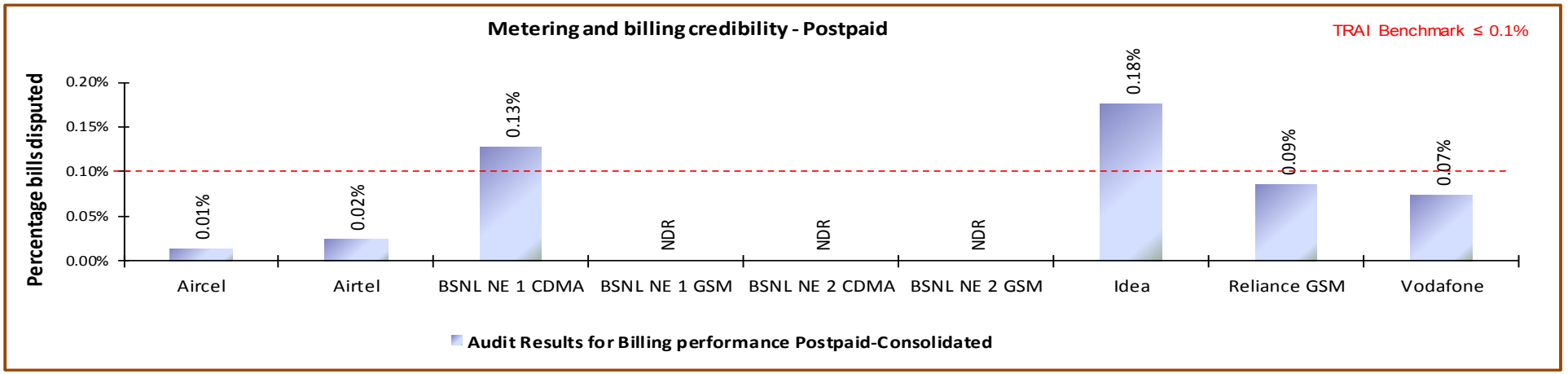
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th March, 2009 were covered. The types of billing complaints covered are listed below.

- 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.

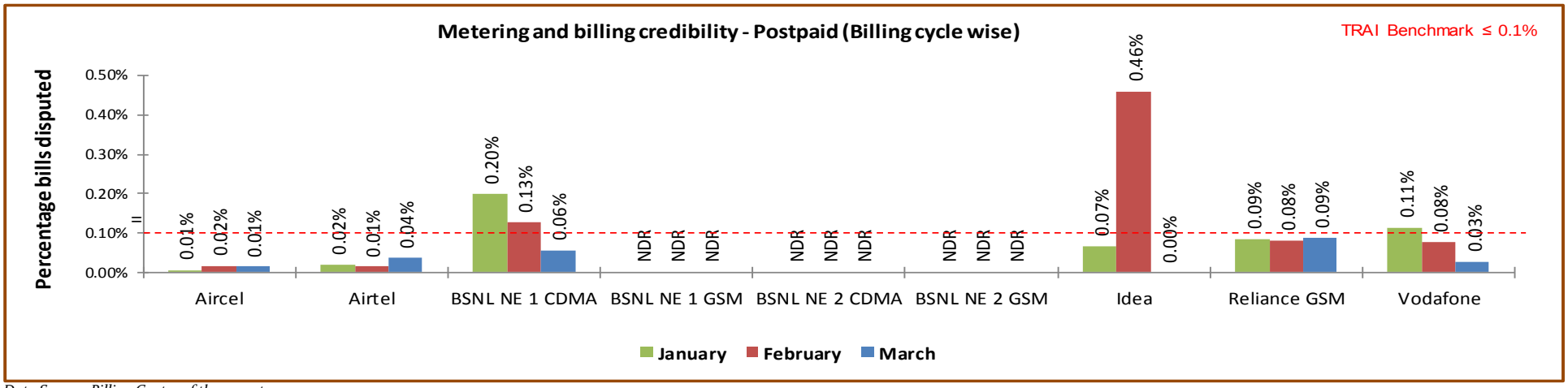
- Computational Methodology:
  - **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated
  - **Billing complaints here shall include only dispute related issues (including those that Febuary 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

8.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



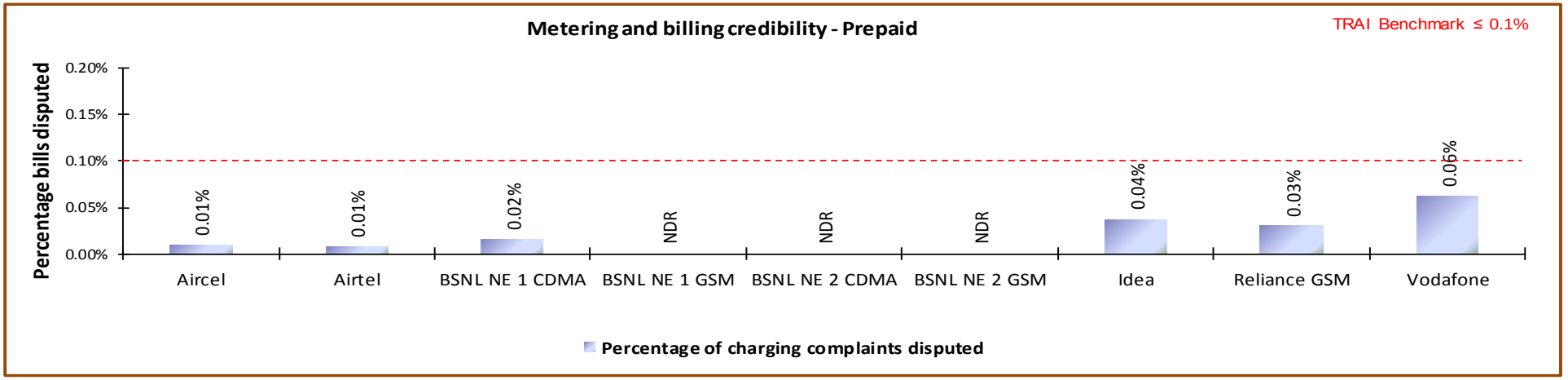
Data Source: Billing Center of the operators

BSNL CDMA NE1 and Idea failed to meet the benchmark of 0.1% post-paid metering and billing credibility.



Data Source: Billing Center of the operators

8.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

All operators met the benchmark for metering and billing credibility of prepaid subscribers.

NDR: Data to conduct audit for metering and billing was not available at the central billing center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.

8.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

8.2.1 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:

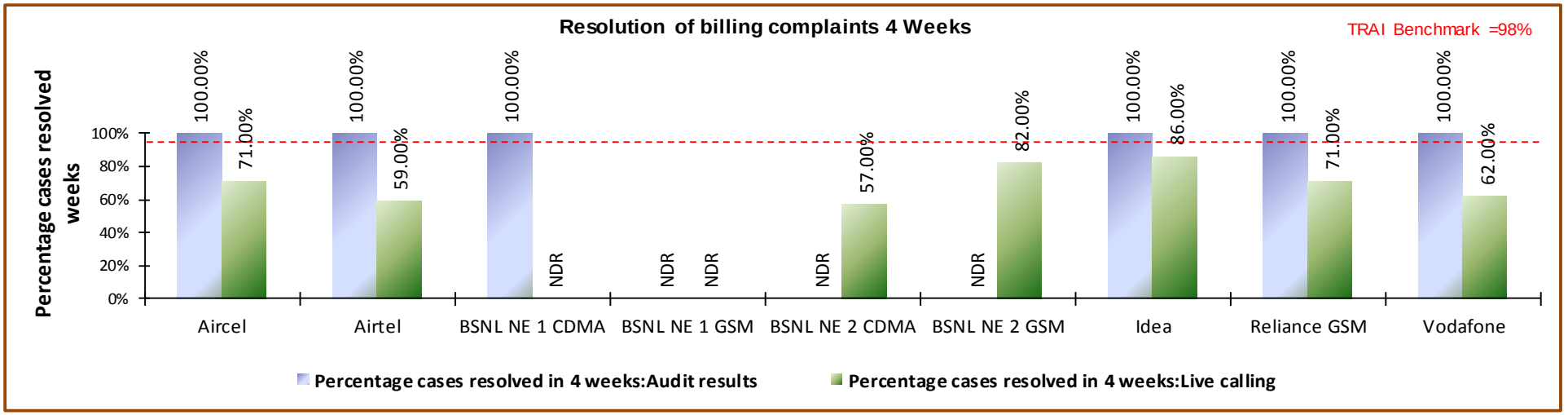
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

- **Billing complaints here shall include only dispute related issues (including those that Febuary 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.

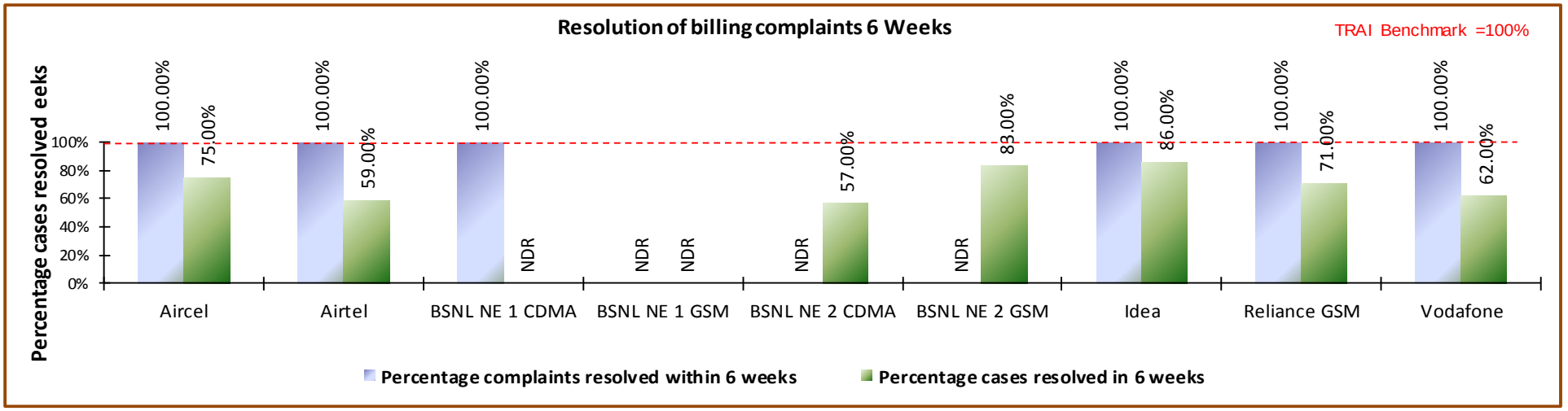
8.2.2 KEY FINDINGS - WITHIN 4 WEEKS



Data Source: Billing Center of the operators

None of the operators met the TRAI benchmark for live calling

8.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks. However, as per live calling done to customers, the performance of all operators was observed to be much below the PMR data.

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI. Further details can be found in annexure (section 8.7).

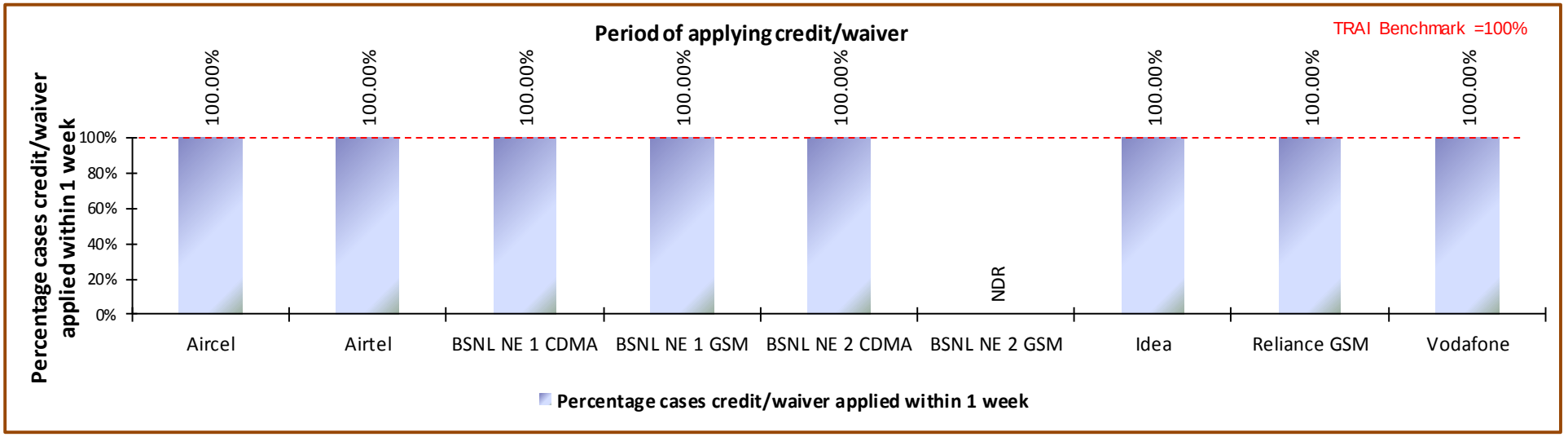
NDR: Data to conduct audit for resolution of billing complaints was not available at the central billing center of BSNL. Hence, audit for the parameter has not been conducted for the operator.

8.3 PERIOD OF APPLYING CREDIT/WAVIER

8.3.1 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

8.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

All operators met the benchmark for this parameter.

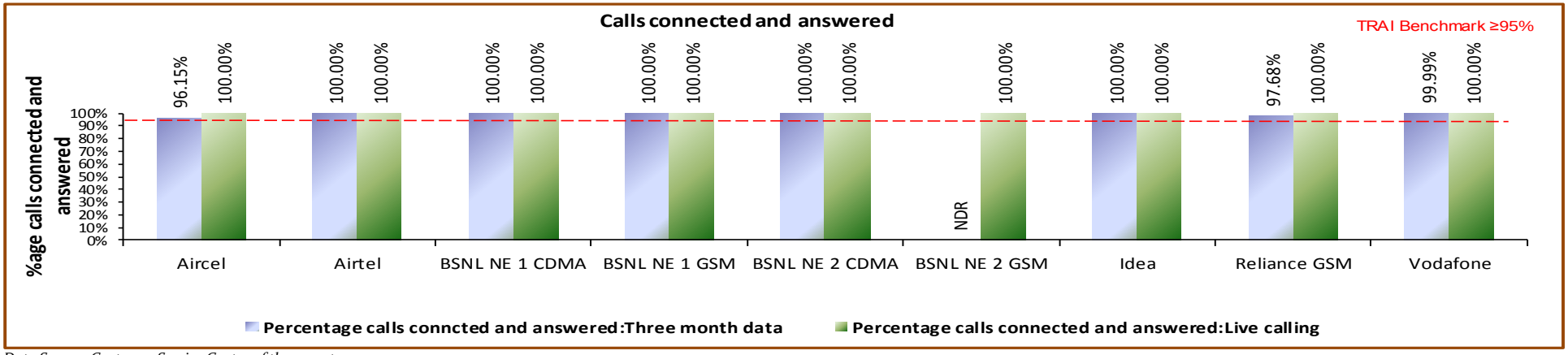
NDR: Data to conduct audit for resolution of billing complaints was not available at the central billing center of BSNL NE2 GSM. Hence, audit for the parameter has not been conducted for the operator.

8.4 CALL CENTRE PERFORMANCE-IVR

8.4.1 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

8.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

As per PMR data, all operators met the benchmark.

