EAST ZONE

TRAI AUDIT WIRELESS REPORT-WEST BENGAL CIRCLE - OND QUARTER, 2014

Prepared By -

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Prepared For-

TRAI

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

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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 March 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-

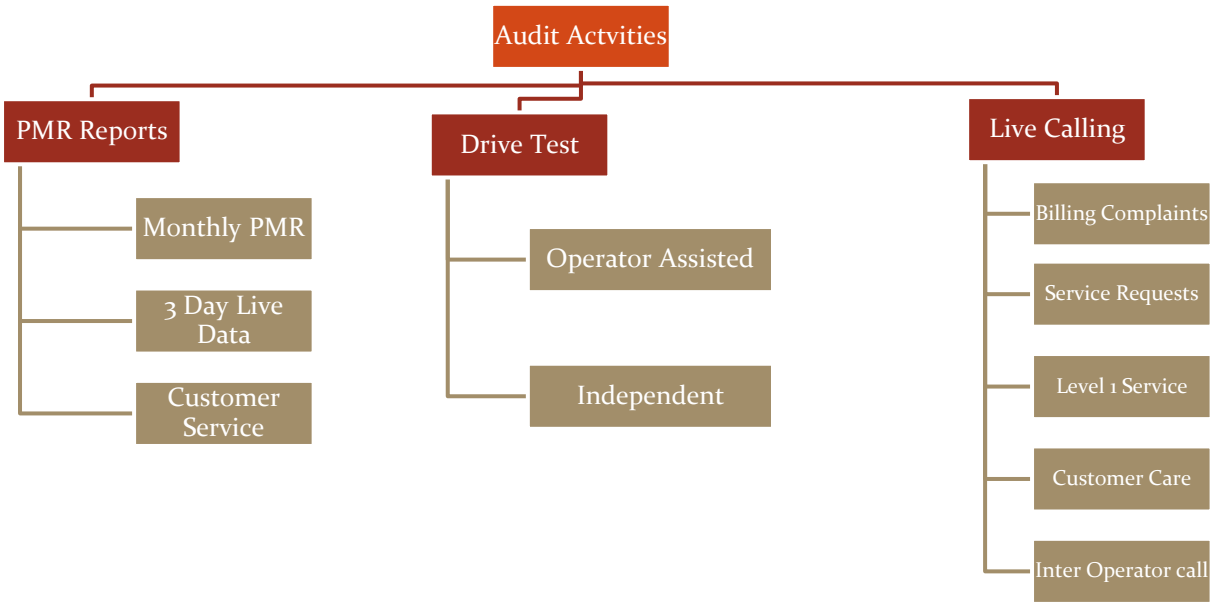
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report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

2.3 COVERAGE

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

Image Source: BSNL website

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 IMRB auditors inform the operators about the audit schedule in advance. As per schedule, the auditors visit the operator premises to conduct the audit.

During TRAI audit, raw data is extracted from the operator's server/ NOC/ exchange/ OMC/ customer service center/ billing center etc. by the IMRB auditor with assistance from the operator personnel in order to generate PMR reports (Network/ Billing /Customer Service etc).

All the calculations are done by IMRB auditors to generate a new PMR report from that raw data.

The newly created PMR reports are then taken in hard copy, duly signed by the competent authority of operators. IMRB auditors also sign the same report.

The PMR report for network parameters is taken for each month of the audit quarter and is generally extracted and verified in the first week of the subsequent month of the audit month. For example, November 2014 audit data was collected in the month of December 2014.

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 2014 (OND'14) was collected in the month of Jan 2014.

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

- Monthly PMR (Network Parameters)
- 3 Day Live Measurement Data (Network Parameters)
- Customer Service Data

Let us understand these formats in detail.

2.4.1.2 MONTHLY PMR

This involved calculation of the various Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems in presence of IMRB representative at the operator's premises for the month of Oct, Nov and Dec 2014. 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 4 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.3 AUDIT PARAMETERS - NETWORK

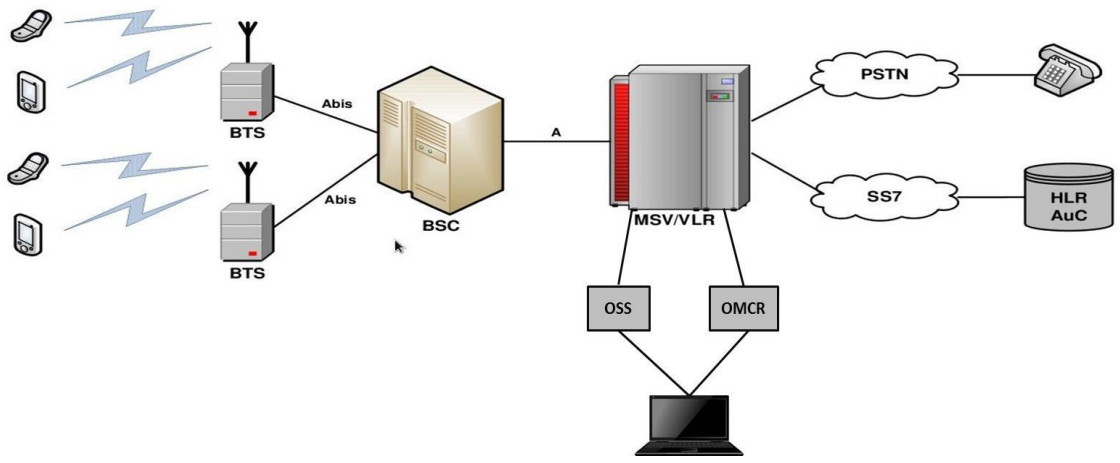
Let us now look at the various parameters involved in the audit reports.

Network Related

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 Channel Congestion	≤ 1 %
TCH Congestion	≤ 2%
Connection Maintenance (Retainability)	
Call Drop Rate	≤ 2%
Worst affected cells having more than 3% TCH drop (call drop) rate	≤ 3%
Connections with good voice quality	≥ 95%
Point of Interconnection	
(POI) Congestion (on individual POI)	≤ 0.5%

2.4.1.4 POINT OF DATA EXTRACTION

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



2.4.1.5 STEP BY STEP AUDIT PROCEDURE

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

All the operators operating in the Wireless domain are informed about the Audit. Tender document and latest list of licencees as per TRAI is taken as a reference document for assimilating the presence of operators.

Audit formats and schedule is shared with the operators in advance. Details include day of the visit and date of 3 day data collection and other requirements.

IMRB auditors visit the operator's server/exchange/central NOC to extract data from operator's systems. Operator personnel assist the auditor in extraction process.

The extracted data is validated and verfied by the IMRB auditors.

IMRB auditors then prepare a PMR report from the extracted data with assistance from the operator.

IMRB auditors validate the values with raw data and also provide their comments, wherever required.

The final audit or PMR sheet is signed by the operator person in-charge along with authorized stamp.

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.

2.4.1.6 CALCULATION METHODOLOGY – NETWORK PARAMETERS

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

2.4.1.7 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.

2.4.1.8 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:

Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify TCBH.

For each day, the hour in which average traffic of the resource group concerned is greatest for the day will be the 'Busy Hour' for the operator.

The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as TCBH for the operator

During audit, the auditors identified from the raw data that the TCBH for the operators in OND'14 was the time period as given below.

Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
20:00 - 21:00	19:00 - 20:00	19:00 - 20:00	19:00 - 20:00	20:00 - 21:00	19:00 - 20:00	19:00 - 20:00	19:00 - 20:00	19:00 - 20:00	19:00 - 20:00

2.4.1.9 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:

Day wise raw data is fetched from the operator's OMCR and kept in a readable format (preferably MS-Excel). Data for a period of 90 days is used to identify CBBH.

For each day, the hour in which a cell in cellular mobile telephone network experiences maximum traffic for the day will be the 'Busy Hour' for the operator.

The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as CBBH for the operator

During audit, the auditors identified from the raw data that the CBBH for the operators in OND'14 was the time period as given below.

Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
20:00 - 21:00	20:00 - 21:00	19:00 - 20:00	19:00 - 20:00	19:00 - 20:00	19:00 - 20:00	19:00 - 20:00	19:00 - 20:00	19:00 - 20:00	20:00 - 21:00

2.4.1.10 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 Dec 2014 (OND'14) was collected in the month of Jan 2014. 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 5 of the report. The benchmark values for each parameter have been given in the table below.

2.4.1.11 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%

2.4.1.12 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

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

2.4.2 LIVE CALLING

2.4.2.1 SIGNIFICANCE AND METHODOLOGY

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

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

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

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

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

Live calling activity was carried out during the period of Dec 2014. 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 Nov 2014 was considered for live calling activity conducted in Dec 2014.

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 March, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 5.1.1.

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 150 test calls were made per service provider in the quarter.

While most of the Level 1 services are toll free, it has been observed that some Level 1 services may not be toll free. In OND'14, 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	State Heath Information Helpline
108	Emergency and Disaster Management Helpline
181	Chief Minister Helpline
1033	Road Accident Management Service
1056	Emergency Medical Service
1063	Public Grievance Cell of DOT
1064	Anti Corruption Helpline
1070	Relief Commissioner for Natural Calamities
1071	Air Accident Helpline
1072	Rail Accident Helpline
1073	Road Accident Information
1077	Control Room for District Collector
1091	Women Crisis Response Center
1098	Child Helpline
1099	Central Accident & Trauma Helpline
1909	National Do Not Call Registry
1916	Drinking Water Supply
1947	Unique Identification Authority of India
1950	Election Commission of India
15100	Free Legal Service Helpline
155214	Labour Helpline
106X	State of Art Hospitals (The actual code has to be confirmed from the operator as per presence of hospitals in the circle. We have to check for all hospitals as per avaialbility of list with operator, For example 1066 is for Apollo)

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 within 60 seconds 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 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 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 DRIVE TEST

2.4.3.1 SIGNIFICANCE AND METHODOLOGY

Drive test, as the name suggests, is conducted to measure the outdoor coverage 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

A total of 3 SSA were selected and audited in each quarter, 1 SSA in each month. The methodology adopted for the drive test-

- 3 consecutive days drive test in one SSA every month. SSA would be defined as per BSNL and month wise SSA list will be finalized by regional TRAI office.
- On an average, a minimum of 100 kilometers were covered each day
- 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 and we can start from the point from where we had left last day (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 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.
- Height of the antenna was kept uniform in case of all service providers.

2.4.3.3 INDEPENDENT DRIVE TEST

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

- A minimum of 100 kilometers was traversed during the independent drive test in a SSA. The SSA would be defined as per BSNL and SSA list will be finalized by regional TRAI office.
- Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.

- Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- The route was classified as-
    - With In city
    - Major Roads
    - Highways
    - Shopping complex/ Mall
    - Office Complex/ Government Building
- There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
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- The speed of the vehicle was kept at around 30 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.
- Height of the antenna was kept uniform in case of all service providers.

2.4.3.4 PARAMETERS EVALUATED DURING DRIVE TEST

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

2.5 OPERATORS COVERED

Name of Operator	Number of Subscriber as per VLR
Aircel(DWL)	3408584
Airtel	10980217
BSNL	1290985
Idea	3937252
MTS	1158157
Reliance CDMA	764059
Reliance GSM	5735070
TATA CDMA	7430
TATA GSM	264818
Vodafone	13837294

December'14 VLR data was considered for the number of subscribers.

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 EXECUTIVE SUMMARY

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

3.1 PMR DATA – 3 MONTHS- CONSOLIDATED

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(DWL)	1.92%	7.81%	97.36%	0.58%	1.26%	1.41%	11.42%	95.24%
Airtel	0.01%	0.01%	98.93%	0.23%	1.35%	1.19%	1.75%	95.60%
BSNL	5.18%	30.34%	98.24%	2.61%	1.02%	1.17%	14.17%	95.05%
Idea	0.05%	0.22%	98.83%	0.08%	0.56%	0.44%	0.39%	95.10%
MTS	0.16%	0.00%	99.71%	NA	0.06%	0.77%	2.22%	99.76%
Reliance CDMA	0.37%	0.74%	98.72%	NA	0.03%	0.24%	0.83%	99.67%
Reliance GSM	0.25%	0.73%	98.66%	0.04%	0.13%	0.62%	0.06%	98.34%
TATA CDMA	0.01%	0.00%	98.89%	NA	0.01%	0.61%	4.11%	97.96%
TATA GSM	0.03%	0.00%	98.75%	0.06%	0.26%	0.60%	2.81%	97.52%
Vodafone	0.03%	0.15%	99.37%	0.29%	0.63%	0.87%	2.93%	95.23%

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

Following are the parameter wise observations for Wireless Operators in West Bengal circle:

BTSs Accumulated Downtime

BSNL failed to meet the benchmark for BTS accumulated downtime while all other operators met the benchmark for the parameter. Airtel and Tata CDMA had the best performance with 0.01% downtime.

Worst Affected BTSs Due to Downtime

Aircel and BSNL failed to meet the TRAI benchmark for the parameter. MTS, Tata CDMA and Tata GSM performed the best with 0.00% worst affected BTS due to downtime.

Call Set-up Success Rate (CSSR)

All the operators met the TRAI benchmark for the ratio of successful call attempts to the overall call attempts. The best performance was recorded for the MTS at 99.71% CSSR.

All the operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section.

Network Congestion parameters:

BSNL did not meet the benchmark for SDCCH/Paging channel congestion ratio. The best performance was recorded for Reliance GSM with 0.04% congestion.

For TCH congestion, all operators met the benchmark while Tata CDMA was the best performer by recording 0.01% TCH congestion.

The calculation methodology (given in parameter description section) followed by the operators was found to be in complete accordance with what has been specified by TRAI.

Call Drop Rate

All operators met the benchmark for call drop rate while Reliance CDMA was the best performer with 0.24% call drop rate.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL and Tata CDMA failed to meet the benchmark for the parameter. Reliance GSM was the best performer with 0.06% worst affected cells having more than 3% TCH drop.

Voice Quality

All the operators ensured an appropriate amount of voice quality, above the benchmark. MTS reported the best performance at 99.76%.

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

3.2 3 DAY DATA – CONSOLIDATED

A three day live measurement was conducted to measure the QoS provided by the operators. It was seen from the live data collected, that the performance of the operators across all parameters more or less corroborated with the audit data collected.

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(DWL)	2.00%	1.69%	97.41%	0.43%	1.14%	1.42%	11.55%	95.27%
Airtel	0.42%	0.00%	98.96%	0.23%	1.29%	1.16%	1.70%	95.31%
BSNL	3.74%	1.13%	97.96%	3.13%	1.22%	1.18%	13.62%	95.04%
Idea	0.05%	0.04%	99.46%	0.03%	0.16%	0.32%	1.02%	96.70%
MTS	0.16%	0.00%	99.77%	NA	0.05%	0.54%	2.02%	99.59%
Reliance CDMA	0.29%	0.01%	98.70%	NA	0.02%	0.24%	0.82%	99.67%
Reliance GSM	0.24%	0.00%	98.63%	0.08%	0.13%	0.84%	0.09%	98.31%
TATA CDMA	0.00%	0.00%	99.06%	NA	0.00%	0.43%	3.50%	97.91%
TATA GSM	0.03%	0.00%	99.23%	0.06%	0.05%	0.55%	2.88%	97.86%
Vodafone	0.02%	0.00%	99.76%	0.20%	0.24%	0.64%	2.91%	96.31%

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

BTSs Accumulated Downtime

During live measurement, it was found that BSNL failed to meet the TRAI specified benchmark for the outage due to downtime of the base transceiver stations (BTS). Tata CDMA performed the best with 0.00% BTS accumulate downtime reported.

Worst Affected BTSs Due to Downtime

All operators met the TRAI benchmark for the parameter with most of them reporting 0.00% worst affected BTS due to downtime.

Call Set-up Success Rate (CSSR)

All the operators met the TRAI benchmark for the ratio of successful call attempts to the overall call attempts. The best performance was recorded for the MTS at 99.78% CSSR

All the operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section.

Network Congestion parameters:

BSNL did not meet the benchmark for SDCCH/Paging channel congestion ratio. The best performance was recorded for Idea with 0.03% congestion.

For TCH congestion, all operators met the benchmark while Tata CDMA was the best performer by recording 0.00% TCH congestion.

The calculation methodology (given in parameter description section) followed by the operators was found to be in complete accordance with what has been specified by TRAI.

Call Drop Rate

All operators met the benchmark for call drop rate. Reliance CDMA was the best performer with 0.24% call drop rate.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL and Tata CDMA failed to meet the benchmark for the parameter. Reliance GSM was the best performer with 0.09% worst affected cells having more than 3% TCH drop.

Voice Quality

All the operators ensured an appropriate amount of voice quality, above the benchmark. Reliance CDMA reported the best performance at 99.67%.

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

3.3 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Service Requests	Level 1 Service	Response time to customer for assistance	
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Complaint /Request attended to Satisfaction	Call answered in 60 seconds	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 90 seconds
Benchmark	98.00%	100.00%		≥ 95%	≥ 95%	≥ 95%
Aircel(DWL)	98.00%	100.00%	94.00%	99.33%	96.00%	96.00%
Airtel	95.00%	100.00%	98.00%	96.67%	100.00%	100.00%
BSNL	98.00%	100.00%	98.00%	100.00%	100.00%	93.00%
Idea	98.00%	100.00%	98.00%	98.00%	100.00%	93.00%
MTS	98.00%	100.00%	97.00%	100.00%	100.00%	99.00%
Reliance CDMA	100.00%	100.00%	95.00%	100.00%	100.00%	100.00%
Reliance GSM	100.00%	100.00%	95.00%	100.00%	100.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
TATA GSM	95.52%	100.00%	98.00%	100.00%	100.00%	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Resolution of billing complaints

Airtel and Tata GSM failed to meet the TRAI benchmark for resolving 98% complaints within 4 weeks. All operators met the TRAI benchmark for resolving 100% complaints within 6 weeks.

Complaint/Request Attended to Satisfaction

Tata CDMA and Vodafone showed complete satisfaction for the customers with regards to their service requests/complaints being attended.

Level 1 Service

All operators met the TRAI benchmark for Level 1 services. The details of live calling done for the level 1 service have been provided in the annexure for each operator.

Accessibility of Call Centre/Customer Care-IVR

All service providers met the TRAI benchmark of answering 95% calls within 60 seconds.

Customer Care / Helpline Assessment

BSNL and Idea did not meet the benchmark while all other operators exceeded the TRAI benchmark of answering 95% calls by the operators (voice to voice) within 90 seconds.

3.4 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Resolution of 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 operators IVR within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 90 seconds
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel(DWL)	0.00%	0.46%	100.00%	100.00%	100.00%	31.49%	97.95%
Airtel	0.09%	0.07%	100.00%	100.00%	100.00%	100.00%	97.32%
BSNL	0.38%	0.09%	100.00%	100.00%	100.00%	95.46%	88.38%
Idea	0.44%	0.34%	100.00%	100.00%	100.00%	98.74%	97.83%
MTS	0.01%	0.03%	100.00%	100.00%	100.00%	99.41%	95.74%
Reliance CDMA	0.21%	0.08%	93.37%	93.37%	100.00%	99.35%	98.54%
Reliance GSM	0.03%	0.09%	100.00%	100.00%	100.00%	98.99%	95.79%
TATA CDMA	NA	0.00%	NA	NA	NA	99.22%	97.35%
TATA GSM	NA	0.01%	100.00%	100.00%	NA	96.71%	86.17%
Vodafone	0.08%	0.06%	100.00%	100.00%	100.00%	100.00%	95.17%

Metering and billing credibility – Postpaid Subscribers

For the postpaid customers, BSNL, Idea and Reliance CDMA failed to meet the TRAI benchmark. Aircel was the best performers with 0.00% billing disputes.

NA: Tata CDMA and GSM do not have postpaid service in the circle.

Metering and billing credibility – Prepaid Subscribers

For the prepaid customers, Aircel and Idea failed to meet the TRAI benchmark. Tata CDMA had the best performance with 0.00% charging disputes.

Resolution of Billing Complaints

Reliance CDMA failed to meet the TRAI benchmark for resolving billing complaints within 4 weeks as well as within 6 weeks.

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

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

Customer Care Percentage of calls answered by the operators IVR within 60 seconds

Aircel, with only 31.49%, failed to meet the benchmark for calls answered by IVR. Airtel and Vodafone performed the best by connecting 100% IVR calls within 60 seconds.

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

BSNL and Tata GSM failed to meet the benchmark of 95% calls (voice to voice) answered within 90 seconds by the call center operators. Best performance was recorded for Reliance CDMA at 98.53%.

3.5 INTER OPERATOR CALL ASSESSMENT – CONSOLIDATED

Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Aircel(DWL)	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BSNL	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Idea	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
MTS	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
Reliance CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	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%
TATA GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA

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

In the inter-operator call assessment, calls were made from the test SIMs of service provider whose audit was being conducted to all the providers. All operators were able to connect to each other with 100% connectivity.

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

4.1 BTS ACCUMULATED DOWNTIME

4.1.1 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

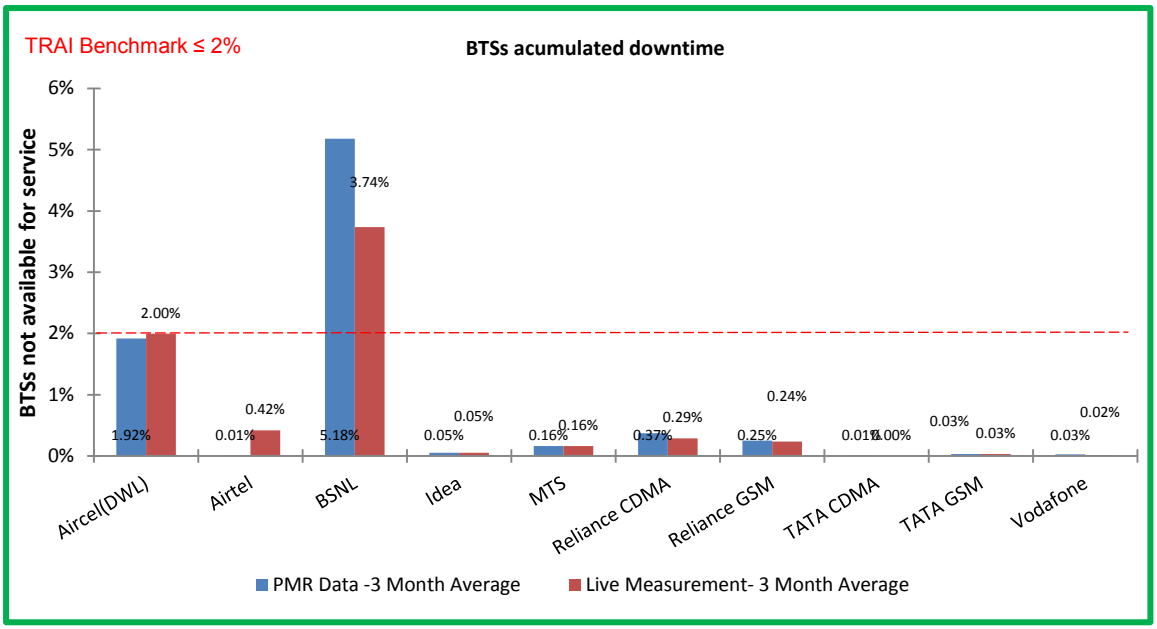
3. **TRAI Benchmark –**

    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.

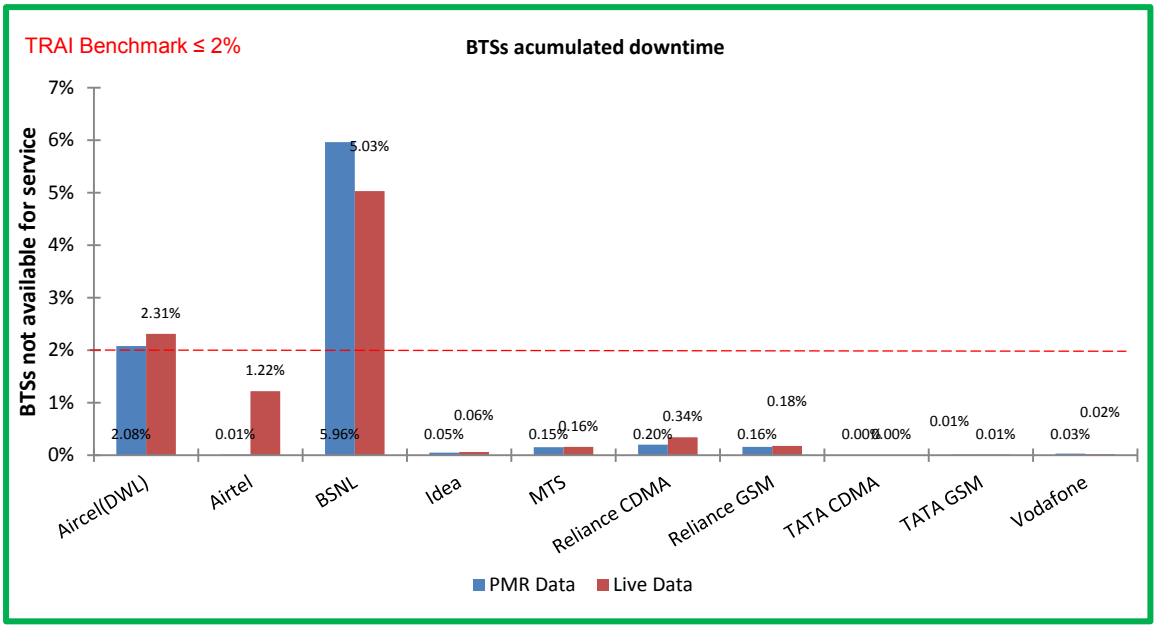
4.1.2 KEY FINDINGS



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

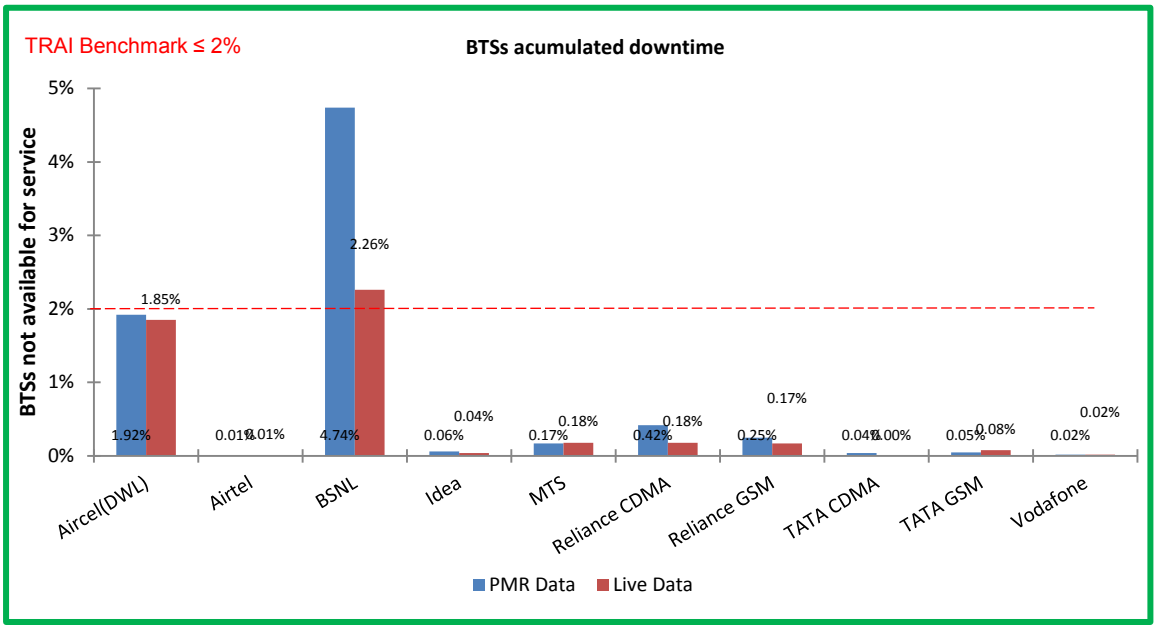
BSNL failed to meet the benchmark for BTS accumulated downtime.

