TRAI Audit Wireless Report for Gujarat Circle

QE March 2016

WEST ZONE

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Submitted to:

TRAI
Telecom Regulatory Authority of India

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2 INTRODUCTION

2.1 ABOUT TRAI

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

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

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

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

2.2 OBJECTIVES

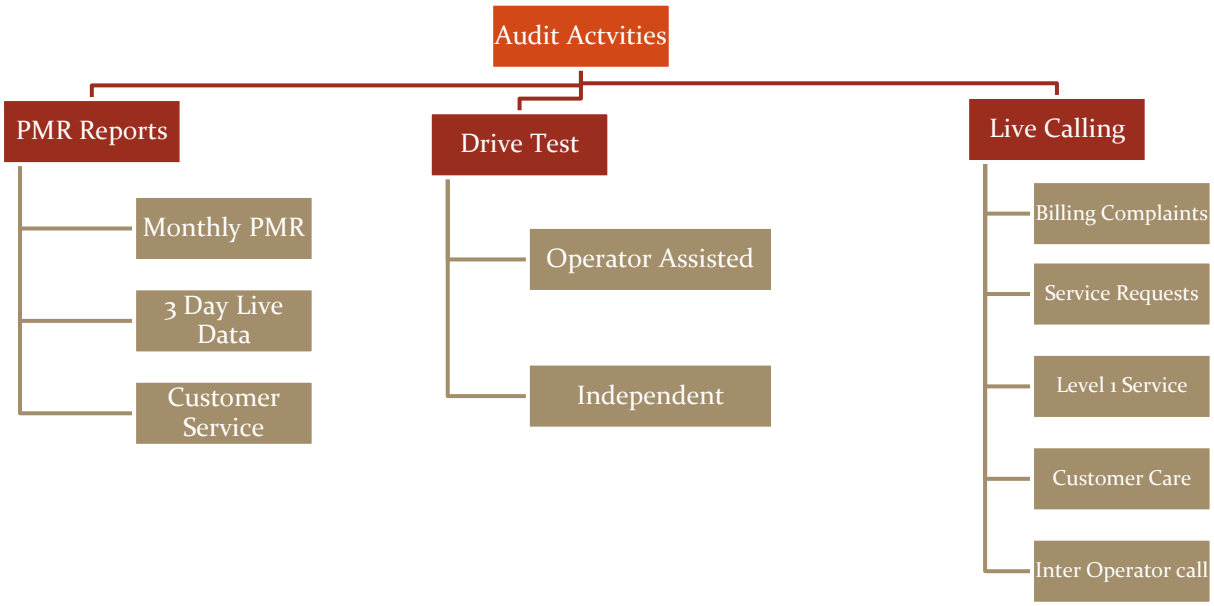
The primary objective of the Audit module is to-

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

2.3 COVERAGE

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

2.4 FRAMEWORK USED

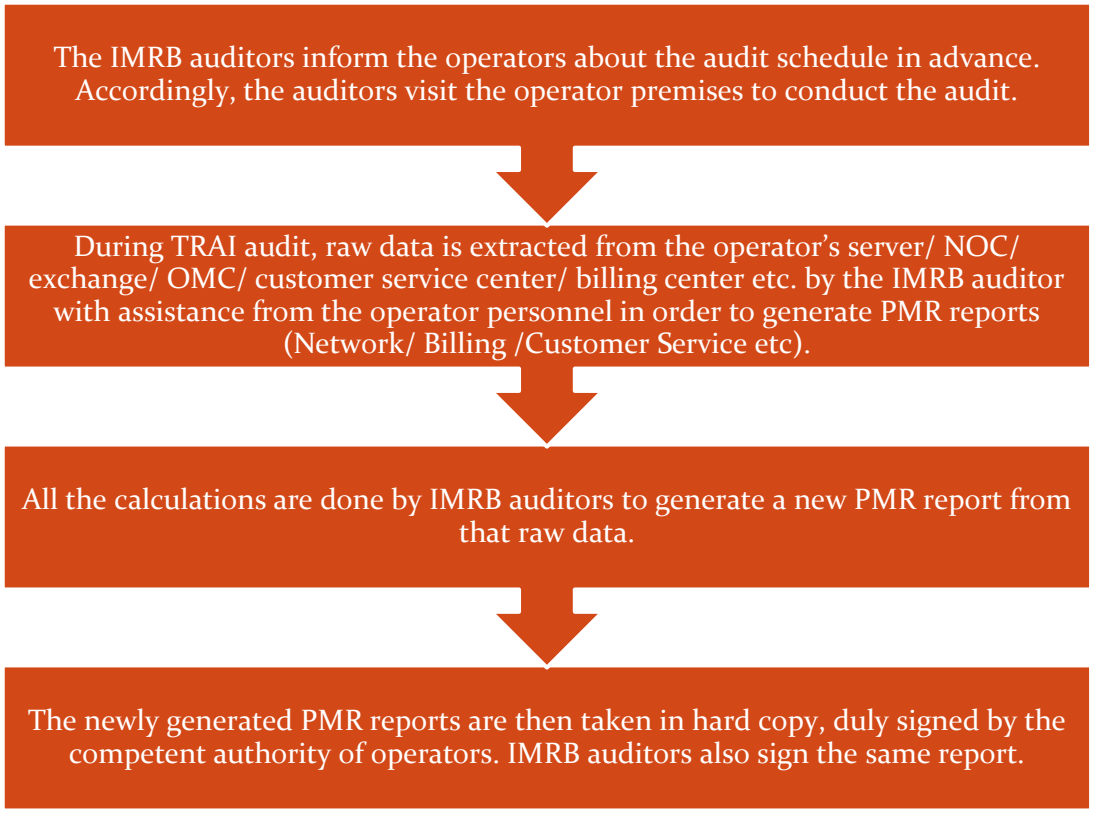


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

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



The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, January 2016 audit data was collected in the month of February 2016.

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

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

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

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR 2G

This involved calculation of the various 2G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of January, February and March 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.4.1.3 AUDIT PARAMETERS – NETWORK 2G

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

Network Related

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

2.4.1.4 MONTHLY PMR 3G

This involved calculation of the various 3G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of January, February and March 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

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

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good Circuit Switched Voice Quality

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

2.4.1.5 AUDIT PARAMETERS – NETWORK 3G

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

Network Related

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

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

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

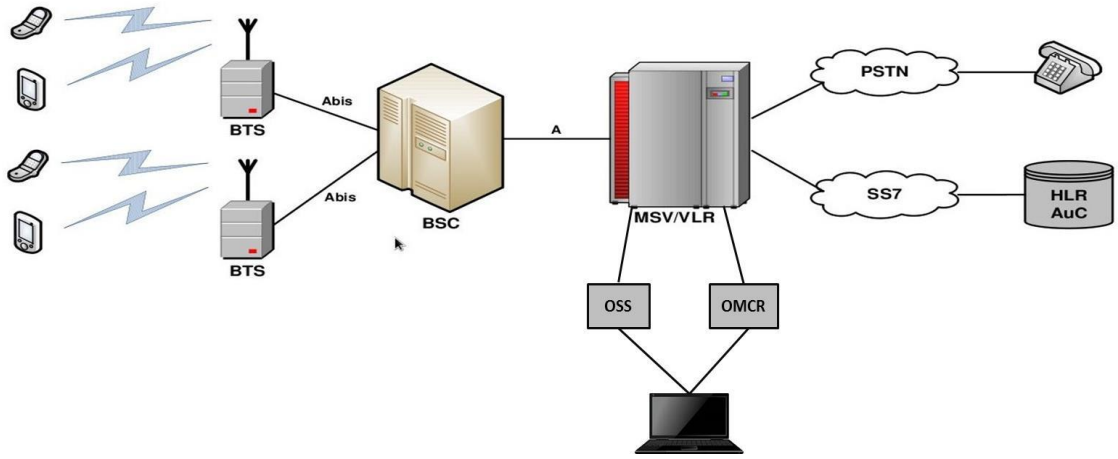
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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

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

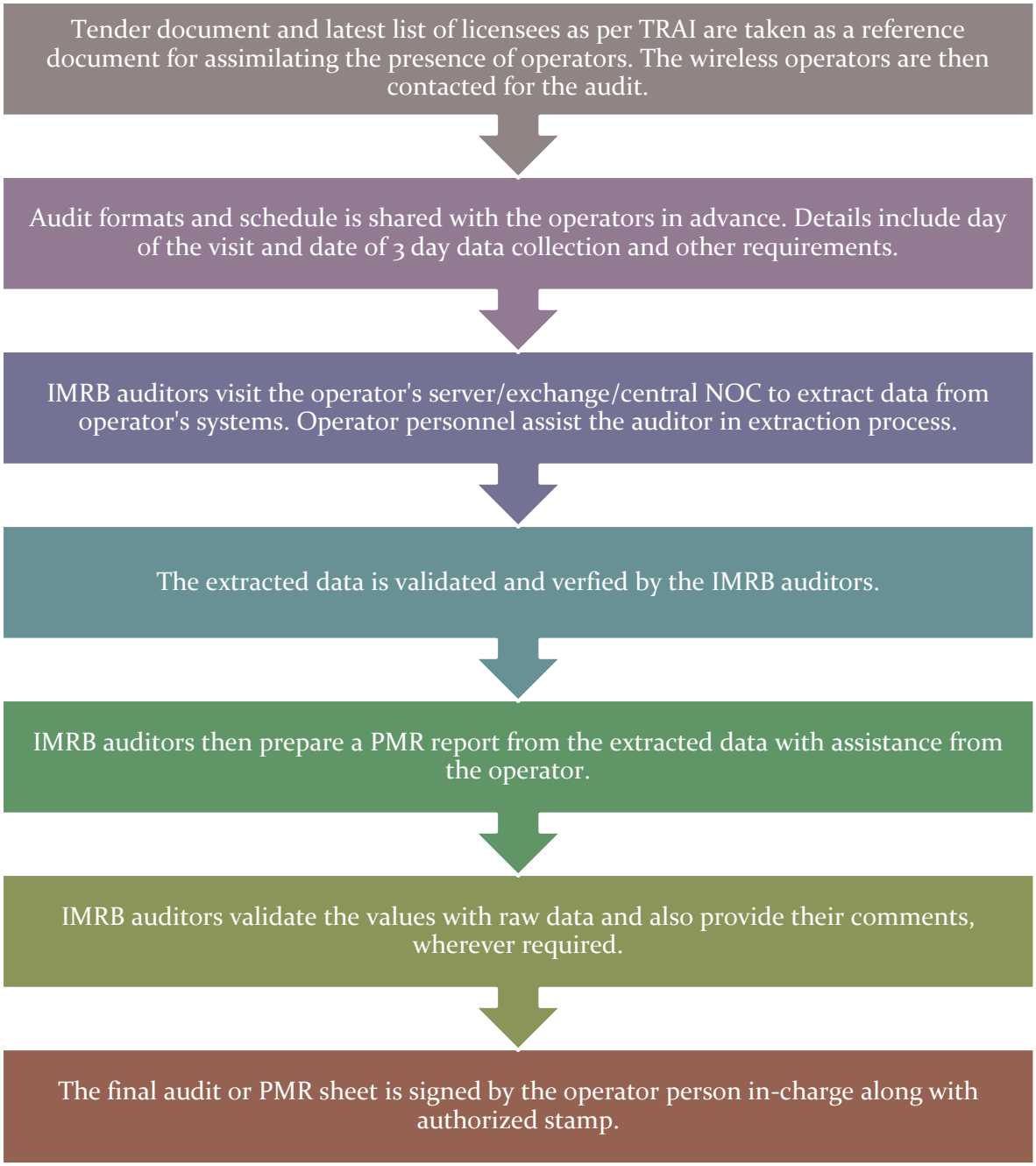
2.4.1.8 POINT OF DATA EXTRACTION

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



2.4.1.9 STEP BY STEP AUDIT PROCEDURE

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



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

2.4.1.10 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.

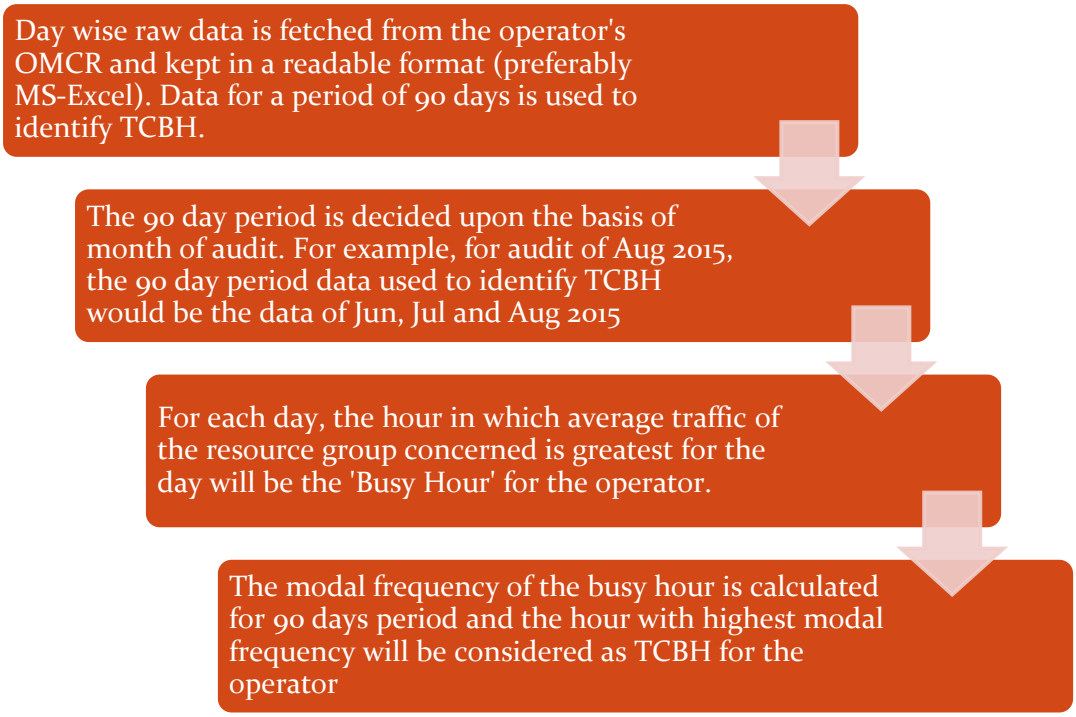
The 3 day live measurement was conducted for network parameters (2G & 3G) and wireless data services (2G & 3G).

Sl. No.	Name of Service Provider	Dates of live measurement Audit		
GSM Operators		January'16	February'16	March'16
1	AIRCEL	1th to 3rd Jan'16	1st to 3rd Feb'16	7th to 9th March'16
2	AIRTEL	1th to 3rd Jan'16	8th to 10th Feb'16	1st to 3rd March'16
3	BSNL	1th to 3rd Jan'16	1st to 3rd Feb'16	4th to 6th March'16
4	IDEA	8th to 10th Jan'16	8th to 10th Feb'16	4th to 6th March'16
5	MTS	1th to 3rd Jan'16	8th to 10th Feb'16	7th to 9th March'16
6	RCOM GSM	8th to 10th Jan'16	1st to 3rd Feb'16	1st to 3rd March'16
7	Tata GSM	8th to 10th Jan'16	27th to 29th Feb'16	4th to 6th March'16
8	Telenor	1th to 3rd Jan'16	8th to 10th Feb'16	9th to 11th Jan'16
9	VODAFONE	1th to 3rd Jan'16	8th to 10th Feb'16	1st to 3rd March'16
CDMA Operators				
10	RCOM CDMA	8th to 10th Jan'16	1st to 3rd Feb'16	1st to 3rd March'16
11	TATA CDMA	8th to 10th Jan'16	27th to 29th Feb'16	4rd to 6th March'16
3G Operators				
2	AIRTEL	1th to 3rd Jan'16	8th to 10th Feb'16	1st to 3rd March'16
3	BSNL	1th to 3rd Jan'16	1st to 3rd Feb'16	4th to 6th March'16
4	IDEA	8th to 10th Jan'16	8th to 10th Feb'16	4th to 6th March'16
7	Tata GSM	8th to 10th Jan'16	27th to 29th Feb'16	4th to 6th March'16
9	VODAFONE	1th to 3rd Jan'16	8th to 10th Feb'16	1st to 3rd March'16

2.4.1.13 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Time Consistent Busy Hour" or "TCBH" means the one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and such Time Consistent Busy Hour shall be established on the basis of analysis of traffic data for a period of ninety days.

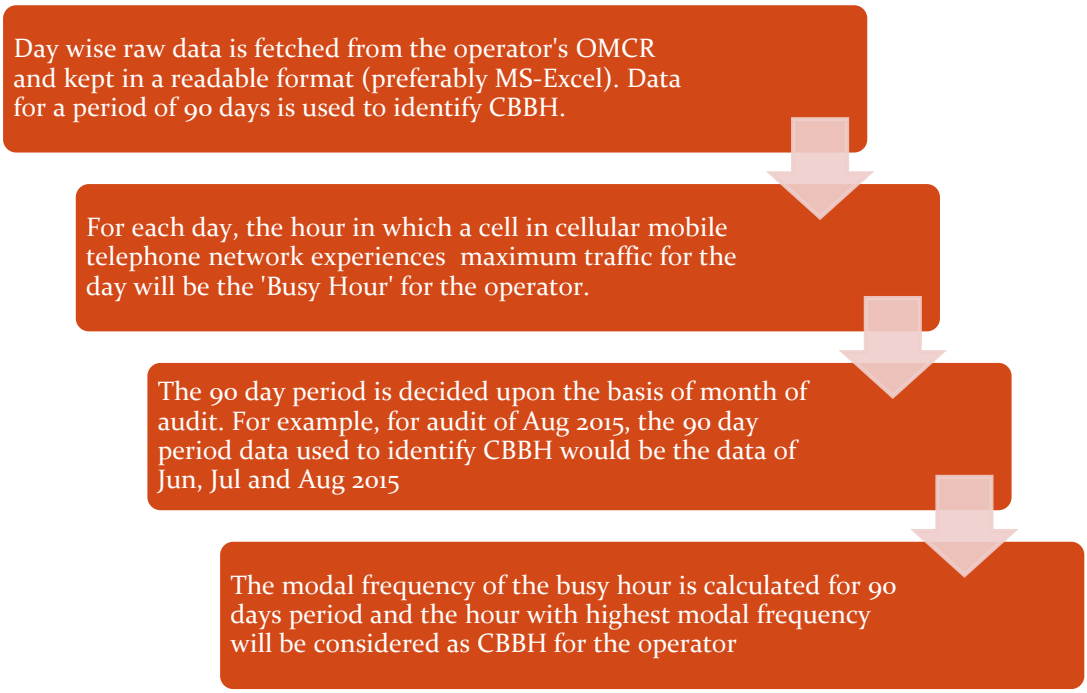
Step by step procedure to identify TCBH for an operator:



2.4.1.14 CBBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2009 (7 of 2009), Cell Bouncing Busy Hour (CBBH) means the one hour period in a day during which a cell in cellular mobile telephone network experiences the maximum traffic.

Step by step procedure to identify CBBH for an operator:



2.4.1.15 CUSTOMER SERVICE PARAMETERS

The data to generate PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending March 2016 (JFM'16) was collected in the month of January 2016. To extract the data for customer service parameters for the purpose of audit, IMRB auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

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

The Customer Service Quality Parameters include the following:

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

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

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

2.4.1.16 AUDIT PARAMETERS – CUSTOMER SERVICE

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

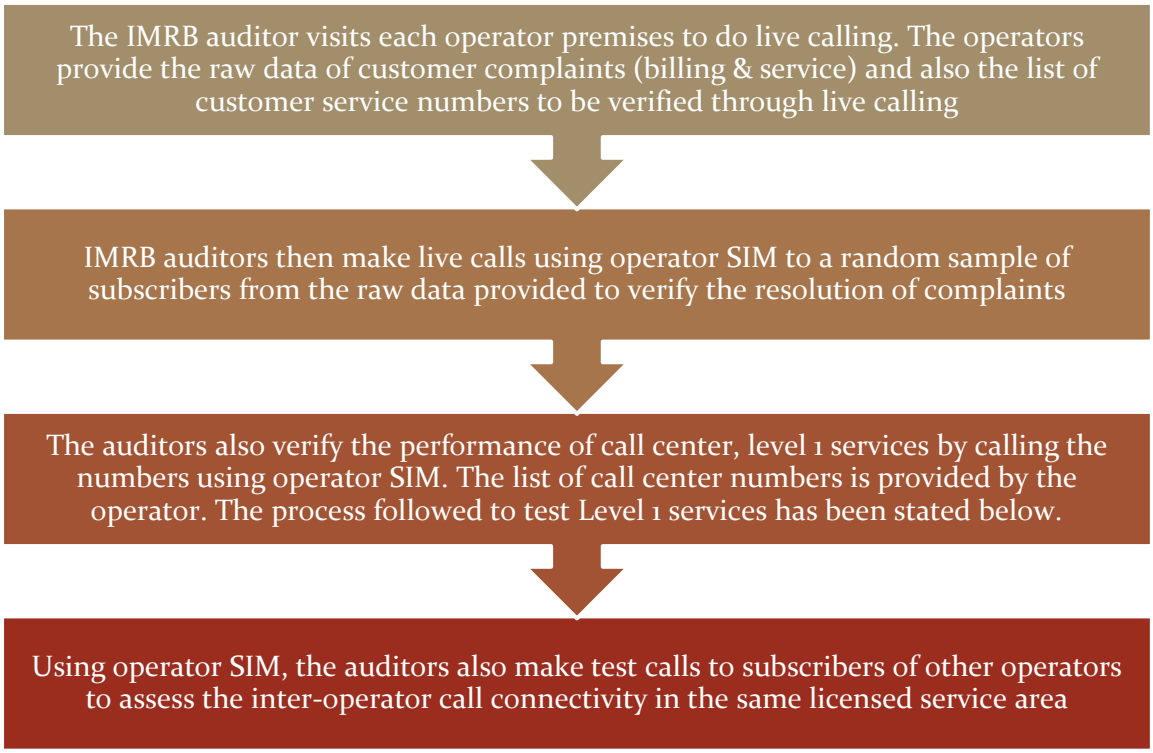
2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

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

2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

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



Live calling activity was carried out during the period of March 2016. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of February 2016 was considered for live calling activity conducted in March 2016.

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

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

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

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

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

TRAI benchmark-

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

2.4.2.3 SERVICE COMPLAINTS REQUESTS

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

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

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

2.4.2.4 LEVEL 1 SERVICE

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

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

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

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

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

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

2.4.2.5 CUSTOMER CARE

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

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

The process for this parameter is stated below.

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

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

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

2.4.3 VOICE DRIVE TEST – 2G & 3G

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

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

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

IMRB conducted two types of drive tests as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test

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

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

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

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

1. Normal SSA

2. Difficult SSA

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

- 3 consecutive days were selected for drive test in selected SSA 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.

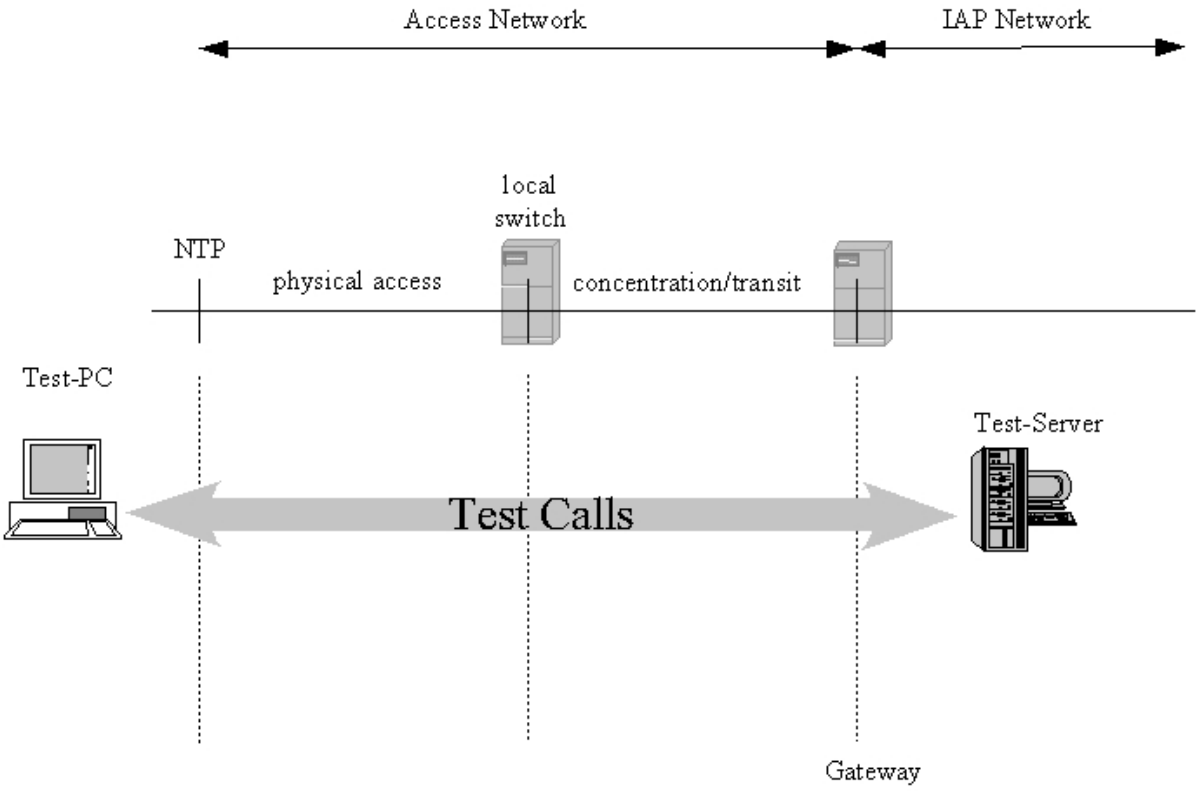


Figure for Measurement set-up

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	8173
Airtel	7193666
BSNL	2735917
Idea	12696526
MTS	87883
RCOM CDMA	144000
RCOM GSM	144000
TATA CDMA	201165
TATA GSM	1285712
Telenor	5776494
Vodafone	429014
Name of Operator	**Number of Subscriber as per VLR-3G**
Airtel 3G	749146
BSNL 3G	556987
Idea 3G	2291547
TATA 3G	588827
Vodafone 3G	2113637

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

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 CRITICAL FINDINGS

PMR Consolidated 2G (Network Parameters)

- TATA GSM failed to meet the benchmark for BTSs Accumulated Downtime.
- TATA CDMA and Telenor failed to meet the benchmark for the parameter Worst Affected Cells Having More than 3% TCH drop.

3 Day Live Measurement 2G (Network Parameters)

- Reliance GSM failed to meet the benchmark on TCH congestion.

Wireless Data Services for 2G

- Telenor failed to meet the benchmark for Activation done within 4 hours in PMR as well as live audit.
- Aircel failed to meet the benchmark for PDP Context activation success rate in PMR audit.

Live Calling

- Reliance GSM & CDMA and TATA GSM failed to meet the benchmark for Customer Care / Helpline assessment (voice to voice).

Customer Service Quality Parameters

- For the billing disputes of post-paid subscribers, it was observed that Idea failed to meet the TRAI benchmark for the parameter.
- BSNL failed to meet the TRAI benchmark of resolution of billing complaints within 4 weeks and resolving 100% complaints within 6 weeks.
- TATA GSM failed to meet the TRAI benchmark of providing credit or waiver within one week in case of complaints received.
- Airtel, Reliance GSM & CDMA and TATA GSM failed to meet the TRAI benchmark of customer care percentage of calls answered by the operators (Voice to Voice) within 90 seconds

Drive Test (Operator Assisted)

- All operators met the TRAI benchmark for all the parameters during the drive tests for 2G as well as 3G operators.

Data Drive test

- All operators met the TRAI benchmarks in Mehsana SSA

Note: In Mehsana SSA Aircel, BSNL, Idea, MTS and RTL did not submit the data for 2G and Airtel 3G, BSNL 3G, Idea 3G, TATA 3Gand Vodafone 3G did not submit the data for 3G

4 EXECUTIVE SUMMARY-2G

The objective assessment of Quality of Service (QoS) carried out by IMRB gives an insight into the overall performance of various operators in the Gujarat 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	0.01%	0.00%	98.85%	0.03%	0.04%	0.32%	1.75%	96.98%
Airtel	0.09%	0.12%	98.98%	0.07%	0.71%	0.69%	1.12%	96.85%
BSNL	1.49%	1.28%	97.96%	0.07%	0.35%	0.54%	1.57%	97.97%
Idea	0.04%	0.10%	99.13%	0.41%	0.39%	0.86%	2.24%	96.00%
MTS	0.04%	0.00%	99.70%	NA	0.00%	0.01%	0.07%	99.22%
RCOM CDMA	0.62%	0.36%	97.98%	NA	0.79%	0.07%	0.31%	NA
RCOM GSM	1.21%	0.58%	98.34%	0.08%	1.34%	0.09%	0.28%	98.92%
TATA CDMA	0.00%	0.00%	97.52%	NA	0.22%	0.28%	3.02%	98.71%
TATA GSM	2.08%	0.00%	98.54%	0.17%	0.23%	0.62%	2.87%	98.39%
Telenor	0.07%	0.19%	98.03%	0.29%	1.16%	0.80%	3.14%	98.05%
Vodafone	0.55%	0.17%	98.77%	0.16%	0.15%	0.58%	1.42%	97.97%

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

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

BTSs Accumulated Downtime:

TATA GSM did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for TATA CDMA at 0.00%.

Worst Affected BTSs Due to Downtime:

All met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Aircel, MTS, TATA CDMA and TATA GSM at 0.00%.

Call Set-up Success Rate (CSSR):

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

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion.

Aircel recorded the best SDCCH / Paging Channel Congestion.

TCH Congestion:

All operators met the benchmark on TCH congestion; MTS performed the best on TCH congestion.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for MTS at 0.00%.

Worst Affected Cells Having More than 3% TCH Drop:

TATA CDMA and Telenor failed to meet the benchmark for the parameter. Best performance was recorded for MTS.

Voice Quality

All operators met the benchmark for the parameter. Best performance was recorded for MTS at 99.22%.

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 - JANUARY FOR 2G

Name of Service Provider Month January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.01%	0.00%	98.83%	0.04%	0.05%	0.34%	1.83%	97.03%
Airtel	0.09%	0.09%	98.93%	0.10%	1.11%	0.75%	1.01%	96.72%
BSNL	1.56%	1.40%	98.05%	0.07%	0.37%	0.64%	1.70%	98.79%
Idea	0.04%	0.10%	99.04%	0.42%	0.50%	0.87%	2.00%	95.69%
MTS	0.07%	0.00%	99.85%	NA	0.00%	0.01%	0.11%	99.20%
RCOM CDMA	1.77%	0.18%	97.50%	NA	1.16%	0.06%	0.29%	NA
RCOM GSM	3.55%	0.55%	98.85%	0.10%	2.14%	0.08%	0.27%	98.85%
TATA CDMA	0.00%	0.00%	94.75%	NA	0.34%	0.32%	3.66%	98.38%
TATA GSM	2.28%	0.00%	97.74%	0.08%	0.17%	0.71%	3.38%	98.52%
Telenor	0.07%	0.26%	98.12%	0.42%	0.98%	0.52%	1.32%	98.01%
Vodafone	0.04%	0.02%	98.44%	0.30%	0.03%	0.58%	0.20%	97.95%

4.1.2 PMR DATA – FEBRUARY FOR 2G

Name of Service Provider Month February	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.02%	0.00%	98.79%	0.03%	0.02%	0.33%	1.72%	96.93%
Airtel	0.11%	0.22%	99.03%	0.05%	0.36%	0.63%	0.99%	96.79%
BSNL	1.47%	1.22%	97.95%	0.07%	0.33%	0.52%	1.55%	96.27%
Idea	0.03%	0.10%	99.15%	0.41%	0.35%	0.90%	2.55%	95.96%
MTS	0.01%	0.00%	99.85%	NA	0.00%	0.01%	0.14%	99.21%
RCOM CDMA	0.04%	0.45%	97.60%	NA	1.17%	0.06%	0.22%	NA
RCOM GSM	0.03%	0.59%	98.96%	0.11%	0.59%	0.09%	0.25%	98.81%
TATA CDMA	0.00%	0.00%	98.90%	NA	0.15%	0.27%	3.56%	98.39%
TATA GSM	2.00%	0.00%	98.93%	0.25%	0.27%	0.59%	2.69%	98.34%
Telenor	0.08%	0.23%	98.06%	0.22%	1.13%	0.99%	4.07%	98.04%
Vodafone	0.03%	0.09%	99.58%	0.18%	0.42%	0.71%	1.94%	97.36%

4.1.3 PMR DATA - MARCH FOR 2G

Name of Service Provider Month March	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.01%	0.00%	98.91%	0.02%	0.04%	0.30%	1.71%	96.99%
Airtel	0.07%	0.05%	98.99%	0.05%	0.64%	0.69%	1.36%	97.04%
BSNL	1.48%	1.22%	97.87%	0.06%	0.34%	0.46%	1.45%	98.78%
Idea	0.04%	0.12%	99.19%	0.39%	0.32%	0.80%	2.18%	96.34%
MTS	0.05%	0.00%	99.41%	NA	0.00%	0.01%	0.00%	99.24%
RCOM CDMA	0.03%	0.45%	98.85%	NA	0.02%	0.11%	0.41%	NA
RCOM GSM	0.03%	0.59%	97.20%	0.05%	1.30%	0.10%	0.30%	99.07%
TATA CDMA	0.00%	0.00%	98.92%	NA	0.18%	0.23%	1.83%	99.36%
TATA GSM	2.01%	0.00%	98.95%	0.19%	0.24%	0.59%	2.55%	98.31%
Telenor	0.06%	0.08%	97.93%	0.24%	1.37%	0.94%	4.04%	98.10%
Vodafone	1.58%	0.38%	98.28%	0.00%	0.00%	0.59%	2.10%	98.04%

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	0.02%	0.00%	98.89%	0.02%	0.01%	0.32%	1.72%	97.02%
Airtel	0.12%	0.00%	98.90%	0.07%	0.69%	0.73%	1.24%	96.71%
BSNL	1.34%	0.47%	97.90%	0.07%	0.35%	0.58%	1.71%	98.71%
Idea	0.04%	0.00%	99.04%	0.50%	0.48%	0.84%	2.25%	95.85%
MTS	0.02%	0.00%	99.86%	NA	0.00%	0.01%	0.00%	99.18%
RCOM CDMA	0.55%	0.00%	98.40%	NA	0.39%	0.10%	0.31%	NA
RCOM GSM	1.35%	0.00%	97.50%	0.13%	2.50%	0.11%	0.27%	98.96%
TATA CDMA	0.03%	0.00%	97.68%	NA	0.05%	0.35%	1.92%	99.30%
TATA GSM	0.03%	0.00%	97.97%	0.19%	0.19%	0.58%	2.85%	98.37%
Telenor	0.31%	0.08%	98.02%	0.39%	1.24%	0.94%	3.00%	98.05%
Vodafone	0.57%	0.00%	99.63%	0.17%	0.13%	0.36%	0.10%	97.96%

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

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

BTSs Accumulated Downtime:

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

Worst Affected BTSs Due to Downtime:

All operators met the benchmark for worst affected BTSs due to downtime.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for MTS with 99.86%.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion.

Aircel recorded the best SDCCH / Paging Channel Congestion.

TCH Congestion:

Reliance GSM failed to meet the benchmark on TCH congestion, while MTS performed the best on TCH congestion.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for MTS at 0.01%.

Worst Affected Cells Having More than 3% TCH Drop:

All operators met the benchmark for the parameter. Best performance was recorded for MTS at 0.00%.

Voice Quality

All operators met the benchmark for the parameter. Best performance was recorded for TATA CDMA at 99.30%.

