EAST ZONE

TRAI AUDIT WIRELESS REPORT-NORTH EAST CIRCLE - AMJ QUARTER, 2015

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TRAI

सत्यमेव जयते

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

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2 INTRODUCTION

2.1 ABOUT TRAI

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

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

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

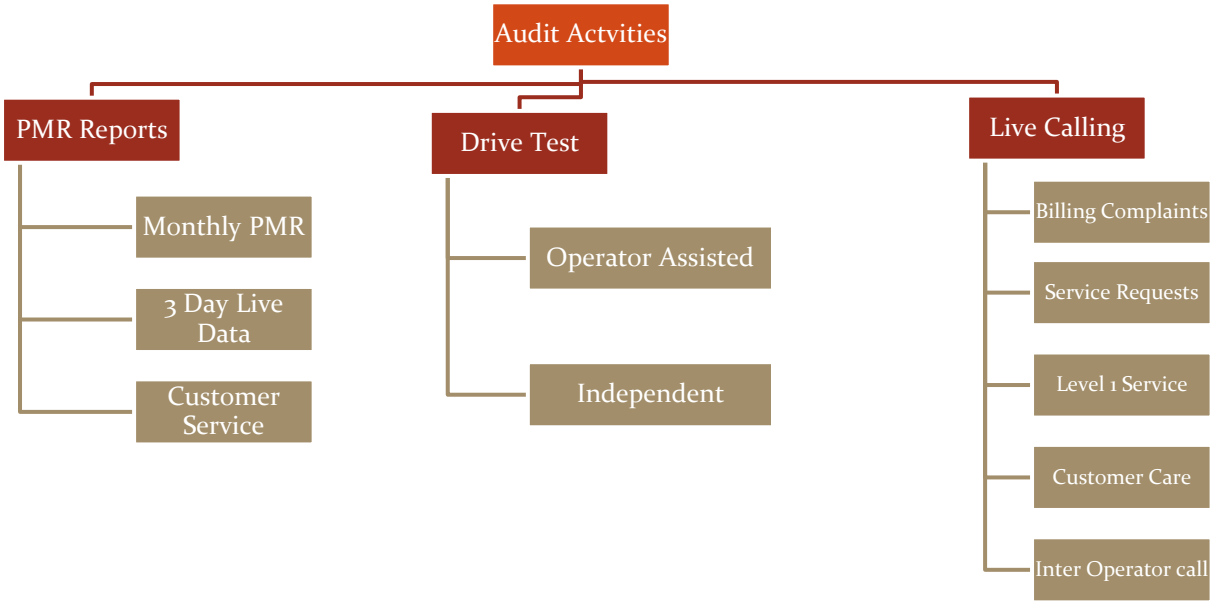
The primary objective of the Audit module is to-

- 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 North East circle.

2.3 COVERAGE

The audit was conducted in North East circle (excluding Assam) covering all the SSAs (Secondary Switching Areas).

2.4 FRAMEWORK USED

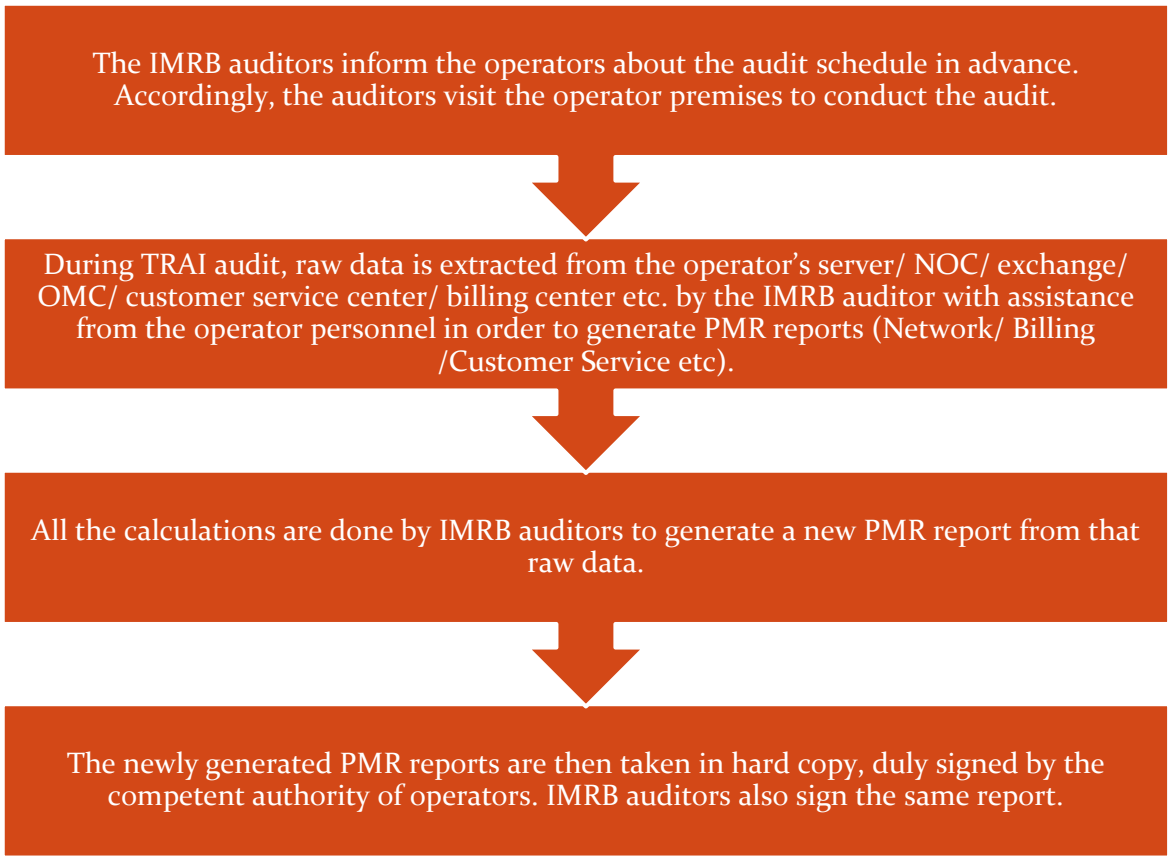


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

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



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

The data to create PMR report for customer service parameters is extracted from Billing Center/ 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 June 2015 (AMJ'15) was collected in the month of July 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 April, May and June 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

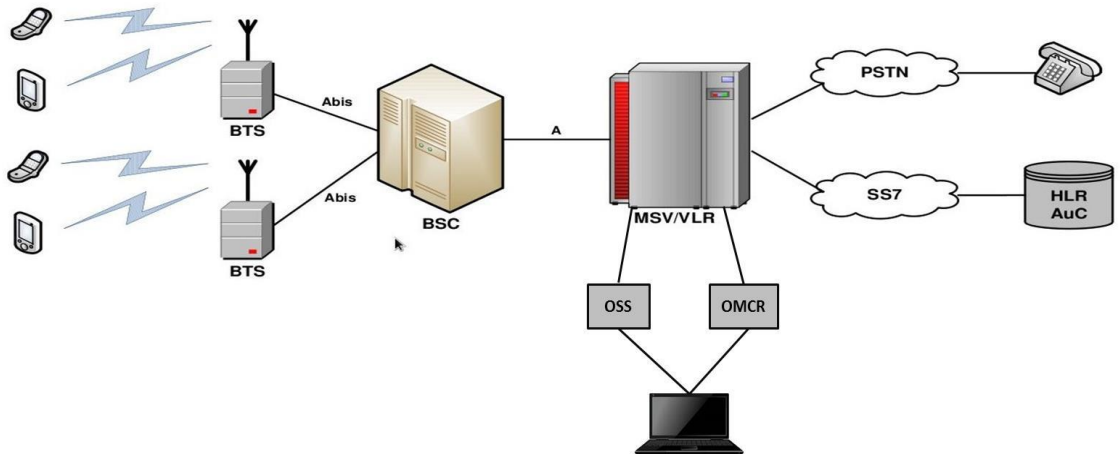
Let us now look at the various parameters involved in the audit reports.

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%

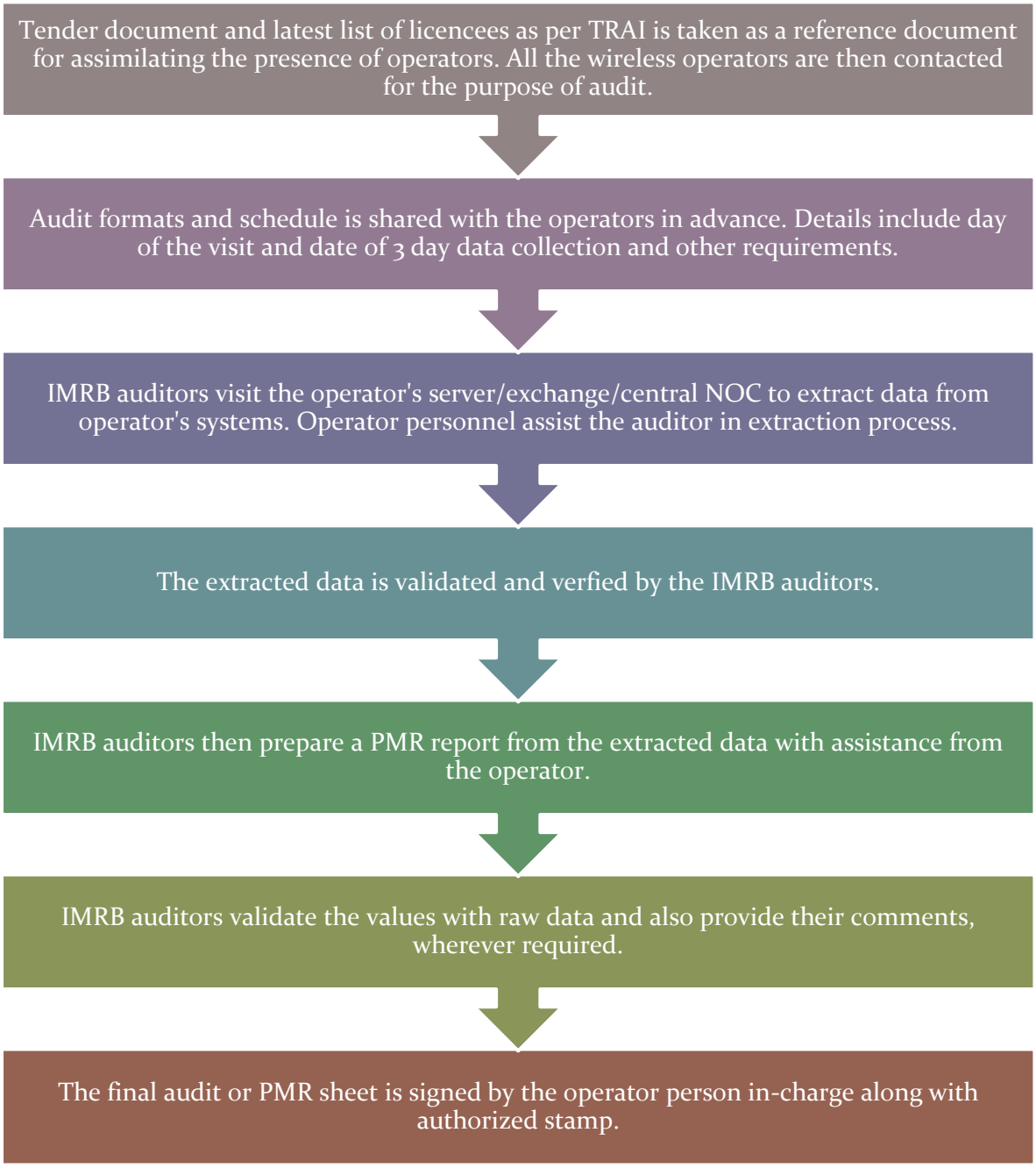
2.4.1.4 POINT OF DATA EXTRACTION

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.

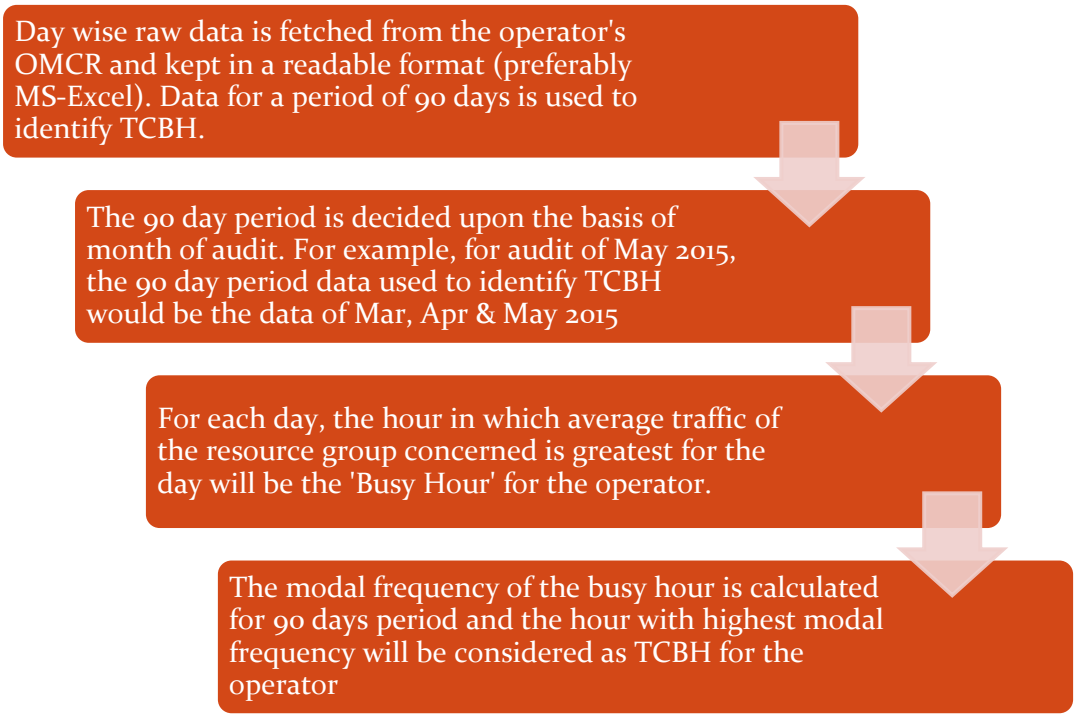
The 3 day live data provides a sample of 9 days in a quarter (3 days each month of a quarter) with hourly performance, which enables the auditor to identify and validate intraday issues for an operator on the QoS network parameters. For example, network congestion being faced by an operator during busy/peak 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 AMJ'15 was the time period as given below.

Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
20:00-21:00	19:00-20:00	18:00-19:00	18:00-19:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00	19:00-20:00

2.4.1.9 CBBH – SIGNIFICANCE AND SELECTION METHODOLOGY

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

Step by step procedure to identify CBBH for an operator:

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

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

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

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

Aircel(DWL)	Airtel	BSNL NE 1 CDMA	BSNL NE 2 CDMA	BSNL NE 1 GSM	BSNL NE 2 GSM	Idea	Reliance GSM	Vodafone
20:00-21:00	19:00-20:00	19:00-20:00	18:00-19:00	19:00-20:00	19:00-20:00	19:00-20:00	20:00-21:00	19:00-20:00

2.4.1.10 CUSTOMER SERVICE PARAMETERS

The data to generate PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending June 2015 (AMJ'15) was collected in the month of July 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 6 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 June 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 May 2015 was considered for live calling activity conducted in June 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 June, 2009 were considered as population for selection of samples. A complete list of the same has been provided in Section 6.1.1.

TRAI benchmark-

Metering and billing credibility–Post Paid- Not more than 0.1% of bills issued should be disputed over a billing cycle

Metering and billing credibility –- Prepaid - Not more than 1 complaint per 1000 customers i.e. 0.1% complaints for metering, charging, credit, and validity

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

2.4.2.3 SERVICE COMPLAINTS REQUESTS

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

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

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

2.4.2.4 LEVEL 1 SERVICE

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

Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator SIMs. A total of 150 test calls were made per service provider in the quarter.

While most of the Level 1 services are toll free, it has been observed that some Level 1 services may not be toll free. In AMJ'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.
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- 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)	1928868
Airtel	3424408
BSNL CDMA NE 1	5790
BSNL CDMA NE 2	22388
BSNL GSM NE 1	384866
BSNL GSM NE 2	456646
Idea	418267
Reliance GSM	548877
Vodafone	1167816

June'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 North East 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)	8.43%	48.80%	93.28%	0.82%	5.45%	1.76%	16.78%	93.11%
Airtel	0.72%	1.40%	89.90%	0.67%	0.61%	0.95%	0.84%	98.83%
BSNL CDMA NE 1	4.60%	10.59%	98.18%	NA	0.00%	1.08%	NDR	NDR
BSNL CDMA NE 2	5.07%	8.34%	95.92%	NA	0.11%	1.00%	2.88%	100.00%
BSNL GSM NE 1	1.96%	1.91%	97.66%	0.95%	1.97%	1.75%	2.98%	97.67%
BSNL GSM NE 2	26.40%	50.72%	76.18%	0.46%	0.86%	4.53%	12.81%	87.37%
Idea	1.55%	1.64%	96.70%	0.65%	1.34%	1.63%	1.87%	95.35%
Reliance GSM	0.45%	1.32%	98.57%	0.03%	0.23%	0.61%	0.17%	98.28%
Vodafone	1.47%	1.92%	99.42%	0.16%	0.58%	0.69%	2.44%	98.22%

For Reliance GSM, data is pertaining to Apr'15. Data for May'15 and Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

NDR: Auditors were not able to get the data for worst affected cells having more than 3% TCH drop and Voice quality from BSNL NE 1 CDMA, as operator reported a technical problem in their systems.

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

The above table represents the parameter wise observations for Wireless Operators in North East circle.

BTSs Accumulated Downtime:

Aircel, BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE 2 GSM failed to meet the benchmark. Reliance GSM performed the best among all operators with 0.45% downtime.

Worst Affected BTSs Due to Downtime:

Aircel, BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE 2 GSM failed to meet the benchmark. Reliance had minimum worst affected BTSs due to downtime at 1.32%.

Call Set-up Success Rate (CSSR):

Aircel, Airtel and BSNL NE 2 GSM failed to meet the benchmark on CSSR. Best CSSR performance was observed for Vodafone with 99.42% of their calls getting completed.

Excluding Airtel, all other operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section. Airtel is using a formula that has not been specified by TRAI or the counter definitions provided by their network service provider (Ericsson). However, this report presents the appropriate CSSR value for Airtel, which was calculated by using the proper counter details (provided in section 8.15.1) by the IMRB auditor during audit.

Network Congestion parameters:

All operators met the benchmark for SDCCH Paging Channel Congestion. Aircel failed to meet the benchmark for TCH Congestion.

Reliance GSM performed the best on SDCCH Paging Channel Congestion and BSNL NE 1 CDMA performed the best on TCH congestion.

The calculation methodology of these parameters was found to be in complete accordance with TRAI specifications.

Call Drop Rate:

BSNL NE 2 GSM failed to meet the TRAI benchmark. Reliance GSM was the best performer by recording call drop rate of 0.61%.

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel and BSNL NE 2 GSM failed to meet the benchmark while Reliance GSM had minimum worst affected cells at 0.17%.

Voice Quality:

Aircel and BSNL NE 2 GSM did not meet the benchmark in terms of voice quality. BSNL NE 2 CDMA was the best performer by recording 100% voice quality.

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

3.1.1 PMR DATA - APRIL

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)	9.56%	54.41%	93.11%	0.82%	5.67%	1.75%	16.25%	93.18%
Airtel	0.33%	1.40%	90.33%	0.72%	0.60%	0.92%	0.67%	98.90%
BSNL CDMA NE 1	6.48%	15.50%	97.81%	NA	NDR	1.38%	NDR	NDR
BSNL CDMA NE 2	5.34%	8.20%	95.29%	NA	0.09%	0.87%	3.14%	100.00%
BSNL GSM NE 1	1.98%	1.88%	97.56%	0.94%	1.97%	1.71%	2.96%	97.00%
BSNL GSM NE 2	28.72%	24.72%	69.62%	0.53%	0.92%	0.35%	13.16%	87.37%
Idea	1.50%	1.05%	96.63%	0.84%	1.28%	1.79%	2.05%	95.21%
Reliance GSM	0.45%	1.32%	98.57%	0.03%	0.23%	0.61%	0.17%	98.28%
Vodafone	1.60%	1.95%	99.34%	0.18%	0.66%	0.68%	2.31%	98.26%

3.1.2 PMR DATA – MAY

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)	7.90%	46.02%	93.85%	0.70%	4.83%	1.77%	16.84%	93.14%
Airtel	0.90%	1.44%	90.38%	0.65%	0.55%	0.97%	0.97%	98.79%
BSNL CDMA NE 1	3.22%	8.53%	98.42%	NA	0.00%	1.20%	NDR	NDR
BSNL CDMA NE 2	4.70%	8.20%	95.77%	NA	0.11%	1.02%	2.16%	100.00%
BSNL GSM NE 1	1.96%	1.87%	97.89%	0.96%	1.97%	1.74%	2.98%	98.00%
BSNL GSM NE 2	22.93%	61.16%	80.68%	0.41%	0.83%	6.44%	12.63%	87.37%
Idea	1.49%	1.87%	97.28%	0.49%	1.10%	1.51%	1.57%	95.13%
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	1.39%	1.94%	99.51%	0.14%	0.49%	0.71%	2.64%	98.16%

For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

3.1.3 PMR DATA - JUNE

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)	7.84%	45.97%	92.87%	0.94%	5.84%	1.75%	17.26%	93.01%
Airtel	0.94%	1.37%	89.00%	0.63%	0.68%	0.96%	0.88%	98.80%
BSNL CDMA NE 1	4.09%	7.75%	98.30%	NA	0.00%	0.65%	NDR	NDR
BSNL CDMA NE 2	5.18%	8.61%	96.70%	NA	0.13%	1.11%	3.34%	100.00%
BSNL GSM NE 1	1.93%	1.98%	97.53%	0.95%	1.98%	1.79%	2.99%	98.00%
BSNL GSM NE 2	27.54%	66.29%	78.24%	0.43%	0.84%	6.79%	12.63%	87.37%
Idea	1.66%	1.99%	96.18%	0.62%	1.65%	1.58%	1.98%	95.70%
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	1.41%	1.88%	99.42%	0.15%	0.58%	0.68%	2.37%	98.23%

For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

3.2 3 DAY DATA – CONSOLIDATED

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	8.94%	8.39%	91.58%	0.90%	7.15%	1.79%	17.15%	93.16%
Airtel	0.79%	0.00%	90.94%	0.75%	0.57%	0.97%	0.87%	98.80%
BSNL CDMA NE 1	5.09%	2.58%	98.37%	NA	0.00%	0.97%	NDR	NDR
BSNL CDMA NE 2	5.06%	5.54%	96.74%	NA	7.54%	1.18%	3.34%	100.00%
BSNL GSM NE 1	1.75%	1.93%	97.29%	0.95%	1.93%	1.74%	2.95%	97.67%
BSNL GSM NE 2	26.39%	50.13%	74.82%	0.50%	0.88%	4.65%	28.89%	87.37%
Idea	1.68%	1.46%	98.09%	0.55%	0.63%	1.50%	2.27%	95.17%
Reliance GSM	4.49%	1.32%	98.41%	0.03%	0.24%	0.58%	0.17%	98.32%
Vodafone	1.68%	0.08%	99.41%	0.34%	0.59%	0.65%	2.52%	99.48%

For Reliance GSM, data is pertaining to Apr'15. Data for May'15 and Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

NDR: Auditors were not able to get the data for worst affected cells having more than 3% TCH drop and Voice quality from BSNL NE 1 CDMA, as operator reported a technical problem in their systems.

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

BTSs Accumulated Downtime:

Aircel, BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE 2 GSM failed to meet the benchmark. Airtel performed the best among all operators by recording 0.79% downtime.

Worst Affected BTSs Due to Downtime:

Aircel, BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE 2 GSM failed to meet the benchmark. Airtel had minimum worst affected BTSs due to downtime at 0.00%.

Call Set-up Success Rate (CSSR):

Aircel, Airtel and BSNL NE 2 GSM failed to meet the benchmark on CSSR. Best CSSR performance was observed for Vodafone with 99.41% of their calls getting completed.

Excluding Airtel, all other operators were found to be calculating the parameter as per the norm specified by TRAI, as given in parameter description section. Airtel is using a formula that has not been specified by TRAI or the counter definitions provided by their network service provider (Ericsson). However, this report presents the appropriate CSSR value for Airtel, which was calculated by using the proper counter details (provided in section 8.15.1) by the IMRB auditor during audit.

Network Congestion parameters:

All operators met the benchmark for SDCCH Paging Channel Congestion. Aircel and BSNL NE 2 CDMA failed to meet the benchmark for TCH Congestion.

Reliance GSM performed the best on SDCCH Paging Channel Congestion and BSNL NE 1 CDMA performed the best on TCH congestion.

The calculation methodology of these parameters was found to be in complete accordance with TRAI specifications.

Call Drop Rate:

BSNL NE 2 GSM failed to meet the TRAI benchmark for the parameter. Reliance GSM was the best performer by recording call drop rate of 0.58%.

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL NE 2 CDMA and BSNL NE 2 GSM failed to meet the benchmark while Reliance GSM had minimum worst affected cells at 0.17%.

Voice Quality:

Aircel and BSNL NE 2 GSM did not meet the benchmark in terms of voice quality. BSNL NE 2 CDMA was the best performer by recording 100% voice quality.

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

3.2.1 3 DAY DATA - APRIL

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)	13.08%	14.71%	90.12%	0.73%	8.58%	1.97%	17.95%	93.27%
Airtel	0.40%	0.00%	91.95%	0.99%	0.66%	0.97%	0.98%	98.80%
BSNL CDMA NE 1	8.57%	6.20%	98.01%	NA	NDR	0.80%	NDR	NDR
BSNL CDMA NE 2	NDR	NDR	NDR	NA	NDR	NDR	NDR	NDR
BSNL GSM NE 1	1.88%	1.88%	97.19%	0.93%	1.92%	1.73%	2.96%	97.00%
BSNL GSM NE 2	26.49%	24.72%	69.62%	0.53%	0.92%	0.35%	13.16%	87.37%
Idea	1.85%	1.06%	96.88%	0.82%	1.03%	1.80%	2.70%	95.17%
Reliance GSM	4.49%	1.32%	98.41%	0.03%	0.24%	0.58%	0.17%	98.32%
Vodafone	1.85%	0.19%	98.85%	0.66%	1.15%	0.64%	2.62%	98.33%

3.2.2 3 DAY DATA – MAY

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)	7.46%	7.07%	92.71%	0.71%	6.01%	1.59%	15.51%	93.25%
Airtel	0.88%	0.00%	89.67%	0.70%	0.57%	0.96%	0.89%	98.82%
BSNL CDMA NE 1	5.19%	1.55%	98.74%	NA	0.00%	0.93%	NDR	NDR
BSNL CDMA NE 2	4.78%	5.33%	97.13%	NA	0.08%	0.95%	3.34%	100.00%
BSNL GSM NE 1	1.94%	1.88%	97.23%	0.95%	1.92%	1.75%	2.94%	98.00%
BSNL GSM NE 2	27.65%	59.39%	75.39%	0.57%	0.89%	7.86%	36.76%	87.37%
Idea	1.49%	1.44%	98.91%	0.44%	0.31%	1.32%	1.92%	95.27%
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	1.53%	0.00%	99.80%	0.16%	0.20%	0.70%	2.75%	101.71%

For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

3.2.3 3 DAY DATA - JUNE

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)	6.29%	3.40%	91.91%	1.27%	6.86%	1.81%	18.00%	92.96%
Airtel	1.09%	0.00%	91.20%	0.56%	0.47%	0.98%	0.75%	98.79%
BSNL CDMA NE 1	1.50%	0.00%	98.37%	NA	0.00%	1.19%	NDR	NDR
BSNL CDMA NE 2	5.33%	5.74%	96.34%	NA	15.00%	1.40%	3.34%	100.00%
BSNL GSM NE 1	1.42%	2.03%	97.45%	0.96%	1.96%	1.75%	2.94%	98.00%
BSNL GSM NE 2	25.03%	66.29%	79.45%	0.40%	0.83%	5.74%	36.76%	87.37%
Idea	1.70%	1.87%	98.47%	0.38%	0.56%	1.37%	2.20%	95.07%
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	1.65%	0.06%	99.57%	0.19%	0.43%	0.61%	2.19%	98.39%

For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

3.3 LIVE CALLING DATA – CONSOLIDATED

Name of Service Provider	Resolution of billing complaints		Service Requests	Level 1 Service	Response time to customer for assistance	
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Complaint /Request attended to Satisfaction	Call answered	Accessibility of call centre/ customer care	Percentage of calls answered by the operators within 90 seconds
Benchmark	98.00%	100.00%		≥ 95%	≥ 95%	≥ 95%
Aircel(DWL)	80.00%	80.00%	38.00%	79.33%	100.00%	96.00%
Airtel	78.00%	82.00%	87.00%	77.33%	100.00%	90.00%
BSNL CDMA NE 1	NDR	NDR	NDR	80.00%	100.00%	78.00%
BSNL CDMA NE 2	NDR	NDR	NDR	75.33%	100.00%	72.00%
BSNL GSM NE 1	86.67%	93.33%	87.00%	80.67%	100.00%	72.00%
BSNL GSM NE 2	86.67%	93.33%	87.00%	77.33%	100.00%	90.00%
Idea	80.00%	83.00%	79.63%	80.00%	100.00%	98.00%
Reliance GSM	72.00%	74.00%	83.00%	77.33%	100.00%	92.00%
Vodafone	85.00%	86.00%	87.00%	78.00%	100.00%	95.00%

NDR: Data to conduct live calling for resolution of complaints and service requests was not available at the central billing center of BSNL NE 1 CDMA and BSNL NE 2 CDMA. Hence, live calling for these parameters has not been conducted for the operator.

Resolution of billing complaints

As per the live calls made to consumers, none of the operators met the benchmark of resolving 98% complaints within 4 weeks and 100% complaints within 6 weeks.

Complaint/Request Attended to Satisfaction

Airtel, BSNL NE 1 GSM, BSNL NE 2 GSM and Vodafone performed the best on customer satisfaction with service complaints/ requests.

Level 1 Service

None of the operators were able to meet the benchmark for level 1 service calls being answered. The details of live calling done for the level 1 service have been provided in the annexure for each operator.

It has also been observed that a number of Category-I (i.e. mandatory) services were not being operated by most of the operators.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all the service providers met the TRAI benchmark with 100% accessibility of all call center/customer care center.

Customer Care / Helpline Assessment (voice to voice)

Airtel, BSNL NE 1 CDMA, BSNL NE 2 CDMA, BSNL NE 1 GSM, BSNL NE 2 GSM and Reliance GSM failed to meet the benchmark of answering 95% calls within 90 seconds by customer care executives.

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)	0.02%	0.04%	100.00%	100.00%	100.00%	95.68%	99.38%
Airtel	0.02%	0.01%	100.00%	100.00%	100.00%	99.99%	92.25%
BSNL CDMA NE 1	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL CDMA NE 2	NDR	NDR	NDR	NDR	NDR	NDR	NDR
BSNL GSM NE 1	0.03%	0.00%	100.00%	100.00%	100.00%	98.30%	97.26%
BSNL GSM NE 2	0.03%	0.00%	100.00%	100.00%	100.00%	98.30%	97.26%
Idea	0.06%	0.02%	100.00%	100.00%	100.00%	100.00%	99.85%
Reliance GSM	0.09%	0.01%	100.00%	100.00%	100.00%	97.91%	97.31%
Vodafone	0.17%	0.01%	100.00%	100.00%	100.00%	99.99%	100.00%

NDR: Data to conduct audit for metering and billing, resolution of billing complaints, response time for customer assistance and customer care was not available at the central billing center/ customer service center of BSNL NE 1 CDMA and BSNL NE 2 CDMA. Hence, audit for these parameters has not been conducted for the operator.

Note: For BSNL GSM, there is no bifurcation of data between BSNL NE1 GSM and BSNL NE 2 GSM at the billing and customer service center. Hence, same data has been presented for both BSNL NE1 GSM and BSNL NE 2 GSM.

Metering and billing credibility

For the postpaid customers, Vodafone did not meet the benchmark. Aircel and Airtel performed the best in the circle.

For prepaid, all operators met the benchmark. BSNL NE1 GSM and BSNL NE 2 GSM performed the best in the circle with 0.00% prepaid charging disputes.

Resolution of Billing Complaints

All the operators met the TRAI criteria of resolution of 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. Further details can be found in annexure (section 8.7).

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

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

Customer Care Percentage of calls answered by the operators IVR

All operators met the benchmark of 95% IVR call getting connected. Idea had the highest percentage of IVR calls being answered at 100 %

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

Airtel failed to meet the benchmark. Vodafone had the highest percentage of voice to voice calls being answered at 100 %.

3.5 INTER OPERATOR CALL ASSESSMENT – CONSOLIDATED

6. Inter Operator Call Assessment

Inter operator call Assessment To↓ From→	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Aircel(DWL)	NA	92.00%	91.00%	93.00%	82.00%	87.00%	98.00%	89.00%	99.00%
Airtel	91.00%	NA	98.00%	92.00%	100.00%	89.00%	98.00%	100.00%	100.00%
BSNL CDMA NE 1	98.00%	93.00%	NA	92.00%	96.00%	88.00%	98.00%	99.00%	97.00%
BSNL CDMA NE 2	93.00%	97.00%	93.00%	NA	92.00%	89.00%	98.00%	93.00%	96.00%
BSNL GSM NE 1	95.00%	96.00%	93.00%	92.00%	NA	94.00%	96.00%	93.00%	97.00%
BSNL GSM NE 2	95.00%	93.00%	96.00%	9%1	92.00%	NA	98.00%	95.00%	98.00%
Idea	98.00%	100.00%	96.00%	95.00%	99.00%	96.00%	NA	90.00%	99.00%
Reliance GSM	97.00%	100.00%	73.00%	91.00%	91.00%	92.00%	100.00%	NA	96.00%
Vodafone	97.00%	96.00%	99.00%	95.00%	94.00%	94.00%	95.00%	96.00%	NA

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

In the inter-operator call assessment, it was observed that all operators faced problems in connecting to and from other operators.

