TRAI Audit Wireless Report for MPCG Circle

WEST ZONE

QE December 2015

Prepared by:

IMRB International | eTech

Submitted to:

TRAI
Telecom Regulatory Authority of India

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2 INTRODUCTION

2.1 ABOUT TRAI

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

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

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

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

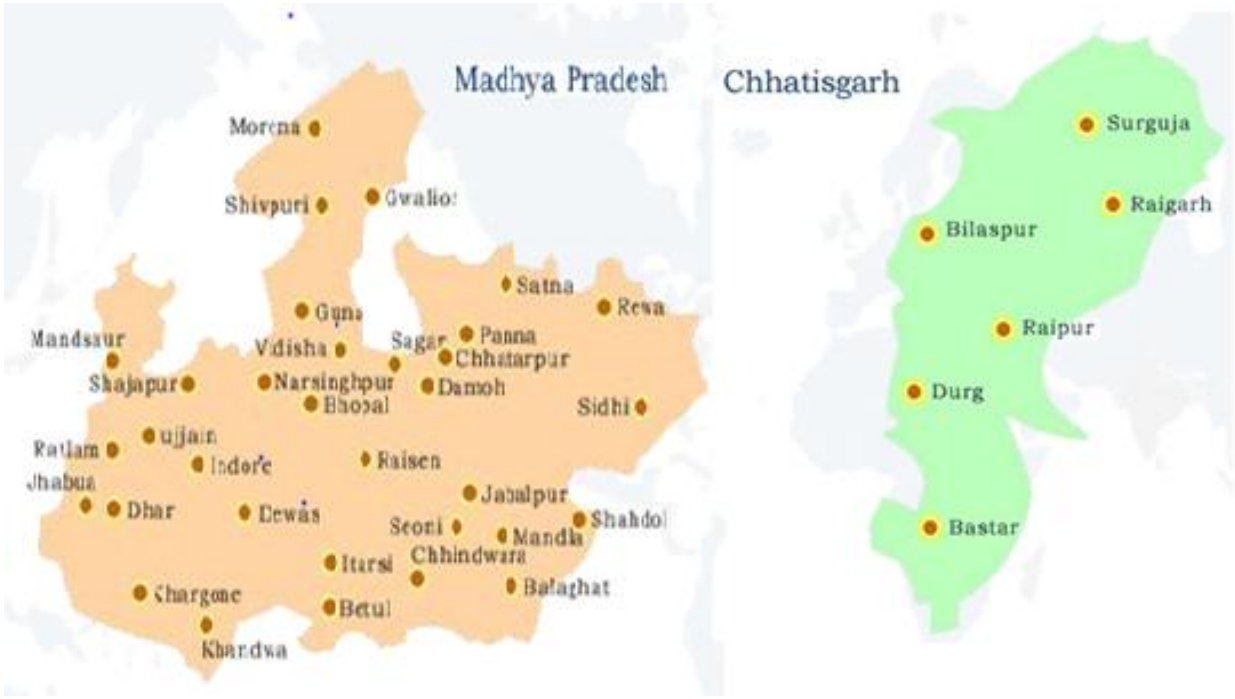
2.2 OBJECTIVES

The primary objective of the Audit module is to-

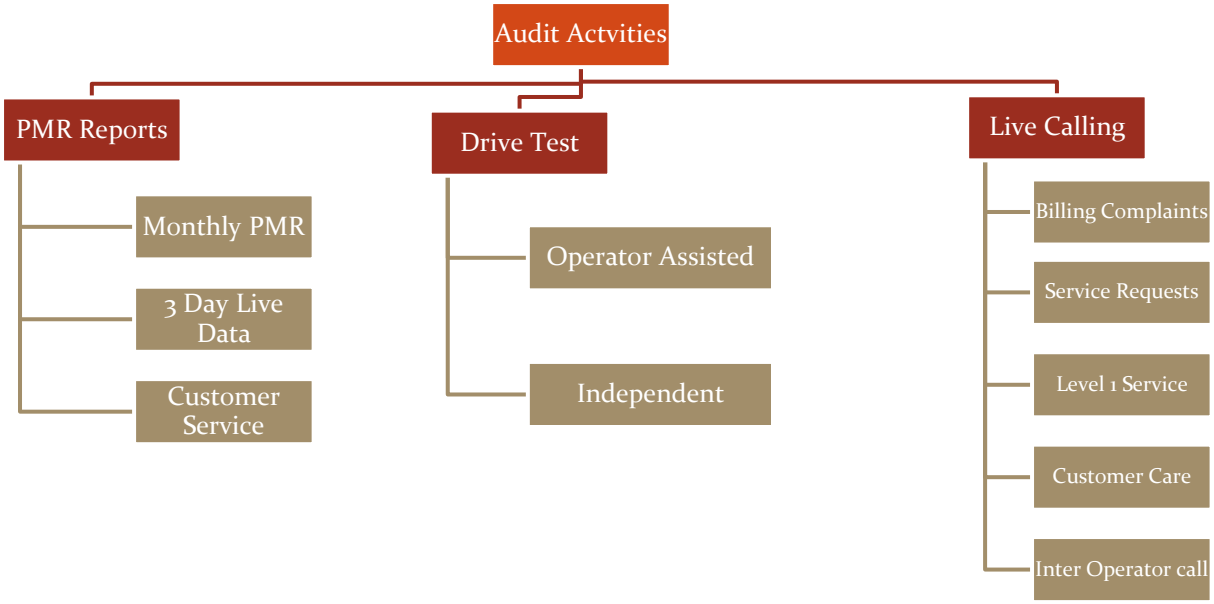
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report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

2.3 COVERAGE

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



2.4 FRAMEWORK USED

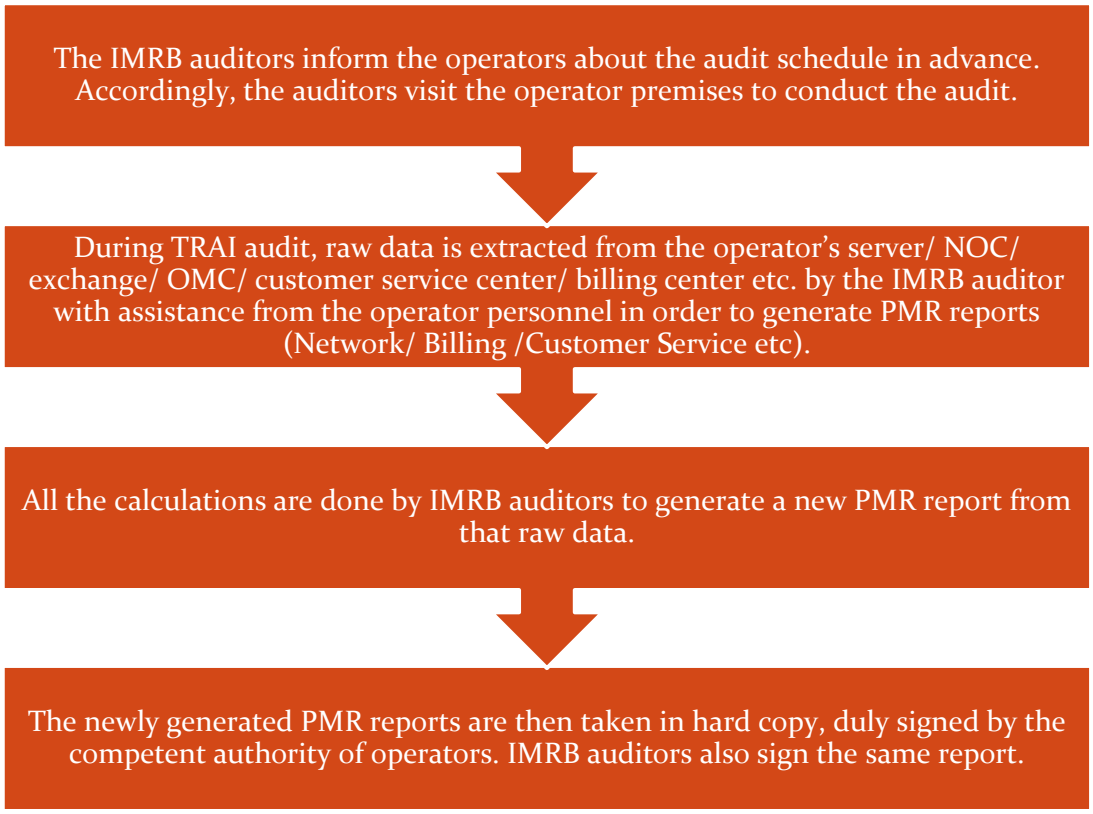


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

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



The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, October 2015 audit data was collected in the month of November 2015.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending December 2015 (OND'15) was collected in the month of January 2016.

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

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

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR 2G

This involved calculation of the various 2G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of October, November and December 2015. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.4.1.3 AUDIT PARAMETERS – NETWORK 2G

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

Network Related

Network Parameters - 2G		
Parameter Category	**Parameter**	**Benchmark**
Network Availability	**BTSs Accumulated downtime (not available for service)**	**≤ 2%**
	Worst affected BTSs due to downtime	**≤ 2%**
Connection Establishment (Accessibility)	**Call Set-up Success Rate (within licensee's own network)**	**≥ 95%**
	SDCCH/ Paging Chl. Congestion (%age)	**≤ 1%**
	TCH Congestion (%age)	**≤ 2%**
Connection Maintenance (Retainability)	**Call Drop Rate (%age)**	**≤ 2%**
	Worst affected cells having more than 3% TCH drop	**≤ 3%**
	%age of connection with good voice quality	**≥ 95%**
	Point of Interconnection (POI)	**≤ 0.5%**

2.4.1.4 MONTHLY PMR 3G

This involved calculation of the various 3G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of October, November and December 2015. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

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

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good Circuit Switched Voice Quality

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

2.4.1.5 AUDIT PARAMETERS – NETWORK 3G

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

Network Related

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

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

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

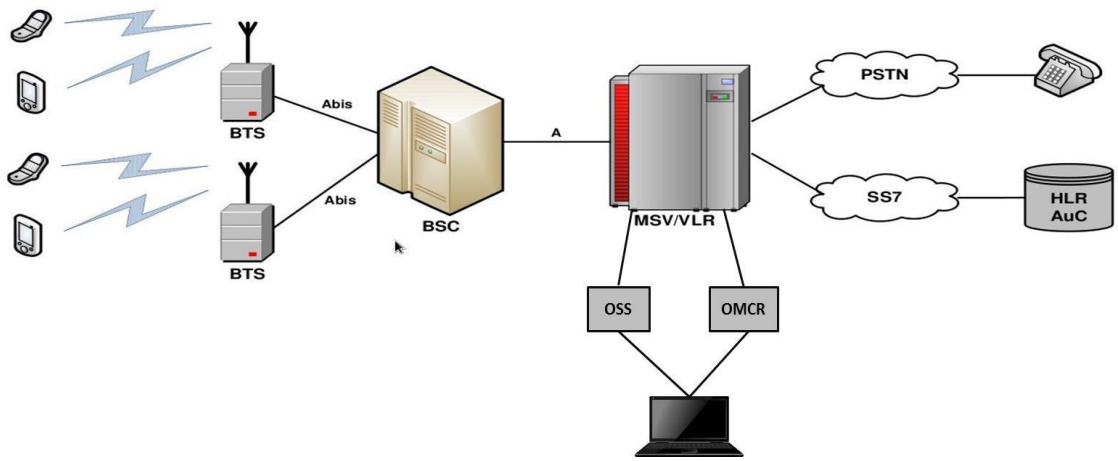
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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

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

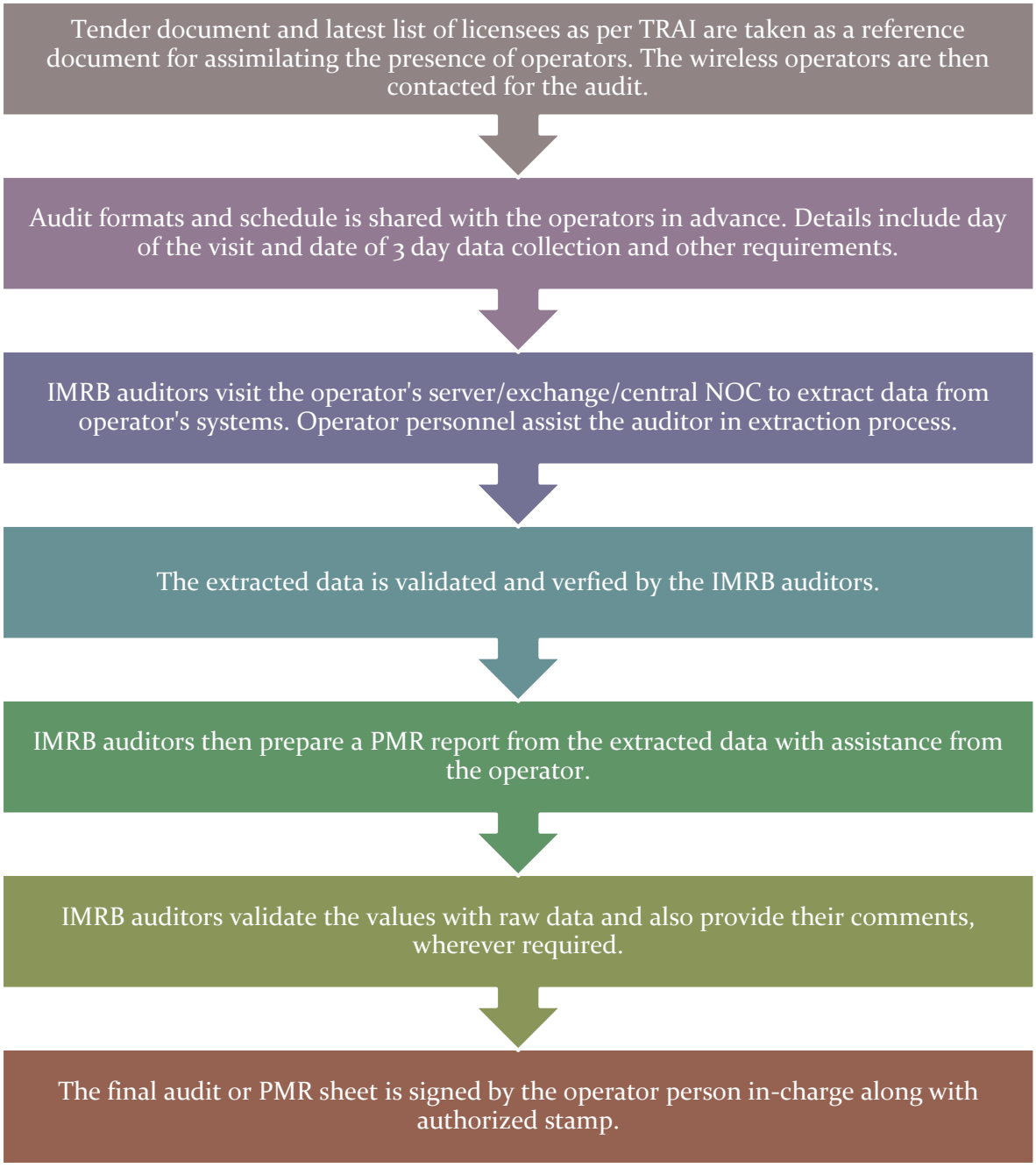
2.4.1.8 POINT OF DATA EXTRACTION

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



2.4.1.9 STEP BY STEP AUDIT PROCEDURE

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



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

2.4.1.10 CALCULATION METHODOLOGY – NETWORK PARAMETERS 2G

Parameter	Calculation Methodology
BTS Accumulated Downtime	Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100
Worst Affected BTS Due to Downtime	(Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100
Call Setup Success Rate	(Calls Established / Total Call Attempts) * 100
SDCCH/ Paging Channel Congestion	SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = Number of attempts to establish SDCCH / TCH made on day 1 C1 = Average SDCCH / TCH Congestion % on day 1 A2 = Number of attempts to establish SDCCH / TCH made on day 2 C2 = Average SDCCH / TCH Congestion % on day 2 An = Number of attempts to establish SDCCH / TCH made on day n Cn = Average SDCCH / TCH Congestion % on day n
TCH Congestion	
POI Congestion	POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
Call Drop Rate	Total Calls Dropped / Total Calls Established x 100
Worst Affected Cells having more than 3% TCH drop	Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the LSA x 100
Connections with good voice quality	No. of voice samples with good voice quality / Total number of samples x 100

2.4.1.11 CALCULATION METHODOLOGY – NETWORK PARAMETERS 3G

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

2.4.1.12 3 DAY LIVE DATA

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

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

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

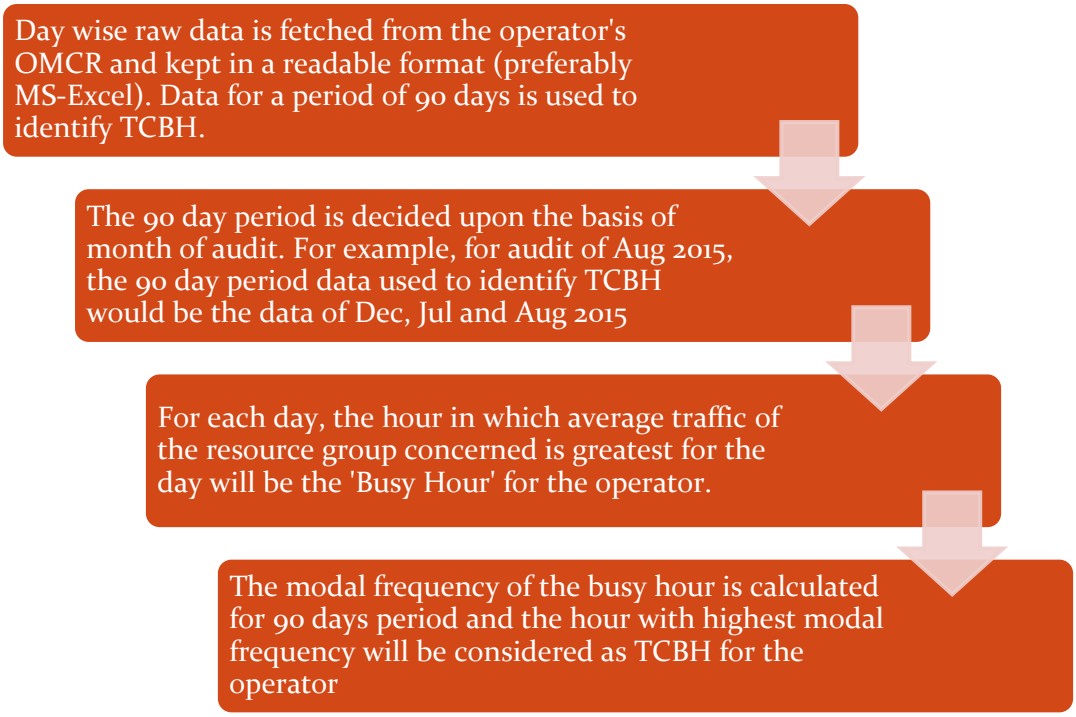
The 3 day live measurement was conducted for network parameters (2G & 3G) and wireless data services (2G & 3G).

Sl. No.	Name of Service Provider	Dates of live measurement Audit		
GSM Operators		Oct-15	Nov-15	Dec-15
1	AIRCEL	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
2	AIRTEL	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
3	BSNL	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
4	TATA GSM	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
5	IDEA	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
6	RCOM GSM	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
7	VIDEOCON	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
8	VODAFONE	28th to 30th Oct'15	2nd to 4th Nov'2015	2nd to 4th Dec'15
CDMA Operators				
9	RCOM CDMA	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
10	TATA CDMA	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
3G Operators				
11	BSNL 3G	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
12	TATA 3G	28th to 30th Oct'15	2nd to 4th Nov'2015	2nd to 4th Dec'15
13	IDEA 3G	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15

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.

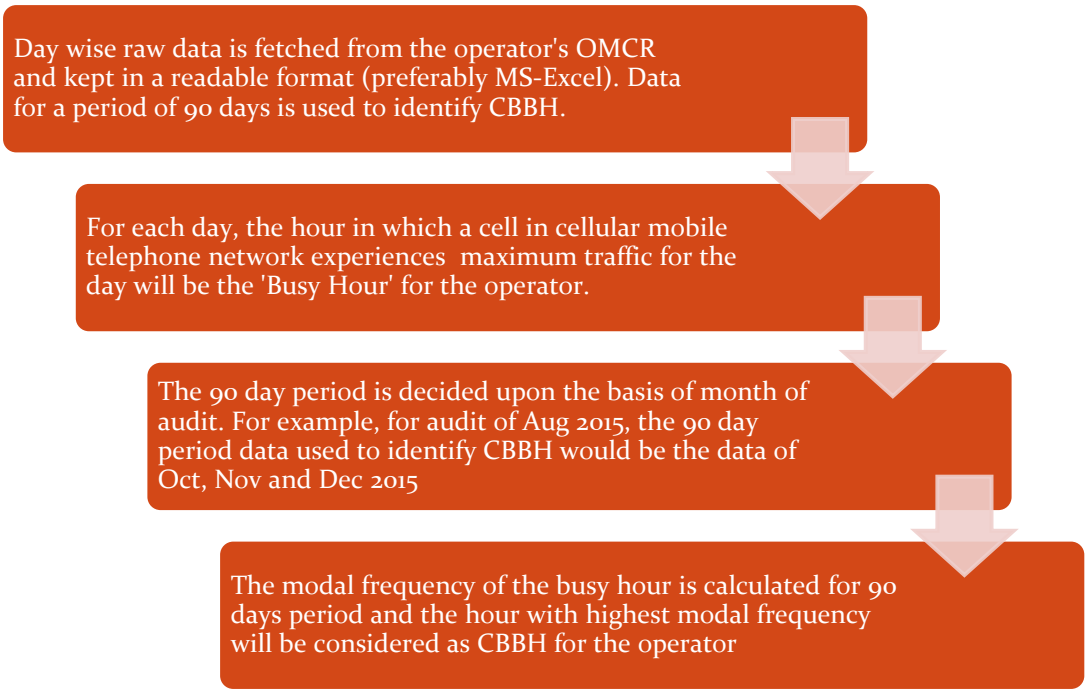
Step by step procedure to identify TCBH for an operator:



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 December 2015 (OND'15) was collected in the month of January 2016. To extract the data for customer service parameters for the purpose of audit, IMRB auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

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

The Customer Service Quality Parameters include the following:

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

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

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

2.4.1.16 AUDIT PARAMETERS – CUSTOMER SERVICE

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

2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

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

2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

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

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

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

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

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

Live calling activity was carried out during the period of December 2015. 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 November 2015 was considered for live calling activity conducted in December 2015.

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

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

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

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

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th December, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 6.1.1.

TRAI benchmark-

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

2.4.2.3 SERVICE COMPLAINTS REQUESTS

"Service request" means a request made to a service provider by its consumer pertaining to his account, and includes.

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

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

2.4.2.4 LEVEL 1 SERVICE

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

Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator SIMs. A total of 300 test calls were made per service provider in the quarter.

In OND'15, IMRB has tried contacting the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

- On visiting the operator's premises (Exchange/Central Server etc.), auditors ask the operator authorized personnel to provide a list of Level 1 services being active in their service. The list should contain a description of the numbers along with dialing code.
- Operators might provide a long list of L1 services. To identify emergency L1 service numbers, auditors check if there is any number that starts with code '10' in that list. If auditors find any emergency number in addition to the below list, that number is also tested during live calling.
- On receiving the list, auditors verify it if the below given list of numbers are active in the service provider's network.
- If there are any other additional numbers provided by the operator, auditors also do live calling on those numbers along with below list.
- If any of these numbers is not active, then we would write the same in our report, auditors write in the report.
- Post verifying the list, auditors do live calling by equally distributing the calls among the various numbers and update the results in the live calling sheet.

L1 Code	Description
100	Police
101	Fire
102	Ambulance
104	Health Information Helpline
108	Emergency and Disaster Management Helpline
138	All India Helpine for Passangers
149	Public Road Transport Utility Service
181	Chief Minister Helpline
182	Indian Railway Security Helpline
1033	Road Accident Management Service
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'
1056	Emergency Medical Services
106X	State of the Art Hospitals
1063	Public Grievance Cell DoT Hq
1064	Anti Corruption Helpline
1070	Relief Commission for Natural Calamities
1071	Air Accident Helpline
1072	Rail Accident Helpline
1073	Road Accident Helpline
1077	Control Room for District Collector
1090	Call Alart (Crime Branch)
1091	Women Helpline
1097	National AIDS Helpline to NACO
1099	Central Accident and Trauma Services (CATS)
10580	Educationa & Vocational Guidance and Counselling
10589	Mother and Child Tracking (MCTH)
10740	Central Pollution Control Board
10741	Pollution Control Board
1511	Police Related Service for all Metro Railway Project
1512	Prevention of Crime in Railway
1514	National Career Service(NCS)
15100	Free Legal Service Helpline
155304	Municipal Corporations
155214	Labour Helpline
1903	Sashastra Seema Bal (SSB)
1909	National Do Not Call Registry
1912	Complaint of Electricity
1916	Drinking Water Supply
1950	Election Commission of India

2.4.2.5 CUSTOMER CARE

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

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

The process for this parameter is stated below.

- Overall sample size is 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1100 HRS to 1400 HRS and 50 calls between 1600 HRS to 1900 HRS.
- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

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

2.4.3 VOICE DRIVE TEST – 2G & 3G

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as the name suggests, is conducted to measure the performance of an operator in a moving vehicle in a specified network coverage area.
The main purpose of the drive test is to check the health of the mobile network of various operators in the area in terms of coverage (signal strength), voice quality, call drop rate, call set up success rate etc.

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

IMRB conducted two types of drive tests as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test

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

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

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

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

1. Normal SSA
2. Difficult SSA

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

- 3 consecutive days were selected for drive test in selected SSA and SSA list was finalized by TRAI office New Delhi.
- On an average, a minimum of 80 kilometers was covered each day, covering a minimum distance of 250kms in 3 days.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI Office New Delhi.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30-50 km/hr.
- The holding period of each test call was 120 seconds.
- A test call was generated 10 seconds after the previous test call is completed. For 3G, the gap between two calls was 30 seconds.
- Height of the antenna was kept uniform in case of all service providers.

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

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

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

2.4.3.3 INDEPENDENT DRIVE TEST – 2G & 3G

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

- A minimum of 80 kilometers was traversed during the independent drive test in a SSA on each day and SSA list was finalized by TRAI office New Delhi.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.

- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- The drive test covered selected cities and adjoining towns/rural areas where the service provider has commenced service, including congested areas and indoor sites.
- The drive test of each mobile network was conducted between 10 am and 8 pm on weekdays.
- The Vehicle used in the drive tests was equipped with the test tool that automatically generates calls on the mobile telephone networks.
- The speed of the vehicle was kept at around 30-50 km/hr.
- The holding period of each test call was 120 seconds.
- A test call was generated 10 seconds after the previous test call is completed. For 3G, the gap between two calls was 30 seconds.
- Height of the antenna was kept uniform in case of all service providers.

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

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

- Coverage-Signal strength (GSM)
    - ✓ Total calls made (A)
    - ✓ Number of calls with signal strength between 0 to -75 dBm
    - ✓ Number of calls with signal strength between 0 to -85 dBm
    - ✓ Number of calls with signal strength between 0 to -95 dBm
- Coverage-Signal strength (CDMA)
    - ✓ Total Ec/Io BINS (A)
    - ✓ Total Ec/Io BINS with less than –15 (B)
    - ✓ Low Interference = [1 - (B/A)] x 100
- Voice quality (GSM)
    - ✓ Total RxQual Samples– A
    - ✓ RxQual samples with 0-5 value – B
    - ✓ %age samples with good voice quality = B/A x 100
- Voice quality (CDMA)
    - ✓ Total FER BINs (forward FER) – A
    - ✓ FER BINs with 0-2 value (forward FER) – B
    - ✓ FER BINs with 0-4 value (forward FER) – C
    - ✓ %age samples with FER bins having 0-2 value (forward FER) = B/A x 100
    - ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 100
    - ✓ No. of FER samples with value > 4 = [A-C]

- Call setup success rate
  - ✓ Total number of call attempts – A
  - ✓ Total Calls successfully established – B
  - ✓ Call success rate (%age) = (B/A) x 100
- Blocked calls
  - ✓ 100% - Call Set up Rate
- Call drop rate
  - ✓ Total Calls successfully established – A
  - ✓ Total calls dropped after being established – B
  - ✓ Call Drop Rate (%age) = (B/A) x 100

2.4.4 WIRELESS DATA DRIVE TEST – 2G & 3G

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

2.4.4.1 METHODOLOGY

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

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

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

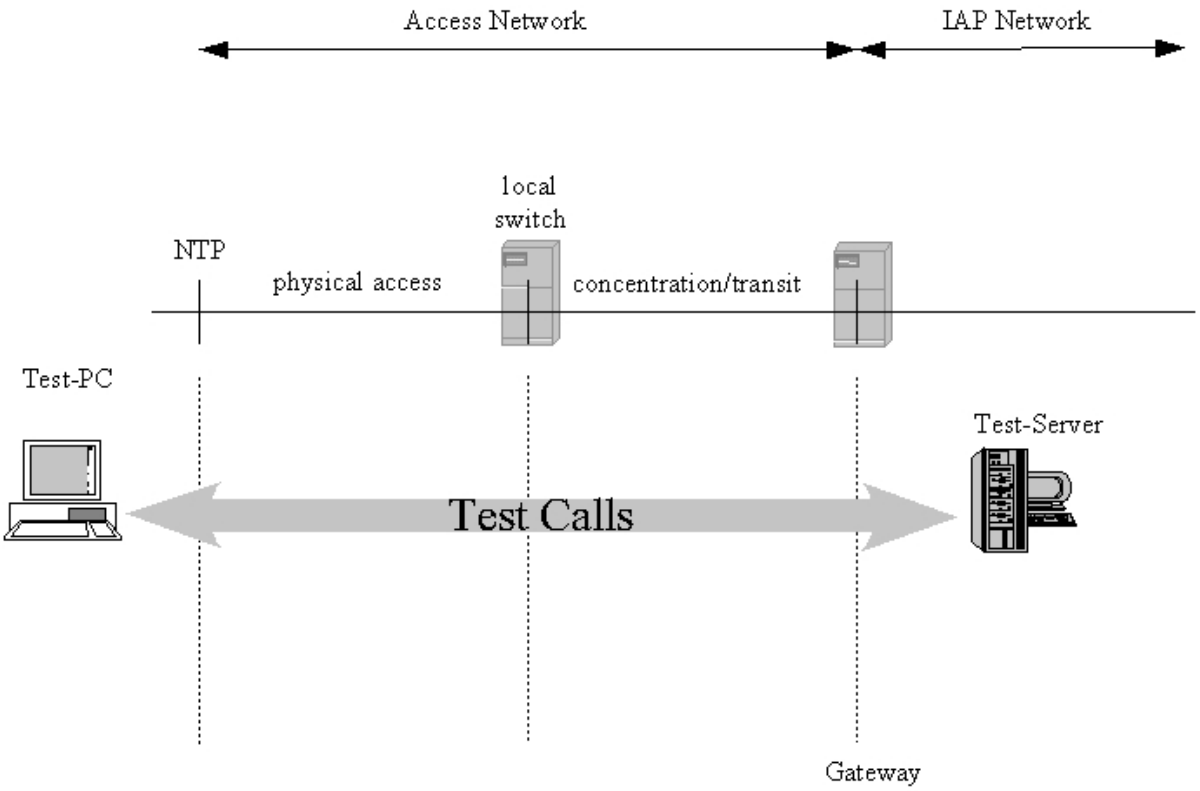


Figure for Measurement set-up

2.4.4.2 REQUIREMENTS FOR THE TEST-SERVER

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

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

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

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

2.4.4.3 TEST FILES

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

2.4.4.4 REPRESENTATIVENESS OR NUMBER OF TEST CALLS

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

2.4.4.5 PARAMETERS EVALUATED DURING DATA DRIVE TEST AT HOTSPOTS

2.4.4.5.1 SUCCESSFUL DATA TRANSMISSIONS DOWNLOAD ATTEMPTS

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

Measurement:

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

Successful data transmission download attempts =

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

2.4.4.5.2 SUCCESSFUL DATA TRANSMISSION UPLOAD ATTEMPTS

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

Measurement:

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

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

2.4.4.5.3 MINIMUM DOWNLOAD SPEED

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

Measurement:

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

Minimum download speed (average of lower 10% of all test calls) = $\frac{\text{Download speed (A1+A2+A3+A4+A5+A6)}}{6} \times 100$

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

2.4.4.5.4 AVERAGE THROUGHPUT FOR PACKET DATA

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

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

Measurement:

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

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

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

2.4.4.5.5 LATENCY

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

Measurement:

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

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

2.5 OPERATORS COVERED 2G AND 3G

Name of Operator	Number of Subscriber as per VLR-2G
Aircel	222
Airtel	11689845
BSNL	2079137
Idea	22274600
Reliance CDMA	8967
Reliance GSM	12474300
TATA CDMA	NA
TATA GSM	4778068
Videocon	1433454
Vodafone	5261701
Name of Operator	**Number of Subscriber as per VLR-3G**
Airtel 3G	11486501
BSNL 3G	2079137
Idea 3G	22274600
TATA 3G	16750

Dec'15 VLR data was considered for the number of subscribers.

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 CRITICAL FINDINGS

PMR Consolidated 2G (Network Parameters)

- Idea and TATA GSM failed to meet the benchmark for BTS Accumulated downtime.
- Airtel failed to meet the benchmark on SDCCH / Paging Channel Congestion.
- Vodafone failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.
- TATA CDMA not submitted data.

3 Day Live Measurement 2G (Network Parameters)

- Idea and TATA GSM failed to meet the benchmark for BTS Accumulated downtime
- TATA GSM and Vodafone failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop, rest of the operators met TRAI benchmark.
- TATA CDMA not submitted data.

PMR Consolidated 3G (Network Parameters)

- Idea 3G and TATA 3G did not meet the benchmark for Node Bs downtime, rest of the operators met TRAI benchmark.
- Airtel 3G not submitted data due to none approval from their corporate team.

3 Day Live Measurement 3G (Network Parameters)

- Idea 3G and TATA 3G did not meet the benchmark for Node Bs downtime.
- TATA 3G did not meet the benchmark for Worst affected cells having more than 3% Circuit switched voice drop rate, rest of the operators met TRAI benchmark.
- Airtel 3G not submitted data due to none approval from their corporate team.

Wireless Data Services 2G

- Aircel failed to meet the benchmark PDP context activation success rate for monthly & live data.
- Aircel and Vodafone failed to meet the benchmark for drop rate in live data, rest of the operators met TRAI benchmark.
- TATA CDMA, TATA GSM, Videocon and Airtel were not submitted data.

Wireless Data Services 3G

- All operators met the benchmark for Activation done within 4 hours, PDP context activation success rate and drop rate.
- TATA 3G and Airtel 3G were not submitted data.

Live Calling

- As per the consumers (live calling exercise) none of the operators was able to meet the benchmark of resolving 98% complaints within 4 weeks and 100% complaints within 6 weeks.
- As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered except TATA GSM.
- Aircel, Reliance GSM, TATA GSM and Vodafone failed to meet the benchmark for Customer Care / Helpline Assessment (voice to voice).

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Airtel, Idea and Vodafone failed to meet the TRAI benchmark for Metering and Billing Credibility – Post-paid Subscribers.
- Vodafone remained slightly below the benchmark for resolving 100% complaints within 6 weeks.
- All the operators met the TRAI benchmark of providing credit or waiver within one week in case of complaints received except Vodafone.
- BSNL, Reliance CDMA and GSM did not meet the benchmark of 95%. TATA CDMA recorded the best performance for Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds.

Drive Test (Operator Assisted)

- BSNL 2G and Reliance GSM failed to meet the benchmark for Voice Quality in outdoor locations in Dhar as well as Ujjain SSA. However all operators met the TRAI benchmark for 3G operators.
- In Dhar SSA Aircel was not available, however TATA CDMA was not available in Dhar as well as Ujjain SSA.
- For 3G drive test Airtel 3G not participated in Dhar as well as Ujjain and Idea 3G was not available in Dhar SSA.

Data Drive test

- All operators met the TRAI benchmarks in Dhar as well as Ujjain SSA

Note: In dhar SSA TATA CDMA, Airtel 3G, BSNL 3G did not submit the data and in Ujjain SSA Airtel 3G and BSNL did not submit the data.

4 EXECUTIVE SUMMARY

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

4.1 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 2G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.22%	0.00%	97.86%	0.10%	0.01%	0.66%	0.85%	99.31%
Airtel	0.06%	0.05%	98.55%	1.59%	0.31%	0.74%	1.77%	97.62%
BSNL	1.95%	1.73%	96.94%	0.42%	1.30%	1.10%	1.64%	NDR
Idea	7.17%	0.50%	97.39%	0.48%	1.13%	0.73%	1.56%	97.20%
Reliance CDMA	0.02%	0.02%	99.30%	NA	0.15%	0.07%	0.54%	NDR
Reliance GSM	0.15%	0.69%	97.03%	0.10%	0.64%	0.15%	0.52%	98.72%
TATA CDMA	NA	NA	NA	NA	NA	NA	NA	NA
TATA GSM	4.17%	0.00%	98.55%	0.05%	0.04%	0.58%	2.56%	98.84%
Videocon	0.01%	0.00%	98.88%	0.14%	0.21%	0.60%	2.51%	98.37%
Vodafone	0.05%	0.33%	99.70%	0.09%	0.30%	0.62%	3.71%	98.94%

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

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

BTSs Accumulated Downtime:

Idea and TATA GSM failed to meet the benchmark. Minimum BTS Accumulated downtime was recorded for Videocon at 0.01%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Aircel and Videocon at 0.00%.

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.70%.

SDCCH/ Paging Chl. Congestion:

Airtel failed to meet the benchmark on SDCCH / Paging Channel Congestion, while TATA GSM recorded the best SDCCH / Paging Channel Congestion

TCH Congestion:

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

Call Drop Rate:

All the operators met the benchmark for the parameter. Minimum call drop rate was recorded for Reliance CDMA at 0.07%.

Worst Affected Cells Having More than 3% TCH Drop:

Vodafone failed to meet the benchmark. Best performance was recorded for Reliance GSM at 0.52%.

Voice Quality

All operators met the benchmark. Best performance was recorded for Aircel at 99.31%.