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 - JANUARY FOR 2G

Name of Service Provider 3 Day January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.00%	0.00%	99.00%	0.02%	0.01%	0.32%	1.88%	97.12%
Airtel	0.10%	0.00%	98.77%	0.17%	1.60%	0.81%	1.18%	96.53%
BSNL	1.85%	1.40%	97.87%	0.07%	0.37%	0.63%	1.82%	98.74%
Idea	0.04%	0.00%	98.79%	0.83%	0.69%	0.92%	2.32%	95.31%
MTS	0.06%	0.00%	99.88%	NA	0.00%	0.01%	0.00%	99.20%
RCOM CDMA	1.60%	0.00%	97.62%	NA	1.16%	0.05%	0.29%	NA
RCOM GSM	3.71%	0.00%	98.80%	0.10%	2.19%	0.09%	0.29%	98.82%
TATA CDMA	0.04%	0.00%	95.64%	NA	0.03%	0.38%	6.92%	99.36%
TATA GSM	0.08%	0.00%	97.60%	0.13%	0.16%	0.29%	3.16%	98.44%
Telenor	0.07%	0.00%	98.03%	0.71%	1.18%	0.58%	1.34%	98.07%
Vodafone	0.00%	0.00%	99.79%	0.28%	0.21%	0.55%	0.10%	97.84%

4.2.2 3 DAY DATA – FEBRUARY FOR 2G

Name of Service Provider 3 Day February	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.05%	0.00%	98.72%	0.02%	0.02%	0.33%	1.75%	96.98%
Airtel	0.17%	0.00%	99.06%	0.02%	0.12%	0.63%	0.90%	96.69%
BSNL	1.08%	0.00%	97.92%	0.08%	0.34%	0.56%	1.66%	98.70%
Idea	0.04%	0.00%	99.16%	0.32%	0.37%	0.80%	2.06%	96.01%
MTS	0.00%	0.00%	99.86%	NA	0.00%	0.02%	0.00%	99.17%
RCOM CDMA	0.04%	0.00%	98.79%	NA	0.01%	0.12%	0.33%	NA
RCOM GSM	0.06%	0.00%	98.91%	0.24%	1.89%	0.12%	0.26%	99.02%
TATA CDMA	0.00%	0.00%	98.78%	NA	0.04%	0.28%	3.49%	99.20%
TATA GSM	0.00%	0.00%	97.32%	0.23%	0.20%	0.57%	2.87%	98.36%
Telenor	0.75%	0.23%	98.06%	0.22%	1.13%	0.99%	4.07%	98.04%
Vodafone	0.00%	0.00%	99.83%	0.24%	0.17%	0.17%	0.08%	98.04%

4.2.3 3 DAY DATA - MARCH FOR 2G

Name of Service Provider 3 Day March	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.00%	0.00%	98.93%	0.02%	0.01%	0.30%	1.52%	96.98%
Airtel	0.08%	0.00%	98.86%	0.03%	0.35%	0.76%	1.62%	96.89%
BSNL	1.08%	0.00%	97.92%	0.08%	0.34%	0.56%	1.66%	98.70%
Idea	0.04%	0.01%	99.16%	0.36%	0.37%	0.82%	2.35%	96.27%
MTS	0.00%	0.00%	99.85%	NA	0.00%	0.01%	0.00%	99.16%
RCOM CDMA	0.03%	0.00%	98.79%	NA	0.01%	0.12%	0.32%	NA
RCOM GSM	0.05%	0.00%	94.79%	0.05%	3.43%	0.12%	0.26%	99.02%
TATA CDMA	0.04%	0.00%	98.63%	NA	0.09%	0.33%	0.17%	99.35%
TATA GSM	0.02%	0.00%	98.98%	0.19%	0.22%	0.64%	2.74%	98.32%
Telenor	0.10%	0.00%	97.96%	0.24%	1.41%	0.94%	3.60%	98.09%
Vodafone	1.70%	0.00%	99.27%	0.00%	0.00%	0.59%	0.12%	98.04%

4.3 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.14%	0.63%	99.87%	0.03%	0.12%	0.24%	2.28%	98.93%
BSNL 3G	1.14%	1.73%	95.94%	0.86%	0.53%	1.19%	1.59%	96.67%
Idea 3G	0.05%	0.10%	99.70%	0.25%	0.09%	0.41%	2.36%	98.81%
TATA 3G	0.92%	0.00%	98.10%	0.30%	1.02%	0.52%	2.38%	99.69%

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

Node Bs downtime:

All operators met the benchmark. Minimum Node Bs downtime was recorded for Idea at 0.05%.

Worst affected Node Bs due to downtime:

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

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Airtel 3G with 99.87%.

RRC Congestion:

All operators met the benchmark. Minimum RRC congestion was recorded for Airtel 3G at 0.03%.

Circuit Switched RAB Congestion:

All operators met the benchmark. Minimum Circuit Switched RAB congestion was recorded for Idea at 0.09%.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Airtel 3G at 0.24%.

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

TATA failed meet the benchmark for the parameter. Best performance was recorded for BSNL 3G at 1.59%.

Circuit Switch Voice Quality:

All operators met the benchmark for the parameter. Best performance was recorded for TATA 3G at 99.69%.

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

4.3.1 PMR DATA - JANUARY FOR 3G

Name of Service Provider Month January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.13%	0.59%	99.84%	0.05%	0.24%	0.30%	2.94%	98.90%
BSNL 3G	1.14%	1.74%	95.95%	0.86%	0.57%	1.22%	1.62%	95.71%
Idea 3G	0.07%	0.13%	99.69%	0.33%	0.11%	0.39%	2.02%	98.87%
TATA 3G	1.37%	0.00%	97.89%	0.39%	1.19%	0.56%	2.59%	99.68%
Vodafone 3G	NA	NA	0.00%	0.00%	0.00%	NA	NA	NA

4.3.2 PMR DATA – FEBRUARY FOR 3G

Name of Service Provider Month February	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.11%	0.48%	99.89%	0.01%	0.06%	0.22%	2.12%	98.91%
BSNL 3G	1.15%	1.93%	96.04%	0.87%	0.56%	1.21%	1.62%	96.19%
Idea 3G	0.05%	0.09%	99.71%	0.20%	0.07%	0.44%	2.69%	98.79%
TATA 3G	0.21%	0.00%	98.25%	0.22%	0.85%	0.51%	2.00%	99.70%
Vodafone 3G	0.03%	0.03%	99.80%	0.06%	0.03%	0.17%	1.10%	98.97%

4.3.3 PMR DATA - MARCH FOR 3G

Name of Service Provider Month February	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.11%	0.48%	99.89%	0.01%	0.06%	0.22%	2.12%	98.91%
BSNL 3G	1.15%	1.93%	96.04%	0.87%	0.56%	1.21%	1.62%	96.19%
Idea 3G	0.05%	0.09%	99.71%	0.20%	0.07%	0.44%	2.69%	98.79%
TATA 3G	0.21%	0.00%	98.25%	0.22%	0.85%	0.51%	2.00%	99.70%
Vodafone 3G	0.03%	0.03%	99.80%	0.06%	0.03%	0.17%	1.10%	98.97%

4.4 3 DAY DATA – CONSOLIDATED FOR 3G

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.19%	0.00%	99.89%	0.01%	0.06%	0.22%	2.22%	98.92%
BSNL 3G	1.27%	0.47%	97.04%	0.48%	0.42%	1.32%	1.47%	95.79%
Idea 3G	0.04%	0.01%	99.69%	0.19%	0.10%	0.41%	2.44%	98.82%
TATA 3G	0.06%	0.00%	98.36%	0.21%	0.84%	0.50%	2.00%	99.70%

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

Node Bs downtime:

All operators met the benchmark. Minimum Node Bs downtime was recorded for Idea 3G at 0.04%.

Worst affected Node Bs due to downtime:

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

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Airtel 3G with 99.89%.

RRC Congestion:

All operators met the benchmark. Minimum RRC congestion was recorded for Airtel 3G at 0.01%.

Circuit Switched RAB Congestion:

All operators met the benchmark. Minimum Circuit Switched RAB congestion was recorded for Airtel 3G at 0.06%.

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Airtel 3G at 0.22%.

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 99.70%.

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

4.4.1 3 DAY DATA - JANUARY FOR 3G

Name of Service Provider 3 Day January	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.12%	0.00%	99.89%	0.01%	0.10%	0.24%	2.29%	98.87%
BSNL 3G	1.20%	0.97%	96.76%	0.87%	0.49%	1.15%	1.53%	93.66%
Idea 3G	0.04%	0.00%	99.68%	0.23%	0.11%	0.40%	2.25%	98.88%
TATA 3G	0.09%	0.00%	98.44%	0.21%	0.76%	0.50%	2.01%	99.70%
Vodafone 3G	NA	NA	0.00%	0.00%	0.00%	NA	NA	NA

4.4.2 3 DAY DATA – FEBRUARY FOR 3G

Name of Service Provider 3 Day February	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.24%	0.00%	99.89%	0.01%	0.05%	0.23%	2.34%	98.92%
BSNL 3G	1.11%	0.05%	97.18%	0.28%	0.39%	1.41%	1.44%	96.78%
Idea 3G	0.05%	0.02%	99.74%	0.11%	0.07%	0.42%	2.66%	98.79%
TATA 3G	0.09%	0.00%	98.44%	0.21%	0.76%	0.50%	1.82%	99.70%
Vodafone 3G	0.03%	0.00%	99.78%	0.17%	0.21%	0.19%	0.07%	98.96%

4.4.3 3 DAY DATA - MARCH FOR 3G

Name of Service Provider 3 Day March	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Airtel 3G	0.21%	0.00%	99.90%	0.01%	0.04%	0.21%	2.07%	98.96%
BSNL 3G	1.51%	0.38%	97.18%	0.29%	0.40%	1.43%	1.44%	97.16%
Idea 3G	0.04%	0.02%	99.65%	0.23%	0.11%	0.41%	2.41%	98.79%
TATA 3G	0.01%	0.00%	98.19%	0.20%	0.99%	0.51%	2.17%	99.70%
Vodafone 3G	0.03%	0.00%	99.79%	0.16%	0.20%	0.42%	0.10%	98.96%

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

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	98.45%	94.60%	0.66%	100.00%	96.51%	0.65%
Airtel	100.00%	98.40%	3.03%	100.00%	99.52%	2.99%
BSNL	100.00%	98.16%	2.76%	100.00%	98.16%	2.76%
Idea	NA	100.00%	0.17%	NA	100.00%	0.17%
MTS	NA	NA	0.00%	NA	NA	0.00%
RCOM CDMA	100.00%	98.31%	0.33%	100.00%	98.31%	0.33%
RCOM GSM	100.00%	100.00%	0.36%	100.00%	100.00%	0.42%
TATA CDMA	100.00%	97.98%	2.98%	100.00%	98.99%	1.26%
TATA GSM	100.00%	99.71%	2.01%	100.00%	99.77%	1.99%
Telenor	94.99%	98.56%	0.75%	94.64%	97.35%	0.74%
Vodafone	NDR	NDR	NDR	NDR	NDR	NDR

Note: MTS, Vodafone and Videocon did not submit the data

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

Activation done within 4 hours:

Telenor failed to meet the benchmark for Activation done within 4 hours in PMR as well as live audit.

PDP Context activation success rate:

Aircel failed to meet the benchmark for PDP Context activation success rate in PMR. Maximum PDP Context activation success rate was recorded for Reliance GSM at 100.00%.

Drop Rate:

All operators met the benchmark in PMR as well as 3day live. The minimum drop rate was observed for in PMR as well as 3days live MTS with 0.00%.

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

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	99.62%	0.06%	NDR	NDR	NDR
BSNL 3G	NDR	95.66%	2.32%	NDR	95.66%	2.23%
Idea 3G	NDR	100.00%	0.64%	NDR	100.00%	0.64%
TATA 3G	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone 3G	NDR	99.35%	0.44%	NDR	99.76%	NDR

NDR: No Data Received

Activation done within 4 hours:

None of the operators submitted data for Activation done within 4 hours for PMR as well as live audit.

PDP Context activation success rate:

In PMR as well as 3days live all operators met the benchmark. Maximum PDP Context activation success rate was recorded for Idea 3G at 100.00%.

Drop Rate:

All operators met the benchmark in PMR as well as 3day live. The minimum drop rate was observed for PMR Airtel 3G with 0.06% and Idea 3G at 0.64% for live.

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	100.00%	100.00%	95.54%	98.53%	99.00%	98.00%
Airtel	100.00%	100.00%	99.99%	95.97%	99.50%	100.00%
BSNL	100.00%	100.00%	98.00%	96.50%	97.00%	99.00%
Idea	100.00%	100.00%	99.00%	99.50%	99.00%	100.00%
MTS	100.00%	100.00%	97.30%	95.26%	100.00%	100.00%
RCOM CDMA	100.00%	100.00%	98.26%	91.46%	98.00%	100.00%
RCOM GSM	100.00%	100.00%	98.20%	91.35%	97.50%	96.00%
TATA CDMA	100.00%	100.00%	97.86%	99.74%	99.00%	99.00%
TATA GSM	100.00%	100.00%	99.18%	94.58%	98.00%	98.00%
Telenor	NA	NA	99.69%	96.36%	100.00%	100.00%
Vodafone	NA	NA	100.00%	96.24%	96.00%	100.00%

Resolution of billing complaints

As per the consumers (live calling exercise) all of the operators met the benchmark of resolving 98% complaints within 4 weeks and 100% complaints within 6 weeks.

Accessibility of Call Centre/Customer Care-IVR

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

Customer Care / Helpline Assessment (voice to voice)

Reliance GSM & CDMA and TATA GSM failed to meet the benchmark for Customer Care / Helpline assessment (voice to voice). TATA CDMA recorded best performance for the parameter with 99.74%.

Level 1 Service

As per the live calling results, all of the operators met the TRAI benchmark for level 1 service with calls being answered.

Complaint/Request Attended to Satisfaction

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

4.8 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Billing Complaints		Response time to customer for assistance	Customer care	
	Postpaid Subscribers	Prepaid Subscribers	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	% of cases where credit/wavier is received within one week	Percentage of calls answered by the IVR	Percentage of calls answered by the operators (voice to
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel	0.00%	0.00%	NA	NA	100.00%	97.74%	98.40%
Airtel	0.04%	0.00%	100.00%	100.00%	100.00%	100.00%	70.61%
BSNL	0.01%	0.05%	97.25%	97.25%	100.00%	98.58%	96.50%
Idea	0.48%	0.04%	100.00%	100.00%	100.00%	98.61%	99.77%
MTS	0.03%	0.00%	100.00%	100.00%	100.00%	98.14%	98.07%
RCOM CDMA	0.09%	0.01%	100.00%	100.00%	100.00%	99.00%	90.16%
RCOM GSM	0.09%	0.03%	100.00%	100.00%	100.00%	99.76%	92.32%
TATA CDMA	0.00%	0.00%	NA	NA	100.00%	NA	99.05%
TATA GSM	0.00%	0.00%	100.00%	100.00%	66.67%	98.44%	90.36%
Telenor	NA	0.00%	100.00%	100.00%	100.00%	99.65%	98.21%
Vodafone	0.10%	0.01%	100.00%	100.00%	100.00%	100.00%	98.27%

Metering and Billing Credibility – Post-paid Subscribers

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

Resolution of billing complaints

BSNL failed to meet the TRAI benchmark of resolution of billing complaints within 4 weeks and resolving 100% complaints within 6 weeks.

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

TATA GSM failed to meet the TRAI benchmark of providing credit or waiver within one week in case of complaints received.

Customer Care Percentage of calls answered by the IVR

All operators met the benchmark of 95% IVR call being attended. Airtel & Vodafone recorded the best performance for the parameter.

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

Airtel, Reliance GSM & CDMA and TATA GSM failed to meet the TRAI benchmark of 95%. Idea recorded the best performance for the parameter.

4.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment												
Inter operator call Assessment To↓ From→	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone	Vodafone
Aircel	NA	100.00%	100.00%	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%	98.00%	99.50%	100.00%	100.00%	98.50%
BSNL	99.00%	100.00%	NA	100.00%	100.00%	98.00%	99.00%	100.00%	99.00%	100.00%	100.00%	99.00%
Idea	100.00%	97.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	97.00%	100.00%
MTS	100.00%	100.00%	100.00%	100.00%	NA	100.00%	99.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RCOM CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	98.00%	100.00%	97.00%	100.00%	100.00%
RCOM GSM	100.00%	100.00%	98.00%	100.00%	98.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%
TATA GSM	100.00%	100.00%	99.00%	100.00%	98.00%	100.00%	99.00%	100.00%	NA	100.00%	100.00%	97.00%
Telenor	98.00%	99.00%	97.00%	99.00%	100.00%	100.00%	100.00%	98.00%	100.00%	NA	98.00%	100.00%
Vodafone	97.00%	100.00%	100.00%	98.00%	100.00%	100.00%	100.00%	99.00%	100.00%	97.00%	NA	100.00%
Vodafone	100.00%	100.00%	97.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.00%	NA

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

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

4.10 PMR COMPARISON WITH IMRB AND OPERATORS DATA 2G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	BTSs Accumulated downtime (not available for service)		Worst affected BTSs due to downtime		Call Set-up Success Rate		SDCCH/ Paging Chl. Congestion		TCH Congestion		Call drop rate		Worst affected cells having more than 3%		Connection with good voice quality			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Aircel	0.01%	0.01%	0.00%	0.00%	98.84%	98.85%	0.03%	0.03%	0.04%	0.04%	0.32%	0.32%	1.75%	1.75%	96.98%	96.98%	0.00%	0.00%
Airtel	0.09%	0.09%	0.15%	0.12%	98.98%	98.98%	0.07%	0.07%	0.73%	0.71%	0.69%	0.69%	1.04%	1.12%	96.79%	96.85%	0.00%	0.00%
BSNL	1.52%	1.49%	1.28%	1.28%	97.96%	97.96%	0.07%	0.07%	0.34%	0.35%	0.53%	0.54%	1.57%	1.57%	100.00%	97.97%	0.00%	0.00%
Idea	0.04%	0.04%	0.10%	0.10%	99.13%	99.13%	0.41%	0.41%	0.39%	0.39%	0.86%	0.86%	2.24%	2.24%	96.00%	96.00%	0.00%	0.00%
MTS	0.01%	0.04%	0.00%	0.00%	99.70%	99.70%	0.00%	NA	0.00%	0.00%	0.01%	0.01%	0.15%	0.07%	99.21%	99.22%	0.00%	0.00%
RCOM CDMA	0.04%	0.62%	0.30%	0.36%	97.98%	97.98%	0.00%	NA	0.79%	0.79%	0.07%	0.07%	0.31%	0.31%	99.27%	NA	0.00%	0.00%
RCOM GSM	0.05%	1.21%	0.49%	0.58%	98.03%	98.34%	0.09%	0.08%	0.92%	1.34%	0.10%	0.09%	0.28%	0.28%	98.91%	98.92%	0.00%	0.00%
TATA CDMA	0.01%	0.00%	0.00%	0.00%	98.85%	97.52%	0.00%	NA	0.24%	0.22%	0.27%	0.28%	3.02%	3.02%	99.37%	98.71%	0.00%	0.00%
TATA GSM	0.03%	2.08%	0.00%	0.00%	98.54%	98.54%	0.17%	0.17%	0.22%	0.23%	0.61%	0.62%	2.87%	2.87%	98.39%	98.39%	0.00%	0.00%
Telenor	0.07%	0.07%	0.19%	0.19%	98.08%	98.03%	0.29%	0.29%	1.15%	1.16%	0.81%	0.80%	3.14%	3.14%	98.05%	98.05%	0.00%	0.00%
Vodafone	0.03%	0.55%	0.10%	0.17%	99.58%	98.77%	0.20%	0.16%	0.42%	0.15%	0.68%	0.58%	1.89%	1.42%	97.41%	97.97%	0.00%	0.00%

4.11 PMR COMPARISON WITH IMRB AND OPERATORS DATA 3G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	Node Bs downtime (not available for service)		Worst affected Node Bs due to downtime		CSSR		RRC Congestion		Circuit Switched RAB Congestion		Call drop rate		Worst affected cells having more than 3% Circuit switched		%Circuit Switch Voice Quality (CSV quality)			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Airtel 3G	0.13%	0.14%	0.56%	0.63%	99.85%	99.87%	0.03%	0.03%	0.13%	0.12%	0.25%	0.24%	2.47%	2.28%	99.16%	98.93%	0.00%	0.00%
BSNL 3G	1.13%	1.14%	1.63%	1.73%	96.00%	95.94%	0.73%	0.86%	1.10%	0.53%	1.33%	1.19%	2.43%	1.59%	100.00%	96.67%	0.00%	0.00%
Idea 3G	0.05%	0.05%	0.11%	0.10%	99.70%	99.70%	0.25%	0.25%	0.09%	0.09%	0.41%	0.41%	2.36%	2.36%	98.81%	98.81%	0.00%	0.00%
TATA 3G	0.02%	0.92%	0.00%	0.00%	97.95%	98.10%	0.30%	0.30%	1.03%	1.02%	0.52%	0.52%	2.47%	2.38%	99.69%	99.69%	0.00%	0.00%

5 CRITICAL FINDINGS

PMR Consolidated 2G (Network Parameters)

- TATA GSM failed to meet the benchmark for BTSs Accumulated Downtime.
- TATA CDMA and Telenor failed to meet the benchmark for the parameter Worst Affected Cells Having More than 3% TCH drop.

3 Day Live Measurement 2G (Network Parameters)

- Reliance GSM failed to meet the benchmark on TCH congestion.

Wireless Data Services for 2G

- Telenor failed to meet the benchmark for Activation done within 4 hours in PMR as well as live audit.
- Aircel failed to meet the benchmark for PDP Context activation success rate in PMR audit.

Live Calling

- Reliance GSM & CDMA and TATA GSM failed to meet the benchmark for Customer Care / Helpline assessment (voice to voice).

Customer Service Quality Parameters

- For the billing disputes of post-paid subscribers, it was observed that Idea failed to meet the TRAI benchmark for the parameter.
- BSNL failed to meet the TRAI benchmark of resolution of billing complaints within 4 weeks and resolving 100% complaints within 6 weeks.
- TATA GSM failed to meet the TRAI benchmark of providing credit or waiver within one week in case of complaints received.
- Airtel, Reliance GSM & CDMA and TATA GSM failed to meet the TRAI benchmark of customer care percentage of calls answered by the operators (Voice to Voice) within 90 seconds

Drive Test (Operator Assisted)

- All operators met the TRAI benchmark for all the parameters during the drive tests for 2G as well as 3G operators.

Data Drive test

- All operators met the TRAI benchmarks in Mehsana SSA

Note: In Mehsana SSA Aircel, BSNL, Idea, MTS and RTL did not submit the data for 2G and Airtel 3G, BSNL 3G, Idea 3G, TATA 3Gand Vodafone 3G did not submit the data for 3G

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 –**

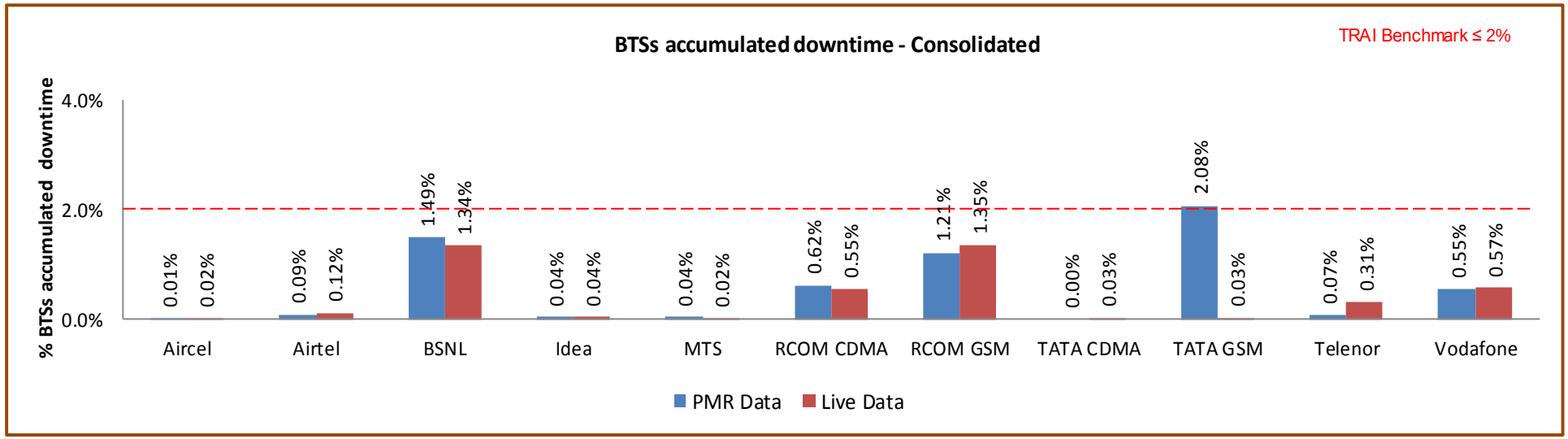
    a. BTSs Accumulated downtime (not available for service) ≤ 2%

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.

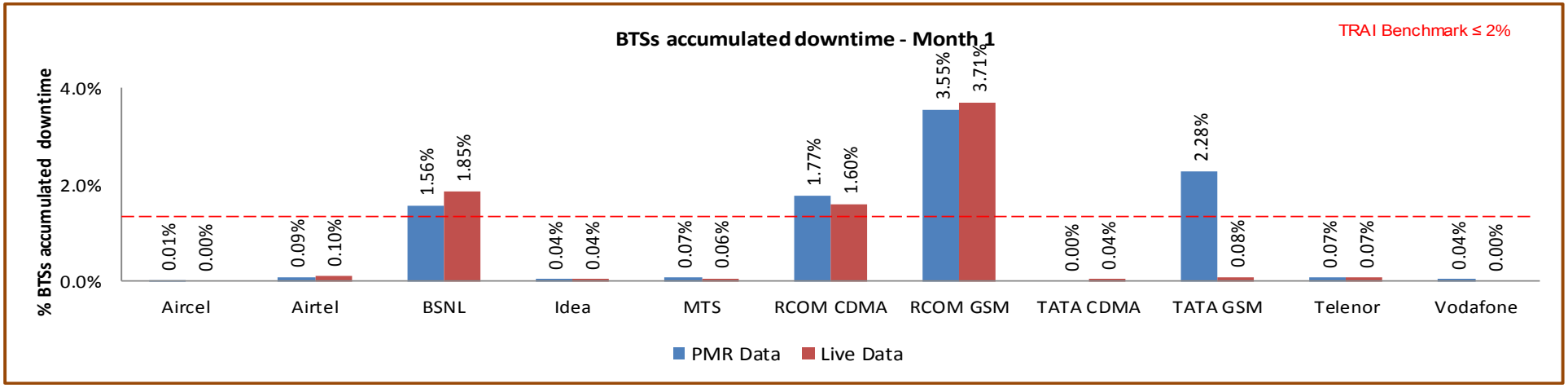
6.1.2 KEY FINDINGS - CONSOLIDATED



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

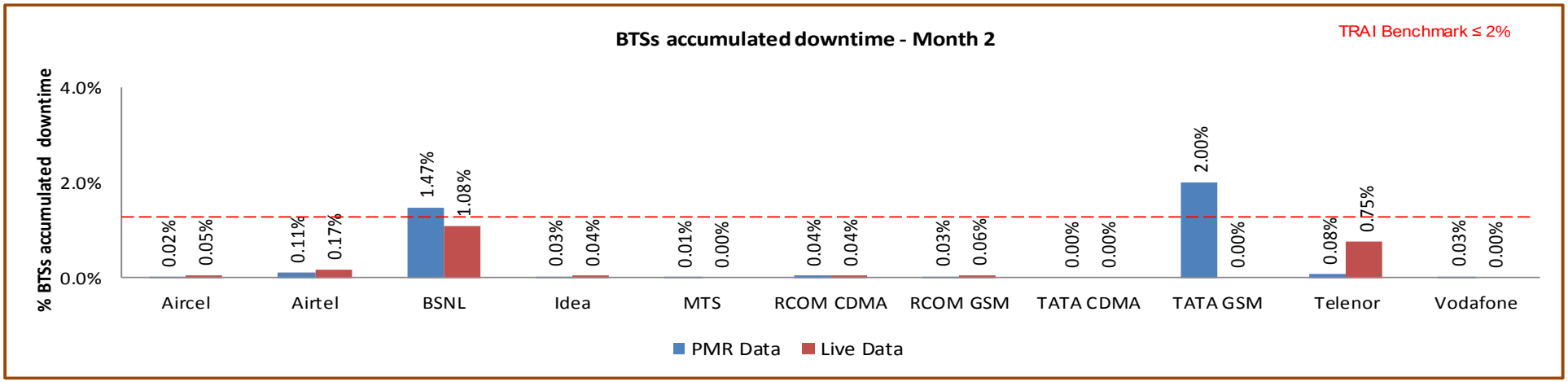
TATA GSM failed to meet the benchmark for BTS accumulated downtime as per audit/PMR data.

6.1.2.1 KEY FINDINGS – MONTH 1



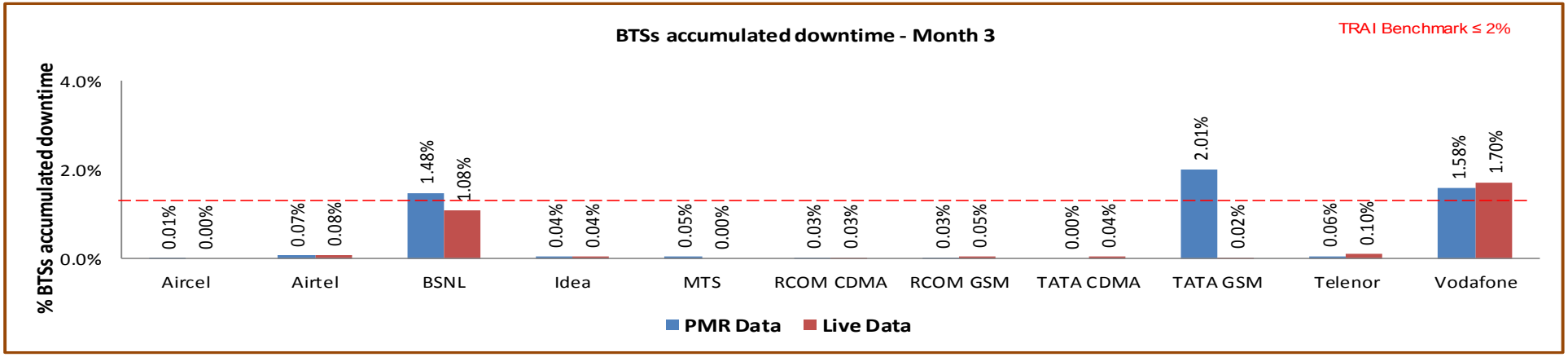
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.2 KEY FINDINGS – MONTH 2



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

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.

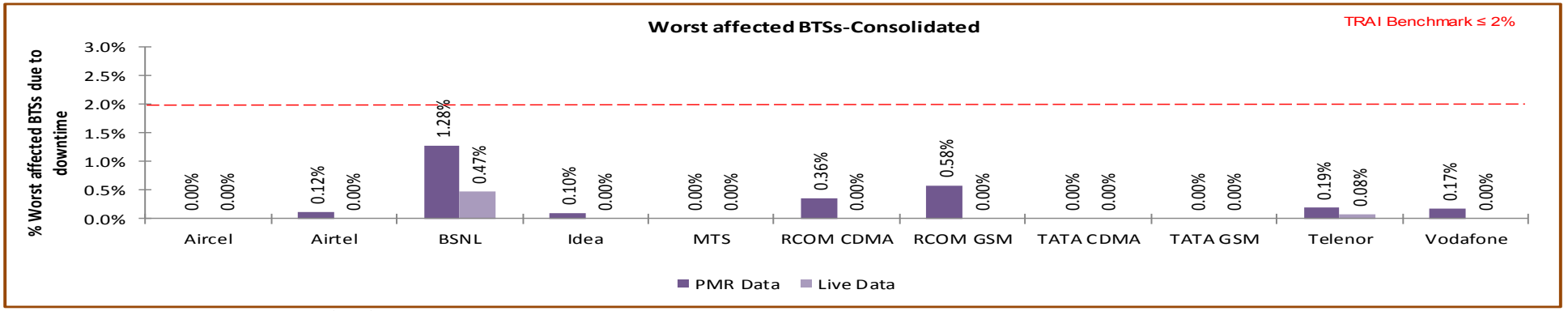
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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

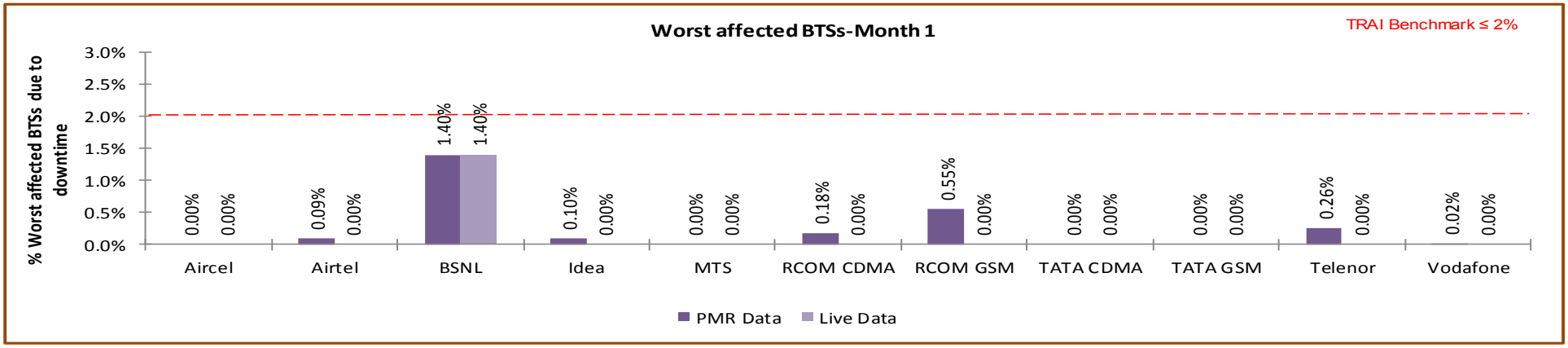


Data Source: Operations and Maintenance Center (OMC) of the operators

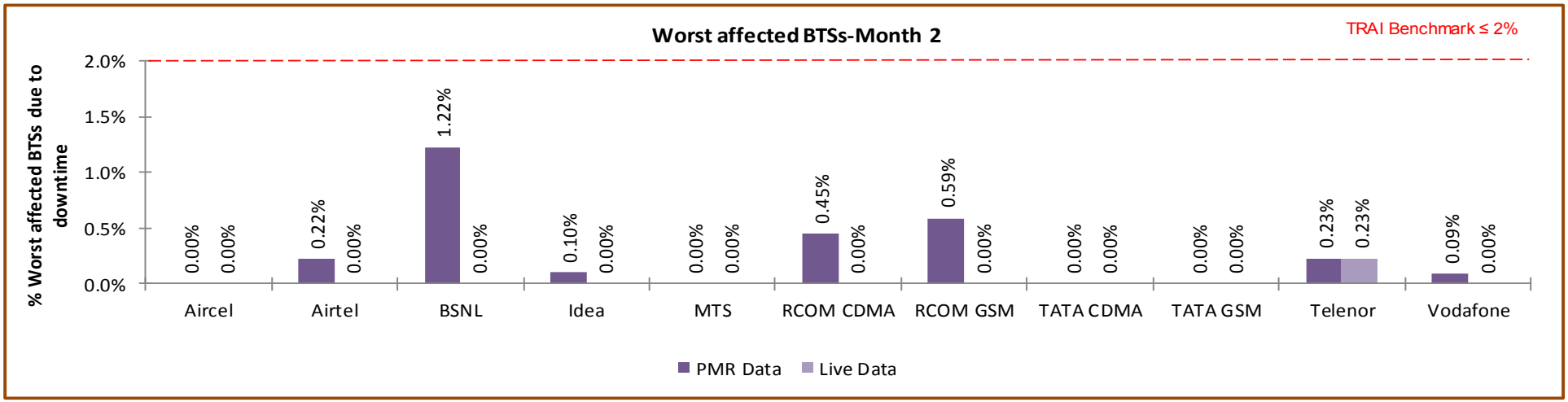
All operators met the benchmark for worst affected BTSs due to downtime as per audit/PMR data.

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

6.2.2.1 KEY FINDINGS – MONTH 1

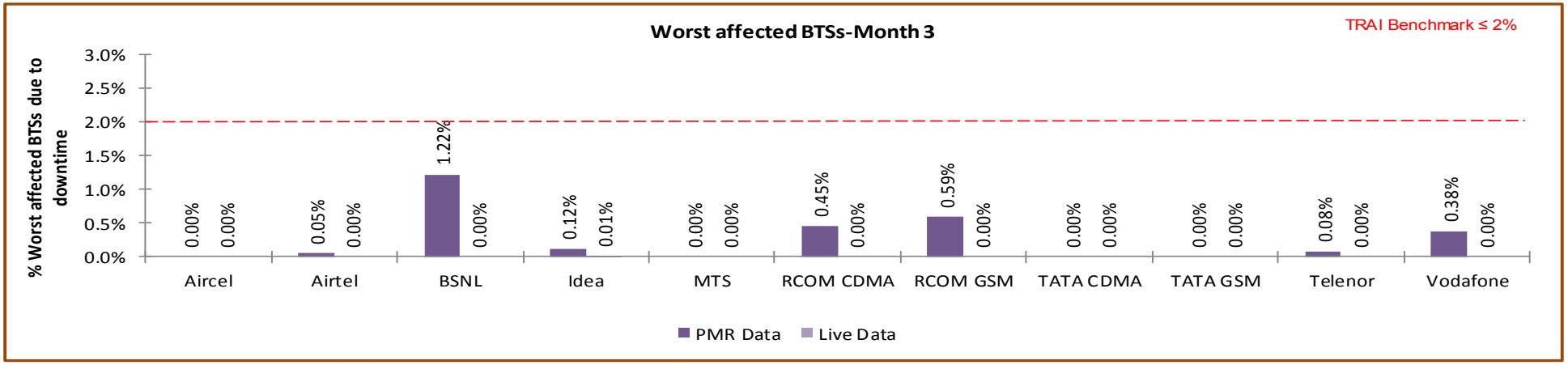


6.2.2.2 KEY FINDINGS – MONTH 2



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

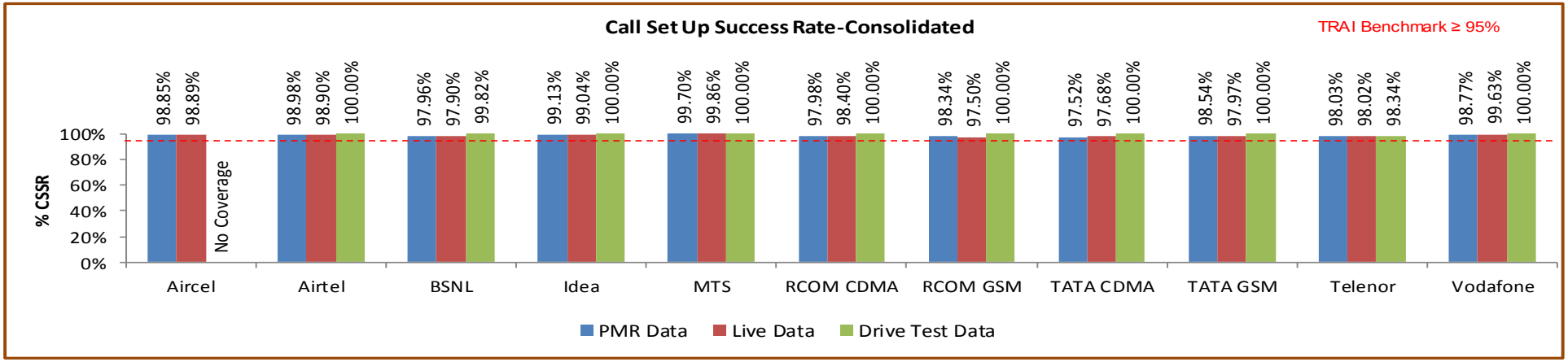
   Call Established means the following events have happened in call setup:-

   - 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.

