EAST ZONE

TRAI AUDIT WIRELESS REPORT-ASSAM CIRCLE- AMJ QUARTER, 2014

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Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)

1   TABLE OF CONTENTS

2   INTRODUCTION

2.1   ABOUT TRAI

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

In pursuance of above objective, TRAI has been issuing regulations, order and directives to deal with the issues or complaints raised by the operators as well as the consumers. These regulations, order and directives have helped the 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 the March 20, 2009 and Quality of Service of Broadband Service Regulations, 2006 (11 of 2006) dated the October 6, 2006 provide for 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).

2.3   COVERAGE

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

Image Source: BSNL website

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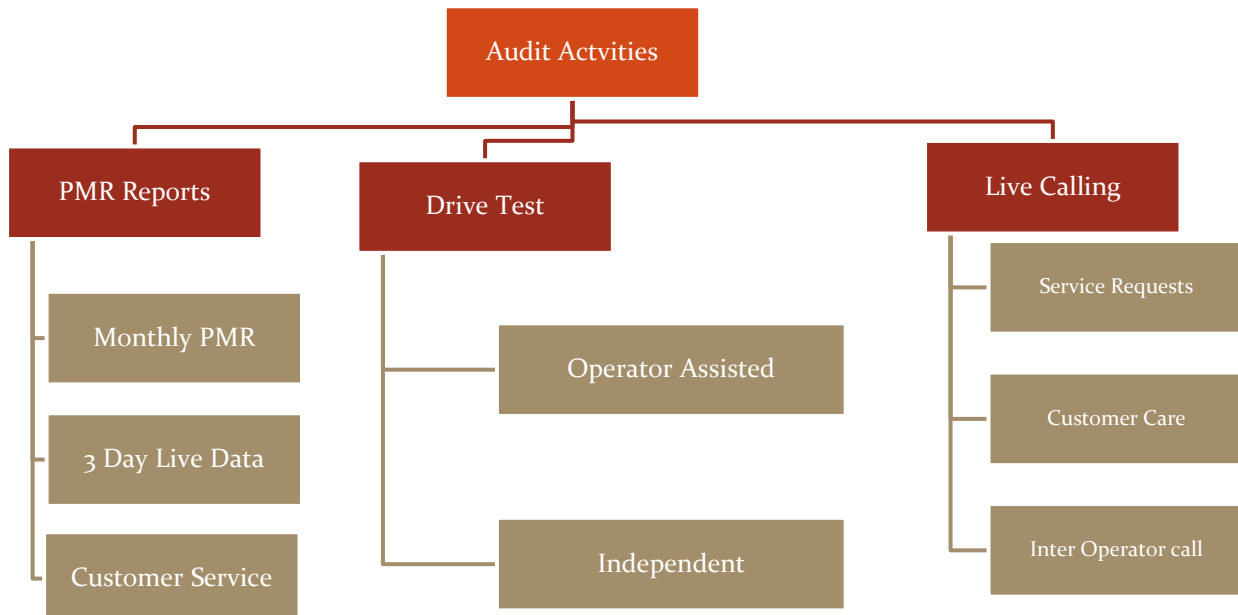
Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

PMR or Performance Monitoring Reports are generated by operators 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 is extracted in the following three formats.

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

During audit, PMR is extracted from the server/NOC/exchange etc. in the presence of the auditor. All the calculations are done during the audit by the operators and IMRB auditors verify the calculations done by the operators.

The verified PMR reports are then submitted in hard copy by the operators to the auditor with authorized signatures of the operator personnel. Sometimes, operators also submit a soft copy of the same report along with hard copy for the sake of convenience.

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

The PMR report for customer service parameters is extracted and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending June 2014 (AMJ'14) was collected in the month of July 2014.

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

2.4.1.2 POINT OF DATA EXTRACTION

The data is extracted from a terminal/computer connected to OMCR on the operator network.
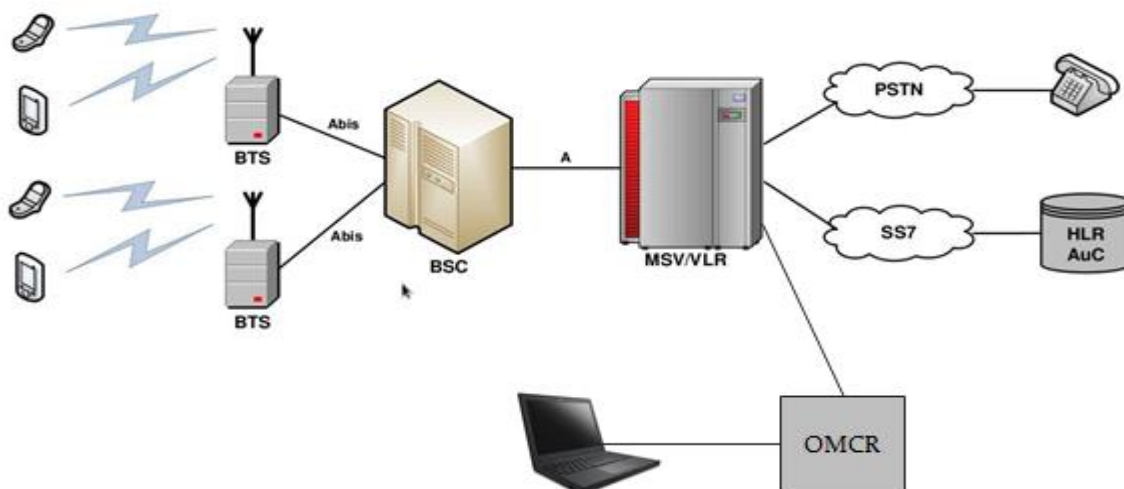
2.4.1.3 STEP BY STEP AUDIT PROCEDURE

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

All the operators operating in the Wireless domain are informed about the Audit. Tender document is taken as a reference document for assimilating the presence of operators.

Audit formats and schedule is shared with the concerned persons. It includes day of the visit and date of 3 day data collection and other requirements.

IMRB auditors visit the respective NOC and extracts the information from the server/exchanges/central NOC through FTP.

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

After extraction of the parametrs, necessary mathemetical operations are done to arrive at figures.

Operators are asked to prepare a report in presence of IMRB personnel from the data extracted and give their comments wherever required. All the comments are stamped and signed by the comcerned person.

IMRB Auditors validate the values with raw data and also put in their comments whereever required.

The final audit sheet is signed by the operator person in-charge and IMRB personnel along with Stamp.

Data has been extracted and calculated as per the counter details.

2.4.1.4 MONTHLY PMR

This involved calculation of the various Quality of Service network parameters through monthly Performance Monitoring Reports (PMR's). The PMR reports were extracted in presence of IMRB representative from the operator's premises for the month of April, May and June. 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 parameter in section 4.

2.4.1.5   AUDIT PARAMETERS

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%

Customer Service Quality-

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 60 seconds	≥ 90%
Termination/ closure of service	≤ 7 days
Time taken for refund of deposits after closures within 60 days	100%

2.4.1.6   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 day end values, the 3 day live data is created by taking dump of network parameters on hourly basis. All the calculations are then done on the basis of that dump 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 at the end of the 3rd day. The extracted data was analyzed to assess the various QoS parameters.

2.4.1.7   CUSTOMER SERVICE PARAMETERS

The 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 2014 (AMJ'14) was collected in the month of July 2014.

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

The Customer Service Quality Parameters include response time to the customer for assistance, termination/closure of service and time taken for refund of security deposit after closures. All the customer service parameters were calculated on the quarterly basis.

All the parameters have been described in detail along with key findings of the parameter in section 5.

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.

The IMRB auditor visits each operator premises to do live calling. The operators provide the data dump of customer service complaints 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 dump provided to verify the resolution of complaints.

The auditors also verify the performance of call center. 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.

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Live calling activity was carried out during the period of July 2014. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of June'14 was considered for live calling activity conducted in July 2014.

A detailed explanation of each parameter is explained below.

2.4.2.2   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.

2.4.2.3   CUSTOMER CARE

Overall sample size is 2*50 calls per service provider per circle at different points of time, to be evenly distributed across the selected exchanges – 50 calls between 10:00 hours to 13:00 hours and 50 calls between 15:00 hours to 17:00 hours.

The time taken to answer the call through IVR and Customer Care is recorded by the audit agency.

TRAI Benchmark- Response time to the customer for assistance:
(a) Accessibility of call center/customer care/IVR>= 95%
(b) % age of calls answered by the operator (voice to voice): within 60 seconds = 90%

2.4.2.4   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 its 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-
    - o   With In city
    - o   Major Roads
    - o   Highways
    - o   Shopping complex/ Mall
    - o   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-
  - o With In city
  - o Major Roads
  - o Highways
  - o Shopping complex/ Mall
  - o 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 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

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

Name of Operator	Number of Subscriber as per VLR
Aircel(DWL)	2323504
Airtel	3712997
BSNL	722577
Idea	1298591
MTS	617690
Reliance CDMA	1056435
Reliance GSM	2671410
TATA CDMA	97951
TATA GSM	1810031
Vodafone	4448589

2.6   COLOUR CODES TO READ THE REPORT
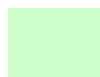
Not Meeting the benchmark   Best Performing Operator

3   EXECUTIVE SUMMARY

3.1   PMR DATA – 3 MONTHS- CONSOLIDATED

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

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)	6.15%	34.57%	95.23%	1.28%	3.04%	1.91%	14.86%	91.79%
Airtel	0.24%	1.39%	98.35%	0.43%	0.65%	0.98%	0.88%	98.47%
BSNL CDMA	19.51%	33.47%	97.55%	1.85%	0.00%	1.52%	11.86%	96.22%
BSNL GSM	2.53%	5.25%	95.16%	1.07%	1.53%	2.37%	5.51%	93.93%
Idea	0.52%	0.55%	98.55%	0.30%	1.12%	1.19%	1.98%	95.24%
Reliance GSM	0.41%	1.53%	98.54%	0.03%	0.17%	0.71%	0.08%	98.46%
Vodafone	0.79%	1.88%	99.30%	0.21%	0.70%	0.61%	2.69%	97.73%

Note: Auditors were not able to get the BSNL CDMA June'14 data as the operator did not cooperate despite multiple reminders and visits. The values given in the table are averages of April and May data.

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

BTSs Accumulated Downtime:

Except Aircel 6.15%, BSNL CDMA 19.51% & BSNL GSM 2.53% all other operators met the benchmark. Maximum BTS accumulated downtime was recorded for BSNL CDMA at 19.51% and minimum BTS Accumulated downtime was recorded for Airtel at 0.24%.

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Worst Affected BTSs Due to Downtime:

Aircel 34.57%, BSNL CDMA 33.47% and BSNL GSM 5.25% failed to meet the benchmark. Minimum worst affected BTSs due to downtime was recorded for Idea at 0.55%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark on this parameter. During the audits, the maximum CSSR was observed for Vodafone with 99.30%. All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH, and POI are part of the network congestion parameters. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI.

Aircel 1.28%, BSNL CDMA 1.85% and BSNL GSM 1.07% failed to meet the benchmark on SDCCH / Paging Channel Congestion and Aircel 3.04% missed the benchmark on TCH congestion. Reliance GSM was best for the both parameters by recording 0.03% and 0.17%.

Call Drop Rate:

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. Also, most of the service providers were found to be meeting the TRAI specified benchmark except BSNL GSM which had a call drop rate of 2.37%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL CDMA, & BSNL GSM having scores of 14.86%%, 11.86%, and 5.51% respectively failed to meet the benchmark.

Voice Quality

During the audit, all parameters were measured according to the TRAI guidelines. The %age of connection with good voice quality was measured as the ratio of total number of calls with voice quality with RxQual value 0-5 to the total number of sample calls.

Aircel 91.79% & BSNL GSM 93.93% failed to meet the benchmark.

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 parameter more or less corroborated 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	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel(DWL)	5.75%	5.60%	97.47%	0.77%	1.56%	1.71%	17.53%	91.82%
Airtel	0.24%	0.00%	98.25%	0.21%	0.69%	0.99%	0.89%	98.48%
BSNL CDMA	18.22%	4.34%	97.52%	1.47%	0.00%	1.64%	8.45%	96.22%
BSNL GSM	3.63%	2.60%	94.32%	0.68%	3.24%	2.50%	6.68%	93.93%
Idea	0.46%	0.11%	99.39%	0.08%	0.33%	0.92%	1.90%	95.94%
Reliance GSM	0.31%	0.00%	98.56%	0.03%	0.16%	0.69%	0.64%	98.93%
Vodafone	0.77%	0.08%	99.69%	0.10%	0.31%	0.55%	2.64%	98.15%

Note: Auditors were not able to get the BSNL CDMA June'14 data as the operator did not cooperate despite multiple reminders and visits. The values given in the table are averages of April and May data.

BTSs Accumulated Downtime:

Aircel 5.75%, BSNL CDMA 18.22% & BSNL GSM 3.63% failed to meet the TRAI specified benchmark. Minimum BTS Accumulated downtime was recorded for Airtel at 0.24%.

Worst Affected BTSs Due to Downtime:

Aircel 5.60%, BSNL CDMA 4.34%, & BSNL GSM 2.60% did not meet the benchmark.

Call Set-up Success Rate (CSSR):

Most of the operators met the benchmark on this parameter except BSNL GSM 94.32%. During the audits the maximum CSSR was observed for Vodafone with 99.69% of their calls getting completed.

All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH, and POI are part of the network congestion parameters. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI.

Most of the operators met the TRAI specified benchmarks on the congestion parameters except BSNL CDMA 1.47% on SDCCH / Paging Channel Congestion and BSNL GSM 3.24% on TCH congestion. Reliance GSM was best for the both parameters by recording 0.03% and 0.16%.

Call Drop Rate:

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.

Excluding BSNL GSM 2.50%, all the other service providers were found to be meeting the TRAI specified benchmark.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel, BSNL CDMA & BSNL GSM having 17.53%%, 8.45%, and 6.68% respectively as Worst Affected Cells Having More than 3% TCH Drop did not meet the TRAI benchmark..

Voice Quality

During the Audit all parameters were measured according to the TRAI guidelines. The %age of connection with good voice quality was measured as the ratio of total number of calls with voice quality with RxQual value 0-5 to the total number of sample calls.

Aircel 91.79% & BSNL GSM 93.93% failed to meet the benchmark. The highest %age of connection with good voice quality was recorded by Reliance GSM at 98.93%.

3.3   LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Service Requests	Response time to customer for assistance	
	Complaint /Request attended to Satisfaction	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark		≥ 95%	≥ 90%
Aircel(DWL)	98.00%	100.00%	88.00%
Airtel	89.00%	100.00%	89.00%
BSNL CDMA	NA	100.00%	82.00%
BSNL GSM	84.00%	100.00%	85.00%
Idea	96.00%	100.00%	91.00%
Reliance GSM	86.00%	100.00%	95.00%
Vodafone	NA	100.00%	93.00%

Complaint/Request Attended to Satisfaction

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

Note: No Service complaint raw data received from operator and we were reported by operator that there is no service complaint raw data in the given period for BSNL CDMA and Vodafone.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect all the service providers meet the TRAI benchmark with 100% accessibility of all call center/customer care center which is well much above the TRAI benchmark of 95%.

Customer Care / Helpline Assessment

It was observed that only Idea, Reliance GSM and Vodafone met TRAI benchmark of 90% of calls answered by the centres within 60 seconds while rest of the operators recorded below the benchmark.

3.4 CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Customer care	
	Percentage of calls answered by the operators IVR within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 60 seconds
Benchmark	≥ 95%	≥ 90%
Aircel(DWL)	96.30%	88.87%
Airtel	100.00%	94.32%
BSNL CDMA	NDR	NDR
BSNL GSM	78.03%	90.92%
Idea	99.38%	97.84%
Reliance GSM	98.99%	86.84%
Vodafone	99.89%	96.49%

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

BSNL GSM 78.03% did not meet the benchmark of 95% of its IVR call being attended within 60 seconds. Airtel performed the best with 100% of its calls getting answered in 60 seconds by the IVR.

Customer Care Percentage of calls answered by the operators (Voice to Voice) within 60 seconds

For voice to voice calls, Aircel & Reliance GSM failed to meet the benchmark.

3.5 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

Inter operator call Assessment To↓　　　　　From→	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Aircel(DWL)	NA	92.00%	91.00%	89.00%	91.00%	91.00%	89.00%
Airtel	90.00%	NA	91.00%	93.00%	91.00%	92.00%	89.00%
BSNL CDMA	89.00%	92.00%	NA	89.00%	90.00%	89.00%	88.00%
BSNL GSM	87.00%	87.00%	87.00%	NA	87.00%	89.00%	87.00%
Idea	89.00%	92.00%	89.00%	91.00%	NA	93.00%	90.00%
Reliance GSM	NA	85.00%	93.00%	95.00%	93.00%	NA	91.00%
Vodafone	87.00%	91.00%	92.00%	92.00%	93.00%	90.00%	NA

▢ **Maximum Problem faced by the calling operator to other operator**

In the inter-operator call assessment, all the operators faced problems in connecting to other operators. Aircel and Vodafone were found to have problems in connecting to almost all other operators.

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

4.1 BTS ACCUMULATED DOWNTIME

4.1.1 PARAMETER DESCRIPTION

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

1. BTSs Accumulated downtime (not available for service)

2. Worst affected BTSs due to downtime

1. **Definition - BTSs 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.