4.1.2.1 KEY FINDINGS – MONTH 1



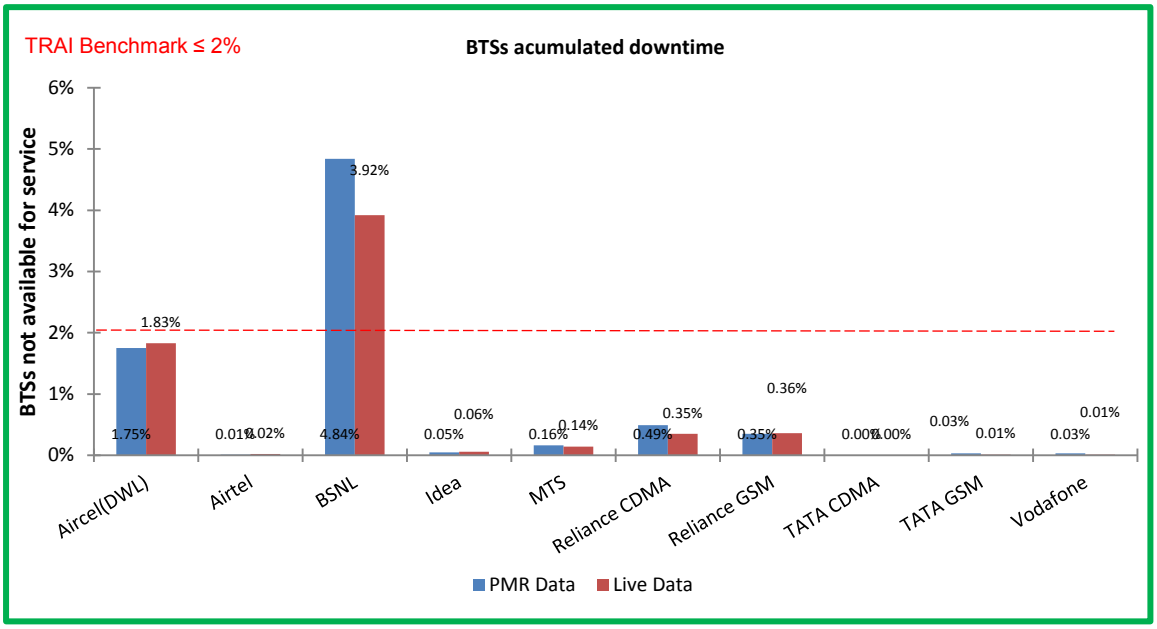
Data Source: Operations and Maintenance Center (OMC) of the operators

4.1.2.2 KEY FINDINGS – MONTH 2



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

4.1.2.3 KEY FINDINGS – MONTH 3



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

4.2 WORST AFFECTED BTS DUE TO DOWNTIME

4.2.1 PARAMETER DESCRIPTION

1. **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.

2. **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

3. **TRAI Benchmark –**

   a. Worst affected BTSs due to downtime ≤ 2%

4. **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.

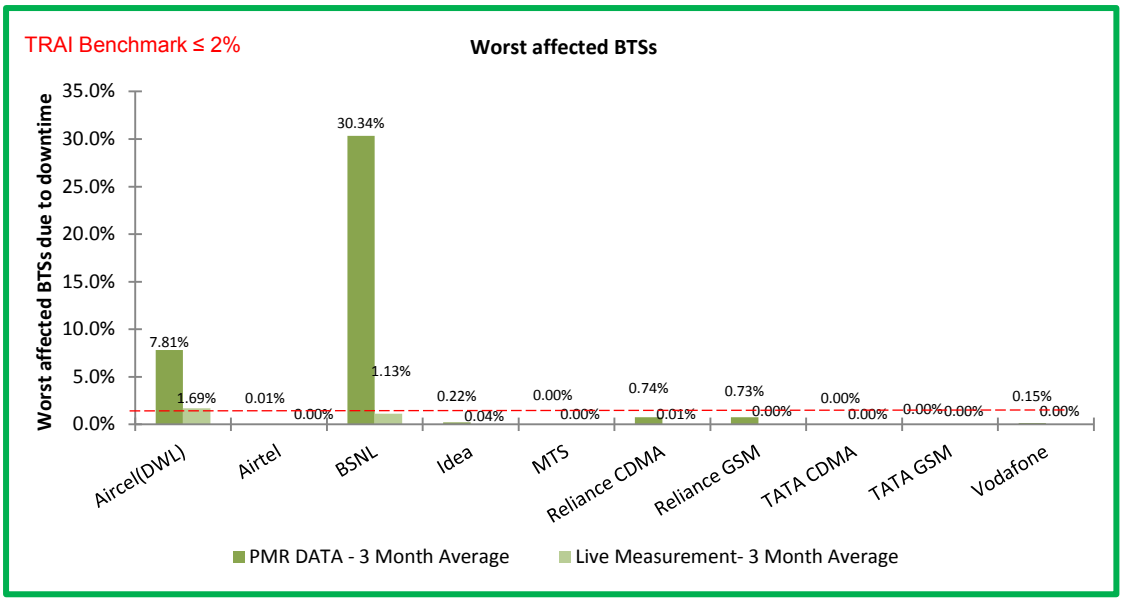
   iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

   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.

4.2.2 KEY FINDINGS

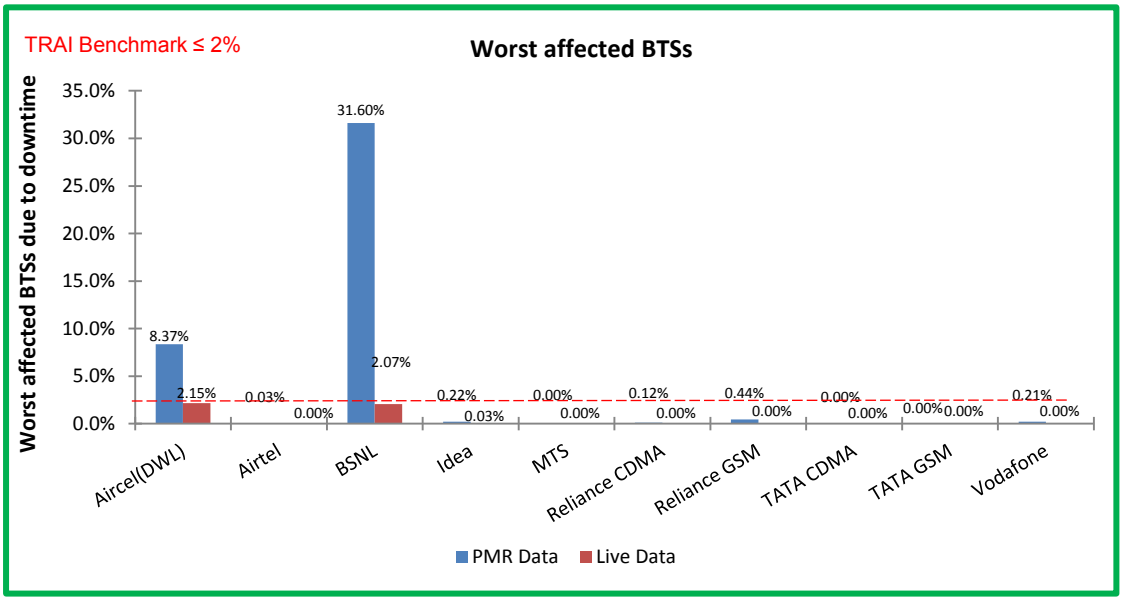


Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel and BSNL failed to meet the benchmark for the parameter.

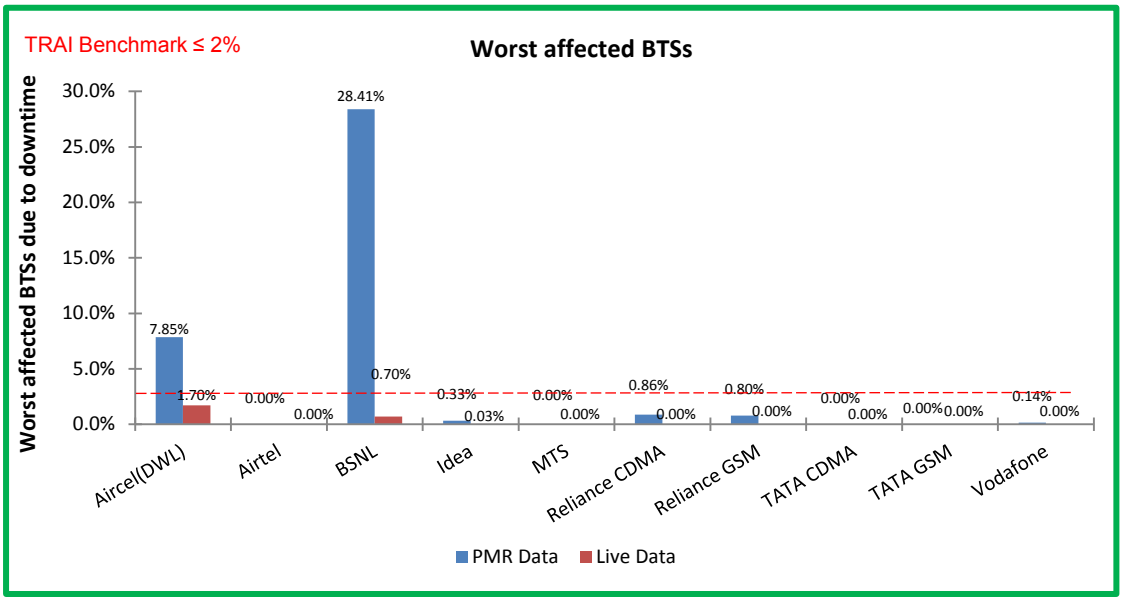
Significant difference was observed between PMR & live measurement data for BSNL and Aircel. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

4.2.2.1 KEY FINDINGS – MONTH 1



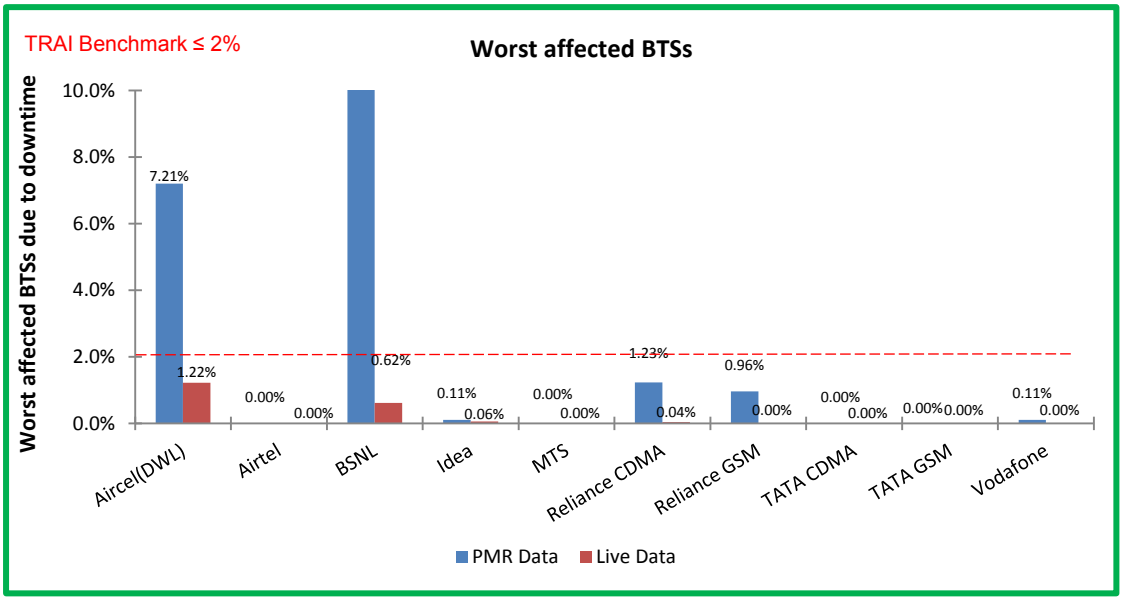
Data Source: Operations and Maintenance Center (OMC) of the operators

4.2.2.2 KEY FINDINGS – MONTH 2



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

4.2.2.3 KEY FINDINGS – MONTH 3



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

4.3 CALL SET UP SUCCESS RATE

4.3.1 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

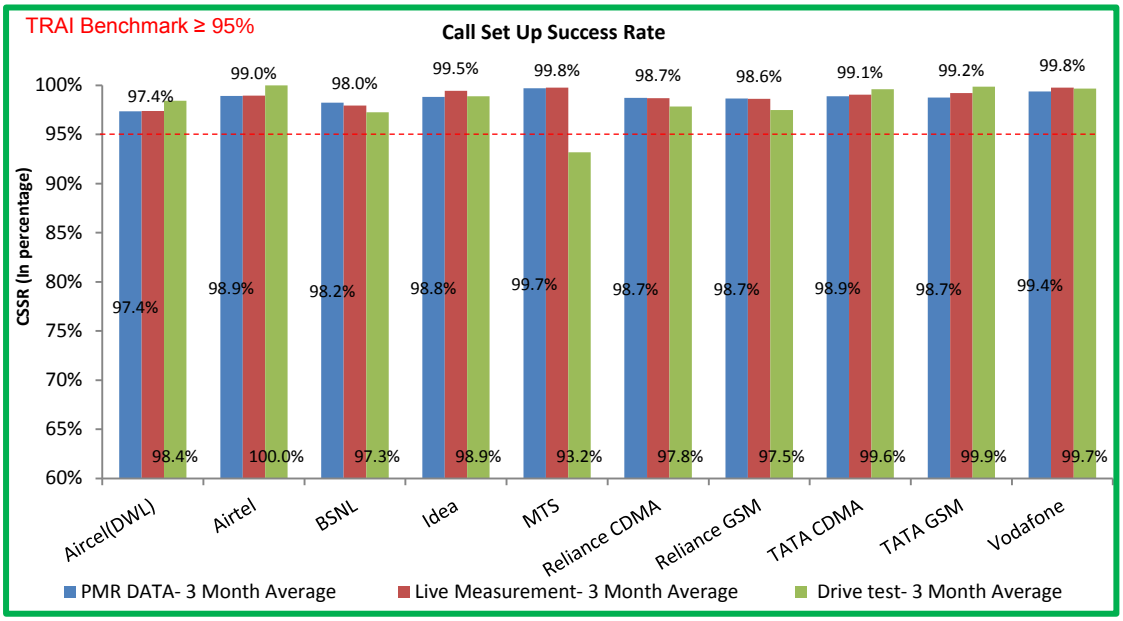
   Call Established means the following events have happened in call setup:-

   - 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.

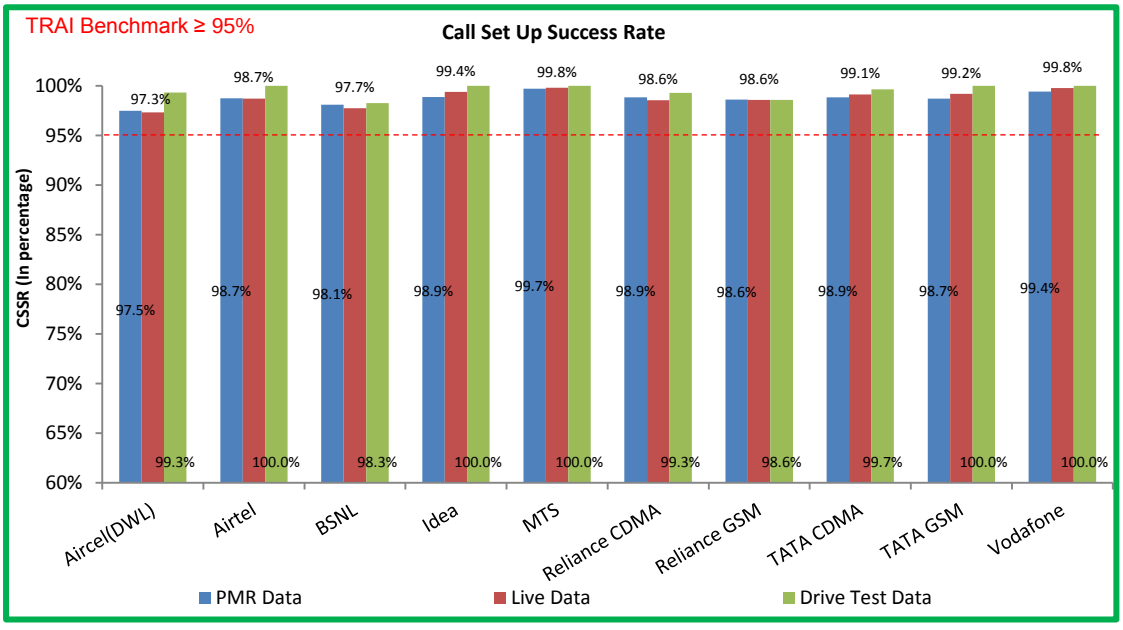
4.3.2 KEY FINDINGS



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

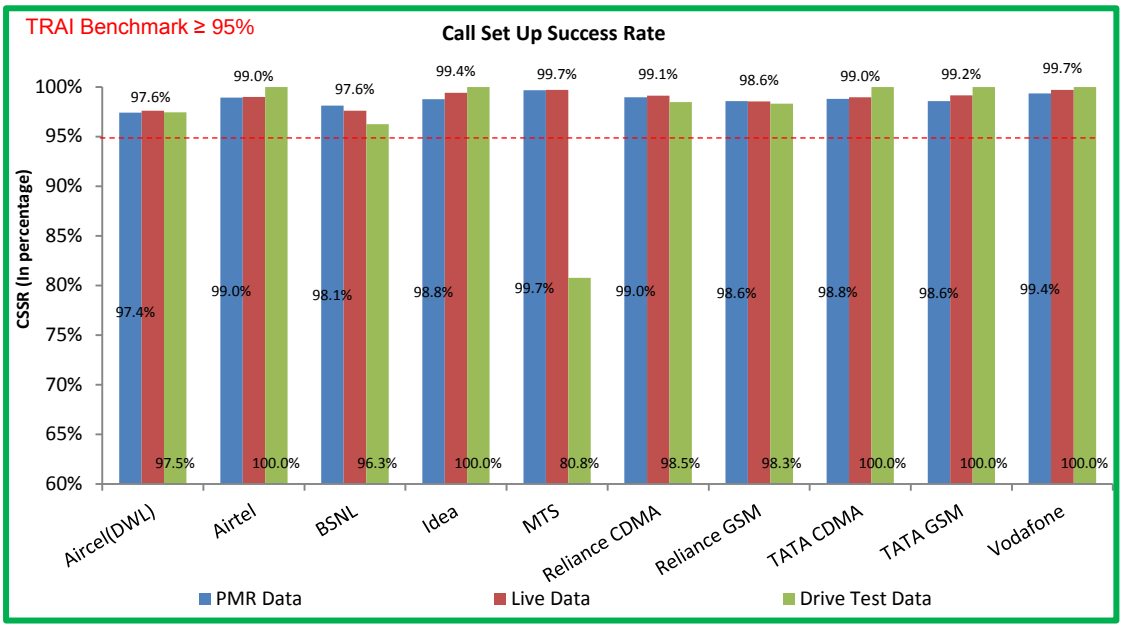
All operators met the TRAI specified benchmark as per audit data.

4.3.2.1 KEY FINDINGS – MONTH 1



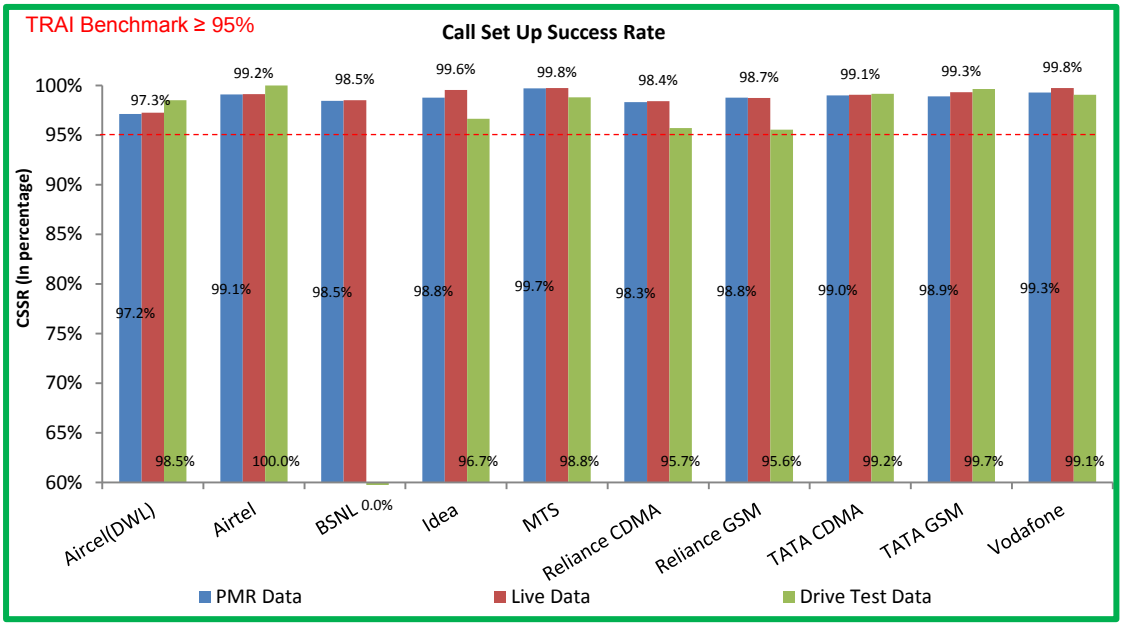
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

4.3.2.2 KEY FINDINGS – MONTH 2



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

4.3.2.3 KEY FINDINGS – MONTH 3



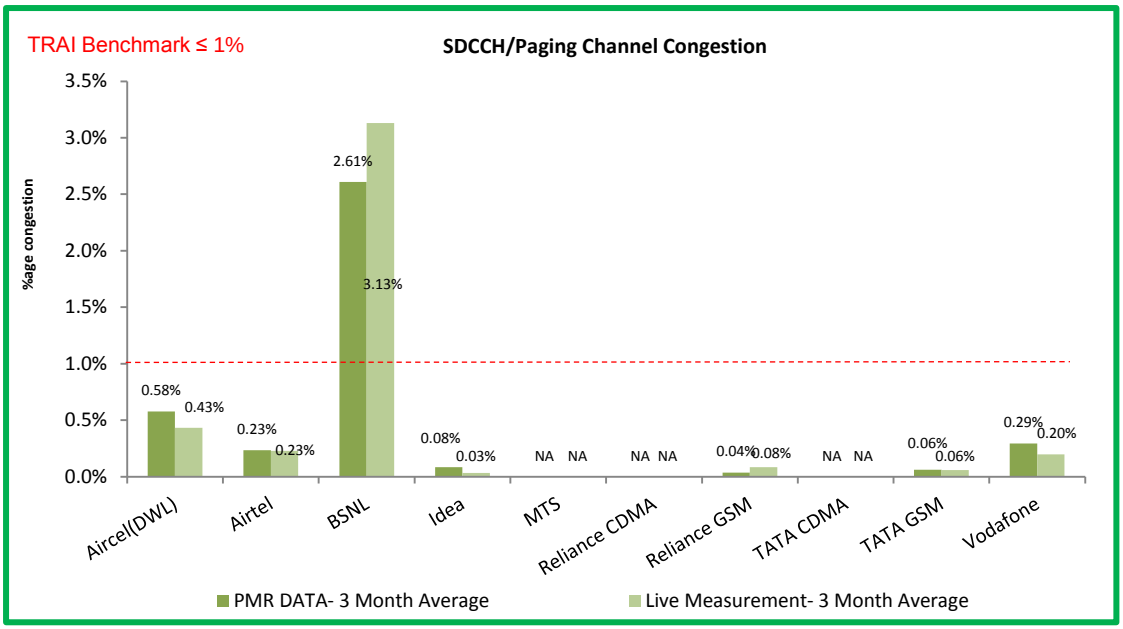
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

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

4.4.1 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

4.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION

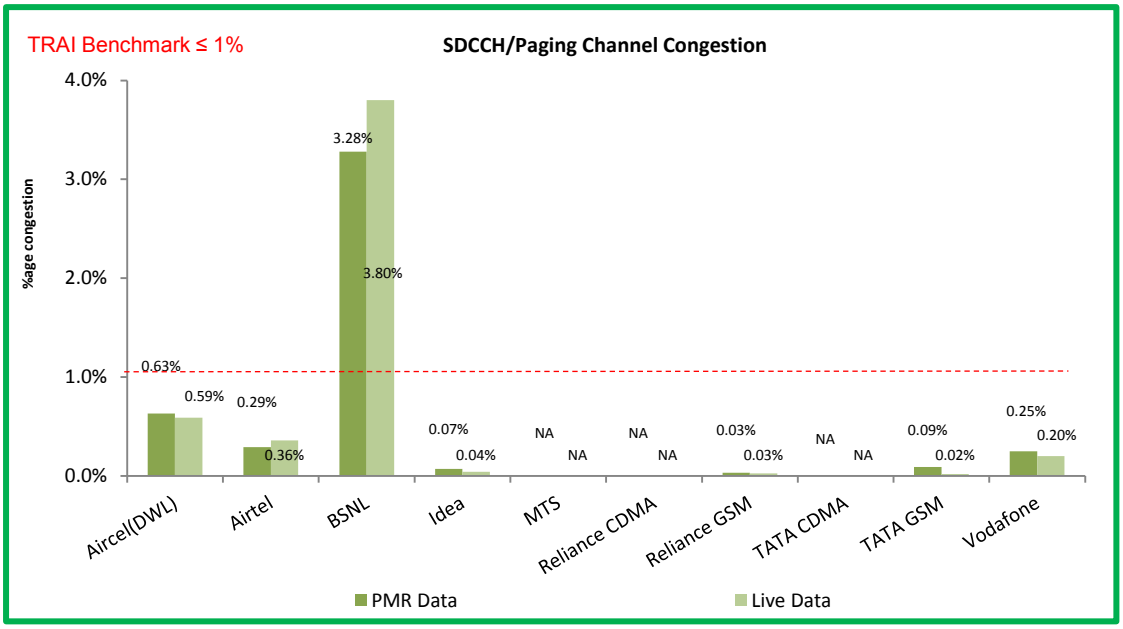


Data Source: Network Operations Center (NOC) of the operators

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

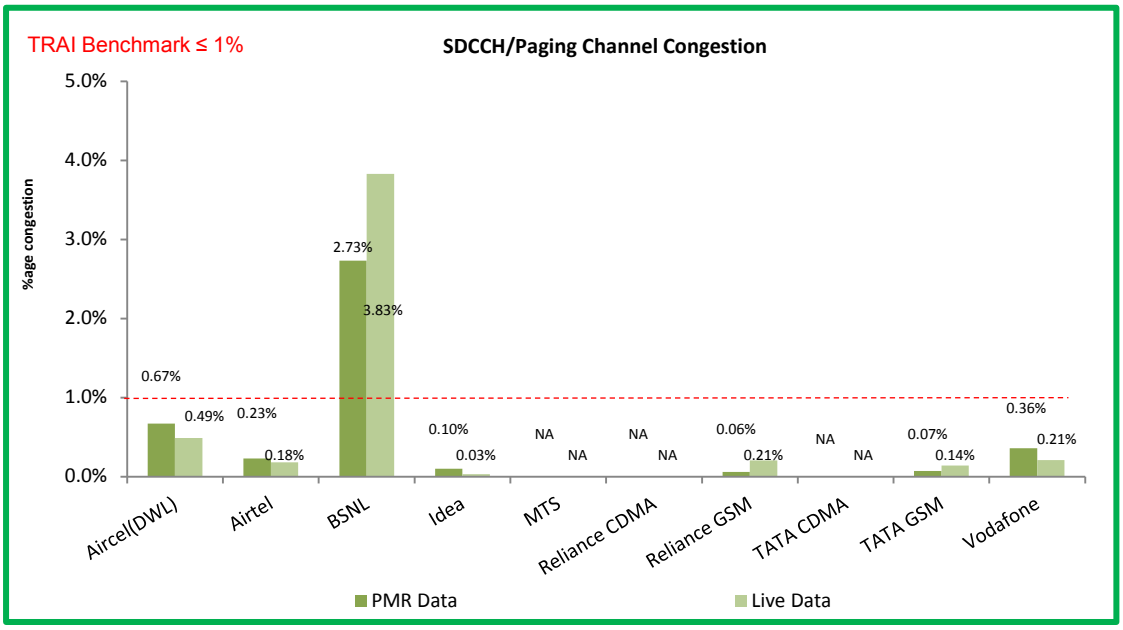
BSNL did not meet the benchmark while all the other operators met the benchmark as per audit.