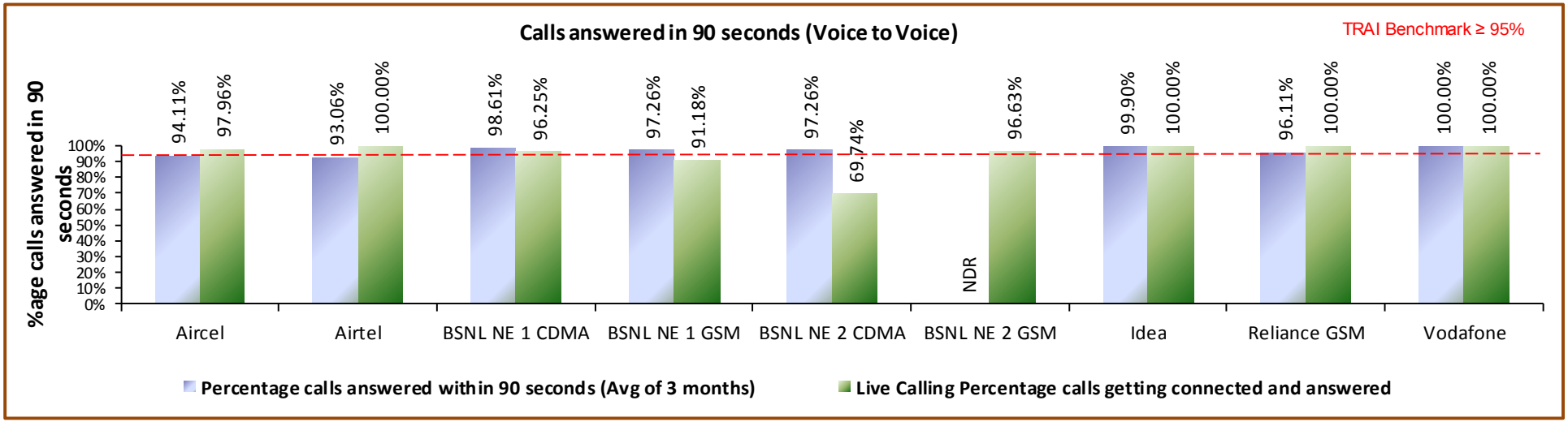
8.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

8.5.1 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

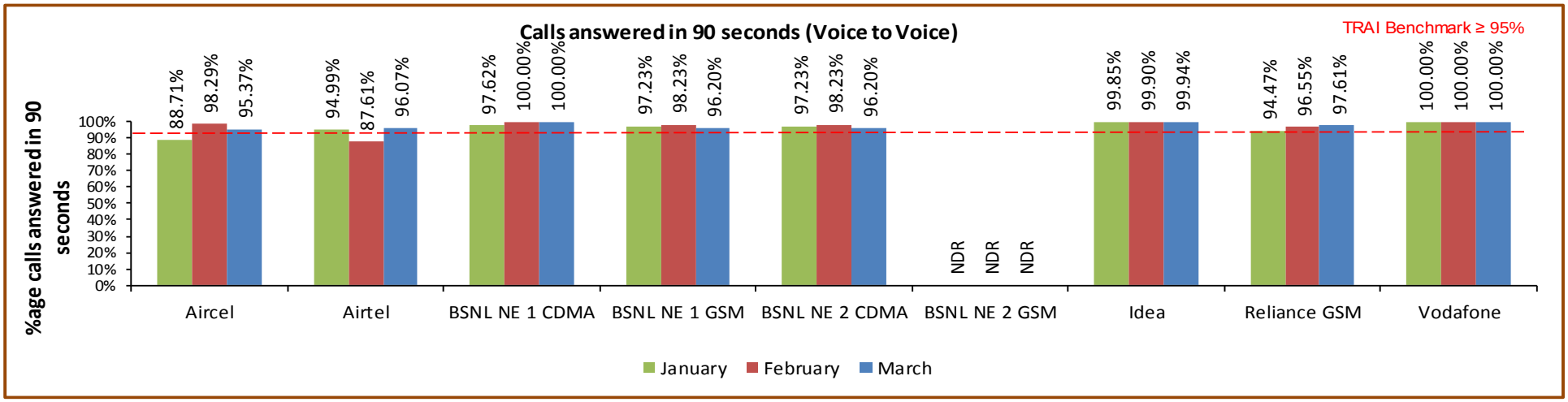
Benchmark: 95% calls to be answered within 90 seconds

8.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Airtel and Airtel were not able to meet the benchmark as per audit. However, as per live calling done to customers, the performance of BSNL NE1 GSM and BSNL NE2 CDMA was far inferior to the PMR data.



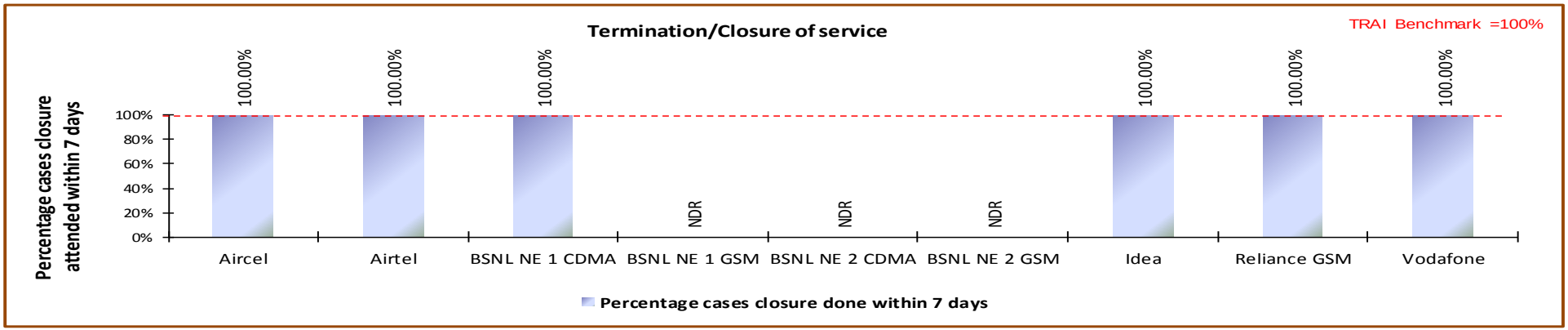
Data Source: Customer Service Center of the operators

8.6 TERMINATION/CLOSURE OF SERVICE

8.6.1 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

8.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

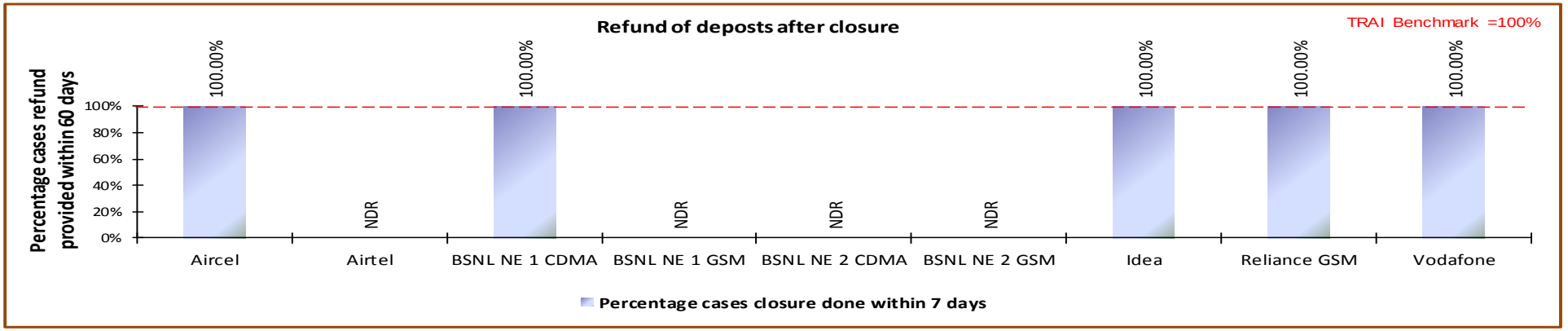
All operators met the TRAI benchmark for the parameter.

8.7 REFUND OF DEPOSITS AFTER CLOSURE

8.7.1 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

8.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

9 DETAILED FINDINGS - DRIVE TEST DATA

9.1 OPERATOR ASSISTED DRIVE TEST - VOICE

The drive test was conducted simultaneously for all the operators present in the North East 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 North East circle are given below.

Name of Operator	Name of Operator
Aircel	Aircel 3G
Airtel	BSNL 3G
BSNL NE 1 CDMA	Reliance 3G
BSNL NE 1 GSM	
BSNL NE 2 CDMA	
BSNL NE 2 GSM	
Idea	
Reliance GSM	
Vodafone	

9.1.1 MIZORAM SSA

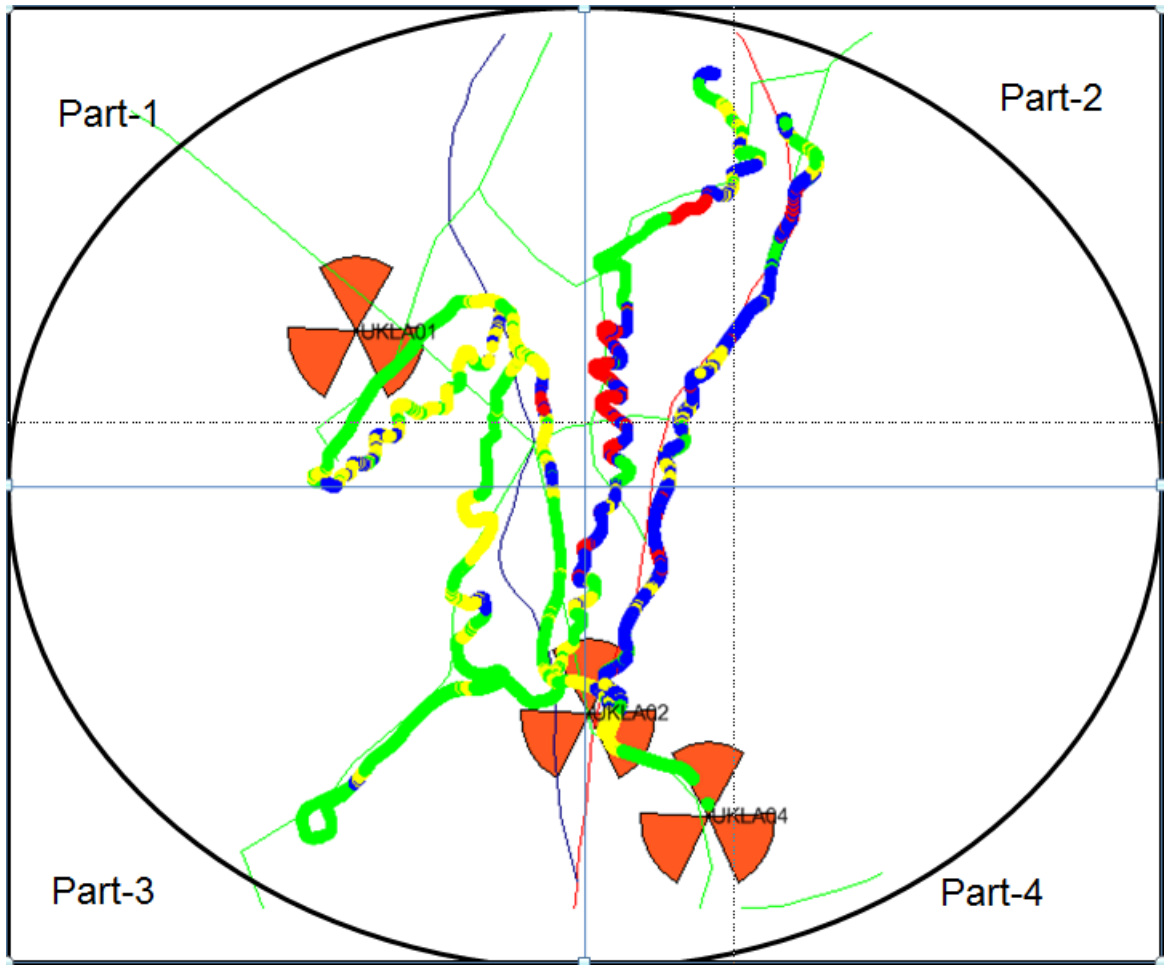
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
February	MIZORAM	15/02/2016	20/02/16	621

9.1.1.1 Route Details - MIZORAM SSA

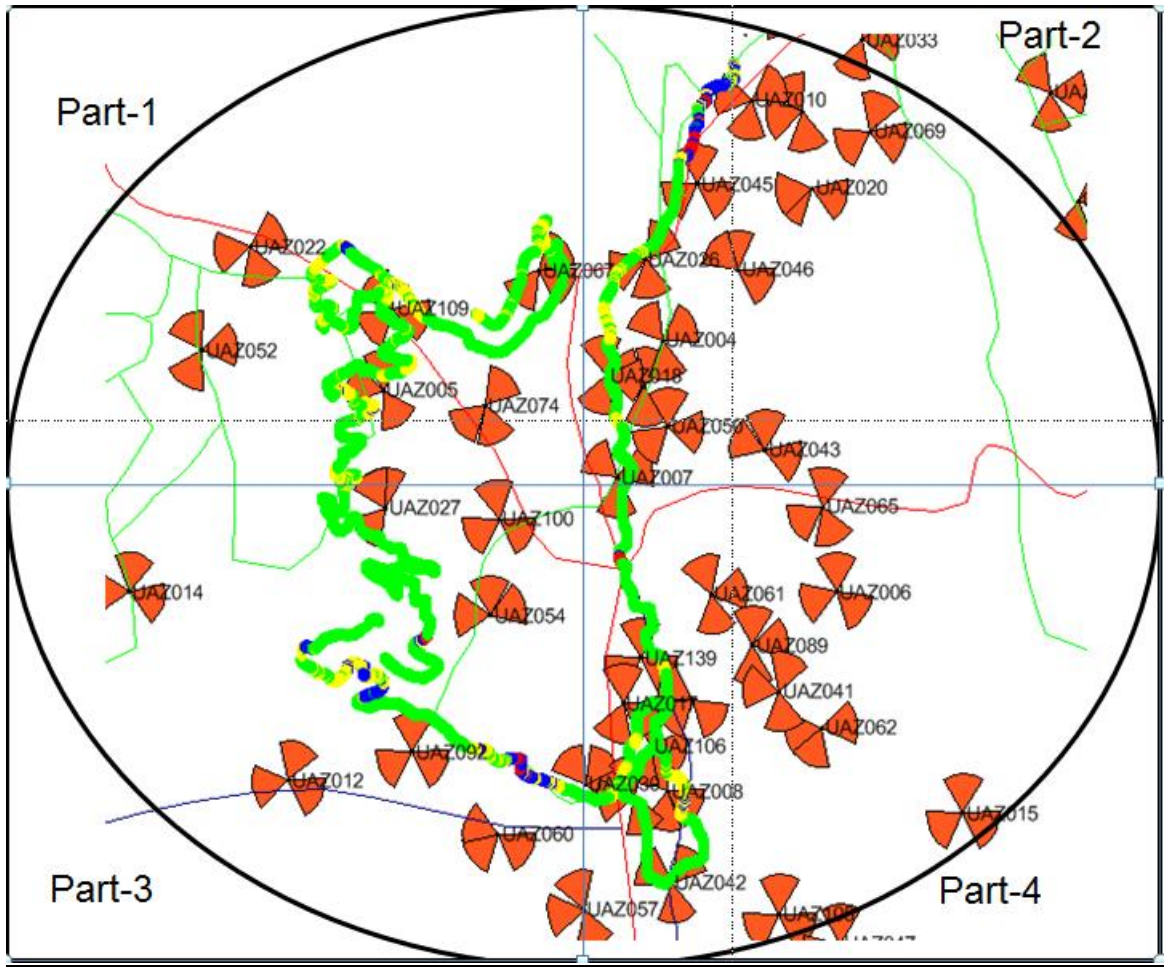
Category	Type of location	February					
		MIZORAM					
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Outdoor	Major Roads	VAIRANGTE to KANPUI)	KOLASIB to SELLING	SELLING TO SERCHIP	Thenzawl to Lunglei	NO DRIVE DONE	THENZAWL TO AIZWAL
	Highways						
	With in the City						
Indoor	Shopping complex						
	Office complex						

The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We February 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.

