EAST ZONE

TRAI AUDIT WIRELESS REPORT-BIHAR & JHARKHAND CIRCLE – QE SEP'15

Prepared By -

IMRB International | eTech

Prepared For-

TRAI

सत्यमेव जयते

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

1 TABLE OF CONTENTS

2 INTRODUCTION

2.1 ABOUT TRAI

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

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

TRAI initiated a regulation - The Standard of Quality of Service of Basic Telephone Service (Wireline) and Cellular Mobile Telephone Service regulations, 2009 (7 of 2009) dated September 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated July 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-

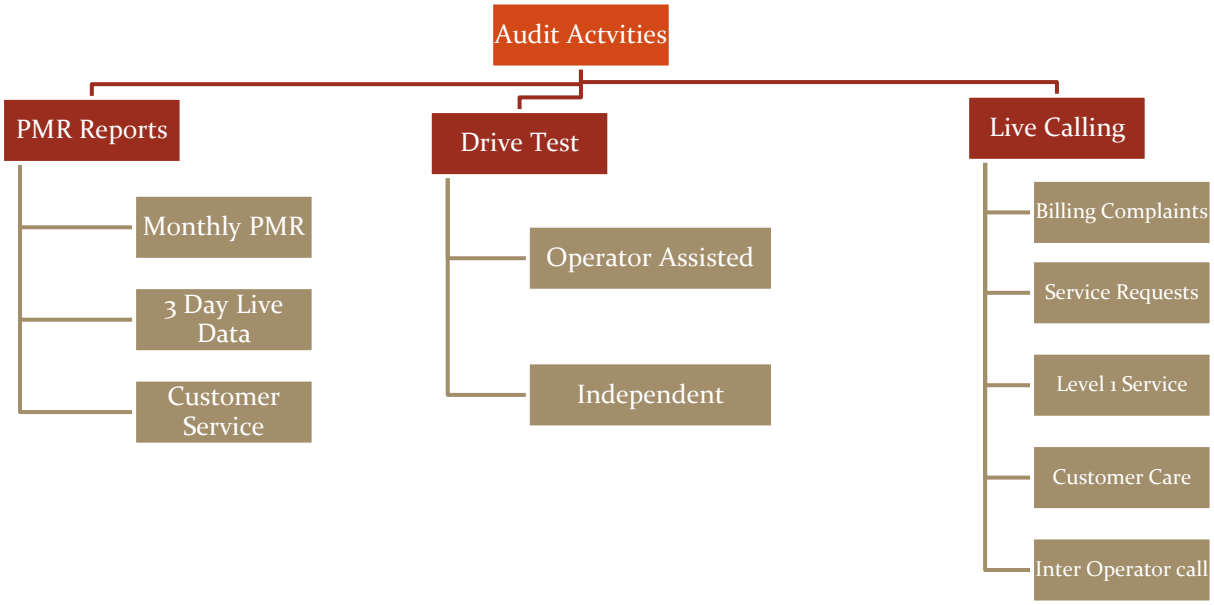
- Audit and Assess the Quality of Services being rendered by Basic (Wireline), Cellular Mobile (Wireless), and Broadband service against the parameters notified by TRAI. (The parameters of Quality of Services (QoS) have been specified by in the respective regulations published by TRAI).
- This report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

2.3 COVERAGE

The audit was conducted in Bihar & Jharkhand 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. Accordingly, 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 generated 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 extracted and verified in the first week of the subsequent month of the audit month. For example, August 2015 audit data was collected in the month of September 2015.

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

The raw data extracted from operator's systems is used 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 by the IMRB representative with the assistance of the operator at the operator's premises for the month of July, August and September 2015. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.4.1.3 AUDIT PARAMETERS - NETWORK

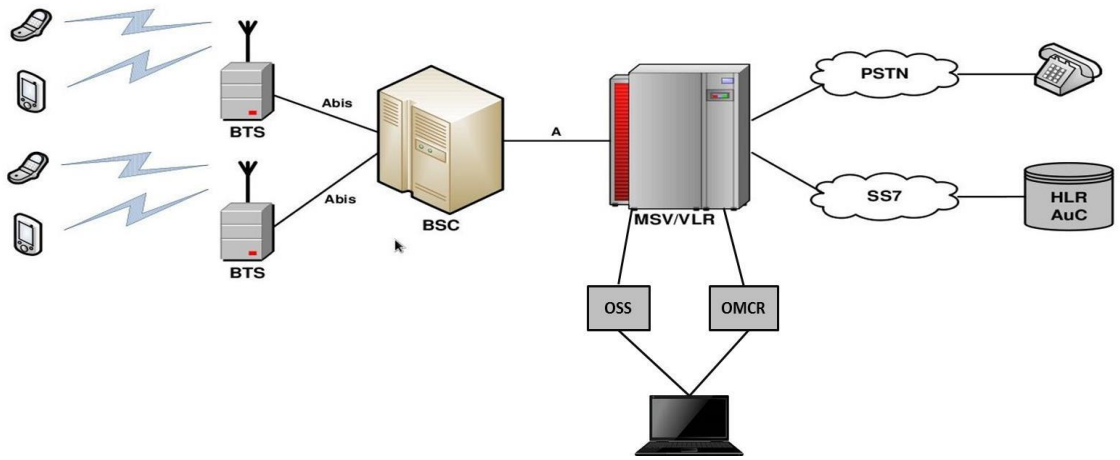
Let us now look at the various parameters involved in the audit reports.

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%

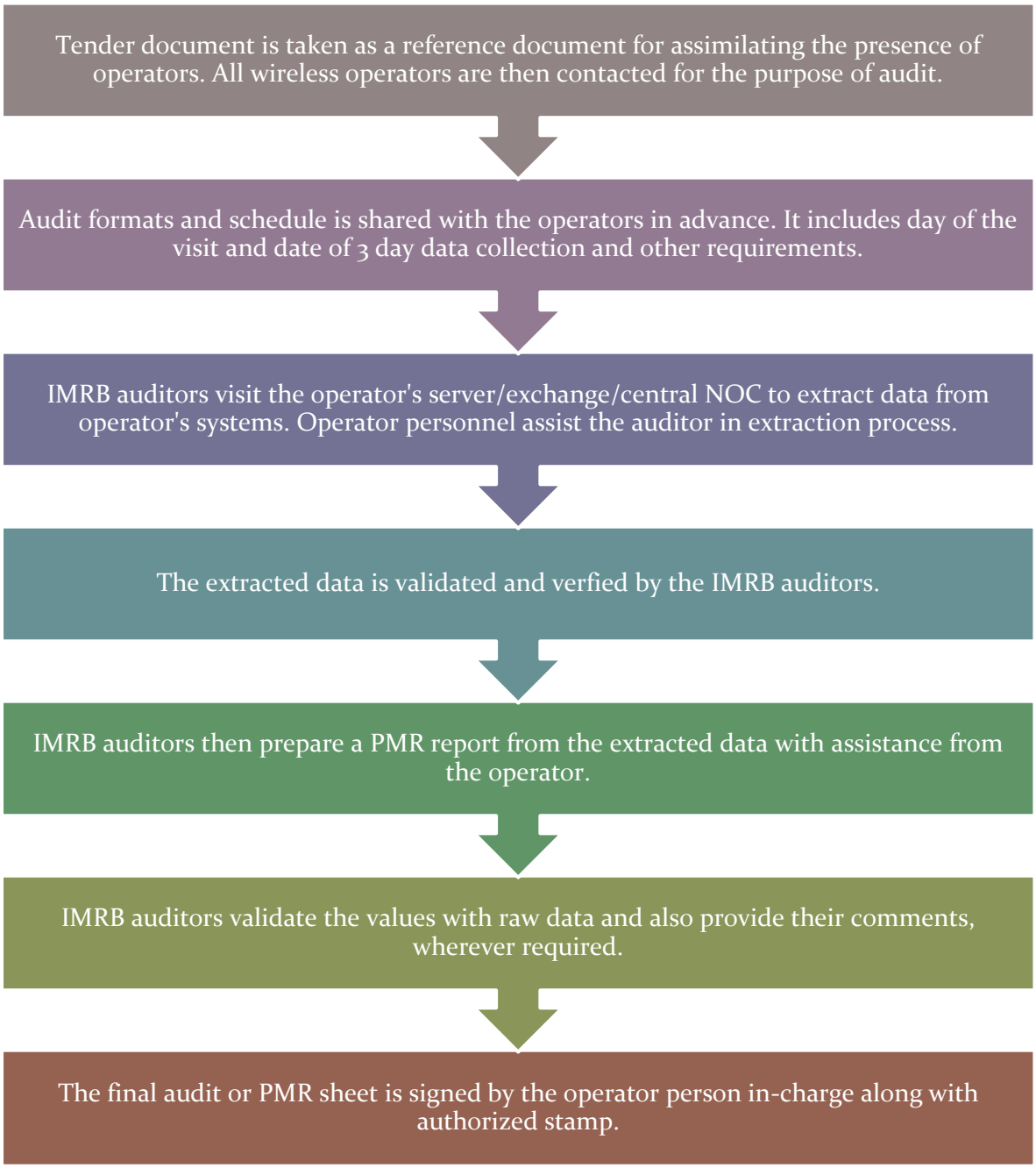
2.4.1.4 POINT OF DATA EXTRACTION

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.



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.

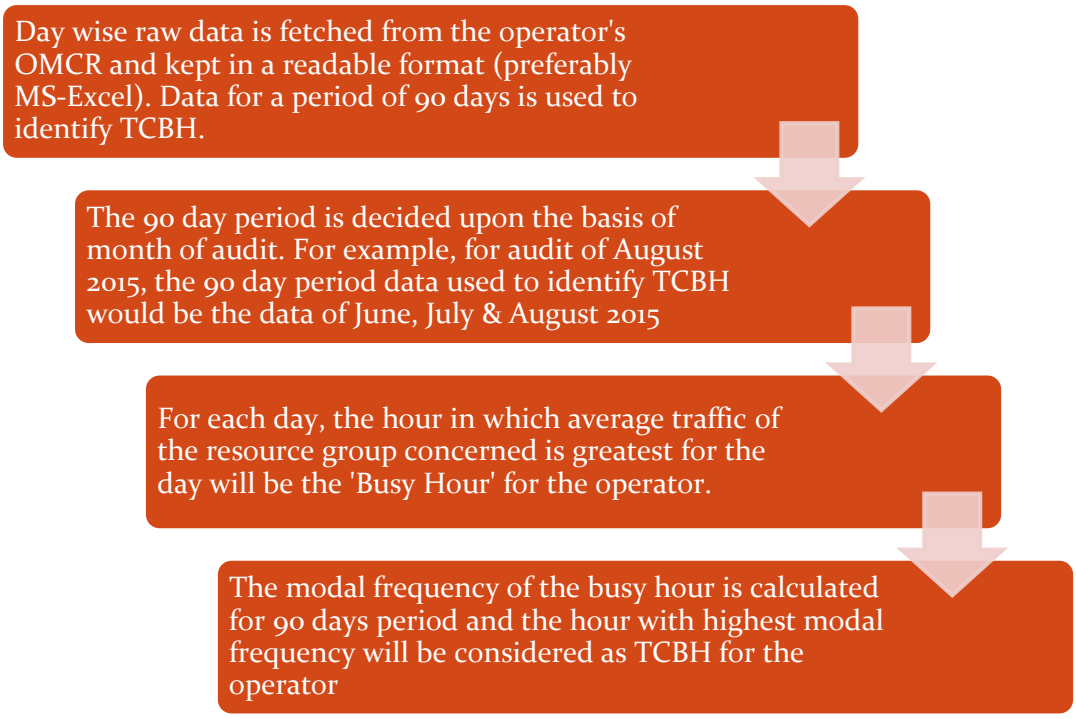
The 3 day live data provides a sample of 9 days in a quarter (3 days each month of a quarter) with hourly performance, which enables the auditor to identify and validate intraday issues for an operator on the QoS network parameters. For example, network congestion being faced by an operator during busy/peak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



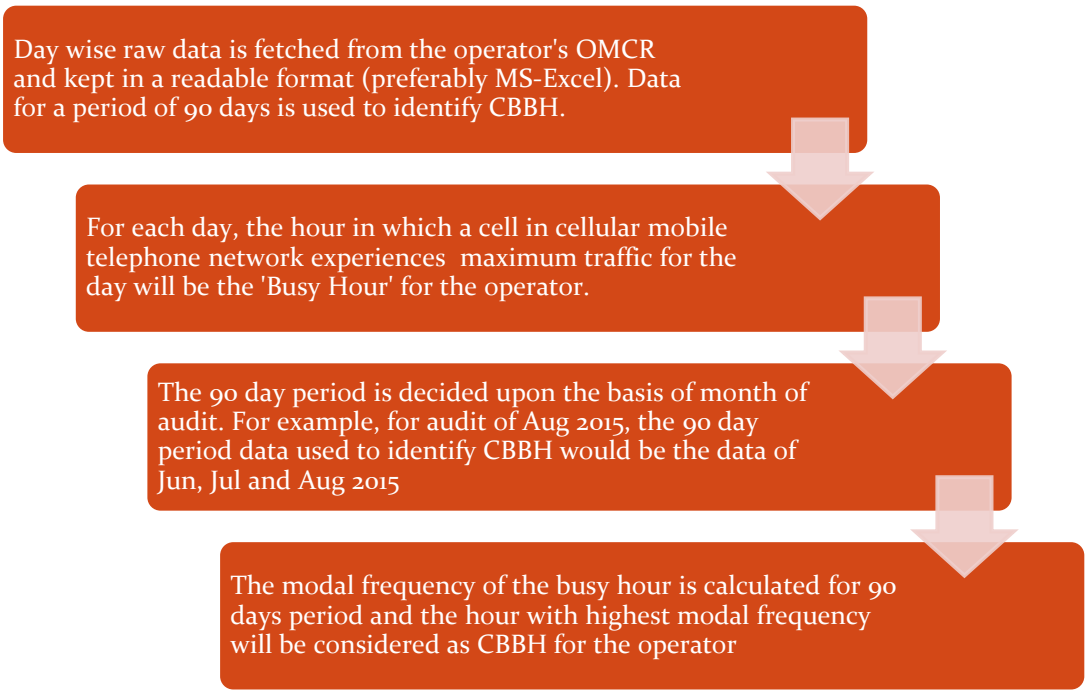
During audit, the auditors identified from the raw data that the TCBH for the operators in JAS'15 was the time period as given below.

Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	18:00-19:00	18:00-19:00	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:



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 September 2015 (JAS'15) was collected in the month of October 2015. 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 September 2015. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of August 2015 was considered for live calling activity conducted in September 2015.

A detailed explanation of each parameter is explained below.

2.4.2.2 BILLING COMPLAINTS

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

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

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

All the complaints related to billing as per clause 3.7.2 of QoS regulation of 20th September, 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.

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

2.4.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

- On visiting the operator's premises (Exchange/Central Server etc.), auditors ask the operator authorized personnel to provide a list of Level 1 services being active in their service. The list should contain a description of the numbers along with dialing code.

- Operators might provide a long list of L1 services. To identify emergency L1 service numbers, auditors check if there is any number that starts with code '10' in that list. If auditors find any emergency number in addition to the below list, that number is also tested during live calling.
- On receiving the list, auditors verify it if the below given list of numbers are active in the service provider's network.
- If there are any other additional numbers provided by the operator, auditors also do live calling on those numbers along with below list.
- If any of these numbers is not active, then we would write the same in our report, auditors write in the report.
- Post verifying the list, auditors do live calling by equally distributing the calls among the various numbers and update the results in the live calling sheet.

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

2.4.2.5 CUSTOMER CARE

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

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

The process for this parameter is stated below.

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

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

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

2.4.3 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.
- 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.

2.4.3.4 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)	4736759
Airtel	25004498
BSNL	1974429
Idea	9832308
Reliance CDMA	2276832
Reliance GSM	6893922
TATA CDMA	240102
TATA GSM	913926
Uninor	5479844
Vodafone	8302310

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

2.6 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

3 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 Bihar 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)	2.77%	17.21%	87.33%	1.56%	11.98%	1.88%	14.02%	95.18%
Airtel	0.08%	0.31%	96.62%	0.87%	1.33%	1.69%	2.42%	95.71%
BSNL	9.70%	24.70%	98.36%	1.98%	2.78%	2.55%	7.11%	97.73%
Idea	0.70%	1.75%	96.26%	0.90%	1.90%	1.21%	2.77%	96.14%
Reliance CDMA	0.52%	1.04%	97.50%	NA	0.03%	0.41%	1.40%	99.80%
Reliance GSM	0.08%	0.27%	95.75%	0.82%	0.09%	0.44%	0.07%	97.99%
TATA CDMA	0.23%	0.00%	97.74%	NA	0.49%	0.83%	4.35%	98.23%
TATA GSM	0.37%	1.84%	97.93%	0.94%	0.62%	0.68%	3.21%	97.36%
Uninor	0.30%	1.61%	94.18%	1.00%	4.62%	0.56%	1.62%	94.98%
Vodafone	0.52%	1.67%	99.07%	0.39%	0.93%	0.99%	2.94%	97.72%

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

Following are the parameter wise observations for Wireless Operators in Bihar & Jharkhand circle:

BTSs Accumulated Downtime:

Aircel and BSNL did not meet the benchmark for the parameter. Minimum BTS accumulated downtime was recorded for Airtel and Reliance GSM at 0.08%.

Worst Affected BTSs Due to Downtime:

Aircel and BSNL failed to meet the benchmark for the parameter. Minimum worst affected BTSs due to downtime was recorded for Tata CDMA at 0.00%.

Call Set-up Success Rate (CSSR):

Aircel and Uninor did not meet the benchmark for CSSR. During the audits, the maximum CSSR was observed for Vodafone with 99.07%.
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:

Aircel and BSNL failed to meet the benchmark on SDCCH / Paging Channel Congestion as well as TCH congestion. Uninor did not meet the benchmark on TCH Congestion.
Vodafone recorded the best performance on SDCCH / Paging Channel Congestion while Reliance CDMA recorded the best performance on 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:

BSNL failed to meet the benchmark for the parameter. Minimum call drop rate was recorded for Reliance CDMA at 0.41%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL, Tata CDMA and Tata GSM failed to meet the benchmark for the parameter. Best performance was recorded for Reliance GSM at 0.07%.

Voice Quality

Uninor failed to meet the benchmark for voice quality. Best performance was recorded for Reliance CDMA at 99.80%.

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

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

3.1.1 PMR DATA – JULY

Name of Service Provider Month July	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)	2.68%	17.70%	88.46%	0.95%	10.82%	1.82%	13.63%	95.06%
Airtel	0.08%	0.30%	98.23%	0.90%	1.60%	1.75%	2.54%	95.55%
BSNL	13.72%	30.69%	98.34%	2.08%	4.29%	3.34%	8.77%	97.49%
Idea	0.71%	1.79%	96.44%	0.95%	1.98%	1.11%	2.74%	96.40%
Reliance CDMA	0.11%	0.00%	97.59%	0.00%	0.02%	0.47%	1.40%	99.81%
Reliance GSM	0.05%	0.09%	95.60%	0.94%	0.07%	0.44%	0.03%	97.88%
TATA CDMA	0.30%	0.00%	97.56%	0.00%	0.63%	0.85%	4.89%	98.17%
TATA GSM	0.51%	3.02%	97.82%	2.03%	0.76%	0.70%	3.00%	97.30%
Uninor	0.32%	1.73%	94.66%	0.89%	4.38%	0.53%	1.47%	94.82%
Vodafone	0.39%	1.05%	99.08%	0.37%	0.92%	1.02%	2.93%	97.78%

3.1.2 PMR DATA – AUGUST

Name of Service Provider Month August	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)	2.51%	16.46%	87.05%	0.93%	12.29%	1.84%	13.84%	95.27%
Airtel	0.08%	0.35%	95.79%	0.90%	1.26%	1.70%	2.43%	95.62%
BSNL	8.81%	22.49%	98.36%	3.75%	3.30%	2.21%	6.36%	98.07%
Idea	0.72%	1.76%	96.22%	0.91%	1.92%	1.31%	2.80%	96.19%
Reliance CDMA	0.77%	1.66%	97.40%	NA	0.04%	0.41%	1.55%	99.80%
Reliance GSM	0.10%	0.44%	95.59%	0.74%	0.08%	0.43%	0.09%	98.20%
TATA CDMA	0.19%	0.00%	98.07%	NA	0.20%	0.94%	5.45%	98.26%
TATA GSM	0.27%	1.25%	98.23%	0.22%	0.45%	0.64%	3.07%	97.33%
Uninor	0.25%	1.24%	94.27%	0.82%	4.43%	0.56%	1.52%	95.11%
Vodafone	0.65%	1.97%	99.07%	0.43%	0.93%	0.98%	2.95%	97.77%

3.1.3 PMR DATA - SEPTEMBER

Name of Service Provider Month September	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)	3.12%	17.47%	86.47%	2.81%	12.84%	1.99%	14.59%	95.21%
Airtel	0.08%	0.27%	95.83%	0.82%	1.13%	1.62%	2.28%	95.97%
BSNL	6.57%	20.92%	98.37%	0.11%	0.74%	2.11%	6.21%	97.63%
Idea	0.67%	1.71%	96.13%	0.85%	1.81%	1.22%	2.76%	95.82%
Reliance CDMA	0.67%	1.45%	97.51%	NA	0.04%	0.35%	1.24%	99.80%
Reliance GSM	0.09%	0.28%	96.05%	0.78%	0.11%	0.44%	0.10%	97.89%
TATA CDMA	0.21%	0.00%	97.58%	NA	0.64%	0.71%	2.72%	98.26%
TATA GSM	0.32%	1.25%	97.74%	0.58%	0.66%	0.69%	3.55%	97.45%
Uninor	0.34%	1.86%	93.61%	1.28%	5.04%	0.59%	1.88%	95.00%
Vodafone	0.51%	1.98%	99.07%	0.38%	0.93%	0.98%	2.95%	97.60%

3.2 3 DAY DATA – CONSOLIDATED

A three day live measurement was conducted to measure the QoS provided by the operators.

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)	2.79%	NA	86.65%	1.38%	12.90%	1.84%	11.64%	95.20%
Airtel	0.08%	0.06%	96.64%	0.87%	1.34%	1.69%	2.43%	95.65%
BSNL	6.28%	2.59%	98.42%	1.97%	2.24%	2.47%	6.18%	98.01%
Idea	0.80%	0.17%	96.62%	0.80%	1.78%	1.26%	2.68%	96.11%
Reliance CDMA	0.85%	1.04%	97.71%	NA	0.03%	0.38%	0.41%	99.80%
Reliance GSM	0.15%	0.27%	94.30%	0.97%	0.21%	0.44%	0.07%	97.87%
TATA CDMA	0.49%	0.00%	98.78%	NA	0.16%	0.65%	10.19%	98.24%
TATA GSM	0.72%	0.07%	98.89%	0.94%	0.20%	0.55%	3.21%	97.58%
Uninor	0.53%	1.20%	93.48%	1.45%	5.06%	0.57%	1.61%	94.96%
Vodafone	0.55%	0.00%	99.11%	0.41%	0.89%	1.00%	2.95%	97.78%

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

Following is a parameter wise review of the performance of the operators for 3 day live measurement:

BTSs Accumulated Downtime:

During 3 day live measurement, Aircel and BSNL did not meet the benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.08%.

Worst Affected BTSs Due to Downtime:

BSNL failed to meet the benchmark while all other operators performed well on this parameter. Best performance was recorded for Tata CDMA and Vodafone.
Data for Aircel was not audited for the parameter as operator's system is not equipped to provide the data during live measurement.

Call Set-up Success Rate (CSSR):

During the live measurement, Aircel, Reliance GSM and Uninor did not meet the benchmark for CSSR. Maximum CSSR was observed for Vodafone with 99.11%.

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:

Aircel, BSNL and Uninor failed to meet the benchmark of SDCCH / Paging Channel Congestion as well as TCH congestion.

Vodafone recorded the best performance on SDCCH / Paging Channel Congestion while Reliance CDMA recorded the best performance on 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:

BSNL failed to meet the benchmark for call drop rate. Minimum call drop rate was recorded for Reliance CDMA at 0.38%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL, Tata CDMA and Tata GSM failed to meet the benchmark for the parameter. Best performance was recorded for Reliance GSM at 0.07%.

Voice Quality

Uninor failed to meet the benchmark for voice quality. Best performance was recorded for Reliance CDMA at 99.80%.

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

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

3.2.1 3 DAY DATA - JULY

Name of Service Provider 3 day July	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)	2.50%	NA	89.03%	0.82%	10.52%	1.74%	13.47%	95.04%
Airtel	0.05%	0.00%	98.28%	0.90%	1.60%	1.75%	2.62%	95.52%
BSNL	7.64%	2.21%	98.60%	2.07%	3.83%	2.96%	7.67%	98.02%
Idea	0.92%	0.18%	97.18%	0.82%	1.55%	1.38%	2.73%	96.26%
Reliance CDMA	0.44%	0.00%	97.49%	0.00%	0.03%	0.43%	0.00%	99.81%
Reliance GSM	0.23%	0.09%	93.22%	1.36%	0.08%	0.44%	0.03%	97.85%
TATA CDMA	0.86%	0.00%	97.47%	0.00%	0.16%	0.78%	21.62%	98.25%
TATA GSM	1.46%	0.21%	98.71%	2.36%	0.27%	0.63%	3.00%	97.48%
Uninor	0.30%	1.74%	94.05%	0.89%	4.34%	0.53%	1.47%	94.78%
Vodafone	0.39%	0.00%	99.11%	0.41%	0.89%	0.94%	2.93%	97.84%

Data for Aircel was not audited for the parameter as operator's system is not equipped to provide the data during live measurement.

3.2.2 3 DAY DATA – AUGUST

Name of Service Provider 3 Day August	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)	2.69%	NA	83.69%	2.44%	15.91%	1.94%	13.92%	95.37%
Airtel	0.07%	0.06%	95.77%	0.90%	1.28%	1.71%	2.44%	95.56%
BSNL	7.64%	3.50%	98.18%	3.77%	2.19%	2.39%	6.48%	98.14%
Idea	0.69%	0.24%	96.41%	0.63%	1.95%	1.12%	2.68%	96.13%
Reliance CDMA	1.20%	1.66%	97.90%	NA	0.03%	0.38%	0.00%	99.80%
Reliance GSM	0.12%	0.44%	95.46%	0.49%	0.49%	0.43%	0.09%	97.87%
TATA CDMA	0.29%	0.00%	99.43%	NA	0.16%	0.72%	5.77%	98.22%
TATA GSM	0.26%	0.00%	99.03%	0.15%	0.13%	0.50%	3.07%	97.61%
Uninor	0.17%	0.00%	93.34%	0.73%	5.28%	0.57%	1.47%	95.12%
Vodafone	0.66%	0.00%	99.15%	0.38%	0.85%	1.07%	2.95%	97.78%

Data for Aircel was not audited for the parameter as operator's system is not equipped to provide the data during live measurement.

3.2.3 3 DAY DATA - SEPTEMBER

Name of Service Provider 3 day September	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)	3.18%	NA	87.22%	0.88%	12.27%	1.84%	7.52%	95.19%
Airtel	0.11%	0.11%	95.87%	0.82%	1.13%	1.61%	2.24%	95.86%
BSNL	3.57%	2.07%	98.49%	0.07%	0.71%	2.05%	4.40%	97.86%
Idea	0.79%	0.08%	96.27%	0.94%	1.84%	1.29%	2.62%	95.95%
Reliance CDMA	0.91%	1.45%	97.74%	NA	0.03%	0.34%	1.24%	99.80%
Reliance GSM	0.10%	0.28%	94.23%	1.06%	0.07%	0.44%	0.09%	97.90%
TATA CDMA	0.33%	0.00%	99.43%	NA	0.16%	0.46%	3.17%	98.26%
TATA GSM	0.45%	0.00%	98.94%	0.30%	0.20%	0.53%	3.55%	97.64%
Uninor	1.11%	1.86%	93.04%	2.72%	5.57%	0.61%	1.88%	94.98%
Vodafone	0.60%	0.00%	99.08%	0.44%	0.92%	0.99%	2.97%	97.72%

Data for Aircel was not audited for the parameter as operator's system is not equipped to provide the data during live measurement.

3.3 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Resolution of billing complaints		Service Requests	Level 1 Service	Customer Care	
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Complaint /Request attended to Satisfaction	Call answered	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)	91.00%	92.00%	85.00%	99.33%	100.00%	98.00%
Airtel	69.00%	77.00%	75.00%	91.33%	100.00%	100.00%
BSNL	71.00%	82.00%	82.50%	83.33%	100.00%	99.50%
Idea	91.00%	91.00%	90.00%	87.33%	100.00%	94.00%
Reliance CDMA	66.00%	85.00%	NA	90.67%	100.00%	99.00%
Reliance GSM	77.00%	86.00%	82.00%	87.33%	100.00%	90.00%
TATA CDMA	NA	NA	NA	91.33%	100.00%	85.00%
TATA GSM	NA	NA	NA	95.33%	100.00%	94.00%
Uninor	89.00%	95.00%	80.00%	100.00%	100.00%	93.00%
Vodafone	86.00%	86.00%	83.00%	100.00%	100.00%	90.00%

Resolution of billing complaints

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

NA: Live calling for Tata CDMA and Tata GSM was not conducted due to very low base of billing complaints.

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. Idea recorded the highest satisfaction at 90%.

There was no data of service complaints available for Reliance CDMA, Tata CDMA and Tata GSM. Hence the live calling for this parameter was not conducted for JAS'15.

Level 1 Service

Airtel, BSNL, Idea, Reliance CDMA, Reliance GSM and Tata CDMA failed to meet 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

For the IVR aspect, all the service providers met the TRAI benchmark.

Customer Care / Helpline Assessment

Idea, Reliance GSM, Tata CDMA, Tata GSM, Uninor and Vodafone failed to meet TRAI benchmark of answering 95% of calls answered by the call centres (voice to voice) within 90 seconds. Airtel had the best performance with 100% connectivity.

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 IVR	Percentage of calls answered by the operators (voice to voice) within 90 seconds
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel(DWL)	0.00%	0.62%	100.00%	100.00%	100.00%	96.35%	97.51%
Airtel	0.09%	0.01%	100.00%	100.00%	100.00%	97.30%	80.37%
BSNL	0.00%	0.00%	99.35%	100.00%	100.00%	99.90%	95.74%
Idea	0.09%	0.03%	100.00%	100.00%	100.00%	95.82%	99.93%
Reliance CDMA	0.09%	0.03%	100.00%	100.00%	100.00%	98.46%	55.58%
Reliance GSM	0.10%	0.03%	100.00%	100.00%	100.00%	98.91%	74.92%
TATA CDMA	0.00%	0.00%	100.00%	100.00%	100.00%	99.38%	96.81%
TATA GSM	0.00%	0.00%	100.00%	100.00%	100.00%	95.05%	96.60%
Uninor	NA	0.00%	100.00%	100.00%	100.00%	99.52%	98.24%
Vodafone	0.01%	0.16%	100.00%	100.00%	100.00%	100.00%	93.78%

Note: Uninor does not have postpaid service in Bihar, hence it is recorded as NA in metering and billing of postpaid subscribers.

Metering and billing credibility – Postpaid Subscribers

All operators met the TRAI benchmark for postpaid metering and billing credibility. Aircel, BSNL, Tata CDMA and Tata GSM recorded the best performance with 0.00% disputes.

Metering and billing credibility – Prepaid Subscribers

Aircel and Vodafone failed to meet the TRAI benchmark for prepaid metering and billing credibility. BSNL, Tata CDMA, Tata GSM and Uninor performed the best on this parameter with 0.00% complaints.

Resolution of billing complaints

All operators met the TRAI benchmark for resolving billing complaints within 4 weeks as well as within 6 weeks.

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI. For details, kindly refer to the annexure (section 8.7).

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

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

Customer Care Percentage of calls answered by the IVR.

All operators met the benchmark of 95% of its IVR calls being attended. Vodafone recorded the best performance for the parameter with 100% connectivity.

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

Airtel, Reliance CDMA, Reliance GSM and Vodafone failed to meet the TRAI specified benchmark of 95%. Idea recorded the best performance for the parameter at 99.93%.

3.5 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment										
Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Aircel(DWL)	NA	95.00%	92.00%	91.00%	92.00%	94.00%	92.00%	84.00%	89.00%	96.00%
Airtel	87.00%	NA	93.00%	91.00%	94.00%	95.00%	94.00%	92.00%	95.00%	93.00%
BSNL	93.00%	94.00%	NA	92.00%	91.00%	93.00%	93.00%	84.00%	94.00%	96.00%
Idea	94.00%	97.00%	96.00%	NA	91.00%	92.00%	91.00%	90.00%	96.00%	97.00%
Reliance CDMA	95.00%	95.00%	95.00%	90.00%	NA	95.00%	95.00%	89.00%	93.00%	95.00%
Reliance GSM	96.00%	96.00%	93.00%	93.00%	94.00%	NA	88.00%	90.00%	94.00%	96.00%
TATA CDMA	97.00%	96.00%	94.00%	92.00%	93.00%	96.00%	NA	89.00%	93.00%	98.00%
TATA GSM	88.00%	97.00%	94.00%	92.00%	93.00%	94.00%	90.00%	NA	92.00%	98.00%
Uninor	91.00%	95.00%	98.00%	90.00%	93.00%	94.00%	94.00%	86.00%	NA	98.00%
Vodafone	98.00%	96.00%	87.00%	90.00%	92.00%	95.00%	94.00%	91.00%	94.00%	NA

Most of the operators faced issues while connecting to other operators.