4.4.2.1 KEY FINDINGS – MONTH 1



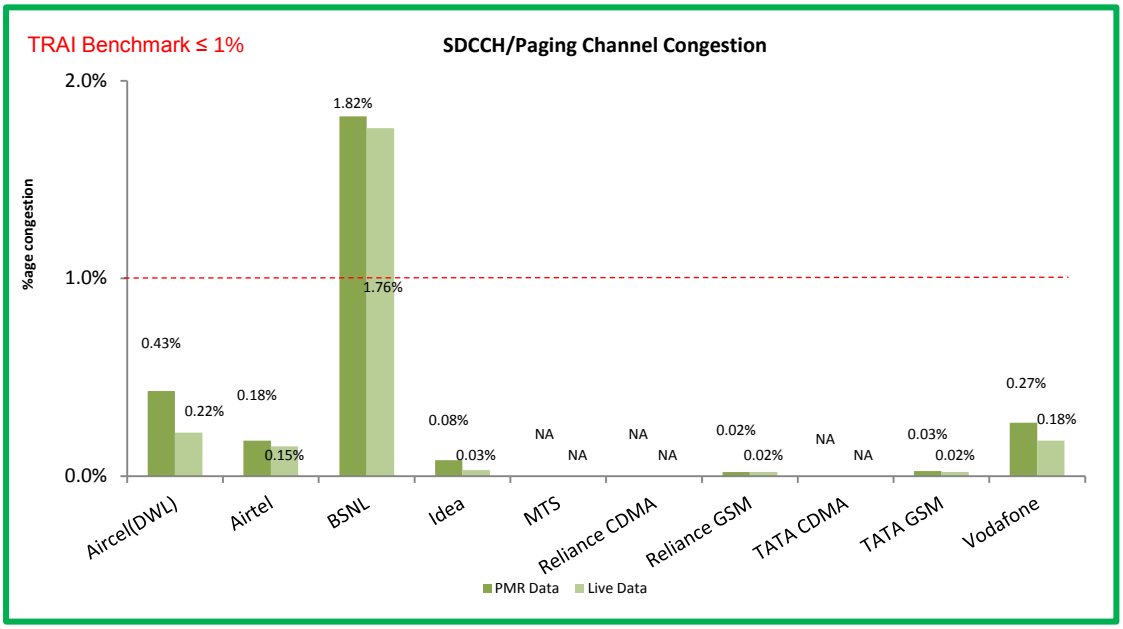
Data Source: Network Operations Center (NOC) of the operators

4.4.2.2 KEY FINDINGS – MONTH 2



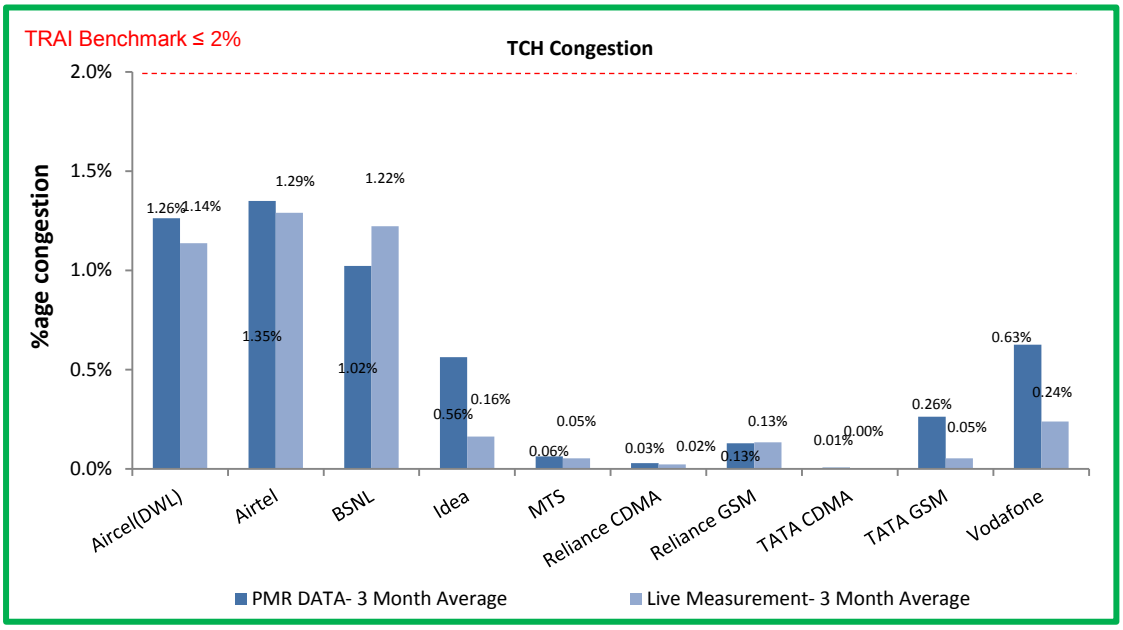
Data Source: Network Operations Center (NOC) of the operators

4.4.2.3 KEY FINDINGS – MONTH 3



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

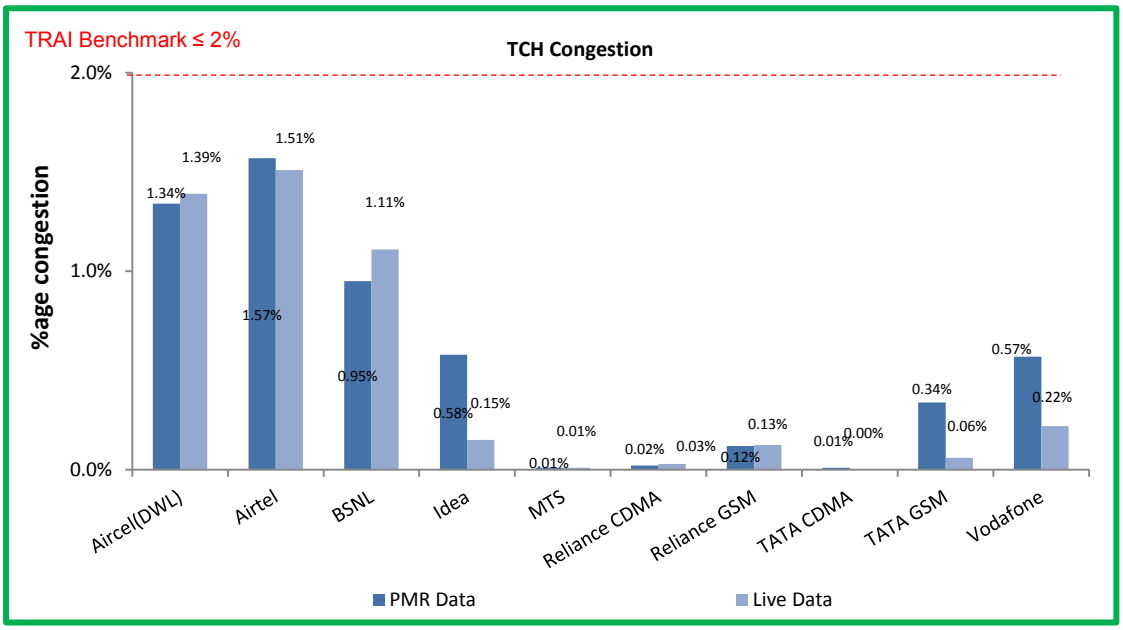
4.4.3 KEY FINDINGS – TCH CONGESTION



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

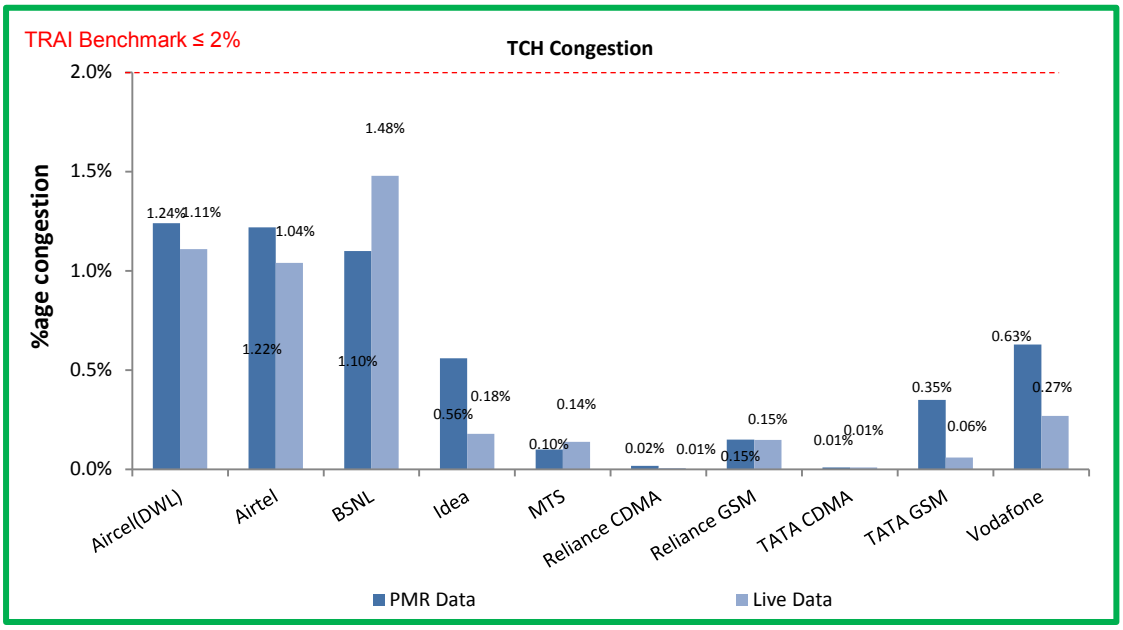
For TCH congestion, all operators met the TRAI benchmark.

4.4.3.1 KEY FINDINGS – MONTH 1



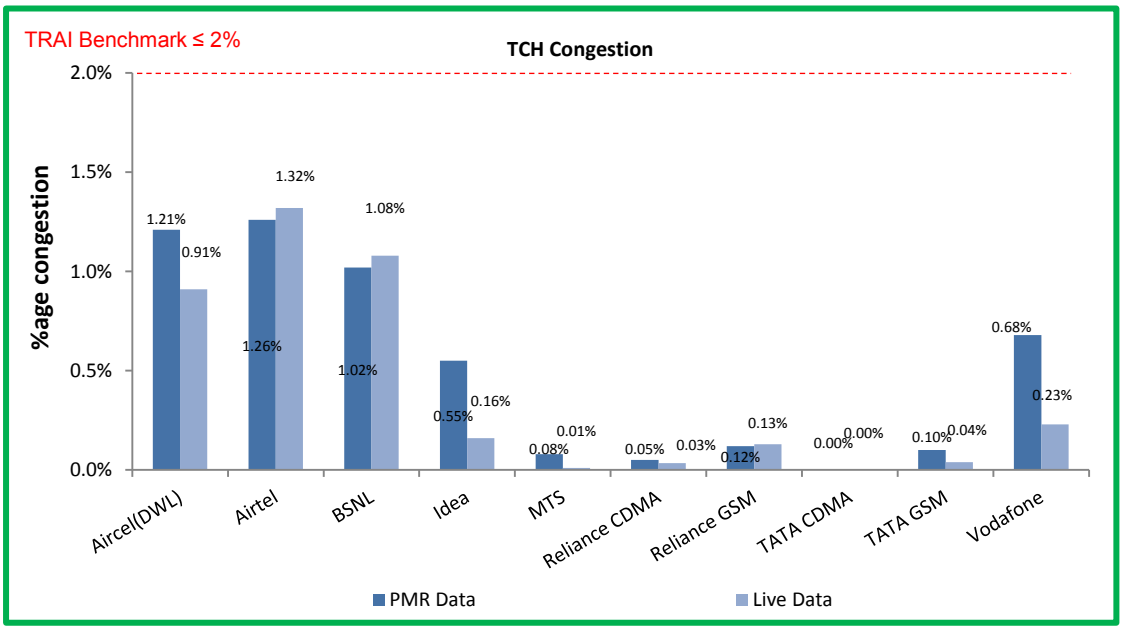
Data Source: Network Operations Center (NOC) of the operators

4.4.3.2 KEY FINDINGS – MONTH 2



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

4.4.3.3 KEY FINDINGS – MONTH 3



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

4.4.4 KEY FINDINGS – POI CONGESTION

Audit Results for POI Congestion-Consolidated											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Average number of working POIs		59	37	75	108	37	21	46	63	20	45
Average No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Average Capacity of all POIs (A) - in erlangs		74307	138480	91478	103797	55994	7831	37086	12846	6127	332104
Average Traffic served for all POIs (B)- in erlangs		36987	80956	17152	61740	25443	2498	19303	2431	1571	184119
Average POI congestion	≤ 0.5%	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-Consolidated											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Average number of working POIs		59	37	75	108	36	21	46	60	21	44
Average No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Average Capacity of all POIs (A) - in erlangs		74191	413804	91271	103520	56125	7851	37316	12815	6324	333858
Average Traffic served for all POIs (B)- in erlangs		37478	215394	17077	61233	26271	2668	20277	2371	1585	177035
Average POI congestion	≤ 0.5%	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 the operators met the benchmark of POI congestion as per audit data.

4.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	76	108	36	21	46	65	19	45
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		74770	136655	92210	104204	55930	7651	36626	13319	5901	330951
Traffic served for all POIs (B)- in erlangs		34661	79968	16451	60214	25947	2436	19118	2803	1557	178290
POI congestion	≤ 0.5%	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-October											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	76	108	36	21	46	60	20	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		72944	411343	92036	103570	56275	7851	37316	13320	5999	331135
Traffic served for all POIs (B)- in erlangs		36084	222948	17065	59990	26065	2904	20731	3073	1590	172570
POI congestion	≤ 0.5%	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

4.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-November											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		60	37	74	107	37	21	46	65	21	45
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		74076	137065	91292	103173	56027	7921	37316	13055	6135	331480
Traffic served for all POIs (B)- in erlangs		38150	83176	17948	62117	25467	2582	19798	2353	1631	198269
POI congestion	≤ 0.5%	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(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	74	107	36	21	46	60	21	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		74522	409693	90827	102843	56071	7851	37316	12962	6628	330840
Traffic served for all POIs (B)- in erlangs		38211	211031	16895	61397	26880	2544	21280	2134	1689	175947
POI congestion	≤ 0.5%	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

4.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	74	108	37	21	46	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		74076	141720	90932	104013	56026	7921	37316	12164	6345	333882
Traffic served for all POIs (B)- in erlangs		38150	79725	17057	62888	24915	2476	18993	2136	1524	175799
POI congestion	≤ 0.5%	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(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	74	108	37	21	46	59	21	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		75107	420376	90951	104147	56027	7851	37316	12164	6345	339598
Traffic served for all POIs (B)- in erlangs		38138	212203	17271	62311	25867	2555	18821	1906	1476	182587
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

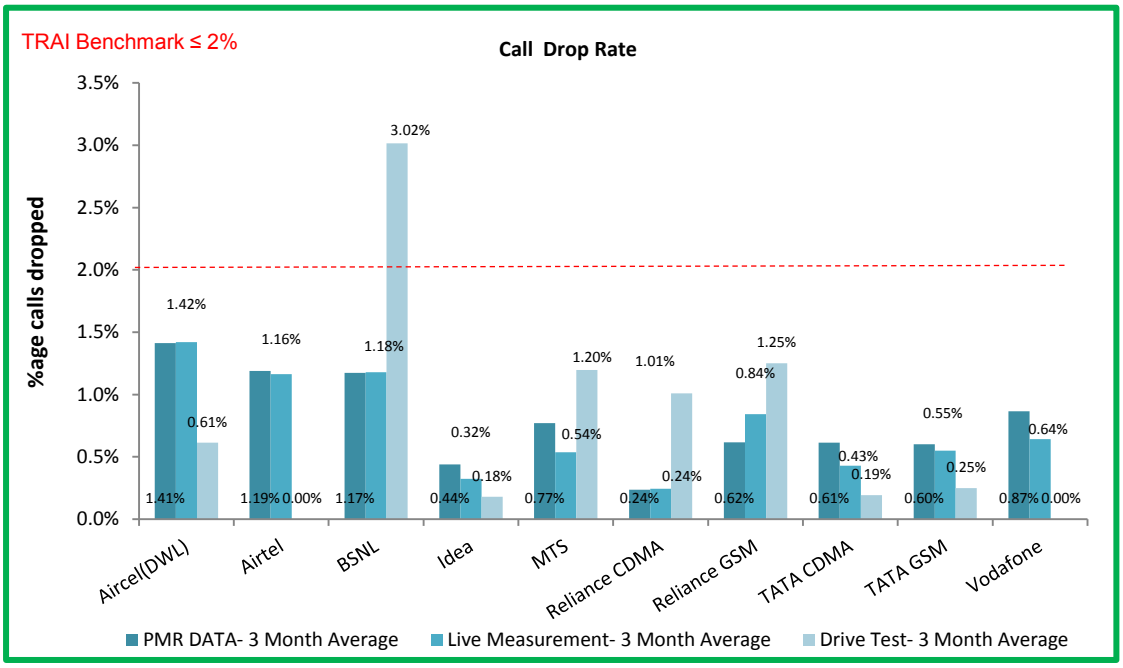
Data Source: Network Operations Center (NOC) of the operators

4.5 CALL DROP RATE

4.5.1 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.

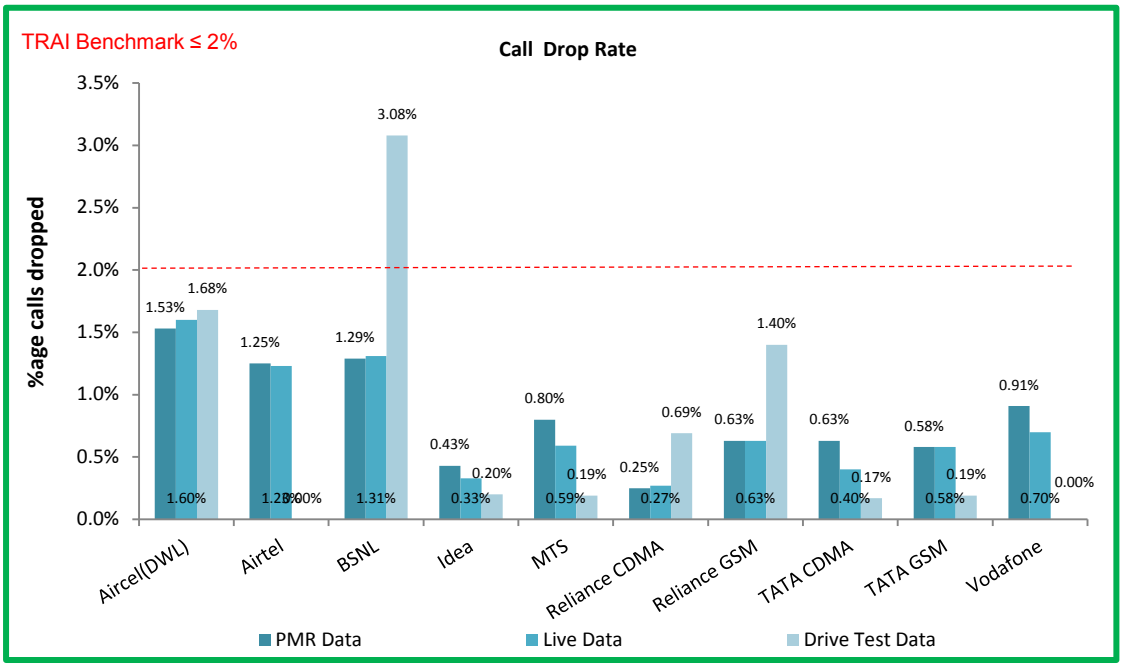
4.5.2 KEY FINDINGS



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

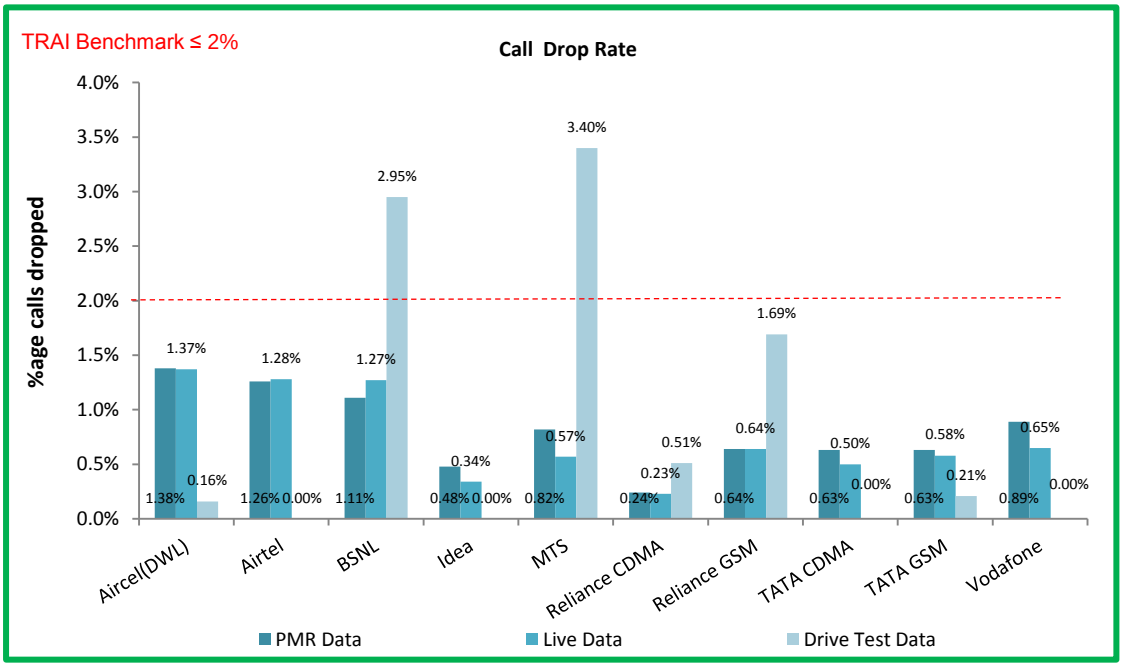
All operators met the benchmark during audit. BSNL showed high call drop rate during drive tests.

4.5.2.1 KEY FINDINGS – MONTH 1



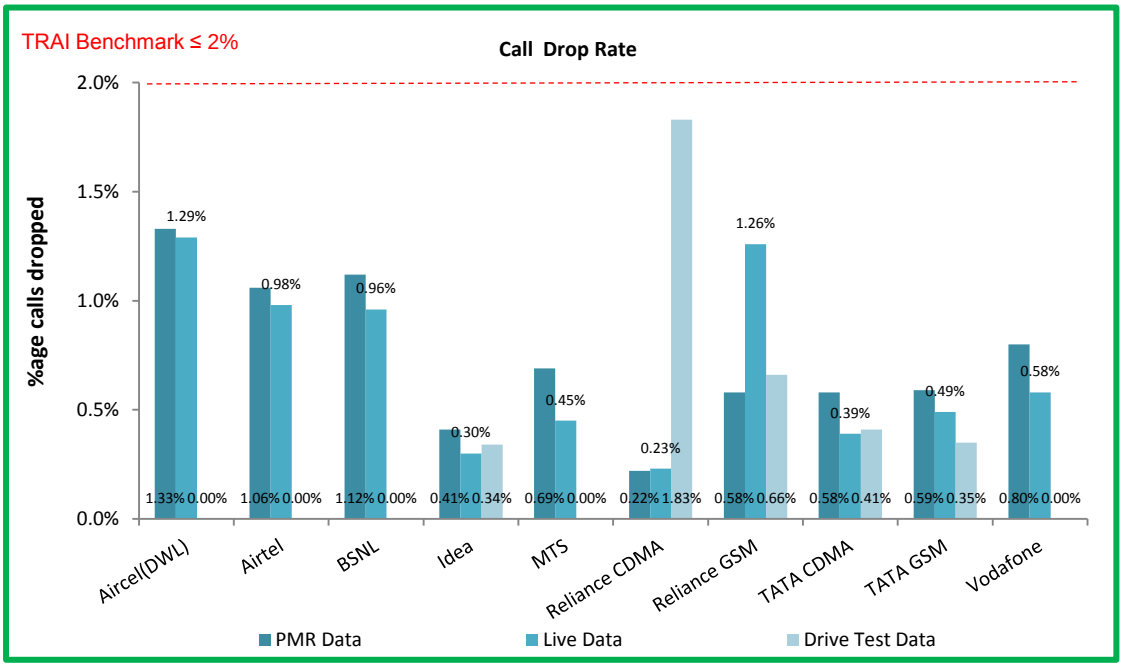
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

4.5.2.2 KEY FINDINGS – MONTH 2



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

4.5.2.3 KEY FINDINGS – MONTH 3



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

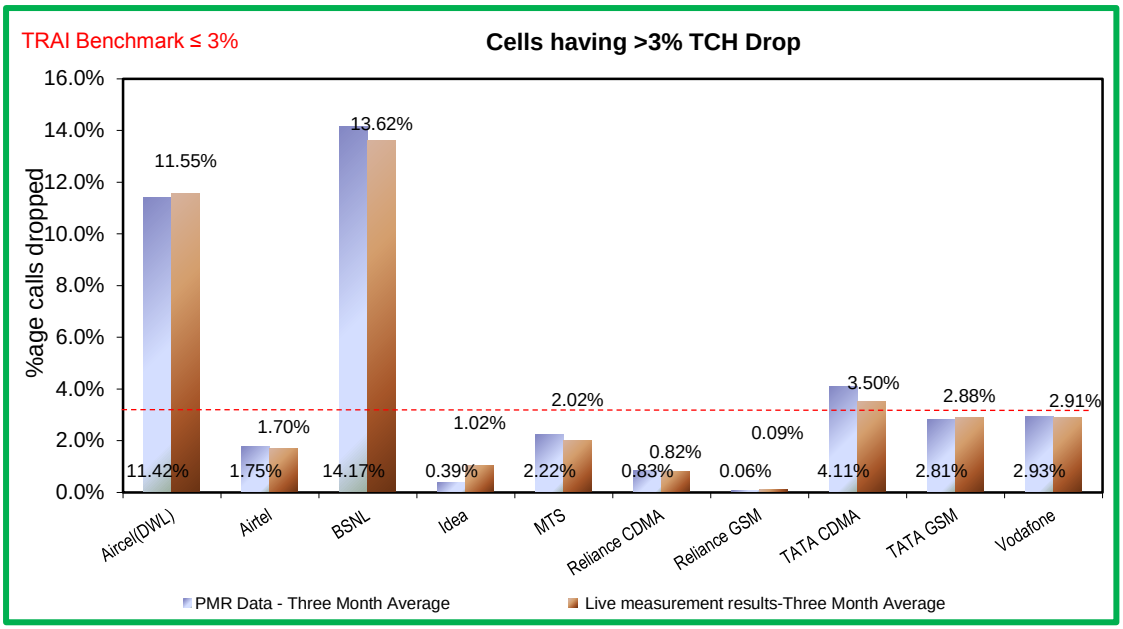
4.6 CELLS HAVING GREATER THAN 3% TCH DROP

4.6.1 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.

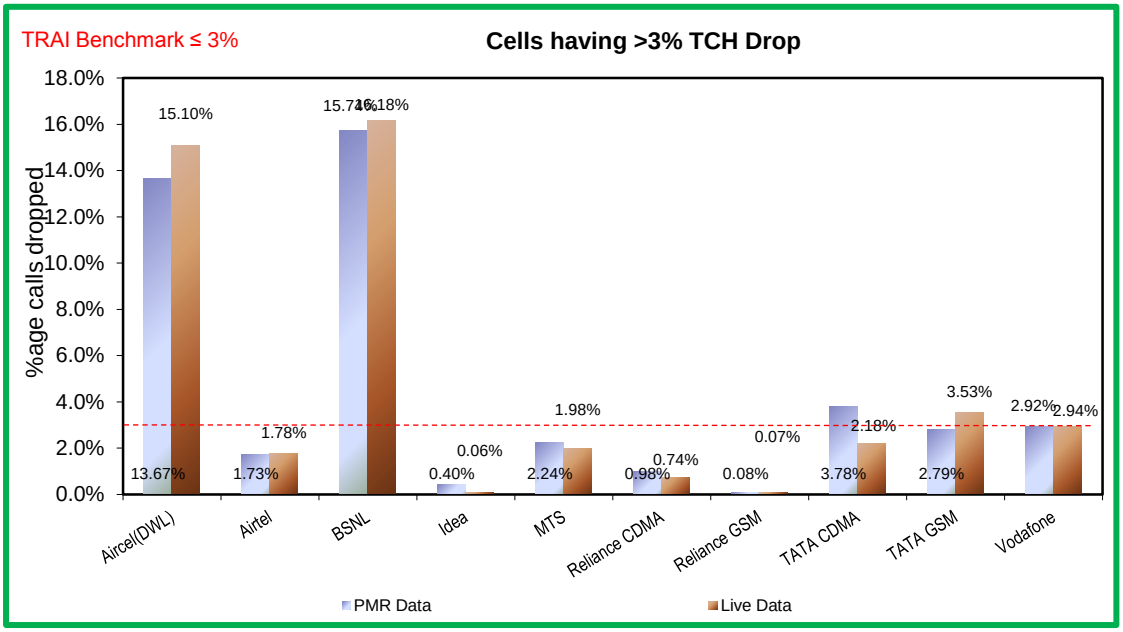
4.6.2 KEY FINDINGS



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

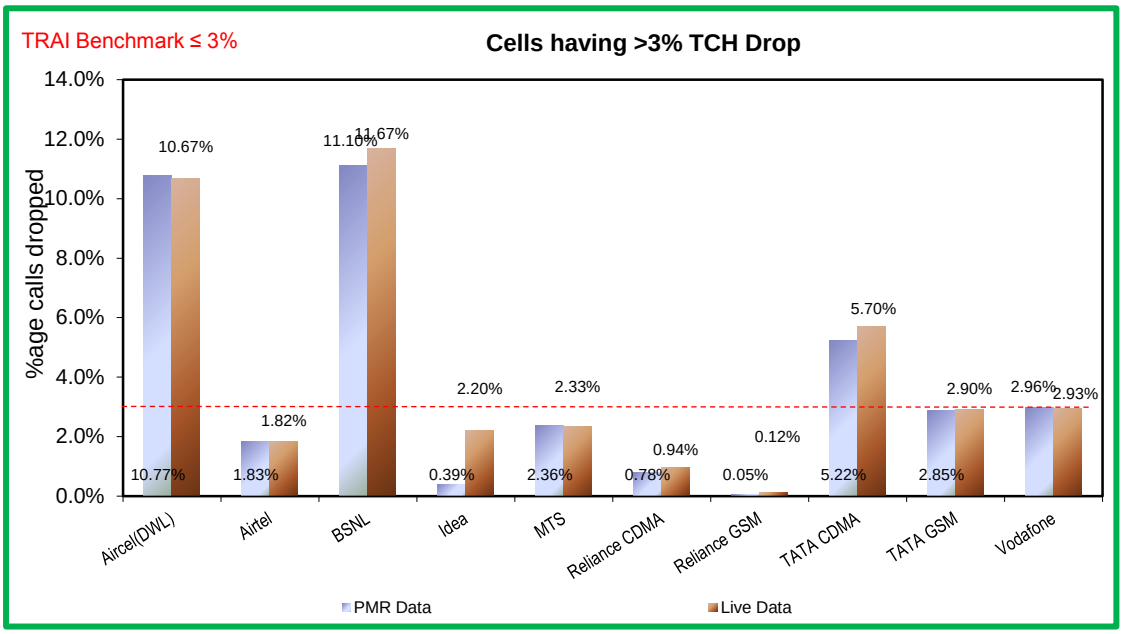
Aircel, BSNL and Tata CDMA failed to meet the benchmark for the parameter during audit.

