EAST ZONE

TRAI AUDIT WIRELINE REPORT – ORISSA CIRCLE - AUDIT OF JAS QUARTER, 2016

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TRAI

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Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

TABLE OF CONTENTS

1 INTRODUCTION

1.1 About TRAI

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

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

TRAI initiated a regulation - The Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 20thMarch, 2009, the "Standards of Quality of Service for Wireless Data Services Regulations, 2012 dated 4th March 2012, and the "Quality of Service of Broadband Service Regulations", 2006 (11 of 2006) dated 6th January, 2006 that provide the benchmarks for the parameters on customer perception of service to be achieved by service provider.

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

1.2 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).

1.3 COVERAGE

The broadband audit was conducted in Orissa circle. For BSNL, a geographical spread among the SDCAs and POPs was maintained. For other operators, the audit was conducted for all SDCAs at overall level.

1.4 AUDIT PROCESS

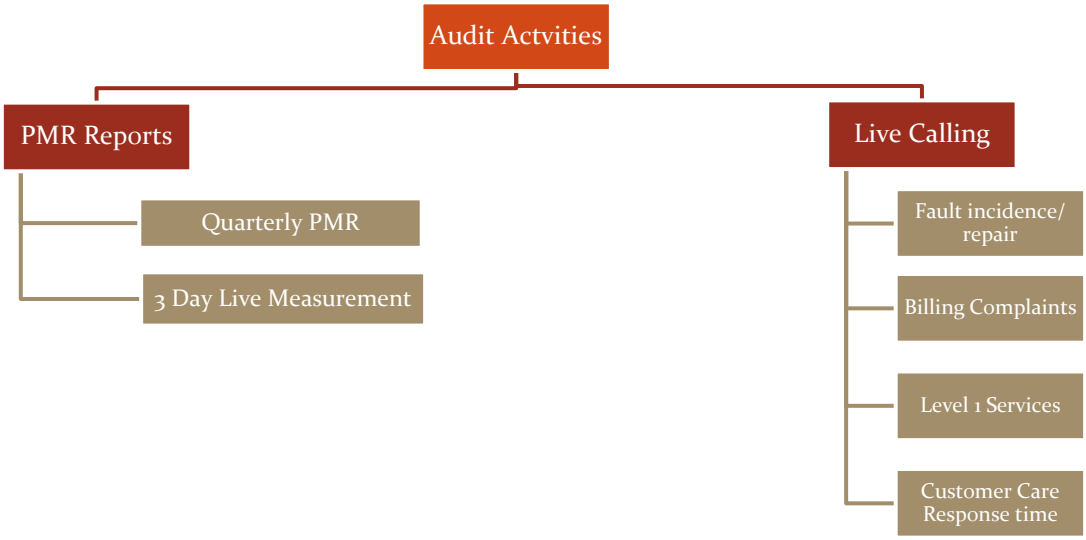
As per TRAI guidelines, the Wireline Audit for a circle is conducted for one quarter once every year.

- The operators have been assimilated as per TRAI guidelines given in QoS tender document 2015 and latest list of licensees provided by TRAI.
- IMRB auditors contacted the following wireline operators to conduct the audit in ORISSA for the JAS' 2016 quarter.

Name of Operator
BSNL
Reliance

- The PMR was generated from the raw data pertaining to July, August and September 2016 (JAS'16), which was collected from the operator during the audit conducted in the month of October 2016.
- Live calling and 3 day live measurement activity was carried out during the month of September 2016. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. For example, data of August 2016 was considered for live calling activity conducted in September 2016.

1.5 FRAMEWORK USED



1.5.1 PMR REPORTS - SIGNIFICANCE AND METHODOLOGY

The significance of PMR or Performance Monitoring Reports is to assess the various Quality of Service (QoS) parameters involved in the Basic (Wireline) telephone services, which indicate the overall health of service for an operator. The operators submit these PMR reports to TRAI time to time as per instructions from TRAI.

To verify the QoS performance of the operators, TRAI has appointed IMRB as their auditor in East Zone to conduct QoS audit of operators. The steps involved in the audit have been given below.

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

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

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

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

The raw data extracted is then used to generate PMR reports in the following formats.

- Quarterly PMR
- 3 Day Live Measurement Data

Let us understand these formats in detail.

1.5.1.1 QUARTERLY PMR REPORT – PARAMETERS REVIEWED

The main purpose of quarterly PMR report is to verify the following key QoS parameters on quarterly basis as per the methodology stated above in section 1.4

- Fault incidence/clearance related statistic
- Mean Time to Repair (MTTR)
- POI (Point of Interconnection) Congestion
- Metering and billing credibility
- Resolution of billing complaints
- Customer care promptness
- Time taken to refund of deposits after closure

1.5.1.2 3 DAY LIVE MEASUREMENT – METHODOLOGY AND PARAMETERS REVIEWED

The main purpose of 3 day live measurement is to evaluate the following parameters on intraday basis. The auditors visit the sample exchanges (in case of BSNL) and main exchanges (in case of other operators) to collect the 3 day live data for the following parameters

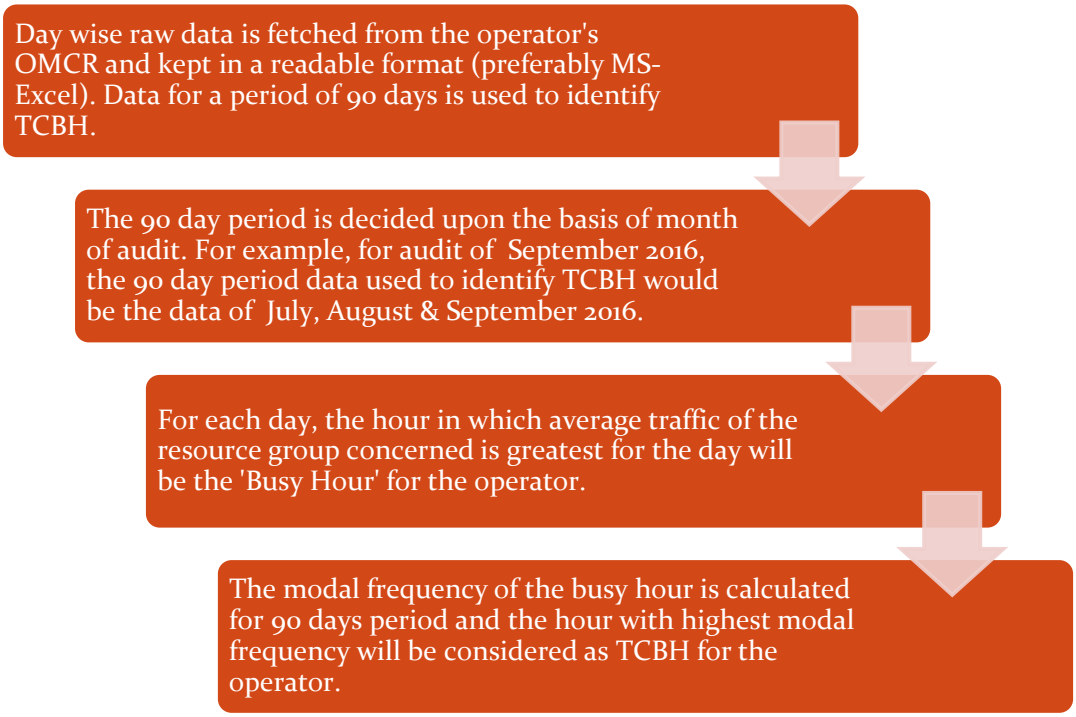
- POI (Point of Interconnection) Congestion

While the quarterly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the above given parameters. All the calculations are then done on the basis of that raw data of 3 days.

1.5.1.3 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

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

Step by step procedure to identify TCBH for an operator:



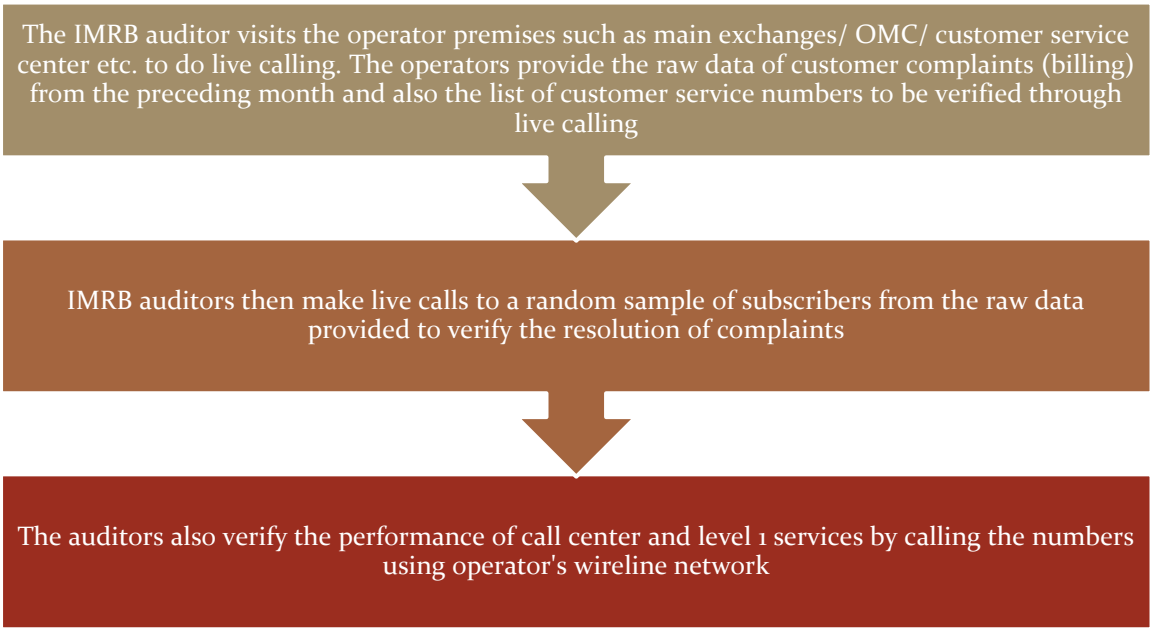
During audit, the auditors identified from the raw data that the TCBH for the operators in JAS'16 was the time period as given below.

1.5.2 LIVE CALLING - SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of following parameters by doing test calls to the subscribers/ specific numbers.

- Fault clearance
- Resolution of billing complaints
- Response time to the customer for assistance
- Level 1 services

The process of conducting live calling has been stated below.



Let us now discuss the methodology of live calling for each parameter in detail.

1.5.2.1 FAULT CLEARANCE

Live calling for fault clearance is done to verify the following.

- Fault repair by next working day - for both Urban and Rural Exchanges
- Fault repair within 5 working days – Urban Exchanges
- Fault repair within 7 working days – Rural Exchanges

- Auditors request the operator to provide the database of all the subscribers who reported Faults in one month prior to IMRB auditor visit
- Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.
- Auditors check and record whether the fault was corrected within the timeframes as mentioned in the benchmark

Benchmark:

- Fault repair by next working day (Urban Exchanges): =>85%
- Fault repair by next working day (Rural Exchanges): =>75%
- Fault repair within 5 working days (Urban Exchanges): =100%
- Fault repair within 7 working days (Rural Exchanges): =100%

1.5.2.2 RESOLUTION OF BILLING COMPLAINTS

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

- Auditors collected the data from operators system of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically
- A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator
- Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

Benchmark:

98% complaints resolved within 4 weeks, 100% complaints resolved within 6 weeks

1.5.2.3 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

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

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

The process for this parameter is stated below.

- Overall sample size is 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS.
- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

1.5.2.4 LEVEL 1 SERVICE

Level 1 is used for accessing special services like emergency services, supplementary services, inquiry and operator-assisted services. Level 1 Services include services such as police, fire, ambulance (Emergency services). Test calls were made from operator network to test the accessibility and efficiency of Level 1 services on an operator's network.

A minimum of 300 test calls were made per service provider in the quarter. In case of BSNL, calls were equally distributed among SDCAs (Short Distance Charging Area) visited for the purpose of live calling.

In JAS'16, IMRB has conducted the live calling to the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

1.5.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

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

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

1.5.3 AUDIT METHODOLOGY

As per audit tender, following table explains the audit methodology for Basic (Wireline) services. Here, a YES signifies that the mentioned parameter gets audited by the given audit method (PMR/ Live Measurement/ Live Calling).

Sl. No.	Parameters	PMR	Live measurement	Live calling
1	Fault incidence/clearance related statistic	YES		
1.1	- Total number of faults registered per month	YES		
1.2	- Fault repair by next working day (Urban and Rural)	YES		YES
1.3.1	- Fault repair within 5 working days (Urban)	YES		YES
1.3.2	- Fault repair within 7 working days (Rural)	YES		YES
1.4	Mean Time to Repair (MTTR)	YES		
4	POI Congestion	YES	YES	
5	Metering and billing credibility – postpaid	YES		YES
5.1	Metering and billing credibility – prepaid	YES		YES
6	Customer service promptness	YES		
6.1	Processing closure request	YES		
7	Response time to customer	YES		
7.1	While call is getting connected and answered	YES		YES
7.2	While call is answered by operator (voice to voice)	YES		YES
8	Level 1 Services			YES
9	Time taken to refund of deposits after closure	YES		

The audit methodology for each parameter has been explained along with the findings of same.

1.5.4 MEASUREMENT METHODOLOGY

As per audit tender, following table explains the measurement methodology in terms of time period consideration for various parameters involved in audit of Basic (Wireline) services.

Sl. No.	Parameters	Averaged over a period
1	Fault incidence	One Quarter
1.1	Total number of faults registered per month	One Quarter
1.2	Fault repair by next working day (Urban and Rural)	One Quarter
1.3.1	Fault repair within 5 working days (Urban)	One Quarter
1.3.2	Fault repair within 7 working days (Rural)	One Quarter
1.4	Mean Time to Repair (MTTR)	One Quarter
4	POI Congestion	One Month
5	Metering and billing credibility – postpaid	One Billing Cycle
5.1	Metering and billing credibility – prepaid	One Quarter
6	Customer care promptness	One Quarter
6.1	Processing closure request	One Quarter
7	Response time to customer	One Quarter
7.1	While call is getting connected and answered	One Quarter
7.2	While call is answered by operator (voice to voice) within 90 seconds	One Quarter
8	Time taken to refund of deposits after closure	One Quarter

1.6 SAMPLING METHODOLOGY

- For BSNL, sampling include all exchanges, including rural and urban exchanges, in 10% of SDCAs in the licensed service area or 10 SDCAs, whichever is more for the purpose of audit, live calling and live measurement.
- For Reliance and Vodafone audit was conducted in centralized exchange.
- The sampling plan for BSNL was finalized as per TRAI guidelines. The details of exchange list are given below

Audit for BSNL has been conducted on the basis of data pertaining to sample SDCAs and exchanges.

1.6.1.1 SDCA SELECTED AS PER SAMPLING PLAN – BSNL

ORISSA
SDCA
DHENKANAL
PURI
BHUBANESWAR
RAYAGADA
ROURKELA
SAMBALPUR
BALASORE
BHADRAK
BERHAMPUR
BOLANGIR
JAJPUR ROAD

Name of Operator
BSNL
Reliance

1.7 COLOUR CODE TO READ THE REPORT

Not Meeting the benchmark

2 EXECUTIVE SUMMARY

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

2.1 PMR (PERFORMANCE MONITORING REPORT) DATA – JAS'16

Parameters	Benchmarks	BSNL	Reliance
Faults incidences (No. of faults/100 Subs./month) - averaged for the quarter	≤7	7.98	NA
% of faults repaired by next working day	≥ 85% (Urban)	32.58%	NA
% of faults repaired within 5 days	100% (Urban)	91.98%	NA
Percentage of faults repaired by next working day during the quarter	≥ 75% (Rural)	NA	NA
Percentage of faults repaired within 7 days during the quarter	100% (Rural)	NA	NA
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	NA	NA
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	NA	NA
Faults pending for > 15 days	Rent rebate of 1 month	NA	NA
Mean Time to Repair (MTTR)	≤ 10 Hrs	27.57	NA
No. of POIs with congestion > 0.5%	≤ 0.5%	0.00%	0.00%
Metering and billing credibility - Number of bills disputed during the quarter	≤ 0.1%	0.00%	0.00%
Resolution of billing complaints within 4 weeks	≥ 98%	NA	NA
Percentage complaints resolved within 6 weeks of date of receipt	100%	NA	NA
Period of applying credit / waiver	≤ 1 week	NA	NA
Closure within 7 days	100%	96.12%	NA
Refund of deposits within 60 days of closure of service	100%	12.10%	NA

Response time to customer for assistance	Benchmarks	BSNL	Reliance
% age calls getting connected and answered	≥ 95%	99.21%	98.83%
Percentage of calls answered by the operators (voice to voice) within 90 seconds	≥ 95%	99.32%	98.46%

NA: Not Applicable

Reliance does not have any faults registered.

2.1.1 FAULT INCIDENCE / CLEARANCE STATISTICS

All the operators met the benchmark for fault incidence except BSNL.

All the operators met the benchmark of fault repair within next day in urban areas except BSNL. BSNL did not have faults registered in rural areas.

All the operators met the benchmark for the Mean time to repair (MTTR).

Rent rebate not applicable as all faults were repaired within stipulated time for the operators.

Note: - Reliance did not receive any fault complaint during the audit period

2.1.2 POI (POINT OF INTERCONNECTION) CONGESTION

All operators met the benchmark by reporting 0% POIs with congestion.

2.1.3 METERING AND BILLING CREDIBILITY

All the operators met the benchmark for metering and billing credibility.

2.1.4 RESOLUTION OF BILLING COMPLAINTS

All operators met the benchmark for resolution of billing complaints within 4 weeks and for resolution of billing complaints within 6 weeks. There were no complaints registered in this period.

2.1.5 PERIOD OF APPLYING CREDIT/ WAIVER

NA: No cases where credit/ waiver were required during the audit period.

2.1.6 CLOSURE WITHIN 7 DAYS

All operators met the benchmark for the parameter except BSNL.

2.1.7 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

All operators met the TRAI benchmark in terms of number of IVR calls being connected and answered.

The benchmark of 95% of voice to voice calls answered within stipulated time of 90 seconds for all operators.

2.1.8 REFUND OF DEPOSIT WITHIN 60 DAYS FROM CLOSURE

BSNL did meet the benchmark for refund of deposit within 60 days from closure.

NA: Did not have any closure request during the audit period. No refunds applicable.

2.2 3 DAY LIVE MEASUREMENT

Parameters	Benchmarks	BSNL	Reliance
POI Congestion	≤ 0.5%	0.00%	0.00%

2.2.1 POI (POINT OF INTERCONNECTION) CONGESTION

All operators met the benchmark by reporting 0% POIs with congestion.

2.3 LIVE CALLING

Parameters	Benchmarks	BSNL	Reliance
Fault Repair/ Clearance			
% of faults repaired by next working day	≥ 85% (Urban)	81.60%	NA
Percentage cases where faults were repaired by next working day	≥ 75% (Rural)	NA	NA
% of faults repaired within 5 days	100% (Urban)	88.19%	NA
Percentage cases where faults were repaired within 7 days	100% (Rural)	NA	NA
Resolution of billing complaints			
Resolution of billing complaints within 4 weeks	≥ 98%	NA	NA
Percentage complaints resolved within 6 weeks of date of receipt	100%	NA	NA
Response time to customer for assistance			
% age calls getting connected and answered	≥ 95%	100.00%	100.00%
% age call answered by operator in 90 seconds	≥ 95%	96.00%	98.00%
Level 1 Services			
% age calls made to Level 1 services getting answered	≥ 90%	99.53%	99.67%

2.3.1 FAULTS REPAIR/ CLEARANCE

All operators met the benchmark of fault repair within next day and within 5 days in urban areas, except BSNL.

NA: Reliance does not have presence in rural areas.

2.3.2 RESOLUTION OF BILLING COMPLAINT

During live calling, for BSNL and Reliance were not conducted as there were no complaints reported for the operator in the audit period.

2.3.3 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

During live calling, it was observed that all operators met the benchmark of %age calls answered by operators in 90 seconds.

2.3.4 LEVEL 1 SERVICES

All operators met the benchmark for Level 1 services. The details of live calling have been provided in the annexure.

3 CRITICAL FINDINGS - JAS'16

Fault Incidence/ Clearance Statistic/ POI

- All the operators met the benchmark for fault incidence. Except BSNL
- All the operators met the benchmark of fault repair within next day in urban areas except BSNL.
- All the operators met the benchmark for the Mean time to repair (MTTR).
- Rent rebate not applicable as all faults were repaired within stipulated time for the operators.

Note: - Reliance did not receive any fault complaint during the audit period

Metering and billing credibility.

- All the operators met the benchmark for metering and billing credibility.

Resolution of Billing Complaints

- All operators met the benchmark for resolution of billing complaints within 4 weeks and for resolution of billing complaints within 6 weeks. There were no complaints registered in this period.

NA: No cases where credit/ waiver were required during the audit period.

Response time for customer assistance

- All operators met the TRAI benchmark in terms of number of IVR calls being connected and answered.
- The benchmark of 95% of voice to voice calls answered within stipulated time of 90 seconds for all operators.

Refund of deposit within 60 days from closure

- BSNL did meet the benchmark for refund of deposit within 60 days from closure.

NA: Reliance did not have any closure request during the audit period. No refunds applicable.

.Live Calling

- All operators met the benchmark of fault repair within next day and within 5 days in urban areas. Except BSNL.

NA: Reliance does not have presence in rural areas.

- During live calling, for BSNL and Reliance were not conducted as there were no complaints reported for the operator in the audit period.
- During live calling, it was observed that all operators met the benchmark of %age calls answered by operators in 90 seconds.
- All operators met the benchmark for Level 1 services. The details of live calling have been provided in the annexure.

4 PARAMETER EXPLANATION AND DETAILED FINDINGS - COMPARISON BETWEEN PMR AND LIVE CALLING/ MEASUREMENT DATA

4.1 FAULT INCIDENCE/ CLEARANCE RELATED SERVICES

4.1.1 PARAMETER EXPLANATION

4.1.1.1 DEFINITION

Fault Incidence: This parameter quantifies the number of faults registered per 100 subscribers/ per month for a wireline service provider in a quarter.

Fault Clearance/Repair: This parameter quantifies the number of faults repaired within a stipulated period of time (within a day, within 5 days – urban, within 7 days – rural) in the quarter

Mean Time to Repair (MTTR): It is the average of total time taken to repair for all faults reported in a quarter

4.1.1.2 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to number of fault received and also number of faults cleared at the service provider's level in the following time frames:-

- Number of faults cleared within 24 hours (Urban & Rural)
- Number of cleared in more than 1 day but less than 5 days (Urban)
- Number of cleared in more than 5 days but less than 7 days (Urban)
- Number of cleared in more than 1 day but less than 7 days (Rural)
- Number of cleared in more than 7 days but less than 15 days (Urban & Rural)
- Number of cleared in more than 15 days (Urban & Rural)

The mean time to repair (in hours) is also calculated by averaging the total time of repair for each customer.

Live calling: -

- Live calling was done to verify the following
    - Fault repair by next working day - for both Urban and Rural Exchanges
    - Fault repair within 5 working days – Urban Exchanges
    - Fault repair within 7 working days – Rural Exchanges
- Auditors ensured that the operator provided a list of all the subscribers who reported Faults in one month prior to IMRB auditor visit

- Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.
- Auditors checked and recorded whether the fault was corrected within the timeframes as mentioned in the benchmark

4.1.1.3 COMPUTATIONAL METHODOLOGY

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed for calculating fault related parameters.

Fault Incidence:

$$\text{Fault incidences – No. of faults/100 subscriber/month} = \frac{\text{Total number of faults in the Quarter (3 months)}}{\text{Total No. of DELs at the end of the Quarter}} \times \frac{100}{3}$$

Here, DEL or Direct Exchange Line would be the subscribers of wireline services.

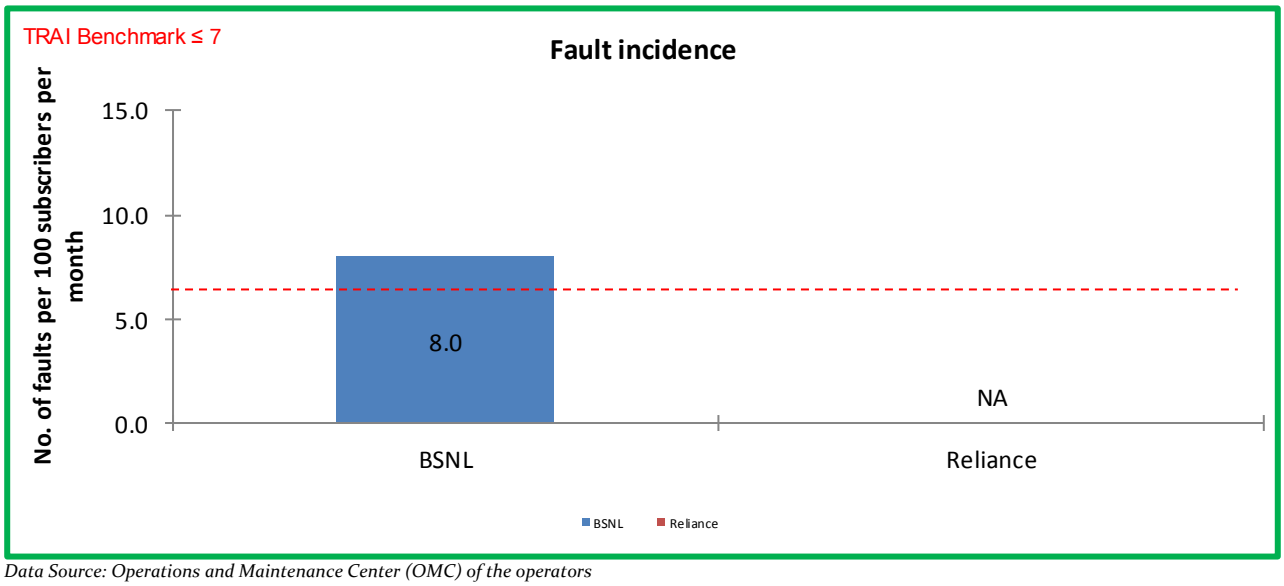
MTTR (Mean Time to Repair):

$$\text{Mean Time to Repair} = \frac{\text{sum of duration of each repair time in hours for all the fault incidences in a Quarter (3 months)}}{\text{Total number of fault incidences in a Quarter (3 months)}}$$

4.1.1.4 BENCHMARK

- Total number of faults registered per month: <=5 complaints per 100 subscribers
- Fault repair:
  - Fault repair by next working day (Urban Exchanges): >=85%
  - Fault repair by next working day (Rural Exchanges): >=75%
  - Fault repair within 5 working days (Urban Exchanges): =100%
  - Fault repair within 7 working days (Rural Exchanges): =100%
- Mean Time to Repair: <=10 hours

4.1.2 DETAILED FINDINGS - FAULT INCIDENCE

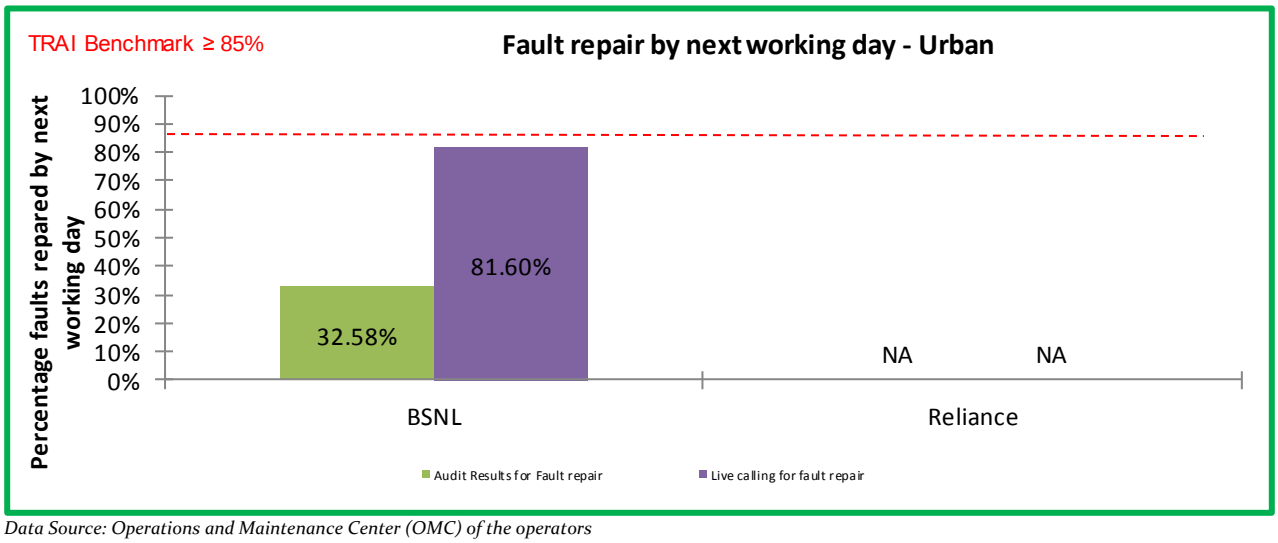


Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for fault incidence.

Reliance does not have any faults registered.

4.1.3 DETAILED FINDINGS - FAULT REPAIR BY NEXT DAY (URBAN)

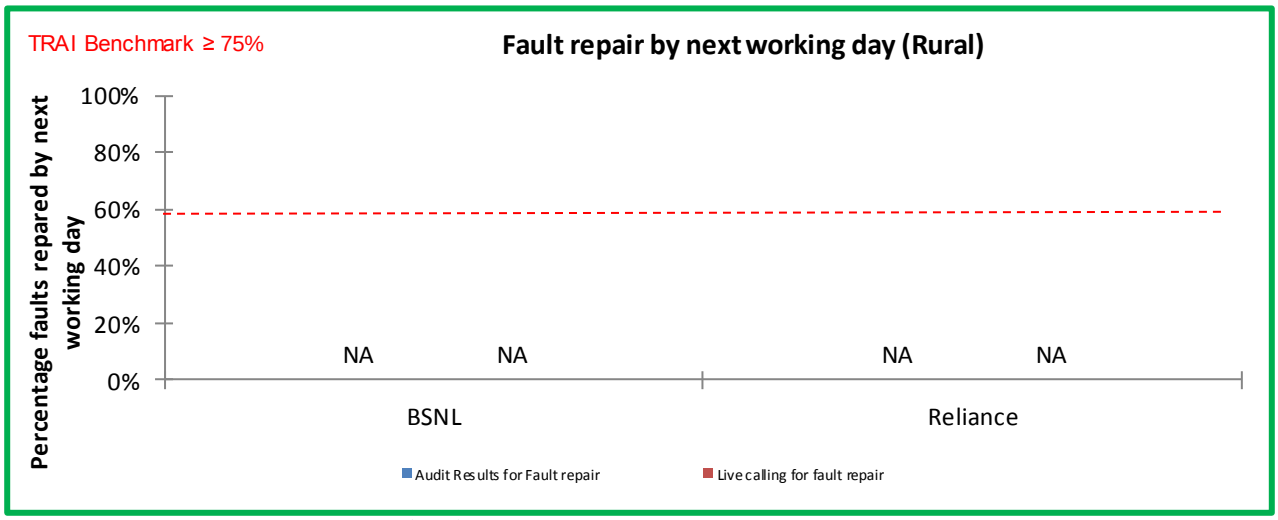


Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark of fault repair within next day in urban areas as per audit, except BSNL did not meet during PMR Audit and Live.

Reliance does not have any faults registered.

4.1.1 DETAILED FINDINGS - FAULT REPAIR BY NEXT DAY (RURAL)

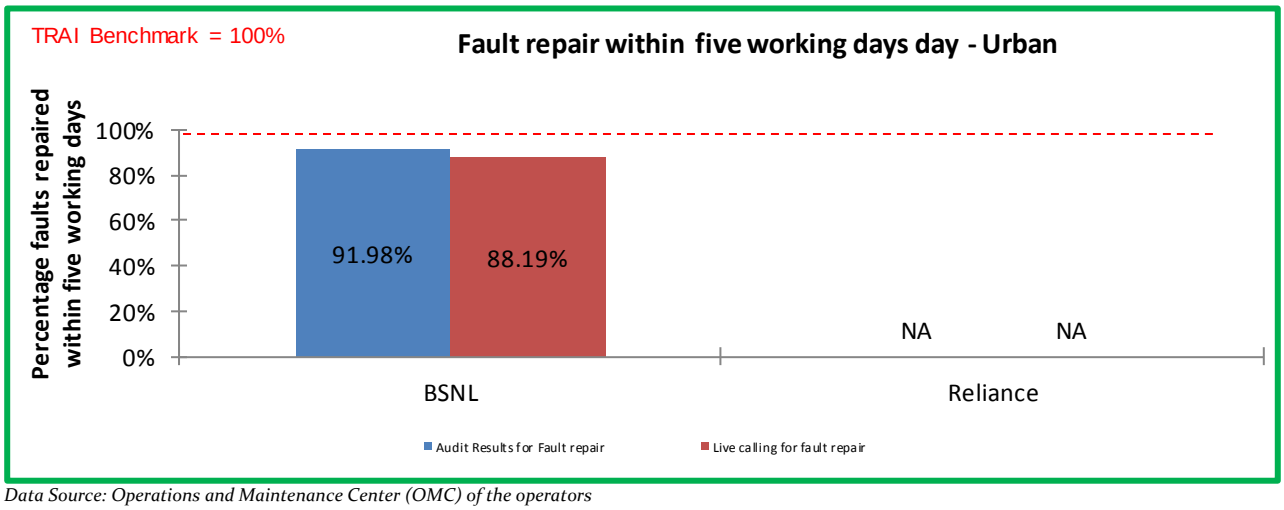


Data Source: Operations and Maintenance Center (OMC) of the operators

BSNL and Reliance did not have faults registered in rural areas.

NA: Does not have network presence in rural and hilly areas.

4.1.2 FINDINGS - FAULT REPAIR WITHIN FIVE WORKING DAYS (URBAN)

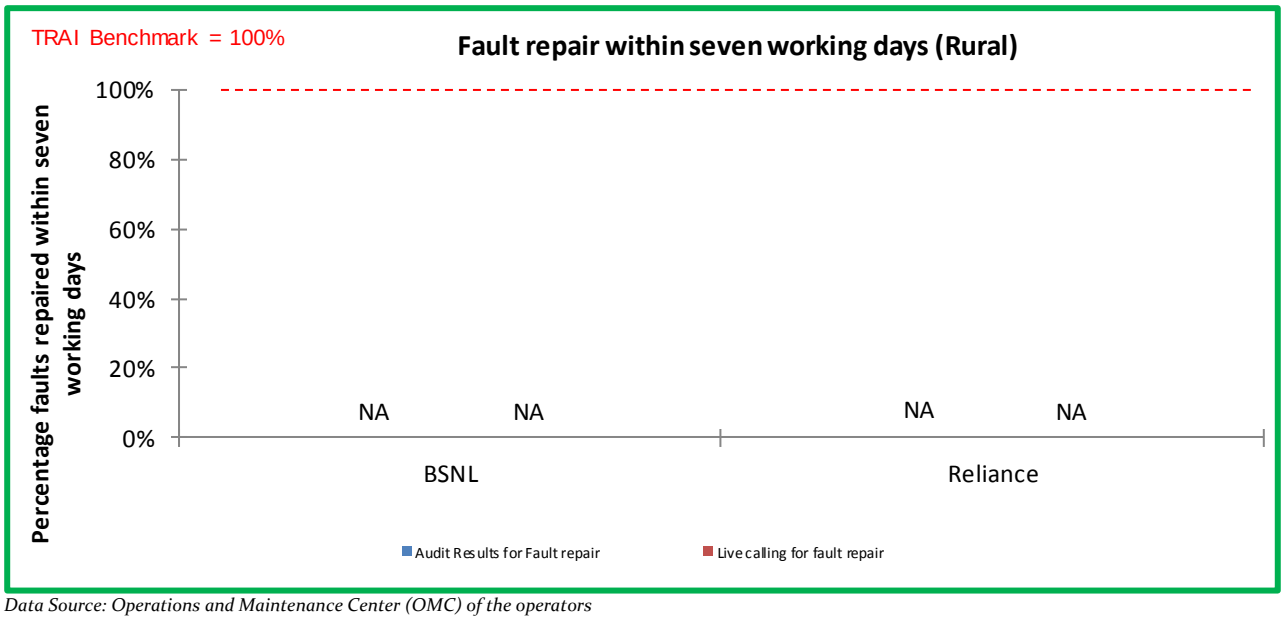


Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark. Except BSNL

Reliance does not have any faults registered.

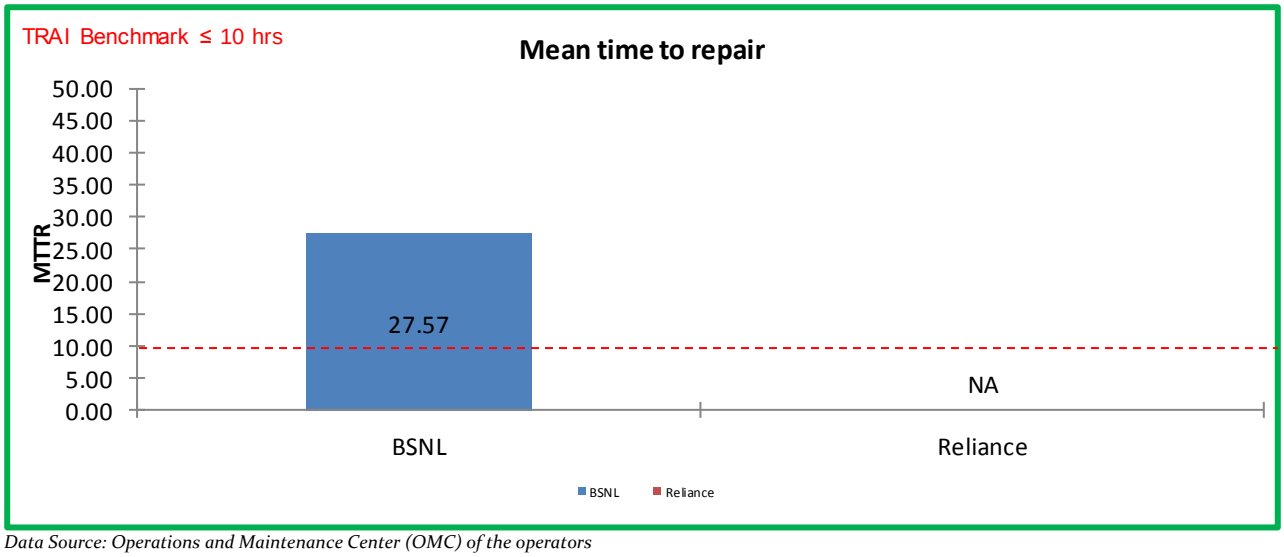
4.1.1 FINDINGS - FAULT REPAIR WITHIN SEVEN WORKING DAYS (RURAL)



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

NA: Does not have network presence in rural and hilly areas.

4.1.2 DETAILED FINDINGS - MEAN TIME TO REPAIR



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

BSNL did not meet the benchmark for the parameter.

Reliance does not have any faults registered.

4.2 METERING AND BILLING CREDIBILITY

4.2.1 PARAMETER EXPLANATION

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

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

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

4.2.1.1 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to –

- Number of Billing complaints received at the service provider's level
- Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled.
- Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills
- Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, Payment made in time but charged penalty/ not reflected in next bill, Last payment not reflected in bill, Adjustment/ waiver not done, Anything else related to bills, Toll free numbers charged etc.
- Billing complaints resolution database, with opening and closing date of complaint to identify the time taken to resolve a complaint

Live calling:

- Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically
- A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator
- Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

Benchmarks:

- 98% complaints resolved within 4 weeks, 100% complaints resolved within 6 weeks

4.2.1.2 COMPUTATIONAL METHODOLOGY – METERING AND BILLING CREDIBILITY

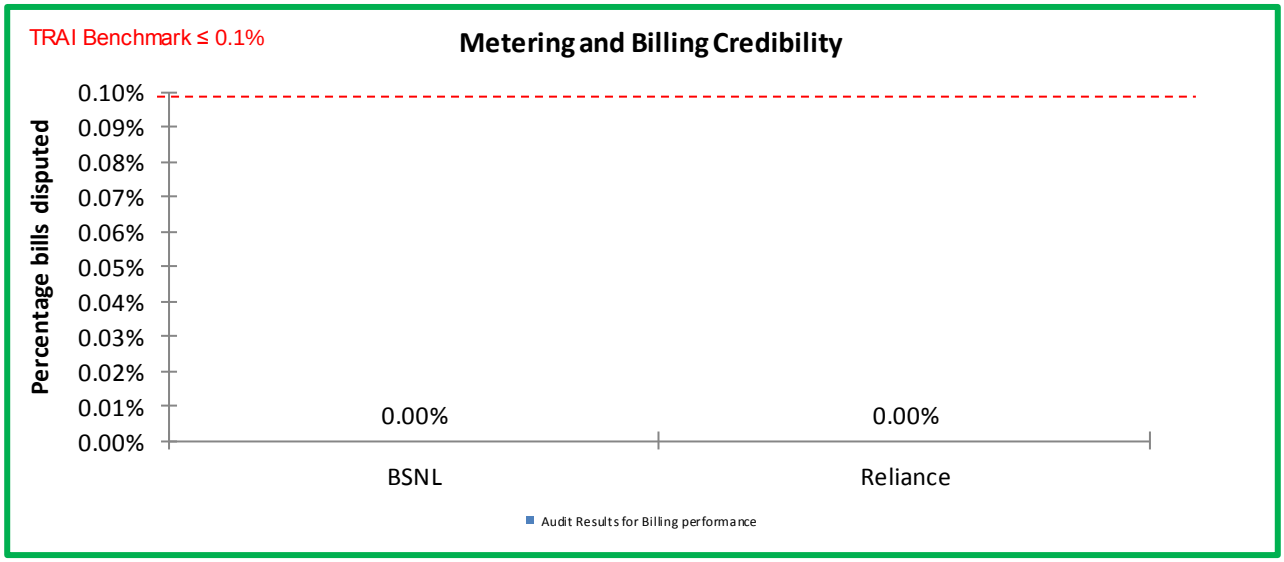
The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed to calculate incidence of billing complaints.

$$\text{Billing complaints (\%)} = \frac{\text{total number of disputed bills X 100}}{\text{total number of bills issued during one billing cycle.}}$$

- *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated
- **Billing complaints here shall include only dispute related issues (including those that August arise because of a lack of awareness at the subscribers' end). It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.

TRAI Benchmark: <= 0.1%

4.2.1.3 METERING AND BILLING CREDIBILITY – AUDIT FINDINGS



Data Source: Billing Center of the operators

All operators met the benchmark for the parameter.

4.2.1.4 COMPUTATIONAL METHODOLOGY – RESOLUTION OF BILLING COMPLAINTS

Calculation of Percentage resolution of billing complaints

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) and TRAI guidelines (Received on Sep 08, 2016) was followed to calculate resolution of billing complaints.

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

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

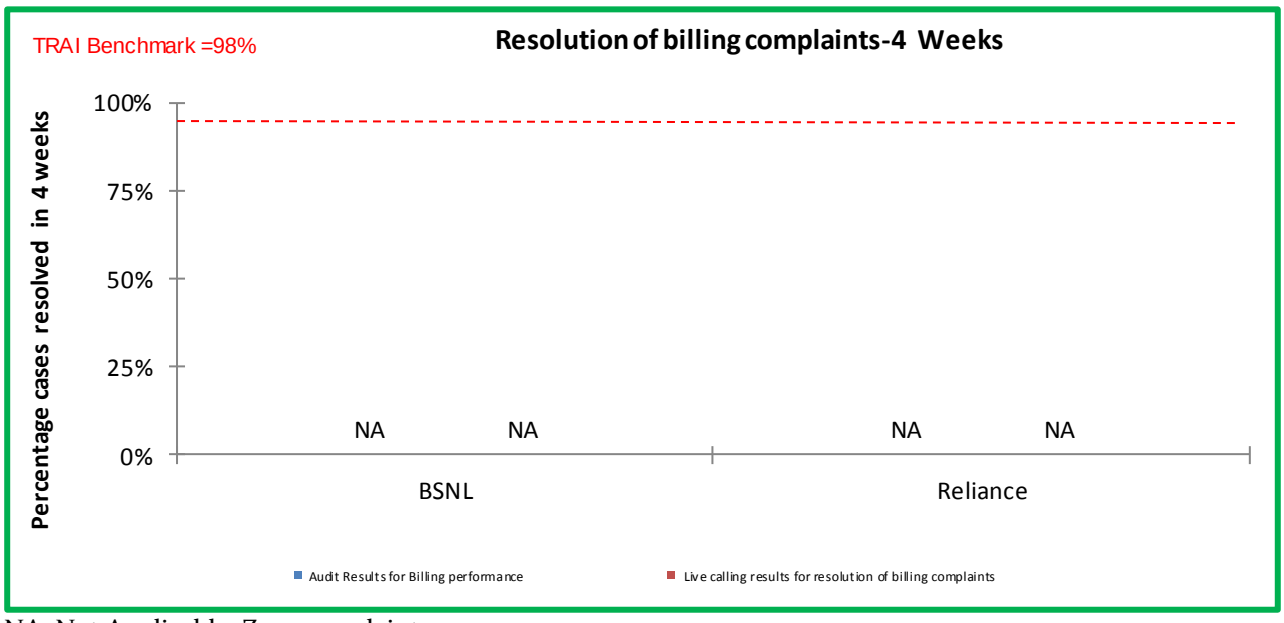
$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 6 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

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

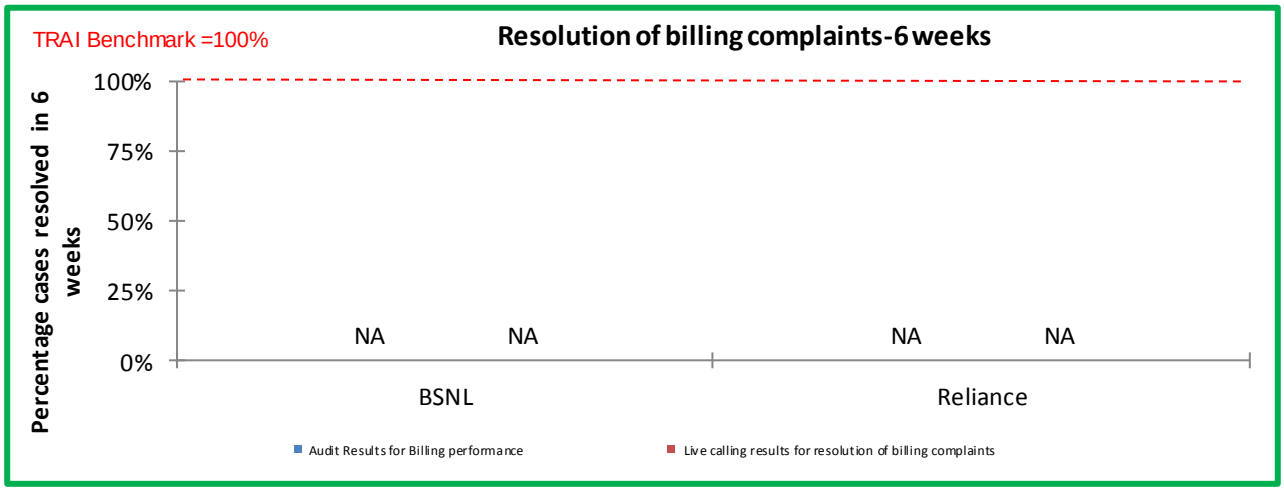
- *** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.

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

4.2.1.5 RESOLUTION OF BILLING COMPLAINTS – AUDIT FINDINGS



NA: Not Applicable: Zero complaints



NA: Not Applicable: Zero complaints

4.2.1.6 COMPUTATION METHODOLOFY - PERIOD OF APPLYING CREDIT WAIVER

This parameter measures whether all refunds in the form of credit/ waiver/ adjustment are made within 7 days from the date of resolution of complaint.

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

4.3 RESPONSE TIME TO CUSTOMER

4.3.1 PARAMETER EXPLANATION

Following two sub-parameters are covered for this parameter:

- Accessibility of Call Centre: The percentage of calls getting connected and answered by the call center. Not more than 5% calls shall encounter busy signal, no reply or any other failure in getting connected to the IVR.
- % age of calls answered by operators (voice to voice) within stipulated time: Not more than 5% calls shall encounter busy signal, no reply or any other failure in getting connected to the call center executive.

4.3.1.1 AUDIT PROCEDURE

- IMRB auditors collect the data for time taken to connect a customer's call both to the IVR as well as to a customer care executive.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

Live calling:

- Overall sample size was 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS.
- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

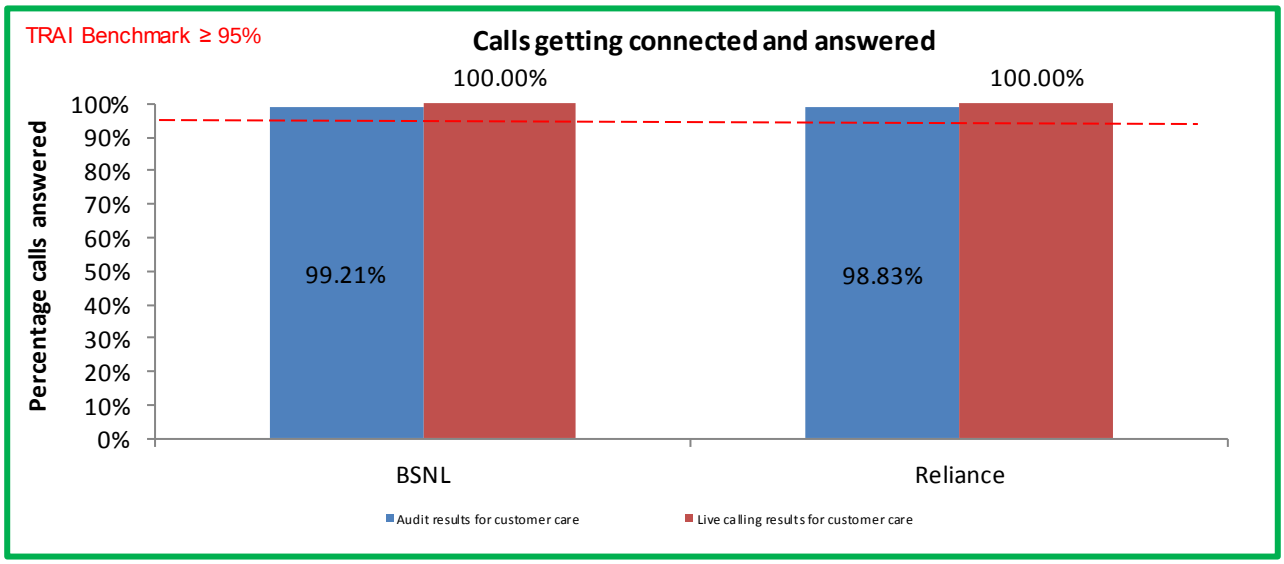
4.3.1.2 COMPUTATIONAL METHODOLOGY

- **Percentage of calls answered in a specified time = (Total no. of calls answered within that specified time / Total no. of calls dialed for a particular service)*100**

4.3.1.3 BENCHMARK

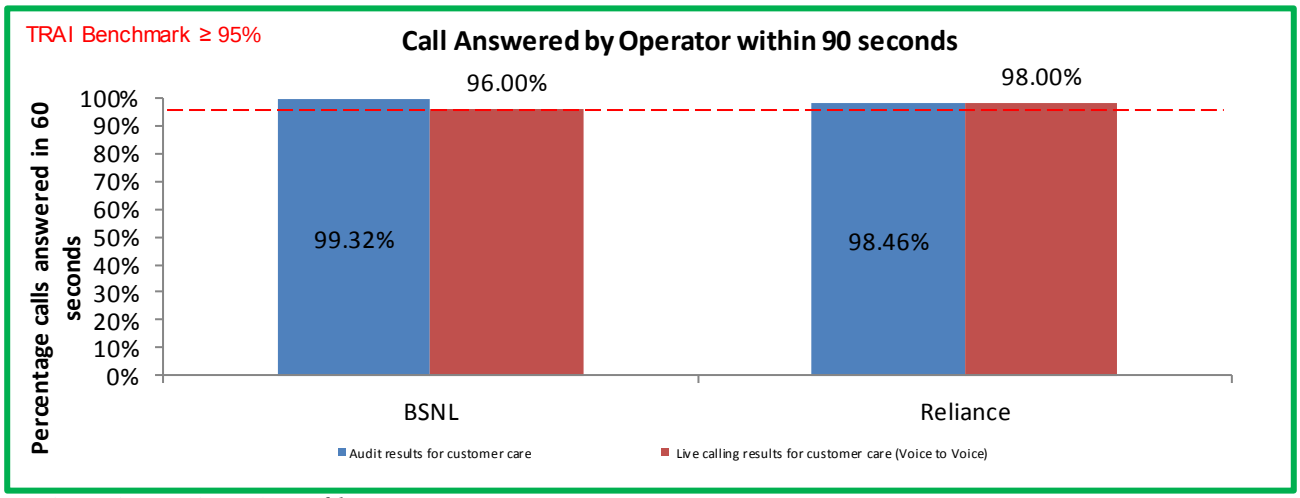
- % age of calls getting connected and answered: In 95% of the cases or more.
- % age of calls answered by operator / voice to voice) within 90 seconds: In 95% of the cases or more

4.3.2 CALLS GETTING CONNECTED AND ANSWERED



All operators met the TRAI benchmark in terms of number of IVR calls being connected and answered.

4.3.3 CALL ANSWERED BY OPERATOR WITHIN 90 SECONDS



Data Source: Customer Service Center of the operators

The benchmark of getting 95% of voice to voice calls answered within stipulated time of 90 seconds was not met by BSNL during live calling.

4.4 CUSTOMER CARE PROMPTNESS

4.4.1 PARAMETER EXPLANATION

4.4.1.1 AUDIT PROCEDURE

IMRB Auditors collected and verified data pertaining to -

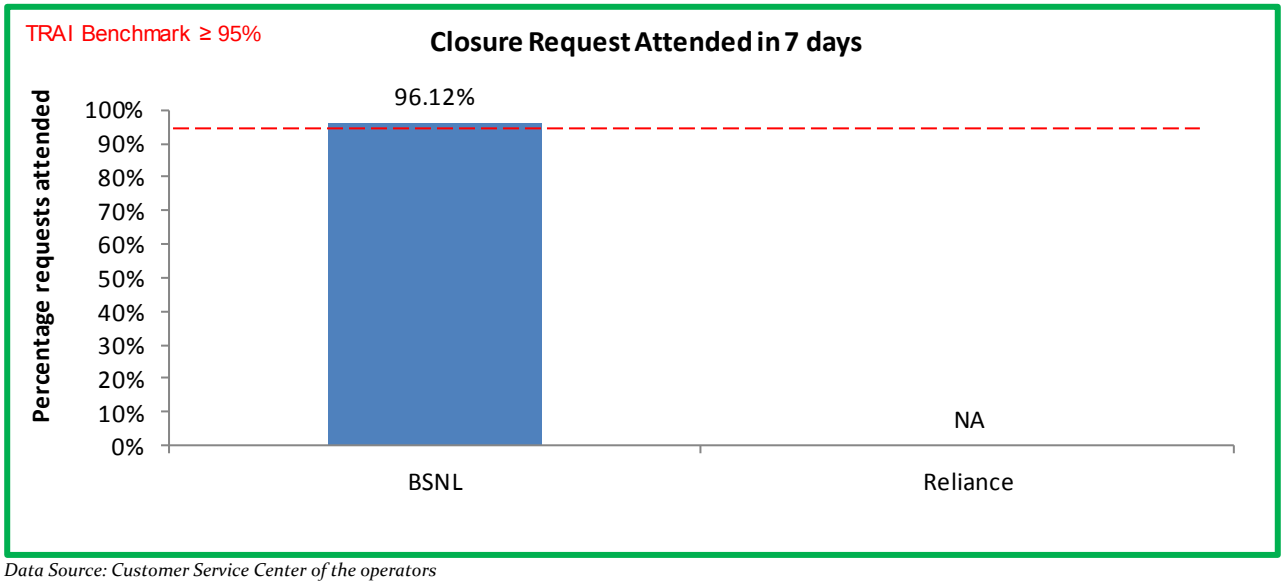
Processing of closure request (Following key points were taken care of while verifying the data)

- The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange.
- DNP (due to Non – payment) cases are excluded.
- All holidays are excluded for calculating 7 days.
- Closure requests attended in the previous months are excluded
- The period for closure starts from the time of submission of application by the subscriber.

4.4.1.2 BENCHMARK

- Processing of closure request: Less than 7 days

4.4.2 FINDINGS - CLOSURE REQUEST ATTENDED IN 7 DAYS



Data Source: Customer Service Center of the operators

NA: The parameter is not applicable for Reliance as there were no closure requests made during the audit period.

BSNL did not meet the benchmark.

4.5 TIME TAKEN TO REFUND DEPOSIT AFTER CLOSURE

4.5.1 PARAMETER EXPLANATION

4.5.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to -

- Cases requiring refund of deposits after closure are to be included.
- Time taken starts from the date on which the closure is made by the service provider and ends at the date on which refund is received by the customer

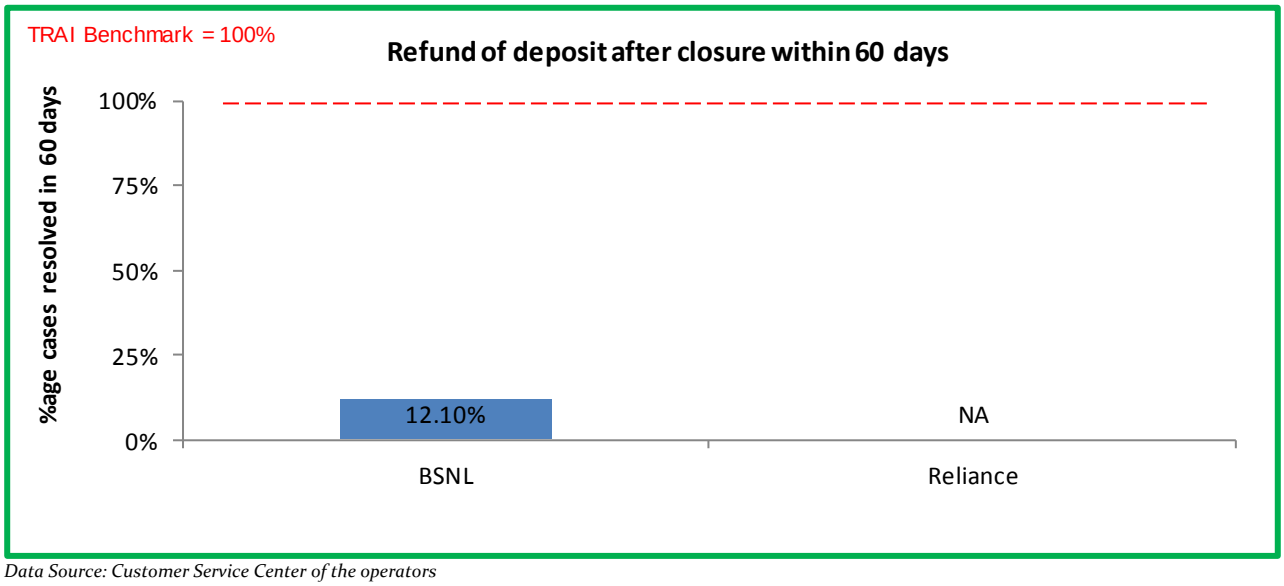
4.5.1.2 COMPUTATIONAL METHODOLOGY

- **Percentage of cases where refund has been made within stipulated time = (Total no. of cases where refund was made within stipulated time/ Total no. of cases requiring refunds)*100**

4.5.1.3 BENCHMARK

- Time taken to refund = 100% within 60 days

4.5.2 FINDINGS - REFUND OF DEPOSIT AFTER CLOSURE WITHIN 60 DAYS



Data Source: Customer Service Center of the operators

NA: Does not have any closure request during the audit period. No refunds applicable.

BSNL did not meet the benchmark.

5 ANNEXURE – JAS'16

5.1 FAULT INCIDENCE / CLEARANCE STATISTIC

Audit Results for Fault repair			
Fault incidences	Benchmark	BSNL	Reliance
Faults incidences (Urban)	≤ 7	8.0	NA
Fault repair (Urban areas)	Benchmark	BSNL	Reliance
Total No. of faults registered during the quarter		8764	NA
No. of faults repaired by next working day during the quarter		2855	NA
Percentage of faults repaired by next working day during the quarter	≥ 85%	32.58%	NA
No. of faults repaired within 5 days during the quarter		8061	NA
Percentage of faults repaired within 5 days during the quarter	100%	91.98%	NA
Fault repair (Rural & Hilly areas)	Benchmark	BSNL	Reliance
Total No. of faults registered during the quarter		NA	NA
No. of faults repaired by next working day during the quarter		NA	NA
Percentage of faults repaired by next working day during the quarter	≥ 75%	NA	NA
No. of faults repaired within 7 days during the quarter		NA	NA
Percentage of faults repaired within 7 days during the quarter	100%	NA	NA
Rent rebate	Benchmark	BSNL	Reliance
No. of cases with faults pending for >5 days and ≤7 days		NA	NA
Out of these number of cases where rent rebate for 7 days was given		NA	NA
Percentage of cases where rent rebate for 7 days was given	100%	NA	NA
No. of cases with faults pending for >7 days and ≤15 days		NA	NA
Out of these number of cases where rent rebate for 15 days was given		NA	NA
Percentage of cases where rent rebate for 15 days was given	100%	NA	NA
No. of cases with faults pending for ≥15 days		NA	NA
Out of these number of cases where rent rebate for 30 days was given		NA	NA
Percentage of cases where rent rebate for 30 days was given	100%	NA	NA
MTTR (Urban + Rural)	Benchmark	BSNL	Reliance
Mean time taken to repair the fault in hours	≤ 10 Hrs	27.57	NA

Live calling for fault repair			
Urban area	Benchmark	BSNL	Reliance
Total Number of calls made		288.00	NA
Number of cases where faults were repaired by next working day		235.00	NA
Percentage cases where faults were repaired by next working day	≥ 85%	81.60%	NA
Number of cases where faults were repaired within 5 days		254.00	NA
Percentage cases where faults were repaired within 5 days	100%	88.19%	NA
Fault Repair (Rural & Hilly areas)	Benchmark	BSNL	Reliance
Total Number of calls made		NA	NA
Number of cases where fauls were repaired by next working day		NA	NA
Percentage cases where faults were repaired by next working day	≥ 75%	NA	NA
Number of cases where faults were repaired within 7 days		NA	NA
Percentage cases where faults were repaired within 7 days	100%	NA	NA

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

5.2 POI CONGESTION

Audit Results for POI Congestion - Consolidated			
POI congestion	Benchmark	BSNL	Reliance
Traffic failed on all POI's (Average of 3 months)	≤ 0.5%	0.00%	0.00%
POI congestion	Benchmark	BSNL	Reliance
No. of POIs not meeting benchmark (Avg. of 3 months)		3	0
Total number of working POIs (Avg. of 3 months)		88	12

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

Live measurement results for POI congestion			
POI congestion	Benchmark	BSNL	Reliance
Traffic failed on all POI's	≤ 0.5%	0.00%	0.00%
POI congestion	Benchmark	BSNL	Reliance
Total number of working POIs		3	0
No. of POIs not meeting benchmark		88	12

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

5.3 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance			
Billing Performance	Benchmark	BSNL	Reliance
Billing diputes			
Total bills generated during the quarter		86976	153
Total number of bills disputed		0	0
Percentage bills disputed (Average of 3 billing cycles)	≤ 0.1%	0.00%	0.00%
Resolution of billing complaints			
Total number of billing/charging complaints		NA	NA
Total complaints resolved in 4 weeks from date of receipt		NA	NA
Percentage complaints resolved within 4 weeks of date of receipt	≥ 98%	NA	NA
Total complaints resolved in 6 weeks from date of receipt		NA	NA
Percentage complaints resolved within 6 weeks of date of receipt	100%	NA	NA

Data Source: Billing Center of the operators

Period of applying credit / waiver			
No. of complaints resolved in favour of the customer during the quarter		NA	NA
No. of complaints disposed on account of not considered as valid complaints		NA	NA
Percentage cases in which credit/waiver was received within 1 week	100%	NA	NA
Number of cases resolved in 6 weeks		NA	NA
Percentage cases resolved in 6 weeks	100%	NA	NA

Data Source: Billing Center of the operators

Live calling results for resolution of billing complaints			
Resolution of billing complaints	Benchmark	BSNL	Reliance
Total Number of calls made		NA	NA
Number of cases resolved in 4 weeks		NA	NA
Percentage cases resolved in 4 weeks	≥ 98%	NA	NA
Total complaints resolved in 6 weeks from date of receipt		NA	NA
Percentage complaints resolved within 6 weeks of date of receipt	100%	NA	NA

NA: - Not applicable, there were no complaint received during the period of audit.

