



INDEPENDENT DRIVE TEST REPORT

For

**Leh
September 2018**

NORTH ZONE

Key Performance Indicators: All TSPs have met the Drop Call Rate (DCR) benchmark of 2% except BSNL 3G. All TSPs have fail to met the Call Setup Success Rate (CSSR) of 95% except BSNL 3G.

The Independent Drive Test has been carried out by M/s PhiMetrics Technologies Pvt. Ltd. on behalf of TRAI in Leh city & adjoining areas from 9:00 AM to 9:00 PM; 13th September 2018. The drive test covered an drive route of 55 Kms & 4 hotspots over a period of one day. Approximately 100 calls were made for each of the 4 networks: two 2G networks and two 3G network covering 2 unique TSPs.

Overview

Voice Summary

Data Summary

Overview

Overview:

Telecom Regulatory Authority of India has been entrusted with the task of laying down the standards of quality of service to be provided by the service providers and ensuring its enforcement; and also TRAI is responsible for conducting the periodical audit of such services provided by the service providers so as to protect the interest of the consumers of telecommunications service

TRAI is regularly monitoring the performance of Telecom Service Providers (TSP) against the benchmarks for the various Quality of Service (QoS) parameters laid down by the Authority. TSPs submit Performance Monitoring Reports to TRAI every quarter. TRAI also undertakes audit and assessment of Quality of Service through independent agencies to verify the Quality of Service claimed. The Audit agencies conduct sample 'Drive tests' across various cities in the country as part of audit and assessment of the TSPs' performance.

In view of complaints on call drops and other network quality issues, on behalf of TRAI, an Independent Drive Test (IDT) was conducted by PhiMetrics Technologies Pvt. Ltd. on **13th September 2018** covering various locations in Leh City & surrounding region. The performance of **Airtel and BSNL** were monitored across various technologies (2G & 3G). The drive test route was defined on the basis of several factors that include - areas from where call drop complaints are commonly received; areas of heavy usage; residential areas away from arterial roads; office areas; areas where previous Drive tests showed network issues; etc.

The test results obtained from these drive tests were utilized to assess the network quality for Voice and Data services in terms of **Voice: Coverage, Quality, Handover Success Rate, Call Setup Success Rate, Drop Call Rate and Block Call Rate.**

Data: Download and Upload Throughputs, Web Browsing Delay, Video Streaming Delay and Latency

Drive Test Details For Leh:

Independent Drive test was conducted for a period of 1 day on 13th September 2018 in Leh city & surrounding areas from 9:00 AM to 9:00 PM. Calls were made for 90 sec duration with wait time of 10 sec between calls in all technologies.

Voice Tests: The drive test covered a drive route of approximately 55 KMs over a period of 1 day on 13th September 2018. Approximately 100 calls were made for each of the 4 networks: two 2G (Lock Mode) networks and two 3G (Dual mode) networks covering 2 unique TSPs.

* In case of multiple call failure in similar geo location in given period of 60secs has been counted as one call failure

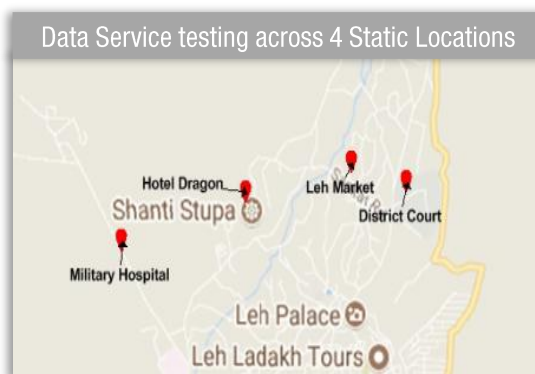
Data Tests: Data Tests were performed at 4 static locations for 1 day on 13th September 2018; two 2G (Lock mode) networks, two 3G (Dual mode) networks and one 4G (Free mode) networks covering 2 unique TSPs were tested.

* For Voice and Data KPI's, 2G measurement is done with UE locked on 2G, 3G measurement is done with UE in Dual mode (2G & 3G) and 4G measurement is done with UE in Free Mode.

* 3G KPI's which are calculated from UE in Dual Mode (2G & 3G) includes samples and events of 2G.

* 4G KPI's which are calculated from the UE in Free Mode included samples and events of 2G & 3G.

