WEST ZONE

TRAI AUDIT BROADBAND REPORT – MUMBAI - AUDIT OF OND QUARTER, 2015

Prepared By -

Prepared For-

TABLE OF CONTENTS

IMRB International | eTech

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

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 Mumbai circle. For MTNL, a geographical spread among the SDCAs and POPs was maintained. For other operators, the audit was conducted for all SDCAs at overall level.

Image Source: Internet

1.4 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 2015 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 Mumbai circle for the OND 2015 quarter.
  - MTNL
  - Broadband Pacenet

- o Citycom
- o D-voice
- o Five Network
- o Hathway
- o Honesty Net
- o Indus Media
- o Syscon
- o Reliance
- o Tata Communications
- o Tata Teleservices
- o Siti Cable
- o You Broadband

- The PMR was generated from the raw data pertaining to Oct, Nov and Dec 2015 (OND'15), which was extracted by auditor from the operator's systems during the audit conducted in the month of Jan 2016.

- Live calling activity was carried out during the period of Dec 2015. The data considered for live calling was for the month prior to the live calling month. In this round of audit, Nov 2015 data was considered for live calling for all operators.

- 3 day live measurement activity was carried out on working days during the month of Dec 2015. 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.

1.5   FRAMEWORK USED
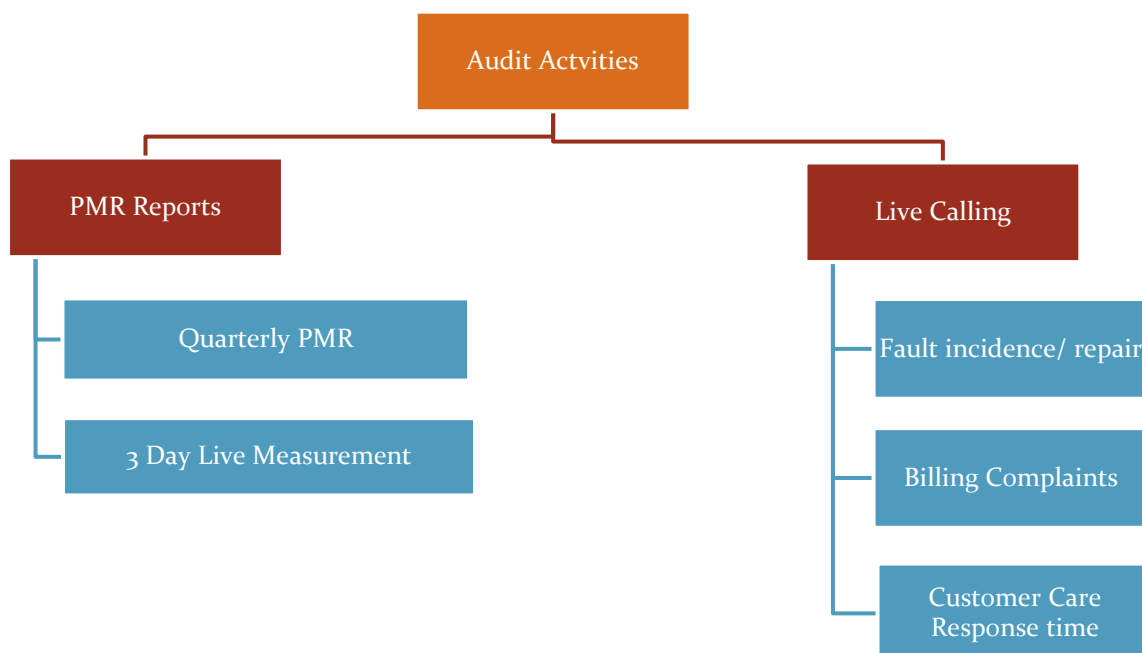
1.5.1   PMR REPORTS - SIGNIFICANCE AND METHODOLOGY

The significance of PMR or Performance Monitoring Reports is to assess the various Quality of Service (QoS) parameters involved in the 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 OND'15 during Jan 2016.

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.

- 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

1.5.1.2   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 MTNL) 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.

1.5.1.3   TCBH – SIGNIFICANCE AND SELECTION METHODOLOGY

As per Quality of Service of Broadband Service 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:

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

The 90 day period is decided upon the basis of month of audit. For example, for audit of Dec 2015, the 90 day period data used to identify TCBH would be the data of, Oct, Nov & Dec 2015

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

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

During audit, the auditors identified following TCBHs from the raw data collected from the operators for the quarter of OND'15.

BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	YOU
11:00 - 12:00	18:00 - 19:00	15:00 - 16:00	18:00 - 19:00	19:00-20:00	18:00 - 19:00	19:00-20:00	19:00-20:00	18:00 - 19:00	18:00 - 19:00	18:00 - 19:00	20:00 - 21:00

The data for network parameters has been taken as per the TCBH identified by the auditor for the operators.

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.

- 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.

The IMRB auditor visits the operator premises such as main exchanges/ OMC/ customer service center etc. to do live calling. The auditors take the raw data of service provisioning, fault repair, customer complaints (billing) from the the operator's system for the preceding month and also the list of customer service numbers to be verified through live calling

IMRB auditors then make live calls 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 by calling the numbers using operator's wireline network

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

1.5.2.1 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 MTNL, 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%

IMRB International | eTech

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

1.5.2.2   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 MTNL, 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%

1.5.2.3   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 MTNL, 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

1.5.2.4   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.

1.6   COLOUR CODE TO READ THE REPORT

Not Meeting the benchmark

1.7   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	

IMRB International | eTech

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

1.8 EXECUTIVE SUMMARY

1.8.1 PMR QUARTERLY DATA – OND'15

Parameters	Benchmarks	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Service provsioning uptime																
Percentage connections provided within 15 days	100%	100.00%	100.00%	100.00%	100.00%	98.47%	100.00%	95.75%	99.88%	100.00%	NA	100.00%	100.00%	NA	100.00%	100.00%
Fault repair restoration time																
Percentage faults repaired by next working days	≥ 90%	97.46%	94.93%	97.59%	NP	87.89%	84.39%	99.61%	91.87%	52.71%	100.00%	90.26%	100.00%	90.44%	86.18%	98.08%
Percentage faults repaired within three working days	≥ 99%	99.87%	99.32%	99.52%	NP	94.01%	95.60%	100.00%	97.09%	86.14%	100.00%	99.09%	100.00%	96.37%	95.73%	100.00%
Billing performance																
Billing complaints per 100 bills issued	< 2%	0.00%	0.35%	0.00%	NA	1.02%	NA	NA	0.00%	NA	0.24%	0.61%	NA	0.15%	0.22%	1.50%
%age of billing complaints resolved in 4 weeks	≥ 98%	100.00%	100.00%	100.00%	NA	100.00%	NA	NA	100.00%	NA	100.00%	100.00%	NA	100.00%	100.00%	100.00%
%age of billing complaints resolved in 6 weeks	100%	100.00%	100.00%	100.00%	NA	100.00%	NA	NA	100.00%	NA	100.00%	100.00%	NA	100.00%	100.00%	100.00%
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	100.00%	100.00%	NA	100.00%	NA	NA	NA	NA	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Customer care/helpline assessment (Voice to Voice)																
Percentage calls answered within 60 seconds	≥ 60%	95.05%	89.97%	98.08%	NP	86.56%	NP	100.00%	74.10%	100.00%	95.03%	67.22%	94.37%	87.38%	75.25%	89.21%
Percentage calls answered within 90 seconds	≥ 80%	97.24%	92.05%	100.00%	NP	89.95%	NP	NP	83.54%	NP	95.59%	81.92%	100.00%	88.89%	80.53%	90.88%
Bandwidth utilisation/Throughput																
Intra network links (POP to ISP Node)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Percentage bandwidth utilised on upstream links	< 80%	11.01%	21.76%	72.70%	66.80%	62.81%	81.85%	NP	52.99%	88.59%	17.52%	70.16%	45.53%	40.90%	77.26%	NP
Broadband download speed	≥ 80%	100.00%	91.67%	26.63%	NP	92.50%	89.32%	NP	NP	91.50%	89.46%	94.33%	82.50%	93.60%	97.23%	87.50%
Service availability/uptime	≥ 98%	99.99%	99.44%	100.00%	NP	99.29%	100.00%	100.00%	99.91%	99.27%	99.47%	100.00%	100.00%	98.68%	99.42%	99.45%
Packet loss	< 1%	0.01%	0.05%	0.50%	NP	0.72%	1.16%	NP	0.00%	0.00%	0.52%	0.00%	0.00%	0.00%	0.10%	0.00%
Network Latency																
POP/ISP Node to NIXI	< 120 msec	29.69	4.35	2	NP	1	30	NA	1	9	16	NA	1.86	1	68.47	8.2
ISP node to NAP port (Terrestrial)	< 350 msec	62.22	167.8	NA	NP	90	65.97	NP	271.95	174	17.33	NA	NA	258	200.95	276.78

IMRB International | eTech

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

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.

NA: Parameters not applicable for the operators.

Following are the parameter wise observations for the operators in Mumbai circle.

1.8.1   SERVICE PROVISIONING/ ACTIVATION TIME

As per audit, all operators met the benchmark for providing new connections within 15 days except Hathway, Indus Media and MTNL.

NA: In the audit period, no new connection was registered with Reliance.

1.8.2   FAULT REPAIR/ RESTORATION

The benchmark of repairing 90% faults within the next day was not met by Hathway, Honesty Net, Pacenet and TTL.

The benchmark of repairing 99% faults within next three days of receiving complaints was not met by Hathway, Honesty Net, MTNL, TCL, Pacenet and TTL.

1.8.3   BILLING PERFORMANCE

As per audit, all operators met the benchmark for metering and billing credibility.

All operators met the benchmark for resolution of billing complaints within 4 weeks as well as within 6 weeks.

NA: Subscribers of Five Network, Honesty, Indus Media, Pacenet and Syscon did not log any billing complaints. Hence, resolution of billing complaints is not applicable for the operators.

All operators met the benchmark of providing refund within 60 days of closure of service.

1.8.4 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.

1.8.5 BANDWIDTH UTILIZATION AND THROUGHPUT

Honesty and Pacenet failed to the benchmark for bandwidth utilized on upstream links during audit.

D-Voice failed to meet the benchmark for download speed.

All operators met the benchmark for service availability time as per audit.

Honesty failed to meet the benchmark for packet loss.

1.8.6 NETWORK LATENCY

All operators met the benchmark for Network Latency parameters.

1.9 LIVE MEASUREMENT

Parameters	Benchmarks	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Bandwidth utilisation/Throughput																
Percentage bandwidth utilised on upstream links	< 80%	69.45%	47.54%	60.98%	NP	72.01%	NA	NA	86.14%	85.83%	50.02%	78.66%	65.53%	41.64%	78.77%	73.30%
Broadband download speed	≥ 80%	115.67%	93.33%	80.53%	NP	93.33%	87.16%	97.00%	NP	91.60%	94.00%	94.33%	84.83%	93.00%	94.86%	86.00%
Service availability/uptime	≥ 98%	99.00%	98.43%	100.00%	NP	99.12%	100.00%	100.00%	98.90%	98.77%	98.78%	100.00%	100.00%	99.56%	99.34%	98.42%
Packet loss	< 1%	0.23%	0.00%	0.23%	NP	0.77%	1.17%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.00%
Network Latency																
POP/ISP Node to NIXI	< 120 msec	32	4.36	1.33	NP	1	30	2	1	3	3.955	NA	1.86	1	33.2	2.33
ISP node to NAP port (Terrestrial)	< 350 msec	74.6	204.58	NA	NP	90	66	NP	193.6	58	0.76	NA	NA	59	163.37	93

1.9.1 BANDWIDTH UTILIZATION AND THROUGHPUT

MTNL and Pacenet failed to meet the benchmark for bandwidth utilized on upstream links during live measurement.

All operators met the benchmark of providing committed broadband download speed as per live measurement.

All operators met the benchmark for service availability time as per live measurement.

Honesty Net failed to meet the benchmark for packet loss.

1.9.2 NETWORK LATENCY

During live measurement, all operators met the benchmark for network latency parameters.

IMRB International | eTech

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

1.10 LIVE CALLING

Parameters	Benchmarks	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Service provsioning uptime																
Percentage connections provided within 15 days	100%	98.00%	100.00%	78.00%	100.00%	89.00%	100.00%	90.00%	100.00%	100.00%	NA	98.00%	100.00%	NA	56.00%	75.00%
Fault repair restoration time																
Percentage faults repaired by next working days	≥ 90%	75.00%	87.00%	67.00%	NP	89.00%	100.00%	92.00%	100.00%	100.00%	78.00%	98.00%	100.00%	98.00%	56.00%	75.00%
Percentage faults repaired within three working days	≥ 99%	100.00%	100.00%	100.00%	NP	100.00%	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Billing performance																
%age of billing complaints resolved in 4 weeks	≥ 98%	100.00%	80.00%	NA	NA	67.00%	NA	NA	NA	NA	75.00%	89.00%	NA	100.00%	76.00%	100.00%
%age of billing complaints resolved in 6 weeks	100%	100.00%	100.00%	NA	NA	79.00%	NA	NA	NA	NA	95.00%	98.00%	NA	100.00%	85.00%	100.00%
Customer care/helpline assessment (Voice to Voice)																
Percentage calls answered within 60 seconds	≥ 60%	96.99%	89.42%	98.13%	92.00%	98.66%	96.00%	100.00%	85.07%	100.00%	98.85%	69.86%	100.00%	91.16%	97.38%	97.48%
Percentage calls answered within 90 seconds	≥ 80%	98.90%	92.57%	100.00%	100.00%	99.35%	100.00%	100.00%	87.12%	100.00%	99.35%	87.70%	100.00%	92.73%	98.86%	98.20%

NA: Parameters not applicable for the operators.

1.10.1 SERVICE PROVISIONING/ ACTIVATION TIMES

As per live calling, Airtel, D-Voice, Hathway, Indus Media, Siti Cable, TTL and You Broadband failed to meet the benchmark of providing 100% new connections within the TRAI stipulated timeline of 15 days.

1.10.2 FAULT REPAIR/ RESTORATION

Airtel, Citicom, D-Voice, Hathway, RCL, TTL and You Broadband failed to meet the benchmark of repairing 90% faults within next working day and RCL failed for repairing 99% faults within 3 days.

1.10.3 BILLING PERFORMANCE

Citycom, Hathway, RCL, Siti cable and TTL failed to meet the benchmark for resolution of billing complaints within 4 weeks and hatchway, RCL, Siti cable and TTL failed to meet the benchmark within 6 weeks.

NA: operator's live calling for 'resolution of billing complaints' has not been conducted due to very low/ zero base of billing complaints for the operators.

1.10.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

As per live calling, all operators met both the benchmarks for customer care promptness parameters.

2. CRITICAL FINDINGS

Service Provisioning/ Activation Time

➢ As per audit, all operators met the benchmark for providing new connections within 15 days except Hathway, Indus Media and MTNL.

➢ However as per live calling, Airtel, D-Voice, Hathway, Indus Media, Siti Cable, TTL and You Broadband failed to meet the benchmark of providing 100% new connections within the TRAI stipulated timeline of 15 days.

Fault Repair/ Restoration

➢ The benchmark of repairing 90% faults within the next day was not met by Hathway, Honesty Net, Pacenet and TTL.

➢ The benchmark of repairing 99% faults within next three days of receiving complaints was not met by Hathway, Honesty Net, MTNL, TCL, Pacenet and TTL.

➢ As per live calling Airtel, Citicom, D-Voice, Hathway, RCL, TTL and You Broadband failed to meet the benchmark of repairing 90% faults within next working day and RCL failed for repairing 99% faults within 3 days.

Billing Performance

➢ As per audit, all operators met the benchmark for metering and billing credibility.

➢ All operators met the benchmark for resolution of billing complaints within 4 weeks as well as within 6 weeks.

➢ However as per live calling Citycom, Hathway, RCL, Siti cable and TTL failed to meet the benchmark for resolution of billing complaints within 4 weeks and hatchway, RCL, Siti cable and TTL failed to meet the benchmark within 6 weeks.

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 and live calling.

Bandwidth Utilization and Throughput

➢ Honesty and Pacenet failed to the benchmark for bandwidth utilized on upstream links during audit. However MTNL and Pacenet failed to meet the benchmark for bandwidth utilized on upstream links during live measurement.

➢ D-Voice failed to meet the benchmark for download speed.

➢ Honesty Net failed to meet the benchmark for packet loss in audit as well as live measurement.

3. DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA AND LIVE MEASUREMENT/ CALLING DATA

3.1 SERVICE PROVISIONING/ ACTIVATION TIME

3.1.1 PARAMETER EXPLANATION

3.1.1.1 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.

3.1.1.2 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*

3.1.1.3 BENCHMARK

100 % cases in =<15 working days.

IMRB International | eTech

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

3.1.2 DETAILED FINDINGS - SERVICE PROVISONING

Service provisioning Provisioning / Activation Time

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. However, during live calling it was observed that Airtel, D-Voice, Hathway, Indus Media, Siti cable, TTL and You Broadband failed to meet the benchmark of providing 100% new connections within the TRAI stipulated timeline of 15 days.

NA: In the audit period, no new connection was registered with Reliance and TCL.

3.2   FAULT REPAIR/ RESTORATION TIME

3.2.1   PARAMETER EXPLANATION

3.2.1.1   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 MTNL, 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.
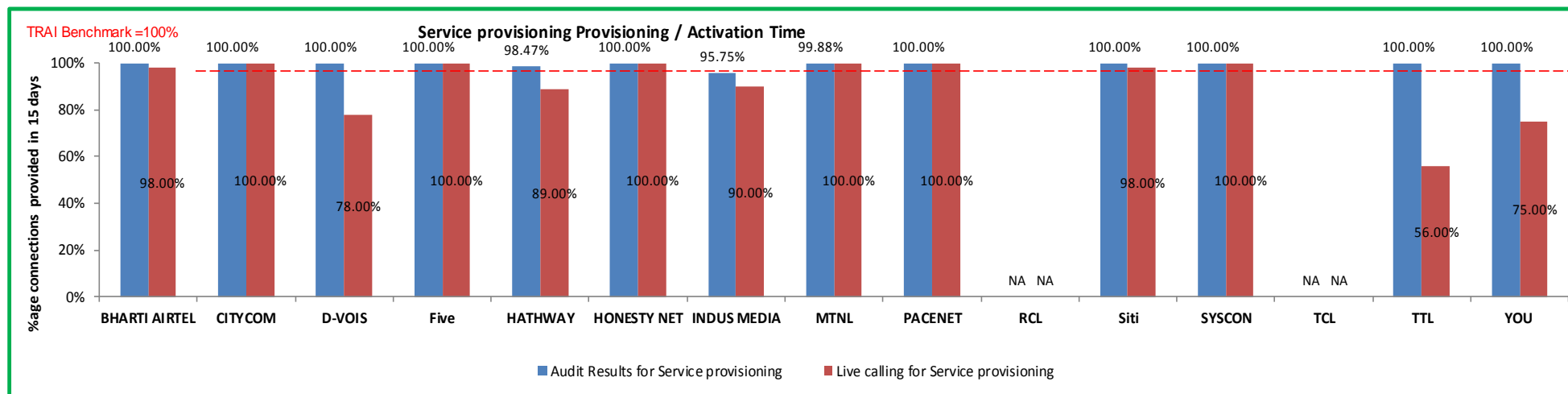
3.2.1.2   COMPUTATIONAL METHODOLOGY

- 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*

3.2.1.3 BENCHMARK

✤ By next working day: => 90% and within 3 working days: => 99%.

3.2.2 DETAILED FINDINGS - FAULT REPAIR WITHIN NEXT WORKING DAY
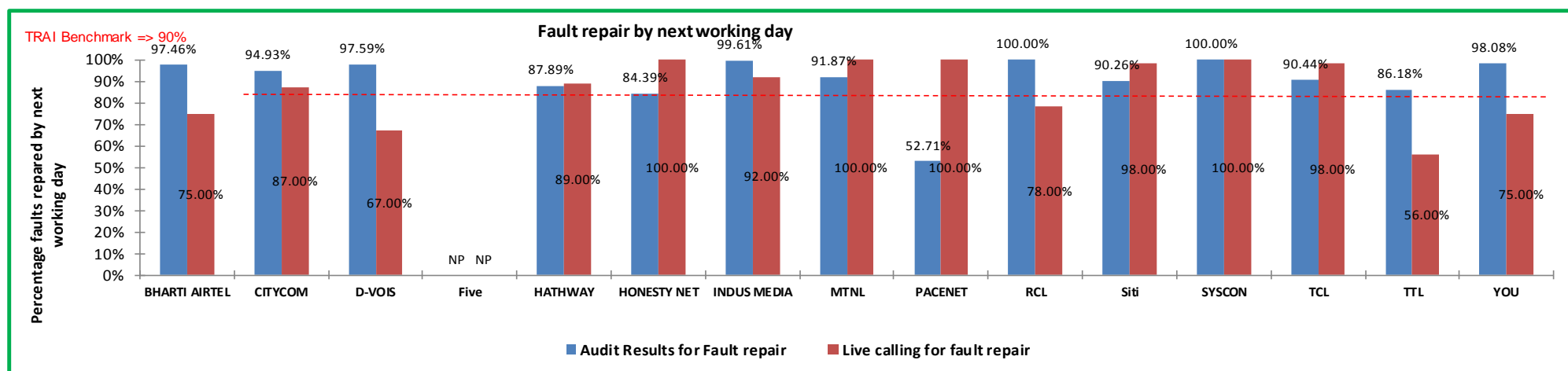
Data Source: OMC (Operations and Maintenance Center) of the operators

Hathway, Honesty, Pacenet and TTL failed to meet the benchmark for the parameter as per audit and all operators failed to meet the benchmark during live calling except Honesty, Indua Media, MTNL, Pacenet, Siti Cable, Syscon and TCL.

3.2.3   DETAILED FINDINGS - FAULT REPAIR WITHIN 3 WORKING DAYS
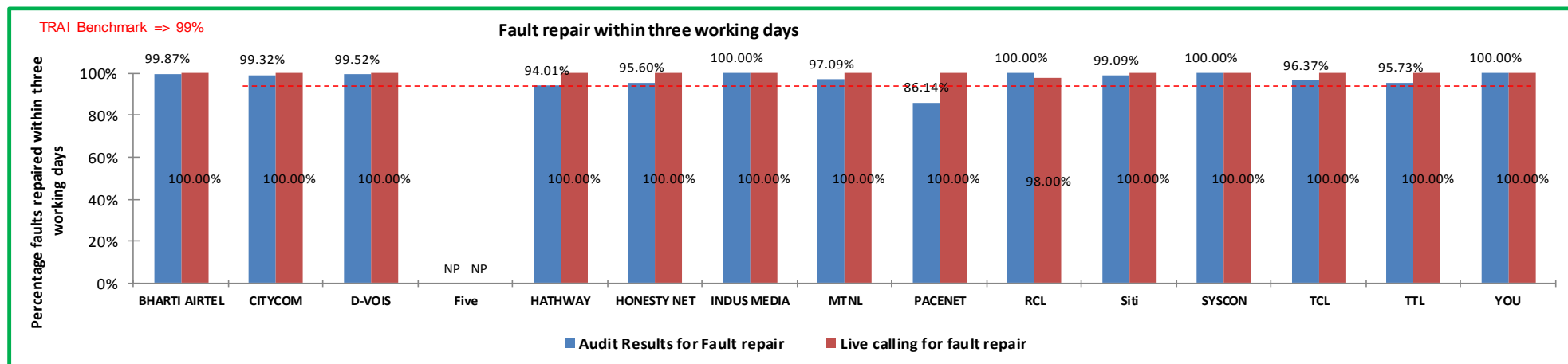
Data Source: OMC (Operations and Maintenance Center) of the operators

Hathway, Honesty, Pacenet, TCL, TTL and MTNL failed to meet the benchmark for the parameter as per audit and RCL failed to meet the benchmark during live calling.

3.3   METERING AND BILLING CREDIBILITY

3.3.1   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.

3.3.1.1   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 MTNL, 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.

3.3.1.2 COMPUTATIONAL METHODOLOGY – METERING AND BILLING CREDIBILITY

The calculation methodology (given below) as per QoS Regulations 2006 (11 of 2006), was followed to calculate incidence of billing complaints.

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

- *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated

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

↳ **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%

3.3.1.3   METERING AND BILLING CREDIBILITY – AUDIT FINDINGS
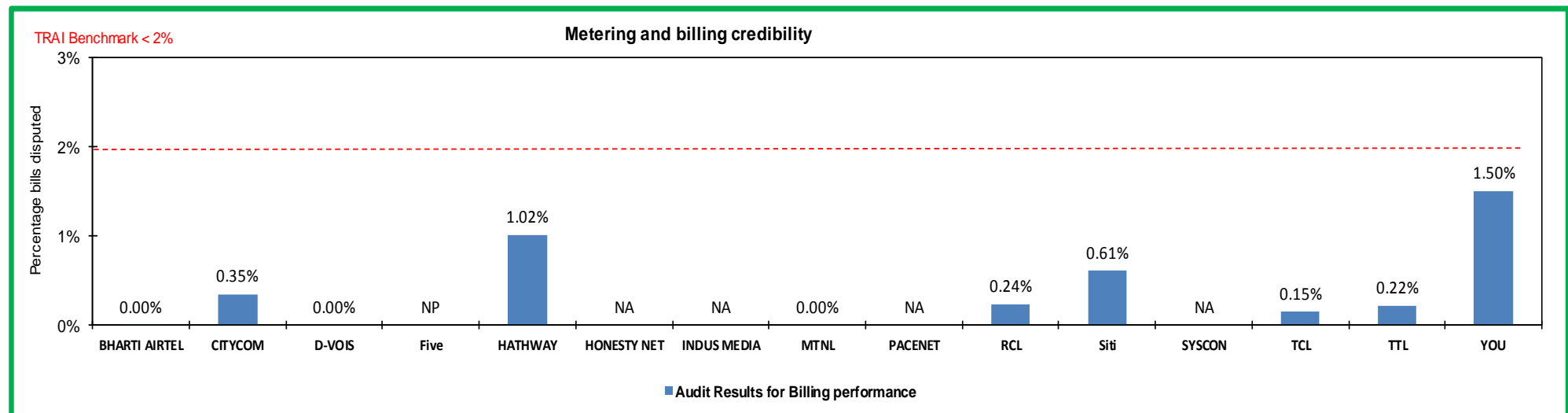
Data Source: Billing Center of the operators

All operators met the benchmark for the parameter.

3.3.1.4   COMPUTATIONAL METHODOLOGY – RESOLUTION OF BILLING COMPLAINTS

✍ **Calculation of Percentage resolution of billing complaints**

The calculation methodology (given below) as per QoS Regulations 2006 (11 of 2006), 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 **=**

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

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 =

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

- o **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.

- o 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.

3.3.1.5   RESOLUTION OF BILLING COMPLAINTS – AUDIT FINDINGS
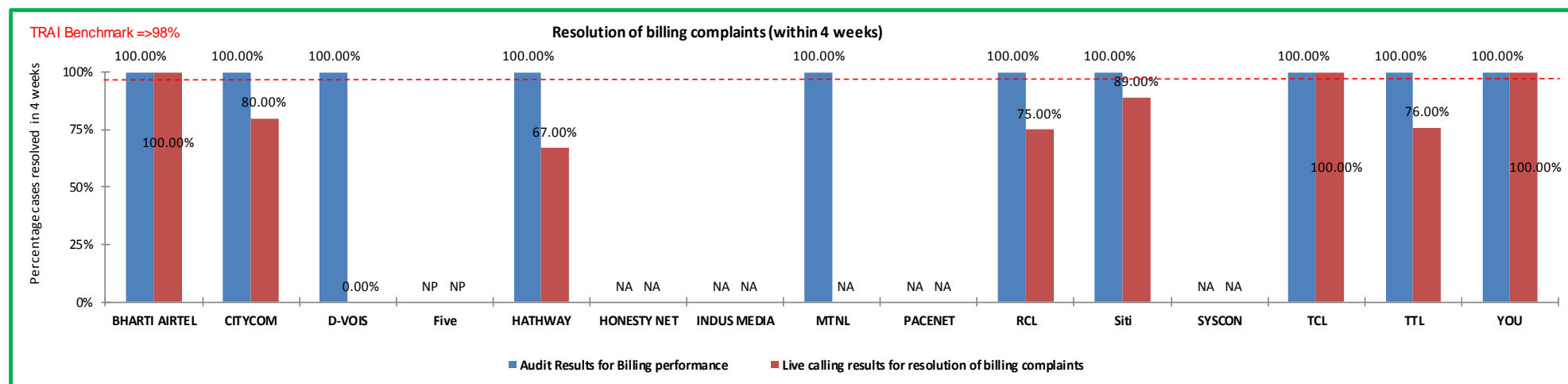
Resolution of billing complaints (within 4 weeks)

TRAI Benchmark =>98%

Legend:
- Audit Results for Billing performance
- Live calling results for resolution of billing complaints

As per audit all operators met the benchmark for resolution of billing complaints within 4 weeks. However, it was observed during live calling that the performance of Citycom, Hathway, RCL, Siti Cable and TTL were below the benchmark of the parameter.
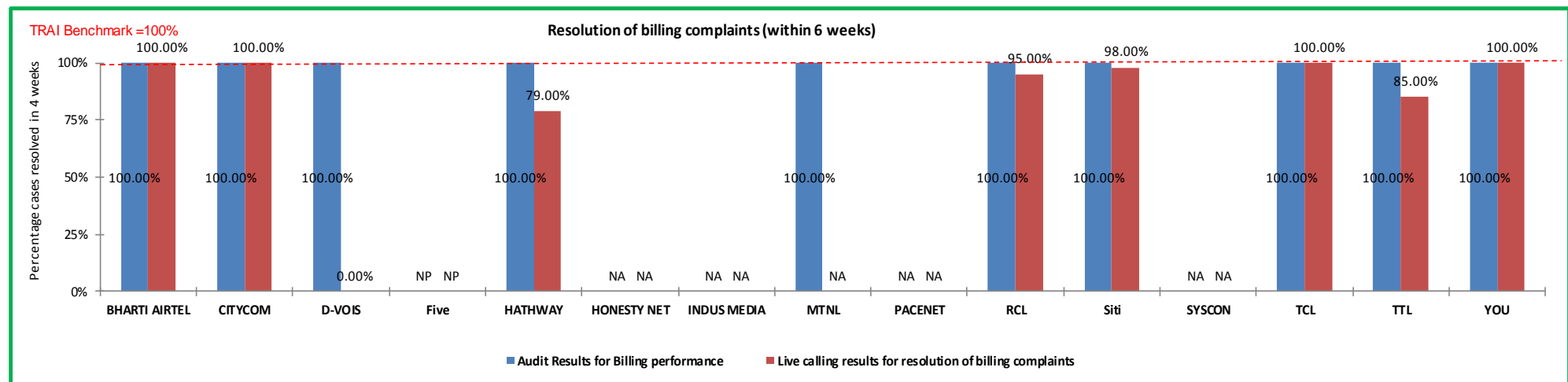
Resolution of billing complaints (within 6 weeks)

TRAI Benchmark =100%

Legend:
- ■ Audit Results for Billing performance
- ■ Live calling results for resolution of billing complaints

Data Source: Billing Center of the operators

As per audit all operators met the benchmark for resolution of billing complaints within 6 weeks. However, it was observed during live calling that the performance of Hathway, RCL, Siti Cable and TTL were below the benchmark of the parameter.

NA: No Subscribers log any billing complaints. Hence, resolution of billing complaints is not applicable for these operators.

3.4 TIME TAKEN TO REFUND AFTER CLOSURE

3.4.1 PARAMETER EXPLANATION

3.4.1.1 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.

3.4.1.2 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

3.4.1.3 BENCHMARK

- ✎ 100% cases in less than 60 days

3.4.2 DETAILED FINDINGS - REFUND OF DEPOSITS

Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)
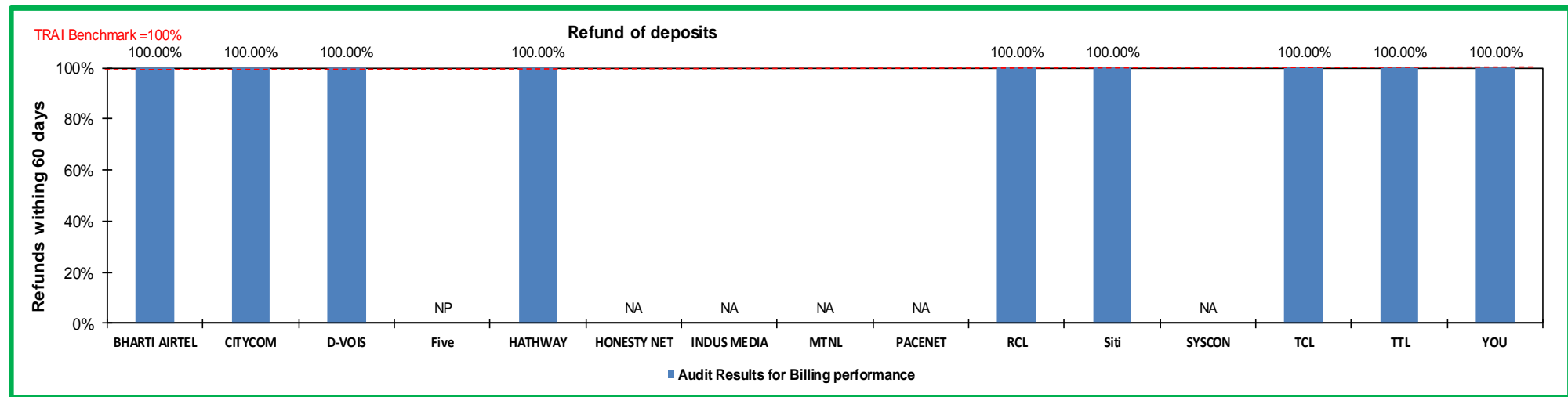
All operators met the benchmark for the parameter.

NA (0.00%): Operators had no cases where a refund was applicable.

3.5   RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

3.5.1   PARAMETER EXPLANATION

3.5.1.1   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.

3.5.1.2   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

3.5.1.3   BENCHMARK

- Calls answered within 60 seconds => 60 %
- Calls answered within 90 seconds => 80%

3.5.2   DETAILED FINDINGS - CALL ANSWERED WITHIN 60 SECONDS

Calls answered in 60 seconds

TRAI Benchmark =>60%

Operator	Audit results for customer care (Voice to Voice)	Live calling results for customer care (Voice to Voice)
BHARTI AIRTEL	95.05%	97%
CITYCOM	89.97%	89%
D-VOIS	98.08%	98%
Five	NP	92%
HATHWAY	86.56%	99%
HONESTY NET	NP	96%
INDUS MEDIA	100.00%	100%
MTNL	74.10%	85%
PACENET	100.00%	100%
RCL	95.03%	99%
Siti	67.22%	70%
SYSCON	94.37%	100%
TCL	87.38%	91%
TTL	75.25%	97%
YOU	89.21%	97%

■ Audit results for customer care (Voice to Voice)   ■ Live calling results for customer care (Voice to Voice)

Data Source: Customer Service Center of the operators

IMRB International | eTech

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

3.5.3 DETAILED FINDINGS - CALL ANSWERED WITHIN 90 SECONDS

Calls answered in 90 seconds

TRAI Benchmark => 80%

%age calls answered in 90 seconds

Operator	Audit results	Live calling results
BHARTI AIRTEL	97.24%	99%
CITYCOM	92.05%	93%
D-VOIS	100.00%	100%
Five	NP	100%
HATHWAY	89.95%	99%
HONESTY NET	NA	100%
INDUS MEDIA	NA	100%
MTNL	83.54%	87%
PACENET	NA	100%
RCL	95.59%	99%
Siti	81.92%	88%
SYSCON	100.00%	100%
TCL	88.89%	93%
TTL	80.53%	99%
YOU	90.88%	98%

■ Audit results for customer care (Voice to Voice)   ■ Live calling results for customer care (Voice to Voice)

Data Source: Customer Service Center of the operators

All operators met the benchmark for answering 60% calls within 60 seconds and 80% calls within 90 seconds as per audit.

IMRB International | eTech

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

3.6 BANDWIDTH UTILIZATION & DOWNLOAD SPEED

3.6.1 PARAMETER EXPLANATION – BANDWIDTH UTILIZATION

3.6.1.1 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.

3.6.1.2 COMPUTATIONAL METHODOLOGY

Percentage Bandwidth available on the link = *Total Bandwidth* utilised in TCBH for the period/ Total Bandwidth Available during the period*100*

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

3.6.1.3   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.

3.6.2   DETAILED FINDINGS – BANDWIDTH UTILIZATION

Audit results for Bandwidth Utilization																
Bandwidth utilization	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	11.01%	21.76%	72.70%	66.80%	62.81%	81.85%	NP	52.99%	88.59%	17.52%	70.16%	45.53%	40.90%	77.26%	NP
Live measurment results for Bandwidth Utilization																
Bandwidth utilization	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	69.45%	47.54%	60.98%	NP	72.01%	NA	NA	86.14%	85.83%	50.02%	78.66%	65.53%	41.64%	78.77%	73.30%

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

Honesty and Pacenet failed to meet the benchmark for bandwidth utilization during audit. However during live calling MTNL and Pacenet failed to meet the benchmark.

3.6.3 PARAMETER EXPLANATION - BROADBAND DOWNLOAD SPEED

3.6.3.1 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

3.6.3.2 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

3.6.3.3 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.

IMRB International | eTech

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

3.6.4 DETAILED FINDINGS – BROADBAND DOWNLOAD SPEED

Audit results for broadband download speed																	
Broadband download speed	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	100.00%	91.67%	26.63%	NP	92.50%	89.32%	NP	NP	91.50%	89.46%	94.33%	82.50%	93.60%	97.23%	87.50%
Live measurement results for broadband download speed																	
Broadband download speed	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	115.67%	93.33%	80.53%	NP	93.33%	87.16%	97.00%	NP	91.60%	94.00%	94.33%	84.83%	93.00%	94.86%	86.00%

Data Source: Download measurement software installed in the server at ISP Node of the operators

D-Voice failed to meet the benchmark of providing committed broadband download speed as per audit.

3.7 SERVICE AVAILABILITY/UPTIME

3.7.1.1 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/

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

Data for the parameter was extracted from OMC (Operations and Maintenance Center) of the operators.

3.7.1.2   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 hours*

3.7.1.3   BENCHMARK

- ✍ =>98% with effect from quarter ending September 2007 and onwards

3.7.2   DETAILED FINDINGS - SERVICE AVAILABILITY
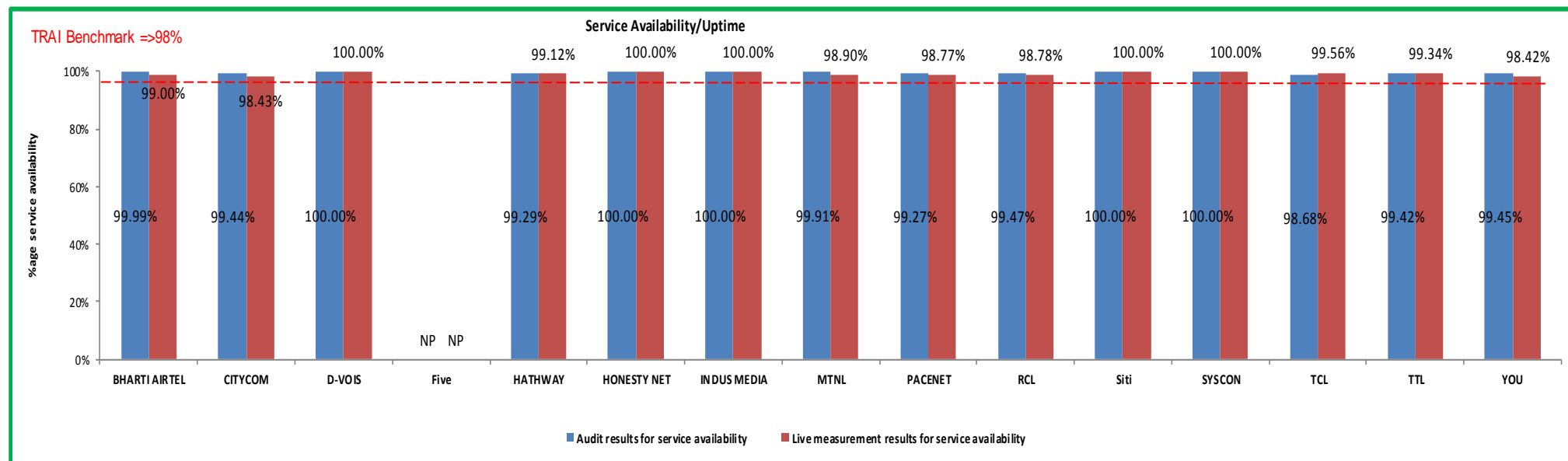
Data Source: Operations and Maintenance Center (OMC) of the operators

All operators met the benchmark for service availability time as per audit.

3.8   NETWORK LATENCY & PACKET LOSS

3.8.1   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).

3.8.1.1   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.

3.8.1.2   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*

3.8.1.3   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)

3.8.2   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.

3.8.2.1   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.

3.8.2.2   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*

3.8.2.3   BENCHMARK

- Packets Loss <1 %

3.8.3 DETAILED FINDINGS - NETWORK LATENCY / PACKET LOSS

Audit results for Latency and packet loss																
Network Latency and Packet Loss	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Packet Loss (Percentage)	< 1%	0.01%	0.05%	0.50%	NP	0.72%	1.16%	NP	0.00%	0.00%	0.52%	0.00%	0.00%	0.00%	0.10%	0.00%
Network Latency																
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	29.69	4.35	2	NP	1	30	NA	1	9	16	NA	1.86	1	68.47	8.2
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	62.22	167.8	NA	NP	90	65.97	NP	271.95	174	17.33	NA	NA	258	200.95	276.78
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

2>>

Live measurement results for Latency and packet loss																
Network Latency and Packet Loss	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Packet Loss (Percentage)	< 1%	0.23%	0.00%	0.23%	NP	0.77%	1.17%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.00%
Network Latency																
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	32	4.36	1.33	NP	1	30	2	1	3	3.955	NA	1.86	1	33.2	2.33
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	74.6	204.58	NA	NP	90	66	NP	193.6	58	0.76	NA	NA	59	163.37	93
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

All operators met the benchmark for network latency related parameters.

IMRB International | eTech

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

4. CRITICAL FINDINGS

Service Provisioning/ Activation Time

- As per audit, all operators met the benchmark for providing new connections within 15 days except Hathway, Indus Media and MTNL.
- However as per live calling, Airtel, D-Voice, Hathway, Indus Media, Siti Cable, TTL and You Broadband failed to meet the benchmark of providing 100% new connections within the TRAI stipulated timeline of 15 days.

Fault Repair/ Restoration

- The benchmark of repairing 90% faults within the next day was not met by Hathway, Honesty Net, Pacenet and TTL.
- The benchmark of repairing 99% faults within next three days of receiving complaints was not met by Hathway, Honesty Net, MTNL, TCL, Pacenet and TTL.
- As per live calling Airtel, Citicom, D-Voice, Hathway, RCL, TTL and You Broadband failed to meet the benchmark of repairing 90% faults within next working day and RCL failed for repairing 99% faults within 3 days.

Billing Performance

- As per audit, all operators met the benchmark for metering and billing credibility.
- All operators met the benchmark for resolution of billing complaints within 4 weeks as well as within 6 weeks.
- However as per live calling Citycom, Hathway, RCL, Siti cable and TTL failed to meet the benchmark for resolution of billing complaints within 4 weeks and hatchway, RCL, Siti cable and TTL failed to meet the benchmark within 6 weeks.

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 and live calling.

Bandwidth Utilization and Throughput

- Honesty and Pacenet failed to the benchmark for bandwidth utilized on upstream links during audit. However MTNL and Pacenet failed to meet the benchmark for bandwidth utilized on upstream links during live measurement.
- D-Voice failed to meet the benchmark for download speed.

5. ANNEXURE – OND'15

5.1 SERVICE PROVISIONING

Audit Results for Service provisioning																
	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Total connections registered during the period		4567	854	12674	9809	13515	4887	1810	16448	2567	NA	7150	15068	NA	2944	320
Number of connections provided within 15 days		4567	854	12674	9809	13308	4887	1733	16429	2567	NA	7150	15068	NA	2944	320
Percentage of connections provided within 15 days	100%	100.00%	100.00%	100.00%	100.00%	98.47%	100.00%	95.75%	99.88%	100.00%	NA	100.00%	100.00%	NA	100.00%	100.00%
Number of connections provided after 15 days of registration of demand		4567	854	12674	9809	13515	4887	1810	16448	2567	NA	7150	15068	NA	2944	320
percentage of connections provided after 15 days of registration of demand	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	NA	100.00%	100.00%
Number of customers to whom credit is given for delayed connections		0	0	0	0	0	0	0	0	0	NA	0	0	NA	0	0
Percentage of customers to whom credit is given for delayed connections	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	NA	100%	100%	NA	100%	100%

2>>

Live calling for Service provisioning																
	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Total connections registered during the period		100	100	100	100	100	100	100	100	100	NA	100	100	NA	100	100
Number of connections provided within 15 days		98	100	78	100	89	100	90	100	100	NA	98	100	NA	56	75
Percentage of connections provided within 15 days	100%	98.00%	100.00%	78.00%	100.00%	89.00%	100.00%	90.00%	100.00%	100.00%	NA	98.00%	100.00%	NA	56.00%	75.00%

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

IMRB International | eTech

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

5.2 FAULT REPAIR/ RESTORATION

Audit Results for Fault repair																
Fault repair	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Total No. of faults registered during the period		5364	2365	65839	NP	81079	5779	4882	332950	7033	307	13390	479	2260	16083	7845
No. of faults repaired by next working day during the period		5228	2245	64253	NP	71264	4877	4863	305874	3707	307	12086	479	2044	13861	7694
Percentage of faults repaired by next working day during the period	≥ 90%	97.46%	94.93%	97.59%	NP	87.89%	84.39%	99.61%	91.87%	52.71%	100.00%	90.26%	100.00%	90.44%	86.18%	98.08%
No. of faults repaired within 3 days during the period		5357	2349	65521	NP	76226	5525	4882	323267	6058	307	13268	479	2178	15396	7845
Percentage of faults repaired within 3 days during the period	≥ 99%	99.87%	99.32%	99.52%	NP	94.01%	95.60%	100.00%	97.09%	86.14%	100.00%	99.09%	100.00%	96.37%	95.73%	100.00%

2>>

Rent rebate	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Percentage of cases where rent rebate for >3 days was given	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Percentage of cases where rent rebate for 15 days was given	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Percentage of cases where rent rebate for 30 days was given	100%	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Data Source: Operations and Maintenance Center (OMC) of the operators and live calls conducted by the auditors from operator's network

Live calling for fault repair															
Fault repair	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Total Number of calls made to subscribers		100	100	100	NP	100	100	100	100	100	100	100	100	100	100	100
Number of cases where faults were repaired by next working day		75	87	67	NP	89	100	92	100	100	78	98	100	98	56	75
Percentage cases where faults were repaired by next working day	≥ 90%	75.00%	87.00%	67.00%	NP	89.00%	100.00%	92.00%	100.00%	100.00%	78.00%	98.00%	100.00%	98.00%	56.00%	75.00%
Number of cases where faults were repaired within 3 days		100	100	100	NP	100	100	100	100	100	98	100	100	100	100	100
Percentage cases where faults were repaired within 3 days	≥ 99%	100.00%	100.00%	100.00%	NP	100.00%	100.00%	100.00%	100.00%	100.00%	98.00%	100.00%	100.00%	100.00%	100.00%	100.00%

IMRB International | eTech

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

5.3 BILLING PERFORMANCE – METERING AND BILLING CREDIBILITY

Audit Results for Billing performance																
Billing Performance	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Billing diputes																
Total bills generated during the period		147043	8599	127396	NA	122085	NA	NA	1601143	NA	13182	97956	NA	2661	124012	133
Total number of bills disputed		1	30	0	NA	1240	NA	NA	0	NA	31	597	NA	4	270	2
Percentage bills disputed (Avg of 3 billing cycles)	≤ 2%	0.00%	0.35%	0.00%	NA	1.02%	NA	NA	0.00%	NA	0.24%	0.61%	NA	0.15%	0.22%	1.50%
Resolution of billing complaints																
Total number of complaints		1	30	0	NA	1240	NA	NA	0	NA	31	597	NA	4	270	2
Total complaints resolved in 4 weeks from date of receipt		1	30	0	NA	1240	NA	NA	0	NA	31	597	NA	4	270	2
Percentage complaints resolved within 4 weeks of date of receipt	≥ 98%	100.00%	100.00%	100.00%	NA	100.00%	NA	NA	100.00%	NA	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Total complaints resolved in 6 weeks from date of receipt		1	30	0	NA	1240	NA	NA	0	NA	31	597	NA	4	270	2
Percentage complaints resolved within 6 weeks of date of receipt	100%	100.00%	100.00%	100.00%	NA	100.00%	NA	NA	100.00%	NA	100.00%	100.00%	NA	100.00%	100.00%	100.00%
Refund of deposits																
Total number of cases requiring refund		0	0	0	NA	381	NA	NA	NA	NA	0	28	NA	1	0	32
Total number of cases where refund was made within 60 days		0	0	0	NA	381	NA	NA	NA	NA	0	28	NA	1	0	32
Percentage cases in which refund was received within 60 days	100%	100.00%	100.00%	100.00%	NA	100.00%	NA	NA	NA	NA	100.00%	100.00%	NA	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

IMRB International | eTech

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

Live calling results for resolution of billing complaints																
Resolution of billing complaints	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Total Number of calls made		1	15	NA	NA	100	NA	NA	NA	NA	20	100	NA	4	100	2
Number of cases resolved in 4 weeks		1	12	NA	NA	67	NA	NA	NA	NA	15	89	NA	4	76	2
Percentage cases resolved in 4 weeks	≥ 98%	100.00%	80.00%	NA	NA	67.00%	NA	NA	NA	NA	75.00%	89.00%	NA	100.00%	76.00%	100.00%
Number of cases resolved in 6 weeks		1	15	NA	NA	79	NA	NA	NA	NA	19	98	NA	4	85	2
Percentage cases resolved in 6 weeks	100%	100.00%	100.00%	NA	NA	79.00%	NA	NA	NA	NA	95.00%	98.00%	NA	100.00%	85.00%	100.00%

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

5.4 RESPONSE TIME TO THE CUSTOMER FOR ASSISTANCE

Audit results for customer care (Voice to Voice)																
Calls Answered within 60 seconds																
Customer Care Assessment	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Total Number of calls received		52582	74605	195278	NP	404388	NP	2252	809012	20150	38705	176791	675	124656	47053	62940
Total Number of calls answered within 60 seconds		49979	67119	191537	NP	350052	NP	2252	599490	20150	36780	118841	637	108921	35409	56146
Percentage calls answered within 60 seconds	≥ 60%	95.05%	89.97%	98.08%	NP	86.56%	NP	100.00%	74.10%	100.00%	95.03%	67.22%	94.37%	87.38%	75.25%	89.21%

IMRB International | eTech

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

Calls Answered within 90 seconds		BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Total Number of calls received		52582	74605	195278	NP	404388	NP	2252	809012	20150	38705	176791	675	124656	47053	62940
Total Number of calls answered within 90 seconds		51130	68672	195278	NP	363762	NP	NP	675826	NP	37000	144826	675	110810	37893	57198
Percentage calls answered within 90 seconds	≥ 80%	97.24%	92.05%	100.00%	NP	89.95%	NP	NP	83.54%	NP	95.59%	81.92%	100.00%	88.89%	80.53%	90.88%

Data Source: Customer Service Center of the operators

Live calling results for customer care (Voice to Voice)																
Customer Care Assessment	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Total Number of calls received		100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Total Number of calls answered within 60 seconds		97	89	98	92	99	96	100	85	100	99	70	100	91	97	97
Percentage calls answered within 60 seconds	≥ 60%	97%	89%	98%	92%	99%	96%	100%	85%	100%	99%	70%	100%	91%	97%	97%
Total Number of calls answered within 90 seconds		99	93	100	100	99	100	100	87	100	99	88	100	93	99	98
Percentage calls answered within 90 seconds	≥ 80%	99%	93%	100%	100%	99%	100%	100%	87%	100%	99%	88%	100%	93%	99%	98%

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

IMRB International | eTech

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

5.5 BANDWIDTH UTILIZATION

Audit results for Bandwidth Utilization																
Bandwidth utilization	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	11.01%	21.76%	72.70%	66.80%	62.81%	81.85%	NP	52.99%	88.59%	17.52%	70.16%	45.53%	40.90%	77.26%	NP

Live measurment results for Bandwidth Utilization																
Bandwidth utilization	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Percentage Bandwidth utilisation during peak hours (In Mbps)	<80%	69.45%	47.54%	60.98%	NP	72.01%	NA	NA	86.14%	85.83%	50.02%	78.66%	65.53%	41.64%	78.77%	73.30%

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

5.6 BROADBAND DOWNLOAD SPEED

Audit results for broadband download speed																
Broadband download speed	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	100.00%	91.67%	26.63%	NP	92.50%	89.32%	NP	NP	91.50%	89.46%	94.33%	82.50%	93.60%	97.23%	87.50%

Live measurement results for broadband download speed																
Broadband download speed	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
%age subscribed speed available to the subscriber during TCBH (B/A)*100	≥ 80%	115.67%	93.33%	80.53%	NP	93.33%	87.16%	97.00%	NP	91.60%	94.00%	94.33%	84.83%	93.00%	94.86%	86.00%

Data Source: Download measurement software installed in the server at ISP Node of the operators

IMRB International | eTech

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

5.7   SERVICE AVAILABILITY/ UPTIME

Audit results for service availability															
Service Availability	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Service Availability Uptime in Percentage	≥ 98%	99.99%	99.44%	100.00%	NP	99.29%	100.00%	100.00%	99.91%	99.27%	99.47%	100.00%	100.00%	98.68%	99.42%	99.45%

Live measurement results for service availability															
Service Availability	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Service Availability Uptime in Percentage	≥ 98%	99.00%	98.43%	100.00%	NP	99.12%	100.00%	100.00%	98.90%	98.77%	98.78%	100.00%	100.00%	99.56%	99.34%	98.42%

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	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Packet Loss (Percentage)	< 1%	0.01%	0.05%	0.50%	NP	0.72%	1.16%	NP	0.00%	0.00%	0.52%	0.00%	0.00%	0.00%	0.10%	0.00%
Network Latency																
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	29.69	4.35	2	NP	1	30	NA	1	9	16	NA	1.86	1	68.47	8.2
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	62.22	167.8	NA	NP	90	65.97	NP	271.95	174	17.33	NA	NA	258	200.95	276.78
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Live measurement results for Latency and packet loss																
Network Latency and Packet Loss	Benchmark	BHARTI AIRTEL	CITYCOM	D-VOIS	Five	HATHWAY	HONESTY NET	INDUS MEDIA	MTNL	PACENET	RCL	Siti	SYSCON	TCL	TTL	YOU
Packet Loss (Percentage)	< 1%	0.23%	0.00%	0.23%	NP	0.77%	1.17%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.20%	0.00%
Network Latency																
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	32	4.36	1.33	NP	1	30	2	1	3	3.955	NA	1.86	1	33.2	2.33
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	74.6	204.58	NA	NP	90	66	NP	193.6	58	0.76	NA	NA	59	163.37	93
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<800msec	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

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

TRAI Audit Wireless Report for Mumbai Circle

WEST ZONE

QE December 2015

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 Mumbai circle.

