

# Objective Assessment of Quality of Services for (QoS) for Basic Wireline, Cellular Mobile (Wireless) and Broadband Service Providers - Orissa Circle

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## Preface

TRAI, the regulatory watch dog for the Quality of Service for the telecom services – Basic (Wireline), Cellular Mobile (Wireless) and Broadband has commissioned this study with the objective of measuring Quality of Services under the parameters as per the published notifications. The study, from the execution perspective, has been divided into two modules – Survey module and Audit module.

The Survey module has been commissioned with the objective of gauging the subscriber feedback on Quality of Services by way of primary survey and comparing them with quality of service benchmarks stipulated by TRAI. In addition, Survey module would also measure the compliance of 'Telecom Consumer Protection and Redressal of Grievances Regulations, 2007'.

The Audit module would assess the Quality of Service of telecom operators (Basic (Wireline), Cellular Mobile (Wireless) and Broadband services) by auditing the service level records maintained by the operators, conducting drive tests as well as live measurements and comparing them with quality of service benchmarks stipulated by TRAI.

For the ease of execution both the modules have been commissioned as two separate exercises. However, the findings of each module would feed into the justification of the other module.

The Survey and Audit modules for various circles within the Zones, due the sheer scale of data collection, have been distributed across various Half Yearly periods. IMRB International Auditors carried out Audits across Orissa, Himachal Pradesh, Jammu and Kashmir, Rajasthan, North East, Assam, Andhra Pradesh and Kerala circles in the second Half Yearly period 2008. **This report details the performance of various service providers in Orissa circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Basic (Wireline), Cellular (Mobile) and Broadband services**

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## **1.0 Background**

The Telecom Regulatory Authority of India (TRAI) has a critical mandate to protect the interest of telecom consumers in addition to various other functions bestowed upon it. As part of the license conditions to telecom operators, it has the power and authority to measure the Quality of Service provided by various govt. (BSNL & MTNL) and private telecom operators. The parameters that need to be measured for Basic (Wireline) and Cellular Mobile (Wireless) services have been specified in the TRAI notification on Quality of Services of Basic (Wireline) and Cellular Mobile (Wireless) services dated 1st July, 2005. The parameters for Broadband Service have been specified in the TRAI notification for Quality of Services of Broadband Service Regulation, 2006

IMRB has been engaged by TRAI for a period of 12 months starting January 2008 to assess the quality of services being provided by Basic (Wireline), Cellular Mobile (Wireless) and Broadband service providers.

The study is being conducted broadly in two modules. They are:

**Survey module:** To obtain subscriber feedback on quality of services by way of primary survey and to check the 'Implementation and effectiveness of Telecom Consumer Protection and Redressal of Grievances Regulations, 2007'

**Audit module:** To assess the quality of service of telecom operators (Basic (Wireline), Cellular Mobile (Wireless) and broadband services) by auditing the service level records maintained by the operators, conducting drive tests as well as live measurements and comparing them with quality of service benchmarks stipulated by TRAI

The present report highlights the findings for the Audit module for Orissa circle that was covered in the Quarter 3 (July – September 2008). The primary data collection and verification of records maintained by various operators of Basic (Wireline), Cellular Mobile (Wireless) and broadband services was undertaken by IMRB International during the period of August 2008 – November 2008.



***The study is being conducted broadly in two modules:  
(i) Survey module and  
(ii) Audit module***

## **2.0 Objectives and Methodology**

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). Following are the key activities undertaken by Auditors during the Audit process conducted at the operator's premises



***All Network related and Non network related parameters notified by TRAI in various regulations were Audited***

1. **Verification of the data submitted by service providers:** This involved verification of the quarterly Performance Monitoring Reports (PMR's) and monthly Point of Interconnect (POI) Congestion reports being submitted by various service providers. The raw data in the records maintained by service providers was audited to assess the book keeping methodology.
2. **Live measurement for three days:** Network performance of service providers was assessed for three days in the month in which the Audit was carried out. Live figures from the server/ NMS software were recorded for various network related parameters.
3. **Data verification for the month in which Audits were carried out:** Subsequent to the visits for Audit during the live measurement at various Exchanges/ISP Nodes/Exchanges, data for all the network and Non network related parameters was collected from various service providers for the complete month in which the Audit was carried out. Raw data/records pertaining to these were also verified on sample basis to check the veracity of data provided by the operators.
4. **Drive tests:** Operator assisted and Independent drive test were conducted in three city as per the norms stated in the tender.
5. **Live calling:** Live testing was done on a sample basis to check efficiency of the customer care, inter operator call assessment, Back check calls for service provisioning and fault repair

- Any changes or discrepancies found in the methodology were reported to the service providers and changes were suggested by IMRB Auditors.
- Separate formats were designed each for Basic (Wireline), Cellular mobile (Wireless) and Broadband services to collect the information on various parameters (Please refer to Annexure)

### **3.0 Sampling methodology**

#### **3.1 Sampling for Basic (Wireline) services**

- BSNL was the only operator providing Wireline services in Orissa circle. Besides BSNL RCOM also provides Wireline connections but only to its internal customer i.e. RTL
- For BSNL the sample of exchanges was selected was spread across 10% of SDCA's in the entire service. Overall 60 exchanges (12 Urban and 48 Rural) exchanges were audited.

#### **3.2 Sampling for Cellular Mobile (Wireless) service providers**

Data pertaining to 100% of the Gateway MSC's (GMSC's) and Mobile Switching Centres (MSC's) of all the Cellular Mobile Service Providers or Unified Access Service Providers (UASP) was collected and verified in specified circles/service areas. Following are the various operators covered in Orissa circle

- Bharti Airtel Ltd.
- Reliance communications
- Reliance Telecommunications
- Aircel
- BSNL
- Idea Cellular

#### **3.3 Sampling for Broadband service providers**

- BSNL and Ortel are two operators offering Broadband services in Orissa circle
- Audit was conducted at the central node in Orissa and data submitted by various exchanges/POPs providing Broadband service was verified and collected. This was done in such a way that atleast 5% of POPs spread across 10% of SDCA's were covered
- For BSNL, the data pertaining to network related parameters was obtained by IMRB Auditors at the central node in Bangalore.

## **4 Audit methodology**

### **4.1 Basic (Wireline) Services**

Following table explains the audit methodology for Basic (Wireline) services:-

<b>Sl. No.</b>	<b>Parameters</b>	<b>One month data verification</b>	<b>Live measurement</b>	<b>Live calling</b>
1	Provision of telephone after registration of demand	YES	----	YES
2	Fault incidence/clearance related statistic	YES		
2.1	- Total number of faults registered per month	YES		YES
2.2	- Fault repair by next working day	YES		YES
3	Mean Time to Repair (MTTR)	YES		
4	Call Completion Rate (CCR)	YES	YES	
5	Metering and billing credibility – billing complaints	YES		YES
6	Customer care promptness	YES		
6.1	- Shifting of telephone line	YES		YES
6.2	- Processing closure request	YES		YES
6.3	- Processing of additional supplementary services	YES		YES
7	Response time to customer	YES		
7.1	- While call is electronically answered	YES		YES
7.2	- While call is answered by operator (voice to voice)	YES		YES
8	Time taken to refund of deposits after closure	YES		YES

\* In addition to above verification of records for PMR submitted during April to June 2008 was carried out for all network and non network related parameters.

{**Note:** - A more detailed explanation of parameter wise audit methodology for Basic (wireline) services is explained in Annexure II}

## 4.2 Cellular Mobile Services

In a nutshell the following activities were done while auditing for various parameters for Cellular Mobile Services:

S.no	Parameter	AS REPORTED IN PMR	AS FOUND IN ACTUAL RECORDS AFTER VERIFICATION	AS FOUND IN VERIFICATION FOR THE MONTH OF AUDIT	AS FOUND IN 3 DAY LIVE MEASUREMENT DATA	LIVE CALLING	OPERATOR ASSISTED DRIVE TESTS	INDEPENDENT DRIVE TESTS
<b>A</b>	<b>Network Performance</b>							
<b>A (i)</b>	Accumulated down time of community isolation	Yes	Yes	Yes				
<b>A (ii)</b>	Call setup success rate (within licensee own network)	Yes	Yes	Yes	Yes		Yes	Yes
<b>A (iii)</b>	Service Access Delay	Yes	Yes	Yes				
<b>A (iv)</b>	Blocked Call Rate	Yes	Yes	Yes	Yes		Yes	Yes
<b>A (v)</b>	Call Drop rate	Yes	Yes	Yes	Yes		Yes	Yes
<b>A (vi)</b>	% Connections with good voice quality	Yes	Yes	Yes			Yes	Yes
<b>A (vii)</b>	Service Coverage	Yes	Yes	Yes			Yes	Yes
<b>A (viii)</b>	PoI Congestion	Yes	Yes	Yes				
<b>B</b>	<b>Customer Helpline</b>							
<b>B (i)</b>	Response time to the customer for assistance	Yes	Yes	Yes		Yes		
<b>C</b>	<b>Billing Complaints</b>							
<b>C (i)</b>	Billing complaints per 100 bills issued	Yes	Yes	Yes				
<b>C (ii)</b>	%age of billing complaints resolved within 4 weeks	Yes	Yes	Yes		Yes		
<b>C (iii)</b>	Period of all refunds/payments due to customers from date of resolution as in (ii) above	Yes	Yes	Yes		Yes		

{Note: A more detailed explanation of parameter wise audit methodology for Cellular Mobile services is explained in Annexure II}



### 4.3 Broadband Services

In a nutshell, the audit methodology was as follows:

	Parameters	Verification of PMR	Three day live measurement	Data Verification for one month	Live calling
(i)	Service Provisioning/ Activation time	YES	YES	YES	YES
(ii)	Fault Repair/ Restoration Time	YES	YES	YES	YES
(iii)	Billing Performance				
-	Billing Complaints per 100 Bills issued	YES	YES	YES	
-	%age of billing complaints resolved in four weeks	YES	YES	YES	YES
-	Time taken for refund of deposits after closure	YES	YES	YES	YES
(iv)	Response time to the customer for assistance(Voice to Voice)				
-	<i>Within 60 seconds &gt; 60%</i>	YES	YES	YES	YES
-	<i>Within 90 seconds &gt; 90%</i>	YES	YES	YES	YES
(V)	Bandwidth Utilization/ Throughput:				
▪	<i>A)Bandwidth Utilization</i>				
-	POP to ISP gateway Node [Intra – network] Links	YES	YES	YES	
-	ISP Gateway Node to IGSP / NIXI Node upstream Link(s) for international connectivity	YES	YES	YES	
▪	<i>B) Broadband Connection Speed (Download)</i>	YES	YES	YES	YES
(vi)	Service availability / Uptime	YES	YES	YES	
(vii)	Packet Loss	YES	YES	YES	
(viii)	Network Latency for wired broadband access)				
-	<i>User reference point at POP / ISP Gateway Note to International Gateway (IGSP/NIXI)</i>	YES	YES	YES	
-	<i>User reference point at ISP Gateway Node to International nearest NAP port abroad ( Satellite)</i>	YES	YES	YES	
-	<i>User reference point at ISP Gateway Node to International nearest NAP port abroad ( Satellite)</i>	YES	YES	YES	

{Note: A more detailed explanation of parameter wise audit methodology for Broadband services is explained in Annexure II}

## 4.4 Audit Limitations

Despite having a wide scope of work, we have found following problems that may impair the comparison across operators. As mentioned earlier we have suggested changes to operators, which will allow comparison in future. TRAI has already suggested a book keeping methodology and practical ways to the operators (within the spirit of QoS definition), also there has been previous rounds of Audit being conducted by different independent audit agencies (including IMRB) which had enabled comparison of the findings but still some variations were observed in methodologies and understanding of parameters among service providers (especially for Broadband services where Audit was carried out for the first time). Hence, the data reported in here has to be used carefully in the light of variation in testing.

- 1. Complete data not being maintained:** In certain cases lack of availability of the data with the service providers rendered verification of raw data unfeasible and verification was done to the extent possible. For e.g. for network related parameters for Broadband services service providers could not produce old raw data files for ping tests, download speed etc
- 2. Difference in measurement methodology:** For some cases, calculation methodology for some of the parameters was found to be different across various service providers.
- 3. Technical unfeasibility:** There were cases observed where service providers expressed technical unfeasibility to provide the data required as according them their current system does not support the data being maintained/ recorded in the desired form. For e.g. Service providers were unable to provide data on service access delay and signal coverage from OMC for cellular mobile services. Hence, data was collected from the results of recent drive tests being conducted by various service providers
- 4. Decentralized system for book keeping:** In certain cases, book keeping of records was found to be decentralized. This was largely observed for call centre performance for BSNL, where required data was not available with the exchanges and hence data could not be collected for the same. Also for some service providers who have call centralized call centres located at places away from ISP Nodes/Exchanges detailed raw data i.e. call by call detail was not available for verification. Hence verification of records was done to the extent possible in such cases.
- 5. Difference in level of reporting to TRAI:** Some of the large Broadband service providers were observed to be reporting their performance on various parameters to TRAI at an all India level. They claimed that since they are providing gateway service to other small service providers, they are "Category A" service providers and consider entire India as one circle. Data for some of the parameters was provided by these operators on All India basis.

## 5 Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Basic (Wireline), Cellular mobile and Broadband service providers during the period starting from September 2008 to November 2008 in Orissa circle. The executive summary encapsulates the key findings of the Audit by providing: -

- “Service provider performance report” for Basic (Wireline), Cellular mobile and Broadband service , which gives a glimpse of the performance of various operators against the benchmark specified by TRAI, during the month in which the Audit was carried out by IMRB Auditors
- “Parameter wise critical findings” for Basic (Wireline), Cellular mobile and Broadband services: This indicates key observations and findings from different activities carried out during the Audit process

### 5.1 Service provider performance report based on one month data verification – Basic (Wireline) Services

S.no	Parameters	B'mark	BSNL
<b>1</b>	<b>Provision of telephone after registration of demand</b>		
1.1	Connections completed within 7 days	100%	69%
<b>2</b>	<b>Fault incidence/clearance statistics</b>		
<b>3</b>	<b>Fault incidences(No. of faults/100 subscribers/month)</b>	<3	4.8
3.1	Faults repaired within 24 hours	>90%	41%
3.2	Faults repaired within three working days	100%	85%
4	Mean time to Repair (MTTR)	<8 hours	18.34
5	Call Completion Rate (CCR)	>55%	83%
<b>6</b>	<b>Metering and billing credibility</b>		
6.1	Billing complaints per 100 bills issued	<0.1%	0.02%
6.2	%age of billing complaints resolved within 4 weeks	100%	60%
<b>7</b>	<b>Customer care/helpline promptness</b>		
7.1	<u>Shift requests attended</u>		
	Shift requests attended within 3 days	95%	60%
7.2	<u>Closure request attended</u>		
	Closure within 24 hours	95%	77%
7.3	<u>Supplementary (additional) service requests attended</u>		
	Additional facility provided within 24 hours	95%	88%
<b>8</b>	<b>Response time to customer for assistance</b>		
8.1	% age call answered through IVR in 20 seconds	80%	Data Not available at the exchanges
	% age call answered through IVR in 40 seconds	100%	
8.2	% age calls answered by operator in 60 seconds	80%	
	% age calls answered by operator in 90 seconds	95%	
<b>9</b>	<b>Time taken for refund of deposits after closure</b>		
9.1	%age cases where refund received within 60 days	100%	74%

(\*Note: For BSNL data pertains to the sample 5% of exchanges audited during the period of to September to November 2008, whereas for rest of the operators figures pertain to all the exchanges present in the circle)

\*\* Methodology not in line with QoS

■ Figures provided on All India basis

■ Not meeting the benchmark

**B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA**: Not Applicable

### **Critical findings and Key take outs: Basic (Wireline) services**

BSNL is the only operator providing Basic (Wireline) Services in Orissa circle to retail customers. During the audit process it was observed that the service provider could not meet TRAI specified on most of the parameters specified by TRAI.

The live calling results were found to be different from the 1 month audit data collection in certain places. To some extent the difference can be attributed to the smaller sample size undertaken for the live calling. For live measurements conducted to assess Call Completion Rate (CCR) it was found that the service provider meets the TRAI specified benchmark with CCR during three days observed to be 83%.