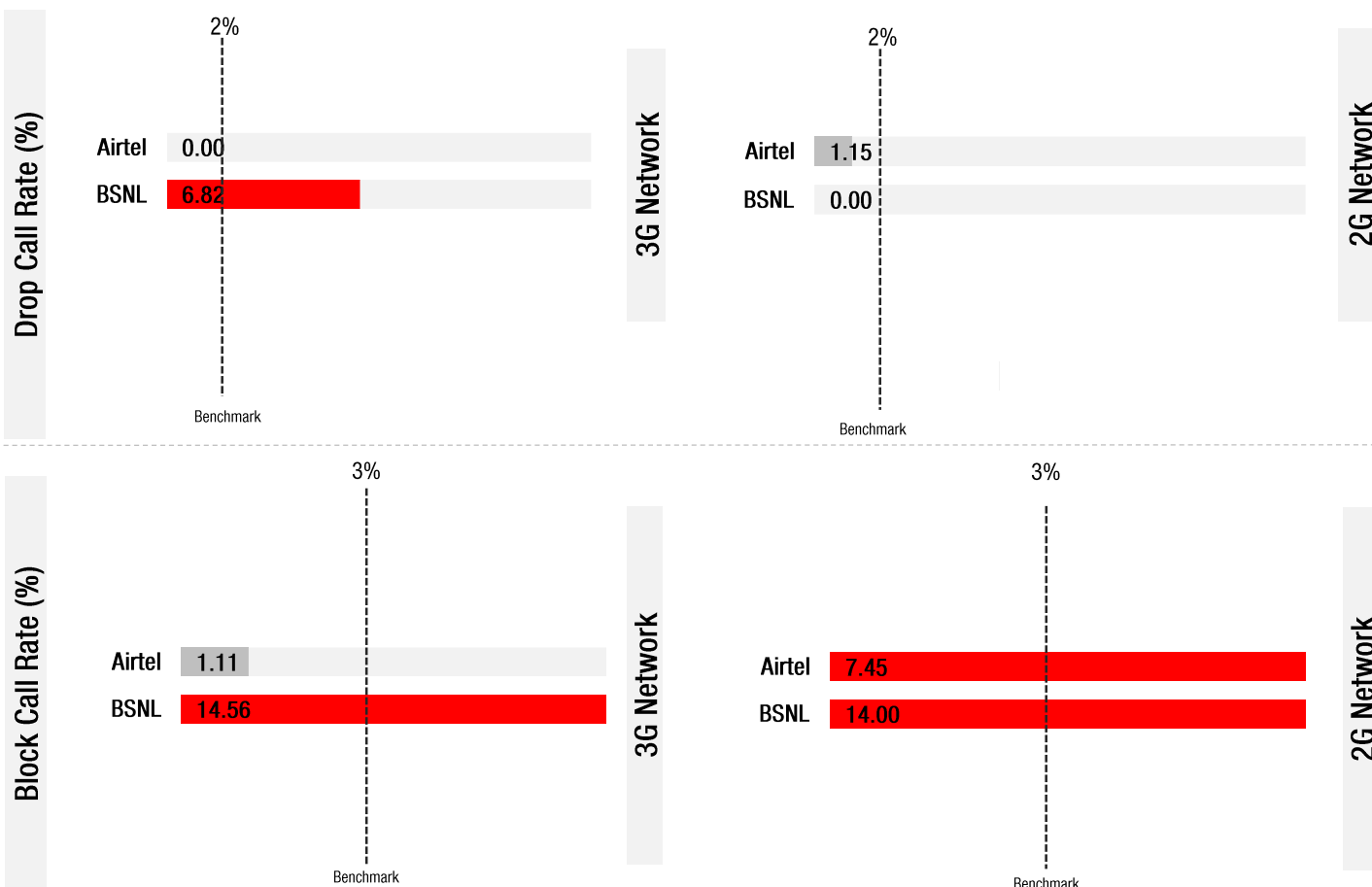
Service	Specifications
Download	2G (Locked) - 500KB, 3G (Dual) - 20 MB, 4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Dual) - 5 MB, 4G (Free) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in, www.flipkart.com and PayTm
Video Streaming	130 sec clip
Latency	32 Bytes on www.google.com



Voice Calls

Key Observations

QoS compliance of the TSPs in Leh for Voice across technologies 2G/3G/4G-VoLTE is given below:



KPI	2G Networks	
	Airtel	BSNL
SDCCH Congestion%	1.07%	0.00%
TCH Congestion %	6.38%	14.00%

KPI	3G Networks	
	Airtel	BSNL
CSFB Failure %	0.00%	
SDCCH Congestion%	0.00%	0.00%
RRC Congestion%	1.11%	0.97%
SDCCH & RRC Congestion%	1.11%	0.97%
TCH Congestion %	0.00%	12.62%
RAB Congestion %	0.00%	0.97%
TCH & RAB Congestion %	0.00%	13.59%

- a) All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%) except BSNL 3G.
- b) Call Block Rate (CBR%) benchmark of 3% was fail to achieved by all TSP's except Airtel 3G.

Not meeting Benchmark

Voice Calls

Key Observations

Coverage

a) Percentage of coverage samples for 2G \geq -85 dBm.

TSPs	2G	
	Airtel	BSNL
Coverage%	78.42%	94.50%

b) Percentage of coverage samples for 2G \geq -85 dBm & 3G \geq -90 dBm.

