TRAI Audit Wireless Report for Gujarat Circle-OND Quarter-2015

WEST ZONE

QE December 2015

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IMRB International | eTech

Submitted to:

TRAI
Telecom Regulatory Authority of India

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2 INTRODUCTION

2.1 ABOUT TRAI

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

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

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

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

2.2 OBJECTIVES

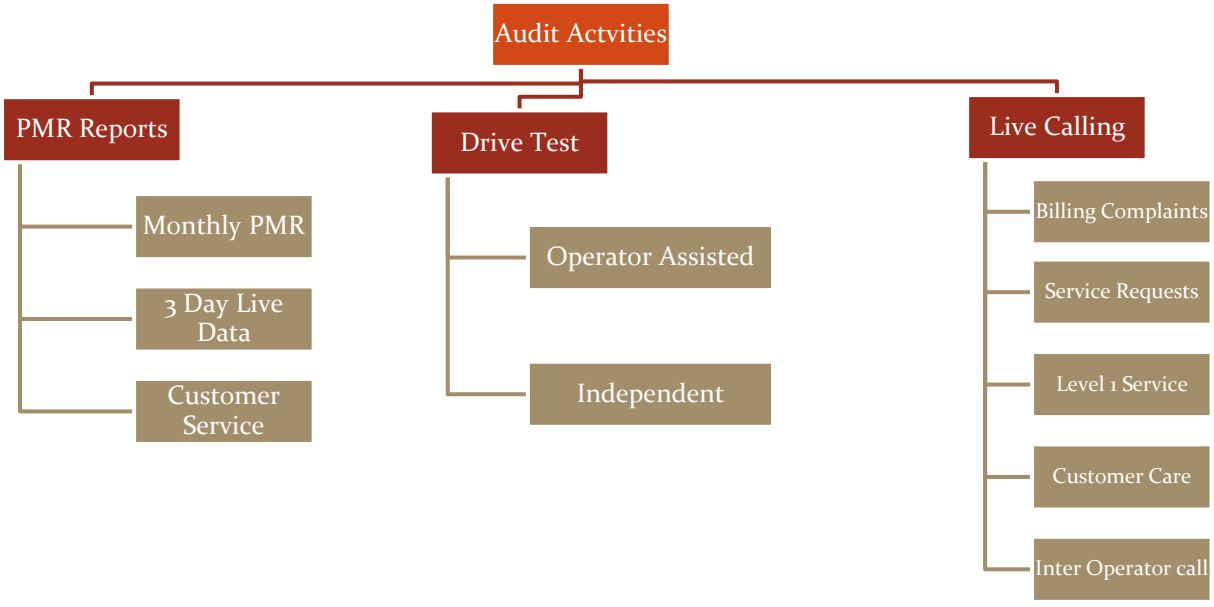
The primary objective of the Audit module is to-

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

2.3 COVERAGE

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

2.4 FRAMEWORK USED

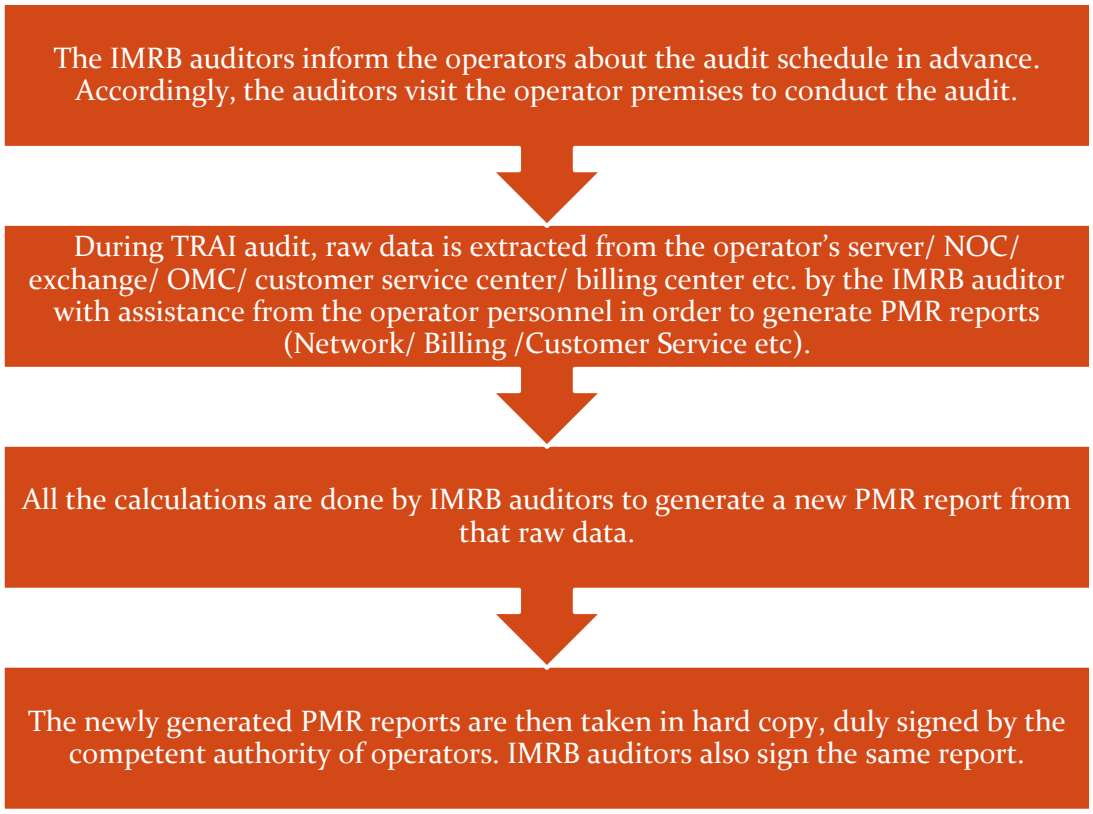


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

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, October 2015 audit data was collected in the month of November 2015.

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

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

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

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR 2G

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

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.4.1.3 AUDIT PARAMETERS – NETWORK 2G

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

Network Related

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

2.4.1.4 MONTHLY PMR 3G

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

Network Availability

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

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good Circuit Switched Voice Quality

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

2.4.1.5 AUDIT PARAMETERS – NETWORK 3G

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

Network Related

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

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

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

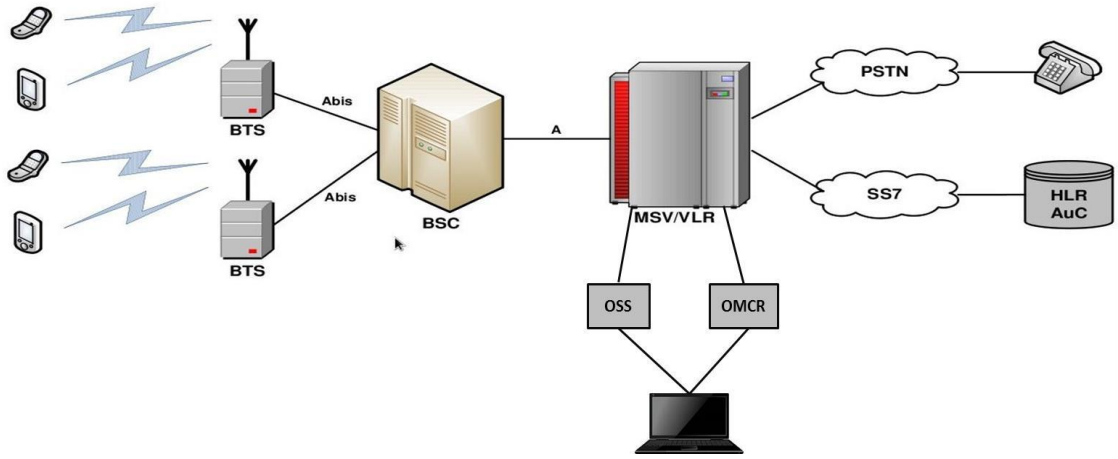
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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

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

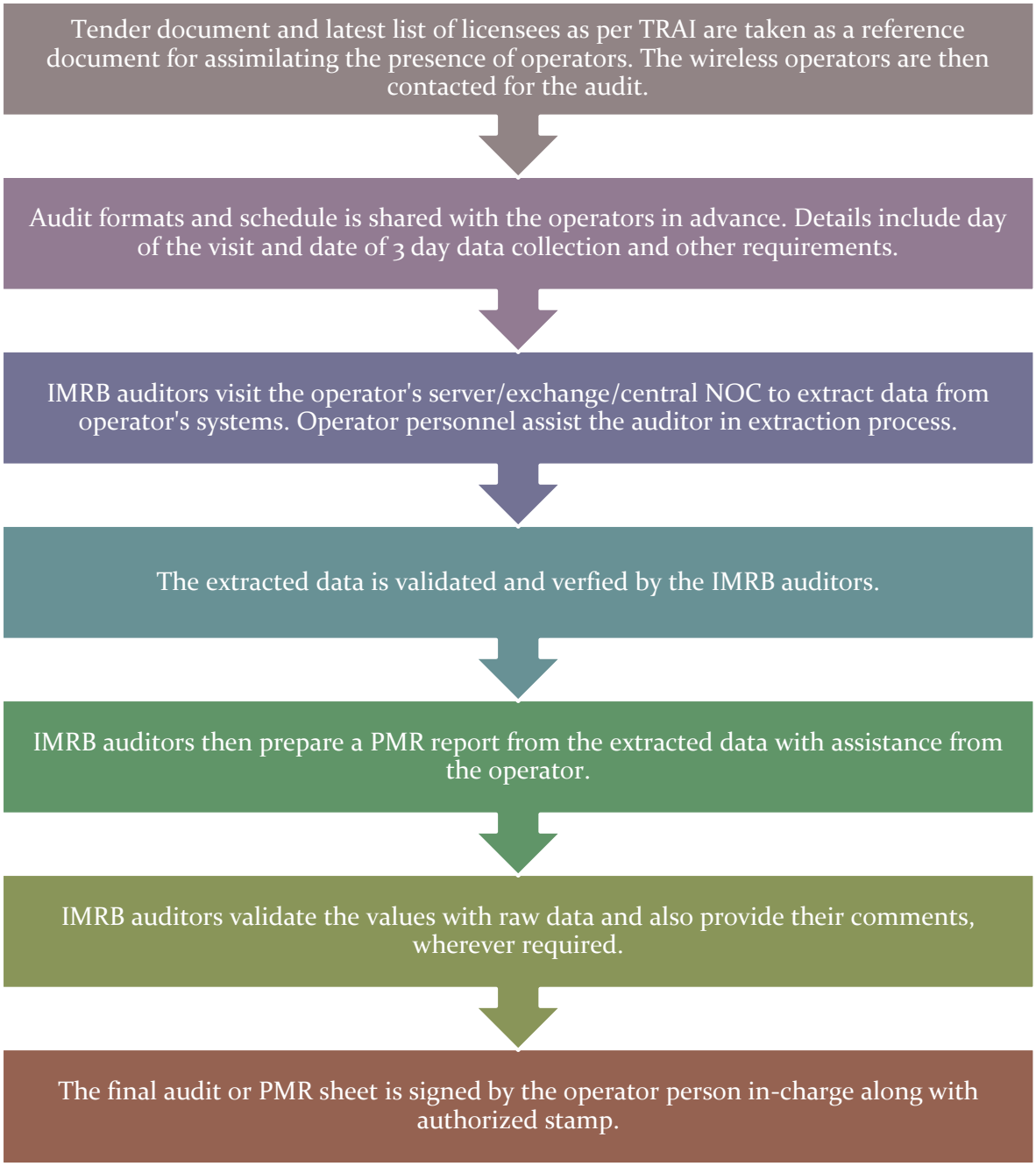
2.4.1.8 POINT OF DATA EXTRACTION

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



2.4.1.9 STEP BY STEP AUDIT PROCEDURE

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



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

2.4.1.10 CALCULATION METHODOLOGY – NETWORK PARAMETERS 2G

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

2.4.1.11 CALCULATION METHODOLOGY – NETWORK PARAMETERS 3G

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

2.4.1.12 3 DAY LIVE DATA

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

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

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

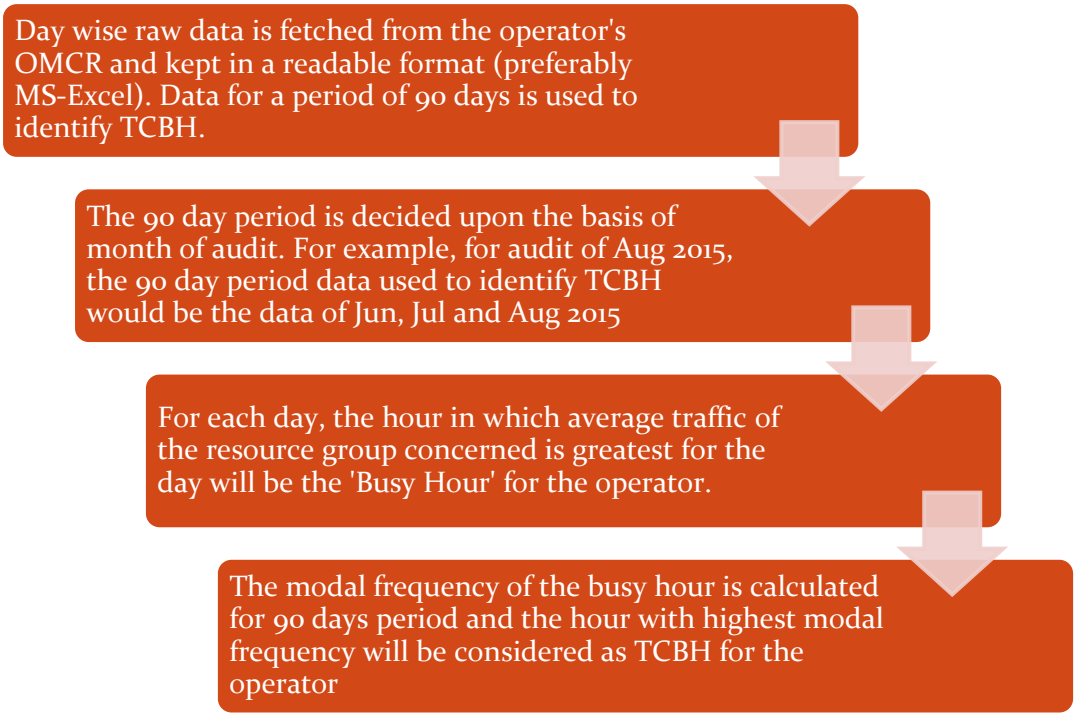
The 3 day live measurement was conducted for network parameters (2G & 3G) and wireless data services (2G & 3G).

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

2.4.1.13 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

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

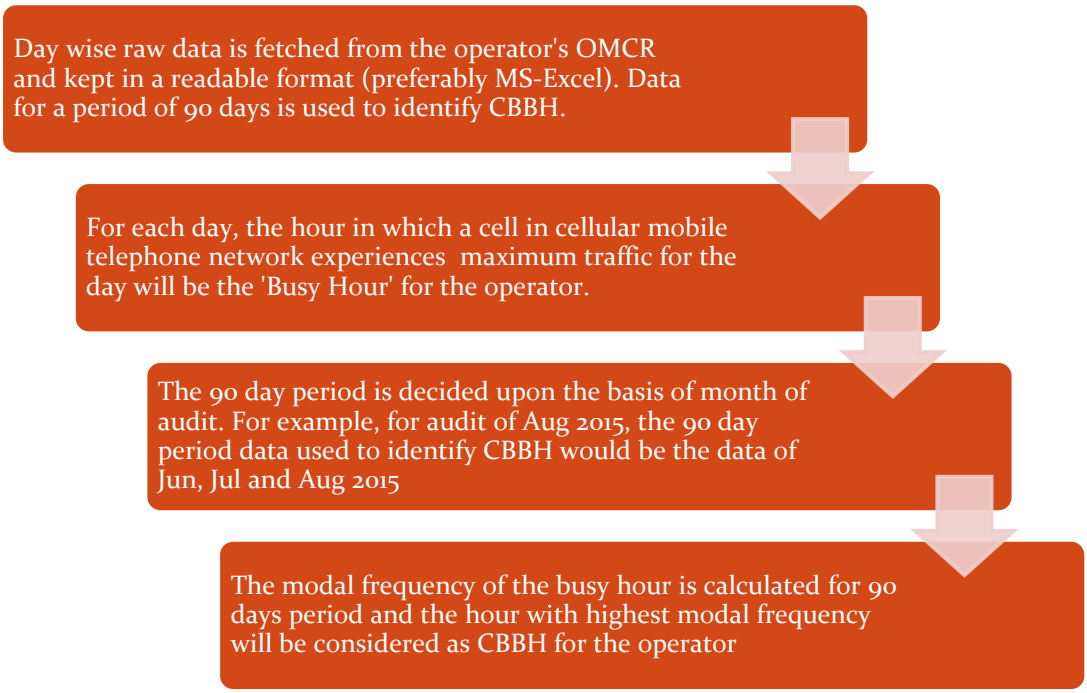
Step by step procedure to identify TCBH for an operator:



2.4.1.14 CBBH – SIGNIFICANCE AND SELECTION METHODOLOGY

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

Step by step procedure to identify CBBH for an operator:



2.4.1.15 CUSTOMER SERVICE PARAMETERS

The data to generate PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending December 2015 (OND'15) was collected in the month of January 2016. To extract the data for customer service parameters for the purpose of audit, IMRB auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

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

The Customer Service Quality Parameters include the following:

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

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

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

2.4.1.16 AUDIT PARAMETERS – CUSTOMER SERVICE

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

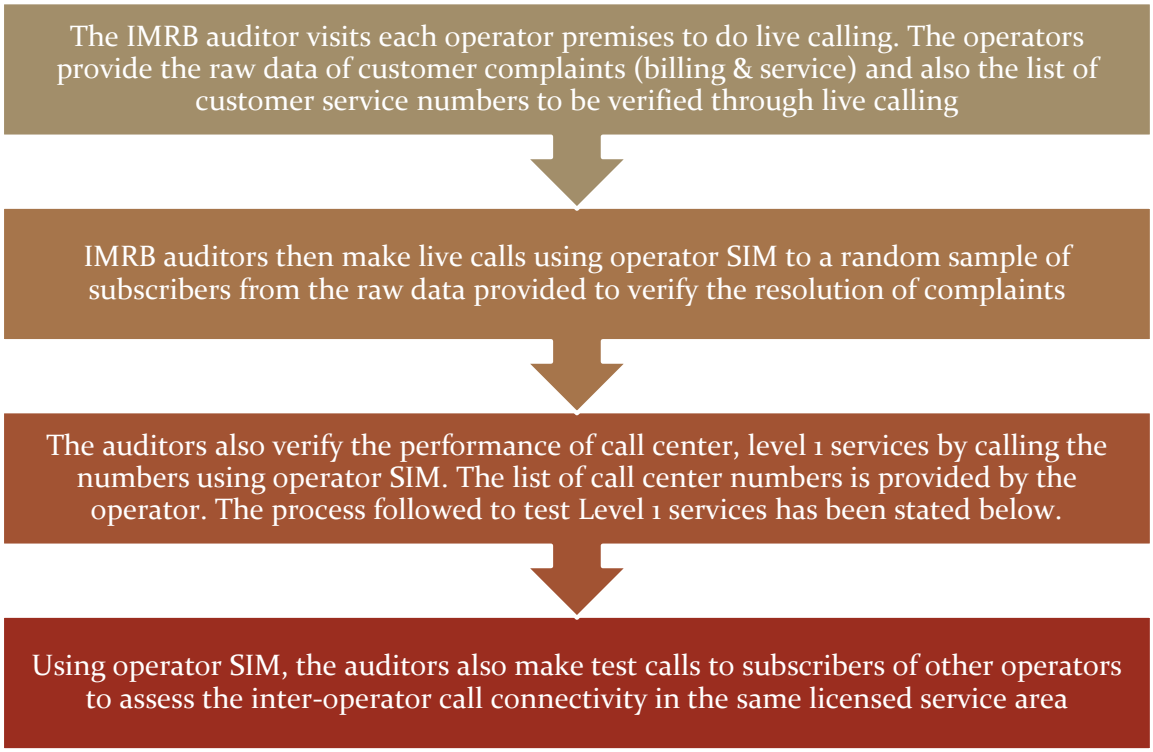
2.4.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

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

2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

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



Live calling activity was carried out during the period of December 2015. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of November 2015 was considered for live calling activity conducted in December 2015.

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

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

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

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

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

TRAI benchmark-

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

2.4.2.3 SERVICE COMPLAINTS REQUESTS

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

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

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

2.4.2.4 LEVEL 1 SERVICE

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

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

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

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

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

- Post verifying the list, auditors do live calling by equally distributing the calls among the various numbers and update the results in the live calling sheet.

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

2.4.2.5 CUSTOMER CARE

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

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

The process for this parameter is stated below.

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

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

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

2.4.3 VOICE DRIVE TEST – 2G & 3G

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

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

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

IMRB conducted two types of drive tests as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test

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

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

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

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

1. Normal SSA
2. Difficult SSA

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

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

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

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

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

2.4.3.3 INDEPENDENT DRIVE TEST – 2G & 3G

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

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

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

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

- Coverage-Signal strength (GSM)
    - ✓ Total calls made (A)
    - ✓ Number of calls with signal strength between 0 to -75 dBm
    - ✓ Number of calls with signal strength between 0 to -85 dBm
    - ✓ Number of calls with signal strength between 0 to -95 dBm
- Coverage-Signal strength (CDMA)
    - ✓ Total Ec/Io BINS (A)
    - ✓ Total Ec/Io BINS with less than –15 (B)
    - ✓ Low Interference = [1 - (B/A)] x 100
- Voice quality (GSM)

- ✓ Total RxQual Samples– A
- ✓ RxQual samples with 0-5 value – B
- ✓ %age samples with good voice quality = B/A x 100

- Voice quality (CDMA)
  - ✓ Total FER BINs (forward FER) – A
  - ✓ FER BINs with 0-2 value (forward FER) – B
  - ✓ FER BINs with 0-4 value (forward FER) – C
  - ✓ %age samples with FER bins having 0-2 value (forward FER) = B/A x 100
  - ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 100
  - ✓ No. of FER samples with value > 4 = [A-C]
- Call setup success rate
  - ✓ Total number of call attempts – A
  - ✓ Total Calls successfully established – B
  - ✓ Call success rate (%age) = (B/A) x 100
- Blocked calls
  - ✓ 100% - Call Set up Rate
- Call drop rate
  - ✓ Total Calls successfully established – A
  - ✓ Total calls dropped after being established – B
  - ✓ Call Drop Rate (%age) = (B/A) x 100

2.4.4 WIRELESS DATA DRIVE TEST – 2G & 3G

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

2.4.4.1 METHODOLOGY

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

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

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

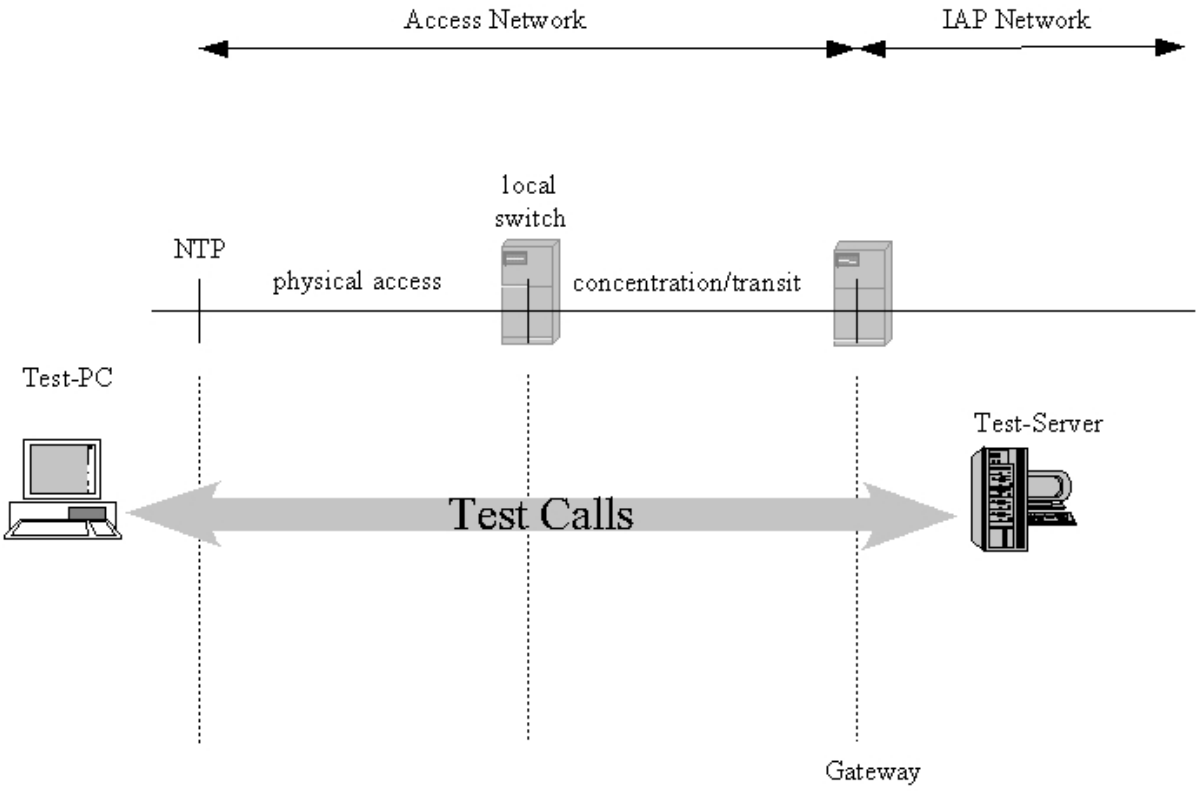


Figure for Measurement set-up

2.4.4.2 REQUIREMENTS FOR THE TEST-SERVER

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

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

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

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

2.4.4.3 TEST FILES

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

2.4.4.4 REPRESENTATIVENESS OR NUMBER OF TEST CALLS

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

2.4.4.5 PARAMETERS EVALUATED DURING DATA DRIVE TEST AT HOTSPOTS

2.4.4.5.1 SUCCESSFUL DATA TRANSMISSIONS DOWNLOAD ATTEMPTS

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

Measurement:

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

Successful data transmission download attempts =

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

2.4.4.5.2 SUCCESSFUL DATA TRANSMISSION UPLOAD ATTEMPTS

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

Measurement:

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

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

2.4.4.5.3 MINIMUM DOWNLOAD SPEED

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

Measurement:

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

Minimum download speed (average of lower 10% of all test calls) =

$$\frac{\text{Download speed } (A1+A2+A3+A4+A5+A6)}{6} \times 100$$

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

2.4.4.5.4 AVERAGE THROUGHPUT FOR PACKET DATA

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

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

Measurement:

The average throughput for packet data should be calculated from all the test calls made according to the measurement setup.
Test calls are made to weigh the results according to the patterns of real traffic. Average throughput is calculated as the average of all such test calls.

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

2.4.4.5.5 LATENCY

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

Measurement:

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

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

2.5 OPERATORS COVERED 2G AND 3G

Name of Operator	Number of Subscriber as per VLR-2G
Aircel	9898
Airtel	8087854
BSNL	2628940
Idea	10622187
MTS	82457
RCOM CDMA	144000
RCOM GSM	144000
TATA CDMA	210256
TATA GSM	1229084
Telenor	5587015
Videocon	429014
Vodafone	18453104
Name of Operator	**Number of Subscriber as per VLR-3G**
BSNL 3G	NDR
Idea 3G	NDR
TATA 3G	556987
Vodafone 3G	2113637

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

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 CRITICAL FINDINGS

PMR Consolidated 2G (Network Parameters)

- Reliance (GSM & CDMA), TATA GSM and Videocon did not meet the benchmark for BTSs Accumulated Downtime.
- TATA CDMA & GSM 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 & CDMA) and Videocon did not meet the benchmark BTS Accumulated downtime.
- TATA CDMA & GSM failed to meet the benchmark for the parameter Worst Affected Cells Having More than 3% TCH Drop.

PMR Consolidated 3G (Network Parameters)

- TATA 3G failed meet the benchmark for the parameter Worst affected cells having more than 3% Circuit switched voice drop rate, however rest of the operators met TRAI benchmark.

3 Day Live Measurement 3G (Network Parameters)

- TATA 3G failed meet the benchmark for the parameter Worst affected cells having more than 3% Circuit switched voice drop rate, however rest of the operators met TRAI benchmark.

Wireless Data Services for 2G

- In PMR as well as 3days live Aircel failed to meet the benchmark PDP Context activation success rate, however rest of the operators met TRAI benchmark in PDP Context activation success rate, Activation done within 4 hours and Drop Rate.

Wireless Data Services for 3G

- In PMR as well as 3days live all operators met TRAI benchmark in PDP Context activation success rate, Activation done within 4 hours and Drop Rate.

Live Calling

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

Customer Service Quality Parameters

- For the billing disputes of post-paid subscribers, it was observed that Idea, Reliance GSM & CDMA and Vodafone failed to meet the TRAI benchmark for the parameter.
- For the prepaid customers, Reliance GSM & CDMA failed to meet the benchmark of charging disputes for Metering and Billing Credibility – Prepaid Subscribers.
- Idea failed to meet the TRAI benchmark of providing credit or waiver within one week in case of complaints received.

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	0.02%	0.00%	98.88%	0.02%	0.02%	0.31%	1.80%	97.43%
Airtel	0.05%	0.08%	98.80%	0.40%	0.36%	0.78%	1.16%	96.70%
BSNL	1.55%	1.24%	98.16%	0.07%	0.41%	0.77%	1.77%	98.67%
Idea	0.05%	0.15%	98.83%	0.46%	0.57%	0.92%	2.19%	95.26%
MTS	0.05%	0.00%	99.79%	NA	0.00%	0.01%	0.35%	99.15%
RCOM CDMA	3.00%	0.36%	97.65%	NA	0.98%	0.07%	0.35%	99.32%
RCOM GSM	3.07%	0.46%	97.54%	0.09%	0.68%	0.08%	0.42%	99.20%
TATA CDMA	0.00%	0.00%	98.96%	NA	0.14%	0.44%	6.41%	99.38%
TATA GSM	3.14%	0.05%	98.13%	0.03%	0.05%	0.69%	4.28%	98.79%
Telenor	0.09%	0.17%	98.06%	0.42%	0.72%	0.45%	1.11%	98.12%
Videocon	2.66%	0.14%	99.16%	0.06%	0.05%	0.41%	0.71%	97.81%
Vodafone	1.11%	0.12%	99.60%	0.26%	0.40%	0.83%	2.51%	97.01%

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:

Reliance (GSM & CDMA), TATA GSM and Videocon 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, TATA CDMA & MTS at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for MTS with 99.79%.

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 & GSM failed to meet the benchmark for the parameter. Best performance was recorded for MTS and Reliance CDMA at 0.35%.

Voice Quality

All operators met the benchmark for the parameter. Best performance was recorded for TATA CDMA at 99.38%.

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

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

4.1.1 PMR DATA - OCTOBER FOR 2G

Month								
Name of Service Provider Month October	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.02%	0.00%	98.81%	0.02%	0.04%	0.34%	1.77%	97.34%
Airtel	0.07%	0.17%	98.77%	0.03%	0.45%	0.81%	1.36%	96.57%
BSNL	1.76%	1.52%	98.47%	0.08%	0.47%	0.99%	1.78%	98.66%
Idea	0.07%	0.20%	98.81%	0.41%	0.59%	0.87%	2.18%	95.31%
MTS	0.04%	0.00%	99.84%	NA	0.00%	0.01%	0.34%	99.15%
RCOM CDMA	3.84%	0.45%	97.68%	NA	0.90%	0.08%	0.40%	NDR
RCOM GSM	3.37%	0.52%	98.10%	0.10%	0.65%	0.09%	0.44%	99.18%
TATA CDMA	0.00%	0.00%	98.83%	NA	0.28%	0.54%	7.23%	63.13%
TATA GSM	5.46%	0.16%	98.06%	0.04%	0.07%	0.87%	5.22%	98.76%
Telenor	0.10%	0.24%	97.81%	0.31%	1.03%	0.47%	1.01%	98.15%
Videocon	0.03%	0.00%	99.15%	0.09%	0.07%	0.49%	0.85%	97.50%
Vodafone	3.25%	0.13%	99.58%	0.23%	0.42%	0.99%	2.82%	96.81%

4.1.2 PMR DATA – NOVEMBER FOR 2G

Month								
Name of Service Provider Month November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.02%	0.00%	98.77%	0.02%	0.02%	0.29%	1.85%	97.62%
Airtel	0.05%	0.04%	98.76%	0.05%	0.59%	0.76%	1.06%	96.77%
BSNL	1.49%	1.34%	97.88%	0.06%	0.39%	0.68%	1.76%	98.71%
Idea	0.04%	0.11%	98.64%	0.57%	0.69%	0.97%	2.27%	95.15%
MTS	0.04%	0.00%	99.72%	NA	0.00%	0.02%	0.31%	99.13%
RCOM CDMA	2.05%	0.18%	97.79%	NA	0.88%	0.05%	0.33%	NDR
RCOM GSM	2.43%	0.28%	98.76%	0.07%	0.52%	0.08%	0.51%	99.23%
TATA CDMA	0.00%	0.00%	98.98%	NA	0.02%	0.45%	6.65%	62.32%
TATA GSM	2.11%	0.00%	98.22%	0.02%	0.03%	0.57%	3.83%	98.85%
Telenor	0.07%	0.08%	98.07%	0.37%	0.62%	0.41%	1.02%	98.29%
Videocon	3.51%	0.16%	99.14%	0.07%	0.08%	0.45%	0.82%	97.58%
Vodafone	0.05%	0.10%	99.54%	0.32%	0.46%	0.78%	2.49%	96.94%

4.1.3 PMR DATA - DECEMBER FOR 2G

Month								
Name of Service Provider Month December	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.02%	0.00%	99.06%	0.03%	0.01%	0.31%	1.78%	97.38%
Airtel	0.04%	0.01%	98.88%	1.12%	0.06%	0.78%	1.06%	96.79%
BSNL	1.46%	0.85%	98.13%	0.07%	0.37%	0.64%	1.78%	98.74%
Idea	0.04%	0.14%	99.05%	0.39%	0.44%	0.92%	2.11%	95.32%
MTS	0.08%	0.00%	99.81%	NA	0.00%	0.01%	0.39%	99.17%
RCOM CDMA	3.19%	0.45%	97.47%	NA	1.14%	0.08%	0.31%	NDR
RCOM GSM	3.49%	0.60%	95.76%	0.11%	0.87%	0.08%	0.33%	99.20%
TATA CDMA	0.00%	0.00%	99.07%	NA	0.12%	0.33%	5.36%	61.46%
TATA GSM	1.93%	0.00%	98.11%	0.03%	0.04%	0.62%	3.78%	98.78%
Telenor	0.09%	0.21%	98.29%	0.58%	0.50%	0.48%	1.28%	97.92%
Videocon	4.60%	0.27%	99.19%	0.01%	0.00%	0.31%	0.44%	98.34%
Vodafone	0.04%	0.13%	99.68%	0.24%	0.32%	0.72%	2.23%	97.28%

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%	98.82%	0.01%	0.01%	0.32%	1.76%	97.57%
Airtel	1.24%	0.02%	98.86%	0.39%	0.18%	0.77%	1.06%	96.81%
BSNL	1.67%	0.00%	98.21%	0.06%	0.41%	0.79%	1.77%	98.74%
Idea	0.05%	0.01%	98.93%	0.26%	0.50%	0.93%	2.21%	95.24%
MTS	0.00%	0.00%	99.79%	NA	0.00%	0.04%	0.00%	99.14%
RCOM CDMA	2.87%	0.00%	97.50%	NA	1.01%	0.07%	0.42%	98.56%
RCOM GSM	2.33%	0.00%	98.66%	0.08%	0.38%	0.08%	0.65%	99.23%
TATA CDMA	0.45%	0.00%	98.97%	NA	0.05%	0.58%	5.23%	99.01%
TATA GSM	0.16%	0.00%	98.16%	0.02%	0.03%	0.63%	4.24%	98.84%
Telenor	0.17%	0.00%	98.53%	0.49%	0.50%	0.21%	1.14%	98.48%
Videocon	2.57%	0.00%	99.09%	0.22%	0.26%	0.48%	0.68%	97.57%
Vodafone	1.03%	0.04%	99.65%	0.19%	0.35%	0.75%	2.52%	97.25%

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:

Reliance (GSM & CDMA) and Videocon did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for MTS at 0.00%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for all the operators at 0.00% except Vodafone, Idea & Airtel.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for MTS with 99.79%.

