



INDEPENDENT DRIVE TEST REPORT

For

Srinagar

May 2018

NORTH ZONE

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

The Independent Drive Test has been carried out by M/s PhiMetrics Technologies Pvt. Ltd. on behalf of TRAI in Srinagar City & adjoining areas from 9:00 AM to 9:00 PM; 14th May to 18th May 2018. The drive test covered an drive route of 300 KMs & 7 hotspot over a period of 5 days. Approximately 583 calls were made for each of the 8 networks: four 2G networks, three 3G networks and one LTE network covering 5 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. From **14th May to 18th May 2018** covering various locations in Srinagar City & surrounding region. The performance of **Airtel, BSNL, Idea, Vodafone and Jio** were monitored across various technologies (2G, 3G and 4G). 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.

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

Drive Test Details For Srinagar:

Independent Drive test was conducted for a period of 5days from 14th May to 18th May 2018 in Srinagar 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 300 KMs over a period of 5days from 14th May to 18th May 2018. Approximately 583 calls were made for each of the 8 networks: four 2G (Lock Mode) networks, three 3G (Dual mode) networks and 1 VoLTE network covering 5 unique TSPs.

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

Data Tests: Data Tests were performed at 7 static locations for 3 days on 16th May 2018 to 18th May 2018 ; four 2G (Lock mode) networks, three 3G (Dual mode) networks and Three 4G (Free mode) networks covering 5 unique TSPs were tested.

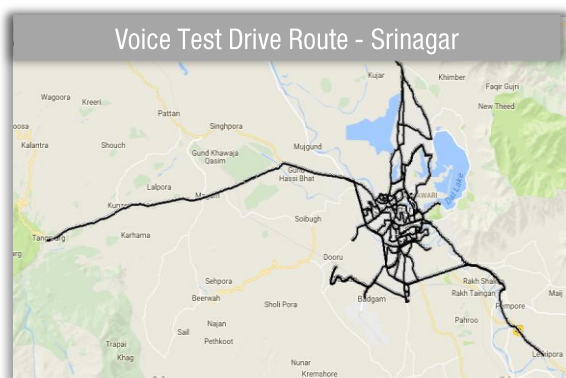
* Outlier values are discarded to calculate the Data KPI's

* 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.

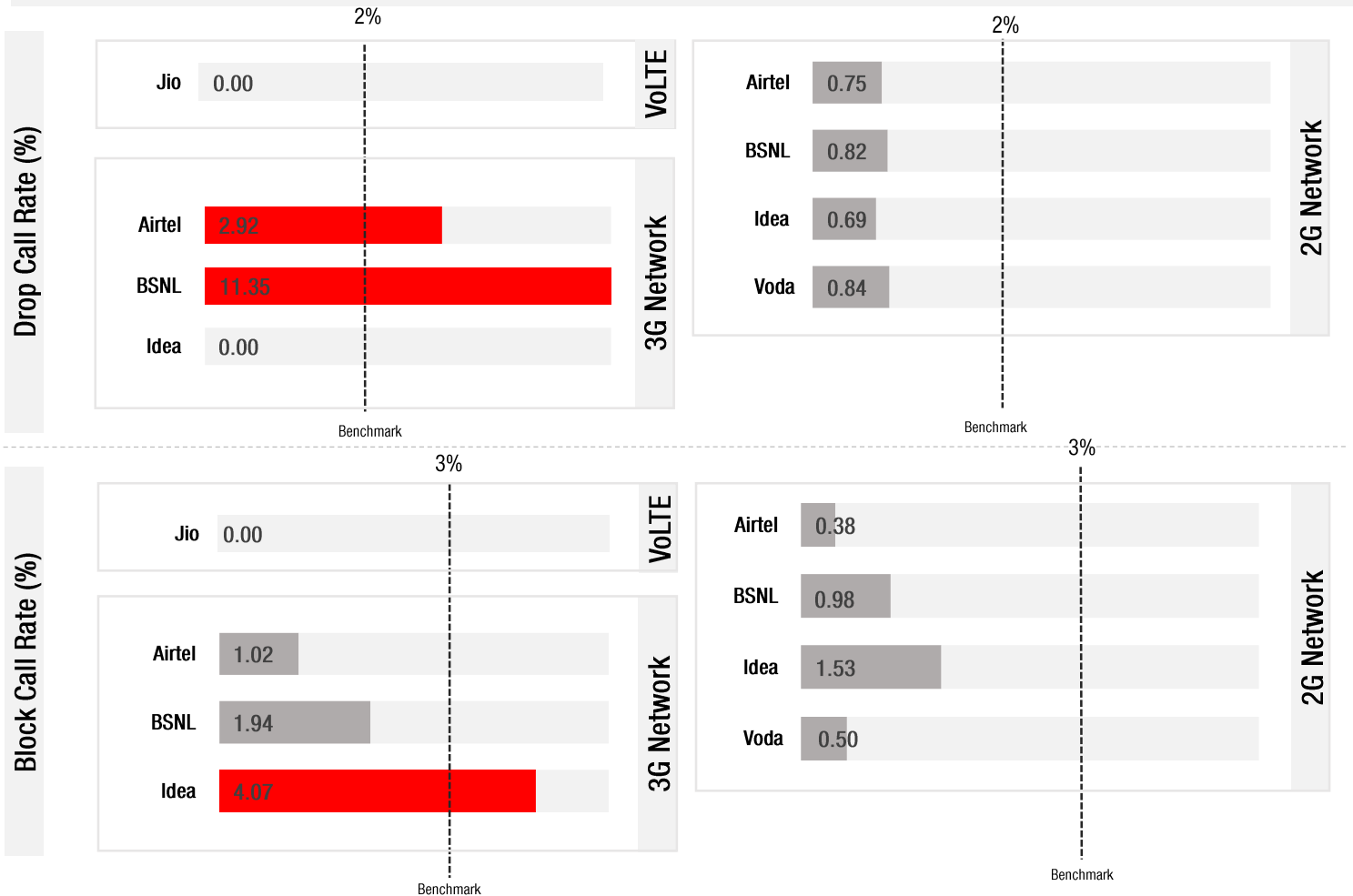
Service	Specifications
Download	2G (Locked) - 500KB, 3G (Dual) - 20 MB, 4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Dual) - 5 MB, 4G (Free) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in, www.flipkart.com and PayTm
Video Streaming	130 sec clip
Latency	32 Bytes on www.google.com



