TRAI Audit Wireless Report for Kolkata Circle

EAST ZONE

QE March 2017

Prepared by:

TRAI RO, Kolkata

Submitted to:

TRAI

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

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).

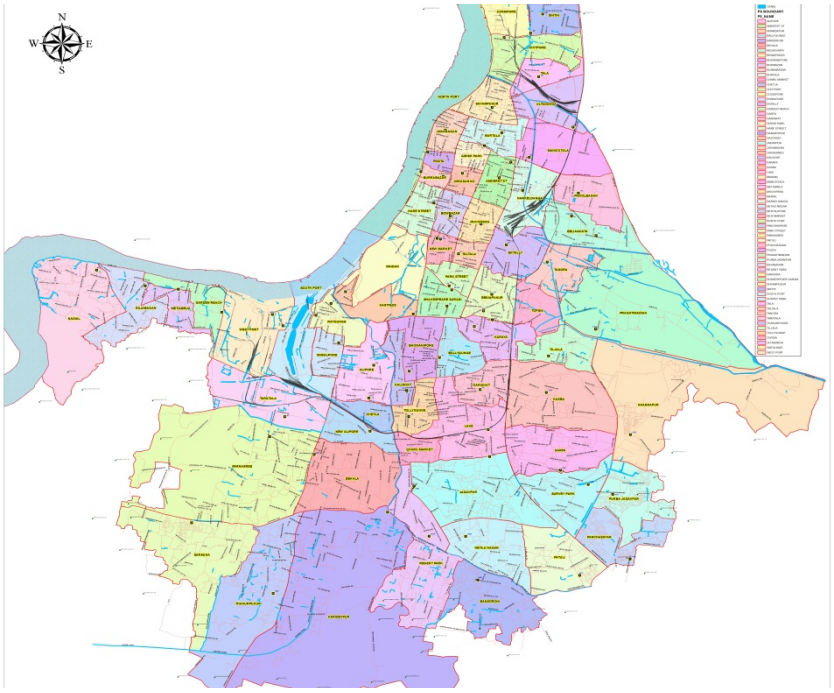
2.2 OBJECTIVES

The primary objective of the Audit module is to-

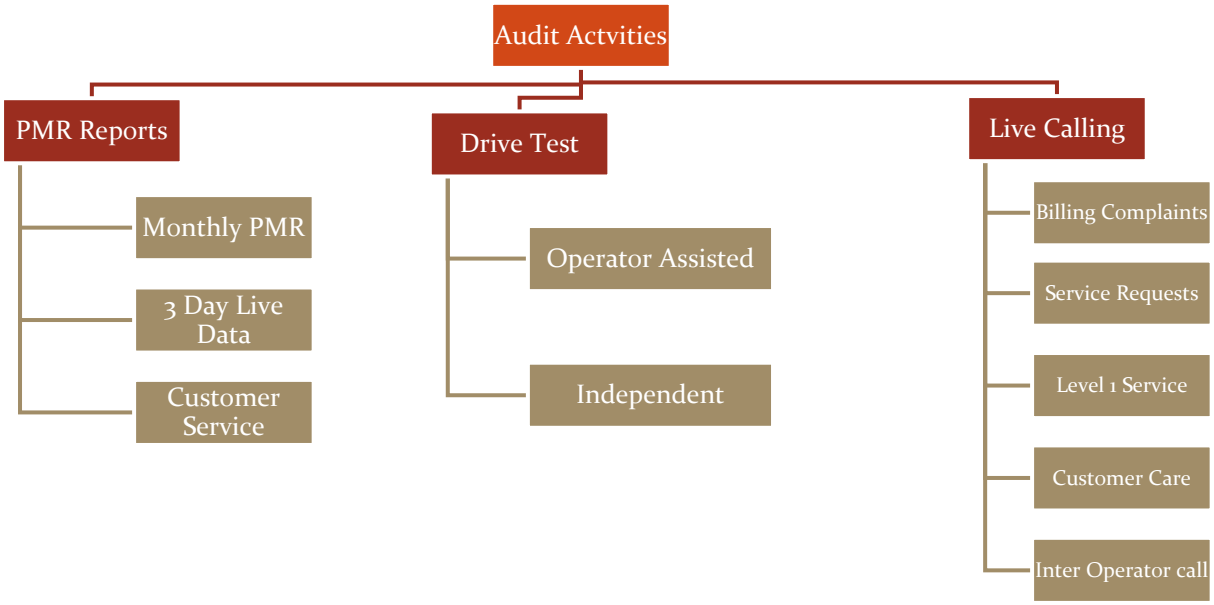
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report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

2.3 COVERAGE

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



2.4 FRAMEWORK USED

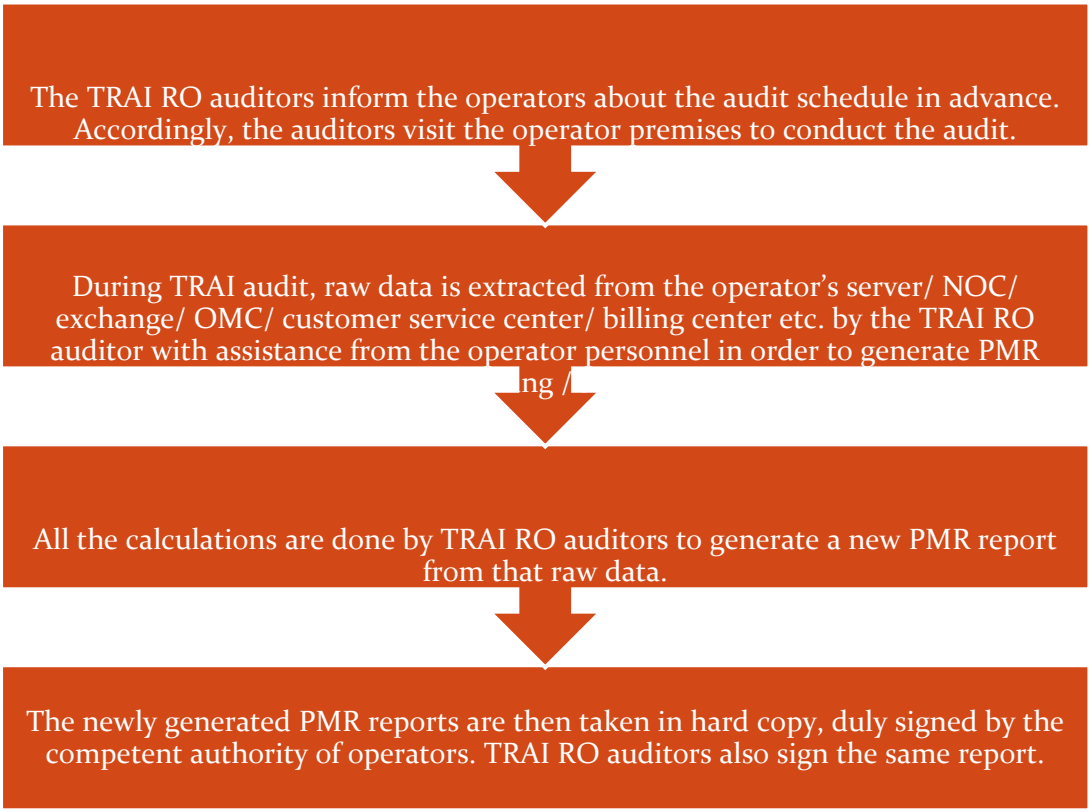


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

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 required to be extracted and verified in the first week of the subsequent month of the audit month. However as per present scenario PMR data for last Quarter was collected in the month of April, 2017.

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 existing Quarter report the date was verified in the month of April, 2017 and May, 2017

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 TRAI RO representatives with the assistance of the operator at TRAI, RO, Kolkata office for the month of January, February and March 2017. 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 TRAI RO representatives with the assistance of the operator at TRAI, RO, Kolkata office for the month of January, February and March 2017. 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 in Apr, 2017 for the last Quarter. This includes three parameters-

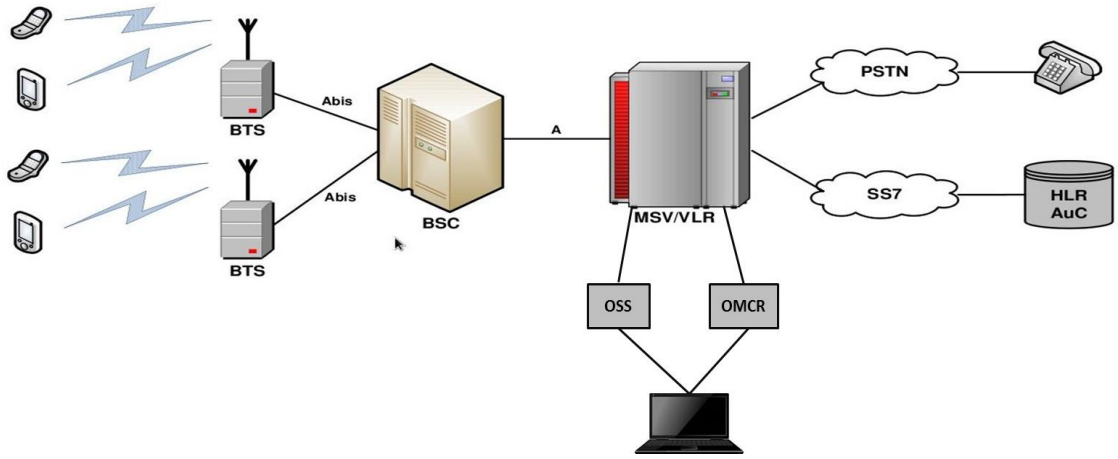
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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%

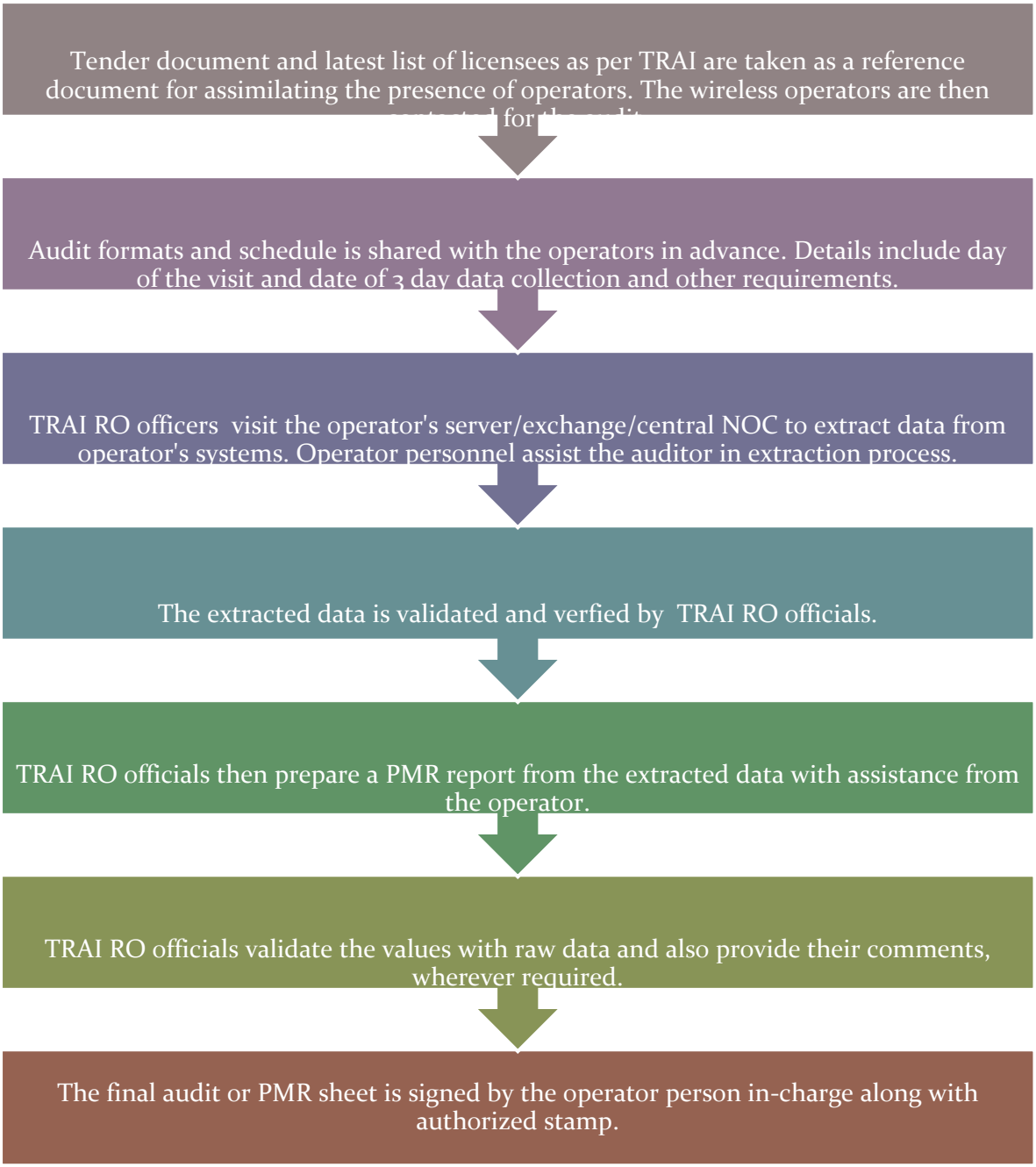
2.4.1.8 POINT OF DATA EXTRACTION

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 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.

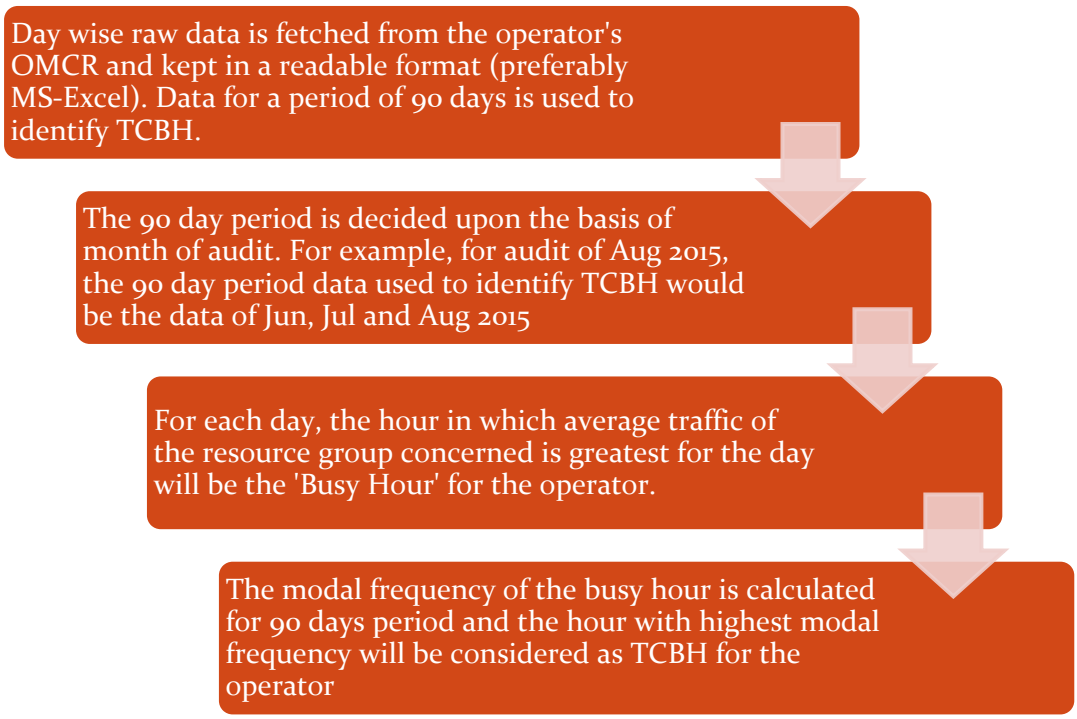
Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar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

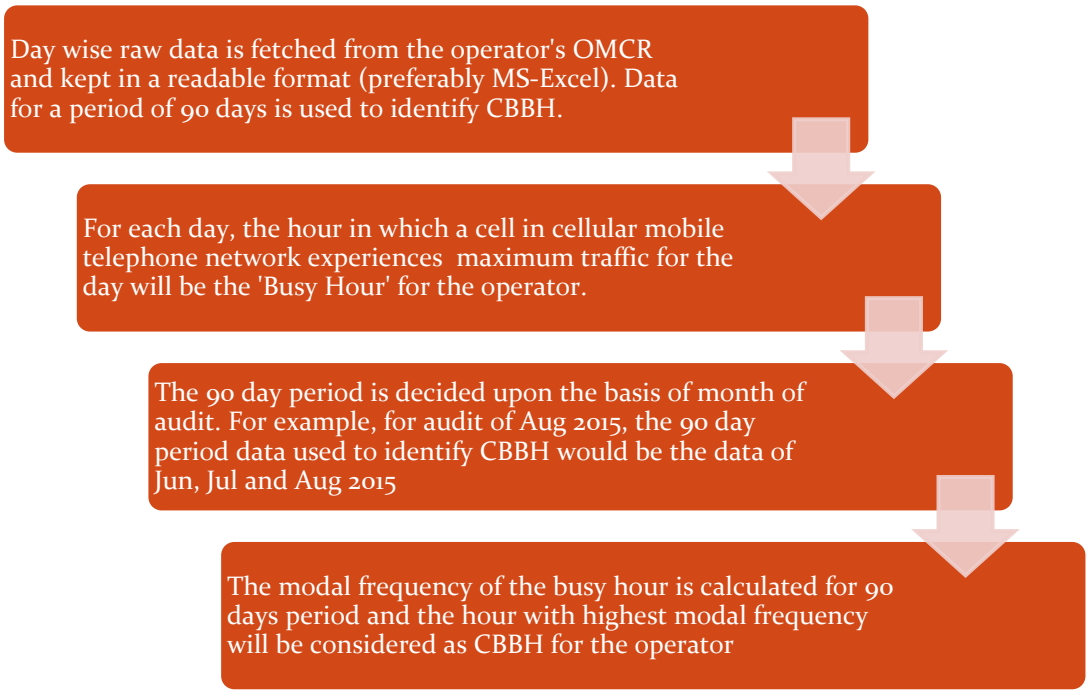
Step by step procedure to identify TCBH for an operator:



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 2017 (JAS'17) was collected in the month of April 2017. To extract the data for customer service parameters for the purpose of audit, TRAI RO auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

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

The Customer Service Quality Parameters include the following:

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

Most of the customer service parameters were calculated by averaging over the quarter; however billing parameters were calculated by averaging over one billing cycle for a quarter.

All the parameters have been described in detail along with key findings of the parameter in section 6 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.16 AUDIT PARAMETERS – CUSTOMER SERVICE

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

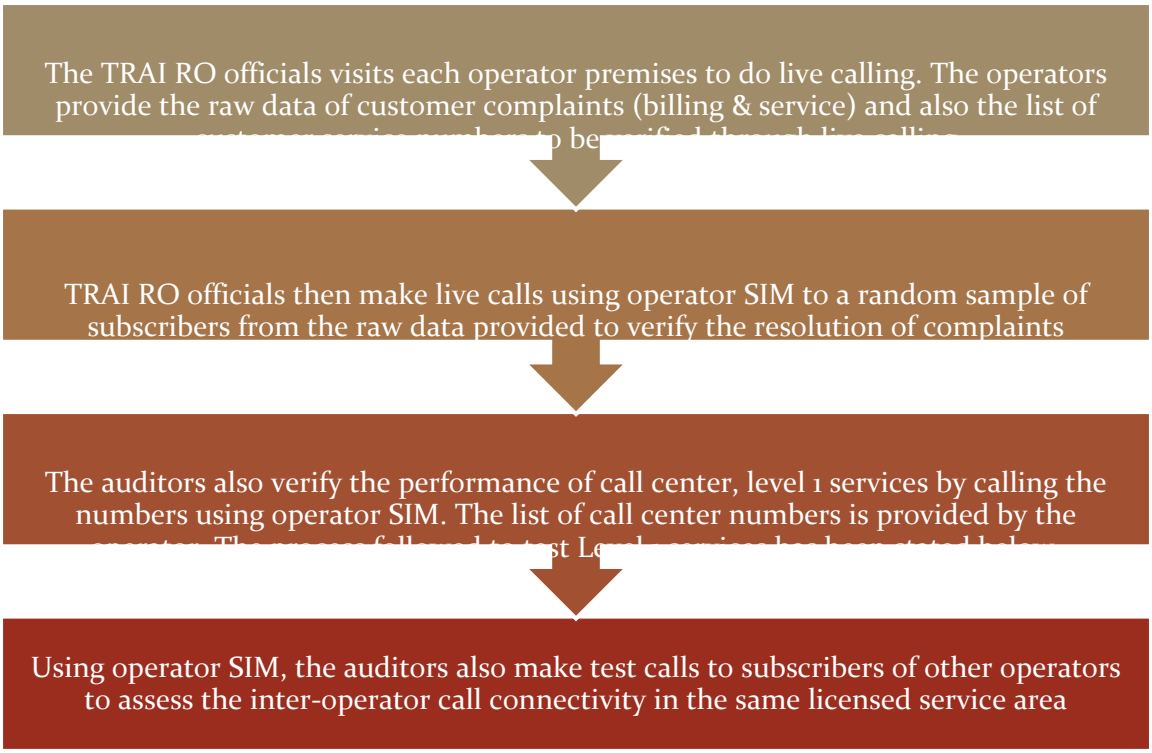
2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

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

2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

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



Live calling activity was carried out during the period April 2017. 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 March 2017 was considered for live calling activity conducted in APRIL 2017.

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 TRAI RO officers visit
- 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 TRAI RO officials.

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.

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.

Level 1 Number	Type of Service
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
1965	Vigilance as Anti Corruption Helpline
1323	IRCTC Railway e-Catering Services
155350	Aviators Air Rescue Pvt. Ltd
155256	Indian Airforce (IAF)

14444	**Cash Kukt Bharat Abhiyan Helpline**
1906	**Petroleum Industry Emergency Helpline**
1517	**Child Helpline**
1533	**NDMC Citizen Facilitation Service to NDMC**
1095	**Traffic Control Helpline**
1079	**Disaster Management Service**
155226	**Indian Airforce (IAF) Helpline**
10582	**Women and Child Trakicking Helpline**
155225	**CISF Helpline**
1955	**IVRS system on Call drop**
1922	**Hon'l Prime Minister Mann ki Baat**
14404	**National Consumer Helpline**
1800-313-1947	**UIDAI**
155231	**Helpline for Women Workers**
14441	**National Informatics Centre (NIC)**

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.

TRAI empaneled auditors generally conducted two types of drive tests as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test (No IDT conducted during the period under consideration)

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 TRAI RO 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 according to the TRAI instruction; 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.

During the period under reference no drive test for Kolkata LSA was conducted by TRAI / TRAI empanelled vendors.

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

- During the period under reference no drive test for Kolkata LSA was conducted by TRAI / TRAI empanelled vendors.

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.

During the period under reference no drive test for Kolkata LSA was conducted by TRAI / TRAI empanelled vendors.

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.

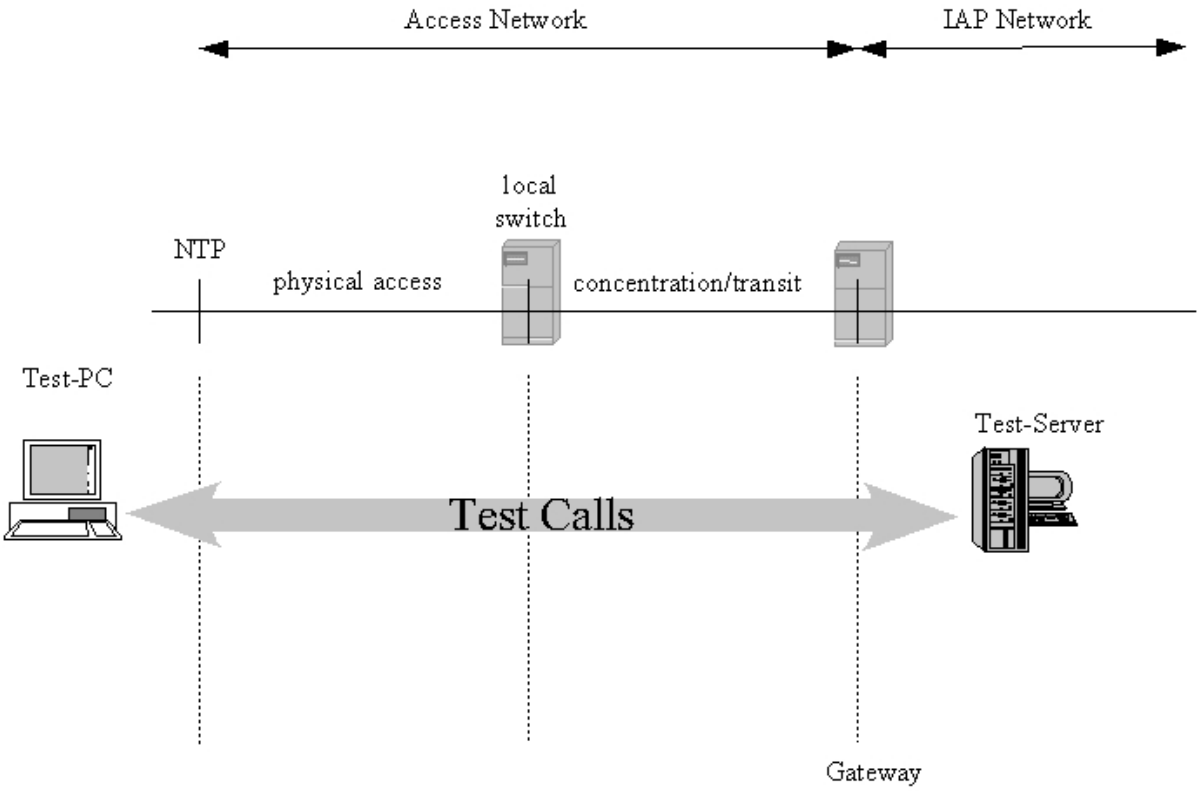


Figure for Measurement set-up

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 =

Total Successful download attempts ×100

Total download attempts

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 = Total Successful upload attempts ×100

Total upload attempts

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) =
Download speed (A1+A2+A3+A4+A5+A6) ×100
6
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	2204537
Airtel	4632595
BSNL	813115
Idea	2464950
MTS	239796
Reliance CDMA	Serviced Closed
Reliance GSM	4093229
TATA CDMA	186096
TATA GSM	1958167
Vodafone	5014866
Name of Operator	**Number of Subscriber as per VLR-3G**
Aircel 3G	451462
Airtel 3G	627600
BSNL 3G	70188
Idea 3G	NA
Reliance 3G	4093229
Vodafone 3G	889204

MARCH'17 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 TRAI RO officials gives an insight into the overall performance of various operators in the Kolkata 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	0.07%	0.17%	98.20%	0.15%	0.05%	0.60%	2.40%	98.07%
Airtel	0.00%	0.00%	99.66%	0.05%	0.04%	0.68%	2.39%	98.35%
BSNL	1.42%	1.87%	99.30%	0.40%	0.75%	1.38%	1.88%	99.80%
Idea	0.21%	0.34%	99.68%	0.05%	0.09%	0.28%	0.18%	98.08%
MTS	0.04%	0.00%	99.89%	NA	0.00%	0.46%	2.68%	99.60%
Reliance GSM	1.35%	6.06%	97.40%	0.10%	0.50%	0.27%	0.42%	98.99%
TATA CDMA	0.10%	0.00%	99.34%	NA	0.13%	0.27%	2.83%	99.72%
TATA GSM	0.06%	0.09%	99.49%	0.03%	0.02%	0.35%	0.96%	98.78%
Vodafone	0.04%	0.20%	99.56%	0.04%	0.44%	0.71%	2.74%	98.12%

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

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

BTSs Accumulated Downtime:

All operators met the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.00%.

Worst Affected BTSs Due to Downtime:

Reliance GSM failed to meet the benchmark. Minimum worst affected BTSs due to downtime was recorded for Airtel, TATA CDMA and MTS at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for MTS with 99.89%.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion. TATA GSM recorded the best SDCCH / Paging Channel Congestion with 0.03%.

TCH Congestion:

All operators met the benchmark on TCH congestion, while MTS performed the best on TCH congestion with 0.00%

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance GSM and TATA CDMA at 0.27%.

Worst Affected Cells Having More than 3% TCH Drop:

All operators met the benchmark for the parameter. Best performance was recorded for Idea at 0.18%.

Voice Quality

All operators met the benchmark for the parameter. Best performance was recorded for BSNL at 99.80%.

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 January 2017								
Name of Service Provider Month January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.10%	0.08%	98.10%	0.14%	0.04%	0.61%	2.50%	98.07%
Airtel	0.00%	0.00%	99.60%	0.03%	0.03%	0.64%	2.43%	98.34%
BSNL	1.16%	1.80%	99.28%	0.38%	0.08%	0.99%	1.49%	99.83%
Idea	0.19%	0.30%	99.72%	0.05%	0.12%	0.28%	0.18%	98.11%
MTS	0.05%	0.00%	99.90%	NA	0.00%	0.49%	2.69%	99.65%
Reliance GSM	1.52%	6.06%	98.65%	0.07%	0.79%	NA	0.35%	99.02%
TATA CDMA	0.09%	0.00%	99.24%	NA	0.16%	0.33%	2.95%	99.65%
TATA GSM	0.04%	0.06%	99.50%	0.02%	0.01%	0.40%	1.15%	98.74%
Vodafone	0.05%	0.22%	99.53%	0.04%	0.47%	0.73%	2.76%	98.13%

3.1.2 PMR DATA – FEBRUARY FOR 2G

Month February 2017								
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	0.06%	0.17%	98.20%	0.17%	0.04%	0.61%	2.31%	98.05%
Airtel	0.01%	0.00%	99.67%	0.05%	0.04%	0.72%	2.39%	98.33%
BSNL	1.56%	1.88%	99.30%	0.26%	0.39%	0.67%	2.86%	99.82%
Idea	0.23%	0.34%	99.72%	0.06%	0.09%	0.29%	0.24%	98.06%
MTS	0.02%	0.00%	99.90%	NA	0.00%	0.47%	2.73%	99.65%
Reliance GSM	2.13%	10.21%	94.86%	0.13%	0.42%	NA	0.41%	98.96%
TATA CDMA	0.03%	0.00%	99.41%	NA	0.09%	0.26%	2.85%	99.76%
TATA GSM	0.04%	0.00%	99.49%	0.02%	0.02%	0.35%	0.89%	98.75%
Vodafone	0.02%	0.04%	99.56%	0.04%	0.44%	0.71%	2.76%	98.12%

3.1.3 PMR DATA - MARCH FOR 2G

Month March 2017								
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	0.06%	0.25%	98.30%	0.14%	0.07%	0.60%	2.40%	98.10%
Airtel	0.00%	0.00%	99.71%	0.06%	0.05%	0.67%	2.37%	98.38%
BSNL	1.68%	1.95%	99.31%	0.56%	1.78%	1.53%	1.31%	99.77%
Idea	0.23%	0.38%	99.61%	0.05%	0.05%	0.28%	0.11%	98.08%
MTS	0.07%	0.00%	99.87%	NA	0.00%	0.42%	2.61%	99.50%
Reliance GSM	0.59%	1.92%	98.68%	0.11%	0.28%	NA	0.43%	98.98%
TATA CDMA	0.19%	0.00%	99.36%	NA	0.15%	0.24%	2.69%	99.75%
TATA GSM	0.10%	0.22%	99.47%	0.05%	0.02%	0.31%	0.85%	98.84%
Vodafone	0.05%	0.35%	99.58%	0.05%	0.42%	0.71%	2.70%	98.09%

3.2 3 DAYS LIVE DATA – CONSOLIDATED FOR 2G CONSIDERING DATA FOR THE MONTH OF MARCH 2017

3 Day LIVE CONSOLIDATED FOR 2G (CONSIDERING MARCH 2017 DATA ONLY)								
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	0.10%	0.04%	98.67%	0.08%	0.01%	0.48%	2.21%	98.56%
Airtel	0.08%	0.00%	99.73%	0.05%	0.04%	0.66%	2.36%	98.32%
BSNL	0.67%	0.23%	98.69%	0.41%	1.84%	1.49%	2.12%	98.83%
Idea	0.23%	0.25%	99.61%	0.05%	0.01%	0.22%	0.01%	98.35%
MTS	0.17%	0.00%	99.90%	NA	0.00%	0.32%	0.08%	99.06%
Reliance GSM	0.84%	0.00%	97.96%	0.05%	0.08%	NA	0.04%	99.11%
TATA CDMA	0.00%	0.00%	99.52%	NA	0.02%	0.28%	2.34%	99.75%
TATA GSM	0.02%	0.00%	99.57%	0.04%	0.01%	0.25%	0.66%	99.16%
Vodafone	0.04%	0.07%	99.74%	0.05%	0.26%	0.57%	2.82%	98.32%

A three day live measurement was conducted to measure the QoS provided by the operators for the month of March 2017 data only. The table provided below gives a snapshot of the performance of all operators during live measurement.

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

BTSs Accumulated Downtime:

All operators met the benchmark. Minimum BTS Accumulated downtime was recorded for TATA CDMA at 0.00%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for MTS with 99.90%.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion. TATA GSM recorded the best SDCCH / Paging Channel Congestion.

TCH Congestion:

All operators met the benchmark, while MTS 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 GSM. No valid data obtained from Reliance GSM for Kolkata LSA

Worst Affected Cells Having More than 3% TCH Drop:

All operators met the benchmark for the parameter.. Best performance was recorded for Idea at 0.01%.

Voice Quality

All operators met the benchmark for the parameter. Best performance was recorded for TATA CDMA at 99.75%

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

Data not computed

3.2.2 3 DAY DATA – FEBRUARY FOR 2G

Data not computed.

3.2.3 3 DAY DATA - MARCH FOR 2G

3 Day LIVE CONSOLIDATED FOR 2G (CONSIDERING MARCH 2017 DATA ONLY)								
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	0.10%	0.04%	98.67%	0.08%	0.01%	0.48%	2.21%	98.56%
Airtel	0.08%	0.00%	99.73%	0.05%	0.04%	0.66%	2.36%	98.32%
BSNL	0.67%	0.23%	98.69%	0.41%	1.84%	1.49%	2.12%	98.83%
Idea	0.23%	0.25%	99.61%	0.05%	0.01%	0.22%	0.01%	98.35%
MTS	0.17%	0.00%	99.90%	NA	0.00%	0.32%	0.08%	99.06%
Reliance GSM	0.84%	0.00%	97.96%	0.05%	0.08%	NA	0.04%	99.11%
TATA CDMA	0.00%	0.00%	99.52%	NA	0.02%	0.28%	2.34%	99.75%
TATA GSM	0.02%	0.00%	99.57%	0.04%	0.01%	0.25%	0.66%	99.16%
Vodafone	0.04%	0.07%	99.74%	0.05%	0.26%	0.57%	2.82%	98.32%

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	0.08%	0.14%	99.61%	0.21%	0.04%	0.28%	2.92%	98.64%
Airtel 3G	0.00%	0.00%	99.61%	0.00%	0.00%	0.34%	1.86%	99.24%
BSNL 3G	1.26%	1.95%	96.24%	0.60%	0.74%	1.50%	2.88%	99.81%
Idea 3G	0.15%	0.22%	99.91%	0.00%	0.00%	0.18%	0.09%	99.79%
Reliance 3G	0.26%	1.79%	99.96%	0.03%	0.01%	0.05%	0.16%	99.89%
Vodafone 3G	0.03%	0.04%	100.00%	0.00%	0.00%	0.27%	2.28%	98.88%

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

Node Bs downtime:

All operators met the benchmark. Minimum Node Bs Accumulated downtime was recorded for Airtel 3G at 0.00%.

Worst affected Node Bs due to downtime:

BSNL 3G failed to meet the benchmark. Minimum worst affected Node Bs due to downtime was recorded for Airtel 3G at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 100.00%.

RRC Congestion:

All operators met the benchmark for RRC congestion. Minimum RRC congestion was recorded for Airtel 3G at 0.00%.

Circuit Switched RAB Congestion:

All operators met the benchmark for Circuit Switched RAB congestion. Minimum Circuit Switched RAB congestion was recorded for Airtel 3G at 0.00%.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance 3G at 0.05%.

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

All operators met he benchmark for the parameter. Best performance was recorded for Idea 3G at 0.09%.

Circuit Switch Voice Quality:

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

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

3.3.1 PMR DATA - JANUARY FOR 3G

Month January 2017								
Name of Service Provider Month January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.11%	0.05%	99.67%	0.18%	0.01%	0.28%	2.88%	98.67%
Airtel 3G	0.00%	0.00%	99.61%	0.00%	0.00%	0.25%	1.91%	99.00%
BSNL 3G	1.23%	1.94%	97.09%	0.69%	1.32%	1.77%	2.85%	99.83%
Idea 3G	0.13%	0.15%	99.92%	0.00%	0.00%	0.19%	0.16%	99.80%
Reliance 3G	0.24%	1.85%	99.93%	0.05%	0.01%	0.04%	0.15%	99.89%
Vodafone 3G	0.04%	0.08%	100.00%	0.00%	0.00%	0.25%	2.27%	98.77%

3.3.2 PMR DATA – FEBRUARY FOR 3G

Month February 2017								
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	0.06%	0.16%	99.62%	0.20%	0.02%	0.30%	2.95%	98.67%
Airtel 3G	0.00%	0.00%	99.62%	0.00%	0.00%	0.24%	1.83%	99.00%
BSNL 3G	1.34%	1.99%	95.65%	0.73%	0.22%	1.12%	2.85%	99.83%
Idea 3G	0.17%	0.30%	99.91%	0.00%	0.00%	0.18%	0.08%	99.79%
Reliance 3G	0.24%	1.70%	99.96%	0.03%	0.02%	0.04%	0.18%	99.89%
Vodafone 3G	0.02%	0.00%	100.00%	0.00%	0.00%	0.28%	2.30%	98.94%

3.3.3 PMR DATA - MARCH FOR 3G

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 voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	**≤ 2%**	**≤ 2%**	**≥ 95%**	**≤ 1%**	**≤ 2%**	**≤ 2%**	**≤ 3%**	**≥ 95%**
Aircel 3G	0.06%	0.21%	99.53%	0.24%	0.08%	0.28%	2.93%	98.56%
Airtel 3G	0.00%	0.00%	99.60%	0.00%	0.00%	0.25%	1.84%	99.73%
BSNL 3G	1.34%	1.92%	95.99%	0.37%	0.67%	0.85%	2.92%	99.77%
Idea 3G	0.17%	0.20%	99.91%	0.00%	0.00%	0.18%	0.03%	99.78%
Reliance 3G	0.31%	1.82%	99.98%	0.02%	0.01%	0.05%	0.15%	99.89%
Vodafone 3G	0.03%	0.04%	99.99%	0.01%	0.01%	0.27%	2.28%	98.93%

3.4 3 DAY LIVE DATA – CONSOLIDATED FOR 3G (CONSIDERING MARCH 2017 DATA ONLY)

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	0.11%	0.05%	99.56%	0.21%	0.03%	0.30%	2.77%	98.48%
Airtel 3G	0.00%	0.00%	99.59%	0.00%	0.00%	0.30%	1.93%	99.73%
BSNL 3G	0.63%	0.24%	95.86%	0.36%	0.71%	0.56%	0.81%	98.50%
Idea 3G	0.18%	0.20%	99.90%	0.00%	0.00%	0.16%	0.07%	99.87%
Reliance 3G	1.17%	0.00%	100.00%	0.01%	0.00%	0.04%	0.12%	99.89%
Vodafone 3G	0.02%	0.00%	100.00%	0.00%	0.01%	0.26%	2.36%	98.91%

Node Bs downtime:

All operators met the benchmark for the parameter. Minimum Node Bs Accumulated downtime was recorded for Airtel 3G at 0.00%.

Worst affected Node Bs due to downtime:

All operators met the benchmark for the parameter. Minimum worst affected Node Bs due to downtime was recorded for Airtel 3G , Reliance 3G and Vodafone 3G at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for the parameter. The maximum CSSR was observed for Reliance 3G & Vodafone 3G with 100.00%.

RRC Congestion:

All operators met the benchmark for the parameter. Minimum RRC congestion was for Airtel 3G and Vodafone 3G with 0.00%.

Circuit Switched RAB Congestion:

All operators met the benchmark for the parameter. Minimum Circuit Switched RAB congestion was for Airtel 3G , Idea 3G & Reliance 3G with 0.00%

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance 3G at 0.04%.

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

All operators met the benchmark for the parameter. Minimum Worst affected cells having more than 3% Circuit switched voice drop rate was recorded for Idea 3G at 0.07%.

Circuit Switch Voice Quality:

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

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

Data not computed

3.4.2 3 DAY DATA – FEBRUARY FOR 3G

Data not computed

3.4.3 3 DAY DATA - MARCH FOR 3G

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 rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	**≤ 2%**	**≤ 2%**	**≥ 95%**	**≤ 1%**	**≤ 2%**	**≤ 2%**	**≤ 3%**	**≥ 95%**
Aircel 3G	0.11%	0.05%	99.56%	0.21%	0.03%	0.30%	2.77%	98.48%
Airtel 3G	0.00%	0.00%	99.59%	0.00%	0.00%	0.27%	1.93%	99.73%
BSNL 3G	0.63%	0.24%	95.86%	0.36%	0.71%	0.56%	0.81%	98.50%
Idea 3G	0.18%	0.20%	99.90%	0.00%	0.00%	0.16%	0.07%	99.87%
Reliance 3G	1.17%	0.00%	100.00%	0.01%	0.00%	0.04%	0.12%	99.89%
Vodafone 3G	0.02%	0.00%	100.00%	0.00%	0.01%	0.26%	2.36%	98.91%

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	99.98%	98.37%	0.82%	99.96%	99.53%	0.62%
Airtel	99.35%	99.09%	1.41%	99.70%	97.84%	1.40%
BSNL	98.77%	99.74%	NA	99.93%	99.74%	NA
Idea	99.99%	99.86%	0.97%	NA	99.82%	1.23%
MTS	92.71%	99.84%	0.83%	100.00%	96.53%	0.84%
Reliance GSM	99.98%	99.61%	0.27%	99.99%	99.95%	0.37%
TATA CDMA	98.26%	96.59%	3.25%	NA	94.90%	0.83%
TATA GSM	100.00%	99.98%	1.26%	NA	99.99%	1.18%
Vodafone	99.95%	99.93%	2.32%	99.96%	99.92%	2.65%

NA: - No data received from operators

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

Activation done within 4 hours:

In PMR **MTS** failed to meet the Benchmark with 92.71%. Maximum Activation done within 4 hours is recorded for TATA GSM at 100.00%. During 3Days live Tata CDMA failed to meet the benchmark. Maximum Activation done within 4 hours was recorded for TATA GSM at 100.00%. However in 3day live maximum Activation done within 4 hours was recorded by MTS at 100%. TATA GSM and CDMA failed to produce the above data to TRAI auditors.

PDP Context activation success rate:

In PMR as well as 3Days live all operators met the benchmark. Maximum PDP content Activation success rate was recorded for Tata GSM at 99.98%. However in 3day live maximum PDP content Activation success rate TATA CDMA failed to meet the benchmark. PDP content Activation success rate was recorded for TATA GSM for 3 day live category.