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4.1.2 KEY FINDINGS
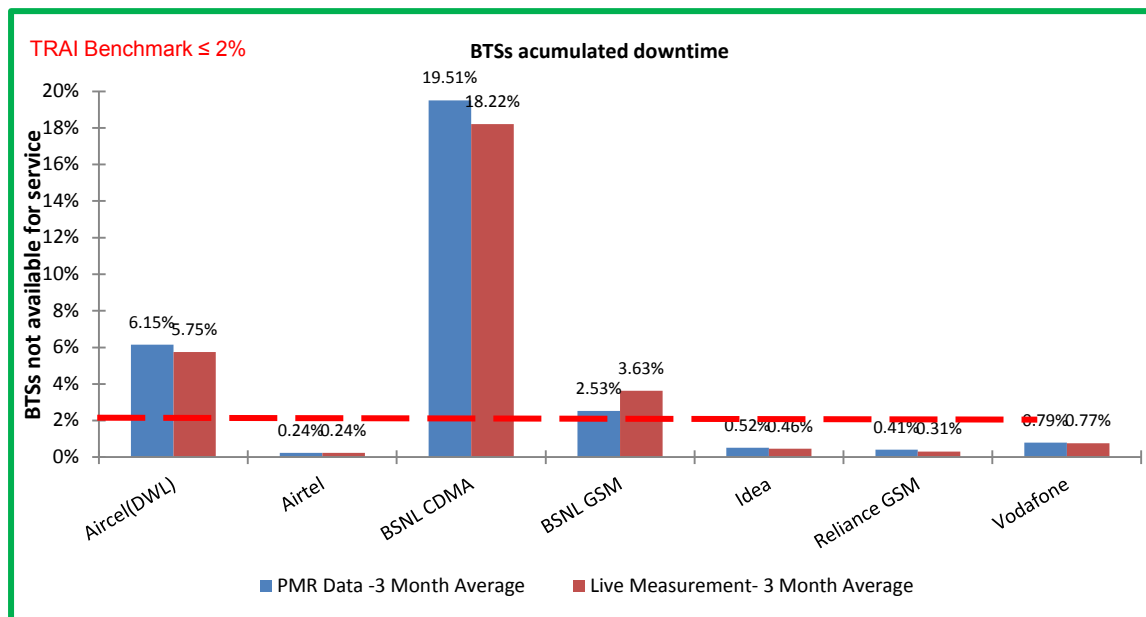
Aircel BSNL CDMA and BSNL GSM did not meet the benchmark on aspect of BTS Accumulated downtime as per PMR data.

4.2 WORST AFFECTED BTS DUE TO DOWNTIME

4.2.1 PARAMETER DESCRIPTION

1. **Definition – Worst Affected BTS due to downtime** shall basically measure percentage of BTS having downtime greater than 24 hours in a month. Planned outages were not considered as part while computing.

   For measuring the parameter "Percentage of worst affected BTSs due to downtime" the downtime of each BTS lasting for more than 1 hour at a time in a day during the period of a month was considered.

2. **Computation Methodology –**

   Worst affected BTSs due to downtime = (Number of BTSs having accumulated downtime greater than 24 hours in a month / Number of BTS in Licensed Service Area) * 100

3. **TRAI Benchmark –**

     a. Worst affected BTSs due to downtime ≤ 2%

4. Audit Procedure –

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

    ii. All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

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

    iv. Any outage as a result of force majeure was not considered at the time of calculation.

    v. List of operating sites with cell details and ids are taken from the operator.

    vi. All the BTS having down time greater than 24 hours is assessed and values of BTS accumulated downtime is computed in accordance.

4.2.2 KEY FINDINGS
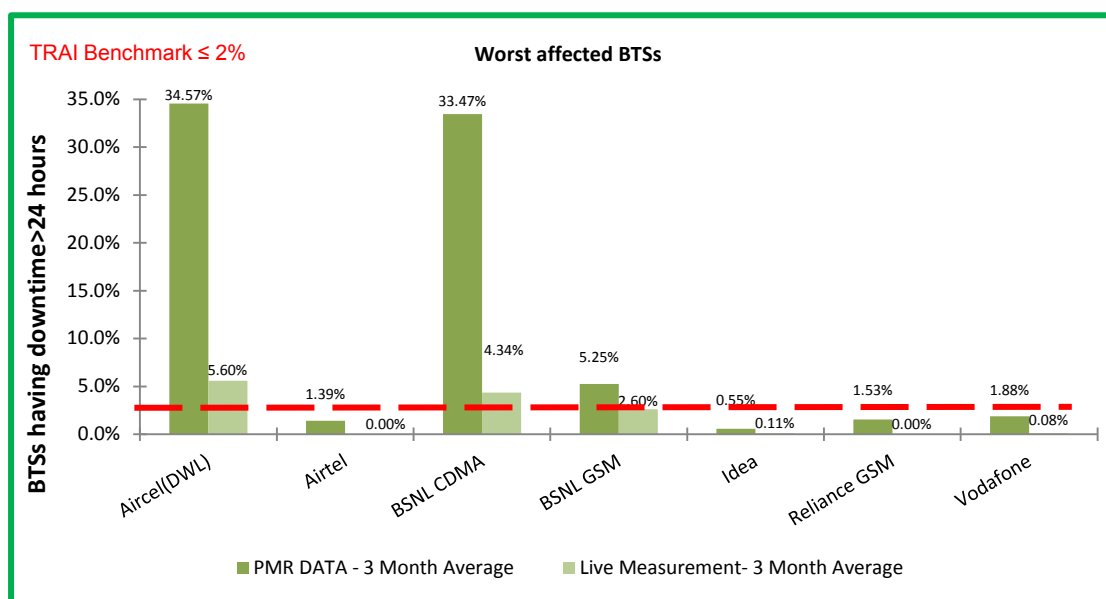
Aircel, BSNL CDMA, and BSNL GSM did not meet the benchmark for worst affected BTSs due to downtime as per PMR report.

Significant difference was observed between PMR & live measurement data for Aircel & BSNL CDMA, which could be accounted for the variation in the sample size.

4.3   CALL SET UP SUCCESS RATE

4.3.1   PARAMETER DESCRIPTION

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

2. **Computation Methodology-**

   (Calls Established / **Total Call Attempts) * 100**

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

   - ↳ call attempt is made

   - ↳ the TCH is allocated

   - ↳ the call is routed to the outward path of the concerned MSC

3. **TRAI Benchmark ≥** 95%

4. **Audit Procedure** –

   - ↳ The cell-wise data generated through counters/ MMC available in the switch for traffic measurements

   - ↳ CSSR calculation should be measured using OMC generated data only

   - ↳ Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week

   - ↳ Counter data is extracted from the NOC of the operators.

   - ↳ Total calls established include all calls established excluding Signaling blocking, TCH Drop and TCH blocking.

   - ↳ The numerator and denominator values are derived from adding the counter values from the MSC.

4.3.2 KEY FINDINGS
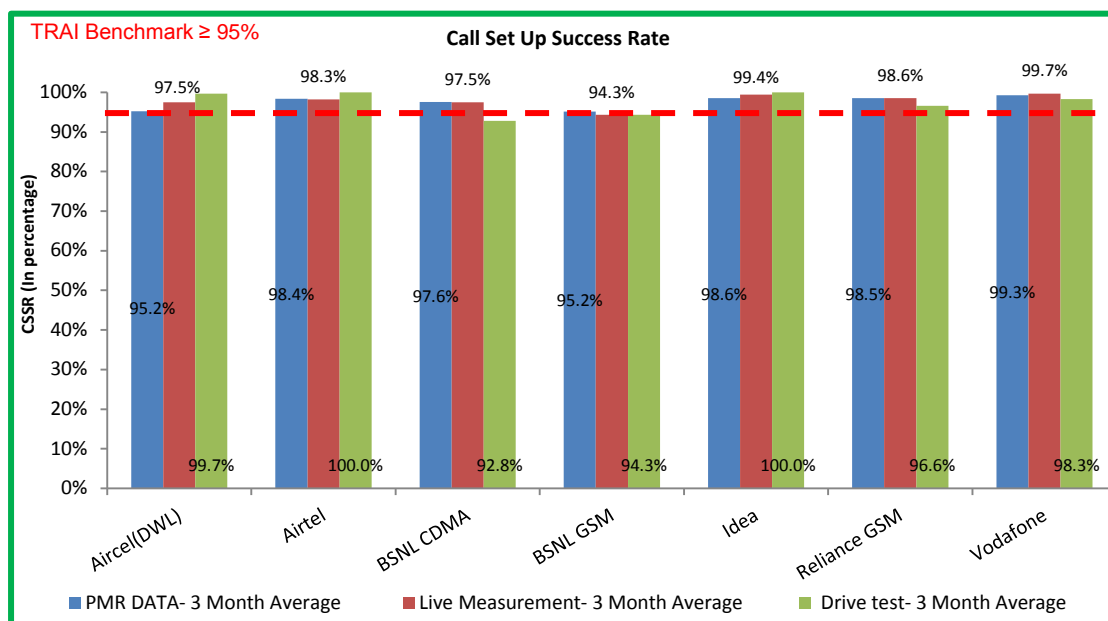
All operators met the benchmark during audit.

However, BSNL GSM during live measurement and BSNL CDMA & BSNL GSM in drive test did not meet the benchmark for Call Setup Success Rate.

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

4.4.1 PARAMETER DESCRIPTION

1. **Definition:** It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels:

   ✤ SDCCH Level: Stand-alone dedicated control channel

   ✤ TCH Level: Traffic Channel

   ✤ POI Level: Point of Interconnect

2. **Computational Methodology:**

   ✤ **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.......+ (An x Cn)] / (A1 + A2 +...+ An)**

      • Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1

      • C1 = Average SDCCH / TCH Congestion % on day 1

      • A2 = Number of attempts to establish SDCCH / TCH made on day 2

- C2 = Average SDCCH / TCH Congestion % on day 2

- An = Number of attempts to establish SDCCH / TCH made on day n

- Cn = Average SDCCH / TCH Congestion % on day n

↪ **POI Congestion% = [(A1 x C1) + (A2 x C2) +.......+ (An x Cn)] / (A1 + A2 +...+ An)**

- Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1

- C1 = Average POI Congestion % on day 1

- A2 = POI traffic offered on all POIs (no. of calls) on day 2

- C2 = Average POI Congestion % on day 2

- An = POI traffic offered on all POIs (no. of calls) on day n

- Cn = Average POI Congestion % on day n

3. **Benchmark:**

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

4. **Audit Procedure –**

↪ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) would be conducted

↪ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

4.4.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION
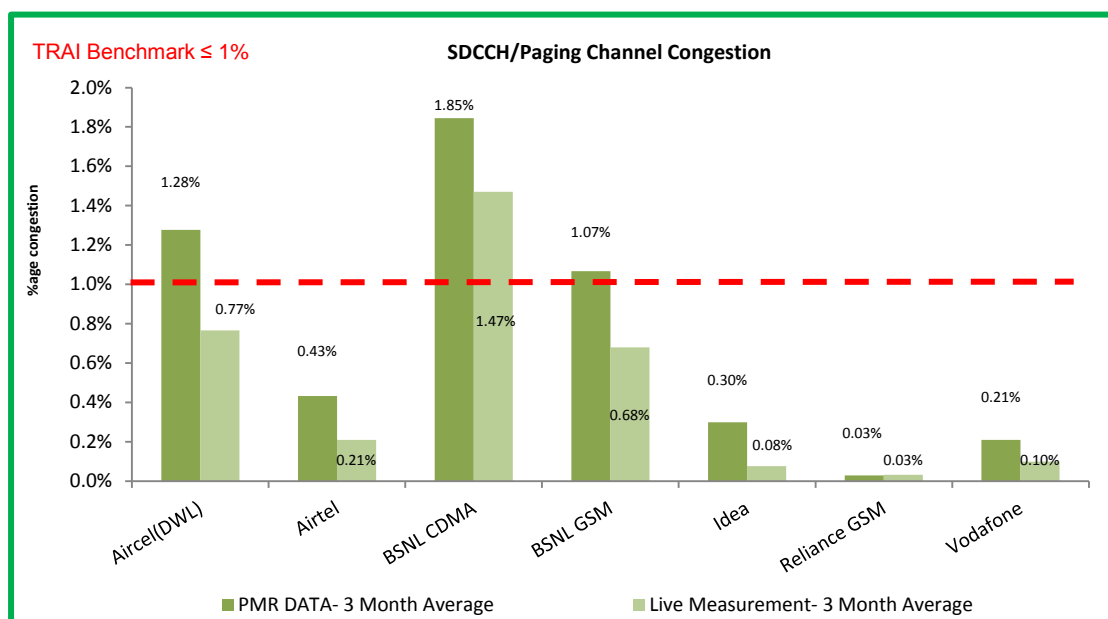
Aircel, BSNL CDMA and BSNL GSM failed to meet the benchmark as per PMR Data. Significant difference was observed between PMR & live measurement data for all operators except Reliance GSM.

4.4.3 KEY FINDINGS – TCH CONGESTION
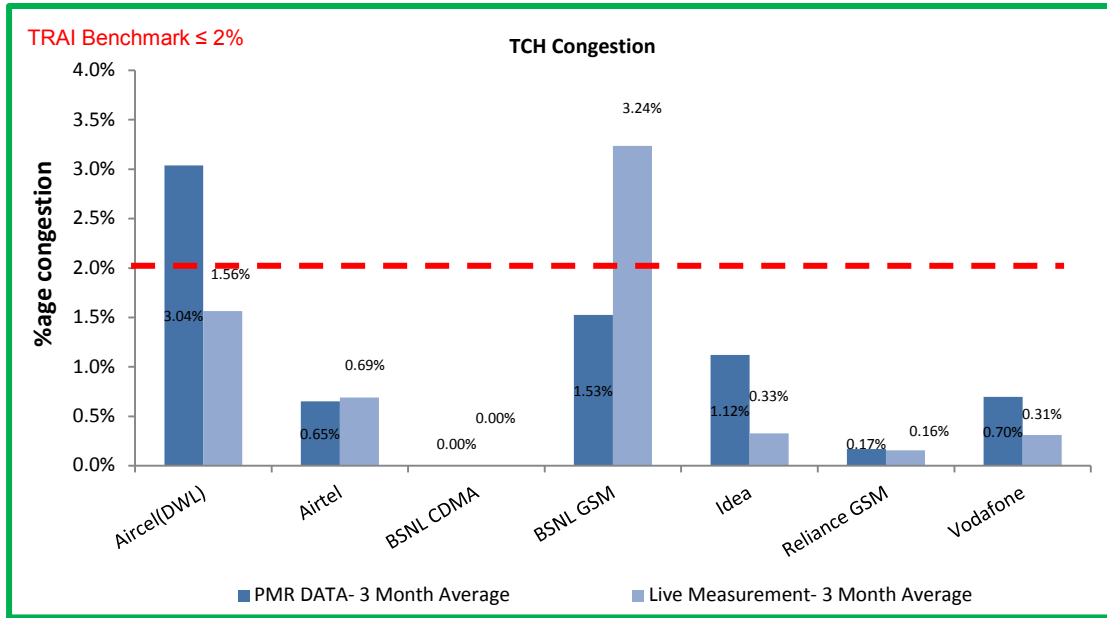
Aircel failed to meet the benchmark as per PMR report. Significant difference was observed between PMR & live measurement data for Aircel, BSNL GSM, Idea and Vodafone, which could be accounted for the variation in the sample size.

4.4.4 KEY FINDINGS – POI CONGESTION

Audit Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		47	18	0	19	28	20	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81623	93393	0	19472	18806	31949	56368514
Traffic served for all POIs (B)- in erlangs		52263	32470	0	21729	12231	21143	14447702
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.11%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		46	18	0	19	28	20	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81400	91270	0	19472	18705	32212	5674274
Traffic served for all POIs (B)- in erlangs		52757	32428	0	18548	12588	21625	1468667
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

All the operators met the benchmark of POI congestion as per PMR Data and Live measurement.

4.5 CALL DROP RATE

4.5.1 PARAMETER DESCRIPTION

1. **Definition** - The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released.

   ↳ **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss

   ↳ **Total calls established** = All calls that have TCH allocation during busy hour

2. **Computational Methodology:** (**Total Calls Dropped** / **Total Calls Established) x 100**

3. **TRAI Benchmark** –

   ↳ Call drop rate ≤ 2%

4. **Audit Procedure** –

   ↳ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was used

   ↳ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter.

4.5.2 KEY FINDINGS
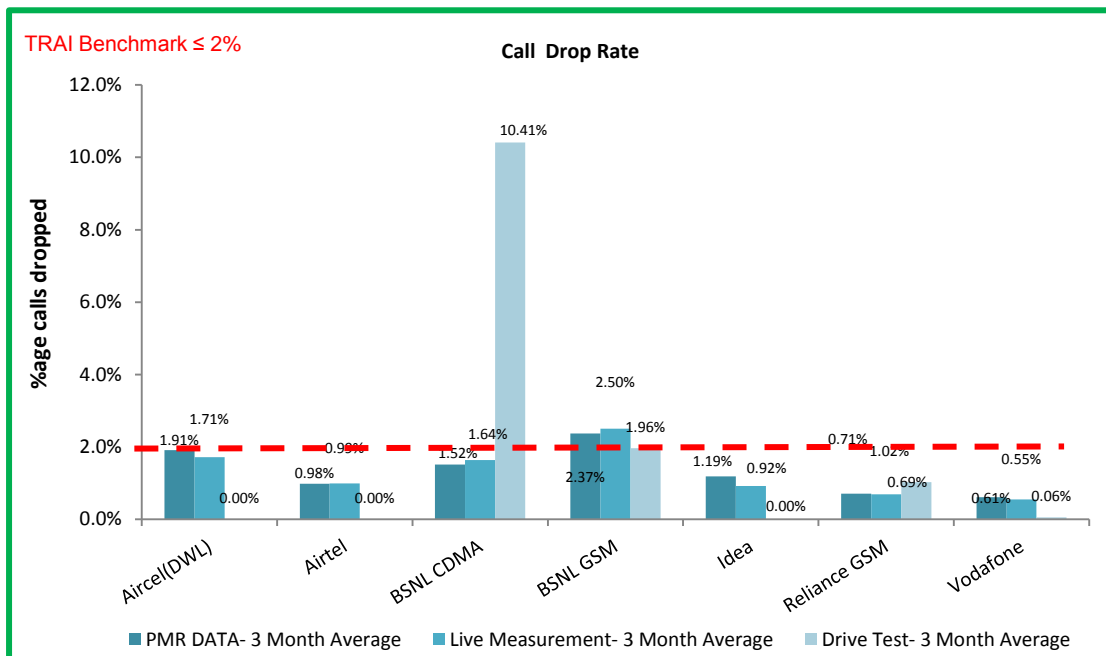
BSNL GSM failed to meet the benchmark for call drop rate during audit. The call drop rate during drive test for BSNL CDMA was far inferior to its PMR or live measurement data.

4.6 CELLS HAVING GREATER THAN 3% TCH DROP

4.6.1 PARAMETER DESCRIPTION

1. **Definition- Worst Affected Cells having more than 3% TCH drop** shall measure the ratio of total number of cells in the network to the ratio of cells having more than 3% TCH drop.