For verification of raw data for the period of April to June 2008, there was variation observed when compared to the figures reported in the PMR. But the same was largely due to the fact that audit was carried out only for sample 5% exchanges in Orissa circle

The parameter wise key takeouts for the Wireline service providers for the Orissa circle are as under:-

#### Provision of telephone after registration of demand

- In Orissa circle, the service provider falls short of TRAI specified benchmark with a score of 69%. Service provider score on live calling was also poor with 47% of the total subscribers called claiming that connection was provided to them within the time period stipulated by TRAI.

#### Fault incidence / clearance statistics

- Fault repair remains pain point as only 41% of the total calls registered in the sample exchanges were repaired within 24 hrs which is significantly short of TRAI specified benchmark of >90%.
- For live calling carried out by IMRB auditors only 64% of subscribers claimed that fault was repaired within 24 hrs.
- Even for fault repair within 3 days BSNL falls short of the TRAI specified benchmark with a score of 85%.
- Part reason of service provider poor performance on this parameter can be attributed to the fact that in remote areas of Orissa prompt action on faults becomes difficult due to accessibility issues.

#### Traffic statistics (CCR)

- BSNL comfortably meets the benchmark on this parameter both during month in which audit was carried out and three days when live measurement was carried out in auditor's presence

#### Metering and billing credibility

- The service provider (BSNL) meets TRAI specified benchmark with percentage billing complaints being less than 0.1% of the total bills generated.

- However only 3 of the total 5 billing complaints reported in the exchanges were resolved in four weeks

Customer care/helpline promptness

- Attention is also required on the promptness of customer care as BSNL falls short of TRAI specified benchmark for time taken to attend shift, closure and supplementary services requests for the month in which audit was carried out

Response time to customer for assistance

- Data on number of calls received and calls answered was not available at the exchanges audited in Orissa circle
- However for the live calling carried out by IMRB auditors service provider comfortably meets the TRAI specified benchmark

Time taken for refund of deposits after closure

- Only 74% of the total cases eligible for refund of deposits were paid during the time period stipulated by TRAI

Level 1 service

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers. 230 calls were made for BSNL to different numbers and time taken to answer the call was noticed. Out of which approximately 77% of calls made were answered in 60 seconds.

### 5.2 Service provider performance report based on one month data verification: Cellular Mobile Services

Parameters	Benchmark	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
<b>Accumulated downtime for community isolation</b>	< 24 hrs.	0.20	6.80	0.00	14.72	0.00	22.83
<b>Call Set Up Success Rate (CSSR)</b>	> 95%	99.42%	97.74%	98.46%	97.86%	97.03%	Report could not be generated by the operator
<b>Service Access Delay*</b>	9 to 20 seconds (< = 15 seconds for 100 calls)	14.00	11.24	8.00	15	10.29	14.08
<b>Blocked Call Rate</b>							
<i>SDCCH/Paging Channel Congestion</i>	<1%	0.00%	0.98%	0.00%	0.00%	0.67%	0.72%
<i>TCH Congestion</i>	< 2%	0.58%	0.02%	1.88%	0.14%	0.95%	1.90%
<b>Call drop rate</b>	< 3%	0.77%	1.42%	2.53%	1.25%	1.20%	1.49%
<b>Percentage connections with good voice quality*</b>	> 95%	99%	94%	97%	98%	88%	94%
<b>Service coverage*</b>							
<i>In door</i>	>-75dbm	Complied	Complied	Complied	Complied	Complied	Complied
<i>In vehicle</i>	>-85dbm						
<i>Out door - in city</i>	>-95dbm						
<b>POI congestion</b>	< 0.5%	Complied	Complied	Complied	Complied	Complied	Complied
<b>Calls answered electronically</b>							
Percentage calls answered within 20 seconds	80%	99%	84%	100%	100%	DNP	100%
Percentage calls answered within 40 seconds	95%	99%	98%	100%	100%	DNP	100%
<b>Calls Answered by the operator</b>							
Percentage calls answered within 60 seconds	80%	94%	83%	99%	96%	94%	99%
Percentage calls answered within 90 seconds	95%	97%	97%	100%	99%	95%	Not Measured
<b>Billing Complaints</b>							
Billing complaints per 100 bills issued	<0.1%	0.09%	0.00%	0.07%	No Billing Complaints received	0.16%	No Billing Complaints received
Percentage billing complaints resolved within 4 weeks	100%	100%	100%	100%		100%	
Period of refunds/payments due to customers from the date of resolution of complaints	<4 weeks	100%	100%	Not Applicable		100%	

\*Details pertaining to these are obtained through operator assisted drive tests. Results of the drive tests are explained in greater detail in critical findings

\*\* Methodology not in line with QoS



Figures provided on All India basis



Not meeting the benchmark

**B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA**: Not Applicable

### Critical findings: Cellular Mobile Services

The audit for cellular mobile service providers were conducted at their respective MSCs in the Orissa circle apart from Reliance Communication whose audit was conducted at their central NOC at Mumbai.

It should be noted that most of the service providers claimed that they were submitting the PMR basis their inference of the QoS parameters. However, we need to take a larger view of the picture and ignore some differences in measurement methodologies. We believe that book keeping is bound to get better as more such Audits will be carried out in subsequent quarters as mandated by TRAI.

The audit involved a three stage verification process which consisted of auditing the records of the service providers and verifying the data submitted to TRAI. The second step involved a three day live measurement of all the network parameters. Finally basis the three day live measurement the auditors needed to find out the busy hour for the service provider and collect the hourly data for this busy hour for the month in which the audit was conducted.

#### Busy Hour of Various Service Providers

Service Provider	Reported Time Consistent Busy Hour	Network Busy Hour found in 3 day live measurement
Bharti	1800 – 1900	1800 – 1900
BSNL	1900 – 2000	1900 – 2000
RCOM	1800 – 1900	1800 – 1900
RTL	1900 – 2000	1900 – 2000
TATA	1900 – 2000	1900 – 2000
Aircel	1900 – 2000	1900 – 2000

The TCBH reported by all the service providers matched the network busy hour calculated by IMRB auditors for the Orissa circle.

#### Accumulated Downtime:

In the Orissa circle, there were outages that led to a community being isolated at a particular point in time for all the operators except Airtel. However, for Aircel the figure is zero because the operator claimed that whatever outages occurred did not lead a community to be isolated for more than an hour. Reliance GSM had the maximum outage in the month of audit with an outage of close to 23 hours observed.

#### Call Set-up Success Rate (CSSR):

All the operators were comfortably meeting the benchmark on this parameter. However, the data for Reliance GSM could not be generated from their switch. During the audits the maximum CSSR was observed for Reliance CDMA with 99.42% of their calls getting completed. All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Service Access Delay:

This parameter is reported to TRAI basis the period drive tests that are conducted by the service providers during that quarter. It is measured using a drive test tool kit and a protocol analyzer. Also, all the operators follow the TRAI specified mechanism for measuring the parameter. During the drive test, none of the operators were found to be using engineering hand sets. The highest service access delay was observed for TTSL at 15 seconds.

Network Congestion parameters:

SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators are meeting the TRAI specified on the congestion parameters. TTSL leads the way in network congestion parameters with almost negligible paging as well as traffic channel congestion. The calculation methodology of these parameters was found to be in complete accordance with what has been specified by TRAI. There was almost 0 POI congestion on almost all individual POI links between a service provider vis-à-vis other service providers.

Call Drop Rate:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped (unexpected seizure) to the total number of call attempts for all operators. Also, all of service providers were found to be meeting the TRAI specified benchmark. The highest call drop rate was of Aircel at 2.53%.

% connections with good voice quality:

Almost all of the operators are measuring these parameters via their periodic drive tests. During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. Drive test was conducted by IMRB with the help of service providers to measure this parameter. In the drive test it was found that Airtel with 88%, BSNL and Reliance GSM with 94% score on percentage connections with good voice quality did not meet the TRAI benchmark.

Service coverage:

This parameter is reported by the service provider basis the periodic drive tests in a particular circle. The service coverage for all the operators was found to be within the TRAI specified limits for 100% of the drive test route (for which the audit was conducted). However, there were places where interference and inadequate coverage was recorded (explained in greater detail along with drive test findings).

Customer Care / Helpline Assessment

For both the IVR and voice to voice aspect all the service providers meet the TRAI benchmark. However, in case of Reliance CDMA no breakup of IVR calls by circle is present. The figure reported is for all India level. Also, RCOM claimed that whatever calls cannot be routed to the IVR is directly routed to the voice to voice operator. For Airtel, no data for percentage calls answered within 20 and 40 seconds electronically was available.



Billing performance

All the operators except Airtel were found to be meeting the benchmark of < 0.1% complaints registered per 100 bills issued and the benchmark of 100% billing complaints being resolved within 4 weeks. In all cases where customers were due for refund, all the service providers meet the TRAI benchmark of 100% with 4 weeks. Reliance GSM and TTSL claimed that they did not receive a single billing complaint for the month of audit.

Inter operator calls assessment

Inter operator call Assessment (To ↓ / From→)	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Reliance CDMA	NA	100%	96%	100%	96%	100%
BSNL GSM	79%	N.A	93%	100%	97%	96%
Aircel GSM	91%	100%	NA	100%	99%	94%
TTSL CDMA	89%	100%	90%	NA	97%	100%
Airtel GSM	92%	100%	100%	90%	NA	100%
Reliance GSM	100%	100%	100%	99%	95%	N.A

In the inter-operator call assessment, calls were made from the test sims of service provider whose audit was being conducted to all the other service providers. Reliance CDMA found connecting to a BSNL number the toughest with only 79 out of 100 calls getting established. It was also observed that in only 90% of the cases a call from Aircel got connected to a TTSL number. All of BSNL's calls to other operators got connected. 90% of calls from TTSL got connected to an Airtel number. 95 out of 100 calls from an Airtel to Reliance GSM number were connected while 94 out of 100 Reliance GSM calls to an Aircel number got connected.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Orissa circle. There was in total of three drive tests conducted in the circle. These tests were conducted in the cities of Bhubhaneshwar, Behrampur and Bhadrak. IMRB auditors were present in vehicles of every operator. A sample of 15 – 30 test calls were made along each of the routes. The holding period for all test calls was between 120 seconds to 180 seconds. The drive test vehicle across all routes plied at a speed of less than 20 km per hour. Taking into consideration the route that was taken for the drive test; most of the major areas of Orissa telecom circle were covered.

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 > -75dbm for indoor, -85 dms for in-vehile and > -95 dbm outdoor routes.

The drive tests in the Orissa circle were conducted in the cities of Bhubhaneshwar, Behrampur and Bhadrak was conducted along the following route:

Mysore	Type of Location	Bhubhaneshwar	Behrampur	Bhadrak
Outdoor	Periphery of the city	Nayapalli-Khandagiri-Jagmohan nagar-Pokhariput-Samantarapur	SMIT(Ankushpur)-Kathamentu chaka-Old Berhampur Main rd- Nilakanthanagar-Andhapasara rd-(New mango Mkt)-Gosaninuagaon-PVN Rao Petrol pump-Giri road-TATA benz sqr	Gelpur-Bonth Chowk-Sanabaghurai-Salandi Overbridge-Dahanigadia-Salandi bypass-Haladiha Bypass-Bankabazar Chowk
	Congested Area	Samantarapur-Rabi talkies Chhak-Kalpana-Jharapada-Jayadurga nagar-Rasulgarh	TATA Benz sqr-Komapalli-Courtpeta sqr-Medical chaka-Gajapatinaragar sqr(Hanuman Mandir)-Bsudevsnagar-Brajanagar-Bank Colony-Lochapada main rd(Radiosatio)-Tulsinagar(Aska rd)	Sanabaghurai-Januganj- Salandi Overbridge-Dahanigadia-Railway Station-Rice Mill-Bankabazar Chowk – Chandanbazar-Kacheri raod
	Across the City	Rasulgarh-Vanivihar-Rupali square-rama Mandir-Master canteen-Raja Mahal square-AG Chhak-Acharya vihar-Sainik school chhak-Kalinga hospital chhak-Jayadev vihar-Rajbhavan square-Delta chhak-Fire Station chhak-rental colony-Nayapalli(N4)	(Bigbazar)-Giri market chhak-Berhampur Municipality office-Rukmini hall-Sai complex Gandhinagar-Congress office sqr-SBI sqr-Hatibandha sahi sqr(Jaganath mandir)-Kalimandir New Bus stand-ashok nagar-Godavaris nagar-Cooperative colony-TATA benz chanka	Dahanigadia-Chhapulia Bypass-Goshala Chowk-Nuabazar-OT Market – Collectorate-Apartibindha Chowk – Treasury office – Aradi Chowk
Indoor	Office Complex	IDCO tower	IDBI Building	Syndicate Bank
	Shopping Complex	TMS, Rabi Talkies	Sai Complex	Tarini Paridhan

The tables given below gives a glimpse of the results of the operator assisted drive test:

**Drive Test – Bhubhaneshwar**

	Reliance CDMA		BSNL GSM		Aircel GSM		TTSL CDMA		Airtel GSM		Reliance GSM	
	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	99.64%	91.53%	95.73%	95.62%	96.42%	96.30%	99.57%	96.57%	85.72%	85.92%	95.46%	91.41%
CSSR	100.00%	99.49%	100.00%	100.00%	100.00%	97.42%	100.00%	100.00%	94.29%	93.83%	94.44%	97.73%
Blocked Call Rate	0.00%	0.51%	0.00%	0.00%	0.00%	2.58%	0.00%	0.00%	5.71%	6.17%	5.56%	2.27%
Call drop rate	0.00%	0.00%	0.00%	0.00%	3.03%	0.53%	0.00%	0.00%	0.00%	0.66%	2.94%	3.49%
Hands off success rate	Complied		Complied		Complied		Complied		Complied		Complied	

**Drive Test – Behrampur**

	Reliance CDMA		BSNL GSM		Aircel GSM		TTSL CDMA		Airtel GSM		Reliance GSM	
	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	99.35%	98.12%	95.49%	93.79%	99.09%	96.01%	99.72%	98.00%	90.83%	87.25%	95.61%	91.92%
CSSR	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	95.74%
Blocked Call Rate	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	4.26%
Call drop rate	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.79%	0.00%	2.59%	0.00%	0.73%
Hands off success rate	Complied		Complied		Complied		Complied		Complied		Complied	

**Drive Test –Bhadrak**

	Reliance CDMA		BSNL GSM		Aircel GSM		TTSL CDMA		Airtel GSM		Reliance GSM	
	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	98.36%	97.25%	92.52%	93.39%	96.93%	96.65%	99.78%	98.76%	93.70%	93.71%	99.25%	95.98%
CSSR	100.00%	100.00%	100.00%	100.00%	100.00%	98.45%	100.00%	100.00%	88.24%	96.43%	100.00%	100.00%
Blocked Call Rate	0.00%	0.00%	0.00%	0.00%	0.00%	1.55%	0.00%	0.00%	11.76%	3.57%	0.00%	0.00%
Call drop rate	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	2.96%	0.00%	0.00%
Hands off success rate	Complied		Complied		Complied		Complied		Complied		Complied	

■ Not meeting the benchmark

Following were the areas where the signal strength was found to be inadequate for the operators:

### ALL SERVICE PROVIDERS

**Bhubhaneshwar:** There was interference and low signal strength recorded for all operators in the outdoor areas of Lewis Nagar while in the indoor areas inadequate coverage was not found in any of the areas.


**Behrampur & Bhadrak:** There was no interference and low signal strength recorded for any of the operators in the outdoor areas as well as the indoor areas.

### Conclusions:

1. Bharti does not meet the TRAI benchmark in all the three cities on percentage connections with good voice quality. It also does not meet the CSSR and blocked call rate benchmark in Bhubhaneshwar and Bhadrak
2. Reliance GSM does not meet the percentage connections with good voice quality benchmark in the outdoor areas of Bhubhaneshwar and Behrampur
3. BSNL does not meet the percentage connections with good voice quality benchmark in the outdoor areas of Behrampur and in the indoor as well as outdoor areas of Bhadrak
4. Aircel does not meet the TRAI benchmark in Bhubhaneshwar on blocked call rate and call drop rate

### Summary of Live Measurement Results – Cellular Mobile Services

Parameter	Benchmark	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
CSSR	> 95%	99.46%	98.04%	98.92%	93.86%	97.12%	No data given by operator
SDCCH / Paging Channel Congestion	< 1%	0.00%	1.00%	0.10%	0.00%	1.41%	0.32%
TCH Congestion	< 2%	0.54%	0.19%	0.33%	0.10%	0.54%	1.75%
Call drop rate	< 3%	0.77%	1.22%	1.80%	1.14%	1.30%	1.13%
POI congestion	< 0.5%	Complied	Complied	Complied	Complied	Complied	Complied

 Not meeting the benchmark

During the three day live measurement, all the operators were found to be meeting the TRAI benchmark on all the parameters except BSNL and Airtel on SDCCH congestion and TTSL on CSSR.