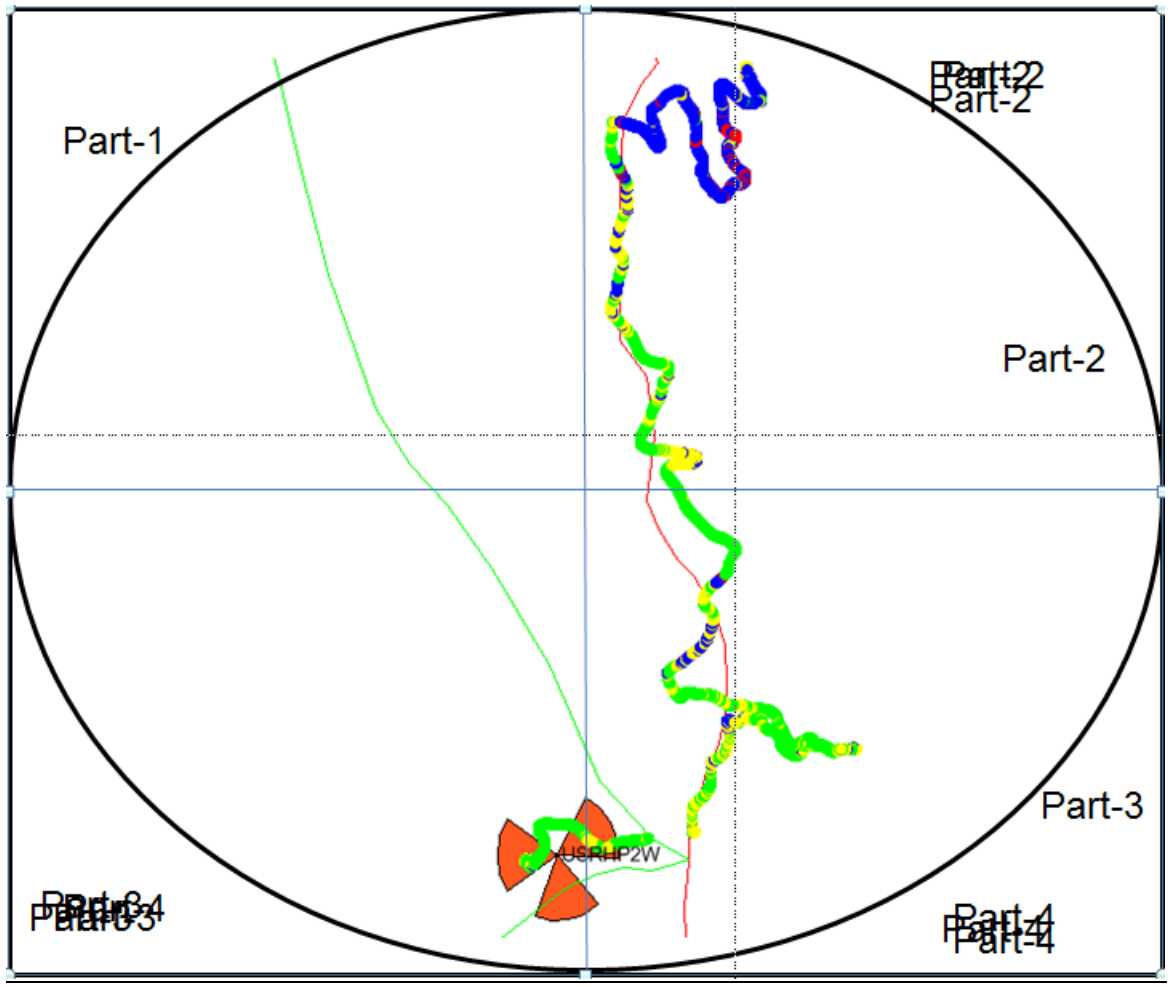
9.1.1.2 Route Map - MIZORAM DAY 1



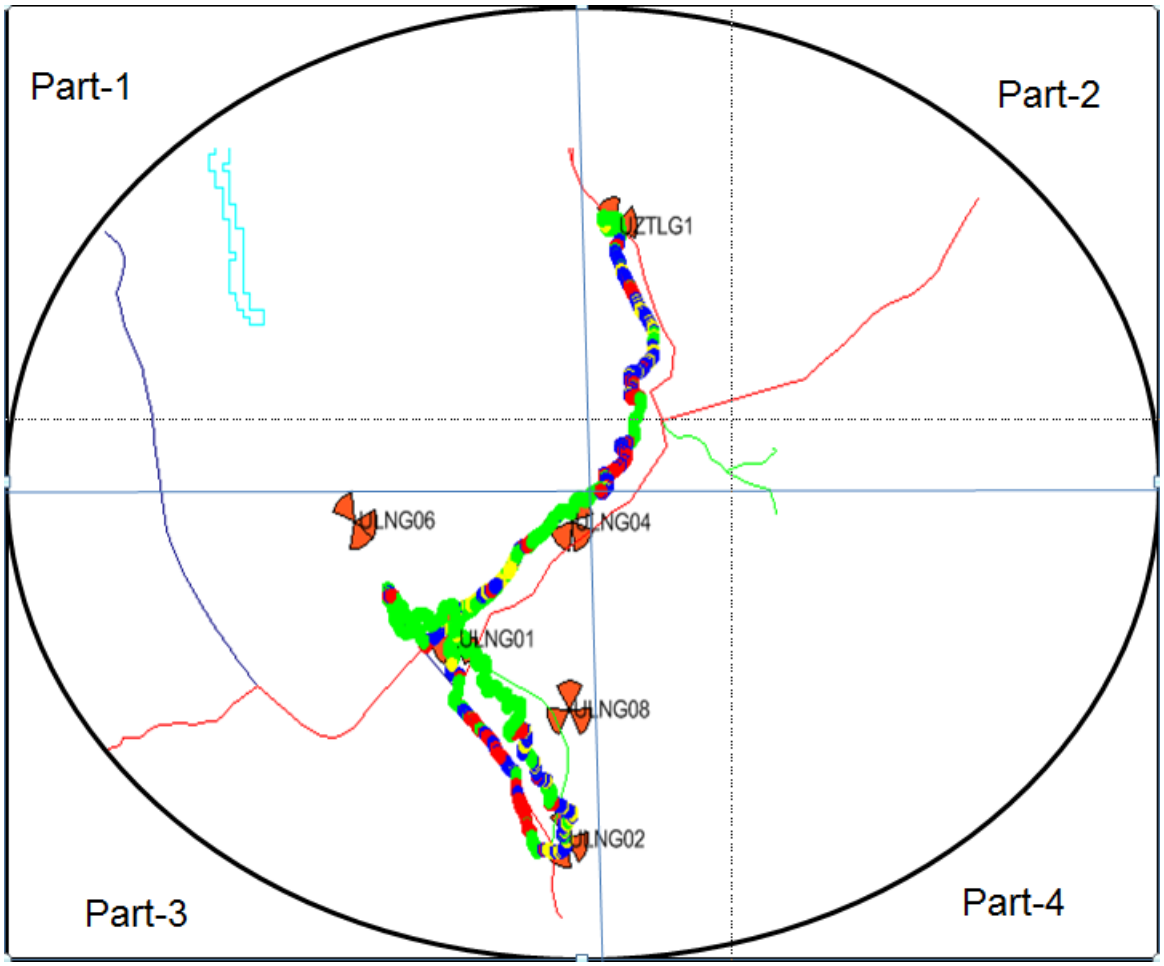
9.1.1.3 Route Map - MIZORAM DAY 2



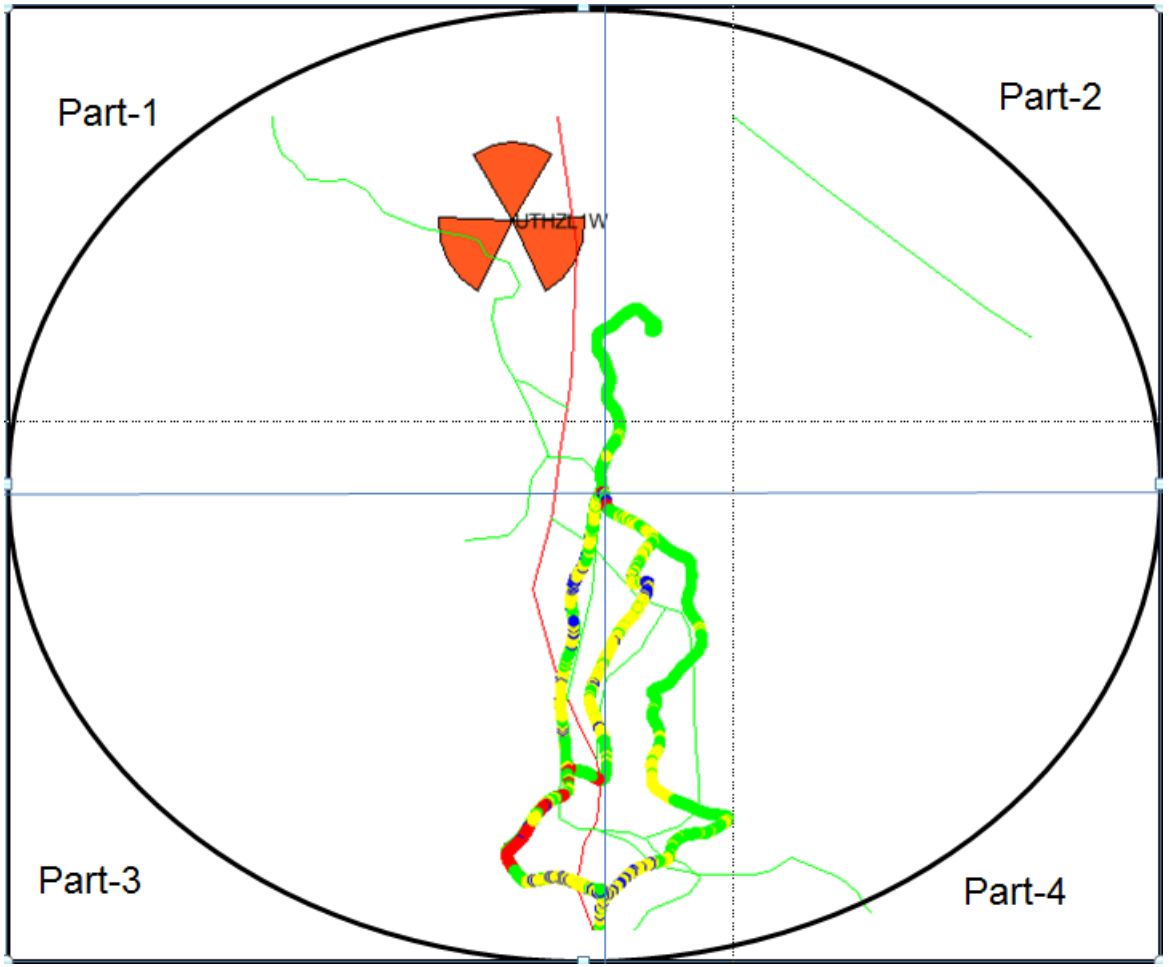
9.1.1.4 Route Map - MIZORAM DAY 3



9.1.1.1 Route Map - MIZORAM DAY 4



9.1.1.2 Route Map - MIZORAM DAY 5



9.1.1.3 Drive Test Results - MIZORAM SSA-2G

Mizoram	B'mark	Aircel		Airtel		BSNL NE 1 CDMA		BSNL NE 1 GSM		BSNL NE 2 CDMA		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		36.75%	24.18%	68.59%	43.98%	Not participating		92.86%	41.22%	Not participating		88.37%	33.65%	No Service		50.69%	33.13%
0 to -85 dBm		77.23%	60.77%	89.30%	66.71%			92.86%	70.49%			99.66%	54.67%			93.73%	65.39%
0 to -95 dBm		79.91%	86.64%	99.45%	87.03%			92.86%	83.90%			99.96%	79.79%			99.65%	87.49%
Voice quality	≥ 95%	99.38%	96.61%	98.65%	96.26%			90.95%	88.09%			99.23%	96.57%			99.28%	92.53%
CSSR	≥ 95%	100.00%	97.08%	100.00%	100.00%			91.67%	79.80%			100.00%	97.00%			100.00%	95.41%
%age Blocked calls		0.00%	2.08%	0.00%	0.00%			8.33%	8.70%			0.00%	4.72%			0.00%	2.07%
Call drop rate	≤ 2%	1.32%	0.43%	0.00%	0.00%			0.00%	0.63%			0.00%	0.44%			0.00%	2.61%
Hands off success rate		100.00%	98.77%	100.00%	100.00%			100.00%	97.96%			100.00%	97.01%			100.00%	86.28%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Vodafone 2G did not meet the benchmark in outdoor locations; however BSNL 2G NE1 GSM did not meet the benchmark in indoor as well as outdoor locations.

Call Set Success Rate (CSSR)

BSNL 2G NE1 GSM failed to meet the benchmark for CSSR in indoor as well as outdoor locations.

Call Drop Rate

Vodafone 2G failed to meet the benchmark for call drop rate in outdoor locations.

9.1.1.1 Drive Test Results - MIZORAM SSA-3G

Mizoram	B'mark	Aircel 3G		Airtel 3G		BSNL 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		36.75%	33.20%	63.57%	68.21%	72.73%	20.81%	87.40%	52.64%
0 to -85 dBm		77.23%	53.44%	88.09%	86.84%	93.18%	55.37%	90.73%	84.11%
0 to -95 dBm		79.91%	77.55%	100.00%	97.31%	95.45%	86.58%	96.72%	94.92%
Voice quality	≥ 95%	98.44%	97.06%	96.23%	94.21%	NDR	NDR	NDR	NDR
CSSR	≥ 95%	NDR	93.96%	100.00%	99.58%	94.25%	93.22%	100.00%	95.74%
%age Blocked calls		NDR	4.82%	0.00%	0.42%	4.65%	12.75%	0.00%	2.13%
Call drop rate	≤ 2%	NDR	0.00%	0.00%	0.00%	0.00%	3.14%	0.00%	2.17%
Hands off success rate		NDR	100.00%	100.00%	100.00%	100.00%	98.42%	100.00%	82.14%

Data Source: Drive test reports submitted by operators to auditors

Note: - Aircel did not share the data

Voice Quality

Airtel 3G failed to meet the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

Aircel 3G failed to meet the benchmark for CSSR in outdoor locations, however BSNL 3G failed to meet the benchmark in indoor as well as outdoor locations.

Call Drop Rate

BSNL 3G and Vodafone 3G failed to meet the benchmark for call drop rate in outdoor locations.

9.1.1.2 Drive Test Results - MIZORAM SSA- DATA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%	100%	NDR	NDR	100	NDR	100%		100%
Succesful Data Transmission upload speed attempts	>75%	100%	100%	NDR	NDR	NDR	NDR	100%		100%
Minimum download speed		28	68	NDR	NDR	NDR	NDR	29	No Service	NDR
Average throughput for Packet Data		51	81	NDR	NDR	138	NDR	52		140
Latency	<250ms	100	100	NDR	NDR	NDR	NDR	NDR		NDR

Note: BSNL CDMA NE-1. BSNL CDMA NE-2, BSNL GSM NE-2 did not submit the data.

All the parameters met the TRAI benchmark.

9.1.1.3 Drive Test Results - MIZORAM SSA- DATA-3G

Name of the Parameter	Bench Mark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100%		100%
Succesful Data Transmission upload speed attempts	>75%	100	100	NDR		100%
Minimum download speed		651	294	NDR	No Service	988
Average throughput for Packet Data		1155	327	796		1140
Latency	<250ms	NDR	100	NDR		100

All the parameters met the TRAI benchmark.