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

4 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

Aircel and BSNL are the key concern operators as these failed to meet the benchmark for majority of the network parameters.

3 Day Live Measurement (Network Parameters)

Aircel, BSNL and Uninor are the key concern operators as these failed to meet the benchmark for majority of the network parameters.

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

Live Calling

During live calling, it was found that none of the operators met the benchmark for resolving billing complaints.

Airtel, BSNL, Idea, Reliance CDMA, Reliance GSM and Tata CDMA failed to meet the TRAI benchmark for level 1 services.

As per live calling conducted for 'level 1' services, a number of Category-I (i.e. mandatory) services were not being operated by most of the operators.

Idea, Reliance GSM, Tata CDMA, Tata GSM, Uninor and Vodafone failed to meet TRAI benchmark of answering 95% of calls answered by the call center (voice to voice) within 90 seconds.

Metering and billing credibility

Aircel and Vodafone failed to meet the benchmark for metering and billing credibility of prepaid.

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI and operators should provide detailed explanation of reasons for reporting majority of their complaints as invalid to TRAI.

Customer Care

Airtel, Reliance CDMA, Reliance GSM and Vodafone failed to meet the TRAI specified benchmark of answering 95% voice to voice calls within 90 seconds by the operators.

Inter-Operator Call Assessment

Most of the operators faced issues while connecting to other operators.

Drive Test (Operator Assisted)

Aircel, BSNL, Reliance CDMA, Reliance GSM, Tata CDMA, Tata GSM and Uninor consistently failing to meet the benchmark of parameters tested during drive tests.

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

5.1 BTS ACCUMULATED DOWNTIME

5.1.1 PARAMETER DESCRIPTION

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

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

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

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

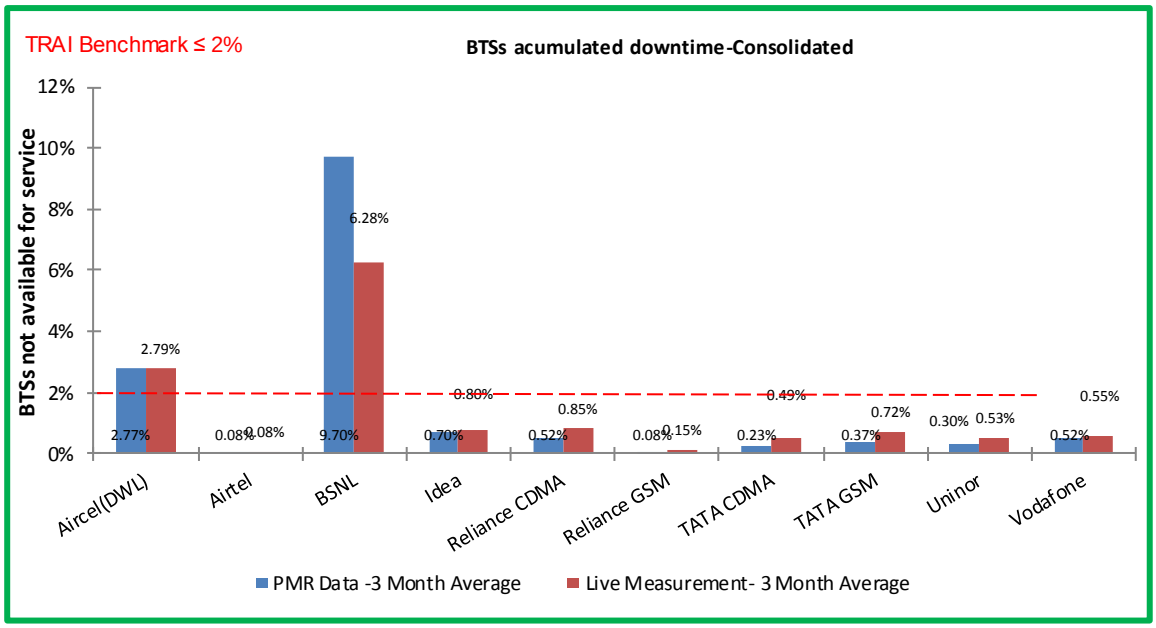
3. **TRAI Benchmark** –

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

4. **Audit Procedure** –

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

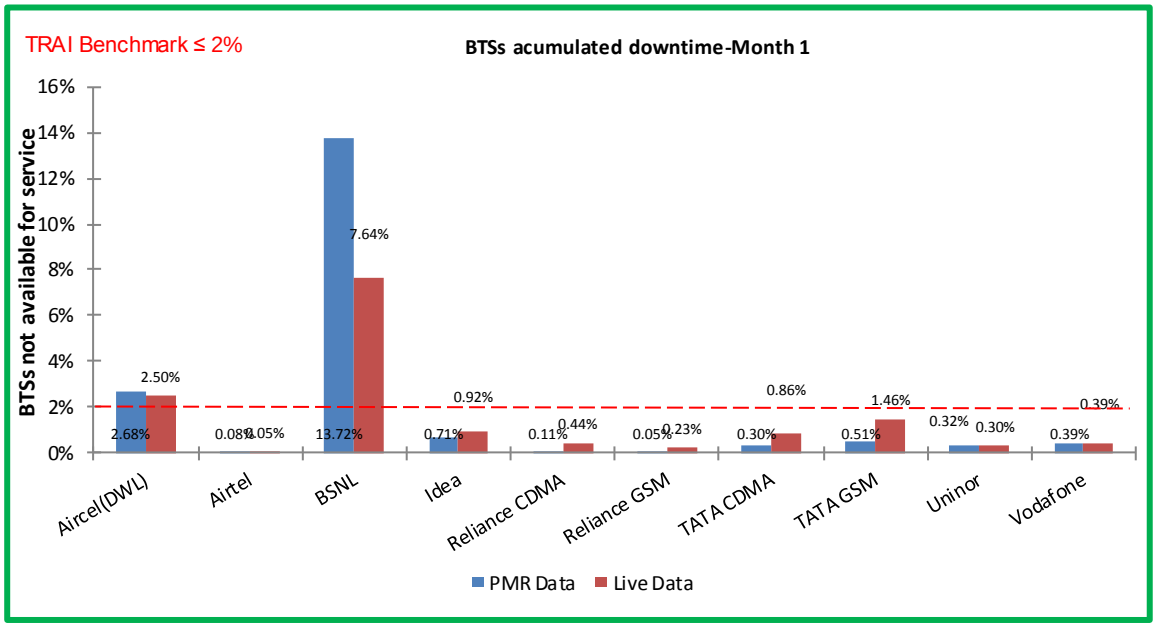
5.1.2 KEY FINDINGS



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

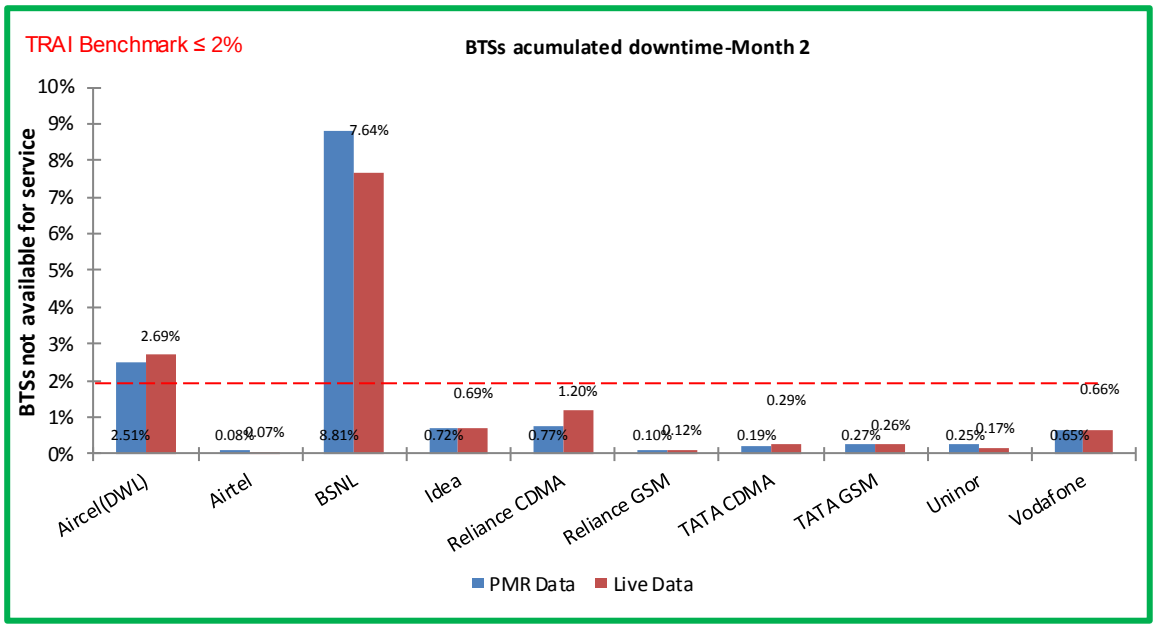
Aircel and BSNL did not meet the benchmark for the parameter during audit.

5.1.2.1 KEY FINDINGS – MONTH 1



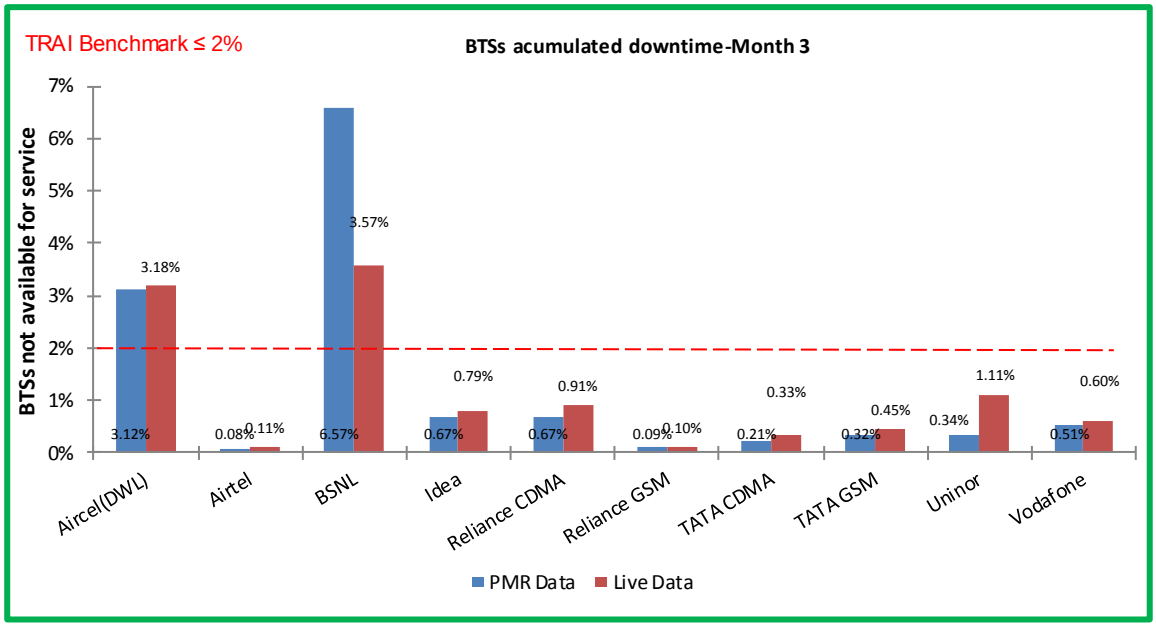
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.2 KEY FINDINGS – MONTH 2



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

5.1.2.3 KEY FINDINGS – MONTH 3



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

5.2 WORST AFFECTED BTS DUE TO DOWNTIME

5.2.1 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.

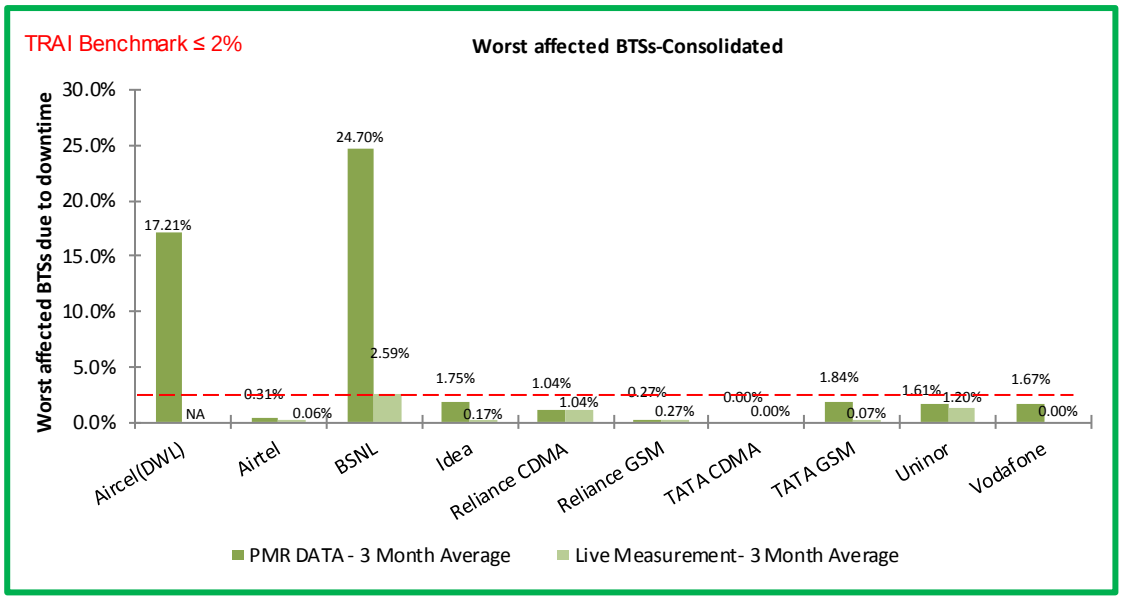
   iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

   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.

5.2.2 KEY FINDINGS

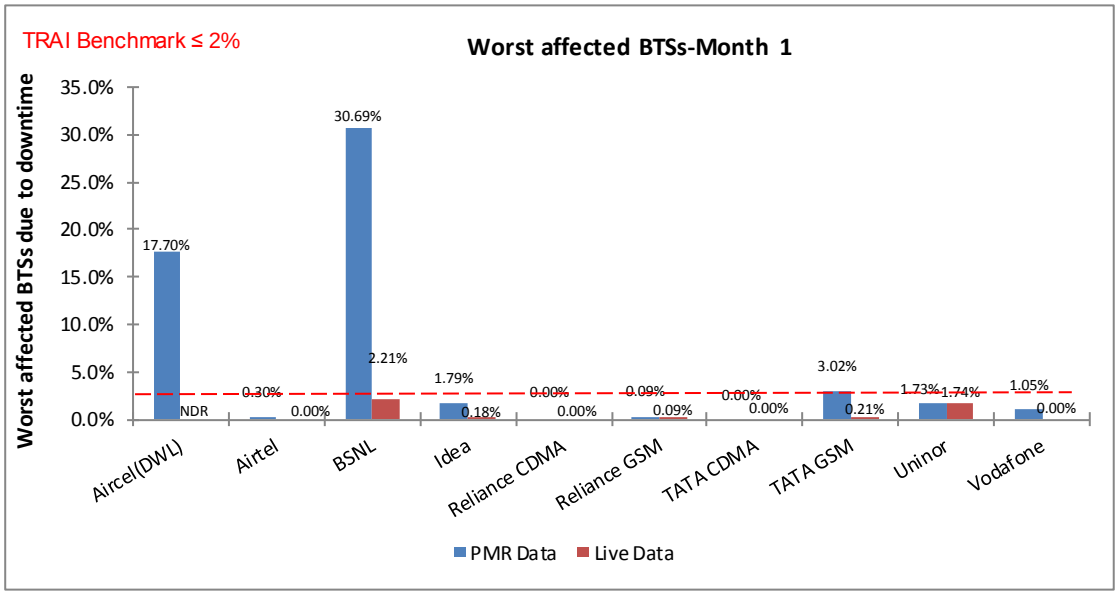


Data Source: Operations and Maintenance Center (OMC) of the operators

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

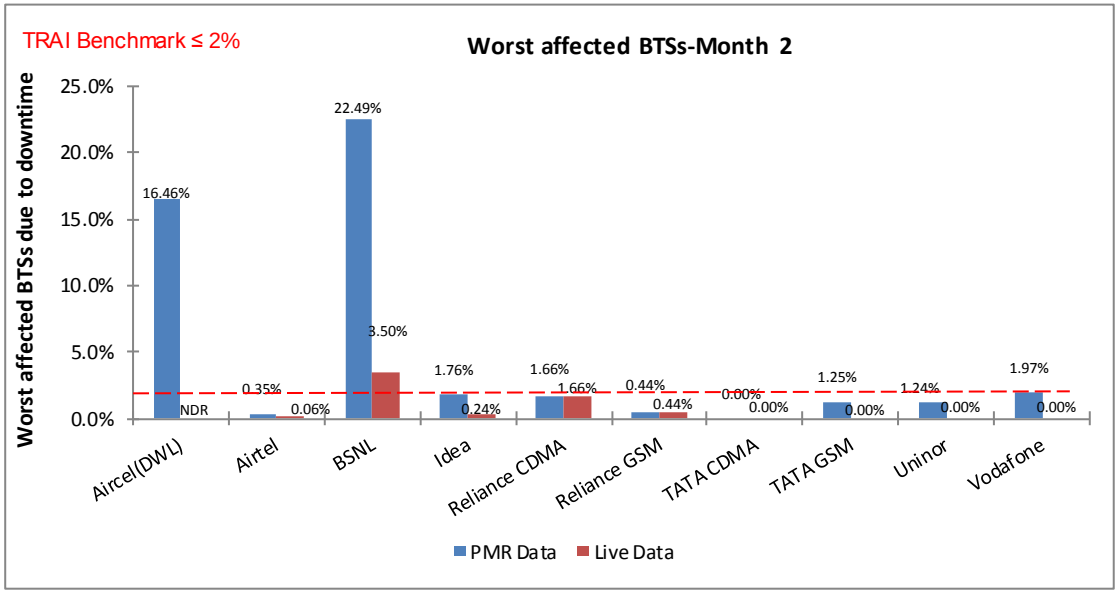
Significant difference was observed between PMR & live measurement data for BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.2.2.1 KEY FINDINGS – MONTH 1



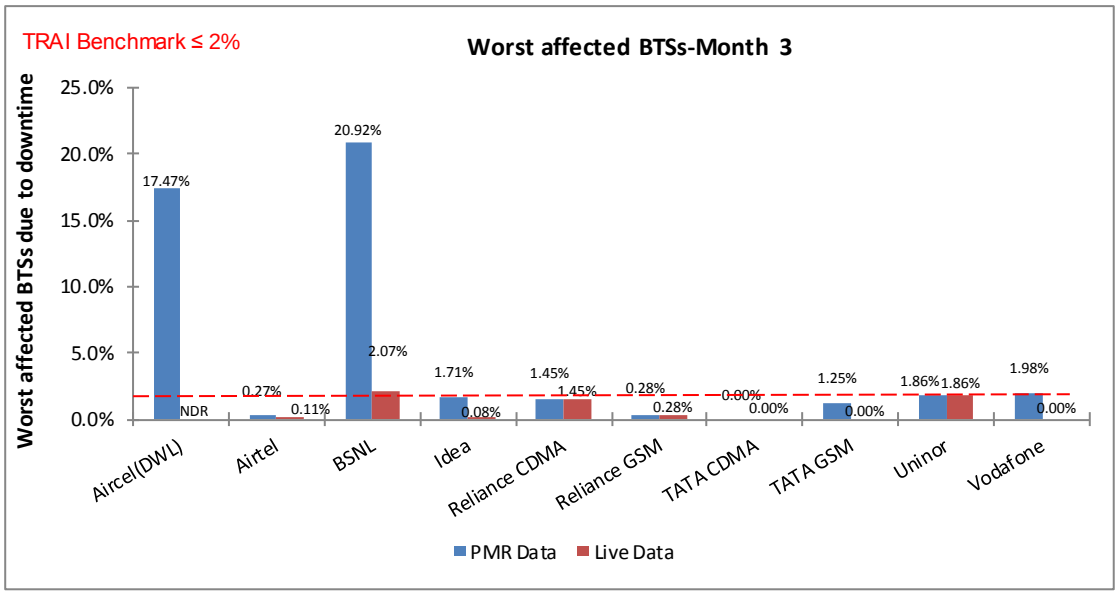
Data Source: Operations and Maintenance Center (OMC) of the operators

5.2.2.2 KEY FINDINGS – MONTH 2



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

5.2.2.3 KEY FINDINGS – MONTH 3



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

5.3 CALL SET UP SUCCESS RATE

5.3.1 PARAMETER DESCRIPTION

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

   (Calls Established / Total Call Attempts) * 100

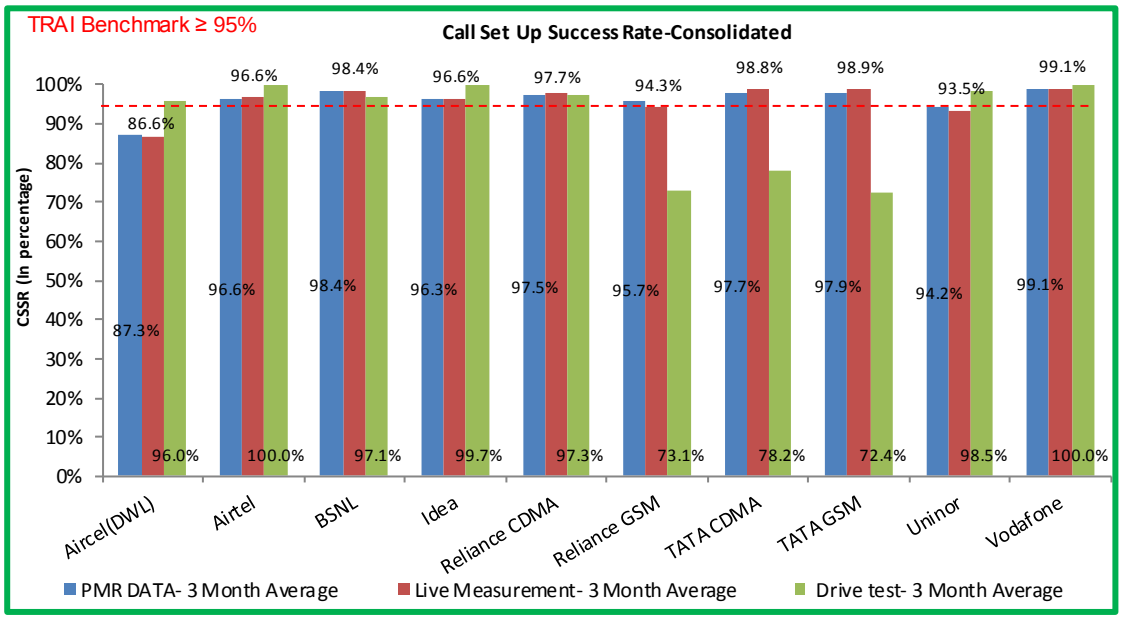
   Call Established means the following events have happened in call setup:-

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

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

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

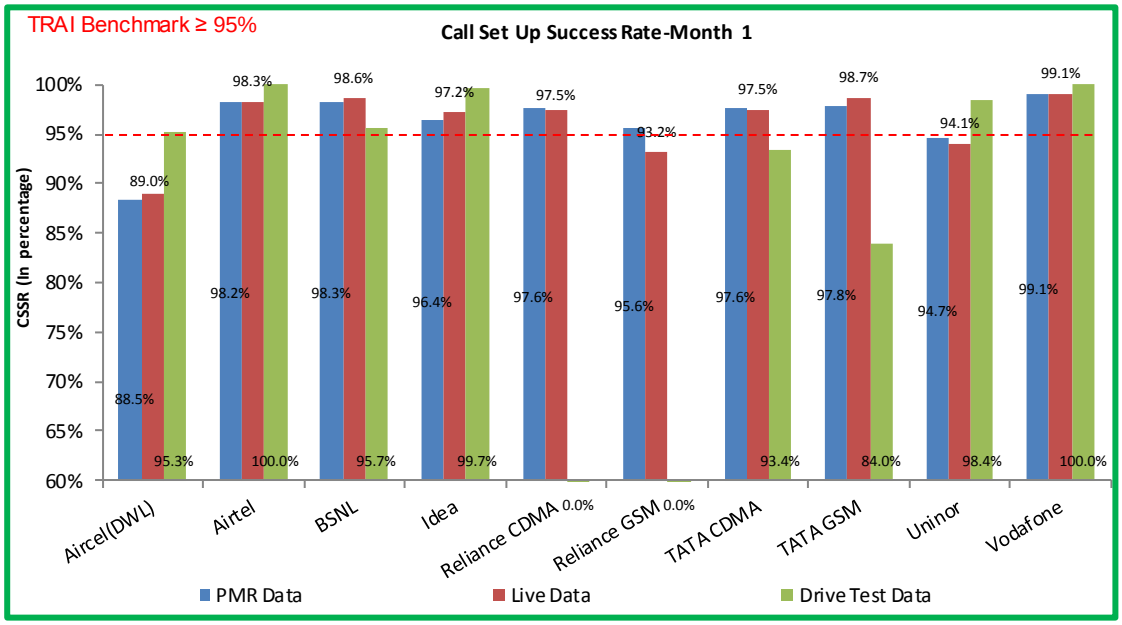
5.3.2 KEY FINDINGS



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

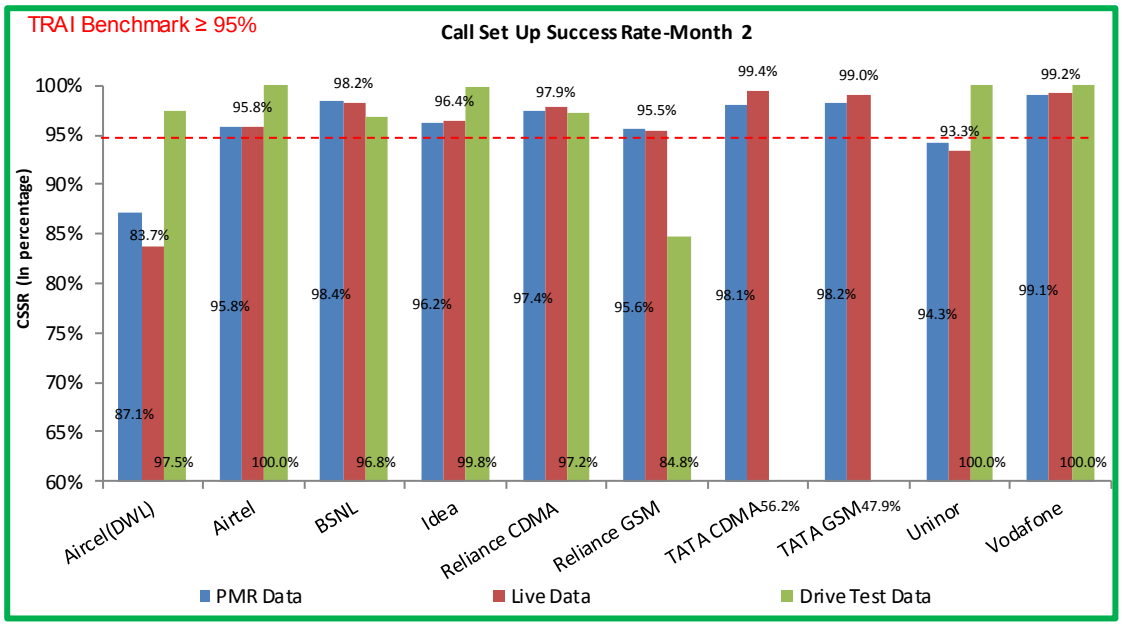
Aircel and Uninor failed to meet the TRAI benchmark during audit.