Voice Calls

Key Observations

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



KPI	2G Networks			
	Airtel	BSNL	Idea	Vodafone
SDCCH Congestion%	0.38%	0.00%	0.00%	0.17%
TCH Congestion %	0.00%	0.98%	1.53%	0.33%

KPI	3G Networks*		
	Airtel	BSNL	Idea
SDCCH Congestion%	0.00%	0.00%	0.00%
RRC Congestion%	0.34%	1.45%	1.11%
SDCCH & RRC Congestion%	0.34%	1.45%	1.11%
TCH Congestion %	0.00%	0.00%	0.18%
RAB Congestion %	0.68%	0.49%	2.78%
TCH & RAB Congestion %	0.68%	0.49%	2.96%

* Calls may move to 2G network, hence both technologies are covered

- a) All TSPs have met above 2% QoS benchmark of Drop Call Rate (DCR%). Except Airtel 3G & BSNL 3G.
- b) Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's except Idea 3G.

Not meeting Benchmark

Voice Calls

Key Observations

Coverage

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

TSPs	2G			
	Airtel	BSNL	Idea	Vodafone
Coverage%	93.54%	94.20%	77.93%	95.66%

b) Percentage of coverage samples for 2G \geq -85 dBm, 3G \geq -90 dBm & LTE \geq -110 dBm.

TSPs	3G			VoLTE
	Airtel	BSNL	Idea	Jio
Coverage %	96.74%	83.04%	90.95%	99.48%

c) Percentage of time spent on 3G network:

TSPs	3G		
	Airtel	BSNL	Idea
Time Spent on 3G%	95.59%	86.55%	86.24%

d) Percentage of RLT \geq 48:

TSPs	2G			
	Airtel	BSNL	Idea	Vodafone
%RLT \geq 48	0.00%	6.73%	0.00%	0.00%

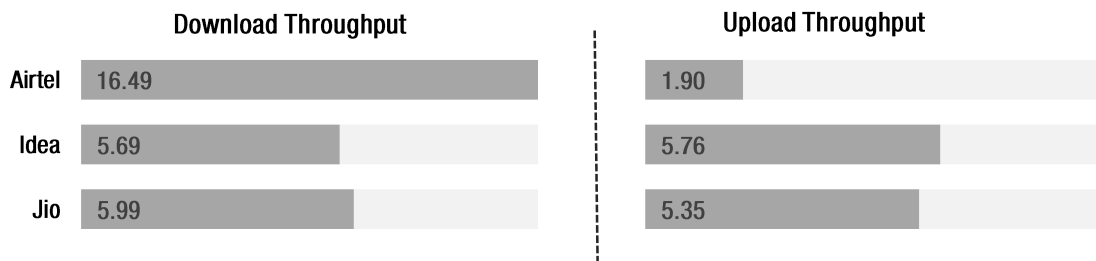
Data Services

Key Observations

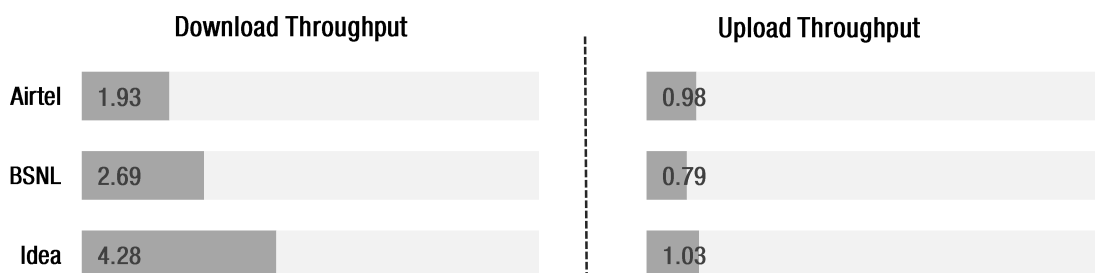
Data was tested at 5 locations viz University of Kashmir, Jamia Masjid, Parimpora Bus Stand, Lal Chowk, Civil Secretariat & Zero Bridge. Following services were tested: Data Download/Upload, Latency (www.google.com), Video Streaming (YouTube) and Web browsing (Flipkart, Amazon, PayTm)

Data Download and Upload Performance (Mbps)