9.1.2 MEGHALAYA SSA

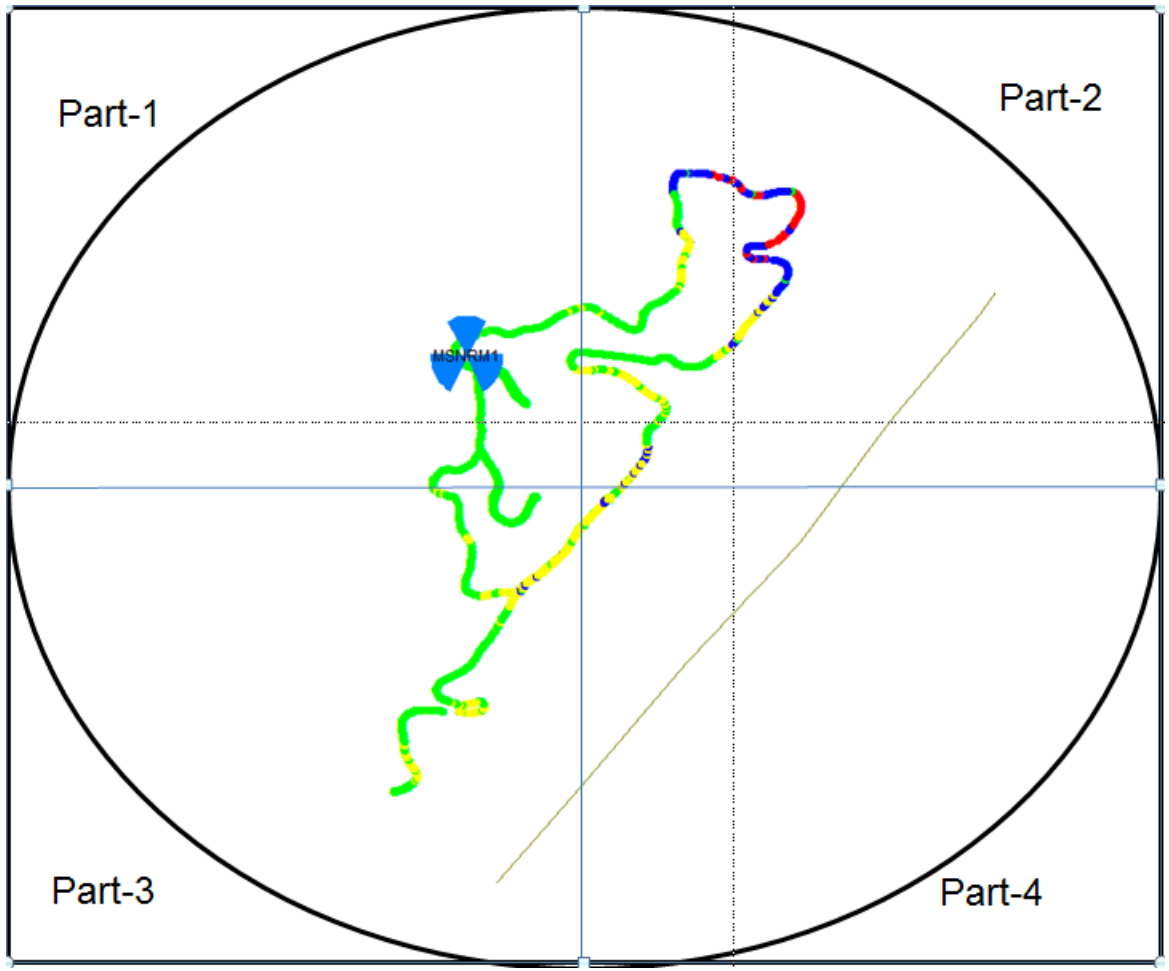
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
March	Meghalaya	14/02/2016	19/03/2017	606

9.1.2.1 Route Details - MEGHALAYA SSA

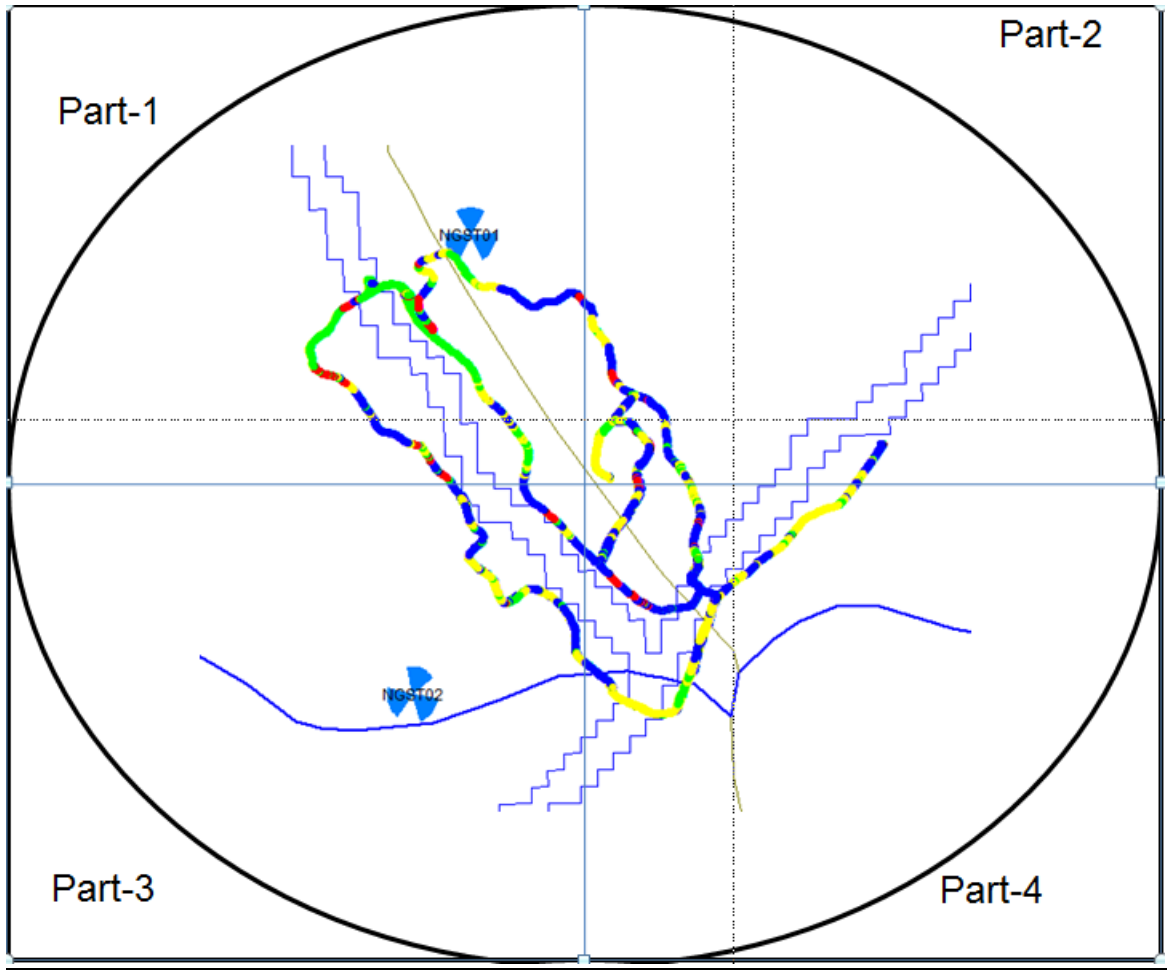
Category	Type of location	March					
		Meghalaya					
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Outdoor	Major Roads	Shillong to Mawdon and Return à Road Drive (High Way) (85 KM) and MAWSYNRAM Town Drive.	Shillong to Nongstoin and return à Road Drive (High Way) (97 KM) and NONGSTOIN Town Drive.	Shillong to Byrnihat and return à Road Drive (High Way) (86 KM) and SHILLONG Town Drive.	Shillong to Jowai à Road Drive (High Way) (102 KM) and JOWAI Town Drive.	Jowai to Borsara à Road Drive (High Way) (87 KM) and KHLIEHRIAT Town Drive.	Borsara to Shillong Return à No Drive Test (149 KM)
	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 February 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.