5.3.2.1 KEY FINDINGS – MONTH 1



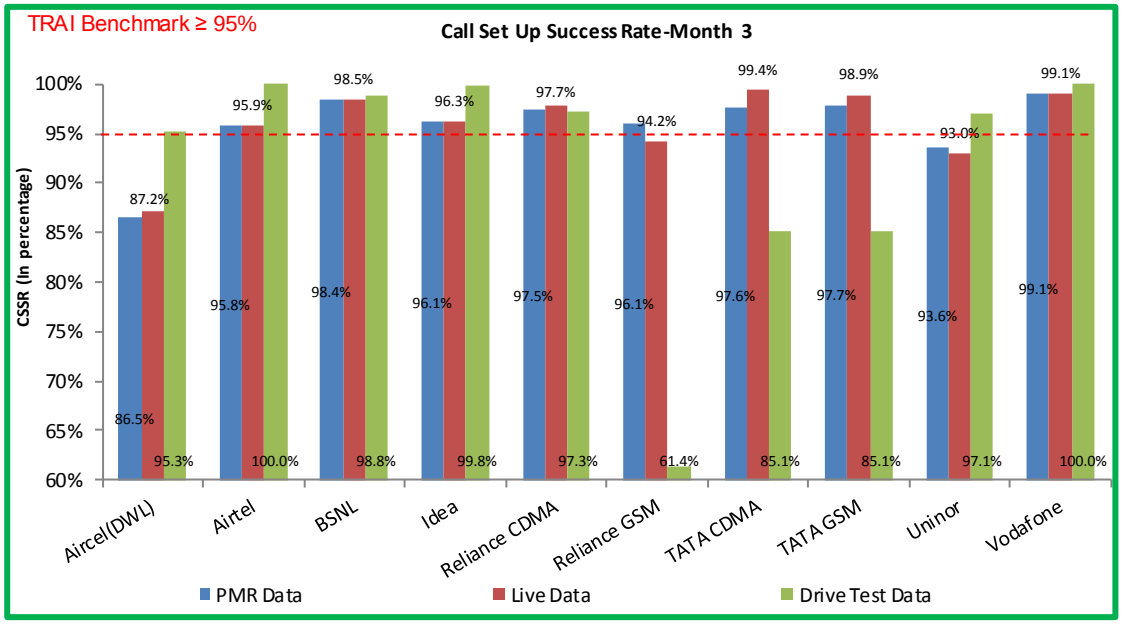
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

5.3.2.2 KEY FINDINGS – MONTH 2



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

5.3.2.3 KEY FINDINGS – MONTH 3



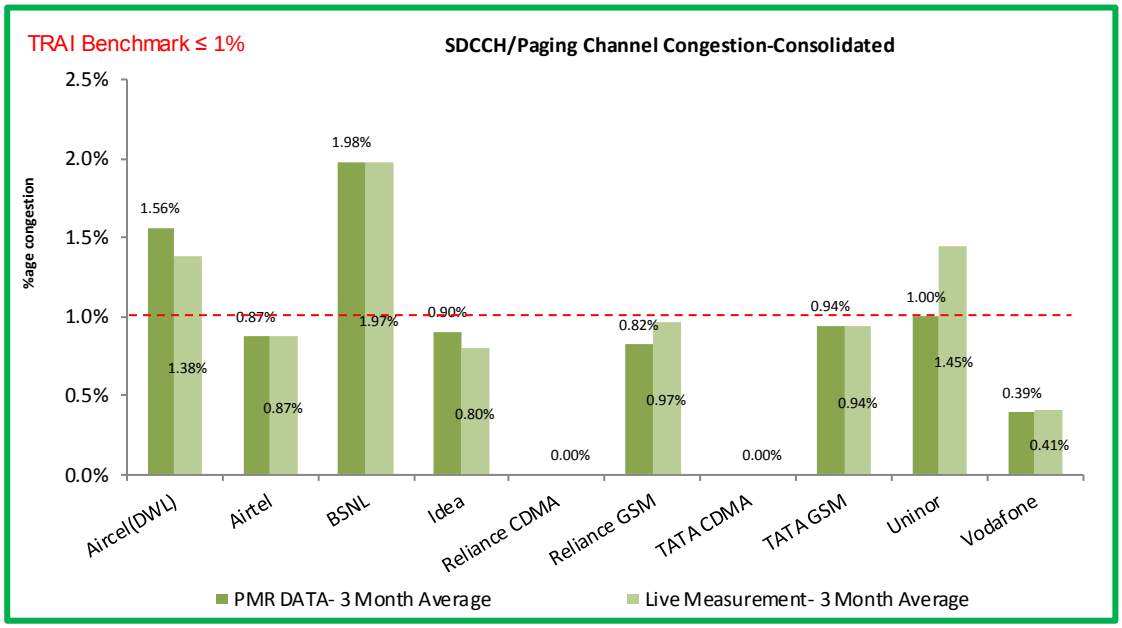
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

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

5.4.1 PARAMETER DESCRIPTION

1. **Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:
   - SDCCH Level: Stand-alone dedicated control channel
   - TCH Level: Traffic Channel
   - POI Level: Point of Interconnect
2. **Computational Methodology:**
   - **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1
     - C1 = Average SDCCH / TCH Congestion % on day 1
     - A2 = Number of attempts to establish SDCCH / TCH made on day 2
     - C2 = Average SDCCH / TCH Congestion % on day 2
     - An = Number of attempts to establish SDCCH / TCH made on day n
     - Cn = Average SDCCH / TCH Congestion % on day n
   - **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
     - C1 = Average POI Congestion % on day 1
     - A2 = POI traffic offered on all POIs (no. of calls) on day 2
     - C2 = Average POI Congestion % on day 2
     - An = POI traffic offered on all POIs (no. of calls) on day n
     - Cn = Average POI Congestion % on day n
3. **Benchmark:**
   - SDCCH Congestion: ≤ 1%, TCH Congestion: ≤ 2%, POI Congestion: ≤ 0.5%
4. **Audit Procedure –**
   - Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) would be conducted
   - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

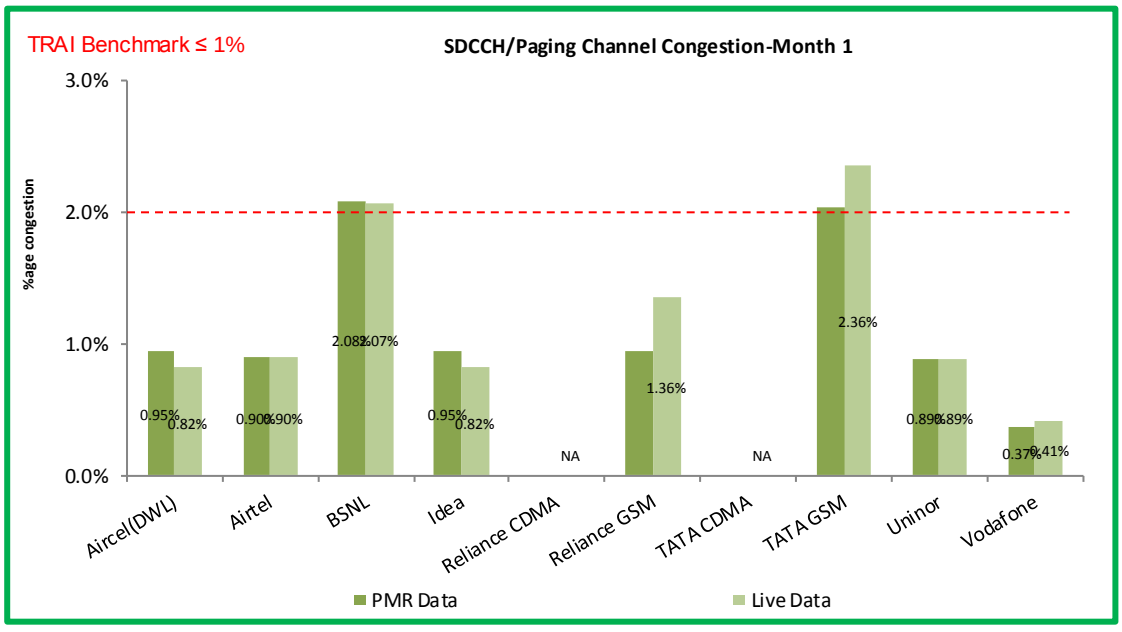
5.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION



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

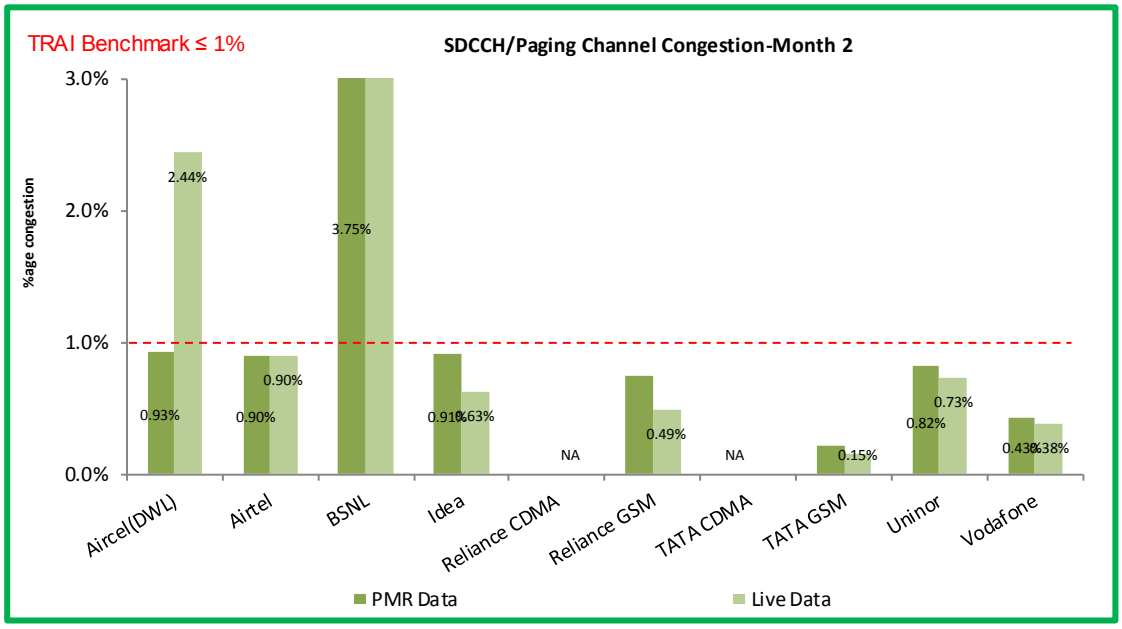
Aircel and BSNL failed to meet the TRAI benchmark as per PMR data.

5.4.2.1 KEY FINDINGS – MONTH 1



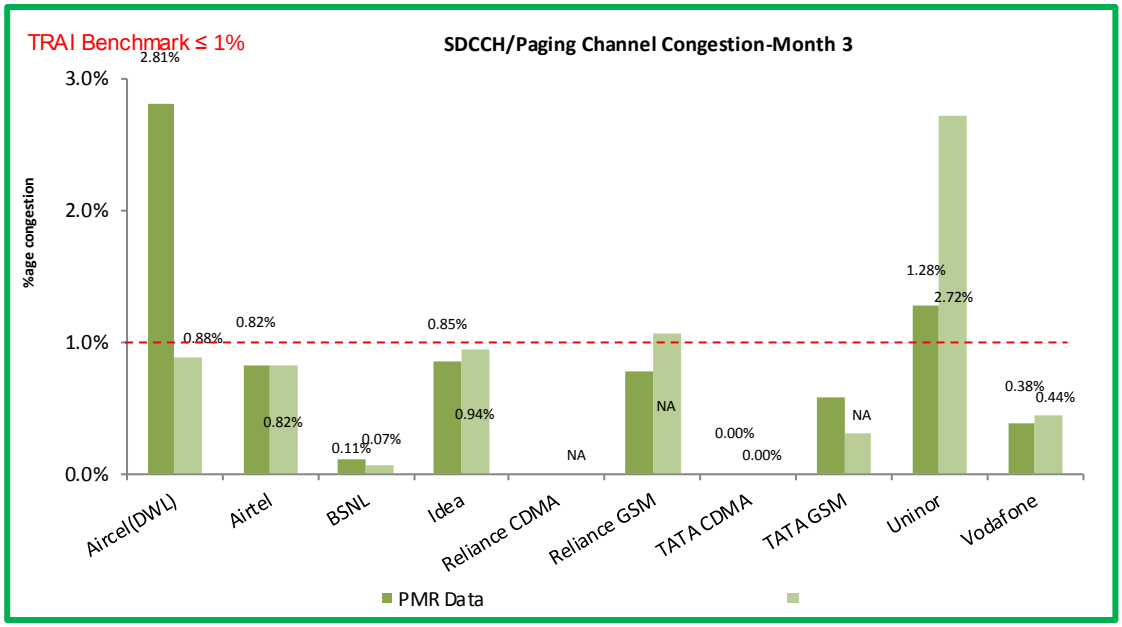
Data Source: Network Operations Center (NOC) of the operators

5.4.2.2 KEY FINDINGS – MONTH 2



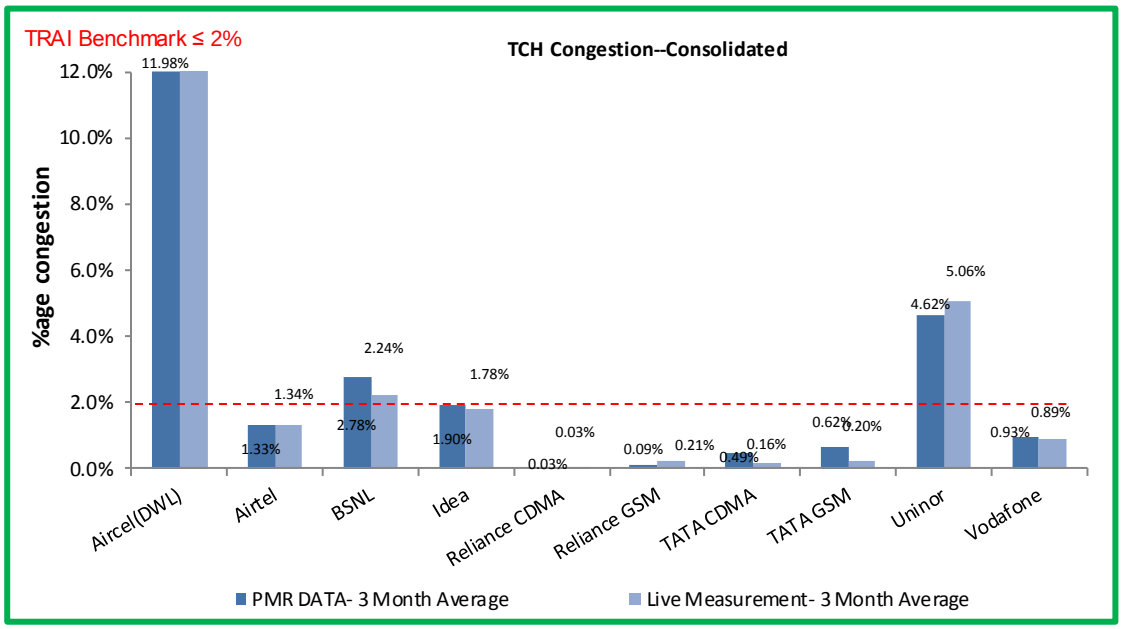
Data Source: Network Operations Center (NOC) of the operators

5.4.2.3 KEY FINDINGS – MONTH 3



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

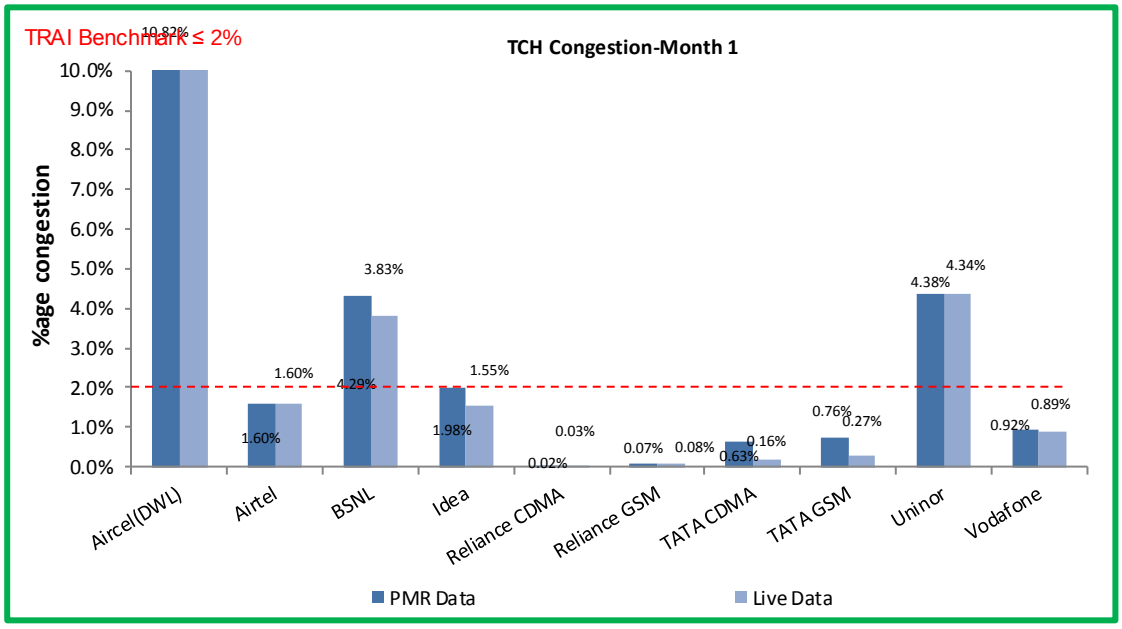
5.4.3 KEY FINDINGS – TCH CONGESTION



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

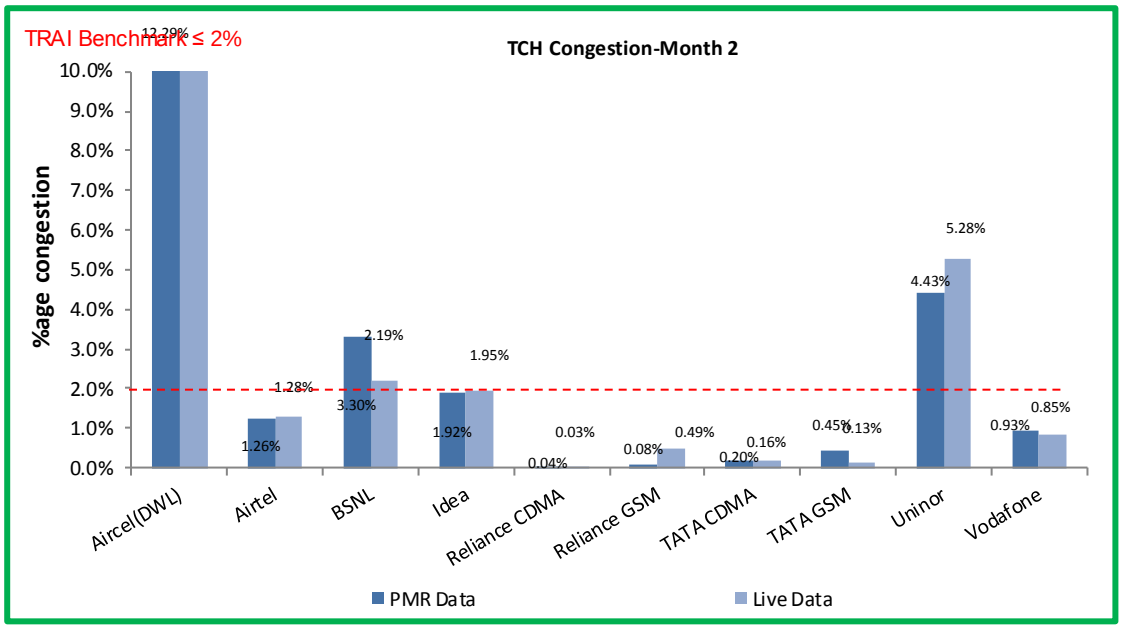
Aircel, BSNL and Uninor failed to meet the benchmark as per PMR data.

5.4.3.1 KEY FINDINGS – MONTH 1



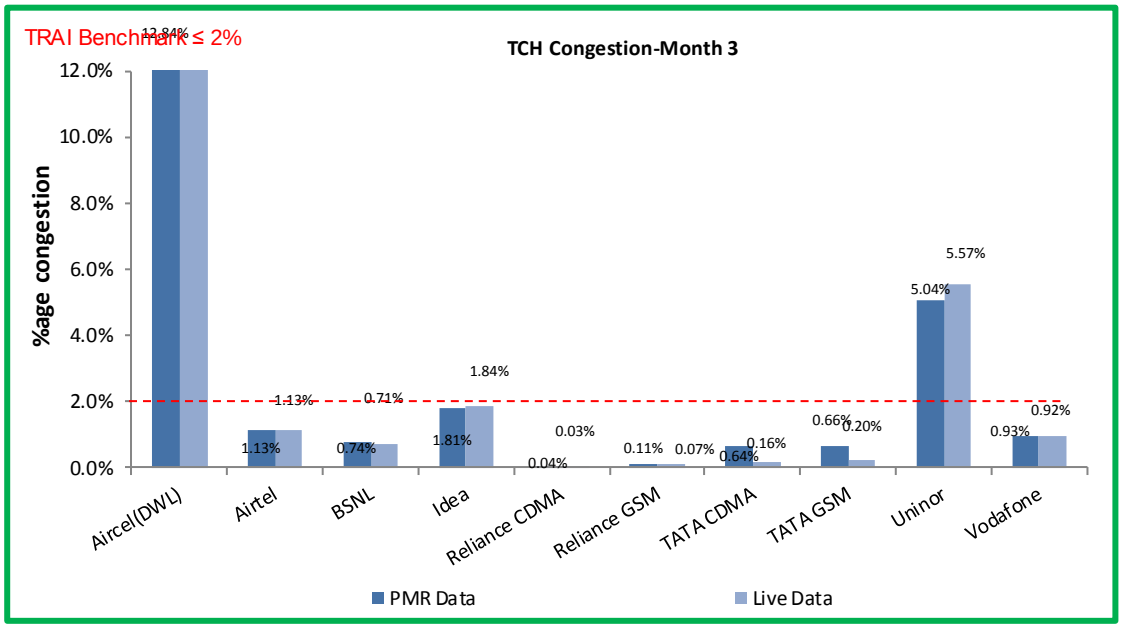
Data Source: Network Operations Center (NOC) of the operators

5.4.3.2 KEY FINDINGS – MONTH 2



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

5.4.3.3 KEY FINDINGS – MONTH 3



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

5.4.4 KEY FINDINGS – POI CONGESTION

Audit Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	828	30	83	105	147	153	19	65	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	25110	0	0	0
Total Capacity of all POIs (A) - in erlangs		127467	724674	59310	278414	48004	85893	75343	10528	77228	243898
Traffic served for all POIs (B)- in erlangs		81260	430647	32032	172026	24232	18644	21327	3282	52602	140400
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											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	828	30	83	112	147	153	19	65	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	74909	0	0	0
Total Capacity of all POIs (A) - in erlangs		127478	2151228	59310	278414	59694	86616	76631	10510	75240	246762
Traffic served for all POIs (B)- in erlangs		81028	1246776	32290	175530	31616	18423	23877	3213	52415	141601
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 PMR data.

5.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-July											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	827	30	83	30	148	152	19	65	59
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		126777	721428	59310	274967	12708	85025	75329	10526	75992	236408
Traffic served for all POIs (B)- in erlangs		83548	429416	30841	175339	4772	20754	21069	3345	53058	134036
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-July											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	827	30	83	53	148	153	19	65	59
No. of POIs not meeting benchmark		0	0	0	0	0	0	75329	0	0	0
Total Capacity of all POIs (A) - in erlangs		126811	2108984	59310	274967	22579	85162	76631	10373	75992	246561
Traffic served for all POIs (B)- in erlangs		84858	1115242	33388	175339	8774	19575	23877	3251	53058	141132
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

5.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-August											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	826	30	83	141	148	153	19	66	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	75329	0	0	0
Total Capacity of all POIs (A) - in erlangs		127677	721812	59310	278483	57132	86074	76631	10538	80857	247064
Traffic served for all POIs (B)- in erlangs		81532	413107	32093	172163	27446	17546	23250	3270	53314	143827
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-August											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	826	30	83	141	148	153	19	65	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	75329	0	0	0
Total Capacity of all POIs (A) - in erlangs		127677	2158593	59310	278483	77446	87971	76631	10599	74895	246051
Traffic served for all POIs (B)- in erlangs		81271	1314456	30122	172163	42511	18464	23877	3306	52754	143877
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

5.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-September											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	832	30	83	143	146	153	19	65	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		127947	730782	59310	281791	74172	86579	74069	10520	74835	248222
Traffic served for all POIs (B)- in erlangs		78700	449417	33161	168577	40478	17631	19663	3231	51433	143337
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-September											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	832	30	83	143	146	153	19	65	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	74069	0	0	0
Total Capacity of all POIs (A) - in erlangs		127947	2186108	59310	281791	79057	86715	76631	10559	74835	247676
Traffic served for all POIs (B)- in erlangs		76956	1310631	33360	179088	43563	17230	23877	3081	51433	139795
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

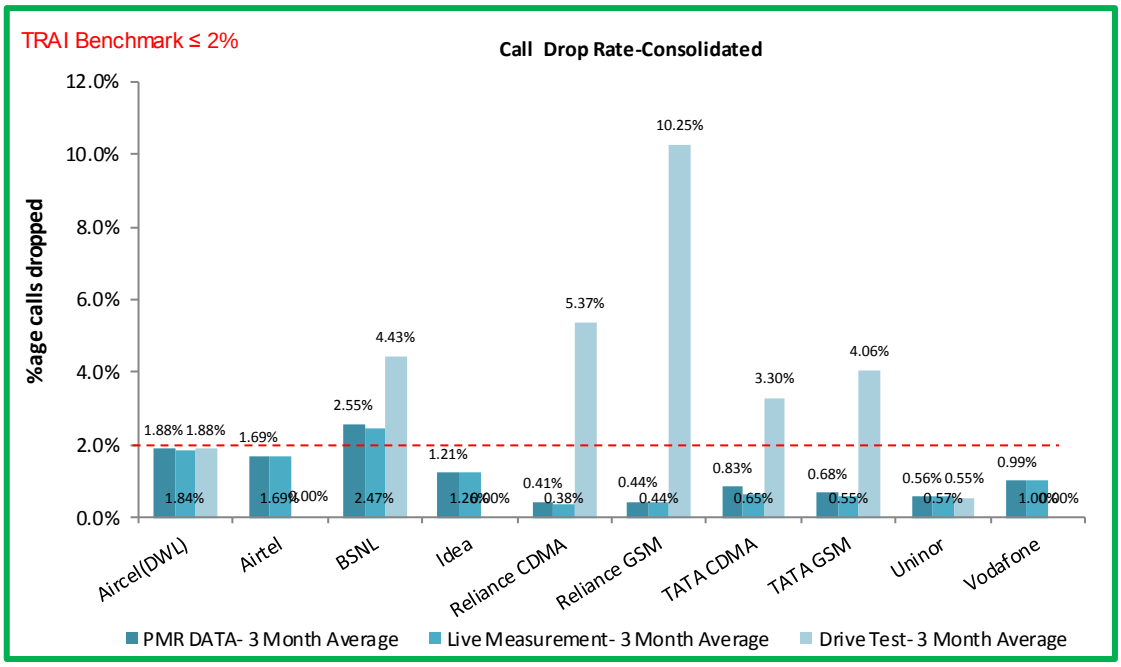
Data Source: Network Operations Center (NOC) of the operators

5.5 CALL DROP RATE

5.5.1 PARAMETER DESCRIPTION

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

5.5.2 KEY FINDINGS

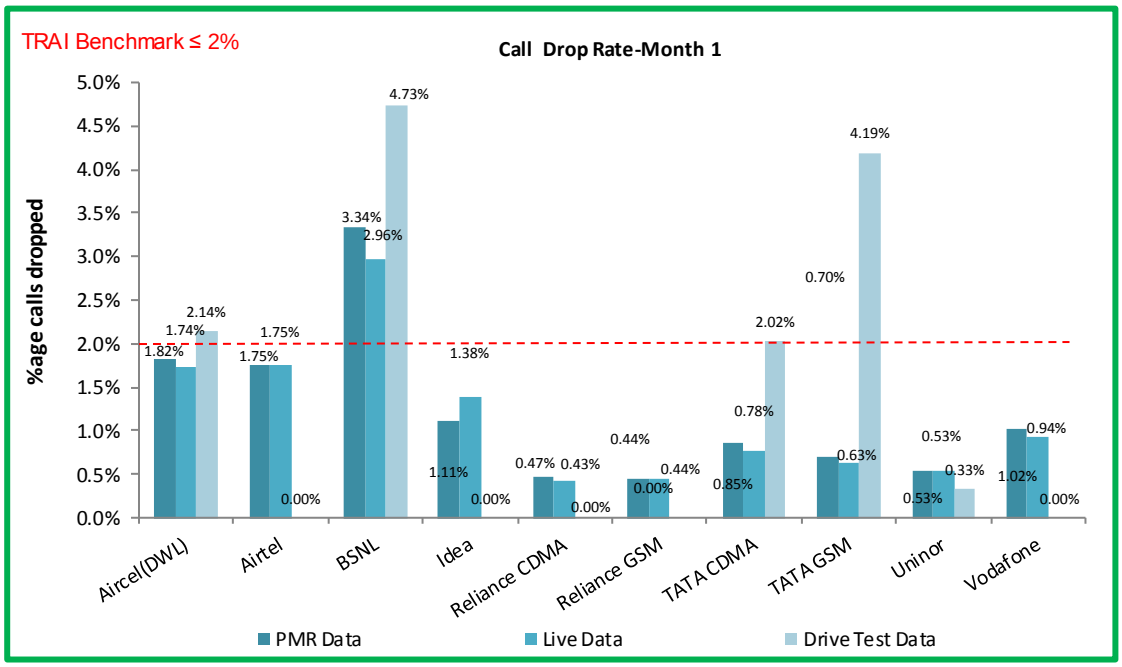


Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

BSNL failed to meet the call drop rate benchmark during audit.

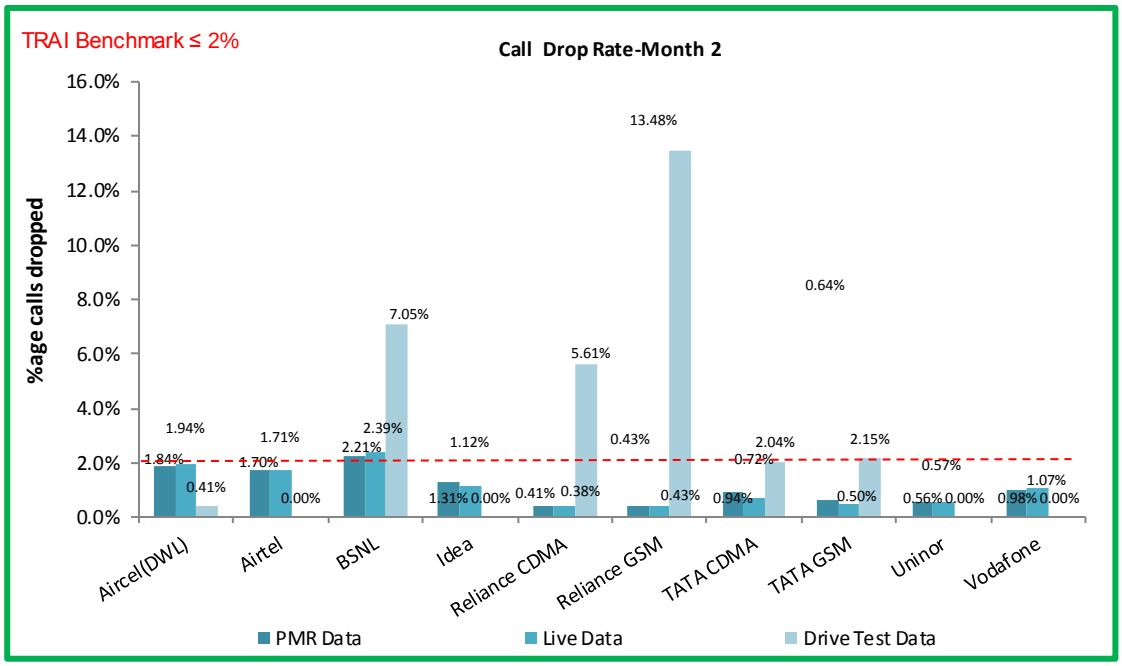
The drive test results showed high call drop rate for BSNL, Reliance CDMA, Reliance GSM, Tata CDMA and Tata GSM.

5.5.2.1 KEY FINDINGS – MONTH 1



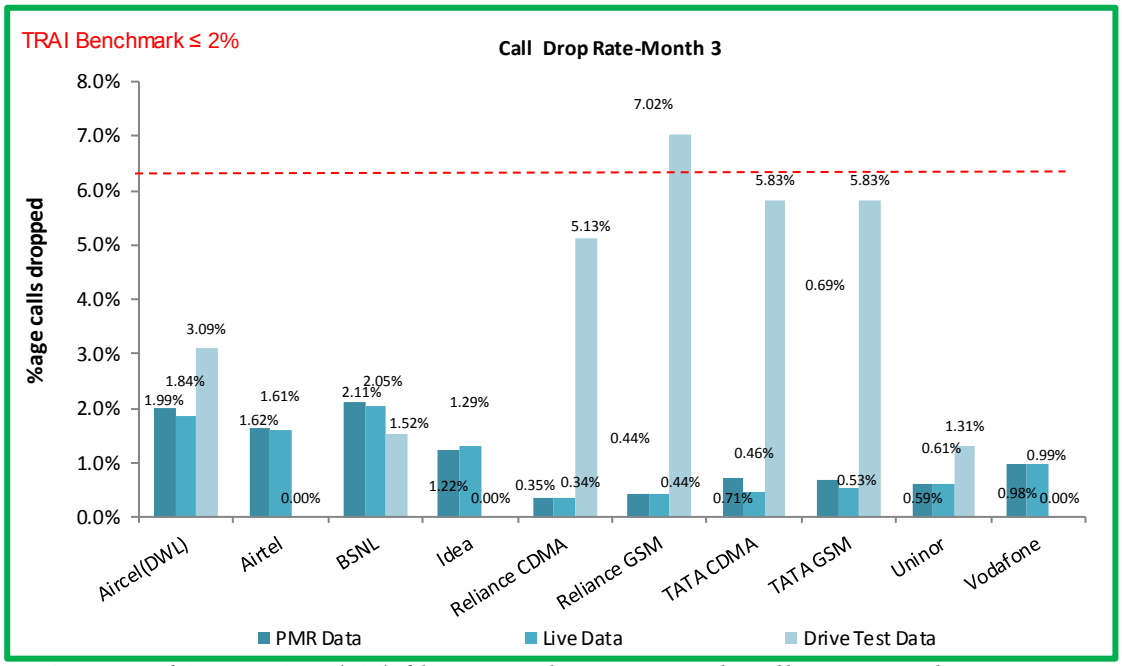
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

5.5.2.2 KEY FINDINGS – MONTH 2



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

5.5.2.3 KEY FINDINGS – MONTH 3



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

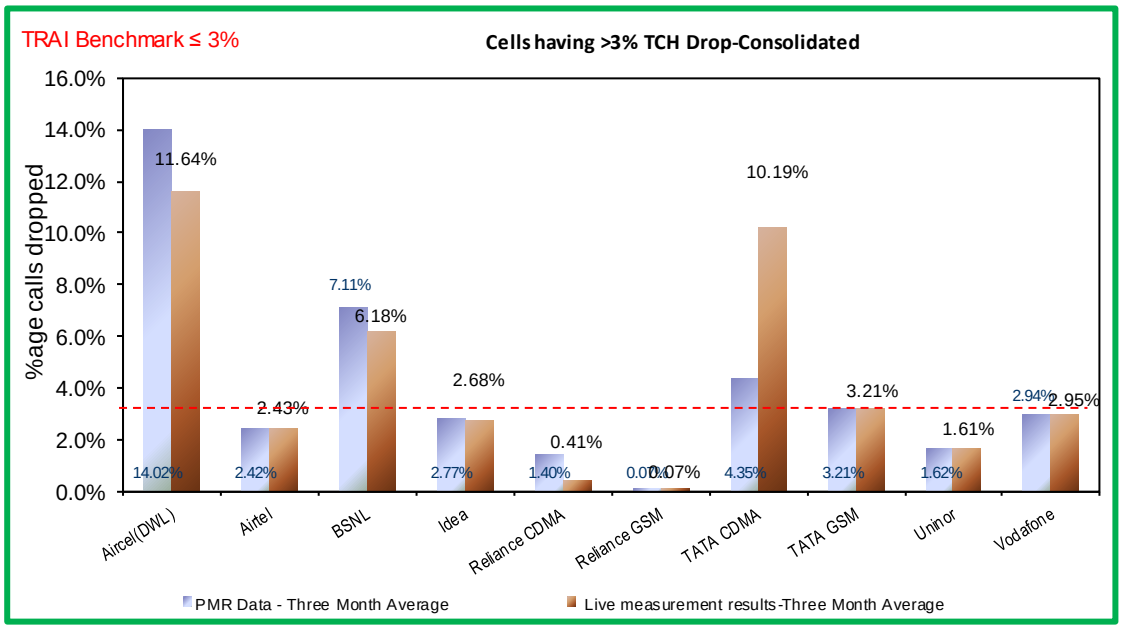
5.6 WORST AFFECTED CELLS HAVING GREATER THAN 3% TCH DROP

5.6.1 PARAMETER DESCRIPTION

1. **Definition- Worst Affected Cells having more than 3% TCH drop** shall measure the ratio of total number of cells in the network to the ratio of cells having more than 3% TCH drop.
2. **Computational Methodology: (Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the network) x 100**
3. **TRAI Benchmark –**
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%
4. **Audit Procedure –**
   - Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR would be conducted.