TSPs	3G	
	Airtel	BSNL
Coverage %	90.55%	93.92%

c) Percentage of time spent on 3G network:

TSPs	3G	
	Airtel	BSNL
Time Spent on 3G%	95.94%	93.05%

d) Percentage of RLT \geq 48:

TSPs	2G	
	Airtel	BSNL
%RLT \geq 48	0.00%	0.00%

e) Average CST Second

TSPs	2G	
	Airtel	BSNL
CST(sec)	3.05	2.62

TSPs	3G	
	Airtel	BSNL
CST(sec)	4.58	3.08

Summary

City Level Summary

Voice Call	2G	
	Airtel	BSNL
Call Attempt	94	100
Blocked Call Rate (%)	7.45%	14.00%
CSSR% (Accessibility)	92.55%	86.00%
Drop Call Rate (%)	1.15%	0.00%
Mobility HOSR (%)	97.44%	100.00%
Rx Quality (%)	91.64%	98.88%

Voice Call	3G	
	Airtel	BSNL
Call Attempt	90	103
Blocked Call Rate (%)	1.11%	14.56%
CSSR% (Accessibility)	98.89%	85.44%
Drop Call Rate (%)	0.00%	6.82%
Mobility HOSR (%)	100.00%	100.00%
Rx Quality (%)	91.39%	87.62%

Summary

City Level Summary(contd.)

Data Test - Stationary

Data Services	2G	
	Airtel	BSNL
Download Throughput (Kbps)	58.04	54.78
Upload Throughput (kbps)	92.84	61.14
Web Browsing Delay (sec)	49.55	26.02
Latency (msec)	354	292

Data Services	3G		4G
	Airtel	BSNL	Airtel
Download Throughput (Mbps)	1.69	0.56	4.04
Upload Throughput (Mbps)	0.67	0.72	0.98
Web Browsing Delay (sec)	14.69	16.85	12.44
Video Streaming Delay (sec)	4.95	5.91	5.67
Latency (msec)	181	206	164

Summary

City Level Summary(contd.)

District Court	2G	
	Airtel	BSNL
Download Throughput (Kbps)	23.64	54.59
Upload Throughput (kbps)	9.99	57.02
Web Browsing Delay (sec)	57.44	33.05
Latency (msec)	438	337

District Court	3G		4G
	Airtel	BSNL	Airtel
Download Throughput (Mbps)	1.56	0.08	1.39
Upload Throughput (Mbps)	0.74	0.48	0.43
Web Browsing Delay (sec)	13.63	15.37	13.43
Video Streaming Delay (sec)	8.49	13.55	10.33
Latency (msec)	115	842	121

Hotel Dragon	2G	
	Airtel	BSNL
Download Throughput (Kbps)	49.47	55.38
Upload Throughput (kbps)	179.17	55.93
Web Browsing Delay (sec)	36.49	27.61
Latency (msec)	348	461

Hotel Dragon	3G		4G
	Airtel	BSNL	Airtel
Download Throughput (Mbps)	2.08	0.86	10.09
Upload Throughput (Mbps)	0.77	1.08	2.21
Web Browsing Delay (sec)	10.66	18.17	6.85
Video Streaming Delay (sec)	1.08	4.50	1.40
Latency (msec)	82	93	90

Summary

City Level Summary(contd.)

Leh Market	2G	
	Airtel	BSNL
Download Throughput (Kbps)	26.59	43.01
Upload Throughput (kbps)	39.49	61.18
Web Browsing Delay (sec)	47.11	17.97
Latency (msec)	355	150

Leh Market	3G		4G
	Airtel	BSNL	Airtel
Download Throughput (Mbps)	0.06	0.38	0.55
Upload Throughput (Mbps)	0.34	1.14	0.12
Web Browsing Delay (sec)	21.78	16.05	20.71
Video Streaming Delay (sec)	-	8.18	18.75
Latency (msec)	-	65	144