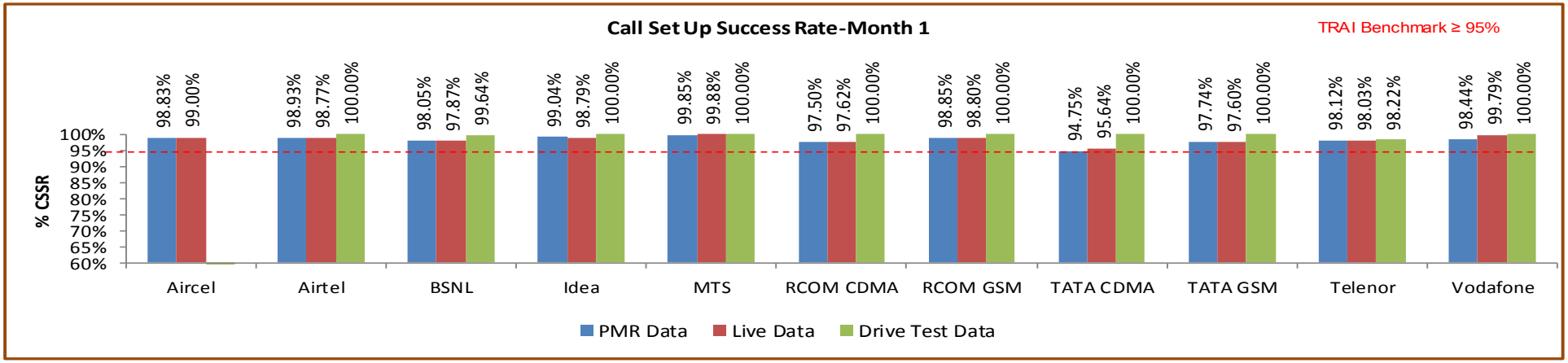
6.3.2 KEY FINDINGS - CONSOLIDATED



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

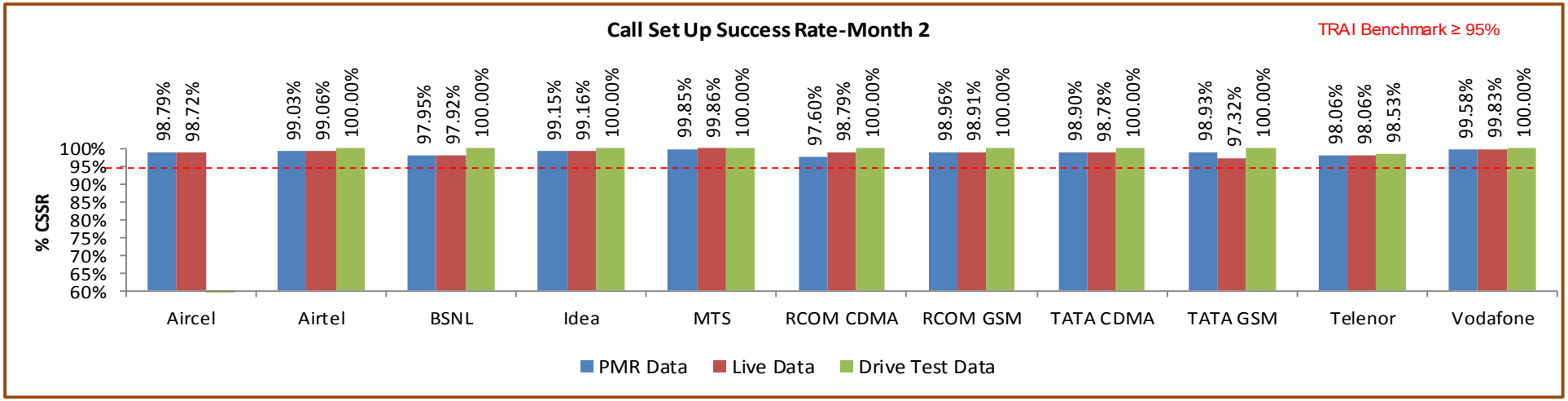
All operators met the TRAI benchmark as per audit/PMR data.

6.3.2.1 KEY FINDINGS – MONTH 1



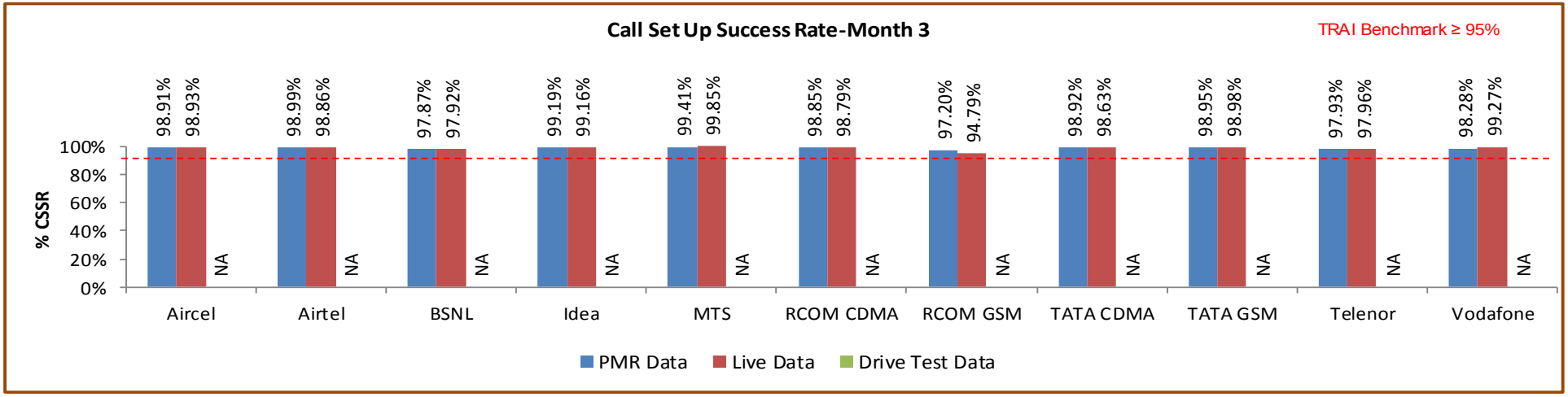
Data Source: Network Operations Center (NOC) of the operators

6.3.2.2 KEY FINDINGS – MONTH 2



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

6.3.2.3 KEY FINDINGS – MONTH 3



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

6.4 NETWORK CHANNEL CONGESTION- 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:**

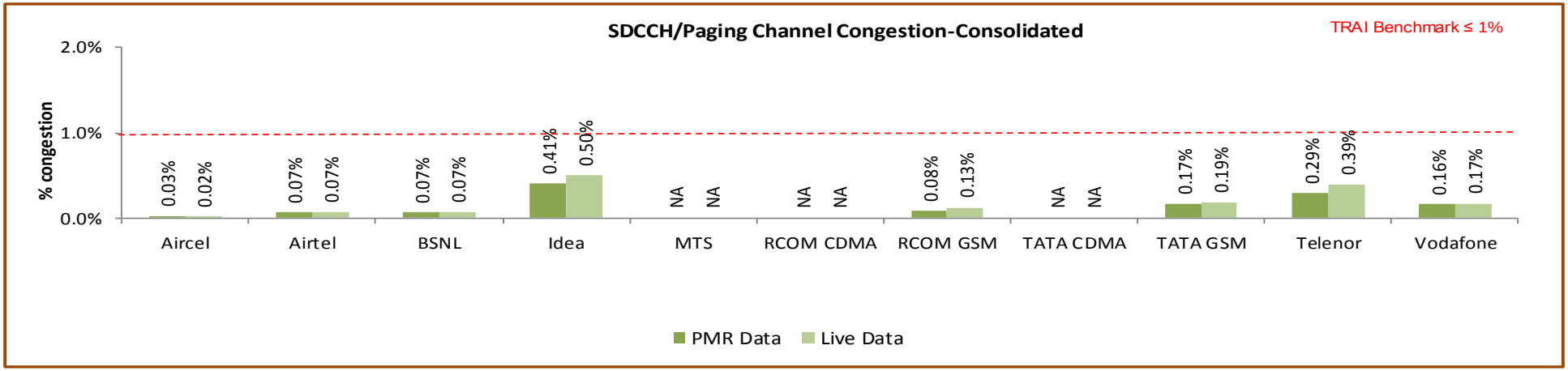
   ↳ SDCCH Congestion: ≤ 1%, TCH Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

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)

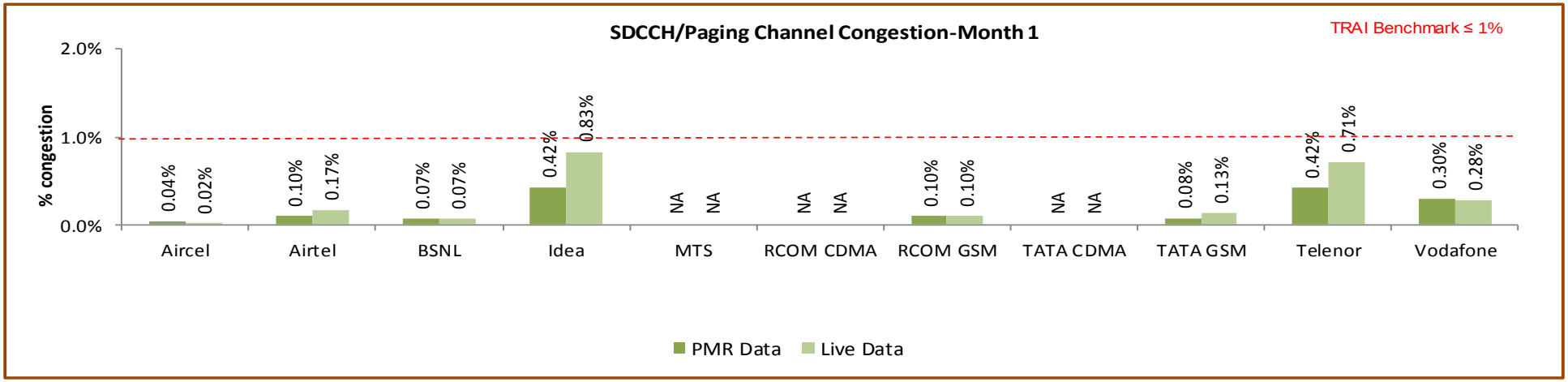


Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark as per PMR/audit Data.
Significant difference was observed between PMR & live measurement data for Telenor 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.

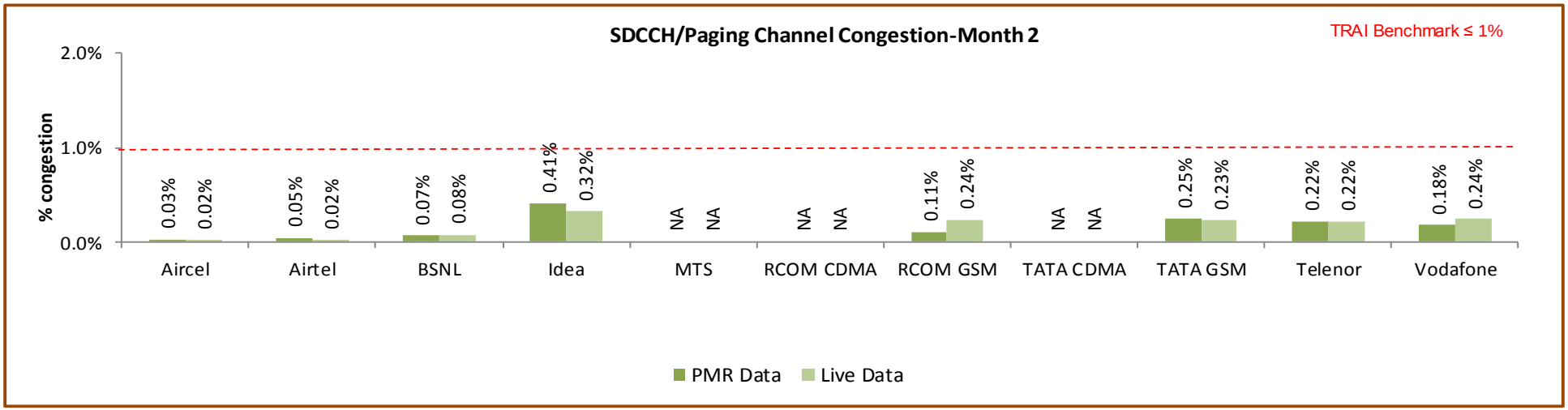
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

6.4.2.1 KEY FINDINGS – MONTH 1



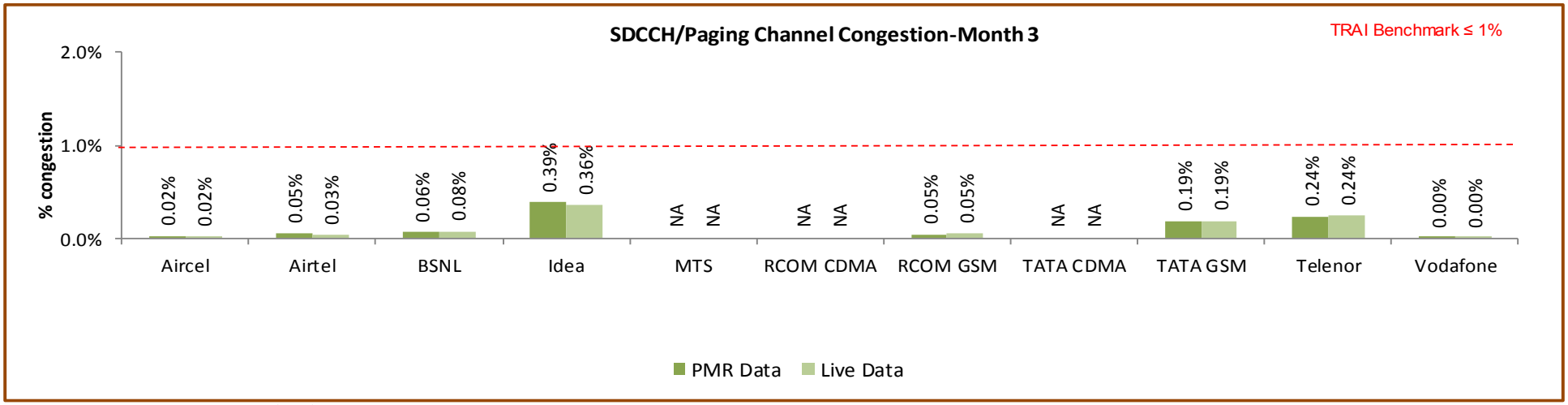
Data Source: Network Operations Center (NOC) of the operators

Key Findings – Month 2



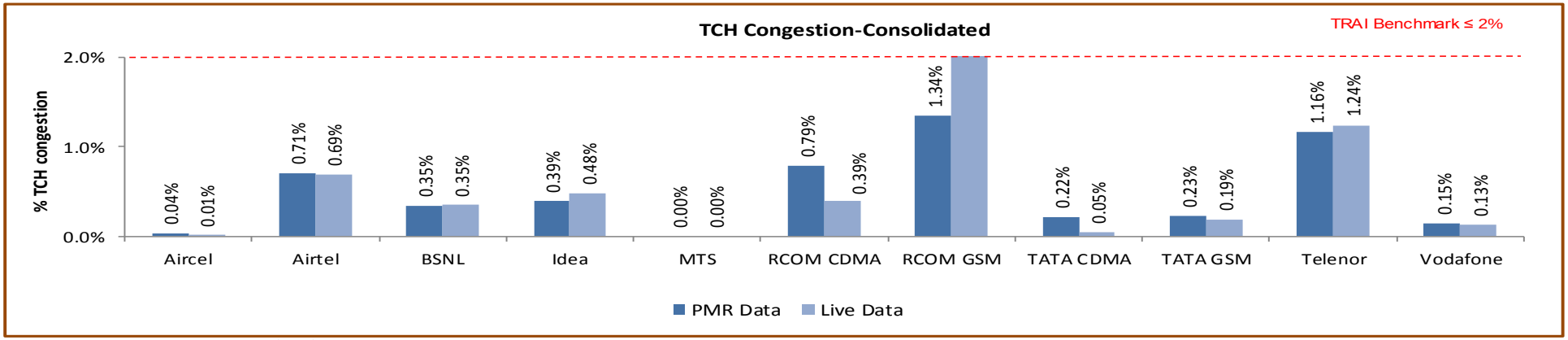
Data Source: Network Operations Center (NOC) of the operators

6.4.2.2 KEY FINDINGS – MONTH 3



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

6.4.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

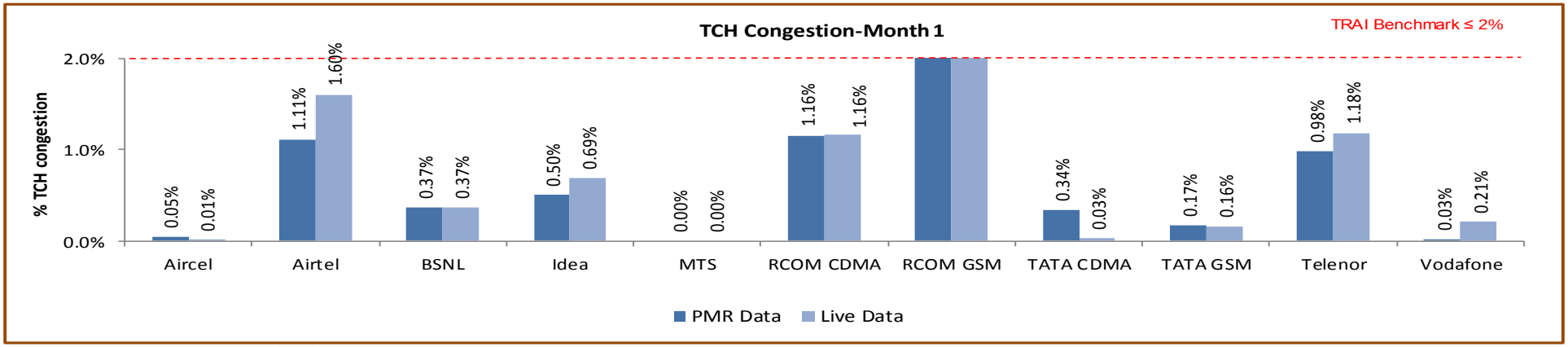


Data Source: Network Operations Center (NOC) of the operators

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

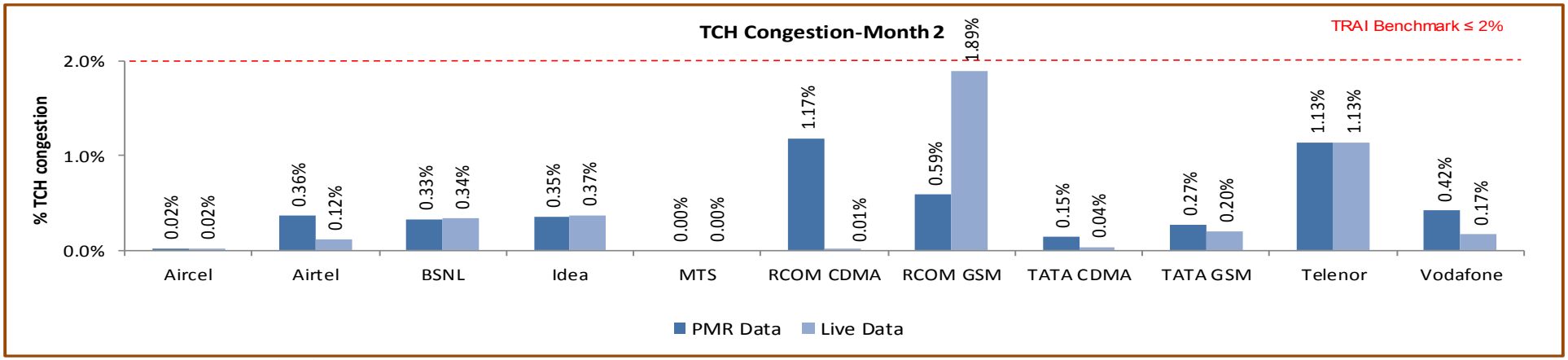
Significant difference was observed between PMR & live measurement data for Airtel, Reliance GSM & CDMA, Telenor and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.4.3.1 KEY FINDINGS – MONTH 1



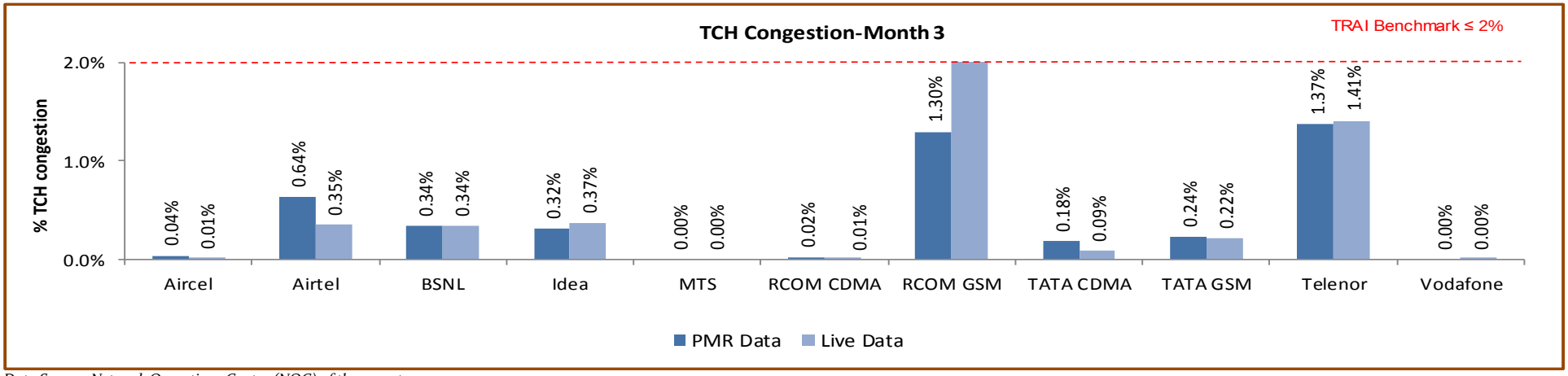
Data Source: Network Operations Center (NOC) of the operators

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	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		120	58	174	463	192	180	57	481	75	72	457
No. of POIs not meeting benchmark		0	0	1	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		5641	153004	145005	484529	24047	182055	170566	106244	110742	416906	465412
Traffic served for all POIs (B)- in erlangs		97	3767	85611	244565	2349	74617	98620	38683	69492	213568	150535
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		120	0	174	463	192	180	57	481	211	72	457
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		5680	0	145005	483865	23994	191787	188018	106244	109578	324193	468003
Traffic served for all POIs (B)- in erlangs		98	0	88632	249317	1658	84242	113668	34249	48137	274248	124013
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

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

6.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-January												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	58	58	155	64	60	19	161	25	22	153
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1918	153004	48335	161188	8051	18620	13123	35750	36915	158377	155912
Traffic served for all POIs (B)- in erlangs		34	3767	27918	80036	539	5863	8353	12038	21218	66892	31329
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	NA	58	155	64	60	19	161	161	22	153
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1918	NA	48335	161324	7998	18809	13105	35750	35750	66584	155912
Traffic served for all POIs (B)- in erlangs		34	NA	29524	82238	549	5525	8232	7991	13262	124881	31329
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

6.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-February												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	NA	58	154	64	60	19	161	25	24	152
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1861	NA	48335	161829	7998	18773	13139	35750	36914	133668	154750
Traffic served for all POIs (B)- in erlangs		32	NA	28727	83144	947	8775	9262	13181	24041	68570	59603
POI congestion	≤ 0.5%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	NA	58	154	64	60	19	161	25	24	152
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1918	NA	48335	161005	7998	18758	13136	35750	36914	133668	157341
Traffic served for all POIs (B)- in erlangs		32	NA	29554	84022	565	9113	9260	12793	24041	68570	33081
POI congestion	≤ 0.5%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

6.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-March												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	NA	58	154	64	60	19	159	25	26	152
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1862	NA	48335	161512	7998	144663	144305	34744	36914	124861	154750
Traffic served for all POIs (B)- in erlangs		31	NA	28967	81385	863	59979	81004	13464	24233	78106	59603
POI congestion	≤ 0.5%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	NA	58	154	64	60	19	159	25	26	152
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1844	NA	48335	161537	7998	154221	161777	34744	36914	123941	154750
Traffic served for all POIs (B)- in erlangs		32	NA	29554	83058	543	69605	96175	13464	10835	80797	59603
POI congestion	≤ 0.5%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

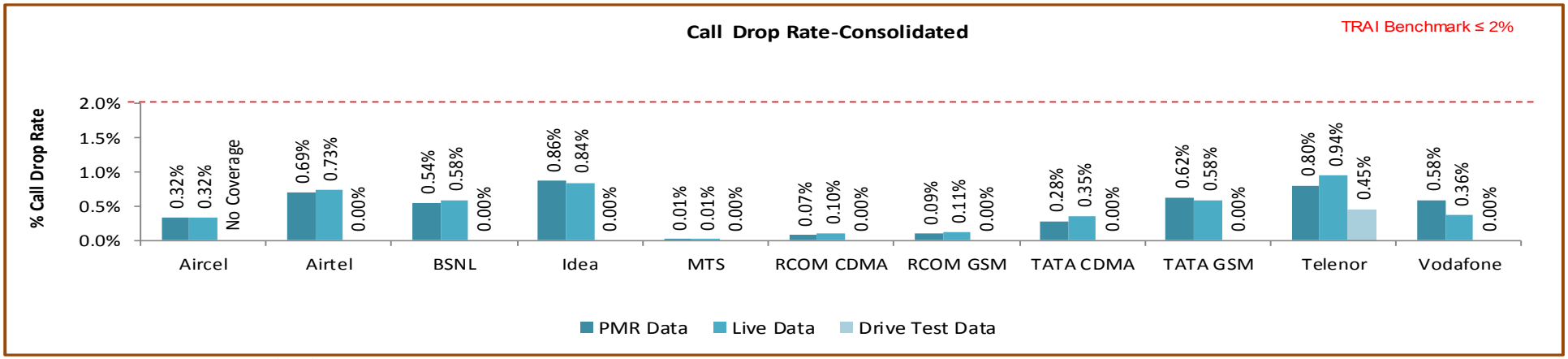
Data Source: Network Operations Center (NOC) of the operators

6.5 CALL DROP RATE

6.5.1 PARAMETER DESCRIPTION

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

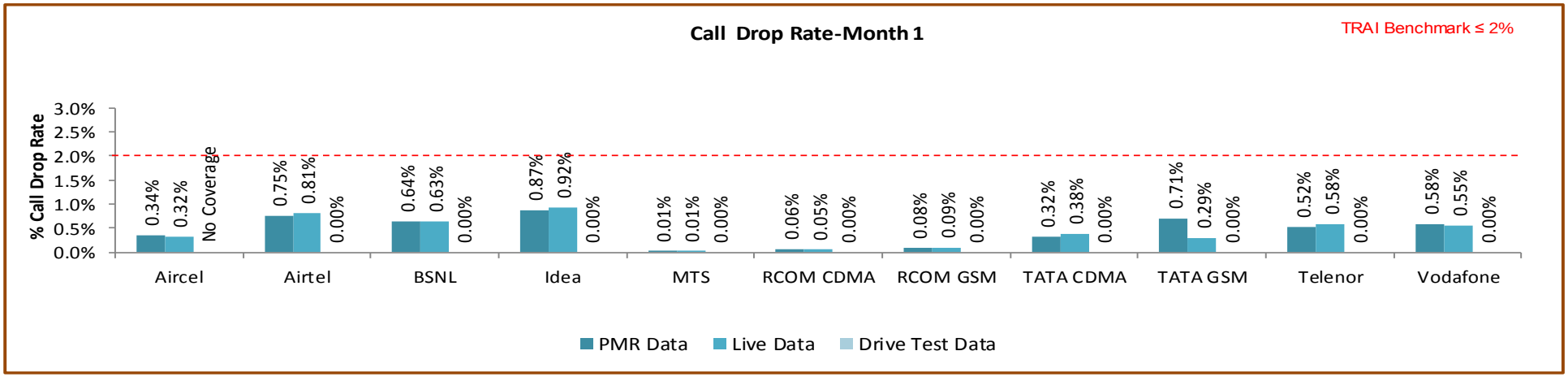
6.5.2 KEY FINDINGS - CONSOLIDATED



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

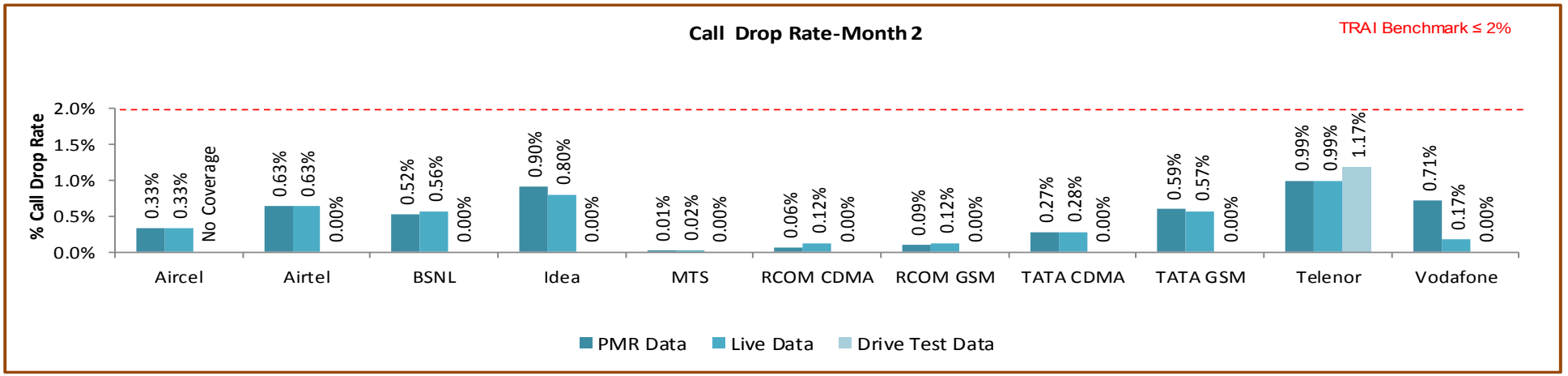
All operators met the benchmark for call drop rate during audit.

6.5.2.1 KEY FINDINGS – MONTH 1



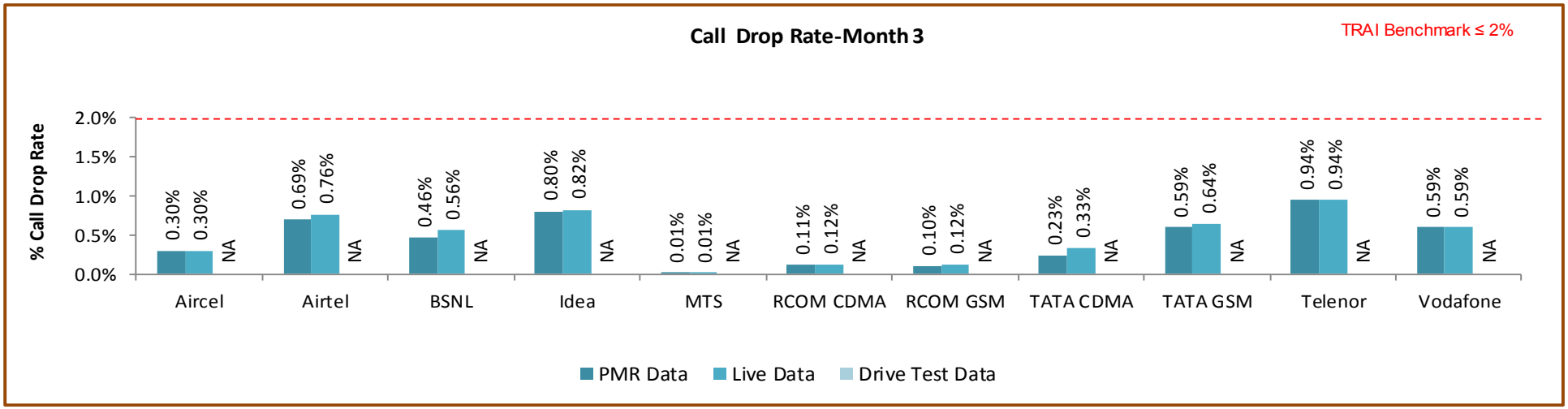
Data Source: Network Operations Center (NOC) of the operators

6.5.2.2 KEY FINDINGS – MONTH 2



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

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 –**

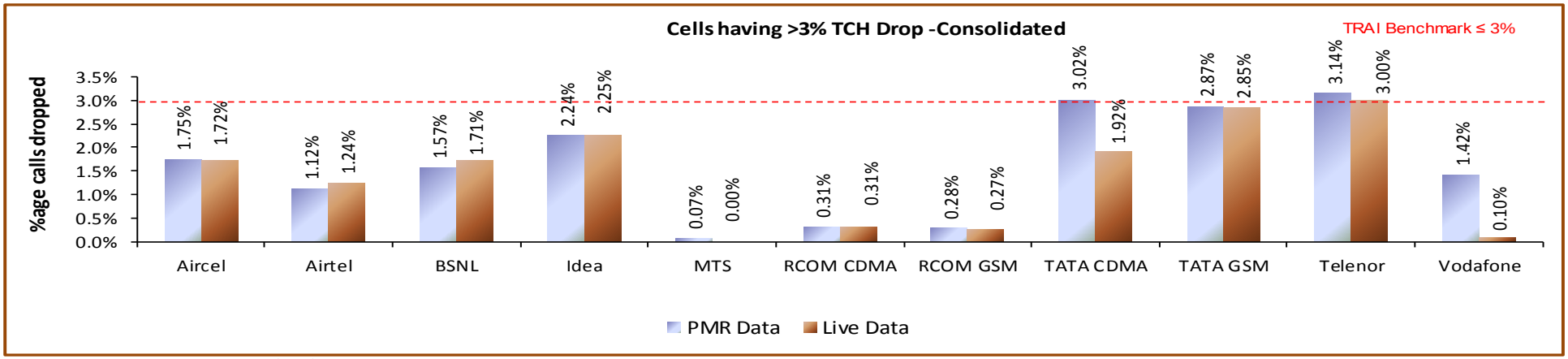
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

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

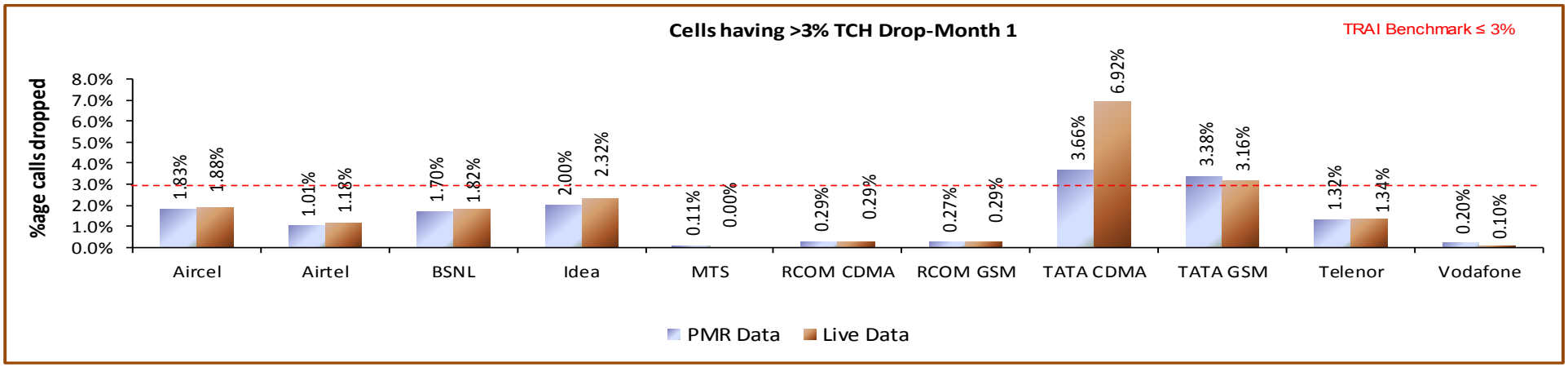


Data Source: Network Operations Center (NOC) of the operators

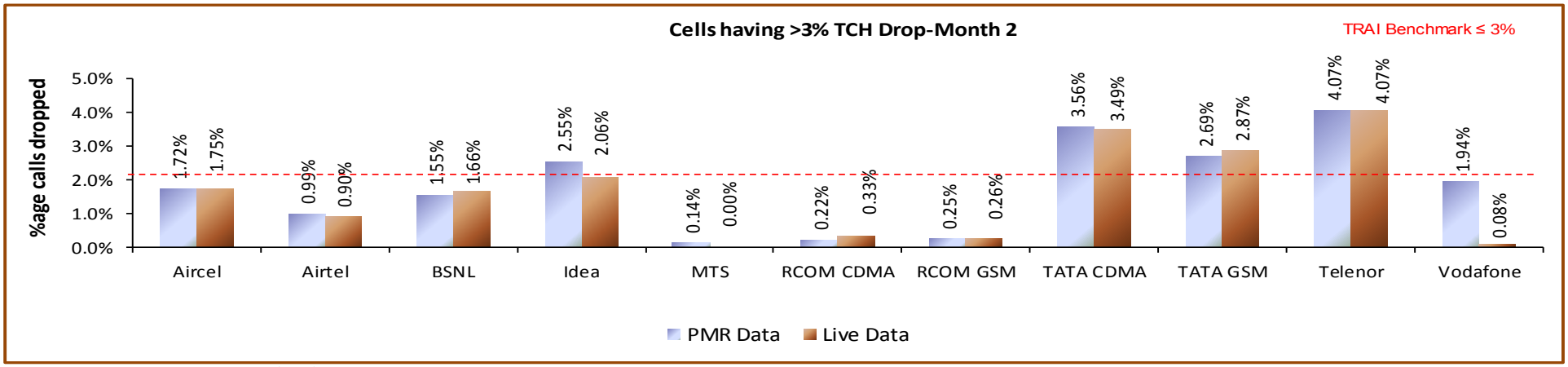
TATA CDMA and Telenor failed to meet the TRAI benchmark.

