

REPORT
ON
AUDIT & ASSESSMENT OF QUALITY OF SERVICE
OF
CELLULAR MOBILE TELEPHONE SERVICE
FOR
SOUTH ZONE – KERALA CIRCLE

Report Period: April 2012 - June 2012

Telecommunications Consultants India Ltd.
TCIL Bhawan, Greater Kailash Part – I
New Delhi – 110048
Phone: +91-11-26202020 Fax: +91-1126242266
Website: <http://www.tcil-india.com>

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I. Objectives and Methodology

The primary objective is to audit and assess the Quality of Service being rendered by Basic, Cellular Mobile & Broadband services against the parameters notified by TRAI. The audit and assessment of Quality of Service is conducted for all the basic service providers, unified access service providers, cellular mobile service providers and ISPs (Internet Service Provider) for basic wireline, Cellular Mobile Telephone Services and broadband service. TCIL has undertaken the following audit works as per the Terms of Reference (TOR):

- i) Verification of the data submitted by the service providers to TRAI as part of QoS monitoring reports i.e. Quarterly Performance Monitoring Reports (PMRs) and monthly Point of Interconnection (POI) Congestion Reports with reference to the records maintained by the service provider.
- ii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using live measurement for 3 days during the month in which the audit and assessment is carried out.
- iii) Verification of the performance of service providers against the Quality of Service benchmarks laid down by TRAI using the data for the entire month during which the live measurement is carried out.
- iv) Drive tests of the mobile networks both operators assisted and independent drive test (as and where required).
- v) Billing and call center's data verification.
- vi) Live testing of the efficiency of the call center / customer care help line.
- vii) Emergency (Level-1) call testing

To fulfill the above mentioned Scope of Work audit was performed on different Systems, Facilities and Field data collection.

Systems audited:-

1. Network Switching Centre (NSS)
2. Base Station Subsystem(BSS)
3. Billing Applications
4. Customer Care applications

Facilities audited:-

1. Billing documents.
2. Customer Care records.

Field data collections carried out:-

1. RF network coverage including KPIs (Key Performance Index)
2. Inter Operator Call Assessment
3. Checking of Customer Billing/Refund Complaints (Random sample)
4. Customer Care efficiency
5. The live calling was made to assess the quality of services for Inter Operator Call Assessment, Customer Billing/Refund Complaints and Customer Care efficiency.

In order to carry out the above scope of work:-

- ✓ TCIL auditors visited all the NSS (Network Sub System) and BSS (Base-station Sub System) to check data for all the operators in their respective service area.
- ✓ All the NSS and BSS data for the relevant details were collected either directly from the centralized NOC or through a remote access to the NOC.
- ✓ The Radio parameters were audited / verified from the data collected from OMC-R (Operation and Maintenance Center – Radio, as part of BSS data).
- ✓ The Drive test was conducted in high, low and medium dense areas including highways, commercial complex and residential areas and special attention was paid for the areas for which TRAI has received complaints.
- ✓ The POI and other network related parameters were audited / verified from the data collected from the OMC-S (Operation and Maintenance Center – Switch as part of NSS data).
- ✓ The data related to Billing and Customer care was checked for the previous month and verified with the customers by calling them on random basis. The process of registration and handling of the complaints was also studied for the various operators. Call centre number were called for measuring the efficiency of the call centre.
- ✓ The inter operator call assessment test was carried out during the time period as is specified in the tender document. TCBH (Time Consistent Busy Hour) is taken after observation of the traffic consistently for 3 days prior to the audit activity.
- ✓ Data has been collected for busy hour of network in case of live assessment & month of audit for all service providers & verified that service providers are providing busy hour data only for QoS service. We found that TCBH hour is matching with network busy hour as provided by service providers for Kerala circle. But for parameters such as 'Worst affected cell exceeding 3% TCH drop' and 'BTSS accumulated down time' CBBH (Cell Bouncing Busy Hour) was taken instead of TCBH (Time Consistent Busy Hours) as per the TRAI new regulation 2009. This has resulted in high value for 'Cell exceeding 3% TCH drop' parameter for some of the service providers.

CHAPTER-2: EXECUTIVE SUMMARY

I. Preface

This report highlights the findings for the audit & assessment of Quality of Service of Cellular Mobile Services in Kerala Circle in 2nd quarter (April – June 2012). The primary data collection and verification of records (PMR data verification – quarterly) maintained by various operators was undertaken during the period October - December 2011.

S/N	Name of Service Provider	Month of Audit	TCBH Hour
GSM Operators			
1	Aircel Ltd	May - 2012	1900-2000 hrs
2	Airtel Ltd	May - 2012	2000-2100 hrs
3	BSNL	May - 2012	2000-2100 hrs
4	Idea	May - 2012	2000-2100 hrs
5	Reliance Communication (GSM)	May - 2012	2000-2100 hrs
6	Tata Communications (GSM)	May - 2012	2000-2100 hrs
7	Uninor	May - 2012	2000-2100 hrs
8	Videocon	May - 2012	1900-2000 hrs
9	Vodafone	May - 2012	2000-2100 hrs
CDMA Operators			
10	MTS (CDMA)	May - 2012	1900-2000 hrs
11	Reliance Communication (CDMA)	May - 2012	1900-2000 hrs
12	Tata Communications (CDMA)	May - 2012	1900-2000 hrs

II. Findings from Quality of Service Audit (Operator wise for each parameter)

(A) Cellular Mobile Telephone Services

3 days Live Data Audit														
S/N	Name of Parameter	Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	TATA GSM	Uninor	Vi-con	V-fone	MTS	Rcom CDMA	TATA CDMA
GSM Operators											CDMA Operators			
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.01%	0.01%	0.40%	0.04%	0.00%	0.02%	0.05%	0.00%	0.01%	0.04%	0.01%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	99.61%	99.87%	98.03%	99.94%	99.92%	99.69%	98.75%	98.48%	98.49%	99.13%	99.34%	98.54%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.02%	0.27%	0.07%	0.00%	0.01%	5.04%	0.00%	0.22%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.05%	0.02%	1.97%	0.53%	0.01%	0.02%	0.05%	0.00%	0.95%	0.00%	0.00%	0.00%
3	Connection maintenance (retainability)													
	a) CDR	<=2%	0.66%	0.14%	0.55%	0.60%	0.04%	0.68%	1.10%	0.00%	0.69%	0.31%	0.01%	0.55%
	b) Worst affected cells>3% TCH drop	<=3%	3.09%	0.52%	1.91%	1.74%	0.02%	1.90%	12.02%	0.00%	2.51%	1.75%	0.00%	1.06%
	c) Good voice quality	>=95%	97.61%	99.93%	99.89%	95.72%	99.32%	97.72%	97.70%	99.16%	96.96%	100%	99.74%	NA
4	No of POI having congestion	>=0.5 %	0	0	0	0	0	0	0	0	0	0	0	0
5	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95%	99%	100%	100%	99%	99%	100%	95%	98%	100%	99%	99%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	>=90%	14%	86%	44%	96%	97%	99%	99%	98%	99%	91%	95%	100%

NA: Not Applicable, NP: Data Not Provided

From the 3 days live data assessment, it is found that all the operators are meeting most of the network parameters. Deviations in Network Parameters found in following cases: 1. UNINOR in respect of SDCCH/PAGING congestion <=1%. 2. AIRCEL & UNINOR in respect of parameter "worst affected cells >3% TCH drop". Deviations in Customer care Parameters found in following cases: 1. AIRCEL, AIRTEL & BSNL in respect of the parameter "% calls answered by operators (voice-to-voice)".

One Month Data Audit		Bench- mark	Aircel	Airtel	BSNL	Idea	Rcom GSM	TATA GSM	Uninor	Vi-con	V-fone	MTS	Rcom CDMA	TATA CDMA
S/ N	Name of Parameter		GSM Operators									CDMA Operators		
(A)	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.02%	0.01%	0.64%	0.07%	0.02%	0.01%	0.03%	0.00%	0.01%	0.04%	0.02%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.09%	0.00%	1.22%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2348	4724	4658	5309	2182	2085	1215	84	4249	716	1188	563
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		267	507	22053	2689	260	147	250	0	457	192	189	40
e) No. of BTSs having accumulated downtime of >24 hours in a month		2	0	57	4	0	0	0	0	0	0	0	0	
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	99.65%	99.88%	98.08%	99.92%	99.93%	99.67%	98.72%	98.77%	98.48%	99.08%	99.34%	98.87%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.01%	0.32%	0.16%	0.00%	0.01%	1.25%	0.26%	0.29%	0.00%	0.00%	0.00%
c) TCH congestion	<=2%	0.02%	0.01%	1.92%	0.54%	0.01%	0.03%	0.08%	0.00%	0.91%	0.00%	0.00%	0.00%	
3	Connection maintenance (retainability)													
	a) CDR	<=2%	0.65%	0.14%	0.55%	0.59%	0.04%	0.69%	1.07%	0.00%	0.65%	0.29%	0.01%	0.69%
	b) Worst affected cells>3% TCH drop	<=3%	0.90%	0.51%	1.88%	1.73%	0.02%	1.16%	11.55%	0.00%	2.49%	1.88%	0.00%	0.83%
c) Good voice quality	>=95%	97.66%	99.92%	99.91%	95.87%	99.34%	97.75%	97.66%	99.03%	96.93%	100.00%	99.74%	NA	
4	No of POI having congestion	>=0.5%	0	0	0	0	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters													
5	Metering/billing credibility-Post paid	<= 0.1%	0.66%	0.01%	0.16%	0.00%	0.10%	1.09%	NA	NA	0.37%	NA	0.10%	0.14%
6	Metering /billing credibility-Pre paid	<= 0.1%	0.03%	0.01%	0.01%	0.00%	0.03%	0.01%	0.01%	0.00%	0.01%	0.01%	0.02%	0.01%
7	Resolution of billing/ charging complaints	100% within 4 weeks	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<=1 week	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
8	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	>=95%	99%	100%	100%	99%	99%	100%	96%	99%	100%	99%	99%	100%
b) % call answered by operators(voice to voice) within 60 sec.	>=90%	27%	94%	97%	97%	93%	91%	98%	96%	97%	92%	94%	98%	
9	Termination/closure of service	<=7days	100%	100%	100%	100%	100%	100%	NA	NA	100%	NA	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	100%	100%	100%	100%	100%	100%	NA	NA	100%	NA	100%	100%

NA: Not Applicable, NP: Data Not Provided

From the month data assessment, it is found that all the operators are meeting most of the network parameters.