2. **Computational Methodology:** **(Total number of cells having more than 3% TCH drop** / **Total number of cells in the network) x 100**

3. **TRAI Benchmark –**

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

4. **Audit Procedure –**

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

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

4.6.2 KEY FINDINGS
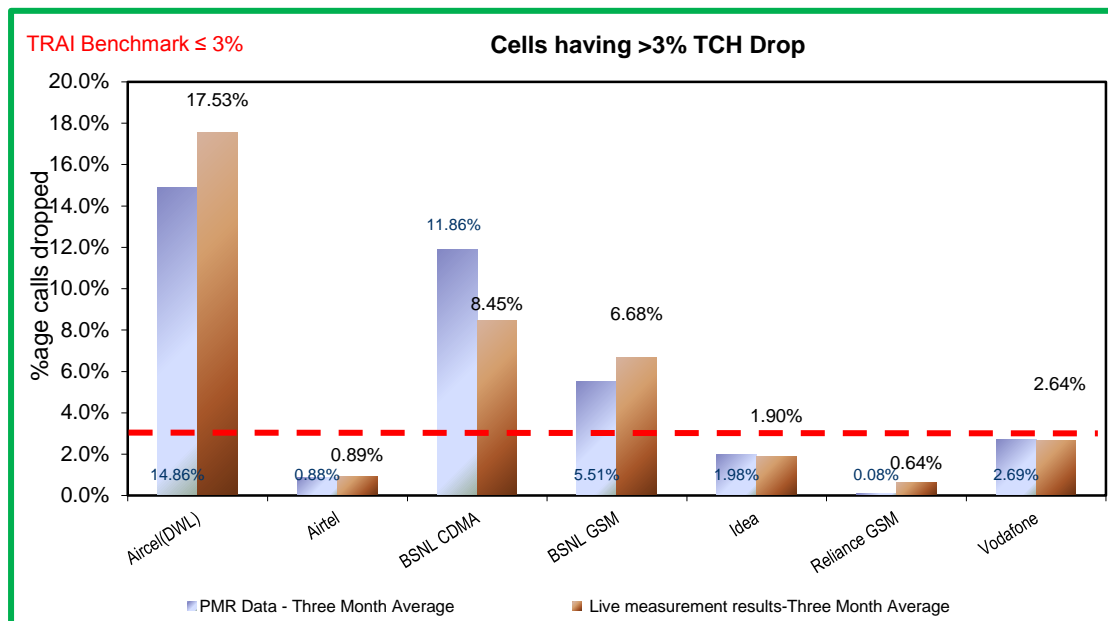
Aircel, BSNL CDMA and BSNL GSM did not meet the benchmark during audit.

4.7   VOICE QUALITY

4.7.1   PARAMETER DESCRIPTION

1. **Definition:**

   ↳ for GSM service providers the calls having a value of 0 –5 are considered to be of good quality (on a seven point scale)

   ↳ For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 %

2. **Computational Methodology:**

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

3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

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

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

4.7.2   KEY FINDINGS
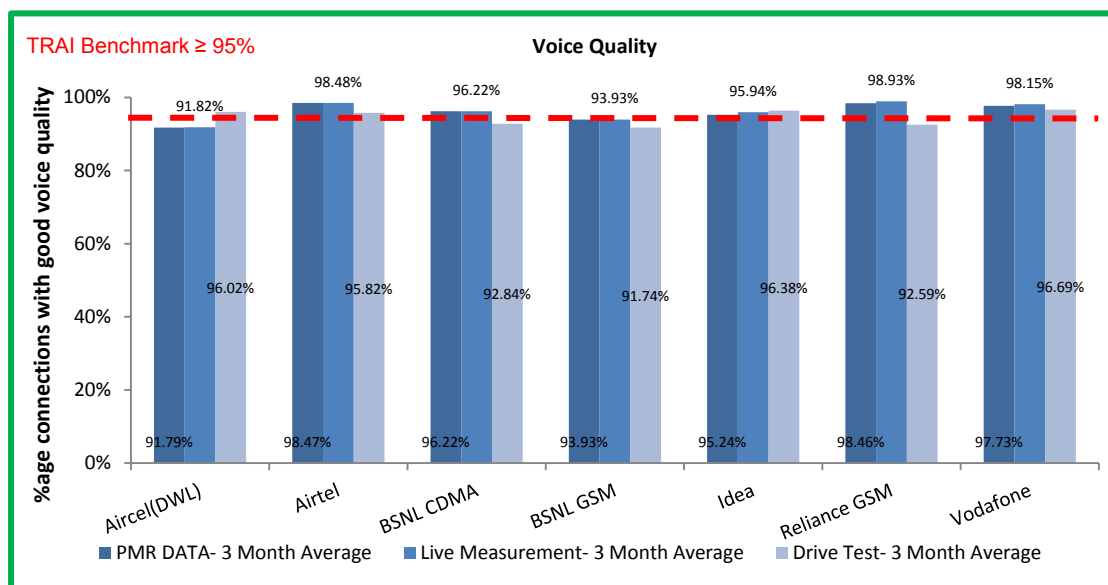
Aircel & BSNL GSM were not able to meet the benchmark for Voice quality as per PMR data.

5 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

Note: - BSNL CDMA did not cooperate in providing data to IMRB; hence it is mentioned as 0.00% in all charts for non-network parameters.

5.1 CALL CENTRE PERFORMANCE-IVR

5.1.1 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:

  - ↳ Operator to provide details of:-

    - ‣ Total calls connected and answered by IVR

    - ‣ Total calls attempted to IVR

  - ↳ Also live calling is done to test the calls connected and answered by IVR

5.1.2 KEY FINDINGS
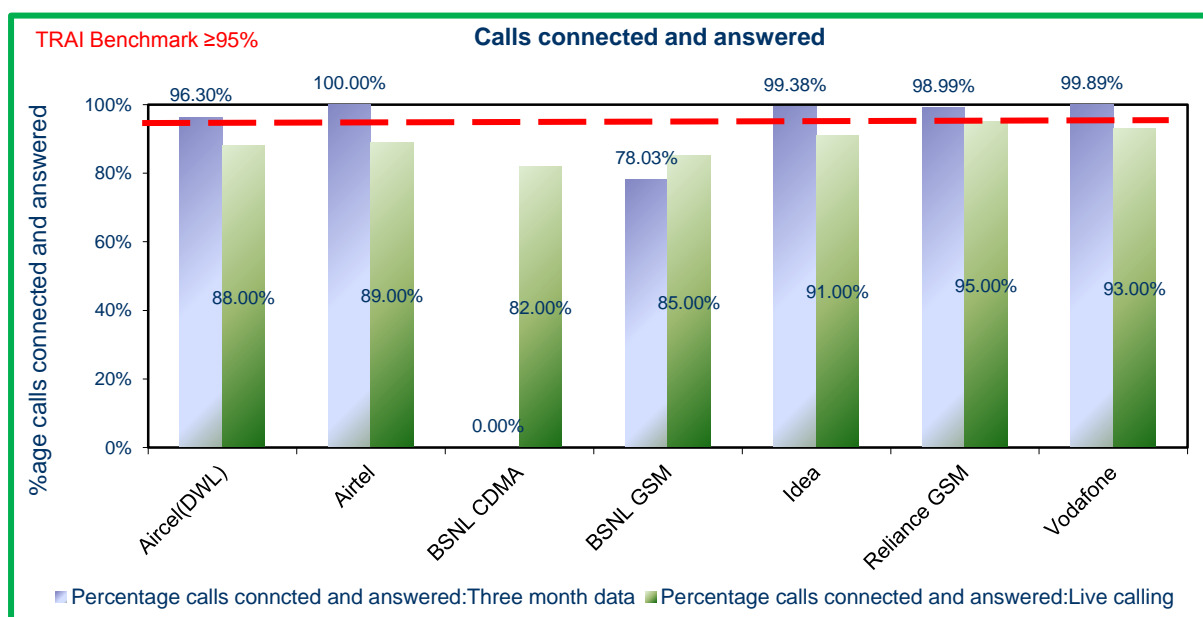
As per PMR report, BSNL GSM was not able to meet the benchmark. During live calling, it was observed that, excluding Reliance GSM, none of the operators was able to meet the benchmark.

5.2   CALL CENTRE PERFORMANCE-VOICE TO VOICE

5.2.1   PARAMETER DESCRIPTION

- ➲ Computational Methodology:

    - ↳ **Call centre performance Voice to Voice = (Number of calls answered by operator within 60 seconds/ All calls attempted to connect to the operator) * 100**

    - ↳ The calculation excludes the calls dropped before 60 seconds

- ➲ TRAI Benchmark: >= 90%

- ➲ Audit Procedure:

    - ↳ Operator to provide details of:-

        - ‣ Total calls connected and answered by operator within 60 seconds

        - ‣ Total calls attempted to connect to the operator

    - ↳ Also live calling is done to test the calls answered within 60 seconds by the operator

5.2.2   KEY FINDINGS

TRAI Benchmark ≥ 90%
Calls answered in 60 seconds (Voice to Voice)

Operator	Percentage calls answered in 60 Seconds: One month data	Percentage calls answered in 60 seconds: Live calling
Aircel(DWL)	88.87%	88.00%
Airtel	94.32%	89.00%
BSNL CDMA	0.00%	82.00%
BSNL GSM	90.92%	85.00%
Idea	97.84%	91.00%
Reliance GSM	86.84%	95.00%
Vodafone	96.49%	93.00%

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Aircel and Reliance GSM were not able to meet the benchmark in the audit. During live calling, we observed that only Idea, Reliance GSM and Vodafone were able to meet the benchmark.

5.3   TERMINATION/CLOSURE OF SERVICE

5.3.1   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 to provide details of:-

          ‣ Dates of lodging of all closure requests

          ‣ Dates of closure of service

5.3.2   KEY FINDINGS
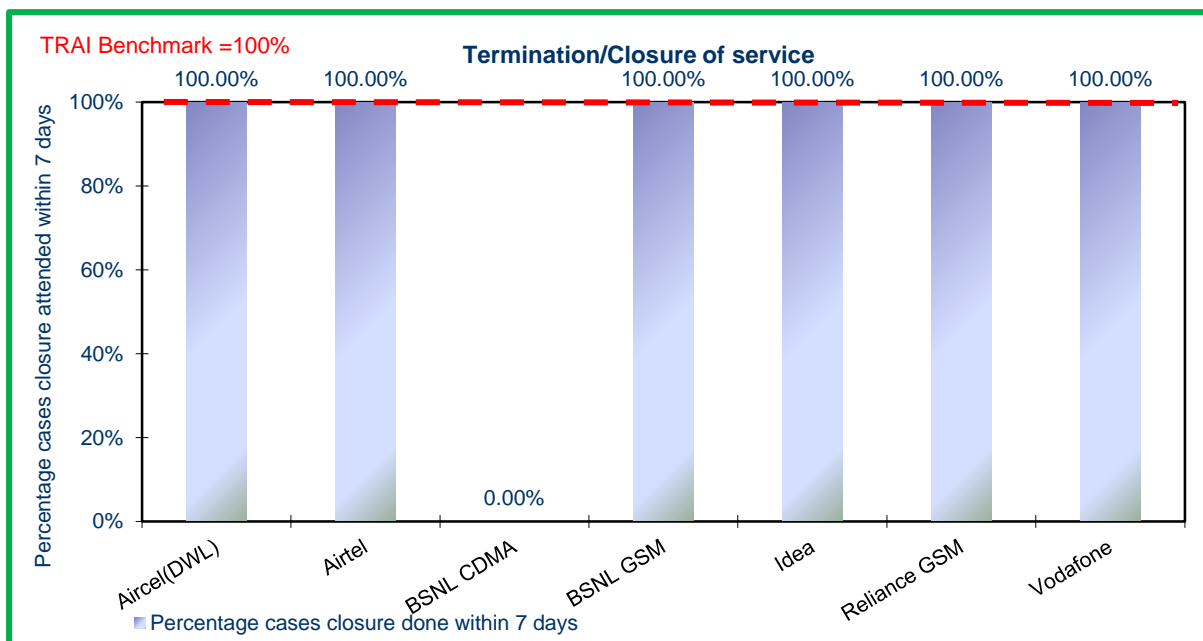
All operators met the benchmark.

5.4 REFUND OF DEPOSITS AFTER CLOSURE

5.4.1 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 to provide details of:-

    - ‣ Dates of lodging of all closure request resolved resulting in requirement of a refund by the operator.

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

5.4.2 KEY FINDINGS
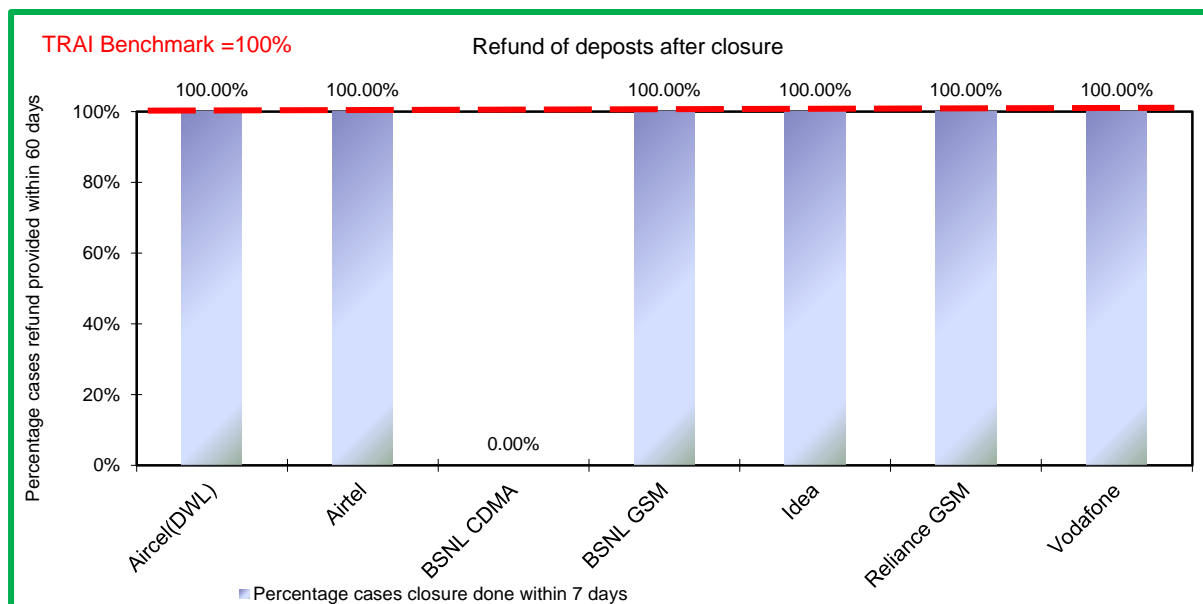
All operators met the TRAI benchmark.

6 DETAILED FINDINGS - DRIVE TEST DATA

6.1 OPERATOR ASSISTED DRIVE TEST

The drive test was conducted simultaneously for all the operators present in the Assam circle. As per the new directive given by TRAI headquarters, drive test for the month of April, May and June 2014 were conducted at a SSA level. Drive test was conducted for three days in each SSA and the selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected 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.

Below is the schedule of the operator assisted drive test for the Assam circle-

Month	Name of SSA Covered	Date of Drive Test
April	Nagaon	25th , 28 & 29th April
May	Silchar	21st to 23rd May
June	Dibrugarh	18th to 20th June
Year	2014	

6.1.1 APRIL - NAGAON

6.1.1.1 ROUTE DETAILS – NAGAON SSA

		April		
		Nagaon		
	Type of location	**Day 1**	**Day 2**	**Day 3**
Outdoor	**Major Roads**	. Morigaon - Inside the city (Major Road, Office Complex and Shopping complex)	Diphu- Inside the city (Major Road, Office Complex)	
	Highways	Morigaon to Nagaon - Starting with stateHighway-15, Moirabari morigaon rd & 47 via Dhing, bordua.	Diphu to Manja- with stateHighway-36A Drive	Lumding to Hojai National High way 54 & stateHighway-19 Drive.
	Within the City	Nagaon - Inside the city (Major Road, Office Complex and Shopping complex)	Manja to Lanka- with National Highway-36 & 54 Drives	
Indoor	**Office complex**	Nagaon to Raha - with National Highway-37		Inside the city (Major Road, Office Complex)
	Shopping complex		Lanka - Inside the city (Major Road, Shopping complex)	Inside the city (Major Road, shopping complex)