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, 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 0.04%.

Worst Affected Cells Having More than 3% TCH Drop:

TATA CDMA & GSM failed to meet 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 Reliance GSM at 99.23%.

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

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

4.2.1 3 DAY DATA - OCTOBER FOR 2G

3 Day								
Name of Service Provider 3 Day October	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.01%	0.00%	98.64%	0.01%	0.01%	0.33%	1.79%	97.55%
Airtel	3.22%	0.03%	98.81%	0.02%	0.21%	0.74%	1.04%	96.90%
BSNL	1.68%	0.00%	98.62%	0.06%	0.44%	0.99%	1.77%	98.75%
Idea	0.06%	0.00%	98.97%	0.31%	0.48%	0.86%	1.96%	95.46%
MTS	0.00%	0.00%	99.83%	NA	0.00%	0.01%	0.00%	99.20%
RCOM CDMA	2.42%	0.00%	97.35%	NA	0.93%	0.07%	0.35%	NDR
RCOM GSM	1.83%	0.00%	98.83%	0.10%	0.18%	0.08%	0.35%	99.25%
TATA CDMA	1.11%	0.00%	98.92%	NA	0.07%	0.69%	4.36%	64.41%
TATA GSM	0.18%	0.00%	98.16%	0.01%	0.01%	0.75%	4.69%	98.84%
Telenor	0.08%	0.00%	98.69%	0.18%	0.22%	0.22%	1.02%	98.52%
Videocon	0.03%	0.00%	99.15%	0.09%	0.07%	0.49%	0.85%	97.50%
Vodafone	2.68%	0.00%	99.63%	0.21%	0.37%	0.88%	2.52%	97.17%

4.2.2 3 DAY DATA – NOVEMBER FOR 2G

3 Day								
Name of Service Provider 3 Day November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.03%	0.00%	98.64%	0.01%	0.01%	0.33%	1.92%	97.50%
Airtel	0.07%	0.01%	98.88%	0.03%	0.26%	0.75%	1.08%	96.87%
BSNL	1.89%	0.00%	98.03%	0.06%	0.41%	0.68%	1.67%	NDR
Idea	0.04%	0.03%	98.79%	0.24%	0.57%	0.95%	2.43%	95.12%
MTS	0.00%	0.00%	99.77%	NA	0.00%	0.02%	NA	99.16%
RCOM CDMA	2.42%	0.00%	97.52%	NA	0.94%	0.07%	0.34%	NDR
RCOM GSM	2.23%	0.00%	98.70%	0.07%	0.48%	0.08%	1.20%	99.19%
TATA CDMA	0.00%	0.00%	98.99%	NA	0.04%	0.57%	4.43%	64.34%
TATA GSM	0.15%	0.00%	98.11%	0.05%	0.04%	0.61%	4.35%	98.78%
Telenor	NA	NA	98.57%	0.31%	0.27%	0.18%	1.19%	98.45%
Videocon	5.24%	0.00%	99.10%	0.10%	0.07%	0.50%	0.98%	97.48%
Vodafone	0.04%	0.00%	99.63%	0.13%	0.37%	0.91%	2.82%	97.01%

4.2.3 3 DAY DATA - DECEMBER FOR 2G

3 Day								
Name of Service Provider 3 Day December	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.01%	0.00%	99.19%	0.02%	0.00%	0.28%	1.56%	97.68%
Airtel	0.04%	0.01%	98.88%	1.12%	0.06%	0.78%	1.06%	96.79%
BSNL	1.45%	0.00%	97.98%	0.07%	0.37%	0.69%	1.86%	98.64%
Idea	0.04%	0.01%	99.02%	0.24%	0.44%	0.96%	2.25%	95.15%
MTS	0.00%	0.00%	99.77%	NA	0.00%	0.08%	0.00%	99.06%
RCOM CDMA	3.78%	0.00%	97.63%	NA	1.14%	0.07%	0.84%	NDR
RCOM GSM	3.07%	0.00%	98.46%	0.07%	0.49%	0.08%	0.39%	99.23%
TATA CDMA	0.23%	0.00%	99.01%	NA	0.03%	0.49%	9.88%	63.59%
TATA GSM	NA	NA	98.20%	0.01%	0.05%	0.56%	3.67%	98.89%
Telenor	0.00%	0.00%	98.32%	0.99%	1.00%	0.47%	1.22%	98.13%
Videocon	2.47%	0.00%	99.01%	0.48%	0.63%	0.20%	0.21%	98.89%
Vodafone	0.04%	0.13%	99.68%	0.24%	0.32%	0.72%	2.23%	97.28%

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%
BSNL 3G	1.07%	1.70%	96.33%	0.84%	0.39%	1.13%	1.55%	98.24%
Idea 3G	0.06%	0.21%	99.65%	0.35%	0.16%	0.39%	2.38%	98.93%
TATA 3G	1.80%	0.02%	98.79%	0.17%	0.41%	0.55%	3.34%	99.69%
Vodafone 3G	0.00%	0.00%	99.72%	0.20%	0.08%	0.22%	1.51%	98.95%

Note: Airtel 3G did not submit the data.

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 Vodafone at 0.00%.

Worst affected Node Bs due to downtime:

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

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.72%.

RRC Congestion:

All operators met the benchmark. Minimum RRC congestion was recorded for TATA at 0.17%.

Circuit Switched RAB Congestion:

All operators met the benchmark. Minimum Circuit Switched RAB congestion was recorded for Vodafone at 0.08%.

Call Drop Rate:

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

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 Vodafone at 1.51%.

Circuit Switch Voice Quality:

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

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

4.3.1 PMR DATA - OCTOBER FOR 3G

Month								
Name of Service Provider Month October	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
BSNL 3G	1.36%	1.59%	96.07%	0.83%	0.35%	1.10%	1.52%	98.90%
Idea 3G	0.09%	0.24%	99.58%	0.42%	0.24%	0.40%	2.80%	98.93%
TATA 3G	2.11%	0.07%	98.91%	0.12%	0.32%	0.54%	3.37%	99.69%
Vodafone 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

4.3.2 PMR DATA – NOVEMBER FOR 3G

Month								
Name of Service Provider Month November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
BSNL 3G	0.82%	1.77%	97.09%	0.84%	0.35%	1.14%	1.54%	97.64%
Idea 3G	0.05%	0.25%	99.65%	0.33%	0.14%	0.40%	2.30%	98.92%
TATA 3G	1.59%	0.00%	98.92%	0.16%	0.29%	0.52%	3.66%	99.69%
Vodafone 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

4.3.3 PMR DATA - DECEMBER FOR 3G

Month								
Name of Service Provider Month December	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
BSNL 3G	1.00%	1.75%	95.83%	0.85%	0.46%	1.14%	1.57%	98.20%
Idea 3G	0.05%	0.15%	99.72%	0.30%	0.10%	0.38%	2.06%	98.93%
TATA 3G	1.68%	0.00%	98.55%	0.23%	0.61%	0.59%	3.00%	99.68%
Vodafone 3G	0.00%	0.00%	99.72%	0.20%	0.08%	0.22%	1.51%	98.95%

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.

Live Data - 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%
BSNL 3G	1.45%	1.40%	96.10%	0.24%	0.36%	1.47%	1.54%	96.12%
Idea 3G	0.05%	0.02%	99.55%	0.45%	0.26%	0.39%	2.39%	98.93%
TATA 3G	1.17%	0.02%	98.91%	0.14%	0.21%	0.55%	3.34%	99.69%
Vodafone 3G	0.00%	0.00%	96.50%	0.38%	0.58%	0.22%	1.47%	98.95%

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 Vodafone at 0.00%.

Worst affected Node Bs due to downtime:

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

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Idea with 99.55%.

RRC Congestion:

All operators met the benchmark. Minimum RRC congestion was recorded for TATA at 0.14%.

Circuit Switched RAB Congestion:

All operators met the benchmark. Minimum Circuit Switched RAB congestion was recorded for TATA at 0.21%.

Call Drop Rate:

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

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 Vodafone at 1.47%.

Circuit Switch Voice Quality:

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

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

4.4.1 3 DAY DATA - OCTOBER FOR 3G

3 Day								
Name of Service Provider 3 Day October	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
BSNL 3G	1.41%	1.36%	95.56%	0.22%	0.34%	1.48%	1.58%	95.56%
Idea 3G	0.05%	0.00%	99.48%	0.56%	0.33%	0.41%	2.70%	98.93%
Airtel	0.77%	0.07%	98.95%	0.09%	0.03%	0.66%	3.95%	99.69%
TATA 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone 3G	NA	NA	0.00%	0.00%	0.00%	NA	NA	NA

4.4.2 3 DAY DATA – NOVEMBER FOR 3G

3 Day								
Name of Service Provider 3 Day November	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
BSNL 3G	1.41%	1.36%	95.56%	0.22%	0.34%	1.48%	1.58%	95.56%
Idea 3G	0.04%	0.04%	99.45%	0.56%	0.35%	0.38%	2.55%	98.93%
TATA 3G	2.75%	0.00%	98.96%	0.16%	0.28%	0.49%	3.15%	99.69%
Vodafone 3G	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

4.4.3 3 DAY DATA - DECEMBER FOR 3G

3 Day								
Name of Service Provider 3 Day December	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
BSNL 3G	1.55%	1.48%	97.18%	0.29%	0.40%	1.43%	1.47%	97.16%
Idea 3G	0.06%	0.02%	99.73%	0.22%	0.09%	0.37%	1.93%	98.94%
TATA 3G	0.00%	0.00%	98.83%	0.16%	0.32%	0.52%	2.92%	99.68%
Vodafone 3G	0.00%	0.00%	96.50%	0.38%	0.58%	0.22%	1.47%	98.95%

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	100.00%	85.34%	0.63%	100.00%	84.38%	0.62%
Airtel	100.00%	98.47%	3.06%	100.00%	99.52%	2.99%
BSNL	100.00%	98.16%	2.76%	100.00%	98.16%	2.76%
Idea	100.00%	100.00%	0.17%	100.00%	99.93%	0.16%
MTS	NDR	NDR	NDR	NDR	NDR	NDR
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	100.00%	99.72%	0.78%	100.00%	99.41%	0.80%
Videocon	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	100.00%	99.54%	4.72%	100.00%	98.71%	4.62%

Note: MTS and Videocon did not submit the data

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

Activation done within 4 hours:

In PMR as well as 3days live all operators met the benchmark. Maximum Activation done within 4 hours was recorded for all the operators at 100.00%.

PDP Context activation success rate:

In PMR as well as 3days live Aircel failed to meet the benchmark. Maximum PDP Context activation success rate was recorded for Idea and 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 Idea with 0.17%.

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%
BSNL 3G	100.00%	98.47%	2.49%	100.00%	98.29%	2.34%
Idea 3G	100.00%	100.00%	0.71%	100.00%	100.00%	0.72%
TATA 3G	100.00%	99.82%	2.09%	100.00%	98.89%	2.10%
Vodafone 3G	100.00%	97.23%	0.63%	100.00%	98.01%	0.84%

Note: Airtel 3G did not submit the data

Activation done within 4 hours:

In PMR as well as 3days live all operators met the benchmark. Maximum Activation done within 4 hours was recorded for all operators at 100.00%.

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 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 Vodafone with 0.63% and Idea 0.72% 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%
Videocon	NA	NA	100.00%	96.24%	96.00%	100.00%
Vodafone	100.00%	100.00%	100.00%	96.91%	97.50%	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.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. Airtel, Idea, MTS, Rcom CDMA, Telenor, Videocon and Vodafone recorded the best performance at 100%.

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.

Accessibility of Call Centre/Customer Care-IVR

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

Customer Care / Helpline Assessment (voice to voice)

Reliance GSM & CDMA and TATA GSM failed to meet the benchmark for the parameter. TATA CDMA recorded best performance for the parameter with 99.74%.

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%	100.00%	100.00%	100.00%	95.54%	98.53%
Airtel	0.04%	0.00%	100.00%	100.00%	100.00%	99.99%	95.97%
BSNL	0.03%	0.05%	100.00%	100.00%	100.00%	98.58%	96.50%
Idea	0.46%	0.02%	99.98%	100.00%	99.71%	99.00%	99.50%
MTS	0.08%	0.00%	100.00%	100.00%	100.00%	98.20%	98.72%
RCOM CDMA	0.90%	0.37%	100.00%	100.00%	100.00%	99.50%	99.50%
RCOM GSM	0.89%	0.86%	100.00%	100.00%	100.00%	97.50%	97.50%
TATA CDMA	0.01%	0.00%	100.00%	100.00%	100.00%	98.60%	98.60%
TATA GSM	0.00%	0.00%	100.00%	100.00%	100.00%	98.60%	98.60%
Telenor	NA	0.00%	100.00%	100.00%	NA	99.69%	96.36%
Videocon	NA	0.00%	100.00%	100.00%	100.00%	100.00%	96.48%
Vodafone	0.22%	0.01%	98.54%	100.00%	100.00%	100.00%	96.91%

Metering and Billing Credibility – Post-paid Subscribers

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

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, Reliance GSM & CDMA failed to meet the benchmark of charging disputes. Aircel, Airtel, TATA CDMA & GSM, Telenor, MTS and Videocon performed the best with 0.00% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and resolving 100% complaints within 6 weeks.

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

Idea 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. Videocon & Vodafone recorded the best performance for the parameter.

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

All operators met the TRAI specified benchmark of 95%. Reliance CDMA & 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	Videocon	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%
Videocon	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 any problems in connecting to other operators.

4.10 PMR COMPARISON WITH IMRB AND OPERATORS DATA

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)					
	BTSs Accumulated downtime (not available for service)		Worst affected BTSs due to downtime		Call Set-up Success Rate (within licensee's own network)		SDCCH/ Paging Chl. Congestion		TCH Congestion		Call Drop Rate (%age)		Worst affected cells having more than 3% TCH drop		%age of connection with good voice quality	
	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%	
	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator
Aircel	0.02%	0.02%	0.00%	0.00%	98.88%	98.88%	0.02%	0.02%	0.02%	0.02%	0.31%	0.31%	1.80%	1.80%	97.43%	97.45%
Airtel	0.05%	0.05%	0.08%	0.08%	98.80%	98.80%	0.40%	0.05%	0.36%	0.57%	0.78%	0.78%	1.16%	1.16%	96.70%	96.71%
BSNL	1.55%	1.57%	1.24%	1.24%	98.16%	98.16%	0.07%	0.07%	0.41%	0.41%	0.77%	0.72%	1.77%	1.78%	98.67%	100.00%
Idea	0.05%	0.05%	0.15%	0.15%	98.83%	98.83%	0.46%	0.46%	0.57%	0.57%	0.92%	0.92%	2.19%	2.19%	95.26%	95.26%
MTS	0.05%	0.02%	0.00%	0.00%	99.79%	99.79%	NA	0.00%	0.00%	0.00%	0.01%	0.01%	0.35%	0.35%	99.15%	99.18%
RCOM CDMA	3.00%	0.05%	0.36%	0.36%	97.65%	96.86%	NA	0.00%	0.98%	0.98%	0.07%	0.07%	0.35%	0.34%	99.32%	99.32%
RCOM GSM	3.07%	0.05%	0.46%	0.46%	97.54%	97.54%	0.09%	0.09%	0.68%	0.68%	0.08%	0.08%	0.42%	0.42%	99.20%	99.20%
TATA CDMA	0.00%	0.00%	0.00%	0.00%	98.96%	98.95%	NA	0.00%	0.14%	0.18%	0.44%	0.40%	6.41%	6.50%	99.38%	99.38%
TATA GSM	3.14%	0.05%	0.05%	0.09%	98.13%	98.11%	0.03%	0.03%	0.05%	0.05%	0.69%	0.69%	4.28%	4.27%	98.79%	98.80%
Telenor	0.09%	0.09%	0.17%	0.17%	98.06%	98.06%	0.42%	0.42%	0.72%	0.72%	0.45%	0.45%	1.11%	1.11%	98.12%	98.12%
Videocon	2.66%	0.07%	0.14%	0.18%	99.16%	99.10%	0.06%	0.12%	0.05%	0.13%	0.41%	0.43%	0.71%	0.74%	97.81%	97.72%
Vodafone	1.11%	0.05%	0.12%	0.21%	99.60%	99.60%	0.26%	0.26%	0.40%	0.40%	0.83%	0.83%	2.51%	2.51%	97.01%	97.01%

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

5 CRITICAL FINDINGS

PMR Consolidated 2G (Network Parameters)

- Reliance (GSM & CDMA), TATA GSM and Videocon did not meet the benchmark for BTSs Accumulated Downtime.
- TATA CDMA & GSM 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 & CDMA) and Videocon did not meet the benchmark BTS Accumulated downtime.
- TATA CDMA & GSM failed to meet the benchmark for the parameter Worst Affected Cells Having More than 3% TCH Drop.

PMR Consolidated 3G (Network Parameters)

- TATA 3G failed meet the benchmark for the parameter Worst affected cells having more than 3% Circuit switched voice drop rate, however rest of the operators met TRAI benchmark.

3 Day Live Measurement 3G (Network Parameters)

- TATA 3G failed meet the benchmark for the parameter Worst affected cells having more than 3% Circuit switched voice drop rate, however rest of the operators met TRAI benchmark.

Wireless Data Services for 2G

- In PMR as well as 3days live Aircel failed to meet the benchmark PDP Context activation success rate, however rest of the operators met TRAI benchmark in PDP Context activation success rate, Activation done within 4 hours and Drop Rate.

Wireless Data Services for 3G

- In PMR as well as 3days live all operators met TRAI benchmark in PDP Context activation success rate, Activation done within 4 hours and Drop Rate.

Live Calling

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

Customer Service Quality Parameters

- For the billing disputes of post-paid subscribers, it was observed that Idea, Reliance GSM & CDMA and Vodafone failed to meet the TRAI benchmark for the parameter.
- For the prepaid customers, Reliance GSM & CDMA failed to meet the benchmark of charging disputes for Metering and Billing Credibility – Prepaid Subscribers.
- Idea failed to meet the TRAI benchmark of providing credit or waiver within one week in case of complaints received.

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 –**

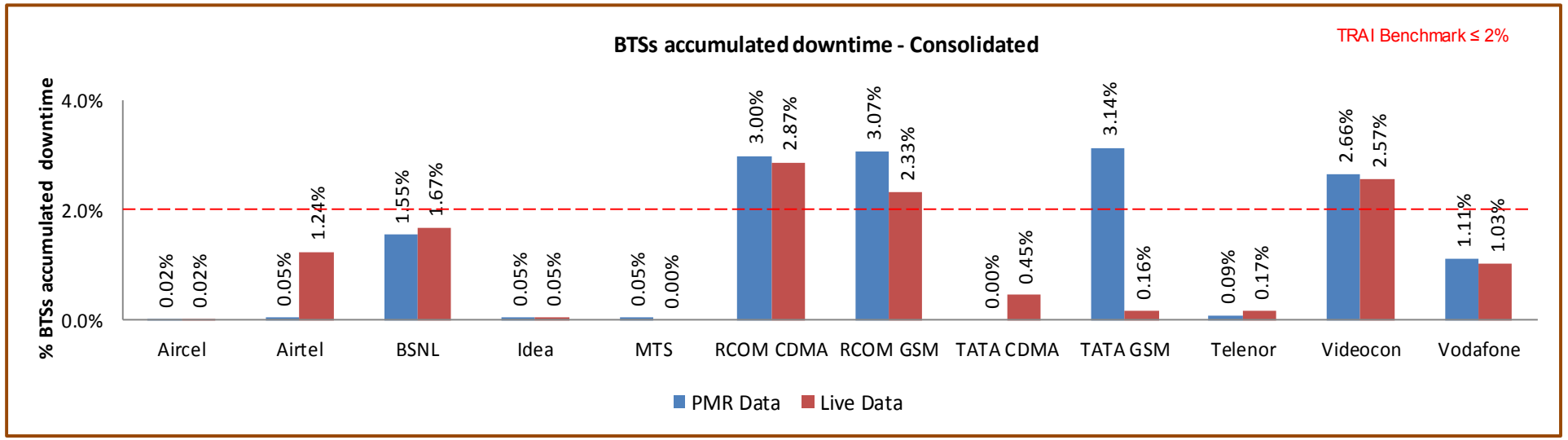
    a. BTSs Accumulated downtime (not available for service) ≤ 2%

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.

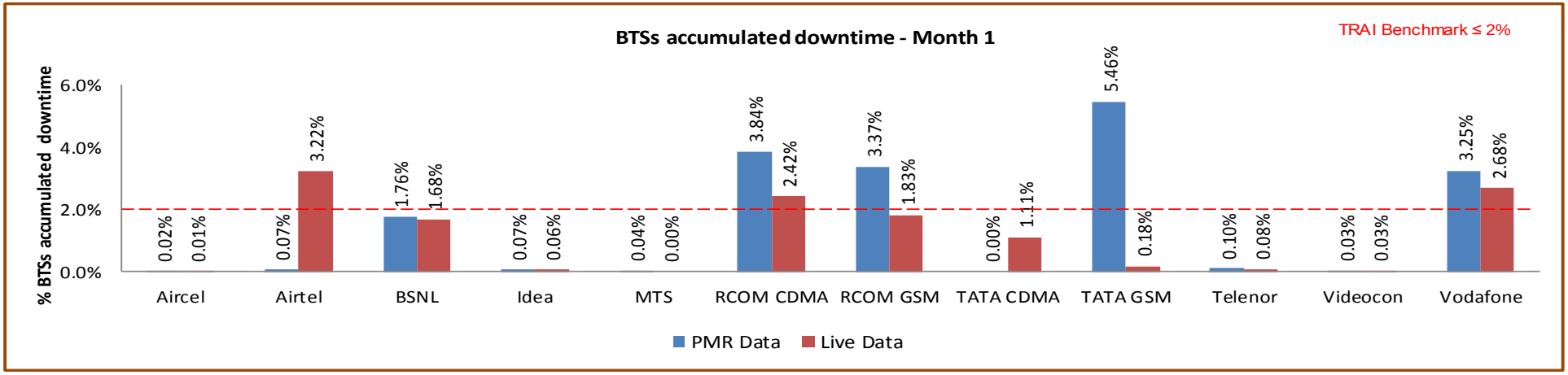
6.1.2 KEY FINDINGS - CONSOLIDATED



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

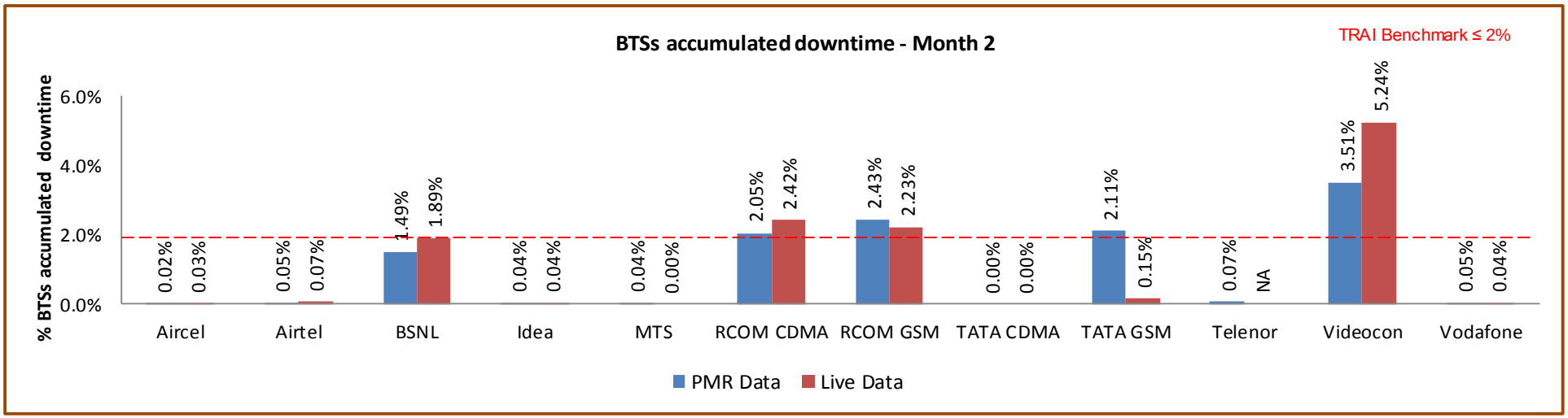
Rcom CDMA & GSM, TATA GSM and Videocon did not meet the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

6.1.2.1 KEY FINDINGS – MONTH 1



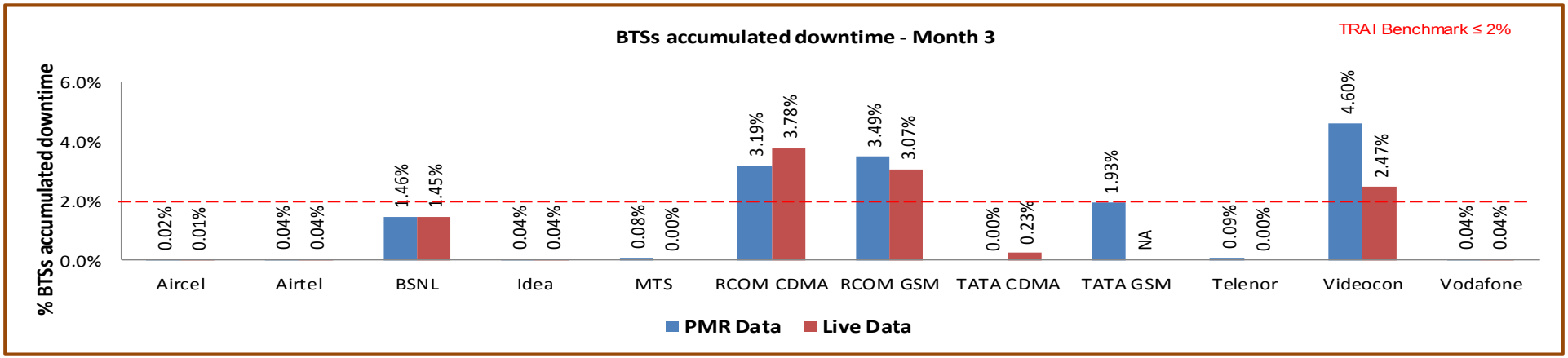
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.2 KEY FINDINGS – MONTH 2



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

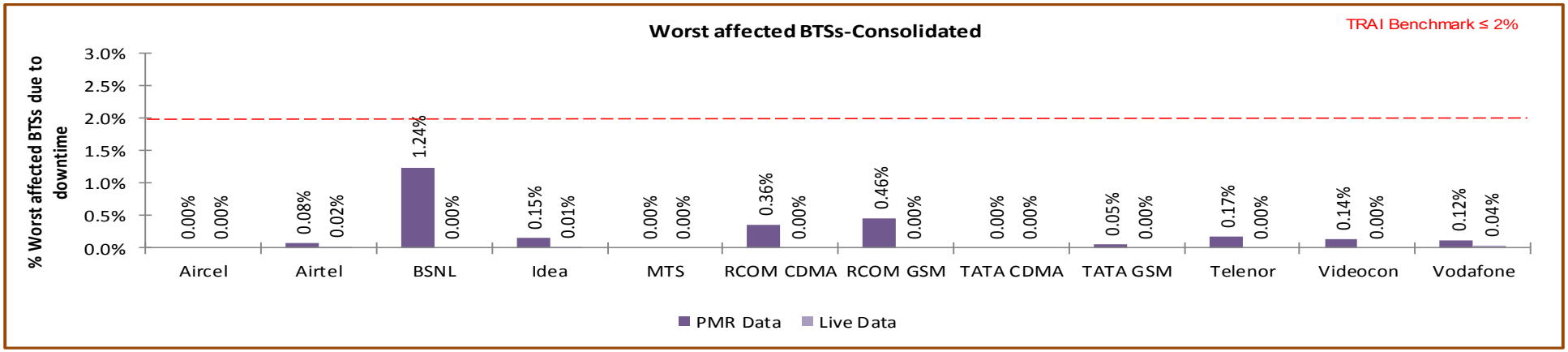
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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

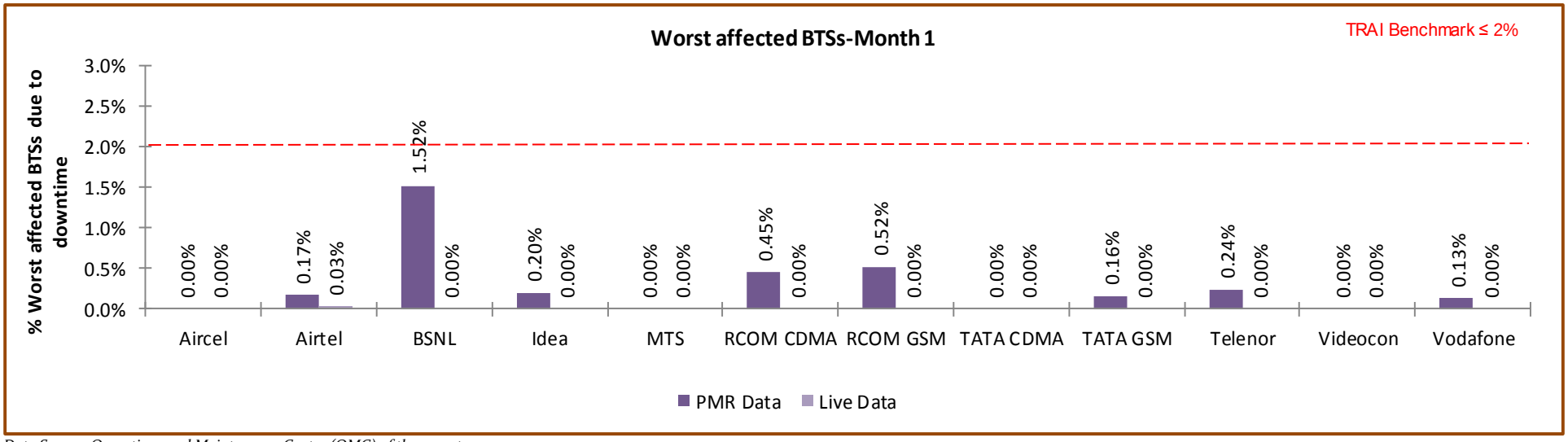


Data Source: Operations and Maintenance Center (OMC) of the operators

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

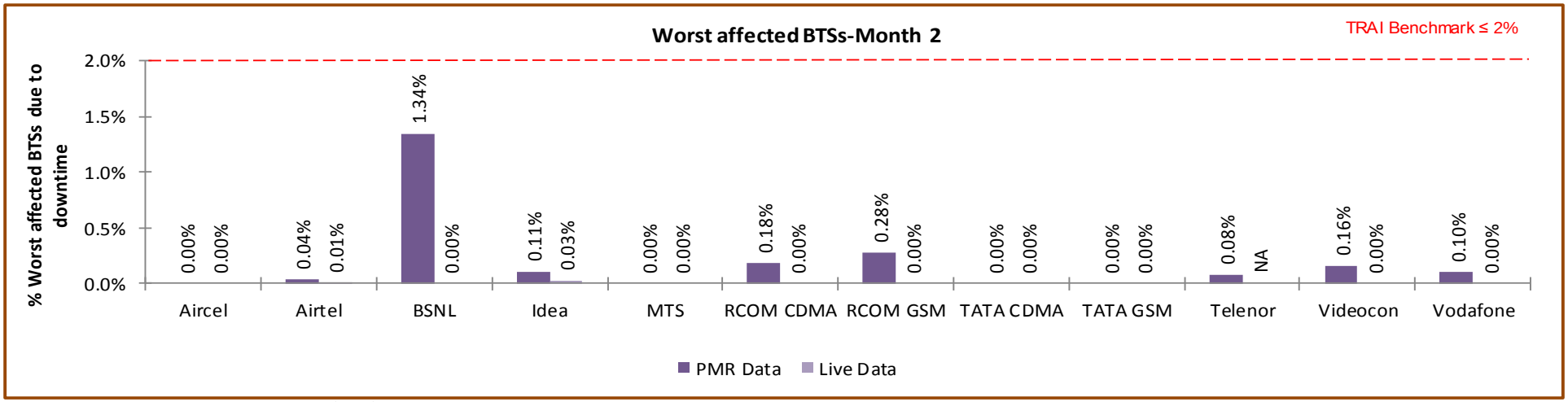
Significant difference was observed between PMR & live measurement data for Reliance GSM & CDMA and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.2.2.1 KEY FINDINGS – MONTH 1



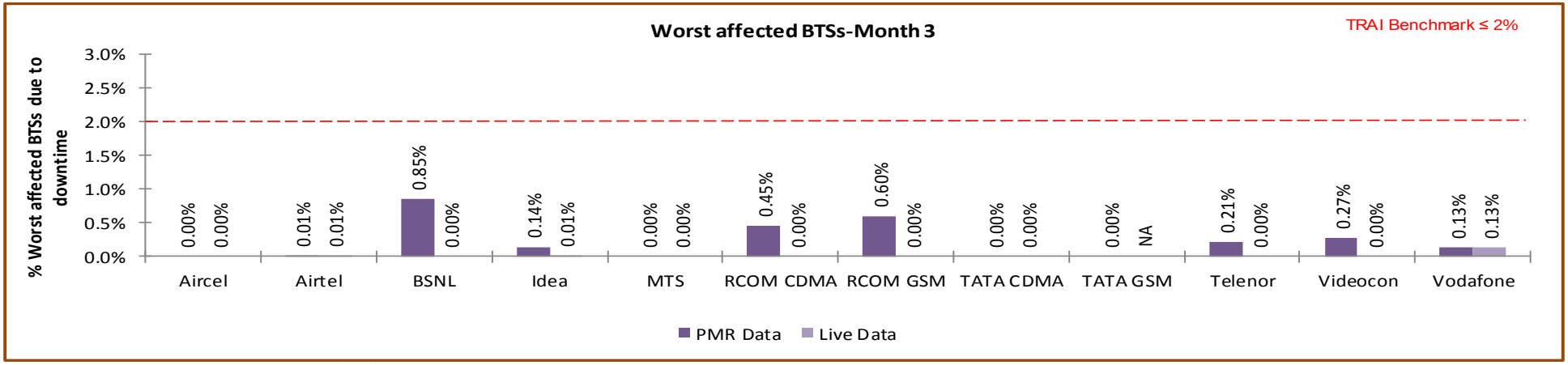
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2



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

6.2.2.3 KEY FINDINGS – MONTH 3



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

6.3 CALL SET UP SUCCESS RATE

6.3.1 PARAMETER DESCRIPTION

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

   (Calls Established / Total Call Attempts) * 100

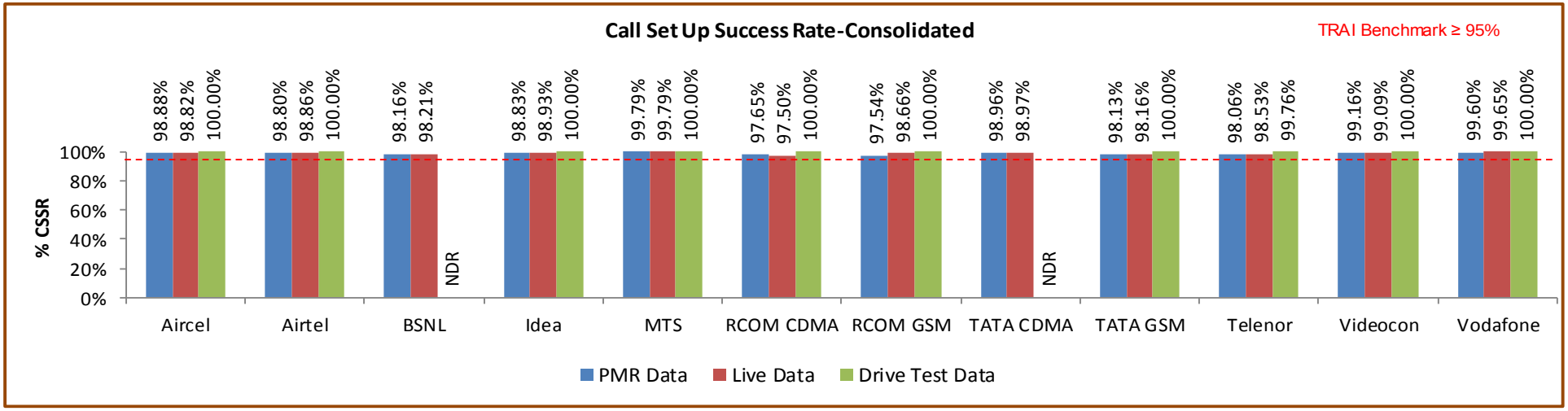
   Call Established means the following events have happened in call setup:-

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

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

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

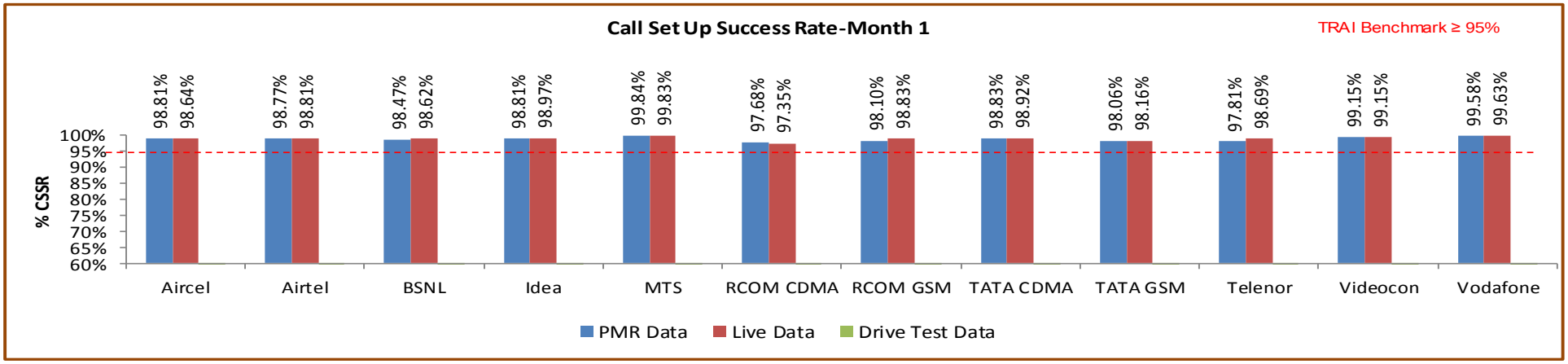
6.3.2 KEY FINDINGS - CONSOLIDATED



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

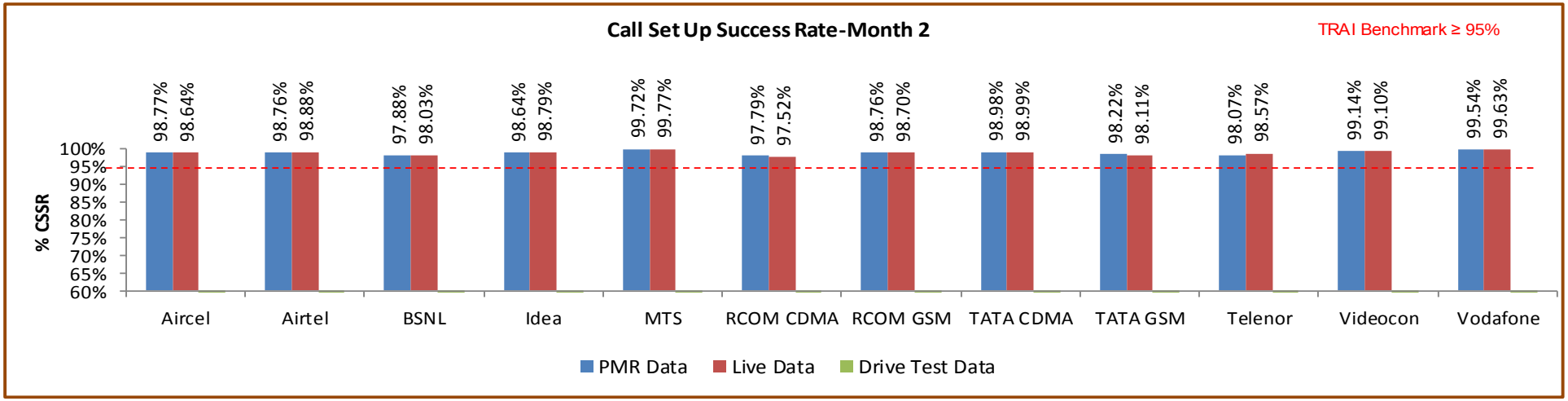
All operators met the TRAI benchmark as per audit/PMR data.