Deviations in Network Parameters found in following cases: 1. UNINOR in respect of SDCCH/PAGING congestion $\leq 1\%$. & "worst affected cells $> 3\%$ TCH drop".

Deviations in Customer care Parameters found in following cases:

- 1 AIRCEL, BSNL, VODAFONE, TATA CDMA & GSM in respect of the parameter "Metering/billing credibility-Post paid".
2. AIRCEL in respect of the parameter "% calls answered by operators (voice-to-voice)".

Operator-Assisted Drive Test

The Operator Assisted Drive Test was conducted at Kerala for all the operators. Route covered was about around 100-120 Kms depending on city areas within the speed limit of 30Km/hr. The cities covered were **Alleppey, Kasargod & Kottayam**. In all the cities, zones were selected for covering different density areas (High, Medium & Low dense areas).

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators						CDMA Operators				
1.1	Blocked Call Rate (<=3%)	Alleppey	0	1.58	1.05	1.06	0	0	0	3.21	0	0	0
		Kasargod	1.18	1.16	0	1.79	1.71	0.58	0	0	0	0	0
		Kottayam	0.53	0	0.57	1.11	0	0	0	3.13	0	0	0
1.2	Dropped Call Rate (<=2%)	Alleppey	0	0	0.53	0	0	0	0	1.07	0	0	0
		Kasargod	0.59	0	0	0	2.29	0	0	0	1.06	0	0
		Kottayam	0	0	0.57	0	0	0	0	1.04	0	0	0
1.3	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Alleppey									99.69	96.19	98.53
		Kasargod									95.70	99.00	98.70
		Kottayam									99.80	97.16	97.43
	(ii) 0-5 (with frequency hopping)	Alleppey	98.80	95.20	97.73	92.15	96.60	98.31	90.01	95.51			
		Kasargod	99.22	95.30	99.53	93.16	95.33	99.50	95.00	97.42			
Kottayam		98.48	96.70	97.43	88.49	96.11	98.83	95.23	91.00				
1.4	Call Setup Success Rate (>=95%)	Alleppey	100	98.42	98.95	98.94	100	100	97.11	96.79	100	100	100
		Kasargod	98.82	98.84	100	98.21	98.29	99.42	97.51	100	100	100	100
		Kottayam	98.40	100	99.43	98.89	100	100	100	96.88	100	100	100

Key observations as could be derived from the table are as under:

- Blocked Call Rate” benchmark is not met by Vodafone in Alleppey & Kottayam.
- Dropped Call Rate” benchmark is not met by Rcom GSM in Kasargod.
- Good Voice Quality benchmark is not met by Idea in Alleppey, Kasargod & Kottayam, Uninor in Alleppey and Vodafone in Kottayam.
- VIDEOCON is having ICR arrangement with 'TATA' in Kerala service area.
- All other parameters are found in order

Independent Drive Test

SN	Parameter	Vodafone (Ernakulam)	BSNL (Kasargod)	BSNL (Kollam)	Uninor (Kollam)	Rcom GSM (Painavu)	Rcom GSM (Wayanad)
1.1	Call Attempts	147	88	142	154	105	134
1.2	Blocked Call Rate (<=3%)	3.40	1.14	0	0	0	0
1.3	Dropped Call Rate (<=2%)	2.04	0.00	0	0	1.90	0.75
	Percentage of connections with good voice quality (=>95%)						
1.4	(i) 0-4 (w/o frequency hopping)						
	(ii) 0-5 (with frequency hopping)	92.06	99.20	92.73	95.70	97.19	97.73
	Service Coverage						
	In door (>= -75dBm)	73.03	70.43	60.43	24.23	31.00	38.00
	In-vehicle (>= -85dBm)	98.50	96.23	94.37	77.23	65.33	64.00
1.5	Outdoor- in city (>= -95dBm)	100	99.77	99.80	99.14	87.00	87.67
1.6	Call Setup Success Rate (>=95%)	96.60	98.86	100	97.40	100	100

Key observations as could be derived from the table are as under:

The performances of the operators in the independent drive test are satisfactory except Vodafone in Ernakulam & BSNL in Kollam. The details are as under:

Vodafone is not meeting “Blocked Call Rate”, Dropped Call Rate & “Percentage of connections with good voice quality” in Ernakulam. BSNL is not meeting the benchmark of “Percentage of connections with good voice quality in Kollam. Videocon is having ICR arrangements at Kasargod. Hence, independent drive test for this operator could not be conducted there.

CHAPTER-3: AUDIT-PMR VERIFICATION															
I. Cellular Mobile Telephone Service															
S/N	PMR Name of Parameter	Bench- mark	Audit	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Vi-con	Vo-fone	MTS	Rcom CDMA	Tata CDMA
				GSM Operators								CDMA Operators			
(A)	Network Service Quality Parameter														
1	Network Availability														
	BTS Accumulated Downtime	<=2%	Reported	0.10%	0.02%	0.50%	0.05%	0.03%	0.01%	0.08%	0.16%	0.02%	0.01%	0.02%	0.01%
			Verified	0.10%	0.02%	0.50%	0.05%	0.03%	0.01%	0.08%	0.16%	0.02%	0.01%	0.02%	0.01%
	Worst affected BTSs due to downtime	<=2%	Reported	0.82%	0.10%	0.97%	0.10%	0.00%	0.00%	0.05%	0.54%	0.06%	0.00%	0.00%	0.00%
			Verified	0.82%	0.10%	0.97%	0.10%	0.00%	0.00%	0.05%	0.54%	0.06%	0.00%	0.00%	0.00%
2	Connection Establishment (Accessibility)														
	CSSR (Call Setup Success Rate)	>=95%	Reported	99.64%	98.94%	98.00%	99.78%	99.88%	98.06%	99.19%	99.04%	98.41%	98.93%	99.55%	98.71%
			Verified	99.64%	98.94%	98.00%	99.78%	99.88%	98.06%	99.19%	99.04%	98.41%	98.93%	99.55%	98.71%
	SDCCH/PAGING congestion	<=1%	Reported	0.02%	0.17%	0.30%	0.27%	0.09%	0.06%	0.18%	0.00%	0.34%	0.00%	0.00%	0.00%
			Verified	0.02%	0.17%	0.30%	0.27%	0.09%	0.06%	0.18%	0.00%	0.34%	0.00%	0.00%	0.00%
TCH congestion	<=2%	Reported	0.01%	0.15%	1.90%	0.46%	0.02%	0.20%	0.09%	0.00%	1.00%	0.00%	0.09%	0.00%	
			Verified	0.01%	0.15%	1.90%	0.46%	0.02%	0.20%	0.09%	0.00%	1.00%	0.00%	0.09%	0.00%
3	Connection maintenance (retainability)														
	CDR	<=2%	Reported	0.62%	1.06%	0.53%	0.85%	0.44%	0.98%	1.15%	0.91%	0.65%	0.47%	0.58%	0.67%
			Verified	0.62%	1.06%	0.53%	0.85%	0.44%	0.98%	1.15%	0.91%	0.65%	0.47%	0.58%	0.67%
	Worst affected cells>3% TCH drop	<=5%	Reported	0.92%	1.87%	2.03%	1.44%	0.47%	2.73%	2.11%	1.17%	0.98%	0.32%	0.41%	1.64%
			Verified	0.92%	1.87%	2.03%	1.44%	0.47%	2.73%	2.11%	1.17%	0.98%	0.32%	0.41%	3.13%
Good voice quality	>=95%	Reported	97.97%	96.81%	99.90%	95.68%	99.18%	98.29%	97.50%	98.44%	97.21%	100%	98.89%	98.94%	
			Verified	97.97%	96.81%	99.90%	95.68%	99.18%	98.29%	97.50%	98.44%	97.21%	100%	98.89%	98.94%
4	POI congestion	<=0.5%	Reported	0	0	0	0	0	0	0	0	0	0	0	0
			Verified	0	0	0	0	0	0	0	0	0	0	0	0
(B)	Customer Service Quality Parameters														
5	Metering/billing credibility-Post paid	<= 0.1%	Reported	0.10%	0.02%	0.00%	0.01%	0.10%	0.00%	0.00%	0.00%	0.09%	0.00%	0.07%	0.00%
			Verified	0.10%	0.02%	0.00%	0.01%	0.10%	0.00%	0.00%	0.00%	0.09%	0.00%	0.07%	0.00%
6	Metering /billing credibility-Pre paid	<= 0.1%	Reported	0.05%	0.06%	0.00%	0.00%	0.04%	0.00%	0.06%	0.09%	0.04%	0.00%	0.02%	0.00%
			Verified	0.05%	0.06%	0.00%	0.00%	0.04%	0.00%	0.06%	0.09%	0.04%	0.00%	0.02%	0.00%
7	Resolution of billing/ charging complaints	100% within 4 weeks	Reported	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Period of applying credit/waiver/adjustment to the customer's account from the date of resolutions of complaints	<=1 week	Reported	100%	100%	100%	100%	100%	100%	0.00%	100%	100%	100%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	0.00%	100%	100%	100%	100%	100%
8	Response time to customers for assistance														
	Accessibility of call centre/Customer Care	>=95%	Reported	100%	99.48%	100%	0.00%	99.41%	99.00%	99.63%	99.56%	100%	99.87%	99.56%	98.00%
			Verified	100%	99.48%	100%	0.00%	99.41%	99.00%	99.63%	99.56%	100%	99.87%	99.56%	98.00%
	% call answered by operators(voice to voice)	>=90%	Reported	92.09%	97.20%	67.50%	86.91%	93.08%	99.00%	97.38%	95.77%	93.79%	90.02%	95.38%	94.00%

	within 60 sec.		Verified	88.41%	97.20%	67.50%	88.53%	93.08%	99.00%	97.38%	95.77%	93.79%	90.02%	95.38%	94.00%
9	Termination/closure of service No.of requests for Termination / Closure of service complied within 7 days during the quarter	<=7days	Reported	100%	100%	100%	100%	100%	100%	0.00%	0.00%	100%	0.00%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	0.00%	0.00%	100%	0.00%	100%	100%
10	Time taken for refunds of deposits after closures.	100% within 60 days	Reported	100%	100%	100%	100%	100%	100%	0.00%	0.00%	100%	0.00%	100%	100%
			Verified	100%	100%	100%	100%	100%	100%	0.00%	0.00%	100%	0.00%	100%	100%

Critical Analysis (PMR Verification):

- The figures proved to be by and large matching with the data obtained from all the operators for verification.