6.1.1.2 ROUTE MAP NAGAON DAY 1
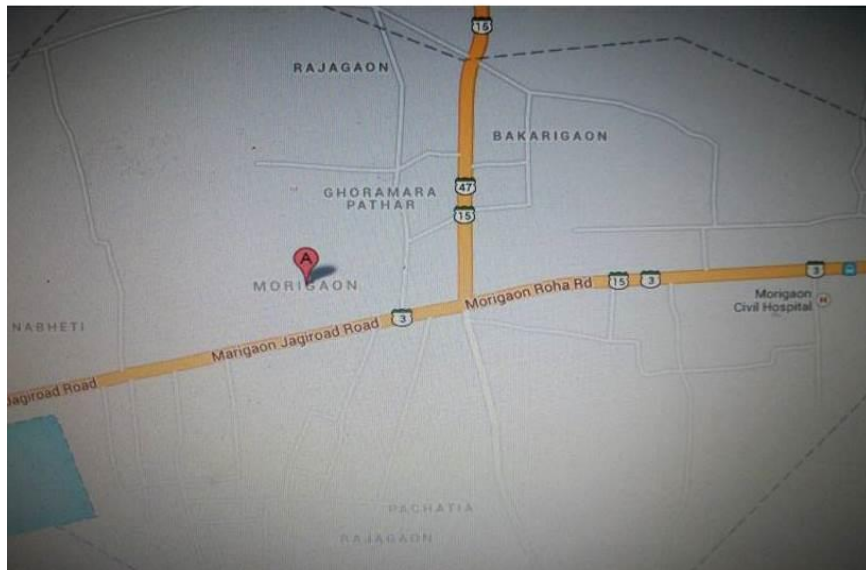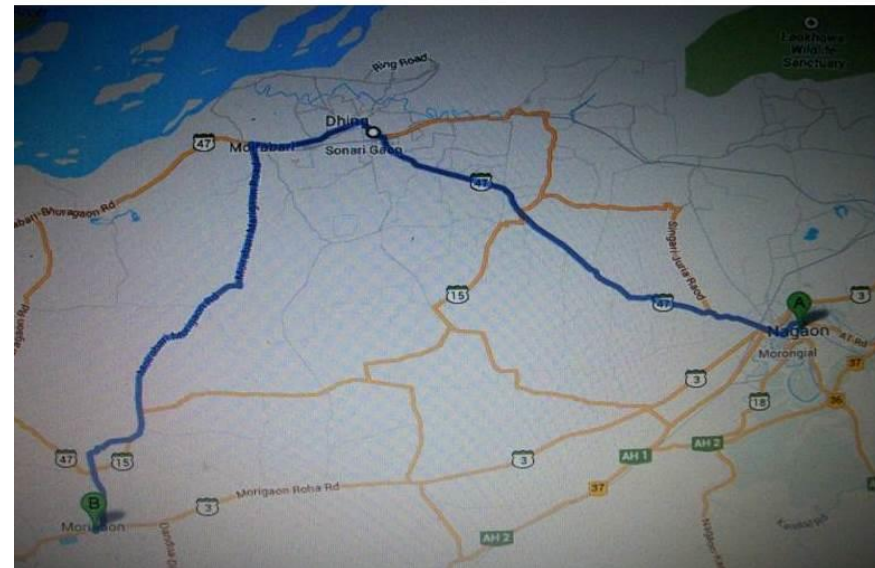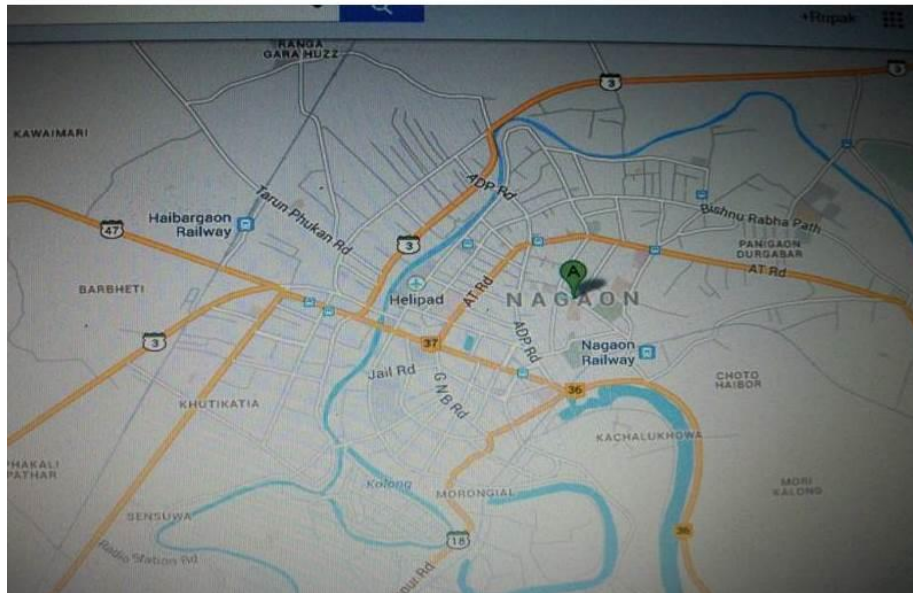
Nagaon-Assam

Nagaon to Raha-Assam
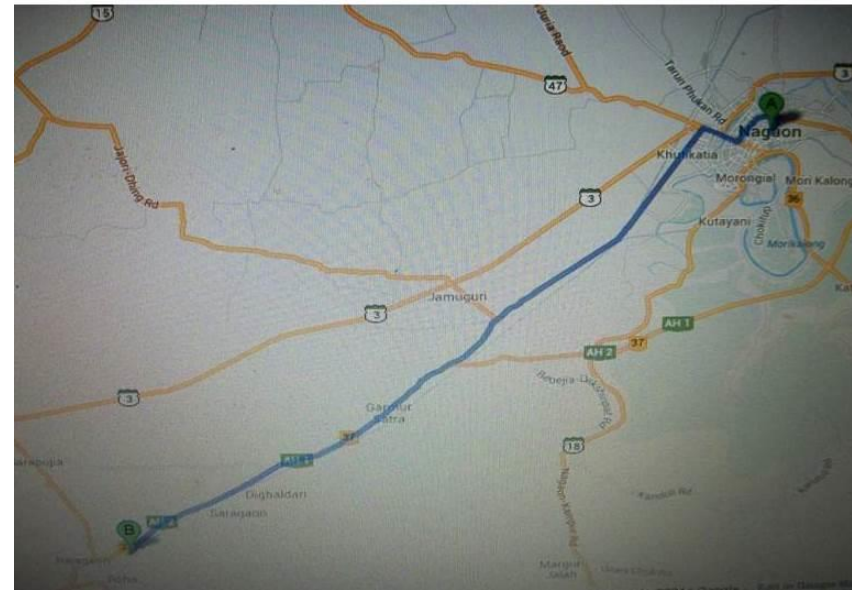
6.1.1.3   ROUTE MAP NAGAON DAY 2

Diphu Town-Assam
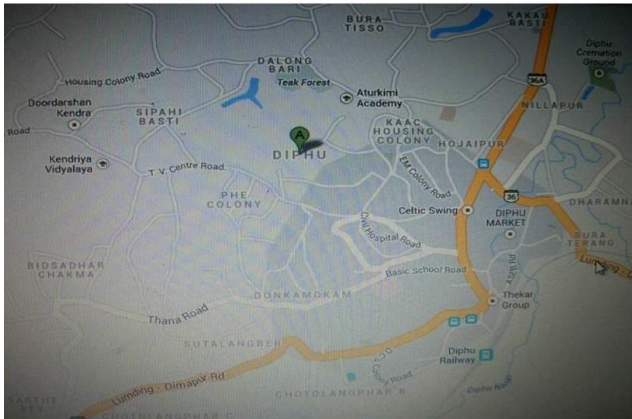
Diphu to Lanka- Assam
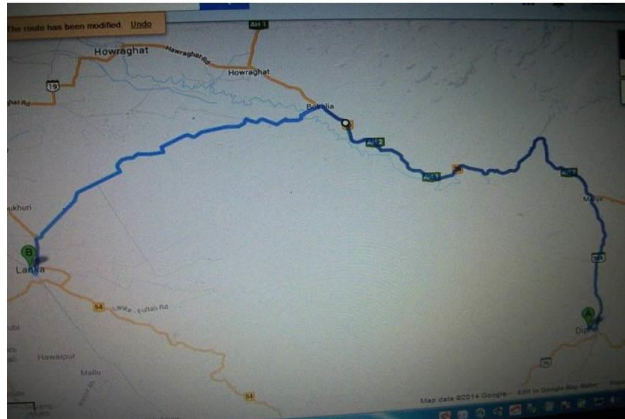
Lanka Town-Assam
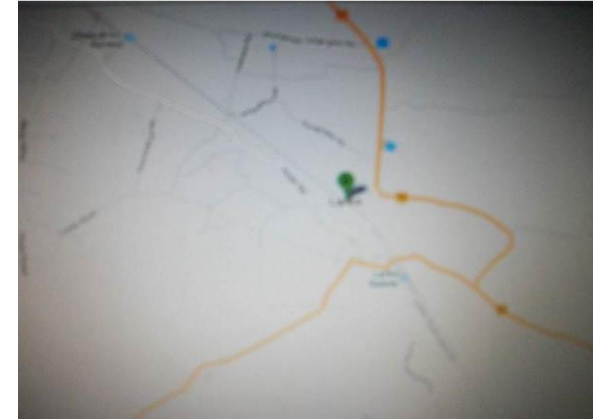
6.1.1.4   ROUTE MAP NAGAON DAY 3

Lumding Town-Assam
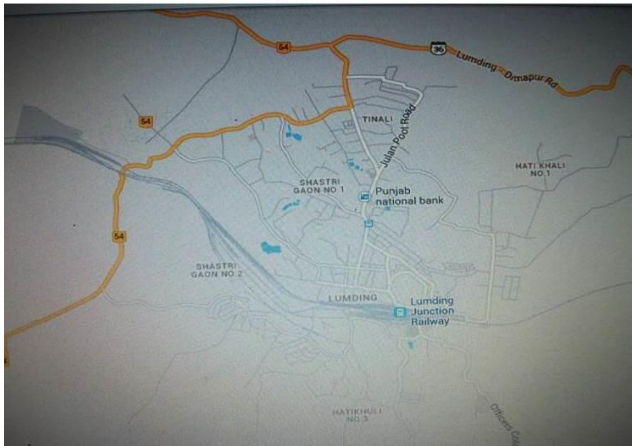
Lumding to Hojai- Assam
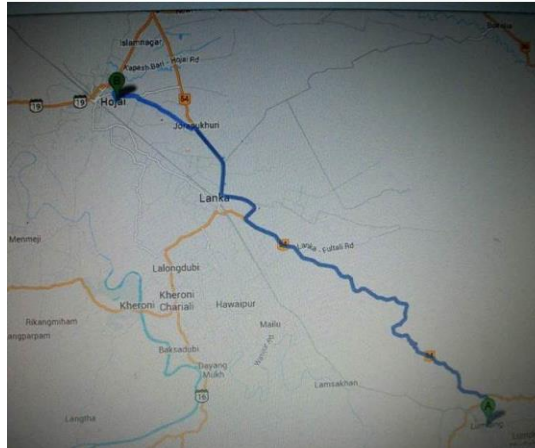
Hojai Town-Assam
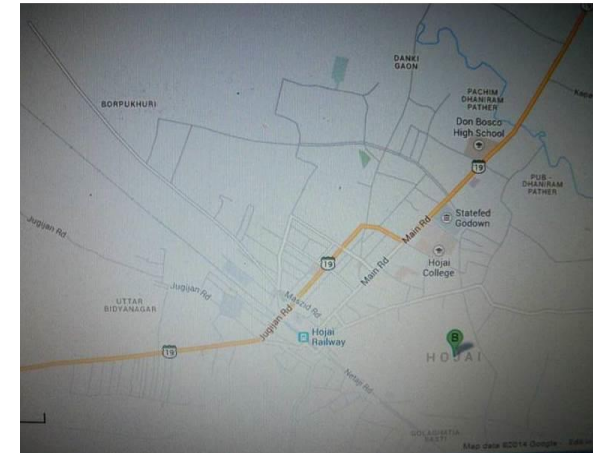
6.1.1.5   DRIVE TEST RESULTS – NAGAON SSA

Name of SSA	Nagaon	Month	April	Consolidated												
	B'mark	Aircel(DWL)		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
>= -75dBm		85.77%	59.30%	77.33%	58.50%	79.49%	15.12%	83.21%	28.61%	67.28%	63.45%	53.44%	44.59%	63.36%	41.26%
>= -85dBm		99.48%	86.30%	99.67%	85.94%	92.77%	39.54%	98.66%	65.44%	100.00%	93.38%	94.78%	78.68%	97.35%	79.62%
>= -95dBm		99.99%	100.00%	100.00%	96.00%	99.68%	72.42%	99.22%	89.70%	100.00%	100.00%	99.56%	95.16%	99.96%	96.53%
Voice quality	≥ 95%	98.26%	95.84%	98.79%	93.66%	99.90%	88.20%	91.19%	87.90%	98.00%	96.54%	98.06%	94.00%	97.94%	94.02%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	99.49%	91.55%	96.06%	85.73%	100.00%	100.00%	99.58%	99.02%	100.00%	96.69%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.51%	8.45%	4.01%	13.95%	0.00%	0.00%	0.42%	0.98%	0.00%	3.12%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	3.01%	17.06%	0.51%	4.24%	0.00%	0.00%	1.33%	0.00%	0.00%	0.24%
Hands off success rate		100.00%	100.00%	100.00%	99.33%	100.00%	100.00%	97.84%	92.83%	100.00%	91.69%	99.78%	87.09%	100.00%	99.70%

Voice Quality

Airtel 93.66%, BSNL CDMA 88.20%, BSNL GSM 87.90%, Reliance GSM 94.00% and Vodafone 94.02% did not meet the benchmark in outdoor locations. BSNL GSM 91.19% failed to meet the benchmark in indoor areas as well.

Call Set Success Rate (CSSR)

BSNL CDMA 91.55% and BSNL GSM 85.73% failed to meet the benchmark in outdoor locations.

Call Drop Rate

Other than BSNL GSM in outdoor areas and BSNL CDMA in both the areas, all operators met the benchmark.

6.1.2   MAY - SILCHAR

6.1.2.1   ROUTE DETAILS – SILCHAR SSA

	Type of location	May		
		Silchar		
		Day 1	Day 2	Day 3
Outdoor	Major Roads	Starting point Sadar Ghat BSNL Office High Way No-53 and 15 Drive via Panchgram, Badarpur, Bhanga, Nilam Bazar, Mullaganj, Kanai Bazar.	Hailakandi to Silchar- Major Road Drive via Silcoorie Grant, Masimpur, Kanakpur.	Jirighat to Silchar- Major Road Drive Via Sonai Road.
	Highways		Starting point Sadar Ghat BSNL Office High Way No-53 and 154 Drive via Algapur	Silchar to Jirighat- - Starting point Sadar Ghat BSNL Office High Way No 53 Drive via Lakhipur.
	Within the City			Lakhipur- Within the City Drive
Indoor	Office complex	Karimganj-City Drive (within the city and office Complex).	Hailakandi - City Drive (within the city and office Complex).	Silchar- City Drive (within the city and office Complex).
	Shopping complex			

6.1.2.2 ROUTE MAP SILCHAR DAY 1

karimganj Town-Assam
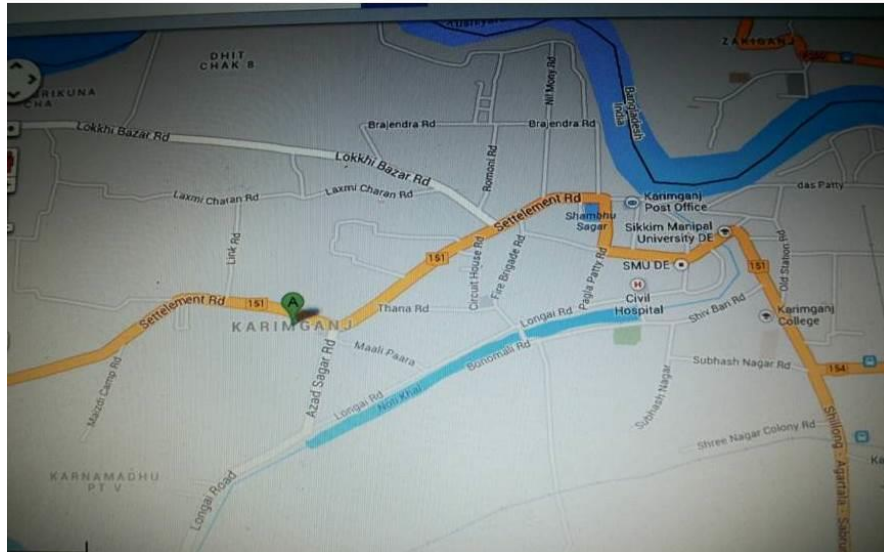
Silchar to Patharkandi High way -Assam
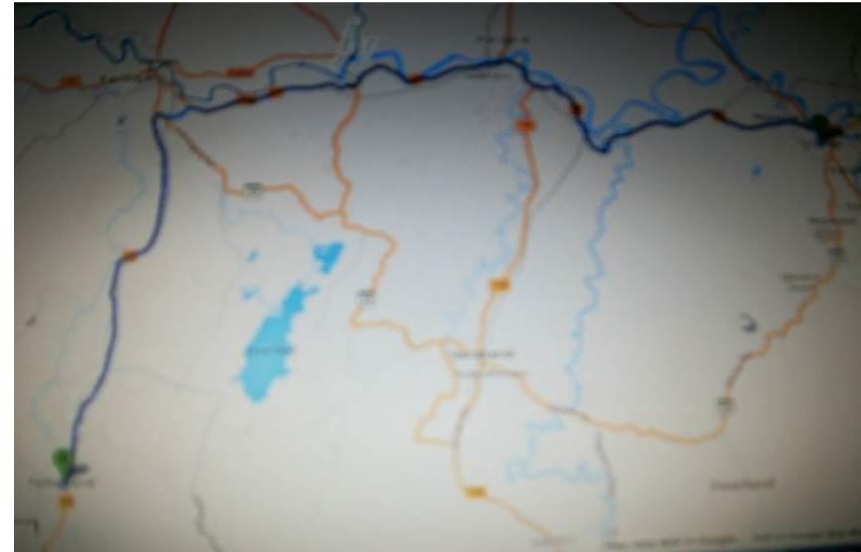
6.1.2.3 ROUTE MAP SILCHAR DAY 2