IMRB International | eTech

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

2.3 COVERAGE

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

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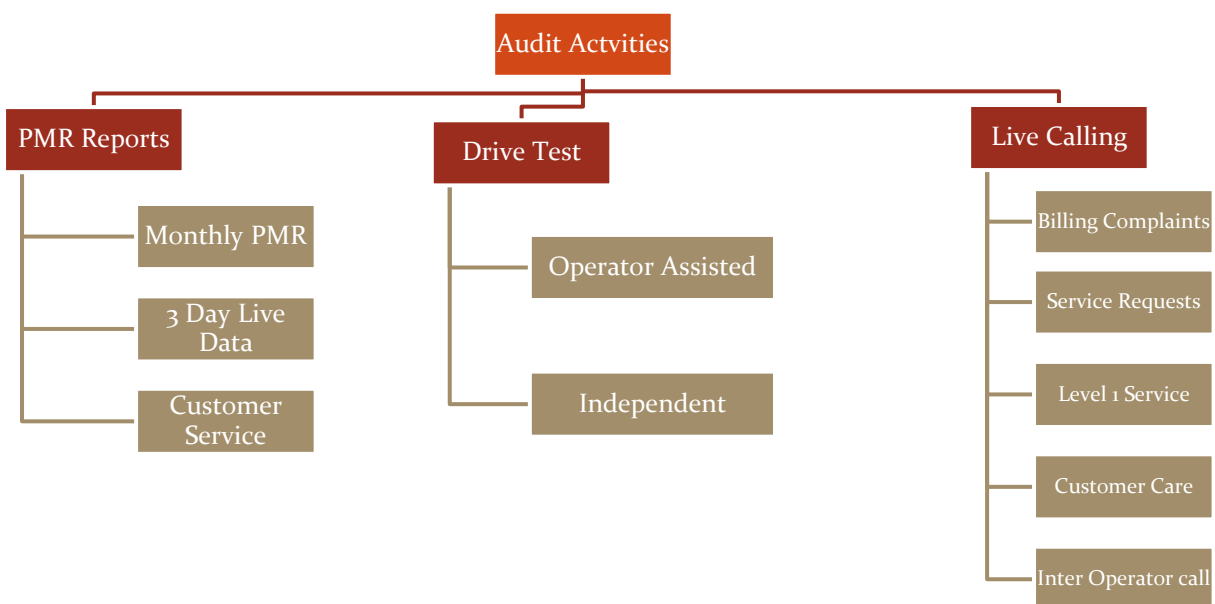
Let's discuss each of the activity in detail and the methodology adopted for each of the module.

2.4.1 PMR REPORTS

2.4.1.1 SIGNIFICANCE AND METHODOLOGY

PMR or Performance Monitoring Reports are generated to assess the various Quality of Service parameters involved in the mobile telephony service, which indicate the overall health of service for an operator.
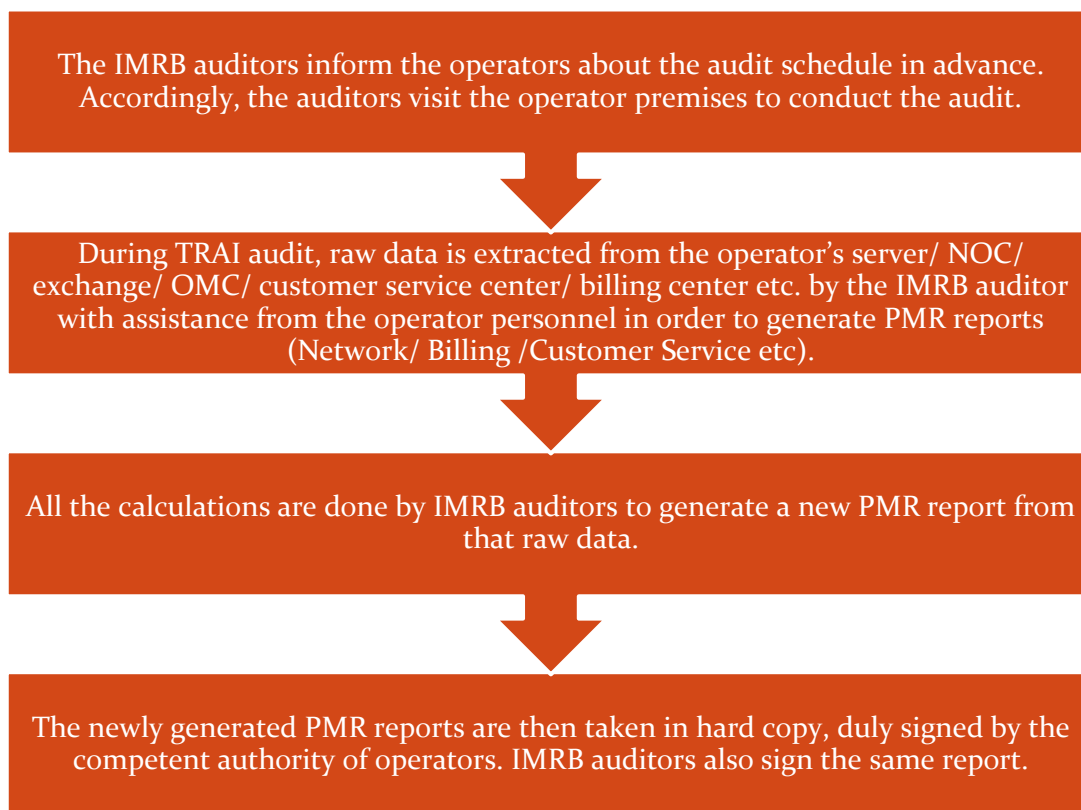
The PMR report for network parameters is taken for each month of the audit quarter and is extracted and verified in the first week of the subsequent month of the audit month. For example, October 2015 audit data was collected in the month of November 2015.

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

2.4.1.2 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 October, November and December 2015. The performance of operators on various parameters was assessed against the benchmarks. Parameters include-

Network Availability

- BTS accumulated downtime
- Worst affected BTS due to downtime

Connection Establishment (Accessibility)

- Call Set Up success Rate (CSSR)

Network Congestion Parameters

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

Connection Maintenance

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

Voice Quality

- % Connections with good voice quality

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

2.4.1.3   AUDIT PARAMETERS – NETWORK 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%**

2.4.1.4 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 October, November and December 2015. 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.

2.4.1.5 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%**

2.4.1.6 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%

2.4.1.7 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%**

2.4.1.8   POINT OF DATA EXTRACTION

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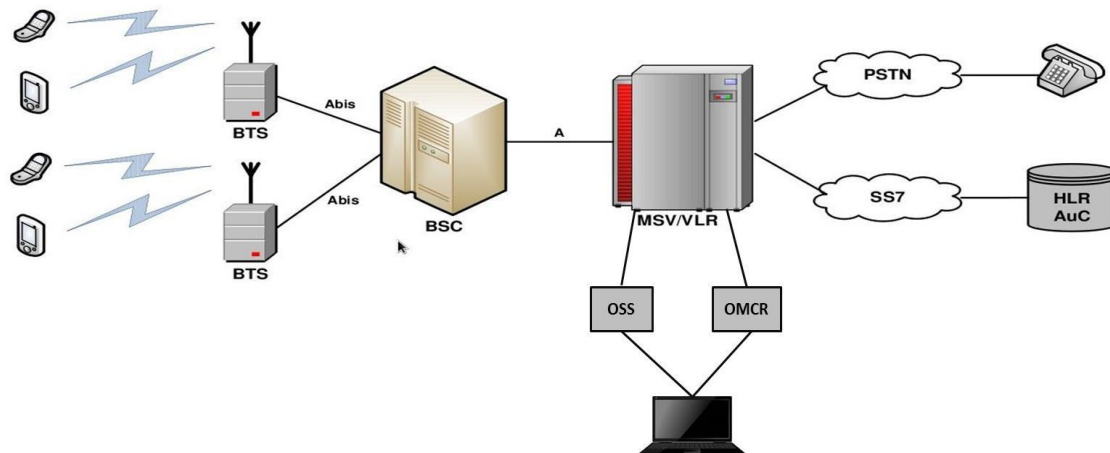
2.4.1.9 STEP BY STEP AUDIT PROCEDURE

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

Tender document and latest list of licensees as per TRAI are taken as a reference document for assimilating the presence of operators. The wireless operators are then contacted for the audit.

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

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

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

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

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

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

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

IMRB International | eTech

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

2.4.1.10 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
TCH Congestion	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	POI Congestion% = [(A1 x C1) + (A2 x C2) +.......+ (An x Cn)] / (A1 + A2 +...+ An) Where: A1 = POI traffic offered on all POIs (no. of calls) on day 1 C1 = Average POI Congestion % on day 1 A2 = POI traffic offered on all POIs (no. of calls) on day 2 C2 = Average POI Congestion % on day 2 An = POI traffic offered on all POIs (no. of calls) on day n Cn = Average POI Congestion % on day n
Call Drop Rate	Total Calls Dropped / Total Calls Established x 100
Worst Affected Cells having more than 3% TCH drop	Total number of cells having more than 3% TCH drop during CBBH/ Total number of cells in the LSA x 100
Connections with good voice quality	No. of voice samples with good voice quality / Total number of samples x 100

2.4.1.11 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
Circuit Switched RAB Congestion	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	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

2.4.1.12 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).

Sl. No.	Name of Service Provider	Dates of live measurement Audit		
GSM Operators		**Oct-14**	**Nov-14**	**Dec-14**
1	AIRCEL	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
2	AIRTEL	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
3	BSNL	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
4	TATA GSM	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
5	IDEA	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
6	RCOM GSM	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
7	VODAFONE	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
CDMA Operators				
8	RCOM CDMA	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
9	TATA CDMA	28th to 30th Oct'15	3rd to 5th Nov'2015	2nd to 4th Dec'15
3G Operators				
10	MTNL 3G	28th to 30th Oct'15	2nd to 4th Nov'2015	1st to 3rd Dec'15
11	Vodafone 3G	28th to 30th Oct'15	2nd to 4th Nov'2015	2nd to 4th Dec'15

2.4.1.13 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:

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

The 90 day period is decided upon the basis of month of audit. For example, for audit of Aug 2015, the 90 day period data used to identify TCBH would be the data of Jun, Jul and Aug 2015

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

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

IMRB | eTech

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

2.4.1.14 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:

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

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

The 90 day period is decided upon the basis of month of audit. For example, for audit of Aug 2015, the 90 day period data used to identify CBBH would be the data of Jun, Jul and Aug 2015

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

2.4.1.15 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 December 2015 (OND'15) was collected in the month of January 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.

2.4.1.16 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%

2.4.1.17 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

IMRB International | eTech

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

2.4.2   LIVE CALLING

2.4.2.1   SIGNIFICANCE AND METHODOLOGY

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

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

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

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

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

Live calling activity was carried out during the period of December 2015. The data considered for live calling was for the month prior to the month in which the live calling activity was being conducted. In this case, data of November 2015 was considered for live calling activity conducted in December 2015.

A detailed explanation of each parameter is explained below.

2.4.2.2   BILLING COMPLAINTS

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

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

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

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

2.4.2.3   SERVICE COMPLAINTS REQUESTS

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

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

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

2.4.2.4   LEVEL 1 SERVICE

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

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

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

2.4.2.4.1   PROCESS TO TEST LEVEL 1 SERVICES

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

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

2.4.2.5 CUSTOMER CARE

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

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

The process for this parameter is stated below.

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

2.4.2.6 INTER OPERATOR CALL ASSESEMENT

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

2.4.3 VOICE DRIVE TEST – 2G & 3G

2.4.3.1 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.

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

SSAs are selected according to the total no. of SSAs on that region and audited in each quarter, at least 1 SSA in each month it may be more 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 Office New Delhi, 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 and SSA list was finalized by TRAI office New Delhi.
- 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 Office New Delhi.
- 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 and SSA list was finalized by TRAI office New Delhi.
- ✤ 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.

2.4.3.3 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 SSA list was finalized by TRAI office New Delhi.
- ✤ Route map was designed in such a way that all the major roads, highways and all the important towns and villages were covered as part of audit.
- ✤ Special emphasis was given to those areas where the number of complaints received were on the higher side, if provided by TRAI.
- ✤ The route is defined in a way that we cover maximum area in the SSA and try to cover maximum villages and cities within the SSA. The route is designed such that there is no overlap of roads (if possible).
- ✤ The route was classified as-
    - o With In city
    - o Major Roads
    - o Highways
    - o Shopping complex/ Mall
    - o Office Complex/ Government Building
- ✤ There were no fixed calls which we need to do for within city, major roads and highways, but a minimum of 30 calls in each route, i.e., within city, major roads and highways on each day. For indoors, 20 calls each for shopping and office complex each day preferably in relatively bigger city.
- ✤ 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.

2.4.3.4 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 RxQual Samples– A
  - ✓ RxQual samples with 0-5 value – B
  - ✓ %age samples with good voice quality = B/A x 100
- ✤ Voice quality (CDMA)
  - ✓ Total FER BINs (forward FER) – A
  - ✓ FER BINs with 0-2 value (forward FER) – B
  - ✓ FER BINs with 0-4 value (forward FER) – C
  - ✓ %age samples with FER bins having 0-2 value (forward FER) = B/A x 100
  - ✓ %age samples with FER bins having 0-4 value (forward FER) = C/A x 100
  - ✓ No. of FER samples with value > 4 = [A-C]
- ✤ Call setup success rate
  - ✓ Total number of call attempts – A
  - ✓ Total Calls successfully established – B
  - ✓ Call success rate (%age) = (B/A) x 100
- ✤ Blocked calls
  - ✓ 100% - Call Set up Rate
- ✤ Call drop rate
  - ✓ Total Calls successfully established – A
  - ✓ Total calls dropped after being established – B
  - ✓ Call Drop Rate (%age) = (B/A) x 100

2.4.4 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.

2.4.4.1 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.
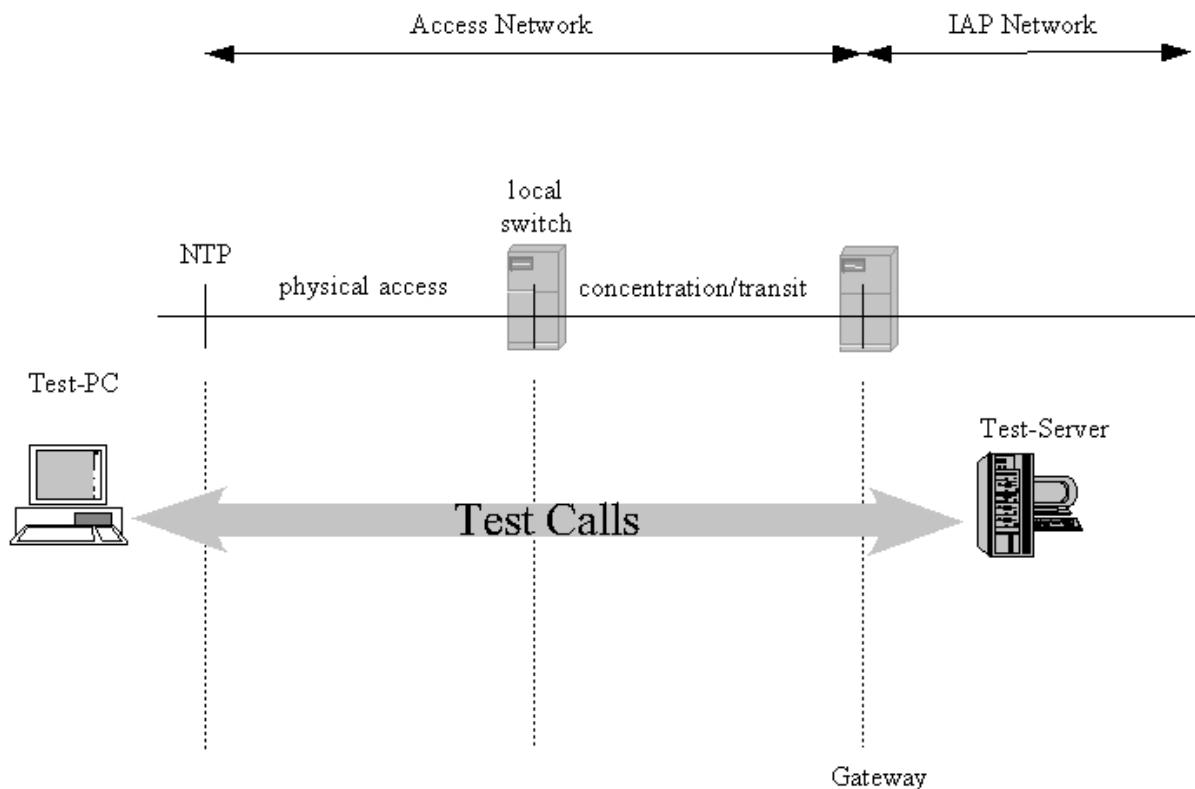
Figure for Measurement set-up

2.4.4.2 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:
- o Maximum Segment Size between 1380 Bytes and 1460 Bytes.
- o TCP RX Window Size > 4096 Bytes
- o SACK (Selective Acknowledgement) enabled.
- o TCP Fast Retransmit.
- o TCP Fast Recovery enabled.
- o Delayed ACK enabled (200ms).

2.4.4.3 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.

2.4.4.4 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.

2.4.4.5 PARAMETERS EVALUATED DURING DATA DRIVE TEST AT HOTSPOTS

2.4.4.5.1 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 =

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

2.4.4.5.2   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 = $\dfrac{\text{Total Successful upload attempts} \times 100}{\text{Total upload attempts}}$

2.4.4.5.3   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) =
$$\dfrac{\text{Download speed } (A1+A2+A3+A4+A5+A6) \times 100}{6}$$
Note- A1, A2, A3, A4 A5 & A6 are download speeds at 6 hotspots

2.4.4.5.4   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

2.4.4.5.5 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) = $\dfrac{\text{Total number of successful ping} \times 100}{\text{Total number of ping sent to the Test Server}}$

2.5   OPERATORS COVERED 2G AND 3G

Name of Operator	Number of Subscriber as per VLR-2G
Aircel	1638213
Airtel	3500185
Idea	3985884
MTNL	724763
Reliance CDMA	54678
Reliance GSM	5859486
TATA CDMA	24356
TATA GSM	3603044
Vodafone	8430533
Name of Operator	**Number of Subscriber as per VLR-3G**
MTNL 3G	724763
Vodafone 3G	8430533

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

2.6   COLOUR CODES TO READ THE REPORT

Not Meeting the benchmark   Best Performing Operator

3 CRITICAL FINDINGS

PMR Consolidated (Network Parameters) for 2G

➢ All the operators performed well for both PMR data Audit, but whereas TATA CDMA failed to meet the TRAI bench marks for voice quality.

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

3 Day Live Measurement (Network Parameters)

➢ All the operators performed well for both PMR data Audit, but whereas TATA CDMA failed to meet the TRAI bench marks for voice quality.

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

PMR Consolidated (Network Parameters) for 3G

➢ Vodafone met the TRAI benchmark for 3G services and was best with 0.11%. But MTNL failed to meet the TRAI benchmark for worst affected Node Bs due to downtime.

3 Day Live Measurement (Network Parameters) for 3G

➢ All operators met as per the TRAI benchmarks.

Wireless data services for 2G and 3G

➢ Aircel 2G failed to meet the TRAI benchmark for Activation done within 4hrs.

➢ Aircel 2G failed to meet the TRAI benchmark for PDP context activation success rate in monthly as well 3days live.

Note: **For 2G as well as 3G none of the operators provided complete data.**

Live Calling

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

➢ Reliance CDMA and 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 postpaid subscribers, it was observed that Idea and Vodafone failed to meet the TRAI benchmark for the parameter Metering and Billing Credibility – Postpaid Subscribers.
- For the prepaid customers, Reliance CDMA and Vodafone failed to meet the benchmark of charging disputes Metering and Billing Credibility – Prepaid Subscribers.
- All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks. However Vodafone remained slightly below the benchmark for resolving 100% complaints within 4 weeks and 6 weeks.
- All the operators met the TRAI benchmark of providing credit or waiver within one week in case of complaints received, except Vodafone.
- Airtel, Reliance CDMA and Reliance GSM failed to meet the TRAI specified benchmark for Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds.

Operator Assisted Drive test

- Aircel and Idea failed to meet the benchmark for Voice Quality in outdoor locations.

Note: - MTNL 2G & 3G, Reliance CDMA and Reliance GSM did not share the data.

Data Drive test

- All operators met the TRAI benchmark for data drive test in Mumbai.

Note: MTNL 2G & 3G, Reliance GSM & CDMA and TATA GSM & CDMA did not submit the data.

IMRB International | eTech

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

4 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 Mumbai circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

4.1 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	0.02%	0.24%	98.14%	0.19%	1.13%	0.87%	5.33%	97.58%
Airtel	0.00%	0.00%	99.93%	0.02%	0.02%	0.15%	0.50%	100.00%
Idea	0.00%	0.06%	99.10%	0.46%	0.60%	1.01%	1.65%	96.42%
MTNL	0.01%	1.08%	97.67%	0.47%	0.10%	1.49%	1.96%	95.60%
Reliance CDMA	0.00%	1.05%	97.09%	NA	1.26%	0.12%	0.29%	99.65%
Reliance GSM	0.00%	1.37%	98.88%	0.25%	0.41%	0.16%	0.51%	99.21%
TATA CDMA	0.00%	0.00%	99.10%	NA	0.34%	0.36%	2.57%	84.83%
TATA GSM	0.00%	0.63%	98.62%	0.17%	1.12%	0.15%	1.24%	97.92%
Vodafone	0.00%	0.00%	99.40%	0.20%	0.53%	0.77%	1.65%	97.72%

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

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

BTSs Accumulated Downtime:

All the operators met the TRAI benchmark, Aircel and MTNL performed slightly low when compared to other operators with 0.02% and 0.01%.

Worst Affected BTSs Due to Downtime:

All the operators met the TRAI benchmark, operators like Airtel, TATA CDMA and Vodafone performed better than other operators at 0.00%

Call Set-up Success Rate (CSSR):

All the operators met the TRAI benchmark, Airtel performed better than other operators at 99.93%

SDCCH/ Paging Chl. Congestion:

All the operators met the TRAI benchmark, Airtel performed better than other operators at 0.02%

TCH Congestion:

All the operators met the TRAI benchmark, Airtel performed better than other operators at 0.02%

Call Drop Rate:

All the operators met the TRAI benchmark, Reliance CDMA performed better than other operators at 0.12%.

Worst Affected Cells Having More than 3% TCH Drop:

All the operators met the TRAI Benchmark expect Aircel failed to meet by recording 5.33% and Reliance CDMA was best among other operators.

Voice Quality

All the operators met the TRAI Benchmark expect TATA CDMA failed to meet by recording 84.33% and Airtel was best among other operators.

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.

4.1.1 PMR DATA - OCTOBER FOR 2G

	Month							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month October	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	0.00%	0.36%	98.15%	0.15%	1.00%	1.05%	5.45%	97.66%
Airtel	0.00%	0.00%	99.95%	0.02%	0.02%	0.80%	0.84%	1324.55%
Idea	0.00%	0.00%	99.04%	0.42%	0.60%	0.99%	1.60%	96.39%
MTNL	0.01%	1.32%	98.47%	0.57%	0.09%	1.53%	1.86%	95.30%
Reliance CDMA	0.00%	1.78%	97.08%	NA	1.26%	0.13%	0.34%	99.65%
Reliance GSM	0.00%	1.48%	98.78%	0.29%	0.80%	0.17%	0.60%	99.29%
TATA CDMA	0.00%	0.00%	99.09%	NA	0.91%	0.36%	1.21%	84.83%
TATA GSM	0.00%	1.88%	99.34%	0.10%	1.49%	0.81%	3.60%	97.88%
Vodafone	0.00%	0.00%	99.35%	0.10%	0.65%	0.96%	1.72%	102.44%

4.1.2 PMR DATA – NOVEMBER FOR 2G

	Month							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month November	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	0.00%	0.05%	98.02%	0.22%	1.44%	0.89%	5.64%	97.57%
Airtel	0.00%	0.00%	99.96%	0.00%	0.00%	0.04%	0.22%	97.67%
Idea	0.00%	0.14%	99.10%	0.42%	0.63%	1.01%	1.70%	96.44%
MTNL	0.01%	0.81%	97.39%	0.44%	0.10%	1.43%	1.95%	95.46%
Reliance CDMA	0.00%	0.81%	97.15%	NA	1.26%	0.11%	0.21%	99.65%
Reliance GSM	0.00%	1.12%	98.70%	0.20%	0.23%	0.16%	0.47%	99.32%
TATA CDMA	0.00%	0.00%	99.15%	NA	0.02%	0.36%	3.33%	84.83%
TATA GSM	0.00%	0.00%	99.10%	0.35%	1.70%	0.00%	0.06%	98.16%
Vodafone	0.00%	0.00%	99.47%	0.41%	0.53%	0.72%	1.51%	97.62%

4.1.3 PMR DATA - DECEMBER FOR 2G

Month								
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month December	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	0.07%	0.31%	98.23%	0.19%	0.96%	0.83%	4.91%	97.52%
Airtel	0.00%	0.00%	99.89%	0.05%	0.05%	0.82%	1.29%	97.57%
Idea	0.00%	0.05%	99.16%	0.53%	0.57%	1.01%	1.65%	96.40%
MTNL	0.01%	1.12%	97.16%	0.39%	0.11%	1.51%	2.09%	95.98%
Reliance CDMA	0.00%	0.58%	97.03%	NA	1.26%	0.11%	0.33%	99.65%
Reliance GSM	0.00%	1.50%	99.15%	0.25%	0.21%	0.15%	0.47%	99.00%
TATA CDMA	0.01%	0.00%	99.06%	NA	0.08%	0.37%	3.20%	NDR
TATA GSM	0.00%	0.00%	97.42%	0.07%	0.17%	15.69%	0.06%	98.04%
Vodafone	0.00%	0.00%	99.37%	0.10%	0.43%	0.91%	1.72%	97.67%

IMRB International | eTech

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

4.2 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	0.03%	0.12%	98.25%	0.17%	0.88%	0.89%	5.23%	97.62%
Airtel	0.01%	0.00%	99.92%	0.03%	0.03%	0.11%	0.84%	97.60%
Idea	0.00%	0.00%	99.06%	0.45%	0.60%	1.11%	1.75%	96.39%
MTNL	0.01%	0.17%	98.26%	0.51%	0.10%	1.58%	2.01%	95.43%
Reliance CDMA	0.00%	0.00%	97.08%	NA	1.27%	0.13%	0.23%	99.65%
Reliance GSM	0.00%	0.00%	99.19%	0.26%	0.29%	0.17%	0.36%	99.31%
TATA CDMA	0.01%	0.18%	99.08%	NA	0.63%	0.38%	1.42%	85.33%
TATA GSM	0.00%	0.00%	98.33%	0.14%	0.94%	0.77%	1.25%	97.00%
Vodafone	0.00%	0.00%	99.33%	0.13%	0.59%	0.97%	1.62%	97.64%

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

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

BTSs Accumulated Downtime:

All the operators met the TRAI benchmark, Aircel, Airtel, MTNL and TATA CDMA performed slightly low when compared to other operators with 0.03%, 0.01%, 0.01% and 0.01%.

Worst Affected BTSs Due to Downtime:

All the operators met the TRAI benchmark, Aircel, MTNL and TATA CDMA performed slightly low when compared to other operators with 0.12%, 0.17% and 0.18%.

Call Set-up Success Rate (CSSR):

All the operators met the TRAI benchmark, Airtel performed better than other operators at 99.92%.

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

SDCCH/ Paging Chl. Congestion:

All the operators met the TRAI benchmark, Airtel performed better than other operators at 0.03%.

TCH Congestion:

All the operators met the TRAI benchmark, Airtel performed better than other operators at 0.03%.

Call Drop Rate:

All the operators met the TRAI benchmark, Airtel performed better than other operators at 0.11%.

Worst Affected Cells Having More than 3% TCH Drop:

All the operators met the TRAI Benchmark expect Aircel failed to meet by recording 5.23% and Reliance CDMA was best among other operators.

Voice Quality

All the operators met the TRAI Benchmark expect TATA CDMA failed to meet by recording 85.33% and Reliance CDMA was best among other operators.

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

4.2.1   3 DAY DATA - OCTOBER FOR 2G

	3 Day							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider 3 Day October	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	0.00%	0.36%	98.17%	0.18%	0.77%	0.82%	5.18%	97.63%
Airtel	0.00%	0.00%	99.95%	0.01%	0.02%	0.04%	0.40%	97.57%
Idea	0.00%	0.00%	99.01%	0.41%	0.55%	1.19%	1.81%	96.37%
MTNL	0.01%	0.20%	98.60%	0.61%	0.11%	1.57%	1.85%	95.28%
Reliance CDMA	0.00%	0.00%	97.10%	NA	1.27%	0.13%	0.32%	99.65%
Reliance GSM	0.00%	0.00%	99.03%	0.28%	0.50%	0.17%	0.53%	99.33%
TATA CDMA	0.00%	0.00%	99.03%	NA	0.97%	0.36%	1.10%	84.83%
TATA GSM	0.00%	0.00%	99.37%	0.11%	1.25%	0.81%	3.69%	98.16%
Vodafone	0.00%	0.00%	99.33%	0.17%	0.67%	0.99%	1.67%	97.75%

4.2.2   3 DAY DATA – NOVEMBER FOR 2G

	3 Day							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider 3 Day November	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	0.00%	0.00%	98.17%	0.22%	0.77%	1.05%	5.45%	97.64%
Airtel	0.00%	0.00%	99.92%	0.03%	0.02%	0.80%	0.84%	97.67%
Idea	0.00%	0.01%	99.05%	0.50%	0.63%	0.99%	1.60%	96.33%
MTNL	0.01%	0.10%	99.28%	0.43%	0.10%	1.61%	1.70%	95.58%
Reliance CDMA	0.00%	0.00%	96.99%	NA	1.26%	0.12%	0.22%	99.65%
Reliance GSM	0.00%	0.00%	99.37%	0.20%	0.20%	0.17%	0.50%	99.30%
TATA CDMA	0.00%	0.00%	99.16%	NA	0.84%	0.37%	0.04%	85.37%
TATA GSM	0.00%	0.00%	99.22%	0.31%	1.46%	0.79%	0.02%	96.91%
Vodafone	0.00%	0.00%	99.27%	0.11%	0.73%	0.93%	1.51%	97.73%
Vodafone	NA	NA	0.00%	0.00%	0.00%	NA	NA	NA

4.2.3 3 DAY DATA - DECEMBER FOR 2G

Name of Service Provider 3 Day December	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	0.09%	0.00%	98.41%	0.12%	1.11%	0.80%	5.06%	97.60%
Airtel	0.02%	0.00%	99.89%	0.05%	0.04%	0.86%	1.26%	97.62%
Idea	0.00%	0.00%	99.11%	0.44%	0.61%	1.07%	1.72%	96.42%
MTNL	0.01%	0.20%	96.89%	0.50%	0.08%	1.55%	2.47%	95.42%
Reliance CDMA	0.00%	0.00%	97.16%	NA	1.27%	0.12%	0.14%	99.65%
Reliance GSM	0.00%	0.00%	99.17%	0.29%	0.18%	0.16%	0.04%	99.29%
TATA CDMA	0.04%	0.53%	99.04%	NA	0.07%	0.52%	3.12%	NDR
TATA GSM	0.00%	0.00%	96.39%	0.00%	0.10%	0.71%	0.02%	98.04%
Vodafone	0.01%	0.00%	99.40%	0.11%	0.37%	0.97%	1.67%	97.58%

4.3 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%
MTNL 3G	1.46%	2.93%	97.20%	0.81%	0.44%	1.46%	2.26%	98.92%
Vodafone 3G	0.11%	0.00%	99.82%	0.02%	0.02%	0.42%	2.35%	97.82%

Note: - Airtel did not allow IMRB to conduct the audit because they did not get the approval form there management.

Following are the parameter wise observations for wireless operators for circle: Mumbai.

Node Bs downtime:

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 0.11%.

Worst affected Node Bs due to downtime:

Vodafone met the TRAI benchmark for 3G services and was best with 0.11%. But MTNL failed to meet the TRAI benchmark with 2.93%.

Call Set-up Success Rate (CSSR):

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 99.82%.

RRC Congestion:

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 0.02%.

Circuit Switched RAB Congestion:

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 0.02%.

Circuit Switched Voice Call Drop Rate:

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 0.42%.

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

MTNL and Vodafone met the TRAI benchmark for 3G services, MTNL was best with 2.26%.

Circuit Switch Voice Quality:

MTNL and Vodafone met the TRAI benchmark for 3G services, MTNL was best with 99.92%.

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.

4.3.1   PMR DATA - OCTOBER FOR 3G

	Month							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month October	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%
MTNL 3G	0.44%	0.69%	96.16%	0.88%	1.05%	1.55%	0.92%	98.89%
Vodafone 3G	0.05%	0.00%	99.80%	0.07%	0.05%	0.42%	2.35%	97.80%

4.3.2   PMR DATA – NOVEMBER FOR 3G

	Month							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month November	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%
MTNL 3G	0.55%	1.30%	98.14%	0.76%	0.13%	1.40%	2.48%	98.94%
Vodafone 3G	0.05%	0.00%	99.84%	0.00%	0.00%	0.44%	2.19%	97.67%

4.3.3   PMR DATA - DECEMBER FOR 3G

	Month							
	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)		
Name of Service Provider Month December	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%
MTNL 3G	0.47%	1.01%	97.32%	0.79%	0.14%	1.42%	2.53%	98.92%
Vodafone 3G	0.01%	0.00%	99.81%	0.00%	0.00%	0.35%	2.42%	97.83%

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%
MTNL 3G	1.02%	0.00%	98.01%	0.71%	0.16%	1.17%	2.26%	98.27%
Vodafone 3G	0.15%	0.00%	99.76%	0.05%	0.05%	0.44%	2.21%	97.80%

Note: - Airtel did not allow IMRB to conduct the audit because they did not get the approval form there management.

Following are the parameter wise observations for wireless operators for circle: Mumbai.

Node Bs downtime:

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 0.15%.

Worst affected Node Bs due to downtime:

MTNL and Vodafone met the TRAI benchmark for 3G services, both the operators performed the best in Mumbai Circle.

Call Set-up Success Rate (CSSR):

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 99.76%.

RRC Congestion:

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 0.05%.

Circuit Switched RAB Congestion:

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 0.05%.

Circuit Switched Voice Call Drop Rate:

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 0.44%.

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

MTNL and Vodafone met the TRAI benchmark for 3G services, Vodafone was best with 2.21%.

Circuit Switch Voice Quality:

MTNL and Vodafone met the TRAI benchmark for 3G services, MTNL was best with 98.27%.

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.

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

4.4.1 3 DAY DATA - OCTOBER FOR 3G

3 Day								
Name of Service Provider 3 Day October	**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%
MTNL 3G	0.01%	0.00%	NDR	NDR	NDR	1.79%	1.06%	99.86%
Vodafone 3G	0.07%	0.00%	99.78%	0.08%	0.07%	0.44%	2.21%	97.79%

4.4.2 3 DAY DATA – NOVEMBER FOR 3G

3 Day								
Name of Service Provider 3 Day November	**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%
MTNL 3G	0.64%	0.00%	97.79%	0.67%	0.17%	1.15%	1.76%	98.91%
Vodafone 3G	0.07%	0.00%	99.74%	0.08%	0.08%	0.44%	2.21%	97.79%

4.4.3 3 DAY DATA - DECEMBER FOR 3G

3 Day								
Name of Service Provider 3 Day December	**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%
MTNL 3G	0.44%	0.00%	98.24%	0.76%	0.15%	1.27%	2.55%	98.92%
Vodafone 3G	0.01%	0.00%	99.78%	0.00%	0.00%	0.45%	2.10%	97.81%

IMRB International | eTech

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

4.5   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	70.41%	87.86%	NDR	NDR	83.16%	NDR
Airtel	NDR	NDR	NDR	NDR	NDR	NDR
Idea	NDR	NDR	NDR	NDR	NDR	NDR
MTNL	NDR	100.00%	0.00%	NDR	NDR	NDR
Reliance CDMA	NDR	NDR	NDR	NDR	NDR	NDR
Reliance GSM	NDR	NDR	NDR	NDR	NDR	NDR
TATA CDMA	NDR	NDR	NDR	NDR	NDR	NDR
TATA GSM	NDR	NDR	NDR	NDR	NDR	NDR
Vodafone	NDR	NDR	NDR	NDR	NDR	NDR

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

Aircel failed to meet the TRAI benchmark for Activation done within 4hrs.

Aircel failed to meet the TRAI benchmark for PDP context activation success rate in monthly as well 3days live.

Note: - None of the operators submitted data for all the 3 months completely and same as shown in the section '7' in detail. Above values are not the average of 3 months*

4.6   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%
MTNL 3G	NDR	100.00%	0.00%	NDR	NDR	2.48%
Vodafone 3G	NDR	NDR	2.22%	NDR	99.06%	0.44%

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

Note: - None of the operators submitted data for all the 3 months completely and same as shown in the section '7' in detail. Above values are not the average of 3 months*

IMRB International | eTech

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

4.7 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	96.00%	100.00%	100.00%	100.00%	100.00%	97.00%
Airtel	92.00%	100.00%	100.00%	100.00%	100.00%	98.00%
Idea	78.00%	100.00%	100.00%	100.00%	100.00%	90.00%
MTNL	95.00%	100.00%	100.00%	99.00%	100.00%	90.00%
Reliance CDMA	90.00%	100.00%	100.00%	86.00%	100.00%	83.33%
Reliance GSM	86.00%	100.00%	100.00%	86.00%	100.00%	90.00%
TATA CDMA	NA	NA	100.00%	100.00%	100.00%	100.00%
TATA GSM	NA	NA	100.00%	100.00%	100.00%	100.00%
Vodafone	97.00%	100.00%	100.00%	96.00%	100.00%	98.00%

NA: -Not Applicable

Resolution of billing complaints

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

Complaint/Request Attended to Satisfaction

All operators performed satisfactorily in terms of satisfaction of the customers for service requests. TATA GSM & CDMA recorded the best performance at 100%.

Level 1 Service

All the operators met the TRAI benchmark.

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

Accessibility of Call Centre/Customer Care-IVR

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

Customer Care / Helpline Assessment (voice to voice)

Reliance CDMA and Reliance GSM failed to meet the benchmark for the parameter.

IMRB International | eTech

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

4.8   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	0.00%	0.00%	100.00%	100.00%	100.00%	98.40%	95.43%
Airtel	0.02%	0.00%	100.00%	100.00%	100.00%	99.23%	93.00%
Idea	0.37%	0.07%	100.00%	100.00%	100.00%	99.58%	99.35%
MTNL	0.08%	0.09%	99.33%	100.00%	100.00%	95.40%	95.60%
Reliance CDMA	0.10%	0.15%	100.00%	100.00%	100.00%	99.00%	90.75%
Reliance GSM	0.10%	0.09%	100.00%	100.00%	100.00%	98.29%	91.50%
TATA CDMA	0.00%	0.01%	NA	NA	100.00%	99.23%	99.37%
TATA GSM	0.00%	0.03%	NA	NA	100.00%	98.03%	96.90%
Vodafone	0.62%	0.11%	97.95%	99.56%	96.33%	99.44%	97.70%

Metering and Billing Credibility – Postpaid Subscribers

For the billing disputes of postpaid subscribers, it was observed that Idea and Vodafone failed to meet the TRAI benchmark for the parameter.

Metering and Billing Credibility – Prepaid Subscribers

For the prepaid customers, Reliance CDMA and Vodafone failed to meet the benchmark of charging disputes.

Resolution of billing complaints

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks. Vodafone remained slightly below the benchmark for resolving 100% complaints within 4 weeks and 6 weeks

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

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

Customer Care Percentage of calls answered by the IVR

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

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

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

4.9 INTER OPERATOR CALL ASSESSMENT - CONSOLIDATED

6. Inter Operator Call Assessment									
Inter operator call Assessment To↓ From→	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Aircel	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Airtel	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Idea	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
MTNL	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%	100.00%
Reliance CDMA	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%	100.00%
Reliance GSM	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%	100.00%
TATA CDMA	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%	100.00%
TATA GSM	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	100.00%
Vodafone	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	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, none of the operators faced any problems in connecting to other operators.

IMRB International | eTech

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

4.1   PMR COMPARISON WITH IMRB AND OPERATORS DATA

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	
	≤ 2%		≤ 2%		≥ 95%		≤ 1%		≤ 2%		≤ 2%		≤ 3%		≥ 95%	
	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator	IMRB	Operator
Aircel	0.02%	0.08%	0.24%	0.24%	98.14%	98.13%	0.19%	0.19%	1.13%	1.13%	0.87%	0.86%	5.33%	5.23%	97.58%	97.58%
Airtel	0.00%	0.01%	0.00%	0.00%	99.93%	99.92%	0.02%	0.03%	0.02%	0.03%	0.15%	0.63%	0.50%	0.84%	100.00%	97.63%
Idea	0.00%	0.10%	0.06%	0.10%	99.10%	99.10%	0.46%	0.46%	0.60%	0.60%	1.01%	1.05%	1.65%	1.67%	96.42%	96.41%
MTNL	0.01%	0.56%	1.08%	1.08%	97.67%	97.67%	0.47%	0.47%	0.10%	0.10%	1.49%	1.49%	1.96%	1.97%	95.60%	95.58%
Reliance CDMA	0.00%	0.13%	1.05%	1.06%	97.09%	97.09%	NA	0.00%	1.26%	1.26%	0.12%	0.12%	0.29%	0.29%	99.65%	99.60%
Reliance GSM	0.00%	0.10%	1.37%	1.14%	98.88%	98.88%	0.25%	0.25%	0.41%	0.41%	0.16%	0.16%	0.51%	0.48%	99.21%	99.30%
TATA CDMA	0.00%	0.01%	0.00%	0.00%	99.10%	99.10%	NA	0.00%	0.34%	0.05%	0.36%	0.48%	2.57%	3.63%	84.83%	99.12%
TATA GSM	0.00%	0.00%	0.63%	0.00%	98.62%	99.31%	0.17%	0.12%	1.12%	0.09%	0.15%	0.72%	1.24%	3.62%	97.92%	97.57%
Vodafone	0.00%	0.06%	0.00%	0.00%	99.40%	99.36%	0.20%	0.09%	0.53%	0.65%	0.77%	0.93%	1.65%	1.58%	97.72%	97.63%

Value calculated by IMRB match	

Value calculated by Operator and IMRB do not match	

PMR Consolidated (Network Parameters) for 2G

- ➢ All the operators performed well for both PMR data Audit, but whereas TATA CDMA failed to meet the TRAI bench marks for voice quality.
- ➢ Aircel failed to meet the benchmark for worst affected cells having more than 3% TCH drop rate.

3 Day Live Measurement (Network Parameters)

- ➢ All the operators performed well for both PMR data Audit, but whereas TATA CDMA failed to meet the TRAI bench marks for voice quality.
- ➢ Aircel failed to meet the benchmark for worst affected cells having more than 3% TCH drop rate.

PMR Consolidated (Network Parameters) for 3G

- ➢ Vodafone met the TRAI benchmark for 3G services and was best with 0.11%. But MTNL failed to meet the TRAI benchmark for worst affected Node Bs due to downtime.

3 Day Live Measurement (Network Parameters) for 3G

- ➢ All operators met as per the TRAI benchmarks.

Wireless data services for 2G and 3G

- ➢ Aircel 2G failed to meet the TRAI benchmark for Activation done within 4hrs.
- ➢ Aircel 2G failed to meet the TRAI benchmark for PDP context activation success rate in monthly as well 3days live.

Note: For 2G as well as 3G none of the operators provided complete data.

Live Calling

- ➢ As per the consumers (live calling exercise) none of the operators was able to meet the benchmark of resolving 98% complaints within 4 weeks but was able to meet for 100% complaints within 6 weeks.
- ➢ Reliance CDMA and 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 postpaid subscribers, it was observed that Idea and Vodafone failed to meet the TRAI benchmark for the parameter Metering and Billing Credibility – Postpaid Subscribers.
- For the prepaid customers, Reliance CDMA and Vodafone failed to meet the benchmark of charging disputes Metering and Billing Credibility – Prepaid Subscribers.
- All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks and 6 weeks. However Vodafone remained slightly below the benchmark for resolving 100% complaints within 4 weeks and 6 weeks.
- All the operators met the TRAI benchmark of providing credit or waiver within one week in case of complaints received, except Vodafone.
- Airtel, Reliance CDMA and Reliance GSM failed to meet the TRAI specified benchmark for Customer Care Percentage of calls answered by the operators (Voice to Voice) within 90 seconds.

Operator Assisted Drive test

- Aircel and Idea failed to meet the benchmark for Voice Quality in outdoor locations.

Note: - MTNL 2G & 3G, Reliance CDMA and Reliance GSM did not share the data.

Data Drive test

- All operators met the TRAI benchmark for data drive test in Mumbai.

Note: MTNL 2G & 3G, Reliance GSM & CDMA and TATA GSM & CDMA did not submit the data.

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

6.1 BTS ACCUMULATED DOWNTIME

6.1.1 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.