Drop Rate:

All operators met the benchmark in PMR as well as 3day live. The minimum drop rate was observed in PMR for Reliance GSM at 0.27% and 3days live for Reliance GSM at 0.37%

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	99.98%	98.37%	0.84%	99.96%	99.53%	0.62%
Airtel 3G	NA	99.66%	0.48%	99.70%	99.95%	0.07%
BSNL 3G	98.42%	99.91%	3.68%	99.93%	99.91%	2.21%
Idea 3G	99.99%	99.11%	1.12%	NA	99.22%	1.81%
Reliance 3G	99.98%	99.15%	0.35%	99.99%	NA	NA
Vodafone 3G	99.93%	98.97%	0.29%	NA	98.93%	0.36%

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

Activation done within 4 hours:

In PMR as well as 3days live all operators met the benchmark. Maximum Activation done within 4 hours was recorded for Idea 3G at 99.99%. However in 3day live maximum Activation done within 4 hours was recorded for Reliance 3G at 99.99%.

PDP Context activation success rate:

In PMR as well as 3Days live all operators met the benchmark. Maximum PDP content Activation success rate was recorded for BSNL 3G at 99.91%. However in 3day live maximum PDP content Activation success rate was recorded for Airtel 3G at 99.95%.

Drop Rate:

All operators met the benchmark in PMR as well as 3day live. The minimum drop rate was observed for Vodafone 3G and for as well 3days live Airtel 3G.

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 voice) within 90 seconds	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel	97.30%	100.00%	100.00%	100.00%	28.57%	100.00%
Airtel	99.00%	100.00%	100.00%	96.00%	47.62%	95.00%
BSNL	84.62%	100.00%	100.00%	99.00%	69.77%	68.09%
Idea	98.00%	100.00%	100.00%	100.00%	51.22%	99.00%
MTS	100.00%	100.00%	100.00%	100.00%	46.51%	97.92%
Reliance GSM	97.00%	97.00%	100.00%	100.00%	53.49%	95.00%
TATA CDMA	NA	NA	100.00%	100.00%	NA	95.00%
TATA GSM	NA	NA	100.00%	100.00%	44.19%	58.97%
Vodafone	100.00%	100.00%	100.00%	100.00%	69.77%	100.00%

Resolution of billing complaints

As per the consumers (live calling exercise) Aircel, BSNL, Reliance GSM failed to meet the benchmark of resolving 98% complaints within 4 weeks and Reliance GSM failed to meet the benchmark of 100% complaints within 6 weeks.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all of the operators met the recording 100% for the parameter.

Customer Care / Helpline Assessment (voice to voice)

All the operators meet the TRAI benchmark of 95%

Level 1 Service

As per the live calling results, none of the operators met the TRAI benchmark for level 1 service. 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. Aircel and Vodafone recorded the best performance at 100.00%.

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 voice) within 90 seconds
Benchmark	**≤ 0.1%**	**≤ 0.1%**	**≥ 98%**	**≥ 100%**	**≥ 100%**	**≥ 95%**	**≥ 95%**
Aircel	0.01%	0.01%	100.00%	100.00%	100.00%	96.59%	92.03%
Airtel	0.06%	0.02%	96.64%	96.64%	100.00%	92.67%	88.96%
BSNL	0.02%	0.01%	100.00%	100.00%	100.00%	96.95%	96.03%
Idea	0.62%	0.04%	100.00%	100.00%	100.00%	98.36%	99.22%
MTS	0.10%	0.01%	100.00%	100.00%	100.00%	99.74%	96.43%
Reliance GSM	0.08%	0.03%	100.00%	100.00%	100.00%	99.56%	94.46%
TATA CDMA	0.00%	0.00%	100.00%	100.00%	100.00%	NA	99.01%
TATA GSM	0.00%	0.00%	NA	NA	100.00%	98.54%	97.38%
Vodafone	0.10%	0.05%	100.00%	100.00%	100.00%	100.00%	97.06%

Metering and Billing Credibility – Post-paid Subscribers

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

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, all operators met the benchmark of charging disputes. TATA GSM & TATA CDMA performed the best with 0.00% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks except AIRTEL. **No data received from TATA GSM** for above two categories.

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

Airtel failed to meet the TRAI benchmark of 95% IVR call being attended. Vodafone recorded the best performance for the parameter**. For TATA CDMA no data was obtained**.

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

Aircel, Airtel and Reliance GSM failed to meet the TRAI specified benchmark of 95%. Idea recorded the best performance for the parameter with 99.22%.

3.9 INTER OPERATOR CALL ASSESSMENT – CONSOLIDATED

6. Inter Operator Call Assessment										
Inter operator call Assessment To↓ From→	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Aircel	NA	100.00%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	NA	100.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	Not Tested
BSNL	100.00%	100.00%	NA	100.00%	100.00%	NS	100.00%	100.00%	100.00%	100.00%
Idea	100.00%	100.00%	100.00%	NA	100.00%	NS	100.00%	100.00%	100.00%	100.00%
MTS	100.00%	100.00%	100.00%	100.00%	NA	NS	100.00%	100.00%	100.00%	100.00%
Reliance CDMA	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	NS	NA	100.00%	100.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	NA	100.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	NA	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	NA

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

3.10 COMPARISON BETWEEN TRAI RO AND OPERATOR'S DATA FOR PMR 2G

Name of service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	BTSs Accumulated downtime (not available for service) (%age)		Worst affected BTSs due to downtime (%age)		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 (call drop) rate (%age)		Connection with good voice quality			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO
Aircel	0.07%	0.07%	0.17%	0.17%	98.2%	98.20%	0.15%	0.15%	0.05%	0.05%	0.61%	0.60%	2.4%	2.40%	98.07%	98.07%	0%	0%
AIRTEL	0%	0.00%	0%	0.00%	99.66%	99.66%	0.05%	0.05%	0.04%	0.04%	0.68%	0.68%	2.39%	2.39%	98.35%	98.35%	0%	0%
BSNL	1.46%	1.42%	1.87%	1.87%	99.3%	99.30%	0.4%	0.40%	0.75%	0.75%	1.06%	1.38%	1.99%	1.88%	99.81%	99.80%	0%	0%
IDEA	0.16%	0.21%	0.27%	0.34%	99.58%	99.68%	0.11%	0.05%	0.14%	0.09%	0.35%	0.28%	0.67%	0.18%	97.78%	98.08%	0%	0%
MTS	0.05%	0.04%	0%	0.00%	99.89%	99.89%	0%	NA	0%	0.00%	0.46%	0.46%	2.67%	2.68%	99.6%	99.60%	0%	0%
RTL	0.46%	1.35%	1.88%	6.06%	95.41%	97.40%	0.1%	0.10%	0.5%	0.50%	0.12%	0.27%	0.4%	0.42%	98.99%	98.99%	0%	0%
TTSL CDMA	0.11%	0.10%	0%	0.00%	99.34%	99.34%	0%	NA	0.13%	0.13%	0.28%	0.27%	2.83%	2.83%	99.72%	99.72%	0%	0%
TTSL GSM	0.06%	0.06%	0.09%	0.09%	99.49%	99.49%	0.03%	0.03%	0.02%	0.02%	0.35%	0.35%	0.96%	0.96%	98.78%	98.78%	0%	0%
Vodafone	0.04%	0.04%	0.2%	0.20%	99.56%	99.56%	0.04%	0.04%	0.44%	0.44%	0.72%	0.71%	2.74%	2.74%	98.11%	98.12%	0%	0%

3.11 COMPARISON BETWEEN TRAI RO AND OPERATOR'S DATA FOR PMR 3G

Name of service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	Node-B's Accumulated downtime (not available for service)		Worst affected BTSs and Node-B's 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%		≤ 0.5%	
	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO	Operators	TRAI RO
Aircel	0.08%	0.08%	0.14%	0.14%	99.61%	99.61%	0.21%	0.21%	0.04%	0.04%	0.28%	0.28%	2.92%	2.92%	98.64	98.64%	0%	0%
AIRTEL	0%	0.00%	0%	0.00%	99.61%	99.61%	0%	0.00%	0%	0.00%	0.25%	0.34%	1.86%	1.86%	99.25	99.24%	0%	0%
BSNL	1.23%	1.26%	1.9%	1.95%	96.33%	96.24%	0.53%	0.60%	0.7%	0.74%	1.2%	1.50%	2.8%	2.88%	99.77	99.81%	0%	0%
IDEA	0.16%	0.15%	0.22%	0.22%	99.91%	99.91%	0%	0.00%	0%	0.00%	0.18%	0.18%	0.09%	0.09%	99.79	99.79%	0%	0%
RTL	0.28%	0.26%	1.76%	1.79%	99.95%	99.96%	0.03%	0.03%	0.01%	0.01%	0.05%	0.05%	0.16%	0.16%	99.90	99.89%	0%	0%
Vodafone	0.03%	0.03%	0.04%	0.04%	99.9%	100.00%	0%	0.00%	0.01%	0.00%	0.27%	0.27%	2.29%	2.28%	98.98	98.88%	0%	0%

Value calculated by Operator and TRAI RO OFFICE match		Value calculated by Operator and TRAI RO OFFICE do not match	

4 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Reliance GSM failed to meet the benchmark Worst Affected Cells Having More than 3% TCH Drop.

3 Day Live Measurement (Network Parameters) for 2G

- No critical findings noted.

PMR and 3days live Consolidated (Network Parameters) for 3G

- BSNL 3G failed to meet the benchmark for worst affected Node Bs due to downtime during PMR audit.

Wireless data services for 2G

- MTS failed to meet the benchmark for Activation done within 4 hours.
- TATA CDMA failed to reach the benchmark in PDP context activation success rate

Wireless data services for 3G

- No critical findings noted.

Live Calling

- As per the consumers (live calling exercise) Aircel, BSNL, Reliance GSM failed to meet the benchmark of resolving 98% complaints within 4 weeks and Reliance GSM failed to meet the benchmark of 100% complaints within 6 weeks.
- As per the live calling results, none of the operators met the TRAI benchmark for level 1 service. The details of live calling done for the level 1 service have been provided in the annexure for each operator.
- For the IVR aspect, all of the operators successfully met the benchmark of recording 100% for the parameter.
- All the operators met the TRAI benchmark of 95%

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Idea failed to meet the TRAI benchmark for the parameter. TATA GSM & CDMA had the best performance with 0.00% billing disputes.
- Airtel failed to meet the TRAI benchmark of 95% IVR call being attended. Vodafone recorded the best performance for the parameter.
- All the operators met the TRAI benchmark of providing credit or waiver within one week in case of complaints received.

Drive Test (Operator Assisted) voice

- No drive test conducted in the given LSA under period in consideration.

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%

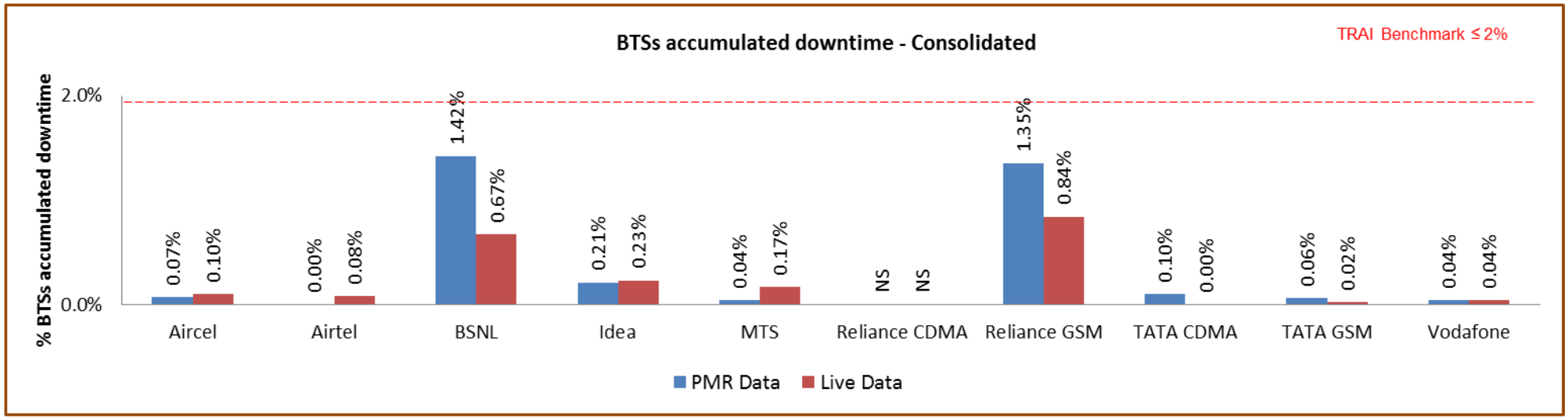
4. **Audit Procedure –**

    - 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.

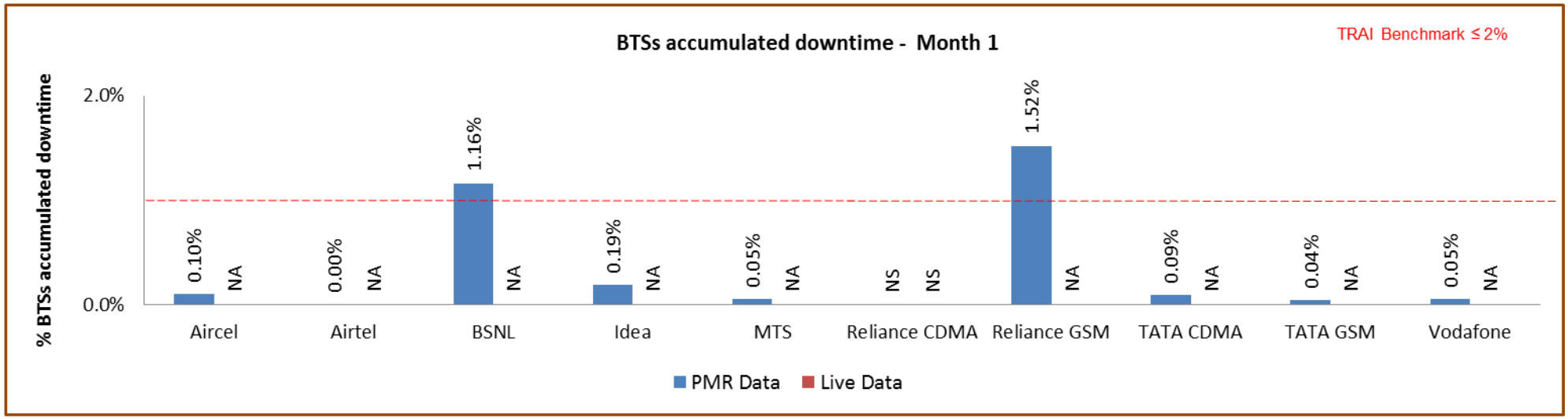
5.1.2 KEY FINDINGS - CONSOLIDATED

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



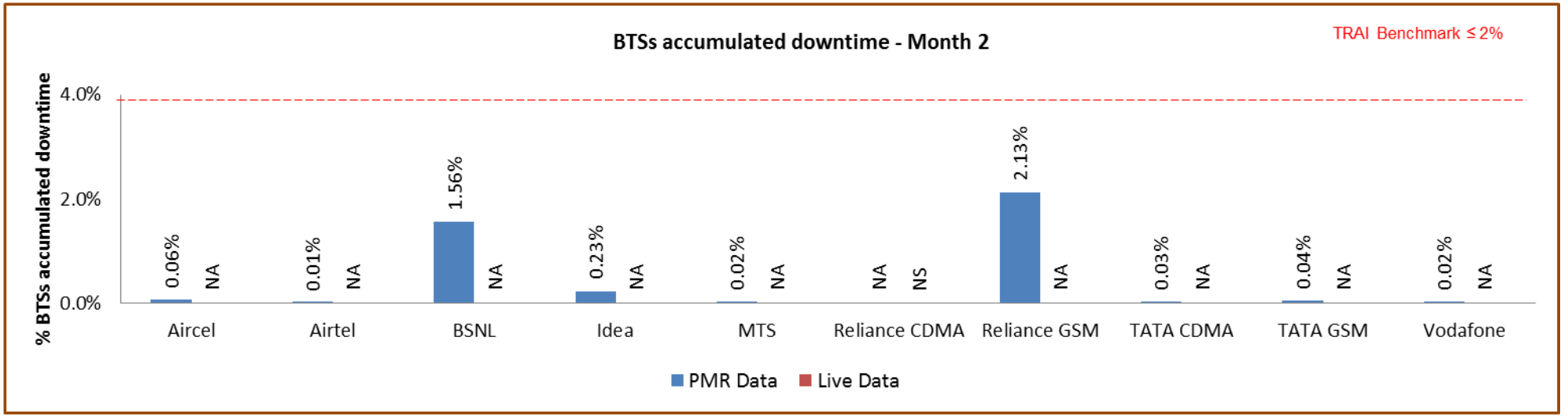
All operators met the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

5.1.2.1 KEY FINDINGS – JANUARY



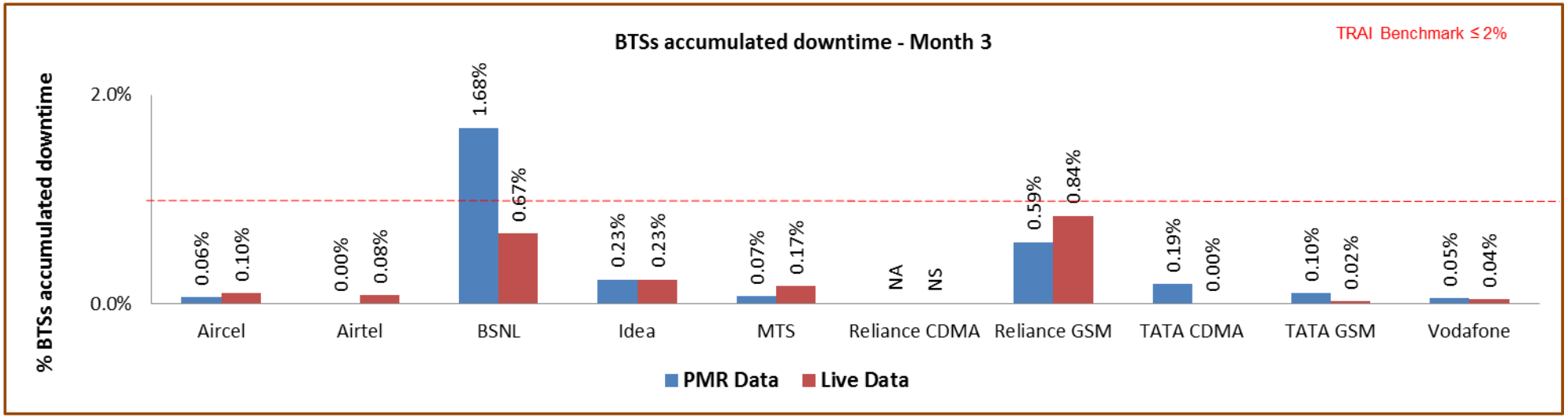
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.2 KEY FINDINGS – FEBRUARY



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

5.1.2.3 KEY FINDINGS – MARCH



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.

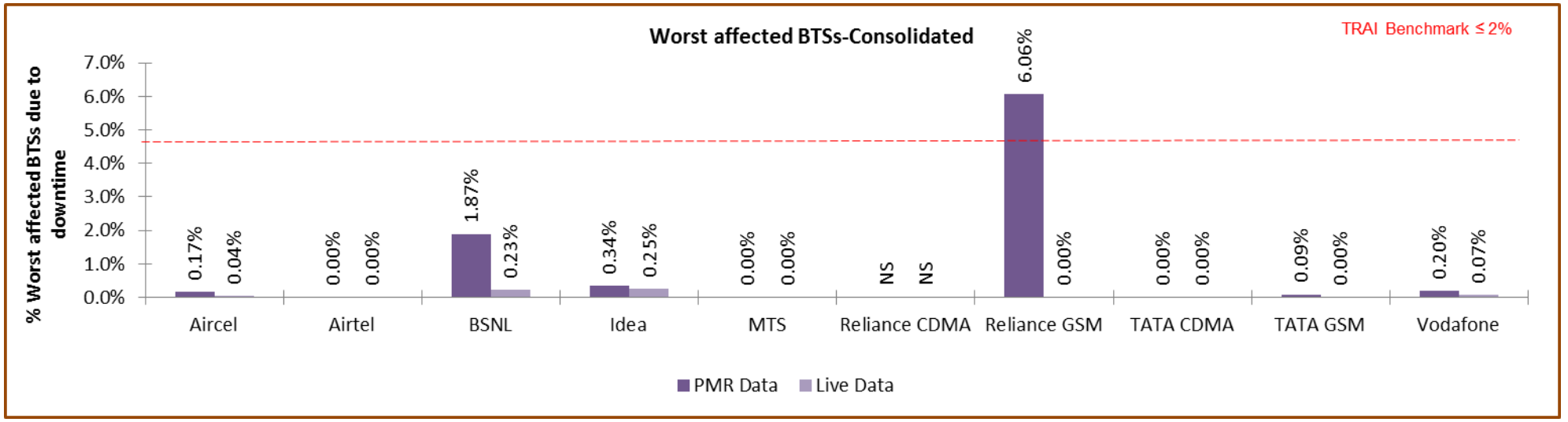
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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

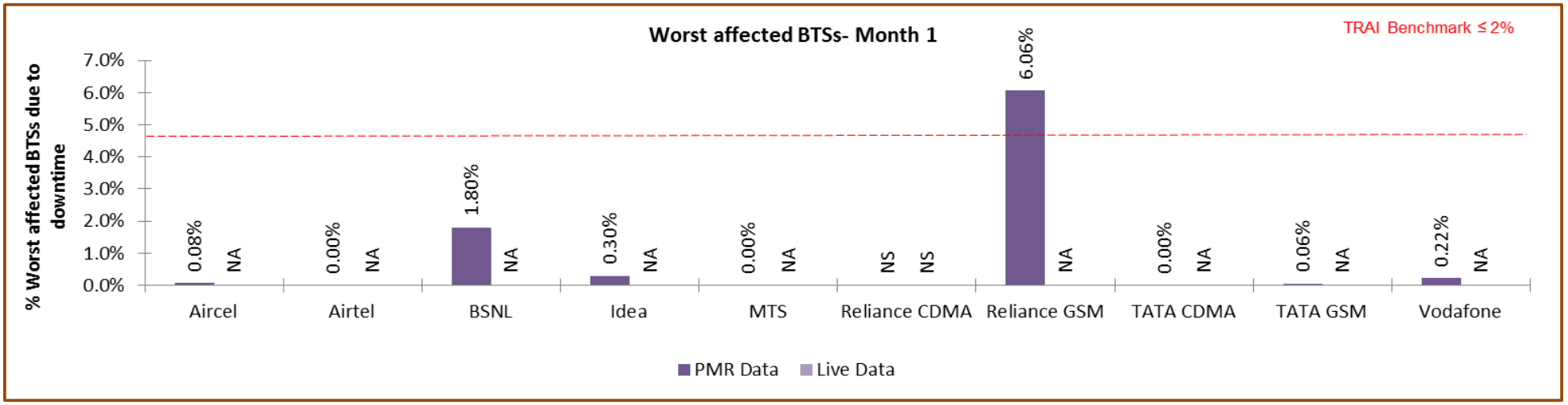


Data Source: Operations and Maintenance Center (OMC) of the operators

All operatots except Reliance GSM met the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

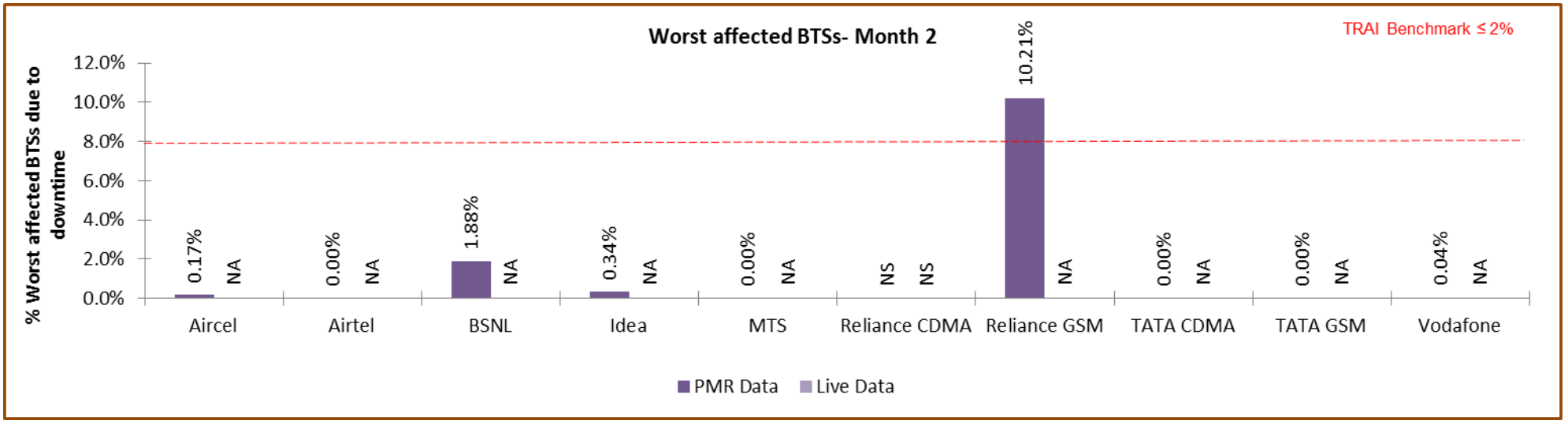
Significant difference was observed between PMR & live measurement data for BSNL and Reliance GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.2.2.1 KEY FINDINGS – JANUARY



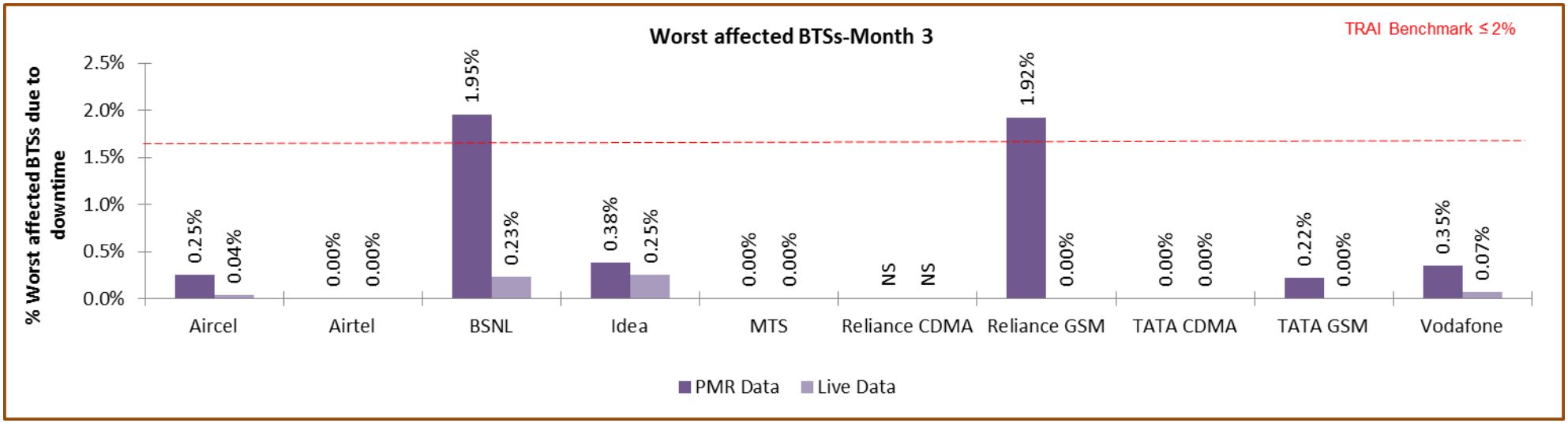
Data Source: Operations and Maintenance Center (OMC) of the operators

5.2.2.2 KEY FINDINGS – FEBRUARY



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

5.2.2.3 KEY FINDINGS – MARCH



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

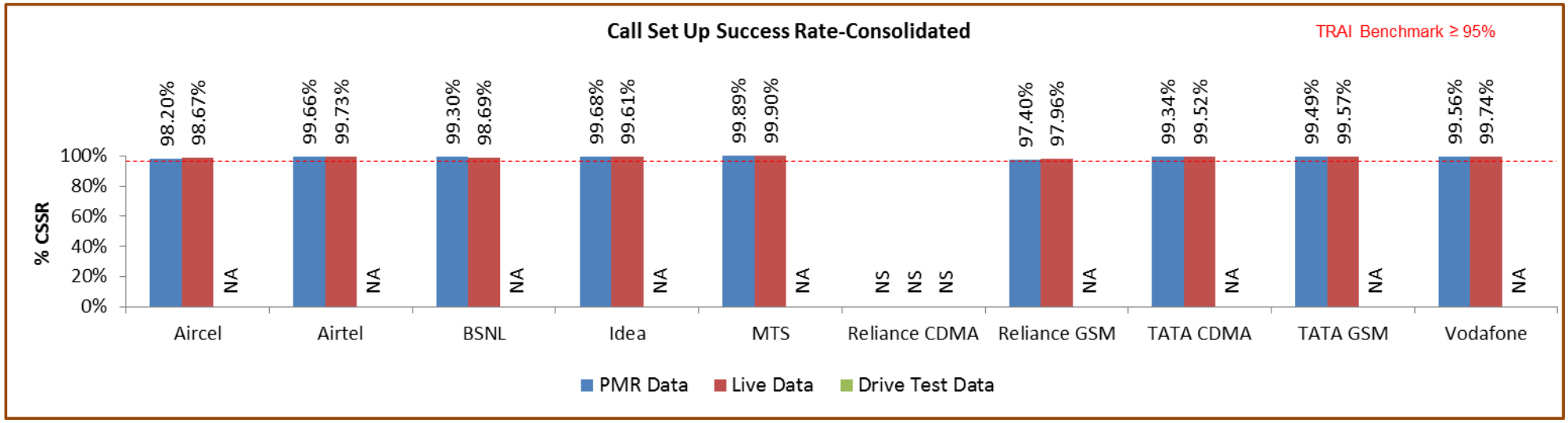
   Call Established means the following events have happened in call setup:-

   - 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.

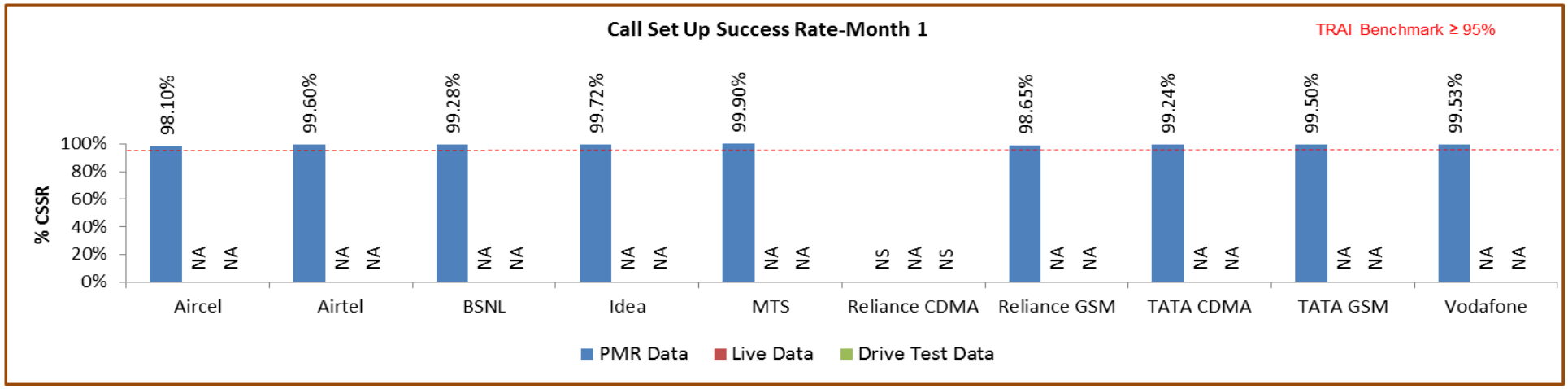
5.3.2 KEY FINDINGS - CONSOLIDATED



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

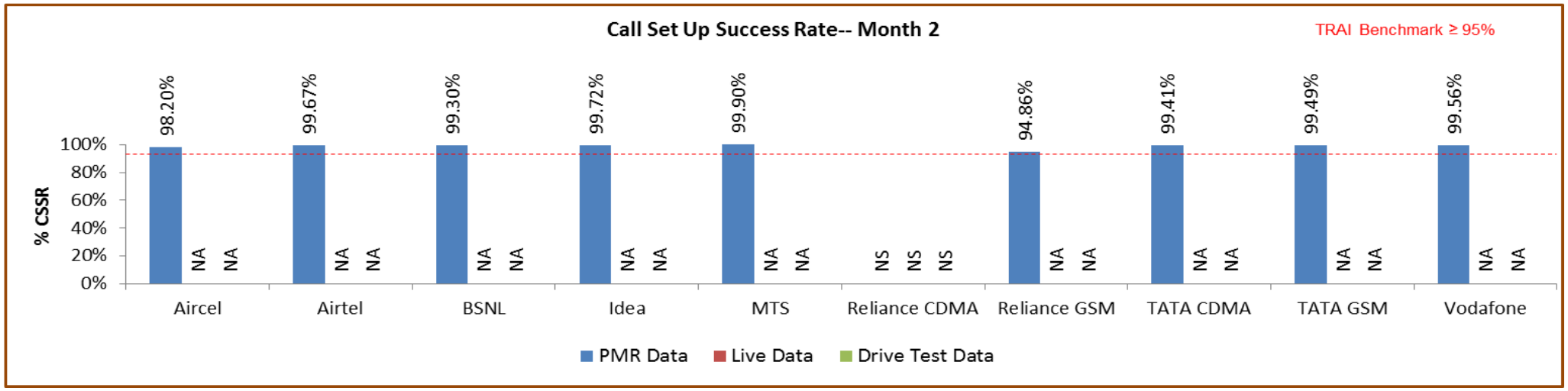
All operators met the TRAI benchmark as per audit/PMR data, 3days live.

5.3.2.1 KEY FINDINGS – JANUARY



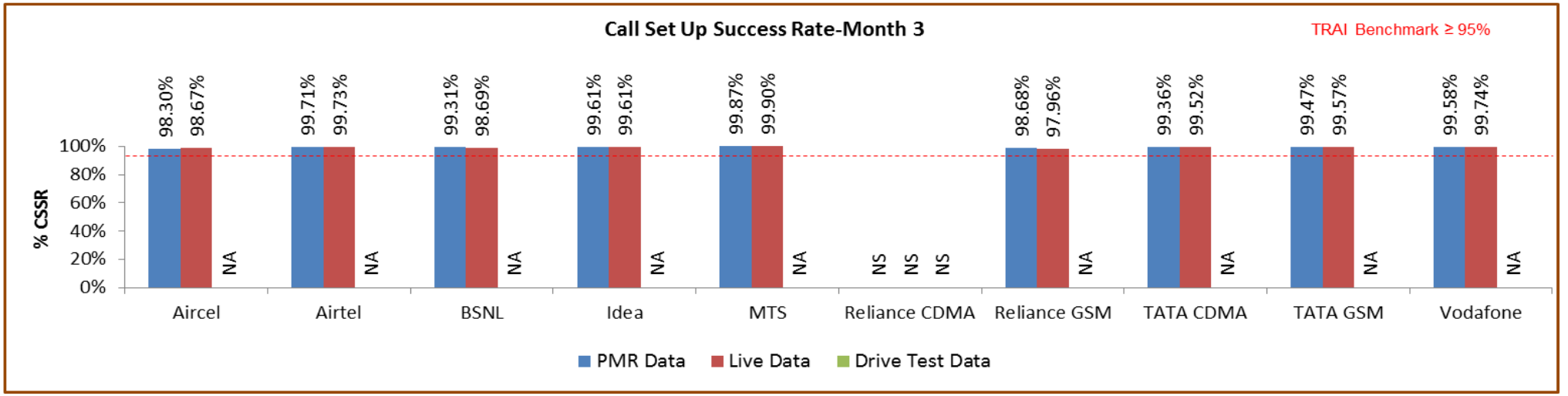
Data Source: Network Operations Center (NOC) of the operators

5.3.2.2 KEY FINDINGS – FEBRUARY



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

5.3.2.3 KEY FINDINGS – MARCH



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

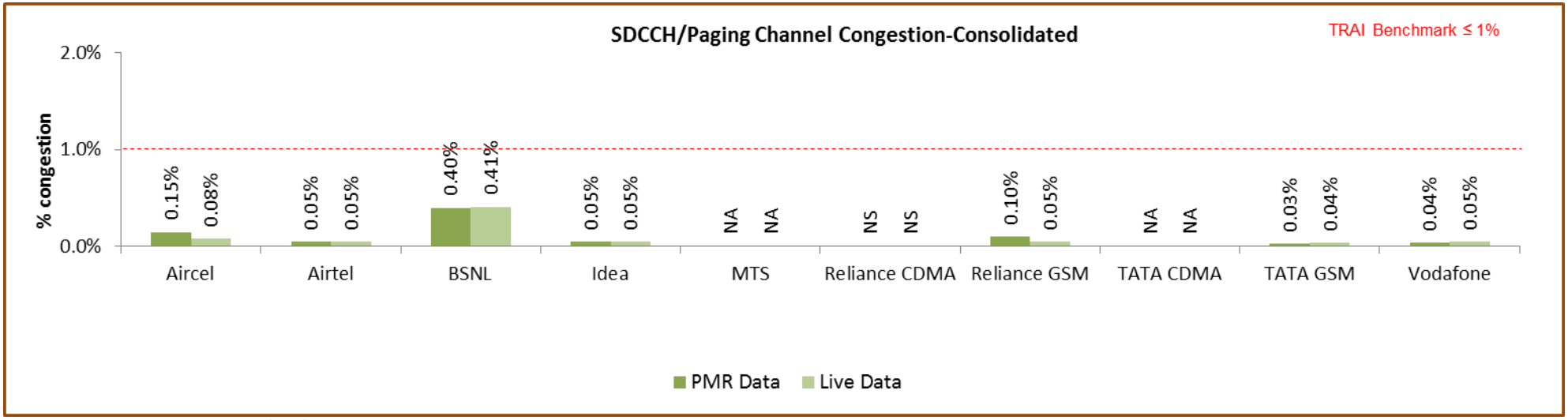
3. Benchmark:

- 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)

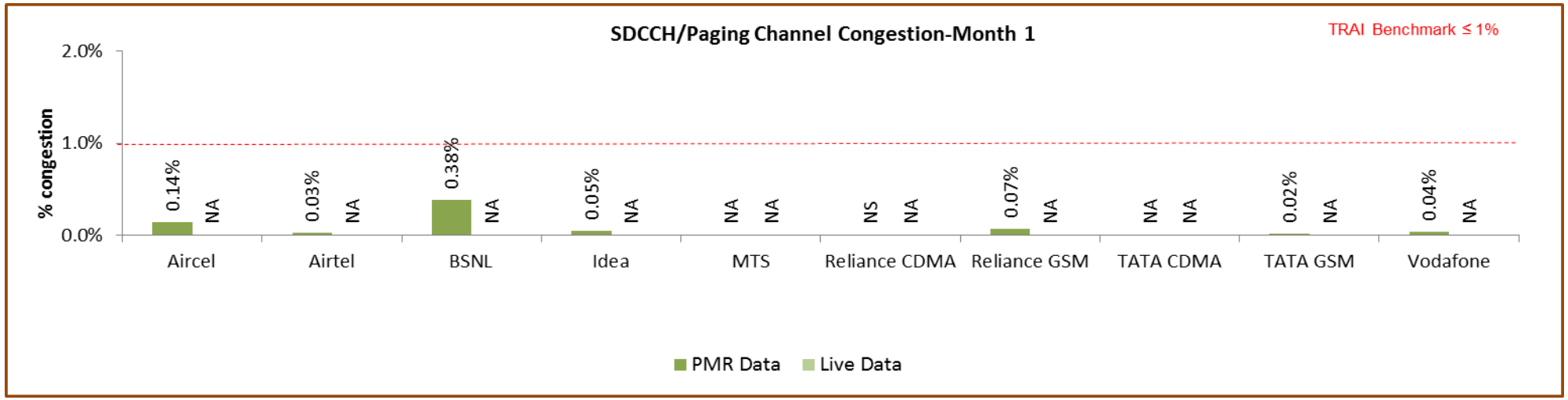


Data Source: Network Operations Center (NOC) of the operators

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

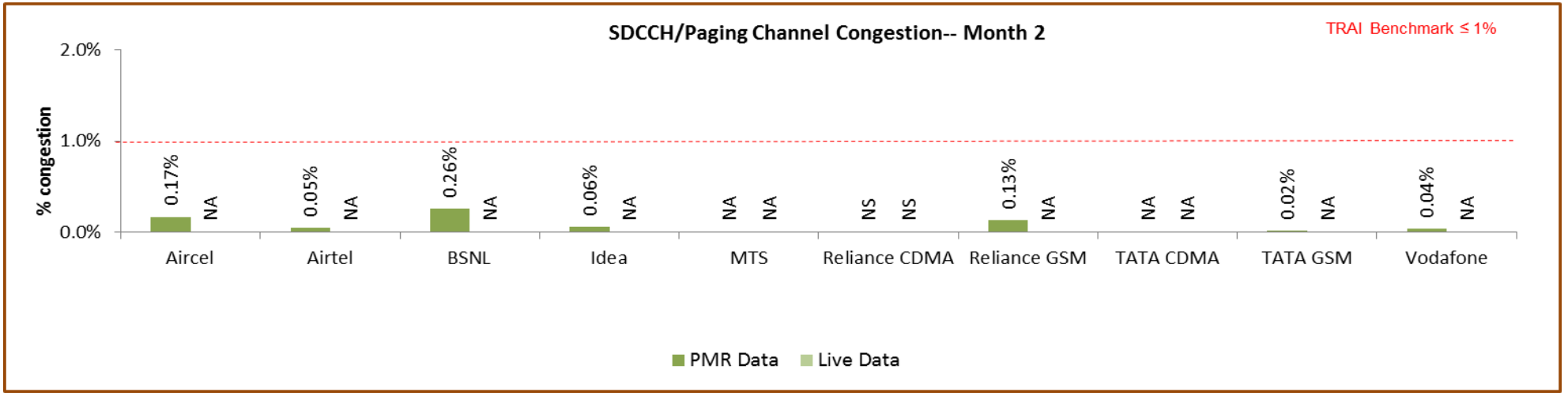
All operators met the benchmark as per PMR/audit Data.