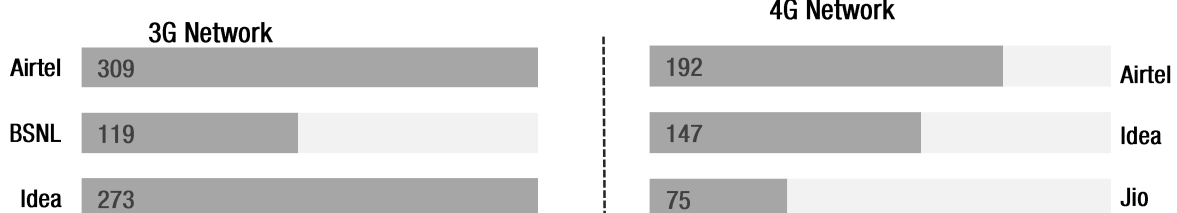
4G Network:



3G Network:



Latency (msec)

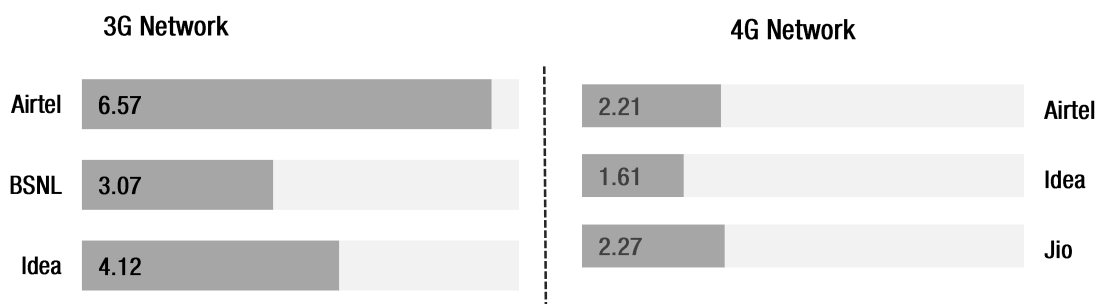


Data Services

Key Observations

Video Streaming Performance (130 sec YouTube video sample sizes)

Streaming (sec)

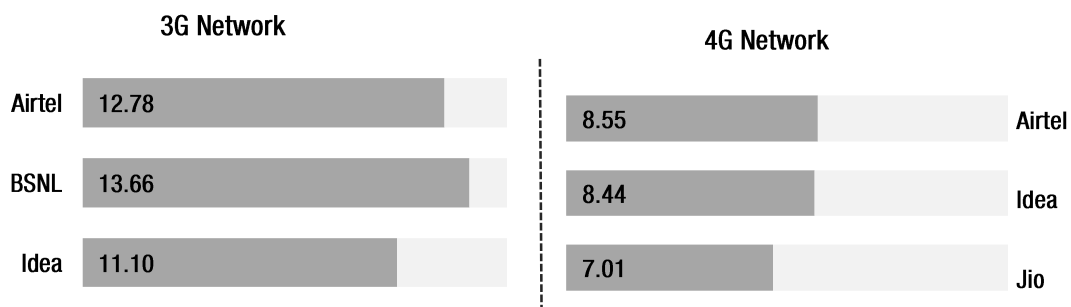


Streaming Delay further broken into 2 parameters which form the end-user perception to assess consistency on Video streaming.

- Initial Start time
- Interruption time while playing the video.

Video Streaming	3G			4G		
	Airtel	BSNL	Idea	Airtel	Idea	Jio
Avg. Initial Start Time (sec)	3.31	2.64	1.65	2.21	1.61	2.27
Avg. Interruption Time (sec)	3.26	0.43	2.47			

Web Page Download Time (sec)



Web browsing experience is the average time taken to fully load the websites tested.

Summary

City Level Summary

Voice Call	2G			
	Airtel	BSNL	Idea	Vodafone
Call Attempt	532	613	587	598
Blocked Call Rate (%)	0.4%	1.0%	1.5%	0.5%
CSSR% (Accessibility)	99.6%	99.0%	98.5%	99.5%
Drop Call Rate (%)	0.8%	0.8%	0.7%	0.8%
Mobility HOSR (%)	98.9%	99.1%	99.5%	99.6%
Rx Quality (%)	95.8%	99.2%	98.9%	98.8%

Voice Call	3G			VoLTE
	Airtel	BSNL	Idea	Jio
Call Attempt	588	620	541	599
Blocked Call Rate (%)	1.0%	1.9%	4.1%	0.0%
CSSR% (Accessibility)	99.0%	98.1%	95.9%	100.0%
Drop Call Rate (%)	2.9%	11.3%	0.0%	0.0%
Mobility HOSR (%)	99.9%	99.7%	99.9%	100.0%
Rx Quality (%)	92.2%	98.0%	97.9%	84.8%

Summary

City Level Summary(contd.)

Data Services	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	129.09	111.89	102.00	90.88
Upload Throughput (kbps)	140.29	140.50	144.16	122.42
Web Browsing Delay (sec)	25.02	25.58	24.81	26.76
Latency (msec)	340	283	389	

Data Services	3G			4G		
	Airtel	BSNL	Idea	Airtel	Idea	Jio
Download Throughput (Mbps)	1.93	2.69	4.28	16.49	5.69	5.99
Upload Throughput (Mbps)	0.98	0.79	1.03	1.90	5.76	5.35
Web Browsing Delay (sec)	12.78	13.66	11.10	8.55	8.44	7.01
Video Streaming Delay (sec)	5.22	3.07	1.64	2.21	1.61	2.27
Latency (msec)	309	119	273	192	147	75

Summary

City Level Summary(contd.)