6.1.2   KEY FINDINGS - CONSOLIDATED
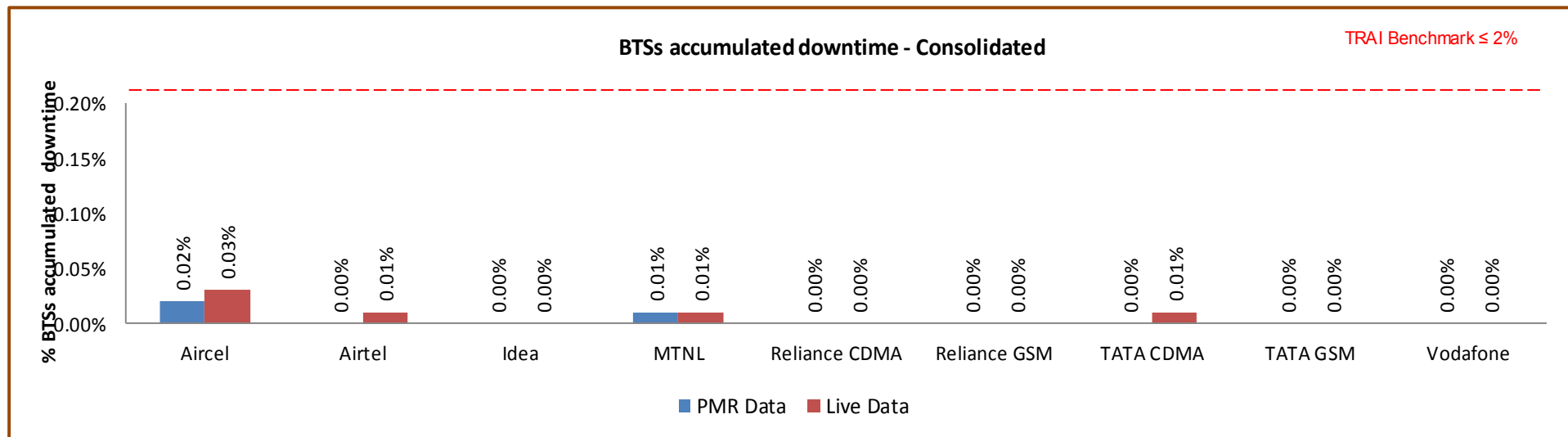
Data Source: Operations and Maintenance Center (OMC) of the operators

All the Operators met the TRAI benchmark.

6.1.2.1 KEY FINDINGS – MONTH 1

BTSs accumulated downtime - Month 1

TRAI Benchmark ≤ 2%

	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
PMR Data	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Data	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
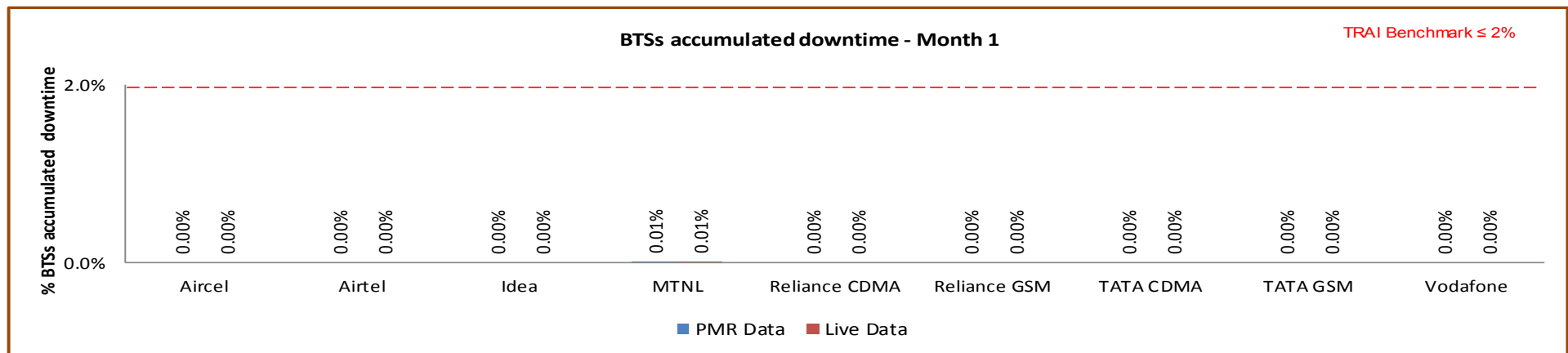
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.2 KEY FINDINGS – MONTH 2

BTSs accumulated downtime - Month 2

TRAI Benchmark ≤ 2%

	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
PMR Data	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Data	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
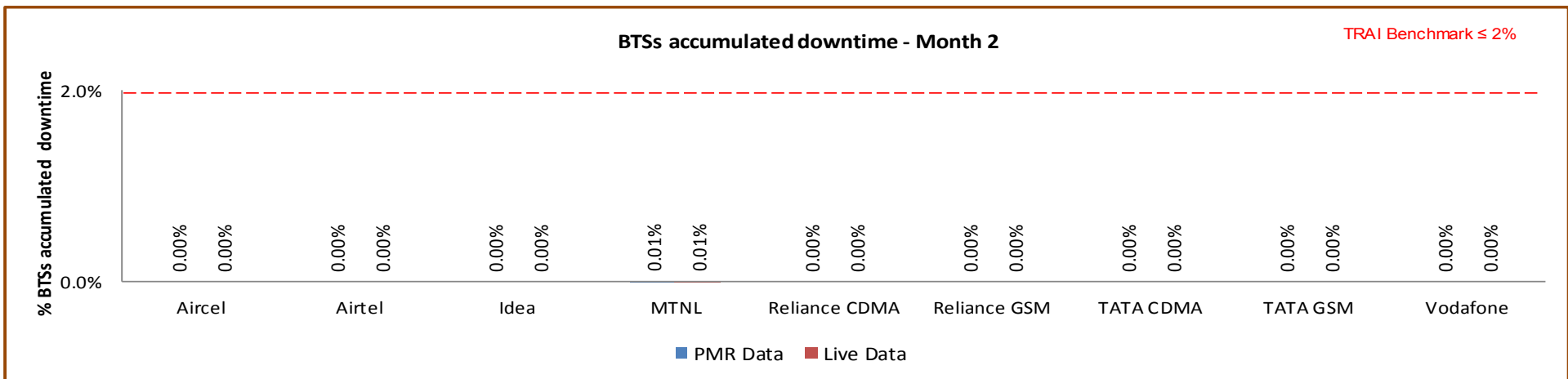
Data Source: Operations and Maintenance Center (OMC) of the operators

6.1.2.3 KEY FINDINGS – MONTH 3

BTSs accumulated downtime - Month 3

TRAI Benchmark ≤ 2%

	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
PMR Data	0.07%	0.00%	0.00%	0.01%	0.00%	0.00%	0.01%	0.00%	0.00%
Live Data	0.09%	0.02%	0.00%	0.01%	0.00%	0.00%	0.04%	0.00%	0.01%

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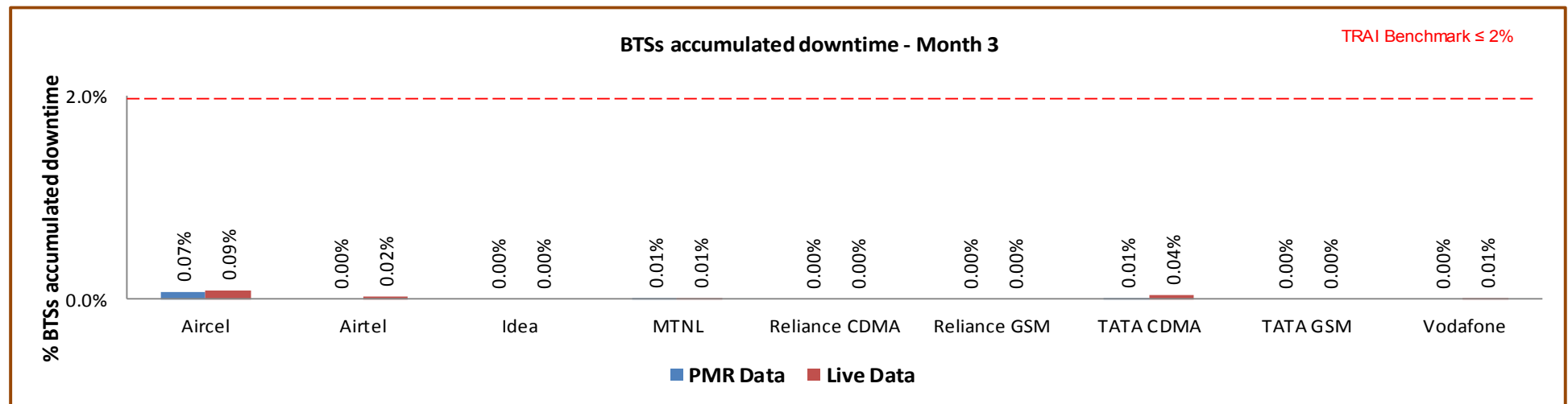
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2   WORST AFFECTED BTS DUE TO DOWNTIME

6.2.1   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.

6.2.2   KEY FINDINGS – CONSOLIDATED
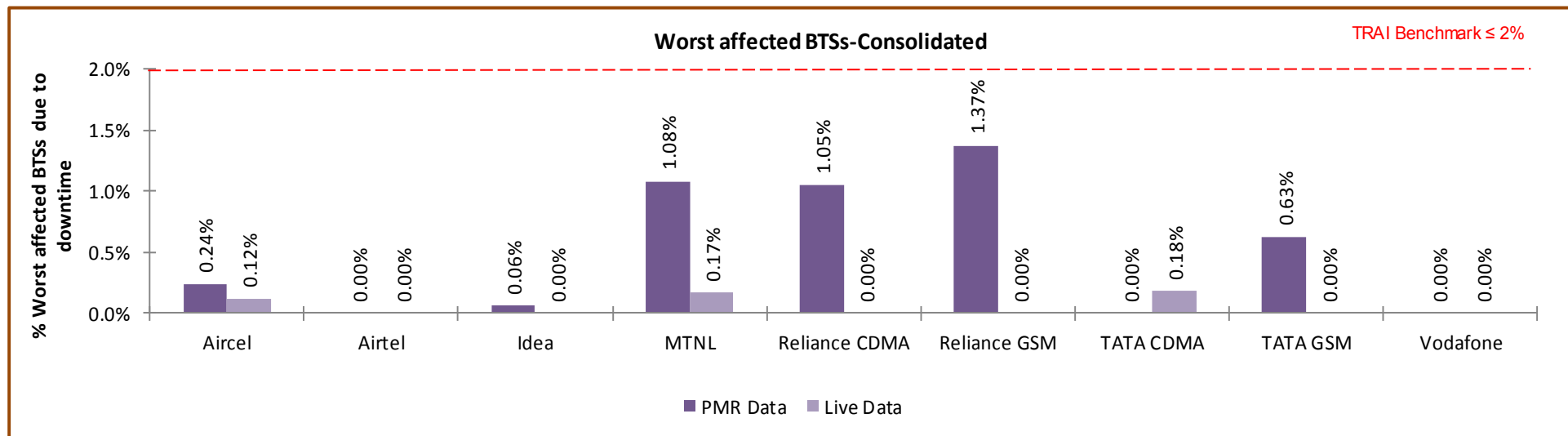
Worst affected BTSs-Consolidated

TRAI Benchmark ≤ 2%

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

All the Operators met the TRAI benchmark.

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

6.2.2.1 KEY FINDINGS – MONTH 1

Worst affected BTSs-Month 1

TRAI Benchmark ≤ 2%
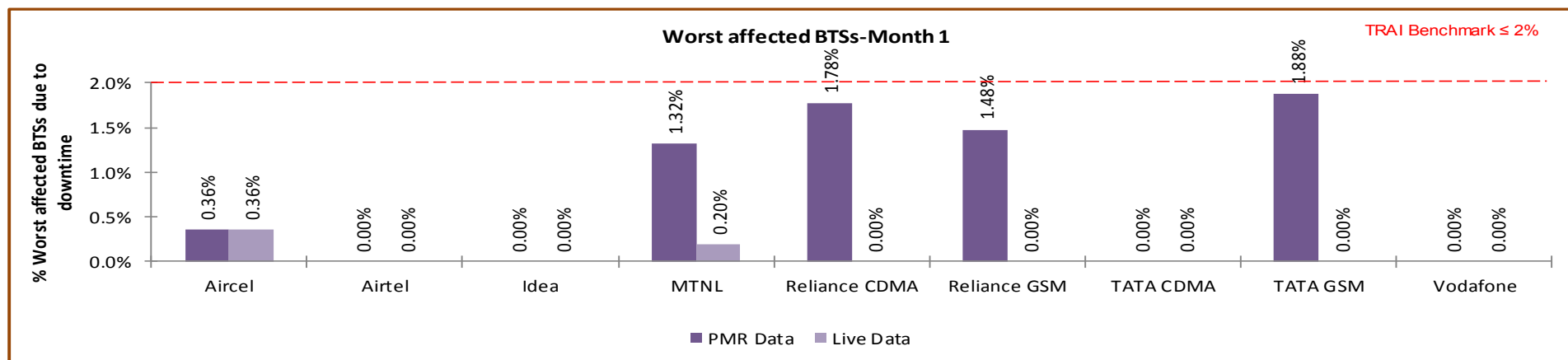
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.2 KEY FINDINGS – MONTH 2

Worst affected BTSs-Month 2

TRAI Benchmark ≤ 2%
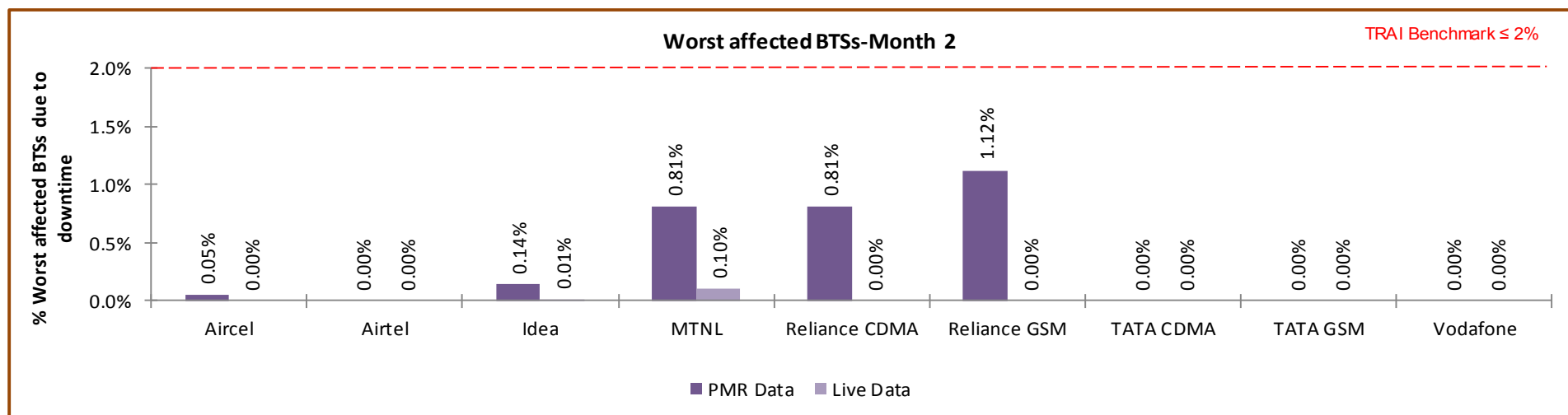
Data Source: Operations and Maintenance Center (OMC) of the operators

6.2.2.3 KEY FINDINGS – MONTH 3

Worst affected BTSs-Month 3

TRAI Benchmark ≤ 2%

% Worst affected BTSs due to downtime

Operator	PMR Data	Live Data
Aircel	0.31%	0.00%
Airtel	0.00%	0.00%
Idea	0.05%	0.00%
MTNL	1.12%	0.20%
Reliance CDMA	0.58%	0.00%
Reliance GSM	1.50%	0.00%
TATA CDMA	0.00%	0.53%
TATA GSM	0.00%	0.00%
Vodafone	0.00%	0.00%

■ PMR Data ■ Live Data

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

Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)
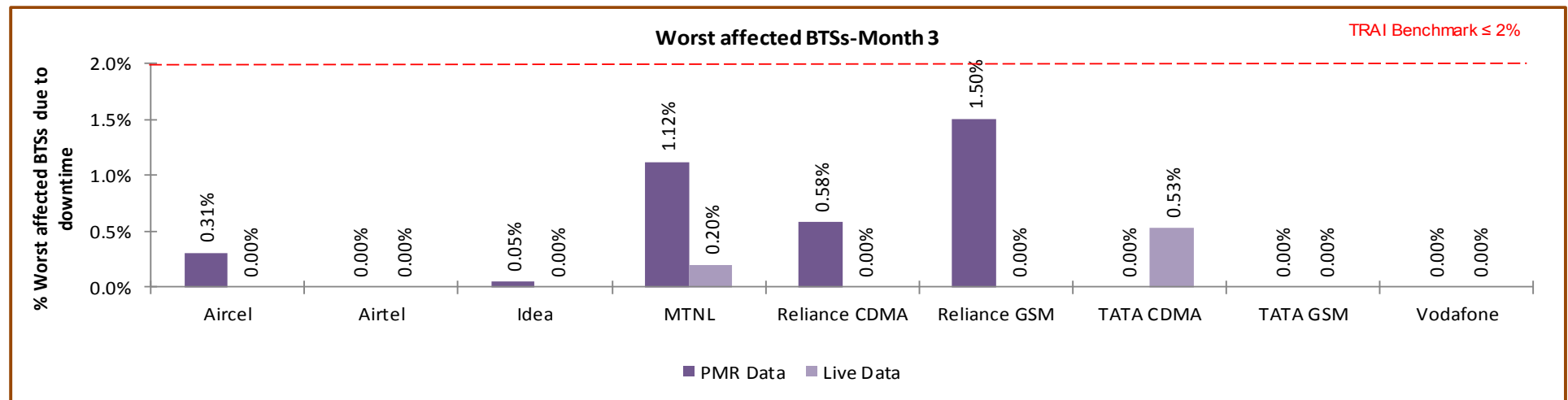
6.3   CALL SET UP SUCCESS RATE

6.3.1   PARAMETER DESCRIPTION

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

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

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

   - call attempt is made

   - the TCH is allocated

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

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

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

   - CSSR calculation should be measured using OMC generated data only

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

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

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

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

IMRB International | eTech

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

6.3.2 KEY FINDINGS - CONSOLIDATED

Call Set Up Success Rate-Consolidated

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	98.14%	98.25%	99.22%
Airtel	99.93%	99.92%	99.75%
Idea	99.10%	99.06%	99.34%
MTNL	97.67%	98.26%	
Reliance CDMA	97.09%	97.08%	
Reliance GSM	98.88%	99.19%	
TATA CDMA	99.10%	99.08%	100.00%
TATA GSM	98.62%	98.33%	99.39%
Vodafone	99.40%	99.33%	100.00%
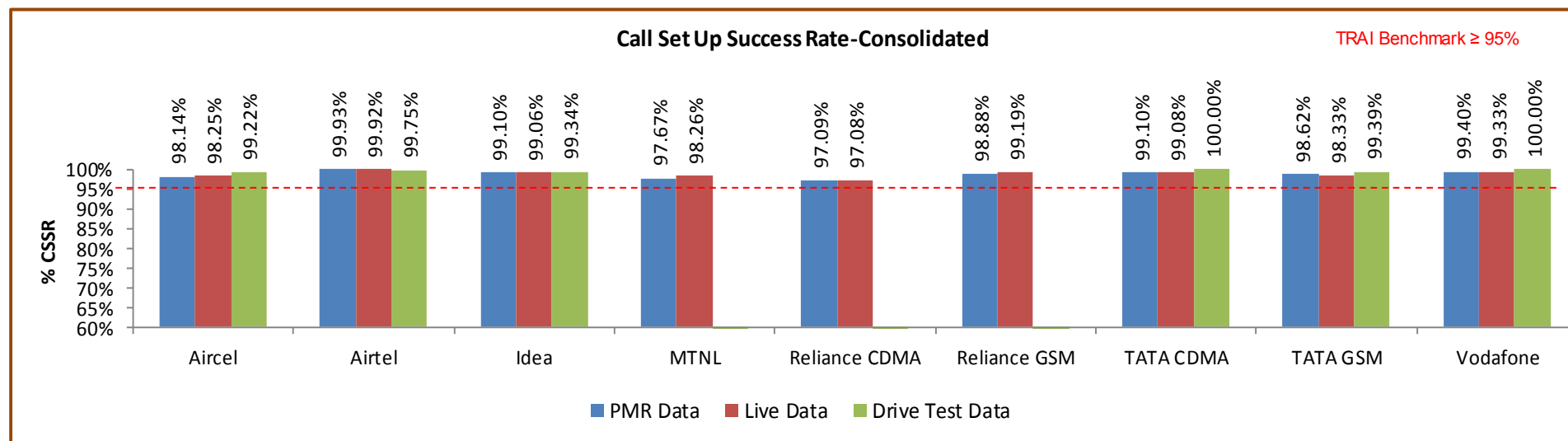
Data Source: Network Operations Center (NOC) of the operators

All the Operators met the TRAI benchmark.

6.3.2.1 KEY FINDINGS – MONTH 1

Call Set Up Success Rate-Month 1

TRAI Benchmark ≥ 95%

	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
PMR Data	98.15%	99.95%	99.04%	98.47%	97.08%	98.78%	99.09%	99.34%	99.35%
Live Data	98.17%	99.95%	99.01%	98.60%	97.10%	99.03%	99.03%	99.37%	99.33%

■ PMR Data ■ Live Data ■ Drive Test Data
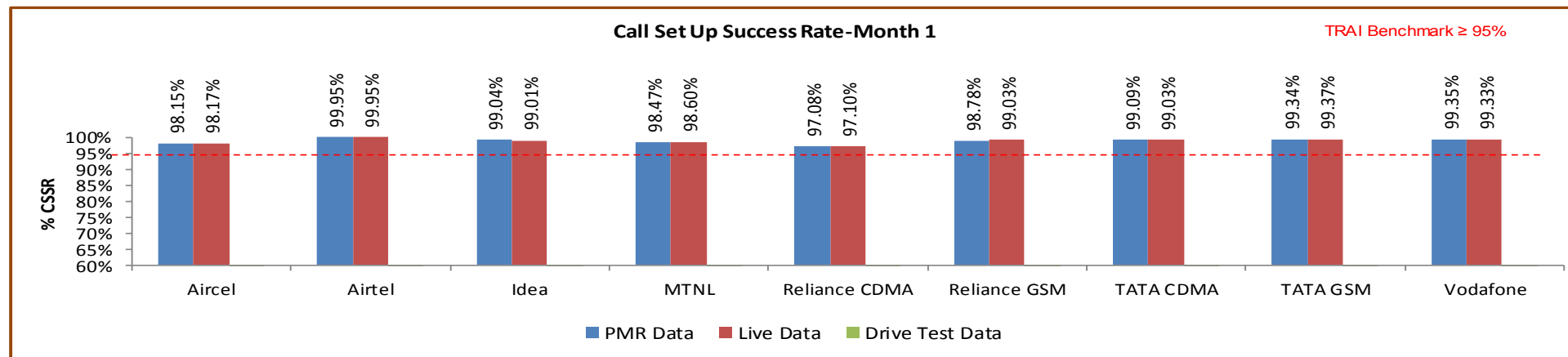
Data Source: Network Operations Center (NOC) of the operators

6.3.2.2 KEY FINDINGS – MONTH 2

Call Set Up Success Rate-Month 2

TRAI Benchmark ≥ 95%

	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
PMR Data	98.02%	99.96%	99.10%	97.39%	97.15%	98.70%	99.15%	99.10%	99.47%
Live Data	98.17%	99.92%	99.05%	99.28%	96.99%	99.37%	99.16%	99.22%	99.27%

■ PMR Data ■ Live Data ■ Drive Test Data
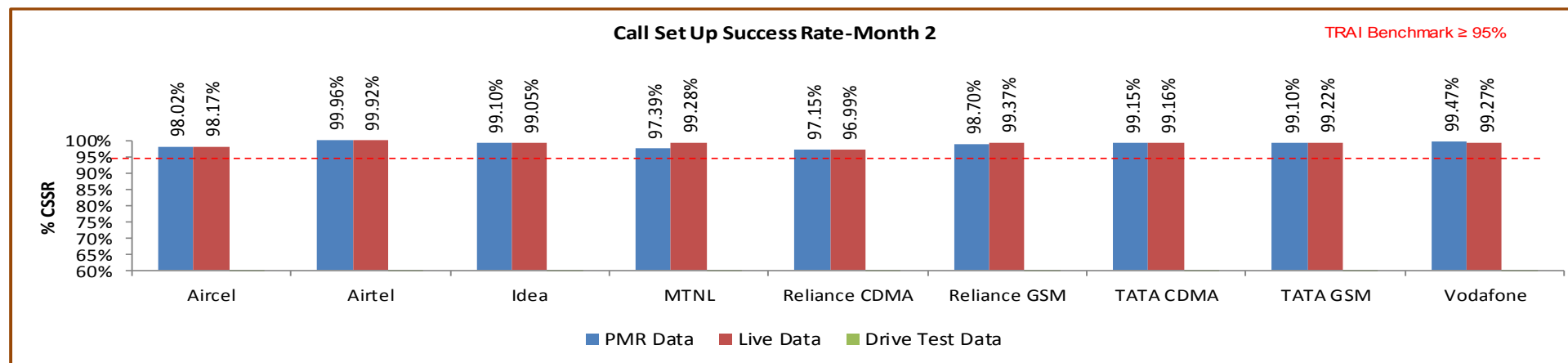
Data Source: Network Operations Center (NOC) of the operators

6.3.2.3   KEY FINDINGS – MONTH 3
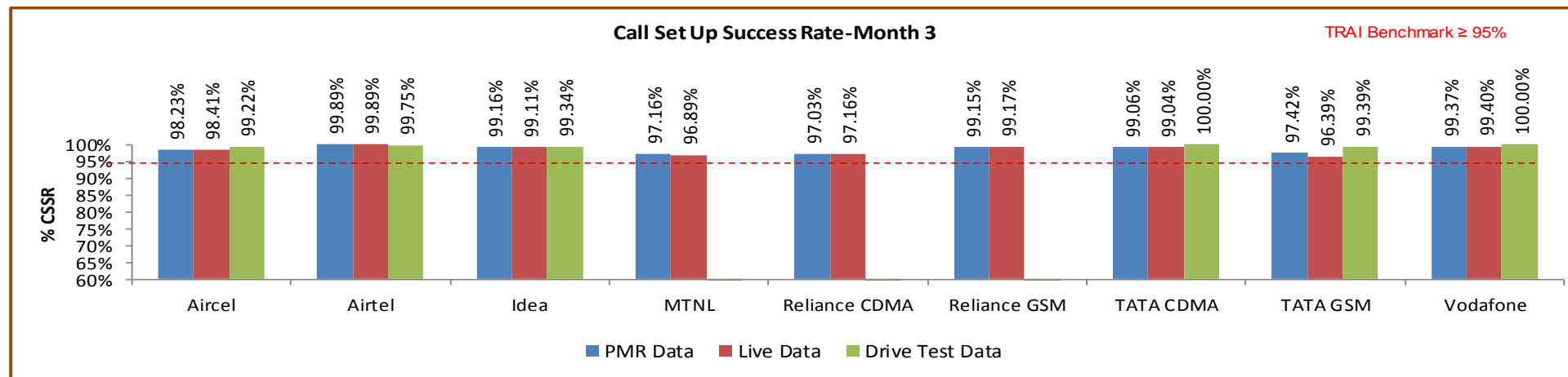
Data Source: Network Operations Center (NOC) of the operators

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

6.4.1 PARAMETER DESCRIPTION

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

   - SDCCH Level: Stand-alone dedicated control channel

   - TCH Level: Traffic Channel

   - POI Level: Point of Interconnect

2. **Computational Methodology:**

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

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

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

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

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

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

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

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

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

     - C1 = Average POI Congestion % on day 1

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

     - C2 = Average POI Congestion % on day 2

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

- Cn = Average POI Congestion % on day n

3. **Benchmark:**

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

4. **Audit Procedure** –

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

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

6.4.2   KEY FINDINGS - SDCCH/PAGING CHANNEL CONGESTION (CONSOLIDATED)
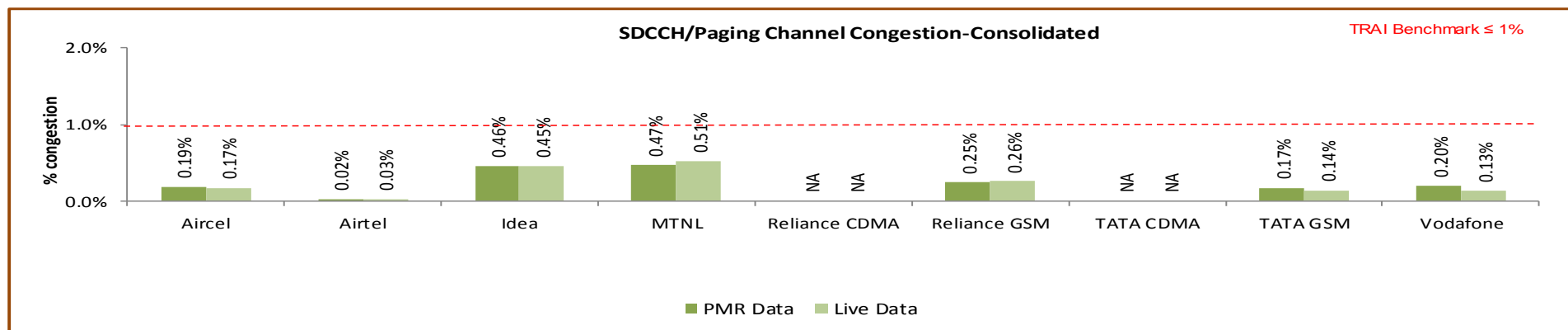
Data Source: Network Operations Center (NOC) of the operators

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

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

6.4.2.1   KEY FINDINGS – MONTH 1

SDCCH/Paging Channel Congestion-Month 1

TRAI Benchmark ≤ 1%

Operator	PMR Data	Live Data
Aircel	0.15%	0.18%
Airtel	0.02%	0.01%
Idea	0.42%	0.41%
MTNL	0.57%	0.61%
Reliance CDMA	NA	NA
Reliance GSM	0.29%	0.28%
TATA CDMA	NA	NA
TATA GSM	0.10%	0.11%
Vodafone	0.10%	0.17%

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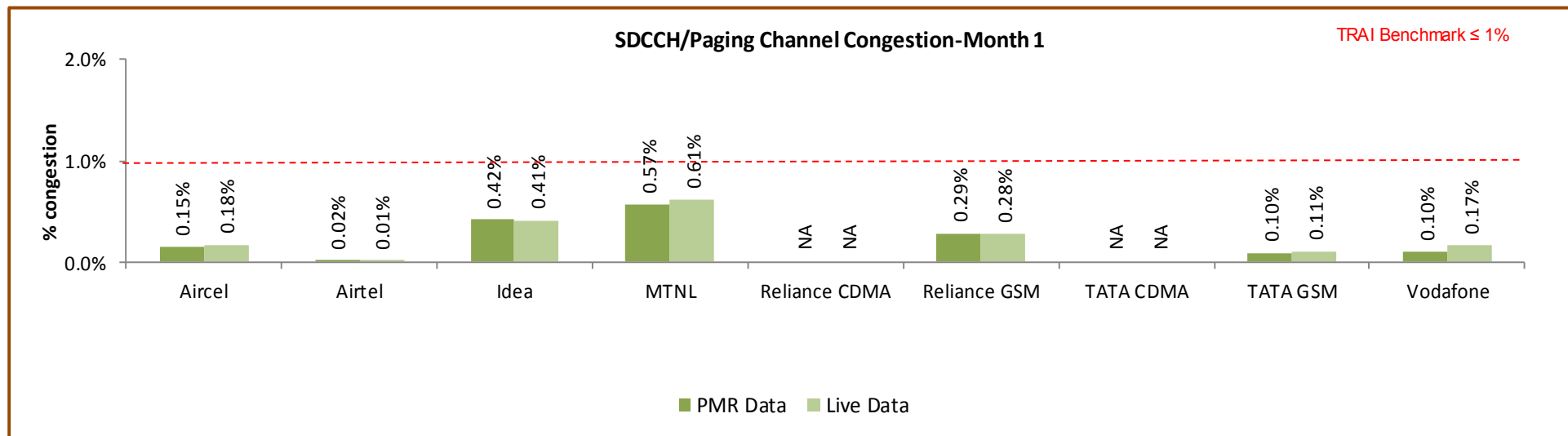
Data Source: Network Operations Center (NOC) of the operators

6.4.2.2   KEY FINDINGS – MONTH 2

SDCCH/Paging Channel Congestion-Month 2

TRAI Benchmark ≤ 1%

Operator	PMR Data	Live Data
Aircel	0.22%	0.22%
Airtel	0.00%	0.03%
Idea	0.42%	0.50%
MTNL	0.44%	0.43%
Reliance CDMA	NA	NA
Reliance GSM	0.20%	0.20%
TATA CDMA	NA	NA
TATA GSM	0.35%	0.31%
Vodafone	0.41%	0.11%

■ PMR Data ■ Live Data

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

IMRB International | eTech

Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)
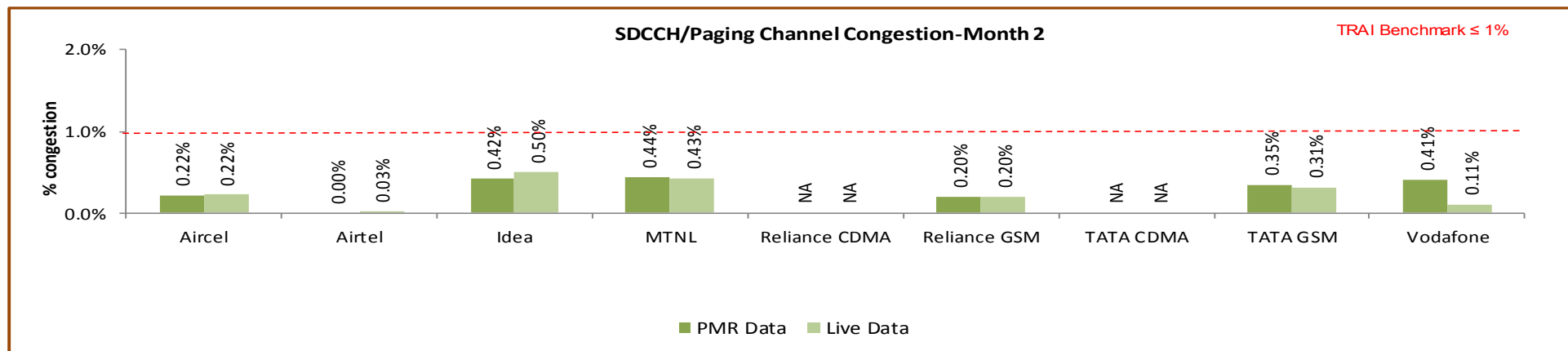
6.4.2.3   KEY FINDINGS – MONTH 3
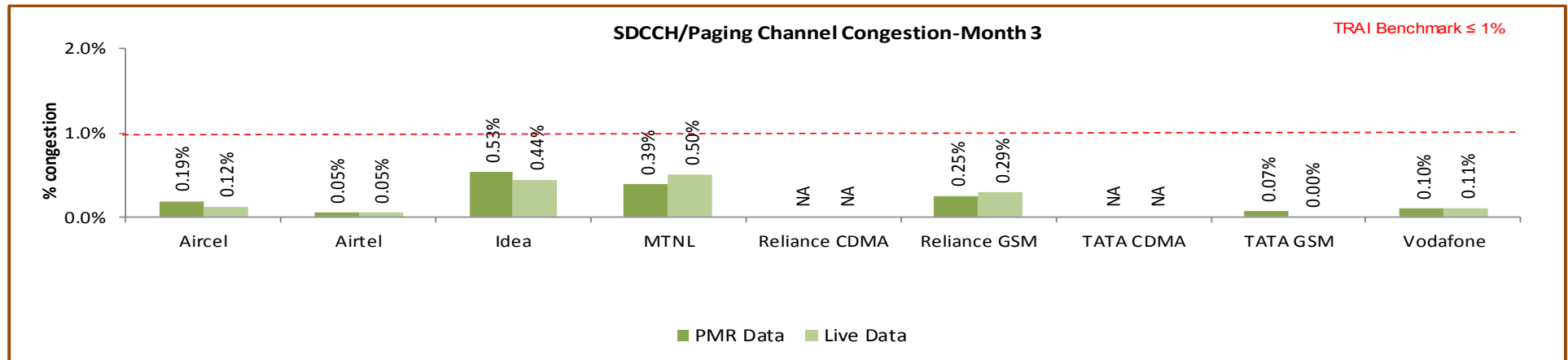
Data Source: Network Operations Center (NOC) of the operators

6.4.3   KEY FINDINGS – TCH CONGESTION (CONSOLIDATED)
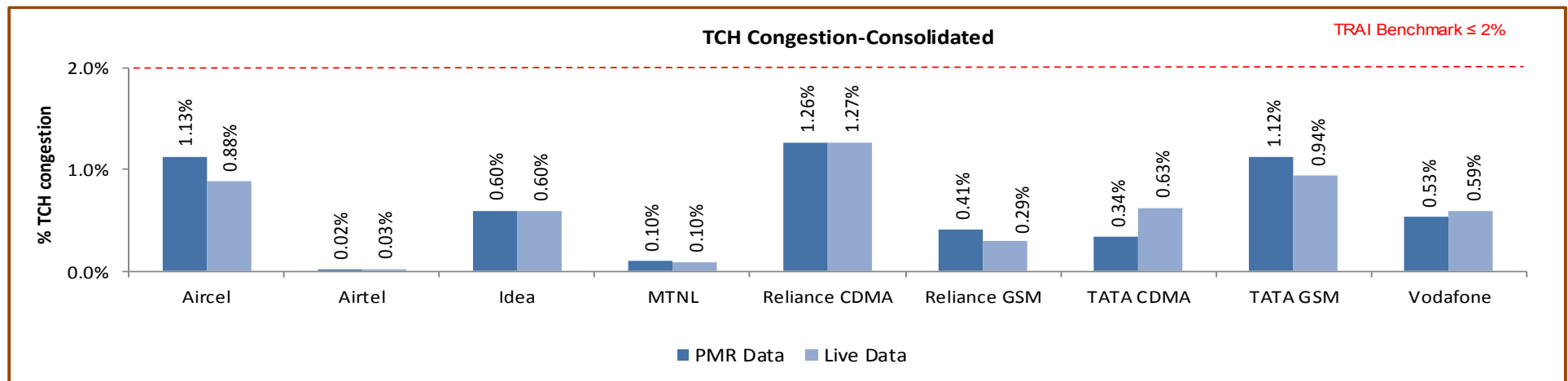
TCH Congestion-Consolidated

TRAI Benchmark ≤ 2%

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

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

6.4.3.1   KEY FINDINGS – MONTH 1

TCH Congestion-Month 1

TRAI Benchmark ≤ 2%
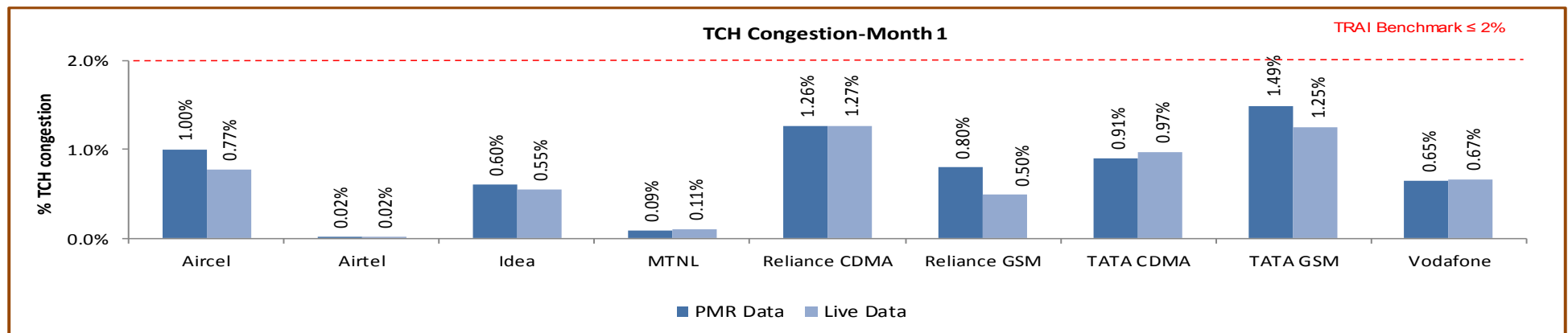
Data Source: Network Operations Center (NOC) of the operators

6.4.3.2 KEY FINDINGS – MONTH 2

TCH Congestion-Month 2

TRAI Benchmark ≤ 2%

% TCH congestion

Operator	PMR Data	Live Data
Aircel	1.44%	0.77%
Airtel	0.00%	0.02%
Idea	0.63%	0.63%
MTNL	0.10%	0.10%
Reliance CDMA	1.26%	1.26%
Reliance GSM	0.23%	0.20%
TATA CDMA	0.02%	0.84%
TATA GSM	1.70%	1.46%
Vodafone	0.53%	0.73%

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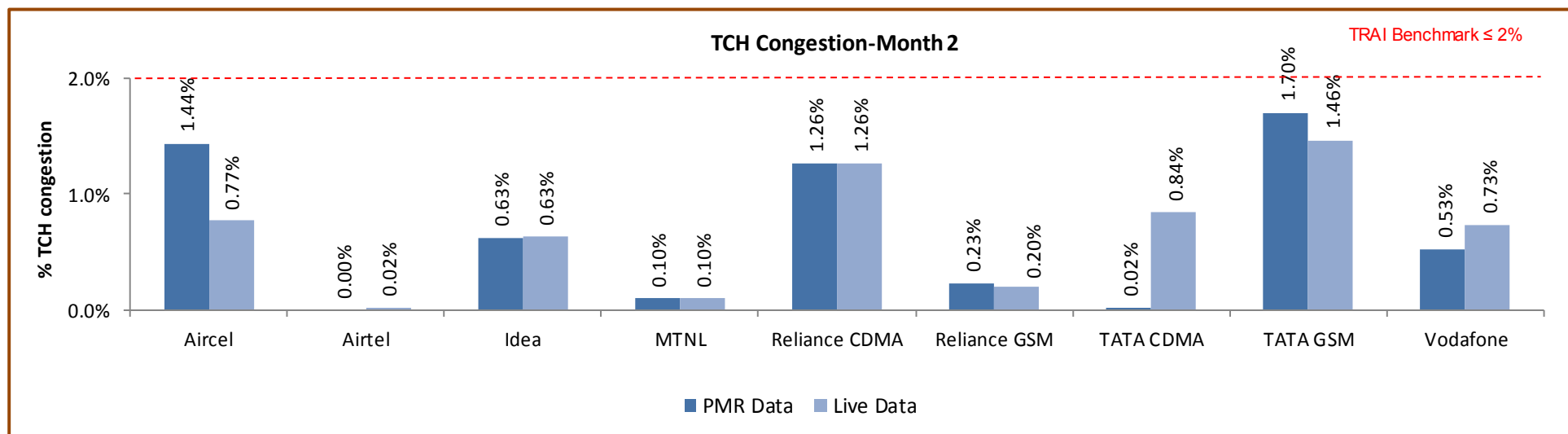
Data Source: Network Operations Center (NOC) of the operators

6.4.3.3 KEY FINDINGS – MONTH 3

TCH Congestion-Month 3

TRAI Benchmark ≤ 2%

% TCH congestion

Operator	PMR Data	Live Data
Aircel	0.96%	1.11%
Airtel	0.05%	0.04%
Idea	0.57%	0.61%
MTNL	0.11%	0.08%
Reliance CDMA	1.26%	1.27%
Reliance GSM	0.21%	0.18%
TATA CDMA	0.08%	0.07%
TATA GSM	0.17%	0.10%
Vodafone	0.43%	0.37%

■ PMR Data ■ Live Data

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

IMRB International | eTech

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

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

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		283	885	851	93	178	353	750	750	984
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		206444	415472	3595510	537326	50136	228796	314523	359761	2810984
Traffic served for all POIs (B)- in erlangs		79868	264362	3572798	22004	21351	129841	105475	87631	447312
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data										
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		283	883	851	93	769	369	750	750	982
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		161459	585309	3395042	46410	255051	239699	312761	312761	860886
Traffic served for all POIs (B)- in erlangs		121258	617538	4000591	23322	110243	132418	88411	88411	461452
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

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

6.4.4.1 KEY FINDINGS – MONTH 1

Audit Results for POI Congestion- PMR data-October										
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		93	293	282	31	55	304	250	250	330
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		67824	136974	3129230	274348	15136	210166	104151	104151	287105
Traffic served for all POIs (B)- in erlangs		25581	86260	100443	7392	6670	117083	42160	42160	147173
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October										
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		93	293	282	31	641	320	250	250	328
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		67978	216045	3129230	15470	218352	221155	104151	104151	287007
Traffic served for all POIs (B)- in erlangs		25161	256095	100443	7702	93223	119031	42160	42160	153313
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

6.4.4.2 KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-November										
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		95	296	284	31	61	24	250	250	327
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		69348	140812	305726	247509	17103	9306	106067	151305	2236940
Traffic served for all POIs (B)- in erlangs		26374	90072	3367457	7166	7045	6202	40190	22346	146070
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November										
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		95	296	284	31	64	24	250	250	327
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		24134	140812	105726	15470	18416	9308	104305	104305	286940
Traffic served for all POIs (B)- in erlangs		69348	90072	3796657	7715	8816	6772	23126	23126	154070
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

6.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**Idea**	**MTNL**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		95	296	285	31	63	25	250	250	327
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		69273	137686	160554	15469	17897	9324	104305	104305	286940
Traffic served for all POIs (B)- in erlangs		27913	88029	104898	7446	7635	6556	23126	23126	154070
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December										
POI congestion	**Benchmark**	**Aircel**	**Airtel**	**Idea**	**MTNL**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of working POIs		95	294	285	31	64	25	250	250	327
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		69348	228453	160086	15470	18283	9236	104305	104305	286940
Traffic served for all POIs (B)- in erlangs		26749	271370	103491	7905	8204	6615	23126	23126	154070
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

6.5 CALL DROP RATE

6.5.1 PARAMETER DESCRIPTION

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

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

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

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

3. **TRAI Benchmark** –

   ↳ Call drop rate ≤ 2%

4. **Audit Procedure** –

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

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

6.5.2 KEY FINDINGS - CONSOLIDATED
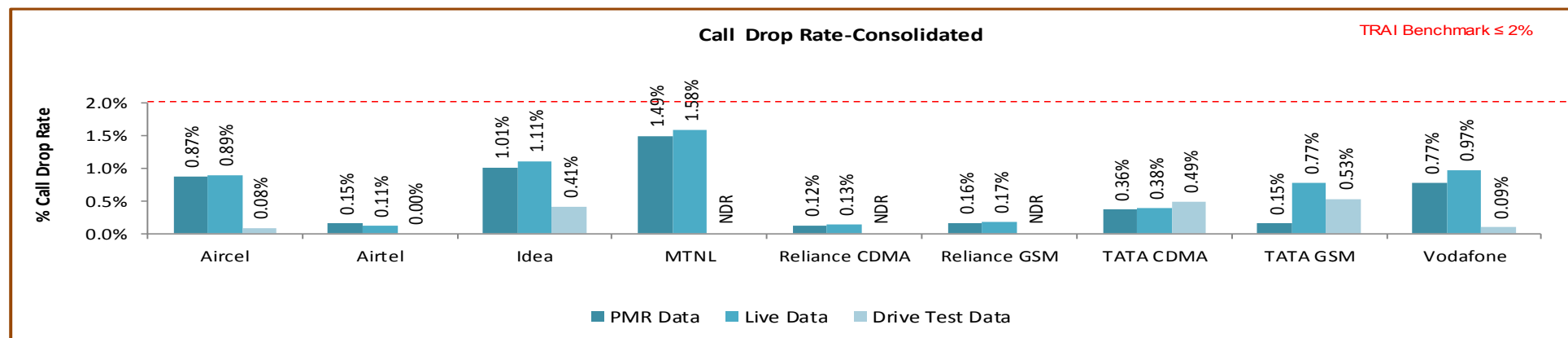
Call Drop Rate-Consolidated

TRAI Benchmark ≤ 2%

	PMR Data	Live Data	Drive Test Data
Aircel	0.87%	0.89%	0.08%
Airtel	0.15%	0.11%	0.00%
Idea	1.01%	1.11%	0.41%
MTNL	1.49%	1.58%	NDR
Reliance CDMA	0.12%	0.13%	NDR
Reliance GSM	0.16%	0.17%	NDR
TATA CDMA	0.36%	0.38%	0.49%
TATA GSM	0.15%	0.77%	0.53%
Vodafone	0.77%	0.97%	0.09%

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

Call Drop Rate-Month 1

TRAI Benchmark ≤ 2%

	PMR Data	Live Data	Drive Test Data
Aircel	1.05%	0.82%	NA
Airtel	0.80%	0.04%	NA
Idea	0.99%	1.19%	NA
MTNL	1.53%	1.57%	NA
Reliance CDMA	0.13%	0.13%	NA
Reliance GSM	0.17%	0.17%	NA
TATA CDMA	0.36%	0.36%	NA
TATA GSM	0.81%	0.81%	NA
Vodafone	0.96%	0.99%	NA
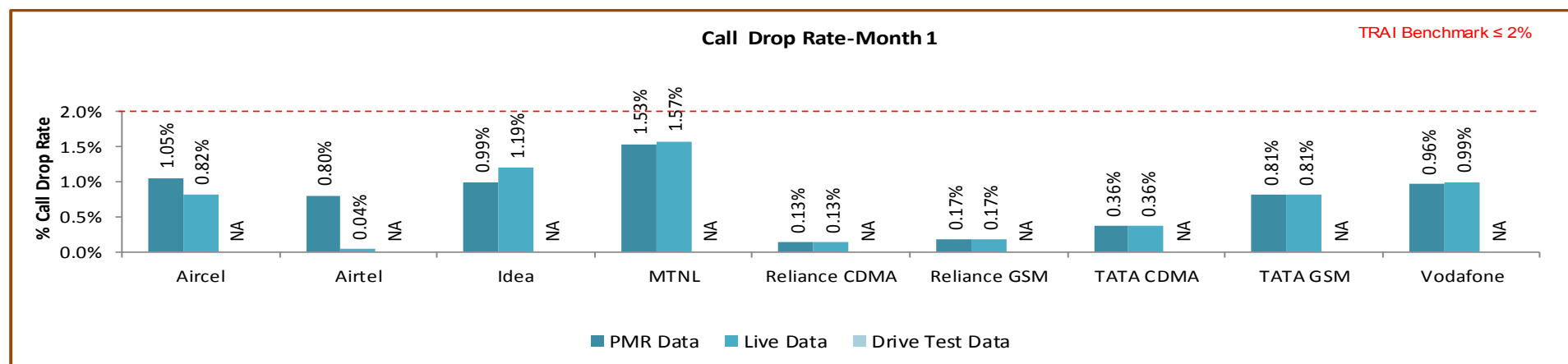
Data Source: Network Operations Center (NOC) of the operators