4.6.2.1 KEY FINDINGS – MONTH 1



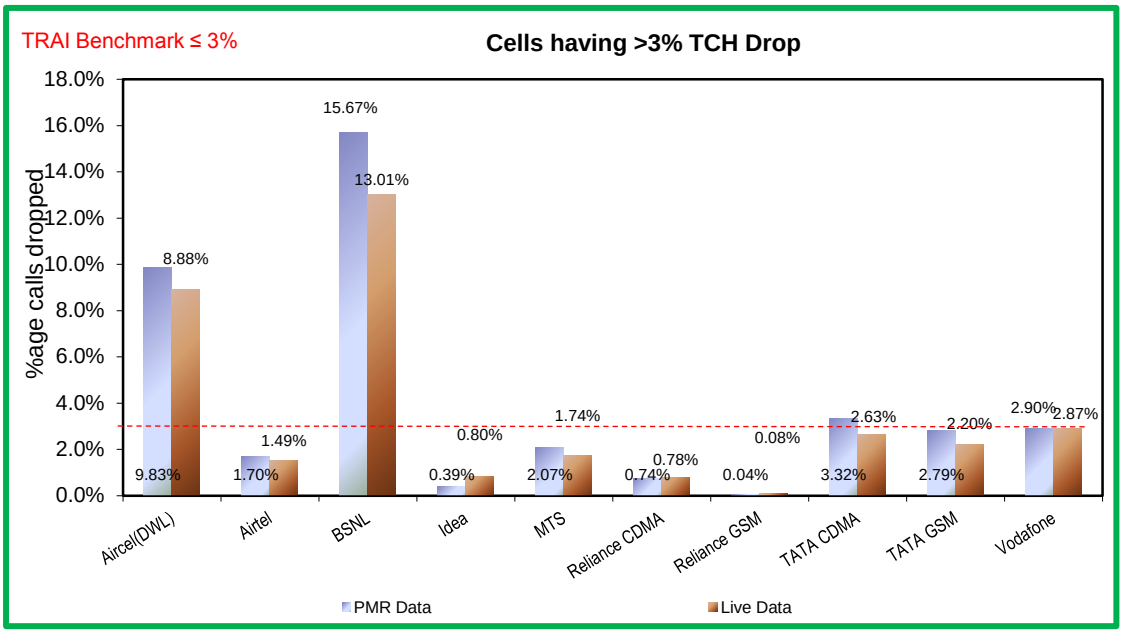
Data Source: Network Operations Center (NOC) of the operators

4.6.2.2 KEY FINDINGS – MONTH 2



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

4.6.2.3 KEY FINDINGS – MONTH 3



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

4.7 VOICE QUALITY

4.7.1 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**

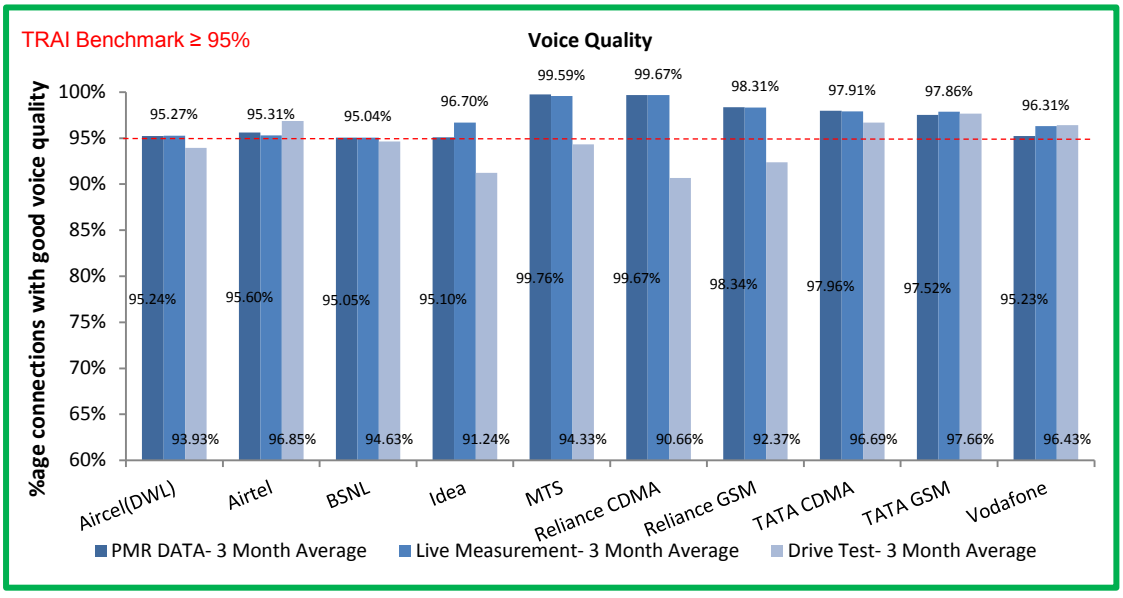
3. **TRAI Benchmark:** ≥ 95%

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.

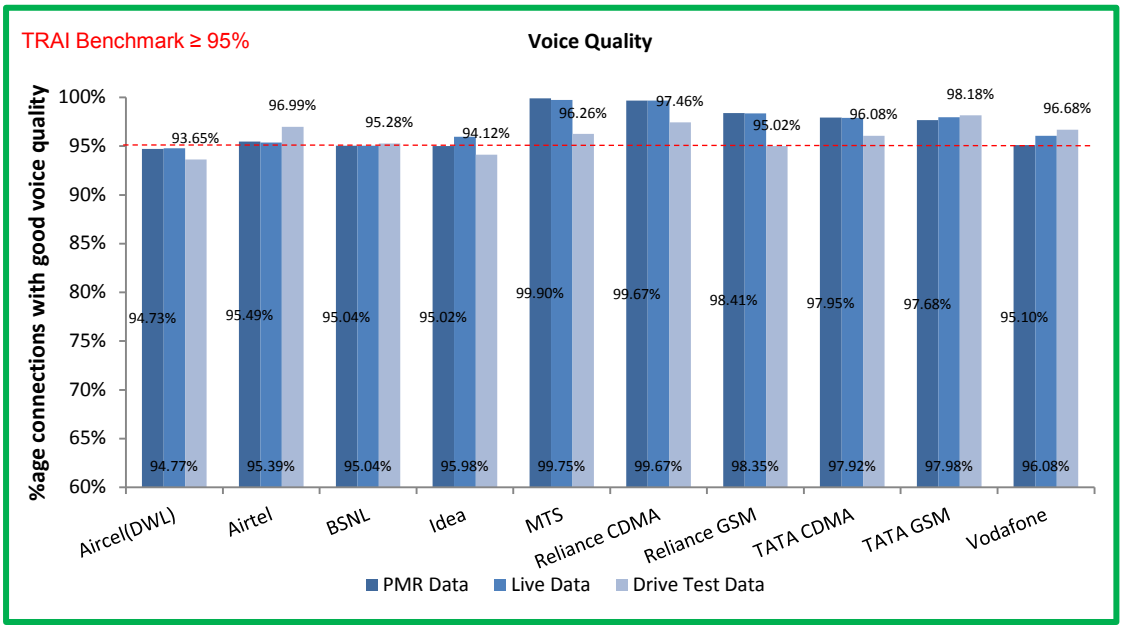
4.7.2 KEY FINDINGS



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

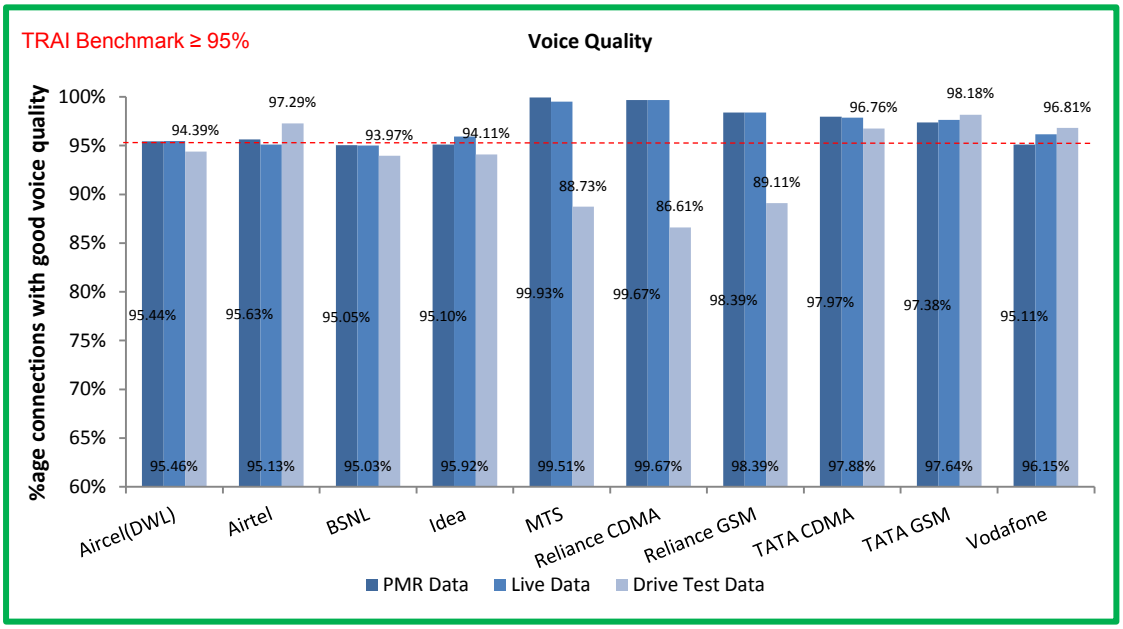
All operators met the benchmark for voice quality during the audit.

4.7.2.1 KEY FINDINGS – MONTH 1



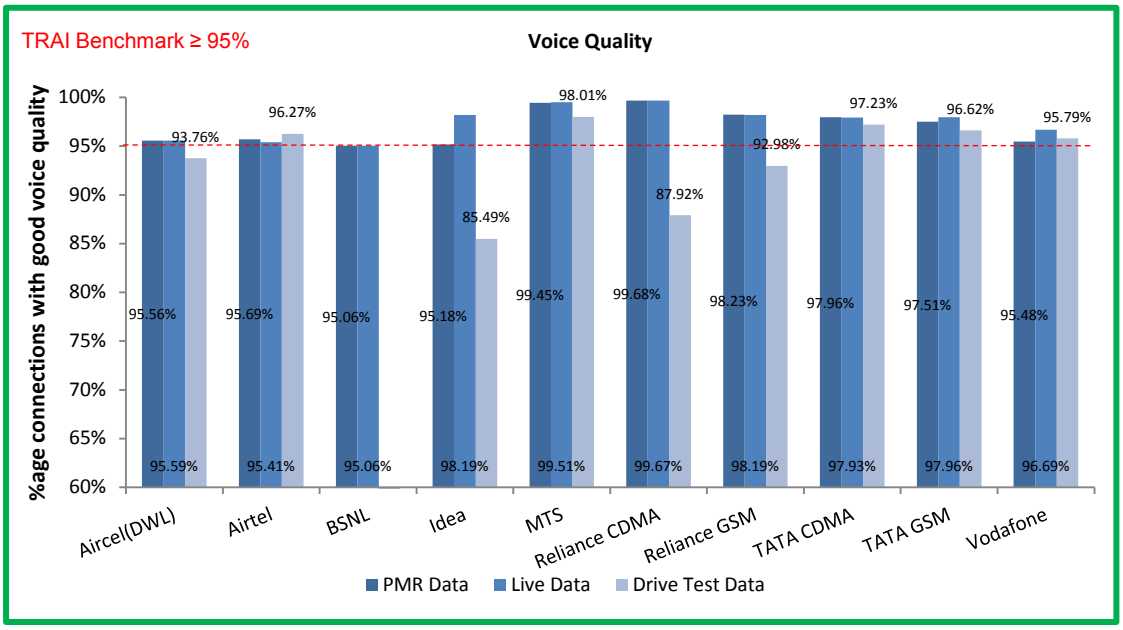
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

4.7.2.2 KEY FINDINGS – MONTH 2



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

4.7.2.3 KEY FINDINGS – MONTH 3



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

5 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

5.1 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.

5.1.1 PARAMETER DESCRIPTION

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

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

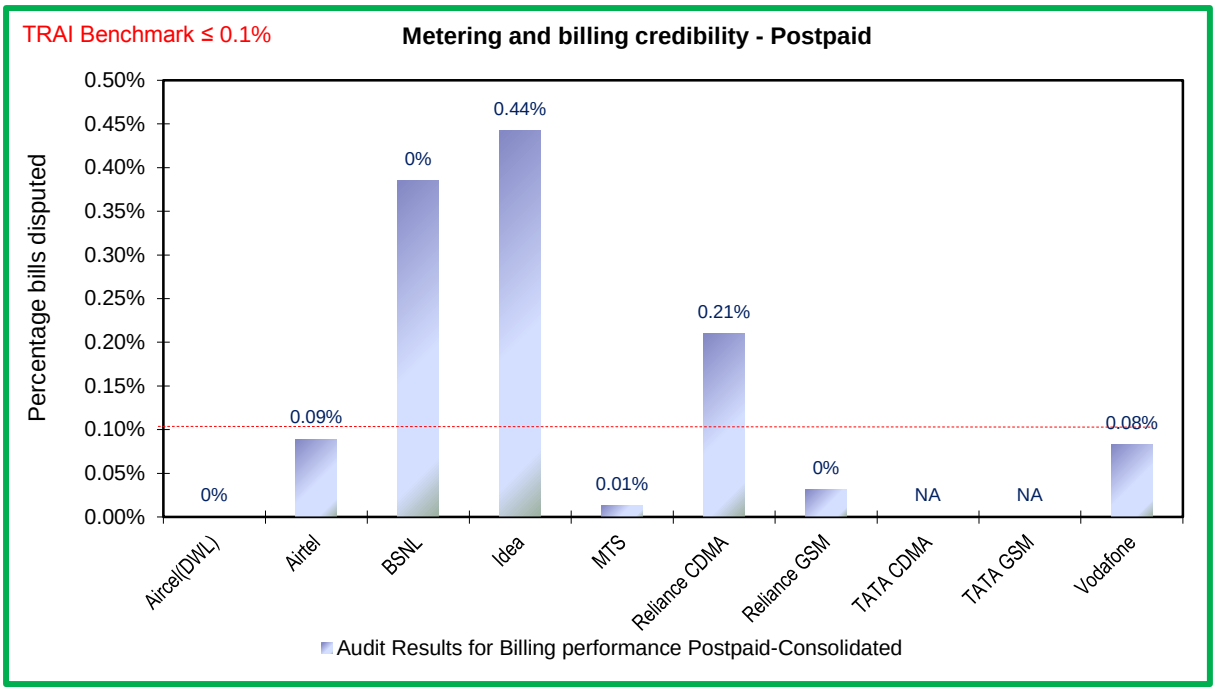
In addition to the above, any billing complaint which leads to billing error, waiver, refund, credit, or any adjustment is also considered as valid billing complaint for calculating the number of disputed bills.

- Computational Methodology:
  - **Metering and billing credibility (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 may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.
- **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

- 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.

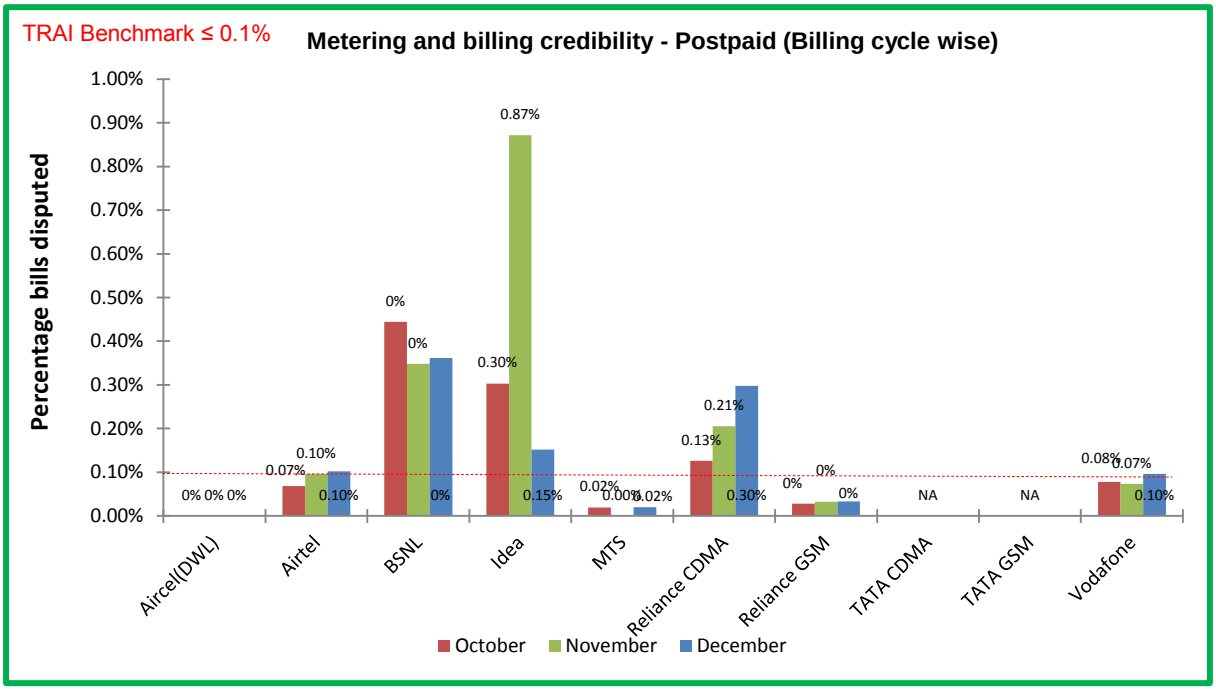
5.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



Data Source: Billing Center of the operators

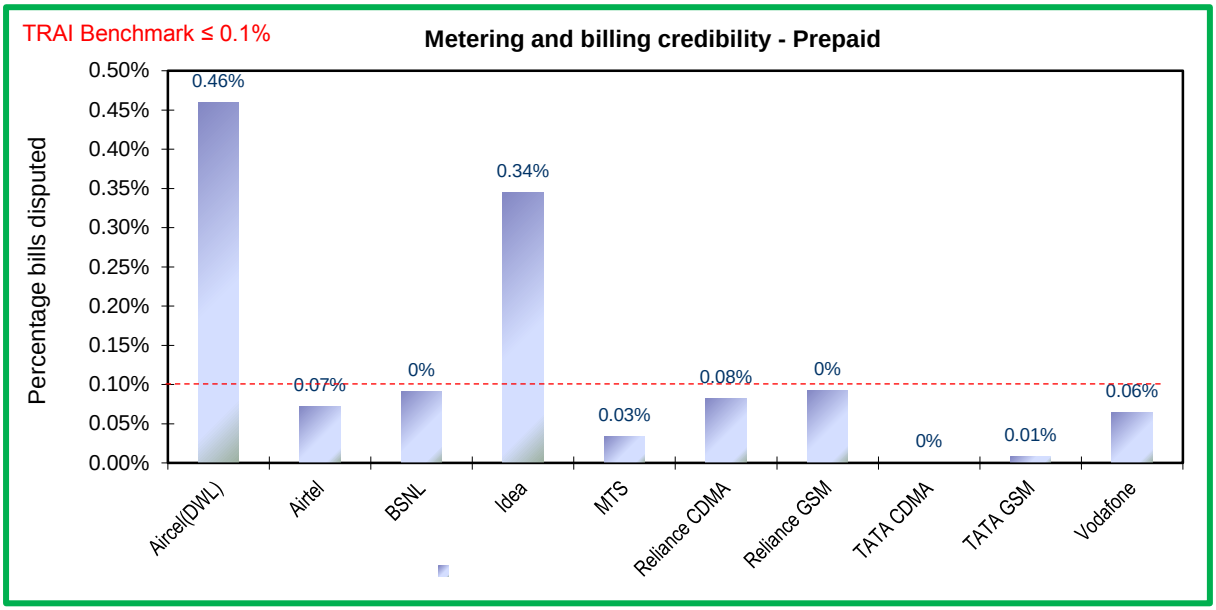
For the postpaid customers, BSNL, Idea and Reliance CDMA failed to meet the TRAI benchmark.

NA: Tata CDMA and Tata GSM do not have postpaid service in West Bengal.



Data Source: Billing Center of the operators

5.1.3 KEY FINDINGS – METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

For the prepaid customers, Aircel and Idea failed to meet the TRAI benchmark.

5.2 RESOLUTION OF BILLING COMPLAINTS

5.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

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

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

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

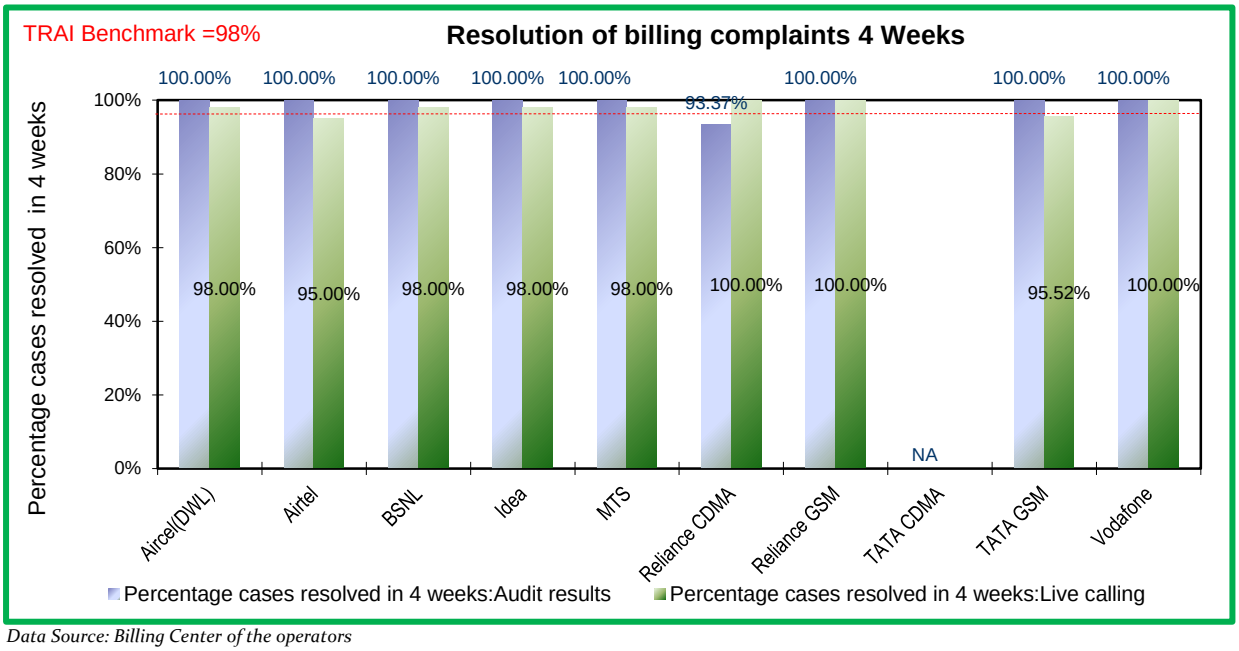
$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

- **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally. Complaints raised by the consumers to operator are only considered as part of the calculation.

- *** 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.

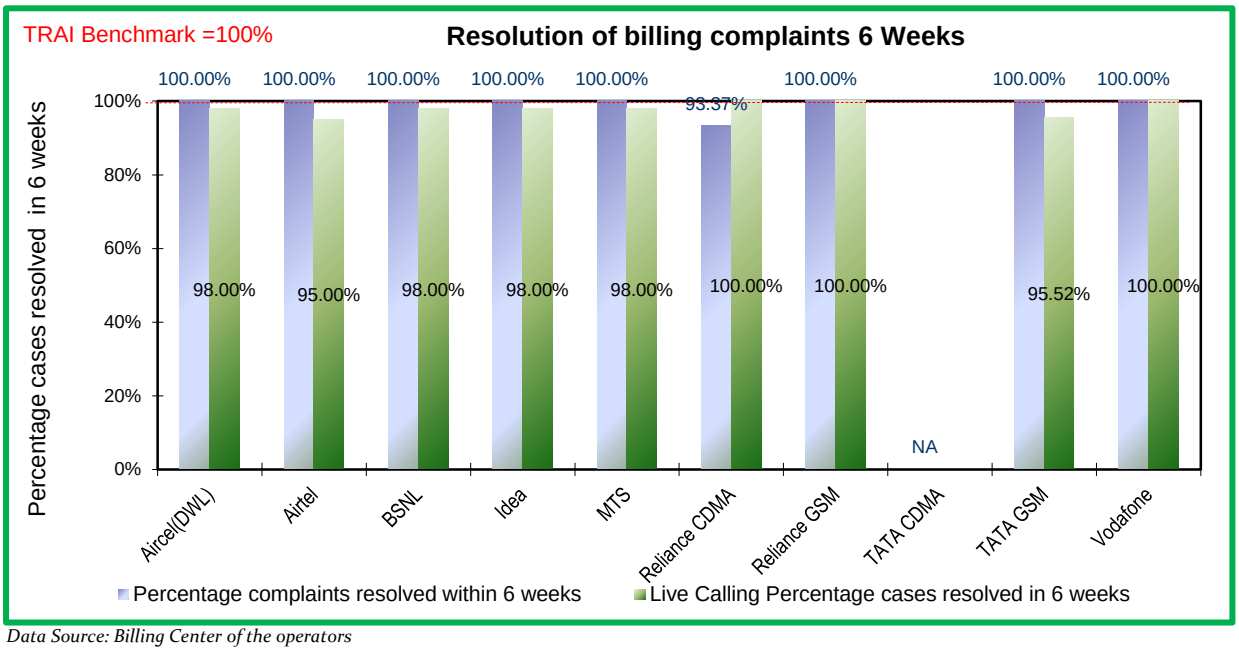
Benchmark: 98% complaints resolved within 4 weeks, 100% within 6 weeks.

5.2.2 KEY FINDINGS 4 WEEKS



Data Source: Billing Center of the operators

5.2.3 KEY FINDINGS 6 WEEKS



Data Source: Billing Center of the operators

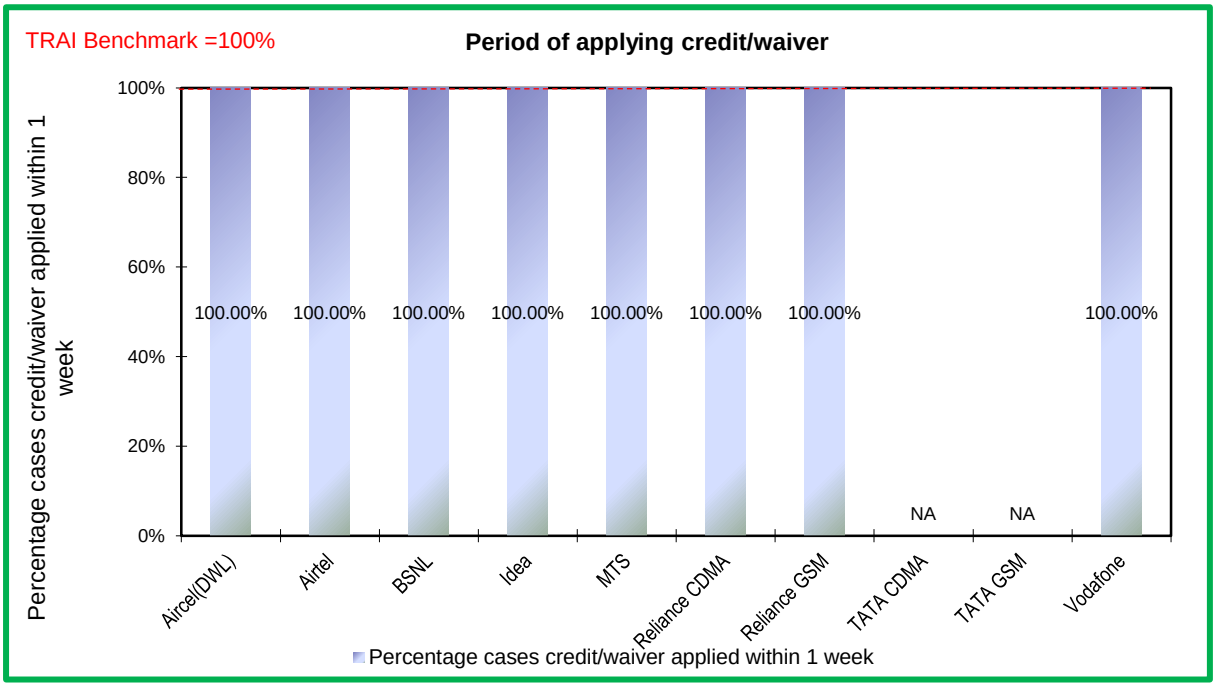
Reliance CDMA failed to meet the TRAI benchmark for resolving billing complaints within 4 weeks as well as within 6 weeks.