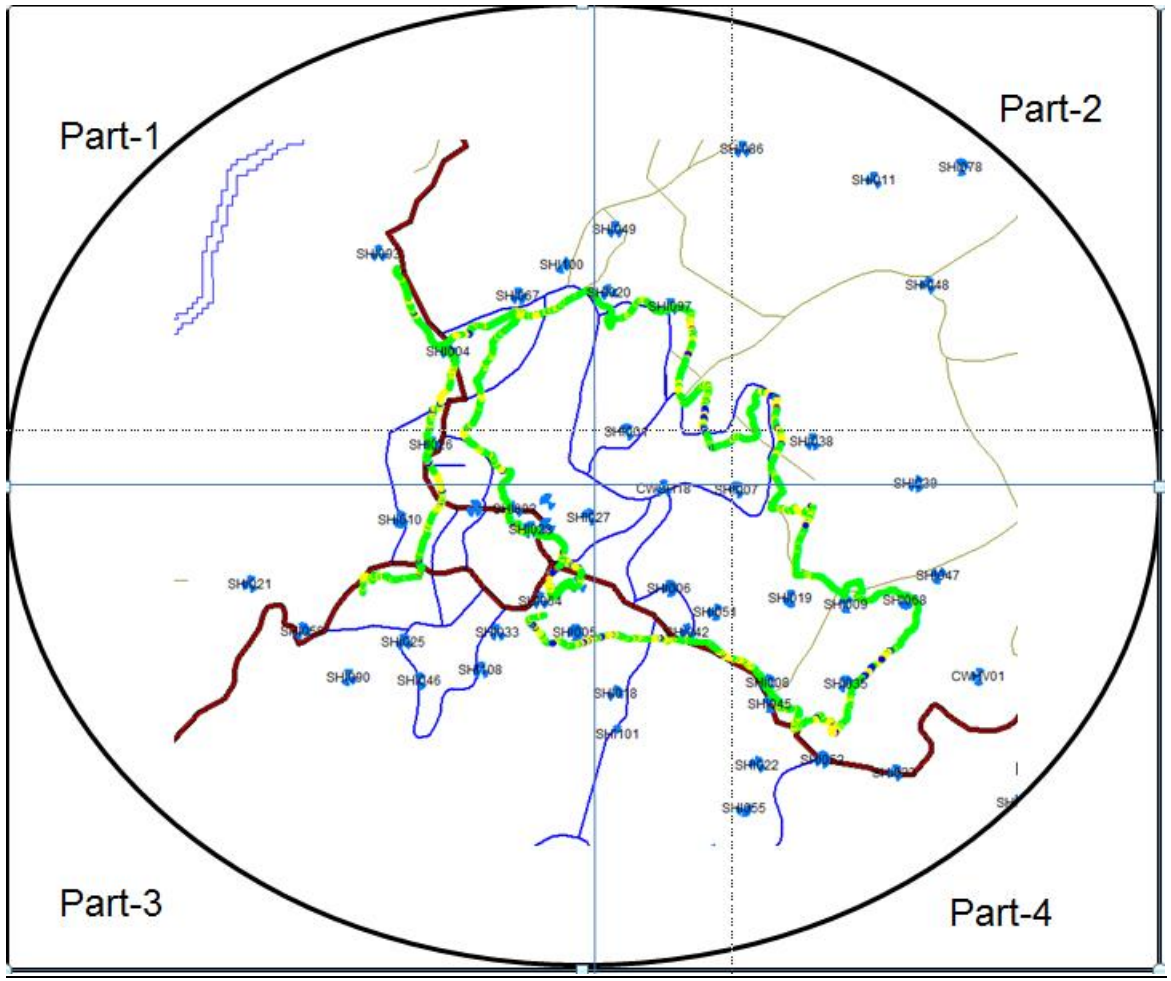
9.1.2.2 Route Map - MEGHALAYA DAY 1



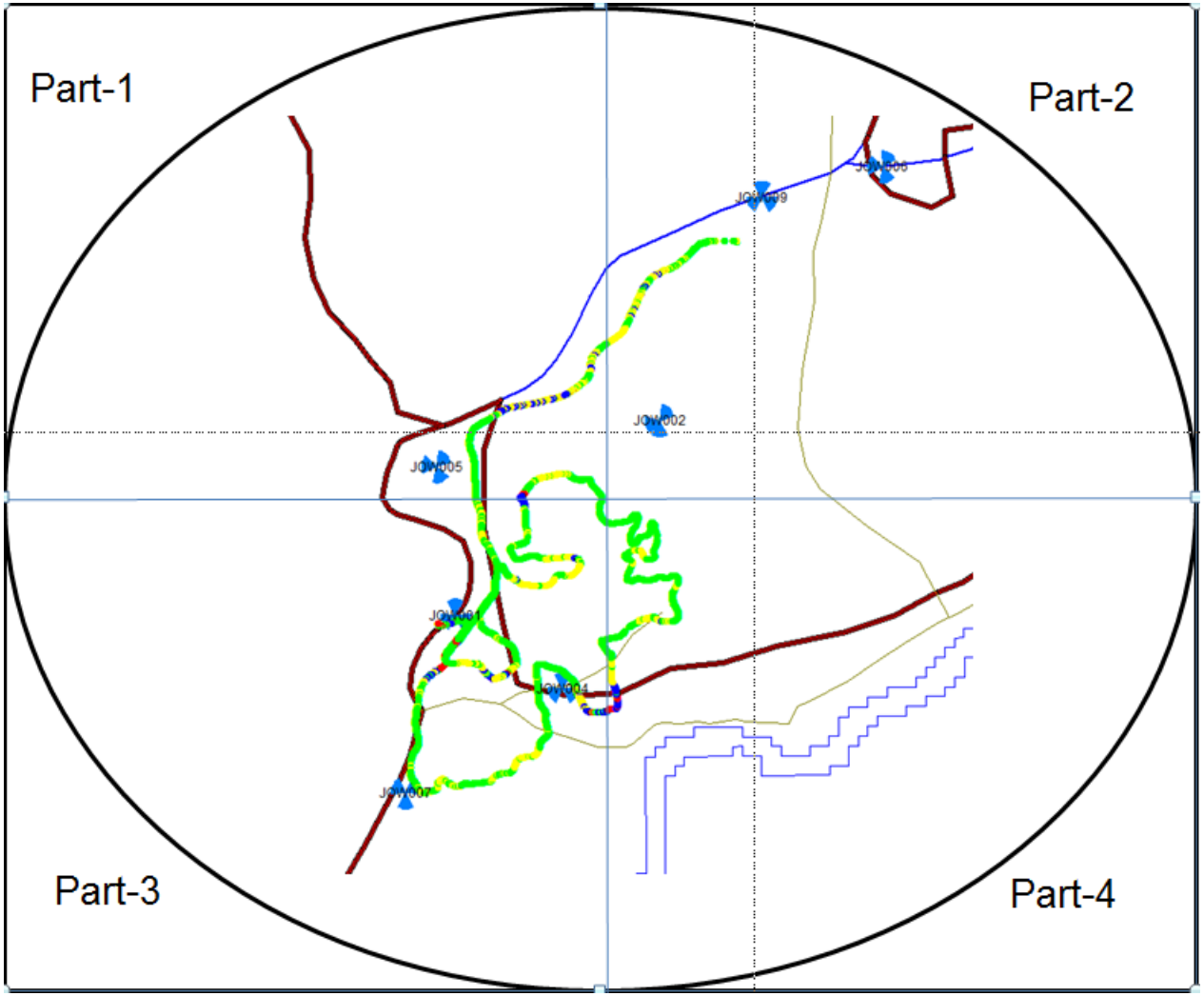
9.1.2.3 Route Map - MEGHALAYA DAY 2



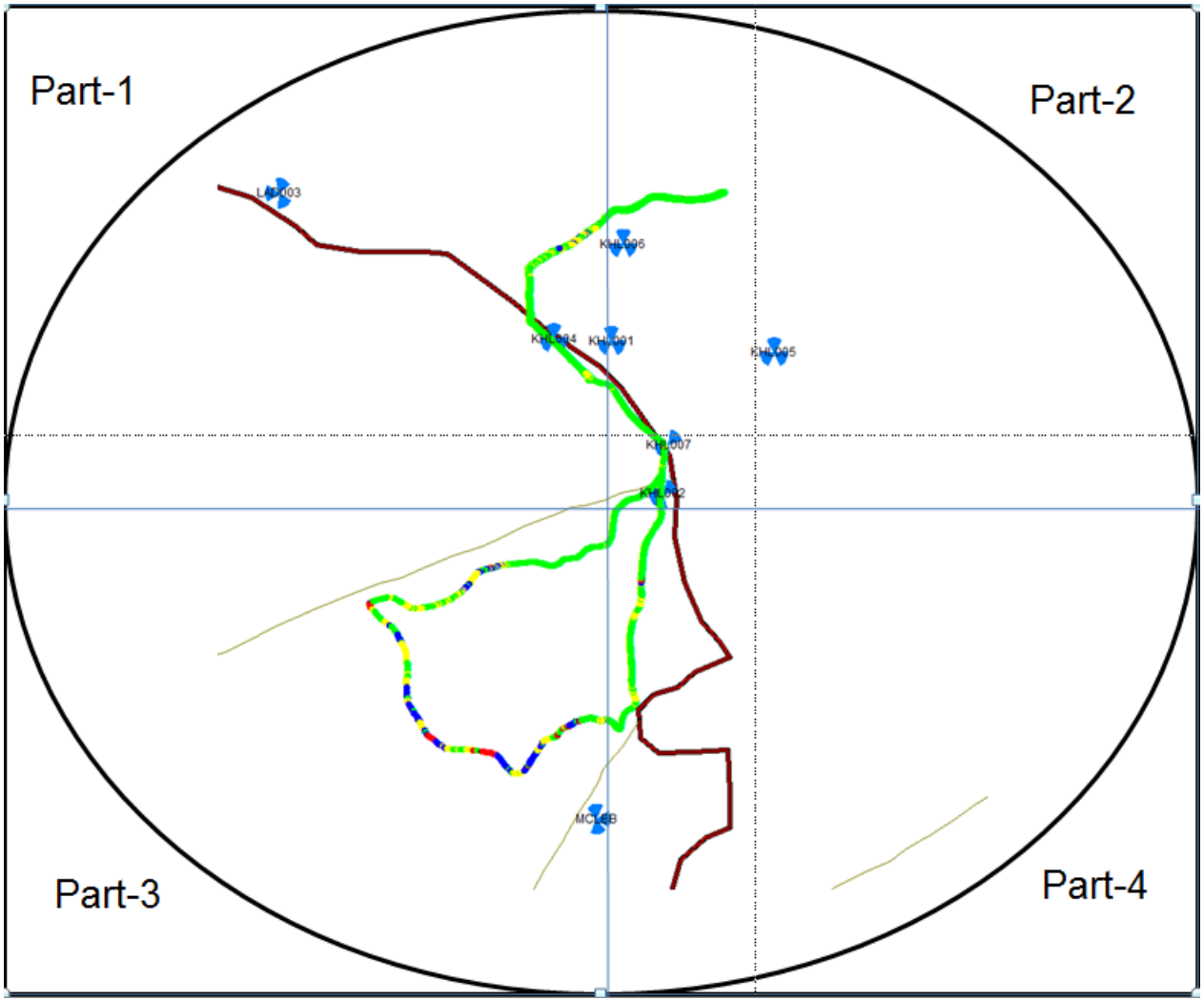
9.1.2.4 Route Map - MEGHALAYA DAY 3



9.1.2.1 Route Map - MEGHALAYA DAY 4



9.1.2.2 Route Map - MEGHALAYA DAY 5



9.1.2.3 Drive Test Results - MEGHALAYA SSA-2G

Meghalaya	B'mark	Aircel		Airtel		BSNL NE 1 CDMA		BSNL NE 1 GSM		BSNL NE 2 CDMA		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		80.51%	58.15%	94.43%	57.81%	Not participating		55.13%	40.78%	Not participating		79.71%	42.73%	No Service		87.69%	51.46%
0 to -85 dBm		74.55%	56.29%	99.88%	81.00%			84.28%	65.75%			98.93%	73.56%			96.92%	75.42%
0 to -95 dBm		76.57%	94.02%	99.99%	94.94%			96.44%	87.31%			99.89%	91.83%			100.00%	93.54%
Voice quality	≥ 95%	95.06%	96.56%	98.57%	96.78%			97.49%	83.10%			98.67%	98.26%			99.56%	94.74%
CSSR	≥ 95%	96.33%	97.46%	100.00%	100.00%			93.22%	87.16%			NDR	98.47%			98.48%	93.74%
%age Blocked calls		0.00%	0.11%	0.00%	0.00%			6.78%	12.84%			NDR	1.53%			0.00%	1.57%
Call drop rate	≤ 2%	0.02%	1.02%	0.00%	0.00%			0.00%	1.03%			NDR	0.00%			0.00%	0.42%
Hands off success rate		100.00%	100.00%	100.00%	100.00%			100.00%	84.40%			NDR	100.00%			100.00%	97.09%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL NE1 GSM and Vodafone failed to meet the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

Vodafone 2G failed to meet the benchmark for CSSR in outdoor locations, however BSNL NE1 GSM failed to meet the benchmark in indoor as well as outdoor locations.

Call Drop Rate

All operators met the benchmark for call drop rate in indoor as well as outdoor locations.

9.1.2.4 Drive Test Results - MEGHALAYA SSA-3G

Meghalaya	B'mark	Aircel 3G		Airtel 3G		BSNL 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		66.00%	29.77%	57.45%	44.03%	69.96%	24.12%	100.00%	52.00%
0 to -85 dBm		70.44%	53.82%	76.94%	68.67%	89.65%	50.72%	100.00%	86.00%
0 to -95 dBm		70.91%	79.38%	100.00%	84.18%	89.47%	75.08%	100.00%	95.00%
Voice quality	≥ 95%	95.35%	94.26%	98.97%	92.26%	99.72%	92.44%	NDR	NDR
CSSR	≥ 95%	96.55%	97.10%	100.00%	100.00%	94.34%	94.48%	100.00%	100.00%
%age Blocked calls		4.11%	3.77%	0.00%	0.36%	5.88%	15.43%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	2.29%	0.00%	0.00%	2.08%	6.69%	0.00%	0.00%
Hands off success rate		NDR	NDR	100.00%	100.00%	100.00%	100.00%	100.00%	97.80%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Airtel 3G, Aircel 3G and BSNL 3G failed to meet the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

BSNL 3G failed to meet the benchmark for CSSR in indoor as well as outdoor locations.

Call Drop Rate

Aircel 3G failed to meet the benchmark for call drop rate in outdoor locations, however BSNL 3G failed in indoor as well as outdoor locations.

9.1.2.5 Drive Test Results - MEGHALAYA SSA- DATA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100%	100%	NDR	NDR	NDR	NDR	100%		100%
Succesful Data Transmission upload speed attempts	>75%	100%	100%	NDR	NDR	NDR	NDR	100%		100%
Minimum download speed		67	71	NDR	NDR	NDR	NDR	100	No Service	NDR
Average throughput for Packet Data		116	86	NDR	NDR	NDR	NDR	171		123
Latency	<250ms	100	100	NDR	NDR	NDR	NDR	NDR		NDR

Note : BSNL CDMA NE-1, BSNL CDMA NE-2, BSNL GSM NE-1, BSNL GSM NE-2 did not submit the data.

All the parameters met the TRAI benchmark.

9.1.2.6 Drive Test Results - MEGHALAYA SSA- DATA-3G

Name of the Parameter	Bench Mark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	100	100	NDR		100%
Succesful Data Transmission upload speed attempts	>75%	100	100	NDR		100%
Minimum download speed		414	1467	NDR	No Service	NDR
Average throughput for Packet Data		1157	1245	NDR		753
Latency	<250ms	100	100	NDR		NDR

Note : BSNL did not submit the data.

All the parameters met the TRAI benchmark.

10 ANNEXURE – CONSOLIDATED-2G

10.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data										
	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		5600	6546	438	106	198	1969	3186	No Service	5085
Sum of downtime of BTSs in a month (in hours)		247818	47523	5059	2832	8088	6449	44360	No Service	264179
BTSs accumulated downtime (not available for service)	≤ 2%	5.95%	0.98%	1.55%	3.59%	5.49%	0.44%	1.87%	No Service	6.98%
Number of BTSs having accumulated downtime >24 hours		2099	87	67	6	18	107	44	No Service	92
Worst affected BTSs due to downtime	≤ 2%	37.48%	1.33%	15.30%	5.66%	9.09%	5.43%	1.38%	No Service	1.81%
Live Measurement Results for Network Availability- 3 Day live data										
	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		5564	6400	438	106	198	1969	3151	No Service	5085
Sum of downtime of BTSs in a month (in hours)		22926	4393	649	216	936	1387	4459	No Service	6856
BTSs accumulated downtime (not available for service)	≤ 2%	5.72%	0.95%	2.06%	2.83%	6.57%	0.98%	1.97%	No Service	1.87%
Number of BTSs having accumulated downtime >24 hours		1824	0	9	3	14	116	30	No Service	42
Worst affected BTSs due to downtime	≤ 2%	32.79%	0.00%	2.05%	2.83%	7.07%	5.89%	0.95%	No Service	0.83%

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

10.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.01%	95.58%	98.52%	95.56%	97.12%	89.73%	95.23%	No Service	98.63%
SDCCH/Paging channel congestion	≤ 1%	0.84%	0.61%	NA	0.19%	NA	5.14%	0.14%	No Service	0.67%
TCH congestion	≤ 2%	4.02%	1.12%	NDR	NDR	NDR	11.56%	1.21%	No Service	1.37%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.29%	96.08%	98.40%	96.40%	97.19%	95.30%	97.35%	No Service	98.97%
SDCCH/Paging channel congestion	≤ 1%	0.66%	0.34%	NA	0.05%	NA	3.39%	0.08%	No Service	0.73%
TCH congestion	≤ 2%	1.78%	0.57%	NDR	NDR	NDR	5.17%	0.74%	No Service	1.03%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		709	825	0	869	0	0	489	0	1572
Total number of successful calls established		692	825	0	736	0	0	479	0	1499
CSSR	≥ 95%	97.60%	100.00%	NDR	84.70%	NDR	NDR	97.96%	NDR	95.36%
%age blocked calls		2.40%	0.00%	NDR	15.30%	NDR	NDR	2.04%	NDR	4.64%

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

10.3 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 NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		196675947	345735562	396607	3627417	10069391	293404637	40307985	No Service	104729717
Total number of calls dropped		3284931	5346389	4493	57692	75934	12679131	215401	No Service	878766
Call drop rate	≤ 2%	1.67%	1.55%	1.13%	1.59%	0.75%	4.32%	0.53%	No Service	0.84%
Total number of cells in the network		180859	19404	NDR	214	411	5895	9569	No Service	15109
Total number of cells having more than 3% TCH		2891	318	NDR	1	7	595	148	No Service	433
Worst affected cells having more than 3% TCH	≤ 3%	1.60%	1.64%	NDR	0.47%	1.70%	10.09%	1.55%	No Service	2.86%
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 NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		253382635	418543464	433269	319220	896722	94189346	57422440	No Service	157499177
Total number of calls dropped		3750897	3167017	4781	4596	6458	1391085	251845	No Service	1279298
Call drop rate	≤ 2%	1.48%	0.76%	1.10%	1.44%	0.72%	1.48%	0.44%	No Service	0.81%
Total number of cells in the network		389644	19208	NDR	214	411	5907	9461	No Service	15115
Total number of cells having more than 3% TCH		49521	309	NDR	6	8	281	146	No Service	329
Worst affected cells having more than 3% TCH	≤ 3%	12.71%	1.61%	NDR	2.80%	1.95%	4.76%	1.54%	No Service	2.17%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data										
Call drop rate	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		694	825	0	752	0	0	479	0	1478
Total number of calls dropped		6	0	0	5	0	0	1	0	24
Call drop rate	≤ 2%	0.86%	0.00%	NDR	0.66%	NDR	NDR	0.21%	NDR	1.62%

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

10.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		25918043950	40216825149	NDR	NDR	2670	297564522	10107771269	No Service	18335397646
Total number of calls with good voice quality		24025296629	39823489675	NDR	NDR	2670	278463360	9726471159	No Service	17847706665
%age calls with good voice quality	≥ 95%	92.70%	99.02%	NDR	NDR	100.00%	93.58%	96.23%	No Service	97.34%
Live measurement results for Voice quality-3 Day data										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		1079918498	1675701048	NDR	NDR	90	82673878	421157136	No Service	763974902
Total number of calls with good voice quality		1001054026	1659312070	NDR	NDR	90	80681890	405269632	No Service	743654444
%age calls with good voice quality	≥ 95%	92.70%	99.02%	NDR	NDR	100.00%	97.59%	96.23%	No Service	97.34%
Drive test results for Voice quality (Average of three drive tests) - DT data										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		1080587	1356325	0	904102	0	0	1005985	0	1658881
Total number of calls with good voice quality		559308	1313722	0	798827	0	0	981720	0	1566629
%age calls with good voice quality	≥ 95%	51.76%	96.86%	NDR	88.36%	NDR	NDR	97.59%	NDR	94.44%

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

10.5 POI CONGESTION

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	39	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		136623	214203	0	0	0	0	53092	No Service	92602917
Traffic served for all POIs (B)- in erlangs		83095	65527	0	0	0	0	29759	No Service	27911116
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	39	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		136623	196808	0	0	0	0	52655	No Service	2987191
Traffic served for all POIs (B)- in erlangs		77833	63537	0	0	0	0	29201	No Service	725707
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

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

10.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang									
Traffic in Erlang	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Eqipped capacity of the network	106069	106175	16043	5625	5625	NDR	24056	No Service	51259
Total taffic handled in erlang during TCBH	55063	86437	41	244.65	98.98	NDR	14434	No Service	30723
Total no. of customers served (as per VLR)	2083413	3437485	4215	8704	536	NDR	486666	No Service	1457045

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

11 ANNEXURE – CONSOLIDATED-3G

11.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		1646	834	301
Sum of downtime (i.e. total outage time) of Node Bs		66931	4540	1434
Node Bs downtime (not available for service)	≤ 2%	5.47%	0.73%	0.64%
Number of Node Bs having accumulated downtime of >24 hours in a month		629	151	2
Worst affected Node Bs due to downtime	≤ 2%	38.21%	18.11%	0.66%
Live Measurement Results for Network Availability- 3 Day live data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		1646	834	301
Sum of downtime (i.e. total outage time) of Node Bs		6136	405	328
Node Bs downtime (not available for service)	≤ 2%	5.18%	0.67%	1.51%
Number of Node Bs having accumulated downtime of >24 hours in a month		527	74	2
Worst affected Node Bs due to downtime	≤ 2%	32.04%	8.87%	0.66%

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

11.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	97.13%	95.01%	98.50%
RRC Congestion	≤ 1%	0.53%	3.29%	0.55%
Circuit Switched RAB Congestion	≤ 2%	0.72%	2.16%	0.02%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	97.27%	95.35%	99.49%
RRC Congestion	≤ 1%	0.04%	5.32%	0.11%
Circuit Switched RAB Congestion	≤ 2%	0.01%	2.38%	0.01%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data				
CSSR	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of RRC attempts (A)		396	797	0
Total number of RRC established (B)		384	749	0
Call setup success rate (B/A*100)	≥ 95%	96.97%	93.98%	NDR
%age blocked calls		3.03%	6.02%	NDR

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 Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		8224719	1269037	829681
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		111559	30974	6688
Call drop rate (B/A*100)	≤ 2%	1.36%	2.44%	0.81%
Total no. of cells in the licensed service area (B)		59992	2502	782
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		686	263	8
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.14%	10.52%	1.02%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		9141934	543773	68583
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		136346	11086	407
Call drop rate (B/A*100)	≤ 2%	1.49%	2.04%	0.59%
Total no. of cells in the licensed service area (B)		96103	2502	782
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		1335	146	8
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.39%	5.83%	1.02%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data				
Call drop rate	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		384	749	0
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		8	32	0
Call drop rate (B/A*100)	≤ 2%	2.08%	4.27%	NDR

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 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		58600521776	0	8295601285
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		57617251936	0	8280204138
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.32%	NDR	99.81%
Live measurement results for Voice quality-3 Day data				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		2441688407	0	778473480
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		2400718831	NDR	777206870
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.32%	NDR	99.84%
Drive test results for Voice quality (Average of three drive tests) - DT data				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1178309	1258367	0
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1118685	1178680	0
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	94.94%	93.67%	NDR

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 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	11
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		136598	0	11325
Traffic served for all POIs (B)- in erlangs		82601	0	2663
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	11
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		136583	0	11325
Traffic served for all POIs (B)- in erlangs		77253	0	2663
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

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

11.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang				
Traffic in Erlang		Aircel 3G	BSNL 3G	Reliance 3G
Eqipped capacity of the network		NDR	NDR	NDR
Total taffic handled in erlang during TCBH		NDR	NDR	NDR
Total no. of customers served (as per VLR)		NDR	NDR	NDR

12 ANNEXURE – CUSTOMER SERVICES

12.1 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated										
Billing Performance	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)										
Metering and billing credibility - Postpaid										
Total bills generated during the period		84137	100196	11529	0	0	NDR	4303	36248	104481
Total number of bills disputed		11	24	15	0	0	NDR	7	31	76
Total number of valid billing complaints		1	9	9	0	0	NDR	1	31	47
Total complaints considered invalid		10	15	6	0	0	NDR	6	0	29
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.01%	0.02%	0.13%	NDR	NDR	NDR	0.18%	0.09%	0.07%
January										
Total bills generated during the first billing cycle		28673	33372	4006	0	0	NDR	1489	12781	34132
Total number of bills disputed in first billing cycle		2	7	8	0	0	NDR	1	11	39
Total number of valid billing complaints (billing cycle 1)		0	2	4	0	0	NDR	1	11	23
Total complaints considered invalid (billing cycle 1)		2	5	4	0	0	NDR	0	0	16
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.01%	0.02%	0.20%	NDR	NDR	NDR	0.07%	0.09%	0.11%

February										
Total bills generated during the second billing cycle		28040	33369	3969	0	0	NDR	1307	12143	34710
Total number of bills disputed in second billing cycle		5	5	5	0	0	NDR	6	10	27
Total number of valid billing complaints (billing cycle 2)		0	2	3	0	0	NDR	0	10	15
Total complaints considered invalid (billing cycle 2)		5	3	2		0	NDR	6	0	12
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.02%	0.01%	0.13%	NDR	NDR	NDR	0.46%	0.08%	0.08%
March										
Total bills generated during the third billing cycle		27424	33455	3554	0	0	NDR	1507	11324	35639
Total number of bills disputed in third billing cycle		4	12	2	0	0	NDR	0	10	10
Total number of valid billing complaints (billing cycle 3)		1	5	2	0	0	NDR	0	10	9
Total complaints considered invalid (billing cycle 3)		3	7	0	0	0	NDR	0	0	1
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.01%	0.04%	0.06%	NDR	NDR	NDR	0.00%	0.09%	0.03%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid										
Performance prepaid	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of charging complaints (valid) - sum of 3 months		0	213	19	0	0	NDR	117	310	711
Total complaints considered invalid (sum of 3 months)		842	706	3	0	0	NDR	436	0	213
Total number of charging complaints (sum of 3 months)		842	919	22	0	0	NDR	553	310	924
Total no of customers served (Sum of 3 months)		9266840	11522177	140748	0	0	NDR	1493362	1038976	1501596
Percentage of charging complaints disputed	≤ 0.1%	0.01%	0.01%	0.02%	NDR	NDR	NDR	0.04%	0.03%	0.06%

Data Source: Billing Center of the operators

NDR: Data to conduct audit for metering and billing was not available at the central billing center of BSNL. Hence, audit for the parameter has not been conducted for the operator.