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

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

4.1.1 PMR DATA - OCTOBER FOR 2G

Month								
Name of Service Provider Month October	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	0.19%	0.00%	98.15%	0.17%	0.02%	0.68%	0.97%	99.27%
Airtel	0.09%	0.06%	98.83%	4.69%	0.33%	0.82%	1.95%	97.14%
BSNL	1.99%	1.96%	96.67%	0.48%	1.31%	1.12%	0.99%	NDR
Idea	10.31%	0.99%	97.32%	0.57%	1.21%	0.77%	1.71%	97.05%
Reliance CDMA	0.02%	0.06%	99.51%	NA	0.10%	0.08%	0.63%	NDR
Reliance GSM	0.10%	0.53%	97.79%	0.09%	0.59%	0.14%	0.69%	98.85%
TATA CDMA	NA	NA	NA	NA	NA	NA	NA	NA
TATA GSM	4.47%	0.00%	98.56%	0.04%	0.05%	0.59%	2.79%	98.83%
Videocon	0.00%	0.00%	98.90%	0.16%	0.22%	0.59%	2.55%	98.37%
Vodafone	0.14%	0.69%	99.63%	0.11%	0.37%	0.66%	4.04%	98.85%

4.1.2 PMR DATA – NOVEMBER FOR 2G

Month								
Name of Service Provider Month November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.22%	0.00%	97.48%	0.03%	0.00%	0.61%	0.76%	99.31%
Airtel	0.01%	0.00%	98.00%	0.04%	0.27%	0.75%	1.75%	97.09%
BSNL	1.91%	1.75%	96.95%	0.37%	1.39%	1.13%	2.21%	NDR
Idea	5.69%	0.26%	97.48%	0.39%	0.93%	0.70%	1.38%	97.10%
Reliance CDMA	0.00%	0.00%	99.11%	NA	0.17%	0.07%	0.54%	NDR
Reliance GSM	0.00%	0.00%	97.35%	0.12%	0.70%	0.15%	0.30%	98.81%
TATA CDMA	NA	NA	NA	NA	NA	NA	NA	NA
TATA GSM	3.97%	0.00%	98.54%	0.05%	0.04%	0.60%	2.54%	98.82%
Videocon	0.01%	0.00%	98.85%	0.12%	0.19%	0.60%	2.48%	98.36%
Vodafone	0.01%	0.16%	99.81%	0.08%	0.19%	0.59%	3.64%	99.01%

4.1.3 PMR DATA - DECEMBER FOR 2G

Month								
Name of Service Provider Month December	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	0.24%	0.00%	97.94%	0.08%	0.00%	0.69%	0.82%	99.36%
Airtel	0.08%	0.07%	98.83%	0.03%	0.34%	0.73%	1.61%	97.65%
BSNL	1.96%	1.48%	97.18%	0.40%	1.20%	1.04%	1.71%	NDR
Idea	5.54%	0.24%	97.38%	0.47%	1.25%	0.73%	1.59%	97.44%
Reliance CDMA	0.02%	0.00%	99.29%	NA	0.18%	0.07%	0.45%	NDR
Reliance GSM	0.30%	1.37%	95.95%	0.09%	0.62%	0.16%	0.58%	98.54%
TATA CDMA	NA	NA	NA	NA	NA	NA	NA	NA
TATA GSM	4.07%	0.00%	98.53%	0.06%	0.03%	0.55%	2.34%	98.86%
Videocon	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	0.00%	0.14%	99.64%	0.08%	0.36%	0.63%	3.44%	98.91%

4.2 3 DAY DATA – CONSOLIDATED FOR 2G

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.45%	0.00%	98.53%	0.21%	0.00%	0.84%	0.31%	99.26%
Airtel	0.12%	0.02%	98.83%	0.03%	0.24%	0.77%	1.93%	97.09%
BSNL	0.89%	0.81%	96.57%	0.49%	0.99%	1.09%	2.79%	NDR
Idea	8.86%	0.02%	97.43%	0.50%	0.83%	0.71%	1.49%	97.15%
Reliance CDMA	0.02%	0.00%	99.37%	0.00%	0.13%	0.04%	0.60%	NDR
Reliance GSM	0.12%	0.00%	97.06%	0.11%	0.65%	0.14%	0.51%	98.54%
TATA CDMA	NA	NA	NA	NA	NA	NA	NA	NA
TATA GSM	7.26%	0.00%	98.54%	0.07%	0.03%	0.57%	4.47%	98.88%
Videocon	0.08%	0.03%	98.90%	0.13%	0.19%	0.60%	2.60%	98.41%
Vodafone	0.15%	0.08%	99.52%	0.09%	0.14%	0.61%	3.85%	99.02%

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

BTSs Accumulated Downtime:

Idea and TATA GSM failed to meet the benchmark. Minimum BTS Accumulated downtime was recorded for Reliance CDMA at 0.02%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Aircel, Reliance GSM & CDMA at 0.00%.

Call Set-up Success Rate (CSSR):

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

SDCCH/ Paging Chl. Congestion:

All the operators met the benchmark on SDCCH / Paging Channel Congestion, while Reliance CDMA recorded the best SDCCH / Paging Channel Congestion

TCH Congestion:

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

Call Drop Rate:

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

Worst Affected Cells Having More than 3% TCH Drop:

TATA GSM and Vodafone failed to meet the benchmark. Best performance was recorded for Aircel 0.31%.

Voice Quality

All operators met the benchmark. Best performance was recorded for Aircel at 99.26%.

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

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

4.2.1 3 DAY DATA - OCTOBER FOR 2G

3 Day								
Name of Service Provider 3 Day October	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	0.56%	0.00%	97.90%	0.40%	0.00%	0.95%	0.08%	99.17%
Airtel	0.22%	0.06%	98.84%	0.03%	0.22%	0.85%	2.41%	96.98%
BSNL	1.93%	1.67%	96.55%	0.59%	1.15%	1.01%	2.79%	NDR
Idea	12.08%	0.02%	97.54%	0.66%	0.76%	0.81%	1.79%	97.07%
Reliance CDMA	0.01%	0.00%	99.73%	NA	0.05%	0.10%	0.75%	NDR
Reliance GSM	0.01%	0.00%	97.88%	0.12%	0.64%	0.14%	0.58%	98.86%
TATA CDMA	NA	NA	NA	NA	NA	NA	NA	NA
TATA GSM	8.07%	0.00%	98.53%	0.08%	0.02%	0.57%	4.54%	98.85%
Videocon	0.11%	0.06%	98.94%	0.14%	0.18%	0.59%	2.73%	98.46%
Vodafone	0.31%	0.07%	99.78%	0.11%	0.22%	0.63%	4.38%	99.02%

4.2.2 3 DAY DATA – NOVEMBER FOR 2G

3 Day								
Name of Service Provider 3 Day November	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	0.40%	0.00%	98.84%	0.11%	0.00%	0.00%	0.43%	99.86%
Airtel	0.07%	0.00%	98.82%	0.05%	0.24%	0.75%	1.75%	97.09%
BSNL	0.33%	0.29%	96.35%	0.58%	1.10%	1.17%	2.72%	NDR
Idea	8.27%	0.03%	97.39%	0.58%	0.86%	0.69%	1.55%	97.14%
Reliance CDMA	0.03%	0.00%	99.11%	NA	0.17%	0.00%	0.54%	NDR
Reliance GSM	0.01%	0.00%	97.35%	0.12%	0.70%	0.15%	0.30%	98.39%
TATA CDMA	NA	NA	NA	NA	NA	NA	NA	NA
TATA GSM	9.62%	0.00%	98.54%	0.06%	0.05%	0.55%	4.31%	98.83%
Videocon	0.05%	0.00%	98.85%	0.12%	0.19%	0.60%	2.48%	98.36%
Vodafone	0.12%	0.10%	99.81%	0.08%	0.19%	0.59%	3.64%	99.01%

4.2.3 3 DAY DATA - DECEMBER FOR 2G

3 Day								
Name of Service Provider 3 Day December	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	0.40%	0.00%	98.84%	0.11%	0.00%	0.00%	0.43%	99.86%
Airtel	0.07%	0.00%	98.83%	0.03%	0.25%	0.75%	1.64%	97.16%
BSNL	0.40%	0.46%	96.82%	0.31%	0.71%	1.10%	2.86%	NDR
Idea	6.28%	0.01%	97.35%	0.25%	0.86%	0.65%	1.12%	97.24%
Reliance CDMA	0.02%	0.00%	99.29%	0.00%	0.18%	0.05%	0.49%	NDR
Reliance GSM	0.31%	0.00%	95.95%	0.09%	0.62%	0.12%	0.66%	98.82%
TATA CDMA	NA	NA	NA	NA	NA	NA	NA	NA
TATA GSM	4.08%	0.00%	98.53%	0.06%	0.03%	0.58%	4.55%	98.93%
Videocon	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	0.01%	0.05%	98.97%	0.07%	0.02%	0.49%	3.54%	97.53%

4.3 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

For Airtel 3G, data is pertaining to Oct'15. Data for Nov'15 and Dec'15 could not be audited due to a none cooperation at operator's end. The same was pre-informed to TRAI by the operator.

NA: Data not provided

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NA	NA	NA	NA	NA	NA	NA	NA
BSNL 3G	1.79%	1.67%	97.46%	0.53%	0.46%	0.39%	1.47%	98.00%
Idea 3G	3.36%	0.08%	99.43%	0.24%	0.21%	0.72%	2.32%	98.96%
TATA 3G	2.46%	0.00%	98.99%	0.69%	0.94%	0.41%	2.24%	99.72%

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

Node Bs downtime:

Idea 3G and TATA 3G did not meet the benchmark.

Worst affected Node Bs due to downtime:

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

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for Idea 3G with 99.43%.

RRC Congestion:

All the operators met the benchmark for RRC Congestion. The minimum RRC Congestion was observed for Idea 3G with 0.24%.

Circuit Switched RAB Congestion:

All operators met the benchmark for the parameter. Minimum Circuit Switched RAB Congestion was recorded for Idea 3Gat 0.21%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for BSNL 3G at 0.39%.

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

All operators met the benchmark for the parameter. Best performance was recorded for BSNL 3G at 1.47%%.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for TATA 3G at 99.72%.

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

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

4.3.1 PMR DATA - OCTOBER FOR 3G

Month								
Name of Service Provider Month October	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NA	NA	NA	NA	NA	NA	NA	NA
BSNL 3G	1.99%	1.80%	97.59%	0.15%	0.21%	0.10%	0.04%	98.00%
Idea 3G	6.26%	0.21%	99.30%	0.28%	0.34%	0.70%	2.32%	98.97%
TATA 3G	3.77%	0.00%	98.96%	0.71%	0.88%	0.41%	2.55%	99.72%

4.3.2 PMR DATA – NOVEMBER FOR 3G

Month								
Name of Service Provider Month November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NA	NA	NA	NA	NA	NA	NA	NA
BSNL 3G	1.90%	1.96%	97.47%	0.72%	0.49%	0.41%	1.68%	NDR
Idea 3G	0.37%	0.00%	99.44%	0.15%	0.18%	0.68%	2.59%	98.97%
TATA 3G	2.11%	0.00%	99.01%	0.70%	0.91%	0.42%	2.20%	99.72%

4.3.3 PMR DATA - DECEMBER FOR 3G

Month								
Name of Service Provider Month December	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NA	NA	NA	NA	NA	NA	NA	NA
BSNL 3G	1.49%	1.25%	97.31%	0.72%	0.69%	0.40%	1.71%	NDR
Idea 3G	3.43%	0.04%	99.55%	0.28%	0.11%	0.73%	2.07%	98.96%
TATA 3G	1.53%	0.00%	98.98%	0.65%	1.04%	0.41%	1.99%	99.72%

4.4 3 DAY DATA – CONSOLIDATED FOR 3G

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NA	NA	NA	NA	NA	NA	NA	NA
BSNL 3G	1.89%	1.71%	96.31%	0.88%	1.37%	0.70%	2.71%	97.00%
Idea 3G	4.86%	0.00%	99.46%	0.11%	0.15%	0.69%	2.34%	98.96%
TATA 3G	5.28%	0.00%	99.27%	0.46%	0.70%	0.44%	3.07%	99.71%

Node Bs downtime:

Idea 3G and TATA 3G did not meet the benchmark.

Worst affected Node Bs due to downtime:

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

Call Set-up Success Rate (CSSR):

All the operators met the benchmark for CSSR. The maximum CSSR was observed for Idea 3G with 99.46%.

RRC Congestion:

All the operators met the benchmark for RRC Congestion. The minimum RRC Congestion was observed for Idea 3G with 0.11%.

Circuit Switched RAB Congestion:

All operators met the benchmark for the parameter. Minimum Circuit Switched RAB Congestion was recorded for Idea 3G at 0.15%.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for TATA 3G at 0.44%.

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

TATA 3G did not meet the benchmark for the parameter. Best performance was recorded for Idea 3G at 2.34%.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for TAAT 3G at 99.71%.

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

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

4.4.1 3 DAY DATA - OCTOBER FOR 3G

3 Day								
Name of Service Provider 3 Day October	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NA	NA	NA	NA	NA	NA	NA	NA
BSNL 3G	1.89%	1.29%	96.13%	0.99%	1.13%	0.76%	2.73%	97.00%
Idea 3G	7.69%	0.00%	99.36%	0.13%	0.19%	0.72%	2.36%	98.96%
TATA 3G	10.74%	0.00%	99.26%	0.47%	0.80%	0.46%	3.30%	99.74%

4.4.2 3 DAY DATA – NOVEMBER FOR 3G

3 Day								
Name of Service Provider 3 Day November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NA	NA	NA	NA	NA	NA	NA	NA
BSNL 3G	1.92%	1.93%	96.02%	0.77%	0.99%	0.69%	2.71%	NDR
Idea 3G	3.78%	0.00%	99.44%	0.15%	0.18%	0.68%	2.59%	98.97%
TATA 3G	3.68%	0.00%	99.27%	0.44%	0.62%	0.45%	3.10%	99.62%

4.4.3 3 DAY DATA - DECEMBER FOR 3G

3 Day								
Name of Service Provider 3 Day December	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	NA	NA	NA	NA	NA	NA	NA	NA
BSNL 3G	1.86%	1.92%	96.78%	0.87%	1.99%	0.66%	2.68%	NDR
Idea 3G	3.28%	0.00%	99.57%	0.05%	0.07%	0.66%	2.09%	98.97%
TATA 3G	1.51%	0.00%	99.27%	0.48%	0.68%	0.42%	2.81%	99.74%

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

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel	100.00%	85.21%	4.38%	100.00%	80.51%	5.39%
Airtel	NDR	98.45%	3.54%	NDR	NDR	NDR
BSNL	100.00%	96.69%	3.33%	100.00%	95.91%	2.50%
Idea	100.00%	99.13%	1.09%	100.00%	99.09%	1.13%
Reliance CDMA	100.00%	99.55%	3.81%	100.00%	99.08%	3.75%
Reliance GSM	100.00%	99.26%	0.92%	100.00%	99.04%	0.96%
TATA CDMA	NDR	NDR	NDR	NDR	NDR	NDR
TATA GSM	NDR	NDR	NDR	NDR	NDR	NDR
Videocon	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	100.00%	97.11%	2.89%	100.00%	97.50%	6.33%

NDR: No data received from oprators

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

Activation done within 4 hours:

All operators met the benchmark Activation done within 4 hours for monthly as well as live.

PDP Context activation success rate:

Aircel failed to meet the benchmark PDP context activation success rate for monthly & live data.

Drop Rate:

Aircel & Vodafone failed to meet the benchmark for drop rate in live data.

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

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	100.00%	NDR	3.02%	NDR	96.61%	3.11%
Idea 3G	100.00%	98.84%	0.63%	100.00%	99.11%	0.60%
TATA 3G	NDR	NDR	NDR	NDR	NDR	NDR

NDR: No data received

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

Activation done within 4 hours:

All operators met the benchmark Activation done within 4 hours for monthly as well as live.

PDP Context activation success rate:

All operators met the benchmark PDP context activation success rate for monthly & live data.

Drop Rate:

All operators met the benchmark for drop rate.

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

4.7 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Response time to customer for assistance		Level 1 Service	Service Requests
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel	NA	NA	100.00%	69.00%	57.00%	NA
Airtel	84.00%	90.00%	100.00%	98.00%	94.67%	75.00%
BSNL	75.00%	75.00%	100.00%	100.00%	94.00%	74.00%
Idea	81.00%	81.00%	100.00%	100.00%	94.67%	86.00%
Reliance CDMA	70.73%	70.73%	100.00%	97.00%	52.33%	46.51%
Reliance GSM	58.14%	60.47%	100.00%	90.00%	46.67%	19.51%
TATA CDMA	NA	NA	100.00%	97.00%	48.67%	100.00%
TATA GSM	51.09%	51.09%	100.00%	85.00%	100.00%	57.95%
Videocon	90.00%	90.00%	100.00%	98.00%	58.00%	84.09%
Vodafone	73.81%	73.81%	100.00%	93.00%	68.67%	NA

NA- Not applicable

Resolution of billing complaints

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

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests.

Level 1 Service

As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered except TATA GSM.

Accessibility of Call Centre/Customer Care-IVR

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

Customer Care / Helpline Assessment (voice to voice)

Aircel, Reliance GSM, TATA GSM and Vodafone failed to meet the benchmark for the parameter.

4.8 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Billing Complaints		Response time to customer for assistance	Customer care	
	Postpaid Subscribers	Prepaid Subscribers	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	% of cases where credit/wavier is received within one week	Percentage of calls answered by the IVR	Percentage of calls answered by the operators (voice to
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel	0.00%	0.00%	NA	NA	100.00%	97.05%	99.30%
Airtel	0.11%	0.00%	100.00%	100.00%	100.00%	100.00%	97.07%
BSNL	0.01%	0.04%	99.98%	100.00%	100.00%	98.95%	94.35%
Idea	0.37%	0.04%	100.00%	100.00%	100.00%	95.17%	97.41%
Reliance CDMA	0.09%	0.03%	100.00%	100.00%	100.00%	97.44%	86.06%
Reliance GSM	0.09%	0.03%	100.00%	100.00%	100.00%	97.55%	92.18%
TATA CDMA	0.00%	0.00%	NA	NA	100.00%	97.88%	99.48%
TATA GSM	0.00%	0.00%	100.00%	100.00%	100.00%	97.23%	97.10%
Videocon	NA	0.00%	100.00%	100.00%	100.00%	100.00%	96.50%
Vodafone	0.41%	0.08%	99.66%	99.98%	100.00%	NA	NA

Metering and Billing Credibility – Post-paid Subscribers

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

Metering and Billing Credibility – Prepaid Subscribers

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

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks. Vodafone remained slightly below the benchmark for resolving 100% complaints within 6 weeks.

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

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

Customer Care Percentage of calls answered by the IVR

All the operators met the TRAI benchmark of 95% IVR call.

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

BSNL, Reliance CDMA and GSM did not meet the benchmark of 95%. TATA CDMA recorded the best performance for the parameter.

Termination/Closures of service complied within 7 days

Idea did not meet the benchmark of 95%; rest of the operators recorded the best performance for the parameter.

Time taken for refund of deposit after closures

All the operators met the TRAI benchmark of 95% IVR call.

4.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment										
Inter operator call Assessment To↓ From→	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Aircel	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Idea	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Reliance CDMA	100.00%	100.00%	91.67%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%
Videocon	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	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.

In the inter-operator call assessment, most of the operators faced any problems in connecting to other operators.

4.10 PMR COMPARISON WITH IMRB AND OPERATORS DATA

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	
	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%	
	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator
Aircel	0.22%	0.22%	0.00%	0.00%	97.86%	97.84%	0.10%	0.09%	0.01%	0.01%	0.66%	0.68%	0.85%	0.85%	99.31%	99.31%
Airtel	0.06%	0.08%	0.05%	0.04%	98.55%	98.82%	1.59%	0.04%	0.31%	0.31%	0.74%	0.77%	1.77%	1.71%	97.62%	97.30%
BSNL	1.95%	1.89%	1.73%	1.74%	96.94%	96.77%	0.42%	0.49%	1.30%	1.19%	1.10%	1.26%	1.64%	2.51%	NDR	96.95%
Idea	7.17%	0.12%	0.50%	0.50%	97.39%	97.39%	0.48%	0.48%	1.13%	1.13%	0.73%	0.73%	1.56%	1.56%	97.20%	97.19%
Reliance CDMA	0.02%	0.01%	0.02%	0.02%	99.30%	99.30%	NA	0.00%	0.15%	0.15%	0.07%	0.28%	0.54%	0.54%	NDR	99.21%
Reliance GSM	0.15%	0.13%	0.69%	0.63%	97.03%	96.93%	0.10%	0.12%	0.64%	0.50%	0.15%	0.14%	0.52%	0.64%	98.72%	98.88%
TATA CDMA	NA	0.09%	NA	0.08%	NA	99.15%	NA	0.00%	NA	0.11%	NA	0.37%	NA	6.20%	NA	99.25%
TATA GSM	4.17%	0.08%	0.00%	0.04%	98.55%	98.54%	0.05%	0.05%	0.04%	0.04%	0.58%	0.60%	2.56%	2.56%	98.84%	98.89%
Videocon	0.01%	0.12%	0.00%	0.27%	98.88%	98.94%	0.14%	0.11%	0.21%	0.20%	0.60%	0.57%	2.51%	2.41%	98.37%	98.47%
Vodafone	0.05%	0.10%	0.33%	0.39%	99.70%	99.62%	0.09%	0.11%	0.30%	0.38%	0.62%	0.64%	3.71%	3.73%	98.94%	98.87%

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

5 CRITICAL FINDINGS

PMR Consolidated 2G (Network Parameters)

- Idea and TATA GSM failed to meet the benchmark for BTS Accumulated downtime.
- Airtel failed to meet the benchmark on SDCCH / Paging Channel Congestion.
- Vodafone failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.
- TATA CDMA not submitted data.

3 Day Live Measurement 2G (Network Parameters)

- Idea and TATA GSM failed to meet the benchmark for BTS Accumulated downtime
- TATA GSM and Vodafone failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop, rest of the operators met TRAI benchmark.
- TATA CDMA not submitted data.

PMR Consolidated 3G (Network Parameters)

- Idea 3G and TATA 3G did not meet the benchmark for Node Bs downtime, rest of the operators met TRAI benchmark.
- Airtel 3G not submitted data due to none approval from their corporate team.

3 Day Live Measurement 3G (Network Parameters)

- Idea 3G and TATA 3G did not meet the benchmark for Node Bs downtime.
- TATA 3G did not meet the benchmark for Worst affected cells having more than 3% Circuit switched voice drop rate, rest of the operators met TRAI benchmark.
- Airtel 3G not submitted data due to none approval from their corporate team.

Wireless Data Services 2G

- Aircel failed to meet the benchmark PDP context activation success rate for monthly & live data.
- Aircel and Vodafone failed to meet the benchmark for drop rate in live data, rest of the operators met TRAI benchmark.
- TATA CDMA, TATA GSM, Videocon and Airtel were not submitted data.

Wireless Data Services 3G

- All operators met the benchmark for Activation done within 4 hours, PDP context activation success rate and drop rate.
- TATA 3G and Airtel 3G were not submitted data.

Live Calling

- As per the consumers (live calling exercise) none of the operators was able to meet the benchmark of resolving 98% complaints within 4 weeks and 100% complaints within 6 weeks.
- As per the live calling results, none of the operators met the TRAI benchmark for level 1 service with calls being answered except TATA GSM.
- Aircel, Reliance GSM, TATA GSM and Vodafone failed to meet the benchmark for Customer Care / Helpline Assessment (voice to voice).

Metering and billing credibility

- For the billing disputes of post-paid subscribers, it was observed that Airtel, Idea and Vodafone failed to meet the TRAI benchmark for Metering and Billing Credibility – Post-paid Subscribers.
- Vodafone remained slightly below the benchmark for resolving 100% complaints within 6 weeks.
- All the operators met the TRAI benchmark of providing credit or waiver within one week in case of complaints received except Vodafone.
- BSNL, Reliance CDMA and GSM did not meet the benchmark of 95%. TATA CDMA recorded the best performance for Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds.

Drive Test (Operator Assisted)

- BSNL 2G and Reliance GSM failed to meet the benchmark for Voice Quality in outdoor locations in Dhar as well as Ujjain SSA. However all operators met the TRAI benchmark for 3G operators.
- In Dhar SSA Aircel was not available, however TATA CDMA was not available in Dhar as well as Ujjain SSA.
- For 3G drive test Airtel 3G not participated in Dhar as well as Ujjain and Idea 3G was not available in Dhar SSA.

Data Drive test

- All operators met the TRAI benchmarks in Dhar as well as Ujjain SSA

Note: In dhar SSA TATA CDMA, Airtel 3G, BSNL 3G did not submit the data and in Ujjain SSA Airtel 3G and BSNL did not submit the data.

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

6.1 BTS ACCUMULATED DOWNTIME

6.1.1 PARAMETER DESCRIPTION

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

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

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

2. **Computation Methodology –**
   BTS accumulated downtime (not available for service) = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month / (24 x Number of days in a month x Number of BTSs in the network in licensed service area) x 100

3. **TRAI Benchmark –**

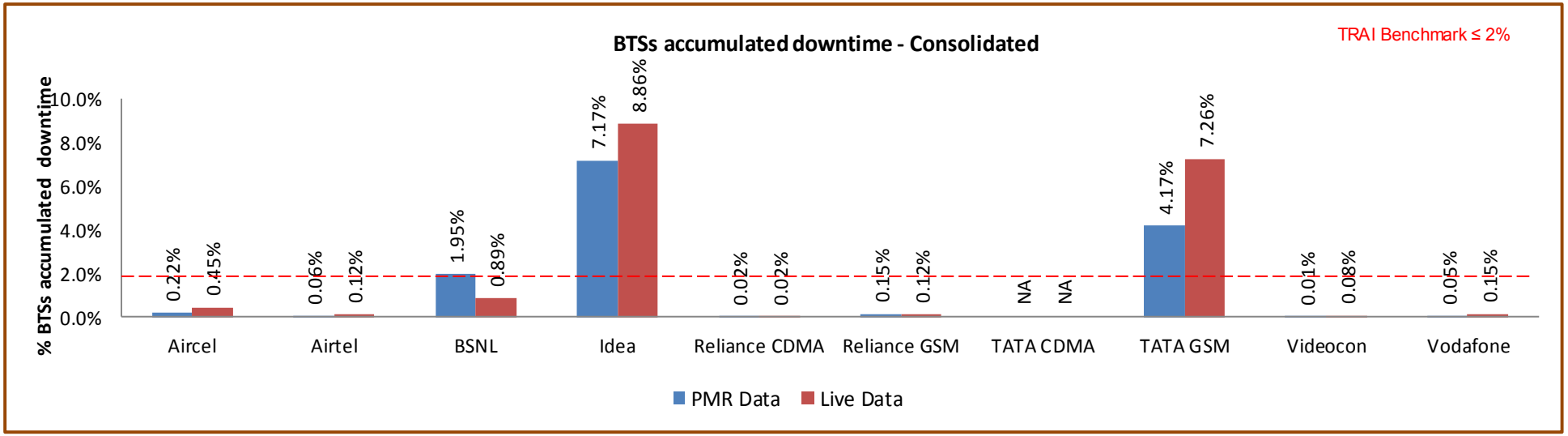
    a. BTSs Accumulated downtime (not available for service) ≤ 2%

4. **Audit Procedure –**

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

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

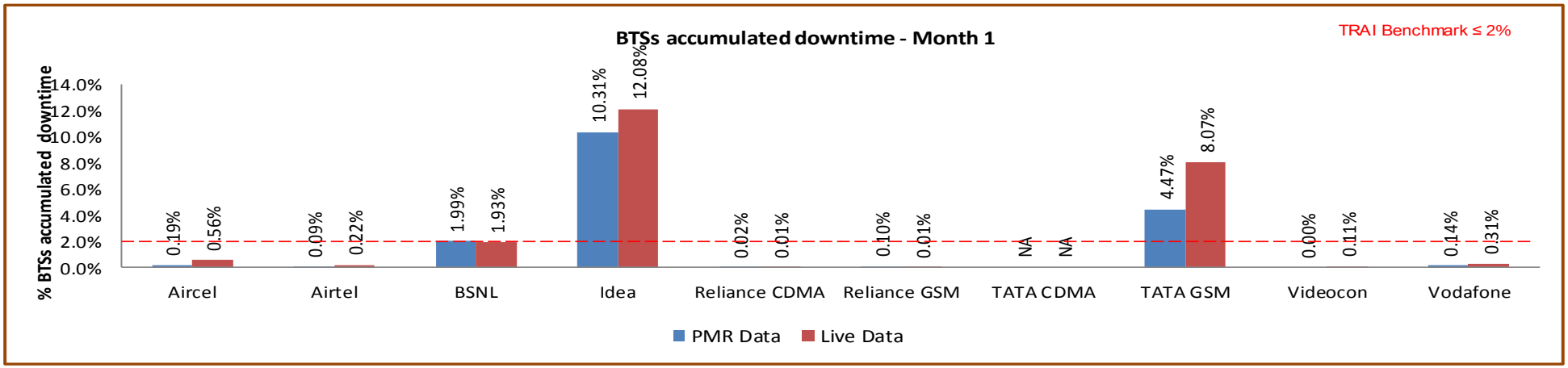
6.1.2 KEY FINDINGS - CONSOLIDATED



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

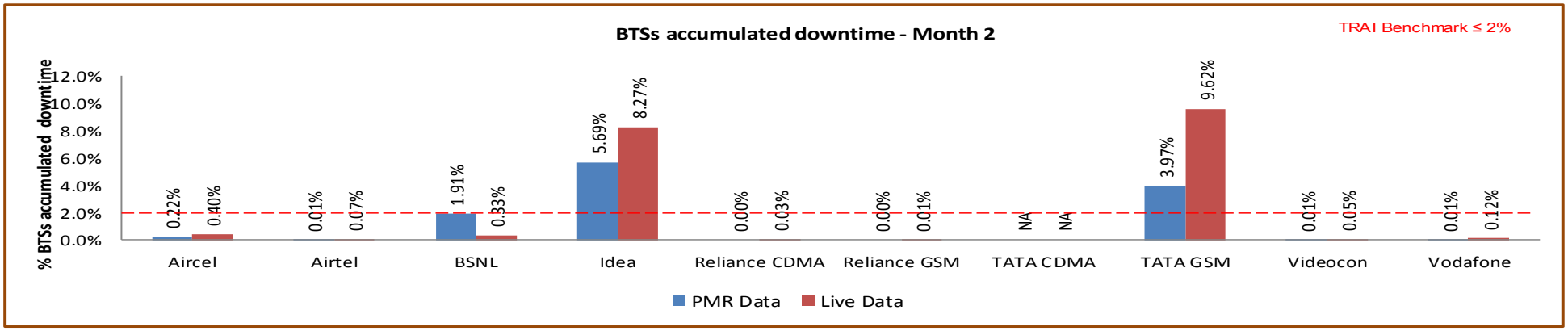
Idea and TATA GSM did not meet the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

6.1.2.1 KEY FINDINGS – MONTH 1



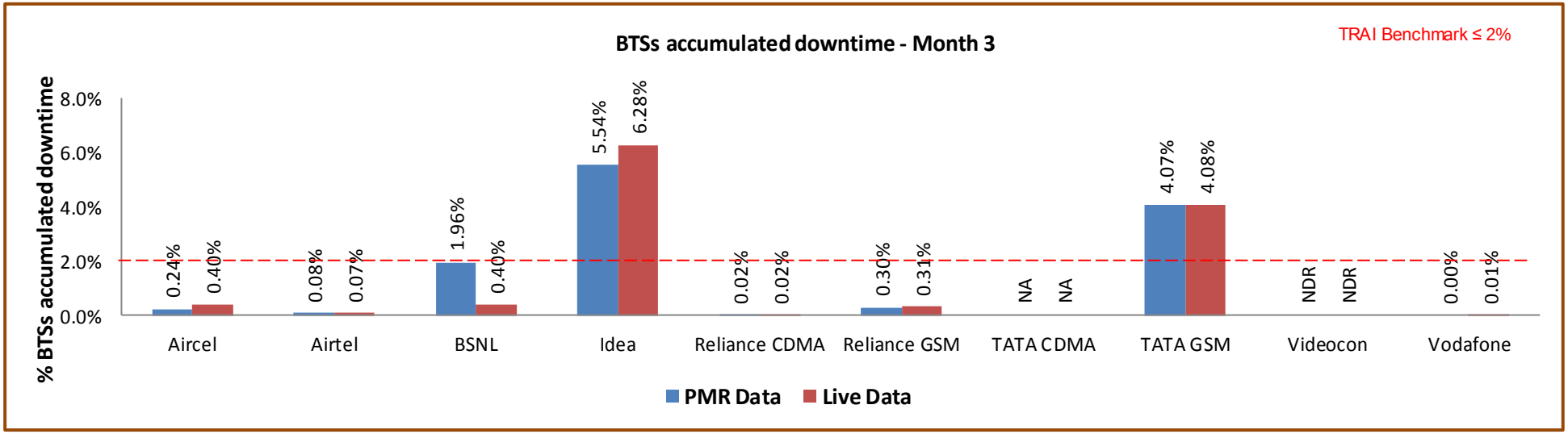
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.2 KEY FINDINGS – MONTH 2



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

6.1.2.3 KEY FINDINGS – MONTH 3



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

6.2 WORST AFFECTED BTS DUE TO DOWNTIME

6.2.1 PARAMETER DESCRIPTION

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

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

- **Computation Methodology –**

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

- **TRAI Benchmark –**

  a. Worst affected BTSs due to downtime ≤ 2%

- **Audit Procedure –**

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

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

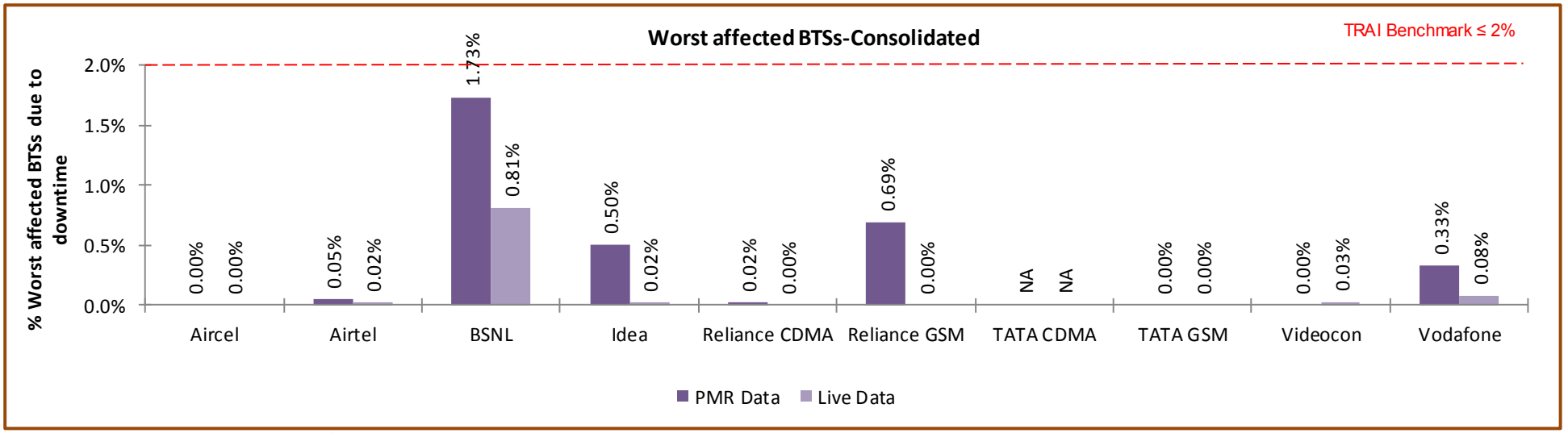
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

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

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

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

6.2.2 KEY FINDINGS – CONSOLIDATED

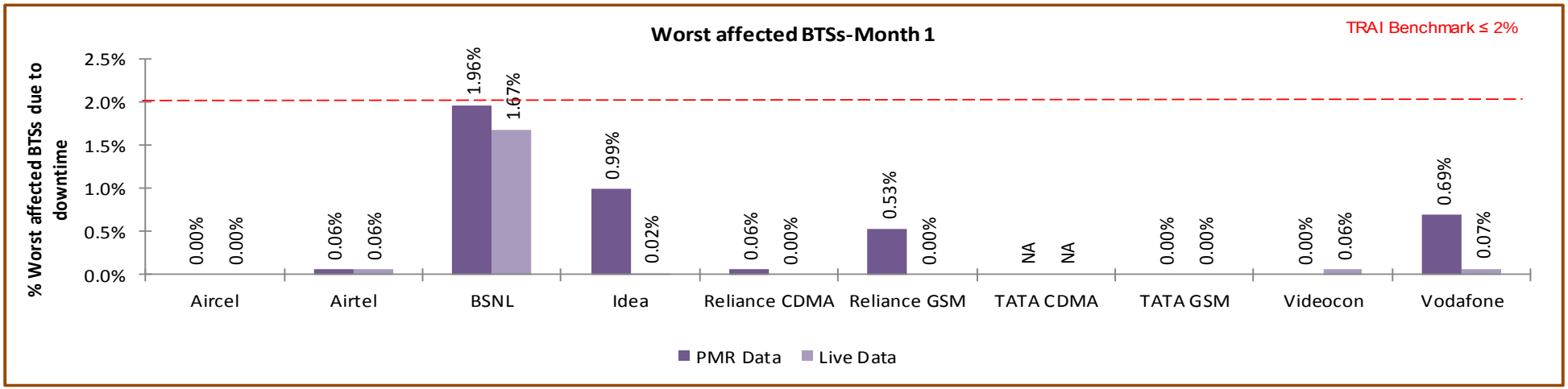


Data Source: Operations and Maintenance Center (OMC) of the operators

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

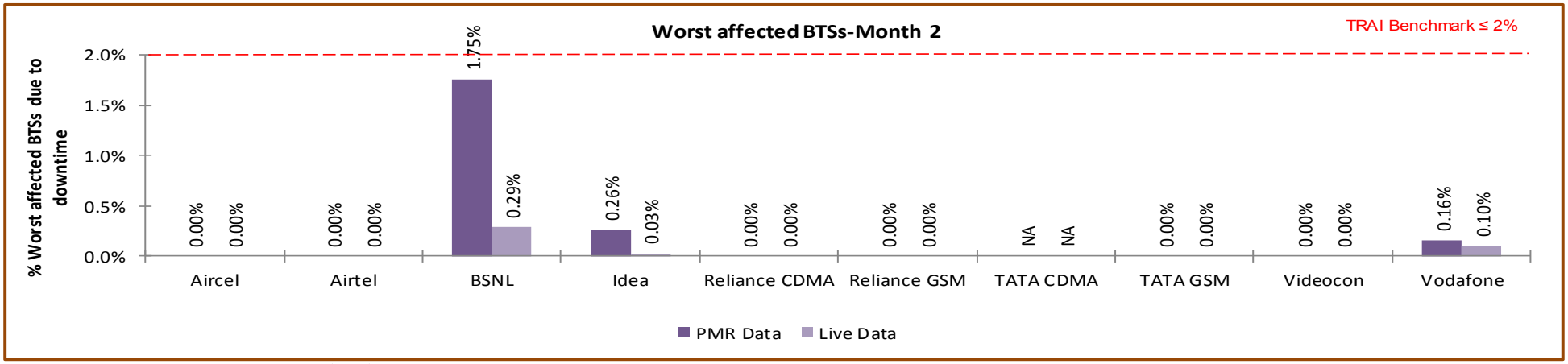
Significant difference was observed between PMR & live measurement data for Reliance, vodafone and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.2.2.1 KEY FINDINGS – MONTH 1