**Summary of TCH congestion for one month Audit period**

<b>Parameter</b>	<b>Reliance CDMA</b>	<b>Aircel</b>	<b>TATA</b>	<b>Airtel</b>	<b>BSNL</b>	<b>Reliance GSM</b>
<b>Total number of cells</b>	406	4565	412	7103	3668	DNP
<b>No. of cells exceeding 3% TCH drop</b>	3	1250	38	987	363	DNP
<b>% of cells exceeding 3% TCH Drop</b>	1%	27%	9%	14%	10%	DNP

27% of Aircel cells exceed 3% TCH drop. The same is as high as 14% for Airtel and 10% for BSNL. Only 1% Reliance CDMA cells exceed 3% TCH drop. The data for reliance GSM was not provided by the operator

### 5.3 Service provider performance report based on one month data Verification – Broadband Services

S.No	Parameters	B'mark	BSNL	Ortel
1	<b>Service provisioning uptime</b>			
1.1	Total connections registered		1286	673
1.2	Percentage connections provided within 15 days	100%	87%	100%
2	<b>Fault repair restoration time</b>			
2.1	Total number of faults registered/calls made		2154	10845
2.2	Percentage faults repaired by next working days	> 90%	57%	89%
2.3	Percentage faults repaired within three working days	99%	77%	100%
3	<b>Billing performance</b>			
3.1	Total bills generated		18115	17553
3.2	Billing complaints per 100 bills issued	<2%	0.22%	1.85%
3.3	%age of billing complaints resolved within 4 weeks	100%	45%	100%
3.4	Time taken for refund of deposits after closure	100%	89%	0%
4	<b>Customer care/helpline assessment</b>			
4.1	Percentage calls answered within 60 seconds	> 60%	100%	92%
4.2	Percentage calls answered within 90 seconds	>80%	100%	100%
5	<b>Bandwidth utilization/Throughput</b>			
5.1	Total number of intra network links tested		23 BRAS, TI 24, T2624,DSLAM 5960	3
5.2	Total number if intra network links crossing 90%		0	0
	<i>Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)</i>			
5.3	Total number of upstream links		141	Upstream bandwidth hired from Bharti and RCOM
5.4	Number of upstream links > 90%		8	
5.5	Percentage bandwidth utilised on upstream links	<80%	70%	72%
6	<b>Broadband download speed</b>	>80%		
7	<b>Service availability/uptime</b>	>98%	Complied	Complied
8	<b>Packet loss</b>	<1%	0%	0%
9	<b>Network Latency</b>			
9.1	POP/ISP Node to NIXI to IGSP	<120msec	<120	<50
9.2	ISP node to NAP port	<350msec	Complied	<300

\*\* Methodology not in line with QoS

■ Figures provided on All India basis
 ■ Not meeting the benchmark

B'mark = TRAI Benchmark, DNA = Details not available, NA: Not Applicable

### **Critical findings and Key take outs: Broadband services**

Before concluding the Audit findings for Broadband services we would like to accentuate the fact that the Broadband audit process was being carried out for the first time by an independent audit agency in the circle. BSNL and Ortel are the only two operator offering Broadband services in Orissa circle

BSNL (for network related parameters) claimed to be category "A" service provider and consider all India as one circle. In fact the findings reported herewith for network related parameters for the operators are on an all India basis.

The key conclusions (Parameter wise) emerging out from the Audit exercise of Broadband service providers are highlighted below

#### Service provisioning/Activation time

- BSNL (87%) marginally fall short of TRAI benchmark of 100% connections to be provided within 15 days.
- Live calling results for BSNL and Ortel are observed to be 89% and 48% respectively.

#### Fault Repair/Restoration time

- BSNL (57%) and Ortel (89%) are falling below the benchmark for fault repair within next working day.
- For fault repair within three working days as well BSNL (77%) was found to be not meeting the benchmark.
- TRAI can consider including Mean Time to Repair (MTTR) for faults as one of the parameters for measuring Quality of Services (QoS) in future for Broadband services as well.
- Live calling scores for fault repair within 24 hrs are observed to be 48% and 11% for BSNL and Ortel respectively.

#### Billing performance

- BSNL was found to be not meeting the benchmark of 4 weeks for resolution of billing complaints for the month in which data was collected.
- For Ortel none of the 39 cases in which refund was supposed to be provided was closed in time period stipulated by TRAI

#### Customer Care/Helpline Assessment

- Both the operators meet the benchmark of calls answered by the operator within 90 and 60 seconds.
- However, for live calling Ortel scores are observed to be abysmally low with only 28% calls answered in 60 seconds and 57% calls answered in 90 seconds



Bandwidth Utilisation:

- Both the service providers were found to be using Multiple Router Traffic Grapher (MRTG) to measure the bandwidth utilisation at intra network links.
- Both the service providers were found to be reporting combined bandwidth utilisation for corporate and household customers as there is no mechanism available to provide it separately for different users.
- For Intra network link, data for BSNL was obtained on all India basis. It was observed that all the links (tested during three day live measurement) in the access segment for both the service providers were found to be below 80%.
- For Bandwidth utilisation on upstream links both the operators meet the TRAI specified benchmark

Download speed

- Also, during live measurements carried out at Pop's/ISP Node it was observed that all the operators are meeting the TRAI prescribed benchmark of greater than 80% speed available to the customer.
- However, no historic data was available for verification of records for month of Audit as well as quarter ending April to June 2008 with the service providers. Most of them claimed that they are reporting to TRAI basis live tests conducted at customer premises during field visits and tests conducted at POPs/ISP Node.

Service Availability/Uptime:

- Both the service providers are meeting the benchmark on service availability/uptime for the month in which audit was carried out.
- There was no occasion observed when Broadband access network was in state of failure for both the operators for the month in which audit was carried out.

Packet Loss and Network Latency

- Due to non availability of the records of old ping tests, verification process could not be conducted for Ortel
- However, ping tests conducted/smoked ping results during live measurements revealed that both the service providers are meeting the benchmark prescribed by TRAI.

## Summary of Live Measurement Results – Broadband Services

Parameters	Benchmark	BSNL	Ortel
Service Availability Uptime	>98%	100.00%	100.00%
No of <b>Intra network links</b> found to be above 90% (Out of sample links tested)		0	0
Total Bandwidth utilization at all upstream links	< 80%	83%	73%
Data Download Speed	> 80%	Complied	Complied
Packet Loss (Percentage)	< 1%	<1%	<1%
From user reference point at POP/ISP Node to IGSP NIXI (msec)	<120msec	Complied	<50
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	Complied	<300

\*\* Methodology not in line with QoS

■ Figures provided on All India basis

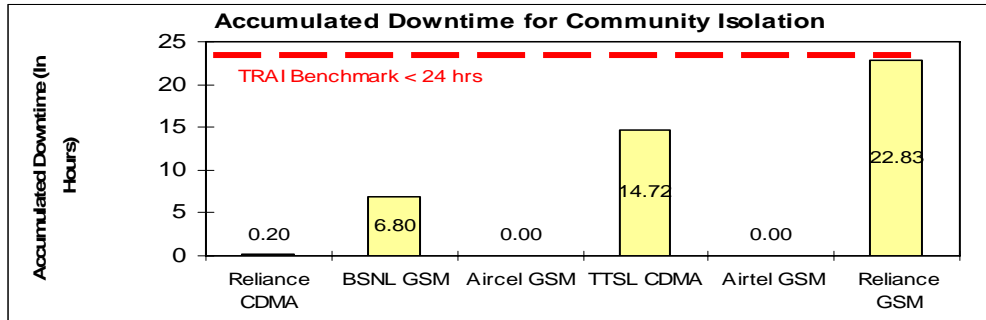
■ Not meeting the benchmark

**B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA**: Not Applicable

- Both Ortel and BSNL are meeting the benchmark on service availability/uptime for three day live measurements. As explained earlier, it was observed that type of sites being taken into consideration for calculating network uptime varies from operator to operator.
- The testing for Bandwidth utilization during live measurement was carried out on sample basis by IMRB auditors for intra network links. There were no intra network links that were found to have a utilization of more than 90% for both the operators
- For Bandwidth utilization on upstream links, both the service providers are meeting the benchmark during the three day live measurement and have excess capacities available on their upstream links.
- However, it should be noted that for BSNL out of the total 141 gateway links present at different places in India 8 were found to be > 90 %.
- For network latency and packet loss both the service providers comfortably meet the TRAI specified benchmark for ping tests carried out during live measurements.

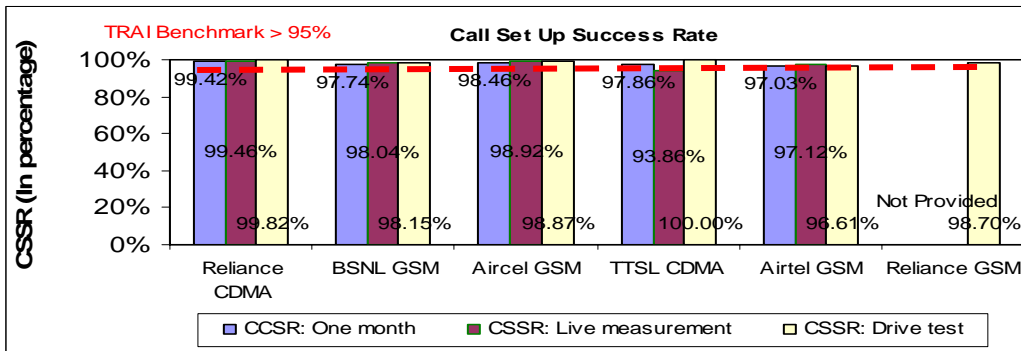
## 6. Detailed findings – Includes comparison between Live calling/Live measurements and One month data collection for Cellular Mobile Services

### 6.1 Graphical/Tabular Representations for Cellular Mobile Services Accumulated Downtime



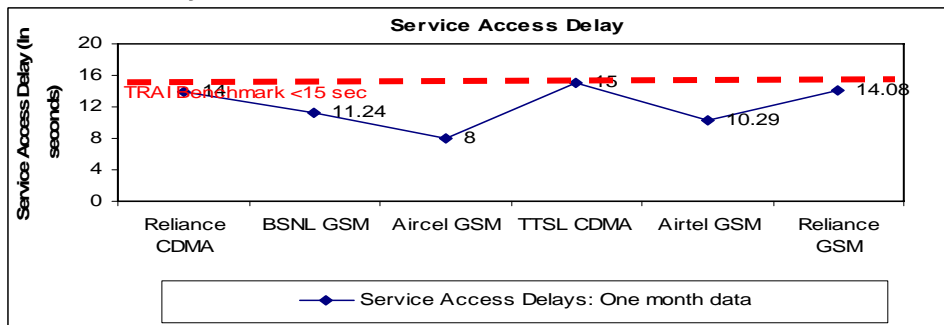
In the Orissa circle, there were outages that led to a community being isolated at a particular point in time for all the operators except Airtel. However, for Aircel the figure is zero because the operator claimed that whatever outages occurred did not lead a community to be isolated for more than an hour. Reliance GSM had the maximum outage in the month of audit with an outage of close to 23 hours observed.

### Call Set-up Success Rate (CSSR)



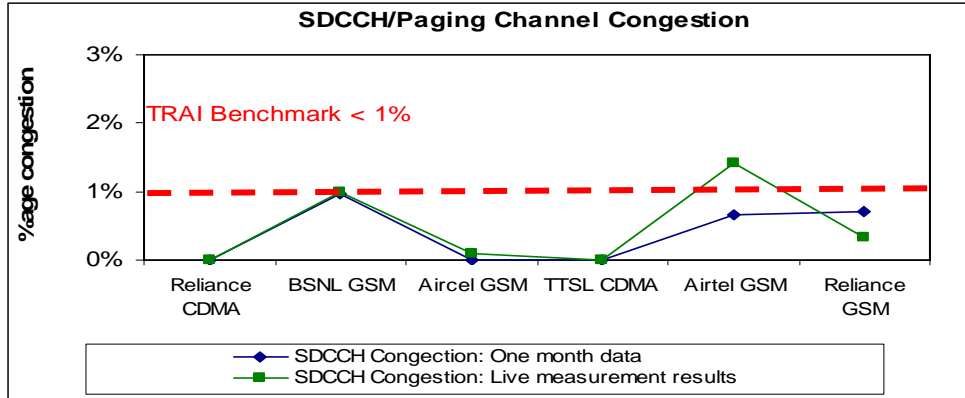
All the operators except TTSL during 3 day live measurement are meeting the benchmark for the audit month, live measurement as well as the drive test.

### Service Access Delay



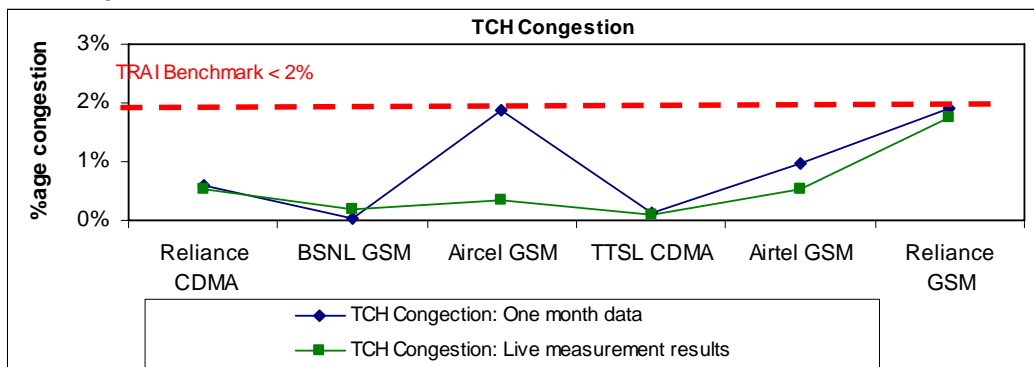
All the operators are meeting the benchmark. The auditors measured this parameter using a standard drive test tool kit. The highest service access delay was measured for TTSL at 15 seconds.

**SDCCH / Paging Channel Congestion**



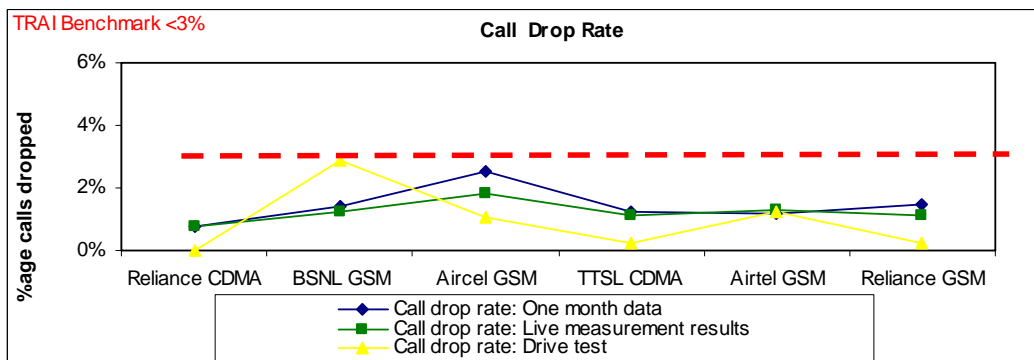
All the operators except Bharti and BSNL for 3 day live measurement meet the benchmark for the month and the three day live measurement period.

**TCH Congestion**



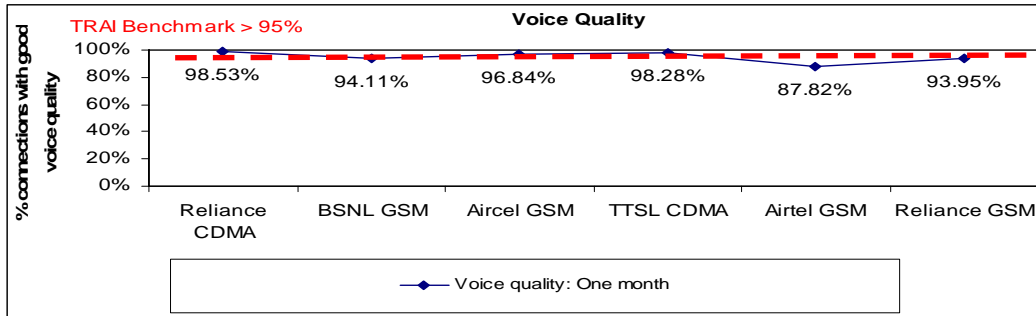
All the operators for one month data collection and verification meet the TRAI benchmark for both the monthly audit as well as the three day live measurement period. On an overall basis, the relatively lower congestion is observed for BSNL and TTSL.