6.5.2.2   KEY FINDINGS – MONTH 2

Call Drop Rate-Month 2

TRAI Benchmark ≤ 2%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	0.89%	1.05%	NA
Airtel	0.04%	0.80%	NA
Idea	1.01%	0.99%	NA
MTNL	1.43%	1.61%	NA
Reliance CDMA	0.11%	0.12%	NA
Reliance GSM	0.16%	0.17%	NA
TATA CDMA	0.36%	0.37%	NA
TATA GSM	0.00%	0.79%	NA
Vodafone	0.72%	0.93%	NA
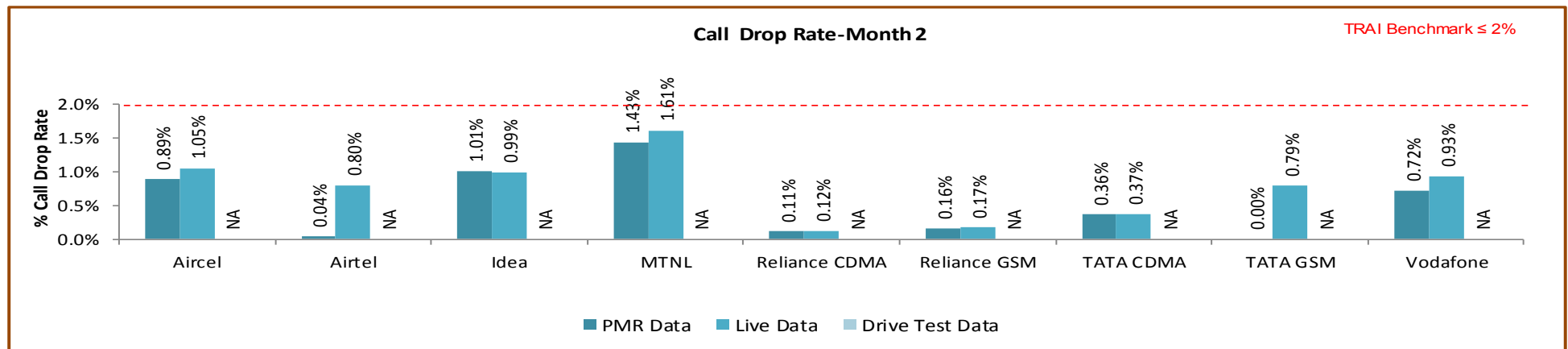
Data Source: Network Operations Center (NOC) of the operators

6.5.2.3   KEY FINDINGS – MONTH 3

Call Drop Rate-Month 3

TRAI Benchmark ≤ 2%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	0.83%	0.80%	0.08%
Airtel	0.82%	0.86%	0.00%
Idea	1.01%	1.07%	0.41%
MTNL	1.51%	1.55%	NDR
Reliance CDMA	0.11%	0.12%	NDR
Reliance GSM	0.15%	0.16%	NDR
TATA CDMA	0.37%	0.52%	0.49%
TATA GSM	15.69%	0.71%	0.53%
Vodafone	0.91%	0.97%	0.09%
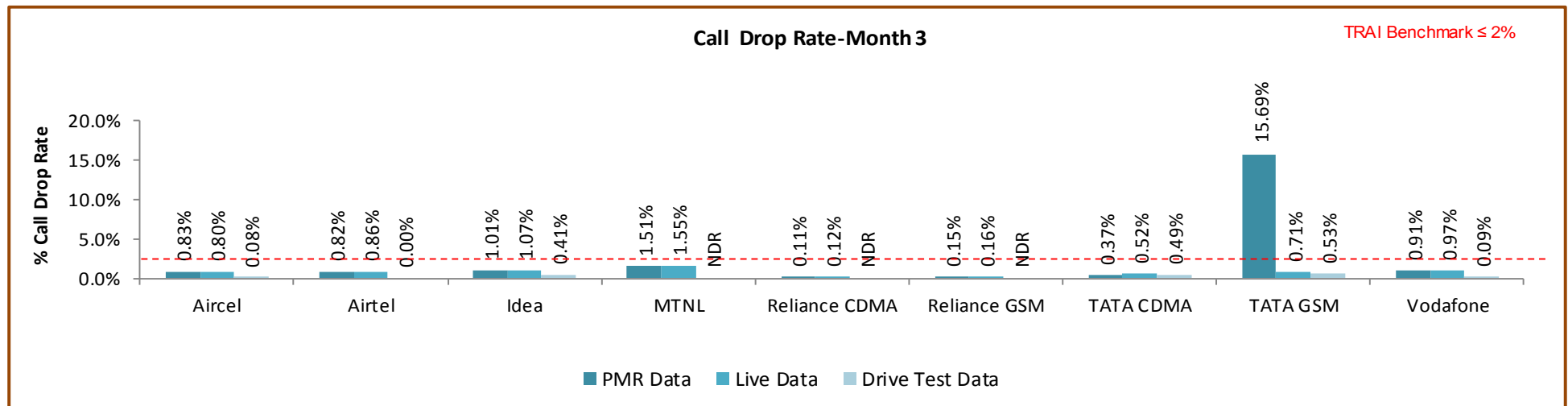
Data Source: Network Operations Center (NOC) of the operators

6.6   CELLS HAVING GREATER THAN 3% TCH DROP

6.6.1   PARAMETER DESCRIPTION

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

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

3. **TRAI Benchmark –**

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

4. **Audit Procedure –**

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

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

6.6.2 KEY FINDINGS - CONSOLIDATED
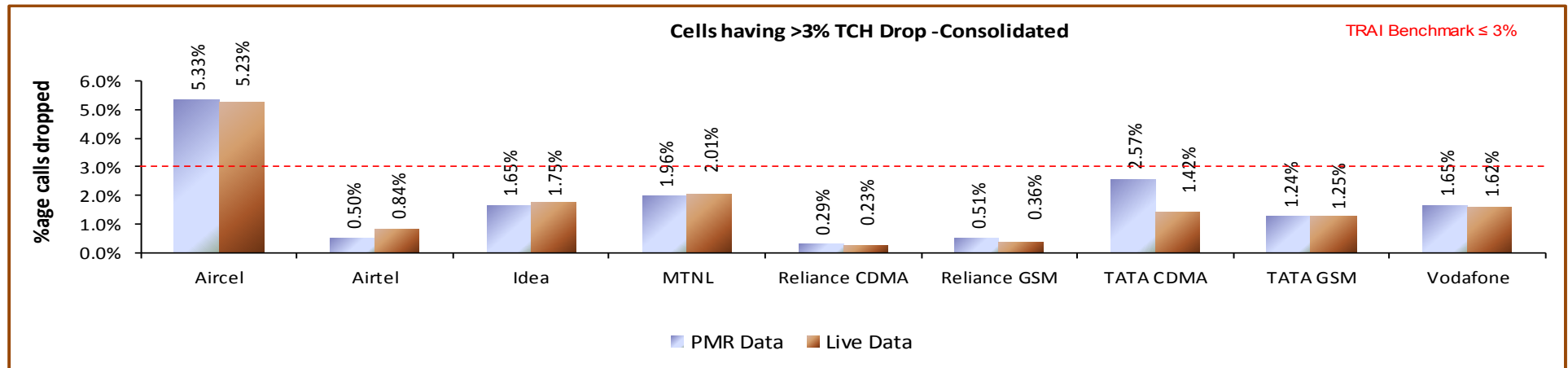
Cells having >3% TCH Drop -Consolidated

TRAI Benchmark ≤ 3%

%age calls dropped

Operator	PMR Data	Live Data
Aircel	5.33%	5.23%
Airtel	0.50%	0.84%
Idea	1.65%	1.75%
MTNL	1.96%	2.01%
Reliance CDMA	0.29%	0.23%
Reliance GSM	0.51%	0.36%
TATA CDMA	2.57%	1.42%
TATA GSM	1.24%	1.25%
Vodafone	1.65%	1.62%

■ PMR Data ■ Live Data

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

All operators met the benchmark as per PMR/audit Data except Aircel.
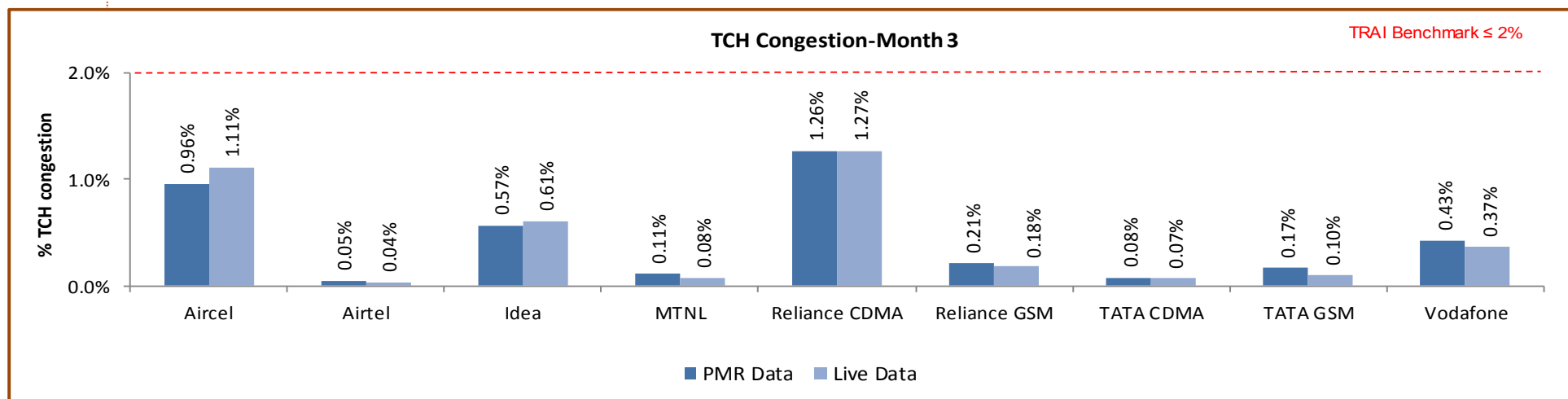
6.6.2.1 KEY FINDINGS – MONTH 1

Cells having >3% TCH Drop-Month 1

TRAI Benchmark ≤ 3%

%age calls dropped

Operator	PMR Data	Live Data
Aircel	5.45%	5.18%
Airtel	0.84%	0.40%
Idea	1.60%	1.81%
MTNL	1.86%	1.85%
Reliance CDMA	0.34%	0.32%
Reliance GSM	0.60%	0.53%
TATA CDMA	1.21%	1.10%
TATA GSM	3.60%	3.69%
Vodafone	1.72%	1.67%

■ PMR Data ■ Live Data

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

IMRB International | eTech

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

6.6.2.2 KEY FINDINGS – MONTH 2

Cells having >3% TCH Drop-Month 2

TRAI Benchmark ≤ 3%

Operator	PMR Data	Live Data
Aircel	5.64%	5.45%
Airtel	0.22%	0.84%
Idea	1.70%	1.60%
MTNL	1.95%	1.70%
Reliance CDMA	0.21%	0.22%
Reliance GSM	0.47%	0.50%
TATA CDMA	3.33%	0.04%
TATA GSM	0.06%	0.02%
Vodafone	1.51%	1.51%

%age calls dropped

■ PMR Data ■ Live Data

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

6.6.2.3 KEY FINDINGS – MONTH 3

Cells having >3% TCH Drop-Month 3

TRAI Benchmark ≤ 3%

Operator	PMR Data	Live Data
Aircel	4.91%	5.06%
Airtel	1.29%	1.26%
Idea	1.65%	1.72%
MTNL	2.09%	2.47%
Reliance CDMA	0.33%	0.14%
Reliance GSM	0.47%	0.04%
TATA CDMA	3.20%	3.12%
TATA GSM	0.06%	0.02%
Vodafone	1.72%	1.67%

%age calls dropped

■ PMR Data ■ Live Data

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

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

6.7 VOICE QUALITY

6.7.1 PARAMETER DESCRIPTION

1. **Definition:**

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

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

2. **Computational Methodology:**

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

3. **TRAI Benchmark:** ≥ 95%

4. **Audit Procedure –**

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

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

6.7.2 KEY FINDINGS
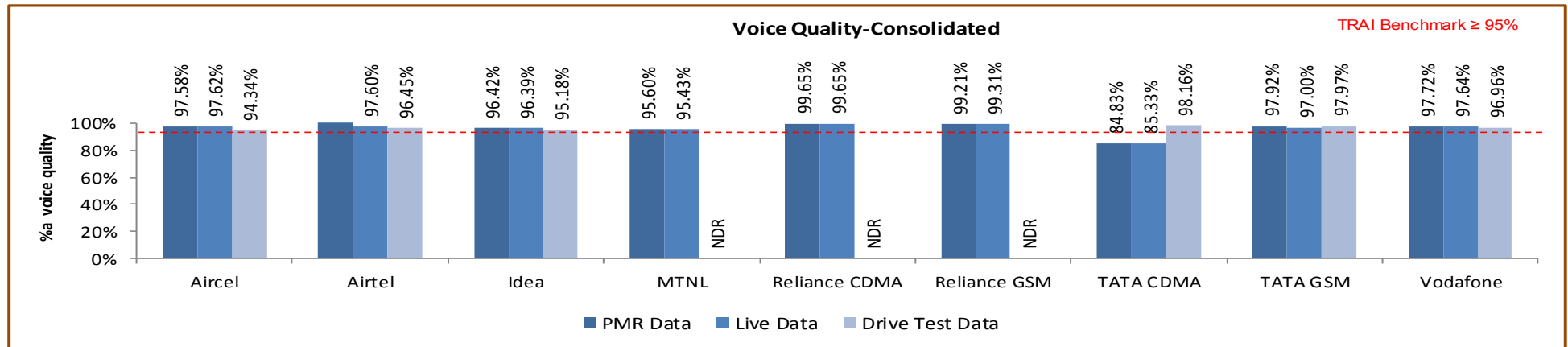
Voice Quality-Consolidated

TRAI Benchmark ≥ 95%

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

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

6.7.2.1 KEY FINDINGS – MONTH 1

Voice Quality-Month 1

TRAI Benchmark ≥ 95%
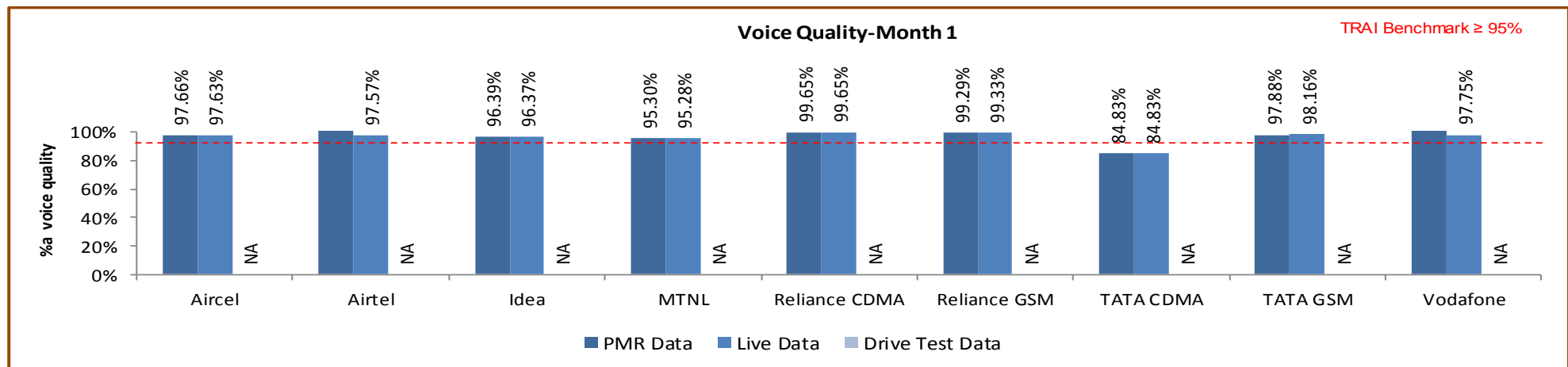
Data Source: Network Operations Center (NOC) of the operators

6.7.2.2 KEY FINDINGS – MONTH 2

Voice Quality-Month 2

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	97.57%	97.64%	NA
Airtel	97.67%	97.67%	NA
Idea	96.44%	96.33%	NA
MTNL	95.46%	95.58%	NA
Reliance CDMA	99.65%	99.65%	NA
Reliance GSM	99.32%	99.30%	NA
TATA CDMA	84.83%	85.37%	NA
TATA GSM	98.16%	96.91%	NA
Vodafone	97.62%	97.73%	NA

■ PMR Data ■ Live Data ■ Drive Test Data
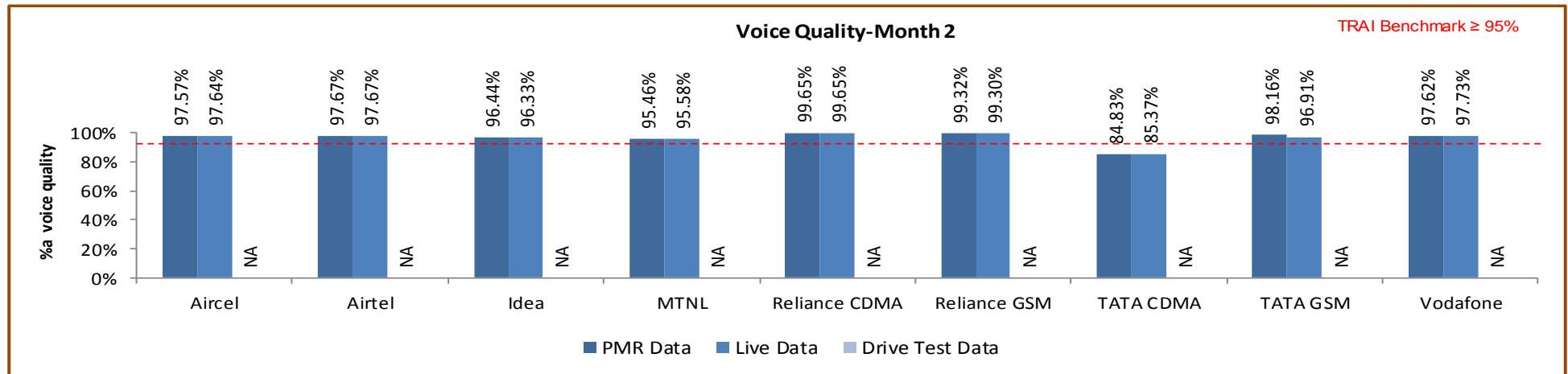
Data Source: Network Operations Center (NOC) of the operators

6.7.2.3 KEY FINDINGS – MONTH 3

Voice Quality-Month 3

TRAI Benchmark ≥ 95%

Operator	PMR Data	Live Data	Drive Test Data
Aircel	97.52%	97.60%	94.34%
Airtel	97.57%	97.62%	96.45%
Idea	96.40%	96.42%	95.18%
MTNL	95.98%	95.42%	NDR
Reliance CDMA	99.65%	99.65%	NDR
Reliance GSM	99.00%	99.29%	NDR
TATA CDMA	NDR	NDR	98.16%
TATA GSM	98.04%	98.04%	97.97%
Vodafone	97.67%	97.58%	96.96%

■ PMR Data ■ Live Data ■ Drive Test Data

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

IMRB International | eTech

Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)
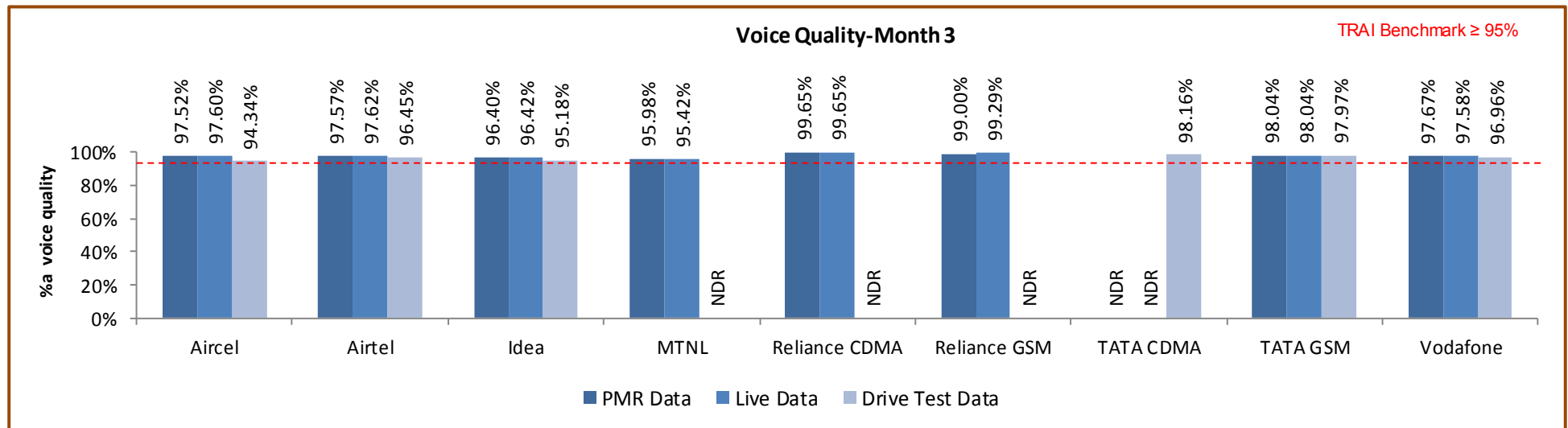
7 PARAMETER DESCRIPTION & DETAILED FINDINGS - COMPARISON BETWEEN PMR DATA, 3 DAY LIVE DATA AND LIVE CALLING DATA FOR 3G

7.1 NODE BS DOWNTIME

7.1.1 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.

7.1.2 KEY FINDINGS - CONSOLIDATED
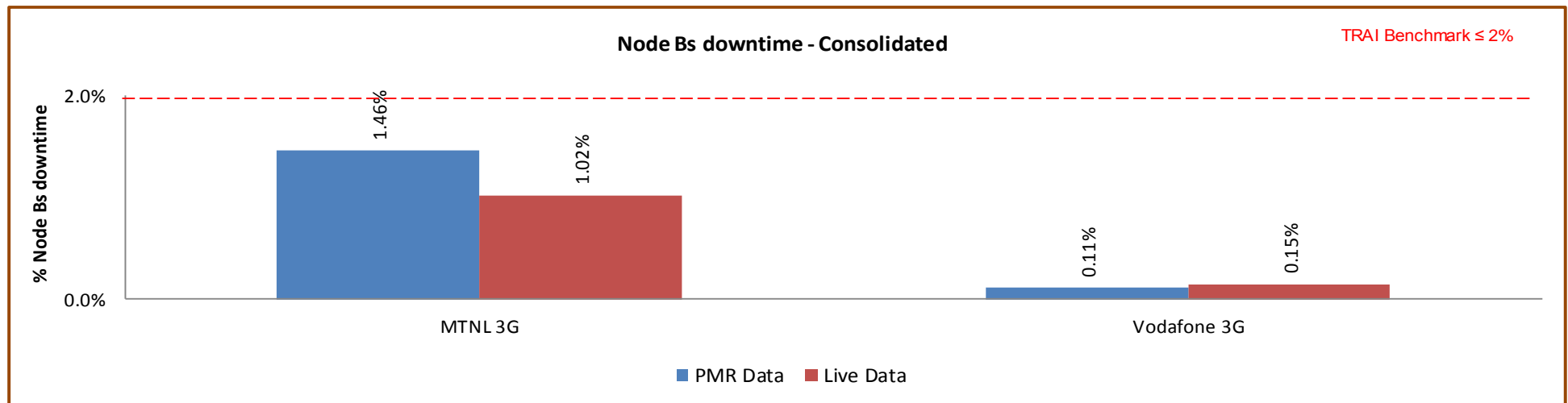
Node Bs downtime - Consolidated

TRAI Benchmark ≤ 2%

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

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

7.1.2.1 KEY FINDINGS – MONTH 1

Node Bs downtime - Month 1

TRAI Benchmark ≤ 2%

% Node Bs downtime

- 2.0%
- 0.0%

MTNL 3G: 0.44% (PMR Data), 0.01% (Live Data)

Vodafone 3G: 0.05% (PMR Data), 0.07% (Live Data)

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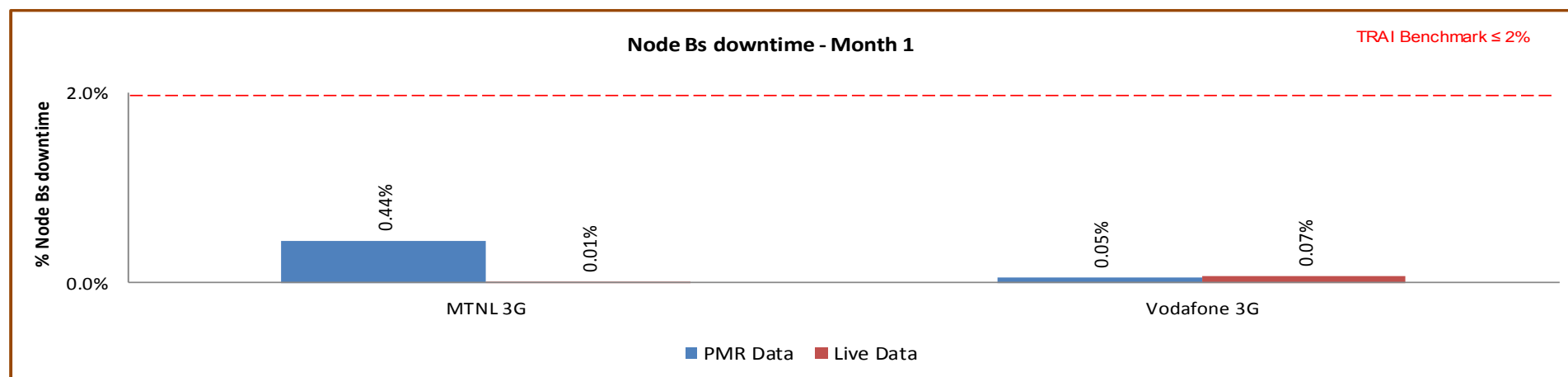
Data Source: Operations and Maintenance Center (OMC) of the operators

7.1.2.2 KEY FINDINGS – MONTH 2

Node Bs downtime - Month 2

TRAI Benchmark ≤ 2%

% Node Bs downtime

- 2.0%
- 0.0%

MTNL 3G: 0.55% (PMR Data), 0.64% (Live Data)

Vodafone 3G: 0.05% (PMR Data), 0.07% (Live Data)

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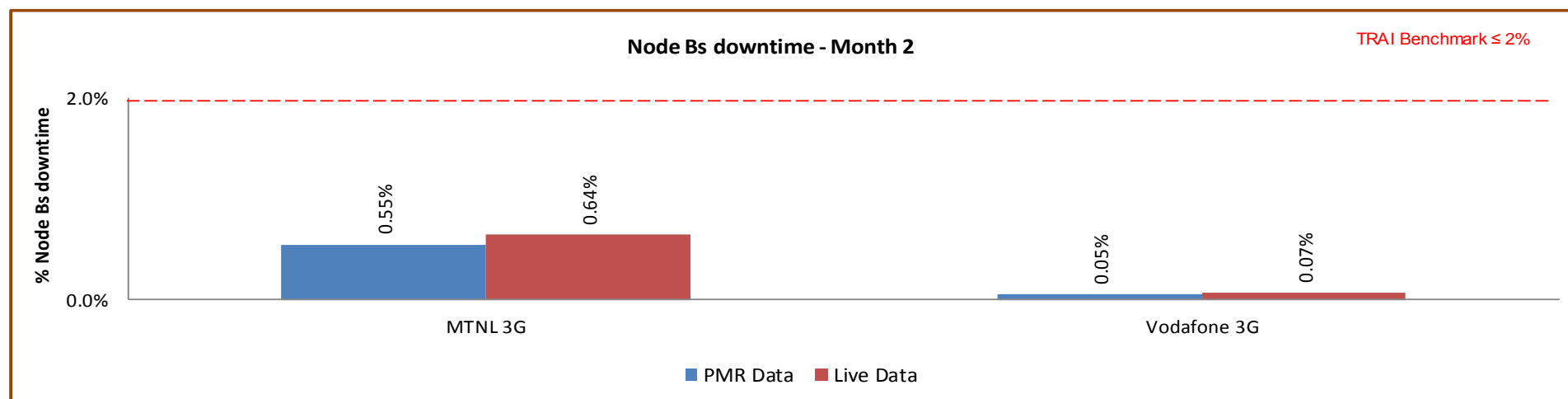
Data Source: Operations and Maintenance Center (OMC) of the operators

7.1.2.3   KEY FINDINGS – MONTH 3

Node Bs downtime - Month 3

TRAI Benchmark ≤ 2%

% Node Bs downtime

- 2.0%
- 0.0%

MTNL 3G: 0.47% (PMR Data), 0.44% (Live Data)

Vodafone 3G: 0.01% (PMR Data), 0.01% (Live Data)

■ PMR Data   ■ Live Data

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

IMRB International | eTech

TRAI

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

7.2   WORST AFFECTED NODE BS DUE TO DOWNTIME

7.2.1   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.

7.2.2 KEY FINDINGS – CONSOLIDATED
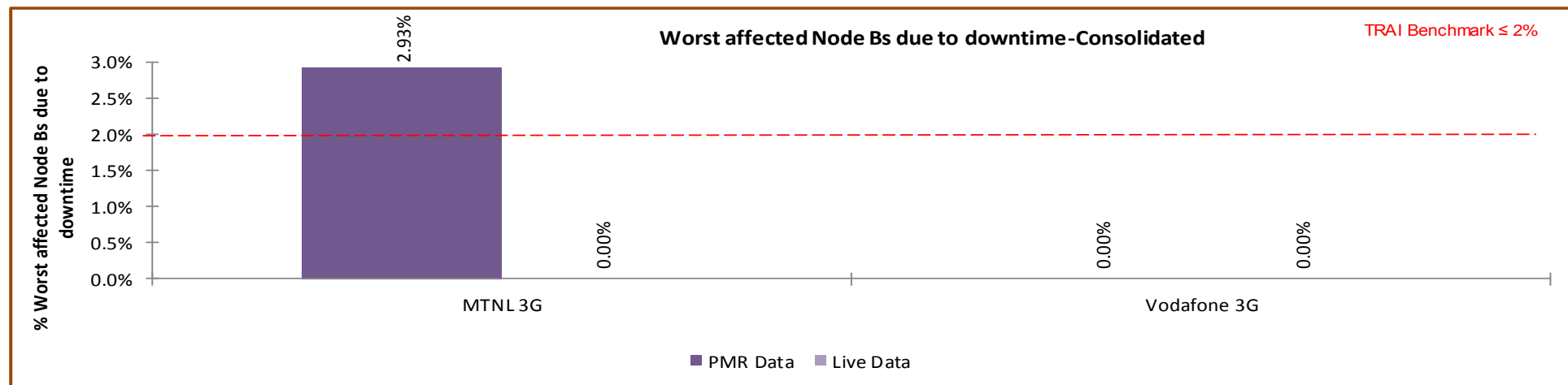
Worst affected Node Bs due to downtime-Consolidated

TRAI Benchmark ≤ 2%

% Worst affected Node Bs due to downtime

- MTNL 3G: 2.93%, 0.00%
- Vodafone 3G: 0.00%, 0.00%

■ PMR Data ■ Live Data

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

All operators met the benchmark as per PMR/audit Data, except MTNL.
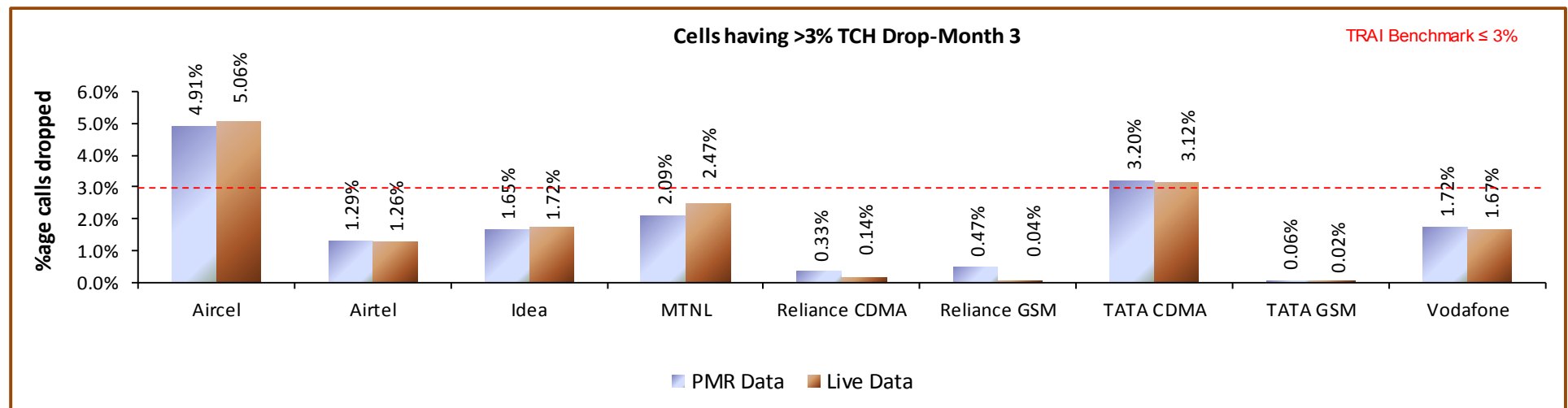
7.2.2.1 KEY FINDINGS – MONTH 1

Worst affected Node Bs due to downtime-Month 1

TRAI Benchmark ≤ 2%

% Worst affected Node Bs due to downtime

- MTNL 3G: 0.69%, 0.00%
- Vodafone 3G: 0.00%, 0.00%

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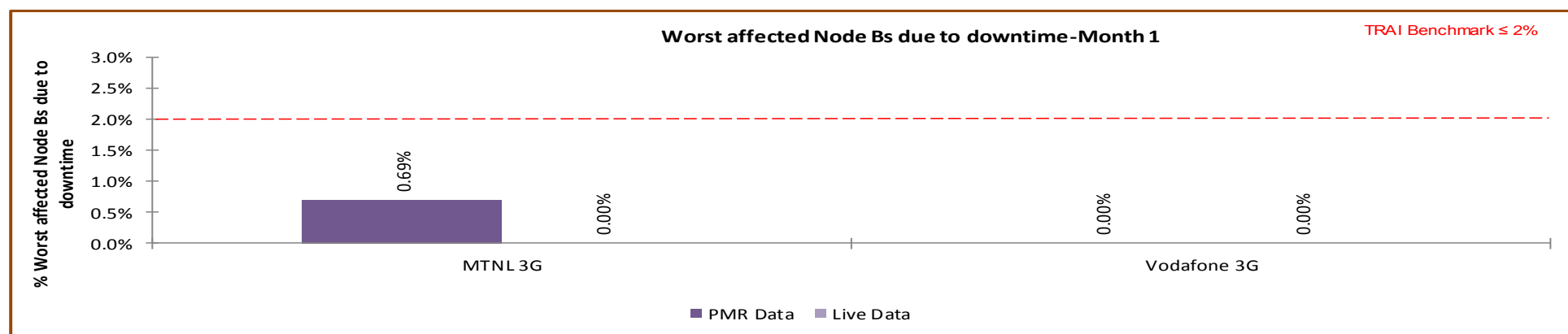
Data Source: Operations and Maintenance Center (OMC) of the operators

7.2.2.2 KEY FINDINGS – MONTH 2

Worst affected Node Bs due to downtime-Month 2

TRAI Benchmark ≤ 2%
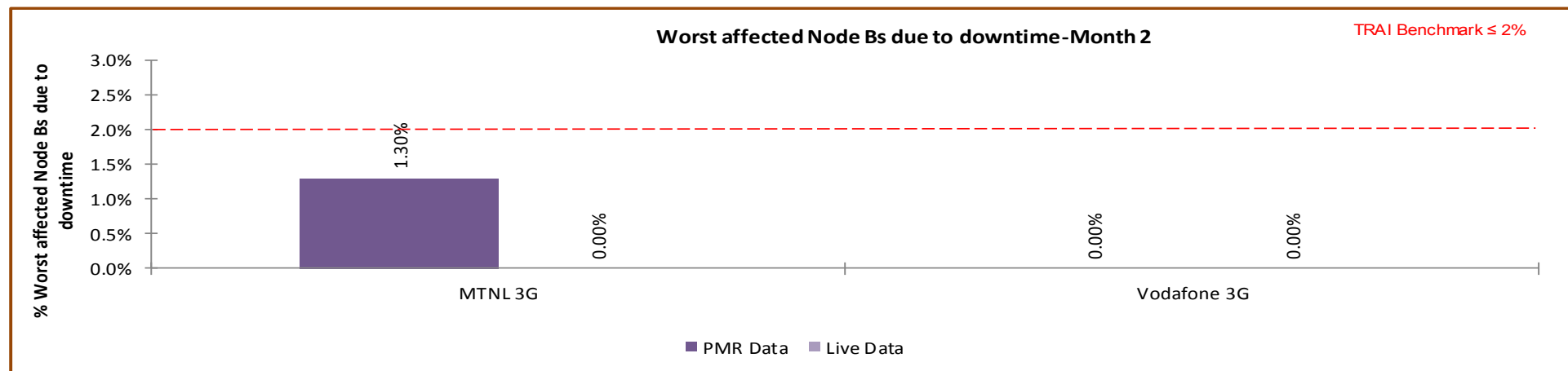
Data Source: Operations and Maintenance Center (OMC) of the operators

7.2.2.3 KEY FINDINGS – MONTH 3

Worst affected Node Bs due to downtime-Month 3

TRAI Benchmark ≤ 2%
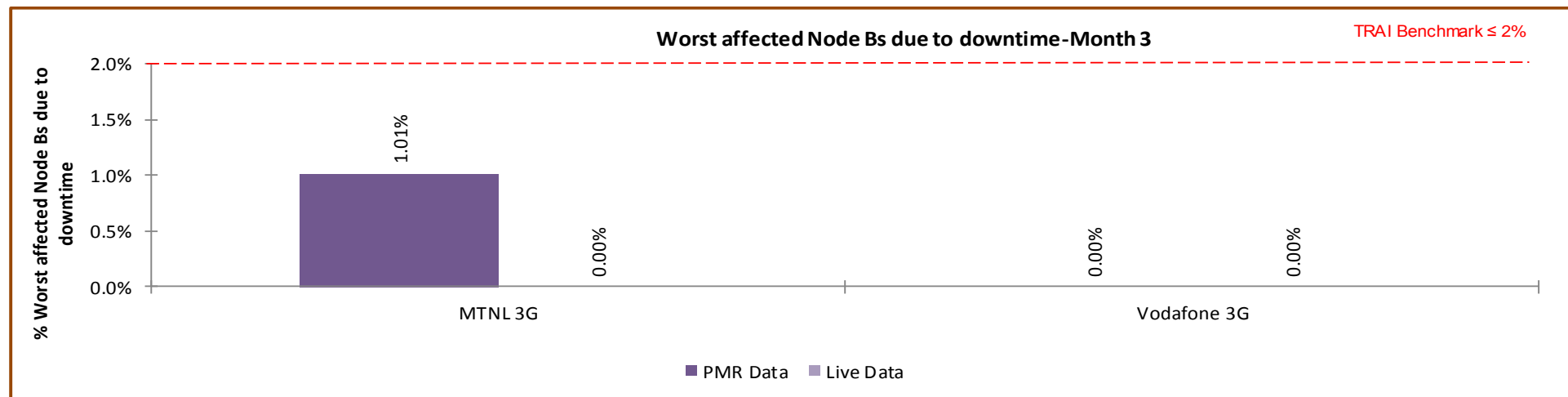
Data Source: Operations and Maintenance Center (OMC) of the operators

7.3   CALL SET UP SUCCESS RATE

7.3.1   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.

7.3.2 KEY FINDINGS - CONSOLIDATED
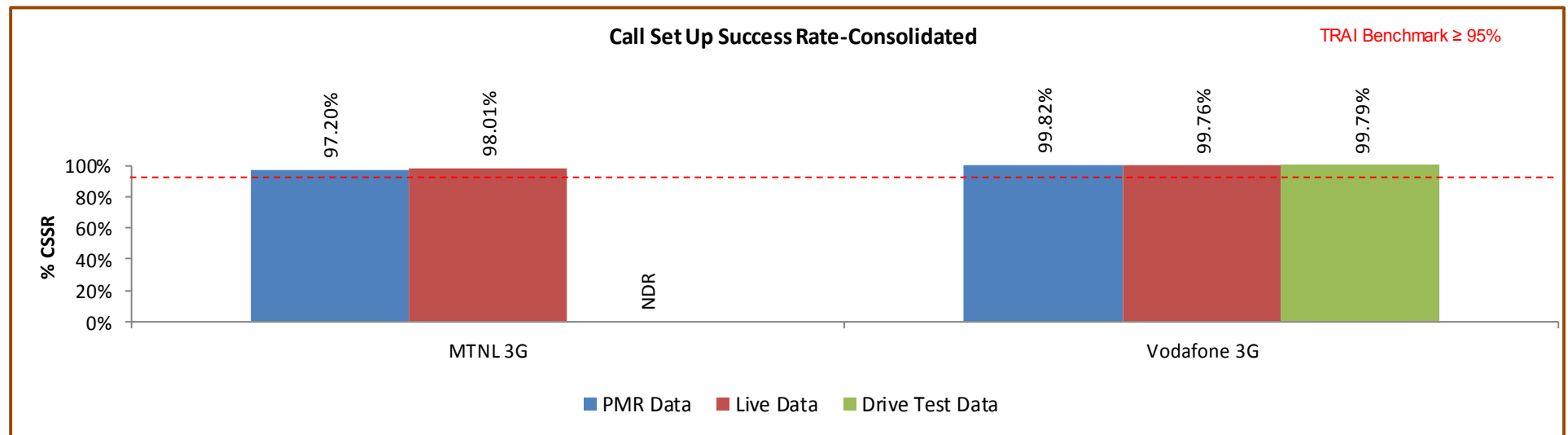
Data Source: Network Operations Center (NOC) of the operators

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

7.3.2.1 KEY FINDINGS – MONTH 1

Call Set Up Success Rate-Month 1

TRAI Benchmark ≥ 95%

- MTNL 3G: PMR Data 96.16%, Live Data NDR, Drive Test Data NA
- Vodafone 3G: PMR Data 99.80%, Live Data 99.78%, Drive Test Data NA

Y-axis: % CSSR (0% to 100%)

Legend: ■ PMR Data ■ Live Data ■ Drive Test Data
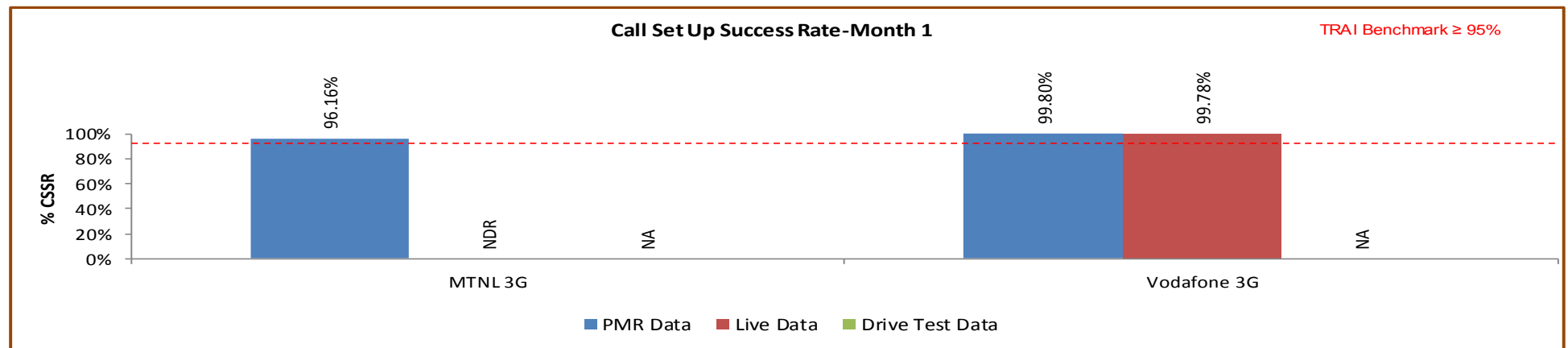
Data Source: Network Operations Center (NOC) of the operators

7.3.2.2 KEY FINDINGS – MONTH 2

Call Set Up Success Rate-Month 2

TRAI Benchmark ≥ 95%

- MTNL 3G: PMR Data 98.14%, Live Data 97.79%, Drive Test Data NA
- Vodafone 3G: PMR Data 99.84%, Live Data 99.74%, Drive Test Data NA

Y-axis: % CSSR (0% to 100%)

Legend: ■ PMR Data ■ Live Data ■ Drive Test Data

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

IMRB International | eTech

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

7.3.2.3   KEY FINDINGS – MONTH 3

Call Set Up Success Rate-Month 3

TRAI Benchmark ≥ 95%

	MTNL 3G		Vodafone 3G	
PMR Data	97.32%		99.81%	
Live Data	98.24%		99.78%	
Drive Test Data		NA		NA

Legend: PMR Data, Live Data, Drive Test Data

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

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

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

7.4.1   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%** = $[(A_1 \times C_1) + (A_2 \times C_2) + \ldots\ldots + (A_n \times C_n)] / (A_1 + A_2 + \ldots + A_n)$

     - Where:-A_1 = Number of attempts to establish RRC/ RAB made on day 1

     - C_1 = Average RRC / RAB Congestion % on day 1

     - A_2 = Number of attempts to establish RRC / RAB made on day 2

     - C_2 = Average RRC / RAB Congestion % on day 2

     - A_n = Number of attempts to establish RRC / RAB made on day n

     - C_n = Average RRC / RAB Congestion % on day n

IMRB International | eTech

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

- POI Congestion% = $[(A_1 \times C_1) + (A_2 \times C_2) + \ldots + (A_n \times C_n)] / (A_1 + A_2 + \ldots + A_n)$

  - Where:-A_1 = POI traffic offered on all POIs (no. of calls) on day 1

  - C_1 = Average POI Congestion % on day 1

  - A_2 = POI traffic offered on all POIs (no. of calls) on day 2

  - C_2 = Average POI Congestion % on day 2

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

  - C_n = 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

IMRB International | eTech

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

7.4.2 KEY FINDINGS - RRC CONGESTION (CONSOLIDATED)
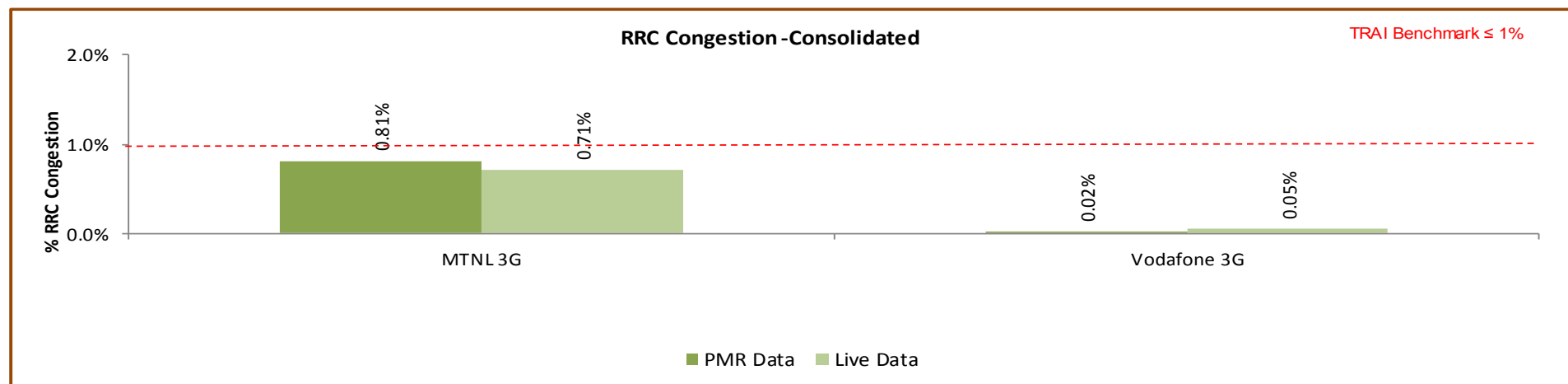
RRC Congestion -Consolidated

TRAI Benchmark ≤ 1%

% RRC Congestion

- MTNL 3G: PMR Data 0.81%, Live Data 0.71%
- Vodafone 3G: PMR Data 0.02%, Live Data 0.05%

■ PMR Data   ■ Live Data

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

All operators met the benchmark as per PMR/audit Data.
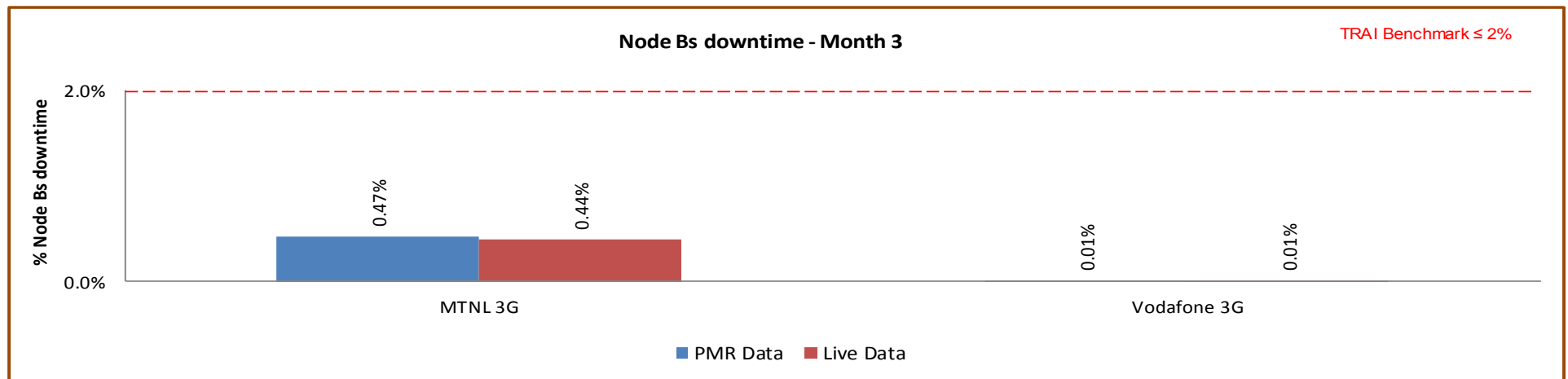
7.4.2.1 KEY FINDINGS – MONTH 1

RRC Congestion -Month 1

TRAI Benchmark ≤ 1%

% RRC Congestion

- MTNL 3G: PMR Data 0.88%, Live Data NDR
- Vodafone 3G: PMR Data 0.07%, Live Data 0.08%

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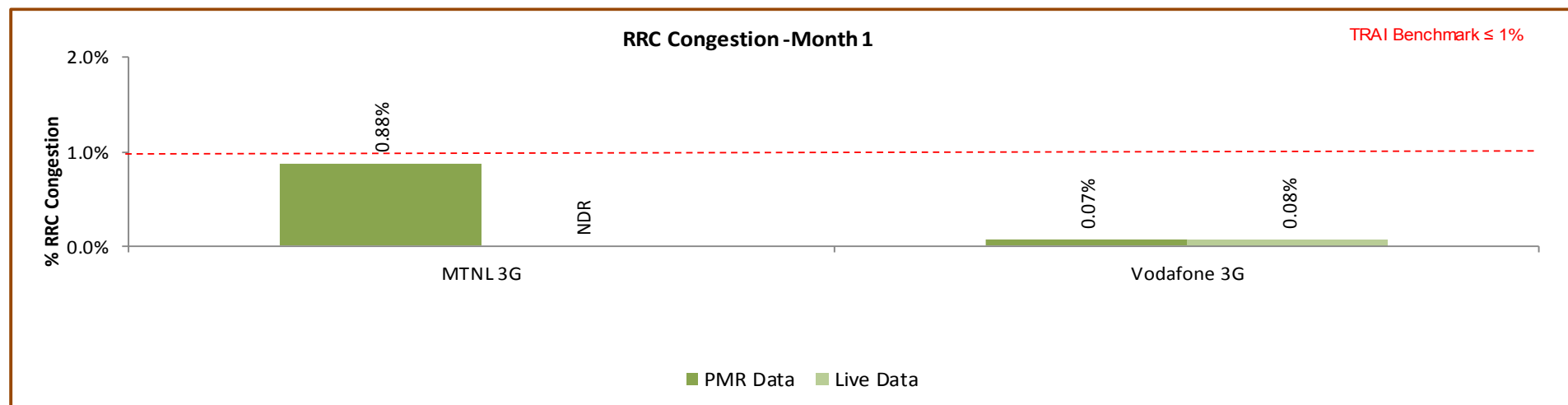
Data Source: Network Operations Center (NOC) of the operators

7.4.2.2 KEY FINDINGS – MONTH 2

RRC Congestion - Month 2

TRAI Benchmark ≤ 1%

- MTNL 3G: PMR Data 0.76%, Live Data 0.67%
- Vodafone 3G: PMR Data 0.00%, Live Data 0.08%

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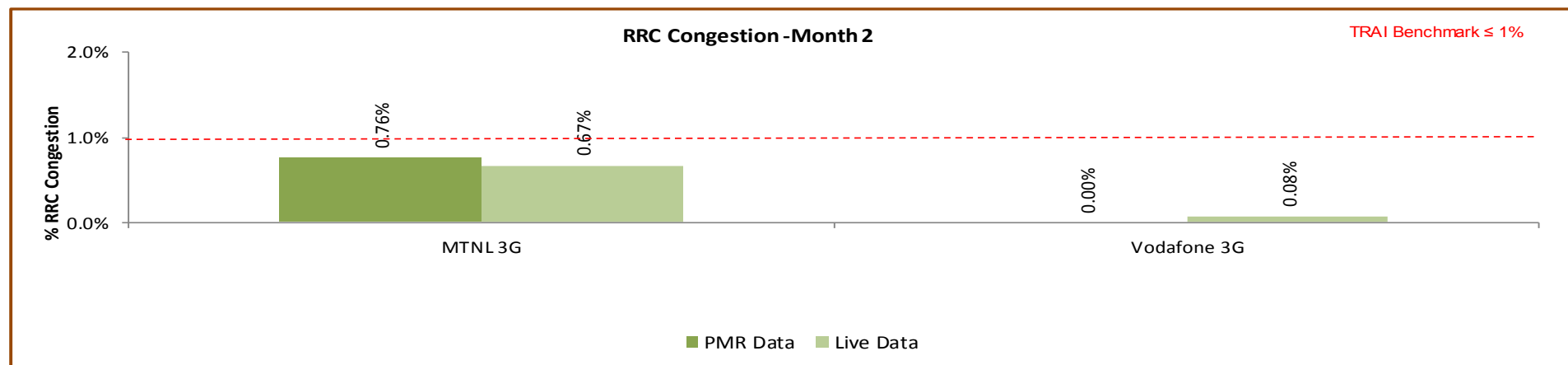
Data Source: Network Operations Center (NOC) of the operators

7.4.2.3 KEY FINDINGS – MONTH 3

RRC Congestion - Month 3

TRAI Benchmark ≤ 1%

- MTNL 3G: PMR Data 0.79%, Live Data 0.76%
- Vodafone 3G: PMR Data 0.00%, Live Data 0.00%

■ PMR Data ■ Live Data

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

7.4.3 KEY FINDINGS – CIRCUIT SWITCHED RAB CONGESTION (CONSOLIDATED)

Circuit Switched RAB Congestion-Consolidated

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

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

7.4.3.1 KEY FINDINGS – MONTH 1

Circuit Switched RAB Congestion-Month 1

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

7.4.3.2 KEY FINDINGS – MONTH 2

Circuit Switched RAB Congestion-Month 2

TRAI Benchmark ≤ 2%

- MTNL 3G: PMR Data 0.13%, Live Data 0.17%
- Vodafone 3G: PMR Data 0.00%, Live Data 0.08%

■ PMR Data ■ Live Data

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

7.4.3.3 KEY FINDINGS – MONTH 3

Circuit Switched RAB Congestion-Month 3

TRAI Benchmark ≤ 2%

- MTNL 3G: PMR Data 0.14%, Live Data 0.15%
- Vodafone 3G: PMR Data 0.00%, Live Data 0.00%

■ PMR Data ■ Live Data

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

IMRB International | eTech

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

Audit Results for POI Congestion- PMR data			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		93	984
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		510486	860805
Traffic served for all POIs (B)- in erlangs		21778	451190
POI congestion	≤ 0.5%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		31	984
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		15470	860805
Traffic served for all POIs (B)- in erlangs		7905	451190
POI congestion	≤ 0.5%	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.