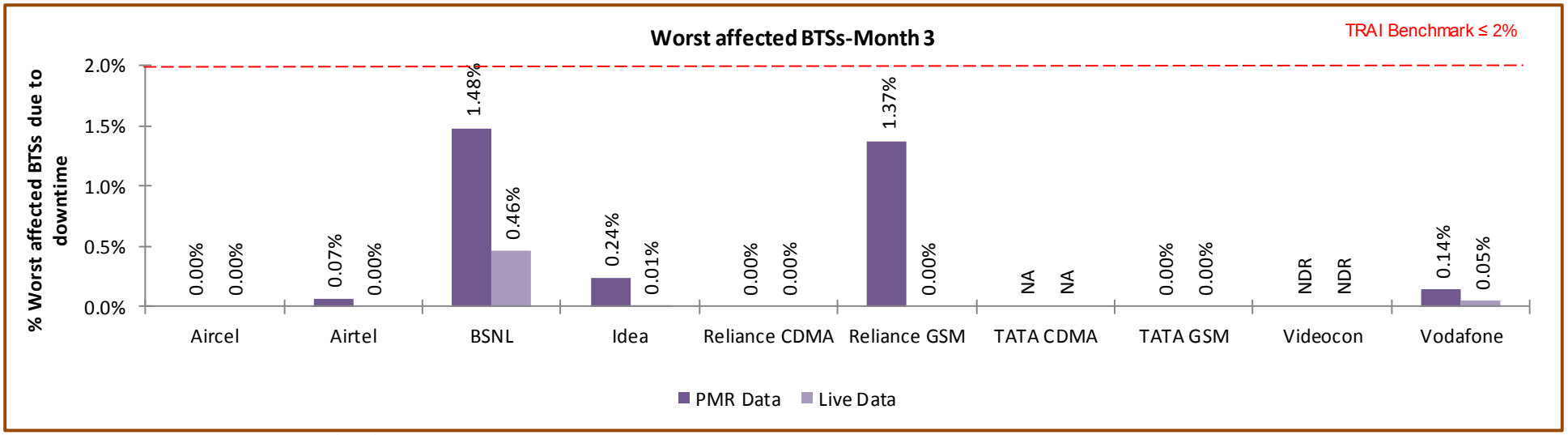
Data Source: Operations and Maintenance Center (OMC) of the operators

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

   (Calls Established / Total Call Attempts) * 100

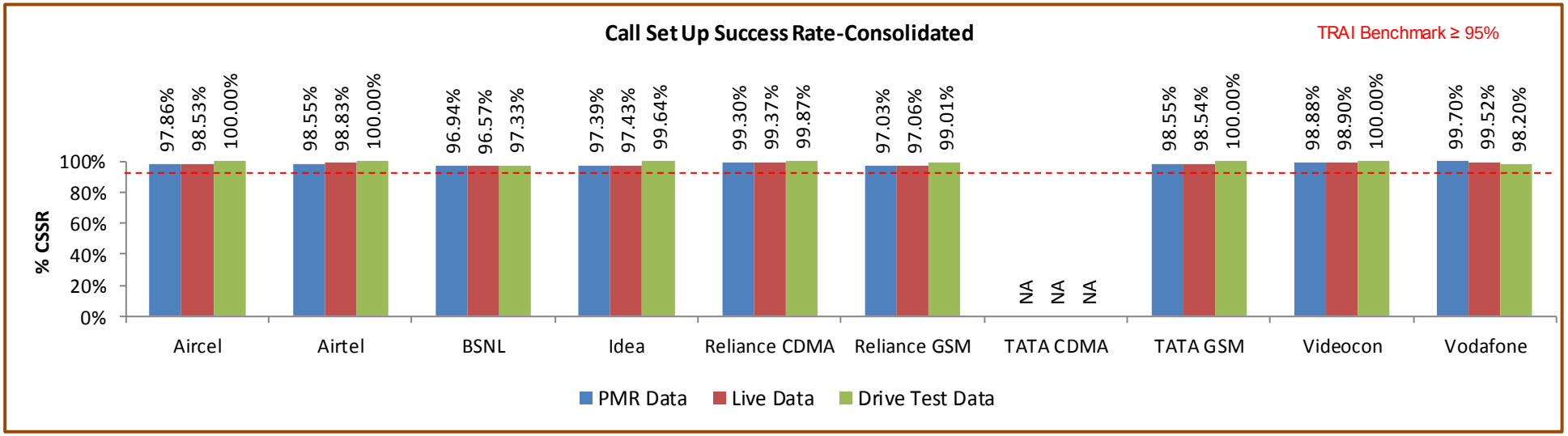
   Call Established means the following events have happened in call setup:-

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

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

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

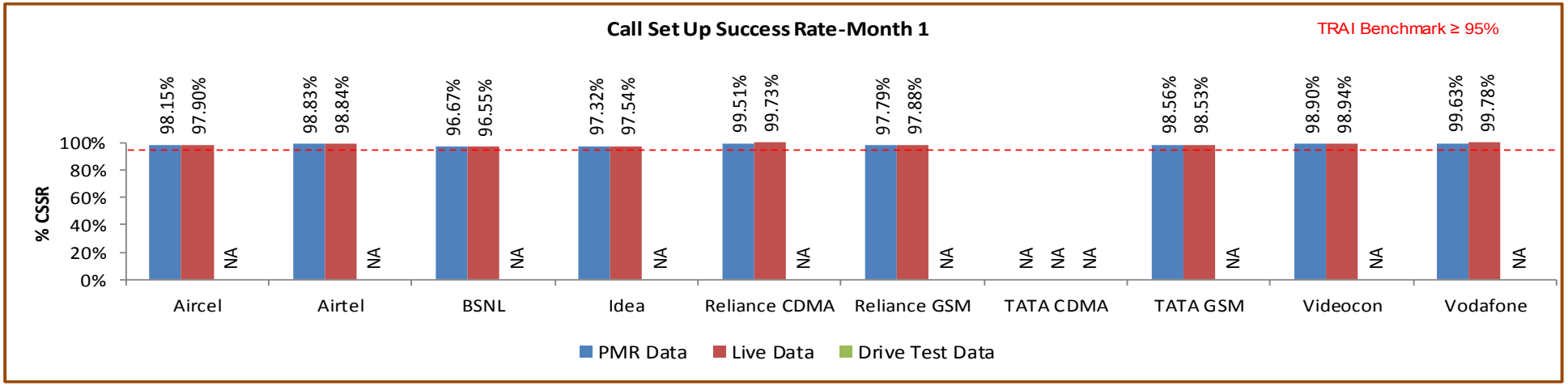
6.3.2 KEY FINDINGS - CONSOLIDATED



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

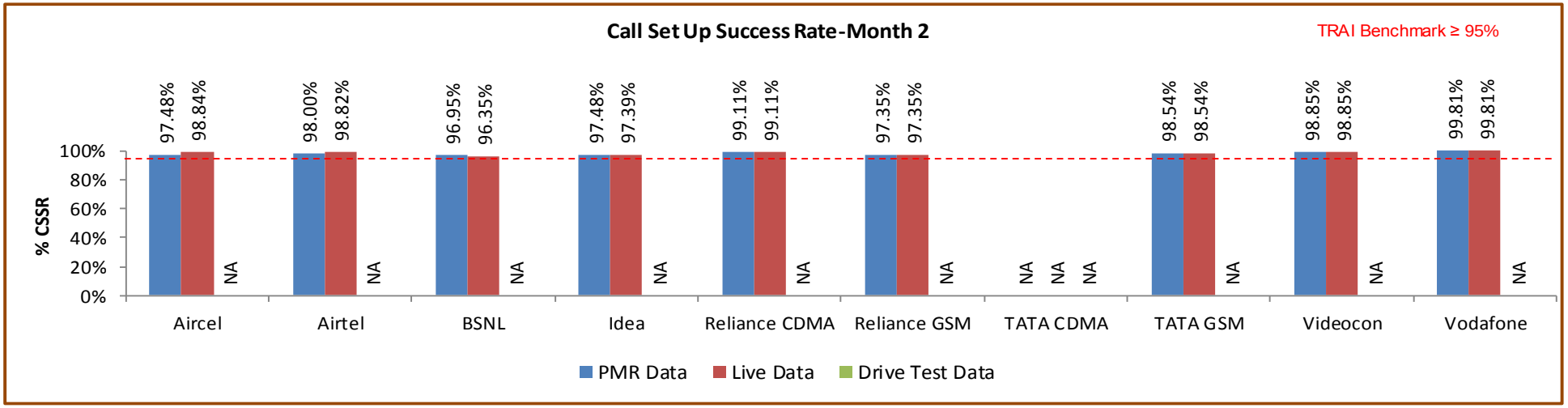
All the operators met the benchmark for both PMR and Live data.

6.3.2.1 KEY FINDINGS – MONTH 1



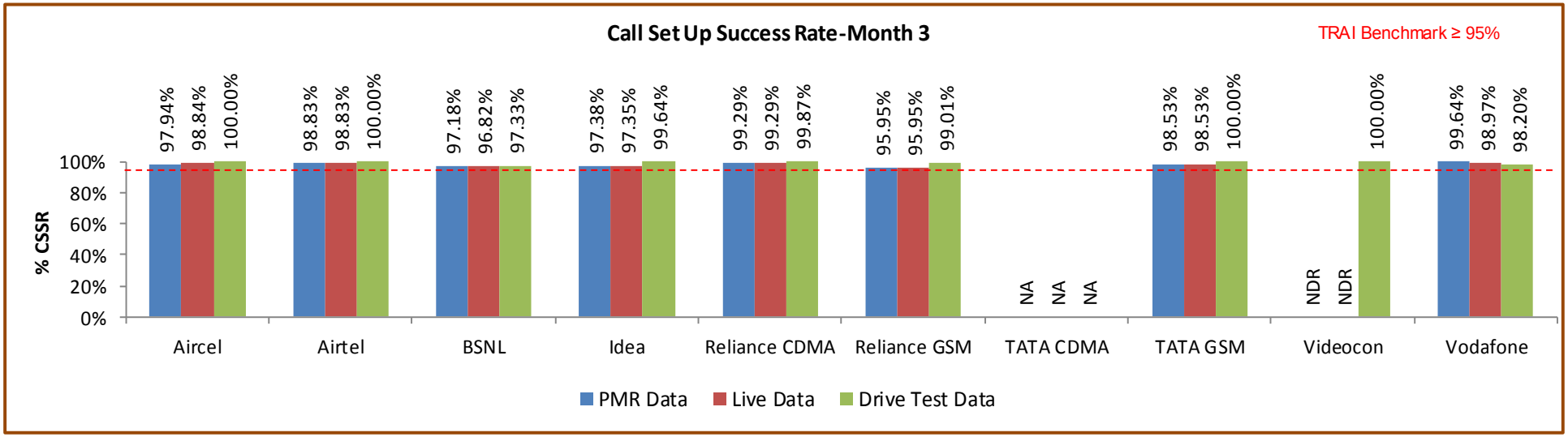
Data Source: Network Operations Center (NOC) of the operators

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- PAGING CHANNEL /TCH CONGESTION/POI

6.4.1 PARAMETER DESCRIPTION

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

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

2. **Computational Methodology:**

   - **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1
     - C1 = Average SDCCH / TCH Congestion % on day 1
     - A2 = Number of attempts to establish SDCCH / TCH made on day 2
     - C2 = Average SDCCH / TCH Congestion % on day 2
     - An = Number of attempts to establish SDCCH / TCH made on day n
     - Cn = Average SDCCH / TCH Congestion % on day n
   - **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
     - C1 = Average POI Congestion % on day 1
     - A2 = POI traffic offered on all POIs (no. of calls) on day 2
     - C2 = Average POI Congestion % on day 2

- An = POI traffic offered on all POIs (no. of calls) on day n
- Cn = Average POI Congestion % on day n

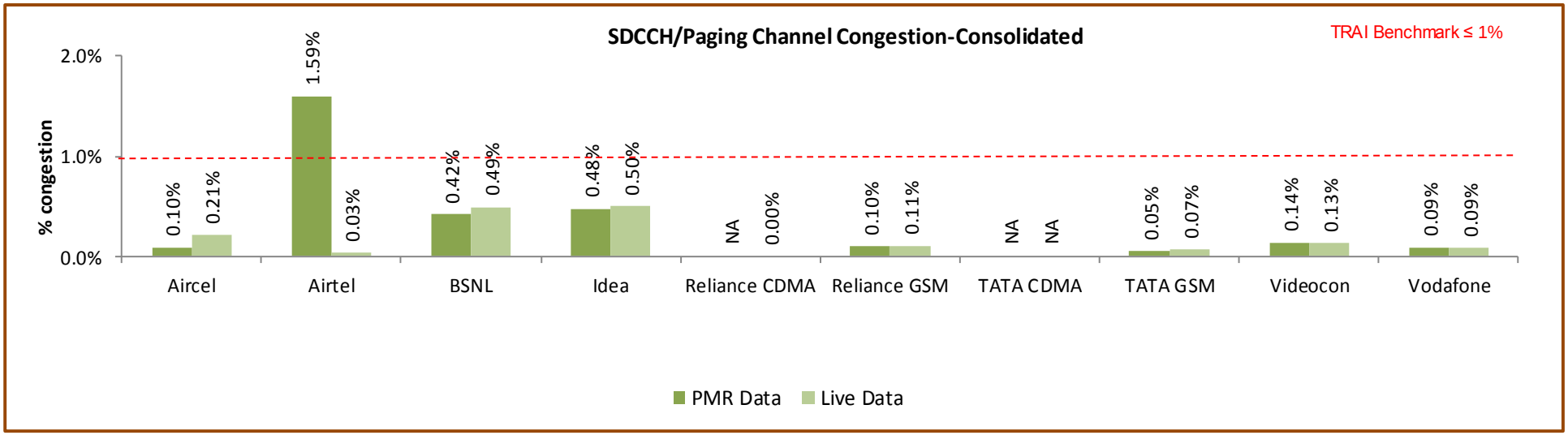
3. **Benchmark:**

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

4. **Audit Procedure –**

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

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



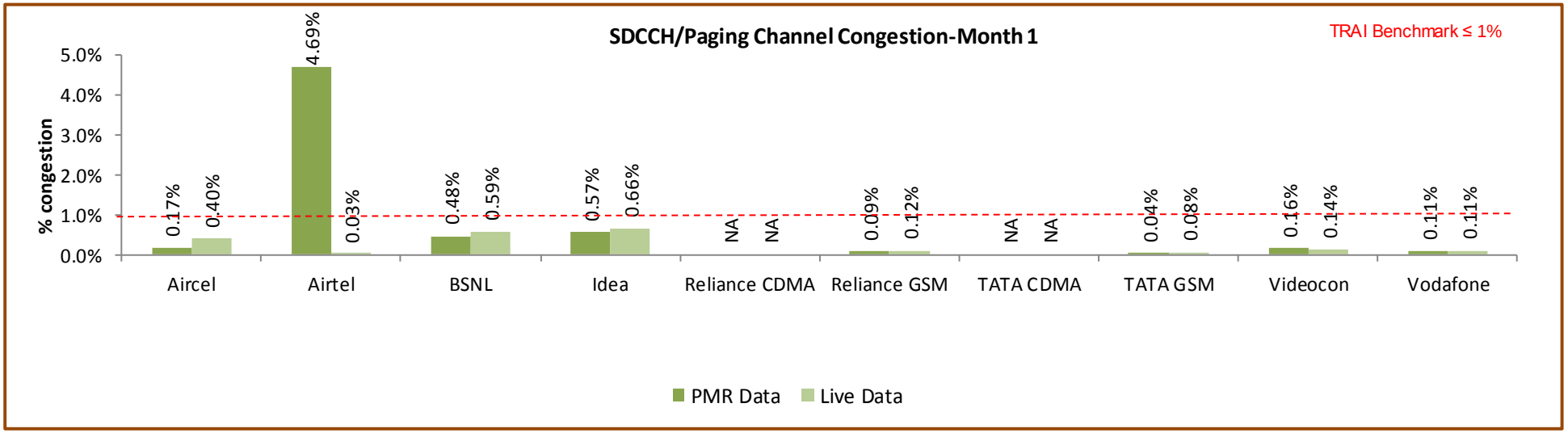
Data Source: Network Operations Center (NOC) of the operators

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

Significant difference was observed between PMR & live measurement data for Airtel, Aircel and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for 3 days.

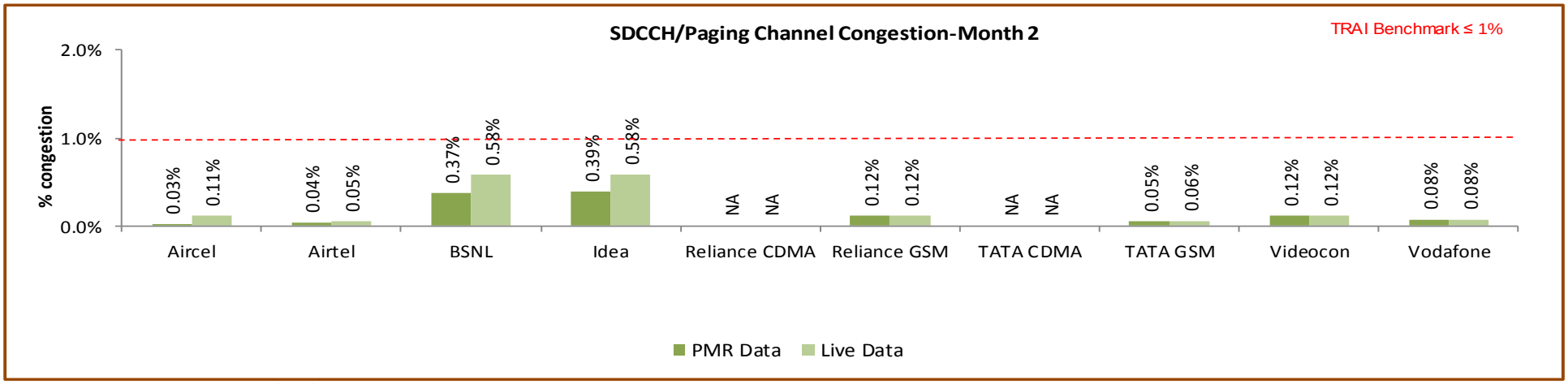
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

6.4.2.1 KEY FINDINGS – MONTH 1



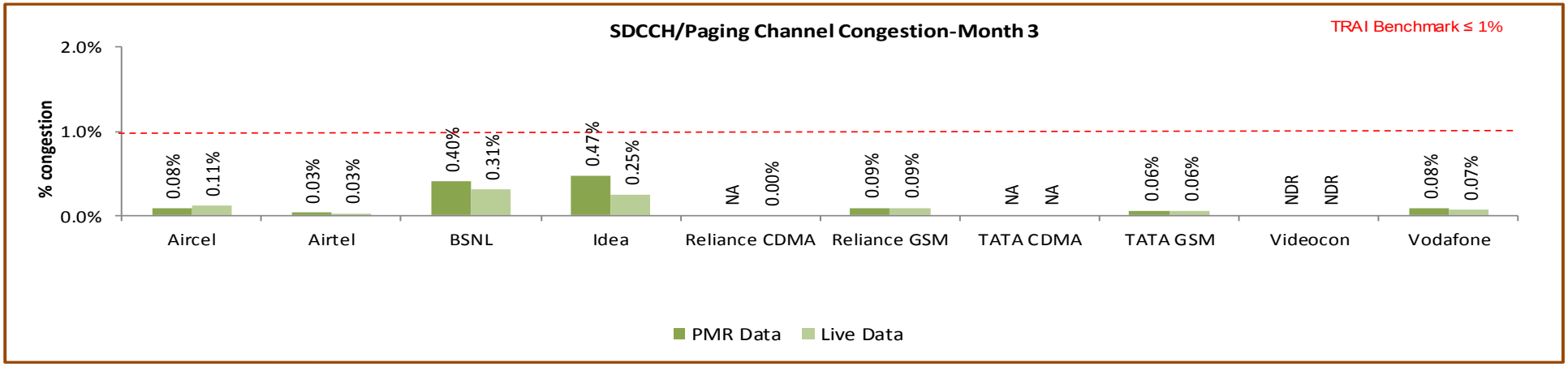
Data Source: Network Operations Center (NOC) of the operators

6.4.2.2 KEY FINDINGS – MONTH 2



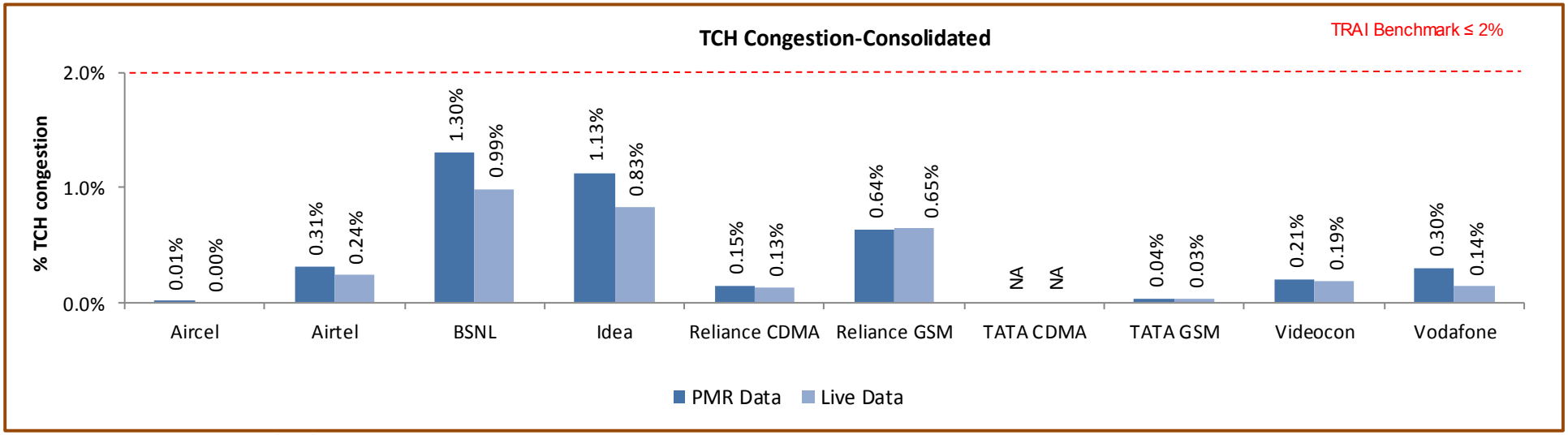
Data Source: Network Operations Center (NOC) of the operators

6.4.2.3 KEY FINDINGS – MONTH 3



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

6.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

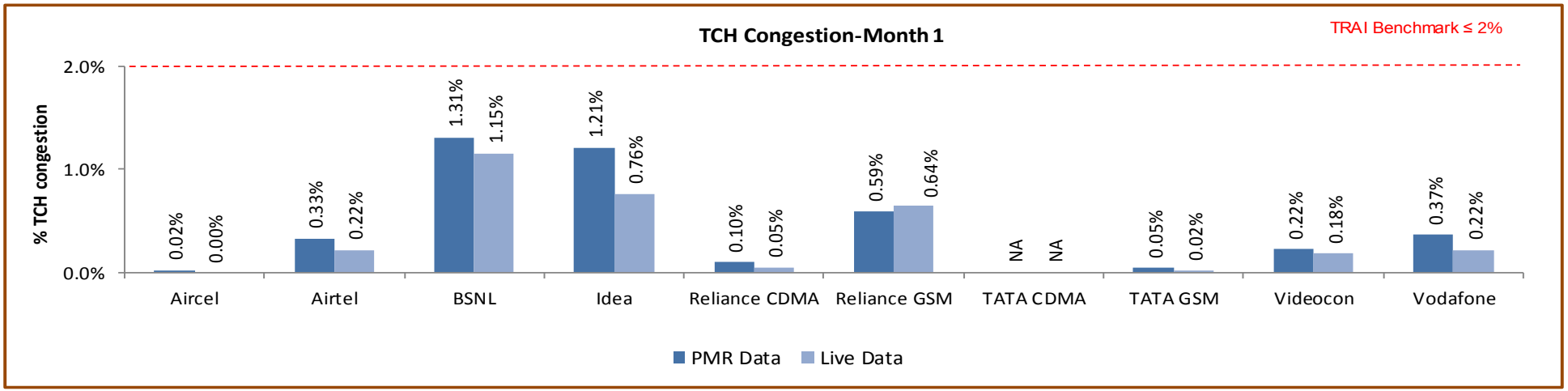


Data Source: Network Operations Center (NOC) of the operators

All the operators met the benchmark for both PMR and Live data. BSNL, Idea and Reliance GSM had a lower performance compared to other operators.

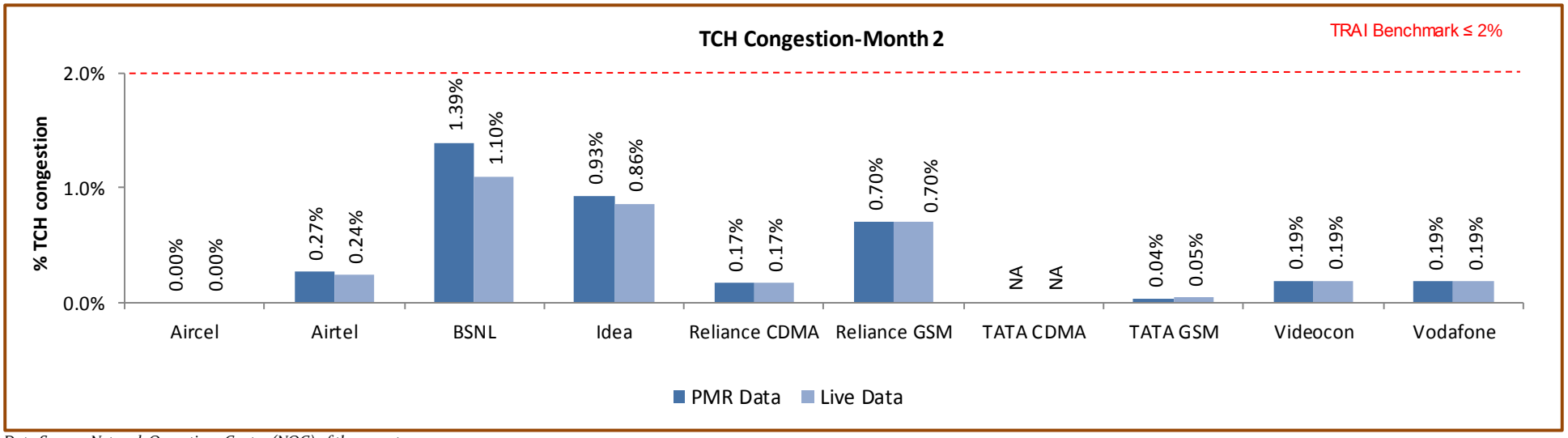
The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.4.3.1 KEY FINDINGS – MONTH 1



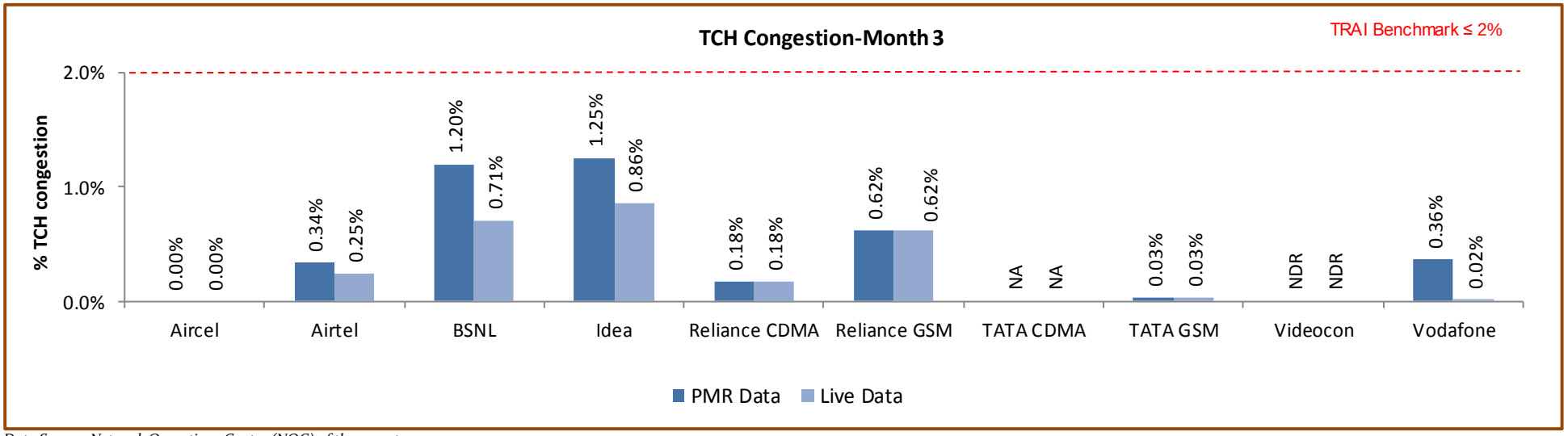
Data Source: Network Operations Center (NOC) of the operators

6.4.3.2 KEY FINDINGS – MONTH 2



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

6.4.3.3 KEY FINDINGS – MONTH 3



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

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

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		51	277	459	754	131	564	NA	162	72	132
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	1
Total Capacity of all POIs (A) - in erlangs		6551	831227	555017	480471	58921	378868	NA	130160	40122	254073
Traffic served for all POIs (B)- in erlangs		25	408212	85992	280667	34043	175035	NA	68193	22171	119684
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		51	275	185	756	132	518	NA	162	72	132
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		6551	778120	190101	480026	59456	355806	NA	130262	40142	254145
Traffic served for all POIs (B)- in erlangs		2	405512	81157	279546	34721	163148	NA	38922	21954	94960
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%

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

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

6.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	92	153	251	44	187	NA	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	257180	185006	160028	19640	123252	NA	43337	19952	84526
Traffic served for all POIs (B)- in erlangs		12	134846	28580	86802	11348	56111	NA	22653	11458	47120
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	91	62	252	44	146	NA	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	253926	63346	160473	19912	104391	NA	43419	19964	84599
Traffic served for all POIs (B)- in erlangs		0	117906	25768	82970	12030	44709	NA	12696	10321	22395
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%

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

6.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-November											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	92	153	251	44	222	NA	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	311261	185006	160352	19640	142538	NA	43418	20170	84599
Traffic served for all POIs (B)- in erlangs		12	123585	27934	95477	11348	66729	NA	22433	10713	23206
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	92	62	252	44	222	NA	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	261261	63346	160452	19640	142538	NA	43434	20177	84599
Traffic served for all POIs (B)- in erlangs		1	133585	27325	96745	11348	66729	NA	13001	11633	23206
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%

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

6.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	93	153	251	44	155	NA	54	NDR	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		2184	262787	185006	160091	19640	113078	NA	43405	NDR	84948
Traffic served for all POIs (B)- in erlangs		1	149781	29478	98387	11348	52196	NA	23107	NDR	49358
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	92	61	252	44	150	NA	54	NDR	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		2184	262933	63409	159100	19903	108877	NA	43410	NDR	84948
Traffic served for all POIs (B)- in erlangs		1	154021	28064	99831	11344	51711	NA	13224	NDR	49358
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	NDR	0.00%

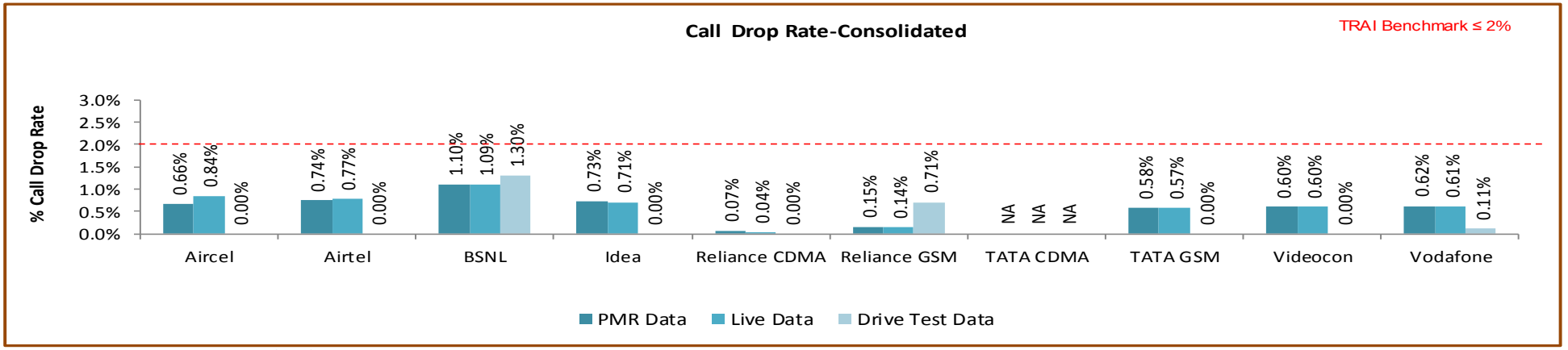
Data Source: Network Operations Center (NOC) of the operators

6.5 CALL DROP RATE

6.5.1 PARAMETER DESCRIPTION

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

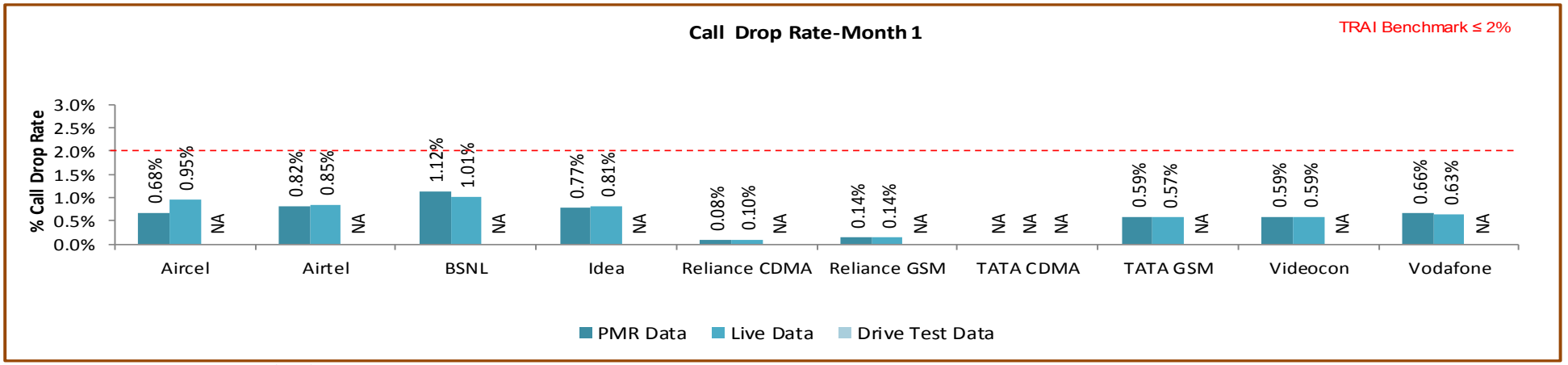
6.5.2 KEY FINDINGS - CONSOLIDATED



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

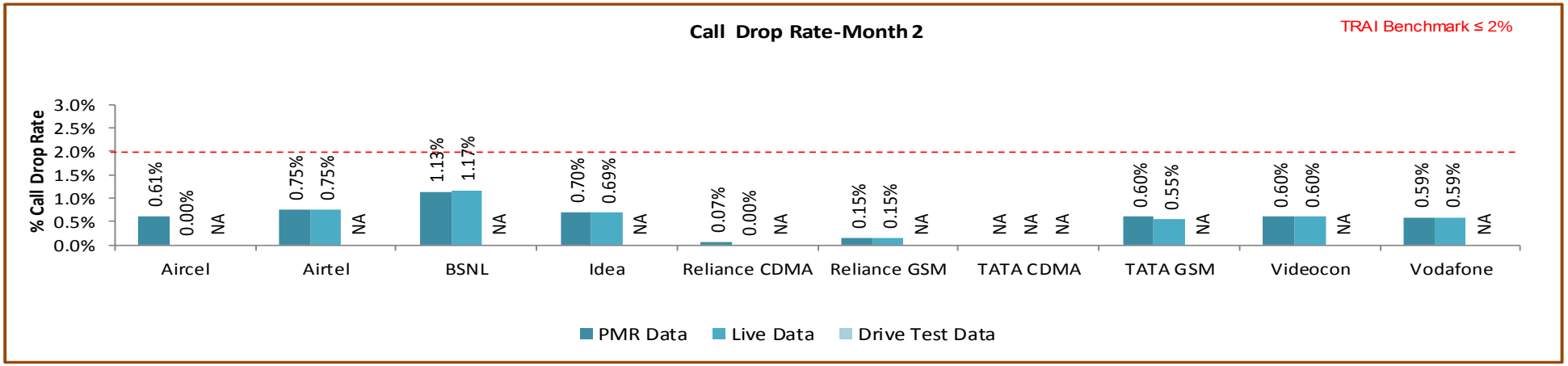
All operators met the benchmark for call drop rate during audit. The call drop rate during drive test was observed to be higher than audit for BSNL, Aircel and Reliance GSM.