Civil Secretariat	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	110.97	33.29	118.63	95.46
Upload Throughput (kbps)	89.95	39.98	215.55	135.42
Web Browsing Delay (sec)	27.91	29.43	28.13	17.53
Latency (msec)	371	225	326	-

Civil Secretariat	3G			4G		
	Airtel	BSNL	Idea	Airtel	Idea	Jio
Download Throughput (Mbps)	0.49	1.15	7.04	4.71	6.63	1.20
Upload Throughput (Mbps)	0.36	0.13	0.90	3.91	5.15	2.29
Web Browsing Delay (sec)	18.40	16.83	8.95	9.97	7.18	7.01
Video Streaming Delay (sec)	14.09	3.78	1.34	6.89	1.12	4.28
Latency (msec)	313	110	236	751	137	72

Dal Lake Gate	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	106.57	158.94	64.64	90.19
Upload Throughput (kbps)	170.88	222.66	61.09	143.52
Web Browsing Delay (sec)	24.23	26.35	23.84	27.45
Latency (msec)	281	122	560	-

Dal Lake Gate	3G			4G		
	Airtel	BSNL	Idea	Airtel	Idea	Jio
Download Throughput (Mbps)	0.72	1.83	1.83	15.94	7.59	1.91
Upload Throughput (Mbps)	1.08	0.13	0.13	0.32	5.54	6.03
Web Browsing Delay (sec)	15.42	13.45	13.45	11.57	7.61	9.75
Video Streaming Delay (sec)	14.26	4.30	1.34	1.76	4.35	3.58
Latency (msec)	262	284	284	158	138	78

Summary

City Level Summary(contd.)

Jamia Masjid	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	69.15	163.79	90.93	94.94
Upload Throughput (kbps)	61.20	181.97	218.07	132.03
Web Browsing Delay (sec)	18.64	23.72	29.60	24.06
Latency (msec)	507	473	415	-

Jamia Masjid	3G			4G		
	Airtel	BSNL	Idea	Airtel	Idea	Jio
Download Throughput (Mbps)	2.14	0.69	2.15	13.46	2.99	10.96
Upload Throughput (Mbps)	1.43	0.65	0.45	0.73	3.95	5.03
Web Browsing Delay (sec)	10.22	17.96	16.21	8.02	10.75	5.41
Video Streaming Delay (sec)	2.78	3.68	1.57	1.75	10.92	0.94
Latency (msec)	265	127	309	243	173	82

Lal Chowk	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	167.16	60.79	125.72	93.43
Upload Throughput (kbps)	160.85	150.08	112.42	122.61
Web Browsing Delay (sec)	21.29	16.91	19.68	28.02
Latency (msec)	208	440	283	-

Lal Chowk	3G			4G		
	Airtel	BSNL	Idea	Airtel	Idea	Jio
Download Throughput (Mbps)	1.82	4.76	3.54	16.79	2.89	6.45
Upload Throughput (Mbps)	0.86	0.98	1.56	2.07	5.51	6.82
Web Browsing Delay (sec)	13.18	9.14	9.09	6.61	7.78	5.73
Video Streaming Delay (sec)	5.82	1.13	3.93	2.57	1.09	1.27
Latency (msec)	227	75	238	142	120	69

Summary

City Level Summary(contd.)

Parimpora Bus Stand	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	100.02	67.21	132.97	113.79
Upload Throughput (kbps)	100.84	96.88	159.18	118.93
Web Browsing Delay (sec)	28.68	24.41	28.72	29.68
Latency (msec)	394	204	334	-

Parimpora Bus Stand	3G			4G		
	Airtel	BSNL	Idea	Airtel	Idea	Jio
Download Throughput (Mbps)	2.72	1.27	3.95	23.03	9.22	5.58
Upload Throughput (Mbps)	1.26	0.39	0.49	3.04	7.84	6.40
Web Browsing Delay (sec)	7.79	12.55	12.02	7.69	8.58	6.23
Video Streaming Delay (sec)	1.74	3.13	0.84	3.11	1.66	1.97
Latency (msec)	306	91	350	177	170	77

University of Kashmir	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	167.88	105.31	86.83	68.38
Upload Throughput (kbps)	297.45	147.12	96.88	105.44
Web Browsing Delay (sec)	25.74	30.15	26.10	34.49
Latency (msec)	249	349	391	-

University of Kashmir	3G			4G		
	Airtel	BSNL	Idea	Airtel	Idea	Jio
Download Throughput (Mbps)	1.28	0.68	6.21	16.42	6.69	2.06
Upload Throughput (Mbps)	0.41	0.43	3.16	2.57	5.68	3.46
Web Browsing Delay (sec)	15.35	14.76	8.70	9.09	7.66	10.31
Video Streaming Delay (sec)	19.68	4.51	1.00	1.46	2.00	2.97
Latency (msec)	388	138	282	130	161	80

Summary

City Level Summary(contd.)