4 CRITICAL FINDINGS

PMR Consolidated (Network Parameters)

Aircel, BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE 2 GSM are the key concern operators as these failed to meet the benchmark for majority network parameters.

To calculate CSSR, Airtel is using a formula that has not been specified by TRAI or the counter definitions provided by their network service provider (Ericsson). However, this report presents the appropriate CSSR value for Airtel, which was calculated by using the proper counter details (provided in section 8.15.1) by the IMRB auditor during audit.

3 Day Live Measurement (Network Parameters)

Aircel, BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE 2 GSM are the key concern operators as these failed to meet the benchmark for majority network parameters.

Significant difference was observed between PMR & live measurement data for Aircel on Worst Affected BTS due to downtime and for BSNL NE 2 GSM on worst affected cells having more than 3% TCH drop. 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

None of the operators met the benchmark for complaints resolved within 4 weeks as well as within 6 weeks and Level 1 services. Airtel, BSNL NE 1 CDMA, BSNL NE 2 CDMA, BSNL NE 1 GSM, BSNL NE 2 GSM and Reliance GSM failed to meet the benchmark for calls answered by operator (voice to voice).

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

Metering and Billing credibility

Vodafone did not meet the benchmark for metering and billing credibility of postpaid subscribers.

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 did not meet the benchmark of answering 95% calls by the operator (voice to voice) within 90 seconds.

NDR: Data to conduct audit for metering and billing, resolution of billing complaints, response time for customer assistance and customer care was not available at the central billing center/ customer service center of BSNL NE 1 CDMA and BSNL NE 2 CDMA. Hence, audit for these parameters has not been conducted for the operator.

Inter-Operator Call Assessment

In the inter-operator call assessment, it was observed that all operators faced problems in connecting to and from other operators.

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

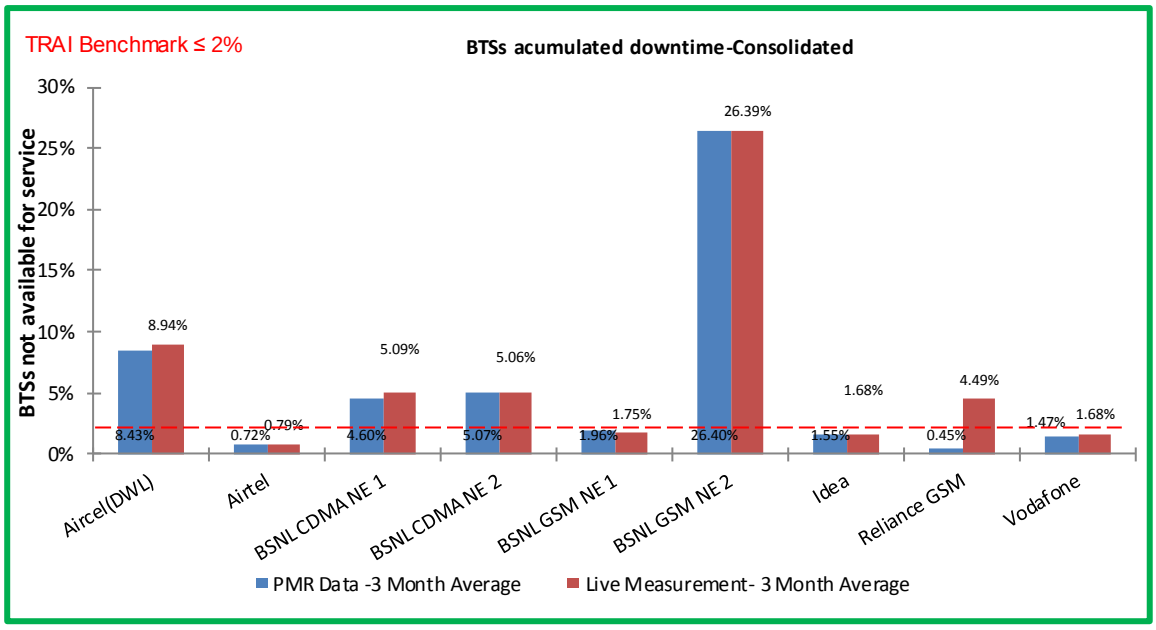
3. **TRAI Benchmark –**

    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.

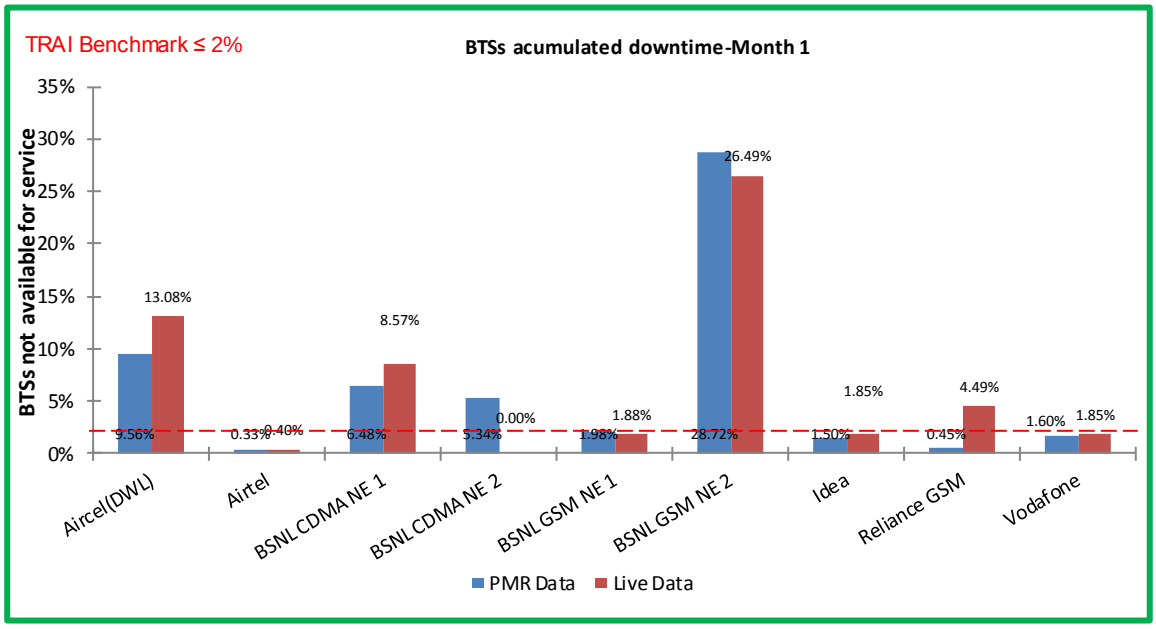
5.1.2 KEY FINDINGS – CONSOLIDATED



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

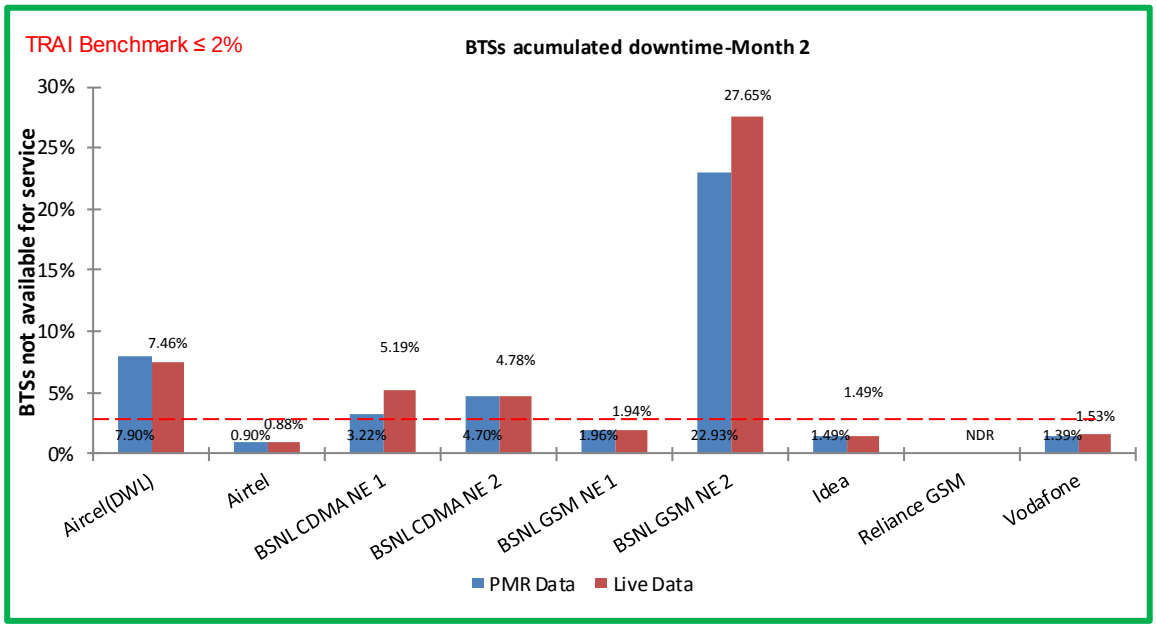
Aircel, BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE 2 GSM failed to meet the benchmark for BTS accumulated downtime during audit.

5.1.2.1 KEY FINDINGS – MONTH 1



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

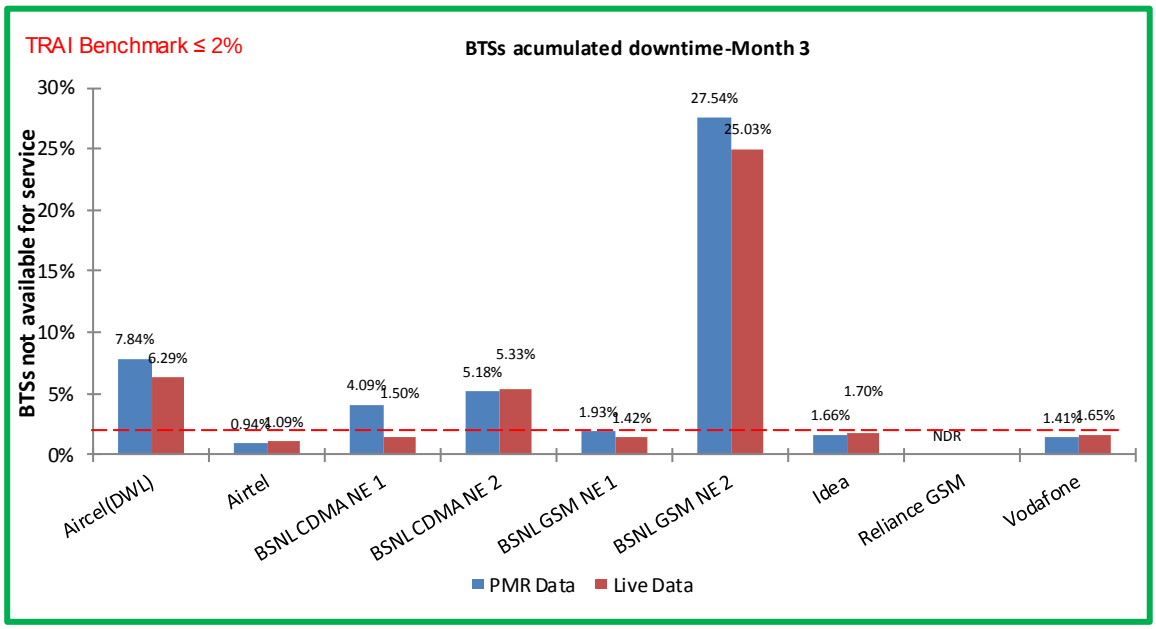
5.1.2.2 KEY FINDINGS – MONTH 2



For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

5.1.2.3 KEY FINDINGS – MONTH 3



For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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.

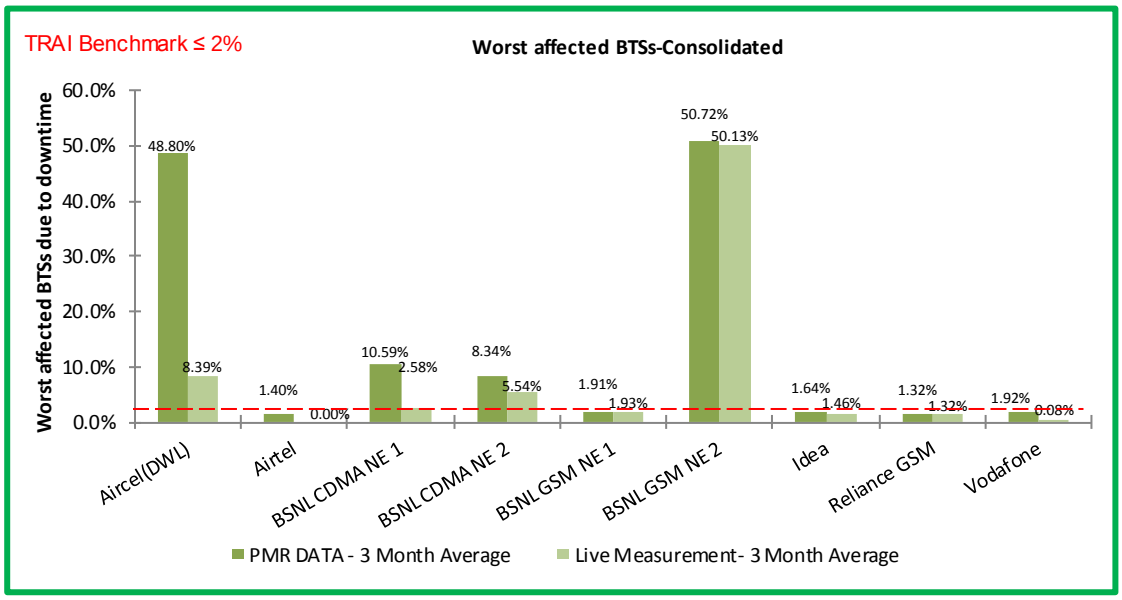
   iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

   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 – CONSOLIDATED

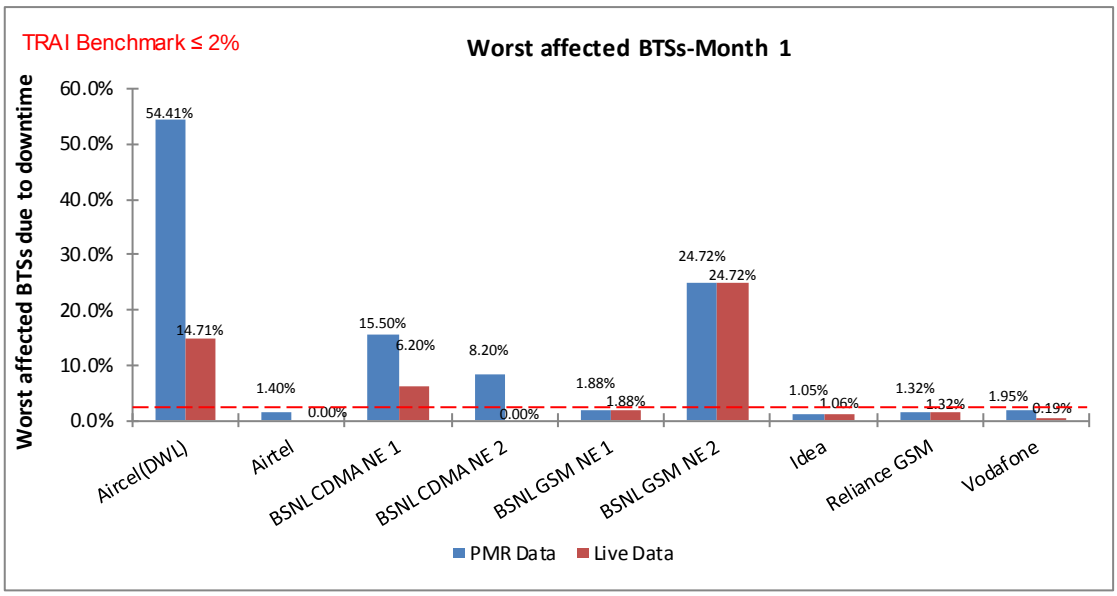


Data Source: Operations and Maintenance Center (OMC) of the operators

Aircel, BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE 2 GSM failed to meet the benchmark during audit.

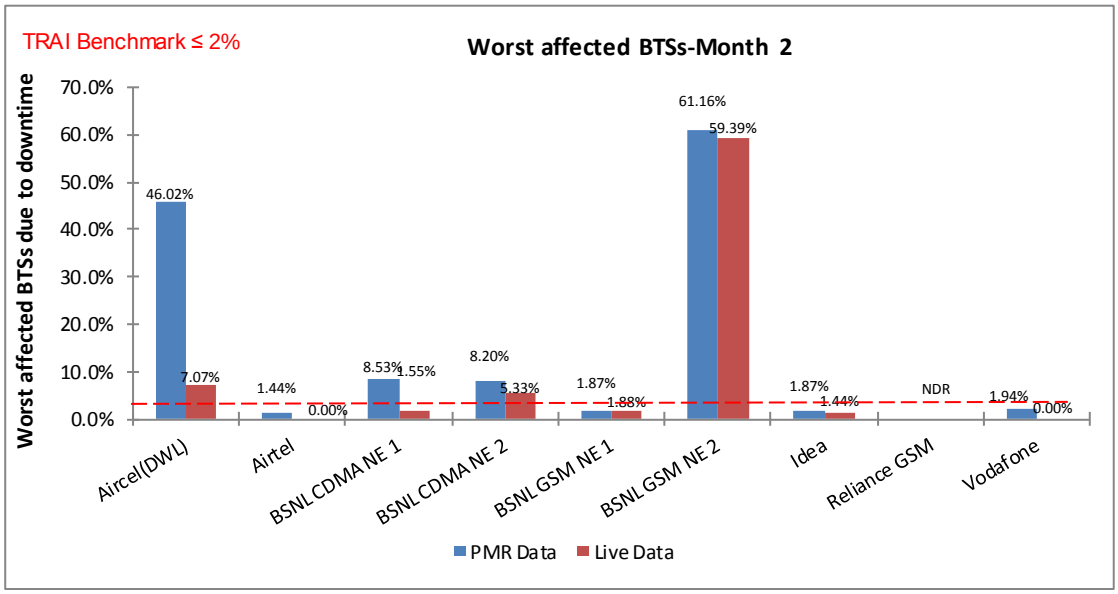
Significant difference was observed between PMR & live measurement data for Aircel and BSNL NE 1 CDMA. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.2.2.1 KEY FINDINGS – MONTH 1



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

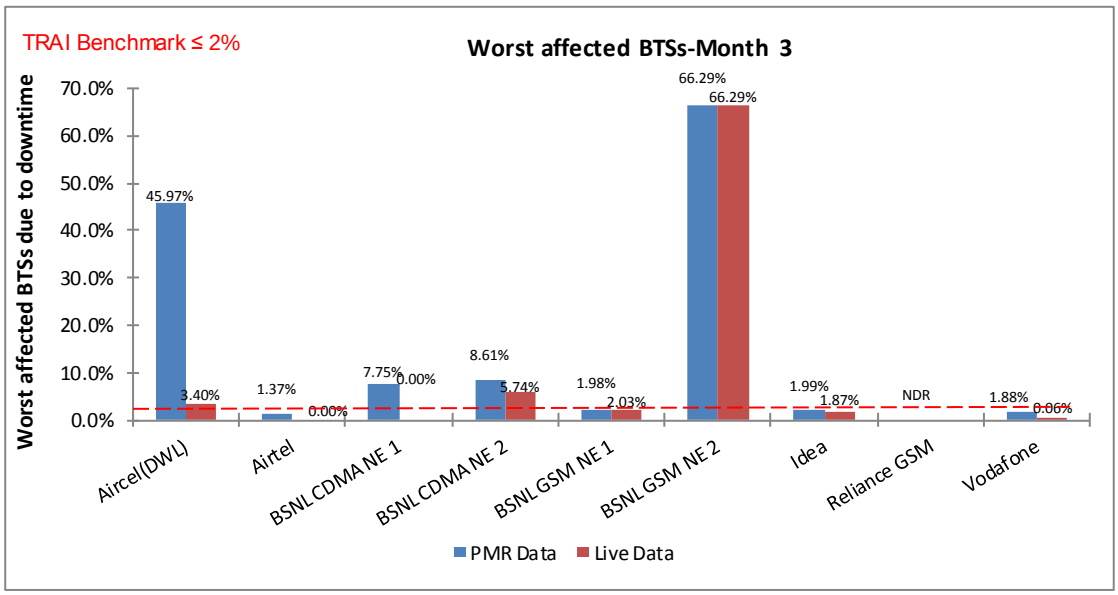
5.2.2.2 KEY FINDINGS – MONTH 2



For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

5.2.2.3 KEY FINDINGS – MONTH 3



For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

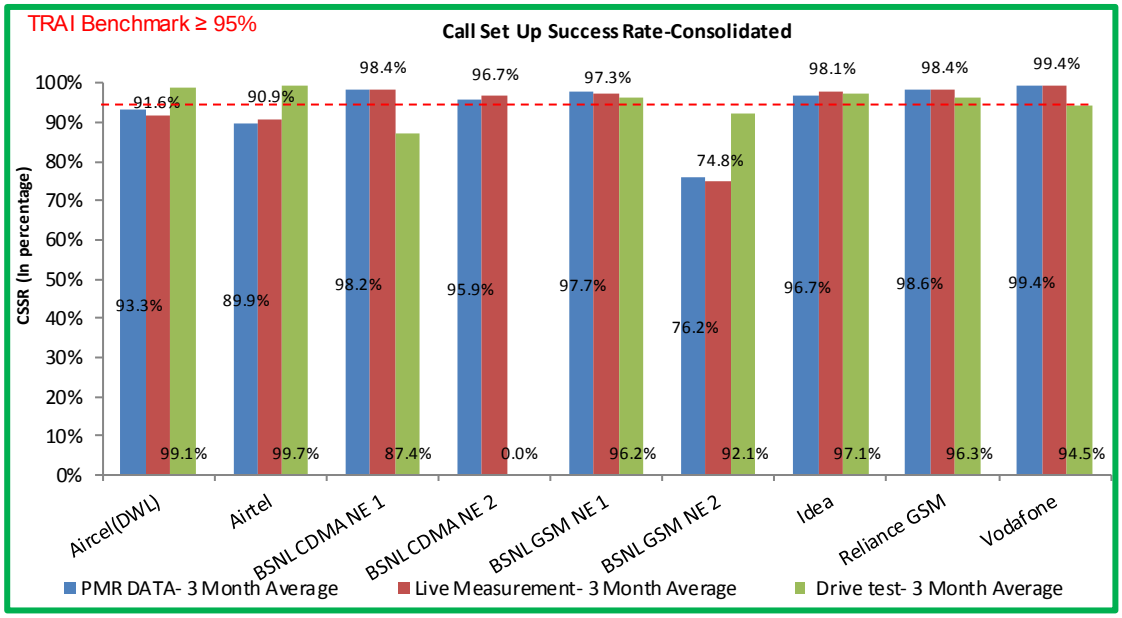
   Call Established means the following events have happened in call setup:-

   - 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.

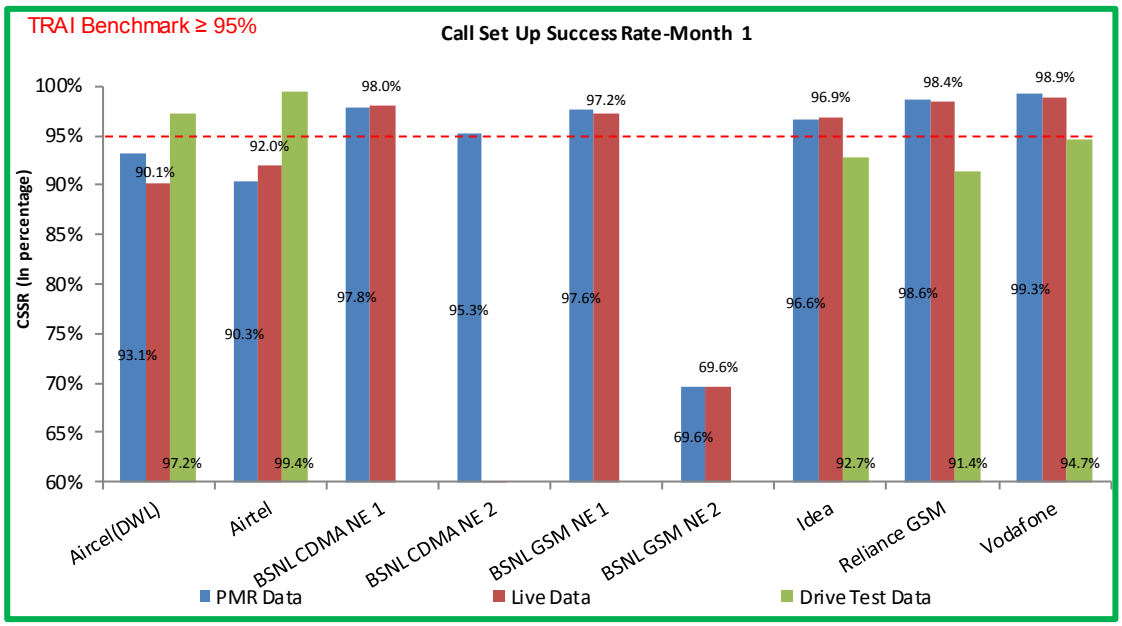
5.3.2 KEY FINDINGS – CONSOLIDATED



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

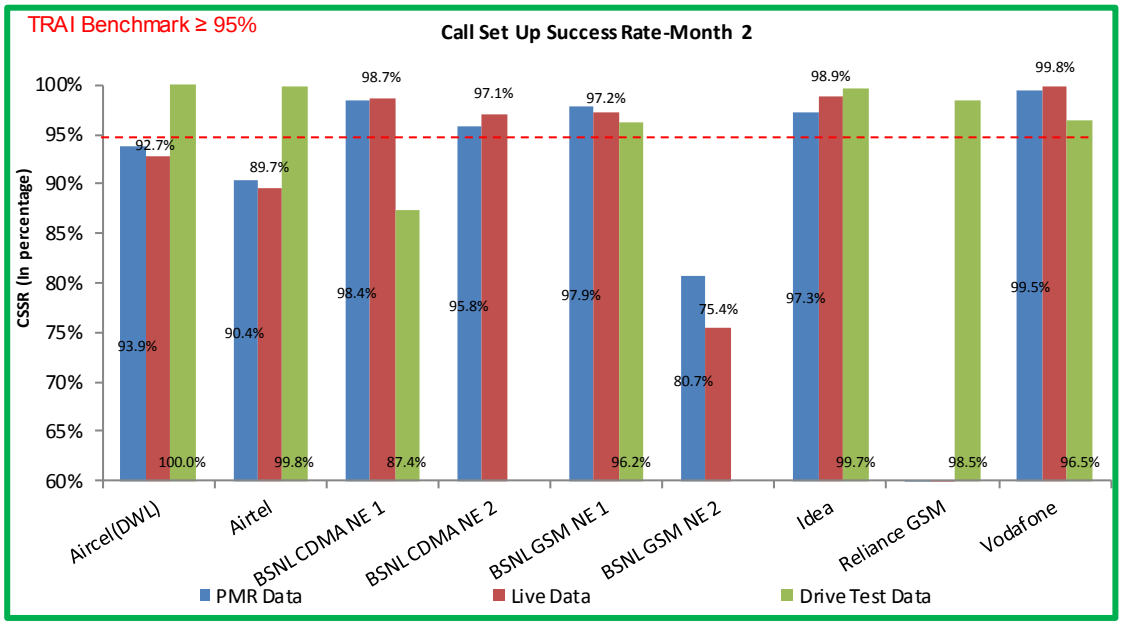
Aircel, Airtel and BSNL NE 2 GSM did not meet the benchmark for CSSR.

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

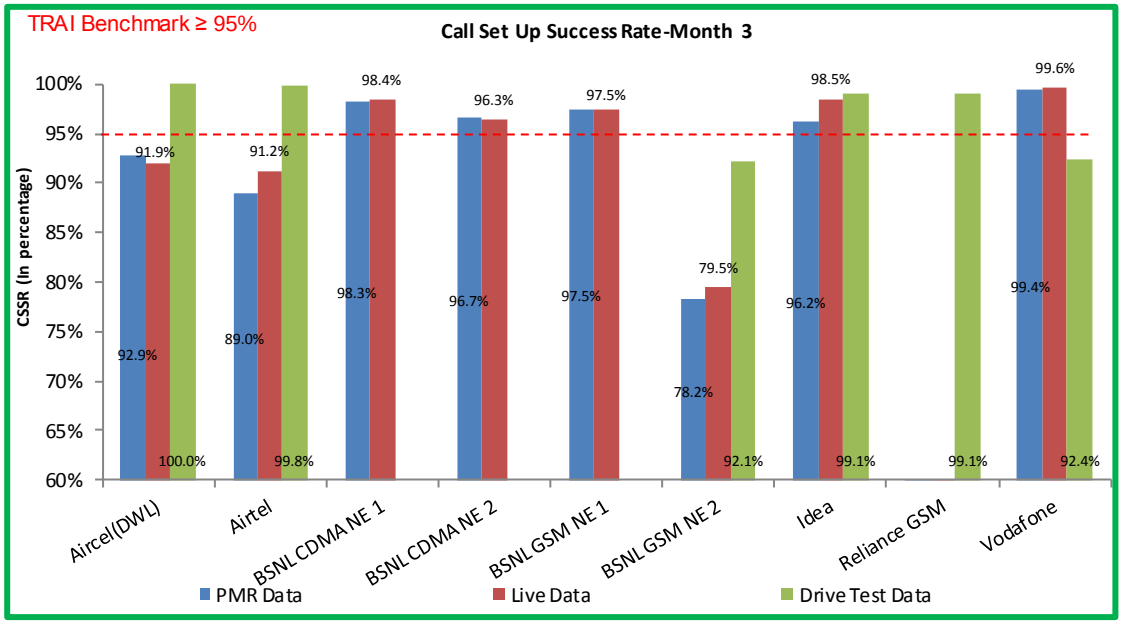
5.3.2.2 KEY FINDINGS – MONTH 2



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

For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.3.2.3 KEY FINDINGS – MONTH 3



For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

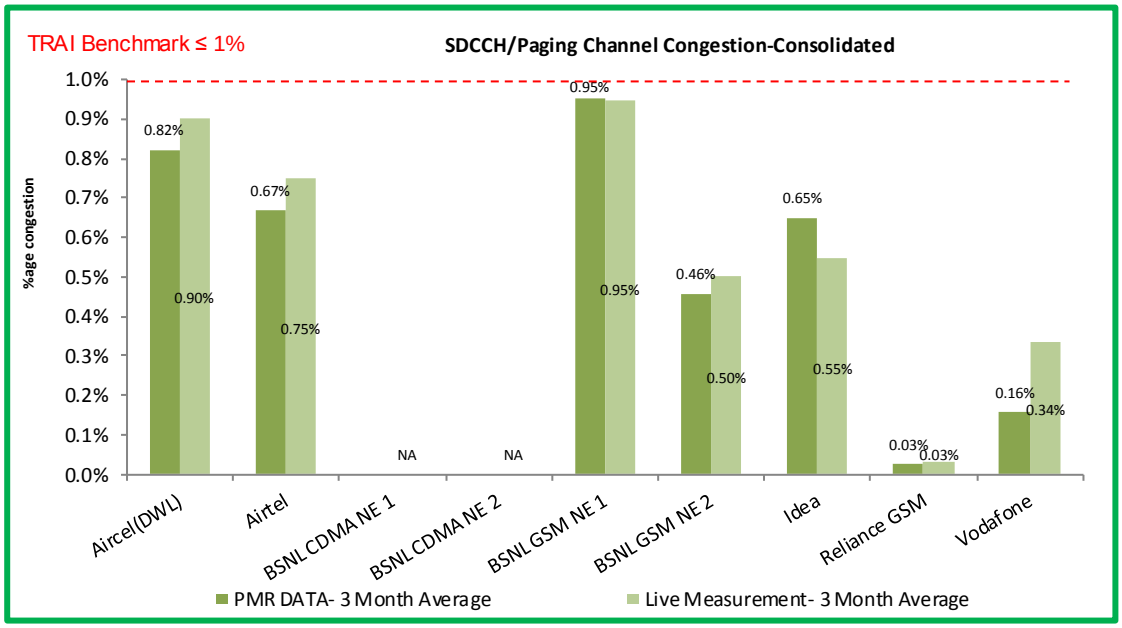
5.4 NETWORK CHANNEL CONGESTION- PAGING CHANNEL /TCH CONGESTION/POI

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

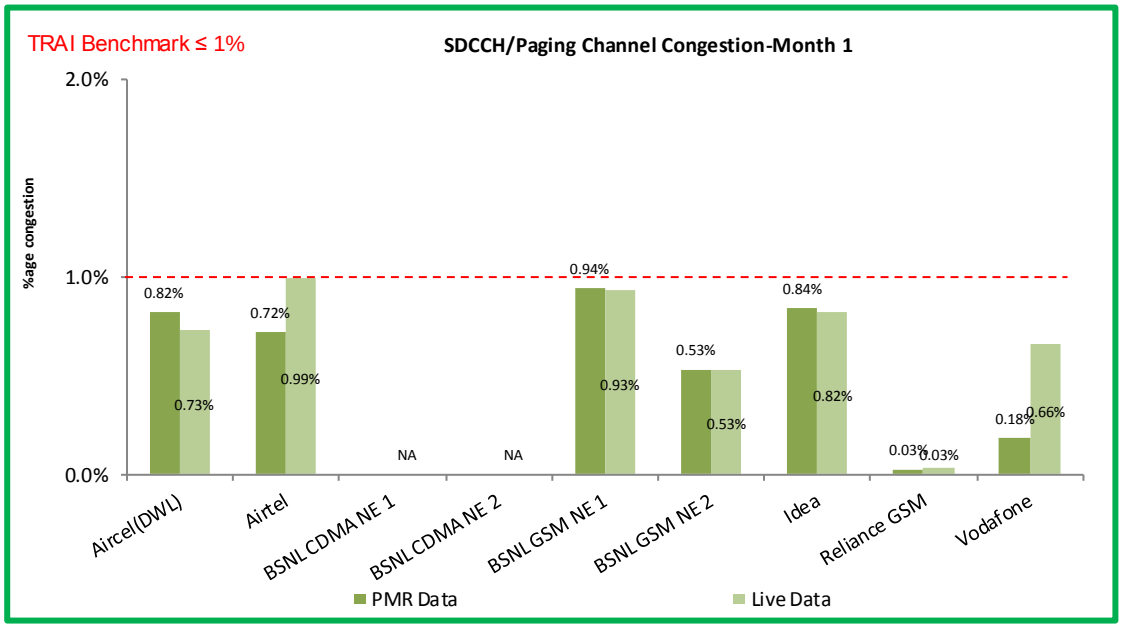


Data Source: Network Operations Center (NOC) of the operators

All operators met the benchmark for the parameter.