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

6.6.2.1 KEY FINDINGS – MONTH 1

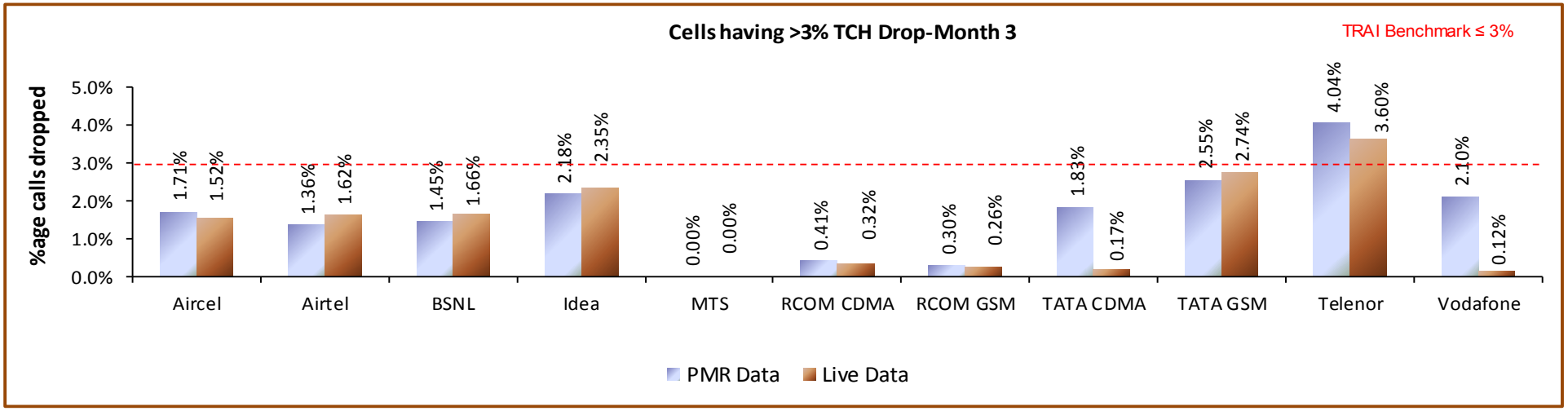


6.6.2.2 KEY FINDINGS – MONTH 2



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

6.6.2.3 KEY FINDINGS – MONTH 3



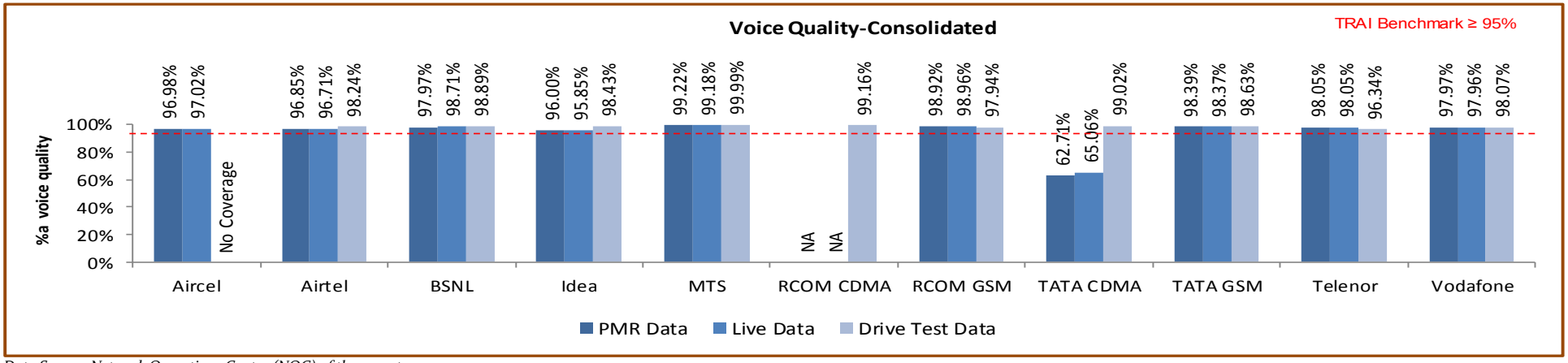
Data Source: Network Operations Center (NOC) of the operators

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.

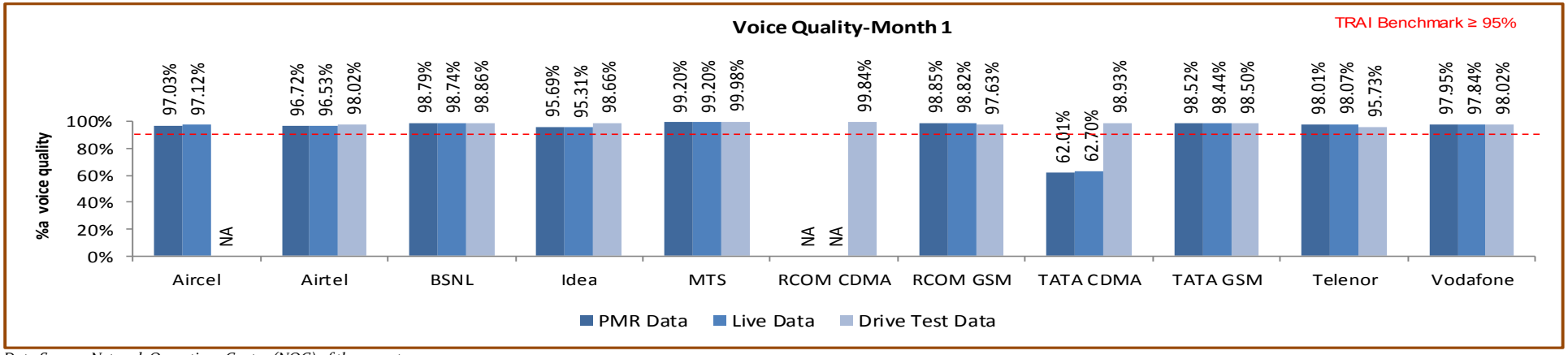
6.7.2 KEY FINDINGS



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

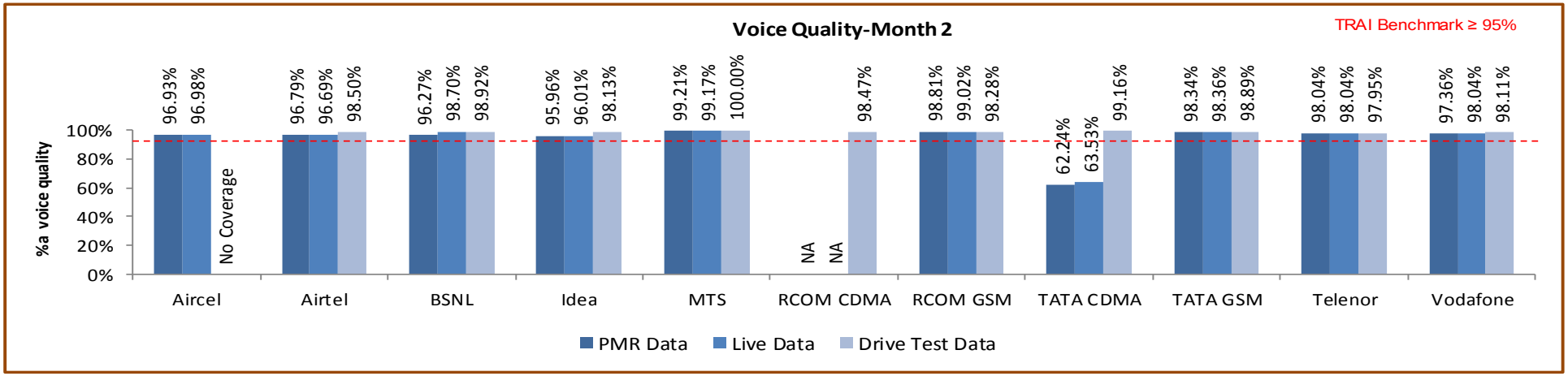
TATA CDMA failed to meet the benchmark for Voice quality as per PMR and live data.

Key Findings – Month 1



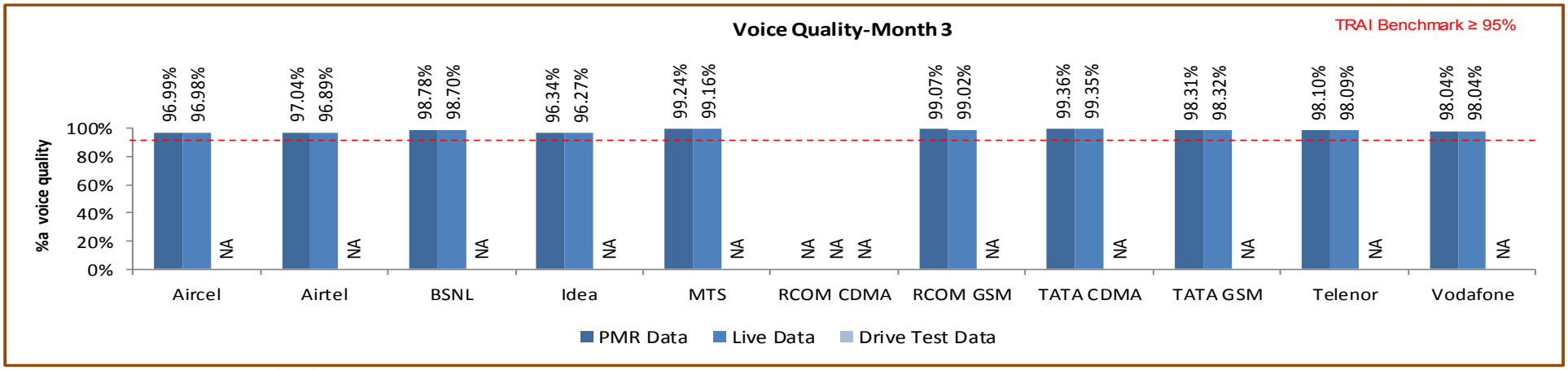
Data Source: Network Operations Center (NOC) of the operators

6.7.2.1 KEY FINDINGS – MONTH 2



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

6.7.2.2 KEY FINDINGS – MONTH 3



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

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

7.1 NODE BS DOWNTIME

7.1.1 PARAMETER DESCRIPTION

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

  1. Node Bs downtime (not available for service)

  2. Worst affected Node Bs due to downtime

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

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

3. TRAI Benchmark –

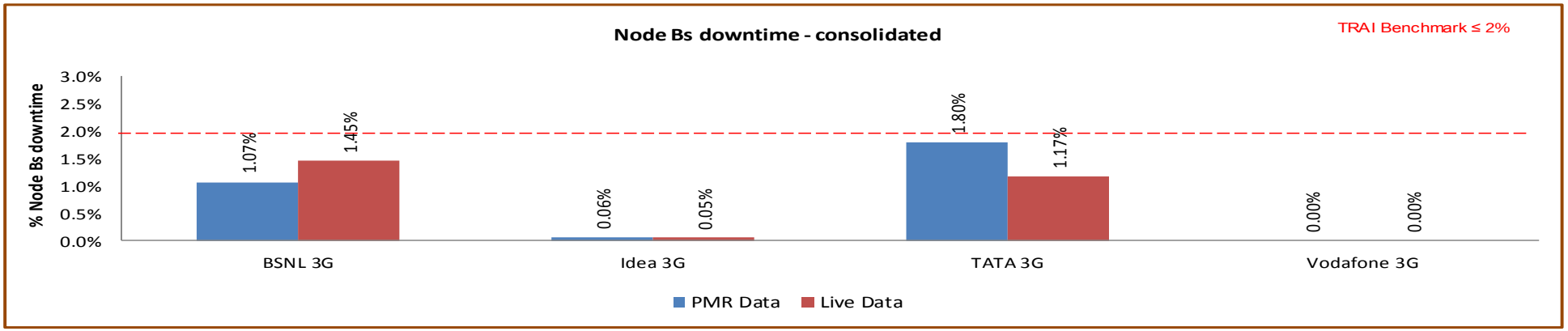
a. Node Bs downtime (not available for service) ≤ 2%

4. Audit Procedure –

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

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

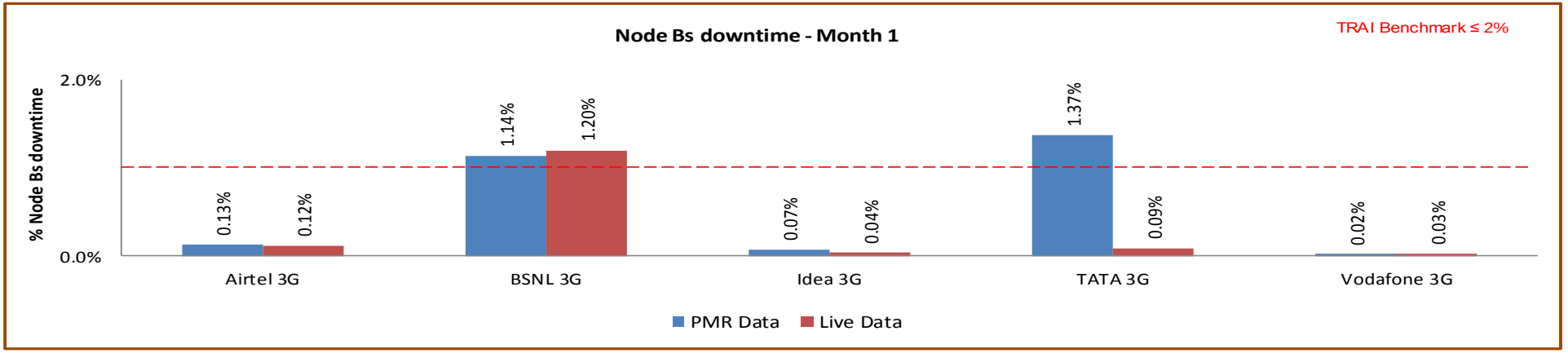
7.1.2 KEY FINDINGS - CONSOLIDATED



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

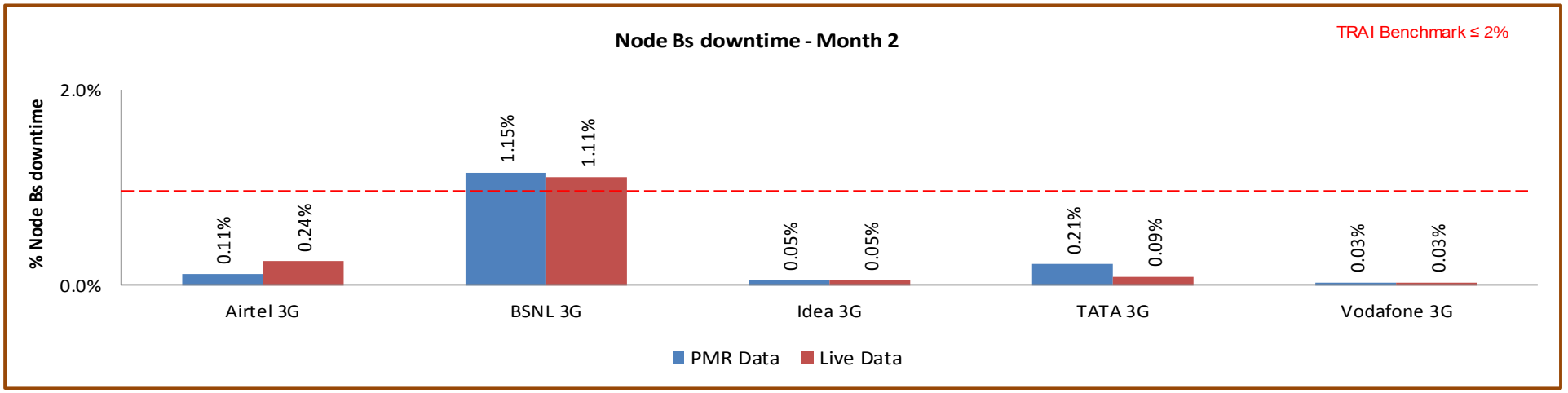
All operators met the benchmark for Node Bs downtime.

7.1.2.1 KEY FINDINGS – MONTH 1



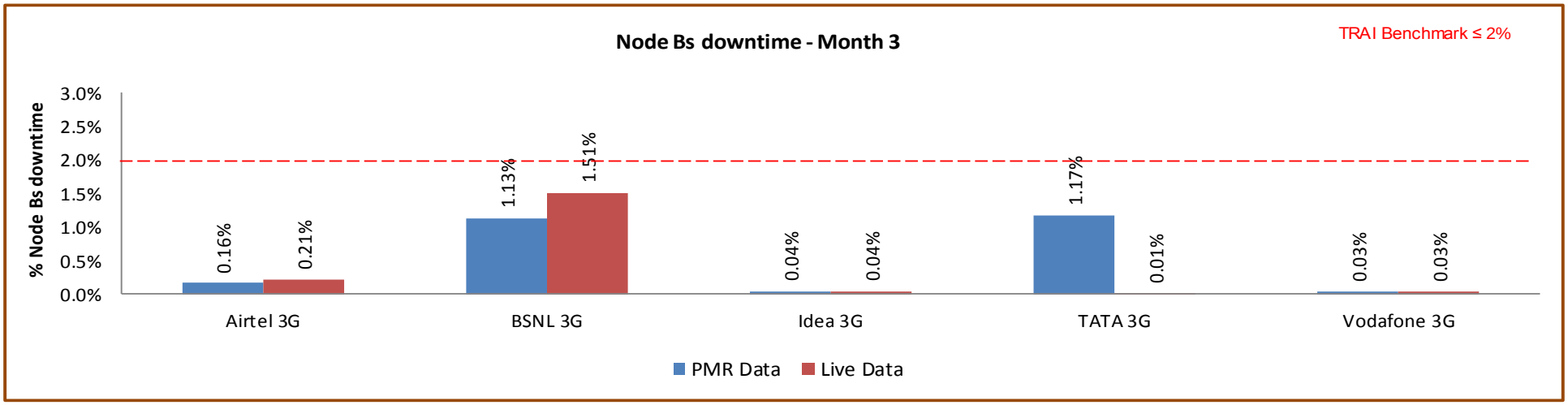
Data Source: Operations and Maintenance Center (OMC) of the operators

7.1.2.2 KEY FINDINGS – MONTH 2



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

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.

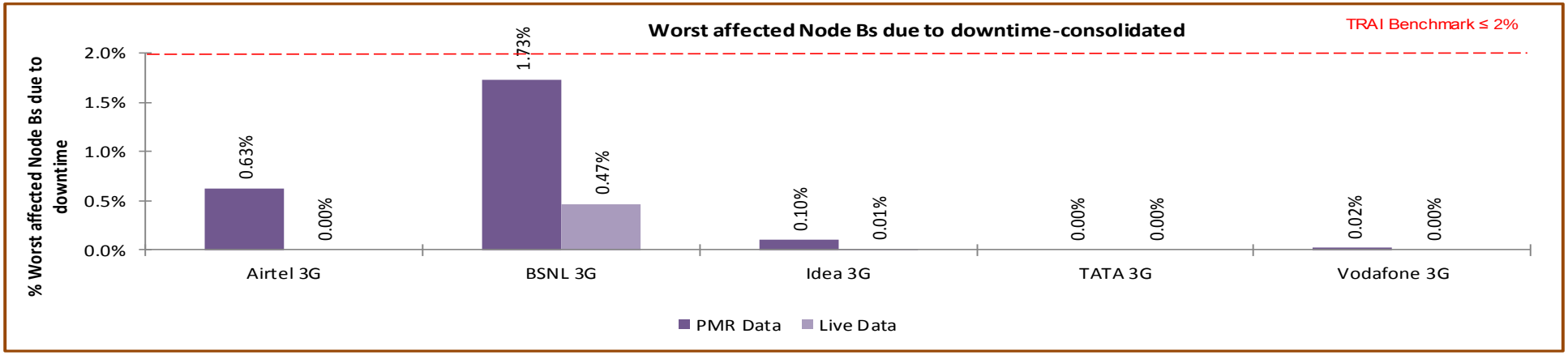
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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

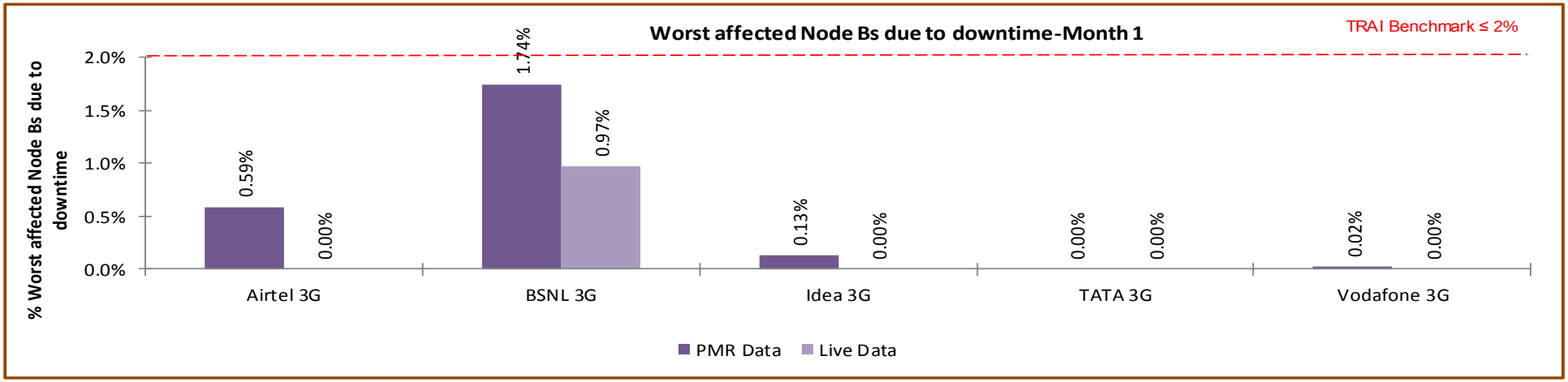


Data Source: Operations and Maintenance Center (OMC) of the operators

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

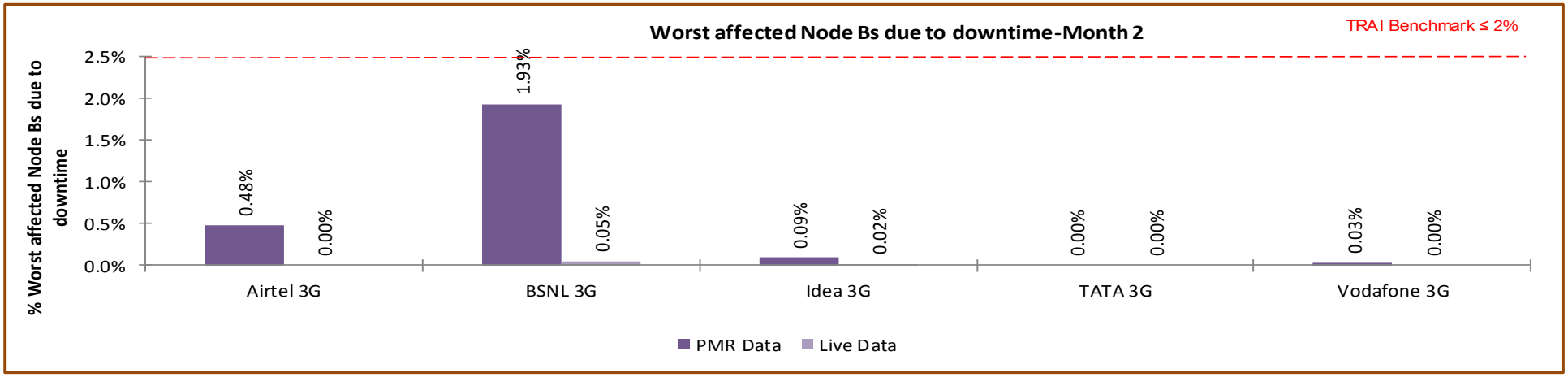
Significant difference was observed between PMR & live measurement data for Airtel, Idea and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

7.2.2.1 KEY FINDINGS – MONTH 1



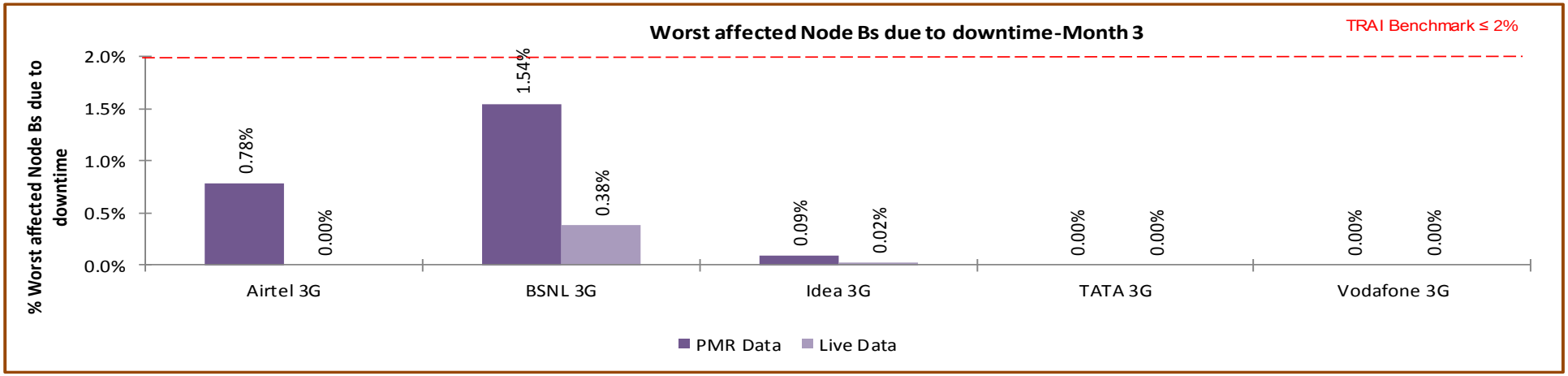
Data Source: Operations and Maintenance Center (OMC) of the operators

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

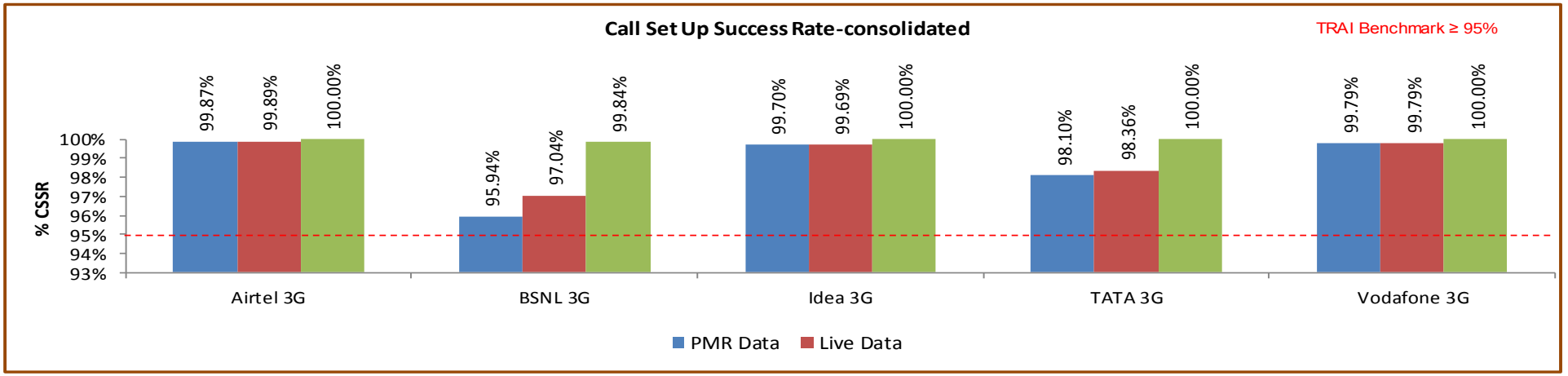
5. **TRAI Benchmark ≥** 95%

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

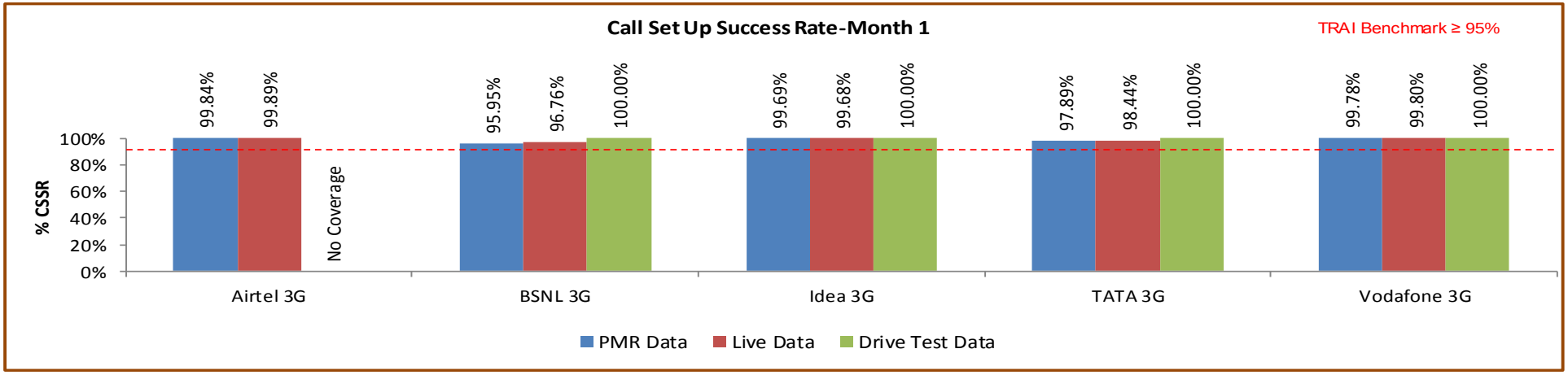


Data Source: Network Operations Center (NOC) of the operators

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

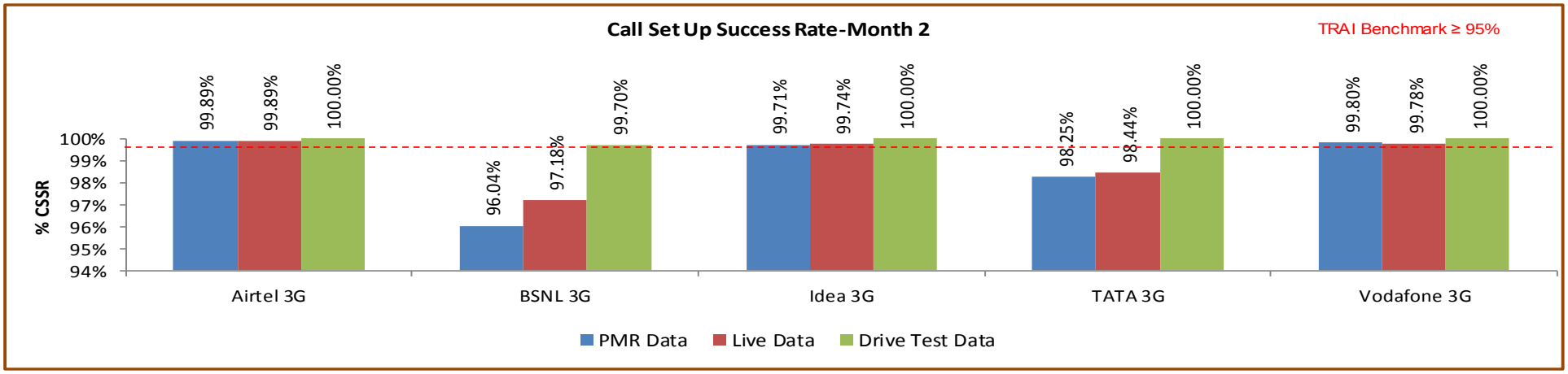
To calculate CSSR, Airtel is using a formula that has not been specified by TRAI or the counter definitions provided by their network service provider (Ericsson). However, this report presents the appropriate CSSR value for BSNL and TATA, which was calculated by using the proper counter details by the IMRB auditor during audit.

7.3.2.1 KEY FINDINGS – MONTH 1



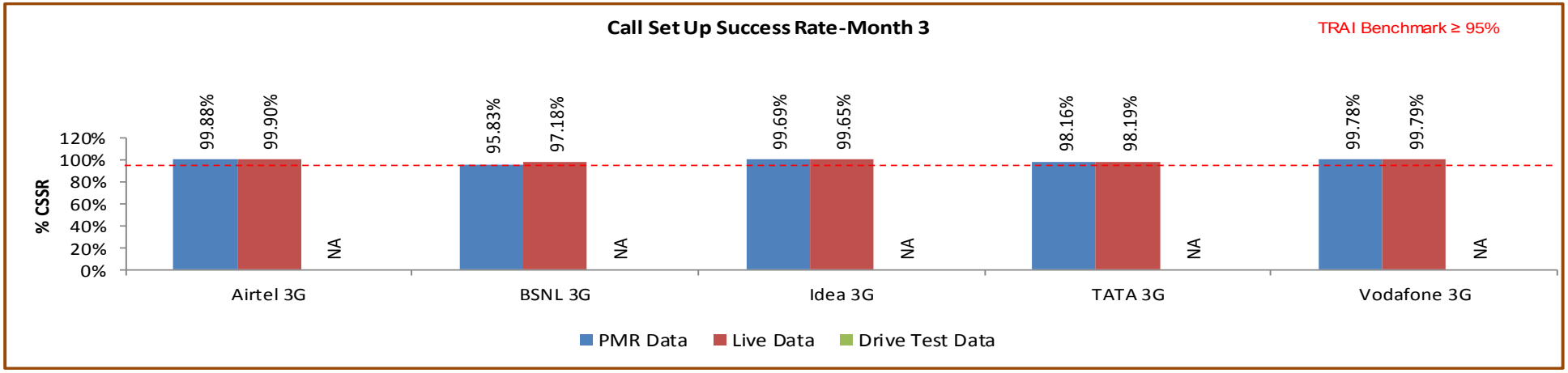
Data Source: Network Operations Center (NOC) of the operators

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

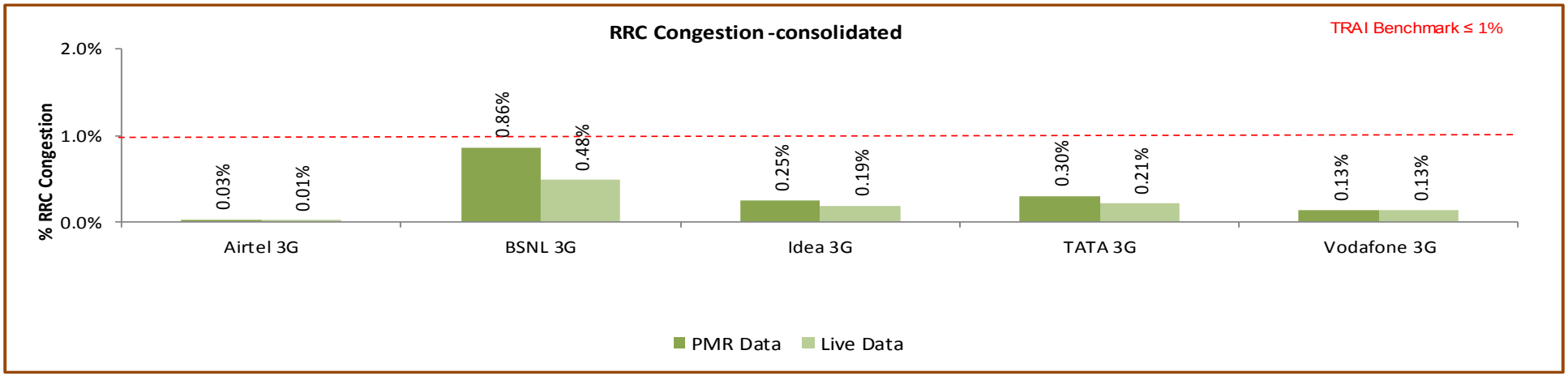
7. Benchmark:

- 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

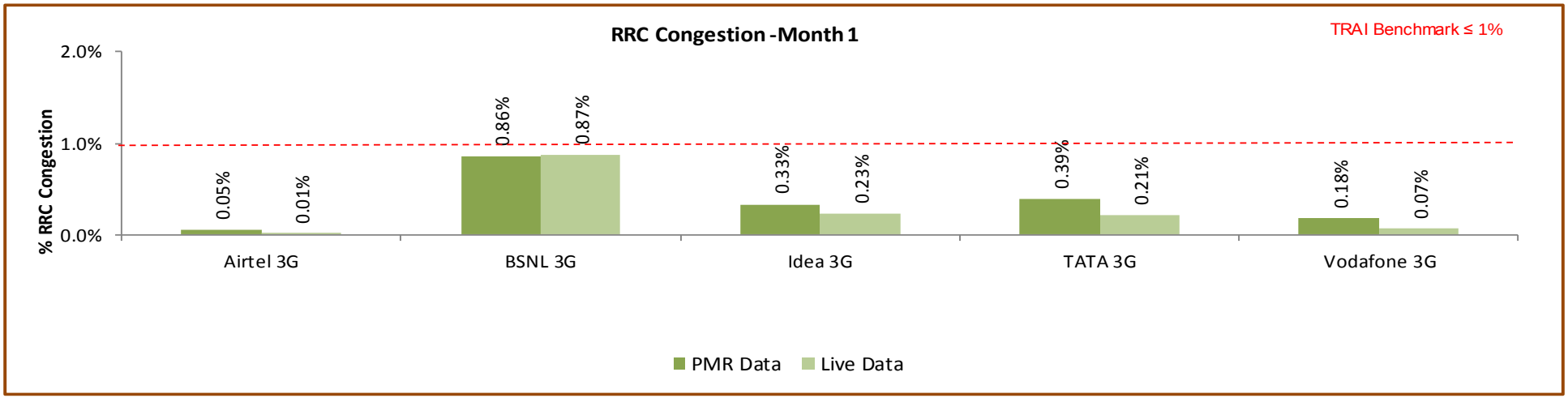
7.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



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

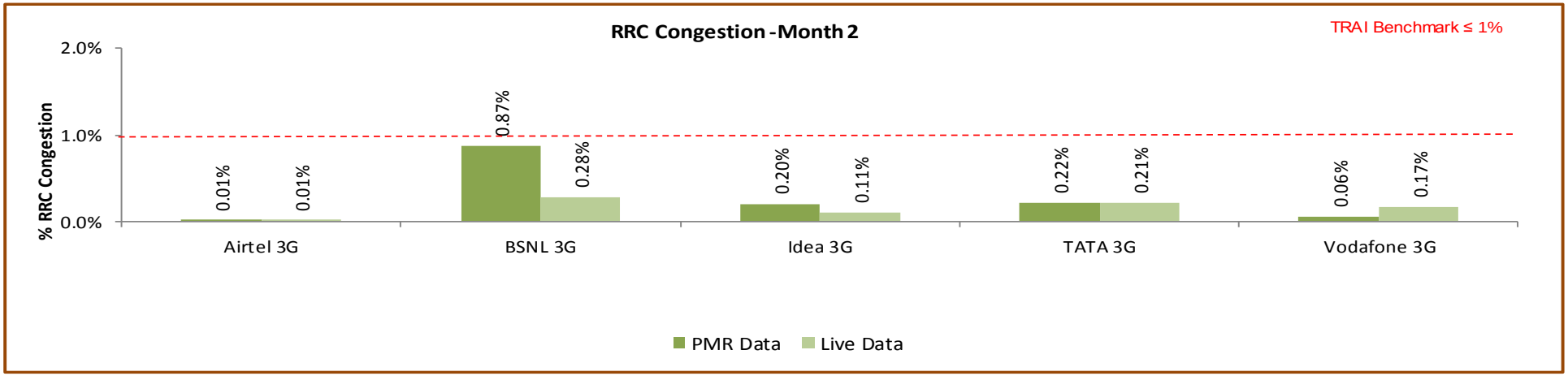
All operators met the benchmark for RRC congestion.