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

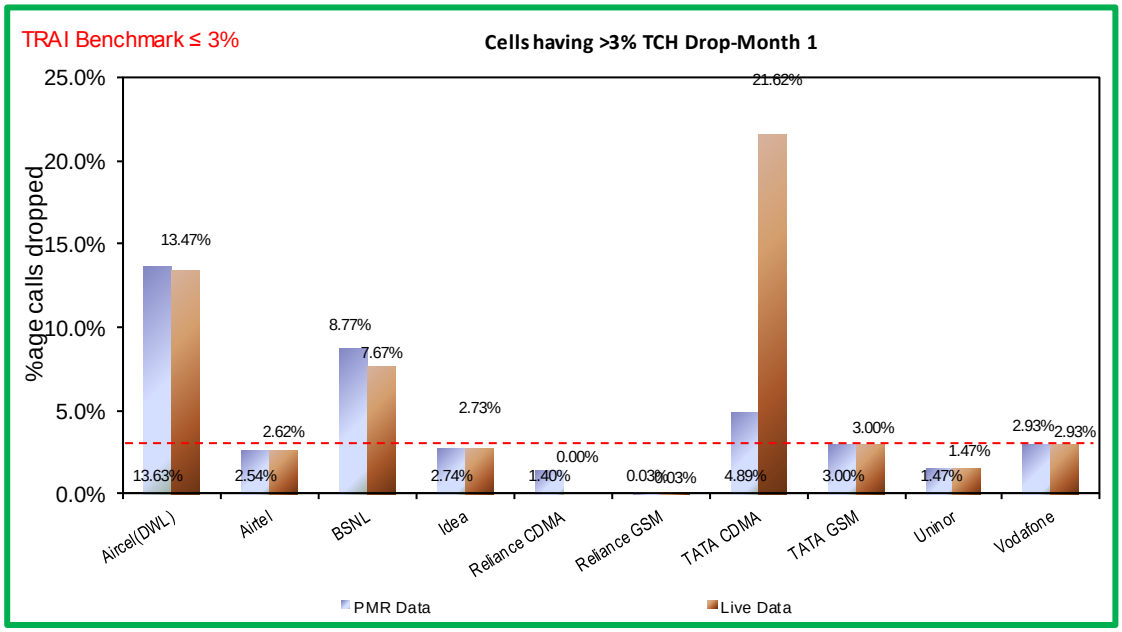
5.6.2 KEY FINDINGS



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

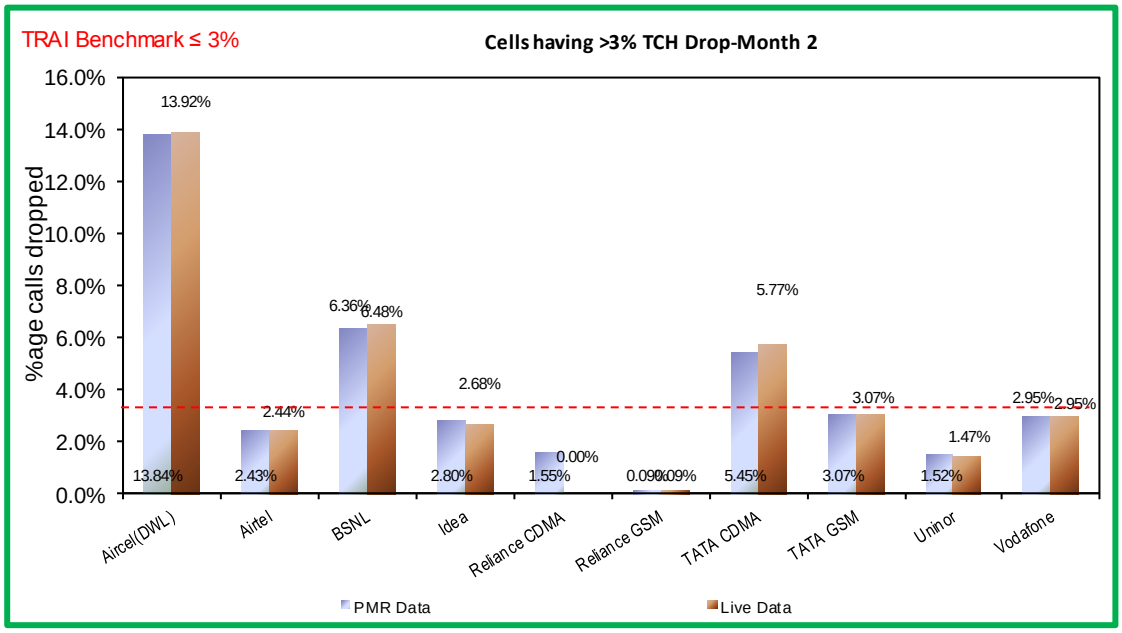
Aircel, BSNL, Tata CDMA and Tata GSM failed to meet the benchmark for the parameter as per PMR data.

5.6.2.1 KEY FINDINGS – MONTH 1



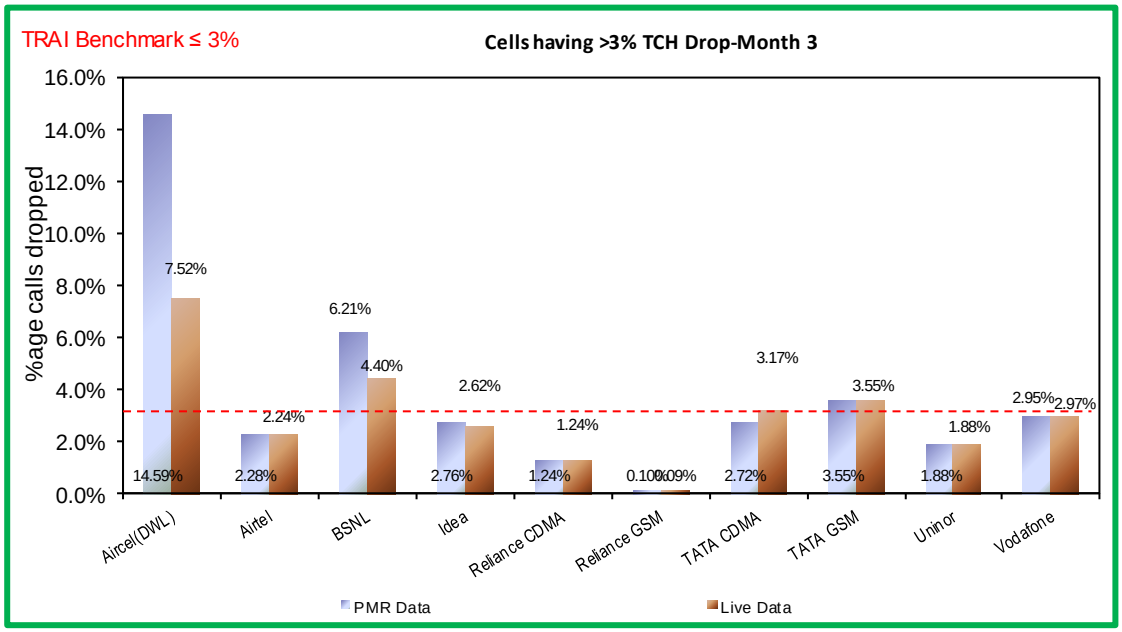
Data Source: Network Operations Center (NOC) of the operators

5.6.2.2 KEY FINDINGS – MONTH 2



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

5.6.2.3 KEY FINDINGS – MONTH 3



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

5.7 VOICE QUALITY

5.7.1 PARAMETER DESCRIPTION

1. **Definition:**

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

2. **Computational Methodology:**

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

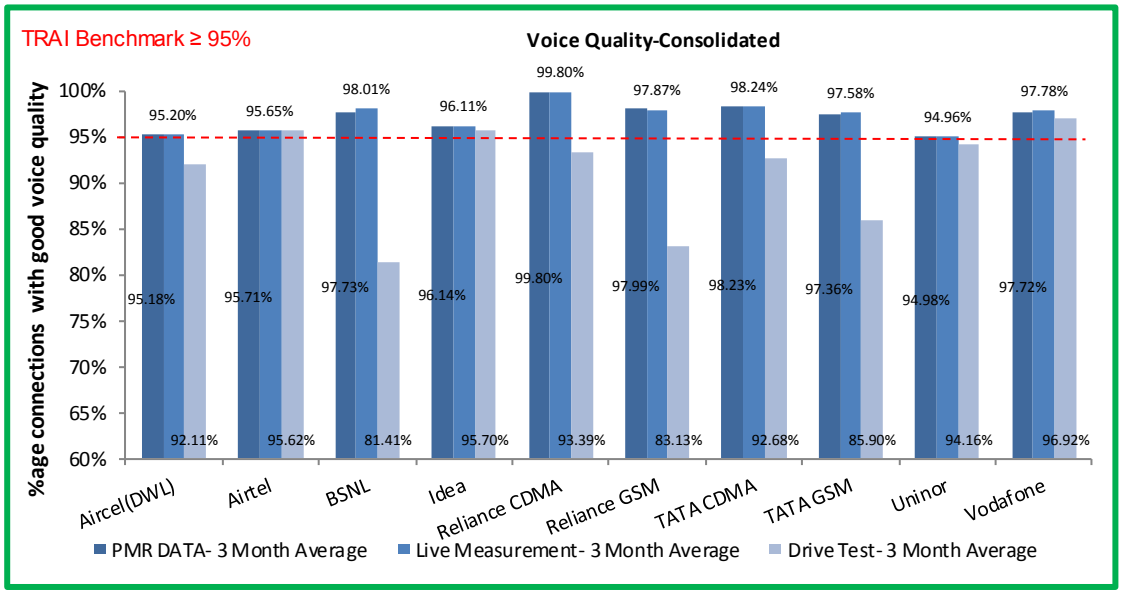
3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

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

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

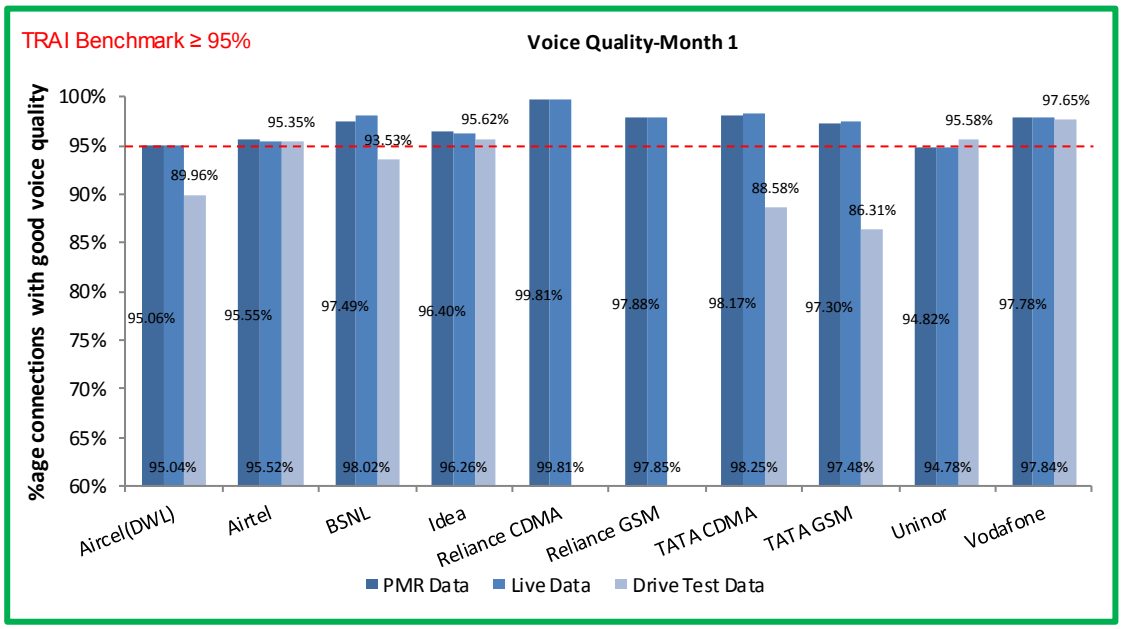
5.7.2 KEY FINDINGS



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

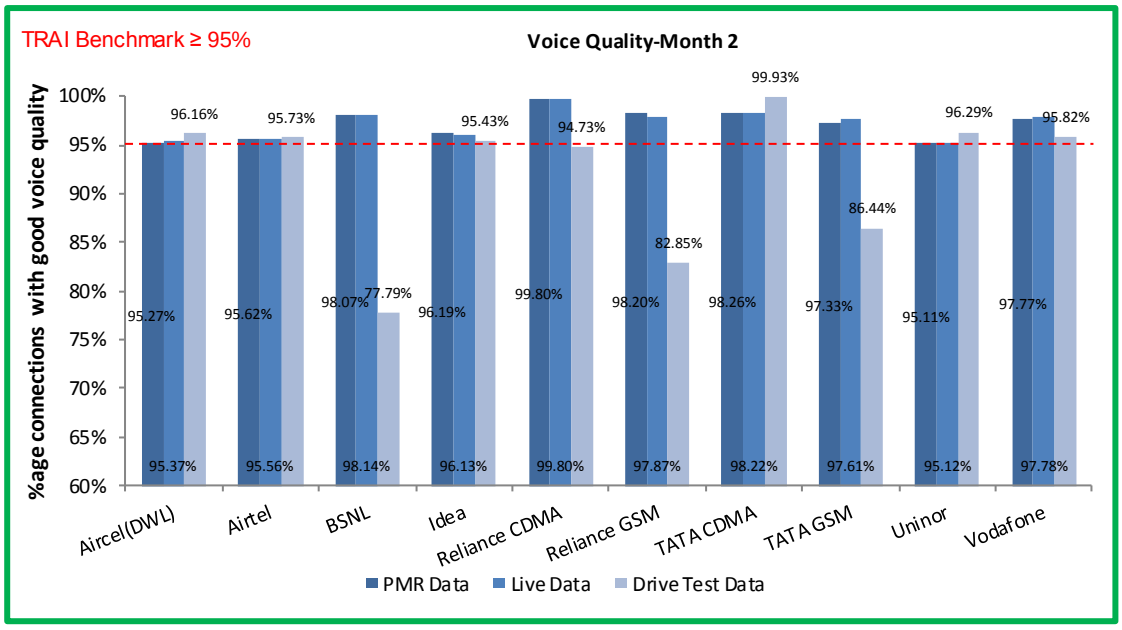
Uninor remained slightly below the benchmark for voice quality during audit.

5.7.2.1 KEY FINDINGS – MONTH 1



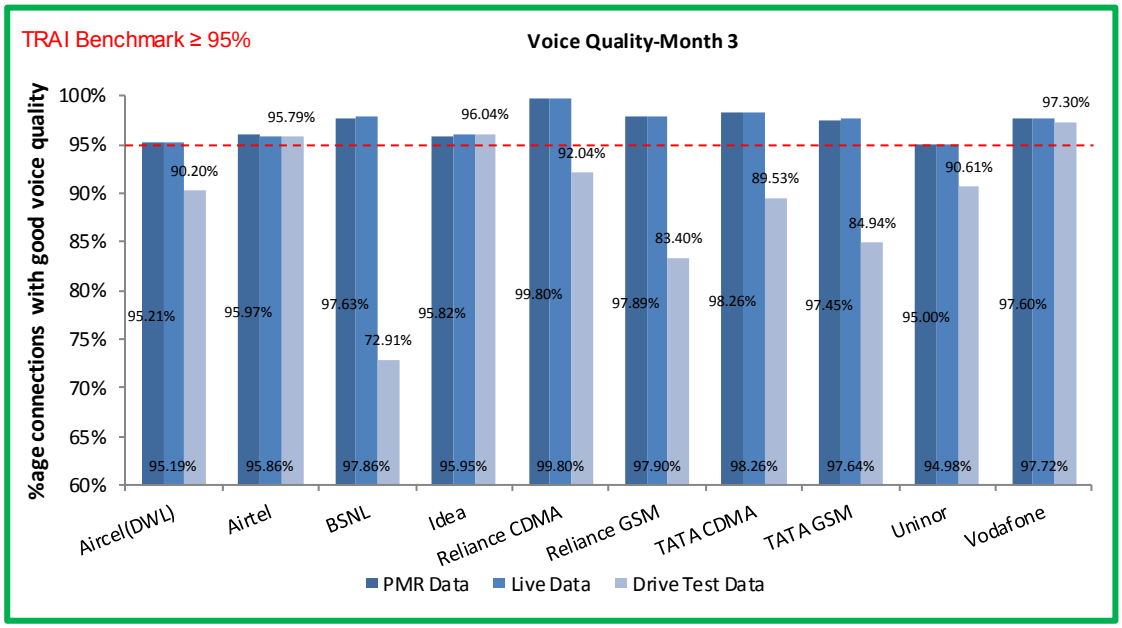
Data Source: Network Operations Center (NOC) of the operators and Drive test reports submitted by operators to auditors

5.7.2.2 KEY FINDINGS – MONTH 2



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

5.7.2.3 KEY FINDINGS – MONTH 3



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

6 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

6.1 METERING AND BILLING CREDIBILITY

The billing complaints for postpaid are calculated by averaging over a 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.

6.1.1 PARAMETER DESCRIPTION

All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th September, 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.

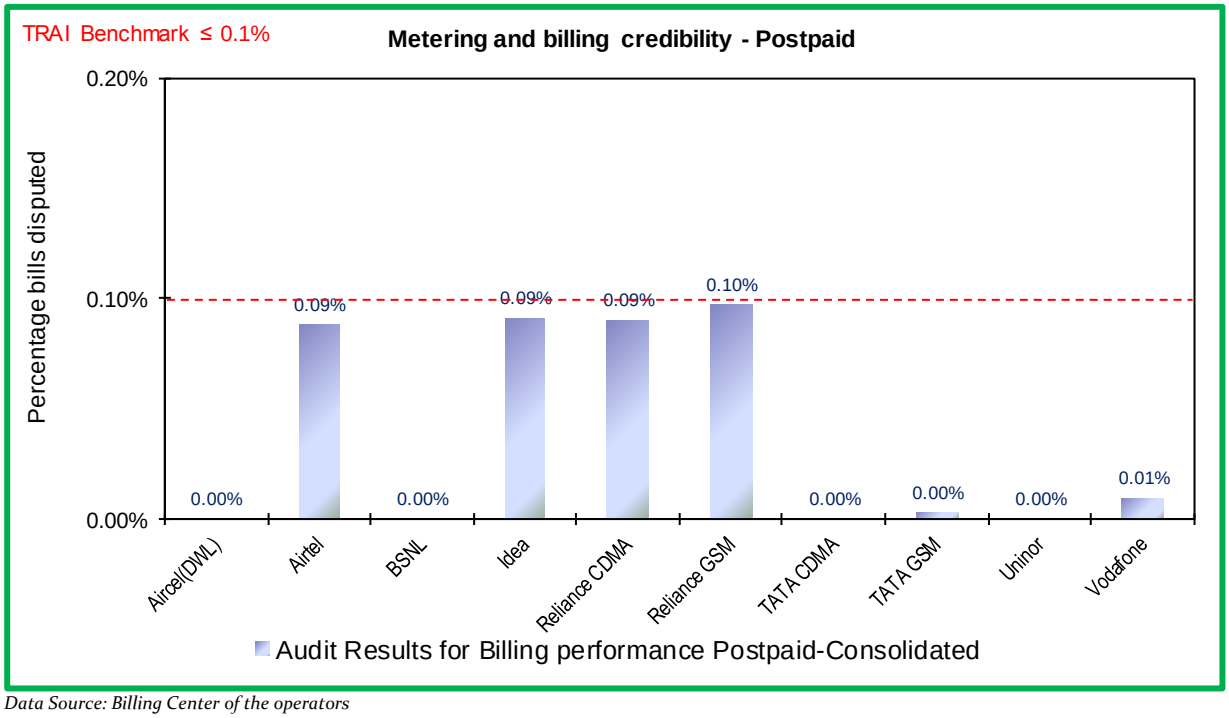
➲ Computational Methodology:

- **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 August 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

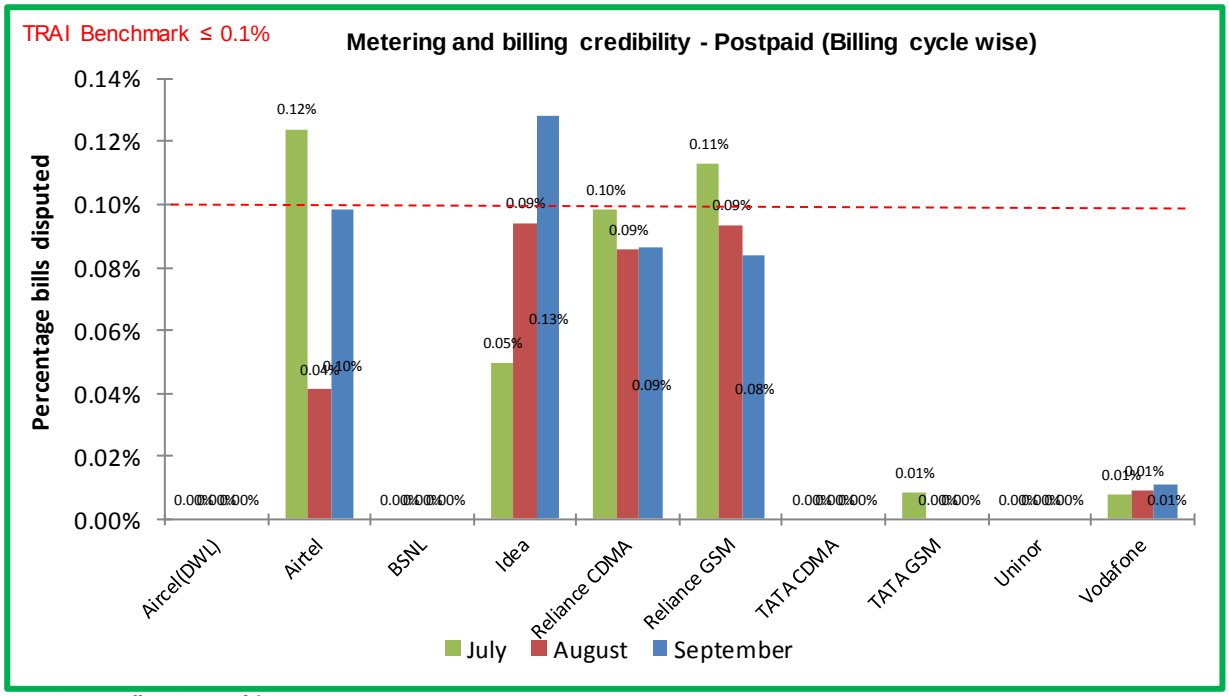
- TRAI Benchmark: <= 0.1%
- Audit Procedure:
  - Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted
    - For Postpaid, the total billing complaints would be audited by averaging over billing cycles in a quarter
  - For Prepaid, the data of total charging complaints in a quarter would be taken for the purpose of audit

6.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



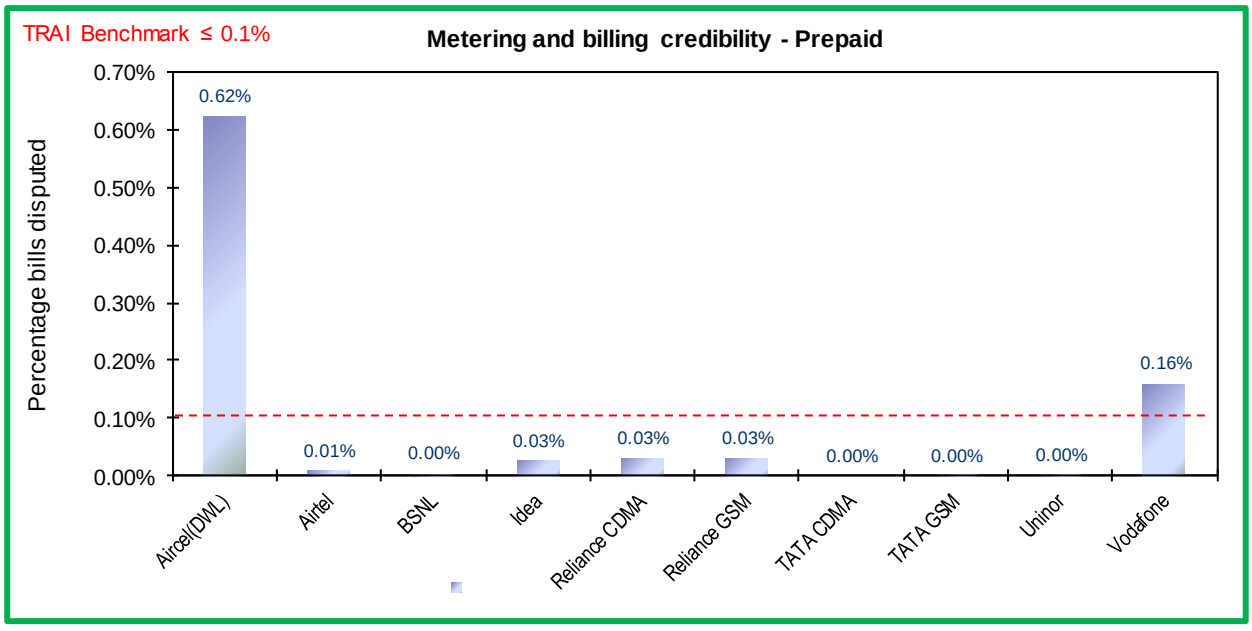
Data Source: Billing Center of the operators

All operators met the benchmark for the parameter.



Data Source: Billing Center of the operators

6.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

Aircel and Vodafone failed to meet the TRAI benchmark for the parameter.

6.2 RESOLUTION OF BILLING COMPLAINTS

6.2.1 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:

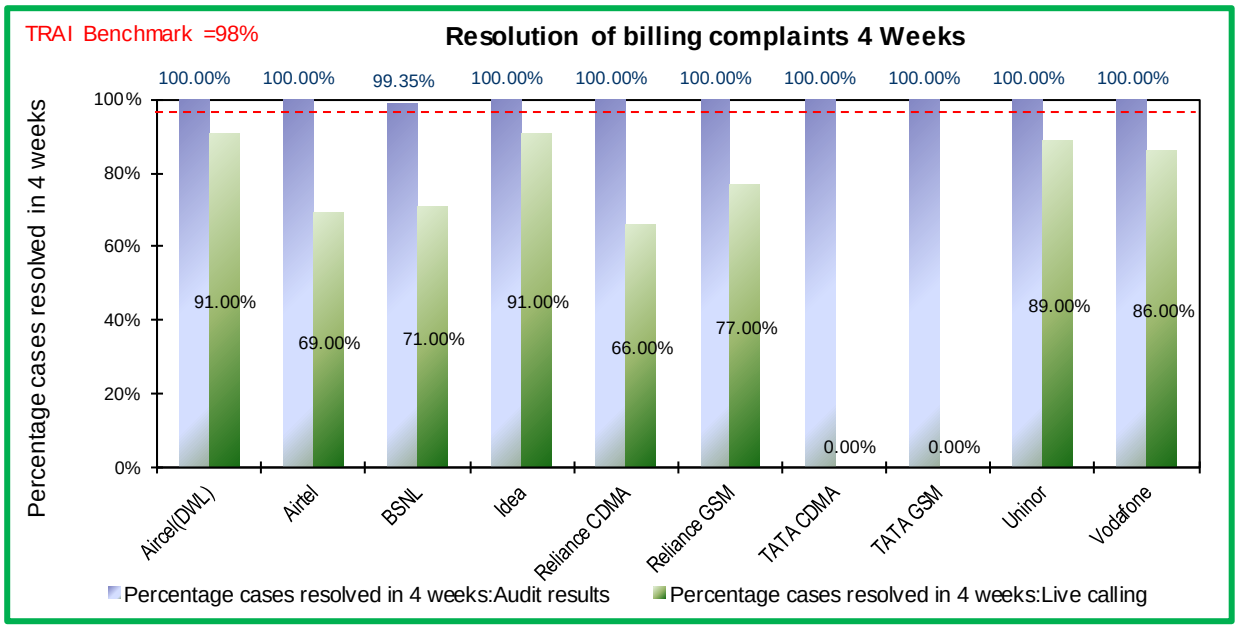
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

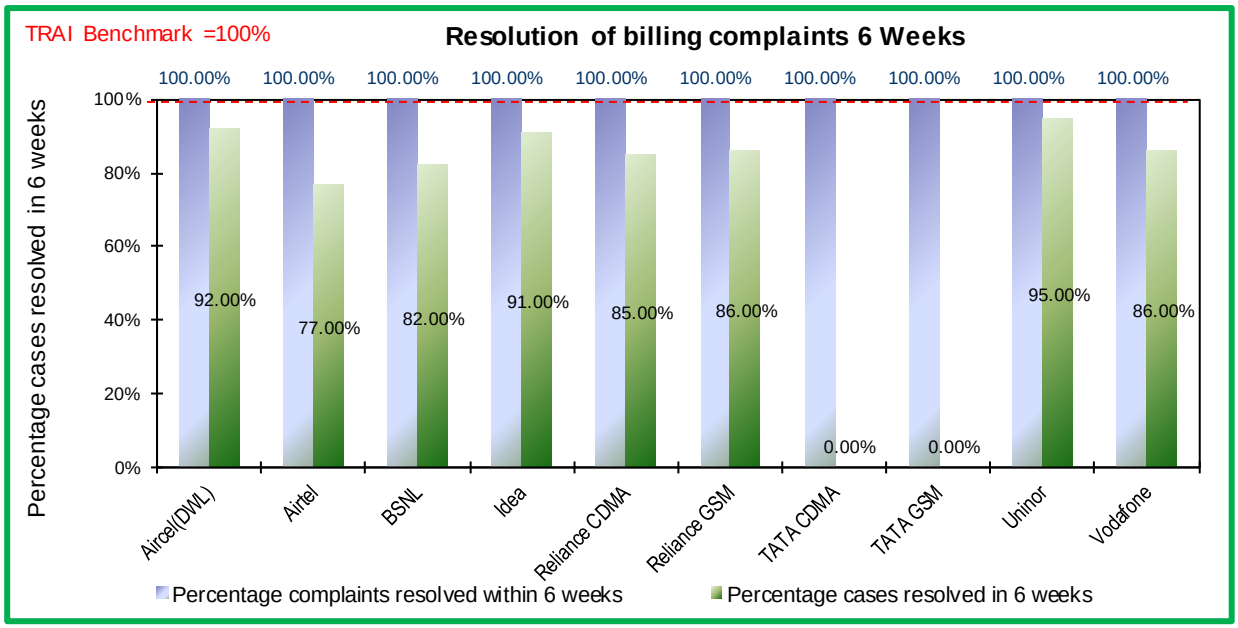
- **Billing complaints here shall include only dispute related issues (including those that August arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket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

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

6.2.2 KEY FINDINGS



Data Source: Billing Center of the operators



Data Source: Billing Center of the operators

As per audit, all operators met the TRAI benchmark for resolving billing complaints within 4 weeks as well as within 6 weeks. However, during live calling it was observed that performance of all operators was below the benchmark levels.

It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI. For details, kindly refer to the annexure (section 8.7).