6.3.2.1 KEY FINDINGS – MONTH 1



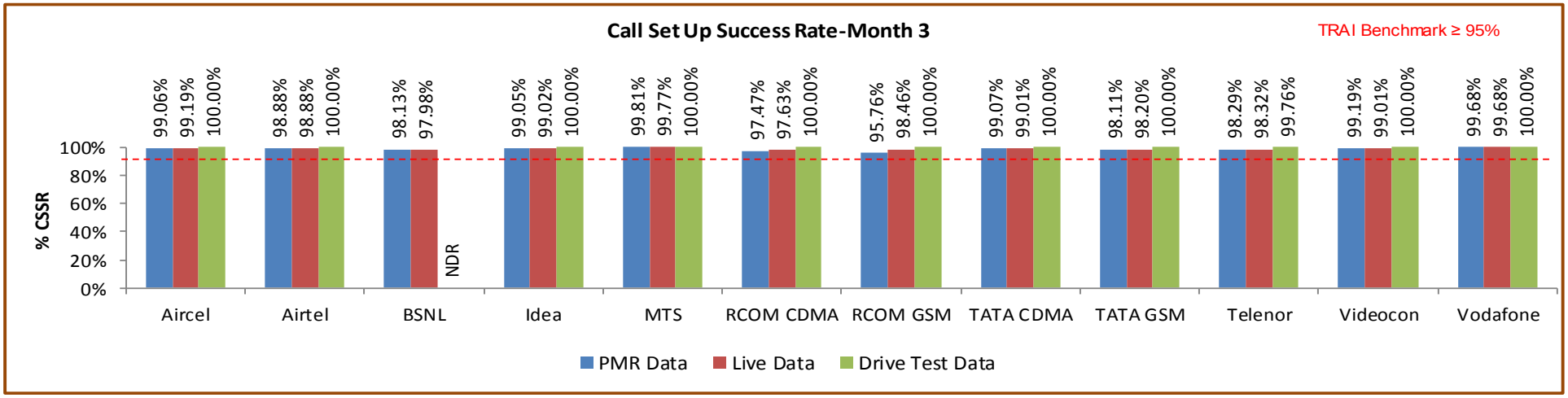
Data Source: Network Operations Center (NOC) of the operators

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

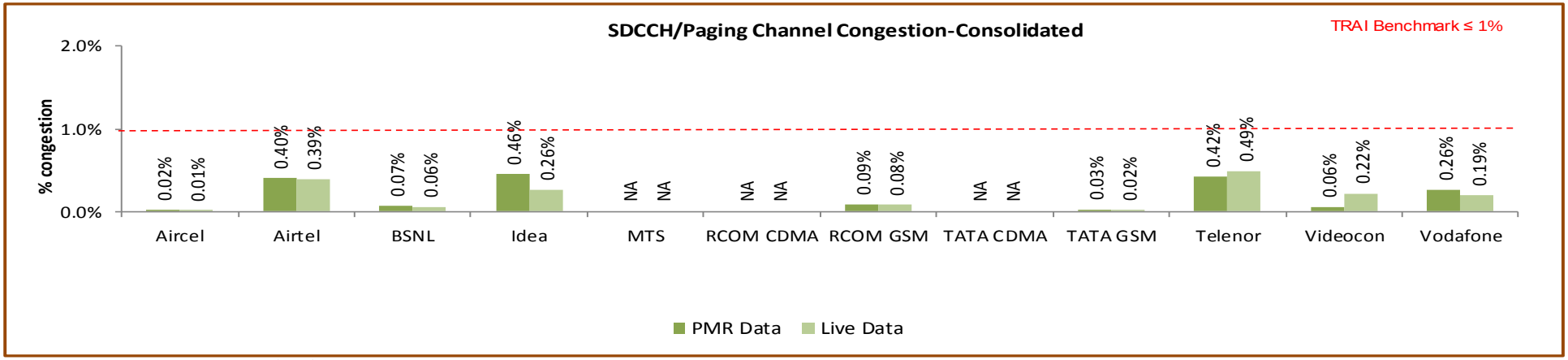
3. **Benchmark:**

   - 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)

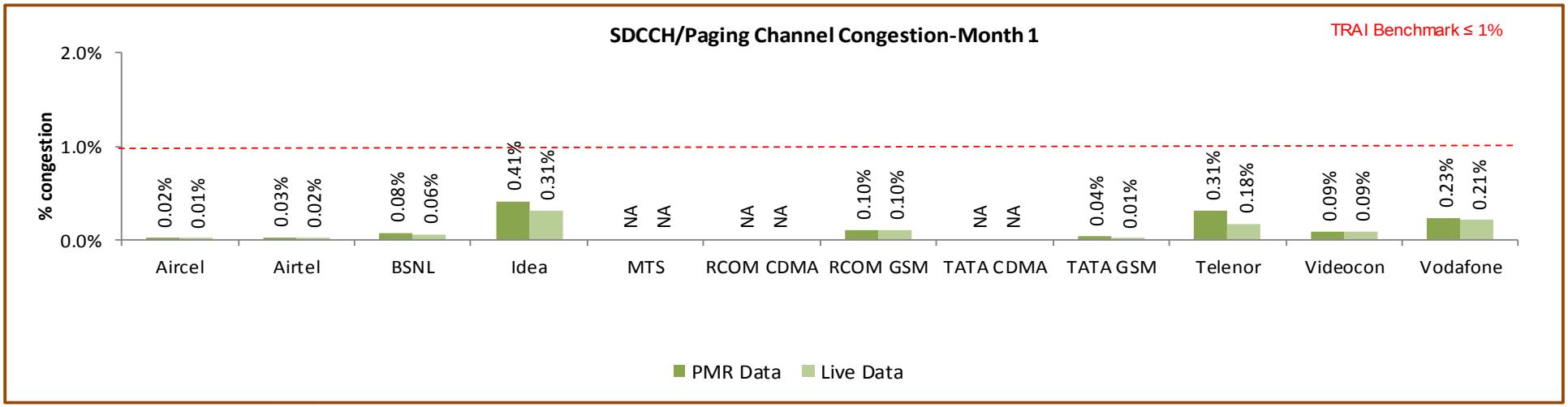


Data Source: Network Operations Center (NOC) of the operators

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

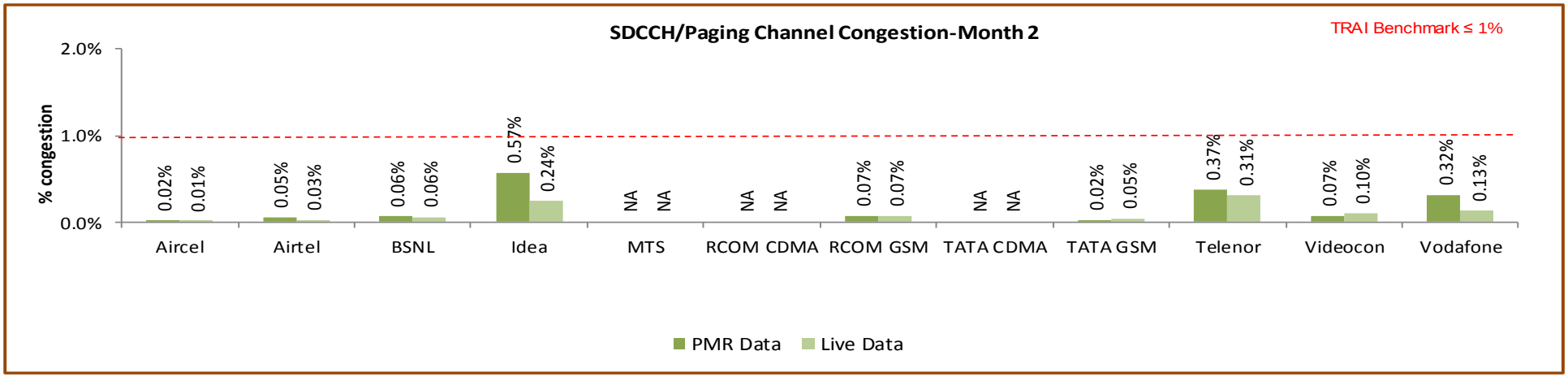
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

6.4.2.1 KEY FINDINGS – MONTH 1



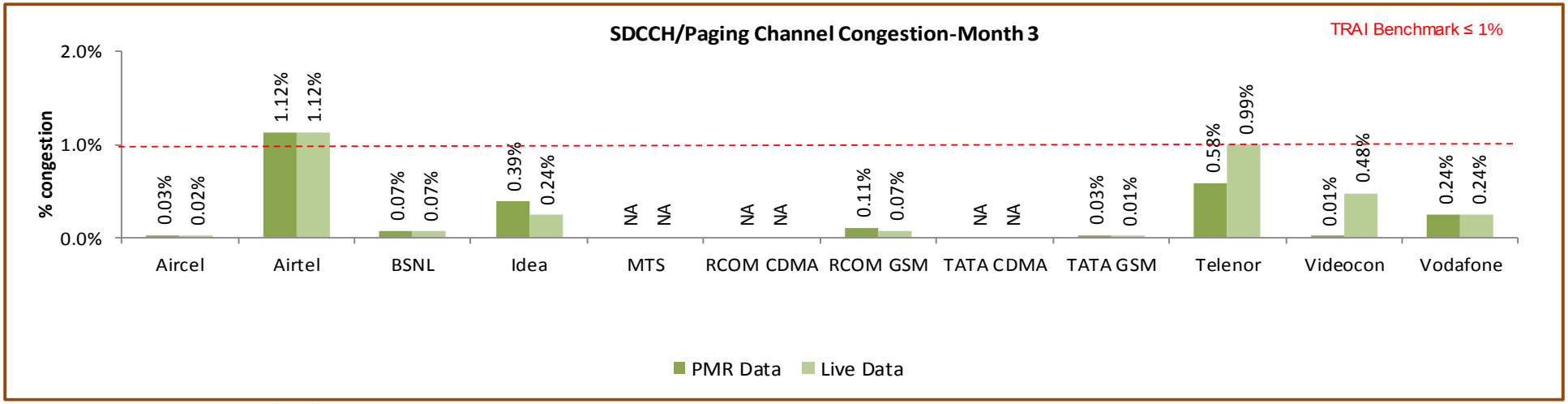
Data Source: Network Operations Center (NOC) of the operators

Key Findings – Month 2



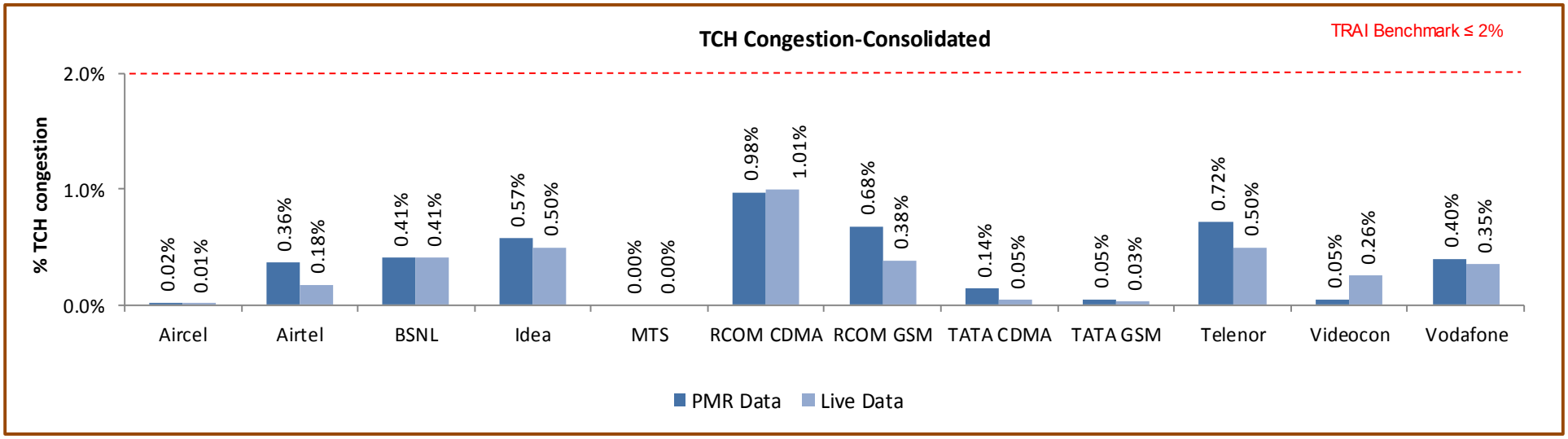
Data Source: Network Operations Center (NOC) of the operators

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)

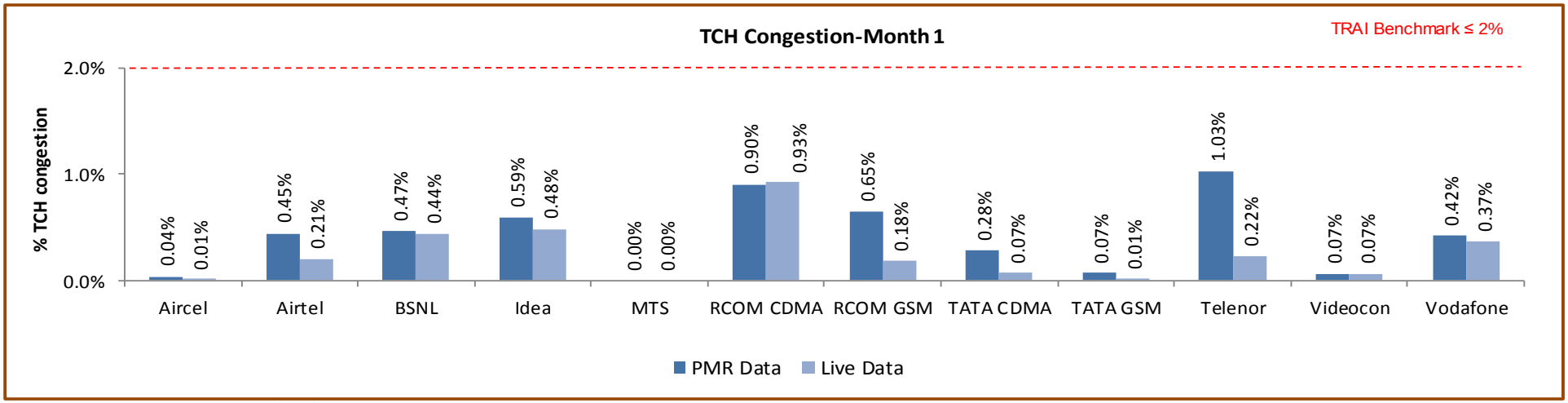


Data Source: Network Operations Center (NOC) of the operators

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

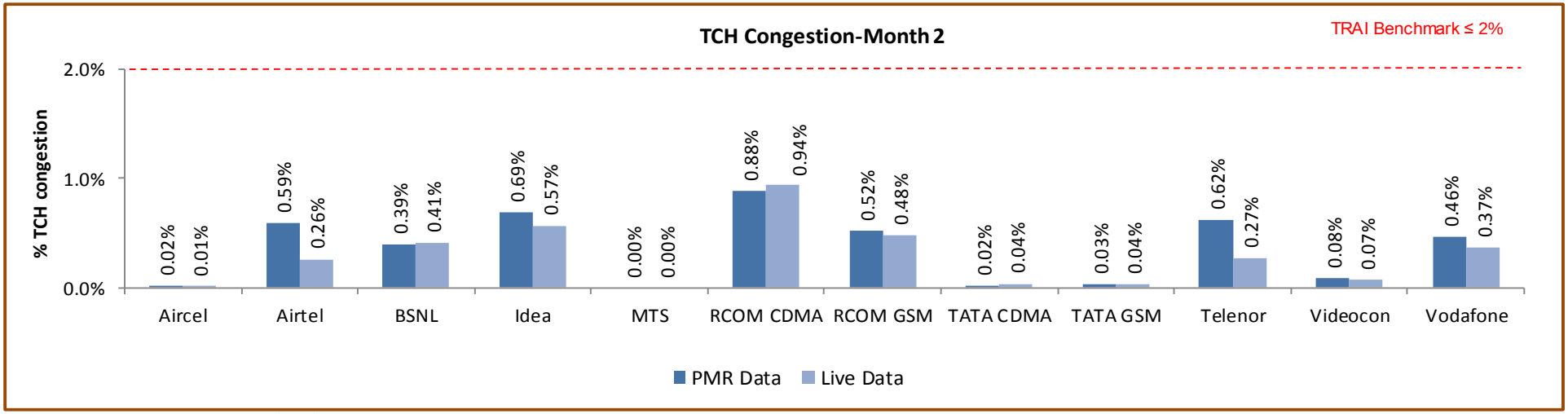
Significant difference was observed between PMR & live measurement data for Airtel, Reliance GSM & CDMA, Telenor and Idea. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.4.3.1 KEY FINDINGS – MONTH 1



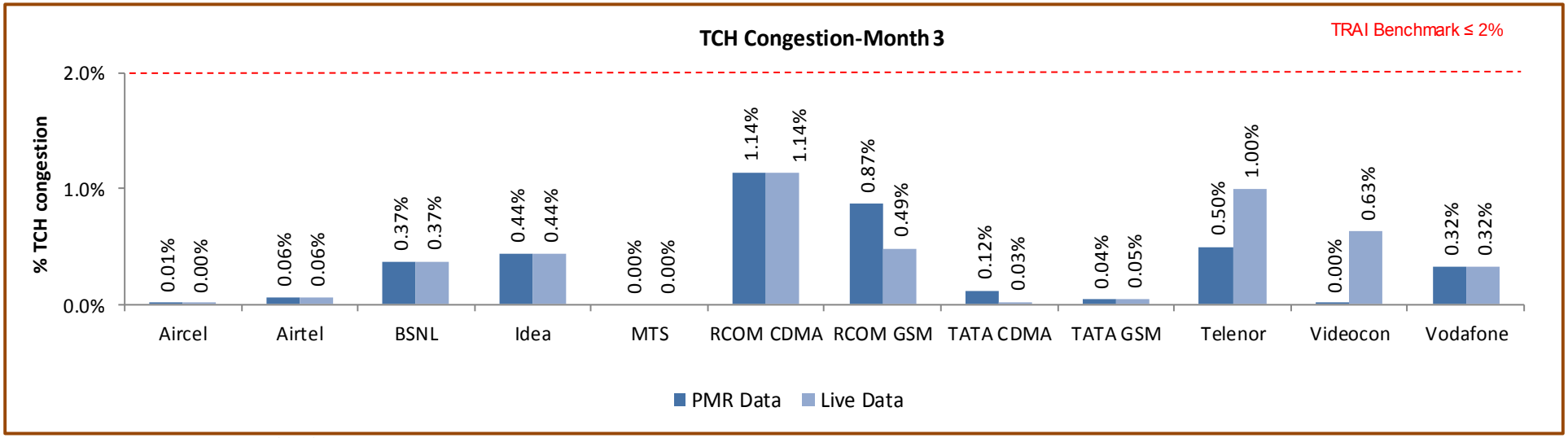
Data Source: Network Operations Center (NOC) of the operators

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	Videocon	Vodafone
Total number of working POIs		120	NDR	171	465	192	181	57	483	75	66	64	464
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0	0	1
Total Capacity of all POIs (A) - in erlangs		5827	NDR	144933	476405	24153	67874	39384	107253	110744	354167	20800	468478
Traffic served for all POIs (B)- in erlangs		94	NDR	80783	231647	2756	19060	20712	32617	50604	185124	10178	184774
POI congestion	≤ 0.5%	0.00%	NDR	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	Videocon	Vodafone
Total number of working POIs		120	NDR	171	465	192	181	38	483	75	66	64	459
No. of POIs not meeting benchmark		0	NDR	1	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		5838	NDR	144933	473319	24100	68826	26273	107253	110744	351748	20951	461722
Traffic served for all POIs (B)- in erlangs		90	NDR	84104	233408	1680	20682	13903	24365	42916	179676	5961	190582
POI congestion	≤ 0.5%	0.00%	NDR	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-October													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NDR	57	155	64	61	19	161	25	22	NDR	157
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0	NDR	1
Total Capacity of all POIs (A) - in erlangs		1949	NDR	48311	154168	8051	18875	13135	35751	36915	117347	NDR	157357
Traffic served for all POIs (B)- in erlangs		31	NDR	26927	79941	1028	7232	6825	11471	17454	64395	NDR	62058
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NDR	57	155	64	61	19	161	25	22	NDR	153
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		1946	NDR	48311	154871	8051	18885	13137	35751	36915	116040	NDR	152305
Traffic served for all POIs (B)- in erlangs		27	NDR	26054	77231	571	7623	6820	11817	17238	59757	NDR	63699
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%

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

6.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-November													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NDR	57	155	64	60	19	161	25	22	32	153
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1946	NDR	48311	160777	8051	18723	13136	35751	36915	116541	10476	155232
Traffic served for all POIs (B)- in erlangs		29	NDR	25974	75512	732	6451	6616	9826	16035	57426	4739	61334
POI congestion	≤ 0.5%	0.00%	NDR	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-November													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NDR	57	155	64	60	19	161	25	22	32	153
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1946	NDR	48311	156816	8051	18723	13136	35751	36915	116039	10476	153527
Traffic served for all POIs (B)- in erlangs		30	NDR	28636	80898	583	7622	7083	6124	18069	62691	5690	65500
POI congestion	≤ 0.5%	0.00%	NDR	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

6.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NA	57	155	64	60	19	161	25	22	32	153
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1932	NA	48311	161460	8051	30277	13113	35750	36915	120279	10325	155889
Traffic served for all POIs (B)- in erlangs		33	NA	27882	76194	996	5377	7271	11320	17115	63303	5439	61382
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%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NA	57	155	64	60	NDR	161	25	22	32	153
No. of POIs not meeting benchmark		0	NA	1	0	0	0	NDR	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1946	NA	48311	161632	7998	31219	NDR	35750	36915	119668	10476	155889
Traffic served for all POIs (B)- in erlangs		33	NA	29413	75279	527	5438	NDR	6424	7609	57228	270	61382
POI congestion	≤ 0.5%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	0.00%

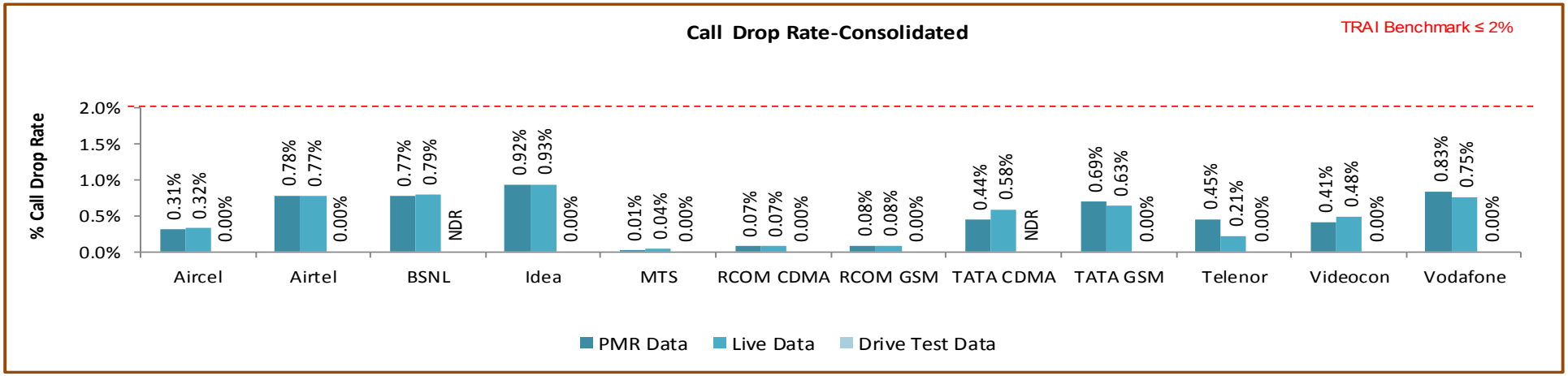
Data Source: Network Operations Center (NOC) of the operators

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.

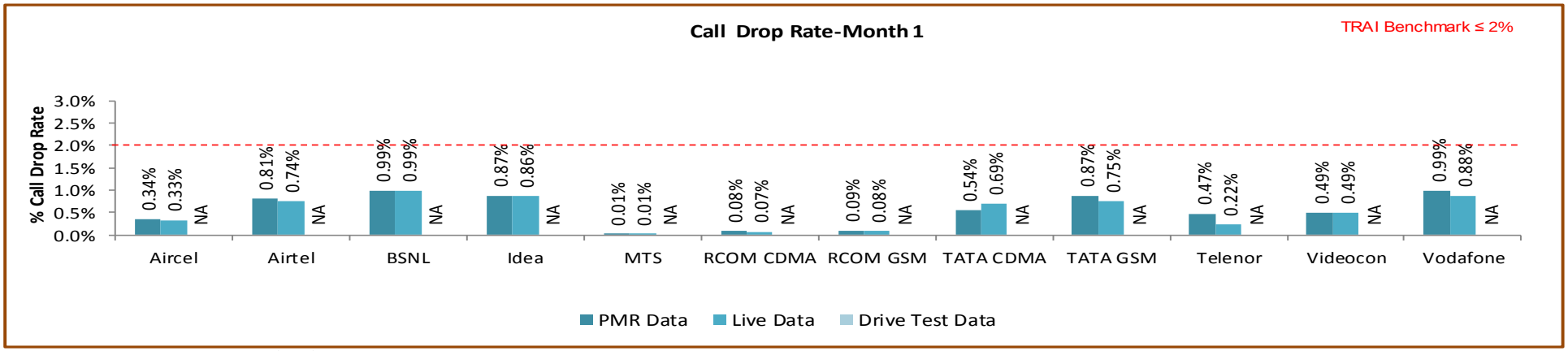
6.5.2 KEY FINDINGS - CONSOLIDATED



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

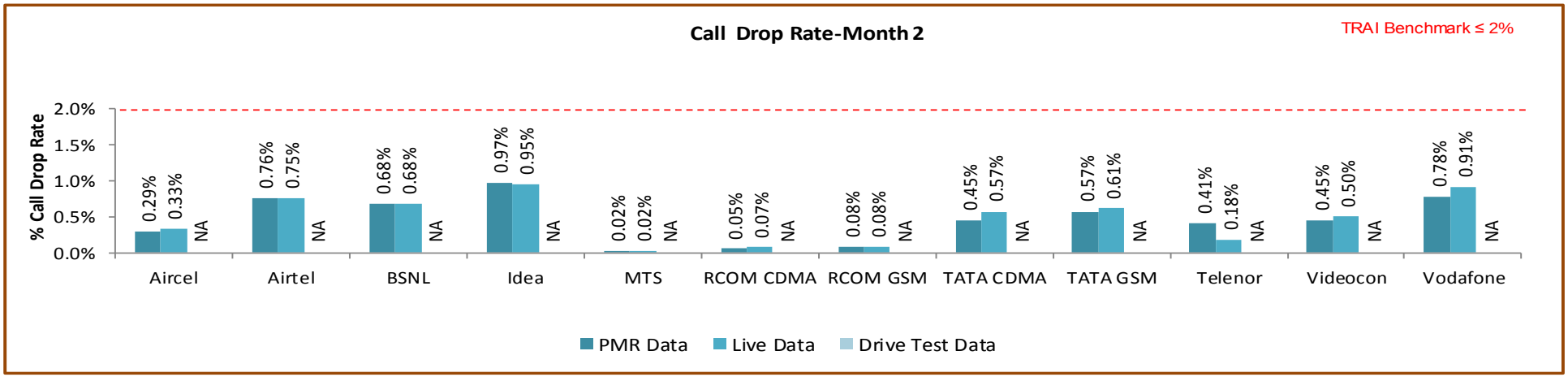
All operators met the benchmark for call drop rate during audit.

6.5.2.1 KEY FINDINGS – MONTH 1



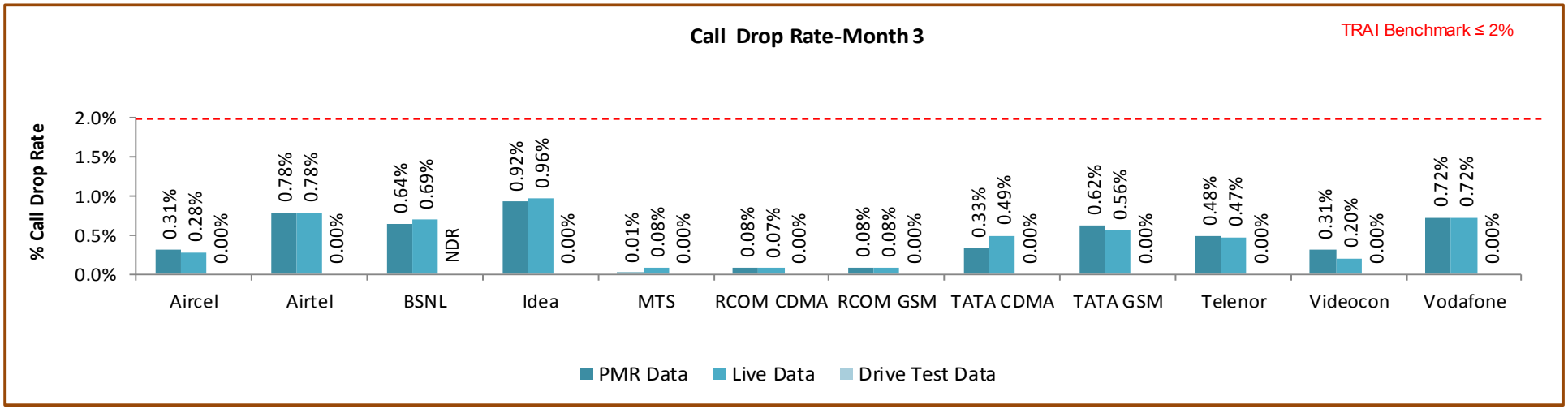
Data Source: Network Operations Center (NOC) of the operators

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 –**

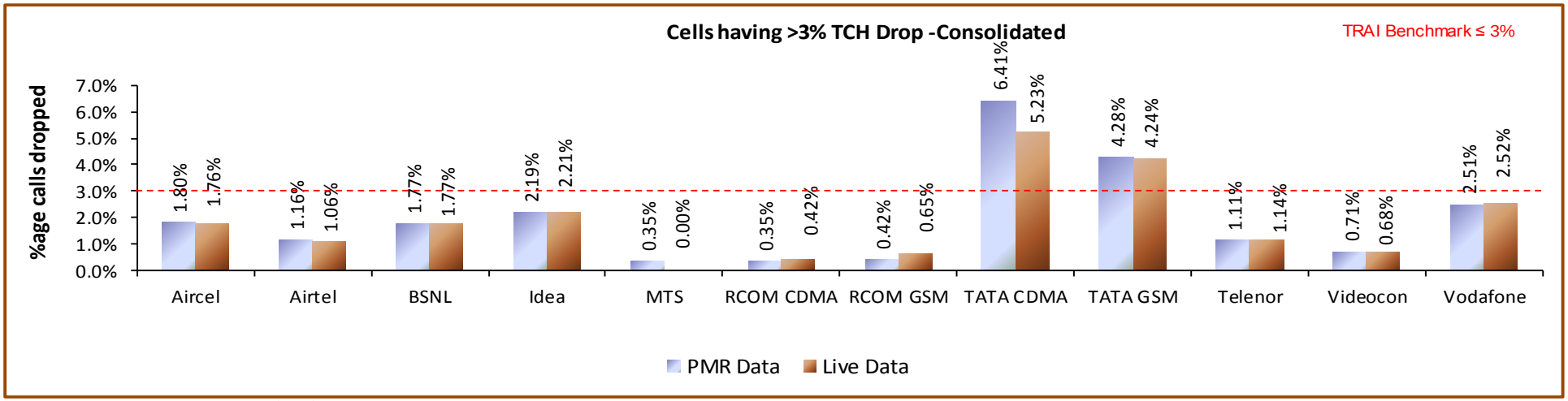
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

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

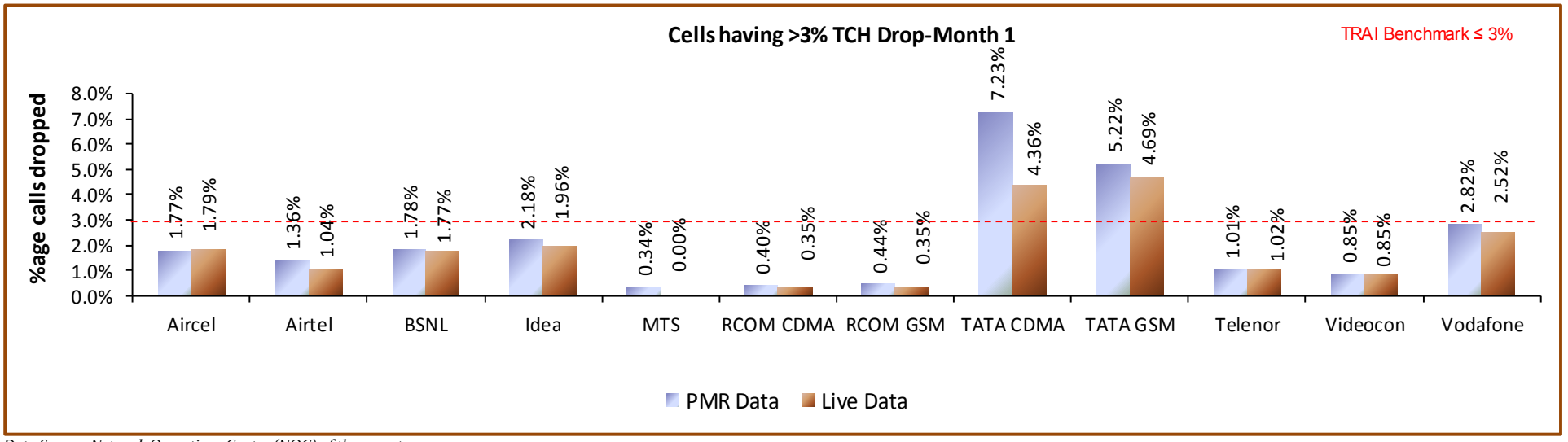


Data Source: Network Operations Center (NOC) of the operators

TATA GSM & CDMA failed to meet the TRAI benchmark.