**Call Drop Rate**



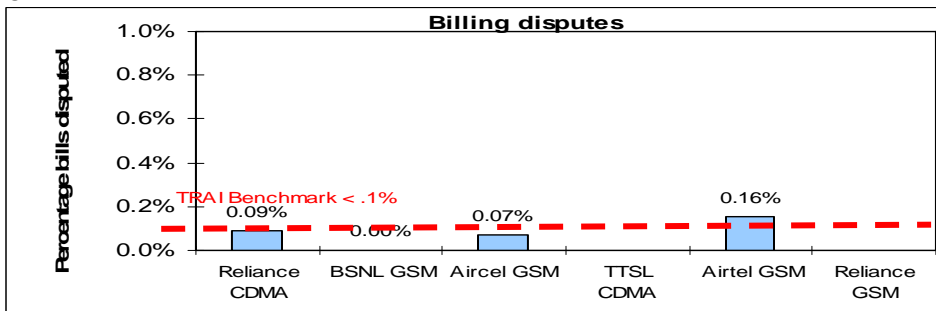
All the operators meet the TRAI benchmark. The operators with the least call drop rates taking into consideration the figures for drive tests, live measurement and the month of audit is Reliance CDMA.

**Voice quality**

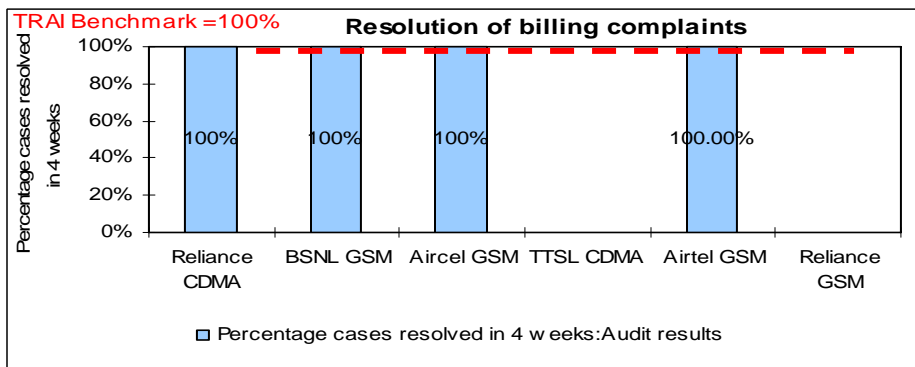


BSNL, Reliance GSM and Bharti Airtel do not meet the TRAI benchmark as found out during the drive test. The lowest percentage of connections with good voice quality was observed across Bharti at a level of 87.82% followed Reliance GSM at 93.95% and BSNL at 94.11%.

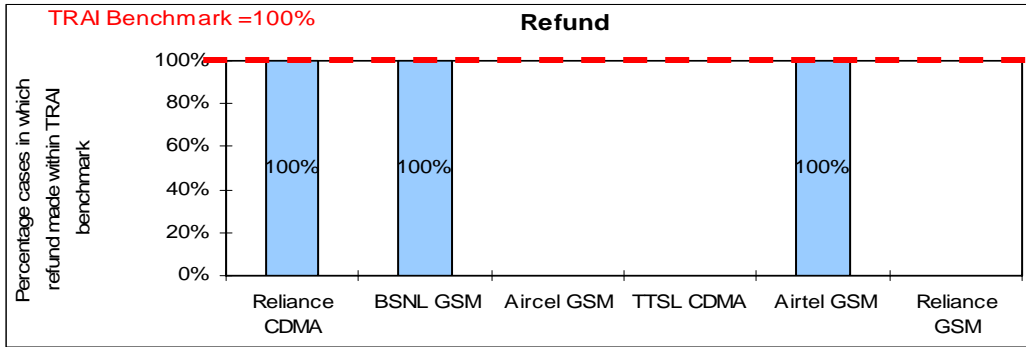
**Billing Disputes**



All the operators except Bharti Airtel meet the TRAI benchmark on percentage billing disputes per 100 bills. Reliance GSM and TTSL did not receive any billing complaint from its postpaid subscribers while BSNL received only a handful of them.



All the operators meet the TRAI benchmark of resolving 100% of the cases related to resolution of billing complaints for the month in which data was collected. However, the operators consider only those as billing complaints where they have issued an internal ticket which essentially means that a refund is due to the customer.



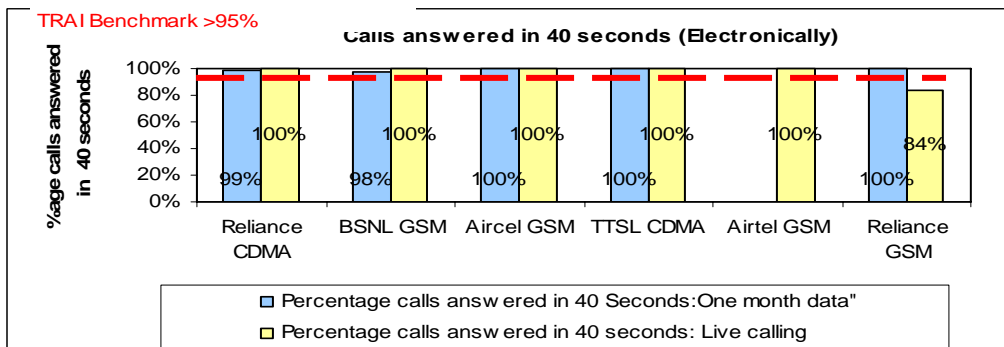
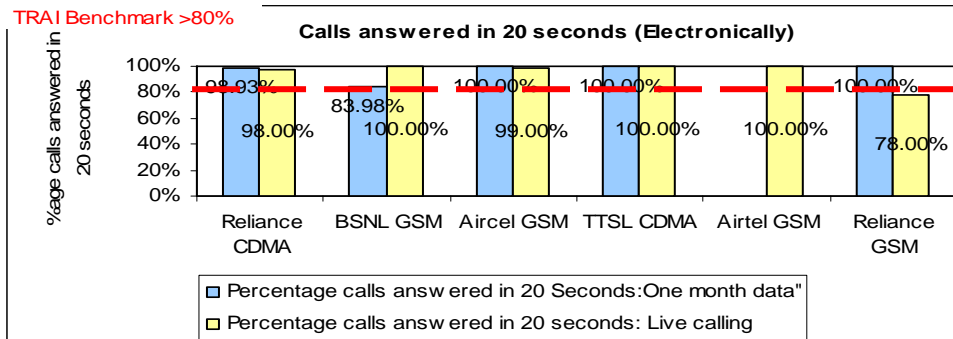
All the operators were found to giving the refunds to their subscribers within the stipulated time period. Aircel claims that it had no subscribers who had to be refunded during the month of audit.

**Live calling for billing Complaints**

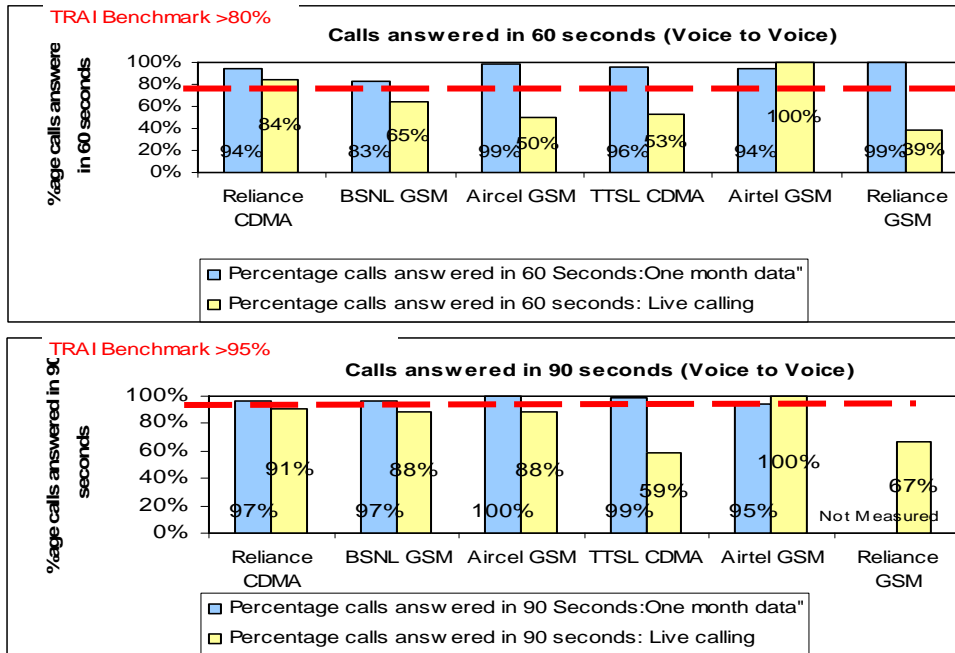
Resolution of billing complaints	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total Number of calls made	11	7	1	3	17	Not Applicable
Number of cases resolved in 4 weeks	11	2	0	2	1	Not Applicable
Percentage cases resolved in four weeks	100.0%	28.6%	0.0%	66.7%	5.9%	Not Applicable

None of the operators except Reliance CDMA were able to meet the TRAI benchmark for the live calling aspect. Only 6% Airtel subscribers say that their complaints were resolved within 4 weeks.

**Customer Care / Helpline:**



All the operators except Reliance GSM for live calling (both for 20 and 40 seconds) meet the TRAI benchmark for IVR (Electronic) answering of customers' calls for the one month data as well as the live calling that was carried out during the audit.



Except for Reliance CDMA and Airtel none of the operators meet TRAI's benchmark of percentage calls answered within 60 seconds for the live calling aspect. All operators except Airtel, fail to meet TRAI benchmark for percentage calls answered by the operator within 90 seconds for the live calling aspect.

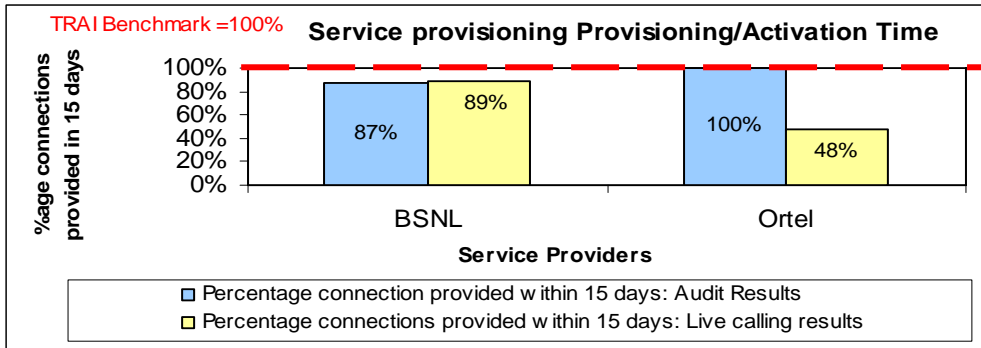
*Inter operator calls assessment*

Inter operator call Assessment (To ↓ / From →)	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Reliance CDMA	NA	100%	96%	100%	96%	100%
BSNL GSM	79%	N.A	93%	100%	97%	96%
Aircel GSM	91%	100%	NA	100%	99%	94%
TTSL CDMA	89%	100%	90%	NA	97%	100%
Airtel GSM	92%	100%	100%	90%	NA	100%
Reliance GSM	100%	100%	100%	99%	95%	N.A

In the inter-operator call assessment, calls were made from the test sims of service provider whose audit was being conducted to all the other service providers. Reliance CDMA found connecting to a BSNL number the toughest with only 79 out of 100 calls getting established. It was also observed that in only 90% of the cases a call from Aircel got connected to a TTSL number. All of BSNL's calls to other operators got connected. 90% of calls from TTSL got connected to an Airtel number. 95 out of 100 calls from an Airtel to Reliance GSM number were connected while 94 out of 100 Reliance GSM calls to an Aircel number got connected.

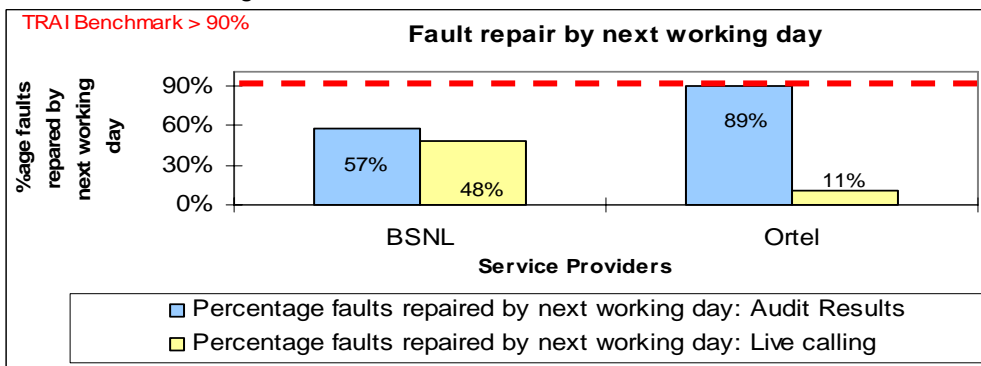
## 6.2 Graphical/Tabular Representations for Broadband services

### Service provisioning/Activation time (Comparison between one month audit results and live calling results)



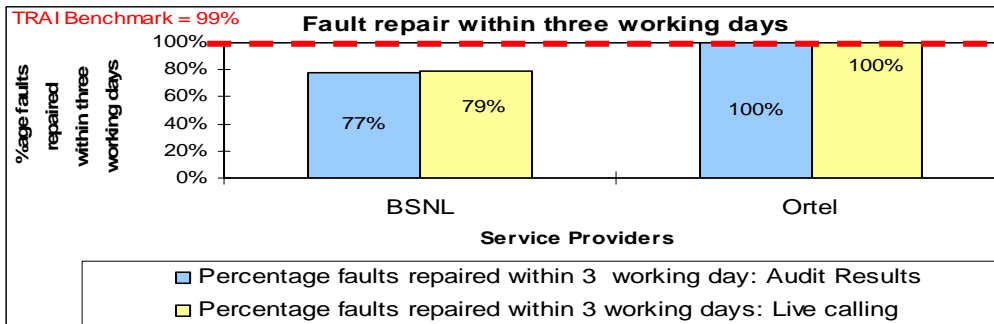
Live calling scores for Ortel is observed to poor with only 48% subscribers claiming that connection was registered in 15 days

### Fault repair/Restoration time (By next working day)- Comparison between one month audit results and live calling results



Both the operators fall short of TRAI specified benchmark for the month of Audit. As in case with service provisioning live calling scores are observed to be low with scores for BSNL and Ortel being 48% and 11% respectively.

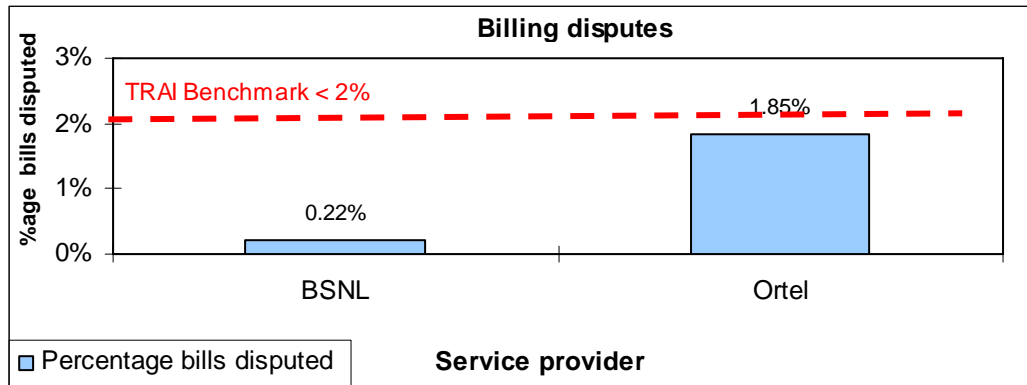
### Fault repair/Restoration time within three working days (Comparison between one month audit results and live calling results)



BSNL falls short of TRAI specified benchmark for the month of Audit. Live calling scores are observed to be low for BSNL at 79%.