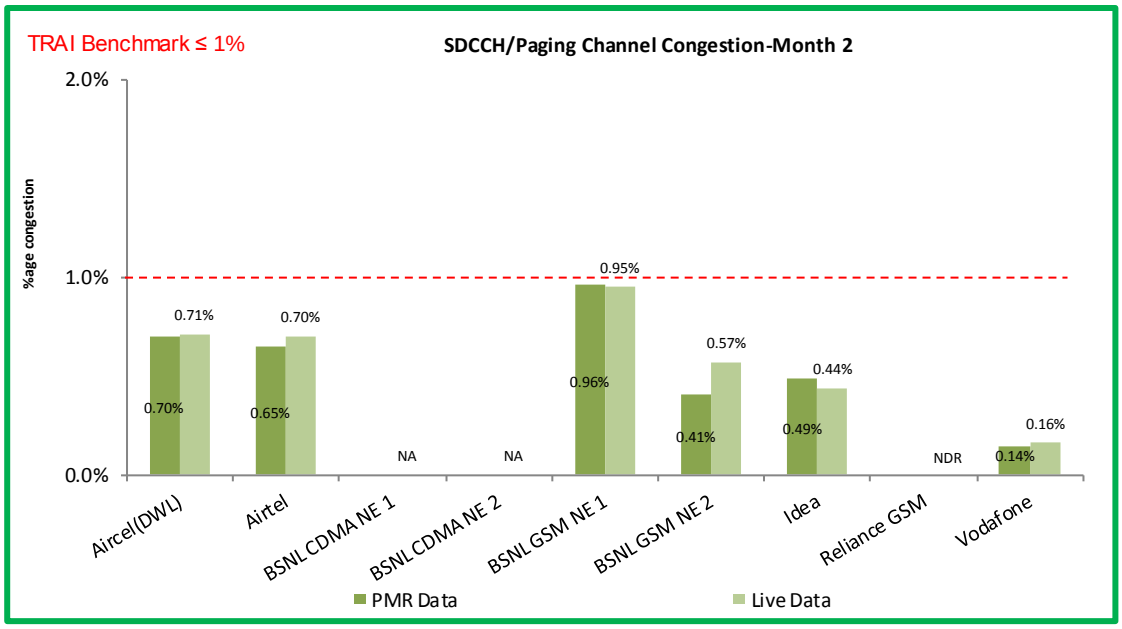
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators. Hence, it has been reported as NA for BSNL CDMA.

5.4.2.1 KEY FINDINGS – MONTH 1



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

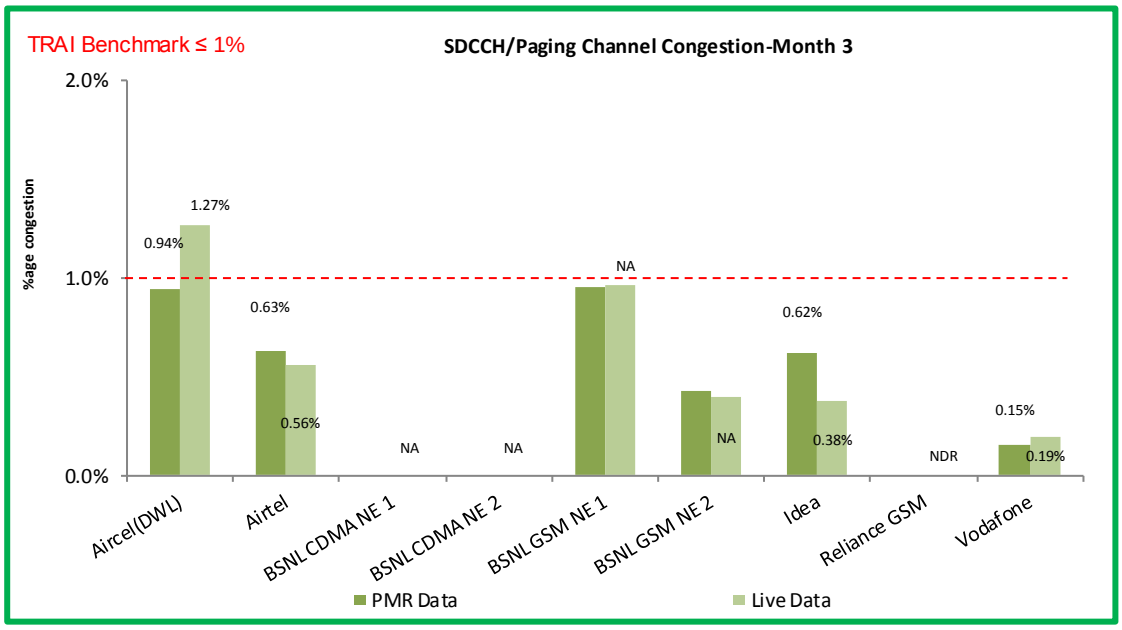
5.4.2.2 KEY FINDINGS – MONTH 2



For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

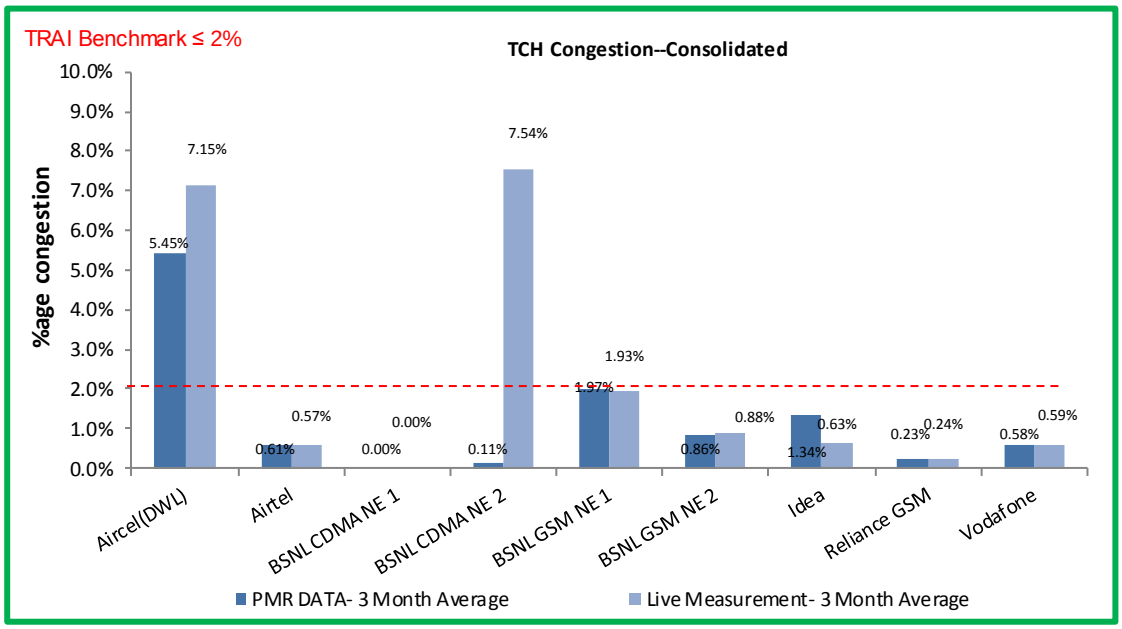
5.4.2.3 KEY FINDINGS – MONTH 3



For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

5.4.3 KEY FINDINGS – TCH CONGESTION

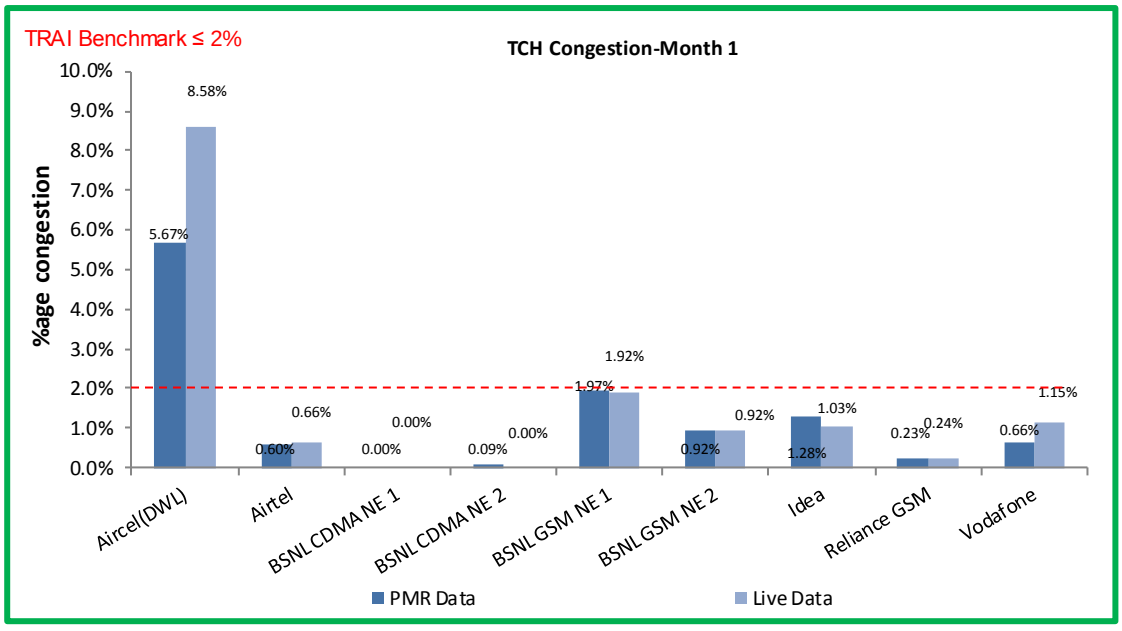


Data Source: Network Operations Center (NOC) of the operators

Aircel failed to meet the benchmark while all other operators met the TRAI benchmark of 2% during audit.

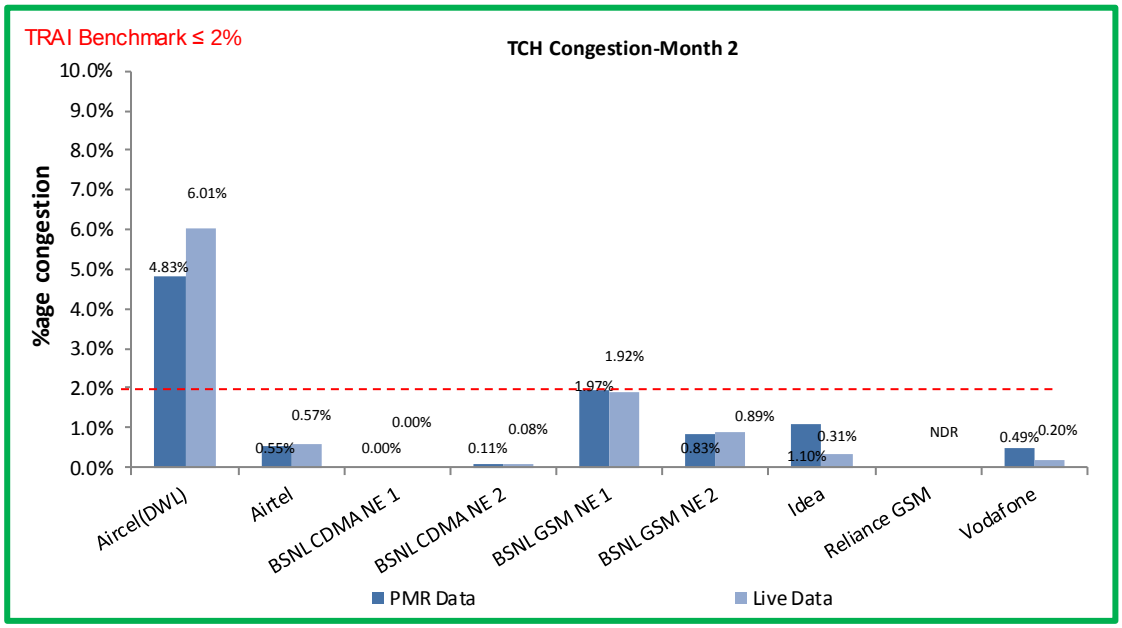
Significant difference was observed between PMR & live measurement data for BSNL NE 2 CDMA. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.4.3.1 KEY FINDINGS – MONTH 1



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

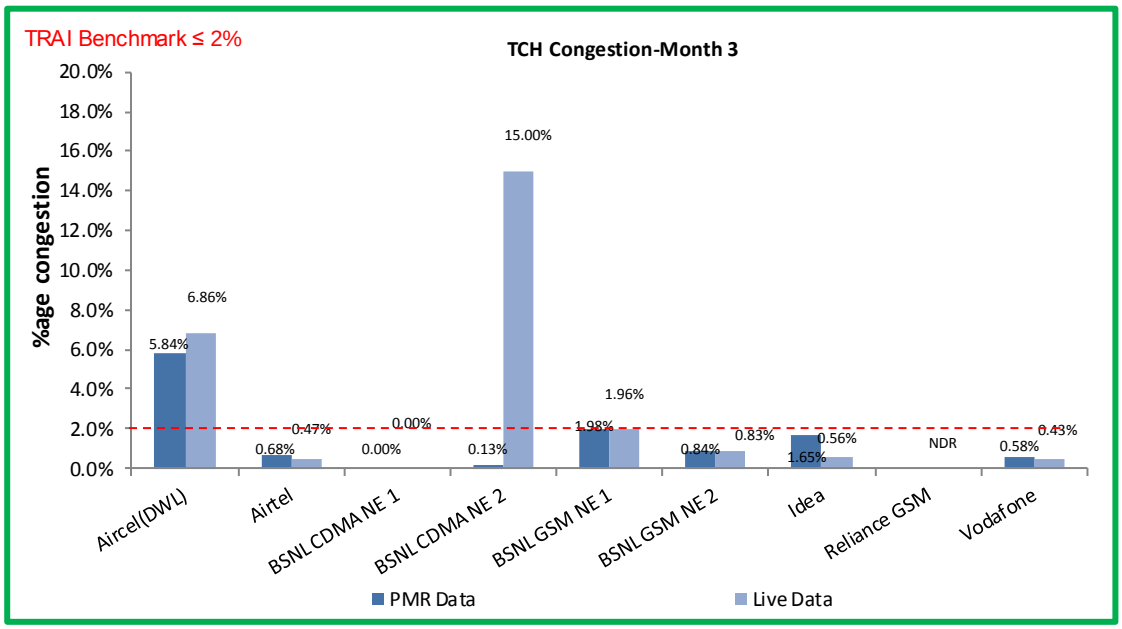
5.4.3.2 KEY FINDINGS – MONTH 2



For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

5.4.4 KEY FINDINGS – POI CONGESTION

Audit Results for POI Congestion										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		38	15	NA	NA	35	NA	28	18	34
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		43964	62481	NA	NA	27803	NA	15540	10774	28330652
Traffic served for all POIs (B)- in erlangs		26981	20989	NA	NA	14298	NA	9548	4030	6590907
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.33%	NA	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		37	15	NA	NA	35	NA	28	18	34
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		42086	59042	NA	NA	27803	NA	15609	10774	933974
Traffic served for all POIs (B)- in erlangs		23563	21572	NA	NA	14298	NA	9615	4030	218353
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.48%	NA	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. Auditors were not able to get the data from BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE2 GSM as the operator (BSNL) uses single set of POIs (BSNL NE 1 GSM) to connect to other networks.

5.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-April										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		37	15	NA	NA	35	NA	28	18	32
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		42086	61448	NA	NA	27802.53	NA	15495	10774	27631910
Traffic served for all POIs (B)- in erlangs		26189	21360	NA	NA	14435	NA	9455	4030	6351098
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.00%	NA	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-April										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		37	15	NA	NA	35	NA	28	18	32
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		42086	55375	NA	NA	27802.53	NA	15627	10774	921064
Traffic served for all POIs (B)- in erlangs		22310	20537	NA	NA	14435	NA	9142	4030	208999
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.48%	NA	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-May										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	15	NA	NA	35	NA	28	NDR	35
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		43933	61049	NA	NA	27803	NA	15540	NDR	28964462
Traffic served for all POIs (B)- in erlangs		28001	20322	NA	NA	14143	NA	9583	NDR	6803015
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.49%	NA	0.00%	NDR	0.00%

x										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		37	15	NA	NA	35	NA	28	NDR	35
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		42086	60914	NA	NA	27803	NA	15625	NDR	934338
Traffic served for all POIs (B)- in erlangs		23645	22724	NA	NA	14143	NA	9801	NDR	220499
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.48%	NA	0.00%	NDR	0.00%

For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

5.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-June										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	14	NA	NA	35	NA	29	NDR	35
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		45873	64945	NA	NA	27803	NA	15584	NDR	28395582
Traffic served for all POIs (B)- in erlangs		26751	21284	NA	NA	14315	NA	9606	NDR	6618609
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.49%	NA	0.00%	NDR	0.00%

Live Measurement Results for POI Congestion- 3 Day data-June										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		37	14	NA	NA	35	NA	28	NDR	35
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		42086	60838	NA	NA	27803	NA	15576	NDR	946519
Traffic served for all POIs (B)- in erlangs		24734	21454	NA	NA	14315	NA	9902	NDR	225561
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.49%	NA	0.00%	NDR	0.00%

For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

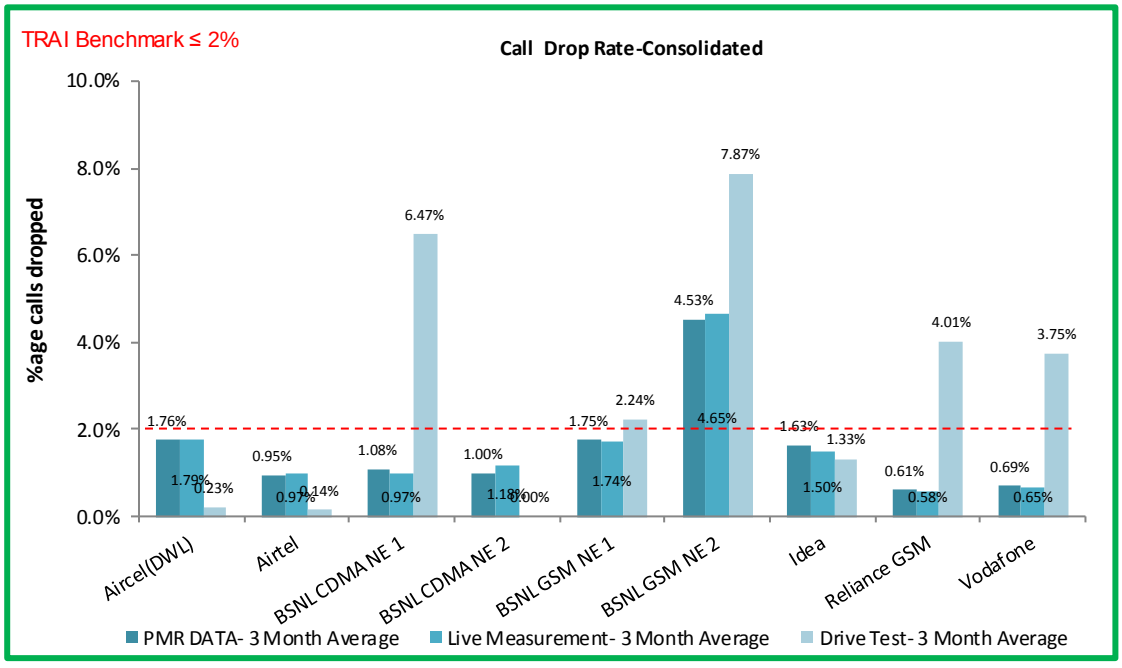
Data Source: Network Operations Center (NOC) of the operators

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.

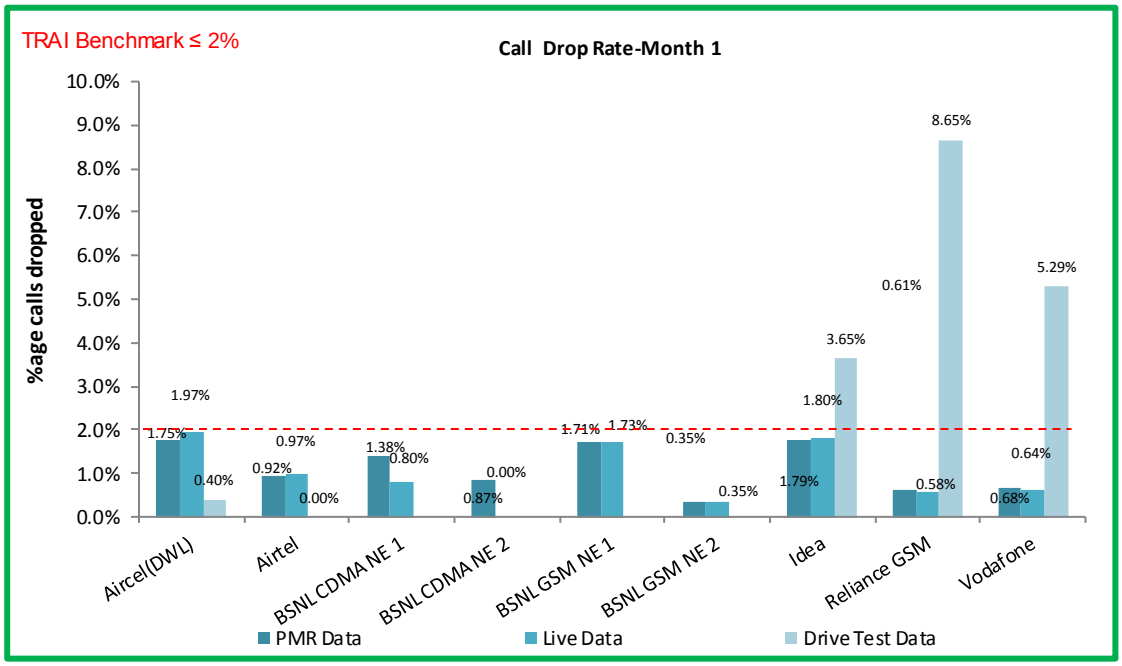
5.5.2 KEY FINDINGS – CONSOLIDATED



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

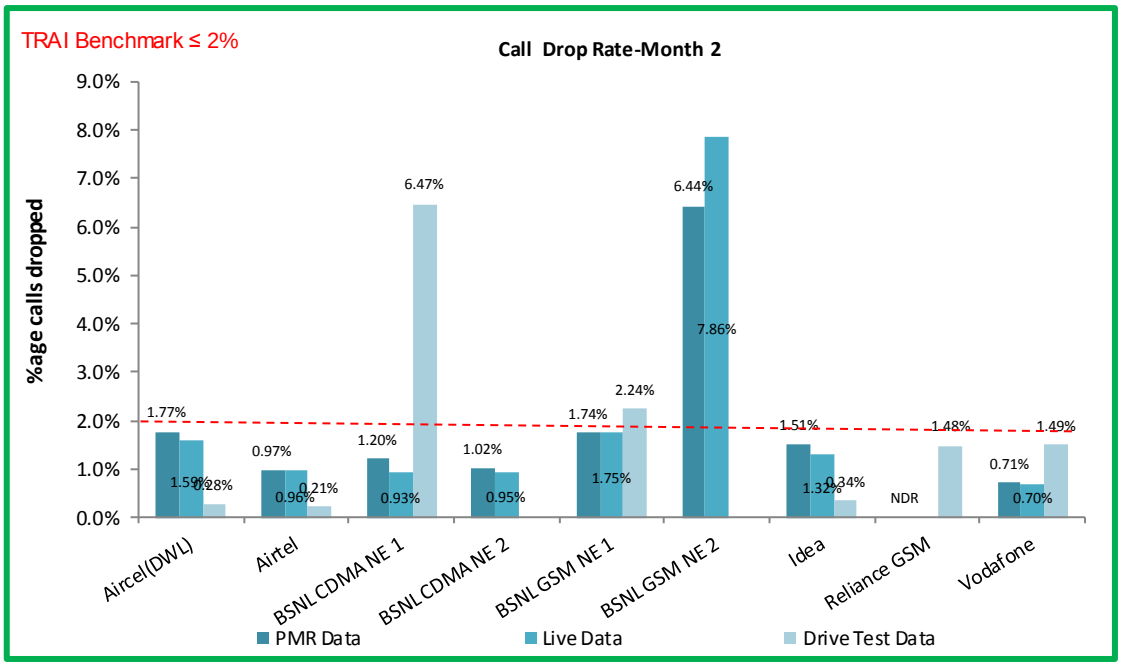
BSNL NE 2 GSM failed to meet the TRAI specified benchmark.

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

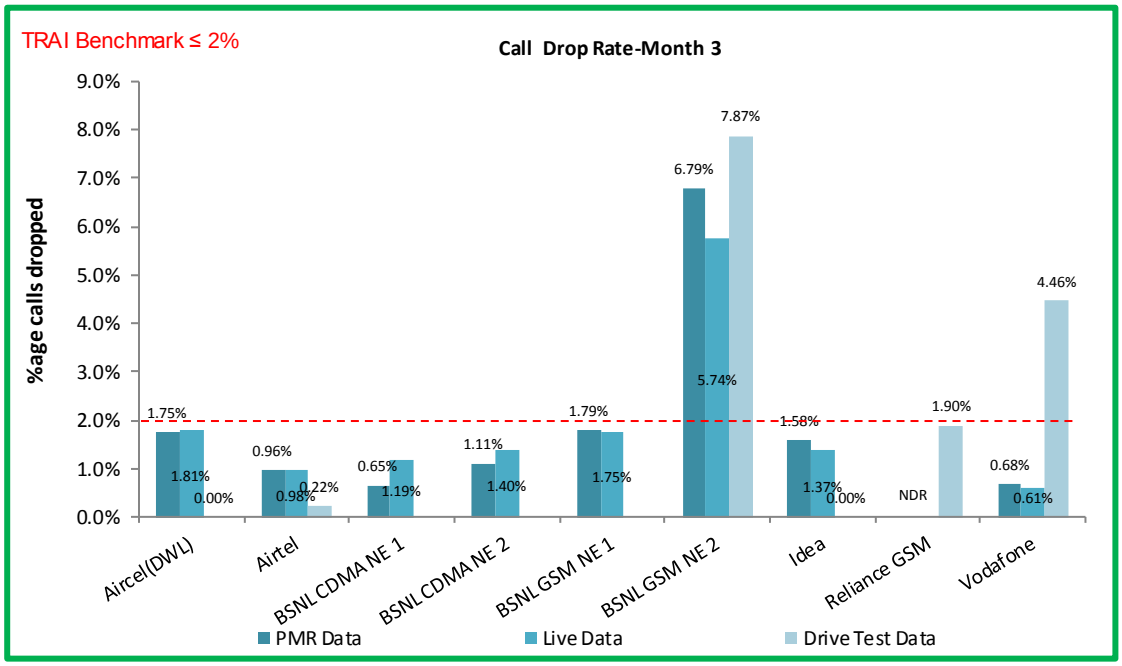
5.5.2.2 KEY FINDINGS – MONTH 2



For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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



For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

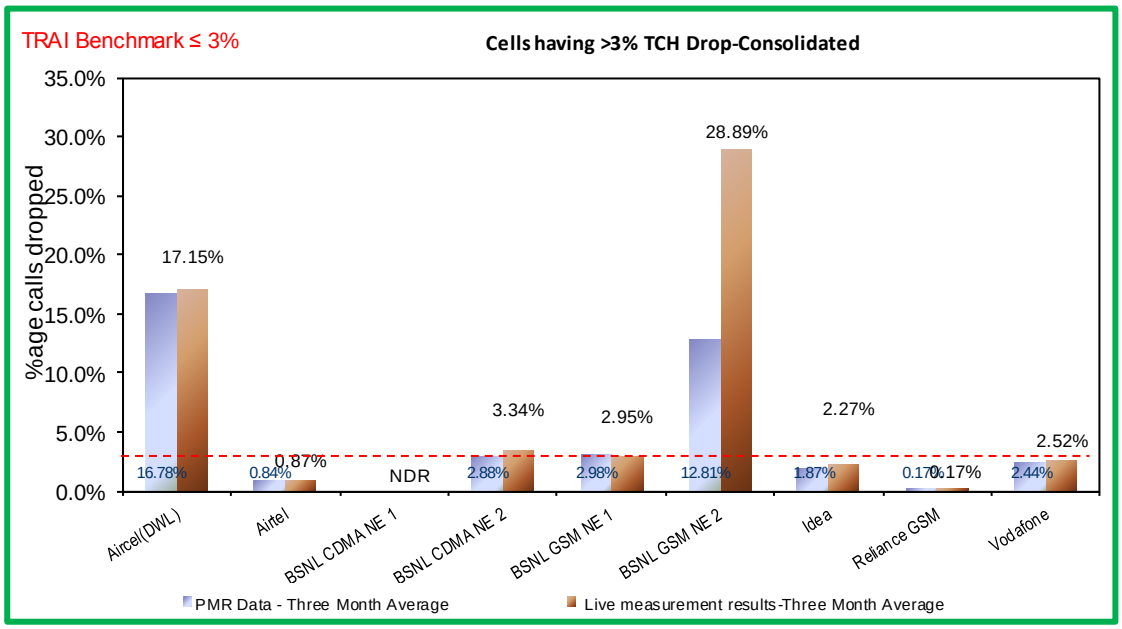
5.6 CELLS HAVING GREATER THAN 3% TCH DROP

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 – CONSOLIDATED

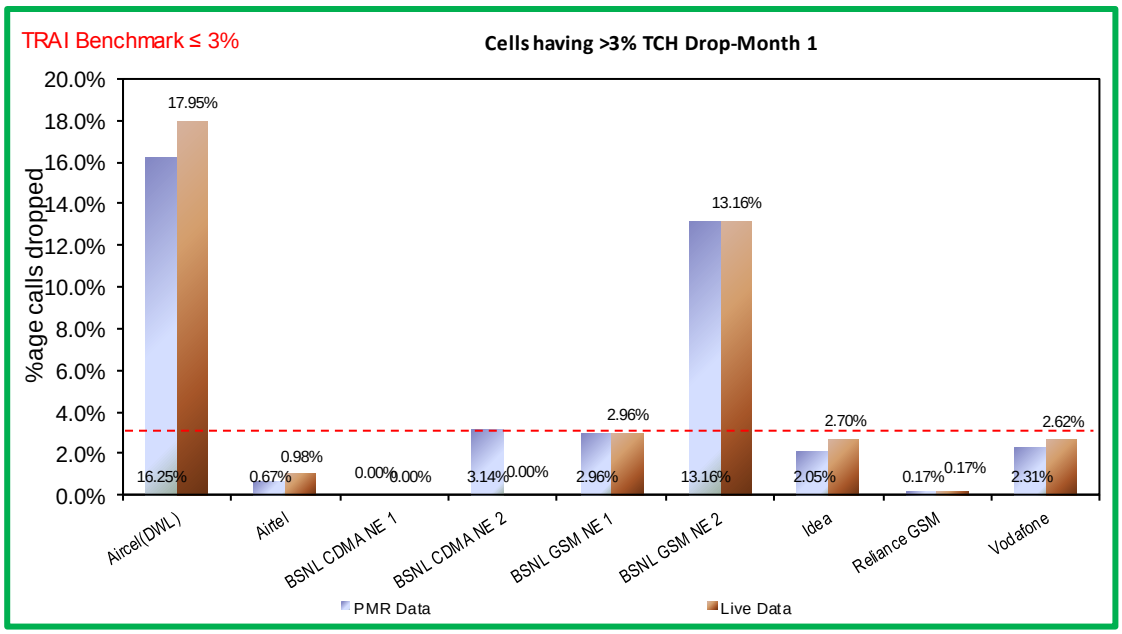


Data Source: Network Operations Center (NOC) of the operators

Aircel and BSNL NE 2 GSM did not meet the TRAI benchmark during audit. Auditors were not able to get the data for 'worst affected cells having more than 3% TCH drop' from BSNL NE 1 CDMA, as operator reported a technical problem in their systems.