CHAPTER-4: DETAILED FINDINGS & ANALYSIS**I. Cellular Mobile Telephone Service (A) MSC Audit (1) 3 Days Live Data Assessment & Summarized Findings**

S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Rcom GSM	TATA GSM	Uninor	Vi-con	V-fone	MTS	Rcom CDMA	TATA CDMA
			GSM Operators										CDMA Operators	
A	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.01%	0.01%	0.40%	0.04%	0.00%	0.02%	0.05%	0.00%	0.01%	0.04%	0.01%	0.00%
	b) Worst affected BTSs due to downtime	<=2%	0.00%	0.00%	0.06%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2348	4724	4658	5309	2182	2085	1215	84	4249	716	1188	563
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		12	49	1358	160	7	34	45	0	43	22	12	1
	e) No. of BTSs having accumulated downtime of >24 hours in a month		0	0	3	0	0	0	0	0	0	0	0	0
1	Connection Establishment (Accessibility)													
	a) CSSR	>=95%	99.61%	99.87%	98.03%	99.94%	99.92%	99.69%	98.75%	98.48%	98.49%	99.13%	99.34%	98.54%
	b) SDCCH/PAGING congestion	<=1%	0.02%	0.02%	0.27%	0.07%	0.00%	0.01%	5.04%	0.00%	0.22%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.05%	0.02%	1.97%	0.53%	0.01%	0.02%	0.05%	0.00%	0.95%	0.00%	0.00%	0.00%
2	Connection maintenance													
	a) CDR	<=2%	0.66%	0.14%	0.55%	0.60%	0.04%	0.68%	1.10%	0.00%	0.69%	0.31%	0.01%	0.55%
	b) Cells having > 3% TCH drop	<=3%	3.09%	0.52%	1.91%	1.74%	0.02%	1.90%	12.02%	0.00%	2.51%	1.75%	0.00%	1.06%
	c) Good voice quality	>=95%	97.61%	99.93%	99.89%	95.72%	99.32%	97.72%	97.70%	99.16%	96.96%	100%	99.74%	NA
	d) No. of cells > 3% TCH drop		217	74	260	278	1	118	438	0	316	39	0	18
	e) Total no. of cells in the network		7,032	14,097	13,629	16,001	6,546	6,205	3,645	252	12,573	2,234	3,564	1,694
3	No of POI having congestion	>=0.5%	0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	b) Total No. of call attempts on POI (Avg.)		228,537	1,957,847	1,329,668	2,952,144	51,918	453,805	91,012	655	2,359,594	163,520	196,347	441,824
	c) Total traffic served on POI (Erlang) (Avg.)		5,672	80,006	46,637	70,977	1,560	14,722	2,147	30	97,386	5,835	7,940	9,860
	d) Total No. of circuits on POI		12,924	143,042	55,776	126,692	6,729	29,093	3,610	1,745	154,869	15,365	29,945	47,827
	e) Total number of working POI Service Area wise		42	45	12	105	22	16	9	14	36	56	22	82
	f) Equipped Capacity of Network in respect of Traffic in erlang		60,194	177,255	239,073	243,666	50,000	94,495	30,195	1,679	179,134	19,000	142,000	121,966

	g) Total traffic handled in TCBH in erlang		15,805	108,650	141,599	209,320	NP	34,623	6,628	2	164,144	7,337	NP	32,156
(B)	Customer Service Quality Parameters													
4	Response time to customers for assistance													
	a) Accessibility of call centre	>=95%	99%	100%	100%	99%	99%	100%	95%	98%	100%	99%	99%	100%
	b) % of call answered by operators(voice to voice) within 60 sec	>=90%	14%	86%	44%	96%	97%	99%	99%	98%	99%	91%	95%	100%
	c) No. of call attempts to call centre / customer care nos. during TCBH (Avg)		11,926	21,998	9,958	25,536	839	7,965	2,524	41	47,456	210	1,564	464
	d) No. of calls connected and answered successfully to call centre / customer care nos. during TCBH (Avg)		1,691	18,985	4,368	24,590	813	7,865	2,493	40	46,781	191	1,481	463

NA: Not Applicable, NP: Data Not Provided

Parameter wise Findings (Live Data Assessment):

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in Kerala Service Area are as given below:-

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 0.40%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 0.06%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 98.03% and 99.94%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0% and 0.27% except Uninor (5.04%).
Note: CDMA operators have the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.0% and 1.97%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.0% and 1.10%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 3\%$):** Aircel & Uninor are not meeting the benchmark. Other operators are satisfying the benchmark with value in between 0.0% and 2.51%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** Tata CDMA has declared that the parameter is not system generated. GSM operators are meeting the benchmark with values lying between 95.72% and 99.93%. Tata CDMA has not provided data.
- **POI Congestion (benchmark $\leq 0.5\%$):** All the operators are meeting the benchmark with value of 0%. There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization / usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.
- **%age of call answered by operator (electronically) (benchmark $>95\%$):** All the operators are meeting the benchmark with values lying between 95% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** Aircel, Airtel & BSNL are not meeting the benchmark. Others meeting the benchmark with values lying between 91% and 100%

(2) Month Data Assessment & Summarized Findings														
S/N	Name of Parameter	Benchmark	Aircel	Airtel	BSNL	Idea	Rcom GSM	TATA GSM	Uninor	Vi-con	V-fone	MTS	Rcom CDMA	TATA CDMA
			GSM Operators										CDMA Operators	
(A)	Network Service Quality Parameter													
1	Network Availability													
	a) BTS Accumulated Downtime	<=2%	0.02%	0.01%	0.64%	0.07%	0.02%	0.01%	0.03%	0.00%	0.01%	0.04%	0.02%	0.01%
	b) Worst affected BTSs due to downtime	<=2%	0.09%	0.00%	1.22%	0.08%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	c) Total no. of BTSs in the licensed service area		2,348	4,724	4,658	5,309	2,182	2,085	1,215	84	4,249	716	1,188	563
	d) Sum of downtime of BTSs in a month in hours i.e. total outage time of all BTSs in hours during a month		267	507	22,053	2,689	260	147	250	0	457	192	189	40
	e) No. of BTSs having accumulated downtime of >24 hours in a month		2	0	57	4	0	0	0	0	0	0	0	0
2	Connection Establishment (Accessibility)													
	a) CSSR (Call Setup Success Rate)	>=95%	99.65%	99.88%	98.08%	99.92%	99.93%	99.67%	98.72%	98.77%	98.48%	99.08%	99.34%	98.87%
	b) SDCCH/PAGING congestion	<=1%	0.01%	0.01%	0.32%	0.16%	0.00%	0.01%	1.25%	0.26%	0.29%	0.00%	0.00%	0.00%
	c) TCH congestion	<=2%	0.02%	0.01%	1.92%	0.54%	0.01%	0.03%	0.08%	0.00%	0.91%	0.00%	0.00%	0.00%
3	Connection maintenance (retainability)													
	a) CDR	<=2%	0.65%	0.14%	0.55%	0.59%	0.04%	0.69%	1.07%	0.00%	0.65%	0.29%	0.01%	0.69%
	b) Worst affected cells>3% TCH drop	<=3%	0.90%	0.51%	1.88%	1.73%	0.02%	1.16%	11.55%	0.00%	2.49%	1.88%	0.00%	0.83%
	c) Good voice quality	>=95%	97.66%	99.92%	99.91%	95.87%	99.34%	97.75%	97.66%	99.03%	96.93%	100%	99.74%	0.00%

	d) Total No. of cells exceeding 3% TCH drop (call drop)		63	72	256	277	1	72	421	0	313	42	0	14
	e) Total no. of cells in the network		7,032	14,097	13,629	16,001	6,546	6,205	3,645	252	12,573	2,234	3,564	1,694
4	No of POI having congestion	$\geq 0.5\%$	0	0	0	0	0	0	0	0	0	0	0	0
	a) Name of POI not meeting the benchmark		NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	b) Total No. of call attempts on POI (Avg.)		231,820	2,040,865	1,363,821	3,100,759	55,025	478,167	91,689	694	2,563,375	165,138	202,308	430,143
	c) Total traffic served on POI (Erlang) (Avg.)		5,706	82,286	45,682	76,349	1,626	15,525	2,070	26	91,948	5,961	8,023	9,217
	d) Total No. of circuits on POI		12,924	143,044	55,776	130,594	6,729	29,093	3,610	1,745	149,175	15,363	30,286	47,902
	e) Total number of working POI Service Area wise		42	45	12	107	22	16	9	14	36	56	22	82
5	Network Data													
	a) Equipped Capacity of Network Erlang		60,194	177,255	239,073	243,666	50,000	94,495	30,195	1,679	179,134	19,000	142,000	121,966
	b) Total traffic in TCBH in erlang (Avg.)		16,013	111,535	138,995	215,062	28,609	35,657	6,930	1	161,140	7,490	100,025	30,167
	c) Total no. of customers served (as per VLR) on last day of the month		616,212	3,164,340	4,754,785	7,173,204	1,003,157	1,121,494	247,467	9,380	5,055,858	298,697	1,389,773	255,858
(B)	Customer Service Quality Parameters													
6	Metering/billing credibility-Post paid	$\leq 0.1\%$	0.66%	0.01%	0.16%	0.00%	0.10%	1.09%	NA	NA	0.37%	NA	0.10%	0.14%
	a) No. of bills issued during the period		9,712	144,010	182,723	258,611	13,468	20,512	NA	NA	178,720	NA	169,356	66,967
	b) No. of bills disputed including billing complaints during the period		64	17	292	12	13	223	NA	NA	657	NA	169	95
7	Metering /billing credibility-Pre paid	$\leq 0.1\%$	0.03%	0.01%	0.01%	0.00%	0.03%	0.02%	0.01%	0.00%	0.01%	0.01%	0.02%	0.01%
	a) No. of charging / credit / validity complaints during the quarter		196	657	821	114	511	320	88	0	720	61	489	63
	b) Total no. of pre-paid customers at the end of the quarter		656,529	4,986,845	6,681,995	7,243,542	1,858,248	2,057,799	628,399	150,651	5,800,491	546,197	2,222,173	451,386