7.4.4.1   KEY FINDINGS – MONTH 1

IMRB International | eTech

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

Audit Results for POI Congestion- PMR data-October			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		31	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		247509	286935
Traffic served for all POIs (B)- in erlangs		7166	150397
POI congestion	≤ 0.5%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		0	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		0	286935
Traffic served for all POIs (B)- in erlangs		0	150397
POI congestion	≤ 0.5%	0.00%	0.00%

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

7.4.4.2   KEY FINDINGS – MONTH 2

Audit Results for POI Congestion- PMR data-November			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		31	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		247509	286935
Traffic served for all POIs (B)- in erlangs		7166	150397
POI congestion	≤ 0.5%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		0	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		0	286935
Traffic served for all POIs (B)- in erlangs		0	150397
POI congestion	≤ 0.5%	0.00%	0.00%

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

7.4.4.3 KEY FINDINGS – MONTH 3

Audit Results for POI Congestion- PMR data-December			
POI congestion	**Benchmark**	**MTNL 3G**	**Vodafone 3G**
Total number of working POIs		31	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		15469	286935
Traffic served for all POIs (B)- in erlangs		7446	150397
POI congestion	≤ 0.5%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December			
POI congestion	**Benchmark**	**MTNL 3G**	**Vodafone 3G**
Total number of working POIs		31	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		15470	286935
Traffic served for all POIs (B)- in erlangs		7905	150397
POI congestion	≤ 0.5%	0.00%	0.00%

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

IMRB International | eTech

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

7.5 CIRCUIT SWITCHED VOICE DROP RATE

7.5.1 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.

IMRB International | eTech

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

7.5.2   KEY FINDINGS - CONSOLIDATED

Call Drop Rate-Consolidated

TRAI Benchmark ≤ 2%

MTNL 3G: PMR Data 1.46%, Live Data 1.17%, Drive Test Data NDR
Vodafone 3G: PMR Data 0.42%, Live Data 0.44%, Drive Test Data 0.00%

■ PMR Data ■ Live Data ■ Drive Test Data
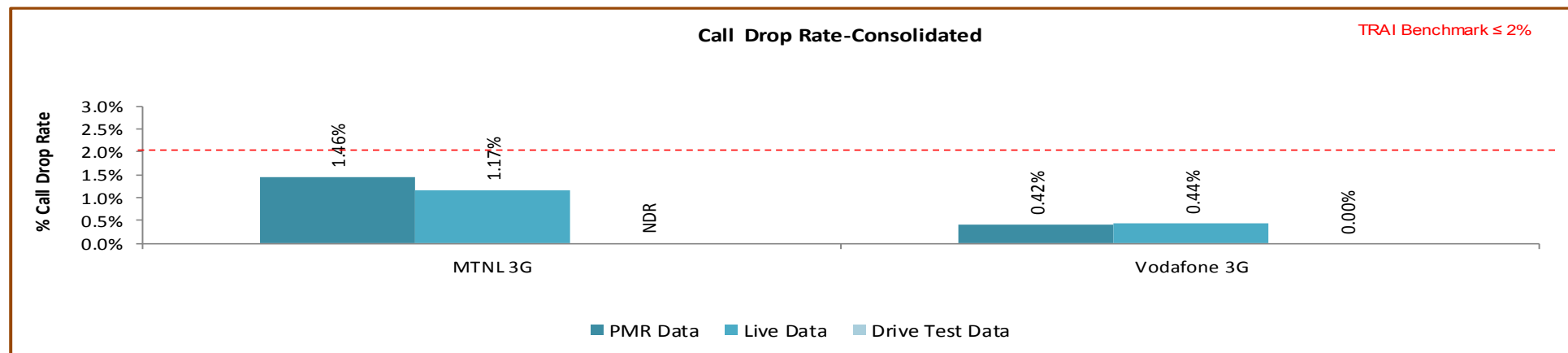
Data Source: Network Operations Center (NOC) of the operators

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

7.5.2.1   KEY FINDINGS – MONTH 1

Call Drop Rate-Month 1

TRAI Benchmark ≤ 2%

MTNL 3G: PMR Data 1.55%, Live Data 1.79%, Drive Test Data NA
Vodafone 3G: PMR Data 0.42%, Live Data 0.44%, Drive Test Data NA

■ PMR Data ■ Live Data ■ Drive Test Data
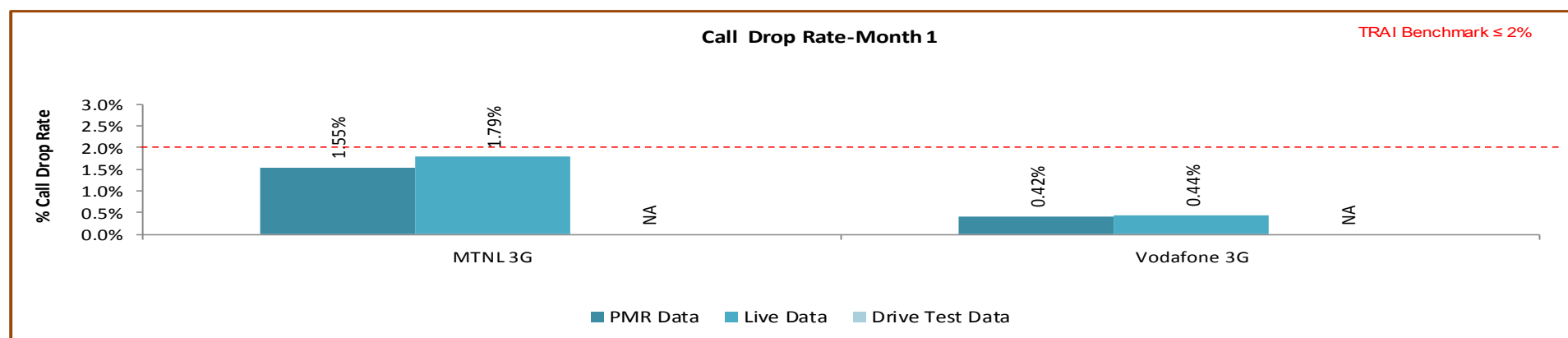
Data Source: Network Operations Center (NOC) of the operators

7.5.2.2 KEY FINDINGS – MONTH 2

Call Drop Rate-Month 2

TRAI Benchmark ≤ 2%
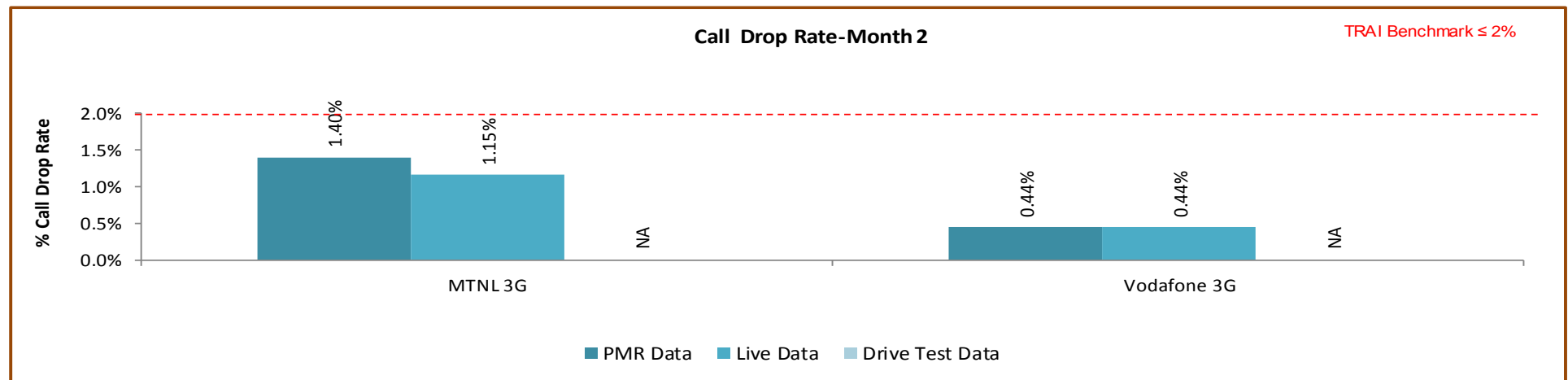
Data Source: Network Operations Center (NOC) of the operators

7.5.2.3 KEY FINDINGS – MONTH 3

Call Drop Rate-Month 3

TRAI Benchmark ≤ 2%
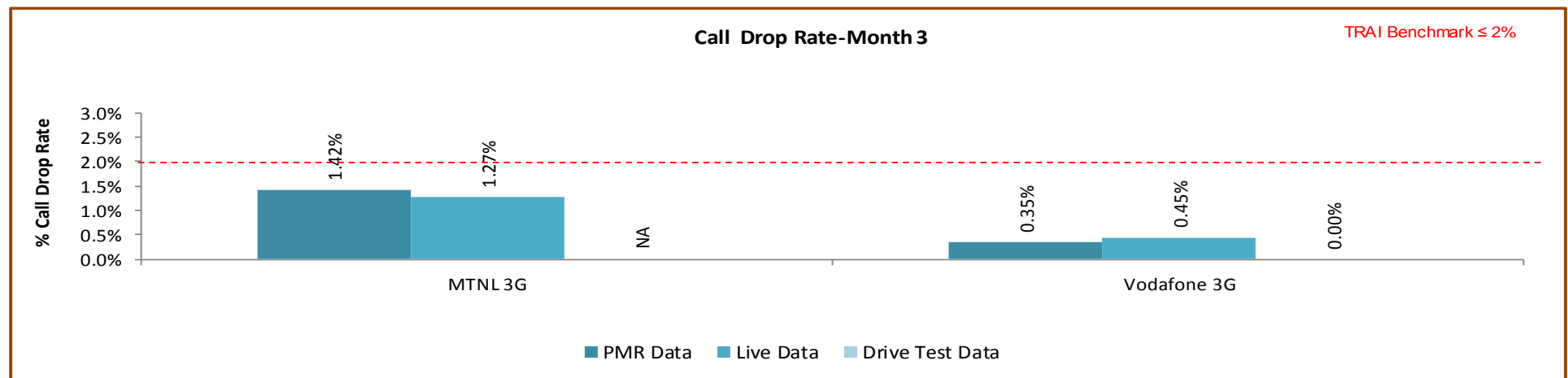
Data Source: Network Operations Center (NOC) of the operators

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

7.6.1   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.

7.6.2   KEY FINDINGS - CONSOLIDATED
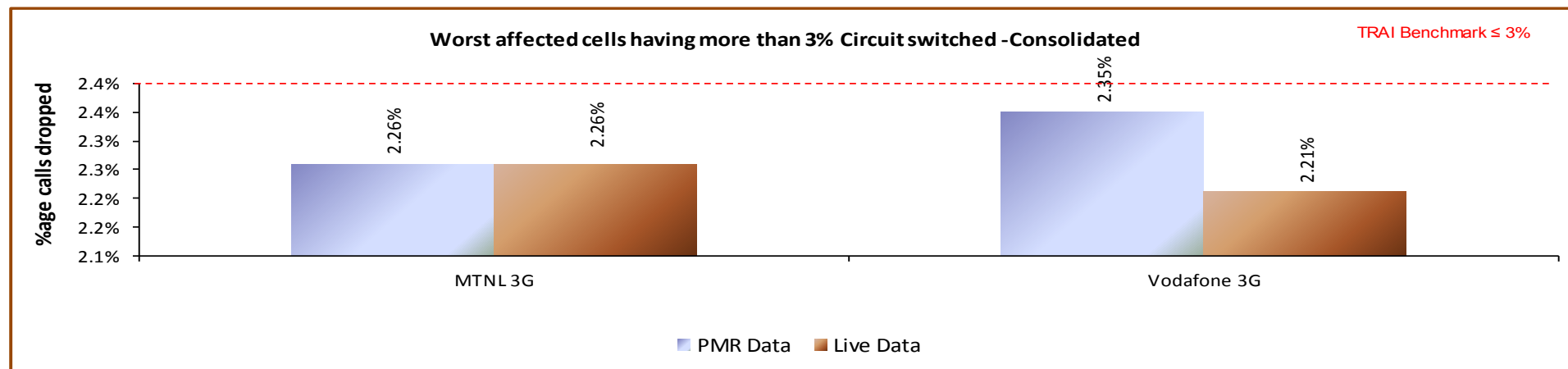
Worst affected cells having more than 3% Circuit switched -Consolidated

TRAI Benchmark ≤ 3%

%age calls dropped

- MTNL 3G: PMR Data 2.26%, Live Data 2.26%
- Vodafone 3G: PMR Data 2.35%, Live Data 2.21%

■ PMR Data ■ Live Data

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

All operators met the benchmark as per PMR/audit Data.
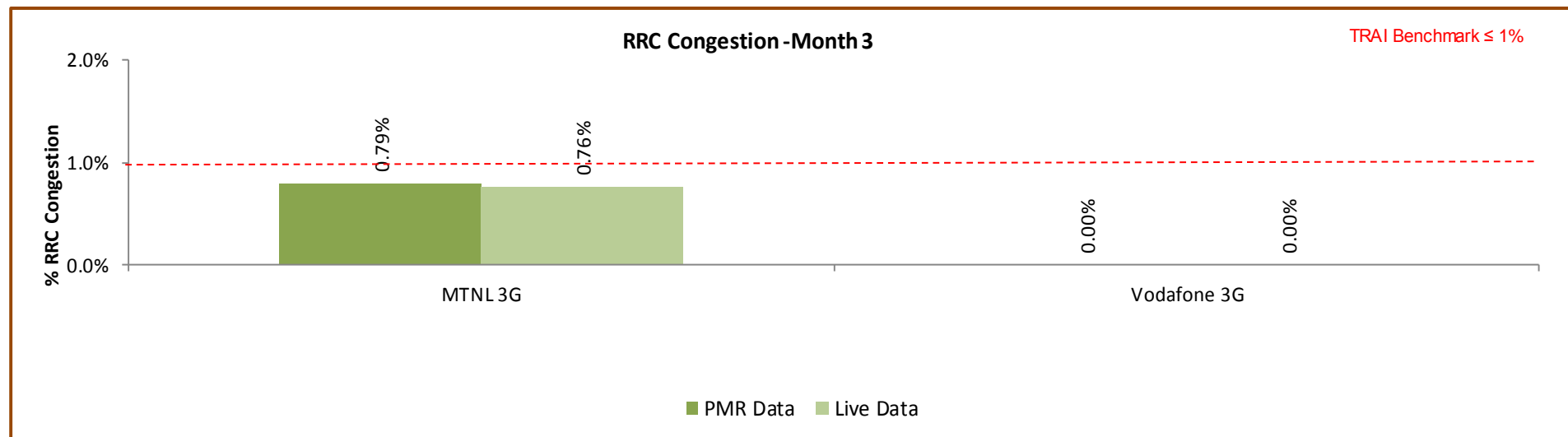
7.6.2.1   KEY FINDINGS – MONTH 1

Worst affected cells having more than 3% Circuit switched -Month 1

TRAI Benchmark ≤ 3%

%age calls dropped

- MTNL 3G: PMR Data 0.92%, Live Data 1.06%
- Vodafone 3G: PMR Data 2.35%, Live Data 2.21%

■ PMR Data ■ Live Data

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

IMRB International | eTech

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

7.6.2.2   KEY FINDINGS – MONTH 2

Worst affected cells having more than 3% Circuit switched -Month 2

TRAI Benchmark ≤ 3%
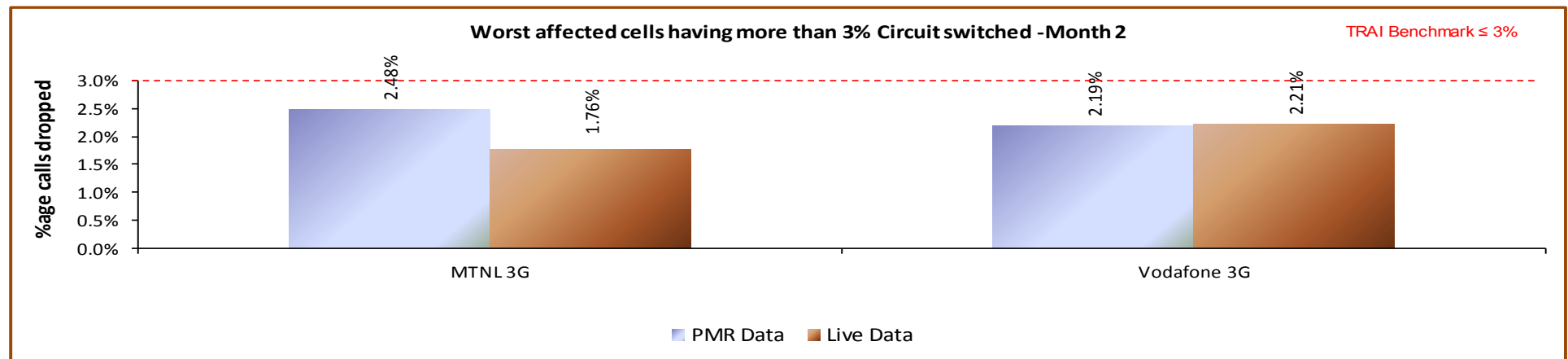
Data Source: Network Operations Center (NOC) of the operators
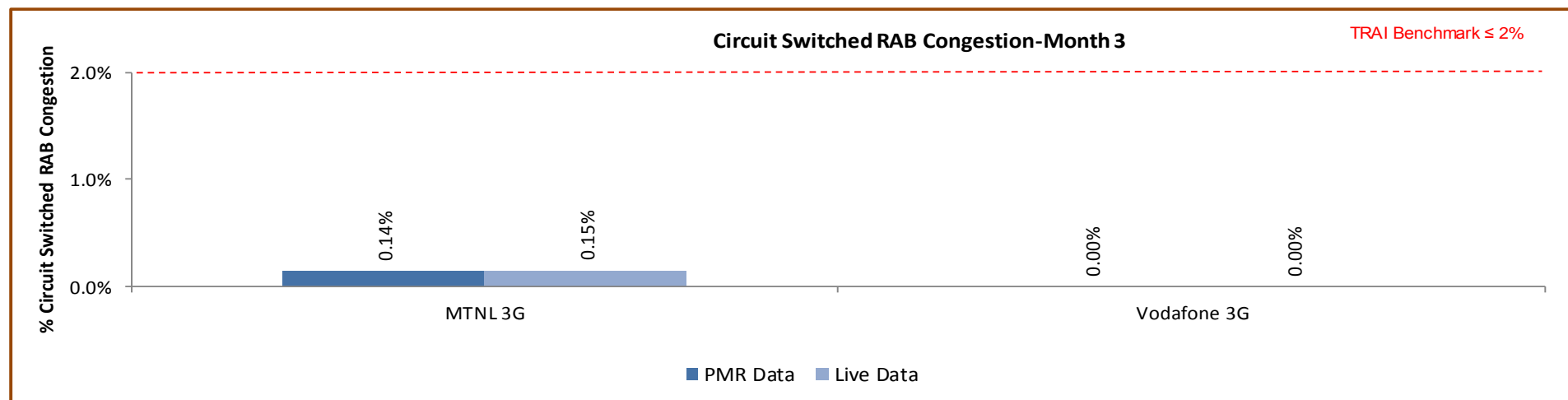
7.6.2.3   KEY FINDINGS – MONTH 3

Worst affected cells having more than 3% Circuit switched -Month 3

TRAI Benchmark ≤ 3%
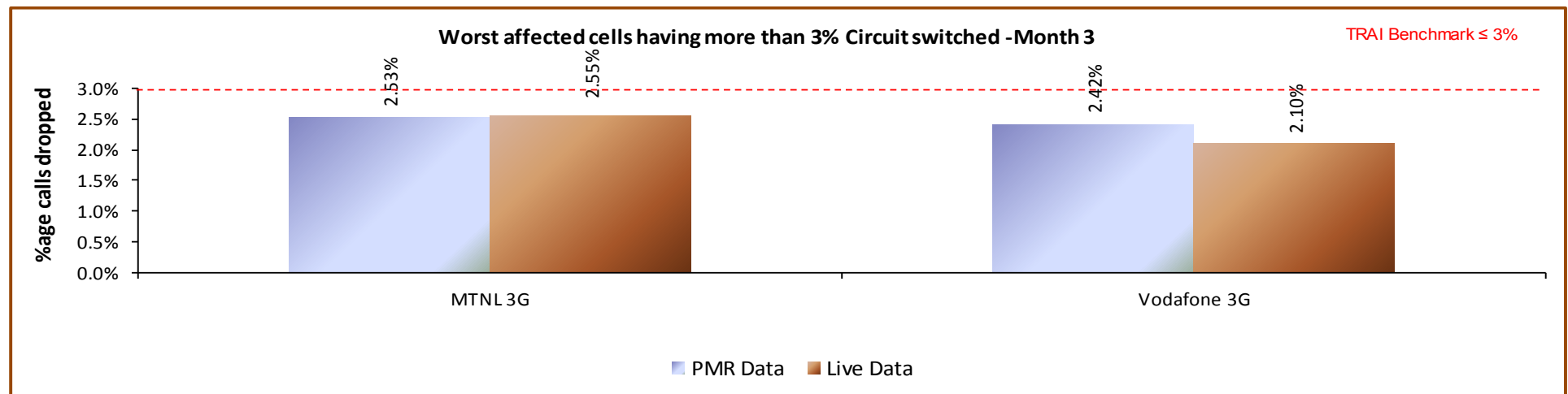
Data Source: Network Operations Center (NOC) of the operators

7.7 CIRCUIT SWITCH VOICE QUALITY

7.7.1 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.

7.7.2   KEY FINDINGS
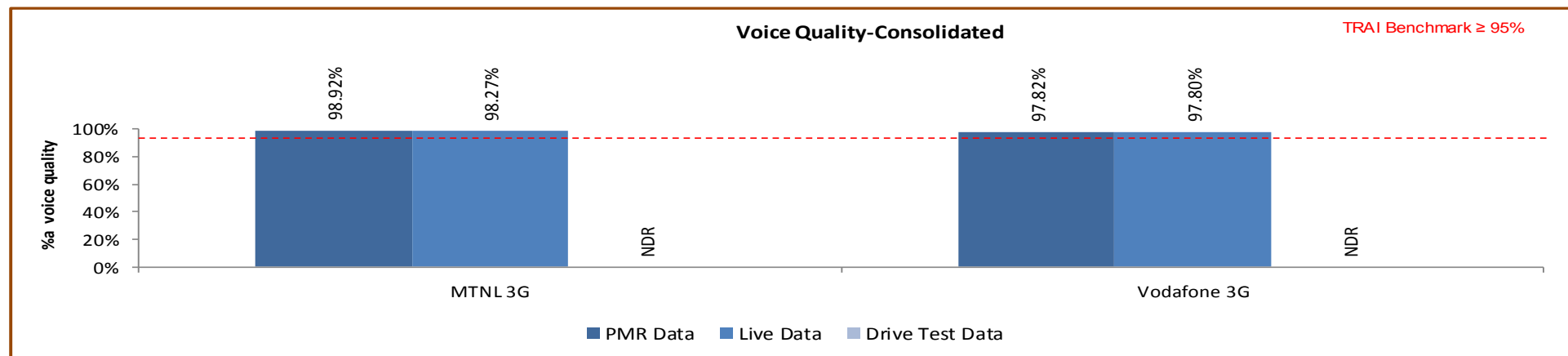
Voice Quality-Consolidated

TRAI Benchmark ≥ 95%

MTNL 3G: PMR Data 98.92%, Live Data 98.27%, Drive Test Data NDR

Vodafone 3G: PMR Data 97.82%, Live Data 97.80%, Drive Test Data NDR

■ PMR Data ■ Live Data ■ Drive Test Data

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

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

7.7.2.1   KEY FINDINGS – MONTH 1

Voice Quality-Month 1

TRAI Benchmark ≥ 95%

MTNL 3G: PMR Data 98.89%, Live Data 99.86%, Drive Test Data NA

Vodafone 3G: PMR Data 97.80%, Live Data 97.79%, Drive Test Data NA

■ PMR Data ■ Live Data ■ Drive Test Data

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

7.7.2.2 KEY FINDINGS – MONTH 2

Voice Quality-Month 2

TRAI Benchmark ≥ 95%

- MTNL 3G: PMR Data 98.94%, Live Data 98.91%, Drive Test Data NA
- Vodafone 3G: PMR Data 97.67%, Live Data 97.79%, Drive Test Data NA

Legend: ■ PMR Data ■ Live Data ■ Drive Test Data

Y-axis: %a voice quality (0% to 100%)

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

7.7.2.3 KEY FINDINGS – MONTH 3

Voice Quality-Month 3

TRAI Benchmark ≥ 95%

- MTNL 3G: PMR Data 98.92%, Live Data 98.92%, Drive Test Data NA
- Vodafone 3G: PMR Data 97.83%, Live Data 97.81%, Drive Test Data NA

Legend: ■ PMR Data ■ Live Data ■ Drive Test Data

Y-axis: %a voice quality (0% to 100%)

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

IMRB International | eTech

Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)
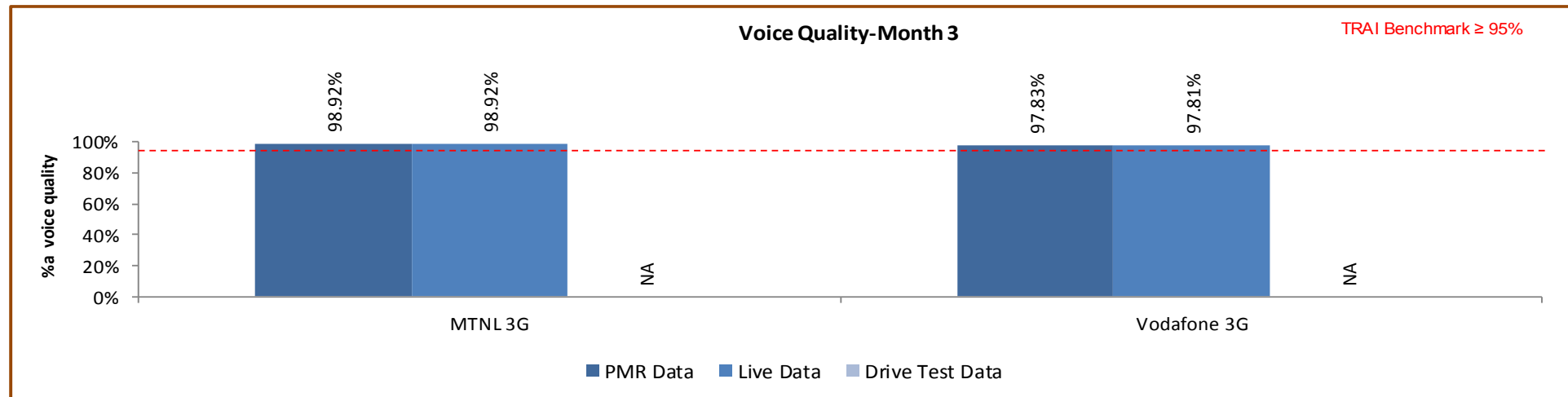
8 PARAMETER DESCRIPTION & DETAILED FINDINGS - WIRELESS DATA SERVICES (2G & 3G)

8.1 OCTOBER

Wireless Data-PMR										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Activation done within 4 hours										
Total request time made		444127	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		443630	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	99.89%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate										
No. of data Session requested		1200083444	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		1127258928	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	93.93%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate										
No. of Successful data calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% Drop rate	≤ 5%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Wireless Data-Live Data										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Activation done within 4 hours										
Total request time made		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate										
No. of data Session requested		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate										
No. of Successful data calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop rate	≤ 5%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

8.2 NOVEMBER

Wireless Data-PMR										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Activation done within 4 hours										
Total request time made		422304	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		421669	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	99.85%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate										
No. of data Session requested		1345823935	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		1142955150	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	84.93%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate										
No. of Successful data calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop rate	≤ 5%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Wireless Data-Live Data										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Activation done within 4 hours										
Total request time made		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate										
No. of data Session requested		124930263	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		108546689	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	86.89%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate										
No. of Successful data calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop rate	≤ 5%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

IMRB International | eTech

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

8.3 DECEMBER

Wireless Data-PMR										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Activation done within 4 hours										
Total request time made		563677	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		563305	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	99.93%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate										
No. of data Session requested		1548359597	NDR	NDR	44418323	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		1326839857	NDR	NDR	44417325	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	85.69%	NDR	NDR	100.00%	NDR	NDR	NDR	NDR	NDR
Drop Rate										
No. of Successful data calls		NDR	NDR	NDR	44417325	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		NDR	NDR	NDR	998	NDR	NDR	NDR	NDR	NDR
Drop rate	≤ 5%	NDR	NDR	NDR	0.00%	NDR	NDR	NDR	NDR	NDR
Wireless Data-Live Data										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Activation done within 4 hours										
Total request time made		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Total Time Taken for Activation		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate										
No. of data Session requested		175046856	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of data Session Successful		140924174	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
PDP Context activation success rate	≥ 95%	80.51%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop Rate										
No. of Successful data calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
No. of Dropped data Calls		NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR
Drop rate	≤ 5%	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR	NDR

IMRB International | eTech

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

9   PARAMETER DESCRIPTION & DETAILED FINDINGS - WIRELESS DATA SERVICES (2G & 3G)

9.1   OCTOBER

Wireless Data-PMR			
	Benchmark	MTNL 3G	Vodafone 3G
Activation done within 4 hours			
Total request time made		NDR	NDR
Total Time Taken for Activation		NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR
PDP Context activation success rate			
No. of data Session requested		NDR	NDR
No. of data Session Successful		NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	NDR
Drop Rate			
No. of Successful data calls		NDR	NDR
No. of Dropped data Calls		NDR	NDR
% Drop rate	≤ 5%	NDR	NDR
Wireless Data-Live Data			
	Benchmark	MTNL 3G	Vodafone 3G
Activation done within 4 hours			
Total request time made		NDR	NDR
Total Time Taken for Activation		NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR
PDP Context activation success rate			
No. of data Session requested		NDR	53703841
No. of data Session Successful		NDR	53227196
PDP Context activation success rate	≥ 95%	NDR	99.11%
Drop Rate			
No. of Successful data calls		NDR	106181379
No. of Dropped data Calls		NDR	474192
Drop rate	≤ 5%	NDR	0.45%

9.2 NOVEMBER

Wireless Data-PMR			
	Benchmark	MTNL 3G	Vodafone 3G
Activation done within 4 hours			
Total request time made		NDR	NDR
Total Time Taken for Activation		NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR
PDP Context activation success rate			
No. of data Session requested		NDR	NDR
No. of data Session Successful		NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	NDR
Drop Rate			
No. of Successful data calls		NDR	727134365
No. of Dropped data Calls		NDR	16172700
Drop rate	≤ 5%	NDR	2.22%
Wireless Data-Live Data			
	Benchmark	MTNL 3G	Vodafone 3G
Activation done within 4 hours			
Total request time made		NDR	NDR
Total Time Taken for Activation		NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR
PDP Context activation success rate			
No. of data Session requested		NDR	35859636
No. of data Session Successful		NDR	35497894
PDP Context activation success rate	≥ 95%	NDR	98.99%
Drop Rate			
No. of Successful data calls		51825577	105092734
No. of Dropped data Calls		1385514	464417
Drop rate	≤ 5%	2.67%	0.44%

IMRB International | eTech

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

9.3   DECEMBER

Wireless Data–PMR			
	Benchmark	MTNL 3G	Vodafone 3G
Activation done within 4 hours			
Total request time made		NDR	NDR
Total Time Taken for Activation		NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR
PDP Context activation success rate			
No. of data Session requested		44418323	NDR
No. of data Session Successful		44417325	NDR
PDP Context activation success rate	≥ 95%	100.00%	NDR
Drop Rate			
No. of Successful data calls		44417325	NDR
No. of Dropped data Calls		998	NDR
Drop rate	≤ 5%	0.00%	NDR
Wireless Data–Live Data			
	Benchmark	MTNL 3G	Vodafone 3G
Activation done within 4 hours			
Total request time made		NDR	NDR
Total Time Taken for Activation		NDR	NDR
% activation done within 4 hours	≥ 95%	NDR	NDR
PDP Context activation success rate			
No. of data Session requested		NDR	NDR
No. of data Session Successful		NDR	NDR
PDP Context activation success rate	≥ 95%	NDR	NDR
Drop Rate			
No. of Successful data calls		75277811	NDR
No. of Dropped data Calls		1761389	NDR
Drop rate	≤ 5%	2.34%	NDR

10 PARAMETER DESCRIPTION AND DETAILED FINDINGS – NON-NETWORK PARAMETERS

10.1 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.

10.1.1 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 November 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

10.1.2 KEY FINDINGS – METERING AND BILLING CREDIBILITY (POSTPAID)

Metering and billing credibility - Postpaid

TRAI Benchmark ≤ 0.1%

Percentage bills disputed

Aircel	0.00%
Airtel	0.02%
Idea	0.37%
MTNL	0.08%
Reliance CDMA	0.10%
Reliance GSM	0.10%
TATA CDMA	0.00%
TATA GSM	0.00%
Vodafone	0.62%

■ **Audit Results for Billing performance Postpaid-Consolidated**
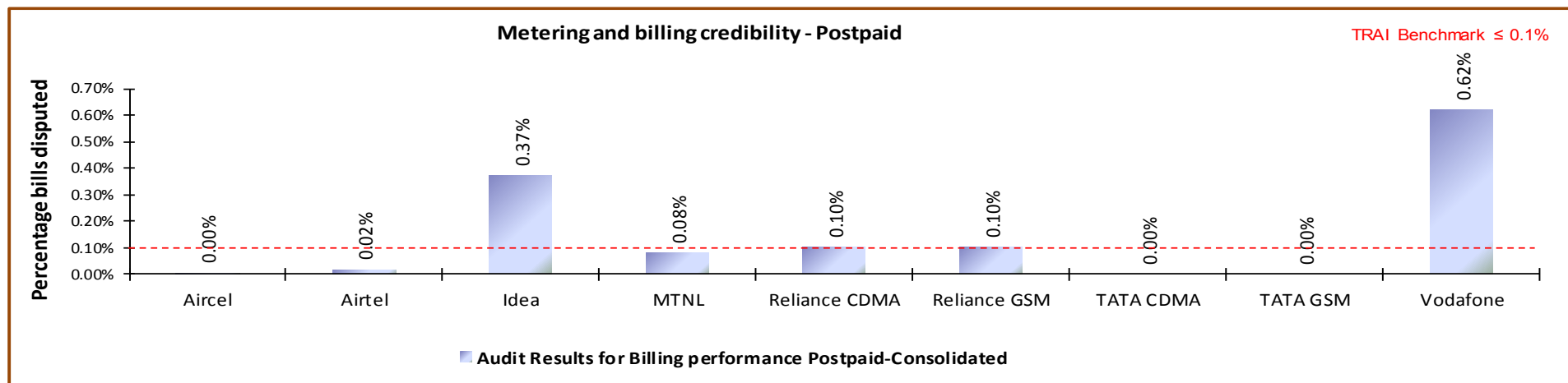
Data Source: Billing Center of the operators

Idea and Vodafone failed to meet the benchmark of 0.1% postpaid metering and billing credibility.

10.1.3 KEY FINDINGS - METERING AND BILLING CREDIBILITY (PREPAID)

Metering and billing credibility - Prepaid

TRAI Benchmark ≤ 0.1%

Percentage bills disputed

Aircel	0.00%
Airtel	0.00%
Idea	0.07%
MTNL	0.09%
Reliance CDMA	0.15%
Reliance GSM	0.09%
TATA CDMA	0.01%
TATA GSM	0.03%
Vodafone	0.11%

■ **Percentage of charging complaints disputed**
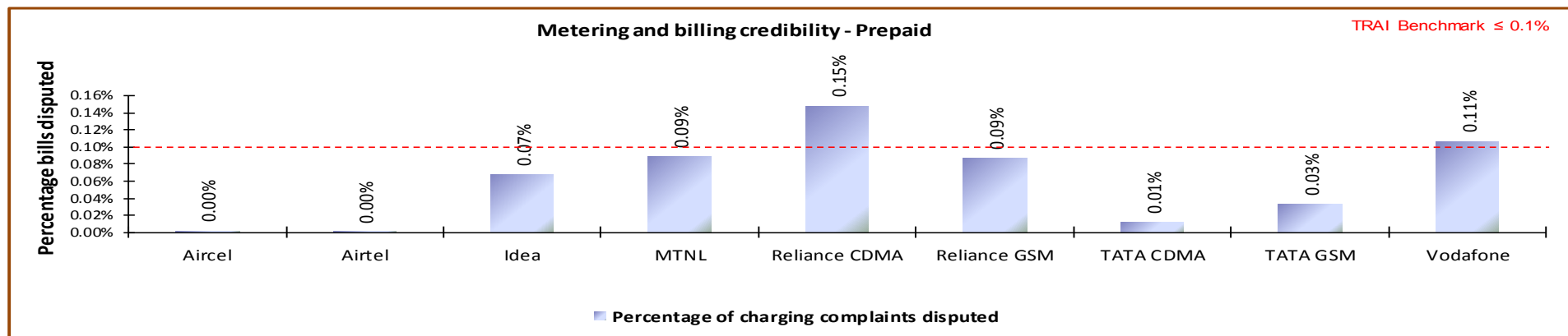
Data Source: Billing Center of the operators

Reliance CDMA and Vodafone failed to meet the benchmark for metering and billing credibility of prepaid subscribers.

IMRB International | eTech

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

10.2   RESOLUTION OF BILLING/ CHARGING COMPLAINTS

10.2.1 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 November 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.

10.2.2 KEY FINDINGS - WITHIN 4 WEEKS

Resolution of billing complaints 4 Weeks

TRAI Benchmark =98%

	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Audit results	100.00%	100.00%	100.00%	99.33%	100.00%	100.00%	NA	NA	97.95%
Live calling	96.00%	92.00%	78.00%	95.00%	90.00%	86.00%	NA	NA	97.00%

■ Percentage cases resolved in 4 weeks:Audit results   ■ Percentage cases resolved in 4 weeks:Live calling
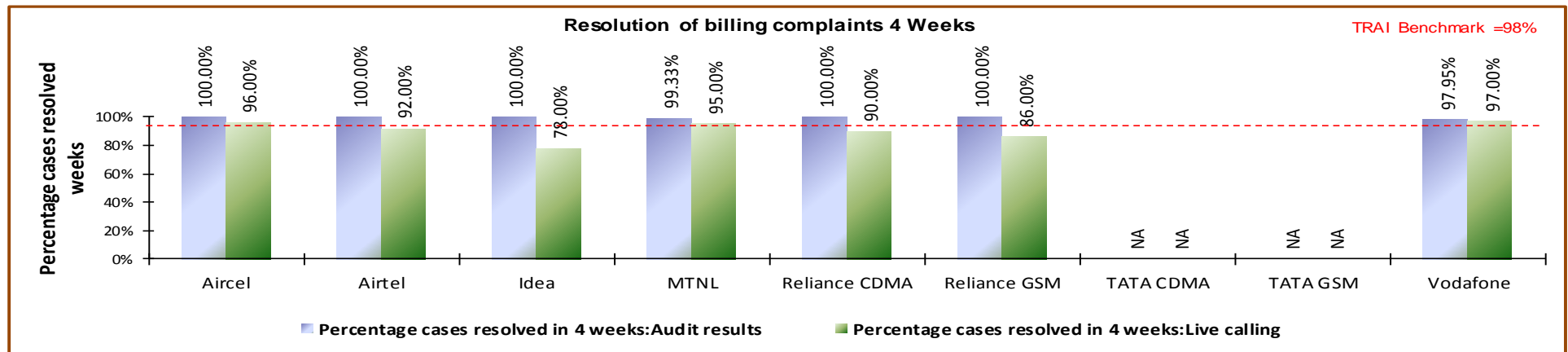
Data Source: Billing Center of the operators

10.2.3 KEY FINDINGS WITHIN 6 WEEKS
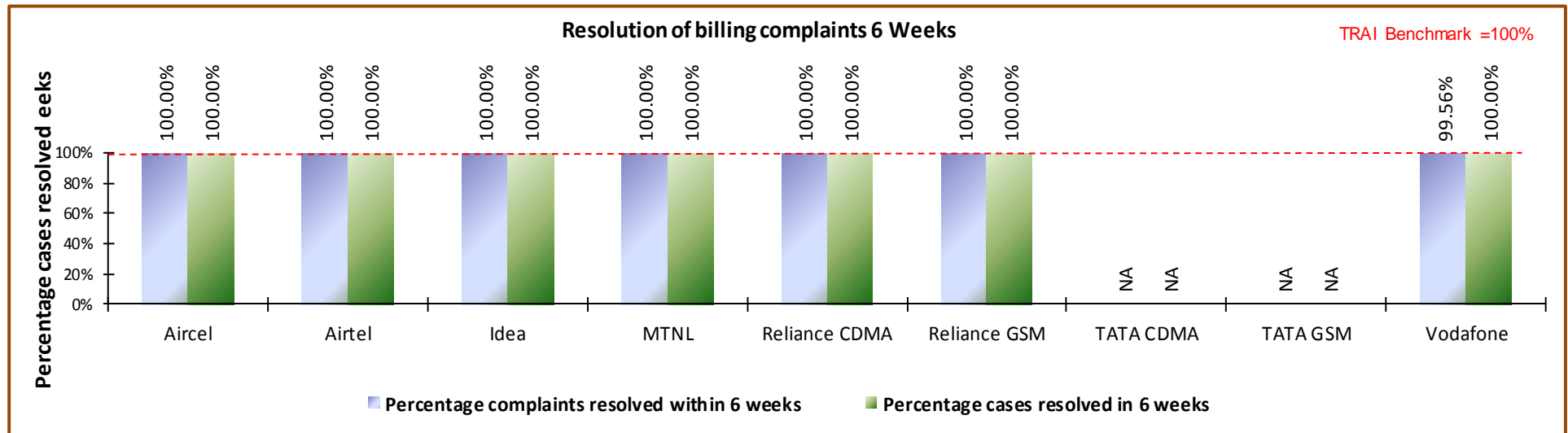
Resolution of billing complaints 6 Weeks

TRAI Benchmark =100%

Data Source: Billing Center of the operators

All operators met the TRAI benchmark of resolution of billing complaints within 4 weeks, while Vodafone fell slightly short of the benchmark of resolution of billing complaints within 4 weeks and 6 Weeks. However, as per live calling done to customers, the performance of all operators was observed to be much below the PMR data.

All operators met the TRAI benchmark for Live calling with 6 Weeks.

10.3   PERIOD OF APPLYING CREDIT/WAVIER

10.3.1 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

10.3.2 KEY FINDINGS
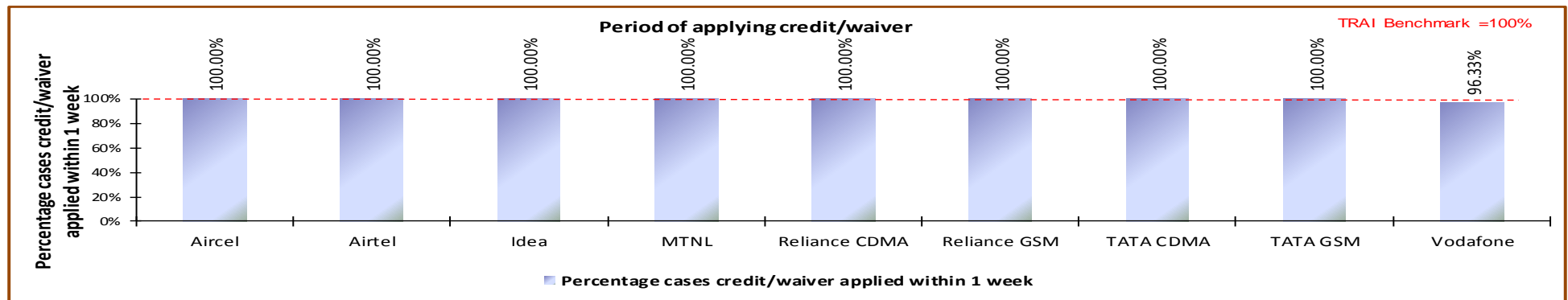
Data Source: Billing Center of the operators

All operators met the benchmark for this parameter, except 96.33%.