6.5.2.1 KEY FINDINGS – MONTH 1



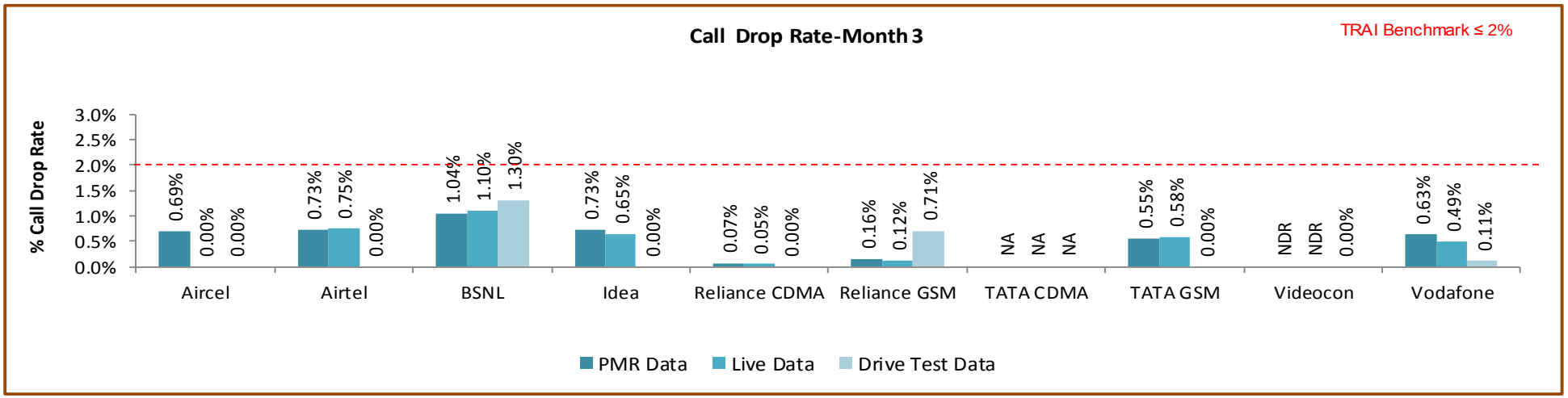
Data Source: Network Operations Center (NOC) of the operators

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 CELLS HAVING GREATER THAN 3% TCH DROP

6.6.1 PARAMETER DESCRIPTION

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

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

3. **TRAI Benchmark –**

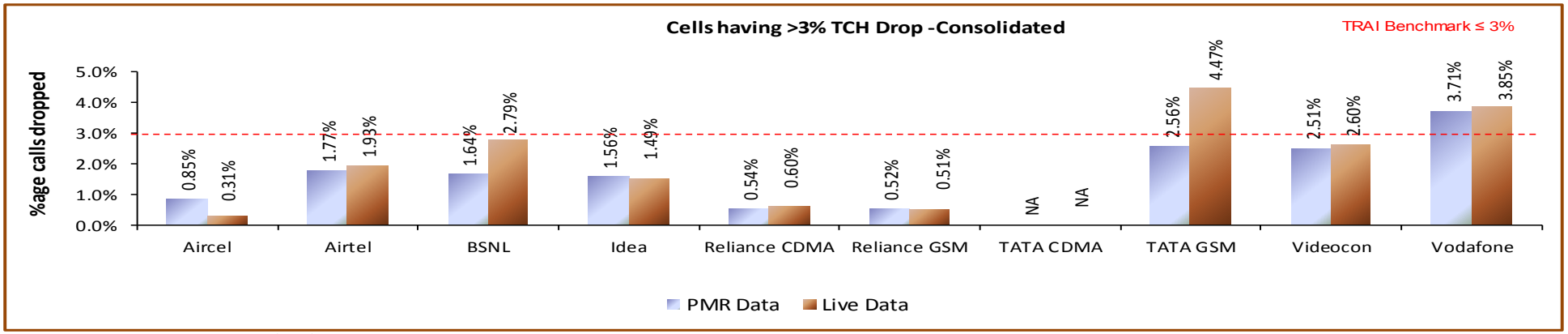
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

4. **Audit Procedure –**

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

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

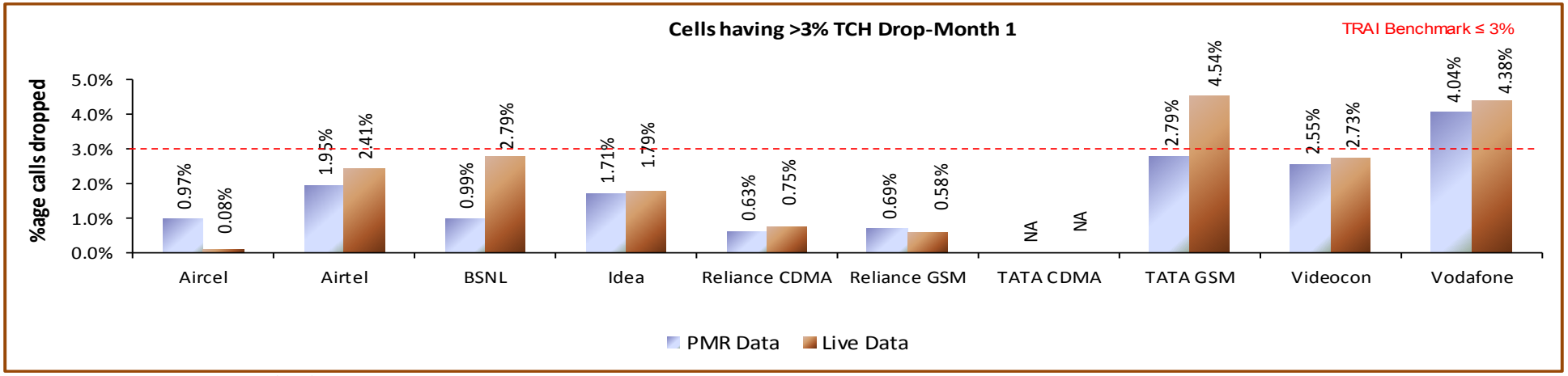
6.6.2 KEY FINDINGS - CONSOLIDATED



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

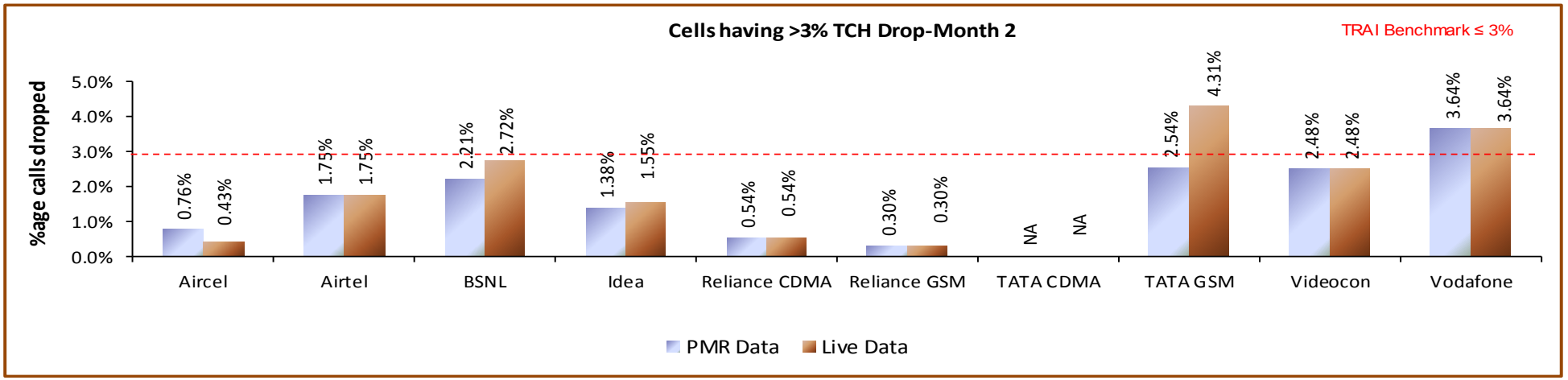
All the operators met the benchmark for both PMR and Live data except TATA GSM (live calling not met) and Vodafone.

6.6.2.1 KEY FINDINGS – MONTH 1



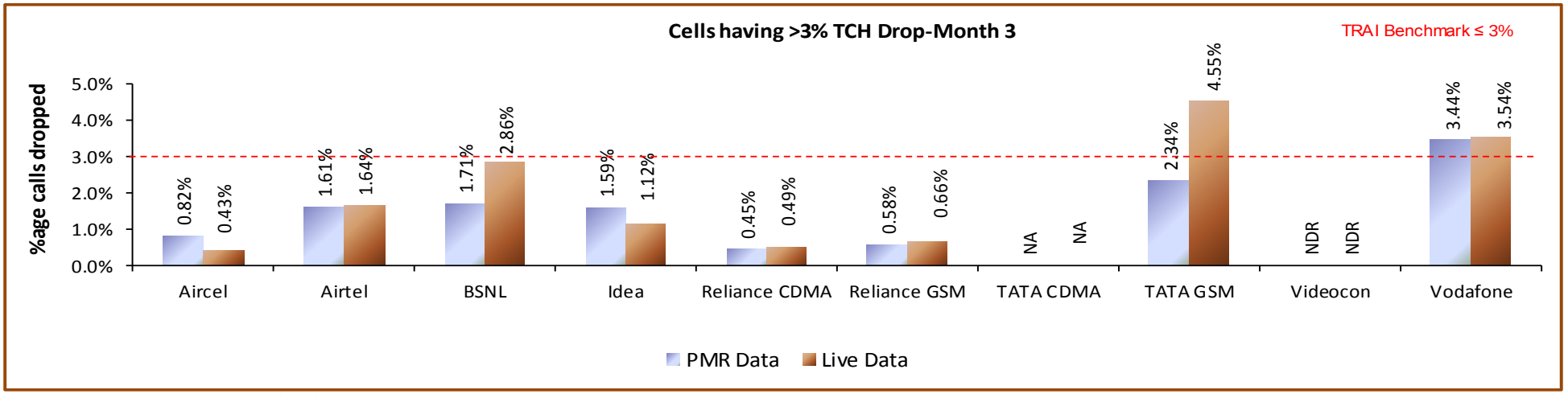
Data Source: Network Operations Center (NOC) of the operators

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



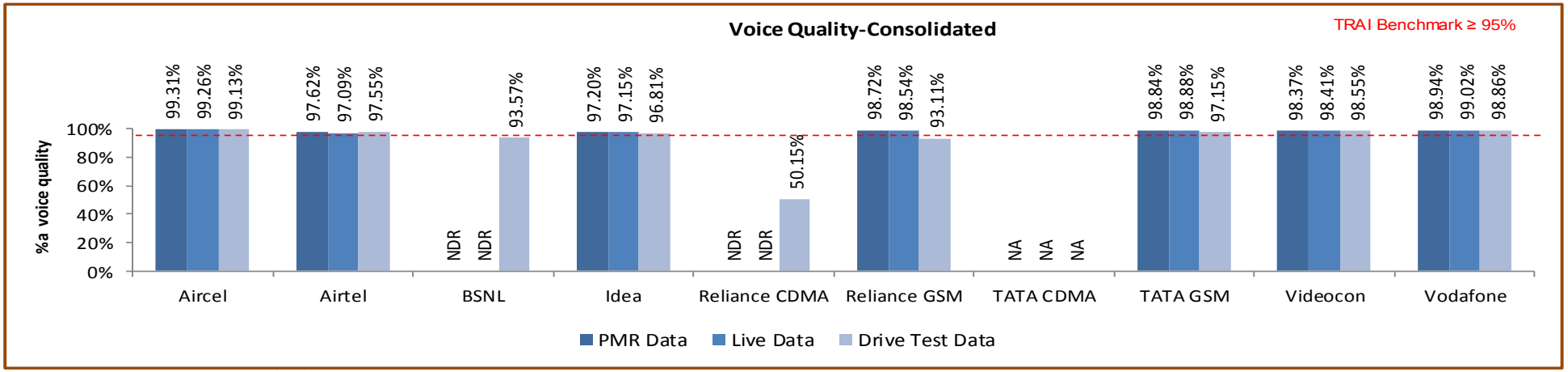
Data Source: Network Operations Center (NOC) of the operators

6.7 VOICE QUALITY

6.7.1 PARAMETER DESCRIPTION

1. **Definition:**
   - for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)
   - For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %
2. **Computational Methodology:**
   - **% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100**
3. **TRAI Benchmark:** ≥ 95%
4. **Audit Procedure –**
   a. A sample of calls would be taken randomly from the total calls established.
   b. The operator should only be considering those calls which are meeting the desired benchmark of good voice quality.

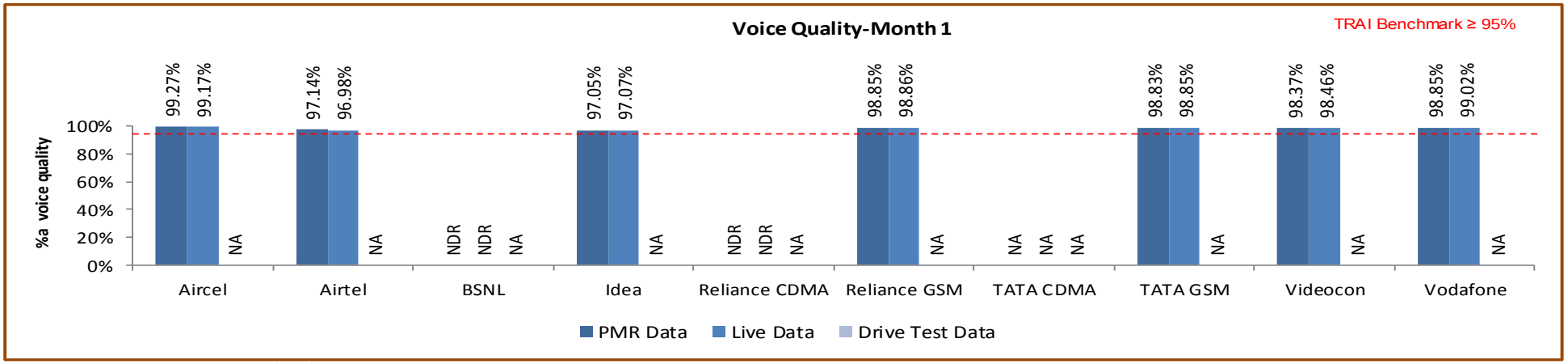
6.7.2 KEY FINDINGS



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

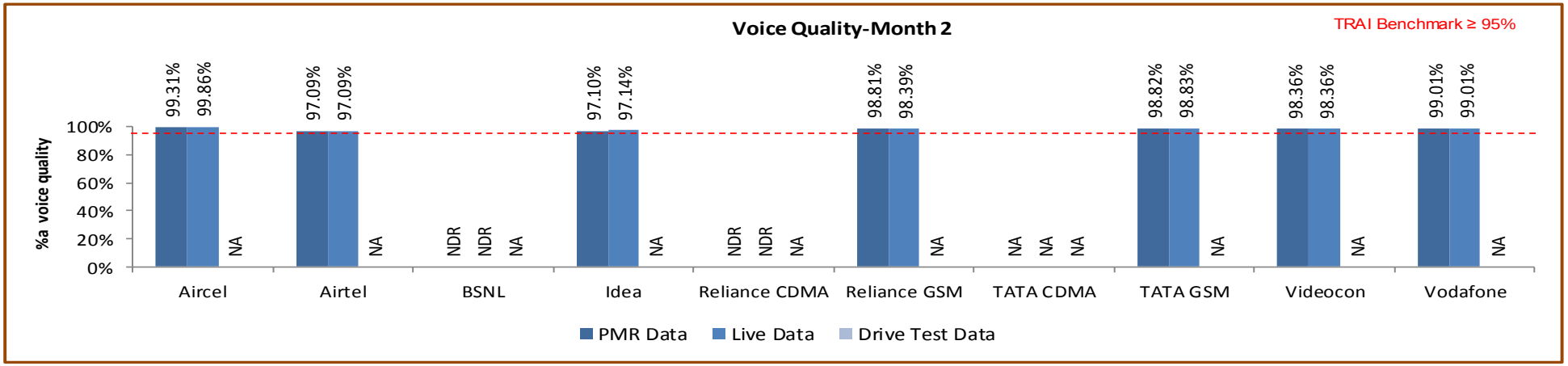
BSNL and Reliance GSM & CDMA were not able to meet the benchmark for Voice quality as per drive test data.

6.7.2.1 KEY FINDINGS – MONTH 1



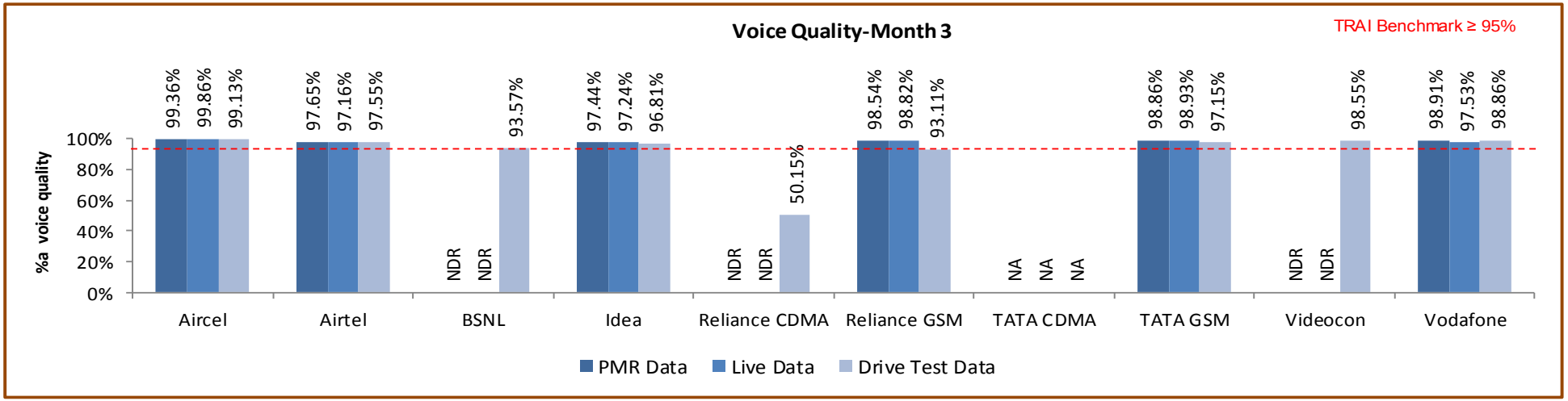
Data Source: Network Operations Center (NOC) of the operators

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 - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 3G

7.1 NODE BS DOWNTIME

7.1.1 PARAMETER DESCRIPTION

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

  1. Node Bs downtime (not available for service)

  2. Worst affected Node Bs due to downtime

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

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

3. TRAI Benchmark –

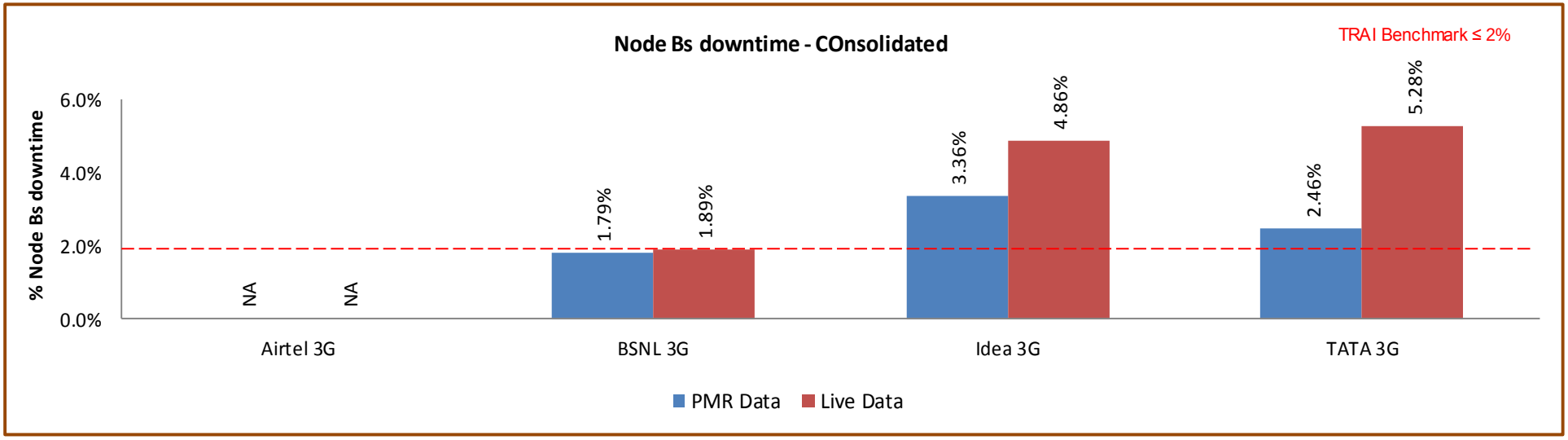
a. Node Bs downtime (not available for service) ≤ 2%

4. Audit Procedure –

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

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

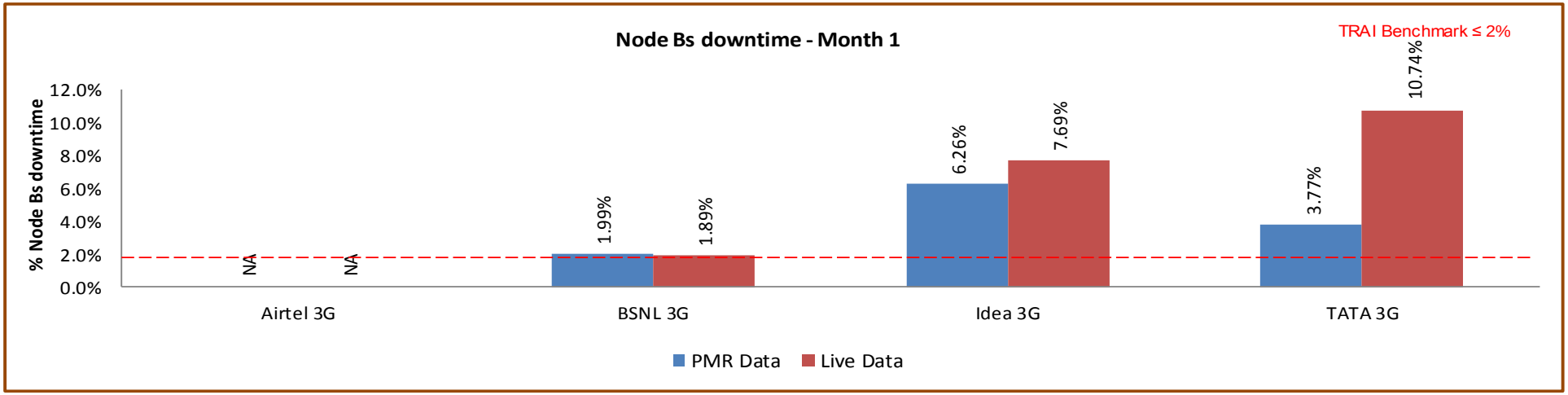
7.1.2 KEY FINDINGS - CONSOLIDATED



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

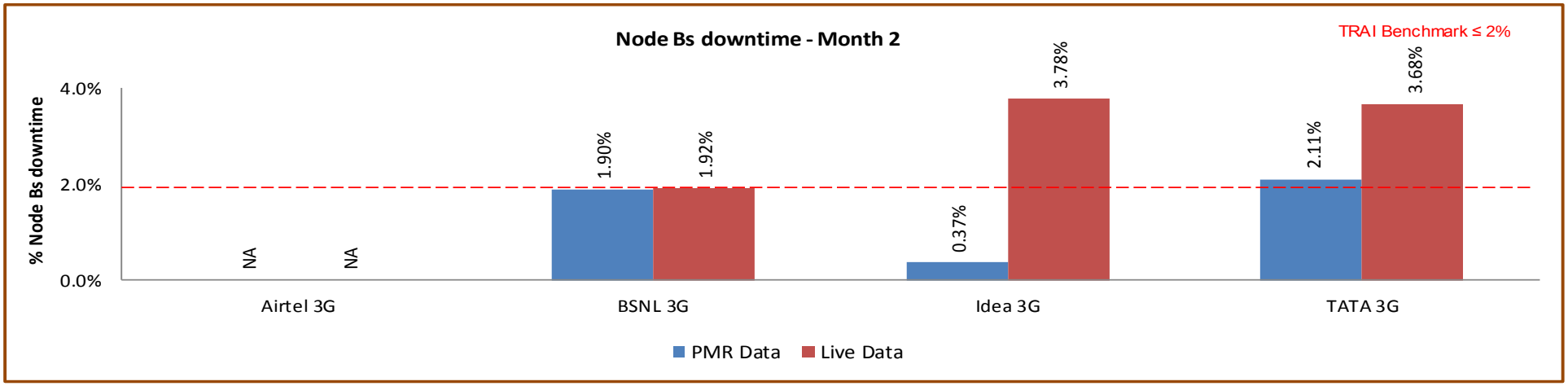
Idea and TATA WCDMA failed to meet the benchmark for both PMR and Live data

7.1.2.1 KEY FINDINGS – MONTH 1



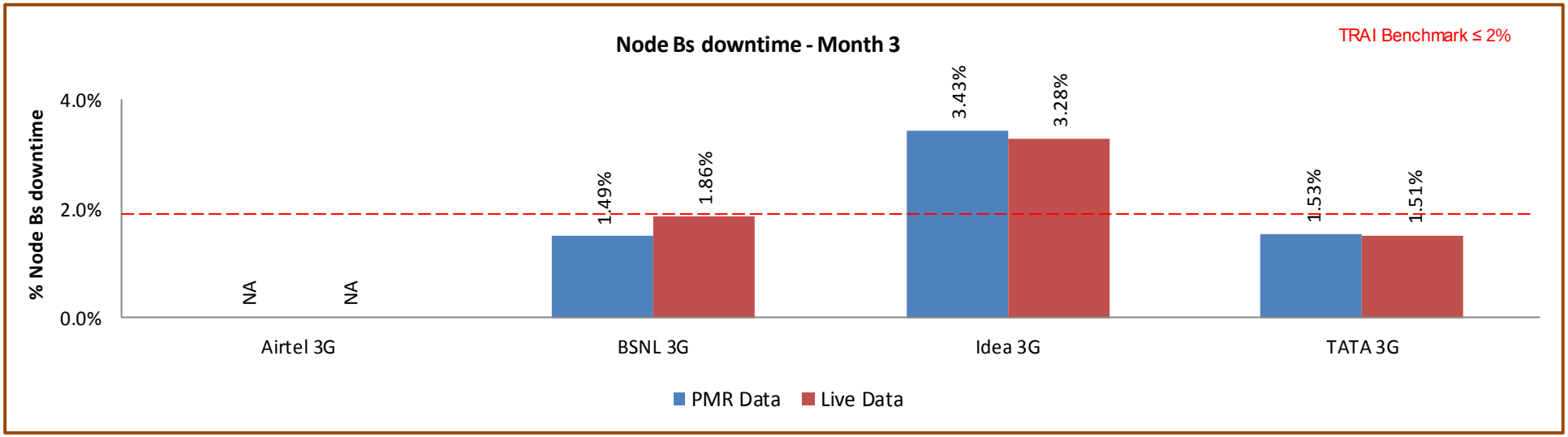
Data Source: Operations and Maintenance Center (OMC) of the operators

7.1.2.2 KEY FINDINGS – MONTH 2



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

7.1.2.3 KEY FINDINGS – MONTH 3



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

7.2 WORST AFFECTED NODE BS DUE TO DOWNTIME

7.2.1 PARAMETER DESCRIPTION

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

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

- **Computation Methodology –**

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

- **TRAI Benchmark –**

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

- **Audit Procedure –**

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

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

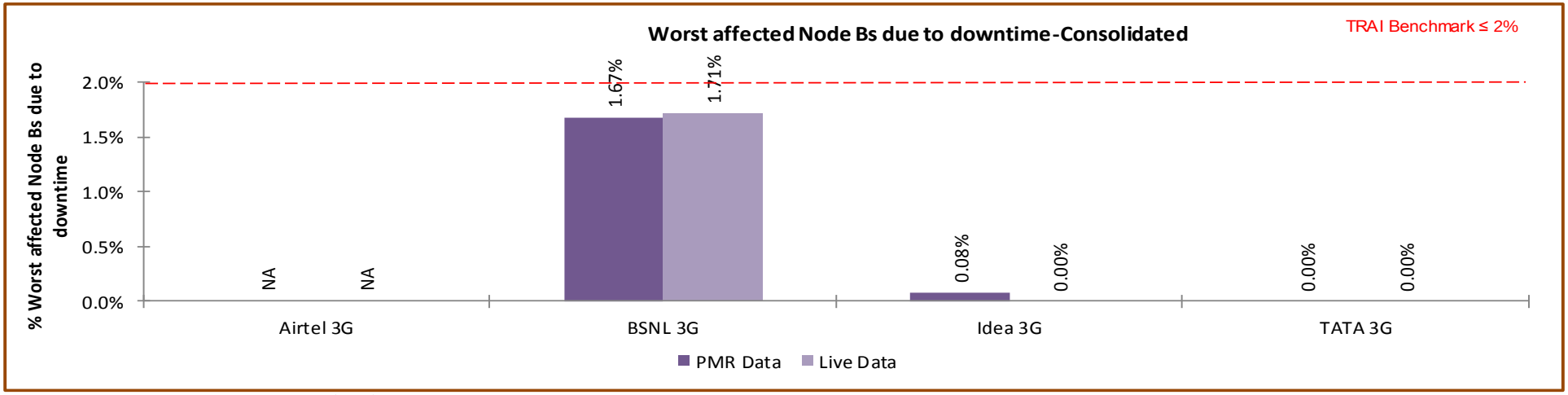
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

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

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

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

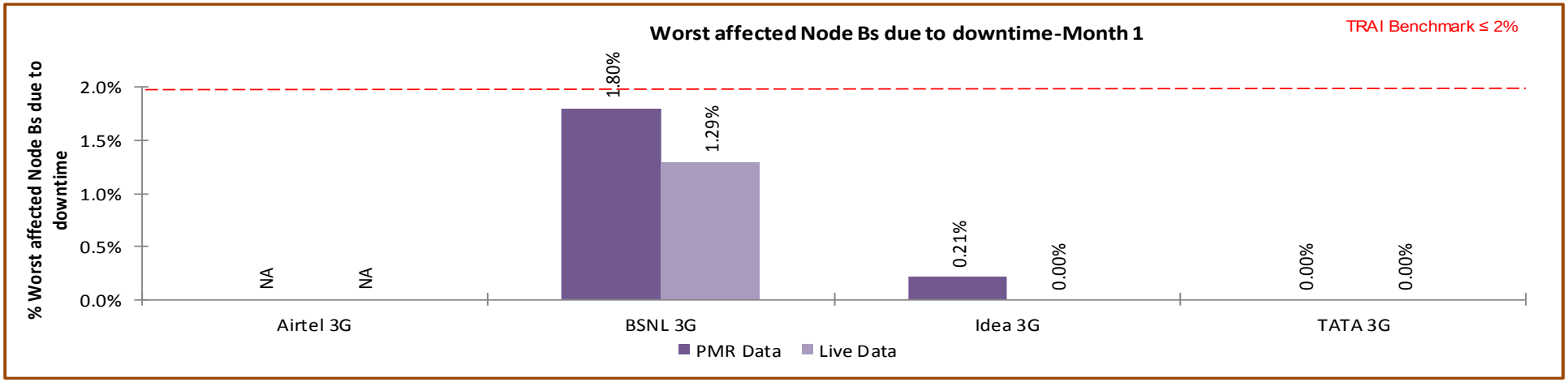
7.2.2 KEY FINDINGS – CONSOLIDATED



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

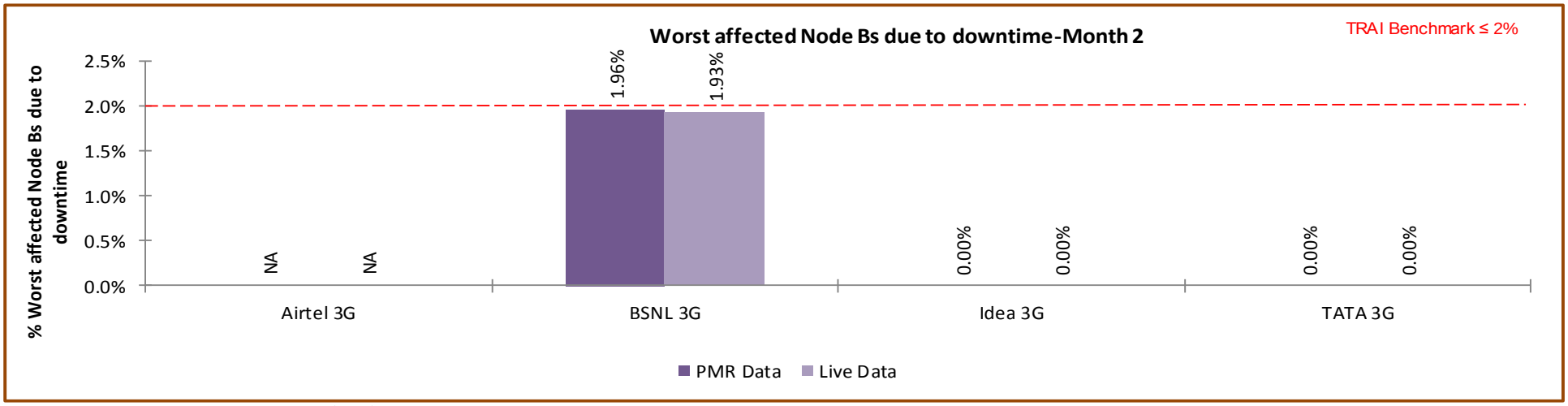
All the operators met the benchmark for both PMR and Live data

7.2.2.1 KEY FINDINGS – MONTH 1



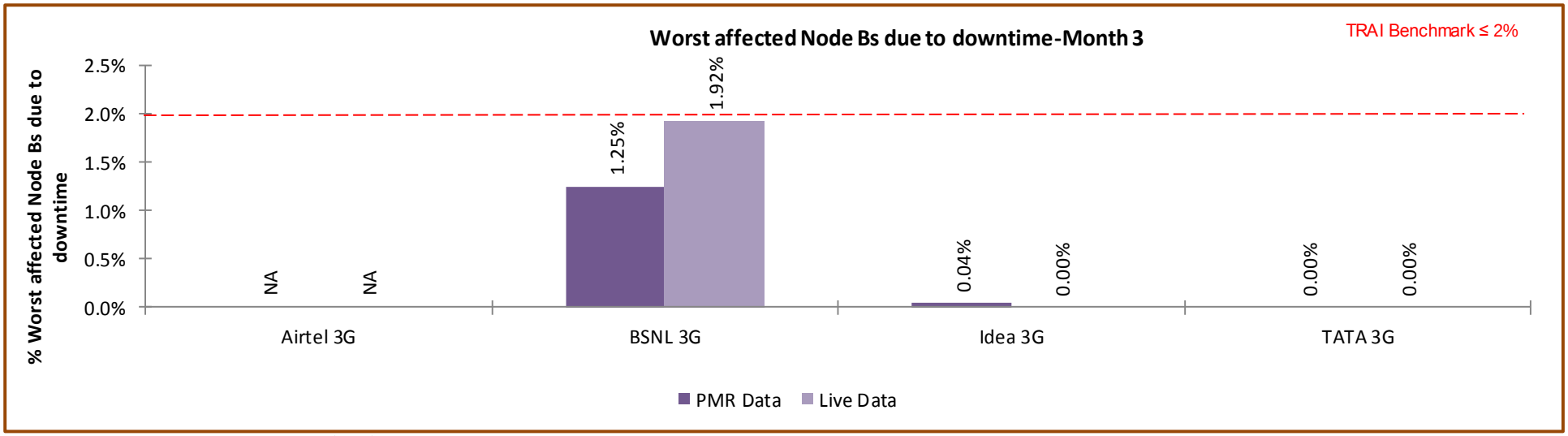
Data Source: Operations and Maintenance Center (OMC) of the operators

7.2.2.2 KEY FINDINGS – MONTH 2



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

7.2.2.3 KEY FINDINGS – MONTH 3



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

7.3 CALL SET UP SUCCESS RATE

7.3.1 PARAMETER DESCRIPTION

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

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

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

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

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

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

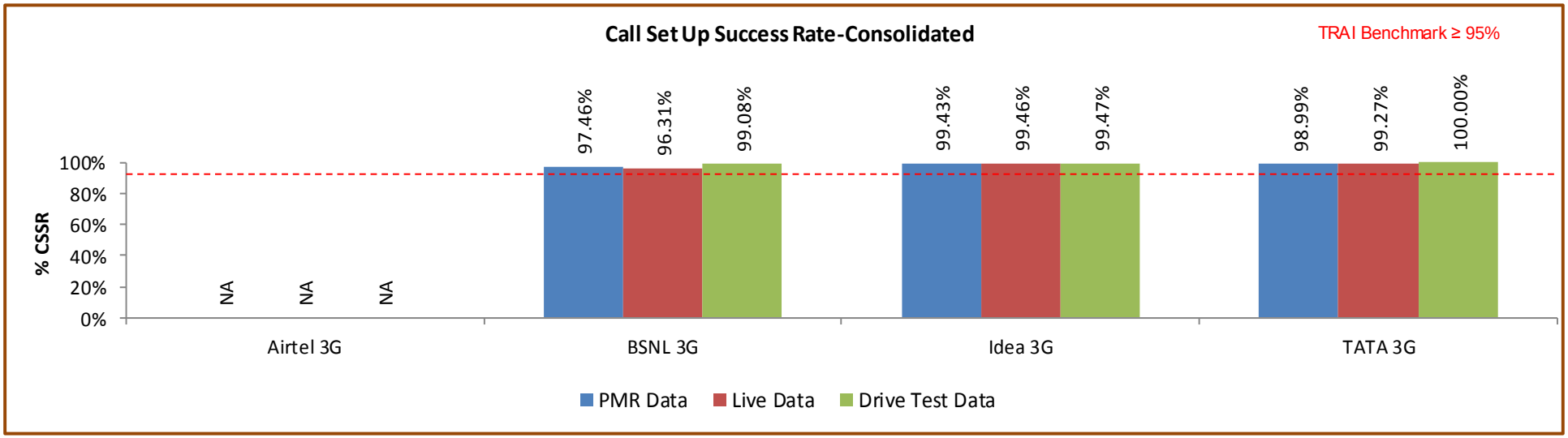
5. **TRAI Benchmark ≥** 95%

6. **Audit Procedure –**

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

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

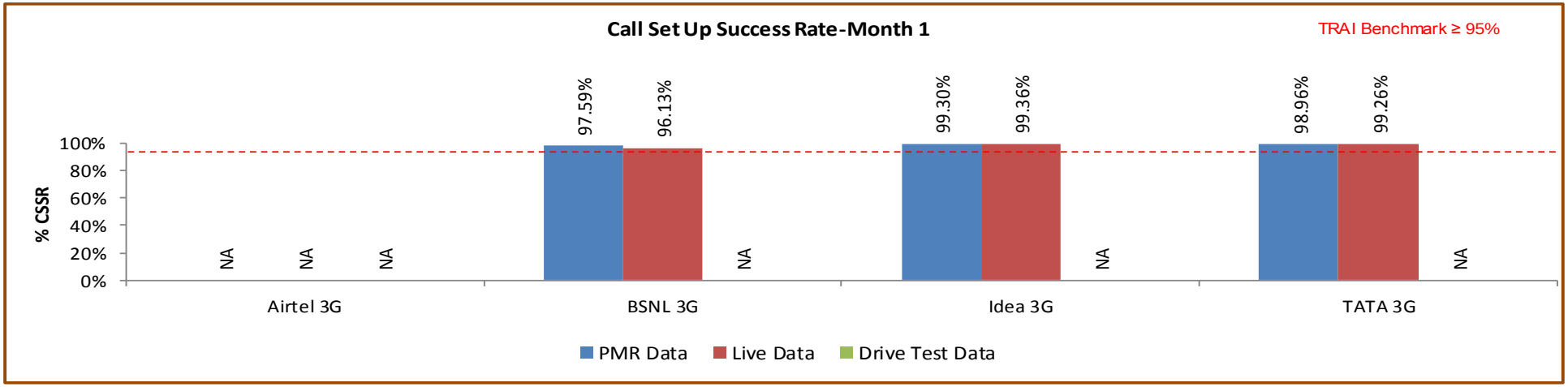
7.3.2 KEY FINDINGS - CONSOLIDATED



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

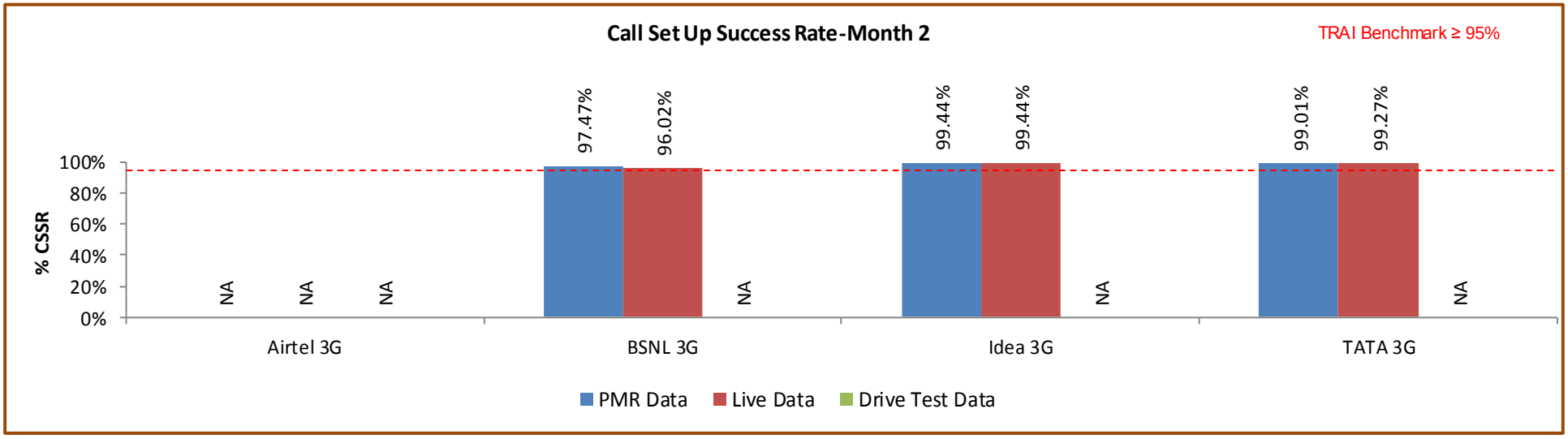
All the operators met the benchmark for both PMR and Live data.

