8 Balaji Estate, Guru Ravidass Marg, Kalkaji, New Delhi - 110019
Phone: (91)-11-4269-7800, Fax: (91)-11-42697802
Website: www.imrbint.com

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

Delhi Circle

Audit Report for July-August-September '09

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Prepared for: **Telecom Regulatory Authority of India**

By: **eTech Group@IMRB**

A specialist unit of IMRB International

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, had until recently been distributed across various Half Yearly periods. From July 2009 onwards the distribution is on a quarterly basis. IMRB International Auditors carried out Audits across Haryana, Delhi, Orissa, Chennai and Tamil Nadu circles in the July-August-September period 2009. **This report details the performance of various service providers in Delhi circle against Quality of Services benchmarks for various parameters laid down by TRAI in respective regulations for Cellular (Mobile), Basic Wireline and Broadband services.**

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1. 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 20th March, 2009. The parameters for Broadband Service have been specified in the TRAI notification for Quality of Services of Broadband Service Regulation, 2006

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

IMRB has been carrying out this exercise for TRAI since December 2007 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

This report highlights the Audit Module findings for Delhi circle for Cellular Mobile, Basic Wireline and Broadband services

This report highlights the findings for the Audit module for Delhi circle that was covered in the 3rd Quarter (July – September 2009). The primary data collection and verification of records maintained by various operators of Cellular Mobile (Wireless), Basic wireline and Broadband services was undertaken by IMRB International during the period July – September 2009.

2. 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 for Cellular Mobile 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 (Applicable only for wireless audit):** Operator assisted and Independent drive test were conducted in three cities 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.
- PMR verification was done as per the old parameters being reported to TRAI by all operators.
- Live measurement and 1 month data collection was done as per the new regulations published by TRAI on 20th March, 2009.
- Separate formats were designed each for Basic (Wireline), Cellular mobile (Wireless) and Broadband services to collect the information on various parameters

3. Sampling methodology

3.1 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 circle

	Name of Operator
Operator 1	Airtel
Operator 2	Vodafone
Operator 3	Idea
Operator 4	MTNL CDMA
Operator 5	TATA
Operator 6	RCOM CDMA
Operator 7	RCOM GSM
Operator 8	Aircel
Operator 9	MTNL GSM

For all the operators audit was conducted in the month of September '09.

3.2 Sampling for Basic (Wireline) services

- For MTNL 5% of the exchanges were selected in such a way that these exchanges were spread across 10% of SDCA's in the entire service area.
- For rest of the service providers (Airtel, TTSL and RCOM) data was collected pertaining to all the exchanges present in the circle/service area

The satisfaction level of subscribers was collected on a four-point Likert scale.

3.3 Sampling for Broadband service providers

- Audits for various Broadband service providers were conducted at the service provider's central node in the Delhi circle. Since most of the private operators have a centralized system of monitoring their network data was obtained for all the Point of Presence (POPs) present in the circle.
- For MTNL, audit was conducted at the central node in Delhi and data submitted by various exchanges/POPs providing Broadband service was verified and collected. This was done in such a way that at-least 5% of POPs spread across 10% of SDCA's were covered.
- Following Broadband service providers were Audited in Delhi circle: - Bharti Airtel Ltd., Hathway, Sify, Reliance, MTNL and VSNL (TATA communications Ltd.)

4. Audit methodology

4.1 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 ASSISSTED DRIVE TESTS	INDEPENDENT DRIVE TESTS
A	**Network Performance**							
A (i)	BTS accumulated down time	Yes	Yes	Yes				
A (ii)	Call setup success rate (within licensee own network)	Yes	Yes	Yes	Yes		Yes	Yes
A (iii)	Blocked Call Rate	Yes	Yes	Yes	Yes		Yes	Yes
A (iv)	Call Drop rate	Yes	Yes	Yes	Yes		Yes	Yes
A (v)	% Connections with good voice quality	Yes	Yes	Yes			Yes	Yes
A (vi)	Service Coverage	Yes	Yes	Yes			Yes	Yes
A (vii)	PoI Congestion	Yes	Yes	Yes				
B	**Customer Helpline**							
B (i)	Response time to the customer for assistance	Yes	Yes	Yes		Yes		
C	**Billing Complaints**							
C (i)	Billing complaints per 100 bills issued	Yes	Yes	Yes				
C (ii)	%age of billing complaints resolved within 4 weeks	Yes	Yes	Yes		Yes		
C (iii)	Period of all refunds/payments due to customers from date of resolution as in (ii) above	Yes	Yes	Yes		Yes		

4.2 Basic (Wireline) Services

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

Sl. No.	Parameters	One month data verification	Live measurement	Live calling
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 January to March 2009 was carried out for all network and non network related parameters.

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)				
-	*Within 60 seconds > 60%*	YES	YES	YES	YES
-	*Within 90 seconds > 90%*	YES	YES	YES	YES
(V)	Bandwidth Utilization/ Throughput:				
▪	*A)Bandwidth Utilization*				
-	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	
▪	*B) Broadband Connection Speed (Download)*	YES	YES	YES	YES
(vi)	Service availability / Uptime	YES	YES	YES	
vii)	Packet Loss	YES	YES	YES	
(viii)	Network Latency for wired broadband access)				
-	*User reference point at POP / ISP Gateway Note to International Gateway (IGSP/NIXI)*	YES	YES	YES	
-	*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	YES	
-	*User reference point at ISP Gateway Node to International nearest NAP port abroad (Satellite)*	YES	YES	YES	

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

5. Executive Summary

The objective assessment of Quality of Services (QoS) was carried out by IMRB International for all the Cellular mobile service providers during the period starting from July 2009 to September 2009 in Delhi circle. The executive summary encapsulates the key findings of the Audit by providing: -

- *"Service provider performance report"* for Cellular mobile, Basic (wireline) and Broadband services , 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 Cellular mobile, Basic (wireline) 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: Cellular Mobile Services

Name of Service Area / City	Time Consistent Busy Hour (TCBH)	Network Availability					Connection Establishment (Accessibility)			Connection Maintenance (Retainability)					POI		Network Traffic Capacity and Utilization		
		Total no. of BTSs in the licensed service area	Sum of downtime of BTSs in a month in hours	BTSs Accumulated downtime (not available for service) (%age)	No. of BTSs having accumulated downtime of >24 hours in a month	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Total No. of cells exceeding 3% TCH drop (call drop)	Total no. of cells in the network	Worst affected cells having more than 3% TCH drop	*Connection with good voice quality	Point of Interconnection (POI) Congestion (No. of POIs not meeting the benchmark)	Total number of working POI Service Area wise	Equipped Capacity of Network in respect of Traffic in erlang	Total traffic handled in TCBH in erlang	Total no. of customers served (as per VLR) on last day of the month
Benchmark →				**≤ 2%**		**≤ 2%**	**≥ 95%**	**≤ 1%**	**≤ 2%**	**≤ 2%**			**≤ 5%**	**≥ 95%**	**≤ 0.5%**				
Airtel	19:00	4177	7956	0.26	40	0.96	98.73	0.15	0.14	1.07	470	9449	4.98	95.12	0	13	272704	142971	4337068
Vodafone	19:00	4141	83.92	0.00	0	0.00	99.63	0.12	0.20	0.86	320	9951	3.22	98.25	0	24	185031	122245	4027392
Idea	20:00	3032	1344.66	0.06	4	0.13	99.85	0.13	0.49	0.82	212	7702	2.75	98.19	0	261	106299	66859	1968825
MTNL CDMA	19:00	221	5139.6	3.23	4	1.80	96.15	0.19	1.45	1.16	14	221	6.34	97.87	0	2	36000	1090.44	58087
Tata	19:00	814	46:25:00	0.00	0	0.00	99.09	0.00	0.01	0.41	21	2937	0.72	98.26	0	83	361251.0	189520	2593308
RCOM CDMA	19:00	793	445.45	0.08	4	0.50	99.25	0.00	0.28	0.87	22	793	2.77	99.26	0	8	16870	2176870	89369
RCOM GSM	19:00	1471	2936	0.28	24	1.63	98.88	0.30	0.13	0.82	46	4425	1.04	98.27					
Aircel	20:00	2006	5480.25	0.38	18	0.93	98.23	1.00	0.81	0.88	114	5392	2.11	98.08	0	50	73539.78	7460.33	358030
MTNL GSM	19:00	DNA	DNA	1.86	3	1.36	97.56	0.00	0.35	1.87	DNA	DNA	0.56	DNP	0	DNP	DNP		

*Details pertaining to these are obtained through drive tests.

Not meeting the benchmark

B'mark = TRAI Benchmark, **DNA** = Details not available, **DNP:** Data not provided

Critical findings: Cellular Mobile Services

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

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
Aircel	2000 – 2100 hrs.	2000 – 2100 hrs.
Bharti Airtel	1900 – 2000 hrs.	1900 – 2000 hrs.
Idea	1900 – 2000 hrs.	2000 – 2100 hrs.
MTNL	1900 – 2000 hrs.	1900 – 2000 hrs.
RCOM GSM	1900 – 2000 hrs.	1900 – 2000 hrs.
RCOM CDMA	1900 – 2000 hrs.	1900 – 2000 hrs.
Tata	1900 – 2000 hrs.	1900 – 2000 hrs.
Vodafone	2000 – 2100 hrs.	1900 – 2000 hrs.

The TCBH reported by all the service providers except Idea and Vodafone matched the network busy hour calculated by IMRB auditors for the Delhi circle.

BTS Accumulated Downtime:
In the Delhi circle, all the operators are meeting benchmark on the parameter BTS accumulated downtime except MTNL CDMA with 3.23%.

Call Set-up Success Rate (CSSR):
All the operators were comfortably meeting the benchmark on this parameter. During the audits the maximum CSSR was observed for IDEA with 99.85% of their calls getting completed. All the operators were found to be calculating the parameter as per the norm specified by TRAI. CSSR was established as the ratio of total number of successful call attempts (establishment) to the total number of call attempts made.

Network Congestion parameters:
SDCCH / Paging Channel Congestion, TCH and POI are part of the network congestion parameters. All the operators are meeting the TRAI specified benchmarks on the congestion parameters. TATA 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. Both Reliance CDMA and Tata Teleservices measure paging channel utilization. When the value of this parameter is less than 100%, it is counted as 0% congestion. There was almost negligible POI congestion on almost all individual POI links between a service provider vis-à-vis other service providers. RCOM is having common POIs for CDMA and GSM as permitted by TRAI.

Call Drop Rate:

During the audit it was found that all the service providers were measuring this parameter as per the TRAI guidelines. The call drop rate was measured as the ratio of total calls dropped to the total number of call attempts for all operators. Also, all the service providers were found to be meeting the TRAI specified benchmark. The lowest call drop rate was for Tata at 0.41%.

Connections with good voice quality:

All the operators are measuring this parameter via their periodic drive tests. However, for Vodafone these parameters can be obtained at their switch as well. 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 all the operators except Idea, Tata, RCOM CDMA and MTNL CDMA met the TRAI benchmark.

Customer Care / Helpline Assessment

For the IVR aspect all the service providers meet the TRAI benchmark. However, in case of Reliance 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. In case of calls answered by operators within 60 seconds, MTNL, Tata and RCOM GSM do not meet the benchmark for the month of audit.

Billing performance

All the operators except Airtel and Aircel, 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 except Idea meet the TRAI benchmark of 100% with 1 week.

Inter operator calls assessment

Inter operator call Assessment From↓ To→	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Airtel	-	100%	99%	99%	100%	100%	99%	100%	91%
Vodafone	100%	-	100%	98%	100%	99%	100%	100%	98%
Idea	99%	99%	-	100%	99%	100%	99%	100%	95%
MTNL CDMA	100%	99%	96%	-	99%	100%	100%	97%	98%
TATA	94%	100%	97%	90%	-	99%	99%	95%	86%
RCOM CDMA	100%	100%	99%	100%	99%	-	100%	96%	100%
RCOM GSM	99%	100%	100%	97%	100%	100%	-	99%	100%
Aircel	100%	94%	99%	98%	99%	100%	99%	-	95%
MTNL GSM	99%	99%	94%	98%	99%	100%	100%	100%	-

The maximum problem faced by the calling operator to other operators

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. All the operators except RCOM (both GSM and CDMA) found tough connecting to a MTNL GSM number with as low as 86 out of 100 calls (from Tata) getting connected. MTNL GSM and Tata also found it difficult connecting to almost all the operators.

Results of Operator assisted Drive test

The drive test was conducted simultaneously for all the operators present in the Delhi circle. 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 in the 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-vehicle and > -95 dbm outdoor routes.

The drive tests in the Delhi circle was conducted along the following route:

	Type of location	Delhi
Outdoor	Periphery of the city	Kalkaji,Nehru Place, New Friends Colony,Ashram,Sarai Kala khan,Akshardham, Ghazipur Red lights,Anand Vihar, Seema Puri Boarder,Wazirabad,Karnal By Pass, Pitampura,Peeragarhi Chowk, Nangloi,Nazafgarh, Brijwasan, Kapasheda Boarder, Mahipal Pur,Andhera Mode,lado Sarai, Ambedkar Nagar, Sangam Vihar, Kalkaji Office
	Congested area	Paharganj, Jhandewalan, Anand Parbat, Chandni Chowk, Darya Ganj
	Across the city	Kalkaji, Aandrew Ganj Flyover, Sai Baba Mandir, CP, Karol Bagh,, Shastri Nagar,Kamla Nagar Ashok Vihar,North Campus,ISBT,Laxmi Nagar,Shahadra,Cross River Mall
Indoor	Office complex	IMRB building
	Shopping complex	Cross River Mall

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

Drive Test (Delhi)

	Benchmark	Airtel		Vodafone		Idea		MTNL GSM		TATA		RCOM CDMA		RCOM GSM		Aircel		MTNL CDMA	
		In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor	In door	Outdoor
Voice quality	≥ 95%	99.02%	95.87%	97.45%	97.11%	94.35%	93.75%	53.01%	91.76%	97.36%	96.10%	99.64	98.34	98.41%	98.14%	98.91%	97.78%	94.28%	
CSSR	≥ 95%	100%	100%	100%	98.36%	100%	100%	51.28%	86.46%	100%	99.46%	100%	100%	100%	99.67%	100%	99.64%	100%	100%
%age Blocked calls		0%	0%	0%	1.64%	0%	0%	48.72%	13.54%	0%	0.54%	0%	0%	0%	0.33%	0%	0.36%	0%	0%
Call drop rate	≤ 2%	0%	0%	0%	0%	0%	0%	15.00%	4.82%	1.67%	0%	0%	0%	0%	0%	0%	0.71%	0%	3.35%
Hands off success rate		100%	100%	100%	100%	100%	100%	94.87%	94.04%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

Not meeting the benchmark

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

TATA: Interference was recorded in small patches near Chanchal Park, Wazirabad road, near Khanpur road and near Jhandewalan
RCOM GSM: Inadequate coverage was recorded at Bijwasan to Kapasehera, Bijwasan to Chhawla Route, Raghubir Enclave Najafgarh to West of Mohan Garden and Kaka Nagar-2 to PCST Office
Vodafone: Inadequate coverage was recorded at Wazirabad Yamuna Over Bridge, Bijwasan, Mahipalpur and Andheria More. Interference was recorded at Pitampura red light and Akshardham
Idea: Inadequate coverage was recorded at Wazirabad Yamuna Over Bridge, Bijwasan and Mahipalpur

During the operator assisted drive test, network optimization exercise was in progress for MTNL which has been claimed to be the reason for poor results in drive test shown in the report.

Conclusions:

1. MTNL CDMA does not meet the TRAI benchmark on voice quality, CSSR and call drop rate in Delhi
2. Idea in do not meet the benchmark for voice quality in both outdoor and indoor areas
3. MTNL GSM does not meet the TRAI benchmark on call drop rate in outdoor areas

Summary of Live Measurement Results – Cellular Mobile Services

Name of Service Provider	Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			POI	Metering and Billing	Response time to customer for assistance	
	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	Connection with good voice quality	Point of Interconnection (POI) Congestion	%age complaints resolved within 4 weeks	Accessibility of call centre/ customer care	Percentage of calls answered by the operators (voice to voice) within 60 seconds
B'mark	≥ 95%	≤ 1%	≤ 2%	≤ 2%	≤ 5%	≥ 95%	≤ 0.5%	100%	≥ 95%	≥ 90%
Airtel	98.86%	0.09%	0.11%	1.00%	5.02%	96.12%	0.00%	73.00%	100.00%	75.29%
Vodafone	99.34%	0.08%	0.09%	0.75%	3.38%	97.16%	0.00%	79.59%	100.00%	88.00%
Idea	99.82%	0.09%	0.52%	0.91%	3.28%	93.84%	0.00%	65.52%	100.00%	94.00%
MTNL CDMA	97.00%	0.20%	0.76%	0.98%	4.61%	80.69%	0.00%	32.00%	100.00%	83.00%
TATA	98.99%	0.00%	0.01%	0.46%	1.06%	78.83%	0.00%	82.98%	99.00%	58.00%
RCOM CDMA	99.15%	0.00%	0.29%	0.59%	1.39%	91.63%	0.00%	56.00%	100.00%	94.00%
RCOM GSM	98.77%	0.03%	0.16%	0.71%	0.75%	98.18%	0.00%	64.71%	90.00%	50.00%
Aircel	98.48%	0.01%	1.42%	0.83%	2.04%	97.95%	0.00%	17.89%	100.00%	85.00%
MTNL GSM	97.00%	0.00%	0.09%	1.97%	4.54%	85.53%	0.00%	70.00%	99.00%	95.96%

Not meeting the benchmark

DNA: Details not available

During the three day live measurement, Airtel was found to be not meeting the TRAI benchmark for worst affected cells having more than 3% TCH drop. During the live calling none of the operators met the 100% benchmark for complaints resolved in 4 weeks.

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

Parameters	Benchmarks	MTNL	Airtel	TTSL	RCOM
Percentage connections completed within 7 days	100%	99.00%	100.00%	100.00%	100.00%
Faults incidences (No. of faults/100 Subs./month)	≤5	8.88	4.65	1.24	0.89
% of faults repaired by next working day	≥ 90%	75.62%	94.49%	98.46%	99.97%
% of faults repaired within 3 days	100%	91.41%	99.11%	99.69%	100.00%
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	98.24%	100.00%	100.00%	100.00%
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	88.71%	100.00%	NA	NA
Faults pending for > 15 days	Rent rebate of 1 month	94.29%	100.00%	NA	NA
Mean Time to Repair (MTTR)	≤ 8 Hrs	11.06	7.19	6.39	4
Call Completion Rate (CCR)	≥ 55%	93.98%	97.01%	98.37%	DNP
Answer to Seizure ratio (ASR)	≥ 75%	62.33%	DNP	DNP	90.35%
POI Congestion	≤0.5	0.12	0.00	0.00	0.00
Metering and billing credibility - Number of bills disputed during over a billing cycle	≤ 0.1%	0.09%	0.01%	0.11%	0.05%
Resolution of billing complaints within 4 weeks	100%	72.60%	100.00%	100.00%	100.00%
Period of applying credit / waiver	≤ 1 week	32.69%	100.00%	100.00%	100.00%
Customer care/helpline promptness					
Percentage shift requests attended within 3 days	≥ 95%	79.69%	99.55%	100.00%	96.55%
Closure within 7 days	100%	91.50%	100.00%	100.00%	100.00%
Response time to customer for assistance					
% age calls getting connected and answered	≥ 95%	100.00%	95.13%	100.00%	100.00%
% age call answered by operator in 60 seconds	≥ 90%	99.68%	92.00%	71.72%	92.00%
Time taken for refund of deposits after closures within 60 days	100%	53.50%	100.00%	NA	NA

*Note: For MTNL data pertains to the sample 5% of exchanges audited during the period of July to September 2009, 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

Summary of Live Measurement Results – Wireline Services

Parameters	Benchmarks	MTNL	Airtel	TTSL	RCOM
Percentage connections completed within 7 days	100%	89.75%	100.00%	96.67%	100.00%
% of faults repaired by next working day	≥ 90%	35.94%	71.00%	88.00%	86.00%
% of faults repaired within 3 days	100%	84.82%	100.00%	100.00%	100.00%
Call Completion Rate (CCR)	≥ 55%	97.15%	99.00%	98.00%	DNP
Answer to Seizure ratio (ASR)	≥ 75%	68.67%	DNP	DNP	77.27%
POI Congestion	≤0.5	0.00	0.00	0.00	0.00
Resolution of billing complaints within 4 weeks	100%	84.31%	100.00%	100.00%	100.00%
Customer care/helpline promptness					
Percentage shift requests attended within 3 days	≥ 95%	80.05%	97.00%	96.00%	95.00%
Response time to customer for assistance					
% age calls getting connected and answered	≥ 95%	71.29%	100.00%	100.00%	100.00%
% age call answered by operator in 60 seconds	≥ 90%	22.12%	87.00%	85.00%	92.00%

Not meeting the benchmark

B'mark = TRAI Benchmark, **DNP** = Details not provided,

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

MTNL, Airtel, Tata Teleservices (TTSL) and Reliance Communications (RCOM) are the 4 operators providing Basic (Wireline) Services in Delhi circle to retail customers. During the audit process it was observed that MTNL could not meet TRAI specified benchmark for most of the parameters specified by TRAI.