7.4.2.1 KEY FINDINGS – MONTH 1



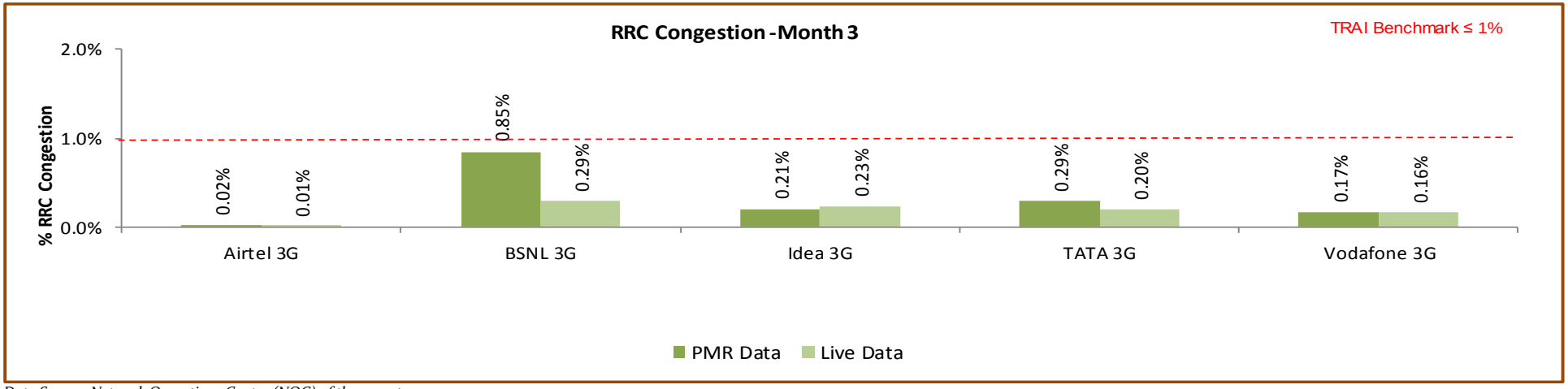
Data Source: Network Operations Center (NOC) of the operators

7.4.2.2 KEY FINDINGS – MONTH 2



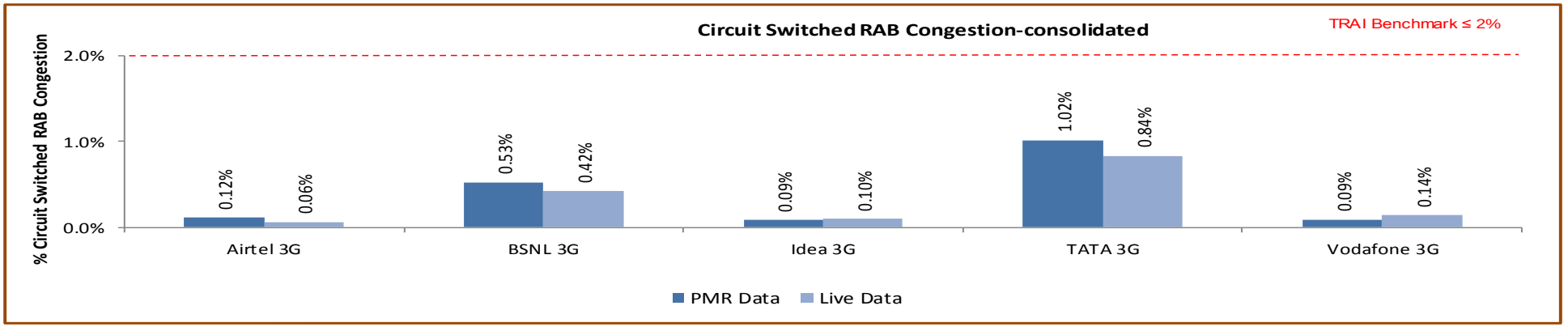
Data Source: Network Operations Center (NOC) of the operators

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)

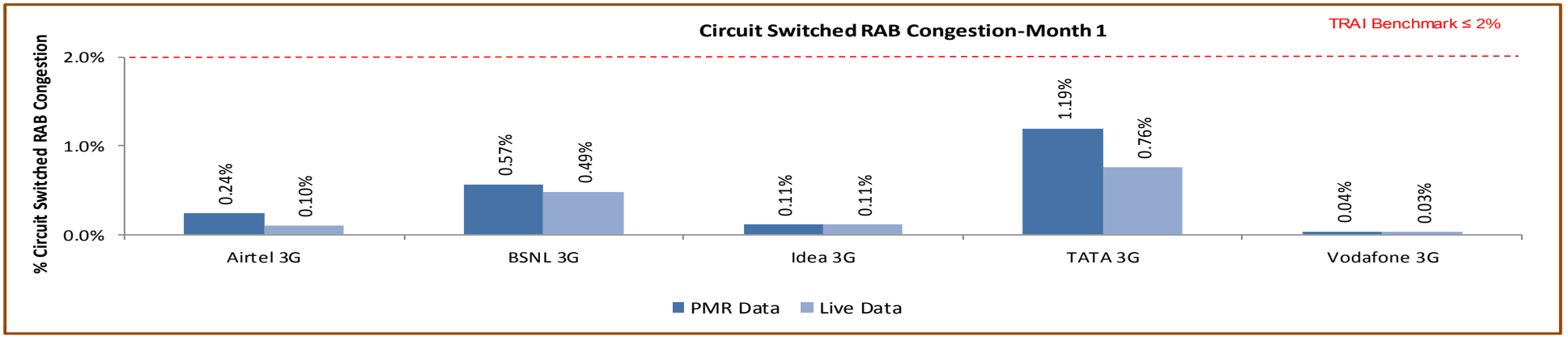


Data Source: Network Operations Center (NOC) of the operators

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

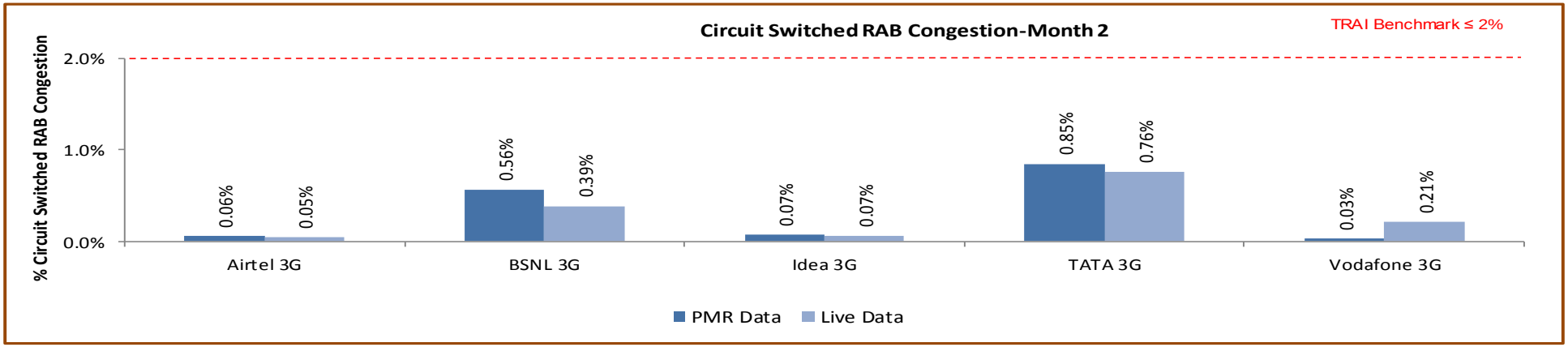
Significant difference was observed between PMR & live measurement data for BSNL, TATA and Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

7.4.3.1 KEY FINDINGS – MONTH 1



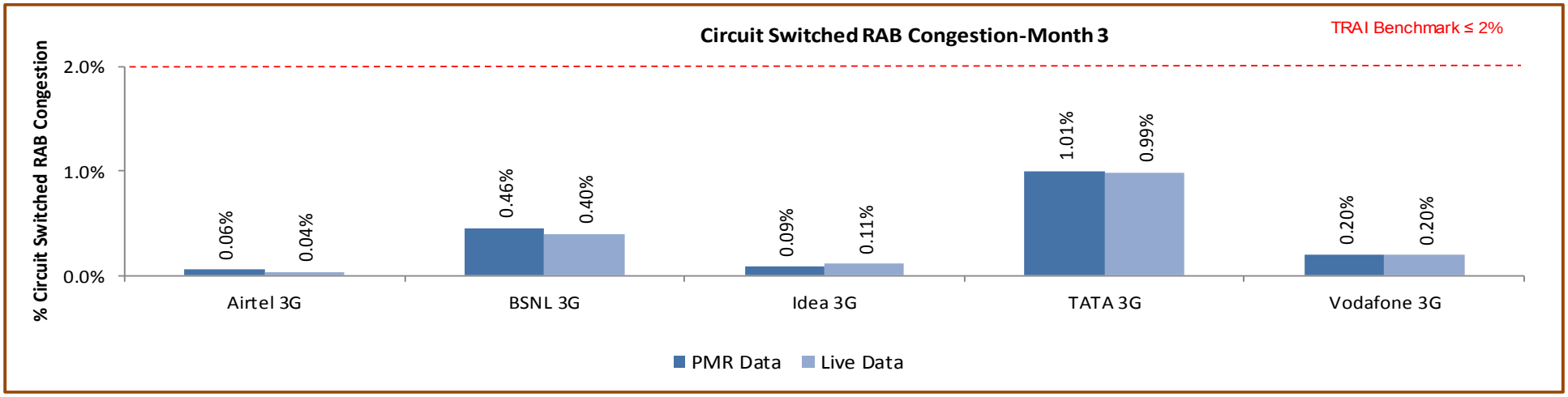
Data Source: Network Operations Center (NOC) of the operators

7.4.3.2 KEY FINDINGS – MONTH 2



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

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	Vodafone 3G
Total number of working POIs		0	174	463	25	456
No. of POIs not meeting benchmark		0	1	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	145005	484801	36914	465530
Traffic served for all POIs (B)- in erlangs		0	85686	240723	24233	179270
POI congestion	≤ 0.5%	#DIV/0!	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		0	174	463	25	457
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	145005	483865	36914	470602
Traffic served for all POIs (B)- in erlangs		0	84324	249317	10835	126918
POI congestion	≤ 0.5%	#DIV/0!	0.00%	0.00%	0.00%	0.00%

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

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

7.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-January						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	155	0	152
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161460	0	156030
Traffic served for all POIs (B)- in erlangs		NA	28025	76194	0	60064
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	155	0	153
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161324	0	155920
Traffic served for all POIs (B)- in erlangs		NA	26663	82238	0	60756
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%

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

7.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-February						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	154	0	152
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161829	0	154750
Traffic served for all POIs (B)- in erlangs		NA	28727	83144	0	59603
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	154	0	152
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161005	0	157341
Traffic served for all POIs (B)- in erlangs		NA	28727	84022	0	33081
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%

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

7.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-March						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	154	25	152
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161512	36914	154750
Traffic served for all POIs (B)- in erlangs		NA	28935	81385	24233	59603
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	154	25	152
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161537	36914	157341
Traffic served for all POIs (B)- in erlangs		NA	28935	83058	10835	33081
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%

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

7.5 CIRCUIT SWITCHED VOICE DROP RATE

7.5.1 PARAMETER DESCRIPTION

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

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

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

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

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

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

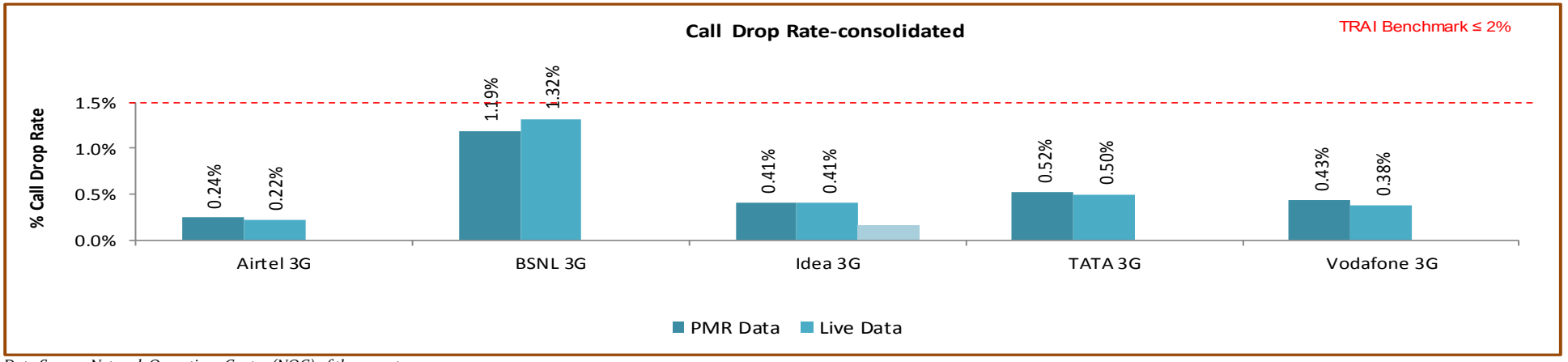
5. **TRAI Benchmark –**

   - Circuit switched voice drop rate ≤ 2%

6. **Audit Procedure –**

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

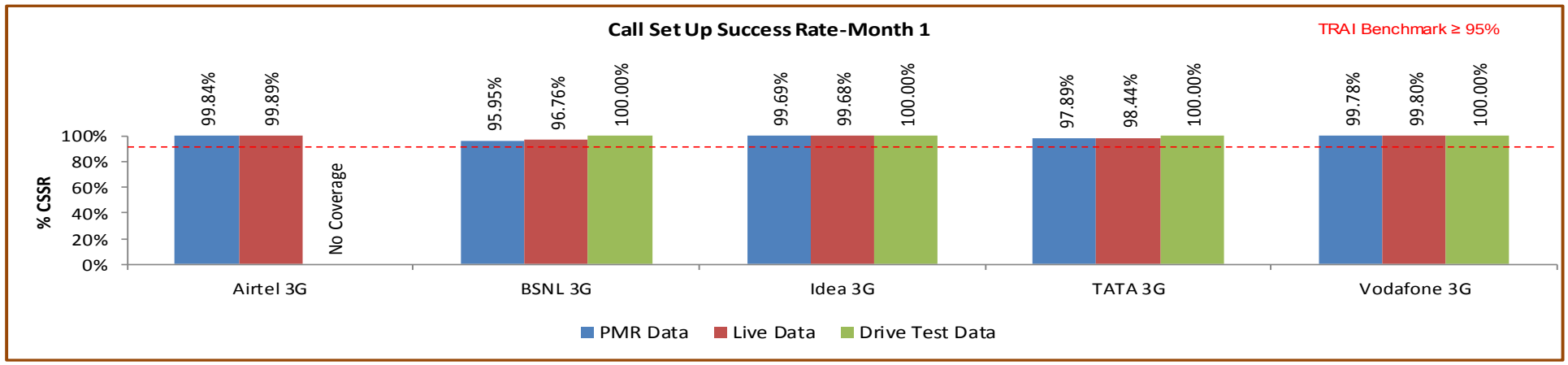
7.5.2 KEY FINDINGS - CONSOLIDATED



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

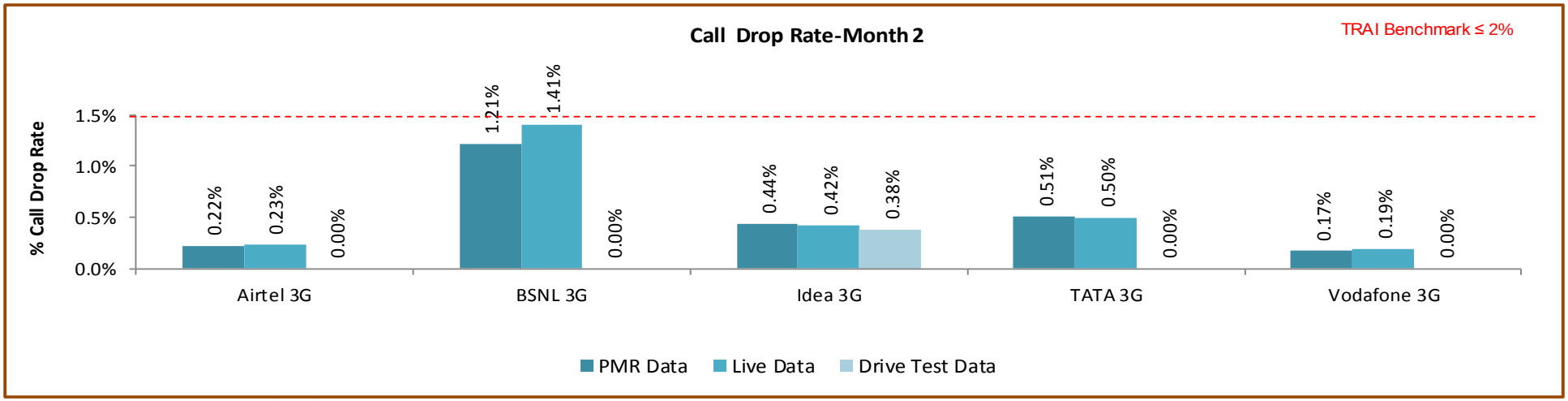
All operators met the benchmark for call drop rate during audit.

7.5.2.1 KEY FINDINGS – MONTH 1



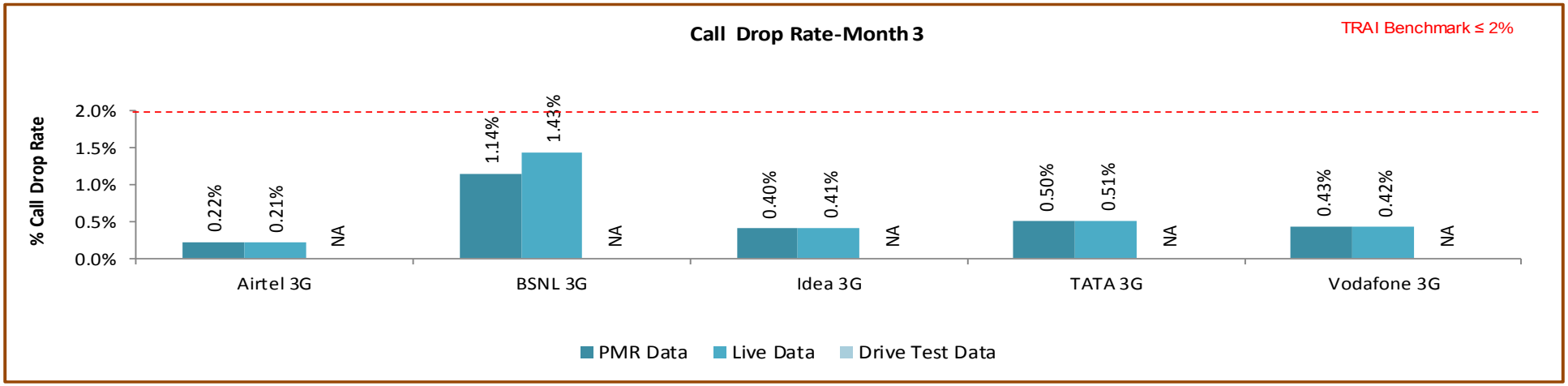
Data Source: Network Operations Center (NOC) of the operators

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** –

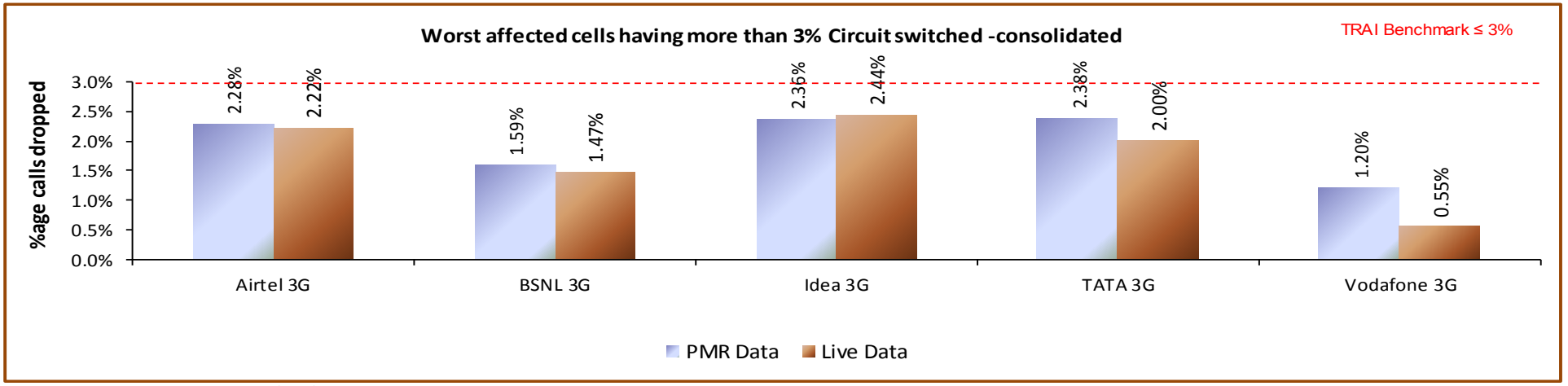
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

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.

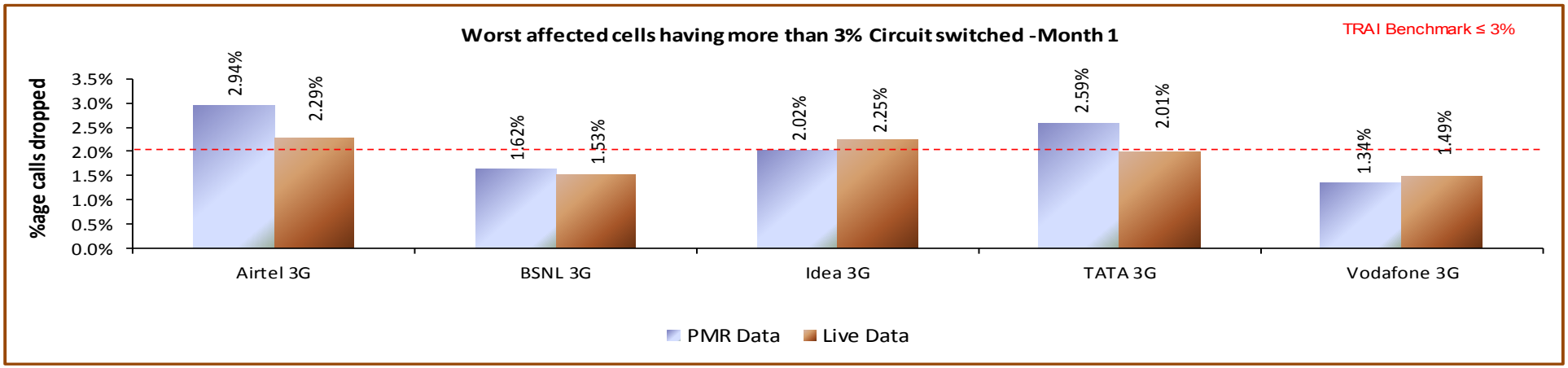
7.6.2 KEY FINDINGS - CONSOLIDATED



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

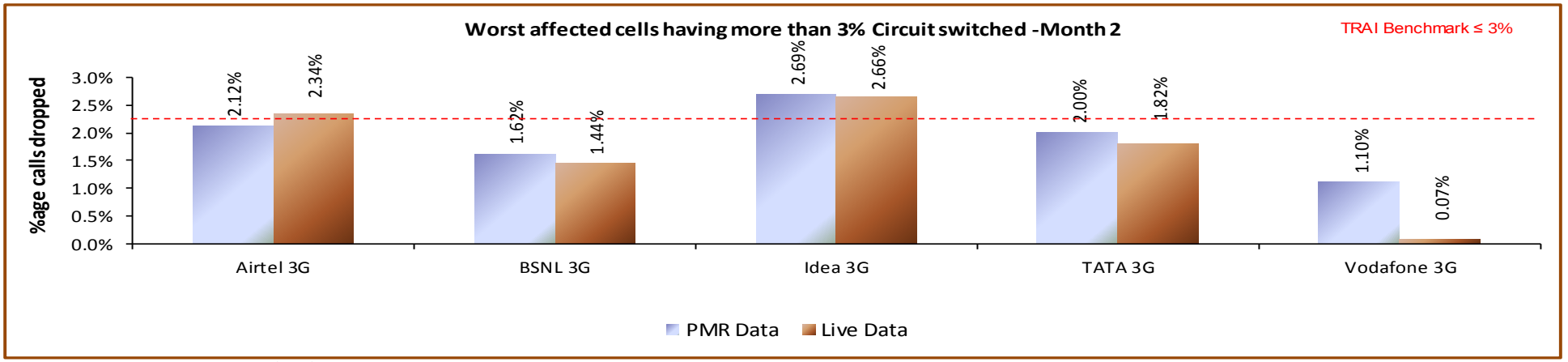
All operators met the benchmark during audit.

7.6.2.1 KEY FINDINGS – MONTH 1



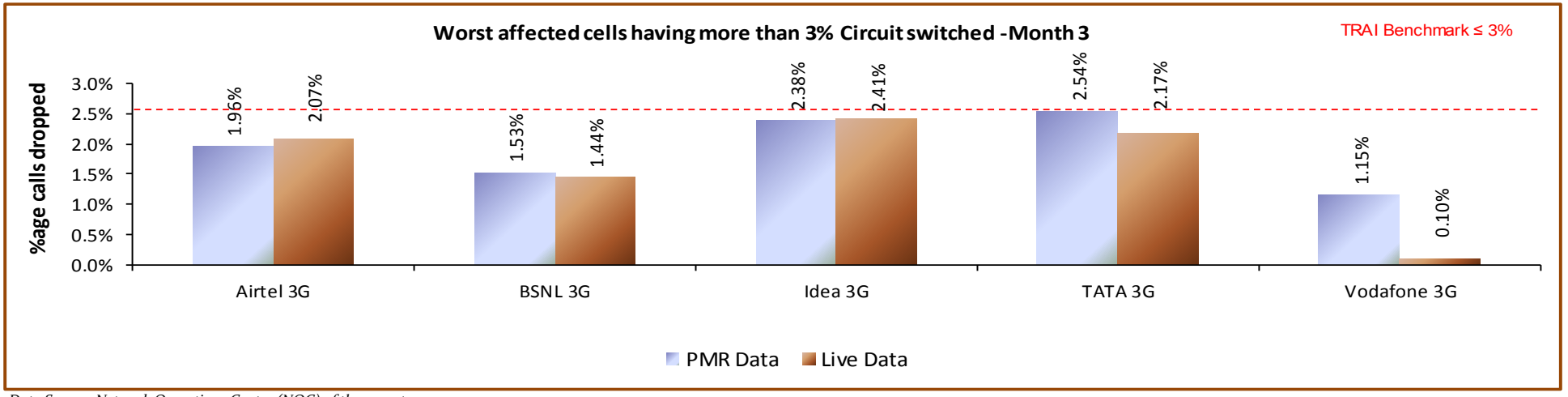
Data Source: Network Operations Center (NOC) of the operator

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**

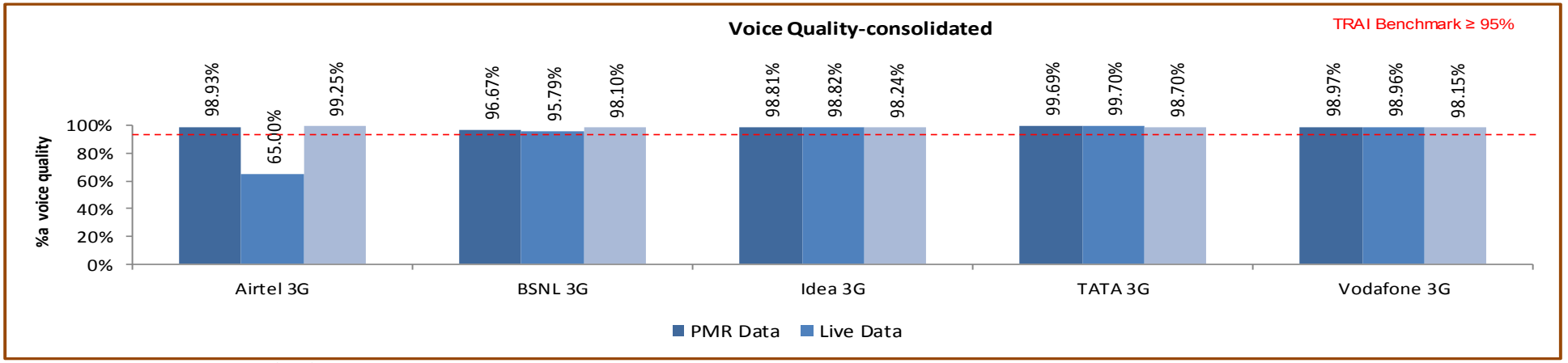
7. **TRAI Benchmark:** ≥ 95%

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.

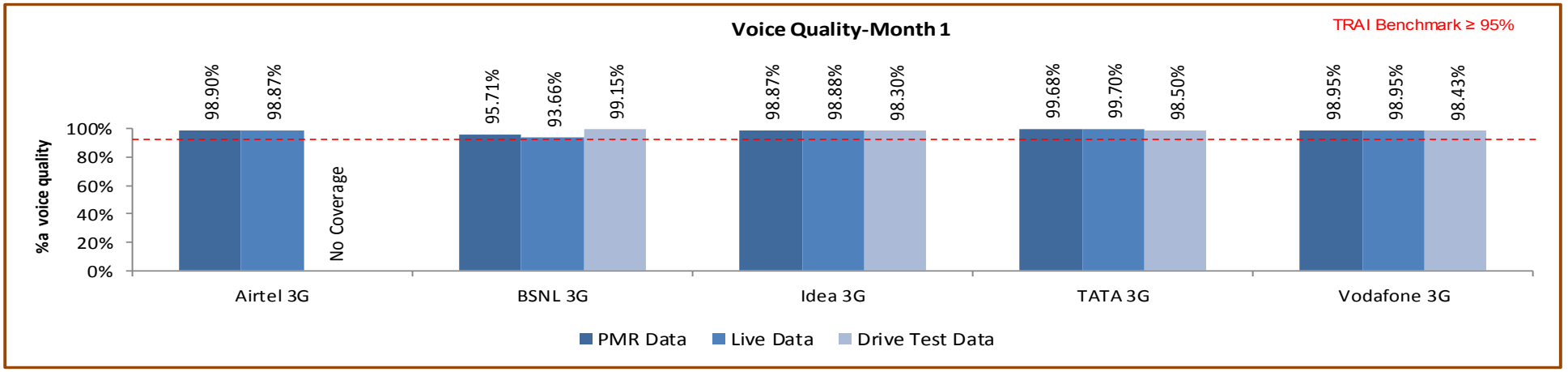
7.7.2 KEY FINDINGS



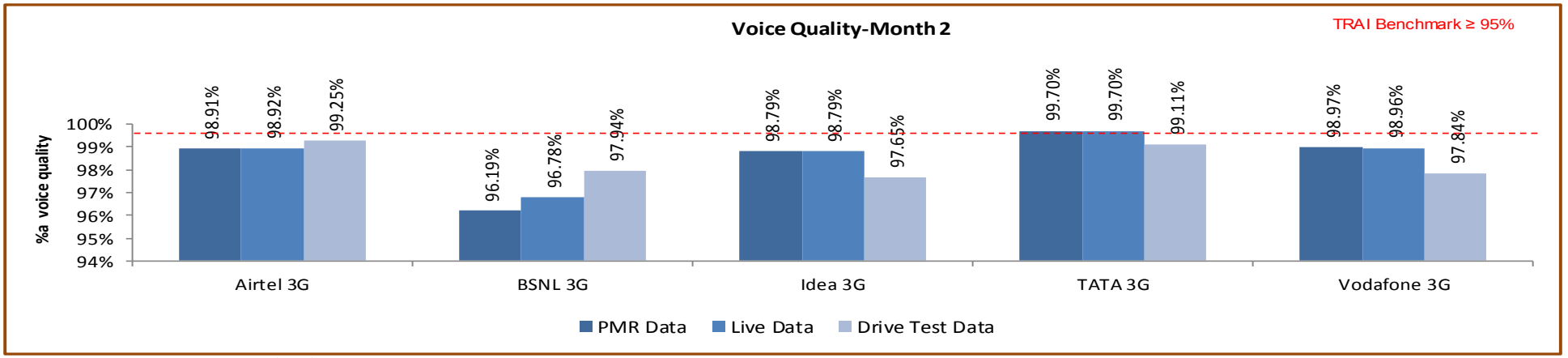
Data Source: Network Operations Center (NOC) of the operators

Airtel failed to meet the benchmark for circuit switch Voice quality in live audit.

7.7.2.1 KEY FINDINGS – MONTH 1

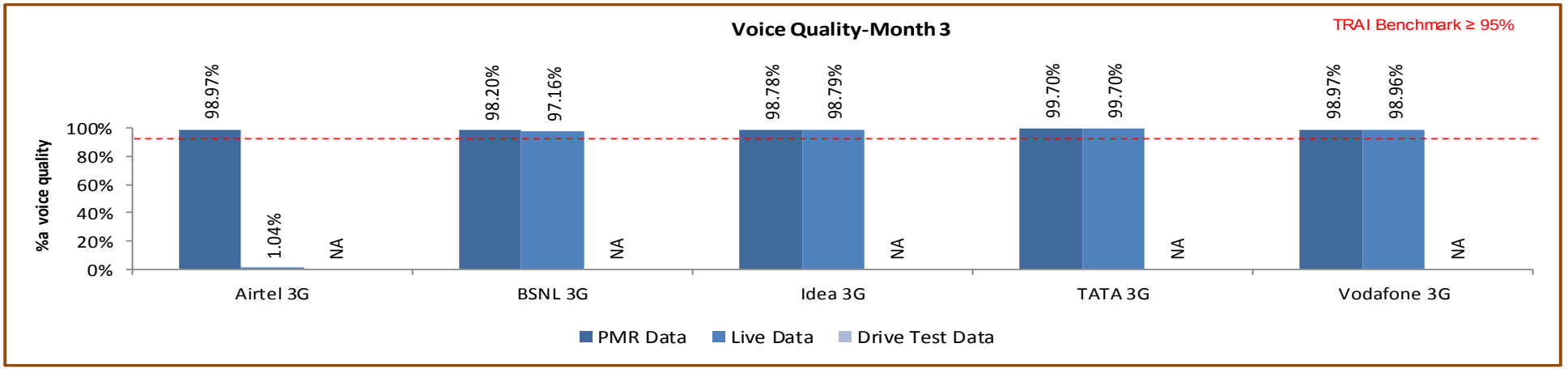


7.7.2.2 KEY FINDINGS – MONTH 2



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 AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

8.1 METERING AND BILLING CREDIBILITY

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

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

8.1.1 PARAMETER DESCRIPTION

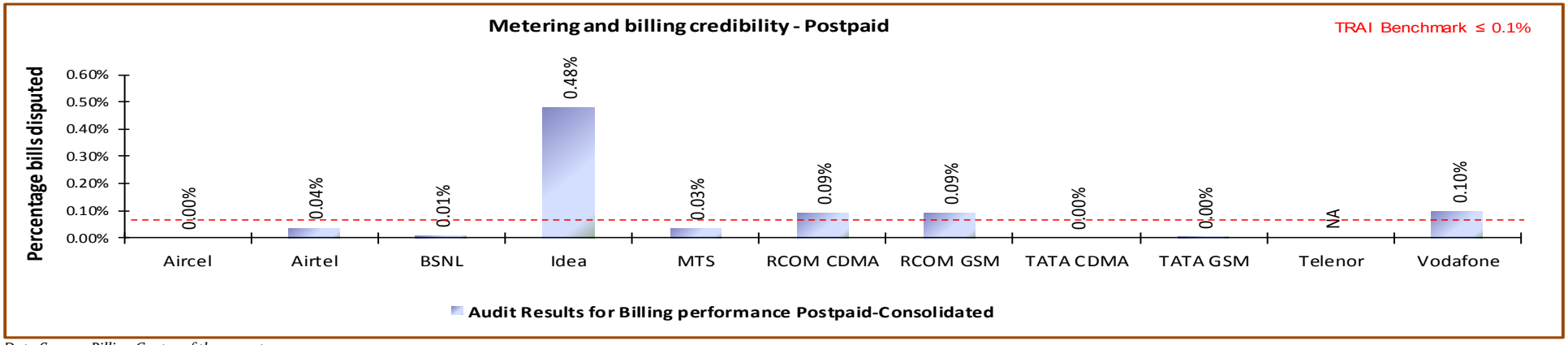
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th December, 2009 were covered. The types of billing complaints covered are listed below.