5.4.2.1 KEY FINDINGS – JANUARY



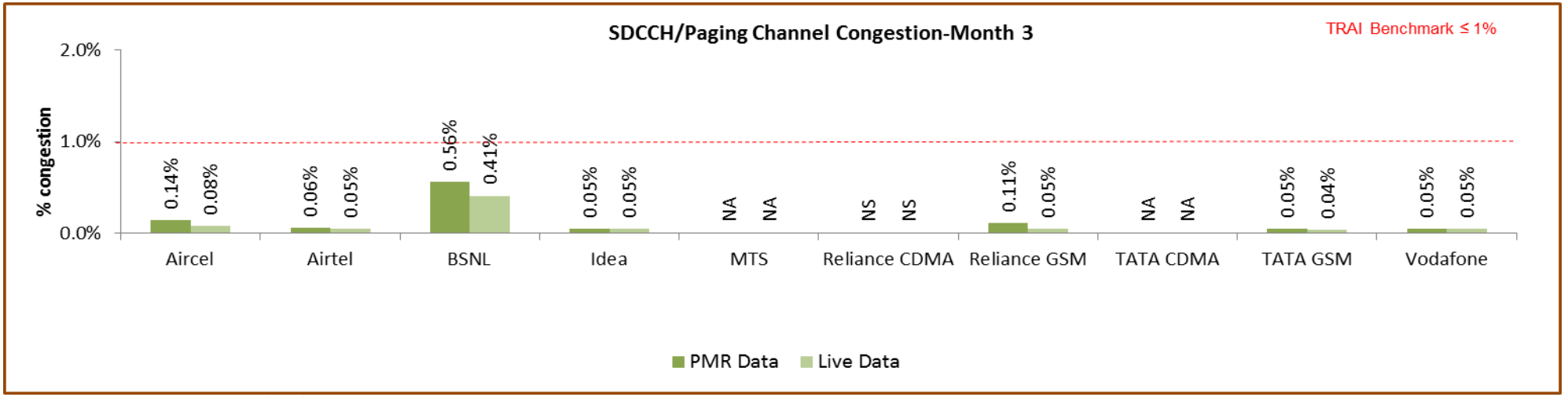
Data Source: Network Operations Center (NOC) of the operators

5.4.2.2 KEY FINDINGS – FEBRUARY



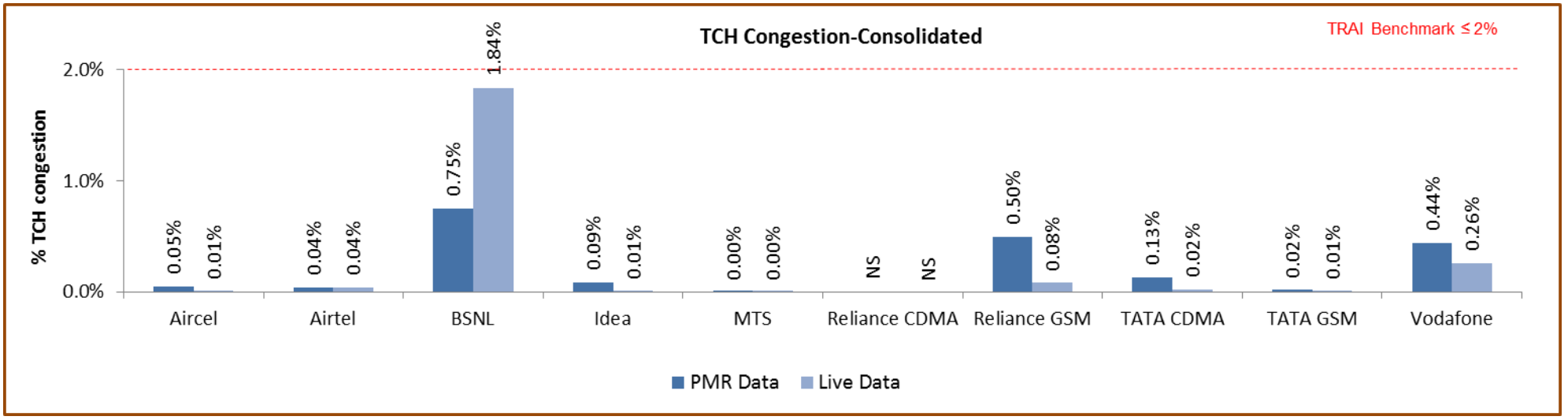
Data Source: Network Operations Center (NOC) of the operators

5.4.2.3 KEY FINDINGS – MARCH



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

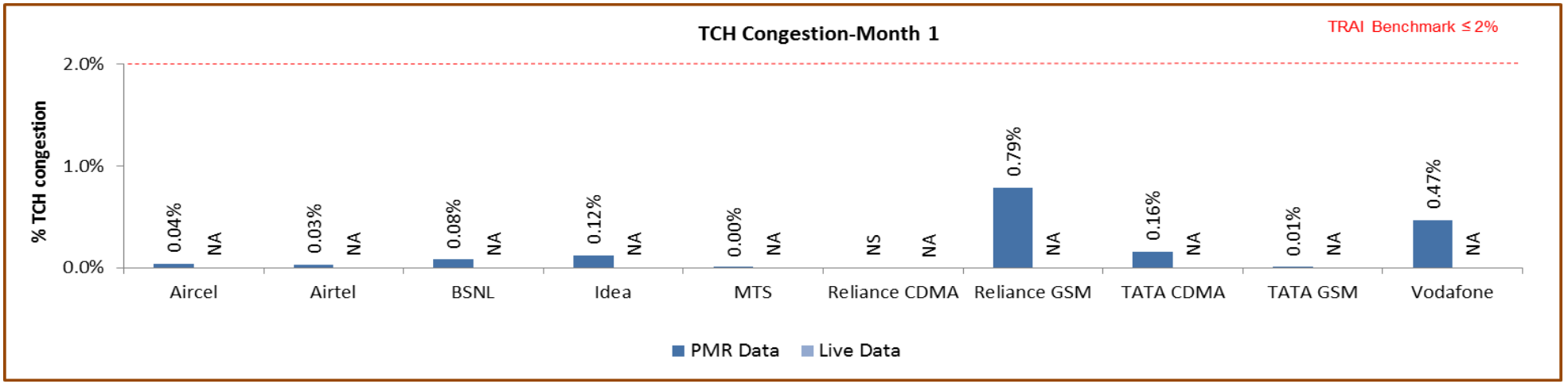
5.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)



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

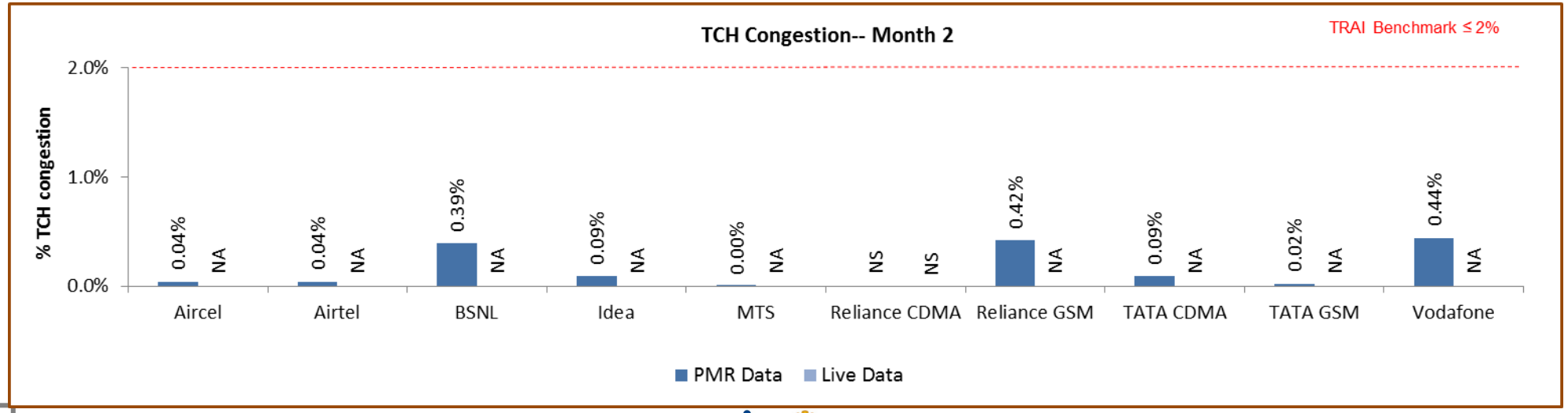
All operators met the benchmark as per audit/PMR report.

5.4.3.1 KEY FINDINGS – MONTH 1



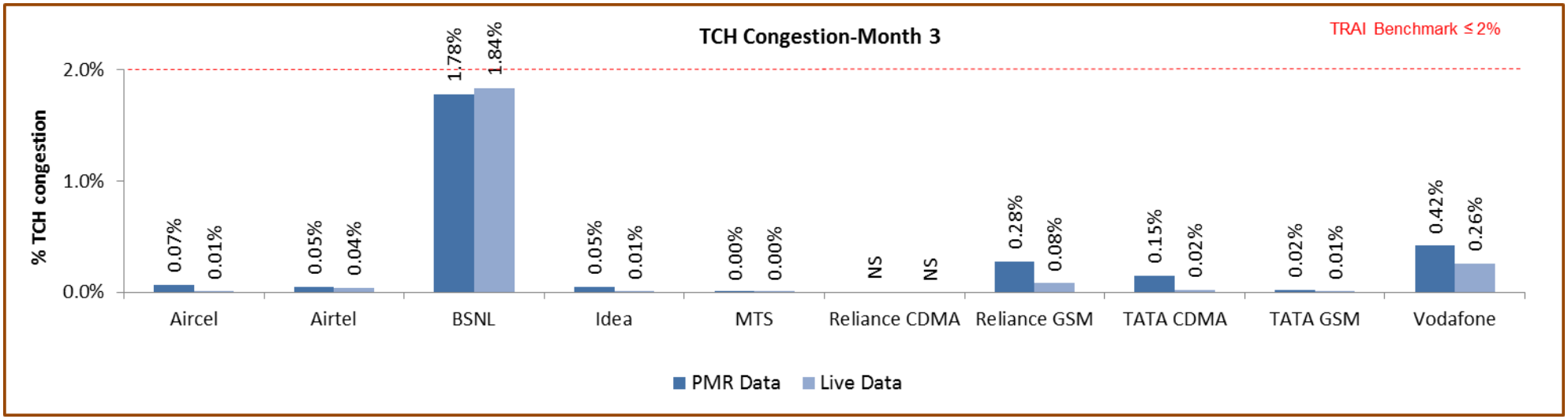
Data Source: Network Operations Center (NOC) of the operators

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**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		50	31	79	101	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		245277	252664	454707	229568	107734	NS	42778	62119	40178	649227
Traffic served for all POIs (B)- in erlangs		90973	124451	21611	123941	24903	NS	26322	21341	15101	364511
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		50	31	79	102	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81986	94616	52656	76641	35319	NS	19024	20070	12084	221433
Traffic served for all POIs (B)- in erlangs		16513	24636	11478	21557	6829	NS	6546	3892	2100	68069
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%

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

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	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		50	31	79	101	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81658	82245	402051	77146	35731	NS	11877	21516	13617	210980
Traffic served for all POIs (B)- in erlangs		30106	42385	10701	39067	6857	NS	9454	7126	5143	115295
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
No. of POIs not meeting benchmark		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Capacity of all POIs (A) - in erlangs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Traffic served for all POIs (B)- in erlangs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POI congestion	≤ 0.5%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		50	31	N/A	101	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81768	83299	N/A	76680	35319	NS	11877	20330	13591	218028
Traffic served for all POIs (B)- in erlangs		30297	41052	N/A	41338	6862	NS	9659	7216	5263	122675
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
No. of POIs not meeting benchmark		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Capacity of all POIs (A) - in erlangs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Traffic served for all POIs (B)- in erlangs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POI congestion	≤ 0.5%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

5.4.4.3 KEY FINDINGS – MONTH 3

5. POI Congestion											
Audit Results for POI Congestion- PMR data-March											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		50	31	79	101	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81851	87121	52656	75742	36684	NS	19024	20273	12970	220218
Traffic served for all POIs (B)- in erlangs		30571	41014	10910	43536	11184	NS	7209	6999	4695	126542
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		50	31	79	102	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81986	94616	52656	76641	35319	NS	19024	20070	12084	221433
Traffic served for all POIs (B)- in erlangs		16513	24636	11478	21557	6829	NS	6546	3892	2100	68069
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%

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

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**

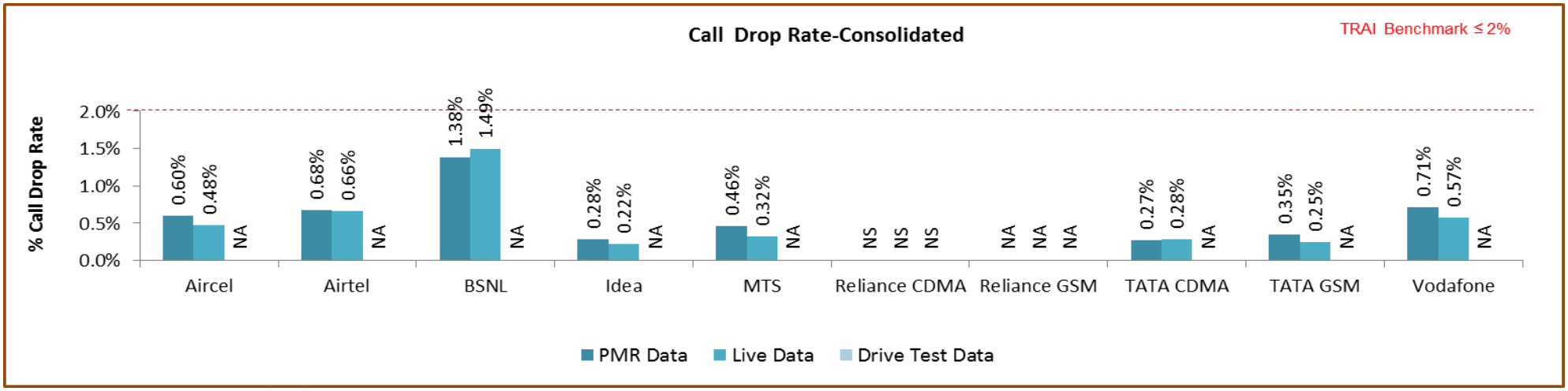
3. **TRAI Benchmark** –

   - 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.

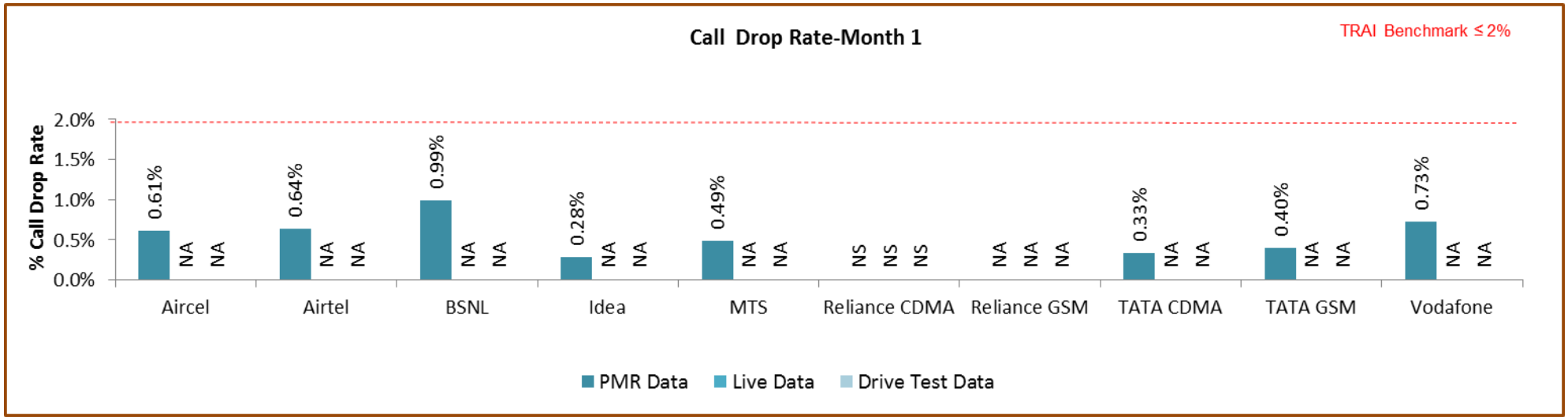
5.5.2 KEY FINDINGS - CONSOLIDATED



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

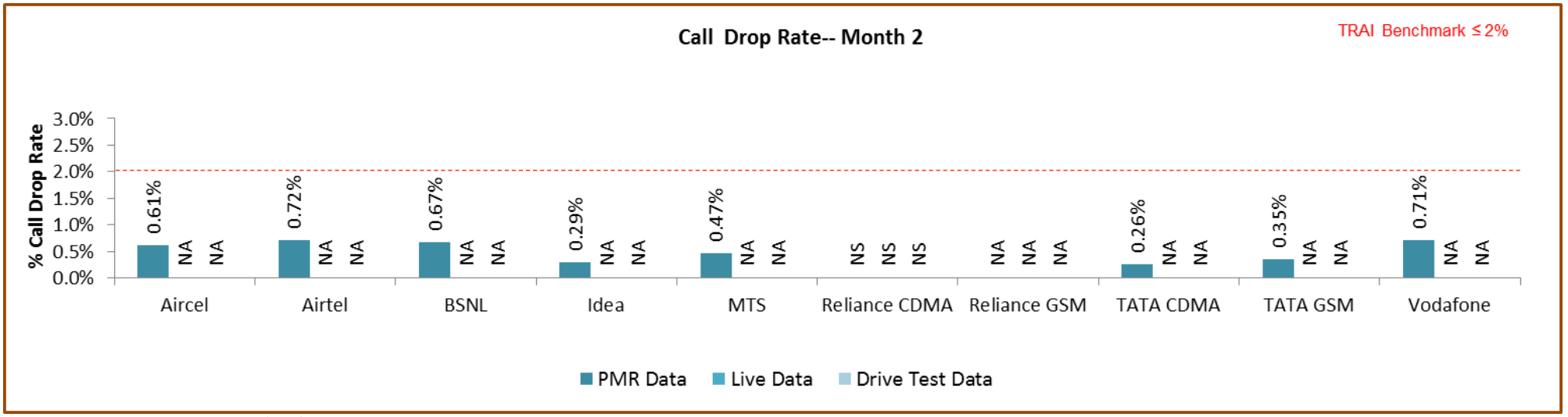
All operators met the benchmark for call drop rate during audit.

5.5.2.1 KEY FINDINGS – MONTH 1



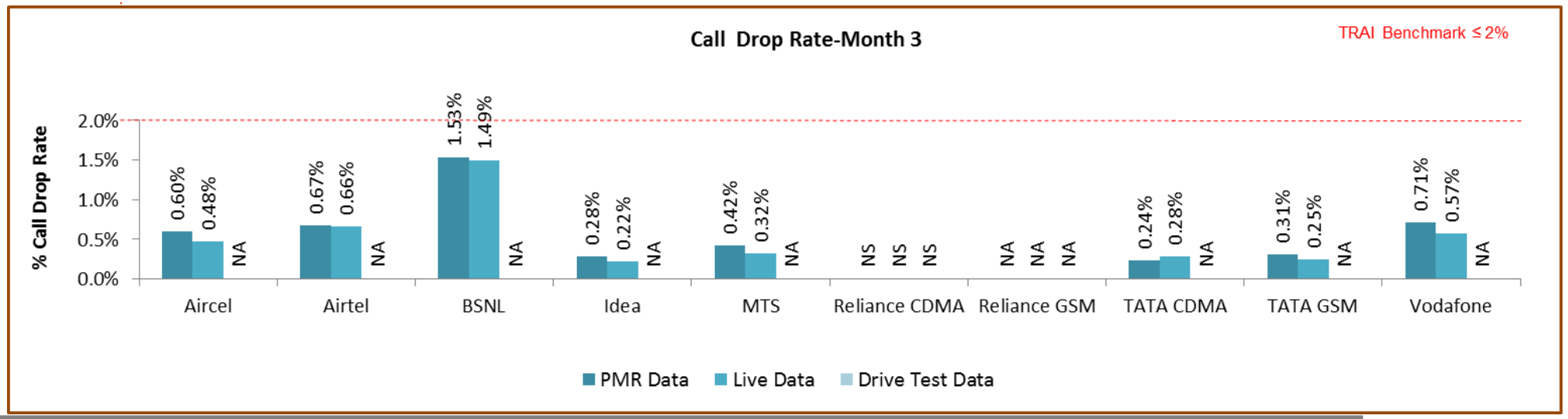
Data Source: Network Operations Center (NOC) of the operators

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 –**

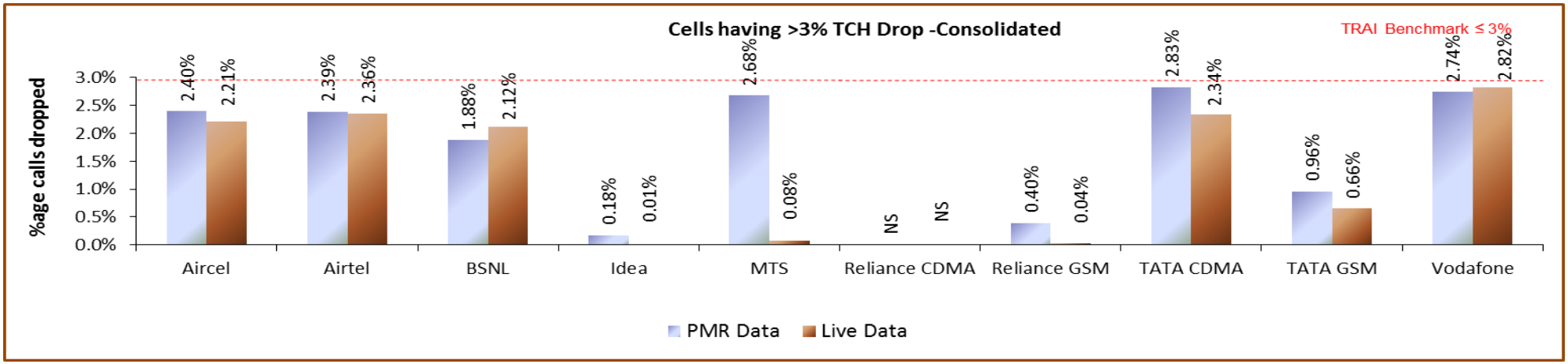
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

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.

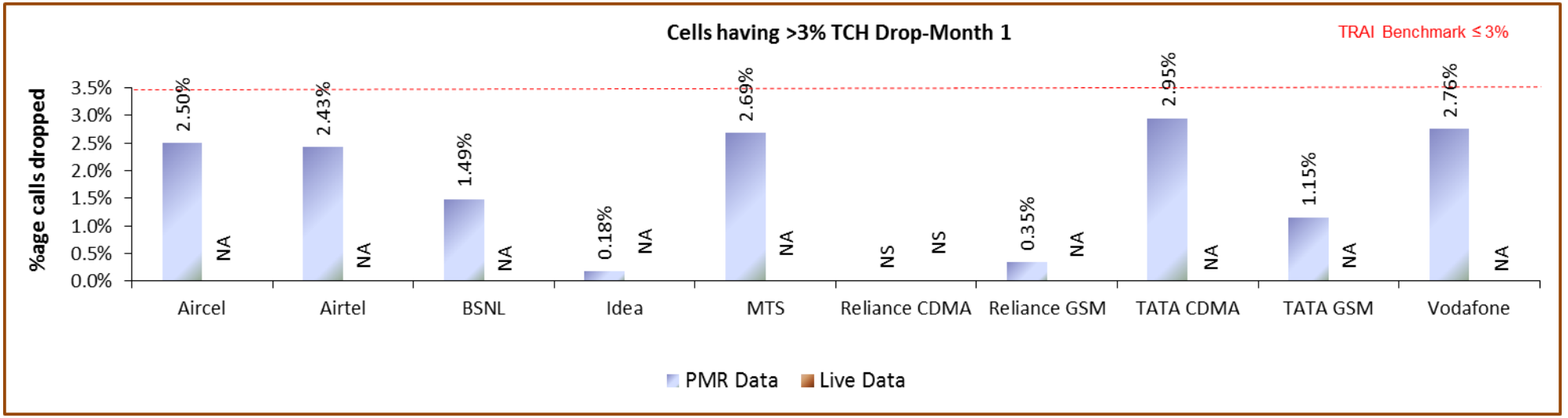
5.6.2 KEY FINDINGS - CONSOLIDATED



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

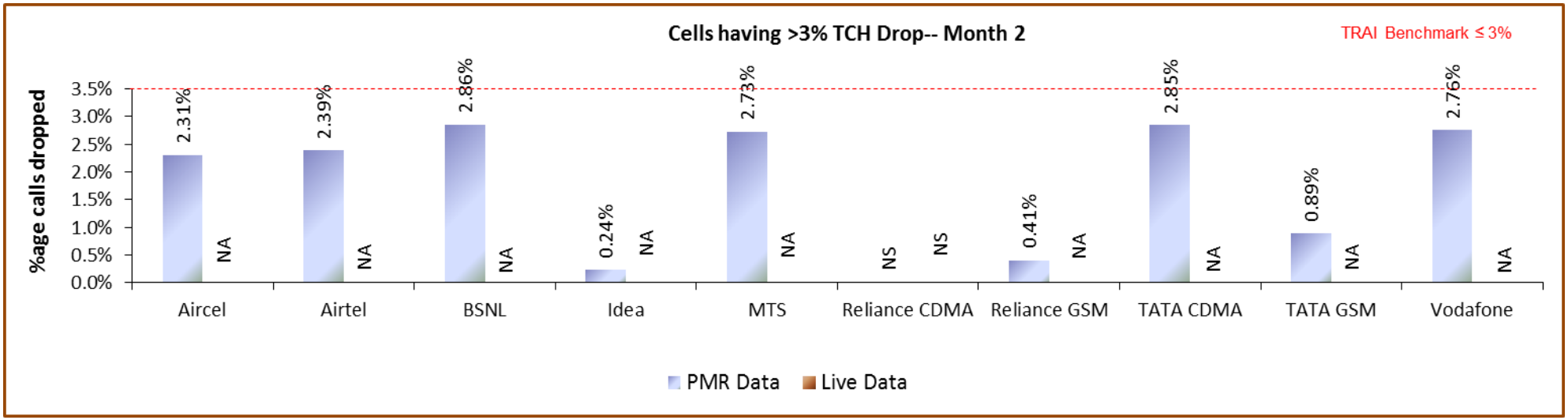
All operators met the benchmark.

5.6.2.1 KEY FINDINGS – MONTH 1



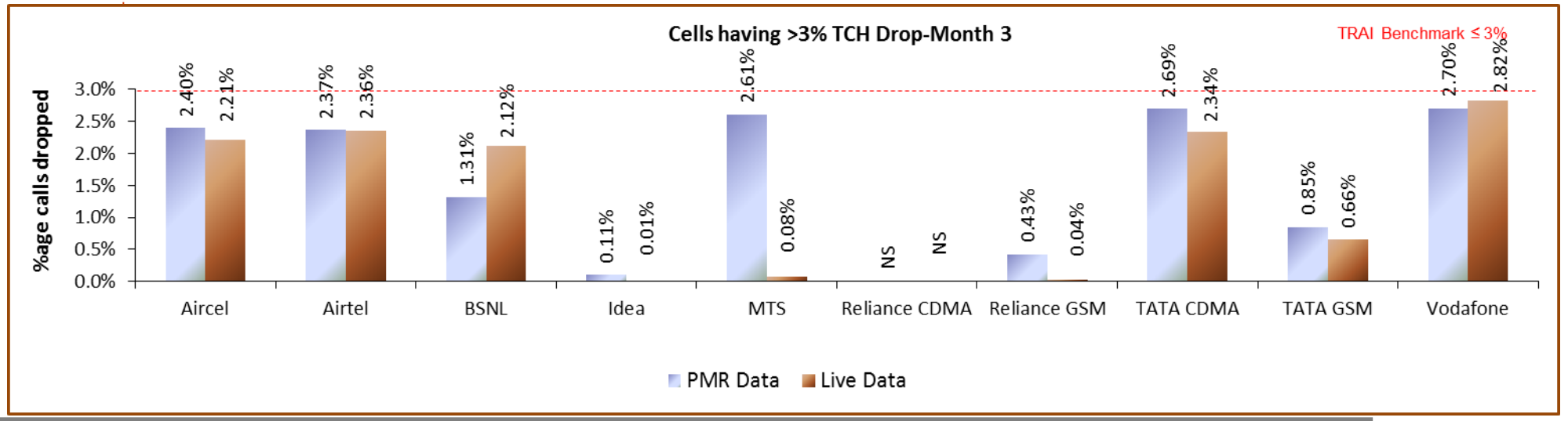
Data Source: Network Operations Center (NOC) of the operators

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**

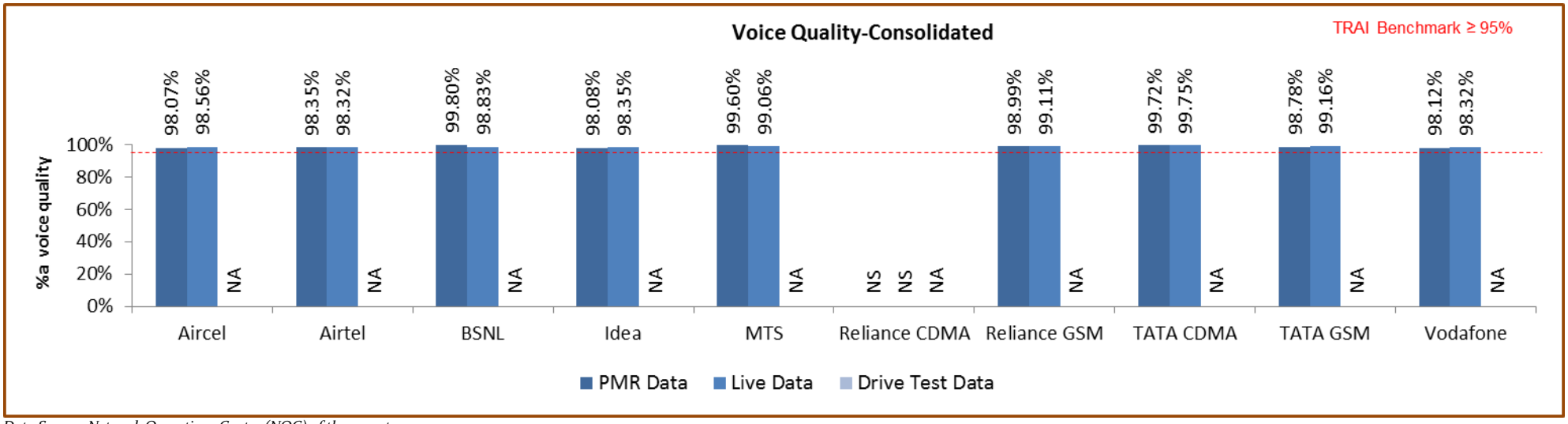
3. **TRAI Benchmark:** ≥ 95%

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.

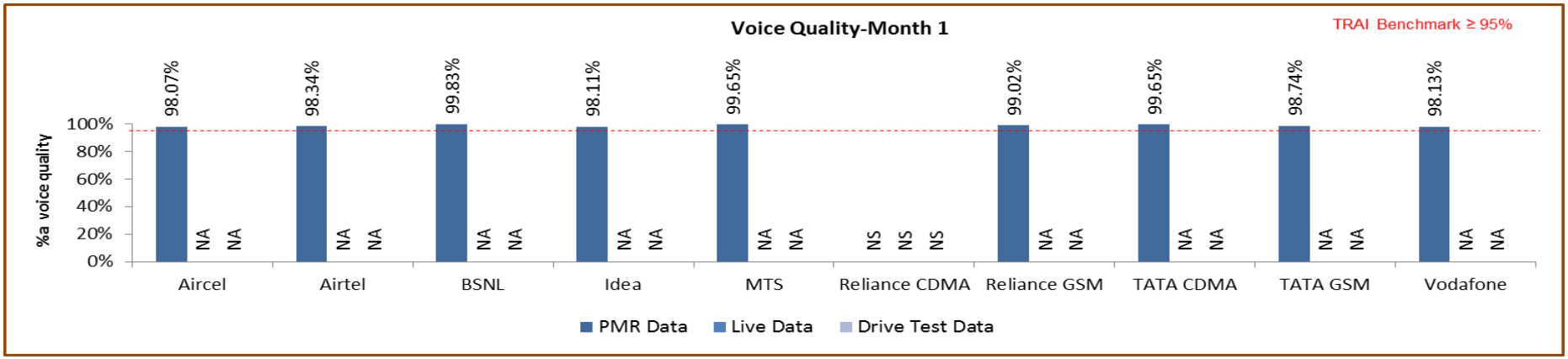
5.7.2 KEY FINDINGS



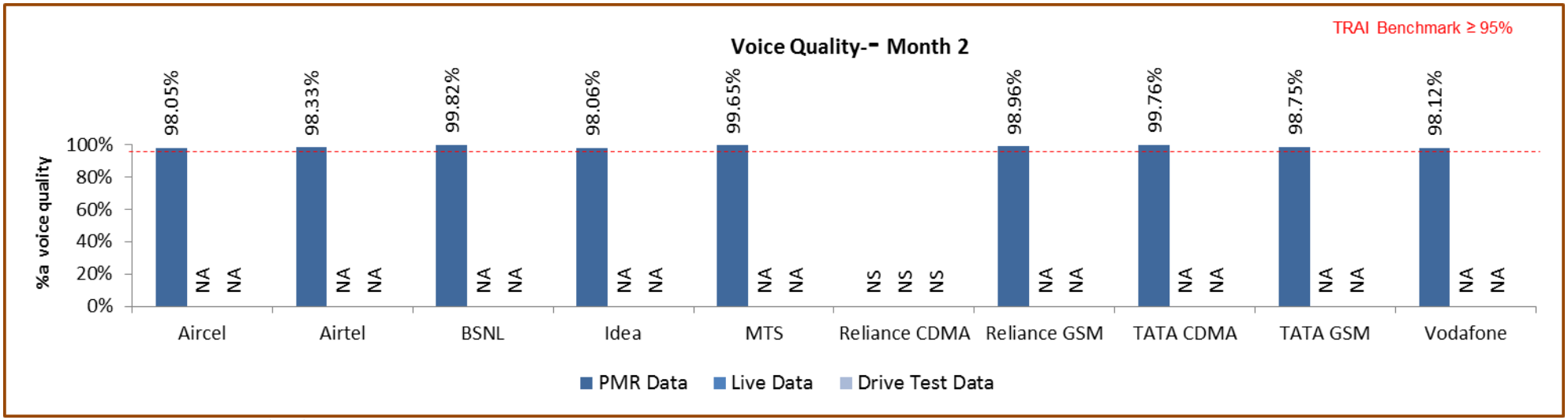
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for Voice quality as per PMR audit. During drive test Aircel, Reliance GSM failed to meet the TRAI benchmark for voice quality.

5.7.2.1 KEY FINDINGS – MONTH 1

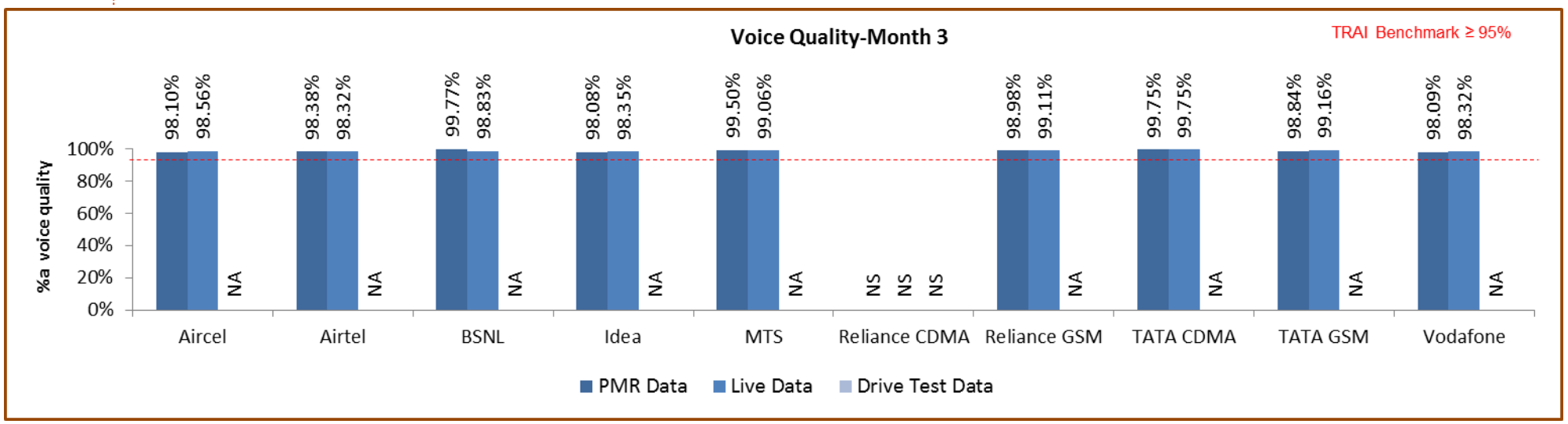


5.7.2.2 KEY FINDINGS – MONTH 2



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

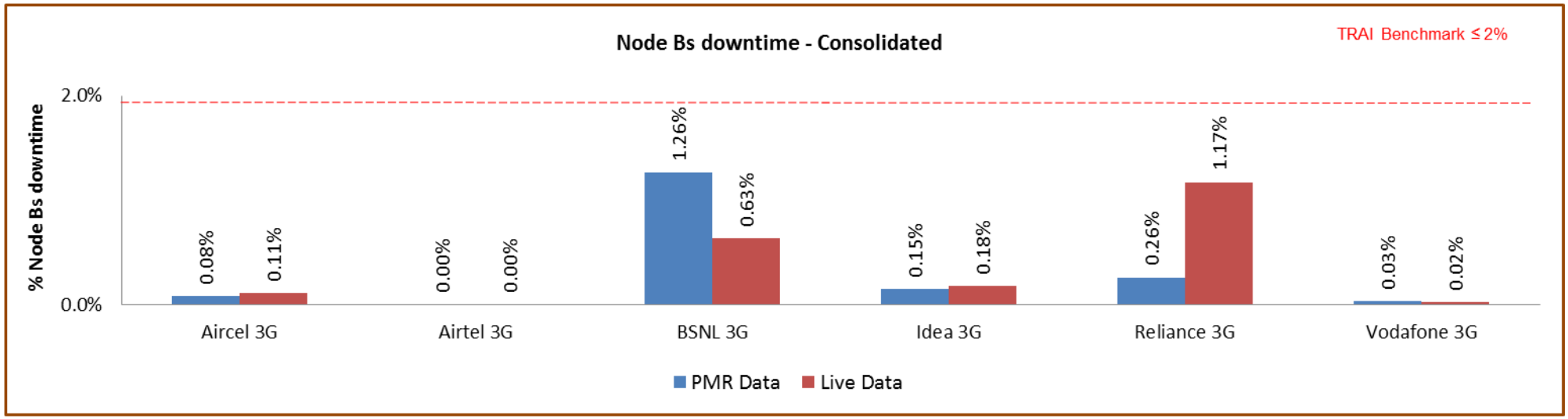
3. TRAI Benchmark –

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

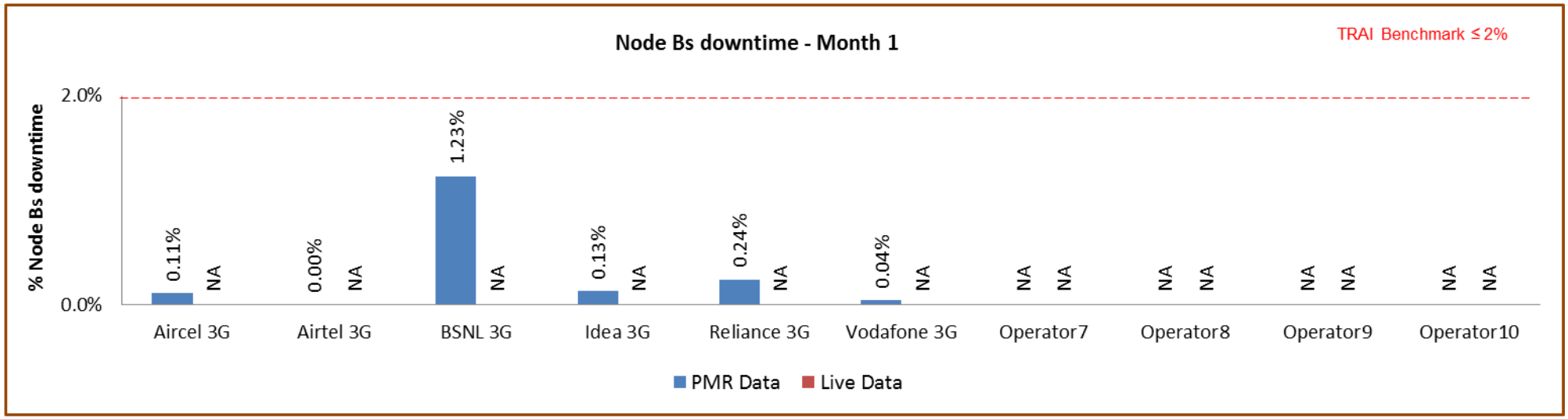


Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for Node Bs down time in PMR audit data, rest of the operators are meeting the benchmark.

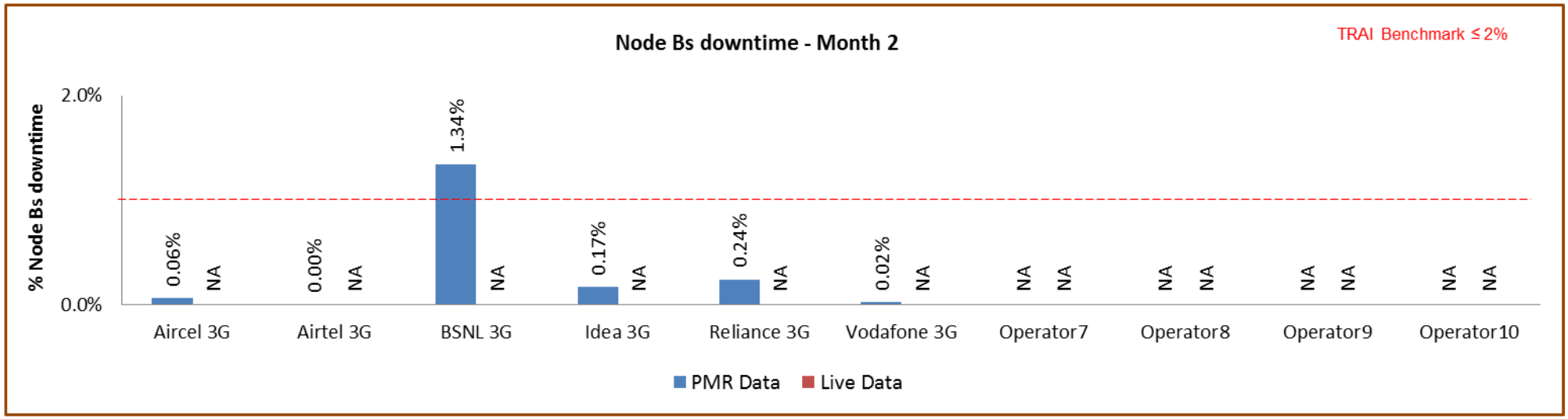
Significant difference was observed between PMR & live measurement data for BSNL 3G & Reliance 3G. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.1.2.1 KEY FINDINGS – MONTH 1



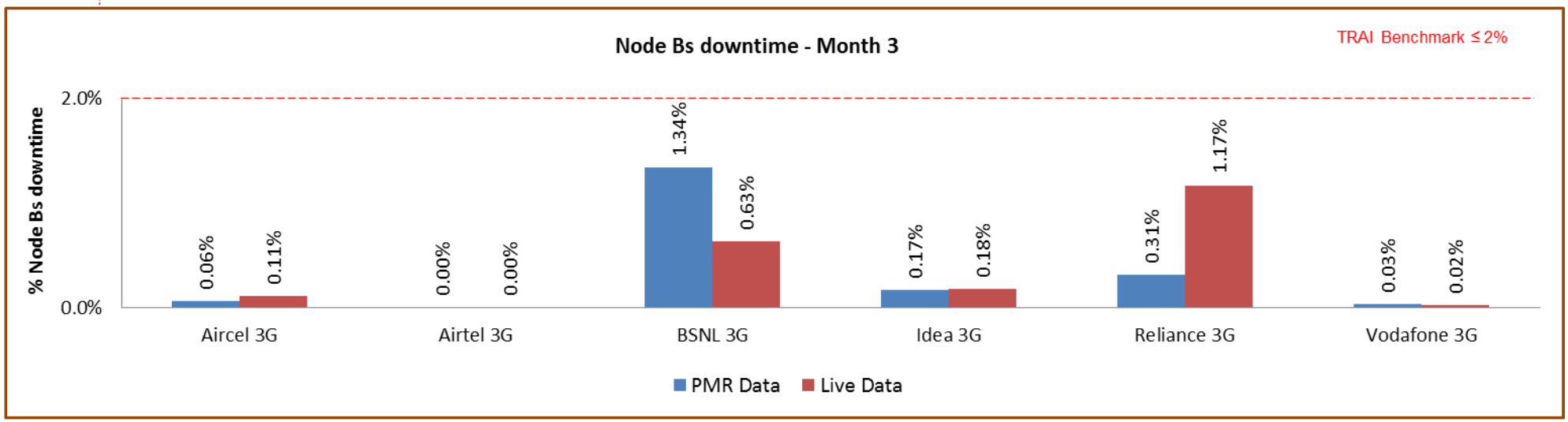
Data Source: Operations and Maintenance Center (OMC) of the operators

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.