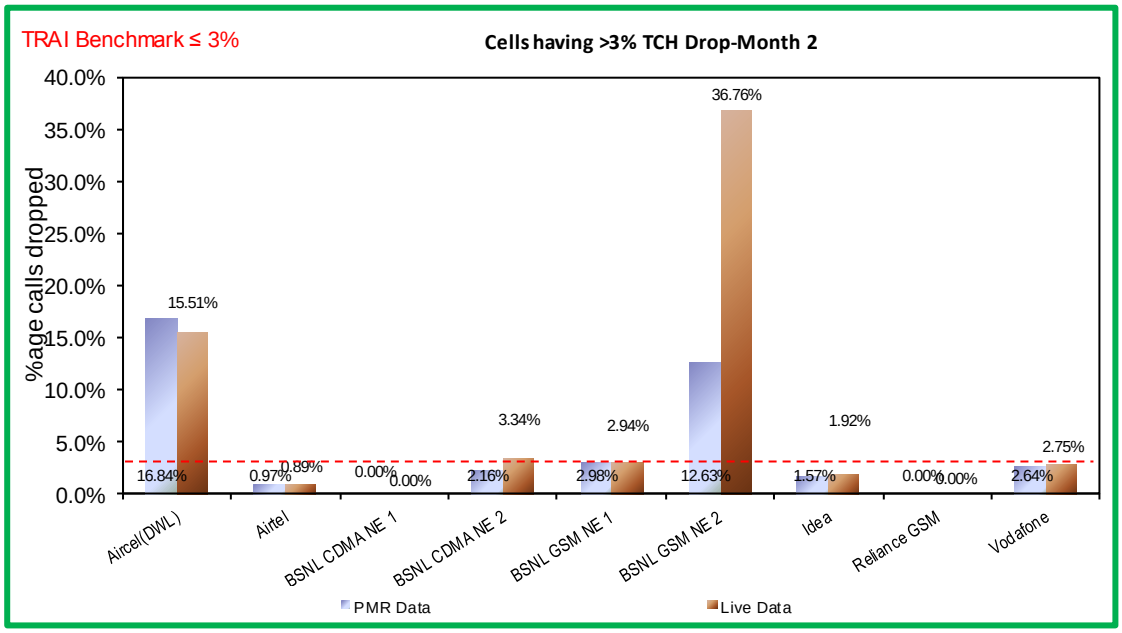
Significant difference was observed between PMR & live measurement data for BSNL NE 2 GSM. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.6.2.1 KEY FINDINGS – MONTH 1



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

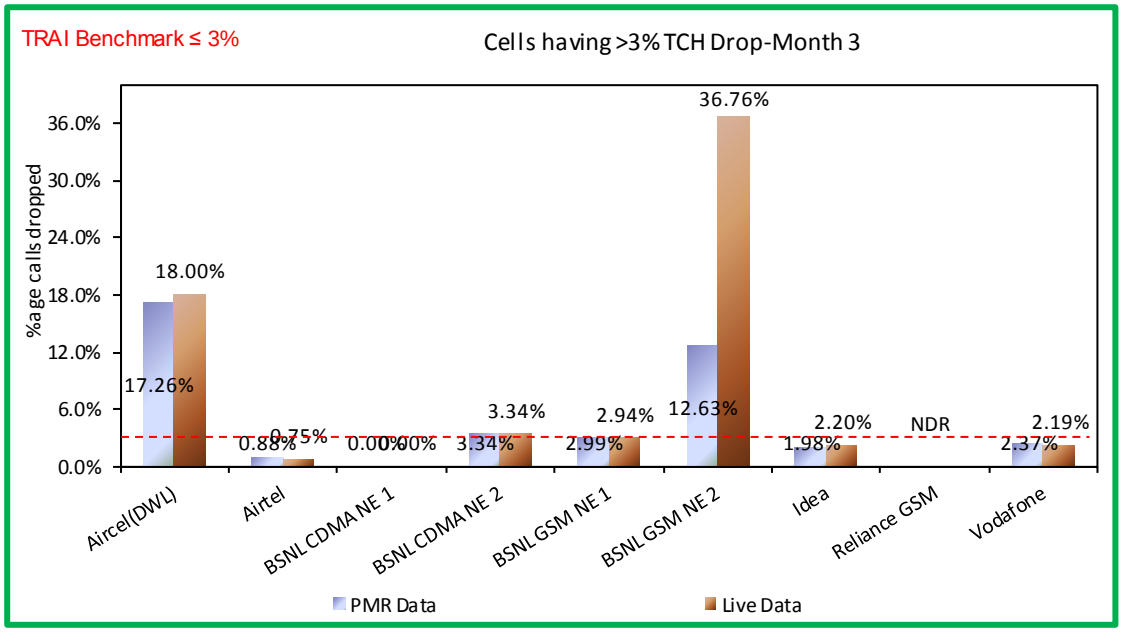
5.6.2.2 KEY FINDINGS – MONTH 2



For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

5.6.2.3 KEY FINDINGS – MONTH 3



For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

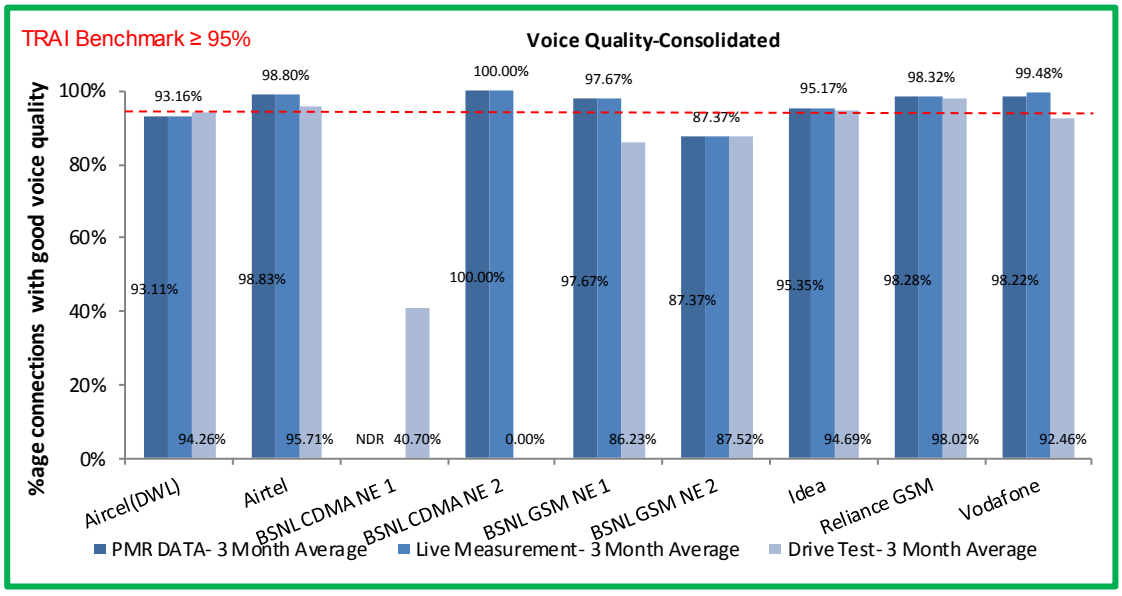
Data Source: Network Operations Center (NOC) of the operators

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.

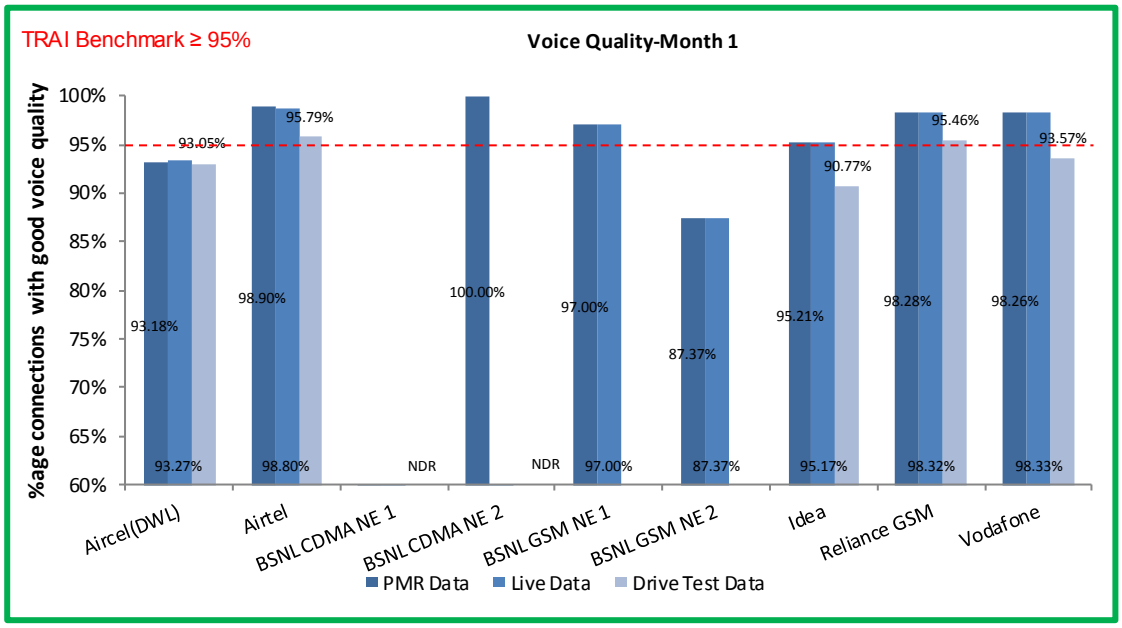
5.7.2 KEY FINDINGS – CONSOLIDATED



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

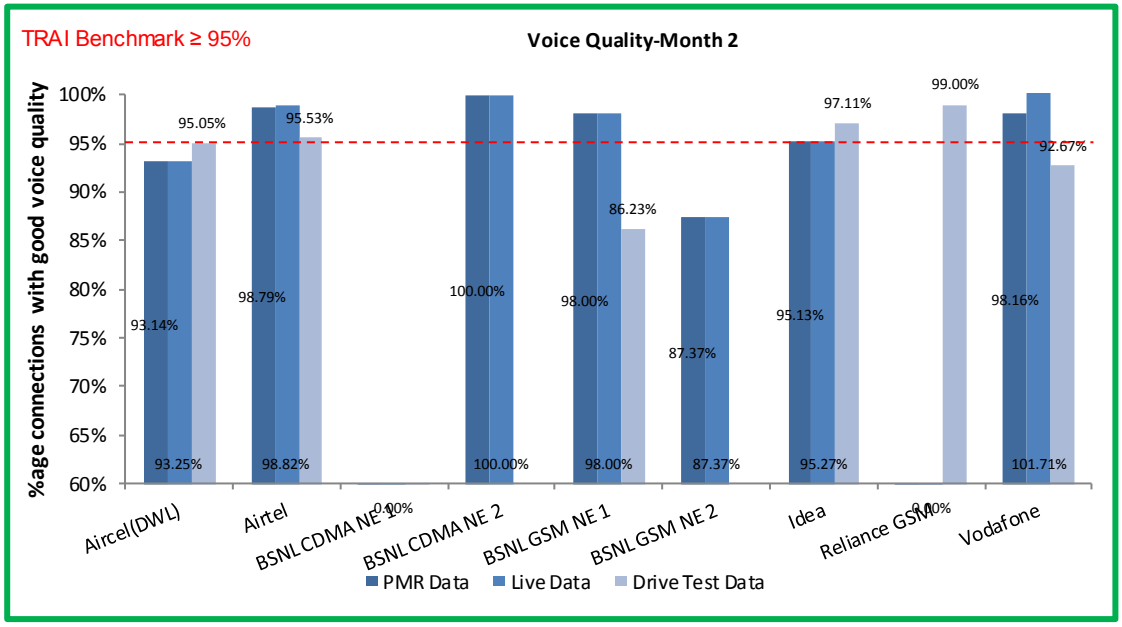
Aircel and BSNL NE 2 GSM failed to meet the benchmark during audit. Auditors were not able to get the data for 'voice quality' from BSNL NE 1 CDMA, as operator reported a technical problem in their systems.

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

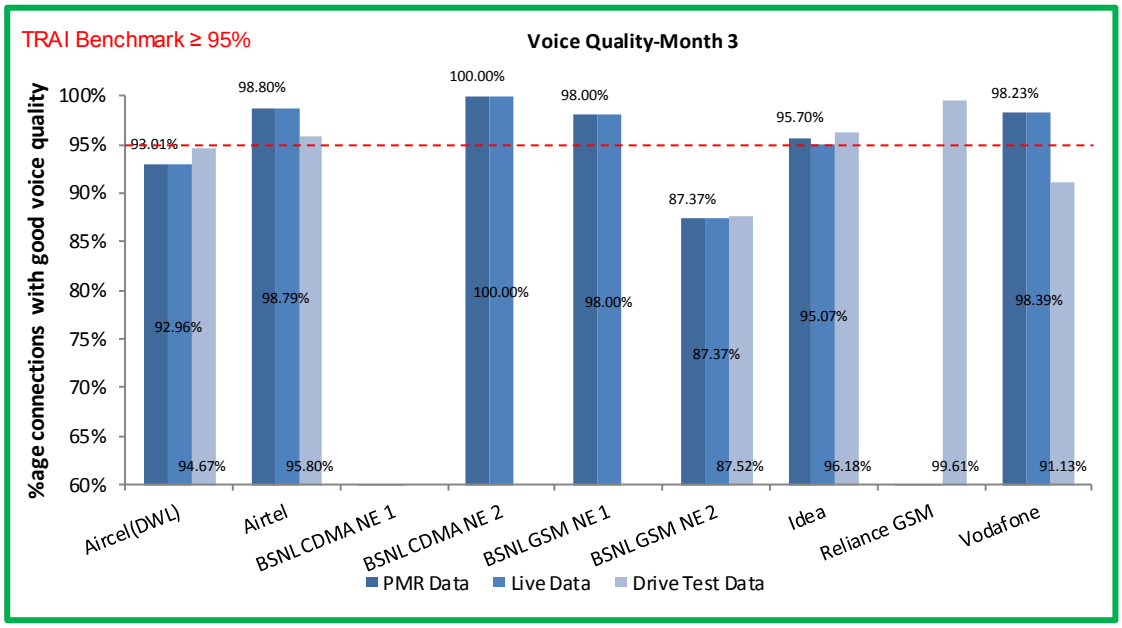
5.7.2.2 KEY FINDINGS – MONTH 2



For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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



For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

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

Auditors were not able to get the data from BSNL NE 1 CDMA as the operator reported a technical problem in their system.

6 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

Data to conduct audit for metering and billing, resolution of billing complaints, response time for customer assistance and customer care was not available at the central billing center/ customer service center of BSNL CDMA. Hence, audit for these parameters has not been conducted for the operator.

6.1 METERING AND BILLING CREDIBILITY

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

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

6.1.1 PARAMETER DESCRIPTION

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

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

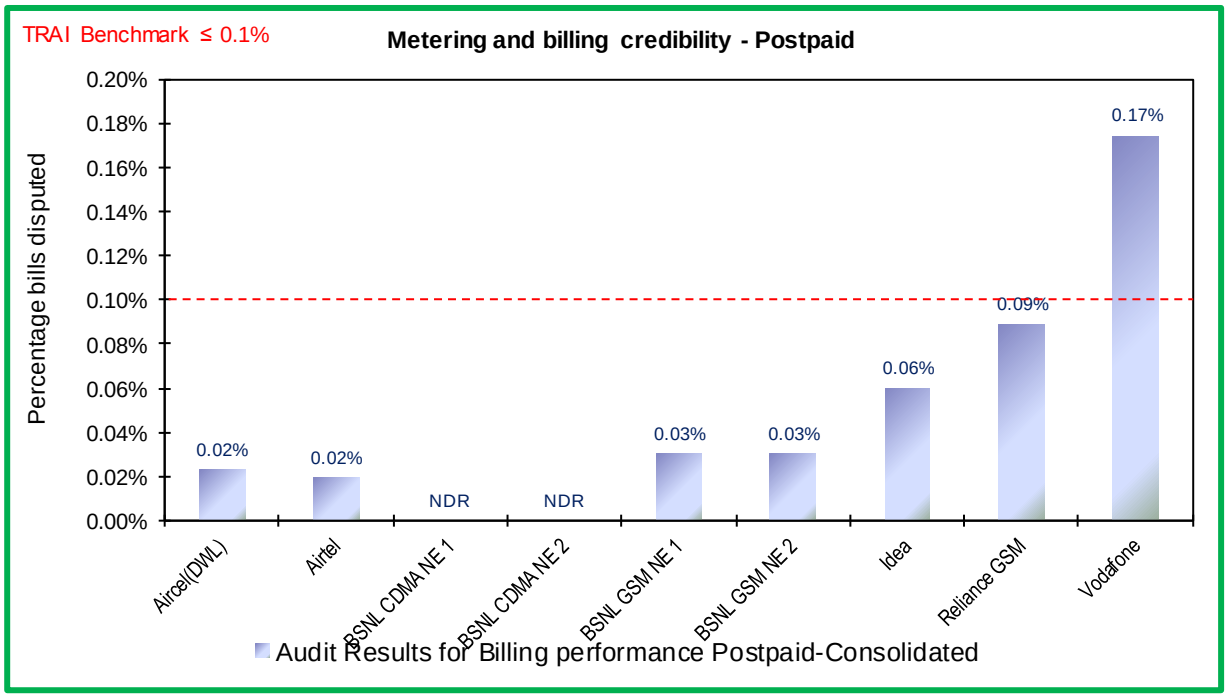
In addition to the above, any billing complaint which leads to billing error, waiver, refund, credit, or any adjustment is also considered as valid billing complaint for calculating the number of disputed bills.

- Computational Methodology:
  - Metering and billing credibility (**Postpaid**) = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100

- *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated
- **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.
- Metering and billing credibility (**Prepaid**) = (Total charging complaints received during the quarter/ Total number of subscribers reported by the operator at the end of the quarter) * 100

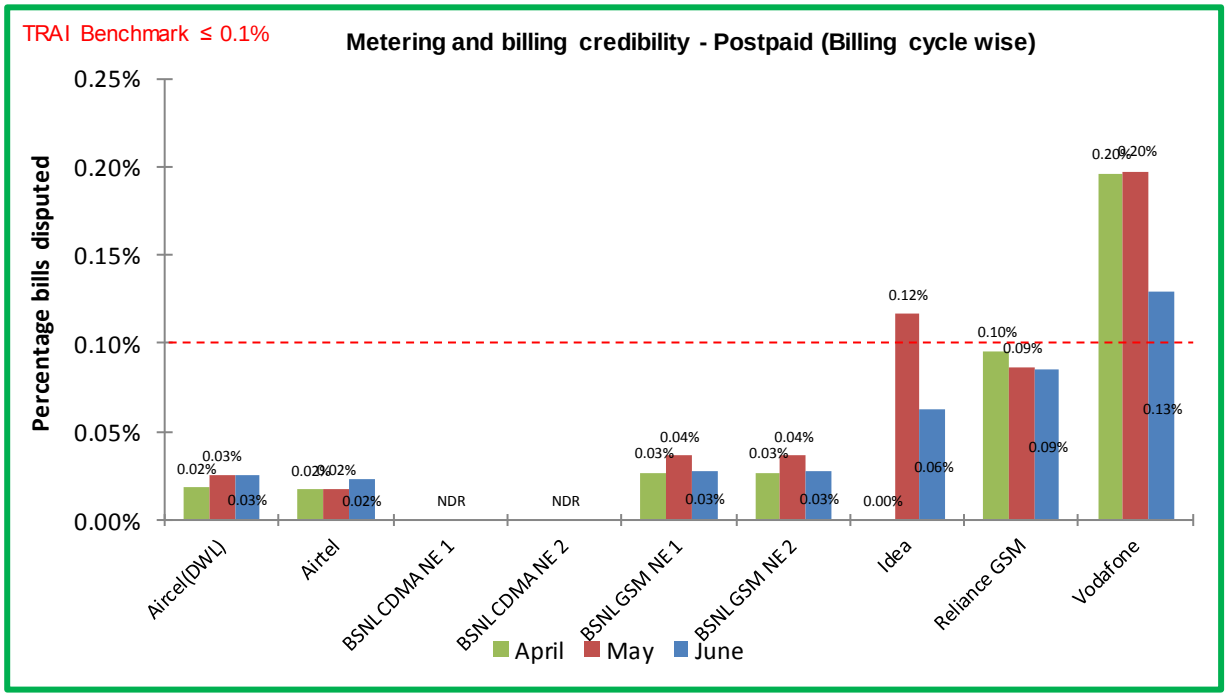
- TRAI Benchmark: <= 0.1%
- Audit Procedure:
  - Audit of billing complaint details for the complaints received during the quarter and used for arriving at the benchmark reported to TRAI would be conducted
    - For Postpaid, the total billing complaints would be audited by averaging over billing cycles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

6.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY – POSTPAID



Data Source: Billing Center of the operators

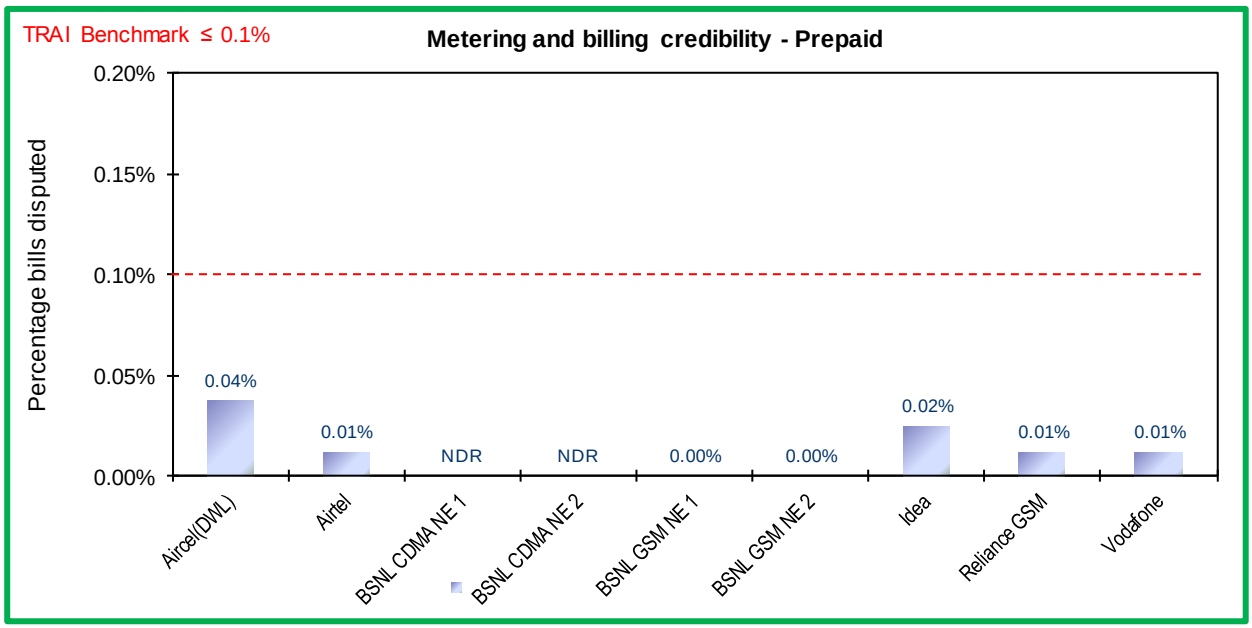
For postpaid services, Vodafone failed to meet the benchmark.



Data Source: Billing Center of the operators

NDR: Data to conduct audit for metering and billing was not available at the central billing center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.

6.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY - PREPAID



Data Source: Billing Center of the operators

For prepaid, all operators met the benchmark.

NDR: Data to conduct audit for metering and billing was not available at the central billing center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.

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:

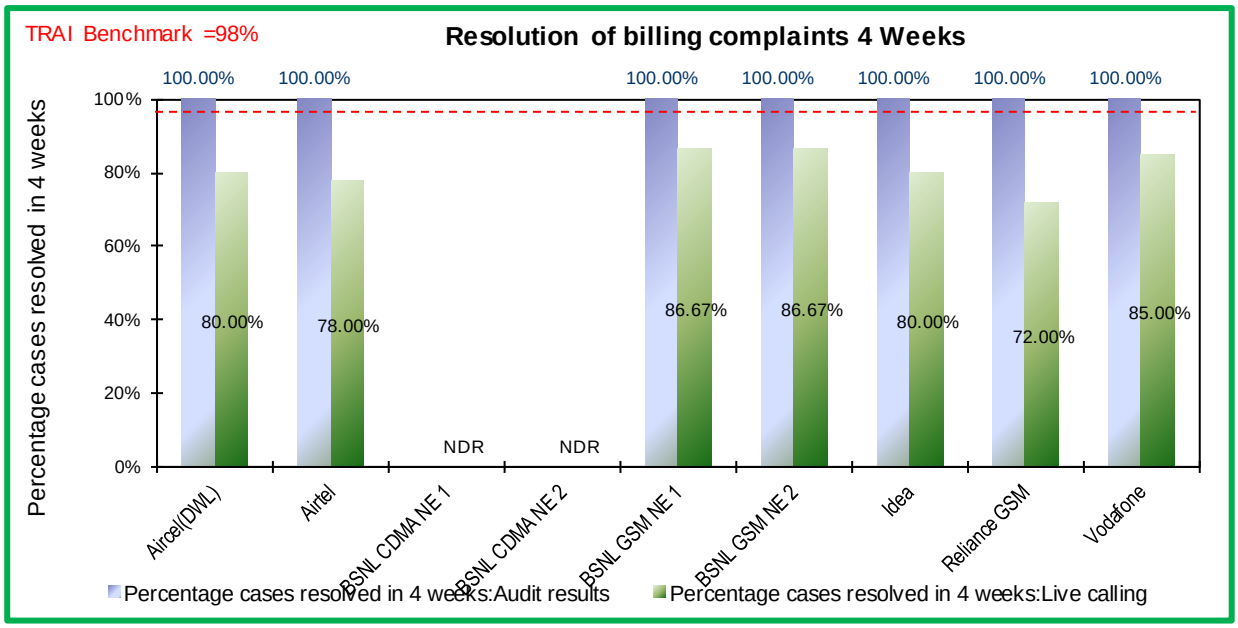
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

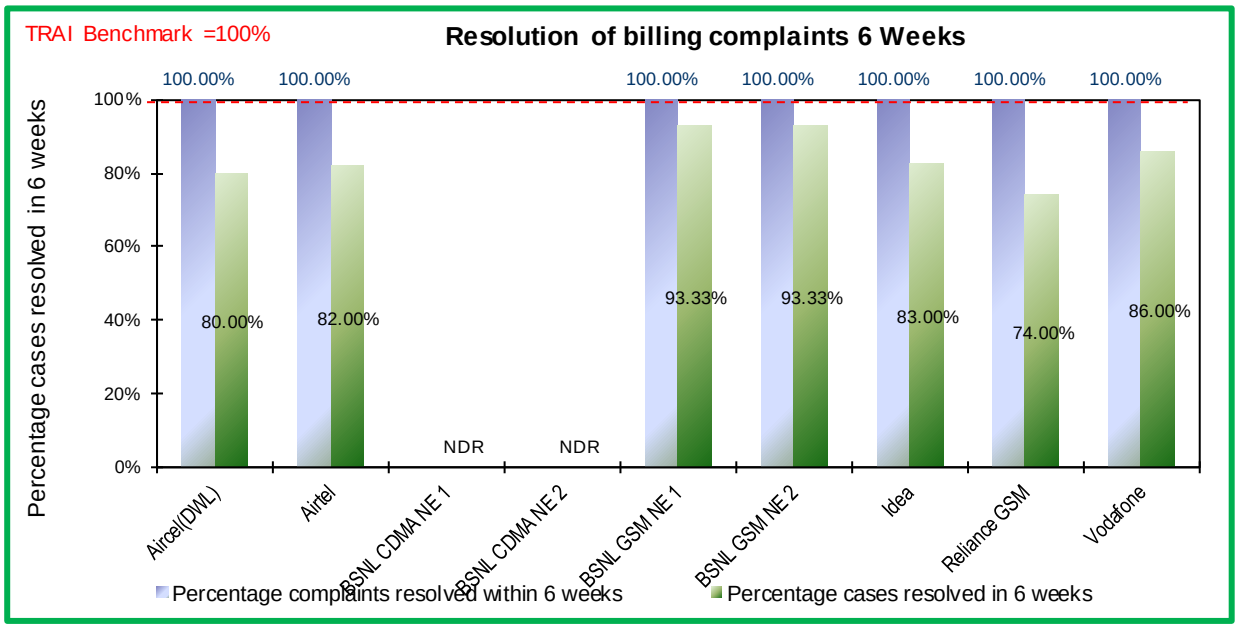
- **Billing complaints here shall include only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.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

The audit results showed that all the operators met the TRAI benchmark for resolution of complaints within 4 weeks as well 6 weeks. However, the performance of all operators during live calling was below the benchmark level.

NDR: Data to conduct audit for resolution of billing complaints was not available at the central billing center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.

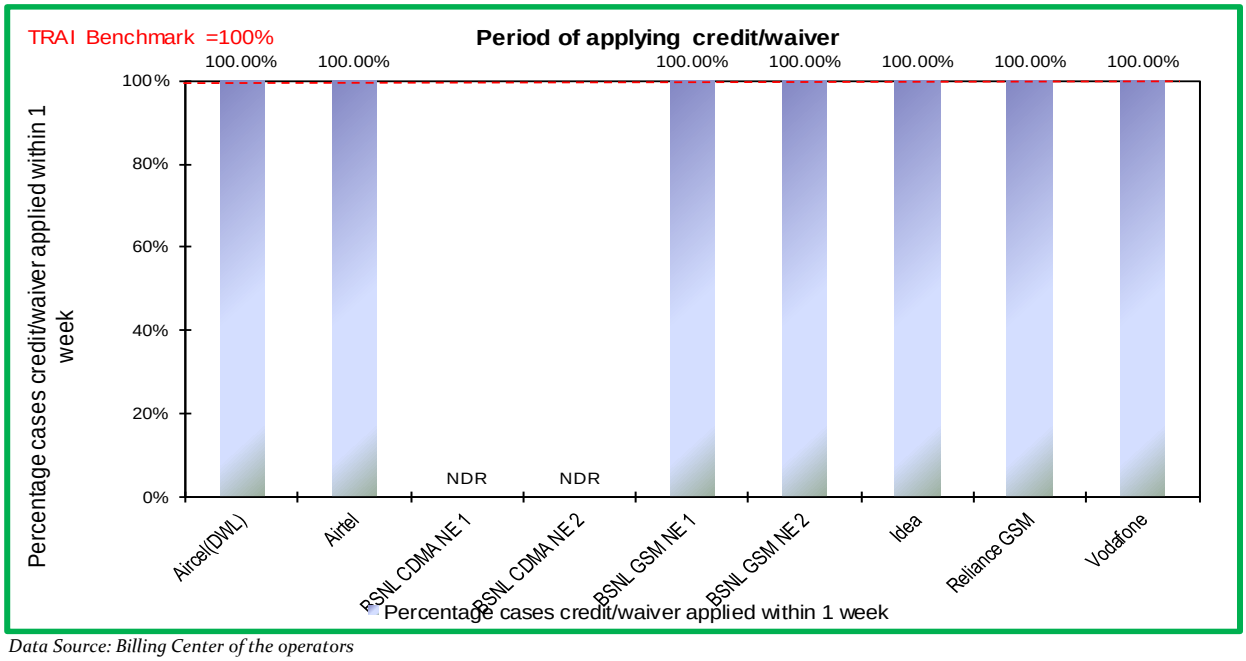
It is to be noted that Aircel, Airtel, Idea and Vodafone have reported high ratio of invalid complaints. Auditors recommend further investigation of the issue independently by TRAI. Further details can be found in annexure (section 8.7).

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 operators met the benchmark for the parameter.

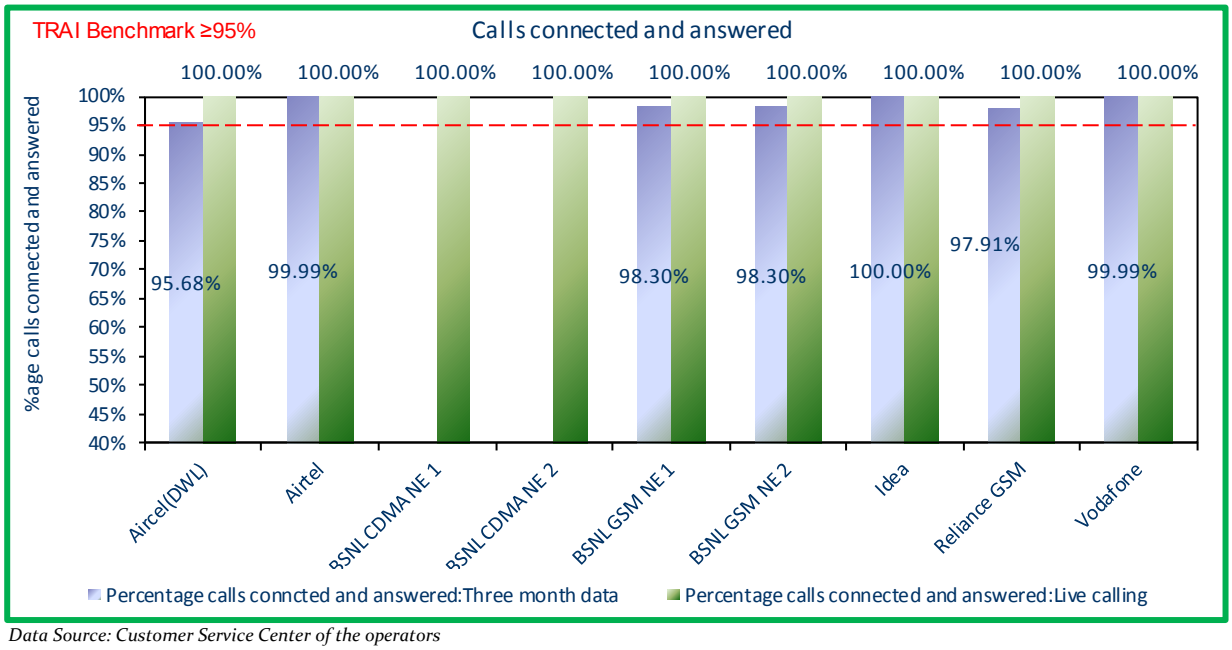
NDR: Data to conduct audit for customer care was not available at the customer service center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.