Silchar to Hailakandi High way –Assam | **Hailakandi Town**-Assam | **Hailakandi to Silchar Major Rd**-Assam
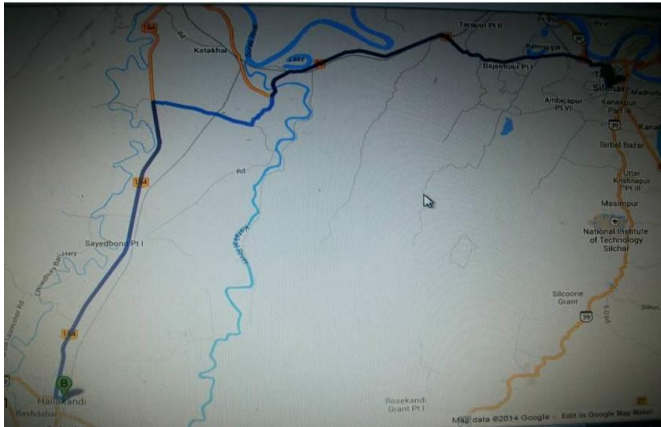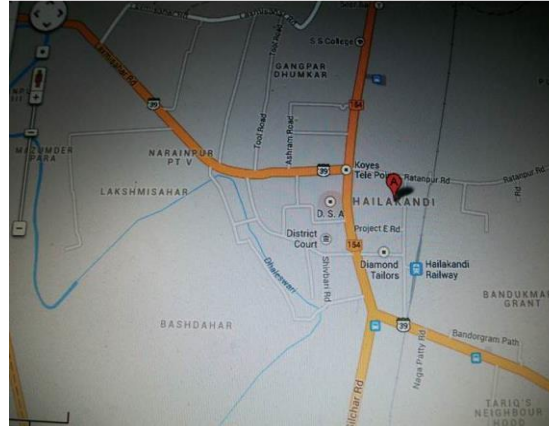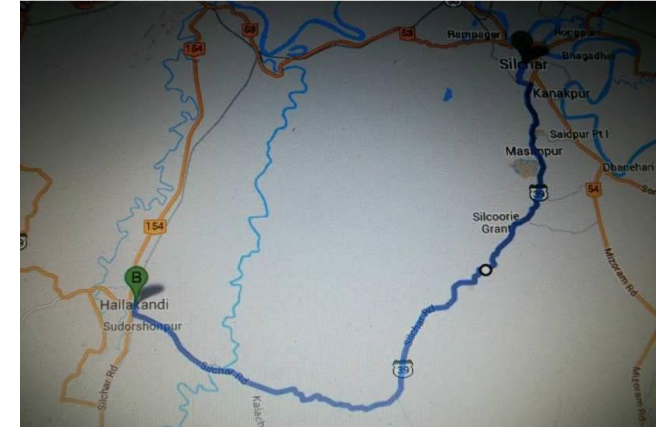
6.1.2.4   ROUTE MAP SILCHAR DAY 3
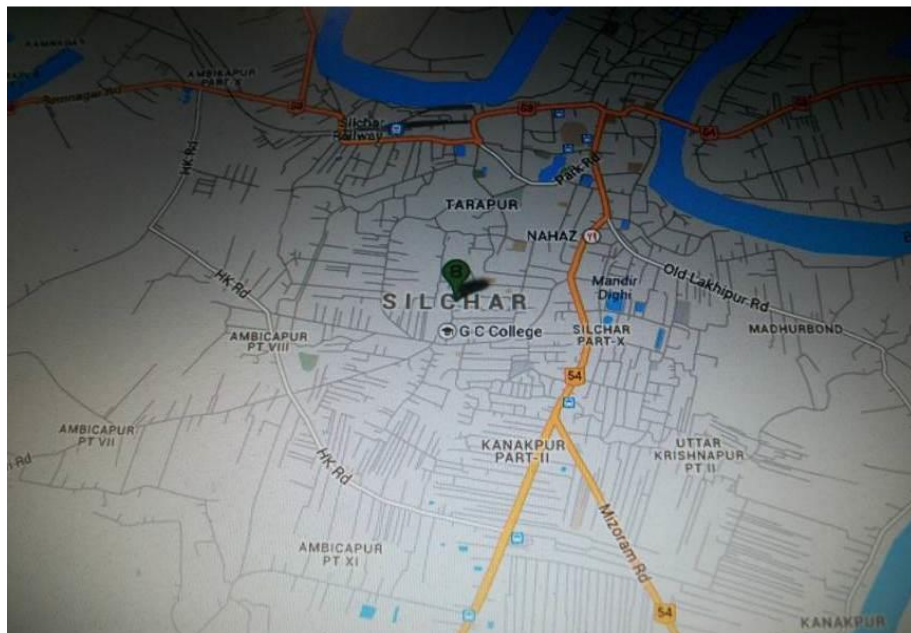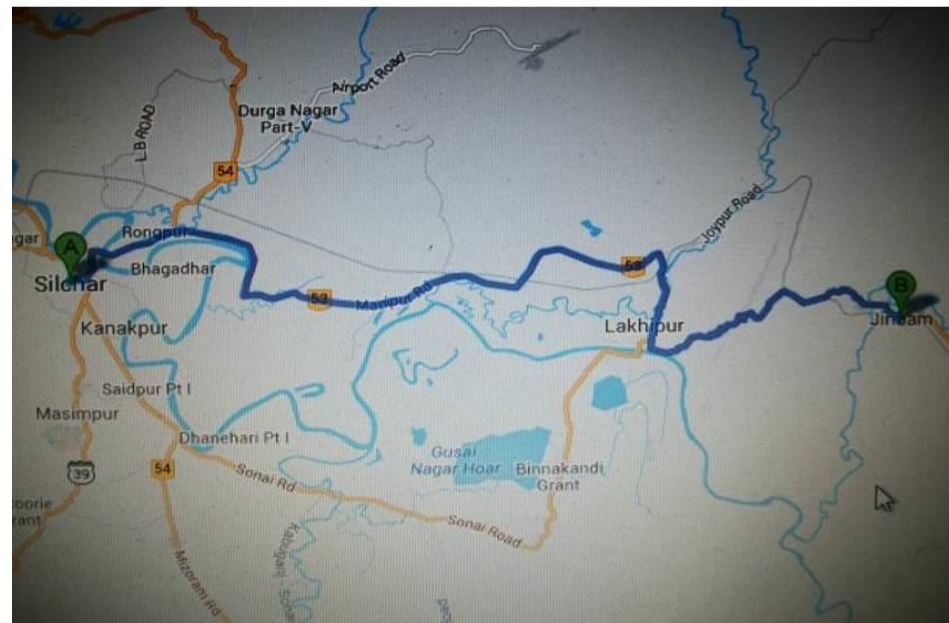
Lakhipur Town-Assam
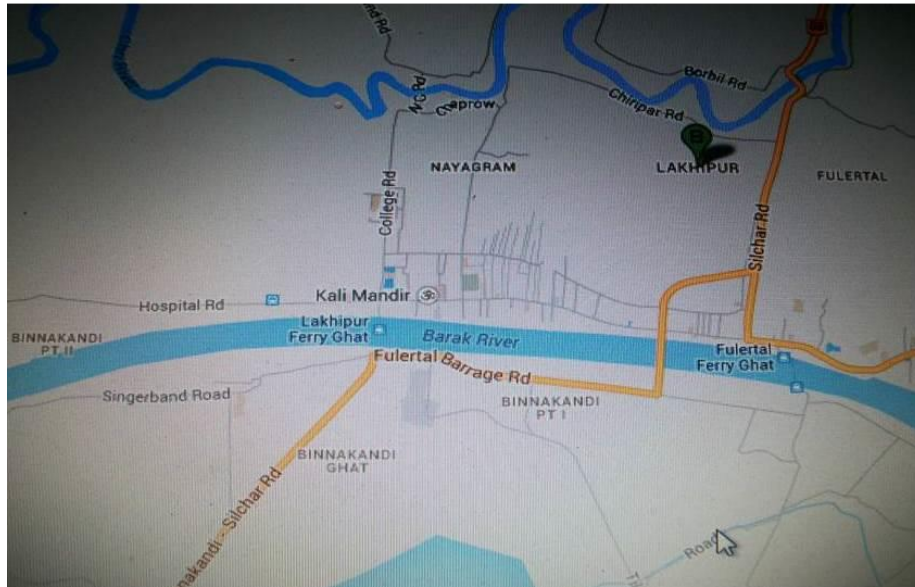
Jiribam to Silchar Major Rd-Assam
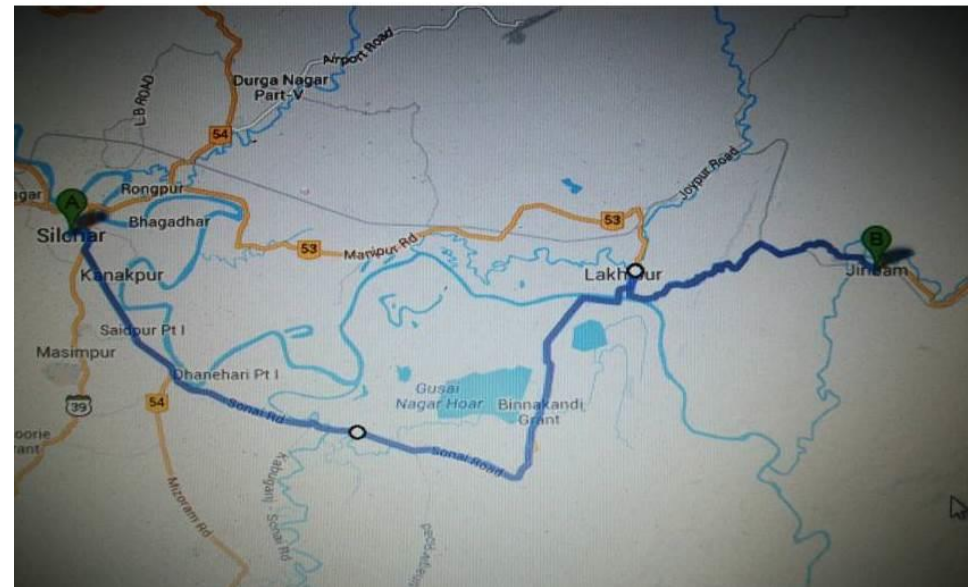
6.1.2.5 DRIVE TEST RESULTS – SILCHAR SSA

Name of SSA	Silchar	Month	May	Consolidated											
	B'mark	Aircel(DWL)		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
>= -75dBm		44.15%	45.83%	69.30%	43.91%	32.94%	26.68%	NDR	NDR	97.92%	70.29%	41.71%	44.11%	76.66%	41.32%
>= -85dBm		87.77%	80.54%	93.55%	77.34%	42.63%	62.73%	NDR	NDR	100.00%	90.74%	95.51%	78.15%	97.96%	74.07%
>= -95dBm		100.00%	100.00%	99.85%	96.09%	42.63%	77.20%	NDR	NDR	100.00%	100.00%	100.00%	95.09%	99.82%	92.29%
Voice quality	≥ 95%	98.90%	95.53%	97.69%	96.16%	99.16%	91.04%	99.30%	92.69%	97.99%	95.45%	96.96%	91.03%	99.16%	96.77%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	94.24%	98.15%	97.18%	100.00%	100.00%	98.96%	92.43%	100.00%	97.99%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.36%	0.00%	0.00%	1.04%	7.35%	0.00%	2.04%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	7.24%	1.11%	1.90%	0.00%	0.00%	0.00%	1.63%	0.00%	0.00%
Hands off success rate		100.00%	98.58%	100.00%	97.87%	100.00%	99.91%	66.67%	95.00%	100.00%	99.09%	66.67%	92.20%	98.72%	99.17%

Voice Quality

BSNL CDMA 91.04%, BSNL GSM 92.69%, & Reliance GSM 91.03% did not meet the benchmark of 95% in outdoor areas.

Call Set Success Rate (CSSR)

BSNL CDMA94.24% and Reliance GSM 92.43% also failed to meet the benchmark in outdoor areas.

Call Drop Rate

All operators met the benchmark except BSNL CDMA 7.24%.

6.1.3   JUNE - DIBRUGARH

6.1.3.1   ROUTE DETAILS – DIBRUGARH SSA

| | | June | | |
| | | DIBRUGARH | | |
	Type of location	Day 1	Day 2	Day 3
Outdoor	**Major Roads**			
	Highways	Dibrugarh to Naharkatia – Via Moran NH Way	Naharkatia to Tinsukia – Via Digboi, Ledo and Makum via NH Way Drive	Dibrugarh to Doomdooma via Tinsukia – NH Way Drive
	Within the City	Dibrugarh- City Drive (within the city and office Complex).	City Drive (within the city and office Complex).	Tinsukia - City Drive (within the city and office Complex).
Indoor	**Office complex**			
	Shopping complex			

6.1.3.2 ROUTE MAP DIBRUGARH DAY 1

Dibrugarh Town-Assam
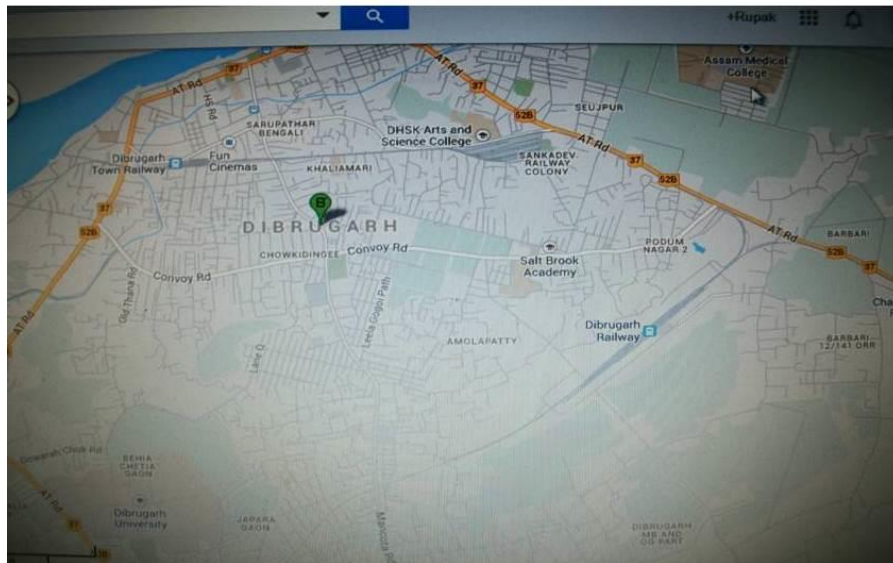
Dibrugarh to Naharkatia High way – Assam
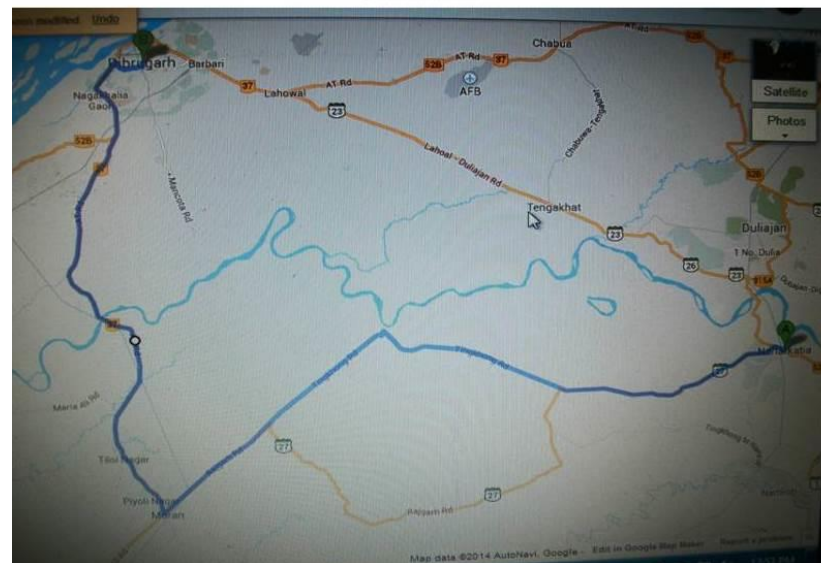
6.1.3.3 ROUTE MAP DIBRUGARH DAY 2

Naharkatia to Ledo High way -Assam
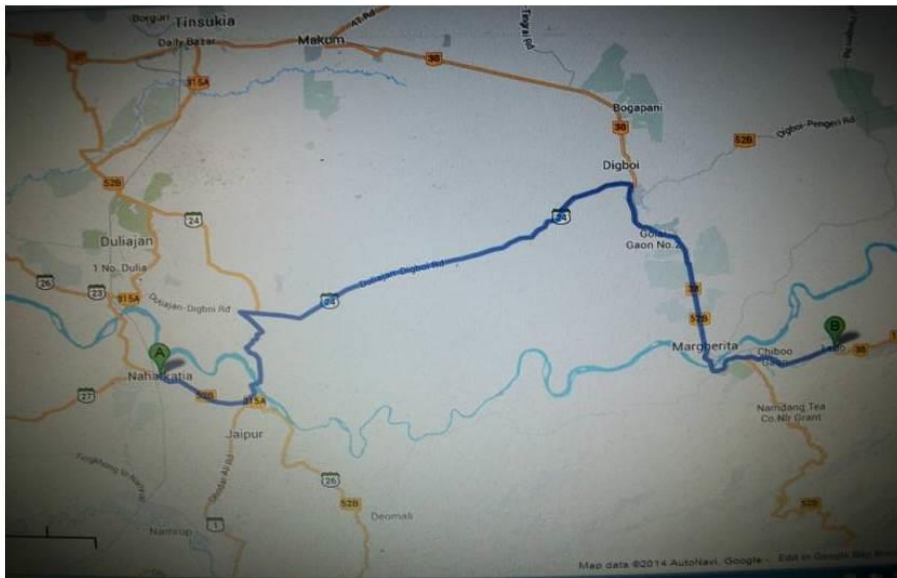
Digboi to Tinsukia High way -Assam
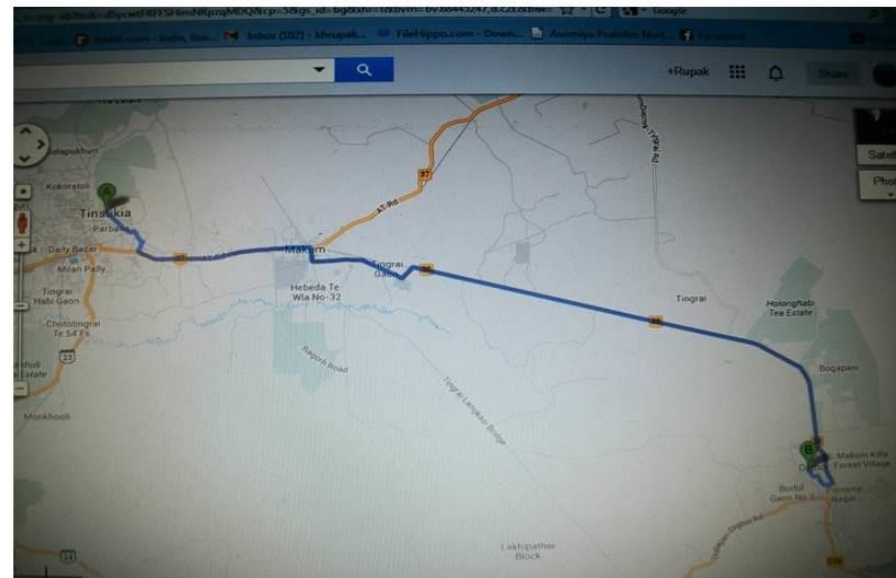
6.1.3.4   ROUTE MAP DIBRUGARH DAY 3