5.4 RESPONSE TIME TO THE CUSTOMER FOR ASSISTANCE

Audit results for customer care			
Customer Care Assessment	Benchmark	BSNL	Reliance
Total no. of call attempts to call centre / customer care nos.		1109250	36980
No. of calls connected and answered successfully to call centre / customer care nos.		1100517	36548
Percentage of calls getting connected and answered electronically	≥ 95%	99.21%	98.83%
Audit results for customer care (voice to voice)			
Total no. of call attempts to call centre / customer care (voice to voice)		94374	36980
No. of calls connected and answered successfully to call centre / customer care nos.		93731	36409
Percentage of calls answered by the operators (voice to voice) within 90 seconds (Avg of 3 months)	≥ 95%	99.32%	98.46%

Live calling results for customer care			
Customer Care Assessment	Benchmark	BSNL	Reliance
Total Number of calls made		600.00	100.00
Total Number of calls getting connected and answered		600.00	100.00
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%

Live calling results for customer care (Voice to Voice)			
Customer Care Assessment	Benchmark	BSNL	Reliance
Total Number of calls received		500	100
Total Number of calls answered within 90 seconds		480	98
Percentage calls answered within 90 seconds	≥ 95%	96.00%	98.00%

Data Source: Customer Service Center of the operators

5.5 CUSTOMER CARE - PROMPTNESS IN ATTENDING CUSTOMER REQUEST

Audit Results for Closure Requests			
Closure Requests	Benchmark	BSNL	Reliance
Total no. of requests received for Closures		387	NA
Total no. of requests for closures attended within 7 days		372	NA
Percentage of requests for closures attended within 7 days	100%	96.12%	NA
Total no. of requests for closures not attended or attended beyond 7 days		NA	NA

Data Source: Customer Service Center of the operators

5.6 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits			
Refund	Benchmark	BSNL	Reliance
Total number of cases requiring refund of deposits		157.00	NA
Total number of cases where refund was made within 60 days		19.00	NA
Percentage cases in which refund was receive within 60 days	100%	12.10%	NA

Data Source: Billing Center of the operators

5.7 LIVE CALLING FOR LEVEL 1 SERVICES

Live calling for level 1 services			
Level 1 services	Benchmark	BSNL	Reliance
Total no. of calls made		1500.00	300.00
Calls answered		1493.00	299.00
Percentage of Calls answered	≥ 90%	99.53%	99.67%

Data Source: Live calling conducted by auditors from operator's network

BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	18
101	Fire		N		
102	Ambulance	Y		18	17
104	Health Information Helpline	Y		18	17
108	Emergency and Disaster Management Helpline		N		
138	All India Helpline for Passengers	Y		18	17
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		17	17
1033	Road Accident Management Service	Y		18	18
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		18	18

1071	Air Accident Helpline	Y		18	17
1072	Rail Accident Helpline	Y		17	17
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
1090	Call Alert (Crime Branch)	Y		17	17
1091	Women Helpline	Y		17	17
1097	National AIDS Helpline to NACO	Y		18	17
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		18	18
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		17	17
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		18	17
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry	Y		17	17
1912	Complaint of Electricity		N		
1916	Drinking Water Supply		N		
1950	Election Commission of India	Y		18	17

Reliance

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		19	8
101	Fire		N		
102	Ambulance		N		
104	Health Information Helpline	Y		19	7
108	Emergency and Disaster Management Helpline	Y		19	7
138	All India Helpline for Passengers		N		
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		19	8
1033	Road Accident Management Service	Y		19	7
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		

106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		19	8
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		19	7
1073	Road Accident Helpline	Y		19	7
1077	Control Room for District Collector		N		
1090	Call Alert (Crime Branch)	Y		19	8
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	Y		19	7
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		18	7
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project	Y		19	7
1512	Prevention of Crime in Railway	Y		19	7
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		18	7
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry		N		
1912	Complaint of Electricity	Y		18	7
1916	Drinking Water Supply		N		
1950	Election Commission of India	Y		18	7

5.8 EXCHANGE CAPACITY AND SUBSCRIBERS – SAMPLE EXCHANGES

Exchange capacity and Subscribers			
Exchange Capacity & Subscribers		BSNL	Reliance
Equipped Capacity of the exchange (in erlangs)		52074	64000
Total number of customers served		23898	3293

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

5.9 SDCA SELECTED AS PER SAMPLING PLAN – BSNL

Orissa
ANGUL
DHENKANAL
PURI
BHUBANESWAR
RAYAGADA
ROURKELA
SAMBALPUR
BALASORE
BHADRAK
BERHAMPUR
BOLANGIR
JAJPUR ROAD

5.10 SAMPLE LIST OF SDCA WISE EXCHANGES (ORISSA)

ANGUL	DHENKANAL	PURI	BHUBANESWAR			RAYAGADA	ROURKELA	SAMBALPUR	BALASORE	BHADRAK	BERHAMPUR	BOLANGIR	JAJPUR ROAD
ANUGUL	BANASINGH	BASELISAHI	ADIMATA	GANDARPUR	MENDHASAL	ANTAMADA	BASANTI COLONY	AINTHAPALLI	AYODHYA	AGARPARA	AMBAPUA	BGR-COLLEGE SQR	BARUNDEI
BADKERA	BAULAPUR	BASUDEVPUR	AIGINIA	GGP COLONY	MICROWAVE COLONY	J.K.PUR	BIRMITRAPUR	ANAND VIHAR	BALASORE	ARNAPAL	ASKA ROAD	BOLANGIR	BRAHMANIPAL
BANARPAL	BHAPUR	BATAMANGALA	AIIMS	GHATIKIA	MUKUNDADASPUR	JAGARNATHPUR	BISHRA	BAREIPALLI	BALGOPALPUR	BAHUDARADA	BAIDYANATHPUR	CHANDANABHATI	DAITARI
BANTALA	DEOGAON	BRAHMAGIRI	BALAKATI	INFO CITY	NAHARKANTA	JIMIDIPETA	BONDAMUNDA	BHUSAN	BAMPADA	BANTA	BALIPADA	CHHATAMAKHANA	DUBURI
JARAPADA	DHENKANAL	CHANDANPUR	BALIANTA	IRC VILLAGE	NANDANVIHAR	K.SINGPUR	CHADRI HARIHARPUR	BURLA	CHANDIPUR	BARAPADA	BERHAMPUR	CHUDAPALI	GOBARDHANPUR
KUKUDANGA	DKL-RLY-STN.	CHHAITANA	BALIPATNA	JAGAMARA	NAYAPALLI	KUMBHIKOTA	CHHEND	CHIPILIMA	DURGADEVI	BASUDEVPUR	CHIKITI	DEOGAON	JAJPUR ROAD
NALCONAGAR	GANDIA	GABAKUNDA	BANAMALIPUR(K)	JAGANNATH NAGAR	NILADRI VIHAR	MUKUNDPUR	DOOR SANCHAR BHAWAN,GMTD	DHANUPALLI	FATEPUR	BEDEIPUR	DAKHINAPUR	GUDVELA	JAKHAPURA
NALCONAGART/S	GOVINDAPUR	INDIPUR	BAPUJINAGAR	JANLA(BN)	NISER	RAMKRISHNANAGAR	FERTILIZER	DTO BLDG	HEMKAPADA	BETEDA	DURA	KUDASINGHA	KALIAPANI
SUSUDA	INDIPUR	KANAS	BARMUNDA	JARIPATNA	OCAC	RAYAGADA	JAGDA	GOSHALA	KHANTAPADA	BHADRAK	GADIVARI STREET	MAHIMUNDA	KORAI

TALMULA	KAIMATI	KHAJURIA	BASANTAMAL	JATNI	PAHALA	SIKARPAI	JAREIKELA	HIRAKUD	KURUDA	BHADRAK MAIN	GOLANTARA	TUSRA	KUHIKA
TULSIPAL	KALANGA	MARKANDESWAR SAHI	BHINGARPUR	JAYDEV VIHAR	PALASPALLI	THERUBALI	KALUNGA	JAGRUTI VIHAR	NAGRAM	BILAONA	GOSANI NUAGAON		LMLJJRD
	KARAMUL	NUAPADA	BHUBANESWAR	JHARAPADA	POKHARIPUT		KUARMUNDA	LAIDA	NIJAMPUR	CHARAMPA	GUNDURA		MANAPUR
	MAHIMAGADI	PANASPADA	BJB NAGAR	KALINGA VIHAR	RAGHUNATHPUR		LATHIKATA	LAPANGA	OUPADA	CHUNIDA	GURUNTHI		MANITIRA
	MANDAR	PURI	C.S.PUR	KALPANA	SAHEEDNAGAR		PANPOSH	RENGALI	RAJBERHAMPUR	DOLASAHI	HOUSING BOARD COLONY		NINL
	PINGUA	SAKHIGOPAL	COSMOPOLIS	KAUSALYAGANGA	SAMANTARAPUR		RKLBASANTICOLNY	SAKHIPADA	RAJNILAGIRI	ERAM	JARADAGADA		PANIKOILI
	R.LETHEKA	SANCHARKHETRA	D.S. BHAWAN	KESURA	SATYANAGAR		ROURKELA ,T.KENDRA,U, NGR	SAMBALPUR	RASALPUR	KADABARANGA	JAYANTIPUR		RAGADI
	SANKARPUR	SATAPADA	DARUTHENGA	KHANDAGIRI ENCLAVE	SHYAMPUR(BHARATPUR)		ROURKELA C/TOWNSHIP	SASON	REMUNA	KAMARGAON	KALINGA NAGAR		SUKINDA
	SIMINAI	SATSANKHA	EST-COST RAILWAY	KUDIARY	SUNDARAPADA		ROURKELA T/S ,SEC-6,MAIN		SANTARAGADIA	MOUDA	KHARIAGUDA		
		SIDHAMAHAVIR	FOREST PARK	MAGHESWAR	SURYANAGAR		RSP ROURKELA		SHERGARH	PADAMPUR	KONISI		
		SUNAMUHIN	FORUM BUILDIN	MANCHESWAR	TRAHIACHYUTA		SECTOR-8 RSU		SONAPUR	PIRIHAT	KORAPALLI		

			G										
		TADAS	GANDA MUNDA	MARUTI VIHAR	VIDYUT MARG		VEDVYAS			RANITAL	KUKUDAKHANDI		
										SALANDI PILLAR	LANJIPALLI		
										SENDHATIRA	MICROWAVE COMPOUND		
										TIHIDI	NILACHAL NAGAR		
											NUAPENTHO		
											PATRAPUR		
											PITATALI		
											R.SUVANI(BF)		
											SIHALA		
											SURALA		
											TUMBA		
											TURUBUDI		

5.11 ABBREVIATIONS

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

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. JAS'16 – Refers to the quarter of July, August and September 2016
4. IMRB – Refers to IMRB International, the audit agency for this report
5. NOC – Network Operation Center
6. OMC – Operations and Maintenance Center
7. SDCA – Short Distance Charging Area
8. PMR – Performance Monitoring Reports
9. MTTR - Mean Time to Repair faults
10. TCBH – Time Consistent Busy Hour
11. NA – Not Applicable
12. NC – Non Compliance
13. POI – Point of Interconnection
14. IVR – Interactive Voice Response
15. DEL – Direct Exchange Line
16. STD – Standard Trunk Dialing
17. ISD – International Subscriber Dialing

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TRAI Audit Wireless Report for Orissa Circle

QE September 2016

EAST ZONE

Prepared by:

KANTAR IMRB

Submitted to:

TRAI

Telecom Regulatory Authority of India

(IS/ISO 9001-2008 Certified Organisation)

1 TABLE OF CONTENTS

2 INTRODUCTION

2.1 ABOUT TRAI

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

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

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

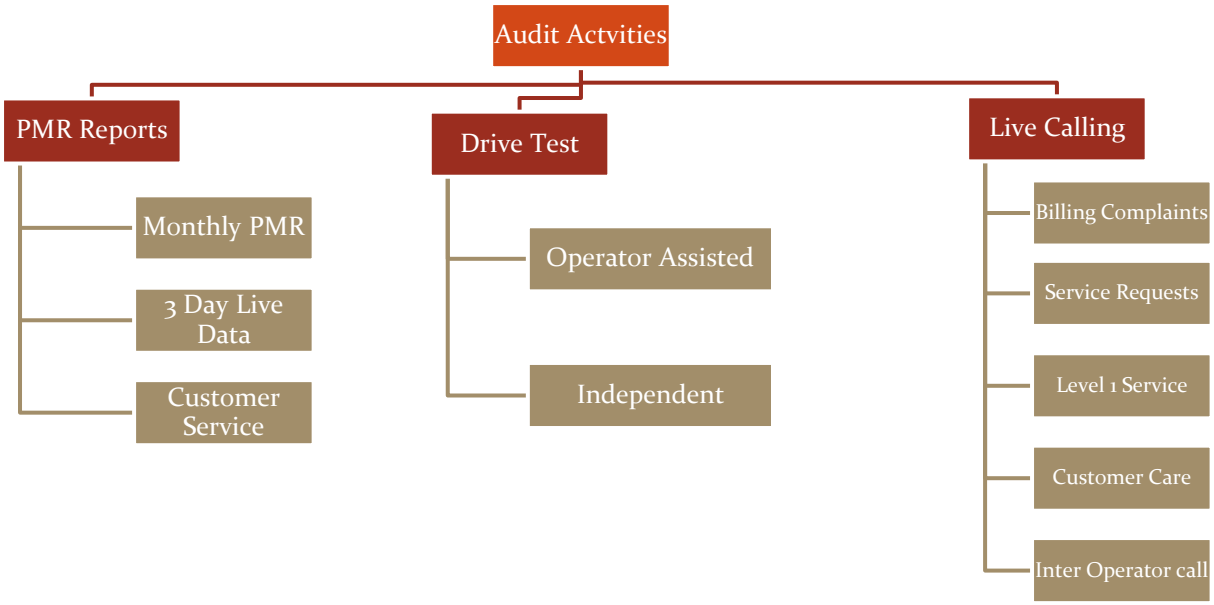
In order to assess the above regulations, TRAI has commissioned a third party agency to conduct the audit of the service providers and check the performance of the operators on the various benchmarks set by Telecom Regulatory Authority of India (TRAI).

2.2 OBJECTIVES

The primary objective of the Audit module is to-

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

2.3 FRAMEWORK USED

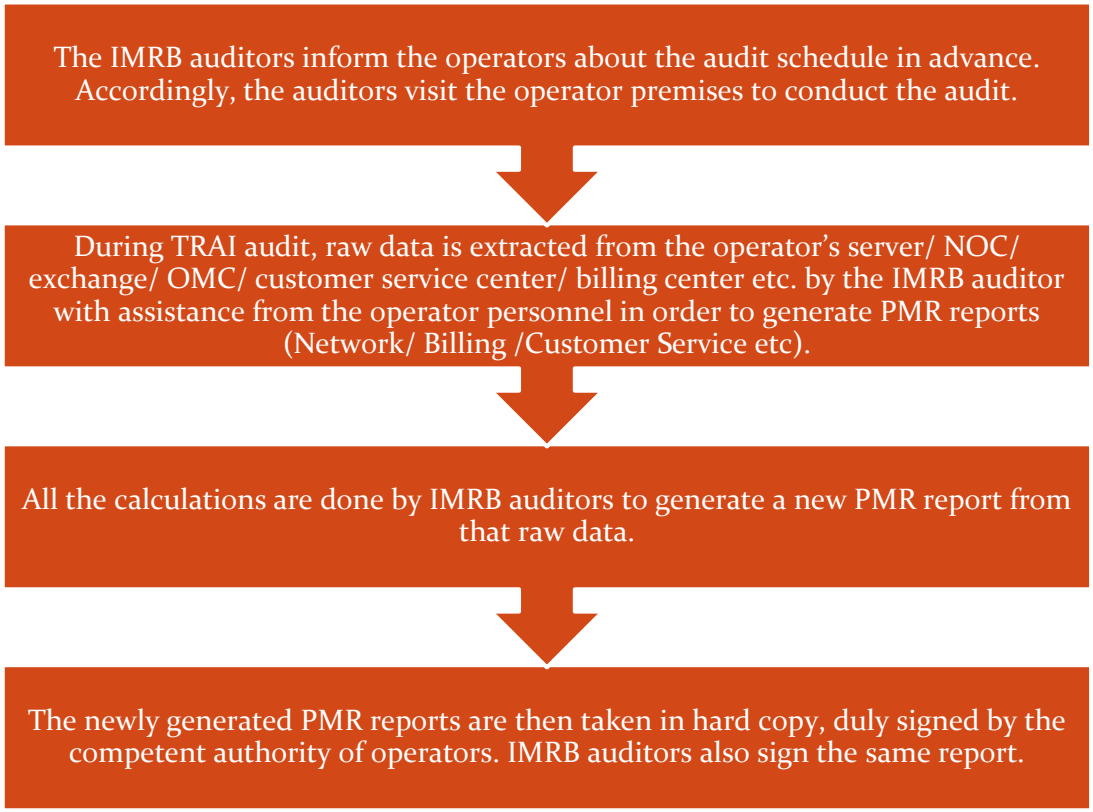


Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.3.1 PMR REPORTS

2.3.1.1 SIGNIFICANCE AND METHODOLOGY

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



The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, July 2016 audit data was collected in the month of August 2016.

The PMR report for customer service parameters is extracted from Customer Service Center and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending September 2016 (JAS'16) was collected in the month of October 2016.

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

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

Let us understand these formats in detail.

2.3.1.2 MONTHLY PMR 2G

This involved calculation of the various 2G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of July, August and September 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.3.1.3 AUDIT PARAMETERS – NETWORK 2G

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

Network Related

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

2.3.1.4 MONTHLY PMR 3G

This involved calculation of the various 3G Quality of Service network parameters through monthly Performance Monitoring Reports (PMR). The PMR reports were generated from the data extracted from operator's systems by the IMRB representative with the assistance of the operator at the operator's premises for the month of July, August and September 2016. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

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

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good Circuit Switched Voice Quality

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

2.3.1.5 AUDIT PARAMETERS – NETWORK 3G

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

Network Related

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

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

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

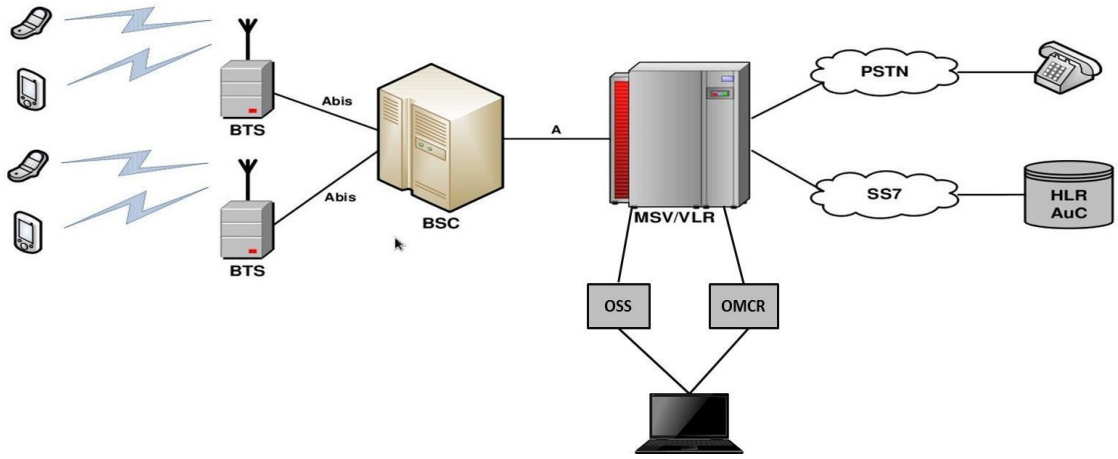
- Services Activation/ provisioning:- Activation done within 4 hours ≥ 95%
- PDP Context activation success rate:- PDP Context activation success rate ≥ 95%
- Drop Rate:- Drop Rate ≤ 5%

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

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

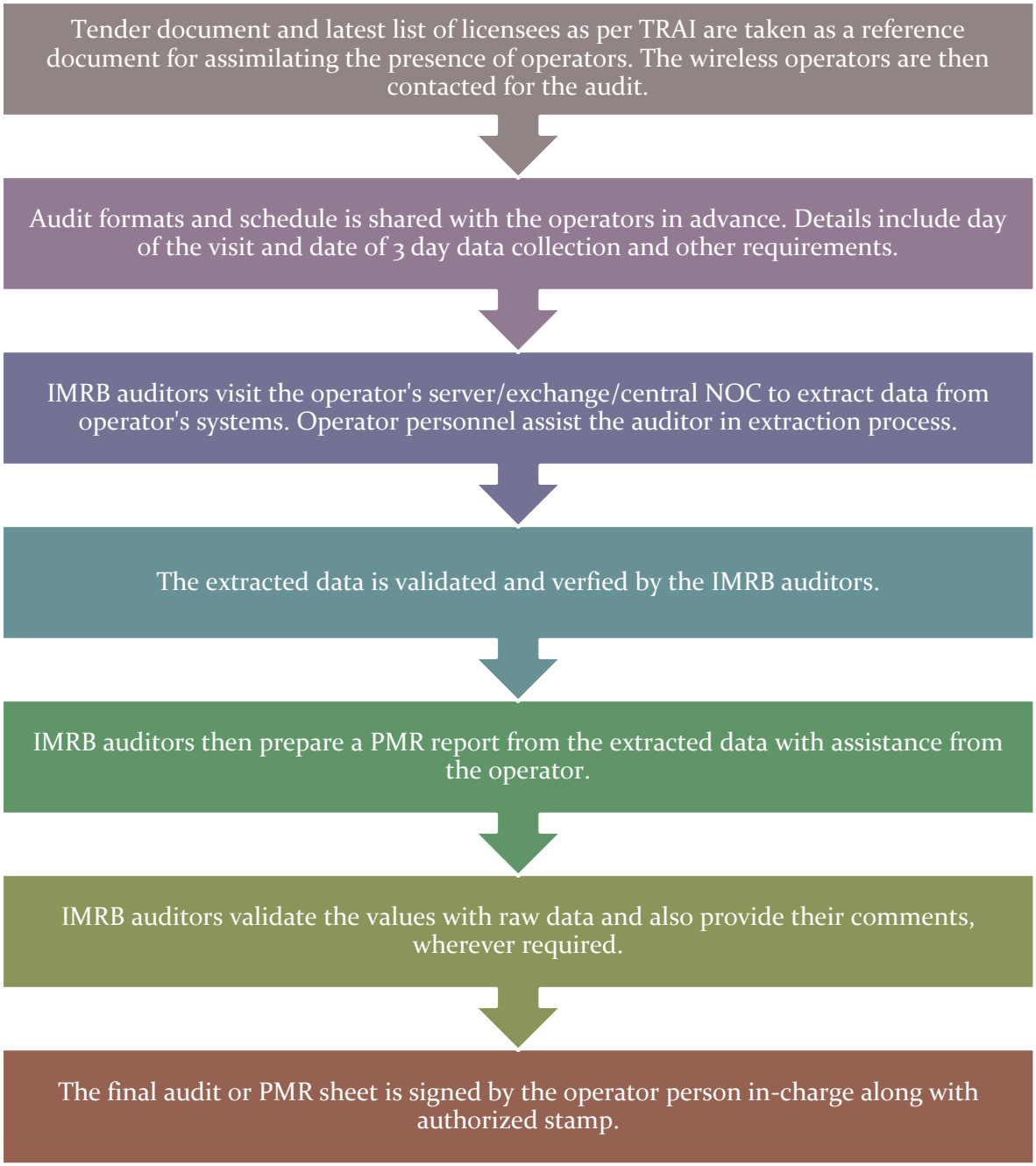
2.3.1.8 POINT OF DATA EXTRACTION

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



2.3.1.9 STEP BY STEP AUDIT PROCEDURE

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



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

2.3.1.10 CALCULATION METHODOLOGY – NETWORK PARAMETERS 2G

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

2.3.1.11 CALCULATION METHODOLOGY – NETWORK PARAMETERS 3G

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

2.3.1.12 3 DAY LIVE DATA

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

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

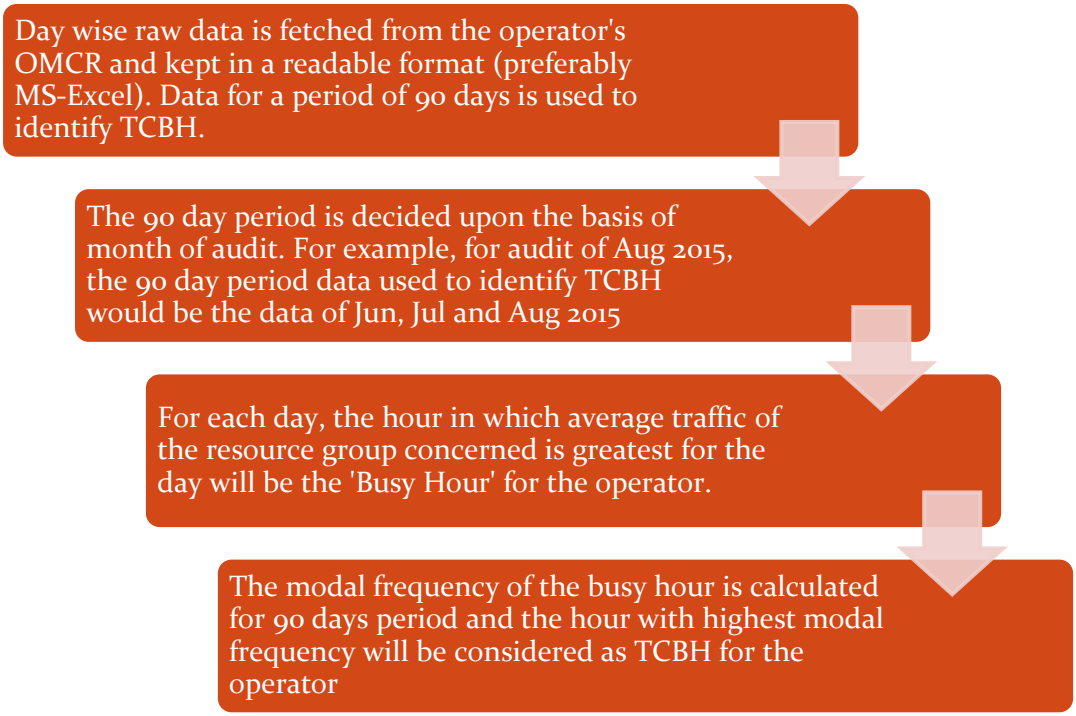
Network related parameters were evaluated for a period of 3 days in each month. 3 day live audit was conducted for 3 consecutive weekdays for each month. The data was extracted from each operator's server/ NOC etc. at the end of the 3rd day. The extracted data is then used to create a report (similar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

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

2.3.1.13 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

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

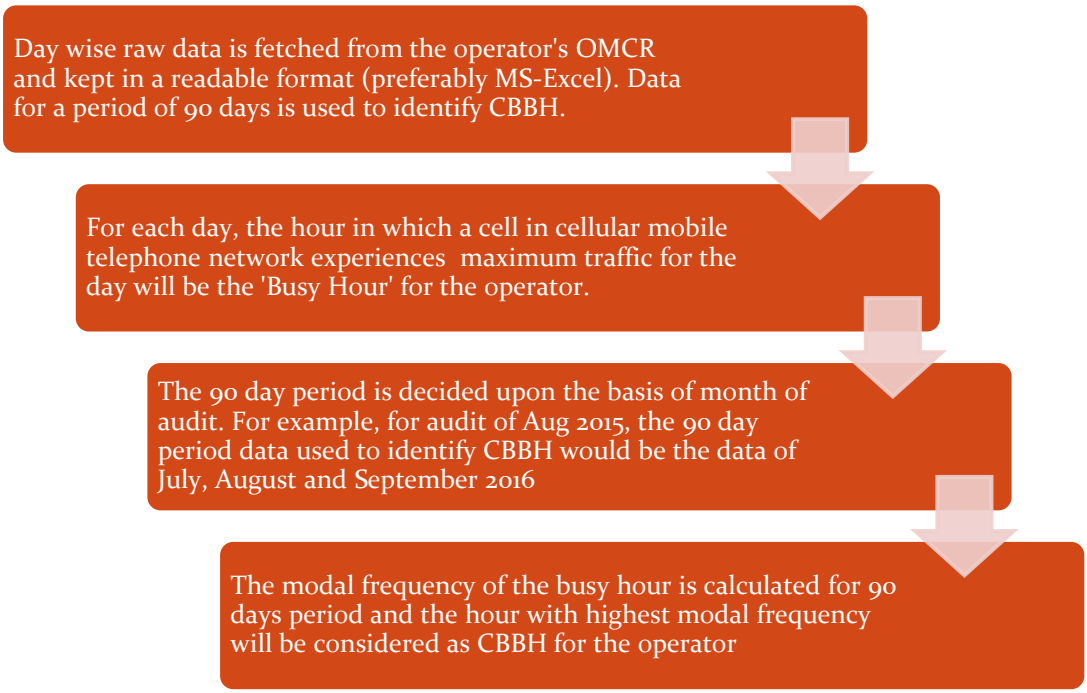
Step by step procedure to identify TCBH for an operator:



2.3.1.14 CBBH – SIGNIFICANCE AND SELECTION METHODOLOGY

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

Step by step procedure to identify CBBH for an operator:



2.3.1.15 CUSTOMER SERVICE PARAMETERS

The data to generate PMR report for customer service parameters is extracted at the operator premises and verified once every quarter in the subsequent month of the last month of the quarter. For example, data for quarter ending September 2016 (JAS'16) was collected in the month of October 2016. To extract the data for customer service parameters for the purpose of audit, IMRB auditors primarily visit the following locations/ departments/ offices at the operator's end.

- Central Billing Center
- Central Customer Service Center

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

The Customer Service Quality Parameters include the following:

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

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

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

2.3.1.16 AUDIT PARAMETERS – CUSTOMER SERVICE

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

2.3.1.17 CALCULATION METHODOLOGY – CUSTOMER SERVICE PARAMETERS

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

2.3.2 LIVE CALLING

2.3.2.1 SIGNIFICANCE AND METHODOLOGY

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

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

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

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

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

Live calling activity was carried out during the period of September 2016. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of August 2016 was considered for live calling activity conducted in September 2016.

A detailed explanation of each parameter is explained below.

2.3.2.2 BILLING COMPLAINTS

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

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

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

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

TRAI benchmark-

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

2.3.2.3 SERVICE COMPLAINTS REQUESTS

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

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

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

2.3.2.4 LEVEL 1 SERVICE

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

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

In JAS'16, IMRB has tried contacting the list of Level 1 services provided by TRAI as per the NNP (National Numbering Plan).

2.3.2.4.1 PROCESS TO TEST LEVEL 1 SERVICES

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

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

2.3.2.5 CUSTOMER CARE

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

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

The process for this parameter is stated below.

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

2.3.2.6 INTER OPERATOR CALL ASSESEMENT

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

2.3.3 VOICE DRIVE TEST – 2G & 3G

2.3.3.1 SIGNIFICANCE AND METHODOLOGY

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

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

IMRB conducted two types of drive tests as mentioned below.

- Operator Assisted Drive Test
- Independent Drive Test

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

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

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

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

1. Normal SSA
2. Difficult SSA

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

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

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

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

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

2.3.3.3 INDEPENDENT DRIVE TEST – 2G & 3G

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

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

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

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

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

- ✓ Total Rx Qual Samples– A
- ✓ Rx Qual 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

2.3.4 WIRELESS DATA DRIVE TEST – 2G & 3G

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

2.3.4.1 METHODOLOGY

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

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

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

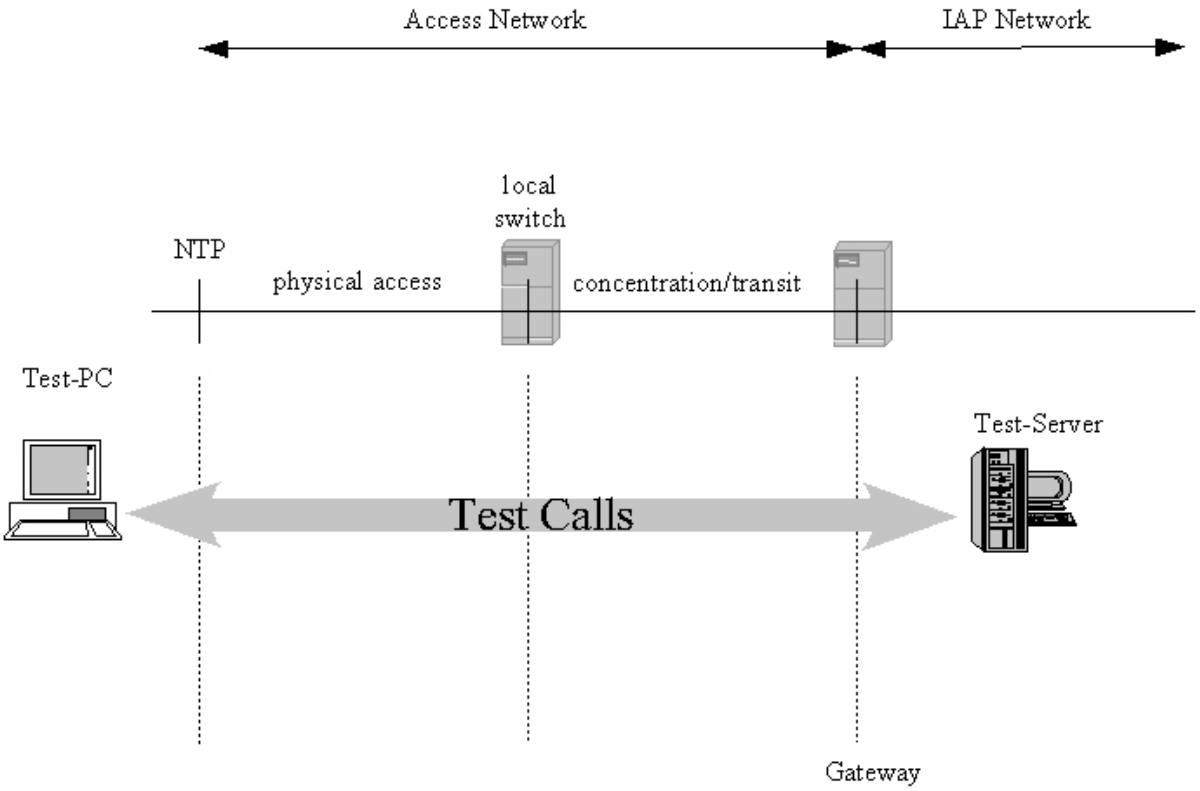


Figure for Measurement set-up

2.3.4.2 REQUIREMENTS FOR THE TEST-SERVER

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

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

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

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

2.3.4.3 TEST FILES

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

2.3.4.4 REPRESENTATIVENESS OR NUMBER OF TEST CALLS

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

2.3.4.5 PARAMETERS EVALUATED DURING DATA DRIVE TEST AT HOTSPOTS

2.3.4.5.1 SUCCESSFUL DATA TRANSMISSIONS DOWNLOAD ATTEMPTS

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

Measurement:

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

Successful data transmission download attempts =

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

2.3.4.5.2 SUCCESSFUL DATA TRANSMISSION UPLOAD ATTEMPTS

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

Measurement:

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

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

2.3.4.5.3 MINIMUM DOWNLOAD SPEED

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

Measurement:

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

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

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

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

2.3.4.5.4 AVERAGE THROUGHPUT FOR PACKET DATA

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

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

Measurement:

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

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

2.3.4.5.5 LATENCY

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

Measurement:

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

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

2.4 OPERATORS COVERED 2G AND 3G

Name of Operator	Number of Subscriber as per VLR-2G
Aircel	2448742
Airtel	9929302
BSNL	497239
Idea	1773395
Reliance CDMA	No Service
TATA CDMA	74395
TATA GSM	1692567
Vodafone	4288181
Name of Operator	**Number of Subscriber as per VLR-3G**
Aircel 3G	263887
Airtel 3G	369257
BSNL 3G	18790
Reliance 3G	102480

September'16 VLR data was considered for the number of subscribers.

2.5 COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark

Best Performing Operator

2.6 COVERAGE

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

2.7 RAW DATA DETAILS

- Aircel: - Aircel providing the Raw Data from July' 2016.right now they are giving consolidated sheets which was discussed in our earlier meetings.
- Airtel: - Not providing the data for BTS Downtime Less than 60 Seconds.
- BSNL: - BSNL did not submit the RAW DATA for all switches and BTS Downtime Less than 60 Seconds.
- Idea: - Providing all RAW DATA.
- Reliance CDMA: - Service Closed.
- Reliance GSM: - Service Closed.
- TATA CDMA: -asked for the corporate approval and provided partial RAW DATA for the month of September.
- TATA GSM: - asked for the corporate approval and provided partial RAW DATA for the month of September.
- Vodafone: - Did not submit the RAW DATA.

3 EXECUTIVE SUMMARY-2G

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

3.1 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 2G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.46%	1.94%	97.31%	0.44%	1.95%	1.23%	10.08%	95.91%
Airtel	0.08%	0.01%	96.09%	0.42%	1.77%	1.20%	1.61%	96.02%
BSNL	1.36%	1.90%	98.01%	0.56%	1.73%	1.11%	1.95%	96.30%
Idea	0.21%	0.78%	99.56%	0.08%	0.10%	0.29%	0.19%	95.63%
TATA CDMA	0.07%	0.00%	98.49%	NA	0.08%	0.49%	2.39%	98.24%
TATA GSM	0.07%	0.02%	98.75%	0.16%	0.59%	0.42%	1.50%	97.52%
Vodafone	0.14%	0.39%	99.14%	0.43%	0.86%	0.82%	2.37%	97.75%

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

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

BTSs Accumulated Downtime:

All operators met the benchmark. Minimum BTS Accumulated downtime was recorded for TATA GSM & CDMA at 0.07%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark. Minimum worst affected BTSs due to downtime was recorded for Tata CDMA at 0.00%.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Idea with 99.56%.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion. Idea recorded the best SDCCH / Paging Channel Congestion with 0.08%

TCH Congestion:

All operators met the benchmark for TCH congestion, while Tata CDMA performed the best on TCH congestion with 0.08%

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Idea at 0.29%.

Worst Affected Cells Having More than 3% TCH Drop:

Aircel failed to meet the benchmark with 10.08%. Best performance was recorded for Idea at 0.19%.

Voice Quality

All operators met the benchmark. Best performance was recorded for Tata CDMA at 98.24%.

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

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

3.1.1 PMR DATA –JULY FOR 2G

Name of Service Provider Month July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.42%	1.95%	97.30%	0.48%	1.95%	1.25%	9.84%	95.82%
Airtel	0.09%	0.00%	96.10%	0.56%	1.84%	1.15%	1.63%	96.05%
BSNL	1.31%	1.90%	97.66%	0.50%	1.58%	1.03%	1.29%	96.25%
Idea	0.15%	0.47%	99.43%	0.11%	0.12%	0.30%	0.26%	95.65%
TATA CDMA	0.06%	0.00%	98.57%	NA	0.01%	0.49%	2.94%	98.25%
TATA GSM	0.10%	0.00%	98.50%	0.20%	0.81%	0.45%	1.61%	97.40%
Vodafone	0.14%	0.43%	98.85%	0.53%	1.15%	0.97%	2.69%	97.65%

3.1.2 PMR DATA – AUGUST FOR 2G

Name of Service Provider Month August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.61%	1.92%	97.23%	0.36%	1.96%	1.27%	10.26%	95.88%
Airtel	0.08%	0.02%	96.04%	0.38%	1.77%	1.25%	1.58%	96.02%
BSNL	1.24%	1.98%	98.33%	0.61%	1.67%	0.99%	2.42%	96.25%
Idea	0.28%	1.38%	99.64%	0.04%	0.07%	0.30%	0.18%	95.58%
TATA CDMA	0.09%	0.00%	98.38%	NA	0.16%	0.52%	2.35%	98.24%
TATA GSM	0.05%	0.07%	98.73%	0.21%	0.59%	0.43%	1.54%	97.48%
Vodafone	0.13%	0.48%	99.25%	0.28%	0.75%	0.78%	2.23%	97.74%

3.1.3 PMR DATA - SEPTEMBER FOR 2G

Name of Service Provider Month September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.35%	1.95%	97.39%	0.47%	1.94%	1.18%	10.15%	96.05%
Airtel	0.08%	0.02%	96.14%	0.33%	1.69%	1.20%	1.61%	96.02%
BSNL	1.56%	1.81%	98.05%	0.57%	1.95%	1.39%	2.13%	96.40%
Idea	0.19%	0.49%	99.62%	0.09%	0.10%	0.28%	0.14%	95.67%
TATA CDMA	0.07%	0.00%	98.52%	0.00%	0.07%	0.45%	1.87%	98.24%
TATA GSM	0.07%	0.00%	99.03%	0.06%	0.36%	0.36%	1.34%	97.68%
Vodafone	0.13%	0.27%	99.33%	0.47%	0.67%	0.72%	2.18%	97.85%

3.2 3 DAY DATA – CONSOLIDATED FOR 2G

A three day live measurement was conducted to measure the QoS provided by the operators. The table provided below gives a snapshot of the performance of all operators during live measurement.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel	0.55%	0.26%	97.34%	0.36%	1.88%	1.21%	12.20%	95.97%
Airtel	0.07%	0.00%	96.00%	0.39%	1.74%	1.19%	1.62%	96.09%
BSNL	1.55%	0.00%	98.54%	0.38%	0.65%	0.69%	1.51%	96.86%
Idea	0.16%	0.18%	99.65%	0.03%	0.03%	0.28%	0.06%	95.88%
TATA CDMA	0.06%	0.00%	98.54%	NA	0.07%	0.48%	2.66%	97.47%
TATA GSM	0.13%	0.00%	98.72%	0.07%	0.58%	0.44%	1.67%	97.58%
Vodafone	0.12%	0.01%	99.82%	0.42%	0.18%	0.69%	2.32%	97.85%

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

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

BTSs Accumulated Downtime:

All operators met the benchmark. Minimum BTS Accumulated downtime was recorded for Tata CDMA at 0.06%.

Worst Affected BTSs Due to Downtime:

All operators met the benchmark for worst affected BTSs due to downtime. Minimum worst affected BTSs due to downtime was recorded for Airtel, BSNL, TATA CDMA and TATA GSM at 0.00%

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum CSSR was observed for Vodafone with 99.82%.

SDCCH/ Paging Chl. Congestion:

All operators met the benchmark on SDCCH / Paging Channel Congestion. Idea recorded the best SDCCH / Paging Channel Congestion at 0.03%

TCH Congestion:

All operators met the benchmark for TCH congestion, while Idea performed the best on TCH congestion at 0.03%

Call Drop Rate:

All operators met the benchmark for the parameter. Minimum call drop rate was recorded for Idea CDMA at 0.28%

Worst Affected Cells Having More than 3% TCH Drop:

Aircel (**12.20%**) failed to meet the benchmark for Worst Affected Cells Having More than 3% TCH Drop. Best performance was recorded for Idea at 0.06%.

Voice Quality

All operators met the benchmark. Best performance was recorded for Vodafone at 97.85%.

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

3.2.1 3 DAY DATA -JULYFOR 2G

Name of Service Provider 3 Day July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.55%	0.29%	97.09%	0.35%	1.88%	1.26%	11.65%	95.94%
Airtel	0.07%	0.00%	96.13%	0.40%	1.80%	1.14%	1.63%	96.12%
BSNL	0.10%	0.00%	98.54%	0.38%	0.46%	0.49%	1.20%	96.86%
Idea	0.09%	0.20%	99.52%	0.03%	0.03%	0.27%	0.06%	95.88%
TATA CDMA	0.07%	0.00%	98.59%	NA	0.01%	0.47%	3.00%	96.08%
TATA GSM	0.07%	0.00%	98.49%	0.03%	0.74%	0.46%	1.61%	97.45%
Vodafone	0.15%	0.02%	99.76%	0.37%	0.24%	0.77%	2.64%	97.91%

3.2.2 3 DAY DATA – AUGUST FOR 2G

Name of Service Provider 3 Day August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.73%	0.30%	97.08%	0.45%	1.93%	1.21%	12.42%	95.94%
Airtel	0.06%	0.00%	96.04%	0.39%	1..59%	1.20%	1.63%	96.12%
BSNL	0.20%	0.00%	98.35%	0.42%	1.23%	0.92%	2.15%	96.82%
Idea	0.18%	0.15%	99.67%	0.03%	0.04%	0.28%	0.07%	95.82%
TATA CDMA	0.05%	0.00%	98.35%	NA	0.19%	0.50%	2.81%	98.22%
TATA GSM	0.11%	0.00%	98.81%	0.08%	0.50%	0.46%	1.70%	97.54%
Vodafone	0.11%	0.00%	99.83%	0.76%	0.17%	0.65%	2.24%	97.84%

3.2.3 3 DAY DATA - SEPTEMBER FOR 2G

Name of Service Provider 3 Day September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	BTSs Accumulated downtime (not available for service)	Worst affected BTSs due to downtime	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion	TCH Congestion	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	%age of connection with good voice quality
Benchmark	≤2%	≤2%	≥95%	≤1%	≤2%	≤2%	≤3%	≥95%
Aircel	0.37%	0.18%	97.86%	0.26%	1.83%	1.16%	12.53%	96.05%
Airtel	0.09%	0.00%	95.82%	0.37%	1.68%	1.22%	1.60%	96.03%
BSNL	4.17%	0.00%	98.74%	0.32%	0.26%	0.52%	1.19%	96.91%
Idea	0.21%	0.19%	99.75%	0.04%	0.02%	0.28%	0.05%	95.95%
TATA CDMA	0.06%	0.00%	98.69%	0.00%	0.00%	0.45%	2.16%	98.25%
TATA GSM	0.21%	0.00%	98.87%	0.09%	0.51%	0.40%	1.70%	97.76%
Vodafone	0.10%	0.00%	99.87%	0.15%	0.13%	0.64%	2.08%	97.93%

3.3 PMR DATA – 3 MONTHS- CONSOLIDATED FOR 3G

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.55%	1.68%	97.88%	0.21%	0.11%	1.07%	11.13%	98.86%
Airtel 3G	0.02%	0.00%	99.57%	0.04%	0.21%	0.41%	1.66%	99.21%
BSNL 3G	0.00%	0.00%	97.66%	0.77%	0.64%	1.02%	2.42%	NA
Reliance 3G	0.15%	0.70%	98.35%	0.03%	0.00%	0.14%	0.96%	99.92%

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

Node Bs downtime:

All operators met the benchmark for Node Bs downtime. Minimum Node Bs downtime was recorded for BSNL 3G at 0.00%

Worst affected Node Bs due to downtime:

All operators met the benchmark for worst affected Node Bs due to downtime. Minimum benchmark for worst affected Node Bs due to downtime was recorded for Airtel 3G and BSNL 3G.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for CSSR. The maximum was recorded for Airtel 3G.

RRC Congestion:

All operators met the benchmark for RRC Congestion. Minimum RRC Congestion was recorded for Reliance 3G.

Circuit Switched RAB Congestion:

All operators met the benchmark for Circuit Switched RAB Congestion. Minimum Circuit Switched RAB Congestion was recorded for Reliance 3G.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for Circuit Switched Voice Call Drop Rate. Minimum Call drop rate was recorded for Reliance 3G.

Worst affected cells having more than 3% Circuit switched voice drop rate:

Aircel 3G failed to meet the benchmark for worst affected cells having more than 3% at 11.13% Circuit switched voice drop rate. Minimum was recorded for Reliance 3G.

Circuit Switch Voice Quality:

All operators met the benchmark for Circuit Switch Voice Quality at 67.53%. Maximum was recorded for Airtel 3G.

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

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

3.3.1 PMR DATA -JULYFOR 3G

Name of Service Provider Month July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.49%	1.32%	98.02%	0.23%	0.15%	1.11%	11.48%	98.87%
Airtel 3G	0.04%	0.00%	99.61%	0.03%	0.19%	0.41%	1.73%	99.25%
BSNL 3G	0.00%	0.00%	96.91%	0.95%	0.31%	0.52%	2.47%	NA
Reliance 3G	0.30%	1.13%	97.91%	0.02%	0.01%	0.11%	0.31%	99.89%

3.3.2 PMR DATA – AUGUST FOR 3G

Name of Service Provider Month August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.64%	1.75%	97.17%	0.25%	0.10%	1.09%	11.78%	98.84%
Airtel 3G	0.01%	0.00%	99.53%	0.05%	0.27%	0.41%	1.53%	99.21%
BSNL 3G	0.00%	0.00%	96.68%	0.75%	0.80%	0.76%	2.39%	NA
Reliance 3G	0.11%	0.49%	97.15%	0.04%	0.00%	0.15%	0.98%	99.89%

3.3.3 PMR DATA - SEPTEMBER FOR 3G

Name of Service Provider Month September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.55%	1.97%	98.43%	0.16%	0.06%	1.01%	10.14%	98.88%
Airtel 3G	0.01%	0.00%	99.58%	0.05%	0.18%	0.41%	1.71%	99.17%
BSNL 3G	0.00%	0.00%	99.38%	0.62%	0.81%	1.71%	2.41%	NA
Reliance 3G	0.04%	0.49%	99.98%	0.02%	0.00%	0.16%	1.60%	99.90%

3.4 3 DAY DATA – CONSOLIDATED FOR 3G

A three day live measurement was conducted to measure the QoS provided by the operators. The table provided below gives a snapshot of the performance of all operators during live measurement.

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.70%	0.55%	97.74%	0.18%	0.11%	1.34%	9.86%	98.87%
Airtel 3G	0.03%	0.00%	99.84%	0.02%	0.21%	0.37%	1.73%	99.21%
BSNL 3G	0.00%	0.00%	97.53%	0.95%	0.38%	0.93%	0.95%	NA
Reliance 3G	0.14%	0.00%	98.50%	0.09%	0.00%	0.13%	0.75%	99.32%

Node Bs downtime:

All operators met the benchmark for Node Bs downtime. Minimum was recorded for BSNL 3G.

Worst affected Node Bs due to downtime:

All operators met the benchmark for worst affected Node Bs due to downtime. Minimum was recorded for Airtel 3G, BSNL 3G and Reliance 3G.

Call Set-up Success Rate (CSSR):

All operators met the benchmark for for CSSR. Maximum was recorded for Airtel 3G.

RRC Congestion:

All operators met the benchmark for RRC Congestion. Minimum was recorded for Airtel 3G.

Circuit Switched RAB Congestion:

All operators met the benchmark for Circuit Switched RAB Congestion. Minimum was recorded for Reliance 3G.

Circuit Switched Voice Call Drop Rate:

All operators met the benchmark for Circuit Switched Voice Call Drop Rate. Minimum was recorded for Reliance 3G.

Worst affected cells having more than 3% Circuit switched voice drop rate:

Aircel 3G failed to meet the benchmark for worst affected cells having more than 3% at 9.86% Circuit switched voice drop rate. Minimum was recorded for Airtel 3G.

Circuit Switch Voice Quality:

Aircel 3G failed to meet the benchmark for Circuit Switch Voice Quality at 69.84%. Maximum was recorded for Airtel 3G.

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

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

3.4.1 3 DAY DATA -JULYFOR 3G

Name of Service Provider 3 Day July	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.76%	0.66%	96.88%	0.27%	0.22%	1.70%	10.40%	98.89%
Airtel 3G	0.02%	0.00%	99.81%	0.03%	0.42%	0.45%	1.75%	99.27%
BSNL 3G	0.00%	0.00%	96.87%	0.95%	0.24%	0.42%	1.03%	NA
Reliance 3G	0.30%	0.00%	95.75%	0.01%	0.00%	0.08%	0.17%	98.16%

3.4.2 3 DAY DATA – AUGUST FOR 3G

Name of Service Provider 3 Day August	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.71%	0.33%	97.58%	0.25%	0.09%	1.13%	10.66%	98.80%
Airtel 3G	0.05%	0.00%	99.87%	0.02%	0.13%	0.37%	1.69%	98.90%
BSNL 3G	0.00%	0.00%	98.11%	0.88%	0.63%	0.80%	1.04%	NA
Reliance 3G	0.04%	0.00%	99.86%	0.14%	0.00%	0.17%	1.14%	99.90%

3.4.3 3 DAY DATA - SEPTEMBER FOR 3G

Name of Service Provider 3 Day September	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
	Node Bs downtime (not available for service)	Worst affected Node Bs due to downtime	CSSR	RRC Congestion	Circuit Switched RAB Congestion	Call drop rate	Worst affected cells having more than 3% Circuit switched voice drop rate	%Circuit Switch Voice Quality (CSV quality)
Benchmark	≤ 2%	≤ 2%	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 3%	≥ 95%
Aircel 3G	0.64%	0.66%	98.78%	0.03%	0.02%	1.12%	8.52%	98.93%
Airtel 3G	0.02%	0.00%	99.85%	0.02%	0.07%	0.37%	1.75%	99.47%
BSNL 3G	0.00%	0.00%	97.61%	1.03%	0.27%	1.70%	0.85%	NA
Reliance 3G	0.07%	0.00%	99.88%	0.11%	0.00%	0.14%	0.96%	99.90%

3.5 WIRELESS DATA PMR & 3 DAY LIVE – CONSOLIDATED FOR 2G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel	99.96%	98.98%	1.19%	99.96%	99.42%	1.16%
Airtel	93.67%	99.73%	2.59%	NA	NA	NA
BSNL	100.00%	99.69%	NA	100.00%	99.15%	NA
Idea	99.98%	99.58%	1.40%	99.99%	99.70%	1.39%
TATA CDMA	98.53%	97.09%	0.88%	100.00%	97.20%	0.91%
TATA GSM	99.45%	99.98%	0.98%	100.00%	99.99%	0.96%
Vodafone	99.67%	99.93%	4.13%	NA	NA	NA

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

Activation done within 4 hours:

Airtel failed to meet the TRAI benchmark for Activation done within 4 hours. Maximum was recorded for BSNL at 100.00% in PMR as well as live data and Tata GSM and Tata CDMA at 100.00% in live data.

PDP Context activation success rate:

All operators met the benchmark for PDP Context activation success rate. Maximum was recorded for TATA GSM in PMR and live data.

Drop Rate:

All operators met the benchmark for Drop Rate. Minimum was recorded for TATA CDMA in PMR and live data.

3.6 WIRELESS DATA PMR & 3 DAY LIVE – CONSOLIDATED FOR 3G

Name of Service Provider	Wireless Data-PMR			Wireless Data-Live Data		
	Activation done within 4 hours	PDP Context activation success rate	Drop Rate	Activation done within 4 hours	PDP Context activation success rate	Drop Rate
Benchmark	≥ 95%	≥ 95%	≤ 5%	≥ 95%	≥ 95%	≤ 5%
Aircel 3G	99.96%	98.98%	0.94%	99.96%	99.42%	0.95%
Airtel 3G	NA	99.83%	0.51%	NA	NA	NA
BSNL 3G	100.00%	99.87%	1.05%	100.00%	98.79%	1.56%
Reliance 3G	100.00%	100.00%	0.00%	100.00%	NA	NA

NA: No data received

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

Activation done within 4 hours:

All operators met the benchmark for Activation done within 4 hours. Maximum was recorded for BSNL 3G at 100.00% for both PMR and Live data.

PDP Context activation success rate:

All operators met the benchmark for PDP Context activation success rate. Maximum was recorded for Reliance 3G at 100% in PMR data and Aircel 3G 99.42% in Live data.

Drop Rate:

All operators met the benchmark for Drop Rate. Minimum was recorded for Reliance 3G at 0.00% in PMR and Aircel at 0.95% in Live data.

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

3.7 LIVE CALLING DATA - CONSOLIDATED

Name of Service Provider	Metering and Billing		Response time to customer for assistance		Level 1 Service	Service Requests
	%age complaints resolved within 4 weeks	%age complaints resolved within 6 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to	Call answered	Complaint /Request attended to Satisfaction
Benchmark	98%	100%	≥ 95%	≥ 95%	≥ 95%	
Aircel	98.00%	100.00%	100.00%	100.00%	98.67%	100.00%
Airtel	97.00%	100.00%	100.00%	97.00%	99.67%	98.00%
BSNL	96.51%	100.00%	100.00%	98.00%	100.00%	98.00%
Idea	97.00%	100.00%	100.00%	99.00%	100.00%	98.00%
Reliance GSM	97.37%	100.00%	100.00%	88.00%	94.67%	97.00%
TATA CDMA	NA	NA	100.00%	100.00%	100.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%	98.00%	100.00%	99.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	99.00%	98.00%

Resolution of billing complaints

As per the consumers (live calling exercise) Airtel, Idea, Reliance GSM and BSNL was not able to meet the benchmark of resolving 98% complaints within 4 weeks, however all operators met TRAI benchmark for resolving 100% complaints within 6 weeks.

Level 1 Service

As per the live calling results Reliance GSM failed to meet the TRAI benchmark for level 1 service with calls being answered. The details of live calling done for the level 1 service have been provided in the annexure for each operator.

Accessibility of Call Centre/Customer Care-IVR

For the IVR aspect, all operators met the TRAI benchmark of 95% with all of the operators recording 100% for the parameter.

Customer Care / Helpline Assessment (voice to voice)

Reliance GSM failed to meet the benchmark for the parameter customer care/Helpline assessment (Voice to Voice) and Aircel, TATA CDMA and Vodafone were recorded at 100.00%

Complaint/Request Attended to Satisfaction

All operators performed well in terms of satisfaction of the customers for service requests. Tata CDMA and Aircel recorded the best performance at 100%.

3.8 BILLING AND CUSTOMER CARE - CONSOLIDATED

Name of Service Provider	Metering and billing credibility		Billing Complaints		Response time to customer for assistance	Customer care	
	Postpaid Subscribers	Prepaid Subscribers	% of complaints resolved in 4 weeks	% of complaints resolved in 6 weeks	% of cases where credit/wavier is received within one week	Percentage of calls answered by the IVR	Percentage of calls answered by the operators (voice to
Benchmark	≤ 0.1%	≤ 0.1%	≥ 98%	≥ 100%	≥ 100%	≥ 95%	≥ 95%
Aircel	0.01%	0.08%	100.00%	100.00%	100.00%	96.59%	98.89%
Airtel	0.03%	0.04%	100.00%	100.00%	100.00%	99.61%	96.94%
BSNL	0.00%	0.00%	100.00%	100.00%	100.00%	99.94%	99.04%
Idea	0.12%	0.13%	100.00%	100.00%	100.00%	98.34%	99.95%
Reliance GSM	0.09%	0.03%	100.00%	100.00%	100.00%	98.58%	96.36%
TATA CDMA	0.00%	0.00%	NA	NA	100.00%	NA	99.00%
TATA GSM	0.00%	0.00%	NA	NA	100.00%	96.84%	97.73%
Vodafone	0.03%	0.03%	100.00%	100.00%	100.00%	99.98%	99.54%

Metering and Billing Credibility – Postpaid Subscribers

For the billing disputes of post-paid subscribers, it was observed that Idea failed to meet the TRAI benchmark for the parameter at 0.12%. BSNL, TATA GSM & CDMA had the best performance with 0.00% billing disputes.

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, Idea failed to meet the benchmark of charging disputes. BSNL, TATA GSM & CDMA performed the best with 0.00% disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and within 6 weeks and were recorded at 100.00%

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

All the operators met the TRAI benchmark of providing credit or waivers within one week in case of complaints received and were recorded at 100.00%

Customer Care Percentage of calls answered by the IVR

All operators met the benchmark of 95% IVR call being attended. Vodafone recorded the best performance for the parameter recorded at 99.98%

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

All operators met the TRAI specified benchmark of 95%. Idea recorded the best performance for the parameter at 99.95%

3.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment									
Inter operator call Assessment To↓ From→	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Aircel	NA	99.00%	100.00%	98.00%	NS	100.00%	100.00%	100.00%	100.00%
Airtel	98.00%	NA	100.00%	100.00%	NS	100.00%	100.00%	100.00%	100.00%
BSNL	97.00%	100.00%	NA	100.00%	NS	100.00%	100.00%	100.00%	99.00%
Idea	100.00%	98.00%	100.00%	NA	NS	98.00%	100.00%	100.00%	99.00%
Reliance CDMA	NS	NS	NS	NS	NS	NS	NS	NS	NS
Reliance GSM	100.00%	100.00%	99.00%	100.00%	NS	NA	100.00%	100.00%	99.00%
TATA CDMA	98.00%	99.00%	99.00%	99.00%	NS	100.00%	NA	100.00%	99.00%
TATA GSM	100.00%	97.00%	99.00%	100.00%	NS	99.00%	100.00%	NA	100.00%
Vodafone	100.00%	100.00%	98.00%	99.00%	NS	100.00%	100.00%	100.00%	NA

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

In the inter-operator call assessment, most of the operators faced any problems in connecting to other operators.