7.3.2.1 KEY FINDINGS – MONTH 1



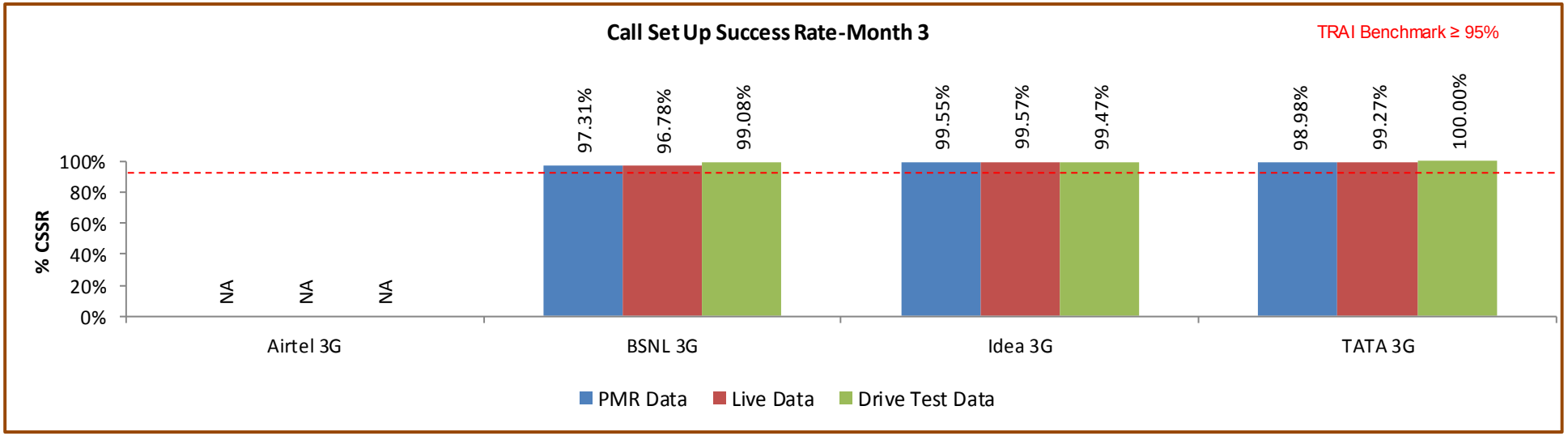
Data Source: Network Operations Center (NOC) of the operators

7.3.2.2 KEY FINDINGS – MONTH 2



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

7.3.2.3 KEY FINDINGS – MONTH 3



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

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

7.4.1 PARAMETER DESCRIPTION

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

- **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
    - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
    - C1 = Average POI Congestion % on day 1
    - A2 = POI traffic offered on all POIs (no. of calls) on day 2
    - C2 = Average POI Congestion % on day 2
    - An = POI traffic offered on all POIs (no. of calls) on day n
    - Cn = Average POI Congestion % on day n

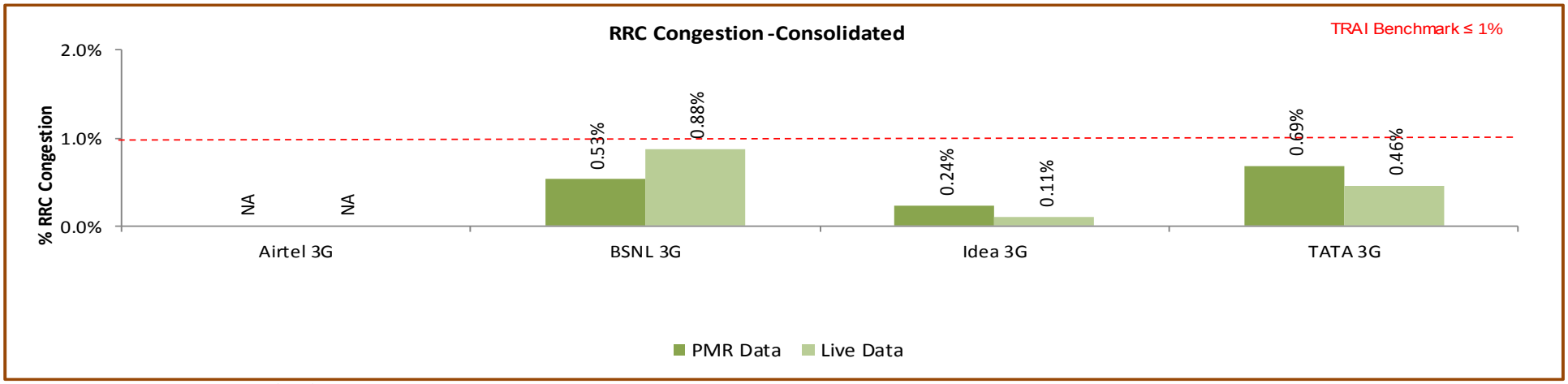
7. Benchmark:

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

8. Audit Procedure –

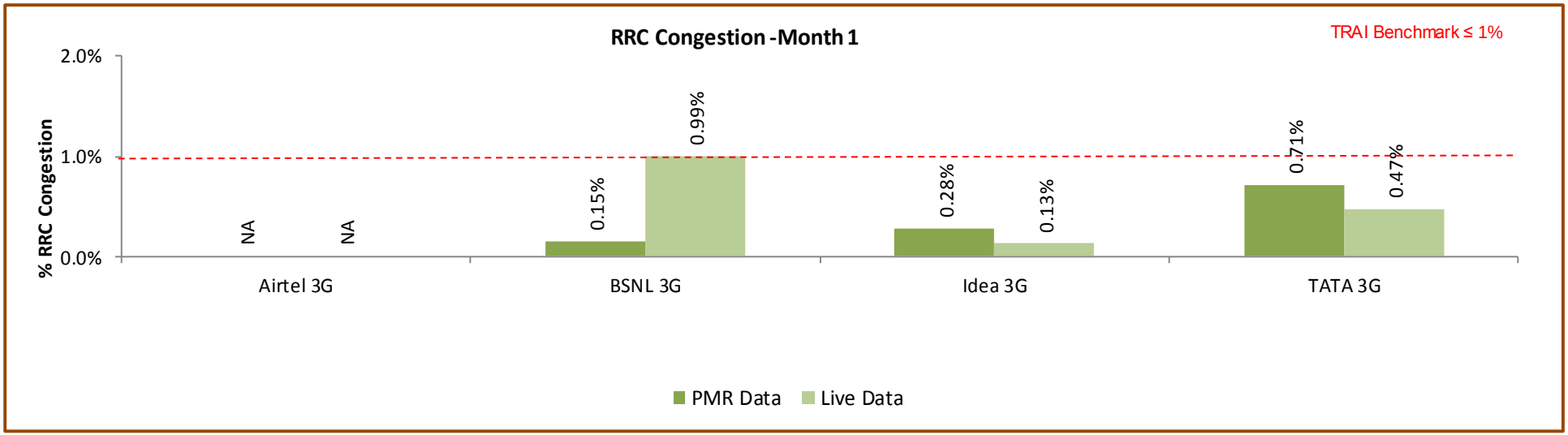
- Audit of the details of RRC and RAB congestion percentages computed by the operator (using OMC–Switch data only) would be conducted
    - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only RRC

7.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



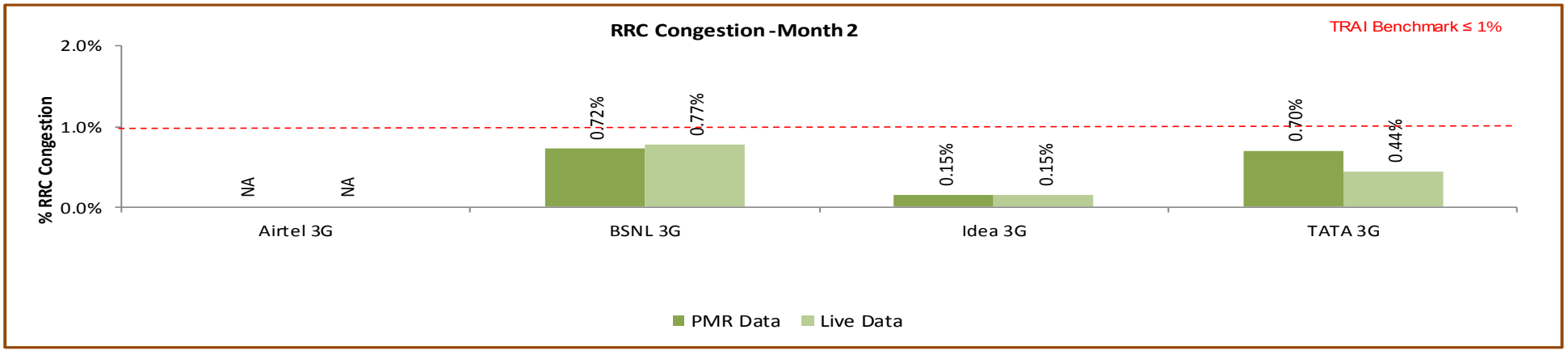
Data Source: Network Operations Center (NOC) of the operators

7.4.2.1 KEY FINDINGS – MONTH 1



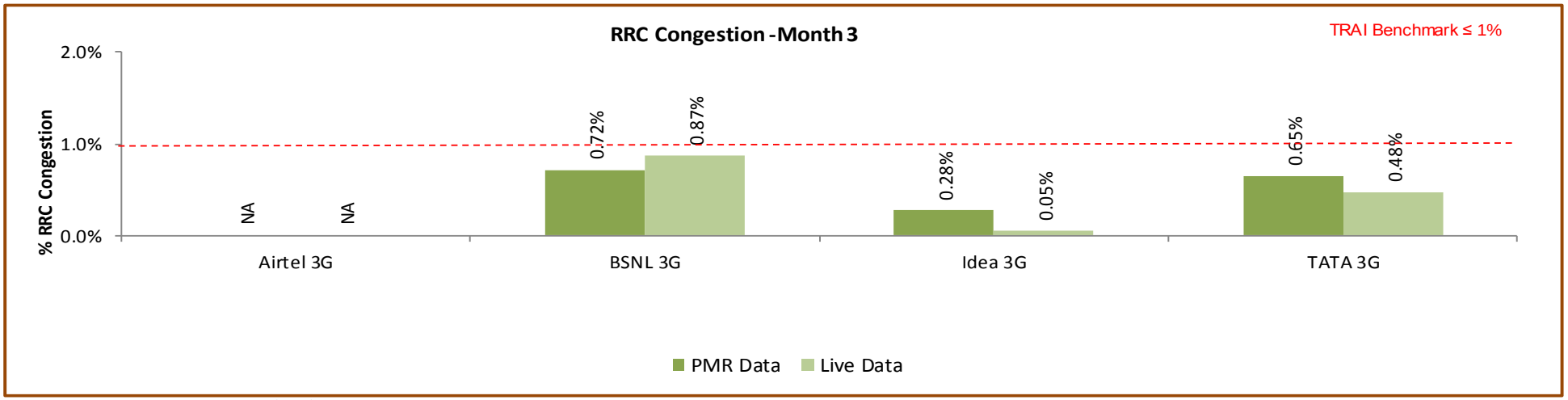
Data Source: Network Operations Center (NOC) of the operators

7.4.2.2 KEY FINDINGS – MONTH 2



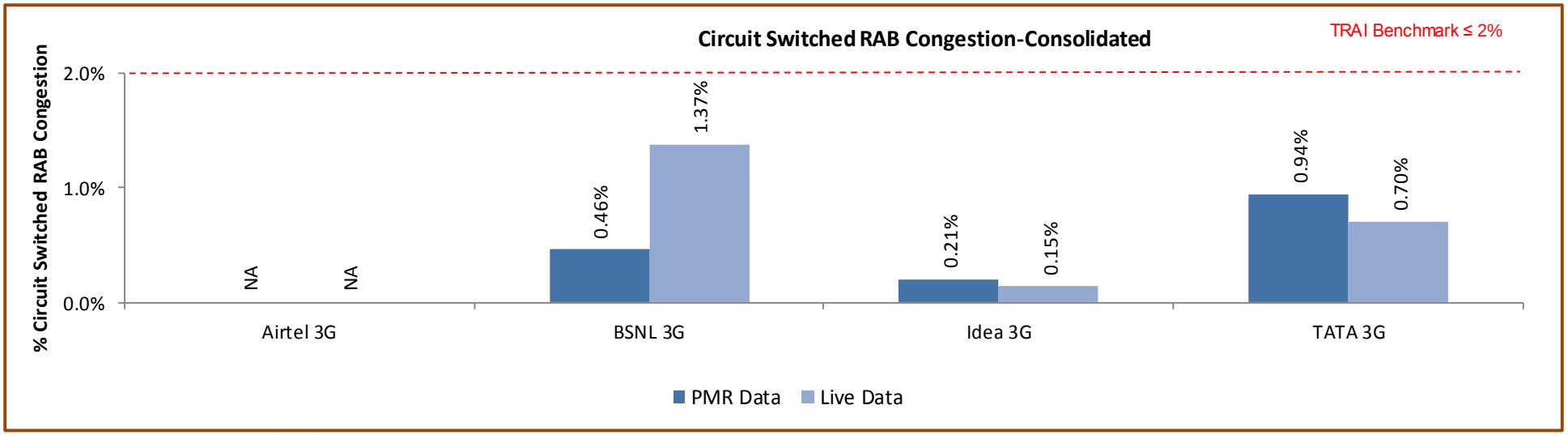
Data Source: Network Operations Center (NOC) of the operators

7.4.2.3 KEY FINDINGS – MONTH 3



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

7.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)

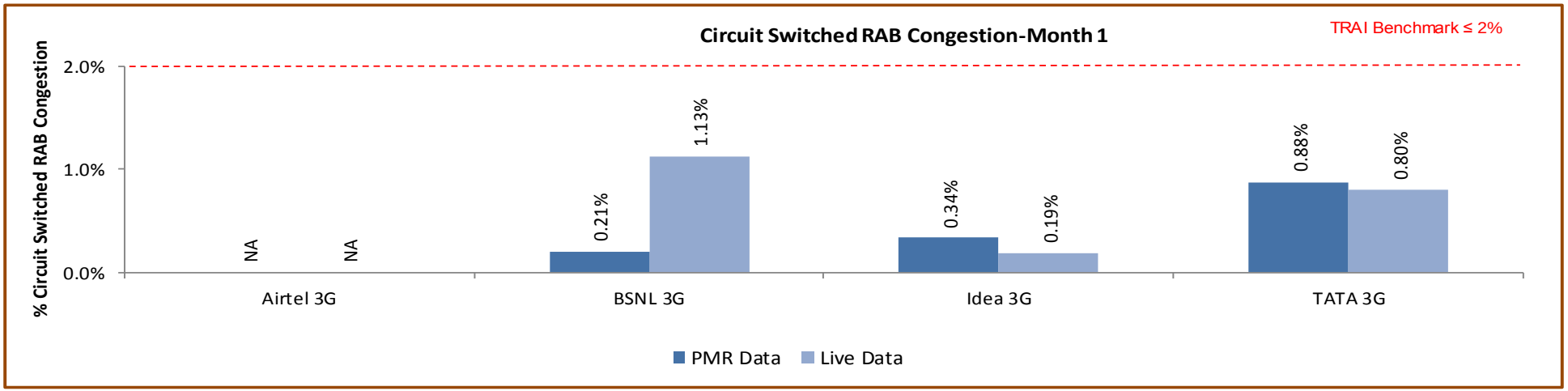


Data Source: Network Operations Center (NOC) of the operators

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

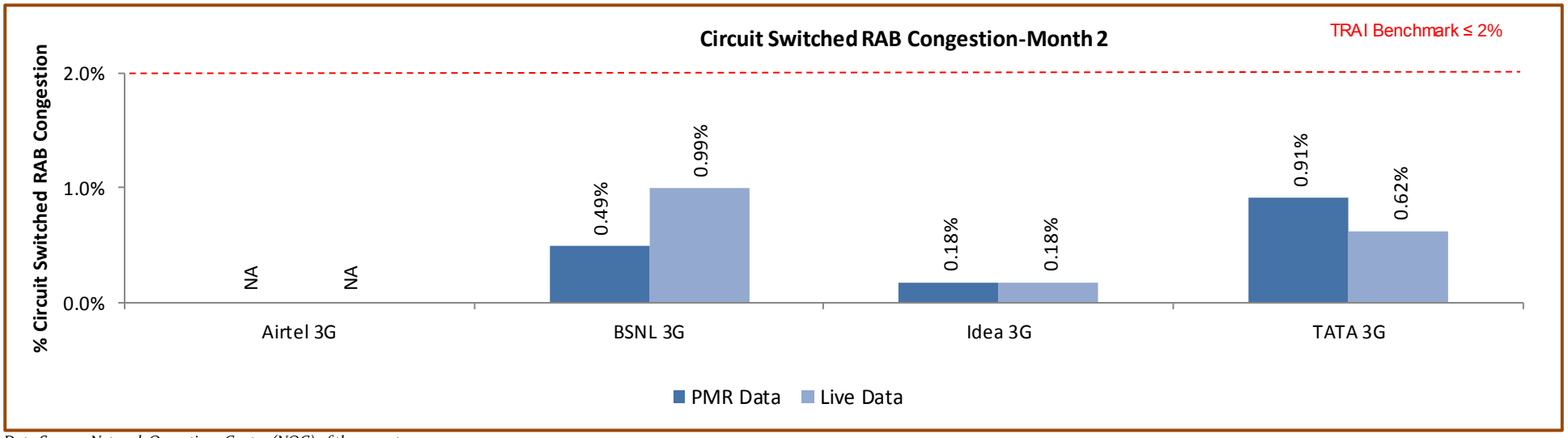
Significant difference was observed between PMR & live measurement data for BSNL, TATA and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

7.4.3.1 KEY FINDINGS – MONTH 1



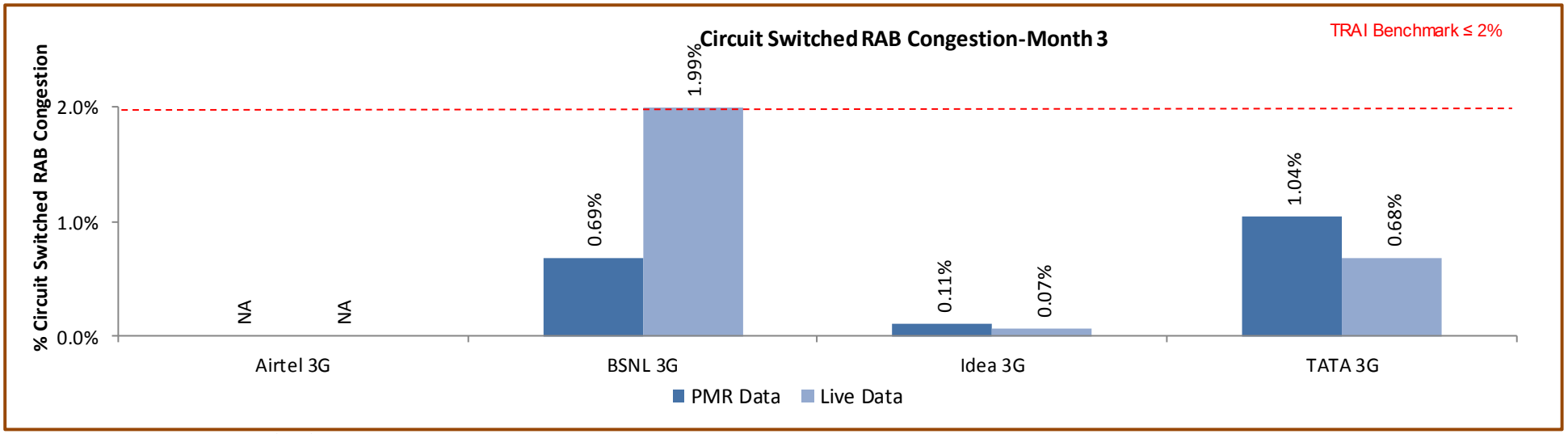
Data Source: Network Operations Center (NOC) of the operators

7.4.3.2 KEY FINDINGS – MONTH 2



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

7.4.3.3 KEY FINDINGS – MONTH 3



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

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

Audit Results for POI Congestion- PMR data					
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**
Total number of working POIs		NA	278	754	162
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	311664	480471	520996
Traffic served for all POIs (B)- in erlangs		NA	82569	280667	58814
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data					
POI congestion	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**
Total number of working POIs		NA	185	755	161
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	190135	479896	129355
Traffic served for all POIs (B)- in erlangs		NA	81157	278278	47739
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%

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

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

7.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	62	251	54
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	63346	160028	43337
Traffic served for all POIs (B)- in erlangs		NA	25768	86802	22653
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	62	252	54
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	63346	160473	43419
Traffic served for all POIs (B)- in erlangs		NA	25768	82970	12696
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%

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

7.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-November					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	63	251	54
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	63312	160352	434254
Traffic served for all POIs (B)- in erlangs		NA	27324	95477	13054
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	62	251	54
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	63346	160323	43434
Traffic served for all POIs (B)- in erlangs		NA	27325	95477	13001
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%

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

7.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	153	251	54
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	185006	160091	43405
Traffic served for all POIs (B)- in erlangs		NA	29478	98387	23107
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	61	252	53
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	63443	159100	42502
Traffic served for all POIs (B)- in erlangs		NA	28064	99831	22041
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%

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

7.5 CIRCUIT SWITCHED VOICE DROP RATE

7.5.1 PARAMETER DESCRIPTION

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

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

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

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

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

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

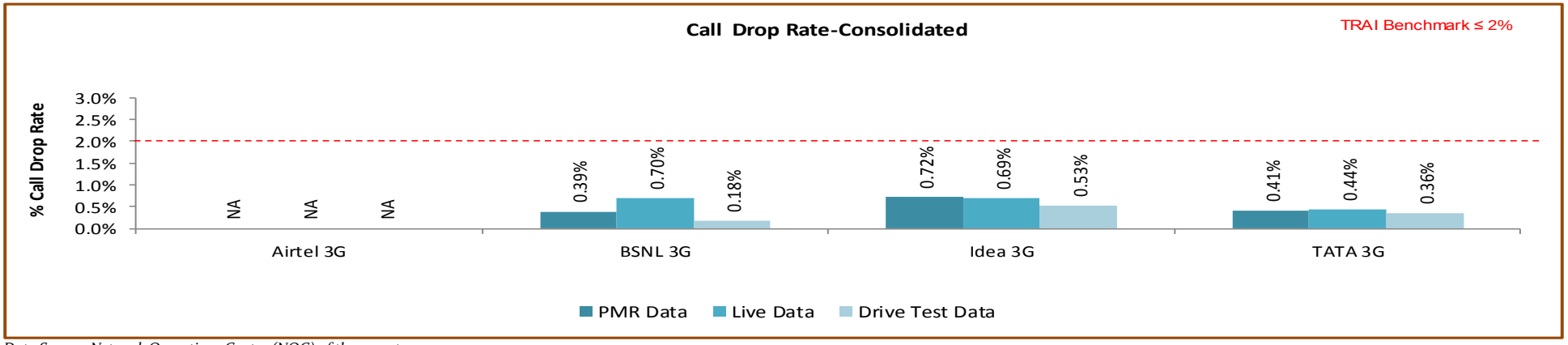
5. **TRAI Benchmark –**

   - Circuit switched voice drop rate ≤ 2%

6. **Audit Procedure –**

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

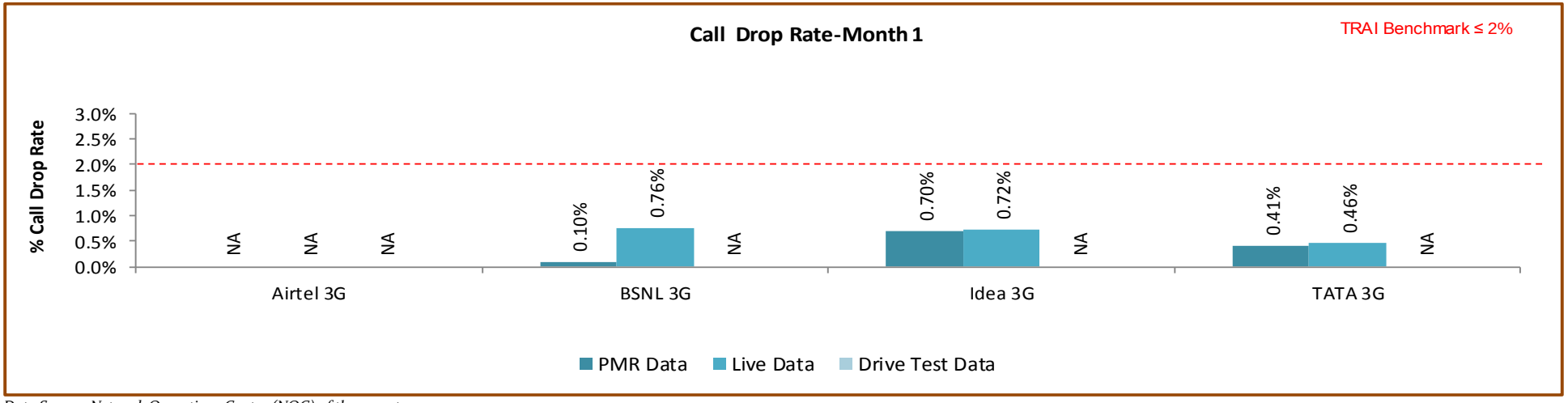
7.5.2 KEY FINDINGS - CONSOLIDATED



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

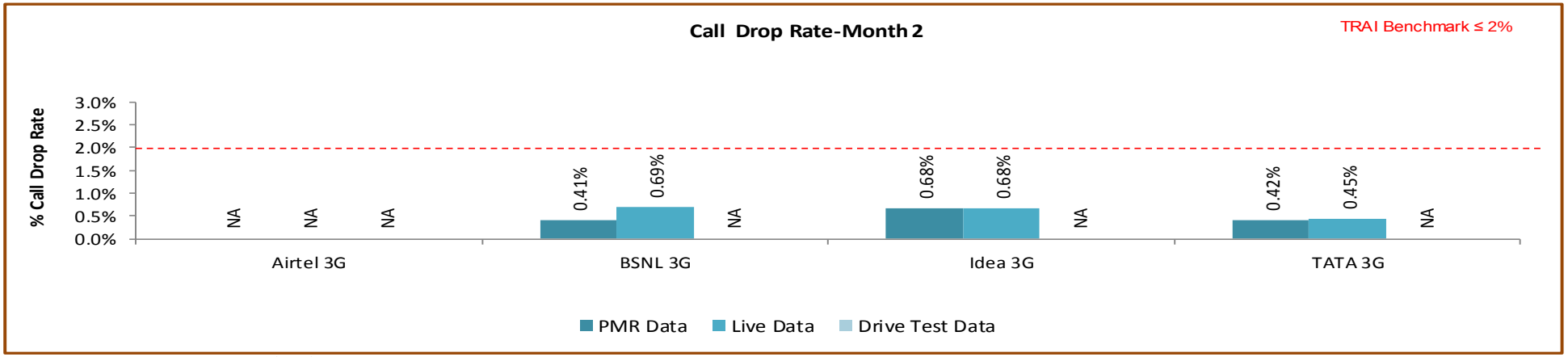
All operators met the benchmark for call drop rate during audit.

7.5.2.1 KEY FINDINGS – MONTH 1



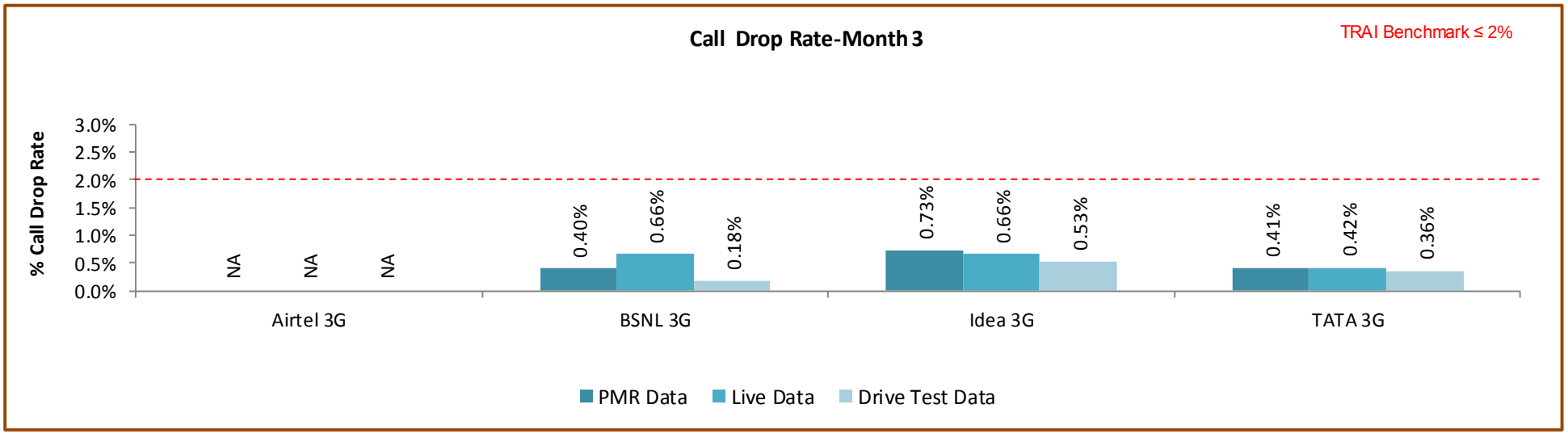
Data Source: Network Operations Center (NOC) of the operators

7.5.2.2 KEY FINDINGS – MONTH 2



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

7.5.2.3 KEY FINDINGS – MONTH 3



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

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

7.6.1 PARAMETER DESCRIPTION

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

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

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

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

5. **TRAI Benchmark** –

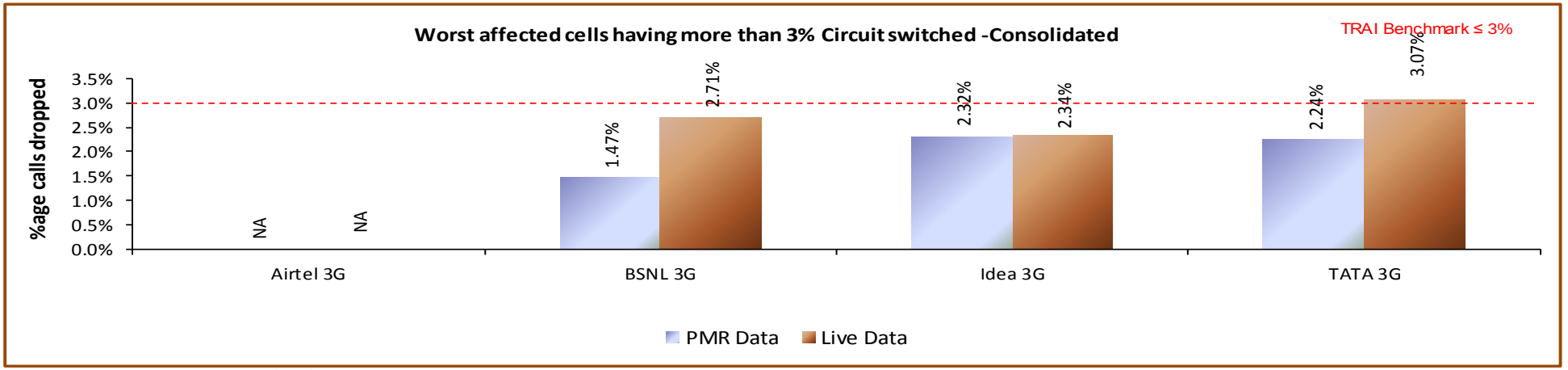
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

6. **Audit Procedure** –

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

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

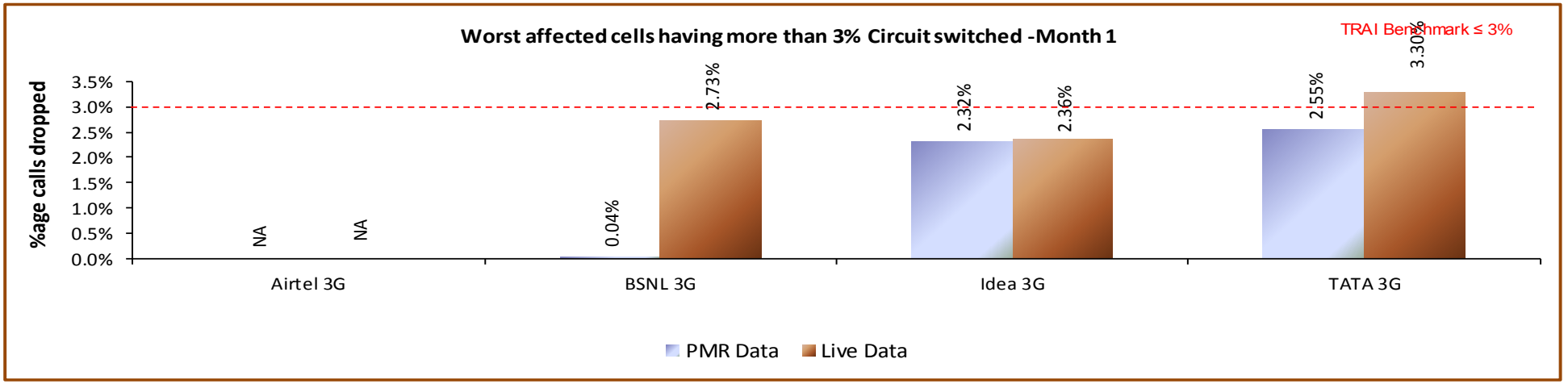
7.6.2 KEY FINDINGS - CONSOLIDATED



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

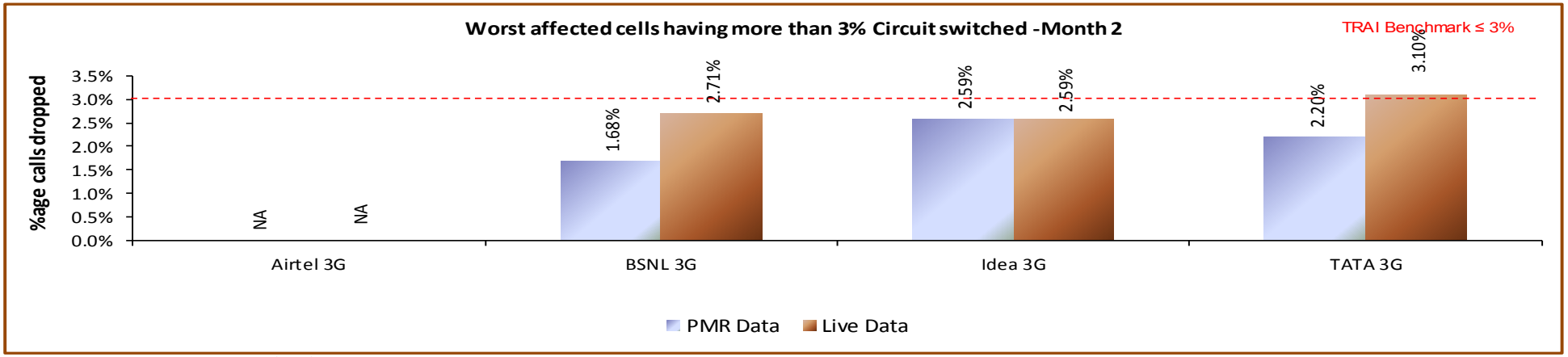
TATA 3G did not meet the benchmark during audit for live calling.