For one month data in the period of July to September 2009, MTNL fails to meet the TRAI specified benchmark for majority of parameters (14 out of 19 parameters shown in the table). For faults repaired within 3 days, RCOM was found to be the only operator meeting the TRAI benchmark. Also for CCR, all the operators were found to be scoring way above the TRAI benchmark.

The live calling/measurement 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 all the service providers meet the TRAI specified benchmark with CCR during three days found to be varying from 97.15% for MTNL to 99.00% for Airtel. During the live measurement, none of the operator was able to meet the benchmark score for faults repaired within next working day.

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

Provision of telephone after registration of demand

- In Delhi circle, all the service providers except MTNL meet the TRAI specified benchmark score of 100% connections within 7 days. In live calling, in addition to MTNL, TTSL also failed to meet the benchmark score.

Fault incidence / clearance statistics

- For faults repaired within 24 hrs, all the operators except MTNL scored more than 90%. MTNL was found to be way below the benchmark score with only 75.62% of the faults repaired within 24 hrs.
- For live calling, the situation was found to be even worse. In live calling all the operators were found to be falling short of the TRAI benchmark.
- Even for fault repair within 3 days, RCOM was found to be the only operator meeting the TRAI benchmark for the one month data.
- Whereas in live calling, MTNL was the only operator falling short of the TRAI benchmark for faults repaired within 3 days.

Traffic statistics (CCR)

- All the operators were found to be comfortably meeting 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 at various exchanges.

Metering and billing credibility

- For one month data, TTSL was found to be the only service provider failing to meet the TRAI specified benchmark with percentage billing complaints being equal to 0.11% of the total bills generated.
- For resolution of billing complaints, MTNL was the only provider falling short of the benchmark and that too in both one month data as well as live calling.

Customer care/helpline promptness

- MTNL failed to meet the TRAI benchmark for all the sub-parameters in both one month data as well as live calling.

Response time to customer for assistance

- For percentage of calls getting connected and answered, all the operators managed to meet the TRAI benchmark for 1 month data, but MTNL fell short of the same for live calling.
- For calls answered by the operator within 60 seconds, TTSL was found to be falling short of the TRAI benchmark in one month data whereas for live calling, RCOM was the only operator meeting the benchmark.
- For MTNL, only 22.12% of the calls made to the customer care during the live calling were answered by the operator within 60 seconds.

Time taken for refund of deposits after closure

- For TTSL and RCOM, there were no cases of refund. In case of Airtel and MTNL, refund of deposits after closure was made within 60 days in 100% and 53.5% of the cases respectively.

Level 1 service

Level 1 services	MTNL	Airtel	TTSL	RCOM
Total no. of calls made	480	50	50	50
Calls answered in 60 sec	362	48	47	47
Calls answered after 60 sec	70	2	3	3

To test the efficiency of level 1 services (Trunk booking, Child helpline, Women helpline, Airline booking, Fire, Police, Railways) offered by various service providers. 480 calls were made for MTNL and 50 each for Airtel, TTSL and RCOM to different numbers and time taken to answer the call was noticed. Out of which 75% of the calls made for MTNL were answered within 60 seconds. Same figure for Airtel, TTSL and RCOM was 96%, 94% and 94% respectively.

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

Parameters	Benchmarks	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Service provisioning uptime							
Percentage connections provided within 15 days	100%	98.50%	95.19%	99.73%	100.00%	99.54%	100.00%
Fault repair restoration time							
Percentage faults repaired by next working days	> 90%	61.06%	96.46%	96.91%	98.00%	100.00%	90.99%
Percentage faults repaired within three working days	> 99%	80.18%	99.08%	99.06%	100.00%	NA	100.00%
Billing performance							
Billing complaints per 100 bills issued	< 2%	0.14%	0.01%	1.18%	0.81%	0.40%	NA
%age of billing complaints resolved in 4 weeks	100%	95.96%	100.00%	92.86%	100.00%	100.00%	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	100.00%	100.00%	100.00%	NA	NA
Customer care/helpline assessment (Voice to Voice)							
Percentage calls answered within 60 seconds	> 60%	99.06%	96.38%	89.00%	79.11%	91.36%	96.54%
Percentage calls answered within 90 seconds	> 80%	99.53%	98.34%	DNP	82.64%	94.60%	100.00%
Bandwidth utilization/Throughput							
Intra network links (POP to ISP Node)		13	1937	50	19	21	400
Total number of intra network links > 90%		0	0	0	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		7	2	5	5	18	20
Percentage bandwidth utilized on upstream links	< 80%	81.62%	83.86%	75.50%	44.88%	34.95%	83.22%
Broadband download speed	> 80%	84.00%	89.00%	82.00%	87.00%	90.50%	89.30%
Service availability/uptime	> 98%	99.86%	99.99%	97.50%	99.70%	99.79%	100.00%
Packet loss	< 1%	0.07%	0.00%	0.32%	0.00%	0.47%	<1%
Network Latency							
POP/ISP Node to NIXI	< 120 msec	Complied	12	78	<80	Complied	<45
ISP node to NAP port (Terrestrial)	< 350 msec	Complied	68	240	<250	Complied	<300

{*Note: For MTNL data pertains to the sample 5% of exchanges audited during the period of to August to September 2009. For VSNL data pertains to the North region as submitted in their PMR, whereas for rest of the operators figures pertain to all the exchanges present in the circle}

Figures provided on All India basis

Not meeting the benchmark

B'mark = TRAI Benchmark, **DNP** = Details not provided, **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 some service providers claimed that they were submitting the PMR basis their inference of the QoS parameters. Also, there were differences observed in level of reporting for e.g. Sify, and MTNL (for network related parameters) consider all India as one circle and VSNL has been reporting PMR on the regional basis where 1 region would cover multiple circles. In fact the findings reported herewith for some of the parameters for these operators are on an all India basis.

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

Service provisioning/Activation time

- MTNL, Airtel, Hathway and Reliance were found to be not meeting the benchmark as far as the performance for one month data collection is concerned.
- However, only MTNL and VSNL are falling below the benchmark for the results of Live calling process undertaken by IMRB interviewers.

Fault Repair/Restoration time

- MTNL (61.06%) is the only service provider falling below the benchmark for fault repair within next working day with Reliance giving 100% fault repair service within next working day.
- For fault repair within three working days all operators except MTNL are meeting the TRAI specified benchmark of 99%
- 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.
- None of the service providers except Airtel and Reliance were found to be meeting the benchmark for Fault repair/Restoration for Live calling results. Some part of variation can also be attributed to low sample size

Billing performance

- All the service providers were found to be meeting the benchmark of percentage billings complaints received.
- MTNL and Hathway were not meeting benchmark on time taken for resolution of billing complaints for the month in which data was collected.
- Sify however claims that all its retail broadband customers are prepaid and hence there are no billing complaints for Sify.
- During live calling, all the service providers (except Airtel) were not meeting the benchmark of 4 weeks for resolution of billing complaints.

Customer Care/Helpline Assessment

- All the operators meet the TRAI specified benchmark for calls answered by the operator in 60 and 90 seconds for the month in which audit was carried out
- For live calling results MTNL with 31% falls short of benchmark for calls answered within 60 seconds by the operator.
- For live calling MTNL also falls short of TRAI specified benchmark for calls answered within 90 seconds with a score of 52%.

Bandwidth Utilization:

- All the service providers were found to be using Multiple Router Traffic Grapher (MRTG) to measure the bandwidth utilization at intra network links.
- However, it was noticed that some of the service providers are reporting Average bandwidth utilized during the complete period to TRAI instead of Bandwidth utilized during

Time Consistent Busy Hour (TCBH) as they claim that the peak hours generally range from 11.00AM in the morning to 4.00 PM in the evening owing to high corporate usage during the period. Also, it was observed that there are multiple links and busy hour may vary for each link.

- All the service providers were found to be reporting combined bandwidth utilization for corporate and household customers as there is no mechanism available to provide it separately for different users.
- For Intra network link, data for VSNL (TATA Communications), Reliance and Sify was obtained on an all India basis. None of the links tested for these operators was found to be having above 90% bandwidth utilization for the month in which audit was carried out
- Also It was observed that all the links (tested during three day live measurement) in the access segment for most of the service providers were found be below 80%.
- For Bandwidth utilization on upstream links (From ISP Node to IGSP/NIXI), MTNL, Airtel and Sify are slightly above the 80% bandwidth utilization mark with utilization of 81.62%, 83.86% and 83.22% respectively

Download speed

- 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. These measurements were carried out by IMRB auditors on a sample basis during visits at PoPs and ISP Node
- However, no historic data was available for verification of records for month of Audit as well as quarter ending January to March 2009 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:

- All the service providers (except Hathway) are meeting the benchmark on service availability/uptime for the month in which audit was carried out.

Packet Loss and Network Latency

- It was observed that almost all the service providers are measuring packet loss and latency by conducting random ping tests for their internal performance measurement.
- The verification of the records of old ping tests was done through latency graphs (available from smoke ping tool) for some of the operators.
- However, ping tests conducted/smoked ping results during live measurements revealed that all the service providers are meeting the benchmark prescribed by TRAI.

Summary of Live Measurement Results – Broadband Services

Parameters	Benchmarks	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Service provisioning uptime							
Percentage connections provided within 15 days	100%	85.00%	100.00%	100.00%	99.00%	100.00%	100.00%
Fault repair restoration time							
Percentage faults repaired by next working days	> 90%	26.67%	92.00%	59.00%	82.00%	96.00%	87.00%
Percentage faults repaired within three working days	> 99%	75.00%	100.00%	89.00%	100.00%	100.00%	100.00%
Billing performance							
%age of billing complaints resolved in 4 weeks	100%	76.00%	100.00%	90.00%	97.50%	98.00%	NA
Customer care/helpline assessment (Voice to Voice)							
Percentage calls answered within 60 seconds	> 60%	31.00%	80.00%	73.00%	79.00%	71.00%	82.00%
Percentage calls answered within 90 seconds	> 80%	52.00%	98.00%	91.00%	93.00%	99.00%	96.00%
Bandwidth utilization/Throughput							
Intra network links (POP to ISP Node)		13	1937	50	19	21	394
Total number of intra network links > 90%		0	0	0	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		7	2	5	5	18	20
Percentage bandwidth utilized on upstream links	< 80%	62.75%	83.51%	78.81%	54.97%	34.95%	83.04%
Broadband download speed	> 80%	84.00%	89.00%	82.00%	87.00%	90.50%	89.30%
Service availability/uptime	> 98%	99.99%	99.99%	98.61%	99.66%	98.00%	100.00%
Packet loss	< 1%	0.07%	0.00%	0.16%	0.00%	0.47%	0.00%
Network Latency							
POP/ISP Node to NIXI	< 120 msec	57	12	71	56	12	44
ISP node to NAP port (Terres trial)	< 350 msec	121	75	250	105	147	228

Figures provided on All India basis

Not meeting the benchmark

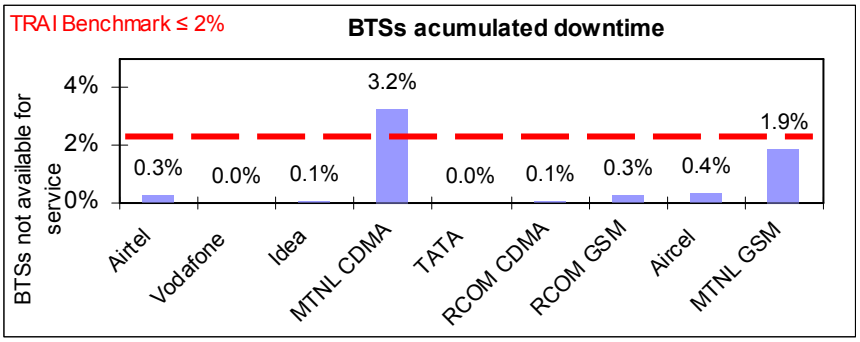
B'mark = TRAI Benchmark, **DNP** = Details not provided, **NA:** Not Applicable

- All the service providers (except RCOM) are meeting the benchmark on service availability/uptime for three day live measurements.
- 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 all of the operators
- For Bandwidth utilization on upstream links, all the service providers except Airtel and Sify are meeting the benchmark during the three day live measurement and have excess capacities available on their upstream links.
- For network latency all 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

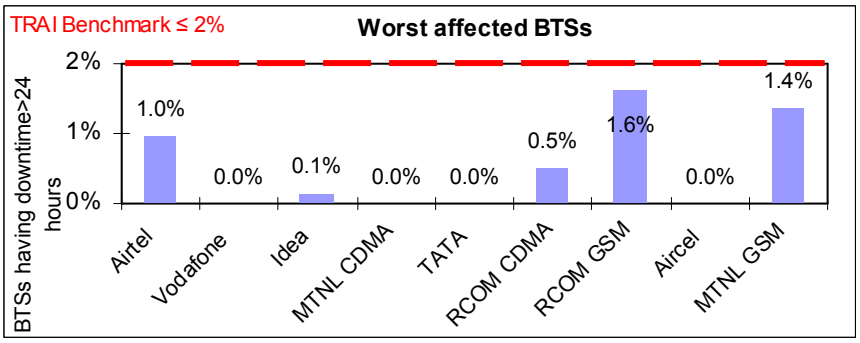
6.1 Graphical/Tabular Representations for Cellular Mobile Services

BTSs Accumulated Downtime



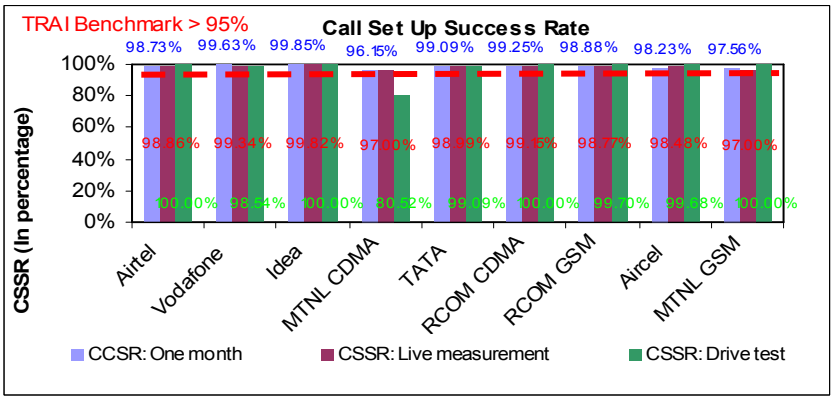
Operator meeting benchmark: Airtel, Vodafone, Idea, TATA, RCOM CDMA, RCOM GSM, Aircel, MTNL GSM
Operator not meeting benchmark: MTNL CDMA

Worst Affected BTSs



All operators are meeting the benchmark

Call Set-up Success Rate (CSSR)

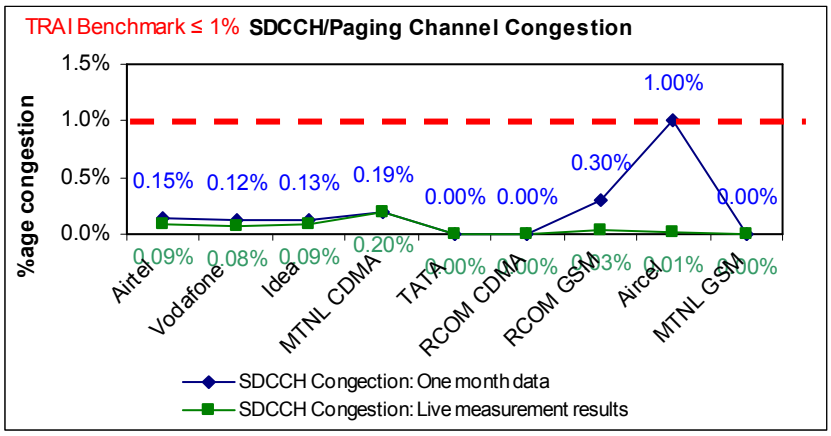


One month
All operators are meeting the benchmark

Live measurement
All operators are meeting the benchmark

Drive test
Operator meeting benchmark: Airtel, Vodafone, Idea, TATA, RCOM CDMA, RCOM GSM, Aircel, MTNL GSM
Operator not meeting benchmark: MTNL CDMA

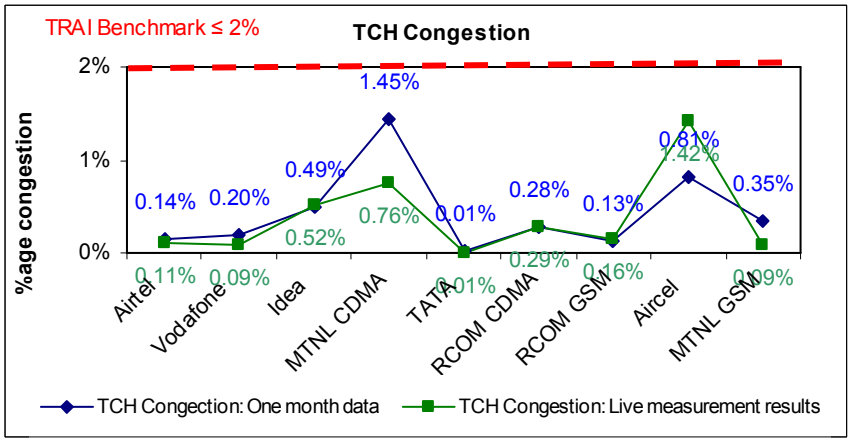
SDCCH / Paging Channel Congestion



One month
All operators are meeting the benchmark

Live measurement
All operators are meeting the benchmark

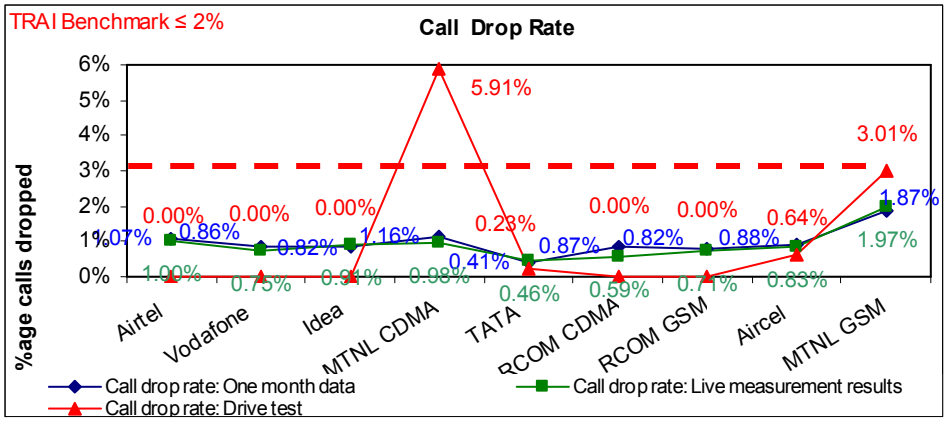
TCH Congestion



One month
All operators are meeting the benchmark

Live measurement
All operators are meeting the benchmark

Call Drop Rate

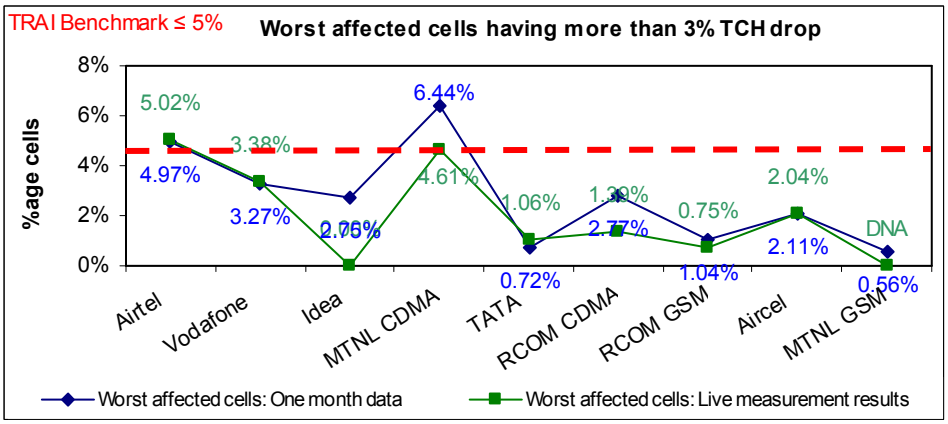


One month
All operators are meeting the benchmark

Live measurement
All operators are meeting the benchmark

Drive test
Operator meeting benchmark: Airtel, Vodafone, Idea, TATA, RCOM CDMA, RCOM GSM, Aircel
Operator not meeting benchmark: MTNL CDMA, MTNL GSM