3.10 COMPARISON BETWEEN IMRB AND OPERATOR'S DATA FOR PMR 2G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	BTSs Accumulated downtime (not available for service)		Worst affected BTSs due to downtime		Call Set-up Success Rate		SDCCH/ Paging Chl. Congestion		TCH Congestion		Call drop rate		Worst affected cells having more than 3%		Connection with good voice quality			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Aircel	0.46%	0.46%	1.94%	1.94%	97.31%	97.31%	0.44%	0.44%	1.95%	1.95%	1.24%	1.23%	10.08%	10.08%	95.92%	95.91%	0.00%	0.00%
Airtel	0.09%	0.08%	0.01%	0.01%	96.08%	96.09%	0.45%	0.42%	1.79%	1.77%	1.20%	1.20%	1.61%	1.61%	96.03%	96.02%	0.00%	0.00%
BSNL	1.31%	1.36%	1.96%	1.90%	98.36%	98.01%	0.88%	0.56%	1.50%	1.73%	1.92%	1.11%	2.93%	1.95%	97.61%	96.30%	0.00%	0.00%
Idea	0.21%	0.21%	0.78%	0.78%	99.56%	99.56%	0.08%	0.08%	0.10%	0.10%	0.29%	0.29%	0.19%	0.19%	95.63%	95.63%	0.00%	0.00%
TATA CDMA	0.07%	0.07%	0.00%	0.00%	98.52%	98.49%	0.00%	NA	0.07%	0.08%	0.47%	0.49%	2.39%	2.39%	98.24%	98.24%	0.00%	0.00%
TATA GSM	0.07%	0.07%	0.02%	0.02%	98.75%	98.75%	0.14%	0.16%	0.59%	0.59%	0.41%	0.42%	1.50%	1.50%	97.52%	97.52%	0.00%	0.00%
Vodafone	0.14%	0.14%	0.39%	0.39%	99.14%	99.14%	0.43%	0.43%	0.86%	0.86%	0.82%	0.82%	2.37%	2.37%	97.75%	97.75%	0.00%	0.00%

3.11 COMPARISON BETWEEN IMRB AND OPERATOR'S DATA FOR PMR 3G

Name of Service Provider	Network Availability				Connection Establishment (Accessibility)						Connection Maintenance (Retainability)						Point of Interconnection (POI) Congestion	
	Node Bs downtime (not available for service)		Worst affected Node Bs due to downtime		CSSR		RRC Congestion		Circuit Switched RAB Congestion		Call drop rate		Worst affected cells having more than 3% Circuit switched		%Circuit Switch Voice Quality (CSV quality)			
Benchmark	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%		≤ 0.5%	
	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB	Operators	IMRB
Aircel	0.55%	0.55%	1.68%	1.68%	97.87%	97.88%	0.21%	0.21%	0.10%	0.11%	1.07%	1.07%	11.12%	11.13%	98.86%	98.86%	0.00%	0.00%
Airtel	0.02%	0.02%	0.00%	0.00%	99.57%	99.57%	0.04%	0.04%	0.22%	0.21%	0.41%	0.41%	1.72%	1.66%	99.22%	99.21%	0.00%	0.00%
BSNL	1.53%	0.00%	1.83%	0.00%	97.00%	97.66%	0.83%	0.77%	1.80%	0.64%	1.70%	1.02%	2.67%	2.42%	97.57%	NA	0.00%	0.00%
RTL	0.15%	0.15%	0.70%	0.70%	98.35%	98.35%	0.03%	0.03%	0.00%	0.00%	0.14%	0.14%	0.96%	0.96%	99.89%	99.92%	0.00%	0.00%

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

4 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

- Aircel failed to meet the benchmark with 10.08% for worst affected cells having more than 3% TCH drop rate.

3 Day Live Measurement (Network Parameters)

- Aircel (**12.20%**) failed to meet the benchmark for worst affected cells having more than 3% TCH drop rate.

PMR & 3Days live Consolidated (Network Parameters) for 3G

- Aircel 3G failed to meet the benchmark for worst affected cells having more than 3% at 11.13% Circuit switched voice drop rate for PMR and 9.86% for 3 day live.

Wireless data services

- Airtel failed to meet the TRAI benchmark for Activation done within 4 hours

Live Calling

- As per the consumers (live calling exercise) Airtel, Idea, Reliance GSM and BSNL was not able to meet the benchmark of resolving 98% complaints within 4 weeks, however all operators met TRAI benchmark for resolving 100% complaints within 6 weeks.
- As per the live calling results Reliance GSM failed to meet the TRAI benchmark for level 1 service with calls being answered. The details of live calling done for the level 1 service have been provided in the annexure for each operator.
- Reliance GSM failed to meet the benchmark for the parameter customer care/Helpline assessment (Voice to Voice)

Metering and billing credibility

For the billing disputes of post-paid subscribers, it was observed that Idea failed to meet the TRAI benchmark for the parameter at 0.12%.

- For the prepaid customers, Idea failed to meet the benchmark of charging disputes.

Operator Assisted Drive Test – Voice 2G

- In Dhenkanal Aircel 2G and Vodafone 2G failed to meet the benchmark for voice quality in outdoor locations.
- In Rourkela BSNL 3G failed to meet the benchmark for voice quality in outdoor locations.

5 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 2G

5.1 BTS ACCUMULATED DOWNTIME

5.1.1 PARAMETER DESCRIPTION

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

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

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

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

3. **TRAI Benchmark –**

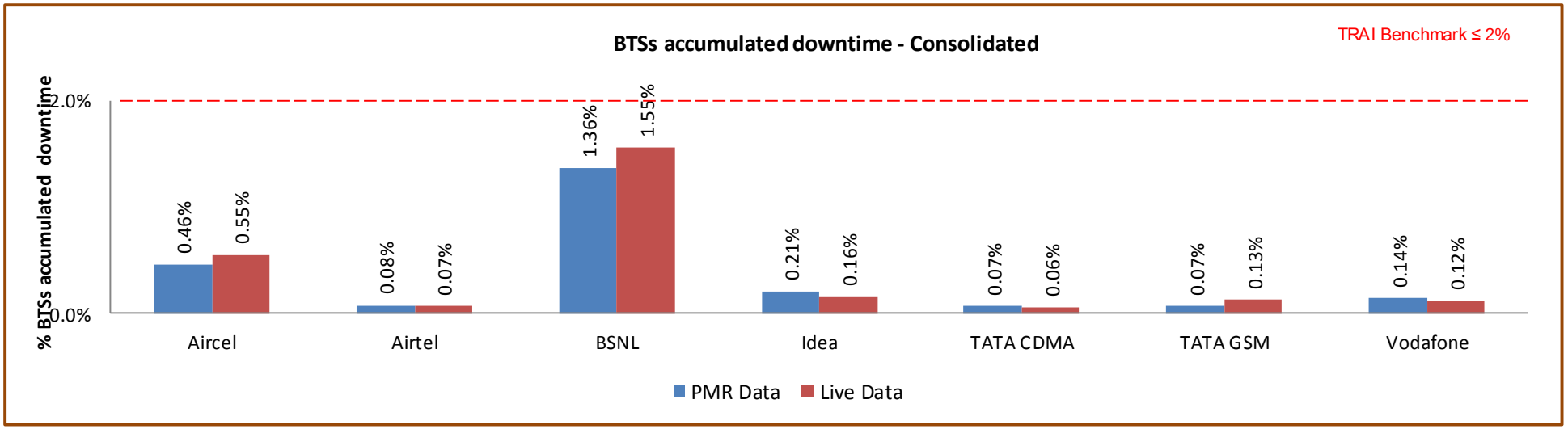
    a. BTSs Accumulated downtime (not available for service) ≤ 2%

4. **Audit Procedure –**

    - The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) was audited
    - All the BTS in service area were considered. Planned outages due to network up gradation, routine maintenance were not considered.

- Any outage as a result of force majeure were not considered at the time of calculation
- Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.
- List of operating sites with cell details and ids are taken from the operator.
- When there is any outage a performance report gets generated in line with that cell resulting and master base of the Accumulated downtime and worst affected BTS due to downtime.

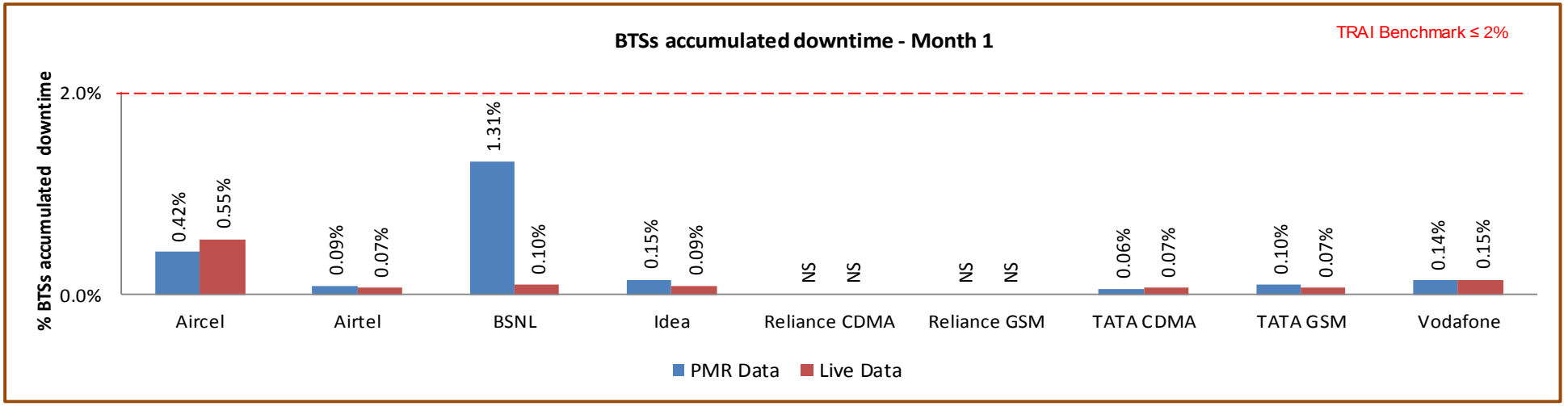
5.1.2 KEY FINDINGS - CONSOLIDATED



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

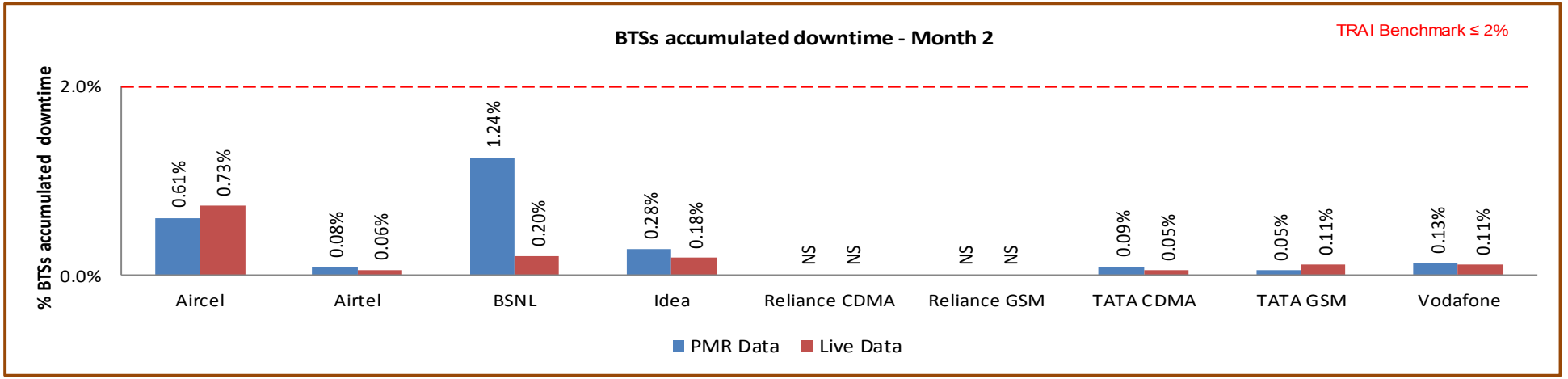
All operators met the benchmark on aspect of BTS accumulated downtime as per audit/PMR data.

5.1.2.1 KEY FINDINGS – MONTH 1



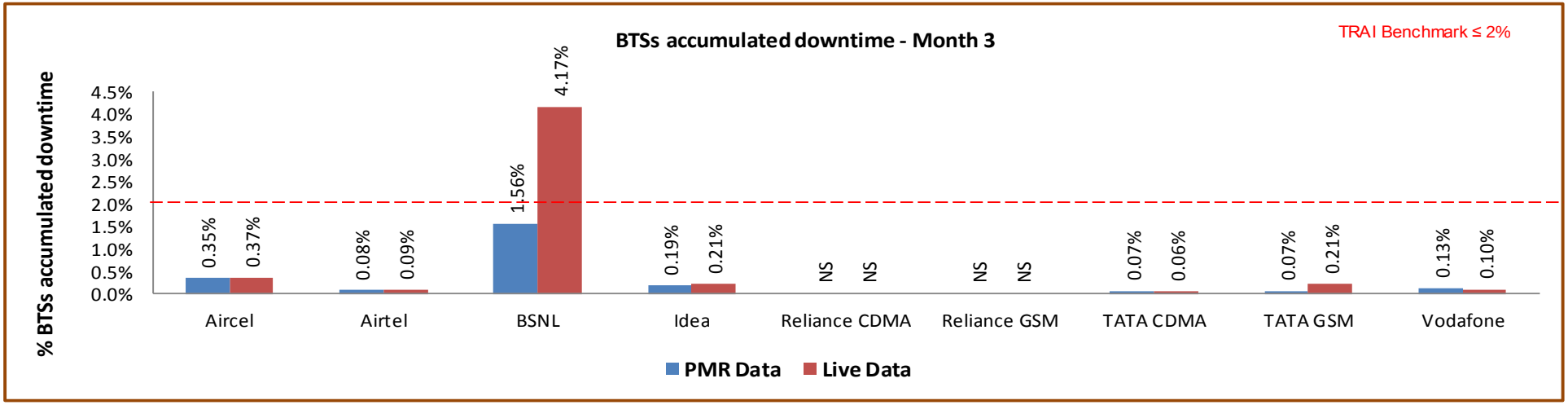
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.2.2 KEY FINDINGS – MONTH 2



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

5.1.2.3 KEY FINDINGS – MONTH 3



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

WORST AFFECTED BTS DUE TO DOWNTIME

5.1.3 PARAMETER DESCRIPTION

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

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

- **Computation Methodology –**

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

- **TRAI Benchmark –**

  a. Worst affected BTSs due to downtime ≤ 2%

- **Audit Procedure –**

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

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

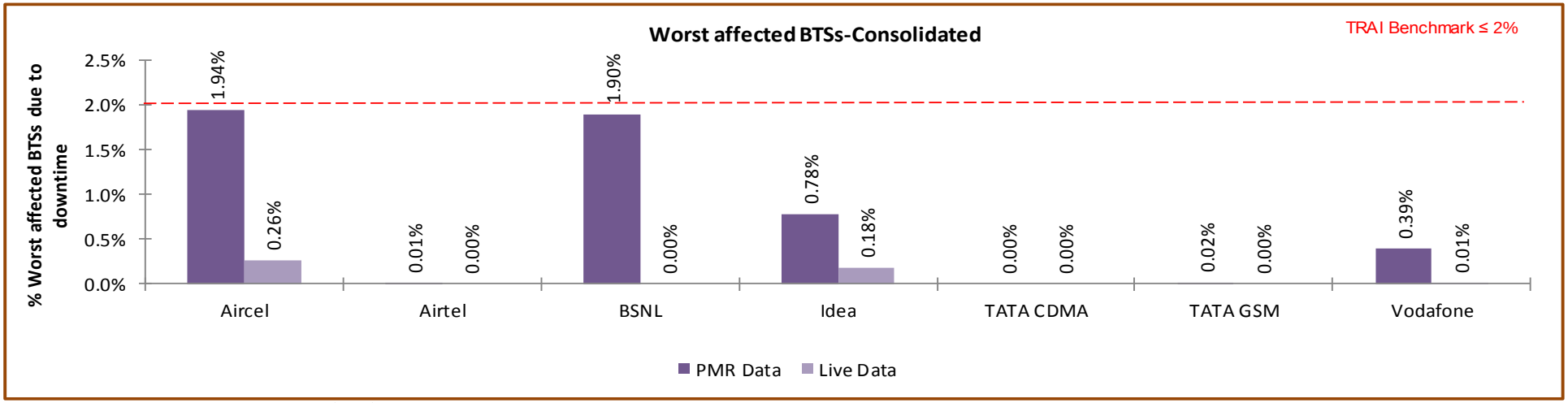
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

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

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

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

5.1.4 KEY FINDINGS – CONSOLIDATED

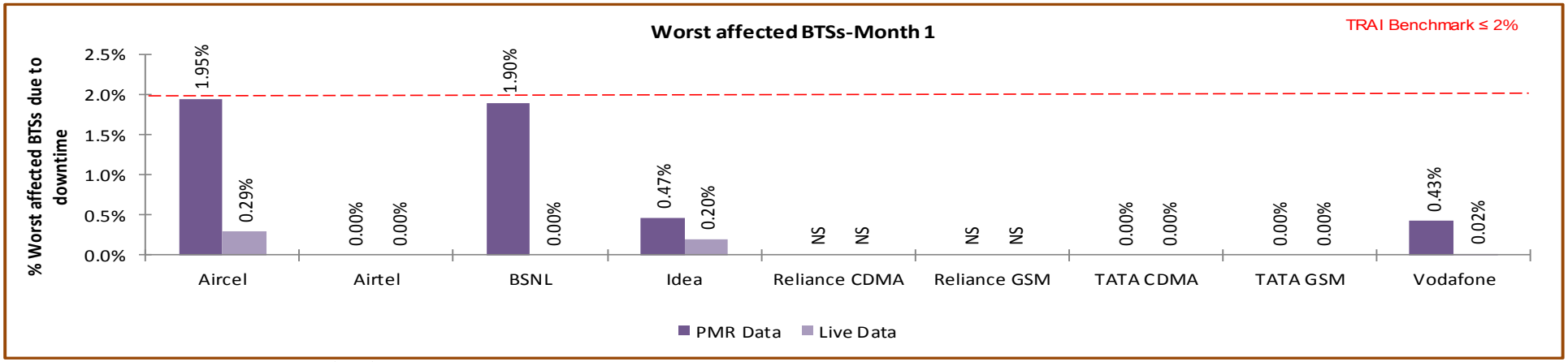


Data Source: Operations and Maintenance Center (OMC) of the operators

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

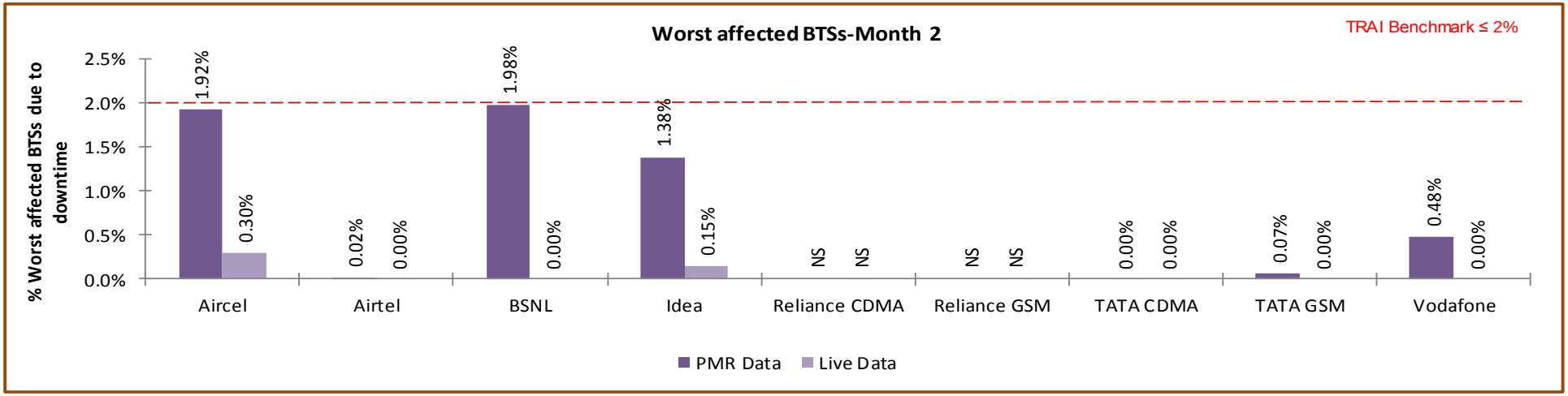
Significant difference was observed between PMR & live measurement data for Aircel and BSNL, Idea, TATA GSM& TATA CDMA and Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.1.4.1 KEY FINDINGS – MONTH 1



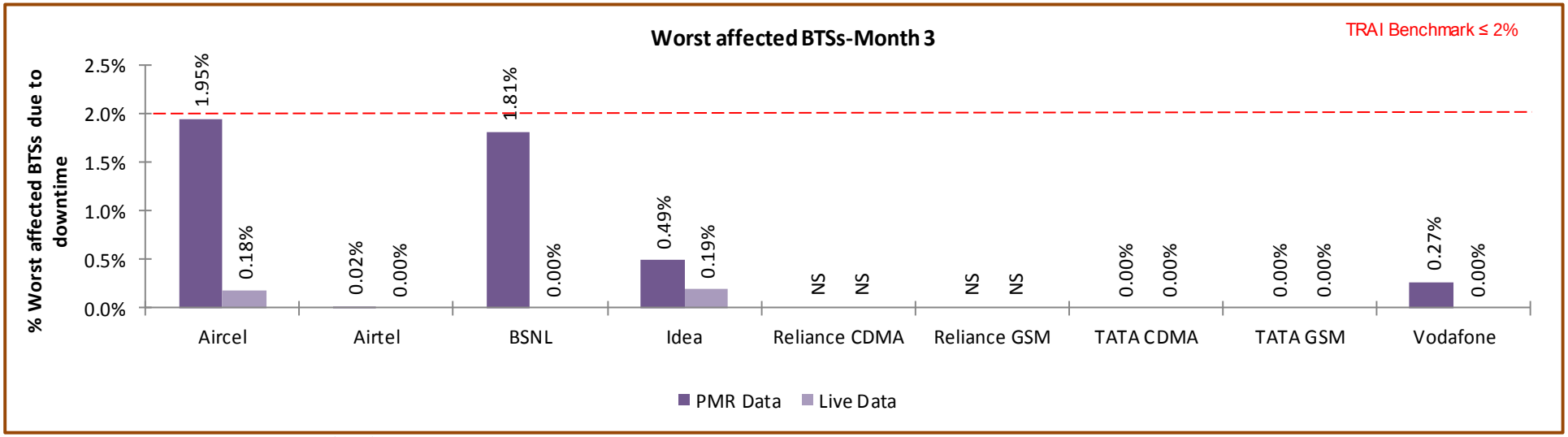
Data Source: Operations and Maintenance Center (OMC) of the operators

5.1.4.2 KEY FINDINGS – MONTH 2



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

5.1.4.3 KEY FINDINGS – MONTH 3



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

5.2 CALL SET UP SUCCESS RATE

5.2.1 PARAMETER DESCRIPTION

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

   (Calls Established / Total Call Attempts) * 100

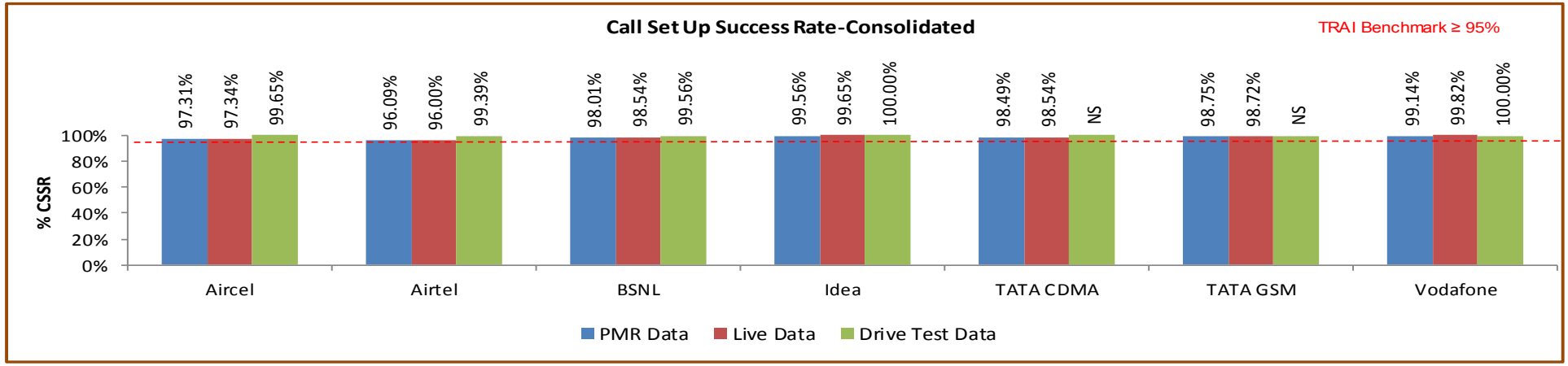
   Call Established means the following events have happened in call setup:-

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

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

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

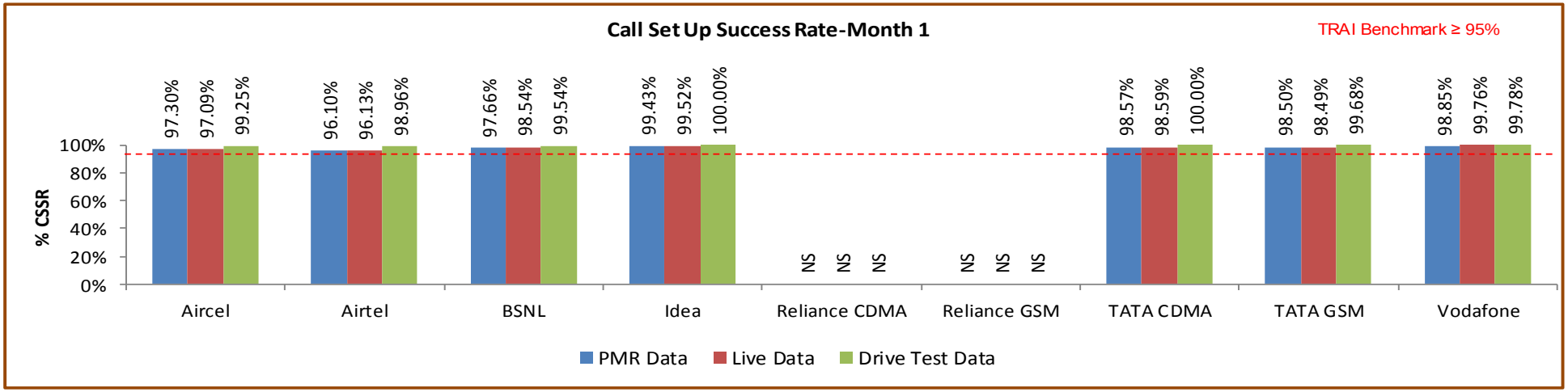
5.2.2 KEY FINDINGS - CONSOLIDATED



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

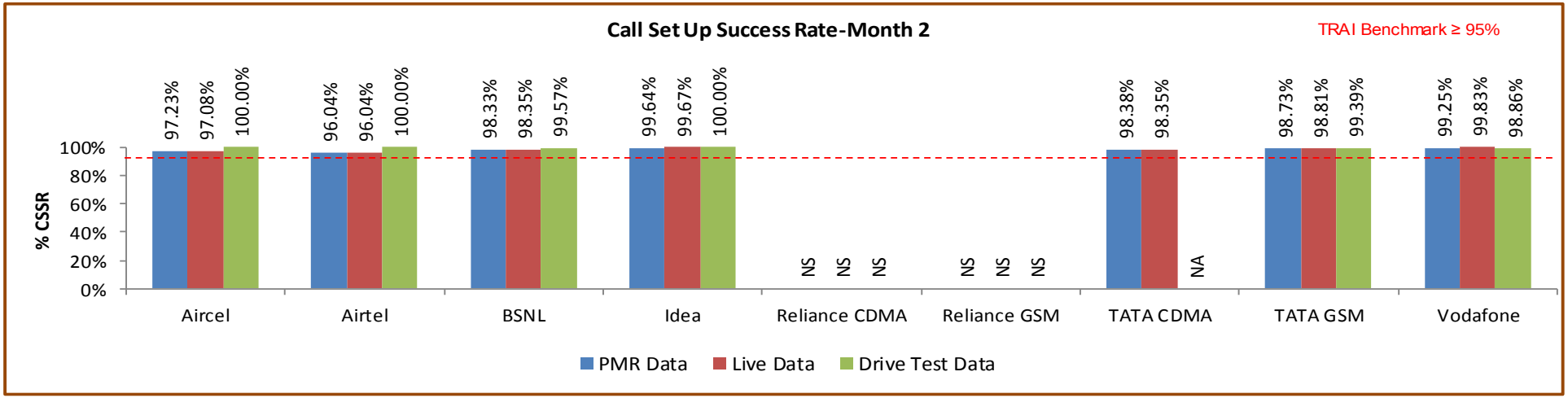
All Operators met the TRAI benchmark as per audit/PMR data.

5.2.2.1 KEY FINDINGS – MONTH 1



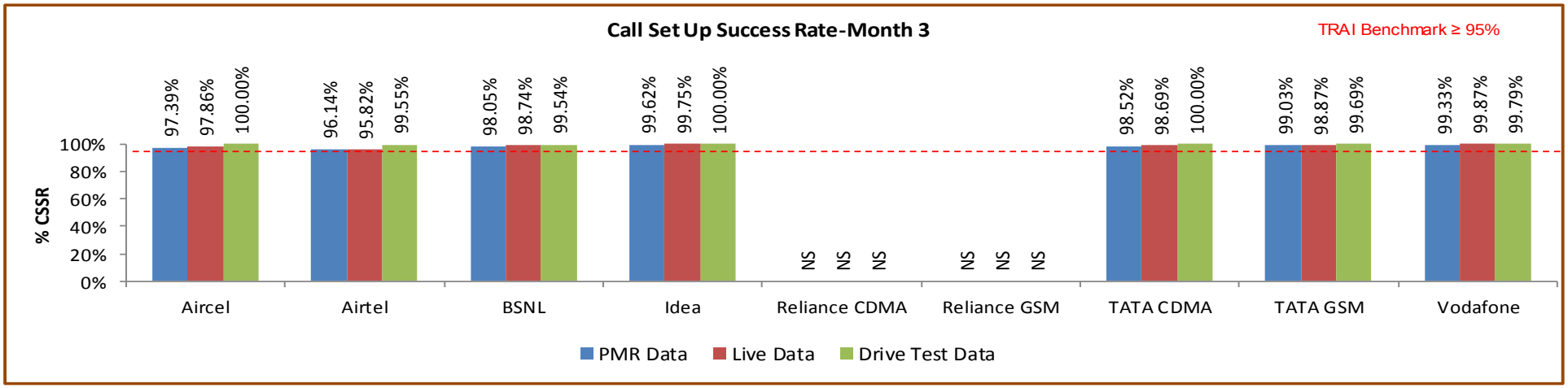
Data Source: Network Operations Center (NOC) of the operators

5.2.2.2 KEY FINDINGS – MONTH 2



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

5.2.2.3 KEY FINDINGS – MONTH 3



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

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

5.3.1 PARAMETER DESCRIPTION

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

   - SDCCH Level: Stand-alone dedicated control channel
   - TCH Level: Traffic Channel
   - POI Level: Point of Interconnect

2. **Computational Methodology:**

   - **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1
     - C1 = Average SDCCH / TCH Congestion % on day 1
     - A2 = Number of attempts to establish SDCCH / TCH made on day 2
     - C2 = Average SDCCH / TCH Congestion % on day 2
     - An = Number of attempts to establish SDCCH / TCH made on day n
     - Cn = Average SDCCH / TCH Congestion % on day n
   - **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
     - C1 = Average POI Congestion % on day 1
     - A2 = POI traffic offered on all POIs (no. of calls) on day 2
     - C2 = Average POI Congestion % on day 2

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

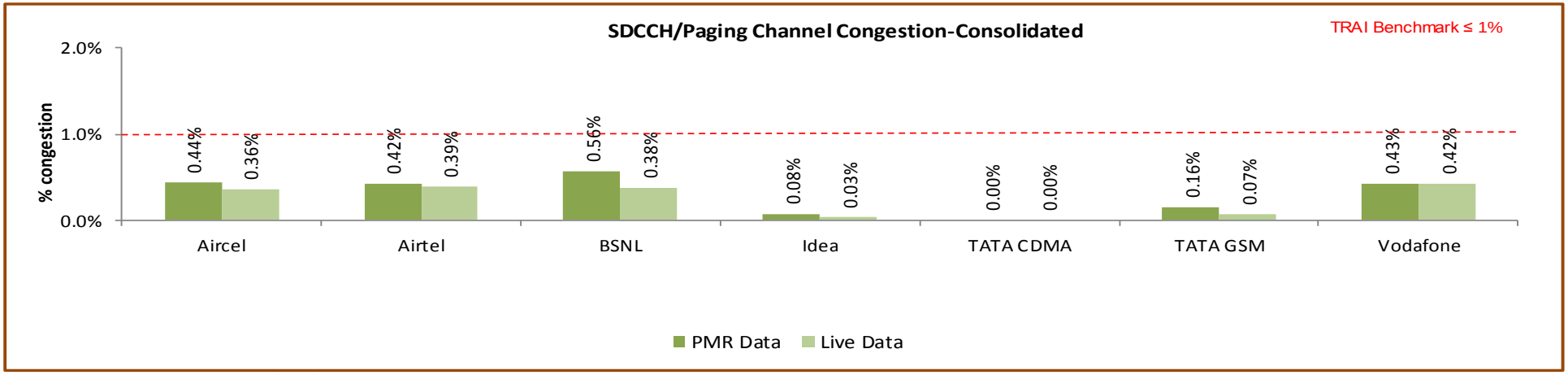
3. **Benchmark:**

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

4. **Audit Procedure –**

   - Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) would be conducted
   - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH

5.3.2 KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)

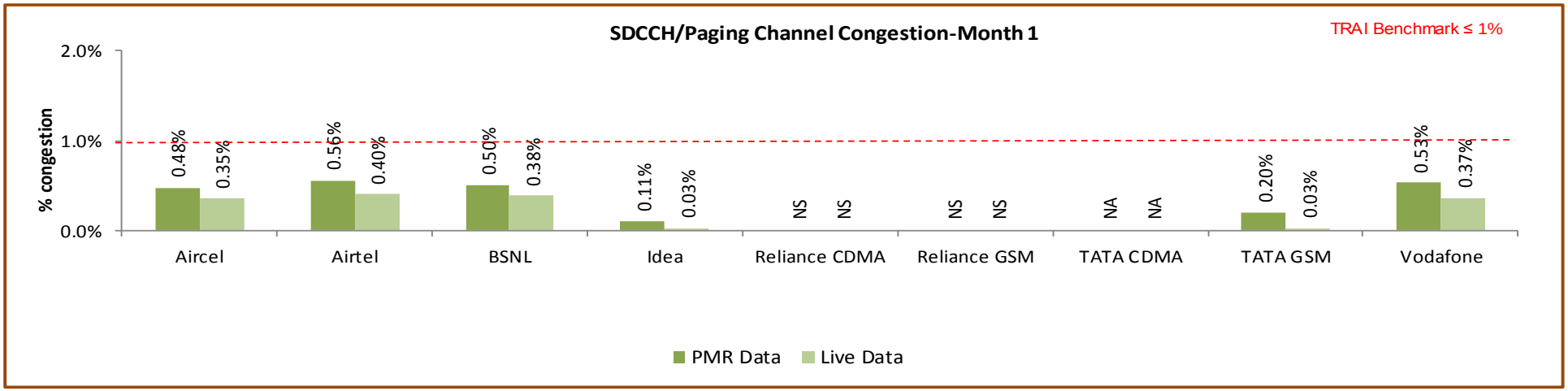


Data Source: Network Operations Center (NOC) of the operators

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

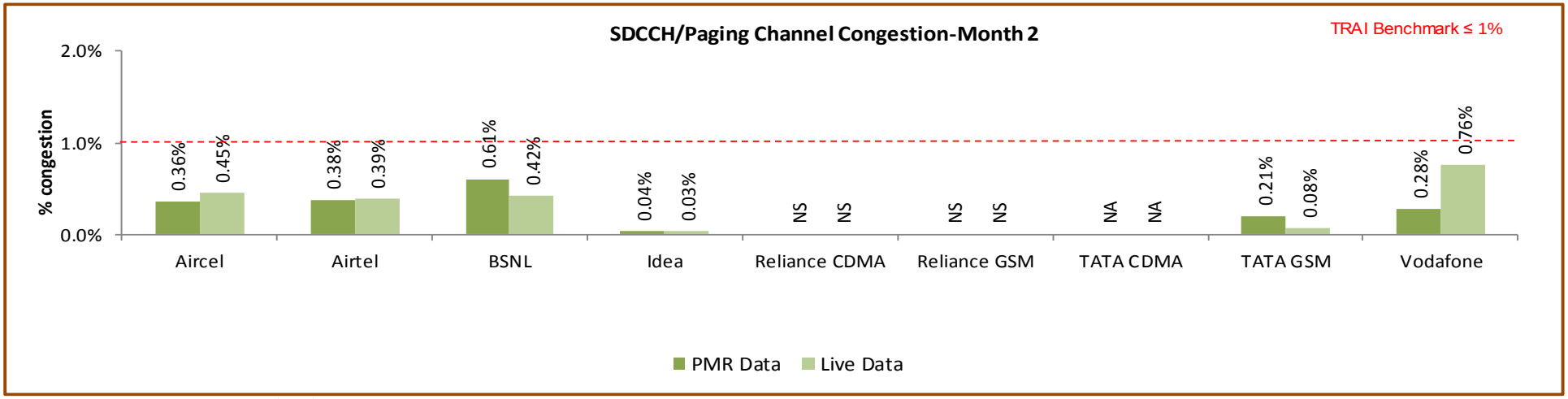
Significant difference was observed between PMR & live measurement data for Aircel, BSNL, TATA GSM, Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for 3 days.
NA: SDCCH/ Paging channel congestion not applicable for CDMA operators.

5.3.2.1 KEY FINDINGS – MONTH 1



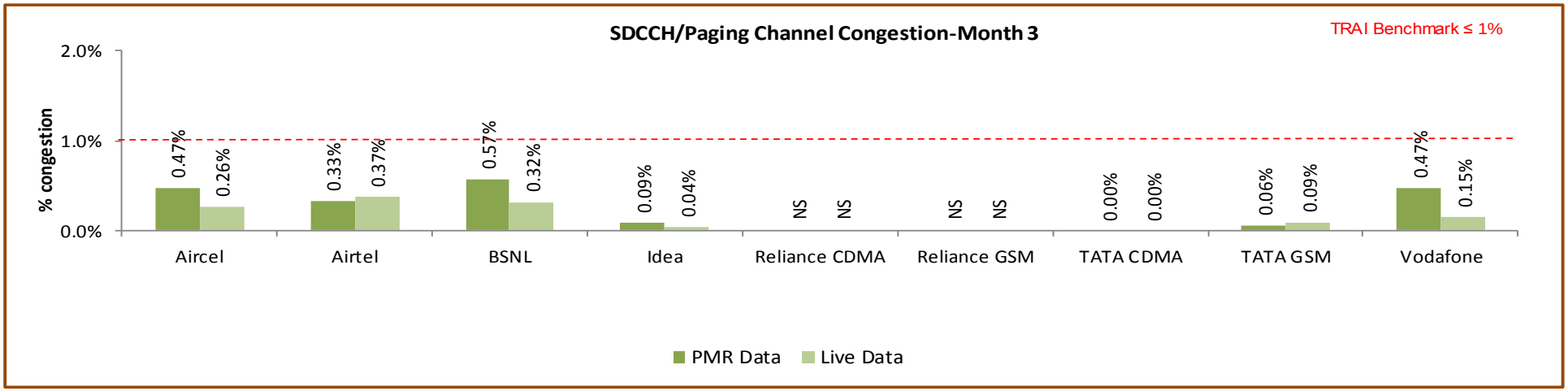
Data Source: Network Operations Center (NOC) of the operators

5.3.2.2 KEY FINDINGS – MONTH 2



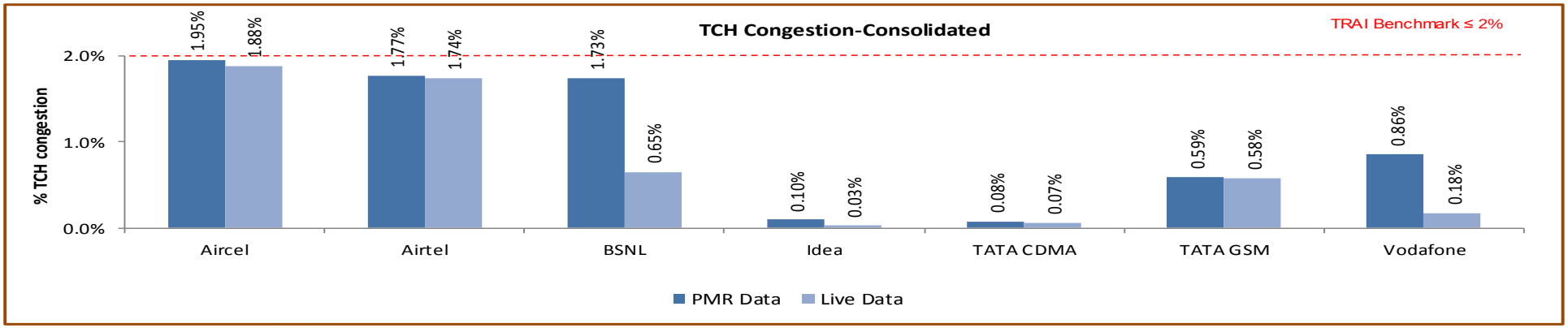
Data Source: Network Operations Center (NOC) of the operators

5.3.2.3 KEY FINDINGS – MONTH 3



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

5.3.3 KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)

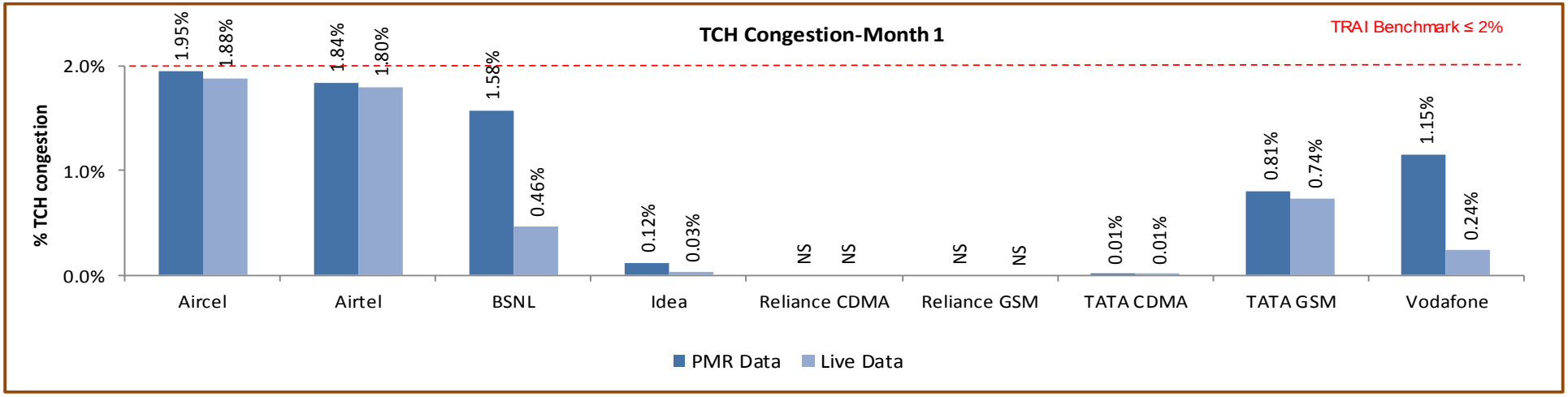


Data Source: Network Operations Center (NOC) of the operators

All Operators met the TRAI benchmark as per audit/PMR report.

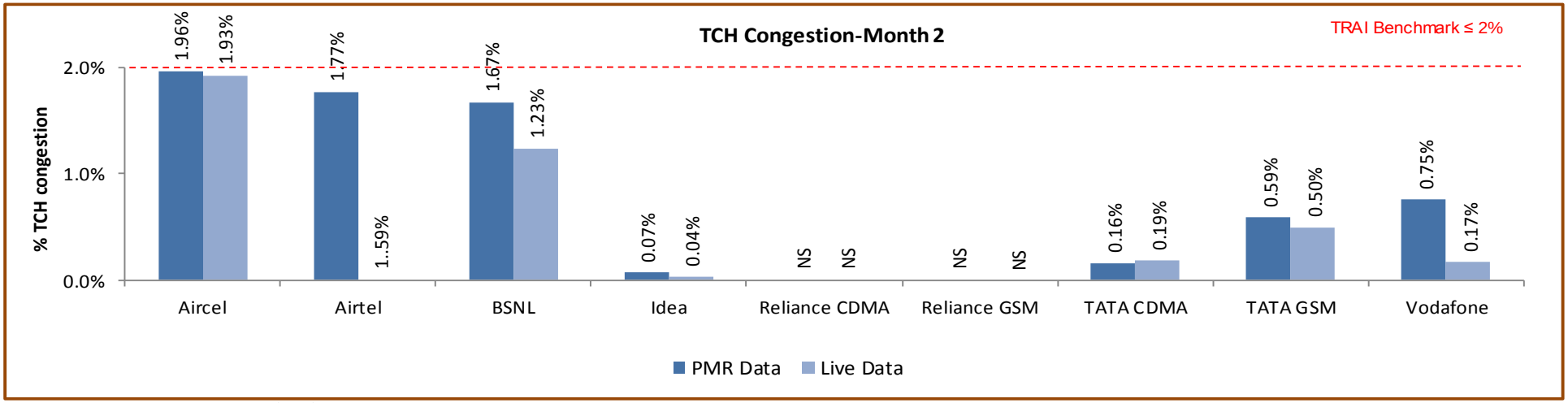
Significant difference was observed between PMR & live measurement data for Vodafone. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

5.3.3.1 KEY FINDINGS – MONTH 1



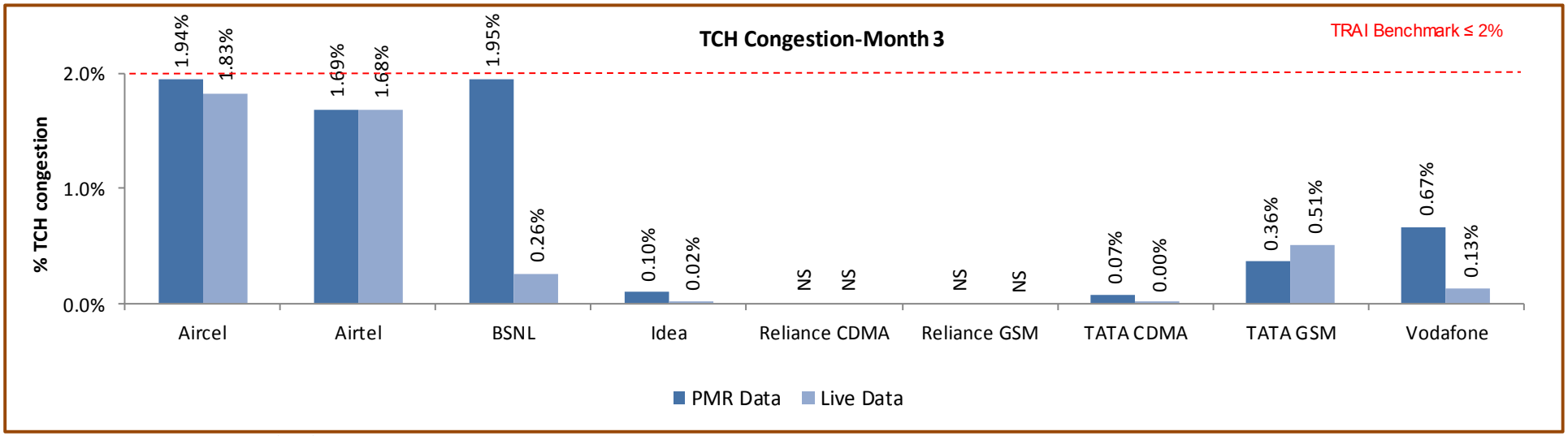
Data Source: Network Operations Center (NOC) of the operators

5.3.3.2 KEY FINDINGS – MONTH 2



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

5.3.3.3 KEY FINDINGS – MONTH 3



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

5.3.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED) – AVERAGE OF 3 MONTHS

5. POI Congestion								
Audit Results for POI Congestion- PMR data								
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		111	22	14	73	43	13	50
No. of POIs not meeting benchmark		0	0	1	0	0	0	1
Total Capacity of all POIs (A) - in erlangs		2172	323987	142000	162281	40671	44613	423545
Traffic served for all POIs (B)- in erlangs		1277	206203	124285	96569	14952	19481	215400
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data								
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		111	22	14	73	43	13	50
No. of POIs not meeting benchmark		0	0	1	0	0	0	1
Total Capacity of all POIs (A) - in erlangs		2166	322585	139000	158277	40632	41385	423545
Traffic served for all POIs (B)- in erlangs		599	205833	88693	42569	8910	8872	209398
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

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

5.3.4.1 KEY FINDINGS – MONTH 1

5. POI Congestion										
Audit Results for POI Congestion- PMR data-July										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		115	21	13	72	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	1	0	NS	NS	0	0	0
Total Capacity of all POIs (A) - in erlangs		791	105733	49000	52415	NS	NS	13595	14675	140734
Traffic served for all POIs (B)- in erlangs		457	69253	41142	31875	NS	NS	4803	6862	69320
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-July										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		115	21	13	72	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	1	0	NS	NS	0	0	0
Total Capacity of all POIs (A) - in erlangs		787	105677	49000	52399	NS	NS	13595	14654	140734
Traffic served for all POIs (B)- in erlangs		210	69194	40886	14271	NS	NS	3033	3105	65733
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%

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

5.3.4.2 KEY FINDINGS – MONTH 2

5. POI Congestion										
Audit Results for POI Congestion- PMR data-August										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		109	22	15	72	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	0	0	NS	NS	0	0	1
Total Capacity of all POIs (A) - in erlangs		688	107059	44000	54852	NS	NS	13592	14770	141374
Traffic served for all POIs (B)- in erlangs		410	68540	41302	32177	NS	NS	4922	6502	74588
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-August										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		108	22	15	72	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	0	0	NS	NS	0	0	1
Total Capacity of all POIs (A) - in erlangs		685	105733	41000	50269	NS	NS	13591	11563	141374
Traffic served for all POIs (B)- in erlangs		200	68240	23832	14197	NS	NS	3001	3001	73320
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%

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

5.3.4.3 KEY FINDINGS – MONTH 3

5. POI Congestion										
Audit Results for POI Congestion- PMR data-September										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		109	22	15	74	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	0	0	NS	NS	0	0	0
Total Capacity of all POIs (A) - in erlangs		693	111195	49000	55013	NS	NS	13485	15168	141437
Traffic served for all POIs (B)- in erlangs		410	68409	41840	32516	NS	NS	5228	6117	71492
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-September										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		109	22	15	74	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	0	0	NS	NS	0	0	0
Total Capacity of all POIs (A) - in erlangs		694	111175	49000	55610	NS	NS	13446	15168	141437
Traffic served for all POIs (B)- in erlangs		190	68399	23975	14101	NS	NS	2875	2765	70345
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%

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

5.4 CALL DROP RATE

5.4.1 PARAMETER DESCRIPTION

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

   - **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss
   - **Total calls established** = All calls that have TCH allocation during busy hour

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

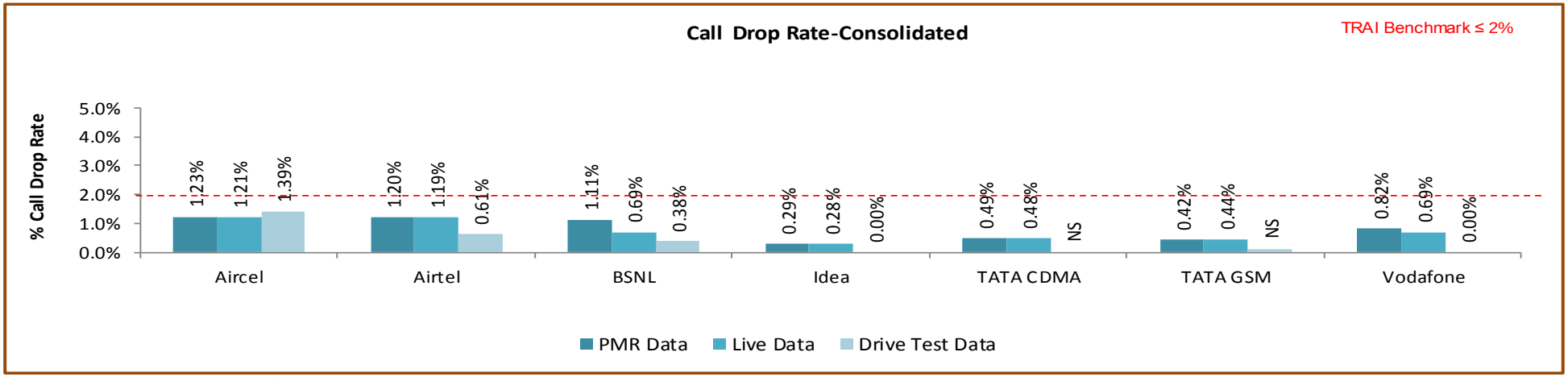
3. **TRAI Benchmark** –

   - Call drop rate ≤ 2%

4. **Audit Procedure** –

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

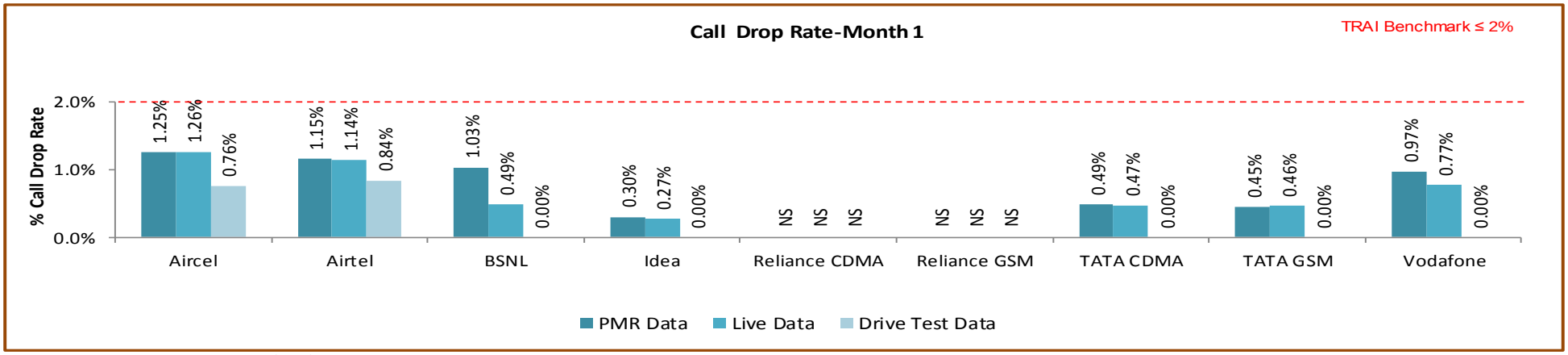
5.4.2 KEY FINDINGS - CONSOLIDATED



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

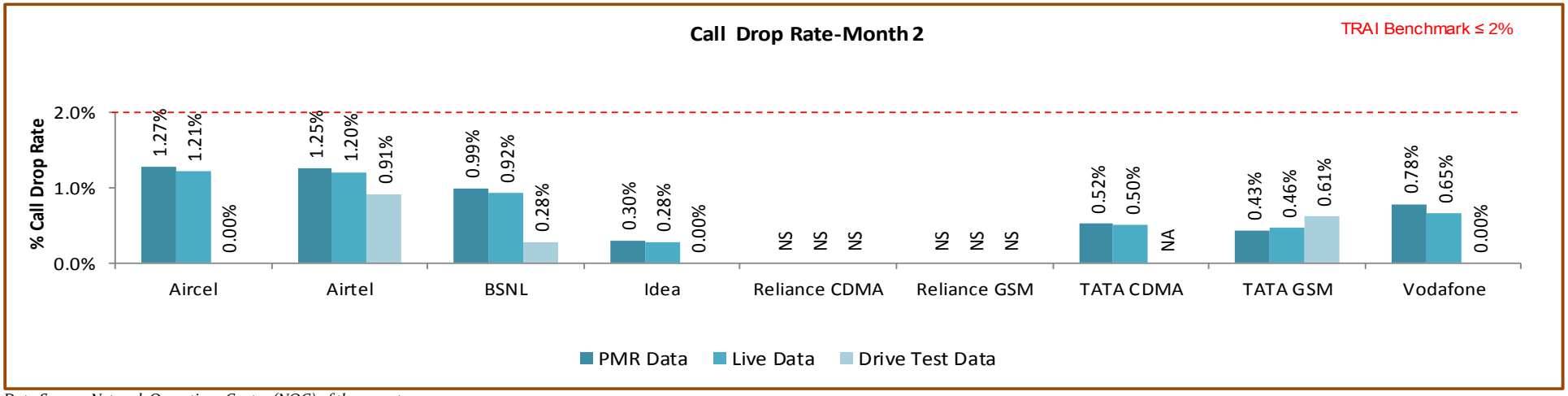
All operators met the benchmark for call drop rate during audit.

5.4.2.1 KEY FINDINGS – MONTH 1



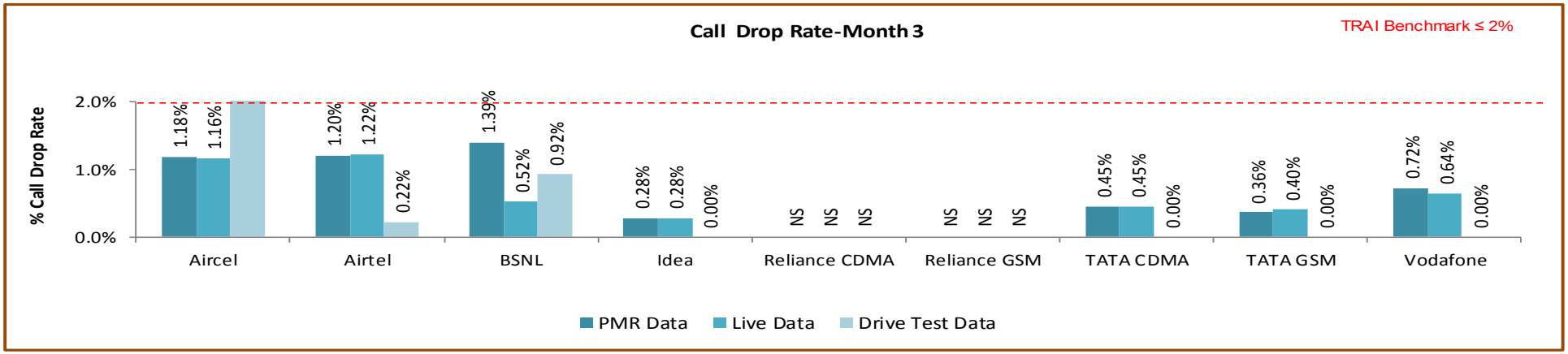
Data Source: Network Operations Center (NOC) of the operators

5.4.2.2 KEY FINDINGS – MONTH 2



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

5.4.2.3 KEY FINDINGS – MONTH 3



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

5.5 CELLS HAVING GREATER THAN 3% TCH DROP

5.5.1 PARAMETER DESCRIPTION

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

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

3. **TRAI Benchmark –**

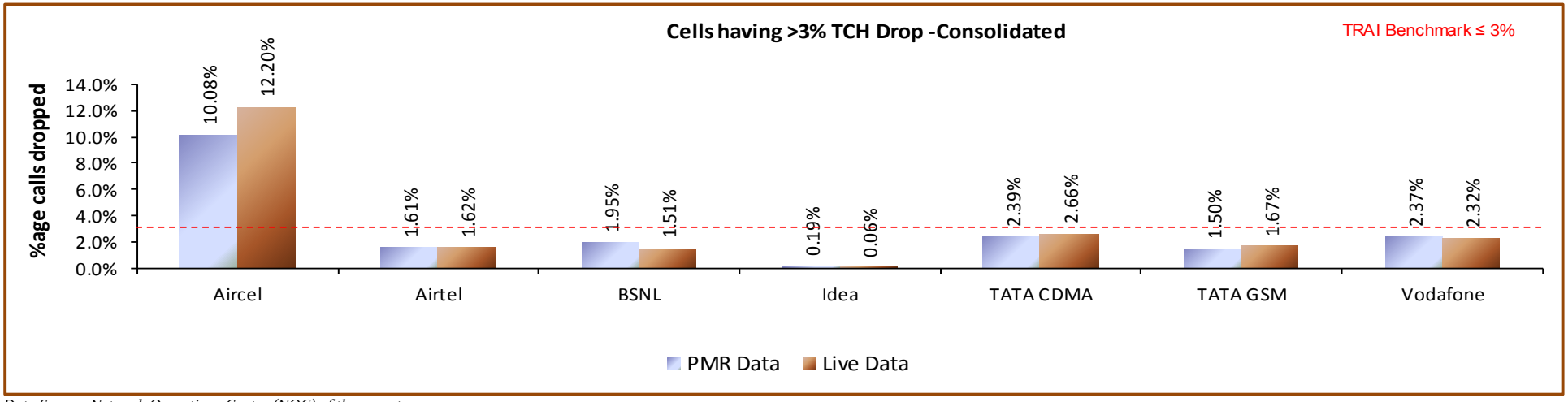
   - Worst affected cells having more than 3% TCH drop rate ≤ 3%

4. **Audit Procedure –**

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

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

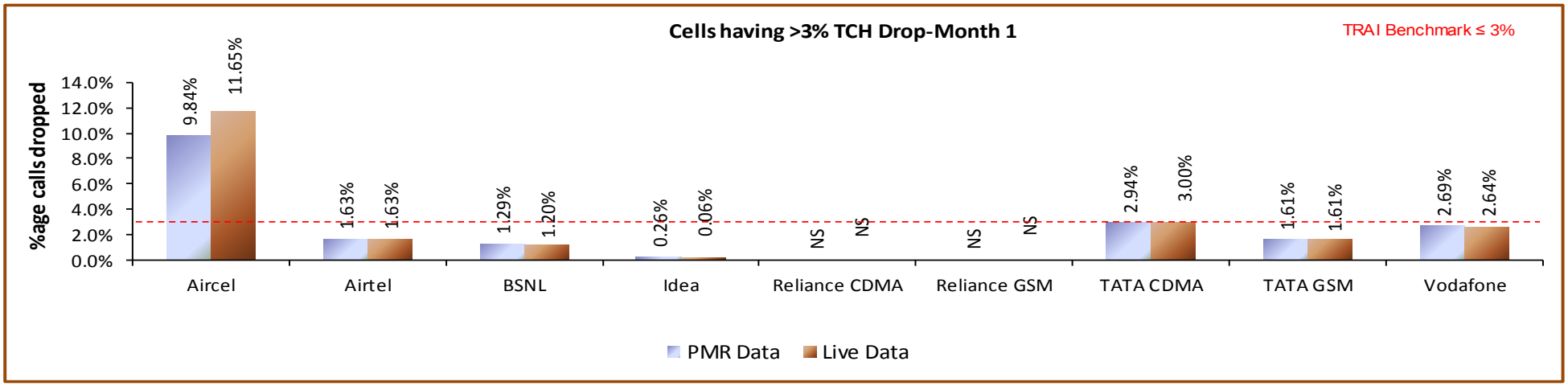
5.5.2 KEY FINDINGS - CONSOLIDATED



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

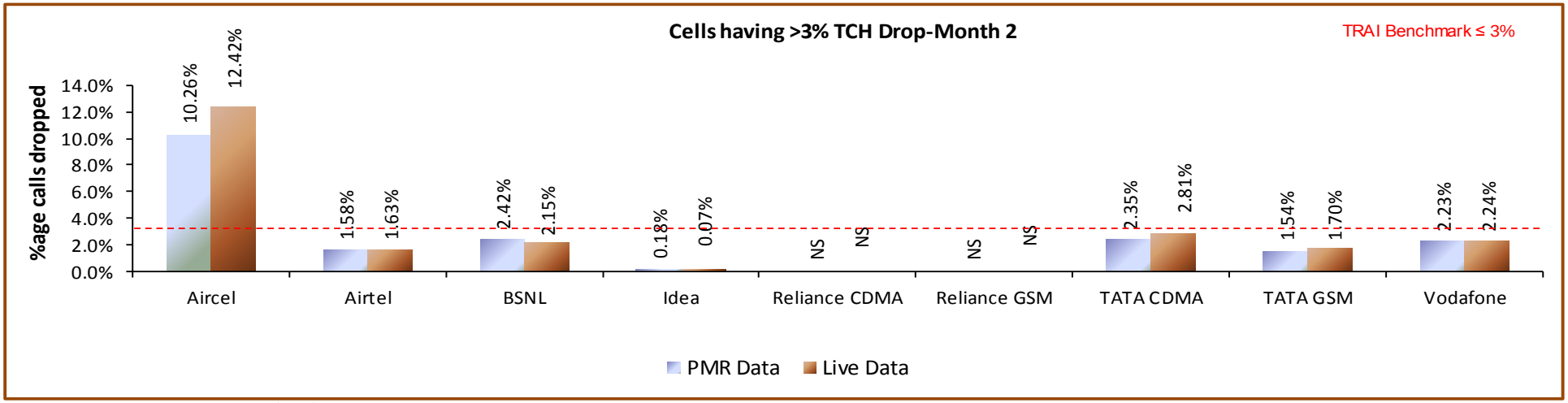
Aircel failed to meet the TRAI benchmark.