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated										
Billing Performance	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of billing/charging complaints		853	943	37	0	0	NDR	1002	341	1000
Total number of complaints resolved in favour of customer		1	222	28	0	0	NDR	560	341	758
Total complaints considered invalid		852	721	9	0	0	NDR	442	0	242
Number of complaints resolved in 4 weeks		1	222	28	0	0	NDR	560	341	758
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	NDR	NDR	NDR	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		1	222	28	0	0	NDR	560	341	758
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	NDR	NDR	NDR	100.00%	100.00%	100.00%
Period of applying credit / waiver										
Total number of complaints where credit/waiver is required		1	222	6	0	0	NDR	133	341	709
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	NDR	100.00%	100.00%	100.00%
Live calling results for resolution of billing complaints										
Resolution of billing complaints	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made		100	100	0	0	100	100	100	100	100
Number of cases resolved in 4 weeks		71	59	0	0	57	82	86	71	62
Percentage cases resolved in 4 weeks	≥ 98%	71.00%	59.00%	NDR	NDR	57.00%	82.00%	86.00%	71.00%	62.00%
Number of cases resolved in 6 weeks		75	59	0	0	57	83	86	71	62
Percentage cases resolved in 6 weeks	100.00%	75.00%	59.00%	NDR	NDR	57.00%	83.00%	86.00%	71.00%	62.00%

Data Source: Billing Center of the operators

12.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated										
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		4159331	692000	149	8627	8627	NDR	1520797	250393	1570636
Number of calls getting connected and answered (electronically)		3999373	691980	149	8627	8627	NDR	1520797	244573	1570551
Percentage calls getting connected and answered	≥ 95%	96.15%	100.00%	100.00%	100.00%	100.00%	NDR	100.00%	97.68%	99.99%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated										
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total Number of calls received (3 months)		534578	706450	72	4563	4563	NDR	285912	76610	698176
Total Number of calls answered within 90 seconds (3 months)		503112	657400	71	4438	4438	NDR	285620	73633	698176
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	94.11%	93.06%	98.61%	97.26%	97.26%	NDR	99.90%	96.11%	100.00%
January										
Total calls received (Month 1)		173339	249312	42	1806	1806	NDR	94734	28033	240703
Total calls answered within 90 seconds (Month 1)		153765	236831	41	1756	1756	NDR	94596	26484	240703
% calls answered within 90 seconds (Month 1)	≥ 95%	88.71%	94.99%	97.62%	97.23%	97.23%	NDR	99.85%	94.47%	100.00%
February										
Total calls received (Month 2)		165383	219901	9	1469	1469	NDR	90909	25139	218855
Total calls answered within 90 seconds (Month 2)		162560	192655	9	1443	1443	NDR	90815	24271	218855
% calls answered within 90 seconds (Month 2)	≥ 95%	98.29%	87.61%	100.00%	98.23%	98.23%	NDR	99.90%	96.55%	100.00%
March										
Total calls received (Month 3)		195856	237237	21	1288	1288	NDR	100269	23438	238618
Total calls answered within 90 seconds (Month 3)		186787	227914	21	1239	1239	NDR	100209	22878	238618
% calls answered within 90 seconds (Month 3)	≥ 95%	95.37%	96.07%	100.00%	96.20%	96.20%	NDR	99.94%	97.61%	100.00%

Live calling results for customer care (IVR)										
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)										
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total Number of calls received		98	36	80	68	76	89	39	50	98
Total Number of calls getting connected and answered		96	36	77	62	53	86	39	50	98
Live Calling Percentage calls getting connected and answered	≥ 95%	97.96%	100.00%	96.25%	91.18%	69.74%	96.63%	100.00%	100.00%	100.00%

12.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated										
Termination	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of closure request		344	415	23	0	0	NDR	19	130	430
Number of requests attended within 7 days		344	415	23	0	0	NDR	19	130	430
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	NDR	NDR	NDR	100.00%	100.00%	100.00%

Data Source: Customer Service Center of the operators

12.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated										
Refund	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of cases requiring refund of deposits		262	0	21	0	0	NDR	28	607	1087
Total number of cases where refund was made within 60 days		262	0	21	0	0	NDR	28	607	1087
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	NDR	100.00%	NDR	NDR	NDR	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

12.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests									
Resolution of service requests	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made	100	100	0	5	100	100	100	100	100
Number of cases resolved to satisfaction	85	63	0	4	63	80	69	54	73
Percentage cases resolved in four weeks	85.00%	63.00%	NDR	80.00%	63.00%	80.00%	69.00%	54.00%	73.00%

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

NDR: Data to conduct live calling for customer care was not available at the customer service center of BSNL. Hence, live calling for the parameter has not been conducted for the operator.

12.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services										
Level 1 services		Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total no. of calls made		300	300	300	300	300	300	300	300	300
Calls answered		238	247	240	221	236	232	253	226	240
% of calls connected	≥ 95%	79.43%	82.27%	80.14%	73.76%	78.72%	77.30%	84.40%	75.18%	80.14%

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

12.7 LEVEL 1 SERVICE CALLS MADE

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		25	18
101	Fire	✓		25	18
102	Ambulance		×		
104	Health Information Helpline		×		
108	Emergency and Disaster Management Helpline	✓		25	18
138	All India Helpline for Passengers		×		
1412	Public Road Transport Utility Service		×		
181	Chief Minister Helpline	✓		25	18
182	Indian Railway Security Helpline		×		
1033	Road Accident Management Service	✓		25	18
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	✓		25	17
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		
1073	Road Accident Helpline	✓		25	18
1077	Control Room for District Collector		×		
10120	Call Alert (Crime Branch)		×		
10121	Women Helpline		×		

10127	National AIDS Helpline to NACO	✓		25	18
101212	Central Accident and Trauma Services (CATS)		×		
10580	Educationall & Vocational Guidance and Counselling		×		
105812	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	✓		25	18
155304	Municipal Corporations		×		
155214	Labour Helpline		×		
11203	Sashastra Seema Bal (SSB)		×		
112012	National Do Not Call Registry	✓		25	18
11212	Complaint of Electricity	✓	×	25	18
11216	Drinking Water Supply		×		
11250	Election Commission of India		×		
Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		25	18
101	Fire	✓		25	18
102	Ambulance		×		
104	Health Information Helpline		×		
108	Emergency and Disaster Management Helpline	✓		25	18
138	All India Helpline for Passengers		×		
1412	Public Road Transport Utility Service		×		

181	Chief Minister Helpline	✓	☐	25	18
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	25	19
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	✓	☐	25	19
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	25	18
1077	Control Room for District Collector	☐	×		
10120	Call Alert (Crime Branch)	☐	×		
10121	Women Helpline	☐	×		
10127	National AIDS Helpline to NACO	✓	☐	25	19
101212	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educationall & Vocational Guidance and Counselling	☐	×		
105812	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	✓	☐	25	18

155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
11203	Sashastra Seema Bal (SSB)	☐	×		
112012	National Do Not Call Registry	✓	☐	25	18
11212	Complaint of Electricity	✓	×	25	18
11216	Drinking Water Supply	☐	×		
11250	Election Commission of India	☐	×		
BSNL CDMA NE 1					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	25	20
101	Fire	✓	☐	25	20
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	25	20
138	All India Helpline for Passengers	☐	×		
1412	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	25	20
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	25	19
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	✓	☐	25	20
1071	Air Accident Helpline	☐	×		

1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	25	19
1077	Control Room for District Collector	☐	×		
10120	Call Alert (Crime Branch)	☐	×		
10121	Women Helpline	✓	☐	25	20
10127	National AIDS Helpline to NACO	✓	☐	25	20
101212	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & Vocational Guidance and Counselling	☐	×		
105812	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	✓	☐	25	20
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
11203	Sashastra Seema Bal (SSB)	☐	×		
112012	National Do Not Call Registry	✓	☐	25	20
11212	Complaint of Electricity	✓	×	25	20
11216	Drinking Water Supply	☐	×		
11250	Election Commission of India	☐	×		
BSNL CDMA NE 2					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	25	22
101	Fire	✓	☐	25	22
102	Ambulance	☐	×		

104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	25	22
138	All India Helpline for Passengers	☐	×		
1412	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	25	25
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	25	22
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	✓	☐	25	22
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	25	22
1077	Control Room for District Collector	☐	×		
10120	Call Alert (Crime Branch)	☐	×		
10121	Women Helpline	✓	☐	25	25
10127	National AIDS Helpline to NACO	✓	☐	25	22
101212	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & Vocational Guidance and Counselling	☐	×		
105812	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	✓	☐	25	22
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
11203	Sashastra Seema Bal (SSB)	☐	×		
112012	National Do Not Call Registry	✓	☐	25	25
11212	Complaint of Electricity	✓	×	25	22
11216	Drinking Water Supply	☐	×		
11250	Election Commission of India	☐	×		
BSNL GSM NE 1					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	25	16
101	Fire	✓	☐	25	16
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	25	17
138	All India Helpline for Passengers	☐	×		
1412	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	25	17
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	25	17
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	✓	☐	25	16
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	25	17
1077	Control Room for District Collector	☐	×		
10120	Call Alert (Crime Branch)	☐	×		
10121	Women Helpline	✓	☐	25	16
10127	National AIDS Helpline to NACO	✓	☐	25	17
101212	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & Vocational Guidance and Counselling	☐	×		
105812	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	✓	☐	25	17
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
11203	Sashastra Seema Bal (SSB)	☐	×		
112012	National Do Not Call Registry	✓	☐	25	17
11212	Complaint of Electricity	✓	×	25	16
11216	Drinking Water Supply	☐	×		
11250	Election Commission of India	☐	×		
BSNL GSM NE 2					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		25	16
101	Fire	✓		25	16
102	Ambulance		×		
104	Health Information Helpline		×		
108	Emergency and Disaster Management Helpline	✓		25	16
138	All India Helpline for Passengers		×		
1412	Public Road Transport Utility Service		×		
181	Chief Minister Helpline	✓		25	16
182	Indian Railway Security Helpline		×		
1033	Road Accident Management Service	✓		25	16
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	✓		25	16
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		
1073	Road Accident Helpline	✓		25	16
1077	Control Room for District Collector		×		
10120	Call Alert (Crime Branch)		×		
10121	Women Helpline	✓		25	16
10127	National AIDS Helpline to NACO	✓		25	16
101212	Central Accident and Trauma Services (CATS)		×		

10580	Educational & Vocational Guidance and Counselling	☐	×		
105812	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	✓	☐	25	16
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
11203	Sashastra Seema Bal (SSB)	☐	×		
112012	National Do Not Call Registry	✓	☐	25	16
11212	Complaint of Electricity	✓	×	25	16
11216	Drinking Water Supply	☐	×		
11250	Election Commission of India	☐	×		

Idea

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	25	22
101	Fire	✓	☐	25	22
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	25	22
138	All India Helpline for Passengers	☐	×		
1412	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	25	22
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	25	22

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	✓	☐	25	22
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	25	22
1077	Control Room for District Collector	☐	×		
10120	Call Alert (Crime Branch)	☐	×		
10121	Women Helpline	✓	☐	25	22
10127	National AIDS Helpline to NACO	✓	☐	25	22
101212	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & Vocational Guidance and Counselling	☐	×		
105812	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	✓	☐	25	22
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
11203	Sashastra Seema Bal (SSB)	☐	×		

112012	National Do Not Call Registry	✓	☐	25	22
11212	Complaint of Electricity	✓	×	25	22
11216	Drinking Water Supply	☐	×		
11250	Election Commission of India	☐	×		
Reliance					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	25	23
101	Fire	✓	☐	25	23
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	25	24
138	All India Helpline for Passengers	☐	×		
1412	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	25	23
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	25	24
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	✓	☐	25	23
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	25	23
1077	Control Room for District Collector	☐	×		

10120	Call Alert (Crime Branch)	☐	×		
10121	Women Helpline	✓	☐	25	23
10127	National AIDS Helpline to NACO	✓	☐	25	23
101212	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & Vocational Guidance and Counselling	☐	×		
105812	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	✓	☐	25	23
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
11203	Sashastra Seema Bal (SSB)	☐	×		
112012	National Do Not Call Registry	✓	☐	25	23
11212	Complaint of Electricity	✓	×	25	23
11216	Drinking Water Supply	☐	×		
11250	Election Commission of India	☐	×		

Vodafone

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	25	15
101	Fire	✓	☐	25	15
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	25	16

138	All India Helpline for Passengers	☐	×		
1412	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	25	16
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	25	15
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	✓	☐	25	16
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	25	15
1077	Control Room for District Collector	☐	×		
10120	Call Alert (Crime Branch)	☐	×		
10121	Women Helpline	✓	☐	25	16
10127	National AIDS Helpline to NACO	✓	☐	25	16
101212	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & Vocational Guidance and Counselling	☐	×		
105812	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	✓	☐	25	16
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
11203	Sashastra Seema Bal (SSB)	☐	×		
112012	National Do Not Call Registry	✓	☐	25	16
11212	Complaint of Electricity	✓	×	25	16
11216	Drinking Water Supply	☐	×		
11250	Election Commission of India	☐	×		

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.

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

13 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))**

13.1.1 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.