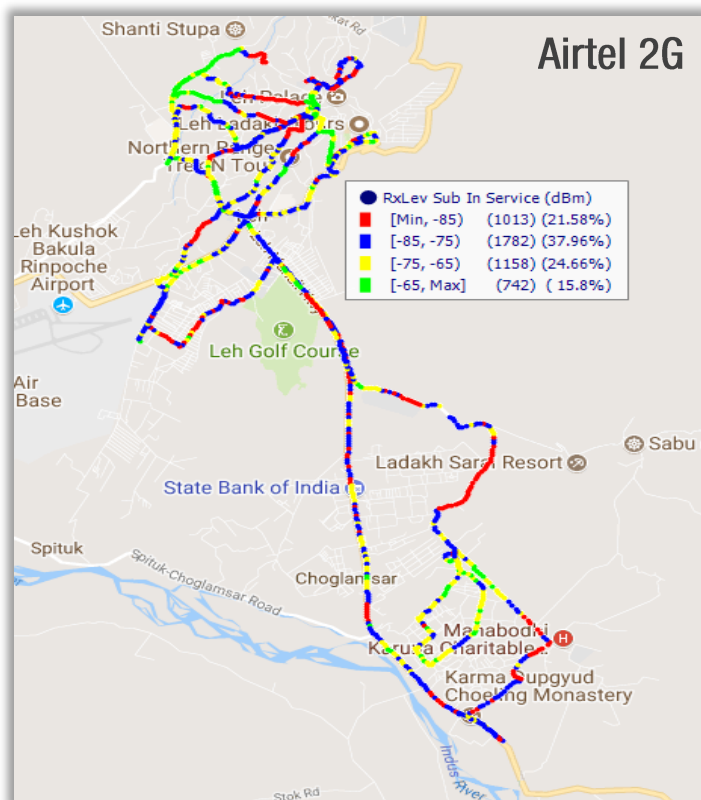
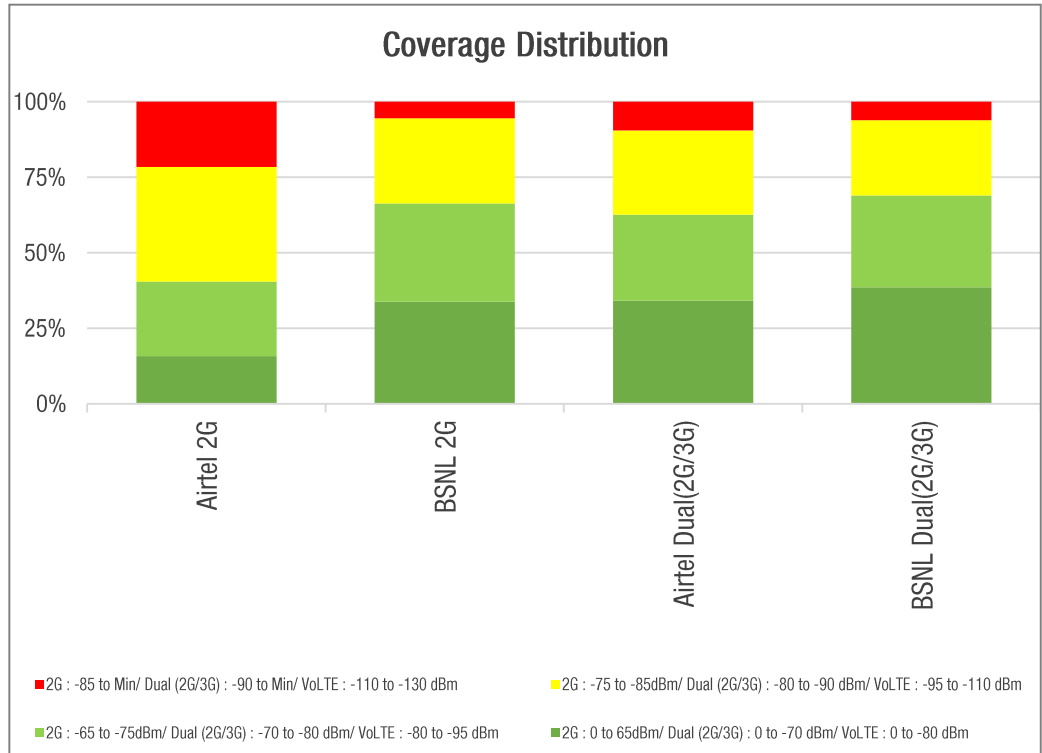
Military Hospital	2G	
	Airtel	BSNL
Download Throughput (Kbps)	109.54	72.45
Upload Throughput (kbps)	142.71	68.71
Web Browsing Delay (sec)	59.71	23.53
Latency (msec)	277	147

Military Hospital	3G		4G
	Airtel	BSNL	Airtel
Download Throughput (Mbps)	3.06	0.87	4.12
Upload Throughput (Mbps)	0.73	0.31	1.17
Web Browsing Delay (sec)	13.69	17.32	9.55
Video Streaming Delay (sec)	5.28	3.27	0.92
Latency (msec)	296	71	322