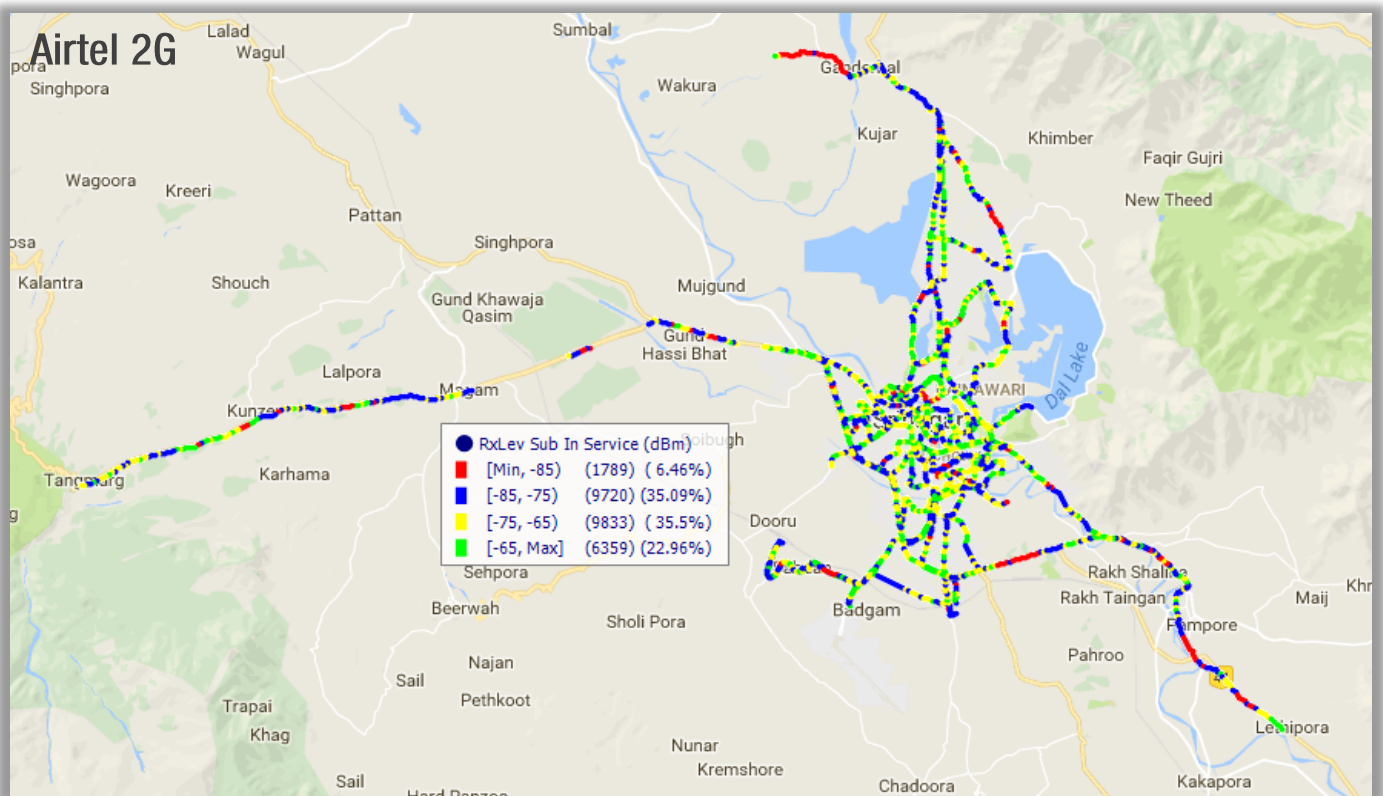
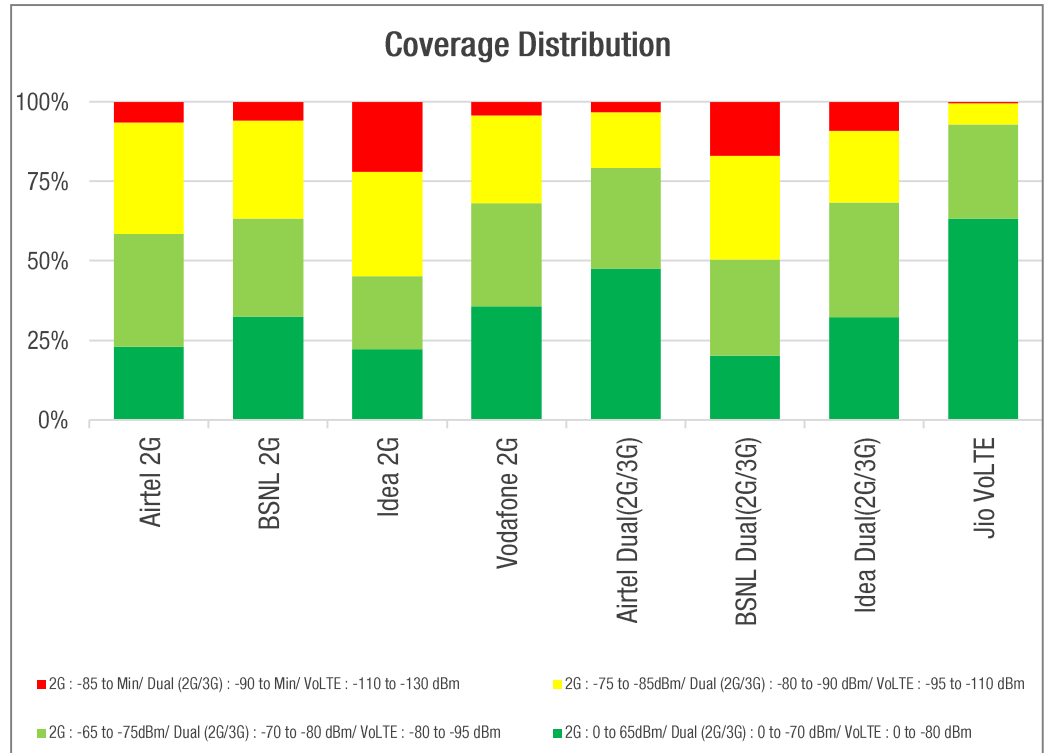
Zero Bridge	2G			
	Airtel	BSNL	Idea	Vodafone
Download Throughput (Kbps)	166.89	193.93	94.24	79.99
Upload Throughput (kbps)	111.08	144.79	145.92	98.99
Web Browsing Delay (sec)	27.21	26.85	16.11	25.17
Latency (msec)	352	144	429	-