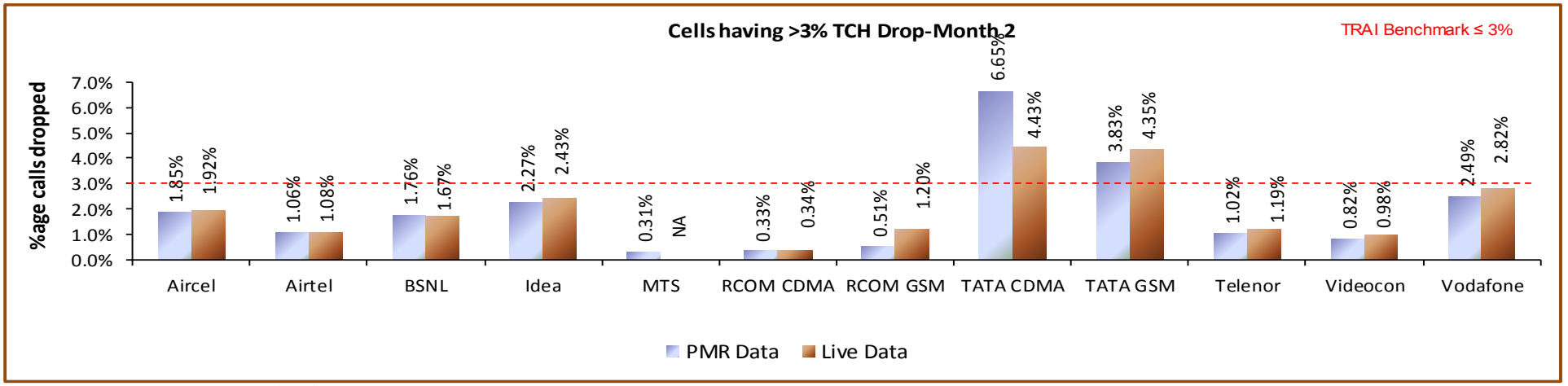
Significant difference was observed between PMR & live measurement data for TATA GSM & CDMA, MTS and Reliance GSM & CDMA. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.6.2.1 KEY FINDINGS – MONTH 1



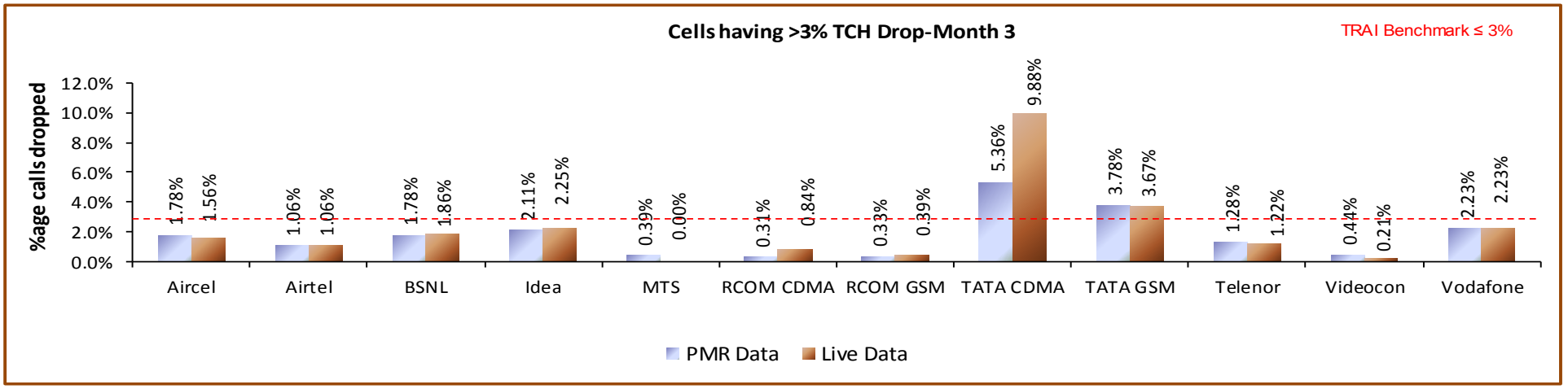
Data Source: Network Operations Center (NOC) of the operators

6.6.2.2 KEY FINDINGS – MONTH 2



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

6.6.2.3 KEY FINDINGS – MONTH 3



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

6.7 VOICE QUALITY

6.7.1 PARAMETER DESCRIPTION

1. **Definition:**

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

2. **Computational Methodology:**

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

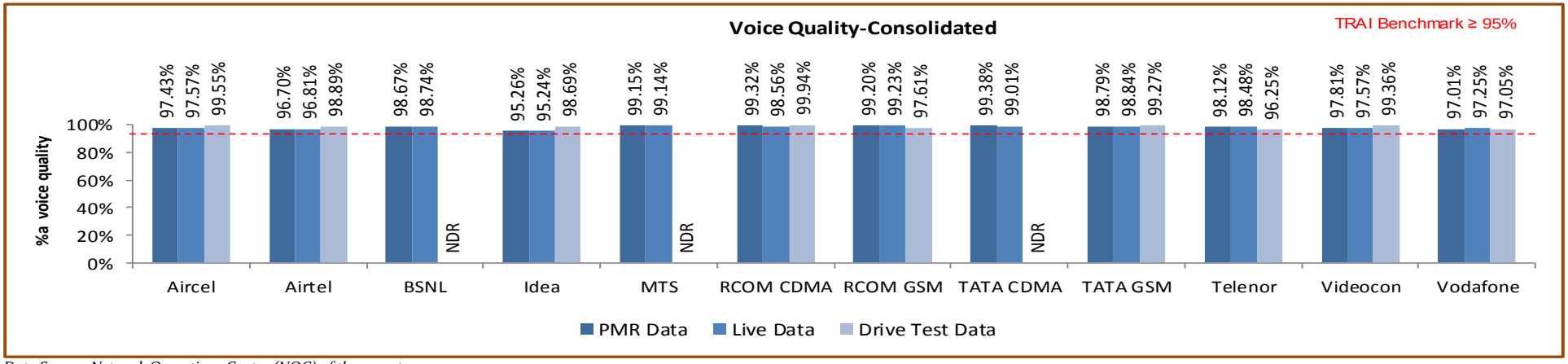
3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

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

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

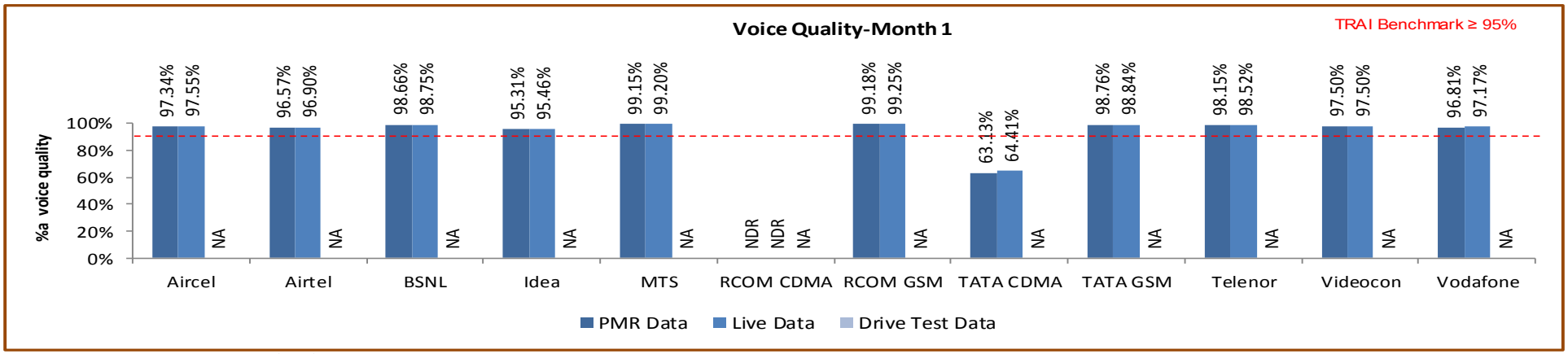
6.7.2 KEY FINDINGS



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

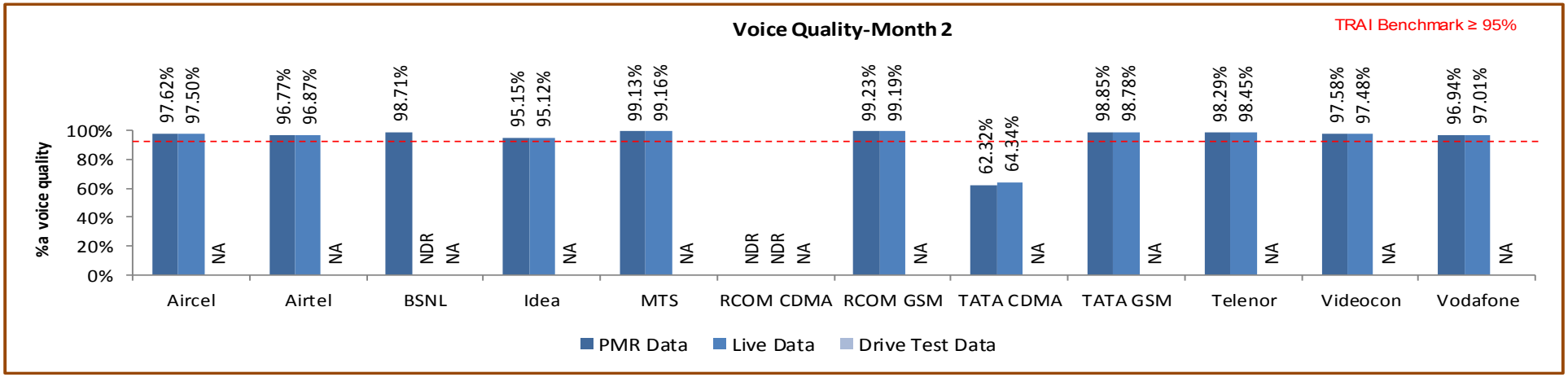
All operators met the benchmark for Voice quality as per PMR data.

Key Findings – Month 1



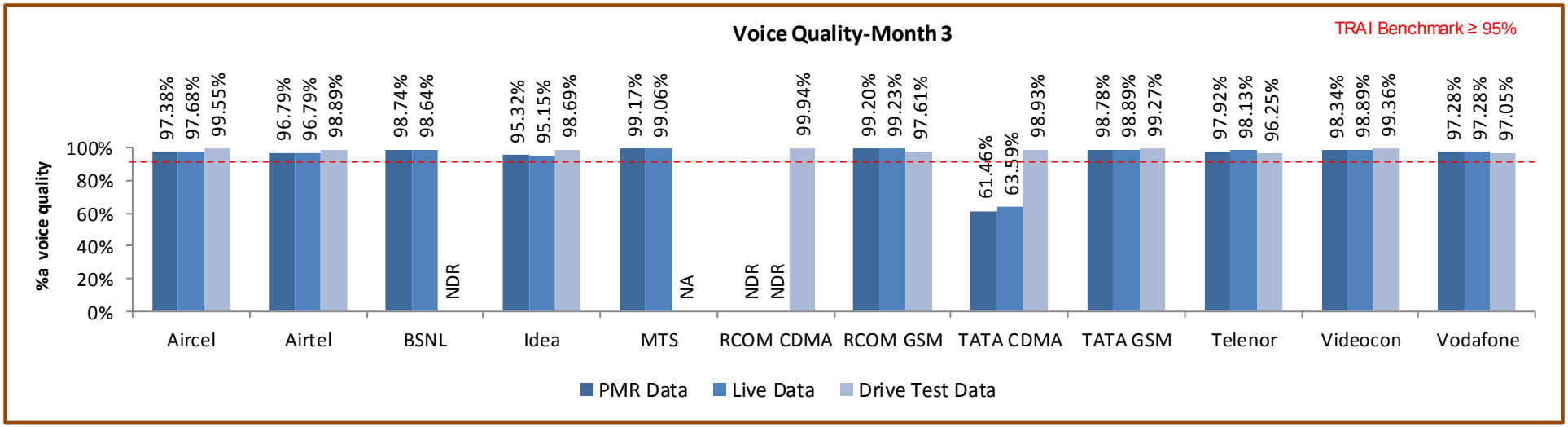
Data Source: Network Operations Center (NOC) of the operators

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 –

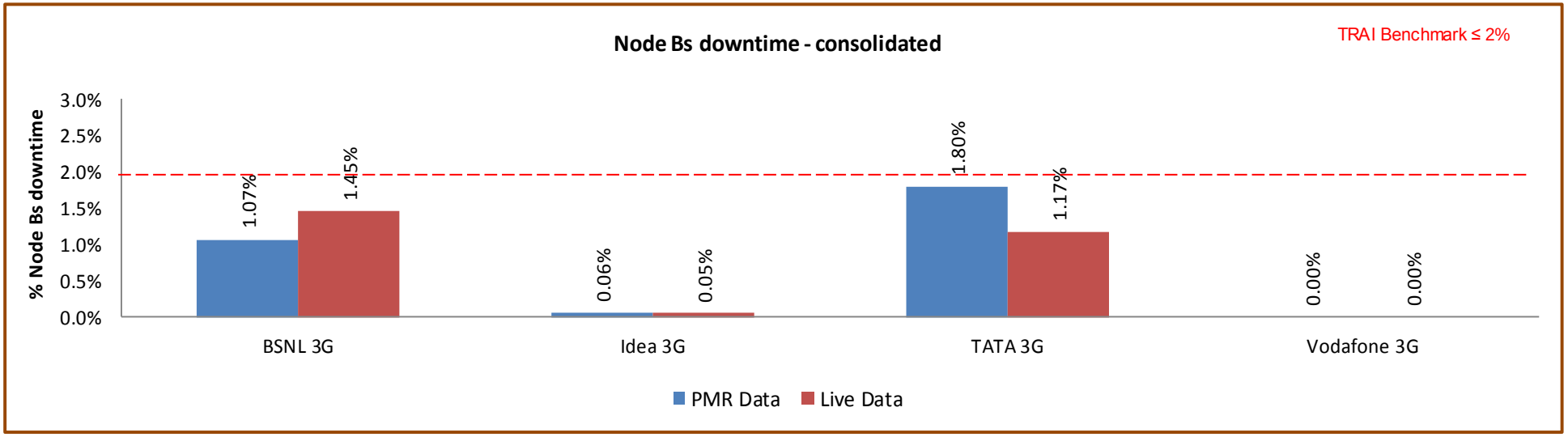
a. Node Bs downtime (not available for service) ≤ 2%

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.

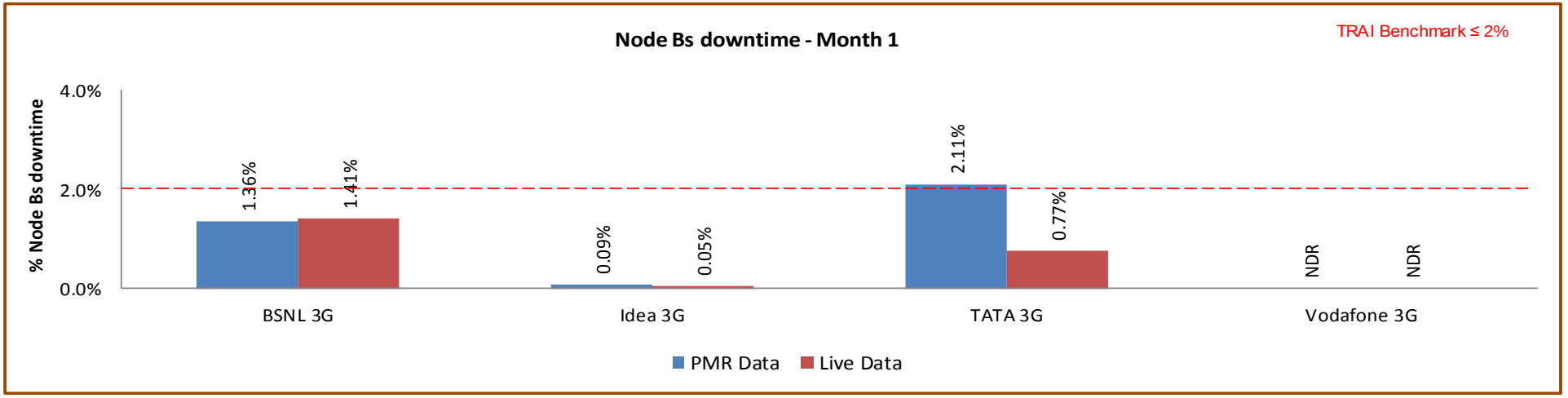
7.1.2 KEY FINDINGS - CONSOLIDATED



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

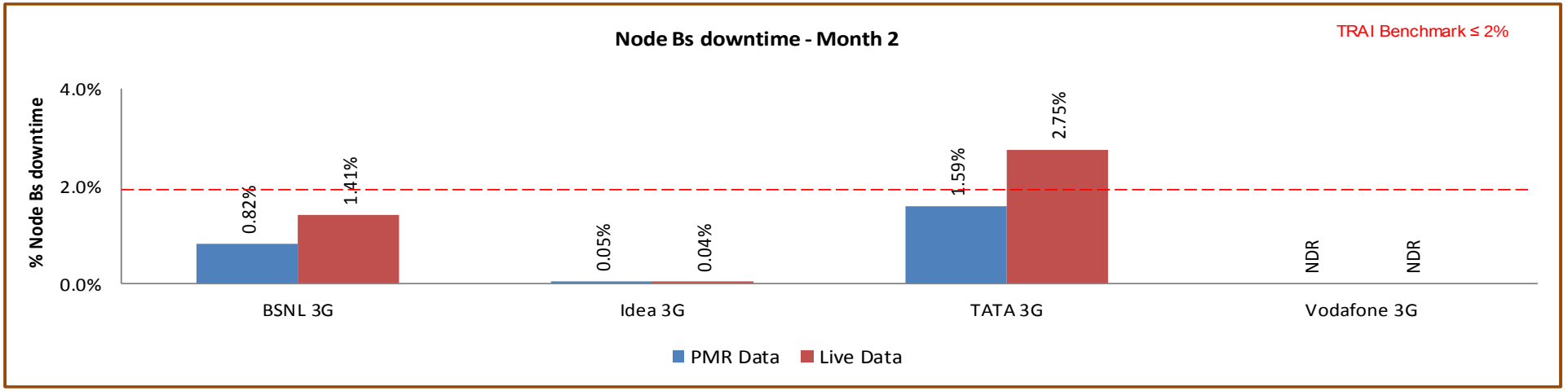
All operators met the benchmark for Node Bs downtime.

7.1.2.1 KEY FINDINGS – MONTH 1



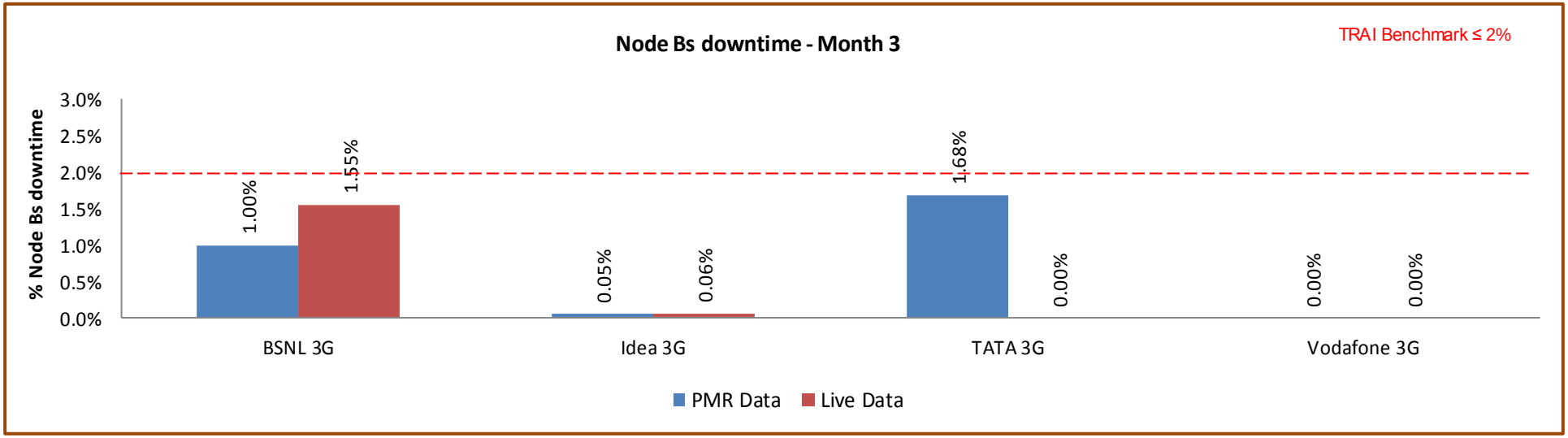
Data Source: Operations and Maintenance Center (OMC) of the operators

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.

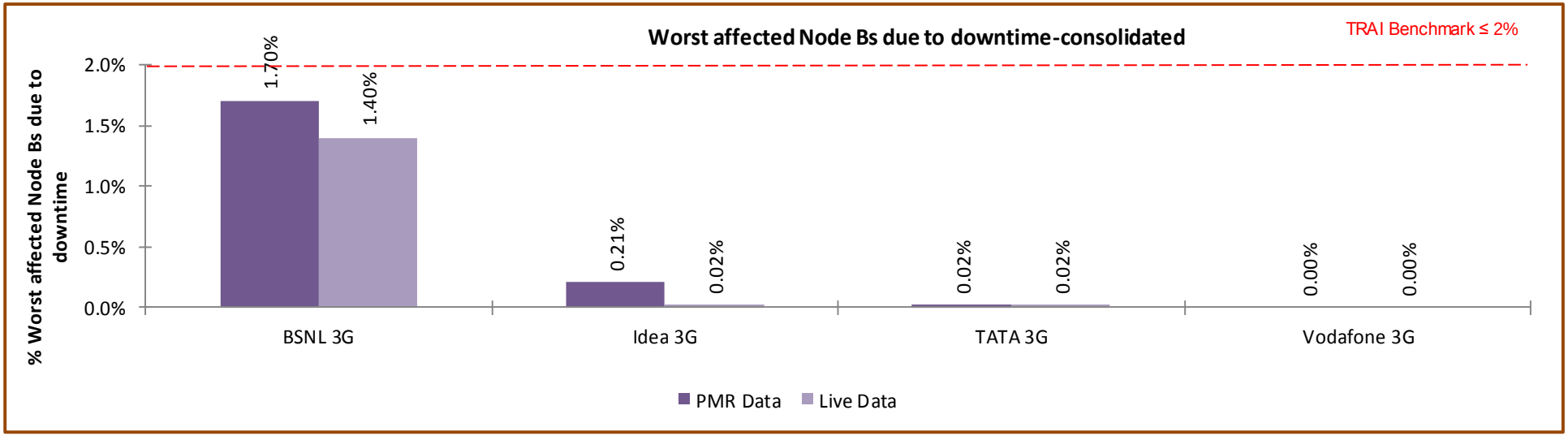
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

  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

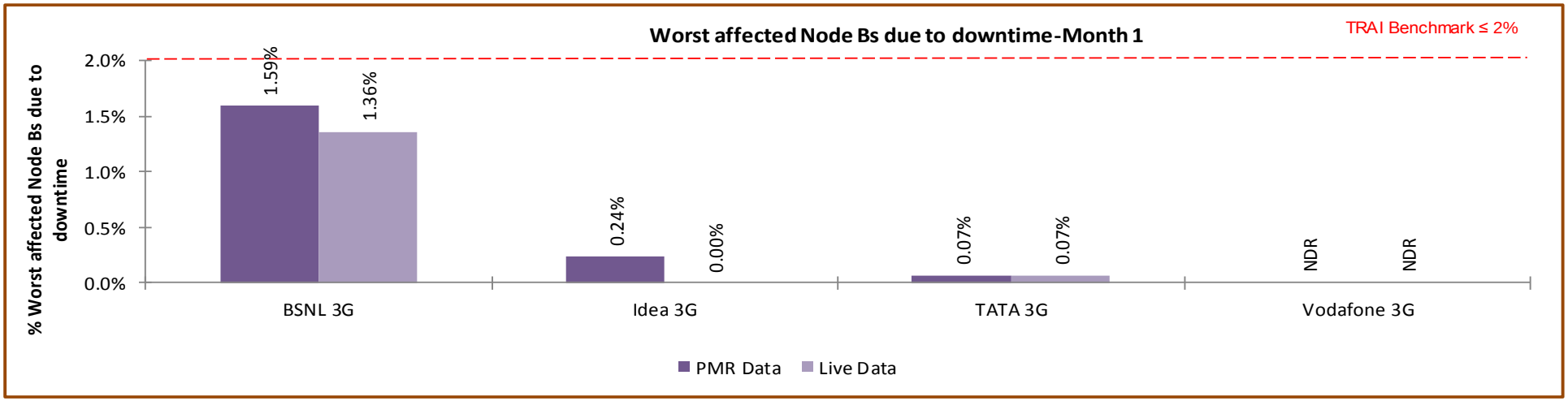


Data Source: Operations and Maintenance Center (OMC) of the operators

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

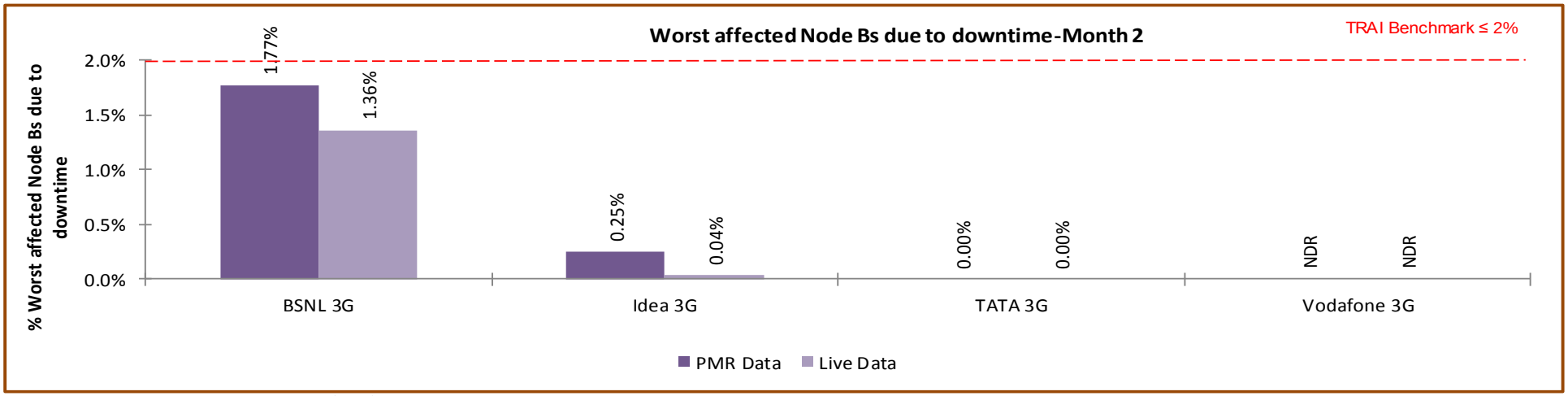
Significant difference was observed between PMR & live measurement data for Idea and BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

7.2.2.1 KEY FINDINGS – MONTH 1



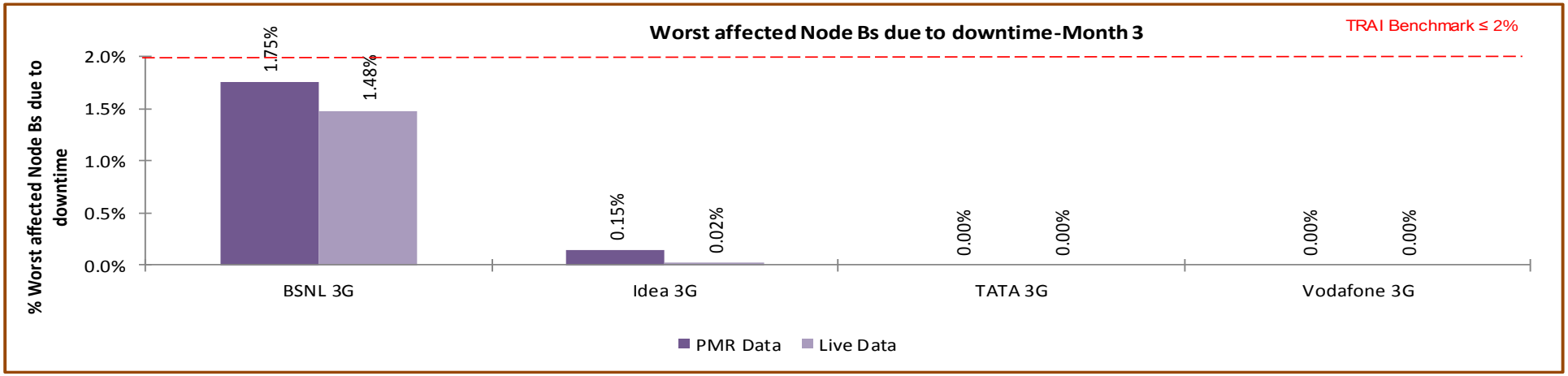
Data Source: Operations and Maintenance Center (OMC) of the operators

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

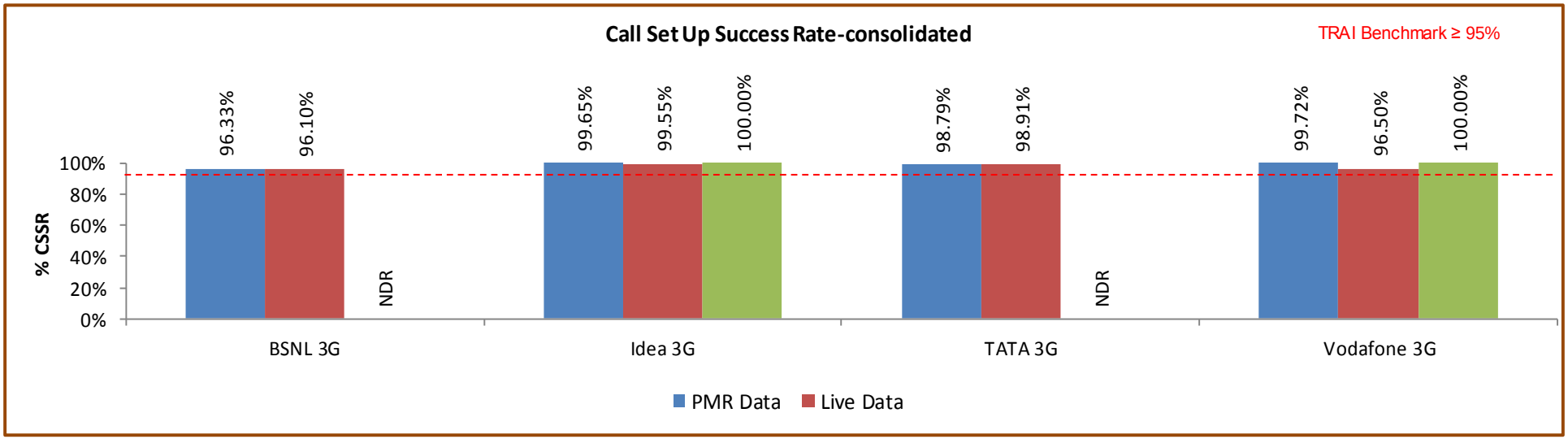
5. **TRAI Benchmark ≥** 95%

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

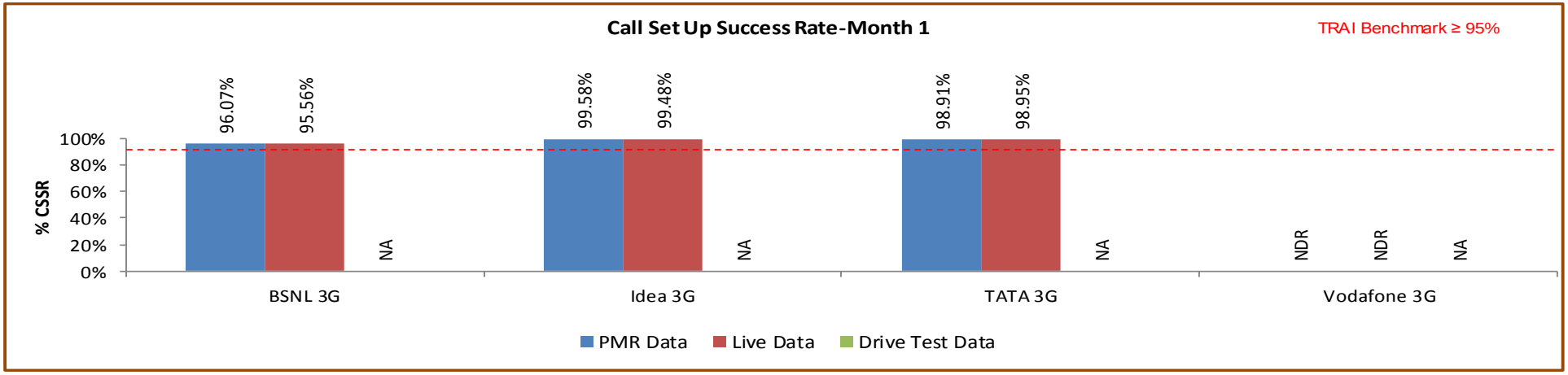


Data Source: Network Operations Center (NOC) of the operators

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

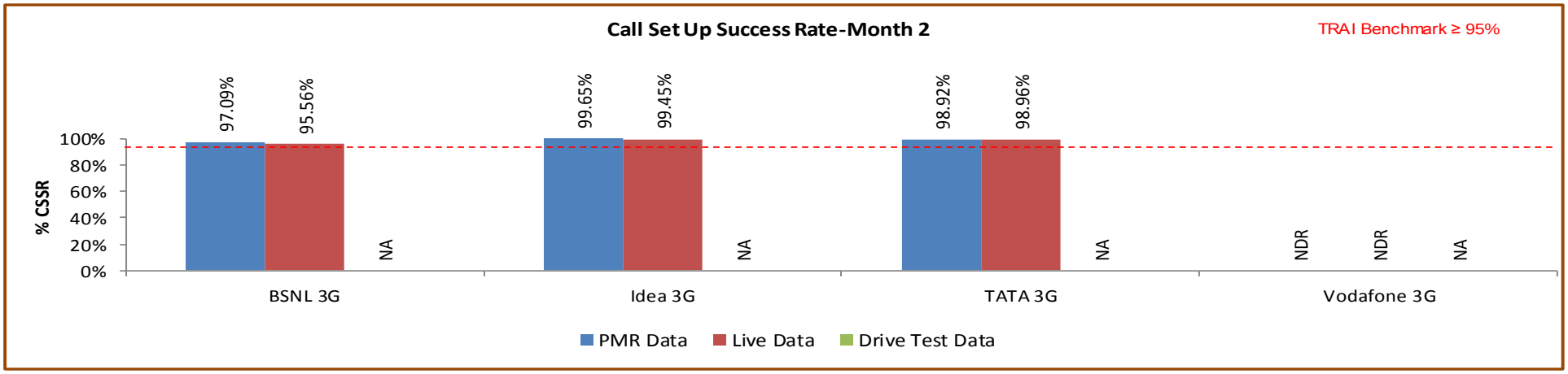
To calculate CSSR, Airtel is using a formula that has not been specified by TRAI or the counter definitions provided by their network service provider (Ericsson). However, this report presents the appropriate CSSR value for BSNL and TATA, which was calculated by using the proper counter details by the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