Worst affected cells having more than 3% TCH drop



One month

Operator meeting benchmark: Airtel, Vodafone, Idea, TATA, RCOM CDMA, RCOM GSM, Aircel, MTNL GSM

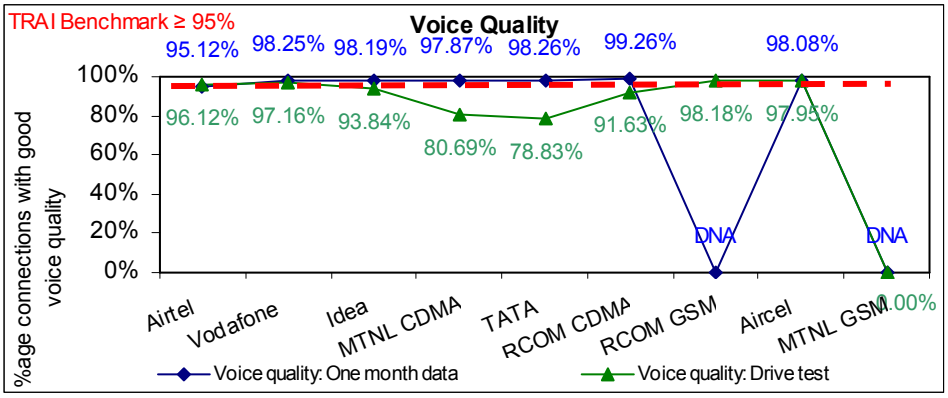
Operator not meeting benchmark: MTNL CDMA

Live measurement

Operator meeting benchmark: Vodafone, Idea, TATA, RCOM CDMA, RCOM GSM, Aircel, MTNL GSM, MTNL CDMA

Operator not meeting benchmark: Airtel

Voice quality



DNA: Details not available

One month

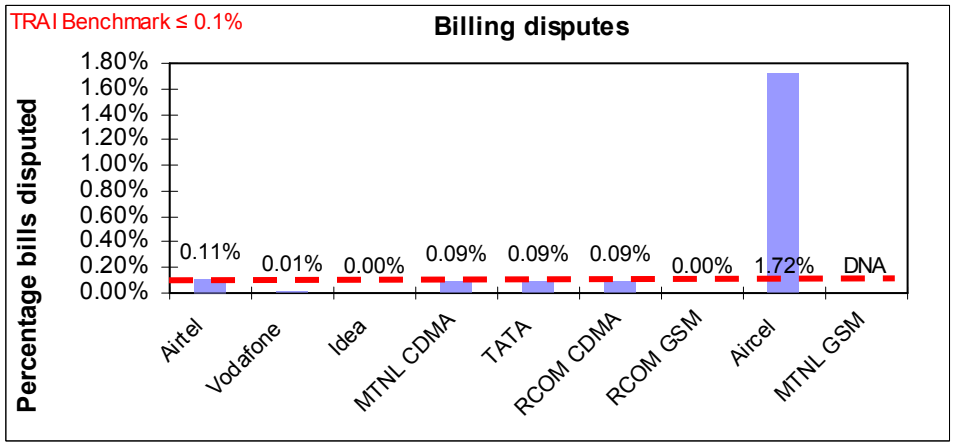
All operators are meeting the benchmark

Drive test

Operator meeting benchmark: Airtel, Vodafone, RCOM GSM, Aircel

Operator not meeting benchmark: Idea, MTNL CDMA, TATA, RCOM CDMA

Billing Disputes

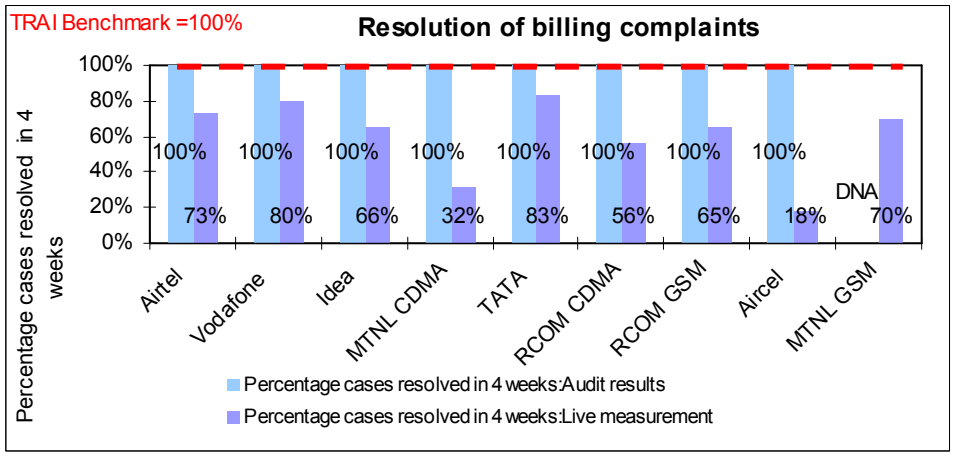


DNA: Details not available

Operator meeting benchmark: Vodafone, Idea, MTNL CDMA, TATA, RCOM CDMA, RCOM GSM

Operator not meeting benchmark: Airtel, Aircel

Resolution of billing complaints



DNA: Details not available

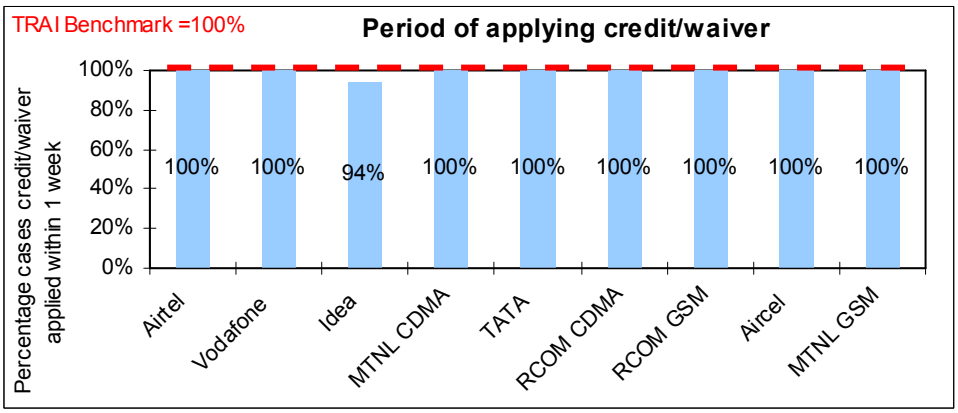
One month

All operators are meeting the benchmark

Live calling

No operator is meeting the benchmark

Period of applying credit / waiver



Operator meeting benchmark: Airtel, Vodafone, MTNL CDMA, TATA, RCOM CDMA, RCOM GSM, Aircel, MTNL GSM

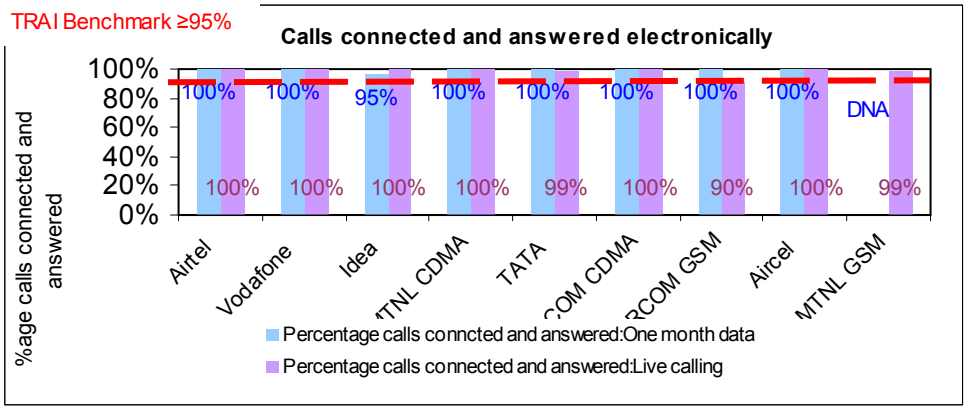
Operator not meeting benchmark: Idea

Live calling for billing Complaints

Resolution of billing complaints	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total Number of calls made		100	49	29	100	47	100	34	95	100
Number of cases resolved in 4 weeks		73	39	19	32	39	56	22	17	70
Percentage cases resolved in four weeks	100%	73.00%	79.59%	65.52%	32.00%	82.98%	56.00%	64.71%	17.89%	70.00%

Operators not meeting benchmark

Customer Care / Helpline: Calls answered electronically



DNA: Details not available

One month

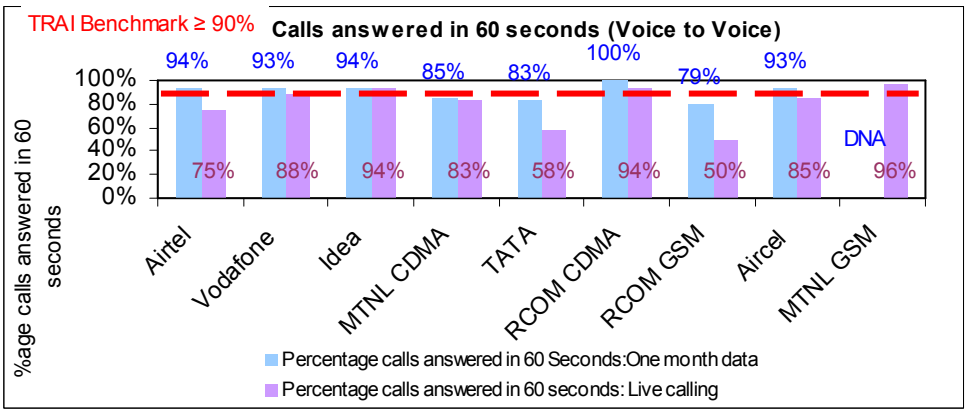
All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Airtel, Vodafone, Idea, MTNL CDMA, TATA, RCOM CDMA, Aircel, MTNL GSM

Operator not meeting benchmark: RCOM GSM

Customer Care / Helpline: Calls answered voice to voice



DNA: Details not available

One month

Operator meeting benchmark: Airtel, Vodafone, Idea, RCOM CDMA, Aircel

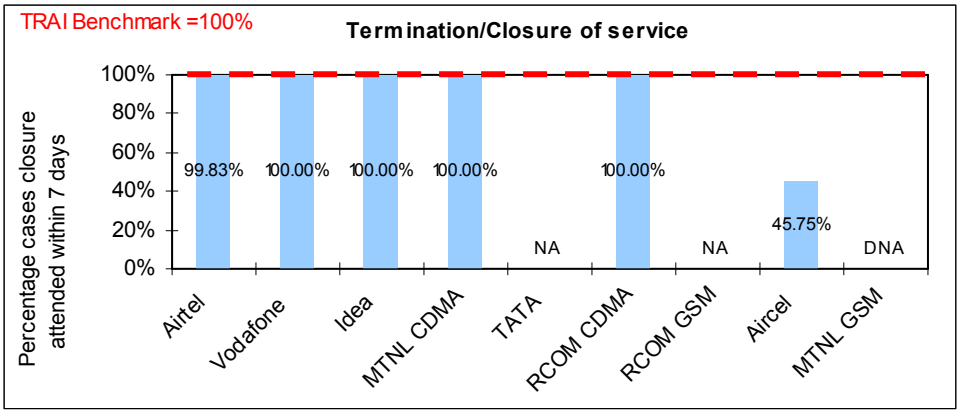
Operator not meeting benchmark: MTNL CDMA, TATA, RCOM GSM

Live calling

Operator meeting benchmark: Idea, RCOM CDMA, MTNL GSM

Operator not meeting benchmark: Airtel, Vodafone, MTNL CDMA, TATA, RCOM GSM, Aircel

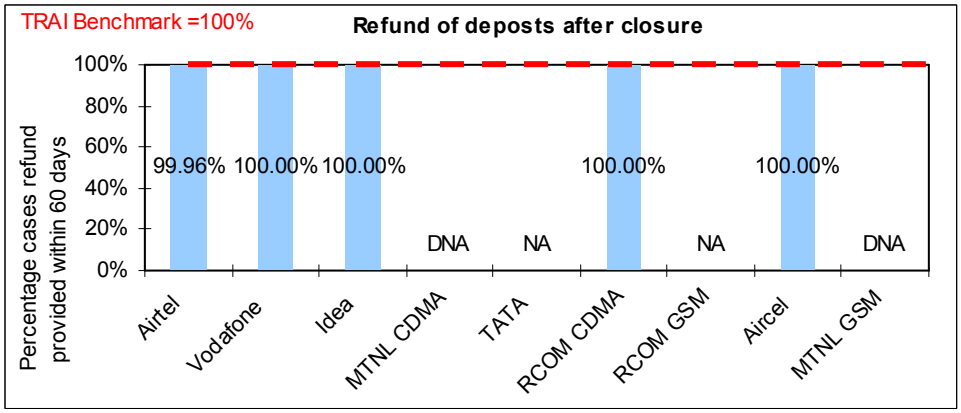
Termination / Closure of service



NA: Not Applicable **DNA:** Details not available

Operator meeting benchmark: Vodafone, Idea, MTNL CDMA, RCOM CDMA
Operator not meeting benchmark: Airtel, Aircel

Refund of deposits



NA: Not Applicable **DNA:** Details not available

Operator meeting benchmark: Vodafone, Idea, RCOM CDMA, Aircel
Operator not meeting benchmark: Airtel

Inter operator calls assessment

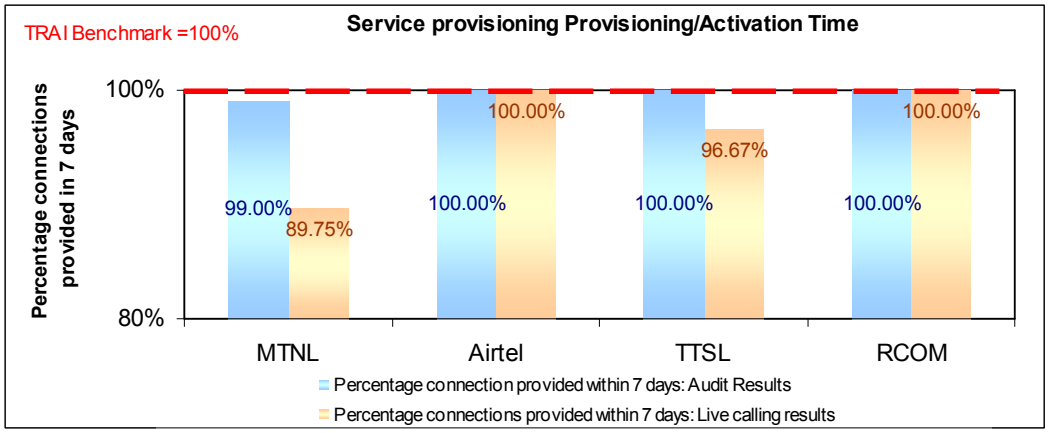
Inter operator call Assessment From ↓ To →	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Airtel	-	100%	99%	99%	100%	100%	99%	100%	91%
Vodafone	100%	-	100%	98%	100%	99%	100%	100%	98%
Idea	99%	99%	-	100%	99%	100%	99%	100%	95%
MTNL CDMA	100%	99%	96%	-	99%	100%	100%	97%	98%
TATA	94%	100%	97%	90%	-	99%	99%	95%	86%
RCOM CDMA	100%	100%	99%	100%	99%	-	100%	96%	100%
RCOM GSM	99%	100%	100%	97%	100%	100%	-	99%	100%
Aircel	100%	94%	99%	98%	99%	100%	99%	-	95%
MTNL GSM	99%	99%	94%	98%	99%	100%	100%	100%	-

The maximum problem faced by the calling operator to other operators

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. All the operators except RCOM (both GSM and CDMA) found tough connecting to a MTNL GSM number with as low as 86 out of 100 calls (from Tata) getting connected. MTNL GSM and Tata also found it difficult connecting to almost all the operators.

6.2 Graphical/Tabular Representations for Basic (Wireline) services

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



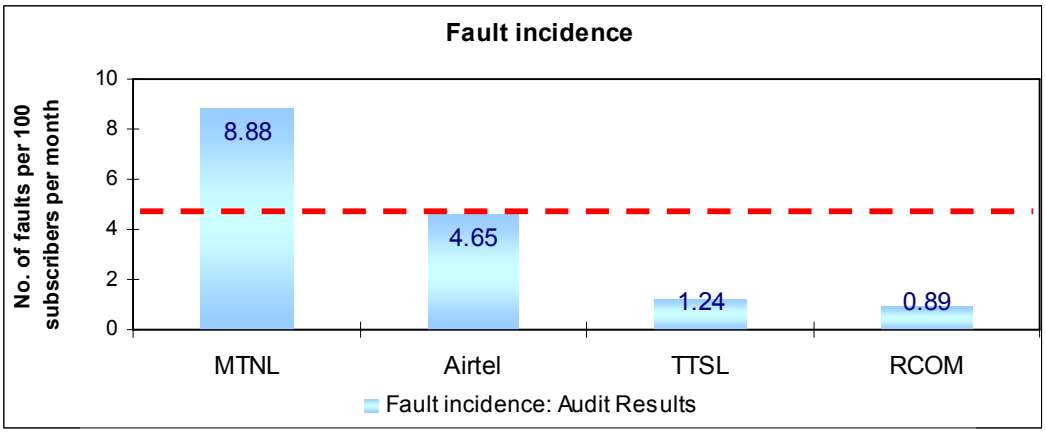
One month

Operator meeting benchmark: Airtel, TTSL, RCOM
Operator not meeting benchmark: MTNL

Live calling

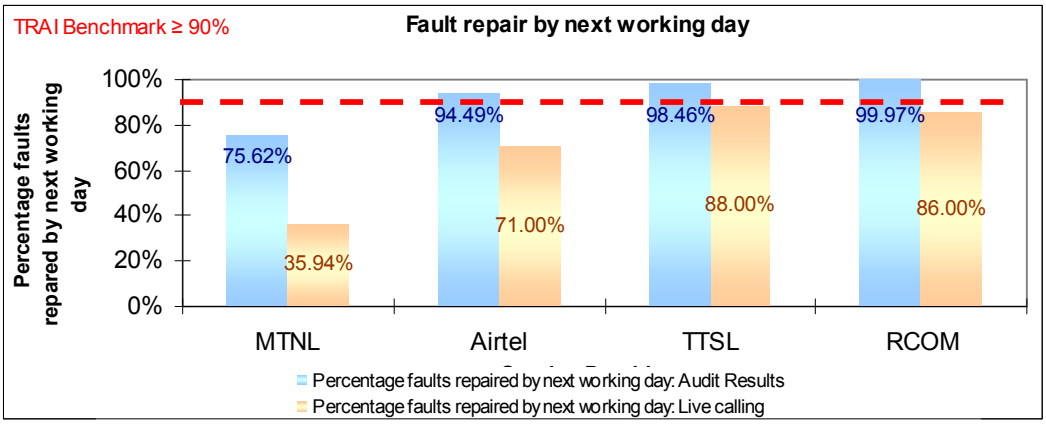
Operator meeting benchmark: Airtel, RCOM
Operator not meeting benchmark: MTNL, TTSL

Fault incidence



Operator meeting benchmark: Airtel, TTSL, RCOM
Operator not meeting benchmark: MTNL