5.3 PERIOD OF APPLYING CREDIT/WAVIER

5.3.1 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

5.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

All operators met the benchmark for the parameter.

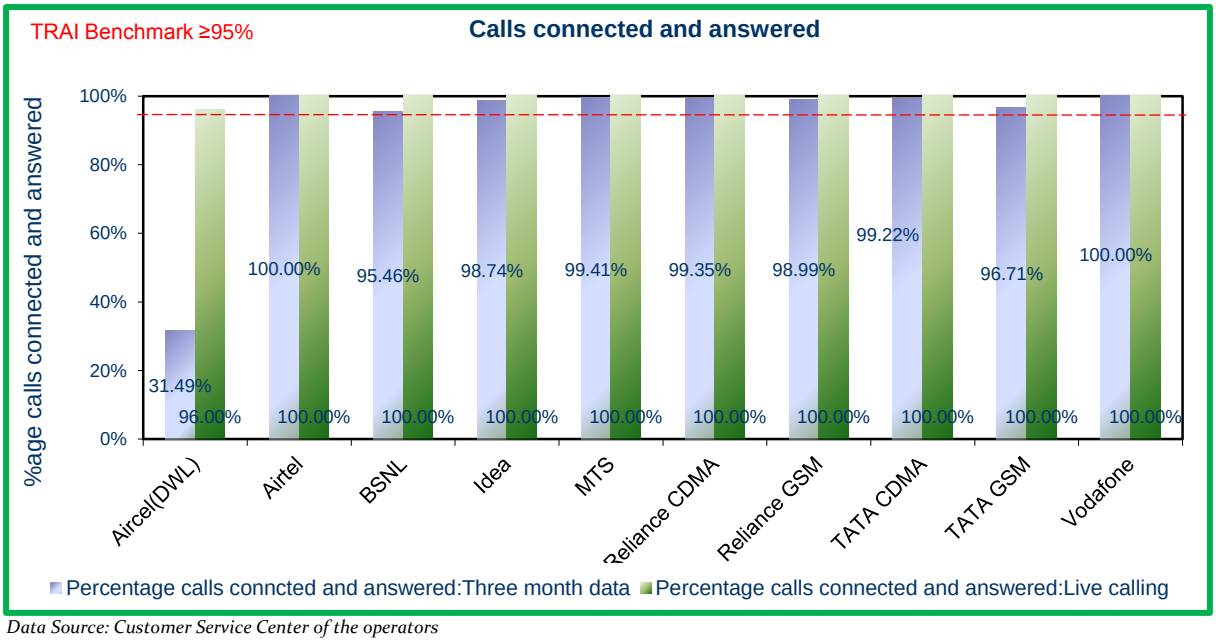
NA: Tata CDMA and Tata GSM do not have postpaid service in West Bengal.

5.4 CALL CENTRE PERFORMANCE-IVR

5.4.1 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

5.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Aircel, with only 31.49%, failed to meet the benchmark for calls answered by IVR as per audit data.

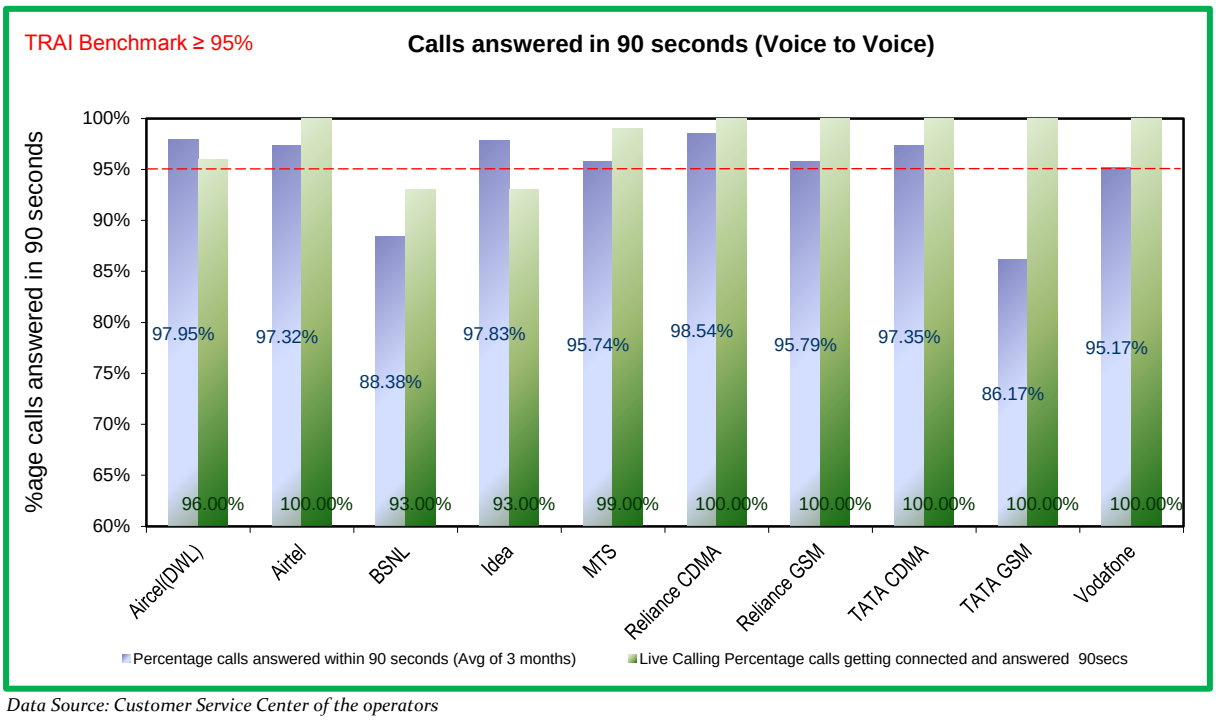
5.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

5.5.1 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

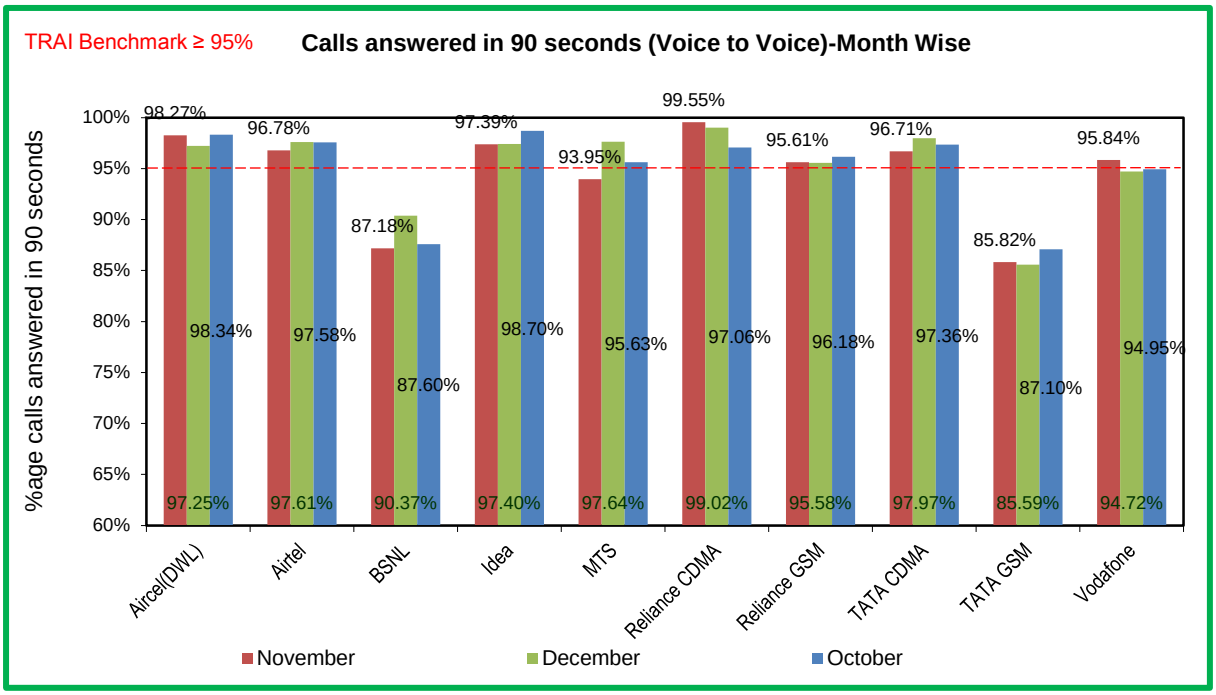
Benchmark: 95% calls to be answered within 90 seconds.

5.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

BSNL and Tata GSM failed to meet the benchmark of 95% calls (voice to voice) answered within 90 seconds by the call center operators.



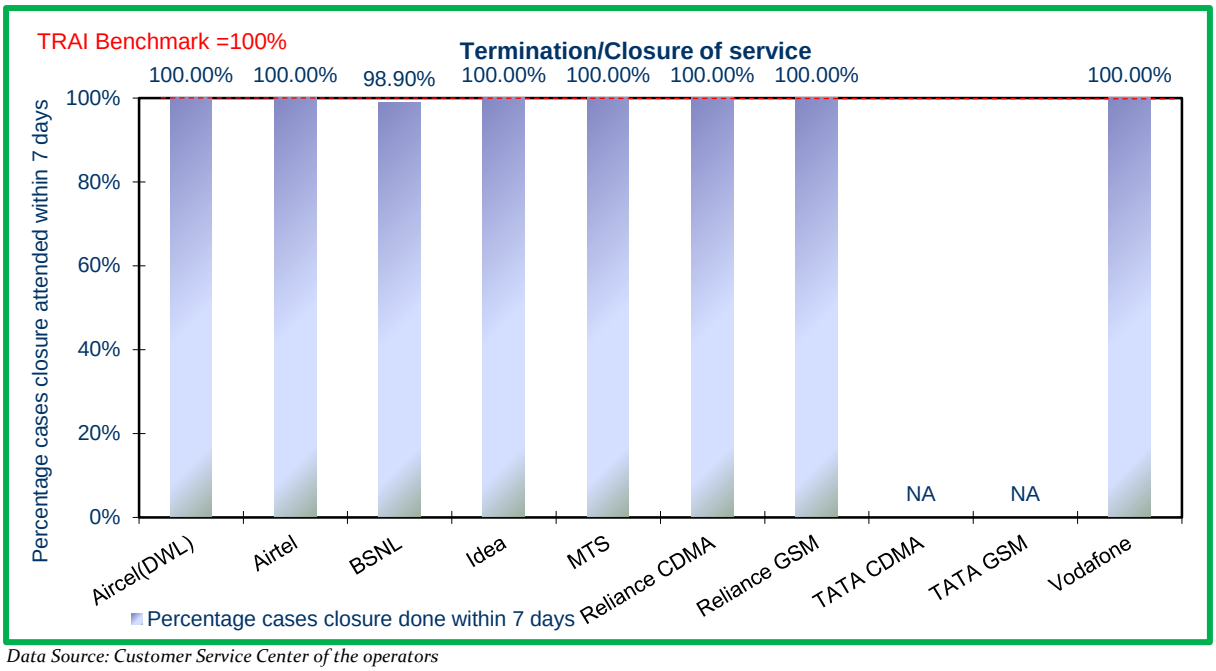
Data Source: Customer Service Center of the operators

5.6 TERMINATION/CLOSURE OF SERVICE

5.6.1 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

5.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the benchmark.

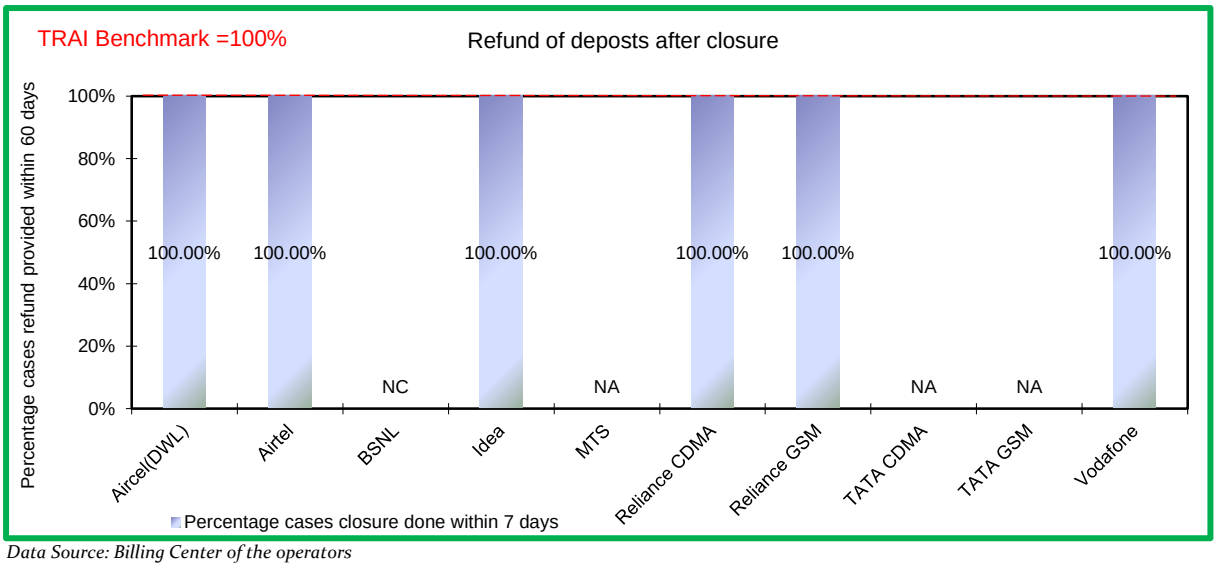
NA: Tata CDMA and Tata GSM do not have postpaid service in West Bengal.

5.7 REFUND OF DEPOSITS AFTER CLOSURE

5.7.1 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 relevant quarter

5.7.2 KEY FINDINGS



Data Source: Billing Center of the operators

All operators met the TRAI benchmark for the parameter.

NC: Auditors were not able to get customer service data from BSNL as the operator did not have the required data available at its central customer service center. Hence it has been reported as non-compliance (NC) for the operator.

NA: Tata CDMA and Tata GSM do not have postpaid service in West Bengal. None of the postpaid subscribers of MTS were eligible for refund.

6 DETAILED FINDINGS - DRIVE TEST DATA

6.1 OPERATOR ASSISTED DRIVE TEST

The drive test was conducted simultaneously for all the operators present in the West Bengal circle. As per the new directive given by TRAI headquarters, drive test for the month of October, November and December, 2014 were conducted at a SSA level. Drive test was conducted for three days in each SSA and the selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected on basis of the complaints received from the customers. IMRB auditors were present in vehicles of every operator. The holding period for all test calls was 120 seconds and the 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 > -75dbm for indoor, -85 dbm for in-vehicle and > -95 dbm outdoor routes.

Below is the schedule and operators involved in the drive test for the West Bengal circle-

Month	Name of SSA Covered	Date of Drive Test
October	Krishnanagar	20th to 22nd October 2014
November	Midnapur	26th to 28th Nov 2014
December	Darjeeling	18th to 20th Dec'14
December	Gangtok	22nd to 24th Dec'14

Name of Operator
Aircel(DWL)
Airtel
BSNL
Idea
MTS
Reliance CDMA
Reliance GSM
TATA CDMA
TATA GSM
Vodafone

6.1.1 OCTOBER - KRISHNANAGAR SSA

Month	Name of SSA Covered	Date of Drive Test
October	Krishnanagar	20th to 22nd October 2014

6.1.1.1 ROUTE DETAILS – KRISHNANAGAR SSA

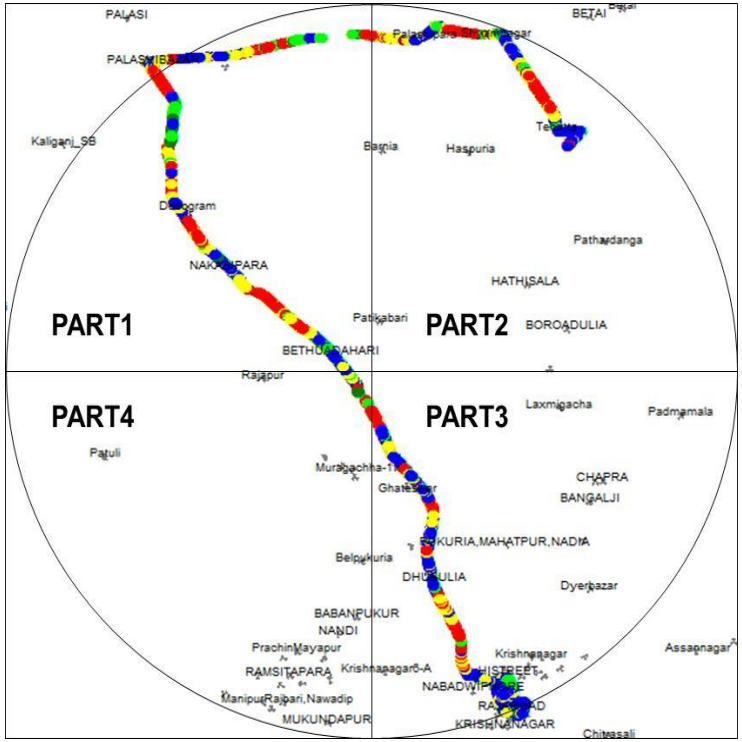
Category	Type of location	West Bengal-October Krishnanagar		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Krishnanagar Rly Stn., Chakar More, Bejikhuli, Bowbazar, Sani Mandir, Nadiapara, Bahadur Pur, NH-34, Kanthalia Math, Hasandanga, Dhubulia, Gabarkuli, Singhati, Gachha, Bholadanga, Bethuadahari, Sonadanga, Bikrampur, Nagadibazar, Debagram, Pagalachandi, Gobindapur, Mira, Palasi Bazar, Chandghar, Palashipara, Raghunathpur, Tehatta More, Shyamnagar, Tehatta		Krishnanagar Rly Stn., Nediarpara, Hospital More,Krishnanagar Bus stand, Ghurni, Pani nala, Ghoshpara, Tarukdaspur, Dohibazar, Shrinagar, Chapra, Hatra, Kotwali, Pondob More, Jatrapur, Chitrasali, Fulbari, Patrapara, Haskhali, Muragachha, Bagula, Haritala, Kaikhali,Tanga, Ulasi, Silbaria, Duttapulia,Panikhali, Dhantala, Ranaghat, Kamgachhi, Birnagar, Taherpur, Badkulla
	Highways			
	With in the City		Shaktinagar Hospital, Laldighi, Chorpukur, 4NO. BSFGate, Gobrapota, Kulgachhi, Assannagar, Bhimpur, Kutirpara, Shanghata, Krishnaganj, Radha Nagar, Krishnanagar, NH-34, Badkula More, Basakpara, Dignagar, Baliadanga, Gobindapur, Shantipur, Fulia, Udaypur, Aistala, Ranaghat, Dayabari, Patuli, Ghatigachha, Tatla, Punglia, Chakdaha, Kamalpur, Sutra, Chuadanga, Bishnupur	
Indoor	Shopping complex	Maa Tara Ghosh Complex.	Parampara Complex.	Sankar Complex.
	Office complex	Dhubulia Hospital.	Ranaghat Court.	Krishnanagar Hospital.

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

6.1.1.2 KILOMETERS TRAVELLED – KRISHNANAGAR SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Krishnanagar	111	107	109	327

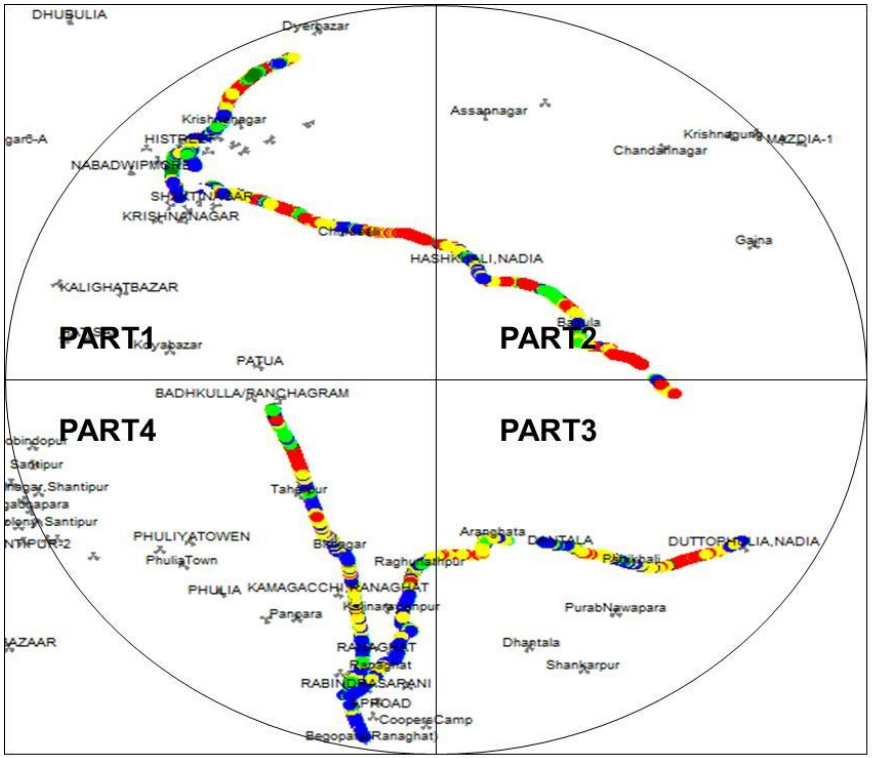
6.1.1.3 ROUTE MAP KRISHNANAGAR DAY 1



Route Covered_Day1 :

1. Bethuadahari, Debogram, Palassy
2. Palassy para, Nischintapur Tehatta
3. Krishnanagar station, Challenge more, Hasadanga and Dhubulia,Indoor-Dhublia Hospital
4. Muragacha and Bethuadahari forest,Indoor-Maa Tara Hotel

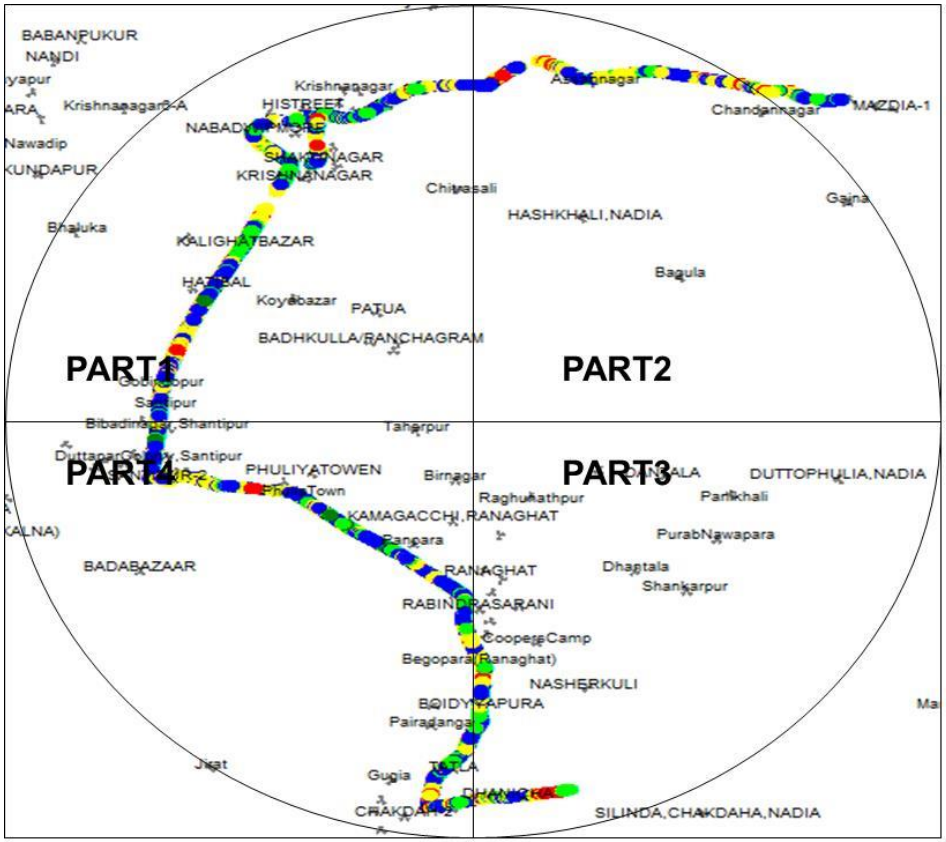
6.1.1.4 ROUTE MAP KRISHNANAGAR DAY 2



Route Covered_Day2

1. Paninala, Boubazar, Palpara and Chitrasali
2. Dakhshinpara, Hanskhali and Bagula
3. Tangrakhali, Silberia, Duttapukur and Dhantala
4. Ranaghat, Habibpur, Taherpur and Badhkulla,Indoor-Parampara Hotel,Ranaghat Court

6.1.1.5 ROUTE MAP KRISHNANAGAR DAY 3



Route Covered_Day3

1. Gobindapur, Diknagar, Nabadwipmore and Gobrapota,Indoor-Shankar Hotel,Shaktinagar Hospital
2. Kulgachi, Bhimpur petrolpum, Asannagar and Krishnaganj
3. Chakhdah more, Gorachandtala and Bishnupur
4. Santipur, Fulia, Payradanga and Chakhdah

6.1.1.6 DRIVE TEST RESULTS – KRISHNANAGAR SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		2.67%	17.85%	85.76%	74.61%	43.06%	46.34%	51.97%	39.88%	25.80%	25.28%	98.11%	55.24%	98.74%	59.01%	68.90%	74.29%	36.53%	33.93%	42.82%	95.61%
0 to -85 dBm		44.52%	62.21%	99.64%	97.82%	77.98%	78.78%	73.53%	77.54%	62.87%	60.54%	100.00%	85.70%	100.00%	90.61%	98.89%	94.28%	88.96%	80.19%	95.24%	99.33%
0 to -95 dBm		88.16%	89.24%	100.00%	100.00%	96.80%	95.29%	100.00%	100.00%	100.00%	100.00%	100.00%	99.39%	100.00%	100.00%	100.00%	99.51%	99.13%	96.91%	99.89%	99.80%
Voice quality	≥ 95%	95.92%	93.29%	98.86%	96.34%	95.19%	95.34%	95.46%	94.17%	98.13%	95.80%	96.96%	97.46%	98.94%	94.78%	96.85%	95.82%	98.71%	98.01%	94.35%	97.23%
CSSR	≥ 95%	100.00%	99.25%	100.00%	100.00%	98.33%	98.19%	100.00%	100.00%	100.00%	100.00%	100.00%	99.07%	100.00%	98.43%	100.00%	99.57%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.75%	0.00%	0.00%	1.67%	1.81%	0.00%	0.00%	0.00%	0.00%	0.00%	0.93%	0.00%	1.57%	0.00%	0.43%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	2.14%	0.00%	0.00%	3.24%	2.73%	0.00%	0.21%	0.00%	0.22%	0.00%	0.89%	0.00%	1.57%	0.00%	0.20%	0.00%	0.28%	0.00%	0.00%
Hands off success rate		100.00%	99.41%	100.00%	99.82%	100.00%	100.00%	100.00%	100.00%	100.00%	99.95%	100.00%	100.00%	100.00%	1.16%	100.00%	100.00%	100.00%	100.00%	100.00%	99.81%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Aircel, Idea, MTS and Reliance GSM did not meet the benchmark set by TRAI in outdoor areas. Vodafone failed to meet the benchmark in indoor areas.