7.3.2.1 KEY FINDINGS – MONTH 1



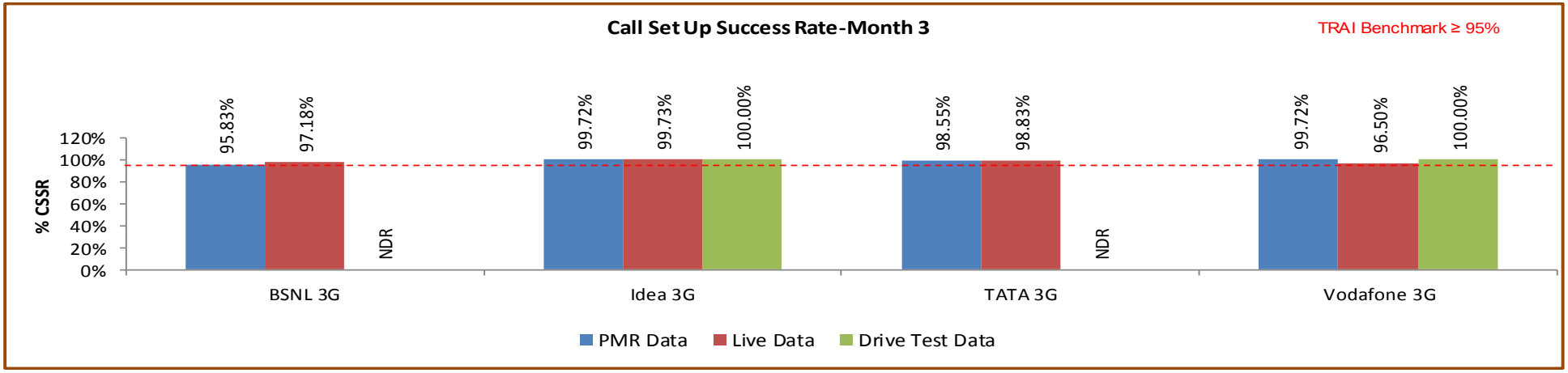
Data Source: Network Operations Center (NOC) of the operators

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

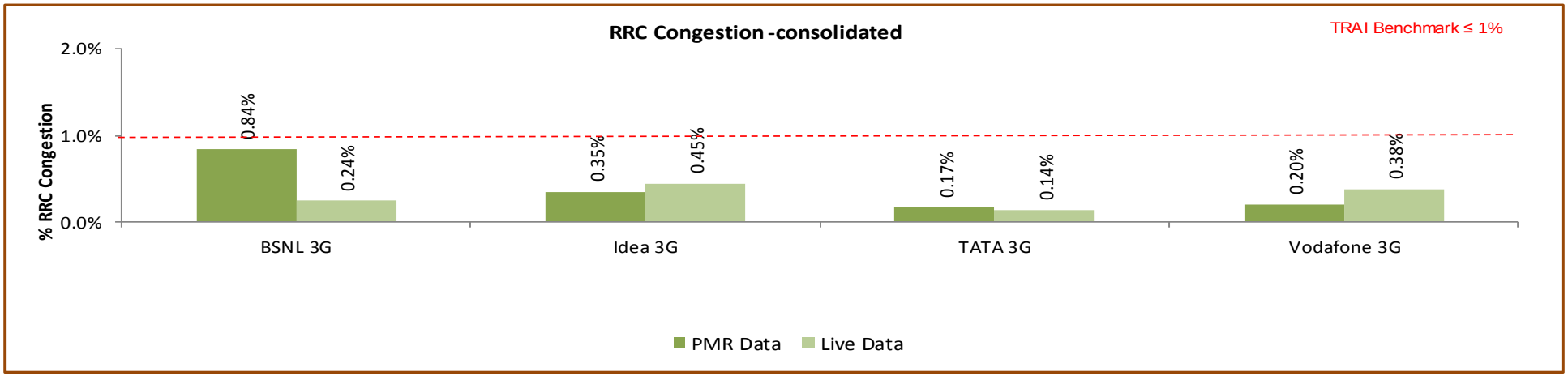
7. Benchmark:

- 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

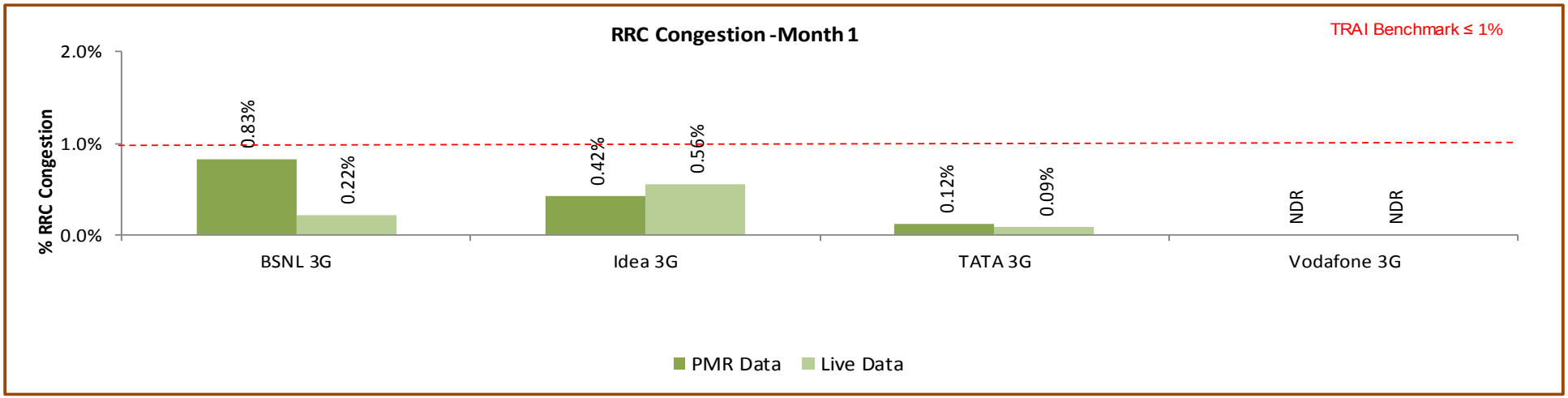
7.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



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

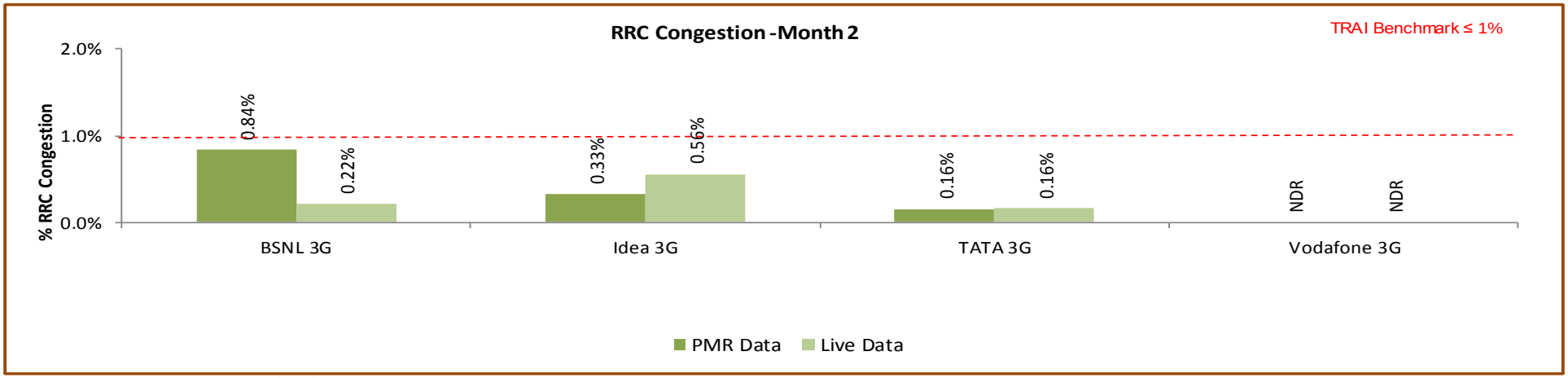
All operators met the benchmark for RRC congestion.

7.4.2.1 KEY FINDINGS – MONTH 1



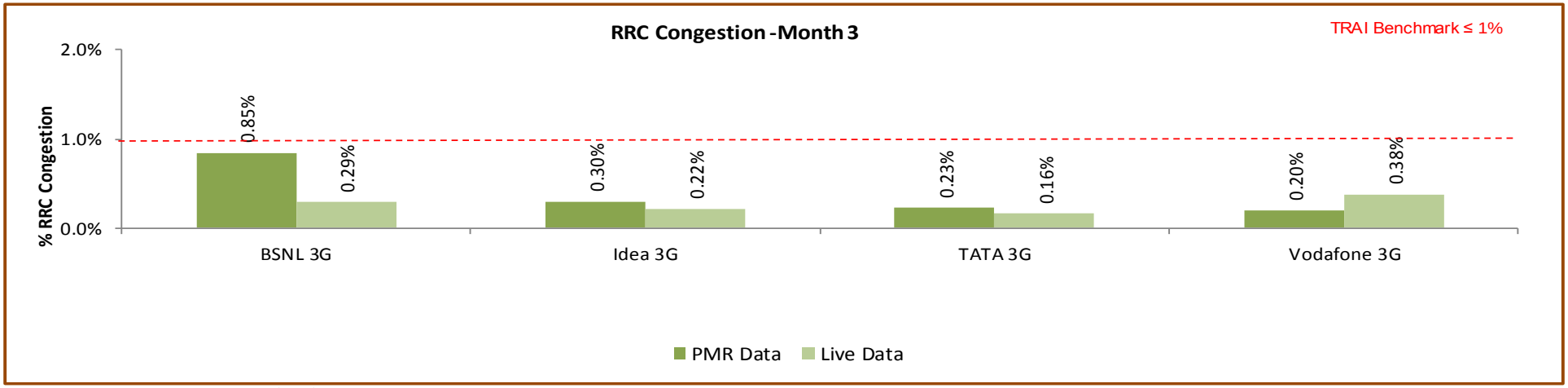
Data Source: Network Operations Center (NOC) of the operators

7.4.2.2 KEY FINDINGS – MONTH 2



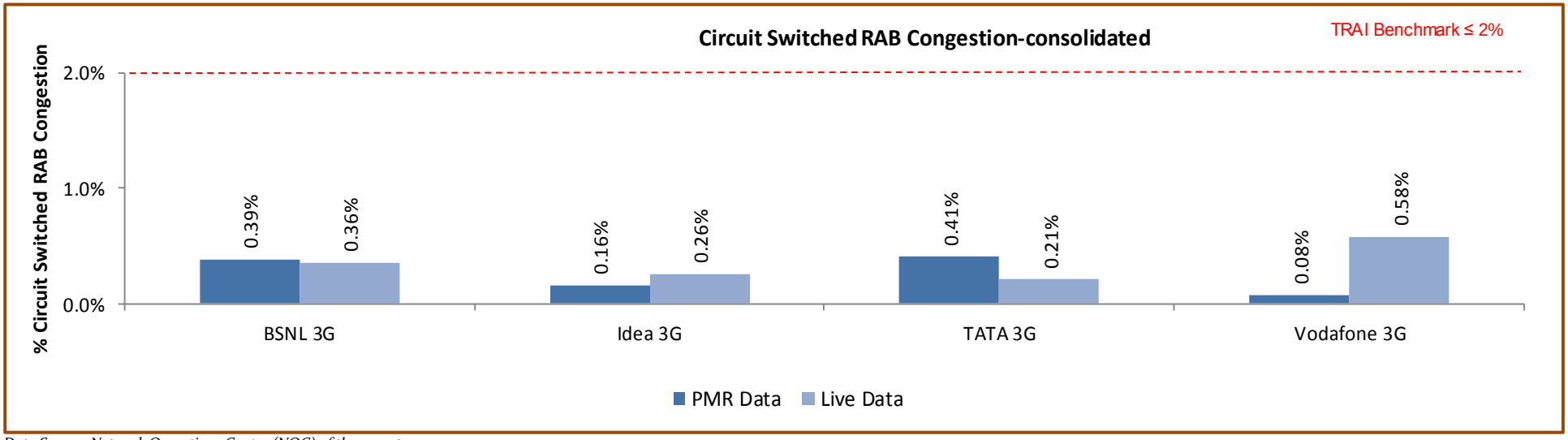
Data Source: Network Operations Center (NOC) of the operators

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)

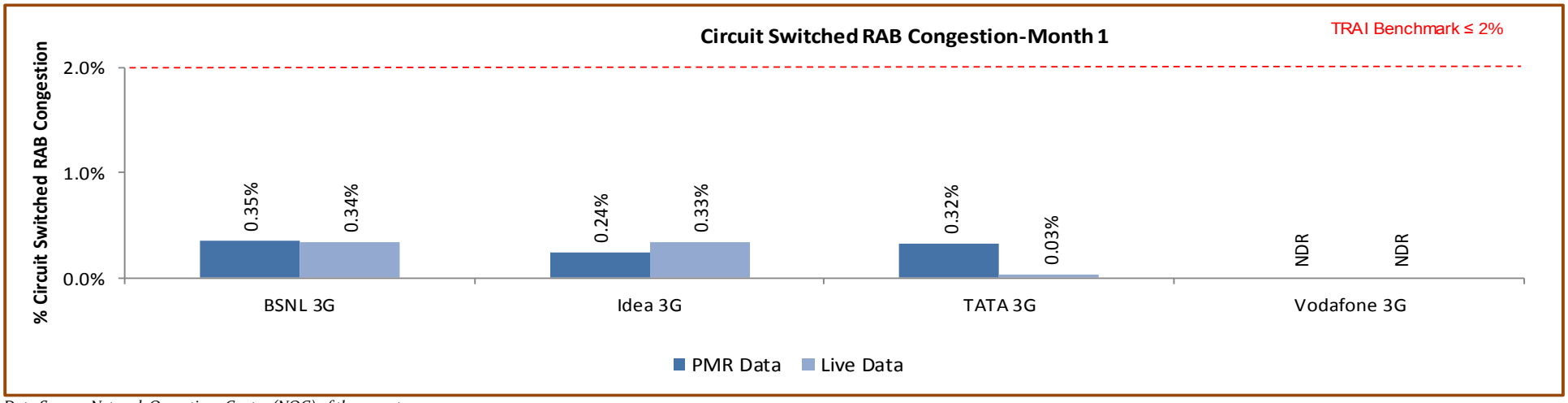


Data Source: Network Operations Center (NOC) of the operators

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

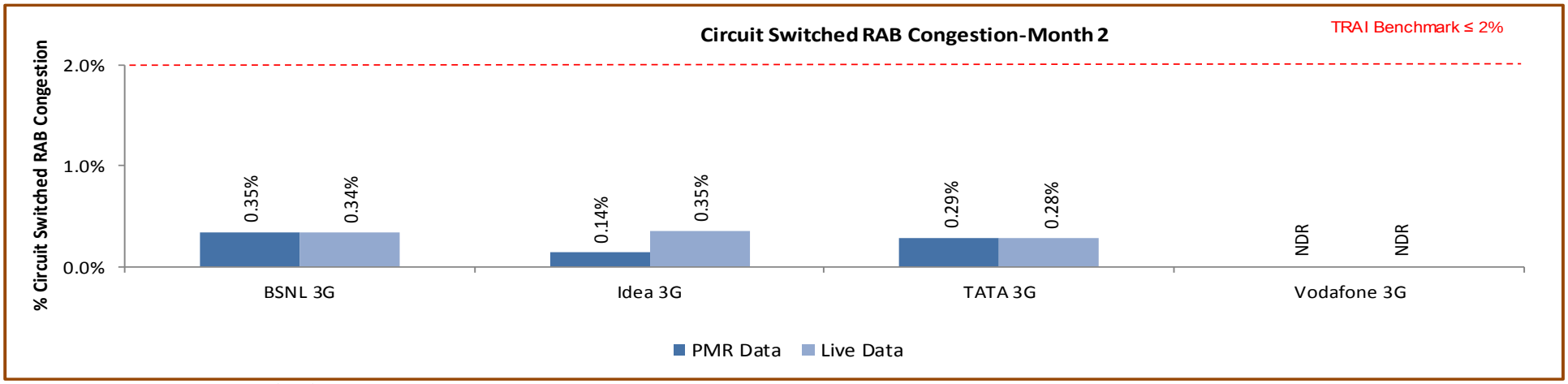
Significant difference was observed between PMR & live measurement data for Idea and Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

7.4.3.1 KEY FINDINGS – MONTH 1



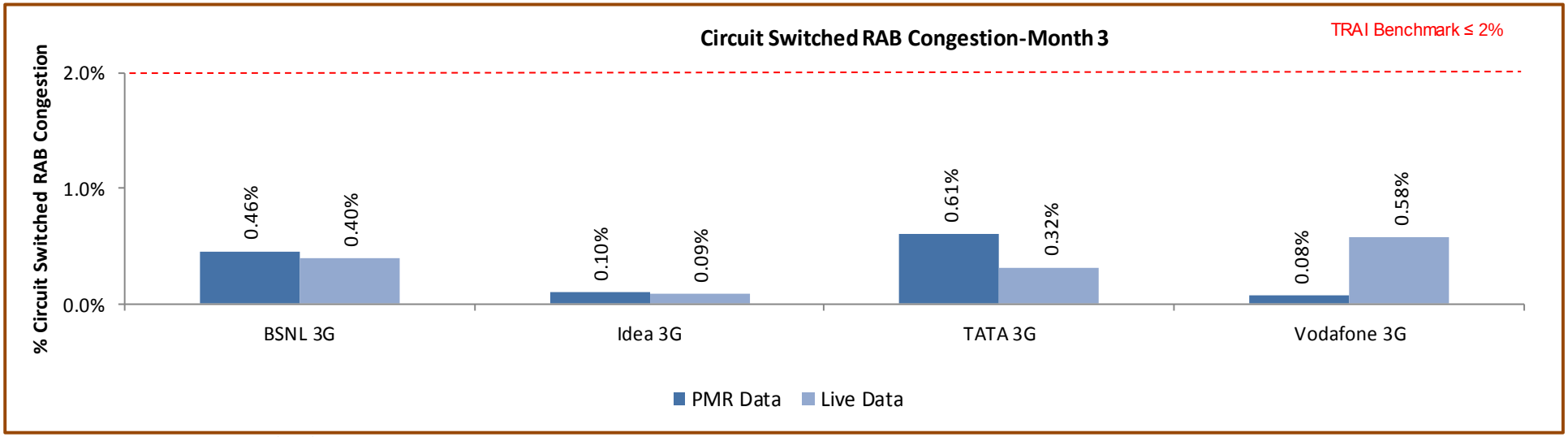
Data Source: Network Operations Center (NOC) of the operators

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	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		171	465	NDR	153
No. of POIs not meeting benchmark		0	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		144933	476405	NDR	155889
Traffic served for all POIs (B)- in erlangs		81749	231647	NDR	61382
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		114	465	NDR	459
No. of POIs not meeting benchmark		1	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		96622	473319	NDR	467757
Traffic served for all POIs (B)- in erlangs		52109	233408	NDR	178734
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	0.00%

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

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

7.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		57	155	NDR	NDR
No. of POIs not meeting benchmark		0	0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		48311	154168	NDR	NDR
Traffic served for all POIs (B)- in erlangs		26927	79941	NDR	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-October					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		57	155	NDR	NDR
No. of POIs not meeting benchmark		0	0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		48311	154871	NDR	NDR
Traffic served for all POIs (B)- in erlangs		26054	77231	NDR	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	NDR

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

7.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-November					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		57	155	NDR	NDR
No. of POIs not meeting benchmark		0	0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		48311	160777	NDR	NDR
Traffic served for all POIs (B)- in erlangs		26942	75512	NDR	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-November					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		57	155	NDR	NDR
No. of POIs not meeting benchmark		0	0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		48311	156816	NDR	NDR
Traffic served for all POIs (B)- in erlangs		26054	80898	NDR	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	NDR

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

7.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		57	155	NDR	153
No. of POIs not meeting benchmark		0	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		48311	161460	NDR	155889
Traffic served for all POIs (B)- in erlangs		27881	76194	NDR	61382
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	155	NDR	459
No. of POIs not meeting benchmark		NDR	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		NDR	161633	NDR	467757
Traffic served for all POIs (B)- in erlangs		NDR	75279	NDR	178734
POI congestion	≤ 0.5%	NDR	0.00%	NDR	0.00%

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

7.5 CIRCUIT SWITCHED VOICE DROP RATE

7.5.1 PARAMETER DESCRIPTION

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

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

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

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

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

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

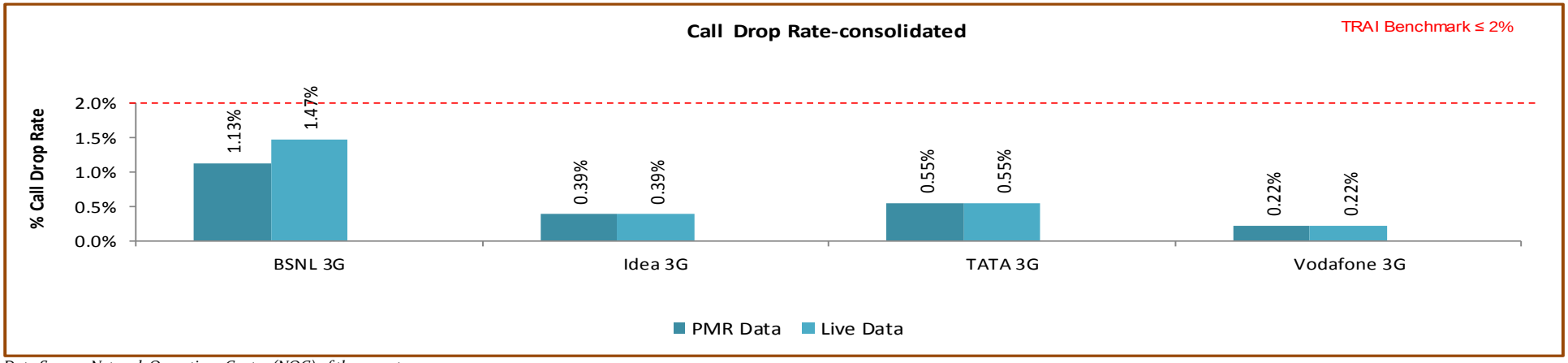
5. **TRAI Benchmark –**

   - Circuit switched voice drop rate ≤ 2%

6. **Audit Procedure –**

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

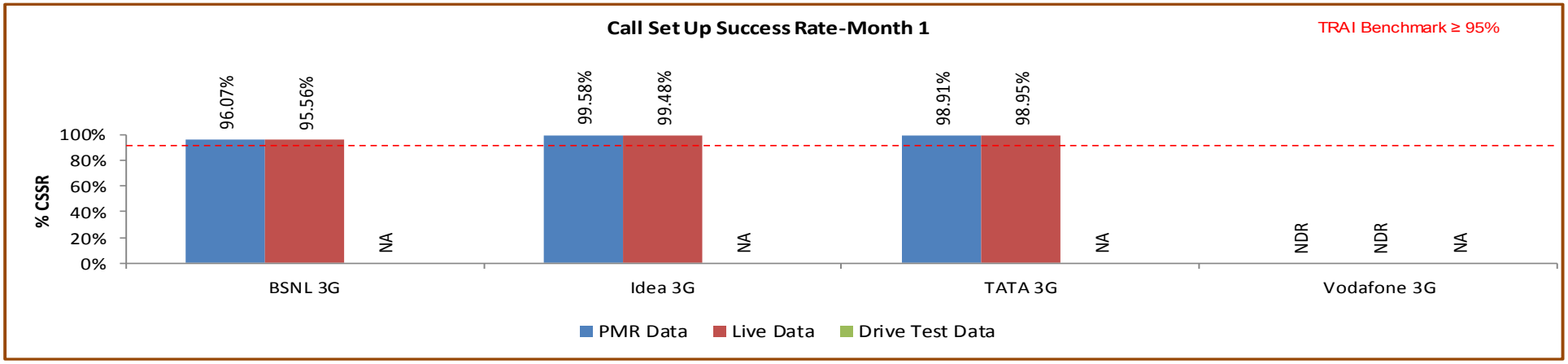
7.5.2 KEY FINDINGS - CONSOLIDATED



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

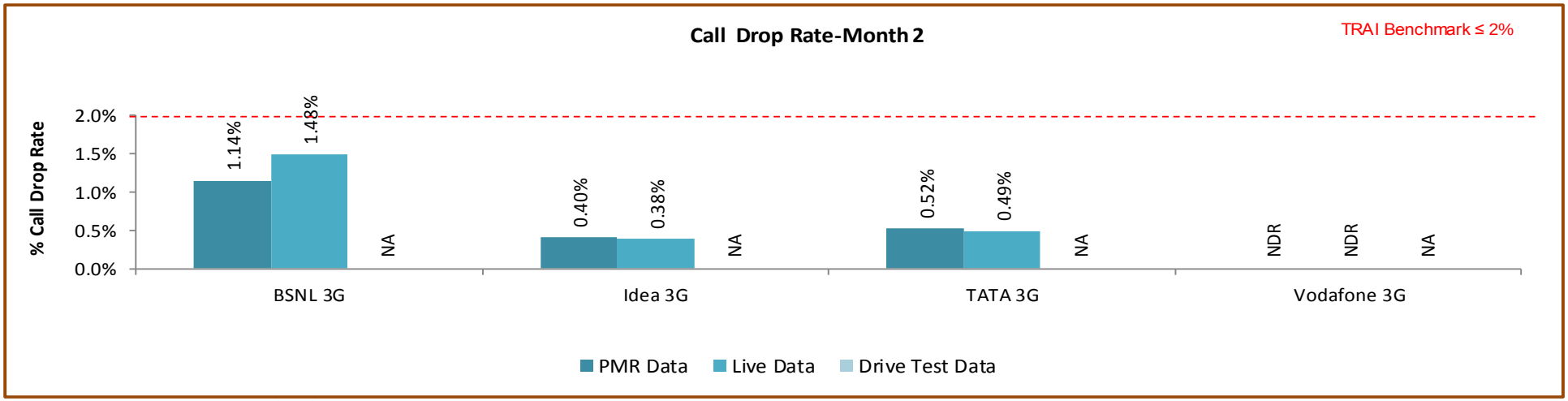
All operators met the benchmark for call drop rate during audit.

7.5.2.1 KEY FINDINGS – MONTH 1



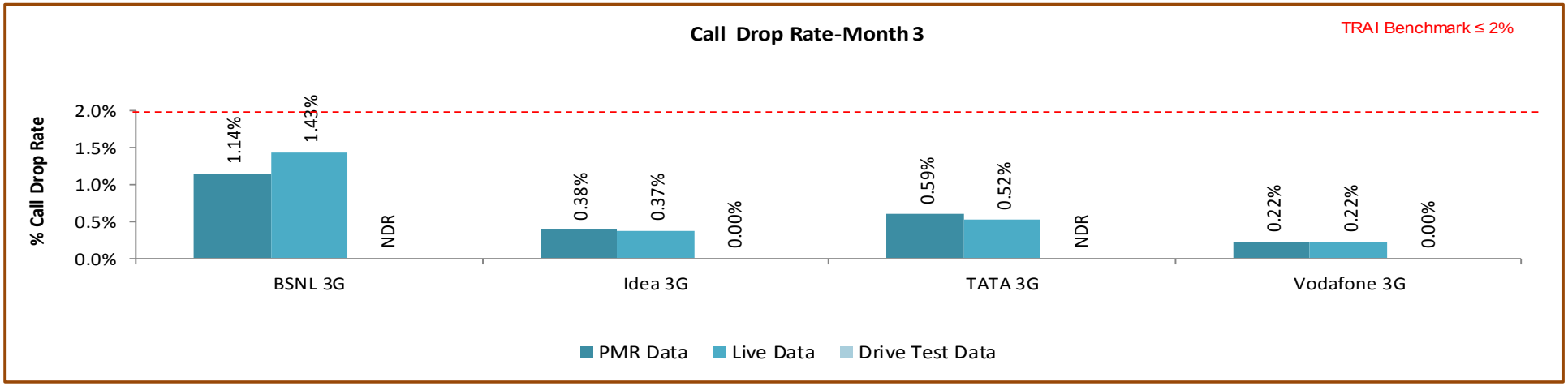
Data Source: Network Operations Center (NOC) of the operators

7.5.2.2 KEY FINDINGS – MONTH 2



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

7.5.2.3 KEY FINDINGS – MONTH 3



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

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

7.6.1 PARAMETER DESCRIPTION

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

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

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

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

5. **TRAI Benchmark** –

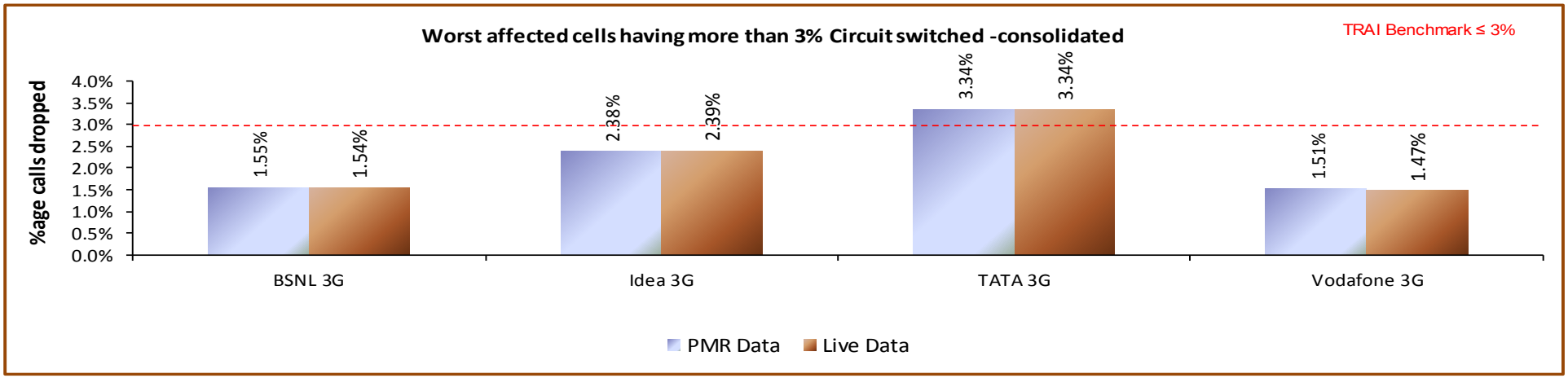
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

6. **Audit Procedure** –

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

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

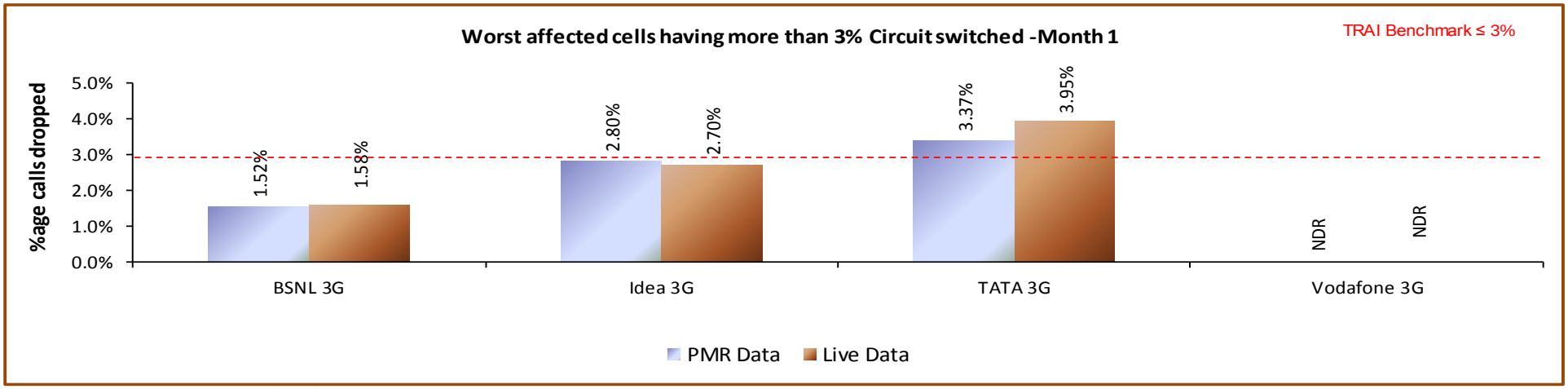
7.6.2 KEY FINDINGS - CONSOLIDATED



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

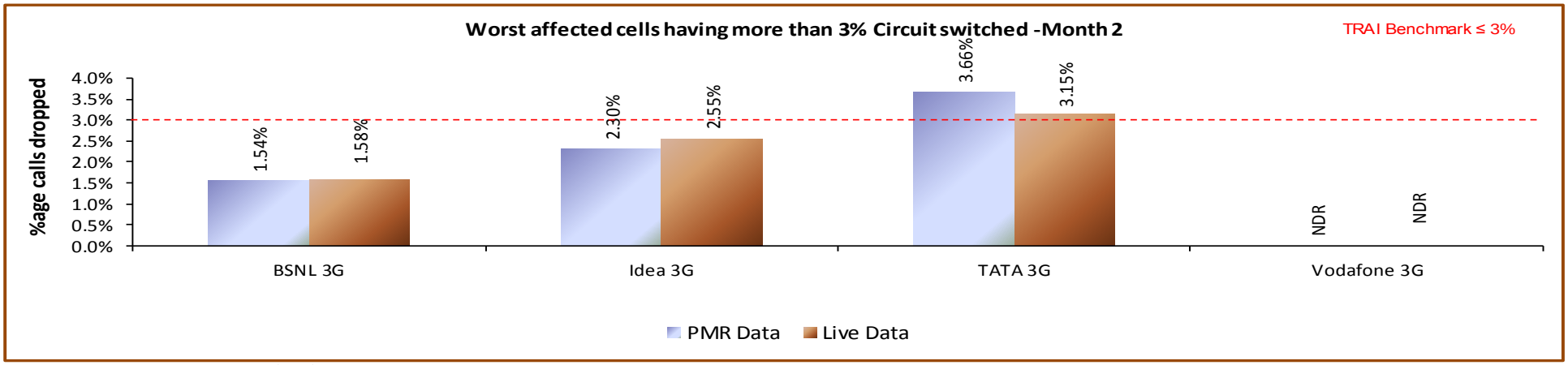
TATA 3G did not meet the benchmark during audit.