8	Resolution of billing/ charging complaints	<i>100% within 4 weeks</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	a) No. of billing/(post paid) and charging, credit/validity (pre paid) complaints resolved within 4 weeks during the quarter		260	7,872	1,113	126	524	543	88	0	1,377	61	658	158
	b) Total no. of billing (post paid) and charging, credit / validity (pre paid) complaints received during the quarter		260	7,872	1,113	126	524	543	88	0	1,377	61	658	158
	c) No. of billing complaints (post paid) and charging, credit/ validity complaints (pre paid) resolved in favour of the customer during the quarter		6	674	1,049	117	187	0	88	0	1,373	9	151	0
	d) No. of complaints disposed on account of not considered as valid complaints during the quarter		254	7,198	64	9	337	543	0	0	4	52	507	158
	e) Period of applying credit/waiver/adjustment to the customers account from the date of resolutions of complaints	<i><=1 week</i>	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
9	Response time to customers for assistance													
	a) Accessibility of call centre/Customer Care	<i>>=95%</i>	99%	100%	100%	99%	99%	100%	96%	99%	100%	99%	99%	100%
	b) % call answered by operators(voice to voice) within 60 sec.	<i>>=90%</i>	27%	94%	97%	97%	93%	91%	98%	96%	97%	92%	94%	98%
	c) Total no. of call attempts to call centre & customer care nos. during TCBH (Avg.).		11,100	17,733	6,405	25,050	1,260	8,979	2,626	50	46,887	195	1,504	562
	d) No. of calls connected and answered successfully to call centre & customer care nos. during TCBH (Avg.).		3,031	16,581	6,237	24,413	1,171	8,206	2,575	48	45,620	179	1,417	553
10	Termination/closure of service	<i><=7days</i>	100%	100%	100%	100%	100%	100%	NA	NA	100%	NA	100%	100%
	a) Total No. of requests for Termination / Closure of service received during the quarter		269	380	2,047	1,326	85	752	NA	NA	589	NA	596	2,004

	b) No.of requests for Termination / Closure of service complied within 7 days during the quarter		269	380	2,047	1,326	85	752	NA	NA	589	NA	596	2,004
11	Time taken for refunds of deposits after closures.	<i>100% within 60 days</i>	100%	100%	100%	100%	100%	100%	NA	NA	100%	NA	100%	100%
NA: Not Applicable, NP: Data Not Provided														

Parameter-wise Findings (Month Data Assessment):

The parameter wise key takeouts for the Cellular Mobile Telephone Services providers in Kerala Service Area are as given below:-

- **BTS accumulated downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.0% and 0.64%.
- **Worst affected BTSs due to downtime (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.22%.
- **Call setup success rate (benchmark $\geq 95\%$):** All operators are meeting the benchmark with values lying between 98.08% and 99.93%.
- **SDCCH/PAGING Channel congestion (benchmark $\leq 1\%$):** All operators are meeting the benchmark with values lying between 0.0% and 0.32% except Uninor (1.25%).
- *Note: CDMA operators have the data for Paging Channel congestion and GSM operators provided SDCCH Channel congestion.*
- **TCH congestion (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0% and 1.92%.
- **Call drop rate (benchmark $\leq 2\%$):** All operators are meeting the benchmark with values lying between 0.0% and 1.07%.
- **Cell exceeding 3% TCH drop (benchmark $\leq 5\%$):** Uninor (11.55%) is not meeting the benchmark. Others are meeting with value in between 0.0% & 2.49%.
- **Connections with good voice quality (benchmark $\geq 95\%$):** Tata CDMA has declared that the parameter is not system generated. GSM operators are meeting this benchmark, with values lying between 95.36% and 99.86%. Tata CDMA has not provided data

- **POI Congestion (benchmark $\leq 0.5\%$):** All the operators are meeting the benchmark with value of 0%. There was no congestion found overall on the POI, but cases were found where individual POIs are showing high utilization / usage. Some are in the range of over 100% though causing no traffic failure due to overflow technique i.e. the extra traffic is carried over by some other operating POI as has been designed to do so.

- **%age of call answered by operator (electronically) (benchmark $>95\%$):** All operators are meeting the benchmark with values lying between 96% and 100%.
- **%age of call answered by operator (Voice to voice) (benchmark $>90\%$):** All operators are meeting the benchmark with values lying between 91% and 98% except Aircel (27%).

- **Metering and billing credibility-Post paid (benchmark $\leq 0.1\%$):** Aircel, BSNL, Vodafone, TATA CDMA & GSM are not meeting the benchmark.
- **Metering and billing credibility-Pre paid (benchmark $\leq 0.1\%$):** All the operators are meeting the benchmark.

- **Resolution of billing/ charging complaints (benchmark 100% within 4 weeks):** All the operators are meeting the benchmark.
- **Termination/Closure of service (Benchmark ≤ 7 days):** All the operators are meeting the benchmark.
- **Time taken for refunds of deposits after closures (benchmark 100% within ≤ 60 days):** All the operators are meeting the benchmark.

Sample Coverage

Switches/BSC/BTS details of operators:

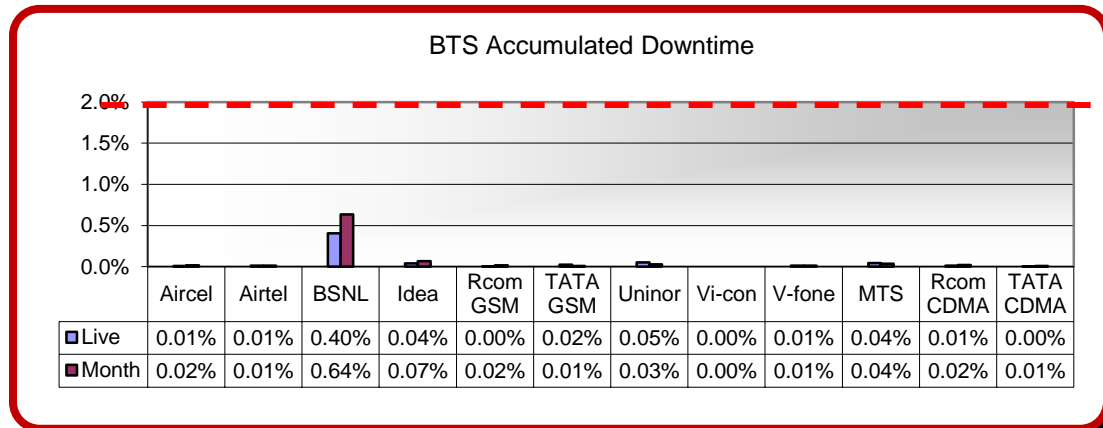
S/N	Name of Service Provider	No. of MSC/ GMSC	No. of BSC	No. of BTS
GSM Operators				
1	Aircel Ltd	3	15	2348
2	Airtel Ltd	11	42	4724
3	BSNL	20	66	4658
4	Idea	12	59	5309
5	Reliance Communication (GSM)	3	10	2182
6	Tata Communications (GSM)	3	15	2085
7	Uninor	2	18	1215
8	Videocon	1	5	84
9	Vodafone	8	64	4249
CDMA Operators				
10	MTS (CDMA)	1	2	716
11	Reliance Communication (CDMA)	7	2	1188
12	Tata Communications (CDMA)	5	7	563

(1) Performance (Graphical Representation)

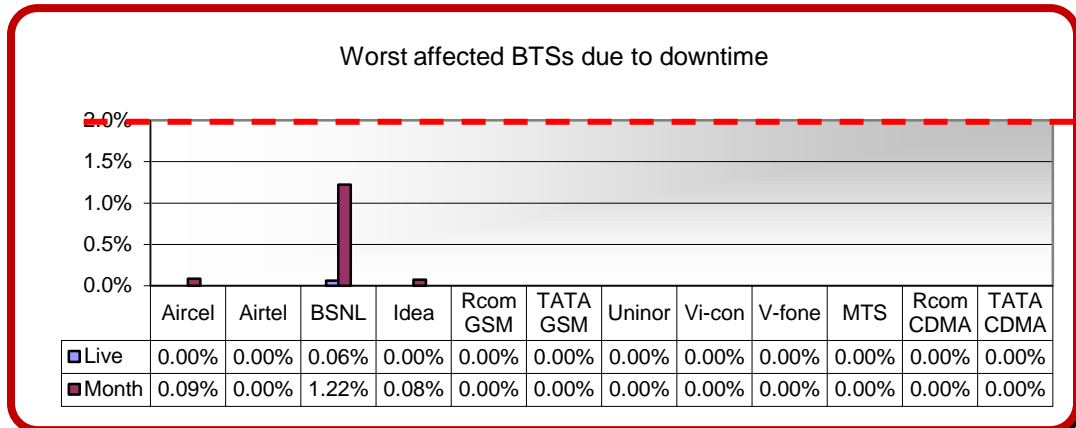
Comparison between Live measurements and One month data Audit – Cellular Mobile Telephone Services