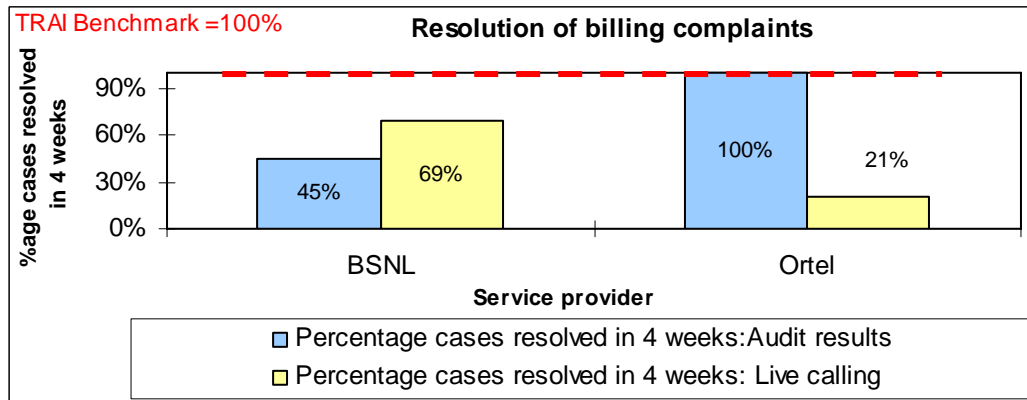


**Percentage bills disputed**



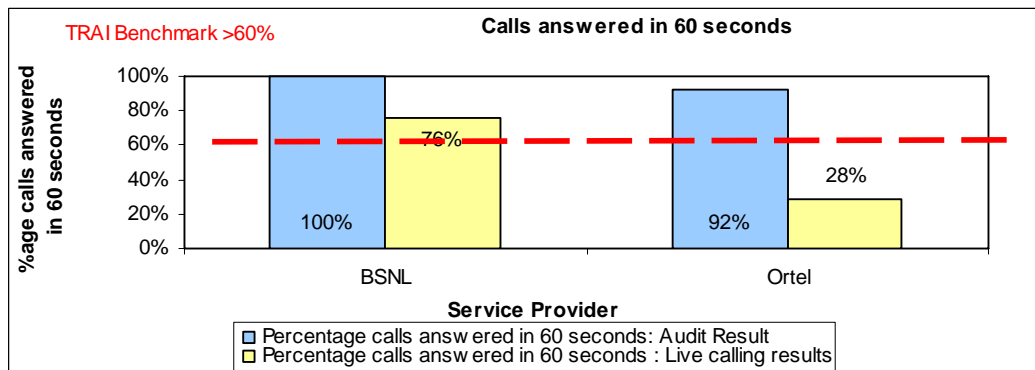
Both the operators meet the benchmark on percentage bills disputed.

**Resolution of billing complaints (Comparison between one month audit results and live calling results)**



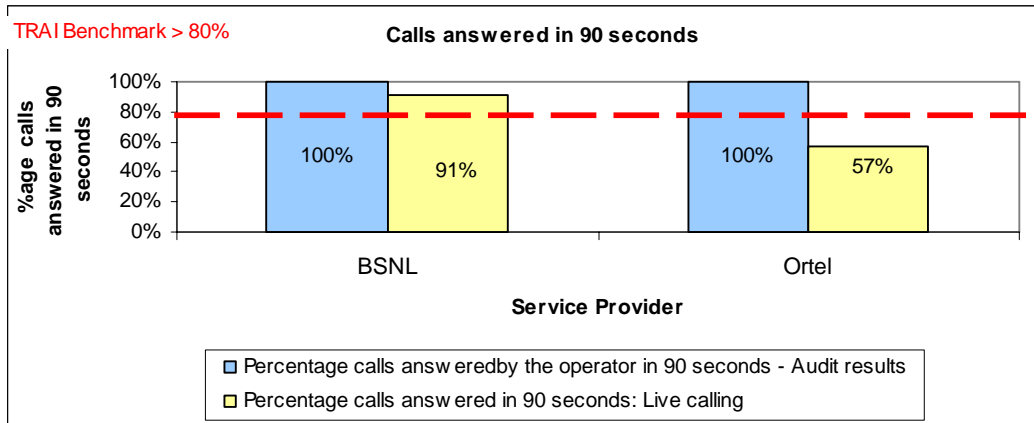
BSNL does not meet the TRAI specified benchmark for Percentage billing complaints resolved within four weeks during the month of Audit. Live calling scores for BSNL and Ortel are observed to be 69% and 21% respectively.

**Response time to customer for assistance - Calls answered by the operator within 60 seconds (Comparison between one month audit results and live calling results)**



Ortel does not meet the TRAI specified benchmark for calls answered within 60 seconds by the operator for live calling carried out by IMRB auditors

**Response time to customer for assistance - Calls answered by the operator within 90 seconds (Comparison between one month audit results and live calling results)**



Ortel does not meet the TRAI specified benchmark for calls answered within 60 seconds by the operator for live calling carried out by IMRB auditors

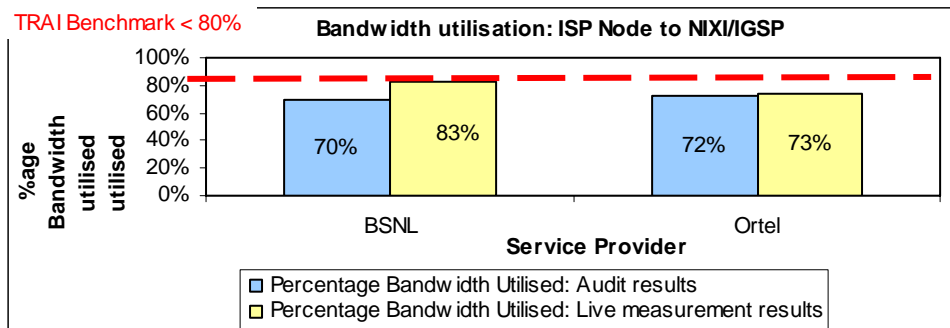
**Bandwidth utilization at Intra network links (Comparison between one month audit results and live measurement results)**

Bandwidth Utilization	B'mark	BSNL*	Ortel
<b>One month audit results</b>			
Total number of intra network links		23 BRAS, TI 24, T2624, DSLAM 5960	3
No of Intra network found to be above 90%	<80%	0	0
<b>Live measurement results</b>			
No of Intra network Links tested		23 BRAS^	3
No of Intra network found to be above 90%	<80%	0	0

\*Reported on All India Basis , ^BRAS: Broadband Remote Access Server

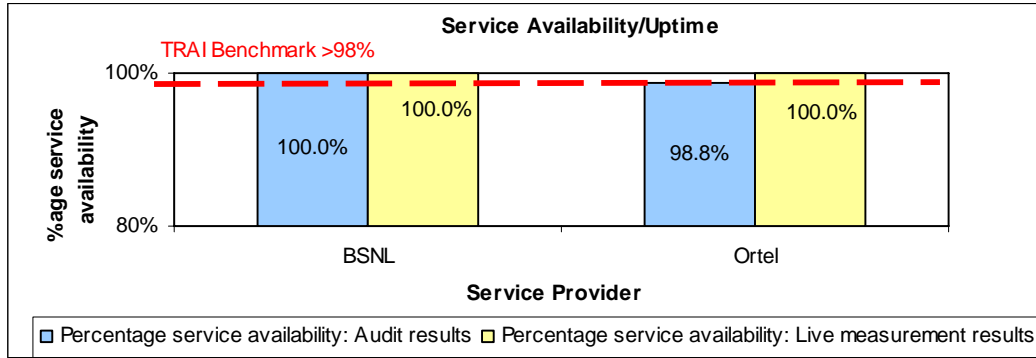
As far as bandwidth utilization on the intra network links is concerned both the operators seem to performing well as all the sample intra network links (Access segment) tested during live measurement were found to be below 90%.

**Bandwidth utilization at Upstream links (Comparison between one month audit results and live measurement results)**



Both the operators meet the TRAI specified benchmark

**Service availability/Uptime (Comparison between one month audit results and live measurement results)**



Both the service providers meet the benchmark with uptime of more than 98% for the month of Audit.

## **7.0 Compliance reports: Results of Verification of Records for April to June 2008**

### **7.1 Basic (Wireline) services**

S.no	Parameters	Benchmark	BSNL	
			PMR	IMRB*
<b>1</b>	<b>Provision of telephone after registration of demand</b>			
1.1	Percentage connections completed within 7 days	100%	99%	63%
<b>2</b>	<b>Fault incidence/clearance statistics</b>			
2.1	Fault incidence	<5	4.2	11.45
2.2	Faults repaired within 24 hours	>90%	93%	54%
2.3	Mean time to repair	<8 hrs	6.9	25.96
3	Call Completion Rate (CCR)	>55%	62%	83%
<b>4</b>	<b>Metering and billing credibility</b>			
4.1	Billing complaints per 100 bills issued	<0.1%	0.04%	0.03%
4.2	%age of billing complaints resolved within 4 weeks	100%	72%	62%
<b>5</b>	<b>Customer care/helpline promptness</b>			
5.1	<u>Shift requests (Total number received)</u>			
	Percentage shift requests attended within 3 days	95%	97%	51%
5.2	<u>Closure request attended (Total number received)</u>			
	Closure within 24 hours	95%	99%	77%
5.3	<u>Supplementary (additional) service requests attended (Total number received)</u>			
	Additional facility provided within 24 hours	95%	99%	78%
<b>6</b>	<b>Response time to customer</b>			
6.1	% age call answered through IVR in 20 seconds	80%	100%	Raw Data not available for verification
	% age call answered through IVR in 40 seconds	100%	100%	
6.2	% age calls answered by operator in 60 seconds	80%	100%	
	% age calls answered by operator in 90 seconds	95%	100%	
7	%age cases where refund received within 60 days	100%	100%	67%

\* These have been calculated cumulatively on the basis of figures reported by various exchanges



Figures do not match with those reported in PMR





Figures verified on all India basis

B'mark = TRAI Benchmark, DNA = Details not available, NA = Not Applicable


### 7.2 Cellular Mobile services

S. No.	Parameter	SERVICE PROVIDER											
		Reliance CDMA		BSNL GSM		Aircel GSM		TTSL CDMA		Airtel GSM		Reliance GSM	
		PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB
<b>A</b>	<b>Network Performance</b>												
1	Accumulated Downtime	0.60	0.60	3	5.64	0.00	Operator claims that downtime did not cross 1 hour at a single stretch	0.3	0.3	0	0	22.77	22.77
2	CSSR	99.15%	99.15%	98.14%	97.39%	98.79%	98.79%	98.56%	98.54%	97.64%	97.02%	99.17%	99.17%
3	Service Access delay	3.49	3.49	12	12	8	8	5.71	5.71	7.90	7.90	6.87	6.87
4	Blocked call rate												
	SDCCH Congestion	0.00%	0.00%	0.99%	0.99%	0.05%	0.05%	0.0%	0.0%	0.47%	0.47%	0.79%	0.79%
	TCH Congestion	0.00%	0.00%	1.67%	1.67%	1.16%	1.16%	0.17%	0.17%	1.33%	1.33%	1.86%	1.86%
5	Call drop rate	1.05%	1.05%	1.78%	1.95%	0.78%	4.31%	0.89%	0.89%	1.12%	1.12%	1.22%	1.22%
6	%age connections with good voice quality	Complied		Complied		97.31%	97.31%	98.56%	98.56%	99.02%	99.02%	Complied	
7	Service coverage	Complied		Complied		Complied		Complied		Complied		Complied	
8	POI congestion	Complied		Complied		Complied		Complied		Complied		Complied	
<b>B</b>	<b>Customer Care</b>												
	Calls answered electronically												
	Within 20 seconds	99.30%	99.30%	87.00%	89.01%	100%	100%	100%	100%	100%	100%	100%	100%
	Within 40 seconds	99.30%	99.30%	97.00%	97.98%	100%	100%	100%	100%	100%	100%	100%	100%
	Calls answered by the operator												
	Within 60 seconds	96.01%	96.01%	89%	90%	83.7%	83.7%	93.9%	94%	92.4%	82%	95.67%	99.4%
	Within 90 seconds	97.68%	97.68%	96%	97%	100%	100%	97.8%	98%	96%	87.62%	100%	100%
<b>C</b>	<b>Billing complaints</b>												
	Billing complaints/100 bills	0.07%	0.07%	0.03%	0.03%	0.06%	0.06%	0.02%	0.02%	0.01%	0.01%	0%	0%
	%age complaints resolved within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Period of refunds due to customers	100%	100%	100%	100%	100%	100%	100%	100%	100.0%	100.0%	100%	100%

 Figures do not match with those reported in PMR

 Figures verified on all India basis

B'mark = TRAI Benchmark, DNA = Details not available

 Not meeting benchmark

### 7.3 Broadband services

Parameter	Benchmark	BSNL		Ortel	
		PMR	IMRB	PMR	IMRB
<b>Service provisioning time</b>					
Percentage connections provided within 15 days	100%	92%	88%	100%	100%
<b>Fault repair restoration time</b>					
Percentage faults repaired by next working days	> 90%	95%	51%	92%	92%
Percentage faults repaired within three working days	99%	100%	84%	100%	96%
<b>Billing performance</b>					
Billing complaints per 100 bills issued	<2%	0.20%	0.00%	0.18%	0.01%
%age of billing complaints resolved in 4 weeks	100%	94%	68%	100%	100%
%age cases in which refund of deposits after closure was made in 60 days	100%	86%	70%	100%	100%
<b>Customer care/helpline assessment (Voice to Voice)</b>					
Percentage calls answered within 60 seconds	> 60%	84%	100%	100	100%
Percentage calls answered within 90 seconds	> 80%	87%	100%	NA	NA
<b>Bandwidth utilisation/Throughput</b>					
<i>Intra network links (POP to ISP Node)</i>					
Total number of intra network links > 90%		NR	0	0	0
<i>Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)</i>					
Percentage bandwidth utilised on upstream links	< 80%	NR	<80%	67%	67%
Broadband download speed		<b>No data available for verification</b>			
<b>Service availability/uptime</b>	> 98%	NR	100%	96%	99%
<b>Packet loss</b>	<2%	No raw data available for verification for Ortel, For BSNL data was verified at the central node in Bangalore			
<b>Network Latency</b>					
POP/ISP Node to NIXI	< 120 msec				
ISP node to NAP port (Terrestrial)	< 350 msec				

<sup>44</sup> Methodology not in Line with QoS regulation,  Data verified on All India basis, NR – Not reported DNA- Details Not Available for verification, B'mark = TRAI Benchmark  Figures do not match those in PMR

## **7.4 Conclusions**

### **7.4.1 Basic Wireline Services**

1. Variation observed in figures for BSNL is owing to the fact that only 5% of the total exchanges were audited for the operator whereas the data provided in the PMR is basis all the exchanges in the circle
2. Raw data on call centre details was not available at the exchanges audited and hence the same could not be verified by IMRB auditors

### **7.4.2 Cellular Mobile services**

1. The figures reported by the operators on all parameters completely match the figures obtained on verification except for Aircel on accumulated downtime and call drop rate and for Airtel for calls answered by the operator within 60 and 90 seconds by the operator

### **7.4.3 Broadband services**

1. For BSNL there is slight variation observed in for some parameters when compared to the figures reported in PMR. But the reason is largely the fact that data was obtained for sample 5% of exchanges whereas reporting is done for 100% of exchanges.
2. Historic data for Broadband download speed and Ping test conducted to check the latency and packet loss was not available for verification for Ortel. Although the service providers claimed that they conduct random ping tests and latency to check the packet loss but there is no book keeping which is maintained at their end. Records of old ping tests were found to be maintained only by BSNL

## **8. Annexure - I**

### **8.1 Parameter wise performance reports for Basic Wireline services**

#### **One month data verification results for Service provisioning**

<b>Service provisioning/Activation time</b>	<b>Benchmark</b>	<b>BSNL</b>
Number of connections registered during the period		123
Total number of connections provided within 7 days		85
Percentage of connections provided within 7 days	100%	69%

#### **Live calling results for Service provisioning**

<b>Service Provisioning/Activation Time</b>	<b>Benchmark</b>	<b>BSNL</b>
Total Number of service registration calls made		178
Number of cases in which connection was provided in 7 Days		84
Percentage cases in which connection was provided in 7 days	100%	47%

#### **One month data verification results for Fault repair/Restoration time**

<b>Fault Repair/Restoration time</b>	<b>Benchmark</b>	<b>BSNL</b>
Total number of faults registered during the period		3974
Total number of faults repaired by next working day		1639
Percentage of faults repaired by next working day	>90%	41%
Total number of fault repaired within three working days		3366
Percentage faults repaired within three working days	100%	85%