7.6.2.1 KEY FINDINGS – MONTH 1



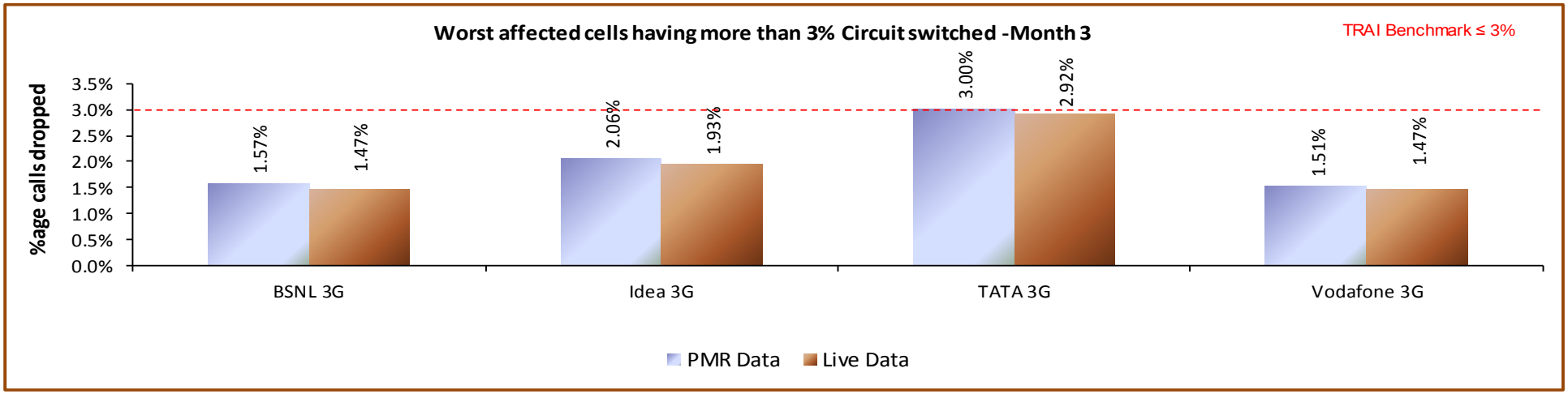
Data Source: Network Operations Center (NOC) of the operator

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**

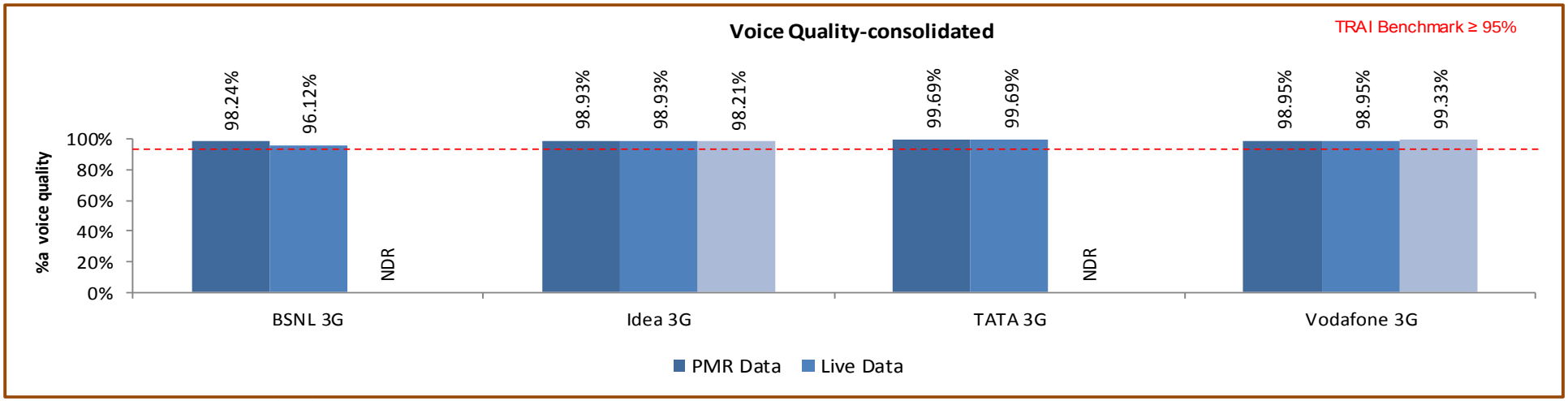
7. **TRAI Benchmark:** ≥ 95%

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.

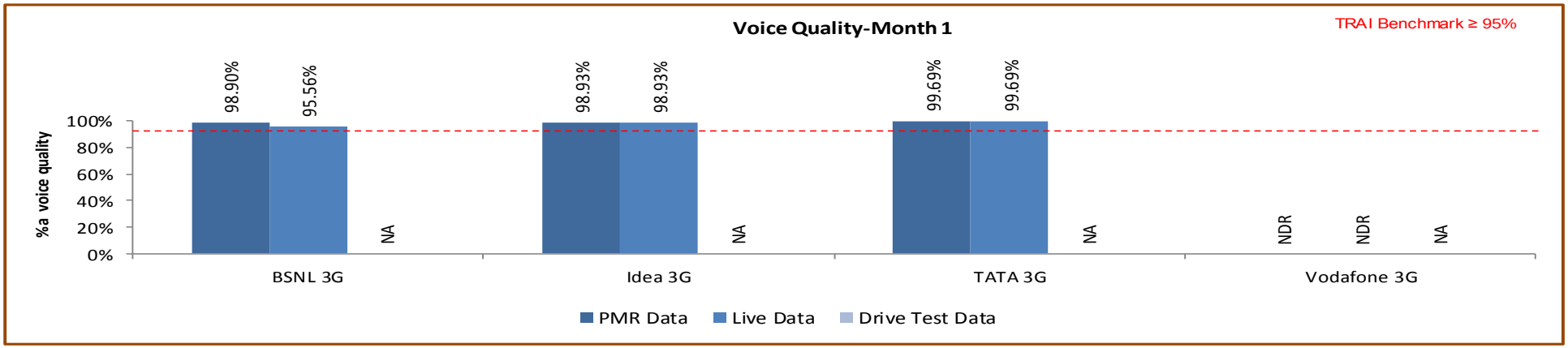
7.7.2 KEY FINDINGS



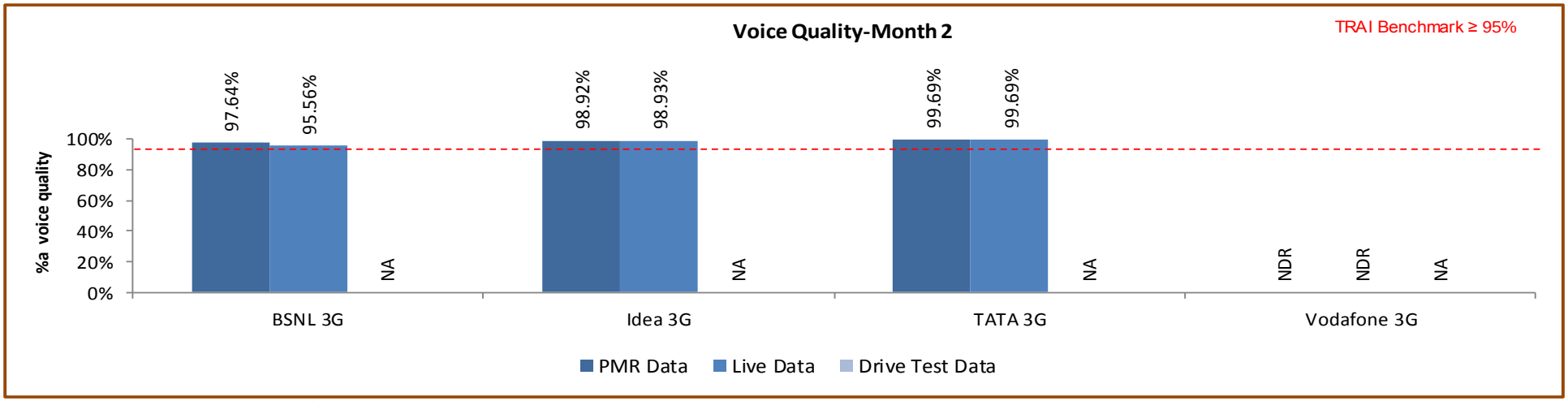
Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark foe circuit switch Voice quality.

7.7.2.1 KEY FINDINGS – MONTH 1

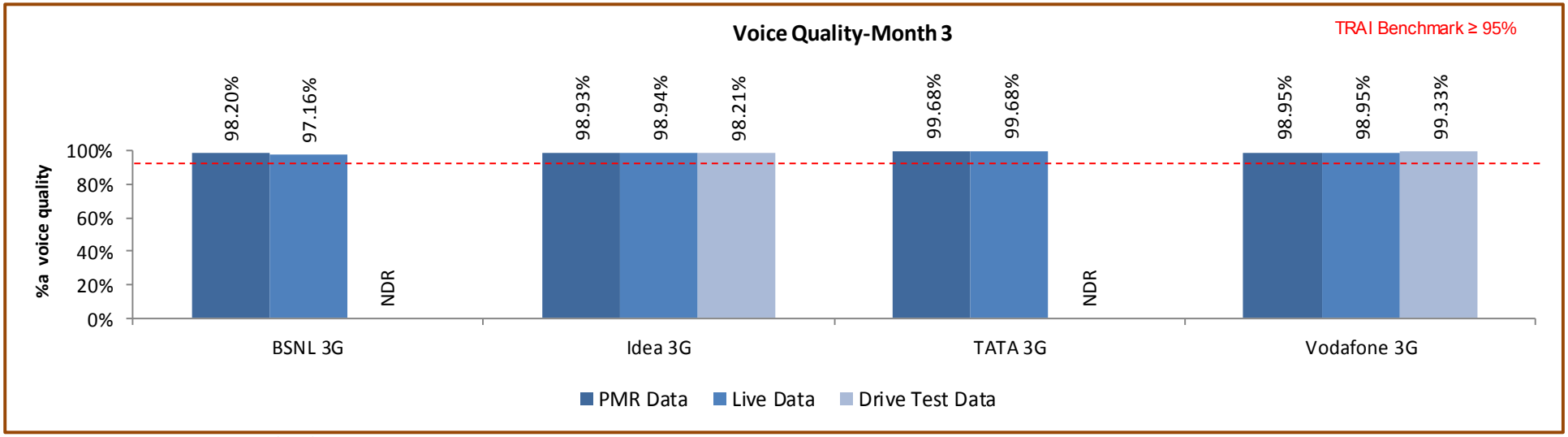


7.7.2.2 KEY FINDINGS – MONTH 2



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

7.7.2.3 KEY FINDINGS – MONTH 3



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

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

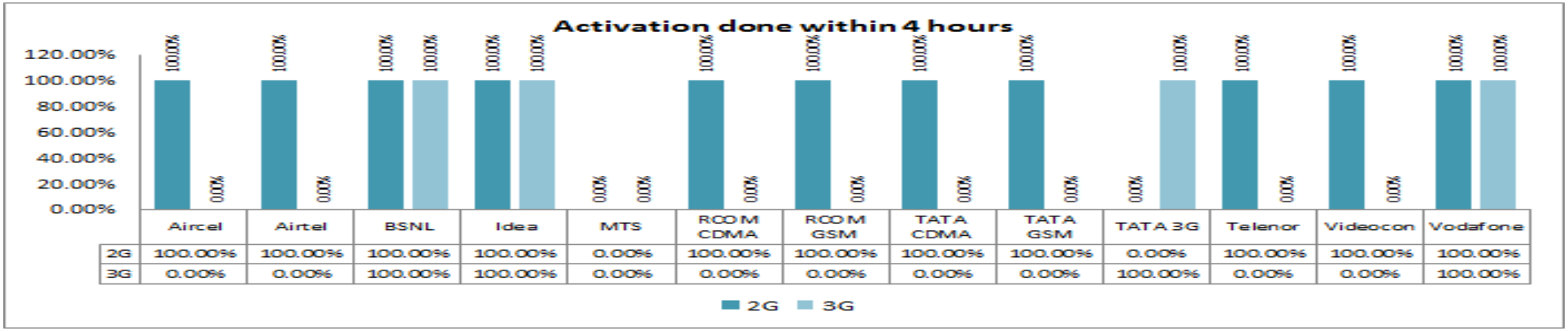
8.1 SERVICE ACTIVATION /PROVISIONING FOR 2G & 3G

8.1.1 PARAMETER DESCRIPTION

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

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

8.1.2 KEY FINDINGS



	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	TATA 3G	Telenor	Videocon	Vodafone
2G	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%	100.00%	0.00%	100.00%	100.00%	100.00%
3G	0.00%	0.00%	100.00%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%	0.00%	100.00%

All operators met the benchmark for 2G as well 3G.

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

8.2.1 PARAMETER DESCRIPTION

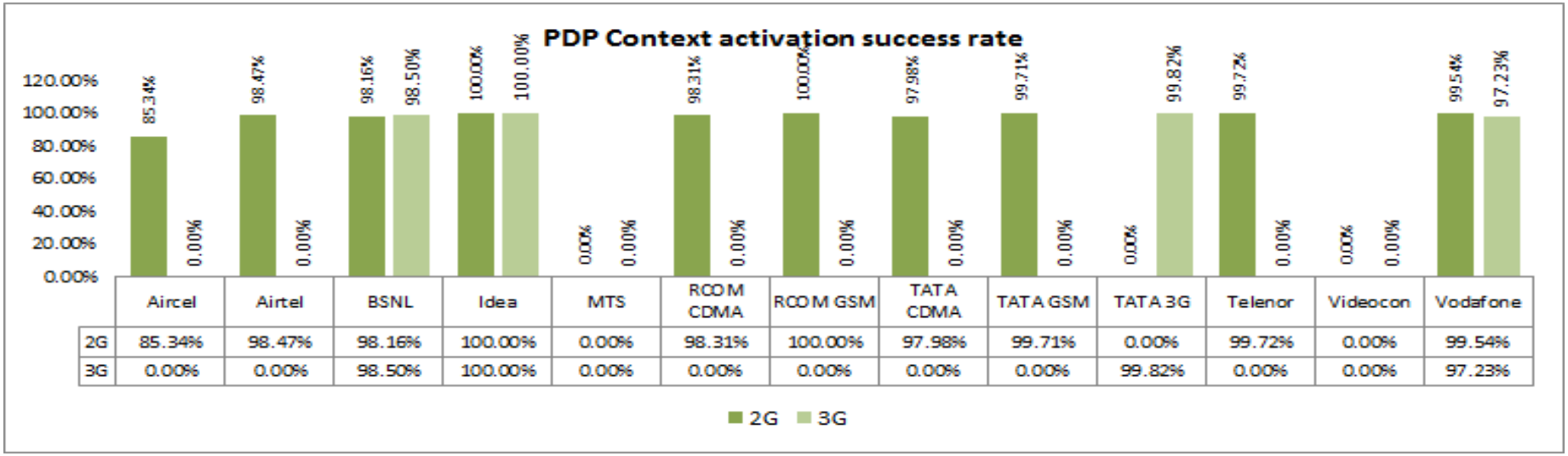
A Packet Data Protocol (PDP) context specifies access to an external packet-switching network. The data associated with the PDP context contains information such as the type of packet-switching network, the Mobile Station PDP (MS PDP) address that is the IP address, the reference of Gateway GPRS Support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

Measurement

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

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

8.2.2 KEY FINDINGS



	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	TATA 3G	Telenor	Videocon	Vodafone
2G	85.34%	98.47%	98.16%	100.00%	0.00%	98.31%	100.00%	97.98%	99.71%	0.00%	99.72%	0.00%	99.54%
3G	0.00%	0.00%	98.50%	100.00%	0.00%	0.00%	0.00%	0.00%	0.00%	99.82%	0.00%	0.00%	97.23%

All operators met the benchmark for 2G as well as 3G, except Aircel 2G.

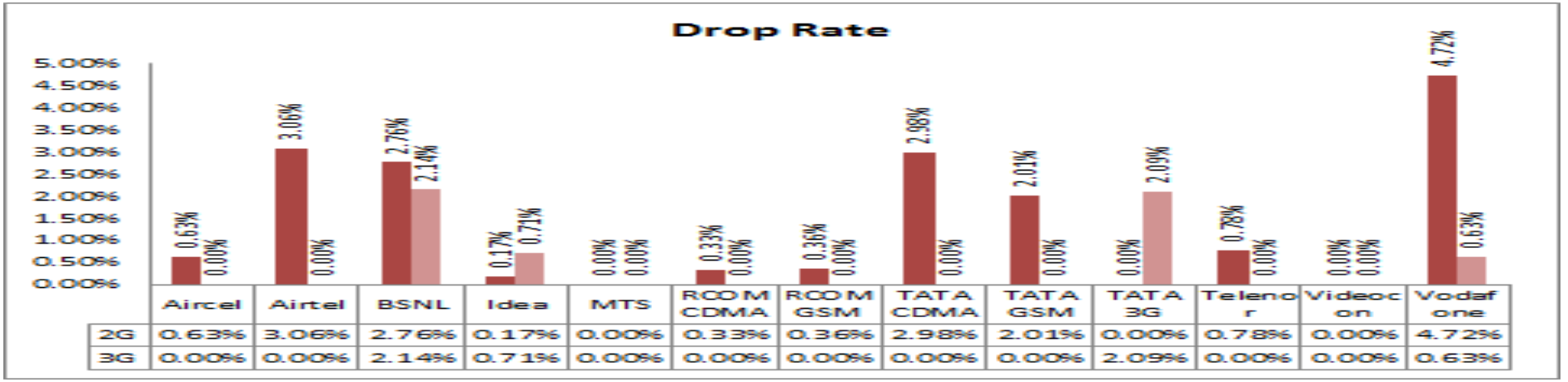
8.3 DROP RATE FOR 2G & 3G

8.3.1 PARAMETER DESCRIPTION

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

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

8.3.2 KEY FINDINGS



	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	TATA 3G	Telenor	Videocon	Vodafone
2G	0.63%	3.06%	2.76%	0.17%	0.00%	0.33%	0.36%	2.98%	2.01%	0.00%	0.78%	0.00%	4.72%
3G	0.00%	0.00%	2.14%	0.71%	0.00%	0.00%	0.00%	0.00%	0.00%	2.09%	0.00%	0.00%	0.63%

All operators met the benchmark in 2G as well as 3G.

9 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

9.1 METERING AND BILLING CREDIBILITY

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

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

9.1.1 PARAMETER DESCRIPTION

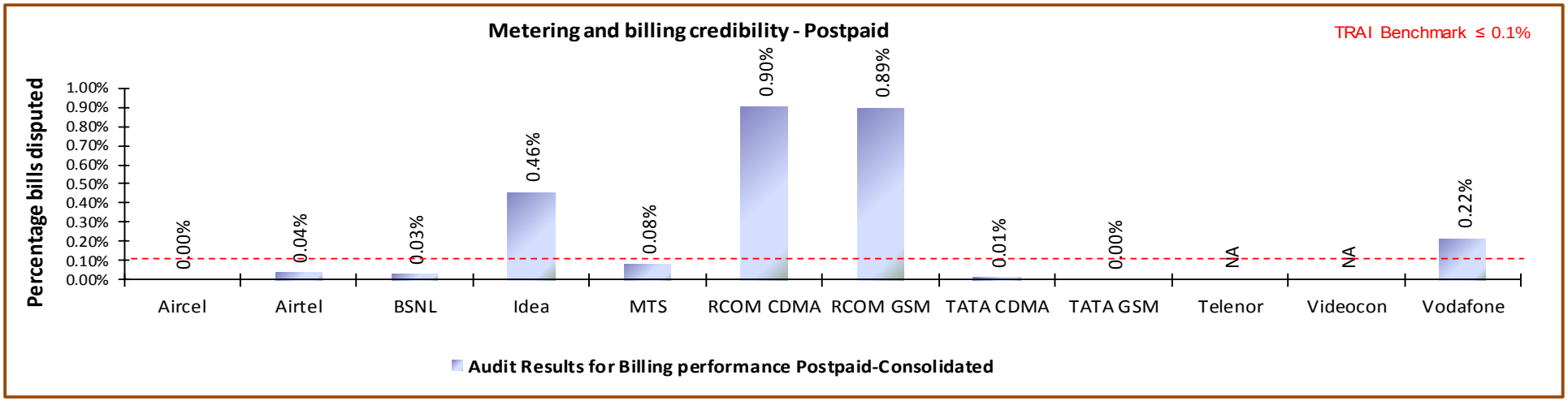
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th December, 2009 were covered. The types of billing complaints covered are listed below.

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

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

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

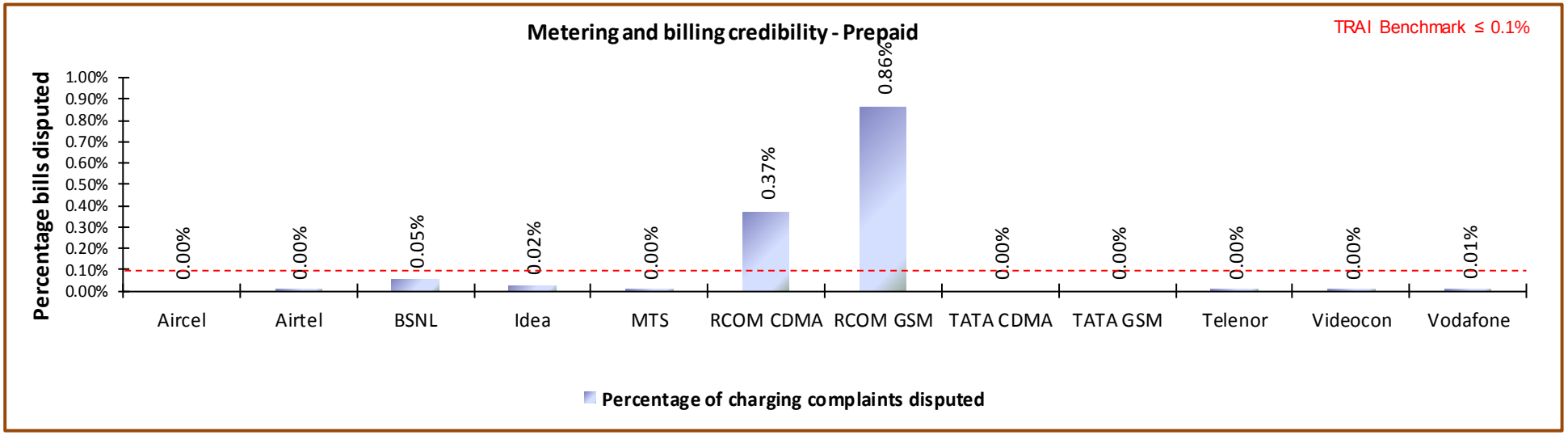
9.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



Data Source: Billing Center of the operators

Data Source: Billing Center of the operators

9.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

Rcom GSM & CDMA failed to meet the benchmark for metering and billing credibility of prepaid subscribers.

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9.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

9.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

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

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

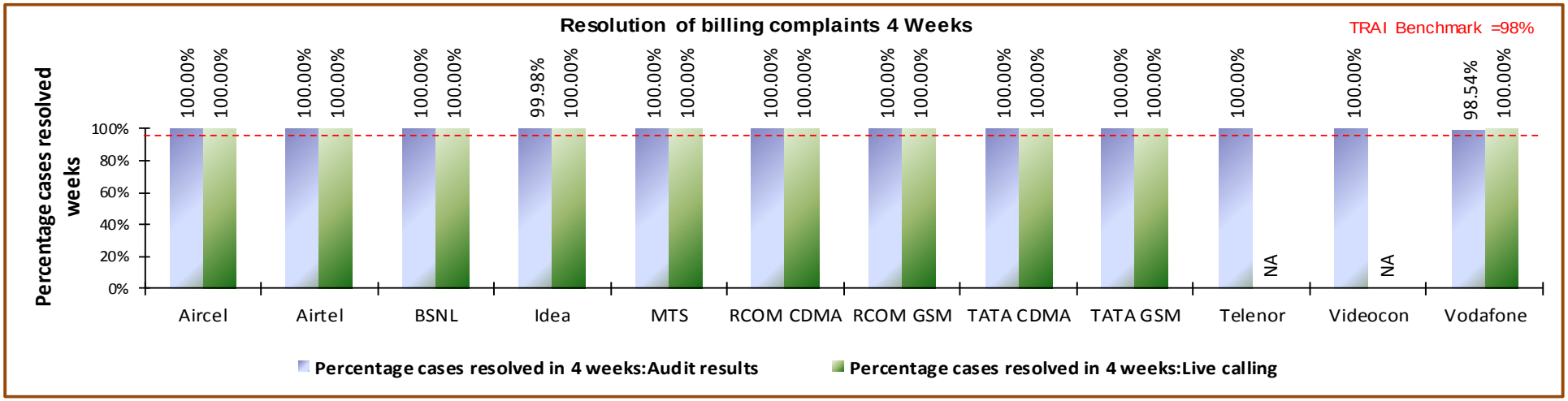
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

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

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

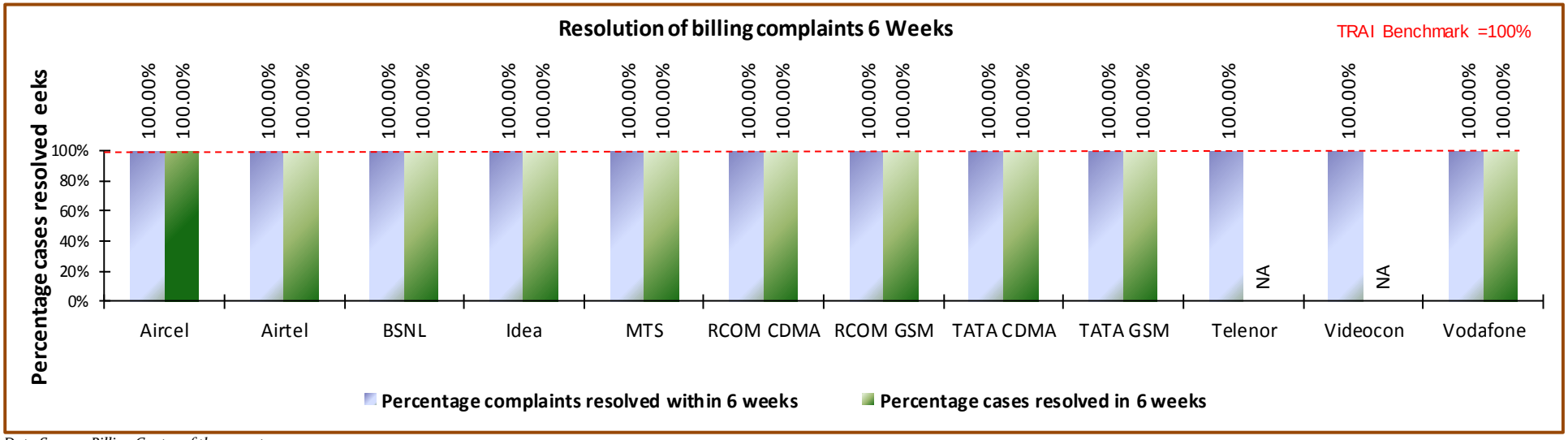
9.2.2 KEY FINDINGS - WITHIN 4 WEEKS



Data Source: Billing Center of the operators

All operators met the benchmark for resolution of billing complaints within 4 weeks.

9.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

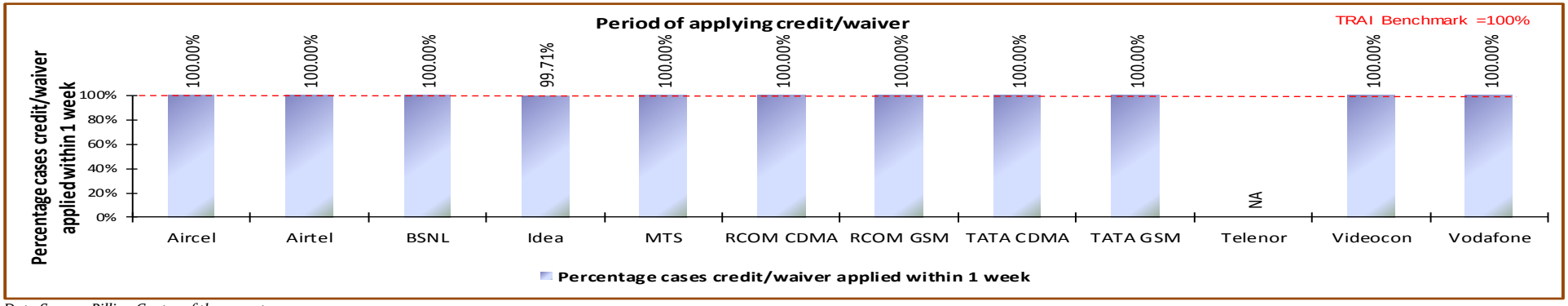
All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks as well as within 4 weeks.

9.3 PERIOD OF APPLYING CREDIT/WAVIER

9.3.1 PARAMETER DESCRIPTION

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

9.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

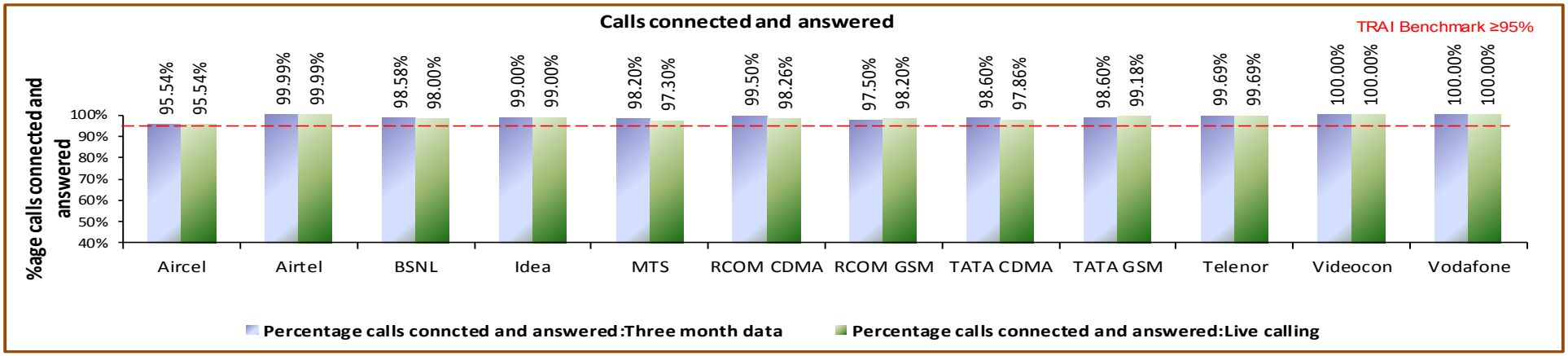
All operators met the benchmark for this parameter.

9.4 CALL CENTRE PERFORMANCE-IVR

9.4.1 PARAMETER DESCRIPTION

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

9.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

As per PMR data, all operators met the benchmark.

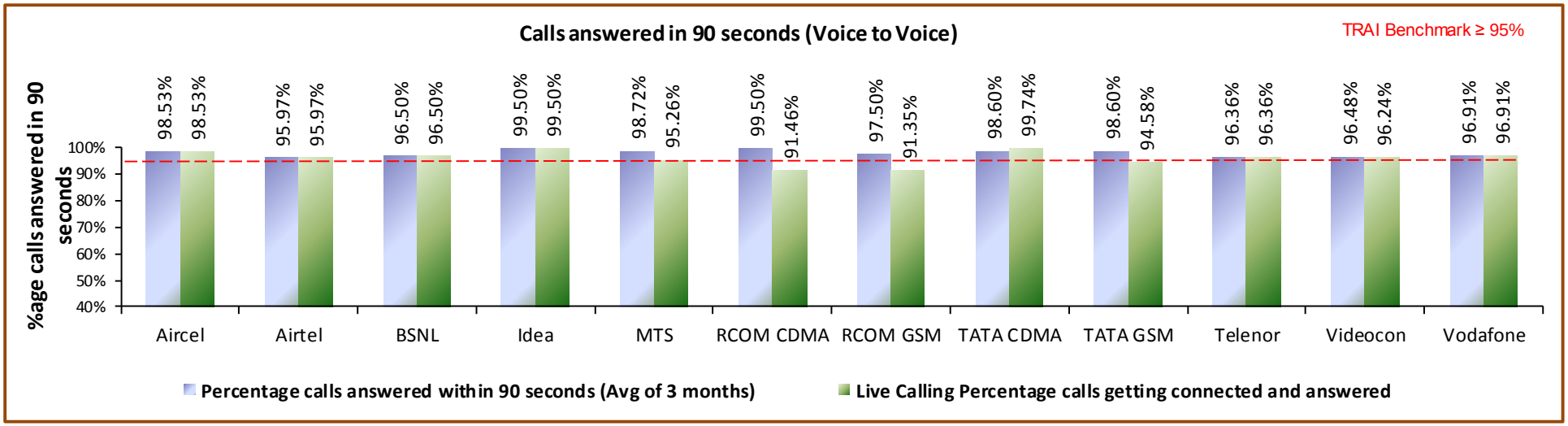
9.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

9.5.1 PARAMETER DESCRIPTION

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

Benchmark: 95% calls to be answered within 90 seconds

9.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

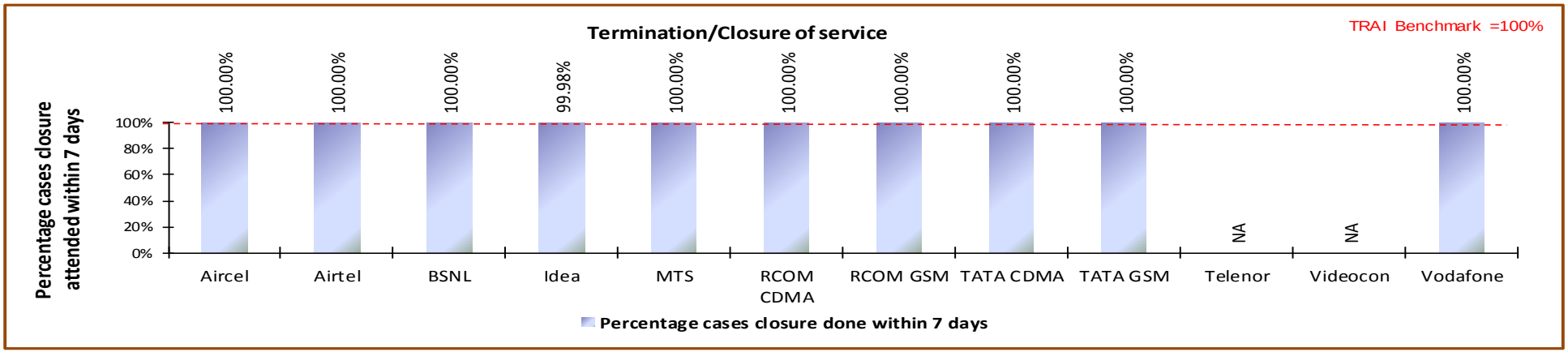
All operators met the benchmark as per audit. However, as per live calling done to customers, the performance of TATA GSM and Reliance GSM & CDMA was far inferior to the PMR data.