Dibrugarh to Doomdooma High Way-Assam
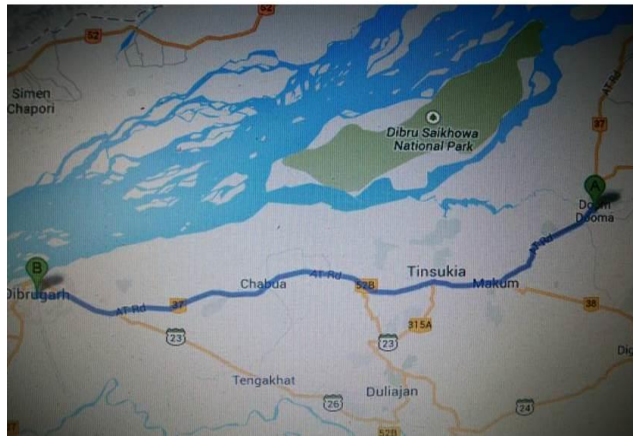
Tinsukia Town –Assam
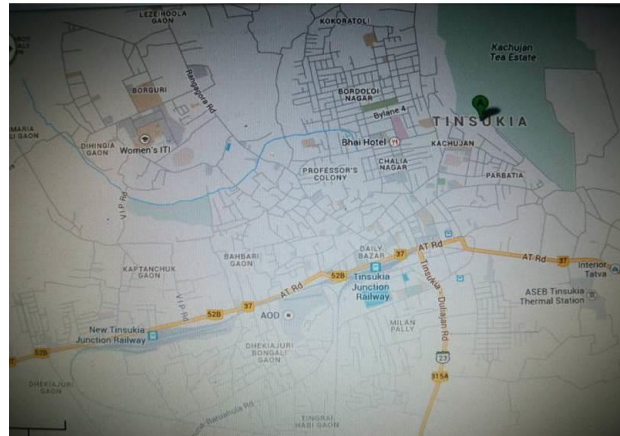
Doomdooma Town-Assam
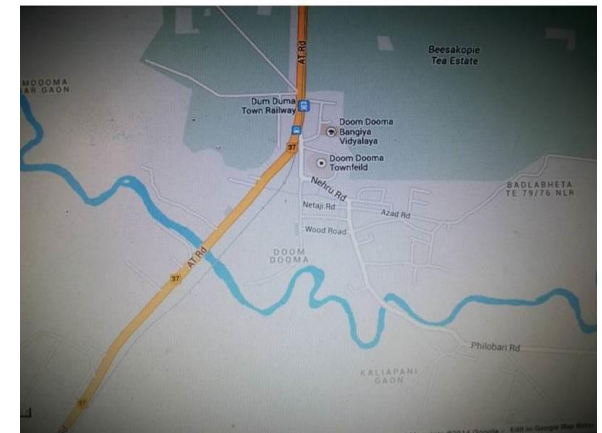
6.1.3.5   DRIVE TEST RESULTS – DIBRUGARH SSA

Name of SSA	Dibrugarh	Month	June	Consolidated												
	B'mark	Aircel(DWL)		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
>= -75dBm		97.29%	32.26%	92.47%	59.44%	54.80%	39.13%	44.07%	28.58%	100.00%	60.54%	67.22%	37.83%	83.44%	65.11%
>= -85dBm		99.79%	75.78%	99.90%	89.17%	91.46%	70.91%	94.35%	63.84%	100.00%	84.68%	92.72%	74.42%	99.36%	91.26%
>= -95dBm		100.00%	100.00%	100.00%	100.00%	91.46%	89.18%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Voice quality	≥ 95%	99.52%	94.51%	98.20%	95.04%	99.95%	91.90%	95.72%	92.30%	99.17%	97.76%	96.56%	92.95%	98.78%	96.69%
CSSR	≥ 95%	100.00%	98.69%	100.00%	100.00%	100.00%	90.89%	100.00%	96.19%	100.00%	100.00%	100.00%	97.21%	100.00%	97.96%
%age Blocked calls		0.00%	1.31%	0.00%	0.00%	0.00%	0.00%	0.00%	3.81%	0.00%	0.00%	0.00%	2.79%	0.00%	0.74%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.00%	0.00%	6.04%	0.00%	1.02%	0.00%	0.00%	0.00%	1.15%	0.00%	0.00%
Hands off success rate		NA	99.14%	100.00%	98.76%	98.91%	99.94%	100.00%	100.00%	100.00%	100.00%	100.00%	99.21%	100.00%	0.09%

Voice Quality

Aircel 94.51%, BSNL CDMA 91.90%, BSNL GSM 92.30% & Reliance GSM 92.95% failed to meet the benchmark in outdoor areas.

Call Set Success Rate (CSSR)

All operators met the benchmark, except BSNL CDMA 90.89%.

Call Drop Rate

BSNL CDMA 6.04% failed to meet the benchmark.

6.2   INDEPENDENT DRIVE TEST

The independent drive test was conducted for all the operators present in the Assam 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.

6.2.1   MORIGAON

Name of the City	Morigaon
Date of Drive Test	18th April' 14
Name of the circle	Assam

Independent Drive Test Route Details – Morigaon SSA
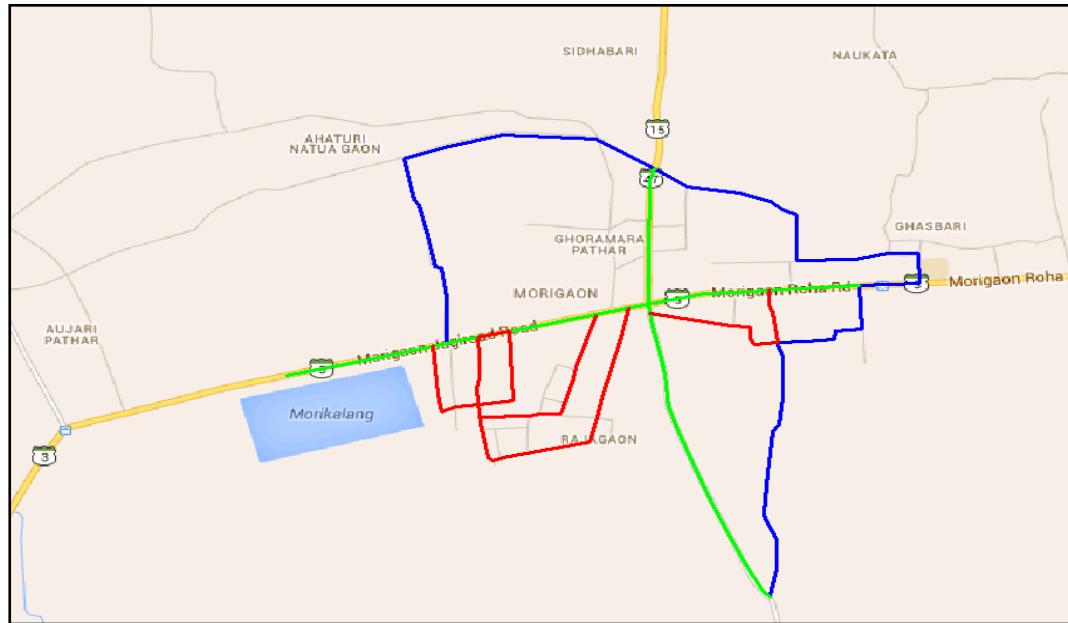
Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Morigaon	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Marakolong No.2 - Morigoan College - Marigoan Jagiroad - Morigoan College	Marigoan jagiroad - Rajagoan - Pachatia - Morigoan Roha Road	Morigoan Jagiroad Road - Morigoan Roha Road - Lathabori - Morigoan Roha Road - Marakolong No.2	POST Office	Ghoramara Pathar

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Independent Drive Test Results – Morigaon SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		BSNL CDMA	
		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		32.75%	51.10%	62.45%	51.73%	83.65%	45.87%	10.25%	79.40%	28.25%	38.97%	0.00%	45.80%	88.05%	44.90%
Signal Strength 0 to -85 dBm		90.35%	74.03%	91.35%	77.47%	100.00%	88.13%	30.85%	97.40%	91.85%	87.70%	32.15%	91.60%	97.35%	87.83%
Signal Strength 0 to -95 dBm		100.00%	99.97%	100.00%	99.93%	100.00%	100.00%	100.00%	99.97%	100.00%	100.00%	100.00%	99.93%	100.00%	99.87%
Voice quality	≥ 95%	88.56%	88.15%	99.87%	95.09%	97.45%	93.68%	96.05%	98.70%	97.75%	97.10%	90.53%	94.15%	93.32%	95.55%
CSSR	≥ 95%	100.00%	96.22%	100.00%	99.38%	100.00%	98.02%	100.00%	100.00%	100.00%	99.37%	98.48%	98.16%	100.00%	99.38%
%age Blocked calls		0.00%	3.78%	0.00%	0.62%	0.00%	1.98%	0.00%	0.00%	0.00%	0.63%	1.52%	1.84%	0.00%	0.62%
Call drop rate	≤ 2%	0.00%	1.80%	0.00%	1.64%	0.00%	0.70%	0.00%	0.00%	0.00%	0.61%	0.00%	0.00%	4.29%	0.54%
Hands off success rate		100.00%	95.82%	0.00%	97.53%	100.00%	99.47%	100.00%	100.00%	100.00%	96.65%	98.86%	98.68%	100.00%	100.00%

Voice Quality

Aircel, Reliance GSM and BSNL CDMA failed to meet the benchmark in indoor areas while Aircel, BSNL GSM and Reliance GSM failed to meet the benchmark in outdoor areas.

Call Set Success Rate (CSSR)

All operators met the TRAI benchmark.

Call Drop Rate

BSNL CDMA failed to meet the benchmark in indoor areas.

6.2.2 DIPHU

Name of the City	Diphu
Date of Drive Test	21st & 22nd April' 14
Name of the circle	Assam

Independent Drive Test Route Details – Diphu SSA
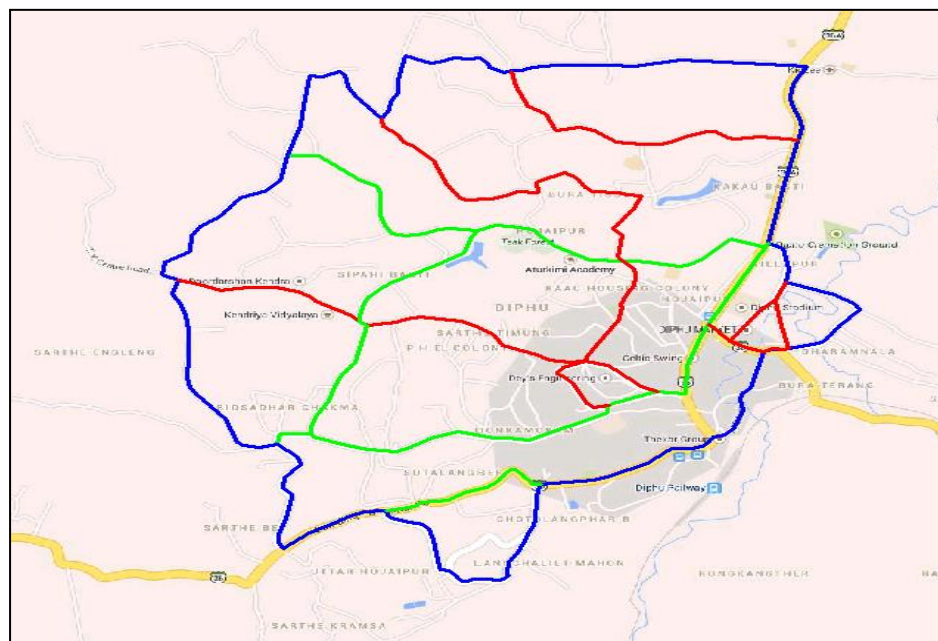
Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Diphu	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Lumding Dimapur Road-Golden Jublee Plantation-MAHATMA GANDHI PARK-Don Bosco School	T.V Centre Road-Calvary Home Academy-LIC	Housing Colony Road-Teak Park-Doordarshan Kendra	Agriculture Office	Khutilalong

Independent Drive Test Results – Diphu SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		BSNL CDMA	
		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		31.70%	49.23%	10.65%	38.10%	75.05%	64.57%	1.95%	46.30%	20.30%	63.60%	29.60%	27.00%	93.35%	51.50%
Signal Strength 0 to -85 dBm		85.85%	88.60%	41.00%	82.33%	92.90%	86.47%	72.60%	68.17%	89.45%	95.63%	71.85%	67.33%	99.94%	73.87%
Signal Strength 0 to -95 dBm		100.00%	100.00%	99.95%	100.00%	100.00%	99.97%	100.00%	99.97%	99.95%	100.00%	99.95%	100.00%	99.94%	99.87%
Voice quality	≥ 95%	93.77%	90.39%	70.02%	79.85%	87.55%	82.32%	81.45%	92.84%	99.21%	97.55%	93.30%	91.11%	98.25%	98.18%
CSSR	≥ 95%	98.53%	99.37%	88.33%	97.44%	98.68%	95.00%	97.30%	100.00%	100.00%	96.77%	93.49%	94.96%	100.00%	100.00%
%age Blocked calls		1.47%	0.63%	11.67%	2.56%	1.32%	5.00%	2.70%	0.00%	0.00%	3.23%	6.51%	5.04%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.64%	13.04%	3.85%	0.00%	1.17%	0.00%	0.63%	0.00%	2.72%	5.64%	1.31%	0.00%	0.00%
Hands off success rate		97.92%	99.17%	100.00%	92.14%	99.17%	96.63%	100.00%	100.00%	100.00%	100.00%	94.00%	94.69%	100.00%	100.00%

Voice Quality

Aircel, Airtel, BSNL, Idea and Reliance GSM failed to meet the benchmark in indoor as well as outdoor areas.

Call Set Success Rate (CSSR)

Reliance GSM failed to meet the benchmark in indoor as well as outdoor locations. Airtel failed in indoor while BSNL missed the benchmark in outdoor locations.

Call Drop Rate

Airtel failed to meet the benchmark in indoor and outdoor locations. Vodafone missed in outdoor while Reliance GSM missed the benchmark in indoor locations.

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6.2.3   BADARPUR

Name of the City	Badarpur
Date of Drive Test	2nd May' 14
Name of the circle	Assam

Independent Drive Test Route Details – Badarpur SSA
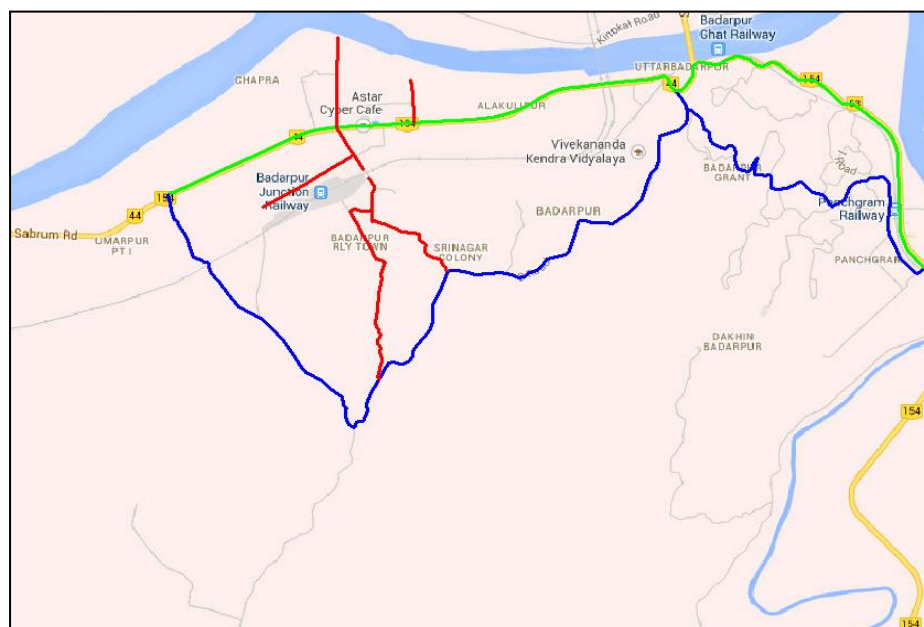
Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Badarpur	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	Shilong Agartala Sabrum Rd-Jumbasti-Barak Valley Cements Ltd-HPC HPC Rd	Badarpur Junction-Digirpar Maszid-Foyez Apartment-Station Rd-JB Road	Shilong Agartala Sabrum Rd-A.S.C.T Pond-Foyez Apartment-Oxford School	Circle Office	Taj Road Market

Independent Drive Test Results – Badarpur SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		BSNL CDMA	
		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		67.85%	49.50%	86.20%	39.03%	74.35%	29.43%	73.90%	56.53%	67.30%	28.20%	87.75%	62.83%	71.95%	26.63%
Signal Strength 0 to -85 dBm		99.45%	80.63%	99.15%	76.43%	98.40%	66.00%	99.15%	85.00%	98.95%	79.13%	99.60%	93.97%	99.80%	61.00%
Signal Strength 0 to -95 dBm		100.00%	100.00%	99.95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.95%	99.97%	99.90%	99.83%
Voice quality	≥ 95%	94.55%	85.10%	92.30%	88.26%	95.06%	83.31%	96.04%	81.85%	98.56%	93.84%	95.25%	90.34%	98.88%	96.12%
CSSR	≥ 95%	87.50%	96.26%	100.00%	97.37%	97.06%	85.51%	93.42%	96.18%	100.00%	97.54%	86.84%	95.68%	100.00%	99.46%
%age Blocked calls		12.50%	3.74%	0.00%	2.63%	2.94%	14.49%	6.58%	3.82%	0.00%	2.46%	13.16%	4.32%	0.00%	0.54%
Call drop rate	≤ 2%	0.00%	5.32%	0.00%	6.26%	0.00%	5.61%	0.00%	5.95%	0.00%	0.00%	1.79%	7.33%	0.00%	3.34%
Hands off success rate		100.00%	90.37%	100.00%	97.32%	100.00%	72.01%	99.19%	94.34%	100.00%	97.92%	92.31%	82.46%	100.00%	100.00%

Voice Quality

Aircel and Airtel failed to meet the benchmark in indoor as well as outdoor areas. BSNL GSM, Idea, Vodafone and Reliance GSM did not meet the voice quality benchmark in outdoor areas.

Call Set Success Rate (CSSR)

Aircel, Idea and Reliance GSM failed to meet the benchmark in indoor locations while BSNL did not meet the benchmark in outdoor locations.

Call Drop Rate

The call drop rate was below the TRAI benchmark in outdoor locations for Aircel, Airtel, BSNL, Idea, Reliance GSM and BSNL CDMA.