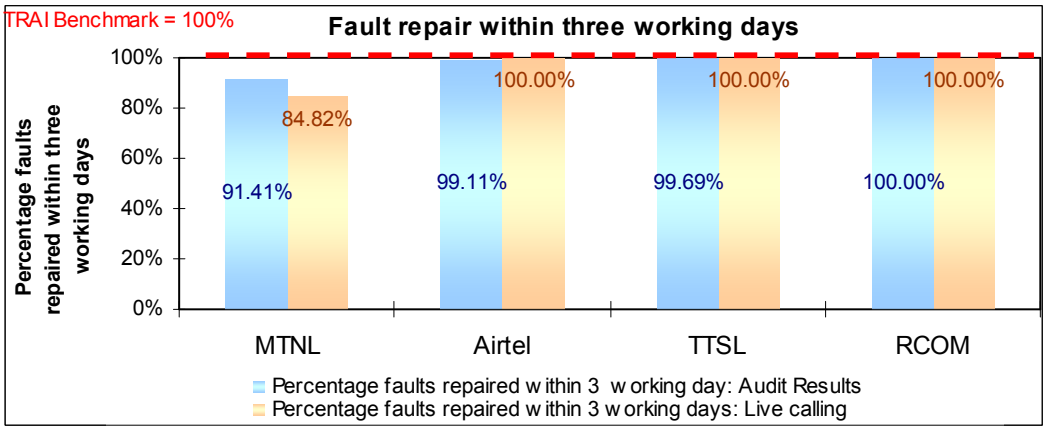
Fault repair/Restoration time (Comparison between one month audit results and live calling results)



One month

Operator meeting benchmark: Airtel, TTSL, RCOM
Operator not meeting benchmark: MTNL

Live calling
No operator is meeting the benchmark



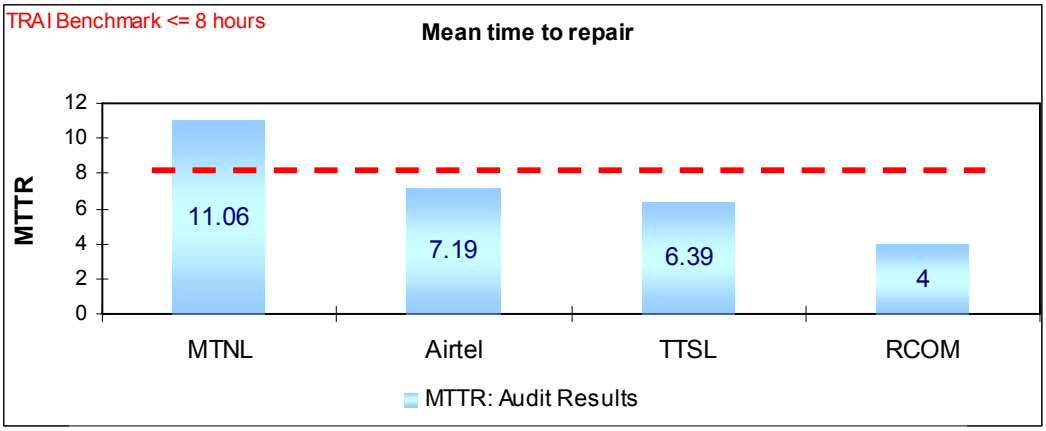
One month

Operator meeting benchmark: RCOM
Operator not meeting benchmark: MTNL, Airtel, TTSL

Live calling

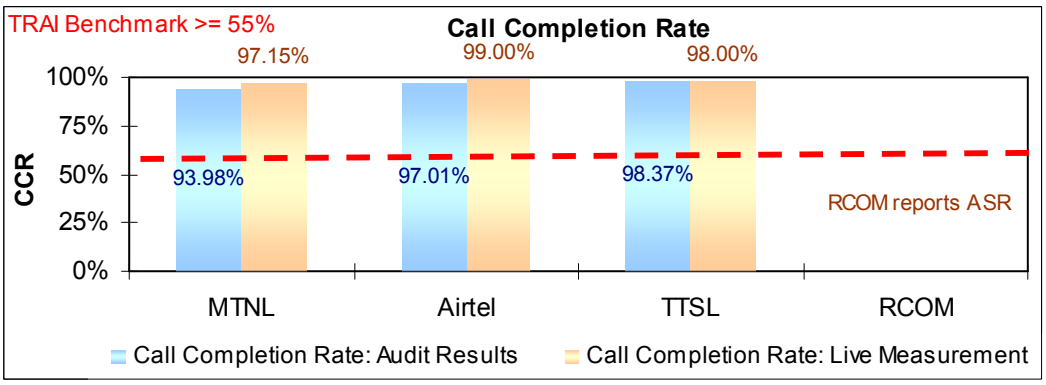
Operator meeting benchmark: Airtel, TTSL, RCOM
Operator not meeting benchmark: MTNL

Mean time to repair



Operator meeting benchmark: Airtel, TTSL, RCOM
Operator not meeting benchmark: MTNL

Call completion rate (Comparison between one month audit results and three day live measurement)



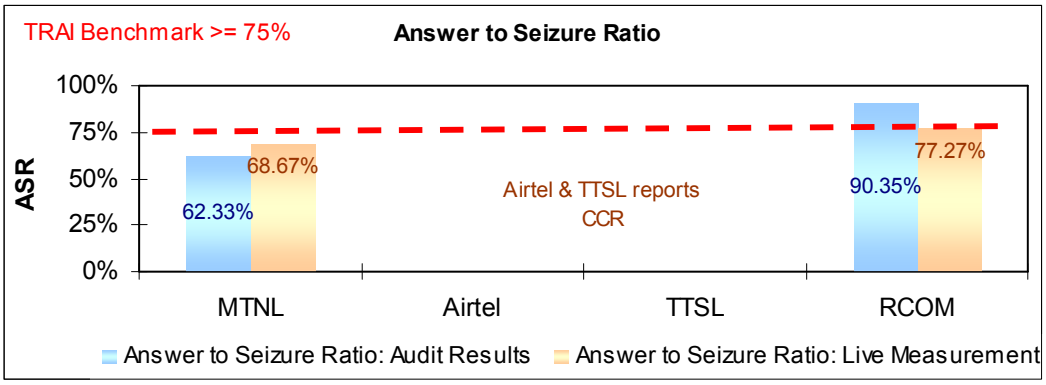
One month

All operators are meeting the benchmark

Live measurement

All operators are meeting the benchmark

Answer to Seizure Ratio (Comparison between one month audit results and three day live measurement)



One month

Operator meeting benchmark: RCOM

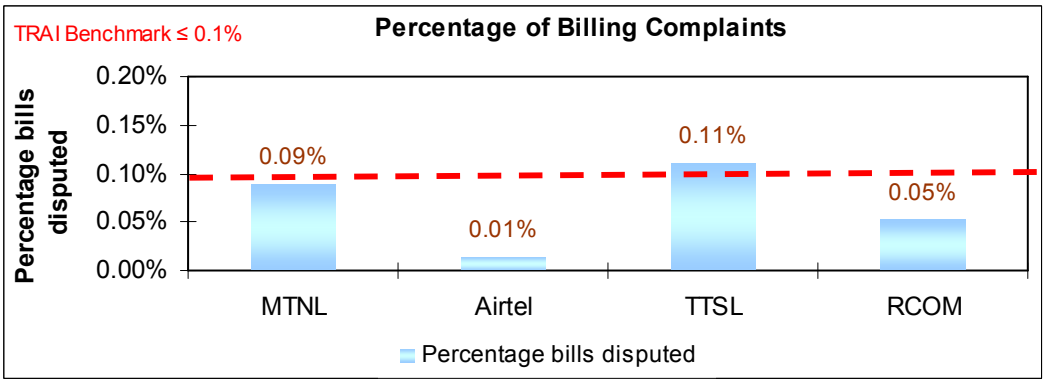
Operator not meeting benchmark: MTNL

Live measurement

Operator meeting benchmark: RCOM

Operator not meeting benchmark: MTNL

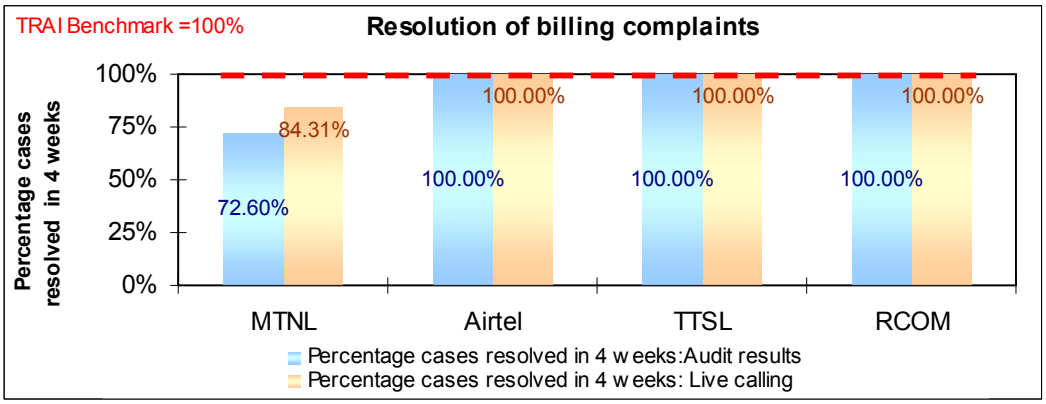
Percentage bills disputed



Operator meeting benchmark: MTNL, Airtel, RCOM

Operator not meeting benchmark: TTSL

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



One month

Operator meeting benchmark: Airtel, TTSL, RCOM

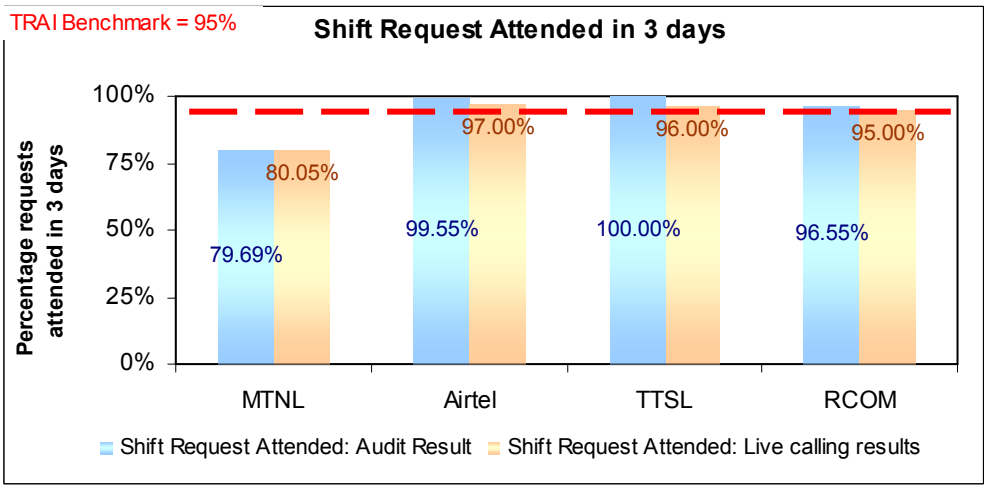
Operator not meeting benchmark: MTNL

Live calling

Operator meeting benchmark: Airtel, TTSL, RCOM

Operator not meeting benchmark: MTNL

Shift requests attended (Comparison between one month audit results and live calling results)



One month

Operator meeting benchmark: Airtel, TTSL, RCOM

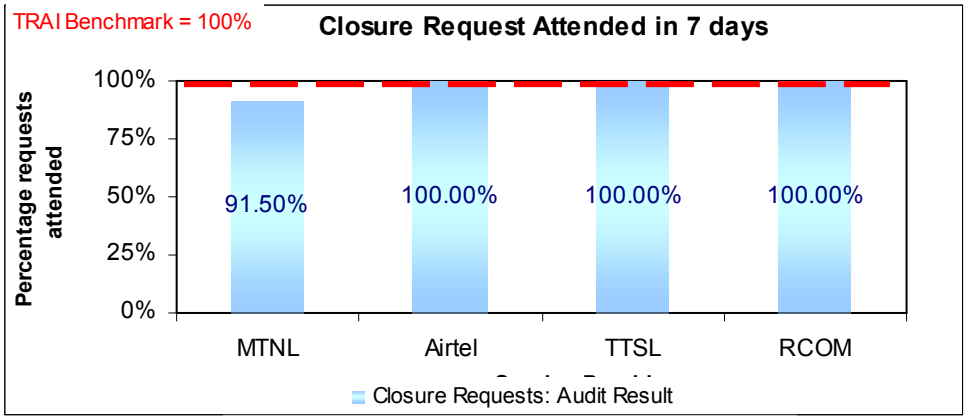
Operator not meeting benchmark: MTNL

Live calling

Operator meeting benchmark: Airtel, TTSL, RCOM

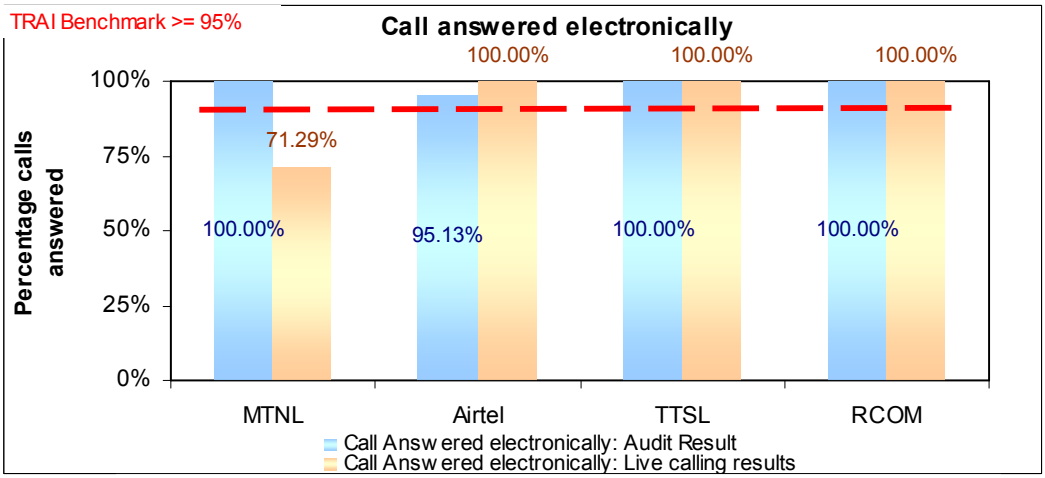
Operator not meeting benchmark: MTNL

Closure requests attended within 7 days



Operator meeting benchmark: Airtel, TTSL, RCOM
Operator not meeting benchmark: MTNL

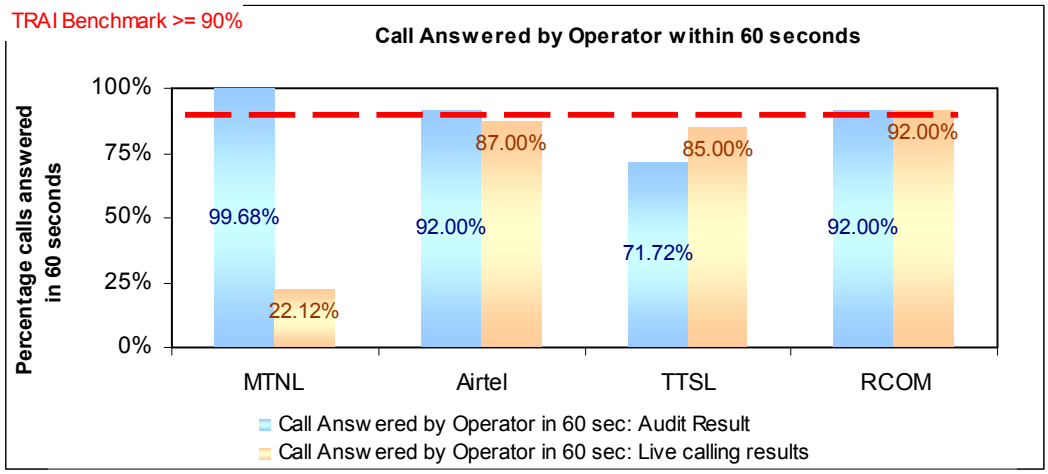
Response time to customer for assistance - Calls answered electronically (Comparison between one month audit live calling results)



One month
All operators are meeting the benchmark

Live calling
Operator meeting benchmark: Airtel, TTSL, RCOM
Operator not meeting benchmark: MTNL

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



One month

Operator meeting benchmark: MTNL, Airtel, RCOM

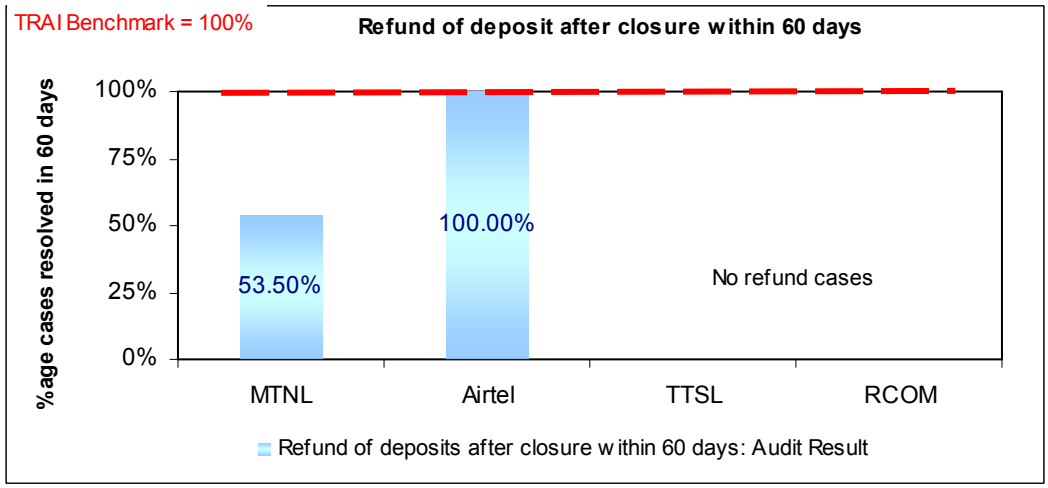
Operator not meeting benchmark: TTSL

Live calling

Operator meeting benchmark: RCOM

Operator not meeting benchmark: MTNL, Airtel, TTSL

Time taken to refund of deposits after closure

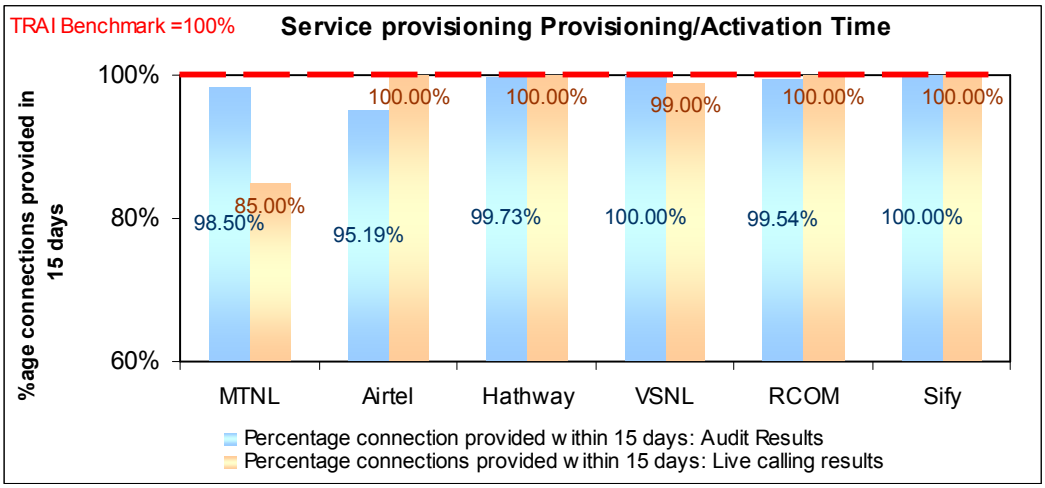


Operator meeting benchmark: Airtel

Operator not meeting benchmark: MTNL

6.3 Graphical/Tabular Representations for Broadband services

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



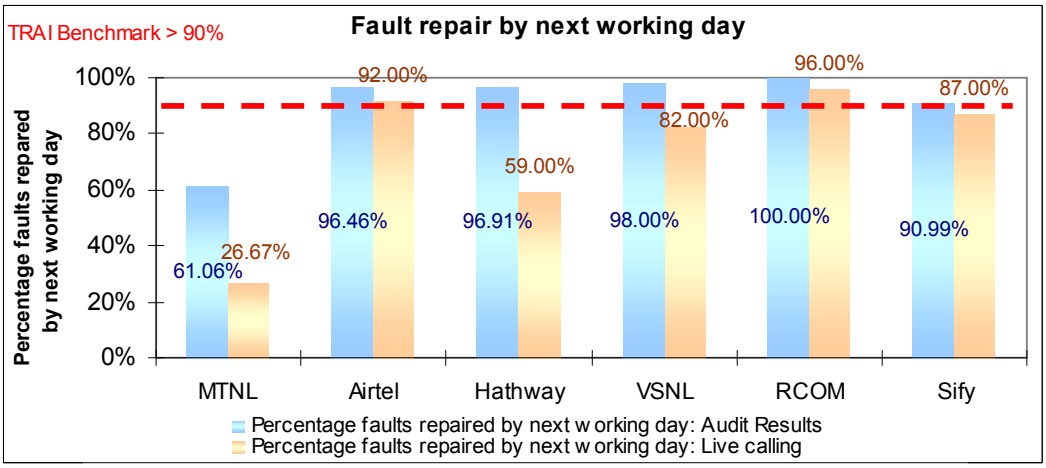
One month

Operator meeting benchmark: VSNL, Sify
Operator not meeting benchmark: MTNL, Airtel, Hathway, RCOM