5.5.2.1 KEY FINDINGS – MONTH 1



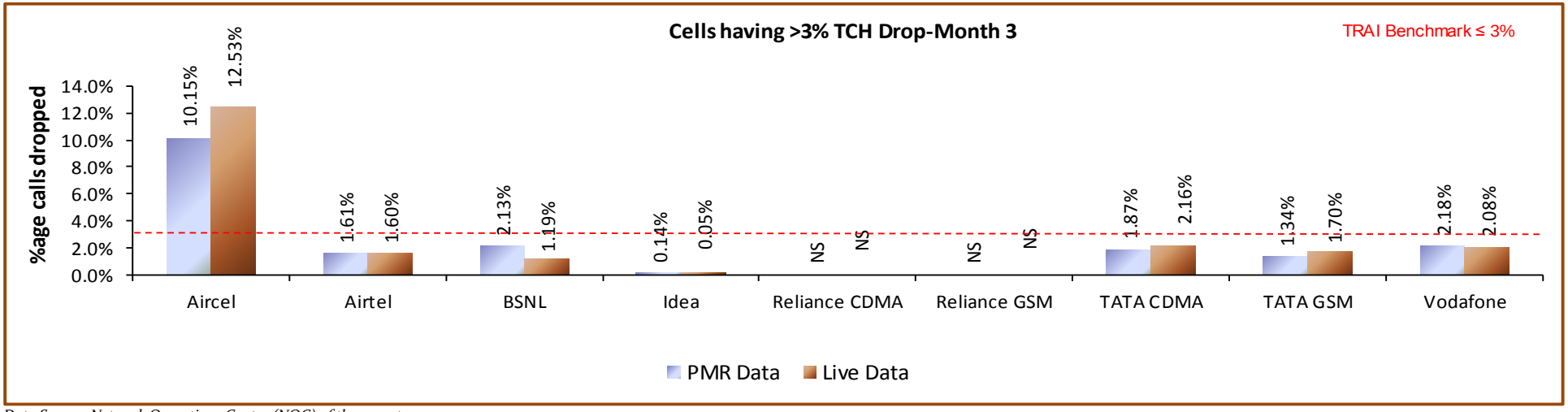
Data Source: Network Operations Center (NOC) of the operators

5.5.2.2 KEY FINDINGS – MONTH 2



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

5.5.2.3 KEY FINDINGS – MONTH 3



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

5.6 VOICE QUALITY

5.6.1 PARAMETER DESCRIPTION

1. **Definition:**

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

2. **Computational Methodology:**

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

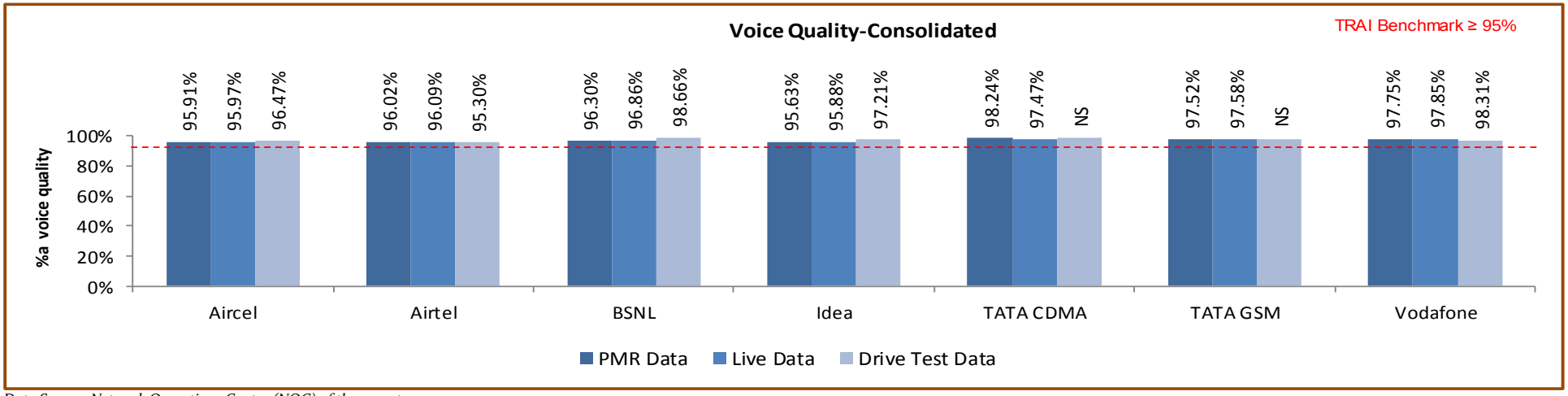
3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

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

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

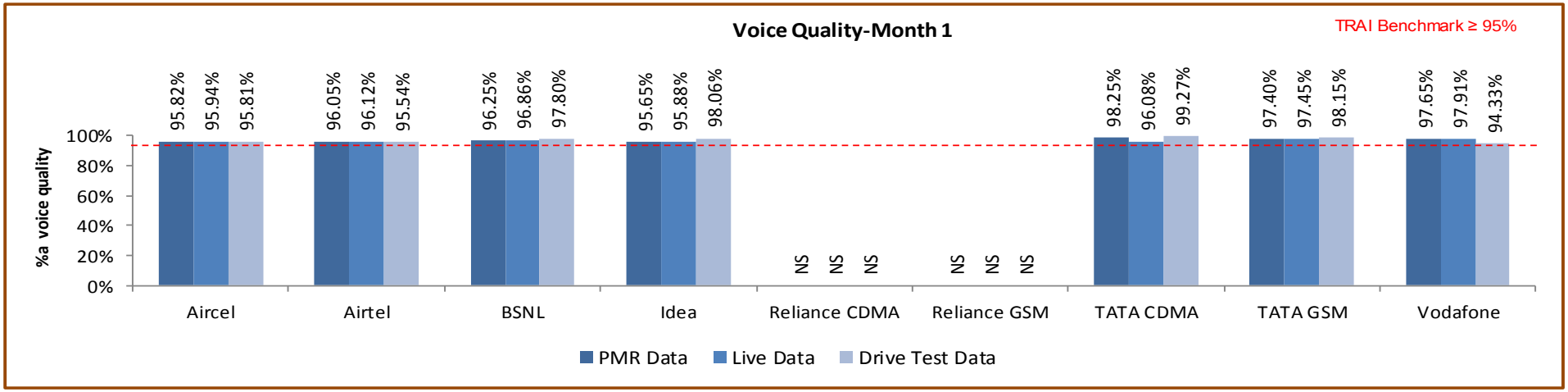
5.6.2 KEY FINDINGS



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

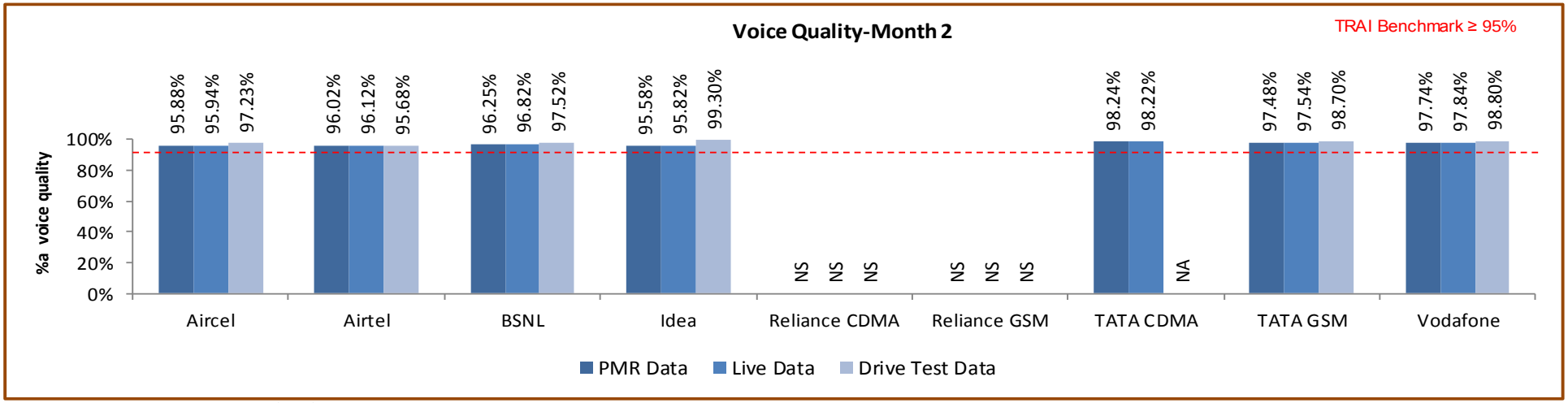
All Operators met the TRAI benchmark for Voice quality as per PMR data.

5.6.2.1 KEY FINDINGS – MONTH 1



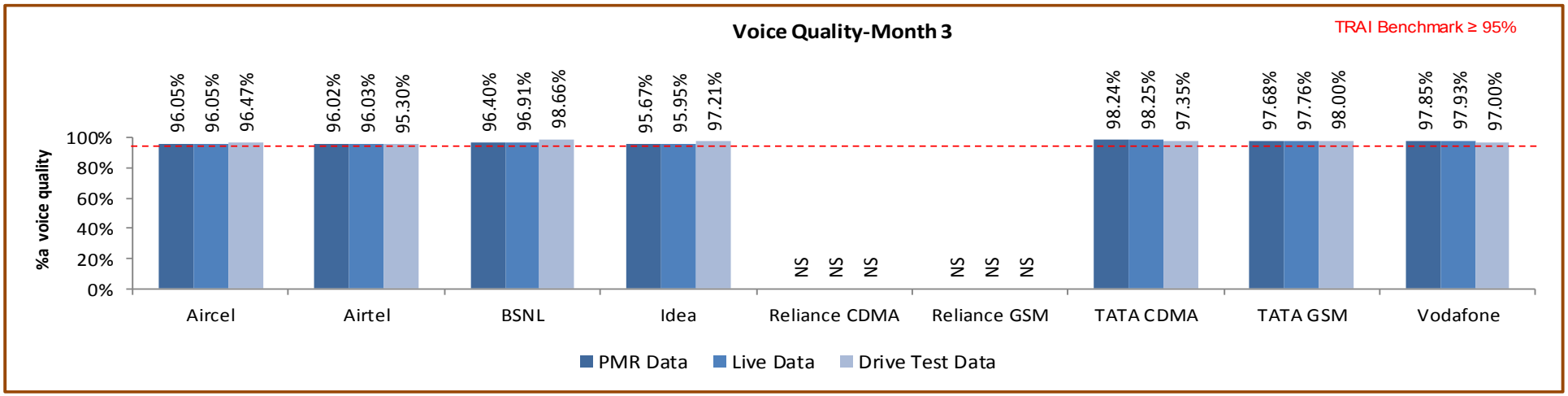
Data Source: Network Operations Center (NOC) of the operators

5.6.2.2 KEY FINDINGS – MONTH 2



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

5.6.2.3 KEY FINDINGS – MONTH 3



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

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

6.1 NODE BS DOWNTIME

6.1.1 PARAMETER DESCRIPTION

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

  1. Node Bs downtime (not available for service)

  2. Worst affected Node Bs due to downtime

- **Definition - Node Bs downtime (not available for service):** In the case of 3G networks, instead of BTS the nomenclature is Node B. The measurement methodology for the parameter Node B Accumulated downtime (not available for service) will be similar to the existing parameter for BTSs Accumulated downtime (not available for service).

- **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.
- **Source of Data:** Network Operation Center (NOC) or a Central Server
- **Computation Methodology –**
  Node Bs downtime (not available for service) = Sum of downtime of Node Bs in a month in hours i.e. total outage time of all Node Bs in hours during a month / (24 x Number of days in a month x Number of Node Bs in the network in licensed service area) x 100

3. TRAI Benchmark –

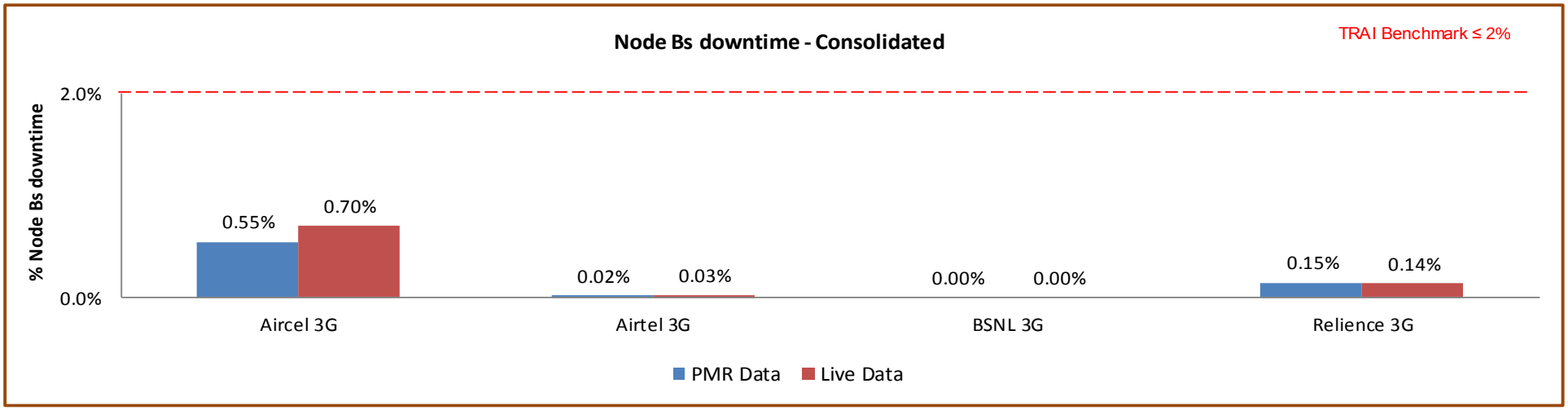
a. Node Bs downtime (not available for service) ≤ 2%

4. Audit Procedure –

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

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

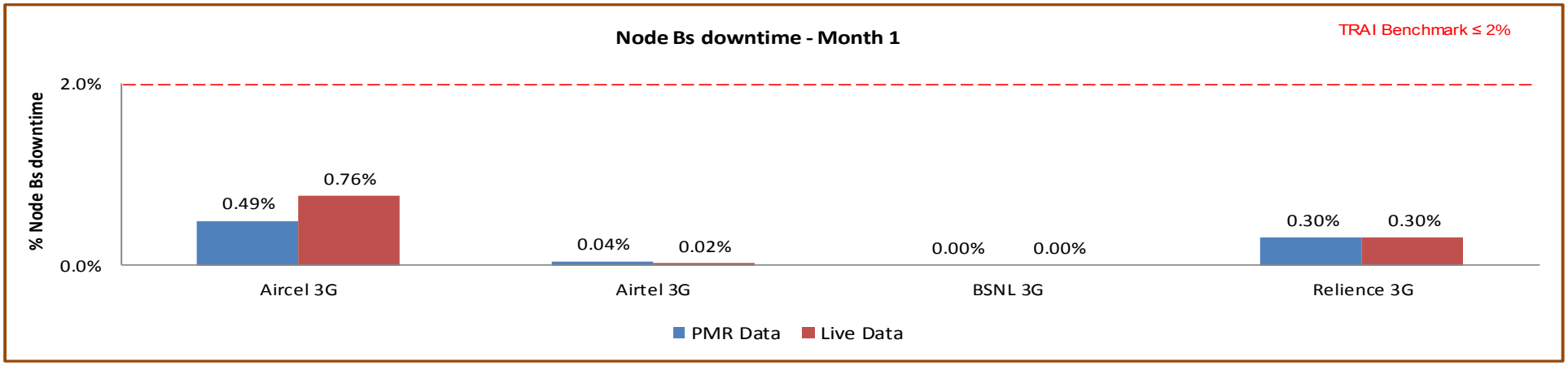
6.1.2 KEY FINDINGS - CONSOLIDATED



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

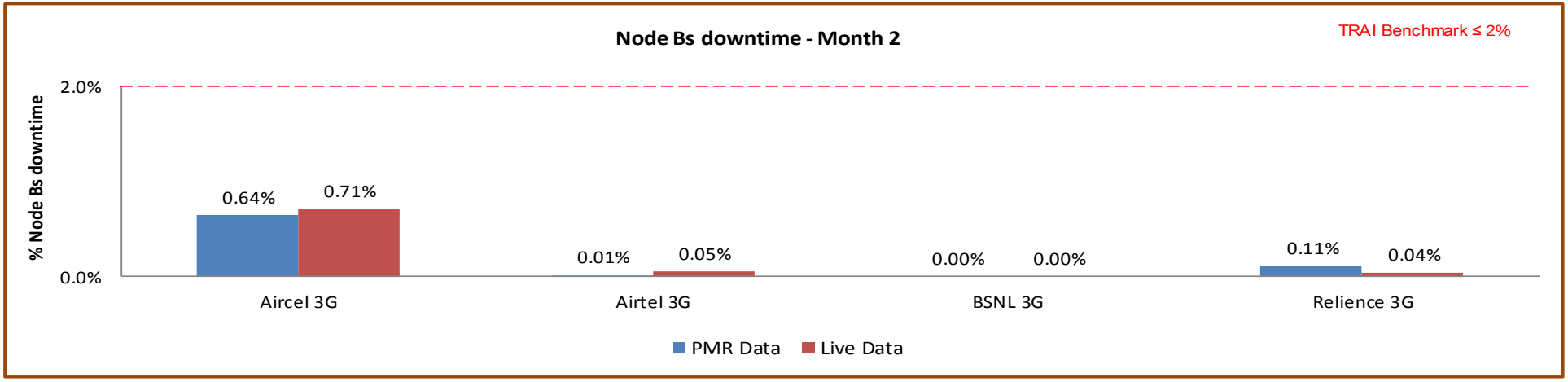
All Operators met the TRAI benchmark.

6.1.2.1 KEY FINDINGS – MONTH 1



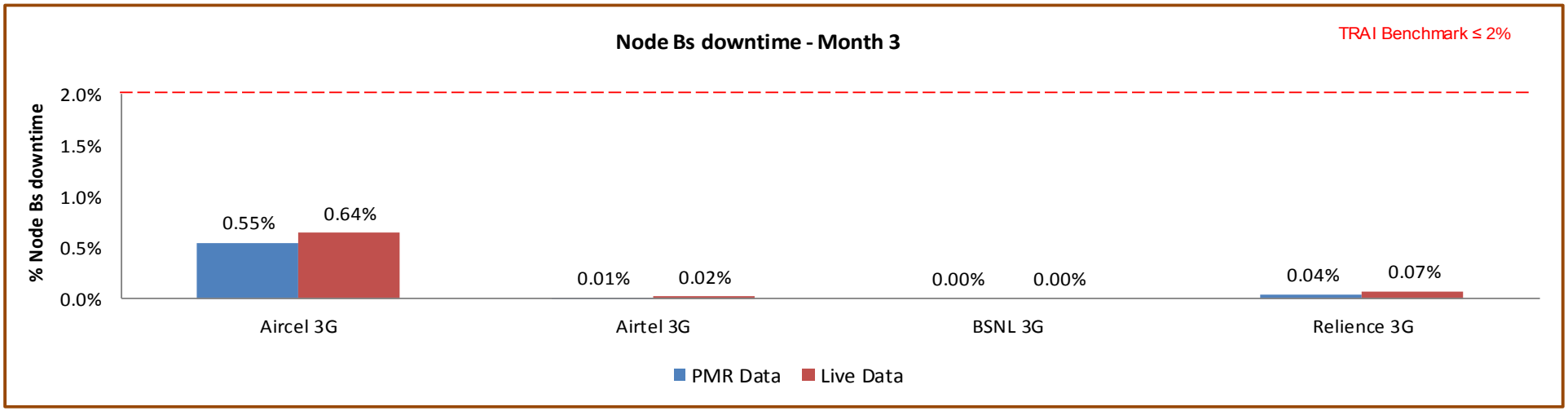
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.2 KEY FINDINGS – MONTH 2



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

6.1.2.3 KEY FINDINGS – MONTH 3



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

6.2 WORST AFFECTED NODE BS DUE TO DOWNTIME

6.2.1 PARAMETER DESCRIPTION

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

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

- **Computation Methodology –**

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

- **TRAI Benchmark –**

  b. Worst affected Node Bss due to downtime ≤ 2%

- **Audit Procedure –**

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

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

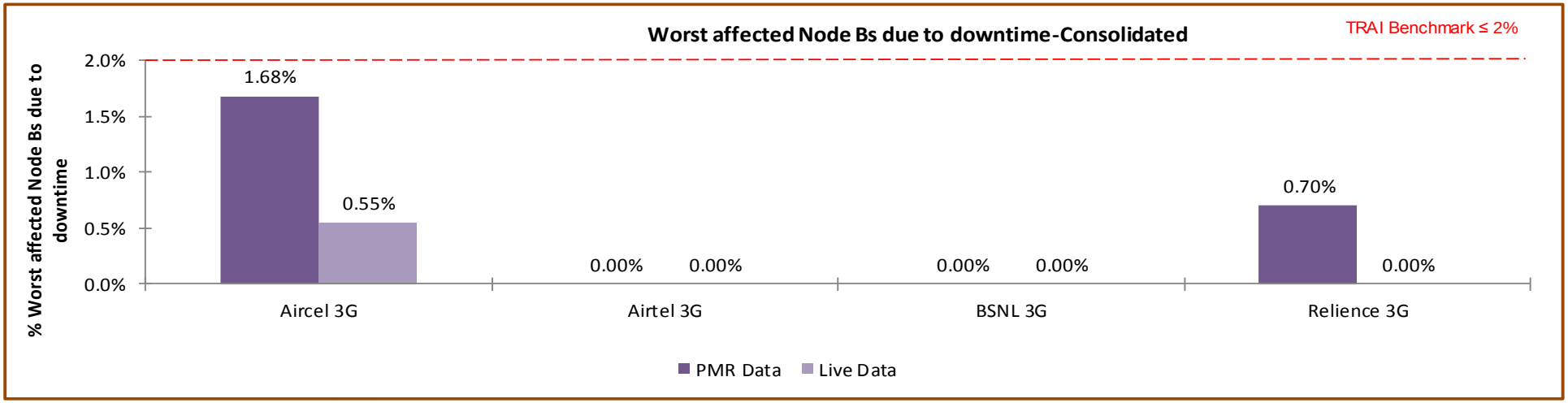
  iii. Data is extracted from system log of the server of the operator. This data is in raw format which is further processed to arrive at the cumulative values.

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

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

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

6.2.2 KEY FINDINGS – CONSOLIDATED

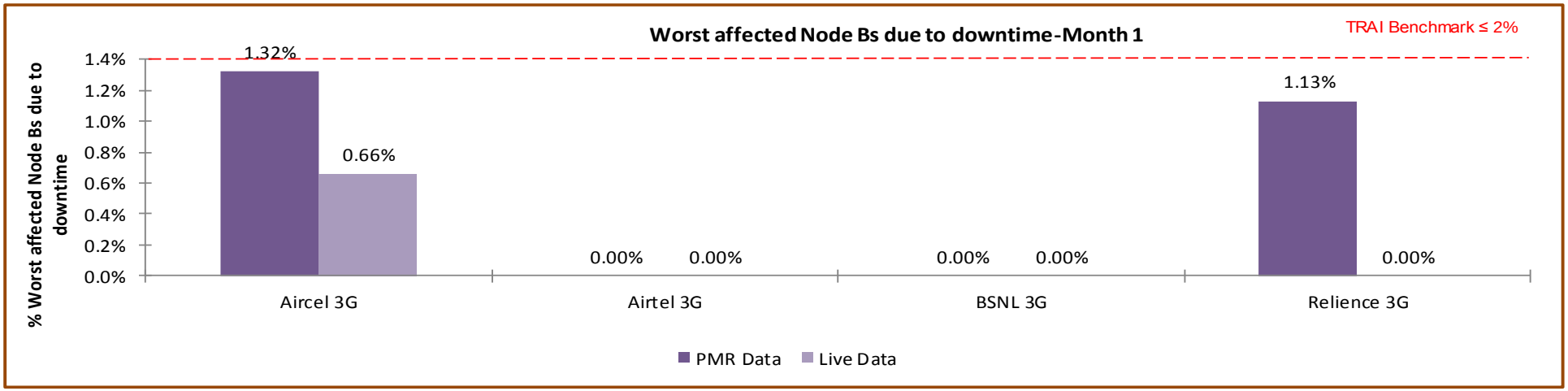


Data Source: Operations and Maintenance Center (OMC) of the operators

All Operators met the TRAI benchmark for worst affected Node Bs due to downtime as per audit/PMR data.

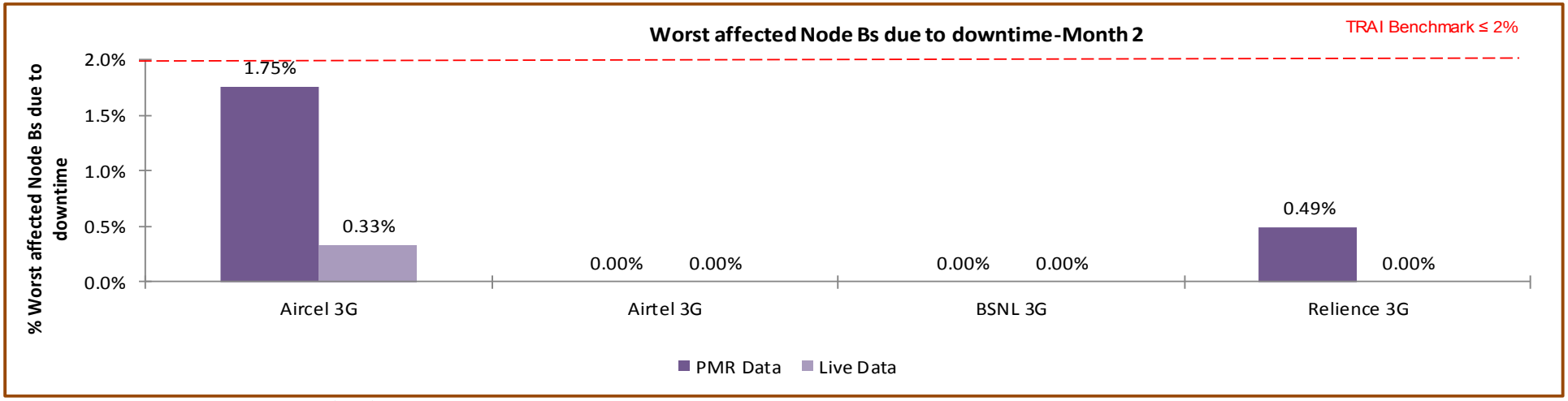
Significant difference was observed between PMR & live measurement data for Aircel and Reliance. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.2.2.1 KEY FINDINGS – MONTH 1



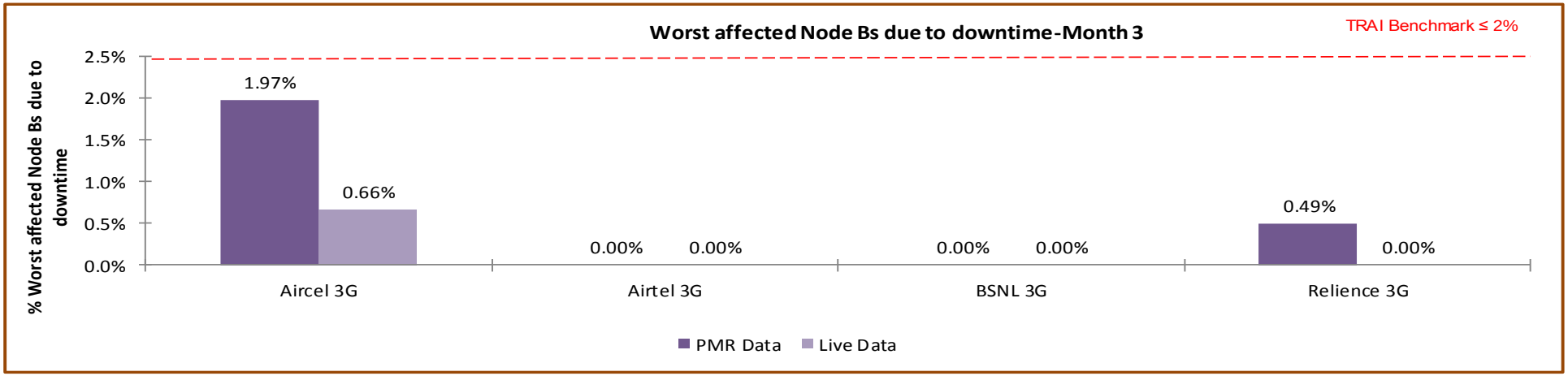
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2



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

6.2.2.3 KEY FINDINGS – MONTH 3



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

6.3 CALL SET UP SUCCESS RATE

6.3.1 PARAMETER DESCRIPTION

1. **Definition:** This parameter is same for 2G Networks as well as 3G Networks. However, the network elements involved in both the networks are different. Call Set-up Success Rate is defined as the ratio of Established Calls to Call Attempts. For establishing a call in 3G Networks, User Equipment (UE) accesses the Universal Terrestrial Radio Access Network (UTRAN) and establishes an RRC connection. Once RRC connection is established the Non Access Stratum (NAS) messages are exchanged between the UE and the Core Network (CN). The last step of the call setup is the establishment of a Radio Access Bearer (RAB) between the CN and the UE. However, any RAB abnormal release after RAB Assignment Response or Alerting/Connect message is to be considered as a dropped call.

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

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

4. **Computation Methodology-**
   (RRC Established / Total RRC Attempts) * 100

   RRC Established means the following events have happened in RRC setup:-

   - RRC attempt is made
   - The RRC established
   - The RRC is routed to the outward path of the concerned MSC

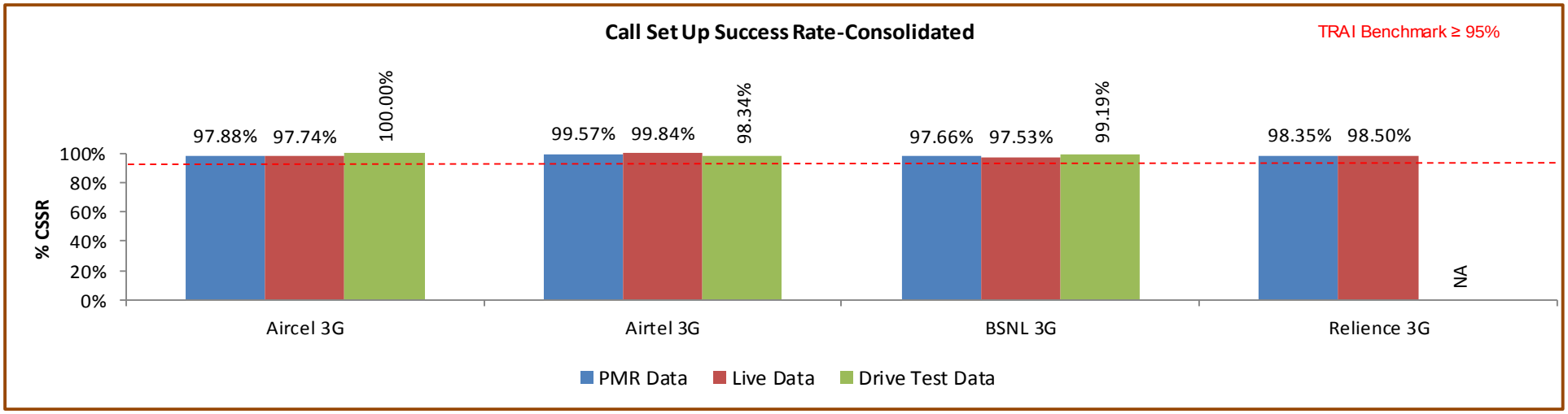
5. **TRAI Benchmark ≥** 95%

6. **Audit Procedure –**

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

- CSSR calculation should be measured using OMC generated data only
- Measurement should be only in Time Consistent Busy Hour (CBBH) period for all days of the week
- Counter data is extracted from the NOC of the operators.
- Total calls established include all calls established excluding RAB congestion.
  - The numerator and denominator values are derived from adding the counter values from the MSC.

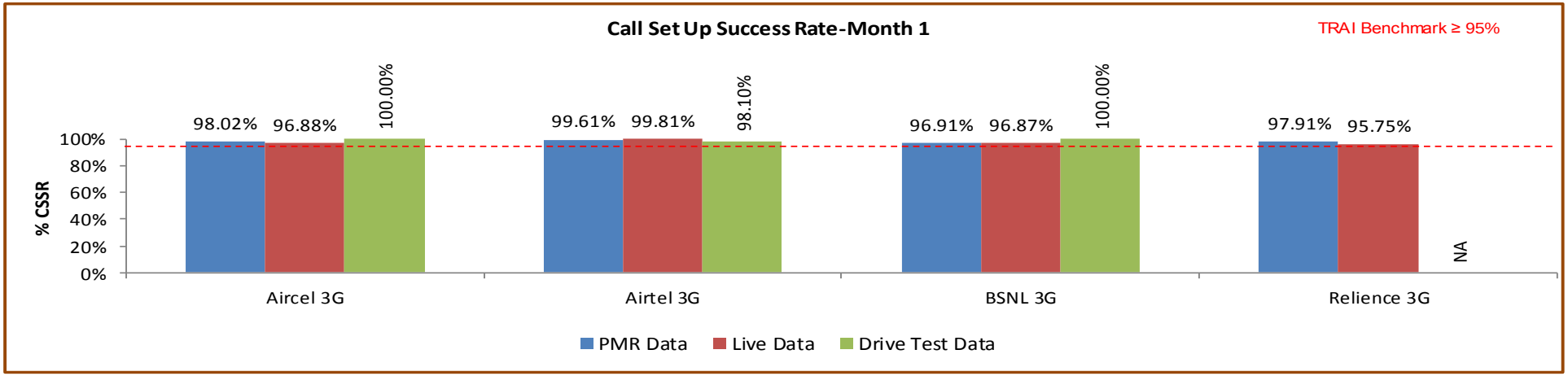
6.3.2 KEY FINDINGS - CONSOLIDATED



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

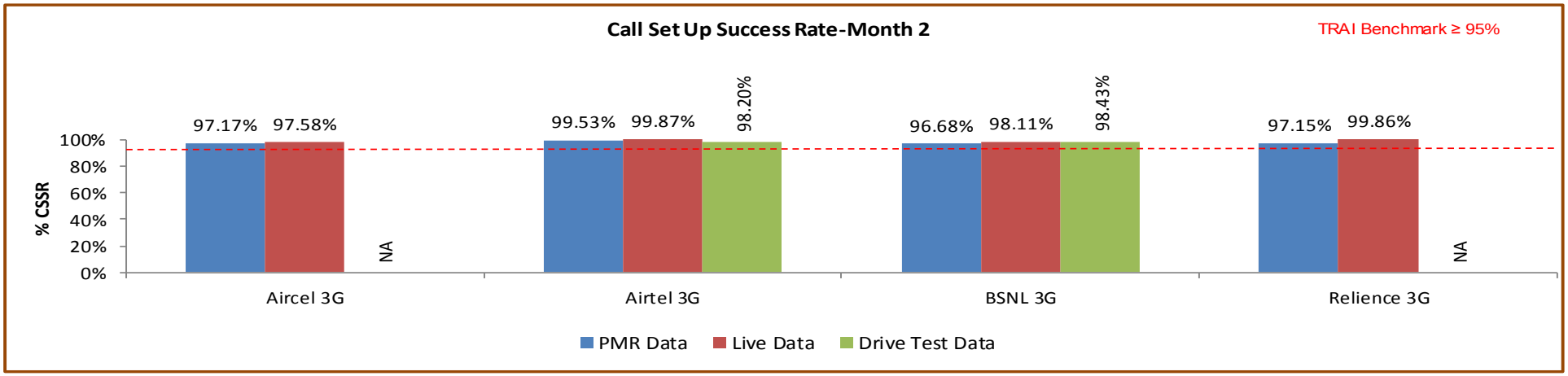
All Operators met the TRAI benchmark as per audit/PMR data.

6.3.2.1 KEY FINDINGS – MONTH 1



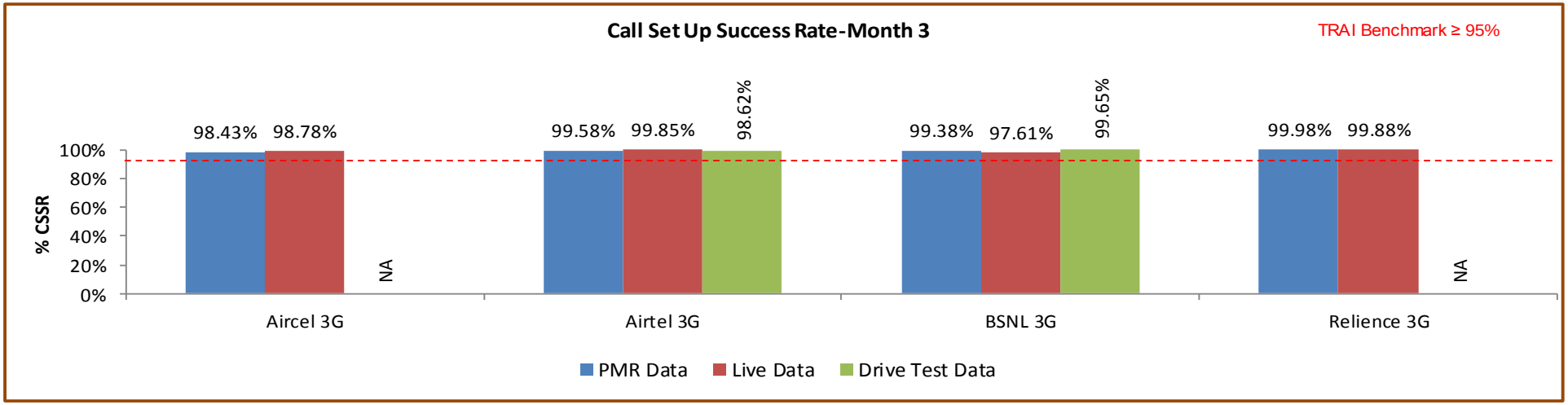
Data Source: Network Operations Center (NOC) of the operators

6.3.2.2 KEY FINDINGS – MONTH 2



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

6.3.2.3 KEY FINDINGS – MONTH 3



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

6.4 NETWORK CHANNEL CONGESTION- RRC CONGESTION/ CIRCUIT SWITCHED RAB CONGESTION

6.4.1 PARAMETER DESCRIPTION

1. **Definition (RRC Congestion):** This parameter has been amended to include RRC Congestion in 3G Networks.
2. **Definition (Circuit Switched RAB congestion):** Circuit Switched RAB congestion is similar to Traffic Channel Congestion. Therefore, the existing parameter has been amended to include RAB congestion in 3G Networks.
3. **Point of Interconnection (POI) Congestion:** This parameter denotes congestion at the outgoing traffic between two networks and is equally applicable for 2G networks and 3G networks.
   - RRC Level: Stand-alone dedicated control channel
   - RAB Level: Traffic Channel
   - POI Level: Point of Interconnect
4. **Data Extraction/collection methodology** - Data extraction to be done from appropriate counters. Auditors should be aware of counter details and definitions for each operator.
5. **Source of Data:** Network Operation Center (NOC) or a Central Server
6. **Computational Methodology:**
   - **RRC / RAB Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
     - Where:-A1 = Number of attempts to establish RRC/ RAB made on day 1
     - C1 = Average RRC / RAB Congestion % on day 1
     - A2 = Number of attempts to establish RRC / RAB made on day 2
     - C2 = Average RRC / RAB Congestion % on day 2
     - An = Number of attempts to establish RRC / RAB made on day n
     - Cn = Average RRC / RAB Congestion % on day n

- **POI Congestion% = [(A1 x C1) + (A2 x C2) +.....+ (An x Cn)] / (A1 + A2 +...+ An)**
  - Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1
  - C1 = Average POI Congestion % on day 1
  - A2 = POI traffic offered on all POIs (no. of calls) on day 2
  - C2 = Average POI Congestion % on day 2
  - An = POI traffic offered on all POIs (no. of calls) on day n
  - Cn = Average POI Congestion % on day n

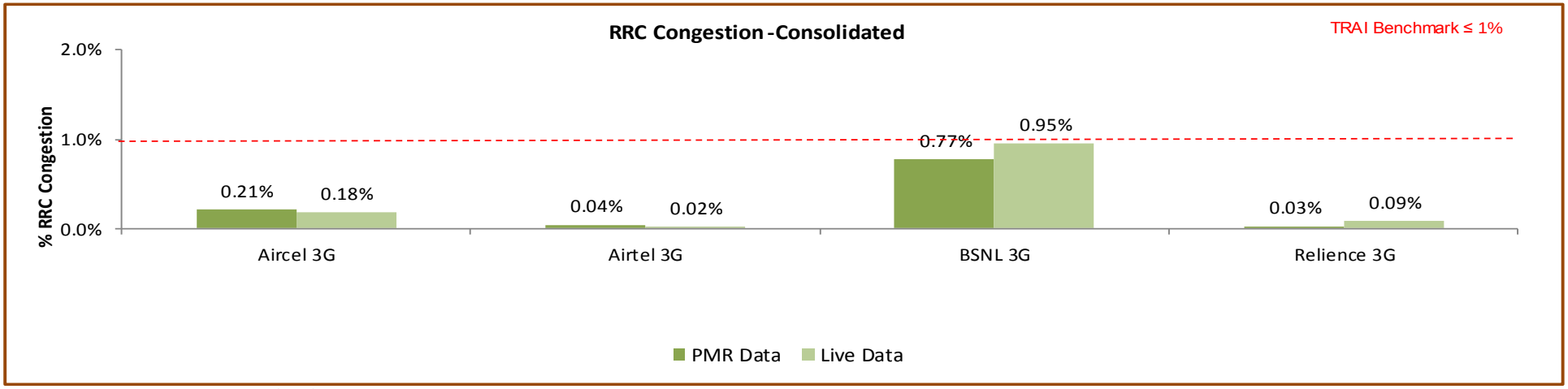
7. Benchmark:

- RRC Congestion: ≤ 1%, RAB Congestion: ≤ 2%, POI Congestion: ≤ 0.5%

8. Audit Procedure –

- Audit of the details of RRC and RAB congestion percentages computed by the operator (using OMC–Switch data only) would be conducted
  - The operator should be measuring this parameter during Time consistent busy hour (TCBH) only RRC

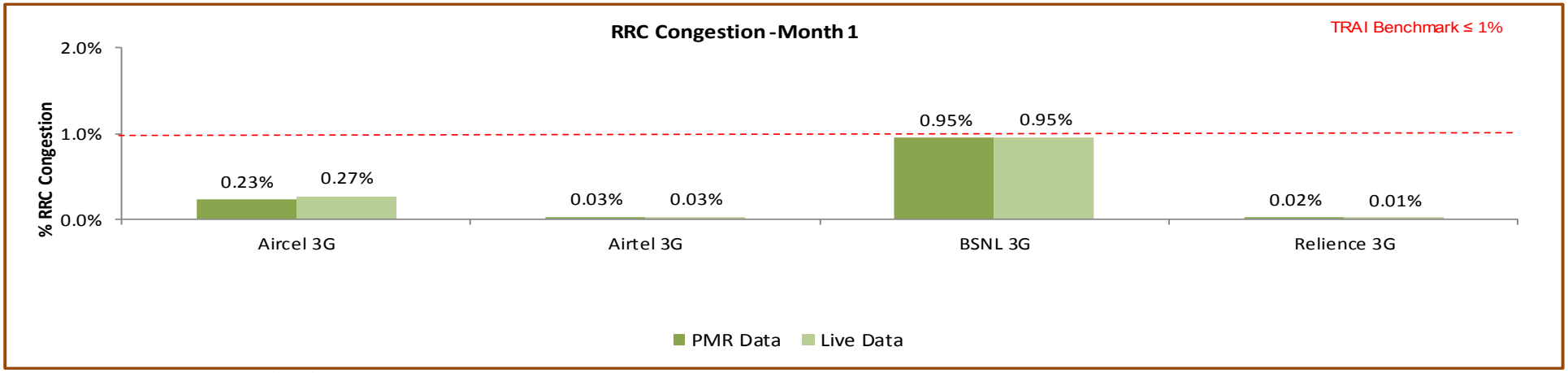
6.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)



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

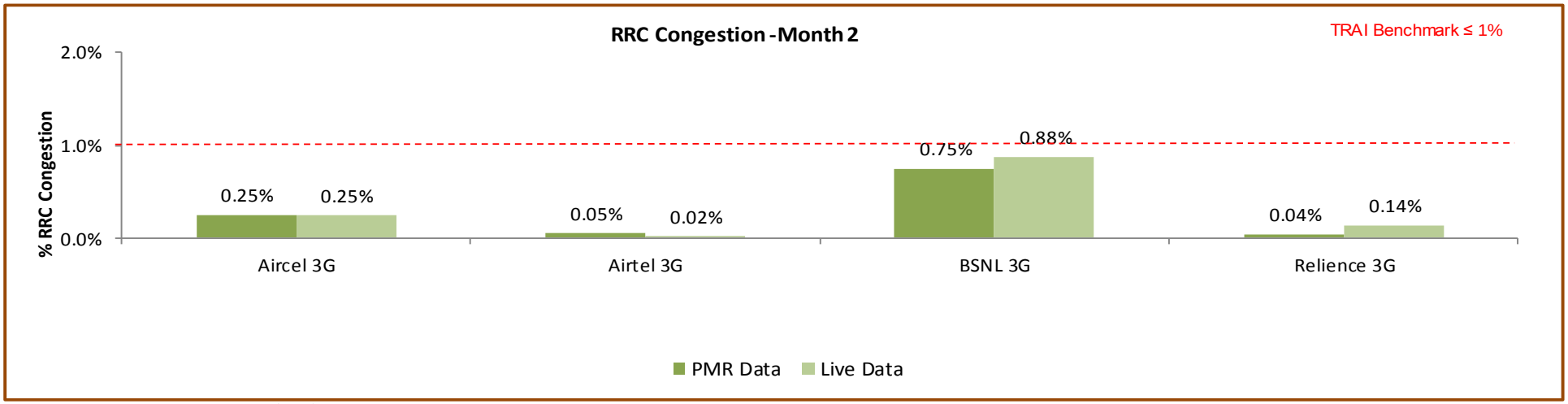
All Operators met the TRAI benchmark for RRC congestion.

6.4.2.1 KEY FINDINGS – MONTH 1



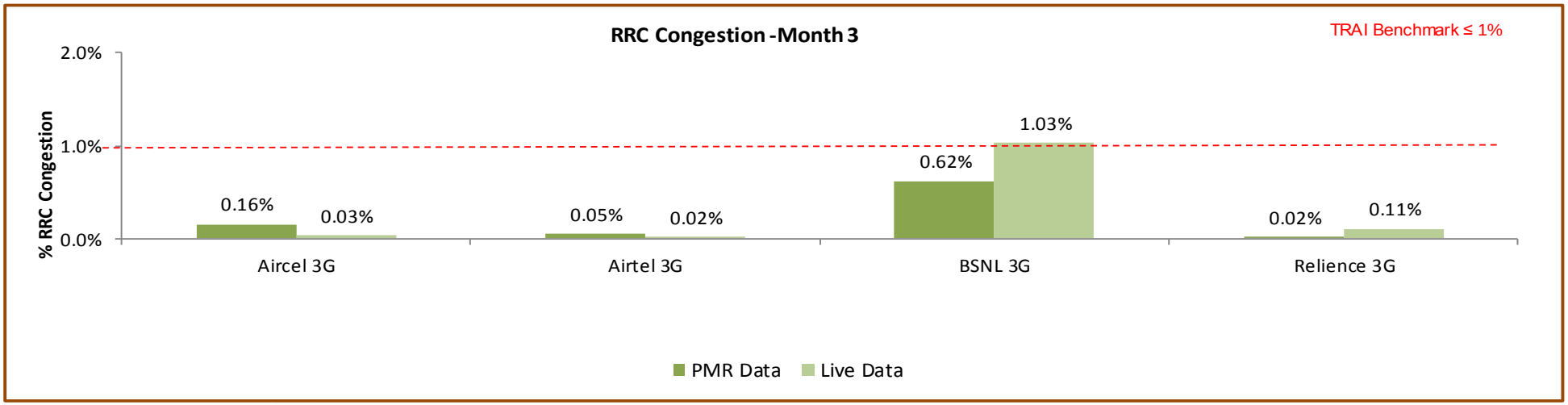
Data Source: Network Operations Center (NOC) of the operators

6.4.2.2 KEY FINDINGS – MONTH 2



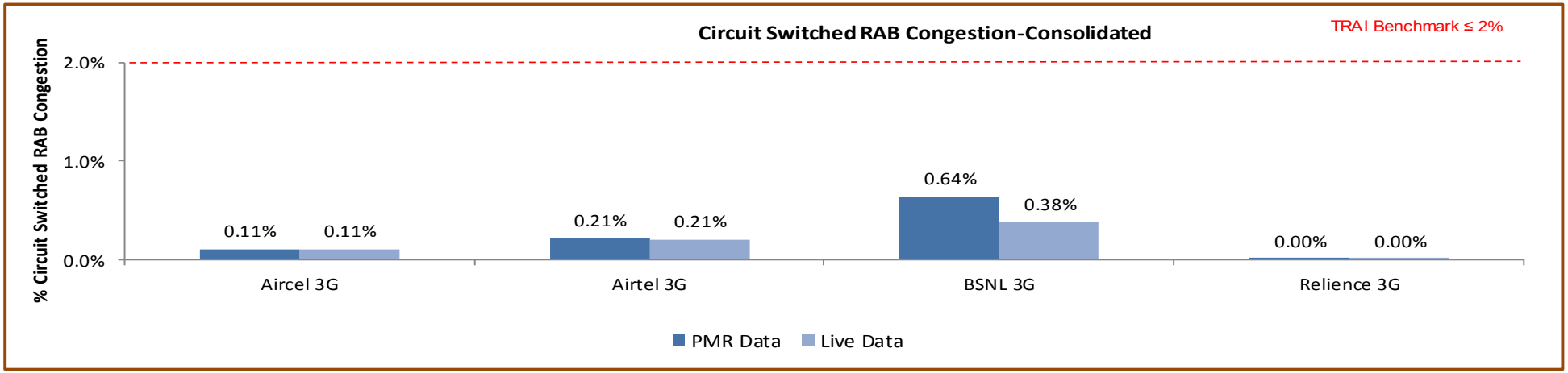
Data Source: Network Operations Center (NOC) of the operators

6.4.2.3 KEY FINDINGS – MONTH 3



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

6.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)

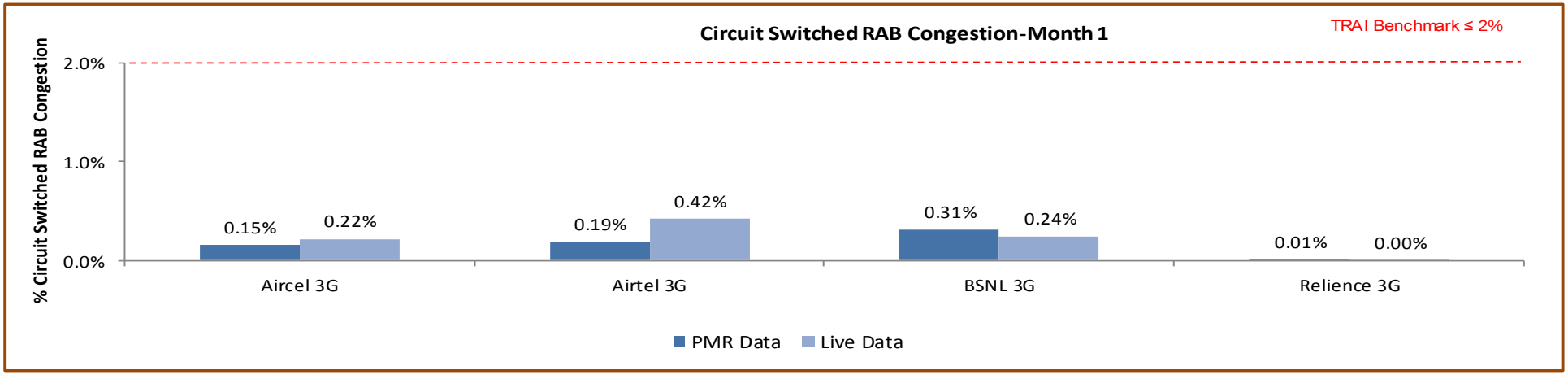


Data Source: Network Operations Center (NOC) of the operators

All Operators met the TRAI benchmark as per audit/PMR report.

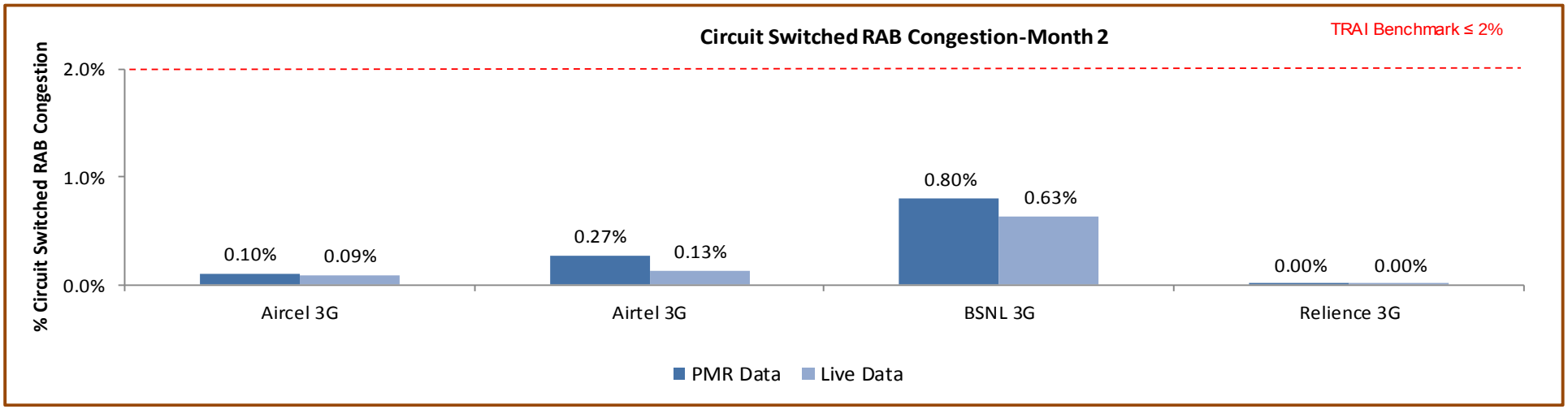
Significant difference was observed between PMR & live measurement data for BSNL. The possible reason for the variation could be the difference in time frame of data as PMR data is for 30 days and live measurement data is for three days.

6.4.3.1 KEY FINDINGS – MONTH 1



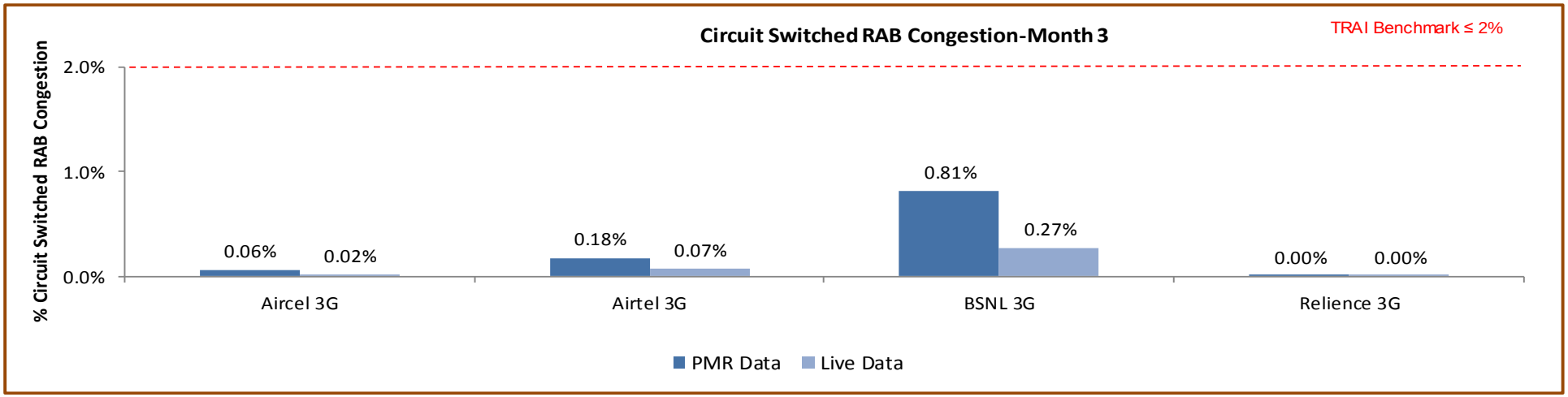
Data Source: Network Operations Center (NOC) of the operators

6.4.3.2 KEY FINDINGS – MONTH 2



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

6.4.3.3 KEY FINDINGS – MONTH 3



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

6.4.4 KEY FINDINGS – POI CONGESTION (CONSOLIDATED) – AVERAGE OF 3 MONTHS

5. POI Congestion					
Audit Results for POI Congestion- PMR data					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	14	7
No. of POIs not meeting benchmark		0	0	1	0
Total Capacity of all POIs (A) - in erlangs		0	323987	142000	201965
Traffic served for all POIs (B)- in erlangs		0	206203	124285	79525
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	14	7
No. of POIs not meeting benchmark		0	0	1	0
Total Capacity of all POIs (A) - in erlangs		0	322585	141000	199639
Traffic served for all POIs (B)- in erlangs		0	205833	88593	76730
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

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

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

6.4.4.1 KEY FINDINGS – MONTH 1

5. POI Congestion					
Audit Results for POI Congestion- PMR data-July					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	21	13	7
No. of POIs not meeting benchmark		0	0	1	0
Total Capacity of all POIs (A) - in erlangs		0	105733	49000	67971
Traffic served for all POIs (B)- in erlangs		0	69253	41142	26978
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-July					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	21	13	7
No. of POIs not meeting benchmark		0	0	1	0
Total Capacity of all POIs (A) - in erlangs		0	105677	49000	65821
Traffic served for all POIs (B)- in erlangs		0	69194	40786	23864
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

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

6.4.4.2 KEY FINDINGS – MONTH 2

5. POI Congestion					
Audit Results for POI Congestion- PMR data-August					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	15	7
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	107059	44000	67209
Traffic served for all POIs (B)- in erlangs		0	68540	41302	26324
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-August					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	15	7
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	105733	43000	67074
Traffic served for all POIs (B)- in erlangs		0	68240	23832	26122
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

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

6.4.4.3 KEY FINDINGS – MONTH 3

5. POI Congestion					
Audit Results for POI Congestion- PMR data-September					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	15	7
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	111195	49000	66785
Traffic served for all POIs (B)- in erlangs		0	68409	41840	26223
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-September					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	15	7
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	111175	49000	66744
Traffic served for all POIs (B)- in erlangs		0	68399	23975	26744
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

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

6.5 CIRCUIT SWITCHED VOICE DROP RATE

6.5.1 PARAMETER DESCRIPTION

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

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

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

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

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

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

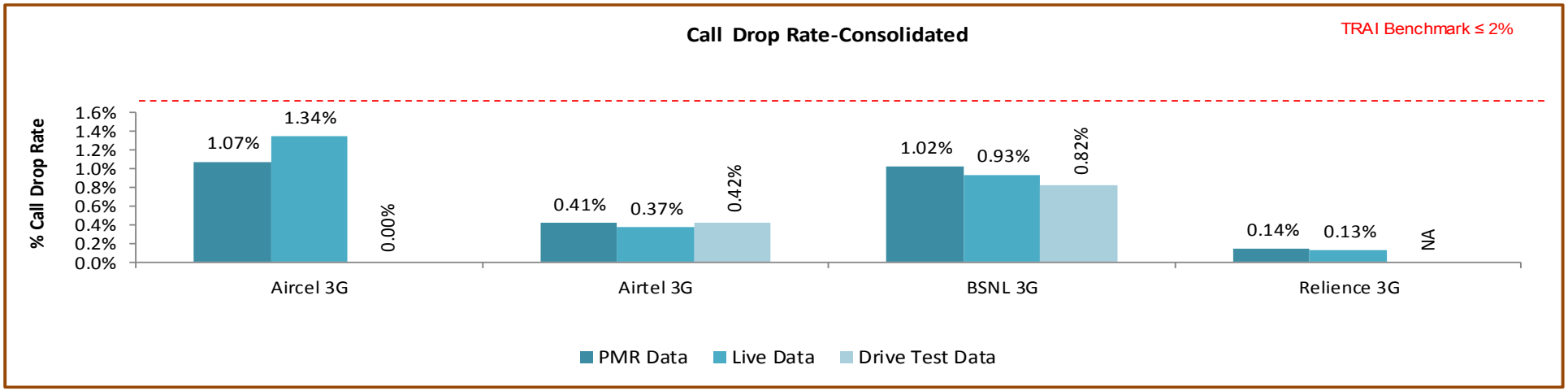
5. **TRAI Benchmark –**

   - Circuit switched voice drop rate ≤ 2%

6. **Audit Procedure –**

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

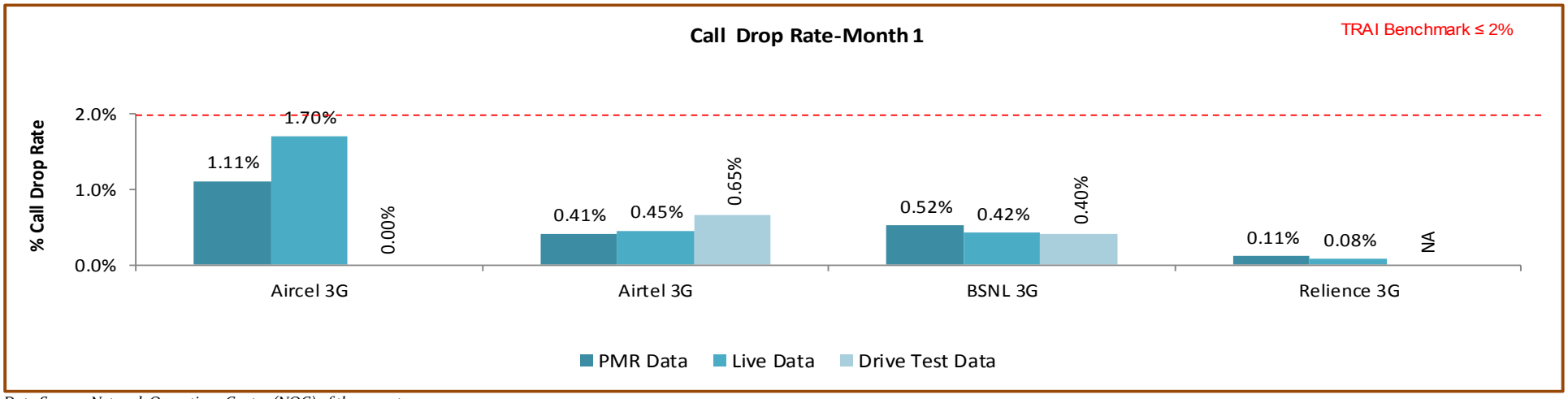
6.5.2 KEY FINDINGS - CONSOLIDATED



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

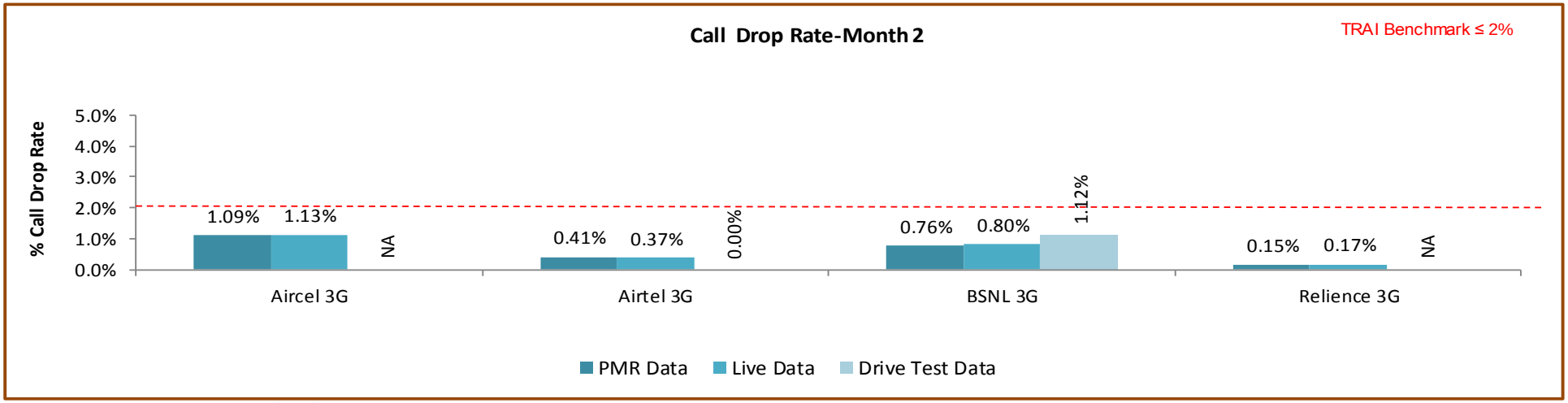
All operators met the benchmark for call drop rate during audit.