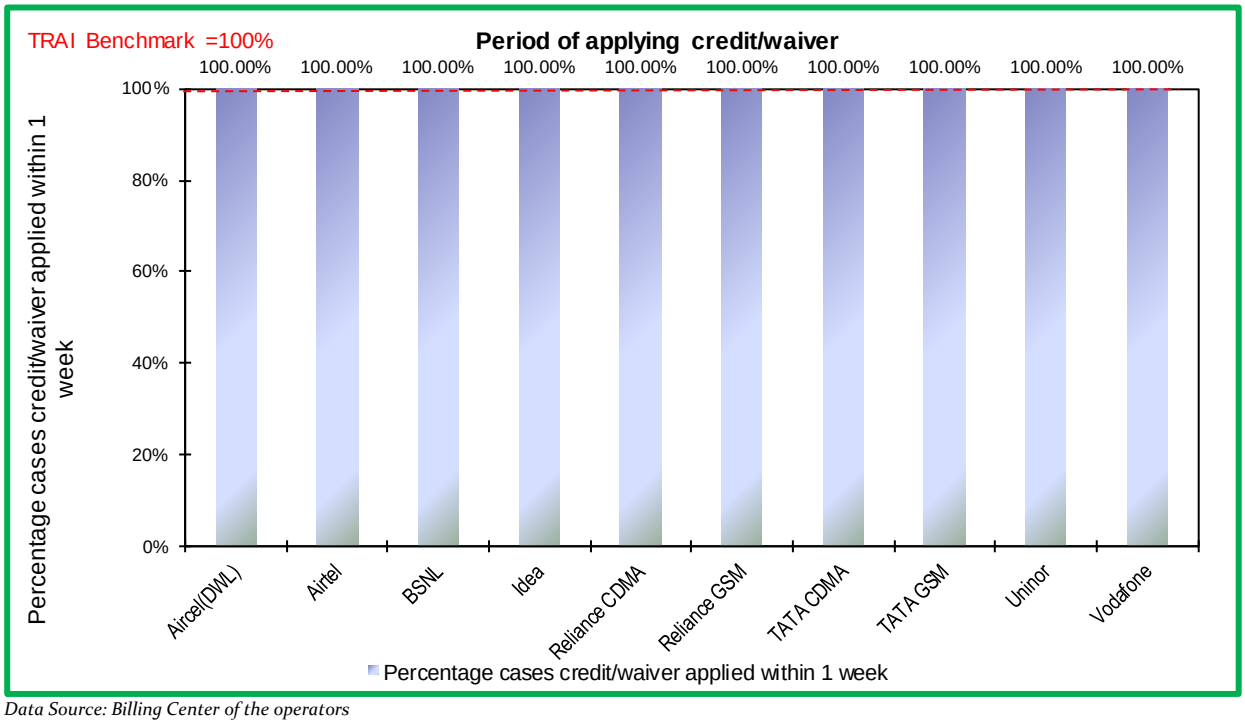
NA: Live calling for Tata CDMA and Tata GSM was not conducted due to very low base of billing complaints.

6.3 PERIOD OF APPLYING CREDIT/WAVIER

6.3.1 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

6.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

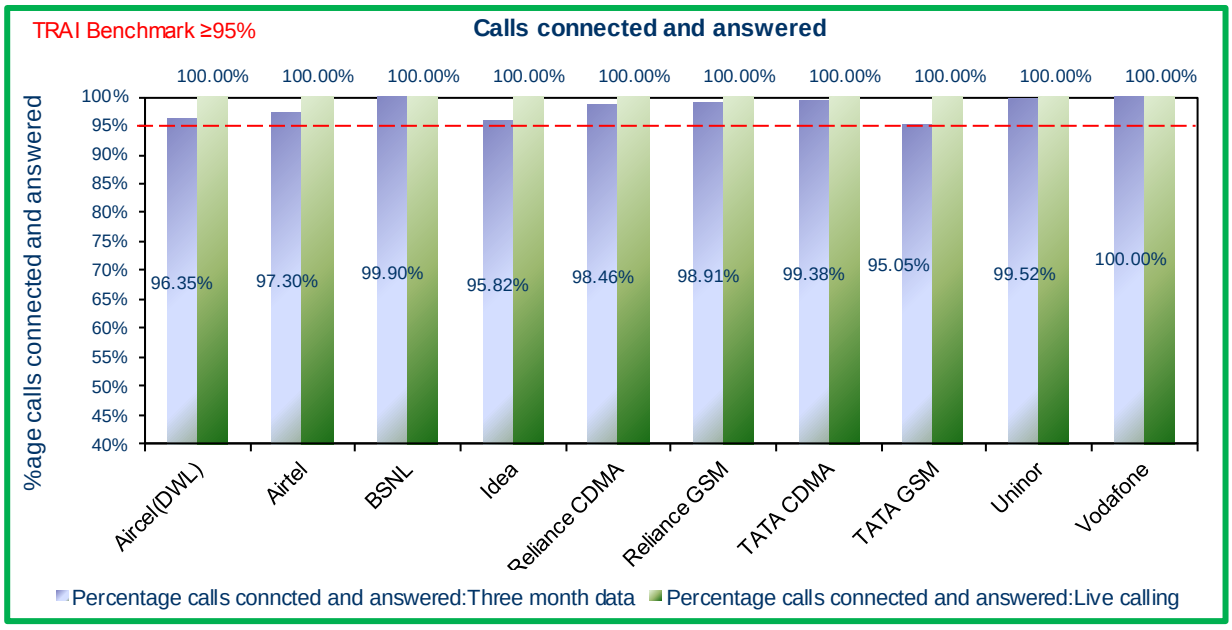
All the operators met the TRAI benchmark for the parameter.

6.4 CALL CENTRE PERFORMANCE-IVR

6.4.1 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

6.4.2 KEY FINDINGS



Data Source: Billing Center of the operators

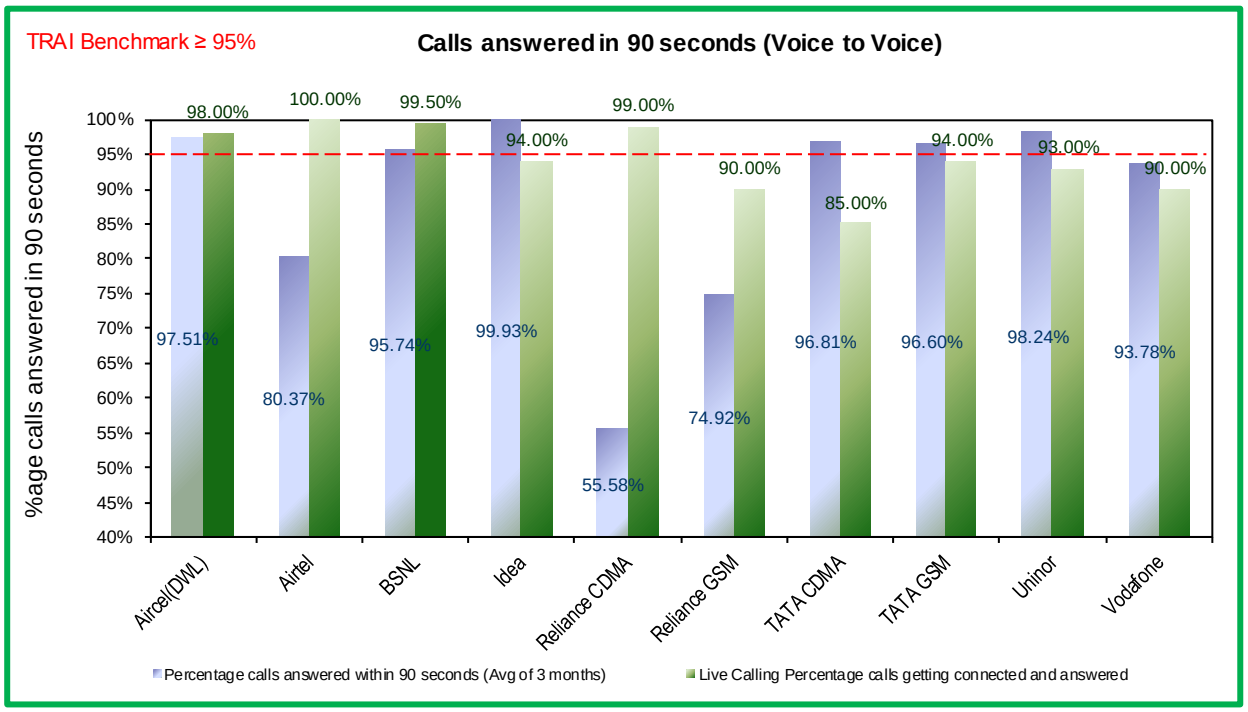
All operators met the benchmark for the parameter as per audit data.

6.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

6.5.1 PARAMETER DESCRIPTION

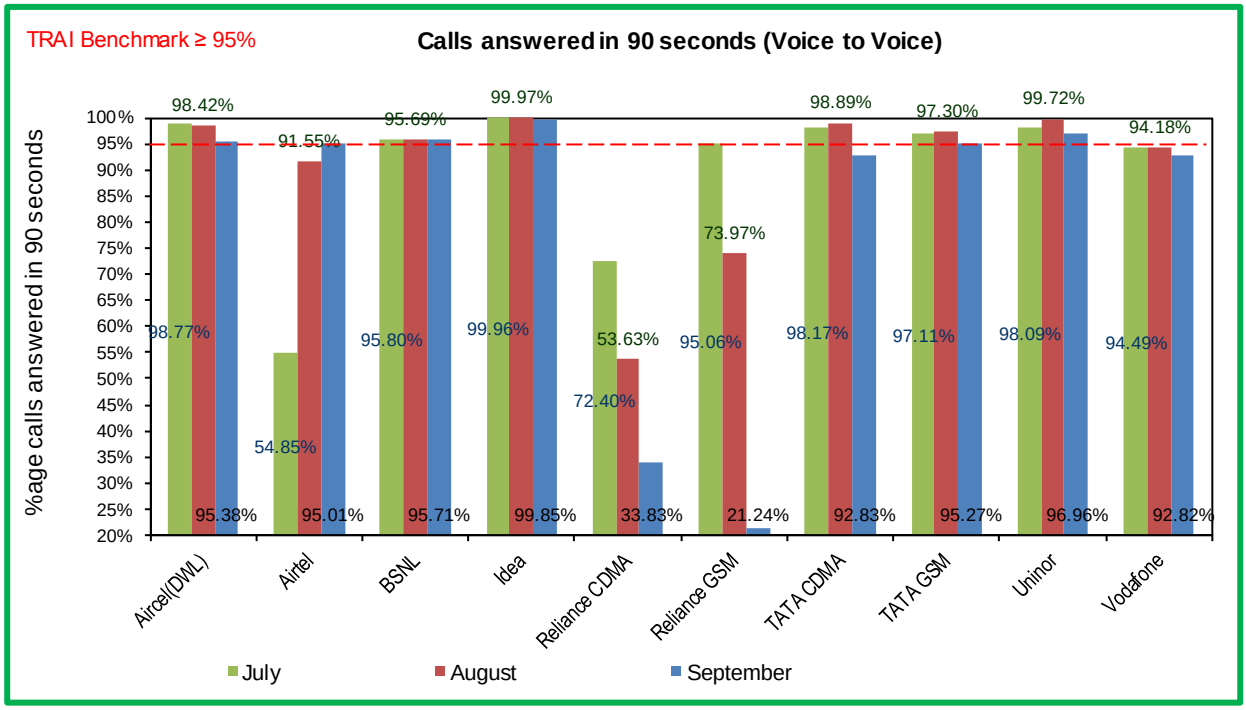
- Computational Methodology:
  - Call centre performance Voice to Voice = (Number of calls answered by operator within 90 seconds/ All calls attempted to connect to the operator) * 100
- Audit Procedure:
  - Operators provide details of the following from their central call centre/ customer service database: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

6.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Airtel, Reliance CDMA, Reliance GSM and Vodafone failed to meet the benchmark during audit for Calls answered (Voice to Voice) as per audit.



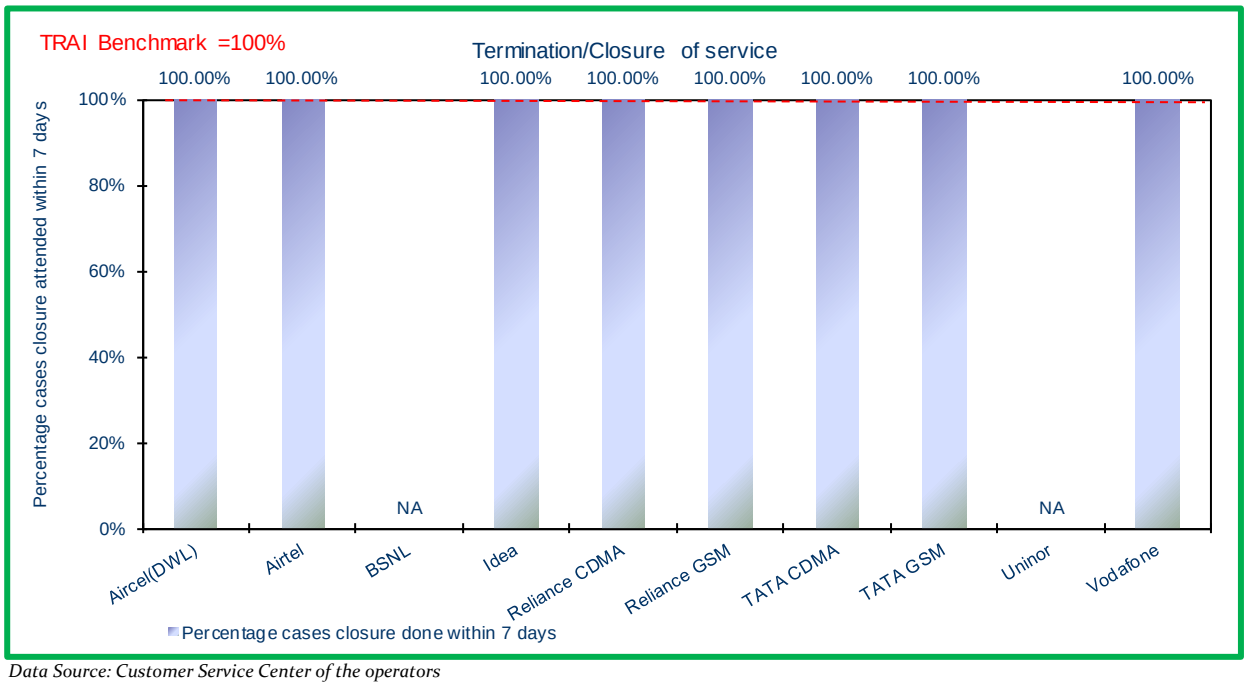
Data Source: Customer Service Center of the operators

6.6 TERMINATION/CLOSURE OF SERVICE

6.6.1 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

6.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All the operators met the benchmark.

NA: BSNL and Uninor did not have any data of closures within their system during audit.

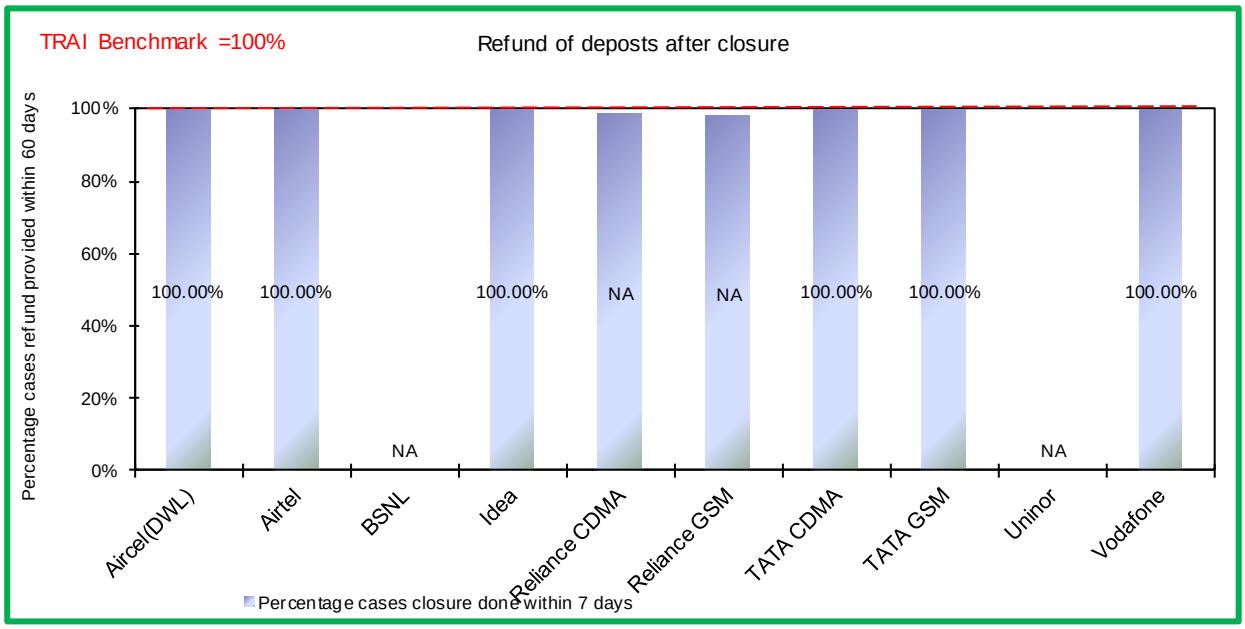
6.7 REFUND OF DEPOSITS AFTER CLOSURE

6.7.1 PARAMETER DESCRIPTION

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

- Dates of refund pertaining to all closure request received during the relevant quarter

6.7.2 KEY FINDINGS



Data Source: Billing Center of the operators

All operators met the TRAI benchmark for the parameter.

NA: BSNL and Uninor did not have any data regarding refunds within their system during audit. Uninor does not have postpaid service available in the circle.

7 DETAILED FINDINGS - DRIVE TEST DATA

7.1 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 July, August and September 2015 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 post discussion with TRAI advisors. IMRB auditors were present in vehicles of every operator. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

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

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

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

7.1.1 July – Chhapra SSA

Month	Name of SSA Covered	Date of Drive Test
July	CHHAPRA	29th to 31st July 2015

7.1.1.1 Route Details - Chhapra SSA

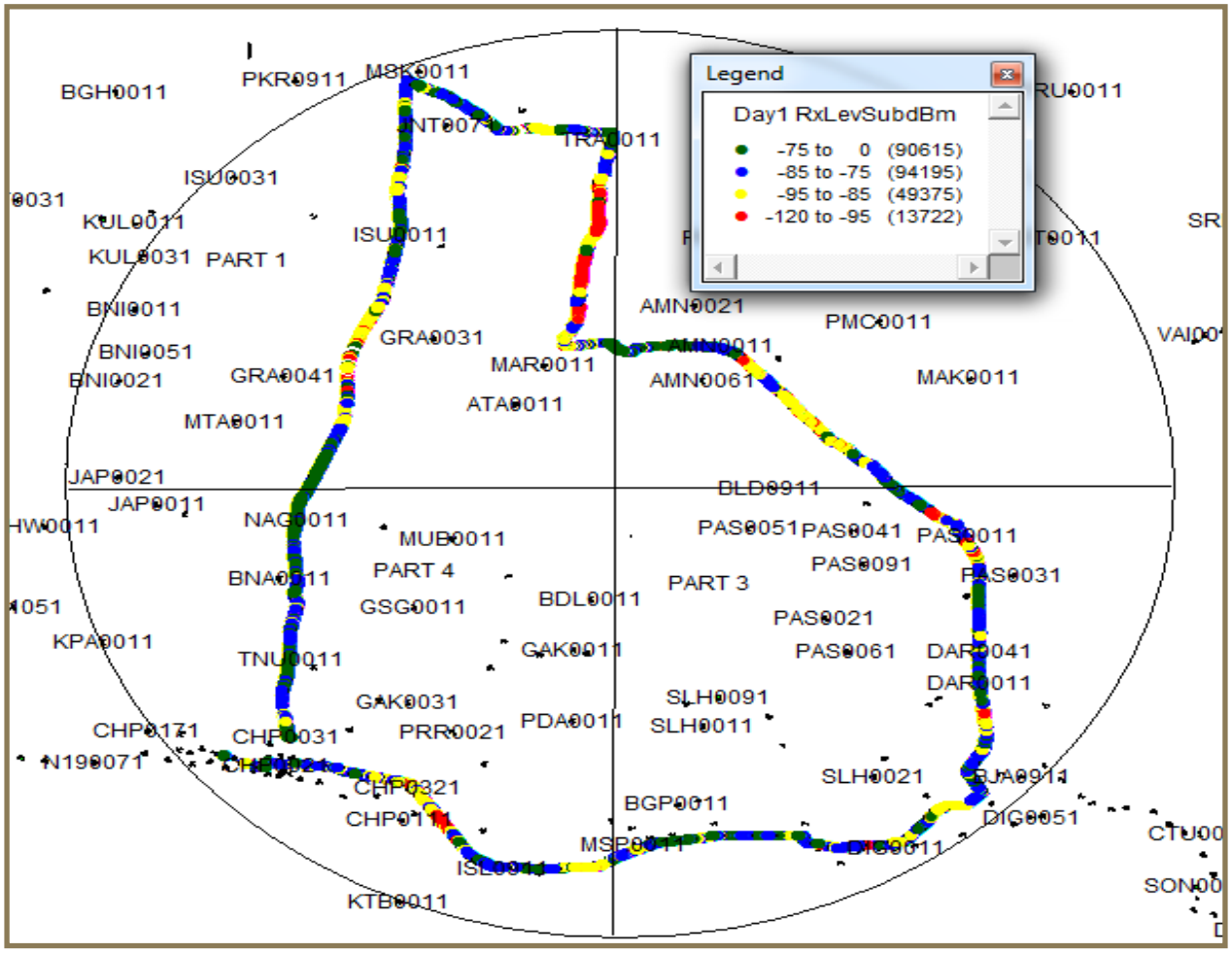
Category	Type of location	Bihar		
		CHHAPRA		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Sitalpur to Parsa to Amnor to Mashrak	Shyam Chowk to Baniyapur to Madarpur	Siwan- Hasanpura-Chainpur- Siswan Gayaspur
	Highways	Bhikhari Chowk to Sitalpur to Mashrak Isuuapur to Chhapra	Madarpur to Gopalgunj to Mirgunj	Methwalia to Daudpur to Ekma to Chanp to Siwan
	With in the City	Station to Bhikhari Chowk	V-Mart to Shyam Chowk	Shayam Chock-Methwallia
Indoor	Shopping complex		V-Mart	
	Office complex	Railway 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 colors (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.

7.1.1.2 Kilometers Travelled- Chhapra SS

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Chhapra	120	125	108	353

7.1.1.3 Route Map - Chhapra Day 1



Route Covered- day 1 .

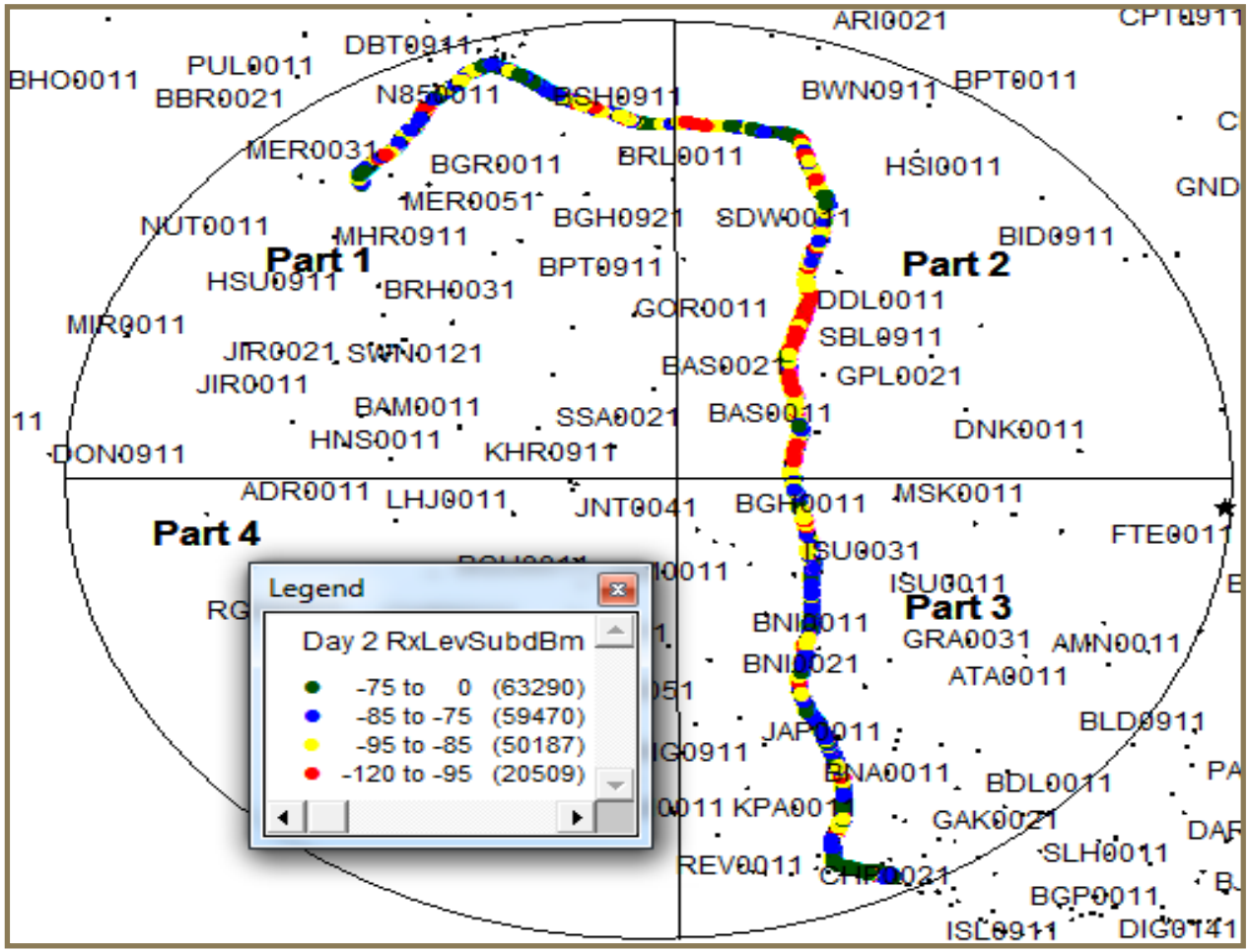
1- Railway Station-Bhikhari Chock

2- Bhikhari Chock-Sitalpur

3-Sitalpur-Parsha-Aumnnur-Masrakh

4-Masrakh-Issuapur-CHHAPRA

7.1.1.4 Route Map - Chhapra Day 2



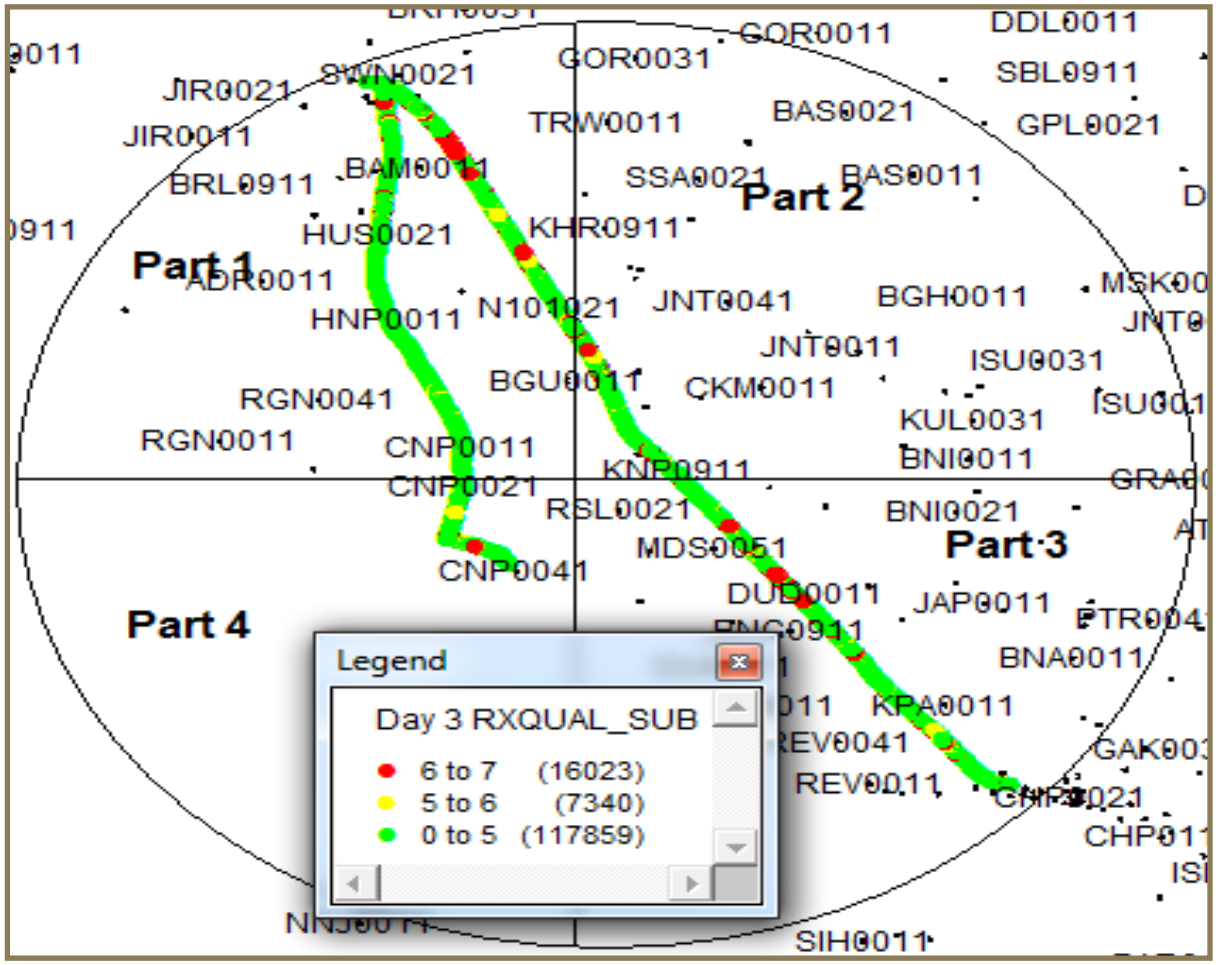
Route Covered- day 2 .

1- V-Mart-Shayam Chock

2-Shayam Chock-Baniyapur-Madarpur

3- Madarpur-Gopalgang-Mirgang

7.1.1.5 Route Map - Chhapra DAY 3



ROUTE COVERED DAY-3

1.-Shayam Chock-Brampur- Enai-Methwallia

2- Methwalliya-Daudpur- Ekma-Chanp- Siwan

3- Siwan- Hansapura-Chainpur- Siswan-Gayaspur-Methwaliya

7.1.1.6 Drive Test Results - Chhapra SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Uninor		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		57.62%	37.95%	83.67%	79.25%	47.22%	36.51%	40.18%	49.87%	NDR		NDR		61.72%	20.97%	72.81%	22.22%	96.97%	49.17%	48.95%	42.44%
0 to -85 dBm		97.70%	74.17%	99.85%	98.17%	95.68%	70.66%	97.73%	92.81%					75.83%	39.05%	93.50%	59.23%	99.76%	75.85%	97.27%	84.55%
0 to -95 dBm		99.96%	94.03%	100.00%	99.91%	99.90%	92.58%	99.96%	99.21%					95.39%	69.96%	99.96%	84.82%	100.00%	100.00%	99.99%	98.14%
Voice quality	≥ 95%	91.81%	90.11%	97.55%	95.33%	95.36%	94.17%	96.38%	95.92%					95.12%	82.05%	85.93%	87.12%	98.08%	94.34%	99.36%	97.67%
CSSR	≥ 95%	100.00%	95.04%	100.00%	100.00%	100.00%	96.67%	100.00%	99.76%					100.00%	95.86%	100.00%	82.62%	100.00%	97.69%	100.00%	100.00%
%age Blocked calls		0.00%	4.34%	0.00%	0.00%	0.00%	3.33%	0.00%	0.24%					0.00%	4.14%	4.29%	17.93%	0.00%	1.99%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	2.34%	0.00%	0.00%	1.67%	4.19%	0.00%	0.00%					0.00%	1.44%	0.00%	5.00%	0.00%	0.26%	0.00%	0.00%
Hands off success rate		100.00%	96.51%	100.00%	100.00%	100.00%	85.64%	100.00%	99.87%					100.00%	100.00%	100.00%	98.38%	100.00%	99.78%	100.00%	89.02%

Data Source: Drive test reports submitted by operators to auditors

NDR: Reliance did not submit the DT reports due to technical difficulty in their systems.

Voice Quality

Aircel and Tata GSM failed to meet the benchmark in indoor as well as outdoor locations. BSNL, Tata CDMA and Uninor did not meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

Tata GSM failed to meet the benchmark for CSSR in outdoor locations.

Call Drop Rate

Aircel, BSNL and Tata GSM did not meet the benchmark in outdoor locations.