Live calling

Operator meeting benchmark: Airtel, Hathway, RCOM, Sify
Operator not meeting benchmark: MTNL, VSNL

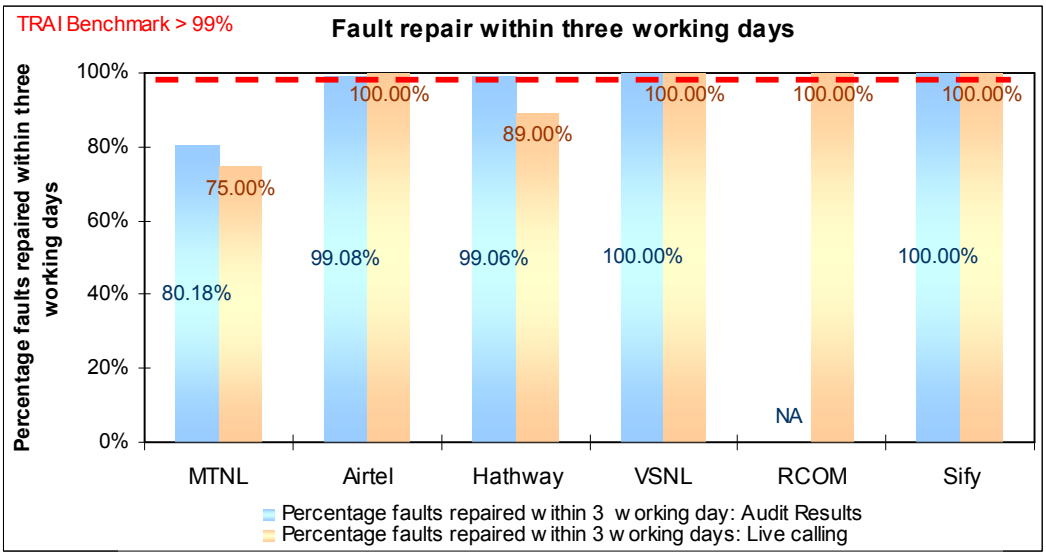
Fault repair/Restoration time (By next working day)- Comparison between one month audit results and live calling results



One month
Operator meeting benchmark: Airtel, Hathway, VSNL, RCOM, Sify
Operator not meeting benchmark: MTNL

Live calling
Operator meeting benchmark: Airtel, RCOM
Operator not meeting benchmark: MTNL, Hathway, VSNL, Sify

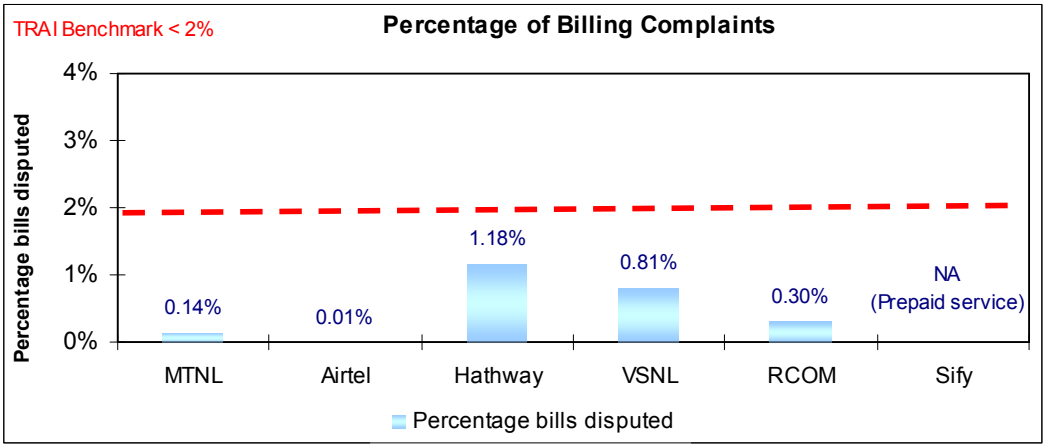
Fault repair/Restoration time within three working days (Comparison between one month audit results and live calling results



One month
Operator meeting benchmark: Airtel, Hathway, VSNL, Sify
Operator not meeting benchmark: MTNL

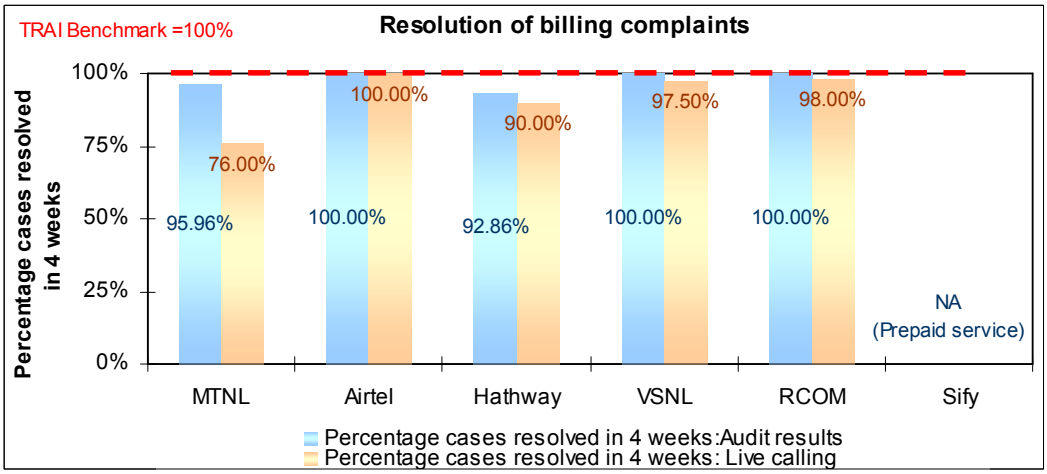
Live calling
Operator meeting benchmark: Airtel, VSNL, RCOM, Sify
Operator not meeting benchmark: MTNL, Hathway

Percentage bills disputed



All operators are meeting the benchmark

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



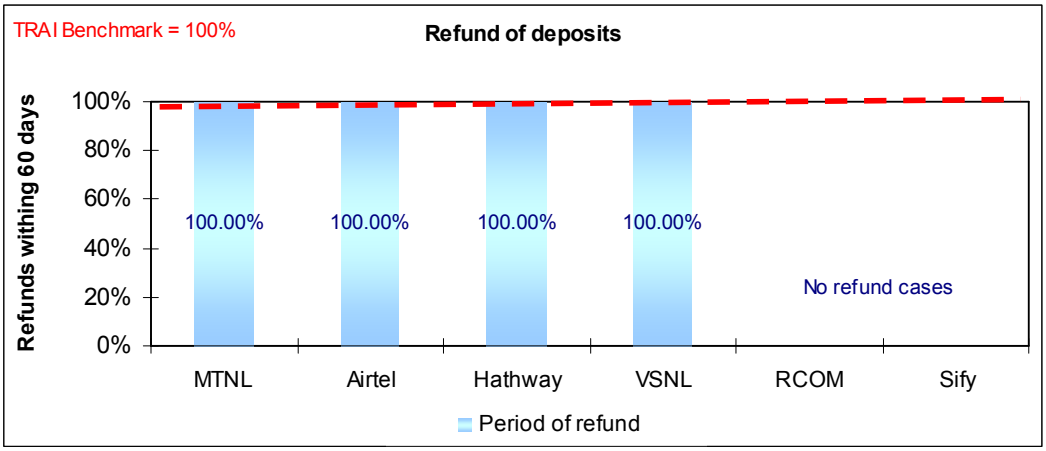
One month

Operator meeting benchmark: Airtel, VSNL, RCOM
Operator not meeting benchmark: MTNL, Hathway

Live calling

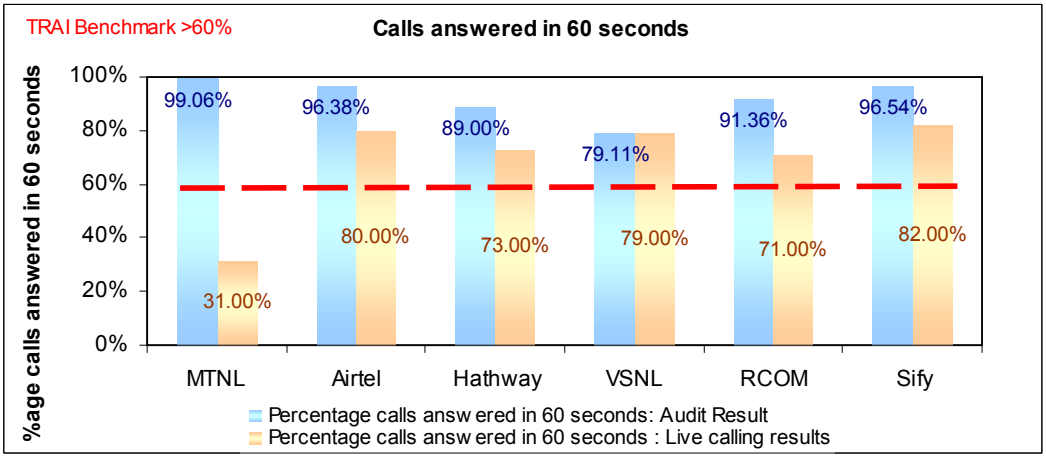
Operator meeting benchmark: Airtel
Operator not meeting benchmark: MTNL, Hathway, VSNL, RCOM

Refund of deposits after closure



All operators are meeting the benchmark

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



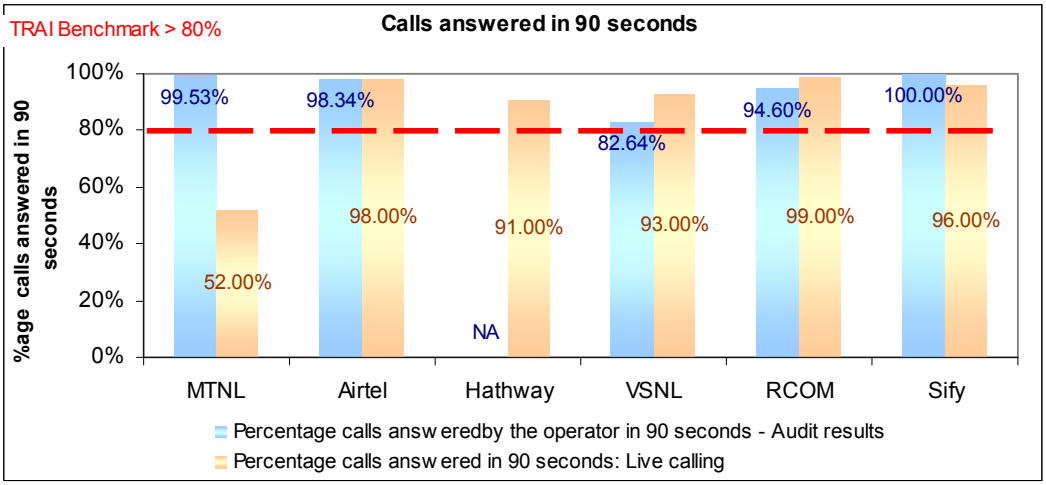
One month

All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Airtel, Hathway, VSNL, RCOM, Sify
Operator not meeting benchmark: MTNL

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



One month

All operators are meeting the benchmark

Live calling

Operator meeting benchmark: Airtel, Hathway, VSNL, RCOM, Sify

Operator not meeting benchmark: MTNL

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

Bandwidth Utilization	B'mark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total number of intra network links		13	1937	50	19	21	400
No of Intra network found to be above 90%		0	0	0	0	0	0

Bandwidth Utilization	B'mark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total number of intra network links		13	1937	50	19	21	394
No of Intra network found to be above 90%		0	0	0	0	0	0

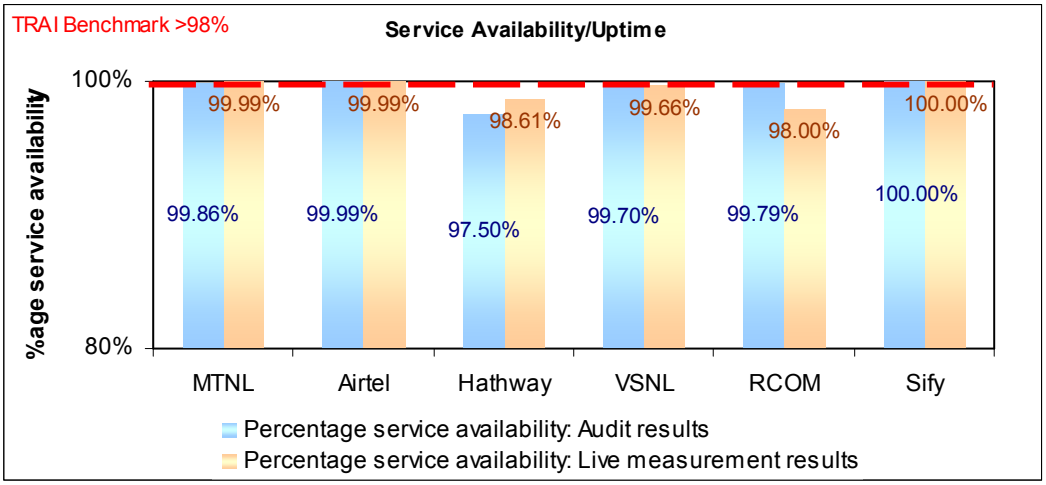
Broadband download speed	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total committed download speed to the sample subscribers (In mpbs) (A)		12800	12800	12800	12800	12800	12800
Total average download speed observed during TCBH (In Mpbs) (B)		10752	11392	10496	11136	11584	11430
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	84.00%	89.00%	82.00%	87.00%	90.50%	89.30%

As far as bandwidth utilization on the intra network links is concerned all 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%.

However, the level from which the bandwidth utilization at Intra network links is being reported varied because of the difference in networks. For e.g. Bharti was found to be reporting Bandwidth from links running from each RSU (Collection of DSLAM's) to the main node in a circle. Whereas VSNL (TATA Communications) considers the links between core distribution routers (located at 8 locations in India) and Routers being used for National long distance connectivity (Located at Chennai, Ernakkulam and Mumbai)

For operators distributing through cable operators, bandwidth utilization at the end customer level (from POP to cable operator) remains unreported which may be a concern as some cable operators may be distributing more connections then their equipped capacity.

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



One month

Operator meeting benchmark: MTNL, Airtel, VSNL, RCOM, Sify
Operator not meeting benchmark: Hathway

Live measurement

Operator meeting benchmark: MTNL, Airtel, Hathway, VSNL, Sify
Operator not meeting benchmark: RCOM

7.0 Compliance reports: Results of Verification of Records for January to March 2009

7.1 Cellular Mobile services

Name of Service Provider		Network Performance							Billing complaints			Customer's Helpline			
		Accumulated downtime of Community isolation (in hours)	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Connection with good voice quality	Point of Interconnection (POI) Congestion	Billing complaints per 100 bills issued	%age complaints resolved within 4 weeks	Period of all refunds/payments due to customers from date of resolution	Percentage of calls answered electronically within 20 seconds	Percentage of calls answered electronically within 40 seconds	Percentage of calls answered by the operators (voice to voice) within 60 seconds	Percentage of calls answered by the operators (voice to voice) within 90 seconds
B'mark*		**≤24**	**≥95%**	**≤1%**	**≤2%**	**≤3%**	**≥95%**	**≤0.5%**	**≤0.1%**	**100%**	**≤4 weeks**	**≥ 80%**	**≥ 95%**	**≥ 90%**	**≥ 95%**
Airtel	**PMR**	Complied	98.40%	0.16%	0.19%	0.93%	95.37%	Complied	0.06%	100.00%	< 4 weeks	Complied	Complied	95.25%	Complied
	IMRB		98.40%	0.16%	0.19%	0.93%	95.37%		0.06%	100.00%	< 4 weeks			95.25%	
Vodafone	**PMR**	Complied	99.30%	0.44%	0.30%	0.83%	97.83%	DNA	0.10%	100.00%	16 days	Complied	Complied	95.00%	Complied
	IMRB		99.30%	0.44%	0.30%	0.83%	97.83%	DNA	0.10%	100.00%	<4 weeks			94.93%	
Idea	**PMR**	Complied	95.00%	0.09%	0.43%	0.62%	98.57%	0.00%	0.00%	100.00%	<4 weeks	Complied	Complied	89.00%	Complied
	IMRB		99.80%	0.09%	0.43%	0.66%	98.50%	0.00%	0.00%	100.00%	<4 weeks			94.00%	
MTNL CDMA	**PMR**	Complied	96.32%	0.12%	2.35%	0.83%	97.87%	0.00%	0.09%	100.00%	<4 weeks	Complied	Complied	89.00%	Complied
	IMRB		96.32%	0.12%	2.35%	0.83%	97.87%	0.00%	0.09%	100.00%	<4 weeks			89.00%	
TATA	**PMR**	Complied	99.77%	0.00%	0.04%	0.69%	98.53%	0.00%	0.03%	100.00%	< 4 weeks	Complied	Complied	84.00%	Complied
	IMRB		99.77%	0.00%	0.04%	0.69%	98.53%	0.00%	0.09%	100.00%	< 4 weeks			84.00%	
RCOM CDMA	**PMR**	Complied	99.20%	0.00%	0.38%	0.57%	99.26%	0.50%	0.09%	100.00%	< 4 weeks	Complied	Complied	72.54%	Complied
	IMRB		DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA	DNA			DNA	

Figures do not match with those reported in PMR Not meeting the benchmark **B'mar**k = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

*As per the PMR reports for JFM 2009 quarter

For all the parameters related to wireless audits RCOM (CDMA) could not provide auditors with data pertaining to Jan-Mar '09 period, Hence PMR verification for the same could not be done.

Some of the operators have recently started with their services for which the PMR data was not available. IMRB auditors have advised these operators to start submitting their PMRs to TRAI.

7.1.1 Conclusions – Cellular Mobile Services

1. The figures reported by all the operators on all parameters completely match the figures obtained on verification except for Idea on CSSR, call drop voice quality and percentage calls answered by the operator in 60 seconds, Tata for billing complaints and Vodafone for percentage of calls answered by the operator in 60 seconds.
2. MTNL CDMA does not meet the benchmark for TCH congestion.
3. RCOM CDMA fails to meet the benchmark for percentage calls answered by the operator in 60 seconds.