10.4 CALL CENTRE PERFORMANCE-IVR

10.4.1 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

10.4.2 KEY FINDINGS
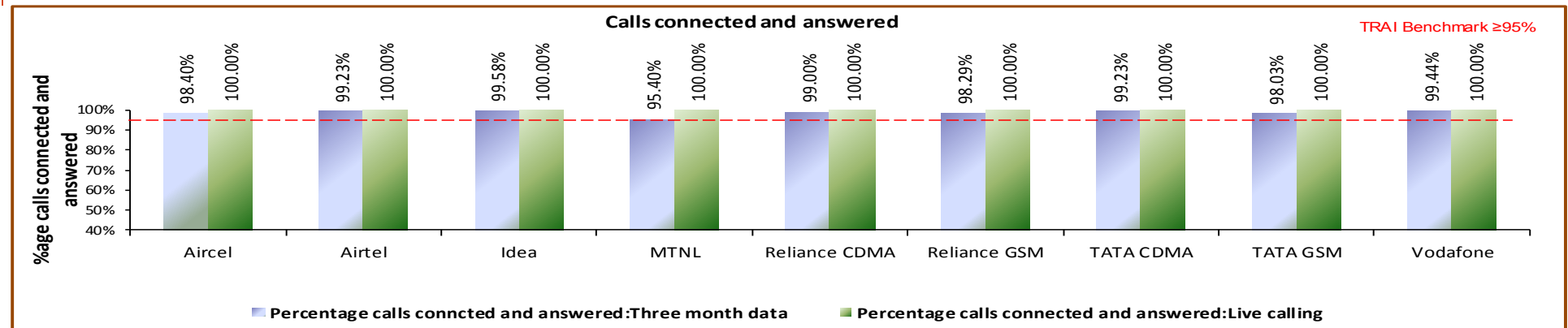
Data Source: Customer Service Center of the operators

As per PMR data, all operators met the benchmark

IMRB International | eTech

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

10.5   CALL CENTRE PERFORMANCE-VOICE TO VOICE

10.5.1 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

10.5.2 KEY FINDINGS

Calls answered in 90 seconds (Voice to Voice)

TRAI Benchmark ≥ 95%

Operator	Percentage calls answered within 90 seconds (Avg of 3 months)	Live Calling Percentage calls getting connected and answered
Aircel	95.43%	100.00%
Airtel	93.00%	100.00%
Idea	99.35%	100.00%
MTNL	95.60%	99.00%
Reliance CDMA	90.75%	85.00%
Reliance GSM	91.50%	85.00%
TATA CDMA	99.37%	100.00%
TATA GSM	96.90%	100.00%
Vodafone	97.70%	96.00%
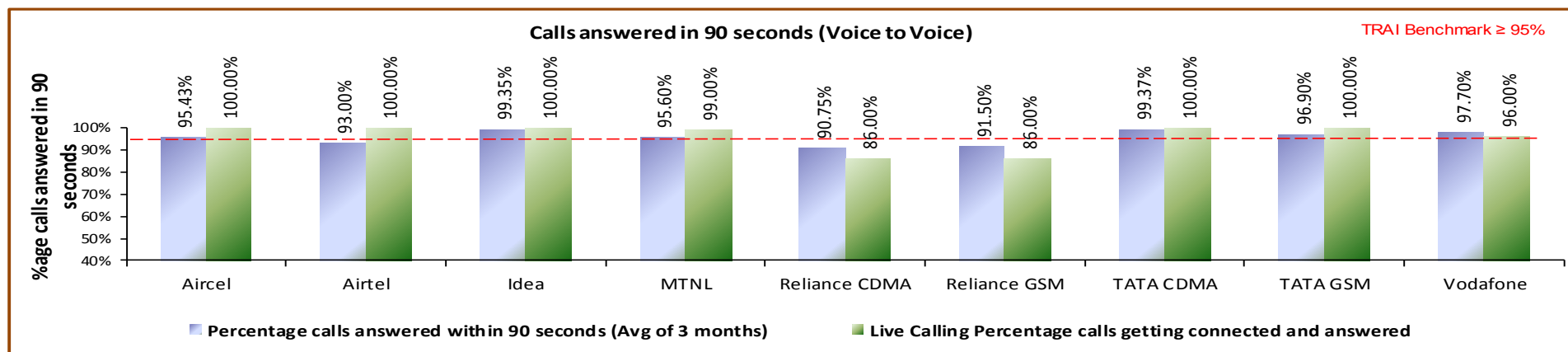
Data Source: Customer Service Center of the operators

Airtel, TATA CDMA, Reliance CDMA and Reliance GSM were not able to meet the benchmark as per PMR audit. However, as per live calling done to customers, the performance of Airtel, Reliance CDMA and Reliance GSM was far inferior to the PMR data.

10.6 TERMINATION/CLOSURE OF SERVICE

10.6.1 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

10.6.2 KEY FINDINGS
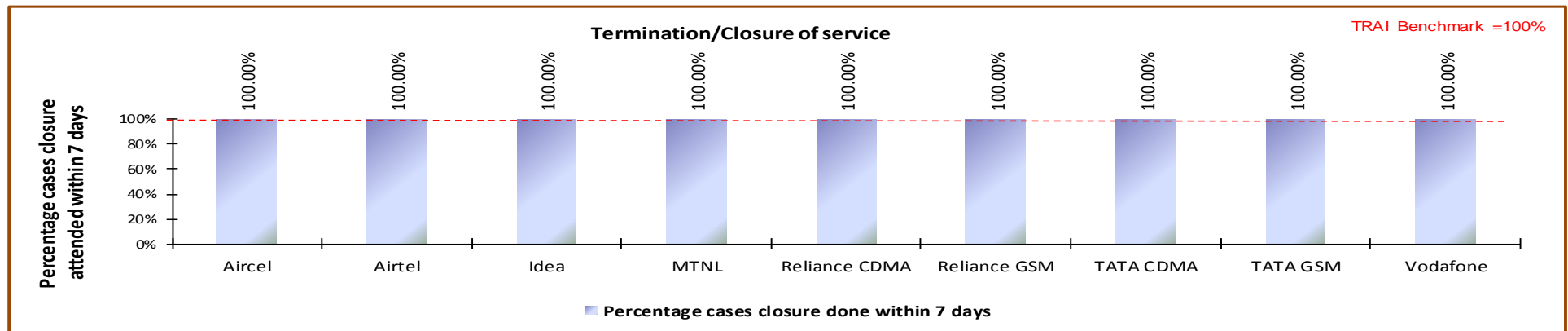
Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

10.7   REFUND OF DEPOSITS AFTER CLOSURE

10.7.1 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

10.7.2 KEY FINDINGS
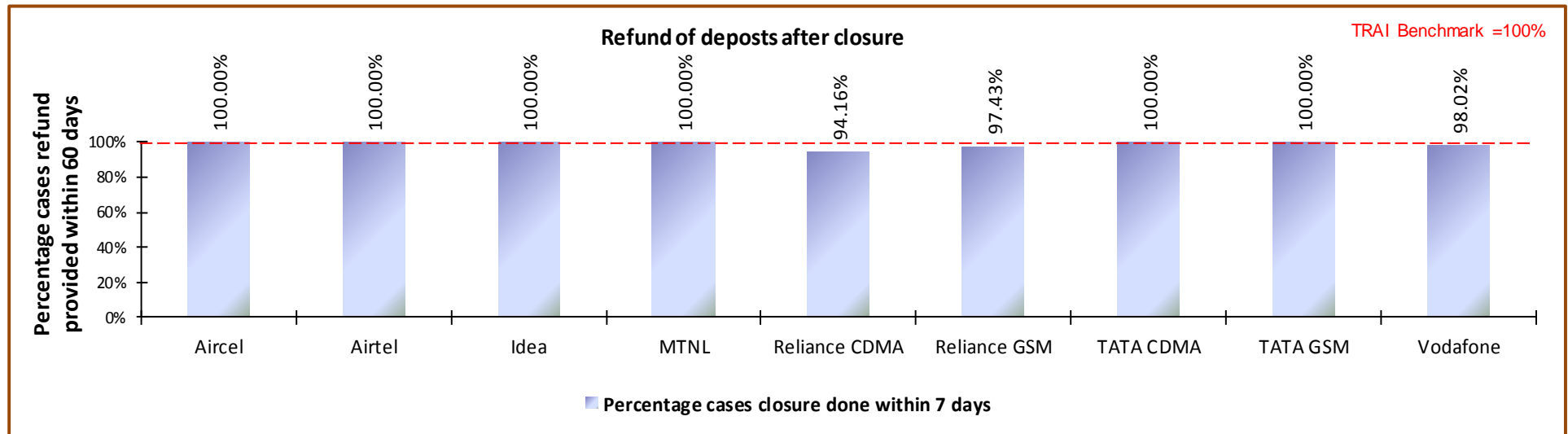
Data Source: Customer Service Center of the operators

All operators met the TRAI benchmark for the parameter.

11.1 OPERATOR ASSISTED DRIVE TEST - VOICE

The drive test was conducted simultaneously for all the operators present in the Mumbai 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 Mumbai circle are given below.

11.1.1 Mumbai SSA

Month	Name of SSA Covered	Start date	End Date	Kilometer Travelled
December	Mumbai	14/12/2015	19/12/15	627

11.1.1.1 Route Details - Mumbai SSA

Category	Type of location	December Mumbai					
		Day 1	Day 2	Day 3	Day 4	Day 5	Day 6
Outdoor	Major Roads	Poor Level & Qualitynear Worli seaface,Poor level & Quality Jay Avant Palkar road,Dr.Gopal rao deshmukh Road	Poor Coverage & Quality Nariman Point ,Poor Quality JJ Flyover	Poor Coverage & Quality Band Stand road,Poor Coverage SV Road Near Pavan Hansh	Poor Covergae & quality near dharvai Bandra Link Road,Poor Coverage near lokhndwala area, Poor Covergae LBS Road Near	Poor Covergae INS Hamla,Poor Coverage & Quality Lokhndwala area,	Poor Coverage & Quality Essel World Road,Poor Coverage & Quality Near Lic Colony, Poor Coverage Uttan Road
	Highways						
	With in the City						
Indoor	Shopping complex						
	Office complex						

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

Note: - MTNL, Reliance CDMA and Reliance GSM did not share the data for 2G and MTNL for 3G.

11.1.1.1 Route Map - Mumbai DAY 1
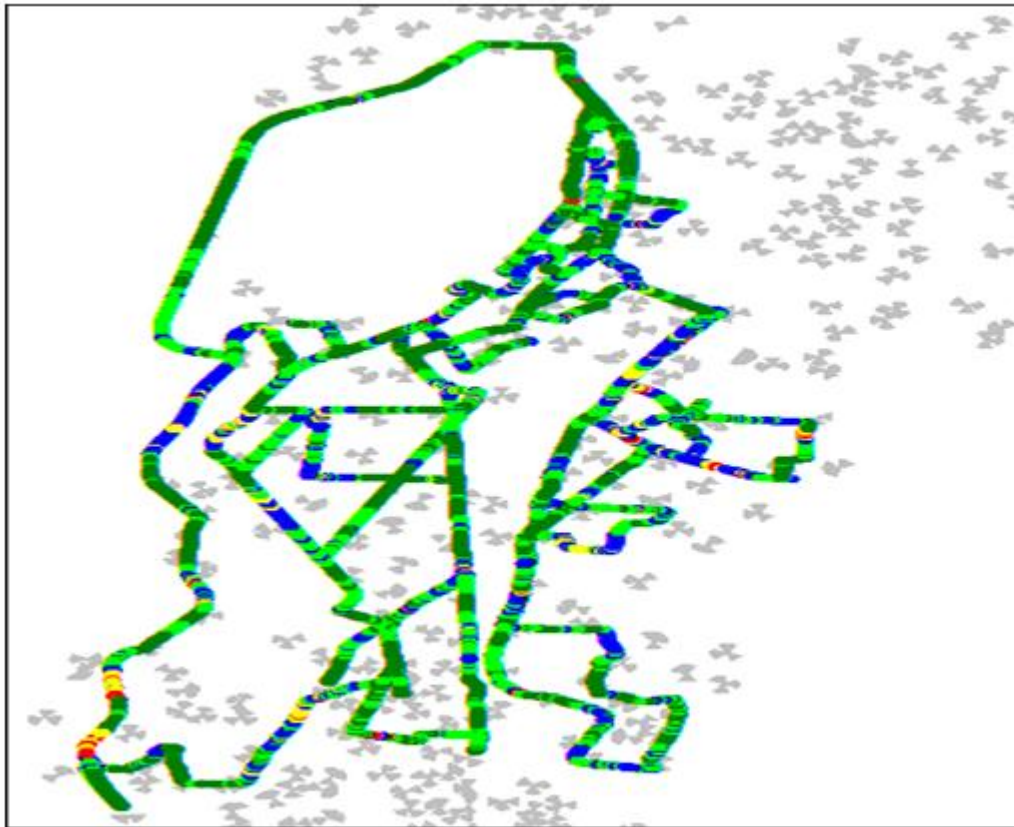
Route Covered-Day 1

1. Bandra-Worli Sealink
2. Dadar West
3. Mahim West
4. Sewri West
5. Altamount Road
6. Dr.Babasaheb Ambedkar Road
7. Grant Road Station
8. Mazgaon
9. Lower Parel Station
10. Mumbai Central East
11. Byculla East
12. Kemps Corner
13. Worli Seaface
14. Dr.Annie Beasant Road
15. Mahalaxmi
16. Haji Ali

11.1.1.2 Route Map - Mumbai DAY 2

Route Covered-Day 2

1. Dadar West
2. Dadar East Station
3. Sion
4. Matunga East
5. Wadala West
6. P'Dmello Road
7. Navy Nagar
8. Colaba
9. Nariman Point
10. Peddar Road
11. Grant Road West
12. Lower Parel West
13. Marin Drive Station
14. Churchgate
15. Senapati Bapat Marg
16. Worli
17. Masjid
18. J.J Flyover
19. Mumbai Central East
20. Cuffe Parade
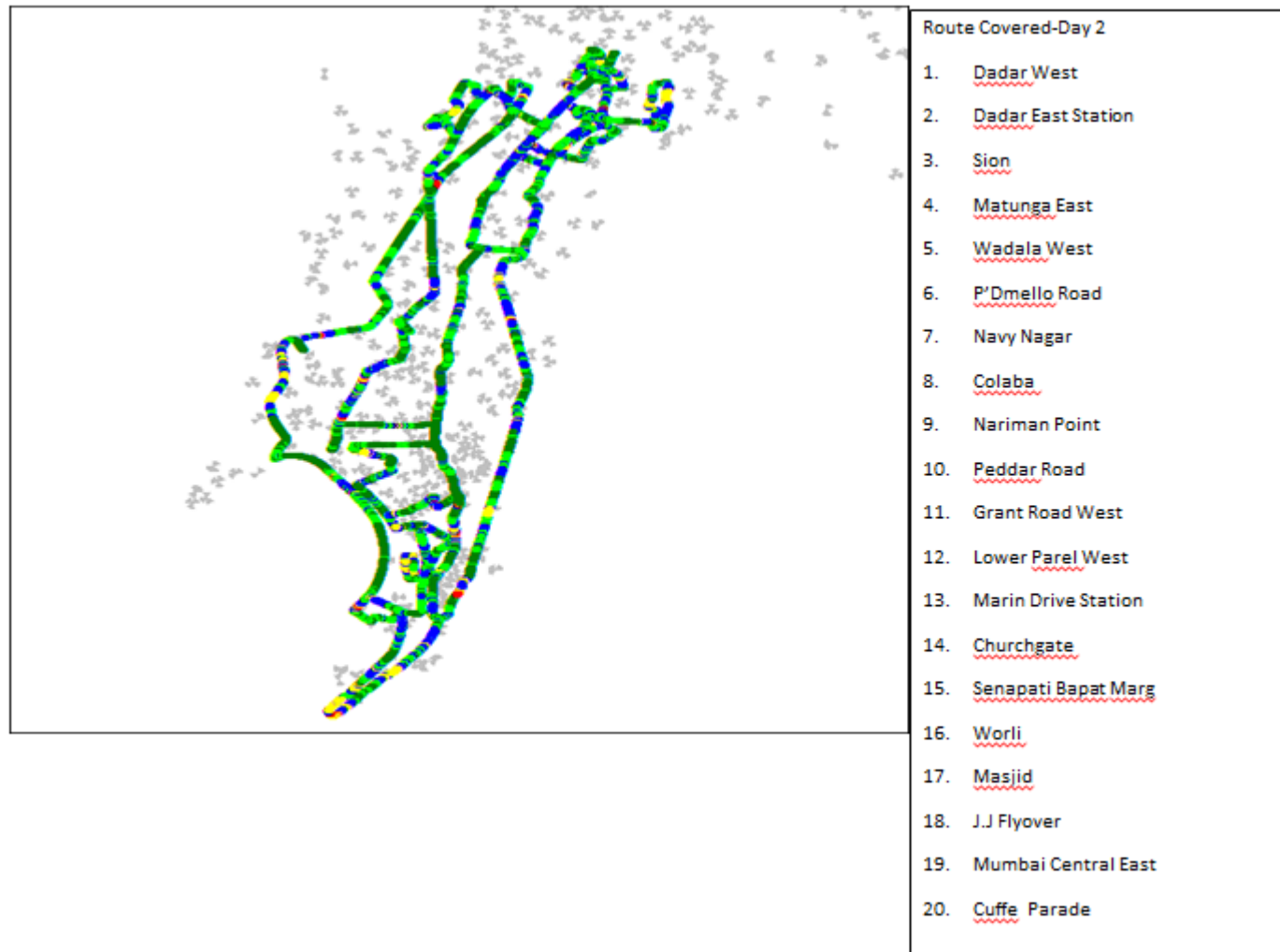
11.1.1.3 Route Map - Mumbai DAY 3

Route Covered-Day 3

1. Western Express Highway
2. Eastern Express Highway
3. Bandra East
4. Khar Subway
5. Pali Hill Road
6. S.V Road
7. Juhu Tara Road
8. Bandra Kurla Complex
9. Sion West
10. Matunga Station
11. Santacruz West
12. Vakola Pipeline Road
13. JVLR
14. Powai

IMRB International | eTech

Telecom Regulatory Authority of India
(IS/ISO 9001-2008 Certified Organisation)
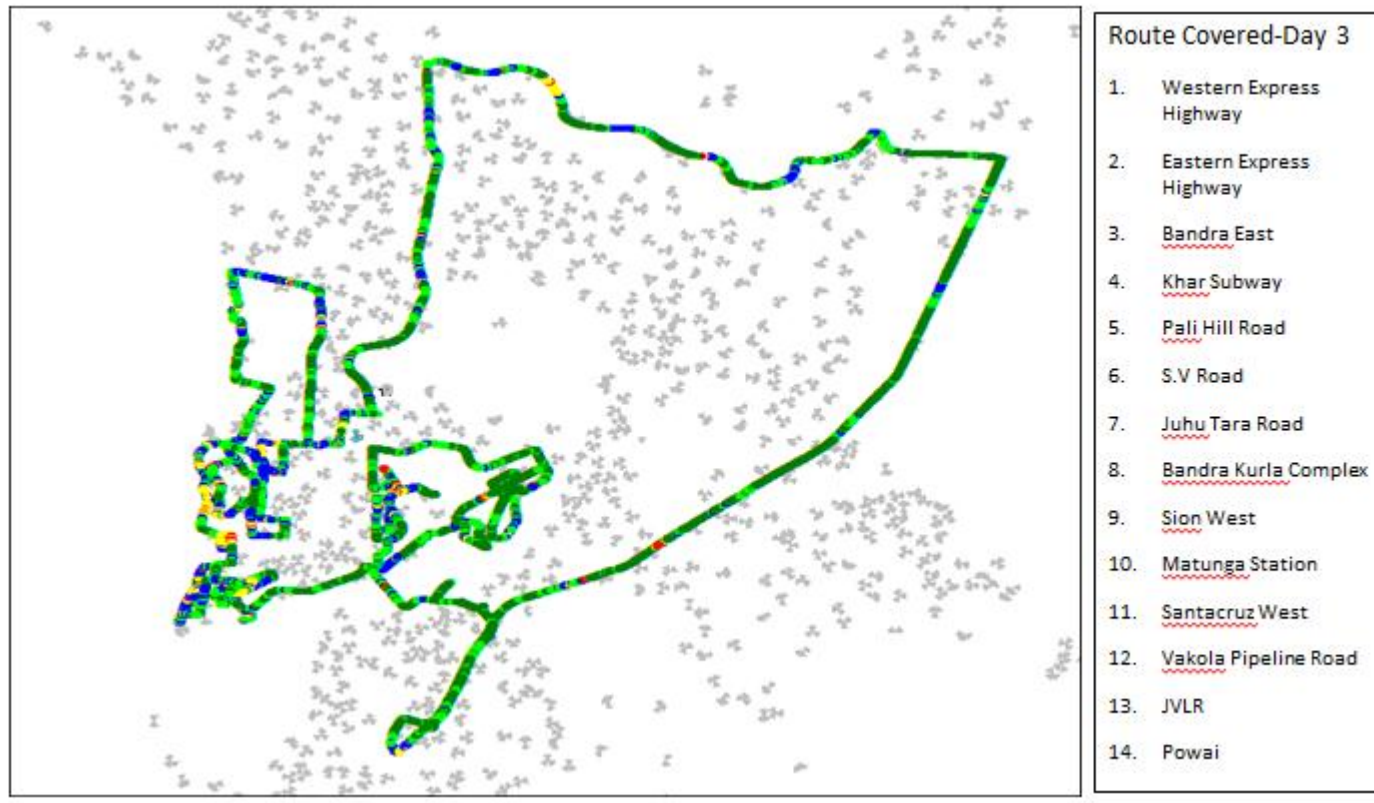
11.1.1.4 Route Map - Mumbai DAY 4

Route Covered-Day 4

1. Eastern Express Highway
2. Matunga East
3. Bandra East
4. Andheri-Kurla Road
5. Link Road
6. S.V Road
7. Andheri Station
8. Sakkivihar Road
9. Juhu
10. Sion West
11. Santacruz East
12. Dharavi
13. J.P Road
14. Versova
15. Oshiwara
16. Powai
17. Chandivali Farm Road
18. Vikroli West
19. L.B.S Road
20. JVLR

Public
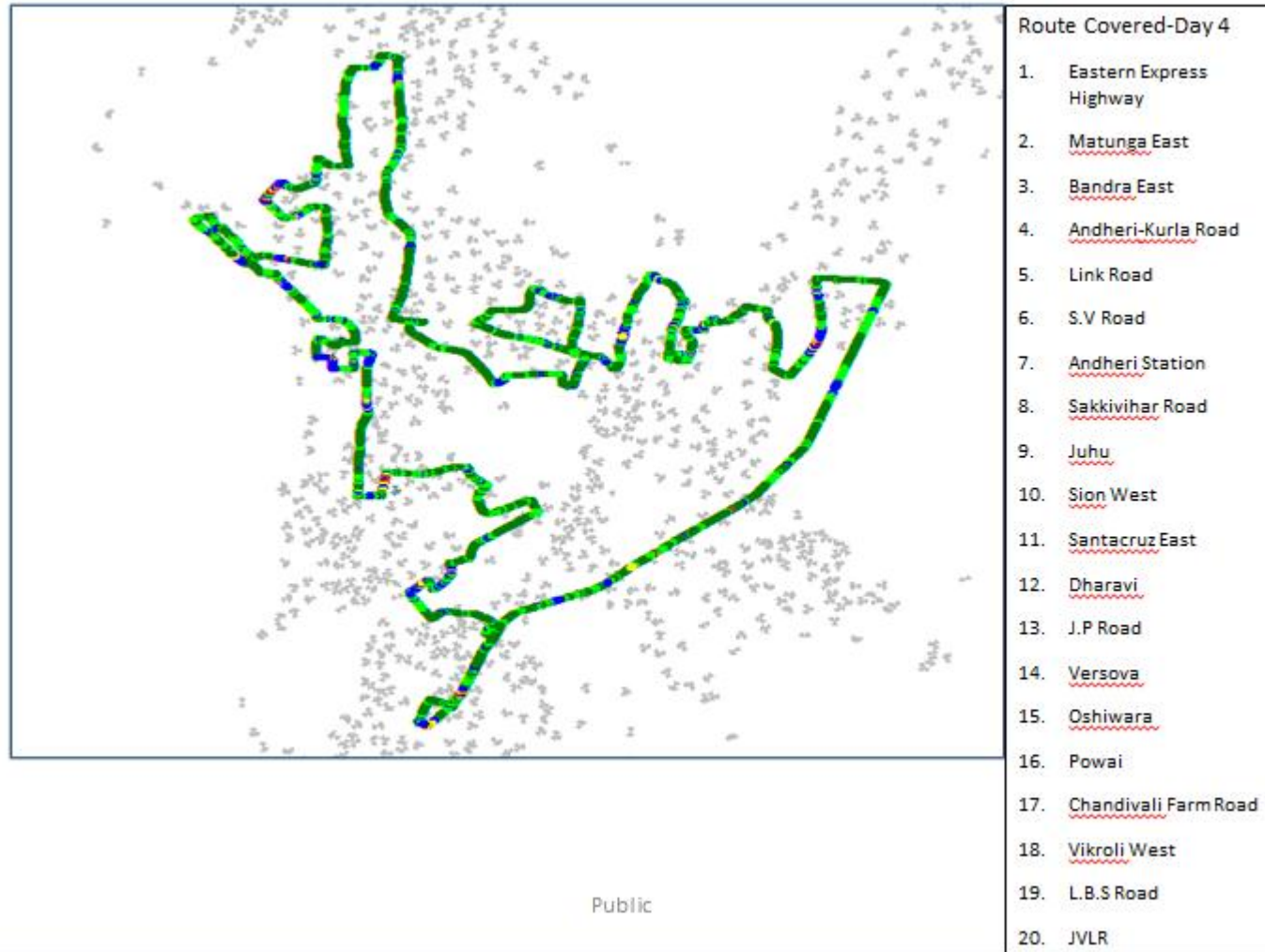
11.1.1.5 Route Map - Mumbai DAY 5

Incity

Starting Point
Malad Interface

End Point
Ashok Nagar
Kandivali(E)

Public

Route Covered-Day 5

1. Malad West
2. Link Road
3. Kandivali West
4. Charkop
5. Gorai
6. Borivali West
7. Carter Road
8. Borvali East
9. Akurli Road
10. Kandivali East
11. Thakur Village
12. Western Express Highway
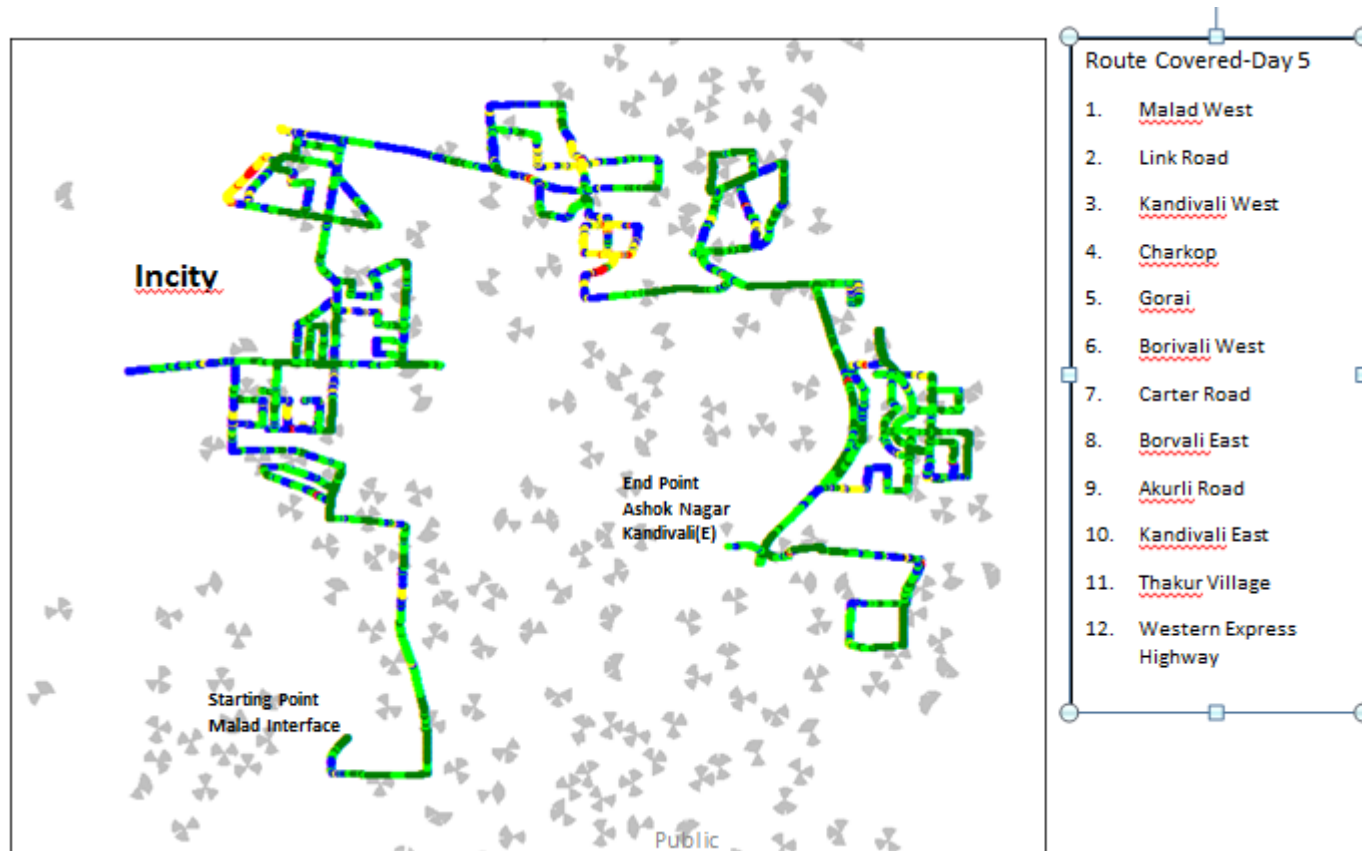
11.1.1.6 ROUTE MAP - MUMBAI DAY 6

Route Covered-Day 6

1. Western Express Highway
2. Mira-Bhayander Road
3. Bhayander West
4. Link Road
5. Borivali East
6. IC Colony
7. Borivali West
8. Mira-Bhayander Road
9. Bhayander Station
10. Navghar Road
11. Golden Nest Road
12. Gorai Road
13. Uttan Road
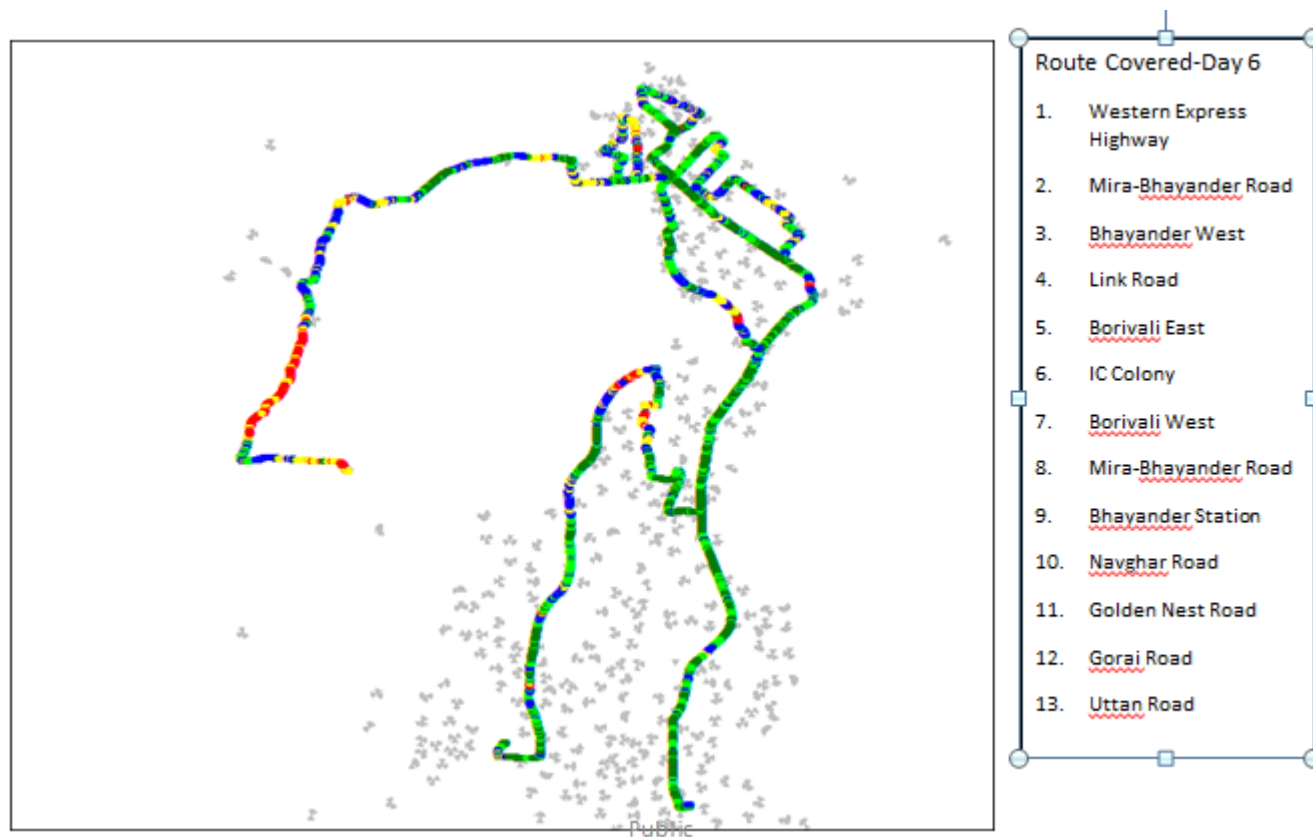
11.1.1.7 Drive Test Results - Mumbai SSA-2G

December	B'mark	Aircel		Airtel		Idea		MTNL		RCOM CDMA		RCOM GSM		TATA CDMA		TATA GSM		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
0 to -75 dBm		96.95%	75.47%	90.43%	87.49%	91.77%	93.40%							98.04%	98.02%	100.00%	97.26%	98.14%	67.85%
0 to -85 dBm		99.93%	93.50%	99.70%	97.94%	99.96%	99.57%							99.78%	99.77%	100.00%	99.87%	99.96%	92.12%
0 to -95 dBm		100.00%	98.79%	100.00%	100.00%	100.00%	99.94%							100.00%	100.00%	100.00%	100.00%	100.00%	99.34%
Voice quality	≥ 95%	98.82%	94.24%	99.05%	96.39%	99.73%	94.34%	NDR		NDR		NDR		98.05%	98.27%	99.96%	97.67%	99.28%	96.49%
CSSR	≥ 95%	100.00%	99.09%	100.00%	99.71%	100.00%	99.23%							100.00%	100.00%	100.00%	99.27%	100.00%	100.00%
%age Blocked calls		0.00%	0.91%	0.00%	0.29%	0.00%	0.77%							0.00%	0.00%	0.00%	0.73%	0.00%	0.00%
Call drop rate	≤ 2%	0.00%	0.09%	0.00%	0.00%	0.00%	0.49%							0.00%	0.57%	0.00%	0.63%	0.00%	0.10%
Hands off success rate		100.00%	97.15%	100.00%	97.45%	100.00%	97.18%							100.00%	100.00%	100.00%	98.18%	100.00%	99.10%

Data Source: Drive test reports submitted by operators to auditors

Voice Quality

Aircel and Idea failed to meet the benchmark in outdoor locations.

Call Set Success Rate (CSSR)

All the operators met the benchmarks.

Call Drop Rate

All the operators met the benchmarks.

11.1.1.1 Drive Test Results - Mumbai SSA-3G

December	B'mark	MTNL		Vodafone	
Parameter's		In door	Outdoor	In door	Outdoor
0 to -75 dBm				98.67%	72.24%
0 to -85 dBm				99.97%	90.78%
0 to -95 dBm				100.00%	98.23%
Voice quality	≥ 95%	NDR		NDR	NDR
CSSR	≥ 95%			100.00%	99.75%
%age Blocked calls				0.00%	0.00%
Call drop rate	≤ 2%			0.00%	0.00%
Hands off success rate				100.00%	100.00%

Voice Quality

No data

Call Set Success Rate (CSSR)

Vodafone met the benchmark for CSSR in outdoor locations.

Call Drop Rate

Vodafone met the benchmark for call drop rate in outdoor locations.

11.1.1.1 Data Drive Test Results - Mumbai SSA-2G

Name of the Parameter	Bench Mark	Aircel	Airtel	Idea	MTNL	RCOM CDMA	RCOM GSM	TATA CDMA	TATA GSM	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	100	100	NDR	NDR	NDR	NDR	NDR	100
Succesful Data Transmission upload speed attempts	>75%	100	100	100	NDR	NDR	NDR	NDR	NDR	100
Minimum download speed		107	131	97	NDR	NDR	NDR	NDR	NDR	152
Average throughput for Packet Data	>75%	789	205	1467	NDR	NDR	NDR	NDR	NDR	835
Latency	<250ms	100	100	100	NDR	NDR	NDR	NDR	NDR	100

Note: MTNL, Reliance GSM & CDMA and TATA GSM & CDMA did not submit the data.

All operators met the TRAI benchmark for data drive test.

11.1.1.2 Data Drive Test Results - Mumbai SSA-3G

Name of the Parameter	Bench Mark	Airtel	MTNL	Vodafone
Succesful Data Transmission download speed attempts	>80%	100	NDR	100
Succesful Data Transmission upload speed attempts	>75%	100	NDR	100
Minimum download speed		5644	NDR	4349
Average throughput for Packet Data	>75%	2173	NDR	2152
Latency	<250ms	100	NDR	100

Note: MTNL did not submit the data.

All operators met the TRAI benchmark for data drive test.

12 ANNEXURE – CONSOLIDATED-2G

12.1 NETWORK AVAILABILITY

Audit Results for Network Availability- PMR data										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		5836	12264	10975	2957	2576	6444	2823	8609	13929
Sum of downtime of BTSs in a month (in hours)		1021	30	189	203	40	41	85	48	164
BTSs accumulated downtime (not available for service)	≤ 2%	0.02%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Number of BTSs having accumulated downtime >24 hours		14	0	7	32	27	88	0	54	0
Worst affected BTSs due to downtime	≤ 2%	0.24%	0.00%	0.06%	1.08%	1.05%	1.37%	0.00%	0.63%	0.00%
Live Measurement Results for Network Availability- 3 Day live data										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		5807	12246	10944	2959	2550	6458	2826	8609	13929
Sum of downtime of BTSs in a month (in hours)		124	53	12	24	4	6	25	1	19
BTSs accumulated downtime (not available for service)	≤ 2%	0.03%	0.01%	0.00%	0.01%	0.00%	0.00%	0.01%	0.00%	0.00%
Number of BTSs having accumulated downtime >24 hours		7	0	0	5	0	0	5	0	0
Worst affected BTSs due to downtime	≤ 2%	0.12%	0.00%	0.00%	0.17%	0.00%	0.00%	0.18%	0.00%	0.00%

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

12.2   CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, SDCCH and TCH congestion- PMR data										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**Idea**	**MTNL**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	98.14%	99.93%	99.10%	97.67%	97.09%	98.88%	99.10%	98.62%	99.40%
SDCCH/Paging channel congestion	≤ 1%	0.19%	0.02%	0.46%	0.47%	NA	0.25%	NA	0.17%	0.20%
TCH congestion	≤ 2%	1.13%	0.02%	0.60%	0.10%	1.26%	0.41%	0.34%	1.12%	0.53%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**Idea**	**MTNL**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
CSSR	≥ 95%	98.25%	99.92%	99.06%	98.26%	97.08%	99.19%	99.08%	98.33%	99.33%
SDCCH/Paging channel congestion	≤ 1%	0.17%	0.03%	0.45%	0.51%	NA	0.26%	NA	0.14%	0.13%
TCH congestion	≤ 2%	0.88%	0.03%	0.60%	0.10%	1.27%	0.29%	0.63%	0.94%	0.59%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data										
CSSR	**Benchmark**	**Aircel**	**Airtel**	**Idea**	**MTNL**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of call attempts		1276	1220	1218	NDR	NDR	NDR	1230	1142	1157
Total number of successful calls established		1266	1217	1210	NDR	NDR	NDR	1230	1135	1157
CSSR	≥ 95%	99.22%	99.75%	99.34%	NDR	NDR	NDR	100.00%	99.39%	100.00%
%age blocked calls		0.78%	0.25%	0.66%	NDR	NDR	NDR	0.00%	0.61%	0.00%

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)

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data										
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		101662004	54606968	282059928	115360231	77479885	92632066	57449212	9684823010	646459264
Total number of calls dropped		882646	79551	2856046	1722032	92683	148772	208924	14887394	4992670
Call drop rate	≤ 2%	0.87%	0.15%	1.01%	1.49%	0.12%	0.16%	0.36%	0.15%	0.77%
Total number of cells in the network		17278	68951	31905	7930	7608	18021	7752	24162	35476
Total number of cells having more than 3% TCH		921	342	525	156	22	92	199	299	584
Worst affected cells having more than 3% TCH	≤ 3%	5.33%	0.50%	1.65%	1.96%	0.29%	0.51%	2.57%	1.24%	1.65%
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	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		14312433	163722850	34066678	11878928	9342237	9146740	27005598	193699971	30384710
Total number of calls dropped		127671	176087	377391	187638	11700	15385	103794	15031363	293419
Call drop rate	≤ 2%	0.89%	0.11%	1.11%	1.58%	0.13%	0.17%	0.38%	0.77%	0.97%
Total number of cells in the network		17175	78698	52234	7937	7620	18023	7798	24120	35695
Total number of cells having more than 3% TCH		898	657	912	159	17	65	111	300	578
Worst affected cells having more than 3% TCH	≤ 3%	5.23%	0.84%	1.75%	2.01%	0.23%	0.36%	1.42%	1.25%	1.62%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data										
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		1266	1217	1210	NDR	NDR	NDR	1230	1135	1157
Total number of calls dropped		1	0	5	NDR	NDR	NDR	6	6	1
Call drop rate	≤ 2%	0.08%	0.00%	0.41%	NDR	NDR	NDR	0.49%	0.53%	0.09%

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

IMRB International | eTech

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

12.4 VOICE QUALITY

Audit Results for Voice quality -PMR Data										
Voice quality	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		27241886042	19249653596	33616268019	23458845242	NA	17874010476	1077960713	7219655305	45513377625
Total number of calls with good voice quality		26583248293	19416313165	32413145173	22426965463	NA	17733654204	914385873	7069516730	44474250642
%age calls with good voice quality	≥ 95%	97.58%	100.87%	96.42%	95.60%	99.65%	99.21%	84.83%	97.92%	97.72%
Live measurement results for Voice quality-3 Day data										
Voice quality	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		2694786316	4613139351	3993093937	2385878413	NA	2018888351	1369170190	16498178998	3729246016
Total number of calls with good voice quality		2630752388	4502645893	3848871952	2276900810	NA	2004969897	1168351757	16002985021	3641294006
%age calls with good voice quality	≥ 95%	97.62%	97.60%	96.39%	95.43%	99.65%	99.31%	85.33%	97.00%	97.64%
Drive test results for Voice quality (Average of three drive tests) - DT data										
Voice quality	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		1960989	1916857	293024	NDR	NDR	NDR	NA	2176751	541407
Total number of calls with good voice quality		1850060	1848901	278886	NDR	NDR	NDR	NA	2132582	524930
%age calls with good voice quality	≥ 95%	94.34%	96.45%	95.18%	NDR	NDR	NDR	98.16%	97.97%	96.96%

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

IMRB International | eTech

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

12.5   POI CONGESTION

Audit Results for POI Congestion- PMR data										
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		283	885	851	93	178	353	750	750	984
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		206444	415472	3595510	537326	50136	228796	314523	359761	2810984
Traffic served for all POIs (B)- in erlangs		79868	264362	3572798	22004	21351	129841	105475	87631	447312
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data										
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		283	883	851	93	769	369	750	750	982
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		161459	585309	3395042	46410	255051	239699	312761	312761	860886
Traffic served for all POIs (B)- in erlangs		121258	617538	4000591	23322	110243	132418	88411	88411	461452
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

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

13 ANNEXURE – CONSOLIDATED-3G

13.1 NETWORK AVAILABILITY

1. Network Availability			
Audit Results for Network Availability- PMR data			
	Benchmark	MTNL 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		751	5313
Sum of downtime (i.e. total outage time) of Node Bs		8139	4481
Node Bs downtime (not available for service)	≤ 2%	1.46%	0.11%
Number of Node Bs having accumulated downtime of >24 hours in a month		22	0
Worst affected Node Bs due to downtime	≤ 2%	2.93%	0.00%
Live Measurement Results for Network Availability- 3 Day live data			
	Benchmark	MTNL 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		751	5188
Sum of downtime (i.e. total outage time) of Node Bs		551	549
Node Bs downtime (not available for service)	≤ 2%	1.02%	0.15%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.00%

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

IMRB International | eTech

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

13.2 CONNECTION ESTABLISHMENT (ACCESSIBILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data			
	Benchmark	MTNL 3G	Vodafone 3G
CSSR	≥ 95%	97.20%	99.82%
RRC Congestion	≤ 1%	0.81%	0.02%
Circuit Switched RAB Congestion	≤ 2%	0.44%	0.02%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data			
	Benchmark	MTNL 3G	Vodafone 3G
CSSR	≥ 95%	98.01%	99.76%
RRC Congestion	≤ 1%	0.71%	0.05%
Circuit Switched RAB Congestion	≤ 2%	0.16%	0.05%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data			
CSSR	Benchmark	MTNL 3G	Vodafone 3G
Total number of RRC attempts (A)		NDR	1400
Total number of RRC established (B)		NDR	1397
Call setup success rate (B/A*100)	≥ 95%	NDR	99.79%
%age blocked calls		NDR	0.21%

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

13.3   CONNECTION MAINTENANCE (RETAINABILITY)

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data			
	Benchmark	MTNL 3G	Vodafone 3G
CSSR	≥ 95%	97.20%	99.82%
RRC Congestion	≤ 1%	0.81%	0.02%
Circuit Switched RAB Congestion	≤ 2%	0.44%	0.02%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data			
	Benchmark	MTNL 3G	Vodafone 3G
CSSR	≥ 95%	98.01%	99.76%
RRC Congestion	≤ 1%	0.71%	0.05%
Circuit Switched RAB Congestion	≤ 2%	0.16%	0.05%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data			
CSSR	Benchmark	MTNL 3G	Vodafone 3G
Total number of RRC attempts (A)		NDR	1400
Total number of RRC established (B)		NDR	1397
Call setup success rate (B/A*100)	≥ 95%	NDR	99.79%
%age blocked calls		NDR	0.21%

IMRB International | eTech

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

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data			
	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		13548762	8401107
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		197849	35069
Call drop rate (B/A*100)	≤ 2%	1.46%	0.42%
Total no. of cells in the licensed service area (B)		5974	1790640
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		135	42111
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.26%	2.35%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data			
	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		6710157	25213466
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		78712	111579
Call drop rate (B/A*100)	≤ 2%	1.17%	0.44%
Total no. of cells in the licensed service area (B)		5970	58611
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		135	1297
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.26%	2.21%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data			
Call drop rate	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NDR	1187
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NDR	0
Call drop rate (B/A*100)	≤ 2%	NDR	0.00%

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

13.4   VOICE QUALITY

Audit Results for Voice quality -PMR Data			
Voice quality	Benchmark	MTNL 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		23968789591	420771530050
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		23708904503	411604665713
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.92%	97.82%
Live measurement results for Voice quality-3 Day data			
Voice quality	Benchmark	MTNL 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		12041198785	112910332342
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		11832383112	110425721800
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.27%	97.80%
Drive test results for Voice quality (Average of three drive tests) - DT data			
Voice quality	Benchmark	MTNL 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NDR	NDR
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NDR	NDR

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

IMRB International | eTech

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

13.5   POI CONGESTION

Audit Results for POI Congestion- PMR data			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		93	984
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		510486	860805
Traffic served for all POIs (B)- in erlangs		21778	451190
POI congestion	≤ 0.5%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		31	984
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		15470	860805
Traffic served for all POIs (B)- in erlangs		7905	451190
POI congestion	≤ 0.5%	0.00%	0.00%

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

14 ANNEXURE – CUSTOMER SERVICES

14.1 METERING AND BILLING CREDIBILITY

Audit Results for Billing performance Postpaid-Consolidated										
Billing Performance	Benchmark	Aircel	Airtel	Idea	MTNL	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		2167557	104799	2025080	1561028	494083	289248	6746052	1268306	144245
Total number of bills disputed		96	18	7484	1249	494	289	0	0	891
Percentage bills disputed (Avg of 3 billing cycles)	≤ 0.1%	0.00%	0.02%	0.37%	0.08%	0.10%	0.10%	0.00%	0.00%	0.62%

Data Source: Billing Center of the operators

Metering and billing credibility - Prepaid										
Performance prepaid	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of charging complaints (valid) - sum of 3 months		44	10	442	81	1413	2105	0	0	747
Total no of customers served (Sum of 3 months)		3889810	2264610	10652567	3321182	2541842	2430398	6224800	2506198	701383
Percentage of charging complaints disputed	≤ 0.1%	0.00%	0.00%	0.07%	0.09%	0.15%	0.09%	0.01%	0.03%	0.11%