Call Set Success Rate (CSSR)

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

Call Drop Rate

BSNL failed to meet the benchmark in outdoor as well as indoor areas. Aircel did not meet the benchmark in outdoor areas

6.1.2 NOVEMBER – MEDINIPORE SSA

Month	Name of SSA Covered	Date of Drive Test
November	Midnapur	26th to 28th Nov 2014

6.1.2.1 ROUTE DETAILS – MEDINIPORE SSA

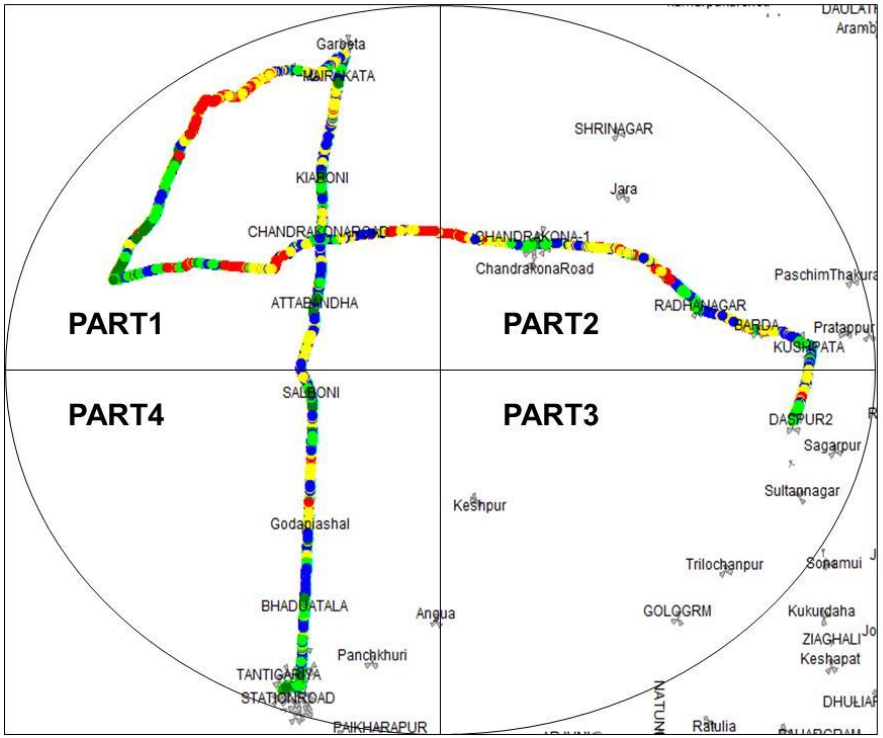
Category	Type of location	West Bengal-November		
		Midnapur		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Mednapore-Keranichoti, Garbeta-Goaltore-Chandrakona Road-Chandrakona Town, Khirpai-Radhanagar.	Khemasuli-Chunapara-Sakrail-Sukhnakhali-Lodhasuli-Jhargram, Jhargram-Binpur-Jhargram, Jhargram-Dherua-Chandra-Mednapur	Kaushlya-Makrampur, Datun, Bhakrabad-Dasgram-Temathani-Sabang-Pingla-Balichawk
	Highways	Midnapore-Salboni-Chandrakona Road-Garbeta	Sadatpur- Kalaikunda-Khemasuli	Makrampur-Belda-Datun
	With in the City	Chandrakona Town, Radhanagar-Ghatal-Daspur.	DRM Building-Nimpura-Sadatpur, Jhargram	Kharagpur Station-DRM Building-Kaushalya, Belda, Balichawk-Debra
Indoor	Shopping complex	Hazra Hotel, Chandrakona Road	Green Park Hotel, Jhargram.	Srijoni Hotel, Datun
	Office complex	Garbeta B.D.O. Office	Nimpura W.B.S.E.D.C.L Office.	Belda Police Station

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

6.1.2.2 KILOMETERS TRAVELLED – MEDINIPORE SSA

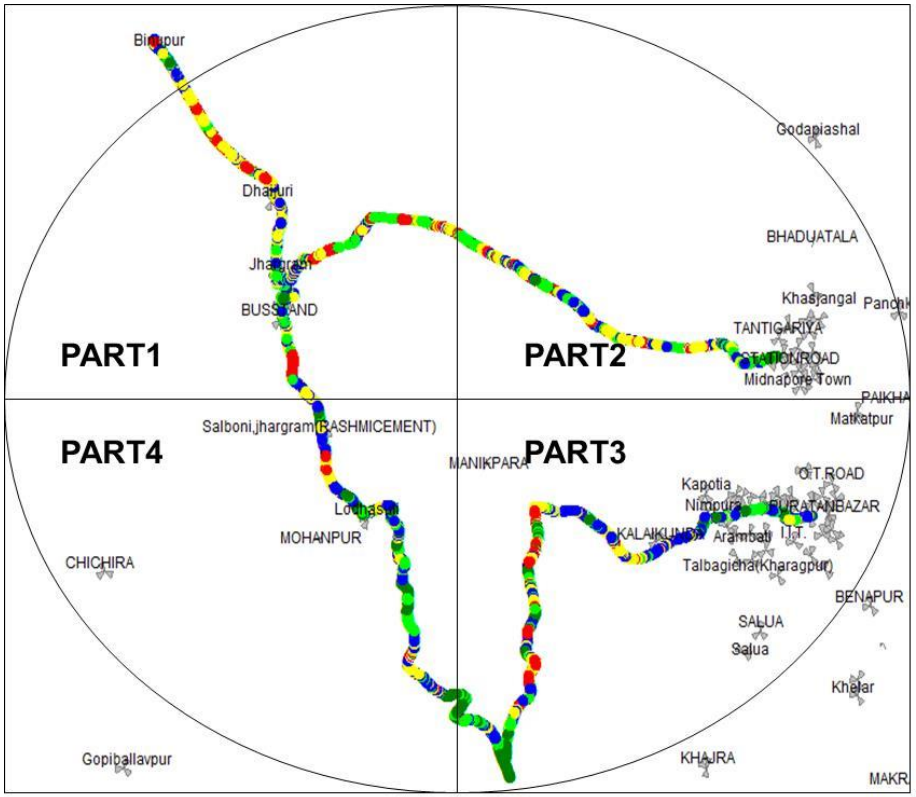
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Medinipore	106	110	114	330

6.1.2.3 ROUTE MAP MEDINIPORE DAY 1



Route Covered_Day1 :
1.Salbani,Garbetta,Hazra Hotel,BDO office,Galtor Chandrakona Rd,Chandrakona Town
2.Chandrakona Town,Katal
3.Katan,Daspur
4.Mednipore Town,Kiranichoti,Salbani

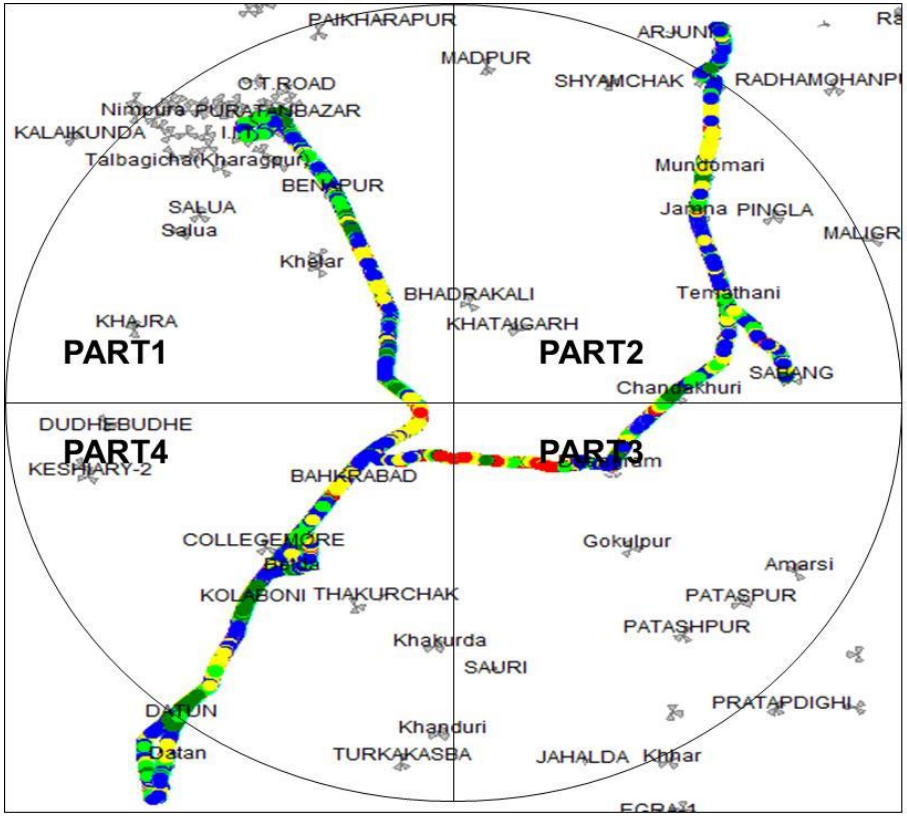
6.1.2.4 ROUTE MAP MEDINIPORE DAY 2



Route Covered_Day2

1.Salboni,Jhargram,Dohuzudi,Binpur,Dherua,Green Park Hotel
2.Dherua,Mednipore Town
3.Kharagpur,Guptmani,Sakrail,WBSEDCL Office
4Sakrail,Lodhasuli,Salboni

6.1.2.5 ROUTE MAP MEDINIPORE DAY 3



Route Covered_Day3

1.Khargapur,Benapur,Makrampur,Narayanghad
2.Chandkuri,Kemathani,Sabang,Pingla,Balichak,Debra
3.Gopinathpur,Chandkuri
4.Narayanghad,Belda,Datun,Narayanghad,Gopinathpur,Srijan Hotel, Belda PS

6.1.2.6 DRIVE TEST RESULTS – MEDINIPORE SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		26.63%	37.02%	91.73%	82.62%	51.04%	35.57%	63.84%	63.61%	33.37%	44.62%	35.03%	28.06%	37.26%	62.97%	16.29%	36.95%	24.86%	25.70%	36.09%	47.81%
0 to -85 dBm		71.78%	70.64%	99.99%	99.70%	95.12%	70.73%	93.68%	85.32%	75.42%	65.62%	35.90%	62.74%	75.83%	89.86%	80.15%	66.48%	62.69%	63.23%	96.17%	89.00%
0 to -95 dBm		99.79%	94.84%	99.99%	100.00%	99.92%	91.94%	100.00%	100.00%	99.94%	89.63%	63.14%	84.10%	100.00%	100.00%	99.16%	97.56%	99.37%	97.56%	99.99%	99.10%
Voice quality	≥ 95%	98.40%	94.25%	99.38%	96.78%	97.99%	91.49%	98.38%	93.55%	98.71%	89.73%	88.58%	87.09%	97.44%	89.80%	97.71%	96.66%	99.19%	97.65%	98.70%	96.83%
CSSR	≥ 95%	100.00%	97.88%	100.00%	100.00%	97.83%	95.04%	100.00%	100.00%	100.00%	81.61%	100.00%	98.58%	100.00%	98.27%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.80%	0.00%	0.00%	2.15%	4.96%	0.00%	0.00%	0.00%	18.39%	0.00%	2.16%	0.00%	1.73%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.14%	0.00%	0.00%	0.68%	5.01%	0.00%	0.00%	0.00%	2.68%	0.00%	0.95%	0.00%	2.41%	0.00%	0.00%	0.00%	0.21%	0.00%	0.00%
Hands off success rate		100.00%	98.72%	100.00%	99.62%	100.00%	100.00%	100.00%	98.82%	100.00%	99.93%	100.00%	99.09%	100.00%	98.09%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Reliance CDMA failed to meet the benchmark for voice quality in outdoor as well as indoor areas. Aircel, BSNL, Idea, MTS and Reliance GSM did not meet the benchmark set by TRAI in outdoor areas.

Call Set Success Rate (CSSR)

MTS did not meet the benchmark for CSSR in outdoor locations.

Call Drop Rate

BSNL, MTS and Reliance GSM failed to meet the benchmark for call drop rate in outdoor areas.

6.1.3 DECEMBER – DARJEELING SSA

Month	Name of SSA Covered	Date of Drive Test
December	Darjeeling	18th to 20th Dec'14

6.1.3.1 ROUTE DETAILS – DARJEELING SSA

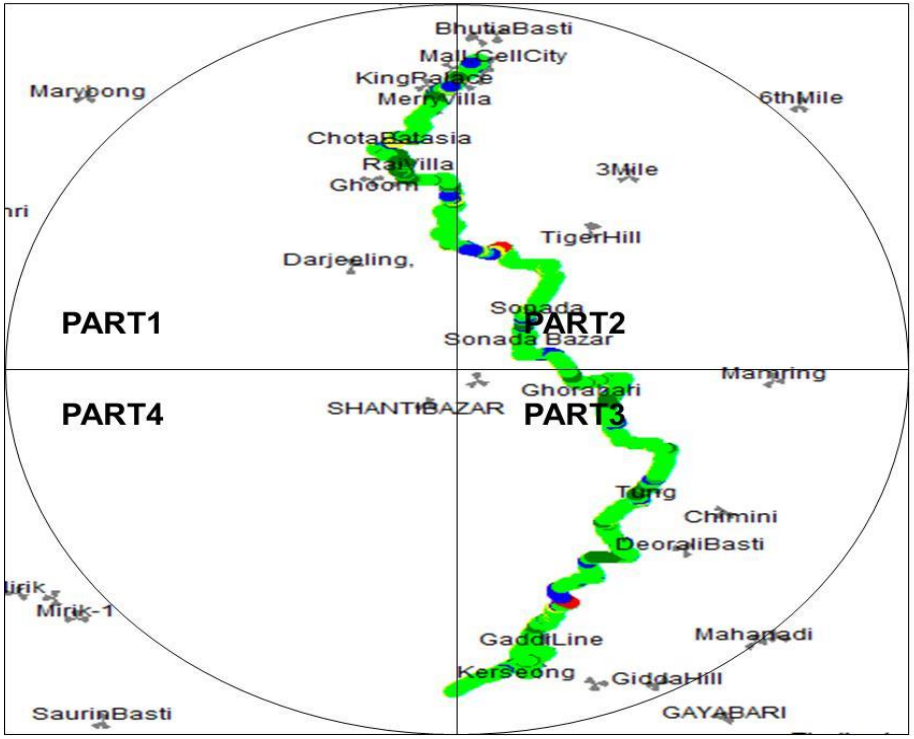
Category	Type of location	West Bengal- December		
		Darjeeling		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	NH 34 to Ghoom Station , Tourist lodge to Zambas restaurant, Zambas restaurant to Bus stand , Zambas restaurant to NH 34, Tung station to Sipai daura, Sipai daura, Karseong taxi stand, Pankha bari road, Pankha bari road to Fatak, Pankha bari road to Karseong station, Eagles cary (new point)., Karseong court, Karseong court to Tourist lodge	Mohakal mandir, Rasbari, Bhanu bhaban, Sun flower, S.P Office, D.M bangla, Ecological park, ST Josephs school, Happy valley tea garden, Circuit house, district court, Loreto school, Taxi stand, Police station, Chowk bazar, Judge bazar, Big bazar, Anand place, Post office, SBI bank, BSNL office, Sinclair hotel, Hedeyn hotel, Green laues school, ST Paul school, Travelers INN, GTA Office, Mirik Lake, Mirik Bazar via Bypass, Mirik P.S, Mirik H.S School, Lake side bazar, Play gound, View Point	Rishi road, Degree college, 11 mile, Parnami girls school, Delo, Science centre, RCM road, Forest office, District court, Municipal office, Ongei rd, Kalimpong bazar, Taxi stand, ST Therese cothage church , Trimoti shopping complex (Kalimpong), SP office, SBI, Singhee dwar, Golf ground, Camelia Complex (Military Complex), BSNL exchange
	Highways	NA	NA	NA
	With in the City	NA	NA	NA
Indoor	Shopping complex	Zimbus shopping complex,Karseong	Kolkata shopping complex,Mirik	Trimoti shopping complex,Kalimpong
	Office complex	Karseong Court	Gorkha territorial adminstration chief executive office	Militarry Camp,Kalimpong

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

6.1.3.2 KILOMETERS TRAVELLED – DARJEELING SSA

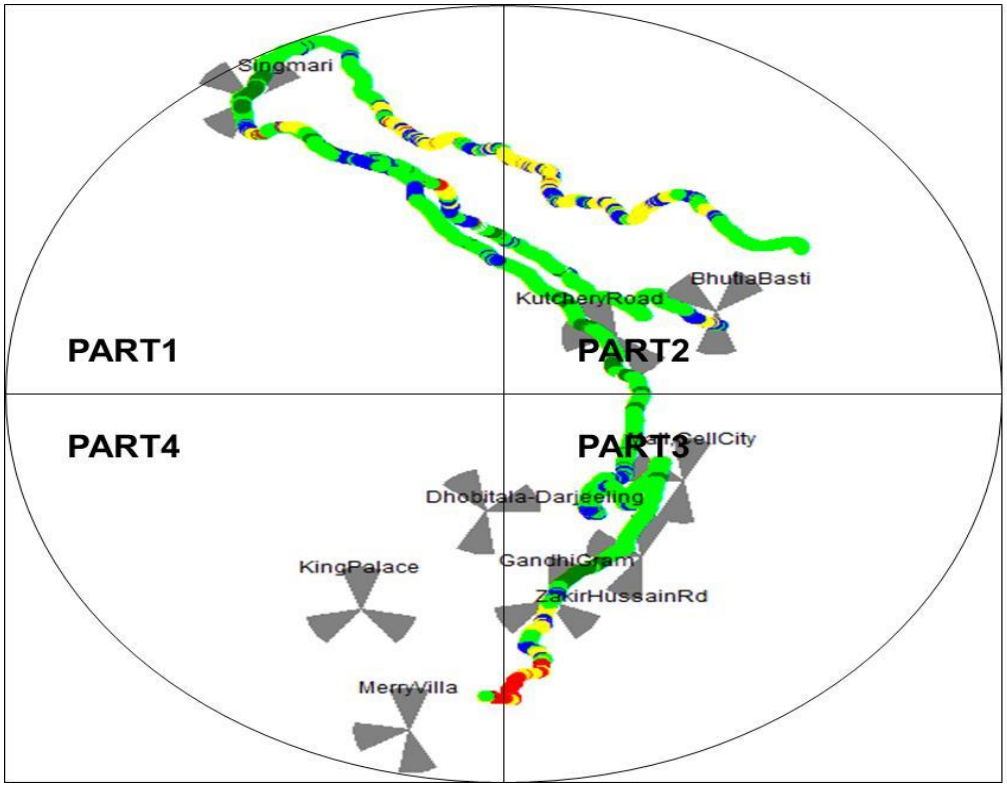
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Darjelling	101	102	104	307

6.1.3.3 ROUTE MAP DARJEELING DAY 1



Route Covered_Day1 :
1. NH-34
2.Tung Station, Sipai Daura
3.Kurseong taxi stand, Pankhabari road, Kurseong railway station, eagles cary, new point, Kurseong Court Tourist lodge,Phatag Indoor-Zindas Resturant,Kurseong Court

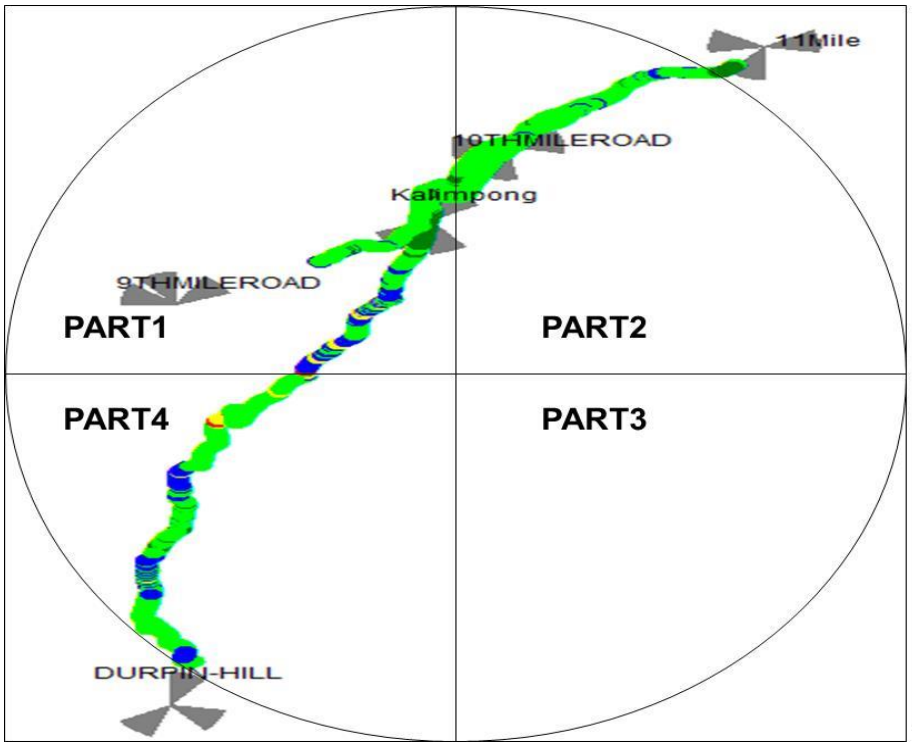
6.1.3.4 ROUTE MAP DARJEELING DAY 2



Route Covered_Day2

1.S.P office, DM bunglow, Logical park, St Joseph School, Happy valley tea estate garden, Circuit house,Indoor –Kolkatta Hotel
2.Mahakal mandir, Rajbari, Bhanu bhawan, Sunflower, District court, Loretto School, Taxi stand, Police station, Chown Bazaar
3.Judgebazaar, Bigbazaar, Anand palace, Post Office, SBI bank, Gareli Road, BSNL office, Sinclair hotel, Hayden hall, Green Lawn school, St. Paul School, travellers inn.Indoor –GTA office

6.1.3.5 ROUTE MAP DARJEELING DAY 3



Route Covered_Day3

1.Trimoti shopping complex
2.Kalimpong bazaar, taxi stand, St. Theresa catholic church, risi road, degree college, 11 mile, Pranmai balika vidya school, Delo, Science centre, RCMRD
4.SP office, Singhee dwar, Golf ground, Camelia complex, BSNL exchange, Forest office, District court, Municipal office, Ongel road,Indoor office

6.1.3.6 DRIVE TEST RESULTS – DARJEELING SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		57.14%	56.72%	85.49%	84.73%	Not Participated		63.84%	23.16%	100.00%	83.67%	51.14%	43.90%	75.53%	50.43%	92.77%	59.47%	49.79%	26.67%	100.00%	96.10%
0 to -85 dBm		87.65%	85.63%	99.07%	98.07%			93.68%	53.66%	100.00%	91.88%	90.42%	80.64%	98.13%	83.32%	99.98%	83.51%	87.68%	68.12%	100.00%	98.95%
0 to -95 dBm		99.95%	98.76%	99.89%	99.71%			100.00%	100.00%	100.00%	99.86%	100.00%	97.05%	98.63%	96.86%	100.00%	97.69%	99.89%	95.63%	100.00%	99.64%
Voice quality	≥ 95%	92.20%	93.50%	97.25%	96.21%			98.38%	82.14%	99.69%	97.85%	96.20%	97.65%	87.00%	88.48%	98.64%	96.15%	97.17%	95.35%	98.13%	95.39%
CSSR	≥ 95%	100.00%	97.23%	100.00%	100.00%			99.24%	95.68%	100.00%	96.93%	96.10%	98.19%	96.00%	97.20%	100.00%	97.44%	99.28%	99.62%	100.00%	100.00%
%age Blocked calls		0.00%	1.15%	0.00%	0.00%			0.76%	4.36%	0.00%	3.07%	0.00%	0.00%	0.00%	0.00%	0.00%	2.56%	0.72%	0.38%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	1.84%	0.00%	0.00%			0.00%	0.62%	0.00%	0.24%	0.80%	1.60%	0.60%	0.90%	0.00%	0.95%	0.00%	1.94%	0.00%	0.00%
Hands off success rate		97.62%	86.15%	100.00%	117.32%			100.00%	98.91%	100.00%	99.85%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	98.67%

Data Source: Drive test reports submitted by operators to auditors

Note: BSNL did not participate in the drive test due to technical and logistical issues at operator's end.

Voice Quality

Aircel and Reliance GSM failed to meet the benchmark for voice quality in indoor as well as outdoor locations. Idea did not meet the benchmark set by TRAI in outdoor areas.

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

6.1.4 DECEMBER – GANGTOK SSA

Month	Name of SSA Covered	Date of Drive Test
December	Gangtok	22nd to 24th Dec'14

6.1.4.1 ROUTE DETAILS – GANGTOK SSA

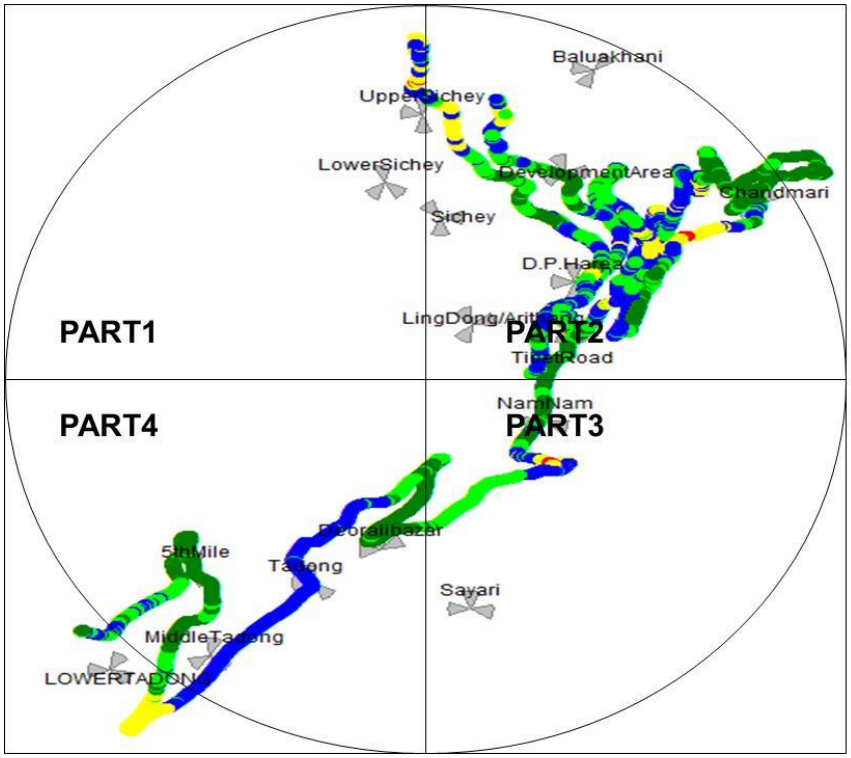
Category	Type of location	West Bengal-December		
		Gangtok		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Upper Sichey, Children park, Flower show center, V.I.P complex, T.M.A school, Senchey monestery, CM bangla, T.N.A school, Bajara H.S school, Super market, Palzar stadium, Sichey ground, P.N.G school, D.C office, Palzer stadium, Children park, Wood land restaurant, Anima bus bandry, Sikkim Govt. collage, Manipal hospital, Sikkim Manipal University, Upper Tadong, Holy cross school	Duck bangla, Women hospital, District hospital, Baychung stadium, Girl's school, Loyla collage, Kolkata hotel and restaurant, Nandak Gumpha, Tamang Gumpha, Taxi stand, Tendoing educational institute, Nanchi Govt. College. For Office Complex, Nanchi Govt. college, Jawaharlal Nehru hospital, District jail, Blind school, Nanchi Municipal office, Panchayet office, Church	River road, Magi Gwoi, D M head quarter, State Institute of Capacity Building, Jorethang ground (stadium), Bazar, Taxi stand, Santi nagar, Power office, Akar bridge, IOCL pump, Police station, BDO office, Old Stn. Bus Stand, Milk Processing plant, Motor vehicle office.
	Highways	NA	NA	NA
	With in the City	NA	NA	NA
Indoor	Shopping complex	Wood land shopping complex,Gangtok	Kolkata shopping complex,Namchi	Jorethang super market
	Office complex	D.C office, Gangtok	Namchi govt college	Power office, Jorethang