6.5.2.1 KEY FINDINGS – MONTH 1



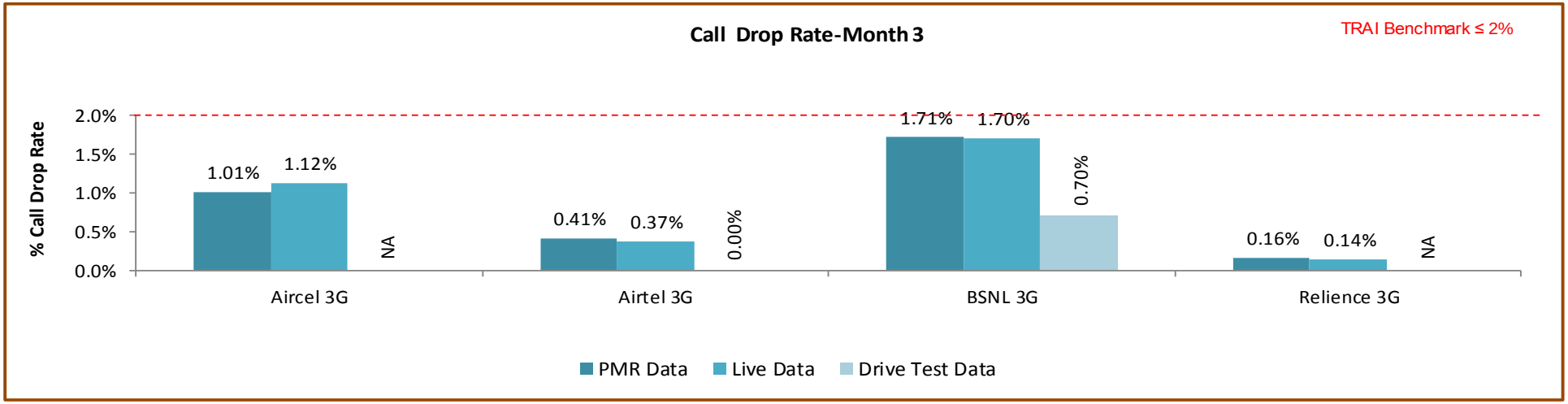
Data Source: Network Operations Center (NOC) of the operators

6.5.2.2 KEY FINDINGS – MONTH 2



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

6.5.2.3 KEY FINDINGS – MONTH 3



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

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

6.6.1 PARAMETER DESCRIPTION

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

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

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

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

5. **TRAI Benchmark –**

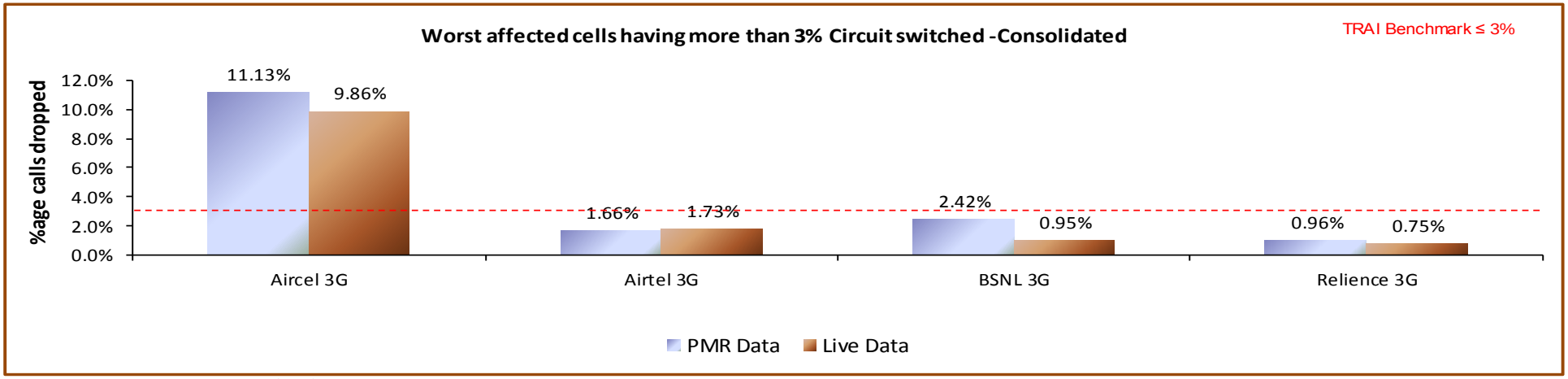
   - Worst affected cells having CSV drop rate > 3% during CBBH in a month ≤ 3%

6. **Audit Procedure –**

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

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

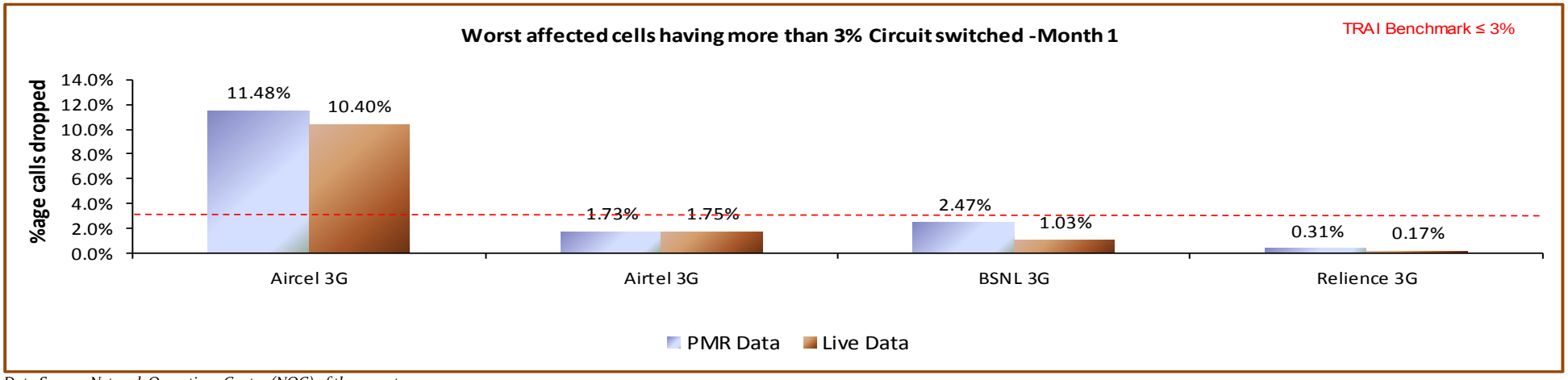
6.6.2 KEY FINDINGS - CONSOLIDATED



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

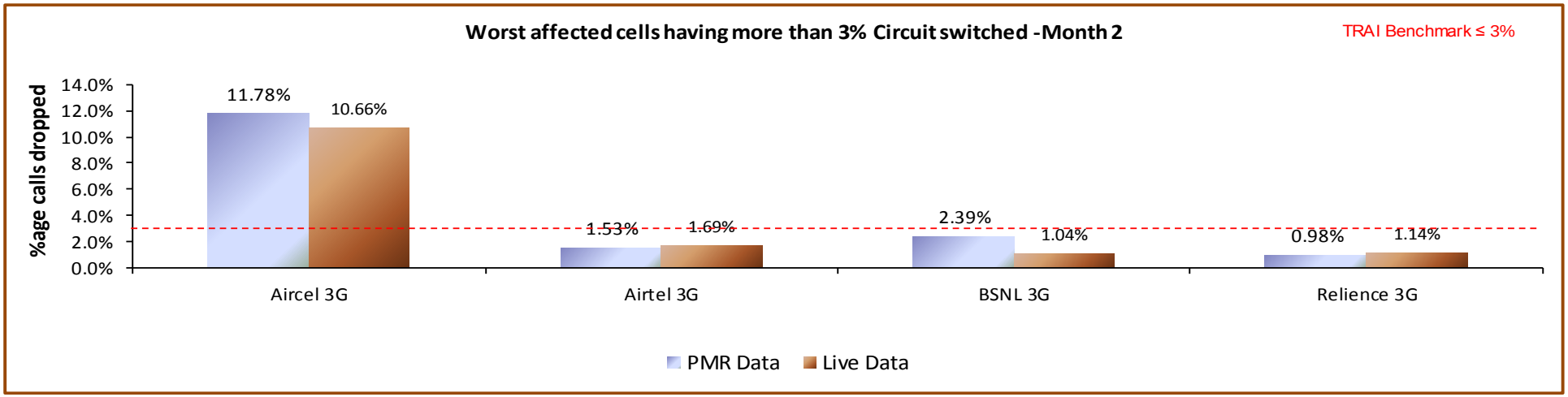
Aircel did not meet the benchmark during audit.

6.6.2.1 KEY FINDINGS – MONTH 1



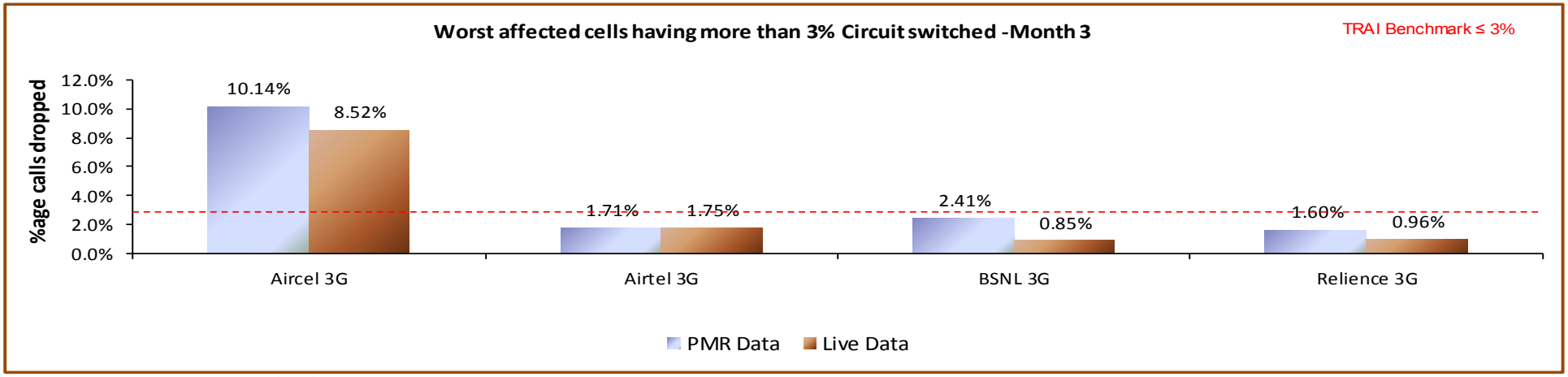
Data Source: Network Operations Center (NOC) of the operators

6.6.2.2 KEY FINDINGS – MONTH 2



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

6.6.2.3 KEY FINDINGS – MONTH 3



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

6.7 CIRCUIT SWITCH VOICE QUALITY

6.7.1 PARAMETER DESCRIPTION

5. **Definition:**

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

6. **Computational Methodology:**

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

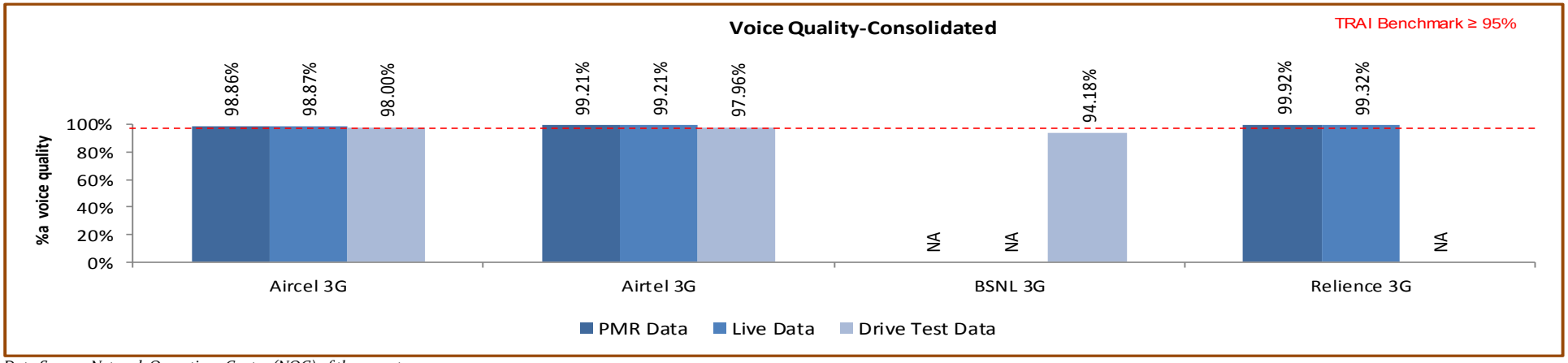
7. **TRAI Benchmark:** ≥ 95%

8. **Audit Procedure –**

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

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

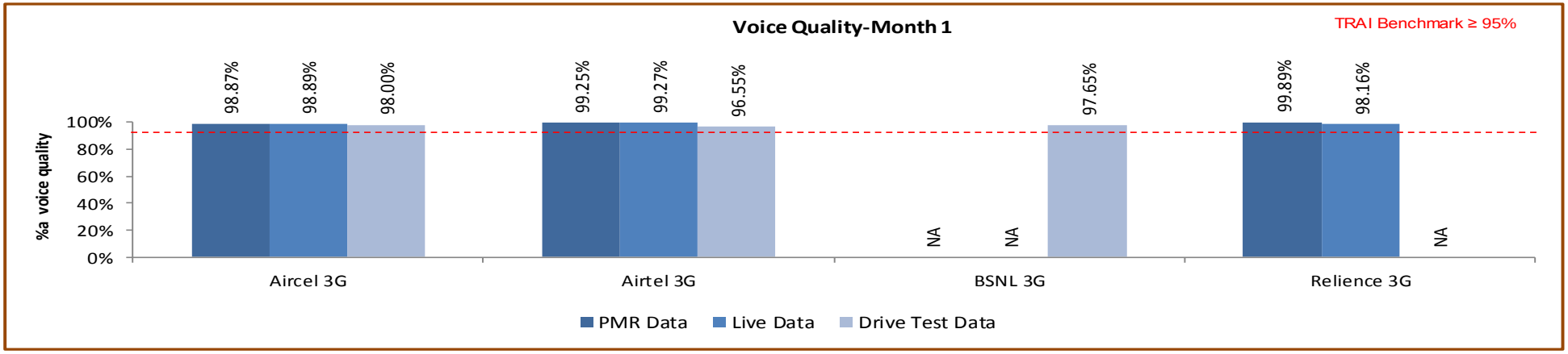
6.7.2 KEY FINDINGS



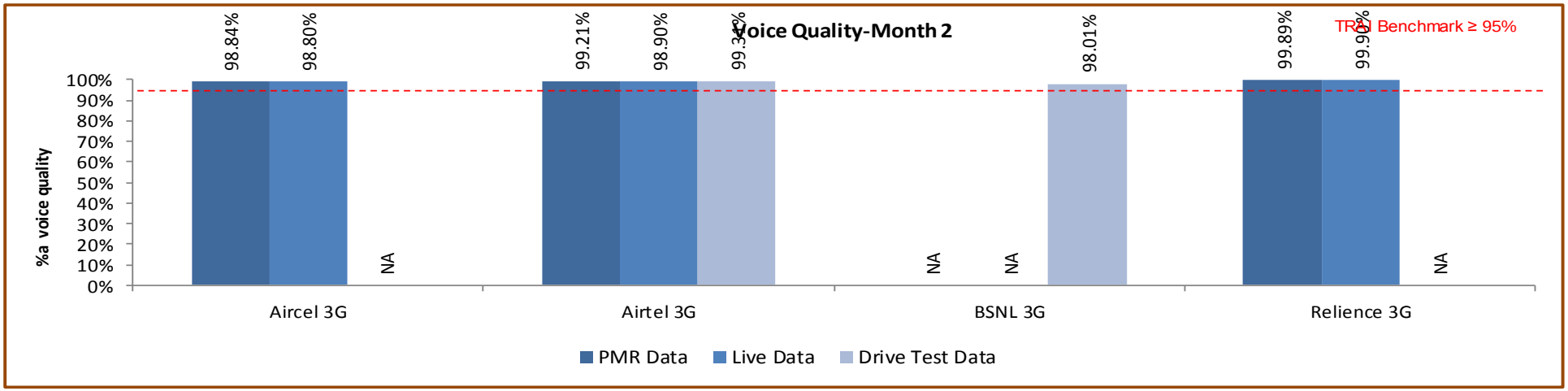
Data Source: Network Operations Center (NOC) of the operators

All operators met the TRAI benchmark for voice quality during PMR/live audit, however during drive test BSNL failed to meet the benchmark.

6.7.2.1 KEY FINDINGS – MONTH 1

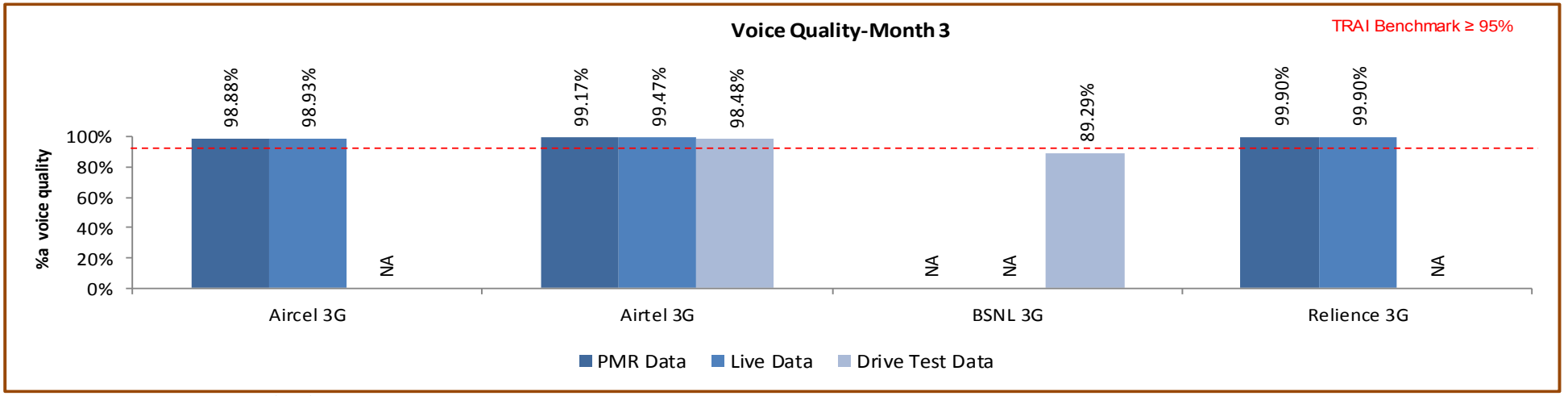


6.7.2.2 KEY FINDINGS – MONTH 2



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

6.7.2.3 KEY FINDINGS – MONTH 3



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

7 PARAMETER DESCRIPTION & DETAILED FINDINGS - WIRELESS DATA SERVICES FOR PMR & 3DAYS LIVE (2G)

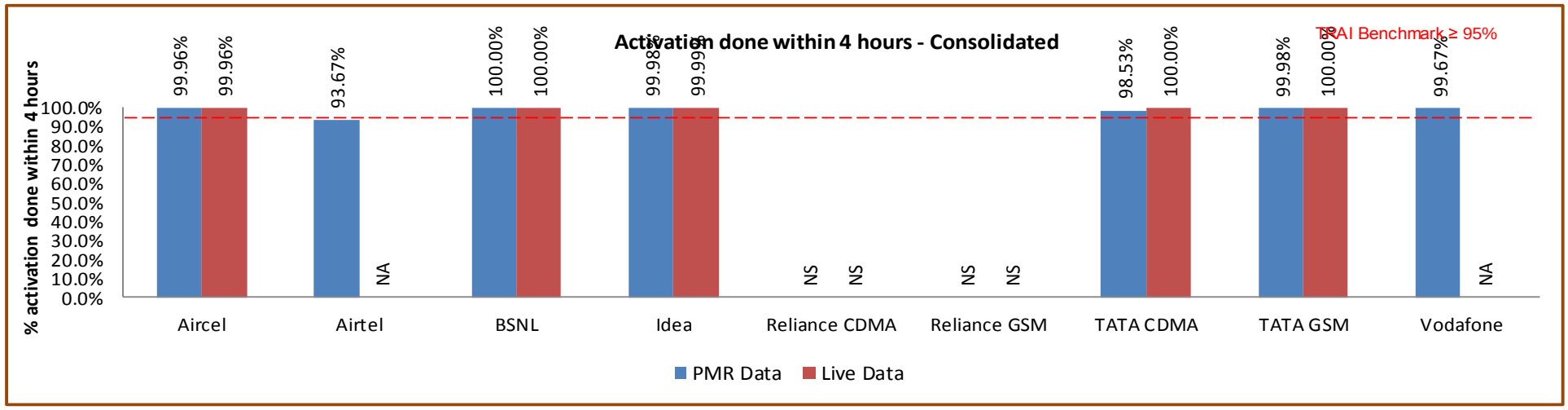
7.1 SERVICE ACTIVATION /PROVISIONING FOR 2G PMR & 3DAYSLIVE

7.1.1 PARAMETER DESCRIPTION

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

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

7.1.2 KEY FINDINGS



Airtel failed to meet the TRAI benchmark for monthly and data not shared by Airtel and Vodafone for live audit.

7.2 PDP CONTEXT ACTIVATION SUCCESS RATE FOR 2G PMR & 3DAYS LIVE

7.2.1 PARAMETER DESCRIPTION

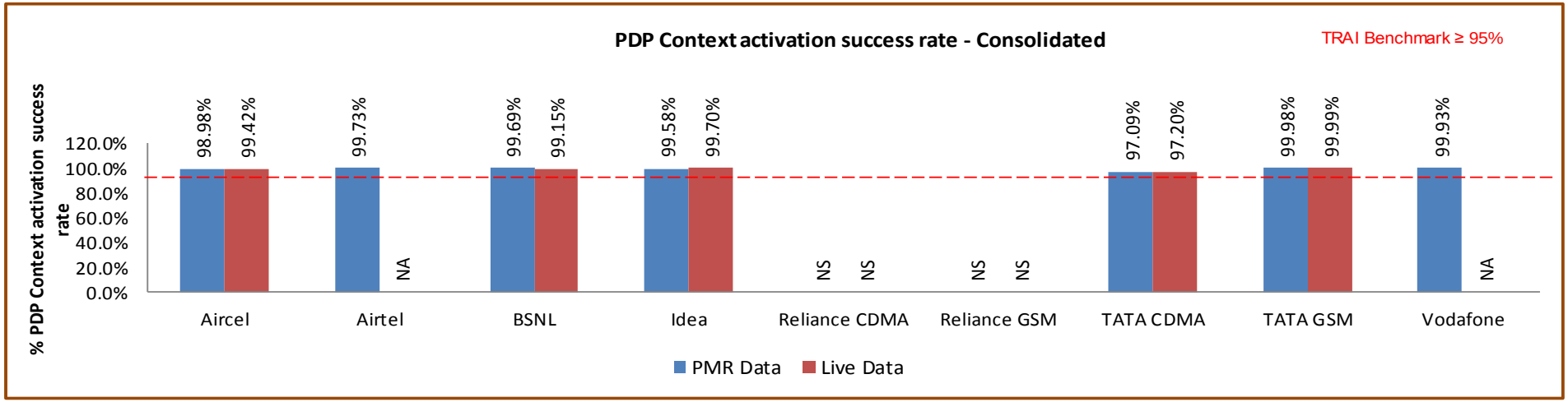
A Packet Data Protocol (PDP) context specifies access to an external packet-switching network. The data associated with the PDP context contains information such as the type of packet-switching network, the Mobile Station PDP (MS PDP) address that is the IP address, the reference of Gateway GPRS Support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

Measurement

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

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

7.2.2 KEY FINDINGS



All Operators met the TRAI benchmark for PDP context Activation success rate.

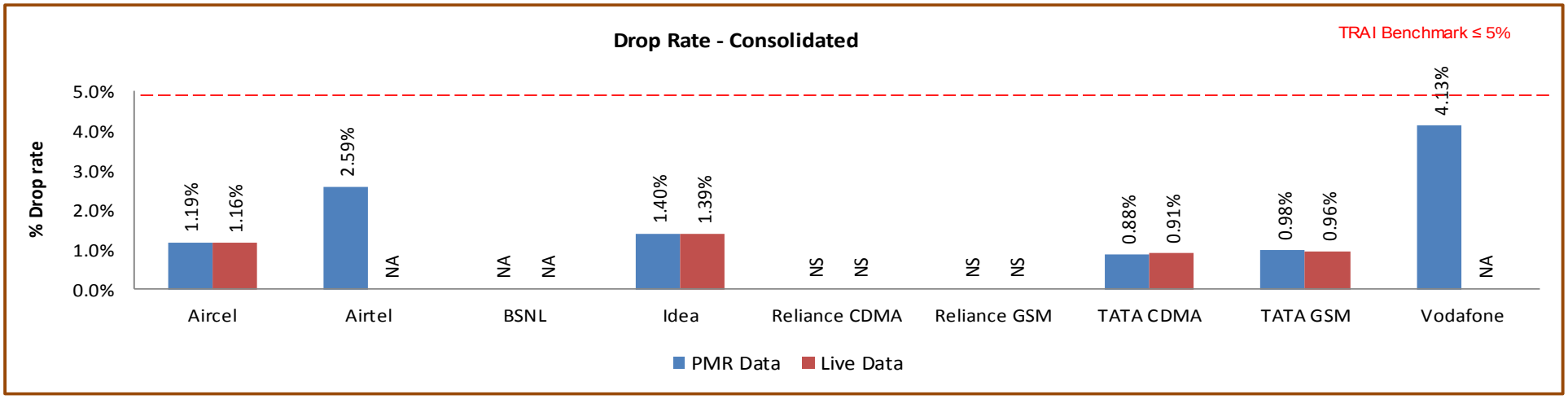
7.3 DROP RATE FOR 2G PMR & 3DAYS LIVE

7.3.1 PARAMETER DESCRIPTION

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

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

7.3.2 KEY FINDINGS



All operators met the TRAI benchmark for drop rate.

8 PARAMETER DESCRIPTION & DETAILED FINDINGS - WIRELESS DATA SERVICES FOR PMR & 3DAYS LIVE (3G)

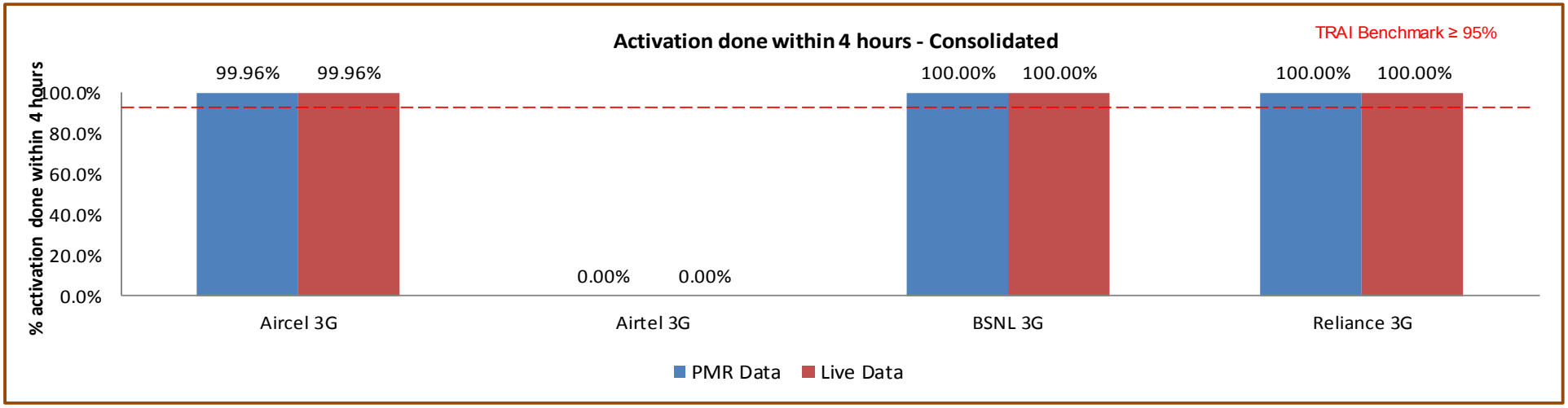
8.1 SERVICE ACTIVATION /PROVISIONING FOR 3G PMR & 3DAYS LIVE

8.1.1 PARAMETER DESCRIPTION

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

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

8.1.2 KEY FINDINGS



All Operators met the TRAI benchmark

.

8.2 PDP CONTEXT ACTIVATION SUCCESS RATE FOR 3G PMR & 3DAYS LIVE

8.2.1 PARAMETER DESCRIPTION

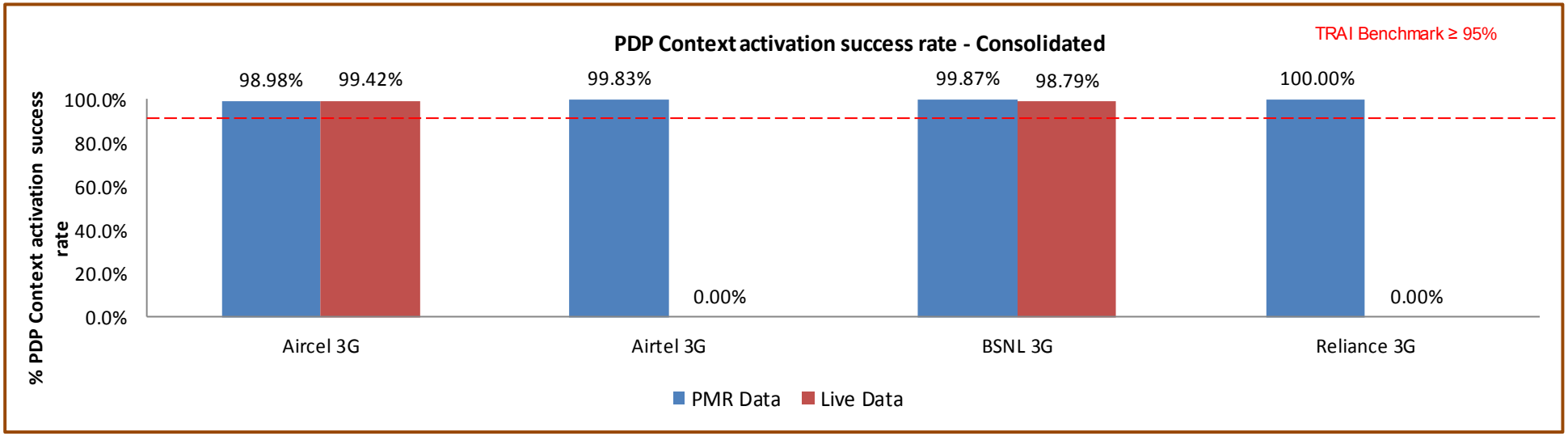
A Packet Data Protocol (PDP) context specifies access to an external packet-switching network. The data associated with the PDP context contains information such as the type of packet-switching network, the Mobile Station PDP (MS PDP) address that is the IP address, the reference of Gateway GPRS Support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

Measurement

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

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

8.2.2 KEY FINDINGS



All operators met the TRAI benchmark.

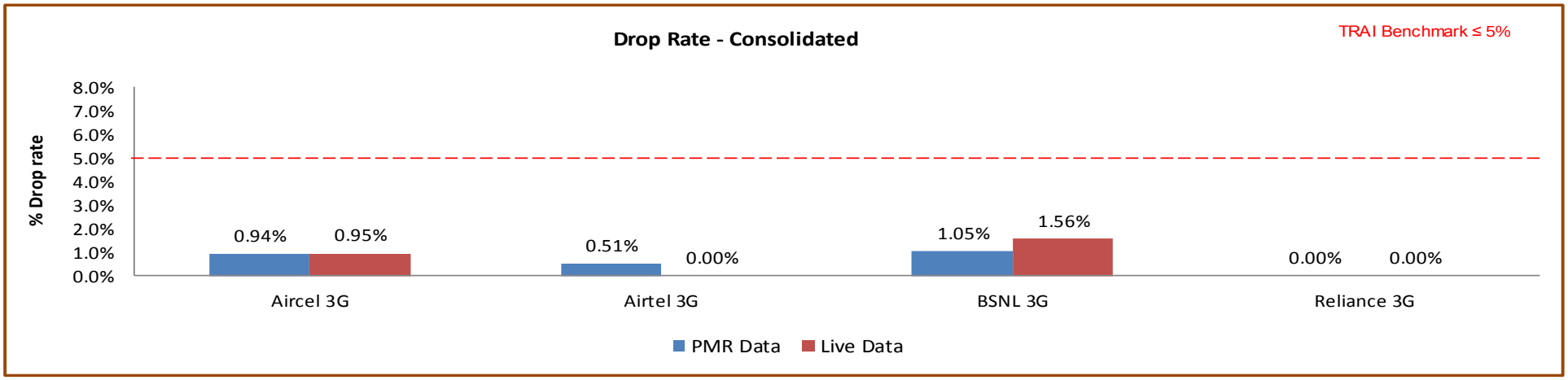
8.3 DROP RATE FOR 3G PMR & 3DAYS LIVE

8.3.1 PARAMETER DESCRIPTION

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

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

8.3.2 KEY FINDINGS



All Operators met the TRAI benchmark.

9 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

9.1 METERING AND BILLING CREDIBILITY

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

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

9.1.1 PARAMETER DESCRIPTION

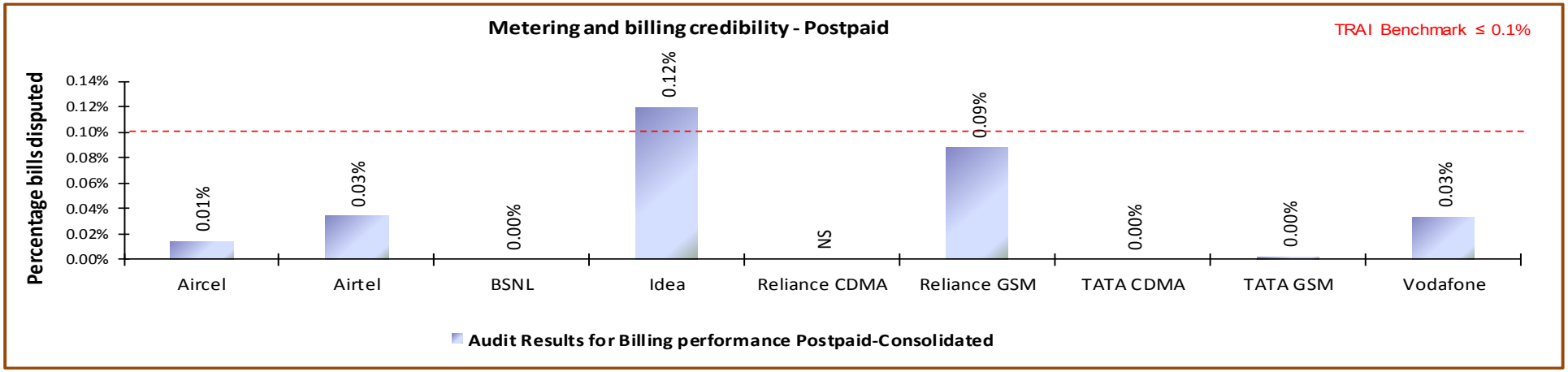
All the complaints related to billing/ charging as per clause 3.7.2 of QoS regulation of 20th December, 2009 were covered. The types of billing complaints covered are listed below.

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

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

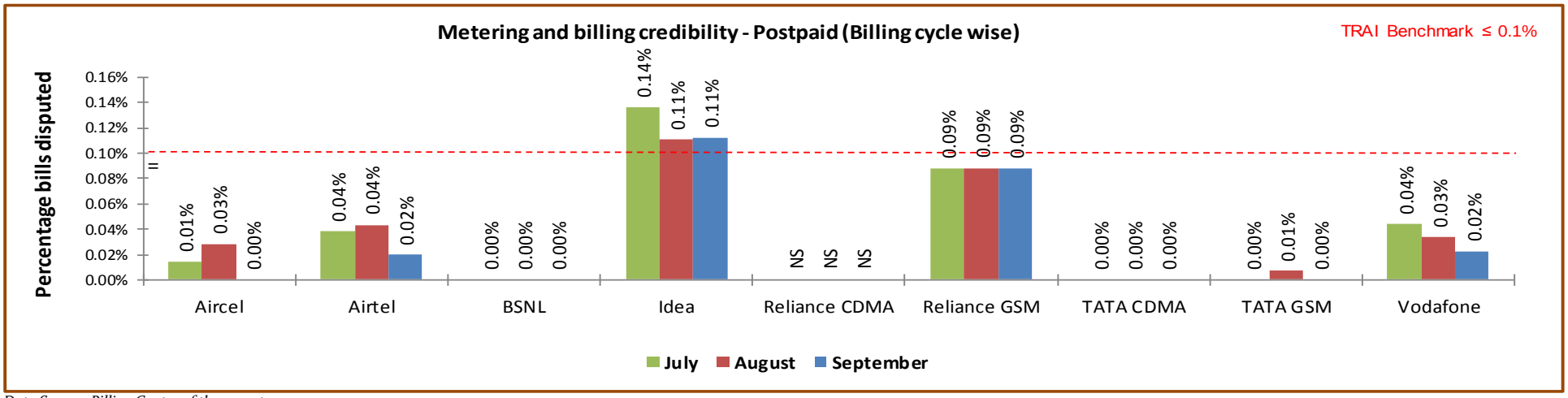
- Computational Methodology:
  - **Billing complaints per 100 bills issued (Postpaid)** = (Total billing complaints** received during the relevant billing cycle / Total bills generated* during the relevant billing cycle)*100
  - *Operator to include all types of bills generated for customers. This would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

9.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)



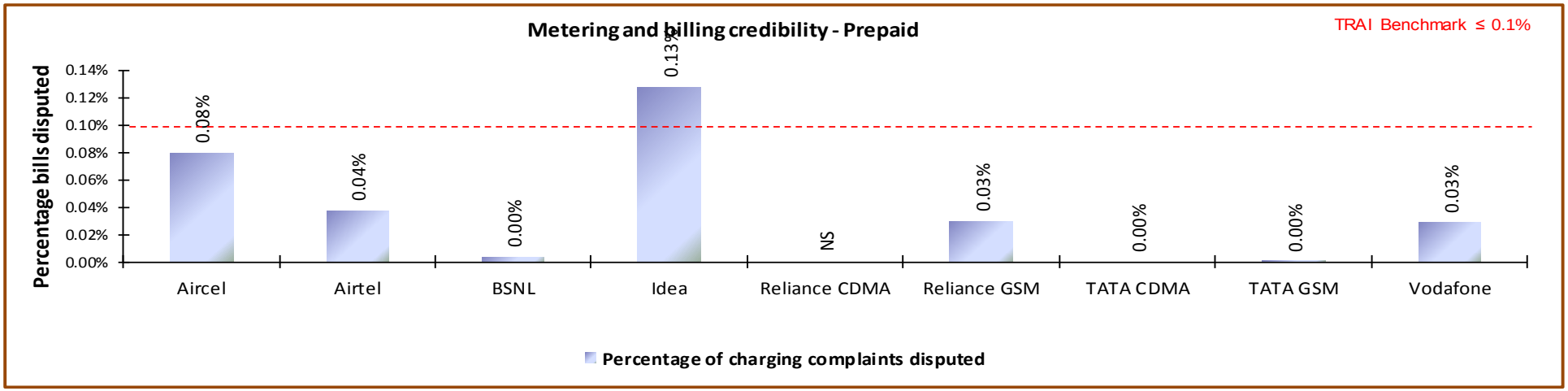
Data Source: Billing Center of the operators

All Operators met the TRAI benchmark of 0.1% post-paid metering and billing credibility except idea.



Data Source: Billing Center of the operators

9.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)



Data Source: Billing Center of the operators

All Operators met the TRAI benchmark for metering and billing credibility of prepaid subscribers except Idea.

9.2 RESOLUTION OF BILLING/ CHARGING COMPLAINTS

9.2.1 PARAMETER DESCRIPTION

Calculation of Percentage resolution of billing complaints

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

Resolution of billing complaints within 4 weeks:

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

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

Resolution of billing complaints within 6 weeks:

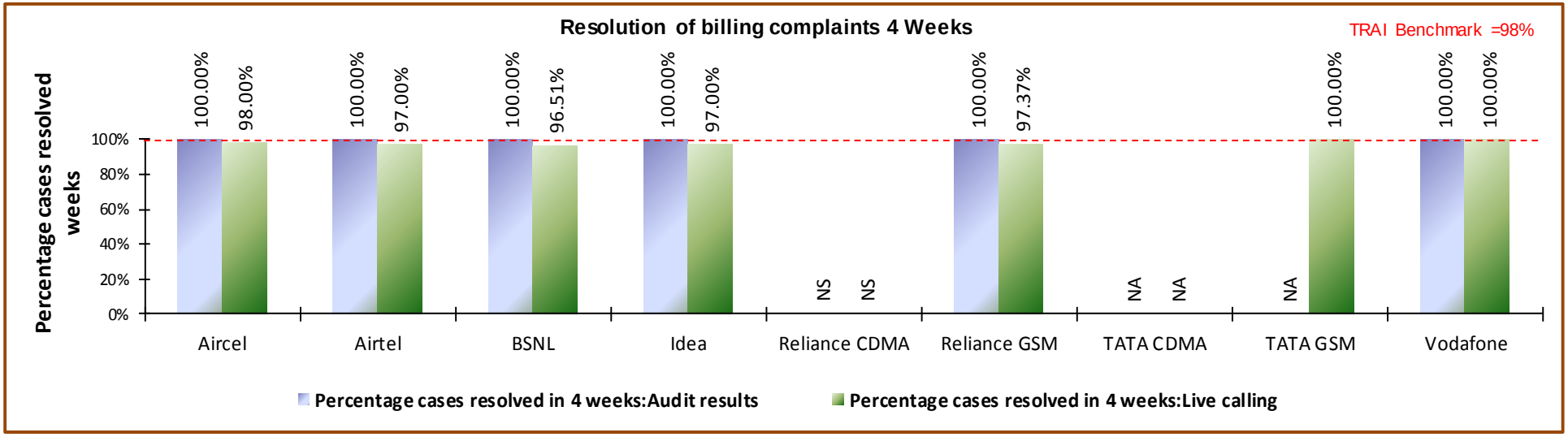
%age of billing complaints (for post-paid customers)/ charging, credit & validity (for pre-paid customers) resolved within 6 weeks =

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

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

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

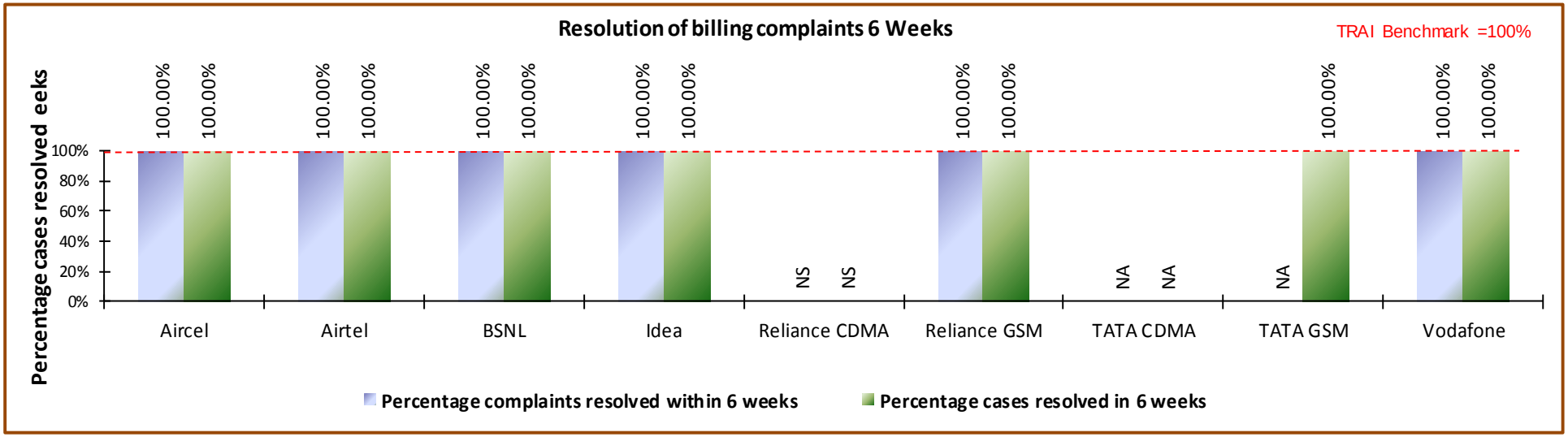
9.2.2 KEY FINDINGS - WITHIN 4 WEEKS



Data Source: Billing Center of the operators

Airtel, BSNL, Idea and Reliance GSM failed to meet the TRAI benchmark of resolution of billing complaints within 4 weeks for live calling.

9.2.3 KEY FINDINGS WITHIN 6 WEEKS



Data Source: Billing Center of the operators

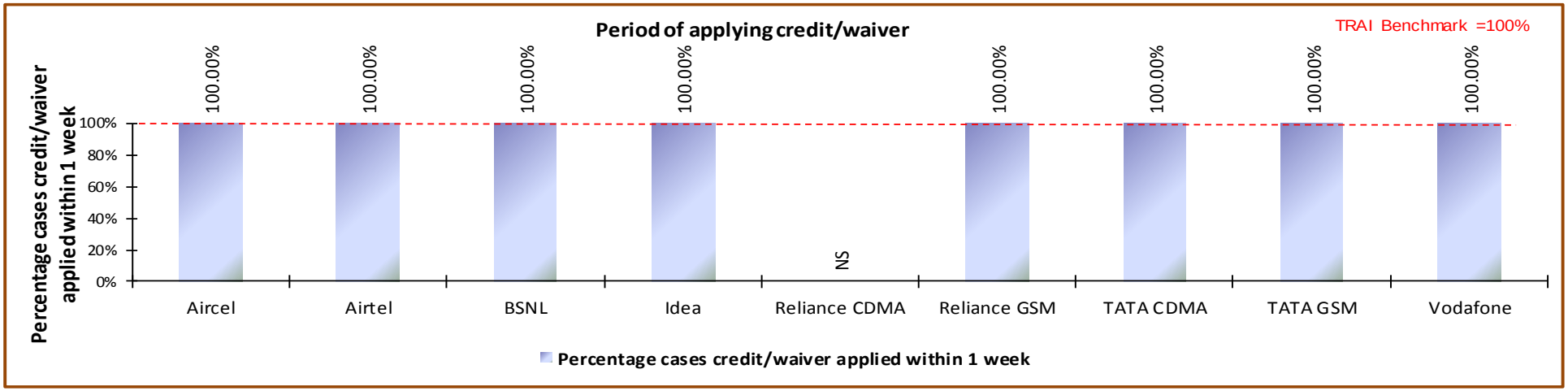
All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks.

9.3 PERIOD OF APPLYING CREDIT/WAVIER

9.3.1 PARAMETER DESCRIPTION

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

9.3.2 KEY FINDINGS



Data Source: Billing Center of the operators

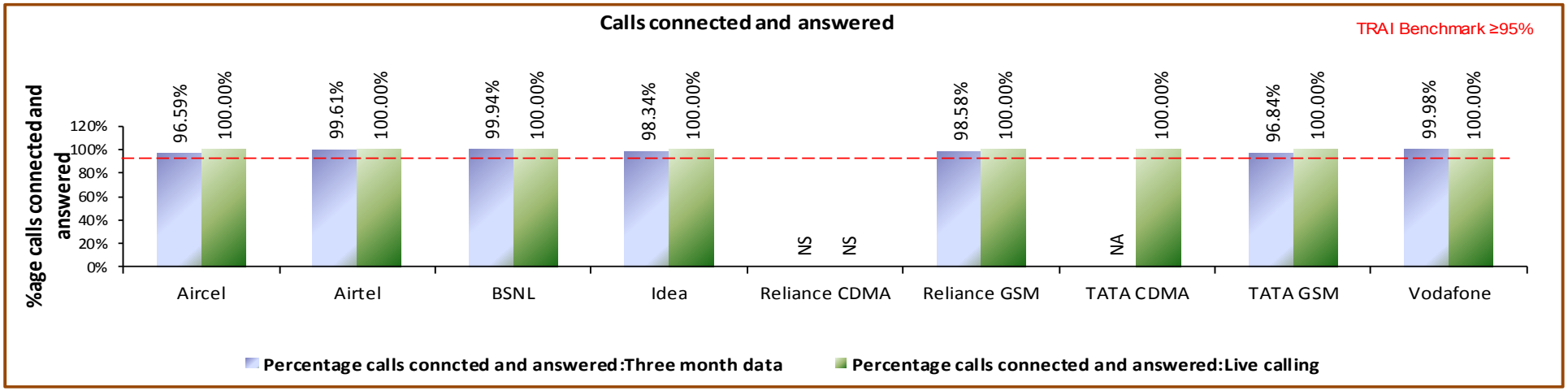
All operators met the benchmark for this parameter.

9.4 CALL CENTRE PERFORMANCE-IVR

9.4.1 PARAMETER DESCRIPTION

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

9.4.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

As per PMR data, all operators met the benchmark.

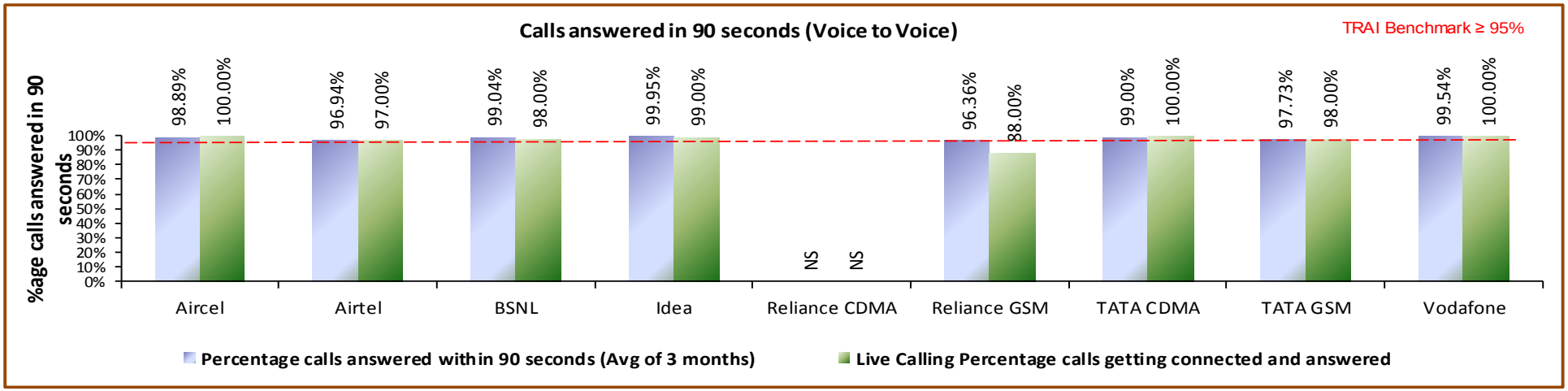
9.5 CALL CENTRE PERFORMANCE-VOICE TO VOICE

9.5.1 PARAMETER DESCRIPTION

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

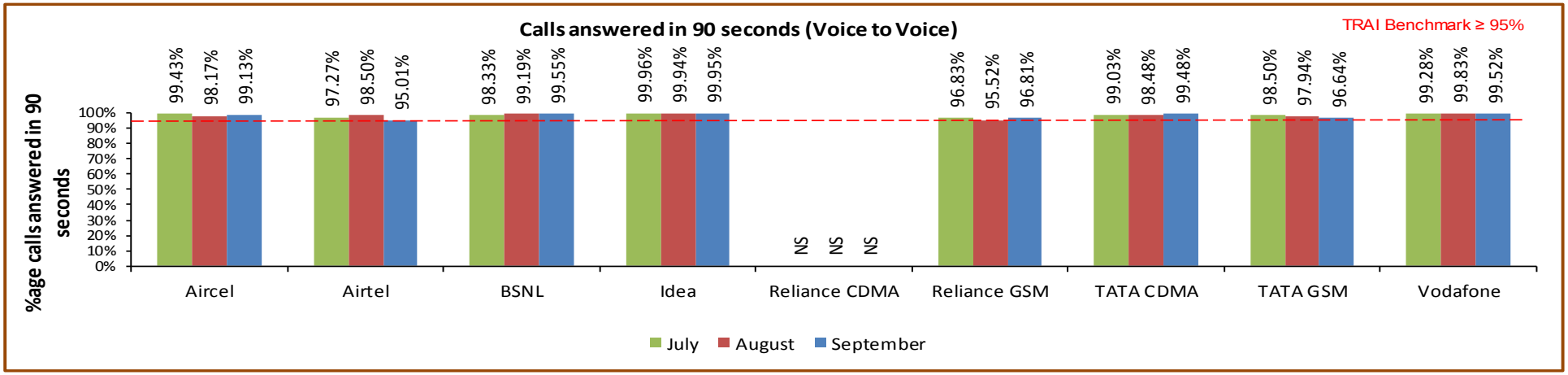
Benchmark: 95% calls to be answered within 90 seconds

9.5.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark as per PMR audit for Percentage calls answered within 90 seconds (Avg. of 3 months). However, as per live calling done to customers, the performance of Reliance GSM was far inferior to the PMR data.



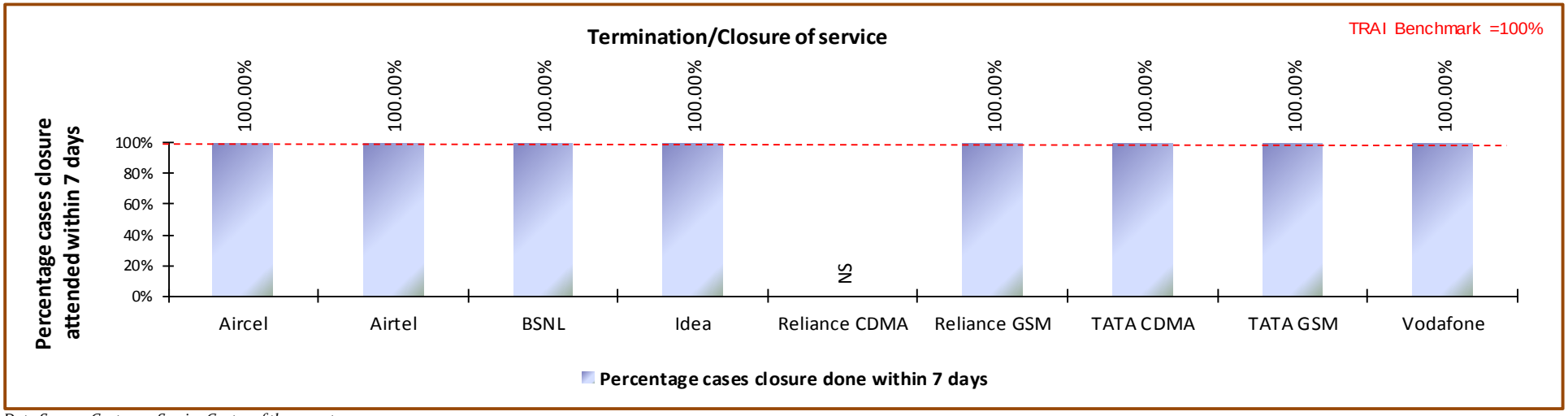
Data Source: Customer Service Center of the operators

9.6 TERMINATION/CLOSURE OF SERVICE

9.6.1 PARAMETER DESCRIPTION

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

9.6.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

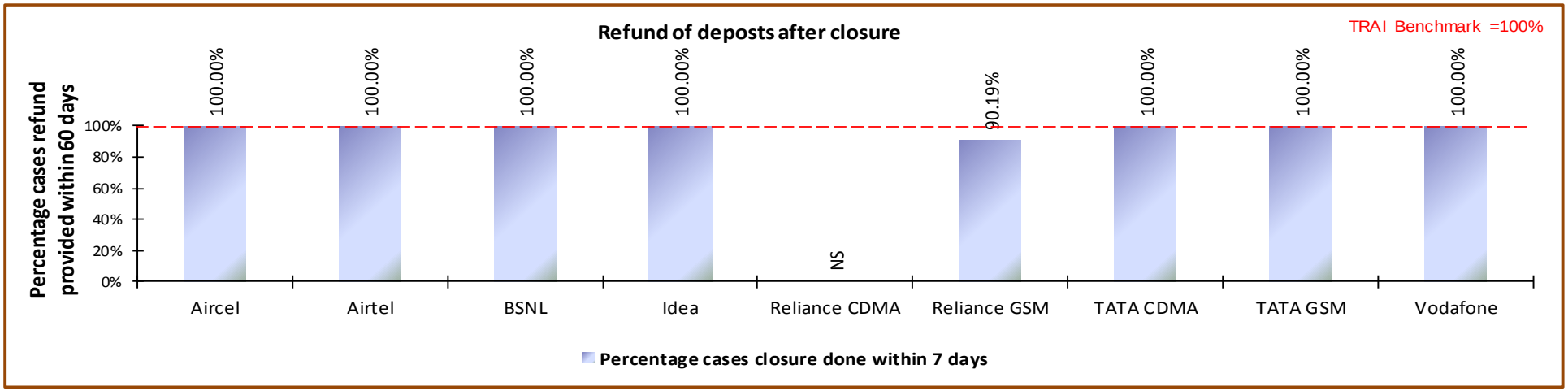
All operators met the TRAI benchmark for the parameter.

9.7 REFUND OF DEPOSITS AFTER CLOSURE

9.7.1 PARAMETER DESCRIPTION

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

9.7.2 KEY FINDINGS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter except Reliance GSM.

10 DETAILED FINDINGS - DRIVE TEST DATA

10.1 OPERATOR ASSISTED DRIVE TEST - VOICE

The drive test was conducted simultaneously for all the operators present in the Orissa circle. As per the new directive given by TRAI headquarters, drive test in the quarter were conducted at a SSA level. SSAs have been defined in two categories by TRAI as per the criticality of the SSA.

3. Normal SSA
4. Difficult SSA

The drive test in Normal SSA was conducted for three days with minimum distance of 250 kilometers over three days. The drive test in difficult SSAs was conducted for six days with minimum distance of 500 kilometers over six days. The selection of routes ensured that the maximum towns, villages, highways are covered as part of drive test. The routes were selected post discussion with TRAI regional teams. The holding period for all test calls was 120 seconds and gap between calls was 10 seconds.