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: Customer Service Center of the operators

As per PMR data, all operators met the TRAI benchmark.

NDR: Data to conduct audit for customer care was not available at the customer service center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.

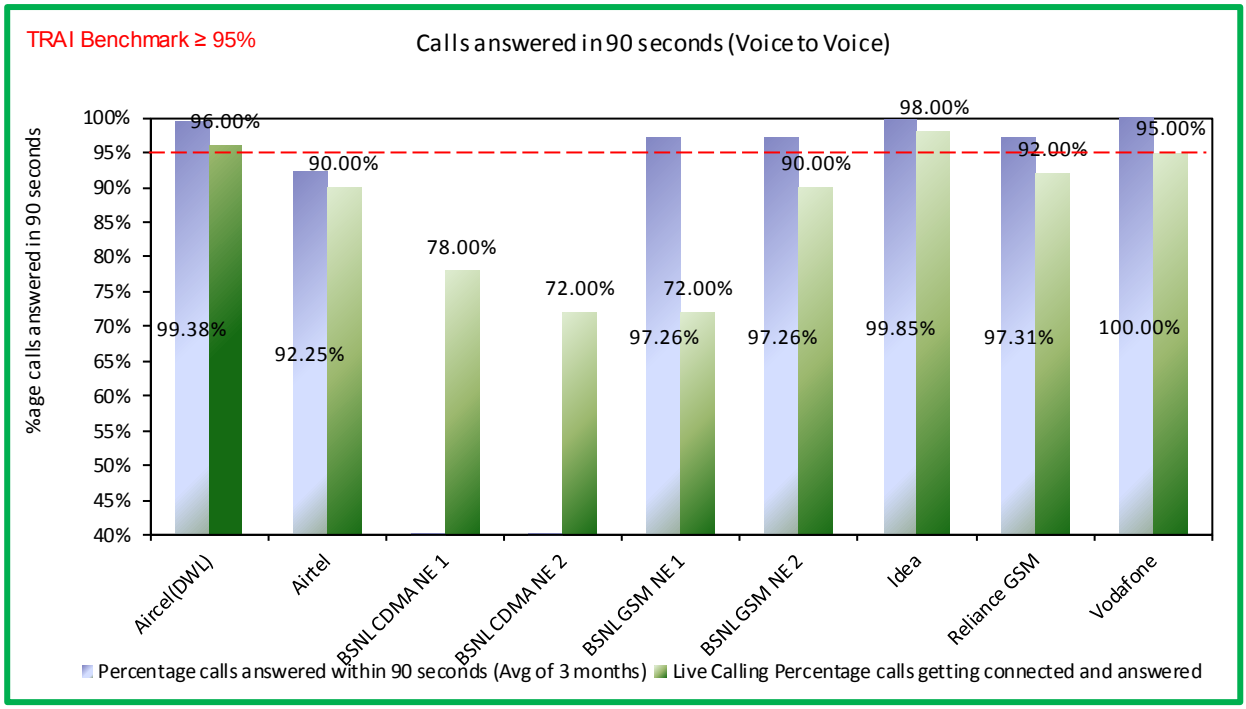
6.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

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

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

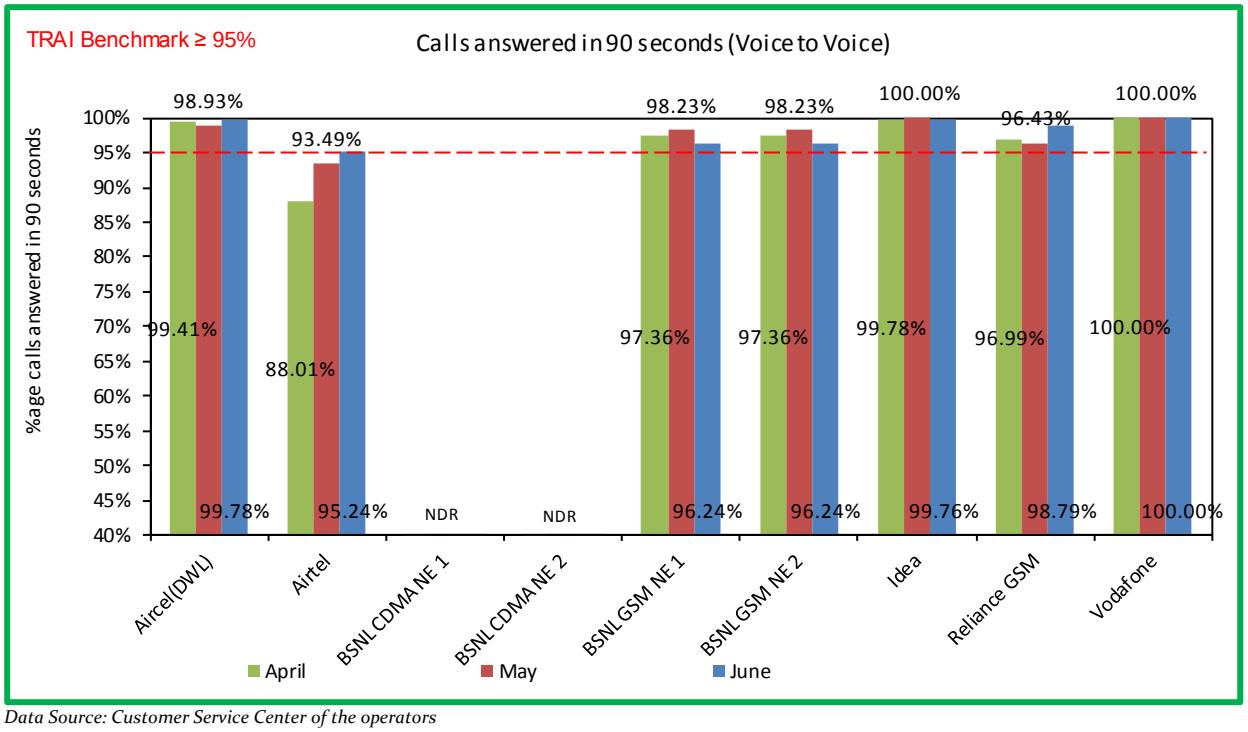
6.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

Airtel failed to meet the benchmark for the parameter.

NDR: Data to conduct audit for customer care was not available at the customer service center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.



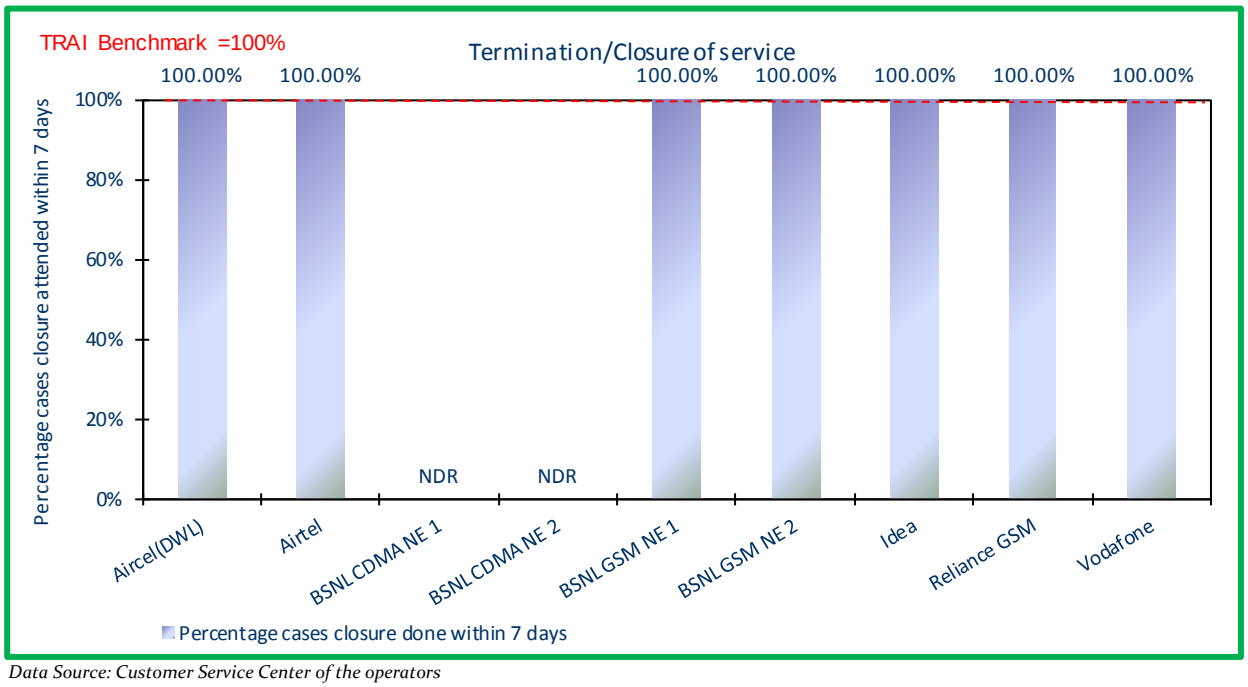
Data Source: Customer Service Center of the operators

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 TRAI specified benchmark for the parameter.

NDR: Data to conduct audit for customer care was not available at the customer service center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.

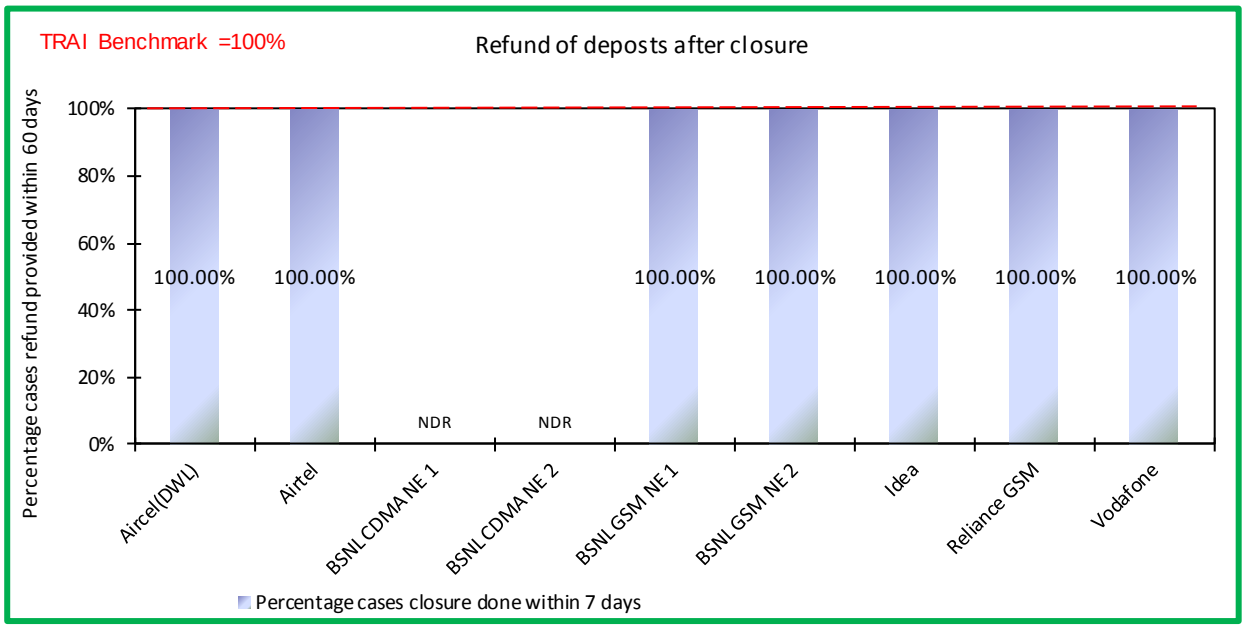
6.7 REFUND OF DEPOSITS AFTER CLOSURE

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: Customer Service Center of the operators

All the operators met the TRAI benchmark.

NDR: Data to conduct audit for customer care was not available at the customer service center of BSNL CDMA. Hence, audit for the parameter has not been conducted for the operator.

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

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

Name of Operator
Aircel(DWL)
Airtel
BSNL CDMA NE 1
BSNL CDMA NE 2
BSNL GSM NE 1
BSNL GSM NE 2
Idea
Reliance GSM
Vodafone

Note: - It is important to highlight that in case we are covering BSNL NE 1 GSM area then BSNL NE 2 GSM will be Not Applicable for that month hence values will be 'NA'.

7.1.1 APRIL – NAGALAND

Month	Name of SSA Covered	Date of Drive Test
April	NAGALAND	28/04/15 to 30/04/15

7.1.1.1 ROUTE DETAILS – NAGALAND SSA

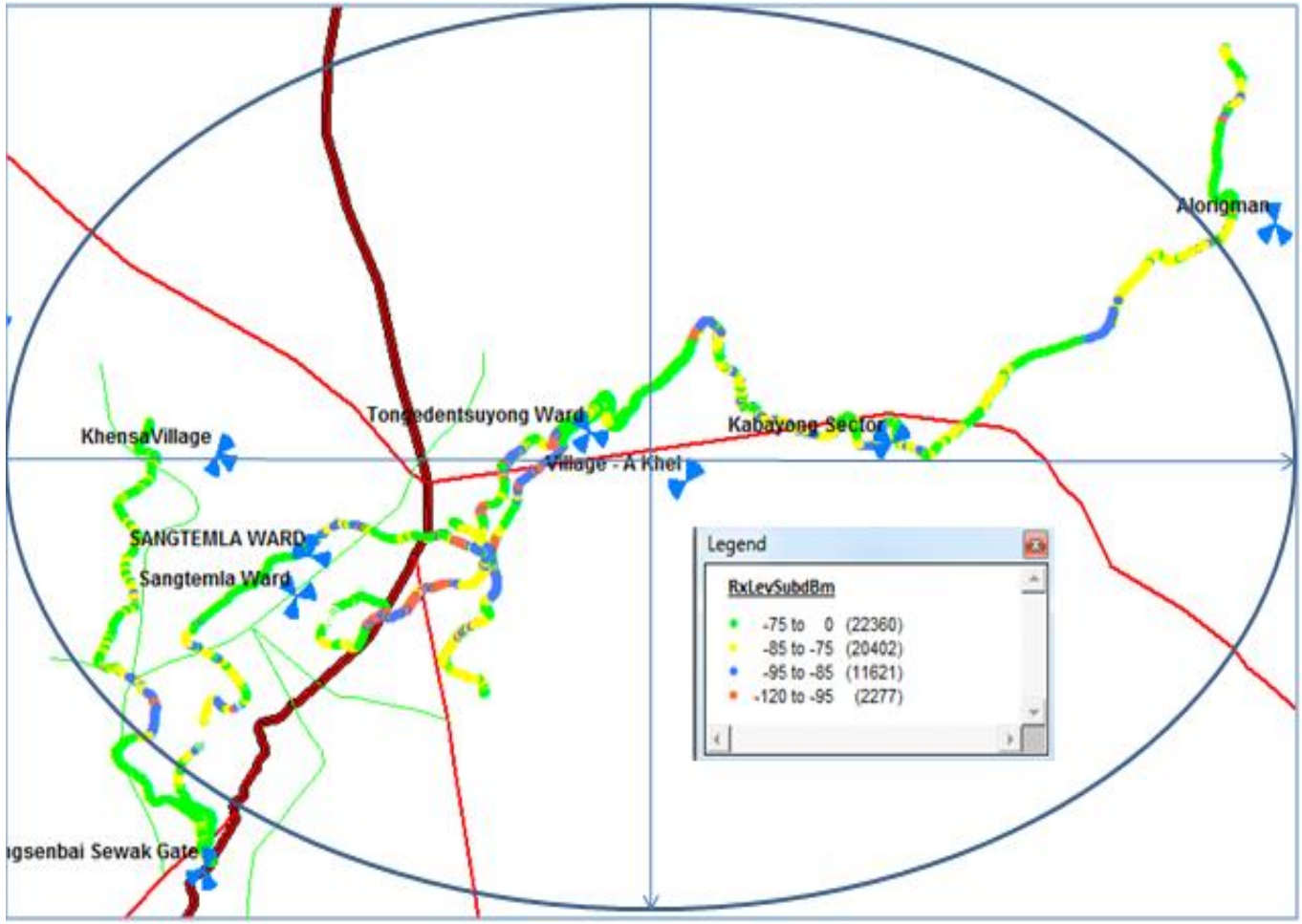
Category	Type of location	North East		
		NAGALAND		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Sangki to Wokha via mokokchung.(108 KM) and Mokokchung Town Drive	Wokha to Mao.(108 KM) and kohima Town Drive	Mao to Dimapur,(104 KM) and Dimapur Town Drive
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

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

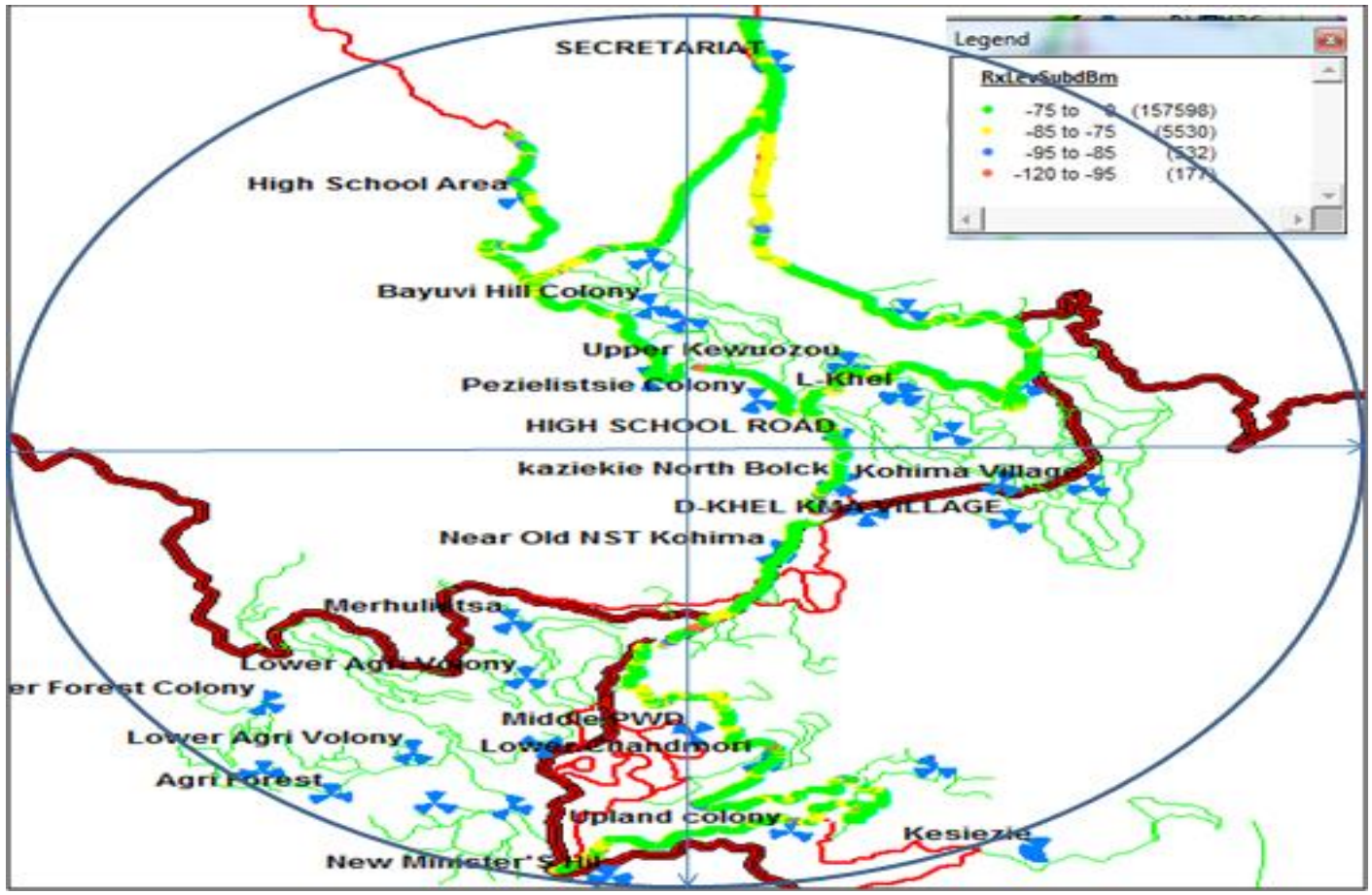
7.1.1.2 KILOMETERS TRAVELLED– NAGALAND SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
NAGALAND	108	108	104	320

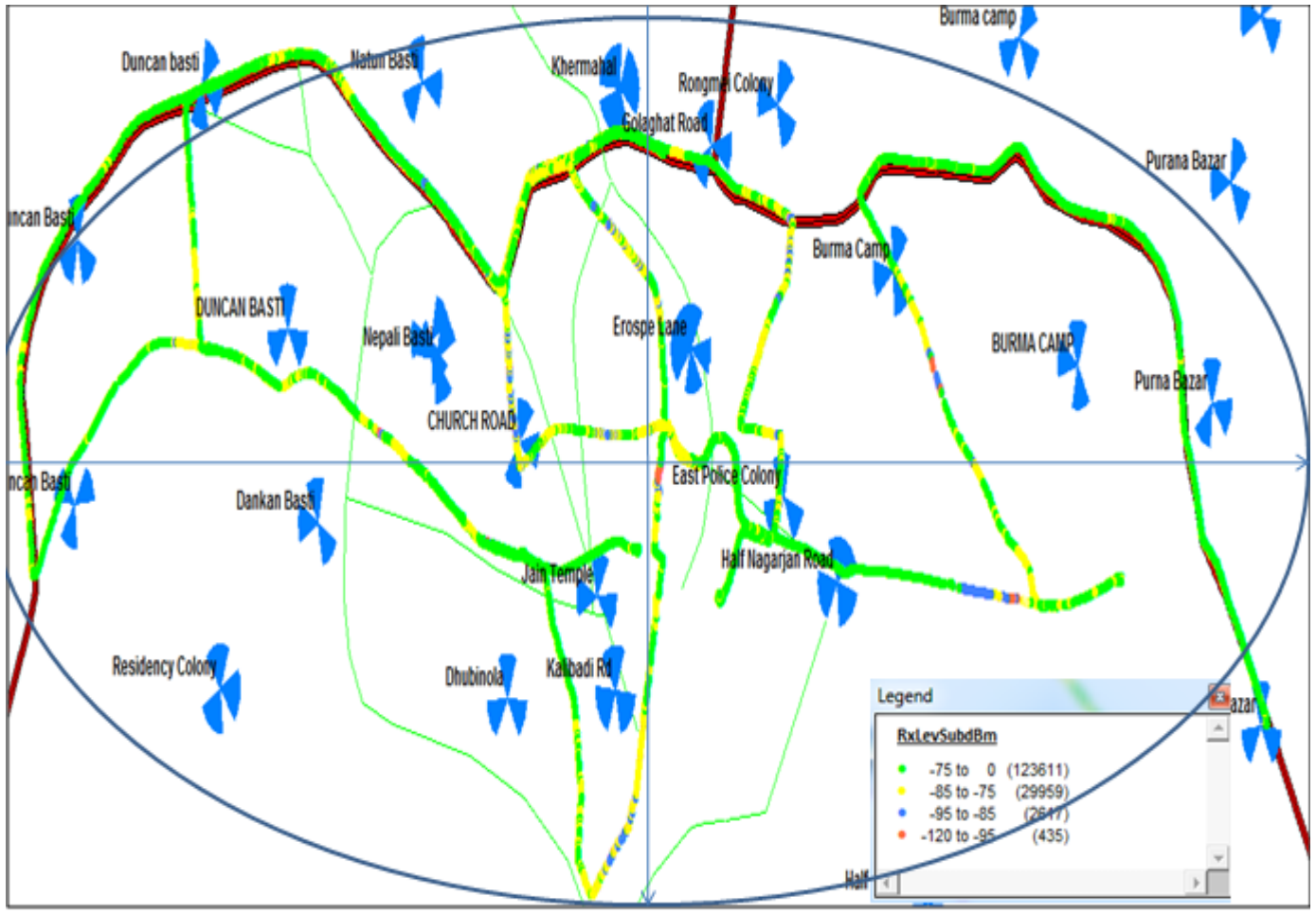
7.1.1.3 ROUTE MAP NAGALAND DAY 1



7.1.1.4 ROUTE MAP NAGALAND DAY 2



7.1.1.5 ROUTE MAP NAGALAND DAY 3



7.1.1.6 DRIVE TEST RESULTS – NAGALAND SSA

	B'mark	Aircel(DWL)		Airtel		BSNL CDMA NE 1		BSNL CDMA NE 2		BSNL GSM NE 1		BSNL GSM NE 2		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		98.64%	65.78%	75.92%	66.39%	NA		NDR		NA		NDR		52.00%	43.83%	62.22%	53.51%	59.01%	38.47%
0 to -85 dBm		99.92%	85.10%	99.00%	84.39%									79.57%	68.71%	80.01%	77.48%	97.27%	71.13%
0 to -95 dBm		100.00%	96.72%	99.98%	96.86%									99.09%	89.10%	98.47%	93.53%	99.85%	92.10%
Voice quality	≥ 95%	97.86%	93.02%	97.87%	95.53%									93.45%	89.43%	95.74%	95.84%	99.00%	93.31%
CSSR	≥ 95%	100.00%	97.12%	100.00%	99.51%									100.00%	90.83%	98.96%	90.02%	100.00%	95.51%
%age Blocked calls		0.00%	2.88%	0.00%	0.66%									0.00%	9.17%	1.04%	9.98%	0.00%	4.49%
Call drop rate	≤ 2%	0.00%	0.41%	0.00%	0.00%									2.22%	4.49%	2.22%	9.90%	0.00%	4.49%
Hands off success rate		100.00%	98.52%	100.00%	100.00%									96.97%	96.74%	95.83%	93.11%	100.00%	98.12%

Data Source: Drive test reports submitted by operators to auditors

Note: Drive Test conducted in NE 2 region; hence BSNL NE 1 region is not applicable.

NDR: BSNL NE 2 CDMA and BSNL NE 2 GSM did not participate in the drive test.

Voice Quality:

Idea failed to meet the benchmark of 95% on voice quality in outdoor as well as indoor areas. Aircel and Vodafone did not meet the benchmark of 95% on voice quality in outdoor areas.

CSSR:

Idea and Reliance GSM did not meet the benchmark for CSSR in outdoor areas.

Call drop rate:

Idea and Reliance GSM failed to meet the benchmark for call drop rate in outdoor as well as indoor areas. Vodafone did not meet the benchmark for the criteria in outdoor areas.

7.1.2 MAY – TRIPURA

Month	Name of SSA Covered	Date of Drive Test
May	TRIPURA	11/05/15 to 13/05/15

7.1.2.1 ROUTE DETAILS – TRIPURA SSA

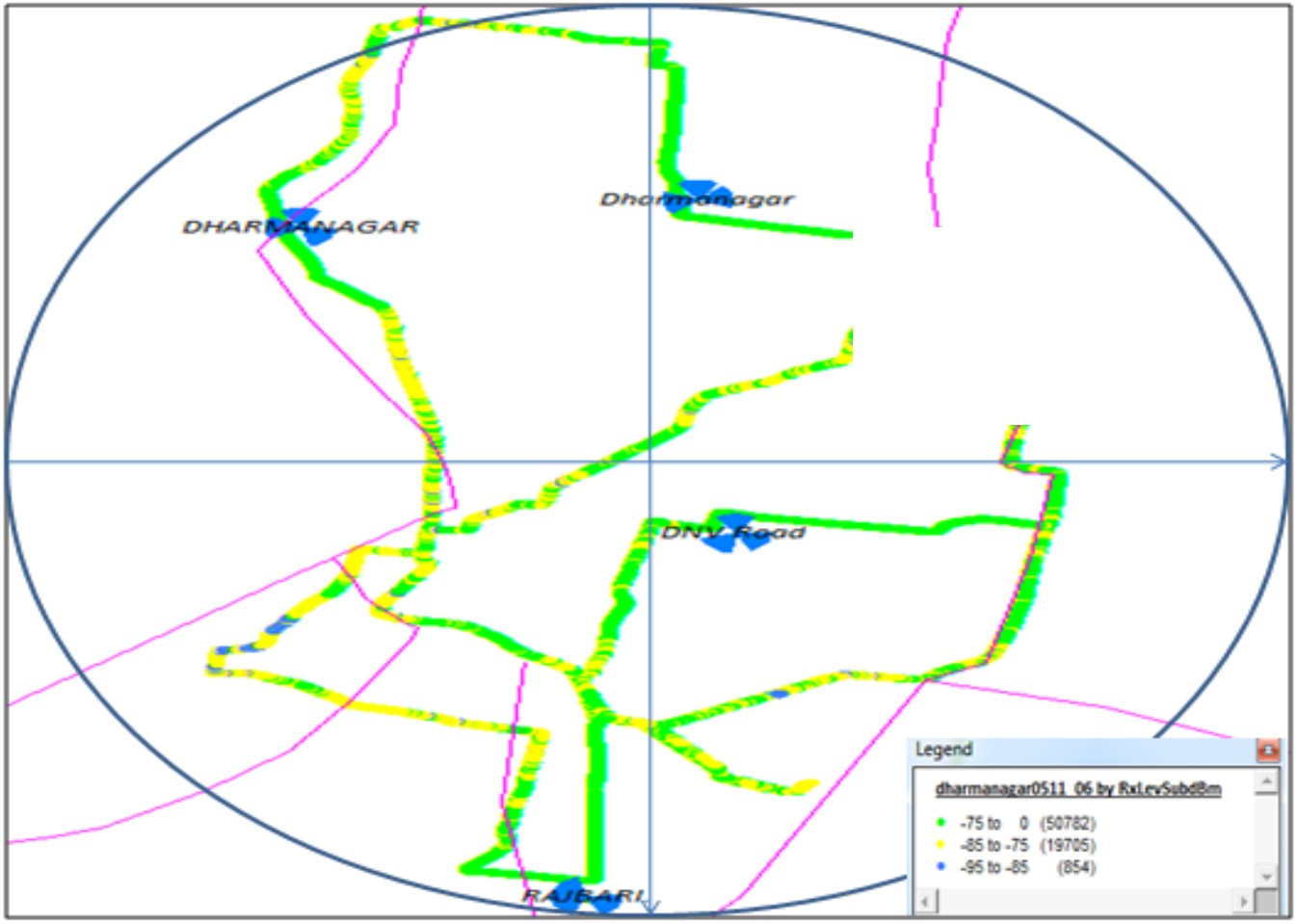
Category	Type of location	North East – TRIPURA		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Dharma Nagar to Kumarghat Major Rd.(90 KM) - Kumarghat to Teliamura High way.(90 KM) and DHARMA NAGAR Town Drive - TOTAL- 90+90=180 KM	Teliamura to Agartala High way.(43 KM) - Agartala to Melaghar High way.(48 KM) - Melaghar to Udaipur Major Rd.(26 KM) and AGARTALA Town Drive - TOTAL- 43+48+26=117 KM	Udaipur to Belonia High Way,(41 KM) - Belonia to Jholaibari Major Rd,(41 KM) - Jholaibari to Bishalgarh High Way.(80 KM) and BALONIA Town Drive - TOTAL- 41+41+80=162KM
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

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

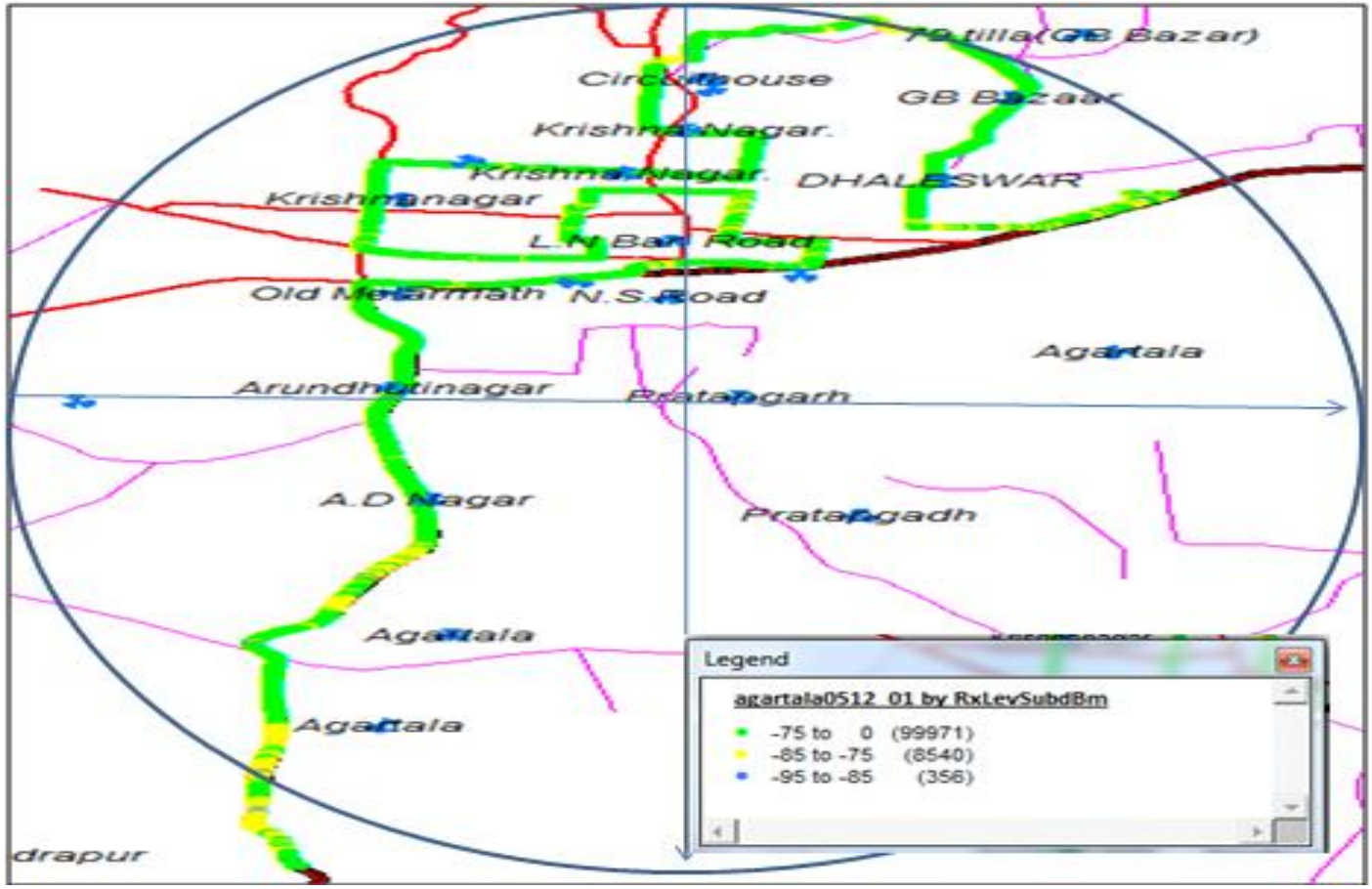
7.1.2.2 KILOMETERS TRAVELLED– TRIPURA SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
TRIPURA	180	117	162	459