7.6.2.1 KEY FINDINGS – MONTH 1



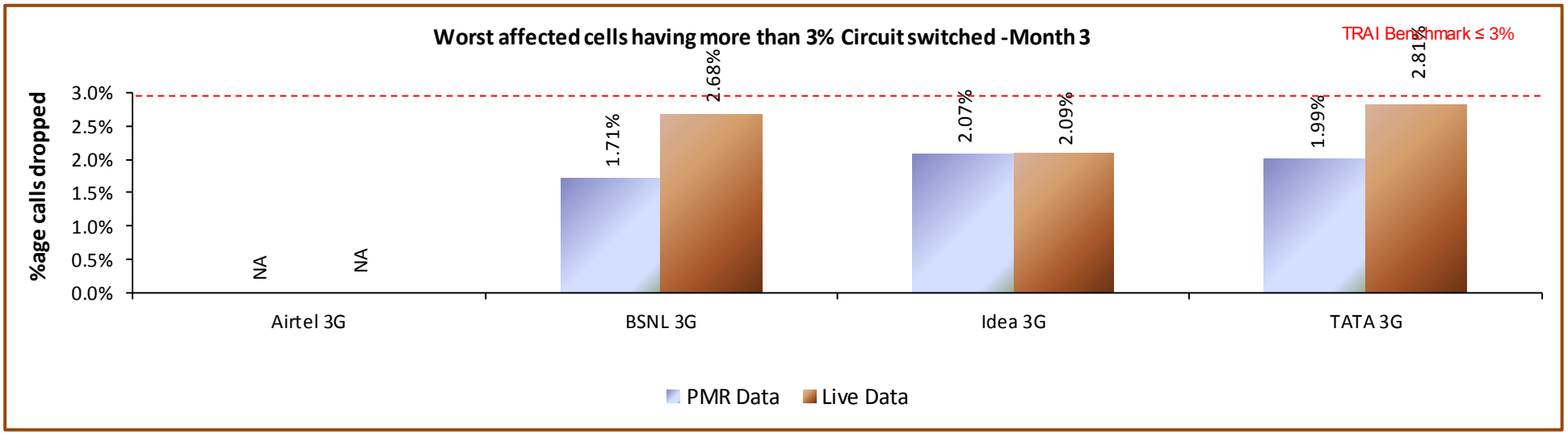
Data Source: Network Operations Center (NOC) of the operators

7.6.2.2 KEY FINDINGS – MONTH 2



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

7.6.2.3 KEY FINDINGS – MONTH 3



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

7.7 CIRCUIT SWITCH VOICE QUALITY

7.7.1 PARAMETER DESCRIPTION

5. **Definition:**

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

6. **Computational Methodology:**

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

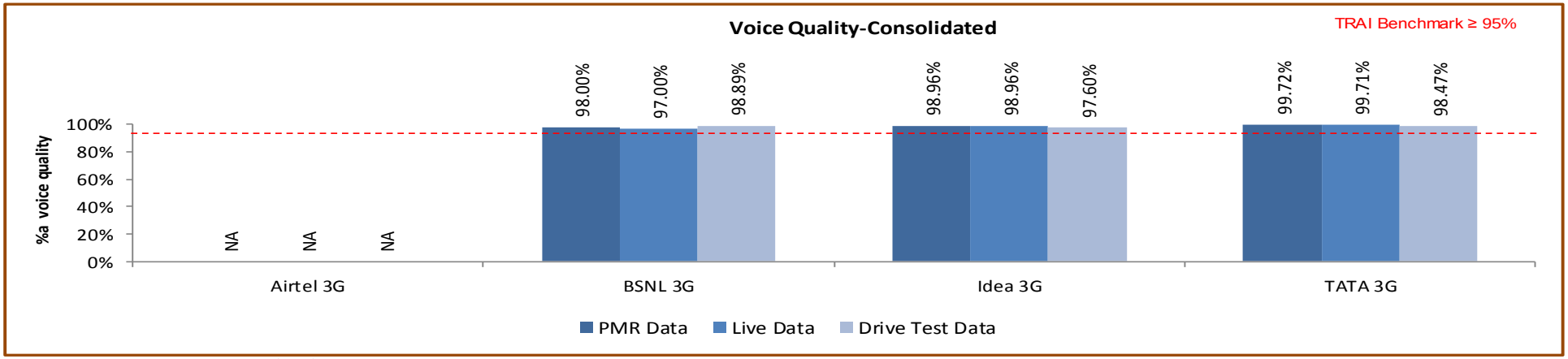
7. **TRAI Benchmark:** ≥ 95%

8. **Audit Procedure –**

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

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

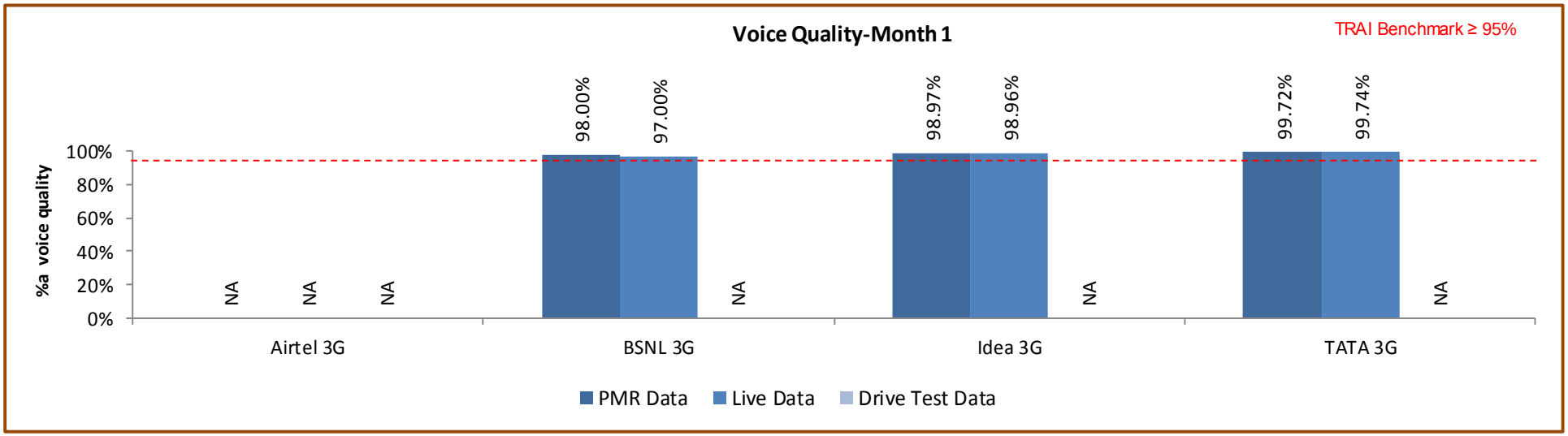
7.7.2 KEY FINDINGS



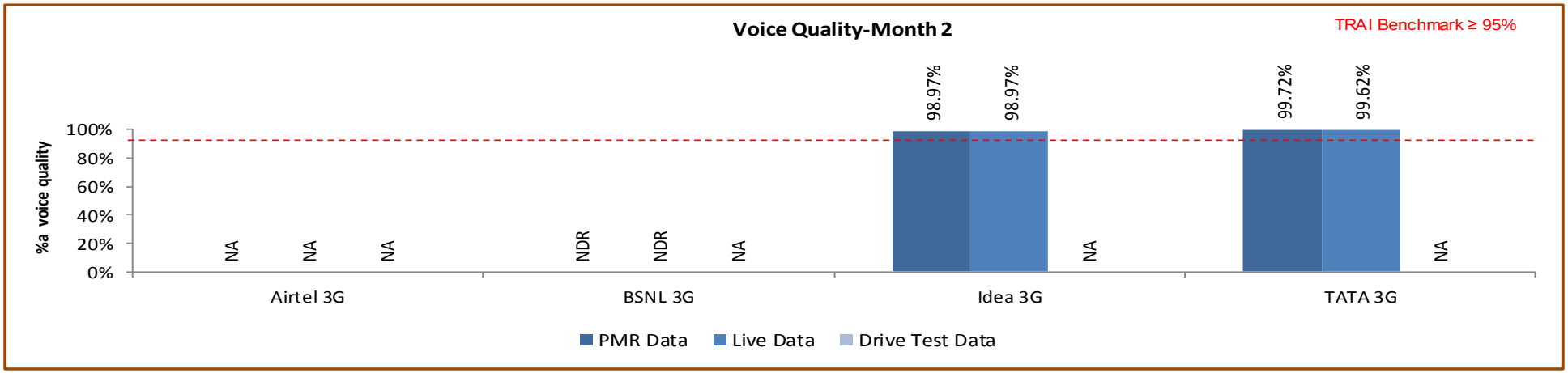
Data Source: Network Operations Center (NOC) of the operators

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

7.7.2.1 KEY FINDINGS – MONTH 1

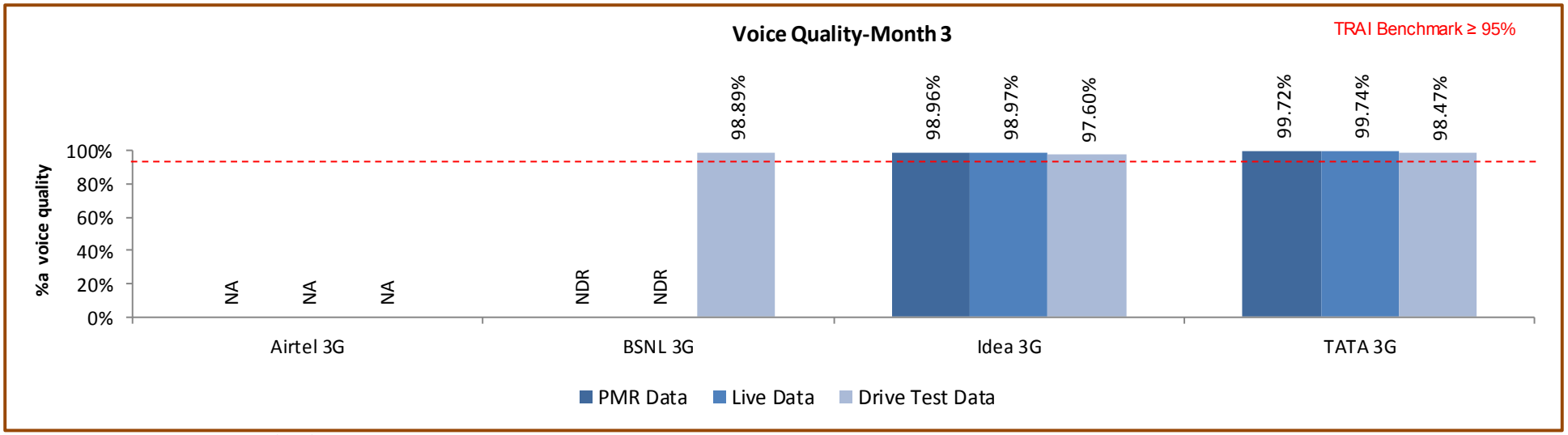


7.7.2.2 KEY FINDINGS – MONTH 2



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

7.7.2.3 KEY FINDINGS – MONTH 3



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

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

8.1 SERVICE ACTIVATION /PROVISIONING FOR 2G & 3G

8.1.1 PARAMETER DESCRIPTION

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

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

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

8.2.1 PARAMETER DESCRIPTION

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

Measurement

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

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

8.3 DROP RATE FOR 2G & 3G

8.3.1 PARAMETER DESCRIPTION

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

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

KEY FINDINGS

Wireless Data 2G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel	100.00%	85.21%	4.38%	100.00%	80.51%	5.39%
Airtel	NDR	98.45%	3.54%	NDR	NDR	NDR
BSNL	100.00%	96.69%	3.33%	100.00%	95.91%	2.50%
Idea	100.00%	99.13%	1.09%	100.00%	99.09%	1.13%
Reliance CDMA	100.00%	99.55%	3.81%	100.00%	99.08%	3.75%
Reliance GSM	100.00%	99.26%	0.92%	100.00%	99.04%	0.96%
TATA CDMA	NDR	NDR	NDR	NDR	NDR	NDR
TATA GSM	NDR	NDR	NDR	NDR	NDR	NDR
Videocon	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	100.00%	97.11%	2.89%	100.00%	97.50%	6.33%

Wireless Data 3G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Airtel 3G	NDR	NDR	NDR	NDR	NDR	NDR
BSNL 3G	100.00%	NDR	3.02%	NDR	96.61%	3.11%
Idea 3G	100.00%	98.84%	0.63%	100.00%	99.11%	0.60%
TATA 3G	NDR	NDR	NDR	NDR	NDR	NDR

9 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

9.1 METERING AND BILLING CREDIBILITY

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

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

9.1.1 PARAMETER DESCRIPTION

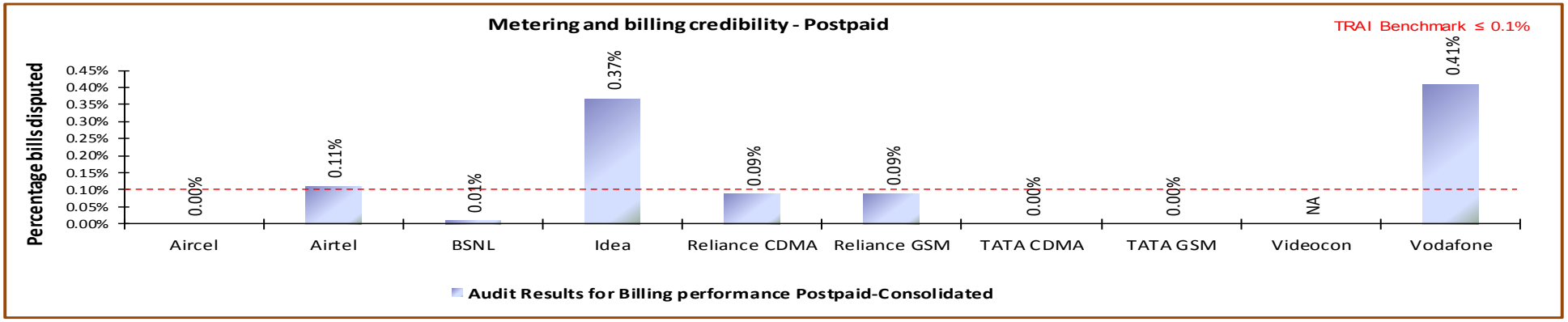
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th December, 2009 were covered. The types of billing complaints covered are listed below.

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

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

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

9.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)

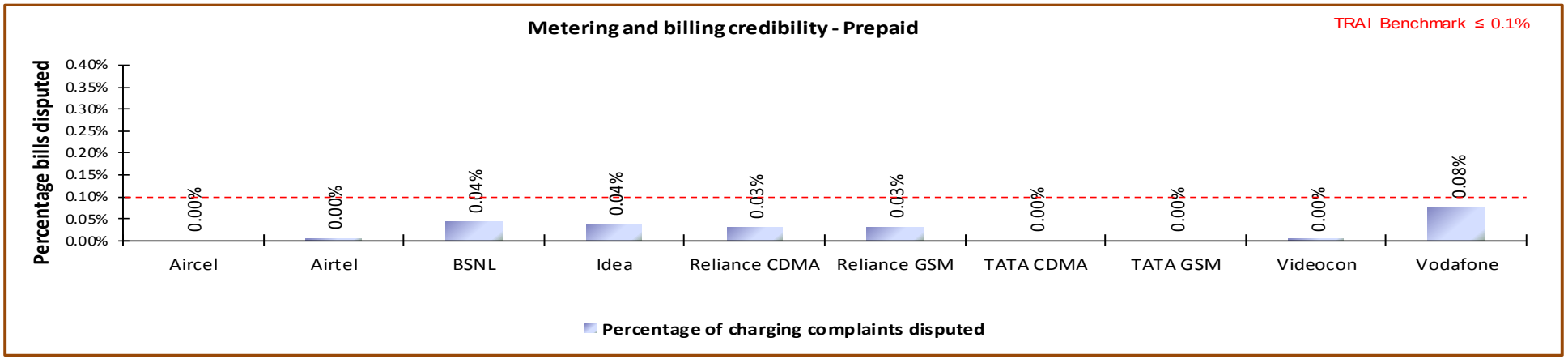


Data Source: Billing Center of the operators

Idea and Vodafone failed to meet the benchmark of 0.1% postpaid 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:

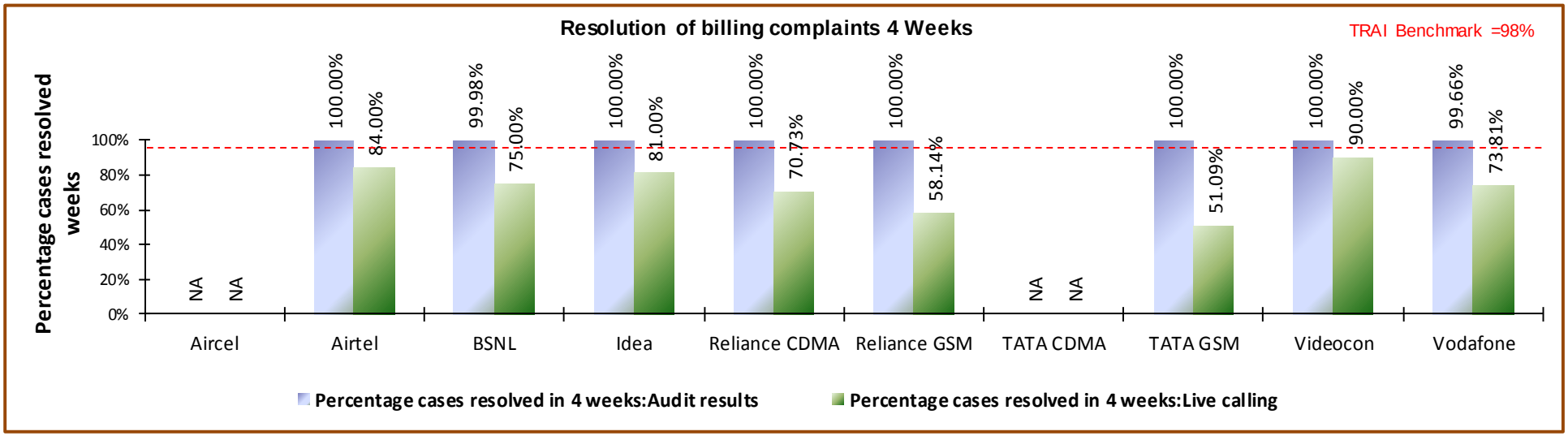
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

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

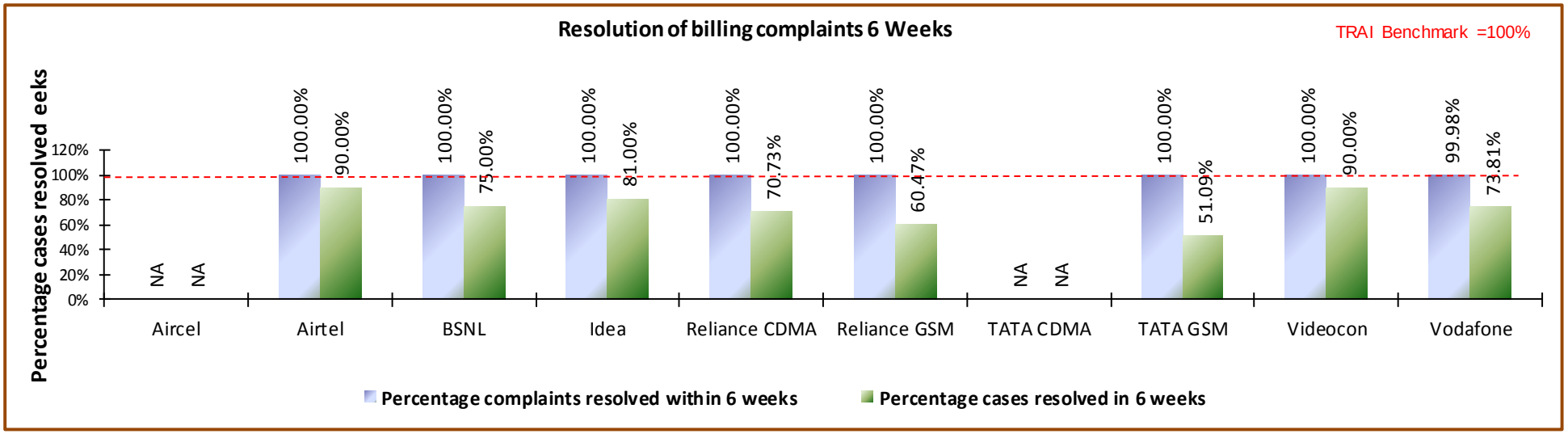
Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

9.2.2 KEY FINDINGS - WITHIN 4 WEEKS



Data Source: Billing Center of the operators

9.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

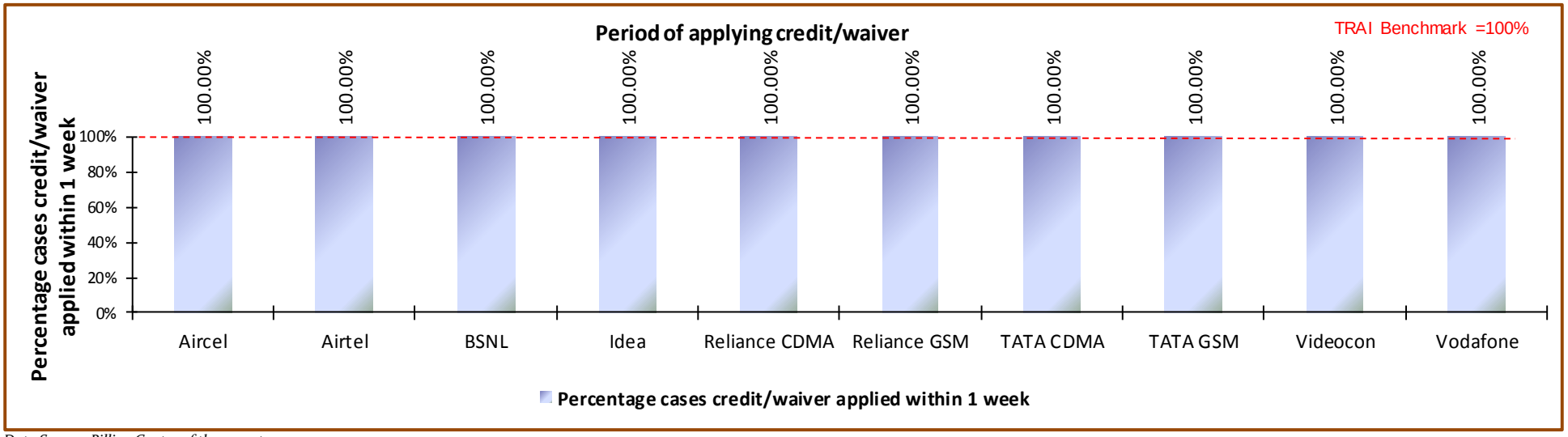
None of the operators met the TRAI benchmark of resolution of billing complaints within 4 weeks as well as 6 weeks for live calling. As per live calling done to customers, the performance of all operators was observed to be much below the PMR data.

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

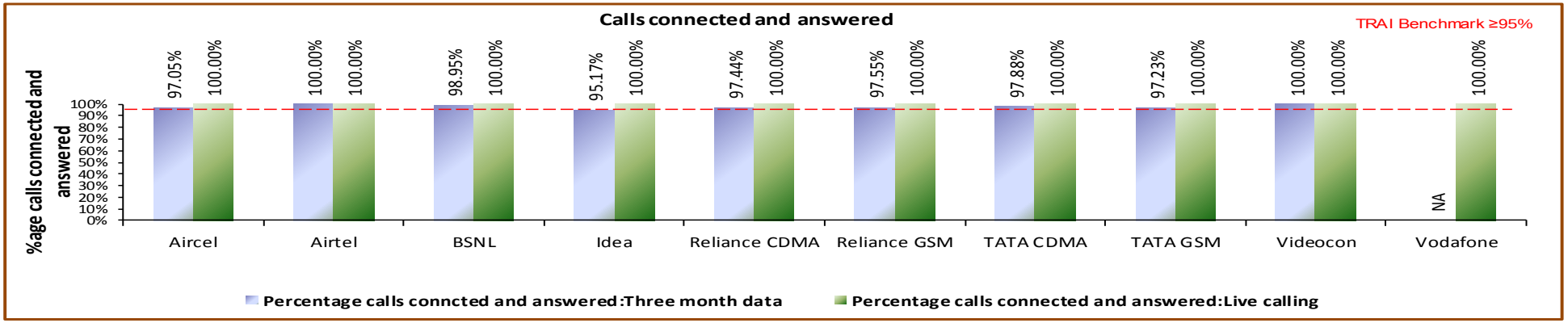
All operators met the benchmark for this parameter.

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 data, all operators met the benchmark.

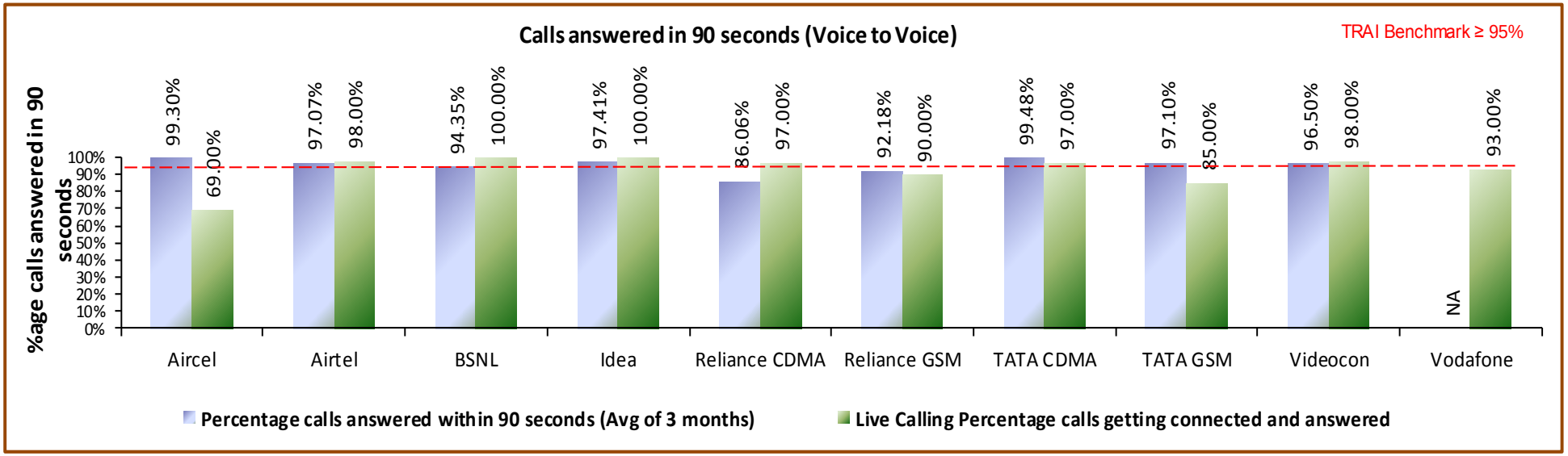
9.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

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

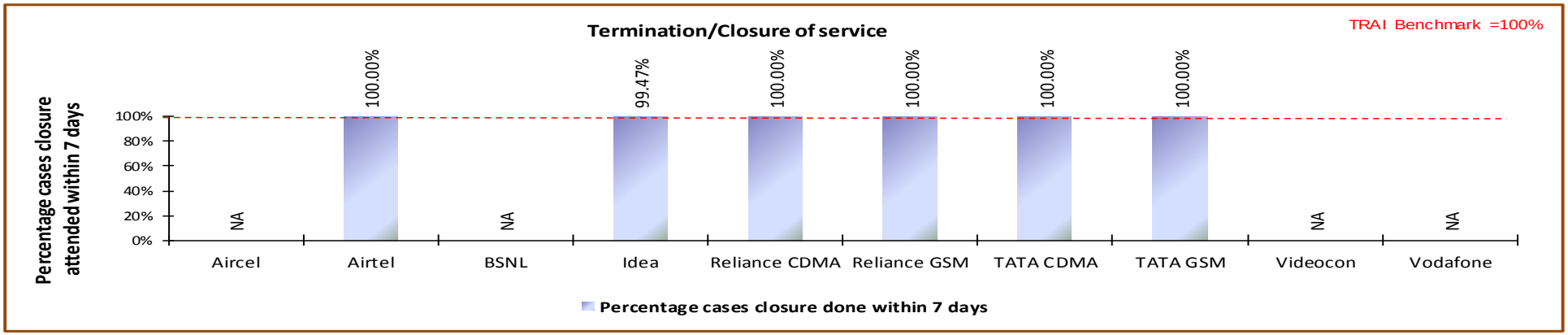
BSNL and Reliance GSM & CDMA were not able to meet the benchmark as per PMR audit. However, as per live calling done to customers, the performance of Aircel, Reliance GSM, TATA GSM and Vodafone was far inferior to the PMR data.

9.6 TERMINATION/CLOSURE OF SERVICE

9.6.1 PARAMETER DESCRIPTION

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

9.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

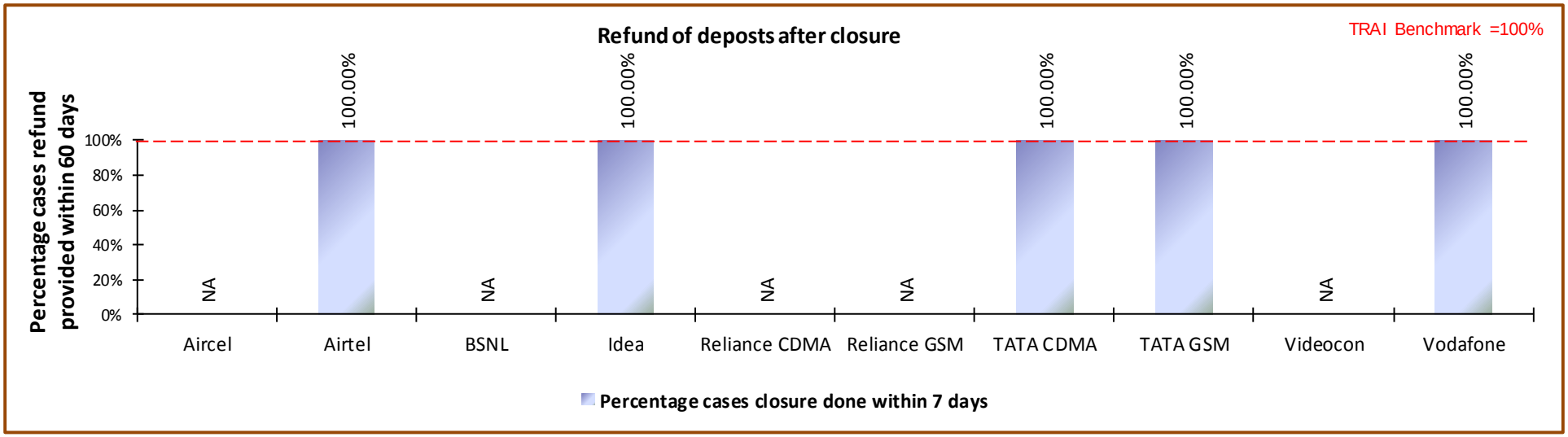
All operators met the TRAI benchmark for the parameter.

9.7 REFUND OF DEPOSITS AFTER CLOSURE

9.7.1 PARAMETER DESCRIPTION

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

9.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

10 DETAILED FINDINGS - DRIVE TEST DATA

10.1 OPERATOR ASSISTED DRIVE TEST - VOICE

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

3. Normal SSA
4. Difficult SSA

The drive test in Normal SSA was conducted for three days with minimum distance of 250 kilometers over three days. The drive test in difficult SSAs was conducted for six days with minimum distance of 500 kilometers over six days. The selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected post discussion with TRAI regional teams. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

For measuring voice quality RxQual samples for GSM operators and Frame Error Rate (FERs) for CDMA service providers were measured. RxQual greater than 5 meant that the sample was not of appropriate voice quality and for CDMA operators FERs of more than 4 were considered bad. Call drops were measured by the number of calls that were dropped to the total number of calls established during the drive test. Similarly CSSR was measured as the ratio of total calls established to the total call attempts made. Signal strength was measured in Dbm with strength > -75 dbm for indoor, -85 dbm for in-vehicle and > -95 dbm outdoor routes.

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

Name of Operator	Name of Operator
Aircel	Airtel 3G
Airtel	BSNL 3G
BSNL	Idea 3G
Idea	TATA 3G
Reliance CDMA	
Reliance GSM	
TATA CDMA	
TATA GSM	
Videocon	

10.1.1 DHAR SSA

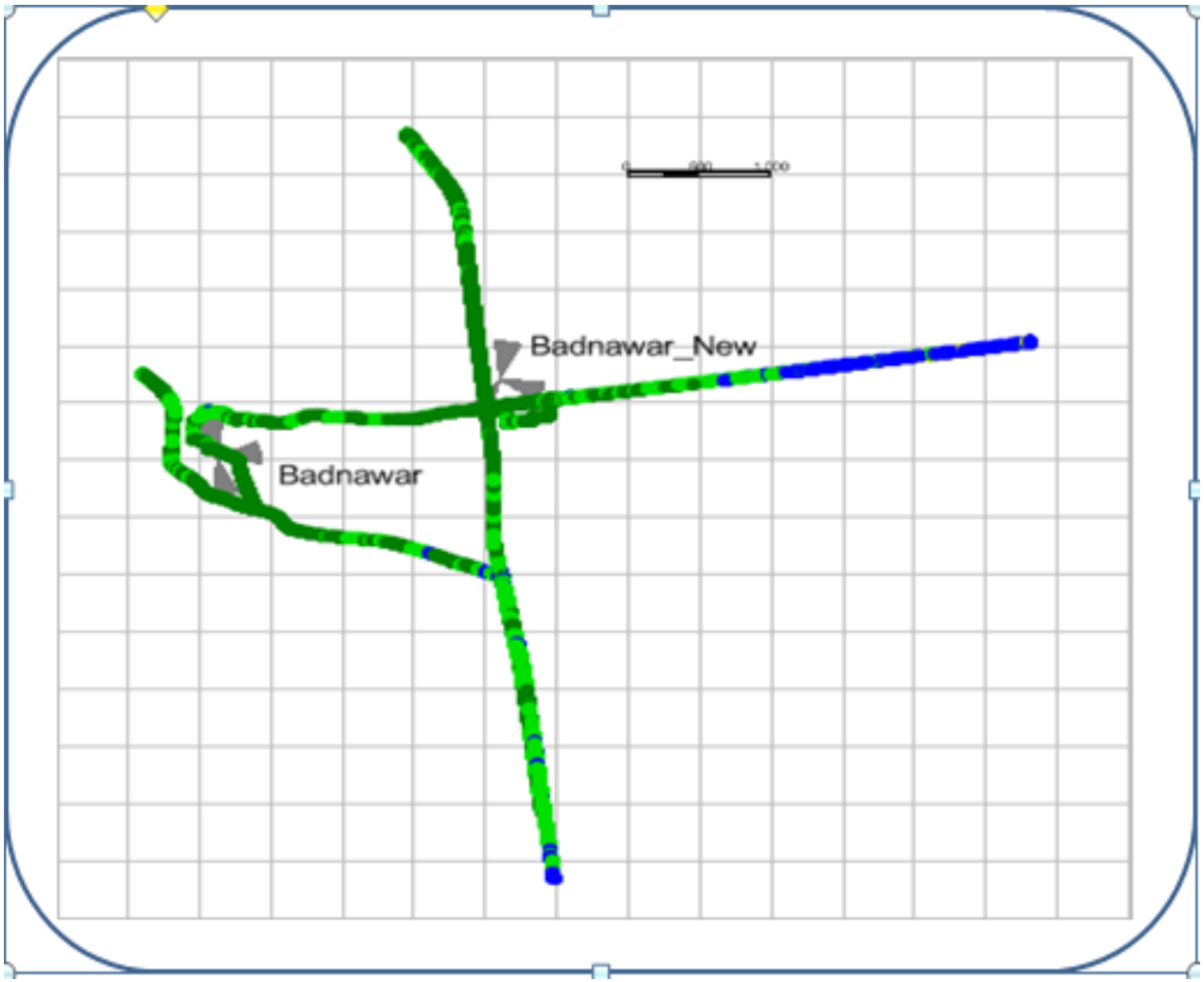
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
December	DHAR	21-Dec'2015	23-Dec'2015	312

10.1.1.1 Route Details – DHAR SSA

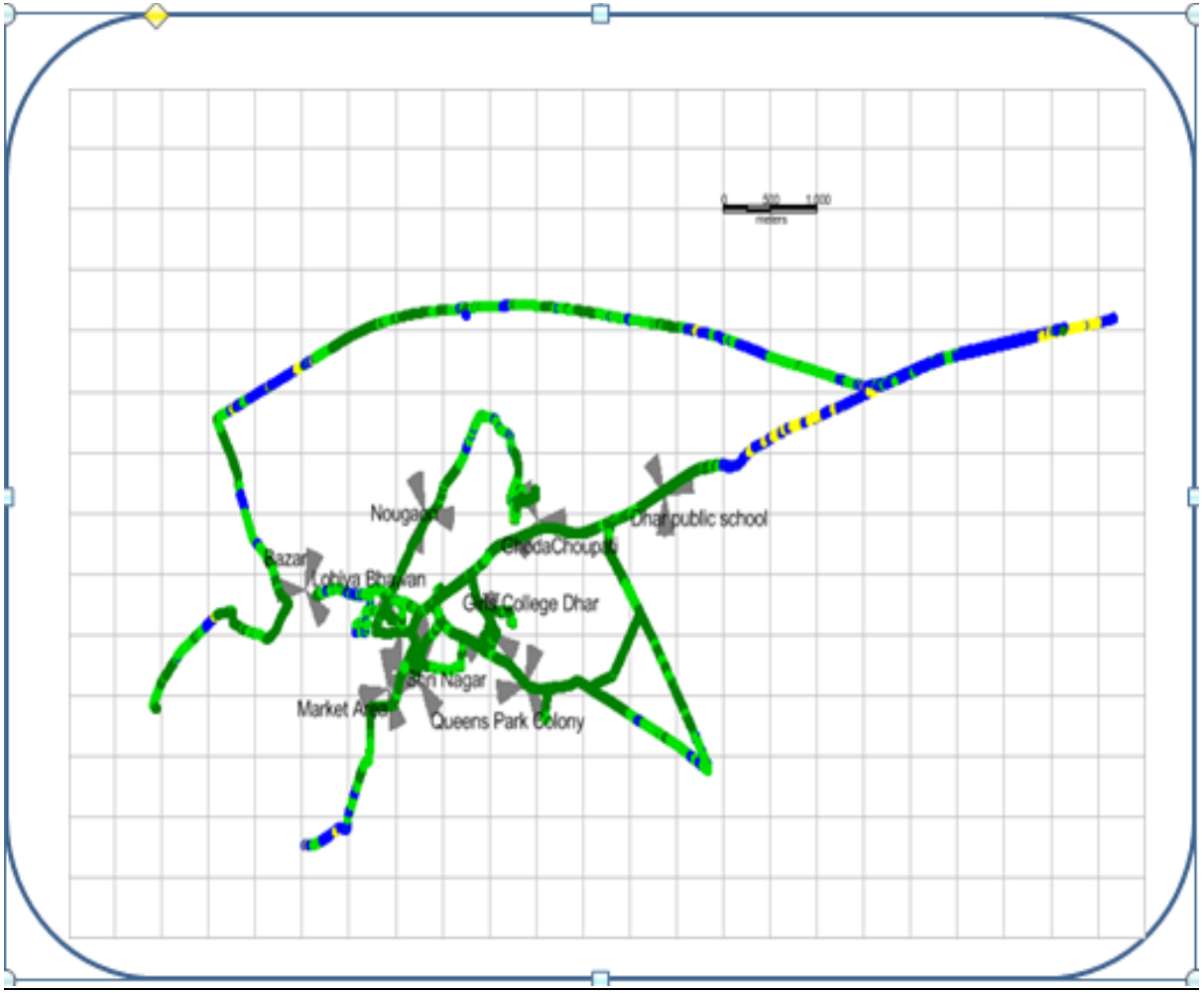
Category	Type of location	December DHAR Day 1	Day 2	Day 3
Outdoor	Major Roads	1. Bus stand Badnawar, Petlawad Road, Laxmibai Marg, Jawahar Marg, Mandi Road. 2. Badnawar Chopati, Ratlam Highway, Badnagar Road. 3. Indore Highway, Petlawad Road, Jawahar Marg, Mandi Road 4. Rajgarh Town, Jhabua Road. 5. Sardapur Badnawar.Raod 6. Sardarpur Town, Dhar Road	1. Dhar Bypass, Nawgaon, Shree ji Dham Colony, Nihal Nagar, Court Area,, Indore Naka, Silver Hills Colony, Trimurti Choraha . 2. Govt. PG Collage Dhar, Dhar Public School , Jetpura, Dhar Pithumpur Highway. 3. DRP Line, Panchsheel Nagar. Mandu Road. 4. Dhar Bus Stand, Ghoda Chopati, Queens Park Colony, Indra Colony, Pochopati, Rajwada, Dhan Mandi, Bhaktambar Colony	1. Kukshi Bus Stand, Kachahari Chowk, Kukshi Rajgarh Road, Bhairav nagar, Silkuwa, BSNL Office. 2. Singhana Road 4. Kukshi Barwani Highway, Susari Village
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

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

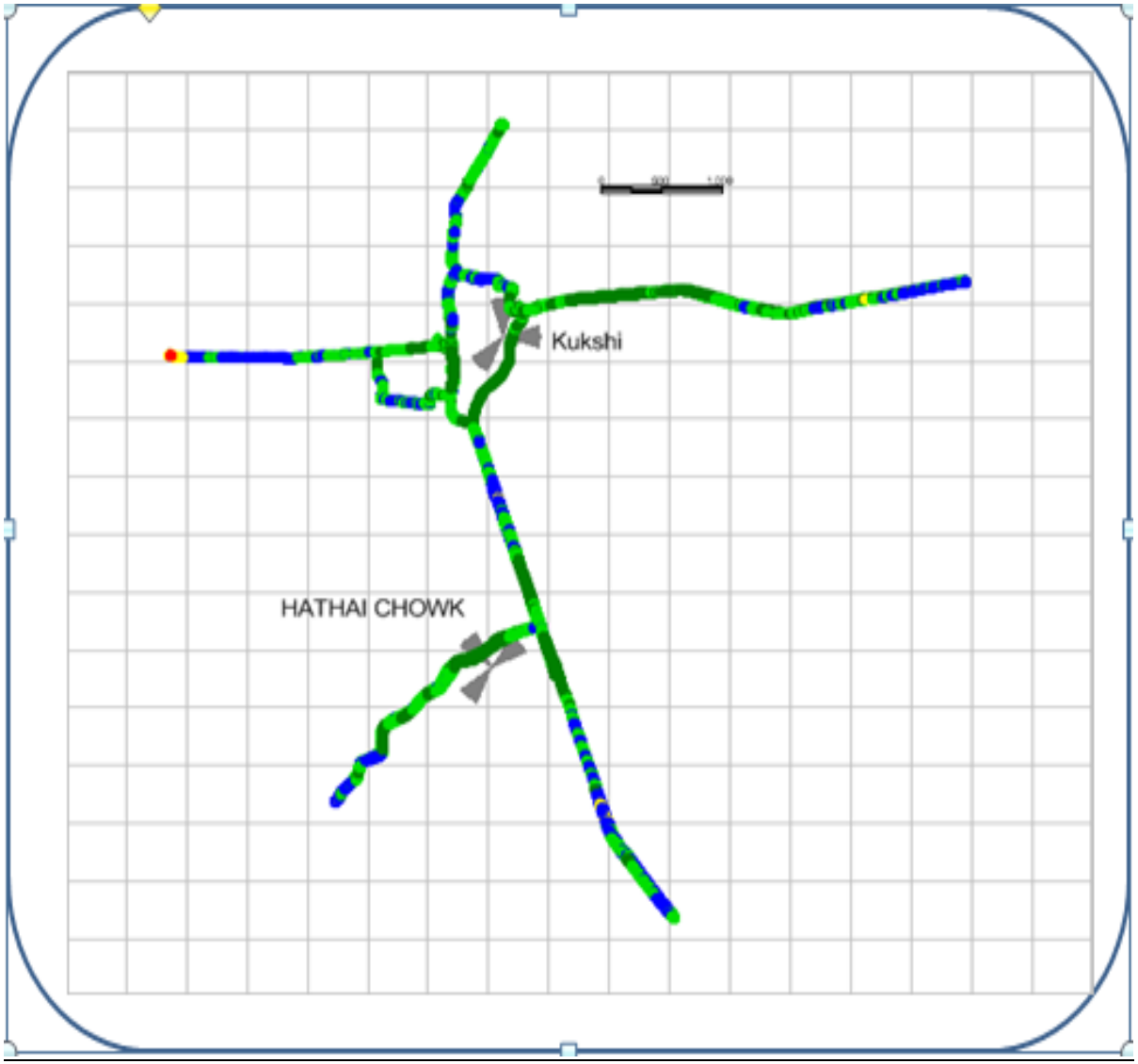
10.1.1.2 Route Map - DHAR DAY 1



10.1.1.3 Route Map - DHAR DAY 2



10.1.1.4 Route Map - DHAR DAY 3



10.1.1.5 Drive Test Results - DHAR SSA

December																					
DHAR	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NA	NA	99.92%	80.29%	94.01%	47.16%	66.08%	88.00%	38.59%	32.08%	97.66%	70.81%	NA	NA	99.33%	77.97%	87.82%	62.20%	63.74%	93.31%
0 to -85 dBm		NA	NA	100.00%	95.69%	96.82%	80.38%	98.88%	98.89%	68.47%	74.23%	99.98%	97.09%	NA	NA	99.95%	94.99%	99.79%	91.59%	94.25%	98.97%
0 to -95 dBm		NA	NA	100.00%	99.57%	98.78%	95.84%	99.95%	99.85%	99.98%	98.03%	100.00%	99.97%	NA	NA	99.99%	99.67%	99.99%	99.48%	99.67%	99.83%
Voice quality	≥ 95%	NA	NA	95.02%	96.72%	99.63%	94.54%	98.73%	96.68%	95.36%	95.64%	98.09%	92.42%	NA	NA	99.24%	96.58%	98.58%	98.74%	99.02%	99.10%
CSSR	≥ 95%	NA	NA	100.00%	100.00%	96.83%	96.11%	100.00%	100.00%	100.00%	99.64%	100.00%	98.93%	NA	NA	100.00%	100.00%	100.00%	100.00%	98.39%	98.75%
%age Blocked calls		NA	NA	0.00%	0.25%	3.17%	0.90%	0.00%	0.00%	0.00%	0.36%	0.00%	1.07%	NA	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	NA	NA	0.00%	0.00%	0.00%	1.87%	0.00%	0.00%	0.00%	0.00%	0.00%	0.36%	NA	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.25%
Hands off success rate		NA	NA	100.00%	100.00%	100.00%	100.00%	100.00%	99.72%	100.00%	100.00%	100.00%	95.44%	NA	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL and Reliance GSM failed to meet the benchmark in outdoor locations in Dhar SSA.