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

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

Name of Operator	Name of Operator
Aircel	Aircel 3G
Airtel	Airtel 3G
BSNL	BSNL 3G
BSNL	Reliance 3G
Idea	
TATA CDMA	
TATA GSM	
Vodafone	

10.1.1 DHENKANAL SSA

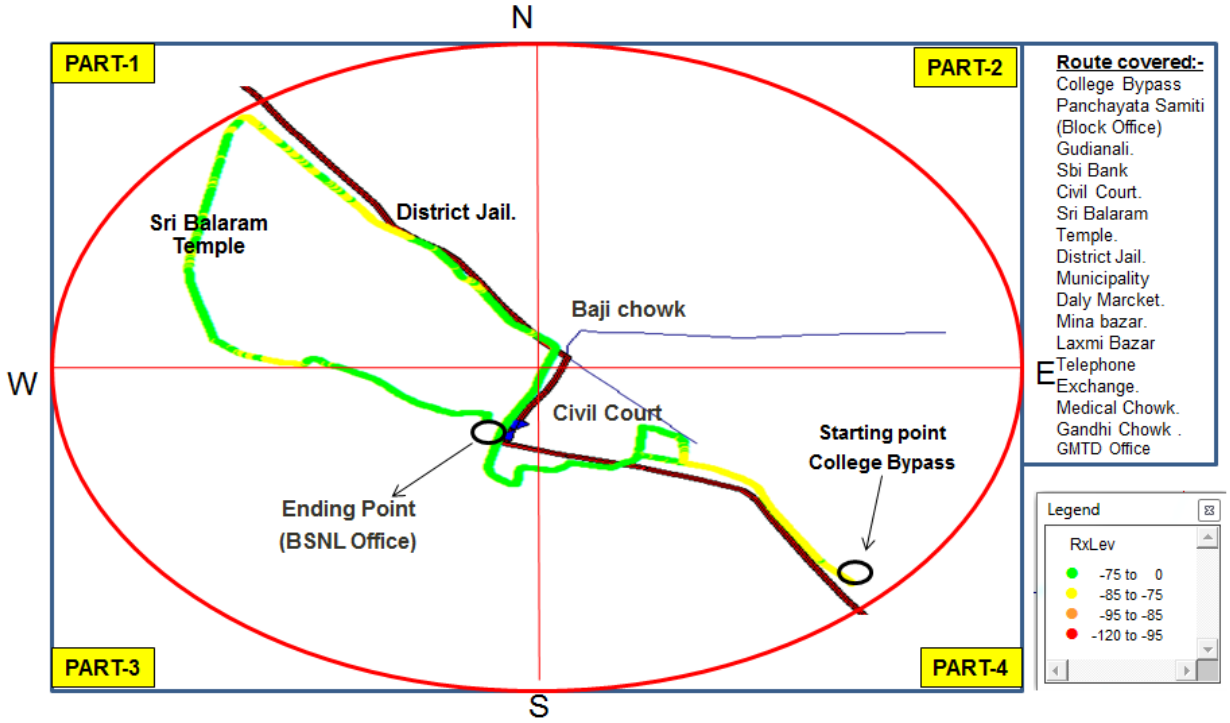
Name of SSA Covered	Start date	End Date	Kilometer Travelled
DHENKANAL	27/7/16	29/7/16	305

10.1.1.1 Route Details - DHENKANAL SSA

Type of location	July		
	DHENKANAL		
	Day 1	Day 2	Day 3
Major Roads	Gudiakateni, Haldiyabahal, Motanga, Masalia, B.R.G., Komalanga, Banarpal, Nalconagar, Anugul	Boinda, Handpa, Kamarei, Nakci, Puranapani, Kishore Nagar, Kalabada, Bamur	Ballahar chuck, Santhapada, Pitiri, Parjang, Badajhara, Muktapasi, Kusia, Kamakhyanagar
Highways	Korhua, Siminai, Nilamadhabpur, Godasila, Baulpur, Kaunripal, Banipara, Hindol road, Gudiakateni	Anugul Town Police station, Musapapuli, Badkera, Santrapur, Kanjrea, Malisahi, Kumarsing, Katada, Bolanda	Banarpal, Bonda, Chainpal, Anand Bazar, Talcher, Talabada, Kalandiprasad, Samal ,Gahama, Pabita Nagar
With in the City	College by pass, Kunjakanta, Amalapada, Ganesh bivar, Dolamandepshai ,Gopabandhu chock ,Station bazar, Synergy by pass, Police work land, BSNL Office	Town Police station, Nigamananda lane, N.S.C Chock, Bramhanipada, Madanmohanpada, Sishu udyan, N.A.C Colony, Tamut colony, Jail chock, Tada, Sulursinga	Bus Stand, Thana sahi colony, Nilachalvihar, Remuna, Green park hotel, Gopinathapur, Lingaraj road, Handiduan, Talcher road station.
Shopping complex	Indu Market Complex, Dhenkanal	Style bazar, Anugul	New bus stand market complex, Talcher
Office complex	Telephone Bhawan, Dhenkanal	Telephone Exchange, Anugul	Telephone Bhawan, Talcher

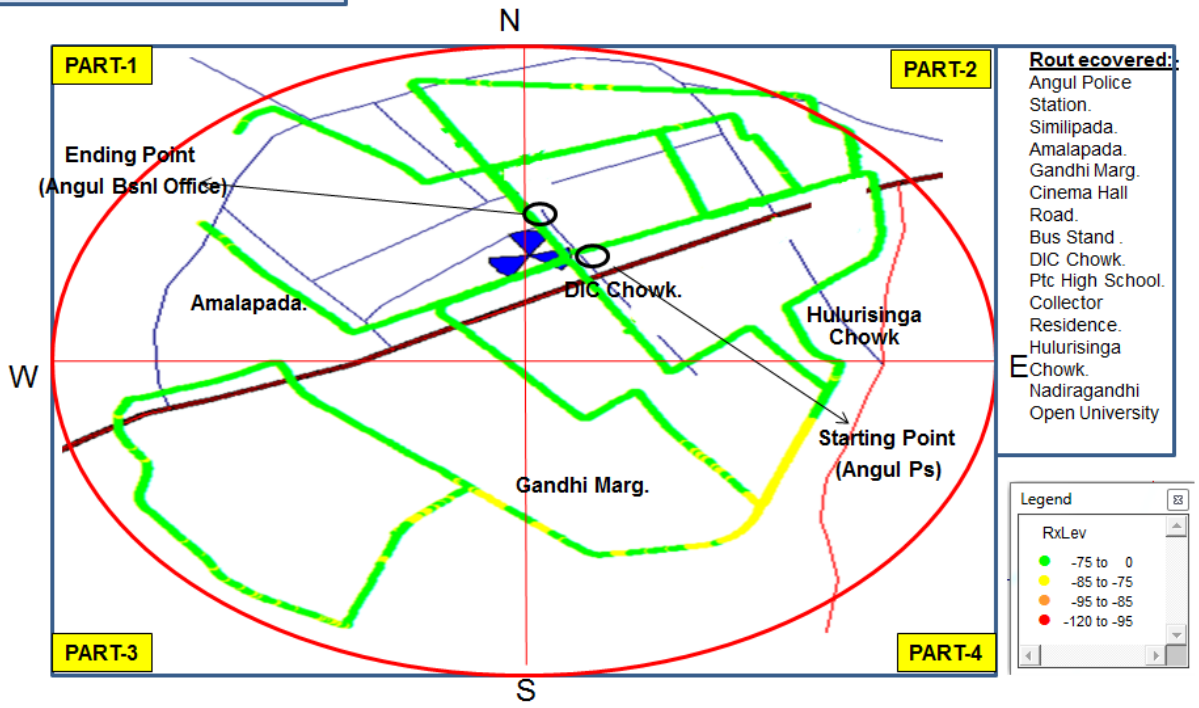
The route maps given in the report are provided for the purpose of identifying the routes traversed during the drive tests. We observe three different colours (Red/Green/Yellow) of the lines, which signify signal strength; however these maps are for a single operator and have not been referred to any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

10.1.1.2 Route Map - DHENKANAL DAY 1



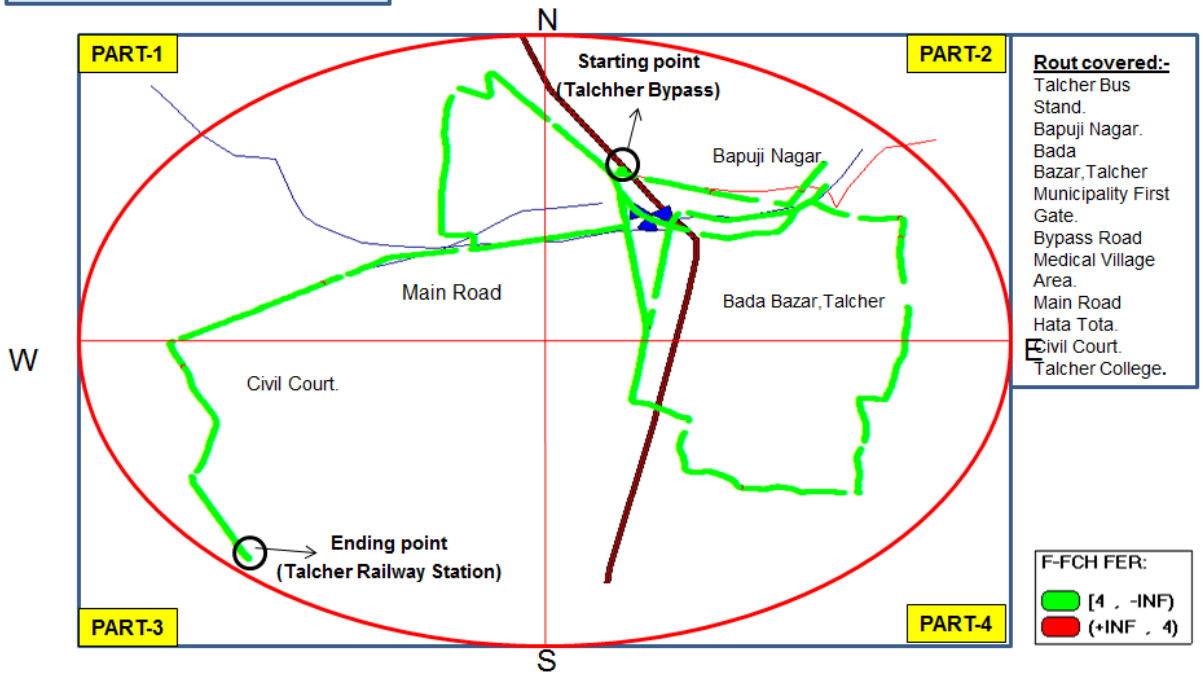
10.1.1.3 Route Map - DHENKANAL DAY 2

Name of the service Provider:- Tata Docomo, Odisha
Date of Drive test: 28-07-2016 (Day-2)
Name Of the SSA:- Dhenkanal



10.1.1.4 Route Map - DHENKANAL DAY 3

Name of the service Provider:- Tata Docomo, Odisha
Date of Drive test: 29-07-2016 (Day-3)
Name Of the SSA:- Dhenkanal



10.1.1.5 Drive Test Results - DHENKANAL SSA-2G

July															
DHENKANAL	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		46.94%	48.41%	48.18%	50.93%	75.15%	60.25%	50.45%	61.53%	49.18%	44.91%	46.05%	61.24%	67.37%	56.96%
0 to -85 dBm		72.79%	79.80%	97.07%	87.07%	99.76%	88.04%	92.52%	92.22%	90.32%	78.07%	96.13%	91.93%	98.28%	90.07%
0 to -95 dBm		99.18%	94.09%	99.98%	98.14%	100.00%	98.71%	100.00%	100.00%	100.00%	99.45%	99.36%	99.41%	99.98%	98.72%
Voice quality	≥ 95%	99.00%	94.15%	95.13%	95.61%	99.67%	96.92%	98.10%	98.04%	99.07%	99.47%	99.09%	97.45%	96.69%	93.36%
CSSR	≥ 95%	100.00%	98.93%	100.00%	98.53%	100.00%	99.35%	100.00%	100.00%	100.00%	100.00%	100.00%	99.45%	99.26%	100.00%
%age Blocked calls		0.00%	1.07%	0.00%	0.88%	0.00%	0.65%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.76%	0.00%	1.19%	0.00%	1.97%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	99.31%	100.00%	98.75%	100.00%	99.72%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	99.57%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Aircel and Vodafone failed to meet the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

All the operators met the benchmark.

Call Drop Rate

All the operators met the benchmark.

10.1.1.1 Drive Test Results – DHENEKANAL SSA-3G

July									
DHENKANAL	B'mark	Aircel 3G		Airtel 3G		BSNL 3G		Reliance 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		60.51%	43.00%	45.89%	30.80%	48.16%	21.05%	Not Participating	
0 to -85 dBm		90.02%	77.93%	80.58%	61.87%	89.55%	48.31%		
0 to -95 dBm		98.67%	96.64%	99.67%	87.23%	90.73%	75.01%		
Voice quality	≥ 95%	99.16%	96.84%	98.89%	95.10%	99.18%	96.19%		
CSSR	≥ 95%	100.00%	100.00%	100.00%	96.63%	100.00%	100.00%		
%age Blocked calls		0.00%	0.00%	0.00%	2.25%	0.00%	0.00%		
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	1.16%	0.00%	0.83%		
Hands off success rate		100.00%	100.00%	100.00%	99.82%	100.00%	100.00%		

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

All operators met the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

All operators met the benchmark in outdoor locations.

Call Drop Rate

All the operators met the benchmark.

10.1.1.1 Data Drive Test Results - DHENKANAL SSA -2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	100
Minimum download speed		142	47	71	168	133	133	95
Average throughput for Packet Data		134	102	86	168	133	133	95
Latency	<250ms	100	100	100	100	100	100	100

All operators met the TRAI benchmark.

10.1.1.2 Data Drive Test Results - DHENKANAL SSA -3G

Name of the Parameter	Bench Mark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100	Not Participate
Succesful Data Transmission upload speed attempts	>75%	100	100	100	
Minimum download speed		2299	1707	1618	
Average throughput for Packet Data		2518	3189	1384	
Latency	<250ms	100	100	100	

All operators met the TRAI benchmark.

10.1.2 PHULBANI SSA

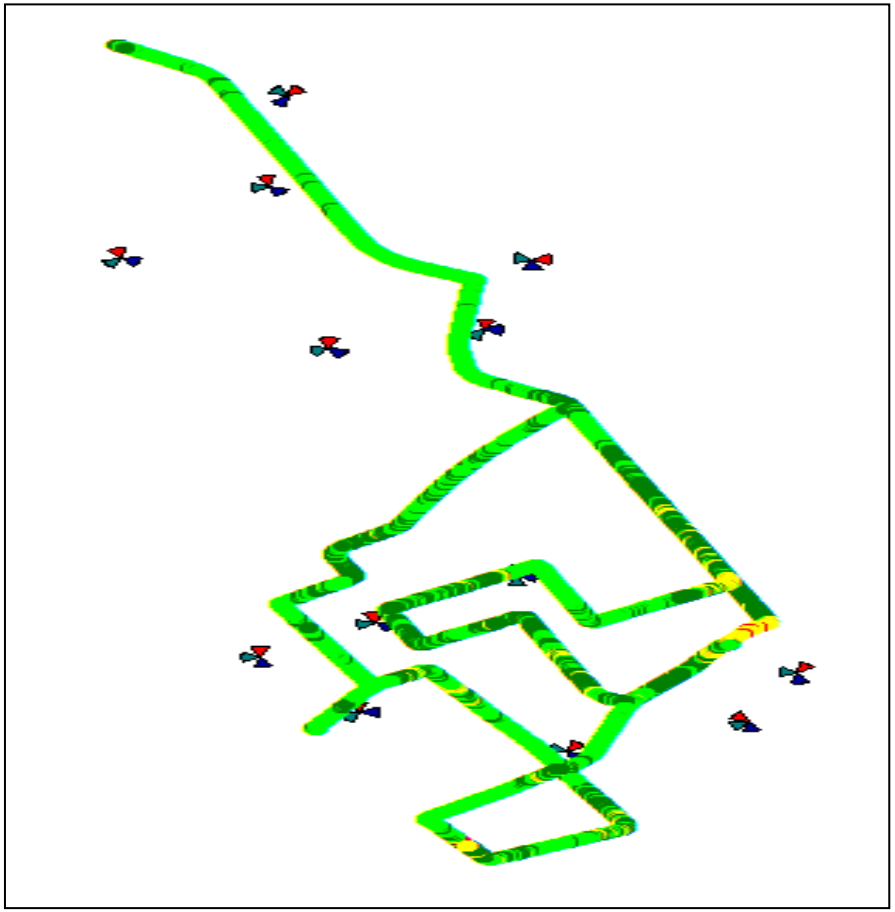
Name of SSA Covered	Start date	End Date	Kilometer Travelled
PHULBANI	24/8/2016	26/8/2016	285

10.1.2.1 Route Details - PHULBANI SSA

Type of location	August PHULBANI		
	Day 1	Day 2	Day 3
Major Roads	Sarangagada,Dameria,Nuagam, Mahasingi,Gumapadar,Baliguda	Kalinga,G Udaygiri,Jakamaha,Lingagada,Katingya,Raikia	Charichowk,Singhanibeda,Marding, madhapur,Badla,Boudhend
Highways	Phulbani bus stand,Pakanagaon,Telapati,Gambhariguda,Phiringia,Pabingia,Podopada,Bandhagada,Manipadar, Sarangagada	Phulbani Police station,Pakangaon,Ambapada chowk,Baida,Kenedi,Gumagadi,Kambrikia,Kochilagada,Tikabali,Duhgi,Talanimaha,Kalinga	Phulbani Busstand,Sudreku,Sudnukumpa,Ranipathar,Jhanganajing,Banibhusanpur, Charichowk,Purunakatak
With in the City	(Baliguda Town): No network.	(Phulbani Town): College square, Govt. Polytechnic, Circuit House,Jhiringipada, Bus stand,Masterpada,Forester office,Main Road, Town Police Station,Collector Office,Medical Square,Phulbani Sahi,Masterpada,Employment office,Satyasai Highschool,Main Road,Madikunda Chowk,Reserve Police Ground	(Purunakatak Town): Purunakatak High school,College square, Dhalapur, Deypur,Medical,Petrolpump
Shopping complex	No Network	Anand Market Complex, Phulbani	Mohapatra Market Complex
Office complex	No Network	BSNL Telephone Bhawan,Phulbani	BSNL Telephone Bhawan, Purunakatak.

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

10.1.2.2 Route Map - PHULBANI DAY 1



SSA- Route Covered--

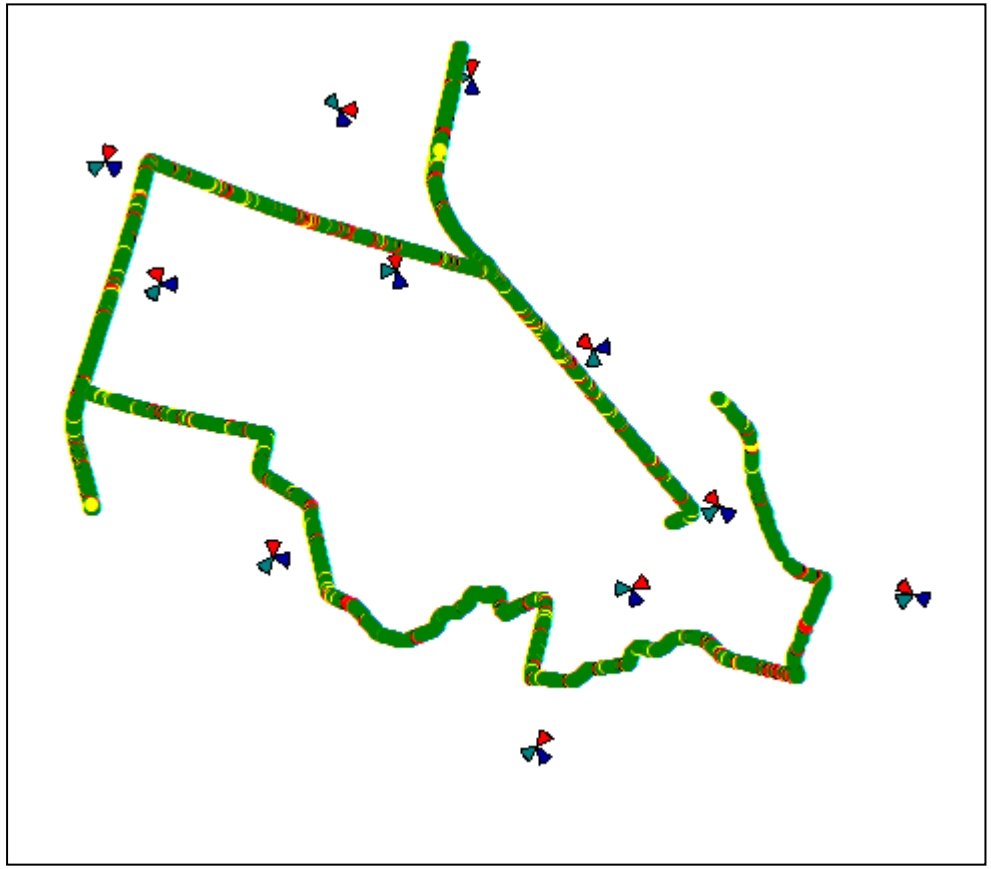
1.IFFCO Chawk

2.Atharabanki

3. Gopinath colony

4. Friends colony

10.1.2.3 Route Map - PHULBANI DAY 2



SSA- Route Covered--

1.Santara

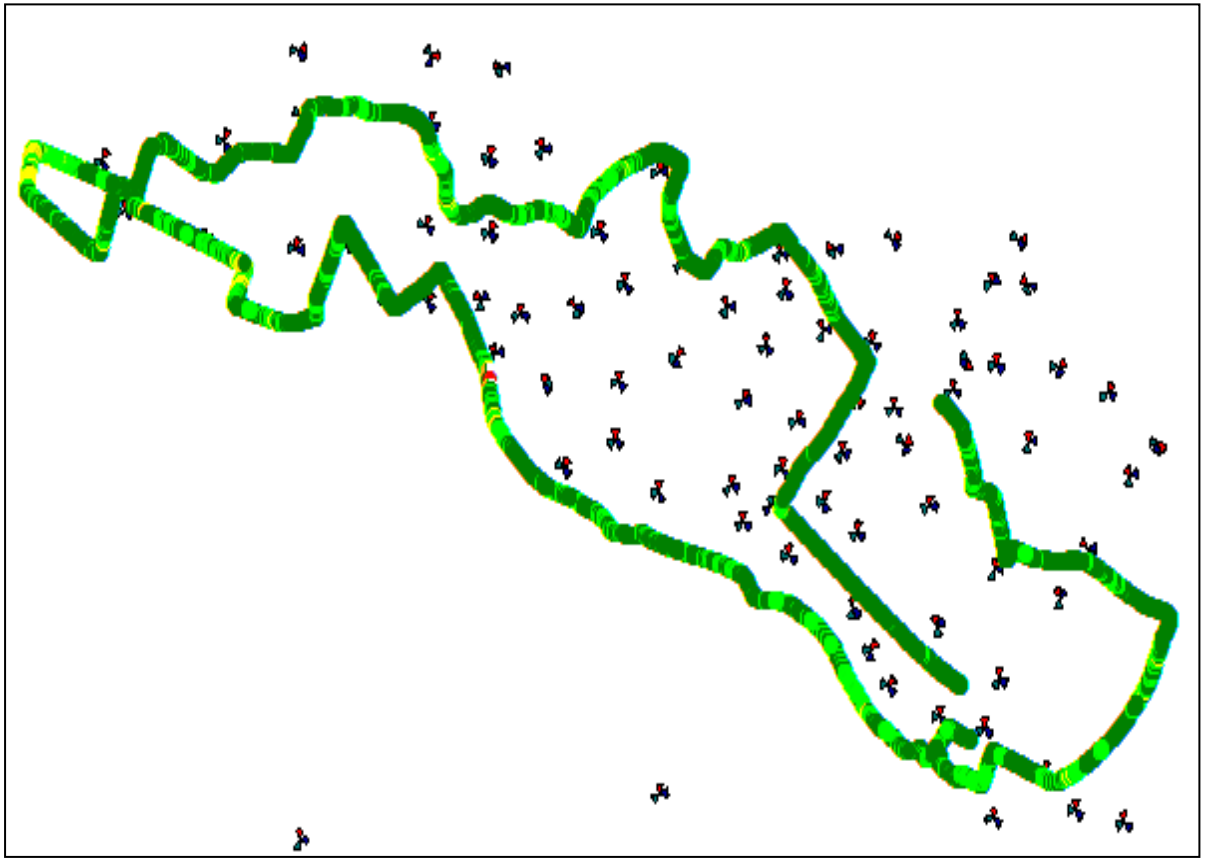
2.Railway station

3.Kopand

4.Kanheipur

5.ITI collage Roade

10.1.2.4 Route Map - PHULBANI DAY 3



SSA- Route Covered--

1.Link road

2.Badambadi

3.Dolamundai

4.Ranihat

5.Buxibazar

6.Chandini chawk

7.CDA

8.Ring Road

10.1.2.5 Drive Test Results -PHULBANI SSA-2G

August															
PHULBANI	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		32.66%	21.58%	57.38%	37.84%	94.54%	79.82%	43.60%	54.57%	NA		48.99%	38.40%	94.51%	70.30%
0 to -85 dBm		94.34%	98.83%	90.37%	77.83%	99.10%	88.42%	96.42%	97.39%			91.97%	88.05%	98.30%	92.67%
0 to -95 dBm		99.49%	99.88%	98.97%	94.60%	99.24%	92.13%	100.00%	100.00%			99.89%	98.74%	100.00%	100.00%
Voice quality	≥ 95%	99.16%	97.80%	97.82%	95.18%	97.68%	97.50%	99.28%	99.34%			99.07%	98.26%	99.03%	98.61%
CSSR	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	99.50%	100.00%	NA			100.00%	98.68%	100.00%	97.89%
%age Blocked calls		0.00%	0.00%	0.00%	1.55%	0.00%	0.50%	0.00%	0.00%			1.12%	0.00%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	1.57%	0.00%	0.33%	0.00%	0.00%			0.00%	1.33%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	100.00%	100.00%	99.72%	100.00%	100.00%			100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

All the operators met the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

All the operators met the benchmark for CSSR.

Call Drop Rate

All the operators met the benchmark for call drop rate.

10.1.2.6 Drive Test Results - PHULBANI SSA-3G

August									
PHULBANI	B'mark	Aircel 3G		Airtel 3G		BSNL 3G		Reliance 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NA		69.79%	41.98%	63.35%	46.19%	Not Participating	
0 to -85 dBm				92.36%	79.55%	69.30%	64.83%		
0 to -95 dBm				99.69%	93.87%	97.17%	95.69%		
Voice quality	≥ 95%			100.00%	98.69%	97.13%	98.27%		
CSSR	≥ 95%			100.00%	96.51%	100.00%	98.16%		
%age Blocked calls				0.00%	2.33%	0.00%	0.79%		
Call drop rate	≤ 2%			0.00%	0.00%	0.00%	1.32%		
Hands off success rate				100.00%	99.73%	100.00%	100.00%		

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

All the operators met the benchmark.

Call Set Success Rate (CSSR)

All the operators met the benchmark.

Call Drop Rate

All the operators met the benchmark.

10.1.2.1 Data Drive Test Results - PHULBANI SSA -2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	NA	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100		100	100
Minimum download speed		139	57	88	157		141	108
Average throughput for Packet Data		135	113	1526	163		141	109
Latency	<250ms	100	100	100	100		100	100

All operators met the TRAI benchmark.

10.1.2.1 Data Drive Test Results - PHULBANI SSA -3G

Name of the Parameter	Bench Mark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G
Succesful Data Transmission download speed attempts	>80%	NA	100	100	Not Participate
Succesful Data Transmission upload speed attempts	>75%		100	100	
Minimum download speed			1313	1526	
Average throughput for Packet Data			3029	1526	
Latency	<250ms		60	100	

All operators met the TRAI benchmark.

10.1.3 ROURKELA SSA

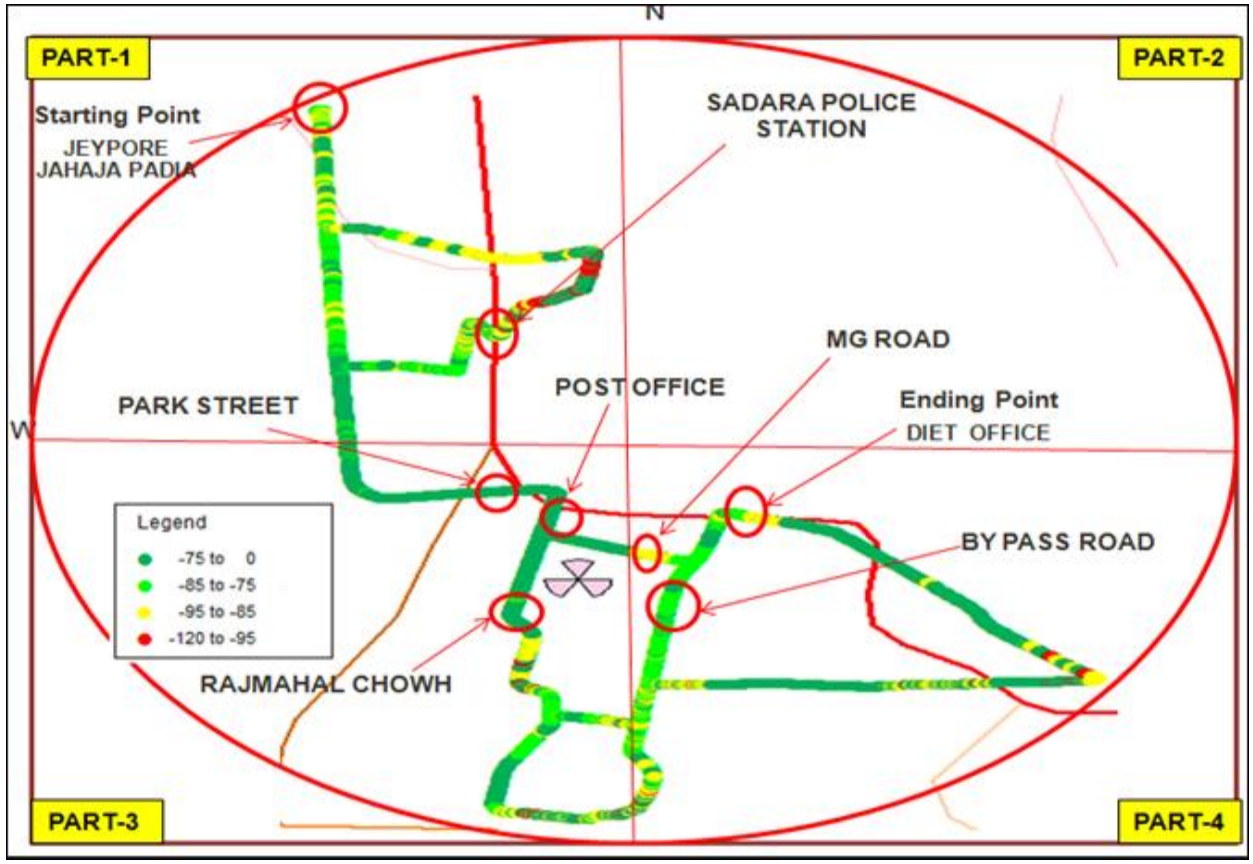
Name of SSA Covered	Start date	End Date	Kilometer Travelled
ROURKELA	21/9/2016	23/9/2016	330

10.1.3.1 ROUTE DETAILS - ROURKELA SSA

Type of location	September ROURKELA		
	Day 1	Day 2	Day 3
Major Roads	Bus Stand Govt. Collage Daily Market Sunaripada Mahadevpada RTO Office Bijupattanaik square Forest Office Bypass Road Court	New OCL Plant Subas Chowk Police Station Railway station OCL Colony Hair chowk Bus stand Block Colony	BSNL Office Udit Nagar Panposh Civil Township Chend Colony Basanti Colony Kalinga Nagar Space Chowk Ambagan
Highways			
With in the City			
Shopping complex			
Office complex			

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

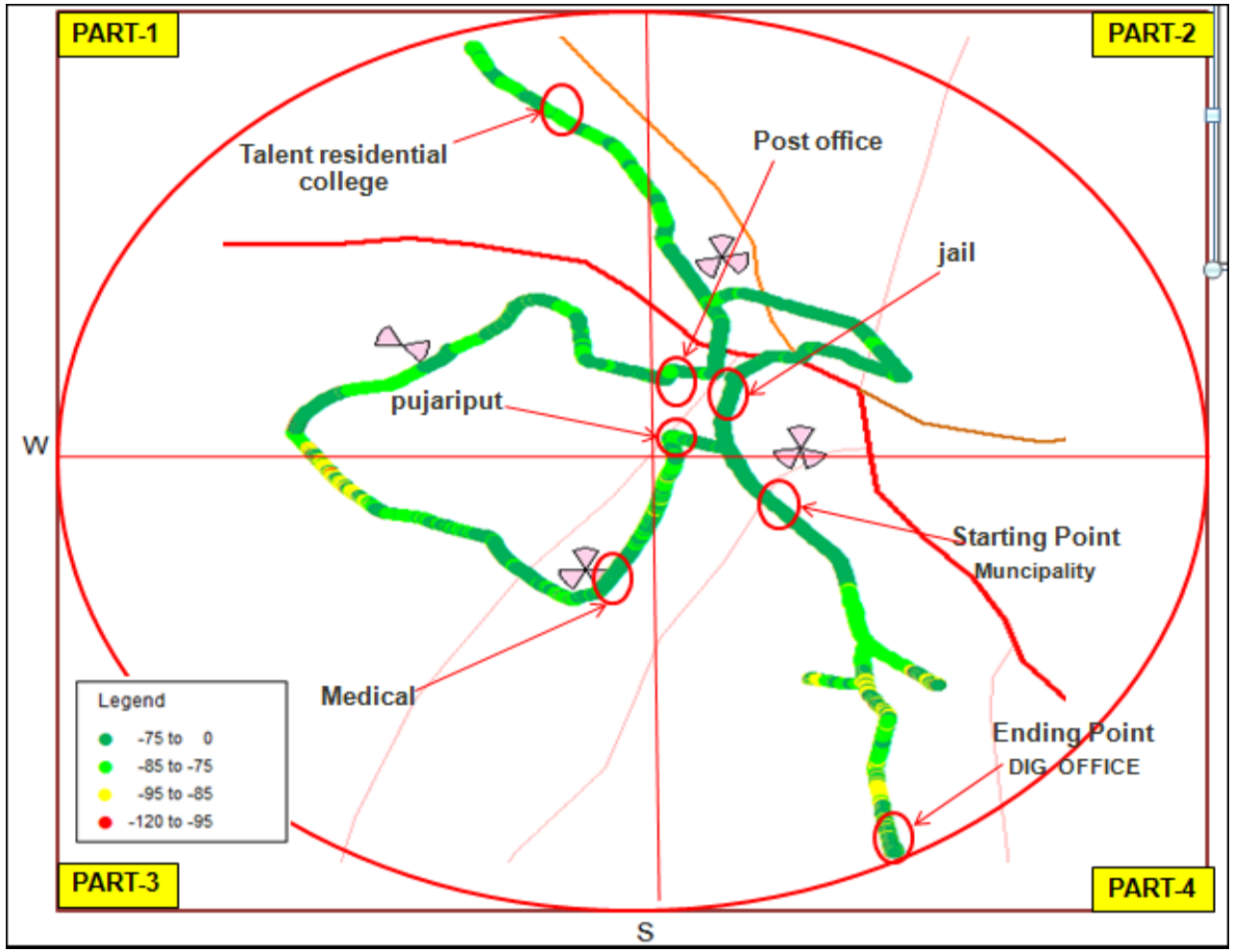
10.1.3.2 Route Map - ROURKELA DAY 1



SSA Route Covered-

1.Jeypore jahaja padia
2.Sadara police station
3.Park street
4.Post office
5.Rajmahal chowk
6.Mg road
7.By pass road
8.Diet office

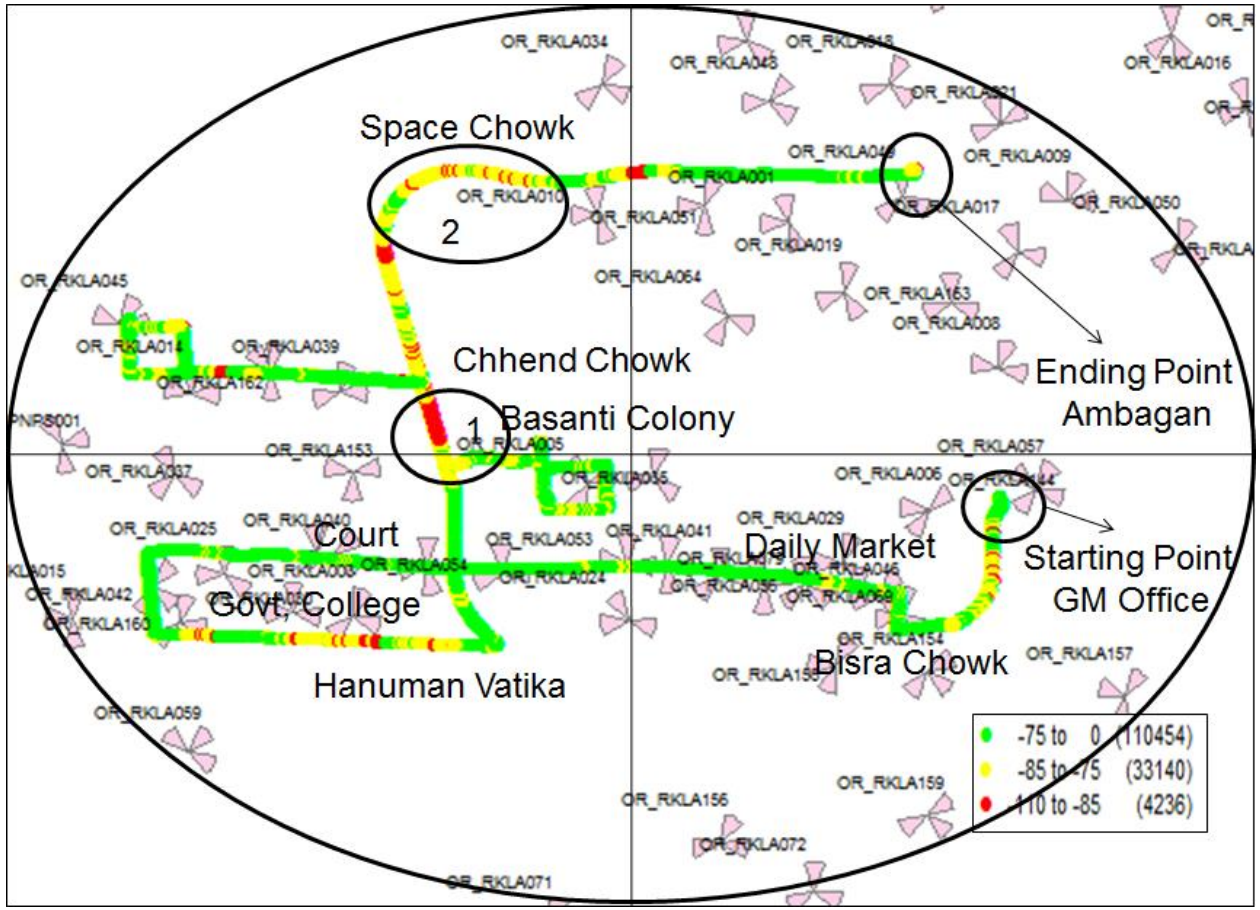
10.1.3.3 Route Map - ROURKELA DAY 2



SSA Route Covered-

1. Talent residential college
2. Post office
3. Jail
4. pujariput
5. Medical
6. Muncipality
7. Dig office

10.1.3.1 Route Map - ROURKELA DAY 3



10.1.3.2 Drive Test Results - ROURKELA SSA-2G

September															
ROURKELA	B'mark	Aircel(DWL)		Airtel		BSNL		Idea		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		72.57%	52.40%	81.86%	61.24%	86.73%	57.02%	70.22%	61.46%	30.04%	48.99%	58.88%	78.30%	74.64%	51.22%
0 to -85 dBm		92.77%	79.76%	98.75%	88.84%	100.00%	79.55%	99.36%	92.09%	67.25%	86.33%	98.22%	97.88%	98.58%	87.60%
0 to -95 dBm		98.55%	93.58%	99.97%	97.87%	100.00%	94.43%	100.00%	100.00%	100.00%	100.00%	99.91%	99.77%	100.00%	100.00%
Voice quality	≥ 95%	98.34%	95.48%	97.18%	95.06%	99.72%	98.23%	98.68%	96.57%	97.25%	97.45%	98.90%	97.23%	98.02%	96.67%
CSSR	≥ 95%	100.00%	100.00%	100.00%	99.38%	100.00%	99.35%	100.00%	100.00%	100.00%	100.00%	100.00%	99.49%	99.19%	100.00%
%age Blocked calls		0.00%	0.00%	0.00%	0.00%	0.00%	0.97%	0.00%	0.00%	0.00%	0.00%	0.00%	0.51%	0.00%	0.29%
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	0.31%	0.00%	1.31%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hands off success rate		100.00%	100.00%	100.00%	99.38%	100.00%	98.86%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

All the operators met the benchmark.

Call Set Success Rate (CSSR)

All the operators met the benchmark.

Call Drop Rate

All the operators met the benchmark for outdoor location.

10.1.3.3 Drive Test Results -ROURKELA SSA-3G

September									
ROURKELA	B'mark	Aircel 3G		Airtel 3G		BSNL 3G		Reliance 3G	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		NA		30.78%	28.54%	43.86%	7.30%	Not Participating	
0 to -85 dBm				71.53%	61.63%	87.57%	30.88%		
0 to -95 dBm				99.75%	92.00%	99.95%	59.20%		
Voice quality	≥ 95%			97.78%	98.84%	98.60%	84.39%		
CSSR	≥ 95%			100.00%	97.90%	100.00%	99.38%		
%age Blocked calls				0.00%	0.42%	0.00%	17.90%		
Call drop rate	≤ 2%			0.00%	1.29%	0.00%	1.27%		
Hands off success rate				100.00%	99.90%	100.00%	98.14%		

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

BSNL 3G did not meet the benchmark for voice quality in outdoor locations.

Call Set Success Rate (CSSR)

All the operators met the benchmark.

Call Drop Rate

All the operators met the benchmark.

10.1.3.1 Data Drive Test Results - ROURKELA SSA -2G

Name of the Parameter	Bench Mark	Aircel	Airtel	BSNL	Idea	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	100	100	100	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	100	100	100	100
Minimum download speed		147	66	76	142	1520	136	128
Average throughput for Packet Data		145	116	92	143	1520	136	135
Latency	<250ms	100	100	100	100	100	100	100

All operators met the TRAI benchmark.

10.1.3.1 Data Drive Test Results - ROURKELA SSA -3G

Name of the Parameter	Bench Mark	Aircel 3G	Airtel 3G	BSNL 3G	Reliance 3G
Succesful Data Transmission download speed attempts	>80%	100	100	100	Not Participate
Succesful Data Transmission upload speed attempts	>75%	100	100	100	
Minimum download speed		2773	1762	1384	
Average throughput for Packet Data		2773	3205	1618	
Latency	<250ms	100	100	100	

All operators met the TRAI benchmark.

11 ANNEXURE – CONSOLIDATED-2G

11.1 NETWORK AVAILABILITY

1. Network Availability								
Audit Results for Network Availability- PMR data								
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		8137	16223	8272	7783	1009	4245	12426
Sum of downtime of BTSs in a month (in hours)		27757	9945	83417	12020	541	2265	12533
BTSs accumulated downtime (not available for service)	≤ 2%	0.46%	0.08%	1.36%	0.21%	0.07%	0.07%	0.14%
Number of BTSs having accumulated downtime >24 hours		158	2	157	61	0	1	49
Worst affected BTSs due to downtime	≤ 2%	1.94%	0.01%	1.90%	0.78%	0.00%	0.02%	0.39%
Live Measurement Results for Network Availability- 3 Day live data								
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		8137	16214	8271	7783	1009	4245	12426
Sum of downtime of BTSs in a month (in hours)		3207	864	9203	913	45	396	1079
BTSs accumulated downtime (not available for service)	≤ 2%	0.55%	0.07%	1.55%	0.16%	0.06%	0.13%	0.12%
Number of BTSs having accumulated downtime >24 hours		21	0	0	14	0	0	1
Worst affected BTSs due to downtime	≤ 2%	0.26%	0.00%	0.00%	0.18%	0.00%	0.00%	0.01%

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

11.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

2. Connection Establishment (Accessibility)								
Audit Results for CSSR, SDCCH and TCH congestion- PMR data								
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	97.31%	96.09%	98.01%	99.56%	98.49%	98.75%	99.14%
SDCCH/Paging channel congestion	≤ 1%	0.44%	0.42%	0.56%	0.08%	NA	0.16%	0.43%
TCH congestion	≤ 2%	1.95%	1.77%	1.73%	0.10%	0.08%	0.59%	0.86%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data								
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	97.34%	96.00%	98.54%	99.65%	98.54%	98.72%	99.82%
SDCCH/Paging channel congestion	≤ 1%	0.36%	0.39%	0.38%	0.03%	NA	0.07%	0.42%
TCH congestion	≤ 2%	1.88%	1.74%	0.65%	0.03%	0.07%	0.58%	0.18%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data								
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of call attempts		869	1151	1575	840	452	805	1092
Total number of successful calls established		866	1144	1568	840	452	802	1088
CSSR	≥ 95%	99.65%	99.39%	99.56%	100.00%	100.00%	99.63%	99.63%
%age blocked calls		0.35%	0.61%	0.44%	0.00%	0.00%	0.37%	0.37%

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

11.3 CONNECTION MAINTENANCE (RETAINABILITY)

3. Connection Maintenance (Retainability)								
Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		245278854	1072719010	306087608	171889852	9238043	152468822	398499065
Total number of calls dropped		3028344	12868894	3384301	502270	44912	633564	3275230
Call drop rate	≤ 2%	1.23%	1.20%	1.11%	0.29%	0.49%	0.42%	0.82%
Total number of cells in the network		23848	51993	25757	23376	3099	12828	37183
Total number of cells having more than 3% TCH		2405	837	502	45	74	192	881
Worst affected cells having more than 3% TCH	≤ 3%	10.08%	1.61%	1.95%	0.19%	2.39%	1.50%	2.37%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		24937019	104844207	376942137	205972048	952936	14006210	491425719
Total number of calls dropped		301391	1244685	2604500	576947	4534	62088	3368287
Call drop rate	≤ 2%	1.21%	1.19%	0.69%	0.28%	0.48%	0.44%	0.69%
Total number of cells in the network		23848	51984	25755	23376	3099	12828	37183
Total number of cells having more than 3% TCH		2909	843	390	14	82	214	862
Worst affected cells having more than 3% TCH	≤ 3%	12.20%	1.62%	1.51%	0.06%	2.66%	1.67%	2.32%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data								
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		866	1142	1570	861	452	805	1088
Total number of calls dropped		12	7	6	0	0	1	0
Call drop rate	≤ 2%	1.39%	0.61%	0.38%	0.00%	0.00%	0.12%	0.00%

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

11.4 VOICE QUALITY

4. Voice quality								
Audit Results for Voice quality -PMR Data								
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		39932844050	809219974667	16999025509	24214342699	13960953596	31637345932	74466500488
Total number of calls with good voice quality		38300065188	777024910719	16369905031	23156994228	13715572989	30851667518	72787351414
%age calls with good voice quality	≥ 95%	95.91%	96.02%	96.30%	95.63%	98.24%	97.52%	97.75%
Live measurement results for Voice quality-3 Day data								
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		3879875096	19879960262	2057651819	2602613112	1417710188	3056714038	33565295173
Total number of calls with good voice quality		3723564063	19102518415	1993100943	2495405727	1381869369	2982631644	32844286490
%age calls with good voice quality	≥ 95%	95.97%	96.09%	96.86%	95.88%	97.47%	97.58%	97.85%
Drive test results for Voice quality (Average of three drive tests) - DT data								
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		634462	100735	193871	674894	NA	639938	1132476
Total number of calls with good voice quality		612039	96003	191280	656097	NA	627119	1098491
%age calls with good voice quality	≥ 95%	96.47%	95.30%	98.66%	97.21%	98.31%	98.00%	97.00%

Drive test results for Voice quality (Average of three drive tests) - DT data									
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1480612	209390	404359	1285966	NA	NA	1167807	1643136
Total number of calls with good voice quality		1441118	200800	398562	1257112	NA	NA	1137952	1597645
%age calls with good voice quality	≥ 95%	97.33%	95.90%	98.57%	97.76%	99.15%	98.01%	97.44%	97.23%

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

11.5 POI CONGESTION

5. POI Congestion								
Audit Results for POI Congestion- PMR data								
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		111	22	14	73	43	13	50
No. of POIs not meeting benchmark		0	0	1	0	0	0	1
Total Capacity of all POIs (A) - in erlangs		2172	323987	142000	162281	40671	44613	423545
Traffic served for all POIs (B)- in erlangs		1277	206203	124285	96569	14952	19481	215400
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data								
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		111	22	14	73	43	13	50
No. of POIs not meeting benchmark		0	0	1	0	0	0	1
Total Capacity of all POIs (A) - in erlangs		2166	322585	139000	158277	40632	41385	423545
Traffic served for all POIs (B)- in erlangs		599	205833	88693	42569	8910	8872	209398
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

11.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang								
Traffic in Erlang		Aircel	Airtel	BSNL	Idea	TATA CDMA	TATA GSM	Vodafone
Eqipped capacity of the network		127901	358479	99638	74104	62976	86169	138953
Total taffic handled in erlang during TCBH		74068	315408.5338	81858.1991	47057	2952	43481	115224
Total no. of customers served (as per VLR)		2412545	9759819	3315414	1792072	63076	1605371	4350927

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

12 ANNEXURE – CONSOLIDATED-3G

12.1 NETWORK AVAILABILITY

1. Network Availability					
Audit Results for Network Availability- PMR data					
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
(Number of Node Bs in the network in the licensed service area		2734	8136	3822	1855
Sum of downtime (i.e. total outage time) of Node Bs		11276	1164	0	2065
Node Bs downtime (not available for service)	≤ 2%	0.55%	0.02%	0.00%	0.15%
Number of Node Bs having accumulated downtime of >24 hours in a month		46	0	0	13
Worst affected Node Bs due to downtime	≤ 2%	1.68%	0.00%	0.00%	0.70%
Live Measurement Results for Network Availability- 3 Day live data					
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
(Number of Node Bs in the network in the licensed service area		2734	8136	3822	1855
Sum of downtime (i.e. total outage time) of Node Bs		1379	173	0	181
Node Bs downtime (not available for service)	≤ 2%	0.70%	0.03%	0.00%	0.14%
Number of Node Bs having accumulated downtime of >24 hours in a month		15	0	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.55%	0.00%	0.00%	0.00%

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

12.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

2. Connection Establishment (Accessibility)					
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
CSSR	≥ 95%	97.88%	99.57%	97.66%	98.35%
RRC Congestion	≤ 1%	0.21%	0.04%	0.77%	0.03%
Circuit Switched RAB Congestion	≤ 2%	0.11%	0.21%	0.64%	0.00%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
CSSR	≥ 95%	97.74%	99.84%	97.53%	98.50%
RRC Congestion	≤ 1%	0.18%	0.02%	0.95%	0.09%
Circuit Switched RAB Congestion	≤ 2%	0.11%	0.21%	0.38%	0.00%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data					
CSSR	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of RRC attempts (A)		214	845	985	NA
Total number of RRC established (B)		214	831	977	NA
Call setup success rate (B/A*100)	≥ 95%	100.00%	98.34%	99.19%	NA
%age blocked calls		0.00%	1.66%	0.81%	NA

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

12.3 CONNECTION MAINTENANCE (RETAINABILITY)

3. Connection Maintenance (Retainability)					
Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		26015387	34854346	22028407	11390267
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		279493	142752	225121	15611
Call drop rate (B/A*100)	≤ 2%	1.07%	0.41%	1.02%	0.14%
Total no. of cells in the licensed service area (B)		8199	25004	11517	5517
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		913	414	278	53
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	11.13%	1.66%	2.42%	0.96%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		2549317	58823173	33291416	15180612
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		34070	218444	308916	19125
Call drop rate (B/A*100)	≤ 2%	1.34%	0.37%	0.93%	0.13%
Total no. of cells in the licensed service area (B)		8199	24472	9807	5517
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		808	423	93	42
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	9.86%	1.73%	0.95%	0.75%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data					
Call drop rate	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total calls successfully established (A) (Number of voice RAB normally released)		214	477	981	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		0	2	8	NA
Call drop rate (B/A*100)	≤ 2%	0.00%	0.42%	0.82%	NA

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

12.4 VOICE QUALITY

4. Voice quality					
Audit Results for Voice quality -PMR Data					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		14202605306860	NA	NA	80486694279
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		14041181619877	NA	NA	80425291844
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.86%	99.21%	NA	99.92%
Live measurement results for Voice quality-3 Day data					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1457285621255	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1440785616605	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.87%	99.21%	NA	99.32%
Drive test results for Voice quality (Average of three drive tests) - DT data					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1054193	4050794	641291	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1033073	3968160	603960	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.00%	97.96%	94.18%	NA

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

12.5 POI CONGESTION

5. POI Congestion					
Audit Results for POI Congestion- PMR data					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	14	7
No. of POIs not meeting benchmark		0	0	1	0
Total Capacity of all POIs (A) - in erlangs		0	323987	142000	201965
Traffic served for all POIs (B)- in erlangs		0	206203	124285	79525
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	14	7
No. of POIs not meeting benchmark		0	0	1	0
Total Capacity of all POIs (A) - in erlangs		0	322585	141000	199639
Traffic served for all POIs (B)- in erlangs		0	205833	88593	76730
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

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

12.6 ADDITIONAL NETWORK RELATED PARAMETERS

Audit Results for Total Traffic Handled in Erlang					
Traffic in Erlang		Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
Eqipped capacity of the network		NA	NA	16898	78000
Total taffic handled in erlang during TCBH		7138	13776	3187	20140
Total no. of customers served (as per VLR)		238389	552099	103127	194782

13 ANNEXURE – CUSTOMER SERVICES

13.1 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated										
Billing Performance	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Metering and billing credibility - Postpaid (Avg of 3 billing cycles)										
Metering and billing credibility - Postpaid										
Total bills generated during the period		20819	452959	180527	32734	NS	218032	9125	43534	195912
Total number of bills disputed		3	153	0	39	NS	192	0	1	65
Total number of valid billing complaints		0	61	0	9	NS	192	0	1	52
Total complaints considered invalid		3	92	0	30	NS	0	0	0	13
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.01%	0.03%	0.00%	0.12%	NS	0.09%	0.00%	0.00%	0.03%
July										
Total bills generated during the first billing cycle		7003	149084	60470	10292	NS	69509	3059	14576	63851
Total number of bills disputed in first billing cycle		1	57	0	14	NS	61	0	0	28
Total number of valid billing complaints (billing cycle 1)		0	23	0	1	NS	61	0	0	23
Total complaints considered invalid (billing cycle 1)		1	34	0	13	NS	0	0	0	5
Percentage bills disputed (first billing cycle)	≤ 0.1%	0.01%	0.04%	0.00%	0.14%	NS	0.09%	0.00%	0.00%	0.04%
August										
Total bills generated during the second billing cycle		7021	151313	60153	10853	NS	72375	3039	14407	65500
Total number of bills disputed in second billing cycle		2	66	0	12	NS	64	0	1	22
Total number of valid billing complaints (billing cycle 2)		0	31	0	3	NS	64	0	1	19
Total complaints considered invalid (billing cycle 2)		2	35	0	9	NS	0	0	0	3
Percentage bills disputed (second billing cycle)	≤ 0.1%	0.03%	0.04%	0.00%	0.11%	NS	0.09%	0.00%	0.01%	0.03%

September										
Total bills generated during the third billing cycle		6795	152562	59904	11589	NS	76148	3027	14551	66561
Total number of bills disputed in third billing cycle		0	30	0	13	NS	67	0	0	15
Total number of valid billing complaints (billing cycle 3)		0	7	0	5	NS	67	0	0	10
Total complaints considered invalid (billing cycle 3)		0	23	0	8	NS	0	0	0	5
Percentage bills disputed (third billing cycle)	≤ 0.1%	0.00%	0.02%	0.00%	0.11%	NS	0.09%	0.00%	0.00%	0.02%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid										
Performance prepaid	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of charging complaints (valid) - sum of 3 months		134	4135	460	1555	NS	1820	0	1	3108
Total complaints considered invalid (sum of 3 months)		11057	8061	1	5209	NS	0	0	0	397
Total number of charging complaints (sum of 3 months)		11191	12196	461	6764	NS	1820	0	1	3505
Total no of customers served (Sum of 3 months)		14081189	32805464	13412628	5303520	NS	6081692	106739	2634722	12321563
Percentage of charging complaints disputed	≤ 0.1%	0.08%	0.04%	0.00%	0.13%	NS	0.03%	0.00%	0.00%	0.03%

Data Source: Billing Center of the operators

Resolution of Billing Complaints

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated										
Billing Performance	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of billing/charging complaints		11194	12349	461	6803	NS	2012	0	2	3570
Total number of complaints resolved in favour of customer		134	4196	460	1564	NS	2012	0	2	3160
Total complaints considered invalid		11060	8153	1	5239	NS	0	0	0	410
Number of complaints resolved in 4 weeks		134	4196	460	1564	NS	2012	0	2	3160
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	NA	NA	100.00%
Number of complaints resolved in 6 weeks		134	4196	460	1564	NS	2012	0	2	3160
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	NA	NA	100.00%
Period of applying credit / waiver										
Total number of complaints where credit/waiver is required		134	4196	460	1564	NS	2012	0	2	657
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	100.00%
Live calling results for resolution of billing complaints										
Resolution of billing complaints	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total Number of calls made		100	100	86	100	NS	38	0	1	100
Number of cases resolved in 4 weeks		98	97	83	97	NS	37	0	1	100
Percentage cases resolved in 4 weeks	≥ 98%	98.00%	97.00%	96.51%	97.00%	NS	97.37%	NA	100.00%	100.00%
Number of cases resolved in 6 weeks		100	100	86	100	NS	38	0	1	100
Percentage cases resolved in 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	NA	100.00%	100.00%

Data Source: Billing Center of the operators

13.2 CUSTOMER CARE

Audit results for customer care (IVR and voice-to-Voice) -Consolidated										
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		8715698	2712786	3233423	5973407	NS	1345150	0	342882	5874201
Number of calls getting connected and answered (electronically)		8418206	2702184	3231485	5874306	NS	1326007	0	332058	5873300
Percentage calls getting connected and answered	≥ 95%	96.59%	99.61%	99.94%	98.34%	NS	98.58%	NA	96.84%	99.98%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated										
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received (3 months)		2112900	3562021	1776852	1860590	NS	454910	8977	455246	2294990
Total Number of calls answered within 90 seconds (3 months)		2089467	3452994	1759760	1859651	NS	438345	8887	444930	2284423
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	98.89%	96.94%	99.04%	99.95%	NS	96.36%	99.00%	97.73%	99.54%
July										
Total calls received (Month 1)		697995	1300816	571167	594242	NS	133025	3598	161904	795360
Total calls answered within 90 seconds (Month 1)		694015	1265323	561628	594026	NS	128814	3563	159475	789652
% calls answered within 90 seconds (Month 1)	≥ 95%	99.43%	97.27%	98.33%	99.96%	NS	96.83%	99.03%	98.50%	99.28%
August										
Total calls received (Month 2)		741831	1126574	590505	645272	NS	161377	2692	151447	764059
Total calls answered within 90 seconds (Month 2)		728231	1109701	585721	644861	NS	154142	2651	148330	762745
% calls answered within 90 seconds (Month 2)	≥ 95%	98.17%	98.50%	99.19%	99.94%	NS	95.52%	98.48%	97.94%	99.83%
September										
Total calls received (Month 3)		673074	1134631	615180	621076	NS	160508	2687	141895	735571
Total calls answered within 90 seconds (Month 3)		667221	1077970	612411	620764	NS	155389	2673	137125	732026
% calls answered within 90 seconds (Month 3)	≥ 95%	99.13%	95.01%	99.55%	99.95%	NS	96.81%	99.48%	96.64%	99.52%

Live calling results for customer care (IVR)										
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	NS	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	100	100	NS	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)										
Customer Care Assessment	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received		100	100	100	100	NS	100	100	100	100
Total Number of calls getting connected and answered		100	97	98	99	NS	88	100	98	100
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	97.00%	98.00%	99.00%	NS	88.00%	100.00%	98.00%	100.00%

13.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated										
Termination	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of closure request		377	1225	504	196	NS	198	705	673	507
Number of requests attended within 7 days		377	1225	504	196	NS	198	705	673	507
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	100.00%	NS	100.00%	100.00%	100.00%	100.00%

Data

Source: Customer Service Center of the operators

13.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated										
Refund	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cases requiring refund of deposits		337	49	493	124	NS	1081	15	24	1505
Total number of cases where refund was made within 60 days		337	49	493	124	NS	975	15	24	1505
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	NS	90.19%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

13.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests									
Resolution of service requests	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made	100	100	100	100	NS	100	3	100	100
Number of cases resolved to satisfaction	100	98	98	98	NS	97	3	99	98
Percentage cases resolved in four weeks	100.00%	98.00%	98.00%	98.00%	NS	97.00%	100.00%	99.00%	98.00%

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

13.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services										
Level 1 services		Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total no. of calls made		300	300	300	300	NS	300	300	300	300
Calls answered		296	299	300	300	NS	284	300	300	297
% of calls connected	≥ 95%	98.67%	99.67%	100.00%	100.00%	NS	94.67%	100.00%	100.00%	99.00%

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

13.7 LEVEL 1 SERVICE CALLS MADE

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

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

Aircel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	y		18	18
101	Fire	y		17	17
102	Ambulance	y		18	17
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	y		18	18
138	All India Helpline for passengers		N		
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	y		18	18
182	Indian Railway Security Helpline	y		18	18
1033	Road Accident Management Service	y		18	18
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	y		17	17
1064	Anti-Corruption Helpline	y		18	17

1070	Relief Commission for Natural Calamities	y		18	17
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	y		18	17
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	y		18	18
1090	Call Alert (Crime Branch)		N		
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	y		18	18
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	y		17	17
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)	y		17	17
1909	National Do Not Call Registry	y		17	17
1912	Complaint of Electricity	y		17	17
1916	Drinking Water Supply		N		
1950	Election Commission of India		N		
Airtel					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	y		28	28
101	Fire	y		28	27
102	Ambulance	y		27	27
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	y		27	27
138	All India Helpline for passengers	y		27	27
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	y		27	27
182	Indian Railway Security Helpline	y		27	27
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	y		27	27
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
1090	Call Alert (Crime Branch)		N		
1091	Women Helpline		N		
1097	National AIDS Helpline to NACO	y		28	27

1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)	y		27	27
1909	National Do Not Call Registry	y		27	26
1912	Complaint of Electricity		N		
1916	Drinking Water Supply		N		
1950	Election Commission of India		N		
BSNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	y		16	17
101	Fire	y		16	17
102	Ambulance		N		
104	Health Information Helpline	y		15	15
108	Emergency and Disaster Management Helpline	y		16	16
138	All India Helpline for passengers	y		16	17
149	Public Road Transport Utility Service		N		

181	Chief Minister Helpline	y		16	17
182	Indian Railway Security Helpline	y		15	15
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq		N		
1064	Anti-Corruption Helpline	y		16	17
1070	Relief Commission for Natural Calamities	y		16	17
1071	Air Accident Helpline	y		16	17
1072	Rail Accident Helpline	y		16	17
1073	Road Accident Helpline	y		15	15
1077	Control Room for District Collector	y		16	17
1090	Call Alart (Crime Branch)		N		
1091	Women Helpline	y		16	17
1097	National AIDS Helpline to NACO		N		
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	y		16	17
1514	National Career Service(NCS)		N		

15100	Free Legal Service Helpline	y		16	17
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)	y		16	17
1909	National Do Not Call Registry		N		
1912	Complaint of Electricity	y		15	15
1916	Drinking Water Supply		N		
1950	Election Commission of India		N		

Idea

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	y		16	16
101	Fire	y		16	16
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	y		16	16
138	All India Helpline for passengers	y		16	16
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	y		16	16
182	Indian Railway Security Helpline	y		16	16
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	y		15	15
1064	Anti-Corruption Helpline	y		16	16

1070	Relief Commission for Natural Calamities	y		16	16
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	y		15	15
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	y		16	16
1090	Call Alert (Crime Branch)		N		
1091	Women Helpline	y		15	15
1097	National AIDS Helpline to NACO	y		16	16
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	y		15	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	y		16	16
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)	y		16	16
1909	National Do Not Call Registry	y		16	16
1912	Complaint of Electricity	y		16	16
1916	Drinking Water Supply		N		
1950	Election Commission of India	y		16	16
TATA CDMA					

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	y		14	14
101	Fire	y		14	14
102	Ambulance	y		15	15
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	y		15	15
138	All India Helpline for passengers	y		15	15
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	y		14	14
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	y		15	15
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	y		15	15
1063	Public Grievance Cell DoT Hq	y		15	15
1064	Anti-Corruption Helpline	y		14	14
1070	Relief Commission for Natural Calamities	y		14	14
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	y		14	14
1073	Road Accident Helpline	y		14	14
1077	Control Room for District Collector	y		14	14
1090	Call Alert (Crime Branch)	y		14	14
1091	Women Helpline	y		14	14
1097	National AIDS Helpline to NACO	y		14	14

1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	y		14	14
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	y		14	14
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry	y		14	14
1912	Complaint of Electricity		N		
1916	Drinking Water Supply		N		
1950	Election Commission of India	y		14	14
TATA GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	y		14	14
101	Fire	y		14	14
102	Ambulance	y		15	15
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	y		15	15
138	All India Helpline for passengers	y		14	14
149	Public Road Transport Utility Service		N		

181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	y		14	14
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	y		15	15
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	y		14	14
1063	Public Grievance Cell DoT Hq	y		14	14
1064	Anti-Corruption Helpline	y		15	15
1070	Relief Commission for Natural Calamities	y		14	14
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	y		15	15
1073	Road Accident Helpline	y		14	14
1077	Control Room for District Collector	y		15	15
1090	Call Alert (Crime Branch)	y		14	14
1091	Women Helpline	y		14	14
1097	National AIDS Helpline to NACO	y		14	14
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	y		14	14
1514	National Career Service(NCS)		N		

15100	Free Legal Service Helpline	y		14	14
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry	y		14	14
1912	Complaint of Electricity		N		
1916	Drinking Water Supply		N		
1950	Election Commission of India	y		14	14
Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	y		22	22
101	Fire	y		22	22
102	Ambulance	y		21	21
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpline for passengers	y		22	22
149	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	y		22	22
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	y		21	21
1064	Anti-Corruption Helpline		N		

1070	Relief Commission for Natural Calamities	y		21	21
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	y		21	21
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	y		22	22
1090	Call Alert (Crime Branch)		N		
1091	Women Helpline	y		22	22
1097	National AIDS Helpline to NACO		N		
1099	Central Accident and Trauma Services (CATS)		N		
10580	Educational & Vocational Guidance and Counselling		N		
10589	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	y		21	21
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	y		21	21
155304	Municipal Corporations		N		
155214	Labour Helpline	y		21	21
1903	Sashastra Seema Bal (SSB)		N		
1909	National Do Not Call Registry	y		21	21
1912	Complaint of Electricity		N		
1916	Drinking Water Supply		N		
1950	Election Commission of India		N		

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

14 COUNTER DETAILS

14.1.1 ERICSSON

Ericsson provides network support to Aircel and, BSNL in the circle.