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

6.1.4.2 KILOMETERS TRAVELLED – GANGTOK SSA

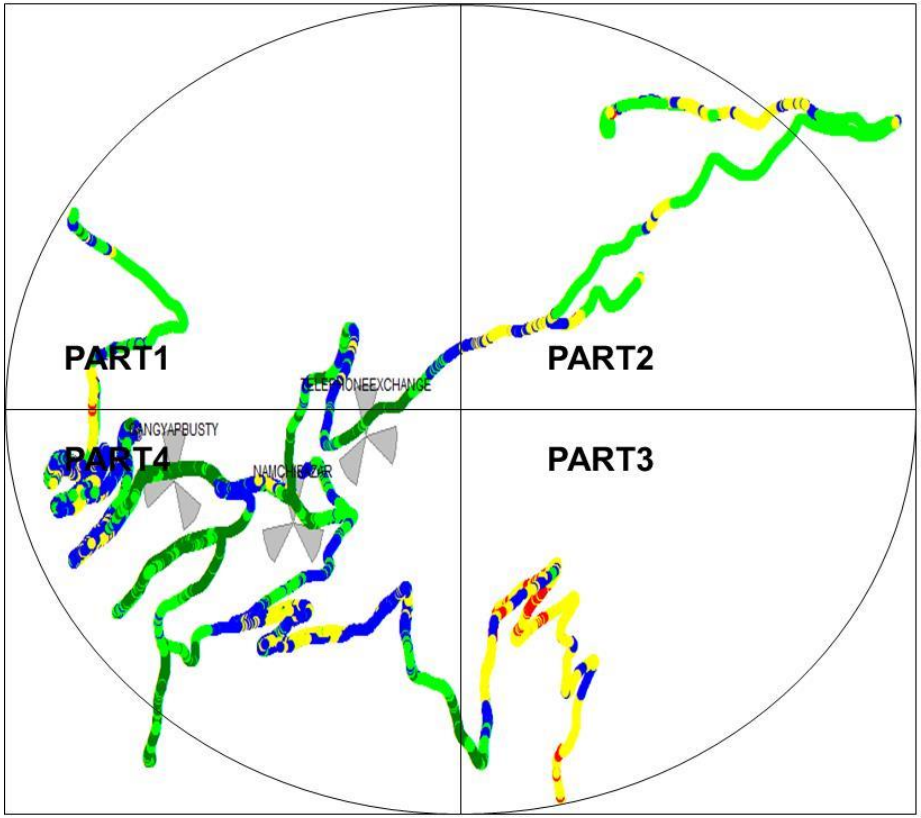
Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Gangtok	104	108	106	318

6.1.4.3 ROUTE MAP GANGTOK DAY 1



Route Covered_Day1 :
1. Sechay Ground, PNG school, DC office
2.Children park, flower show centre, VIP complex, TMA school, Inchey Monestry, CM bunglow, TNA school, Vajra high school, Super market, Palzor stadium,Woodland Resturant
3. Lal bazaar, Numnum, Animal husbandry
4.Sikkim Government College, Manipal Hospital, Sikkim manipal university, Upper tadong, Holy cross school

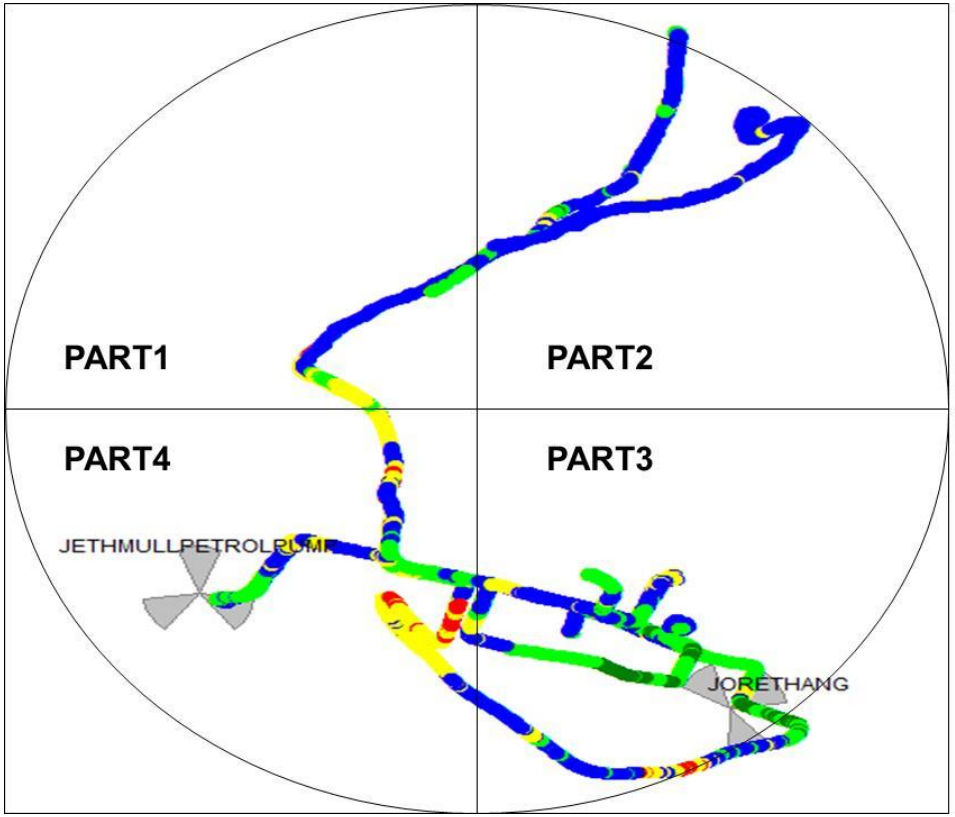
6.1.4.4 ROUTE MAP GANGTOK DAY 2



Route Covered_Day2

1.Namchi Government college
2.Loyola College, Namchi public school, Kolkata hotel, Nandak Gumpha, Tamang Gumpha
3.Dak Bunglow, Womens hospital, District hospital
4.Taxi stand, Tendoing education hall, Tntitute, Jawaharlal Nehru hospital, District jail, Blind school, Namchi municipal office, Panchayat office, Catholic church, Baichung stadium

6.1.4.5 ROUTE MAP GANGTOK DAY 3



Route Covered_Day3

1.Jorethang ground, bazaar, taxi stand, Shantinagar, FCI,
2.SNT bus stand, Motor vehicle office, Power office
3. Police station, Riverroad, BDO office, Majigaon, Old bus stand, Akra bridge, Milk processing plant, DM headqurter
4.Jorethang Supermarket, State institute of capacity building

6.1.4.6 DRIVE TEST RESULTS – GANGTOK SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		MTS		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		67.43%	45.18%	87.01%	84.53%	Not Participated		59.16%	25.64%	15.51%	47.40%	23.97%	19.39%	87.41%	85.91%	44.41%	60.76%	47.01%	27.83%	96.81%	85.29%
0 to -85 dBm		97.58%	81.90%	99.62%	97.30%			94.47%	55.42%	63.22%	60.01%	37.97%	32.67%	99.44%	99.40%	90.49%	79.51%	89.16%	72.63%	99.51%	97.35%
0 to -95 dBm		99.86%	98.42%	99.99%	98.47%			100.00%	100.00%	98.87%	90.42%	60.32%	53.50%	100.00%	100.00%	100.00%	98.41%	99.70%	97.13%	99.87%	99.86%
Voice quality	≥ 95%	97.92%	94.31%	97.35%	95.93%			91.93%	89.99%	99.30%	97.36%	88.71%	87.50%	96.20%	95.10%	99.24%	96.54%	97.55%	97.11%	97.11%	96.02%
CSSR	≥ 95%	97.92%	96.60%	100.00%	100.00%			98.20%	95.41%	100.00%	98.02%	95.80%	95.71%	97.00%	95.57%	100.00%	97.96%	100.00%	98.33%	100.00%	97.99%
%age Blocked calls		0.00%	3.03%	0.00%	0.00%			1.80%	4.59%	0.00%	1.98%	0.02%	0.04%	0.00%	0.00%	0.00%	2.04%	0.00%	1.67%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%			0.50%	0.00%	0.00%	0.00%	0.80%	1.20%	0.23%	0.66%	0.00%	1.06%	0.00%	0.35%	0.00%	0.00%
Hands off success rate		100.00%	92.13%	100.00%	100.00%			100.00%	100.00%	100.00%	99.97%	88.00%	91.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.52%

Data Source: Drive test reports submitted by operators to auditors

Note: BSNL did not participate in the drive test due to technical and logistical issues at operator's end.

Voice Quality

Idea and Reliance CDMA failed to meet the benchmark for voice quality in indoor as well as outdoor locations. Aircel did not meet the benchmark set by TRAI in outdoor areas.

Call Set Success Rate (CSSR)

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

Call Drop Rate

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

7 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

BSNL did not meet the benchmark for BTS Accumulated Downtime, Worst Affected BTS due to Downtime, SDCCH/ Paging Channel Congestion and Worst Affected Cells Having More than 3% TCH Drop.

Aircel did not meet the benchmark for Worst Affected BTS due to Downtime and Worst Affected Cells Having More than 3% TCH Drop.

Tata CDMA failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop.

3 Day Live Measurement (Network Parameters)

BSNL did not meet the benchmark for BTS Accumulated Downtime, SDCCH/ Paging Channel Congestion and Worst Affected Cells Having More than 3% TCH Drop.

For 'Worst affected BTSs due to downtime', significant difference was observed between PMR & live measurement data for BSNL and Aircel. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

Live Calling

Airtel and Tata GSM failed to meet the TRAI benchmark for resolving 98% complaints within 4 weeks.

BSNL and Idea did not meet the benchmark while all other operators exceeded the TRAI benchmark of answering 95% calls by the operators (voice to voice) within 90 seconds.

Billing and Customer Care

BSNL failed to meet the benchmark for metering and billing credibility for postpaid subscribers and 95% calls answered by the operators (Voice to Voice) within 90 seconds.

Idea failed to meet the benchmark for metering and billing credibility for prepaid as well as postpaid subscribers. Reliance CDMA failed to meet the benchmark for postpaid subscribers while Aircel failed to meet the benchmark for metering and billing credibility for prepaid subscribers.

Aircel, with only 31.49%, failed to meet the benchmark for calls answered by IVR.

Tata GSM failed to meet the benchmark of 95% calls (voice to voice) answered within 90 seconds by the call center operators.

Operators have been reporting majority of complaints made by customers as invalid. This has been observed mainly for Aircel, Airtel, Idea and Tata GSM. In the audit process, there is no mechanism in place to further probe this phenomenon. However, IMRB is of the opinion that this needs to be further investigated and operators should provide detailed explanation of reasons for reporting majority of their complaints as invalid to TRAI.

Drive Test (Operator Assisted)

Voice quality is a key concern for majority of operators in outdoor areas. Aircel, Idea and Reliance GSM consistently failing to meet the voice quality benchmark during drive tests.

8 ANNEXURE

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability-Consolidated											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		8103	17712	7254	10802	2720	2445	7518	78	1045	21436
Sum of downtime of BTSs in a month (in hours)		115467	1818	279558	4174	3249	6700	14220	8	202	4755
BTSs accumulated downtime (not available for service)	≤ 2%	1.92%	0.01%	5.18%	0.05%	0.16%	0.37%	0.25%	0.01%	0.03%	0.03%
Number of BTSs having accumulated downtime >24 hours		633	2	2201	24	0	18	55	0	0	33
Worst affected BTSs due to downtime	≤ 2%	7.81%	0.01%	30.34%	0.22%	0.00%	0.74%	0.73%	0.00%	0.00%	0.15%

Live Measurement- BTSs accumulated downtime-Consolidated											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		8104	17699	7254	10800	2720	2445	7518	78	1045	21374
Sum of downtime of BTSs in a month (in hours)		11673	5253	19531	426	313	510	1270	0	18	245
(not available for service)	≤ 2%	2.00%	0.42%	3.74%	0.05%	0.16%	0.29%	0.24%	0.00%	0.03%	0.02%
Number of BTSs having accumulated downtime >24 hours		137	0	82	4	0	0	0	0	0	0
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	1.69%	0.00%	1.13%	0.04%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%

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

8.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion-Consolidated											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.36%	98.93%	98.24%	98.83%	99.71%	98.72%	98.66%	98.89%	98.75%	99.37%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.58%	0.23%	2.61%	0.08%	NA	NA	0.04%	NA	0.06%	0.29%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.26%	1.35%	1.02%	0.56%	0.06%	0.03%	0.13%	0.01%	0.26%	0.63%

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

Live measurement results for CSSR, SDCCH and TCH congestion-Consolidated

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.41%	98.96%	97.96%	99.46%	99.77%	98.70%	98.63%	99.06%	99.23%	99.76%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.43%	0.23%	3.13%	0.03%	NA	NA	0.08%	NA	0.06%	0.20%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.14%	1.29%	1.22%	0.16%	0.05%	0.02%	0.13%	0.00%	0.05%	0.24%

Drive test results for CSSR (Average of three drive tests) and blocked calls-Consolidated

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		1497	1821	687	1407	1347	1812	1502	1341	1277	1637
Total number of successful calls established		1473	1821	666	1397	1218	1772	1465	1337	1276	1633
CSSR	≥ 95%	98.44%	100.00%	97.27%	98.89%	93.20%	97.84%	97.50%	99.62%	99.88%	99.69%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		1.56%	0.00%	2.73%	1.11%	6.80%	2.16%	2.50%	0.38%	0.12%	0.31%

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

8.3 CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-Consolidated											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		333859299	964111087	152317415	390624809	136559355	49725537	276513886	963230	28628670	1257118056
Total number of calls dropped		4731399	11452355	1786028	1720138	1056318	116783	1716300	5925	170343	10924448
Call drop rate	≤ 2%	1.41%	1.19%	1.17%	0.44%	0.77%	0.24%	0.62%	0.61%	0.60%	0.87%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		23875	56548	21189	32562	9761	7341	22538	226	2934	64453
Total number of cells having more than 3% TCH		2727	992	3003	127	217	61	13	9	82	1887
Worst affected cells having more than 3% TCH	≤ 3%	11.42%	1.75%	14.17%	0.39%	2.22%	0.83%	0.06%	4.11%	2.81%	2.93%

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

Live measurement results for Call drop rate and for number of cells having more than 3% TCH-Consolidated											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		32057153	93250959	14073335	439895593	187361148	5076634	25384704	1407350	33497597	1476548243
Total number of calls dropped		456982	1084868	164205	1421108	1009169	12407	197310	6022	187890	9542102
Call drop rate	≤ 2%	1.42%	1.16%	1.18%	0.32%	0.54%	0.24%	0.84%	0.43%	0.55%	0.64%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		23493	169391	21189	795372	9720	7344	17465	228	3136	64266
Total number of cells having more than 3% TCH		2709	2871	2886	673	196	60	16	8	96	1873
Worst affected cells having more than 3% TCH	≤ 3%	11.55%	1.70%	13.62%	1.02%	2.02%	0.82%	0.09%	3.50%	2.88%	2.91%

Drive test results for Call drop rate (Average of three drive tests)-Consolidated											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		1467	1821	668	1397	1218	1772	1471	1337	1276	1633
Total number of calls dropped		11	0	20	2	19	18	19	2	3	0
Call drop rate	≤ 2%	0.61%	0.00%	3.02%	0.18%	1.20%	1.01%	1.25%	0.19%	0.25%	0.00%

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

8.4 VOICE QUALITY

Audit Results for Voice quality -Consolidated											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		60847175832	302746749315	21070	56599938533	136559355	0	39533501187	103293506	5025035680	221277314673
Total number of calls with good voice quality		57962957825	289451563034	20027	53828534438	136236613	0	38885931113	101188062	4901742311	210720815275
%age calls with good voice quality	≥ 95%	95.24%	95.60%	95.05%	95.10%	99.76%	99.67%	98.34%	97.96%	97.52%	95.23%

Live measurement results for Voice quality-Consolidated											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		5959048463	26965697370	2159	77668687721	187542922	NA	3913497167	57856785	4725589986	226616153415
Total number of calls with good voice quality		5677652911	25699936105	2052	75427503210	186775843	NA	3848091577	56645991	4624566617	218234108915
%age calls with good voice quality	≥ 95%	95.27%	95.31%	95.04%	96.70%	99.59%	99.67%	98.31%	97.91%	97.86%	96.31%

Drive test results for Voice quality (Average of three drive tests)-Consolidated											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		2566168	2122945	1055389	2189356	218182	388780	422405	1356404	1073226	3918135
Total number of calls with good voice quality		2410686	2046278	996652	2008464	205565	356894	386692	1317830	1038697	3778881
%age calls with good voice quality	≥ 95%	93.93%	96.85%	94.63%	91.24%	94.33%	90.66%	92.37%	96.69%	97.66%	96.43%

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

Note: Reliance CDMA has not shared the bases for calculating the voice quality, as it is not feasible to fetch the parameters from the current system of the operator.

8.5 POI CONGESTION

Audit Results for POI Congestion-Consolidated											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Average number of working POIs		59	37	75	108	37	21	46	63	20	45
Average No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Average Capacity of all POIs (A) - in erlangs		74307	138480	91478	103797	55994	7831	37086	12846	6127	332104
Average Traffic served for all POIs (B)- in erlangs		36987	80956	17152	61740	25443	2498	19303	2431	1571	184119
Average POI congestion	≤ 0.5%	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-Consolidated											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Average number of working POIs		59	37	75	108	36	21	46	60	21	44
Average No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Average Capacity of all POIs (A) - in erlangs		74191	413804	91271	103520	56125	7851	37316	12815	6324	333858
Average Traffic served for all POIs (B)- in erlangs		37478	215394	17077	61233	26271	2668	20277	2371	1585	177035
Average POI congestion	≤ 0.5%	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

8.6 TOTAL CALLS MADE DURING DRIVE TEST – VOICE QUALITY

October										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	859112	123642	376205	745271	64085	185866	121420	67812	56364	1216565
November										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	878647	154628	679184	840332	77039.72048	202914	220507	54216	58100	1445557
December										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls	828409	1844675	NP	603753	77057	NA	80478	1234376	958762	1256013

Data Source: Drive test reports submitted by operators to auditors

NP: BSNL did not participate in the drive test conducted in the month of December 2014 due to technical and logistical issues at operator's end. Reliance CDMA did not have coverage in the SSA covered in December 2014.

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)											
Metering and billing credibility - Postpaid											
Total bills generated during the period		942	180732	201107	7803	30071	27816	54510	NA	NA	849766
Total number of bills disputed		0	161	774	34	4	58	11	NA	NA	702
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.09%	0.38%	0.44%	0.01%	0.21%	0.03%	NA	NA	0.08%
October											
Total bills generated during the first billing cycle		303	59865	68012	2640	10211	9512	17916	NA	NA	285443
Total number of bills disputed in first billing cycle		0	41	302	8	2	12	5	NA	NA	222
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.07%	0.44%	0.30%	0.02%	0.13%	0.03%	NA	NA	0.08%
November											
Total bills generated during the second billing cycle		294	60112	66956	2525	9986	9243	9243	NA	NA	282394
Total number of bills disputed in second billing cycle		0	58	233	22	0	19	3	NA	NA	208
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.10%	0.35%	0.87%	0.00%	0.21%	0.03%	NA	NA	0.07%
December											
Total bills generated during the third billing cycle		345	60755	66139	2638	9874	9061	9061	NA	NA	281929
Total number of bills disputed in third billing cycle		0	62	239	4	2	27	3	NA	NA	272
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.10%	0.36%	0.15%	0.02%	0.30%	0.03%	NA	NA	0.10%

Data Source: Billing Center of the operators

NA: Tata CDMA and GSM do not have postpaid service in the circle.

Metering and billing credibility - Prepaid											
Performance prepaid	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of charging complaints		21393	8331	3901	13346	586	694	5406	0	75	9051
Total no of customers served		4661721	11535682	4297582	3870554	1753263	842858	5843281	18915	946677	14107327
Percentage of charging complaints disputed	≤ 0.1%	0.46%	0.07%	0%	0.34%	0.03%	0.08%	0%	0%	0.01%	0.06%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of billing/charging complaints		21393	8492	3901	13379	586	796	5408	0	75	9753
Total number of complaints resolved in favour of customer		5	1446	3822	2647	308	664	5407	0	0	5471
Total complaints considered invalid		21388	7046	79	10732	278	132	1	0	75	4282
Number of complaints resolved in 4 weeks		5	1446	3822	2647	308	620	5407	0	0	5471
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%	93.37%	100.00%	NA	100.00%	100.00%
Number of complaints resolved in 6 weeks		5	1446	3822	2647	308	620	5407	0	0	5471
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	93.37%	100.00%	NA	100.00%	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		5	1446	1265	2647	34	488	5407	NA	0	1189
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%

Data Source: Billing Center of the operators

Operators have been reporting majority of complaints made by customers as invalid. This has been observed mainly for Aircel, Airtel, Idea and Tata GSM. In the audit process, there is no mechanism in place to further probe this phenomenon. However, IMRB is of the opinion that this needs to be further investigated and operators should provide detailed explanation of reasons for reporting majority of their complaints as invalid to TRAI.

Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made		100	100	100	100	100	100	100	0	67	100
Number of cases resolved in 4 weeks		98	95	98	98	98	100	100	0	64	100
Percentage cases resolved in four weeks	≥ 98%	98.00%	95.00%	98.00%	98.00%	98.00%	100.00%	100.00%	NA	95.52%	100.00%
Number of cases resolved in 6 weeks		98	95	98	98	98	100	100	0	64	100
Live Calling Percentage cases resolved in 6 weeks	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%

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

Note: Live calls for Tata GSM are lower than target due to low base of complaints.

8.8 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		43574083	No Data	2153656	14470454	6214133	1624156	12342126	308746	1991357	28802444
Number of calls getting connected and answered (electronically)		13721647	No Data	2055855	14287774	6177195	1613576	12216970	306349	1925768	28802444
Percentage calls getting connected and answered	≥ 95%	31.49%	100.00%	95.46%	98.74%	99.41%	99.35%	98.99%	99.22%	96.71%	100.00%

Data Source: Customer Service Center of the operators

Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received (3 months)		3508488	7878732	771755	5035205	2450589	428258	3345451	8043	237103	9093548
Total Number of calls answered within 90 seconds (3 months)		3437663	7667355	681478	4926194	2345496	421982	3204676	7829	204328	8655019
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	97.95%	97.32%	88.38%	97.83%	95.74%	98.54%	95.79%	97.35%	86.17%	95.17%
October											
Total calls received (Month 1)		1323944	2756674	280465	1687545	811975	148943	1122567	2612	80123	3082359
Total calls answered within 90 seconds (Month 1)		1301934	2689987	245678	1665635	776504	144567	1079655	2543	69785	2926732
% calls answered within 90 seconds (Month 1)	≥ 95%	98.34%	97.58%	87.60%	98.70%	95.63%	97.06%	96.18%	97.36%	87.10%	94.95%
November											
Total calls received (Month 2)		1106778	2656532	256787	1701235	840129	157811	1156374	2766	80374	3078376
Total calls answered within 90 seconds (Month 2)		1087655	2570876	223876	1656876	789321	157103	1105667	2675	68977	2950466
% calls answered within 90 seconds (Month 2)	≥ 95%	98.27%	96.78%	87.18%	97.39%	93.95%	99.55%	95.61%	96.71%	85.82%	95.84%
December											
Total calls received (Month 3)		1077766	2465526	234503	1646425	798485	121504	1066510	2665	76606	2932813
Total calls answered within 90 seconds (Month 3)		1048074	2406492	211924	1603683	779671	120312	1019354	2611	65566	2777821
% calls answered within 90 seconds (Month 3)	≥ 95%	97.25%	97.61%	90.37%	97.40%	97.64%	99.02%	95.58%	97.97%	85.59%	94.72%

Data Source: Customer Service Center of the operators

Live calling results for customer care (IVR)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		96	100	100	100	100	100	100	100	100	100
Live Calling Percentage calls getting connected and answered 90secs	≥ 95%	96.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		96	100	93	93	99	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	96.00%	100.00%	93.00%	93.00%	99.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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

8.9 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated											
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of closure request		3	288	906	255	404	105	328	NA	NA	5260
Number of requests attended within 7 days		3	288	896	255	404	105	328	NA	NA	5260
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	98.90%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%

Data Source: Customer Service Center of the operators

8.10 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated											
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cases requiring refund of deposits		3	NA	NC	63	NA	105	328	NA	NA	1935
Total number of cases where refund was made within 60 days		3	NA	NC	63	NA	105	328	NA	NA	1935
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	NC	100.00%	NA	100.00%	100.00%	NA	NA	100.00%

Data Source: Customer Service Center of the operators

NC: Auditors were not able to get customer service data from BSNL as the operator did not have the required data available at its central customer service center. Hence it has been reported as non-compliance (NC) for the operator.

NA: Tata CDMA and GSM do not have postpaid service in the circle. Also, none of the MTS customers were eligible for refund.

8.11 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang										
Traffic in Erlang	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Eqipped capacity of the network	145390	280119	156000	118747	109200	118000	174000	5617	14130	364479
Total taffic handled in erlang during TCBH	97045	257642	64510	112634	43201	31097	87879	231	6015	340621
Total no. of customers served (as per VLR)	3408584	10980217	1290985	3937252	1158157	764059	5735070	17904	958543	13837294

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

8.12 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests										
Resolution of service requests	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made	100	100	100	100	100	100	100	6	100	100
Number of cases resolved to satisfaction	94	98	98	98	97	95	95	6	98	100
Percentage cases resolved in four weeks	94.00%	98.00%	98.00%	98.00%	97.00%	95.00%	95.00%	100.00%	98.00%	100.00%

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

8.13 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services											
Level 1 services		Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total no. of calls made		150	150	150	150	150	150	150	150	150	150
Calls answered in 60 sec		149	145	150	147	150	150	150	150	150	150
% of calls connected in 60 seconds	≥ 95%	99.33%	96.67%	100.00%	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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

8.14 DETAILS - LEVEL 1 SERVICES CALLS

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.

Level 1 Service No	Category	Aircel	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
100	I	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
101	I	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
102	I	✔		✔							
104	I			✔							
108	I	✔		✔							
181	I			✔							
1033	I			✔							
1056	I					✔					
1063	I			✔	✔	✔	✔	✔	✔	✔	✔
1064	I			✔							
1066	I			✔					✔		
1068	I	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
1070	I	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
1071	I	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
1072	I		✔	✔	✔	✔					
1073	I	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
1077	I			✔	✔						
1091	I	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
1099	I			✔							
1909	I	✔	✔	✔	✔	✔	✔	✔	✔	✔	✔
1916	I		✔	✔							
1947	I			✔	✔	✔	✔	✔	✔	✔	✔
1950	I		✔	✔	✔	✔			✔	✔	
15100	I		✔	✔	✔		✔	✔		✔	✔
155214	I			✔							

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

Live calls were made to the active numbers to test the calls answered within 60 seconds. The details of the same have been given below for each operator.

BSNL								Aircel				Airtel				Idea				MTS			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	7	7	0	1072	7	7	0	100	17	17	0	100	14	14	0	100	12	12	0	100	13	13	0
101	7	7	0	1073	6	6	0	101	17	17	0	101	14	14	0	101	12	12	0	101	13	13	0
102	7	7	0	1077	6	6	0	102	17	16	1	1070	14	12	2	1063	12	11	1	1056	13	13	0
104	7	7	0	1091	6	6	0	108	17	17	0	1071	14	14	0	1070	12	12	0	1063	13	13	0
108	7	7	0	1099	6	6	0	1070	17	17	0	1072	14	14	0	1071	12	12	0	1070	13	13	0
181	7	7	0	1909	6	6	0	1071	17	17	0	1073	14	12	2	1072	12	11	1	1071	13	13	0
1033	7	7	0	1916	6	6	0	1073	16	16	0	1091	14	14	0	1073	12	12	0	1072	12	12	0
1063	7	7	0	1947	6	6	0	1091	16	16	0	1909	13	13	0	1077	11	11	0	1073	12	12	0
1064	7	7	0	1950	6	6	0	1909	16	16	0	1916	13	13	0	1091	11	11	0	1091	12	12	0
1070	7	7	0	15100	6	6	0					1950	13	12	1	1909	11	10	1	1909	12	12	0
1071	7	7	0	155214	6	6	0					15100	13	13	0	1947	11	11	0	1947	12	12	0
				1066	6	6	0									1950	11	11	0	1950	12	12	0
																15100	11	11	0				

Reliance CDMA				Reliance GSM				TATA CDMA				TATA GSM				Vodafone			
Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect	Level 1 sevice No	Total calls made	Able to connect	Not able to connect
100	15	15	0	100	15	15	0	100	14	14	0	100	13	13	0	100	15	15	0
101	15	15	0	101	15	15	0	101	14	14	0	101	13	13	0	101	15	15	0
1063	15	15	0	1063	15	15	0	1063	14	14	0	1063	13	13	0	1063	15	15	0
1070	15	15	0	1070	15	15	0	1070	14	14	0	1070	13	13	0	1070	15	15	0
1071	15	15	0	1071	15	15	0	1071	14	14	0	1071	13	13	0	1071	15	15	0
1073	15	15	0	1073	15	15	0	1073	14	14	0	1073	13	13	0	1073	15	15	0
1091	15	15	0	1091	15	15	0	1091	14	14	0	1091	12	12	0	1091	15	15	0
1909	15	15	0	1909	15	15	0	1909	13	13	0	1909	12	12	0	1909	15	15	0
1947	15	15	0	1947	15	15	0	1947	13	13	0	1947	12	12	0	1947	15	15	0
15100	15	15	0	15100	15	15	0	1950	13	13	0	1950	12	12	0	15100	15	15	0
1066				1066				1066	13	13	0	15100	12	12	0				
												1066	12	12	0				

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

8.15 COUNTER DETAILS

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

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

8.15.1 ERICSSON

Ericsson provides network support to Idea, Vodafone, Aircel, BSNL, Reliance GSM and Tata 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.

8.15.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Airtel in the circle.

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

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

8.15.3 HUAWEI

Huawei provides network support to Reliance CDMA in the circle.