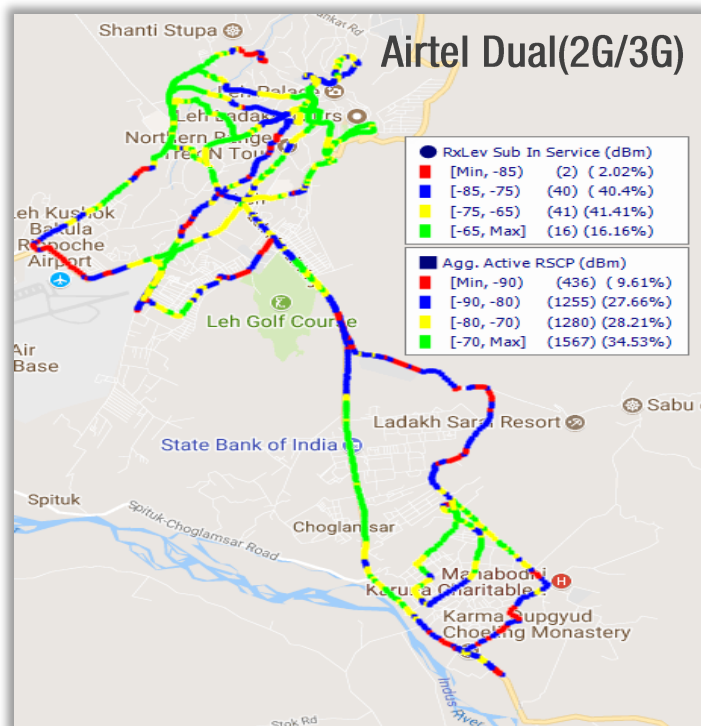
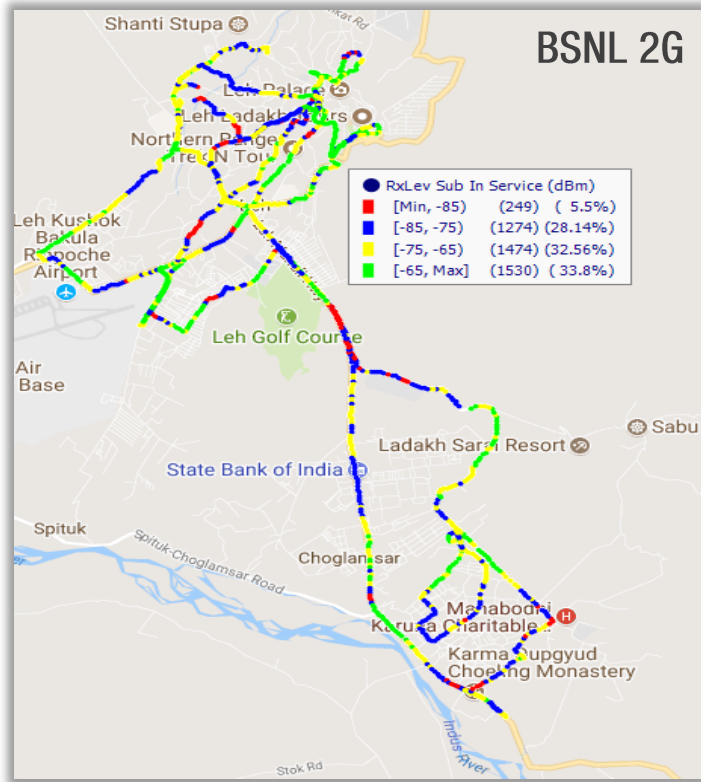
I. Coverage Details

RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call/data session. The Coverage rate of an TSP is calculated on the basis of % of samples in which the Rx level ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110 dBm. The details are as follows.

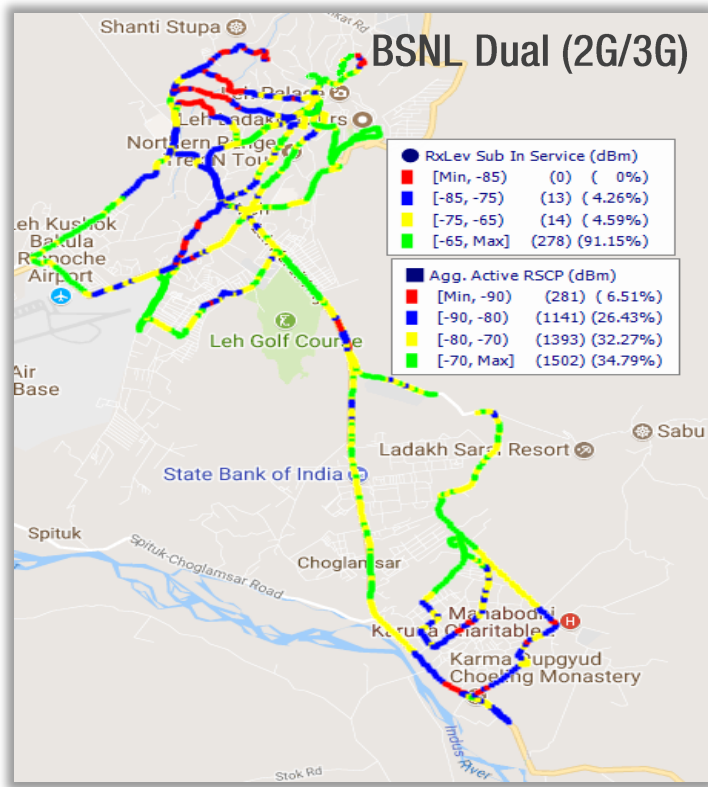
TSP	Coverage Rate
Airtel 2G	78.42%
BSNL 2G	94.50%
Airtel Dual(2G/3G)	90.55%
BSNL Dual(2G/3G)	93.92%