Zero Bridge	3G			4G		
	Airtel	BSNL	Idea	Airtel	Idea	Jio
Download Throughput (Mbps)	3.92	8.46	5.23	17.20	3.81	13.76
Upload Throughput (Mbps)	1.47	2.81	0.53	0.90	6.66	7.43
Web Browsing Delay (sec)	10.18	10.61	10.72	7.25	9.62	4.49
Video Streaming Delay (sec)	1.86	0.97	1.20	0.78	1.99	0.87
Latency (msec)	393	45	192	156	143	66

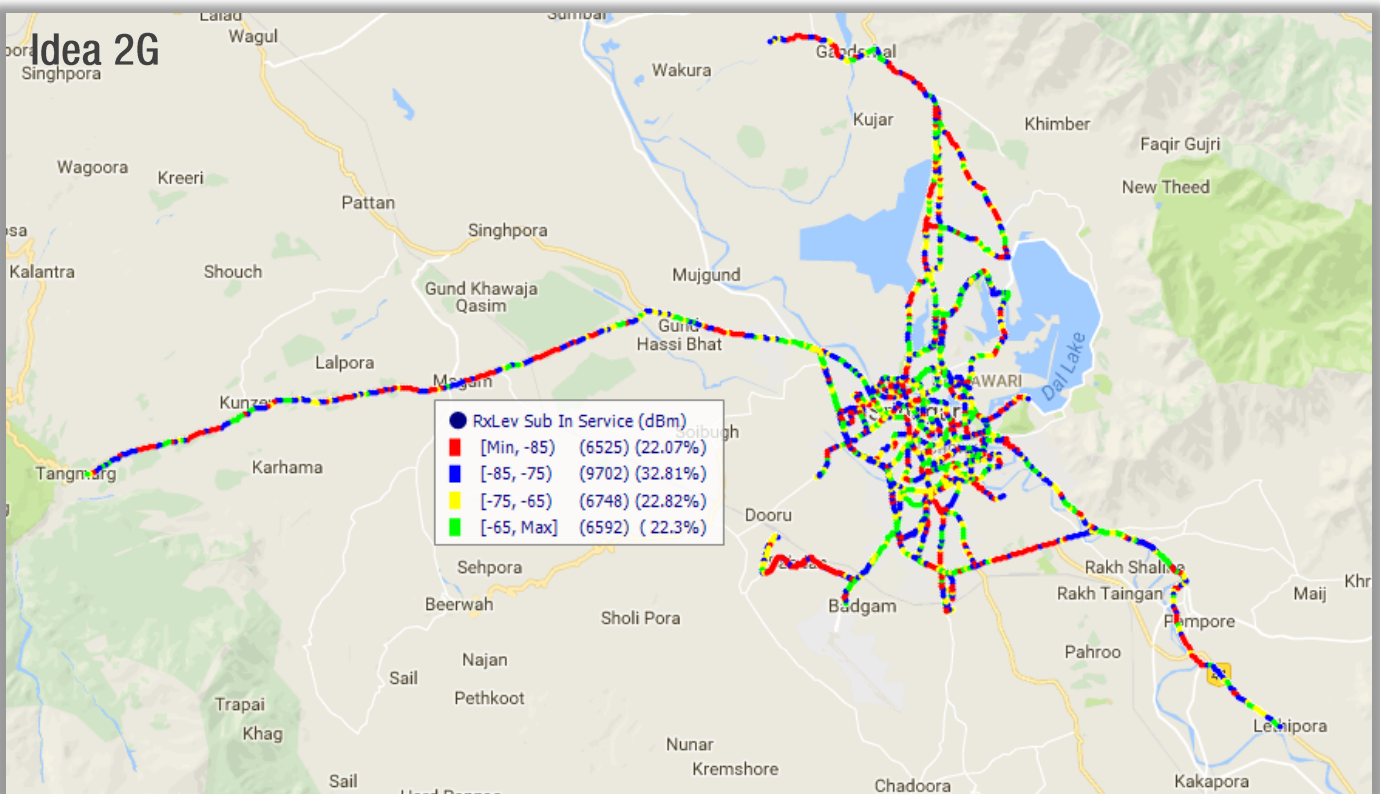
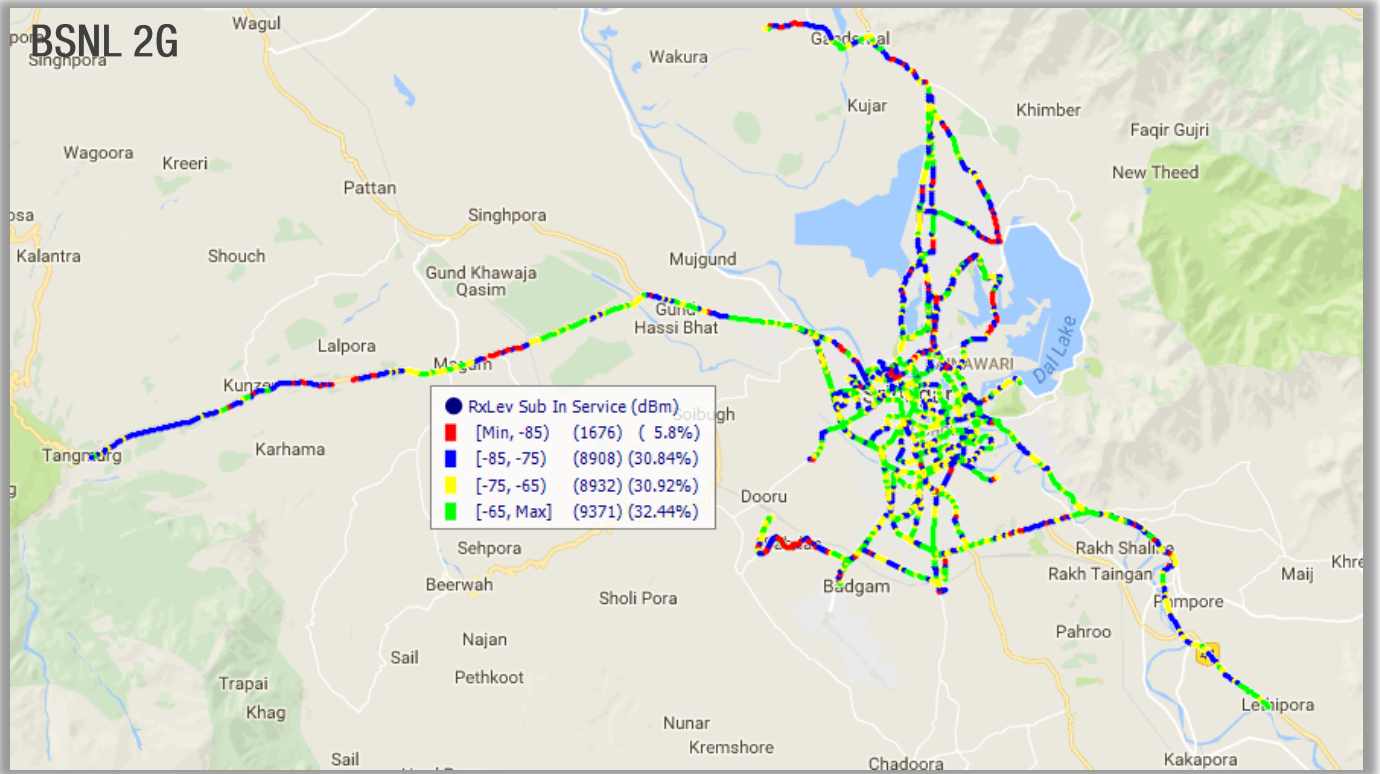
I. Coverage Details