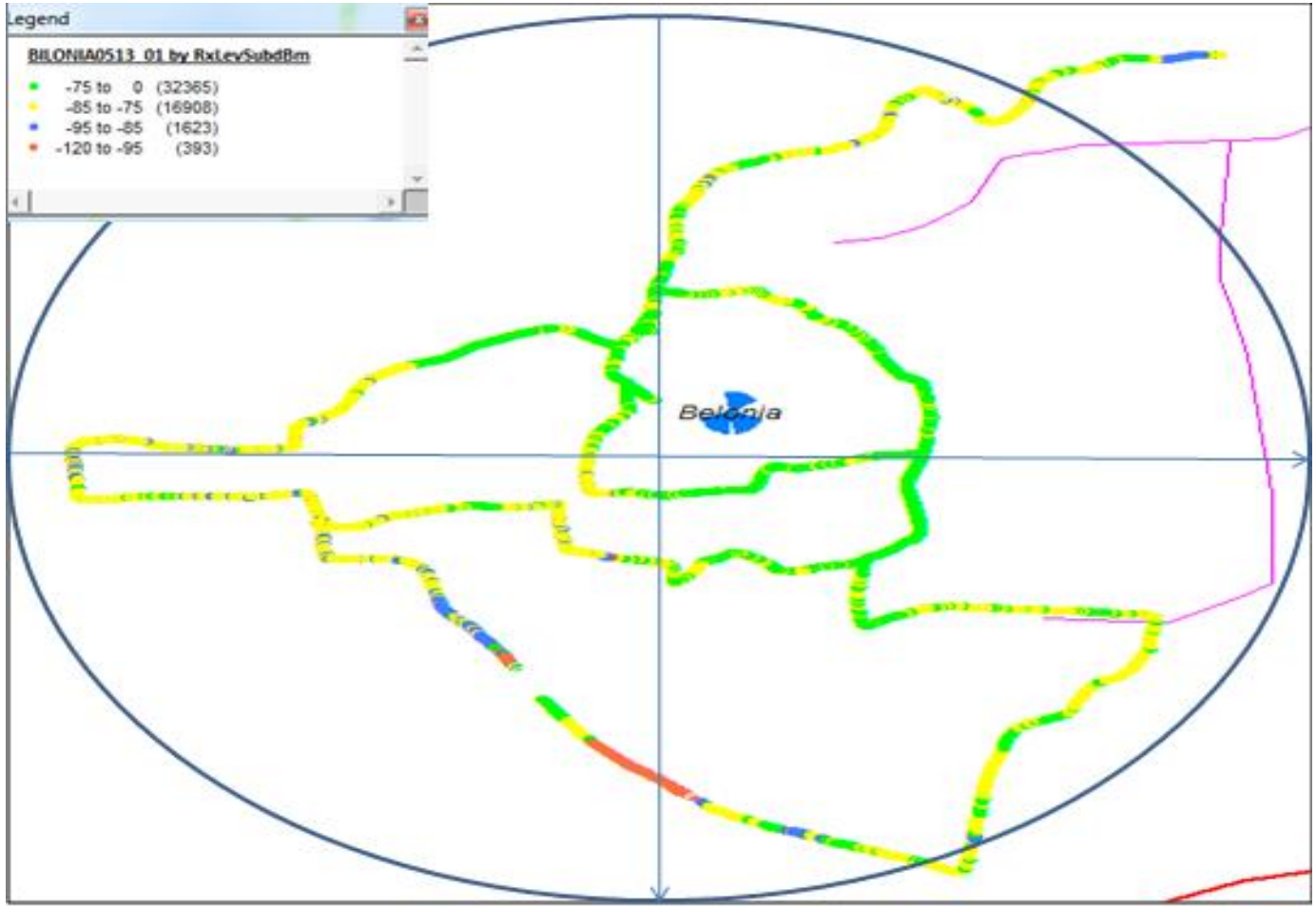
7.1.2.3 ROUTE MAP TRIPURA DAY 1



7.1.2.4 ROUTE MAP TRIPURA DAY 2



7.1.2.5 ROUTE MAP TRIPURA DAY 3



7.1.2.6 DRIVE TEST RESULTS – TRIPURA SSA

	B'mark	Aircel(DWL)		Airtel		BSNL CDMA NE 1		BSNL CDMA NE 2		BSNL GSM NE 1		BSNL GSM NE 2		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		30.41%	57.48%	79.43%	61.55%	63.55%	15.20%	NA		96.60%	78.56%	NA		92.28%	37.25%	49.90%	42.34%	45.90%	39.18%
0 to -85 dBm		98.83%	87.77%	99.21%	87.17%	97.35%	35.45%			99.36%	94.11%			99.50%	64.09%	96.18%	69.91%	92.22%	71.36%
0 to -95 dBm		100.00%	100.00%	99.99%	97.90%	100.00%	100.00%			99.64%	100.00%			99.98%	88.13%	99.99%	88.89%	99.91%	89.69%
Voice quality	≥ 95%	98.31%	94.70%	98.82%	94.85%	57.25%	36.43%			96.82%	85.47%			99.49%	97.14%	99.69%	98.59%	98.92%	92.50%
CSSR	≥ 95%	100.00%	100.00%	100.00%	99.84%	93.61%	85.94%			98.48%	96.01%			100.00%	99.68%	98.41%	98.39%	100.00%	96.46%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	2.03%			1.52%	3.98%			0.00%	0.32%	1.59%	1.61%	0.00%	3.01%
Call drop rate	≤ 2%	0.00%	3.70%	0.00%	0.16%	0.00%	7.27%			0.00%	2.07%			0.00%	0.22%	0.00%	1.45%	0.00%	1.38%
Hands off success rate		100.00%	99.01%	100.00%	88.70%	100.00%	97.43%			100.00%	99.40%			100.00%	91.70%	100.00%	93.88%	100.00%	98.71%

Data Source: Drive test reports submitted by operators to auditors

Note: Drive Test conducted in NE 1 region; hence BSNL NE 2 region is not applicable.

Voice Quality:

BSNL NE 1 CDMA failed to meet the benchmark of 95% on voice quality in outdoor as well as indoor areas. Aircel, Airtel, BSNL NE 1 GSM and Vodafone did not meet the benchmark in outdoor areas.

CSSR:

BSNL NE 1 CDMA failed to meet the benchmark for CSSR in outdoor as well as indoor areas.

Call drop rate:

Aircel, BSNL NE 1 CDMA and BSNL NE 1 GSM failed to meet the benchmark for call drop rate in outdoor areas.

7.1.3 JUNE – ARUNACHAL PRADESH

Month	Name of SSA Covered	Date of Drive Test
June	ARUNACHAL PRADESH	24/06/15 to 26/06/15

7.1.3.1 ROUTE DETAILS – ARUNACHAL PRADESH SSA

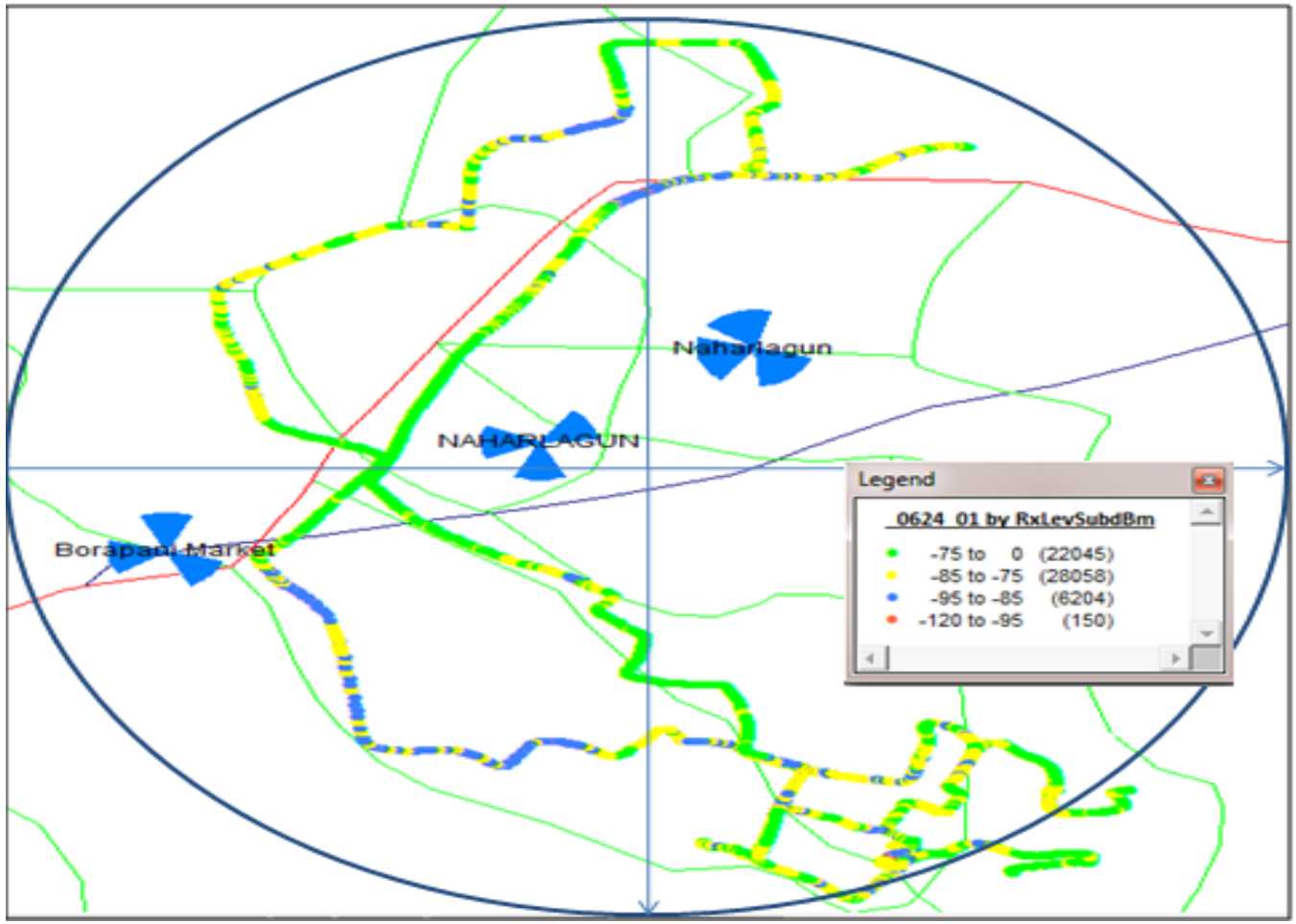
Category	Type of location	North East		
		ARUNACHAL PRADESH		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Bandardewa to Ziro High Way Drive.(122 KM) and NAHARLAGOON TOWN Drive	Ziro to Daporijo High way Drive.(158 KM)and ZIROTOWN Drive	Daporijo to Garu High Way Drive,(168 KM) and DAPORIJO TOWN Drive
	Highways			
	With in the City			
Indoor	Shopping complex			
	Office complex			

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

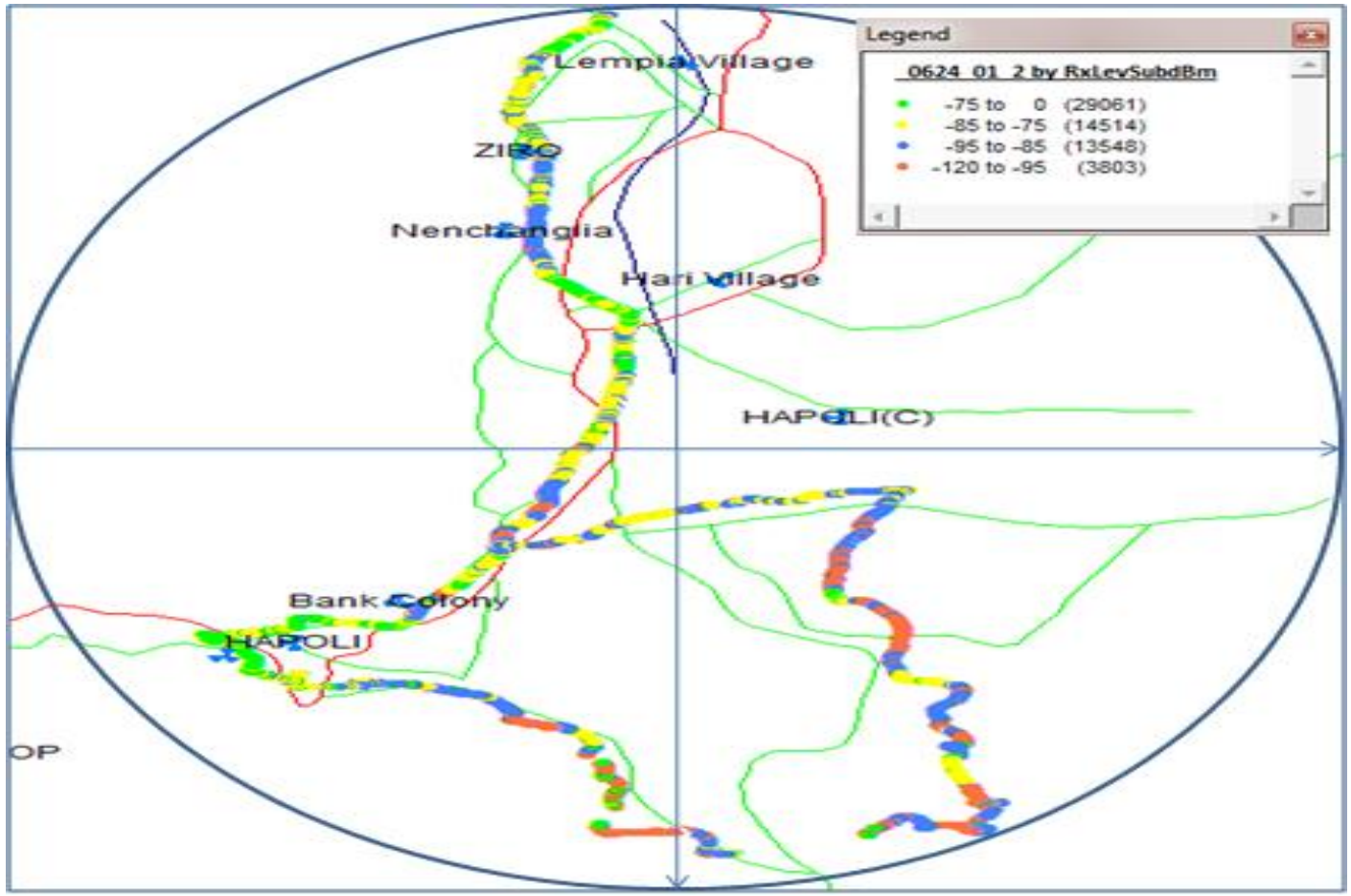
7.1.3.2 KILOMETERS TRAVELLED– ARUNACHAL PRADESH SSA

Drive Test - Kilometers Travelled	Day 1	Day 2	Day 3	Total
ARUNACHAL PRADESH	122	158	168	448

7.1.3.3 ROUTE MAP ARUNACHAL PRADESH DAY 1



7.1.3.4 ROUTE MAP ARUNACHAL PRADESH DAY 2



7.1.3.5 DRIVE TEST RESULTS – ARUNACHAL PRADESH SSA

	B'mark	Aircel(DWL)		Airtel		BSNL CDMA NE 1		BSNL CDMA NE 2		BSNL GSM NE 1		BSNL GSM NE 2		Idea		Reliance GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		33.04%	36.80%	91.93%	53.20%	NA		NDR		NA		93.63%	42.38%	30.54%	39.51%	9.90%	71.06%	34.21%	29.52%
0 to -85 dBm		73.69%	70.88%	99.31%	80.59%							99.97%	66.77%	98.60%	64.64%	23.79%	81.61%	92.11%	60.56%
0 to -95 dBm		100.00%	100.00%	100.00%	95.37%							99.99%	88.63%	100.00%	89.52%	61.14%	91.96%	99.82%	83.64%
Voice quality	≥ 95%	98.12%	93.85%	97.81%	95.91%							96.98%	89.73%	99.54%	96.01%	99.62%	99.82%	97.13%	90.88%
CSSR	≥ 95%	100.00%	100.00%	100.00%	99.86%							96.67%	93.38%	100.00%	98.48%	100.00%	98.61%	98.48%	92.92%
%age Blocked calls		0.00%	0.00%	0.00%	0.14%							3.33%	6.62%	0.00%	1.52%	0.00%	1.39%	1.52%	6.60%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.19%							3.33%	6.62%	0.00%	0.00%	0.00%	2.47%	0.00%	4.00%
Hands off success rate		100.00%	100.00%	100.00%	99.73%							100.00%	97.28%	100.00%	100.00%	100.00%	99.02%	96.88%	93.61%

Data Source: Drive test reports submitted by operators to auditors

Note: Drive Test conducted in NE 2 region; hence BSNL NE 1 region is not applicable.

NDR: BSNL NE 2 CDMA did not participate in the drive test.

Voice Quality:

Aircel, BSNL NE 2 GSM and Vodafone did not meet the voice quality benchmark in outdoor areas.

CSSR:

BSNL NE 2 GSM and Vodafone failed to meet the benchmark for CSSR in outdoor areas.

Call drop rate:

BSNL NE 2 GSM failed to meet the benchmark for call drop rate in outdoor as well as indoor areas. Reliance GSM and Vodafone failed to meet the benchmark in outdoor areas.

7.2 INDEPENDENT DRIVE TEST

The independent drive test was conducted for all the operators present in the Kolkata circle. As per the new directive given by TRAI headquarters, drive test were conducted at a SSA level. A minimum of 100 kilometers were traversed 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. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

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

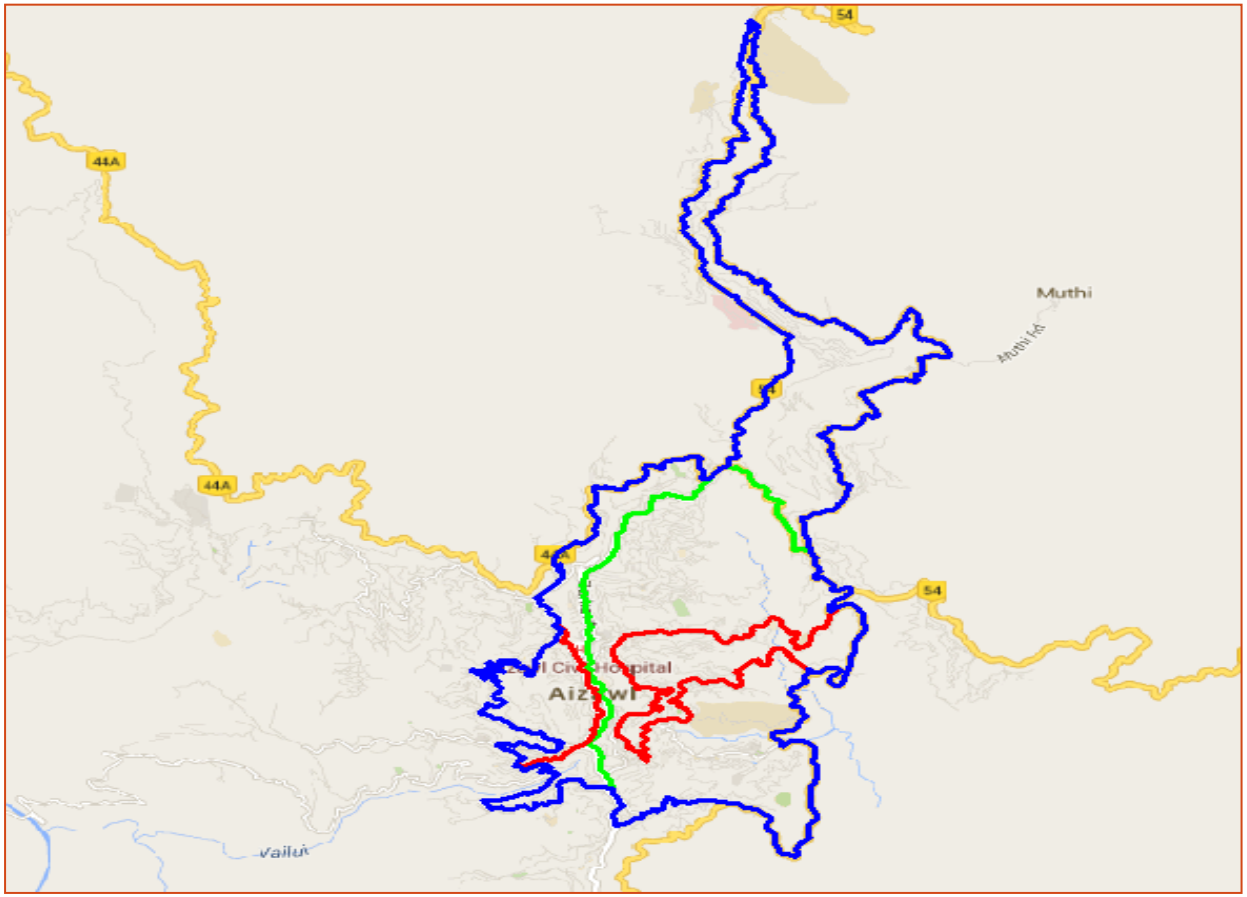
7.2.1 AIZAWL

Name of the City	Aizawl
Date of Drive Test	15th May' 15
Name of the circle	North East

Drive Test - Kilometers Travelled	Total
Aizawl	115

Aizawl	Outdoor Routes			Indoor Routes	
	Within City	Major Road	Highway	Office Complex	Shopping Complex
Route Details	Aizawl Seling Champhai-Jk Steel Wheel Show Room Amawii Tyres-Upper Khatla Bus Stop-MG Rd-Bible House-City Park-Bazar Bungkawn-Zarkawt Bus Stop-New Life Hospital-Chandmari Sub Post Office	FH Traders-Khalta Kawn-IGNITE Studio-Khatla North Presbyterian Church-Gilead Special School-Government T. Romana College-Soil & Water Conservation Dept	Kawnpuri Durtlang Silchar Rd-Zuangtui Selesih Rd-Presbyterian Church Selesih-State Bank of India, Durtlang Branch-NIRLIT-Greenwood Hospital-Thuampui Bus Stop-World Bank Rd-D.G.PARK-Salem Presbyterian Church	Agriculture Office	zarkwt ,Near United color of Benetton

Independent Drive Test Route Details – AIZAWL SSA



Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Independent Drive Test Result – AIZAWL SSA

	B'mark	Aircel		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		59.15%	38.80%	54.35%	51.17%	93.70%	38.57%	55.60%	41.57%	97.05%	42.33%	47.80%	22.33%	47.85%	35.27%
Signal Strength - 0 to -85 dBm		80.85%	77.20%	83.45%	80.03%	100.00%	74.23%	98.00%	79.63%	99.90%	70.60%	92.85%	55.73%	94.00%	79.83%
Signal Strength - 0 to -95 dBm		99.95%	100.00%	99.95%	99.97%	100.00%	99.97%	100.00%	100.00%	100.00%	99.97%	99.95%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	91.71%	76.49%	93.15%	75.02%	98.07%	82.80%	75.06%	81.01%	99.25%	77.46%	75.57%	60.57%	99.35%	80.85%
CSSR	≥ 95%	96.00%	92.93%	97.92%	90.18%	98.28%	78.76%	91.67%	92.29%	100.00%	97.18%	100.00%	91.29%	95.55%	70.84%
%age Blocked calls		4.00%	7.07%	2.08%	9.82%	1.72%	21.24%	8.33%	7.71%	0.00%	2.82%	0.00%	8.71%	4.45%	29.16%
Call drop rate	≤ 2%	0.00%	17.34%	10.87%	20.61%	0.00%	10.44%	0.00%	14.47%	0.00%	12.25%	0.00%	32.75%	0.00%	19.74%
Hands off success rate		100.00%	93.08%	97.62%	92.19%	100.00%	100.00%	100.00%	91.77%	100.00%	92.98%	100.00%	97.62%	100.00%	78.85%

Voice Quality

Operators who have not met the benchmark for Voice Quality in Indoor are Aircel, Airtel, BSNL GSM and Reliance GSM and for Outdoor Aircel, Airtel, BSNL CDMA, BSNL GSM, Idea , Reliance GSM and Vodafone.

Call Setup Success Rate (CSSR)

Operators who have not met the benchmark for CSSR in Indoor are BSNL GSM and for Outdoor are Aircel, Airtel, BSNL CDMA, BSNL GSM, Reliance GSM and Vodafone.

Call Drop Rate

Operators who have not met the benchmark for Call Drop Rate in Indoor are Airtel and for Outdoor are Aircel, Airtel, BSNL CDMA, BSNL GSM, Idea, Reliance GSM and Vodafone.

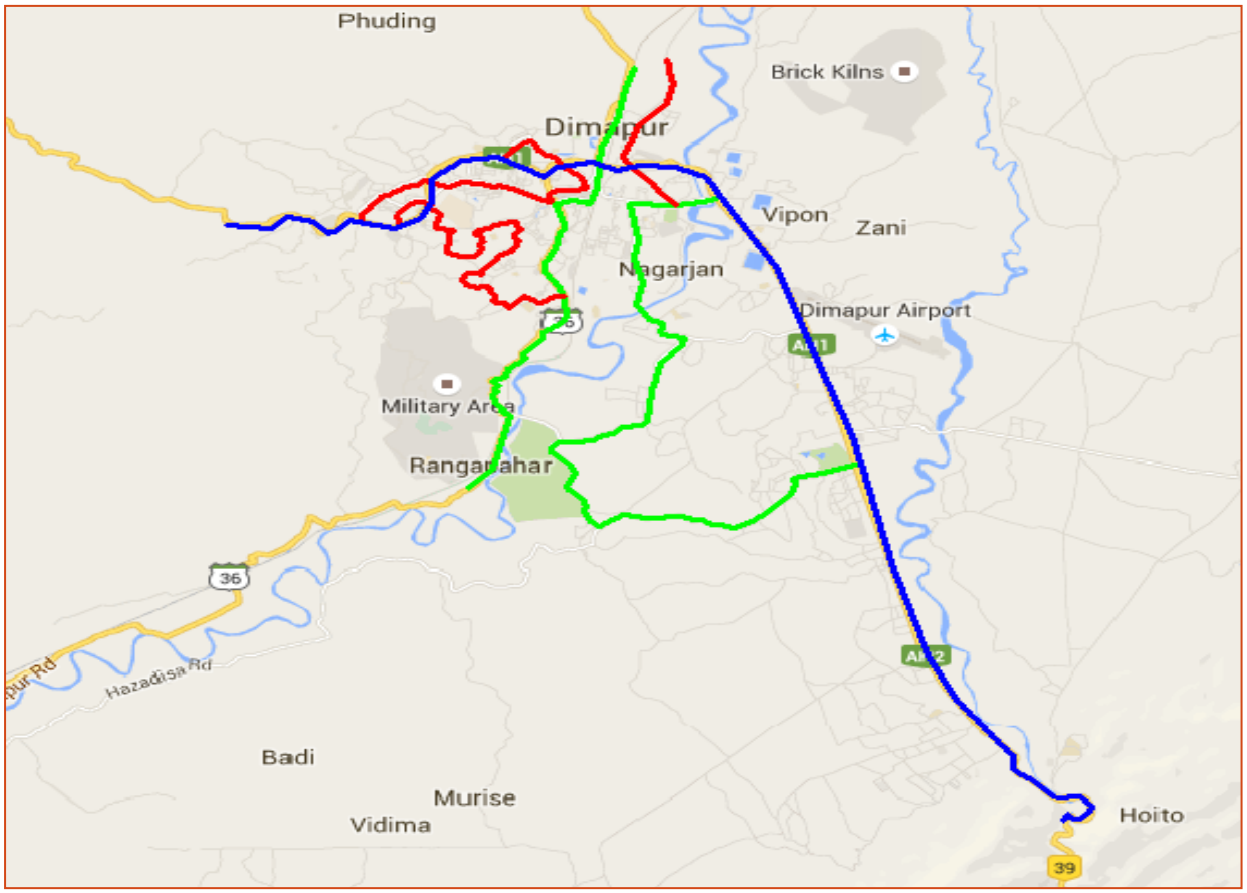
7.2.2 DIMAPUR

Name of the City	Dimapur
Date of Drive Test	18th May' 15
Name of the circle	North East

Drive Test - Kilometers Travelled	Total
Dimapur	117

Dimapur	Outdoor Routes			Indoor Routes	
	Within City	Major Road	Highway	Office Complex	Shopping Complex
Route Details	Rangapahar Railway Station-lungdung Dimapur Rd-Dimapur Railway Station-super Market Rd-town Hall-Half Nagrajan Rd-Tetso College-Old Dhansari Bridge	Notan Bosti Rd-LivingStone Foundation Senior Higher Secondary School-ELLIDE-Dimapur Hospital-KMC Boys Hostel-Nagaland Engineering & Management College-Sewak Rd	Star Ex Kindergarten School-Nagaland Post-Bible College-impressions print services-St John Higher Secondary School-Sunday Bazar-Paramedical Institute-Metro Hospital	Railway Station	Millennium Market

Independent Drive Test Route Details – DIMAPUR SSA



Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Independent Drive Test Result – DIMAPUR SSA

	B'mark	Aircel		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		83.90%	67.60%	71.60%	52.73%	0.55%	35.83%	64.95%	49.03%	79.45%	39.43%	60.75%	21.33%	68.70%	42.60%
Signal Strength - 0 to -85 dBm		99.95%	90.07%	96.25%	84.17%	96.40%	72.77%	94.60%	86.17%	99.20%	78.17%	99.35%	65.90%	99.30%	80.03%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	99.95%	99.97%	100.00%	99.93%	100.00%	100.00%	100.00%	99.97%	100.00%	99.97%
Voice quality	≥ 95%	89.45%	81.05%	96.55%	83.01%	96.11%	75.58%	96.67%	82.95%	89.32%	81.25%	96.78%	83.89%	94.79%	91.40%
CSSR	≥ 95%	97.73%	95.86%	97.92%	97.98%	94.23%	72.54%	100.00%	94.10%	88.21%	95.06%	100.00%	96.18%	100.00%	94.37%
%age Blocked calls		2.27%	4.14%	2.08%	2.02%	5.77%	27.46%	0.00%	5.90%	11.79%	4.94%	0.00%	3.82%	0.00%	5.63%
Call drop rate	≤ 2%	4.76%	6.71%	0.00%	6.65%	4.35%	8.14%	0.00%	2.52%	0.00%	10.71%	0.00%	7.17%	0.00%	3.10%
Hands off success rate		96.43%	97.00%	100.00%	96.68%	100.00%	100.00%	100.00%	85.82%	100.00%	99.59%	100.00%	98.85%	100.00%	98.00%

Voice Quality

Operators who have not met the benchmark for Voice Quality in Indoor are Aircel , Idea and Vodafone and for Outdoor Aircel, Airtel, BSNL CDMA, BSNL GSM, Idea, Reliance GSM and Vodafone.

Call Setup Success Rate (CSSR)

Operators who have not met the benchmark for CSSR in Indoor are BSNL CDMA and Idea and for Outdoor are BSNL CDMA, BSNL GSM and Vodafone.

Call Drop Rate

Operators who have not met the benchmark for Call Drop Rate in Indoor are Aircel and BSNL CDMA and for Outdoor are Aircel, Airtel, BSNL CDMA, BSNL GSM, Idea and Reliance GSM.