I. Coverage Details (contd.)



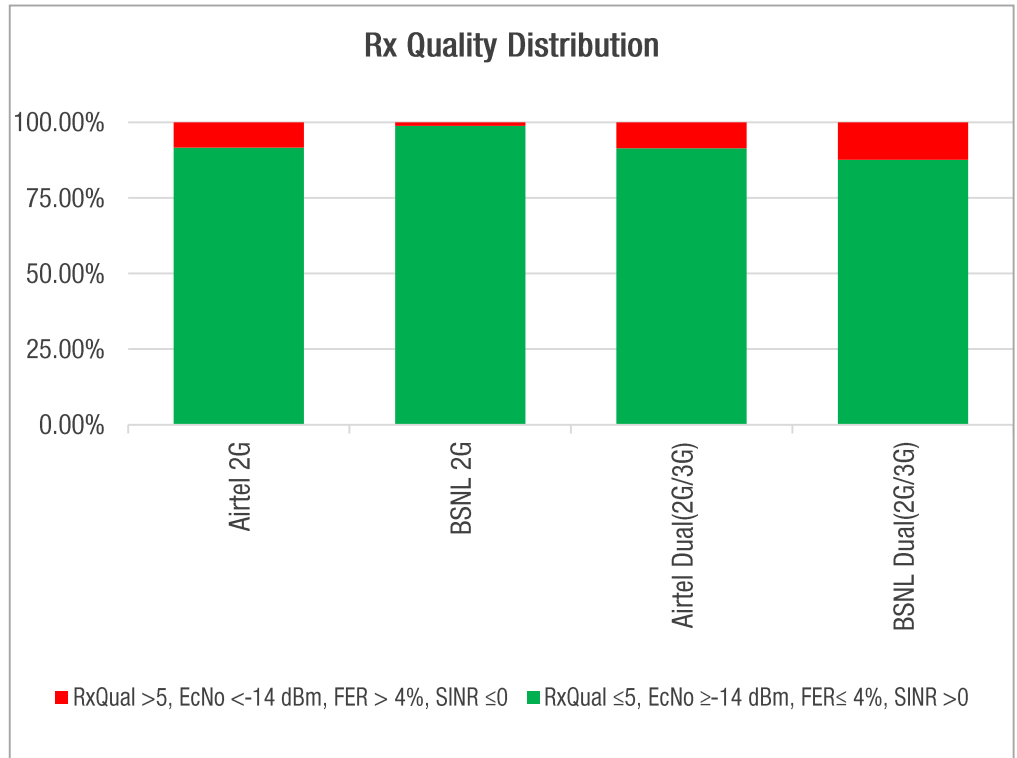
I. Coverage Details (contd.)



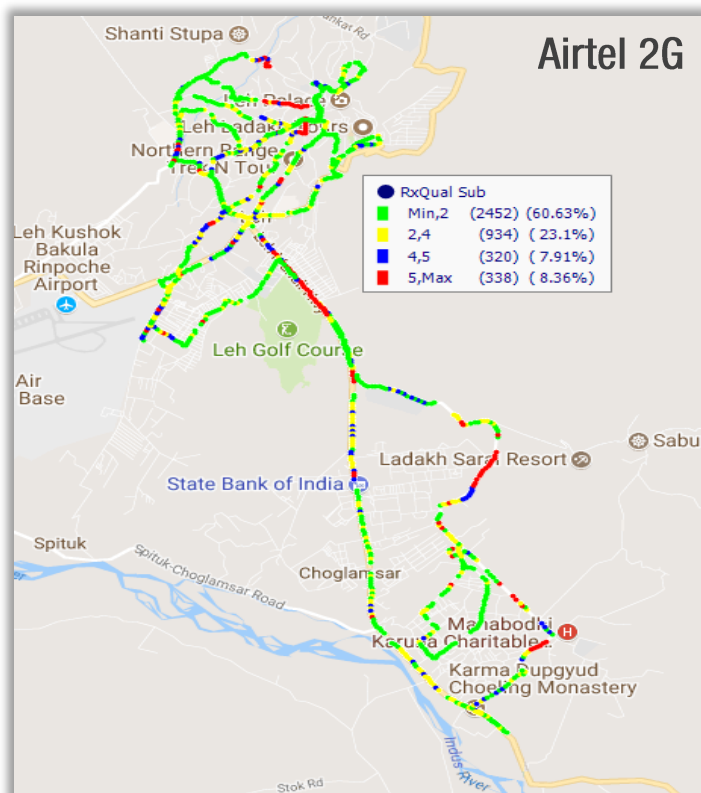
II. Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSPs, FER $\leq 4\%$ for CDMA TSPs and SINR > 0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be $\geq 95\%$.