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR in Dhar SSA

Call Drop Rate

All operators met the benchmark for call drop rate in Dhar SSA.

10.1.1.1 Drive Test Results - DHAR SSA 3G

December									
DHAR	B'mark	Airtel		BSNL		Idea		TATA 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NA	NA	69.48%	14.50%	NA	NA	97.97%	77.07%
0 to -85 dBm		NA	NA	92.00%	52.43%	NA	NA	100.00%	89.33%
0 to -95 dBm		NA	NA	100.00%	93.90%	NA	NA	100.00%	99.16%
Voice quality	≥ 95%	NA	NA	100.00%	98.79%	NA	NA	100.00%	99.76%
CSSR	≥ 95%	NA	NA	96.83%	98.68%	NA	NA	100.00%	100.00%
%age Blocked calls		NA	NA	0.00%	0.44%	NA	NA	0.00%	0.00%
Call drop rate	≤ 2%	NA	NA	0.00%	0.44%	NA	NA	0.00%	0.00%
Hands off success rate		NA	NA	100.00%	100.00%	NA	NA	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

10.1.1.1 Data Drive Test Results - DHAR SSA 2G

December	Dhar										
Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	100	100	100	100	100	NDR	100	100	100
Succesful Data Transmission upload speed attempts	>75%	NDR	97	100	100	100	100	NDR	100	100	100
Minimum download speed		NDR	96	45	157	76	65	NDR	33	22	106
Average throughput for Packet Data	>75%	NDR	81	90	236	408	430	NDR	347	65	256
Latency	<250ms	NDR	100	NDR	100	100	100	NDR	100	100	100

Note: Aircel, TATA CDMA did not submit the data.

All operators met the benchmark.

10.1.1.2 Data Drive Test Results - DHAR SSA 3G

December	Dhar				
Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA WCDMA
Succesful Data Transmission download speed attempts	>80%	NDR	NDR	100	100
Succesful Data Transmission upload speed attempts	>75%	NDR	NDR	100	100
Minimum download speed		NDR	NDR	1057	1045
Average throughput for Packet Data	>75%	NDR	NDR	656	749
Latency	<250ms	NDR	NDR	100	100

Note: Airtel, BSNL did not submit the data.

All operators met the benchmark.

10.1.2 MPCG UJJAIN SSA

10.1.2.1 ROUTE DETAILS - UJJAIN SSA

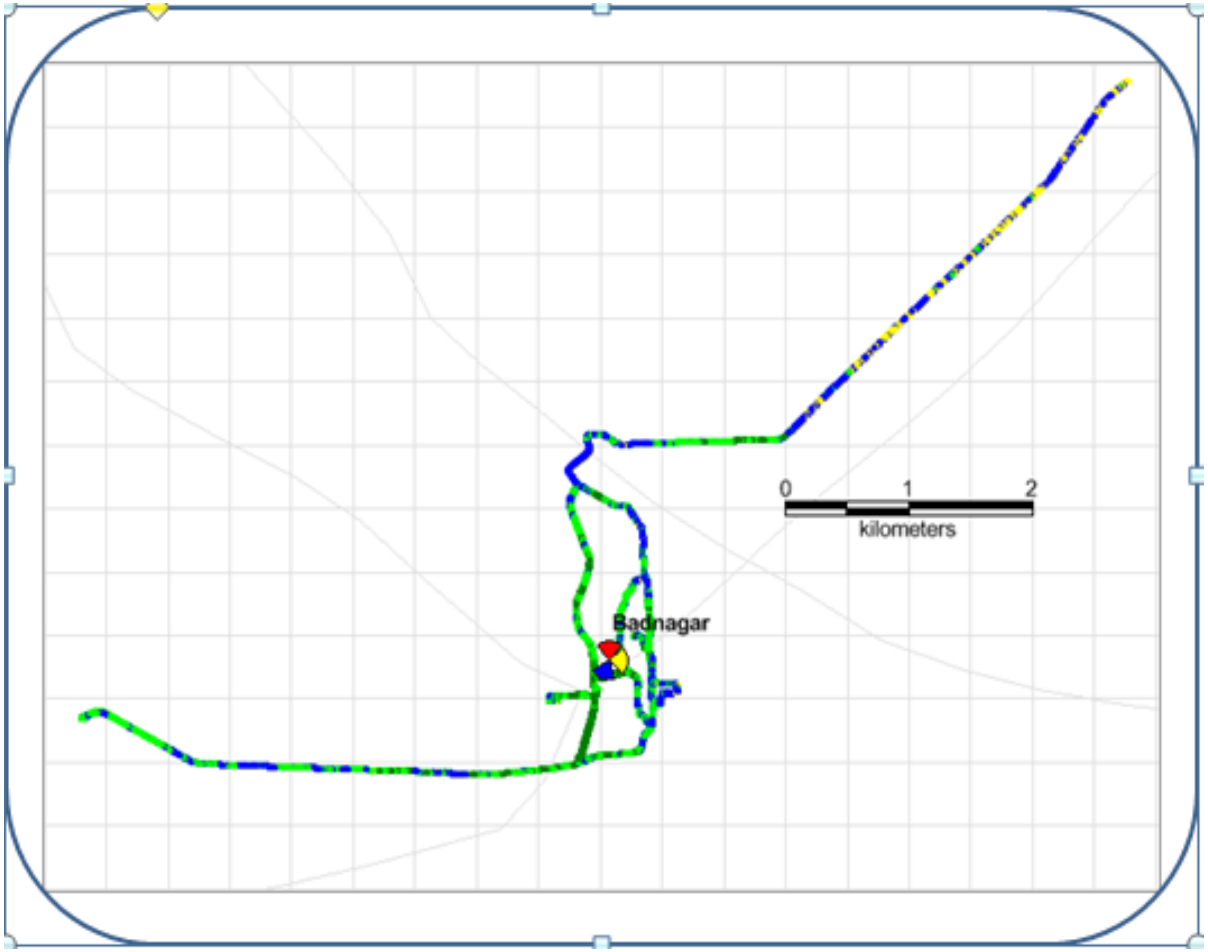
Category	Type of location	December Ujjain Day 1	Day 2	Day 3
Outdoor	Major Roads	1 Ujjain Road, Kisan Mandi, Railway, Bus Stand, School, Bohara Gali, Badnawar Road. 2 Khacharod Railway Station, Bus Stand, Ujjain Darwaza, Nagda Raod	1 Shipra River Road, Ayodhya Colony, Police Station, Rajendra Marg, Bus Stand, Jaora Raod, Ujjain Raod. 2 .Ghatiya, Ghosala, Ujjain Road, Tarana Road 3 Ghosala Road, Tarana Bus Stand, Ujjain Raod	1. Bherugarh, Mangal Nath, PipliNaka, Agar Naka, Indra Nagar, Chiman Gunj, Chatri Chowk, Chamunda naka, Rudra sagar, Hari Fatak, Railway Station, Teen Batti Choraha, Freegunj. 2 Sethi Nagar, Nirman Nagar 3. Dewas Road, Vikram University, Mahananda, Nagziri Colony, Adarsh Nagar. 4. Rishi Nagar , Nanakheda, Vasant vihar colony, Govt. Engg. College, Malanwasa, Indore Road.
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

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

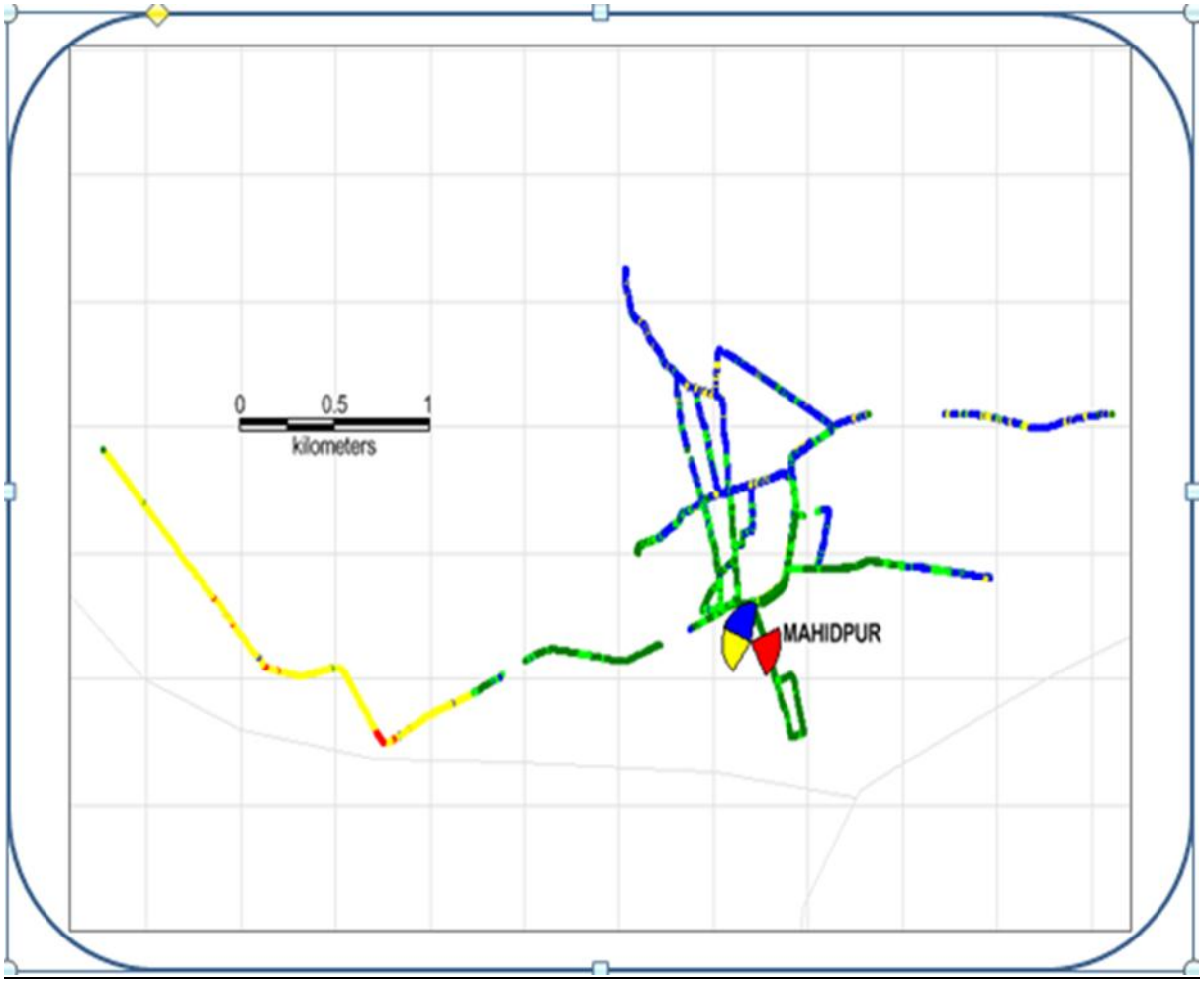
10.1.2.2 KILOMETERS TRAVELLED- UJJAIN SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
December	Ujjain	28-Dec'2015	30-Dec'2015	330

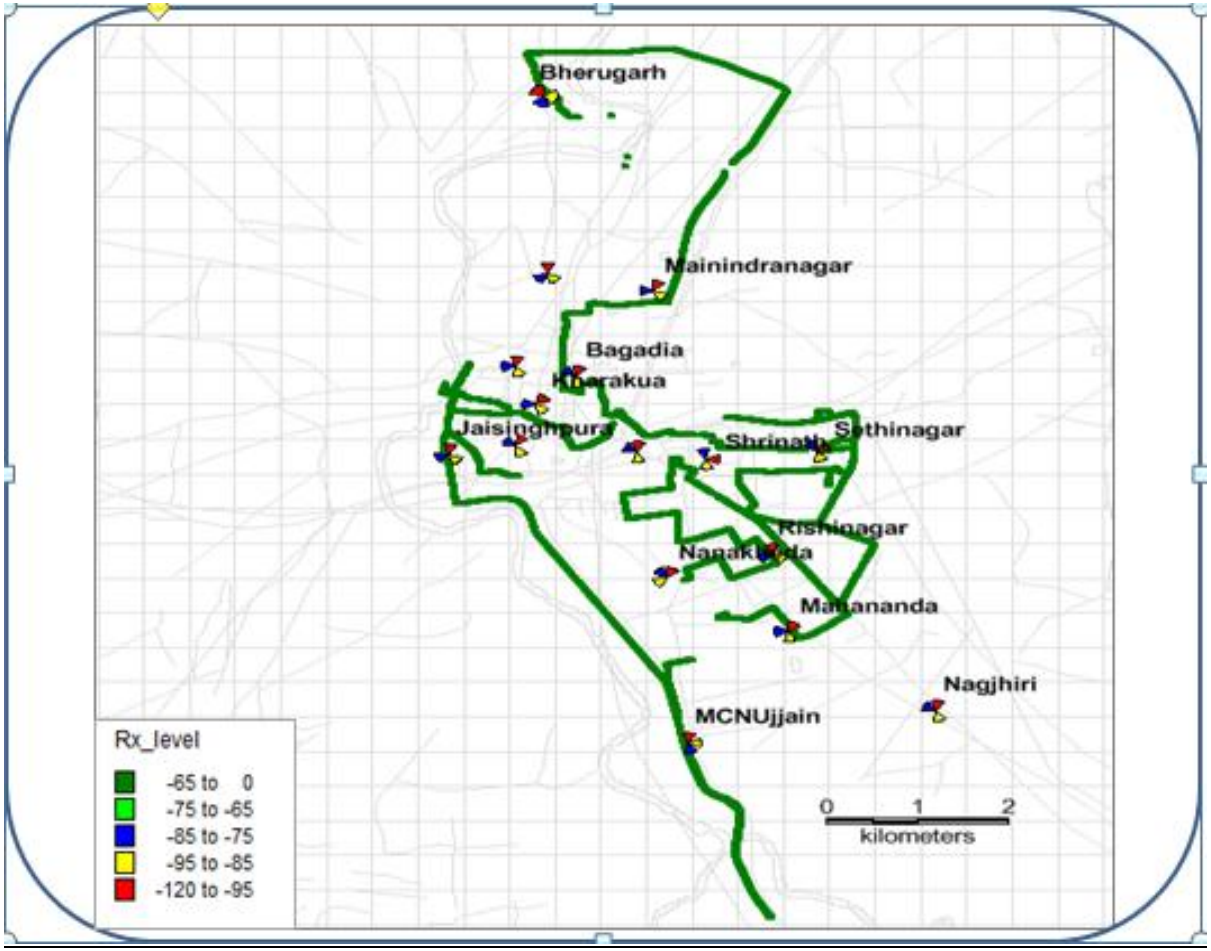
10.1.2.3 Route Map - UJJAIN DAY 1



10.1.2.4 Route Map - UJJAIN DAY 2



10.1.2.5 Route Map - UJJAIN DAY 3



10.1.2.6 Drive Test Results - UJJAIN SSA

December																					
Ujjain	B'mark	Aircel		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.62%	93.05%	90.22%	81.38%	55.19%	67.19%	99.72%	89.08%	99.29%	65.28%	99.99%	84.42%	NA	NA	77.03%	84.27%	93.91%	80.39%	99.98%	94.83%
0 to -85 dBm		100.00%	98.59%	98.86%	97.09%	84.60%	90.59%	100.00%	97.38%	100.00%	94.53%	100.00%	96.40%	NA	NA	99.95%	98.46%	100.00%	97.87%	100.00%	99.09%
0 to -95 dBm		100.00%	100.00%	99.80%	99.50%	99.81%	99.69%	100.00%	99.79%	100.00%	99.83%	100.00%	99.18%	NA	NA	100.00%	99.86%	100.00%	99.89%	100.00%	99.93%
Voice quality	≥ 95%	99.41%	99.04%	98.26%	98.27%	96.93%	91.05%	98.74%	96.48%	100.00%	97.94%	95.60%	92.84%	NA	NA	98.89%	97.12%	99.02%	98.32%	99.12%	98.57%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	98.55%	98.44%	100.00%	99.21%	100.00%	100.00%	100.00%	98.68%	NA	NA	100.00%	100.00%	100.00%	100.00%	100.00%	97.41%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	1.45%	1.56%	0.00%	0.79%	0.00%	0.00%	0.00%	1.32%	NA	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	1.27%	0.00%	0.00%	0.00%	0.00%	0.00%	1.34%	NA	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	99.78%	100.00%	100.00%	100.00%	98.11%	100.00%	100.00%	100.00%	98.85%	NA	NA	100.00%	99.45%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL and Reliance GSM failed to meet the benchmark in outdoor locations in Ujjain SSA

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR in outdoor locations in Ujjain SSA

Call Drop Rate

All operators met the benchmark for call drop rate in outdoor locations in Ujjain SSA

10.1.2.1 Drive Test Results - UJJAIN SSA 3G

December									
Ujjain	B'mark	Airtel		BSNL		Idea		TATA 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NA	NA	51.36%	45.93%	99.97%	73.56%	93.21%	39.72%
0 to -85 dBm		NA	NA	51.36%	84.11%	100.00%	95.70%	100.00%	71.36%
0 to -95 dBm		NA	NA	99.89%	99.70%	100.00%	99.43%	100.00%	94.27%
Voice quality	≥ 95%	NA	NA	99.64%	98.59%	99.03%	97.46%	100.00%	97.98%
CSSR	≥ 95%	NA	NA	100.00%	100.00%	100.00%	99.37%	100.00%	100.00%
%age Blocked calls		NA	NA	0.00%	0.00%	0.00%	0.63%	0.00%	0.52%
Call drop rate	≤ 2%	NA	NA	0.00%	0.00%	0.00%	0.63%	0.00%	0.52%
Hands off success rate		NA	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

10.1.2.1 Data Drive Test Results - UJJAIN SSA 2G

December	Ujjain										
Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	100	100	100	100
Minimum download speed		143	90	69	115	91	65	407	59	68	93
Average throughput for Packet Data	>75%	122	56	56	493	196	407	943	652	67	447
Latency	<250ms	100	100	NDR	100	100	100	100	100	100	100

NDR: No data received

All operators met the TRAI benchmark.

10.1.2.2 Data Drive Test Results - UJJAIN SSA 3G

December	Ujjain				
Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA WCDMA
Succesful Data Transmission download speed attempts	>80%	NDR	NDR	100	100
Succesful Data Transmission upload speed attempts	>75%	NDR	NDR	100	100
Minimum download speed		NDR	NDR	1940	1037
Average throughput for Packet Data	>75%	NDR	NDR	1014	965
Latency	<250ms	NDR	NDR	100	100

NDR: No data received

Note: Aircel, BSNL did not submit the data.

All operators met the TRAI benchmark.

11 ANNEXURE – CONSOLIDATED-2G

11.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		384	28829	11211	30772	5394	11013	NA	8837	3374	17311
Sum of downtime of BTSs in a month (in hours)		620	13538	162968	1640848	648	12090	NA	274056	128	6413
BTSs accumulated downtime (not available for service)	≤ 2%	0.22%	0.06%	1.95%	7.17%	0.02%	0.15%	NA	4.17%	0.01%	0.05%
Number of BTSs having accumulated downtime >24 hours		0	13	194	153	1	76	NA	0	0	57
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.05%	1.73%	0.50%	0.02%	0.69%	NA	0.00%	0.00%	0.33%
Live Measurement Results for Network Availability- 3 Day live data											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		384	28820	5202	30432	5274	11013	NA	8835	3377	17311
Sum of downtime of BTSs in a month (in hours)		124	2511	3323	194091	73	940	NA	46157	190	1837
BTSs accumulated downtime (not available for service)	≤ 2%	0.45%	0.12%	0.89%	8.86%	0.02%	0.12%	NA	7.26%	0.08%	0.15%
Number of BTSs having accumulated downtime >24 hours		0	6	42	6	0	0	NA	0	1	13
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.02%	0.81%	0.02%	0.00%	0.00%	NA	0.00%	0.03%	0.08%

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

11.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
CSSR	≥ 95%	97.86%	98.55%	96.94%	97.39%	99.30%	97.03%	NA	98.55%	98.88%	99.70%
SDCCH/Paging channel congestion	≤ 1%	0.10%	1.59%	0.42%	0.48%	NA	0.10%	NA	0.05%	0.14%	0.09%
TCH congestion	≤ 2%	0.01%	0.31%	1.30%	1.13%	0.15%	0.64%	NA	0.04%	0.21%	0.30%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
CSSR	≥ 95%	98.53%	98.83%	96.57%	97.43%	99.37%	97.06%	NA	98.54%	98.90%	99.52%
SDCCH/Paging channel congestion	≤ 1%	0.21%	0.03%	0.49%	0.50%	0.00%	0.11%	NA	0.07%	0.13%	0.09%
TCH congestion	≤ 2%	0.00%	0.24%	0.99%	0.83%	0.13%	0.65%	NA	0.03%	0.19%	0.14%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of call attempts		80	940	786	840	780	710	NA	685	795	945
Total number of successful calls established		80	940	765	837	779	703	NA	685	795	928
CSSR	≥ 95%	100.00%	100.00%	97.33%	99.64%	99.87%	99.01%	NA	100.00%	100.00%	98.20%
%age blocked calls		0.00%	0.00%	2.67%	0.36%	0.13%	0.99%	NA	0.00%	0.00%	1.80%

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

11.3 Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of calls established		8590	335804042	1740222824	1778035832	152935709	312360545	NA	228627728	4117629	343125649
Total number of calls dropped		57	2473923	19070346	13034133	113803	469103	NA	1323179	24508	2142565
Call drop rate	≤ 2%	0.66%	0.74%	1.10%	0.73%	0.07%	0.15%	NA	0.58%	0.60%	0.62%
Total number of cells in the network		1152	89157	35577	92347	16294	36941	NA	26487	10314	52047
Total number of cells having more than 3% TCH		10	1574	585	1440	88	193	NA	677	259	1931
Worst affected cells having more than 3% TCH	≤ 3%	0.85%	1.77%	1.64%	1.56%	0.54%	0.52%	NA	2.56%	2.51%	3.71%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of calls established		2862	28854466	19629844	173795402	61516394	89866522	NA	315021461	3950681	378431114
Total number of calls dropped		24	223232	214701	1229692	22165	128535	NA	1792600	23610	2317701
Call drop rate	≤ 2%	0.84%	0.77%	1.09%	0.71%	0.04%	0.14%	NA	0.57%	0.60%	0.61%
Total number of cells in the network		1152	89137	15645	92301	15934	36938	NA	26468	10303	52231
Total number of cells having more than 3% TCH		4	1720	436	1373	95	190	NA	1182	268	2013
Worst affected cells having more than 3% TCH	≤ 3%	0.31%	1.93%	2.79%	1.49%	0.60%	0.51%	NA	4.47%	2.60%	3.85%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of calls established		80	940	767	837	779	703	NA	685	795	928
Total number of calls dropped		0	0	10	0	0	5	NA	0	0	1
Call drop rate	≤ 2%	0.00%	0.00%	1.30%	0.00%	0.00%	0.71%	NA	0.00%	0.00%	0.11%

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

11.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of sample calls		568482	51044373091	NDR	188044721845	NDR	39949839379	NA	32443416724	497180176	51080083846
Total number of calls with good voice quality		564575	49830444342	NDR	182782426406	NDR	39439794998	NA	32066134528	489060183	50538035668
%age calls with good voice quality	≥ 95%	99.31%	97.62%	NDR	97.20%	NDR	98.72%	NA	98.84%	98.37%	98.94%
Live measurement results for Voice quality-3 Day data											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of sample calls		233673	4266548783	NDR	18476352825	NDR	8662596208	NA	34853244229	484438381	55008456740
Total number of calls with good voice quality		231939	4142315477	NDR	17950515586	NDR	8536424081	NA	34463138943	476724936	54467082886
%age calls with good voice quality	≥ 95%	99.26%	97.09%	NDR	97.15%	NDR	98.54%	NA	98.88%	98.41%	99.02%
Drive test results for Voice quality (Average of three drive tests) - DT data											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of sample calls		128230	2526305	178604	1703876	61150	93197	NA	2562212	1347472	1962213
Total number of calls with good voice quality		127117	2464304	167114	1649493	30664	86779	NA	2489084	1327925	1939870
%age calls with good voice quality	≥ 95%	99.13%	97.55%	93.57%	96.81%	50.15%	93.11%	NA	97.15%	98.55%	98.86%

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

11.5 POI CONGESTION

Audit Results for POI Congestion- PMR data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		51	277	459	754	131	564	NA	162	72	132
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	1
Total Capacity of all POIs (A) - in erlangs		6551	831227	555017	480471	58921	378868	NA	130160	40122	254073
Traffic served for all POIs (B)- in erlangs		25	408212	85992	280667	34043	175035	NA	68193	22171	119684
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		51	275	185	756	132	518	NA	162	72	132
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		6551	778120	190101	480026	59456	355806	NA	130262	40142	254145
Traffic served for all POIs (B)- in erlangs		2	405512	81157	279546	34721	163148	NA	38922	21954	94960
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%

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

12 ANNEXURE – CONSOLIDATED-3G

12.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
(Number of Node Bs in the network in the licensed service area		NA	3300	14671	3928
Sum of downtime (i.e. total outage time) of Node Bs		NA	43951	366418	71873
Node Bs downtime (not available for service)	≤ 2%	NA	1.79%	3.36%	2.46%
Number of Node Bs having accumulated downtime of >24 hours in a month		NA	55	12	0
Worst affected Node Bs due to downtime	≤ 2%	NA	1.67%	0.08%	0.00%
Live Measurement Results for Network Availability- 3 Day live data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
(Number of Node Bs in the network in the licensed service area		NA	1400	14289	3890
Sum of downtime (i.e. total outage time) of Node Bs		NA	1906	50009	14800
Node Bs downtime (not available for service)	≤ 2%	NA	1.89%	4.86%	5.28%
Number of Node Bs having accumulated downtime of >24 hours in a month		NA	24	0	0
Worst affected Node Bs due to downtime	≤ 2%	NA	1.71%	0.00%	0.00%

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

12.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
CSSR	≥ 95%	NA	97.46%	99.43%	98.99%
RRC Congestion	≤ 1%	NA	0.53%	0.24%	0.69%
Circuit Switched RAB Congestion	≤ 2%	NA	0.46%	0.21%	0.94%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
CSSR	≥ 95%	NA	96.31%	99.46%	99.27%
RRC Congestion	≤ 1%	NA	0.88%	0.11%	0.46%
Circuit Switched RAB Congestion	≤ 2%	NA	1.37%	0.15%	0.70%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data					
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of RRC attempts (A)		NA	546	377	279
Total number of RRC established (B)		NA	541	375	279
Call setup success rate (B/A*100)	≥ 95%	NA	99.08%	99.47%	100.00%
%age blocked calls		NA	0.92%	0.53%	0.00%

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

12.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	231648800	131558384	49260024
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	904450	942224	204298
Call drop rate (B/A*100)	≤ 2%	NA	0.39%	0.72%	0.41%
Total no. of cells in the licensed service area (B)		NA	6687	43917	12138
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NA	99	1021	272
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NA	1.47%	2.32%	2.24%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	20361773	18692678	62770119
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	142607	128373	275938
Call drop rate (B/A*100)	≤ 2%	NA	0.70%	0.69%	0.44%
Total no. of cells in the licensed service area (B)		NA	4200	44233	11963
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NA	114	1037	367
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NA	2.71%	2.34%	3.07%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data					
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	541	376	279
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	1	2	1
Call drop rate (B/A*100)	≤ 2%	NA	0.18%	0.53%	0.36%

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

12.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	100	103279581203	85854514310
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	98	102209528478	85614051970
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	98.00%	98.96%	99.72%
Live measurement results for Voice quality-3 Day data					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	100	14218562586	150834901256
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	97	14071376622	150397306362
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	97.00%	98.96%	99.71%
Drive test results for Voice quality (Average of three drive tests) - DT data					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	117915	1882470	1297360
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	116610	1837220	1277547
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	98.89%	97.60%	98.47%

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

12.5 POI CONGESTION

Audit Results for POI Congestion- PMR data					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	278	754	162
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	311664	480471	520996
Traffic served for all POIs (B)- in erlangs		NA	82569	280667	58814
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	185	755	161
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	190135	479896	129355
Traffic served for all POIs (B)- in erlangs		NA	81157	278278	47739
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%

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

13 ANNEXURE – CUSTOMER SERVICES

13.1 `METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated											
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)											
Metering and billing credibility - Postpaid											
Total bills generated during the period		9	749403	866721	1451018	266753	400613	16649	136685	0	450966
Total number of bills disputed		0	832	83	5352	235	356	0	0	0	1847
Total number of valid billing complaints		0	111	83	668	235	356	0	0	0	1218
Total complaints considered invalid		0	721	0	4684	0	0	0	0	0	629
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.11%	0.01%	0.37%	0.09%	0.09%	0.00%	0.00%	NA	0.41%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid											
Performance prepaid	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of charging complaints (valid) - sum of 3 months		0	127	4463	7938	1891	9120	0	0	16	11767
Total complaints considered invalid (sum of 3 months)		0	1585	0	13488	0	0	0	0	2	2944
Total number of charging complaints (sum of 3 months)		0	1712	4463	21426	1891	9120	0	0	18	14711
Total no of customers served (Sum of 3 months)		20691	35226532	10739570	59727193	6325015	30419180	639906	15979600	10043087	19551235
Percentage of charging complaints disputed	≤ 0.1%	0.00%	0.00%	0.04%	0.04%	0.03%	0.03%	0.00%	0.00%	0.00%	0.08%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of billing/charging complaints		0	2544	4546	26778	2126	9476	0	6	18	16558
Total number of complaints resolved in favour of customer		0	238	4546	8606	2126	9476	0	6	16	12985
Total complaints considered invalid		0	2306	0	18172	0	0	0	0	2	3573
Number of complaints resolved in 4 weeks		0	238	4545	8606	2126	9476	0	6	16	12941
Percentage complaints resolved within 4 weeks	≥ 98%	NA	100.00%	99.98%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	99.66%
Number of complaints resolved in 6 weeks		0	238	4546	8606	2126	9476	0	6	16	12983
Percentage complaints resolved within 6 weeks	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	99.98%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		0	238	1	8606	2126	9476	0	6	16	12983
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total Number of calls made		0	100	100	100	41	43	0	92	10	42
Number of cases resolved in 4 weeks		0	84	75	81	29	25	0	47	9	31
Percentage cases resolved in 4 weeks	≥ 98%	NA	84.00%	75.00%	81.00%	70.73%	58.14%	NA	51.09%	90.00%	73.81%
Number of cases resolved in 6 weeks		0	90	75	81	29	26	0	47	9	31
Percentage cases resolved in 6 weeks	100.00%	NA	90.00%	75.00%	81.00%	70.73%	60.47%	NA	51.09%	90.00%	73.81%

Data Source: Billing Center of the operators

13.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of call attempts to customer care for assistance		9597	3070848	3644679	53445017	1871821	13632177	33038	1051864	7095724	0
Number of calls getting connected and answered (electronically)		9314	3070848	3606460	50864508	1823946	13298644	32337	1022764	7095724	0
Percentage calls getting connected and answered	≥ 95%	97.05%	100.00%	98.95%	95.17%	97.44%	97.55%	97.88%	97.23%	100.00%	NA
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total Number of calls received (3 months)		862	4623026	1895535	11717992	890878	4387297	39837	1714714	2083553	0
Total Number of calls answered within 90 seconds (3 months)		856	4487722	1788527	11415040	766711	4044076	39629	1664971	2010642	0
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	99.30%	97.07%	94.35%	97.41%	86.06%	92.18%	99.48%	97.10%	96.50%	NA

Live calling results for customer care (IVR)											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	100	100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		69	98	100	100	97	90	97	85	98	93
Live Calling Percentage calls getting connected and answered	≥ 95%	69.00%	98.00%	100.00%	100.00%	97.00%	90.00%	97.00%	85.00%	98.00%	93.00%

13.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated											
Termination	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of closure request		0	2967	0	9307	795	688	459	1600	0	0
Number of requests attended within 7 days		0	2967	0	9258	795	688	459	1600	0	0
Percentage cases in which termination done within 7 days	100.00%	NA	100.00%	NA	99.47%	100.00%	100.00%	100.00%	100.00%	NA	NA

Data Source: Customer Service Center of the operators

13.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated											
Refund	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of cases requiring refund of deposits		0	251	0	2669	0	0	101	463	0	4486
Total number of cases where refund was made within 60 days		0	251	0	2669	0	0	101	463	0	4486
Percentage cases in which refund was receive within 60 days	100.00%	NA	100.00%	NA	100.00%	NA	NA	100.00%	100.00%	NA	100.00%

Data Source: Billing Center of the operators

13.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests										
Resolution of service requests	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total Number of calls made	0	100	100	100	43	41	10	88	44	0
Number of cases resolved to satisfaction	0	75	74	86	20	8	10	51	37	0
Percentage cases resolved in four weeks	NA	75.00%	74.00%	86.00%	46.51%	19.51%	100.00%	57.95%	84.09%	NA

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

13.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services											
Level 1 services		Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total no. of calls made		300	300	300	300	300	300	300	300	300	300
Calls answered		171	284	282	284	157	140	146	300	174	206
% of calls connected	≥ 95%	57.00%	94.67%	94.00%	94.67%	52.33%	46.67%	48.67%	100.00%	58.00%	68.67%

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

13.7 LEVEL 1 SERVICE CALLS MADE

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

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

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		15	8
101	Fire	Y		14	9
102	Ambulance	Y		14	8
104	Health Information Helpline	Y		14	8
108	Emergency and Disaster Management Helpline	Y		14	8
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		14	8
182	Indian Railway Security Helpline	Y		14	8
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services	Y		15	8
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		14	9
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		14	8

1073	Road Accident Helpline	Y		14	8
1077	Control Room for District Collector	Y		14	8
10120	Call Alart (Crime Branch)	Y		14	8
10121	Women Helpline	Y		14	8
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		14	8
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		15	8
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		15	8
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		14	9
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		15	8
112012	National Do Not Call Registry	Y		15	8
11212	Complaint of Electricity	Y		14	8
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		16	15
101	Fire	Y		16	15
102	Ambulance	Y		16	15
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		15	14