7.2 Basic (Wireline) services

Parameters	Benchmarks	MTNL		Airtel		TTSL		RCOM	
		PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB
Percentage connections completed within 7 days	100%	99.43%	99.00%	100.00%	100.00%	99.16%	99.16%	43.98%	43.98%
Faults incidences (No. of faults/100 Subs./month)	≤5	6.68	7.51	2.00	2.00	1.04	1.04	0.51	0.51
% of faults repaired by next working day	≥ 90%	92.67%	84.23%	97.00%	97.00%	86.15%	86.15%	97.34%	97.34%
Faults pending for> 3days and ≤7 days	Rent rebate of 7 days	10990	13081	309	309	7	7	2	2
Faults pending for > 7 days and ≤15 days	Rent rebate of 15 days	2827	3842	110	110	0	0	0	0
Faults pending for > 15 days	Rent rebate of 1 month	225	694	42	42	0	0	0	0
Mean Time to Repair (MTTR)	≤ 8 Hrs	7.25	5.39	7.00	7.00	8.00	8.00	3.55	3.55
Call Completion Rate (CCR)	≥ 55%	51.39%	91.00%	96.00%	96.00%	96.00%	96.06%	DNP	DNP
Metering and billing credibility - Number of bills disputed during over a billing cycle	< 0.1%	0.07%	0.03%	0.03%	0.03%	0.06%	0.06%	0.05%	0.05%
Resolution of billing complaints within 4 weeks	100%	81.21%	95..4%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Customer care/helpline promptness									
Shift requests (Total number received)		6062	2169	8856	8856	23	23	105	105
Percentage shift requests attended within 3 days	>95%	90.66%	83.36%	99.00%	99.00%	82.61%	82.61%	97.14%	97.14%
Closure request attended		21746	6541	34313	34313	173	173	3356	3356
Closure within 24 hours	>95%	97.07%	96.87%	100.00%	100.00%	100.00%	100.00%	96.16%	96.16%
Supplementary (additional) service requests attended)		Complied		Complied		Complied		Complied	
Additional facility provided within 24 hours	>95%	Complied		Complied		Complied		Complied	
Response time to customer for assistance									
% age call answered through IVR in 20 seconds	>80%	Complied		Complied		Complied		Complied	
% age call answered through IVR in 40 seconds	100%	Complied		Complied		Complied		Complied	
% age call answered by operator in 60 seconds	>80%	89.63%	90.00%	96.00%	95.68%	90.00%	90.00%	94.00%	94.00%
% age call answered by operator in 90 seconds	>95%	Complied		Complied		Complied		Complied	
Time taken for refund of deposits after closures within 60 days	100%	100.00%	100.00%	100.00%	100.00%	97.00%	97.00%	100.00%	100.00%

* 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

7.2.1 Conclusions - Basic Wireline Services

1. No significant variation was observed in figures reported in PMR and those verified in sample exchanges for any operator except MTNL.
2. Variation observed in figures for MTNL 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.
3. For MTNL, raw data on call centre details was not available at the exchanges audited and hence the same could not be verified by IMRB auditors.

7.3 Broadband services

Parameters	Benchmarks	MTNL		Airtel		Hathway		VSNL		RCOM		Sify	
		PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB	PMR	IMRB
Service provisioning uptime													
Percentage connections provided within 15 days	100%	96.00%	96.00%	100.00%	94.00%	100.00%	100.00%	97.00%	95.00%	99.00%	99.00%	100.00%	100.00%
Fault repair restoration time													
Percentage faults repaired by next working days	> 90%	69.00%	69.00%	98.00%	98.00%	98.00%	98.00%	94.00%	91.00%	100.00%	100.00%	92.00%	91.00%
Percentage faults repaired within three working days	> 99%	89.00%	89.00%	99.00%	99.00%	100.00%	100.00%	99.00%	97.00%	100.00%	100.00%	99.00%	100.00%
Billing performance													
Billing complaints per 100 bills issued	< 2%	0.11%	0.11%	0.00%	0.00%	1.31%	1.31%	0.67%	0.62%	0.23%	0.24%	NA	NA
%age of billing complaints resolved in 4 weeks	100%	100.00%	100.00%	100.00%	100.00%	90.00%	90.00%	100.00%	100.00%	NA	NA	NA	NA
%age cases in which refund of deposits after closure was made in 60 days	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	NA	NA
Customer care/helpline assessment (Voice to Voice)													
Percentage calls answered within 60 seconds	> 60%	99.00%	99.00%	94.00%	94.00%	90.00%	90.00%	98.00%	98.26%	83.00%	83.00%	98.00%	98.00%
Percentage calls answered within 90 seconds	> 80%	99.00%	99.00%	97.00%	97.00%	NA	NA	99.00%	99.13%	91.00%	91.00%	99.00%	100.00%
Bandwidth utilization/Throughput													
Intra network links (POP to ISP Node)		7	7	2233	2233	50	50	16	16	129	129	432	432
Total number of intra network links > 90%		0	0	6	6	NA	NA	0	0	0	0	0	0
Upstream Bandwidth (ISP Node to NIXI/NAP/IGSP)		6	6	7	7	4	4	4	4	18	18	27	27
Percentage bandwidth utilized on upstream links	< 80%	77.00%	76.00%	90.00%	90.00%	84.00%	87.00%	53.00%	53.35%	41.00%	41.00%	79.00%	83.00%
Broadband download speed	> 80%	95.00%	95.00%	100.00%	100.00%	85.00%	85.00%	>80%	>80%	90.00%	90.00%	95.00%	95.00%
Service availability/uptime	> 98%	100.00%	100.00%	100.00%	100.00%	94.00%	94.00%	98.75%	97.60%	100.00%	100.00%	100.00%	100.00%
Packet loss	< 1%	Complied	Complied	0.00%	0.00%	1.00%	1.00%	0.00%	0.00%	<1%	0.76%	<1%	<1%
Network Latency													
POP/ISP Node to NIXI (in msec)	< 120 msec	Complied	Complied	0	20	80	80	<80	<80	31.63	36	< 45	< 45
ISP node to NAP port (Terrestrial) (in msec)	< 350 msec	NA	NA	0	74	300	300	<250	<250	102.27	0	< 300	< 300

Figures do not match with those reported in PMR Not meeting the benchmark **B'mark** = TRAI Benchmark, **DNA** = Details not available, **NA:** Not Applicable

7.3.1 Conclusions - Broadband services

1. Complete data for Sify and Reliance was verified on an all India level
2. Historic data for Broadband download speed and Ping test conducted to check the latency and packet loss was not available for verification for all the service providers.
3. Although all the service providers claimed that they conduct random ping tests and latency to check the packet loss but there is no book keeping at their end. Records of old ping tests were found to be nonexistent.
4. Airtel, Hathway and Sify were found to be not meeting the benchmark for bandwidth utilization on upstream links. These which was found again during the month of audit.
5. MTNL, Airtel, VSNL and Sify are not meeting benchmark on fault repair within 3 working days.
6. There were some variations in PMR reporting across all service providers on different parameters

8. Annexure - I

8.1 Parameter wise performance reports for Cellular Mobile services

1. Network Availability

Audit Results for Network Availability

	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Number of BTSs in the licensed service area		4177	4141	3032	221	814	793	1471	2006	221
Sum of downtime of BTSs in a month (in hours)		7956	83.917	1344.66	5139.6	46:25:00	445.45	2936	5480.25	2963
BTSs accumulated downtime (not available for service)	≤ 2%	0.26%	0.00%	0.06%	3.23%	0.00%	0.08%	0.28%	0.38%	1.86%
Number of BTSs having accumulated downtime >24 hours		40	0	4	4	0	4	24	18	3
Worst affected BTSs due to downtime	≤ 2%	0.96%	0	0.13%	1.8	0.00%	0.50%	1.63%	0.93%	1.36%

2. Connection Establishment (Accessibility)

Audit Results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of call attempts		DNA	148662605	2876180	DNA	142908041	100049251	42455764	9360673	30830021
Total number of successful calls established		DNA	148115197	2871942	DNA	141612952	99298882	41982132	9194989	30076331
CSSR	≥ 95%	98.73%	99.63%	99.85%	96.15%	99.09%	99.25%	98.88%	98.23%	97.56%

SDCCH congestion	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of SDCCH/Paging channel attempts		17123191	425398918	8393010	DNA	DNA	DNA	DNA	33980212	DNA
Number of successful SDCCH/Paging channel attempts		17098295	424868038	8382296	DNA	DNA	DNA	DNA	33640410	DNA
SDCCH/Paging channel congestion	≤ 1%	0.15%	0.12%	0.13%	0.19%	0.00%	0.00%	0.30%	1.00%	0.00%

TCH congestion	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
TCH attempts		6906653	173287440	3512251	DNA	611663687	DNA	DNA	9352480	148292429
Number of successful TCH attempts		6896753	172939455	3494975	DNA	611595705	DNA	DNA	9276686	147771355
TCH congestion	≤ 2%	0.14%	0.20%	0.49%	1.45%	0.01%	0.28%	0.13%	0.81%	0.35%

Operators not meeting benchmark

DNA: Detailed breakup was not available with the operator. IMRB auditors have taken data the data directly from the counters.

Live measurement results for CSSR, SDCCH and TCH congestion

CSSR	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of call attempts		DNA	108182180	3090428	DNA	189920243	9941374	5221291	358098	DNA
Total number of successful calls established		DNA	107464650	3084916	DNA	188002981	9856890	5157142	352642	DNA
CSSR	≥ 95%	98.86%	99.34%	99.82%	97.00%	98.99%	99.15%	98.77%	98.48%	97.00%

SDCCH congestion	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of SDCCH/Paging channel attempts		35078945	689591145	8599111	DNA	DNA	DNA	DNA	1252958	DNA
Number of successful SDCCH/Paging channel attempts		35047711	689050007	8591307	DNA	DNA	DNA	DNA	1252827	DNA
SDCCH/Paging channel congestion	≤ 1%	0.09%	0.08%	0.09%	0.20%	0.00%	0.00%	0.03%	0.01%	0.00%

TCH congestion	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
TCH attempts		21038626	246422681	3593948	DNA	913401105	DNA	DNA	358195	DNA
Number of successful TCH attempts		21015679	246209997	3575261	DNA	913348284	DNA	DNA	353091	DNA
TCH congestion	≤ 2%	0.11%	0.09%	0.52%	0.76%	0.01%	0.29%	0.16%	1.42%	0.09%

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

CSSR	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of call attempts		300	274	328	231	220	262	332	314	300
Total number of successful calls established		300	270	328	186	218	262	331	313	300
CSSR	≥ 95%	100.00%	98.54%	100.00%	80.52%	99.09%	100.00%	99.70%	99.68%	100.00%

Blocked calls	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
%age blocked calls		0.00%	1.46%	0.00%	19.48%	0.91%	0.00%	0.30%	0.32%	0.00%

3. Connection Maintenance (Retainability)

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

Call drop rate	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of calls established		6865842	172584121	3415543	DNA	141612952	DNA	DNA	9194989	30076331
Total number of calls dropped		73486	1484129	28138	DNA	587645	DNA	DNA	80916	561625
Call drop rate	≤ 2%	1.07%	0.86%	0.82%	1.16%	0.41%	0.87%	0.82%	0.88%	1.87%

Operators not meeting the benchmark

DNA: Detailed breakup was not available with the operator. IMRB auditors have taken data the data directly from the counters.

Cells having more than 3% TCH	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of cells in the network		9449	9951	7702	221	2937	793	4425	5392	DNA
Total number of cells having more than 3% TCH		470	320	212	14	21	22	46	114	DNA
Worst affected cells having more than 3% TCH	≤ 5%	4.97%	3.22%	2.75%	6.34%	0.72%	2.77%	1.04%	2.11%	0.56%

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

Call drop rate	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of calls established		20925698	245764800	3455336	DNA	188002981	DNA	DNA	352624.3	DNA
Total number of calls dropped		209421	1852078	31594	DNA	863980	DNA	DNA	2923	DNA
Call drop rate	≤ 2%	1.00%	0.75%	0.91%	0.98%	0.46%	0.59%	0.71%	0.83%	1.97%

Cells having more than 3% TCH	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of cells in the network		9505	29160	7718	DNA	2937	793	4425	5490	2454
Total number of cells having more than 3% TCH		477	986	253	DNA	31	11	33	112	116
Worst affected cells having more than 3% TCH	≤ 5%	5.02%	3.38%	3.28%	4.61%	1.06%	1.39%	0.75%	2.04%	4.54%

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

Call drop rate	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of calls established		300	267	328	186	435	0	332	313	299
Total number of calls dropped		0	0	0	11	1	0	0	2	9
Call drop rate	≤ 2%	0.00%	0.00%	0.00%	5.91%	0.23%	0.00%	0.00%	0.64%	3.01%

4. Voice quality

Audit Results for Voice quality

Voice quality	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of sample calls		201331	19975490724	75121315	DNA	172	DNA	DNA	1438800185	DNA
Total number of calls with good voice quality		191496	19625401530	466530010	DNA	169	DNA	DNA	1411175222	DNA
%age calls with good voice quality	≥ 95%	95.12%	98.25%	98.19%	97.87%	98.26%	99.26%	98.27%	98.08%	DNP

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

Voice quality	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of sample calls		683531	580065	450884	DNA	19342	15763	9436	522430	65444
Total number of calls with good voice quality		656991	563574	423115	DNA	15248	14444	9264	511745	52809
%age calls with good voice quality	≥ 95%	96.12%	97.16%	93.84%	94.28	78.83%	91.63%	98.18%	97.95%	80.69%

Operators not meeting the benchmark

DNP: Details not provided

5. POI Congestion

Audit Results for POI Congestion

POI congestion	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
POI traffic offered on all individual POI's		DNA	DNA	DNA	DNA	2818531	14444.15	14444.15	13569	359.9
Served traffic for all POI's		DNA	DNA	DNA	DNA	2818531	14378.61	14378.61	5534	287.44
Traffic failed on all POI's	≤ 0.5%	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.20

Live measurement results for POI congestion

POI congestion	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
POI traffic offered on all individual POI's		DNA	DNA	DNA	DNA	3870747	15011	15011	13569	DNA
Served traffic for all POI's		DNA	DNA	DNA	DNA	3870747	15011	15011	5846	DNA
Traffic failed on all POI's	≤ 0.5%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%

6. Inter Operator Call Assessment

Inter operator call Assessment From ↓ To →	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Airtel	-	100%	99%	99%	100%	100%	99%	100%	91%
Vodafone	100%	-	100%	98%	100%	99%	100%	100%	98%
Idea	99%	99%	-	100%	99%	100%	99%	100%	95%
MTNL CDMA	100%	99%	96%	-	99%	100%	100%	97%	98%
TATA	94%	100%	97%	90%	-	99%	99%	95%	86%
RCOM CDMA	100%	100%	99%	100%	99%	-	100%	96%	100%
RCOM GSM	99%	100%	100%	97%	100%	100%	-	99%	100%
Aircel	100%	94%	99%	98%	99%	100%	99%	-	95%
MTNL GSM	99%	99%	94%	98%	99%	100%	100%	100%	-

7. Metering and Billing credibility

Audit Results for Billing performance

Billing Performance	Benchmark	Airtel	Vodafone	Idea	MTNL GSM	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL CDMA
Billing diputes – Postpaid										
Total bills generated during the period		863204	890944	375810	DNA	505515	405389	405389	17247	DNA
Total number of bills disputed		961	80	11	1101	466	368	1	296	DNA
Percentage bills disputed	≤ 0.1%	0.11%	0.01%	0.00%	0.09%	0.09%	0.09%	0.00%	1.72%	DNA
Billing diputes – Prepaid										
Total number of prepaid customers in that period		3734932	3600295	2031161	1612057	4221560	4135696	NA	530170	NA
Number of complaints related to charging, credit & validity		2410	90	129	840	791	2796	NA	3421	NA

Operators not meeting the benchmark

DNA: Details not available

Percentage of complaints	≤ 0.1%	0.06%	0.00%	0.01%	0.05%	0.02%	0.02%	NA	0.65%	NA
Resolution of billing complaints										
Total complaints resolved in 4 weeks from date of receipt		3371	80	140	1101	1257	2371	59	1540	DNA
Percentage complaints resolved within 4 weeks of date of receipt	100%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	DNA
Period of applying credit / waiver										
Total number of cases requiring credit/waiver		NA	71	140	DNA	914	368	1	142	DNA
Total number of cases where credit/waiver was made within 1 week		NA	71	132	DNA	914	368	1	142	DNA
Percentage cases in which credit/waiver was received within 1 week	100%	100.00%	100.00%	94.29%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total Number of calls made		100	49	29	100	47	100	34	95	100
Number of cases resolved in 4 weeks		73	39	19	32	39	56	22	17	70
Percentage cases resolved in four weeks	100%	73.00%	79.59%	65.52%	32.00%	82.98%	56.00%	64.71%	17.89%	70.00%

8. Customer Care

Audit results for customer care (Electronically)

Customer Care Assessment	Benchmark	Airtel	Vodafone	Idea	MTNL GSM	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL CDMA
Total Number of calls received		2623322	10363118	553386	1378135	5504044	DNA	DNA	2088078	DNA
Total Number of calls getting connected and answered		2623322	10347398	527173	1375555	5504044	19239314	19299314	2088078	DNA
Percentage calls getting connected and answered	≥ 95%	100.00%	99.85%	95.26%	99.81%	100.00%	100.00%	100.00%	100.00%	DNP

Live calling results for customer care (Electronically)

Customer Care Assessment	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total Number of calls received		100	100	100	100	100	100	100	100	100
Total Number of calls getting connected and answered		100	100	100	100	99	100	90	100	99
Percentage calls getting connected and answered	≥ 95%	100.00%	100.00%	100.00%	100.00%	99.00%	100.00%	90.00%	100.00%	99.00%

Operators not meeting the benchmark

DNP: Details not provided

Audit results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Vodafone	Idea	MTNL GSM	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL CDMA
Total Number of calls answered within 60 seconds		2403291	2799685	32513	401239	1349904	1397891	1397891	66395	DNA
Percentage calls answered within 60 seconds	≥ 90%	94.00%	92.64%	93.50%	85.24%	83.00%	100.00%	78.88%	93.00%	DNP

Live calling results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total Number of calls received		85	100	100	100	100	100	90	100	99
Total Number of calls answered within 60 seconds		64	88	94	83	58	94	45	85	95
Percentage calls answered within 60 seconds	≥ 90%	75.29%	88.00%	94.00%	83.00%	58.00%	94.00%	50.00%	85.00%	95.96%

9. Termination / closure of service

Audit results for termination / closure of service

Termination	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of closure request		5291	4202	5026	24	NA	2699	NA	1377	NA
Number of requests attended within 7 days		5282	4202	5026	24	NA	2699	NA	630	NA
Percentage cases in which termination done within 7 days	100%	99.83%	100.00%	100.00%	100.00%	NA	100.00%	NA	45.75%	DNP

10. Time taken for refund of deposits after closure

Audit results for refund of deposits

Refund	Benchmark	Airtel	Vodafone	Idea	MTNL CDMA	TATA	RCOM CDMA	RCOM GSM	Aircel	MTNL GSM
Total number of cases requiring refund of deposits		5232	1667	53	DNA	NA	2962	NA	9	DNA
Total number of cases where refund was made within 60 days		5230	1667	53	DNA	NA	2962	NA	9	DNA
Percentage cases in which refund was receive within 60 days	100%	99.96%	100.00%	100.00%	DNA	NA	100.00%	NA	100.00%	DNP

Operators not meeting the benchmark

DNP: Details not provided

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

Name of Service Provider	Network Availability		Connection Establishment (Accessibility)			Connection Maintenance (Retainability)			POI	Metering and Billing			Response time to customer for assistance		Termination / closure of service	
	BTSs Accumulated downtime (not available for service) (%age)	Worst affected BTSs due to downtime (%age)	Call Set-up Success Rate (within licensee's own network)	SDCCH/ Paging Chl. Congestion (%age)	TCH Congestion (%age)	Call Drop Rate (%age)	Worst affected cells having more than 3% TCH drop	Connection with good voice quality	Point of Interconnection (POI) Congestion	Metering and billing credibility	%age complaints resolved within 4 weeks	Period of applying credit/waiver less than 1 week	Accessibility of call centre/ customer care (IVR)	Percentage of calls answered by operators (voice to voice) within 60 sec	%age requests for Termination complied within 7 days	Refund of deposits after closure within 60 days
Benchmark	**≤ 2%**	**≤ 2%**	**≥ 95%**	**≤ 1%**	**≤ 2%**	**≤ 2%**	**≤ 5%**	**≥ 95%**	**≤ 0.5%**	**< 0.1%**	**100%**	**100%**	**≥ 95%**	**≥ 90%**	**100%**	**100%**
Airtel	0.26%	0.96%	98.73%	0.15%	0.14%	1.07%	4.97%	95.12%	0.00%	0.11%	100.00%	100.00%	100.00%	94.00%	99.83%	99.96%
Vodafone	0.00%	DNA	99.63%	0.12%	0.20%	0.86%	3.27%	98.25%	0.00%	0.01%	100.00%	100.00%	99.85%	92.64%	100.00%	100.00%
Idea	0.06%	0.13%	99.85%	0.13%	0.49%	0.82%	2.75%	98.19%	0.00%	0.00%	100.00%	94.29%	95.26%	93.50%	100.00%	100.00%
MTNL CDMA	3.23%	DNA	96.15%	0.19%	1.45%	1.16%	6.44%	97.87%	0.00%	DNP	DNP	100.00%	DNP	DNP	DNP	DNP
TATA	0.00%	0.00%	99.09%	0.00%	0.01%	0.41%	0.72%	98.26%	0.00%	0.09%	100.00%	100.00%	100.00%	83.00%	NA	NA
RCOM CDMA	0.08%	0.50%	99.25%	0.00%	0.28%	0.87%	2.77%	99.26%	0.45%	0.09%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RCOM GSM	0.28%	1.63%	98.88%	0.30%	0.13%	0.82%	1.04%	98.27%	0.45%	0.00%	100.00%	100.00%	100.00%	78.88%	NA	NA
Aircel	0.38%	0.00%	98.23%	1.00%	0.81%	0.88%	2.11%	98.08%	0.00%	1.72%	100.00%	100.00%	100.00%	93.00%	45.75%	100.00%
MTNL GSM	1.86%	1.36%	97.56%	0.00%	0.35%	1.87%	0.56%	DNP	0.20%	0.09%	100.00%	100.00%	99.81%	85.24%	100.00%	NA