A) NETWORK PERFORMANCE

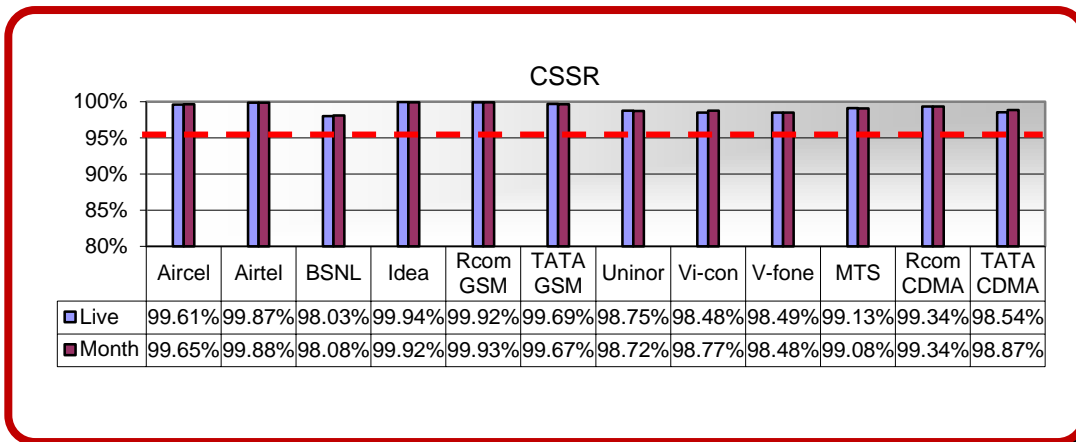
- I. BTS Accumulated Downtime:** All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



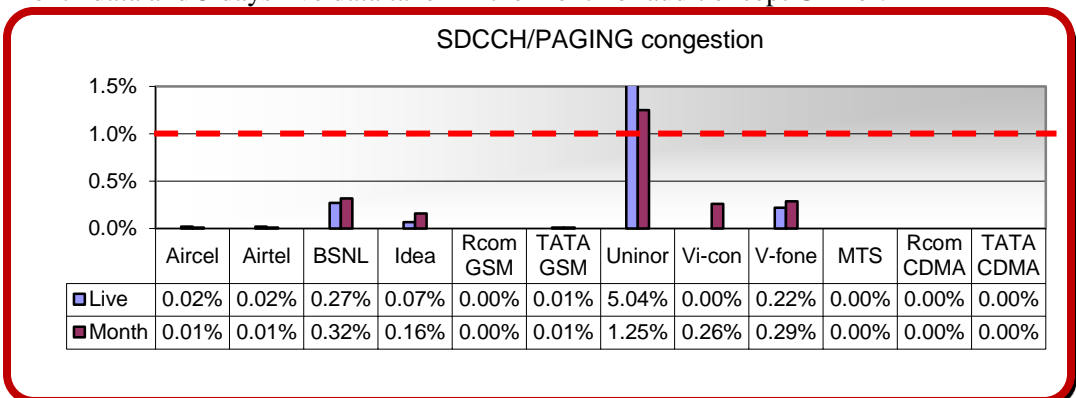
Worst affected BTSs due to downtime: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



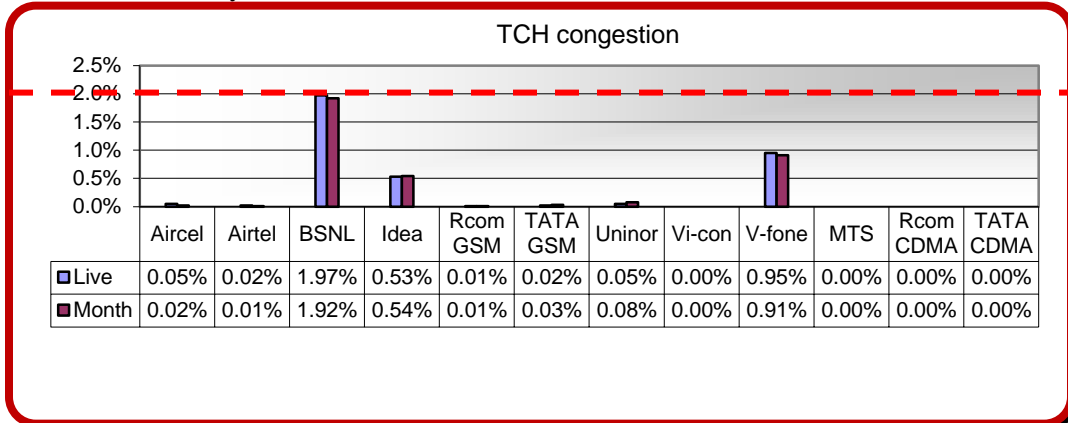
II. **Call setup success rate:** All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.



III. **Blocked call rate:**
SDCCH congestion: All operators are meeting the TRAI benchmarks ($\leq 1\%$) for both one month data and 3 days live data taken in the month of audit except Uninor.

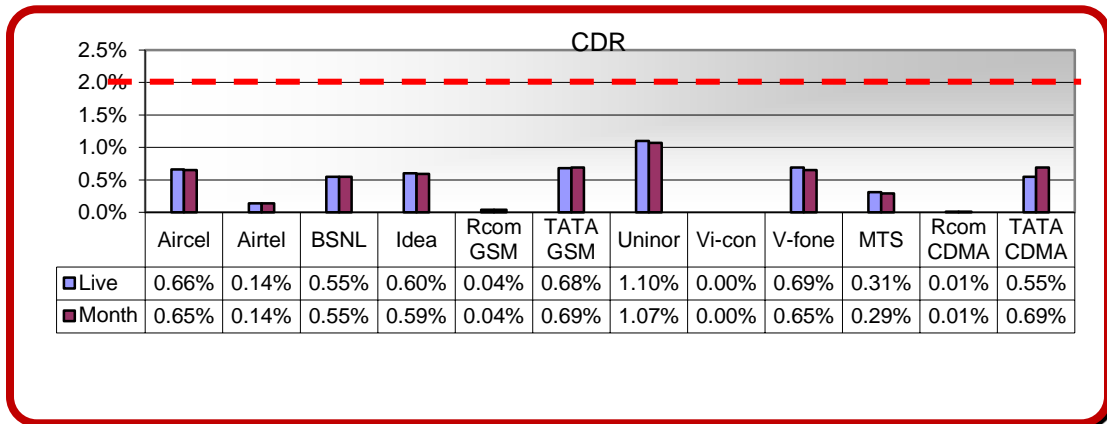


TCH congestion: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.

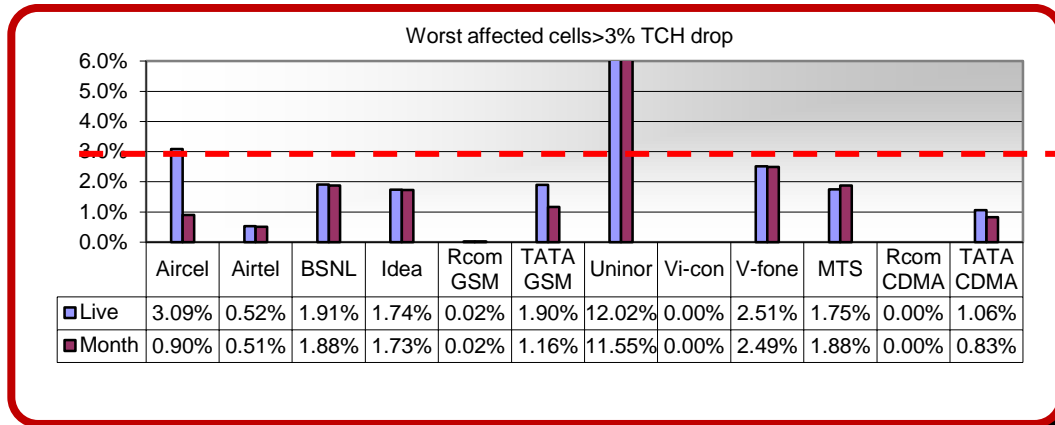


IV. Connection Maintainability (Retainability):

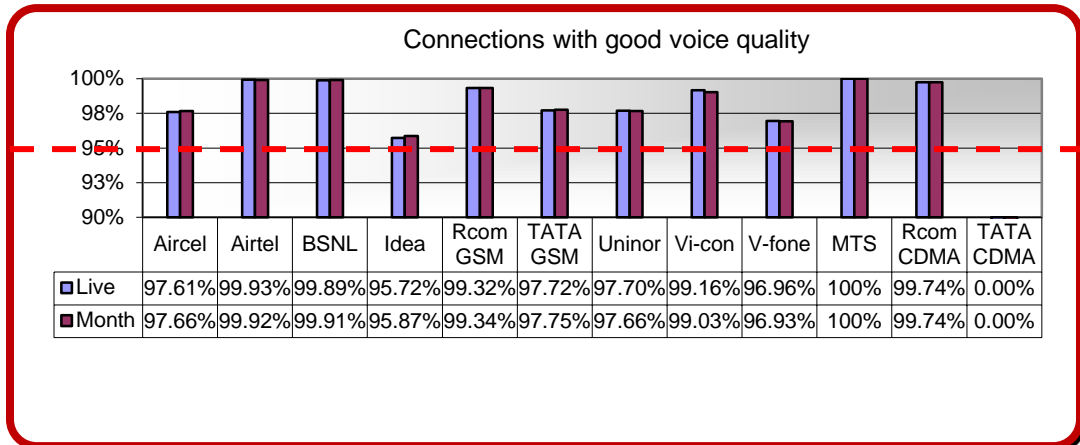
Call drop rate: All operators are meeting the TRAI benchmarks ($\leq 2\%$) for both one month data and 3 days live data taken in the month of audit.



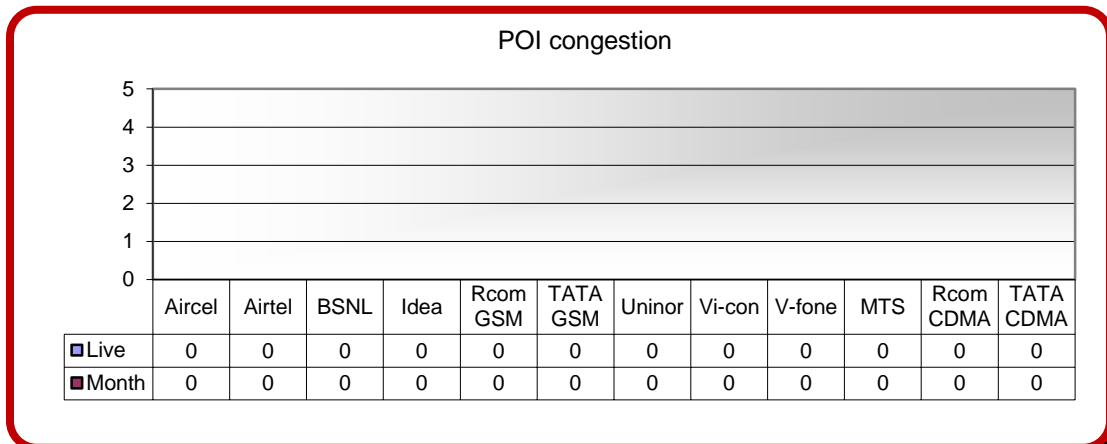
Worst affected Cell exceeding 3% TCH Drop: For live audit Aircel & Uninor for both live and month data are not meeting the benchmark of $\leq 3\%$. Other operators are meeting the benchmark for both cases.