#### **Live calling results for Fault repair/Restoration time**

<b>Fault Repair</b>	<b>Benchmark</b>	<b>BSNL</b>
Total Number of calls made		1206
Number of cases where faults were repaired by next working day		768
Percentage cases where faults were repaired by next working day	>90%	64%
Number of cases where faults were repaired within 3 days		1049
Percentage cases where faults were repaired within 3 days	100%	87%



**One month data verification results for CCR**

Traffic statistics - Call Completion Rate	Benchmark	BSNL
Total local call attempts		1486261
Total number of successful local calls		1237038
Call Completion Rate (CCR) in the local network	>55%	83%

**Live measurement results for CCR**

Traffic statistics - Call Completion Rate	Benchmark	BSNL
Total local call attempts		412174
Total number of successful local calls		313503
Call Completion Rate (CCR) in the local network	>55%	76%

**One month data verification results for billing performance**

Billing Performance	Benchmark	BSNL
<b>Billing disputes</b>		
Total bills generated during the period		32202
Total number of bills disputed		5
Percentage bills disputed	0.10%	0.02%
<b>Resolution of billing complaints</b>		
Total complaints resolved in 4 weeks from date of receipt		3
Percentage complaints resolved within 4 weeks of date of receipt	100%	60%

**Live calling results for billing performance**

Resolution of billing complaints	Benchmark	BSNL
Total Number of calls made		1
Number of cases resolved in 4 weeks		0
Percentage cases resolved in four weeks	100%	0%

**One month data verification for Customer Care – Shifts**

Customer Care - Shift Requests	Benchmark	BSNL
Total Number of shift requests received		104
Total number requests attended in 3 days		62
Total number requests attended beyond 3 days		42
Shifts not attended		0
Percentage of requests attended in 3 days	95%	60%
Percentage of requests attended beyond 3 days		40%
Percentage of shifts not attended		0%

**Live calling results for Customer Care – Shifts**

Customer Care - Shift Requests	Benchmark	BSNL
Total number of call to shift requests		79
Total number of requests attended in 3 days	95%	37
Total number of requests attended beyond 3 days		38
Shifts not attended		4
Percentage of requests attended in 3 days		47%
Percentage of requests attended beyond 3 days		48%
Percentage of shifts not attended		5%

**One month data verification Audit results for Customer Care – Closures**

Customer Care - Closure Requests	Benchmark	BSNL
Total Number of closure requests received		150
Total closure attended within 24 hours	95%	116
Total number of requests attended beyond 24 hours		34
Closure requests not attended		0
Percentage of closure attended within 24 hours		77%
Percentage of closure attended beyond 24 hours		23%
Percentage of closures not attended		0%

**Live calling results for Customer Care – Supplementary requests**

Customer Care - Supplementary Requests	Benchmark	BSNL
Total Number of supplementary requests received		210
Total number requests attended within 24 hours	95%	127
Total number requests attended beyond 24 hours		65
Supplementary requests not attended		7
Percentage of requests attended within 24 hours		60%
Percentage of requests attended beyond 24 hours		31%
Percentage of supplementary requests not attended		3%

**Live calling results for calls answered electronically**

Customer Care Assessment	Benchmark	BSNL
Total Number of calls dialed on toll free number		1200
<b>Calls answered within 20 seconds</b>		
Total Number of calls answered by IVR in 20 seconds	80%	1198
Percentage calls answered in 20 seconds		100%
<b>Calls answered within 40 seconds</b>		
Total Number of calls answered by IVR in 40 seconds	95%	1200
Percentage calls answered in 40 seconds		100%

**Live calling results for calls answered by the operator**

Customer Care Assessment	Benchmark	BSNL
Total Number of calls dialed on toll free number		1200
<b>Calls answered within 60 seconds</b>		
Total Number of calls answered by operator in 60 seconds	80%	1028
Percentage calls answered in 60 seconds		86%
<b>Calls answered within 90 seconds</b>		
Total Number of calls answered by operator in 90 seconds	95%	1164
Percentage calls answered in 90 seconds		97%

**One month data verification Audit results for Refund of deposits after closure**

Resolution of billing complaints	Benchmark	BSNL
Total Number of cases requiring refund		103
Number of cases where refund was made in < 60 days		76
Percentage cases where refund was made in < 60 days	100%	74%

**Level 1 Services**

Level 1 services	BSNL
TOTAL Calls Made	230
Answered in 60 seconds	169
Percentage calls answered in 60 seconds	77%

## 8.2 Parameter wise performance reports for Cellular Mobile services

### Audit Results for Accumulated Downtime for community Isolation

Accumulated Downtime	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total Downtime (In hours)	0.20	6.80	0.00	14.72	0.00	22.83

### Audit Results for CSSR

CSSR	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total number of call attempts	8899145	550793316	23132243	26473225	1778876602	DNP
Total number of successful calls	8847691	538354998	22775436	25905824	1726045746	DNP
CSSR	99.42%	97.74%	98.46%	97.86%	97.03%	Report could not be generated by the operator

### Live measurement results for CSSR

CSSR	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total number of call attempts	8854072	53342558	2648205	3079209	16430353	DNP
Total number of successful calls	8805831	52297200	2619535	2890017	15957213	DNP
CSSR	99.46%	98.04%	98.92%	93.86%	97.12%	Report could not be generated by the operator

### Drive test results for CSSR (Average of three drive tests)

CSSR	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total number of call attempts	545	813	797	722	766	460
Total number of successful calls	544	798	788	722	740	454
CSSR	99.82%	98.15%	98.87%	100.00%	96.61%	98.70%

\* DNP: Details Not provided

### Service Access Delay

Service Access Delay	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
One month data collection	14	11.24	8	15	10.29	14.08

### Audit results for SDCCH and TCH Congestion

Traffic Statistics	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
<b>SDCCH Congestion</b>						
Total number of SDCCH Attempts	2370880	1019870842	57696108	9709325	340981799	3338458
Total Number of SDCCH Congestions	0	9987639	2553	0	2281004	DNP
Percentage SDCCH Congestion	0.00%	0.98%	0.00%	0.00%	0.67%	0.72%
<b>TCH Congestion</b>						
Total number of TCH Attempts	9232707	550793316	23132243	26473225	162513389	1348148
Total Number of TCH Congestions	53550	106249	434887	36647	1549768	DNP

Percentage TCH Congestion	0.58%	0.02%	1.88%	0.14%	0.95%	1.90%
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**Live measurement results for SDCCH and TCH Congestion**

Traffic Statistics	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
<b>SDCCH Congestion</b>						
Total number of SDCCH Attempts	2871958	97174514	4882039	12454947	34511270	2149222
Total Number of SDCCH Congestions	0	967538	4977	0	487860	DNP
Percentage SDCCH Congestion	0.00%	1.00%	0.10%	0.00%	1.41%	0.32%
<b>TCH Congestion</b>						
Total number of TCH Attempts	8844747	53342558	2648205	33139678	16430353	823784
Total Number of TCH Congestions	47761	99562	8758	31910	89044	DNP
Percentage TCH Congestion	0.54%	0.19%	0.33%	0.10%	0.54%	1.75%

\* DNP: Details Not provided

**Call Drop Rate**

**Audit Results for Call drop rate**

Call drop rate	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total number of calls established	8847691	538354998	22775436	25905824	1662974006	615830832
Total number of calls dropped	68458	7632797	575439	323534	20007509	9149583
Call drop rate	0.77%	1.42%	2.53%	1.25%	1.20%	1.49%

**Live measurement results for Call drop rate**

Call drop rate	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total number of calls established	8805831	52297200	2619535	2890017	16395948	62187591
Total number of calls dropped	67815	635816	47040	32942	213116	702632
Call drop rate	0.77%	1.22%	1.80%	1.14%	1.30%	1.13%

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

Call drop rate	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total number of calls established	1065	798	191	772	741	456
Total number of calls dropped	0	23	2	2	9	1
Call drop rate	0.00%	2.88%	1.05%	0.26%	1.21%	0.22%

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

Voice quality	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total number of sample calls	45045	1364232	1004221	46116	86405	699868
Total number of calls with good voice quality	44382	1283932	972529	45324	75877	657524
%age calls with good voice quality	98.53%	94.11%	96.84%	98.28%	87.82%	93.95%

**Audit Results for POI Congestion**

POI congestion	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
POI traffic offered on all individual POI's	DNP	833760	DNP	12905.52	225350	25459.64
Served traffic for all individual POI's	DNP	10555	DNP	4977.42	225167	16824.15
Traffic failed on all individual POI's	Complied	Complied	Complied	Complied	Complied	Complied

**Live measurement results for POI congestion**

POI congestion	Bharti Airtel	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
POI traffic offered on all individual POI's	DNP	2127364	DNP	48172.83	266696.26	25459.64
Served traffic for all individual POI's	DNP	30361	DNP	20392.17	17901.57	17222.48
Traffic failed on all individual POI's	Complied	Complied	Complied	Complied	Complied	Complied

Inter operator call Assessment (To/From)	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Reliance CDMA	NA	100%	96%	100%	96%	100%
BSNL GSM	79%	N.A	93%	100%	97%	96%
Aircel GSM	91%	100%	NA	100%	99%	94%
TTSL CDMA	89%	100%	90%	NA	97%	100%
Airtel GSM	92%	100%	100%	90%	NA	100%
Reliance GSM	100%	100%	100%	99%	95%	N.A

**Audit results for customer care (Electronically)**

Customer Care Assessment	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total Number of calls received by	32484710	2653	1747350	1596413	DNP	1864009
<b>Calls answered within 20 seconds</b>						
Total Number of calls answered in 20 seconds	32135956	2228	1747350	1596413	DNP	1864009
Percentage calls answered in 20 seconds	98.93%	83.98%	100.00%	100.00%	DNP	100.00%
<b>Calls answered within 40 seconds</b>						
Total Number of calls answered in 40 seconds	32135956	2599	1747350	1596413	DNP	1864009
Percentage calls answered in 40 seconds	98.93%	97.96%	100.00%	100.00%	DNP	100.00%

**Live calling results for customer care (Electronically)**

Customer Care Assessment	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total Number of calls received by the operator	100	100	100	100	100	100
<b>Calls answered within 20 seconds</b>						
Total Number of calls answered in 20 seconds	98	100	99	100	100	78
Percentage calls answered in 20 seconds	98.00%	100.00%	99.00%	100.00%	100.00%	78.00%
<b>Calls answered within 40 seconds</b>						

Total Number of calls answered in 40 seconds	100	100	100	100	100	84
Percentage calls answered in 40 seconds	100.00%	100.00%	100.00%	100.00%	100.00%	84.00%

**Audit results for customer care (Voice to Voice)**

Customer Care Assessment	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total Number of calls received by the operator	556455	1958	609703	DNP	1454929	1158712
<b>Calls answered within 60 seconds</b>						
Total Number of calls answered in 60 seconds	523152	1625	601960	219522	1366966	1152835
Percentage calls answered in 60 seconds	94.02%	82.99%	98.73%	96.00%	93.95%	99.49%
<b>Calls answered within 90 seconds</b>						
Total Number of calls answered in 90 seconds	536983	1899	609703	223781	1379500	Not Measured
Percentage calls answered in 90 seconds	96.50%	96.99%	100.00%	99.00%	94.82%	Not Measured

**Live calling results for customer care (Voice to Voice)**

Customer Care Assessment	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total Number of calls made	100	100	100	100	100	100
<b>Calls answered within 60 seconds</b>						
Number calls answered within 60 seconds	84	65	50	53	100	39
Percentage calls answered in 60 seconds	84.00%	65.00%	50.00%	53.00%	100.00%	39.00%
<b>Calls answered within 90 seconds</b>						
Number calls answered within 90 seconds	91	88	88	59	100	67.00
Percentage calls answered in 90 seconds	91.00%	88.00%	88.00%	59%	100%	67%

\* DNP: Details Not provided

**Audit Results for Billing performance**

Billing Performance	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
<b>Billing disputes</b>						
Total bills generated during the period	39144	70736	1398	No complaints received	24841	4920
Total number of bills disputed	34	1	1		39	0
Percentage bills disputed	0.09%	0.00%	0.07%		0.16%	0.00%
<b>Resolution of billing complaints</b>						
Total complaints resolved in 4 weeks from date of receipt	34	1	1	No complaints received	39	Not Applicable
Percentage complaints resolved within 4 weeks of date of receipt	100%	100%	100%		100.00%	Not Applicable
<b>Refund of deposits after closure</b>						

Total number of cases requiring refund of deposits	34	42	Not Applicable	No complaints received	2	Not Applicable
Total number of cases where refund was made within 60 days	34	42	Not Applicable		2	Not Applicable
Percentage cases in which refund was receive within 60 days	100%	100%	Not Applicable		100%	Not Applicable

**Live calling results for resolution of billing complaints**

Resolution of billing complaints	Reliance CDMA	BSNL GSM	Aircel GSM	TTSL CDMA	Airtel GSM	Reliance GSM
Total Number of calls made	11	7	1	3	17	Not Applicable
Number of cases resolved in 4 weeks	11	2	0	2	1	Not Applicable
Percentage cases resolved in four weeks	100.0%	28.6%	0.0%	66.7%	5.9%	Not Applicable



### 8.3 Parameter wise performance reports for Broadband services

#### One month data verification results for Service provisioning

Service provisioning/Activation time	B'mark	BSNL	Ortel
No of connections registered during the period		1286	673
Total number registered during 15 days		1125	673
Percentage of connections provided within 15 days	100%	87.5%	100%

#### Live calling results for Service provisioning

Service Provisioning/Activation Time	B'mark	BSNL	Ortel
Total Number of calls made		321	241
Number of cases in which connection was provided in 15 Days		287	116
Percentage cases in which connection was provided in 15 days	100%	89%	48%

#### One month data verification results for Fault repair

Fault Repair/Restoration time	B'mark	BSNL	Ortel
Total number of faults registered during the period		2154	10845
Total number of faults repaired by next working day		1231	9688
Percentage of faults repaired by next working day	>90%	57%	89%
Total number of faults repaired within three working days		1669	10845
Percentage of faults repaired within three working days	>99%	77%	100%

#### Live calling results for fault repair

Fault Repair	B'mark	BSNL	Ortel
Total Number of calls made		97	56
Number of cases in which faults were repaired by next working day		47	6
Percentage cases in which faults were repaired by next working day	>90%	48%	11%
Number of cases in which faults were repaired within three working days		77	56
Percentage cases in which faults were repaired within three working days	>99%	79%	100%

**One month data verification results for billing performance**

Billing Performance	B'mark	BSNL	Ortel
<b>Billing diputes</b>			
Total bills generated during the period		18115	17553
Total number of bills disputed		40	324
Percentage bills disputed	<b>&lt;2%</b>	0.22%	1.85%
<b>Resolution of billing complaints</b>			
Total complaints resolved in 4 weeks from date of receipt		18	324
Percentage complaints resolved within 4 weeks of date of receipt	<b>100%</b>	45%	100%
<b>Refund of deposits after closure</b>			
Total number of cases requiring refund of deposits		18	39
Total number of cases where refund was made within 60 days		16	0
Percentage cases in which refund was receive within 60 days	<b>100%</b>	89%	0%

**Live calling results for billing complaints**

Resolution of billing complaints	B'mark	BSNL	Ortel
Total Number of calls made		13	81
Number of cases resolved in 4 weeks		9	17
Percentage cases resolved in four weeks	<b>100%</b>	69%	21%

**Live calling results for call centre**

Customer Care Assessment	B'mark	BSNL	Ortel
Total Number of calls made		400	400
<b>Calls answered within 60 seconds</b>			
Number calls answered within 60 seconds		302	113
Percentage calls answered in 60 seconds	>60%	76%	28%
<b>Calls answered within 90 seconds</b>			
Number calls answered within 90 seconds		363	226
Percentage calls answered in 90 seconds	>80%	91%	57%

**One month data verification results for Service Availability/Uptime**

Service Availability Uptime	B'mark	BSNL	Ortel
Total Operational Hours		53568	2880
Total Downtime		2	36.5
Total time when the service was available		53566	2844
Service Availability Uptime in Percentage	>98%	100.0%	98.8%

**Three day live measurement results for Service Availability/Uptime**

Service Availability Uptime	B'mark	BSNL	Ortel
Total Operational Hours		5184	72
Total Downtime		0	0
Total time when the service was available		5184	72
Service Availability Uptime in Percentage	>98%	100.00%	100.0%