** 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

DNP: Details not provided

Monthly Point of Interconnection (POI) Congestion Report

Name of the Service Provider	Name of POI not meeting the benchmark	Total No. of circuits on POI	Total No. of call attempts on POI	Total traffic served on POI (Erlang)	% of Congestion POI	Action already taken/ action plan for meeting the benchmark
Airtel	All POIs meeting benchmark					
Vodafone	All POIs meeting benchmark					
Idea	All POIs meeting benchmark					
MTNL CDMA	All POIs meeting benchmark					
Tata	All POIs meeting benchmark					
RCOM CDMA	All POIs meeting benchmark					
Aircel	All POIs meeting benchmark					
RCOM GSM	All POIs meeting benchmark					
MTNL GSM	All POIs meeting benchmark					

POI Congestion Report will contain the name of only those POIs, where benchmark is not met where POI Congestion is measured during Time Consistent Busy Hour (TCBH)

8.2 Parameter wise performance reports for Basic Wireline services

1.1 Audit Results for Service provisioning

	Benchmark	MTNL	Airtel	TTSL	RCOM
Total registrations / OB note issued in General category		2603	29224	147	864
Number of connections provided within 7 days		2577	29224	147	864
Percentage of connections provided within 7 days	100%	99.00%	100.00%	100.00%	100.00%
Connections completed after 7 days including pending connections		42	0	0	0

1.2 Live calling for Service provisioning

	Benchmark	MTNL	Airtel	TTSL	RCOM
Total registrations / OB note issued in General category		790	100	60	15
Number of connections provided within 7 days		709	100	58	15
Percentage of connections provided within 7 days	100%	89.75%	100.00%	96.67%	100.00%
Connections completed after 7 days including pending connections		81	0	2	0

2.1 Audit Results for Fault repair

Fault incidences	Benchmark	MTNL	Airtel	TTSL	RCOM
Faults incidences (No. of faults/100 Subs./month)	≤ 5	8.88	4.65	1.24	0.89

Fault repair (Urban areas)	Benchmark	MTNL	Airtel	TTSL	RCOM
Total No. of faults registered during the month		84580	44726	325	10223
No. of faults repaired by next working day during the month		63957	42261	320	10220
Percentage of faults repaired by next working day during the month	≥ 90%	75.62%	94.49%	98.46%	99.97%
No. of faults repaired within 3 days during the month		77316	44327	324	10223
Percentage of faults repaired within 3 days during the month	100%	91.41%	99.11%	99.69%	100.00%

Rent rebate	Benchmark	MTNL	Airtel	TTSL	RCOM
No. of cases with faults pending for >3 days and ≤7 days		15872	994	1	2
Out of these number of cases where rent rebate for 7 days was given		15593	994	1	2
Percentage of cases where rent rebate for 7 days was given	100%	98.24%	100.00%	100.00%	100.00%
No. of cases with faults pending for >7 days and ≤15 days		9966	344	0	0
Out of these number of cases where rent rebate for 15 days was given		8841	344	0	0
Percentage of cases where rent rebate for 15 days was given	100%	88.71%	100.00%	NA	NA
No. of cases with faults pending for ≥15 days		3381	100	0	0
Out of these number of cases where rent rebate for 30 days was given		3188	100	0	0
Percentage of cases where rent rebate for 30 days was given	100%	94.29%	100.00%	NA	NA

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

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

MTTR	Benchmark	MTNL	Airtel	TTSL	RCOM
Mean time taken to repair the fault in hours	≤ 8	11.06	7.19	6.39	4

2.2 Live calling for fault repair

Urban area	Benchmark	MTNL	Airtel	TTSL	RCOM
Total Number of calls made		1700	100	50	50
Number of cases where fauls were repaired by next working day		611	71	44	43
Percentage cases where faults were repaired by next working day	≥ 90%	35.94%	71.00%	88.00%	86.00%
Number of cases where faults were repaired within 3 days		1442	100	50	50
Percentage cases where faults were repaired within 3 days	100%	84.82%	100.00%	100.00%	100.00%

3.1 Audit Results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	MTNL	Airtel	TTSL	RCOM
Total local call attempts		846535	486636484	210866	NA
Total number of successful local calls		795547	472081548	207436	NA
Call Completion Rate (CCR) in the local network	≥ 55%	93.98%	97.01%	98.37%	NA

Traffic statistics - Answer to Seizure Ratio	Benchmark	MTNL	Airtel	TTSL	RCOM
Total number of calls processed by the switch		968161	NA	NA	1279214
Total number of calls answered		603446	NA	NA	1155775
Answer to Seizure Ratio (ASR)	≥ 75%	62.33%	NA	NA	90.35%

3.2 Live measurement results for Call Completion Rate (CCR)

Traffic statistics - Call Completion Rate	Benchmark	MTNL	Airtel	TTSL	RCOM
Total local call attempts		122191	13184	8543	NA
Total number of successful local calls		118712	13052	8372	NA
Call Completion Rate (CCR) in the local network	≥ 55%	97.15%	99.00%	98.00%	NA

Traffic statistics - Answer to Seizure Ratio	Benchmark	MTNL	Airtel	TTSL	RCOM
Total number of calls processed by the switch		171212	NA	NA	105244
Total number of calls answered		117564	NA	NA	81326
Answer to Seizure Ratio (ASR)	≥ 75%	68.67%	NA	NA	77.27%

4.1 Audit Results for POI Congestion

POI congestion	Benchmark	MTNL	Airtel	TTSL	RCOM
POI traffic offered on all individual POI's		154633.16	54743.6	DNA	4438.2
Served traffic for all POI's		135663.99	54743.6	DNA	4438.2
Traffic failed on all POI's	≤ 0.5%	0.12	0.00%	0.00%	0.00%

4.2 Live measurement results for POI congestion

POI congestion	Benchmark	MTNL	Airtel	TTSL	RCOM
POI traffic offered on all individual POI's		2368.68	DNA	DNA	4152.9
Served traffic for all POI's		2368.68	DNA	DNA	4152.9
Traffic failed on all POI's	≤ 0.5%	0.00%	0.00%	0.00%	0.00%

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

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

5.1 Audit Results for Billing performance

Billing Performance	Benchmark	MTNL	Airtel	TTSL	RCOM
Billing diputes – Postpaid					
Total bills generated during the period		943164	171297	9000	22735
Total number of bills disputed		843	24	10	12
Percentage bills disputed	≤ 0.1%	0.09%	0.01%	0.11%	0.05%
Resolution of billing complaints					
Total complaints resolved in 4 weeks from date of receipt		612	24	10	12
Percentage complaints resolved within 4 weeks of date of receipt	100%	72.60%	100.00%	100.00%	100.00%
Period of applying credit / waiver					
Total number of cases requiring credit/waiver		104	24	10	12
Total number of cases where credit/waiver was made within 1 week		34	24	10	12
Percentage cases in which credit/waiver was received within 1 week	100%	32.69%	100.00%	100.00%	100.00%

5.2 Live calling results for resolution of billing complaints

Resolution of billing complaints	Benchmark	MTNL	Airtel	TTSL	RCOM
Total Number of calls made		153	15	5	5
Number of cases resolved in 4 weeks		129	15	5	5
Percentage cases resolved in 4 weeks	100%	84.31%	100.00%	100.00%	100.00%

6.1 Audit Results for Requests

Shift Requests	Benchmark	MTNL	Airtel	TTSL	RCOM
Total no. of requests received for Shifts		778	3143	49	58
Total no. of requests for shifts attended within 3 days		620	3129	49	56
Percentage of requests for shifts attended within 3 days	≥ 95%	79.69%	99.55%	100.00%	96.55%
Total no. of requests for shifts not attended or attended beyond 3 days		47	14	0	2

Closure Requests	Benchmark	MTNL	Airtel	TTSL	RCOM
Total no. of requests received for Closures		1930	11149	3	432
Total no. of requests for closures attended within 7 days		1766	11149	3	432
Percentage of requests for closures attended within 7 days	100%	91.50%	100.00%	100.00%	100.00%
Total no. of requests for closures not attended or attended beyond 7 days		0	0	0	0

6.2 Live calling for Requests

Shift Requests	Benchmark	MTNL	Airtel	TTSL	RCOM
Total no. of requests received for Shifts		366	100	25	20
Total no. of requests for shifts attended within 3 days		293	97	24	19
Percentage of requests for shifts attended within 3 days	≥ 95%	80.05%	97.00%	96.00%	95.00%
Total no. of requests for shifts not attended or attended beyond 3 days		73	3	1	1

** Methodology not in line with QoS

Figures provided on All India basis

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7.1 Audit results for customer care (Electronically)

Customer Care Assessment	Benchmark	MTNL	Airtel	TTSL	RCOM
Total Number of calls received		286286	328987	376375	183069
Total Number of calls getting connected and answered		286284	312977	376375	183069
Percentage calls getting connected and answered	≥ 95%	100.00%	95.13%	100.00%	100.00%

7.2 Live calling results for customer care (Electronically)

Customer Care Assessment	Benchmark	MTNL	Airtel	TTSL	RCOM
Total Number of calls received		850	100	100	100
Total Number of calls getting connected and answered		606	100	100	100
Percentage calls getting connected and answered	≥ 95%	71.29%	100.00%	100.00%	100.00%

7.3 Audit results for customer care (Voice to Voice)

Customer Care Assessment	Benchmark	MTNL	Airtel	TTSL	RCOM
Total Number of calls received					
Total Number of calls answered within 60 seconds		26199	301458	269939	124758
Percentage calls answered within 60 seconds	≥ 90%	99.68%	92.00%	71.72%	92.00%

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

Customer Care Assessment	Benchmark	MTNL	Airtel	TTSL	RCOM
Total Number of calls received		850	100	100	100
Total Number of calls answered within 60 seconds		188	87	85	92
Percentage calls answered within 60 seconds	≥ 90%	22.12%	87.00%	85.00%	92.00%

8.1 Audit results for refund of deposits

Refund	Benchmark	MTNL	Airtel	TTSL	RCOM
Total number of cases requiring refund of deposits		6475	227	0	0
Total number of cases where refund was made within 60 days		3464	227	0	0
Percentage cases in which refund was receive within 60 days	100%	53.50%	100.00%	NA	NA

9.1 Live calling for level 1 services

Level 1 services	Benchmark	MTNL	Airtel	TTSL	RCOM
Total no. of calls made		480	50	50	50
Calls answered in 60 sec		362	48	47	47
Calls answered after 60 sec		70	2	3	3

** Methodology not in line with QoS

Figures provided on All India basis

Not meeting the benchmark

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

8.3 Parameter wise performance reports for Broadband services

1. Service Provisioning

Audit result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total connections registered during the period		10244	14421	371	2199	1954	1571
Number of connections provided within 15 days		10090	13728	370	2199	1945	1571
Percentage of connections provided within 15 days	100%	98.50%	95.19%	99.73%	100.00%	99.54%	100.00%
Number of connections provided after 15 days of registration of demand		154	693	1	0	9	0
Number of customers to whom credit is given for delayed connections		0	0	0	NA	0	NA
Percentage of customers to whom credit is given for delayed connections	100%	NA	NA	NA	NA	NA	NA

Live calling result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total connections registered during the period		200	100	100	100	100	100
Number of connections provided within 15 days		170	100	100	99	100	100
Percentage of connections provided within 15 days	100%	85.00%	100.00%	100.00%	99.00%	100.00%	100.00%

2. Fault Incidence / Clearance Statistics

Fault repair - Audit result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total No. of faults registered during the month		69867	14679	10693	9648	3054	2941
No. of faults repaired by next working day during the month		42660	14160	10363	9455	3054	2676
Percentage of faults repaired by next working day during the month	> 90%	61.06%	96.46%	96.91%	98.00%	100.00%	90.99%
No. of faults repaired within 3 days during the month		56019	14544	10592	9648	NA	2941
Percentage of faults repaired within 3 days during the month	>99%	80.18%	99.08%	99.06%	100.00%	NA	100.00%

Rent rebate	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
No. of cases with faults pending for >3 days and ≤7 days		2320	586	12	3238	2	NA
Out of these number of cases where rent rebate for 7 days was given		2320	586	12	3238	2	NA
Percentage of cases where rent rebate for 7 days was given	100%	100.00%	100.00%	100.00%	100.00%	100.00%	NA
No. of cases with faults pending for >7 days and ≤15 days		1027	191	7	302	0	NA
Out of these number of cases where rent rebate for 15 days was given		1027	191	7	302	0	NA
Percentage of cases where rent rebate for 15 days was given	100%	100.00%	100.00%	100.00%	100.00%	NA	NA
No. of cases with faults pending for ≥15 days		104	73	3	80	0	NA
Out of these number of cases where rent rebate for 30 days was given		104	73	3	80	0	NA
Percentage of cases where rent rebate for 30 days was given	100%	100.00%	100.00%	100.00%	100.00%	NA	NA

Operators not meeting the benchmark DNA: Details not available DNP: Details not provided
NA: Not applicable

Fault repair - Live calling result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total Number of calls made		300	100	100	100	100	100
Number of cases where faults were repaired by next working day		80	92	59	82	96	87
Percentage cases where faults were repaired by next working day	> 90%	26.67%	92.00%	59.00%	82.00%	96.00%	87.00%
Number of cases where faults were repaired within 3 days		225	100	89	100	100	100
Percentage cases where faults were repaired within 3 days	>99%	75.00%	100.00%	89.00%	100.00%	100.00%	100.00%

3. Billing performance

Billing Performance - Audit result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Billing disputes							
Total bills generated during the period		329274	413725	1190	11676	7423	NA
Total number of bills disputed		445	25	14	95	22	NA
Percentage bills disputed	< 2%	0.14%	0.01%	1.18%	0.81%	0.30%	NA
Resolution of billing complaints							
Total complaints resolved in 4 weeks from date of receipt		427	25	13	95	22	NA
Percentage complaints resolved within 4 weeks of date of receipt	100%	95.96%	100.00%	92.86%	100.00%	100.00%	NA
Period of refund							
Total number of cases requiring refund		DNA	74	37	DNA	0	NA
Total number of cases where credit/waiver was made within 60 days		DNA	74	37	DNA	0	NA
Percentage cases in which credit/waiver was received within 60 days	100%	100.00%	100.00%	100.00%	100.00%	NA	NA

Resolution of billing complaints - Live calling result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total Number of calls made		100	15	10	40	50	NA
Number of cases resolved in 4 weeks		76	15	9	39	49	NA
Percentage cases resolved in 4 weeks	100%	76.00%	100.00%	90.00%	97.50%	98.00%	NA

4. Response time to the customer for assistance

Customer Care Assessment - Audit result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total Number of calls received		112615	154837	24619	447054	288022	6209
Total Number of calls answered within 60 seconds		111556	149229	21911	353664	263137	5994
Percentage calls answered within 60 seconds	> 60%	99.06%	96.38%	89.00%	79.11%	91.36%	96.54%

Customer Care Assessment - Live calling result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total Number of calls received		100	100	100	100	100	100
Total Number of calls answered within 60 seconds		31	80	73	79	71	82
Percentage calls answered within 60 seconds	> 60%	31.00%	80.00%	73.00%	79.00%	71.00%	82.00%

Operators not meeting the benchmark DNA: Details not available DNP: Details not provided
NA: Not applicable

Customer Care Assessment - Audit result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total Number of calls received		112615	154837	DNP	447054	288022	6209
Total Number of calls answered within 90 seconds		112086	152274	DNP	369445	272469	6209
Percentage calls answered within 90 seconds	> 80%	99.53%	98.34%	DNP	82.64%	94.60%	100.00%

Customer Care Assessment - Live calling result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total Number of calls received		100	100	100	100	100	100
Total Number of calls answered within 90 seconds		52	98	91	93	99	96
Percentage calls answered within 90 seconds	> 80%	52.00%	98.00%	91.00%	93.00%	99.00%	96.00%

5. Bandwidth utilization

Bandwidth utilization - Audit result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Intra-network links (POP to ISP Node)							
Total number of intra network links		13	1937	50	19	21	400
Total Bandwidth Available at the links (in Mbps)		13000	DNA	152	11826	29928	14614
Total Bandwidth utilized at all the links during TCBH (In Mbps)		850	DNA	103	7908	9630	4620
Percentage Bandwidth utilized	<80%	6.54%	<80%	67.76%	66.87%	32.18%	31.61%
No of Intra network found to be above 90%		0	0	0	0	0	0
International Bandwidth							
Total number of upstream links		7	2	5	5	18	20
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		4640	8622	151	59142	22482	2830
Total International Bandwidth utilized during peak hours		3787	7230	114	26545	7857	2355
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	81.62%	83.86%	75.50%	44.88%	34.95%	83.22%
No of Intra network found to be above 90%		0	0	0	0	0	0

Bandwidth utilization - Live measurement result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Intra-network links (POP to ISP Node)							
Total number of intra network links		13	1937	50	19	21	394
Total Bandwidth Available at the links (in Mbps)		13000	DNA	152	DNA	29928	15813
Total Bandwidth utilized at all the links during TCBH (In Mbps)		700	DNA	107	DNA	9630	4550
Percentage Bandwidth utilized	<80%	5.38%	<80%	70.39%	<80%	32.18%	28.77%
No of Intra network found to be above 90%		0	0	0	0	0	0
International Bandwidth							
Total number of upstream links		7	2	5	5	18	20
Total International Bandwidth available from ISP Node to IGSP/NIXI/NAP (In mpbs)		4940	8622	151	10240	22482	2730
Total International Bandwidth utilized during peak hours		3100	7200	119	5629.13	7857	2267
Percentage Bandwidth utilization during peak hours (In mpbs)	<80%	62.75%	83.51%	78.81%	54.97%	34.95%	83.04%
No of Intra network found to be above 90%		0	0	0	0	0	0

Operators not meeting the benchmark DNA: Details not available DNP: Details not provided
NA: Not applicable

6. Broadband download speed

Broadband download speed - Live measurement result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total committed download speed to the sample subscribers (In mpbs) (A)		12800	12800	12800	12800	12800	12800
Total average download speed observed during TCBH (In Mpbs) (B)		10752	11392	10496	11136	11584	11430
%age subscribed speed available to the subscriber during TCBH (B/A)*100	>80%	84.00%	89.00%	82.00%	87.00%	90.50%	89.30%

7. Service availability/uptime

Service Availability - Audit result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total Operational Hours		368316480	691807680	720	141120	744	744
Total Downtime		513688	59416	18	419	1.55	0
Total time when the service was available		367802792	691748264	702	140701	742.45	744
Service Availability Uptime in Percentage	>98%	99.86%	99.99%	97.50%	99.70%	99.79%	100.00%

Service Availability - Live measurement result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Total Operational Hours		18531648	23060256	72	4704	25	72
Total Downtime		2525	1981	1	16	0.5	0
Total time when the service was available		18529123	23058275	71	4688	24.5	72
Service Availability Uptime in Percentage	>98%	99.99%	99.99%	98.61%	99.66%	98.00%	100.00%

8. Network latency / Packet loss

Network Latency and Packet Loss - Audit result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Packet Loss (Percentage)	< 1%	0.07%	0.00%	0.32%	0.00%	0.47%	<1%
Network Latency							
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	Complied	12	78	<80	Complied	<45
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	Complied	68	240	<250	Complied	<300