6.2.4   TINSUKIA

Name of the City	Tinsukia
Date of Drive Test	12th May' 14
Name of the circle	Assam

Independent Drive Test Route Details – Tinsukia SSA
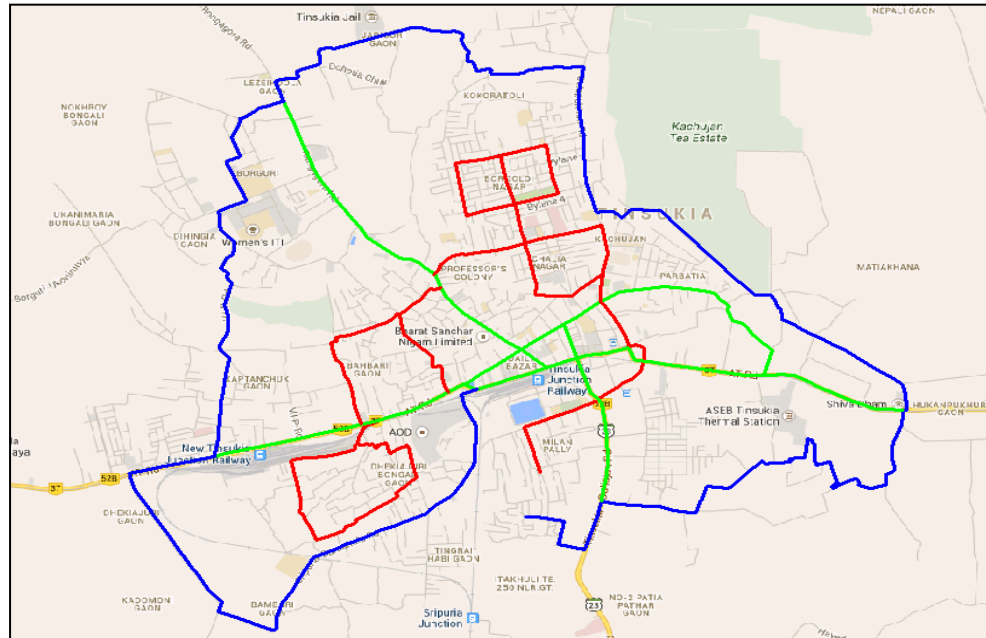
Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Tinsukia	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	N.F.R Hospital-Circuit House-District Transport Office-Borguri School-Gelapukhuri Road-Borthakur Nursing Home	Sangmai Workshop-SBI ATM-Axis Bank-Tamulbari Field-Commerce College	Marble India-M/s MP Jalan-NIIT-SBI-Tinsukia Junction railway-Shiva Dham	COURT OF THE DISTICT JUDGE OFFICE	RK MARKET COMPLEX-DEBI POKHARI

Independent Drive Test Results – Tinsukia SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		BSNL CDMA	
		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		47.90%	26.60%	86.15%	74.57%	78.45%	51.10%	59.90%	44.37%	79.65%	60.23%	56.30%	41.13%	15.85%	18.27%
Signal Strength 0 to -85 dBm		97.55%	76.73%	99.90%	96.43%	99.30%	90.00%	82.05%	68.47%	99.40%	93.93%	94.45%	77.80%	90.50%	44.03%
Signal Strength 0 to -95 dBm		100.00%	99.97%	100.00%	100.00%	100.00%	99.97%	100.00%	100.00%	100.00%	100.00%	99.95%	100.00%	99.85%	99.87%
Voice quality	≥ 95%	93.40%	82.45%	93.73%	89.25%	86.32%	87.88%	95.46%	87.94%	97.38%	90.44%	97.19%	91.01%	98.30%	95.82%
CSSR	≥ 95%	87.10%	98.72%	100.00%	99.36%	100.00%	98.08%	95.05%	95.81%	98.33%	98.79%	100.00%	98.12%	100.00%	98.95%
%age Blocked calls		12.90%	1.28%	0.00%	0.64%	0.00%	1.92%	4.95%	4.19%	1.67%	1.21%	0.00%	1.88%	0.00%	1.05%
Call drop rate	≤ 2%	3.23%	1.78%	0.00%	1.31%	0.00%	1.32%	0.00%	2.67%	0.00%	0.57%	0.00%	1.27%	0.00%	0.00%
Hands off success rate		100.00%	93.41%	100.00%	97.34%	100.00%	99.05%	100.00%	98.53%	100.00%	99.63%	100.00%	99.10%	100.00%	100.00%

Voice Quality

Aircel, Airtel, BSNL GSM failed to meet the voice quality benchmark in indoor as well as outdoor areas. Idea, Vodafone and Reliance GSM missed the benchmark in outdoor areas.

Call Set Success Rate (CSSR)

Aircel failed to meet the benchmark in indoor locations.

Call Drop Rate

Aircel failed to meet the benchmark in indoor locations while Idea did not meet the benchmark in outdoor locations.

6.2.5 GOSAIGAON

Name of the City	Gosaigaon
Date of Drive Test	21st & 22nd May' 14
Name of the circle	Assam

Independent Drive Test Route Details – Gosaigaon SSA
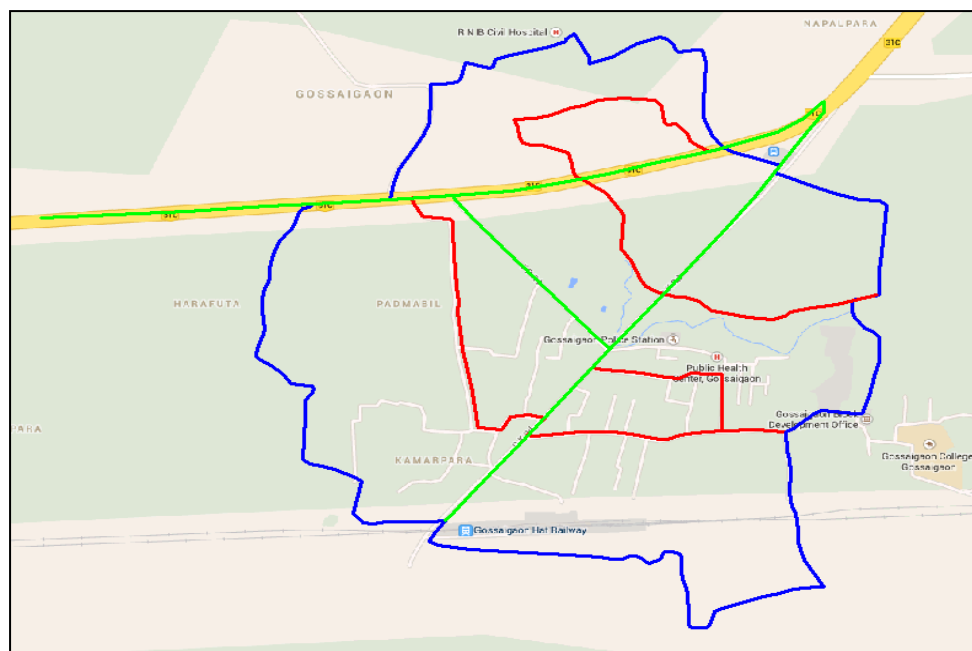
Blue colour road represents Periphery of the city
Red colour road represents Congested Area
Green colour road represents Across the city

Gosaigaon	Outdoor Routes			Indoor Routes	
	Periphery of the City	Congested area	Across the City	Office Complex	Shopping Complex
Route Details	RNB Civil Hospital-Gossaigaon Hat Railway Station-Division Forest Office	Public Health Centre-Madati River-D.K Road	T.P Road-Gossaigaon Police Station-Dipamkara Stupa-N H 31 C-D.K Road	Office of the Deputy Inspector of Schools	Shree Banar Balaji Complex

Independent Drive Test Results – Gosaigaon SSA

	B'mark	Aircel		Airtel		BSNL		Idea		Vodafone		Reliance GSM		BSNL CDMA	
		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		5.85%	12.40%	67.70%	80.27%	NA	NA	50.90%	19.93%	52.40%	21.47%	30.70%	38.53%	50.65%	45.77%
Signal Strength 0 to -85 dBm		40.10%	53.80%	97.75%	93.17%	NA	NA	87.40%	49.10%	95.15%	82.03%	64.60%	78.77%	99.20%	93.33%
Signal Strength 0 to -95 dBm		100.00%	99.93%	100.00%	100.00%	NA	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.90%	99.83%
Voice quality	≥ 95%	95.90%	95.28%	97.28%	96.01%	NA	NA	99.62%	88.02%	97.85%	96.50%	96.90%	95.11%	99.20%	98.98%
CSSR	≥ 95%	100.00%	99.37%	96.97%	100.00%	NA	NA	97.06%	96.41%	100.00%	100.00%	96.72%	93.13%	97.56%	95.90%
%age Blocked calls		0.00%	0.63%	3.03%	0.00%	NA	NA	2.94%	3.59%	0.00%	0.00%	3.28%	6.87%	2.44%	4.10%
Call drop rate	≤ 2%	0.00%	1.23%	0.00%	0.00%	NA	NA	0.00%	1.32%	0.00%	0.00%	0.00%	2.62%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%	100.00%	100.00%	99.22%	100.00%	100.00%	100.00%	100.00%

NA: BSNL (GSM) SIM got deactivated during Drive Test

Voice Quality

Idea failed to meet the benchmark in outdoor areas for voice quality.

Call Set Success Rate (CSSR)

Reliance GSM failed to meet the CSSR benchmark in outdoor locations.

Call Drop Rate

Reliance GSM also failed to meet the call drop rate benchmark in outdoor locations.

PMR Consolidated (Network Parameters)

Aircel, BSNL CDMA and BSNL GSM also failed to meet the benchmark for majority network parameters.

3 Day Live Measurement (Network Parameters)

Aircel, BSNL CDMA and BSNL GSM also failed to meet the benchmark for majority network parameters.

Live Calling

None of the operators met the benchmark for complaints resolved within 4 weeks and Level 1 services. Also, for calls answered by operator (voice to voice), Idea, Reliance GSM and Vodafone met the benchmark.

PMR (Customer Service Parameters)

Vodafone failed to meet the benchmark of billing disputes. BSNL GSM did not meet the benchmark of IVR calls being attended within 60 seconds. Aircel and Reliance GSM did not meet the TRAI benchmark of calls answered by the operators (Voice to Voice) within 60 seconds.

Inter-Operator Call Assessment

In the inter-operator call assessment, it was observed that all operators faced problems in connecting to other operators. Aircel and Vodafone were found to have problems in connecting to almost all other operators

Drive Test (Operator Assisted)

During all the drive tests, it was observed that BSNL CDMA is the key concern operator in terms of Voice Quality, CSSR and Call Drop Rate. BSNL GSM also missed benchmark for the key parameters during all drive tests. Reliance GSM faced problems with voice quality during all drive tests.

Drive Test (Independent)

During all the drive tests, it was observed that Voice Quality has remained below benchmark for most of the operators in all SSAs except Gosaigaon.

8 ANNEXURE - CONSOLIDATED

8.1 NETWORK AVAILABILITY

Audit Results for Network Availability								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2492	3171	242	1347	1151	1608	2734
Sum of downtime of BTSs in a month (in hours)		113982	5622	35119	25344	4446	4913	16174
BTSs accumulated downtime (not available for service)	≤ 2%	6.15%	0.24%	19.51%	2.53%	0.52%	0.41%	0.79%
Number of BTSs having accumulated downtime >24 hours		861	44	81	71	6	25	51
Worst affected BTSs due to downtime	≤ 2%	34.57%	1.39%	33.47%	5.25%	0.55%	1.53%	1.88%

Live Measurement- BTSs accumulated downtime								
	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2489	3136	242	1347	1151	1626	2734
Sum of downtime of BTSs in a month (in hours)		10306	530	3174	3521	384	368	1504
(not available for service)	≤ 2%	5.75%	0.24%	18.22%	3.63%	0.46%	0.31%	0.77%
Number of BTSs having accumulated downtime >24 hours		139	0	11	35	1	0	2
Live Mesurement - Worst affected BTSs due to downtime	≤ 2%	5.60%	0.00%	4.34%	2.60%	0.11%	0.00%	0.08%

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8.2   CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion								
CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.23%	98.35%	97.55%	95.16%	98.55%	98.54%	99.30%
SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.28%	0.43%	1.85%	1.07%	0.30%	0.03%	0.21%
TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	3.04%	0.65%	0.00%	1.53%	1.12%	0.17%	0.70%

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.47%	98.25%	97.52%	94.32%	99.39%	98.56%	99.69%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.77%	0.21%	1.47%	0.68%	0.08%	0.03%	0.10%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.56%	0.69%	0.00%	3.24%	0.33%	0.16%	0.31%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		520	531	606	522	443	546	517
Total number of successful calls established		519	531	563	491	443	527	508
CSSR	≥ 95%	99.68%	100.00%	92.81%	94.31%	100.00%	96.61%	98.28%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.32%	0.00%	7.19%	5.69%	0.00%	3.39%	1.72%

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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	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		160258360	183852982	465908	476426214	19008588	88385276	3997084
Total number of calls dropped		3064940	1797893	7034	11305494	225628	624217	24474
Call drop rate	≤ 2%	1.91%	0.98%	1.52%	2.37%	1.19%	0.71%	0.61%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7380	9530	687	3972	3453	4885	8282
Total number of cells having more than 3% TCH		1097	84	82	219	68	4	223
Worst affected cells having more than 3% TCH	≤ 3%	14.86%	0.88%	11.86%	5.51%	1.98%	0.08%	2.69%

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	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		182916227	18410953	42234	49685694	23080283	9513994	2087186
Total number of calls dropped		3134215	182394	689	1242744	210891	65674	11408
Call drop rate	≤ 2%	1.71%	0.99%	1.64%	2.50%	0.92%	0.69%	0.55%
Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7378	9466	687	3972	3453	4885	8280
Total number of cells having more than 3% TCH		1294	85	58	265	66	32	219
Worst affected cells having more than 3% TCH	≤ 3%	17.53%	0.89%	8.45%	6.68%	1.90%	0.64%	2.64%

Drive test results for Call drop rate (Average of three drive tests)

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		519	531	593	493	443	527	508
Total number of calls dropped		0	0	64	10	0	5	0
Call drop rate	≤ 2%	0.00%	0.00%	10.41%	1.96%	0.00%	1.02%	0.06%

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8.4   VOICE QUALITY

Audit Results for Voice quality								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16317071202	18952260254	53845	86185	2435480743	13623520506	694939281
Total number of calls with good voice quality		14973810026	18663151463	51810	79022	2319474403	13413304064	679130288
%age calls with good voice quality	≥ 95%	91.79%	98.47%	96.22%	93.93%	95.24%	98.46%	97.73%

Live measurement results for Voice quality								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16407099382	1893262522	53845	86185	2422677829	1335826297	335162293
Total number of calls with good voice quality		15066451299	1864446264	51810	79022	2324362629	1315479824	328945963
%age calls with good voice quality	≥ 95%	91.82%	98.48%	96.22%	93.93%	95.94%	98.93%	98.15%

Drive test results for Voice quality (Average of three drive tests)								
Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		834563	801394	67092	741654	508297	448872	1028750
Total number of calls with good voice quality		801940	767487	62445	679470	489699	422055	994120
%age calls with good voice quality	≥ 95%	96.02%	95.82%	92.84%	91.74%	96.38%	92.59%	96.69%

8.5   POI CONGESTION

Audit Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		47	18	0	19	28	20	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81623	93393	0	19472	18806	31949	56368514
Traffic served for all POIs (B)- in erlangs		52263	32470	0	21729	12231	21143	14447702
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.11%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion								
POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		46	18	0	19	28	20	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81400	91270	0	19472	18705	32212	5674274
Traffic served for all POIs (B)- in erlangs		52757	32428	0	18548	12588	21625	1468667
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

8.6   TOTAL CALL MADE DURING THE DRIVE TEST-VOICE QUALITY

April							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	1045631	973646	60010	811723	526310	922035	1095936
May							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	848798	678300	54515	770172	520531	214595	753923
June							
Voice quality	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls	609261	752236	86750	643067	478049	209986	1236392

8.7   CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice)

Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts to customer care for assistance		5737726	714432	NDR	168792	105766	2334736	3318206
Number of calls getting connected and answered (electronically)		5525290	714432	NDR	131716	105113	2311080	3314440
Percentage calls getting connected and answered	≥ 95%	96.30%	100.00%	NDR	78.03%	99.38%	98.99%	99.89%
Number of calls getting transferred to the operator (voice to voice)		908017	1257075	NDR	688643	252160	495365	1037794
Number of calls answered by operator (voice to voice) within 60 seconds		806960	1185614	NDR	626082	246703	430175	1001363
Percentage calls answered within 60 seconds (V2V)	≥ 90%	88.87%	94.32%	NDR	90.92%	97.84%	86.84%	96.49%

Live calling results for customer care (IVR)

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

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls received		100	100	100	100	100	100	100
Total Number of calls getting connected and answered		88	89	82	85	91	95	93
Percentage calls getting connected and answered	≥ 95%	88.00%	89.00%	82.00%	85.00%	91.00%	95.00%	93.00%

8.8 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service								
Termination	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of closure request		482	494	NDR	1139	111	193	127
Number of requests attended within 7 days		482	494	NDR	1139	111	193	127
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	NDR	100.00%	100.00%	100.00%	100.00%

8.9 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits								
Refund	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cases requiring refund of deposits		289	139	NDR	181	94	321	359
Total number of cases where refund was made within 60 days		289	139	NDR	181	94	321	359
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	NDR	100.00%	100.00%	100.00%	100.00%

8.10 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang								
Traffic in Erlang		Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Eqipped capacity of the network		196339	143967	NDR	108000	28890	132000	106777
Total taffic handled in erlang during TCBH		106163	128410	NDR	22141	14773	59119	97995

Total number of customers as per VLR								
		Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total no. of customers served (as per VLR)		3284954	4537714	NDR	1021482	573548	1986628	2739340

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Live calling results for resolution of service requests								
Resolution of service requests	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total Number of calls made		100	100	NA	100	100	100	NA
Number of cases resolved to satisfaction		98	89	NA	84	96	86	NA
Percentage cases resolved in four weeks		98.00%	89.00%	NA	84.00%	96.00%	86.00%	NA

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8.11 COMPARISON OF IMRB & OPERATOR PMR REPORTS – NETWORK RELATED PARAMETERS