Percentage of connections with good voice quality: All operators are meeting the TRAI benchmarks ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.



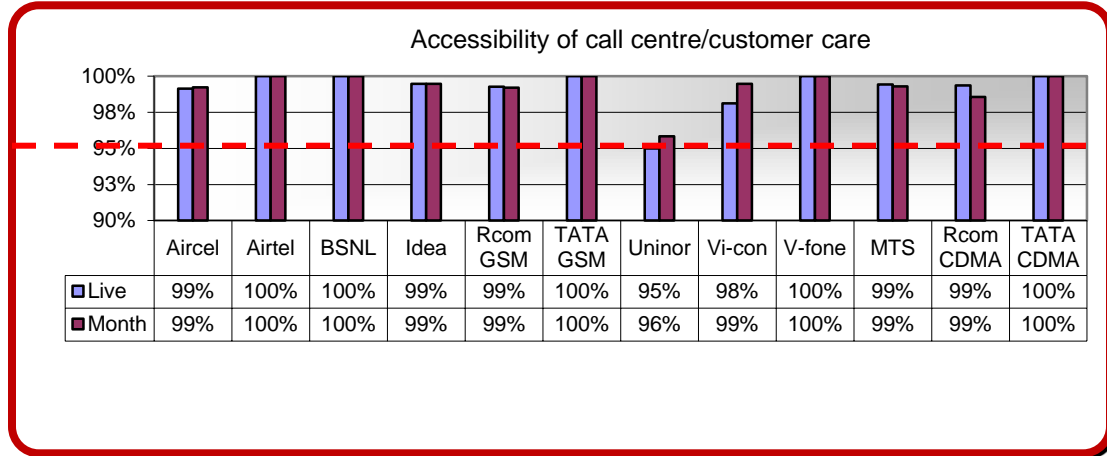
POI Congestion: All operators are meeting the TRAI benchmark ($\geq 0.5\%$) for both one month data and 3 days live data taken in the month of audit.



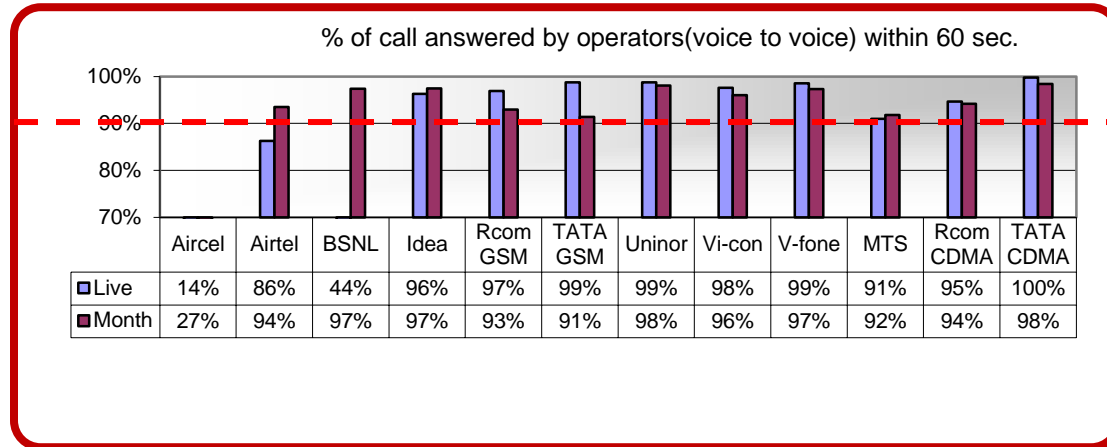
B) CUSTOMER SERVICE QUALITY PARAMETERS

(A) Response time to the customer for assistance:

Percentage of call answered (Electronically): All operators are meeting the TRAI benchmark ($\geq 95\%$) for both one month data and 3 days live data taken in the month of audit.



Percentage of call answered by operators (Voice to voice) within 60 sec: Aircel for both live and month audit and Airtel & BSNL for live audit and are not meeting the required benchmark.



(2) Critical Analysis

The above comparative study between live data & month data shows similar trends & consistency in both the cases. However, inconsistency in live & month data was found for the parameter “SDCCH/PAGING congestion” with Uninor, “Worst affected cells>3% TCH drop” with Aircel & Uninor. Customer care parameters are satisfactory with all the operators except with Aircel, BSNL, Vodafone, Tata CDMA & GSM in Metering/billing credibility-Post paid and with Aircel, Airtel & BSNL in % of calls answered by operators (Voice to voice) within 60 sec.

C) Redressal

Sample coverage

A sample of billing complaints was taken for each operator and calls were made for assessing the resolution of billing/charging complaints within 4 weeks as claimed by the respective operators.

I. Performance (live calling for billing complaints)

Q2-2012 Kerala Circle Billing Complaints Customer Feedback Calls												
Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Total No. of Calls Attempted	126	120	130	120	130	109	88	NA	121	61	121	119
Total No. of calls Answered	100	100	100	100	100	100	70	NA	100	55	100	100
Cases resolved with 4 weeks	100	100	100	100	100	100	70	NA	100	55	100	100
%age of cases resolved	100%	100%	100%	100%	100%	100%	100%	NA	100%	100%	100%	100%

Note: During the verification in some cases we could not get answer from subscriber. However, those whom we contacted have confirmed their complaint and subsequently solved by the operator. For MTS & Uninor total complaints are less than 100 hence all the complaints are tested.

II. Performance (live calling to Call Centre)

Q2-2012 Kerala Circle Call Centre Test Calls												
Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Call Centre No.	121	121	2502	198	*333	121	121	121	111	198	*333	121
Total No. of Calls Attempted	200	200	200	200	200	200	100	100	200	100	200	200
Total No. of calls connected to IVR	200	200	200	200	200	200	100	100	200	100	200	200
Calls got connected to agent within 60 Sec	200	200	200	200	200	200	100	100	200	100	200	200
%age of calls got answered	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%

NOTE: Calls were made from the Operators place. All the calls were connected within 60 seconds. 200 calls total made i.e. 100 each for Prepaid and Post paid except Uninor, Videocon & MTS who have only Prepaid services.

III. Performance (level 1 calling)

Q2 -2012 Kerala Circle Level 1 calling														
Emergency calls were made in office of the respective operator at Ernakulam. Also Calls were made for 100 & 101 from Kasargod, Alleppey & Kottayam and below given is the success rate.														
Emergency no.	No. of calls made	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA	
100	4	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	Police
101	4	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	Fire service
108	1	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	Emergency Ambulance
139	4	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	Railway Enquiry
1091	1	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	Women Helpline
1093	1	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	OK	Coastal Helpline
TOTAL CALLS MADE : 180 (12*15)														

Critical Analysis

Random numbers were selected from the operators' database of billing / metering complaints and calls were made to the customers to get their feedback for complaint redressal. It was found that the operators had made refunds in 100% cases as claimed by their records. Rcom has not provided the data for verification.

Calls were made from Operators office at Ernakulam for Call Centre test calls. 200 calls total made i.e. 100 each for Prepaid and Post paid except Uninor, Videocon & MTS as these operators are having prepaid services only. Call centre calls were successfully connected within the 60 seconds time for all the operators.

All the level 1 calls were also answered by the agent and found as per requirement. It was confirmed from the called party that the location was nearer to the calling place. However, there were occasion calls were not answered in case of Level-1 calling for emergency nos. 100 & 101. Also Calls were made for 100 & 101 from Kasargod, Alleppey & Kottayam.

C) Inter operator call assessment

(1) Sample coverage

A sample of 2x50 test calls per Service Providers with in the licensed service area (Kerala Circle) were made between 1100 to 1400 hrs and between 1600 to 1900 hrs.

(2) Performance based on live measurement

Calling Operator	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	Videocon	Vodafone	MTS	Rcom CDMA	Tata CDMA
Aircel	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Airtel	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
BSNL	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%
Idea	100%	100%	100%		100%	100%	99%	100%	100%	100%	100%	100%
Reliance (GSM)	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%
Tata (GSM)	100%	100%	100%	100%	100%	-	100%	100%	99%	100%	100%	100%
Uninor	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%	100%
Videocon	100%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%	100%
Vodafone	100%	99%	100%	100%	100%	100%	100%	100%	-	100%	100%	100%
MTS	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%	100%
Reliance (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-	100%
Tata (CDMA)	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	-

(3) Critical Analysis

In the inter-operator call assessment test, calls were made from one operator to other operators so as to check congestion on both the operators' network. In such cases, the radio part, switch part & the POI in-between the operators are involved and hence if any congestion is found in the network, it may be due to any of these parts. The result shows that there is not much congestion on the operator networks.

D) Drive test of the mobile network of service providers**1. Sample Coverage**

The Operator Assisted Drive Test was conducted at Kerala for all the operators. Route covered was about around 100-120Km depending on city areas within the speed limit of 30Km/hr.