Network Latency and Packet Loss - Live measurement result	Benchmark	MTNL	Airtel	Hathway	VSNL	RCOM	Sify
Packet Loss (Percentage)	< 1%	0.07%	0.00%	0.16%	0.00%	0.47%	0.00%
Network Latency							
From user reference point at POP/ISP Node to IGSP/ NIXI (msec)	<120msec	57	12	71	56	12	44
From user reference point at ISP Gateway Node to nearest NAP Port (Terrestrial) (In msec)	<350msec	121	75	250	105	147	228

Operators not meeting the benchmark DNA: Details not available DNP: Details not provided
NA: Not applicable

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

9.1 Cellular Mobile services

1. Accumulated Downtime of the Network	
Computational Methodology as per QoS definition	BTSs accumulated downtime (not available for service) shall basically measure the downtime of the BTSs, including its transmission links/circuits during the period of a month, but excludes all planned service downtime for any maintenance or software upgradation. **Computational Methodology:** • BTSs Accumulated downtime = Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month X 100 --- 24 X No. of days in the month X No. of BTSs in the network in the licensed service area • Worst affected BTSs due to downtime = No. of BTSs having accumulated downtime >24 hours in a month X 100 --- Total No. of BTSs in the network in the licensed service area
Benchmark	• BTSs Accumulated downtime (not available for service) ≤ 2% • Worst affected BTSs due to downtime ≤ 2%
Audit Procedure	**IMRB** auditors collected and verified data pertaining to: 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 audit

2. Call Set-Up Success Rate (CSSR)	
Computational Methodology as per QoS definition	The ratio of calls established to total calls is known CSSR. Call Established means the following events have happened in call setup:- ↳ call attempt is made ↳ the TCH is allocated ↳ the call is routed to the outward path of the concerned MSC Computational Methodology: Calls Established / Total Call Attempts * 100
Benchmark	> 95%
Audit Procedure	**IMRB** auditors collected and verified data pertaining to ↳ The cell-wise data generated through counters/ MMC available in the switch for traffic measurements was verified by the auditors ↳ CSSR calculation was measured using OMC generated data only ↳ Measurement was done only in Time Consistent Busy Hour (TCBH) period for all days of the week

3. Network Congestion Parameters	
Computational Methodology as per QoS definition	It means a call is not connected because there is no free channel to serve the call attempt. This parameter represents congestion in the network. It happens at three levels: ↳ SDCCH Level: Stand-alone dedicated control channel ↳ TCH Level: Traffic Channel ↳ POI Level: Point of Interconnect **Computational Methodology:** ↳ **SDCCH / TCH Congestion% = [(A1 x C1) + (A2 x C2) +…….+ (An x Cn)] / (A1 + A2 +…+ An)** ● Where:-A1 = Number of attempts to establish SDCCH / TCH made on day 1 ● C1 = Average SDCCH / TCH Congestion % on day 1 ● A2 = Number of attempts to establish SDCCH / TCH made on day 2 ● C2 = Average SDCCH / TCH Congestion % on day 2 ● An = Number of attempts to establish SDCCH / TCH made on day n ● Cn = Average SDCCH / TCH Congestion % on day n ↳ **POI Congestion% = [(A1 x C1) + (A2 x C2) +…….+ (An x Cn)] / (A1 + A2 +…+ An)** ● Where:-A1 = POI traffic offered on all POIs (no. of calls) on day 1 ● C1 = Average POI Congestion % on day 1 ● A2 = POI traffic offered on all POIs (no. of calls) on day 2 ● C2 = Average POI Congestion % on day 2 ● An = POI traffic offered on all POIs (no. of calls) on day n ● Cn = Average POI Congestion % on day n
Benchmark	**SDCCH Congestion: ≤ 1%** **TCH Congestion: ≤ 2%** **POI Congestion: ≤ 0.5%**
Audit Procedure	**IMRB Auditors collected and verified records pertaining to**: ↳ Audit of the details of SDCCH and TCH congestion percentages computed by the operator (using OMC–Switch data only) was conducted ↳ The operator should be measuring this parameter during Time consistent busy hour (TCBH) only SDCCH ↳ The POI details were verified from the switch for all the links of the operators

4. Call Drop Rate	
Computational Methodology as per QoS definition	The dropped call rate is the ratio of successfully originated calls that were found to drop to the total number of successfully originated calls that were correctly released ↳ **Total calls dropped** = All calls ceasing unnaturally i.e. due to handover or due to radio loss ↳ **Total calls established** = All calls that have TCH allocation during busy hour **Computational Methodology:** Total Calls Dropped / Total Calls Established x 100
Benchmark	**≤ 2%**
Audit Procedure	**IMRB Auditors collected and verified records pertaining to**: ↳ Audit of traffic data of the relevant quarter kept in OMC-R at MSCs and used for arriving at CDR was conducted. ↳ The operator should only be considering those calls which are dropped during Time consistent busy hour (TCBH) for all days of the relevant quarter

5. Connections with Good Voice Quality	
Computational Methodology as per QoS definition	Definition: ↳ for GSM service providers the calls having a value of 0 – 4 are considered to be of good quality (on a seven point scale) ↳ For CDMA the measure of voice quality is Frame Error Rate (FER). FER is the probability that a transmitted frame will be received incorrectly. Good voice quality of a call is considered when it FER value lies between 0 – 4 % **Computational Methodology:** ↳ **% Connections with good voice quality =** (No. of voice samples with good voice quality / Total number of samples) x 100
Benchmark	**≥ 95%**
Audit Procedure	**IMRB Auditors collected and verified records pertaining to**: 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. Procedures that were to be followed by operator for obtaining relevant details for computing this parameter were audited ↳ Operator to conduct at least one drive test using standard drive test equipment every week during TCBH ↳ Each drive test should evenly cover the following 5 types of locations: ↳ **3 Outdoor** (Periphery of the city, Congested Area, Across the City), and **2 Indoor** (Office Complex and Shopping Complex) ↳ 2 minute long calls to be initiated and held throughout the drive test ↳ 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 ↳ RxQual / FER samples generated during the drive test collected by the operator were verified ↳ *Measurements using Engineering handsets were not acceptable* ↳ All the operators were not maintaining this data at the switch level

6. Service Coverage	
Computational Methodology as per QoS definition	Definition: ➢ The level of signal available in a particular part of a city is known as signal strength. **Computational Methodology:** ➢ Service Coverage for route type x = [(N1 x CSS1) + (N2 x CSS2) + …..+ (Nn x CSSn)] / (N1 + N2 +……..+Nn) ➢ Where:-N1 = Number of calls on type of route x made in drive test 1 ➢ CSS1 = Average coverage signal strength on type of route x in drive test 1 (in dBm) ➢ N2 = Number of calls on type of route x made in drive test 2 ➢ CSS2 = Average coverage signal strength on type of route x in drive test 2 (in dBm) ➢ Nn = Number of calls on type of route x made in drive test n ➢ CSSn = Average coverage signal strength on type of route x in drive test n (in dBm)
Benchmark	**Indoor >= -75 dBm** **In-vehicle >= -85 dBm** **Outdoor – in city >= -95 dBm**
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to**: ➢ 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. ➢ Procedures were verified that were to be followed by operator for obtaining relevant details for computing this parameter:- ➢ Operator to conduct at least one drive test using standard drive test equipment* every week during Time consistent busy hour (TCBH). ➢ Each drive test should evenly cover the following 5 types of locations: – ➢ 3 Outdoor (Periphery of the city, Congested Area, Across the City), and ➢ 2 Indoor (Office Complex and Shopping Complex) ➢ *Measurements using Engineering handsets were not acceptable*

7. Response time to customer (Electronically and Voice to Voice)	
Computational Methodology	**To connect to IVR:** The time taken to connect a person (as soon as he presses call) to the IVR of the service provider **To connect to operator:** The time taken to connect a person (as soon as he presses 9) to the customer care executive **Computational Methodology:** • % age of calls getting connected (electronically) = Total n of calls getting connected electronically X 100 / Total number of calls made • % age of calls answered within 60 sec (voice to voice) = Total number of calls answered within 60 seconds X 100 / Total number of calls made
Benchmark	➢ % age of calls getting connected and answered (electronically) ≥ 95% ➢ % age of calls answered by operator (voice to voice) within 60 seconds ≥ 90%

Audit Procedure	-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. **Live calling: -** - 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.

8.1 Billing complaints per 100 bills issued	
Computational Methodology as per QoS definition	Billing complaints includes any of the following complaints related to billing from the point of view of customer: • Local call charges billed as STD/ISD or vice-versa • Toll free numbers charged • Wrong roaming charges • Call made/received disputed • Wrongly charged extra for some service (SIM replacement charged twice, service not used but charged etc.) • 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) • Payment made but not reflected (may be wrongly adjusted to another customer etc.) **Billing complaints per 100 bills issued =** Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter * *All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included* ** *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.*
Benchmark	< 0.1% billing complaints per 100 bills
Audit Procedure	**IMRB** auditors collected and verified data pertaining to - Number of bills generated - Number of billing complaints received - %age complaints per 100 bills

8.2 Resolution of billing complaints	
Computational Methodology as per QoS definition	**%age of billing complaints resolved within 4 weeks=**(Complaints resolved in 4 weeks from date of receipt / Total billing complaints received during the relevant period) x 100 *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.* *Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.*
Benchmark	100% cases to be resolved within 4 weeks
Audit Procedure	**IMRB Auditors collected and verified data pertaining to** - Total number of billing complaints/bills disputed - Number of complaints resolved in 4 weeks **Live calling : -** **Overall 100 number of live calls** 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 than100

8.3 Period of refunds / payments due to customers	
Computational Methodology as per QoS definition	**Period of all refunds = Maximum value of 'Time taken to refund'** where:-Time taken to refund = Date of refund – date of complaint resolution
Benchmark	100% cases in less than 1 week
Audit Procedure	**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.** **Operator to provide details of:-** • **Dates of resolution of all billing complaints resolved in favour of customer and resulting in requirement of a refund by the operator** • **Dates of refund pertaining to all billing complaints received during the relevant quarter** **Also random live checks of all subscribers entitled for refund were conducted**

9.2 Basic Wireline services

1. Provision of telephone after registration of demand	
Computational Methodology as per QoS definition	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.
Benchmark	100% cases in <7 days, subject to technical feasibility
Audit Procedure	IMRB Auditors verified and collected data pertaining to number of applications received at the service provider's level in the following time frames:- - Number of connections provided within 7 days - Number of connections provided after 7 days - Number of connections were request is still pending **Live calling : -** - 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

2. Fault incidence/clearance related statistic	
Computational Methodology	**Fault incidence** = (No. of faults reported by the customer per month/ Total Number of Subscribers for that particular month)*100
Benchmark	Total number of faults registered per month: <=5 complaints per 100 subscribers Fault repair by next working day: >=90% and within 3 days: 100%, averaged over a quarter.
Audit Procedure	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 **Live calling : -** -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.

3. Metering and billing credibility – billing complaints	
Computational Methodology	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
Benchmark	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 Period of applying credit/waiver/adjustment : In 100% of the cases within 1 week of resolution of complaint
Audit Procedure	IMRB Auditors to verify and collect data pertaining to - Number of Billing complaints received at the service provider's level - Last billing cycle stated should be such that due date for payment of bills must be beyond the date when this form is filled. - Include all types of bills generated for customers. This could include online as well as other forms of bills presentation including printed bills - Billing complaint is any of written complaint/ personal visit/ telephonic complaint related to: Excess metering/ wrong tariff scheme charged, 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. **Live calling : -** - IMRB Auditors collected the list of all the subscribers who have made billing complaints in the month prior to the Audit. -100 such subscribers per service provider were called to check the time taken to resolve t he billing complaint. However, in some cases where number of billing complaints were less the sample size could not be achieved

4. Customer care promptness (Shifts and Closures)	
Computational Methodology	Shifts and closure requests
Benchmark	Shifting of telephone line : Less than 3 days Processing of closure request: Less than 7 days
Audit procedure	**IMRB Auditors collected and verified data pertaining to** **Shifting Request: (Following key points were taken care of while verifying the data)** - Date of filing form should be at least 3 working days after the date of month appraised. - All the holidays are excluded and only working days are considered - The number of shift requests per month does not include the pending connections of the previous months. **Processing of closure request (Following key points were taken care of while verifying the data)** - The operator includes all Requests for volunteer Permanent Closure and External (shifts to other exchanges) Shift requests received at their exchange. - DNP (due to Non – payment) cases are excluded - All holidays are excluded for calculating 7 days. - Closure requests attended in the previous months are excluded - The period for closure starts from the time of submission of application by the subscriber.

5. Response time to customer (Electronically and Voice to Voice)	
Computational Methodology	Percentage of calls answered in a specified time = (Total no. of calls answered within that specified time / Total no. of calls dialed for a particular service)*100
Benchmark	(i) % age of calls answered (electronically): In 95% of the cases or more (ii) % age of calls answered by operator / voice to voice) within 60 seconds: In 90% of the cases or more

Audit Procedure	-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. **Live calling: -** - 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.

6. Time taken to refund of deposits after closure	
Computational Methodology	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
Benchmark	Time taken to refund = 100% within 60 days
Audit Procedure	IMRB Auditors verified and collected data pertaining to - Cases requiring refund of deposits after closure are to be included - Time taken starts from the date on which the closure is made by the service provider and ends at the date on which refund is received by the customer **Live calling : -** - 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)

7. Call completion rate	
Computational Methodology	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] X 100
Benchmark	Call Completion Rate (CCR) within local network: More than 55%
Audit Procedure	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

9.3 Broadband services

1. Service provisioning/Activation time	
Computational Methodology as per QoS definition	Service provisioning time refers to the time taken from the date of receipt of an application to the date when the service is activated **Percentage connections provided within X working days** = No of connections provided within X working days/ Total number of connections registered during the period * 100 **Technically Non Feasible (TNF**) cases such as unavailability of Broadband infrastructure/ equipment in the Area or Spare Capacity i.e. Broadband Ports including equipment to be installed at the customer premises for activating Broadband connection shall be excluded from the calculation of this parameter. Also, problems relating to customer owned equipment such as PC, LAN Card/ USB Port and internal wiring or non-availability of such equipment shall be excluded from the calculation of this parameter.
Benchmark	100 % cases in =<15 working days.
Audit Procedure	**IMRB** auditors collected and verified data pertaining to -Number of applications received at the service provider's level -Number of connections provided within 15 days -Number of connections provided after 15 days **Live calling :** At least 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days

2. Fault repair/Restoration time	
Computational Methodology as per QoS definition	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 **Percentage faults repaired in X working days** = (Total no of faults repaired in X working days /Total number of faults reported during the period)*100 The time period for fault repair starts from the time when the fault is reported to the service provider either through customer care help line or in person by the subscriber Only the complaints registered till the close of the business hours of the day are to be taken into account. All the complaints registered after the business hours are to be considered as being registered in the next day business hours
Benchmark	By next working day: > 90% and within 3 working days: 99%
Audit Procedure	**IMRB** auditors collected and verified data pertaining to -Number of applications received at the service provider's level -Number of connections provided within 15 days -Number of connections provided after 15 days **Live calling :** At least 10% of the subscribers who had requested for new connections in month prior to Audit were called to check whether connection was provided in 15 days

3. Billing complaints per 100 bills issued	
Computational Methodology as per QoS definition	Billing complaints includes any of the following complaints related to billing from the point of view of customer: • Wrongly charged extra for some service • Cheque submitted on time but charged penalty for paying beyond due date • Payment made but not reflected (may be wrongly adjusted to another customer etc.) **Billing complaints per 100 bills issued =** Total billing complaints** received during the relevant quarter / Total bills generated* during the relevant quarter * *All types of bills generated for customers i.e. printed bills, online bills and any other forms of bills generated are to be included* ** *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.*
Benchmark	< 2% billing complaints per 100 bills
Audit Procedure	**IMRB** auditors collected and verified data pertaining to - Number of bills generated - Number of billing complaints received - %age complaints per 100 bills

3.1. Resolution of billing complaints	
Computational Methodology as per QoS definition	**%age of billing complaints resolved within 4 weeks=**(Complaints resolved*** in 4 weeks from date of receipt / Total billing complaints** received during the period) x 100 *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.* *Date of resolution in this case would refer to the date when a communication has taken place from the operator's end to inform the complainant about the final resolution of the issue / dispute.*
Benchmark	100% cases to be resolved within 4 weeks
Audit Procedure	**IMRB Auditors collected and verified data pertaining to** - Total number of billing complaints/bills disputed - Number of complaints resolved in 4 weeks **Live calling : -** **-Overall 100 number of live calls** 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 than100

3.2 Time taken to refund after closure	
Computational Methodology as per QoS definition	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
Benchmark	100% cases in less than 60 days
Audit Procedure	**IMRB Auditors collected and verified data pertaining to** -Number of cases requiring refund of deposits -Number of cases where refund was made within 60 days -%age cases where refund was made within 60 days

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

5. Bandwidth Utilization	
Computational Methodology as per QoS definition	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
Benchmark	-- < 80% link(s)/route bandwidth utilization during peak hours (TCBH). -- If on any link(s)/route bandwidth utilization exceeds 90%, then network is considered to have congestion. For this additional provisioning of bandwidth on immediate basis, but not later than one month is mandated.
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to** **(I)POP to ISP gateway Node [Intra – network] Links** -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 **(ii) ISP Gateway Node to IGSP / NIXI Node upstream Link's) for international connectivity** -Total number of upstream links for International connectivity -Total number of links having Bandwidth > 90%Total Bandwidth available and Total Bandwidth 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)

Broadband download speed	
Computational Methodology as per QoS definition	This refers to the ratio of size of the file to be downloaded and total time required for error free transmission of the file
Benchmark	Subscribed broadband connection speed to be met >80% from ISP Node to user
Audit Procedure	**Live calling : -** -Details of live customers were obtained from the service providers -Overall **50 number** 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 -Details of total committed download speed and speed available to the users were recorded for each of the subscriber - Percentage download speed available was calculated as = Sum of total speed available for 50 customers/Total committed download speed for 50 customers*100

Service availability/Uptime	
Computational Methodology as per QoS definition	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 Service availability/Uptime = (**Total operational hours – Total Downtime hrs)*100 / Total operational hours** Total downtime for all users, including the LAN switches, Routers, Servers, Etc at ISP Node and connectivity to upstream service provider are to be included Planned outages for routine maintenance of the system are excluded from the calculation of service availability/uptime
Benchmark	- 90% for quarter ending June 2007 - 98% with effect from quarter ending September 2007 and onwards
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to** -Total operational hrs -Total downtime hrs The above mentioned data was obtained and verified separately for three days in which the live measurement was carried out, Month in which audit was carried out Also, verification of old records(July to September 2007) was verified

Packet loss	
Computational Methodology as per QoS definition	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 The packet loss is measured by computing the percent packet loss of **1000 pings of 64 byte packet each**. Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI Minimum sample reference points for each service area shall be three in number or multiple reference points if required **Hence Packet loss is computed by the formula - (Total number of ping packets lost during the period/Total number of ping packets transmitted)* 100**
Benchmark	<1 %
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to** - Records maintained for ping tests conducted during the period of July to September 2007 - Smoked ping test (wherever available) results for the period of July to September 2007 - Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours) - Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

Network Latency	
Computational Methodology as per QoS definition	Latency is the measure of duration of a round trip for a data packet between specific source and destination Router Port/Customer Premises Equipment (CPE). The round trip delay for the ping packets from ISP premises to the IGSP premises to the IGSP/NIXI gateway and to the nearest NAP port abroad are measured by computing delay for **1000 pings of 64 bytes each** (Pings are to be sent subsequent to acknowledgement received for the same for previous ping) Service provider needs to carry out such tests daily during Time Consistent Busy Hour(TCBH) and report the average results for the month in the performance monitoring report to TRAI Minimum sample reference points for each service area shall be three in number or multiple reference points if required **Hence the formula for network latency would be Network latency for X days= Total round trip time for all the ping packets transmitted in X days /No of days during the period**
Benchmark	< 120 msec from user reference point at POP/ISP Node to International Gateway < 350 msec from User reference point at ISP Gateway Node to International nearest NAP port (Terrestrial) < 800 msec from User reference point at ISP Gateway Node to International nearest Nap port (Satellite)
Audit Procedure	**IMRB Auditors collected and verified call centre records pertaining to** - Records maintained for ping tests conducted during the period of July to September 2007 - Smoked ping test (wherever available) results for the period of July to September 2007 - Results of live ping tests conducted during three day live measurement and month of Audit (During peak hours) - Live ping tests were conducting by selecting a minimum of three user reference test points at POP/ISP Node in each circle

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