- 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 February arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.
  - **Charging complaints per 100 subscribers (Prepaid)** = (Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter) * 100
- TRAI Benchmark: <= 0.1%
- Audit Procedure:
  - Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted
    - For Postpaid, the total billing complaints would be audited by averaging over billing cycles in a quarter
    - For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

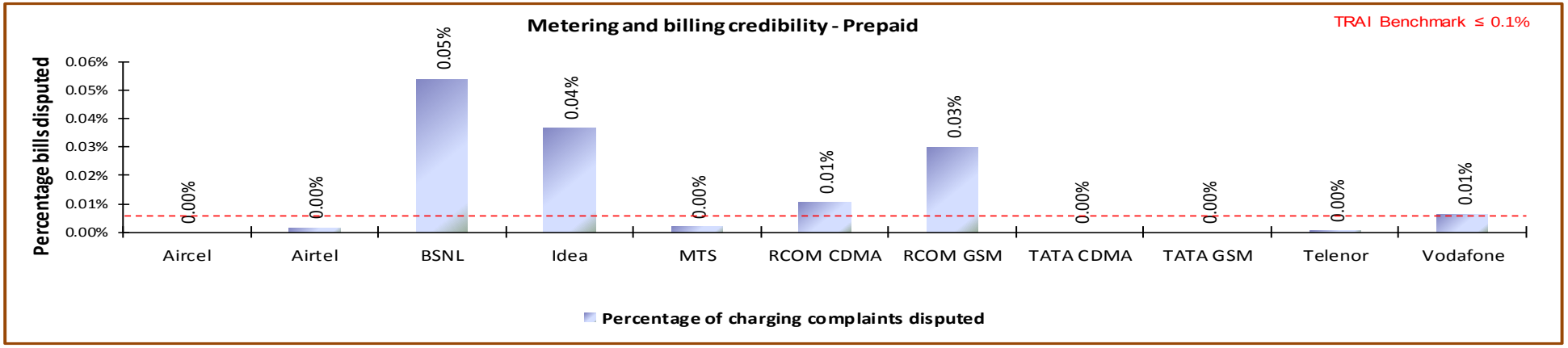
8.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



Data Source: Billing Center of the operators

Idea Failed to meet the benchmark for metering and billing credibility of postpaid subscribers

8.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

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

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8.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

8.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

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

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

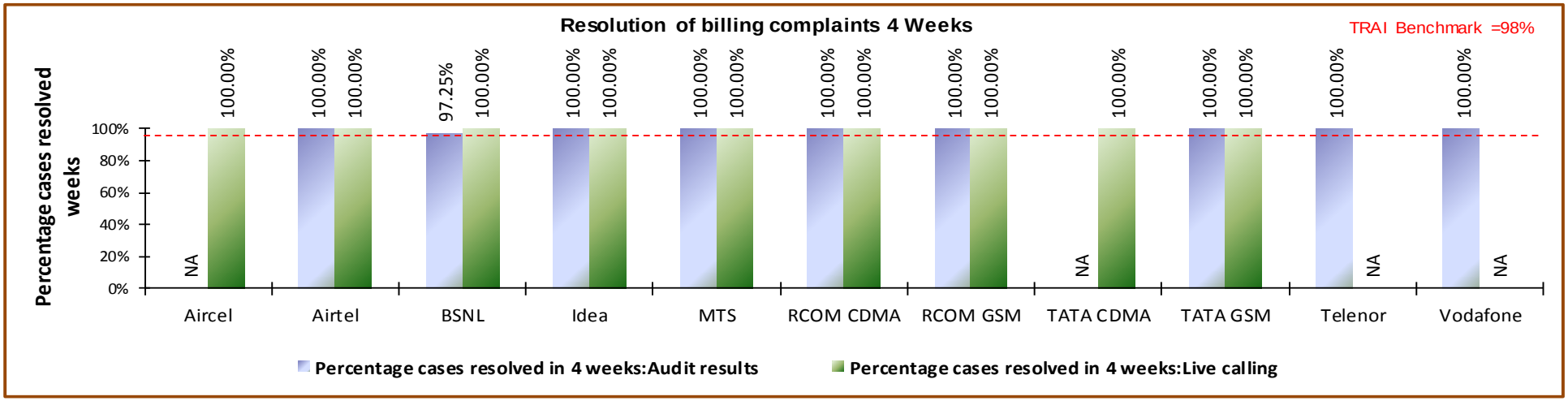
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

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

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

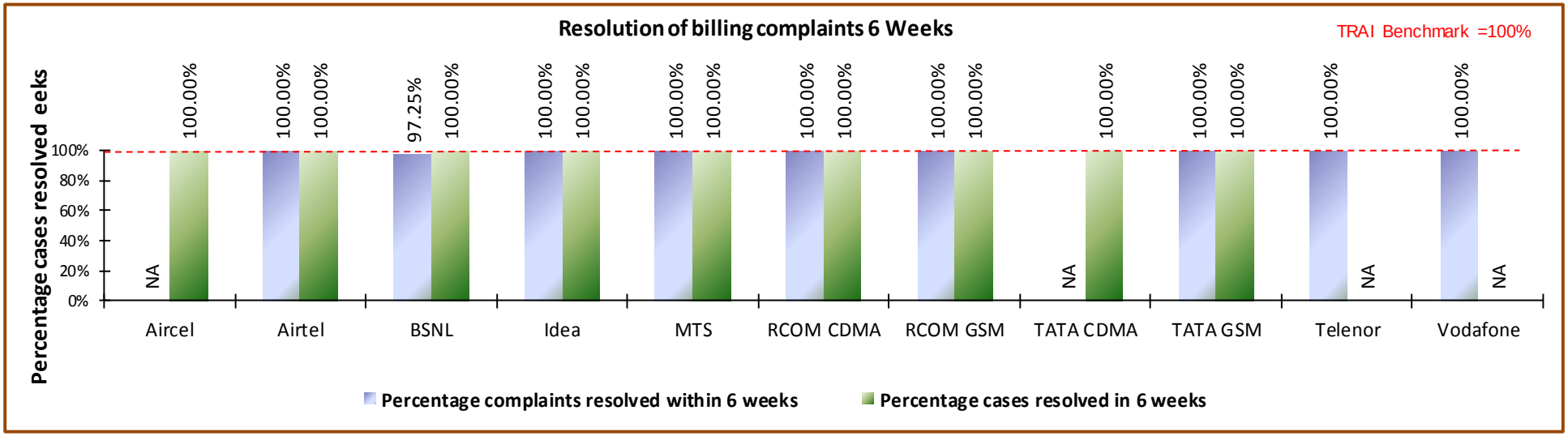
8.2.2 KEY FINDINGS - WITHIN 4 WEEKS



Data Source: Billing Center of the operators

BSNL failed to meet the benchmark for resolution of billing complaints within 4 weeks.

8.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

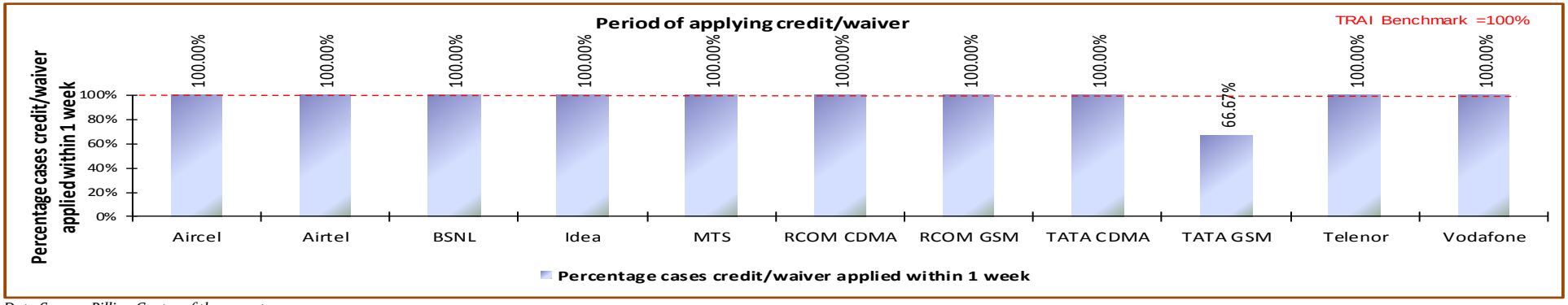
BSNL failed to meet the TRAI benchmark of resolution of billing complaints within 4 weeks as well as within 6 weeks.

8.3 PERIOD OF APPLYING CREDIT/WAVIER

8.3.1 PARAMETER DESCRIPTION

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

8.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

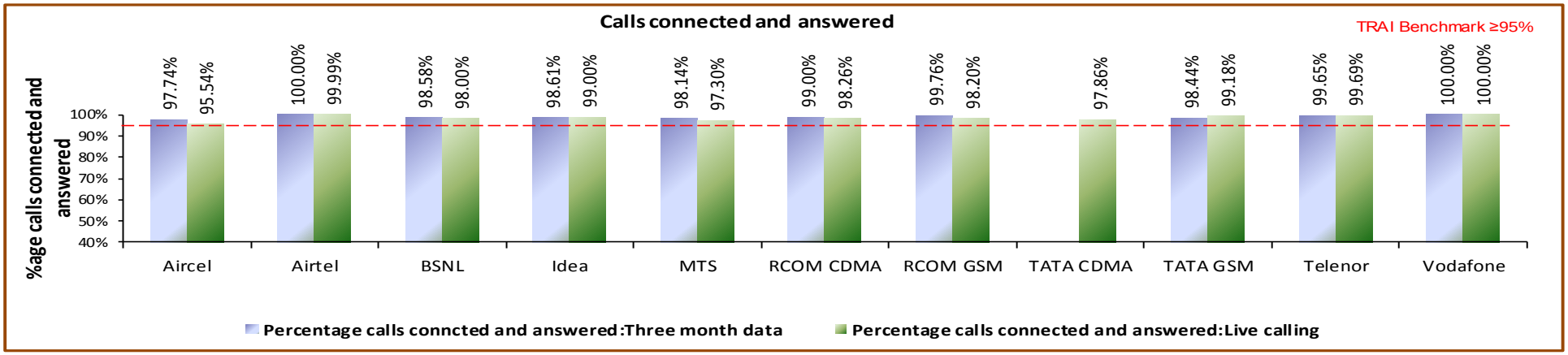
TATA GSM failed to meet the benchmark for this parameter.

8.4 CALL CENTRE PERFORMANCE-IVR

8.4.1 PARAMETER DESCRIPTION

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

8.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

As per PMR data, all operators met the benchmark.

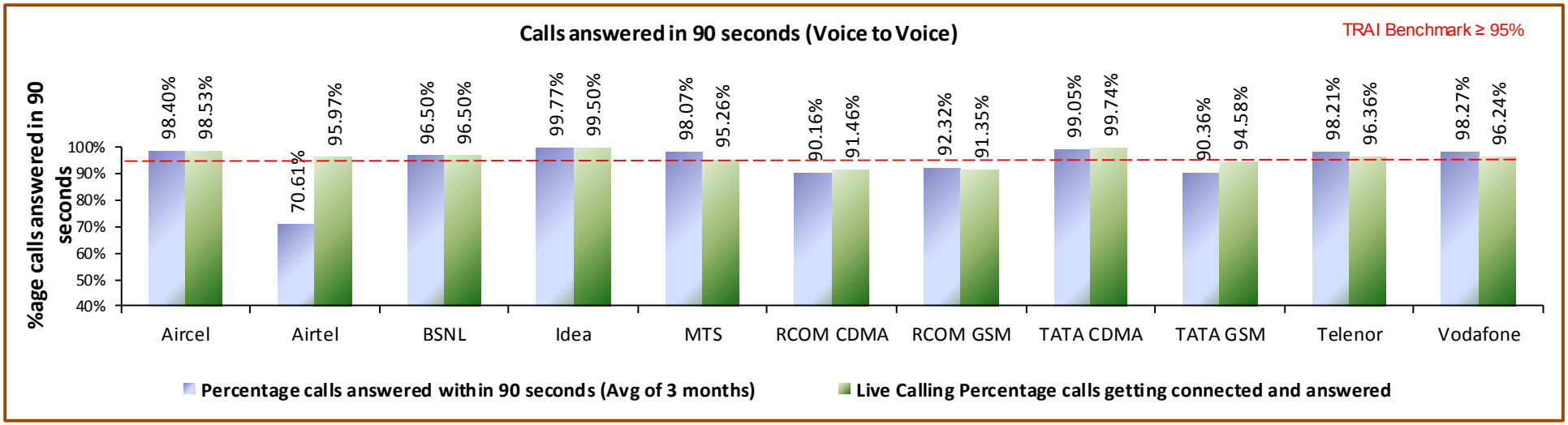
8.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

8.5.1 PARAMETER DESCRIPTION

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

Benchmark: 95% calls to be answered within 90 seconds

8.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

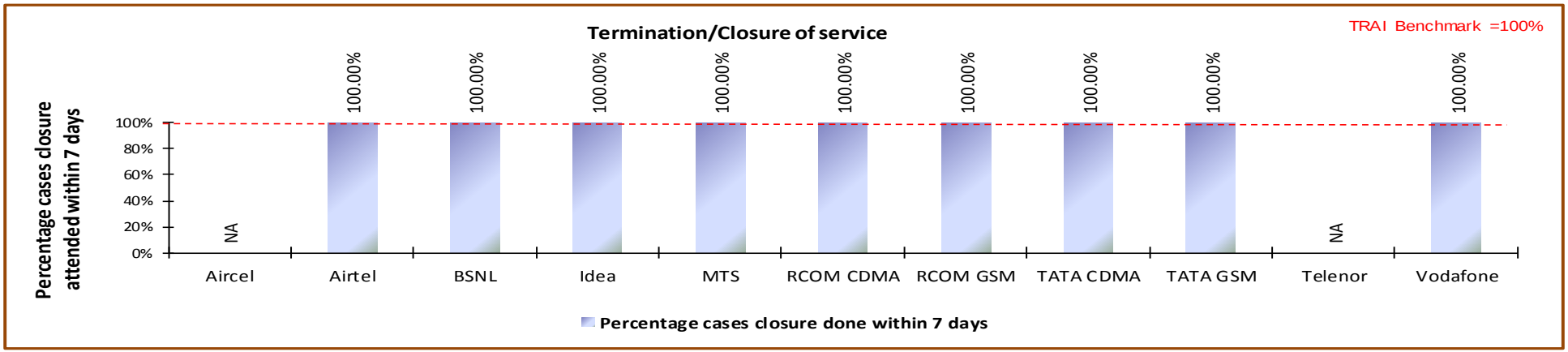
Reliance GSM & CDMA, Airtel and Tata GSM failed to meet the benchmark as per audit. However, as per live calling done to customers, the performance of TATA GSM and Reliance GSM & CDMA was far inferior to the PMR data.

8.6 TERMINATION/CLOSURE OF SERVICE

8.6.1 PARAMETER DESCRIPTION

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

8.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

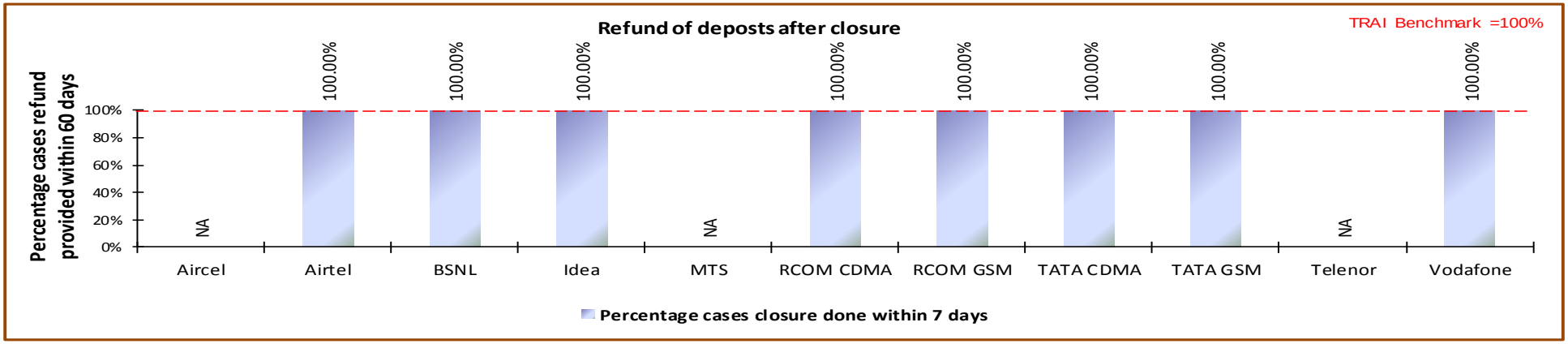
All operators met the TRAI benchmark for the parameter.

8.7 REFUND OF DEPOSITS AFTER CLOSURE

8.7.1 PARAMETER DESCRIPTION

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

8.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

9 DETAILED FINDINGS - DRIVE TEST DATA

9.1 OPERATOR ASSISTED DRIVE TEST - VOICE

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

Name of Operator	Name of Operator
Aircel	BSNL 3G
Airtel	Idea 3G
BSNL	TATA 3G
Idea	Vodafone 3G
MTS	
RCOM CDMA	
RCOM GSM	
TATA CDMA	
TATA GSM	
Telenor	
Videocon	
Vodafone	

9.1.1 Nadiad SSA

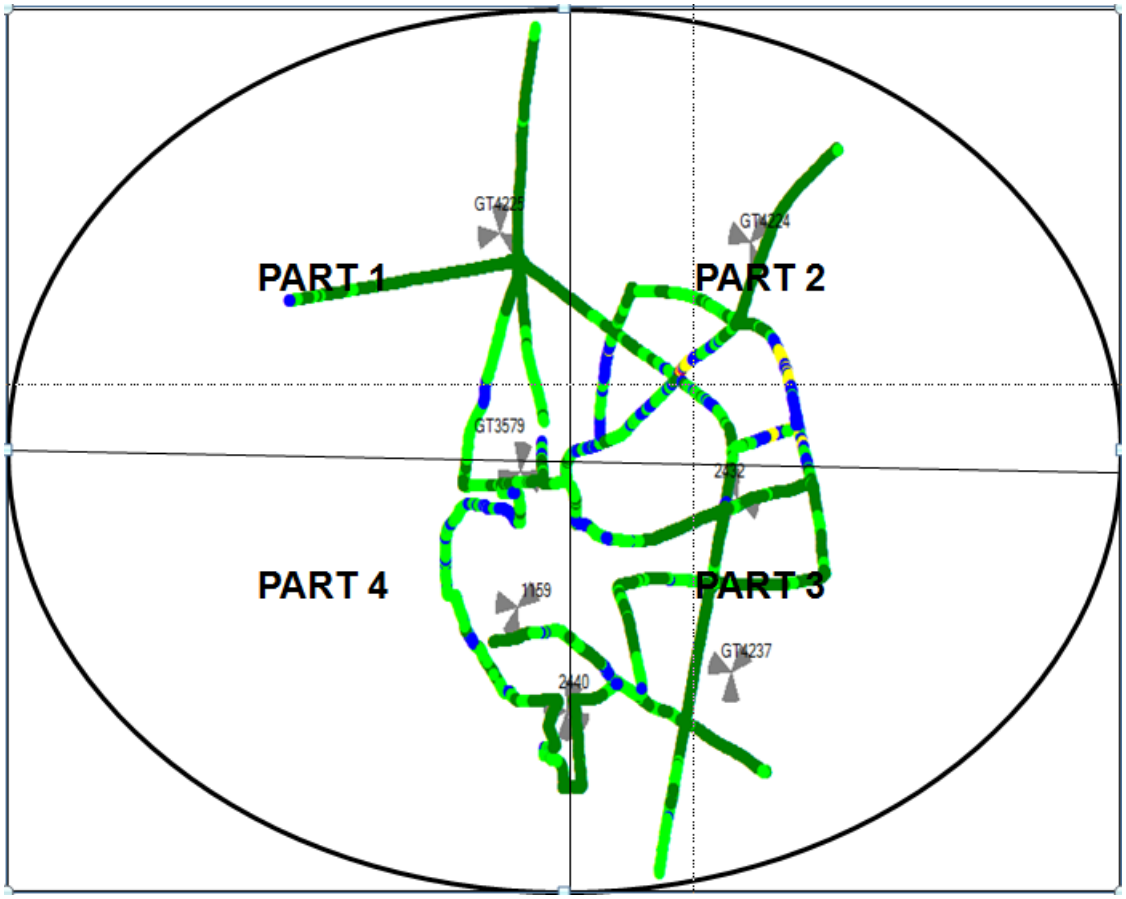
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
January	Nadiad	04-01-2016	06-01-2016	310

9.1.1.1 Route Details - Nadiad a SSA

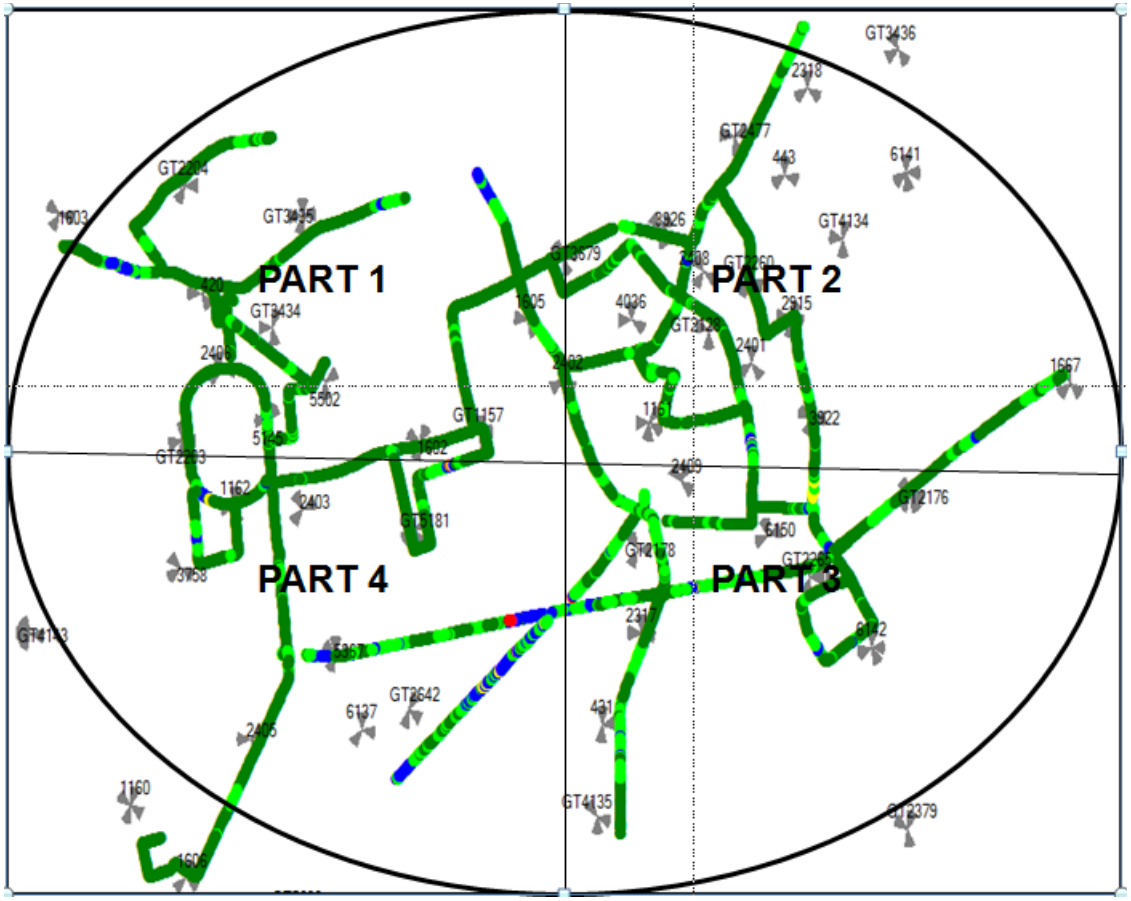
Category	Type of location	Nadiad		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Swaminarayan temple,GEB Borsad,surya Mandir,saiyad wada,Madina nagar,sankarhari park,Borsad college, Laldarwaja road, Gawara road, Metpur Road,Bthak rd,Javahar road,Madra lake,Nawab Sahab Territory,Shakarpur rd, Lion's Garden, Ishrama Village,Sardar patel Park,Petlad raiway station,PBM colony,Rangaipura,Town Hall,MGVCL Petlad	Fatepura Road,Nadiad Railway station,Indira Nagar,Santaram Mandir,Gunj Bazar,Vania vad,Juna Dumaral road, Desai park society,Punit colony, sardar patel University,Vitthal Udhyognagar, R&S Cinema,Bakrol Road,VV nagar road,Chikodra road,Anand Industrial Estate,Anand institute of management,Amul dairy road	Mullavada, patel vada,Sudarshan Lake,Balasinor- sivaliya road, Balasinor bus stand, Indraprasth society, Railway station,Dakor highway,Premji faliya,Jyoti cinema 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.

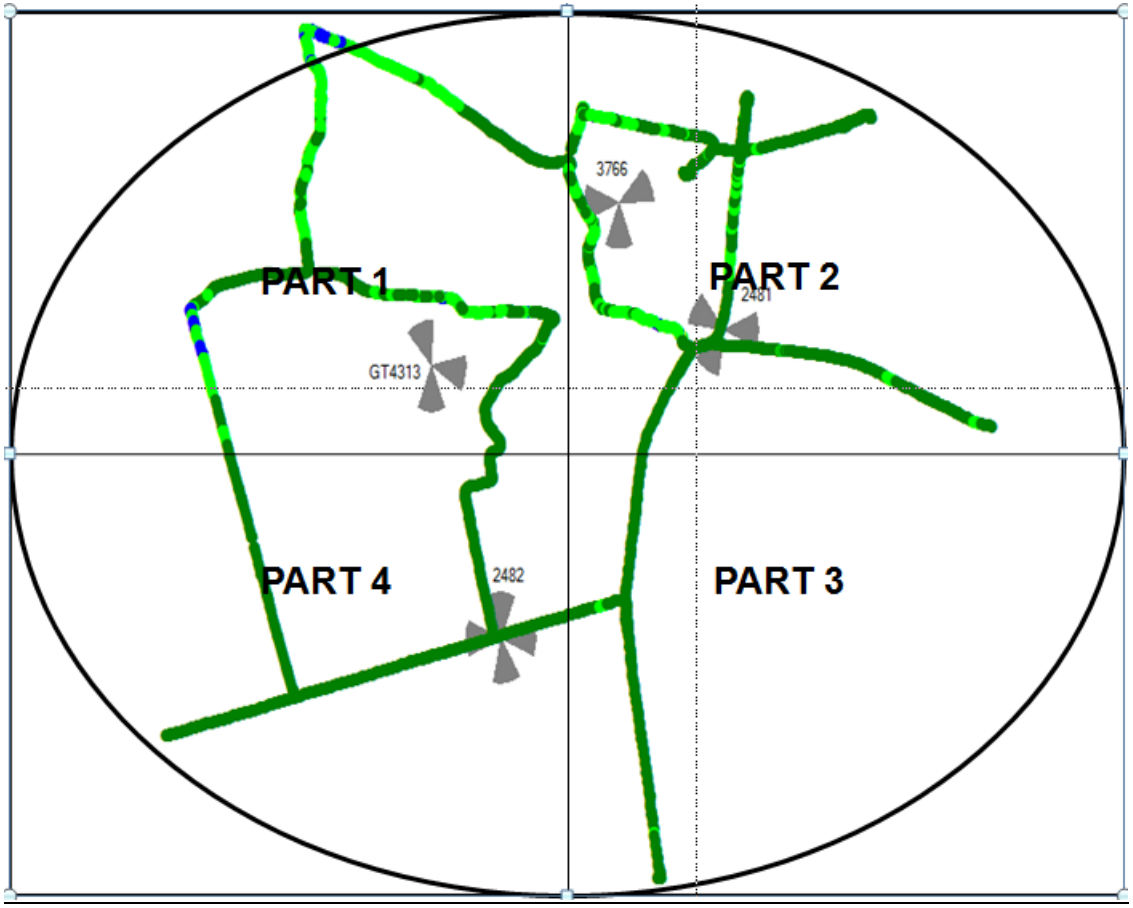
9.1.1.1 Route Map - AHMEDNARGAR DAY 1



9.1.1.2 Route Map - AHMEDNARGAR DAY 2



9.1.1.3 Route Map - AHMEDNARGAR DAY 3



9.1.1.4 Drive Test Results - Nadiad SSA 2G

Naidad	B'mark	Aircel		Airtel		BSNL		Idea		MTS		RCOM CDMA		RCOM GSM		TATA CDMA		TATA GSM		Telenor		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	In door	Outdoor
0 to -75 dBm		No Coverage		99.96%	93.61%	96.20%	71.64%	97.79%	96.57%	87.57%	67.60%	80.73%	63.13%	76.51%	69.18%	78.00%	55.03%	37.20%	37.58%	73.19%	74.80%	100.00%	90.15%
0 to -85 dBm				100.00%	99.24%	99.97%	94.68%	100.00%	99.87%	99.45%	96.73%	99.00%	92.01%	99.29%	93.30%	96.47%	90.56%	99.32%	69.85%	20.05%	18.16%	100.00%	99.18%
0 to -95 dBm				100.00%	99.92%	100.00%	99.80%	100.00%	99.99%	99.78%	99.80%	100.00%	99.84%	100.00%	99.68%	99.99%	99.40%	100.00%	97.30%	0.06%	0.45%	100.00%	99.79%
Voice quality	≥ 95%			98.56%	97.92%	99.84%	98.65%	99.20%	98.56%	100.00%	99.95%	100.00%	99.68%	99.38%	97.59%	99.57%	98.61%	99.93%	98.29%	98.06%	95.52%	99.25%	97.59%
CSSR	≥ 95%			100.00%	100.00%	100.00%	99.53%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.48%	98.19%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

9.1.1.5 Drive Test Results - Nadiad SSA 3G

Naidad	B'mark	Airtel		BSNL 3G		Idea		TATA CDMA		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		No Coverage		99.85%	46.33%	99.99%	97.90%	37.20%	37.58%	82.45%	56.35%
0 to -85 dBm				100.00%	83.95%	100.00%	99.90%	99.32%	69.85%	99.94%	88.55%
0 to -95 dBm				100.00%	97.97%	100.00%	99.99%	100.00%	97.30%	100.00%	99.15%
Voice quality	≥ 95%			100.00%	98.96%	99.78%	98.01%	99.93%	98.29%	99.96%	98.03%
CSSR	≥ 95%			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

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

Call Set Success Rate (CSSR)

All operators met the benchmark for CSSR in outdoor locations.

Call Drop Rate

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

9.1.1.1 Data Drive Test Results - Nadiad SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	No Coverage	100	100	NDR	NDR	100	NDR	NDR	100	NDR	100	100
Succesful Data Transmission upload speed attempts	>75%		100	100	NDR	NDR	100	NDR	NDR	100	NDR	100	100
Minimum download speed			126	41	NDR	NDR	174	NDR	NDR	86	NDR	163	97
Average throughput for Packet Data			150	116	NDR	NDR	145	NDR	NDR	109	NDR	159	121
Latency	<250ms		100	100	NDR	NDR	100	NDR	NDR	100	NDR	100	100

All operators met the TRAI benchmark for data drive test.

9.1.1.2 Data Drive Test Results - Nadiad SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	NDR	100	NDR	100	100
Succesful Data Transmission upload speed attempts	>75%	NDR	100	NDR	100	100
Minimum download speed		NDR	588	NDR	1750	2257
Average throughput for Packet Data		NDR	1543	NDR	83	3301
Latency	<250ms	NDR	100	NDR	100	100

All operators met the TRAI benchmark for data drive test.

9.1.2 Godhra SSA

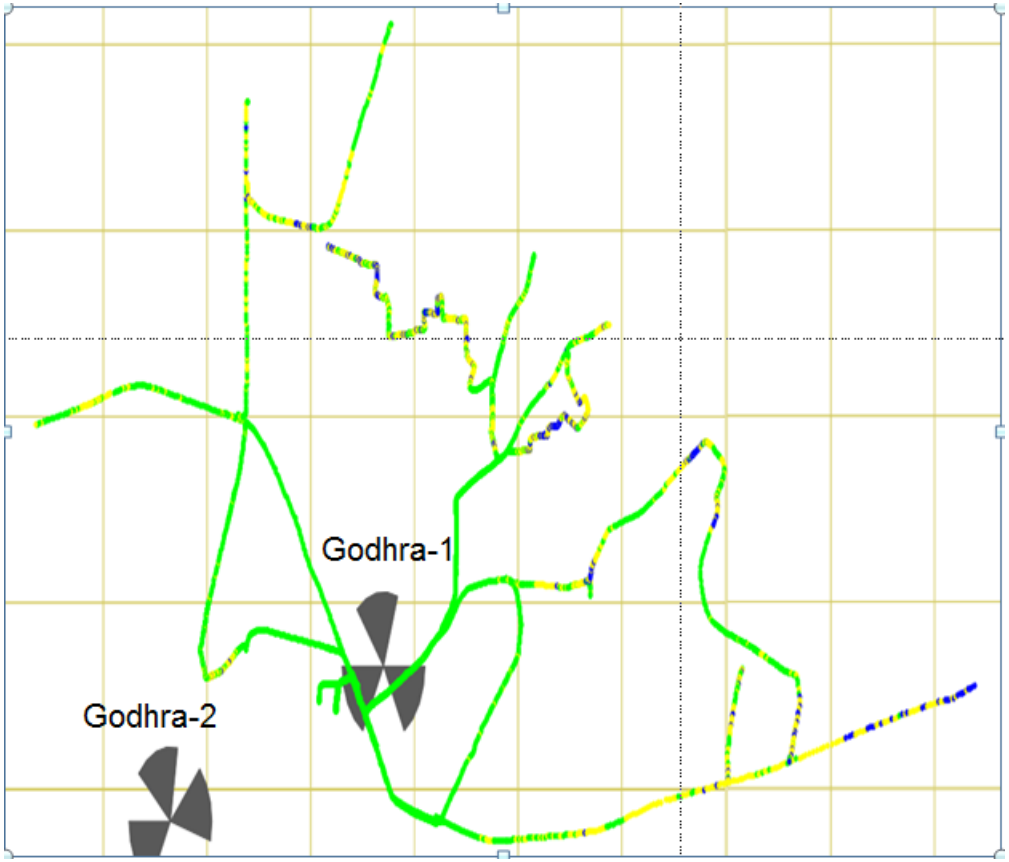
Name of SSA Covered	Start date	End Date	Kilometer Travelled
Godhra	01-03-2016	03-03-2016	315

9.1.2.1 Route Details - Godhra SSA

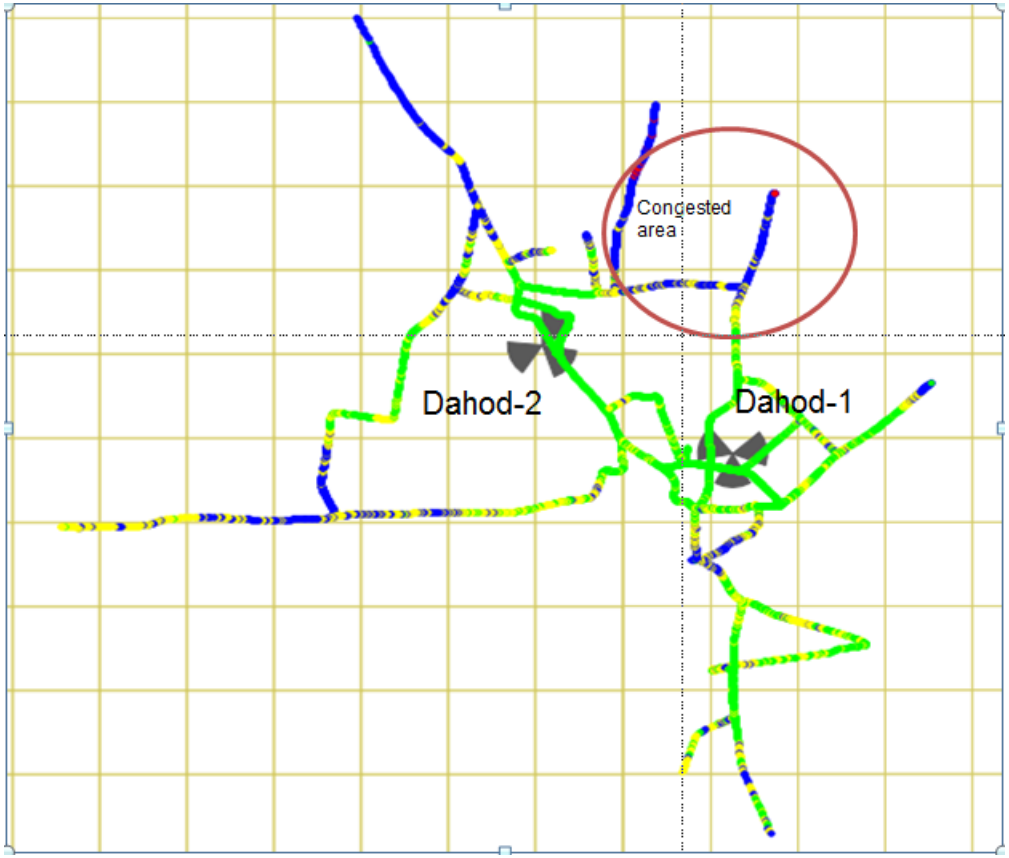
Type of location	February		
	Godhra		
	Day 1	Day 2	Day 3
Major Roads Highways With in the City Shopping complex Office complex	Godhra Major roads, Godhra Highway, Godhra Town	Dahod Major roads, Dahod Highway, Dahod Town	Lunawada Town, Lunawada Major roads, Lunawada Highway

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.