HUAWEI CDMA		
SR .NO	KPI	HUAWEI FORMULA
1	CALL SETUP SUCCES (NUM)	[Successful CS IS-95 Orig Call Setups + Successful CS IS-2000 Orig Call Setups + Successful CS IS-95 Term Call Setups + Successful CS IS-2000 Term Call Setups] ([1157628567] + [1157628587] + [1157628568] + [1157628588])

2	CALL SETUP SUCCES (DEN)	[CS IS-95 Orig Attempts + CS IS-2000 Orig Attempts + CS IS-95 Term Attempts + CS IS-2000 Term Attempts] ([1157628553] + [1157628573] + [1157628554] + [1157628574])
3	CALL SETUP SUCCESS RATE (%)	CALL SETUP SUCCES (NUM) / CALL SETUP SUCCES (DEN) * 100\
4	CALL DROP RATE (NUM)	[CS IS-95 Call Drops (Too many Erasure frames) + CS IS-2000 Call Drops (Too many Erasure frames) + CS IS-95 Call Drops (No reverse frame received) + CS IS-2000 Call Drops (No reverse frame received) + CS IS-95 Call Drops (Abis interface abnormal) + CS IS-2000 Call Drops (Abis interface abnormal) + CS IS-95 Call Drops (A2 interface abnormal) + CS IS-2000 Call Drops (A2 interface abnormal) + CS IS-95 Call Drops (HHO fail) + CS IS-2000 Call Drops (HHO fail) + CS IS-95 Call Drops (Other causes) + CS IS-2000 Call Drops (Other causes)] ([1157628608] + [1157628614] + [1157628609] + [1157628615] + [1157628610] + [1157628616] + [1157628611] + [1157628617] + [1157628612] + [1157628618] + [1157628613] + [1157628619])
5	CALL DROP RATE(DEN)	[Successful CS IS-95 Orig Call Setups + Successful CS IS-2000 Orig Call Setups + Successful CS IS-95 Term Call Setups + Successful CS IS-2000 Term Call Setups + CS IS-95 Successful Incoming Hard HOs + CS IS-2000 Successful Incoming Hard HOs] [1157628619]) x 100/([1157628567] + [1157628587] + [1157628568] + [1157628588] + [1157628569] + [1157628589])]
6	Call DROP Rate	CALL DROP RATE (NUM) / CALL DROP RATE(DEN) * 100\
7	RF BLOCK RATE (NUM)	{[(TCH Assignment Requests-CS Orig-IS95[Times] + TCH Assignment Requests-CS Orig-IS2000[Times] + TCH Assignment Requests-CS Term-IS95[Times] + TCH Assignment Requests-CS Term-IS2000[Times]) - (Successful TCH Assignments-CS Orig-IS95[Times] + Successful TCH Assignments-CS Orig-IS2000[Times] + Successful TCH Assignments-CS Term-IS95[Times] + Successful TCH Assignments-CS Term-IS2000[Times])] {[(1157628621 + 1157628628 + 1157628635+ 1157628642)
8	RF BLOCK RATE (DEN)	[(TCH Assignment Requests-CS Orig-IS95[Times] + TCH Assignment Requests-CS Orig-IS2000[Times] + TCH Assignment Requests-CS Term-IS95[Times] + TCH Assignment Requests-CS Term-IS2000[Times]))]} [(1157628621 + 1157628628 + 1157628635+ 1157628642)]}
9	RF BLOCK RATE	RF BLOCK RATE (NUM) / RF BLOCK RATE (DEN) *100
10	Call Quality (RFER)	CS Reverse Link Average FER of Carrier[%]

8.15.4 ZTE

ZTE provides network support to Tata CDMA and MTS in the circle.

1. Connection Establishment (Accessibility)

A. CALL SETUP SUCCESS RATE:

KPI is calculated as Average over the month at TCBH

((1-C900060053/(C900060003+C900060010+C900060038))*(1-
((C900060005+C900060011+C900060039)/(C900060003+C900060010+C900060038)))*(1-
((C900060020+C900060031+C900060043+C900060047)/(C900060019+C900060030+C900060042+C900060046
))*(1-
((C900060018+C900060029+C900060037+C900060135+C900060200+C900060211)/(C900060017+C900060028
+C900060036+C900060018+C900060029+C900060037+C900060235+C900060199+C900060210+C900060135
+C900060200+C900060211)))*100

Where,

C900060053	Number of SDCCH drops
C900060003	Number of SDCCH seizure attempts for assignment
C900060010	Number of signaling TCH/F seizure attempts for assignment
C900060038	Number of signaling TCH/H seizure attempts for assignment
C900060005	Number of SDCCH seizure failure for assignment
C900060011	Number of signaling TCH/F seizure failure for assignment
C900060039	Number of signaling TCH/H seizure failure for assignment
C900060020	Number of voice TCH/F seizure failure for assignment
C900060031	Number of data TCH/F seizure failure for assignment
C900060043	Number of voice TCH/H seizure failure for assignment
C900060047	Number of data TCH/H seizure failure for assignment
C900060019	Number of voice TCH/F seizure attempts for assignment
C900060030	Number of data TCH/F seizure attempts for assignment
C900060042	Number of voice TCH/H seizure attempts for assignment
C900060046	Number of data TCH/H seizure attempts for assignment
C900060018	Number of signaling TCH/F assignment failure for assignment
C900060029	Number of voice TCH/F assignment failure for assignment

C900060037	Number of data TCH/F assignment failure
C900060135	Number of signaling TCH/H assignment failure
C900060200	Number of Voice TCH/H assignment failure
C900060211	Number of data TCH/H assignment failure
C900060017	Number of signaling TCH/F assignment success for assignment
C900060028	Number of voice TCH/F assignment success
C900060036	Number of data TCH/F assignment success
C900060235	Number of signaling TCH/H assignment success
C900060199	Number of Voice TCH/H assignment success
C900060210	Number of data TCH/H assignment success

B. SDCCH BLOCKING:

KPI is calculated as Average over the month at TCBH

(C900060005+C900060011+C900060039)/(C900060003+C900060010+C900060038)

Where,

C900060005	Number of SDCCH seizure failure for assignment
C900060011	Number of signaling TCH/F seizure failure for assignment
C900060039	Number of signaling TCH/H seizure failure for assignment
C900060003	Number of SDCCH seizure attempts for assignment
C900060010	Number of signaling TCH/F seizure attempts for assignment
C900060038	Number of signaling TCH/H seizure attempts for assignment

C. TCH BLOCKING:

KPI is calculated as Average over the month at TCBH

(C900060020+C900060031+C900060043+C900060047)/(C900060019+C900060030+C900060042+C900060046)

Where,

C900060020	Number of voice TCH/F seizure failure for assignment
C900060031	Number of data TCH/F seizure failure for assignment
C900060043	Number of voice TCH/H seizure failure for assignment
C900060047	Number of data TCH/H seizure failure for assignment
C900060019	Number of voice TCH/F seizure attempts for assignment

C900060030	Number of data TCH/F seizure attempts for assignment
C900060042	Number of voice TCH/H seizure attempts for assignment
C900060046	Number of data TCH/H seizure attempts for assignment

2. Connection Maintenance (Retainability)

A. TCH drop:

KPI is calculated as Average over the month at TCBH

(C900060054+C900060055)/(C900060028+C900060036+C900060199+C900060210+C900060098+C900060102 -(C900060094+C900060095))

Where,

C900060054	Number of TCH/F drops
C900060055	Number of TCH/H drops
C900060028	Number of voice TCH/F assignment success
C900060036	Number of data TCH/F assignment success
C900060199	Number of Voice TCH/H assignment success
C900060210	Number of data TCH/H assignment success
C900060098	Number of BSC-controlled inter-cell incoming handover success
C900060102	Number of MSC-controlled incoming handover success
C900060094	Number of BSC-controlled inter-cell outgoing handover success
C900060095	Number of MSC-controlled outgoing handover

C900060030	Number of data TCH/F seizure attempts for assignment
C900060042	Number of voice TCH/H seizure attempts for assignment
C900060046	Number of data TCH/H seizure attempts for assignment

2. Connection Maintenance (Retainability)

A. TCH drop:

KPI is calculated as Average over the month at TCBH

(C900060054+C900060055)/(C900060028+C900060036+C900060199+C900060210+C900060098+C900060102 -(C900060094+C900060095))

Where,

C900060054	Number of TCH/F drops
C900060055	Number of TCH/H drops
C900060028	Number of voice TCH/F assignment success
C900060036	Number of data TCH/F assignment success
C900060199	Number of Voice TCH/H assignment success
C900060210	Number of data TCH/H assignment success
C900060098	Number of BSC-controlled inter-cell incoming handover success
C900060102	Number of MSC-controlled incoming handover success
C900060094	Number of BSC-controlled inter-cell outgoing handover success
C900060095	Number of MSC-controlled outgoing handover

B. Total No. of cells exceeding 3% TCH drop (call drop):

Total no of cells with TCH drop>3%

C. Total No. of cells in the Network:

Active cell from last day of the month.

D. Worst affected cells having more than 3% TCH drop (call drop) rate:

(Total no. of cells with TCH drop>3%/Total no. of cells of on air sites)*100

E. %age of Connection with Good Voice Quality:

KPI is calculated as Average over the month at TCBH

(C900060074+C900060075+C900060076+C900060077+C900060078+C900060079)/(C900060074+C900060075+C900060076+C900060077+C900060078+C900060079+C900060080+C900060081)*100

Where,

C900060074	Number of samples with DL RQ = 0
C900060075	Number of samples with DL RQ = 1
C900060076	Number of samples with DL RQ = 2
C900060077	Number of samples with DL RQ = 3
C900060078	Number of samples with DL RQ = 4
C900060079	Number of samples with DL RQ = 5
C900060079	Number of samples with DL RQ = 5
C900060080	Number of samples with DL RQ = 6
C900060081	Number of samples with DL RQ = 7

9 ANNEXURE – OCTOBER

1. Network Availability

Audit Results for Network Availability- PMR data-October

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2699	5870	2418	3598	906	815	2506	26	533	7072
Sum of downtime of BTSs in a month (in hours)		41797	633	107186	1378	1031	1226	2921	0	53	1747
BTSs accumulated downtime (not available for service)	≤ 2%	2.08%	0.01%	5.96%	0.05%	0.15%	0.20%	0.16%	0.00%	0.01%	0.03%
Number of BTSs having accumulated downtime >24 hours		226	2	764	8	0	1	11	0	0	15
Worst affected BTSs due to downtime	≤ 2%	8.37%	0.03%	31.60%	0.22%	0.00%	0.12%	0.44%	0.00%	0.00%	0.21%

Live Measurement Results for Network Availability- 3 Day live data-October											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2701	5873	2418	3598	908	815	2506	26	533	7051
Sum of downtime of BTSs in a month (in hours)		4502	5158	8759	156	105	202	316	0	2	84
BTSs accumulated downtime (not available for service)	≤ 2%	2.31%	1.22%	5.03%	0.06%	0.16%	0.34%	0.18%	0.00%	0.01%	0.02%
Number of BTSs having accumulated downtime >24 hours		58	0	50	1	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	2.15%	0.00%	2.07%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-October

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.50%	98.74%	98.11%	98.89%	99.73%	98.86%	98.62%	98.85%	98.72%	99.43%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.63%	0.29%	3.28%	0.07%	NA	NA	0.03%	NA	0.09%	0.25%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.34%	1.57%	0.95%	0.58%	0.01%	0.02%	0.12%	0.01%	0.34%	0.57%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-October

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.33%	98.73%	97.74%	99.40%	99.82%	98.55%	98.59%	99.13%	99.20%	99.78%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.59%	0.36%	3.80%	0.04%	NA	NA	0.03%	NA	0.02%	0.20%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.39%	1.51%	1.11%	0.15%	0.01%	0.03%	0.13%	0.00%	0.06%	0.22%

Drive test results for CSSR (Average of three drive tests) and blocked calls-October- Drive Test Data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		597	530	231	501	437	584	428	608	514	552
Total number of successful calls established		593	530	227	501	437	580	422	606	514	552
CSSR	≥ 95%	99.33%	100.00%	98.27%	100.00%	100.00%	99.32%	98.60%	99.67%	100.00%	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		0.67%	0.00%	1.73%	0.00%	0.00%	0.68%	1.40%	0.33%	0.00%	0.00%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-October-PMR data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		116571216	335496899	50180551	133524554	49297710	17629589	109451620	325033	13207991	448552745
Total number of		1786192	4178867	648405	572944	395563	43806	684912	2038	76391	4090468

calls dropped											
Call drop rate	≤ 2%	1.53%	1.25%	1.29%	0.43%	0.80%	0.25%	0.63%	0.63%	0.58%	0.91%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7923	18747	7063	10846	3214	2448	7510	76	1395	21265
Total number of cells having more than 3% TCH		1083	325	1112	43	72	24	6	3	39	621
Worst affected cells having more than 3% TCH	≤ 3%	13.67%	1.73%	15.74%	0.40%	2.24%	0.98%	0.08%	3.78%	2.79%	2.92%

Live measurement results for Call drop rate and for number of cells having more than 3% TCH-October- 3 Day data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		10982374	32383896	5259695	144967771	65299693	1785546	9757210	517906	16100766	506154275
Total number of		175862	397598	68653	484093	385248	4828	61112	2055	93801	3559389

calls dropped											
Call drop rate	≤ 2%	1.60%	1.23%	1.31%	0.33%	0.59%	0.27%	0.63%	0.40%	0.58%	0.70%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7704	56107	7063	780912	3187	2448	7507	76	1596	21201
Total number of cells having more than 3% TCH		1163	999	1143	507	63	18	5	2	56	623
Worst affected cells having more than 3% TCH	≤ 3%	15.10%	1.78%	16.18%	0.06%	1.98%	0.74%	0.07%	2.18%	3.53%	2.94%

Drive test results for Call drop rate (Average of three drive tests)-October - Drive Test Data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		597	530	227	501	437	580	428	606	514	552
Total number of		10	0	7	1	1	4	6	1	1	0

calls dropped											
Call drop rate	≤ 2%	1.68%	0.00%	3.08%	0.20%	0.19%	0.69%	1.40%	0.17%	0.19%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data-October

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		19252847824	93122692178	7002	17544596622	49297710	NA	14872720897	34919481	22309842	75429562104
Total number of calls with good voice quality		18239118245	88920207112	6655	16671159990	49248412	NA	14636656671	34203508	21791191	71733794706
%age calls with good voice quality	≥ 95%	94.73%	95.49%	95.04%	95.02%	99.90%	99.67%	98.41%	97.95%	97.68%	95.10%

Live measurement results for Voice quality-3 Day data-October

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1942175684	8766875427	706	18200173071	6529693	NA	1441062186	20187878	2916673797	75992871484
Total number of calls with good voice quality		1840591371	8362951615	671	17468576373	6513389 1	NA	1417304423	19767867	2857835116	73010211307

%age calls with good voice quality	≥ 95%	94.77%	95.39%	95.04%	95.98%	99.75%	99.67%	98.35%	97.92%	97.98%	96.08%

Drive test results for Voice quality (Average of three drive tests) - DT data-October

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		859112	123642	376205	745271	64085	185866	121420	67812	56364	1216565
Total number of calls with good voice quality		804583	119920	358440	701438	61688	181151	115377	65155	55336	1176223
%age calls with good voice quality	≥ 95%	93.65%	96.99%	95.28%	94.12%	96.26%	97.46%	95.02%	96.08%	98.18%	96.68%

5. POI Congestion

Audit Results for POI Congestion- PMR data-October

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	76	108	36	21	46	65	19	45
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of		74770	136655	92210	104204	55930	7651	36626	13319	5901	330951

all POIs (A) - in erlangs											
Traffic served for all POIs (B)- in erlangs		34661	79968	16451	60214	25947	2436	19118	2803	1557	178290
POI congestion	≤ 0.5%	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-October

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	76	108	36	21	46	60	20	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		72944	411343	92036	103570	56275	7851	37316	13320	5999	331135
Traffic served for all POIs (B)- in erlangs		36084	222948	17065	59990	26065	2904	20731	3073	1590	172570
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

10 ANNEXURE – NOVEMBER

1. Network Availability

Audit Results for Network Availability- PMR data-November											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2699	5901	2418	3601	904	815	2506	26	256	7153
Sum of downtime of BTSs in a month (in hours)		38540	629	85276	1517	1128	2526	4725	8	101	1326
BTSs accumulated downtime (not available for service)	≤ 2%	1.92%	0.01%	4.74%	0.06%	0.17%	0.42%	0.25%	0.04%	0.05%	0.02%
Number of BTSs having accumulated downtime >24 hours		212	0	687	12	0	7	20	0	0	10
Worst affected BTSs due to downtime	≤ 2%	7.85%	0.00%	28.41%	0.33%	0.00%	0.86%	0.80%	0.00%	0.00%	0.14%
Live Measurement Results for Network Availability- 3 Day live data-November											

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2699	5895	2418	3599	904	815	2506	26	256	7136
Sum of downtime of BTSs in a month (in hours)		3599	26	3941	111	118	105	311	0	14	106
BTSs accumulated downtime (not available for service)	≤ 2%	1.85%	0.01%	2.26%	0.04%	0.18%	0.18%	0.17%	0.00%	0.08%	0.02%
Number of BTSs having accumulated downtime >24 hours		46	0	17	1	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	1.70%	0.00%	0.70%	0.03%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-November

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.43%	98.95%	98.13%	98.80%	99.68%	98.97%	98.58%	98.81%	98.60%	99.37%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.67%	0.23%	2.73%	0.10%	NA	NA	0.06%	NA	0.07%	0.36%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.24%	1.22%	1.10%	0.56%	0.10%	0.02%	0.15%	0.01%	0.35%	0.63%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-November

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.64%	99.01%	97.62%	99.42%	99.71%	99.13%	98.55%	98.97%	99.17%	99.73%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.49%	0.18%	3.83%	0.03%	NA	NA	0.21%	NA	0.14%	0.21%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.11%	1.04%	1.48%	0.18%	0.14%	0.01%	0.15%	0.01%	0.06%	0.27%

Drive test results for CSSR (Average of three drive tests) and blocked calls-November- Drive Test Data

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone

Total number of call attempts		628	653	456	606	656	599	600	485	474	654
Total number of successful calls established		612	653	439	606	530	590	590	485	474	654
CSSR	≥ 95%	97.45%	100.00%	96.27%	100.00%	80.79%	98.50%	98.33%	100.00%	100.00%	100.00%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		2.55%	0.00%	3.73%	0.00%	19.21%	1.50%	1.67%	0.00%	0.00%	0.00%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-November-PMR data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		109254761	313290290	51756199	126178706	43320955	16415881	105258131	319569	7828067	410955619
Total number of calls dropped		1507458	3940955	574330	607739	357184	38707	674147	2026	49361	3656526
Call drop	≤ 2%	1.38%	1.26%	1.11%	0.48%	0.82%	0.24%	0.64%	0.63%	0.63%	0.89%

rate											
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		8056	18842	7063	10855	3263	2448	7510	76	769	21507
Total number of cells having more than 3% TCH		868	345	784	42	77	19	4	4	22	637
Worst affected cells having more than 3% TCH	≤ 3%	10.77%	1.83%	11.10%	0.39%	2.36%	0.78%	0.05%	5.22%	2.85%	2.96%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH-November- 3 Day data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		10851112	31025531	3589379	147830464	61639858	1670846	9830787	465250	9405705	491801785
Total number of calls dropped		149143	395642	45492	500085	352785	3794	63160	2327	54989	3204777
Call drop rate	≤ 2%	1.37%	1.28%	1.27%	0.34%	0.57%	0.23%	0.64%	0.50%	0.58%	0.65%
Cells having	Benchma	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance	Reliance	TATA	TATA GSM	Vodafone

more than 3% TCH	rk						CDMA	GSM	CDMA		
Total number of cells in the network		8063	56493	7063	3599	3255	2448	7510	76	769	21456
Total number of cells having more than 3% TCH		860	1028	824	79	76	23	9	4	22	629
Worst affected cells having more than 3% TCH	≤ 3%	10.67%	1.82%	11.67%	2.20%	2.33%	0.94%	0.12%	5.70%	2.90%	2.93%

Drive test results for Call drop rate (Average of three drive tests)-November - Drive Test Data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		612	653	441	606	530	590	590	485	474	654
Total number of calls dropped		1	0	13	0	18	3	10	0	1	0
Call drop rate	≤ 2%	0.16%	0.00%	2.95%	0.00%	3.40%	0.51%	1.69%	0.00%	0.21%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data-November

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		20753069832	108205486942	7027	18661518236	43320955	NA	15565199571	34930776	1406760343	73686503348
Total number of calls with good voice quality		19807057685	103480851076	6679	17747542728	43290925	NA	15314685767	34222095	1369877058	70084907214
%age calls with good voice quality	≥ 95%	95.44%	95.63%	95.05%	95.10%	99.93%	99.67%	98.39%	97.97%	97.38%	95.11%

Live measurement results for Voice quality-3 Day data-November

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		2045107261	9559603871	724	19058647480	61821632	NA	1544222117	1932749	1665437388	75388819797
Total number of calls with good voice quality		1952293554	9094115432	688	18280925132	61518355	NA	1519376080	1891704 1	1626182236	72483270721
%age calls with good voice quality	≥ 95%	95.46%	95.13%	95.03%	95.92%	99.51%	99.67%	98.39%	97.88%	97.64%	96.15%

Drive test results for Voice quality (Average of three drive tests) - DT data-November											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		878647	154628	679184	840332	77040	202914	220507	54216	58100	1445557
Total number of calls with good voice quality		829350	150442	638212	790853	68356	175743	196486	52461	57043	1399508
%age calls with good voice quality	≥ 95%	94.39%	97.29%	93.97%	94.11%	88.73%	86.61%	89.11%	96.76%	98.18%	96.81%

5. POI Congestion

Audit Results for POI Congestion- PMR data-November											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		60	37	74	107	37	21	46	65	21	45
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of		74076	137065	91292	103173	56027	7921	37316	13055	6135	331480

all POIs (A) - in erlangs											
Traffic served for all POIs (B)- in erlangs		38150	83176	17948	62117	25467	2582	19798	2353	1631	198269
POI congestion	≤ 0.5%	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(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	74	107	36	21	46	60	21	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		74522	409693	90827	102843	56071	7851	37316	12962	6628	330840
Traffic served for all POIs (B)- in erlangs		38211	211031	16895	61397	26880	2544	21280	2134	1689	175947
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

11 ANNEXURE - DECEMBER

1. Network Availability

Audit Results for Network Availability- PMR data-December

	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2705	5941	2418	3603	910	815	2506	26	256	7211
Sum of downtime of BTSs in a month (in hours)		35130	556	87096	1279	1090	2948	6574	0	48	1682
BTSs accumulated downtime (not available for service)	≤ 2%	1.75%	0.01%	4.84%	0.05%	0.16%	0.49%	0.35%	0.00%	0.03%	0.03%
Number of BTSs having accumulated downtime >24 hours		195	0	750	4	0	10	24	0	0	8
Worst affected BTSs due to downtime	≤ 2%	7.21%	0.00%	31.02%	0.11%	0.00%	1.23%	0.96%	0.00%	0.00%	0.11%

Live Measurement Results for Network Availability- 3 Day live data-December											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		2704	5931	2418	3603	908	815	2506	26	256	7187
Sum of downtime of BTSs in a month (in hours)		3572	69	6831	159	90	203	643	0	2	55
BTSs accumulated downtime (not available for service)	≤ 2%	1.83%	0.02%	3.92%	0.06%	0.14%	0.35%	0.36%	0.00%	0.01%	0.01%
Number of BTSs having accumulated downtime >24 hours		33	0	15	2	0	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	1.22%	0.00%	0.62%	0.06%	0.00%	0.04%	0.00%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-December

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.15%	99.10%	98.48%	98.80%	99.72%	98.33%	98.78%	99.00%	98.92%	99.32%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.43%	0.18%	1.82%	0.08%	NA	NA	0.02%	NA	0.03%	0.27%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	1.21%	1.26%	1.02%	0.55%	0.08%	0.05%	0.12%	0.00%	0.10%	0.68%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-December

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	97.26%	99.15%	98.52%	99.55%	99.77%	98.43%	98.74%	99.07%	99.33%	99.77%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.22%	0.15%	1.76%	0.03%	NA	NA	0.02%	NA	0.02%	0.18%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
TCH congestion	≤ 2%	0.91%	1.32%	1.08%	0.16%	0.01%	0.03%	0.13%	0.00%	0.04%	0.23%

Drive test results for CSSR (Average of three drive tests) and blocked calls-December- Drive Test Data											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		272	638	NP	300	254	629	474	248	289	431
Total number of successful calls established		268	638	NP	290	251	602	453	246	288	427
CSSR	≥ 95%	98.53%	100.00%	NP	96.67%	98.82%	95.71%	95.57%	99.19%	99.65%	99.07%
Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
%age blocked calls		1.47%	0.00%	NP	3.33%	1.18%	4.29%	4.43%	0.81%	0.35%	0.93%

3. Connection Maintenance (Retainability)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-December-PMR data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		108033322	315323898	50380665	130921549	43940690	15680067	61804135	318628	7592612	397609692
Total number of calls		1437749	3332533	563293	539455	303571	34270	357241	1861	44591	3177454

dropped											
Call drop rate	≤ 2%	1.33%	1.06%	1.12%	0.41%	0.69%	0.22%	0.58%	0.58%	0.59%	0.80%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7896	18959	7063	10861	3284	2445	7518	74	770	21681
Total number of cells having more than 3% TCH		776	322	1107	42	68	18	3	2	22	629
Worst affected cells having more than 3% TCH	≤ 3%	9.83%	1.70%	15.67%	0.39%	2.07%	0.74%	0.04%	3.32%	2.79%	2.90%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH-December- 3 Day data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		10223667	29841532	5224261	147097358	60421597	1620242	5796707	424194	7991126	478592183
Total number of calls dropped		131977	291628	50060	436930	271136	3785	73038	1640	39100	2777936
Call drop	≤ 2%	1.29%	0.98%	0.96%	0.30%	0.45%	0.23%	1.26%	0.39%	0.49%	0.58%

rate											
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cells in the network		7726	56791	7063	10861	3278	2448	2448	76	771	21609
Total number of cells having more than 3% TCH		686	844	919	87	57	19	2	2	17	621
Worst affected cells having more than 3% TCH	≤ 3%	8.88%	1.49%	13.01%	0.80%	1.74%	0.78%	0.08%	2.63%	2.20%	2.87%
Drive test results for Call drop rate (Average of three drive tests)-December - Drive Test Data											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		258	638	NP	290	251	602	453	246	288	427
Total number of calls dropped		0	0	NP	1	0	11	3	1	1	0
Call drop rate	≤ 2%	0.00%	0.00%	NP	0.34%	0.00%	1.83%	0.66%	0.41%	0.35%	0.00%

4. Voice quality

Audit Results for Voice quality -PMR Data-December

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		20841258176	101418570195	7041	20393823675	43940690	NA	909558071 9	33443249	1387291039	72161249221
Total number of calls with good voice quality		19916781895	97050504846	6693	19409831720	43697276	NA	893458675	32762459	1352746152	68902113355
%age calls with good voice quality	≥ 95%	95.56%	95.69%	95.06%	95.18%	99.45%	99.68%	98.23%	97.96%	97.51%	95.48%

Live measurement results for Voice quality-3 Day data-December

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1971765518	8639218072	729	40409867170	60421597	NA	928212864	18341408	143478801	75234462134
Total number of calls with good voice quality		1884767986	8242869058	693	39678001705	60123597	NA	911411074	17961083	140549265	72740626887
%age calls with good voice quality	≥ 95%	95.59%	95.41%	95.06%	98.19%	99.51%	99.67%	98.19%	97.93%	97.96%	96.69%

Drive test results for Voice quality (Average of three drive tests) - DT data-December

Voice	Benchma	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance	Reliance	TATA	TATA GSM	Vodafone

quality	rk						CDMA	GSM	CDMA		
Total number of sample calls		828409	1844675	NP	603753	77057	NA	80478	1234376	958762	1256013
Total number of calls with good voice quality		776753	1775916	NP	516173	75521	NA	74829	1200214	926318	1203150
%age calls with good voice quality	≥ 95%	93.76%	96.27%	NP	85.49%	98.01%	87.92%	92.98%	97.23%	96.62%	95.79%

5. POI Congestion

Audit Results for POI Congestion- PMR data-December

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	74	108	37	21	46	59	20	46
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		74076	141720	90932	104013	56026	7921	37316	12164	6345	333882
Traffic served for all POIs (B)-		38150	79725	17057	62888	24915	2476	18993	2136	1524	175799

in erlangs											
POI congestion	≤ 0.5%	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(DWL)	Airtel	BSNL	Idea	MTS	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		59	37	74	108	37	21	46	59	21	44
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		75107	420376	90951	104147	56027	7851	37316	12164	6345	339598
Traffic served for all POIs (B)- in erlangs		38138	212203	17271	62311	25867	2555	18821	1906	1476	182587
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

12 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'14 – Refers to the quarter of October, November and December 2014
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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