9.6 TERMINATION/CLOSURE OF SERVICE

9.6.1 PARAMETER DESCRIPTION

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

9.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

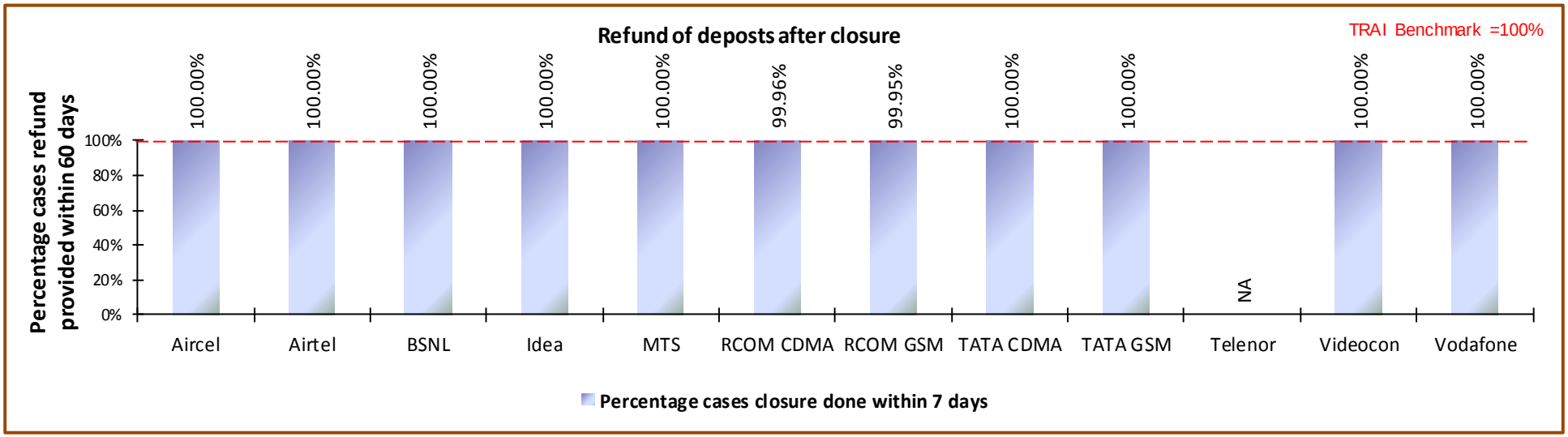
All operators met the TRAI benchmark for the parameter.

9.7 REFUND OF DEPOSITS AFTER CLOSURE

9.7.1 PARAMETER DESCRIPTION

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

9.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

10 DETAILED FINDINGS - DRIVE TEST DATA

10.1 OPERATOR ASSISTED DRIVE TEST - VOICE

The drive test was conducted simultaneously for all the operators present in the 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	

10.1.1 Mahesana SSA

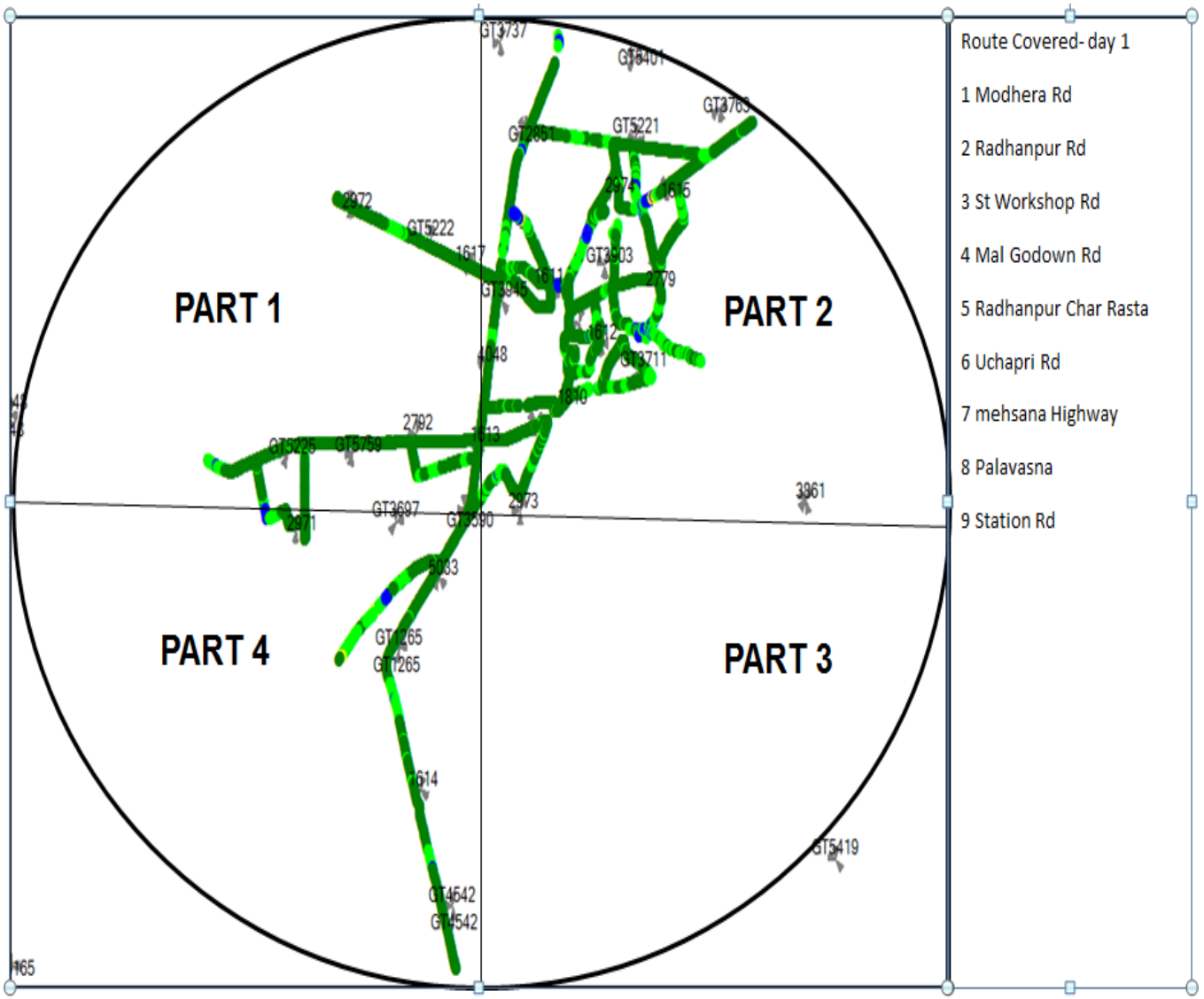
Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
December	Mahesana	22-12-15	24-12-15	323

10.1.1.1 Route Details - Mahesana SSA

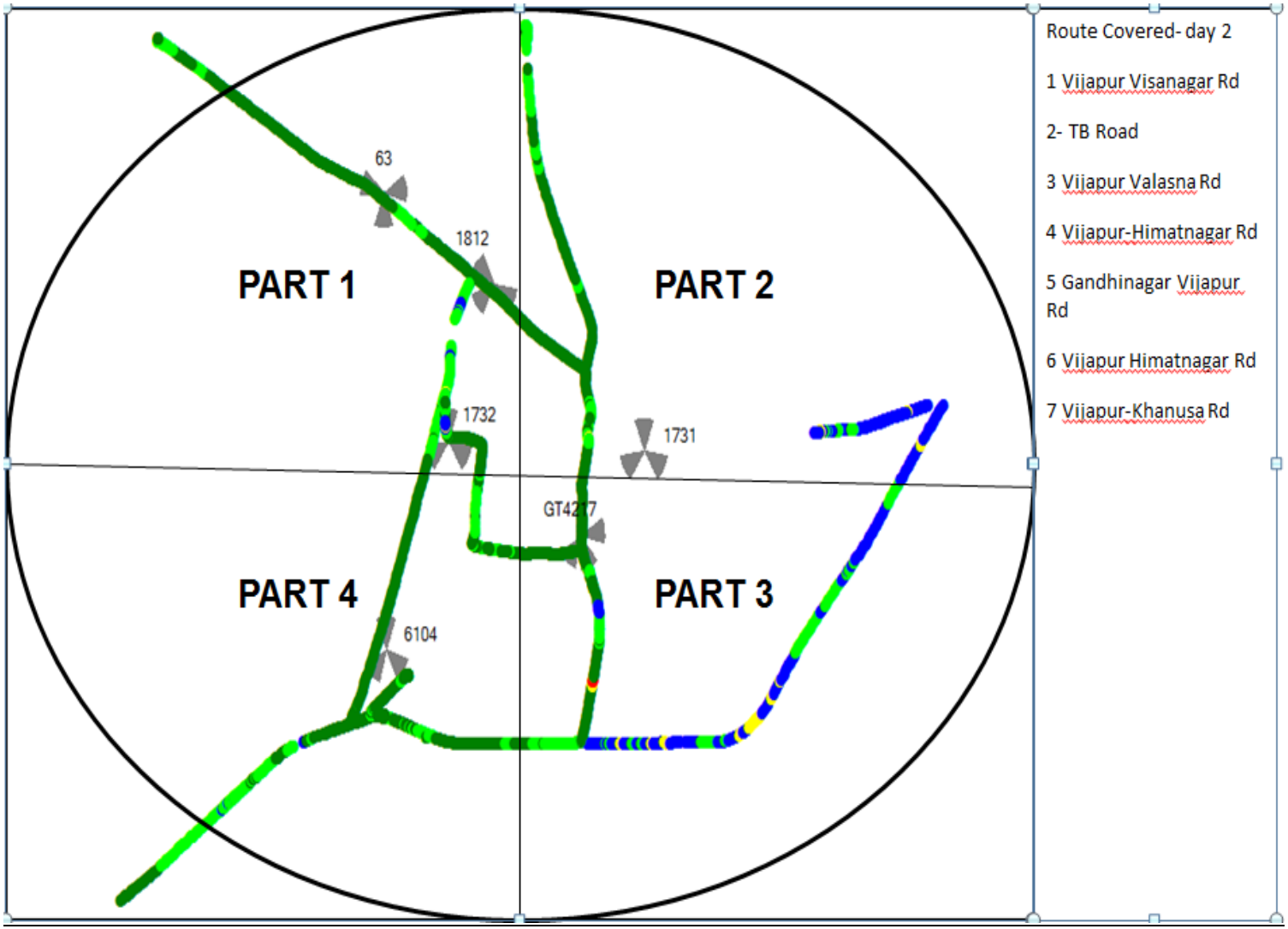
Category	Type of location	December Mahesana Day 1	Day 2	Day 3
Outdoor	Major Roads	Modhera Rd, Radhanpur Rd, St Workshop Rd, Mal Godown Rd, Radhanpur Char Rasta, Uchapri Rd, mehsana Highway, Palavasna,Station Rd, Gurukul Rd, MN Collage Rd, Vivekanand Rd.Tower Rd, Patani Darwaja Rd, Anand Nagar,Vijapur Visanagar Rd, Visanagar-Ambaji Highway	Vijapur Visanagar Rd, TB Road, Vijapur Valasna Rd, Vijapur-Himatnagar Rd, Gandhinagar Vijapur Rd, Vijapur Himatnagar Rd, Vijapur-Khanusa Rd,mehsana-Visnagar-Ambaji HW, Hospital Rd, Vaghvadi Rd,Civil Hospital Rd	Navdurga Nagar Rd, Payal Park Rd, Matarvadi Part Rd, Hansapur Rd, Ambaji Rd, Ayodhya Nagar, Vardmaan Tenament1 Patan Rd, Mohan Nagar Society, Gundipati Part, Galdhara Society Rd
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

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

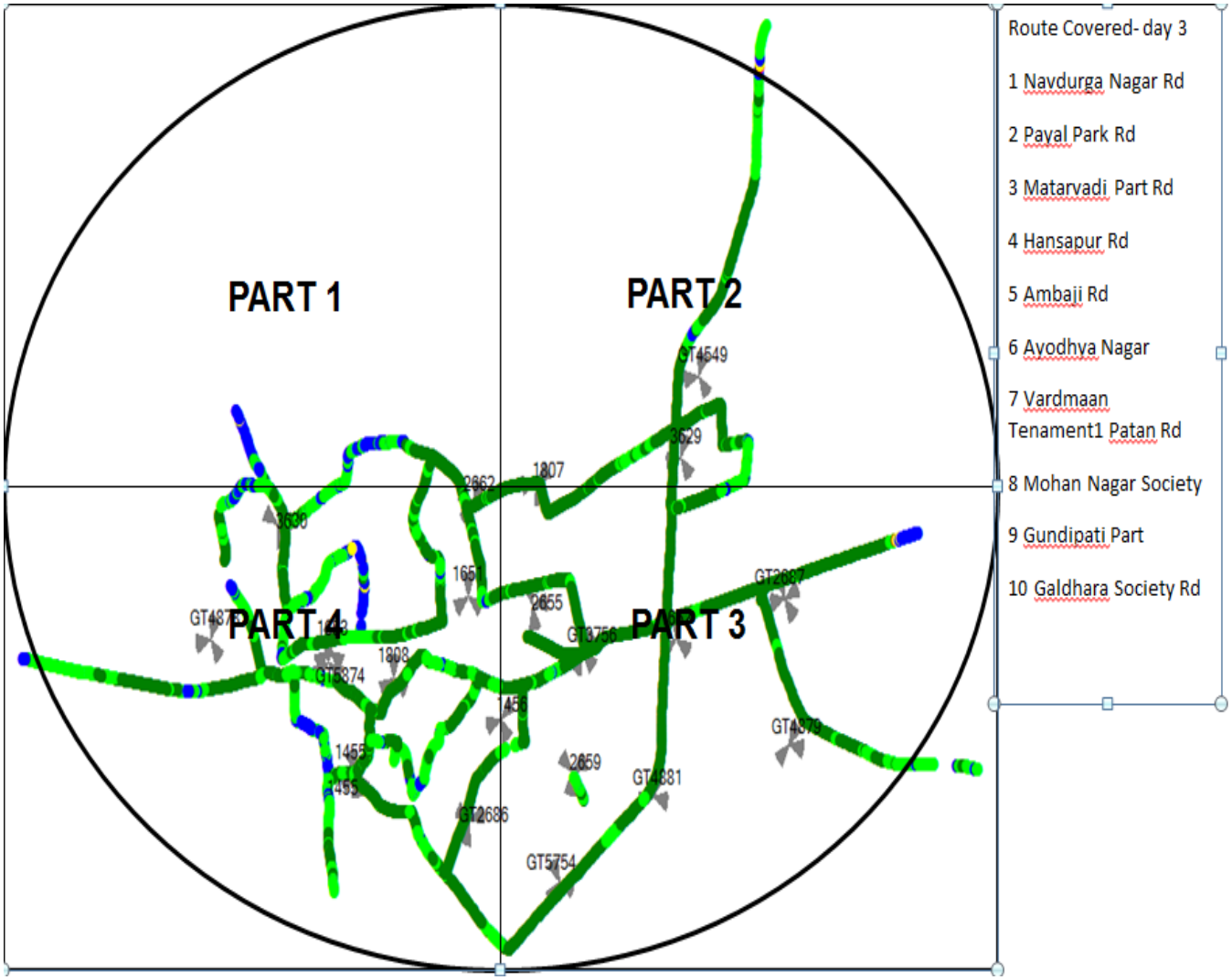
10.1.1.2 Route Map - Mahesana DAY 1



10.1.1.3 Route Map - Mahesana DAY 2



10.1.1.4 ROUTE MAP - Mahesana DAY 3



10.1.1.5 Drive Test Results - Mahesana SSA 2G

December																							
	B'mark	Aircel		Airtel		BSNL		Idea		MTS		RCOM CDMA		RCOM GSM		TATA CDMA		TATA GSM		Telenor		Videocon		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		99.78%	27.42%	97.59%	94.19%	NDR	NDR	93.09%	88.41%	99.00%	68.75%	100.00%	85.18%	98.96%	83.36%	78.00%	55.03%	94.99%	81.08%	81.94%	78.08%	94.11%	70.27%	98.28%	89.88%
0 to -85 dBm		100.00%	70.53%	99.98%	99.54%	NDR	NDR	99.88%	99.00%	99.74%	94.85%	100.00%	97.21%	100.00%	98.41%	96.47%	90.56%	99.95%	97.15%	16.41%	17.64%	98.23%	91.45%	99.89%	98.50%
0 to -95 dBm		100.00%	98.83%	100.00%	99.93%	NDR	NDR	99.99%	99.96%	99.90%	99.13%	100.00%	99.97%	100.00%	99.99%	99.99%	99.40%	100.00%	99.78%	0.00%	0.07%	99.96%	99.79%	99.99%	99.83%
Voice quality	≥ 95%	99.67%	99.30%	99.49%	98.64%	NDR	NDR	99.28%	98.46%	100.00%	99.97%	100.00%	99.88%	98.48%	97.54%	99.57%	98.61%	99.40%	99.22%	97.48%	95.86%	99.99%	99.32%	97.14%	97.00%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	NDR	NDR	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%	99.67%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	NDR	NDR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	100.00%	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%	NDR	NDR	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%	NDR	NDR	100.00%	99.19%	100.00%	100.00%	100.00%	100.00%	100.00%	99.34%	100.00%	100.00%	100.00%	99.25%	100.00%	99.54%	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.

10.1.1.1 Drive Test Results - Mahesana SSA 3G

December									
	B'mark	BSNL 3G		Idea 3G		TATA 3G		Vodafone 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NDR	NDR	95.75%	75.40%	NDR	NDR	64.33%	61.65%
0 to -85 dBm		NDR	NDR	100.00%	96.61%	NDR	NDR	93.39%	88.97%
0 to -95 dBm		NDR	NDR	100.00%	99.93%	NDR	NDR	99.93%	97.81%
Voice quality	≥ 95%	NDR	NDR	99.96%	97.54%	NDR	NDR	99.63%	99.12%
CSSR	≥ 95%	NDR	NDR	100.00%	100.00%	NDR	NDR	100.00%	100.00%
%age Blocked calls		NDR	NDR	0.00%	0.00%	NDR	NDR	0.00%	0.00%
Call drop rate	≤ 2%	NDR	NDR	0.00%	0.00%	NDR	NDR	0.00%	0.00%
Hands off success rate		NDR	NDR	100.00%	100.00%	NDR	NDR	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. Aircel and BSNL CDMA did not meet the benchmark in outdoor 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.

10.1.1.1 Data Drive Test Results - Mahesana SSA -2G

Note: Aircel, BSNL, Idea, MTS and RTL did not submit the data.

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RTL GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	100	NDR	NDR	NDR	100	NDR	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	NDR	100	NDR	NDR	NDR	100	NDR	100	100	100	100	100
Minimum download speed		NDR	147	NDR	NDR	NDR	276	NDR	64	86	97	154	1142
Average throughput for Packet Data	>75%	NDR	1262	NDR	NDR	NDR	1519	NDR	149	163	244	238	2329
Latency	<250ms	NDR	100	NDR	NDR	NDR	100	NDR	100	100	100	100	100

All operators met the TRAI benchmark.

10.1.1.1 Data Drive Test Results - Mahesana SSA -3G

Note: Airtel, BSNL, Idea, TATA WCDMA and Vodafone did not submit the data.

Name of the Parameter	Bench Mark	Airtel	BSNL	Idea	TATA WCDMA	Vodafone
Succesful Data Transmission download speed attempts	>80%	NDR	NDR	NDR	NDR	100
Succesful Data Transmission upload speed attempts	>75%	NDR	NDR	NDR	NDR	100
Minimum download speed		NDR	NDR	NDR	NDR	2192
Average throughput for Packet Data	>75%	NDR	NDR	NDR	NDR	2501
Latency	<250ms	NDR	NDR	NDR	NDR	100

All operators met the TRAI benchmark.

11 ANNEXURE – CONSOLIDATED-2G

11.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data													
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Number of BTSs in the licensed service area		2478	22469	13419	21309	92	3336	7557	1734	5758	11483	5666	24881
Sum of downtime of BTSs in a month (in hours)		411	8867	155188	7817	36	74538	172642	4	134676	7377	112013	204771
BTSs accumulated downtime (not available for service)	≤ 2%	0.02%	0.05%	1.55%	0.05%	0.05%	3.00%	3.07%	0.00%	3.14%	0.09%	2.66%	1.11%
Number of BTSs having accumulated downtime >24 hours		0	17	166	32	0	12	35	0	3	20	8	30
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.08%	1.24%	0.15%	0.00%	0.36%	0.46%	0.00%	0.05%	0.17%	0.14%	0.12%
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	Videocon	Vodafone
Number of BTSs in the licensed service area		2478	22459	13389	21207	92	3336	8305	1734	3839	3816	5673	24874
Sum of downtime of BTSs in a month (in hours)		30	20088	16140	701	0	6897	13919	557	453	477	10512	18403
BTSs accumulated downtime (not available for service)	≤ 2%	0.02%	1.24%	1.67%	0.05%	0.00%	2.87%	2.33%	0.45%	0.16%	0.17%	2.57%	1.03%
Number of BTSs having accumulated downtime >24 hours		0	4	0	3	0	0	0	0	0	0	0	11
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.02%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.04%

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

11.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data													
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
CSSR	≥ 95%	98.88%	98.80%	98.16%	98.83%	99.79%	97.65%	97.54%	98.96%	98.13%	98.06%	99.16%	99.60%
SDCCH/Paging channel congestion	≤ 1%	0.02%	0.40%	0.07%	0.46%	NA	NA	0.09%	NA	0.03%	0.42%	0.06%	0.26%
TCH congestion	≤ 2%	0.02%	0.36%	0.41%	0.57%	0.00%	0.98%	0.68%	0.14%	0.05%	0.72%	0.05%	0.40%
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	Videocon	Vodafone
CSSR	≥ 95%	98.82%	98.86%	98.21%	98.93%	99.79%	97.50%	98.66%	98.97%	98.16%	98.53%	99.09%	99.65%
SDCCH/Paging channel congestion	≤ 1%	0.01%	0.39%	0.06%	0.26%	NA	NA	0.08%	NA	0.02%	0.49%	0.22%	0.19%
TCH congestion	≤ 2%	0.01%	0.18%	0.41%	0.50%	0.00%	1.01%	0.38%	0.05%	0.03%	0.50%	0.26%	0.35%
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	Videocon	Vodafone
Total number of call attempts		60	377	NDR	461	368	448	446	NDR	295	420	395	364
Total number of successful calls established		60	377	NDR	461	368	448	446	NDR	295	419	395	364
CSSR	≥ 95%	100.00%	100.00%	NDR	100.00%	100.00%	100.00%	100.00%	NDR	100.00%	99.76%	100.00%	100.00%
%age blocked calls		0.00%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.24%	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 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	Videocon	Vodafone
Total number of calls established		27669644	598539969	189469244	864914238	288803	68584281	133820562	28162438	86231097	506140724	69566012	1495677669
Total number of calls dropped		87157	4693152	1460826	7957629	38	49739	112644	124754	593234	2296139	283173	12378824
Call drop rate	≤ 2%	0.31%	0.78%	0.77%	0.92%	0.01%	0.07%	0.08%	0.44%	0.69%	0.45%	0.41%	0.83%
Total number of cells in the network		7434	70136	40216	63814	282	10002	22269	5274	17258	36103	17221	75680
Total number of cells having more than 3% TCH		134	814	712	1396	1	35	94	338	738	400	122	1901
Worst affected cells having more than 3% TCH	≤ 3%	1.80%	1.16%	1.77%	2.19%	0.35%	0.35%	0.42%	6.41%	4.28%	1.11%	0.71%	2.51%
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	Videocon	Vodafone
Total number of calls established		2656743	233339009	19007612	83218295	78776	7260556	13737535	37877592	8184198	450358689	7539381	595268588
Total number of calls dropped		8393	1799613	149724	769912	30	5095	10560	220415	51944	938701	35840	4467997
Call drop rate	≤ 2%	0.32%	0.77%	0.79%	0.93%	0.04%	0.07%	0.08%	0.58%	0.63%	0.21%	0.48%	0.75%
Total number of cells in the network		7434	70149	39831	63865	184	7776	22270	375	17289	36032	17241	75649
Total number of cells having more than 3% TCH		131	743	703	1414	0	32	144	20	732	412	118	1908
Worst affected cells having more than 3% TCH	≤ 3%	1.76%	1.06%	1.77%	2.21%	0.00%	0.42%	0.65%	5.23%	4.24%	1.14%	0.68%	2.52%
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	Videocon	Vodafone
Total number of calls established		60	377	NDR	461	368	448	446	NDR	295	419	395	364
Total number of calls dropped		0	0	NDR	0	0	0	0	NDR	0	0	0	0
Call drop rate	≤ 2%	0.00%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%

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

11.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data													
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of sample calls		5226632831	107326244694	13409601004	250568913790	841537343	0	27338739349	600448478	15343419040	109829815246	7994440812	229137083307
Total number of calls with good voice quality		5092484094	103787718904	13231033706	238690477288	834404418	0	27119097847	374180096	15158267802	107760570783	7819736531	222283492911
%age calls with good voice quality	≥ 95%	97.43%	96.70%	98.67%	95.26%	99.15%	99.32%	99.20%	99.38%	98.79%	98.12%	97.81%	97.01%
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	Videocon	Vodafone
Total number of sample calls		514430142	42987271999	1235457876	24928352080	248537826	0	2604822305	737273303	1511430201	84645977590	882401227	92001462047
Total number of calls with good voice quality		501937512	41613926803	1219848629	23742447519	246399931	0	2584661904	472802339	1493837353	83356128015	860996798	89467634844
%age calls with good voice quality	≥ 95%	97.57%	96.81%	98.74%	95.24%	99.14%	98.56%	99.23%	99.01%	98.84%	98.48%	97.57%	97.25%
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	Videocon	Vodafone
Total number of sample calls		85728	95091	NDR	108946	NDR	NDR	56384	NDR	440912	61757	470652	242241
Total number of calls with good voice quality		85339	94035	NDR	107521	NDR	NDR	55034	NDR	437713	59443	467661	235096
%age calls with good voice quality	≥ 95%	99.55%	98.89%	NDR	98.69%	NDR	99.94%	97.61%	NDR	99.27%	96.25%	99.36%	97.05%

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

11.5 POI CONGESTION

Audit Results for POI Congestion- PMR data													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		120	NDR	171	465	192	181	57	483	75	66	64	464
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0	0	1
Total Capacity of all POIs (A) - in erlangs		5827	NDR	144933	476405	24153	67874	39384	107253	110744	354167	20800	468478
Traffic served for all POIs (B)- in erlangs		94	NDR	80783	231647	2756	19060	20712	32617	50604	185124	10178	184774
POI congestion	≤ 0.5%	0.00%	NDR	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	Videocon	Vodafone
Total number of working POIs		120	NDR	171	465	192	181	38	483	75	66	64	459
No. of POIs not meeting benchmark		0	NDR	1	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		5838	NDR	144933	473319	24100	68826	26273	107253	110744	351748	20951	461722
Traffic served for all POIs (B)- in erlangs		90	NDR	84104	233408	1680	20682	13903	24365	42916	179676	5961	190582
POI congestion	≤ 0.5%	0.00%	NDR	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

11.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang												
Traffic in Erlang	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Eqipped capacity of the network	31593	235115	317000	299130	21000	144000	144000	95612	106192.8	149405	82460	486330
Total taffic handled in erlang during TCBH	8448	177708	87158	237707	996.2270968	NDR	NDR	11886	23849.111	187464	11233	357123
Total no. of customers served (as per VLR)	9898	8087854	2628940	10622187	82457	NDR	NDR	210256	1229084	5587015	429014	18453104

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

12 ANNEXURE – CONSOLIDATED-3G

12.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		6291	15742	4009	5627
Sum of downtime (i.e. total outage time) of Node Bs		50080	7407	53559	0
Node Bs downtime (not available for service)	≤ 2%	1.07%	0.06%	1.80%	0.00%
Number of Node Bs having accumulated downtime of >24 hours in a month		107	33	1	0
Worst affected Node Bs due to downtime	≤ 2%	1.70%	0.21%	0.02%	0.00%
Live Measurement Results for Network Availability- 3 Day live data					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		6437	15463	4009	5627
Sum of downtime (i.e. total outage time) of Node Bs		6727	565	3381	0
Node Bs downtime (not available for service)	≤ 2%	1.45%	0.05%	1.17%	0.00%
Number of Node Bs having accumulated downtime of >24 hours in a month		90	3	1	0
Worst affected Node Bs due to downtime	≤ 2%	1.40%	0.02%	0.02%	0.00%

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

12.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	96.33%	99.65%	98.79%	99.72%
RRC Congestion	≤ 1%	0.84%	0.35%	0.17%	0.20%
Circuit Switched RAB Congestion	≤ 2%	0.39%	0.16%	0.41%	0.08%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	96.10%	99.55%	98.91%	96.50%
RRC Congestion	≤ 1%	0.24%	0.45%	0.14%	0.38%
Circuit Switched RAB Congestion	≤ 2%	0.36%	0.26%	0.21%	0.58%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data					
CSSR	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NDR	487	NDR	361
Total number of RRC established (B)		NDR	487	NDR	361
Call setup success rate (B/A*100)	≥ 95%	NDR	100.00%	NDR	100.00%
%age blocked calls		NDR	0.00%	NDR	0.00%

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

12.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		414920237	236628953	39979834	131050912
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		4677113	929088	221618	286120
Call drop rate (B/A*100)	≤ 2%	1.13%	0.39%	0.55%	0.22%
Total no. of cells in the licensed service area (B)		18310	47869	12004	18592
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		283	1140	401	281
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.55%	2.38%	3.34%	1.51%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		35035018	23621525	3826116	11684732
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		513312	91711	21221	25297
Call drop rate (B/A*100)	≤ 2%	1.47%	0.39%	0.55%	0.22%
Total no. of cells in the licensed service area (B)		17481	46083	12006	55776
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		269	1100	401	820
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.54%	2.39%	3.34%	1.47%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data					
Call drop rate	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	487	NDR	361
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	0	NDR	0
Call drop rate (B/A*100)	≤ 2%	NDR	0.00%	NDR	0.00%

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

12.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		396973054	146841376715	92716078000	311292449394
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		390003762	145264431654	92427305755	308020212061
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.24%	98.93%	99.69%	98.95%
Live measurement results for Voice quality-3 Day data					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		39335909	14582473480	9161442000	27780219025
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		37811127	14427129834	9132822307	27489054436
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	96.12%	98.93%	99.69%	98.95%
Drive test results for Voice quality (Average of three drive tests) - DT data					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	763542	NDR	406580
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	749907	NDR	403848
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	98.21%	NDR	99.33%

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

12.5 POI CONGESTION

Audit Results for POI Congestion- PMR data					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		171	465	NDR	153
No. of POIs not meeting benchmark		0	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		144933	476405	NDR	155889
Traffic served for all POIs (B)- in erlangs		81749	231647	NDR	61382
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		114	465	NDR	459
No. of POIs not meeting benchmark		1	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		96622	473319	NDR	467757
Traffic served for all POIs (B)- in erlangs		52109	233408	NDR	178734
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	0.00%

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

13 ANNEXURE – CUSTOMER SERVICES

13.1 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated													
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)													
Metering and billing credibility - Postpaid													
Total bills generated during the period		98	1392099	156881	1676966	186132	415029	272905	40088	183138	NA	NA	5675706
Total number of bills disputed		0	510	41	7671	162	373	244	3	6	NA	NA	12213
Total number of valid billing complaints		0	74	23	860	162	373	244	3	6	NA	NA	4863
Total complaints considered invalid		0	436	18	6811	0	0	0	0	0	NA	NA	7350
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.04%	0.03%	0.46%	0.08%	0.90%	0.89%	0.01%	0.00%	NA	NA	0.22%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid													
Performance prepaid	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of charging complaints (valid) - sum of 3 months		0	20	459	2472	7	115	3461	0	0	99	4	2596
Total complaints considered invalid (sum of 3 months)		0	333	4652	5482	2	231	0	0	0	0	0	0
Total number of charging complaints (sum of 3 months)		0	353	5111	7954	9	346	3461	0	0	99	4	2596
Total no of customers served (Sum of 3 months)		50805	22122753	9471744	33787086	476414	2945112	11553951	738448	9510326	23374704	5903597	51770423
Percentage of charging complaints disputed	≤ 0.1%	0.00%	0.00%	0.05%	0.02%	0.00%	0.37%	0.86%	0.00%	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**	**Videocon**	**Vodafone**
Total number of billing/charging complaints		0	863	5634	6664	338	719	3705	3	6	198	8	14918
Total number of complaints resolved in favour of customer		0	769	5152	3332	169	488	3705	3	6	99	4	7459
Total complaints considered invalid		0	94	482	3332	169	231	0	0	0	99	4	7459
Number of complaints resolved in 4 weeks		0	769	4670	12293	2	719	3705	3	6	0	0	7350
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	99.98%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.54%
Number of complaints resolved in 6 weeks		0	769	459	3324	169	719	3705	3	6	99	4	7459
Percentage complaints resolved within 6 weeks	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%
Period of applying credit / waiver													
Total number of complaints where credit/waiver is required		0	114	0	3421	169	488	3705	3	6	0	4	0
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	99.71%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	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**	**Videocon**	**Vodafone**
Total Number of calls made		100	100	100	100	100	100	100	3	6	NA	NA	100
Number of cases resolved in 4 weeks		100	100	100	100	100	100	100	3	6	NA	NA	100
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	100.00%
Number of cases resolved in 6 weeks		100	100	100	100	100	100	100	3	6	NA	NA	100
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	100.00%

Data Source: Billing Center of the operators

13.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated													
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of call attempts to customer care for assistance		7283	2121146	269259	23886572	41811	631867	6453040	38323	572805	17352438	284171	28595470
Number of calls getting connected and answered (electronically)		6958	2121029	265444	23648724	41057	620882	6336836	37501	568092	17298550	284171	28595470
Percentage calls getting connected and answered	≥ 95%	95.54%	99.99%	98.58%	99.00%	98.20%	99.50%	97.50%	98.60%	98.60%	99.69%	100.00%	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	Videocon	Vodafone
Total Number of calls received (3 months)		1565	3374084	1839686	7985518	2817	194194	1393822	48380	1032050	4360005	73078	10117050
Total Number of calls answered within 90 seconds (3 months)		1542	3237948	1775339	7945438	2781	177618	1273193	48252	976137	4201256	70509	9804639
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	98.53%	95.97%	96.50%	99.50%	98.72%	99.50%	97.50%	98.60%	98.60%	96.36%	96.48%	96.91%

13.3 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	Videocon	Vodafone
Total number of closure request		0	5218	5667	10905	7295	2800	810	1181	2962	0	0	20524
Number of requests attended within 7 days		0	5218	5667	10903	7295	2800	810	1181	2962	0	0	20524
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	99.98%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%

Data Source: Customer Service Center of the operators

13.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated													
Refund	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of cases requiring refund of deposits		0	1263	1789	2936	0	2535	2170	367	583	0	0	6928
Total number of cases where refund was made within 60 days		0	1263	1789	2936	0	2534	2169	367	583	0	0	6928
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.96%	99.95%	100.00%	100.00%	NA	100.00%	100.00%

Data Source: Billing Center of the operators

13.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests												
Resolution of service requests	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	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

13.6 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	Videocon	Vodafone
Total no. of calls made		300	300	300	300	300	300	300	300	300	300	300	300
Calls answered		254	241	168	251	263	259	275	294	218	273	182	131
% 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%	97.50%

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

13.7 LEVEL 1 SERVICE CALLS MADE

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

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

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		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

14 COUNTER DETAILS

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

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

14.1.1 ERICSSON

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

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

Ericsson Counters

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

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

14.1.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.