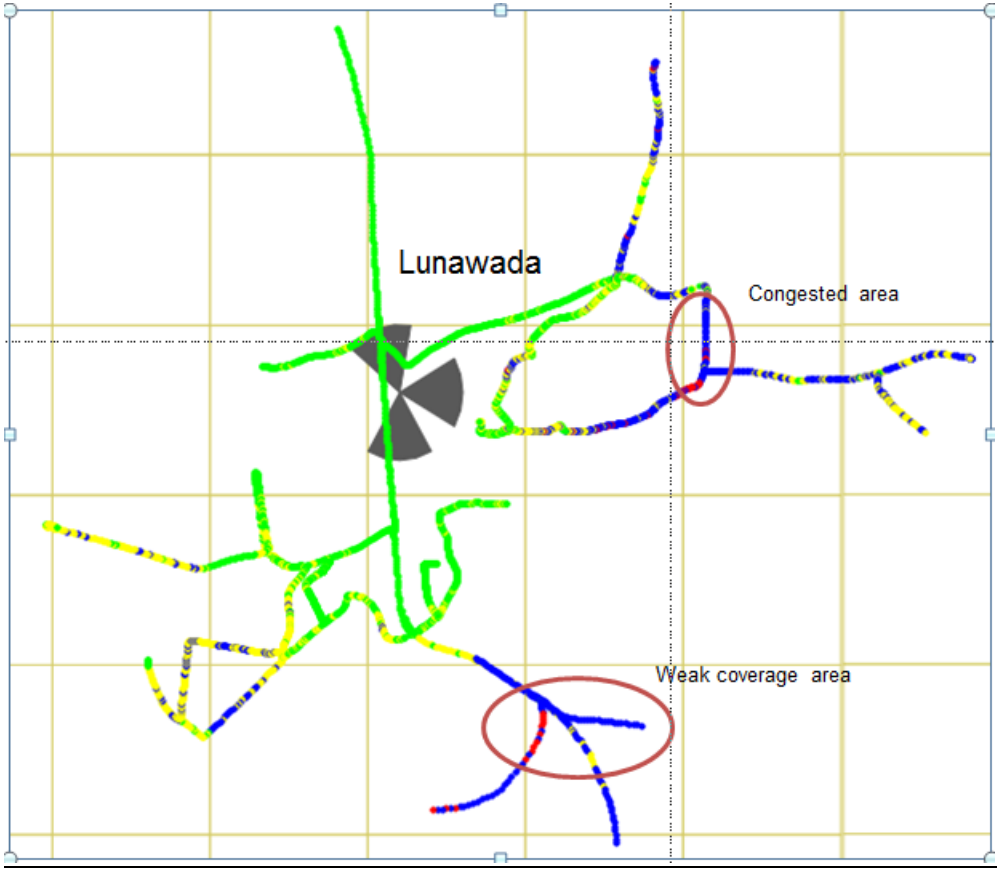
9.1.2.2 Route Map - Godhra DAY 1



9.1.2.3 Route Map - Godhra DAY 2



9.1.2.4 Route Map - Godhra DAY 3



9.1.2.1 Drive Test Results -Godhra SSA 2G

Godhra	B'mark	Aircel		Airtel		BSNL		Idea		MTS		RCOM CDMA		RCOM GSM		TATA CDMA		TATA GSM		Telenor		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	In door	Outdoor
0 to -75 dBm		No Coverage		99.98%	94.78%	95.54%	81.98%	98.35%	93.71%	99.29%	NA	99.67%	43.97%	57.02%	49.70%	99.85%	46.07%	53.89%	57.24%	67.97%	55.49%	100.00%	92.35%
0 to -85 dBm				100.00%	99.65%	99.90%	97.57%	99.99%	99.83%	99.52%	NA	100.00%	76.54%	94.28%	80.67%	100.00%	85.23%	95.50%	87.93%	89.25%	81.81%	100.00%	98.90%
0 to -95 dBm				100.00%	99.99%	100.00%	99.80%	100.00%	100.00%	99.69%	NA	100.00%	99.54%	100.00%	97.90%	100.00%	97.60%	99.82%	98.19%	99.25%	98.39%	100.00%	99.92%
Voice quality	≥ 95%			98.71%	98.45%	99.81%	98.78%	99.01%	97.91%	100.00%	NA	99.74%	97.20%	99.56%	98.22%	99.13%	99.17%	99.55%	98.67%	97.91%	97.67%	99.26%	97.80%
CSSR	≥ 95%			100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.22%	100.00%	100.00%
%age Blocked calls				0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.42%	0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate				100.00%	100.00%	100.00%	98.88%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

9.1.2.2 Drive Test Results - Godhra SSA 3G

Godhra	B'mark	Airtel		BSNL 3G		Idea		TATA CDMA		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		77.66%	58.96%	90.53%	48.11%	99.99%	91.55%	99.99%	20.17%	88.90%	55.60%
0 to -85 dBm		99.23%	87.17%	98.74%	84.18%	100.00%	98.76%	100.00%	50.87%	100.00%	86.83%
0 to -95 dBm		100.00%	98.20%	100.00%	97.48%	100.00%	99.97%	100.00%	95.93%	100.00%	97.78%
Voice quality	≥ 95%	100.00%	99.08%	98.20%	97.56%	99.74%	97.49%	99.98%	99.00%	98.99%	97.49%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	99.63%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.50%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

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

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

9.1.2.1 Data Drive Test Results - Godhra SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	No Coverage	NDR	100	NDR	100	100	NDR	NDR	NDR	100	NDR	100
Succesful Data Transmission upload speed attempts	>75%		NDR	100	NDR	100	100	NDR	NDR	NDR	100	NDR	100
Minimum download speed			NDR	50	NDR	297	81	NDR	NDR	NDR	122	NDR	107
Average throughput for Packet Data			NDR	100	NDR	524	111	NDR	NDR	NDR	134	NDR	143
Latency	<250ms		NDR	100	NDR	100	100	NDR	NDR	NDR	100	NDR	100

Note: Airtel, Idea, Reliance GSM and TATA GSM & CDMA, Videocon did not submit the data.

All operators met the TRAI benchmark for data drive test.

9.1.2.2 Data Drive Test Results - Godhra SSA-3G

Name of the Parameter	Bench Mark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Succesful Data Transmission download speed attempts	>80%	100	100	NDR	NDR	100
Succesful Data Transmission upload speed attempts	>75%	100	100	NDR	NDR	100
Minimum download speed		2311	179	NDR	NDR	2137
Average throughput for Packet Data		3174	727	NDR	NDR	3365
Latency	<250ms	100	100	NDR	NDR	100

Note: Idea and TATA did not submit the data.

All operators met the TRAI benchmark for data drive test.

10 ANNEXURE – CONSOLIDATED-2G

10.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data												
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		2476	22773	13533	22058	106	3335	7636	1731	5751	11552	25358
Sum of downtime of BTSs in a month (in hours)		221	14881	149841	6280	34	15270	68691	1	88843	5940	104287
BTSs accumulated downtime (not available for service)	≤ 2%	0.01%	0.09%	1.49%	0.04%	0.04%	0.62%	1.21%	0.00%	2.08%	0.07%	0.55%
Number of BTSs having accumulated downtime >24 hours		0	28	173	23	0	12	44	0	0	22	42
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.12%	1.28%	0.10%	0.00%	0.36%	0.58%	0.00%	0.00%	0.19%	0.17%
Live Measurement Results for Network Availability- 3 Day live data												
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		2477	22612	13494	21788	100	3335	7207	1734	5753	11554	25318
Sum of downtime of BTSs in a month (in hours)		34	1878	12973	611	1	1329	7028	31	135	2571	10400
BTSs accumulated downtime (not available for service)	≤ 2%	0.02%	0.12%	1.34%	0.04%	0.02%	0.55%	1.35%	0.03%	0.03%	0.31%	0.57%
Number of BTSs having accumulated downtime >24 hours		0	0	63	1	0	0	0	0	0	9	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.47%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.08%	0.00%

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

10.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	98.85%	98.98%	97.96%	99.13%	99.70%	97.98%	98.34%	97.52%	98.54%	98.03%	98.77%
SDCCH/Paging channel congestion	≤ 1%	0.03%	0.07%	0.07%	0.41%	NA	NA	0.08%	NA	0.17%	0.29%	0.16%
TCH congestion	≤ 2%	0.04%	0.71%	0.35%	0.39%	0.00%	0.79%	1.34%	0.22%	0.23%	1.16%	0.15%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	98.89%	98.90%	97.90%	99.04%	99.86%	98.40%	97.50%	97.68%	97.97%	98.02%	99.63%
SDCCH/Paging channel congestion	≤ 1%	0.02%	0.07%	0.07%	0.50%	NA	NA	0.13%	NA	0.19%	0.39%	0.17%
TCH congestion	≤ 2%	0.01%	0.69%	0.35%	0.48%	0.00%	0.39%	2.50%	0.05%	0.19%	1.24%	0.13%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		No Coverage	687	559	706	586	653	712	588	407	903	582
Total number of successful calls established		No Coverage	687	558	706	586	653	712	588	407	888	582
CSSR	≥ 95%	No Coverage	100.00%	99.82%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.34%	100.00%
%age blocked calls		No Coverage	0.00%	0.18%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.66%	0.00%

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

10.3 Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		35336492	640374589	190957785	898226186	45117	257890551	232213904	22456499	112769103	560700888	7489202090
Total number of calls dropped		113883	4401524	1028507	7705361	4	172522	217503	62547	703618	4498543	43771662
Call drop rate	≤ 2%	0.32%	0.69%	0.54%	0.86%	0.01%	0.07%	0.09%	0.28%	0.62%	0.80%	0.58%
Total number of cells in the network		7428	71050	40240	65675	318	10009	22593	5249	17257	36167	77034
Total number of cells having more than 3% TCH		130	797	630	1473	0	31	62	158	496	1137	1094
Worst affected cells having more than 3% TCH	≤ 3%	1.75%	1.12%	1.57%	2.24%	0.07%	0.31%	0.28%	3.02%	2.87%	3.14%	1.42%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		3412856	64877045	18695415	88783287	74380	27367304	21681838	21757966	8898001	201645284	1295371901
Total number of calls dropped		10792	473908	108617	749200	9	26656	23459	75852	51372	1903711	4702069
Call drop rate	≤ 2%	0.32%	0.73%	0.58%	0.84%	0.01%	0.10%	0.11%	0.35%	0.58%	0.94%	0.36%
Total number of cells in the network		7431	70974	40292	65309	306	10013	22668	3574	13278	36169	76800
Total number of cells having more than 3% TCH		128	878	689	1466	0	31	62	69	378	1085	77
Worst affected cells having more than 3% TCH	≤ 3%	1.72%	1.24%	1.71%	2.25%	0.00%	0.31%	0.27%	1.92%	2.85%	3.00%	0.10%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		No Coverage	687	555	706	586	653	712	588	407	894	582
Total number of calls dropped		No Coverage	0	0	0	0	0	0	0	0	4	0
Call drop rate	≤ 2%	No Coverage	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.45%	0.00%

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

10.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		6698106127	107314042536	3705320140	240889692492	158395690	NA	33616297580	585894043	19102355056	128905002483	1897003738624
Total number of calls with good voice quality		6496036762	103934433377	3630138032	231244404285	157154070	NA	33254660428	367430098	18794322651	126394281033	1858469190352
%age calls with good voice quality	≥ 95%	96.98%	96.85%	97.97%	96.00%	99.22%	NA	98.92%	62.71%	98.39%	98.05%	97.97%
Live measurement results for Voice quality-3 Day data												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		645665502	10938166458	639409302	23884619028	229605006	NA	3417600347	240745684	1919923400	47935613016	211153078568
Total number of calls with good voice quality		626421251	10577826414	631166668	22892819879	227714475	NA	3382194446	156627632	1888689025	47001457857	206835258392
%age calls with good voice quality	≥ 95%	97.02%	96.71%	98.71%	95.85%	99.18%	NA	98.96%	65.06%	98.37%	98.05%	97.96%
Drive test results for Voice quality (Average of three drive tests) - DT data												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		No Coverage	510066	139555	167387	NA	NA	106030	137509	1172264	130307	385085
Total number of calls with good voice quality		No Coverage	501080	138003	164758	NA	NA	103842	136162	1156259	125540	377645
%age calls with good voice quality	≥ 95%	No Coverage	98.24%	98.89%	98.43%	99.99%	99.16%	97.94%	99.02%	98.63%	96.34%	98.07%

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

10.5 POI CONGESTION

Audit Results for POI Congestion- PMR data												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		120	58	174	463	192	180	57	481	75	72	457
No. of POIs not meeting benchmark		0	0	1	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		5641	153004	145005	484529	24047	182055	170566	106244	110742	416906	465412
Traffic served for all POIs (B)- in erlangs		97	3767	85611	244565	2349	74617	98620	38683	69492	213568	150535
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		120	0	174	463	192	180	57	481	211	72	457
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		5680	0	145005	483865	23994	191787	188018	106244	109578	324193	468003
Traffic served for all POIs (B)- in erlangs		98	0	88632	249317	1658	84242	113668	34249	48137	274248	124013
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

11 ANNEXURE – CONSOLIDATED-3G

11.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		12127	6227	16362	4012	17246
Sum of downtime (i.e. total outage time) of Node Bs		12322	52872	6120	27365	3562
Node Bs downtime (not available for service)	≤ 2%	0.14%	1.14%	0.05%	0.92%	0.03%
Number of Node Bs having accumulated downtime of >24 hours in a month		76	108	17	0	3
Worst affected Node Bs due to downtime	≤ 2%	0.63%	1.73%	0.10%	0.00%	0.02%
Live Measurement Results for Network Availability- 3 Day live data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		10898	6227	16288	4012	17146
Sum of downtime (i.e. total outage time) of Node Bs		1501	5709	506	179	378
Node Bs downtime (not available for service)	≤ 2%	0.19%	1.27%	0.04%	0.06%	0.03%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	29	2	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.47%	0.01%	0.00%	0.00%

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

11.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.87%	95.94%	99.70%	98.10%	99.79%
RRC Congestion	≤ 1%	0.03%	0.86%	0.25%	0.30%	0.13%
Circuit Switched RAB Congestion	≤ 2%	0.12%	0.53%	0.09%	1.02%	0.09%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.89%	97.04%	99.69%	98.36%	99.79%
RRC Congestion	≤ 1%	0.01%	0.48%	0.19%	0.21%	0.13%
Circuit Switched RAB Congestion	≤ 2%	0.06%	0.42%	0.10%	0.84%	0.14%
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	Vodafone 3G
Total number of RRC attempts (A)		277	610	639	256	670
Total number of RRC established (B)		277	609	639	256	670
Call setup success rate (B/A*100)	≥ 95%	100.00%	99.84%	100.00%	100.00%	100.00%
%age blocked calls		0.00%	0.16%	0.00%	0.00%	0.00%

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

11.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		65308461	424029650	263880917	47905840	8466346490
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		157929	5045840	1089637	251402	36122210
Call drop rate (B/A*100)	≤ 2%	0.24%	1.19%	0.41%	0.52%	0.43%
Total no. of cells in the licensed service area (B)		37778	18681	50887	12000	56915
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		863	297	1202	285	681
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.28%	1.59%	2.36%	2.38%	1.20%
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	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		6552174	38508374	25902480	4859758	980035826
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		14630	509753	106404	24525	3746139
Call drop rate (B/A*100)	≤ 2%	0.22%	1.32%	0.41%	0.50%	0.38%
Total no. of cells in the licensed service area (B)		33840	18681	50680	12006	56295
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		752	275	1238	240	312
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.22%	1.47%	2.44%	2.00%	0.55%
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	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		277	609	639	256	670
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	0	1	0	0
Call drop rate (B/A*100)	≤ 2%	0.00%	0.00%	0.16%	0.00%	0.00%

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

11.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		193680357559	433446657	190322051101	105594742500	4512537327473
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		191615884137	419012466	188059246238	105270388958	4465868013532
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.93%	96.67%	98.81%	99.69%	98.97%
Live measurement results for Voice quality-3 Day data						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		17303181579	43165315	18938445528	10641228000	831494676608
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		11246357235	41348704	18714217505	10609339245	822858928502
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	65.00%	95.79%	98.82%	99.70%	98.96%
Drive test results for Voice quality (Average of three drive tests) - DT data						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		830197	608061	726467	1155242	1825692
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		823966	596518	713716	1140262	1791998
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.25%	98.10%	98.24%	98.70%	98.15%

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	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		0	174	463	25	456
No. of POIs not meeting benchmark		0	1	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	145005	484801	36914	465530
Traffic served for all POIs (B)- in erlangs		0	85686	240723	24233	179270
POI congestion	≤ 0.5%	#DIV/0!	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		0	174	463	25	457
No. of POIs not meeting benchmark		0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	145005	483865	36914	470602
Traffic served for all POIs (B)- in erlangs		0	84324	249317	10835	126918
POI congestion	≤ 0.5%	#DIV/0!	0.00%	0.00%	0.00%	0.00%

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

12 ANNEXURE – CUSTOMER SERVICES

12.1 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated												
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)												
Metering and billing credibility - Postpaid												
Total bills generated during the period		97	1479776	157336	1782652	168693	409833	373729	38115	179535	NA	5906373
Total number of bills disputed		0	543	13	8542	59	368	335	0	3	NA	5658
Total number of valid billing complaints		0	98	13	707	42	368	335	0	3	NA	5658
Total complaints considered invalid		0	445	0	7835	17	0	0	0	0	NA	0
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.04%	0.01%	0.48%	0.03%	0.09%	0.09%	0.00%	0.00%	NA	0.10%
January												
Total bills generated during the first billing cycle		32	474717	52734	582257	59459	135795	113054	12995	60854	NA	1931813
Total number of bills disputed in first billing cycle		0	176	5	2843	28	125	101	0	0	NA	1522
Total number of valid billing complaints (billing cycle 1)		0	36	5	255	19	125	101	0	0	NA	1522
Total complaints considered invalid (billing cycle 1)		0	140	0	2588	9	0	0	0	0	NA	0
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.04%	0.01%	0.49%	0.05%	0.09%	0.09%	0.00%	0.00%	NA	0.08%
February												
Total bills generated during the second billing cycle		32	478739	52520	593086	55096	136612	126049	12688	59792	NA	1976256
Total number of bills disputed in second billing cycle		0	179	3	2335	12	122	113	0	3	NA	1575
Total number of valid billing complaints (billing cycle 2)		0	20	3	214	5	122	113	0	3	NA	1575
Total complaints considered invalid (billing cycle 2)		0	159	0	2121	7	0	0	0	0	NA	0
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.04%	0.01%	0.39%	0.02%	0.09%	0.09%	0.00%	0.01%	NA	0.08%

Data Source: Billing Center of the operators

March												
Total bills generated during the third billing cycle		33	526320	52082	607309	54138	137426	134626	12432	58889	NA	1998304
Total number of bills disputed in third billing cycle		0	188	5	3364	19	121	121	0	0	NA	2561
Total number of valid billing complaints (billing cycle 3)		0	42	5	238	18	121	121	0	0	NA	2561
Total complaints considered invalid (billing cycle 3)		0	146	0	3126	1	0	0	0	0	NA	0
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.04%	0.01%	0.55%	0.04%	0.09%	0.09%	0.00%	0.00%	NA	0.13%
Metering and billing credibility - Prepaid												
Performance prepaid	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of charging complaints (valid) - sum of 3 months		0	20	459	2253	8	105	4049	0	0	130	1135
Total complaints considered invalid (sum of 3 months)		0	333	4652	10385	0	190	0	0	0	0	0
Total number of charging complaints (sum of 3 months)		0	353	5111	12638	8	295	4049	0	0	130	1135
Total no of customers served (Sum of 3 months)		50805	23225909	9471744	34551888	468659	2798731	13510861	237367	3254436	26028211	17494088
Percentage of charging complaints disputed	≤ 0.1%	0.00%	0.00%	0.05%	0.04%	0.00%	0.01%	0.03%	0.00%	0.00%	0.00%	0.01%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated												
Billing Performance	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**RCOM CDMA**	**RCOM GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total number of billing/charging complaints		0	896	5124	21180	67	663	4384	0	3	130	13743
Total number of complaints resolved in favour of customer		0	118	472	2960	50	473	4384	0	3	130	6793
Total complaints considered invalid		0	778	4652	18220	17	190	0	0	0	0	6950
Number of complaints resolved in 4 weeks		0	118	459	2960	50	473	4384	0	3	130	6793
Percentage complaints resolved within 4 weeks	≥ 98%	NA	100.00%	97.25%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		0	118	459	2960	50	473	4384	0	3	130	6793
Percentage complaints resolved within 6 weeks	100.00%	NA	100.00%	97.25%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Period of applying credit / waiver												
Total number of complaints where credit/waiver is required		0	114	459	3931	47	473	4384	0	2	130	6793
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%	66.67%	100.00%	100.00%
Live calling results for resolution of billing complaints												
Resolution of billing complaints	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**MTS**	**RCOM CDMA**	**RCOM GSM**	**TATA CDMA**	**TATA GSM**	**Telenor**	**Vodafone**
Total Number of calls made		100	100	100	100	100	100	100	3	6	NA	NA
Number of cases resolved in 4 weeks		100	100	100	100	100	100	100	3	6	NA	NA
Percentage cases resolved in 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA
Number of cases resolved in 6 weeks		100	100	100	100	100	100	100	3	6	NA	NA
Percentage cases resolved in 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA

Data Source: Billing Center of the operators

12.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated												
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts to customer care for assistance		10567	1972657	269259	24116862	35967	745735	7460510	NA	645367	17921746	23809849
Number of calls getting connected and answered (electronically)		10328	1972657	265444	23781751	35297	738258	7442686	NA	635296	17858166	23809849
Percentage calls getting connected and answered	≥ 95%	97.74%	100.00%	98.58%	98.61%	98.14%	99.00%	99.76%	NA	98.44%	99.65%	100.00%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated												
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total Number of calls received (3 months)		1314	3667697	1839686	7972794	2795	239020	1427612	40850	1159617	4263917	10098310
Total Number of calls answered within 90 seconds (3 months)		1293	2589611	1775339	7954271	2741	215495	1318021	40462	1047793	4187576	9923663
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	98.40%	70.61%	96.50%	99.77%	98.07%	90.16%	92.32%	99.05%	90.36%	98.21%	98.27%
January												
Total calls received (Month 1)		389	1192947	588150	2757468	969	75666	519235	15363	403698	1398814	3408516
Total calls answered within 90 seconds (Month 1)		379	1061240	568899	2748915	948	64136	469265	15095	334976	1368359	3299722
% calls answered within 90 seconds (Month 1)	≥ 95%	97.43%	88.96%	96.73%	99.69%	97.83%	84.76%	90.38%	98.26%	82.98%	97.82%	96.81%
February												
Total calls received (Month 2)		384	1198993	579643	2529109	958	83128	460478	12749	368266	1417066	3213859
Total calls answered within 90 seconds (Month 2)		378	764366	565062	2522992	937	75465	432480	12692	337128	1387537	3192480
% calls answered within 90 seconds (Month 2)	≥ 95%	98.44%	63.75%	97.48%	99.76%	97.81%	90.78%	93.92%	99.55%	91.54%	97.92%	99.33%
March												
Total calls received (Month 3)		541	1275757	671893	2686217	868	80226	447899	12738	387653	1448037	3475935
Total calls answered within 90 seconds (Month 3)		536	764005	641378	2682364	856	75894	416276	12675	375689	1431680	3431461
% calls answered within 90 seconds (Month 3)	≥ 95%	99.08%	59.89%	95.46%	99.86%	98.62%	94.60%	92.94%	99.51%	96.91%	98.87%	98.72%

12.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated												
Termination	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of closure request		NA	6378	5056	16635	7414	2527	881	884	1862	NA	24849
Number of requests attended within 7 days		NA	6378	5056	16635	7414	2527	881	884	1862	NA	24849
Percentage cases in which termination done within 7 days	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%

Data Source: Customer Service Center of the operators

12.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated												
Refund	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of cases requiring refund of deposits		NA	1136	1306	3258	NA	2204	2979	219	138	NA	6827
Total number of cases where refund was made within 60 days		NA	1136	1306	3258	NA	2204	2979	219	138	NA	6827
Percentage cases in which refund was receive within 60 days	100.00%	NA	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	NA	100.00%

Data Source: Billing Center of the operators

12.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests												
Resolution of service requests	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone	Vodafone
Total Number of calls made		100	100	100	100	100	100	100	100	100	100	100
Number of cases resolved to satisfaction		100	99	100	100	100	96	99	98	100	100	100
Percentage cases resolved in four weeks	98.00%	100.00%	99.00%	100.00%	100.00%	100.00%	96.00%	99.00%	98.00%	100.00%	100.00%	100.00%

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

12.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services												
Level 1 services		Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total no. of calls made		300	300	300	300	300	300	300	300	300	300	300
Calls answered		254	241	168	251	263	259	275	294	218	273	182
% of calls connected	≥ 95%	99.00%	99.50%	97.00%	99.00%	100.00%	98.00%	97.50%	99.00%	98.00%	100.00%	96.00%

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

12.7 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		24	20
101	Fire	Y		23	20
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		23	20
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		23	19
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		23	20
1071	Air Accident Helpline	Y		23	20
1072	Rail Accident Helpline		N		

1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		23	19
10120	Call Alart (Crime Branch)	Y		23	20
10121	Women Helpline	Y		23	19
10127	National AIDS Helpline to NACO	Y		23	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				
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway				
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline				
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		23	19
11212	Complaint of Electricity	Y		23	19
11216	Drinking Water Supply	Y		23	20
11250	Election Commission of India		N		
Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		22	17
101	Fire	Y		21	18
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		22	17

1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		22	17
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		21	17
1071	Air Accident Helpline	Y		22	18
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		21	17
10120	Call Alart (Crime Branch)	Y		21	17
10121	Women Helpline	Y		21	17
10127	National AIDS Helpline to NACO	Y		22	18
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		21	17
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline				
155304	Municipal Corporations		N		
155214	Labour Helpline		N		

11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		21	17
11212	Complaint of Electricity	Y		21	17
11216	Drinking Water Supply	Y		22	17
11250	Election Commission of India		N		
BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	10
101	Fire	Y		17	9
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	9
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	9
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	9
1073	Road Accident Helpline	Y		16	9
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		17	10
10121	Women Helpline	Y		16	9

10127	National AIDS Helpline to NACO	Y		16	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		17	9
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		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		17	10
112012	National Do Not Call Registry	Y		16	9
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		17	10

Idea

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		22	18
101	Fire	Y		21	18
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		22	17
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		22	18
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		21	17
1071	Air Accident Helpline	Y		22	17
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		21	18
10120	Call Alart (Crime Branch)	Y		21	18
10121	Women Helpline	Y		21	19
10127	National AIDS Helpline to NACO	Y		22	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		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		21	18
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline				
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		21	18
11212	Complaint of Electricity	Y		21	18
11216	Drinking Water Supply	Y		22	18

11250	Election Commission of India		N		
MTS					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	24
101	Fire	Y		28	24
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		28	24
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		27	23
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		27	24
1071	Air Accident Helpline	Y		28	24
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		27	24
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		27	24
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		27	24
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		27	24
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	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		27	24
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

Reliance CDMA

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		22	19
101	Fire	Y		21	19
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		22	18
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		22	18
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		21	18
1071	Air Accident Helpline	Y		22	18
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline				
1077	Control Room for District Collector	Y		21	18
10120	Call Alart (Crime Branch)	Y		21	18
10121	Women Helpline	Y		21	19
10127	National AIDS Helpline to NACO	Y		22	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				
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		21	18
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline				
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		21	19
11212	Complaint of Electricity	Y		21	19
11216	Drinking Water Supply	Y		22	19
11250	Election Commission of India		N		
Reliance GSM					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	25
101	Fire	Y		28	25
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		28	25
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		27	25
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		27	25
1071	Air Accident Helpline	Y		28	25
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		27	25
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		27	25
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		27	25
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		27	25
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	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		27	25
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		17	17
101	Fire	Y		17	17
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		17	17
138	All India Helpine for Passangers	Y		17	16
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	16
182	Indian Railway Security Helpline	Y		17	17
1033	Road Accident Management Service	Y		17	16
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	16
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		16	16
1073	Road Accident Helpline	Y		16	16
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		17	17
10121	Women Helpline	Y		16	16
10127	National AIDS Helpline to NACO	Y		16	16
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	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		16	16
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		17	17
112012	National Do Not Call Registry	Y		16	16
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		17	16
TATA GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	19
101	Fire	Y		28	19

102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		28	20
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		27	19
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		27	20
1071	Air Accident Helpline	Y		28	20
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		27	20
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		27	22
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		27	20
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		

1512	Prevention of Crime in Railway	Y		27	20
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	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		27	19
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

Telenor

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		14	13
101	Fire	Y		14	13
102	Ambulance				
104	Health Information Helpline				
108	Emergency and Disaster Management Helpline	Y		14	13
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		14	13
182	Indian Railway Security Helpline	Y		13	13
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services				
106X	State of the Art Hospitals	Y		14	13
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline	Y		13	13
1070	Relief Commission for Natural Calamities	Y		14	13
1071	Air Accident Helpline	Y		14	13

1072	Rail Accident Helpline	Y		13	13
1073	Road Accident Helpline	Y		14	13
1077	Control Room for District Collector	Y		13	13
10120	Call Alart (Crime Branch)	Y		14	13
10121	Women Helpline	Y		14	13
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		14	13
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		13	13
10741	Pollution Control Board	Y		14	13
1511	Police Related Service for all Metro Railway Project	Y	N	13	
1512	Prevention of Crime in Railway	Y		13	13
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		13	13
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)				
112012	National Do Not Call Registry	Y		14	13
11212	Complaint of Electricity	Y		14	13
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

Videocon

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		19	11
101	Fire	Y		19	11
102	Ambulance	Y		18	11
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		

138	All India Helpine for Passangers	Y		19	12
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
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		18	11
1071	Air Accident Helpline	Y		19	12
1072	Rail Accident Helpline	Y		19	12
1073	Road Accident Helpline	Y		19	12
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		19	12
10121	Women Helpline	Y		18	11
10127	National AIDS Helpline to NACO	Y		19	11
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	11
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		19	11
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		19	11
155304	Municipal Corporations		N		

155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		19	12
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		19	11
Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	8
101	Fire	Y		17	7
102	Ambulance	Y		18	7
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	8
138	All India Helpine for Passangers	Y		17	7
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		18	8
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	7
1071	Air Accident Helpline	Y		17	8
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		17	7
1077	Control Room for District Collector	Y		18	8
10120	Call Alart (Crime Branch)	Y		17	8

10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		18	8
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	8
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
155304	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

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

13 COUNTER DETAILS

Sl No.	KPI	Formula with Counter Description
1	CSSR= (No of established Calls / No of Attempted Calls)%	***No of established Calls =*** ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)] +[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)]))/***No of Attempted Calls =*** ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Changeable)])
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	***SDCCH Failure=*** ([Channel Assignment Failures (All Channels Busy or Channels Unconfigured) in Immediate Assignment Procedure (SDCCH)] + [Failed Internal Intra-Cell Handovers (No Channel Available) (SDCCH)] + [Number of Unsuccessful Incoming Internal Inter-Cell Handovers (No Channel Available) (SDCCH)] + [Failed Incoming External Inter-Cell Handovers (No Channel Available) (SDCCH)])/***SDCCH attempts =*** ([Channel Assignment Requests in Immediate Assignment Procedure (SDCCH)] + [Internal Intra-Cell Handover Requests (SDCCH)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Number of Incoming Internal Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-900/850/810)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (900/850/810-1800/1900)] + [Incoming External Inter-Cell Handover Requests (SDCCH) (1800/1900-900/850/810)])
3	TCH congestion= (TCH Failures /TCH Attempts)%	***TCH Failures=*** ((Failed TCH Seizures due to Busy TCH (Signaling Channel)+([Failed Assignments (First Assignment, No Channel Available in Assignment Procedure)]+[Failed Assignments (First Assignment, No Channel Available in Directed Retry Procedure)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Assignment)]+[Failed Assignments (Reconnection to Old Channels, No Channel Available in Directed Retry)])/***TCH Attempts =*** ([Assignment Requests (Signaling Channel) (TCH)] + [Assignment Requests (Signaling Channel) (SDCCH)] + [Assignment Requests (TCHF Only)] + [Assignment Requests (TCHH Only)] + [Assignment Requests (TCHF Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHH Preferred, Channel Type Unchangeable)] + [Assignment Requests (TCHF or TCHH, Channel Type Unchangeable)] + [Assignment Requests (TCHF Preferred, Channel Type Changeable)] + [Assignment Requests (TCHH Preferred, Channel Type Changeable)] + [Assignment Requests (TCHF or TCHH, Channel Type

4	**Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)**	***The total no of dropped calls=*** **([Call Drops on Radio Interface in Stable State (Traffic Channel)] + [Call Drops on Radio Interface in Handover State (Traffic Channel)] + [Call Drops Due to No MR from MS for a Long Time (Traffic Channel)] + [Call Drops due to Abis Terrestrial Link Failure (Traffic Channel)] + [Call Drops due to Equipment Failure (Traffic Channel)] + [Call Drops due to Forced Handover (Traffic Channel)] + [Call Drops due to local switching Start Failure] + [Call Drops due to Failures to Return to Normal Call from local switching])/*Total no of calls successfully established (where traffic channel is allotted) =* ([Assignment Requests]-([Failed Assignments (Signaling Channel)]+[Failed Assignments during MOC on the A Interface (Including Directed Retry)]+[Failed Assignments during MTC on the A Interface (Including Directed Retry)]+[Failed Assignments during Emergency Call on the A Interface (Including Directed Retry)] +[Failed Assignments during Call Re-establishment on the A Interface (Including Directed Retry)]+[Failed Mode Modify Attempts (MOC) (TCHF)]+[Failed Mode Modify Attempts (MTC) (TCHF)]+[Failed Mode Modify Attempts (Emergency Call) (TCHF)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHF)]+[Failed Mode Modify Attempts (MOC) (TCHH)]+[Failed Mode Modify Attempts (MTC) (TCHH)]+[Failed Mode Modify Attempts (Call Re-establishment) (TCHH)])**
5	**Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area**	**Above formula with counters being used in CBBH.**
6	**Connection with good quality voice= (Connection with good quality voice/Total voice samples)%**	***Connection with good quality voice =*** **((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)) /*Total voice samples=* ((Number of MRs on Downlink TCHF (Receive Quality Rank 0)+Number of MRs on Downlink TCHF (Receive Quality Rank 1)+Number of MRs on Downlink TCHF (Receive Quality Rank 2)+Number of MRs on Downlink TCHF (Receive Quality Rank 3)+Number of MRs on Downlink TCHF (Receive Quality Rank 4)+Number of MRs on Downlink TCHF (Receive Quality Rank 5)+Number of MRs on Downlink TCHF (Receive Quality Rank 6)+Number of MRs on Downlink TCHF (Receive Quality Rank 7)+Number of MRs on Downlink TCHH (Receive Quality Rank 0)+:Number of MRs on Downlink TCHH (Receive Quality Rank 1)+Number of MRs on Downlink TCHH (Receive Quality Rank 2)+Number of MRs on Downlink TCHH (Receive Quality Rank 3)+Number of MRs on Downlink TCHH (Receive Quality Rank 4)+Number of MRs on Downlink TCHH (Receive Quality Rank 5)+Number of MRs on Downlink TCHH (Receive Quality Rank 6)+Number of MRs on Downlink TCHH (Receive Quality Rank 7))**

13.1.1 ERICSSON

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

Sl No.	KPI	Ericsson
1	**CSSR= (No of established Calls / No of Attempted Calls)%**	CSSR (No of established Calls / No of Attempted Calls)=(TCASSALL/TASSALL)*100
2	**SDCCH congestion= (SDCCH Failure/SDCCH attempts)%**	SDCCH congestion (SDCCH Failure/SDCCH attempts)% = (CCONGS/CCALLS)*100
3	**TCH congestion= (TCH Failures /TCH Attempts)%**	TCH congestion (TCH Failures /TCH Attempts)%= (CNRELCONG+TNRELCONG)/TASSALL)*100
4	**Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)**	Call Drop Rate (Total no dropped calls/No of established calls)%= (TNDROP)/TCASSALL*100
5	**Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area**	Above formula with counters being used in CBBH.
6	**Connection with good quality voice= (Connection with good quality voice/Total voice samples)%**	Connection with good quality voice (Connection with good quality voice samples 0-5 /Total voice samples)= 100 * (QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL) / (QUAL70DL + QUAL60DL + QUAL50DL + QUAL40DL + QUAL30DL + QUAL20DL + QUAL10DL + QUAL00DL)

Ericsson Counters

Counter	Counter Description
TCASSALL	Number of assignment complete messages on TCH for all MS classes
TASSALL	Number of first assignment attempts on TCH for all MS classes.
CNRELCONG	Number of released connections on SDCCH due to TCH or Transcoder (TRA) congestion.
TNRELCONG	Number of released TCH signalling connections due to transcoder resource congestion during immediate assignment on TCH
CCONGS	Congestion counter for SDCCH. Stepped per congested allocation attempt.
CCALLS	Channel allocation attempt counter on SDCCH.