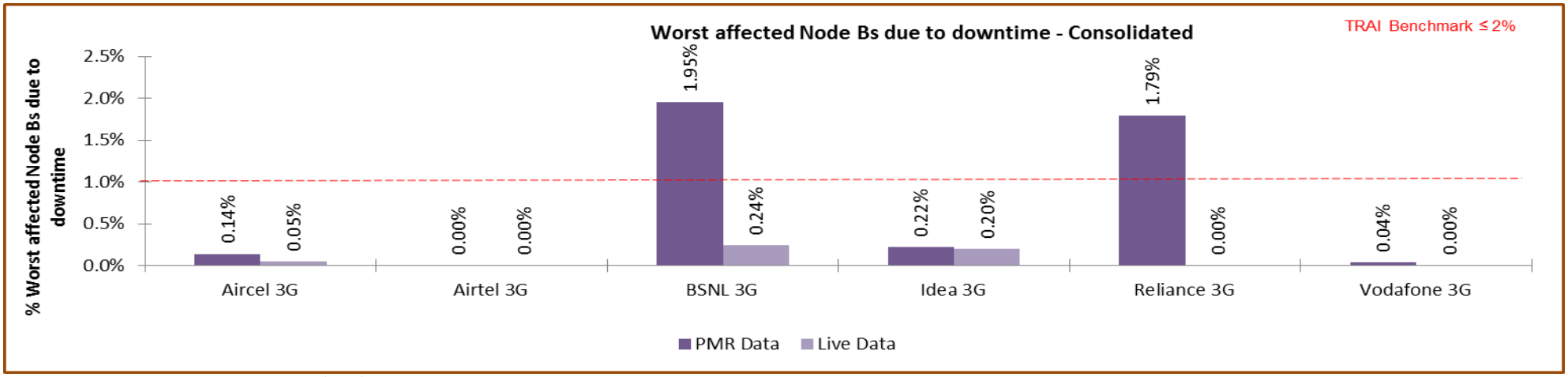
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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.

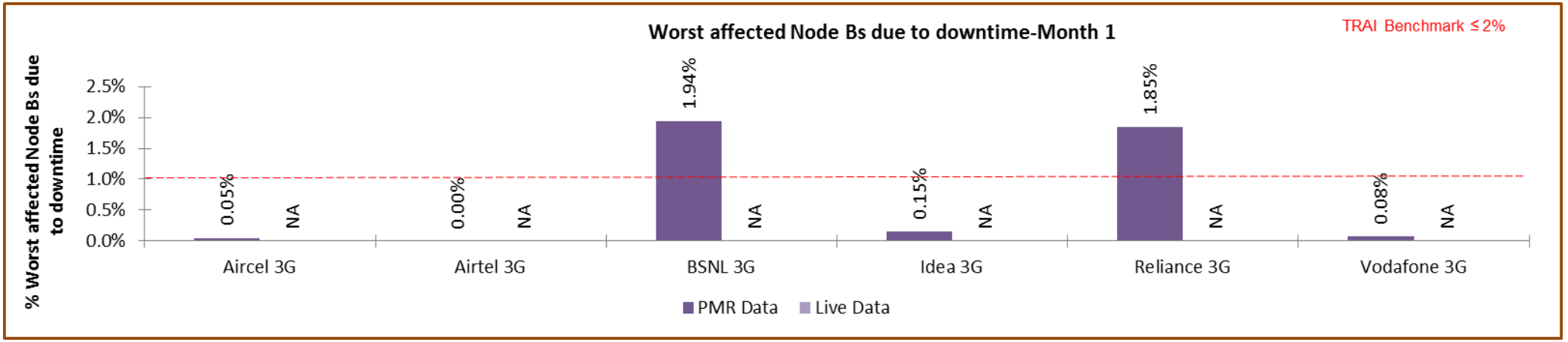
6.2.2 KEY FINDINGS – CONSOLIDATED



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

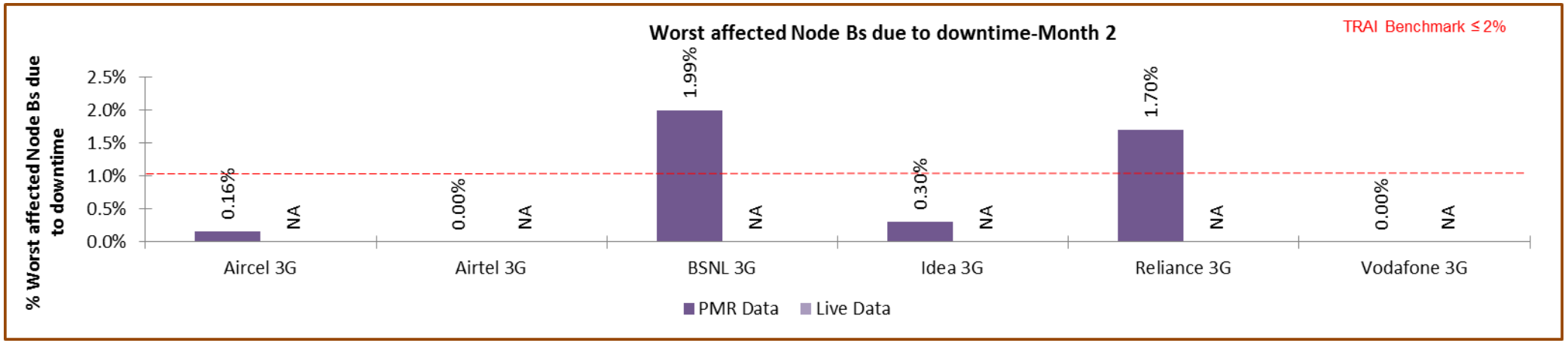
All operators except BSNL 3G and Reliance 3G met the benchmark for worst affected BTSs due to downtime as per audit/PMR data. Significant difference was observed between PMR & live measurement data for Reliance and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.2.2.1 KEY FINDINGS – MONTH 1



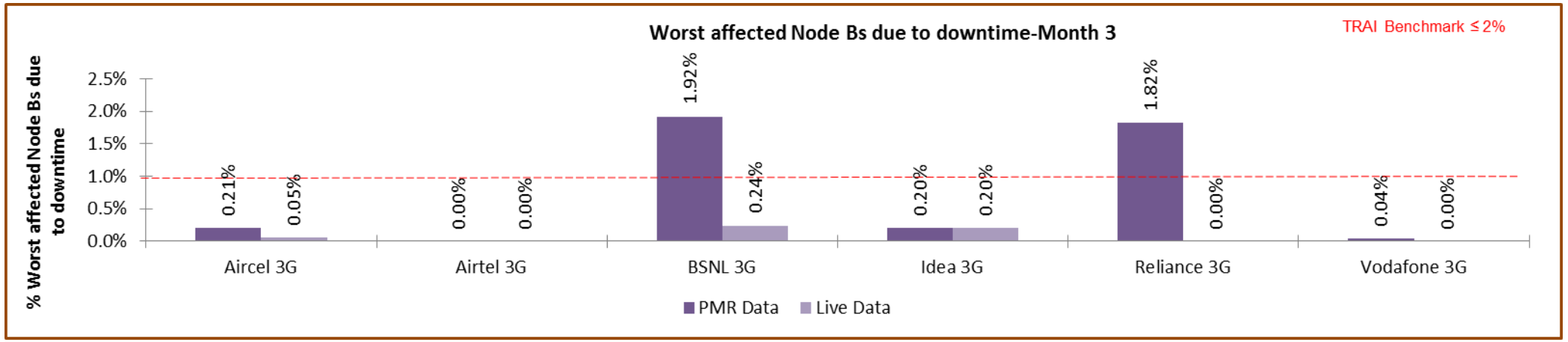
Data Source: Operations and Maintenance Center (OMC) of the operators

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

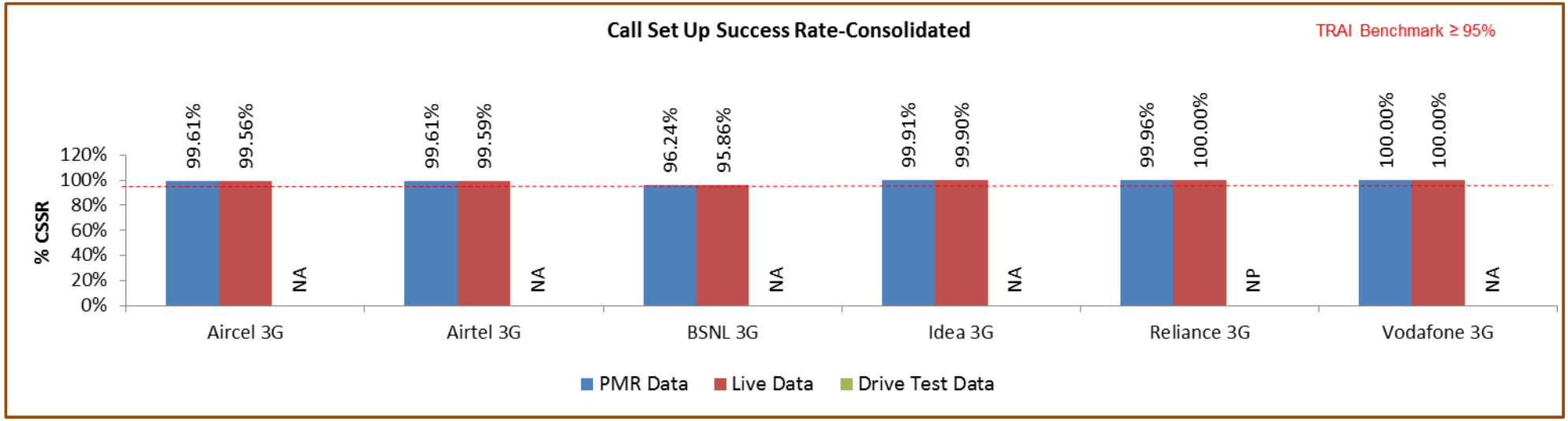
5. **TRAI Benchmark ≥** 95%

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.

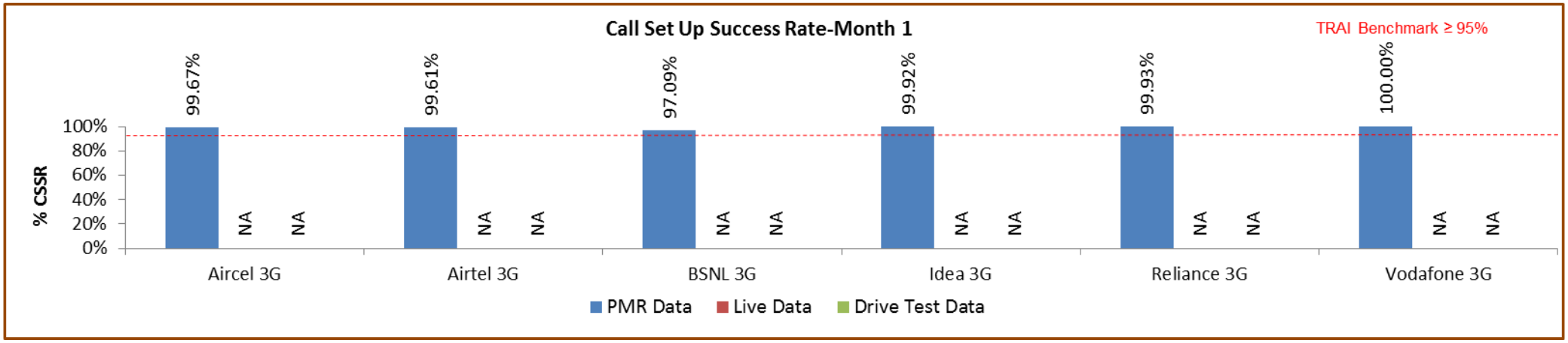
6.3.2 KEY FINDINGS - CONSOLIDATED



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

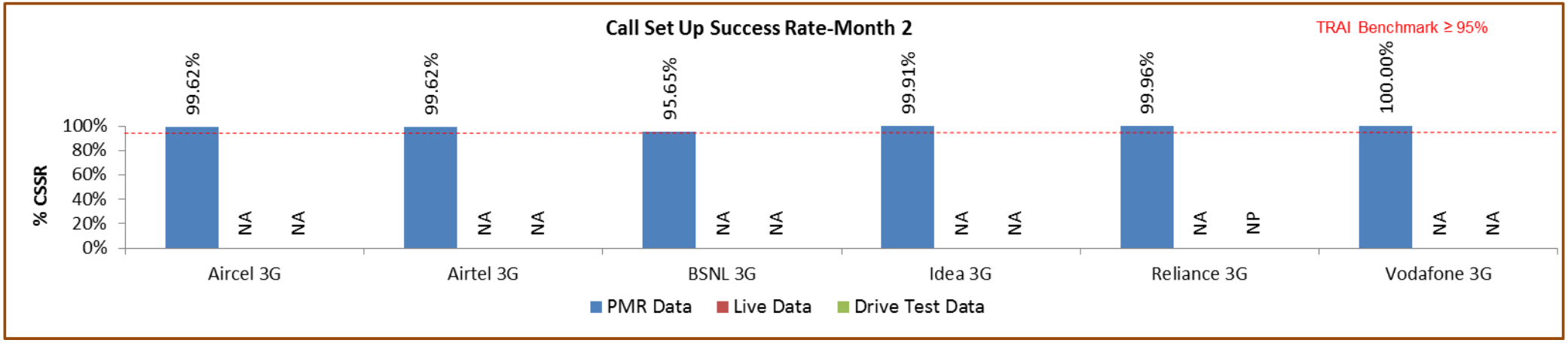
All operators met the TRAI benchmark as per audit/PMR data except BSNL 3G as per live audit and no drive test was conducted during the audit period.

6.3.2.1 KEY FINDINGS – MONTH 1



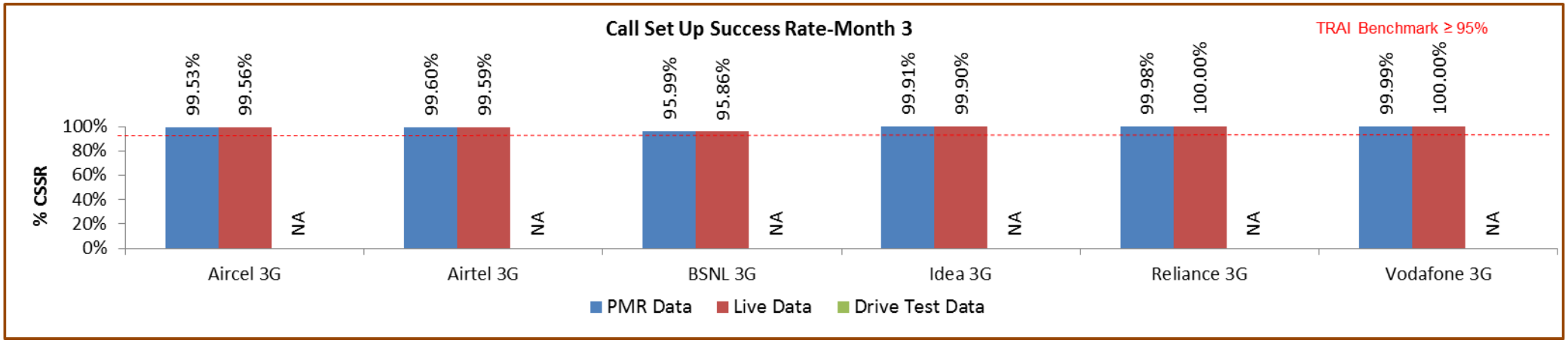
Data Source: Network Operations Center (NOC) of the operators

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

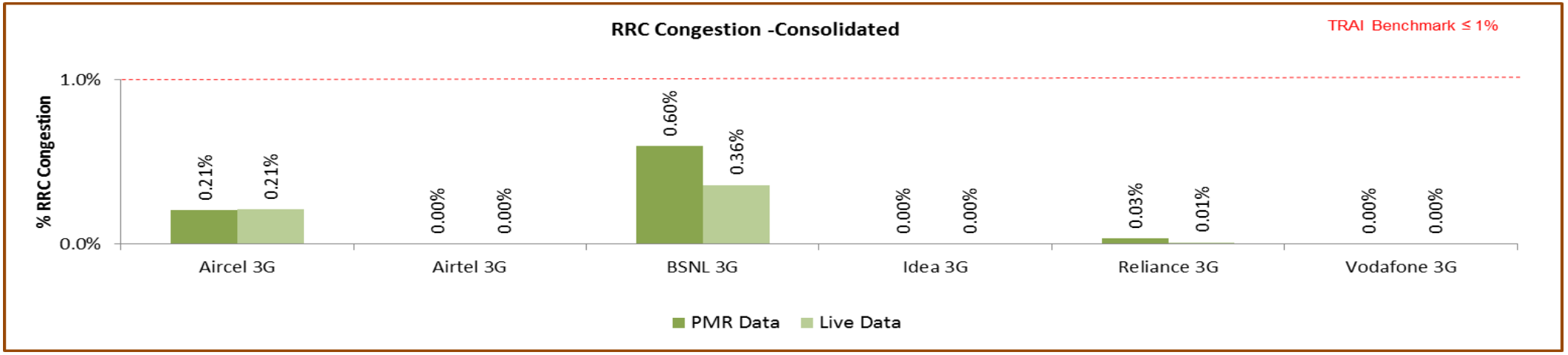
7. Benchmark:

- 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

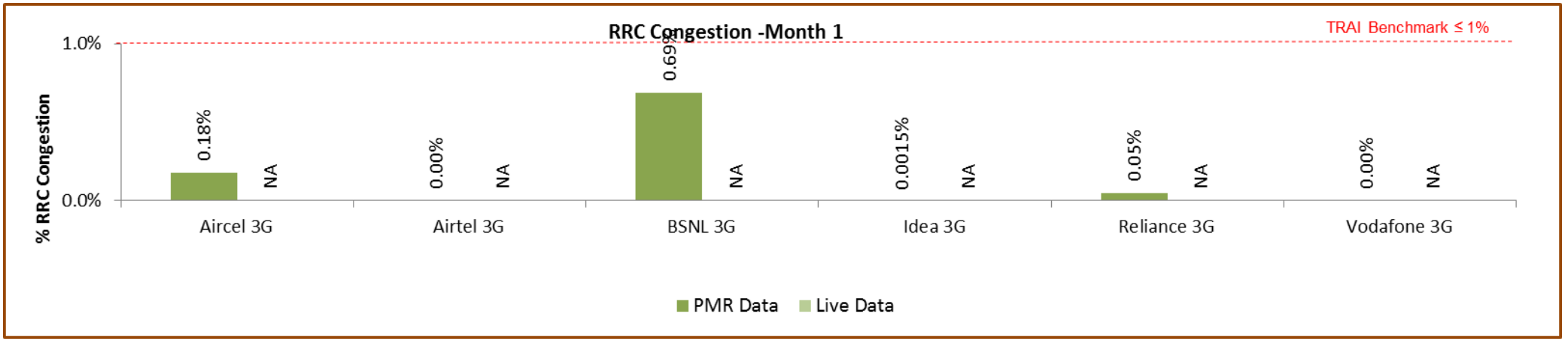
6.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



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

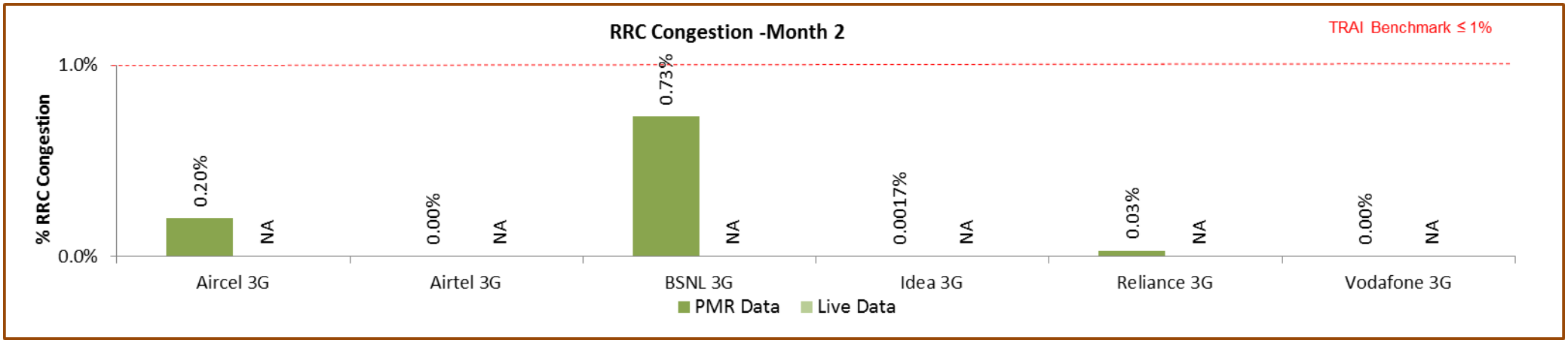
All operators met the benchmark for RRC Congestion with live data.

6.4.2.1 KEY FINDINGS – MONTH 1



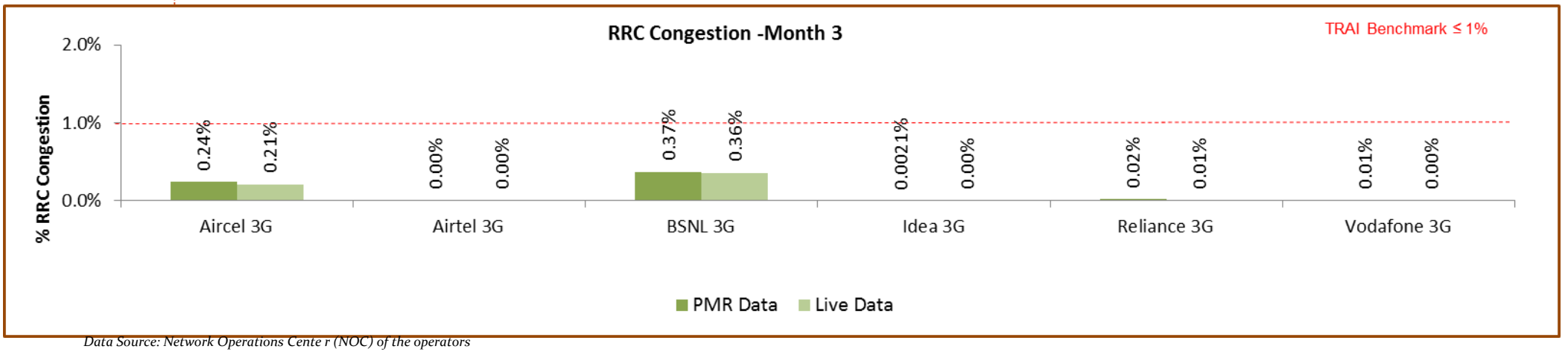
Data Source: Network Operations Center (NOC) of the operators

6.4.2.2 KEY FINDINGS – MONTH 2



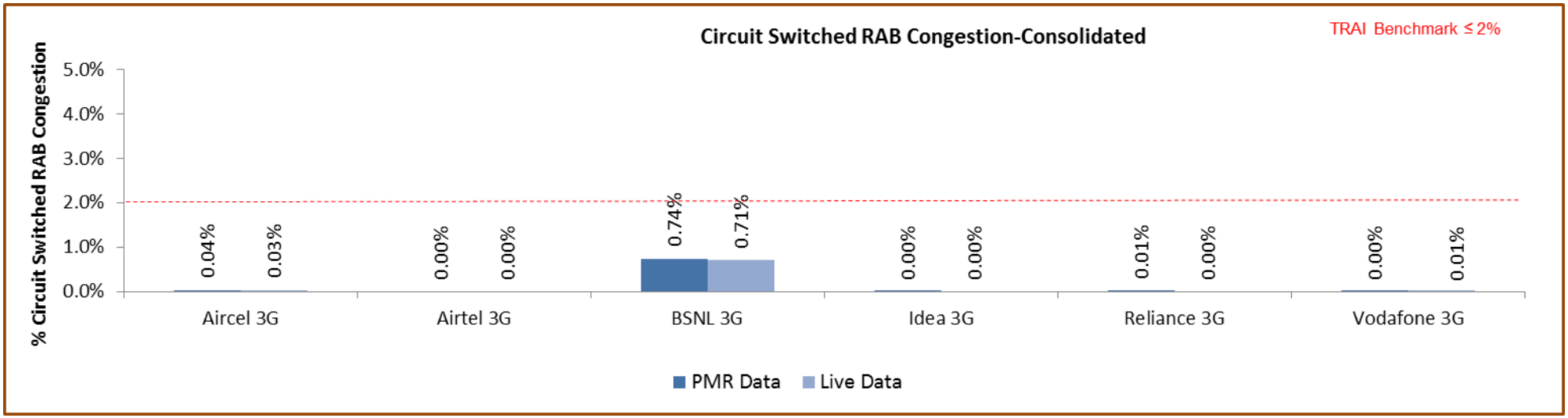
Data Source: Network Operations Center (NOC) of the operators

6.4.2.3 KEY FINDINGS – MONTH 3



Data Source: Network Operations Cente r (NOC) of the operators

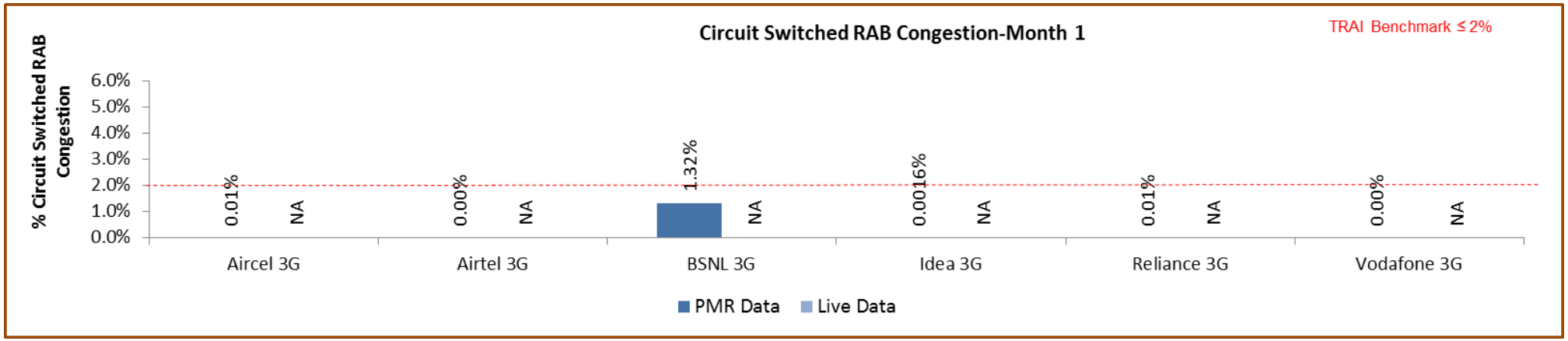
6.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)



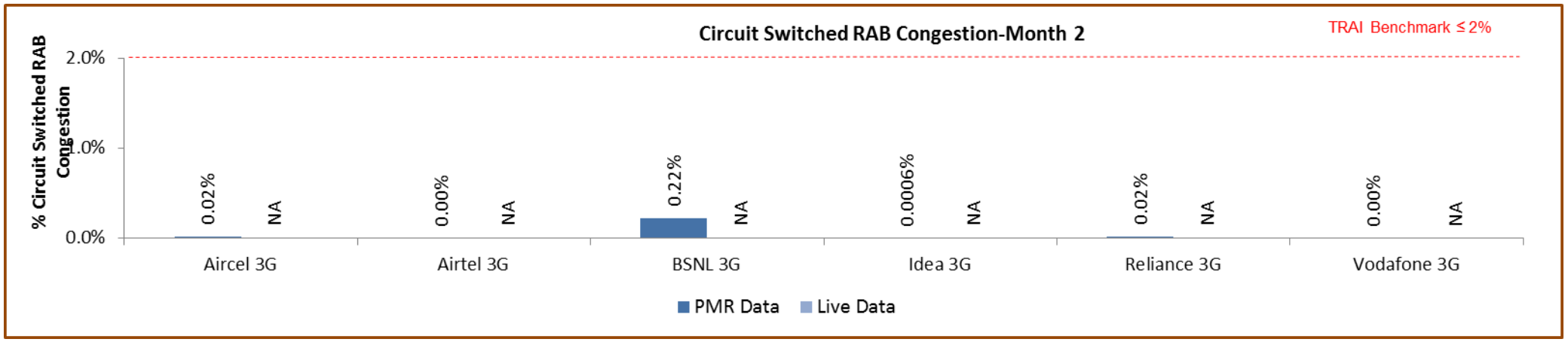
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark as per audit/PMR & 3days live report.

6.4.3.1 KEY FINDINGS – MONTH 1

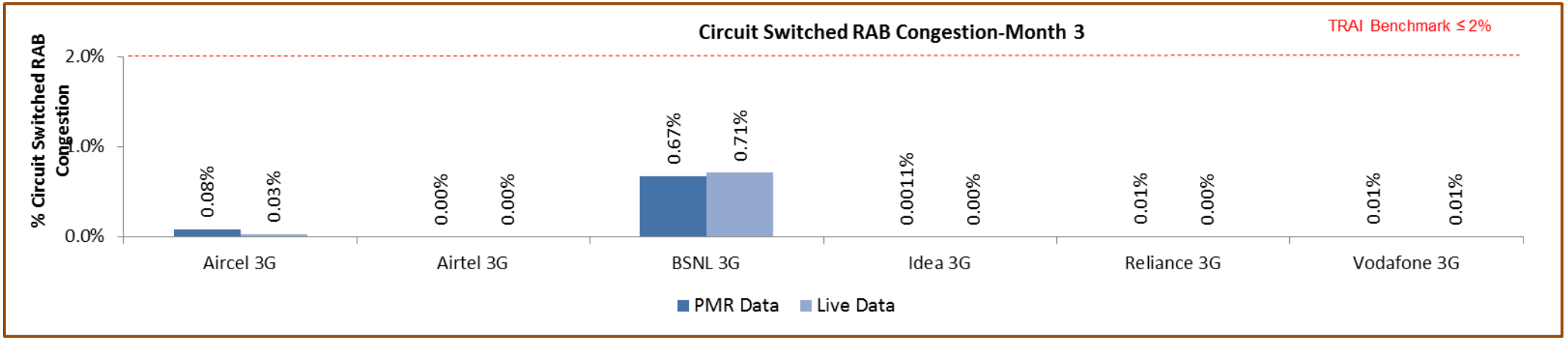


6.4.3.2 KEY FINDINGS – MONTH 2



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

6.5 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 –**

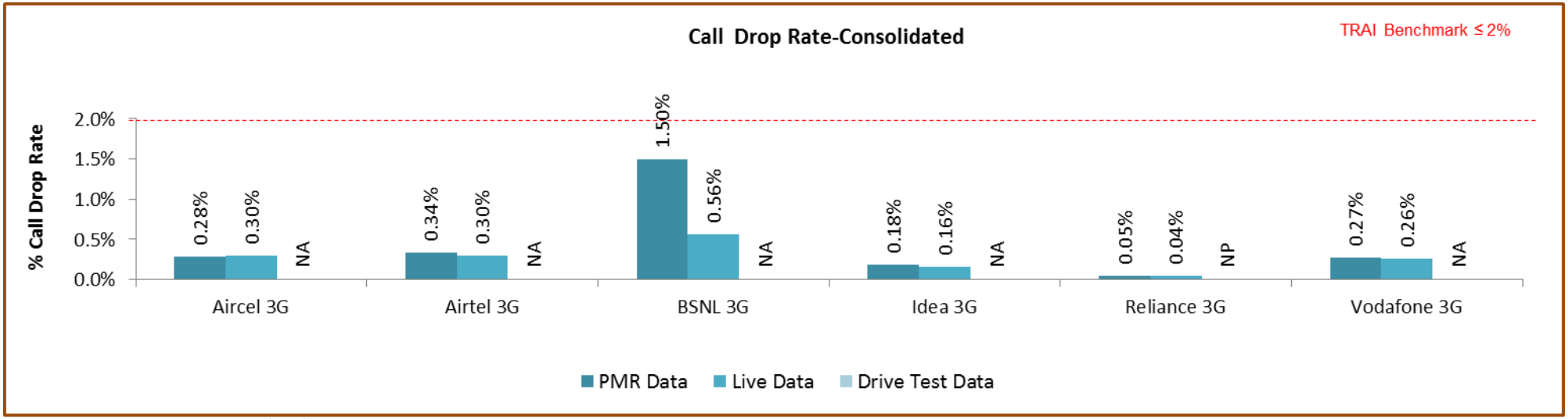
   - Circuit switched voice drop rate ≤ 2%

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

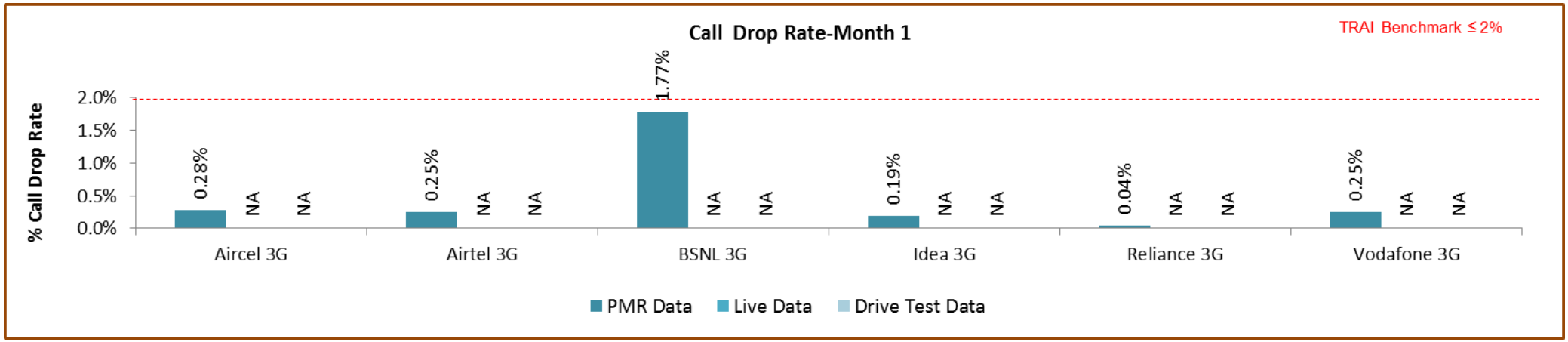


Data Source: Network Operations Center (NOC) of the operators

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

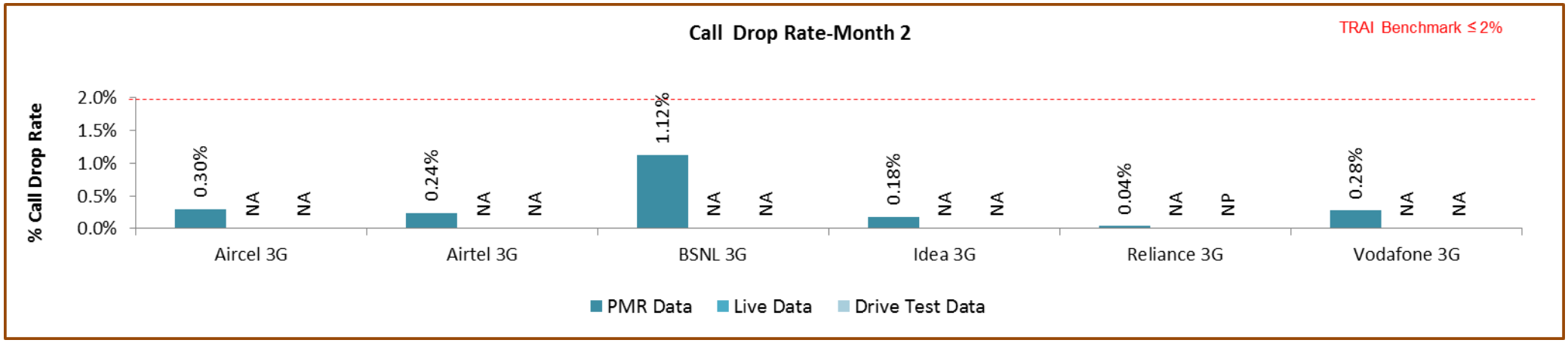
Significant difference was observed between PMR & live measurement data for BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.5.2.1 KEY FINDINGS – MONTH 1



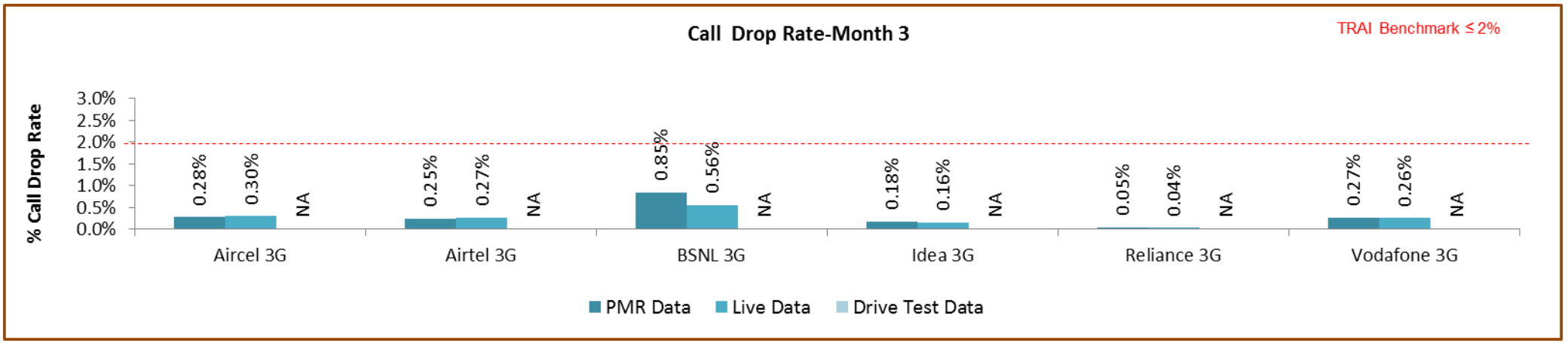
Data Source: Network Operations Center (NOC) of the operators

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 –

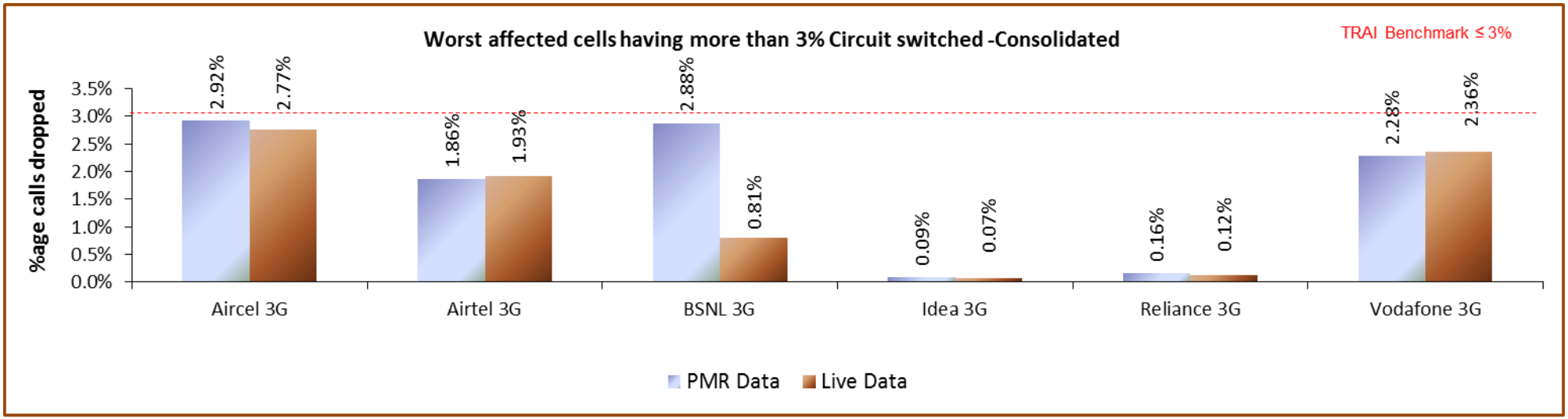
- Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

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

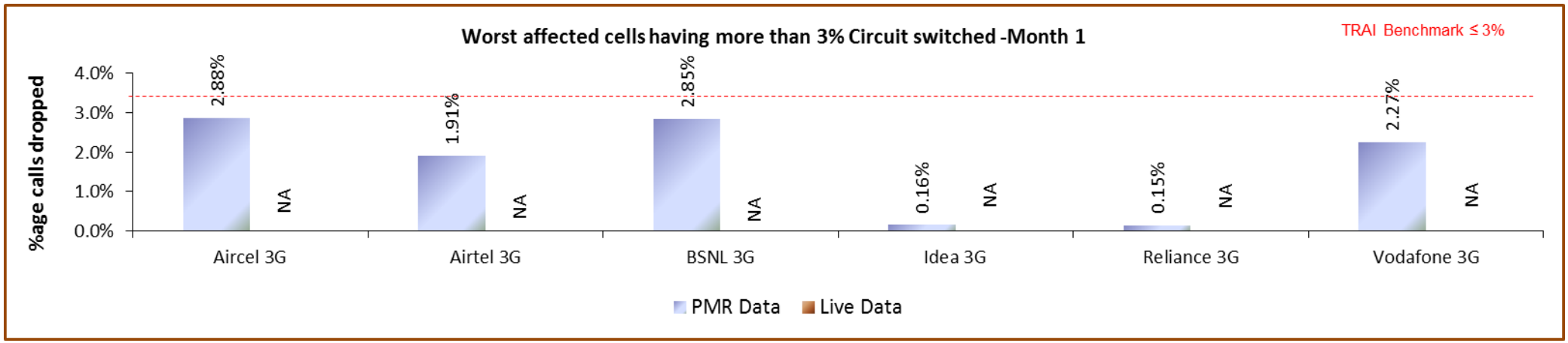


Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark during audit PMR/live.