Data Source: Billing Center of the operators

Resolution of billing complaints (Postpaid+Prepaid)-Consolidated										
Billing Performance	**Benchmark**	**Aircel**	**Airtel**	**Idea**	**MTNL**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of complaints resolved in favour of customer		139	27	1337	1330	1907	2394	0	0	1639
Number of complaints resolved in 4 weeks		139	27	1337	1321	1907	2394	0	0	1605
Percentage complaints resolved within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	99.33%	100.00%	100.00%	NA	NA	97.95%
Number of complaints resolved in 6 weeks		139	27	1337	1330	1907	2394	0	0	1632
Percentage complaints resolved within 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	99.56%
Period of applying credit / waiver										
Total number of complaints where credit/waiver is required		139	27	1337	1330	1907	2394	0	0	1632
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	96.33%
Live calling results for resolution of billing complaints										
Resolution of billing complaints	**Benchmark**	**Aircel**	**Airtel**	**Idea**	**MTNL**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total Number of calls made		100	100	100	100	100	100	0	0	100
Number of cases resolved in 4 weeks		96	92	78	95	90	86	0	0	97
Percentage cases resolved in 4 weeks	≥ 98%	96.00%	92.00%	78.00%	95.00%	90.00%	86.00%	NA	NA	97.00%
Number of cases resolved in 6 weeks		100	100	100	100	100	100	0	0	100
Percentage cases resolved in 6 weeks	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA	100.00%

Data Source: Billing Center of the operators

IMRB International | eTech

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

14.2   CUSTOMER CARE

Customer Care										
Audit results for customer care (IVR and voice-to-Voice) -Consolidated										
Customer Care Assessment	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		1029302	10378165	9638623	9634304	7203633	648762	15446007	1451929	166954
Number of calls getting connected and answered (electronically)		1012833	10298253	9598141	9191126	7131597	637694	15327073	1423340	166015
Percentage calls getting connected and answered	≥ 95%	98.40%	99.23%	99.58%	95.40%	99.00%	98.29%	99.23%	98.03%	99.44%
Audit results for customer care (voice-to-Voice)- (Avg of 3 months)-Consolidated										
Customer Care Assessment	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received (3 months)		3200063	1866726	2842773	3422678	1373647	913649	4991800	273158	142426
Total Number of calls answered within 90 seconds (3 months)		3053820	1736055	2824295	3272080	1246585	835989	4960550	264690	139150
Percentage calls answered within 90 seconds (Avg of 3 months)	≥ 95%	95.43%	93.00%	99.35%	95.60%	90.75%	91.50%	99.37%	96.90%	97.70%

Live calling results for customer care (IVR)										
Customer Care Assessment	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts to customer care for assistance		100	100	100	100	100	100	100	100	100
Number of calls getting connected and answered (electronically)		100	100	100	100	100	100	100	100	100
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Live calling results for customer care (Voice to Voice)										
Customer Care Assessment	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls received		100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	99	86	86	100	100	96
Live Calling Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	99.00%	86.00%	86.00%	100.00%	100.00%	96.00%

IMRB International | eTech

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

14.3 TERMINATION / CLOSURE OF SERVICE

Audit results for termination / closure of service-Consolidated										
Termination	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of closure request		7236	697	10615	9292	2379	2664	21685	4831	960
Number of requests attended within 7 days		7236	697	10615	9292	2379	2664	21685	4831	960
Percentage cases in which termination done within 7 days	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Customer Service Center of the operators

14.4 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits-Consolidated										
Refund	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of cases requiring refund of deposits		4149	127	3235	2674	1788	110	3896	3180	105
Total number of cases where refund was made within 60 days		4149	127	3235	2674	1684	107	3896	3180	103
Percentage cases in which refund was receive within 60 days	100.00%	100.00%	100.00%	100.00%	100.00%	94.16%	97.43%	100.00%	100.00%	98.02%

Data Source: Billing Center of the operators

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

14.5 LIVE CALLING RESULTS FOR RESOLUTION OF SERVICE REQUESTS

Live calling results for resolution of service requests									
Resolution of service requests	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total Number of calls made	100	100	100	100	6	100	100	100	100
Number of cases resolved to satisfaction	97	98	90	90	5	90	100	100	98
Percentage cases resolved in four weeks	97.00%	98.00%	90.00%	90.00%	83.33%	90.00%	100.00%	100.00%	98.00%

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

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

14.6 LIVE CALLING RESULTS FOR LEVEL 1 SERVICES

Live calling for level 1 services										
Level 1 services		Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total no. of calls made		300	300	300	300	300	300	300	300	300
Calls answered		300	300	300	300	300	300	300	300	300
% of calls connected	≥ 95%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

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

IMRB International | eTech

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

14.7   LEVEL 1 SERVICE CALLS MADE

	Aircel				
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	18
101	Fire	Y		18	18
102	Ambulance	Y		17	17
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	18
138	All India Helpine for Passangers	Y		18	18
1412	Public Road Transport Utility Service	Y		18	18
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		17	17
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		N		
1070	Relief Commission for Natural Calamities	Y		18	18
1071	Air Accident Helpline	Y		17	17
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	17

IMRB International | eTech

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

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
101212	Central Accident and Trauma Services (CATS)	Y		17	17
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board	Y		18	18
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		18	18
1514	National Career Service(NCS)	Y		18	18
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		18	18
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		18	18
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	17
101	Fire	Y		16	16
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		17	17
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		17	17
182	Indian Railway Security Helpline	Y		16	16
1033	Road Accident Management Service		N		

IMRB International | eTech

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

1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		16	16
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	16
1070	Relief Commission for Natural Calamities	Y		17	17
1071	Air Accident Helpline	Y		17	17
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		16	16
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		17	17
105812	Mother and Child Tracking (MCTH)	Y		17	17
10740	Central Pollution Control Board	Y		16	16
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)	Y		17	17
15100	Free Legal Service Helpline	Y		17	17
155304	Municipal Corporations	Y		17	17
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		17	17
11212	Complaint of Electricity	Y		17	17

IMRB International | eTech

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

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

Idea					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	17
101	Fire		N		
102	Ambulance		N		
104	Health Information Helpline	Y		16	16
108	Emergency and Disaster Management Helpline	Y		17	17
138	All India Helpine for Passangers	Y		17	17
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		16	16
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		17	17
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	Y		17	17
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline	Y		17	17
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		16	16
10121	Women Helpline	Y		17	17
10127	National AIDS Helpline to NACO	Y		17	17

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
101212	Central Accident and Trauma Services (CATS)	Y		16	16
10580	Educationa & Vocational Guidance and Counselling		N		
105812	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	Y		17	17
1512	Prevention of Crime in Railway	Y		17	17
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		16	16
11212	Complaint of Electricity	Y		17	17
11216	Drinking Water Supply	Y		17	17
11250	Election Commission of India	Y		16	16
MTNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y	N	25	25
101	Fire	Y		25	25
102	Ambulance		N		
104	Health Information Helpline	Y		25	25
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		25	25
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		25	25
1033	Road Accident Management Service		N		

IMRB International | eTech

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

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		25	25
1070	Relief Commission for Natural Calamities	Y		25	25
1071	Air Accident Helpline	Y		25	25
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		25	25
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board		N		
10741	Pollution Control Board	Y		25	25
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)	Y		25	25
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		25	25
11212	Complaint of Electricity		N		

11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Reliance CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y	N	19	19
101	Fire	Y		18	18
102	Ambulance				
104	Health Information Helpline	Y		19	19
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service		N		
1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		18	18
1056	Emergency Medical Services	Y		19	19
106X	State of the Art Hospitals	Y		19	19
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		19	19
1071	Air Accident Helpline	Y		19	19
1072	Rail Accident Helpline	Y		19	19
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		18	18

IMRB International | eTech

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

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
101212	Central Accident and Trauma Services (CATS)	Y		19	19
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		19	19
10741	Pollution Control Board	Y		19	19
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		19	19
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		19	19
155304	Municipal Corporations		N		
155214	Labour Helpline	Y		18	18
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Reliance GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		19	19
101	Fire	Y		19	19
102	Ambulance	Y		18	18
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		18	18
138	All India Helpine for Passangers	Y		19	19
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		19	19
182	Indian Railway Security Helpline	Y		19	19
1033	Road Accident Management Service		N		

IMRB International | eTech

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

1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'		N		
1056	Emergency Medical Services		N		
106X	State of the Art Hospitals	Y		18	18
1063	Public Grievance Cell DoT Hq		N		
1064	Anti Corruption Helpline	Y		19	19
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		19	19
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		19	19
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)	Y		19	19
10740	Central Pollution Control Board	Y		19	19
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project	Y		18	18
1512	Prevention of Crime in Railway		N		
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations	Y		19	19
155214	Labour Helpline	Y		19	19
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		

IMRB International | eTech

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

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
TATA CDMA					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y	N	15	15
101	Fire	Y		15	15
102	Ambulance	Y		15	15
104	Health Information Helpline	Y		15	15
108	Emergency and Disaster Management Helpline	Y		15	15
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline	Y		15	15
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		15	15
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		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		15	15
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		15	15
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		15	15
10127	National AIDS Helpline to NACO		N		

101212	Central Accident and Trauma Services (CATS)	Y		15	15
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		15	15
10741	Pollution Control Board	Y		15	15
1511	Police Related Service for all Metro Railway Project	Y		15	15
1512	Prevention of Crime in Railway	Y		15	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		15	15
11212	Complaint of Electricity	Y		15	15
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
TATA GSM					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		17	17
101	Fire	Y		17	17
102	Ambulance		N		
104	Health Information Helpline	Y		16	16
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service	Y		17	17
181	Chief Minister Helpline	Y		17	17
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service		N		

IMRB International | eTech

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

1037	Public Grievance Cell DoT Hq as 'Telecom Consumer Grievance Redressal Helpline'	Y		17	17
1056	Emergency Medical Services	Y		16	16
106X	State of the Art Hospitals		N		
1063	Public Grievance Cell DoT Hq	Y		17	17
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities		N		
1071	Air Accident Helpline	Y		17	17
1072	Rail Accident Helpline	Y		16	16
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		17	17
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)	Y		16	16
10580	Educationa & Vocational Guidance and Counselling	Y		17	17
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		17	17
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project	Y		16	16
1512	Prevention of Crime in Railway	Y		17	17
1514	National Career Service(NCS)	Y		17	17
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity		N		

IMRB International | eTech

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

11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		16	16

Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		15	15
101	Fire	Y		15	15
102	Ambulance		N		
104	Health Information Helpline	Y		15	15
108	Emergency and Disaster Management Helpline	Y		15	15
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		15	15
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		N		
1064	Anti Corruption Helpline	Y		15	15
1070	Relief Commission for Natural Calamities	Y		15	15
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline	Y		15	15
1073	Road Accident Helpline	Y		15	15
1077	Control Room for District Collector	Y		15	15
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO		N		

101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		15	15
105812	Mother and Child Tracking (MCTH)	Y		15	15
10740	Central Pollution Control Board		N		
10741	Pollution Control Board	Y		15	15
1511	Police Related Service for all Metro Railway Project	Y		15	15
1512	Prevention of Crime in Railway	Y		15	15
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		15	15
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		15	15
11212	Complaint of Electricity	Y		15	15
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		

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 each operator.

15 COUNTER DETAILS

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

IMRB International | eTech

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

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

IMRB International | eTech

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

15.1.1 ERICSSON

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

SI 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.

IMRB International | eTech

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

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.

15.1.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.

Sl No.	KPI	NSN
1	CSSR= (No of established Calls / No of Attempted Calls)%	CSSR= 100-100*((SDCCH_BUSY_ATT)-(TCH_SEIZ_DUE_SDCCH_CON) + (SDCCH_RADIO_FAIL)+(SDCCH_RF_OLD_HO)+(SDCCH_USER_ACT)+(SDCCH_BCSU_RESET)+(SDCCH_NETW_ACT)+(SDCCH_BTS_FAIL)+(SDCCH_LAPD_FAIL)+ (BLCK_8I_NOM)/ {(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
2	SDCCH congestion= (SDCCH Failure/SDCCH attempts)%	SDCCH congestion = (sdcch_busy_att - .tch_seiz_due_sdcch_con)/{(CH_REQ_MSG_REC)+(PACKET_CH_REQ)}-{(GHOST_CCCH_RES)-(REJ_SEIZ_ATT_DUE_DIST)}
3	TCH congestion= (TCH Failures /TCH Attempts)%	TCH congestion = BLCK_8I_NOM / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}
4	Call Drop Rate= (The total no of dropped calls*100)/Total no of calls successfully established (where traffic channel is allotted)	TCH Drop = (drop_after_tch_assign)-(tch_re_est_release) / {(TCH_NORM_SEIZ)+(MSC_I_SDCCH_TCH_AT)+(BSC_I_SDCCH_TCH_AT)}

5	Call Drop Rate= (No of cells having call drop rate >3% during CBBH in a month*100)/Total no of cells in the licensed service area	Above formula with counters being used in CBBH.
6	Connection with good quality voice= (Connection with good quality voice/Total voice samples)%	Connection with good quality voice= (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5) / (FREQ_DL_QUAL0+FREQ_DL_QUAL1+FREQ_DL_QUAL2+FREQ_DL_QUAL3+FREQ_DL_QUAL4+FREQ_DL_QUAL5+FREQ_DL_QUAL6+FREQ_DL_QUAL7)

IMRB International | eTech

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

15.2 BLOCK SCHEMATIC DIAGRAMS

15.2.1 ERICSSON

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

Ericsson

15.2.2 NSN (NOKIA SIEMENS NETWORKS)

NSN provides network support to Vodafone in the circle.

NSN

Audit Results for Network Availability- PMR data-October										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1926	4077	3617	987	842	2156	941	2867	4643
Sum of downtime of BTSs in a month (in hours)		23	9	103	67	22	1	28	2	1
BTSs accumulated downtime (not available for service)	≤ 2%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Number of BTSs having accumulated downtime >24 hours		7	0	0	13	15	32	0	54	0
Worst affected BTSs due to downtime	≤ 2%	0.36%	0.00%	0.00%	1.32%	1.78%	1.48%	0.00%	1.88%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-October										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1926	4070	3617	987	842	2156	941	2867	4643
Sum of downtime of BTSs in a month (in hours)		2	1	5	7	1	0	0	0	1
BTSs accumulated downtime (not available for service)	≤ 2%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Number of BTSs having accumulated downtime >24 hours		7	0	0	2	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.36%	0.00%	0.00%	0.20%	0.00%	0.00%	0.00%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-October										
CSSR	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.15%	99.95%	99.04%	98.47%	97.08%	98.78%	99.09%	99.34%	99.35%
SDCCH/Paging channel congestion	≤ 1%	0.15%	0.02%	0.42%	0.57%	NA	0.29%	NA	0.10%	0.10%
TCH congestion	≤ 2%	1.00%	0.02%	0.60%	0.09%	1.26%	0.80%	0.91%	1.49%	0.65%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-October										
CSSR	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.17%	99.95%	99.01%	98.60%	97.10%	99.03%	99.03%	99.37%	99.33%
SDCCH/Paging channel congestion	≤ 1%	0.18%	0.01%	0.41%	0.61%	NA	0.28%	NA	0.11%	0.17%
TCH congestion	≤ 2%	0.77%	0.02%	0.55%	0.11%	1.27%	0.50%	0.97%	1.25%	0.67%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October										
CSSR	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-October									
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		4939815	3622044	5161580	40255021	25867122	31732941	19858733	73287845	6029488
Total number of calls dropped		51703	28854	51332	617317	34807	53798	71256	590353	57991
Call drop rate	≤ 2%	1.05%	0.80%	0.99%	1.53%	0.13%	0.17%	0.36%	0.81%	0.96%
Total number of cells in the network		5697	11224	10573	2648	2526	6018	2602	8032	11795
Total number of cells having more than 3% TCH		310	94	169	49	9	36	31	289	203
Worst affected cells having more than 3% TCH	≤ 3%	5.45%	0.84%	1.60%	1.86%	0.34%	0.60%	1.21%	3.60%	1.72%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-October									
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		4666004	149082474	14395815	3898513	3258464	2998905	1938998	7922953	6010906
Total number of calls dropped		38493	52637	170674	61359	4305	5153	7074	64126	59618
Call drop rate	≤ 2%	0.82%	0.04%	1.19%	1.57%	0.13%	0.17%	0.36%	0.81%	0.99%
Total number of cells in the network		5697	33580	30961	2648	2526	6018	2602	8032	11904
Total number of cells having more than 3% TCH		295	135	559	49	8	32	29	296	199
Worst affected cells having more than 3% TCH	≤ 3%	5.18%	0.40%	1.81%	1.85%	0.32%	0.53%	1.10%	3.69%	1.67%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-October									
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA

IMRB International | eTech

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

Audit Results for Voice quality -PMR Data-October										
Voice quality	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		8840579119	50191152	550364043	7697816857	NA	8303238891	978753825	6011868560	713998805
Total number of calls with good voice quality		8633809965	664807479	530484395	7336315676	NA	8244433572	830233386	5884659057	731420002
%age calls with good voice quality	≥ 95%	97.66%	1324.55%	96.39%	95.30%	99.65%	99.29%	84.83%	97.88%	102.44%
Live measurement results for Voice quality-3 Day data-October										
Voice quality	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		883889406	2032155825	1661043403	771201333	NA	1002776192	99206888	600091753	742741371
Total number of calls with good voice quality		862943493	1982846740	1600810275	734835948	NA	996013658	84152487	589064593	726016788
%age calls with good voice quality	≥ 95%	97.63%	97.57%	96.37%	95.28%	99.65%	99.33%	84.83%	98.16%	97.75%
Drive test results for Voice quality (Average of three drive tests) - DT data-October										
Voice quality	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA

IMRB International | eTech

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

Audit Results for POI Congestion- PMR data-October										
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		93	293	282	31	55	304	250	250	330
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		67824	136974	3129230	274348	15136	210166	104151	104151	287105
Traffic served for all POIs (B)- in erlangs		25581	86260	100443	7392	6670	117083	42160	42160	147173
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October										
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		93	293	282	31	641	320	250	250	328
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		67978	216045	3129230	15470	218352	221155	104151	104151	287007
Traffic served for all POIs (B)- in erlangs		25161	256095	100443	7702	93223	119031	42160	42160	153313
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

IMRB International | eTech

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

17 ANNEXURE – NOVEMBER-2G

Audit Results for Network Availability- PMR data-November									
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1953	4075	3661	985	866	2151	940	2871	4643
Sum of downtime of BTSs in a month (in hours)		15	6	46	69	11	29	16	23	20
BTSs accumulated downtime (not available for service)	≤ 2%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Number of BTSs having accumulated downtime >24 hours		1	0	5	8	7	24	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.05%	0.00%	0.14%	0.81%	0.81%	1.12%	0.00%	0.00%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-November									
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1928	4075	3630	987	842	2151	943	2871	4643
Sum of downtime of BTSs in a month (in hours)		1	0	3	8	1	4	1	1	1
BTSs accumulated downtime (not available for service)	≤ 2%	0.00%	0.00%	0.00%	0.01%	0.00%	0.00%	0.00%	0.00%	0.00%
Number of BTSs having accumulated downtime >24 hours		0	0	0	1	0	0	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.01%	0.10%	0.00%	0.00%	0.00%	0.00%	0.00%

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

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-November										
CSSR	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.02%	99.96%	99.10%	97.39%	97.15%	98.70%	99.15%	99.10%	99.47%
SDCCH/Paging channel congestion	≤ 1%	0.22%	0.00%	0.42%	0.44%	NA	0.20%	NA	0.35%	0.41%
TCH congestion	≤ 2%	1.44%	0.00%	0.63%	0.10%	1.26%	0.23%	0.02%	1.70%	0.53%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-November										
CSSR	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.17%	99.92%	99.05%	99.28%	96.99%	99.37%	99.16%	99.22%	99.27%
SDCCH/Paging channel congestion	≤ 1%	0.22%	0.03%	0.50%	0.43%	NA	0.20%	NA	0.31%	0.11%
TCH congestion	≤ 2%	0.77%	0.02%	0.63%	0.10%	1.26%	0.20%	0.84%	1.46%	0.73%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-November										
CSSR	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of successful calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA
CSSR	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA
%age blocked calls		NA	NA	NA	NA	NA	NA	NA	NA	NA

IMRB International | eTech

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

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-November										
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		46883911	47348021	138449174	36647063	25127669	27836177	19858733	9520967825	460174487
Total number of calls dropped		416861	20733	1402357	524551	28462	45737	71256	85674	3300508
Call drop rate	≤ 2%	0.89%	0.04%	1.01%	1.43%	0.11%	0.16%	0.36%	0.00%	0.72%
Total number of cells in the network		5782	46363	10614	2641	2547	6017	2556	8065	11887
Total number of cells having more than 3% TCH		326	101	180	52	5	28	85	5	179
Worst affected cells having more than 3% TCH	≤ 3%	5.64%	0.22%	1.70%	1.95%	0.21%	0.47%	3.33%	0.06%	1.51%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-November										
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		4939815	3622044	5161580	4075973	3306258	3091515	23160319	95209678	6480114
Total number of calls dropped		51703	28854	51332	65634	4121	5230	86719	755870	59993
Call drop rate	≤ 2%	1.05%	0.80%	0.99%	1.61%	0.12%	0.17%	0.37%	0.79%	0.93%
Total number of cells in the network		5697	11224	10573	2648	2547	6017	2602	8065	11887
Total number of cells having more than 3% TCH		310	94	169	45	6	30	1	2	179
Worst affected cells having more than 3% TCH	≤ 3%	5.45%	0.84%	1.60%	1.70%	0.22%	0.50%	0.04%	0.02%	1.51%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-November										
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls dropped		NA	NA	NA	NA	NA	NA	NA	NA	NA
Call drop rate	≤ 2%	NA	NA	NA	NA	NA	NA	NA	NA	NA

IMRB International | eTech

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

Audit Results for Voice quality -PMR Data-November										
Voice quality	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		8833445803	18600452973	16341601545	7131509710	NA	4435648601	99206888	600091753	22674020070
Total number of calls with good voice quality		8618422401	18167068287	15760425432	6807621420	NA	4405438027	84152487	589064593	22133962946
%age calls with good voice quality	≥ 95%	97.57%	97.67%	96.44%	95.46%	99.65%	99.32%	84.83%	98.16%	97.62%

Live measurement results for Voice quality-3 Day data-November										
Voice quality	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		913782741	655507444	571135464	842347590	NA	518454571	1269963302	15290392253	747518733
Total number of calls with good voice quality		892257447	640214622	550157688	805083127	NA	514822143	1084199270	14818127348	730561256
%age calls with good voice quality	≥ 95%	97.64%	97.67%	96.33%	95.58%	99.65%	99.30%	85.37%	96.91%	97.73%

Drive test results for Voice quality (Average of three drive tests) - DT data-November										
Voice quality	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of sample calls		NA	NA	NA	NA	NA	NA	NA	NA	NA
Total number of calls with good voice quality		NA	NA	NA	NA	NA	NA	NA	NA	NA
%age calls with good voice quality	≥ 95%	NA	NA	NA	NA	NA	NA	NA	NA	NA

Audit Results for POI Congestion- PMR data-November									
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		95	296	284	31	61	24	250	250	327
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		69348	140812	305726	247509	17103	9306	106067	151305	2236940
Traffic served for all POIs (B)- in erlangs		26374	90072	3367457	7166	7045	6202	40190	22346	146070
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November									
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		95	296	284	31	64	24	250	250	327
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		24134	140812	105726	15470	18416	9308	104305	104305	286940
Traffic served for all POIs (B)- in erlangs		69348	90072	3796657	7715	8816	6772	23126	23126	154070
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

IMRB International | eTech

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

18 ANNEXURE – DECEMBER-2G

Audit Results for Network Availability- PMR data-December										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1957	4112	3697	985	868	2137	942	2871	4643
Sum of downtime of BTSs in a month (in hours)		983	15	40	68	7	12	41	23	144
BTSs accumulated downtime (not available for service)	≤ 2%	0.07%	0.00%	0.00%	0.01%	0.00%	0.00%	0.01%	0.00%	0.00%
Number of BTSs having accumulated downtime >24 hours		6	0	2	11	5	32	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.31%	0.00%	0.05%	1.12%	0.58%	1.50%	0.00%	0.00%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-December										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1953	4101	3697	985	866	2151	942	2871	4643
Sum of downtime of BTSs in a month (in hours)		121	52	4	9	1	2	24	0	17
BTSs accumulated downtime (not available for service)	≤ 2%	0.09%	0.02%	0.00%	0.01%	0.00%	0.00%	0.04%	0.00%	0.01%
Number of BTSs having accumulated downtime >24 hours		0	0	0	2	0	0	5	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.00%	0.20%	0.00%	0.00%	0.53%	0.00%	0.00%

IMRB International | eTech

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

Audit Results for Network Availability- PMR data-December										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1957	4112	3697	985	868	2137	942	2871	4643
Sum of downtime of BTSs in a month (in hours)		983	15	40	68	7	12	41	23	144
BTSs accumulated downtime (not available for service)	≤ 2%	0.07%	0.00%	0.00%	0.01%	0.00%	0.00%	0.01%	0.00%	0.00%
Number of BTSs having accumulated downtime >24 hours		6	0	2	11	5	32	0	0	0
Worst affected BTSs due to downtime	≤ 2%	0.31%	0.00%	0.05%	1.12%	0.58%	1.50%	0.00%	0.00%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-December										
	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Number of BTSs in the licensed service area		1953	4101	3697	985	866	2151	942	2871	4643
Sum of downtime of BTSs in a month (in hours)		121	52	4	9	1	2	24	0	17
BTSs accumulated downtime (not available for service)	≤ 2%	0.09%	0.02%	0.00%	0.01%	0.00%	0.00%	0.04%	0.00%	0.01%
Number of BTSs having accumulated downtime >24 hours		0	0	0	2	0	0	5	0	0
Worst affected BTSs due to downtime	≤ 2%	0.00%	0.00%	0.00%	0.20%	0.00%	0.00%	0.53%	0.00%	0.00%

Audit Results for CSSR, SDCCH and TCH congestion- PMR data-December										
CSSR	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.23%	99.89%	99.16%	97.16%	97.03%	99.15%	99.06%	97.42%	99.37%
SDCCH/Paging channel congestion	≤ 1%	0.19%	0.05%	0.53%	0.39%	NA	0.25%	NA	0.07%	0.10%
TCH congestion	≤ 2%	0.96%	0.05%	0.57%	0.11%	1.26%	0.21%	0.08%	0.17%	0.43%
Live measurement results for CSSR, SDCCH and TCH congestion- 3 Day Data-December										
CSSR	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
CSSR	≥ 95%	98.41%	99.89%	99.11%	96.89%	97.16%	99.17%	99.04%	96.39%	99.40%
SDCCH/Paging channel congestion	≤ 1%	0.12%	0.05%	0.44%	0.50%	NA	0.29%	NA	0.00%	0.11%
TCH congestion	≤ 2%	1.11%	0.04%	0.61%	0.08%	1.27%	0.18%	0.07%	0.10%	0.37%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December										
CSSR	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of call attempts		1276	1220	1218	NDR	NDR	NDR	1230	1142	1157
Total number of successful calls established		1266	1217	1210	NDR	NDR	NDR	1230	1135	1157
CSSR	≥ 95%	99.22%	99.75%	99.34%	NDR	NDR	NDR	100.00%	99.39%	100.00%
%age blocked calls		0.78%	0.25%	0.66%	NDR	NDR	NDR	0.00%	0.61%	0.00%

IMRB International | eTech

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

Audit Results for Call drop rate and for number of cells having more than 3% TCH-PMR data-December										
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		49838278	3636904	138449174	38458147	26485094	33062948	17731746	90567340	180255289
Total number of calls dropped		414082	29965	1402357	580164	29414	49237	66412	14211367	1634171
Call drop rate	≤ 2%	0.83%	0.82%	1.01%	1.51%	0.11%	0.15%	0.37%	15.69%	0.91%
Total number of cells in the network		5799	11364	10718	2641	2535	5986	2594	8065	11795
Total number of cells having more than 3% TCH		285	146	176	55	8	28	83	5	203
Worst affected cells having more than 3% TCH	≤ 3%	4.91%	1.29%	1.65%	2.09%	0.33%	0.47%	3.20%	0.06%	1.72%
Live measurement results for Call drop rate and for number of cells having more than 3% TCH- 3 Day data-December										
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		4706614	11018332	14509283	3904442	2777515	3056320	1906281	90567340	17893690
Total number of calls dropped		37475	94596	155385	60645	3274	5002	10001	14211367	173808
Call drop rate	≤ 2%	0.80%	0.86%	1.07%	1.55%	0.12%	0.16%	0.52%	0.71%	0.97%
Total number of cells in the network		5781	33894	10699	2641	2547	5988	2594	8023	11904
Total number of cells having more than 3% TCH		292	428	184	65	4	2	81	2	199
Worst affected cells having more than 3% TCH	≤ 3%	5.06%	1.26%	1.72%	2.47%	0.14%	0.04%	3.12%	0.02%	1.67%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December										
Call drop rate	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of calls established		1266	1217	1210	NDR	NDR	NDR	1230	1135	1157
Total number of calls dropped		1	0	5	NDR	NDR	NDR	6	6	1
Call drop rate	≤ 2%	0.08%	0.00%	0.41%	NDR	NDR	NDR	0.49%	0.53%	0.09%

Audit Results for Voice quality -PMR Data-December										
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**Idea**	**MTNL**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		9567861120	599009472	16724302431	8629518675	NA	5135122984	NDR	607694992	22125358750
Total number of calls with good voice quality		9331015927	584437400	16122235346	8283028367	NA	5083782605	NDR	595793080	21608867694
%age calls with good voice quality	≥ 95%	97.52%	97.57%	96.40%	95.98%	99.65%	99.00%	NDR	98.04%	97.67%
Live measurement results for Voice quality-3 Day data-December										
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**Idea**	**MTNL**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		897114169	1925476082	1760915070	772329490	NA	497657588	NDR	607694992	2238985912
Total number of calls with good voice quality		875551448	1879584531	1697903989	736981735	NA	494134096	NDR	595793080	2184715962
%age calls with good voice quality	≥ 95%	97.60%	97.62%	96.42%	95.42%	99.65%	99.29%	NDR	98.04%	97.58%
Drive test results for Voice quality (Average of three drive tests) - DT data-December										
Voice quality	**Benchmark**	**Aircel**	**Airtel**	**Idea**	**MTNL**	**Reliance CDMA**	**Reliance GSM**	**TATA CDMA**	**TATA GSM**	**Vodafone**
Total number of sample calls		1960989	1916857	293024	NDR	NDR	NDR	NA	2176751	541407
Total number of calls with good voice quality		1850060	1848901	278886	NDR	NDR	NDR	NA	2132582	524930
%age calls with good voice quality	≥ 95%	94.34%	96.45%	95.18%	NDR	NDR	NDR	98.16%	97.97%	96.96%

IMRB International | eTech

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

Audit Results for POI Congestion- PMR data-December									
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		95	296	285	31	63	25	250	250	327
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		69273	137686	160554	15469	17897	9324	104305	104305	286940
Traffic served for all POIs (B)- in erlangs		27913	88029	104898	7446	7635	6556	23126	23126	154070
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December									
POI congestion	Benchmark	Aircel	Airtel	Idea	MTNL	Reliance CDMA	Reliance GSM	TATA CDMA	TATA GSM	Vodafone
Total number of working POIs		95	294	285	31	64	25	250	250	327
No. of POIs not meeting benchmark		0	0	0	0	0	0	0	0	0
Total Capacity of all POIs (A) - in erlangs		69348	228453	160086	15470	18283	9236	104305	104305	286940
Traffic served for all POIs (B)- in erlangs		26749	271370	103491	7905	8204	6615	23126	23126	154070
POI congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

19 ANNEXURE – OCTOBER -3G

Audit Results for Network Availability- PMR data-October			
	Benchmark	MTNL 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		870	5063
Sum of downtime (i.e. total outage time) of Node Bs		2869	2070
Node Bs downtime (not available for service)	≤ 2%	0.44%	0.05%
Number of Node Bs having accumulated downtime of >24 hours in a month		6	0
Worst affected Node Bs due to downtime	≤ 2%	0.69%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-October			
	Benchmark	MTNL 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		870	5063
Sum of downtime (i.e. total outage time) of Node Bs		8	258
Node Bs downtime (not available for service)	≤ 2%	0.01%	0.07%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.00%

IMRB International | eTech

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

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-October			
	Benchmark	MTNL 3G	Vodafone 3G
CSSR	≥ 95%	96.16%	99.80%
RRC Congestion	≤ 1%	0.88%	0.07%
Circuit Switched RAB Congestion	≤ 2%	1.05%	0.05%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-October			
	Benchmark	MTNL 3G	Vodafone 3G
CSSR	≥ 95%	NDR	99.78%
RRC Congestion	≤ 1%	NDR	0.08%
Circuit Switched RAB Congestion	≤ 2%	NDR	0.07%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-October			
CSSR	Benchmark	MTNL 3G	Vodafone 3G
Total number of RRC attempts (A)		NA	NA
Total number of RRC established (B)		NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA
%age blocked calls		NA	NA

IMRB International | eTech

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

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-October			
	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		4509633	3956627
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		70018	16585
Call drop rate (B/A*100)	≤ 2%	1.55%	0.42%
Total no. of cells in the licensed service area (B)		1990	596880
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		35	14037
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	0.92%	2.35%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate – 3 Day data-October			
	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		107912	12606008
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		1933	55788
Call drop rate (B/A*100)	≤ 2%	1.79%	0.44%
Total no. of cells in the licensed service area (B)		1990	19537
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		49	432
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.06%	2.21%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-October			
Call drop rate	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA

IMRB International | eTech

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

Audit Results for Voice quality -PMR Data-October			
Voice quality	**Benchmark**	**MTNL 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		7948546845	36678566233
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		7860332056	35870614264
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.89%	97.80%
Live measurement results for Voice quality-3 Day data-October			
Voice quality	**Benchmark**	**MTNL 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		948546845	37282189230
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		860332056	36460104974
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	99.86%	97.79%
Drive test results for Voice quality (Average of three drive tests) - DT data-October			
Voice quality	**Benchmark**	**MTNL 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA

Audit Results for POI Congestion- PMR data-October			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		31	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		247509	286935
Traffic served for all POIs (B)- in erlangs		7166	150397
POI congestion	≤ 0.5%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-October			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		0	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		0	286935
Traffic served for all POIs (B)- in erlangs		0	150397
POI congestion	≤ 0.5%	0.00%	0.00%

20 ANNEXURE – NOVEMBER-3G

Audit Results for Network Availability- PMR data-November			
	Benchmark	MTNL 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		692	5438
Sum of downtime (i.e. total outage time) of Node Bs		2825	2070
Node Bs downtime (not available for service)	≤ 2%	0.55%	0.05%
Number of Node Bs having accumulated downtime of >24 hours in a month		9	0
Worst affected Node Bs due to downtime	≤ 2%	1.30%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-November			
	Benchmark	MTNL 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		692	5063
Sum of downtime (i.e. total outage time) of Node Bs		321	258
Node Bs downtime (not available for service)	≤ 2%	0.64%	0.07%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.00%

IMRB International | eTech

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

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-November

	Benchmark	MTNL 3G	Vodafone 3G
CSSR	≥ 95%	98.14%	99.84%
RRC Congestion	≤ 1%	0.76%	0.00%
Circuit Switched RAB Congestion	≤ 2%	0.13%	0.00%

Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data- November

	Benchmark	MTNL 3G	Vodafone 3G
CSSR	≥ 95%	97.79%	99.74%
RRC Congestion	≤ 1%	0.67%	0.08%
Circuit Switched RAB Congestion	≤ 2%	0.17%	0.08%

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

CSSR	Benchmark	MTNL 3G	Vodafone 3G
Total number of RRC attempts (A)		NA	NA
Total number of RRC established (B)		NA	NA
Call setup success rate (B/A*100)	≥ 95%	NA	NA
%age blocked calls		NA	NA

IMRB International | eTech

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

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-November

	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		4293089	3956627
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		60258	16585
Call drop rate (B/A*100)	≤ 2%	1.40%	0.44%
Total no. of cells in the licensed service area (B)		1990	596880
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		49	14037
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.48%	2.19%

Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-November

	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		6123496	12606008
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		70699	55788
Call drop rate (B/A*100)	≤ 2%	1.15%	0.44%
Total no. of cells in the licensed service area (B)		1990	19537
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		35	432
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	1.76%	2.21%

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

Call drop rate	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	NA
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	NA
Call drop rate (B/A*100)	≤ 2%	NA	NA

IMRB International | eTech

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

Audit Results for Voice quality -PMR Data-November			
Voice quality	**Benchmark**	**MTNL 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		7608605641	12608827140
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		7527622769	12315295436
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.94%	97.67%
Live measurement results for Voice quality-3 Day data-November			
Voice quality	**Benchmark**	**MTNL 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		10226031750	37282189230
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		10114805217	36460104974
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.91%	97.79%
Drive test results for Voice quality (Average of three drive tests) - DT data-November			
Voice quality	**Benchmark**	**MTNL 3G**	**Vodafone 3G**
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA

IMRB International | eTech

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

Audit Results for POI Congestion- PMR data-November			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		31	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		247509	286935
Traffic served for all POIs (B)- in erlangs		7166	150397
POI congestion	≤ 0.5%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-November			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		0	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		0	286935
Traffic served for all POIs (B)- in erlangs		0	150397
POI congestion	≤ 0.5%	0.00%	0.00%

IMRB International | eTech

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

21 ANNEXURE – DECEMBER-3G

Audit Results for Network Availability- PMR data-December			
	Benchmark	MTNL 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		692	5438
Sum of downtime (i.e. total outage time) of Node Bs		2444	342
Node Bs downtime (not available for service)	≤ 2%	0.47%	0.01%
Number of Node Bs having accumulated downtime of >24 hours in a month		7	0
Worst affected Node Bs due to downtime	≤ 2%	1.01%	0.00%
Live Measurement Results for Network Availability- 3 Day live data-December			
	Benchmark	MTNL 3G	Vodafone 3G
(Number of Node Bs in the network in the licensed service area		692	5438
Sum of downtime (i.e. total outage time) of Node Bs		221	33
Node Bs downtime (not available for service)	≤ 2%	0.44%	0.01%
Number of Node Bs having accumulated downtime of >24 hours in a month		0	0
Worst affected Node Bs due to downtime	≤ 2%	0.00%	0.00%

Audit Results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- PMR data-December			
	Benchmark	MTNL 3G	Vodafone 3G
CSSR	≥ 95%	97.32%	99.81%
RRC Congestion	≤ 1%	0.79%	0.00%
Circuit Switched RAB Congestion	≤ 2%	0.14%	0.00%
Live measurement results for CSSR, RRC Congestion and Circuit Switched RAB Congestion- 3 Day Data-December			
	Benchmark	MTNL 3G	Vodafone 3G
CSSR	≥ 95%	98.24%	99.78%
RRC Congestion	≤ 1%	0.76%	0.00%
Circuit Switched RAB Congestion	≤ 2%	0.15%	0.00%
Drive test results for CSSR (Average of three drive tests) and blocked calls- Drive Test Data-December			
CSSR	Benchmark	MTNL 3G	Vodafone 3G
Total number of RRC attempts (A)		NA	1400
Total number of RRC established (B)		NA	1397
Call setup success rate (B/A*100)	≥ 95%	NA	NA
%age blocked calls		NA	NA

IMRB International | eTech

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

Audit Results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate -PMR data-December			
	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		4746040	487853
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		67573	1899
Call drop rate (B/A*100)	≤ 2%	1.42%	0.35%
Total no. of cells in the licensed service area (B)		1994	596880
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		51	14037
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.53%	2.42%
Live measurement results for Call drop rate and Worst affected cells having more than 3% Circuit switched voice drop rate - 3 Day data-December			
	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		478749	1450
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		6080	3
Call drop rate (B/A*100)	≤ 2%	1.27%	0.45%
Total no. of cells in the licensed service area (B)		1990	19537
No. of affected cells having CSV call drop rate >3% during (CBBH) in a month (A)		51	432
Worst affected cells having more than 3% Circuit switched voice drop rate (A/B*100)	≤ 3%	2.55%	2.10%
Drive test results for Call drop rate (Average of three drive tests) - Drive Test Data-December			
Call drop rate	Benchmark	MTNL 3G	Vodafone 3G
Total calls successfully established (A) (Number of voice RAB normally released)		NA	1187
Total calls dropped after establishment (B) (Number of voice RAB abnormally released)		NA	0
Call drop rate (B/A*100)	≤ 2%	NA	0.00%

IMRB International | eTech

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

Audit Results for Voice quality -PMR Data-December			
Voice quality	Benchmark	MTNL 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		8411637105	371484136677
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		8320949678	363418756013
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.92%	97.83%
Live measurement results for Voice quality-3 Day data-December			
Voice quality	Benchmark	MTNL 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		866620190	38345953882
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		857245839	37505511852
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	98.92%	97.81%
Drive test results for Voice quality (Average of three drive tests) - DT data-December			
Voice quality	Benchmark	MTNL 3G	Vodafone 3G
Total Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA
Faulty Transport Blocks InUplink downlink After Selection Combining Speech-10Sec		NA	NA
%Circuit Switch Voice Quality (CSV quality) (B/A*100)	≥ 95%	NA	NA

IMRB International | eTech

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

Audit Results for POI Congestion- PMR data-December			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		31	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		15469	286935
Traffic served for all POIs (B)- in erlangs		7446	150397
POI congestion	≤ 0.5%	0.00%	0.00%
Live Measurement Results for POI Congestion- 3 Day data-December			
POI congestion	Benchmark	MTNL 3G	Vodafone 3G
Total number of working POIs		31	328
No. of POIs not meeting benchmark		0	0
Total Capacity of all POIs (A) - in erlangs		15470	286935
Traffic served for all POIs (B)- in erlangs		7905	150397
POI congestion	≤ 0.5%	0.00%	0.00%

IMRB International | eTech

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

22 ABBREVIATIONS

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

1.   TRAI – Telecom Regulatory Authority of India
2.   QoS – Quality of Service
3.   OND'15 – Refers to the quarter of October , November and December 2015
4.   IMRB – Refers to IMRB International, the audit agency for this report
5.   SSA – Secondary Switching Area
6.   NOC – Network Operation Center
7.   OMC – Operations and Maintenance Center
8.   MSC – Mobile Switching Center
9.   PMR – Performance Monitoring Reports
10. TCBH – Time Consistent Busy Hour
11. CBBH - Cell Bouncing Busy Hour
12. BTS – Base Transceiver Station
13. CSSR – Call Setup Success Rate
14. TCH – Traffic Channel
15. SDCCH – Standalone Dedicated Control Channel
16. CDR – Call Drop Rate
17. FER – Frame Error Rate
18. SIM – Subscriber Identity Module
19. GSM – Global System for Mobile
20. CDMA – Code Division Multiple Access
21. NA – Not Applicable
22. NC – Non Compliance
23. POI – Point of Interconnection
24. IVR – Interactive Voice Response
25. STD – Standard Trunk Dialing
26. ISD – International Subscriber Dialing

WEST ZONE

TRAI AUDIT WIRELINE REPORT – MUMBAI CIRCLE - AUDIT OF OND QUARTER, 2015

Prepared By -

Prepared For-

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 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

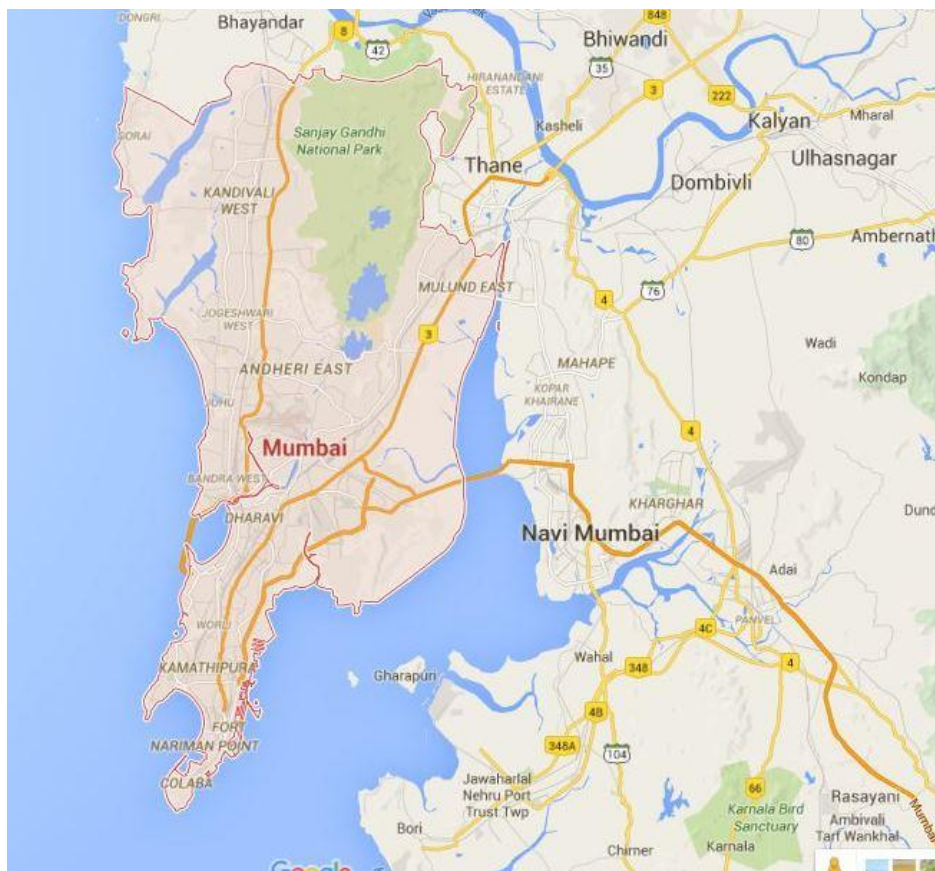The wireline audit was conducted in Mumbai circle.
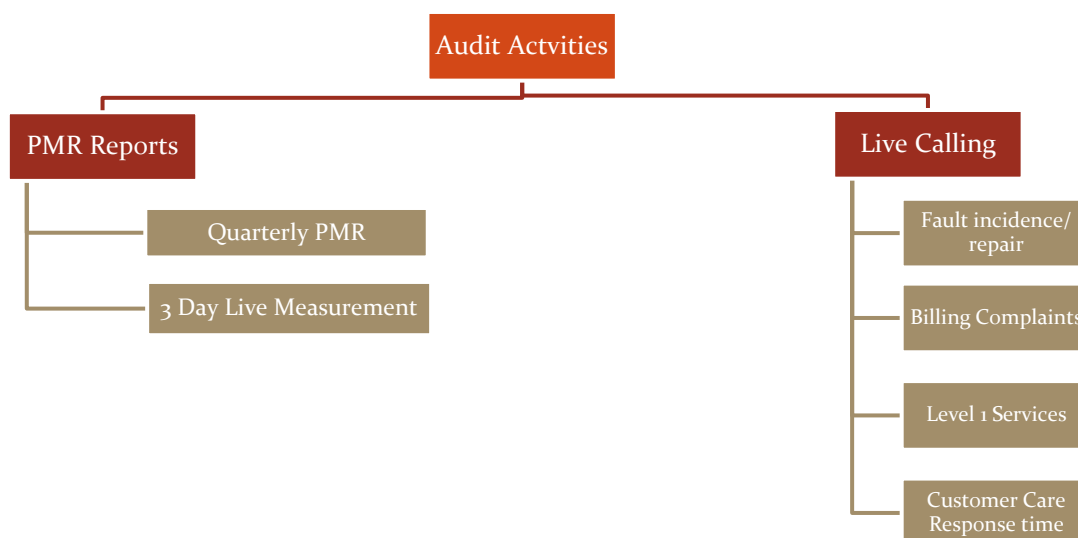

Image Source: Google Maps

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 Mumbai for the OND 2015 quarter and conducted the audit for all operators.
  - o MTNL
  - o Bharti Airtel
  - o Reliance
  - o Tata Teleservices
  - o Vodafone

- The PMR was generated from the raw data pertaining to October, November and December 2015 (OND'15), which was collected from the operator during the audit conducted in the month of January 2016.

- Live calling and 3 day live measurement activity was carried out during the month of December 2015. 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 November 2015 was considered for live calling activity conducted in December 2015.
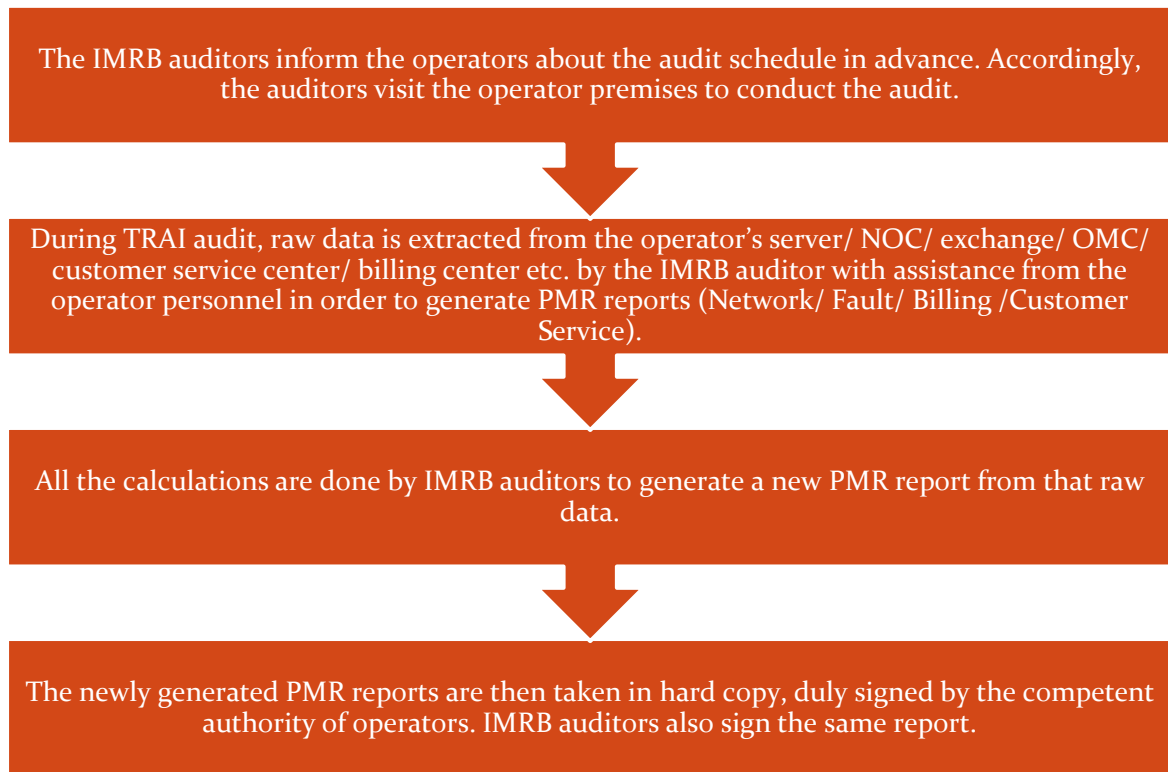
1.5 FRAMEWORK USED

```
                        ┌─────────────────┐
                        │ Audit Actvities │
                        └────────┬────────┘
               ┌─────────────────┴─────────────────┐
        ┌─────────────┐                      ┌──────────────┐
        │ PMR Reports │                      │ Live Calling │
        └──────┬──────┘                      └──────┬───────┘
               │   ┌──────────────────┐             │   ┌──────────────────────┐
               ├───│   Quarterly PMR  │             ├───│ Fault incidence/repair│
               │   └──────────────────┘             │   └──────────────────────┘
               │   ┌──────────────────────┐         │   ┌──────────────────────┐
               └───│ 3 Day Live Measurement│         ├───│  Billing Complaints  │
                   └──────────────────────┘         │   └──────────────────────┘
                                                     │   ┌──────────────────────┐
                                                     ├───│   Level 1 Services   │
                                                     │   └──────────────────────┘
                                                     │   ┌──────────────────────┐
                                                     └───│    Customer Care     │
                                                         │    Response time     │
                                                         └──────────────────────┘
```

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 on time as per instructions from TRAI.