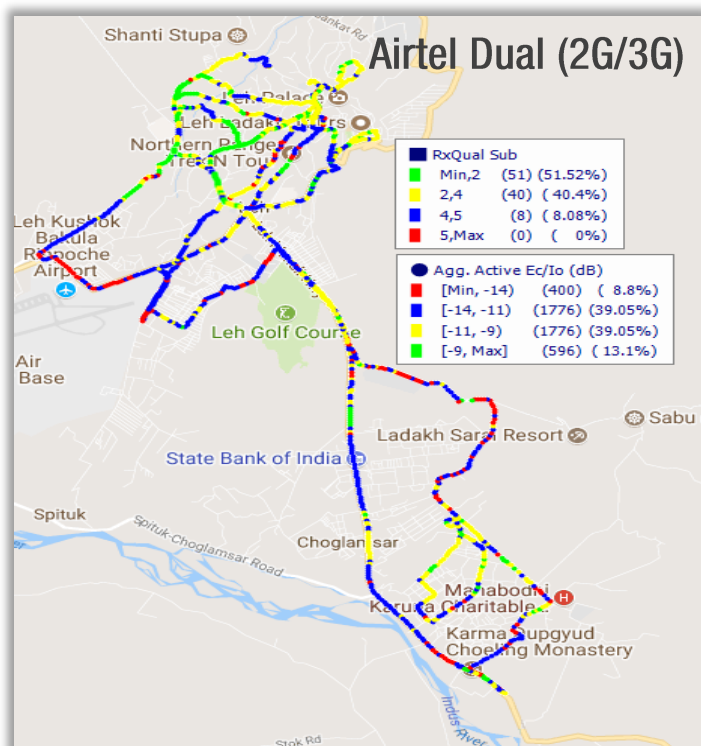
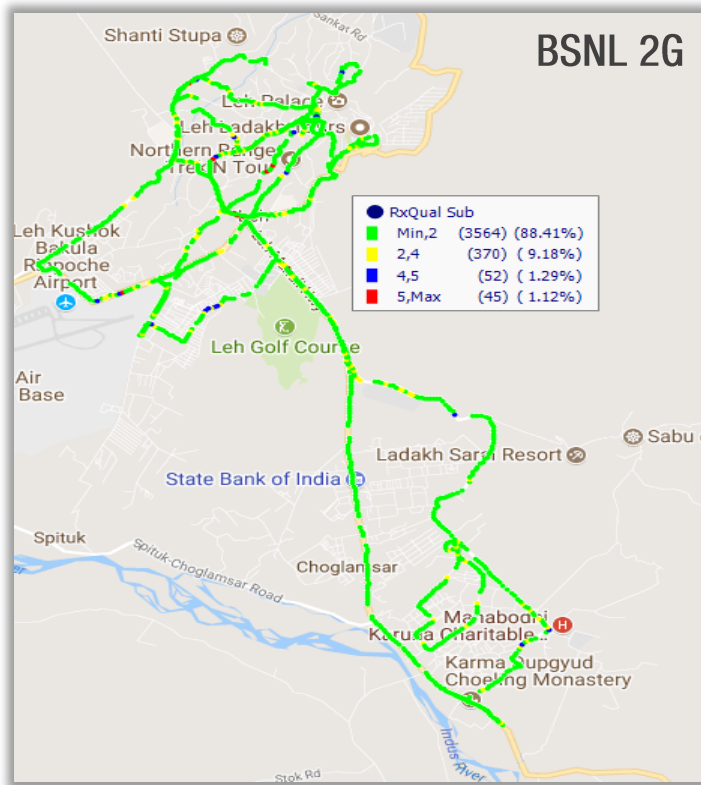
TSP	Rx Quality
Airtel 2G	91.64%
BSNL 2G	98.88%
Airtel Dual(2G/3G)	91.39%
BSNL Dual(2G/3G)	87.62%