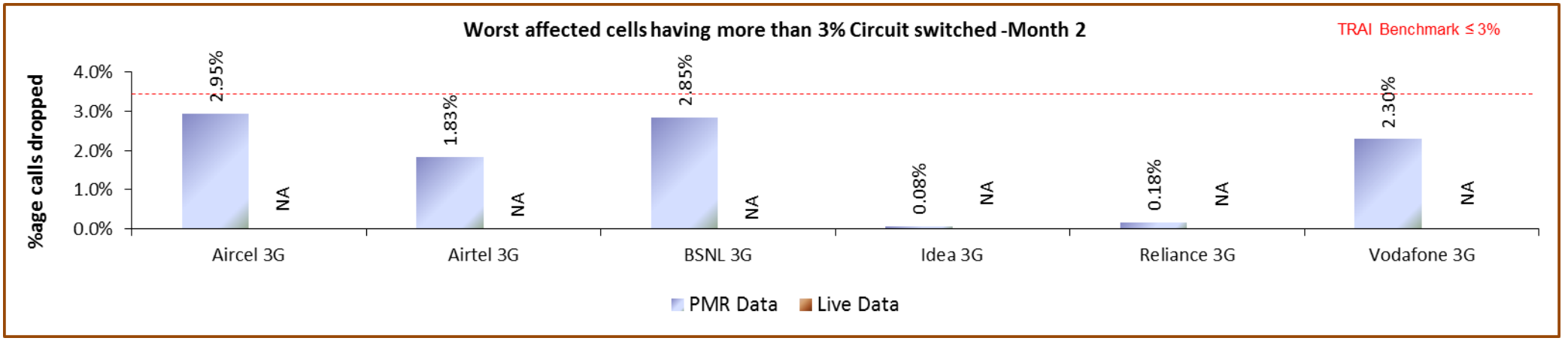
Significant difference was observed between PMR & live measurement data for BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.6.2.1 KEY FINDINGS – MONTH 1



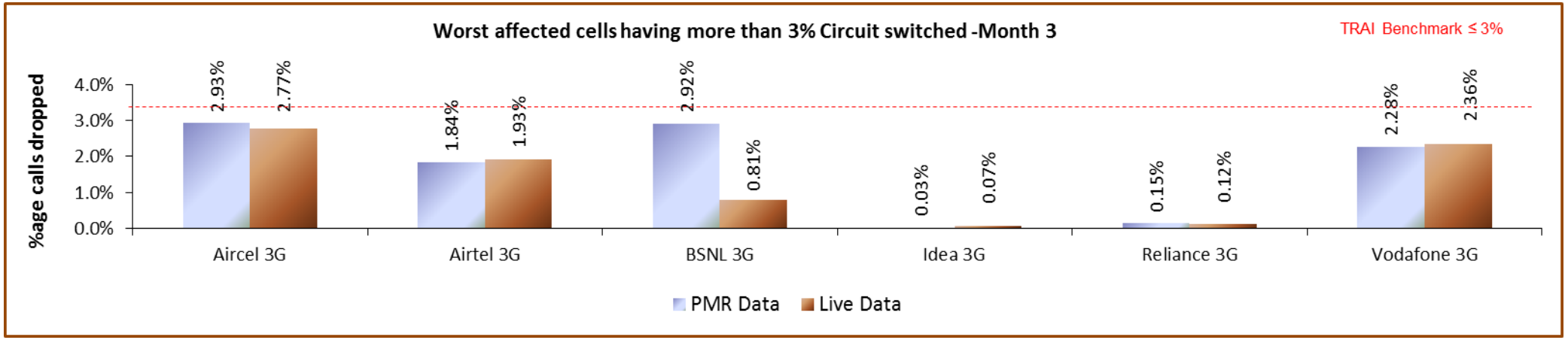
Data Source: Network Operations Center (NOC) of the operators

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**

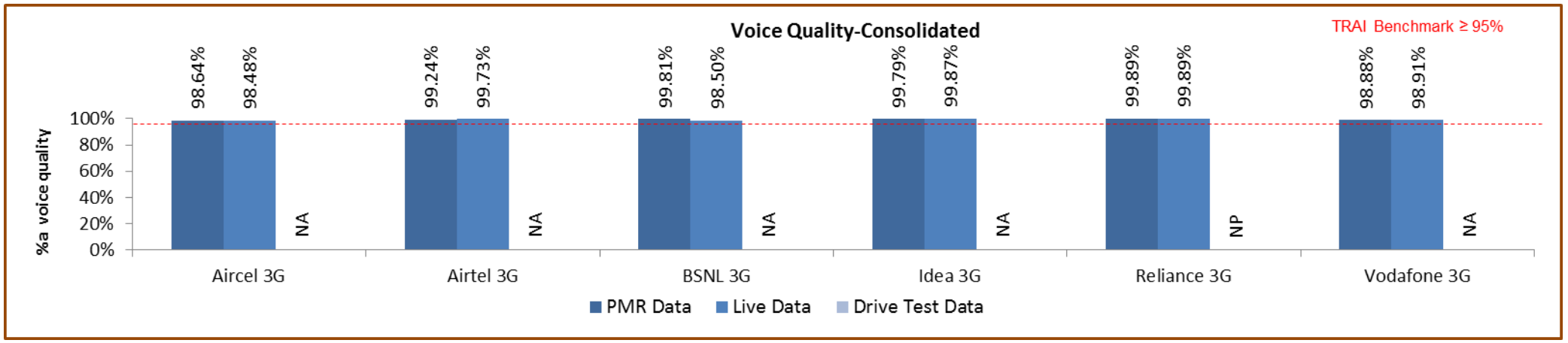
7. **TRAI Benchmark:** ≥ 95%

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.

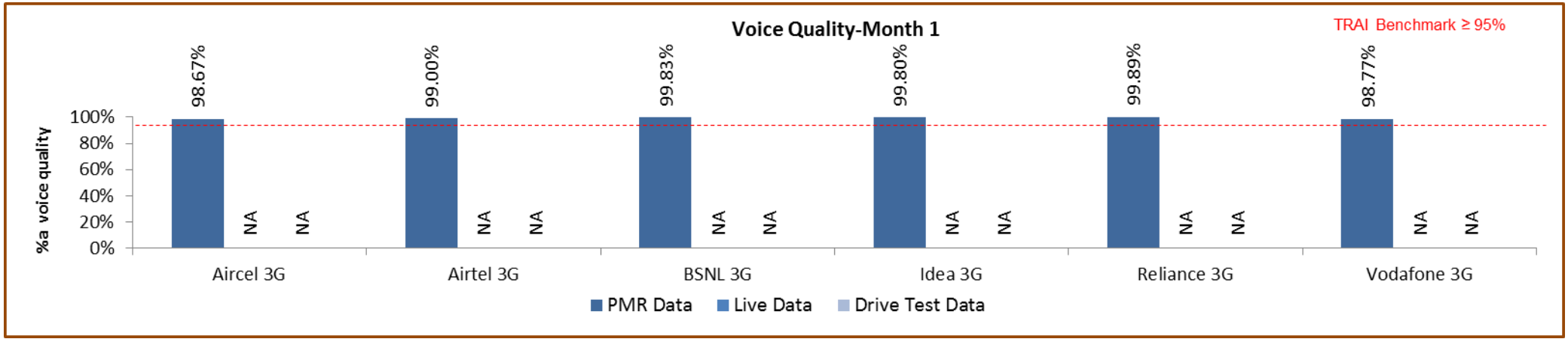
6.7.2 KEY FINDINGS



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

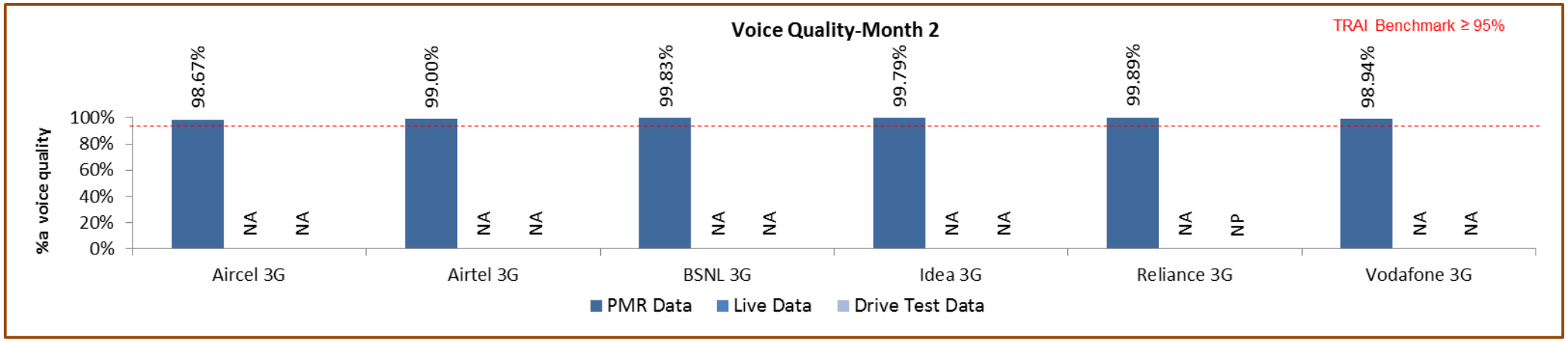
All operators met the benchmark for voice quality. No drive test was conducted during the audit period for the given LSA.

6.7.2.1 KEY FINDINGS – MONTH 1



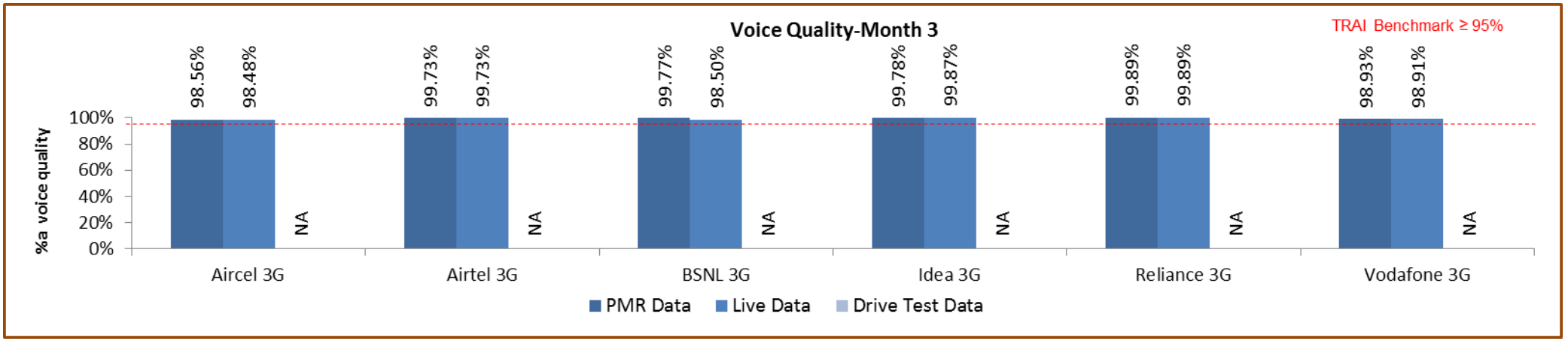
Data Source: Network Operations Center (NOC) of the operators

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

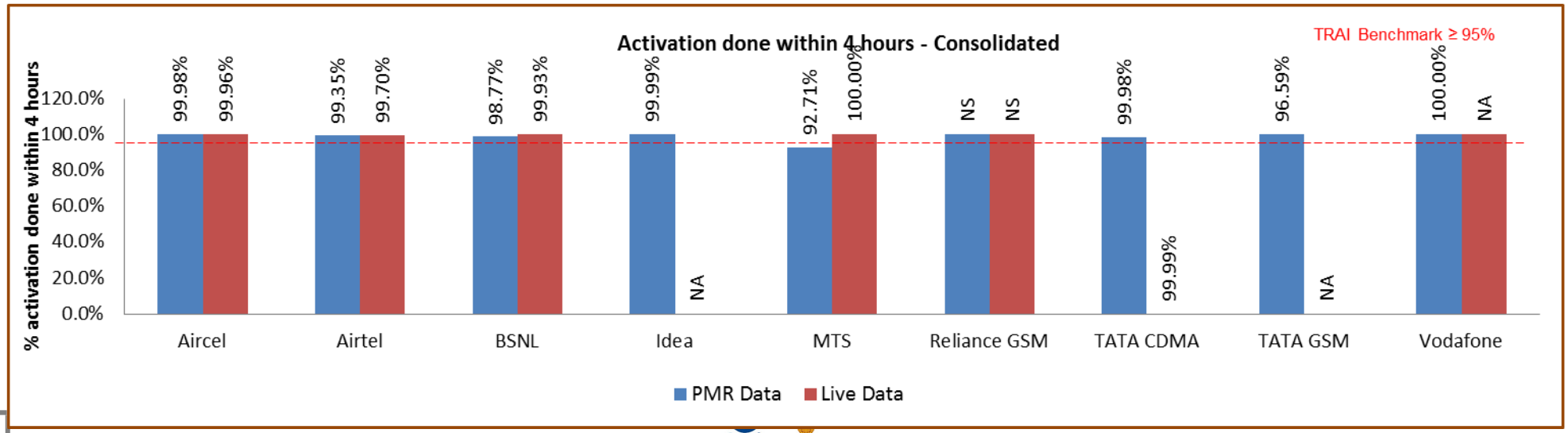
7 PARAMETER DESCRIPTION & DETAILED FINDINGS - WIRELESS DATA SERVICES 2G

7.1 SERVICE ACTIVATION /PROVISIONING FOR 2G

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.

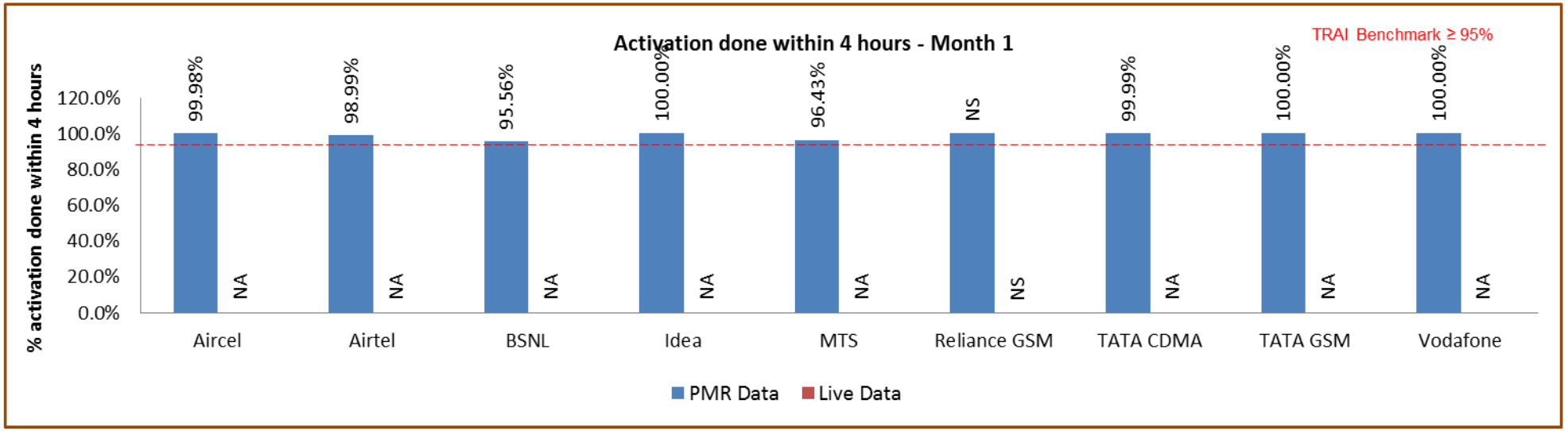
% activation done within 4 hours = Total Time Taken for Activation ×100
Total request time made



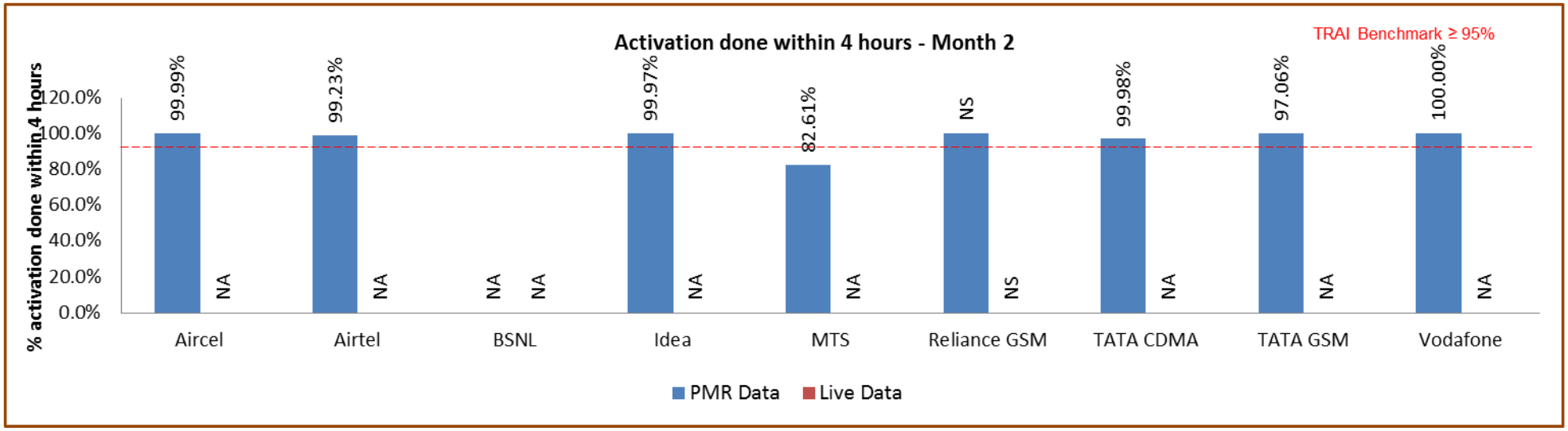
All operators met the benchmark for PMR as well as live audit except MTS for PMR.

Significant difference was observed between PMR & live measurement data for TATA CDMA 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.

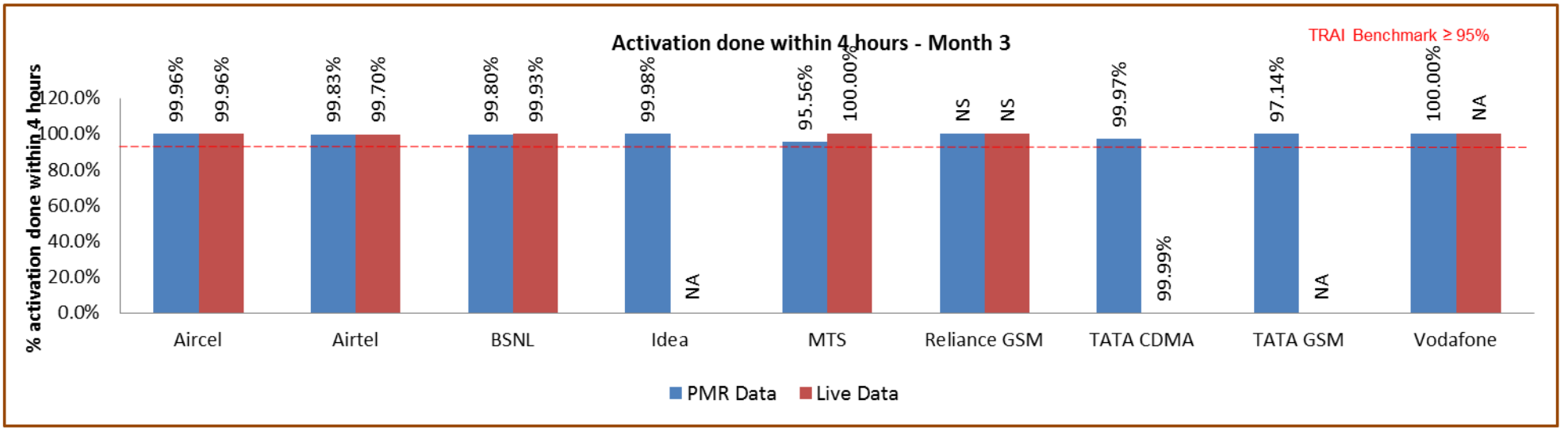
7.1.1.1 KEY FINDINGS – MONTH 1



7.1.1.2 KEY FINDINGS – MONTH 2



7.1.1.3 KEY FINDINGS – MONTH 3



7.2 PDP CONTEXT ACTIVATION SUCCESS RATE FOR 2G

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

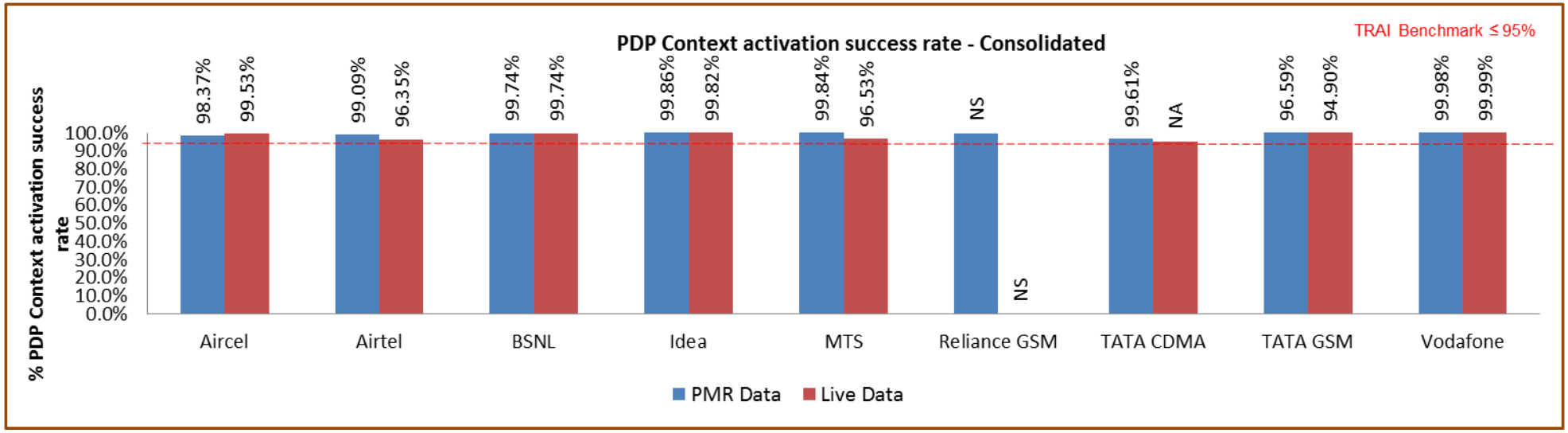
This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully and a report of PDP context activation success is generated at GGSN.

PDP Context Activation Success Rate (%) =

Number of successfully completed PDP context activations ×100

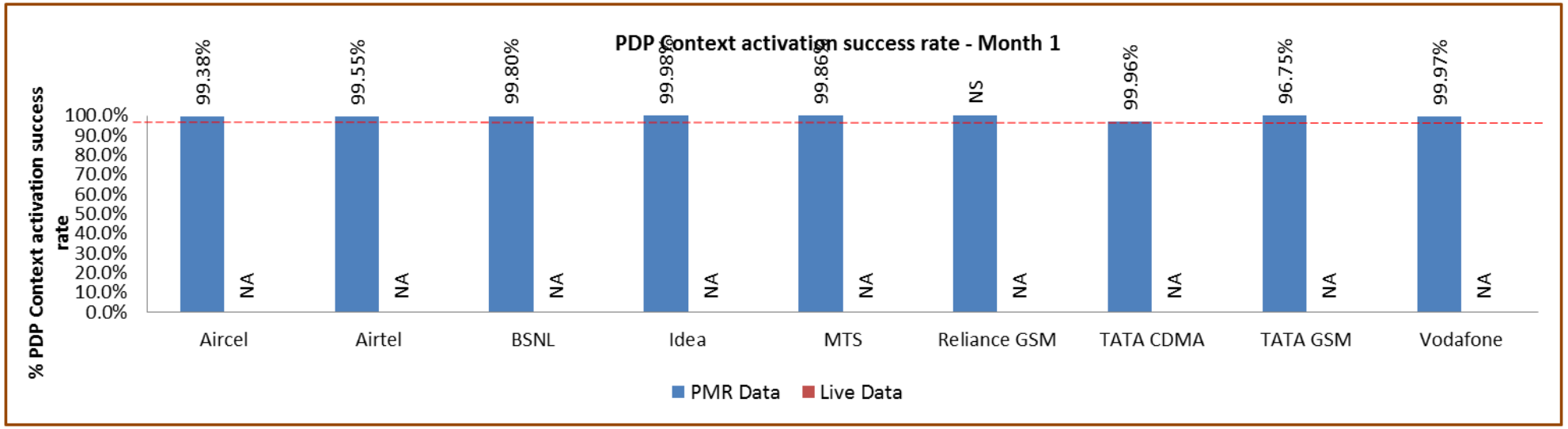
Total attempts of context activation

7.2.2 KEY FINDINGS

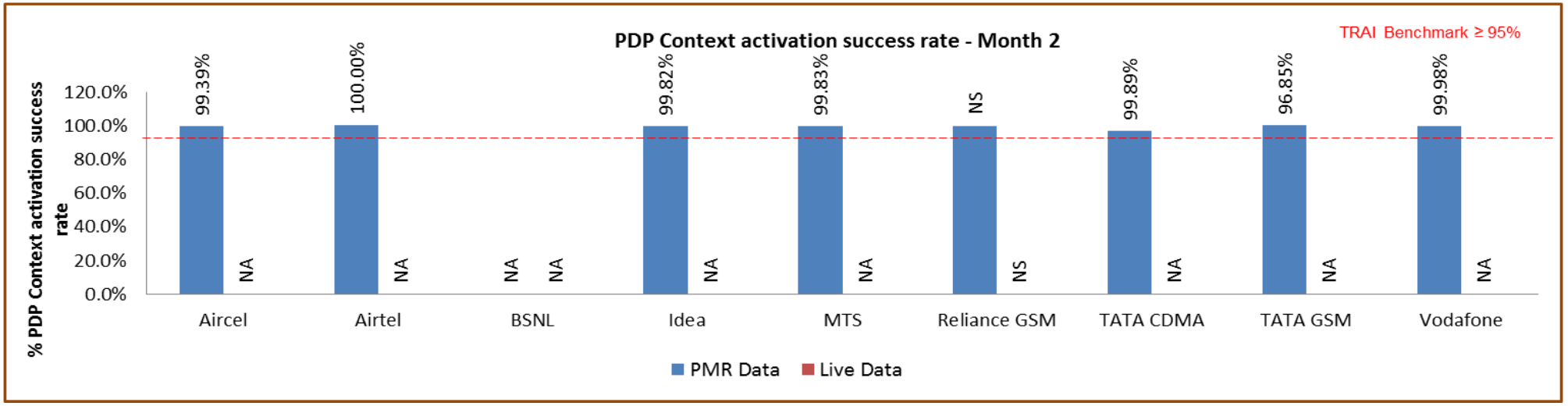


All operators met the benchmark for PMR as well as live audit

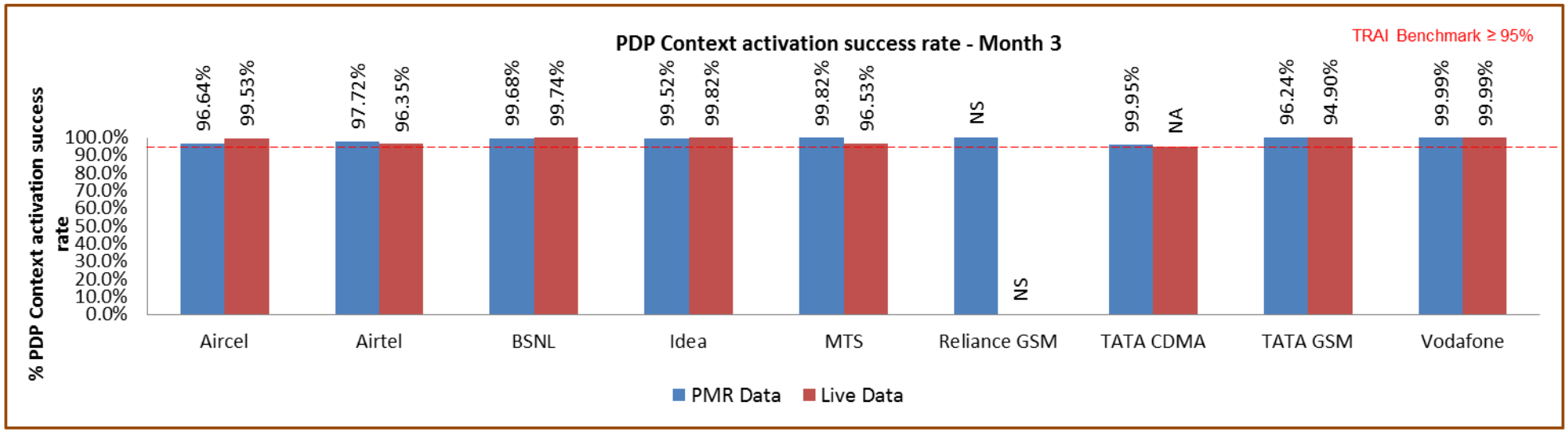
7.2.2.1 KEY FINDINGS – MONTH 1



7.2.2.2 KEY FINDINGS – MONTH 2



7.2.2.3 KEY FINDINGS – MONTH 3



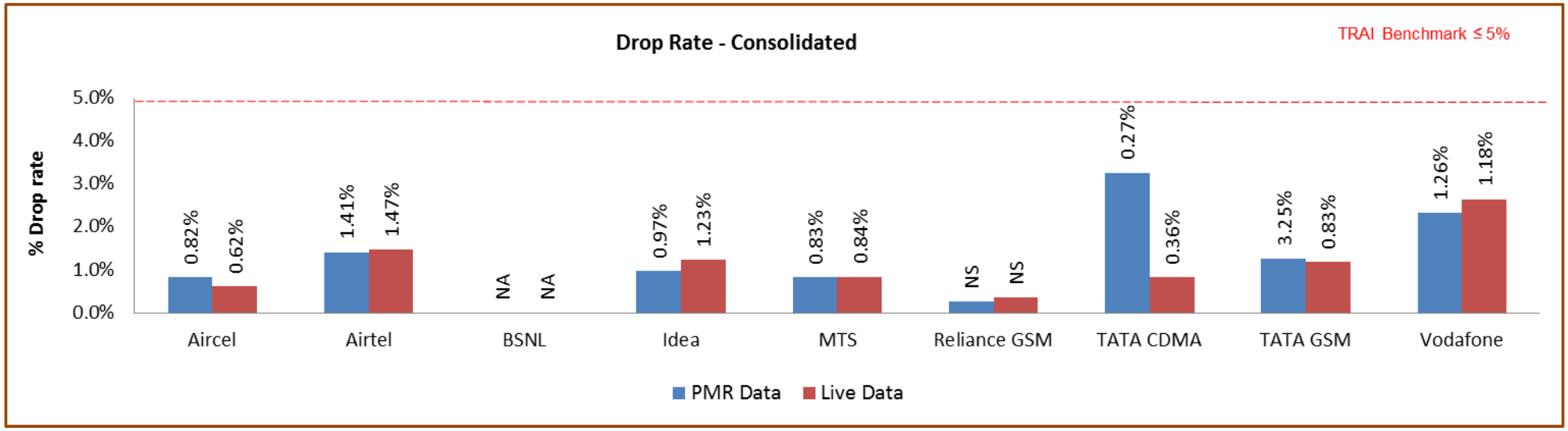
7.3 DROP RATE FOR 2G

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.

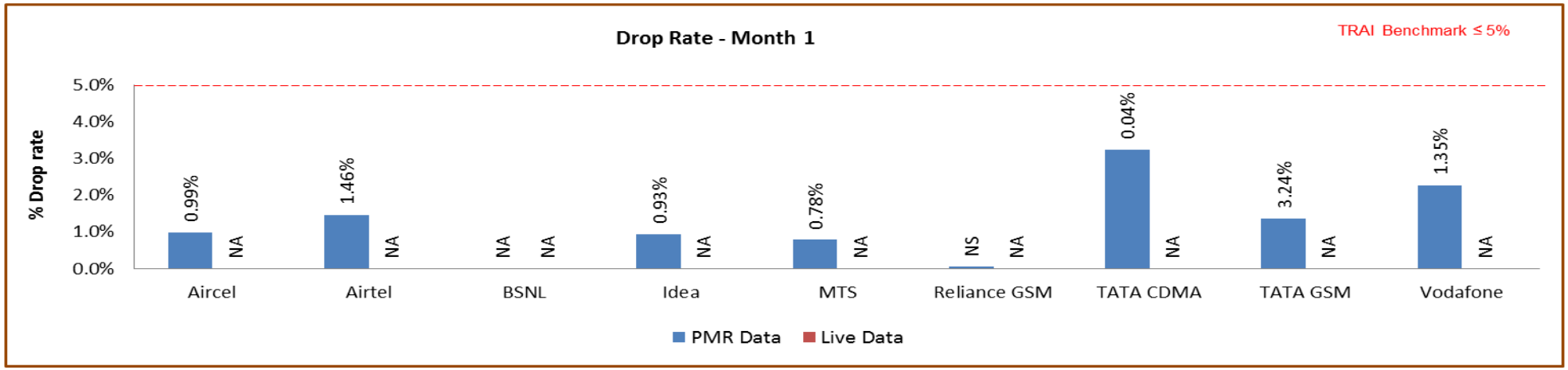
$$\textbf{Drop rate} = \frac{\text{No. of Dropped data Calls}}{\text{No. of Successful data calls}} \times 100$$

7.3.2 KEY FINDINGS

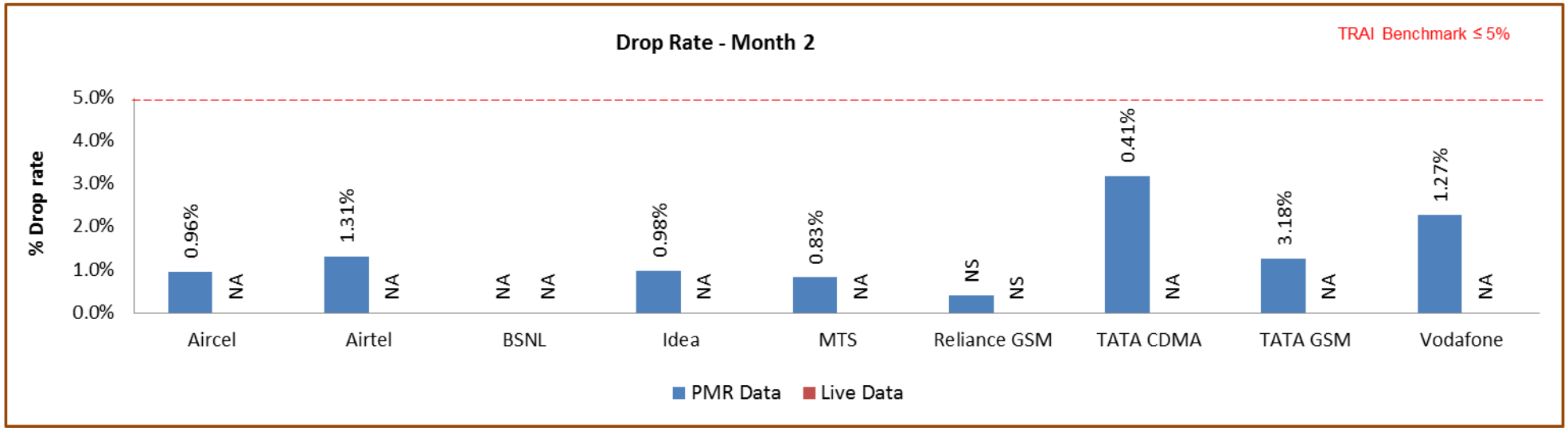


All operators met the benchmark for PMR as well as live audit. Note: BSNL did not submit the data for % Drop Rate for both PMR and Live audit .

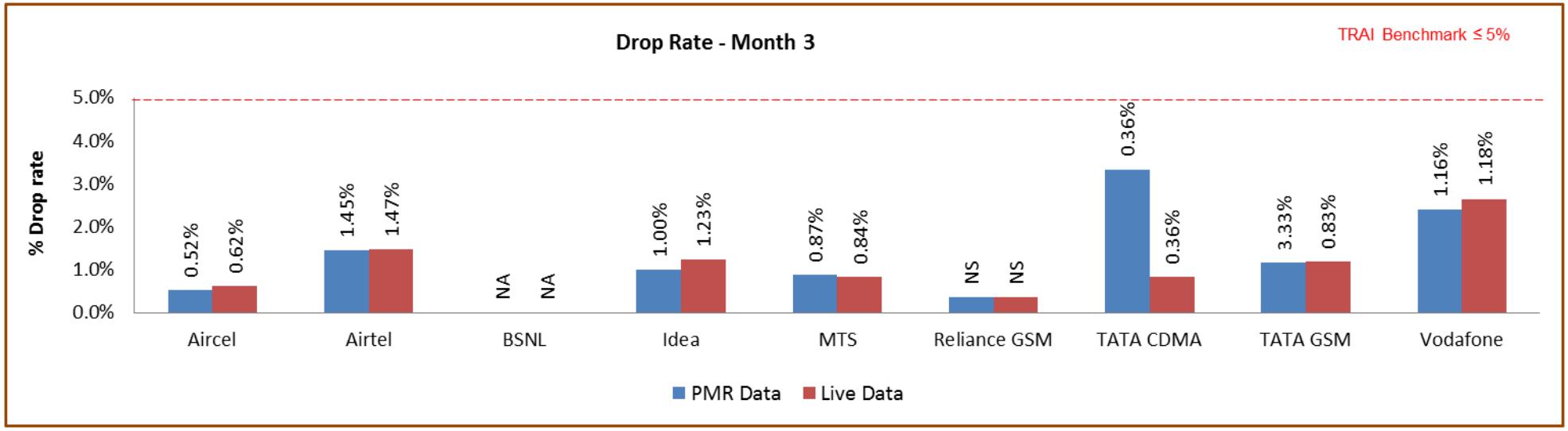
7.3.2.1 KEY FINDINGS – MONTH 1



7.3.2.2 KEY FINDINGS – MONTH 2



7.3.2.3 KEY FINDINGS – MONTH 3



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

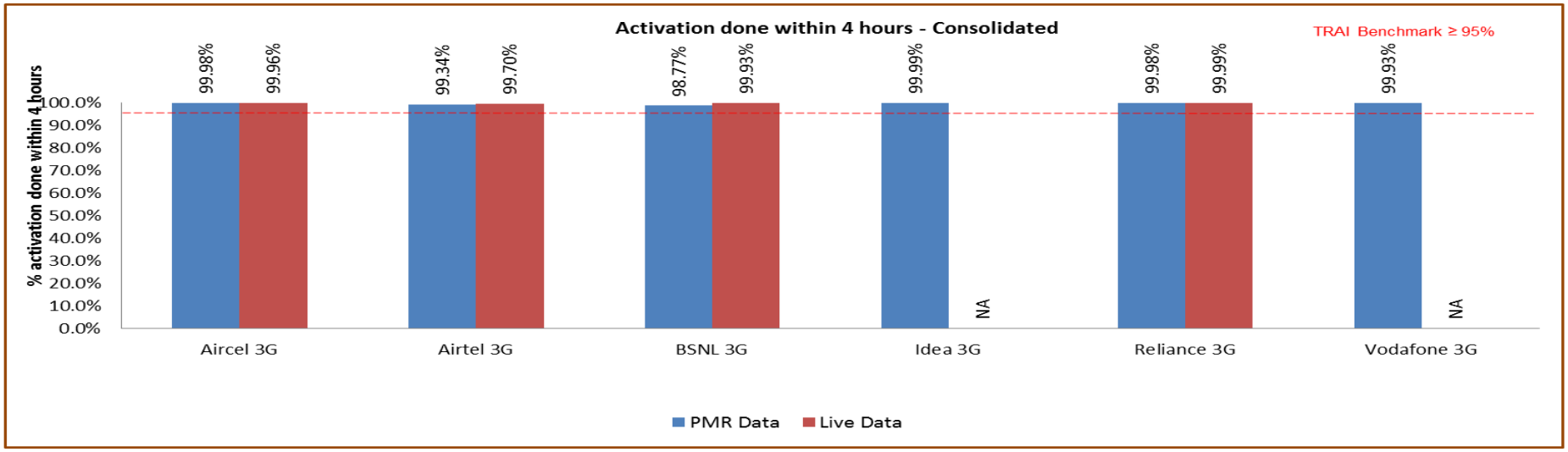
8.1 SERVICE ACTIVATION /PROVISIONING FOR 3G

8.1.1 PARAMETER DESCRIPTION

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

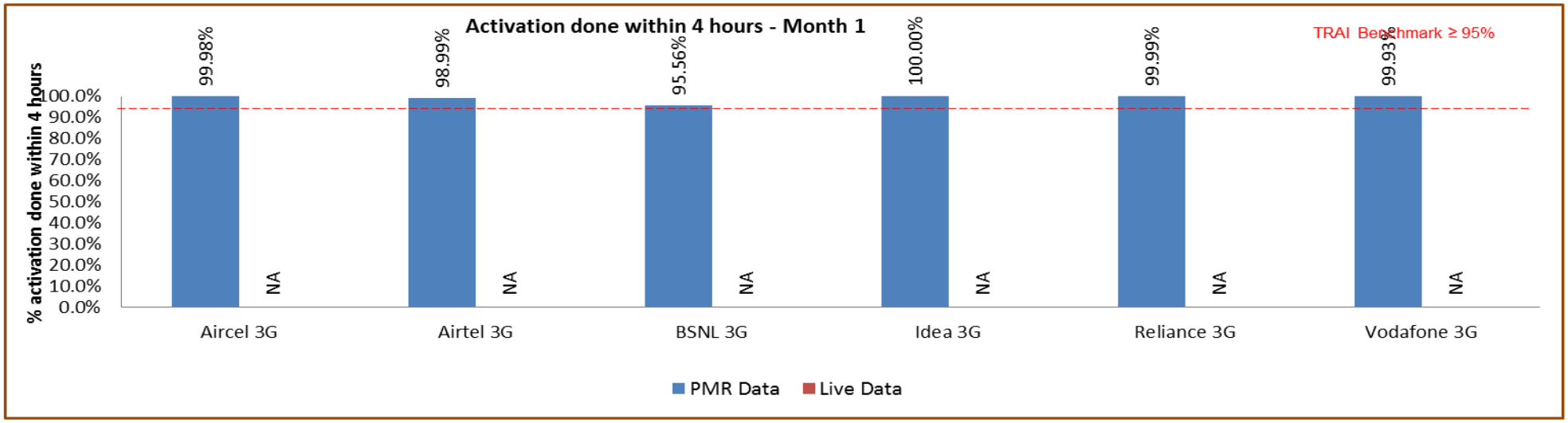
$$\text{\% activation done within 4 hours} = \frac{\text{Total Time Taken for Activation}}{\text{Total request time made}} \times 100$$

8.1.2 KEY FINDINGS

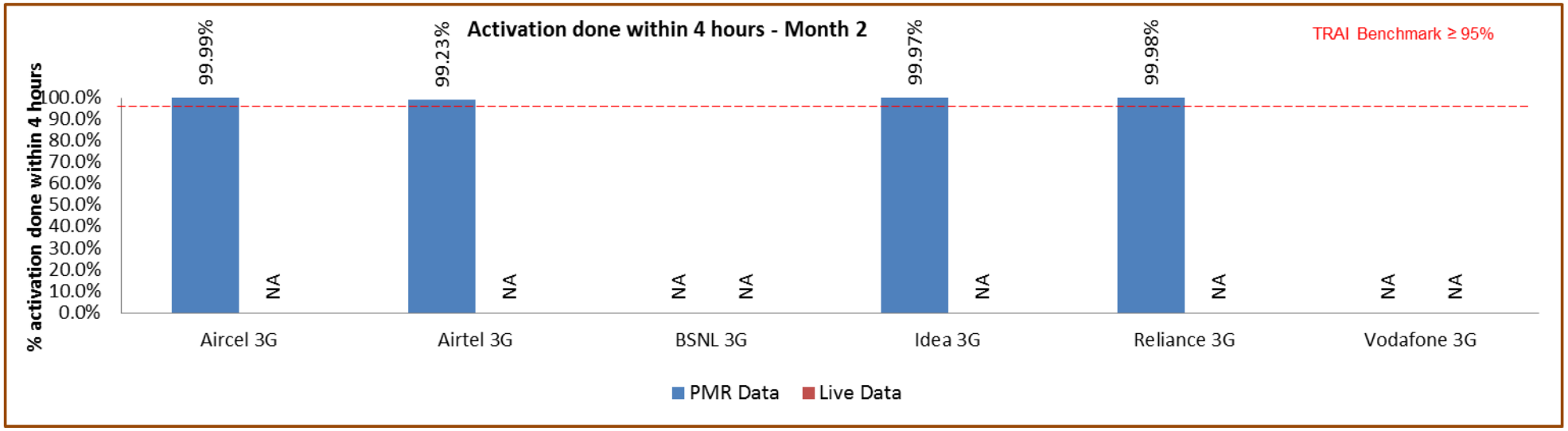


All operators met the benchmark for PMR as well as live audit.