To verify the QoS performance of the operators, TRAI has appointed IMRB as their auditor in West 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 MTNL) 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:

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

The 90 day period is decided upon the basis of quarter of audit. For example, for audit of OND 2015, the 90 day period data used to identify TCBH would be the data of October, November & December 2015

For each day, the hour in which average traffic of the resource group concerned is greatest for the day will be the 'Busy Hour' for the operator.
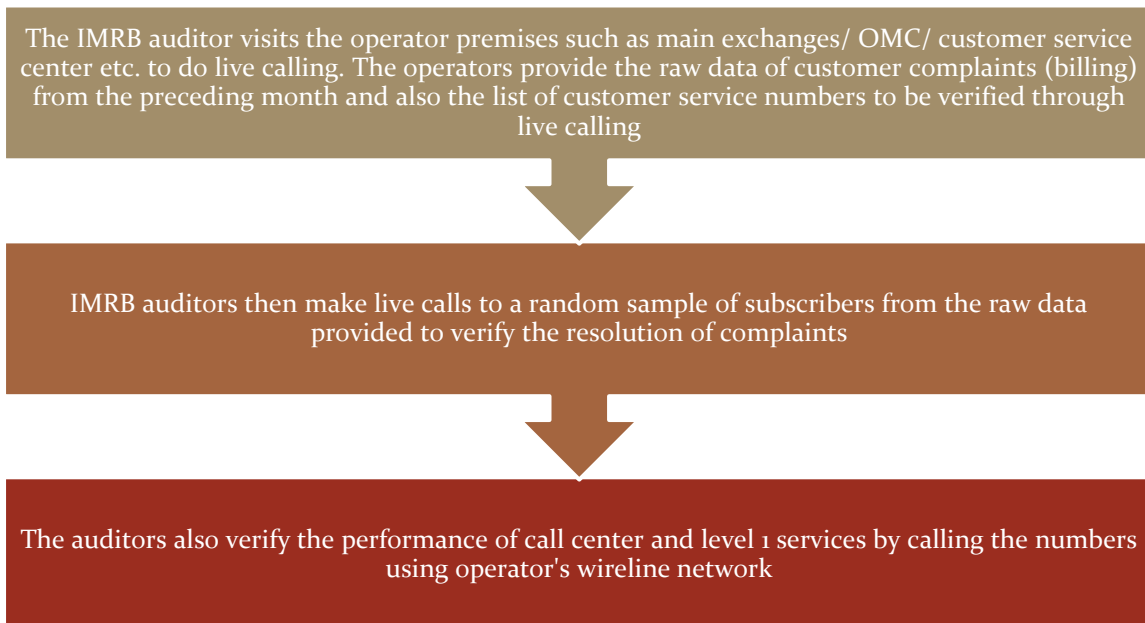
The modal frequency of the busy hour is calculated for 90 days period and the hour with highest modal frequency will be considered as TCBH for the operator

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.

The IMRB auditor visits the operator premises such as main exchanges/ OMC/ customer service center etc. to do live calling. The operators provide the raw data of customer complaints (billing) from the preceding month and also the list of customer service numbers to be verified through live calling

IMRB auditors then make live calls 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 and level 1 services by calling the numbers using operator's wireline network

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. 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 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 MTNL, 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 MTNL, calls are equally distributed among SDCAs (Short Distance Charging Area) visited for the purpose of live calling.

In OND'15, 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		

IMRB International | eTech

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

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

- As per the sampling methodology prescribed by TRAI, all exchanges over 10% of SDCA in a service area should be selected for the purpose of audit, live calling and live measurement.
- Mumbai has only 1 SDCA. Hence all the exchanges present in the circle have been covered for all operators during the audit.

Sr. No	Service Provider	Circle	Urban Exchange	Rural Exchange	Total Exchange	No. of Urban Exchanges Covered for audit	No. of Rural Exchanges Covered for audit
1	MTNL	Mumbai	233	0	233	12	0
2	Bharti-Airtel	Mumbai	2	0	2	1	0
3	TTL	Mumbai	6	0	6	2	0
4	RCL	Mumbai	2	0	2	1	0
5	VODAFONE	Mumbai	4	0	4	2	0
Total Exchanges			247	0	247	18	0

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 Mumbai circle, with a parameter wise performance evaluation as compared to TRAI benchmark.

2.1   PMR (PERFORMANCE MONITORING REPORT) DATA – OND'15

Parameters	Benchmarks	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Faults incidences (No. of faults/100 Subs./month) - averaged for the quarter	≤7	0.31%	10.17%	0.35%	1.55%	0.36%
% of faults repaired by next working day	≥ 85% (Urban)	95.84%	92.28%	100.00%	94.00%	100.00%
% of faults repaired within 5 days	100% (Urban)	100.00%	99.85%	100.00%	100.00%	100.00%
Percentage of faults repaired by next working day during the quarter	≥ 75% (Rural)	NA	NA	NA	NA	NA
Percentage of faults repaired within 7 days during the quarter	100% (Rural)	NA	NA	NA	NA	NA
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	NA	NA	NA	NA	NA
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	NA	NA	NA	NA	NA
Faults pending for > 15 days	Rent rebate of 1 month	NA	NA	NA	NA	NA
Mean Time to Repair (MTTR)	≤ 10 Hrs	3.92	6.17	3.29	6.00	2.12
No. of POIs with congestion > 0.5%	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
Metering and billing credibility - Number of bills disputed during the quarter	≤ 0.1%	0.00%	0.00%	0.01%	0.03%	0.00%
Resolution of billing complaints within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%
Percentage complaints resolved within 6 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Closure within 7 days	100%	100.00%	99.98%	100.00%	100.00%	100.00%
Refund of deposits within 60 days of closure of service	100%	100.00%	100.00%	100.00%	100.00%	100.00%

Response time to customer for assistance	Benchmarks	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
% age calls getting connected and answered	≥ 95%	99.97%	94.20%	98.36%	93.36%	96.45%
Percentage of calls answered by the operators (voice to voice) within 90 seconds	≥ 95%	96.77%	95.89%	97.47%	88.56%	97.97%

NA: Parameters not applicable for the operators.

Following are the parameter wise observations for the operators in Mumbai circle:

2.1.1   FAULT INCIDENCE / CLEARANCE STATISTICS

All operators met the benchmark for fault incidence except MTNL.

In urban areas, all operators met the benchmark of fault repair within next day, whereas MTNL failed to meet the benchmark within 5 days in urban areas.

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

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

All operators met the benchmark for rent rebate parameters. Rent rebate not applicable as all faults were repaired within stipulated time.

2.1.2 POI (POINT OF INTERCONNECTION) CONGESTION

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

2.1.3 METERING AND BILLING CREDIBILITY

All 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 within 6 weeks.

2.1.5 PERIOD OF APPLYING CREDIT/ WAIVER

All operators met the benchmark for the parameter.

2.1.6 CLOSURE WITHIN 7 DAYS

MTNL failed to meet the benchmark for the parameter.

2.1.7 REFUND OF DEPOSIT WITHIN 60 DAYS FROM CLOSURE

All operators met the benchmark for the parameter.

2.1.8 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

MTNL, RCL and TTL failed to meet the TRAI benchmark in terms of number of IVR calls being connected and answered.

TTL failed to meet the benchmark of 95% of voice to voice calls answered within stipulated time of 90 seconds.

2.2 3 DAY LIVE MEASUREMENT

Parameters	Benchmarks	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
POI Congestion	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%

Let us now review the various parameters involved during live measurement.

2.2.1 POI (POINT OF INTERCONNECTION) CONGESTION

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

2.3 LIVE CALLING

Parameters	Benchmarks	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Fault Repair/ Clearance						
% of faults repaired by next working day	≥ 85% (Urban)	98.20%	89.30%	100.00%	100.00%	100.00%
Percentage cases where faults were repaired by next working day	≥ 75% (Rural)	NA	NA	NA	NA	NA
% of faults repaired within 5 days	100% (Urban)	100.00%	100.00%	100.00%	100.00%	100.00%
Percentage cases where faults were repaired within 7 days	100% (Rural)	NA	NA	NA	NA	NA
Resolution of billing complaints						
Resolution of billing complaints within 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%
Percentage complaints resolved within 6 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Response time to customer for assistance						
% age calls getting connected and answered	≥ 95%	100.00%	96.00%	99.00%	100.00%	95.00%
% age call answered by operator in 90 seconds	≥ 95%	98.00%	100.00%	99.00%	92.00%	99.00%
Level 1 Services						
% age calls made to Level 1 services getting answered	≥ 90%	99.00%	97.00%	98.00%	97.00%	100.00%

2.3.1 FAULTS REPAIR/ CLEARANCE

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

2.3.2 RESOLUTION OF BILLING COMPLAINTS

During live calling, it was observed that all operators met the benchmark of resolving complaints within 4 weeks as well as within 6 weeks.

2.3.3 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

During live calling, it was observed that all operators met the benchmark of 95% IVR calls getting connected and answered.

TTL failed to meet the benchmark of 95% calls getting answered (voice to voice) within 90 seconds.

2.3.4 LEVEL 1 SERVICES

All operators met the benchmark for Level 1 services. The category 1 (restricted) services were tested from different SDCAs.

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

Detailed Level 1 Calling is given in section 5.6.1

3   CRITICAL FINDINGS - OND'15

Fault Incidence / Clearance Statistics

➢ All operators met the benchmark for fault incidence.

➢ In urban areas, all operators met the benchmark of fault repair within next day, as well as within 5 days in urban areas.

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

➢ All operators met the benchmark for rent rebate parameters. Rent rebate not applicable as all faults were repaired within stipulated time.

POI (Point of Interconnection) Congestion

➢ All operators met the benchmark with 0% POIs with congestion.

Metering and Billing Credibility

➢ All 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 within 6 weeks.

Period of Applying Credit/ Waiver

➢ All operators met the benchmark for the parameter.

Closure within 7 days

➢ MTNL and TTL failed to meet the benchmark for the parameter.

Refund of deposit within 60 days from closure

➢ MTNL failed to meet the benchmark for the parameter.

Response time to customer for assistance

➢ MTNL, RCL and TTL failed to meet the TRAI benchmark in terms of number of IVR calls being connected and answered.

➢ TTL failed to meet the benchmark of 95% of voice to voice calls answered within stipulated time of 90 seconds.

Live Calling

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

➢ During live calling, it was observed that all operators met the benchmark of resolving complaints within 4 weeks as well as within 6 weeks.

➢ During live calling, it was observed that all operators met the benchmark of 95% IVR calls getting connected and answered.

➢ TTL failed to meet the benchmark of 95% calls getting answered (voice to voice) within 90 seconds.

➢ All operators met the benchmark for Level 1 services. The category 1 (restricted) services were tested from different SDCAs.

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)
- ✎ 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 7 days but less than 15 days (Urban)
- ✎ Number of cleared in more than 15 days (Urban)

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
    - o Fault repair by next working day - for both Urban Exchanges
    - o Fault repair within 5 working days – Urban 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 MTNL, 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:

Fault incidences – No. of faults/100 subscriber/month =

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

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:

          o Fault repair by next working day (Urban Exchanges): =>85%

          o Fault repair within 5 working days (Urban Exchanges): =100%
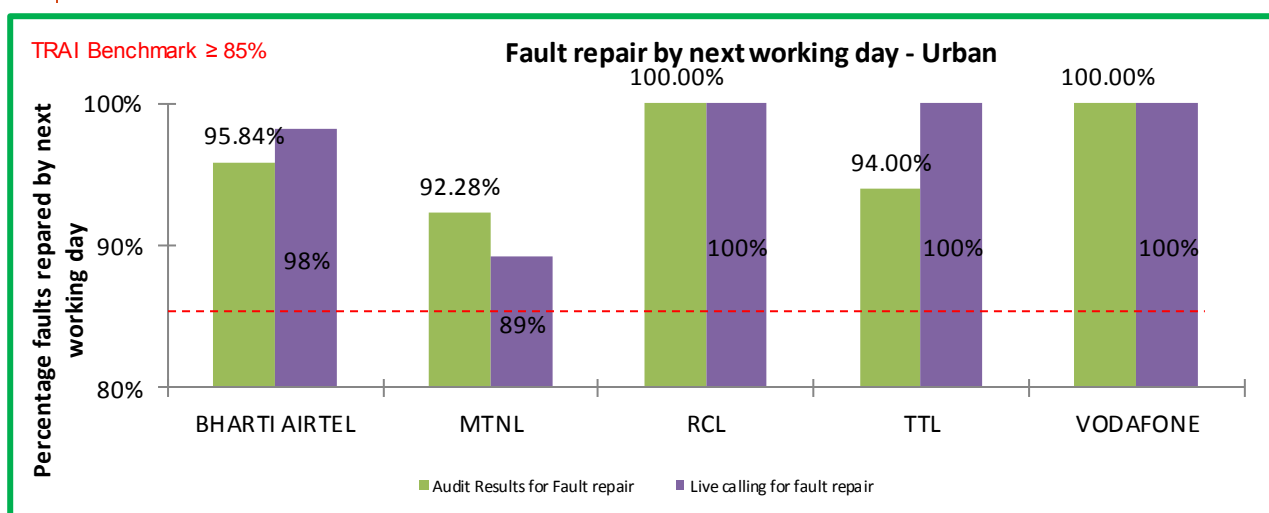
     ✥ Mean Time to Repair: 10 hours

4.1.2 DETAILED FINDINGS - FAULT INCIDENCE
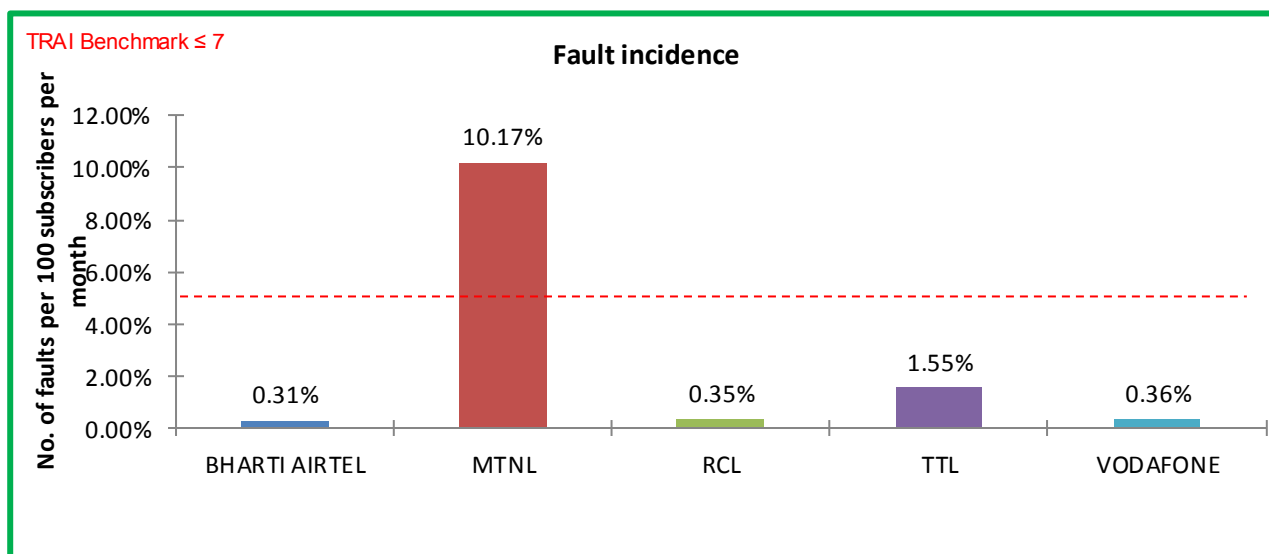
Fault incidence

TRAI Benchmark ≤ 7

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

All operators met the benchmark for fault incidence except MTNL.

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

Fault repair by next working day - Urban

TRAI Benchmark ≥ 85%

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

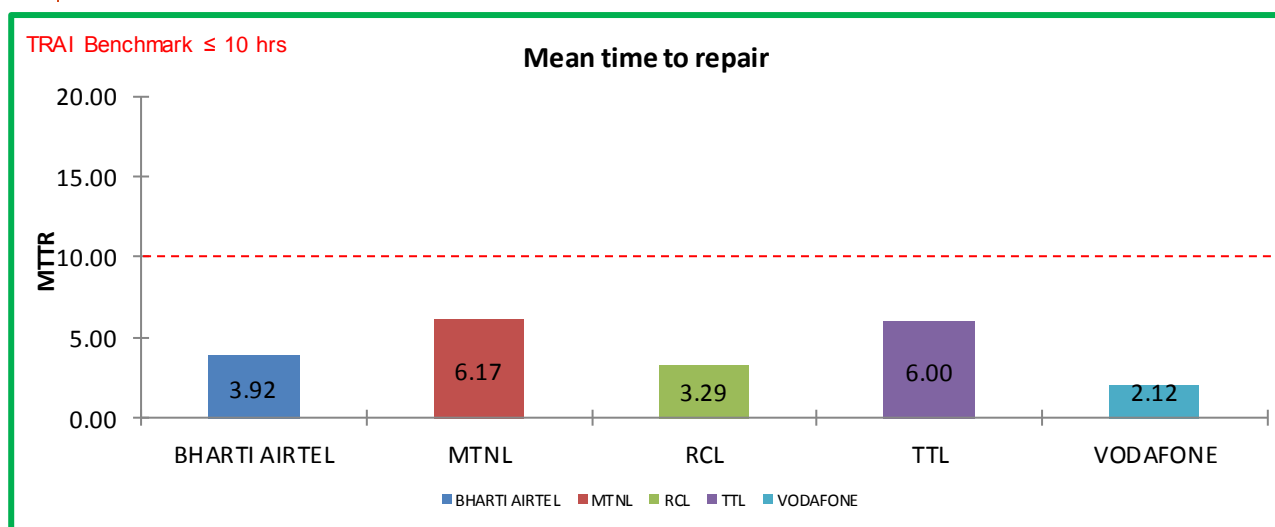All operators met the benchmark of fault repair within next day.

4.1.4 FINDINGS - FAULT REPAIR WITHIN FIVE WORKING DAYS (URBAN)
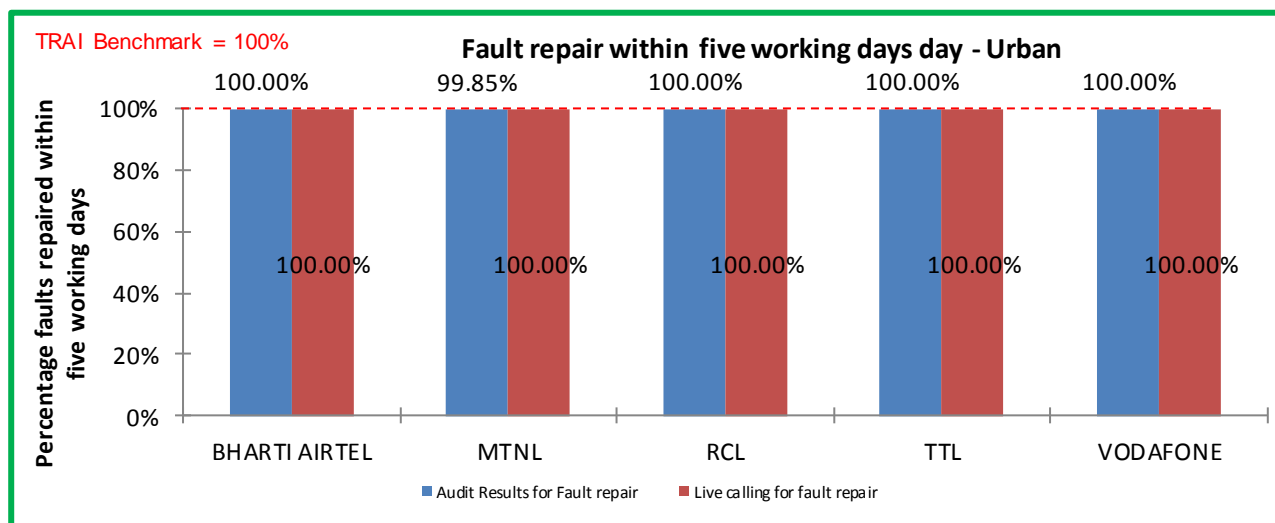
Data Source: Operations and Maintenance Center (OMC) of the operators

MTNL failed to meet the benchmark of fault repair within five working days in urban areas. During live calling the performance of the operator was good.

4.1.5 DETAILED FINDINGS - MEAN TIME TO REPAIR

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

All operators met the benchmark for MTTR while Reliance and Tata met the benchmark for the parameter.

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

IMRB International | eTech

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

Live calling:

ఋ 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 MTNL, data for the complaints from the subscribers belonging to the sample exchanges is requested specifically

ఋ A sample of 10% or 100 complainants, whichever is less, is selected randomly from the list provided by operator

ఋ 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:

ఋ 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.

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

ఋ *Operator to include all types of bills generated for customers. This would include printed bills, online bills and any other forms of bills generated

ఋ **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: < 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, 2015) 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 =

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

- o **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.

  - o 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.

4.2.1.5   RESOLUTION OF BILLING COMPLAINTS – AUDIT FINDINGS
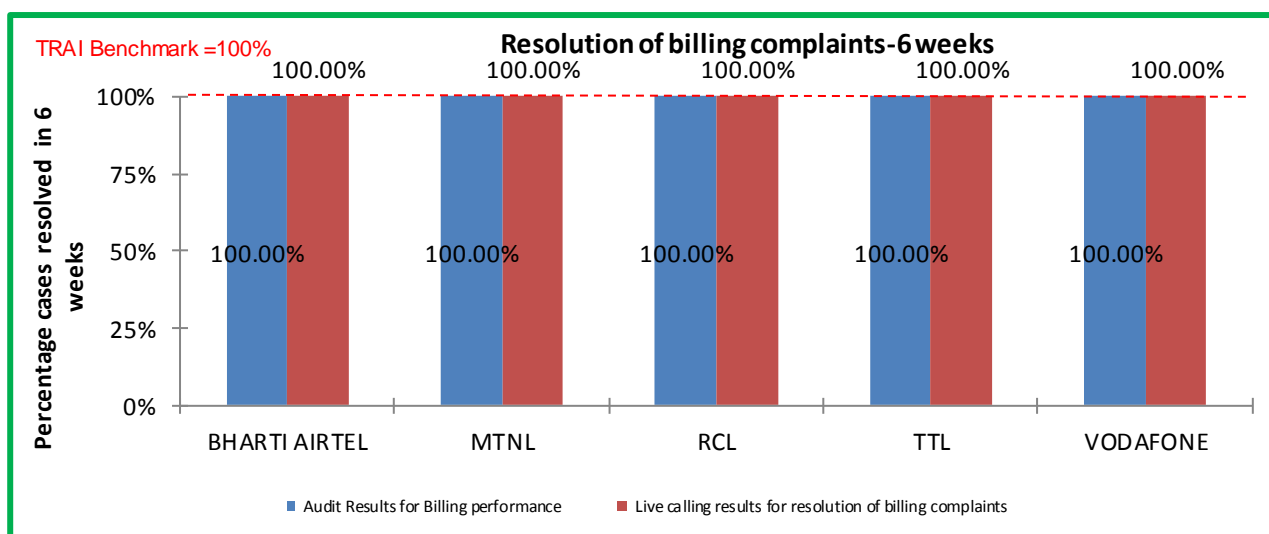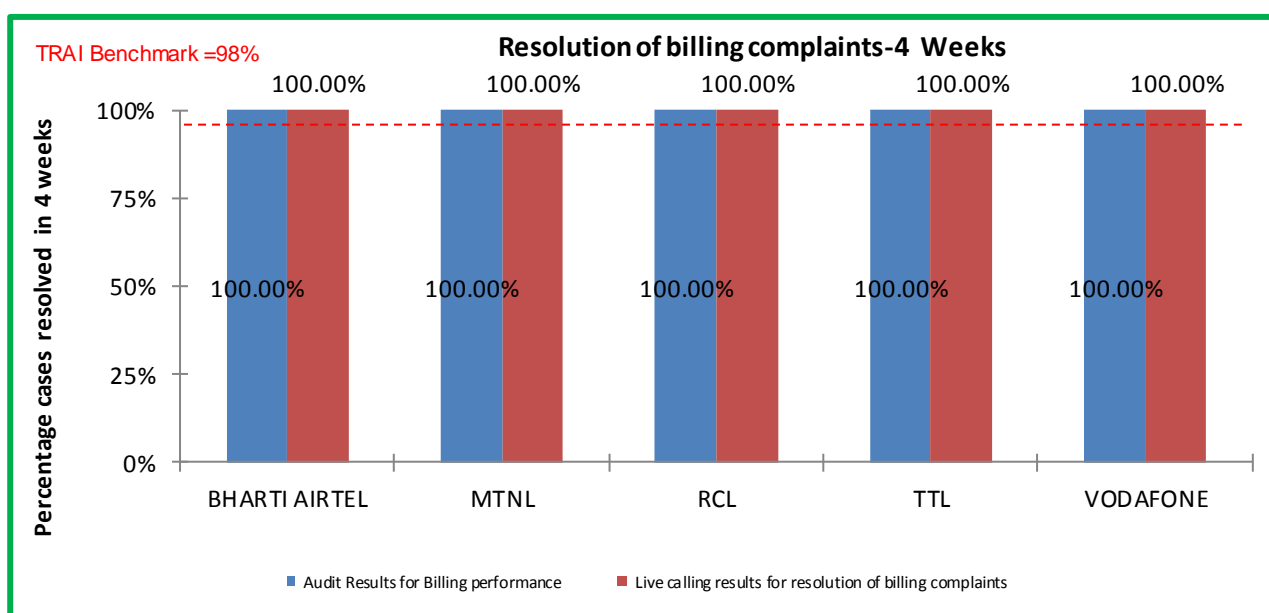
As per audit conducted, All operators met the benchmark for resolution of billing complaints within 4 weeks and within 6 weeks.

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:
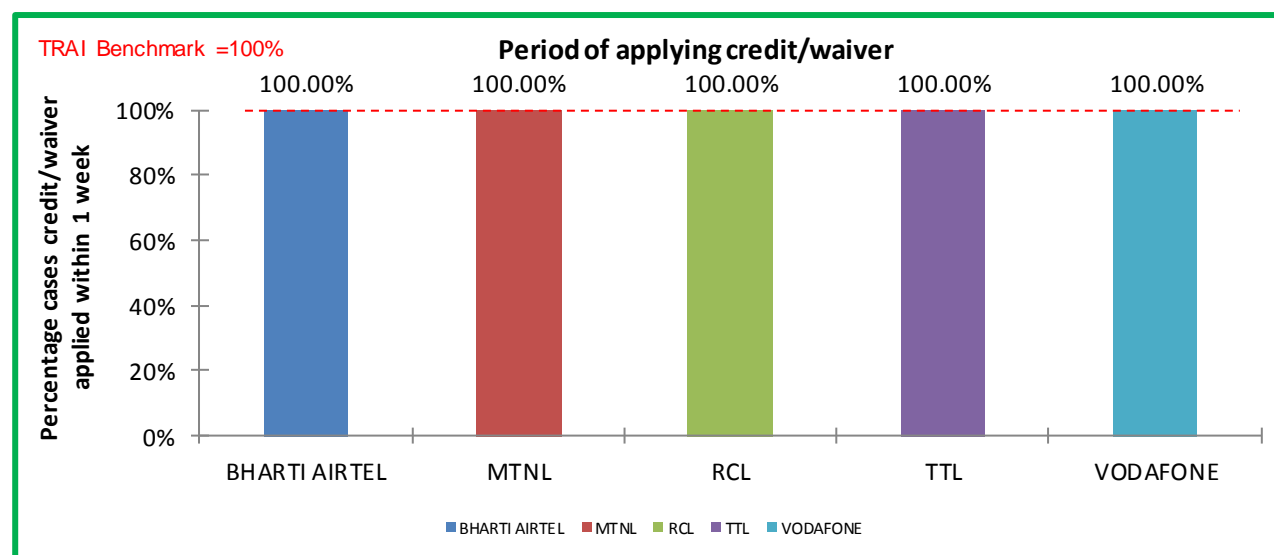
  - ↳ Period of applying credit waiver within 7 days: 100%

- ➲ 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

4.2.1.7 PERIOD OF APPLYING CREDIT WAIVER – AUDIT FINDINGS

All operators met the benchmark for the parameter.

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

TRAI Benchmark ≥ 95%

Calls getting connected and answered
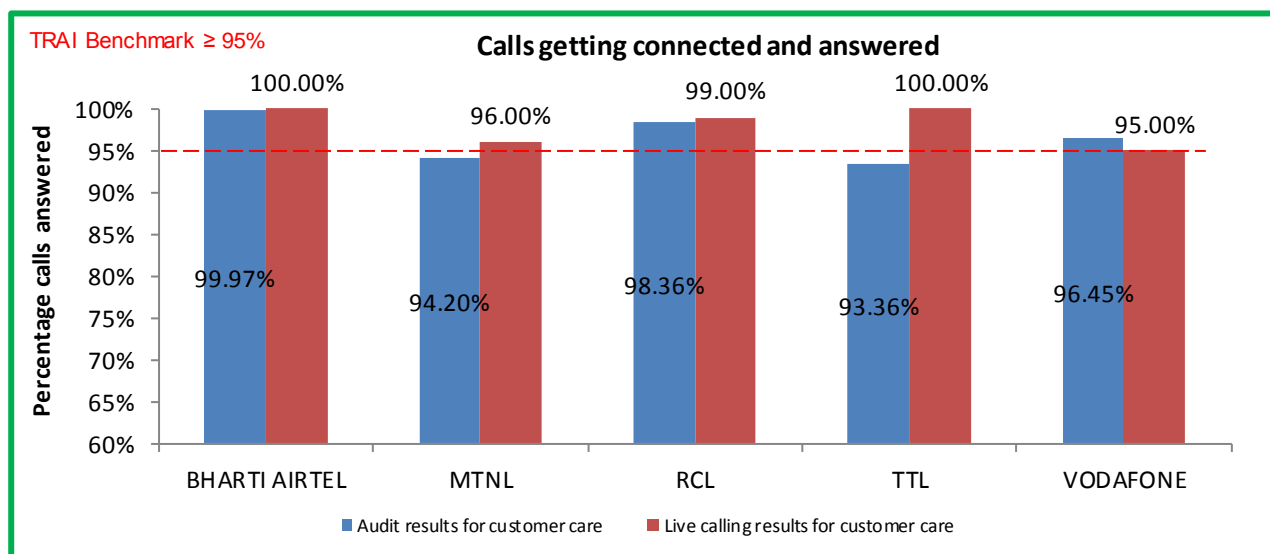
Data Source: Customer Service Center of the operators

MTNL and TTL failed to meet the TRAI benchmark in terms of number of IVR calls being connected and answered. However, during live calling, performance all operators met the benchmark level.

4.3.3 CALL ANSWERED BY OPERATOR WITHIN 90 SECONDS

TRAI Benchmark ≥ 95%

Call Answered by Operator within 90 seconds
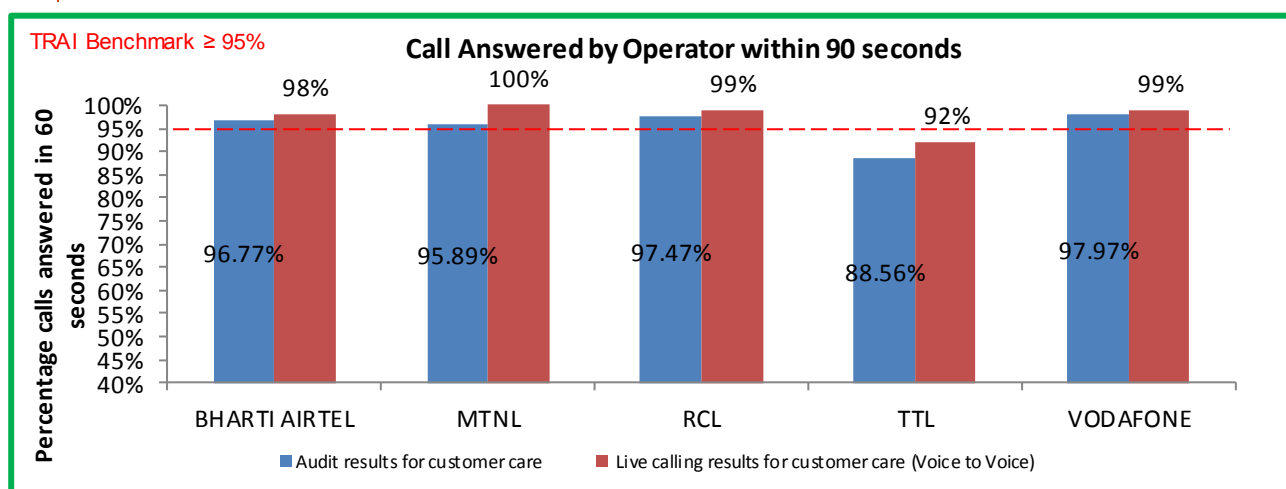
Data Source: Customer Service Center of the operators

The benchmark of 95% of voice to voice calls answered within stipulated time of 90 seconds was met by all operators except TTL. However, during live calling it was observed that only TTL failed to meet the benchmark.

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 requests within 7 days = 100%

4.4.2 FINDINGS - CLOSURE REQUEST ATTENDED IN 7 DAYS
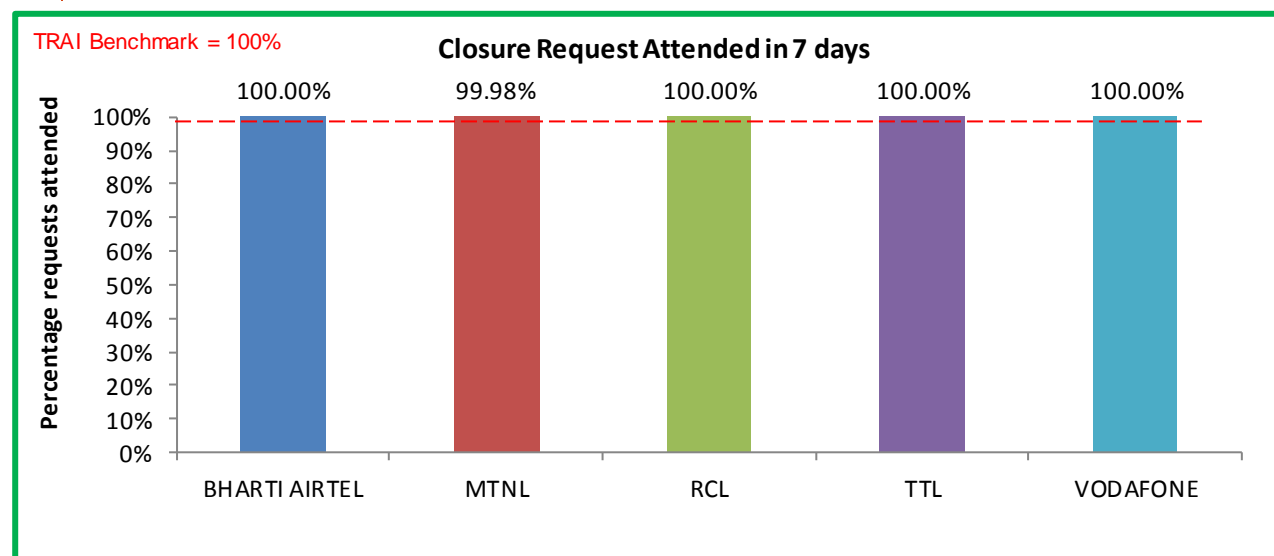
Data Source: Customer Service Center of the operators

MTNL failed to meet the benchmark for the parameter.

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
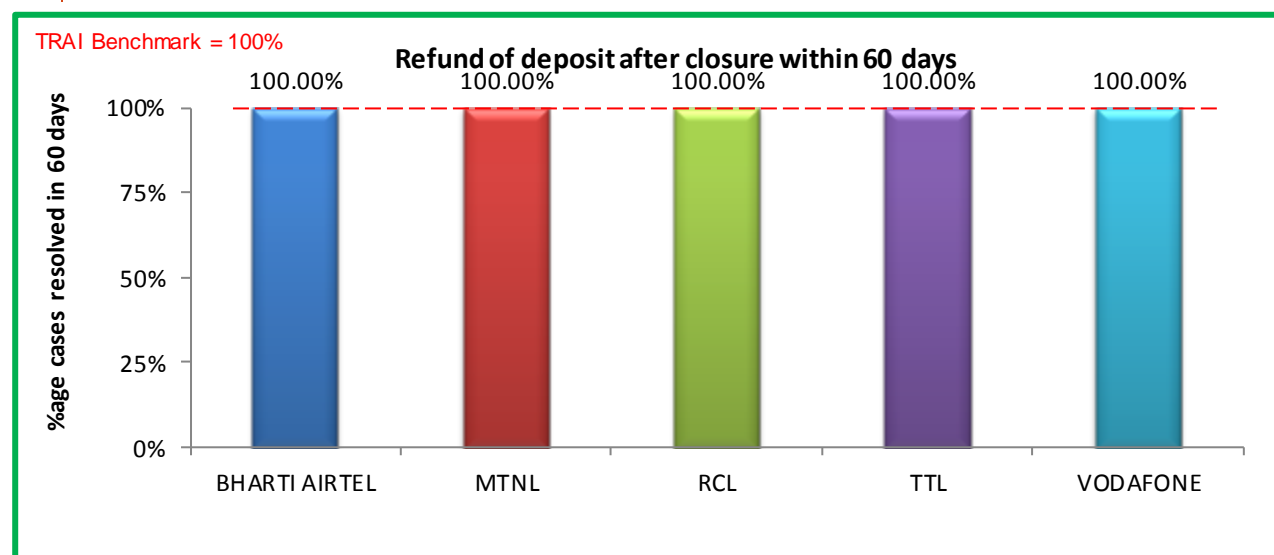
Data Source: Customer Service Center of the operators

All operators met the benchmark for the parameter.

5 ANNEXURE – OND'15

5.1 FAULT INCIDENCE / CLEARANCE STATISTIC

Fault Incidence / Clearance Statistics						
Audit Results for Fault repair						
Fault incidences	**Benchmark**	**BHARTI AIRTEL**	**MTNL**	**RCL**	**TTL**	**VODAFONE**
Faults incidences (Urban)	≤ 7	0.31%	10.17%	0.35%	1.55%	0.36%
Fault repair (Urban areas)	**Benchmark**	**BHARTI AIRTEL**	**MTNL**	**RCL**	**TTL**	**VODAFONE**
Total No. of faults registered during the quarter		10325	505	469	33	2350
No. of faults repaired by next working day during the quarter		9895	466	469	31	2350
Percentage of faults repaired by next working day during the quarter	≥ 85%	95.84%	92.28%	100.00%	94.00%	100.00%
No. of faults repaired within 5 days during the quarter		10325	504	469	33	2350
Percentage of faults repaired within 5 days during the quarter	100%	100.00%	99.85%	100.00%	100.00%	100.00%
Fault repair (Rural & Hilly areas)	**Benchmark**	**BHARTI AIRTEL**	**MTNL**	**RCL**	**TTL**	**VODAFONE**
Total No. of faults registered during the quarter		NA	NA	NA	NA	NA
No. of faults repaired by next working day during the quarter		NA	NA	NA	NA	NA
Percentage of faults repaired by next working day during the quarter	≥ 75%	NA	NA	NA	NA	NA
No. of faults repaired within 7 days during the quarter		NA	NA	NA	NA	NA
Percentage of faults repaired within 7 days during the quarter	100%	NA	NA	NA	NA	NA

Rent rebate	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Percentage of cases where rent rebate for 7 days was given	100%	NA	NA	NA	NA	NA
Percentage of cases where rent rebate for 15 days was given	100%	NA	NA	NA	NA	NA
Percentage of cases where rent rebate for 30 days was given	100%	NA	NA	NA	NA	NA

MTTR (Urban + Rural)	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Mean time taken to repair the fault in hours	≤ 10 Hrs	3.92	6.17	3.29	6.00	2.12

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

Live calling for fault repair						
Urban area	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Total Number of calls made		100	100	100	25	100
Number of cases where faults were repaired by next working day		98	89	100	25	100
Percentage cases where faults were repaired by next working day	≥ 85%	98%	89%	100%	100%	100%
Number of cases where faults were repaired within 5 days		100	100	100	25	100
Percentage cases where faults were repaired within 5 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Fault Repair (Rural & Hilly areas)	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Total Number of calls made		NA	NA	NA	NA	NA
Number of cases where fauls were repaired by next working day		NA	NA	NA	NA	NA
Percentage cases where faults were repaired by next working day	≥ 75%	NA	NA	NA	NA	NA
Number of cases where faults were repaired within 7 days		NA	NA	NA	NA	NA
Percentage cases where faults were repaired within 7 days	100%	NA	NA	NA	NA	NA

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

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

5.2 POI CONGESTION

POI Congestion						
Audit Results for POI Congestion - Consolidated						
POI congestion	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Total capacity of all POIs (Average of 3 months)		7026	5325	7198	NA	NA
Served traffic for all POI's (Average of 3 months)		4149	4890	4880	NA	NA
Traffic failed on all POI's (Average of 3 months)	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
POI congestion	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
No. of POIs not meeting benchmark (Avg. of 3 months)		0	0	0	NA	NA
Total number of working POIs (Avg. of 3 months)		26	31	49	NA	NA
Live measurement results for POI congestion						
POI congestion	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Total capacity of all POIs		7026	5325	7198	NA	NA
Served traffic for all POI's		3746	4890	4427	NA	NA
Traffic failed on all POI's	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%
POI congestion	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
No. of POIs not meeting benchmark		0	0	0	NA	NA
Total number of working POIs		26	31	49	NA	NA

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

In case of POI for Vodafone, there is no direct POI from Wireline MSC. All Calls are getting routed via InterMSC TGs with GSM MSCs. So, Total number of working POI is not present in the wireline system of Vodafone.

5.3 METERING AND BILLING CREDIBILITY

Metering and Billing credibility						
Audit Results for Billing performance						
Billing Performance	**Benchmark**	**BHARTI AIRTEL**	**MTNL**	**RCL**	**TTL**	**VODAFONE**
Billing diputes						
Total bills generated during the quarter		312831	29834	19458	5482	15921
Total number of bills disputed		5	7	2	0	0
Percentage bills disputed (Average of 3 billing cycles)	≤ 0.1%	0.00%	0.00%	0.01%	0.03%	0.00%
Resolution of billing complaints						
Total number of billing/charging complaints		5	7	2	0	0
Total complaints resolved in 4 weeks from date of receipt		5	7	2	0	0
Percentage complaints resolved within 4 weeks of date of receipt	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%
Total complaints resolved in 6 weeks from date of receipt		5	7	2	0	0
Percentage complaints resolved within 6 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%
Period of applying credit / waiver						
No. of complaints resolved in favour of the customer during the quarter		5	7	2	0	0
No. of complaints disposed on account of not considered as valid complaints		5	7	2	0	0
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

IMRB International | eTech

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

Live calling results for resolution of billing complaints						
Resolution of billing complaints	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Total Number of calls made		5	7	2	0	0
Number of cases resolved in 4 weeks		5	7	2	0	0
Percentage cases resolved in 4 weeks	≥ 98%	100.00%	100.00%	100.00%	100.00%	100.00%
Total complaints resolved in 6 weeks from date of receipt		5	7	2	0	0
Percentage complaints resolved within 6 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

5.4 RESPONSE TIME TO CUSTOMER FOR ASSISTANCE

Audit results for customer care						
Customer Care Assessment	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Total no. of call attempts to call centre / customer care nos.		113230	35678	34449	23456	26744
No. of calls connected and answered successfully to call centre / customer care nos.		113196	33609	33884	21899	25795
Percentage of calls getting connected and answered electronically	≥ 95%	99.97%	94.20%	98.36%	93.36%	96.45%
Audit results for customer care (voice to voice)						
Total no. of call attempts to call centre / customer care (voice to voice)		113230	35678	34449	23456	26744
No. of calls connected and answered successfully to call centre / customer care nos.		109573	34212	33576	20773	26201
Percentage of calls answered by the operators (voice to voice) within 90 seconds (Avg of 3 months)	≥ 95%	96.77%	95.89%	97.47%	88.56%	97.97%

Live calling results for customer care						
Customer Care Assessment	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Total Number of calls made		100	100	100	100	100
Total Number of calls getting connected and answered		100	96	99	100	95
Percentage calls getting connected and answered	≥ 95%	100.00%	96.00%	99.00%	100.00%	95.00%

Live calling results for customer care (Voice to Voice)						
Customer Care Assessment	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Total Number of calls received		100	100	100	100	100
Total Number of calls answered within 90 seconds		98	100	99	92	99
Percentage calls answered within 90 seconds	≥ 95%	98%	100%	99%	92%	99%

Data Source: Customer Service Center of the operators

5.5 TIME TAKEN FOR REFUND OF DEPOSITS AFTER CLOSURE

Audit results for refund of deposits						
Refund	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Total number of cases requiring refund of deposits		0	0	0	0	0
Total number of cases where refund was made within 60 days		0	0	0	0	0
Percentage cases in which refund was receive within 60 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%

Data Source: Billing Center of the operators

5.6 LIVE CALLING FOR LEVEL 1 SERVICES

Live calling for level 1 services						
Level 1 services	Benchmark	BHARTI AIRTEL	MTNL	RCL	TTL	VODAFONE
Total no. of calls made		300	300	300	300	300
Calls answered		297	291	294	291	300
Percentage of Calls answered	≥ 90%	99.00%	97.00%	98.00%	97.00%	100.00%

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

5.6.1 DETAILED LIVE CALLS MADE FOR LEVEL 1 SERVICES

Airtel					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		18	16
101	Fire	Y		18	16
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		17	16
1412	Public Road Transport Utility Service	Y		18	16
181	Chief Minister Helpline		N		
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		18	16
1064	Anti Corruption Helpline		N		
1070	Relief Commission for Natural Calamities	Y		17	16
1071	Air Accident Helpline	Y		18	15
1072	Rail Accident Helpline	Y		17	15
1073	Road Accident Helpline	Y		18	16
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		18	16
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		17	16
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling	Y		18	16
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		18	16
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		17	16
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		18	16

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		17	16
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		18	16
MTNL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	22
101	Fire		N		
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline	Y		27	21
138	All India Helpine for Passangers		N		
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline		N		
1033	Road Accident Management Service	Y		27	22
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		

IMRB International | eTech

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

1070	Relief Commission for Natural Calamities	Y		27	22
1071	Air Accident Helpline		N		
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)	Y		28	22
10121	Women Helpline	Y		27	21
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		27	21
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		28	22
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)	Y		27	21
112012	National Do Not Call Registry	Y		27	21
11212	Complaint of Electricity		N		
11216	Drinking Water Supply		N		
11250	Election Commission of India	Y		28	22

IMRB International | eTech

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

RCL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		25	24
101	Fire	Y		25	24
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		25	24
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		25	25
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		25	24
1071	Air Accident Helpline	Y		25	24
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		

IMRB International | eTech

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

10121	Women Helpline	Y		25	24
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		
10740	Central Pollution Control Board	Y		25	24
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		25	24
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline	Y		25	
155304	Municipal Corporations	Y		25	
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		25	24
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
TTL					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		27	24
101	Fire	Y		28	24
102	Ambulance		N		
104	Health Information Helpline		N		

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

108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		28	24
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		27	23
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	24
1071	Air Accident Helpline	Y		28	24
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline	Y		27	24
1077	Control Room for District Collector		N		
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline	Y		27	24
10127	National AIDS Helpline to NACO		N		
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	Mother and Child Tracking (MCTH)		N		

IMRB International | eTech

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

Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
10740	Central Pollution Control Board	Y		27	24
10741	Pollution Control Board		N		
1511	Police Related Service for all Metro Railway Project		N		
1512	Prevention of Crime in Railway	Y		27	24
1514	National Career Service(NCS)		N		
15100	Free Legal Service Helpline		N		
155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry		N		
11212	Complaint of Electricity	Y		27	24
11216	Drinking Water Supply		N		
11250	Election Commission of India		N		
Vodafone					
Level 1 Number	Type of Service	Working	Not Working	Calls Made	Calls Connected
100	Police	Y		30	20
101	Fire	Y		30	20
102	Ambulance		N		
104	Health Information Helpline		N		
108	Emergency and Disaster Management Helpline		N		
138	All India Helpine for Passangers	Y		30	20
1412	Public Road Transport Utility Service		N		
181	Chief Minister Helpline		N		
182	Indian Railway Security Helpline	Y		30	19
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		30	20
1071	Air Accident Helpline	Y		30	20
1072	Rail Accident Helpline		N		
1073	Road Accident Helpline		N		
1077	Control Room for District Collector	Y		30	19
10120	Call Alart (Crime Branch)		N		
10121	Women Helpline		N		
10127	National AIDS Helpline to NACO	Y		30	20
101212	Central Accident and Trauma Services (CATS)		N		
10580	Educationa & Vocational Guidance and Counselling		N		
105812	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		

IMRB International | eTech

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

155304	Municipal Corporations		N		
155214	Labour Helpline		N		
11203	Sashastra Seema Bal (SSB)		N		
112012	National Do Not Call Registry	Y		30	20
11212	Complaint of Electricity		N		
11216	Drinking Water Supply	Y		30	20
11250	Election Commission of India		N		

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

+91 (124) 4217300

www.imrbint.com