7.1.2 August – Darbhanga SSA

Month	Name of SSA Covered	Date of Drive Test
August	Darbhanga	26th to 28th Aug'15

7.1.2.1 Route Details – Darbhanga SSA

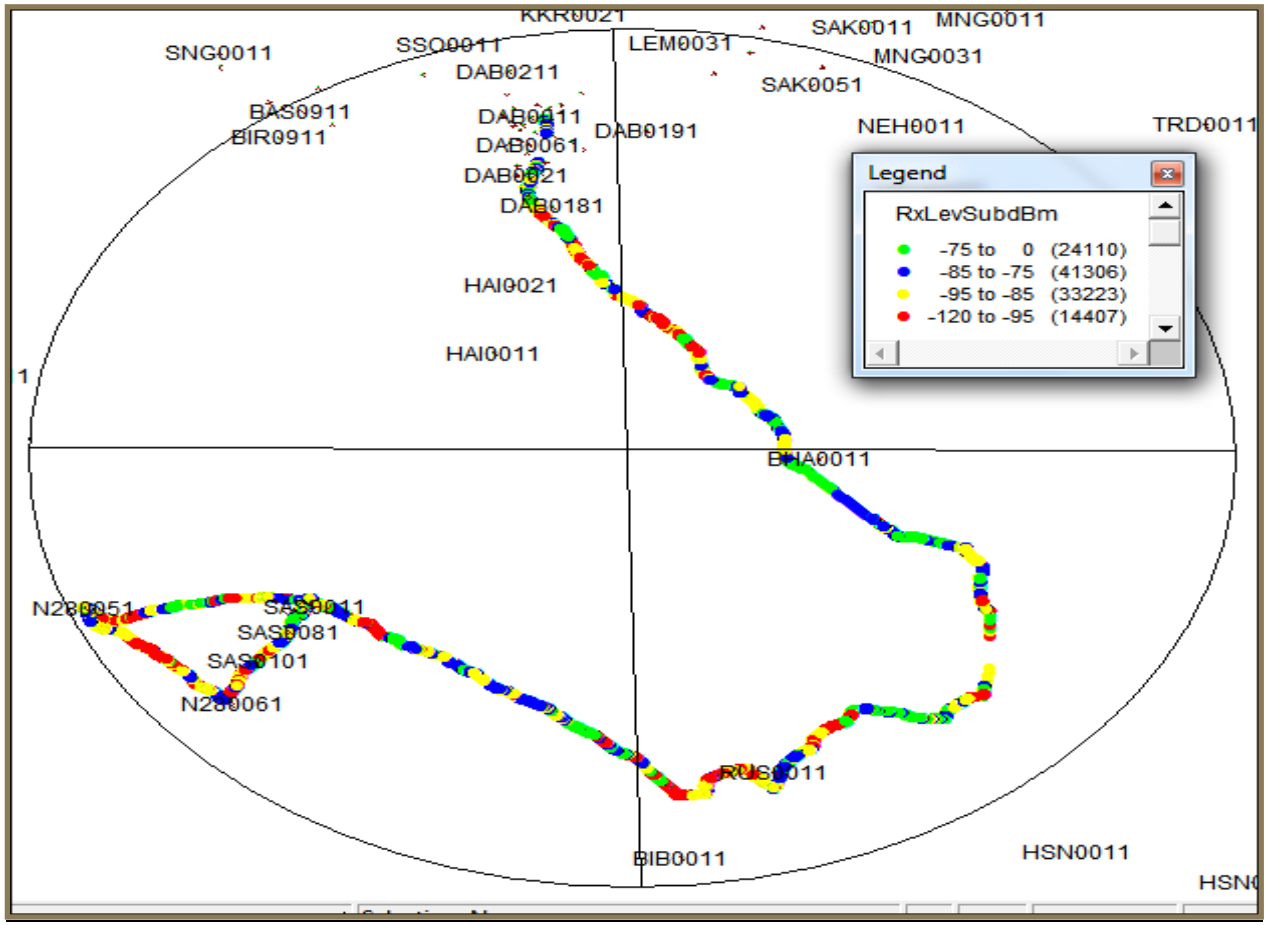
Category	Type of location	Bihar		
		Darbhanga		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	DEKULI –BAHERI-SINGHAI-ROSRA	SAIDNAGAR-KALYANPUR-SAMASTIPUR	BADSANGHI-RAMPATI-RAJNAGAR-BANIGAMA-KALUAHI-RAHIKA-DILLI MOR
	Highways	ROSERA-SAMSTIPUR-TAJPUR-MUSRIGHARARI	SAMSTIPUR-MUSRIGHRARI-DALSINGHSARA	HIGHWAY-DILLI MOR-KAKARGHATI-MANIGHATI-BADSANGHI
	With in the City	RAILWAY STATION –DEKULI	SAIDPUR	RAILWAY STATION-DILLI MOR,
Indoor	Shopping complex	Railway Station	Railway Station	Railway Station
	Office complex	Railway Station	Railway Station	Railway 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 colors (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.

7.1.2.2 Kilometers Travelled– Darbhanga SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Darbhanga	130	105	135	370

7.1.2.3 Route Map Darbhanga Day 1



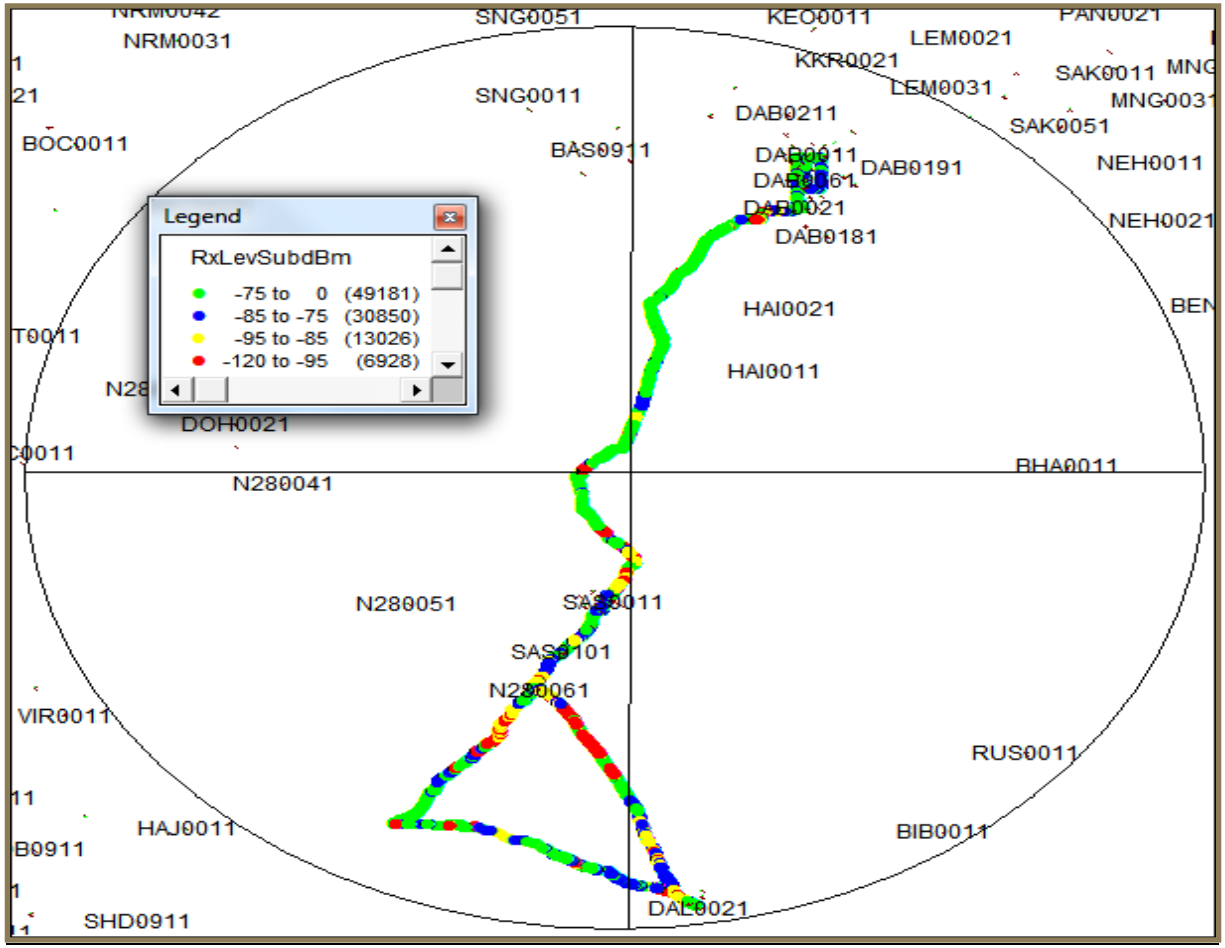
Route Covered- day 1 .

CITY- RAILWAY STATION – DEKULI

MAJOR ROAD- DEKULI – BAHERI- SINGHAI- ROSRA,

HIGHWAY- ROSERA- SAMSTIPUR- TAJPUR- MUSRIGHARARI

7.1.2.4 Route Map Darbhanga Day 2



Route Covered- day 2 .

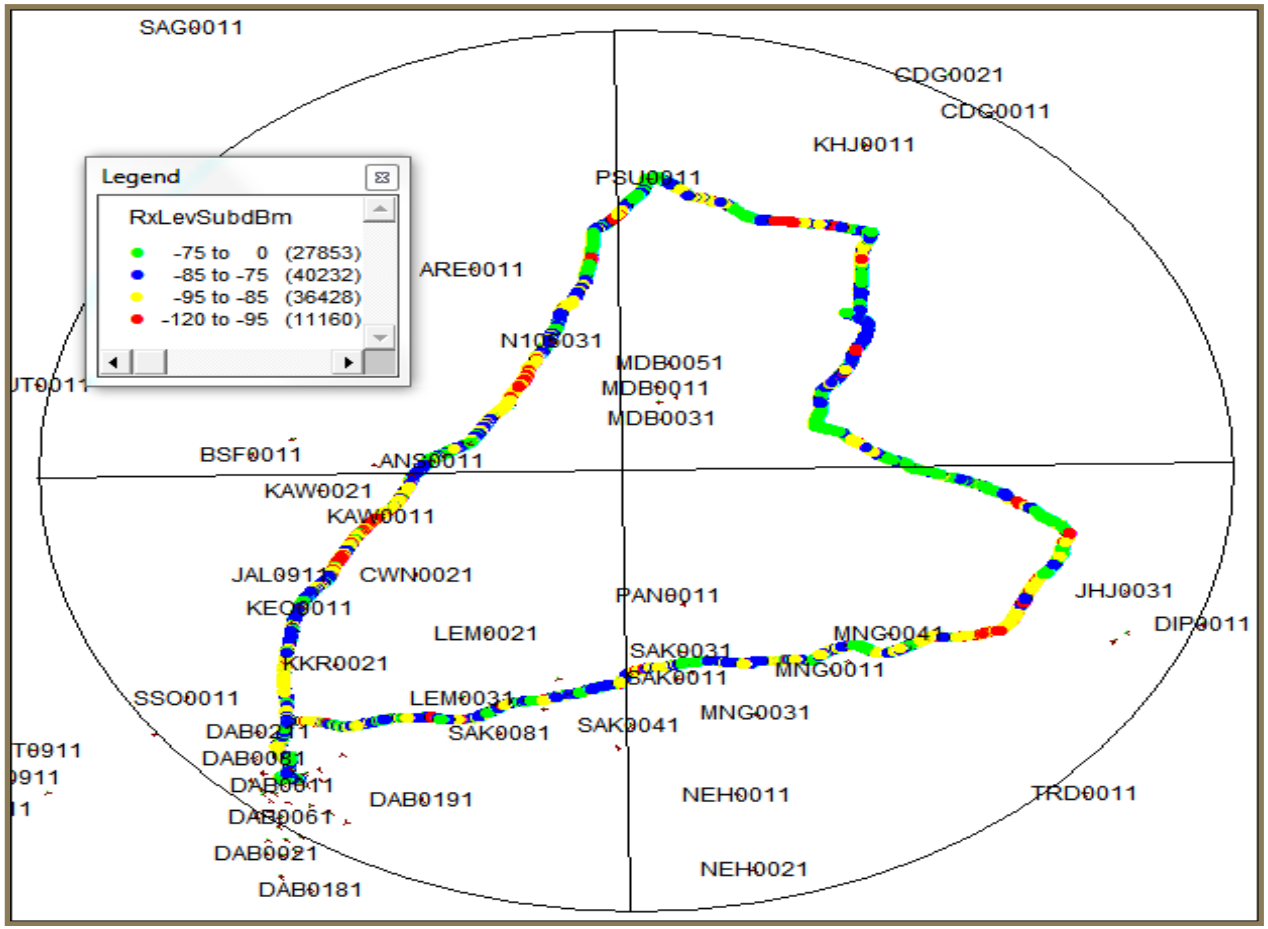
CITY-V2-SAIDPUR

MAJOR— KALYANPUR-SAMSTIPUR,

HIGHWAY-SAMSTIPUR-MUSRIGHRARI-DALSINGHSARAI,

MAJOR-DALSINGSARAI-PACHBHINDA-MUSRIGHRARI

7.1.2.5 Route Map Darbhanga DAY 3



ROUTE COVERED DAY-3

CITY-RAILWAY STATION-KADIRABAD-DILLI MOR,

HIGHWAY-DILLI MOR-KAKARGHATI-MANIGHATI-BADSANGHI,

MAJOR-BADSANGHI-RAMPATI-RAJNAGAR-BANIGAMA-KALUAHI-RAHIKA-DILLI MOR

7.1.2.6 Drive Test Results – Darbhanga SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Uninor		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		63.12%	33.74%	99.81%	70.54%	83.64%	45.61%	47.24%	40.04%	99.39%	29.31%	22.60%	20.31%	25.39%	19.82%	30.17%	19.03%	96.06%	55.35%	93.35%	55.76%
0 to -85 dBm		89.17%	68.86%	99.99%	95.98%	98.55%	71.67%	99.72%	91.25%	100.00%	49.36%	84.79%	51.33%	68.32%	54.87%	83.17%	53.70%	99.89%	79.92%	99.17%	87.23%
0 to -95 dBm		100.00%	91.97%	99.99%	99.83%	100.00%	100.00%	100.00%	99.06%	100.00%	71.45%	99.81%	77.04%	84.16%	81.77%	99.31%	75.30%	100.00%	100.00%	100.00%	97.39%
Voice quality	≥ 95%	95.11%	96.10%	98.24%	95.51%	98.00%	80.70%	96.38%	95.47%	99.54%	89.92%	92.69%	84.84%	85.25%	89.33%	90.75%	85.76%	97.99%	95.54%	98.90%	95.71%
CSSR	≥ 95%	98.48%	97.54%	100.00%	100.00%	100.00%	97.14%	100.00%	99.81%	100.00%	98.36%	100.00%	88.97%	56.17%	86.43%	100.00%	44.50%	100.00%	100.00%	100.00%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	3.66%	0.00%	0.00%	0.00%	1.64%	0.00%	11.03%	0.00%	0.00%	0.00%	13.26%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	1.61%	0.00%	0.00%	0.00%	0.00%	6.40%	0.00%	0.00%	0.00%	4.17%	0.00%	10.58%	2.10%	1.90%	0.00%	2.63%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	97.63%	100.00%	100.00%	100.00%	89.20%	100.00%	99.51%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	93.21%	100.00%	100.00%	100.00%	99.72%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Reliance GSM, Tata CDMA and Tata GSM failed to meet the benchmark in indoor as well as in outdoor locations. BSNL and Reliance CDMA did not meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

Tata CDMA failed to meet the benchmark for CSSR in indoor as well as outdoor locations. Reliance GSM and Tata GSM did not meet the benchmark in outdoor locations.

Call Drop Rate

BSNL, Reliance CDMA, Reliance GSM and Tata GSM failed to meet the benchmark for call drop rate in outdoor locations. Tata CDMA failed to meet the benchmark in indoor locations.

7.1.3 September – Gaya SSA

Month	Name of SSA Covered	Date of Drive Test
September	Gaya	23rd to 25th Sep, 2015

7.1.3.1 Route Details – Gaya SSA

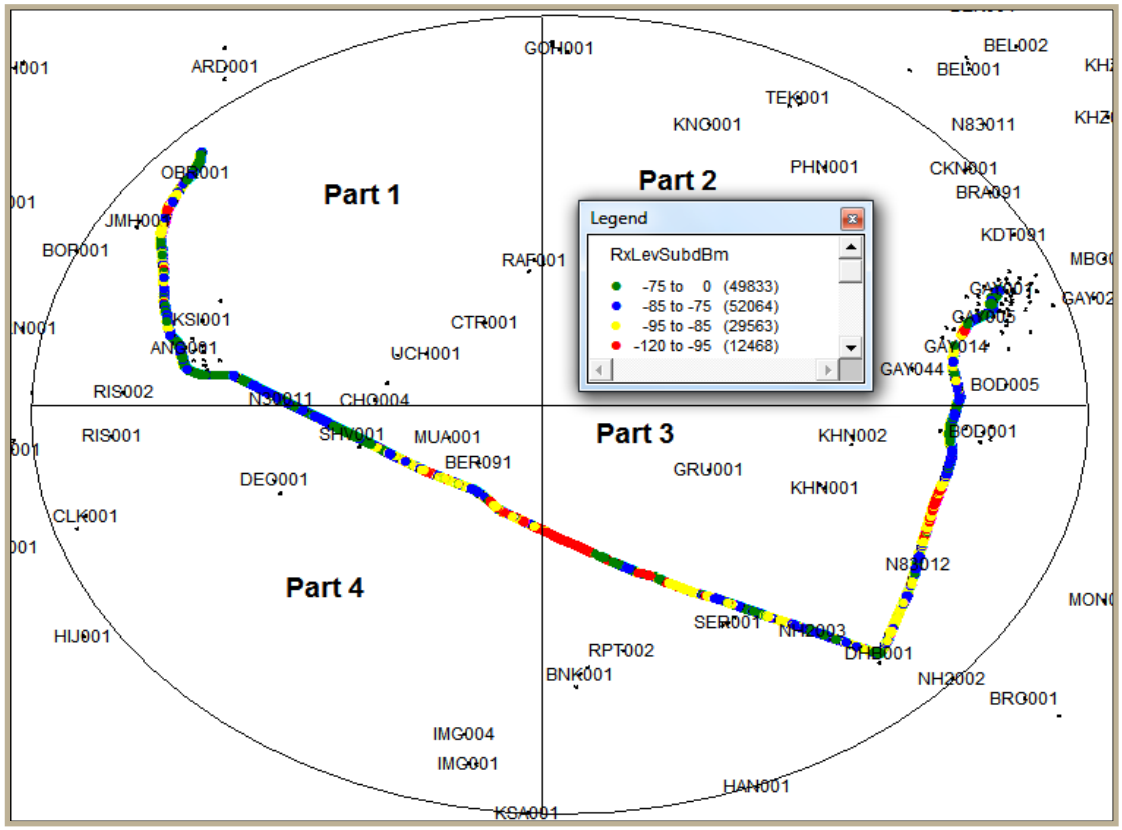
Category	Type of location	Bihar		
		Gaya		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Sikaria more to Bodhgaya byepass to Dobhi Aurangabad to Obra	City public school to Nawada	Kujap to Daudnagar
	Highways	Dobhi to Aurangabad	Nawada to Hisua	Daudnagar to Jahanabad
	With in the City	Railway Station to Sikaria more	App mall to City public school	Railway station to Kujap
Indoor	Shopping complex	Railway Station	Railway Station	Railway Station
	Office complex	Railway Station	App Mall	Railway 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 colors (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.

7.1.3.2 Kilometers Travelled– Gaya SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
Gaya	125	120	145	390

7.1.3.3 Route Map Gaya Day 1



Route Covered- day 1 .

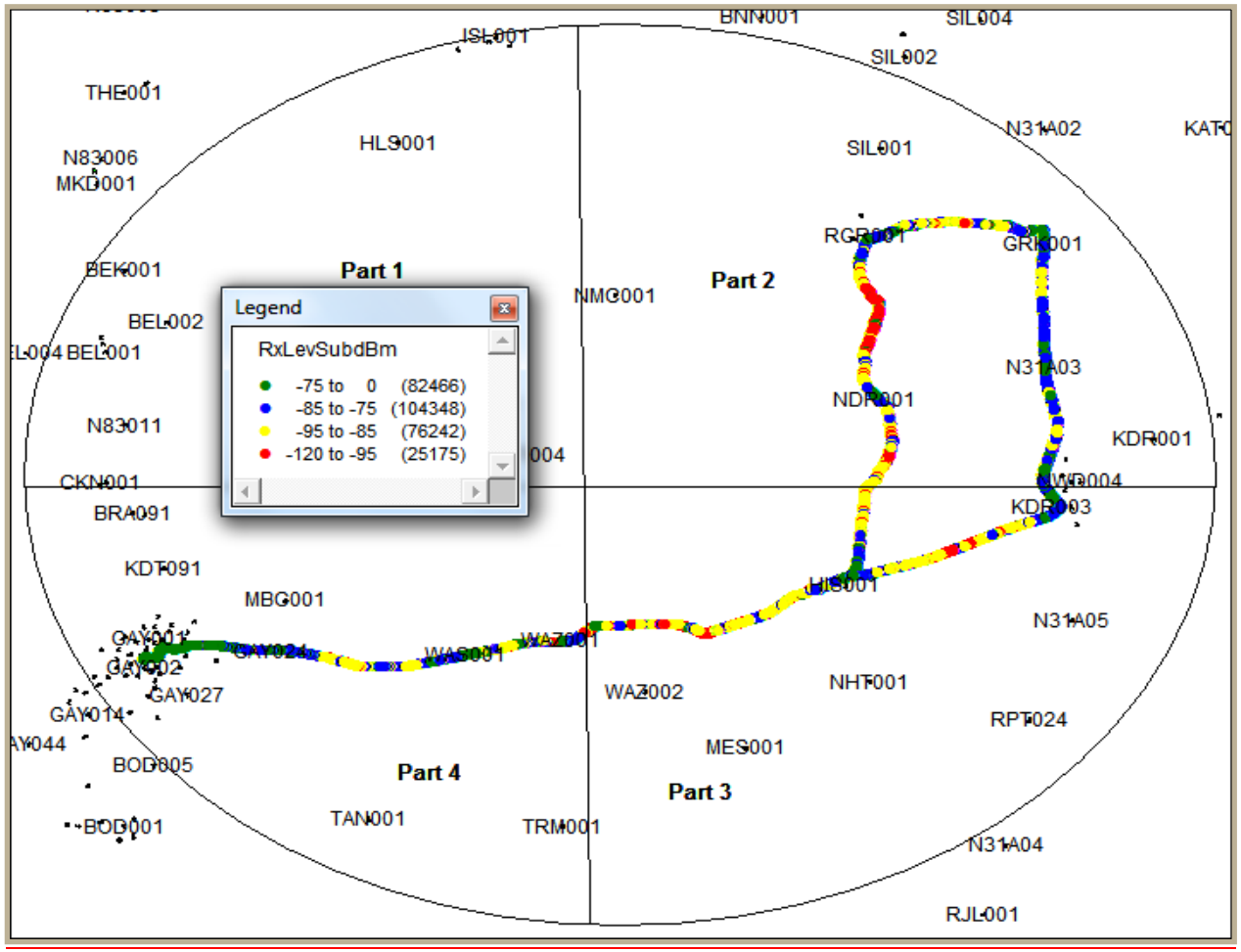
1- Railway Station to Sikaria more

2-Sikaria more to Bodhgaya byepass to Dobhi

3- Dobhi to Aurangabad

4- Aurangabad to Obra

7.1.3.4 Route Map Gaya Day 2



Route Covered- day 2

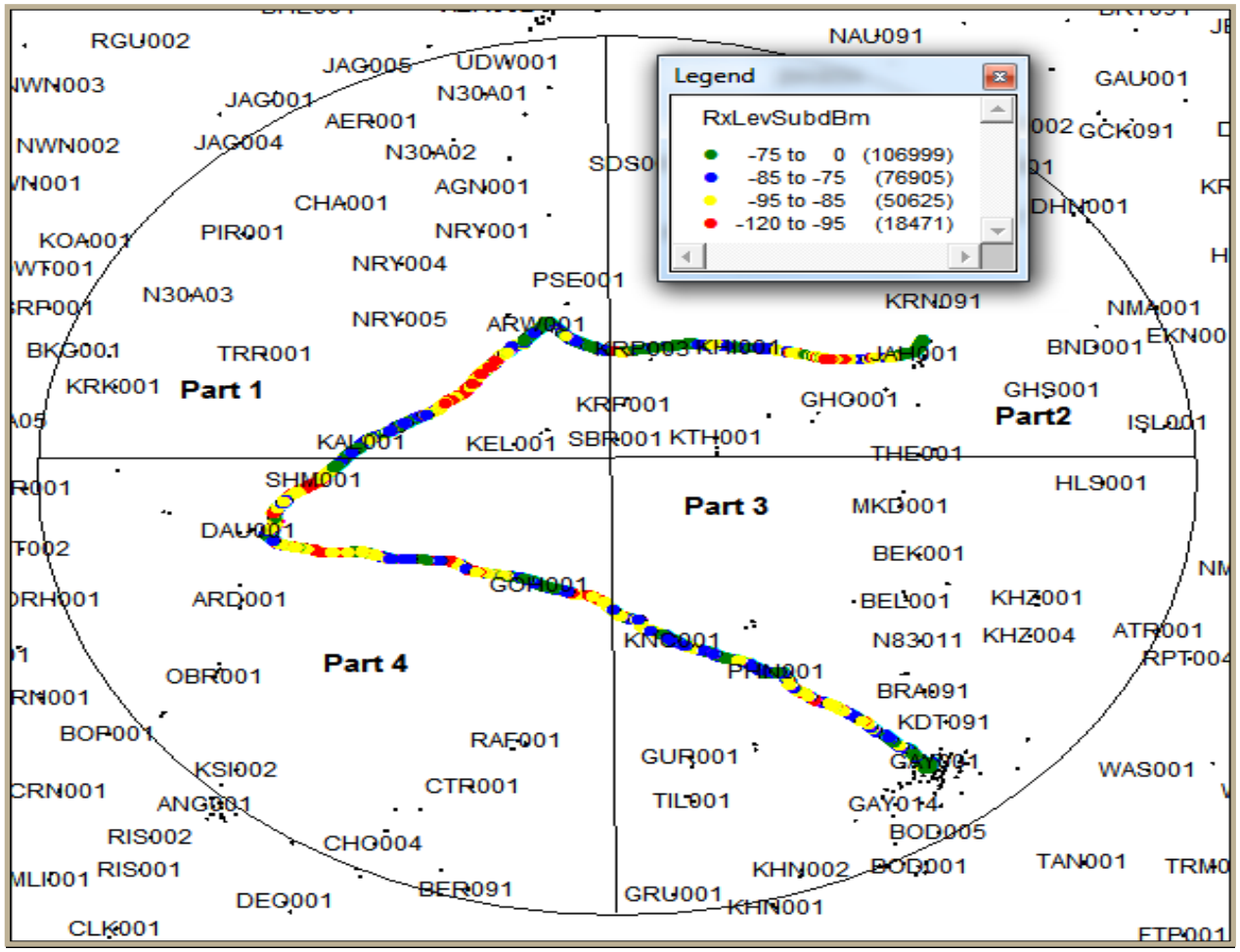
.

1- App mall to City public school

2- City public school to Nawada

3- Nawada to Hisua

7.1.3.5 Route Map Gaya Day 3



ROUTE COVERED DAY-3

1.- Railway station to Kujap

2- Kujap to Daudnagar

3- Daudnagar to Jahanabad

7.1.3.6 Drive Test Results – Gaya SSA

	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		Reliance CDMA		Reliance GSM		TATA CDMA		TATA GSM		Uninor		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		87.89%	45.32%	99.97%	82.78%	73.78%	35.09%	64.76%	61.64%	50.56%	30.74%	82.82%	27.98%	99.42%	67.57%	99.42%	67.57%	91.23%	39.80%	56.10%	58.58%
0 to -85 dBm		99.25%	75.80%	100.00%	97.93%	26.22%	41.27%	98.72%	91.28%	93.99%	56.12%	99.26%	60.37%	99.99%	88.88%	99.99%	88.88%	99.84%	67.11%	95.98%	89.33%
0 to -95 dBm		99.99%	93.60%	100.00%	99.88%	0.00%	23.65%	99.91%	99.41%	100.00%	81.71%	100.00%	82.96%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.95%	99.10%
Voice quality	≥ 95%	89.78%	88.13%	98.16%	95.54%	95.43%	73.56%	96.64%	96.16%	94.44%	89.64%	96.41%	85.49%	93.29%	86.17%	92.17%	84.17%	98.13%	89.72%	98.45%	97.02%
CSSR	≥ 95%	100.00%	94.15%	100.00%	100.00%	100.00%	98.90%	100.00%	99.77%	100.00%	97.35%	100.00%	72.25%	100.00%	84.47%	100.00%	84.47%	98.39%	96.94%	100.00%	100.00%
%age Blocked calls		0.00%	3.68%	0.00%	0.00%	0.00%	1.10%	0.00%	0.23%	0.00%	2.65%	0.00%	27.75%	0.00%	3.67%	0.00%	10.98%	0.00%	0.93%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	3.00%	0.00%	0.00%	0.00%	1.53%	0.00%	0.00%	0.00%	4.84%	0.00%	7.37%	0.00%	6.43%	0.00%	6.43%	0.00%	1.09%	0.00%	0.00%
Hands off success rate		100.00%	97.58%	NA	100.00%	100.00%	86.47%	100.00%	99.62%	100.00%	100.00%	NA	NA	100.00%	89.87%	100.00%	89.87%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Aircel, Reliance CDMA, Tata CDMA and Tata GSM failed to meet the benchmark in indoor as well as in outdoor locations. BSNL, Reliance GSM and Uninor did not meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

Aircel, Reliance GSM, Tata CDMA and Tata GSM failed to meet the benchmark for CSSR in outdoor locations.

Call Drop Rate

Aircel, Reliance CDMA, Reliance GSM, Tata CDMA and Tata GSM failed to meet the benchmark for call drop rate in outdoor locations.

8 ANNEXURE – CONSOLIDATED

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		8764	27791	11145	21880	4565	9690	1194	2881	9686	26517
Sum of downtime of BTSs in a month (in hours)		178431	15807	797914	112848	17272	5453	2072	7817	21511	101509
BTSs accumulated downtime (not available for service)	≤ 2%	2.77%	0.08%	9.70%	0.70%	0.52%	0.08%	0.23%	0.37%	0.30%	0.52%
Number of BTSs having accumulated downtime >24 hours		1508	85	2752	383	47	26	0	53	156	442
Worst affected BTSs due to downtime	≤ 2%	17.21%	0.31%	24.70%	1.75%	1.04%	0.27%	0.00%	1.84%	1.61%	1.67%
Live Measurement- BTSs accumulated downtime											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		8764	27773	11145	21649	4565	9690	1179	2881	9679	26517
Sum of downtime of BTSs in a month (in hours)		17590	1497	50378	12431	2784	1059	417	1502	3661	10513
BTSs accumulated downtime (not available for service)	≤ 2%	2.79%	0.08%	6.28%	0.80%	0.85%	0.15%	0.49%	0.72%	0.53%	0.55%
Number of BTSs having accumulated downtime >24 hours		NA	16	289	36	47	26	0	2	116	0
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	NA	0.06%	2.59%	0.17%	1.04%	0.27%	0.00%	0.07%	1.20%	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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	87.33%	96.62%	98.36%	96.26%	97.50%	95.75%	97.74%	97.93%	94.18%	99.07%
SDCCH/Paging channel congestion	≤ 1%	1.56%	0.87%	1.98%	0.90%	NA	0.82%	NA	0.94%	1.00%	0.39%
TCH congestion	≤ 2%	11.98%	1.33%	2.78%	1.90%	0.03%	0.09%	0.49%	0.62%	4.62%	0.93%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	86.65%	96.64%	98.42%	96.62%	97.71%	94.30%	98.78%	98.89%	93.48%	99.11%
SDCCH/Paging channel congestion	≤ 1%	1.38%	0.87%	1.97%	0.80%	NA	0.97%	NA	0.94%	1.45%	0.41%
TCH congestion	≤ 2%	12.90%	1.34%	2.24%	1.78%	0.03%	0.21%	0.16%	0.20%	5.06%	0.89%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts		1195	1725	1294	1553	1196	1280	1575	1682	1050	1677
Total number of successful calls established		1144	1725	1256	1549	1163	933	1114	1102	1033	1677
CSSR	≥ 95%	96.02%	100.00%	97.10%	99.75%	97.25%	73.07%	78.23%	72.35%	98.49%	100.00%
%age blocked calls		3.98%	0.00%	2.90%	0.25%	2.75%	26.93%	21.77%	27.65%	1.51%	0.00%

Data Source: 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											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		449463492	2336649335	106793896	926527721	182244085	280322641	45000942	72761949	605697759	823437887
Total number of calls dropped		8464192	39555183	2802316	11227779	706118	1210352	378755	493208	3402484	8183965
Call drop rate	≤ 2%	1.88%	1.69%	2.55%	1.21%	0.41%	0.44%	0.83%	0.68%	0.56%	0.99%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		26191	83705	33359	66047	13673	29194	3816	8483	29103	79695
Total number of cells having more than 3% TCH		3673	2023	2373	1828	191	22	166	272	472	2345
Worst affected cells having more than 3% TCH	≤ 3%	14.02%	2.42%	7.11%	2.77%	1.40%	0.07%	4.35%	3.21%	1.62%	2.94%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		14648884	5823606586	13703058	85145917	23146227	38592883	55798294	99336005	243028575	80311839
Total number of calls dropped		269079	98766062	2751678	1080891	87433	169416	367163	550777	1319831	805150
Call drop rate	≤ 2%	1.84%	1.69%	2.47%	1.26%	0.38%	0.44%	0.65%	0.55%	0.57%	1.00%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		26185	250547	33359	65341	13673	29194	8392	8483	29101	79695
Total number of cells having more than 3% TCH		3043	6087	2061	1748	56	21	1376	272	467	2352
Worst affected cells having more than 3% TCH	≤ 3%	11.64%	2.43%	6.18%	2.68%	0.41%	0.07%	10.19%	3.21%	1.61%	2.95%

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

Drive test results for Call drop rate (Average of three drive tests)										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		1147	1725	1252	1548	1163	933	1114	1103	1019	1677
Total number of calls dropped		25	0	57	0	63	100	35	43	6	0
Call drop rate	≤ 2%	1.88%	0.00%	4.43%	0.00%	5.37%	10.25%	3.30%	4.06%	0.55%	0.00%

Data Source: Drive test reports submitted by operators to auditors

8.4 VOICE QUALITY

Audit Results for Voice quality											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		73834975408	533436031718	11201	166955168147	NA	37078964214	135440740100	14481832254	114016698774	154371088641
Total number of calls with good voice quality		70277670501	510593708934	10948	160508922607	NA	36383013838	133035720026	14099074622	108289340996	150849503402
%age calls with good voice quality	≥ 95%	95.18%	95.71%	97.73%	96.14%	99.80%	97.99%	98.23%	97.36%	94.98%	97.72%

Live measurement results for Voice quality											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		2427320003	51671854119	2771	16346474615	NA	2397866474	117927122656	16705555739	11377175709	15041825655
Total number of calls with good voice quality		2310817728	49419349327	2716	15710957641	NA	2346929494	115850313017	16300845796	10803746528	14707806009
%age calls with good voice quality	≥ 95%	95.20%	95.65%	98.01%	96.11%	99.80%	97.87%	98.24%	97.58%	94.96%	97.78%

Drive test results for Voice quality (Average of three drive tests)											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		1910486	3463014	116750	3124138	NA	429058	1399960	2033844	1603256	2884778
Total number of calls with good voice quality		1747701	3311306	96831	2987628	NA	356487	1348557	1748592	1506829	2793300
%age calls with good voice quality	≥ 95%	92.11%	95.62%	81.41%	95.70%	93.39%	83.13%	92.68%	85.90%	94.16%	96.92%

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

NA: On the aspect of Voice quality, auditors could get only the overall value from Reliance CDMA. Current equipment used by Reliance does not have capability to fetch these parameters. During drive test, voice quality is taken from FER rate for CDMA operators. Hence it is NA for Reliance CDMA and Tata CDMA.