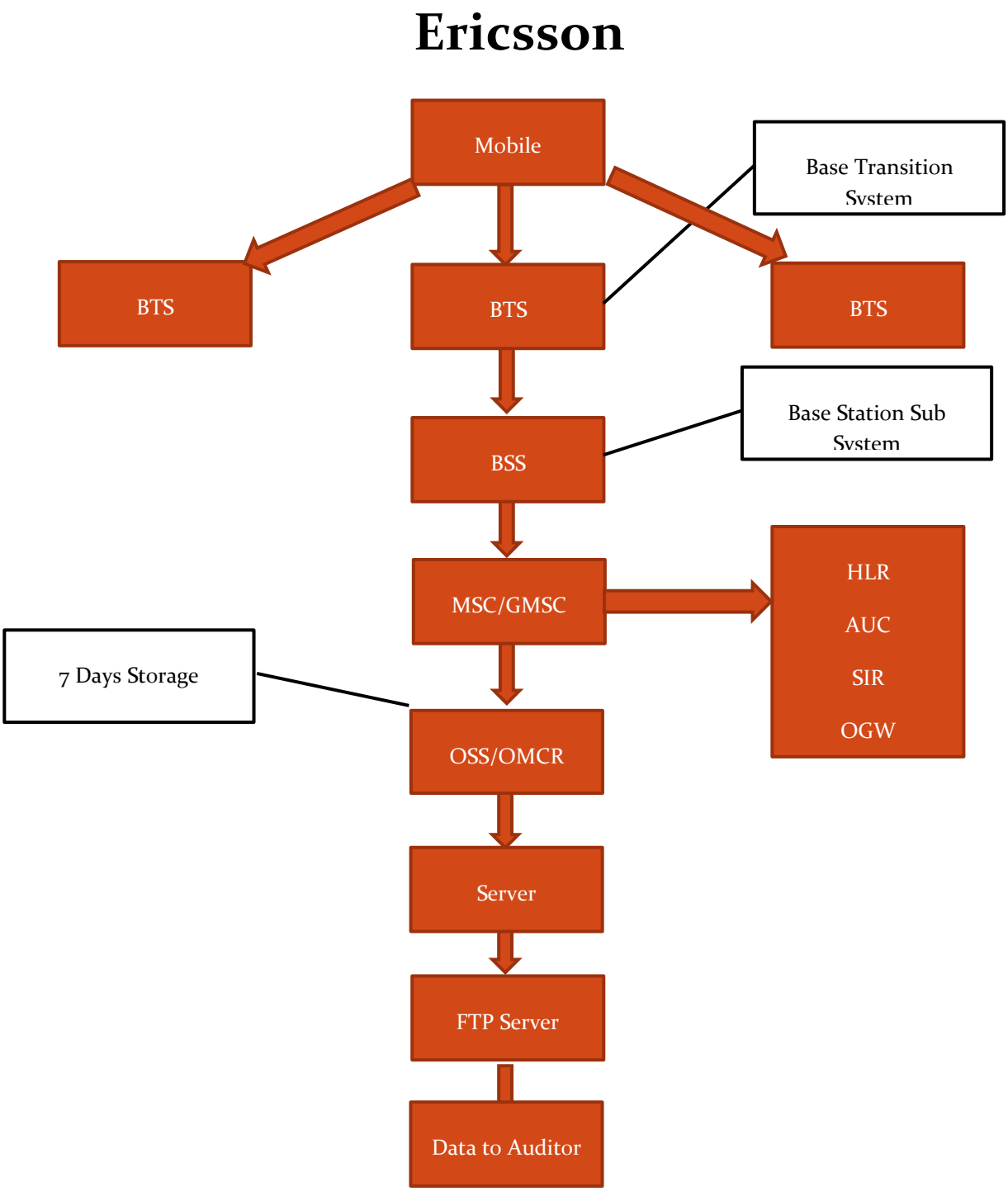
Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	SDCCH congestion = (sdcch_busy_att - .tch_seiz_due_sdcch_con)/{(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
3	TCH congestion= (TCH Failures /TCH Attempts)%	TCH congestion = BLCK_8I_NOM / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	TCH Drop = (drop_after_tch_assign)-(tch_re_est_release) / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}

5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice= (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5) / (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5+FREQ_DL_QUAL6+FREQ_DL_QUAL7)

14.2 BLOCK SCHEMATIC DIAGRAMS

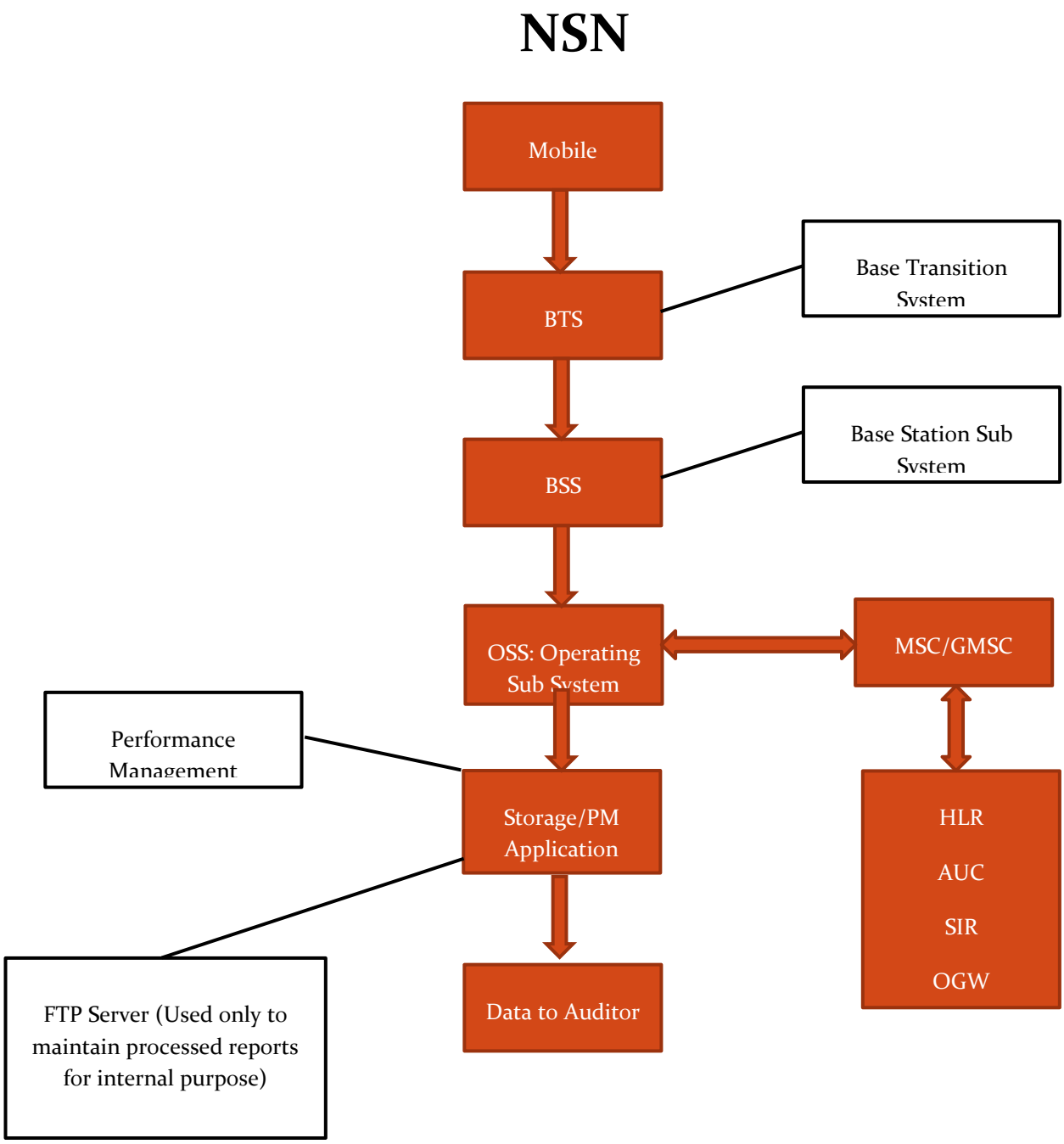
14.2.1 ERICSSON

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



14.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.



15 ANNEXURE – OCTOBER -2G

Audit Results for Network Availability- PMR data-October													
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Number of BTSs in the licensed service area		826	7474	4460	7066	28	1112	2519	578	1920	3814	1900	8259
Sum of downtime of BTSs in a month (in hours)		148	3916	58535	3720	8	31756	63161	1	77987	2945	36	199624
BTSs accumulated downtime (not available for service)	≤ 2%	0.02%	0.07%	1.76%	0.07%	0.04%	3.84%	3.37%	0.00%	5.46%	0.10%	0.03%	3.25%
Number of BTSs having accumulated downtime >24 hours		0	13	68	14	0	5	13	0	3	9	0	11
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.17%	1.52%	0.20%	0.00%	0.45%	0.52%	0.00%	0.16%	0.24%	0.00%	0.13%
Live Measurement Results for Network Availability- 3 Day live data-October													
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Number of BTSs in the licensed service area		826	7478	4454	7066	28	1112	3267	578	1919	3815	1900	8254
Sum of downtime of BTSs in a month (in hours)		5	17354	5398	287	0	1934	4297	460	247	215	36	15925
BTSs accumulated downtime (not available for service)	≤ 2%	0.01%	3.22%	1.68%	0.06%	0.00%	2.42%	1.83%	1.11%	0.18%	0.08%	0.03%	2.68%
Number of BTSs having accumulated downtime >24 hours		0	2	0	0	0	0	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.03%	0.00%	0.00%	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-October													
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
CSSR	≥ 95%	98.81%	98.77%	98.47%	98.81%	99.84%	97.68%	98.10%	98.83%	98.06%	97.81%	99.15%	99.58%
SDCCH/Paging channel congestion	≤ 1%	0.02%	0.03%	0.08%	0.41%	NA	NA	0.10%	NA	0.04%	0.31%	0.09%	0.23%
TCH congestion	≤ 2%	0.04%	0.45%	0.47%	0.59%	0.00%	0.90%	0.65%	0.28%	0.07%	1.03%	0.07%	0.42%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-October													
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
CSSR	≥ 95%	98.64%	98.81%	98.62%	98.97%	99.83%	97.35%	98.83%	98.92%	98.16%	98.69%	99.15%	99.63%
SDCCH/Paging channel congestion	≤ 1%	0.01%	0.02%	0.06%	0.31%	NA	NA	0.10%	NA	0.01%	0.18%	0.09%	0.21%
TCH congestion	≤ 2%	0.01%	0.21%	0.44%	0.48%	0.00%	0.93%	0.18%	0.07%	0.01%	0.22%	0.07%	0.37%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October													
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of call attempts		NA	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	NA
CSSR	≥ 95%	NA	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	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-October													
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of calls established		10100280	215623345	63408505	309035115	252415	22910547	51635144	9552588	28968553	165476455	1749504	486196996
Total number of calls dropped		33982	1752785	628744	2700486	34	18630	46688	52002	252517	772973	8622	4789731
Call drop rate	≤ 2%	0.34%	0.81%	0.99%	0.87%	0.01%	0.08%	0.09%	0.54%	0.87%	0.47%	0.49%	0.99%
Total number of cells in the network		2478	23339	13256	21180	86	3335	7424	1756	5737	12017	5773	25119
Total number of cells having more than 3% TCH		44	318	235	461	0	13	32	127	299	122	49	709
Worst affected cells having more than 3% TCH	≤ 3%	1.77%	1.36%	1.78%	2.18%	0.34%	0.40%	0.44%	7.23%	5.22%	1.01%	0.85%	2.82%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-October													
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of calls established		906619	19312579	6164178	27240591	24098	2442547	4753028	12417456	2510086	231316081	1749504	43194562
Total number of calls dropped		2988	142897	61173	235549	2	1796	3610	85106	18878	500384	8622	380181
Call drop rate	≤ 2%	0.33%	0.74%	0.99%	0.86%	0.01%	0.07%	0.08%	0.69%	0.75%	0.22%	0.49%	0.88%
Total number of cells in the network		2478	23355	13262	21256	86	3335	7425	160	5761	12020	5773	25094
Total number of cells having more than 3% TCH		44	243	235	416	0	12	26	7	270	122	49	632
Worst affected cells having more than 3% TCH	≤ 3%	1.79%	1.04%	1.77%	1.96%	0.00%	0.35%	0.35%	4.36%	4.69%	1.02%	0.85%	2.52%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-October													
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of calls established		NA	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	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-October													
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of sample calls		1887683516	37916970716	11168169606	84569219613	732271894	NDR	13600278495	216507073	5520399202	39364599485	200212773	79794001425
Total number of calls with good voice quality		1837418588	36614970548	11018163063	80599489041	726066447	NDR	13488787038	136672683	5451876355	38637333304	195215123	77251695844
%age calls with good voice quality	≥ 95%	97.34%	96.57%	98.66%	95.31%	99.15%	NDR	99.18%	63.13%	98.76%	98.15%	97.50%	96.81%
Live measurement results for Voice quality-3 Day data-October													
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of sample calls		174793151	3569129912	1113956997	8239975338	79088972	NDR	1052817816	251592874	508729303	44086863939	200212773	7646826515
Total number of calls with good voice quality		170507348	3458375553	1099995533	7865572311	78459518	NDR	1044901202	162060423	502826619	43435942365	195215123	7430334757
%age calls with good voice quality	≥ 95%	97.55%	96.90%	98.75%	95.46%	99.20%	NDR	99.25%	64.41%	98.84%	98.52%	97.50%	97.17%
Drive test results for Voice quality (Average of three drive tests) - DT data-October													
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of sample calls		NA	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	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-October													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NDR	57	155	64	61	19	161	25	22	NDR	157
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0	NDR	1
Total Capacity of all POIs (A) - in erlangs		1949	NDR	48311	154168	8051	18875	13135	35751	36915	117347	NDR	157357
Traffic served for all POIs (B)- in erlangs		31	NDR	26927	79941	1028	7232	6825	11471	17454	64395	NDR	62058
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NDR	57	155	64	61	19	161	25	22	NDR	153
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		1946	NDR	48311	154871	8051	18885	13137	35751	36915	116040	NDR	152305
Traffic served for all POIs (B)- in erlangs		27	NDR	26054	77231	571	7623	6820	11817	17238	59757	NDR	63699
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	NDR	0.00%

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Audit Results for Network Availability- PMR data-November													
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Number of BTSs in the licensed service area		826	7489	4474	7075	32	1112	2518	578	1919	3819	1883	8261
Sum of downtime of BTSs in a month (in hours)		130	2592	47975	1906	10	16388	44115	2	29151	1945	47595	2904
BTSs accumulated downtime (not available for service)	≤ 2%	0.02%	0.05%	1.49%	0.04%	0.04%	2.05%	2.43%	0.00%	2.11%	0.07%	3.51%	0.05%
Number of BTSs having accumulated downtime >24 hours		0	3	60	8	0	2	7	0	0	3	3	8
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.04%	1.34%	0.11%	0.00%	0.18%	0.28%	0.00%	0.00%	0.08%	0.16%	0.10%
Live Measurement Results for Network Availability- 3 Day live data-November													
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Number of BTSs in the licensed service area		826	7475	4461	7066	32	1112	2518	578	1920	0	1890	8259
Sum of downtime of BTSs in a month (in hours)		17	376	6064	198	0	1940	4048	0	206	262	7134	235
BTSs accumulated downtime (not available for service)	≤ 2%	0.03%	0.07%	1.89%	0.04%	0.00%	2.42%	2.23%	0.00%	0.15%	NA	5.24%	0.04%
Number of BTSs having accumulated downtime >24 hours		0	1	0	2	0	0	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.01%	0.00%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-November													
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
CSSR	≥ 95%	98.77%	98.76%	97.88%	98.64%	99.72%	97.79%	98.76%	98.98%	98.22%	98.07%	99.14%	99.54%
SDCCH/Paging channel congestion	≤ 1%	0.02%	0.05%	0.06%	0.57%	NA	NA	0.07%	NA	0.02%	0.37%	0.07%	0.32%
TCH congestion	≤ 2%	0.02%	0.59%	0.39%	0.69%	0.00%	0.88%	0.52%	0.02%	0.03%	0.62%	0.08%	0.46%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-November													
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
CSSR	≥ 95%	98.64%	98.88%	98.03%	98.79%	99.77%	97.52%	98.70%	98.99%	98.11%	98.57%	99.10%	99.63%
SDCCH/Paging channel congestion	≤ 1%	0.01%	0.03%	0.06%	0.24%	NA	NA	0.07%	NA	0.05%	0.31%	0.10%	0.13%
TCH congestion	≤ 2%	0.01%	0.26%	0.41%	0.57%	0.00%	0.94%	0.48%	0.04%	0.04%	0.27%	0.07%	0.37%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November													
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of call attempts		NA	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	NA
CSSR	≥ 95%	NA	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	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-November													
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of calls established		8090931	189110849	61997814	280287782	16913	16691328	41898210	9118555	27154759	152387032	45926021	503213149
Total number of calls dropped		23491	1435799	424071	2715180	3	9080	32414	41196	155468	626691	207069	3919873
Call drop rate	≤ 2%	0.29%	0.76%	0.68%	0.97%	0.02%	0.05%	0.08%	0.45%	0.57%	0.41%	0.45%	0.78%
Total number of cells in the network		2478	23351	13302	21281	98	3335	7424	1759	5761	12009	5724	25125
Total number of cells having more than 3% TCH		46	248	234	483	0	11	38	117	221	123	47	625
Worst affected cells having more than 3% TCH	≤ 3%	1.85%	1.06%	1.76%	2.27%	0.31%	0.33%	0.51%	6.65%	3.83%	1.02%	0.82%	2.49%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-November													
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of calls established		919168	20220655	6353296	29144131	27032	2222700	4514503	12883122	2994809	202377913	5278301	45806502
Total number of calls dropped		3054	152148	43474	277704	5	1567	3565	73071	18164	360745	26175	418596
Call drop rate	≤ 2%	0.33%	0.75%	0.68%	0.95%	0.02%	0.07%	0.08%	0.57%	0.61%	0.18%	0.50%	0.91%
Total number of cells in the network		2478	23348	13267	21331	N/A	3336	7424	158	5764	12012	5744	25119
Total number of cells having more than 3% TCH		48	252	221	519	N/A	11	89	7	251	143	56	708
Worst affected cells having more than 3% TCH	≤ 3%	1.92%	1.08%	1.67%	2.43%	NA	0.34%	1.20%	4.43%	4.35%	1.19%	0.98%	2.82%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-November													
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of calls established		NA	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	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-November													
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of sample calls		1526239048	33693212366	1034795598	82402455752	50504108	NDR	7005824403	179409872	4626351711	32879844910	5311669252	72903429337
Total number of calls with good voice quality		1489873853	32603385634	1021474510	78402371690	50066738	NDR	6951582019	111805750	4573228662	32317961489	5183233041	70672445511
%age calls with good voice quality	≥ 95%	97.62%	96.77%	98.71%	95.15%	99.13%	NDR	99.23%	62.32%	98.85%	98.29%	97.58%	96.94%
Live measurement results for Voice quality-3 Day data-November													
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of sample calls		179423649	3702080475	NDR	8607716022	86549426	NDR	768225180	251114734	529378368	37196095074	627287712	7914982987
Total number of calls with good voice quality		174938647	3586188528	NDR	8188040684	85818757	NDR	762003663	161579431	522943168	36620108892	611491957	7677948531
%age calls with good voice quality	≥ 95%	97.50%	96.87%	NDR	95.12%	99.16%	NDR	99.19%	64.34%	98.78%	98.45%	97.48%	97.01%
Drive test results for Voice quality (Average of three drive tests) - DT data-November													
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of sample calls		NA	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	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-November													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NDR	57	155	64	60	19	161	25	22	32	153
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1946	NDR	48311	160777	8051	18723	13136	35751	36915	116541	10476	155232
Traffic served for all POIs (B)- in erlangs		29	NDR	25974	75512	732	6451	6616	9826	16035	57426	4739	61334
POI congestion	≤ 0.5%	0.00%	NDR	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-November													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NDR	57	155	64	60	19	161	25	22	32	153
No. of POIs not meeting benchmark		0	NDR	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1946	NDR	48311	156816	8051	18723	13136	35751	36915	116039	10476	153527
Traffic served for all POIs (B)- in erlangs		30	NDR	28636	80898	583	7622	7083	6124	18069	62691	5690	65500
POI congestion	≤ 0.5%	0.00%	NDR	0.00%	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-December													
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Number of BTSs in the licensed service area		826	7506	4485	7168	32	1112	2520	578	1919	3850	1883	8361
Sum of downtime of BTSs in a month (in hours)		133	2358	48678	2192	18	26394	65366	1	27538	2487	64381	2243
BTSs accumulated downtime (not available for service)	≤ 2%	0.02%	0.04%	1.46%	0.04%	0.08%	3.19%	3.49%	0.00%	1.93%	0.09%	4.60%	0.04%
Number of BTSs having accumulated downtime >24 hours		0	1	38	10	0	5	15	0	0	8	5	11
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.01%	0.85%	0.14%	0.00%	0.45%	0.60%	0.00%	0.00%	0.21%	0.27%	0.13%
Live Measurement Results for Network Availability- 3 Day live data-December													
	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Number of BTSs in the licensed service area		826	7506	4474	7075	32	1112	2520	578	0	1	1883	8361
Sum of downtime of BTSs in a month (in hours)		7	2358	4678	216	0	3023	5574	97	0	0	3342	2243
BTSs accumulated downtime (not available for service)	≤ 2%	0.01%	0.04%	1.45%	0.04%	0.00%	3.78%	3.07%	0.23%	NA	0.00%	2.47%	0.04%
Number of BTSs having accumulated downtime >24 hours		0	1	0	1	0	0	0	0	0	0	0	11
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.01%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	NA	0.00%	0.00%	0.13%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-December													
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
CSSR	≥ 95%	99.06%	98.88%	98.13%	99.05%	99.81%	97.47%	95.76%	99.07%	98.11%	98.29%	99.19%	99.68%
SDCCH/Paging channel congestion	≤ 1%	0.03%	1.12%	0.07%	0.39%	NA	NA	0.11%	NA	0.03%	0.58%	0.01%	0.24%
TCH congestion	≤ 2%	0.01%	0.06%	0.37%	0.44%	0.00%	1.14%	0.87%	0.12%	0.04%	0.50%	0.00%	0.32%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-December													
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
CSSR	≥ 95%	99.19%	98.88%	97.98%	99.02%	99.77%	97.63%	98.46%	99.01%	98.20%	98.32%	99.01%	99.68%
SDCCH/Paging channel congestion	≤ 1%	0.02%	1.12%	0.07%	0.24%	NA	NA	0.07%	NA	0.01%	0.99%	0.48%	0.24%
TCH congestion	≤ 2%	0.00%	0.06%	0.37%	0.44%	0.00%	1.14%	0.49%	0.03%	0.05%	1.00%	0.63%	0.32%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December													
CSSR	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of call attempts		60	377	NDR	461	368	448	446	355	295	420	395	364
Total number of successful calls established		60	377	NDR	461	368	448	446	355	295	419	395	364
CSSR	≥ 95%	100.00%	100.00%	NDR	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.76%	100.00%	100.00%
%age blocked calls		0.00%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.24%	0.00%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-December													
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of calls established		9478433	193805775	64062925	275591341	19475	28982406	40287208	9491295	30107785	188277237	21890487	506267524
Total number of calls dropped		29684	1504568	408011	2541963	1	22029	33542	31556	185249	896475	67482	3669220
Call drop rate	≤ 2%	0.31%	0.78%	0.64%	0.92%	0.01%	0.08%	0.08%	0.33%	0.62%	0.48%	0.31%	0.72%
Total number of cells in the network		2478	23446	13658	21353	98	3332	7421	1759	5760	12077	5724	25436
Total number of cells having more than 3% TCH		44	248	243	452	0	10	24	94	218	155	25	567
Worst affected cells having more than 3% TCH	≤ 3%	1.78%	1.06%	1.78%	2.11%	0.39%	0.31%	0.33%	5.36%	3.78%	1.28%	0.44%	2.23%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-December													
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of calls established		830956	193805775	6490138	26833573	27646	2595309	4470004	12577014	2679303	16664695	511576	506267524
Total number of calls dropped		2351	1504568	45077	256659	23	1732	3385	62238	14902	77572	1043	3669220
Call drop rate	≤ 2%	0.28%	0.78%	0.69%	0.96%	0.08%	0.07%	0.08%	0.49%	0.56%	0.47%	0.20%	0.72%
Total number of cells in the network		2478	23446	13302	21278	98	1105	7421	57	5764	12000	5724	25436
Total number of cells having more than 3% TCH		39	248	247	479		9	29	6	211	146	12	567
Worst affected cells having more than 3% TCH	≤ 3%	1.56%	1.06%	1.86%	2.25%	0.00%	0.84%	0.39%	9.88%	3.67%	1.22%	0.21%	2.23%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December													
Call drop rate	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of calls established		60	377	NDR	461	368	448	446	355	295	419	395	364
Total number of calls dropped		0	0	NDR	0	0	0	0	0	0	0	0	0
Call drop rate	≤ 2%	0.00%	0.00%	NDR	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-December													
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of sample calls		1812710267	35716061612	1206635800	83597238425	58761341	NDR	6732636451	204531533	5196668127	37585370851	2482558787	76439652545
Total number of calls with good voice quality		1765191653	34569362722	1191396133	79688616557	58271233	NDR	6678728790	125701663	5133162785	36805275990	2441288367	74359351556
%age calls with good voice quality	≥ 95%	97.38%	96.79%	98.74%	95.32%	99.17%	NDR	99.20%	61.46%	98.78%	97.92%	98.34%	97.28%
Live measurement results for Voice quality-3 Day data-December													
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of sample calls		160213342	35716061612	121500879	8080660720	82899428	NDR	783779309	234565695	473322530	3363018577	54900742	76439652545
Total number of calls with good voice quality		156491517	34569362722	119853096	7688834524	82121656	NDR	777757039	149162484	468067566	3300076758	54289718	74359351556
%age calls with good voice quality	≥ 95%	97.68%	96.79%	98.64%	95.15%	99.06%	NDR	99.23%	63.59%	98.89%	98.13%	98.89%	97.28%
Drive test results for Voice quality (Average of three drive tests) - DT data-December													
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of sample calls		85728	95091	NDR	108946	0	NA	56384	83199	440912	61757	470652	242241
Total number of calls with good voice quality		85339	94035	NDR	107521	0	NA	55034	82310	437713	59443	467661	235096
%age calls with good voice quality	≥ 95%	99.55%	98.89%	NDR	98.69%	NA	99.94%	97.61%	98.93%	99.27%	96.25%	99.36%	97.05%

Audit Results for POI Congestion- PMR data-December													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NA	57	155	64	60	19	161	25	22	32	153
No. of POIs not meeting benchmark		0	NA	0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1932	NA	48311	161460	8051	30277	13113	35750	36915	120279	10325	155889
Traffic served for all POIs (B)- in erlangs		33	NA	27882	76194	996	5377	7271	11320	17115	63303	5439	61382
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%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December													
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	MTS	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Telenor	Videocon	Vodafone
Total number of working POIs		40	NA	57	155	64	60	NDR	161	25	22	32	153
No. of POIs not meeting benchmark		0	NA	1	0	0	0	NDR	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		1946	NA	48311	161632	7998	31219	NDR	35750	36915	119668	10476	155889
Traffic served for all POIs (B)- in erlangs		33	NA	29413	75279	527	5438	NDR	6424	7609	57228	270	61382
POI congestion	≤ 0.5%	0.00%	NA	0.00%	0.00%	0.00%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%	0.00%

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Audit Results for Network Availability- PMR data-October					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		2204	5101	1336	NDR
Sum of downtime (i.e. total outage time) of Node Bs		22316	3328	21000	NDR
Node Bs downtime (not available for service)	≤ 2%	1.36%	0.09%	2.11%	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		35	12	1	NDR
Worst affected Node Bs due to downtime	≤ 2%	1.59%	0.24%	0.07%	NDR
Live Measurement Results for Network Availability- 3 Day live data-October					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		2204	5101	1336	NDR
Sum of downtime (i.e. total outage time) of Node Bs		2230	173	736	NDR
Node Bs downtime (not available for service)	≤ 2%	1.41%	0.05%	0.77%	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		30	0	1	NDR
Worst affected Node Bs due to downtime	≤ 2%	1.36%	0.00%	0.07%	NDR

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-October					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	96.07%	99.58%	98.91%	NDR
RRC Congestion	≤ 1%	0.83%	0.42%	0.12%	NDR
Circuit Switched RAB Congestion	≤ 2%	0.35%	0.24%	0.32%	NDR
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-October					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	95.56%	99.48%	98.95%	NDR
RRC Congestion	≤ 1%	0.22%	0.56%	0.09%	NDR
Circuit Switched RAB Congestion	≤ 2%	0.34%	0.33%	0.03%	NDR
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October					
CSSR	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-October					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		134542490	76064808	14020815	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		1483860	301538	76232	NDR
Call drop rate (B/A*100)	≤ 2%	1.10%	0.40%	0.54%	NDR
Total no. of cells in the licensed service area (B)		6136	15584	4002	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		93	436	135	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.52%	2.80%	3.37%	NDR
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-October					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		11360306	7558662	1251669	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		168627	30958	8213	NDR
Call drop rate (B/A*100)	≤ 2%	1.48%	0.41%	0.66%	NDR
Total no. of cells in the licensed service area (B)		5697	15255	4002	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		90	412	158	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.58%	2.70%	3.95%	NDR
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-October					
Call drop rate	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-October					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		127529023	46512407897	32619417000	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		126130892	46015080611	32518939325	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.90%	98.93%	99.69%	NDR
Live measurement results for Voice quality-3 Day data-October					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		12737703	4664711647	2950325500	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		12172139	4615021681	2941278965	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	95.56%	98.93%	99.69%	NDR
Drive test results for Voice quality (Average of three drive tests) - DT data-October					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-October					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		57	155	NDR	NDR
No. of POIs not meeting benchmark		0	0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		48311	154168	NDR	NDR
Traffic served for all POIs (B)- in erlangs		26927	79941	NDR	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-October					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		57	155	NDR	NDR
No. of POIs not meeting benchmark		0	0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		48311	154871	NDR	NDR
Traffic served for all POIs (B)- in erlangs		26054	77231	NDR	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	NDR

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Audit Results for Network Availability- PMR data-November					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		2029	5261	1336	NDR
Sum of downtime (i.e. total outage time) of Node Bs		12443	1974	15800	NDR
Node Bs downtime (not available for service)	≤ 2%	0.82%	0.05%	1.59%	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		36	13	0	NDR
Worst affected Node Bs due to downtime	≤ 2%	1.77%	0.25%	0.00%	NDR
Live Measurement Results for Network Availability- 3 Day live data-November					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		2204	5101	1336	NDR
Sum of downtime (i.e. total outage time) of Node Bs		2230	147	2645	NDR
Node Bs downtime (not available for service)	≤ 2%	1.41%	0.04%	2.75%	NDR
Number of Node Bs having accumulated downtime of >24 hours in a month		30	2	0	NDR
Worst affected Node Bs due to downtime	≤ 2%	1.36%	0.04%	0.00%	NDR

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-November					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	97.09%	99.65%	98.92%	NDR
RRC Congestion	≤ 1%	0.84%	0.33%	0.16%	NDR
Circuit Switched RAB Congestion	≤ 2%	0.35%	0.14%	0.29%	NDR
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-November					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	95.56%	99.45%	98.96%	NDR
RRC Congestion	≤ 1%	0.22%	0.56%	0.16%	NDR
Circuit Switched RAB Congestion	≤ 2%	0.34%	0.35%	0.28%	NDR
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November					
CSSR	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NA	NA	NA	NA
Total number of RRC established (B)		NA	NA	NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-November					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		137969675	75709489	11813565	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		1572487	306099	62019	NDR
Call drop rate (B/A*100)	≤ 2%	1.14%	0.40%	0.52%	NDR
Total no. of cells in the licensed service area (B)		6087	15936	4002	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		94	367	146	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.54%	2.30%	3.66%	NDR
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-November					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		11360306	7963496	1301589	NDR
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		168627	30559	6424	NDR
Call drop rate (B/A*100)	≤ 2%	1.48%	0.38%	0.49%	NDR
Total no. of cells in the licensed service area (B)		5697	15104	4002	NDR
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		90	385	126	NDR
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.58%	2.55%	3.15%	NDR
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-November					
Call drop rate	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA	NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA	NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA	NA	NA

Audit Results for Voice quality -PMR Data-November					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		129815620	47765046731	27294257500	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		126752590	47248143606	27209686735	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	97.64%	98.92%	99.69%	NDR
Live measurement results for Voice quality-3 Day data-November					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		12737703	4964970566	3135907000	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		12172139	4911759104	3126156996	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	95.56%	98.93%	99.69%	NDR
Drive test results for Voice quality (Average of three drive tests) - DT data-November					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-November					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		57	155	NDR	NDR
No. of POIs not meeting benchmark		0	0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		48311	160777	NDR	NDR
Traffic served for all POIs (B)- in erlangs		26942	75512	NDR	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	NDR
Live Measurement Results for POI Congestion- 3 Day data-November					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		57	155	NDR	NDR
No. of POIs not meeting benchmark		0	0	NDR	NDR
Total Capacity of all POIs (A) - in erlangs		48311	156816	NDR	NDR
Traffic served for all POIs (B)- in erlangs		26054	80898	NDR	NDR
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	NDR

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Audit Results for Network Availability- PMR data-December					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		2058	5380	1337	5627
Sum of downtime (i.e. total outage time) of Node Bs		15321	2105	16759	0
Node Bs downtime (not available for service)	≤ 2%	1.00%	0.05%	1.68%	0.00%
Number of Node Bs having accumulated downtime of >24 hours in a month		36	8	0	0
Worst affected Node Bs due to downtime	≤ 2%	1.75%	0.15%	0.00%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-December					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		2029	5261	1337	5627
Sum of downtime (i.e. total outage time) of Node Bs		2267	245	0	0
Node Bs downtime (not available for service)	≤ 2%	1.55%	0.06%	0.00%	0.00%
Number of Node Bs having accumulated downtime of >24 hours in a month		30	1	0	0
Worst affected Node Bs due to downtime	≤ 2%	1.48%	0.02%	0.00%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-December					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	95.83%	99.72%	98.55%	99.72%
RRC Congestion	≤ 1%	0.85%	0.30%	0.23%	0.20%
Circuit Switched RAB Congestion	≤ 2%	0.46%	0.10%	0.61%	0.08%

Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-December					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
CSSR	≥ 95%	97.18%	99.73%	98.83%	96.50%
RRC Congestion	≤ 1%	0.29%	0.22%	0.16%	0.38%
Circuit Switched RAB Congestion	≤ 2%	0.40%	0.09%	0.32%	0.58%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December					
CSSR	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of RRC attempts (A)		NDR	487	NDR	361
Total number of RRC established (B)		NDR	487	NDR	361
Call setup success rate (B/A*100)	≥ 95%	NDR	100.00%	NDR	100.00%
%age blocked calls		NDR	0.00%	NDR	0.00%

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-December					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		142408072	84854656	14145454	131050912
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		1620766	321451	83367	286120
Call drop rate (B/A*100)	≤ 2%	1.14%	0.38%	0.59%	0.22%
Total no. of cells in the licensed service area (B)		6087	16349	4000	18592
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		96	336	120	281
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.57%	2.06%	3.00%	1.51%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-December					
	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		12314406	8099367	1272858	11684732
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		176058	30194	6584	25297
Call drop rate (B/A*100)	≤ 2%	1.43%	0.37%	0.52%	0.22%
Total no. of cells in the licensed service area (B)		6087	15724	4002	55776
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		90	303	117	820
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.47%	1.93%	2.92%	1.47%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December					
Call drop rate	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	487	NDR	361
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	0	NDR	0
Call drop rate (B/A*100)	≤ 2%	NDR	0.00%	NDR	0.00%

Audit Results for Voice quality -PMR Data-December					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		139628411	52563922087	32802403500	311292449394
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		137120280	52001207437	32698679695	308020212061
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.20%	98.93%	99.68%	98.95%
Live measurement results for Voice quality-3 Day data-December					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		13860503	4952791267	3075209500	27780219025
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		13466849	4900349049	3065386346	27489054436
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	97.16%	98.94%	99.68%	98.95%
Drive test results for Voice quality (Average of three drive tests) - DT data-December					
Voice quality	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	763542	NDR	406580
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	749907	NDR	403848
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	98.21%	NDR	99.33%

Audit Results for POI Congestion- PMR data-December					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		57	155	NDR	153
No. of POIs not meeting benchmark		0	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		48311	161460	NDR	155889
Traffic served for all POIs (B)- in erlangs		27881	76194	NDR	61382
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December					
POI congestion	Benchmark	BSNL 3G	Idea 3G	TATA 3G	Vodafone 3G
Total number of working POIs		NDR	155	NDR	459
No. of POIs not meeting benchmark		NDR	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		NDR	161633	NDR	467757
Traffic served for all POIs (B)- in erlangs		NDR	75279	NDR	178734
POI congestion	≤ 0.5%	NDR	0.00%	NDR	0.00%

21 ABBREVIATIONS

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

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

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