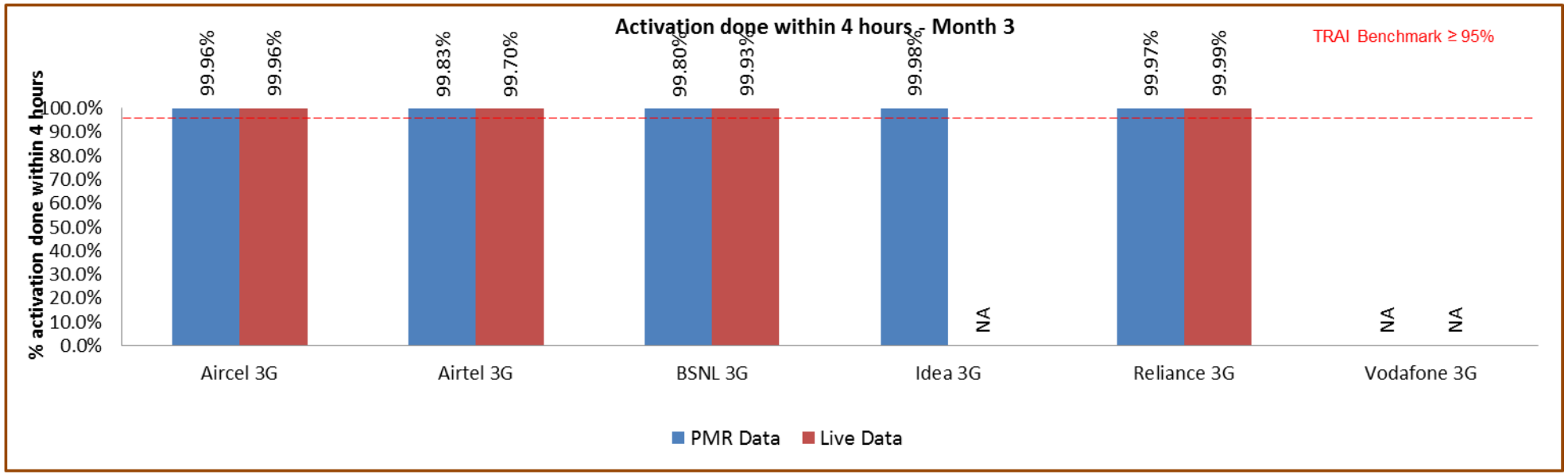
8.1.2.1 KEY FINDINGS – MONTH 1



8.1.2.2 KEY FINDINGS – MONTH 2



8.1.2.3 KEY FINDINGS – MONTH 3



8.2 PDP CONTEXT ACTIVATION SUCCESS RATE FOR 3G

8.2.1 PARAMETER DESCRIPTION

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

Measurement

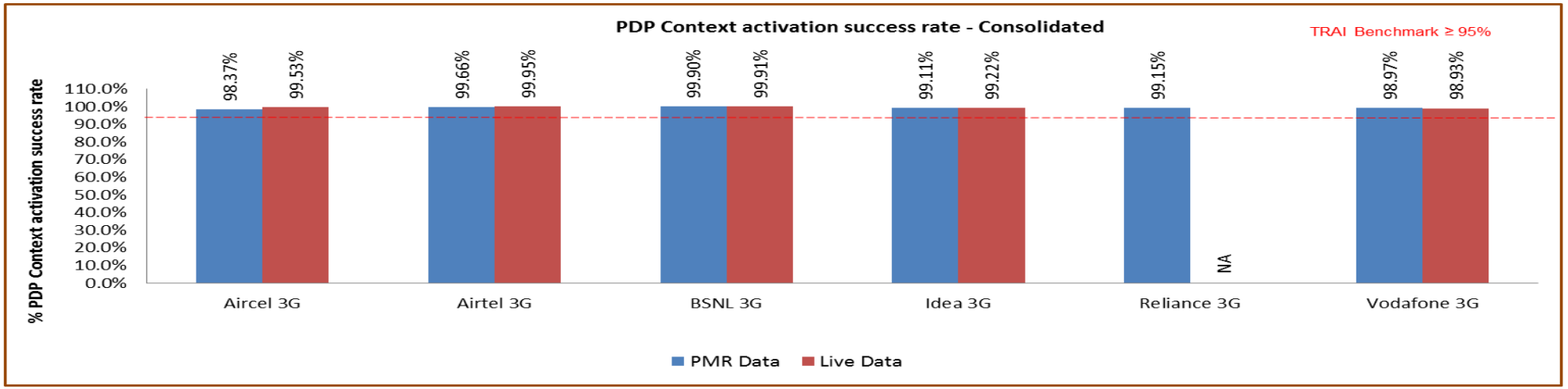
This measurement provides the number of successfully completed PDP context activations. For these context activations, the GGSN is updated successfully and a report of PDP context activation success is generated at GGSN.

PDP Context Activation Success Rate (%) =

Number of successfully completed PDP context activations ×100

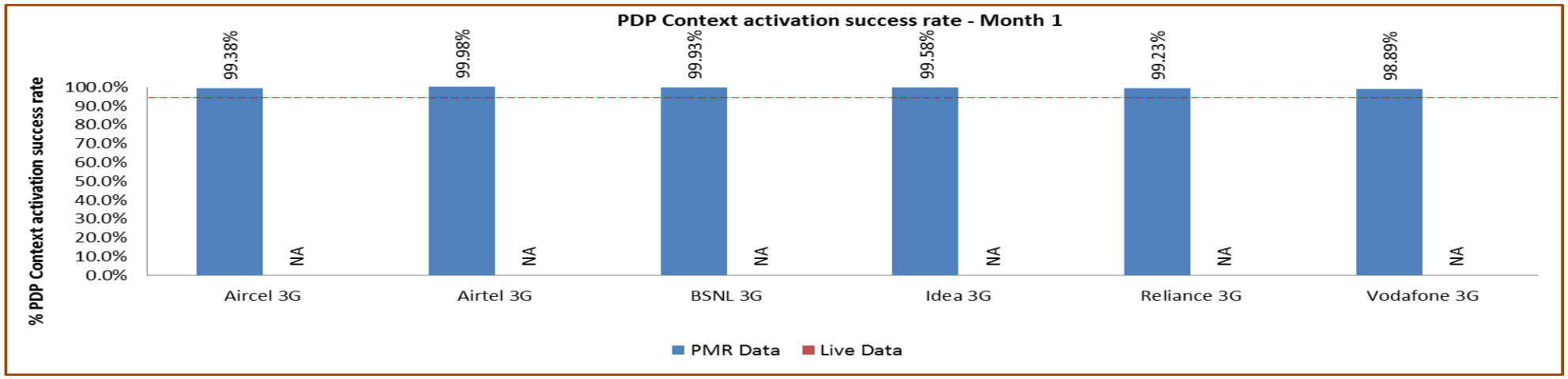
Total attempts of context activation

8.2.2 KEY FINDINGS

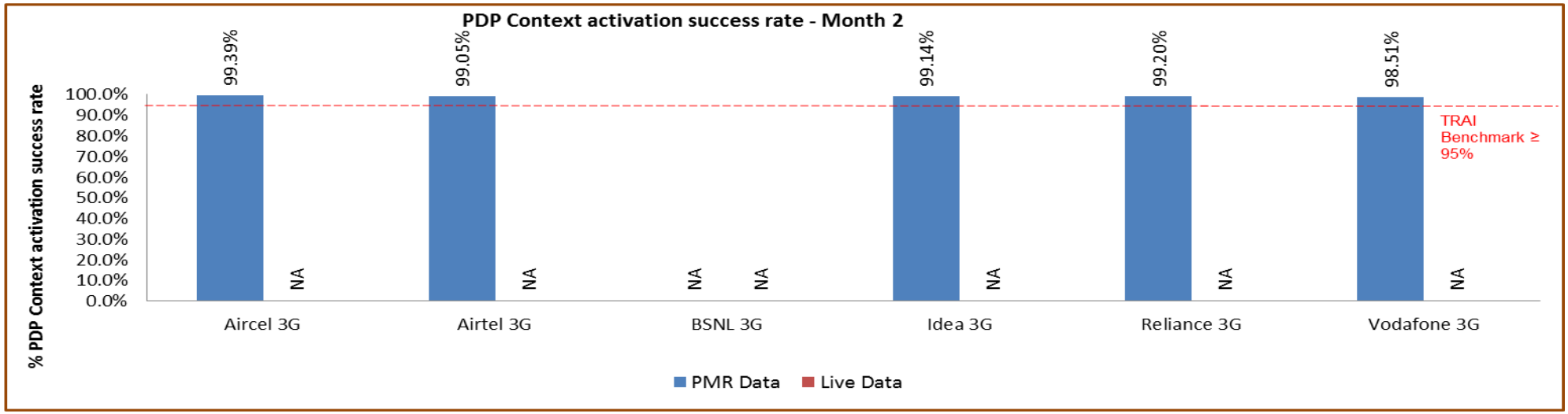


All operators met the benchmark for PMR as well as live audit. Reliance 3G data not available.

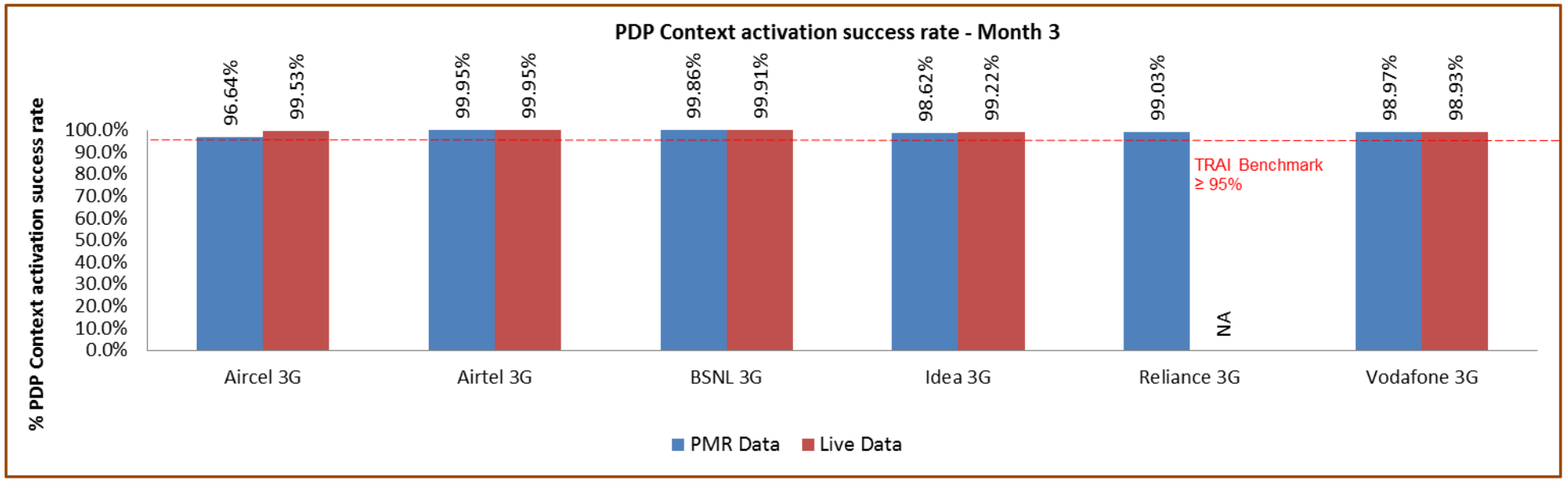
8.2.2.1 KEY FINDINGS – MONTH 1



8.2.2.2 KEY FINDINGS – MONTH 2



8.2.2.3 KEY FINDINGS – MONTH 3



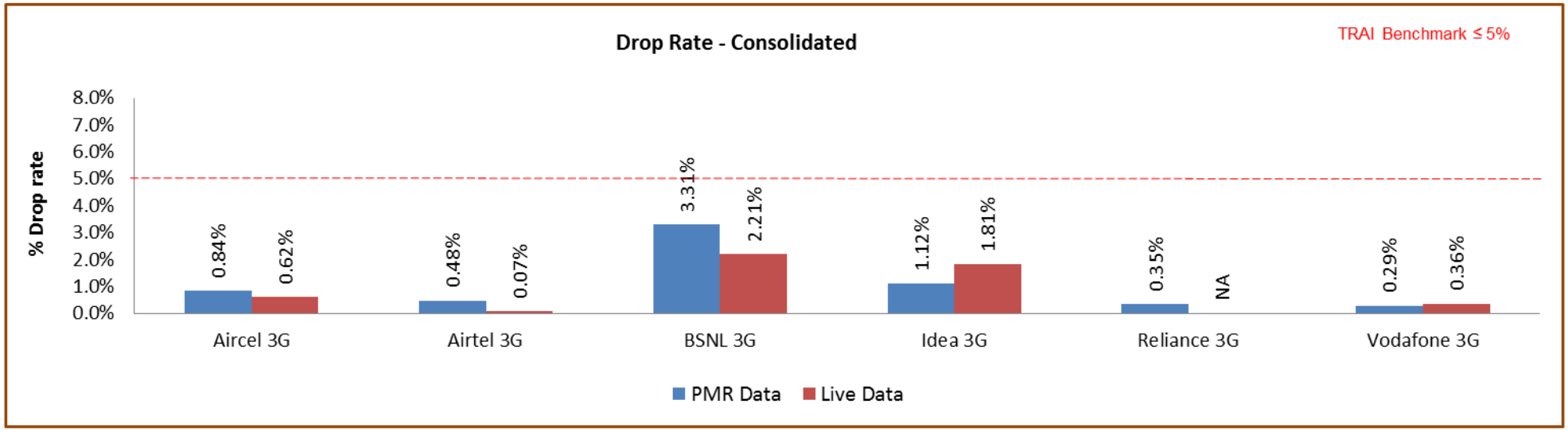
8.3 DROP RATE FOR 3G

8.3.1 PARAMETER DESCRIPTION

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

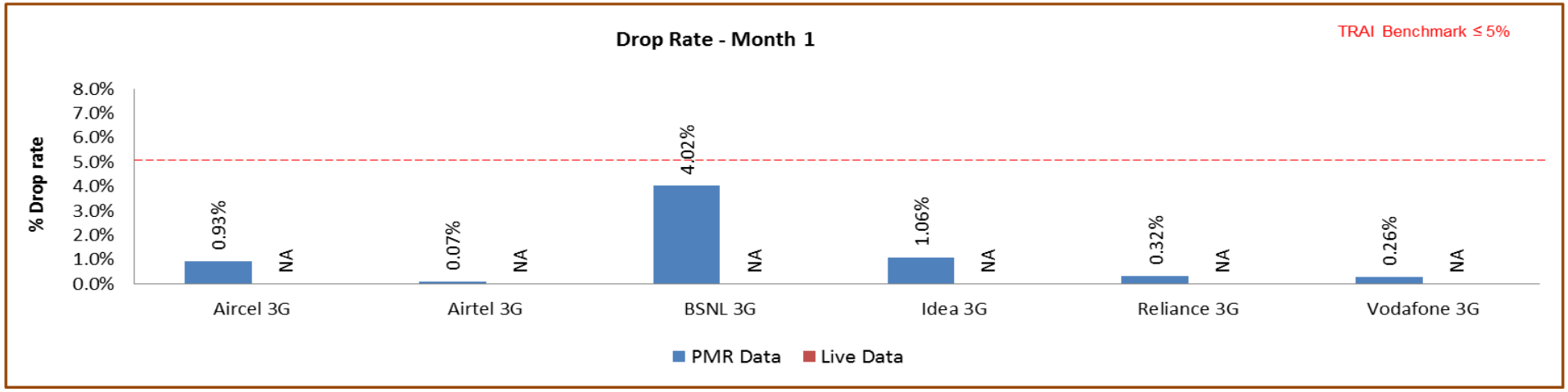
$$\textbf{Drop rate} = \frac{\text{No. of Dropped data Calls}}{\text{No. of Successful data calls}} \times 100$$

8.3.2 KEY FINDINGS

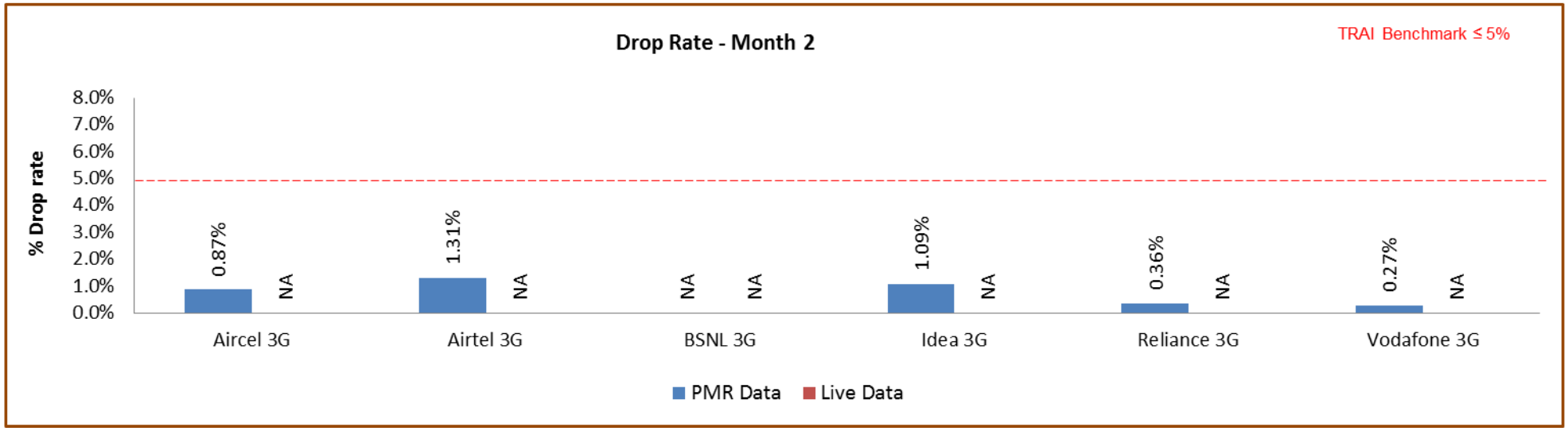


All operators met the benchmark for PMR as well as live audit.

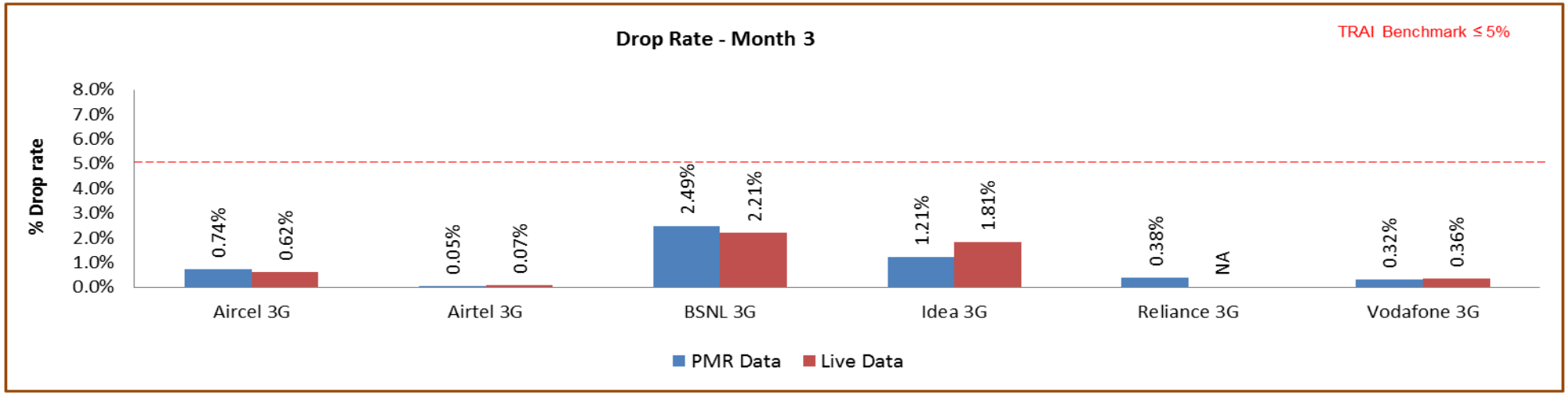
8.3.2.1 KEY FINDINGS – MONTH 1



8.3.2.2 KEY FINDINGS – MONTH 2



8.3.2.3 KEY FINDINGS – MONTH 3



9 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

9.1 METERING AND BILLING CREDIBILITY

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

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

9.1.1 PARAMETER DESCRIPTION

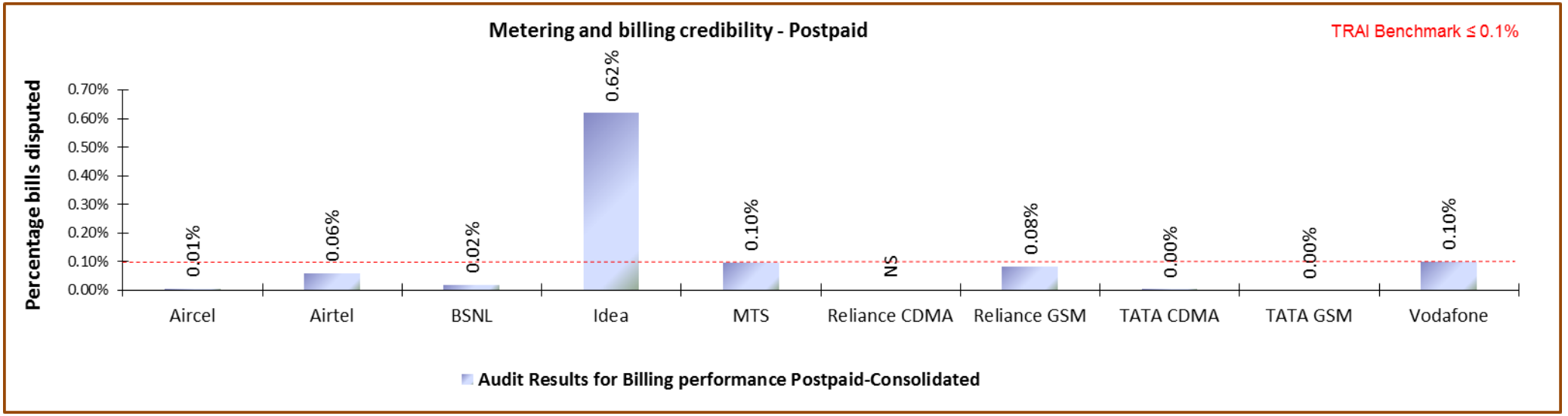
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th December, 2009 were covered. The types of billing complaints covered are listed below.

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

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

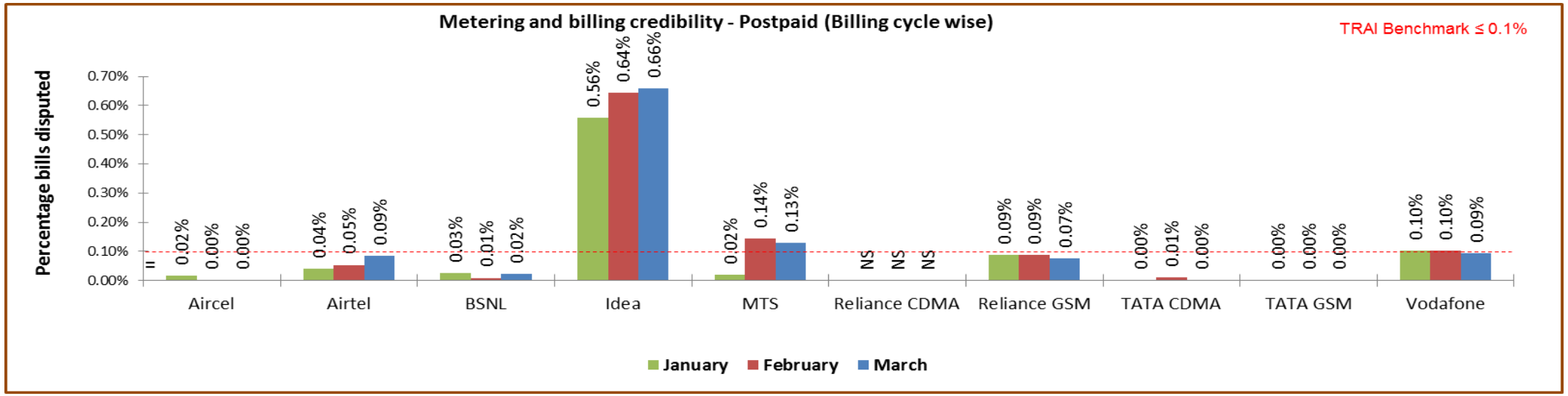
- Computational Methodology:
  - **Billing complaints per 100 bills issued (Post-paid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would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

9.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



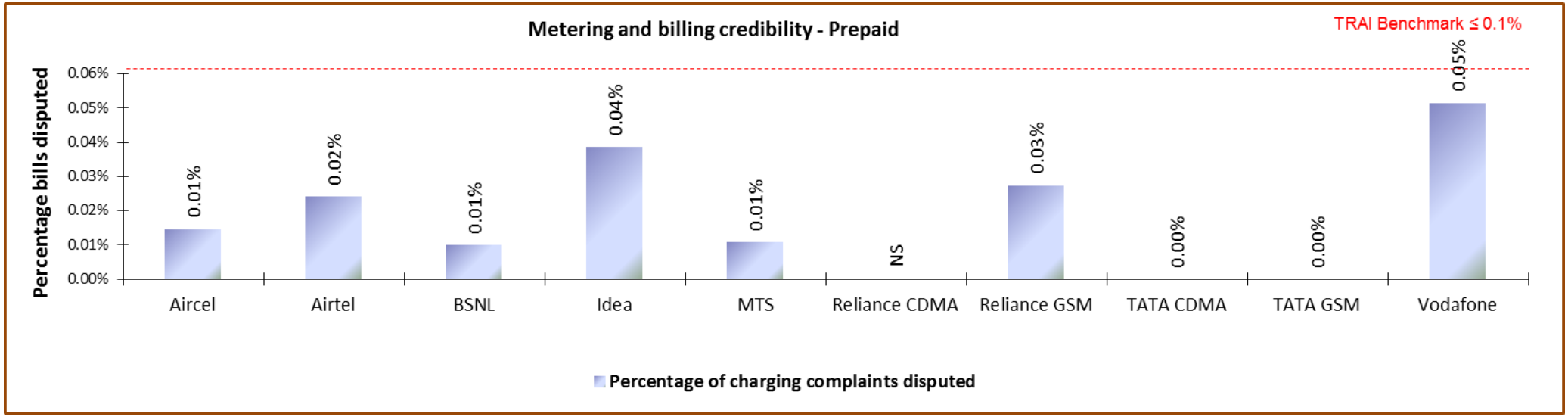
Data Source: Billing Center of the operators

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



Data Source: Billing Center of the operators

9.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

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

9.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

9.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

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

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

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

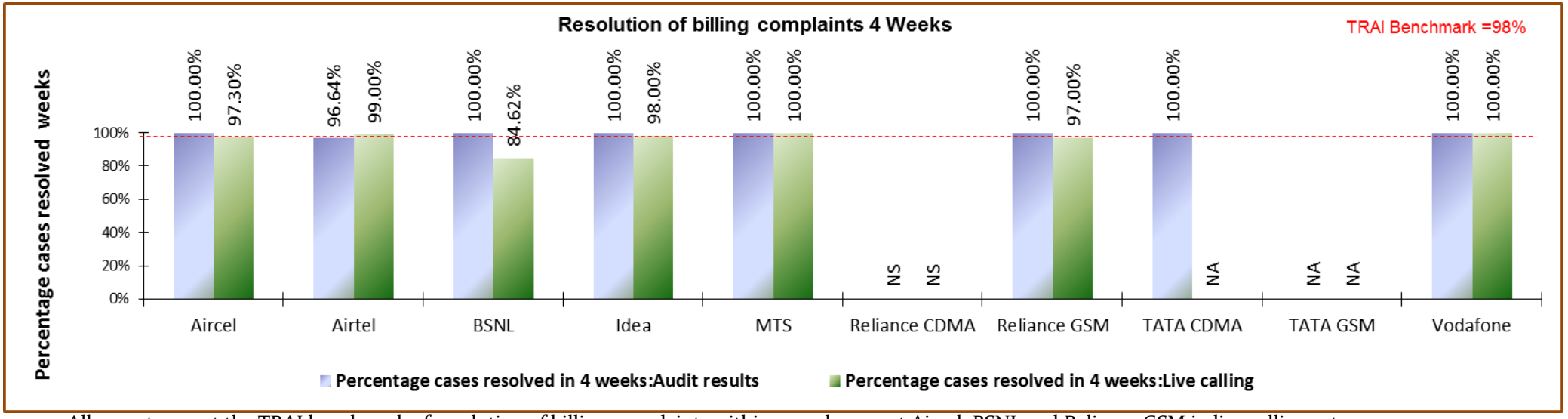
$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

- **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally. Complaints raised by the consumers to operator are only considered as part of the calculation.
- The complaints that get marked as invalid by the operator are not considered for calculation as those complaints cannot be considered as resolved by the operator.
- *** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.

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

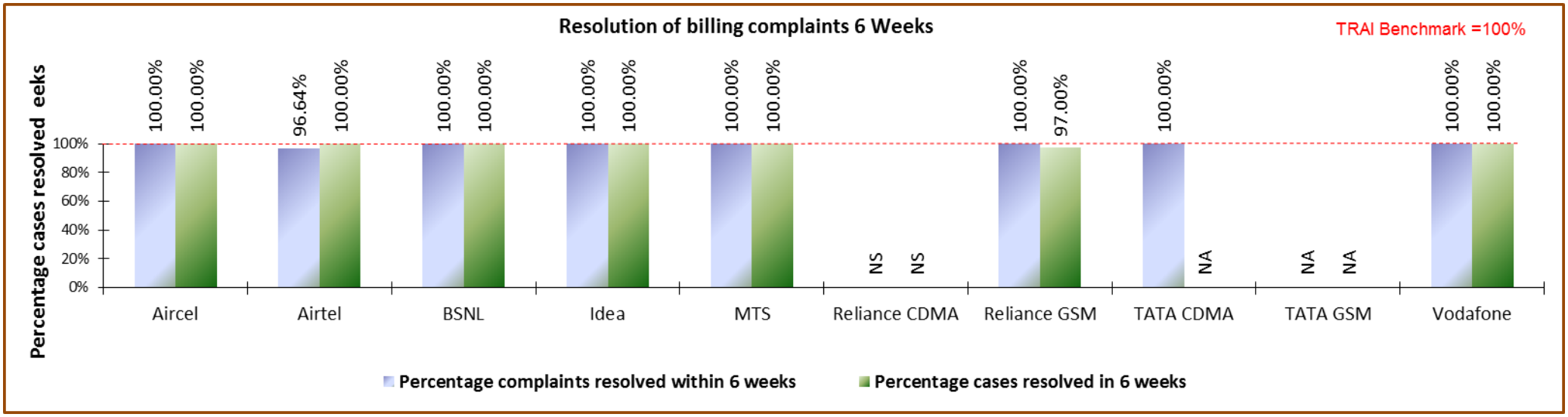
9.2.2 KEY FINDINGS - WITHIN 4 WEEKS

Data Source: Billing Center of the operators



All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks except Aircel, BSNL and Reliance GSM in live calling category.

9.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

All operators met the TRAI benchmark of resolution of billing complaints within 6 week except Airtel as per Audit results and Reliance GSM for live calling category. No data received from TATA GSM unlike earlier occasions.

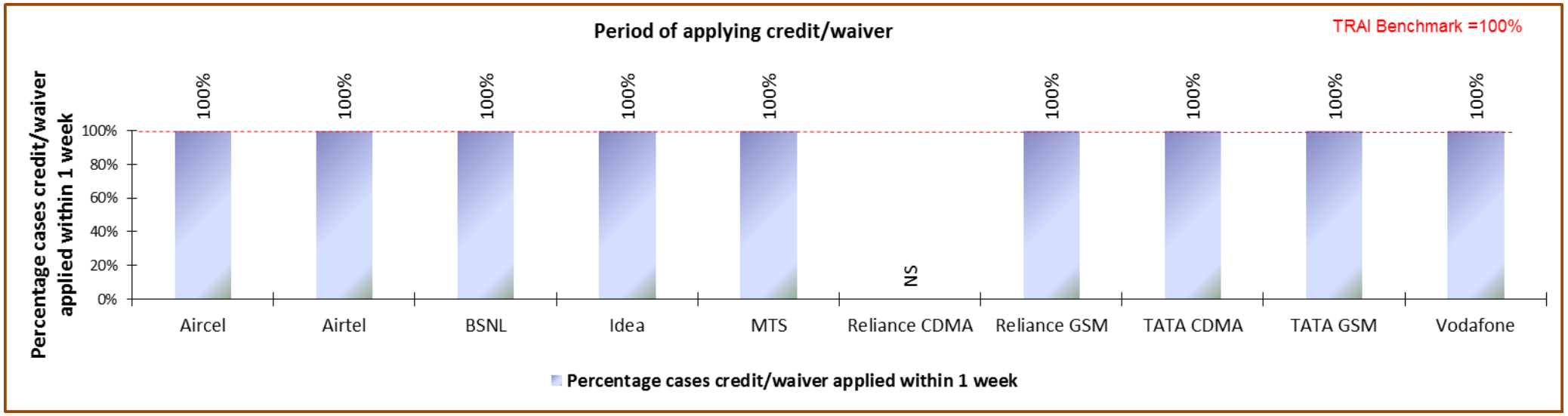
9.3 PERIOD OF APPLYING CREDIT/WAVIER

9.3.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Period of applying credit waiver = (number of cases where credit waiver is applied within 7 days/ total number of cases eligible for credit waiver) * 100**
- TRAI Benchmark:
  - Period of applying credit waiver within 7 days: 100%
- Audit Procedure:
  - Operator to provide details of:-
    - List of all eligible cases along with
      - Date of applying credit waiver to all the eligible cases.
      - Date of resolution of complaint for all eligible cases

9.3.2 KEY FINDINGS

Data Source: Billing Center of the operators



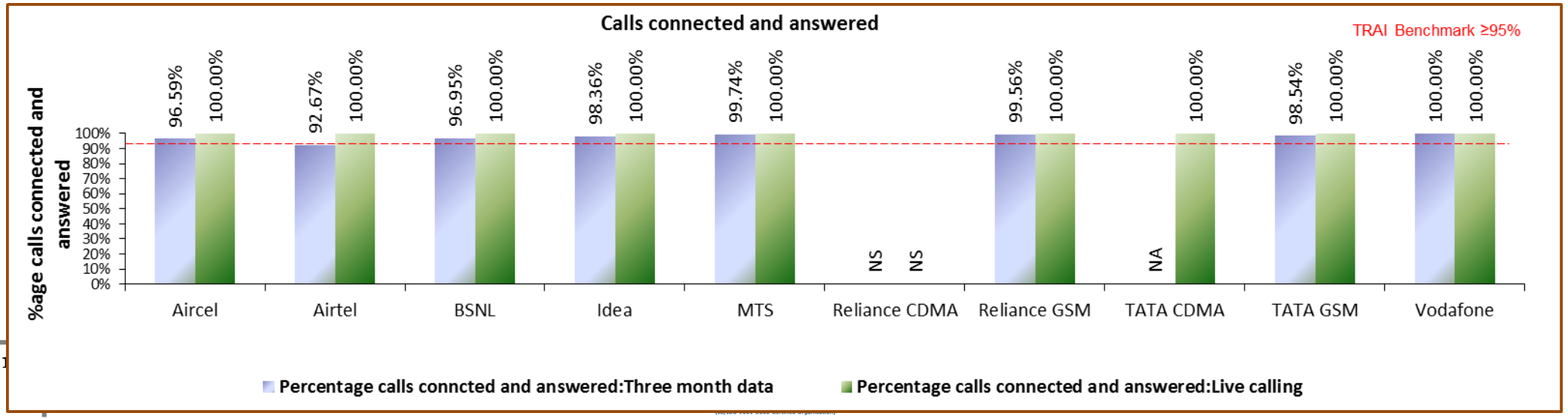
All operators met the benchmark for this parameter.

9.4 CALL CENTRE PERFORMANCE-IVR

9.4.1 PARAMETER DESCRIPTION

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

9.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

As per PMR Airtel failed to meet the benchmark.

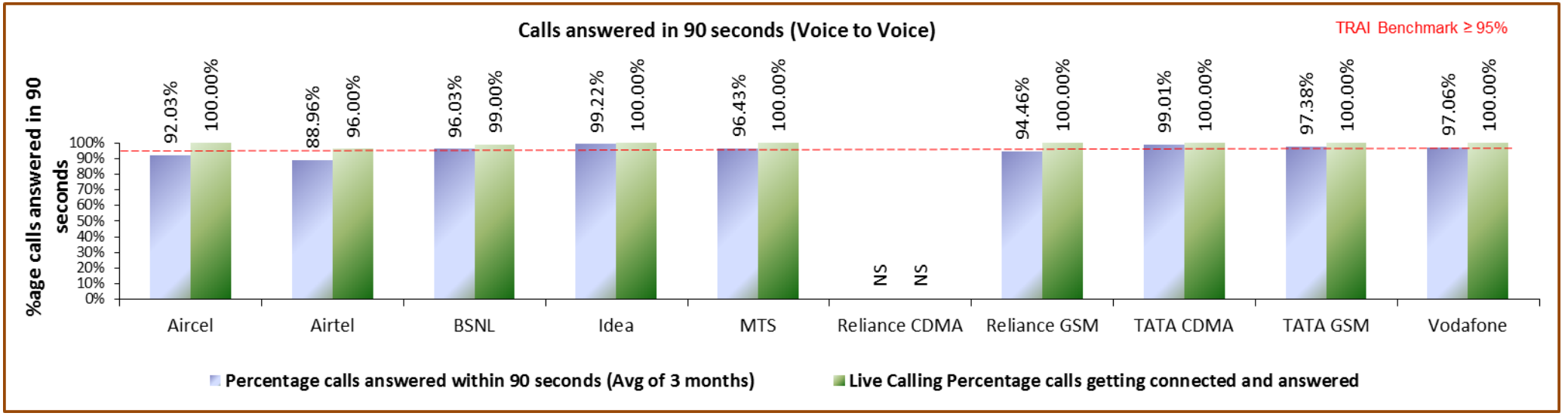
9.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

9.5.1 PARAMETER DESCRIPTION

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

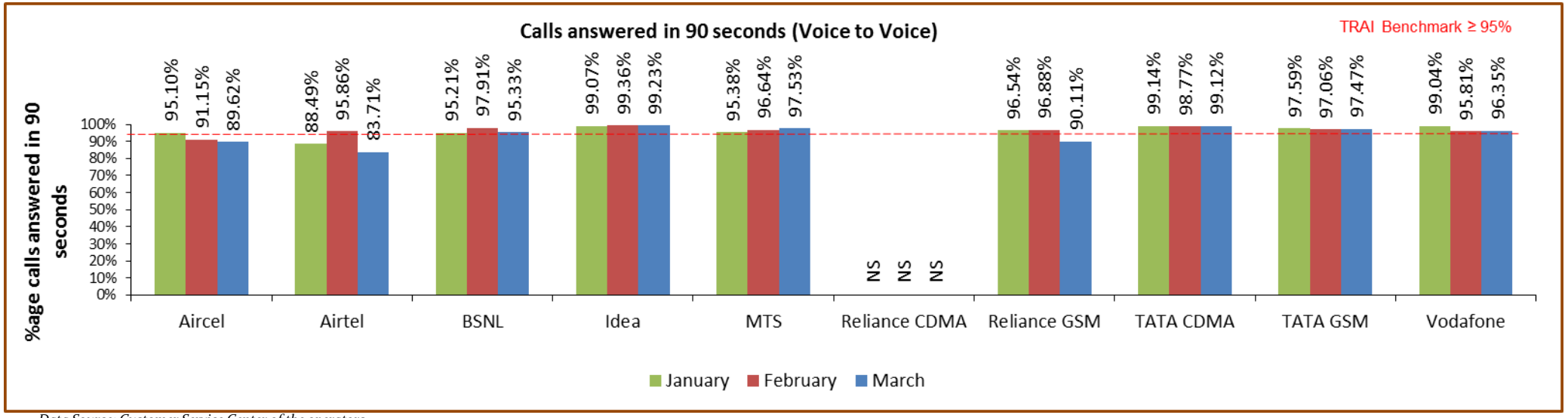
Benchmark: 95% calls to be answered within 90 seconds

9.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Aircel, Airtel and Reliance GSM were not able to meet the benchmark as per audit PMR data. However, as per live calling done to customers, the performance of all operators met the benchmark. Reliance CDMA is not offering any service in the LSA.



Data Source: Customer Service Center of the operators

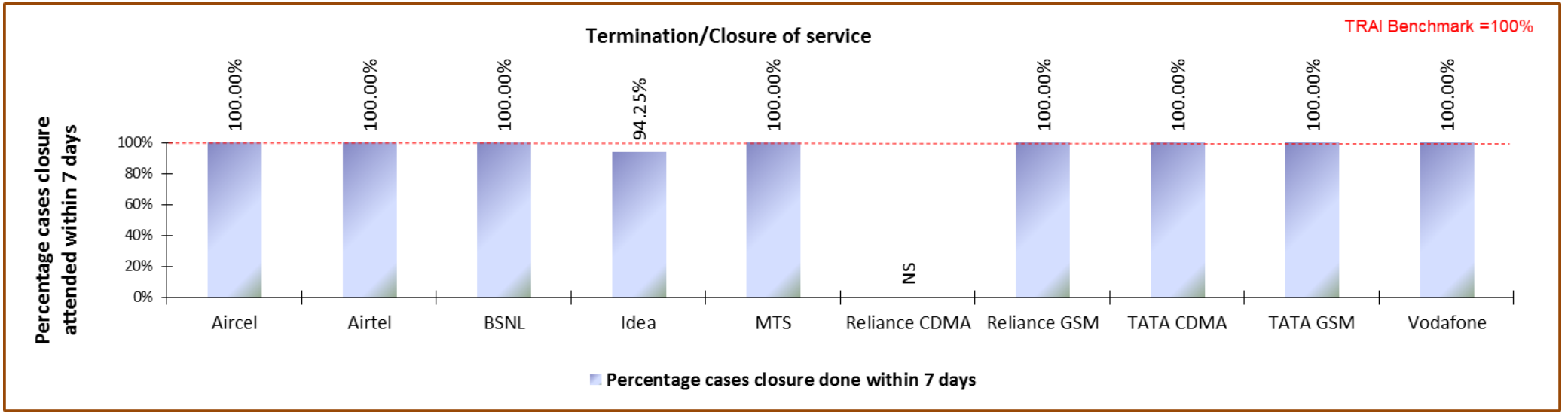
9.6 TERMINATION/CLOSURE OF SERVICE

9.6.1 PARAMETER DESCRIPTION

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

- Date of lodging the closure request (all requests in given period)
- Date of closure of service

9.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter except Idea.