138	All India Helpine for Passangers	Y		16	15
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		16	15
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		16	14
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		15	15
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	15
1073	Road Accident Helpline	Y		16	14
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		16	15
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		16	15
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		16	15
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project				
1512	Prevention of Crime in Railway	Y		16	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		16	15

155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		16	16
112012	National Do Not Call Registry	Y		16	16
11212	Complaint of Electricity	Y		15	15
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		15	15
BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		16	15
101	Fire	Y		16	15
102	Ambulance	Y		16	15
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		15	14
138	All India Helpine for Passangers	Y		16	15
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		16	15
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		16	14
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		15	15
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	15
1073	Road Accident Helpline	Y		16	14

1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		16	15
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		16	15
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		16	15
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		16	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		16	15
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		16	15
112012	National Do Not Call Registry	Y		16	15
11212	Complaint of Electricity	Y		15	15
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		15	15
Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	16
101	Fire	Y		16	16
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		17	16
138	All India Helpine for Passangers	Y		16	16

1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	15
182	Indian Railway Security Helpline	Y		17	16
1033	Road Accident Management Service	Y		16	15
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	16
1073	Road Accident Helpline	Y		17	16
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		16	15
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	16
101212	Central Accident and Trauma Services (CATS)	Y		17	16
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		17	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		17	16
155154	Municipal Corporations		N		

155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		17	16
112012	National Do Not Call Registry	Y		17	16
11212	Complaint of Electricity	Y		17	16
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		17	16

Reliance CDMA

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		20	10
101	Fire	Y		20	11
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		20	10
138	All India Helpine for Passangers	Y		20	10
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		20	11
182	Indian Railway Security Helpline	Y		20	11
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		20	11
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		20	10
1073	Road Accident Helpline	Y		20	11
1077	Control Room for District Collector	Y		20	11

10120	Call Alart (Crime Branch)	Y		20	10
10121	Women Helpline	Y		20	11
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		20	10
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		20	10
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		20	10
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Reliance GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		20	10
101	Fire	Y		20	9
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		20	9
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		

181	Chief Minister Helpline	Y		20	10
182	Indian Railway Security Helpline	Y		20	9
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		20	9
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		20	9
1073	Road Accident Helpline	Y		20	9
1077	Control Room for District Collector	Y		20	9
10120	Call Alart (Crime Branch)	Y		20	9
10121	Women Helpline	Y		20	9
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		20	10
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		20	10
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		20	10
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155154	Municipal Corporations		N		
155214	Labour Helpline		N		

11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		20	9
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
TATA CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	9
101	Fire	Y		18	9
102	Ambulance	Y		17	9
104	Health Information Helpline	Y		17	9
108	Emergency and Disaster Management Helpline	Y		18	9
138	All India Helpine for Passangers	Y		18	9
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	8
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		17	9
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		17	8
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		18	9
1073	Road Accident Helpline	Y		17	8
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		

10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		18	9
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		18	9
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	8
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		18	8
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	8
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		18	8

TATA GSM

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		19	19
101	Fire	Y		19	19
102	Ambulance	Y		18	18
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		19	19
138	All India Helpine for Passangers	Y		19	19
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		19	19

182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		18	18
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		18	18
1071	Air Accident Helpline				
1072	Rail Accident Helpline	Y		19	19
1073	Road Accident Helpline	Y		19	19
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		19	19
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		18	18
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		19	19
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		19	19
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		

112012	National Do Not Call Registry	Y		19	19
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		19	19
Videocon					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	10
101	Fire	Y		17	10
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		17	10
138	All India Helpine for Passangers	Y		17	10
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	9
182	Indian Railway Security Helpline	Y		17	10
1033	Road Accident Management Service	Y		17	9
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		17	10
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	10
1073	Road Accident Helpline	Y		16	9
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		17	9
10121	Women Helpline	Y		16	9

10127	National AIDS Helpline to NACO	Y		16	10
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		17	10
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		16	9
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		17	10
112012	National Do Not Call Registry	Y		16	10
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		17	10
Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		23	16
101	Fire	Y		23	16
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		23	16
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		25	14
182	Indian Railway Security Helpline		N		

1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		23	16
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		23	16
1073	Road Accident Helpline	Y		23	16
1077	Control Room for District Collector	Y		23	16
10120	Call Alart (Crime Branch)	Y		23	16
10121	Women Helpline	Y		23	16
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		23	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		23	16
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155154	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		

11212	Complaint of Electricity	Y		23	16
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

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

14 COUNTER DETAILS

Sl No.	KPI	Formula with Counter Description
1	CSSR= (No of established Calls / No of Attempted Calls)%	***No of established Calls =*** ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)] +[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)]))/***No of Attempted Calls =*** ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Changeable)])

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

6	**Connection with good quality voice= (Connection with good quality voice/Total voice samples)%**	***Connection with good quality voice =*** **((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)) /*Total voice samples=* ((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHF (Receive Quality Rank 6)+Number of MRs on Downlink TCHF (Receive Quality Rank 7)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+:Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 6)+Number of MRs on Downlink TCHH (Receive Quality Rank 7))**

14.1.1 ERICSSON

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

Sl No.	KPI	Ericsson
1	**CSSR= (No of established Calls / No of Attempted Calls)%**	CSSR (No of established Calls / No of Attempted Calls)=(TCASSALL/TASSALL)*100
2	**SDCCH congestion= (SDCCH Failure/SDCCH attempts)%**	SDCCH congestion (SDCCH Failure/SDCCH attempts)% = (CCONGS/CCALLS)*100
3	**TCH congestion= (TCH Failures /TCH Attempts)%**	TCH congestion (TCH Failures /TCH Attempts)%= (CNRELCONG+TNRELCONG)/TASSALL)*100

4	**Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)**	Call Drop Rate (Total no dropped calls/No of established calls)%= (TNDROP)/TCASSALL*100
5	**Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area**	Above formula with counters being used in CBBH.
6	**Connection with good quality voice= (Connection with good quality voice/Total voice samples)%**	Connection with good quality voice (Connection with good quality voice samples 0-5 /Total voice samples)= 100 * (QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL) / (QUAL70DL + QUAL60DL + QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL)

Ericsson Counters

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

14.1.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.

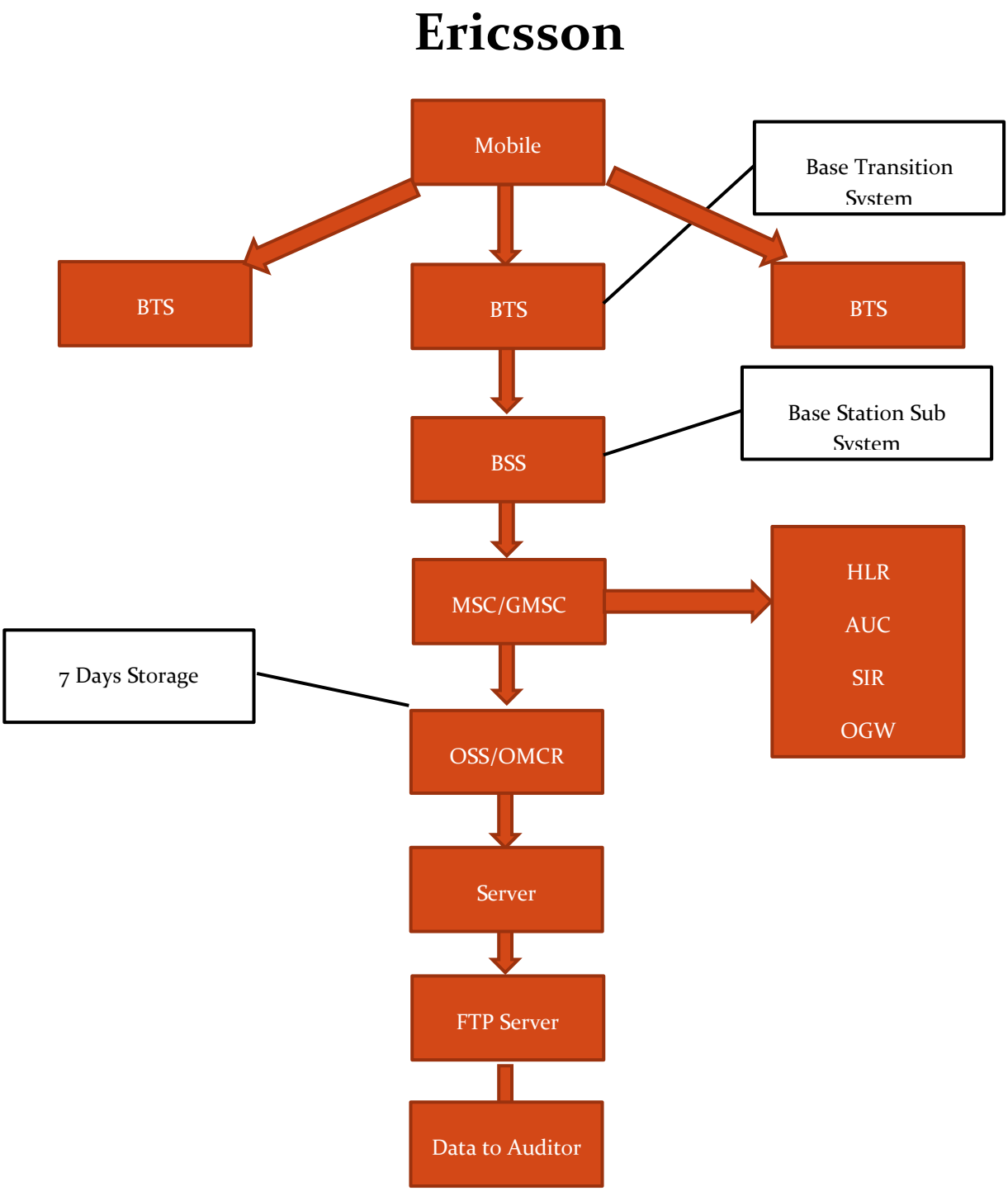
Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}

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

14.2 BLOCK SCHEMATIC DIAGRAMS

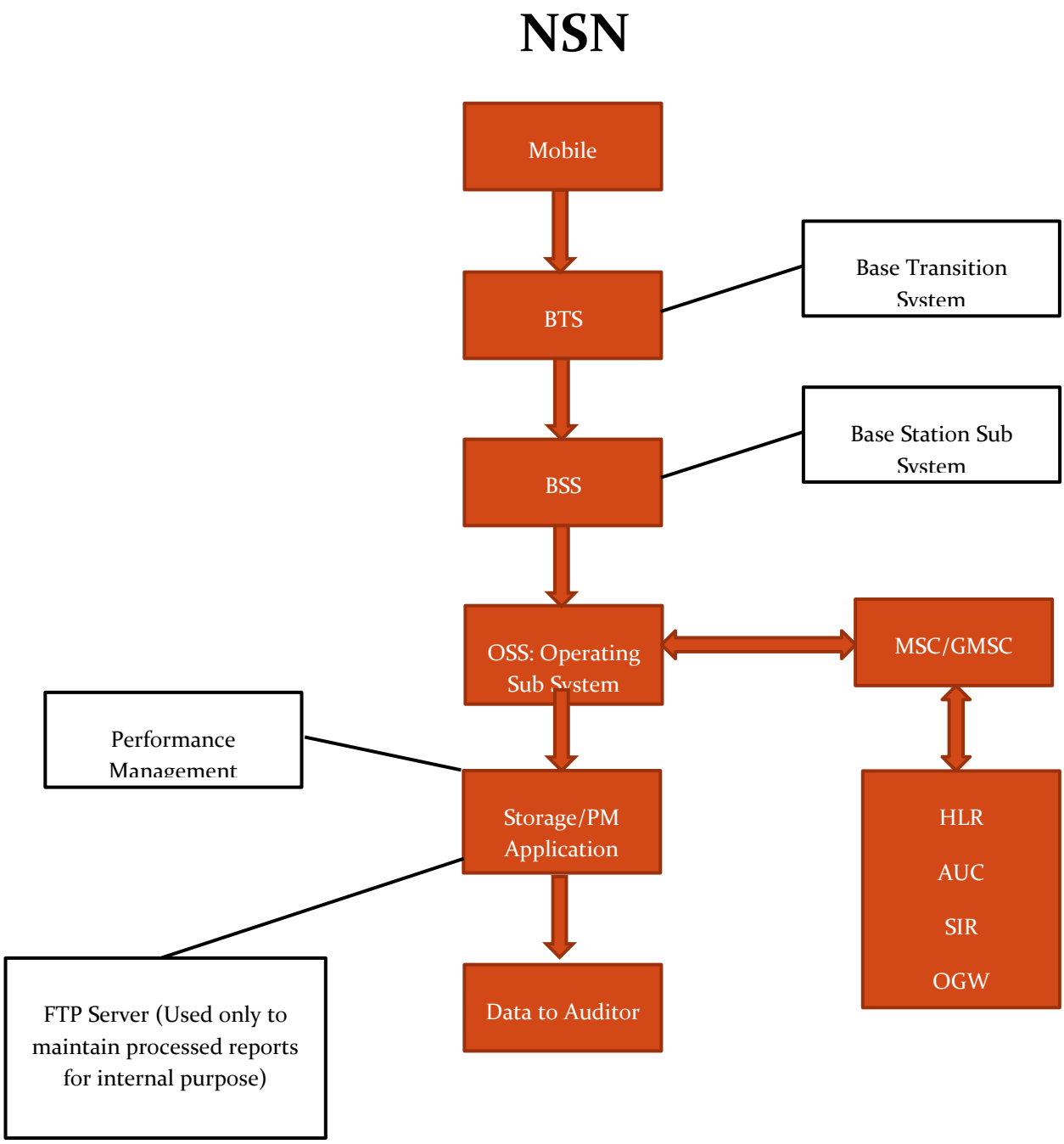
14.2.1 ERICSSON

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



14.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.



15 ANNEXURE – OCTOBER -2G

Audit Results for Network Availability- PMR data-October											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		128	9574	3771	10169	1807	3976	NA	2946	1684	5770
Sum of downtime of BTSs in a month (in hours)		185	6535	55859	780330	301	2915	NA	97984	61	5804
BTSs accumulated downtime (not available for service)	≤ 2%	0.19%	0.09%	1.99%	10.31%	0.02%	0.10%	NA	4.47%	0.00%	0.14%
Number of BTSs having accumulated downtime >24 hours		0	6	74	101	1	21	NA	0	0	40
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.06%	1.96%	0.99%	0.06%	0.53%	NA	0.00%	0.00%	0.69%
Live Measurement Results for Network Availability- 3 Day live data-October											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		128	9583	1734	10044	1807	3976	NA	2946	1687	5770
Sum of downtime of BTSs in a month (in hours)		51	1508	2413	87325	14	16	NA	17112	134	1272
BTSs accumulated downtime (not available for service)	≤ 2%	0.56%	0.22%	1.93%	12.08%	0.01%	0.01%	NA	8.07%	0.11%	0.31%
Number of BTSs having accumulated downtime >24 hours		0	6	29	2	0	0	NA	0	1	4
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.06%	1.67%	0.02%	0.00%	0.00%	NA	0.00%	0.06%	0.07%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-October											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
CSSR	≥ 95%	98.15%	98.83%	96.67%	97.32%	99.51%	97.79%	NA	98.56%	98.90%	99.63%
SDCCH/Paging channel congestion	≤ 1%	0.17%	4.69%	0.48%	0.57%	NA	0.09%	NA	0.04%	0.16%	0.11%
TCH congestion	≤ 2%	0.02%	0.33%	1.31%	1.21%	0.10%	0.59%	NA	0.05%	0.22%	0.37%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-October											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
CSSR	≥ 95%	97.90%	98.84%	96.55%	97.54%	99.73%	97.88%	NA	98.53%	98.94%	99.78%
SDCCH/Paging channel congestion	≤ 1%	0.40%	0.03%	0.59%	0.66%	NA	0.12%	NA	0.08%	0.14%	0.11%
TCH congestion	≤ 2%	0.00%	0.22%	1.15%	0.76%	0.05%	0.64%	NA	0.02%	0.18%	0.22%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-October											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of calls established		3976	8961631	571262031	531004136	70701117	126391394	NA	74839653	2057447	145516698
Total number of calls dropped		27	73044	6385467	4099581	60011	178930	NA	442398	12047	965996
Call drop rate	≤ 2%	0.68%	0.82%	1.12%	0.77%	0.08%	0.14%	NA	0.59%	0.59%	0.66%
Total number of cells in the network		384	29562	11653	30519	5454	12271	NA	8809	5157	17339
Total number of cells having more than 3% TCH		4	575	116	521	34	85	NA	245	132	701
Worst affected cells having more than 3% TCH	≤ 3%	0.97%	1.95%	0.99%	1.71%	0.63%	0.69%	NA	2.79%	2.55%	4.04%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-October											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of calls established		2520	7570614	6622091	47947067	18629815	10585893	NA	103833637	1890498	181558201
Total number of calls dropped		24	64471	67180	388230	18502	14983	NA	593065	11149	1151566
Call drop rate	≤ 2%	0.95%	0.85%	1.01%	0.81%	0.10%	0.14%	NA	0.57%	0.59%	0.63%
Total number of cells in the network		384	29635	5215	30651	5454	12270	NA	8806	5146	17341
Total number of cells having more than 3% TCH		0	713	145	550	41	71	NA	400	140	760
Worst affected cells having more than 3% TCH	≤ 3%	0.08%	2.41%	2.79%	1.79%	0.75%	0.58%	NA	4.54%	2.73%	4.38%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-October											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	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	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-October											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of sample calls		157078	1390346697	NDR	59428557663	NDR	17004700368	NA	10702707196	244086805	22091113698
Total number of calls with good voice quality		155928	1350582781	NDR	57673424130	NDR	16809323026	NA	10577274265	240117543	21837137937
%age calls with good voice quality	≥ 95%	99.27%	97.14%	NDR	97.05%	NDR	98.85%	NA	98.83%	98.37%	98.85%
Live measurement results for Voice quality-3 Day data-October											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of sample calls		202815	1234492941	NDR	5588772511	NDR	1384542948	NA	9625123580	231345009	26781015618
Total number of calls with good voice quality		201125	1197272203	NDR	5424791983	NDR	1368789440	NA	9514793601	227782296	26519469825
%age calls with good voice quality	≥ 95%	99.17%	96.98%	NDR	97.07%	NDR	98.86%	NA	98.85%	98.46%	99.02%
Drive test results for Voice quality (Average of three drive tests) - DT data-October											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	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	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-October											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	92	153	251	44	187	NA	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	257180	185006	160028	19640	123252	NA	43337	19952	84526
Traffic served for all POIs (B)- in erlangs		12	134846	28580	86802	11348	56111	NA	22653	11458	47120
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	91	62	252	44	146	NA	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	253926	63346	160473	19912	104391	NA	43419	19964	84599
Traffic served for all POIs (B)- in erlangs		0	117906	25768	82970	12030	44709	NA	12696	10321	22395
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%

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Audit Results for Network Availability- PMR data-November											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		128	9575	3720	10219	1782	3013	NA	2943	1690	5770
Sum of downtime of BTSs in a month (in hours)		208	900	52914	432252	46	51	NA	86843	67	512
BTSs accumulated downtime (not available for service)	≤ 2%	0.22%	0.01%	1.91%	5.69%	0.00%	0.00%	NA	3.97%	0.01%	0.01%
Number of BTSs having accumulated downtime >24 hours		0	0	65	27	0	0	NA	0	0	9
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	1.75%	0.26%	0.00%	0.00%	NA	0.00%	0.00%	0.16%
Live Measurement Results for Network Availability- 3 Day live data-November											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		128	9575	1734	10169	1782	3013	NA	2946	1690	5770
Sum of downtime of BTSs in a month (in hours)		37	501	408	60566	35	24	NA	20395	56	512
BTSs accumulated downtime (not available for service)	≤ 2%	0.40%	0.07%	0.33%	8.27%	0.03%	0.01%	NA	9.62%	0.05%	0.12%
Number of BTSs having accumulated downtime >24 hours		0	0	5	3	0	0	NA	0	0	6
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.29%	0.03%	0.00%	0.00%	NA	0.00%	0.00%	0.10%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-November											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
CSSR	≥ 95%	97.48%	98.00%	96.95%	97.48%	99.11%	97.35%	NA	98.54%	98.85%	99.81%
SDCCH/Paging channel congestion	≤ 1%	0.03%	0.04%	0.37%	0.39%	NA	0.12%	NA	0.05%	0.12%	0.08%
TCH congestion	≤ 2%	0.00%	0.27%	1.39%	0.93%	0.17%	0.70%	NA	0.04%	0.19%	0.19%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-November											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
CSSR	≥ 95%	98.84%	98.82%	96.35%	97.39%	99.11%	97.35%	NA	98.54%	98.85%	99.81%
SDCCH/Paging channel congestion	≤ 1%	0.11%	0.05%	0.58%	0.58%	NA	0.12%	NA	0.06%	0.12%	0.08%
TCH congestion	≤ 2%	0.00%	0.24%	1.10%	0.86%	0.17%	0.70%	NA	0.05%	0.19%	0.19%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-November											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of calls established		2282	10675424	572459651	611516053	38691155	66853269	NA	70247083	2060183	192747040
Total number of calls dropped		14	79684	6488972	4301841	25302	98455	NA	418615	12461	1145985
Call drop rate	≤ 2%	0.61%	0.75%	1.13%	0.70%	0.07%	0.15%	NA	0.60%	0.60%	0.59%
Total number of cells in the network		384	29611	11960	30769	5389	12320	NA	8840	5157	17349
Total number of cells having more than 3% TCH		3	517	265	424	29	37	NA	225	128	632
Worst affected cells having more than 3% TCH	≤ 3%	0.76%	1.75%	2.21%	1.38%	0.54%	0.30%	NA	2.54%	2.48%	3.64%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-November											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of calls established		171	10675424	6768612	62416843	38691155	66853269	NA	107968717	2060183	192747040
Total number of calls dropped		0	79684	79097	429002	1480	98454	NA	597636	12461	1145985
Call drop rate	≤ 2%	0.00%	0.75%	1.17%	0.69%	0.00%	0.15%	NA	0.55%	0.60%	0.59%
Total number of cells in the network		384	29611	5215	30666	5389	12320	NA	8822	5157	17349
Total number of cells having more than 3% TCH		2	517	142	475	29	37	NA	380	128	632
Worst affected cells having more than 3% TCH	≤ 3%	0.43%	1.75%	2.72%	1.55%	0.54%	0.30%	NA	4.31%	2.48%	3.64%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-November											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	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	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-November											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of sample calls		225038	1417002710	NDR	62201912019	NDR	7659649992	NA	10324562235	253093372	28220854099
Total number of calls with good voice quality		223479	1375838076	NDR	60396790709	NDR	7568405318	NA	10203206777	248942640	27941188528
%age calls with good voice quality	≥ 95%	99.31%	97.09%	NDR	97.10%	NDR	98.81%	NA	98.82%	98.36%	99.01%
Live measurement results for Voice quality-3 Day data-November											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of sample calls		15429	1417002710	NDR	6274189212	NDR	5659649992	NA	9990767299	253093372	28220854099
Total number of calls with good voice quality		15407	1375838076	NDR	6094722525	NDR	5568405318	NA	9874328067	248942640	27941188528
%age calls with good voice quality	≥ 95%	99.86%	97.09%	NDR	97.14%	NDR	98.39%	NA	98.83%	98.36%	99.01%
Drive test results for Voice quality (Average of three drive tests) - DT data-November											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	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	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-November											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	92	153	251	44	222	NA	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	311261	185006	160352	19640	142538	NA	43418	20170	84599
Traffic served for all POIs (B)- in erlangs		12	123585	27934	95477	11348	66729	NA	22433	10713	23206
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	92	62	252	44	222	NA	54	36	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		2184	261261	63346	160452	19640	142538	NA	43434	20177	84599
Traffic served for all POIs (B)- in erlangs		1	133585	27325	96745	11348	66729	NA	13001	11633	23206
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%

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Audit Results for Network Availability- PMR data-December											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		128	9680	3720	10384	1805	4024	NA	2948	NDR	5771
Sum of downtime of BTSs in a month (in hours)		227	6103	54195	428266	301	9124	NA	89228	NDR	97
BTSs accumulated downtime (not available for service)	≤ 2%	0.24%	0.08%	1.96%	5.54%	0.02%	0.30%	NA	4.07%	NDR	0.00%
Number of BTSs having accumulated downtime >24 hours		0	7	55	25	0	55	NA	0	NDR	8
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.07%	1.48%	0.24%	0.00%	1.37%	NA	0.00%	NDR	0.14%
Live Measurement Results for Network Availability- 3 Day live data-December											
	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Number of BTSs in the licensed service area		128	9662	1734	10219	1685	4024	NA	2943	NDR	5771
Sum of downtime of BTSs in a month (in hours)		37	502	502	46200	24	899	NA	8650	NDR	53
BTSs accumulated downtime (not available for service)	≤ 2%	0.40%	0.07%	0.40%	6.28%	0.02%	0.31%	NA	4.08%	NDR	0.01%
Number of BTSs having accumulated downtime >24 hours		0	0	8	1	0	0	NA	0	NDR	3
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.46%	0.01%	0.00%	0.00%	NA	0.00%	NDR	0.05%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-December											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
CSSR	≥ 95%	97.94%	98.83%	97.18%	97.38%	99.29%	95.95%	NA	98.53%	NDR	99.64%
SDCCH/Paging channel congestion	≤ 1%	0.08%	0.03%	0.40%	0.47%	NA	0.09%	NA	0.06%	NDR	0.08%
TCH congestion	≤ 2%	0.00%	0.34%	1.20%	1.25%	0.18%	0.62%	NA	0.03%	NDR	0.36%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-December											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
CSSR	≥ 95%	98.84%	98.83%	96.82%	97.35%	99.29%	95.95%	NA	98.53%	NDR	98.97%
SDCCH/Paging channel congestion	≤ 1%	0.11%	0.03%	0.31%	0.25%	0.00%	0.09%	NA	0.06%	NDR	0.07%
TCH congestion	≤ 2%	0.00%	0.25%	0.71%	0.86%	0.18%	0.62%	NA	0.03%	NDR	0.02%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December											
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of call attempts		80	940	786	840	780	710	NA	685	795	945
Total number of successful calls established		80	940	765	837	779	703	NA	685	795	928
CSSR	≥ 95%	100.00%	100.00%	97.33%	99.64%	99.87%	99.01%	NA	100.00%	100.00%	98.20%
%age blocked calls		0.00%	0.00%	2.67%	0.36%	0.13%	0.99%	NA	0.00%	0.00%	1.80%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-December											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of calls established		2332	316166987	596501142	635515643	43543437	119115882	NA	83540992	NDR	4861911
Total number of calls dropped		16	2321195	6195907	4632711	28490	191718	NA	462166	NDR	30584
Call drop rate	≤ 2%	0.69%	0.73%	1.04%	0.73%	0.07%	0.16%	NA	0.55%	NDR	0.63%
Total number of cells in the network		384	29983	11964	31059	5451	12350	NA	8838	NDR	17359
Total number of cells having more than 3% TCH		3	481	204	495	24	71	NA	207	NDR	598
Worst affected cells having more than 3% TCH	≤ 3%	0.82%	1.61%	1.71%	1.59%	0.45%	0.58%	NA	2.34%	NDR	3.44%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-December											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of calls established		171	10608428	6239141	63431492	4195424	12427360	NA	103219107	NDR	4125873
Total number of calls dropped		0	79077	68424	412460	2183	15098	NA	601899	NDR	20150
Call drop rate	≤ 2%	0.00%	0.75%	1.10%	0.65%	0.05%	0.12%	NA	0.58%	NDR	0.49%
Total number of cells in the network		384	29891	5215	30984	5091	12348	NA	8840	NDR	17541
Total number of cells having more than 3% TCH		2	489	149	348	25	82	NA	402	NDR	621
Worst affected cells having more than 3% TCH	≤ 3%	0.43%	1.64%	2.86%	1.12%	0.49%	0.66%	NA	4.55%	NDR	3.54%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December											
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of calls established		80	940	767	837	779	703	NA	685	795	928
Total number of calls dropped		0	0	10	0	0	5	NA	0	0	1
Call drop rate	≤ 2%	0.00%	0.00%	1.30%	0.00%	0.00%	0.71%	NA	0.00%	0.00%	0.11%

Audit Results for Voice quality -PMR Data-December											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of sample calls		186366	48237023685	NDR	66414252163	NDR	15285489019	NA	11416147293	NDR	768116049
Total number of calls with good voice quality		185168	47104023485	NDR	64712211567	NDR	15062066654	NA	11285653486	NDR	759709203
%age calls with good voice quality	≥ 95%	99.36%	97.65%	NDR	97.44%	NDR	98.54%	NA	98.86%	NDR	98.91%
Live measurement results for Voice quality-3 Day data-December											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of sample calls		15429	1615053132	NDR	6613391102	NDR	1618403268	NA	15237353350	NDR	6587023
Total number of calls with good voice quality		15407	1569205198	NDR	6431001078	NDR	1599229323	NA	15074017275	NDR	6424533
%age calls with good voice quality	≥ 95%	99.86%	97.16%	NDR	97.24%	NDR	98.82%	NA	98.93%	NDR	97.53%
Drive test results for Voice quality (Average of three drive tests) - DT data-December											
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of sample calls		128230	2526305	178604	1703876	61150	93197	NA	2562212	1347472	1962213
Total number of calls with good voice quality		127117	2464304	167114	1649493	30664	86779	NA	2489084	1327925	1939870
%age calls with good voice quality	≥ 95%	99.13%	97.55%	93.57%	96.81%	50.15%	93.11%	NA	97.15%	98.55%	98.86%

Audit Results for POI Congestion- PMR data-December											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	93	153	251	44	155	NA	54	NDR	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		2184	262787	185006	160091	19640	113078	NA	43405	NDR	84948
Traffic served for all POIs (B)- in erlangs		1	149781	29478	98387	11348	52196	NA	23107	NDR	49358
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December											
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Videocon	Vodafone
Total number of working POIs		17	92	61	252	44	150	NA	54	NDR	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		2184	262933	63409	159100	19903	108877	NA	43410	NDR	84948
Traffic served for all POIs (B)- in erlangs		1	154021	28064	99831	11344	51711	NA	13224	NDR	49358
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	NDR	0.00%

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Audit Results for Network Availability- PMR data-October					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
(Number of Node Bs in the network in the licensed service area		NA	1056	4757	1289
Sum of downtime (i.e. total outage time) of Node Bs		NA	15631	221706	36134
Node Bs downtime (not available for service)	≤ 2%	NA	1.99%	6.26%	3.77%
Number of Node Bs having accumulated downtime of >24 hours in a month		NA	19	10	0
Worst affected Node Bs due to downtime	≤ 2%	NA	1.80%	0.21%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-October					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
(Number of Node Bs in the network in the licensed service area		NA	464	4575	1289
Sum of downtime (i.e. total outage time) of Node Bs		NA	633	25342	9966
Node Bs downtime (not available for service)	≤ 2%	NA	1.89%	7.69%	10.74%
Number of Node Bs having accumulated downtime of >24 hours in a month		NA	6	0	0
Worst affected Node Bs due to downtime	≤ 2%	NA	1.29%	0.00%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-October					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
CSSR	≥ 95%	NA	97.59%	99.30%	98.96%
RRC Congestion	≤ 1%	NA	0.15%	0.28%	0.71%
Circuit Switched RAB Congestion	≤ 2%	NA	0.21%	0.34%	0.88%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-October					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
CSSR	≥ 95%	NA	96.13%	99.36%	99.26%
RRC Congestion	≤ 1%	NA	0.99%	0.13%	0.47%
Circuit Switched RAB Congestion	≤ 2%	NA	1.13%	0.19%	0.80%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October					
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of RRC attempts (A)		NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-October					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	11918221	59851401	16139265
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	11471	420925	66768
Call drop rate (B/A*100)	≤ 2%	NA	0.10%	0.70%	0.41%
Total no. of cells in the licensed service area (B)		NA	897	14282	3988
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NA	0	332	102
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NA	0.04%	2.32%	2.55%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-October					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	6272382	6100455	19783588
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	47607	44147	90888
Call drop rate (B/A*100)	≤ 2%	NA	0.76%	0.72%	0.46%
Total no. of cells in the licensed service area (B)		NA	1392	14513	3988
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NA	38	343	132
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NA	2.73%	2.36%	3.30%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-October					
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-October					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	100	45581761349	40182085000
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	98	45110755824	40071427451
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	98.00%	98.97%	99.72%
Live measurement results for Voice quality-3 Day data-October					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	100	4513402441	52804141000
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	97	4466484766	52667342468
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	97.00%	98.96%	99.74%
Drive test results for Voice quality (Average of three drive tests) - DT data-October					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-October					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	62	251	54
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	63346	160028	43337
Traffic served for all POIs (B)- in erlangs		NA	25768	86802	22653
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	62	252	54
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	63346	160473	43419
Traffic served for all POIs (B)- in erlangs		NA	25768	82970	12696
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%

19 ANNEXURE – NOVEMBER-3G

Audit Results for Network Availability- PMR data-November					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
(Number of Node Bs in the network in the licensed service area		NA	1122	4757	1307
Sum of downtime (i.e. total outage time) of Node Bs		NA	15843	12950	20556
Node Bs downtime (not available for service)	≤ 2%	NA	1.90%	0.37%	2.11%
Number of Node Bs having accumulated downtime of >24 hours in a month		NA	22	0	0
Worst affected Node Bs due to downtime	≤ 2%	NA	1.96%	0.00%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-November					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
(Number of Node Bs in the network in the licensed service area		NA	467	4757	1289
Sum of downtime (i.e. total outage time) of Node Bs		NA	645	12950	3413
Node Bs downtime (not available for service)	≤ 2%	NA	1.92%	3.78%	3.68%
Number of Node Bs having accumulated downtime of >24 hours in a month		NA	9	0	0
Worst affected Node Bs due to downtime	≤ 2%	NA	1.93%	0.00%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-November					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
CSSR	≥ 95%	NA	97.47%	99.44%	99.01%
RRC Congestion	≤ 1%	NA	0.72%	0.15%	0.70%
Circuit Switched RAB Congestion	≤ 2%	NA	0.49%	0.18%	0.91%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-November					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
CSSR	≥ 95%	NA	96.02%	99.44%	99.27%
RRC Congestion	≤ 1%	NA	0.77%	0.15%	0.44%
Circuit Switched RAB Congestion	≤ 2%	NA	0.99%	0.18%	0.62%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November					
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of RRC attempts (A)		NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-November					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	106161775	6320018	15693771
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	440320	42769	65618
Call drop rate (B/A*100)	≤ 2%	NA	0.41%	0.68%	0.42%
Total no. of cells in the licensed service area (B)		NA	2895	14570	3976
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NA	49	377	88
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NA	1.68%	2.59%	2.20%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-November					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	6675294	6320018	20992068
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	46067	42769	93625
Call drop rate (B/A*100)	≤ 2%	NA	0.69%	0.68%	0.45%
Total no. of cells in the licensed service area (B)		NA	1401	14570	3989
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NA	38	377	124
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NA	2.71%	2.59%	3.10%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-November					
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-November					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NDR	4639930936	113186810
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NDR	4591979627	112865338
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NDR	98.97%	99.72%
Live measurement results for Voice quality-3 Day data-November					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NDR	4639930936	37097949756
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NDR	4591979627	36955155232
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NDR	98.97%	99.62%
Drive test results for Voice quality (Average of three drive tests) - DT data-November					
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-November					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	63	251	54
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	63312	160352	434254
Traffic served for all POIs (B)- in erlangs		NA	27324	95477	13054
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	62	251	54
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	63346	160323	43434
Traffic served for all POIs (B)- in erlangs		NA	27325	95477	13001
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%

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Audit Results for Network Availability- PMR data-December					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
(Number of Node Bs in the network in the licensed service area		NA	1122	5157	1332
Sum of downtime (i.e. total outage time) of Node Bs		NA	12477	131762	15183
Node Bs downtime (not available for service)	≤ 2%	NA	1.49%	3.43%	1.53%
Number of Node Bs having accumulated downtime of >24 hours in a month		NA	14	2	0
Worst affected Node Bs due to downtime	≤ 2%	NA	1.25%	0.04%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-December					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
(Number of Node Bs in the network in the licensed service area		NA	469	4957	1312
Sum of downtime (i.e. total outage time) of Node Bs		NA	628	11717	1422
Node Bs downtime (not available for service)	≤ 2%	NA	1.86%	3.28%	1.51%
Number of Node Bs having accumulated downtime of >24 hours in a month		NA	9	0	0
Worst affected Node Bs due to downtime	≤ 2%	NA	1.92%	0.00%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-December					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
CSSR	≥ 95%	NA	97.31%	99.55%	98.98%
RRC Congestion	≤ 1%	NA	0.72%	0.28%	0.65%
Circuit Switched RAB Congestion	≤ 2%	NA	0.69%	0.11%	1.04%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-December					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
CSSR	≥ 95%	NA	96.78%	99.57%	99.27%
RRC Congestion	≤ 1%	NA	0.87%	0.05%	0.48%
Circuit Switched RAB Congestion	≤ 2%	NA	1.99%	0.07%	0.68%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December					
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of RRC attempts (A)		NA	546	377	279
Total number of RRC established (B)		NA	541	375	279
Call setup success rate (B/A*100)	≥ 95%	NA	99.08%	99.47%	100.00%
%age blocked calls		NA	0.92%	0.53%	0.00%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-December					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	113568804	65386965	17426988
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	452659	478530	71912
Call drop rate (B/A*100)	≤ 2%	NA	0.40%	0.73%	0.41%
Total no. of cells in the licensed service area (B)		NA	2895	15065	4174
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NA	49	312	83
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NA	1.71%	2.07%	1.99%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-December					
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	7414097	6272205	21994463
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	48933	41457	91425
Call drop rate (B/A*100)	≤ 2%	NA	0.66%	0.66%	0.42%
Total no. of cells in the licensed service area (B)		NA	1407	15150	3986
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		NA	38	317	112
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	NA	2.68%	2.09%	2.81%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December					
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	541	376	279
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	1	2	1
Call drop rate (B/A*100)	≤ 2%	NA	0.18%	0.53%	0.36%

Audit Results for Voice quality -PMR Data-December					
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NDR	53057888918	45559242500
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NDR	52506793027	45429759181
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NDR	98.96%	99.72%
Live measurement results for Voice quality-3 Day data-December					
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NDR	5065229209	60932810500
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NDR	5012912229	60774808662
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NDR	98.97%	99.74%
Drive test results for Voice quality (Average of three drive tests) - DT data-December					
Voice quality	**Benchmark**	**Airtel 3G**	**BSNL 3G**	**Idea 3G**	**TATA 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	117915	1882470	1297360
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	116610	1837220	1277547
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	98.89%	97.60%	98.47%

Audit Results for POI Congestion- PMR data-December					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	153	251	54
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	185006	160091	43405
Traffic served for all POIs (B)- in erlangs		NA	29478	98387	23107
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December					
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G
Total number of working POIs		NA	61	252	53
No. of POIs not meeting benchmark		NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	63443	159100	42502
Traffic served for all POIs (B)- in erlangs		NA	28064	99831	22041
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%

21 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. OND'15 – Refers to the quarter of October , November and December 2015
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

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

✆+91 (124) 4217300

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