TNDROP	The total number of dropped TCH Connections.
QUAL00DL	Number of quality 0 reported on downlink.
QUAL10DL	Number of quality 1 reported on downlink.
QUAL20DL	Number of quality 2 reported on downlink.
QUAL30DL	Number of quality 3 reported on downlink.
QUAL40DL	Number of quality 4 reported on downlink.
QUAL50DL	Number of quality 5 reported on downlink.
QUAL60DL	Number of quality 6 reported on downlink.
QUAL70DL	Number of quality 7 reported on downlink.

13.1.2 NSN (NOKIA SIEMENS NETWORKS)

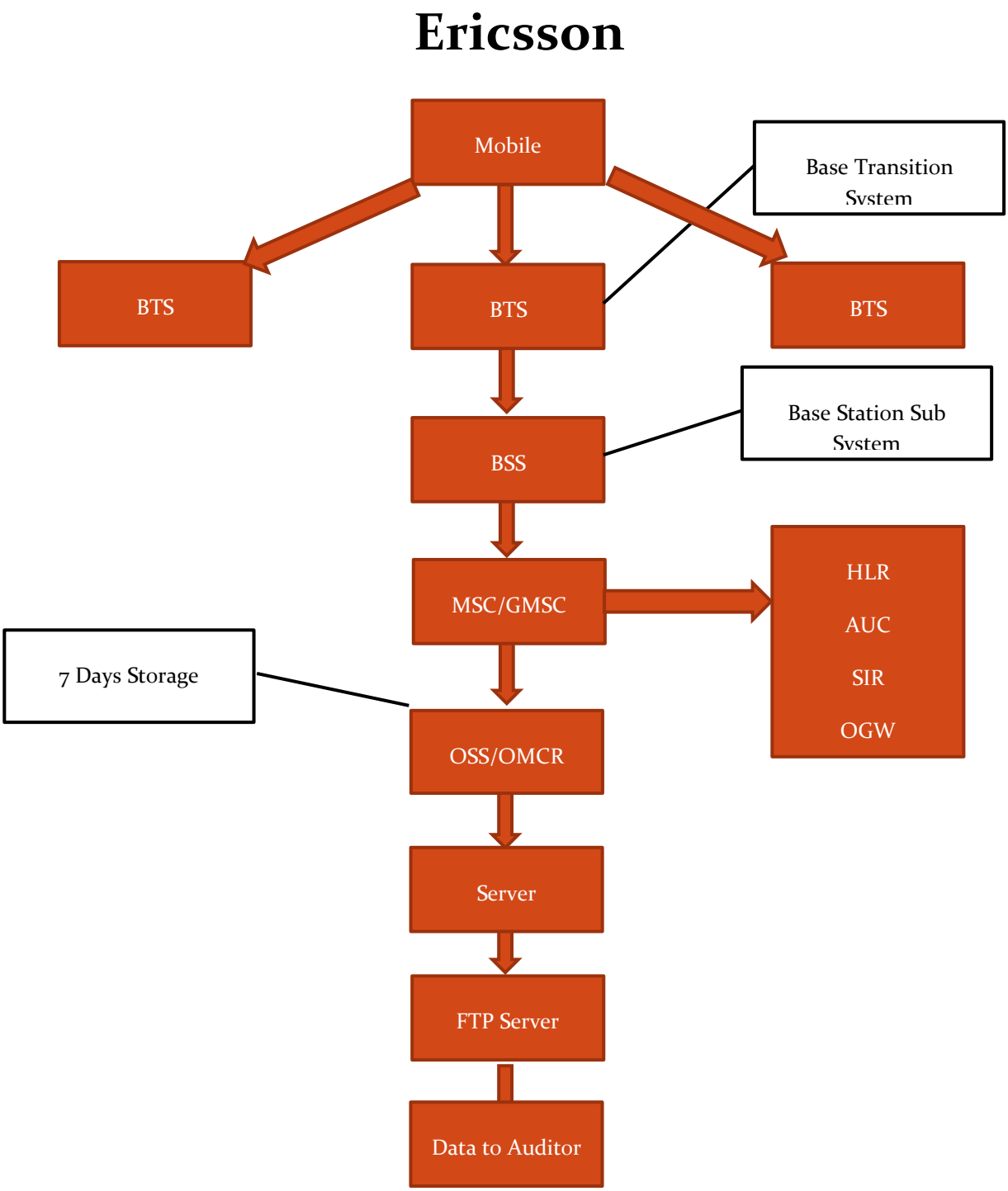
NSN provides network support to Vodafone in the circle.

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

13.2 BLOCK SCHEMATIC DIAGRAMS

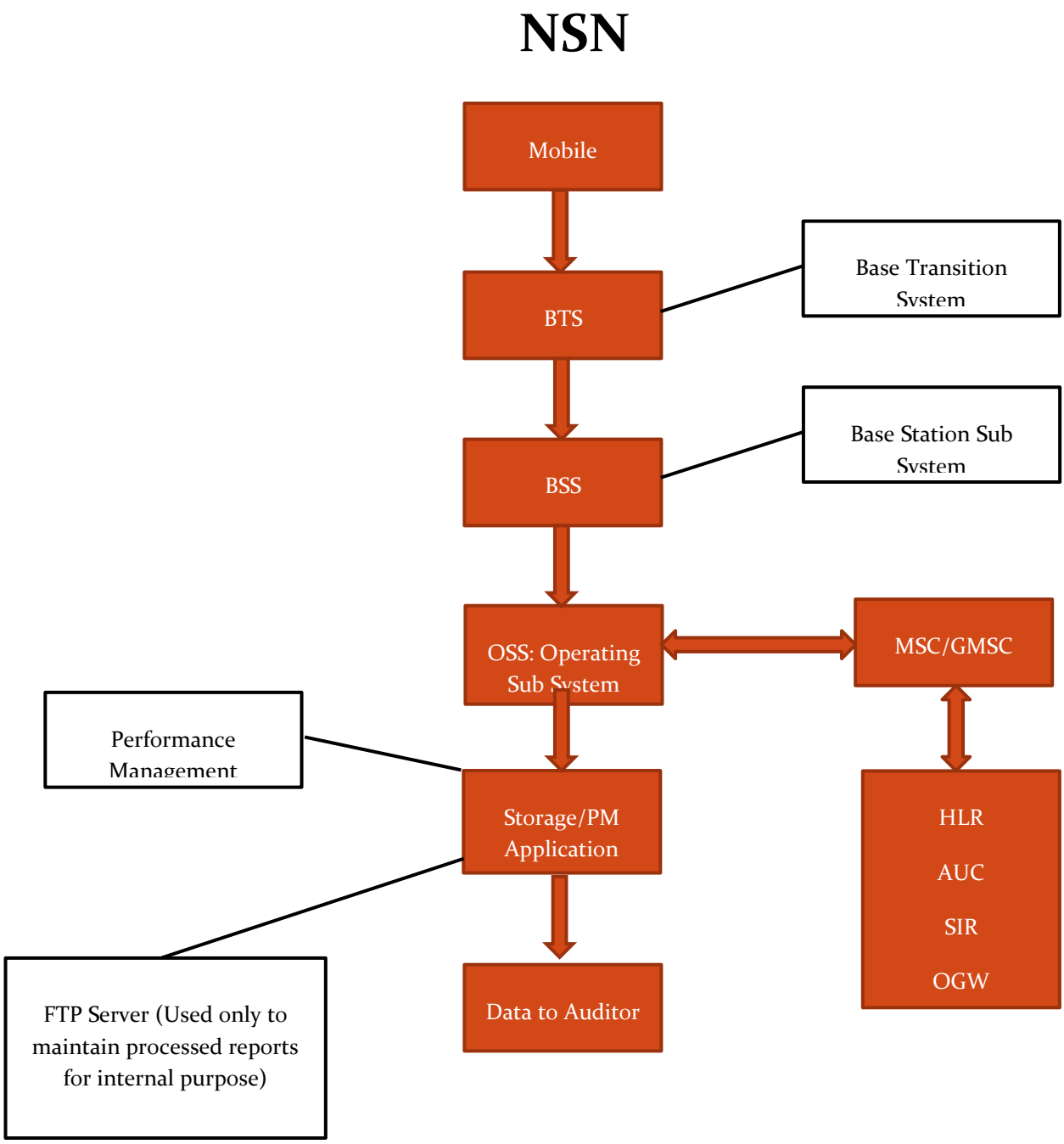
13.2.1 ERICSSON

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



13.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.



14 ANNEXURE – JANUARY -2G

Audit Results for Network Availability- PMR data-January												
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		826	7549	4498	7269	32	1111	2556	578	1919	3851	8361
Sum of downtime of BTSs in a month (in hours)		77	4809	52319	2333	18	14642	67571	0	32572	2138	2399
BTSs accumulated downtime (not available for service)	≤ 2%	0.01%	0.09%	1.56%	0.04%	0.07%	1.77%	3.55%	0.00%	2.28%	0.07%	0.04%
Number of BTSs having accumulated downtime >24 hours		0	7	63	7	0	2	14	0	0	10	2
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.09%	1.40%	0.10%	0.00%	0.18%	0.55%	0.00%	0.00%	0.26%	0.02%
Live Measurement Results for Network Availability- 3 Day live data-January												
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		826	7509	4498	7168	32	1111	2556	578	1920	3850	8361
Sum of downtime of BTSs in a month (in hours)		3	563	6001	189	1	1278	6834	16	110	204	0
BTSs accumulated downtime (not available for service)	≤ 2%	0.00%	0.10%	1.85%	0.04%	0.06%	1.60%	3.71%	0.04%	0.08%	0.07%	0.00%
Number of BTSs having accumulated downtime >24 hours		0	0	63	0	0	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	1.40%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-January												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	98.83%	98.93%	98.05%	99.04%	99.85%	97.50%	98.85%	94.75%	97.74%	98.12%	98.44%
SDCCH/Paging channel congestion	≤ 1%	0.04%	0.10%	0.07%	0.42%	NA	NA	0.10%	NA	0.08%	0.42%	0.30%
TCH congestion	≤ 2%	0.05%	1.11%	0.37%	0.50%	0.00%	1.16%	2.14%	0.34%	0.17%	0.98%	0.03%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-January												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	99.00%	98.77%	97.87%	98.79%	99.88%	97.62%	98.80%	95.64%	97.60%	98.03%	99.79%
SDCCH/Paging channel congestion	≤ 1%	0.02%	0.17%	0.07%	0.83%	NA	NA	0.10%	NA	0.13%	0.71%	0.28%
TCH congestion	≤ 2%	0.01%	1.60%	0.37%	0.69%	0.00%	1.16%	2.19%	0.03%	0.16%	1.18%	0.21%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		No Coverage	382	275	375	306	313	353	355	162	562	231
Total number of successful calls established		No Coverage	382	274	375	306	313	353	355	162	552	231
CSSR	≥ 95%	No Coverage	100.00%	99.64%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.22%	100.00%
%age blocked calls		No Coverage	0.00%	0.36%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.78%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-January												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		10986201	205052061	64062925	289789930	17991	96755386	74964341	8525029	32631956	205501284	6489203024
Total number of calls dropped		37421	1530582	408011	2528497	1	57858	61967	27230	230490	1071448	37344586
Call drop rate	≤ 2%	0.34%	0.75%	0.64%	0.87%	0.01%	0.06%	0.08%	0.32%	0.71%	0.52%	0.58%
Total number of cells in the network		2478	23536	13339	21652	92	3329	7486	1750	5756	12078	25436
Total number of cells having more than 3% TCH		45	238	227	433	0	10	21	64	195	160	51
Worst affected cells having more than 3% TCH	≤ 3%	1.83%	1.01%	1.70%	2.00%	0.11%	0.29%	0.27%	3.66%	3.38%	1.32%	0.20%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-January												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		956695	20207748	5947691	28006813	24749	8685023	6787084	9472477	888709	20711748	623874755
Total number of calls dropped		3075	164442	37267	257246	2	4474	5963	35941	2611	120336	3460500
Call drop rate	≤ 2%	0.32%	0.81%	0.63%	0.92%	0.01%	0.05%	0.09%	0.38%	0.29%	0.58%	0.55%
Total number of cells in the network		2478	23455	13426	21549	98	3323	7480	67	1750	12077	25436
Total number of cells having more than 3% TCH		47	278	244	500	0	10	22	5	55	161	26
Worst affected cells having more than 3% TCH	≤ 3%	1.88%	1.18%	1.82%	2.32%	0.00%	0.29%	0.29%	6.92%	3.16%	1.34%	0.10%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-January												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		No Coverage	382	271	375	306	313	353	355	162	553	231
Total number of calls dropped		No Coverage	0	0	0	0	0	0	0	0	0	0
Call drop rate	≤ 2%	No Coverage	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for Voice quality -PMR Data-January												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		2127508485	37109656840	1215834731	83752290781	58878164	NA	10166601604	198158534	6278751011	46714837793	906201338732
Total number of calls with good voice quality		2064403489	35893146758	1201174156	80146356440	58405884	NA	10050009179	122879127	6186080204	45786032722	887611655926
%age calls with good voice quality	≥ 95%	97.03%	96.72%	98.79%	95.69%	99.20%	NA	98.85%	62.01%	98.52%	98.01%	97.95%
Live measurement results for Voice quality-3 Day data-January												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		181608046	3692588334	126595554	8370270349	76777526	NA	987399915	21544075	633556366	5393171272	89045028712
Total number of calls with good voice quality		176373497	3564608188	125005620	7977930773	76163404	NA	975728392	13507563	623680903	5289262742	87119812002
%age calls with good voice quality	≥ 95%	97.12%	96.53%	98.74%	95.31%	99.20%	NA	98.82%	62.70%	98.44%	98.07%	97.84%
Drive test results for Voice quality (Average of three drive tests) - DT data-January												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		No Coverage	279920	70851	93551	NA	NA	55802	83199	773027	94451	175460
Total number of calls with good voice quality		No Coverage	274381	70040	92300	NA	NA	54478	82310	761457	90418	171985
%age calls with good voice quality	≥ 95%	NA	98.02%	98.86%	98.66%	99.98%	99.84%	97.63%	98.93%	98.50%	95.73%	98.02%

Audit Results for POI Congestion- PMR data-January												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	58	58	155	64	60	19	161	25	22	153
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1918	153004	48335	161188	8051	18620	13123	35750	36915	158377	155912
Traffic served for all POIs (B)- in erlangs		34	3767	27918	80036	539	5863	8353	12038	21218	66892	31329
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	NA	58	155	64	60	19	161	161	22	153
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1918	NA	48335	161324	7998	18809	13105	35750	35750	66584	155912
Traffic served for all POIs (B)- in erlangs		34	NA	29524	82238	549	5525	8232	7991	13262	124881	31329
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

15 ANNEXURE – FEBRUARY-2G

Audit Results for Network Availability- PMR data-February												
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		825	7569	4514	7351	32	1111	2545	578	1916	3850	8484
Sum of downtime of BTSs in a month (in hours)		112	5828	47660	1785	1	351	488	0	27649	2085	1933
BTSs accumulated downtime (not available for service)	≤ 2%	0.02%	0.11%	1.47%	0.03%	0.01%	0.04%	0.03%	0.00%	2.00%	0.08%	0.03%
Number of BTSs having accumulated downtime >24 hours		0	17	55	7	0	5	15	0	0	9	8
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.22%	1.22%	0.10%	0.00%	0.45%	0.59%	0.00%	0.00%	0.23%	0.09%
Live Measurement Results for Network Availability- 3 Day live data-February												
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		826	7550	4498	7269	32	1111	2116	578	1916	3850	8444
Sum of downtime of BTSs in a month (in hours)		29	906	3486	207	0	29	97	0	0	2085	0
BTSs accumulated downtime (not available for service)	≤ 2%	0.05%	0.17%	1.08%	0.04%	0.00%	0.04%	0.06%	0.00%	0.00%	0.75%	0.00%
Number of BTSs having accumulated downtime >24 hours		0	0	0	0	0	0	0	0	0	9	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.23%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-February												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	98.79%	99.03%	97.95%	99.15%	99.85%	97.60%	98.96%	98.90%	98.93%	98.06%	99.58%
SDCCH/Paging channel congestion	≤ 1%	0.03%	0.05%	0.07%	0.41%	NA	NA	0.11%	NA	0.25%	0.22%	0.18%
TCH congestion	≤ 2%	0.02%	0.36%	0.33%	0.35%	0.00%	1.17%	0.59%	0.15%	0.27%	1.13%	0.42%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-February												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	98.72%	99.06%	97.92%	99.16%	99.86%	98.79%	98.91%	98.78%	97.32%	98.06%	99.83%
SDCCH/Paging channel congestion	≤ 1%	0.02%	0.02%	0.08%	0.32%	NA	NA	0.24%	NA	0.23%	0.22%	0.24%
TCH congestion	≤ 2%	0.02%	0.12%	0.34%	0.37%	0.00%	0.01%	1.89%	0.04%	0.20%	1.13%	0.17%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		No Coverage	305	284	331	280	340	359	233	245	341	351
Total number of successful calls established		No Coverage	305	284	331	280	340	359	233	245	336	351
CSSR	≥ 95%	No Coverage	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.53%	100.00%
%age blocked calls		No Coverage	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.47%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-February												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		11731414	220151826	61077971	289969868	14500	113352419	77531368	9039537	38796327	162147083	441231066
Total number of calls dropped		38385	1384530	315475	2615983	2	63589	72237	24290	229063	1607278	3136071
Call drop rate	≤ 2%	0.33%	0.63%	0.52%	0.90%	0.01%	0.06%	0.09%	0.27%	0.59%	0.99%	0.71%
Total number of cells in the network		2475	23598	13444	21872	98	3329	7486	1749	5750	12039	25799
Total number of cells having more than 3% TCH		43	233	208	557	0	7	19	62	155	490	501
Worst affected cells having more than 3% TCH	≤ 3%	1.72%	0.99%	1.55%	2.55%	0.14%	0.22%	0.25%	3.56%	2.69%	4.07%	1.94%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-February												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		1174034	22938118	6373862	29567720	25279	9375043	7447377	944807	3902244	162147083	652229284
Total number of calls dropped		3907	144131	35675	236188	5	11103	8748	2686	22353	1607278	1128086
Call drop rate	≤ 2%	0.33%	0.63%	0.56%	0.80%	0.02%	0.12%	0.12%	0.28%	0.57%	0.99%	0.17%
Total number of cells in the network		2478	23601	13433	21632	98	3345	7570	1749	5764	12039	25682
Total number of cells having more than 3% TCH		43	212	222	446	0	11	20	61	165	490	21
Worst affected cells having more than 3% TCH	≤ 3%	1.75%	0.90%	1.66%	2.06%	0.00%	0.33%	0.26%	3.49%	2.87%	4.07%	0.08%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-February												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		No Coverage	305	284	331	280	340	359	233	245	341	351
Total number of calls dropped		No Coverage	0	0	0	0	0	0	0	0	4	0
Call drop rate	≤ 2%	No Coverage	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	1.17%	0.00%

Audit Results for Voice quality -PMR Data-February												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		2192143794	33047487856	1199575192	76706798821	50088689	NA	10718829217	189765395	6211418815	38233622796	74435608978
Total number of calls with good voice quality		2124834940	31985263984	1154814759	73609563480	49695381	NA	10591588649	118117737	6108126108	37485716616	72469303875
%age calls with good voice quality	≥ 95%	96.93%	96.79%	96.27%	95.96%	99.21%	NA	98.81%	62.24%	98.34%	98.04%	97.36%
Live measurement results for Voice quality-3 Day data-February												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		223781975	3492029755	256406874	7789330472	75919821	NA	1215100216	17588022	641279808	38233622796	90509194997
Total number of calls with good voice quality		217019366	3376492194	253080524	7478252579	75289932	NA	1203233027	11173725	630755972	37485716616	88736541888
%age calls with good voice quality	≥ 95%	96.98%	96.69%	98.70%	96.01%	99.17%	NA	99.02%	63.53%	98.36%	98.04%	98.04%
Drive test results for Voice quality (Average of three drive tests) - DT data-February												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		No Coverage	230146	68704	73836	NA	NA	50228	54310	399237	35856	209625
Total number of calls with good voice quality		No Coverage	226699	67963	72458	NA	NA	49364	53852	394802	35122	205660
%age calls with good voice quality	≥ 95%	No Coverage	98.50%	98.92%	98.13%	100.00%	98.47%	98.28%	99.16%	98.89%	97.95%	98.11%

Audit Results for POI Congestion- PMR data-February												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	NA	58	154	64	60	19	161	25	24	152
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1861	NA	48335	161829	7998	18773	13139	35750	36914	133668	154750
Traffic served for all POIs (B)- in erlangs		32	NA	28727	83144	947	8775	9262	13181	24041	68570	59603
POI congestion	≤ 0.5%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-February												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	NA	58	154	64	60	19	161	25	24	152
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1918	NA	48335	161005	7998	18758	13136	35750	36914	133668	157341
Traffic served for all POIs (B)- in erlangs		32	NA	29554	84022	565	9113	9260	12793	24041	68570	33081
POI congestion	≤ 0.5%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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Audit Results for Network Availability- PMR data-March												
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		825	7655	4521	7438	42	1113	2535	575	1916	3851	8513
Sum of downtime of BTSs in a month (in hours)		33	4245	49863	2162	15	277	632	0	28622	1717	99956
BTSs accumulated downtime (not available for service)	≤ 2%	0.01%	0.07%	1.48%	0.04%	0.05%	0.03%	0.03%	0.00%	2.01%	0.06%	1.58%
Number of BTSs having accumulated downtime >24 hours		0	4	55	9	0	5	15	0	0	3	32
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.05%	1.22%	0.12%	0.00%	0.45%	0.59%	0.00%	0.00%	0.08%	0.38%
Live Measurement Results for Network Availability- 3 Day live data-March												
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Number of BTSs in the licensed service area		825	7553	4498	7351	36	1113	2535	578	1917	3854	8513
Sum of downtime of BTSs in a month (in hours)		2	409	3486	215	0	21	97	16	25	282	10400
BTSs accumulated downtime (not available for service)	≤ 2%	0.00%	0.08%	1.08%	0.04%	0.00%	0.03%	0.05%	0.04%	0.02%	0.10%	1.70%
Number of BTSs having accumulated downtime >24 hours		0	0	0	1	0	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-March												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	98.91%	98.99%	97.87%	99.19%	99.41%	98.85%	97.20%	98.92%	98.95%	97.93%	98.28%
SDCCH/Paging channel congestion	≤ 1%	0.02%	0.05%	0.06%	0.39%	NA	NA	0.05%	NA	0.19%	0.24%	0.00%
TCH congestion	≤ 2%	0.04%	0.64%	0.34%	0.32%	0.00%	0.02%	1.30%	0.18%	0.24%	1.37%	0.00%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-March												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
CSSR	≥ 95%	98.93%	98.86%	97.92%	99.16%	99.85%	98.79%	94.79%	98.63%	98.98%	97.96%	99.27%
SDCCH/Paging channel congestion	≤ 1%	0.02%	0.03%	0.08%	0.36%	NA	NA	0.05%	NA	0.19%	0.24%	0.00%
TCH congestion	≤ 2%	0.01%	0.35%	0.34%	0.37%	0.00%	0.01%	3.43%	0.09%	0.22%	1.41%	0.00%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-March												
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of call attempts		NA	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	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	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-March												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		12618877	215170702	65816889	318466388	12626	47782746	79718195	4891933	41340820	193052521	558768000
Total number of calls dropped		38077	1486412	305021	2560881	1	51075	83299	11027	244065	1819817	3291005
Call drop rate	≤ 2%	0.30%	0.69%	0.46%	0.80%	0.01%	0.11%	0.10%	0.23%	0.59%	0.94%	0.59%
Total number of cells in the network		2475	23917	13456	22151	128	3351	7621	1750	5751	12050	25799
Total number of cells having more than 3% TCH		42	326	195	483	0	14	23	32	146	487	542
Worst affected cells having more than 3% TCH	≤ 3%	1.71%	1.36%	1.45%	2.18%	0.00%	0.41%	0.30%	1.83%	2.55%	4.04%	2.10%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-March												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		1282127	21731179	6373862	31208754	24352	9307238	7447377	11340682	4107048	18786453	19267862
Total number of calls dropped		3810	165335	35675	255766	2	11079	8748	37225	26408	176097	113483
Call drop rate	≤ 2%	0.30%	0.76%	0.56%	0.82%	0.01%	0.12%	0.12%	0.33%	0.64%	0.94%	0.59%
Total number of cells in the network		2475	23917	13433	22128	110	3345	7618	1758	5764	12053	25682
Total number of cells having more than 3% TCH		38	388	222	521	0	11	20	3	158	433	30
Worst affected cells having more than 3% TCH	≤ 3%	1.52%	1.62%	1.66%	2.35%	0.00%	0.32%	0.26%	0.17%	2.74%	3.60%	0.12%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-March												
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of calls established		NA	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	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-March												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		2378453848	37156897840	1289910217	80430602890	49428837	NA	12730866759	197970114	6612185230	43956541894	916366790914
Total number of calls with good voice quality		2306798333	36056022635	1274149117	77488484365	49052805	NA	12613062600	126433235	6500116339	43122531695	898388230551
%age calls with good voice quality	≥ 95%	96.99%	97.04%	98.78%	96.34%	99.24%	NA	99.07%	63.86%	98.31%	98.10%	98.04%
Live measurement results for Voice quality-3 Day data-March												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		240275481	3753548369	256406874	7725018207	76907659	NA	1215100216	201613587	645087226	4308818948	31598854859
Total number of calls with good voice quality		233028388	3636726032	253080524	7436636527	76261139	NA	1203233027	131946343	634252150	4226478499	30978904502
%age calls with good voice quality	≥ 95%	96.98%	96.89%	98.70%	96.27%	99.16%	NA	99.02%	65.45%	98.32%	98.09%	98.04%
Drive test results for Voice quality (Average of three drive tests) - DT data-March												
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of sample calls		NA	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	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-March												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	NA	58	154	64	60	19	159	25	26	152
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1862	NA	48335	161512	7998	144663	144305	34744	36914	124861	154750
Traffic served for all POIs (B)- in erlangs		31	NA	28967	81385	863	59979	81004	13464	24233	78106	59603
POI congestion	≤ 0.5%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-March												
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Vodafone
Total number of working POIs		40	NA	58	154	64	60	19	159	25	26	152
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1844	NA	48335	161537	7998	154221	161777	34744	36914	123941	154750
Traffic served for all POIs (B)- in erlangs		32	NA	29554	83058	543	69605	96175	13464	10835	80797	59603
POI congestion	≤ 0.5%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

17 ANNEXURE – JANUARY -3G

Audit Results for Network Availability- PMR data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		3380	2072	5454	1338	5682
Sum of downtime (i.e. total outage time) of Node Bs		3361	17513	2744	13686	962
Node Bs downtime (not available for service)	≤ 2%	0.13%	1.14%	0.07%	1.37%	0.02%
Number of Node Bs having accumulated downtime of >24 hours in a month		20	36	7	0	1
Worst affected Node Bs due to downtime	≤ 2%	0.59%	1.74%	0.13%	0.00%	0.02%
Live Measurement Results for Network Availability- 3 Day live data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		3380	2072	5380	1337	5682
Sum of downtime (i.e. total outage time) of Node Bs		283	1792	156	86	119
Node Bs downtime (not available for service)	≤ 2%	0.12%	1.20%	0.04%	0.09%	0.03%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	20	0	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.97%	0.00%	0.00%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.84%	95.95%	99.69%	97.89%	99.78%
RRC Congestion	≤ 1%	0.05%	0.86%	0.33%	0.39%	0.18%
Circuit Switched RAB Congestion	≤ 2%	0.24%	0.57%	0.11%	1.19%	0.04%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.89%	96.76%	99.68%	98.44%	99.80%
RRC Congestion	≤ 1%	0.01%	0.87%	0.23%	0.21%	0.07%
Circuit Switched RAB Congestion	≤ 2%	0.10%	0.49%	0.11%	0.76%	0.03%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-January						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		No Coverage	280	377	162	349
Total number of RRC established (B)		No Coverage	280	377	162	349
Call setup success rate (B/A*100)	≥ 95%	No Coverage	100.00%	100.00%	100.00%	100.00%
%age blocked calls		No Coverage	0.00%	0.00%	0.00%	0.00%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		18794252	145408072	87291020	15829573	128650365
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		56130	1770766	343357	88733	251352
Call drop rate (B/A*100)	≤ 2%	0.30%	1.22%	0.39%	0.56%	0.20%
Total no. of cells in the licensed service area (B)		10498	6216	16831	4000	18765
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		308	101	339	104	252
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.94%	1.62%	2.02%	2.59%	1.34%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-January						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		1936011	13665562	8129186	1642658	11487943
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		4596	157637	32341	8284	24157
Call drop rate (B/A*100)	≤ 2%	0.24%	1.15%	0.40%	0.50%	0.21%
Total no. of cells in the licensed service area (B)		10498	6216	16634	4002	18765
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		240	95	374	80	280
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.29%	1.53%	2.25%	2.01%	1.49%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-January						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		No Coverage	280	377	162	349
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		No Coverage	0	0	0	0
Call drop rate (B/A*100)	≤ 2%	No Coverage	0.00%	0.00%	0.00%	0.00%

Audit Results for Voice quality -PMR Data-January						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		50409839080	151628411	56433569151	35490167000	302956237610
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		49855967439	145120280	55793445837	35377725905	299778568417
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.90%	95.71%	98.87%	99.68%	98.95%
Live measurement results for Voice quality-3 Day data-January						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		5264796788	15390309	5180948392	3617371000	27122920227
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		5205482211	14415006	5123027641	3606474843	26837762236
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.87%	93.66%	98.88%	99.70%	98.95%
Drive test results for Voice quality (Average of three drive tests) - DT data-January						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		No Coverage	79512	666824	773027	971872
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		No Coverage	78840	655474	761457	956648
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	No Coverage	99.15%	98.30%	98.50%	98.43%

Audit Results for POI Congestion- PMR data-January						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	155	0	152
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161460	0	156030
Traffic served for all POIs (B)- in erlangs		NA	28025	76194	0	60064
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-January						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	155	0	153
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161324	0	155920
Traffic served for all POIs (B)- in erlangs		NA	26663	82238	0	60756
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%

18 ANNEXURE – FEBRUARY-3G

Audit Results for Network Availability- PMR data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		3986	2072	5454	1337	5782
Sum of downtime (i.e. total outage time) of Node Bs		3357	17801	1831	2067	1250
Node Bs downtime (not available for service)	≤ 2%	0.11%	1.15%	0.05%	0.21%	0.03%
Number of Node Bs having accumulated downtime of >24 hours in a month		19	40	5	0	2
Worst affected Node Bs due to downtime	≤ 2%	0.48%	1.93%	0.09%	0.00%	0.03%
Live Measurement Results for Network Availability- 3 Day live data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		3495	2072	5454	1337	5682
Sum of downtime (i.e. total outage time) of Node Bs		612	1650	192	86	125
Node Bs downtime (not available for service)	≤ 2%	0.24%	1.11%	0.05%	0.09%	0.03%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	1	1	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.05%	0.02%	0.00%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.89%	96.04%	99.71%	98.25%	99.80%
RRC Congestion	≤ 1%	0.01%	0.87%	0.20%	0.22%	0.06%
Circuit Switched RAB Congestion	≤ 2%	0.06%	0.56%	0.07%	0.85%	0.03%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.89%	97.18%	99.74%	98.44%	99.78%
RRC Congestion	≤ 1%	0.01%	0.28%	0.11%	0.21%	0.17%
Circuit Switched RAB Congestion	≤ 2%	0.05%	0.39%	0.07%	0.76%	0.21%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-February						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		277	330	262	94	321
Total number of RRC established (B)		277	329	262	94	321
Call setup success rate (B/A*100)	≥ 95%	100.00%	99.70%	100.00%	100.00%	100.00%
%age blocked calls		0.00%	0.30%	0.00%	0.00%	0.00%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		20965592	136213506	85831221	15432467	124733551
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		45558	1654308	381227	79036	214428
Call drop rate (B/A*100)	≤ 2%	0.22%	1.21%	0.44%	0.51%	0.17%
Total no. of cells in the licensed service area (B)		12388	6216	17015	4000	19075
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		263	101	458	80	209
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.12%	1.62%	2.69%	2.00%	1.10%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-February						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		2116770	12528406	9080808	1642658	161078013
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		4807	176058	38141	8284	308065
Call drop rate (B/A*100)	≤ 2%	0.23%	1.41%	0.42%	0.50%	0.19%
Total no. of cells in the licensed service area (B)		10844	6216	17012	4002	18765
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		254	90	452	73	14
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.34%	1.44%	2.66%	1.82%	0.07%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-February						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		277	329	262	94	321
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	0	1	0	0
Call drop rate (B/A*100)	≤ 2%	0.00%	0.00%	0.38%	0.00%	0.00%

Audit Results for Voice quality -PMR Data-February						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		59419337812	142189835	64872974761	33849899500	299092400375
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		58771206282	136771906	64089018781	33747136793	296001112732
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.91%	96.19%	98.79%	99.70%	98.97%
Live measurement results for Voice quality-3 Day data-February						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		6043582519	13914503	7116554045	3617371000	401436009151
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		5978462762	13466849	7030309705	3606474843	397264355150
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.92%	96.78%	98.79%	99.70%	98.96%
Drive test results for Voice quality (Average of three drive tests) - DT data-February						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		830197	528549	59643	382215	853820
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		823966	517678	58242	378805	835350
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.25%	97.94%	97.65%	99.11%	97.84%

Audit Results for POI Congestion- PMR data-February						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	154	0	152
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161829	0	154750
Traffic served for all POIs (B)- in erlangs		NA	28727	83144	0	59603
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-February						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	154	0	152
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161005	0	157341
Traffic served for all POIs (B)- in erlangs		NA	28727	84022	0	33081
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%

19 ANNEXURE – MARCH-3G

Audit Results for Network Availability- PMR data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		4761	2083	5454	1337	5782
Sum of downtime (i.e. total outage time) of Node Bs		5604	17558	1545	11612	1350
Node Bs downtime (not available for service)	≤ 2%	0.16%	1.13%	0.04%	1.17%	0.03%
Number of Node Bs having accumulated downtime of >24 hours in a month		37	32	5	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.78%	1.54%	0.09%	0.00%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		4023	2083	5454	1338	5782
Sum of downtime (i.e. total outage time) of Node Bs		605	2267	159	7	134
Node Bs downtime (not available for service)	≤ 2%	0.21%	1.51%	0.04%	0.01%	0.03%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	8	1	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.38%	0.02%	0.00%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.88%	95.83%	99.69%	98.16%	99.78%
RRC Congestion	≤ 1%	0.02%	0.85%	0.21%	0.29%	0.17%
Circuit Switched RAB Congestion	≤ 2%	0.06%	0.46%	0.09%	1.01%	0.20%

Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	99.90%	97.18%	99.65%	98.19%	99.79%
RRC Congestion	≤ 1%	0.01%	0.29%	0.23%	0.20%	0.16%
Circuit Switched RAB Congestion	≤ 2%	0.04%	0.40%	0.11%	0.99%	0.20%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-March						
CSSR	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NA	NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA	NA
%age blocked calls		NA	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-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		25548617	142408072	90758676	16643800	8212962574
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		56241	1620766	365053	83633	35656430
Call drop rate (B/A*100)	≤ 2%	0.22%	1.14%	0.40%	0.50%	0.43%
Total no. of cells in the licensed service area (B)		14892	6249	17041	4000	19075
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		292	96	405	102	220
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.96%	1.53%	2.38%	2.54%	1.15%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-March						
	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		2499393	12314406	8692486	1574442	807469870
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		5227	176058	35922	7957	3413917
Call drop rate (B/A*100)	≤ 2%	0.21%	1.43%	0.41%	0.51%	0.42%
Total no. of cells in the licensed service area (B)		12498	6249	17035	4002	18765
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		258	90	411	87	18
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.07%	1.44%	2.41%	2.17%	0.10%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-March						
Call drop rate	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-March						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		83851180667	139628411	69015507189	36254676000	3910488689488
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		82988710416	137120280	68176781620	36145526260	3870088332383
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.97%	98.20%	98.78%	99.70%	98.97%
Live measurement results for Voice quality-3 Day data-March						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		5994802272	13860503	6640943091	3406486000	402935747230
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		5932390010	13466849	6560880159	3396389559	398756811116
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.96%	97.16%	98.79%	99.70%	98.96%
Drive test results for Voice quality (Average of three drive tests) - DT data-March						
Voice quality	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-March						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	154	25	152
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161512	36914	154750
Traffic served for all POIs (B)- in erlangs		NA	28935	81385	24233	59603
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-March						
POI congestion	Benchmark	Airtel 3G	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NA	58	154	25	152
No. of POIs not meeting benchmark		NA	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		NA	48335	161537	36914	157341
Traffic served for all POIs (B)- in erlangs		NA	28935	83058	10835	33081
POI congestion	≤ 0.5%	NA	0.00%	0.00%	0.00%	0.00%

20 ABBREVIATIONS

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

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

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