Drive Test Locations**Alleppey**

HIGH DENSE:	TELEBHAVAN ALLEPPEY, MULLAKKAL, DUTCHSQUARE, COLLECTRATE, VATTAYAL JN, VELLAKKINAR, DHWESTALP, MEDICALCOLLEGE, THIRUVAMBADY TEMPLE, KALERCODE, KALERCODE SHIVATEMPLE, KIDANGANPARAMBU, KAICHOONDY
MEDIUM DENSE:	KOMMADY, PATHIRAPPALLI, RADIOSTATION, KALAVOOR, VALAVANAD, MAYITHARA, KVMHOSPITAL, CHERTHALA, COURT JN, MUTTATHIPARAMBU, THANNEERMUKKOM, PUTHANANGADY, KAVUNGAL, MANNANCHERRY, THALAIVADY.
LOW DENSE:	KAITHAVANA, KAINAKARY, MONCOMPU, PULINKUNNU, KIDANGARA, PARAVOOR, PUNNAPRA, VANDANAM, AMBALAPPUZHA

Kasargod

HIGH DENSE:	THALANGARA, KASARGOD FORT, THAYALANGADI, VIDHYA NAGAR, NULLIPADI, KSD MARKET, KSD BUSSTAND.
MEDIUM DENSE:	KARANDHAKKAD, CHEMMANAD, DELI KOLIYADUKKAM, CHATTAMCHAL, CHERKKALA, CPCRI, MOGRAL PUTHUR, KUMBALA
LOW DENSE:	KUMBALA, AARIKADI, UTTAM BANDHIYODU, MAGALPADI, UPPALA

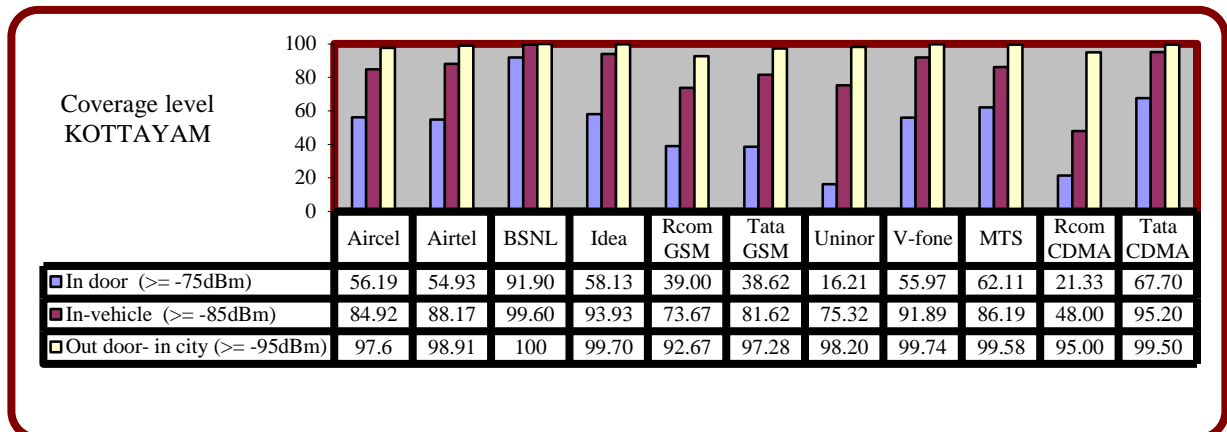
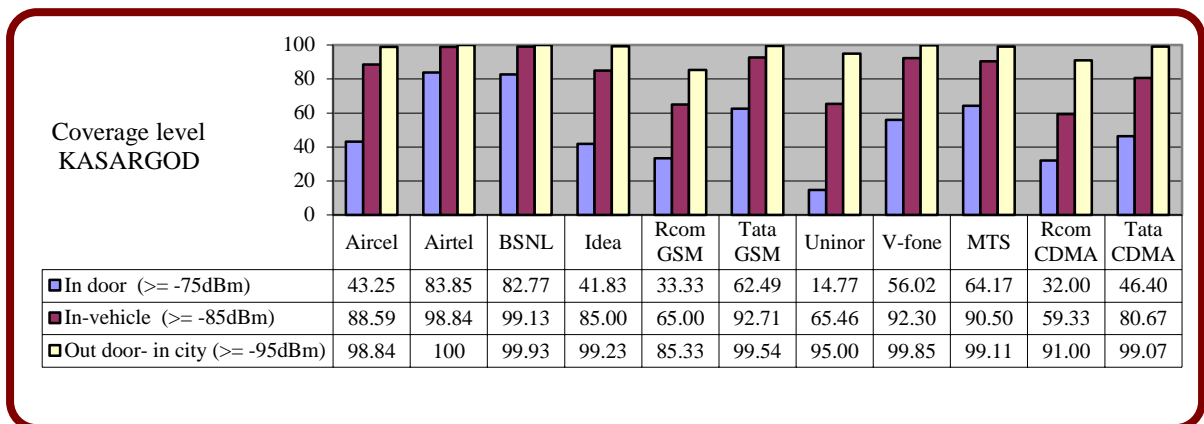
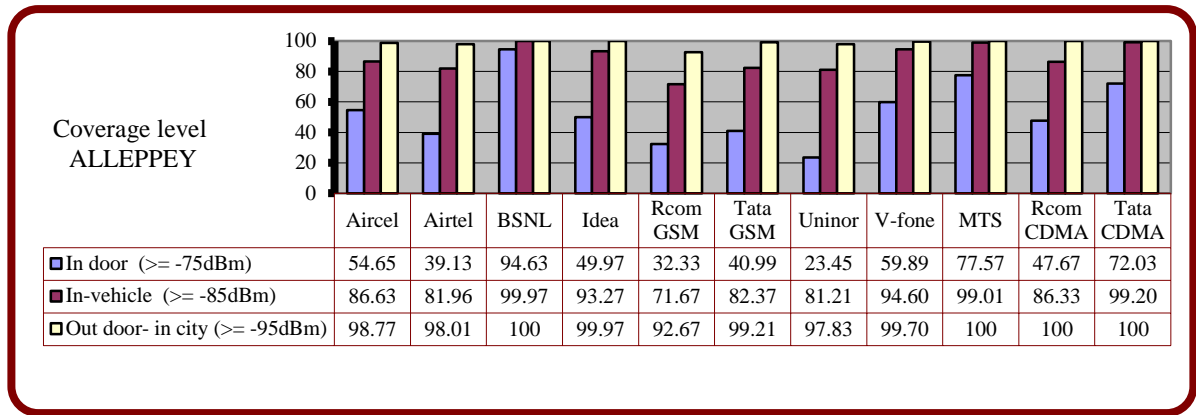
Kottayam

HIGH DENSE:	KOTTAYAM- PUTHENGADI- BAKERJUNCTION - NAGAMPADOM- MANORAMA- THIRUNAKKRA, PAROLICKAL- ETTUMANOOR TOWN- PAROLICKAL, KOTTAYAM-KSRTC- NATTAKOM, VAZHAPALLY- CHANAGANASSERY-KURISHUMOODU, KLALTHIPADI-KANJIKUZH- THIRUNAKKARA-THIRUVATHUKKAL
MEDIUM DENSE:	KOTTAYAMCHUNAGAM- PANAMPALAM- GANDHINAGAR- SAMKRANTHY- PARLOCKAL, PAROLICKAL- SAMKRANTHY- NAGAMPADOM , MANAKAD- VADAVATHOOR- KALATHIPADI
LOW DENSE:	NATTAKOM-CHINGAVANAM-THURUTHY-VAZHAPALLY, KURISHUMOODU-THENGANA- PUTHUPALLY MANARKAD, THIRUVATHUKKAL- KUMARAKOM- THIRUVATHUKKAL

2) Performance (for the respective cities) OPERATED ASSISTED DRIVE TEST

SN	Parameter	City Name	Aircel	Airtel	BSNL	Idea	Rcom GSM	Tata GSM	Uninor	V-fone	MTS	Rcom CDMA	Tata CDMA
			GSM Operators								CDMA Operators		
1.1	Call Attempts	Alleppey	184	190	190	188	170	193	181	187	195	189	183
		Kasargod	169	172	170	168	175	173	166	169	189	175	161
		Kottayam	189	173	176	180	181	180	186	192	172	192	181
1.2	Blocked Call Rate (<=3%)	Alleppey	0	1.58	1.05	1.06	0	0	0	3.21	0	0	0
		Kasargod	1.18	1.16	0	1.79	1.71	0.58	0	0	0	0	0
		Kottayam	0.53	0	0.57	1.11	0	0	0	0	3.13	0	0
1.3	Dropped Call Rate (<=2%)	Alleppey	0	0	0.53	0	0	0	0	1.07	0	0	0
		Kasargod	0.59	0	0	0	2.29	0	0	0	1.06	0	0
		Kottayam	0	0	0.57	0	0	0	0	0	1.04	0	0
1.4	Percentage of connections with good voice quality (=>95%)												
	(i) 0-4 (w/o frequency hopping)	Alleppey									99.69	96.19	98.53
		Kasargod									95.70	99.00	98.70
		Kottayam									99.80	97.16	97.43
	(ii) 0-5 (with frequency hopping)	Alleppey	98.80	95.20	97.73	92.15	96.60	98.31	90.01	95.51			
		Kasargod	99.22	95.30	99.53	93.16	95.33	99.50	95.00	97.42			
Kottayam		98.48	96.70	97.43	88.49	96.11	98.83	95.23	91.00				
1.5	Service Coverage												
	In door (>= -75dBm)	Alleppey	54.65	39.13	94.63	49.97	32.33	40.99	23.45	59.89	77.57	47.67	72.03
		Kasargod	43.25	83.85	82.77	41.83	33.33	62.49	14.77	56.02	64.17	32.00	46.40
		Kottayam	56.19	54.93	91.90	58.13	39.00	38.62	16.21	55.97	62.11	21.33	67.70
	In-vehicle (>= -85dBm)	Alleppey	86.63	81.96	99.97	93.27	71.67	82.37	81.21	94.60	99.01	86.33	99.20
		Kasargod	88.59	98.84	99.13	85.00	65.00	92.71	65.46	92.30	90.50	59.33	80.67
		Kottayam	84.92	88.17	99.60	93.93	73.67	81.62	75.32	91.89	86.19	48.00	95.20
	Out door- in city (>= -95dBm)	Alleppey	98.77	98.01	100	99.97	92.67	99.21	97.83	99.70	100	100	100
		Kasargod	98.84	100	99.93	99.23	85.33	99.54	95.00	99.85	99.11	91.00	99.07
Kottayam		97.6	98.91	100	99.70	92.67	97.28	98.20	99.74	99.58	95.00	99.50	
1.6	Call Setup Success Rate (>=95%)	Alleppey	100	98.42	98.95	98.94	100	100	97.11	96.79	100	100	100
		Kasargod	98.82	98.84	100	98.21	98.29	99.42	97.51	100	100	100	100
		Kottayam	98.4	100	99.43	98.89	100	100	99.50	96.88	100	100	100

Graphical Representation



(3) Critical Analysis

- “Blocked Call Rate” benchmark is not met by Vodafone in Alleppey & Kottayam.
- “Dropped Call Rate” benchmark is not met by Rcom GSM in Kasargod.
- “Good Voice Quality” benchmark is not met by Idea in Alleppey, Kasargod & Kottayam, Uninor in Alleppey and Vodafone in Kottayam.
- VIDEOCON is having ICR arrangement with 'TATA' in Kerala service area.