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

Ericsson Counters

Counter	Counter Description
TCASSALL	Number of assignment complete messages on TCH for all MS classes
TASSALL	Number of first assignment attempts on TCH for all MS classes.
CNRELCONG	Number of released connections on SDCCH due to TCH or Transcoder (TRA) congestion.
TNRELCONG	Number of released TCH signalling connections due to transcoder resource congestion during immediate assignment on TCH

CCONGS	Congestion counter for SDCCH. Stepped per congested allocation attempt.
CCALLS	Channel allocation attempt counter on SDCCH.
TNDROP	The total number of dropped TCH Connections.
QUAL00DL	Number of quality 0 reported on downlink.
QUAL10DL	Number of quality 1 reported on downlink.
QUAL20DL	Number of quality 2 reported on downlink.
QUAL30DL	Number of quality 3 reported on downlink.
QUAL40DL	Number of quality 4 reported on downlink.
QUAL50DL	Number of quality 5 reported on downlink.
QUAL60DL	Number of quality 6 reported on downlink.
QUAL70DL	Number of quality 7 reported on downlink.

14.1.2 NSN (NOKIA SIEMENS NETWORKS)

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

Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	Sum of TCH_NORM_SEIZ/Sum of ms_tch_succ_seiz_assign_cmplt/MS_TCH_SUCC_SEIZ_ASSIGN_CMPLT
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	Sum of SDDCH Blocking NOM/SDDCH_BLOCKING_NOM/Sum of Random Access Success Rate DENOM rach_7a/RACH_7A_DENON
3	TCH congestion= (TCH Failures /TCH Attempts)%	Sum of TCH Blocking (blck_8i) NOM/BLCK_8i_NOM/Sum of TCH Assignment DENOM/TCH_ASSIGNMENT_DENOM

4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	Sum of TCH Drop Call Rate New (Re-est) BTS NOM/TCH_DROP_CALL_RATE5_NEW/Sum of TCH Assignment DENOM/TCH_ASSIGNMENT_DENOM
5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice= (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5) / (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5+FREQ_DL_QUAL6+FREQ_DL_QUAL7)

14.1.3 HUAWEI

Huawei provides network support to Idea in the circle.

Sl No.	KPI	Example 1
1	**CSSR= (No of established Calls / No of Attempted Calls)%**	**CSSR= CA313:Successful Assignments (None)/CA310:Assignment Requests (None)*100**
2	**SDCCH congestion= (SDCCH Failure/SDCCH attempts)%**	**SDCCH congestion=K3001:Failed SDCCH Seizures due to Busy SDCCH (None)/K3000:SDCCH Seizure Requests (None)*100**
3	**TCH congestion= (TCH Failures /TCH Attempts)%**	**TCH congestion= (K3021:Failed TCH Seizures due to Busy TCH (Signaling Channel) (None)+K3011A:Failed TCH Seizures due to Busy TCH (Traffic Channel) (None)/CA310:Assignment Requests (None))*100**
4	**Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established**	**Call Drop Rate=CM33:Call Drops on Traffic Channel (None)/CA313:Successful Assignments (None)*100**

5	**Connection with good quality voice= (Connection with good quality voice/Total voice samples)%**	**Connection with good quality voice=(NCS412A:Number of MRs on Downlink TCHF (Receive Quality Rank 0) (None)+NCS412B:Number of MRs on Downlink TCHF (Receive Quality Rank 1) (None)+ NCS412C:Number of MRs on Downlink TCHF (Receive Quality Rank 2) (None)+ NCS412D:Number of MRs on Downlink TCHF (Receive Quality Rank 3) (None)+NCS412E:Number of MRs on Downlink TCHF (Receive Quality Rank 4) (None)+NCS412F:Number of MRs on Downlink TCHF (Receive Quality Rank 5) (None)+ NCS414A:Number of MRs on Downlink TCHH (Receive Quality Rank 0) (None)+ NCS414B:Number of MRs on Downlink TCHH (Receive Quality Rank 1) (None)+ NCS414C:Number of MRs on Downlink TCHH (Receive Quality Rank 2) (None)+ NCS414D:Number of MRs on Downlink TCHH (Receive Quality Rank 3) (None)+ NCS414E:Number of MRs on Downlink TCHH (Receive Quality Rank 4) (None)+ NCS414F:Number of MRs on Downlink TCHH (Receive Quality Rank 5) (None))/(NCS412A:Number of MRs on Downlink TCHF (Receive Quality Rank 0) (None)+NCS412B:Number of MRs on Downlink TCHF (Receive Quality Rank 1) (None)+ NCS412C:Number of MRs on Downlink TCHF (Receive Quality Rank 2) (None)+ NCS412D:Number of MRs on Downlink TCHF (Receive Quality Rank 3) (None)+NCS412E:Number of MRs on Downlink TCHF (Receive Quality Rank 4) (None)+NCS412F:Number of MRs on Downlink TCHF (Receive Quality Rank 5) (None)+ NCS412G:Number of MRs on Downlink TCHF (Receive Quality Rank 6) (None)+ NCS412H:Number of MRs on Downlink TCHF (Receive Quality Rank 7) (None)+ NCS414A:Number of MRs on Downlink TCHH (Receive Quality Rank 0) (None)+ NCS414B:Number of MRs on Downlink TCHH (Receive Quality Rank 1) (None)+ NCS414C:Number of MRs on Downlink TCHH (Receive Quality Rank 2) (None)+ NCS414D:Number of MRs on Downlink TCHH (Receive Quality Rank 3) (None)+ NCS414E:Number of MRs on Downlink TCHH (Receive Quality Rank 4) (None)+ NCS414F:Number of MRs on Downlink TCHH (Receive Quality Rank 5) (None)+ NCS414G:Number of MRs on Downlink TCHH (Receive Quality Rank 6) (None)+ NCS414H:Number of MRs on Downlink TCHH (Receive Quality Rank 7) (None))*100**

14.1.4 ZTE

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

For ZTE: - operators don't have the option to extract the counter details and it would be difficult to them get the data from the ZTE.

BSNL, have installed the software in there OMC which gives the TRAI required data and our auditor will extract the same data into excel and further he will calculated.

TATA CDMA and TATA GSM have asked their corporate for the approval to get the data since ZTE don't have option to give the counter wise details.

14.1.5 HUAWEI AND ALCATEL LUCENT

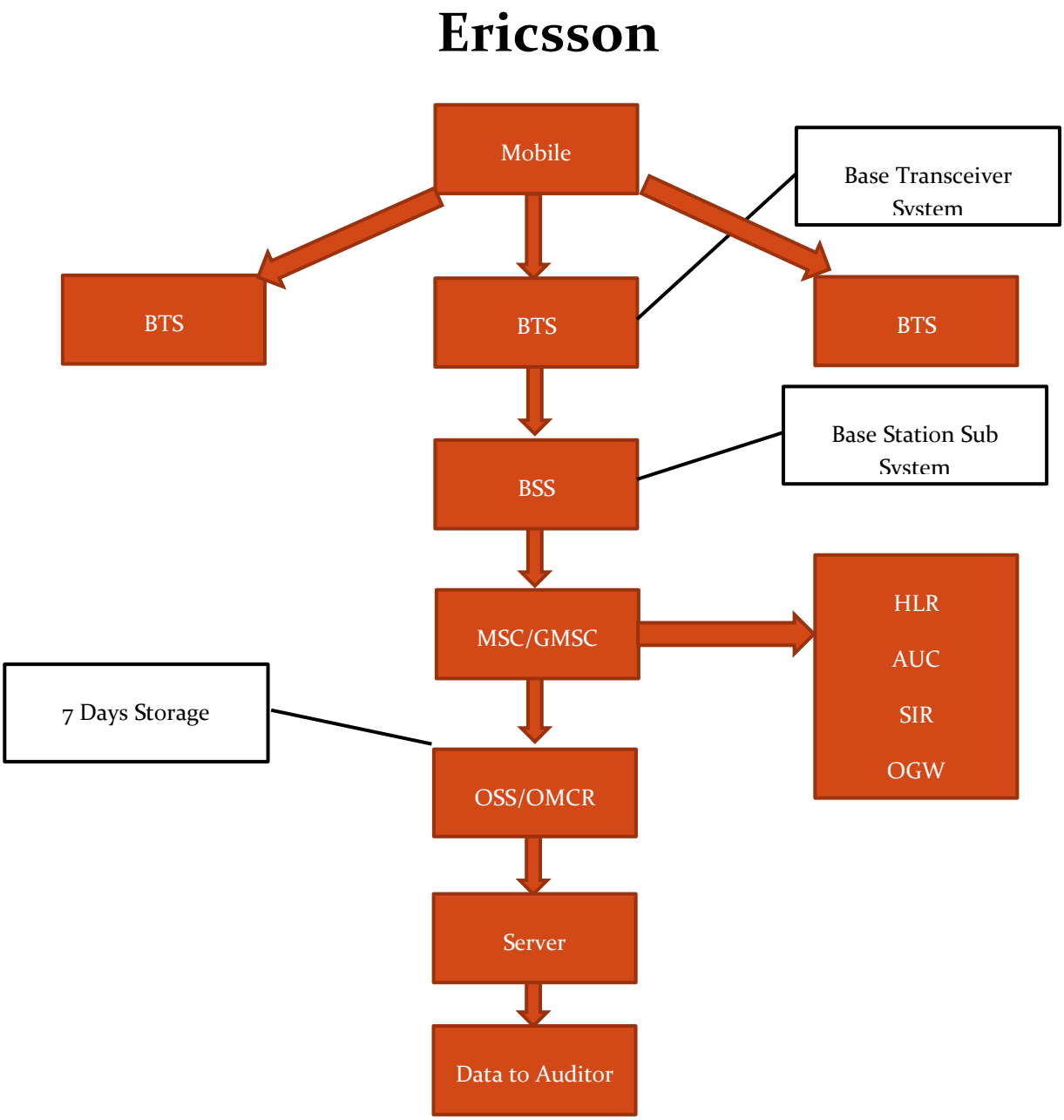
Reliance CDMA uses both technologies

Since Reliance has shut down there services in Orissa circle and they changing everything to LTE and they don't have the option to get the data according counter details.

14.2 BLOCK SCHEMATIC DIAGRAMS

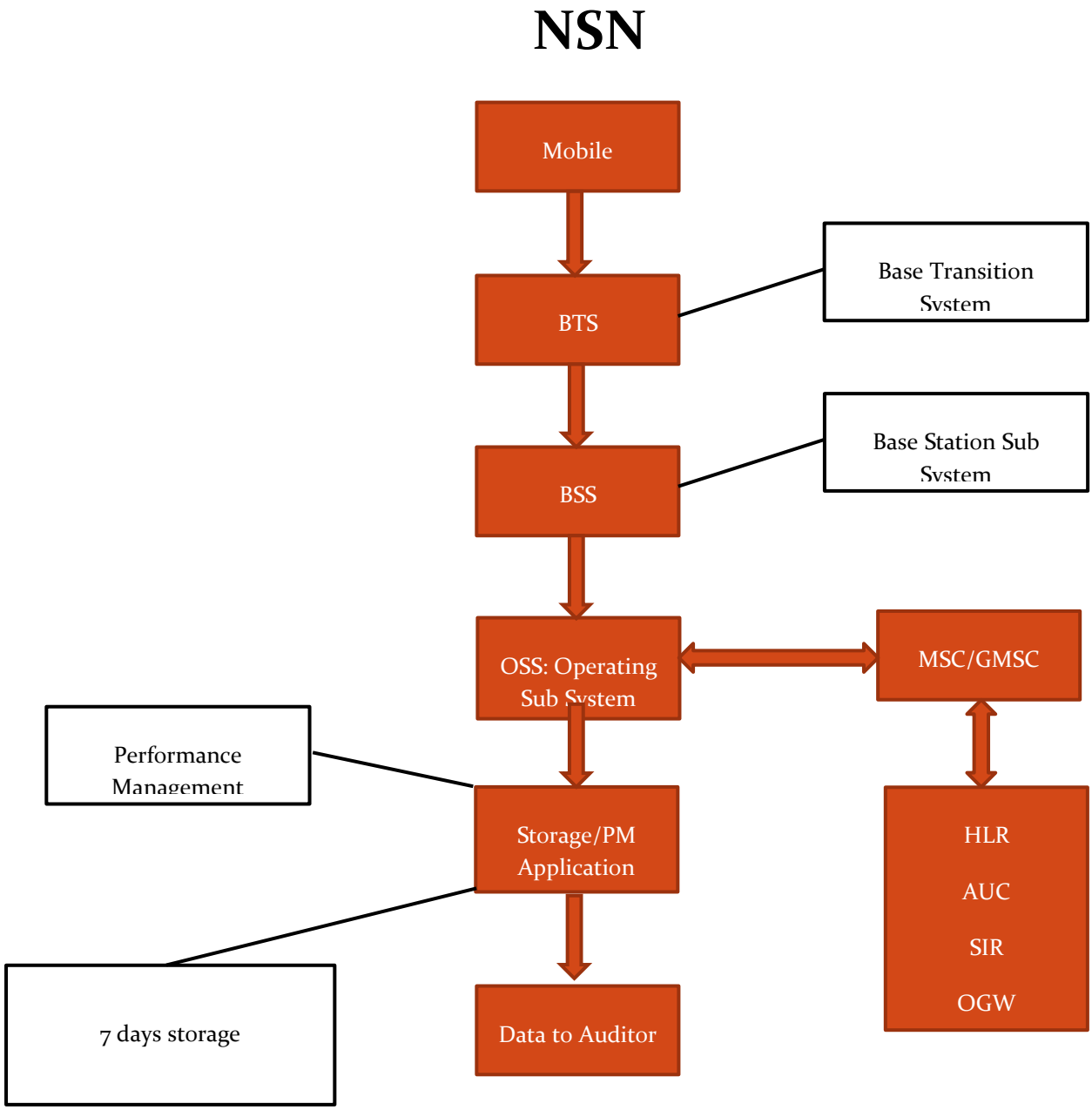
14.2.1 ERICSSON

Ericsson provides network support to Aircel, Telenor and BSNL in the circle.



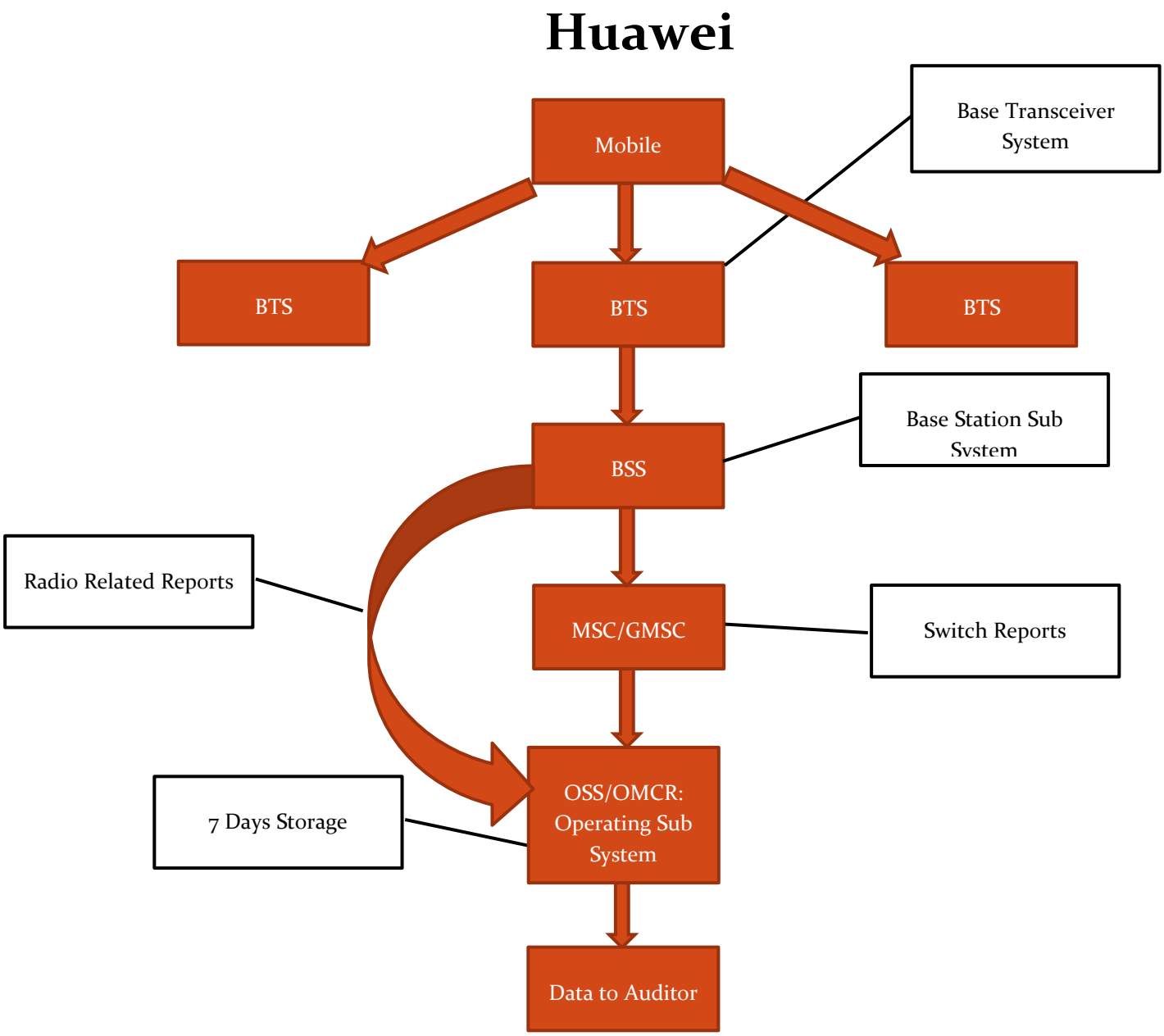
14.2.2 NSN (NOKIA SIEMENS NETWORKS)

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



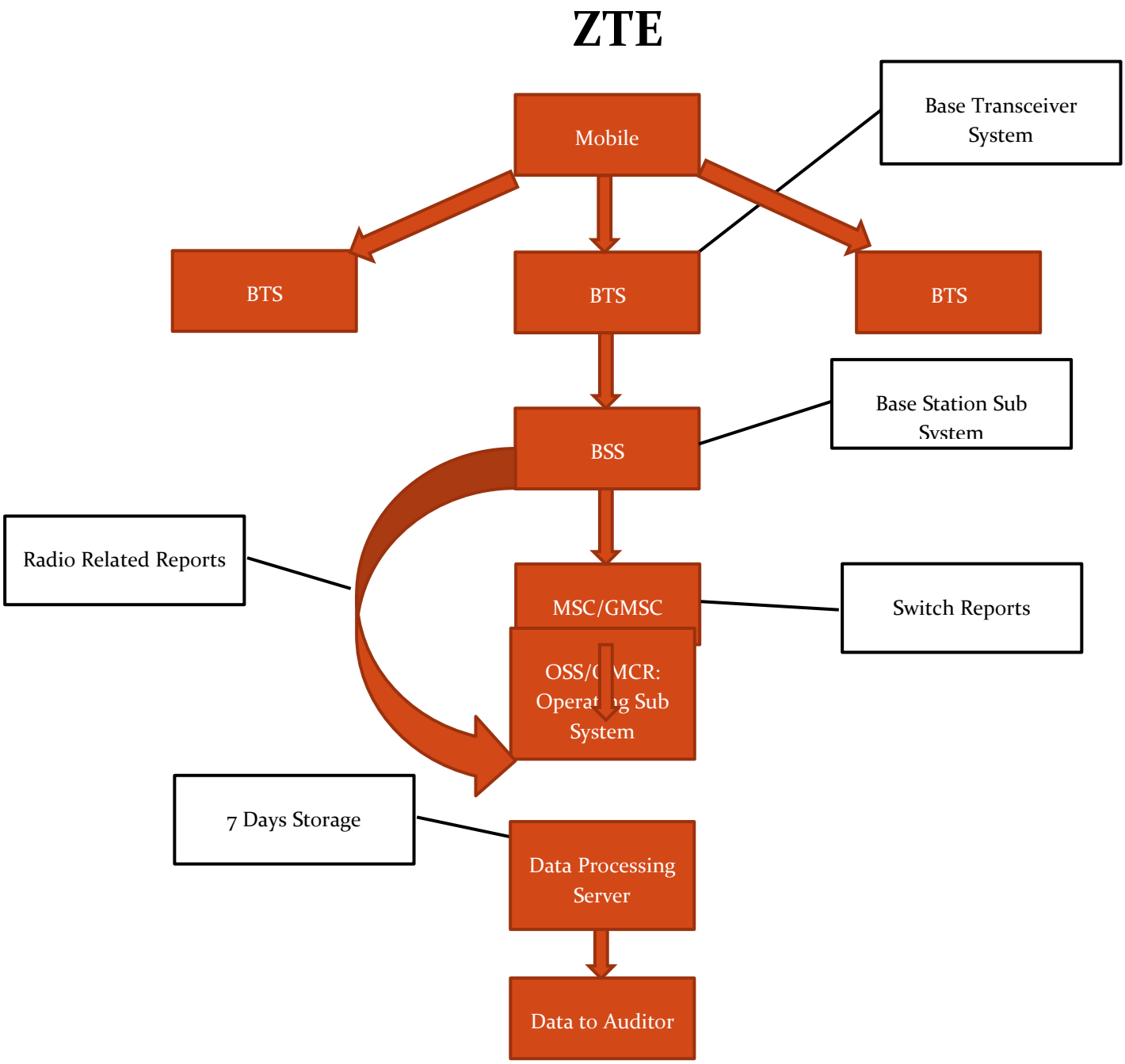
14.2.3 HUAWEI

Huawei provides network support to Uninor in the circle.



14.2.4 ZTE

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



15 ANNEXURE –JULY-2G

1. Network Availability										
Audit Results for Network Availability- PMR data-July										
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		2715	5378	2732	2541	NS	NS	337	1415	4142
Sum of downtime of BTSs in a month (in hours)		8574	3663	26640	2913	NS	NS	154	1041	4386
BTSs accumulated downtime (not available for service)	≤ 2%	0.42%	0.09%	1.31%	0.15%	NS	NS	0.06%	0.10%	0.14%
Number of BTSs having accumulated downtime >24 hours		53	0	52	12	NS	NS	0	0	18
Worst affected BTSs due to downtime	≤ 2%	1.95%	0.00%	1.90%	0.47%	NS	NS	0.00%	0.00%	0.43%
Live Measurement Results for Network Availability- 3 Day live data-July										
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		2715	5375	2731	2541	NS	NS	337	1415	4142
Sum of downtime of BTSs in a month (in hours)		1067	268	206	162	NS	NS	16	69	436
BTSs accumulated downtime (not available for service)	≤ 2%	0.55%	0.07%	0.10%	0.09%	NS	NS	0.07%	0.07%	0.15%
Number of BTSs having accumulated downtime >24 hours		8	0	0	5	NS	NS	0	0	1
Worst affected BTSs due to downtime	≤ 2%	0.29%	0.00%	0.00%	0.20%	NS	NS	0.00%	0.00%	0.02%

2. Connection Establishment (Accessibility)										
Audit Results for CSSR, SDCCH and TCH congestion- PMR data-July										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	97.30%	96.10%	97.66%	99.43%	NS	NS	98.57%	98.50%	98.85%
SDCCH/Paging channel congestion	≤ 1%	0.48%	0.56%	0.50%	0.11%	NS	NS	NA	0.20%	0.53%
TCH congestion	≤ 2%	1.95%	1.84%	1.58%	0.12%	NS	NS	0.01%	0.81%	1.15%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-July										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	97.09%	96.13%	98.54%	99.52%	NS	NS	98.59%	98.49%	99.76%
SDCCH/Paging channel congestion	≤ 1%	0.35%	0.40%	0.38%	0.03%	NS	NS	NA	0.03%	0.37%
TCH congestion	≤ 2%	1.88%	1.80%	0.46%	0.03%	NS	NS	0.01%	0.74%	0.24%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-July										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of call attempts		400	483	435	402	NS	NS	275	316	448
Total number of successful calls established		397	478	433	402	NS	NS	275	315	447
CSSR	≥ 95%	99.25%	98.96%	99.54%	100.00%	NS	NS	100.00%	99.68%	99.78%
%age blocked calls		0.75%	1.04%	0.46%	0.00%	NS	NS	0.00%	0.32%	0.22%

3. Connection Maintenance (Retainability)										
Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-July										
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		84028163	384453943	105470581	59650297	NS	NS	3603281	51394283	131965418
Total number of calls dropped		1052125	4432359	1087541	177664	NS	NS	17590	233075	1282058
Call drop rate	≤ 2%	1.25%	1.15%	1.03%	0.30%	NS	NS	0.49%	0.45%	0.97%
Total number of cells in the network		7955	17202	8568	7632	NS	NS	1035	4277	12394
Total number of cells having more than 3% TCH		783	281	111	20	NS	NS	30	69	334
Worst affected cells having more than 3% TCH	≤ 3%	9.84%	1.63%	1.29%	0.26%	NS	NS	2.94%	1.61%	2.69%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-July										
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		8145052	36867983	103378004	67790014	NS	NS	353751	4839382	160861771
Total number of calls dropped		102316	420571	508393	186039	NS	NS	1680	22484	1242267
Call drop rate	≤ 2%	1.26%	1.14%	0.49%	0.27%	NS	NS	0.47%	0.46%	0.77%
Total number of cells in the network		7955	17211	8565	7632	NS	NS	1035	4277	12394
Total number of cells having more than 3% TCH		926	281	103	5	NS	NS	31	69	327
Worst affected cells having more than 3% TCH	≤ 3%	11.65%	1.63%	1.20%	0.06%	NS	NS	3.00%	1.61%	2.64%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-July										
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		397	478	433	402	NS	NS	275	317	447
Total number of calls dropped		3	4	0	0	NS	NS	0	0	0
Call drop rate	≤ 2%	0.76%	0.84%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%

4. Voice quality										
Audit Results for Voice quality -PMR Data-July										
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		14198499151	67962791467	5711505568	7985683555	NS	NS	4927160642	10773169828	24988026517
Total number of calls with good voice quality		13604571473	65277176851	5497273826	7637965584	NS	NS	4840721054	10493402419	24400242059
%age calls with good voice quality	≥ 95%	95.82%	96.05%	96.25%	95.65%	NS	NS	98.25%	97.40%	97.65%
Live measurement results for Voice quality-3 Day data-July										
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1401339193	6585456001	679546070	850704838	NS	NS	501305157	1056019307	2746047006
Total number of calls with good voice quality		1344415033	6329712186	658195988	815627507	NS	NS	481629764	1029040269	2688790828
%age calls with good voice quality	≥ 95%	95.94%	96.12%	96.86%	95.88%	NS	NS	96.08%	97.45%	97.91%
Drive test results for Voice quality (Average of three drive tests) - DT data-July										
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		649873	128151	73955	709644	NS	NS	NA	551752	825519
Total number of calls with good voice quality		622627	122435	72331	695857	NS	NS	NA	541545	778729
%age calls with good voice quality	≥ 95%	95.81%	95.54%	97.80%	98.06%	NS	NS	99.27%	98.15%	94.33%

5. POI Congestion										
Audit Results for POI Congestion- PMR data-July										
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		115	21	13	72	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	1	0	NS	NS	0	0	0
Total Capacity of all POIs (A) - in erlangs		791	105733	49000	52415	NS	NS	13595	14675	140734
Traffic served for all POIs (B)- in erlangs		457	69253	41142	31875	NS	NS	4803	6862	69320
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-July										
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		115	21	13	72	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	1	0	NS	NS	0	0	0
Total Capacity of all POIs (A) - in erlangs		787	105677	49000	52399	NS	NS	13595	14654	140734
Traffic served for all POIs (B)- in erlangs		210	69194	40886	14271	NS	NS	3033	3105	65733
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%

16 ANNEXURE – AUGUST-2G

1. Network Availability										
Audit Results for Network Availability- PMR data-August										
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		2709	5413	2673	2611	NS	NS	336	1415	4142
Sum of downtime of BTSs in a month (in hours)		12344	3336	24628	5421	NS	NS	227	530	4158
BTSs accumulated downtime (not available for service)	≤ 2%	0.61%	0.08%	1.24%	0.28%	NS	NS	0.09%	0.05%	0.13%
Number of BTSs having accumulated downtime >24 hours		52	1	53	36	NS	NS	0	1	20
Worst affected BTSs due to downtime	≤ 2%	1.92%	0.02%	1.98%	1.38%	NS	NS	0.00%	0.07%	0.48%
Live Measurement Results for Network Availability- 3 Day live data-August										
	Benchmark	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Number of BTSs in the licensed service area		2709	5408	2673	2611	NS	NS	336	1415	4142
Sum of downtime of BTSs in a month (in hours)		1414	233	390	345	NS	NS	13	111	339
BTSs accumulated downtime (not available for service)	≤ 2%	0.73%	0.06%	0.20%	0.18%	NS	NS	0.05%	0.11%	0.11%
Number of BTSs having accumulated downtime >24 hours		8	0	0	4	NS	NS	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.30%	0.00%	0.00%	0.15%	NS	NS	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)										
Audit Results for CSSR, SDCCH and TCH congestion- PMR data-August										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	97.23%	96.04%	98.33%	99.64%	NS	NS	98.38%	98.73%	99.25%
SDCCH/Paging channel congestion	≤ 1%	0.36%	0.38%	0.61%	0.04%	NS	NS	NA	0.21%	0.28%
TCH congestion	≤ 2%	1.96%	1.77%	1.67%	0.07%	NS	NS	0.16%	0.59%	0.75%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-August										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	97.08%	96.04%	98.35%	99.67%	NS	NS	98.35%	98.81%	99.83%
SDCCH/Paging channel congestion	≤ 1%	0.45%	0.39%	0.42%	0.03%	NS	NS	NA	0.08%	0.76%
TCH congestion	≤ 2%	1.93%	1..59%	1.23%	0.04%	NS	NS	0.19%	0.50%	0.17%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-August										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of call attempts		72	221	705	40	NS	NS	NA	165	175
Total number of successful calls established		72	221	702	40	NS	NS	NA	164	173
CSSR	≥ 95%	100.00%	100.00%	99.57%	100.00%	NS	NS	NA	99.39%	98.86%
%age blocked calls		0.00%	0.00%	0.43%	0.00%	NS	NS	NA	0.61%	1.14%

3. Connection Maintenance (Retainability)										
Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-August										
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		77931627	353703076	122729253	56962850	NS	NS	3061382	50299537	133762385
Total number of calls dropped		989587	4406300	1214103	172022	NS	NS	15791	217663	1039372
Call drop rate	≤ 2%	1.27%	1.25%	0.99%	0.30%	NS	NS	0.52%	0.43%	0.78%
Total number of cells in the network		7939	17352	8585	7842	NS	NS	1032	4277	12394
Total number of cells having more than 3% TCH		815	275	208	14	NS	NS	24	66	276
Worst affected cells having more than 3% TCH	≤ 3%	10.26%	1.58%	2.42%	0.18%	NS	NS	2.35%	1.54%	2.23%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-August										
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		8720631	33762963	168181676	69389883	NS	NS	325327	4812698	164853382
Total number of calls dropped		105156	405604	1549575	197233	NS	NS	1623	21993	1067848
Call drop rate	≤ 2%	1.21%	1.20%	0.92%	0.28%	NS	NS	0.50%	0.46%	0.65%
Total number of cells in the network		7939	17334	8586	7842	NS	NS	1032	4277	12394
Total number of cells having more than 3% TCH		986	282	185	5	NS	NS	29	73	277
Worst affected cells having more than 3% TCH	≤ 3%	12.42%	1.63%	2.15%	0.07%	NS	NS	2.81%	1.70%	2.24%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-August										
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		72	219	704	61	NS	NS	NA	164	173
Total number of calls dropped		0	2	2	0	NS	NS	NA	1	0
Call drop rate	≤ 2%	0.00%	0.91%	0.28%	0.00%	NS	NS	NA	0.61%	0.00%

4. Voice quality										
Audit Results for Voice quality -PMR Data-August										
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		13494051253	673857851593	5753110777	8303830636	NS	NS	4768000830	10914101482	25150592289
Total number of calls with good voice quality		12938370306	647029999947	5537262005	7937096693	NS	NS	4684111388	10639527828	24581557286
%age calls with good voice quality	≥ 95%	95.88%	96.02%	96.25%	95.58%	NS	NS	98.24%	97.48%	97.74%
Live measurement results for Voice quality-3 Day data-August										
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		1247834964	6591518235	681475952	877032508	NS	NS	466349674	1047589577	27950972102
Total number of calls with good voice quality		1197112845	6335984285	659816503	840353268	NS	NS	458061197	1021805885	27346691118
%age calls with good voice quality	≥ 95%	95.94%	96.12%	96.82%	95.82%	NS	NS	98.22%	97.54%	97.84%
Drive test results for Voice quality (Average of three drive tests) - DT data-August										
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		112851	40936	161859	95153	NS	NS	NA	270681	272276
Total number of calls with good voice quality		109720	39167	157852	94490	NS	NS	NA	267157	269005
%age calls with good voice quality	≥ 95%	97.23%	95.68%	97.52%	99.30%	NS	NS	NA	98.70%	98.80%

5. POI Congestion										
Audit Results for POI Congestion- PMR data-August										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		109	22	15	72	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	0	0	NS	NS	0	0	1
Total Capacity of all POIs (A) - in erlangs		688	107059	44000	54852	NS	NS	13592	14770	141374
Traffic served for all POIs (B)- in erlangs		410	68540	41302	32177	NS	NS	4922	6502	74588
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-August										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		108	22	15	72	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	0	0	NS	NS	0	0	1
Total Capacity of all POIs (A) - in erlangs		685	105733	41000	50269	NS	NS	13591	11563	141374
Traffic served for all POIs (B)- in erlangs		200	68240	23832	14197	NS	NS	3001	3001	73320
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%

17 ANNEXURE – SEPTEMBER-2G

1. Network Availability

Audit Results for Network Availability- PMR data-September

	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA
Number of BTSs in the licensed service area		2713	5432	2867	2631	NS	NS	336
Sum of downtime of BTSs in a month (in hours)		6839	2946	32149	3686	NS	NS	160
BTSs accumulated downtime (not available for service)	≤ 2%	0.35%	0.08%	1.56%	0.19%	NS	NS	0.07%
Number of BTSs having accumulated downtime >24 hours		53	1	52	13	NS	NS	0
Worst affected BTSs due to downtime	≤ 2%	1.95%	0.02%	1.81%	0.49%	NS	NS	0.00%

Live Measurement Results for Network Availability- 3 Day live data-September

	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA
Number of BTSs in the licensed service area		2713	5431	2867	2631	NS	NS	336
Sum of downtime of BTSs in a month (in hours)		726	363	8607	406	NS	NS	15
BTSs accumulated downtime (not available for service)	≤ 2%	0.37%	0.09%	4.17%	0.21%	NS	NS	0.06%
Number of BTSs having accumulated downtime >24 hours		5	0	0	5	NS	NS	0
Worst affected BTSs due to downtime	≤ 2%	0.18%	0.00%	0.00%	0.19%	NS	NS	0.00%

2. Connection Establishment (Accessibility)										
Audit Results for CSSR, SDCCH and TCH congestion- PMR data-September										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	97.39%	96.14%	98.05%	99.62%	NS	NS	98.52%	99.03%	99.33%
SDCCH/Paging channel congestion	≤ 1%	0.47%	0.33%	0.57%	0.09%	NS	NS	0.00%	0.06%	0.47%
TCH congestion	≤ 2%	1.94%	1.69%	1.95%	0.10%	NS	NS	0.07%	0.36%	0.67%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-September										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	97.86%	95.82%	98.74%	99.75%	NS	NS	98.69%	98.87%	99.87%
SDCCH/Paging channel congestion	≤ 1%	0.26%	0.37%	0.32%	0.04%	NS	NS	0.00%	0.09%	0.15%
TCH congestion	≤ 2%	1.83%	1.68%	0.26%	0.02%	NS	NS	0.00%	0.51%	0.13%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-September										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of call attempts		397	447	435	398	NS	NS	177	324	469
Total number of successful calls established		397	445	433	398	NS	NS	177	323	468
CSSR	≥ 95%	100.00%	99.55%	99.54%	100.00%	NS	NS	100.00%	99.69%	99.79%
%age blocked calls		0.00%	0.45%	0.46%	0.00%	NS	NS	0.00%	0.31%	0.21%

3. Connection Maintenance (Retainability)										
Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-September										
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		83319064	334561991	77887774	55276705	NS	NS	2573380	50775002	132771262
Total number of calls dropped		986632	4030235	1082657	152584	NS	NS	11531	182826	953800
Call drop rate	≤ 2%	1.18%	1.20%	1.39%	0.28%	NS	NS	0.45%	0.36%	0.72%
Total number of cells in the network		7954	17439	8604	7902	NS	NS	1032	4274	12395
Total number of cells having more than 3% TCH		807	281	183	11	NS	NS	19	57	271
Worst affected cells having more than 3% TCH	≤ 3%	10.15%	1.61%	2.13%	0.14%	NS	NS	1.87%	1.34%	2.18%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-September										
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		8071336	34213261	105382457	68792151	NS	NS	273858	4354130	165710566
Total number of calls dropped		93919	418510	546532	193675	NS	NS	1231	17611	1058172
Call drop rate	≤ 2%	1.16%	1.22%	0.52%	0.28%	NS	NS	0.45%	0.40%	0.64%
Total number of cells in the network		7954	17439	8604	7902	NS	NS	1032	4274	12395
Total number of cells having more than 3% TCH		997	280	102	4	NS	NS	22	73	258
Worst affected cells having more than 3% TCH	≤ 3%	12.53%	1.60%	1.19%	0.05%	NS	NS	2.16%	1.70%	2.08%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-September										
Call drop rate	**Benchmark**	**Aircel**	**Airtel**	**BSNL**	**Idea**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of calls established		397	445	433	398	NS	NS	177	324	468
Total number of calls dropped		9	1	4	0	NS	NS	0	0	0
Call drop rate	≤ 2%	2.27%	0.22%	0.92%	0.00%	NS	NS	0.00%	0.00%	0.00%

4. Voice quality										
Audit Results for Voice quality -PMR Data-September										
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		12240293646	67399331607	5534409164	7924828508	NS	NS	4265792124	9950074622	24327881682
Total number of calls with good voice quality		11757123409	64717733921	5335369200	7581931951	NS	NS	4190740547	9718737271	23805552069
%age calls with good voice quality	≥ 95%	96.05%	96.02%	96.40%	95.67%	NS	NS	98.24%	97.68%	97.85%
Live measurement results for Voice quality-3 Day data-September										
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1230700939	6702986026	696629797	874875766	NS	NS	450055357	953105154	2868276065
Total number of calls with good voice quality		1182036185	6436821944	675088452	839424952	NS	NS	442178408	931785490	2808804544
%age calls with good voice quality	≥ 95%	96.05%	96.03%	96.91%	95.95%	NS	NS	98.25%	97.76%	97.93%
Drive test results for Voice quality (Average of three drive tests) - DT data-September										
Voice quality	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		634462	100735	193871	674894	NS	NS	NA	639938	1132476
Total number of calls with good voice quality		612039	96003	191280	656097	NS	NS	NA	627119	1098491
%age calls with good voice quality	≥ 95%	96.47%	95.30%	98.66%	97.21%	NS	NS	97.35%	98.00%	97.00%

5. POI Congestion										
Audit Results for POI Congestion- PMR data-September										
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		109	22	15	74	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	0	0	NS	NS	0	0	0
Total Capacity of all POIs (A) - in erlangs		693	111195	49000	55013	NS	NS	13485	15168	141437
Traffic served for all POIs (B)- in erlangs		410	68409	41840	32516	NS	NS	5228	6117	71492
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-September										
POI congestion	Benchmark	Aircel	Airtel	BSNL	Idea	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		109	22	15	74	NS	NS	43	13	50
No. of POIs not meeting benchmark		0	0	0	0	NS	NS	0	0	0
Total Capacity of all POIs (A) - in erlangs		694	111175	49000	55610	NS	NS	13446	15168	141437
Traffic served for all POIs (B)- in erlangs		190	68399	23975	14101	NS	NS	2875	2765	70345
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	NS	NS	0.00%	0.00%	0.00%

18 ANNEXURE –JULY-3G

1. Network Availability					
Audit Results for Network Availability- PMR data-July					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
(Number of Node Bs in the network in the licensed service area		909	2572	911	620
Sum of downtime (i.e. total outage time) of Node Bs		3324	737	0	1375
Node Bs downtime (not available for service)	≤ 2%	0.49%	0.04%	0.00%	0.30%
Number of Node Bs having accumulated downtime of >24 hours in a month		12	0	0	7
Worst affected Node Bs due to downtime	≤ 2%	1.32%	0.00%	0.00%	1.13%
Live Measurement Results for Network Availability- 3 Day live data-July					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
(Number of Node Bs in the network in the licensed service area		909	2572	911	620
Sum of downtime (i.e. total outage time) of Node Bs		494	42	0	132
Node Bs downtime (not available for service)	≤ 2%	0.76%	0.02%	0.00%	0.30%
Number of Node Bs having accumulated downtime of >24 hours in a month		6	0	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.66%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)					
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-July					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
CSSR	≥ 95%	98.02%	99.61%	96.91%	97.91%
RRC Congestion	≤ 1%	0.23%	0.03%	0.95%	0.02%
Circuit Switched RAB Congestion	≤ 2%	0.15%	0.19%	0.31%	0.01%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-July					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
CSSR	≥ 95%	96.88%	99.81%	96.87%	95.75%
RRC Congestion	≤ 1%	0.27%	0.03%	0.95%	0.01%
Circuit Switched RAB Congestion	≤ 2%	0.22%	0.42%	0.24%	0.00%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-July					
CSSR	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of RRC attempts (A)		214	316	250	NA
Total number of RRC established (B)		214	310	250	NA
Call setup success rate (B/A*100)	≥ 95%	100.00%	98.10%	100.00%	NA
%age blocked calls		0.00%	1.90%	0.00%	NA

4. Voice quality					
Audit Results for Voice quality -PMR Data-July					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		4542208808213	NA	NA	27498009098
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		4490845425158	NA	NA	27467433600
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.87%	99.25%	NA	99.89%
Live measurement results for Voice quality-3 Day data-July					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		459319952261	NA	NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		454205485695	NA	NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.89%	99.27%	NA	98.16%
Drive test results for Voice quality (Average of three drive tests) - DT data-July					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1054193	1452478	170167	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		1033073	1402361	166173	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.00%	96.55%	97.65%	NA

5. POI Congestion					
Audit Results for POI Congestion- PMR data-July					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	21	13	7
No. of POIs not meeting benchmark		0	0	1	0
Total Capacity of all POIs (A) - in erlangs		0	105733	49000	67971
Traffic served for all POIs (B)- in erlangs		0	69253	41142	26978
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-July					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	21	13	7
No. of POIs not meeting benchmark		0	0	1	0
Total Capacity of all POIs (A) - in erlangs		0	105677	49000	65821
Traffic served for all POIs (B)- in erlangs		0	69194	40786	23864
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

19 ANNEXURE – AUGUST-3G

1. Network Availability					
Audit Results for Network Availability- PMR data-August					
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
(Number of Node Bs in the network in the licensed service area		913	2932	1440	617
Sum of downtime (i.e. total outage time) of Node Bs		4357	228	0	499
Node Bs downtime (not available for service)	≤ 2%	0.64%	0.01%	0.00%	0.11%
Number of Node Bs having accumulated downtime of >24 hours in a month		16	0	0	3
Worst affected Node Bs due to downtime	≤ 2%	1.75%	0.00%	0.00%	0.49%
Live Measurement Results for Network Availability- 3 Day live data-August					
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
(Number of Node Bs in the network in the licensed service area		913	2932	1440	617
Sum of downtime (i.e. total outage time) of Node Bs		464	98	0	16
Node Bs downtime (not available for service)	≤ 2%	0.71%	0.05%	0.00%	0.04%
Number of Node Bs having accumulated downtime of >24 hours in a month		3	0	0	0
Worst affected Node Bs due to downtime	≤ 2%	0.33%	0.00%	0.00%	0.00%

2. Connection Establishment (Accessibility)					
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-August					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
CSSR	≥ 95%	97.17%	99.53%	96.68%	97.15%
RRC Congestion	≤ 1%	0.25%	0.05%	0.75%	0.04%
Circuit Switched RAB Congestion	≤ 2%	0.10%	0.27%	0.80%	0.00%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-August					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
CSSR	≥ 95%	97.58%	99.87%	98.11%	99.86%
RRC Congestion	≤ 1%	0.25%	0.02%	0.88%	0.14%
Circuit Switched RAB Congestion	≤ 2%	0.09%	0.13%	0.63%	0.00%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-August					
CSSR	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of RRC attempts (A)		NA	167	446	NA
Total number of RRC established (B)		NA	164	439	NA
Call setup success rate (B/A*100)	≥ 95%	NA	98.20%	98.43%	NA
%age blocked calls		NA	1.80%	1.57%	NA

3. Connection Maintenance (Retainability)					
Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-August					
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
Total calls successfully established (A) (Number of voice RAB normally released)		9214794	18858470	8125012	3920559
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		100493	76792	61924	5702
Call drop rate (B/A*100)	≤ 2%	1.09%	0.41%	0.76%	0.15%
Total no. of cells in the licensed service area (B)		2738	8739	4409	1835
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		322	134	105	18
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	11.78%	1.53%	2.39%	0.98%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-August					
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
Total calls successfully established (A) (Number of voice RAB normally released)		896335	27983479	15496267	5228595
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		10123	103171	123893	8922
Call drop rate (B/A*100)	≤ 2%	1.13%	0.37%	0.80%	0.17%
Total no. of cells in the licensed service area (B)		2738	8207	2699	1835
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		292	138	28	21
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	10.66%	1.69%	1.04%	1.14%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-August					
Call drop rate	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	164	446	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	0	5	NA
Call drop rate (B/A*100)	≤ 2%	NA	0.00%	1.12%	NA

4. Voice quality					
Audit Results for Voice quality -PMR Data-August					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		5091723189325	NA	NA	27955053073
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		5032799785761	NA	NA	27924226136
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.84%	99.21%	NA	99.89%
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		565704421504	NA	NA	3302796334
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		558935535134	NA	NA	3299361949
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.80%	98.90%	NA	99.90%
Drive test results for Voice quality (Average of three drive tests) - DT data-August					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	845297	196327	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	839469	192424	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	99.31%	98.01%	NA

5. POI Congestion					
Audit Results for POI Congestion- PMR data-August					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	15	7
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	107059	44000	67209
Traffic served for all POIs (B)- in erlangs		0	68540	41302	26324
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-August					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	15	7
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	105733	43000	67074
Traffic served for all POIs (B)- in erlangs		0	68240	23832	26122
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

20 ANNEXURE – SEPTEMBER-3G

2. Connection Establishment (Accessibility)					
Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-September					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
CSSR	≥ 95%	98.43%	99.58%	99.38%	99.98%
RRC Congestion	≤ 1%	0.16%	0.05%	0.62%	0.02%
Circuit Switched RAB Congestion	≤ 2%	0.06%	0.18%	0.81%	0.00%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-September					
	Benchmark	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
CSSR	≥ 95%	98.78%	99.85%	97.61%	99.88%
RRC Congestion	≤ 1%	0.03%	0.02%	1.03%	0.11%
Circuit Switched RAB Congestion	≤ 2%	0.02%	0.07%	0.27%	0.00%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-September					
CSSR	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of RRC attempts (A)		NA	362	289	NA
Total number of RRC established (B)		NA	357	288	NA
Call setup success rate (B/A*100)	≥ 95%	NA	98.62%	99.65%	NA
%age blocked calls		NA	1.38%	0.35%	NA

3. Connection Maintenance (Retainability)					
Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-September					
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
Total calls successfully established (A) (Number of voice RAB normally released)		7527353	NA	7669897	3539553
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		75837	NA	131084	5731
Call drop rate (B/A*100)	≤ 2%	1.01%	0.41%	1.71%	0.16%
Total no. of cells in the licensed service area (B)		2734	8340	4412	1838
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		277	143	106	29
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	10.14%	1.71%	2.41%	1.60%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-September					
	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
Total calls successfully established (A) (Number of voice RAB normally released)		706187	29542760	8665497	4449999
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		7883	110320	147024	6026
Call drop rate (B/A*100)	≤ 2%	1.12%	0.37%	1.70%	0.14%
Total no. of cells in the licensed service area (B)		2734	8340	4412	1838
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		233	146	37	18
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	8.52%	1.75%	0.85%	0.96%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-September					
Call drop rate	Benchmark	Aircel 3G	Airtel 3G	BSNL 3G	Relience 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	3	285	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	0	2	NA
Call drop rate (B/A*100)	≤ 2%	NA	0.00%	0.70%	NA

4. Voice quality					
Audit Results for Voice quality -PMR Data-September					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		4568673309322	NA	NA	25033632108
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		4517536408958	NA	NA	25033632108
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.88%	99.17%	NA	99.90%
Live measurement results for Voice quality-3 Day data-September					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		432261247490	NA	NA	2912400755
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		427644595776	NA	NA	2909537914
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.93%	99.47%	NA	99.90%
Drive test results for Voice quality (Average of three drive tests) - DT data-September					
Voice quality	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	1753019	274797	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	1726330	245363	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	98.48%	89.29%	NA

5. POI Congestion					
Audit Results for POI Congestion- PMR data-September					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	15	7
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	111195	49000	66785
Traffic served for all POIs (B)- in erlangs		0	68409	41840	26223
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-September					
POI congestion	**Benchmark**	**Aircel 3G**	**Airtel 3G**	**BSNL 3G**	**Relience 3G**
Total number of working POIs		0	22	15	7
No. of POIs not meeting benchmark		0	0	0	0
Total Capacity of all POIs (A) - in erlangs		0	111175	49000	66744
Traffic served for all POIs (B)- in erlangs		0	68399	23975	26744
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

21 ABBREVIATIONS

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

1. TRAI – Telecom Regulatory Authority of India
2. QoS – Quality of Service
3. JAS'16 – Refers to the quarter of July, August and September 2016
4. IMRB – Refers to IMRB International, the audit agency for this report
5. SSA – Secondary Switching Area
6. NOC – Network Operation Center
7. OMC – Operations and Maintenance Center
8. MSC – Mobile Switching Center
9. PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

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TRAI AUDIT BROADBAND REPORT – ORISSA - AUDIT OF JAS QUARTER, 2016

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सत्यमेव जयते

Telecom Regulatory Authority of India

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TABLE OF CONTENTS

1. INTRODUCTION

1.1 About TRAI

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

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

TRAI initiated a regulation - The Standards of Quality of Service of Basic Telephone Service (Wire line) and Cellular Mobile Telephone Service Regulations, 2009 (7 of 2009) dated 20thMarch, 2009, the "Standards of Quality of Service for Wireless Data Services Regulations, 2012 dated 4th December 2012, and the "Quality of Service of Broadband Service Regulations", 2006 (11 of 2006) dated 6th October, 2006 that provide the benchmarks for the parameters on customer perception of service to be achieved by service provider.

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

1.2 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).

1.3 COVERAGE

The broadband audit was conducted in Orissa circle. For BSNL, a geographical spread among the SDCAs and POPs was maintained. For other operators, the audit was conducted for all SDCAs at overall level.

1.4 OPERATORS AUDITED DURING THE AUDIT PERIOD

Name of Operator
BSNL
Ortel
Reliance

1.5 AUDIT PROCESS AND OPERATOR SELECTION

As per TRAI guidelines, the Broadband Audit for a circle is conducted once every year.

- The operators have been assimilated as per TRAI guidelines given in QoS tender document 2016 and latest list of licensees (with more than 10,000 subscriber in their LSAs) provided by TRAI.

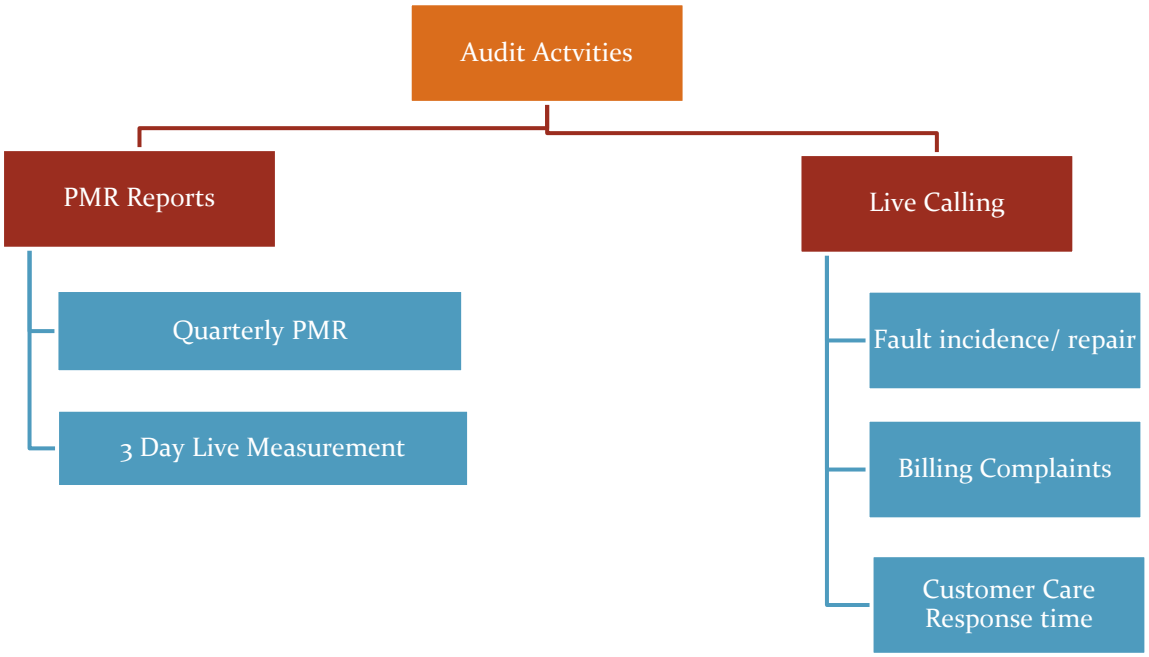
- To conduct the audit, IMRB auditors contacted the broadband operators given in the list below to conduct the audit in ORISSA circle for the JAS 2016 quarter.

- The PMR was generated from the raw data pertaining to July, August and September 2016 (JAS'16), which was extracted by auditor from the operator's systems during the audit conducted in the month of September 2016.

- Live calling activity was carried out during the period of September 2016. The data considered for live calling was for the month prior to the live calling month. In this round of audit, August 2016 data was considered for live calling for all operators whereas live measurement was carried out at the centralized operation centres of the operators, as per tender document.

- 3 day live measurement activity was carried out on working days during the month of September 2016. The data for the last three working days from the date of live measurement was extracted from operator's systems and audited by the auditors.

1.6 FRAMEWORK USED



1.6.1 PMR REPORTS - SIGNIFICANCE AND METHODOLOGY

The significance of PMR or Performance Monitoring Reports is to assess the various Quality of Service (QoS) parameters involved in the Broadband services, which indicate the overall health of service for an operator.

To verify the QoS performance of the operators, TRAI has appointed IMRB as their auditor in East Zone to conduct QoS audit of operators. The steps involved in the audit have been given below.

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

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

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

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

The raw data extracted is then used to generate PMR reports in the following formats.

- Quarterly PMR
- 3 Day Live Measurement Data

Let us understand these formats in detail.

This report has been prepared from the raw data extracted for the period of JAS'16 during October 2016.

1.6.1.1 QUARTERLY PMR REPORT – PARAMETERS REVIEWED

The main purpose of quarterly PMR report is to verify the following key QoS parameters on quarterly basis as per the methodology stated above in section 1.4.

- Service Provisioning
- Fault incidence/clearance related statistic
- Billing Performance (Metering and billing credibility)
- Resolution of billing complaints
- Response time to customer for assistance
- Bandwidth Utilization
- Broadband download speed
- Service Availability/ Uptime
- Network Latency/ Packet Loss

1.6.1.2 3 DAY LIVE MEASUREMENT - SIGNIFICANCE AND METHODOLOGY

The main purpose of 3 day live measurement is to evaluate the following parameters on intraday basis. The auditors visit the sample exchanges (in case of BSNL) and main exchanges (in case of other operators) to collect the 3 day live data for the following parameters.

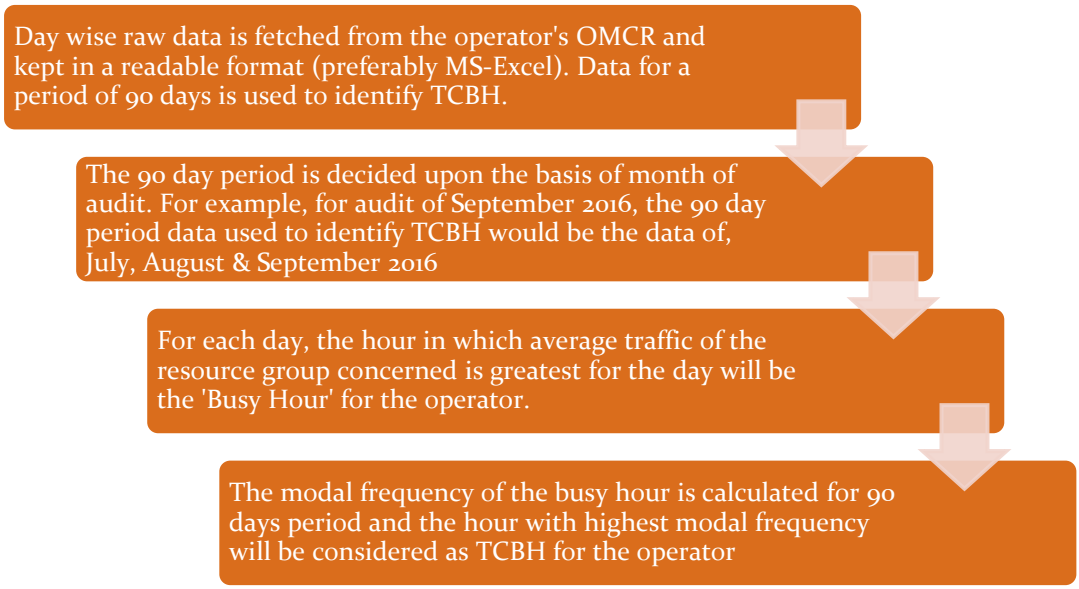
- Bandwidth Utilization
- Broadband download speed
- Service Availability/ Uptime
- Network Latency/ Packet Loss

While the quarterly PMR report provides an overall view of the performance of QoS parameters, the 3 day live data helps looking at intraday performance on the above given parameters. All the calculations are then done on the basis of that raw data of 3 days.

1.6.1.3 TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per QoS regulations 2006 (11 of 2006), Time Consistent Busy Hour" or "TCBH" means the one hour period starting at the same time each day for which the average traffic of the resource group concerned is greatest over the days under consideration and such Time Consistent Busy Hour shall be established on the basis of analysis of traffic data for a period of ninety days.

Step by step procedure to identify TCBH for an operator:



During audit, the auditors identified following TCBHs from the raw data collected from the operators for the quarter of JAS'16.

BSNL	Ortel	Reliance
18:00-19:00	20:00-21:00	19:00-20:00

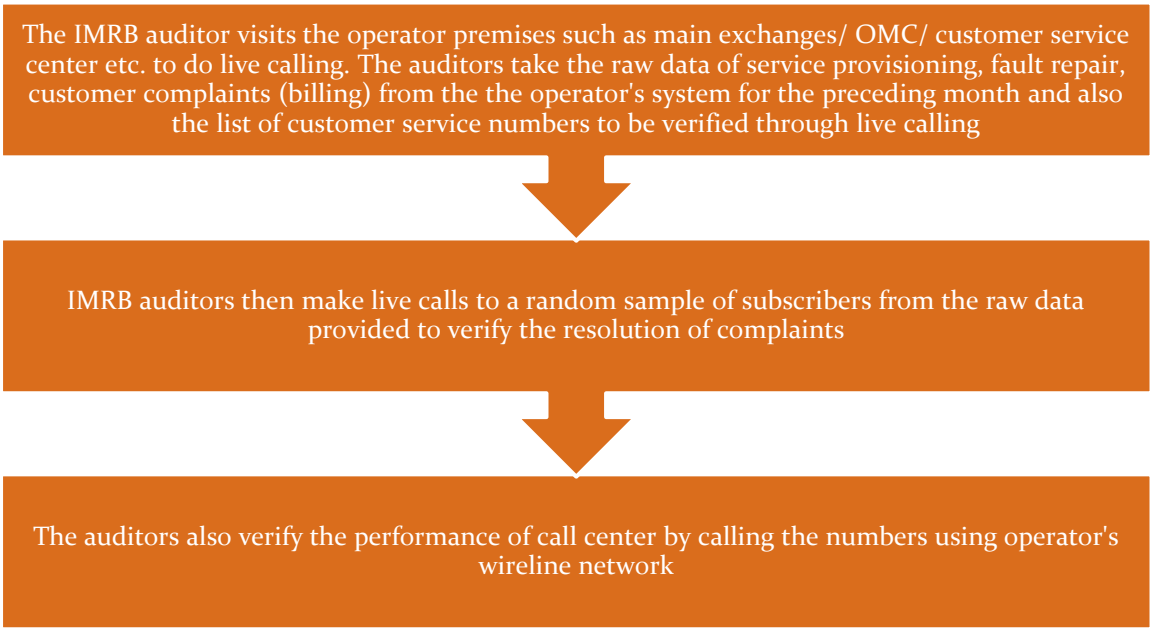
The data for network parameters has been taken as per the TCBH identified by the auditor for the operators.

1.6.2 LIVE CALLING - SIGNIFICANCE AND METHODOLOGY

The main purpose of live calling is to verify the performance of following parameters by doing test calls to the subscribers/ specific numbers.