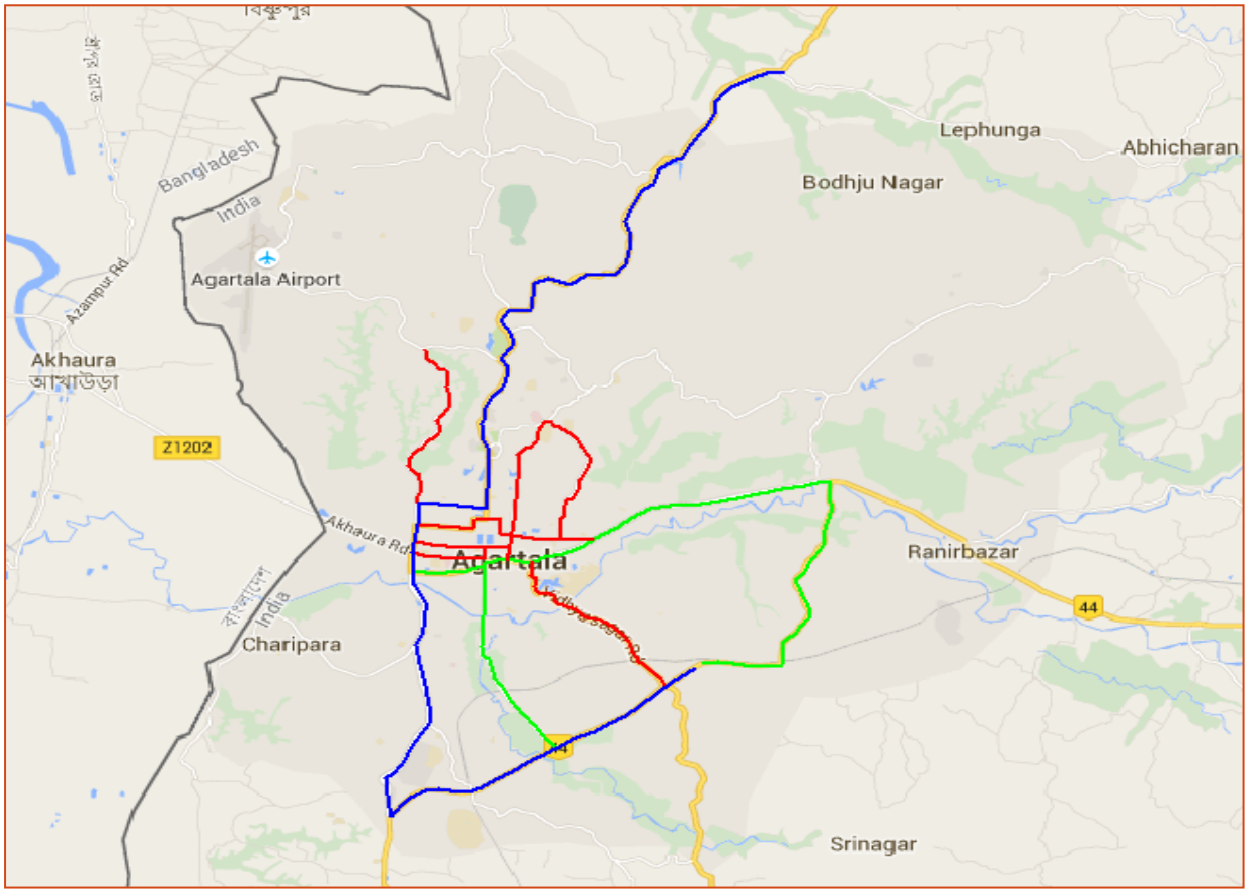
7.2.3 AGARTALA

Name of the City	Agartala
Date of Drive Test	13th july'15
Name of the circle	North East

Drive Test - Kilometers Travelled	Total
Agartala	125

Agartala	Outdoor Routes			Indoor Routes	
	Within City	Major Road	Highway	Office Complex	Shopping Complex
Route Details	Jogendra Nagar-Shillong Agartala Sabrum Rd-Himani Rubbers-Uttar Champamura-Khayerpur-Trinath Temple-TATA MOTORS-Reshambagan School-Indranagar Masjid-Dhaleswar High School-ISKCON Temple-Pratapgarh-Subhash Nagar	Nandan Charcha-Vidhyasagar Rd-Bankumari Bazaar-Jogendranagar Hospital-Jogendra Nagar Girls High School-Rahul's grocery store-BBM College-Lal Bahadur Club-Abhaynagar HS School-RIPSAT College-ITI Rd-Sanghati Club-Satsanga Ashram	Kamalghat Bazar-Lembucherra-SBI ATM-College of Agriculture-Lembucherra Weekly Market-Debendrachandranagar-Indranagar-CRPF Camp-Gandhigram-Lichubagan-Hotel Mars-Durga Chowmuhani-Navana Furniture-Food Corporation of India-Subhash Nagar	Agartala Station	Sakuntala Road Market

Independent Drive Test Route Details – AGARTALA SSA



Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Independent Drive Test Result – AGARTALA SSA

	B'mark	Aircel		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		82.45%	42.33%	97.15%	48.33%	90.75%	33.17%	83.75%	54.63%	34.95%	40.40%	58.00%	30.80%	74.40%	48.00%
Signal Strength - 0 to -85 dBm		99.65%	84.83%	99.50%	82.20%	99.95%	67.73%	95.90%	85.50%	98.95%	76.93%	98.80%	74.60%	99.35%	87.17%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	94.57%	81.46%	80.42%	85.34%	99.96%	87.69%	56.43%	84.35%	87.08%	84.32%	96.76%	86.13%	94.30%	90.06%
CSSR	≥ 95%	100.00%	97.36%	100.00%	95.03%	100.00%	92.53%	98.15%	90.25%	100.00%	97.87%	98.28%	96.31%	98.33%	94.89%
%age Blocked calls		0.00%	2.64%	0.00%	4.97%	0.00%	7.47%	1.85%	9.75%	0.00%	2.13%	1.72%	3.69%	1.67%	5.11%
Call drop rate	≤ 2%	0.00%	1.25%	0.00%	8.51%	0.00%	8.52%	0.00%	5.05%	0.00%	7.02%	0.00%	0.58%	3.45%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	98.06%	100.00%	100.00%	100.00%	90.56%	98.72%	99.53%	100.00%	97.57%	100.00%	92.68%

Voice Quality

Operators who have not met the benchmark for Voice Quality in Indoor are Aircel, Airtel, BSNL GSM, Idea and Vodafone and for Outdoor Aircel, Airtel, BSNL CDMA, BSNL GSM, Idea , Reliance GSM and Vodafone.

Call Setup Success Rate (CSSR)

Operators who have not met the benchmark for CSSR in Outdoor are BSNL CDMA, BSNL GSM and Vodafone.

Call Drop Rate

Operators who have not met the benchmark for Call Drop Rate in Indoor are Vodafone and for Outdoor are Airtel, BSNL CDMA, BSNL GSM and Idea.

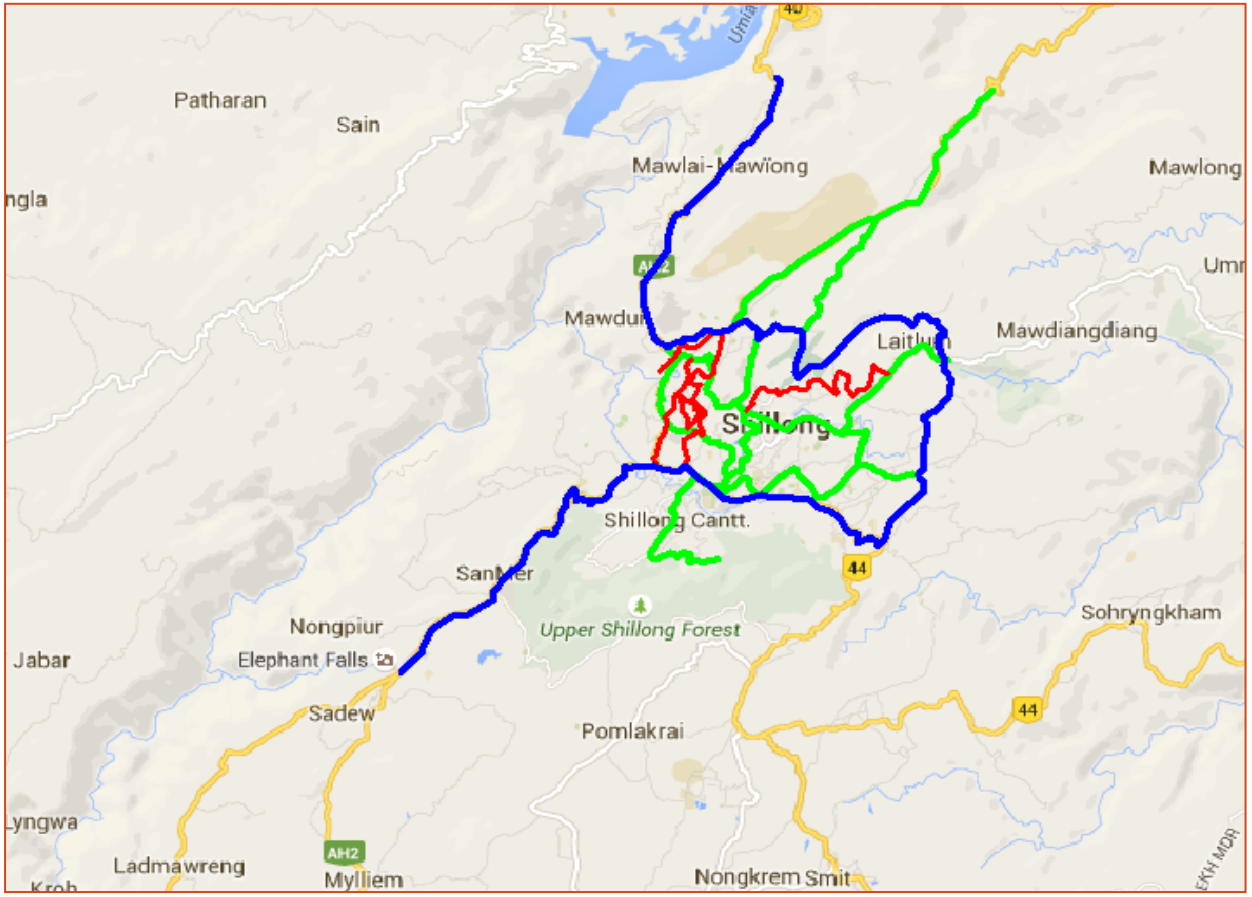
7.2.4 SHILLONG

Name of the City	Shillong
Date of Drive Test	8th July' 15
Name of the circle	North East

Drive Test - Kilometers Travelled	Total
shillong	121

Shillong	Outdoor Routes			Indoor Routes	
	Within City	Major Road	Highway	Office Complex	Shopping Complex
Route Details	Greater Mawlai College-GS Rd-Police Bazar -Martin Luther Christian University-Vidya Bajoria Park-Laban.Martin Luther Christian University-CMJ University-Umkdait Bus Stop -Itshyrwat	Umkdait Bus Stop-BK Bajoria School/College-Golf Link Bus Stand-Sports Centre.Rilbong Point Bus Stop-Garikhana Mosque-Mawkhar Presbyterian Church-Anjali	Shillong Heliport-Vidya Bajoria Park-St. Peter's College-Sawlad Bus Stop-Lapalang Bus Stop-Itshyrwat -Mawroh Presbyterian Church-Greater Mawlai College-Mawïong MLP Bus Stop	Legislative Assembly	Lapalang Bus Stand

Independent Drive Test Route Details – SHILLONG SSA



Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Independent Drive Test Result – SHILLONG SSA

	B'mark	Aircel		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		87.20%	64.13%	93.25%	52.87%	83.65%	33.13%	57.85%	47.80%	25.35%	36.83%	84.60%	38.13%	66.85%	49.43%
Signal Strength - 0 to -85 dBm		98.50%	90.93%	100.00%	88.03%	99.95%	72.27%	89.80%	82.17%	93.95%	74.13%	99.55%	76.20%	98.80%	88.00%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	72.06%	74.33%	84.95%	74.75%	99.80%	85.02%	97.99%	82.35%	86.52%	80.37%	90.60%	78.57%	92.41%	84.18%
CSSR	≥ 95%	76.17%	95.23%	97.92%	95.69%	100.00%	96.22%	95.24%	86.67%	100.00%	94.85%	100.00%	95.28%	100.00%	97.79%
%age Blocked calls		23.83%	4.77%	2.08%	4.31%	0.00%	3.78%	4.76%	13.33%	0.00%	5.15%	0.00%	4.72%	0.00%	2.21%
Call drop rate	≤ 2%	11.32%	16.41%	2.38%	12.28%	0.00%	7.82%	0.00%	4.42%	0.00%	11.34%	0.00%	1.44%	0.00%	1.30%
Hands off success rate		87.42%	90.57%	94.32%	94.18%	100.00%	100.00%	100.00%	63.22%	87.50%	100.00%	100.00%	95.03%	100.00%	99.22%

Voice Quality

Operators who have not met the benchmark for Voice Quality in Indoor are Aircel, Airtel, Idea, Reliance GSM and Vodafone and for Outdoor Aircel, Airtel, BSNL CDMA, BSNL GSM, Idea , Reliance GSM and Vodafone.

Call Setup Success Rate (CSSR)

Operators who have not met the benchmark for CSSR in Indoor are Aircel and for Outdoor are BSNL GSM and Idea.

Call Drop Rate

Operators who have not met the benchmark for Call Drop Rate in Indoor are Aircel and Airtel and for Outdoor are Aircel, Airtel, BSNL CDMA, BSNL GSM and Idea.

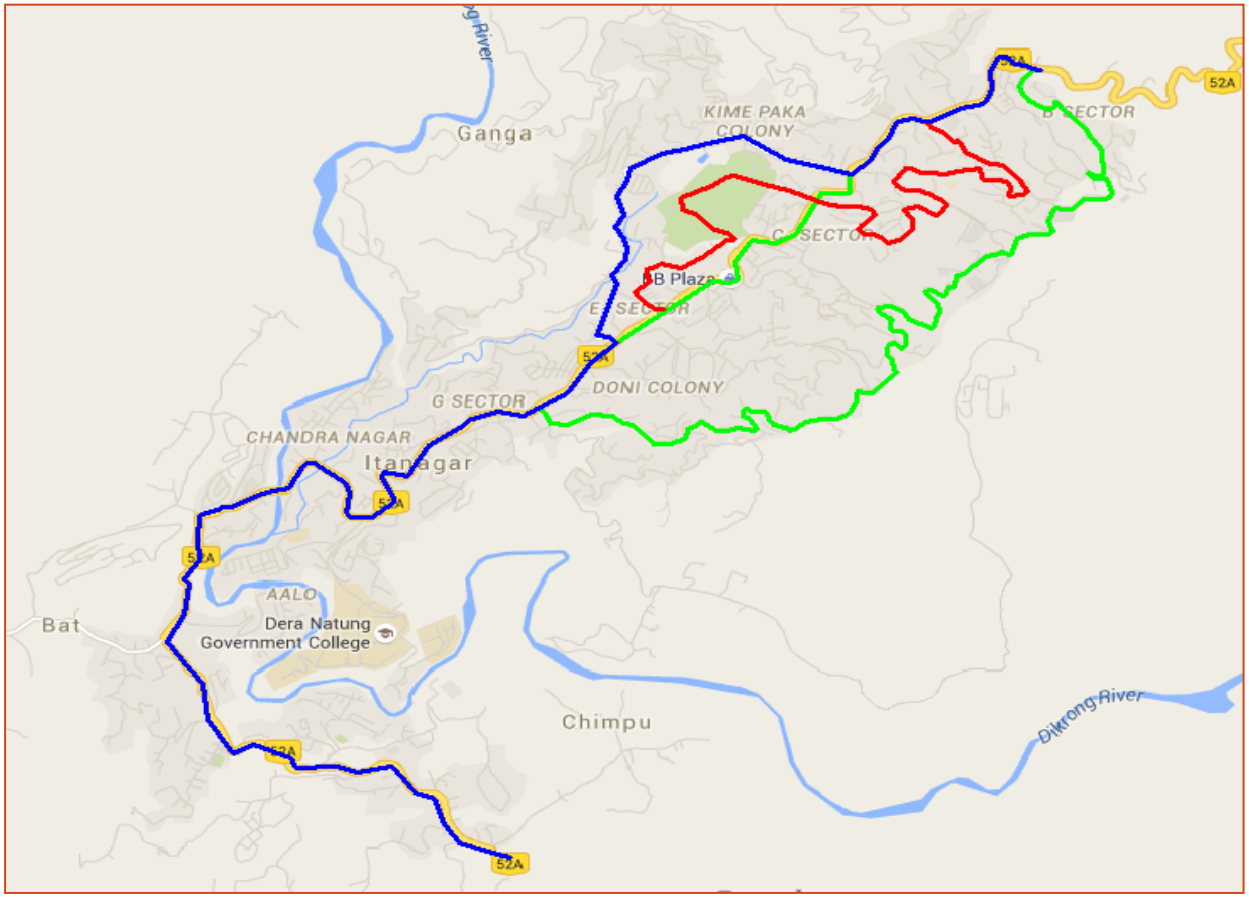
7.2.5 PAMPUPARE (ITANAGAR)

Name of the City	Itanagar
Date of Drive Test	19th May' 15
Name of the circle	North East

Drive Test - Kilometers Travelled	Total
Itanagar	120

Itanagar	Outdoor Routes			Indoor Routes	
	Within City	Major Road	Highway	Office Complex	Shopping Complex
Route Details	Blue Hill Bus Counter-Circuit House-Raj Bhawan Helipad-Clock Tower-Home Decora-YES Bank-BB Plaza-PCA Girls Hostel-Itafort Western Gate-Nokia Priority Dealer	Moomsie Hotel-P Sector-Indira Gandhi Park-E sector-Jyoti Restruant-C Sector-Pentecoast Church	Hotel TODO-Kidzee-GreenValley Bus Counter-NH52A-Trafic Park-KA TVS-Sri Sri Radha Krishna mandir-Kinam Fashion-Heema Hospital-VIP Rd-Blessing Apartments-Kidzee-Government Middle School-Baskin Robbins-Vivek Vihar	Police Station,Itanagar	Ganga Market

Independent Drive Test Route Details – ITANAGAR SSA



Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Independent Drive Test Result – ITANAGAR SSA

	B'mark	Aircel		Airtel		BSNL CDMA		BSNL GSM		Idea		Reliance GSM		Vodafone	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Signal Strength - 0 to -75 dBm		93.75%	80.33%	99.30%	85.40%	30.25%	55.97%	99.05%	48.83%	38.75%	45.20%	61.40%	47.60%	47.80%	41.10%
Signal Strength - 0 to -85 dBm		100.00%	94.90%	99.80%	96.87%	96.85%	92.40%	99.90%	86.60%	99.40%	86.43%	97.50%	88.33%	95.95%	87.63%
Signal Strength - 0 to -95 dBm		100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	92.10%	77.18%	79.43%	83.61%	99.51%	94.39%	99.35%	68.56%	95.93%	92.67%	96.88%	90.56%	95.56%	88.11%
CSSR	≥ 95%	100.00%	92.34%	100.00%	98.99%	100.00%	99.17%	59.03%	63.34%	100.00%	100.00%	100.00%	100.00%	98.21%	99.05%
%age Blocked calls		0.00%	7.66%	0.00%	1.01%	0.00%	0.83%	40.97%	36.66%	0.00%	0.00%	0.00%	0.00%	1.79%	0.95%
Call drop rate	≤ 2%	0.00%	7.94%	0.00%	3.09%	0.00%	5.13%	0.00%	8.33%	0.00%	4.13%	0.00%	1.99%	0.00%	1.96%
Hands off success rate		100.00%	97.57%	96.15%	95.43%	100.00%	100.00%	100.00%	81.85%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Voice Quality

Operators who have not met the benchmark for Voice Quality in Indoor are Aircel and Airtel and for Outdoor Aircel, Airtel, BSNL CDMA, BSNL GSM, Idea , Reliance GSM and Vodafone.

Call Setup Success Rate (CSSR)

Operators who have not met the benchmark for CSSR in Indoor are BSNL GSM and for Outdoor are Aircel and BSNL GSM.

Call Drop Rate

Operators who have not met the benchmark for Call Drop Rate in Outdoor are Aircel, Airtel, BSNL CDMA, BSNL GSM and Idea.

8 ANNEXURE – CONSOLIDATED

For Reliance GSM, data is pertaining to Apr'15. Data for May'15 and Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability										
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		5340	6063	387	732	2091	1869	2424	605	4787
Sum of downtime of BTSs in a month (in hours)		330852	32542	13042	27324	30107	362721	27742	1958	51517
BTSs accumulated downtime (not available for service)	≤ 2%	8.43%	0.72%	4.60%	5.07%	1.96%	26.40%	1.55%	0.45%	1.47%
Number of BTSs having accumulated downtime >24 hours		2605	85	41	61	40	948	40	8	92
Worst affected BTSs due to downtime	≤ 2%	48.80%	1.40%	10.59%	8.34%	1.91%	50.72%	1.64%	1.32%	1.92%
Live Measurement- BTSs accumulated downtime										
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		5301	6006	387	488	2070	1869	2322	605	4776
Sum of downtime of BTSs in a month (in hours)		34141	3423	1417	1776	2602	35510	2813	1958	5769
BTSs accumulated downtime (not available for service)	≤ 2%	8.94%	0.79%	5.09%	5.06%	1.75%	26.39%	1.68%	4.49%	1.68%
Number of BTSs having accumulated downtime >24 hours		445	0	10	27	40	937	34	8	4
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	8.39%	0.00%	2.58%	5.54%	1.93%	50.13%	1.46%	1.32%	0.08%

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 CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	93.28%	89.90%	98.18%	95.92%	97.66%	76.18%	96.70%	98.57%	99.42%
SDCCH/Paging channel congestion	≤ 1%	0.82%	0.67%	NA	NA	0.95%	0.46%	0.65%	0.03%	0.16%
TCH congestion	≤ 2%	5.45%	0.61%	0.00%	0.11%	1.97%	0.86%	1.34%	0.23%	0.58%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	91.58%	90.94%	98.37%	96.74%	97.29%	74.82%	98.09%	98.41%	99.41%
SDCCH/Paging channel congestion	≤ 1%	0.90%	0.75%	NA	NA	0.95%	0.50%	0.55%	0.03%	0.34%
TCH congestion	≤ 2%	7.15%	0.57%	0.00%	7.54%	1.93%	0.88%	0.63%	0.24%	0.59%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of call attempts		1246	1439	1308	NDR	417	648	783	1062	1563
Total number of successful calls established		1224	1434	1143	NDR	401	597	753	1008	1477
CSSR	≥ 95%	99.06%	99.66%	87.39%	NDR	96.16%	92.13%	97.15%	96.32%	94.52%
%age blocked calls		0.94%	0.34%	12.61%	NDR	3.84%	7.87%	2.85%	3.68%	5.48%

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

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

NDR: Operator did not participate in the drive test.

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 CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		193977149	340334665	1020518	3416054	259000166	486235800	38162396	12130714	68058105
Total number of calls dropped		3406794	3231056	9017	33377	4524261	16911031	618958	74178	472941
Call drop rate	≤ 2%	1.76%	0.95%	1.08%	1.00%	1.75%	4.53%	1.63%	0.61%	0.69%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of cells in the network		15350	17963	NDR	1527	6150	3966	7279	1805	14460
Total number of cells having more than 3% TCH		2576	151	NDR	44	183	508	136	3	353
Worst affected cells having more than 3% TCH	≤ 3%	16.78%	0.84%	NDR	2.88%	2.98%	12.81%	1.87%	0.17%	2.44%

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 CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		19327278	34027452	48669	236997	26888181	20338245	51153722	1191535	95994625
Total number of calls dropped		345190	330096	484	2807	469097	750761	765906	6866	629344
Call drop rate	≤ 2%	1.79%	0.97%	0.97%	1.18%	1.74%	4.65%	1.50%	0.58%	0.65%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of cells in the network		15227	17896	NDR	1018	6150	3966	6972	1805	14427
Total number of cells having more than 3% TCH		2610	156	NDR	34	181	1146	158	3	363
Worst affected cells having more than 3% TCH	≤ 3%	17.15%	0.87%	NDR	3.34%	2.95%	28.89%	2.27%	0.17%	2.52%

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 CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		1224	1433	1143	NDR	401	648	753	1008	1508
Total number of calls dropped		4	2	74	NDR	9	51	14	51	58
Call drop rate	≤ 2%	0.23%	0.14%	6.47%	NDR	2.24%	7.87%	1.33%	4.01%	3.75%

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 CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		28080468991	38206640576	NDR	210	300	NA	6302395451	2208282021	11923249931
Total number of calls with good voice quality		26146654820	37759780078	NDR	210	293	NA	6008680636	2170193580	11708075451
%age calls with good voice quality	≥ 95%	93.11%	98.83%	NDR	100.00%	97.67%	87.37%	95.35%	98.28%	98.22%

Live measurement results for Voice quality

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		2770903846	3787931311	NDR	140	300	NA	6214334009	213998418	14599708284
Total number of calls with good voice quality		2581272669	3742532379	NDR	140	293	NA	5914196691	210408202	14602330870
%age calls with good voice quality	≥ 95%	93.16%	98.80%	NDR	100.00%	97.67%	87.37%	95.17%	98.32%	99.48%

Drive test results for Voice quality (Average of three drive tests)

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		2067703	1576078	83837	NDR	NA	47706	1502098	480424	2227471
Total number of calls with good voice quality		1939871	1508142	34125	NDR	NA	41752	1410973	470474	2058481
%age calls with good voice quality	≥ 95%	94.26%	95.71%	40.70%	NDR	86.23%	87.52%	94.69%	98.02%	92.46%

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

8.5 POI CONGESTION

Audit Results for POI Congestion										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		38	15	NA	NA	35	NA	28	18	34
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		43964	62481	NA	NA	27803	NA	15540	10774	28330652
Traffic served for all POIs (B)- in erlangs		26981	20989	NA	NA	14298	NA	9548	4030	6590907
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.33%	NA	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		37	15	NA	NA	35	NA	28	18	34
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		42086	59042	NA	NA	27803	NA	15609	10774	933974
Traffic served for all POIs (B)- in erlangs		23563	21572	NA	NA	14298	NA	9615	4030	218353
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.48%	NA	0.00%	0.00%	0.00%

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

NA: Auditors were not able to get the data from BSNL NE 1 CDMA, BSNL NE 2 CDMA and BSNL NE2 GSM as the operator (BSNL) uses single set of POIs (BSNL NE 1 GSM) to connect to other networks.

8.6 TOTAL CALL MADE DURING THE DRIVE TEST-VOICE QUALITY

April									
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls	1226853	108964	NA	NDR	NA	NDR	724537	176304	700931
May									
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls	600819	663487	83837	NA	639128	NA	592452	127044	747320
June									
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls	240031	803627	NA	NDR	NA	47706	185109	177076	779220

Data Source: Drive test reports submitted by operators to auditors

NDR: Data to conduct audit for metering and billing, resolution of billing complaints, response time for customer assistance and customer care was not available at the central billing center/ customer service center of BSNL CDMA. Hence, audit for these parameters has not been conducted for the operator.

8.7 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated										
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)										
Metering and billing credibility - Postpaid										
Total bills generated during the period		82958	104887	NDR	NDR	66426	66426	4899	38217	79463
Total number of bills disputed		19	20	NDR	NDR	20	20	3	34	138
Total number of valid billing complaints		4	4	NDR	NDR	20	20	0	29	75
Total complaints considered invalid		15	16	NDR	NDR	0	0	3	5	63
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.02%	0.02%	NDR	NDR	0.03%	0.03%	0.06%	0.09%	0.17%
April										
Total bills generated during the first billing cycle		27415	35515	NDR	NDR	22214	22214	1594	12567	26005
Total number of bills disputed in first billing cycle		5	6	NDR	NDR	6	6	0	12	51
Total number of valid billing complaints (billing cycle 1)		2	1	NDR	NDR	6	6	0	8	37
Total complaints considered invalid (billing cycle 1)		3	5	NDR	NDR	0	0	0	4	14
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.02%	0.02%	NDR	NDR	0.03%	0.03%	0.00%	0.10%	0.20%

May										
Total bills generated during the second billing cycle		27688	34686	NDR	NDR	22145	22145	1718	12735	26304
Total number of bills disputed in second billing cycle		7	6	NDR	NDR	8	8	2	11	52
Total number of valid billing complaints (billing cycle 2)		2	1	NDR	NDR	8	8	0	11	19
Total complaints considered invalid (billing cycle 2)		5	5	NDR	NDR	0	0	2	0	33
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.03%	0.02%	NDR	NDR	0.04%	0.04%	0.12%	0.09%	0.20%
June										
Total bills generated during the third billing cycle		27855	34686	NDR	NDR	22067	22067	1587	12915	27154
Total number of bills disputed in third billing cycle		7	8	NDR	NDR	6	6	1	11	35
Total number of valid billing complaints (billing cycle 3)		0	2	NDR	NDR	6	6	0	10	19
Total complaints considered invalid (billing cycle 3)		7	6	NDR	NDR	0	0	1	1	16
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.03%	0.02%	NDR	NDR	0.03%	0.03%	0.06%	0.09%	0.13%

Metering and billing credibility - Prepaid										
Performance prepaid	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of charging complaints (valid)		6	150	NDR	NDR	0	0	124	212	225
Total complaints considered invalid		3272	1080	NDR	NDR	0	0	222	75	235
Total number of charging complaints		3278	1230	NDR	NDR	0	0	346	287	460
Total no of customers served		8780697	10457157	NDR	NDR	730486	730486	1410004	2452213	3915884
Percentage of charging complaints disputed	≤ 0.1%	0.04%	0.01%	NDR	NDR	0.00%	0.00%	0.02%	0.01%	0.01%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated										
Billing Performance	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of billing/charging complaints		3297	1250	NDR	NDR	20	20	574	401	598
Total number of complaints resolved in favour of customer		10	154	NDR	NDR	20	20	349	321	300
Total complaints considered invalid		3287	1096	NDR	NDR	0	0	225	80	298
Number of complaints resolved in 4 weeks		10	154	NDR	NDR	20	20	349	321	300
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	NDR	NDR	100.00%	100.00%	100.00%	100.00%	100.00%
Number of complaints resolved in 6 weeks		10	154	NDR	NDR	20	20	349	321	300
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver										
Total number of complaints where credit/waiver is required		10	154	NDR	NDR	20	20	128	241	196
Percentage cases in which credit/waiver was received within 1	100%	100.00%	100.00%	NDR	NDR	100.00%	100.00%	100.00%	100.00%	100.00%

Live calling results for resolution of billing complaints										
Resolution of billing complaints	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total Number of calls made		10	100	NDR	NDR	15	15	100	100	100
Number of cases resolved in 4 weeks		8	78	NDR	NDR	13	13	80	72	85
Percentage cases resolved in 4 weeks	≥ 98%	80.00%	78.00%	NDR	NDR	86.67%	86.67%	80.00%	72.00%	85.00%
Number of cases resolved in 6 weeks		8	82	NDR	NDR	14	14	83	74	86
Percentage cases resolved in 6 weeks	100.00%	80.00%	82.00%	NDR	NDR	93.33%	93.33%	83.00%	74.00%	86.00%

8.8 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated										
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		4556781	816413	NDR	NDR	9225	9225	1301257	859137	2401513
Number of calls getting connected and answered (electronically)		4359988	816335	NDR	NDR	9068	9068	1301257	841188	2401357
Percentage calls getting connected and answered	≥ 95%	95.68%	99.99%	NDR	NDR	98.30%	98.30%	100.00%	97.91%	99.99%

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 CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total Number of calls received (3 months)		663670	824956	NDR	NDR	5321	5321	287528	343886	628043
Total Number of calls answered within 90 seconds (3 months)		659526	761019	NDR	NDR	5175	5175	287098	334632	628043
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	99.38%	92.25%	NDR	NDR	97.26%	97.26%	99.85%	97.31%	100.00%
April										
Total calls received (Month 1)		213061	276500	NDR	NDR	1628	1628	94910	124061	199344
Total calls answered within 90 seconds (Month 1)		211812	243346	NDR	NDR	1585	1585	94700	120321	199344
% calls answered within 90 seconds (Month 1)	≥ 95%	99.41%	88.01%	NDR	NDR	97.36%	97.36%	99.78%	96.99%	100.00%
May										
Total calls received (Month 2)		223516	267767	NDR	NDR	1803	1803	100269	121260	211276
Total calls answered within 90 seconds (Month 2)		221117	250336	NDR	NDR	1771	1771	100269	116937	211276
% calls answered within 90 seconds (Month 2)	≥ 95%	98.93%	93.49%	NDR	NDR	98.23%	98.23%	100.00%	96.43%	100.00%
June										
Total calls received (Month 3)		227093	280689	NDR	NDR	1890	1890	92349	98565	217423
Total calls answered within 90 seconds (Month 3)		226597	267337	NDR	NDR	1819	1819	92129	97374	217423
% calls answered within 90 seconds (Month 3)	≥ 95%	99.78%	95.24%	NDR	NDR	96.24%	96.24%	99.76%	98.79%	100.00%

Data Source: Customer Service Center of the operators

Live calling results for customer care (IVR)										
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	100	100	100	100	100	100	100
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%

Live calling results for customer care (Voice to Voice)										
Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		96	90	78	72	72	90	98	92	95
Live Calling Percentage calls getting connected and answered	≥ 95%	96.00%	90.00%	78.00%	72.00%	72.00%	90.00%	98.00%	92.00%	95.00%

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 CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of closure request		339	460	NDR	NDR	246	246	46	112	590
Number of requests attended within 7 days		339	460	NDR	NDR	246	246	46	112	590
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Customer Service Center of the operators

8.10 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated										
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of cases requiring refund of deposits		244	104	NDR	NDR	229	229	22	157	792
Total number of cases where refund was made within 60 days		244	104	NDR	NDR	229	229	22	157	792
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	NDR	NDR	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Customer Service Center of the operators

8.11 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang									
Traffic in Erlang	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Eqipped capacity of the network	104772	94708	27293	16875	112000	52000	20567	40000	37479
Total taffic handled in erlang during TCBH	54901	80021	53	822.07	28385	25496	12569	11969	26764
Total no. of customers served (as per VLR)	1928868	3424408	5790	22388	384866	456646	418267	548877	1167816

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 CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total Number of calls made	100	100	NDR	NDR	100	100	54	100	100
Number of cases resolved to satisfaction	38	87	NDR	NDR	87	87	43	83	87
Percentage cases resolved in four weeks	38.00%	87.00%	NDR	NDR	87.00%	87.00%	79.63%	83.00%	87.00%

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 CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total no. of calls made		150	150	150	150	150	150	150	150	150
Calls answered		119	116	120	113	121	116	120	116	117
% of calls connected	≥ 95%	79.33%	77.33%	80.00%	75.33%	80.67%	77.33%	80.00%	77.33%	78.00%