8.5 POI CONGESTION

Audit Results for POI Congestion											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	828	30	83	105	147	153	19	65	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	25110	0	0	0
Total Capacity of all POIs (A) - in erlangs		127467	724674	59310	278414	48004	85893	75343	10528	77228	243898
Traffic served for all POIs (B)- in erlangs		81260	430647	32032	172026	24232	18644	21327	3282	52602	140400
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											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	828	30	83	112	147	153	19	65	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	74909	0	0	0
Total Capacity of all POIs (A) - in erlangs		127478	2151228	59310	278414	59694	86616	76631	10510	75240	246762
Traffic served for all POIs (B)- in erlangs		81028	1246776	32290	175530	31616	18423	23877	3213	52415	141601
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 CALL MADE DURING THE DRIVE TEST-VOICE QUALITY

July										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls	683117	1137447	47283	945496	NDR	NDR	NA	662458	580589	896885
August										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls	437431	1391244	40128	1438299	NA	246034	915012	800484	445181	1131155
September										
Voice quality	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls	789938	934323	29339	740343	NA	183024	484948	570902	577486	856738

Data Source: Drive test reports submitted by operators to auditors

NA: During drive test, voice quality is taken from FER rate for CDMA operators.

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)											
Metering and billing credibility - Postpaid											
Total bills generated during the period		4819	273159	70216	53948	210438	169084	28388	35414	NA	236511
Total number of bills disputed		0	240	0	49	190	163	0	1	NA	22
Total number of valid billing complaints		0	27	0	15	190	159	0	1	NA	15
Total complaints considered invalid		0	213	0	34	0	4	0	0	NA	7
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.09%	0.00%	0.09%	0.09%	0.10%	0.00%	0.00%	NA	0.01%
July											
Total bills generated during the first billing cycle		1774	87158	23143	18014	72142	54063	9572	11619	NA	76439
Total number of bills disputed in first billing cycle		0	108	0	9	71	61	0	1	NA	6
Total number of valid billing complaints (billing cycle 1)		0	12	0	4	71	57	0	1	NA	5
Total complaints considered invalid (billing cycle 1)		0	96	0	5	0	4	0	0	NA	1
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.00%	0.12%	0.00%	0.05%	0.10%	0.11%	0.00%	0.01%	NA	0.01%

August											
Total bills generated during the second billing cycle		1617	89671	23499	18033	70193	55603	9362	11565	NA	76707
Total number of bills disputed in second billing cycle		0	37	0	17	60	52	0	0	NA	7
Total number of valid billing complaints (billing cycle 2)		0	4	0	5	60	52	0	0	NA	3
Total complaints considered invalid (billing cycle 2)		0	33	0	12	0	0	0	0	NA	4
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.00%	0.04%	0.00%	0.09%	0.09%	0.09%	0.00%	0.00%	NA	0.01%
September											
Total bills generated during the third billing cycle		1428	96330	23574	17901	68103	59418	9454	12230	NA	83365
Total number of bills disputed in third billing cycle		0	95	0	23	59	50	0	0	NA	9
Total number of valid billing complaints (billing cycle 3)		0	11	0	6	59	50	0	0	NA	7
Total complaints considered invalid (billing cycle 3)		0	84	0	17	0	0	0	0	NA	2
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.10%	0.00%	0.13%	0.09%	0.08%	0.00%	0.00%	NA	0.01%
Metering and billing credibility - Prepaid											
Performance prepaid	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of charging complaints (valid)		0	625	155	1886	1785	5317	0	2	120	6470
Total complaints considered invalid		122840	5871	44	5789	377	933	0	0	0	7843
Total number of charging complaints		122840	6496	199	7675	2162	6250	0	2	120	14313
Total no of customers served		19746180	77682797	5350537	29908824	7203880	20831017	1300688	5047838	22785205	8958160
Percentage of charging complaints disputed	≤ 0.1%	0.62%	0.01%	0.00%	0.03%	0.03%	0.03%	0.00%	0.00%	0.00%	0.16%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated											
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of billing/charging complaints		122840	6736	202	7724	2352	6413	0	3	120	14335
Total number of complaints resolved in favour of customer		0	652	155	1901	1975	5476	0	3	120	6485
Total complaints considered invalid		122840	6084	47	5823	377	937	0	0	0	7850
Number of complaints resolved in 4 weeks		0	652	154	1901	1975	5476	0	3	120	6485
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	99.35%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		0	652	155	1901	1975	5476	0	3	120	6485
Percentage complaints resolved within 6 weeks	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver											
Total number of complaints where credit/waiver is required		0	652	0	1901	1975	5476	0	3	120	6485
Percentage cases in which credit/waiver was received within 1	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

Live calling results for resolution of billing complaints											
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total Number of calls made		100	100	100	100	100	100	NA	NA	100	100
Number of cases resolved in 4 weeks		91	69	71	91	66	77	NA	NA	89	86
Percentage cases resolved in 4 weeks	≥ 98%	91.00%	69.00%	71.00%	91.00%	66.00%	77.00%	NA	NA	89.00%	86.00%
Number of cases resolved in 6 weeks		92	77	82	91	85	86	NA	NA	95	86
Percentage cases resolved in 6 weeks	100.00%	92.00%	77.00%	82.00%	91.00%	85.00%	86.00%	NA	NA	95.00%	86.00%

Data Source: Billing Center of the operators

It is to be noted that Aircel, Airtel, Idea, Tata CDMA, Tata GSM and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI and operators should provide detailed explanation of reasons for reporting majority of their complaints as invalid to TRAI.

8.8 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts to customer care for assistance		30258284	9309335	59043	57289874	1960689	5248495	58377	349157	25190958	27347490
Number of calls getting connected and answered (electronically)		29152964	9057944	58983	54897478	1930473	5191285	58016	331863	25069243	27347490
Percentage calls getting connected and answered	≥ 95%	96.35%	97.30%	99.90%	95.82%	98.46%	98.91%	99.38%	95.05%	99.52%	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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total Number of calls received (3 months)		4619528	13821333	47002	13162265	853577	4133416	61341	448971	6759036	8689594
Total Number of calls answered within 90 seconds (3 months)		4504573	11107517	44998	13152917	474413	3096860	59387	433720	6640238	8149479
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	97.51%	80.37%	95.74%	99.93%	55.58%	74.92%	96.81%	96.60%	98.24%	93.78%
July											
Total calls received (Month 1)		1520364	4645752	16445	4341084	325185	1901532	22511	158094	2171241	2605558
Total calls answered within 90 seconds (Month 1)		1501682	2548016	15754	4339194	235432	1807609	22100	153524	2129752	2462097
% calls answered within 90 seconds (Month 1)	≥ 95%	98.77%	54.85%	95.80%	99.96%	72.40%	95.06%	98.17%	97.11%	98.09%	94.49%
August											
Total calls received (Month 2)		1538997	4571187	16205	4544598	304084	1545882	20487	151246	2252661	2948378
Total calls answered within 90 seconds (Month 2)		1514756	4184701	15507	4543372	163094	1143524	20260	147168	2246357	2776787
% calls answered within 90 seconds (Month 2)	≥ 95%	98.42%	91.55%	95.69%	99.97%	53.63%	73.97%	98.89%	97.30%	99.72%	94.18%
September											
Total calls received (Month 3)		1560167	4604394	14352	4276583	224308	686002	18343	139631	2335134	3135658
Total calls answered within 90 seconds (Month 3)		1488135	4374800	13737	4270351	75887	145727	17027	133028	2264129	2910595
% calls answered within 90 seconds (Month 3)	≥ 95%	95.38%	95.01%	95.71%	99.85%	33.83%	21.24%	92.83%	95.27%	96.96%	92.82%

Data Source: Customer Service Center of the operators

Live calling results for customer care (IVR)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts to customer care for assistance		100	100	200	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	200	100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)											
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total Number of calls received		100	100	200	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		98	100	199	94	99	90	85	94	93	90
Live Calling Percentage calls getting connected and answered	≥ 95%	98.00%	100.00%	99.50%	94.00%	99.00%	90.00%	85.00%	94.00%	93.00%	90.00%

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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of closure request		13	1232	NA	630	495	592	456	910	NA	2253
Number of requests attended within 7 days		13	1232	NA	630	495	592	456	910	NA	2253
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%

Data Source: Customer Service Center of the operators

NA: BSNL and Uninor did not have any data of closures within their system during audit.

8.10 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated											
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cases requiring refund of deposits		28	108	NA	119	514	841	114	119	NA	851
Total number of cases where refund was made within 60 days		28	108	NA	119	507	826	114	119	NA	851
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	NA	100.00%	98.64%	98.22%	100.00%	100.00%	NA	100.00%

Data Source: Customer Service Center of the operators

Note: - Uninor does not offer postpaid services in the circle.

NA: BSNL did not have any data of closures within their system during audit.

8.11 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang										
Traffic in Erlang	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Eqipped capacity of the network	159339	773696	370100	210930	146000	235000	2174640	48678	177714	252597
Total taffic handled in erlang during TCBH	148195	669265	118442	269485	70602	123557	387679	22216	221074	215846
Total no. of customers served (as per VLR)	4736759	25004498	1974429	9832308	2276832	6893922	240102	913926	5479844	8302310

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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total Number of calls made	100	100	200	100	NA	100	NA	NA	65	100
Number of cases resolved to satisfaction	85	75	165	90	NA	82	NA	NA	52	83
Percentage cases resolved in four weeks	85.00%	75.00%	82.50%	90.00%	NA	82.00%	NA	NA	80.00%	83.00%

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	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total no. of calls made		150	150	300	150	150	150	150	150	150	150
Calls answered		149	137	250	131	136	131	137	143	150	150
% of calls connected	≥ 95%	99.33%	91.33%	83.33%	87.33%	90.67%	87.33%	91.33%	95.33%	100.00%	100.00%

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

8.14 DETAILS - LEVEL 1 SERVICES CALLS

As per live calling conducted for 'level 1' services, a number of Category-I (i.e. mandatory) services were not being operated by most of the operators.

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

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		4	4
101	Fire	✓		4	4
102	Ambulance	✓		4	4
104	Health Information Helpline	✓		4	3
108	Emergency and Disaster Management Helpline	✓		4	4
138	All India Helpine for Passangers	✓		4	4
149	Public Road Transport Utility Service	✓		4	3
181	Chief Minister Helpline	✓		4	4
182	Indian Railway Security Helpline	✓	×		
1033	Road Accident Management Service	✓		4	4
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	✓		4	4
1056	Emergency Medical Services	✓		4	4
106X	State of the Art Hospitals	✓		4	4
1063	Public Grievance Cell DoT Hq	✓		4	4
1064	Anti Corruption Helpline	✓		4	4
1070	Relief Commission for Natural Calamities	✓		4	4
1071	Air Accident Helpline	✓		4	4
1072	Rail Accident Helpline	✓		4	4
1073	Road Accident Helpline	✓		3	4
1077	Control Room for District Collector	✓		4	4
1090	Call Alart (Crime Branch)	✓		4	4
1091	Women Helpline	✓		4	4
1097	National AIDS Helpline to NACO	✓		4	4
1099	Central Accident and Trauma Services (CATS)	✓		4	4
10580	Educationa & Vocational Guidance and Counselling	✓		4	4
10589	Mother and Child Tracking (MCTH)	✓		4	4
10740	Central Pollution Control Board	✓		4	4
10741	Pollution Control Board	✓		4	3
1511	Police Related Service for all Metro Railway Project	✓		4	4
1512	Prevention of Crime in Railway	✓		4	4
1514	National Career Service(NCS)	✓		4	4
15100	Free Legal Service Helpline	✓		3	4
155304	Municipal Corporations	✓		4	4
155214	Labour Helpline	✓		4	4
1903	Sashastra Seema Bal (SSB)	✓		4	4

1909	National Do Not Call Registry	✓		4	4
1912	Complaint of Electricity	✓		4	4
1916	Drinking Water Supply	✓		4	4
1950	Election Commission of India	✓		4	4

Airtel

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		6	5
101	Fire	✓		5	5
102	Ambulance		×		
104	Health Information Helpline	✓		6	6
108	Emergency and Disaster Management Helpline	✓		6	6
138	All India Helpine for Passangers		×		
149	Public Road Transport Utility Service	✓		6	5
181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline	✓		5	5
1033	Road Accident Management Service	✓		5	5
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	✓		6	5
1056	Emergency Medical Services	✓		6	5
106X	State of the Art Hospitals	✓		5	5
1063	Public Grievance Cell DoT Hq	✓		6	5
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities	✓		5	5
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline	✓		6	5
1073	Road Accident Helpline		×		
1077	Control Room for District Collector	✓		5	5
1090	Call Alart (Crime Branch)		×		
1091	Women Helpline	✓		6	5
1097	National AIDS Helpline to NACO	✓		6	6
1099	Central Accident and Trauma Services (CATS)	✓		6	5
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)	✓		6	6
10740	Central Pollution Control Board		×		
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway	✓		6	5
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline	✓		6	5
155304	Municipal Corporations	✓		6	6
155214	Labour Helpline	✓		6	5
1903	Sashastra Seema Bal (SSB)	✓		6	6
1909	National Do Not Call Registry		×		
1912	Complaint of Electricity	✓		6	5
1916	Drinking Water Supply	✓		6	6

1950	Election Commission of India	✓		6	5
BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		7	6
101	Fire	✓		7	6
102	Ambulance	✓		8	6
104	Health Information Helpline	✓		7	6
108	Emergency and Disaster Management Helpline		×		
138	All India Helpine for Passangers	✓		7	6
149	Public Road Transport Utility Service	✓		7	6
181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline	✓		7	5
1033	Road Accident Management Service	✓		8	6
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	Emergency Medical Services		×		
106X	State of the Art Hospitals	✓		7	6
1063	Public Grievance Cell DoT Hq	✓		7	6
1064	Anti Corruption Helpline	✓		8	6
1070	Relief Commission for Natural Calamities	✓		7	5
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		
1073	Road Accident Helpline		×		
1077	Control Room for District Collector	✓		7	6
1090	Call Alart (Crime Branch)		×		
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		7	6
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)	✓		7	6
10740	Central Pollution Control Board	✓		7	6
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway		×		
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline	✓		7	6
155304	Municipal Corporations	✓		7	6
155214	Labour Helpline	✓		7	6
1903	Sashastra Seema Bal (SSB)		×		
1909	National Do Not Call Registry	✓		7	6
1912	Complaint of Electricity		×		
1916	Drinking Water Supply		×		
1950	Election Commission of India	✓		7	6
Idea					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		6	6
101	Fire	✓		6	5
102	Ambulance	✓		7	5
104	Health Information Helpline	✓		6	5
108	Emergency and Disaster Management Helpline	✓		7	6
138	All India Helpine for Passangers	✓		6	6
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline	✓	×	6	5
182	Indian Railway Security Helpline	✓		6	6
1033	Road Accident Management Service	✓		6	5
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	Emergency Medical Services		×		
106X	State of the Art Hospitals	✓		6	5
1063	Public Grievance Cell DoT Hq		×		
1064	Anti Corruption Helpline	✓		6	6
1070	Relief Commission for Natural Calamities	✓		7	5
1071	Air Accident Helpline	✓		6	5
1072	Rail Accident Helpline	✓		7	5
1073	Road Accident Helpline	✓		6	6
1077	Control Room for District Collector		×		
1090	Call Alart (Crime Branch)	✓		7	6
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO		×		
1099	Central Accident and Trauma Services (CATS)	✓		6	6
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)	✓		6	6
10740	Central Pollution Control Board		×		
10741	Pollution Control Board	✓		6	5
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway	✓		6	5
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline	✓		6	6
155304	Municipal Corporations		×		
155214	Labour Helpline	✓		7	5
1903	Sashastra Seema Bal (SSB)	✓		6	5
1909	National Do Not Call Registry	✓		6	6
1912	Complaint of Electricity		×		
1916	Drinking Water Supply		×		
1950	Election Commission of India		×		
Reliance CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		8	7

101	Fire	✓		8	7
102	Ambulance		×		
104	Health Information Helpline		×		
108	Emergency and Disaster Management Helpline	✓		8	7
138	All India Helpine for Passangers		×		
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline	✓		8	7
182	Indian Railway Security Helpline		×		
1033	Road Accident Management Service	✓		8	7
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	Emergency Medical Services	✓		8	8
106X	State of the Art Hospitals		×		
1063	Public Grievance Cell DoT Hq		×		
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities	✓		8	7
1071	Air Accident Helpline	✓		7	7
1072	Rail Accident Helpline	✓		8	7
1073	Road Accident Helpline		×		
1077	Control Room for District Collector		×		
1090	Call Alart (Crime Branch)	✓		8	7
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO	✓		8	7
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)	✓		8	7
10740	Central Pollution Control Board	✓		7	7
10741	Pollution Control Board	✓		8	7
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway	✓		8	7
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline	✓		8	7
155304	Municipal Corporations		×		
155214	Labour Helpline	✓		8	8
1903	Sashastra Seema Bal (SSB)		×		
1909	National Do Not Call Registry	✓		8	7
1912	Complaint of Electricity		×		
1916	Drinking Water Supply		×		
1950	Election Commission of India	✓		8	8

Reliance GSM

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		6	6
101	Fire	✓		6	5
102	Ambulance	✓		7	5
104	Health Information Helpline	✓		6	5

108	Emergency and Disaster Management Helpline	✓		7	6
138	All India Helpine for Passangers	✓		6	6
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline	✓	×	6	5
182	Indian Railway Security Helpline	✓		6	6
1033	Road Accident Management Service	✓		6	5
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	Emergency Medical Services		×		
106X	State of the Art Hospitals	✓		6	5
1063	Public Grievance Cell DoT Hq	✓		6	6
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities	✓		7	5
1071	Air Accident Helpline	✓		6	5
1072	Rail Accident Helpline	✓		7	5
1073	Road Accident Helpline	✓		6	6
1077	Control Room for District Collector		×		
1090	Call Alart (Crime Branch)	✓		7	6
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO		×		
1099	Central Accident and Trauma Services (CATS)	✓		6	6
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)	✓		6	6
10740	Central Pollution Control Board		×		
10741	Pollution Control Board	✓		6	5
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway	✓		6	5
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline	✓		6	6
155304	Municipal Corporations		×		
155214	Labour Helpline	✓		7	5
1903	Sashastra Seema Bal (SSB)	✓		6	5
1909	National Do Not Call Registry	✓		6	6
1912	Complaint of Electricity		×		
1916	Drinking Water Supply		×		
1950	Election Commission of India		×		

TATA CDMA

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		10	9
101	Fire	✓		10	8
102	Ambulance	✓		9	9
104	Health Information Helpline	✓		9	9
108	Emergency and Disaster Management Helpline	✓		9	9
138	All India Helpine for Passangers	✓		9	9
149	Public Road Transport Utility Service		×		

181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline	✓		7	7
1033	Road Accident Management Service	✓		7	7
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		×		
1056	Emergency Medical Services		×		
106X	State of the Art Hospitals		×		
1063	Public Grievance Cell DoT Hq		×		
1064	Anti Corruption Helpline		×		
1070	Relief Commission for Natural Calamities	✓		10	9
1071	Air Accident Helpline	✓		10	10
1072	Rail Accident Helpline	✓		10	10
1073	Road Accident Helpline	✓			
1077	Control Room for District Collector		×		
1090	Call Alart (Crime Branch)		×		
1091	Women Helpline		×		
1097	National AIDS Helpline to NACO		×		
1099	Central Accident and Trauma Services (CATS)	✓	×		
10580	Educationa & Vocational Guidance and Counselling		×		
10589	Mother and Child Tracking (MCTH)		×		
10740	Central Pollution Control Board		×		
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project		×		
1512	Prevention of Crime in Railway	✓		10	9
1514	National Career Service(NCS)		×		
15100	Free Legal Service Helpline	✓		10	8
155304	Municipal Corporations		×		
155214	Labour Helpline	✓		10	9
1903	Sashastra Seema Bal (SSB)	✓		10	8
1909	National Do Not Call Registry	✓		10	7
1912	Complaint of Electricity		×		
1916	Drinking Water Supply		×		
1950	Election Commission of India		×		

TATA GSM

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		6	6
101	Fire	✓		5	5
102	Ambulance	✓		5	5
104	Health Information Helpline		×		
108	Emergency and Disaster Management Helpline	✓		5	5
138	All India Helpine for Passangers	✓		5	5
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline		×		
182	Indian Railway Security Helpline	✓		6	6
1033	Road Accident Management Service	✓		5	6

1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	✓		5	5
1056	Emergency Medical Services	✓		5	5
106X	State of the Art Hospitals		×		
1063	Public Grievance Cell DoT Hq	✓		6	6
1064	Anti Corruption Helpline	✓		5	5
1070	Relief Commission for Natural Calamities		×		
1071	Air Accident Helpline	✓		6	5
1072	Rail Accident Helpline	✓		6	5
1073	Road Accident Helpline		×		
1077	Control Room for District Collector		×		
1090	Call Alart (Crime Branch)		×		
1091	Women Helpline	✓		6	5
1097	National AIDS Helpline to NACO	✓		6	6
1099	Central Accident and Trauma Services (CATS)	✓		6	5
10580	Educationa & Vocational Guidance and Counselling	✓		5	5
10589	Mother and Child Tracking (MCTH)		×		
10740	Central Pollution Control Board	✓		6	5
10741	Pollution Control Board		×		
1511	Police Related Service for all Metro Railway Project	✓		6	6
1512	Prevention of Crime in Railway	✓		5	5
1514	National Career Service(NCS)	✓		5	5
15100	Free Legal Service Helpline	✓		6	5
155304	Municipal Corporations		×		
155214	Labour Helpline	✓		6	6
1903	Sashastra Seema Bal (SSB)		×		
1909	National Do Not Call Registry	✓		6	5
1912	Complaint of Electricity	✓		5	5
1916	Drinking Water Supply	✓		6	5
1950	Election Commission of India	✓		6	6

Uninor

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		4	4
101	Fire	✓		4	4
102	Ambulance	✓		4	4
104	Health Information Helpline	✓		4	4
108	Emergency and Disaster Management Helpline	✓		4	4
138	All India Helpine for Passangers	✓		4	4
149	Public Road Transport Utility Service	✓		4	4
181	Chief Minister Helpline	✓		3	3
182	Indian Railway Security Helpline	✓		4	4
1033	Road Accident Management Service	✓		4	4
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	✓		4	4
1056	Emergency Medical Services	✓		4	4
106X	State of the Art Hospitals	✓		4	4

1063	Public Grievance Cell DoT Hq	✓		4	4
1064	Anti Corruption Helpline	✓		4	4
1070	Relief Commission for Natural Calamities	✓		4	4
1071	Air Accident Helpline	✓		3	3
1072	Rail Accident Helpline	✓		4	4
1073	Road Accident Helpline	✓		4	4
1077	Control Room for District Collector	✓		4	4
1090	Call Alart (Crime Branch)	✓		4	4
1091	Women Helpline	✓		3	3
1097	National AIDS Helpline to NACO	✓		4	4
1099	Central Accident and Trauma Services (CATS)	✓		4	4
10580	Educationa & Vocational Guidance and Counselling	✓		3	3
10589	Mother and Child Tracking (MCTH)	✓		4	4
10740	Central Pollution Control Board	✓		4	4
10741	Pollution Control Board	✓		3	3
1511	Police Related Service for all Metro Railway Project	✓		4	4
1512	Prevention of Crime in Railway	✓		4	4
1514	National Career Service(NCS)	✓		4	4
15100	Free Legal Service Helpline	✓		4	4
155304	Municipal Corporations	✓		4	4
155214	Labour Helpline	✓		4	4
1903	Sashastra Seema Bal (SSB)	✓		3	3
1909	National Do Not Call Registry	✓		4	4
1912	Complaint of Electricity	✓		4	4
1916	Drinking Water Supply	✓		4	4
1950	Election Commission of India	✓		4	4

Vodafone

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		4	4
101	Fire	✓		4	4
102	Ambulance	✓		4	4
104	Health Information Helpline	✓		4	4
108	Emergency and Disaster Management Helpline	✓		4	4
138	All India Helpine for Passangers	✓		4	4
149	Public Road Transport Utility Service	✓		4	4
181	Chief Minister Helpline	✓		3	3
182	Indian Railway Security Helpline	✓		4	4
1033	Road Accident Management Service	✓		4	4
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	✓		4	4
1056	Emergency Medical Services	✓		4	4
106X	State of the Art Hospitals	✓		4	4
1063	Public Grievance Cell DoT Hq	✓		4	4
1064	Anti Corruption Helpline	✓		4	4
1070	Relief Commission for Natural Calamities	✓		4	4

1071	Air Accident Helpline	✓		3	3
1072	Rail Accident Helpline	✓		4	4
1073	Road Accident Helpline	✓		4	4
1077	Control Room for District Collector	✓		4	4
1090	Call Alart (Crime Branch)	✓		4	4
1091	Women Helpline	✓		3	3
1097	National AIDS Helpline to NACO	✓		4	4
1099	Central Accident and Trauma Services (CATS)	✓		4	4
10580	Educationa & Vocational Guidance and Counselling	✓		3	3
10589	Mother and Child Tracking (MCTH)	✓		4	4
10740	Central Pollution Control Board	✓		4	4
10741	Pollution Control Board	✓		3	3
1511	Police Related Service for all Metro Railway Project	✓		4	4
1512	Prevention of Crime in Railway	✓		4	4
1514	National Career Service(NCS)	✓		4	4
15100	Free Legal Service Helpline	✓		4	4
155304	Municipal Corporations	✓		4	4
155214	Labour Helpline	✓		4	4
1903	Sashastra Seema Bal (SSB)	✓		3	3
1909	National Do Not Call Registry	✓		4	4
1912	Complaint of Electricity	✓		4	4
1916	Drinking Water Supply	✓		4	4
1950	Election Commission of India	✓		4	4

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

8.14.1 SDCA WISE LEVEL 1 SERVICE CALLS MADE FOR MANDATORY SERVICES

Operator Name	Arrah					
	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel	1	1	1	1	1	1
Airtel	2	1	1	1	2	1
BSNL	2	2	2	2	2	2
Idea	1	1	1	1	2	1
Reliance CDMA	2	2	2	2	2	2
Reliance GSM	1	1	2	1	2	1
TATA CDMA	2	2	2	2	2	2
TATA GSM	2	2	1	1	1	1
Uninor	1	1	1	1	1	1
Vodafone	1	1	1	1	1	1

Operator Name	Banka					
	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel	1	1	1	1	1	1
Airtel	2	2	1	1	2	2
BSNL	2	1	2	1	2	1
Idea	2	2	2	1	2	1
Reliance CDMA	2	1	2	1	2	1
Reliance GSM	2	2	2	2	2	1
TATA CDMA	3	2	3	2	2	3
TATA GSM	2	2	1	1	2	2
Uninor	1	1	1	1	1	1
Vodafone	1	1	1	1	1	1
Operator Name	Begusarai					
	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel	1	1	1	1	1	1
Airtel	1	1	2	2	1	1
BSNL	1	2	1	2	2	2
Idea	2	2	2	2	1	1
Reliance CDMA	2	2	2	2	2	2
Reliance GSM	2	2	1	1	1	2
TATA CDMA	3	3	3	2	2	2
TATA GSM	1	1	2	2	1	1
Uninor	1	1	1	1	1	1
Vodafone	1	1	1	1	1	1
Operator Name	Bettiah					
	100		101		102	
	Calls Made	Calls Connected	Calls Made	Calls Connected	Calls Made	Calls Connected
Aircel	1	1	1	1	1	1
Airtel	1	1	1	1	1	1
BSNL	2	2	2	2	2	1
Idea	1	1	2	2	2	2
Reliance CDMA	2	2	2	2	2	2
Reliance GSM	1	1	1	1	2	1
TATA CDMA	2	2	2	2	3	2
TATA GSM	1	1	1	1	1	1
Uninor	1	1	1	1	1	1
Vodafone	1	1	1	1	1	1

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 Aircel, Uninor, BSNL, Reliance CDMA and Reliance GSM in the circle.