13.1.2 NSN (NOKIA SIEMENS NETWORKS)

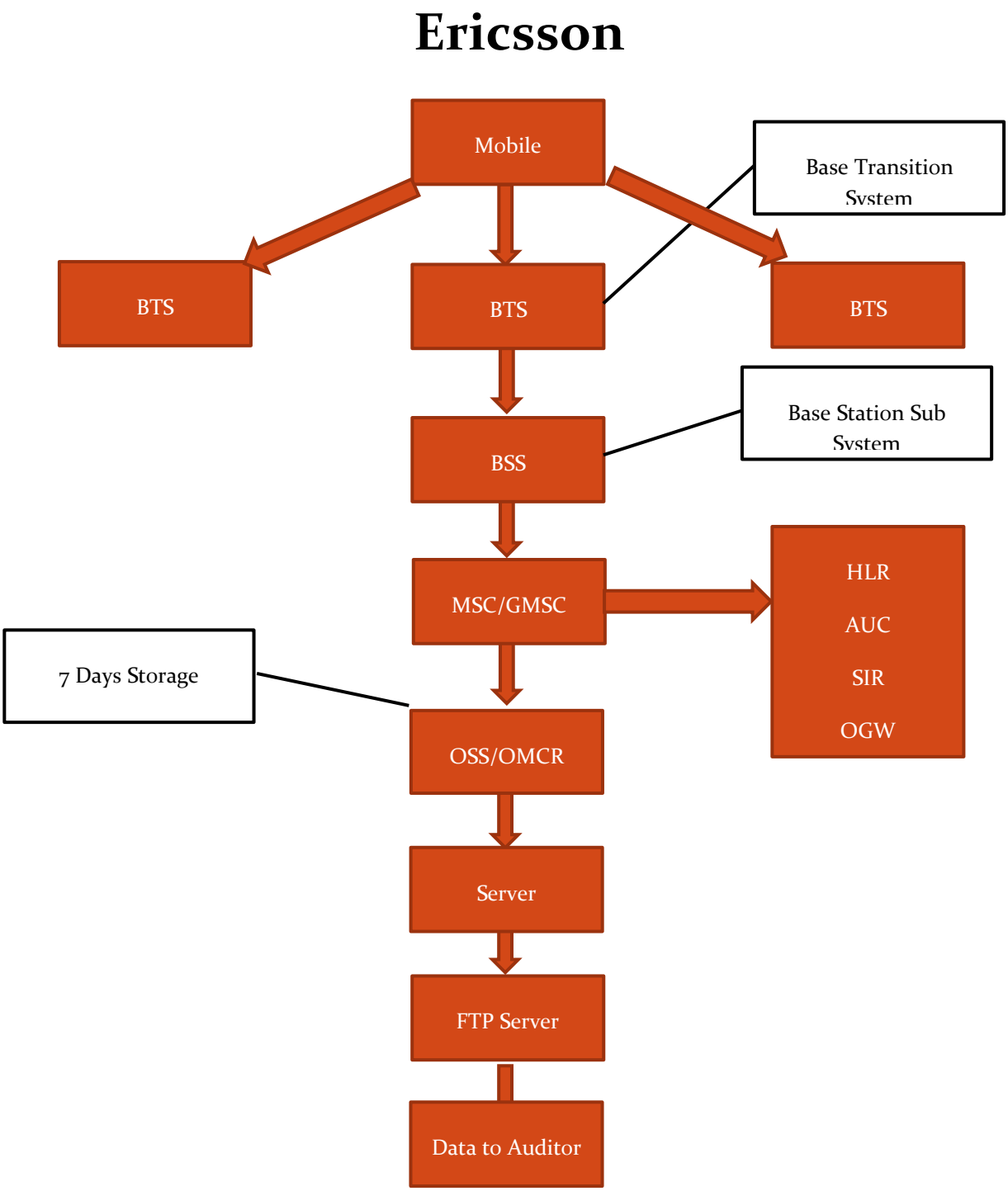
NSN provides network support to Vodafone in the circle.

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)

13.2 BLOCK SCHEMATIC DIAGRAMS

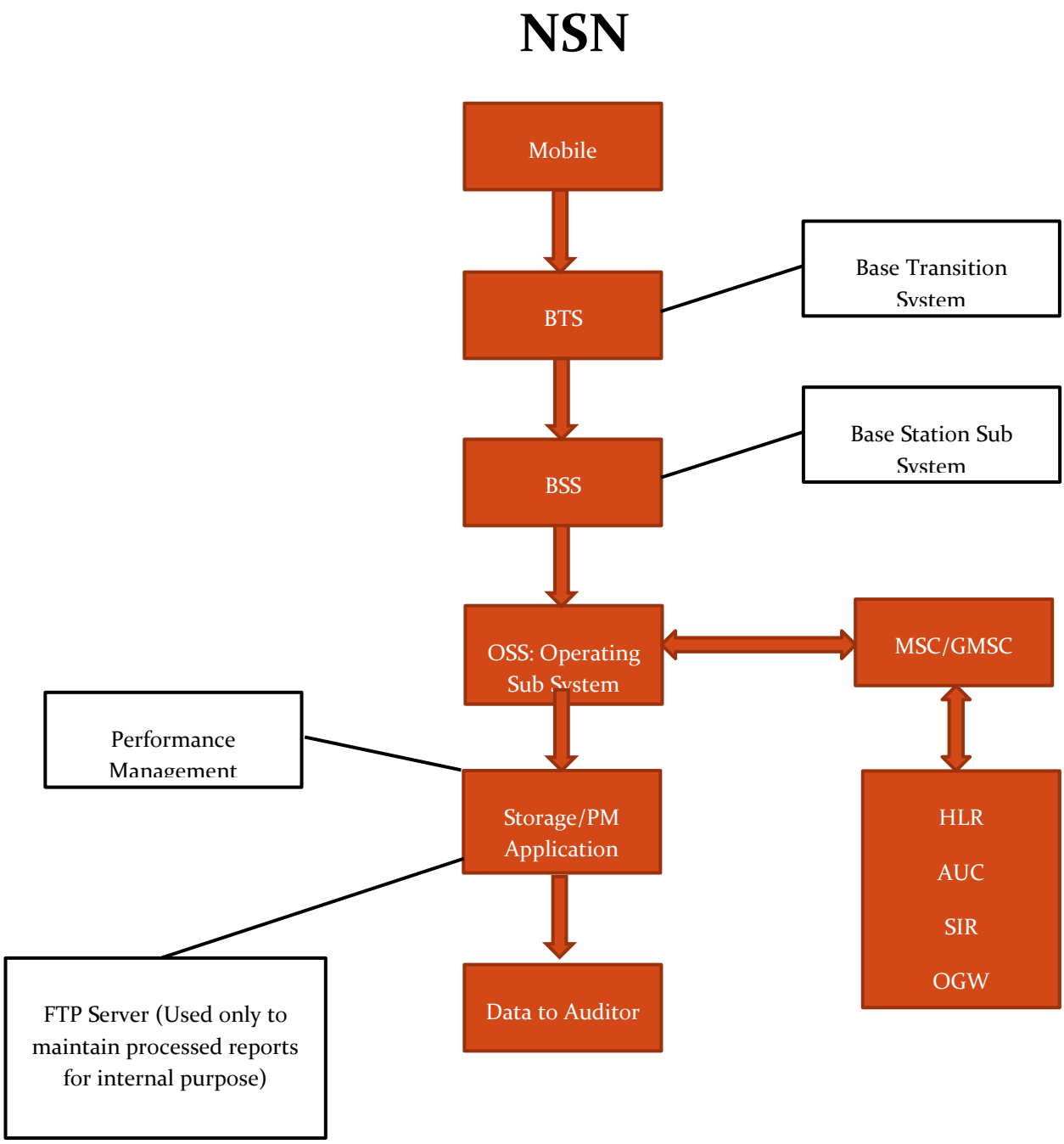
13.2.1 ERICSSON

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



13.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.



14 ANNEXURE – JANUARY -2G

Audit Results for Network Availability- PMR data-January										
	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1884	2164	146	NDR	60	655	1045	No Service	1678
Sum of downtime of BTSs in a month (in hours)		78663	16814	1802	NDR	2688	3517	14423	No Service	125480
BTSs accumulated downtime (not available for service)	≤ 2%	5.61%	1.04%	1.66%	NDR	6.02%	0.72%	1.86%	No Service	10.05%
Number of BTSs having accumulated downtime >24 hours		614	30	26	NDR	5	39	16	No Service	28
Worst affected BTSs due to downtime	≤ 2%	32.59%	1.39%	17.81%	NDR	8.33%	5.95%	1.53%	No Service	1.67%
Live Measurement Results for Network Availability- 3 Day live data-January										
	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1848	2153	146	NDR	60	655	1035	No Service	1678
Sum of downtime of BTSs in a month (in hours)		8232	1816	320	NDR	336	507	1479	No Service	2134
BTSs accumulated downtime (not available for service)	≤ 2%	6.19%	1.17%	3.04%	NDR	7.78%	1.08%	1.98%	No Service	1.77%
Number of BTSs having accumulated downtime >24 hours		615	0	4	NDR	5	38	8	No Service	15
Worst affected BTSs due to downtime	≤ 2%	33.28%	0.00%	2.74%	NDR	8.33%	5.80%	0.77%	No Service	0.89%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-January										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.05%	95.57%	98.45%	NDR	95.09%	81.72%	95.29%	No Service	98.46%
SDCCH/Paging channel congestion	≤ 1%	0.66%	0.58%	NA	NDR	NA	6.34%	0.15%	No Service	0.76%
TCH congestion	≤ 2%	3.86%	1.12%	NDR	NDR	NDR	22.16%	1.17%	No Service	1.54%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-January										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.47%	96.09%	97.76%	NDR	95.98%	93.91%	97.18%	No Service	98.76%
SDCCH/Paging channel congestion	≤ 1%	0.90%	0.25%	NA	NDR	NA	2.83%	0.08%	No Service	0.96%
TCH congestion	≤ 2%	1.55%	0.57%	NDR	NDR	NDR	6.09%	0.75%	No Service	1.24%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
%age blocked calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-January										
Call drop rate	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		67568722	112499611	133342	NDR	4908594	92565764	12700513	No Service	33834930
Total number of calls dropped		1119193	1844180	1480	NDR	34893	5309229	66032	No Service	310624
Call drop rate	≤ 2%	1.66%	1.64%	1.11%	NDR	0.71%	5.74%	0.52%	No Service	0.92%
Total number of cells in the network		5434	6361	NDR	NDR	116	1965	3138	No Service	5618
Total number of cells having more than 3% TCH		885	104	NDR	NDR	3	275	48	No Service	165
Worst affected cells having more than 3% TCH	≤ 3%	16.29%	1.63%	NDR	NDR	2.59%	13.99%	1.53%	No Service	2.94%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-January										
Call drop rate	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		82322059	135891460	131210	NDR	484277	15545703	18471455	No Service	50302718
Total number of calls dropped		1252697	1065767	1499	NDR	3119	487793	87989	No Service	420752
Call drop rate	≤ 2%	1.52%	0.78%	1.14%	NDR	0.64%	3.14%	0.48%	No Service	0.84%
Total number of cells in the network		128293	6364	NDR	NDR	116	1965	3108	No Service	5624
Total number of cells having more than 3% TCH		17342	103	NDR	NDR	3	47	48	No Service	154
Worst affected cells having more than 3% TCH	≤ 3%	13.52%	1.62%	NDR	NDR	2.87%	2.39%	1.56%	No Service	2.75%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-January										
Call drop rate	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

Audit Results for Voice quality -PMR Data-January										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		8306672403	13695622545	NDR	NDR	930	96725649	3331029646	No Service	6298166296
Total number of calls with good voice quality		7726276249	13565689669	NDR	NDR	930	86320868	3210125407	No Service	6125432016
%age calls with good voice quality	≥ 95%	93.01%	99.05%	NDR	NDR	100.00%	89.24%	96.37%	No Service	97.26%
Live measurement results for Voice quality-3 Day data-January										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		346111350	570650939	NDR	NDR	30	4030235	138792902	No Service	262423596
Total number of calls with good voice quality		321928177	565237070	NDR	NDR	30	3596703	133755225	No Service	255226334
%age calls with good voice quality	≥ 95%	93.47%	99.15%	NDR	NDR	100.00%	82.56%	96.46%	No Service	97.40%
Drive test results for Voice quality (Average of three drive tests) - DT data-January										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

Audit Results for POI Congestion- PMR data-January										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45533	71753	0	0	0	0	17620	No Service	30852838
Traffic served for all POIs (B)- in erlangs		27534	21711	0	0	0	0	9240	No Service	11969796
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45533	70670	0	0	0	0	17577	No Service	995253
Traffic served for all POIs (B)- in erlangs		24639	20549	0	0	0	0	8859	No Service	229333
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

15 ANNEXURE – FEBUARY-2G

Audit Results for Network Availability- PMR data-February										
	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1854	2181	146	NDR	60	659	1060	No Service	1690
Sum of downtime of BTSs in a month (in hours)		80504	15928	1550	NDR	2208	2655	14223	No Service	117609
BTSs accumulated downtime (not available for service)	≤ 2%	5.84%	0.98%	1.43%	NDR	4.95%	0.54%	1.80%	No Service	9.35%
Number of BTSs having accumulated downtime >24 hours		722	28	19	NDR	5	36	13	No Service	32
Worst affected BTSs due to downtime	≤ 2%	38.94%	1.28%	13.01%	NDR	8.33%	5.46%	1.23%	No Service	1.89%
Live Measurement Results for Network Availability- 3 Day live data-February										
	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1854	2066	146	NDR	60	659	1049	No Service	1690
Sum of downtime of BTSs in a month (in hours)		7237	1673	160	NDR	192	427	1463	No Service	2202
BTSs accumulated downtime (not available for service)	≤ 2%	5.42%	1.12%	1.52%	NDR	4.44%	0.90%	1.94%	No Service	1.81%
Number of BTSs having accumulated downtime >24 hours		578	0	3	NDR	3	46	8	No Service	14
Worst affected BTSs due to downtime	≤ 2%	31.19%	0.00%	2.05%	NDR	5.00%	6.98%	0.76%	No Service	0.83%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-February										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	94.39%	95.58%	98.39%	NDR	96.90%	89.01%	95.24%	No Service	98.74%
SDCCH/Paging channel congestion	≤ 1%	1.04%	0.57%	NA	NDR	NA	7.29%	0.17%	No Service	0.33%
TCH congestion	≤ 2%	4.26%	1.19%	NDR	NDR	NDR	10.99%	1.22%	No Service	1.26%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-February										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.11%	96.04%	98.45%	NDR	96.21%	95.06%	98.12%	No Service	99.08%
SDCCH/Paging channel congestion	≤ 1%	0.57%	0.38%	NA	NDR	NA	2.73%	0.03%	No Service	0.27%
TCH congestion	≤ 2%	1.99%	0.62%	NDR	NDR	NDR	6.36%	0.41%	No Service	0.92%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		316	403	Not participating	475	Not participating	Not participating	293	No Service	995
Total number of successful calls established		309	403	Not participating	389	Not participating	Not participating	286	No Service	955
CSSR	≥ 95%	97.78%	100.00%	Not participating	81.89%	Not participating	Not participating	97.61%	No Service	95.98%
%age blocked calls		2.22%	0.00%	Not participating	18.11%	Not participating	Not participating	2.39%	No Service	4.02%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-February										
Call drop rate	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		68337248	112537646	127587	NDR	3949835	102908504	13182796	No Service	33961910
Total number of calls dropped		1041926	1778710	1742	NDR	33478	5003937	64716	No Service	288071
Call drop rate	≤ 2%	1.52%	1.58%	1.37%	NDR	0.85%	4.86%	0.49%	No Service	0.85%
Total number of cells in the network		5442	6493	NDR	NDR	116	1965	3184	No Service	4491
Total number of cells having more than 3% TCH		816	102	NDR	NDR	3	263	51	No Service	133
Worst affected cells having more than 3% TCH	≤ 3%	14.99%	1.57%	NDR	NDR	2.59%	13.38%	1.60%	No Service	2.96%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-February										
Call drop rate	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		86234420	139987745	151364	NDR	344283	19367419	19106811	No Service	53133788
Total number of calls dropped		1163536	1122321	1977	NDR	3009	534749	83479	No Service	428171
Call drop rate	≤ 2%	1.35%	0.80%	1.31%	NDR	0.87%	2.76%	0.44%	No Service	0.81%
Total number of cells in the network		130148	6398	NDR	NDR	116	1977	3149	No Service	4491
Total number of cells having more than 3% TCH		14555	108	NDR	NDR	4	167	49	No Service	68
Worst affected cells having more than 3% TCH	≤ 3%	11.18%	1.69%	NDR	NDR	3.16%	8.45%	1.57%	No Service	1.52%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-February										
Call drop rate	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		311	403	Not participating	405	Not participating	Not participating	286	No Service	932
Total number of calls dropped		2	0	Not participating	2	Not participating	Not participating	1	No Service	22
Call drop rate	≤ 2%	0.64%	0.00%	NDR	0.49%	NDR	NDR	0.35%	No Service	2.36%

Audit Results for Voice quality -PMR Data-February										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		8207211569	12973653842	NDR	NDR	870	102908504	3314065466	No Service	6022183773
Total number of calls with good voice quality		7600334209	12850535220	NDR	NDR	870	98818318	3189436008	No Service	5855216242
%age calls with good voice quality	≥ 95%	92.61%	99.05%	NDR	NDR	100.00%	96.03%	96.24%	No Service	97.23%
Live measurement results for Voice quality-3 Day data-February										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		341967149	540568910	NDR	NDR	30	19367419	138086061	No Service	250924324
Total number of calls with good voice quality		316680592	535438968	NDR	NDR	30	18278974	132893167	No Service	243967343
%age calls with good voice quality	≥ 95%	93.12%	99.10%	NDR	NDR	100.00%	94.38%	96.35%	No Service	97.22%
Drive test results for Voice quality (Average of three drive tests) - DT data-February										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		546402	698363	Not participating	662742	Not participating	Not participating	561155	No Service	808236
Total number of calls with good voice quality		531287	675173	Not participating	587342	Not participating	Not participating	544374	No Service	755740
%age calls with good voice quality	≥ 95%	97.23%	96.68%	NDR	88.62%	NDR	NDR	97.01%	No Service	93.50%