- Service Provisioning
- Fault incidence/clearance related statistic
- Resolution of billing complaints
- Response time to customer for assistance

The process of conducting live calling has been stated below.



Let us now discuss the methodology of live calling for each parameter in detail.

1.6.2.1 SERVICE PROVISIONING

Live calling for service provisioning is done to verify the following.

- Number of connections provided in 15 days from customer request

Live Calling Process:

- Auditors request the operator to provide the database of all the subscribers who requested for a new connection in one month prior to IMRB auditor visit
- 100 Calls per service provider are made to customers or in case of BSNL, 10% or 30 per SDCA by randomly selecting from the database provided by operator
- Auditors check and record whether the connection was provided to customers within the timeframes as mentioned in the benchmark

Benchmark:

- New connections provided within 15 days: 100%

1.6.2.2 FAULT CLEARANCE

Live calling for fault clearance is done to verify the following.

- Fault repair by next working day
- Fault repair within 3 working days

Live Calling Process:

- Auditors request the operator to provide the database of all the subscribers who reported Faults in one month prior to IMRB auditor visit

- Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.
- Auditors check and record whether the fault was corrected within the timeframes as mentioned in the benchmark

Benchmarks:

- Fault repair by next working day: =>90%
- Fault repair within 3 working days: =>99%

1.6.2.3 RESOLUTION OF BILLING COMPLAINTS

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

- Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically
- A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator
- Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

Benchmarks:

100% complaints resolved within 4 weeks.

1.6.2.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

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

- % age of calls answered by operator (voice to voice) within 60 seconds: In 60% of the cases or more
- % age of calls answered by operator (voice to voice) within 90 seconds: In 80% of the cases or more

The process for this parameter is stated below.

- Overall sample size was 100 calls per service provider per circle at different points of time, evenly distributed across the selected exchanges – 50 calls between 1000 HRS to 1300 HRS and 50 calls between 1500 HRS to 1700 HRS.
- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.
- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.

1.7 SAMPLING METHODOLOGY

- As per audit tender regulations, to conduct the Broadband audit for BSNL, auditors need to devise a sampling plan as given below
  - A minimum sample of 10% Point of Presence (POP) of ISP should be spread across at least 10% of SDCA's in the telecom circle
  - As per TRAI instructions, a DSLAM site was considered as a point of presence for the operator.
- The sampling plan was finalized as per TRAI guidelines. The POP details have been provided below in section 1.6.1 of the report,
- As per tender guidelines, no sampling activity was required in case of operators other than BSNL. Hence, the audit for operators other than BSNL has been conducted by taking the data for entire circle (all exchanges/ POPs combined).

Audit for BSNL has been conducted for the data pertaining to selected POPs in the sampling plan.

1.7.1 SAMPLING PLAN - BSNL

As per sampling criteria, at least 10% POPs to be selected for audit. However, to maintain a geographical spread and due to presence of multiple DSLAM sites at one exchange, the auditors have selected from each SDCA.

Total SDCAs present in the circle: 120
As per sampling criteria, 10% SDCAs selected for audit: 12
A list of the SDCAs selected for audit has been given below.

Orissa
ANGUL
DHENKANAL
PURI
BHUBANESWAR
RAYAGADA
ROURKELA
SAMBALPUR
BALASORE
BHADRAK
BERHAMPUR
BOLANGIR
JAJPUR ROAD

1.7.1.1 SDCA SELECTED AS PER SAMPLING PLAN – BSNL

.

Name of Operator	Customers
BSNL	13904
Ortel	59916
Reliance	24

BSNL	Ortel	Reliance
18:00-19:00	20:00-21:00	19:00-20:00

1.8 COLOUR CODE TO READ THE REPORT

Meeting the benchmark

1.9 AUDIT METHODOLOGY

As per audit tender, following table explains the audit methodology for Broadband services. Here, a YES signifies that the mentioned parameter gets audited by the given audit method (PMR/ Live Measurement/ Live Calling).

	Parameters	Quarterly PMR Data	3 day live measurement	Live calling
1	**Service Provisioning/ Activation time**	YES		YES
2	**Fault Repair/ Restoration Time**	YES		YES
3	**Billing Performance**			
(i)	Billing Complaints per 100 Bills issued	YES		
(ii)	%age of billing complaints resolved in four weeks	YES		Yes
(iii)	Refund of deposits after closure within 60 days	YES		
4	**Response time to the customer for assistance(Voice to Voice)**			
(i)	*Within 60 seconds > 60%*	YES		YES
(ii)	*Within 90 seconds > 80%*	YES		YES
5	**Bandwidth Utilization/ Throughput:**			
	A) Bandwidth Utilization			
-	POP to ISP gateway Node [Intra – network] Links	YES	YES	
-	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for international connectivity	YES	YES	
	B) Broadband Connection Speed (Download)	YES	YES	
6	**Service Availability/Uptime**	YES	YES	
7	**Packet Loss**	YES	YES	
8	**Network Latency for wired broadband access)**			
(i)	*User reference point at POP / ISP Gateway Note to International Gateway (IGSP/NIXI)*	YES	YES	
(ii)	*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	
(iii)	*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	

2. EXECUTIVE SUMMARY

2.1 PMR QUARTERLY DATA – JAS' 2016

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

Parameters	Benchmarks	BSNL	Ortel	Reliance
Service provsioning uptime				
Percentage connections provided within 15 days	100%	87.08%	100.00%	100.00%
Fault repair restoration time				
Percentage faults repaired by next working days	≥ 90%	43.33%	93.60%	NA
Percentage faults repaired within three working days	≥ 99%	83.69%	99.74%	NA
Billing performance				
Billing complaints per 100 bills issued	< 2%	0.00%	0.00%	0.00%
%age of billing complaints resolved in 4 weeks	100%	NA	NA	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	NA	NA	NA
Customer care/helpline assessment (Voice to Voice)				
Percentage calls answered within 60 seconds	≥ 60%	98.59%	100.00%	99.37%
Percentage calls answered within 90 seconds	≥ 80%	98.86%	100.00%	99.46%
Bandwidth utilisation/Throughput				
Intra network links (POP to ISP Node)		1	7	2
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		775	6140.33	110000
Percentage bandwidth utilised on upstream links	< 80%	71.78%	53.24%	39.22%
Broadband download speed	≥ 80%	NP	94.40%	90.82%
Service availability/uptime	≥ 98%	99.80%	99.87%	100.00%
Packet loss	< 1%	NP	0.00%	0.79%
Network Latency				
POP/ISP Node to NIXI	< 120 msec	NP	0.02	1
ISP node to NAP port (Terrestrial)	< 350 msec	NP	0.04	6.67

NA: Parameters not applicable for the operators.

NP: Not Participated

Following are the parameter wise observations for the operators in ORISSA circle.

2.1.1 SERVICE PROVISIONING/ ACTIVATION TIME

As per audit, all operators met the benchmark for providing new connections within 15 days. Except BSNL

2.1.2 FAULT REPAIR/ RESTORATION

The benchmark of repairing 90% faults within the next day expect BSNL and 99% faults within next three days of receiving complaints was met by all operators. Except BSNL.

2.1.3 BILLING PERFORMANCE

As per audit, all operators met the benchmark for metering and billing credibility.

NA: Subscribers of Broadband BSNL, Ortel and Reliance did not log any billing complaints. Hence, resolution of billing complaints is not applicable for the operators.

None of the operators had any billing dispute that required a refund.

2.1.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

All operators met the benchmark for answering 60% calls within 60 seconds and 80% calls within 90 seconds as per audit.

2.1.5 BANDWIDTH UTILIZATION AND THROUGHPUT

All operators met the benchmark for bandwidth utilized on upstream links during audit.

All operators met the benchmark for service availability time as per audit.

NP: Not Participated, BSNL did not submit the data during Audit for Download Speed and packet loss.

2.1.6 NETWORK LATENCY

All operators met the benchmark for Network Latency parameters.

NP: Not Participated, BSNL did not submit the data during Audit for JAS'2016.

2.2 LIVE MEASUREMENT

Parameters	Benchmarks	BSNL	Ortel	Reliance
Bandwidth utilisation/Throughput				
Intra network links (POP to ISP Node)		1	3	2
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		775	4018.667	110000
Percentage bandwidth utilised on upstream links	< 80%	71.78%	53.29%	42.82%
Broadband download speed	≥ 80%	89.83%	92.36%	100.00%
Service availability/uptime	≥ 98%	100.00%	100.00%	100.00%
Packet loss	< 1%	0.05%	0.00%	0.00%
Network Latency				
POP/ISP Node to NIXI	< 120 msec	0.054	0.025	1.45
ISP node to NAP port (Terrestrial)	< 350 msec	0.112	0.07	1.92

2.2.1 BANDWIDTH UTILIZATION AND THROUGHPUT

All operators met the benchmark for bandwidth utilized on upstream links during live measurement.

All operators met the benchmark for service availability time as per audit.

2.2.2 NETWORK LATENCY

During live measurement, all operators met the benchmark for network latency parameters.

2.3 LIVE CALLING

Parameters	Benchmarks	BSNL	Ortel	Reliance
Service provsioning uptime				
Percentage connections provided within 15 days	100%	86.05%	88.00%	NA
Fault repair restoration time				
Percentage faults repaired by next working days	≥ 90%	80.53%	86.67%	NA
Percentage faults repaired within three working days	≥ 99%	69.91%	86.67%	NA
Billing performance				
%age of billing complaints resolved in 4 weeks	100%	NA	NA	NA
Customer care/helpline assessment (Voice to Voice)				
Percentage calls answered within 60 seconds	≥ 60%	96.00%	100.00%	100.00%
Percentage calls answered within 90 seconds	≥ 80%	100.00%	100.00%	100.00%

NA: Parameters not applicable for the operators.

2.3.1 SERVICE PROVISIONING/ ACTIVATION TIMES

All operators met the benchmark of providing 100% new connections within the TRAI stipulated timeline of 15 days, except BSNL and Ortel

2.3.2 FAULT REPAIR/ RESTORATION

All operators met the benchmark of repairing 90% faults within next working day as well repairing 99% faults within 3 days whereas BSNL failed to meet for repairing 90% faults, BSNL and Ortel failed to meet the benchmark for 99% faults within 3 working days.

2.3.3 BILLING PERFORMANCE

NA: Live calling for BSNL, Ortel and Reliance for 'resolution of billing complaints' has not been conducted due to very low/ zero base of billing complaints for the operators

2.3.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

As per live calling, all operators met the benchmarks of customer care for %age call answered within 60 seconds and 90 seconds.

3. CRITICAL FINDINGS

Service Provisioning/ Activation Time

- As per audit, all operators met the benchmark for providing new connections within 15 days. Except BSNL

Fault Repair/ Restoration

- The benchmark of repairing 90% faults within the next day expect BSNL and 99% faults within next three days of receiving complaints was met by all operators. Except BSNL.

Billing Performance

- As per audit, all operators met the benchmark for metering and billing credibility.

NA: Subscribers of Broadband BSNL, Ortel and Reliance did not log any billing complaints. Hence, resolution of billing complaints is not applicable for the operators.

- None of the operators had any billing dispute that required a refund.

Response time to customer for assistance

- All operators met the benchmark for answering 60% calls within 60 seconds and 80% calls within 90 seconds as per PMR audit as well as live calling.

Bandwidth Utilization and Throughput

- All operators met the benchmark for bandwidth utilized on upstream links during audit.
- All operators met the benchmark for service availability time as per audit.

NP: Not Participated, BSNL did not submit the data during Audit for Download Speed and packet loss.

Network Latency

- All operators met the benchmark for Network Latency parameters.

NP: Not Participated, BSNL did not submit the data during Audit for JAS'2016.

4. DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA AND LIVE MEASUREMENT/ CALLING DATA

4.1 SERVICE PROVISIONING/ ACTIVATION TIME

4.1.1 PARAMETER EXPLANATION

4.1.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to number of applications received at the service provider's level in the following time frames:-

- Number of applications received at the service provider's level
- Number of connections provided within 15 days
- Number of connections provided after 15 days

Live Calling: -

- At least 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days

Data for the parameter was extracted from OMC (Operations and Maintenance Center) of the operators.

4.1.1.2 COMPUTATIONAL METHODOLOGY

- Technically Non Feasible (TNF) cases such as unavailability of Broadband infrastructure/ equipment in the Area or Spare Capacity i.e. Broadband Ports including equipment to be installed at the customer premises for activating Broadband connection were excluded from the calculation of this parameter.

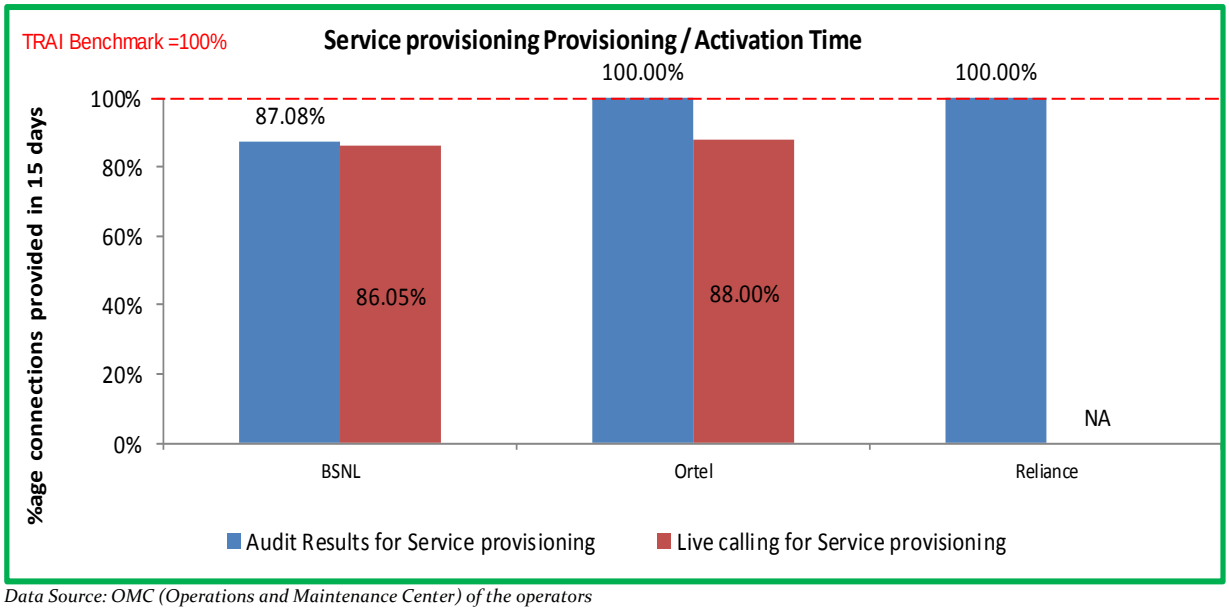
- Also, problems relating to customer owned equipment such as PC, LAN Card/ USB Port and internal wiring or non-availability of such equipment were excluded from the calculation of this parameter.

Percentage connections provided within X working days = *No of connections provided within X working days/ Total number of connections registered during the period * 100*

4.1.1.3 BENCHMARK

100 % cases in =<15 working days.

4.1.2 DETAILED FINDINGS - SERVICE PROVISONING



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

As per audit, all operators met the benchmark for providing new connections within 15 days as per PMR audit, however as per live calling BSNL and Ortel failed to meet the benchmark.

4.2 FAULT REPAIR/ RESTORATION TIME

4.2.1 PARAMETER EXPLANATION

4.2.1.1 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to number of fault received and also number of faults cleared at the service provider's level in the following time frames:-

- Number of faults cleared within 24 hours
- Number of cleared in more than 1 day but less than 3 days
- Number of cleared in more than 3 days

Live calling: -

- Live calling is done to verify 'Fault repair by next working day', 'Fault repair within 3 working days' and 'Fault repair in more than 3 working days'
- Interviewers ensure that operator provided a list of all the subscribers who reported Faults in one month prior to IMRB staff visit
- Calls are made to up to 10% or 100 complainants, whichever is less, per service provider or in case of BSNL, if there are more than 1 SDCAs selected for the sample, 10% or 30 complainants per sample SDCA by randomly selecting from the list provided by operator.
- Auditors check and record whether the fault was corrected within the timeframes as mentioned in the benchmark

Data for the parameter was extracted from OMC (Operations and Maintenance Center) of the operators.

4.2.1.2 COMPUTATIONAL METHODOLOGY

- The time period for fault repair starts from the time when the fault is reported to the service provider either through customer care help line or in person by the subscriber

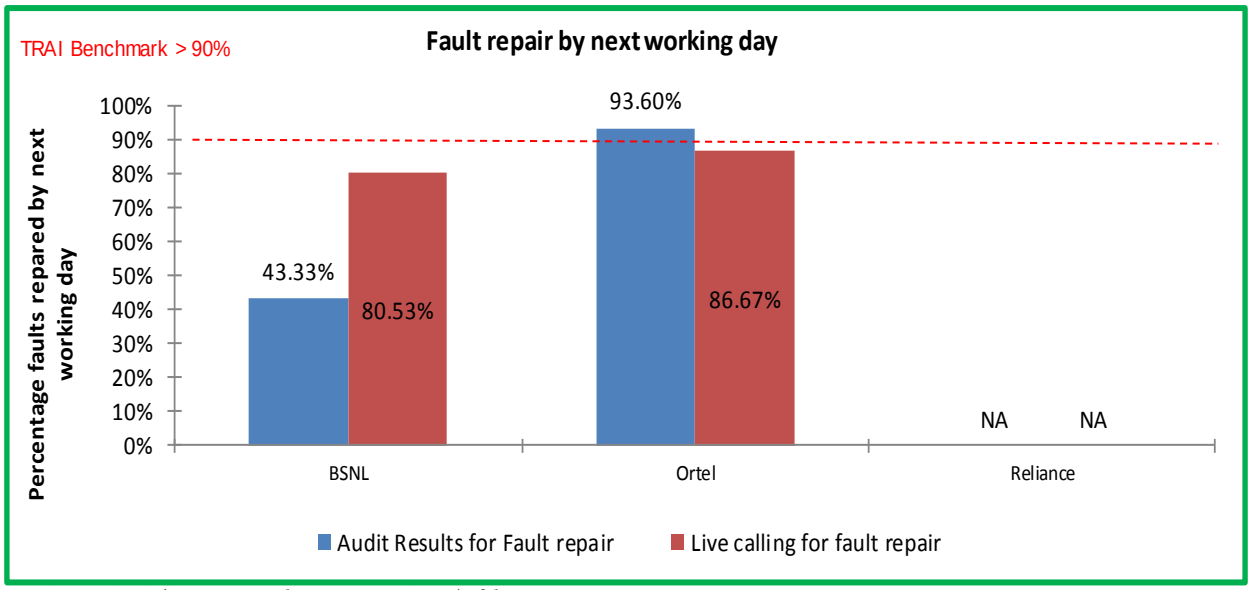
- Only the complaints registered till the close of the business hours of the day are to be taken into account. All the complaints registered after the business hours are to be considered as being registered in the next day business hours

Fault incidence = *(Total no of faults repaired in X working days /Total number of faults reported during the period)*100*

4.2.1.3 BENCHMARK

- By next working day: > 90% and within 3 working days: 99%.

4.2.2 DETAILED FINDINGS - FAULT REPAIR WITHIN NEXT WORKING DAY

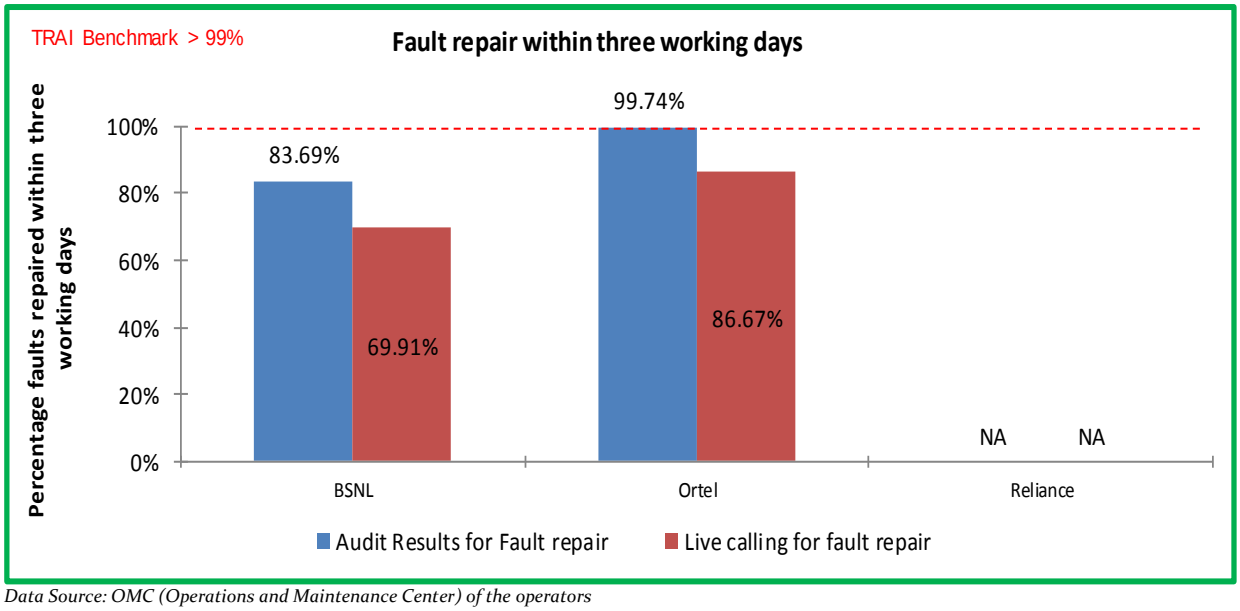


Data Source: OMC (Operations and Maintenance Center) of the operators

The benchmark of repairing 90% faults within the next day of receiving complaints was met by all operators as per audit except BSNL. However, as per live calls made to subscribers, BSNL and Ortel remained short of the benchmark for the parameter.

NA: No faults Registered.

4.2.3 DETAILED FINDINGS - FAULT REPAIR WITHIN 3 WORKING DAYS



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

All operators met the benchmark for repairing 99% faults within three working days as per audit data, except BSNL. However, as per live calls made to subscribers, BSNL and Ortel remained short of the benchmark for the parameter.

NA: No faults Registered.

4.3 METERING AND BILLING CREDIBILITY

4.3.1 PARAMETER EXPLANATION – BILLING COMPLAINTS

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

- Payments made and not credited to the subscriber account
- Payment made on time but late payment charge levied wrongly
- Double charges
- Credit agreed to be given in resolution of complaint, but not accounted in the bill
- Charging for services provided without consent
- Charging not as per tariff plans
- Overcharging or undercharging

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

4.3.1.1 AUDIT PROCEDURE

IMRB Auditors to verify and collect data pertaining to –

- Number of Billing complaints received at the service provider's level
- Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled.
- Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills
- Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, Payment made in time but charged penalty/ not reflected in next bill, Last payment not reflected in bill, Adjustment/ waiver not done, Anything else related to bills, Toll free numbers charged etc.
- Billing complaints resolution database, with opening and closing date of complaint to identify the time taken to resolve a complaint

Live calling:

- Auditors request the operator provided the database of all the subscribers who reported billing complaints in one month prior to IMRB auditor visit. In case of BSNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically. In case the sample data is too low to fulfill the target calls, auditors may call subscribers whose complaints got resolved in other months of the same audit period.
- A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator
- Calls are made by auditors to the sample of subscribers to check and record whether the complaint was resolved within the timeframes as mentioned in the benchmark.

Raw data for the parameter was extracted from central billing center of the operators.

4.3.1.2 COMPUTATIONAL METHODOLOGY – METERING AND BILLING CREDIBILITY

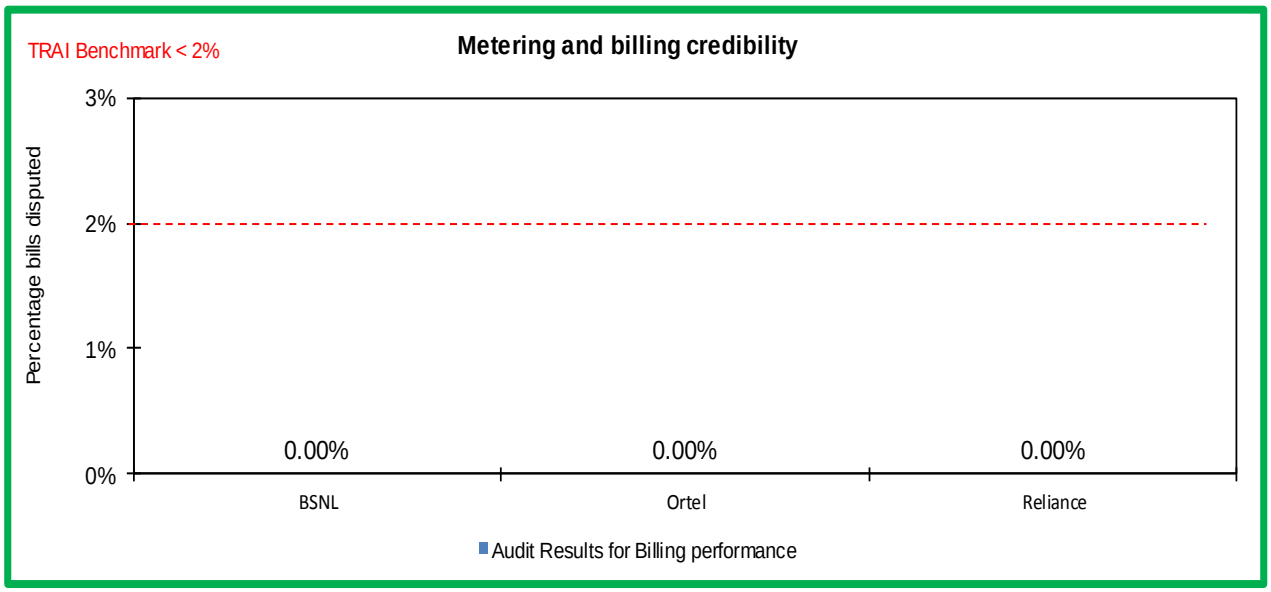
The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) was followed to calculate incidence of billing complaints.

$$\text{Billing complaints (\%)} = \frac{\text{total number of disputed bills X 100}}{\text{total number of bills issued during one billing cycle.}}$$

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

TRAI Benchmark: <= 2%

4.3.1.3 METERING AND BILLING CREDIBILITY – AUDIT FINDINGS



Data Source: Billing Center of the operators

All operators met the benchmark for the parameter.

4.3.1.4 COMPUTATIONAL METHODOLOGY – RESOLUTION OF BILLING COMPLAINTS

- **Calculation of Percentage resolution of billing complaints**

The calculation methodology (given below) as per QoS regulations 2009 (7 of 2009) and TRAI guidelines (Received on Sep 08, 2014) was followed to calculate resolution of billing complaints.

Resolution of billing complaints within 4 weeks:

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

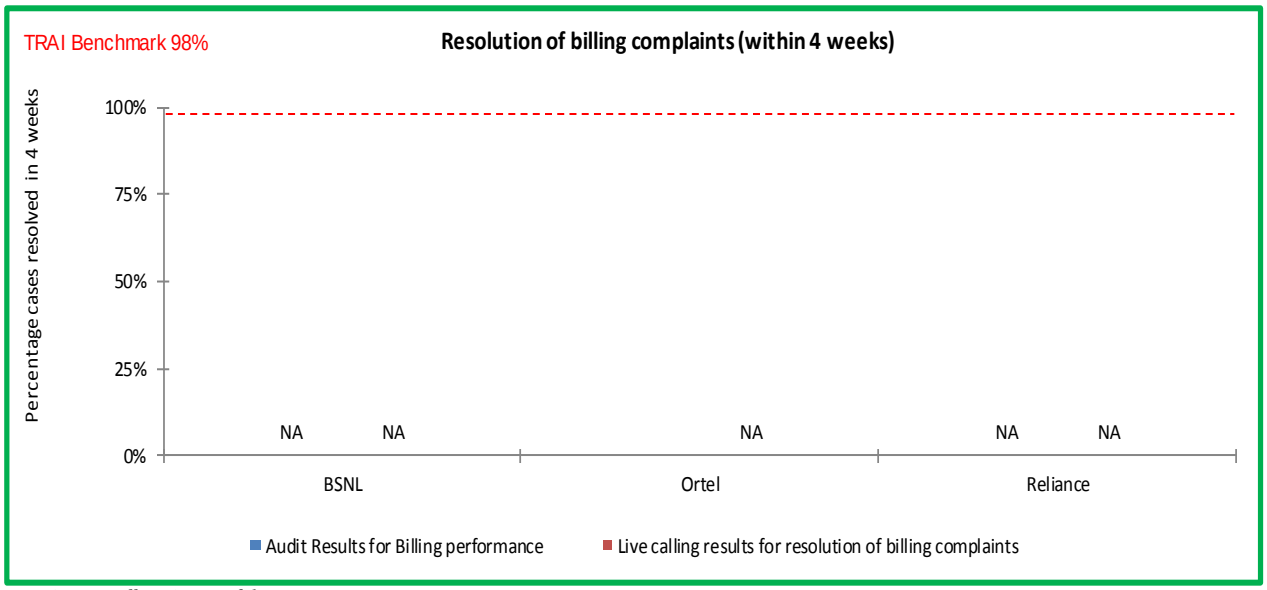
$$\frac{\text{number of billing complaints for post-paid customers/charging, credit/ validity complaints for pre-paid customers resolved within 4 weeks during the quarter}}{\text{number of billing/charging, credit / validity complaints received during the quarter}} \times 100$$

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

- *** Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.

Benchmark: 100% complaints resolved within 4 weeks.

4.3.1.5 RESOLUTION OF BILLING 4 COMPLAINTS – AUDIT FINDINGS



Data Source: Billing Center of the operators

NA: Subscribers of Broadband BSNL, Ortel and Reliance did not log any billing complaints. Hence, resolution of billing complaints is not applicable for the operators. Also, live calling for resolution of billing complaints for BSNL, ortel and Reliance have not been conducted due to low/ zero base billing complaints for the operators.

4.4 TIME TAKEN TO REFUND AFTER CLOSURE

4.4.1 PARAMETER EXPLANATION

4.4.1.1 AUDIT PROCEDURE

IMRB Auditors collected and verified data pertaining to -

- Number of cases requiring refund of deposits
- Number of cases where refund was made within 60 days
- %age cases where refund was made within 60 days.

Data for the parameter was extracted from central billing center of the operators.

4.4.1.2 COMPUTATIONAL METHODOLOGY

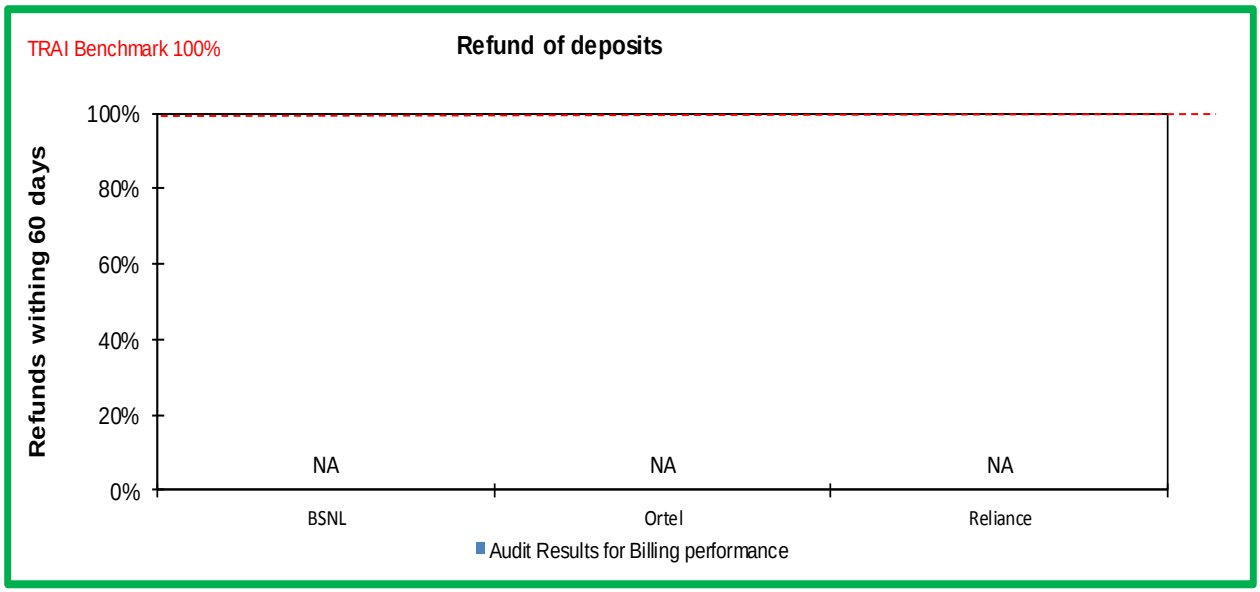
- Date of closure is considered to be the date on which the connection is discontinued in the service provider database of active customers

Time taken to refund = Date of refund – Date of closure

4.4.1.3 BENCHMARK

- 100% cases in less than 60 days

4.4.2 DETAILED FINDINGS - REFUND OF DEPOSITS



NA: No cases where a refund was applicable.

4.5 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

4.5.1 PARAMETER EXPLANATION

4.5.1.1 AUDIT PROCEDURE

IMRB Auditors collected and verified data pertaining to

- Number of calls received by the operator
- Number and percentage calls answered within 60 seconds
- Number and percentage calls answered within 80 seconds

Live calling:

- Overall 100 number of live calls at different points of time were made in a licensed service area/circle for each service provider to assess the efficiency of the call center

Data for the parameter was extracted from central customer service center of the operators.

4.5.1.2 COMPUTATIONAL METHODOLOGY

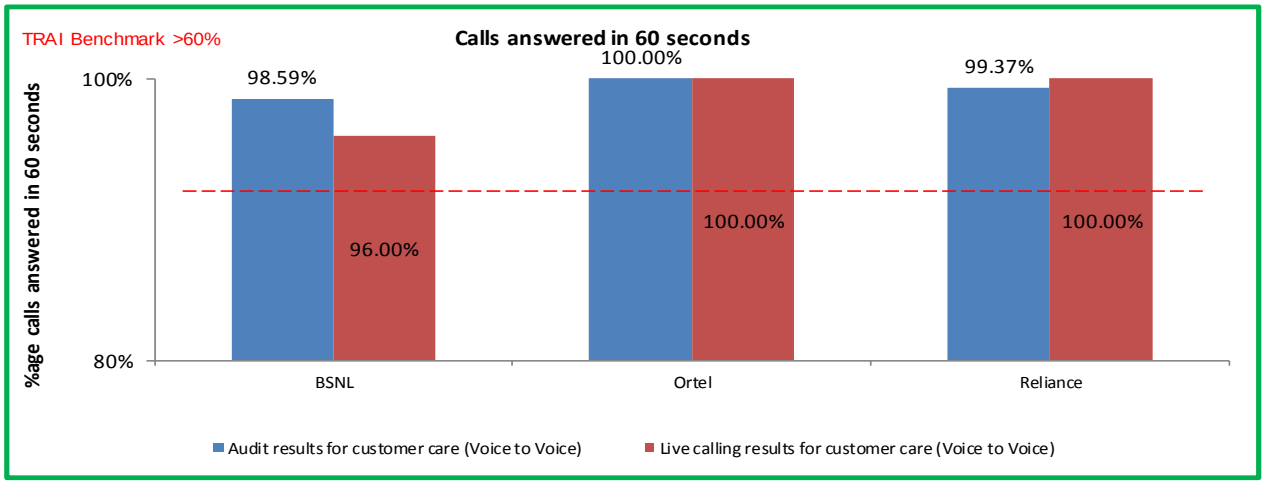
%age of calls answered by operator (voice to voice) within n seconds = *(Number of calls where time taken for operator to respond* >= n sec / Total number of calls where an attempt to route to the operator was made) x 100)*.*

Time taken for operator to respond = Time when an operator responds to a call – Time when the relevant code to reach the operator is dialled

4.5.1.3 BENCHMARK

- Calls answered within 60 seconds > 60 %
- Calls answered within 90 seconds > 80%

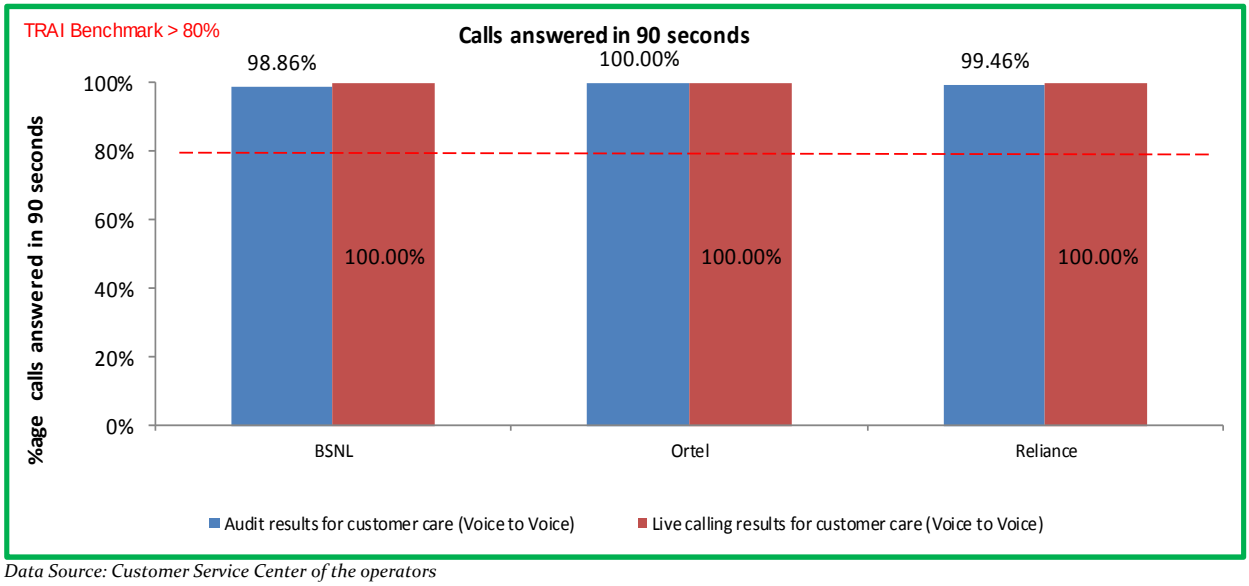
4.5.2 DETAILED FINDINGS - CALL ANSWERED WITHIN 60 SECONDS



Data Source: Customer Service Center of the operator

All operators met the TRAI benchmark.

4.5.3 DETAILED FINDINGS - CALL ANSWERED WITHIN 90 SECONDS



Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark.

4.6 BANDWIDTH UTILIZATION & DOWNLOAD SPEED

4.6.1 PARAMETER EXPLANATION – BANDWIDTH UTILIZATION

4.6.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to –

POP to ISP gateway Node [Intra – network] Links

- Auditors to verify and collect data pertaining to Total Bandwidth available and Total Bandwidth utilized during TCBH at some of the sample intra network links (POP to ISP Node) on each of the three days of live measurement separately
- Total Bandwidth available and Total bandwidth utilized during at the sample links TCBH for the complete month of audit
- Total number of intra network links having >90% bandwidth utilization during the month of Audit

ISP Gateway Node to IGSP / NIXI Node upstream Link's) for international connectivity

- Total number of upstream links for International connectivity
- Total number of links having Bandwidth > 90%Total Bandwidth available and Total Bandwidth utilized on all the upstream links during TCBH (POP to ISP Node) on each of the three days of live measurement separately
- Total Bandwidth available and Total bandwidth utilized at all the international links during TCBH for the complete month of audit (Also obtain details separately for the days)

Data for the parameter was extracted from NOC (Network Operations Center) of the operators.

4.6.1.2 COMPUTATIONAL METHODOLOGY

Percentage Bandwidth available on the link = *Total Bandwidth* utilised in TCBH for the period/ Total Bandwidth Available during the period*100*

4.6.1.3 BENCHMARK

- < 80% link(s)/route bandwidth utilization during peak hours (TCBH).
- If on any link(s)/route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of bandwidth on immediate basis, but not later than one month is mandated.

4.6.2 DETAILED FINDINGS – BANDWIDTH UTILIZATION

Audit results for Bandwidth Utilization				
Bandwidth utilization	Benchmark	BSNL	Ortel	Reliance
Intra-network links (POP to ISP Node)				
Total number of intra network links		1	7	2
No of Intra network found to be above 90%				
Total number of upstream links		1	7	2
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In Mbps)		775	6140	110000
Total International Bandwidth utilised during peak hours		556.3	3269	43139
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	71.78%	53.24%	39.22%
No of Intra network found to be above 90%		No	No	No

>>

Live measurment results for Bandwidth Utilization				
Bandwidth utilization	Benchmark	BSNL	Ortel	Reliance
Intra-network links (POP to ISP Node)				
Total number of intra network links		1	3	2
International Bandwidth				
Total number of upstream links		1	3	2
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In Mbps)		775	4019	110000
Total International Bandwidth utilised during peak hours		556.3	2141	47103
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	71.78%	53.29%	42.82%
No of Intra network found to be above 90%		No	No	No

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

4.6.3 PARAMETER EXPLANATION - BROADBAND DOWNLOAD SPEED

4.6.3.1 AUDIT PROCEDURE

Auditors collected and verified the following information from the operator's system.

- Total committed download speed to the all subscribers (In Mbps) (A)
- Total average download speed observed during TCBH (In Mbps)

Live Calling/ Measurement:

- Details of live customers were obtained from the service providers
- Overall 50 numbers of live calls at were made during peak hours (TCBH) in a licensed service area/circle for each service provider to assess the download speed available to subscribers. A download measurement software tool provided by the service providers was used for the same
- Details of total committed download speed and speed available to the users were recorded for each of the subscriber

4.6.3.2 COMPUTATIONAL METHODOLOGY

- The download speed for one customer is calculated by the download speed measurement software using the formula provided below:

Data Download Speed = Size of test file (data) in ISP server/ Transmission time required for error free transfer of the entire data

Percentage download speed available was calculated as = Sum of total speed available for 50 customers/Total committed download speed for 50 customers*100

4.6.3.3 BENCHMARK

Subscribed broadband connection speed to be met >= 80% from ISP Node to user

Data for the parameter was taken from "Download measurement software" installed in the server at ISP Node of the operators.

4.6.4 DETAILED FINDINGS – BROADBAND DOWNLOAD SPEED

Audit results for broadband download speed				
Broadband download speed	Benchmark	BSNL	Ortel	Reliance
Total average committed download speed (In Mbps) (A)		NP	176	0.512
Total average download speed observed during TCBH (In Mbps) (B)		NP	166	0.465
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	NP	94.40%	90.82%

>>

Live measurement results for broadband download speed				
Broadband download speed	Benchmark	BSNL	Ortel	Reliance
Total committed download speed to the sample subscribers (In Mbps) (A)		2164	463.84	12
Total average download speed observed during TCBH (In Mbps) (B)		1944	428.42	12
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	89.83%	92.36%	100.00%

Data Source: Download measurement software installed in the server at ISP Node of the operators

All operators met the benchmark of providing committed broadband download speed as per audit. However BSNL did not participated during the PMR Audit.

4.7 SERVICE AVAILABILITY/UPTIME

4.7.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to –

- Total operational hrs.
- Total downtime hrs.
- The above mentioned data was obtained and verified separately for three days in which the live measurement was carried out, Month in which audit was carried out.

Data for the parameter was extracted from OMC (Operations and Maintenance Center) of the operators.

4.7.1.2 COMPUTATIONAL METHODOLOGY

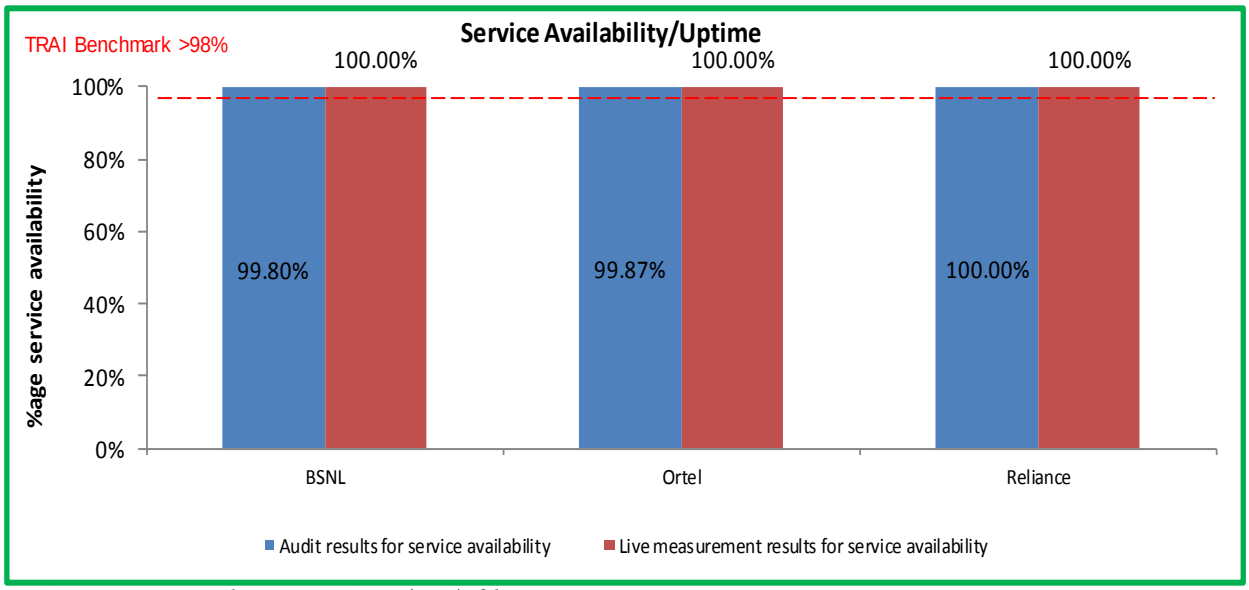
- Total downtime for all users, including the LAN switches, Routers, Servers, etc. at ISP Node and connectivity to upstream service provider are to be included
- Planned outages for routine maintenance of the system are excluded from the calculation of service availability/uptime

Service availability/Uptime = *(Total operational hours – Total Downtime hrs)*100 / Total operational hour*

4.7.1.3 BENCHMARK

- 98% with effect from quarter ending September 2007 and onwards

4.7.2 DETAILED FINDINGS - SERVICE AVAILABILITY



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

All operators met the benchmark for service availability time as per audit.

4.8 NETWORK LATENCY & PACKET LOSS

4.8.1 PARAMETER EXPLANATION - NETWORK LATENCY

Network Latency: Network Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/ Customer Premises Equipment (CPE).

4.8.1.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to:

- Records maintained for ping tests conducted during the period
- Smoked ping test (wherever available) results for the period
- Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours)
- Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

Data for the parameter was extracted from NOC (Network Operations Center) of the operators.

4.8.1.2 COMPUTATIONAL METHODOLOGY

- Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for 1000 pings of 64 bytes each (Pings are to be sent subsequent to acknowledgement received for the same for previous ping)

- Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI
- Minimum sample reference points for each service area shall be three in number or multiple reference points if required

Hence the formula for network latency would be Network latency for X days= *Total round trip time for all the ping packets transmitted in X days /No of days during the period*

4.8.1.3 BENCHMARK

- < 120 msec from user reference point at POP/ISP Node to International Gateway
- < 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial)
- < 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Satellite)

4.8.2 PARAMETER EXPLANATION – PACKET LOSS

Packet Loss: Packet loss is the percentage of packets lost to the total packets transmitted between two designated CPE/ Router Ports.

4.8.2.1 AUDIT PROCEDURE

IMRB Auditors verified and collected data pertaining to –

- Records maintained for ping tests conducted during the period
- Smoked ping test (wherever available) results for the period
- Results of live ping tests conducted during three day live measurement and month of Audit (During TCBH)
- Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

Data for the parameter was extracted from NOC (Network Operations Center) of the operators.

4.8.2.2 COMPUTATIONAL METHODOLOGY

- Packet loss is the percentage of packets lost to total packets transmitted between two designated Customer Premises Equipment's/Router ports. It is the measurement of packet lost from the broadband customer (User) configuration/User reference point at POP/ISP Node to IGSP/NIXI Gateway and to the nearest NAP port abroad
- The packet loss is measured by computing the percent packet loss of 1000 pings of 64 byte packet each.
- Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI
- Minimum sample reference points for each service area were three in number or multiple reference points if required

Hence Packet loss is computed by the formula: ***(Total number of ping packets lost during the period/Total number of ping packets transmitted)* 100***

4.8.2.3 BENCHMARK

- Packets Loss <1 %

4.8.3 DETAILED FINDINGS - NETWORK LATENCY / PACKET LOSS

Audit results for Latency and packet loss				
Network Latency and Packet Loss	Benchmark	BSNL	Ortel	Reliance
Packet Loss (Percentage)	< 1%	NP	0.00%	0.79%
Network Latency				
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	NP	0.02	1
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	NP	0.04	6.67
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NA	NA

>>

Live measurement results for Latency and packet loss				
Network Latency and Packet Loss	Benchmark	BSNL	Ortel	Reliance
Packet Loss (Percentage)	< 1%	0.05%	0.00%	0.00%
Network Latency				
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	0.054	0.025	1.45
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	0.112	0.07	1.92
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NA	NA

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

Broadband BSNL, Ortel and Reliance met the benchmark for network latency related parameters. However, BSNL did not participate during the PMR Audit.

5. ANNEXURE – JAS' 2016

5.1 SERVICE PROVISIONING

Audit Results for Service provisioning				
	Benchmark	BSNL	Ortel	Reliance
Total connections registered during the period		867	4923	13
Number of connections provided within 15 days		755	4923	13
Percentage of connections provided within 15 days	100%	87.08%	100.00%	100.00%
Number of connections provided after 15 days of registration of demand		670	NA	NA
percentage of connections provided after 15 days of registration of demand	100%	77.28%	NA	NA
Number of customers to whom credit is given for delayed connections		NA	NA	NA
Percentage of customers to whom credit is given for delayed connections	100%	NA	NA	NA

>>

Live calling for Service provisioning				
	Benchmark	BSNL	Ortel	Reliance
Total connections registered during the period		43	100	NA
Number of connections provided within 15 days		37	88	NA
Percentage of connections provided within 15 days	100%	86.05%	88.00%	NA

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

5.2 FAULT REPAIR/ RESTORATION

Audit Results for Fault repair				
Fault repair	Benchmark	BSNL	Ortel	Reliance
Total No. of faults registered during the period		3801	102605	NA
No. of faults repaired by next working day during the period		1647	96039	NA
Percentage of faults repaired by next working day during the period	≥ 90%	43.33%	93.60%	NA
No. of faults repaired within 3 days during the period		3181	102337	NA
Percentage of faults repaired within 3 days during the period	≥ 99%	83.69%	99.74%	NA
No. of cases with faults pending for >3 days				

>>

Rent rebate	Benchmark	BSNL	Ortel	Reliance
Percentage of cases where rent rebate for >3 days was given	100%	NA	NA	NA

>>

Live calling for fault repair				
Fault repair	Benchmark	BSNL	Ortel	Reliance
Total Number of calls made to subscribers		113	30	NA
Number of cases where faults were repaired by next working day		91	26	NA
Percentage cases where faults were repaired by next working day	≥ 90%	80.53%	86.67%	NA
Number of cases where faults were repaired within 3 days		79	26	NA
Percentage cases where faults were repaired within 3 days	≥ 99%	69.91%	86.67%	NA

Data Source: Operations and Maintenance Center (OMC) of the operators and live calls conducted by the auditors from operator's network

5.3 BILLING PERFORMANCE – METERING AND BILLING CREDIBILITY

Audit Results for Billing performance				
Billing Performance	Benchmark	BSNL	Ortel	Reliance
Billing diputes				
Total bills generated during the period		28149	184534	101
Total number of bills disputed		0	0	0
Percentage bills disputed (Avg of 3 billing cycles)	≤ 2%	0.00%	0.00%	0.00%
Total bills generated during the first billing cycle		NA	NA	NA
Total number of bills disputed in first billing cycle		NA	NA	NA
Percentage bills disputed (first billing cycle)	≤ 2%	NA	NA	NA
Total bills generated during the second billing cycle		NA	NA	NA
Total number of bills disputed in second billing cycle		NA	NA	NA
Percentage bills disputed (second billing cycle)	≤ 2%	NA	NA	NA
Total bills generated during the third billing cycle		NA	NA	NA
Total number of bills disputed in third billing cycle		NA	NA	NA
Percentage bills disputed (third billing cycle)	≤ 2%	NA	NA	NA
Resolution of billing complaints				
Total number of complaints		NA	NA	NA
Total complaints resolved in 4 weeks from date of receipt		NA	NA	NA
Percentage complaints resolved within 4 weeks of date of receipt	100%	NA	NA	NA
Refund of deposits				
Total number of cases requiring refund		NA	NA	NA
Total number of cases where credit/waiver was made within 60 days		NA	NA	NA
Percentage cases in which credit/waiver was received within 60 days	100%	NA	NA	NA

Data Source: Billing Center of the operators

Live calling results for resolution of billing complaints				
Resolution of billing complaints	Benchmark	BSNL	Ortel	Reliance
Total Number of calls made		NA	NA	NA
Number of cases resolved in 4 weeks		NA	NA	NA
Percentage cases resolved in 4 weeks	100%	NA	NA	NA

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

5.4 RESPONSE TIME TO THE CUSTOMER FOR ASSISTANCE

Calls Answered within 60 seconds				
Customer Care Assessment	Benchmark	BSNL	Ortel	Reliance
Total Number of calls received		53616	506280	25570
Total Number of calls answered within 60 seconds		52859	506280	25409
Percentage calls answered within 60 seconds	≥ 60%	98.59%	100.00%	99.37%
Calls Answered within 90 seconds				
Total Number of calls received		53616	506280	25570
Total Number of calls answered within 90 seconds		53007	506280	NA
Percentage calls answered within 90 seconds	≥ 80%	98.86%	100.00%	99.46%

Data Source: Customer Service Center of the operators

Live calling results for customer care (Voice to Voice)				
Customer Care Assessment	Benchmark	BSNL	Ortel	Reliance
Total Number of calls received		600	100	100
Total Number of calls answered within 60 seconds		576	100	100
Percentage calls answered within 60 seconds	≥ 60%	96.00%	100.00%	100.00%
Total Number of calls answered within 90 seconds		600	100	100
Percentage calls answered within 90 seconds	≥ 80%	100.00%	100.00%	100.00%

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

5.5 BANDWIDTH UTILIZATION

Audit results for Bandwidth Utilization				
Bandwidth utilization	Benchmark	BSNL	Ortel	Reliance
Intra-network links (POP to ISP Node)				
Total number of intra network links		1	7	2
No of Intra network found to be above 90%				
Total number of upstream links		1	7	2
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In Mbps)		775	6140	110000
Total International Bandwidth utilised during peak hours		556.3	3269	43139
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	71.78%	53.24%	39.22%
No of Intra network found to be above 90%		No	No	No

>>

Live measurment results for Bandwidth Utilization				
Bandwidth utilization	Benchmark	BSNL	Ortel	Reliance
Intra-network links (POP to ISP Node)				
Total number of intra network links		1	3	2
International Bandwidth				
Total number of upstream links		1	3	2
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In Mbps)		775	4019	110000
Total International Bandwidth utilised during peak hours		556.3	2141	47103
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	71.78%	53.29%	42.82%
No of Intra network found to be above 90%		No	No	No

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

5.6 BROADBAND DOWNLOAD SPEED

Audit results for broadband download speed				
Broadband download speed	Benchmark	BSNL	Ortel	Reliance
Total average committed download speed (In Mbps) (A)		NP	176	0.512
Total average download speed observed during TCBH (In Mbps) (B)		NP	166	0.465
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	NP	94.40%	90.82%

>>

Live measurement results for broadband download speed				
Broadband download speed	Benchmark	BSNL	Ortel	Reliance
Total committed download speed to the sample subscribers (In Mbps) (A)		2164	463.84	12
Total average download speed observed during TCBH (In Mbps) (B)		1944	428.42	12
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	89.83%	92.36%	100.00%

Data Source: Download measurement software installed in the server at ISP Node of the operators

5.7 SERVICE AVAILABILITY/ UPTIME

Audit results for service availability				
Service Availability	Benchmark	BSNL	Ortel	Reliance
Total Operational Hours		2208	2208	744
Total Downtime		4	2.46	0.00
Total time when the service was available		2204	2205.24	744
Service Availability Uptime in Percentage	≥ 98%	99.80%	99.87%	100.00%

>>

Live measurement results for service availability				
Service Availability	Benchmark	BSNL	Ortel	Reliance
Total Operational Hours		72	72	24
Total Downtime		0	0	0
Total time when the service was available		72	72	24.0
Service Availability Uptime in Percentage	≥ 98%	100.00%	100.00%	100.00%

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

5.8 NETWORK LATENCY / PACKET LOSS

Audit results for Latency and packet loss				
Network Latency and Packet Loss	Benchmark	BSNL	Ortel	Reliance
Packet Loss (Percentage)	< 1%	NP	0.00%	0.79%
Network Latency				
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	NP	0.02	1
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	NP	0.04	6.67
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NA	NA

>>

Live measurement results for Latency and packet loss				
Network Latency and Packet Loss	Benchmark	BSNL	Ortel	Reliance
Packet Loss (Percentage)	< 1%	0.05%	0.00%	0.00%
Network Latency				
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	0.054	0.025	1.45
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	0.112	0.07	1.92
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NA	NA

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

5.9 TOTAL CAPACITY AND SUBSCRIBERS

Capacity and Subscribers				
		BSNL	Ortel	Reliance
Capacity		2442	70000	10000
Total No of customers served (Mar 2016)		13904	59916	24

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

5.10 SAMPLE LIST OF SDCA WISE EXCHANGES ORISSA

ANGUL	DHENKANAL	PURI	BHUBANESWAR			RAYAGADA	ROURKELA	SAMBALPUR	BALASORE	BHADRAK	BERHAMPUR	BOLANGIR	JAJPUR ROAD
ANUGUL	BANASINGH	BASELISAHI	ADIMATA	GANDARPUR	MENDHASAL	ANTAMADA	BASANTI COLONY	AINTHAPALLI	AYODHYA	AGARPARA	AMBAPUA	BGR-COLLEGE SQR	BARUNDEI
BADKERA	BAULAPUR	BASUDEVPUR	AIGINIA	GGP COLONY	MICROWAVE COLONY	J.K.PUR	BIRMITRAPUR	ANAND VIHAR	BALASORE	ARNAPAL	ASKA ROAD	BOLANGIR	BRAHMANIPAL
BANARPAL	BHAPUR	BATAMANGALA	AIIMS	GHATIKIA	MUKUNDADASPUR	JAGARNATHPUR	BISHRA	BAREIPALLI	BALGOPALPUR	BAHUDARADA	BAIDYANATHPUR	CHANDANABHATI	DAITARI
BANTALA	DEOGAON	BRAHMAGIRI	BALAKATI	INFO CITY	NAHARKANTA	JIMIDIPETA	BONDAMUNDA	BHUSAN	BAMPADA	BANTA	BALIPADA	CHHATAMAKHANA	DUBURI
JARAPADA	DHENKANAL	CHANDANPUR	BALIANTA	IRC VILLAGE	NANDANVIHAR	K.SINGPUR	CHADRI HARIHARPUR	BURLA	CHANDIPUR	BARAPADA	BERHAMPUR	CHUDAPALI	GOBARDHANPUR
KUKUDANGA	DKL-RLY-STN.	CHHAITANA	BALIPATNA	JAGAMARA	NAYAPALLI	KUMBHIKOTA	CHHEND	CHIPILIMA	DURGADEVI	BASUDEVPUR	CHIKITI	DEOGAON	JAJPUR ROAD
NALCONAGAR	GANDIA	GABAKUNDA	BANAMALIPUR(K)	JAGANNATH NAGAR	NILADRI VIHAR	MUKUNDPUR	DOOR SANCHAR BHAWAN,GMTD	DHANUPALLI	FATEPUR	BEDEIPUR	DAKHINAPUR	GUDVELA	JAKHAPURA
NALCONAGAR T/S	GOVINDAPUR	INDIPUR	BAPUJINAGAR	JANLA(BN)	NISER	RAMKRISHNANAGAR	FERTILIZER	DTO BLDG	HEMKAPADA	BETEDA	DURA	KUDASINGHA	KALIAPANI
SUSUDA	INDIPUR	KANAS	BARMUNDA	JARIPATNA	OCAC	RAYAGADA	JAGDA	GOSHALA	KHANTAPADA	BHADRAK	GADIVARI STREET	MAHIMUNDA	KORAI

TALMULA	KAIMATI	KHAJURIA	BASANTAMAL	JATNI	PAHALA	SIKARPAI	JAREIKELA	HIRAKUD	KURUDA	BHADRAKMAIN	GOLANTARA	TUSRA	KUHIKA
TULSIPAL	KALANGA	MARKANDESWARSAHI	BHINGARPUR	JAYDEV VIHAR	PALASPALLI	THERUBALI	KALUNGA	JAGRUTI VIHAR	NAGRAM	BILAONA	GOSANI NUAGAON		LMLJJRD
	KARAMUL	NUAPADA	BHUBANESWAR	JHARAPADA	POKHARIPUT		KUARMUNDA	LAIDA	NIJAMPUR	CHARAMPA	GUNDURA		MANAPUR
	MAHIMAGADI	PANASPADA	BJB NAGAR	KALINGA VIHAR	RAGHUNATHPUR		LATHIKATA	LAPANGA	OUPADA	CHUNIDA	GURUNTHI		MANITIRA
	MANDAR	PURI	C.S.PUR	KALPANA	SAHEEDNAGAR		PANPOSH	RENGALI	RAJBERHAMPUR	DOLASAHI	HOUSING BOARD COLONY		NINL
	PINGUA	SAKHIGOPAL	COSMOPOLIS	KAUSALYAGANGA	SAMANTARAPUR		RKLBASANTICOLNY	SAKHIPADA	RAJNILAGIRI	ERAM	JARADAGADA		PANIKOILI
	R.LETHEKA	SANCHARKHETRA	D.S. BHAWAN	KESURA	SATYANAGAR		ROURKELA ,T.KENDRA,U, NGR	SAMBALPUR	RASALPUR	KADABARANGA	JAYANTIPUR		RAGADI
	SANKARPUR	SATAPADA	DARUTHENGA	KHANDAGIRI ENCLAVE	SHYAMPUR(BHARATPUR)		ROURKELA C/TOWNSHIP	SASON	REMUNA	KAMARGAON	KALINGANAGAR		SUKINDA
	SIMINAI	SATSANKHA	EST-COST RAILWAY	KUDIARY	SUNDARAPADA		ROURKELA T/S ,SEC-6,MAIN		SANTARAGADIA	MOUDA	KHARIAGUDA		
		SIDHAMAHAVIR	FOREST PARK	MAGHESWAR	SURYANAGAR		RSP ROURKELA		SHERGARH	PADAMPUR	KONISI		
		SUNAMUHIN	FORUM BUILDIN	MANCHESWAR	TRAHIACHYUTA		SECTOR-8 RSU		SONAPUR	PIRIHAT	KORAPALLI		

			G										
		TADAS	GANDA MUNDA	MARUTI VIHAR	VIDYUT MARG		VEDVYAS			RANITAL	KUKUDAKHANDI		
										SALANDI PILLAR	LANJIPALLI		
										SENDHATIRA	MICROWAVE COMPOUND		
										TIHIDI	NILACHAL NAGAR		
											NUAPENTHO		
											PATRAPUR		
											PITATALI		
											R.SUVANI(BF)		
											SIHALA		
											SURALA		
											TUMBA		
											TURUBUDI		

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