E) Independent Drive Test

The Independent Drive Test was conducted in Kerala in four cities namely Ernakulam, Kasargod, Kollam, Painavu & Wayanad. In Kasargod Videocon is having connectivity through ICR. The service providers' city wise radio coverage with call testing was performed individually through drive test activity on different days. Route covered was 107 Kms for Vodafone at Ernakulam, 117 Kms for BSNL at Kasargod, 105 Kms for BSNL & Uninor at Kollam, 55 Kms for Rcom GSM at Painavu and 120 Kms for Rcom GSM at Wayanad depending on city areas within the speed limit of 30Km/hr. In all the cities / towns, zones were selected for covering different density areas (High, Medium & Low dense areas).

Drive Test Locations and Service provider's name:

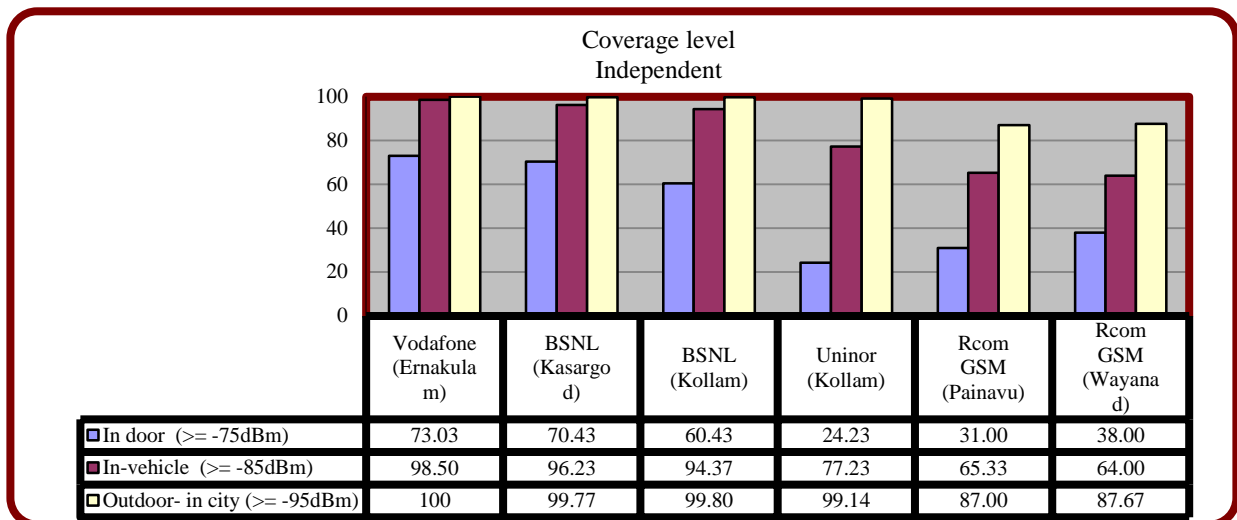
- | | |
|--------------|-------------------------------------|
| 1) Ernakulam | - VODAFONE |
| 2) Kasargod | - BSNL |
| 3) Kollam | - BSNL & UNINOR |
| 4) Painavu | - RCOM GSM |
| 5) Wayanad | - RCOM GSM |

Area Coverage details:

Ernakulam	MG RD, SOUTH RLY STN, KSRTC, KALOOR, PALARIVATTOM, EDAPALLY, MATTANCHERY, THOPPUMPADY, MARINE DRIVE, HIGH COURT, NORTH RLYSTN, KALAMASERRY, ALWAYS, PADIVATTOM, TEVARA, KUNDANOOR, WELLIGTON ISLAND
Kasargod	KUMBALA, AARIKADI, MUTTAM, BANDHIYODU, MAGALPADI, UPPALA, KARANDHAKKAD, CHEMMANAD, DELI-KOLIYADUKKAM, CHATTAMCHAL, CHERKKALA, CPCRI-MOGRAL PUTHUR, THALANGARA, KASARGOD, KASARGOD FORT, THAYALANGADI, VIDHYA NAGAR, NULLIPADI, MARKET-KSRTC BUSSTAND.
Kollam	- FATHIMA RD, CHNNAKADA, NAIRS BUILDING, ANDAVAMUKKU, PALLITHOTTAM, KOLLAM BEACH, THAMARAKULAM, ASHRAMAM RD, SN COLLEGE, POLETHODE, MADANA, VENDARMUKKU, PALLIMUKKU, THATTAMALA, BUS STAND, HIGHSCHOOL JN, CIVIL STATION, KATTACHIRA JN, ULIYAKOVIL, RANDAMKUTTY, KALLUMTHAZHAM, PALAKADAVU, MOONAMKUTTY, KARIKODE, CHANDANATHOPPU, KERALAPURAM, MUKKADA, KUNDARA, AYATHIL, PATTATHANAM, PALKULANGARA, MEVARRAM, KOTTIYAM, THIRUMUKKU, CHATHANOR, SHAKTHI KULANGARA, NEENDAKARA
Painavu	- IDUKKI DISTRICT HOSPITAL, CHERUTHONNI TOWN, COOPERATIVE BANK VAZHATHOPE, ST GEOGRE SCHOOL PREMISES VAZHATHOPE EXCISE RANGE OFFICE PAINAVU, CIVIL STATION ROAD PAINAVU, IDUKKI DAM BOTTOM, PWD GUEST HOUSE PAINAVU, GOVT POLYTECHNIC PAINAVU, IDUKKI ENGINEERING COLLEGE, BSNL TELEPHONE EXCHANGE
Wayanad	MANANTHAVADY TOWN, KALPETTA TOWN, SULTANBATTERY TOWN, MEENANAGADI, KOLANAGAPPARA, WAYANAD ENGG COLLEGE, PANDIKADAVU, PULIYARMALA, KUPPADI, MOOLANKAVU, KALLUVAYAL, ODAYANGADI, ARIVAYAL, SULTANBATTERY TOWN SOUTH, KOYILERY TOWN

SN	Parameter	Vodafone (Ernakulam)	BSNL (Kasargod)	BSNL (Kollam)	Uninor (Kollam)	Rcom GSM (Painavu)	Rcom GSM (Wayanad)
1.1	Call Attempts	147	88	142	154	105	134
1.2	Blocked Call Rate (<=3%)	3.40	1.14	0	0	0	0
1.3	Dropped Call Rate (<=2%)	2.04	0.00	0	0	1.90	0.75
	Percentage of connections with good voice quality (=>95%)						
1.4	(i) 0-4 (w/o frequency hopping)						
	(ii) 0-5 (with frequency hopping)	92.06	99.20	92.73	95.70	97.19	97.73
	Service Coverage						
	In door (>= -75dBm)	73.03	70.43	60.43	24.23	31.00	38.00
	In-vehicle (>= -85dBm)	98.50	96.23	94.37	77.23	65.33	64.00
1.5	Outdoor- in city (>= -95dBm)	100	99.77	99.80	99.14	87.00	87.67
1.6	Call Setup Success Rate (>=95%)	96.60	98.86	100	97.40	100	100

Graphical Representation



Vodafone is not meeting “Blocked Call Rate”, Dropped Call Rate & “Percentage of connections with good voice quality” in Ernakulam. BSNL is not meeting the benchmark in “Percentage of connections with good voice quality” in Kollam in the independent drive test as mentioned above. Videocon is having ICR arrangements at Kasargod. Hence, independent drive test for this operator could not be conducted.

F) Compliance report (Status of service providers with respect to the QoS)

From live, month, PMR and Drive Tests (both Operator Assisted and Independent) findings, it can be concluded that on an average, performance of the operators in the service area (Kerala) is satisfactory for **Network Parameters**. “SDCCH/PAGING congestion” was not met by Uninor and in “worst affected cells >3% TCH drop” Aircel & Uninor are not meeting the required benchmark.

Under **Customer Service Quality** Parameter “Accessibility of call centre/Customer Care” is found that many operators have improved their performances. However, Aircel for both live and month data and Airtel & BSNL for live data did not meet the benchmark in “operator answered calls (voice-to-voice) within 60 seconds”.

Regarding **Metering/Billing Credibility parameter**, in Pre-Paid all operators are meeting the required benchmark. In case of Post-paid connections Aircel, BSNL, Vodafone, Tata CDMA & GSM is not meeting the required benchmark.

During **Drive Tests (Operator Assisted)** it is noticed that most of the operators are meeting the required benchmark in the prescribed parameter. The Drive test performances of operators are satisfactory. Deviations are noticed in “Blocked Call Rate” by Vodafone in Alleppey & Kottayam, in “Dropped Call Rate” by Rcom GSM in Kasargod and in “Good Voice Quality” by Idea in Alleppey, Kasargod & Kottayam, and Uninor in Alleppey and Vodafone in Kottayam. VIDEOCON is having ICR arrangement with 'TATA' in Kerala service area.

The performances of the operators in the independent drive test are satisfactory except Vodafone in Ernakulam & BSNL in Kollam. The details are as under: Vodafone is not meeting “Blocked Call Rate”, Dropped Call Rate & “Percentage of connections with good voice quality” in Ernakulam. BSNL is not meeting the benchmark of “Good voice quality” in Kollam. Videocon is having ICR arrangements at Kasargod. Hence, independent drive test for this operator could not be conducted there.