9.7 REFUND OF DEPOSITS AFTER CLOSURE

9.7.1 PARAMETER DESCRIPTION

- Computational Methodology:
  - **Time taken for refund for deposit after closures = (number of cases of refund after closure done within 60 days/ total number of cases of refund after closure) * 100**

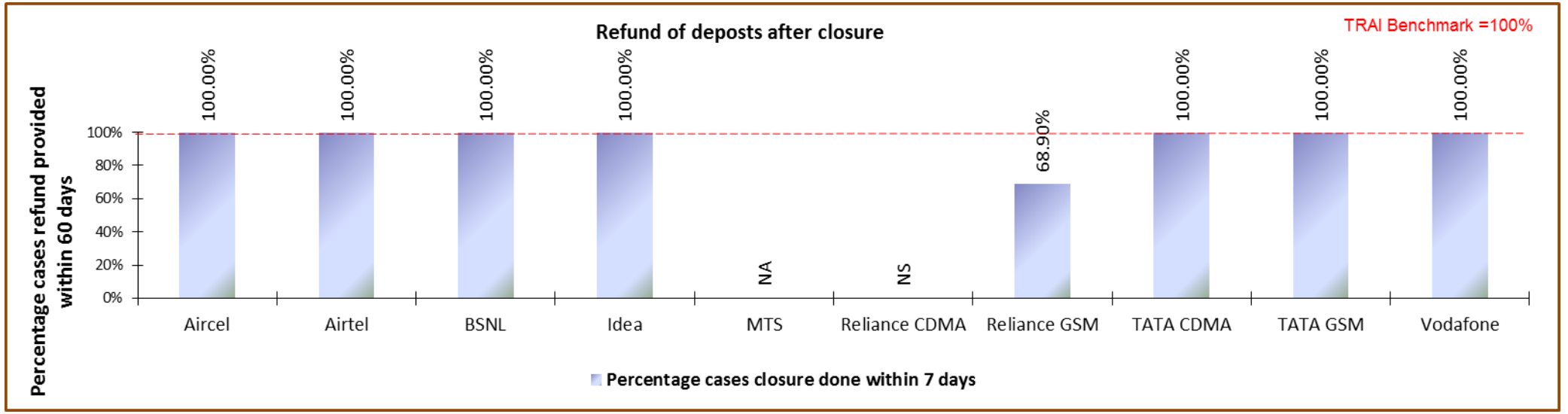
- Any case where the operators need to return the amount back to consumers post closure of service in form of cheque/cash is considered to be refund.

➲ TRAI Benchmark:

- Time taken for refund for deposit after closures: 100% within 60 days

➲ Audit Procedure:

- Operator provide details of the following from their central billing/refund database:
  - Dates of completion of all 'closure requests' resulting in requirement of a refund by the operator.
  - Dates of refund pertaining to all closure request received during the relevant quarter



9.7.2 KEY FINDINGS

Data Source: Customer Service Center of the operators

NA:- Not Applicable

All operators met the TRAI benchmark for the parameter except Reliance GSM.

10 DETAILED FINDINGS - DRIVE TEST DATA

10.1 OPERATOR ASSISTED DRIVE TEST - VOICE

No OADT conducted for the given period for the LSA under consideration.

11 ANNEXURE – CONSOLIDATED-2G

11.1 NETWORK AVAILABILITY

1. Network Availability											
Audit Results for Network Availability- PMR data											
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		7207	8813	3842	7084	1713	NS	4848	1770	5340	8426
Sum of downtime of BTSs in a month (in hours)		3790	134	40477	10958	571	NS	48522	1346	2424	2433
BTSs accumulated downtime (not available for service)	≤ 2%	0.07%	0.00%	1.42%	0.21%	0.04%	NS	1.35%	0.10%	0.06%	0.04%
Number of BTSs having accumulated downtime >24 hours		12	0	72	24	0	NS	294	0	5	17
Worst affected BTSs due to downtime	≤ 2%	0.17%	0.00%	1.87%	0.34%	0.00%	NS	6.06%	0.00%	0.09%	0.20%
Live Measurement Results for Network Availability- 3 Day live data											
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		2400	2934	1285	2362	571	NS	1616	590	1781	2830
Sum of downtime of BTSs in a month (in hours)		175	161	616	393	71	NS	983	0	31	83
BTSs accumulated downtime (not available for service)	≤ 2%	0.10%	0.08%	0.67%	0.23%	0.17%	NS	0.84%	0.00%	0.02%	0.04%
Number of BTSs having accumulated downtime >24 hours		1	0	3	6	0	NS	0	0	0	2
Worst affected BTSs due to downtime	≤ 2%	0.04%	0.00%	0.23%	0.25%	0.00%	NS	0.00%	0.00%	0.00%	0.07%

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

11.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	98.20%	99.66%	99.30%	99.68%	99.89%	NS	97.40%	99.34%	99.49%	99.56%
SDCCH/Paging channel congestion	≤ 1%	0.15%	0.05%	0.40%	0.05%	NA	NS	0.10%	NA	0.03%	0.04%
TCH congestion	≤ 2%	0.05%	0.04%	0.75%	0.09%	0.00%	NS	0.50%	0.13%	0.02%	0.44%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	98.67%	99.73%	98.69%	99.61%	99.90%	NS	97.96%	99.52%	99.57%	99.74%
SDCCH/Paging channel congestion	≤ 1%	0.08%	0.05%	0.41%	0.05%	NA	NS	0.05%	NA	0.04%	0.05%
TCH congestion	≤ 2%	0.01%	0.04%	1.84%	0.01%	0.00%	NS	0.08%	0.02%	0.01%	0.26%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of call attempts		0	0	0	0	0	NS	0	0	0	0
Total number of successful calls established		0	0	0	0	0	NS	0	0	0	0
CSSR	≥ 95%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

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

11.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		173880883	292746856	127218457	170684457	20520019	NS	0	9844192	137814220	337696977
Total number of calls dropped		1051464	1980191	1760290	483285	93792	NS	148143	26940	487943	2408925
Call drop rate	≤ 2%	0.60%	0.68%	1.38%	0.28%	0.46%	NS	NA	0.27%	0.35%	0.71%
Total number of cells in the network		21606	26222	10718	21296	6585	NS	14541	5904	15868	21929
Total number of cells having more than 3% TCH		519	628	202	38	176	NS	58	167	153	601
Worst affected cells having more than 3% TCH	≤ 3%	2.40%	2.39%	1.88%	0.18%	2.68%	NS	0.40%	2.83%	0.96%	2.74%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		74551434	10516107	17829170	77564491	8909051	NS	0	4293964	58830610	168269539
Total number of calls dropped		359291	69162	265053	171404	28606	NS	41291	12048	149916	951607
Call drop rate	≤ 2%	0.48%	0.66%	1.49%	0.22%	0.32%	NS	NA	0.28%	0.25%	0.57%
Total number of cells in the network		7197	8746	3587	7102	2195	NS	4847	1968	5288	7376
Total number of cells having more than 3% TCH		159	206	76	1	2	NS	2	46	35	208
Worst affected cells having more than 3% TCH	≤ 3%	2.21%	2.36%	2.12%	0.01%	0.08%	NS	0.04%	2.34%	0.66%	2.82%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		0	0	0	0	0	NS	0	0	0	0
Total number of calls dropped		0	0	0	0	0	NS	0	0	0	0
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

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

11.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		36458805874	109385115618	12000	27073400362	197550	NS	21674470162	728222946	19336138106	53776489436
Total number of calls with good voice quality		35756370905	107578789894	11976	26554130278	196757	NS	21454927894	726175114	19100138823	52763304882
%age calls with good voice quality	≥ 95%	98.07%	98.35%	99.80%	98.08%	99.60%	NS	98.99%	99.72%	98.78%	98.12%
Live measurement results for Voice quality-3 Day data											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		15597312412	3881903850	600	10844362756	158040	NS	7991986750	347931316	8135169451	23387422731
Total number of calls with good voice quality		15373185937	3816758277	593	10665107331	156550	NS	7920697883	347076806	8066713044	22994228607
%age calls with good voice quality	≥ 95%	98.56%	98.32%	98.83%	98.35%	99.06%	NS	99.11%	99.75%	99.16%	98.32%
Drive test results for Voice quality (Average of three drive tests) - DT data											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		0	0	0	0	NA	NS	0	NA	0	0
Total number of calls with good voice quality		0	0	0	0	NA	NS	0	NA	0	0
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

11.5 POI CONGESTION

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		50	31	79	101	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		245277	252664	454707	229568	107734	NS	42778	62119	40178	649227
Traffic served for all POIs (B)- in erlangs		90973	124451	21611	123941	24903	NS	26322	21341	15101	364511
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		50	31	79	102	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81986	94616	52656	76641	35319	NS	19024	20070	12084	221433
Traffic served for all POIs (B)- in erlangs		16513	24636	11478	21557	6829	NS	6546	3892	2100	68069
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%

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

11.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang										
Traffic in Erlang	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Eqipped capacity of the network	103866	109877	136000	68503	50400	NS	88000	80688	98432	152699
Total taffic handled in erlang during TCBH	58504	97017	50810	58488	6983	NS	50708	10797	39291	113299
Total no. of customers served (as per VLR)	2204537	4632595	813115	2464950	239796	NS	3965842	186096	1958167	5014866

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

12 ANNEXURE – CONSOLIDATED-3G

12.1 NETWORK AVAILABILITY

1. Network Availability							
Audit Results for Network Availability- PMR data							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
(Number of Node Bs in the network in the licensed service area		5605	7569	2415	5991	4077	7974
Sum of downtime (i.e. total outage time) of Node Bs		3164	36	22660	6786	7777	1904
Node Bs downtime (not available for service)	≤ 2%	0.08%	0.00%	1.26%	0.15%	0.26%	0.03%
Number of Node Bs having accumulated downtime of >24 hours in a month		8	0	47	13	73	3
Worst affected Node Bs due to downtime	≤ 2%	0.14%	0.00%	1.95%	0.22%	1.79%	0.04%
Live Measurement Results for Network Availability- 3 Day live data							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
(Number of Node Bs in the network in the licensed service area		1868	2545	835	1997	1375	2679
Sum of downtime (i.e. total outage time) of Node Bs		154	0	380	259	1159	44
Node Bs downtime (not available for service)	≤ 2%	0.11%	0.00%	0.63%	0.18%	1.17%	0.02%
Number of Node Bs having accumulated downtime of >24 hours in a month		1	0	2	4	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.05%	0.00%	0.24%	0.20%	0.00%	0.00%

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

12.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data							
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Vodafone 3G
CSSR	≥ 95%	99.61%	99.61%	96.24%	99.91%	99.96%	100.00%
RRC Congestion	≤ 1%	0.21%	0.00%	0.60%	0.00%	0.03%	0.00%
Circuit Switched RAB Congestion	≤ 2%	0.04%	0.00%	0.74%	0.00%	0.01%	0.00%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data							
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Vodafone 3G
CSSR	≥ 95%	99.56%	99.59%	95.86%	99.90%	100.00%	100.00%
RRC Congestion	≤ 1%	0.21%	0.00%	0.36%	0.00%	0.01%	0.00%
Circuit Switched RAB Congestion	≤ 2%	0.03%	0.00%	0.71%	0.00%	0.00%	0.01%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data							
CSSR	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Vodafone 3G
Total number of RRC attempts (A)		0	0	0	0	NP	0
Total number of RRC established (B)		0	0	0	0	NP	0
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA	NP	NA
%age blocked calls		NA	NA	NA	NA	NP	NA

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

12.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data							
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		35655998	NDR	221927103	24159608	23260367	104442805
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		101126	NDR	3330031	43931	10480	279891
Call drop rate (B/A*100)	≤ 2%	0.28%	0.34%	1.50%	0.18%	0.05%	0.27%
Total no. of cells in the licensed service area (B)		16788	23044	5902	18226	12020	23617
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		490	429	170	17	19	539
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.92%	1.86%	2.88%	0.09%	0.16%	2.28%
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	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		15216006	2478162	2575225	11146709	9461966	55319706
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		45651	6704	14454	18368	3763	146121
Call drop rate (B/A*100)	≤ 2%	0.30%	0.30%	0.56%	0.16%	0.04%	0.26%
Total no. of cells in the licensed service area (B)		5595	7752	2462	6077	4052	7931
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		155	150	20	4	5	187
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.77%	1.93%	0.81%	0.07%	0.12%	2.36%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data							
Call drop rate	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		0	0	0	0	NP	0
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	0	0	0	NP	0
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA	NP	NA

Data

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

12.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		127979620231	0	18000	82740201500	NA	284255123369
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1744925913	0	34	173059994	NA	3180847321
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.64%	99.24%	99.81%	99.79%	99.89%	98.88%
Live measurement results for Voice quality-3 Day data							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		66044858004	NA	600	36626282500	NA	144414304782
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1004415705	NA	591	81514119	NA	1571398698
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.48%	99.73%	98.50%	99.87%	99.89%	98.91%
Drive test results for Voice quality (Average of three drive tests) - DT data							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		0	0	0	0	NP	0
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		0	0	0	0	NP	0
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NP	NA

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

12.5 POI CONGESTION

Audit Results for POI Congestion- PMR data							
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of working POIs		50	31	79	101	29	45
No. of POIs not meeting benchmark		0	0	2	0	0	0
Total Capacity of all POIs (A) - in erlangs		245277	252664	856758	229568	42778	649227
Traffic served for all POIs (B)- in erlangs		90973	124451	32312	123941	26322	364511
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data							
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of working POIs		50	31	79	102	29	45
No. of POIs not meeting benchmark		0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81986	94616	52656	76641	19024	221433
Traffic served for all POIs (B)- in erlangs		16513	24636	11478	21557	6546	68069
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

12.6 ADDITIONAL NETWORK RELATED PARAMETERS

Traffic in Erlang		Aircel 3G	Airtel 3G	BSNL 3G	Idea 3G	Reliance 3G	Vodafone 3G
Eqipped capacity of the network		0	NA	24620	0	NA	NA
Total taffic handled in erlang during TCBH		4781	35382	10832	8119	NA	44402
Total no. of customers served (as per VLR)		451462	627600	70188	0	NA	889204

13 ANNEXURE – CUSTOMER SERVICES

13.1 METERING AND BILLING CREDIBILITY

Metering and billing credibility - Postpaid (Avg of 3 billing cycles)											
Metering and billing credibility - Postpaid											
Total bills generated during the period		17528	1928462	232731	223126	69725	NS	228707	26476	85007	3641923
Total number of bills disputed		1	1140	43	1387	66	NS	192	1	0	3630
Total number of valid billing complaints		0	271	31	200	4	NS	131	1	0	1984
Total complaints considered invalid		1	869	12	1187	62	NS	61	0	0	1646
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.01%	0.06%	0.02%	0.62%	0.10%	NS	0.08%	0.00%	0.00%	0.10%
January											
Total bills generated during the first billing cycle		6166	643752	75235	70195	24796	NS	81474	8936	30422	1198745
Total number of bills disputed in first billing cycle		1	251	19	391	5	NS	72	0	0	1224
Total number of valid billing complaints (billing cycle 1)		0	51	15	65	2	NS	49	0	0	651
Total complaints considered invalid (billing cycle 1)		1	200	4	326	3	NS	23	0	0	573
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.02%	0.04%	0.03%	0.56%	0.02%	NS	0.09%	0.00%	0.00%	0.10%
February											
Total bills generated during the second billing cycle		5868	642355	79070	77550	23190	NS	75805	8788	28020	1214488
Total number of bills disputed in second billing cycle		0	341	7	500	33	NS	67	1	0	1250
Total number of valid billing complaints (billing cycle 2)		0	101	6	71	2	NS	42	1	0	772
Total complaints considered invalid (billing cycle 2)		0	240	1	429	31	NS	25	0	0	478
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.05%	0.01%	0.64%	0.14%	NS	0.09%	0.01%	0.00%	0.10%
March											
Total bills generated during the third billing cycle		5494	642355	78426	75381	21739	NS	71428	8752	26565	1228690
Total number of bills disputed in third billing cycle		0	548	17	496	28	NS	53	0	0	1156
Total number of valid billing complaints (billing cycle 3)		0	119	10	64	0	NS	40	0	0	561
Total complaints considered invalid (billing cycle 3)		0	429	7	432	28	NS	13	0	0	595
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.09%	0.02%	0.66%	0.13%	NS	0.07%	0.00%	0.00%	0.09%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid											
Performance prepaid	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of charging complaints (valid) - sum of 3 months		28	1247	226	619	25	NS	2442	0	0	6392
Total complaints considered invalid (sum of 3 months)		1873	1861	12	2204	13	NS	723	0	0	1012
Total number of charging complaints (sum of 3 months)		1901	3108	238	2823	38	NS	3165	0	0	7404
Total no of customers served (Sum of 3 months)		13070858	12954503	2410647	7329966	356870	NS	11597619	521310	8357529	14401622
Percentage of charging complaints disputed	≤ 0.1%	0.01%	0.02%	0.01%	0.04%	0.01%	NS	0.03%	0.00%	0.00%	0.05%

Data Source: Billing Center of the operators

Resolution of Billing Complaints

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of billing/charging complaints		1902	4248	125	4210	104	NS	3357	1	0	11034
Total number of complaints resolved in favour of customer		28	1518	112	819	29	NS	2573	1	0	8376
Total complaints considered invalid		1874	2730	13	3391	75	NS	784	0	0	2658
Number of complaints resolved in 4 weeks		28	1467	112	819	29	NS	2573	1	0	8376
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	96.64%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	NA	100.00%
Number of complaints resolved in 6 weeks		28	1467	112	819	29	NS	2573	1	0	8376
Percentage complaints resolved within 6 weeks	100.00%	100.00%	96.64%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	NA	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		28	1467	52	819	29	NS	2573	1	0	4487
Percentage cases in which credit/waiver was received within 1 week	100%	100%	100%	100%	100%	100%	NS	100%	100%	100%	100%
Live calling results for resolution of billing complaints											
Resolution of billing complaints	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total Number of calls made		74	100	52	100	100	NS	100	0	0	100
Number of cases resolved in 4 weeks		72	99	44	98	100	NS	97	0	0	100
Percentage cases resolved in 4 weeks	≥ 98%	97.30%	99.00%	84.62%	98.00%	100.00%	NS	97.00%	NA	NA	100.00%
Number of cases resolved in 6 weeks		74	100	52	100	100	NS	97	0	0	100
Percentage cases resolved in 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NS	97.00%	NA	NA	100.00%

Data Source: Billing Center of the operators

13.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		7149202	1657553	1563148	4621959	372609	NS	3676962	0	308083	5981582
Number of calls getting connected and answered (electronically)		6905604	1536106	1515541	4546018	371629	NS	3660635	0	303576	5981544
Percentage calls getting connected and answered	≥ 95%	96.59%	92.67%	96.95%	98.36%	99.74%	NS	99.56%	NA	98.54%	100.00%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received (3 months)		1785888	1078988	30096	1456525	103885	NS	767500	19716	372975	2224668
Total Number of calls answered within 90 seconds (3 months)		1643481	959878	28902	1445169	100176	NS	724993	19521	363191	2159263
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	92.03%	88.96%	96.03%	99.22%	96.43%	NS	94.46%	99.01%	97.38%	97.06%
January											
Total calls received (Month 1)		627920	371450	10700	454162	40379	NS	267699	6855	129813	719935
Total calls answered within 90 seconds (Month 1)		597153	328679	10188	449927	38515	NS	258439	6796	126680	713059
% calls answered within 90 seconds (Month 1)	≥ 95%	95.10%	88.49%	95.21%	99.07%	95.38%	NS	96.54%	99.14%	97.59%	99.04%
February											
Total calls received (Month 2)		557831	320168	8666	459460	31074	NS	239014	6397	121416	666838
Total calls answered within 90 seconds (Month 2)		508460	306916	8485	456537	30029	NS	231552	6318	117849	638869
% calls answered within 90 seconds (Month 2)	≥ 95%	91.15%	95.86%	97.91%	99.36%	96.64%	NS	96.88%	98.77%	97.06%	95.81%
March											
Total calls received (Month 3)		600137	387370	10730	542903	32432	NS	260787	6464	121746	837895
Total calls answered within 90 seconds (Month 3)		537868	324283	10229	538705	31632	NS	235002	6407	118662	807335
% calls answered within 90 seconds (Month 3)	≥ 95%	89.62%	83.71%	95.33%	99.23%	97.53%	NS	90.11%	99.12%	97.47%	96.35%
Live calling results for customer care (IVR)											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	82	100	NS	100	86	53	100
Number of calls getting connected and answered (electronically)		100	100	100	82	100	NS	100	86	53	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received		100	100	100	82	100	NS	100	86	53	100
Total Number of calls getting connected and answered		100	96	99	82	100	NS	100	86	53	100
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	96.00%	99.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	100.00%

13.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated											
Termination	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of closure request		273	8863	3429	4020	2608	NS	2031	717	1437	26946
Number of requests attended within 7 days		273	8863	3429	3789	2608	NS	2031	717	1437	26946
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	94.25%	100.00%	NS	100.00%	100.00%	100.00%	100.00%

Data Source: Customer Service Center of the operators

13.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated											
Refund	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cases requiring refund of deposits		433	711	99	1828	NA	NS	1540	116	73	11643
Total number of cases where refund was made within 60 days		433	711	99	1828	NA	NS	1061	116	73	11643
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NS	68.90%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

13.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests										
Resolution of service requests	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made	92	100	94	100	48	NS	100	100	78	100
Number of cases resolved to satisfaction	92	95	64	99	47	NS	95	95	46	100
Percentage cases resolved in four weeks	100.00%	95.00%	68.09%	99.00%	97.92%	NS	95.00%	95.00%	58.97%	100.00%

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

13.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services											
Level 1 services		Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total no. of calls made		252	252	258	246	258	NS	258	NDR	258	258
Calls answered		72	120	180	126	120	NS	138	NDR	114	180
% of calls connected	≥ 95%	28.57%	47.62%	69.77%	51.22%	46.51%	NS	53.49%	NA	44.19%	69.77%

13.7 LEVEL 1 SERVICE CALLS MADE

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

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

Aircel							
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected	Calls Made(PROPORTIONATE)	Calls Connected (PROPORTIONATE)
100	Police	Y		40	40	6	6
101	Fire	Y		22	22	6	6
102	Ambulance	Y		18	18	6	6
104	Health Information Helpline		N			0	0
108	Emergency and Disaster Management Helpline	Y		27	27	6	6
138	All India Helpine for Passangers		N			6	0
149	Public Road Transport Utility Service		N			0	0
181	Chief Minister Helpline		N			0	0
182	Indian Railway Security Helpline		N			6	0
1033	Road Accident Management Service		N			0	0
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N			6	0
1056	Emergency Medical Services		N			0	0
106X	State of the Art Hospitals		N			6	0
1063	Public Grievance Cell DoT Hq		N			6	0
1064	Anti Corruption Helpline		N			0	0
1070	Relief Commission for Natural Calamities	Y		14	14	6	6
1071	Air Accident Helpline	Y		26	26	6	6
1072	Rail Accident Helpline		N			0	0
1073	Road Accident Helpline	Y		31	31	6	6

1077	Control Room for District Collector		N			0	0
1090	Call Alart (Crime Branch)		N			6	0
1091	Women Helpline		N			6	0
1097	National AIDS Helpline to NACO		N			0	0
1099	Central Accident and Trauma Services (CATS)		N			0	0
10580	Educationa & Vocational Guidance and Counselling		N			0	0
10589	Mother and Child Tracking (MCTH)		N			0	0
10740	Central Pollution Control Board		N			0	0
10741	Pollution Control Board		N			0	0
1511	Police Related Service for all Metro Railway Project		N			6	0
1512	Prevention of Crime in Railway	Y		16	16	6	6
1514	National Career Service(NCS)		N			6	0
15100	Free Legal Service Helpline		N			6	0
155304	Municipal Corporations		N			6	0
155214	Labour Helpline		N			6	0
1903	Sashastra Seema Bal (SSB)		N			6	0
1909	National Do Not Call Registry	Y		91	91	6	6
1912	Complaint of Electricity		N			6	0
1916	Drinking Water Supply		N			6	0
1950	Election Commission of India		N			6	0
1965	Vigilance as Anti Corruption Helpline		N			6	0
1323	IRCTC Railway e-Catering Services	Y		6	6	6	6
155350	Aviators Air Rescue Pvt. Ltd		N			6	0
155256	Indian Airforce (IAF)		N			6	0
14444	Cash Kukt Bharat Abhiyan Helpline		N			6	0
1906	Petroleum Industry Emergency Helpline		N			6	0
1517	Child Helpline		N			6	0
1533	NDMC Citizen Facilitation Service to NDMC		N			6	0
1095	Traffic Control Helpline		N			6	0
1079	Disaster Management Service		N			0	0

155226	Indian Airforce (IAF) Helpline		N			6	0
10582	Women and Child Trakicking Helpline		N			6	0
155225	CISF Helpline		N			6	0
1955	IVRS system on Call drop		N			0	0
1922	Hon'l Prime Minister Mann ki Baat	Y		6	6	6	6
14404	National Consumer Helpline		N			6	0
1800-313-1947	UIDAI	Y		43	43	6	6
155231	Helpline for Women Workers		N			6	0
14441	National Informatics Centre (NIC)		N			6	0
Airtel							
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected	Calls Made(PROPORTIONATE)	Calls Connected (PROPORTIONATE)
100	Police	Y		5	5	6	6
101	Fire	Y		5	5	6	6
102	Ambulance	Y		5	5	6	6
104	Health Information Helpline		N			0	0
108	Emergency and Disaster Management Helpline		N			6	0
138	All India Helpine for Passangers	Y		5	5	6	6
149	Public Road Transport Utility Service		N			0	0
181	Chief Minister Helpline	Y		5	5	0	0
182	Indian Railway Security Helpline	Y		5	5	6	6
1033	Road Accident Management Service		N			0	0
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N			6	0
1056	Emergency Medical Services		N			0	0
106X	State of the Art Hospitals		N			6	0
1063	Public Grievance Cell DoT Hq		N			6	0
1064	Anti Corruption Helpline		N			0	0
1070	Relief Commission for Natural Calamities	Y		5	5	6	6
1071	Air Accident Helpline	Y		5	5	6	6

1072	Rail Accident Helpline	Y		5	5	0	0
1073	Road Accident Helpline	Y		5	5	6	6
1077	Control Room for District Collector		N			0	0
1090	Call Alart (Crime Branch)	Y		5	5	6	6
1091	Women Helpline		N			6	0
1097	National AIDS Helpline to NACO	Y		5	5	0	0
1099	Central Accident and Trauma Services (CATS)		N			0	0
10580	Educationa & Vocational Guidance and Counselling		N			0	0
10589	Mother and Child Tracking (MCTH)		N			0	0
10740	Central Pollution Control Board		N			0	0
10741	Pollution Control Board		N			0	0
1511	Police Related Service for all Metro Railway Project		N			6	0
1512	Prevention of Crime in Railway		N			6	0
1514	National Career Service(NCS)		N			6	0
15100	Free Legal Service Helpline		N			6	0
155304	Municipal Corporations		N			6	0
155214	Labour Helpline		N			6	0
1903	Sashastra Seema Bal (SSB)	Y		5	5	6	6
1909	National Do Not Call Registry	Y		5	5	6	6
1912	Complaint of Electricity	Y		5	5	6	6
1916	Drinking Water Supply		N			6	0
1950	Election Commission of India	Y		5	5	6	6
1965	Vigilance as Anti Corruption Helpline	Y		5	5	6	6
1323	IRCTC Railway e-Catering Services	Y		5	5	6	6
155350	Aviators Air Rescue Pvt. Ltd	Y		5	5	6	6
155256	Indian Airforce (IAF)		N			6	0
14444	Cash Kukt Bharat Abhiyan Helpline		N			6	0
1906	Petroleum Industry Emergency Helpline	Y		5	5	6	6
1517	Child Helpline		N			6	0
1533	NDMC Citizen Facilitation Service to NDMC		N			6	0

1095	Traffic Control Helpline		N			6	0
1079	Disaster Management Service		N			0	0
155226	Indian Airforce (IAF) Helpline	Y		5	5	6	6
10582	Women and Child Trakicking Helpline		N			6	0
155225	CISF Helpline		N			6	0
1955	IVRS system on Call drop		N			0	0
1922	Hon'l Prime Minister Mann ki Baat		N			6	0
14404	National Consumer Helpline	Y		5	5	6	6
1800-313-1947	UIDAI	Y		5	5	6	6
155231	Helpline for Women Workers		N			6	0
14441	National Informatics Centre (NIC)		N			6	0
BSNL							
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected	Calls Made(PROPORTIONATE)	Calls Connected (PROPORTIONATE)
100	Police	Y		6	6	6	6
101	Fire	Y		6	6	6	6
102	Ambulance	Y		6	6	6	6
104	Health Information Helpline		N			0	0
108	Emergency and Disaster Management Helpline		N			6	0
138	All India Helpine for Passangers	Y		6	5	6	6
149	Public Road Transport Utility Service	Y		6	5	0	0
181	Chief Minister Helpline	Y		6	4	6	6
182	Indian Railway Security Helpline	Y		6	6	6	6
1033	Road Accident Management Service		N			0	0
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N			6	0
1056	Emergency Medical Services		N			0	0
106X	State of the Art Hospitals		N			6	0
1063	Public Grievance Cell DoT Hq		N			6	0
1064	Anti Corruption Helpline		N			0	0

1070	Relief Commission for Natural Calamities	Y		6	1	6	6
1071	Air Accident Helpline	Y		6	6	6	6
1072	Rail Accident Helpline		N			0	0
1073	Road Accident Helpline	Y		6	6	6	6
1077	Control Room for District Collector		N			0	0
1090	Call Alart (Crime Branch)	Y		3	3	6	6
1091	Women Helpline	Y		5	2	6	6
1097	National AIDS Helpline to NACO		N			0	0
1099	Central Accident and Trauma Services (CATS)		N			0	0
10580	Educationa & Vocational Guidance and Counselling		N			0	0
10589	Mother and Child Tracking (MCTH)		N			0	0
10740	Central Pollution Control Board		N			0	0
10741	Pollution Control Board		N			0	0
1511	Police Related Service for all Metro Railway Project	Y		6	6	6	6
1512	Prevention of Crime in Railway	Y		6	6	6	6
1514	National Career Service(NCS)	Y		6	5	6	6
15100	Free Legal Service Helpline		N			6	0
155304	Municipal Corporations	Y		6	4	6	6
155214	Labour Helpline	Y		6	5	6	6
1903	Sashastra Seema Bal (SSB)		N			6	0
1909	National Do Not Call Registry	Y		6	6	6	6
1912	Complaint of Electricity	Y		6	6	6	6
1916	Drinking Water Supply		N			6	0
1950	Election Commission of India	Y		6	6	6	6
1965	Vigilance as Anti Corruption Helpline		N			6	0
1323	IRCTC Railway e-Catering Services	Y		6	6	6	6
155350	Aviators Air Rescue Pvt. Ltd		N			6	0
155256	Indian Airforce (IAF)	Y		6	4	6	6
14444	Cash Kukt Bharat Abhiyan Helpline	Y		4	2	6	6
1906	Petroleum Industry Emergency Helpline	Y		5	3	6	6

1517	Child Helpline	Y		6	6	6	6
1533	NDMC Citizen Facilitation Service to NDMC		N			6	0
1095	Traffic Control Helpline	Y		5	5	6	6
1079	Disaster Management Service		N			0	0
155226	Indian Airforce (IAF) Helpline	Y		5	4	6	6
10582	Women and Child Trakicking Helpline		N			6	0
155225	CISF Helpline	Y		2	2	6	6
1955	IVRS system on Call drop		N			0	0
1922	Hon'l Prime Minister Mann ki Baat		N			6	0
14404	National Consumer Helpline		N			6	0
1800-313-1947	UIDAI	Y		5	5	6	6
155231	Helpline for Women Workers	Y		5	5	6	6
14441	National Informatics Centre (NIC)	Y		3	3	6	6
Idea							
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected	Calls Made(PROPORTIONATE)	Calls Connected (PROPORTIONATE)
100	Police	Y		13	13	6	6
101	Fire	Y		13	13	6	6
102	Ambulance		N			6	0
104	Health Information Helpline		N			0	0
108	Emergency and Disaster Management Helpline		N			6	0
138	All India Helpine for Passangers	Y		13	13	6	6
149	Public Road Transport Utility Service		N			0	0
181	Chief Minister Helpline		N			6	0
182	Indian Railway Security Helpline	Y		13	13	6	6
1033	Road Accident Management Service		N			0	0
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N			6	0
1056	Emergency Medical Services		N			0	0
106X	State of the Art Hospitals		N			6	0

1063	Public Grievance Cell DoT Hq		N			6	0
1064	Anti Corruption Helpline		N			0	0
1070	Relief Commission for Natural Calamities		N			6	0
1071	Air Accident Helpline	Y		13	13	6	6
1072	Rail Accident Helpline		N			0	0
1073	Road Accident Helpline	Y		13	13	6	6
1077	Control Room for District Collector		N			0	0
1090	Call Alart (Crime Branch)	Y		13	13	6	6
1091	Women Helpline	Y		13	13	6	6
1097	National AIDS Helpline to NACO	Y		13	13	0	0
1099	Central Accident and Trauma Services (CATS)		N			0	0
10580	Educationa & Vocational Guidance and Counselling		N			0	0
10589	Mother and Child Tracking (MCTH)		N			0	0
10740	Central Pollution Control Board		N			0	0
10741	Pollution Control Board		N			0	0
1511	Police Related Service for all Metro Railway Project		N			6	0
1512	Prevention of Crime in Railway	Y		13	13	6	6
1514	National Career Service(NCS)		N			6	0
15100	Free Legal Service Helpline		N			6	0
155304	Municipal Corporations		N			6	0
155214	Labour Helpline		N			6	0
1903	Sashastra Seema Bal (SSB)	Y		13	13	6	6
1909	National Do Not Call Registry	Y		13	13	6	6
1912	Complaint of Electricity	Y		13	13	6	6
1916	Drinking Water Supply		N			6	0
1950	Election Commission of India	Y		13	13	6	6
1965	Vigilance as Anti Corruption Helpline		N			6	0
1323	IRCTC Railway e-Catering Services	Y		13	13	6	6
155350	Aviators Air Rescue Pvt. Ltd	Y		13	13	6	6
155256	Indian Airforce (IAF)		N			6	0

14444	Cash Kukt Bharat Abhiyan Helpline		N			6	0
1906	Petroleum Industry Emergency Helpline	Y		13	13	6	6
1517	Child Helpline		N			6	0
1533	NDMC Citizen Facilitation Service to NDMC	Y		13	13	6	6
1095	Traffic Control Helpline		N			6	0
1079	Disaster Management Service		N			0	0
155226	Indian Airforce (IAF) Helpline	Y		13	13	6	6
10582	Women and Child Trakicking Helpline	Y		13	13	6	6
155225	CISF Helpline		N			6	0
1955	IVRS system on Call drop		N			0	0
1922	Hon'l Prime Minister Mann ki Baat	Y		13	13	6	6
14404	National Consumer Helpline	Y		13	13	6	6
1800-313-1947	UIDAI	Y		14	14	6	6
155231	Helpline for Women Workers		N			6	0
14441	National Informatics Centre (NIC)		N			6	0
MTS							
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected	Calls Made(PROPORTIONATE)	Calls Connected (PROPORTIONATE)
100	Police	Y		15	15	6	6
101	Fire	Y		13	13	6	6
102	Ambulance	Y		7	7	6	6
104	Health Information Helpline		N			0	0
108	Emergency and Disaster Management Helpline		N			6	0
138	All India Helpine for Passangers		N			6	0
149	Public Road Transport Utility Service		N			0	0
181	Chief Minister Helpline		N			6	0
182	Indian Railway Security Helpline	Y		22	22	6	6
1033	Road Accident Management Service		N			0	0
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N			6	0

1056	Emergency Medical Services		N			0	0
106X	State of the Art Hospitals		N			6	0
1063	Public Grievance Cell DoT Hq		N			6	0
1064	Anti Corruption Helpline		N			0	0
1070	Relief Commission for Natural Calamities		N			6	0
1071	Air Accident Helpline	Y		5	5	6	6
1072	Rail Accident Helpline	Y		5	5	0	0
1073	Road Accident Helpline	Y		21	21	6	6
1077	Control Room for District Collector		N			0	0
1090	Call Alart (Crime Branch)	Y		2	2	6	6
1091	Women Helpline		N			6	0
1097	National AIDS Helpline to NACO		N			0	0
1099	Central Accident and Trauma Services (CATS)		N			0	0
10580	Educationa & Vocational Guidance and Counselling		N			0	0
10589	Mother and Child Tracking (MCTH)		N			0	0
10740	Central Pollution Control Board		N			0	0
10741	Pollution Control Board		N			0	0
1511	Police Related Service for all Metro Railway Project		N			6	0
1512	Prevention of Crime in Railway	Y		19	19	6	6
1514	National Career Service(NCS)		N			6	0
15100	Free Legal Service Helpline		N			6	0
155304	Municipal Corporations		N			6	0
155214	Labour Helpline		N			6	0
1903	Sashastra Seema Bal (SSB)	Y		13	13	6	6
1909	National Do Not Call Registry	Y		23	23	6	6
1912	Complaint of Electricity	Y		22	22	6	6
1916	Drinking Water Supply		N			6	0
1950	Election Commission of India		N			6	0
1965	Vigilance as Anti Corruption Helpline		N			6	0
1323	IRCTC Railway e-Catering Services	Y		26	26	6	6

155350	Aviators Air Rescue Pvt. Ltd	Y		7	7	6	6
155256	Indian Airforce (IAF)		N			6	0
14444	Cash Kukt Bharat Abhiyan Helpline		N			6	0
1906	Petroleum Industry Emergency Helpline	Y		20	20	6	6
1517	Child Helpline	Y		17	17	6	6
1533	NDMC Citizen Facilitation Service to NDMC		N			6	0
1095	Traffic Control Helpline		N			6	0
1079	Disaster Management Service		N			0	0
155226	Indian Airforce (IAF) Helpline	Y		4	4	6	6
10582	Women and Child Trakicking Helpline	Y		4	4	6	6
155225	CISF Helpline		N			6	0
1955	IVRS system on Call drop		N			0	0
1922	Hon'l Prime Minister Mann ki Baat	Y		5	5	6	6
14404	National Consumer Helpline	Y		20	20	6	6
1800-313-1947	UIDAI	Y		25	25	6	6
155231	Helpline for Women Workers		N			6	0
14441	National Informatics Centre (NIC)		N			6	0
Reliance							
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected	Calls Made(PROPORTIONATE)	Calls Connected (PROPORTIONATE)
100	Police	Y		5	5	6	6
101	Fire	Y		4	4	6	6
102	Ambulance		N			6	0
104	Health Information Helpline		N			0	0
108	Emergency and Disaster Management Helpline		N			6	0
138	All India Helpine for Passangers	Y		4	4	6	6
149	Public Road Transport Utility Service		N			0	0
181	Chief Minister Helpline		N			6	0
182	Indian Railway Security Helpline	Y		7	7	6	6
1033	Road Accident Management Service		N			0	0

1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N			6	0
1056	Emergency Medical Services		N			0	0
106X	State of the Art Hospitals		N			6	0
1063	Public Grievance Cell DoT Hq		N			6	0
1064	Anti Corruption Helpline		N			0	0
1070	Relief Commission for Natural Calamities	Y		7	7	6	6
1071	Air Accident Helpline	Y		7	7	6	6
1072	Rail Accident Helpline		N			0	0
1073	Road Accident Helpline	Y		7	7	6	6
1077	Control Room for District Collector		N			0	0
1090	Call Alart (Crime Branch)	Y		7	7	6	6
1091	Women Helpline	Y		3	3	6	6
1097	National AIDS Helpline to NACO	Y		7	7	0	0
1099	Central Accident and Trauma Services (CATS)		N			0	0
10580	Educationa & Vocational Guidance and Counselling		N			0	0
10589	Mother and Child Tracking (MCTH)		N			0	0
10740	Central Pollution Control Board		N			0	0
10741	Pollution Control Board		N			0	0
1511	Police Related Service for all Metro Railway Project		N			6	0
1512	Prevention of Crime in Railway	Y		8	8	6	6
1514	National Career Service(NCS)		N			6	0
15100	Free Legal Service Helpline		N			6	0
155304	Municipal Corporations		N			6	0
155214	Labour Helpline		N			6	0
1903	Sashastra Seema Bal (SSB)	Y		7	7	6	6
1909	National Do Not Call Registry	Y		7	7	6	6
1912	Complaint of Electricity	Y		7	7	6	6
1916	Drinking Water Supply	Y		7	7	6	6
1950	Election Commission of India	Y		7	7	6	6

1965	Vigilance as Anti Corruption Helpline		N			6	0
1323	IRCTC Railway e-Catering Services	Y		4	4	6	6
155350	Aviators Air Rescue Pvt. Ltd	Y		3	3	6	6
155256	Indian Airforce (IAF)		N			6	0
14444	Cash Kukt Bharat Abhiyan Helpline	Y		3	3	6	6
1906	Petroleum Industry Emergency Helpline		N			6	0
1517	Child Helpline	Y		4	4	6	6
1533	NDMC Citizen Facilitation Service to NDMC	Y		3	3	6	6
1095	Traffic Control Helpline		N			6	0
1079	Disaster Management Service		N			0	0
155226	Indian Airforce (IAF) Helpline		N			6	0
10582	Women and Child Trakicking Helpline		N			6	0
155225	CISF Helpline		N			6	0
1955	IVRS system on Call drop		N			0	0
1922	Hon'l Prime Minister Mann ki Baat	Y		3	3	6	6
14404	National Consumer Helpline	Y		3	3	6	6
1800-313-1947	UIDAI	Y		3	3	6	6
155231	Helpline for Women Workers		N			6	0
14441	National Informatics Centre (NIC)		N			6	0
Tata							
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected	Calls Made(PROPORTIONATE)	Calls Connected (PROPORTIONATE)
100	Police	Y		5	5	6	6
101	Fire	Y		5	5	6	6
102	Ambulance		N			6	0
104	Health Information Helpline		N			0	0
108	Emergency and Disaster Management Helpline		N			6	0
138	All India Helpine for Passangers	Y		5	5	6	6
149	Public Road Transport Utility Service		N			0	0
181	Chief Minister Helpline		N			6	0

182	Indian Railway Security Helpline	Y		5	5	6	6
1033	Road Accident Management Service		N			0	0
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N			6	0
1056	Emergency Medical Services		N			0	0
106X	State of the Art Hospitals		N			6	0
1063	Public Grievance Cell DoT Hq		N			6	0
1064	Anti Corruption Helpline		N			0	0
1070	Relief Commission for Natural Calamities	y		5	5	6	6
1071	Air Accident Helpline	Y		5	5	6	6
1072	Rail Accident Helpline		N			0	0
1073	Road Accident Helpline	Y		5	5	6	6
1077	Control Room for District Collector		N			0	0
1090	Call Alart (Crime Branch)		N			6	0
1091	Women Helpline		N			6	0
1097	National AIDS Helpline to NACO	Y		5	5	0	0
1099	Central Accident and Trauma Services (CATS)		N			0	0
10580	Educationa & Vocational Guidance and Counselling		N			0	0
10589	Mother and Child Tracking (MCTH)		N			0	0
10740	Central Pollution Control Board		N			0	0
10741	Pollution Control Board		N			0	0
1511	Police Related Service for all Metro Railway Project		N			6	0
1512	Prevention of Crime in Railway	Y		5	5	6	6
1514	National Career Service(NCS)		N			6	0
15100	Free Legal Service Helpline	Y		5	5	6	6
155304	Municipal Corporations		N			6	0
155214	Labour Helpline		N			6	0
1903	Sashastra Seema Bal (SSB)		N			6	0
1909	National Do Not Call Registry	Y		5	5	6	6
1912	Complaint of Electricity	Y		5	5	6	6

1916	Drinking Water Supply		N			6	0
1950	Election Commission of India	Y		5	0	6	6
1965	Vigilance as Anti Corruption Helpline		N			6	0
1323	IRCTC Railway e-Catering Services	Y		5	5	6	6
155350	Aviators Air Rescue Pvt. Ltd	Y		5	5	6	6
155256	Indian Airforce (IAF)		N			6	0
14444	Cash Kukt Bharat Abhiyan Helpline		N			6	0
1906	Petroleum Industry Emergency Helpline	Y		5	5	6	6
1517	Child Helpline		N			6	0
1533	NDMC Citizen Facilitation Service to NDMC		N			6	0
1095	Traffic Control Helpline		N			6	0
1079	Disaster Management Service		N			0	0
155226	Indian Airforce (IAF) Helpline	Y		5	5	6	6
10582	Women and Child Trakicking Helpline		N			6	0
155225	CISF Helpline		N			6	0
1955	IVRS system on Call drop		N			0	0
1922	Hon'l Prime Minister Mann ki Baat	Y		5	5	6	6
14404	National Consumer Helpline	Y		5	5	6	6
1800-313-1947	UIDAI	Y		5	5	6	6
155231	Helpline for Women Workers		N			6	0
14441	National Informatics Centre (NIC)		N			6	0
Vodafone							
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected	Calls Made(PROPORTIONATE)	Calls Connected (PROPORTIONATE)
100	Police	Y		8	8	6	6
101	Fire	Y		9	9	6	6
102	Ambulance	Y		1	0	6	6
104	Health Information Helpline		N			0	0
108	Emergency and Disaster Management Helpline		N			6	0
138	All India Helpine for Passangers	Y		9	9	6	6

149	Public Road Transport Utility Service		N			0	0
181	Chief Minister Helpline		N			6	0
182	Indian Railway Security Helpline	Y		10	10	6	6
1033	Road Accident Management Service		N			0	0
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N			6	0
1056	Emergency Medical Services		N			0	0
106X	State of the Art Hospitals	Y		1	1	6	6
1063	Public Grievance Cell DoT Hq	Y		1	0	6	6
1064	Anti Corruption Helpline		N			0	0
1070	Relief Commission for Natural Calamities	Y		1	1	6	6
1071	Air Accident Helpline	Y		1	1	6	6
1072	Rail Accident Helpline		N			0	0
1073	Road Accident Helpline	Y		8	8	6	6
1077	Control Room for District Collector		N			0	0
1090	Call Alart (Crime Branch)	Y		1	1	6	6
1091	Women Helpline		N			6	0
1097	National AIDS Helpline to NACO	Y		3	3	0	0
1099	Central Accident and Trauma Services (CATS)		N			0	0
10580	Educationa & Vocational Guidance and Counselling		N			0	0
10589	Mother and Child Tracking (MCTH)		N			0	0
10740	Central Pollution Control Board		N			0	0
10741	Pollution Control Board		N			0	0
1511	Police Related Service for all Metro Railway Project		N			6	0
1512	Prevention of Crime in Railway	Y		2	2	6	6
1514	National Career Service(NCS)		N			6	0
15100	Free Legal Service Helpline	Y		1	1	6	6
155304	Municipal Corporations		N			6	0
155214	Labour Helpline	Y		8	8	6	6
1903	Sashastra Seema Bal (SSB)	Y		1	1	6	6

1909	National Do Not Call Registry	Y		8	8	6	6
1912	Complaint of Electricity	Y		4	4	6	6
1916	Drinking Water Supply	Y		1	0	6	6
1950	Election Commission of India	Y		4	4	6	6
1965	Vigilance as Anti Corruption Helpline	Y		3	3	6	6
1323	IRCTC Railway e-Catering Services	Y		3	3	6	6
155350	Aviators Air Rescue Pvt. Ltd	Y		1	1	6	6
155256	Indian Airforce (IAF)		N			6	0
14444	Cash Kukt Bharat Abhiyan Helpline	Y		1	0	6	6
1906	Petroleum Industry Emergency Helpline	Y		4	4	6	6
1517	Child Helpline	Y		6	6	6	6
1533	NDMC Citizen Facilitation Service to NDMC	Y		3	3	6	6
1095	Traffic Control Helpline		N			6	0
1079	Disaster Management Service		N			0	0
155226	Indian Airforce (IAF) Helpline	Y		5	5	6	6
10582	Women and Child Trakicking Helpline		N			6	0
155225	CISF Helpline		N			6	0
1955	IVRS system on Call drop		N			0	0
1922	Hon'l Prime Minister Mann ki Baat	Y		1	1	6	6
14404	National Consumer Helpline					6	0
1800-313-1947	UIDAI	Y		3	3	6	6
155231	Helpline for Women Workers		N			6	0
14441	National Informatics Centre (NIC)	Y		1	0	6	6

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

13.8 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 Changeable)])

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))**

13.8.1 ERICSSON

Ericsson provides network support to Vodafone, Aircel, BSNL, Reliance CDMA 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.