**One month data verification results for Bandwidth utilisation**

Bandwidth Utilization	B'mark	BSNL	Ortel
<b>Intra-network links (POP to ISP Node)</b>			
Total number of intra network links		23 BRAS, TI 24, T2624,DSLAM 5960	3
No of Intra network found to be above 90%		0	0
<b>International Bandwidth</b>			
Total number of upstream links		141	0
No of Intra network found to be above 90%		8	0
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		27048	245
Total International Bandwidth utilised during peak hours		18934	176
Percentage Bandwidth utilisation during peak hours (In mpbs)	<b>&gt;90%</b>	70%	72%

**Live measurement results for Bandwidth utilisation**

Bandwidth Utilisation	B'mark	BSNL	Ortel
<b>Intra-network links</b>			
Total number of intra network links		23 BRAS, TI 24, T2624,DSLAM 5960	0
No of Intra network Links tested		23 BRAS	0
No of Intra network found to be above 90%		0	0
<b>International Bandwidth</b>			
Total number of upstream links		141	0
No of Intra network found to be above 90%		19	0
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		22010	245
Total International Bandwidth utilised during peak hours		18326	180
Percentage Bandwidth utilisation during peak hours (In mpbs)	<b>&gt;90%</b>	83%	73%

## **9 Annexure – II Detailed Explanation of Audit methodology (Parameter wise)**

### **9.1 For Basic wireline services**

<b>1. Provision of telephone after registration of demand</b>	
<b>Computational Methodology as per QoS definition</b>	Percentage connections provided within 7 working days = (No. of connections provided within seven working days/ Total number of connections registered during the period of 3 months) * 100 Technically Non Feasible (TNF) cases such as unavailability of telephone infrastructure/ equipment in the Area or Spare Capacity for activating telephone connection shall be excluded from the calculation of this parameter.
<b>Benchmark</b>	100% cases in <7 days, subject to technical feasibility
<b>Audit Procedure</b>	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 connections provided within 7 days - Number of connections provided after 7 days - Number of connections were request is still pending  <b>Live calling :-</b> - Interviewers ensured that operator should provide list of all new numbers added in one month prior to IMRB staff visit. - Live calling team called up at least 10% of the customers who applied for new connections during the month prior to Audit - Checked and Recorded whether the connection was provided within 7 days of registration on demand

<b>2. Fault incidence/clearance related statistic</b>	
<b>Computational Methodology</b>	<b>Fault incidence</b> = (No. of faults reported by the customer per month/ Total Number of Subscribers for that particular month)*100
<b>Benchmark</b>	Total number of faults registered per month: By 31st March 2007: <5 and By 31st March 2008: <3, averaged over the quarter Fault repair by next working day: By next working day: >90% and within 3 days: 100%, averaged over a month.
<b>Audit Procedure</b>	IMRB Auditors to verify and collect data pertaining to number of fault received 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 but less than 7 days Number of cleared in more than 7 days but less than 15 days Number of cleared in more than 15 days <b>Live calling :-</b> -Live calling to be done to verify 'Fault repair by next working day' parameter -Interviewers ensured that operator provided a list of all the subscribers who reported faults in one month prior to IMRB staff visit. -Calls were made to up to 10% or 30 complainants for the concerned exchange, whichever is less - Auditors checked and recorded whether the fault was corrected within the timeframes as mentioned in the benchmark.

<b>4. Metering and billing credibility – billing complaints</b>	
<b>Computational Methodology</b>	Percentage incidence of billing complaints = (No. of billing complaints reported by the customer per month/ Total Number of Subscribers for that particular month)*100 Percentage resolution of billing complaints = (No. of billing complaints resolved over a particular period of time/Total No. of billing complaints of that period of time)*100
<b>Benchmark</b>	Percentage incidence of billing complaints: Not more than 0.1% of the bills issued Percentage resolution of billing complaints: 100% within a period of 4 weeks
<b>Audit Procedure</b>	<p>IMRB Auditors to verify and collect data pertaining to</p> <ul style="list-style-type: none"> <li>- Number of Billing complaints received at the service provider's level</li> <li>- Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled.</li> <li>- Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills</li> <li>- Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, Late receipt of bills/ Not received at all, Wrong name and address, 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.</li> </ul> <p><b>Live calling : -</b></p> <ul style="list-style-type: none"> <li>- IMRB Auditors collected the list of all the subscribers who have made billing complaints in the month prior to the Audit.</li> <li>- 100 such subscribers per service provider were called to check the time taken to resolve the billing complaint. However, in some cases where number of billing complaints were less the sample size could not be achieved</li> </ul>

<b>5. Customer care promptness (Shifts, Closures and Additional facility)</b>	
<b>Computational Methodology</b>	Supplementary (Additional) services requests: A few of the supplementary services that are considered for the audit purpose: Clip (caller line identification presentation) facility , STD, ISD, Call forwarding, Voice Mail etc.
<b>Benchmark</b>	Shifting of telephone line : Less than 3 days Processing of closure request: Less than 24 hours Supplementary (Additional) services requests: Less than 24 hours
<b>Audit procedure</b>	<p><b>IMRB Auditors collected and verified data pertaining to</b></p> <p><b>Shifting Request: (Following key points were taken care of while verifying the data)</b></p> <ul style="list-style-type: none"> <li>- Date of filing form should be at least 3 working days after the date of month appraised.</li> <li>- All the holidays are excluded and only working days are considered</li> <li>- The number of shift requests per month does not include the pending connections of the previous months.</li> </ul> <p><b>Processing of closure request (Following key points were taken care of while verifying the data)</b></p> <ul style="list-style-type: none"> <li>- The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange.</li> <li>- DNP (due to Non – payment) cases are excluded</li> <li>- All holidays are excluded for calculating 24 hours.</li> <li>- Closure requests attended in the previous months are excluded</li> <li>- The period for closure starts from the time of submission of application by the subscriber.</li> </ul> <p><b>Supplementary (Additional) services requests</b></p> <ul style="list-style-type: none"> <li>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.</li> <li>- Do not include holidays.</li> <li>- Collect the list of all cases of all subscribers requested for additional facility in past 48 hours prior to IMRB staff visit.</li> <li>- The period starts from the time of submission of application by the subscriber.</li> </ul> <p><b>Live calling was done in 10% of such cases to check the time taken to attend all such requests</b></p>

<b>6. Response time to customer (Electronically and Voice to Voice)</b>	
<b>Computational Methodology</b>	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
<b>Benchmark</b>	(i) % age of calls answered (electronically): within 20 seconds = 80% of the calls over a period within 40 seconds = 95% of the calls over a period (ii) % age of calls answered by operator / voice to voice): within 60 seconds = 80% of the calls over a period within 90 seconds = 95% of the calls over a period
<b>Audit Procedure</b>	-IMRB auditors made test calls from the exchanges to the operator's customer care / helpline / toll free numbers. They will record the 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. - Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator. <b>Live calling: -</b> - Overall sample size is 2*50 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.

<b>7. Time taken to refund of deposits after closure</b>	
<b>Computational Methodology</b>	Percentage of cases needing refund in a specified time = (Total no. of cases where refund was made within a particular time / Total no. of cases requiring refunds)*100
<b>Benchmark</b>	Time taken to refund = 100% within 60 days
<b>Audit Procedure</b>	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 <b>Live calling : -</b> - Collect the details of all the cases for which the refund was provided by the operator prior to the month of Audit - Overall 100 number of live calls are to be made in a licensed service area/circle for each service provider (Distributed across number of exchanges selected)

<b>8. Call completion rate</b>	
<b>Computational Methodology</b>	Call Completion Rate: Call Completion Rate (CCR) is defined as the percentage of total calls that are connected out of the total calls presented to exchange. This could be due to:- Other exchange not working / lines blocked Calling exchange is blocked $CCR = [(Call\ attempts - Calls\ blocked) / Call\ attempts] \times 100$
<b>Benchmark</b>	Call Completion Rate (CCR) within local network: More than 55%
<b>Audit Procedure</b>	IMRB Auditors verified and collected data pertaining to Sample Traffic Data during Time Consistent Busy Hour (TCBH). These details were collected separately for - Three days in which live measurement was carried out - For the complete month in which audit was carried out

## 9.2 For Cellular Mobile services

1. Accumulated Downtime of the Network	
Computational Methodology as per QoS definition	<p>The total time for which the network is down for a particular service provider resulting in a community isolation</p> <p><b>Computational Methodology: Accumulated downtime = Summation of Significant Downtime*</b></p> <p><b>* Significant Downtime to be defined as duration of network outages that result in groups of customers in PLMN being isolated for more than an hour at a stretch. Planned outages during low/ no traffic hours for maintenance/ modernisation/ network enhancement work etc. should be ignored</b></p>
Benchmark	< 24 hrs
Audit Procedure	<p><b>IMRB</b> auditors collected and verified data pertaining to:</p> <ul style="list-style-type: none"> <li>The fault alarm details at the OMC (MSC) for the network outages (due to own network elements and infrastructure service provider end outages) used for arriving at the benchmark reported to TRAI were audited</li> <li>Outages could be in MSC, BSC, BTS or in trunk. In case of BTS failure we have included only those that resulted in community isolation</li> </ul>

2. Call Set-Up Success Rate (CSSR)	
Computational Methodology as per QoS definition	<p>The ratio of calls established to total calls is known CSSR.</p> <p>Call Established means the following events have happened in call setup:-</p> <ul style="list-style-type: none"> <li>↳ call attempt is made</li> <li>↳ the TCH is allocated</li> <li>↳ the call is routed to the outward path of the concerned MSC</li> </ul> <p>Computational Methodology: <math>\text{Calls Established} / \text{Total Call Attempts} * 100</math></p>
Benchmark	> 95%
Audit Procedure	<p><b>IMRB</b> auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> <li>↳ The cell-wise data generated through counters/ MMC available in the switch for traffic measurements was verified by the auditors</li> <li>↳ CSSR calculation was measured using OMC generated data only</li> <li>↳ Measurement was done only in Time Consistent Busy Hour (TCBH) period for all days of the week</li> </ul>



<b>3. Service Access Delay</b>	
<p><b>Computational Methodology as per QoS definition</b></p>	<p>Service Access delay is a summation of following parts in the call flow:</p> <ul style="list-style-type: none"> <li>↳ Time to connect calls</li> <li>↳ Time to confirm instruction to connect</li> <li>↳ Time to release calls</li> <li>↳ Time to alert mobile set</li> </ul> <p><b>Computational Methodology:</b>  <b>Time to connect calls</b> = Time between "<u>Origination</u>" and "<u>Service Connect</u>" message from BTS to Mobile  <b>Time to confirm instruction to connect*</b> = Time between "<u>Origination</u>" and "Base Station Acknowledgment"                      Note: Time measured here is a sub-part of first measurement  <b>Time to release call</b> = Time between "<u>Release on Reverse Link</u>" and "<u>Release on Forward Link</u>"  <b>Time to alert a mobile</b> = This is measured as a mean of two measurements (i+ii/2):</p> <ul style="list-style-type: none"> <li>● First paging attempt = Time between receiving a call request at PLMN and alerting the mobile</li> <li>● Final paging attempt = Time between receiving a call request at PLMN and hearing start of "Not reachable" announcement</li> </ul>
<p><b>Benchmark</b></p>	<p>Between 9 to 20 seconds depending on number of paging attempts (Average of 100 calls &lt; = 15 sec.)</p>
<p><b>Audit Procedure</b></p>	<p><b>IMRB Auditors collected and verified records pertaining to:</b></p> <ul style="list-style-type: none"> <li>↳ Audit of the details of Layer 3 Message diagnostics generated from periodic Drive tests conducted at different parts of the network used to arrive at the benchmarks reported to TRAI was conducted</li> <li>↳ Validating that at least <b>100 sample</b> calls should have been by the service provider <b>made</b> during <b>Time consistent busy hour</b> (TCBH) for the quarter using standard drive test equipment. (Note: measurement using engineering handsets was not deemed acceptable)</li> <li>↳ The component 'first paging attempt' was checked whether it was measured by the operator using a protocol analyser.</li> </ul>

4. Network Congestion Parameters	
Computational Methodology as per QoS definition	<p>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:</p> <ul style="list-style-type: none"> <li>↳ SDCCH Level: Stand-alone dedicated control channel</li> <li>↳ TCH Level: Traffic Channel</li> <li>↳ POI Level: Point of Interconnect</li> </ul> <p><b>Computational Methodology:</b></p> <ul style="list-style-type: none"> <li>↳ <b>SDCCH / TCH Congestion% = <math>[(A1 \times C1) + (A2 \times C2) + \dots + (An \times Cn)] / (A1 + A2 + \dots + An)</math></b> <ul style="list-style-type: none"> <li>● Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1</li> <li>● C1 = Average SDCCH / TCH Congestion % on day 1</li> <li>● A2 = Number of attempts to establish SDCCH / TCH made on day 2</li> <li>● C2 = Average SDCCH / TCH Congestion % on day 2</li> <li>● An = Number of attempts to establish SDCCH / TCH made on day n</li> <li>● Cn = Average SDCCH / TCH Congestion % on day n</li> </ul> </li> <li>↳ <b>POI Congestion% = <math>[(A1 \times C1) + (A2 \times C2) + \dots + (An \times Cn)] / (A1 + A2 + \dots + An)</math></b> <ul style="list-style-type: none"> <li>● Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1</li> <li>● C1 = Average POI Congestion % on day 1</li> <li>● A2 = POI traffic offered on all POIs (no. of calls) on day 2</li> <li>● C2 = Average POI Congestion % on day 2</li> <li>● An = POI traffic offered on all POIs (no. of calls) on day n</li> <li>● Cn = Average POI Congestion % on day n</li> </ul> </li> </ul>
Benchmark	<p><b>SDCCH Congestion: &lt; 1%</b>  <b>TCH Congestion: &lt; 2%</b>  <b>POI Congestion: &lt; 0.5%</b></p>
Audit Procedure	<p><b>IMRB Auditors collected and verified records pertaining to:</b></p> <ul style="list-style-type: none"> <li>↳ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) was conducted</li> <li>↳ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH</li> <li>↳ The POI details were verified from the switch for all the links of the operators</li> </ul>

5. Call Drop Rate	
Computational Methodology as per QoS definition	<p>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</p> <ul style="list-style-type: none"> <li>↳ <b>Total calls dropped</b> = All calls ceasing unnaturally i.e. due to handover or due to radio loss</li> <li>↳ <b>Total calls established</b> = All calls that have TCH allocation during busy hour</li> </ul> <p><b>Computational Methodology:</b>                      Total Calls Dropped / Total Calls Established x 100</p>
Benchmark	< 3%
Audit Procedure	<p><b>IMRB Auditors collected and verified records pertaining to:</b></p> <ul style="list-style-type: none"> <li>↳ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was conducted.</li> <li>↳ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter</li> </ul>

<b>6. Percentage Connections with Good Voice Quality</b>	
<b>Computational Methodology as per QoS definition</b>	<p>Definition:</p> <ul style="list-style-type: none"> <li>↳ for GSM service providers the calls having a value of 0 – 4 are considered to be of good quality (on a seven point scale)</li> <li>↳ 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 %</li> </ul> <p><b>Computational Methodology:</b></p> <ul style="list-style-type: none"> <li>↳ <b>% Connections with good voice quality = (No. of voice samples with good voice quality / Total number of samples) x 100</b></li> </ul>
<b>Benchmark</b>	<b>&gt; 95%</b>
<b>Audit Procedure</b>	<p><b>IMRB Auditors collected and verified records pertaining to:</b></p> <p>Audit would be conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) and used to arrive at the benchmarks reported to TRAI.</p> <p>Procedures that were to be followed by operator for obtaining relevant details for computing this parameter were audited</p> <ul style="list-style-type: none"> <li>↳ Operator to conduct <u>at least one</u> drive test using standard drive test equipment every week during TCBH</li> <li>↳ Each drive test should evenly cover the following 5 types of locations:</li> <li>↳ <b>3 Outdoor</b> (Periphery of the city, Congested Area, Across the City), and <b>2 Indoor</b> (Office Complex and Shopping Complex)</li> <li>↳ 2 minute long calls to be initiated and held throughout the drive test</li> <li>↳ The speed of the vehicle should be kept at around 50km/hr. (around 30 km/hr in case of geographically small cities) – This was ensured during the drive tests conducted by IMRB Auditors</li> <li>↳ RxQual / FER samples generated during the drive test collected by the operator were verified</li> <li>↳ <i>Measurements using Engineering handsets were not acceptable</i></li> <li>↳ All the operators were not maintaining this data at the switch level</li> </ul>