Audit Results for POI Congestion- PMR data-February										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45533	73525	0	0	0	0	17592	No Service	30852838
Traffic served for all POIs (B)- in erlangs		27159	22105	0	0	0	0	10237	No Service	7082647
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45533	73525	0	0	0	0	17432	No Service	995253
Traffic served for all POIs (B)- in erlangs		26486	22105	0	0	0	0	10184	No Service	242850
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

16 ANNEXURE – MARCH-2G

Audit Results for Network Availability- PMR data-March										
	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1862	2201	146	106	78	655	1081	No Service	1717
Sum of downtime of BTSs in a month (in hours)		88651	14781	1707	2832	3192	277	15714	No Service	21089
BTSs accumulated downtime (not available for service)	≤ 2%	6.40%	0.90%	1.57%	3.59%	5.50%	0.06%	1.95%	No Service	1.65%
Number of BTSs having accumulated downtime >24 hours		763	29	22	6	8	32	15	No Service	32
Worst affected BTSs due to downtime	≤ 2%	40.98%	1.32%	15.07%	5.66%	10.26%	4.89%	1.39%	No Service	1.86%
Live Measurement Results for Network Availability- 3 Day live data-March										
	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1862	2181	146	106	78	655	1067	No Service	1717
Sum of downtime of BTSs in a month (in hours)		7457	905	169	216	408	453	1518	No Service	2520
BTSs accumulated downtime (not available for service)	≤ 2%	5.56%	0.58%	1.61%	2.83%	7.26%	0.96%	1.98%	No Service	2.04%
Number of BTSs having accumulated downtime >24 hours		631	0	2	3	6	32	14	No Service	13
Worst affected BTSs due to downtime	≤ 2%	33.89%	0.00%	1.37%	2.83%	7.69%	4.89%	1.31%	No Service	0.76%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-March										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.59%	95.60%	98.72%	95.56%	99.38%	98.47%	95.15%	No Service	98.69%
SDCCH/Paging channel congestion	≤ 1%	0.83%	0.68%	NA	0.19%	NA	1.78%	0.09%	No Service	0.92%
TCH congestion	≤ 2%	3.95%	1.06%	NDR	NDR	NDR	1.53%	1.24%	No Service	1.31%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-March										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.28%	96.10%	98.99%	96.40%	99.37%	96.94%	96.76%	No Service	99.08%
SDCCH/Paging channel congestion	≤ 1%	0.50%	0.38%	NA	0.05%	NA	4.62%	0.13%	No Service	0.95%
TCH congestion	≤ 2%	1.80%	0.53%	NDR	NDR	NDR	3.06%	1.06%	No Service	0.92%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-March										
CSSR	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		393	422	Not participating	394	Not participating	Not participating	196	No Service	577
Total number of successful calls established		383	422	Not participating	347	Not participating	Not participating	193	No Service	544
CSSR	≥ 95%	97.46%	100.00%	Not participating	88.07%	Not participating	Not participating	98.47%	No Service	94.28%
%age blocked calls		2.54%	0.00%	Not participating	11.93%	Not participating	Not participating	1.53%	No Service	5.72%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-March										
Call drop rate	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		60769977	120698305	135678	3627417	1210962	97930369	14424676	No Service	36932877
Total number of calls dropped		1123812	1723499	1271	57692	7563	2365965	84653	No Service	280071
Call drop rate	≤ 2%	1.85%	1.43%	0.94%	1.59%	0.62%	2.42%	0.59%	No Service	0.76%
Total number of cells in the network		169983	6550	NDR	214	179	1965	3247	No Service	5000
Total number of cells having more than 3% TCH		1190	112	NDR	1	1	57	49	No Service	135
Worst affected cells having more than 3% TCH	≤ 3%	0.70%	1.71%	NDR	0.47%	0.56%	2.90%	1.51%	No Service	2.69%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-March										
Call drop rate	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		84826156	142664259	150695	319220	68162	59276224	19844174	No Service	54062671
Total number of calls dropped		1334664	978929	1305	4596	330	368543	80377	No Service	430375
Call drop rate	≤ 2%	1.57%	0.69%	0.87%	0	0.48%	0.62%	0.41%	No Service	0.80%
Total number of cells in the network		131203	6446	NDR	214	179	1965	3204	No Service	5000
Total number of cells having more than 3% TCH		17625	97	NDR	6	1	67	48	No Service	106
Worst affected cells having more than 3% TCH	≤ 3%	13.43%	1.51%	NDR	2.80%	0.56%	3.41%	1.50%	No Service	2.12%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-March										
Call drop rate	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		383	422	Not participating	347	Not participating	Not participating	193	No Service	546
Total number of calls dropped		4	0	Not participating	3	Not participating	Not participating	0	No Service	2
Call drop rate	≤ 2%	1.04%	0.00%	Not participating	0.86%	Not participating	Not participating	0.00%	No Service	0.37%

Audit Results for Voice quality -PMR Data-March										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		9404159978	13547548762	NDR	NDR	870	97930369	3462676157	No Service	6015047577
Total number of calls with good voice quality		8698686171	13407264786	NDR	NDR	870	93324174	3326909744	No Service	5867058407
%age calls with good voice quality	≥ 95%	92.50%	98.96%	NDR	NDR	100.00%	95.30%	96.08%	No Service	97.54%
Live measurement results for Voice quality-3 Day data-March										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		391839999	564481198	NDR	NDR	30	59276224	144278173	No Service	250626982
Total number of calls with good voice quality		362445257	558636033	NDR	NDR	30	58806213	138621239	No Service	244460767
%age calls with good voice quality	≥ 95%	92.79%	99.12%	NDR	NDR	100.00%	99.21%	96.26%	No Service	97.65%
Drive test results for Voice quality (Average of three drive tests) - DT data-March										
Voice quality	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		534185	657962	Not participating	241360	Not participating	Not participating	444830	No Service	850645
Total number of calls with good voice quality		28021	638549	Not participating	211485	Not participating	Not participating	437346	No Service	810889
%age calls with good voice quality	≥ 95%	5.25%	97.05%	Not participating	87.62%	Not participating	Not participating	98.32%	No Service	95.33%

Audit Results for POI Congestion- PMR data-March										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45557	68925	0	0	0	0	17880	No Service	30897241
Traffic served for all POIs (B)- in erlangs		28402	21711	0	0	0	0	10282	No Service	8858673
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March										
POI congestion	Benchmark	Aircel	Airtel	BSNL NE 1 CDMA	BSNL NE 1 GSM	BSNL NE 2 CDMA	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	13	0	0	0	0	29	No Service	35
No. of POIs not meeting benchmark		0	13	0	0	0	0	0	No Service	0
Total Capacity of all POIs (A) - in erlangs		45557	52613	0	0	0	0	17646	No Service	996685
Traffic served for all POIs (B)- in erlangs		26708	20883	0	0	0	0	10158	No Service	253524
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	No Service	0.00%

17 ANNEXURE – JANUARY -3G

Audit Results for Network Availability- PMR data-January				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		484	270	NDR
Sum of downtime (i.e. total outage time) of Node Bs		17450	1226	NDR
Node Bs downtime (not available for service)	≤ 2%	4.85%	0.61%	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		161	87	NDR
Worst affected Node Bs due to downtime	≤ 2%	33.26%	32.22%	NDR
Live Measurement Results for Network Availability- 3 Day live data-January				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		484	270	NDR
Sum of downtime (i.e. total outage time) of Node Bs		1592	99	NDR
Node Bs downtime (not available for service)	≤ 2%	4.57%	0.51%	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		138	32	NDR
Worst affected Node Bs due to downtime	≤ 2%	28.51%	11.85%	NDR

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-January				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	97.64%	92.81%	NDR
RRC Congestion	≤ 1%	0.13%	4.10%	NDR
Circuit Switched RAB Congestion	≤ 2%	1.57%	0.54%	NDR
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-January				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	98.63%	91.38%	NDR
RRC Congestion	≤ 1%	0.04%	9.44%	NDR
Circuit Switched RAB Congestion	≤ 2%	0.01%	2.06%	NDR
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January				
CSSR	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of RRC attempts (A)		NA	NA	NA
Total number of RRC established (B)		NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NDR	NDR	NDR
%age blocked calls		NDR	NDR	NDR

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-January				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		2500534	428766	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		30102	10842	NDR
Call drop rate (B/A*100)	≤ 2%	1.20%	2.53%	NDR
Total no. of cells in the licensed service area (B)		1672	810	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		193	138	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	11.54%	17.04%	NDR

Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-January				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		2606984	174621	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		30478	4893	NDR
Call drop rate (B/A*100)	≤ 2%	1.17%	2.80%	NDR
Total no. of cells in the licensed service area (B)		29706	810	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		488	63	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.64%	7.78%	NDR

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-January				
Call drop rate	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NDR	NDR	NDR

Audit Results for Voice quality -PMR Data-January				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		16070411198	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		15734177196	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	97.91%	NDR	NDR
Live measurement results for Voice quality-3 Day data-January				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		669600467	NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		655590717	NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.03%	NDR	NDR
Drive test results for Voice quality (Average of three drive tests) - DT data-January				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR	NDR

Audit Results for POI Congestion- PMR data-January				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	NDR
No. of POIs not meeting benchmark		0	0	NDR
Total Capacity of all POIs (A) - in erlangs		45533	0	NDR
Traffic served for all POIs (B)- in erlangs		27534	0	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	NDR
Live Measurement Results for POI Congestion- 3 Day data-January				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	NDR
No. of POIs not meeting benchmark		0	0	NDR
Total Capacity of all POIs (A) - in erlangs		45533	0	NDR
Traffic served for all POIs (B)- in erlangs		24059	0	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	NDR

18 ANNEXURE – FEBUARY-3G

Audit Results for Network Availability- PMR data-February				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		563	270	155
Sum of downtime (i.e. total outage time) of Node Bs		21170	1175	1131
Node Bs downtime (not available for service)	≤ 2%	5.05%	0.59%	0.98%
Number of Node Bs having accumulated downtime of >24 hours in a month		192	50	2
Worst affected Node Bs due to downtime	≤ 2%	34.10%	18.52%	1.29%
Live Measurement Results for Network Availability- 3 Day live data-February				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		563	270	155
Sum of downtime (i.e. total outage time) of Node Bs		1632	93	279
Node Bs downtime (not available for service)	≤ 2%	4.03%	0.48%	2.50%
Number of Node Bs having accumulated downtime of >24 hours in a month		142	28	2
Worst affected Node Bs due to downtime	≤ 2%	25.22%	10.37%	1.29%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-February				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	96.60%	95.93%	97.11%
RRC Congestion	≤ 1%	0.49%	4.07%	0.98%
Circuit Switched RAB Congestion	≤ 2%	0.46%	4.04%	0.02%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-February				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	96.90%	97.17%	98.99%
RRC Congestion	≤ 1%	0.02%	3.37%	0.19%
Circuit Switched RAB Congestion	≤ 2%	0.02%	2.83%	0.01%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February				
CSSR	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of RRC attempts (A)		83	382	NA
Total number of RRC established (B)		78	357	NA
Call setup success rate (B/A*100)	≥ 95%	93.98%	93.46%	NDR
%age blocked calls		6.02%	6.54%	NDR

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - PMR data-February				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		2646536	396989	469691
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		38638	9989	6673
Call drop rate (B/A*100)	≤ 2%	1.46%	2.52%	1.42%
Total no. of cells in the licensed service area (B)		1776	810	391
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		247	104	7
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	13.91%	12.87%	1.79%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-February				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		3243703	186713	34994
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		51465	4638	405
Call drop rate (B/A*100)	≤ 2%	1.59%	2.48%	1.16%
Total no. of cells in the licensed service area (B)		30963	810	391
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		672	57	7
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.17%	7.02%	1.79%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-February				
Call drop rate	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		78	372	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	9	NA
Call drop rate (B/A*100)	≤ 2%	0.00%	2.42%	NDR

Audit Results for Voice quality -PMR Data-February				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		18670248285	NDR	4570068125
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		18560463923	NDR	4560237263
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.41%	NDR	99.78%
Live measurement results for Voice quality-3 Day data-February				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		777927012	NDR	417109304
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		773352663	NDR	416401613
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	97.88%	NDR	99.83%
Drive test results for Voice quality (Average of three drive tests) - DT data-February				
Voice quality	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		221707	0	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		215189	0	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	97.06%	NDR	NDR

Audit Results for POI Congestion- PMR data-February				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	13
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		45533	0	6948
Traffic served for all POIs (B)- in erlangs		27534	0	1392
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	13
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		45533	0	6948
Traffic served for all POIs (B)- in erlangs		26486	0	1392
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

19 ANNEXURE – MARCH-3G

Audit Results for Network Availability- PMR data-March				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		599	294	146
Sum of downtime (i.e. total outage time) of Node Bs		28311	2139	303
Node Bs downtime (not available for service)	≤ 2%	6.35%	0.98%	0.28%
Number of Node Bs having accumulated downtime of >24 hours in a month		276	14	0
Worst affected Node Bs due to downtime	≤ 2%	46.08%	4.76%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-March				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
(Number of Node Bs in the network in the licensed service area		599	294	146
Sum of downtime (i.e. total outage time) of Node Bs		2911	213	49
Node Bs downtime (not available for service)	≤ 2%	6.75%	1.01%	0.47%
Number of Node Bs having accumulated downtime of >24 hours in a month		247	14	0
Worst affected Node Bs due to downtime	≤ 2%	41.29%	4.76%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-March				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	97.14%	96.28%	99.88%
RRC Congestion	≤ 1%	0.98%	1.70%	0.11%
Circuit Switched RAB Congestion	≤ 2%	0.14%	1.91%	0.02%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-March				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
CSSR	≥ 95%	96.27%	97.51%	99.98%
RRC Congestion	≤ 1%	0.04%	3.16%	0.02%
Circuit Switched RAB Congestion	≤ 2%	0.01%	2.24%	0.01%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-March				
CSSR	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of RRC attempts (A)		313	415	NA
Total number of RRC established (B)		306	392	NA
Call setup success rate (B/A*100)	≥ 95%	97.76%	94.46%	NDR
%age blocked calls		2.24%	5.54%	NDR

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-March				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		3077649	443282	359990
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		42819	10143	15
Call drop rate (B/A*100)	≤ 2%	1.39%	2.29%	0.00%
Total no. of cells in the licensed service area (B)		56544	882	391
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		246	21	1
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	0.44%	2.38%	0.26%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-March				
	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		3291247	182439	33589
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		54403	1555	2
Call drop rate (B/A*100)	≤ 2%	1.65%	0.85%	0.01%
Total no. of cells in the licensed service area (B)		35434	882	391
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		175	26	1
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	0.49%	2.95%	0.26%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-March				
Call drop rate	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total calls successfully established (A) (Number of voice RAB normally released)		306	377	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		8	23	NA
Call drop rate (B/A*100)	≤ 2%	2.61%	6.10%	NDR

Audit Results for Voice quality -PMR Data-March				
Voice quality	**Benchmark**	**Aircel 3G**	**BSNL 3G**	**Reliance 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		23859862294	NDR	3725533160
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		23322610817	NDR	3719966875
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	97.75%	NDR	99.85%
Live measurement results for Voice quality-3 Day data-March				
Voice quality	**Benchmark**	**Aircel 3G**	**BSNL 3G**	**Reliance 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		994160929	NDR	361364176
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		971775451	NDR	360805257
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	97.88%	NDR	99.85%
Drive test results for Voice quality (Average of three drive tests) - DT data-March				
Voice quality	**Benchmark**	**Aircel 3G**	**BSNL 3G**	**Reliance 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		956602	1258367	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		903496	1178680	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	94.45%	93.67%	NDR

Audit Results for POI Congestion- PMR data-March				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	8
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		45533	0	4377
Traffic served for all POIs (B)- in erlangs		27534	0	1271
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March				
POI congestion	Benchmark	Aircel 3G	BSNL 3G	Reliance 3G
Total number of working POIs		39	0	8
No. of POIs not meeting benchmark		0	0	0
Total Capacity of all POIs (A) - in erlangs		45517	0	4377
Traffic served for all POIs (B)- in erlangs		26708	0	1271
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%

20 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. JFM'16 – Refers to the quarter of January , February and March 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

SCO 47, 5th Floor, Old Judicial Complex, Sector 15
Part 1, Gurgaon, Haryana – 122001

✆+91 (124) 4217300

www.imrbint.com