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

Ericsson Counters

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

8.15.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Airtel, Vodafone and Idea 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 Uninor 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 BSNL, Tata GSM and Tata CDMA 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

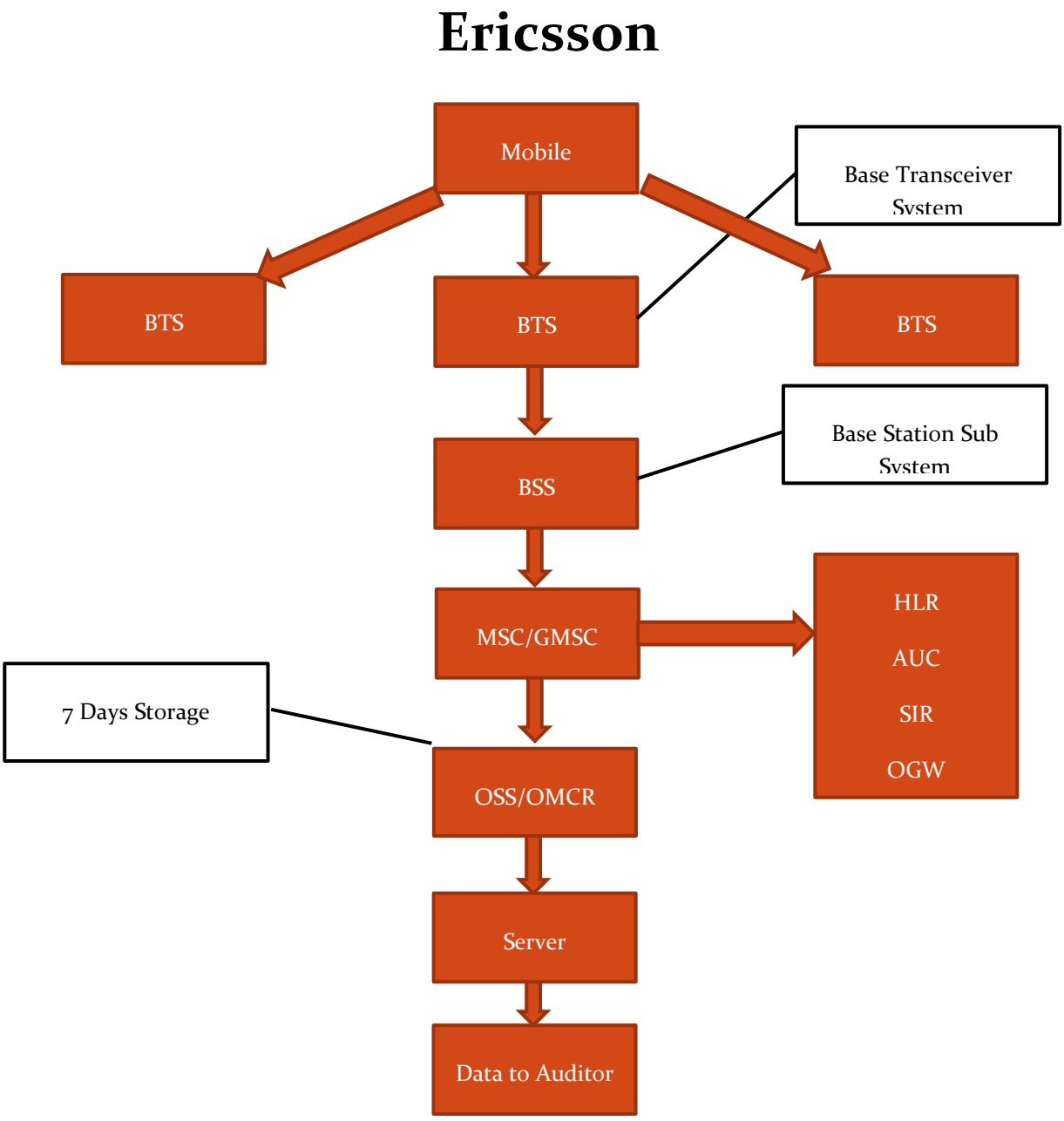
Where,

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

8.16 BLOCK SCHEMATIC DIAGRAMS

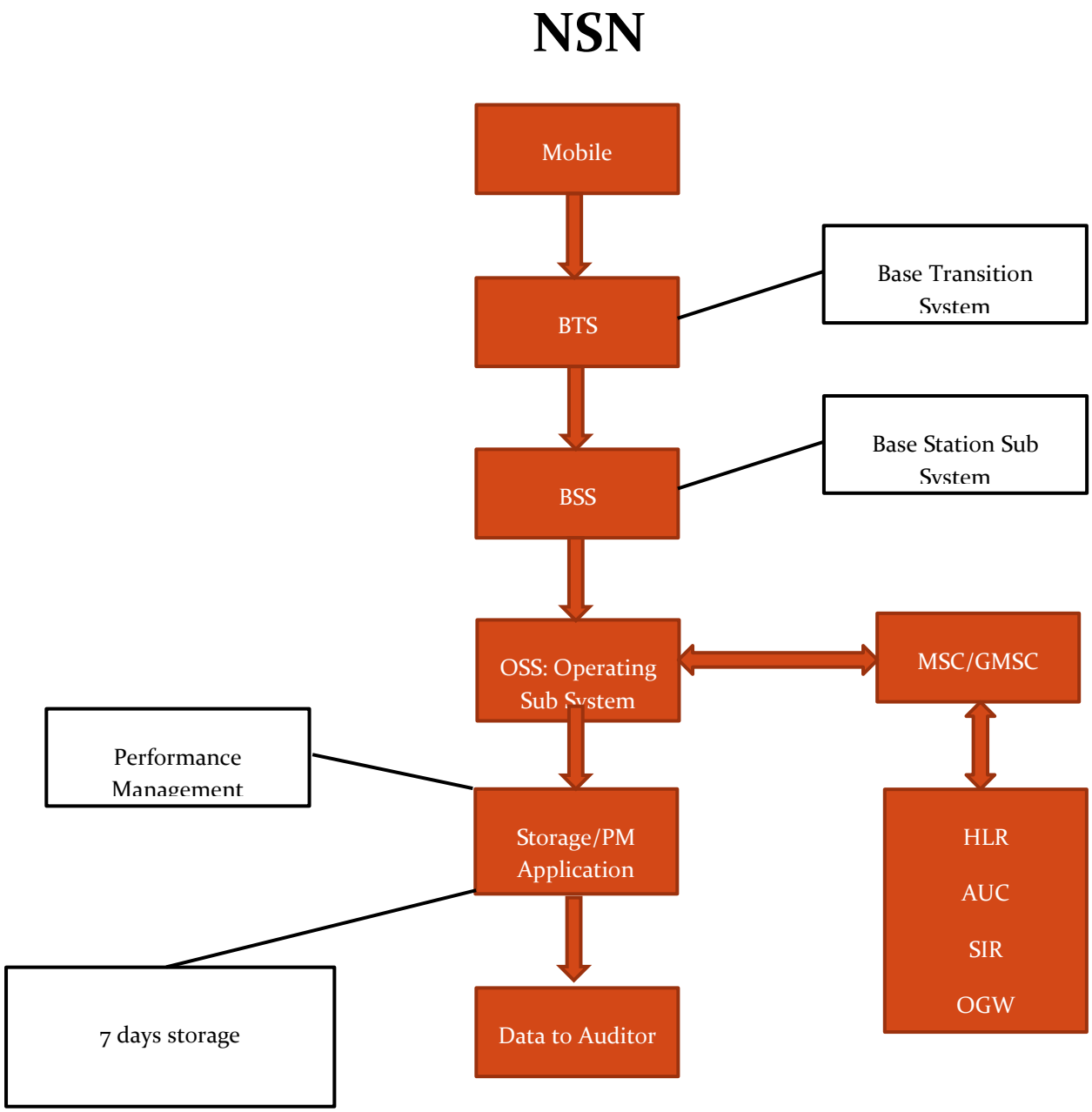
8.16.1 ERICSSON

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



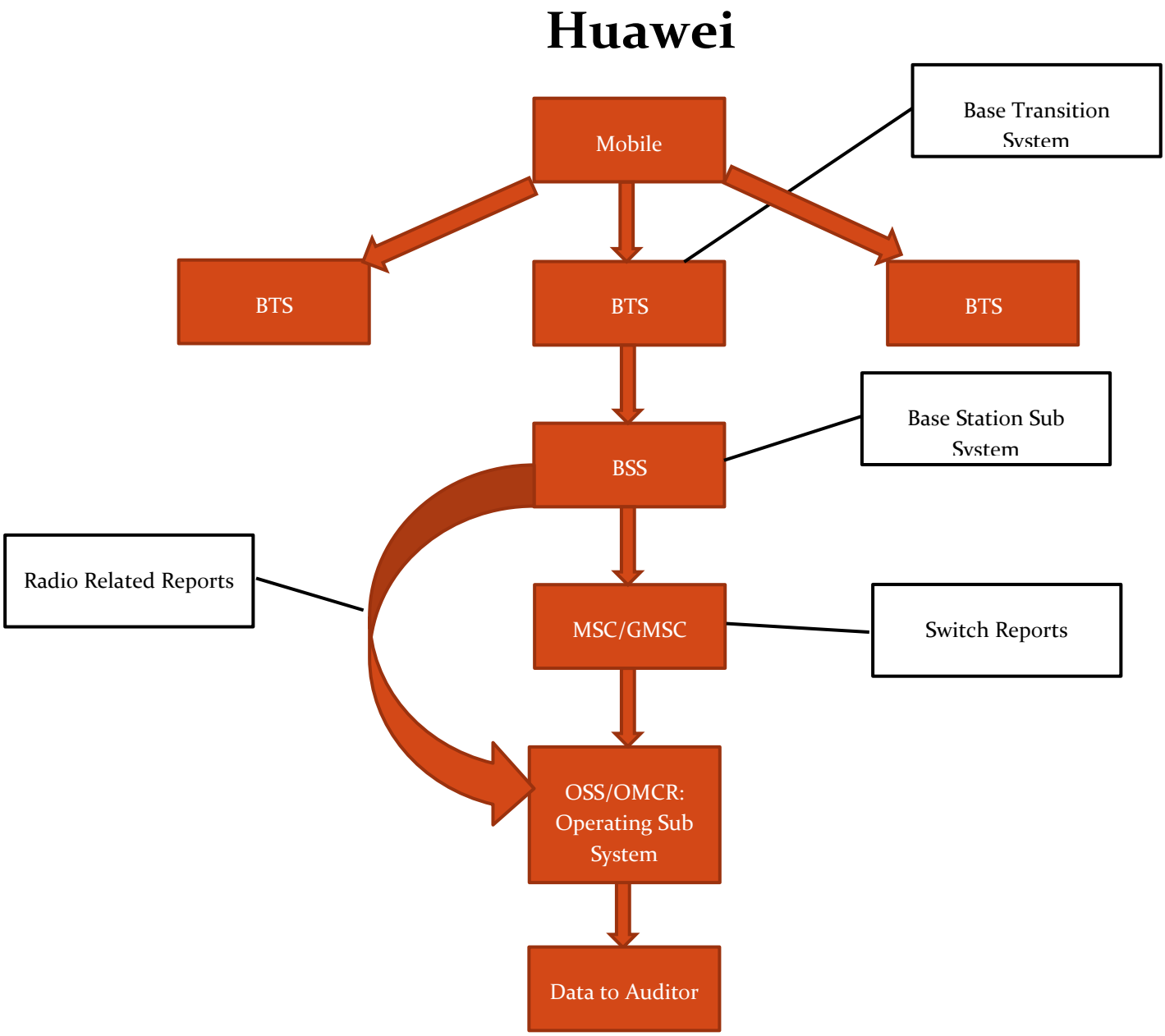
8.16.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Airtel, Vodafone and Idea in the circle.



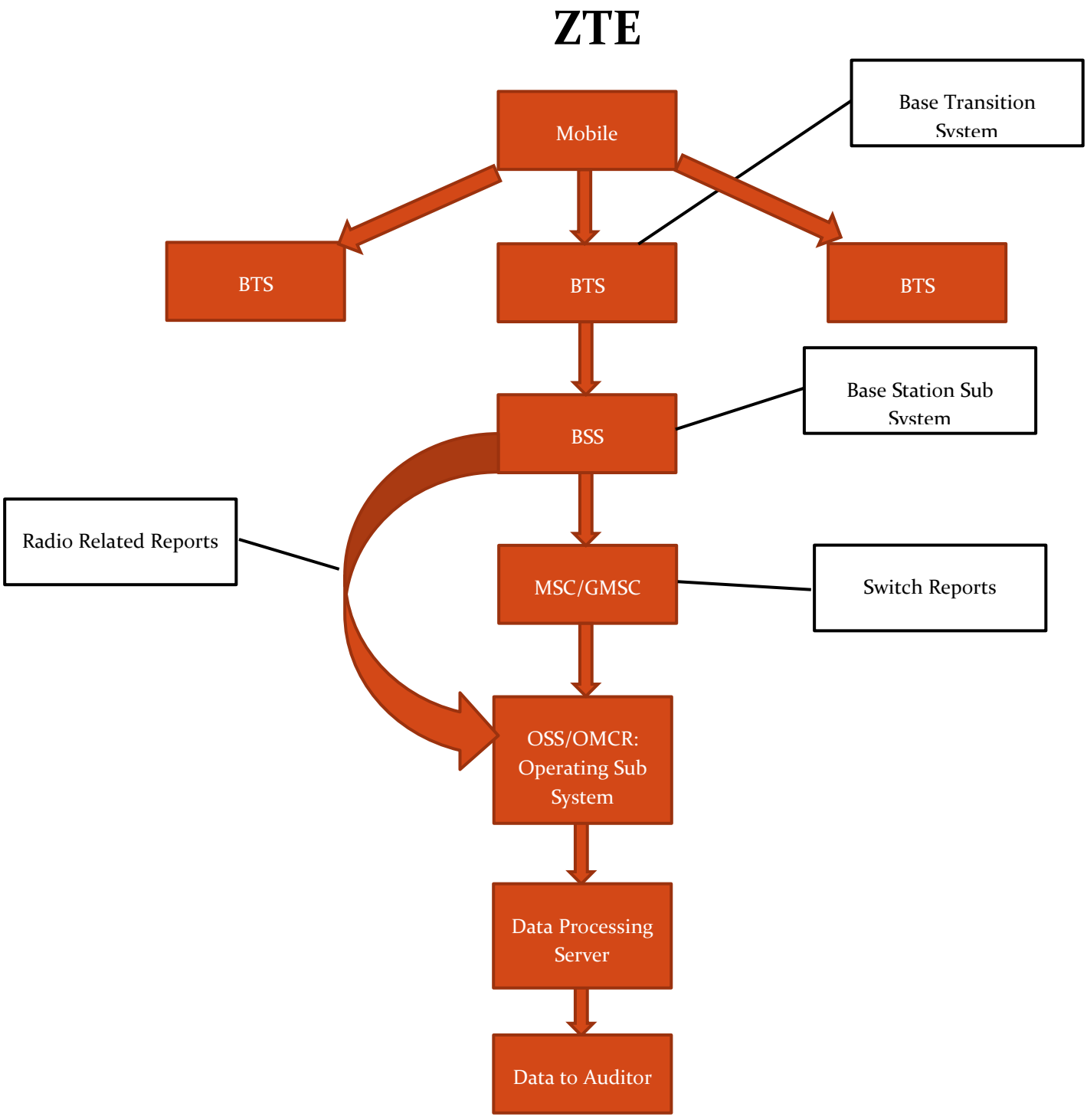
8.16.3 HUAWEI

Huawei provides network support to Uninor in the circle.



8.16.4 ZTE

ZTE provides network support to BSNL, Tata GSM and Tata CDMA in the circle.



9 ANNEXURE – JULY

Audit Results for Network Availability- PMR data-July											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2904	9224	3705	7167	1543	3374	408	961	3228	8839
Sum of downtime of BTSs in a month (in hours)		57925	5315	378249	37991	1287	1157	912	3623	7726	25863
BTSs accumulated downtime (not available for service)	≤ 2%	2.68%	0.08%	13.72%	0.71%	0.11%	0.05%	0.30%	0.51%	0.32%	0.39%
Number of BTSs having accumulated downtime >24 hours		514	28	1137	128	0	3	0	29	56	93
Worst affected BTSs due to downtime	≤ 2%	17.70%	0.30%	30.69%	1.79%	0.00%	0.09%	0.00%	3.02%	1.73%	1.05%
Live Measurement Results for Network Availability- 3 Day live data-July											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2904	9206	3705	7117	1543	3374	393	961	3224	8839
Sum of downtime of BTSs in a month (in hours)		5220	315	20381	4699	484	559	243	1008	695	2500
BTSs accumulated downtime (not available for service)	≤ 2%	2.50%	0.05%	7.64%	0.92%	0.44%	0.23%	0.86%	1.46%	0.30%	0.39%
Number of BTSs having accumulated downtime >24 hours		NA	0	82	13	0	3	0	2	56	0
Worst affected BTSs due to downtime	≤ 2%	NA	0.00%	2.21%	0.18%	0.00%	0.09%	0.00%	0.21%	1.74%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-July											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	88.46%	98.23%	98.34%	96.44%	97.59%	95.60%	97.56%	97.82%	94.66%	99.08%
SDCCH/Paging channel congestion	≤ 1%	0.95%	0.90%	2.08%	0.95%	0.00%	0.94%	0.00%	2.03%	0.89%	0.37%
TCH congestion	≤ 2%	10.82%	1.60%	4.29%	1.98%	0.02%	0.07%	0.63%	0.76%	4.38%	0.92%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-July											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	89.03%	98.28%	98.60%	97.18%	97.49%	93.22%	97.47%	98.71%	94.05%	99.11%
SDCCH/Paging channel congestion	≤ 1%	0.82%	0.90%	2.07%	0.82%	0.00%	1.36%	0.00%	2.36%	0.89%	0.41%
TCH congestion	≤ 2%	10.52%	1.60%	3.83%	1.55%	0.03%	0.08%	0.16%	0.27%	4.34%	0.89%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-July											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts		442	640	420	595	NDR	NDR	318	425	312	547
Total number of successful calls established		421	640	402	593	NDR	NDR	297	357	307	547
CSSR	≥ 95%	95.25%	100.00%	95.71%	99.66%	NDR	NDR	93.40%	84.00%	98.40%	100.00%
%age blocked calls		4.75%	0.00%	4.29%	0.34%	NDR	NDR	6.60%	16.00%	1.60%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-July											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		155493692	831723070	41757898	320699150	23190503	33087945	16527992	25063774	204429073	274937521
Total number of calls dropped		2837145	14539118	1396295	3569186	108904	146083	141080	175553	1093020	2794461
Call drop rate	≤ 2%	1.82%	1.75%	3.34%	1.11%	0.47%	0.44%	0.85%	0.70%	0.53%	1.02%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8701	27742	11089	21629	4629	10162	1262	2804	9691	26561
Total number of cells having more than 3% TCH		1186	706	973	593	65	3	62	84	142	777
Worst affected cells having more than 3% TCH	≤ 3%	13.63%	2.54%	8.77%	2.74%	1.40%	0.03%	4.89%	3.00%	1.47%	2.93%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-July											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		5162581	2262966372	4414905	28907919	6584587	12682375	19279758	33455565	204429073	26465584
Total number of calls dropped		89656	39587067	2544374	399329	28239	56150	150970	210213	1093020	250008
Call drop rate	≤ 2%	1.74%	1.75%	2.96%	1.38%	0.43%	0.44%	0.78%	0.63%	0.53%	0.94%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8704	83129	11089	21473	4629	10162	5838	2804	9691	26561
Total number of cells having more than 3% TCH		1172	2175	850	586	0	3	1262	84	142	779
Worst affected cells having more than 3% TCH	≤ 3%	13.47%	2.62%	7.67%	2.73%	0.00%	0.03%	21.62%	3.00%	1.47%	2.93%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-July											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		420	640	402	593	NDR	NDR	297	358	307	547
Total number of calls dropped		9	0	19	0	NDR	NDR	6	15	1	0
Call drop rate	≤ 2%	2.14%	0.00%	4.73%	0.00%	NDR	NDR	2.02%	4.19%	0.33%	0.00%

Audit Results for Voice quality -PMR Data-July											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		24490483502	178268558666	3551	55866530963	NA	1874457947	49307549787	4904500828	38109725570	51415003870
Total number of calls with good voice quality		23280933882	170335208797	3462	53855549830	NA	1834679218	48405010107	4772046910	36135563216	50275221367
%age calls with good voice quality	≥ 95%	95.06%	95.55%	97.49%	96.40%	99.81%	97.88%	98.17%	97.30%	94.82%	97.78%

Live measurement results for Voice quality-3 Day data-July											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		810396691	18649357231	962	5330279984	NA	772422533	7549067016	5507717893	3837002820	4926691268
Total number of calls with good voice quality		770227395	17813156781	943	5131048975	NA	755836585	7417178121	5369072787	3636551729	4820504716
%age calls with good voice quality	≥ 95%	95.04%	95.52%	98.02%	96.26%	99.81%	97.85%	98.25%	97.48%	94.78%	97.84%

Drive test results for Voice quality (Average of three drive tests) - DT data-July											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		683117	1137447	47283	945496	NDR	NDR	NA	662458	580589	896885
Total number of calls with good voice quality		614545	1084560	44225	904052	NDR	NDR	NA	571737	554917	875789
%age calls with good voice quality	≥ 95%	89.96%	95.35%	93.53%	95.62%	NDR	NDR	88.58%	86.31%	95.58%	97.65%

Audit Results for POI Congestion- PMR data-July											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	827	30	83	30	148	152	19	65	59
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		126777	721428	59310	274967	12708	85025	75329	10526	75992	236408
Traffic served for all POIs (B)- in erlangs		83548	429416	30841	175339	4772	20754	21069	3345	53058	134036
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-July											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	827	30	83	53	148	153	19	65	59
No. of POIs not meeting benchmark		0	0	0	0	0	0	75329	0	0	0
Total Capacity of all POIs (A) - in erlangs		126811	2108984	59310	274967	22579	85162	76631	10373	75992	246561
Traffic served for all POIs (B)- in erlangs		84858	1115242	33388	175339	8774	19575	23877	3251	53058	141132
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 – AUGUST

Audit Results for Network Availability- PMR data-August											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2923	9254	3717	7279	1506	3152	393	960	3227	8839
Sum of downtime of BTSs in a month (in hours)		54523	5326	243499	39156	8681	2306	560	1958	5959	43019
BTSs accumulated downtime (not available for service)	≤ 2%	2.51%	0.08%	8.81%	0.72%	0.77%	0.10%	0.19%	0.27%	0.25%	0.65%
Number of BTSs having accumulated downtime >24 hours		481	32	836	128	25	14	0	12	40	174
Worst affected BTSs due to downtime	≤ 2%	16.46%	0.35%	22.49%	1.76%	1.66%	0.44%	0.00%	1.25%	1.24%	1.97%
Live Measurement Results for Network Availability- 3 Day live data-August											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2923	9254	3717	7203	1506	3152	393	960	3227	8839
Sum of downtime of BTSs in a month (in hours)		5656	470	20435	3588	1304	280	81	182	392	4213
BTSs accumulated downtime (not available for service)	≤ 2%	2.69%	0.07%	7.64%	0.69%	1.20%	0.12%	0.29%	0.26%	0.17%	0.66%
Number of BTSs having accumulated downtime >24 hours		NA	6	130	17	25	14	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	NA	0.06%	3.50%	0.24%	1.66%	0.44%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-August											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	87.05%	95.79%	98.36%	96.22%	97.40%	95.59%	98.07%	98.23%	94.27%	99.07%
SDCCH/Paging channel congestion	≤ 1%	0.93%	0.90%	3.75%	0.91%	NA	0.74%	NA	0.22%	0.82%	0.43%
TCH congestion	≤ 2%	12.29%	1.26%	3.30%	1.92%	0.04%	0.08%	0.20%	0.45%	4.43%	0.93%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-August											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	83.69%	95.77%	98.18%	96.41%	97.90%	95.46%	99.43%	99.03%	93.34%	99.15%
SDCCH/Paging channel congestion	≤ 1%	2.44%	0.90%	3.77%	0.63%	NA	0.49%	NA	0.15%	0.73%	0.38%
TCH congestion	≤ 2%	15.91%	1.28%	2.19%	1.95%	0.03%	0.49%	0.16%	0.13%	5.28%	0.85%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-August											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts		243	535	473	524	715	630	874	874	330	673
Total number of successful calls established		237	535	458	523	695	534	491	419	330	673
CSSR	≥ 95%	97.53%	100.00%	96.83%	99.81%	97.20%	84.76%	56.18%	47.94%	100.00%	100.00%
%age blocked calls		2.47%	0.00%	3.17%	0.19%	2.80%	15.24%	43.82%	52.06%	0.00%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-August											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		151465339	787690276	33689854	295787377	75208956	131408548	15057372	24795948	203250454	278575699
Total number of calls dropped		2785302	13378092	743163	3888980	307633	559933	141874	158905	1144712	2737421
Call drop rate	≤ 2%	1.84%	1.70%	2.21%	1.31%	0.41%	0.43%	0.94%	0.64%	0.56%	0.98%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8704	27941	11126	21973	4522	9498	1262	2833	9688	26567
Total number of cells having more than 3% TCH		1205	679	708	615	70	9	69	87	147	784
Worst affected cells having more than 3% TCH	≤ 3%	13.84%	2.43%	6.36%	2.80%	1.55%	0.09%	5.45%	3.07%	1.52%	2.95%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-August											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		4808610	1904623987	5065440	26656414	8105723	13695970	18000843	32781276	19564991	27121416
Total number of calls dropped		93470	32511641	120917	298583	30591	59356	130341	165320	111540	289946
Call drop rate	≤ 2%	1.94%	1.71%	2.39%	1.12%	0.38%	0.43%	0.72%	0.50%	0.57%	1.07%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8695	83594	11126	21739	4522	9498	1262	2833	9686	26567
Total number of cells having more than 3% TCH		1210	2038	721	582	0	9	73	87	142	784
Worst affected cells having more than 3% TCH	≤ 3%	13.92%	2.44%	6.48%	2.68%	0.00%	0.09%	5.77%	3.07%	1.47%	2.95%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-August											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		241	535	454	522	695	534	491	419	330	673
Total number of calls dropped		1	0	32	0	39	72	10	9	0	0
Call drop rate	≤ 2%	0.41%	0.00%	7.05%	0.00%	5.61%	13.48%	2.04%	2.15%	0.00%	0.00%

Audit Results for Voice quality -PMR Data-August											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		24889738576	172573769412	3890	55591161363	NA	27627622568	43742554680	4926426857	38618702950	52036944937
Total number of calls with good voice quality		23712158987	165016495428	3815	53474128973	NA	27131154462	42979417874	4794916243	36731692226	50875018527
%age calls with good voice quality	≥ 95%	95.27%	95.62%	98.07%	96.19%	99.80%	98.20%	98.26%	97.33%	95.11%	97.77%

Live measurement results for Voice quality-3 Day data-August											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		814599639	16511301835	967	5466950261	NA	852844437	54982468925	5616903902	3868145975	5097629614
Total number of calls with good voice quality		776866622	15778942857	949	5255427215	NA	834702260	54003502567	5482782580	3679545710	4984376539
%age calls with good voice quality	≥ 95%	95.37%	95.56%	98.14%	96.13%	99.80%	97.87%	98.22%	97.61%	95.12%	97.78%

Drive test results for Voice quality (Average of three drive tests) - DT data-August											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		437431	1391244	40128	1438299	NA	246034	915012	800484	445181	1131155
Total number of calls with good voice quality		420614	1331784	31214	1372547	NA	203839	914406	691907	428656	1083871
%age calls with good voice quality	≥ 95%	96.16%	95.73%	77.79%	95.43%	94.73%	82.85%	99.93%	86.44%	96.29%	95.82%

Audit Results for POI Congestion- PMR data-August											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	826	30	83	141	148	153	19	66	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	75329	0	0	0
Total Capacity of all POIs (A) - in erlangs		127677	721812	59310	278483	57132	86074	76631	10538	80857	247064
Traffic served for all POIs (B)- in erlangs		81532	413107	32093	172163	27446	17546	23250	3270	53314	143827
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-August											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	826	30	83	141	148	153	19	65	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	75329	0	0	0
Total Capacity of all POIs (A) - in erlangs		127677	2158593	59310	278483	77446	87971	76631	10599	74895	246051
Traffic served for all POIs (B)- in erlangs		81271	1314456	30122	172163	42511	18464	23877	3306	52754	143877
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 – SEPTEMBER

Audit Results for Network Availability- PMR data-September											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2937	9313	3723	7434	1516	3164	393	960	3231	8839
Sum of downtime of BTSs in a month (in hours)		65983	5165	176166	35701	7304	1990	600	2236	7826	32626
BTSs accumulated downtime (not available for service)	≤ 2%	3.12%	0.08%	6.57%	0.67%	0.67%	0.09%	0.21%	0.32%	0.34%	0.51%
Number of BTSs having accumulated downtime >24 hours		513	25	779	127	22	9	0	12	60	175
Worst affected BTSs due to downtime	≤ 2%	17.47%	0.27%	20.92%	1.71%	1.45%	0.28%	0.00%	1.25%	1.86%	1.98%
Live Measurement Results for Network Availability- 3 Day live data-September											
	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Number of BTSs in the licensed service area		2937	9313	3723	7329	1516	3164	393	960	3228	8839
Sum of downtime of BTSs in a month (in hours)		6714	712	9562	4145	996	220	92	311	2574	3800
BTSs accumulated downtime (not available for service)	≤ 2%	3.18%	0.11%	3.57%	0.79%	0.91%	0.10%	0.33%	0.45%	1.11%	0.60%
Number of BTSs having accumulated downtime >24 hours		NA	10	77	6	22	9	0	0	60	0
Worst affected BTSs due to downtime	≤ 2%	NA	0.11%	2.07%	0.08%	1.45%	0.28%	0.00%	0.00%	1.86%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-September											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	86.47%	95.83%	98.37%	96.13%	97.51%	96.05%	97.58%	97.74%	93.61%	99.07%
SDCCH/Paging channel congestion	≤ 1%	2.81%	0.82%	0.11%	0.85%	NA	0.78%	NA	0.58%	1.28%	0.38%
TCH congestion	≤ 2%	12.84%	1.13%	0.74%	1.81%	0.04%	0.11%	0.64%	0.66%	5.04%	0.93%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-September											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
CSSR	≥ 95%	87.22%	95.87%	98.49%	96.27%	97.74%	94.23%	99.43%	98.94%	93.04%	99.08%
SDCCH/Paging channel congestion	≤ 1%	0.88%	0.82%	0.07%	0.94%	NA	1.06%	NA	0.30%	2.72%	0.44%
TCH congestion	≤ 2%	12.27%	1.13%	0.71%	1.84%	0.03%	0.07%	0.16%	0.20%	5.57%	0.92%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-September											
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of call attempts		510	550	401	434	481	650	383	383	408	457
Total number of successful calls established		486	550	396	433	468	399	326	326	396	457
CSSR	≥ 95%	95.29%	100.00%	98.75%	99.77%	97.30%	61.38%	85.12%	85.12%	97.06%	100.00%
%age blocked calls		4.71%	0.00%	1.25%	0.23%	2.70%	38.62%	14.88%	14.88%	2.94%	0.00%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-September											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		142504461	717235989	31346144	310041194	83844626	115826148	13415578	22902227	198018232	269924667
Total number of calls dropped		2841745	11637973	662858	3769613	289581	504336	95801	158750	1164752	2652083
Call drop rate	≤ 2%	1.99%	1.62%	2.11%	1.22%	0.35%	0.44%	0.71%	0.69%	0.59%	0.98%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8786	28022	11144	22445	4522	9534	1292	2846	9724	26567
Total number of cells having more than 3% TCH		1282	638	692	620	56	10	35	101	183	784
Worst affected cells having more than 3% TCH	≤ 3%	14.59%	2.28%	6.21%	2.76%	1.24%	0.10%	2.72%	3.55%	1.88%	2.95%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-September											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		4677693	1656016227	4222713	29581584	8455917	12214538	18517693	33099164	19034511	26724839
Total number of calls dropped		85953	26667354	86387	382979	28603	53910	85852	175244	115271	265196
Call drop rate	≤ 2%	1.84%	1.61%	2.05%	1.29%	0.34%	0.44%	0.46%	0.53%	0.61%	0.99%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of cells in the network		8786	83824	11144	22129	4522	9534	1292	2846	9724	26567
Total number of cells having more than 3% TCH		661	1874	490	580	56	9	41	101	183	789
Worst affected cells having more than 3% TCH	≤ 3%	7.52%	2.24%	4.40%	2.62%	1.24%	0.09%	3.17%	3.55%	1.88%	2.97%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-September											
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of calls established		486	550	396	433	468	399	326	326	382	457
Total number of calls dropped		15	0	6	0	24	28	19	19	5	0
Call drop rate	≤ 2%	3.09%	0.00%	1.52%	0.00%	5.13%	7.02%	5.83%	5.83%	1.31%	0.00%

Audit Results for Voice quality -PMR Data-September											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		24454753330	182593703640	3760	55497475821	NA	7576883699	42390635633	4650904569	37288270254	50919139834
Total number of calls with good voice quality		23284577632	175242004709	3671	53179243804	NA	7417180158	41651292045	4532111469	35422085554	49699263508
%age calls with good voice quality	≥ 95%	95.21%	95.97%	97.63%	95.82%	99.80%	97.89%	98.26%	97.45%	95.00%	97.60%

Live measurement results for Voice quality-3 Day data-September											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		802323673	16511195053	842	5549244370	NA	772599504	55395586715	5580933944	3672026914	5017504773
Total number of calls with good voice quality		763723711	15827249689	824	5324481451	NA	756390649	54429632329	5448990429	3487649089	4902924754
%age calls with good voice quality	≥ 95%	95.19%	95.86%	97.86%	95.95%	99.80%	97.90%	98.26%	97.64%	94.98%	97.72%

Drive test results for Voice quality (Average of three drive tests) - DT data-September											
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of sample calls		789938	934323	29339	740343	NA	183024	484948	570902	577486	856738
Total number of calls with good voice quality		712542	894962	21392	711029	NA	152648	434151	484948	523256	833640
%age calls with good voice quality	≥ 95%	90.20%	95.79%	72.91%	96.04%	92.04%	83.40%	89.53%	84.94%	90.61%	97.30%

Audit Results for POI Congestion- PMR data-September											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	832	30	83	143	146	153	19	65	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		127947	730782	59310	281791	74172	86579	74069	10520	74835	248222
Traffic served for all POIs (B)- in erlangs		78700	449417	33161	168577	40478	17631	19663	3231	51433	143337
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-September											
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Uninor	Vodafone
Total number of working POIs		48	832	30	83	143	146	153	19	65	58
No. of POIs not meeting benchmark		0	0	0	0	0	0	74069	0	0	0
Total Capacity of all POIs (A) - in erlangs		127947	2186108	59310	281791	79057	86715	76631	10559	74835	247676
Traffic served for all POIs (B)- in erlangs		76956	1310631	33360	179088	43563	17230	23877	3081	51433	139795
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. JAS'15 – Refers to the quarter of July, August and September 2015
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

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

✆+91 (124) 4217300

www.imrbint.com