7. Service Coverage	
<b>Computational Methodology as per QoS definition</b>	<p>Definition:</p> <ul style="list-style-type: none"> <li>↳ The level of signal available in a particular part of a city is known as signal strength.</li> </ul> <p><b>Computational Methodology:</b></p> <ul style="list-style-type: none"> <li>↳ Service Coverage for route type x = <math>[(N1 \times CSS1) + (N2 \times CSS2) + \dots + (Nn \times CSSn)] / (N1 + N2 + \dots + Nn)</math></li> <li>↳ Where:- N1 = Number of calls on type of route x made in drive test 1</li> <li>↳ CSS1 = Average coverage signal strength on type of route x in drive test 1 (in dBm)</li> <li>↳ N2 = Number of calls on type of route x made in drive test 2</li> <li>↳ CSS2 = Average coverage signal strength on type of route x in drive test 2 (in dBm)</li> <li>↳ Nn = Number of calls on type of route x made in drive test n</li> <li>↳ CSSn = Average coverage signal strength on type of route x in drive test n (in dBm)</li> </ul>
<b>Benchmark</b>	<p><b>Indoor &gt;= -75 dBm</b>  <b>In-vehicle &gt;= -85 dBm</b>  <b>Outdoor – in city &gt;= -95 dBm</b></p>
<b>Audit Procedure</b>	<p><b>IMRB Auditors collected and verified call centre records pertaining to:</b></p> <ul style="list-style-type: none"> <li>↳ Audit was conducted based on the details of periodic drive tests conducted at different part of the network during Time consistent busy hour (TCBH) which were used to arrive at the benchmarks reported to TRAI.</li> <li>↳ Procedures were verified that were to be followed by operator for obtaining relevant details for computing this parameter:- <ul style="list-style-type: none"> <li>↳ Operator to conduct at least one drive test using standard drive test equipment* every week during Time consistent busy hour (TCBH).</li> <li>↳ Each drive test should evenly cover the following 5 types of locations: – <ul style="list-style-type: none"> <li>↳ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and</li> <li>↳ 2 Indoor (Office Complex and Shopping Complex)</li> </ul> </li> </ul> </li> </ul> <p>↳ <i>Measurements using Engineering handsets were not acceptable</i></p>

8. Response time to customer (Electronically and Voice to Voice)	
<b>Computational Methodology</b>	<p><b>To connect to IVR:</b> The time taken to connect a person (as soon as he presses call) to the IVR of the service provider</p> <p><b>To connect to operator:</b> The time taken to connect a person (as soon as he presses 9) to the customer care executive</p> <p><b>Computational Methodology:</b>  Percentage of calls answered in a specified time = <math>(\text{Total no. of calls answered within that specified time} / \text{Total no. of calls dialed for a particular service}) * 100</math></p>
<b>Benchmark</b>	<p>(i) %age of calls answered (electronically):</p> <ul style="list-style-type: none"> <li>↳ within 20 seconds = 80%</li> <li>↳ within 40 seconds = 95%</li> </ul> <p>(ii) %age of calls answered by operator (voice to voice):</p> <ul style="list-style-type: none"> <li>↳ within 60 seconds = 80%</li> <li>↳ within 90 seconds = 95%</li> </ul>

<b>Audit Procedure</b>	<p>-IMRB auditors made test calls from the exchanges to the operator's customer care / helpline / toll free numbers. They will record the time taken to connect a customer's call both to the IVR as well as to a customer care executive.</p> <p>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.</p> <p>- Time to answer the call by the operator should be taken from the time auditor has pressed the requisite button for being assisted by the operator.</p> <p><b>Live calling: -</b></p> <p>- Overall sample size is 2*50 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</p> <p>- Time to answer the call by the operator was assessed from the time interviewer pressed the requisite button for being assisted by the operator.</p> <p>- All the supplementary services that have any kind of human intervention are to be covered here. It also includes the IVR assisted services.</p>
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<b>9.1 Billing complaints per 100 bills issued</b>	
<b>Computational Methodology as per QoS definition</b>	<p>Billing complaints includes any of the following complaints related to billing from the point of view of customer:</p> <ul style="list-style-type: none"> <li>• Local call charges billed as STD/ISD or vice-versa</li> <li>• Toll free numbers charged</li> <li>• Wrong roaming charges</li> <li>• Call made/received disputed</li> <li>• Wrongly charged extra for some service (SIM replacement charged twice, service not used but charged etc.)</li> <li>• Cheque submitted on time but charged penalty for paying beyond due date (in case customer is not at fault i.e. all those that operator cannot prove that he/she is not lying)</li> <li>• Payment made but not reflected (may be wrongly adjusted to another customer etc.)</li> </ul> <p><b>Billing complaints per 100 bills issued</b> = Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter</p> <p><i>* All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included</i></p> <p><i>** Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.</i></p>
<b>Benchmark</b>	< 0.1% billing complaints per 100 bills
<b>Audit Procedure</b>	<p>IMRB auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> <li>- Number of bills generated</li> <li>- Number of billing complaints received</li> <li>- %age complaints per 100 bills</li> </ul>

9.2 Resolution of billing complaints	
<b>Computational Methodology as per QoS definition</b>	<p><b>%age of billing complaints resolved within 4 weeks</b>=(Complaints resolved in 4 weeks from date of receipt / Total billing complaints received during the relevant period) x 100</p> <p><i>Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.</i></p> <p><i>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.</i></p>
<b>Benchmark</b>	100% cases to be resolved within 4 weeks
<b>Audit Procedure</b>	<p><b>IMRB Auditors collected and verified data pertaining to</b></p> <ul style="list-style-type: none"> <li>- Total number of billing complaints/bills disputed</li> <li>- Number of complaints resolved in 4 weeks</li> </ul> <p><b>Live calling :-</b>  <b>Overall 100 number of live calls</b> made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than 100</p>

9.3 Period of refunds / payments due to customers	
<b>Computational Methodology as per QoS definition</b>	<p><b>Period of all refunds = Maximum value of 'Time taken to refund'</b>            where:-Time taken to refund = Date of refund – date of lodging complaint</p>
<b>Benchmark</b>	100% cases in less than 4 weeks
<b>Audit Procedure</b>	<p><b>Audit of refund details and complaints (only those resulting in refunds) resolution details used for arriving at the figures reported to TRAI to be conducted.</b>  <b>Operator to provide details of:-</b></p> <ul style="list-style-type: none"> <li>• <b>Dates of lodging</b> of all billing complaints resolved in favour of customer and resulting in requirement of a refund by the operator</li> <li>• <b>Dates of refund</b> pertaining to all billing complaints received during the relevant quarter</li> </ul> <p><b>Also random live checks of all subscribers entitled for refund were conducted</b></p>

### 9.3 For Broadband services

1. Service provisioning/Activation time	
<b>Computational Methodology as per QoS definition</b>	<p>Service provisioning time refers to the time taken from the date of receipt of an application to the date when the service is activated</p> <p><b>Percentage connections provided within X working days =</b>                      No of connections provided within X working days/ Total number of connections registered during the period * 100</p> <p><b>Technically Non Feasible (TNF)</b> 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 shall be excluded from the calculation of this parameter.</p> <p>Also, problems relating to customer owned equipment such as PC, LAN Card/ USB Port and internal wiring or non-availability of such equipment shall be excluded from the calculation of this parameter.</p>
<b>Benchmark</b>	100 % cases in =<15 working days.
<b>Audit Procedure</b>	<p><b>IMRB</b> auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> <li>-Number of applications received at the service provider's level</li> <li>-Number of connections provided within 15 days</li> <li>-Number of connections provided after 15 days</li> </ul> <p><b>Live calling</b> : Atleast 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</p>

2. Fault repair/Restoration time	
<b>Computational Methodology as per QoS definition</b>	<p>This refers to the time taken to restore the existing customer service to operational level from the time that a problem or fault is reported</p> <p><b>Percentage faults repaired in X working days =</b> (Total no of faults repaired in X working days /Total number of faults reported during the period)*100</p> <p>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</p> <p>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</p>
<b>Benchmark</b>	By next working day: > 90% and within 3 working days: 99%
<b>Audit Procedure</b>	<p><b>IMRB</b> auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> <li>-Number of applications received at the service provider's level</li> <li>-Number of connections provided within 15 days</li> <li>-Number of connections provided after 15 days</li> </ul> <p><b>Live calling</b> : Atleast 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</p>

<b>3. Billing complaints per 100 bills issued</b>	
<b>Computational Methodology as per QoS definition</b>	<p>Billing complaints includes any of the following complaints related to billing from the point of view of customer:</p> <ul style="list-style-type: none"> <li>• Wrongly charged extra for some service</li> <li>• Cheque submitted on time but charged penalty for paying beyond due date</li> <li>• Payment made but not reflected (may be wrongly adjusted to another customer etc.)</li> </ul> <p><b>Billing complaints per 100 bills issued</b> = Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter</p> <p>* All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included</p> <p>** <u>Only</u> dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.</p>
<b>Benchmark</b>	< 2% billing complaints per 100 bills
<b>Audit Procedure</b>	<p><b>IMRB</b> auditors collected and verified data pertaining to</p> <ul style="list-style-type: none"> <li>- Number of bills generated</li> <li>- Number of billing complaints received</li> <li>- %age complaints per 100 bills</li> </ul>

<b>3.1. Resolution of billing complaints</b>	
<b>Computational Methodology as per QoS definition</b>	<p><b>%age of billing complaints resolved within 4 weeks</b>=(Complaints resolved*** in 4 weeks from date of receipt / Total billing complaints** received during the period 2008 ) x 100</p> <p><i>Only dispute related issues (including those that may arise because of a lack of awareness at the subscribers' end) are to be included. It does not include any provisional issues (such as delayed dispatch of billing statements, etc.) in which the operator has opened a ticket internally.</i></p> <p><i>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.</i></p>
<b>Benchmark</b>	100% cases to be resolved within 4 weeks
<b>Audit Procedure</b>	<p><b>IMRB Auditors collected and verified data pertaining to</b></p> <ul style="list-style-type: none"> <li>- Total number of billing complaints/bills disputed</li> <li>- Number of complaints resolved in 4 weeks</li> </ul> <p><b>Live calling :-</b></p> <p><b>-Overall 100 number of live calls</b> are to be made in a licensed service area/circle for each service provider. However in certain cases the sample could not be achieved as bills disputed (prior to the month of Audit) were found to be less than 100</p>



3.2 Time taken to refund after closure	
<b>Computational Methodology as per QoS definition</b>	Time taken to refund = Date of refund – Date of closure Date of closure is considered to be the date on which the connection is discontinued in the service provider database of active customers
<b>Benchmark</b>	100% cases in less than 60 days
<b>Audit Procedure</b>	<b>IMRB Auditors collected and verified data pertaining to</b> -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

4. Response time to customer for assistance	
<b>Computational Methodology as per QoS definition</b>	<b>%age of calls answered by operator (voice to voice) within n seconds</b> = (Number of calls where <u>time taken for operator to respond</u> * >= n sec / Total number of calls where an attempt to route to the operator was made) x 100  <u>Time taken for operator to respond</u> = Time when an operator responds to a call – Time when the relevant code to reach the operator is dialled
<b>Benchmark</b>	Calls answered within 60 seconds > 60 % Calls answered within > 80%
<b>Audit Procedure</b>	<b>IMRB Auditors collected and verified call centre records pertaining to</b> -Number of calls received by the operator -Number and %age calls answered within <b>60 seconds</b> -Number and percentage calls answered within <b>90 seconds</b> <b>Live calling : -</b> Overall <b>100 number</b> of live calls at <b>different points of time</b> were made in a licensed service area/circle for each service provider to assess the efficiency of the call centre

5. Bandwidth Utilization	
<b>Computational Methodology as per QoS definition</b>	Percentage Bandwidth available on the link = Total Bandwidth* utilised in TCBH for the period/ Total Bandwidth Available during the period*100  Multi Router Traffic Grapher (MRTG) is to be used to measure the details of Bandwidth utilisation by service providers
<b>Benchmark</b>	-- < 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.
<b>Audit Procedure</b>	<b>IMRB Auditors collected and verified call centre records pertaining to</b> <b>( I )POP to ISP gateway Node [Intra – network] Links</b> -Auditors to verify and collect data pertaining to Total Bandwidth available and Total Bandwidth utilised 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 utilised during at the sample links TCBH for the complete month of audit - Total number of intra network links having >90% bandwidth utilisation during the month of Audit <b>(ii) ISP Gateway Node to IGSP / NIXI Node upstream Link's) for international connectivity</b> -Total number of upstream links for International connectivity -Total number of links having Bandwidth > 90%Total Bandwidth available and Total Bandwidth utilised 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 utilised at all the international links during TCBH for the complete month of audit (Also obtain details separately for the days)

<b>Broadband download speed</b>	
<b>Computational Methodology as per QoS definition</b>	This refers to the ratio of size of the file to be downloaded and total time required for error free transmission of the file
<b>Benchmark</b>	Subscribed broadband connection speed to be met >80% from ISP Node to user
<b>Audit Procedure</b>	<p><b>Live calling : -</b></p> <ul style="list-style-type: none"> <li>-Details of live customers were obtained from the service providers</li> <li>-Overall <b>50 number</b> of live calls at were made during peak hours in a licensed service area/circle for each service provider to assess the download speed available to subscribers. Tool provided by the on the service providers website was used for the same</li> <li>-Details of total committed download speed and speed available to the users were recorded for each of the subscriber</li> <li>- Percentage download speed available was calculated as = Sum of total speed available for 50 customers/Total committed download speed for 50 customers*100</li> </ul>

<b>Service availability/Uptime</b>	
<b>Computational Methodology as per QoS definition</b>	<p>Service availability/uptime is the measure of the degree to which the broadband access network including ISP Node is operable and not in a state of failure or outage at any point of time for all users</p> <p>Service availability/Uptime = <math>(\text{Total operational hours} - \text{Total Downtime hrs}) * 100 / \text{Total operational hours}</math></p> <p>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</p> <p>Planned outages for routine maintenance of the system are excluded from the calculation of service availability/uptime</p>
<b>Benchmark</b>	<ul style="list-style-type: none"> <li>- 90% for quarter ending June 2007</li> <li>- 98% with effect from quarter ending September 2007 and onwards</li> </ul>
<b>Audit Procedure</b>	<p><b>IMRB Auditors collected and verified call centre records pertaining to</b></p> <ul style="list-style-type: none"> <li>-Total operational hrs</li> <li>-Total downtime hrs</li> </ul> <p>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 Also, verification of old records(July to September 2007) was verified</p>

Packet loss	
<b>Computational Methodology as per QoS definition</b>	<p>Packet loss is the percentage of packets lost to total packets transmitted between two designated Customer Premises Equipments/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</p> <p>The packet loss is measured by computing the percent packet loss of <b>1000 pings of 64 byte packet each</b>.</p> <p>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</p> <p>Minimum sample reference points for each service area shall be three in number or multiple reference points if required</p> <p><b>Hence Packet loss is computed by the formula - (Total number of ping packets lost during the period/Total number of ping packets transmitted)* 100</b></p>
<b>Benchmark</b>	<1 %
<b>Audit Procedure</b>	<p><b>IMRB Auditors collected and verified call centre records pertaining to</b></p> <ul style="list-style-type: none"> <li>- Records maintained for ping tests conducted during the period of July to September 2007</li> <li>- Smoked ping test (wherever available) results for the period of July to September 2007</li> <li>- Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours)</li> <li>- Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle</li> </ul>

Network Latency	
<b>Computational Methodology as per QoS definition</b>	<p>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 <b>1000 pings of 64 bytes each</b> (Pings are to be sent subsequent to acknowledgement received for the same for previous ping)</p> <p>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</p> <p>Minimum sample reference points for each service area shall be three in number or multiple reference points if required</p> <p><b>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</b></p>
<b>Benchmark</b>	<p>&lt; 120 msec from user reference point at POP/ISP Node to International Gateway</p> <p>&lt; 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial)</p> <p>&lt; 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Sattelite)</p>
<b>Audit Procedure</b>	<p><b>IMRB Auditors collected and verified call centre records pertaining to</b></p> <ul style="list-style-type: none"> <li>- Records maintained for ping tests conducted during the period of July to September 2007</li> <li>- Smoked ping test (wherever available) results for the period of July to September 2007</li> <li>- Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours)</li> <li>- Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle</li> </ul>

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