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

8.14 LEVEL 1 SERVICES CALLS MADE

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

Live calls were made to the active numbers to test the calls answered within. 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	✓		13	9
101	Fire	✓		13	10
102	Ambulance		×		
104	Health Information Helpline		×		
108	Emergency and Disaster Management Helpline	✓		14	13
138	All India Helpine for Passengers		×		
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline	✓		14	11
182	Indian Railway Security Helpline		×		
1033	Road Accident Management Service	✓		14	10
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	✓		14	12
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		
1073	Road Accident Helpline	✓		14	11
1077	Control Room for District Collector		×		
1090	Call Alert (Crime Branch)		×		
1091	Women Helpline		×	14	12
1097	National AIDS Helpline to NACO	✓		14	12
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educational & 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	✓		13	10
155304	Municipal Corporations		×		
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)		×		

1909	National Do Not Call Registry	✓	☐	13	9
1912	Complaint of Electricity	✓	×		
1916	Drinking Water Supply	☐	×		
1950	Election Commission of India	☐	×		

Airtel

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	13	11
101	Fire	✓	☐	13	10
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	13	12
138	All India Helpine for Passengers	☐	×		
149	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	14	11
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	14	10
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	✓	☐	14	10
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	14	10
1077	Control Room for District Collector	☐	×		
1090	Call Alert (Crime Branch)	☐	×		
1091	Women Helpline	☐	×	14	11
1097	National AIDS Helpline to NACO	✓	☐	14	11
1099	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & 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	✓	☐	14	11
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
1903	Sashastra Seema Bal (SSB)	☐	×		
1909	National Do Not Call Registry	✓	☐	13	9
1912	Complaint of Electricity	✓	×		
1916	Drinking Water Supply	☐	×		

1950	Election Commission of India	☐	×		

BSNL CDMA NE 1

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	14	11
101	Fire	✓	☐	14	11
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	14	11
138	All India Helpine for Passengers	☐	×		
149	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	14	12
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	14	12
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	✓	☐	14	12
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	14	11
1077	Control Room for District Collector	☐	×		
1090	Call Alert (Crime Branch)	☐	×		
1091	Women Helpline	✓	☐	13	11
1097	National AIDS Helpline to NACO	✓	☐	13	10
1099	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & 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	✓	☐	13	11
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
1903	Sashastra Seema Bal (SSB)	☐	×		
1909	National Do Not Call Registry	✓	☐	13	8
1912	Complaint of Electricity	✓	×		
1916	Drinking Water Supply	☐	×		
1950	Election Commission of India	☐	×		

BSNL CDMA NE 2					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓		14	11
101	Fire	✓		14	11
102	Ambulance		×		
104	Health Information Helpline		×		
108	Emergency and Disaster Management Helpline	✓		14	11
138	All India Helpine for Passengers		×		
149	Public Road Transport Utility Service		×		
181	Chief Minister Helpline	✓		14	11
182	Indian Railway Security Helpline		×		
1033	Road Accident Management Service	✓		14	10
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	✓		13	10
1071	Air Accident Helpline		×		
1072	Rail Accident Helpline		×		
1073	Road Accident Helpline	✓		13	10
1077	Control Room for District Collector		×		
1090	Call Alert (Crime Branch)		×		
1091	Women Helpline	✓		13	9
1097	National AIDS Helpline to NACO	✓		13	10
1099	Central Accident and Trauma Services (CATS)		×		
10580	Educational & 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	✓		14	11
155304	Municipal Corporations		×		
155214	Labour Helpline		×		
1903	Sashastra Seema Bal (SSB)		×		
1909	National Do Not Call Registry	✓		14	9
1912	Complaint of Electricity	✓	×		
1916	Drinking Water Supply		×		
1950	Election Commission of India		×		

BSNL GSM NE 1					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	14	11
101	Fire	✓	☐	14	11
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	14	11
138	All India Helpine for Passengers	☐	×		
149	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	14	12
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	14	11
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	✓	☐	14	11
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	14	12
1077	Control Room for District Collector	☐	×		
1090	Call Alert (Crime Branch)	☐	×		
1091	Women Helpline	✓	☐	13	10
1097	National AIDS Helpline to NACO	✓	☐	13	11
1099	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & 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	✓	☐	13	11
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
1903	Sashastra Seema Bal (SSB)	☐	×		
1909	National Do Not Call Registry	✓	☐	13	10
1912	Complaint of Electricity	✓	×		
1916	Drinking Water Supply	☐	×		
1950	Election Commission of India	☐	×		

BSNL GSM NE 2					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	14	11
101	Fire	✓	☐	14	11
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	14	11
138	All India Helpine for Passengers	☐	×		
149	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	14	11
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	14	11
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	✓	☐	14	11
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	14	11
1077	Control Room for District Collector	☐	×		
1090	Call Alert (Crime Branch)	☐	×		
1091	Women Helpline	✓	☐	13	10
1097	National AIDS Helpline to NACO	✓	☐	13	10
1099	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & 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	✓	☐	13	10
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
1903	Sashastra Seema Bal (SSB)	☐	×		
1909	National Do Not Call Registry	✓	☐	13	9
1912	Complaint of Electricity	✓	×		
1916	Drinking Water Supply	☐	×		
1950	Election Commission of India	☐	×		

Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	14	11
101	Fire	✓	☐	14	11
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	14	10
138	All India Helpine for Passengers	☐	×		
149	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	14	11
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	14	12
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	✓	☐	14	11
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	14	12
1077	Control Room for District Collector	☐	×		
1090	Call Alert (Crime Branch)	☐	×		
1091	Women Helpline	✓	☐	13	11
1097	National AIDS Helpline to NACO	✓	☐	13	11
1099	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & 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	✓	☐	13	11
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
1903	Sashastra Seema Bal (SSB)	☐	×		
1909	National Do Not Call Registry	✓	☐	13	9
1912	Complaint of Electricity	✓	×		
1916	Drinking Water Supply	☐	×		
1950	Election Commission of India	☐	×		

Reliance GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	14	11
101	Fire	✓	☐	14	11
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	14	11
138	All India Helpine for Passengers	☐	×		
149	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	14	11
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	14	11
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	✓	☐	14	11
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	14	11
1077	Control Room for District Collector	☐	×		
1090	Call Alert (Crime Branch)	☐	×		
1091	Women Helpline	✓	☐	13	10
1097	National AIDS Helpline to NACO	✓	☐	13	10
1099	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & 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	✓	☐	13	10
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
1903	Sashastra Seema Bal (SSB)	☐	×		
1909	National Do Not Call Registry	✓	☐	13	9
1912	Complaint of Electricity	✓	×		
1916	Drinking Water Supply	☐	×		
1950	Election Commission of India	☐	×		

Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	✓	☐	13	10
101	Fire	✓	☐	13	10
102	Ambulance	☐	×		
104	Health Information Helpline	☐	×		
108	Emergency and Disaster Management Helpline	✓	☐	13	12
138	All India Helpine for Passengers	☐	×		
149	Public Road Transport Utility Service	☐	×		
181	Chief Minister Helpline	✓	☐	13	10
182	Indian Railway Security Helpline	☐	×		
1033	Road Accident Management Service	✓	☐	14	11
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	✓	☐	14	11
1071	Air Accident Helpline	☐	×		
1072	Rail Accident Helpline	☐	×		
1073	Road Accident Helpline	✓	☐	14	11
1077	Control Room for District Collector	☐	×		
1090	Call Alert (Crime Branch)	☐	×		
1091	Women Helpline	✓	☐	14	11
1097	National AIDS Helpline to NACO	✓	☐	14	11
1099	Central Accident and Trauma Services (CATS)	☐	×		
10580	Educational & 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	✓	☐	14	10
155304	Municipal Corporations	☐	×		
155214	Labour Helpline	☐	×		
1903	Sashastra Seema Bal (SSB)	☐	×		
1909	National Do Not Call Registry	✓	☐	14	10
1912	Complaint of Electricity	✓	×		
1916	Drinking Water Supply	☐	×		
1950	Election Commission of India	☐	×		

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

8.15 COUNTER DETAILS

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

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

8.15.1 ERICSSON

Ericsson provides network support to Aircel, Airtel, Idea, BSNL CDMA, BSNL GSM 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 Vodafone in the circle.

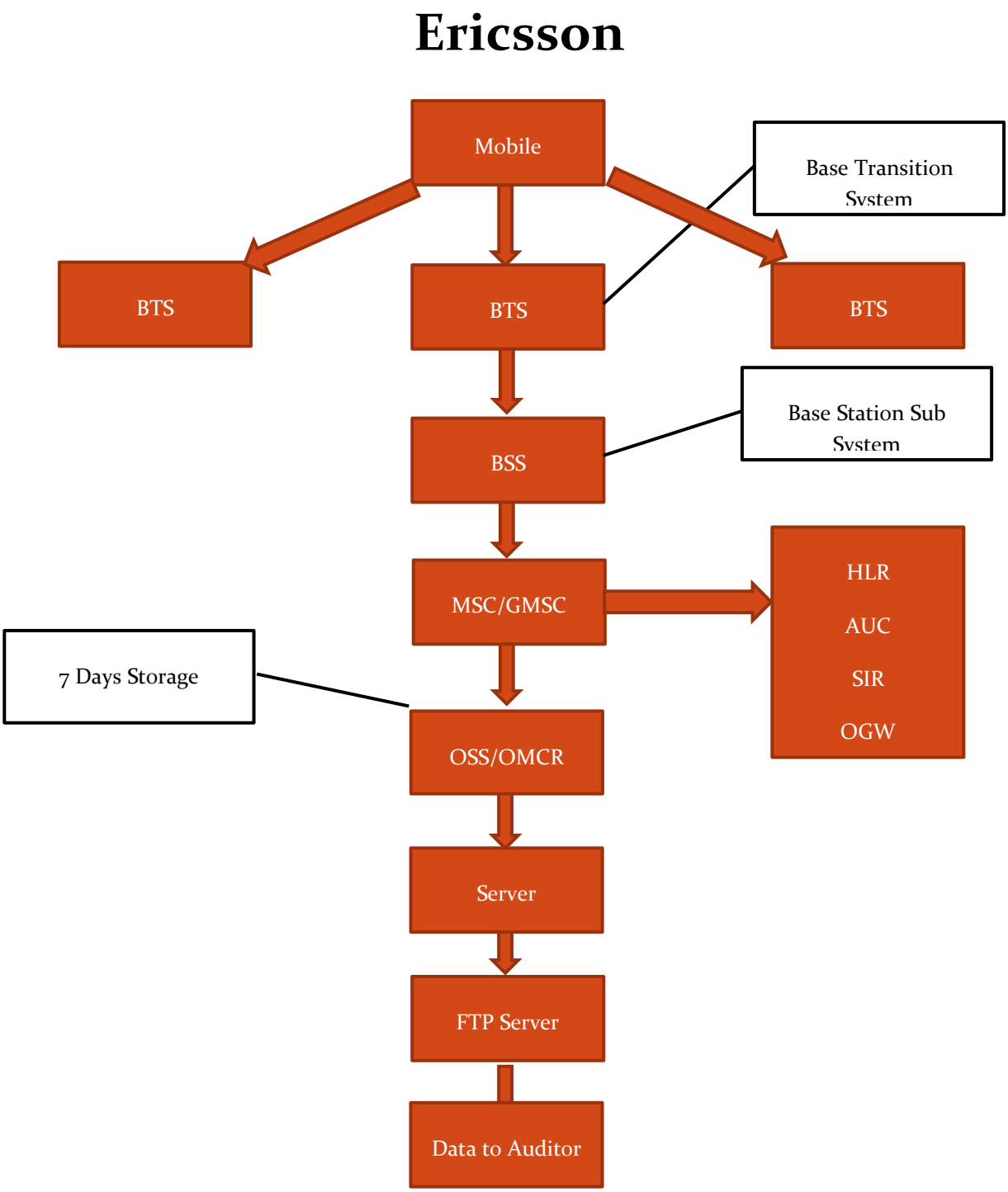
Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}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

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

8.16 BLOCK SCHEMATIC DIAGRAMS

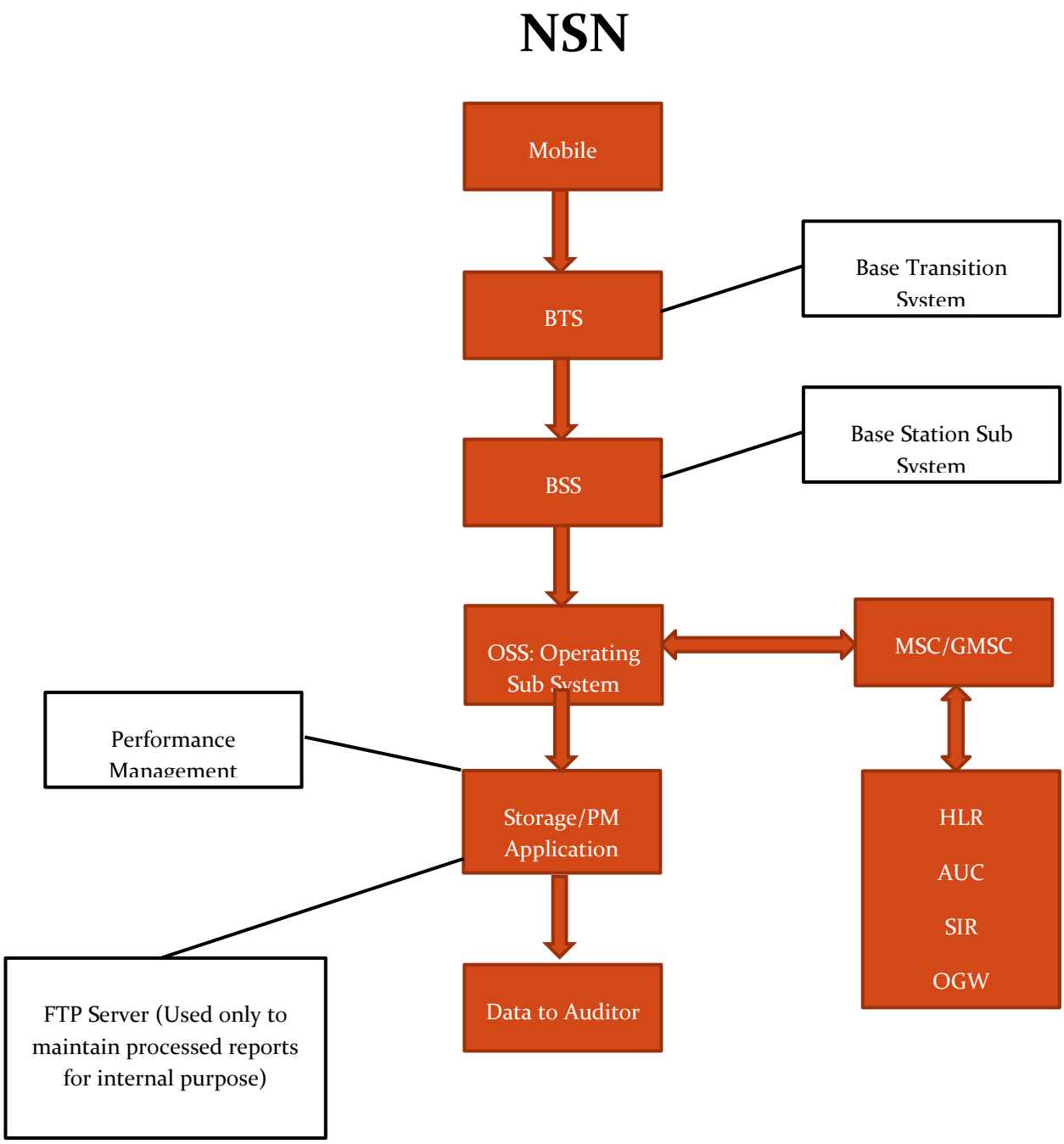
8.16.1 ERICSSON

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



8.16.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.



9 ANNEXURE – APRIL

Audit Results for Network Availability- PMR data-April										
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1768	2004	129	244	690	623	764	605	1593
Sum of downtime of BTSs in a month (in hours)		121709	4738	6023	9384	9847	128820	8256	1958	18349
BTSs accumulated downtime (not available for service)	≤ 2%	9.56%	0.33%	6.48%	5.34%	1.98%	28.72%	1.50%	0.45%	1.60%
Number of BTSs having accumulated downtime >24 hours		962	28	20	20	13	154	8	8	31
Worst affected BTSs due to downtime	≤ 2%	54.41%	1.40%	15.50%	8.20%	1.88%	24.72%	1.05%	1.32%	1.95%

Live Measurement Results for Network Availability- 3 Day live data-April										
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1768	1985	129	NDR	690	623	753	605	1593
Sum of downtime of BTSs in a month (in hours)		16656	565	796	NDR	933	11882	1004	1958	2123
BTSs accumulated downtime (not available for service)	≤ 2%	13.08%	0.40%	8.57%	NDR	1.88%	26.49%	1.85%	4.49%	1.85%
Number of BTSs having accumulated downtime >24 hours		260	0	8	NDR	13	154	8	8	3
Worst affected BTSs due to downtime	≤ 2%	14.71%	0.00%	6.20%	NDR	1.88%	24.72%	1.06%	1.32%	0.19%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-April										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	93.11%	90.33%	97.81%	95.29%	97.56%	69.62%	96.63%	98.57%	99.34%
SDCCH/Paging channel congestion	≤ 1%	0.82%	0.72%	NA	NA	0.94%	0.53%	0.84%	0.03%	0.18%
TCH congestion	≤ 2%	5.67%	0.60%	NDR	0.09%	1.97%	0.92%	1.28%	0.23%	0.66%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-April										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	90.12%	91.95%	98.01%	NDR	97.19%	69.62%	96.88%	98.41%	98.85%
SDCCH/Paging channel congestion	≤ 1%	0.73%	0.99%	NA	NA	0.93%	0.53%	0.82%	0.03%	0.66%
TCH congestion	≤ 2%	8.58%	0.66%	NDR	NDR	1.92%	0.92%	1.03%	0.24%	1.15%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-April										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of call attempts		778	518	NA	NDR	NA	NDR	384	544	567
Total number of successful calls established		756	515					356	497	537
CSSR	≥ 95%	97.17%	99.42%					92.71%	91.36%	94.71%
%age blocked calls		2.83%	0.58%					7.29%	8.64%	5.29%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-April										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		62576225	109566266	179666	1439586	85845038	243472350	12327914	12130714	1067764
Total number of calls dropped		1095421	1005482	2476	12471	1467950	846120	220669	74178	7260
Call drop rate	≤ 2%	1.75%	0.92%	1.38%	0.87%	1.71%	0.35%	1.79%	0.61%	0.68%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5108	5952	NDR	509	2029	1322	2294	1805	4797
Total number of cells having more than 3% TCH		830	40	NDR	16	60	174	47	3	111
Worst affected cells having more than 3% TCH	≤ 3%	16.25%	0.67%	NDR	3.14%	2.96%	13.16%	2.05%	0.17%	2.31%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-April										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		6191450	11243296	17715	NDR	8912029	8115745	16940711	1191535	639377
Total number of calls dropped		122263	109167	141	NDR	153914	28204	305582	6866	4098
Call drop rate	≤ 2%	1.97%	0.97%	0.80%	NDR	1.73%	0.35%	1.80%	0.58%	0.64%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5048	5913	NDR	NDR	2029	1322	2261	1805	4779
Total number of cells having more than 3% TCH		906	58	NDR	NDR	60	174	61	3	125
Worst affected cells having more than 3% TCH	≤ 3%	17.95%	0.98%	NDR	NDR	2.96%	13.16%	2.70%	0.17%	2.62%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-April										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		756	515	NA	NDR	NA	NDR	356	497	567
Total number of calls dropped		3	0					13	43	30
Call drop rate	≤ 2%	0.40%	0.00%					3.65%	8.65%	5.29%

Audit Results for Voice quality -PMR Data-April										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		9292148117	12634325410	NDR	70	100	95	2097175973	2208282021	189856506
Total number of calls with good voice quality		8658732152	12495746980	NDR	70	97	83	1996677353	2170193580	186561741
%age calls with good voice quality	≥ 95%	93.18%	98.90%	NDR	100.00%	97.00%	87.37%	95.21%	98.28%	98.26%

Live measurement results for Voice quality-3 Day data-April										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		889092757	1244763776	NDR	NDR	100	95	1953210309	213998418	96409967
Total number of calls with good voice quality		829219281	1229812867	NDR	NDR	97	83	1858967490	210408202	94796360
%age calls with good voice quality	≥ 95%	93.27%	98.80%	NDR	NDR	97.00%	87.37%	95.17%	98.32%	98.33%

Drive test results for Voice quality (Average of three drive tests) - DT data-April										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		1226853	108964					724537	176304	700931
Total number of calls with good voice quality		1141551	104375	NA	NDR	NA	NDR	657635	168302	655867
%age calls with good voice quality	≥ 95%	93.05%	95.79%					90.77%	95.46%	93.57%

Audit Results for POI Congestion- PMR data-April										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		37	15	NA	NA	35	NA	28	18	32
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		42086	61448	NA	NA	27802.53	NA	15495	10774	27631910
Traffic served for all POIs (B)- in erlangs		26189	21360	NA	NA	14435	NA	9455	4030	6351098
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.00%	NA	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data-April										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		37	15	NA	NA	35	NA	28	18	32
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	0	0
Total Capacity of all POIs (A) - in erlangs		42086	55375	NA	NA	27802.53	NA	15627	10774	921064
Traffic served for all POIs (B)- in erlangs		22310	20537	NA	NA	14435	NA	9142	4030	208999
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.48%	NA	0.00%	0.00%	0.00%

10 ANNEXURE – MAY

For Reliance GSM, data for May'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

Audit Results for Network Availability- PMR data-May										
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1773	2018	129	244	695	623	804	NDR	1594
Sum of downtime of BTSs in a month (in hours)		104190	13562	3094	8532	10128	106267	8885	NDR	16435
BTSs accumulated downtime (not available for service)	≤ 2%	7.90%	0.90%	3.22%	4.70%	1.96%	22.93%	1.49%	NDR	1.39%
Number of BTSs having accumulated downtime >24 hours		816	29	11	20	13	381	15	NDR	31
Worst affected BTSs due to downtime	≤ 2%	46.02%	1.44%	8.53%	8.20%	1.87%	61.16%	1.87%	NDR	1.94%
Live Measurement Results for Network Availability- 3 Day live data-May										
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1768	2005	129	244	690	623	765	NDR	1593
Sum of downtime of BTSs in a month (in hours)		9491	1275	482	840	963	12403	823	NDR	1753
BTSs accumulated downtime (not available for service)	≤ 2%	7.46%	0.88%	5.19%	4.78%	1.94%	27.65%	1.49%	NDR	1.53%
Number of BTSs having accumulated downtime >24 hours		125	0	2	13	13	370	11	NDR	0
Worst affected BTSs due to downtime	≤ 2%	7.07%	0.00%	1.55%	5.33%	1.88%	59.39%	1.44%	NDR	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-May										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	93.85%	90.38%	98.42%	95.77%	97.89%	80.68%	97.28%	NDR	99.51%
SDCCH/Paging channel congestion	≤ 1%	0.70%	0.65%	NA	NA	0.96%	0.41%	0.49%	NDR	0.14%
TCH congestion	≤ 2%	4.83%	0.55%	0.00%	0.11%	1.97%	0.83%	1.10%	NDR	0.49%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-May										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	92.71%	89.67%	98.74%	97.13%	97.23%	75.39%	98.91%	NDR	99.80%
SDCCH/Paging channel congestion	≤ 1%	0.71%	0.70%	NA	NA	0.95%	0.57%	0.44%	NDR	0.16%
TCH congestion	≤ 2%	6.01%	0.57%	0.00%	0.08%	1.92%	0.89%	0.31%	NDR	0.20%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-May										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of call attempts		354	468	1308	NA	417	NA	292	412	486
Total number of successful calls established		354	467	1143		401		291	406	469
CSSR	≥ 95%	100.00%	99.79%	87.39%		96.16%		99.66%	98.54%	96.50%
%age blocked calls		0.00%	0.21%	12.61%		3.84%		0.34%	1.46%	3.50%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-May										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		67050075	118583874	199974	1111016	86332466	120983712	13147898	NDR	33957132
Total number of calls dropped		1184959	1148790	2392	11338	1502185	7793329	198328	NDR	239580
Call drop rate	≤ 2%	1.77%	0.97%	1.20%	1.02%	1.74%	6.44%	1.51%	NDR	0.71%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5154	5982	NDR	509	2044	1322	2414	NDR	4817
Total number of cells having more than 3% TCH		868	58	NDR	11	61	167	38	NDR	127
Worst affected cells having more than 3% TCH	≤ 3%	16.84%	0.97%	NDR	2.16%	2.98%	12.63%	1.57%	NDR	2.64%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-May										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		6659675	11295849	9898	114674	8962631	966603	17095081	NDR	47165604
Total number of calls dropped		105700	107945	92	1095	157040	75932	225090	NDR	331374
Call drop rate	≤ 2%	1.59%	0.96%	0.93%	0.95%	1.75%	7.86%	1.32%	NDR	0.70%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5126	5974	NDR	509	2044	1322	2297	NDR	4802
Total number of cells having more than 3% TCH		795	53	NDR	17	60	486	44	NDR	132
Worst affected cells having more than 3% TCH	≤ 3%	15.51%	0.89%	NDR	3.34%	2.94%	36.76%	1.92%	NDR	2.75%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-May										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		354	467	1143		401		291	406	470
Total number of calls dropped		1	1	74	NA	9	NA	1	6	7
Call drop rate	≤ 2%	0.28%	0.21%	6.47%		2.24%		0.34%	1.48%	1.49%

Audit Results for Voice quality -PMR Data-May										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		9723170162	13279804720	NDR	70	100	95	2147071179	NDR	5955715251
Total number of calls with good voice quality		9056039416	13119519362	NDR	70	98	83	2042447446	NDR	5846155206
%age calls with good voice quality	≥ 95%	93.14%	98.79%	NDR	100.00%	98.00%	87.37%	95.13%	NDR	98.16%

Live measurement results for Voice quality-3 Day data-May										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		959228149	1290559605	NDR	70	100	95	2143149337	NDR	7161081354
Total number of calls with good voice quality		894443421	1275281562	NDR	70	98	83	2041736154	NDR	7283360166
%age calls with good voice quality	≥ 95%	93.25%	98.82%	NDR	100.00%	98.00%	87.37%	95.27%	NDR	101.71%

Drive test results for Voice quality (Average of three drive tests) - DT data-May										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		600819	663487	83837		639128		592452	127044	747320
Total number of calls with good voice quality		571076	633858	34125	NA	551116	NA	575303	125779	692506
%age calls with good voice quality	≥ 95%	95.05%	95.53%	40.70%		86.23%		97.11%	99.00%	92.67%

Audit Results for POI Congestion- PMR data-May										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	15	NA	NA	35	NA	28	NDR	35
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		43933	61049	NA	NA	27803	NA	15540	NDR	28964462
Traffic served for all POIs (B)- in erlangs		28001	20322	NA	NA	14143	NA	9583	NDR	6803015
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.49%	NA	0.00%	NDR	0.00%

x										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		37	15	NA	NA	35	NA	28	NDR	35
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		42086	60914	NA	NA	27803	NA	15625	NDR	934338
Traffic served for all POIs (B)- in erlangs		23645	22724	NA	NA	14143	NA	9801	NDR	220499
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.48%	NA	0.00%	NDR	0.00%

11 ANNEXURE – JUNE

For Reliance GSM, data for Jun'15 could not be audited due to a server issue at operator's end. The same was pre-informed to TRAI by the operator.

Audit Results for Network Availability- PMR data-June										
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1799	2041	129	244	706	623	856	NDR	1600
Sum of downtime of BTSs in a month (in hours)		104953	14242	3925	9408	10132	127634	10601	NDR	16733
BTSs accumulated downtime (not available for service)	≤ 2%	7.84%	0.94%	4.09%	5.18%	1.93%	27.54%	1.66%	NDR	1.41%
Number of BTSs having accumulated downtime >24 hours		827	28	10	21	14	413	17	NDR	30
Worst affected BTSs due to downtime	≤ 2%	45.97%	1.37%	7.75%	8.61%	1.98%	66.29%	1.99%	NDR	1.88%
Live Measurement Results for Network Availability- 3 Day live data-June										
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		1765	2016	129	244	690	623	804	NDR	1590
Sum of downtime of BTSs in a month (in hours)		7994	1583	139	936	706	11225	986	NDR	1892
BTSs accumulated downtime (not available for service)	≤ 2%	6.29%	1.09%	1.50%	5.33%	1.42%	25.03%	1.70%	NDR	1.65%
Number of BTSs having accumulated downtime >24 hours		60	0	0	14	14	413	15	NDR	1
Worst affected BTSs due to downtime	≤ 2%	3.40%	0.00%	0.00%	5.74%	2.03%	66.29%	1.87%	NDR	0.06%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-June										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	92.87%	89.00%	98.30%	96.70%	97.53%	78.24%	96.18%	NDR	99.42%
SDCCH/Paging channel congestion	≤ 1%	0.94%	0.63%	NA	NA	0.95%	0.43%	0.62%	NDR	0.15%
TCH congestion	≤ 2%	5.84%	0.68%	0.00%	0.13%	1.98%	0.84%	1.65%	NDR	0.58%

Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-June										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	91.91%	91.20%	98.37%	96.34%	97.45%	79.45%	98.47%	NDR	99.57%
SDCCH/Paging channel congestion	≤ 1%	1.27%	0.56%	NA	NA	0.96%	0.40%	0.38%	NDR	0.19%
TCH congestion	≤ 2%	6.86%	0.47%	0.00%	15.00%	1.96%	0.83%	0.56%	NDR	0.43%

Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-June										
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of call attempts		114	453	NA	NDR	NA	648	107	106	510
Total number of successful calls established		114	452				597	106	105	471
CSSR	≥ 95%	100.00%	99.78%				92.13%	99.07%	99.06%	92.35%
%age blocked calls		0.00%	0.22%				7.87%	0.93%	0.94%	7.65%

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-June										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		64350849	112184525	640878	865452	86822662	121779738	12686584	NDR	33033209
Total number of calls dropped		1126414	1076784	4149	9568	1554126	8271582	199961	NDR	226101
Call drop rate	≤ 2%	1.75%	0.96%	0.65%	1.11%	1.79%	6.79%	1.58%	NDR	0.68%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5088	6029	NDR	509	2077	1322	2571	NDR	4846
Total number of cells having more than 3% TCH		878	53	NDR	17	62	167	51	NDR	115
Worst affected cells having more than 3% TCH	≤ 3%	17.26%	0.88%	NDR	3.34%	2.99%	12.63%	1.98%	NDR	2.37%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-June										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		6476153	11488307	21056	122323	9013521	11255897	17117930	NDR	48189644
Total number of calls dropped		117227	112984	251	1712	158143	646625	235234	NDR	293872
Call drop rate	≤ 2%	1.81%	0.98%	1.19%	1.40%	1.75%	5.74%	1.37%	NDR	0.61%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of cells in the network		5053	6009	NDR	509	2077	1322	2414	NDR	4846
Total number of cells having more than 3% TCH		909	45	NDR	17	61	486	53	NDR	106
Worst affected cells having more than 3% TCH	≤ 3%	18.00%	0.75%	NDR	3.34%	2.94%	36.76%	2.20%	NDR	2.19%

Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-June										
Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of calls established		114	451	NA	NDR	NA	648	106	105	471
Total number of calls dropped		0	1				51	0	2	21
Call drop rate	≤ 2%	0.00%	0.22%				7.87%	0.00%	1.90%	4.46%

Audit Results for Voice quality -PMR Data-June										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		9065150712	12292510446	NDR	70	100	95	2058148299	NDR	5777678174
Total number of calls with good voice quality		8431883252	12144513736	NDR	70	98	83	1969555837	NDR	5675358504
%age calls with good voice quality	≥ 95%	93.01%	98.80%	NDR	100.00%	98.00%	87.37%	95.70%	NDR	98.23%

Live measurement results for Voice quality-3 Day data-June										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		922582940	1252607930	NDR	70	100	95	2117974363	NDR	7342216963
Total number of calls with good voice quality		857609967	1237437950	NDR	70	98	83	2013493047	NDR	7224174344
%age calls with good voice quality	≥ 95%	92.96%	98.79%	NDR	100.00%	98.00%	87.37%	95.07%	NDR	98.39%

Drive test results for Voice quality (Average of three drive tests) - DT data-June										
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of sample calls		240031	803627	NA	NDR	NA	47706	185109	177076	779220
Total number of calls with good voice quality		227244	769909				41752	178035	176393	710108
%age calls with good voice quality	≥ 95%	94.67%	95.80%				87.52%	96.18%	99.61%	91.13%

Audit Results for POI Congestion- PMR data-June										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		39	14	NA	NA	35	NA	29	NDR	35
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		45873	64945	NA	NA	27803	NA	15584	NDR	28395582
Traffic served for all POIs (B)- in erlangs		26751	21284	NA	NA	14315	NA	9606	NDR	6618609
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.49%	NA	0.00%	NDR	0.00%

Live Measurement Results for POI Congestion- 3 Day data-June										
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA NE 1	BSNL CDMA NE 2	BSNL GSM NE 1	BSNL GSM NE 2	Idea	Reliance GSM	Vodafone
Total number of working POIs		37	14	NA	NA	35	NA	28	NDR	35
No. of POIs not meeting benchmark		0	0	NA	NA	0	NA	0	NDR	0
Total Capacity of all POIs (A) - in erlangs		42086	60838	NA	NA	27803	NA	15576	NDR	946519
Traffic served for all POIs (B)- in erlangs		24734	21454	NA	NA	14315	NA	9902	NDR	225561
POI congestion	≤ 0.5%	0.00%	0.00%	NA	NA	0.49%	NA	0.00%	NDR	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. AMJ'15 – Refers to the quarter of April, May and June 2015
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

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