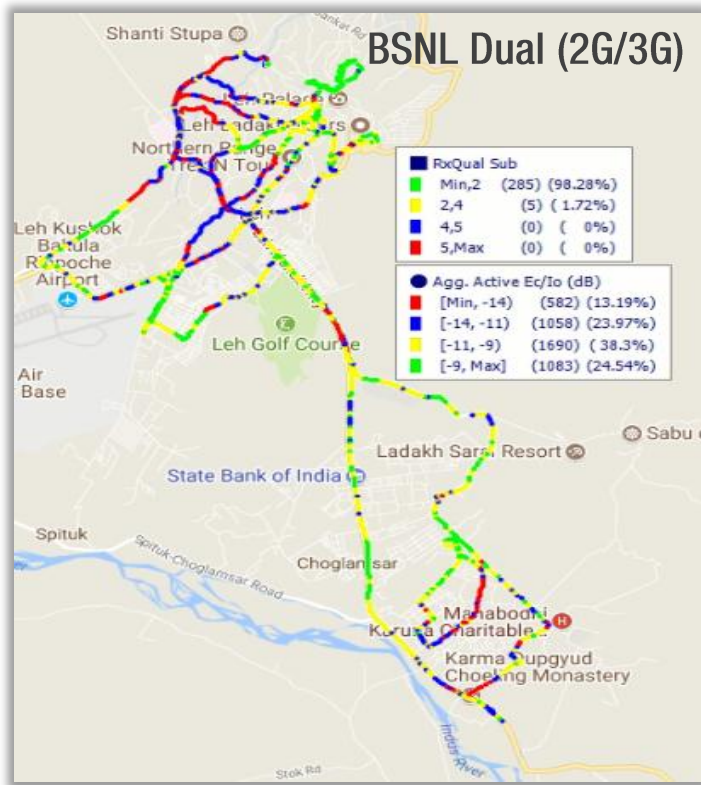
— TSPs not meeting the Benchmark



II. Quality Details (contd.)

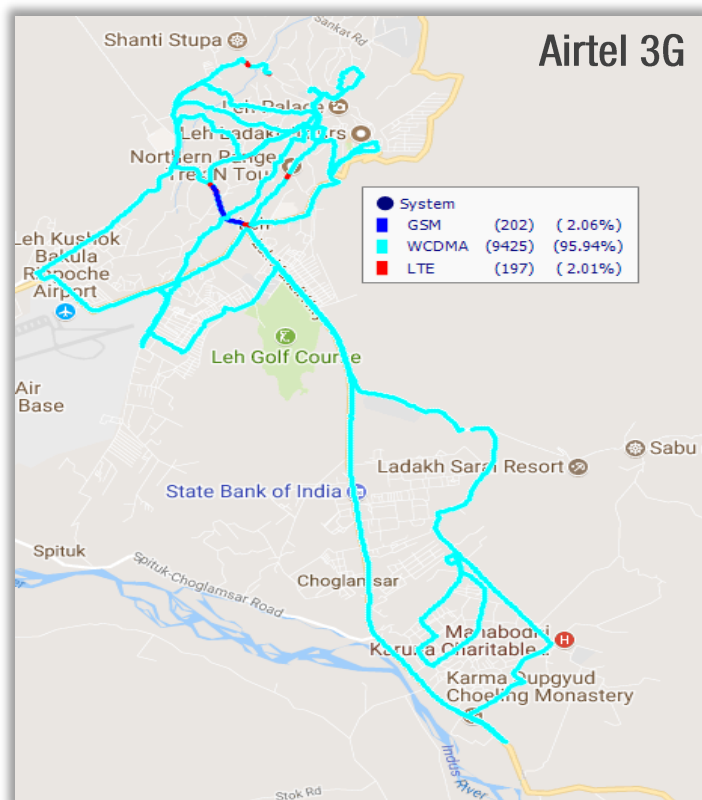
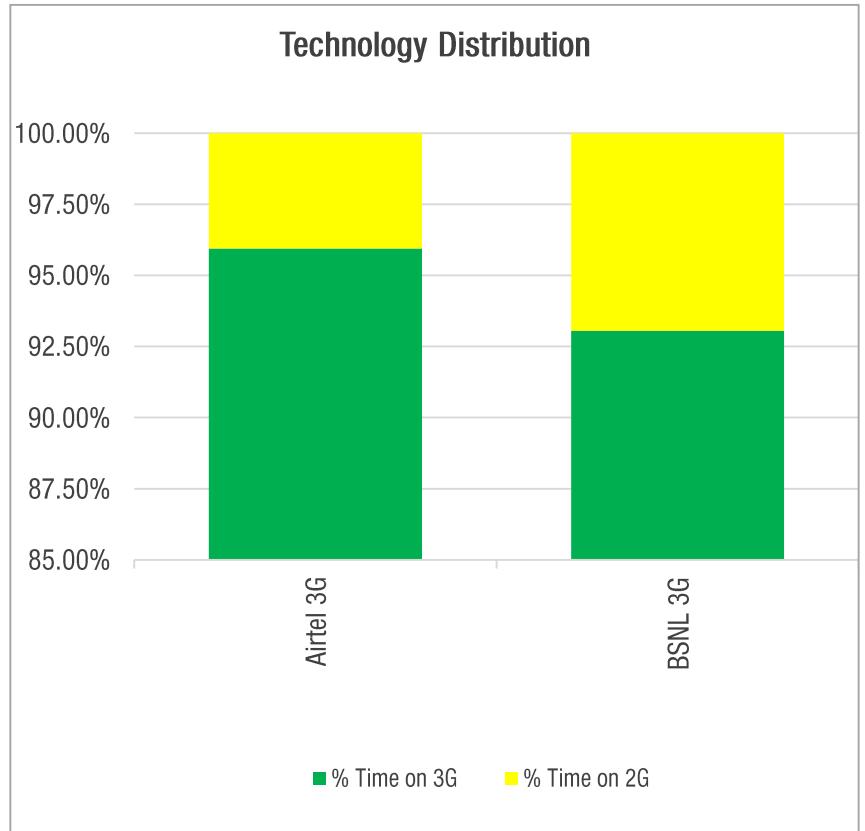


II. Quality Details (contd.)



III. Technology Details

TSP	% Time on 3G
Airtel 3G	95.94%
BSNL 3G	93.05%



II. Quality Details (contd.)