Name of Service Area	Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						POI	
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
		BTSs Accumulated downtime (not available for service) (%age)	BTSs Accumulated downtime (not available for service) (%age)	Worst affected BTSs due to downtime (%age)	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	Call Set-up Success Rate (within licensee's own network)	SDCCH/Paging Chl. Congestion (%age)	SDCCH/Paging Chl. Congestion (%age)	TCH Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop (call drop) rate (%age)	Worst affected cells having more than 3% TCH drop (call drop) rate (%age)	Connection with good voice quality	Connection with good voice quality	Point of Interconnection (POI) Congestion (No. of POIs not meeting the benchmark)	Point of Interconnection (POI) Congestion (No. of POIs not meeting the benchmark)
		≤ 2%	≤ 2%	≤ 2%	≤ 2%	≥ 95%	≥ 95%	≤ 1%	≤ 1%	≤ 2%	≤ 2%	≤ 2%	≤ 2%	≤ 3%	≤ 3%	≥ 95%	≥ 95%	≤ 0.5%	≤ 0.5%
Assam	Aircel	6.28	6.15	34.57	34.57	95.23	95.23	1.28	1.28	3.04	3.04	1.91	1.91	14.86	14.86	91.79	91.79	0	0.00
	Airtel	0.24	0.24	1.39	1.39	98.35	98.35	0.21	0.43	0.65	0.65	0.98	0.98	0.88	0.88	98.47	98.47	0	0.00
	BSNL	2.60	2.53	5.23	5.25	95.00	95.16	1.07	1.07	1.50	1.53	2.37	2.37	5.50	5.51	93.93	93.93	0	0.13
	Idea	0.54	0.52	0.55	0.55	98.55	98.55	0.30	0.30	1.12	1.12	1.19	1.19	1.98	1.98	95.24	95.24	0	0.00
	RTL	0.42	0.41	1.53	1.53	98.54	98.54	0.03	0.03	0.17	0.17	0.71	0.71	0.08	0.08	98.46	98.46	0	0.00
	Vodafone	0.89	0.79	1.85	1.88	99.30	99.30	0.21	0.21	0.70	0.70	0.61	0.61	2.69	2.69	97.73	97.73	0	0.00

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

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8.12 COMPARISON OF IMRB & OPERATOR PMR REPORTS – CUSTOMER SERVICE QUALITY PARAMETERS

Name of Service Area	Name of Service Provider	Customer Service Quality Parameters							
		Response time to the customer for assistance				Termination / closure of service			
		Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB
		Accessibility of call centre/ customer care	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 60 seconds	%age requests for Termination / Closure of service	%age requests for Termination / Closure of service	Time taken for refund of deposits after closures	Time taken for refund of deposits after closures
		≥ 95%	≥ 95%	≥ 90%	≥ 90%	100% within 7 days	100% within 7 days	100% within 60 days	100% within 60 days
Assam	Aircel	95.80	96.30	91.16	88.87	99.79	100.00	100.00	100.00
	Airtel	82.00	100.00	89.00	94.32	100.00	100.00	100.00	100.00
	BSNL	77.00	78.03	90.67	90.92	100.00	100.00	100.00	100.00
	Idea	99.35	99.38	98.25	97.84	100.00	100.00	100.00	100.00
	RTL	98.99	98.99	86.91	86.84	100.00	100.00	100.00	100.00
	Vodafone	99.96	99.89	95.32	96.49	100.00	100.00	100.00	100.00

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

9   ANNEXURE - APRIL

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2493	3140	242	1334	1147	1626	2723
Sum of downtime of BTSs in a month (in hours)		59256	4769	31379	25932	4898	4278	16038
BTSs accumulated downtime (not available for service)	≤ 2%	3.19%	0.20%	17.43%	2.61%	0.57%	0.35%	0.79%
Number of BTSs having accumulated downtime >24 hours		491	43	75	77	6	28	51
Worst affected BTSs due to downtime	≤ 2%	19.70%	1.37%	30.99%	5.77%	0.52%	1.72%	1.87%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2487	3127	242	1334	1147	1626	2723
Sum of downtime of BTSs in a month (in hours)		3484	401	3104	3569	375	161	1035
BTSs accumulated downtime (not available for service)	≤ 2%	1.95%	0.18%	17.81%	3.72%	0.45%	0.14%	0.53%
Number of BTSs having accumulated downtime >24 hours		29	0	9	40	2	0	3
Worst affected BTSs due to downtime	≤ 2%	1.17%	0.00%	3.72%	3.00%	0.17%	0.00%	0.11%

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2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.31%	98.39%	97.64%	95.10%	98.67%	98.59%	99.39%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.24%	0.92%	1.85%	1.40%	0.30%	0.03%	0.20%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	2.21%	0.65%	NA	1.62%	0.99%	0.16%	0.61%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.80%	98.41%	97.44%	91.96%	99.44%	98.59%	99.75%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.55%	0.19%	1.43%	1.60%	0.08%	0.03%	0.09%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.20%	0.60%	NA	2.09%	0.30%	0.15%	0.25%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		636	605	729	594	502	602	596
Total number of successful calls established		636	605	679	529	502	598	584
CSSR	≥ 95%	100.00%	100.00%	93.14%	89.06%	100.00%	99.34%	97.99%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.00%	0.00%	6.86%	10.94%	0.00%	0.66%	2.01%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		163861115	181576797	453297	436336372	19168284	88500094	4013388
Total number of calls dropped		2956792	1671487	7232	10079370	196803	621056	21676
Call drop rate	≤ 2%	1.80%	0.92%	1.60%	2.31%	1.03%	0.70%	0.54%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7377	9437	687	3968	3442	4969	8211
Total number of cells having more than 3% TCH		697	82	76	226	51	2	222
Worst affected cells having more than 3% TCH	≤ 3%	9.45%	0.87%	11.06%	5.70%	1.48%	0.04%	2.70%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		181976679	18206494	39434	48369727	23622141	9890757	2128419
Total number of calls dropped		2762534	166881	705	1165710	183531	68821	10351
Call drop rate	≤ 2%	1.52%	0.92%	1.79%	2.41%	0.78%	0.70%	0.49%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7375	9392	687	3968	3442	4969	8204
Total number of cells having more than 3% TCH		1079	69	57	280	48	30	217
Worst affected cells having more than 3% TCH	≤ 3%	14.63%	0.73%	8.30%	7.06%	1.39%	0.60%	2.65%

Drive Test Resultss for Call drop rate (Average of three drive tests) - Drive Test Data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		636	605	729	529	502	598	584
Total number of calls dropped		0	0	96	16	0	3	1
Call drop rate	≤ 2%	0.00%	0.00%	13.17%	3.02%	0.00%	0.50%	0.17%

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4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		15915228642	19009000987	53845	156238	2468274259	13641881950	698062324
Total number of calls with good voice quality		14724251732	18742732385	51810	138198	2352283022	13432862134	682811191
%age calls with good voice quality	≥ 95%	92.52%	98.60%	96.22%	88.45%	95.30%	98.47%	97.82%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		15066795038	1901276024	53845	156238	2454356974	1387520592	334015599
Total number of calls with good voice quality		13802155780	1874591478	51810	138198	2357072925	1366459564	328449493
%age calls with good voice quality	≥ 95%	91.61%	98.60%	96.22%	88.45%	96.04%	98.48%	98.33%

Drive Test Resultss for Voice quality (Average of three drive tests) - DT data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		1045631	973646	60010	811723	526310	922035	1095936
Total number of calls with good voice quality		1009264	928953	55270	722298	506736	878912	1048347
%age calls with good voice quality	≥ 95%	96.52%	95.41%	92.10%	88.98%	96.28%	95.32%	95.66%

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5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		46	23	0	19	28	20	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		80689.37	111344.00	0.00	19471.90	18280.00	31959.52	57258824.00
Traffic served for all POIs (B)- in erlangs		53415	32311	0	20702	12923	21184	15052151
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.06%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		46	23	0	19	28	20	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		80689.37	111409.00	0.00	19471.90	18280.00	32325.56	5738925.00
Traffic served for all POIs (B)- in erlangs		52595	31751	0	18093	13132	21932	1508907
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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10 ANNEXURE - MAY

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2495	3178	242	1353	1151	1626	2723
Sum of downtime of BTSs in a month (in hours)		129208	5137	38859	25144	4645	5624	16038
BTSs accumulated downtime (not available for service)	≤ 2%	6.96%	0.22%	21.58%	2.50%	0.54%	0.46%	0.79%
Number of BTSs having accumulated downtime >24 hours		975	46	87	69	6	24	51
Worst affected BTSs due to downtime	≤ 2%	39.08%	1.45%	35.95%	5.10%	0.52%	1.48%	1.87%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2493	3142	242	1353	1151	1626	2723
Sum of downtime of BTSs in a month (in hours)		11999	400	3244	3644	301	415	1760
BTSs accumulated downtime (not available for service)	≤ 2%	6.68%	0.18%	18.62%	3.74%	0.36%	0.35%	0.90%
Number of BTSs having accumulated downtime >24 hours		161	0	12	35	0	0	2
Worst affected BTSs due to downtime	≤ 2%	6.46%	0.00%	4.96%	2.59%	0.00%	0.00%	0.07%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.01%	98.33%	97.46%	95.11%	98.64%	98.54%	99.32%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.24%	0.21%	1.84%	0.97%	0.38%	0.03%	0.17%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	2.41%	0.64%	NA	1.63%	1.02%	0.17%	0.68%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.11%	98.21%	97.59%	95.38%	99.44%	98.56%	99.60%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.06%	0.26%	1.51%	1.20%	0.06%	0.04%	0.12%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.88%	0.69%	NA	3.89%	0.27%	0.17%	0.40%

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CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		511	499	583	529	447	577	443
Total number of successful calls established		511	499	542	512	447	536	436
CSSR	≥ 95%	100.00%	100.00%	92.97%	96.79%	100.00%	92.89%	98.42%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.00%	0.00%	7.03%	3.21%	0.00%	7.11%	1.58%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		174027721	187708776	478518	491055468	19353005	90746461	3990220
Total number of calls dropped		3420287	1831836	6835	11490698	249798	636465	24599
Call drop rate	≤ 2%	1.97%	0.98%	1.43%	2.34%	1.29%	0.70%	0.62%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7368	9550	687	3968	3454	4969	8314
Total number of cells having more than 3% TCH		963	81	87	218	83	2	224
Worst affected cells having more than 3% TCH	≤ 3%	13.07%	0.85%	12.66%	5.49%	2.40%	0.04%	2.69%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		183172892	18681127	45033	50055510	22921883	9407686	2075282
Total number of calls dropped		3253063	190592	672	1271410	212652	63145	11404
Call drop rate	≤ 2%	1.78%	1.02%	1.49%	2.54%	0.93%	0.67%	0.55%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7367	9441	687	3968	3454	4969	8314
Total number of cells having more than 3% TCH		1122	90	59	258	73	52	221
Worst affected cells having more than 3% TCH	≤ 3%	15.23%	0.95%	8.59%	6.50%	2.11%	1.05%	2.66%

Drive Test Resultss for Call drop rate (Average of three drive tests) - Drive Test Data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		511	499	542	519	447	536	436
Total number of calls dropped		0	0	70	10	0	9	0
Call drop rate	≤ 2%	0.00%	0.00%	12.92%	1.93%	0.00%	1.68%	0.00%

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4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16246575867	19367439713	53845	47715	2445635056	13939525687	692336761
Total number of calls with good voice quality		15030308640	19069255264	51810	46385	2324064419	13723567304	677041855
%age calls with good voice quality	≥ 95%	92.51%	98.46%	96.22%	97.21%	95.03%	98.45%	97.79%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		17057076264	1914834372	53845	47715	2417982223	1326331471	337194228
Total number of calls with good voice quality		15705867478	1885204799	51810	46385	2315375913	1306837823	330844118
%age calls with good voice quality	≥ 95%	92.08%	98.45%	96.22%	97.21%	95.76%	98.53%	98.12%

Drive Test Resultss for Voice quality (Average of three drive tests) - DT data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		848798	678300	54515	770172	520531	214595	753923
Total number of calls with good voice quality		813398	653277	50139	717418	495540	193058	733656
%age calls with good voice quality	≥ 95%	95.83%	96.31%	91.97%	93.15%	95.20%	89.96%	97.31%

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5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		46	16	0	19	28	20	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81957.73	84046.00	0.00	19471.90	18870.00	31927.36	55916735.00
Traffic served for all POIs (B)- in erlangs		51543	32171	0	22345	11998	21186	14276992
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.15%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		46	16	0	19	28	20	28
No. of POIs not meeting benchmark		0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		81291.23	81495.00	0.00	19471.90	18870.00	32147.18	5641452.00
Traffic served for all POIs (B)- in erlangs		52884	32247	0	19057	12168	21320	1453734
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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11 ANNEXURE - JUNE

1. Network Availability

Audit Results for Network Availability- PMR data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2488	3195	NA	1353	1154	1572	2755
Sum of downtime of BTSs in a month (in hours)		153481	6960	NA	24958	3796	4838	16445
BTSs accumulated downtime (not available for service)	≤ 2%	8.29%	0.29%	NA	2.48%	0.44%	0.41%	0.80%
Number of BTSs having accumulated downtime >24 hours		1118	43	NA	66	7	22	52
Worst affected BTSs due to downtime	≤ 2%	44.94%	1.35%	NA	4.88%	0.61%	1.40%	1.89%

Live Measurement Results for Network Availability- 3 Day live data

	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Number of BTSs in the licensed service area		2488	3138	NDR	1353	1154	1626	2755
Sum of downtime of BTSs in a month (in hours)		15435	789	NDR	3351	477	527	1716
BTSs accumulated downtime (not available for service)	≤ 2%	8.62%	0.35%	NDR	3.44%	0.57%	0.45%	0.87%

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Number of BTSs having accumulated downtime >24 hours		228	0	NDR	30	2	0	2
Worst affected BTSs due to downtime	≤ 2%	9.16%	0.00%	NDR	2.22%	0.17%	0.00%	0.07%

2. Connection Establishment (Accessibility)

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	95.36%	98.34%	NDR	95.27%	98.34%	98.50%	99.20%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	1.35%	0.17%	NDR	0.83%	0.22%	0.03%	0.26%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	4.49%	0.66%	NDR	1.33%	1.35%	0.17%	0.80%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
CSSR	≥ 95%	97.51%	98.13%	NDR	95.63%	99.28%	98.53%	99.72%

SDCCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
SDCCH/Paging channel congestion	≤ 1%	0.69%	0.18%	NDR	0.93%	0.09%	0.03%	0.09%

TCH congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
TCH congestion	≤ 2%	1.61%	0.78%	NDR	3.73%	0.41%	0.15%	0.28%

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

CSSR	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of call attempts		413	489	507	444	379	458	511
Total number of successful calls established		409	489	468	431	379	447	503
CSSR	≥ 95%	99.03%	100.00%	92.31%	97.07%	100.00%	97.60%	98.43%

Blocked calls	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
%age blocked calls		0.97%	0.00%	7.69%	2.93%	0.00%	2.40%	1.57%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		142886245	182273372	NDR	501886802	18504475	85909274	3987645
Total number of calls dropped		2817741	1890356	NDR	12346415	230284	615129	27148
Call drop rate	≤ 2%	1.97%	1.04%	NDR	2.46%	1.24%	0.72%	0.68%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7395	9604	NDR	3980	3463	4716	8321
Total number of cells having more than 3% TCH		1631	88	NDR	213	71	8	224
Worst affected cells having more than 3% TCH	≤ 3%	22.06%	0.92%	NDR	5.35%	2.05%	0.17%	2.69%

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

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		183599110	18345238	NDR	50631846	22696825	9243539	2057856
Total number of calls dropped		3387048	189708	NDR	1291112	236490	65056	12470
Call drop rate	≤ 2%	1.84%	1.03%	NDR	2.55%	1.04%	0.70%	0.61%

Cells having more than 3% TCH	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of cells in the network		7391	9565	NDR	3980	3463	4716	8321
Total number of cells having more than 3% TCH		1681	96	NDR	258	76	13	218
Worst affected cells having more than 3% TCH	≤ 3%	22.74%	1.00%	NDR	6.48%	2.19%	0.28%	2.62%

Drive Test Resultss for Call drop rate (Average of three drive tests) - Drive Test Data

Call drop rate	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of calls established		409	489	507	431	379	447	503
Total number of calls dropped		0	0	26	4	0	4	0
Call drop rate	≤ 2%	0.00%	0.00%	5.13%	0.93%	0.00%	0.89%	0.00%

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4. Voice quality

Audit Results for Voice quality -PMR Data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		16789409097	18480340062	NDR	54603	2392532915	13289153880	694418757
Total number of calls with good voice quality		15166869706	18177466741	NDR	52484	2282075768	13083482753	677537819
%age calls with good voice quality	≥ 95%	90.34%	98.36%	NDR	96.12%	95.38%	98.45%	97.57%

Live measurement results for Voice quality-3 Day data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		17097426843	1863677170	NDR	54603	2395694289	1293626827	334277051
Total number of calls with good voice quality		15691330638	1833542514	NDR	52484	2300639050	1273142086	327544277
%age calls with good voice quality	≥ 95%	91.78%	98.38%	NDR	96.12%	96.03%	99.77%	97.99%

Drive Test Resultss for Voice quality (Average of three drive tests) - DT data

Voice quality	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of sample calls		609261	752236	86750	643067	478049	209986	1236392
Total number of calls with good voice quality		583159	720232	81925	598695	466821	194195	1200357
%age calls with good voice quality	≥ 95%	95.72%	95.75%	94.44%	93.10%	97.65%	92.48%	97.09%

5. POI Congestion

Audit Results for POI Congestion- PMR data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		47	15	NDR	19	28	21	28
No. of POIs not meeting benchmark		0	0	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		82220.65	84788.00	NDR	19471.90	19269.00	31960.48	55929984.00
Traffic served for all POIs (B)- in erlangs		51829	32928	NDR	22141	11773	21059	14013963
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	0.13%	0.00%	0.00%	0.00%

Live Measurement Results for POI Congestion- 3 Day data

POI congestion	Benchmark	Aircel(DWL)	Airtel	BSNL CDMA	BSNL GSM	Idea	Reliance GSM	Vodafone
Total number of working POIs		47	15	NDR	19	28	21	28
No. of POIs not meeting benchmark		0	0	NDR	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		82220.65	80907.00	NDR	19471.90	18964.00	32164.38	5642446.00
Traffic served for all POIs (B)- in erlangs		52793	33287	NDR	18496	12465	21623	1443359
POI congestion	≤ 0.5%	0.00%	0.00%	NDR	0.00%	0.00%	0.00%	0.00%

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