13.8.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Airtel 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)

13.8.3 HUAWEI

Huawei provides network support to Idea, Tata GSM, Tata CDMA and MTS in the circle.

HUAWEI		
SR .NO	KPI	HUAWEI FORMULA
1	CALL SETUP SUCCES (NUM)	[Successful CS IS-95 Orig Call Setups + Successful CS IS-2000 Orig Call Setups + Successful CS IS-95 Term Call Setups + Successful CS IS-2000 Term Call Setups] ([1157628567] + [1157628587] + [1157628568] + [1157628588])
2	CALL SETUP SUCCES (DEN)	[CS IS-95 Orig Attempts + CS IS-2000 Orig Attempts + CS IS-95 Term Attempts + CS IS-2000 Term Attempts] ([1157628553] + [1157628573] + [1157628554] + [1157628574])
3	CALL SETUP SUCCESS RATE (%)	CALL SETUP SUCCES (NUM) / CALL SETUP SUCCES (DEN) * 100\

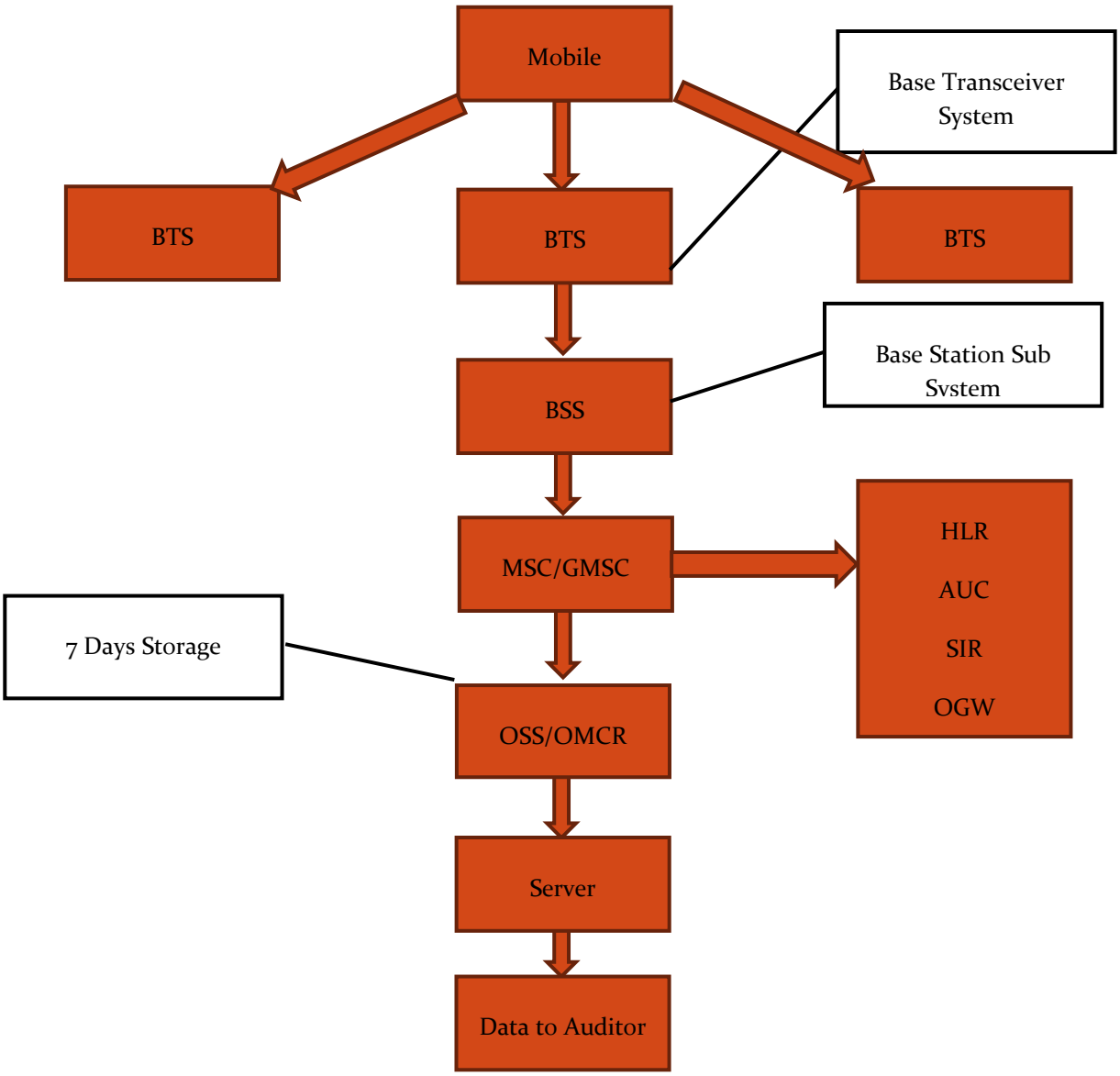
4	CALL DROP RATE (NUM)	[CS IS-95 Call Drops (Too many Erasure frames) + CS IS-2000 Call Drops (Too many Erasure frames) + CS IS-95 Call Drops (No reverse frame received) + CS IS-2000 Call Drops (No reverse frame received) + CS IS-95 Call Drops (Abis interface abnormal) + CS IS-2000 Call Drops (Abis interface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

13.9 BLOCK SCHEMATIC DIAGRAMS

13.9.1 ERICSSON

Ericsson provides network support to Vodafone, Aircel, BSNL, Reliance CDMA and Reliance GSM in the circle.

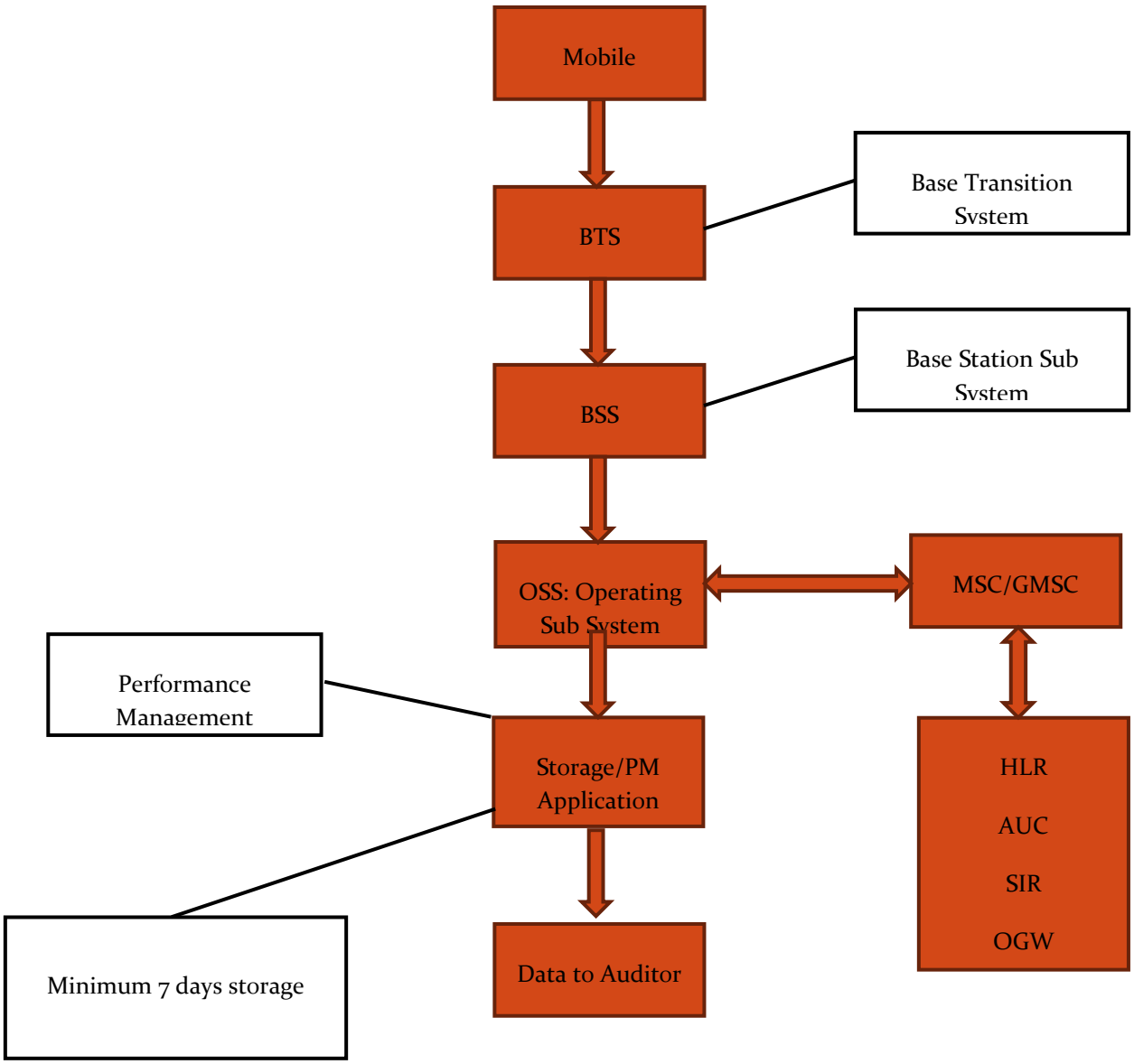
Ericsson



13.9.2 NSN (NOKIA SIEMENS NETWORKS)

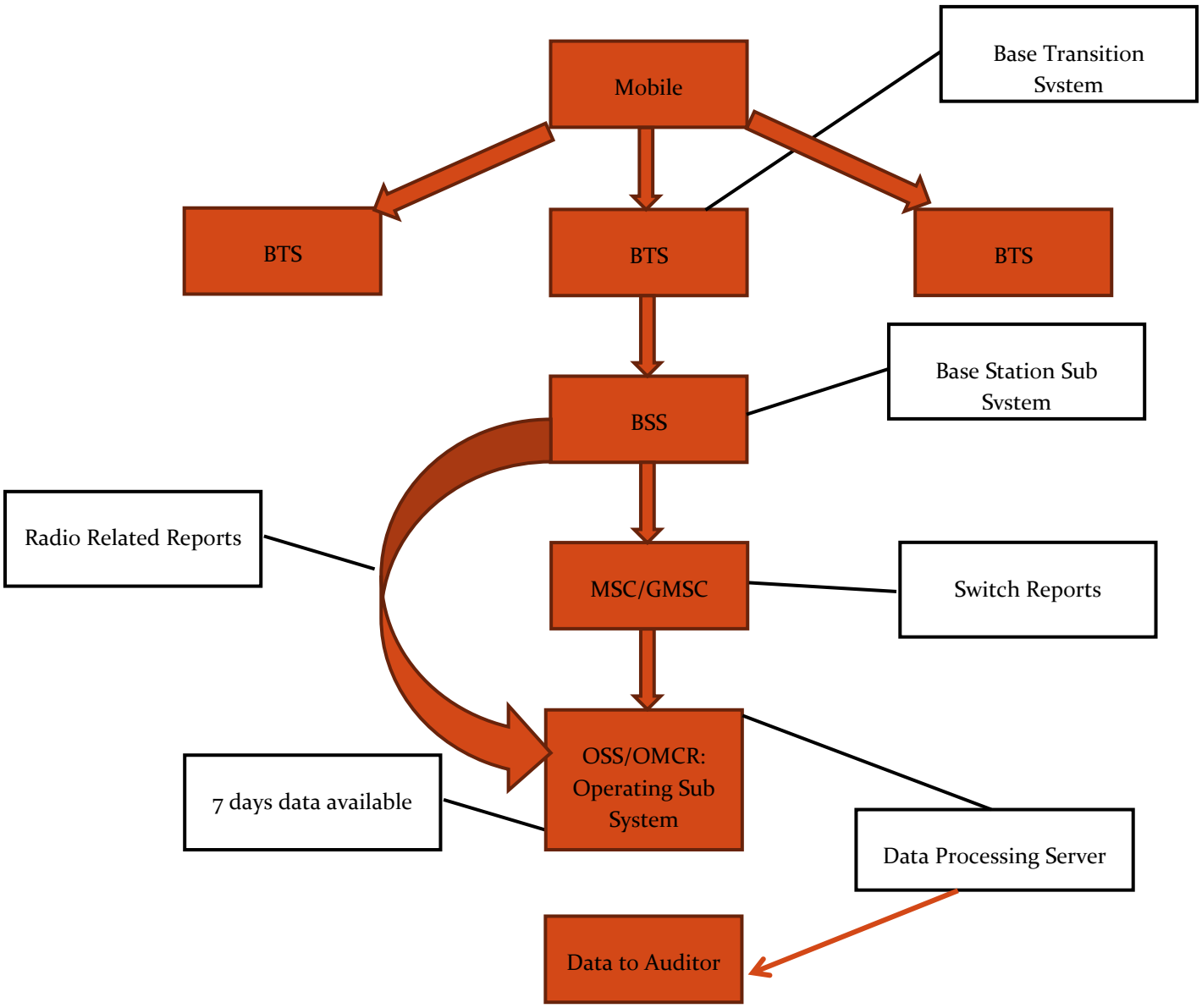
NSN provides network support to Airtel in the circle.

NSN



Huawei provides network support to Idea, Tata GSM, Tata CDMA and MTS in the circle.

Huawei



14 ANNEXURE – JANUARY -2G

1. Network Availability											
Audit Results for Network Availability- PMR data-January											
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		2407	2937	1277	2361	571	NS	1616	590	1779	2785
Sum of downtime of BTSs in a month (in hours)		1696	10	11028	3304	201	NS	18315	395	585	959
BTSs accumulated downtime (not available for service)	≤ 2%	0.10%	0.00%	1.16%	0.19%	0.05%	NS	1.52%	0.09%	0.04%	0.05%
Number of BTSs having accumulated downtime >24 hours		2	0	23	7	0	NS	98	0	1	6
Worst affected BTSs due to downtime	≤ 2%	0.08%	0.00%	1.80%	0.30%	0.00%	NS	6.06%	0.00%	0.06%	0.22%
Live Measurement Results for Network Availability- 3 Day live data-January											
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Sum of downtime of BTSs in a month (in hours)		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
BTSs accumulated downtime (not available for service)	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Number of BTSs having accumulated downtime >24 hours		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Worst affected BTSs due to downtime	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

2. Connection Establishment (Accessibility)											
Audit Results for CSSR, SDCCH and TCH congestion- PMR data-January											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	98.10%	99.60%	99.28%	99.72%	99.90%	NS	98.65%	99.24%	99.50%	99.53%
SDCCH/Paging channel congestion	≤ 1%	0.14%	0.03%	0.38%	0.05%	NA	NS	0.07%	NA	0.02%	0.04%
TCH congestion	≤ 2%	0.04%	0.03%	0.08%	0.12%	0.00%	NS	0.79%	0.16%	0.01%	0.47%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-January											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
SDCCH/Paging channel congestion	≤ 1%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
TCH congestion	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of call attempts		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

3. Connection Maintenance (Retainability)											
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**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		59048283	96217245	34895160	55078512	7079230	NS	NA	2943398	46086275	111109144
Total number of calls dropped		359860	616184	344064	155384	34653	NS	49661	9832	186020	806901
Call drop rate	≤ 2%	0.61%	0.64%	0.99%	0.28%	0.49%	NS	NA	0.33%	0.40%	0.73%
Total number of cells in the network		7214	8727	3561	7096	2195	NS	4847	1968	5288	7237
Total number of cells having more than 3% TCH		180	212	53	13	59	NS	17	58	61	200
Worst affected cells having more than 3% TCH	≤ 3%	2.50%	2.43%	1.49%	0.18%	2.69%	NS	0.35%	2.95%	1.15%	2.76%
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**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of cells in the network		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of cells having more than 3% TCH		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Worst affected cells having more than 3% TCH	≤ 3%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-January											
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

4. Voice quality											
Audit Results for Voice quality -PMR Data-January											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		12346045311	36847106517	6000	9079185895	68045	NS	7563165869	238950940	6507382856	17934586475
Total number of calls with good voice quality		12108186852	36234071248	5990	8907217615	67804	NS	7488864319	238103011	6425527580	17600022590
%age calls with good voice quality	≥ 95%	98.07%	98.34%	99.83%	98.11%	99.65%	NS	99.02%	99.65%	98.74%	98.13%
Live measurement results for Voice quality-3 Day data-January											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		NA	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	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Drive test results for Voice quality (Average of three drive tests) - DT data-January											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

5. POI Congestion											
Audit Results for POI Congestion- PMR data-January											
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		50	31	79	101	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81658	82245	402051	77146	35731	NS	11877	21516	13617	210980
Traffic served for all POIs (B)- in erlangs		30106	42385	10701	39067	6857	NS	9454	7126	5143	115295
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January											
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
No. of POIs not meeting benchmark		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Capacity of all POIs (A) - in erlangs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Traffic served for all POIs (B)- in erlangs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POI congestion	≤ 0.5%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

15 ANNEXURE – FEBRUARY-2G

1. Network Availability											
Audit Results for Network Availability- PMR data-February											
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		2400	2942	1280	2361	571	NS	1616	590	1780	2811
Sum of downtime of BTSs in a month (in hours)		938	99.21	13380	3580	73	NS	23102	130	523	410
BTSs accumulated downtime (not available for service)	≤ 2%	0.06%	0.01%	1.56%	0.23%	0.02%	NA	2.13%	0.03%	0.04%	0.02%
Number of BTSs having accumulated downtime >24 hours		4	0	24	8	0	NS	165	0	0	1
Worst affected BTSs due to downtime	≤ 2%	0.17%	0.00%	1.88%	0.34%	0.00%	NS	10.21%	0.00%	0.00%	0.04%
Live Measurement Results for Network Availability- 3 Day live data-February											
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Sum of downtime of BTSs in a month (in hours)		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
BTSs accumulated downtime (not available for service)	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Number of BTSs having accumulated downtime >24 hours		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Worst affected BTSs due to downtime	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

2. Connection Establishment (Accessibility)											
Audit Results for CSSR, SDCCH and TCH congestion- PMR data-February											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	98.20%	99.67%	99.30%	99.72%	99.90%	NS	94.86%	99.41%	99.49%	99.56%
SDCCH/Paging channel congestion	≤ 1%	0.17%	0.05%	0.26%	0.06%	NA	NS	0.13%	NA	0.02%	0.04%
TCH congestion	≤ 2%	0.04%	0.04%	0.39%	0.09%	0.00%	NS	0.42%	0.09%	0.02%	0.44%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-February											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
SDCCH/Paging channel congestion	≤ 1%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
TCH congestion	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February											
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of call attempts		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

3. Connection Maintenance (Retainability)											
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**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		54563511	93181023	N/A	53495212	6382481	NS	NA	3373334	43874413	106502822
Total number of calls dropped		330807	668049	N/A	155044	29767	NS	50569	8677	153182	754580
Call drop rate	≤ 2%	0.61%	0.72%	0.67%	0.29%	0.47%	NS	NA	0.26%	0.35%	0.71%
Total number of cells in the network		7195	8749	3570	7098	2195	NS	4847	1968	5286	7316
Total number of cells having more than 3% TCH		166	209	102	17	60	NS	20	56	47	202
Worst affected cells having more than 3% TCH	≤ 3%	2.31%	2.39%	2.86%	0.24%	2.73%	NS	0.41%	2.85%	0.89%	2.76%
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**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of cells in the network		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of cells having more than 3% TCH		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Worst affected cells having more than 3% TCH	≤ 3%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-February											
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

4. Voice quality											
Audit Results for Voice quality -PMR Data-February											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		11330153932	34628703126	N/A	8432583720	61460	NS	7168584746	233590703	6170427301	16777570766
Total number of calls with good voice quality		11108649621	34048848405	N/A	8268998594	61245	NS	7093974249	233026023	6093559772	16462297390
%age calls with good voice quality	≥ 95%	98.05%	98.33%	99.82%	98.06%	99.65%	NS	98.96%	99.76%	98.75%	98.12%
Live measurement results for Voice quality-3 Day data-February											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		NA	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	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Drive test results for Voice quality (Average of three drive tests) - DT data-February											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

5. POI Congestion											
Audit Results for POI Congestion- PMR data-February											
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		50	31	N/A	101	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81768	83299	N/A	76680	35319	NS	11877	20330	13591	218028
Traffic served for all POIs (B)- in erlangs		30297	41052	N/A	41338	6862	NS	9659	7216	5263	122675
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February											
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
No. of POIs not meeting benchmark		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total Capacity of all POIs (A) - in erlangs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Traffic served for all POIs (B)- in erlangs		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
POI congestion	≤ 0.5%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

16 ANNEXURE – MARCH-2G

1. Network Availability											
Audit Results for Network Availability- PMR data-March											
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2400	2934	1285	2362	571	NS	1616	590	1781	2830
Sum of downtime of BTSs in a month (in hours)		1156	24	16069	4074	297	NS	7105	821	1317	1064
BTSs accumulated downtime (not available for service)	≤ 2%	0.06%	0.00%	1.68%	0.23%	0.07%	NA	0.59%	0.19%	0.10%	0.05%
Number of BTSs having accumulated downtime >24 hours		6	0	25	9	0	NS	31	0	4	10
Worst affected BTSs due to downtime	≤ 2%	0.25%	0.00%	1.95%	0.38%	0.00%	NS	1.92%	0.00%	0.22%	0.35%
Live Measurement Results for Network Availability- 3 Day live data-March											
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2400	2934	1285	2362	571	NS	1616	590	1781	2830
Sum of downtime of BTSs in a month (in hours)		175	161	616	393	71	NS	983	0	31	83
BTSs accumulated downtime (not available for service)	≤ 2%	0.10%	0.08%	0.67%	0.23%	0.17%	NS	0.84%	0.00%	0.02%	0.04%
Number of BTSs having accumulated downtime >24 hours		1	0	3	6	0	NS	0	0	0	2
Worst affected BTSs due to downtime	≤ 2%	0.04%	0.00%	0.23%	0.25%	0.00%	NS	0.00%	0.00%	0.00%	0.07%

2. Connection Establishment (Accessibility)											
Audit Results for CSSR, SDCCH and TCH congestion- PMR data-March											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.30%	99.71%	99.31%	99.61%	99.87%	NS	98.68%	99.36%	99.47%	99.58%
SDCCH/Paging channel congestion	≤ 1%	0.14%	0.06%	0.56%	0.05%	NA	NS	0.11%	NA	0.05%	0.05%
TCH congestion	≤ 2%	0.07%	0.05%	1.78%	0.05%	0.00%	NS	0.28%	0.15%	0.02%	0.42%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-March											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.67%	99.73%	98.69%	99.61%	99.90%	NS	97.96%	99.52%	99.57%	99.74%
SDCCH/Paging channel congestion	≤ 1%	0.08%	0.05%	0.41%	0.05%	NA	NS	0.05%	NA	0.04%	0.05%
TCH congestion	≤ 2%	0.01%	0.04%	1.84%	0.01%	0.00%	NS	0.08%	0.02%	0.01%	0.26%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-March											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

3. Connection Maintenance (Retainability)											
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**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		60269089	103348588	92323297	62110733	7058308	NS	NA	3527460	47853532	120085011
Total number of calls dropped		360797	695958	1416226	172857	29372	NS	47913	8431	148741	847444
Call drop rate	≤ 2%	0.60%	0.67%	1.53%	0.28%	0.42%	NS	NA	0.24%	0.31%	0.71%
Total number of cells in the network		7197	8746	3587	7102	2195	NS	4847	1968	5294	7376
Total number of cells having more than 3% TCH		173	207	47	8	57	NS	21	53	45	199
Worst affected cells having more than 3% TCH	≤ 3%	2.40%	2.37%	1.31%	0.11%	2.61%	NS	0.43%	2.69%	0.85%	2.70%
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**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		74551434	10516107	17829170	77564491	8909051	NS	NA	4293964	58830610	168269539
Total number of calls dropped		359291	69162	265053	171404	28606	NS	41291	12048	149916	951607
Call drop rate	≤ 2%	0.48%	0.66%	1.49%	0.22%	0.32%	NS	NA	0.28%	0.25%	0.57%
Total number of cells in the network		7197	8746	3587	7102	2195	NS	4847	1968	5288	7376
Total number of cells having more than 3% TCH		159	206	76	1	2	NS	2	46	35	208
Worst affected cells having more than 3% TCH	≤ 3%	2.21%	2.36%	2.12%	0.01%	0.08%	NS	0.04%	2.34%	0.66%	2.82%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-March											
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

4. Voice quality											
Audit Results for Voice quality -PMR Data-March											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		12782606631	37909305975	6000	9561630747	68045	NS	6942719547	255681303	6658327949	19064332195
Total number of calls with good voice quality		12539534432	37295870241	5986	9377914069	67708	NS	6872089326	255046080	6581051471	18700984902
%age calls with good voice quality	≥ 95%	98.10%	98.38%	99.77%	98.08%	99.50%	NS	98.98%	99.75%	98.84%	98.09%
Live measurement results for Voice quality-3 Day data-March											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		15597312412	3881903850	600	10844362756	158040	NS	7991986750	347931316	8135169451	23387422731
Total number of calls with good voice quality		15373185937	3816758277	593	10665107331	156550	NS	7920697883	347076806	8066713044	22994228607
%age calls with good voice quality	≥ 95%	98.56%	98.32%	98.83%	98.35%	99.06%	NS	99.11%	99.75%	99.16%	98.32%
Drive test results for Voice quality (Average of three drive tests) - DT data-March											
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NS	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NS	NA	NA	NA	NA

5. POI Congestion											
Audit Results for POI Congestion- PMR data-March											
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		50	31	79	101	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81851	87121	52656	75742	36684	NS	19024	20273	12970	220218
Traffic served for all POIs (B)- in erlangs		30571	41014	10910	43536	11184	NS	7209	6999	4695	126542
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March											
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		50	31	79	102	40	NS	29	42	30	45
No. of POIs not meeting benchmark		0	0	0	0	0	NS	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81986	94616	52656	76641	35319	NS	19024	20070	12084	221433
Traffic served for all POIs (B)- in erlangs		16513	24636	11478	21557	6829	NS	6546	3892	2100	68069
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	NS	0.00%	0.00%	0.00%	0.00%

17 ANNEXURE – JANUARY -3G

1. Network Availability							
Audit Results for Network Availability- PMR data-January							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
(Number of Node Bs in the network in the licensed service area		1869	2508	775	1997	1351	2634
Sum of downtime (i.e. total outage time) of Node Bs		1529	9	7094	2002	2423	818
Node Bs downtime (not available for service)	≤ 2%	0.11%	0.00%	1.23%	0.13%	0.24%	0.04%
Number of Node Bs having accumulated downtime of >24 hours in a month		1	0	15	3	25	2
Worst affected Node Bs due to downtime	≤ 2%	0.05%	0.00%	1.94%	0.15%	1.85%	0.08%
Live Measurement Results for Network Availability- 3 Day live data-January							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
(Number of Node Bs in the network in the licensed service area		NA	NA	NA	NA	NA	NA
Sum of downtime (i.e. total outage time) of Node Bs		NA	NA	NA	NA	NA	NA
Node Bs downtime (not available for service)	≤ 2%	NA	NA	NA	NA	NA	NA
Number of Node Bs having accumulated downtime of >24 hours in a month		NA	NA	NA	NA	NA	NA
Worst affected Node Bs due to downtime	≤ 2%	NA	NA	NA	NA	NA	NA

2. Connection Establishment (Accessibility)							
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-January							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
CSSR	≥ 95%	99.67%	99.61%	97.09%	99.92%	99.93%	100.00%
RRC Congestion	≤ 1%	0.18%	0.00%	0.69%	0.0015%	0.05%	0.00%
Circuit Switched RAB Congestion	≤ 2%	0.01%	0.00%	1.32%	0.0016%	0.01%	0.00%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-January							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA
RRC Congestion	≤ 1%	NA	NA	NA	NA	NA	NA
Circuit Switched RAB Congestion	≤ 2%	NA	NA	NA	NA	NA	NA
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January							
CSSR	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of RRC attempts (A)		NA	NA	NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA

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-January							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		12107801	19752366	156240949	8024130	8317478	39009667
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		33487	49317	2758607	15451	3412	97856
Call drop rate (B/A*100)	≤ 2%	0.28%	0.25%	1.77%	0.19%	0.04%	0.25%
Total no. of cells in the licensed service area (B)		5598	7635	1720	6074	3984	7803
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		161	146	49	10	6	177
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.88%	1.91%	2.85%	0.16%	0.15%	2.27%
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**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA	NA	NA
Total no. of cells in the licensed service area (B)		NA	NA	NA	NA	NA	NA
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NA	NA	NA	NA	NA	NA
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NA	NA	NA	NA	NA	NA
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-January							
Call drop rate	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA	NA	NA

4. Voice quality							
Audit Results for Voice quality -PMR Data-January							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		45082731415	NA	6000	28160778000	NA	91913791401
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		598604921	NA	10	56542053	NA	1129152592
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.67%	99.00%	99.83%	99.80%	99.89%	98.77%
Live measurement results for Voice quality-3 Day data-January							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NA	NA
Drive test results for Voice quality (Average of three drive tests) - DT data-January							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NA	NA

5. POI Congestion							
Audit Results for POI Congestion- PMR data-January							
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of working POIs		50	31	79	101	29	45
No. of POIs not meeting benchmark		0	0	1	0	0	0
Total Capacity of all POIs (A) - in erlangs		81658	82245	402051	77146	11877	210980
Traffic served for all POIs (B)- in erlangs		30106	42385	10701	39067	9454	115295
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January							
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of working POIs		NA	NA	NA	NA	NA	NA
No. of POIs not meeting benchmark		NA	NA	NA	NA	NA	NA
Total Capacity of all POIs (A) - in erlangs		NA	NA	NA	NA	NA	NA
Traffic served for all POIs (B)- in erlangs		NA	NA	NA	NA	NA	NA
POI congestion	≤ 0.5%	NA	NA	NA	NA	NA	NA

18 ANNEXURE – FEBRUARY-3G

1. Network Availability							
Audit Results for Network Availability- PMR data-February							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
(Number of Node Bs in the network in the licensed service area		1868	2516	805	1997	1351	2661
Sum of downtime (i.e. total outage time) of Node Bs		755	16.11	7268	2276	2197	432
Node Bs downtime (not available for service)	≤ 2%	0.06%	0.00%	1.34%	0.17%	0.24%	0.02%
Number of Node Bs having accumulated downtime of >24 hours in a month		3	0	16	6	23	0
Worst affected Node Bs due to downtime	≤ 2%	0.16%	0.00%	1.99%	0.30%	1.70%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-February							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
(Number of Node Bs in the network in the licensed service area		NA	NA	NA	NA	NA	NA
Sum of downtime (i.e. total outage time) of Node Bs		NA	NA	NA	NA	NA	NA
Node Bs downtime (not available for service)	≤ 2%	NA	NA	NA	NA	NA	NA
Number of Node Bs having accumulated downtime of >24 hours in a month		NA	NA	NA	NA	NA	NA
Worst affected Node Bs due to downtime	≤ 2%	NA	NA	NA	NA	NA	NA

2. Connection Establishment (Accessibility)							
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-February							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
CSSR	≥ 95%	99.62%	99.62%	95.65%	99.91%	99.96%	100.00%
RRC Congestion	≤ 1%	0.20%	0.00%	0.73%	0.0017%	0.03%	0.00%
Circuit Switched RAB Congestion	≤ 2%	0.02%	0.00%	0.22%	0.0006%	0.02%	0.00%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-February							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA
RRC Congestion	≤ 1%	NA	NA	NA	NA	NA	NA
Circuit Switched RAB Congestion	≤ 2%	NA	NA	NA	NA	NA	NA
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February							
CSSR	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of RRC attempts (A)		NA	NA	NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA	NP	NA
%age blocked calls		NA	NA	NA	NA	NP	NA

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-February							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		11254903	19481051	4665970	7363269	7487054	30458166
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		33425	47643	52092	12930	3356	86580
Call drop rate (B/A*100)	≤ 2%	0.30%	0.24%	1.12%	0.18%	0.04%	0.28%
Total no. of cells in the licensed service area (B)		5595	7657	1720	6075	3984	7883
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		165	140	49	5	7	181
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.95%	1.83%	2.85%	0.08%	0.18%	2.30%
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**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA	NA	NA
Total no. of cells in the licensed service area (B)		NA	NA	NA	NA	NA	NA
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NA	NA	NA	NA	NA	NA
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NA	NA	NA	NA	NA	NA
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-February							
Call drop rate	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA	NP	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA	NP	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA	NP	NA

4. Voice quality							
Audit Results for Voice quality -PMR Data-February							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		40657961849	NA	6000	25272538000	NA	89132582847
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		538919492	NA	10	52122085	NA	946316498
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.67%	99.00%	99.83%	99.79%	99.89%	98.94%
Live measurement results for Voice quality-3 Day data-February							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NA	NA
Drive test results for Voice quality (Average of three drive tests) - DT data-February							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NP	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NP	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NP	NA

5. POI Congestion							
Audit Results for POI Congestion- PMR data-February							
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of working POIs		50	31	79	101	29	45
No. of POIs not meeting benchmark		0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81768	83299	402051	76680	11877	218028
Traffic served for all POIs (B)- in erlangs		30297	41052	10701	41338	9659	122675
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February							
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of working POIs		NA	NA	NA	NA	NA	NA
No. of POIs not meeting benchmark		NA	NA	NA	NA	NA	NA
Total Capacity of all POIs (A) - in erlangs		NA	NA	NA	NA	NA	NA
Traffic served for all POIs (B)- in erlangs		NA	NA	NA	NA	NA	NA
POI congestion	≤ 0.5%	NA	NA	NA	NA	NA	NA

19 ANNEXURE – MARCH-3G

1. Network Availability							
Audit Results for Network Availability- PMR data-March							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
(Number of Node Bs in the network in the licensed service area		1868	2545	835	1997	1375	2679
Sum of downtime (i.e. total outage time) of Node Bs		880	11	8298	2508	3157	654
Node Bs downtime (not available for service)	≤ 2%	0.06%	0.00%	1.34%	0.17%	0.31%	0.03%
Number of Node Bs having accumulated downtime of >24 hours in a month		4	0	16	4	25	1
Worst affected Node Bs due to downtime	≤ 2%	0.21%	0.00%	1.92%	0.20%	1.82%	0.04%
Live Measurement Results for Network Availability- 3 Day live data-March							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
(Number of Node Bs in the network in the licensed service area		1868	2545	835	1997	1375	2679
Sum of downtime (i.e. total outage time) of Node Bs		154	0	380	259	1159	44
Node Bs downtime (not available for service)	≤ 2%	0.11%	0.00%	0.63%	0.18%	1.17%	0.02%
Number of Node Bs having accumulated downtime of >24 hours in a month		1	0	2	4	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.05%	0.00%	0.24%	0.20%	0.00%	0.00%

2. Connection Establishment (Accessibility)							
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-March							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
CSSR	≥ 95%	99.53%	99.60%	95.99%	99.91%	99.98%	99.99%
RRC Congestion	≤ 1%	0.24%	0.00%	0.37%	0.0021%	0.02%	0.01%
Circuit Switched RAB Congestion	≤ 2%	0.08%	0.00%	0.67%	0.0011%	0.01%	0.01%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-March							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
CSSR	≥ 95%	99.56%	99.59%	95.86%	99.90%	100.00%	100.00%
RRC Congestion	≤ 1%	0.21%	0.00%	0.36%	0.00%	0.01%	0.00%
Circuit Switched RAB Congestion	≤ 2%	0.03%	0.00%	0.71%	0.00%	0.00%	0.01%
\							
CSSR	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of RRC attempts (A)		NA	NA	NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA

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-March							
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		12293294	22893942	61020184	8772209	7455835	34974972
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		34214	58193	519332	15550	3712	95455
Call drop rate (B/A*100)	≤ 2%	0.28%	0.25%	0.85%	0.18%	0.05%	0.27%
Total no. of cells in the licensed service area (B)		5595	7752	2462	6077	4052	7931
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		164	143	72	2	6	181
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.93%	1.84%	2.92%	0.03%	0.15%	2.28%
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**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		15216006	2478162	2575225	11146709	9461966	55319706
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		45651	6704	14454	18368	3763	146121
Call drop rate (B/A*100)	≤ 2%	0.30%	0.27%	0.56%	0.16%	0.04%	0.26%
Total no. of cells in the licensed service area (B)		5595	7752	2462	6077	4052	7931
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		155	150	20	4	5	187
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.77%	1.93%	0.81%	0.07%	0.12%	2.36%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-March							
Call drop rate	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA	NA	NA

4. Voice quality							
Audit Results for Voice quality -PMR Data-March							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		42238926967	NA	6000	29306885500	NA	103208749121
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		607401500	NA	14	64395856	NA	1105378231
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.56%	99.73%	99.77%	99.78%	99.89%	98.93%
Live measurement results for Voice quality-3 Day data-March							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		66044858004	21441607579	600	36626282500	NA	144414304782
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1004415705	21384143085	591	81514119	NA	1571398698
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.48%	99.73%	98.50%	99.87%	99.89%	98.91%
Drive test results for Voice quality (Average of three drive tests) - DT data-March							
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NA	NA

5. POI Congestion							
Audit Results for POI Congestion- PMR data-March							
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of working POIs		50	31	79	102	29	45
No. of POIs not meeting benchmark		0	0	1	0	0	0
Total Capacity of all POIs (A) - in erlangs		81851	87121	52656	75742	19024	220218
Traffic served for all POIs (B)- in erlangs		30571	41014	10910	43536	7209	126542
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March							
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**Reliance 3G**	**Vodafone 3G**
Total number of working POIs		50	31	79	102	29	45
No. of POIs not meeting benchmark		0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81986	94616	52656	76641	19024	221433
Traffic served for all POIs (B)- in erlangs		16513	24636	11478	21557	6546	68069
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	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. JAS'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