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.

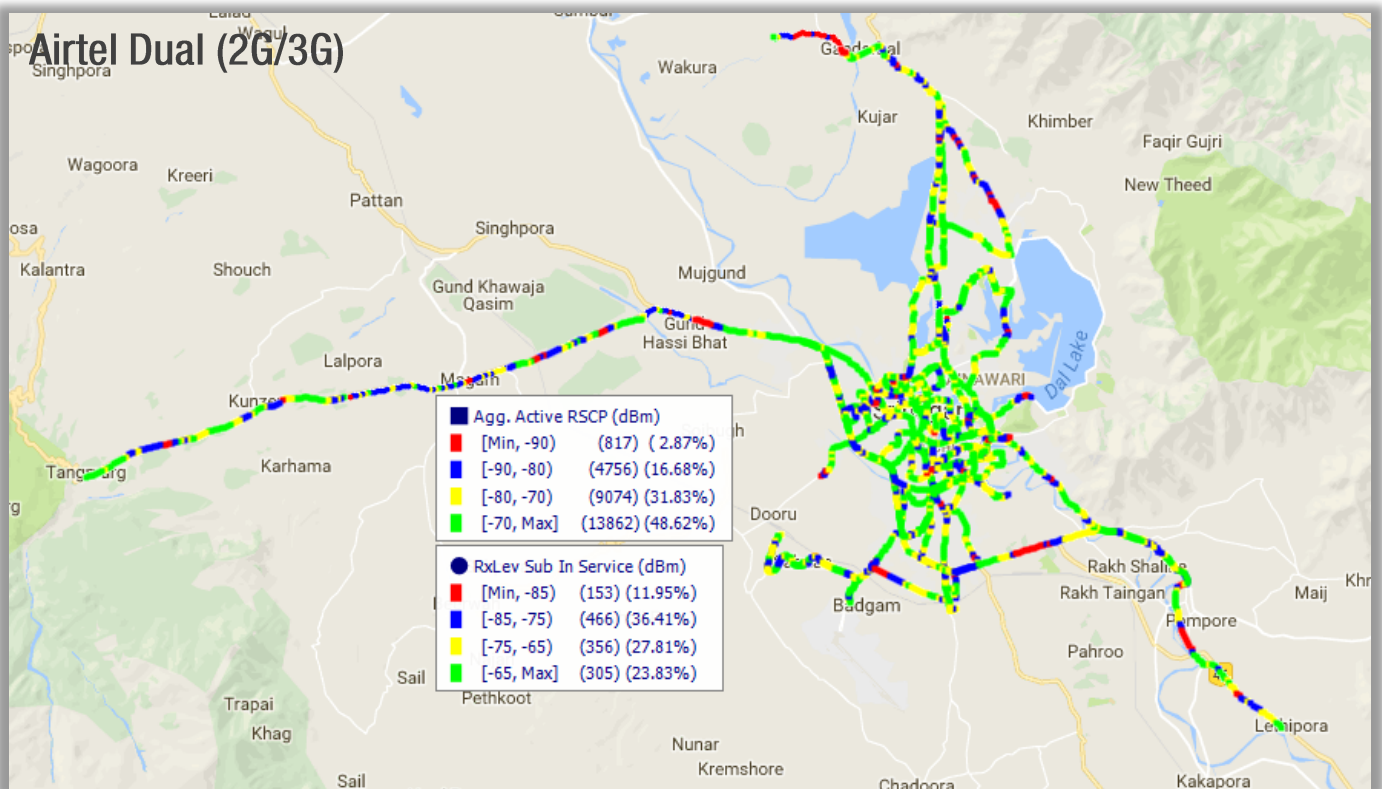
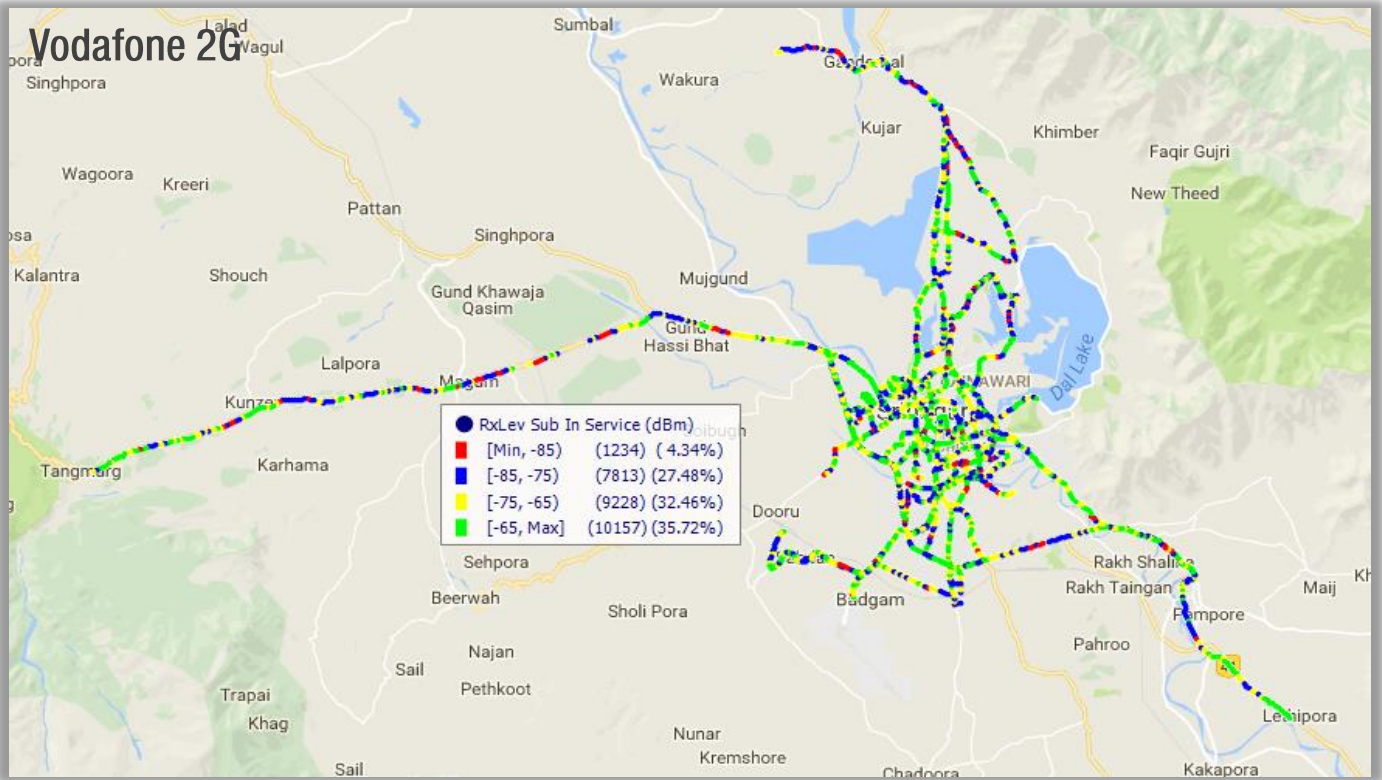
TSP	Coverage Rate
Airtel 2G	93.54%
BSNL 2G	94.20%
Idea 2G	77.93%
Vodafone 2G	95.66%
Airtel Dual(2G/3G)	96.74%
BSNL Dual(2G/3G)	83.04%
Idea Dual(2G/3G)	90.95%
Jio VoLTE	99.48%



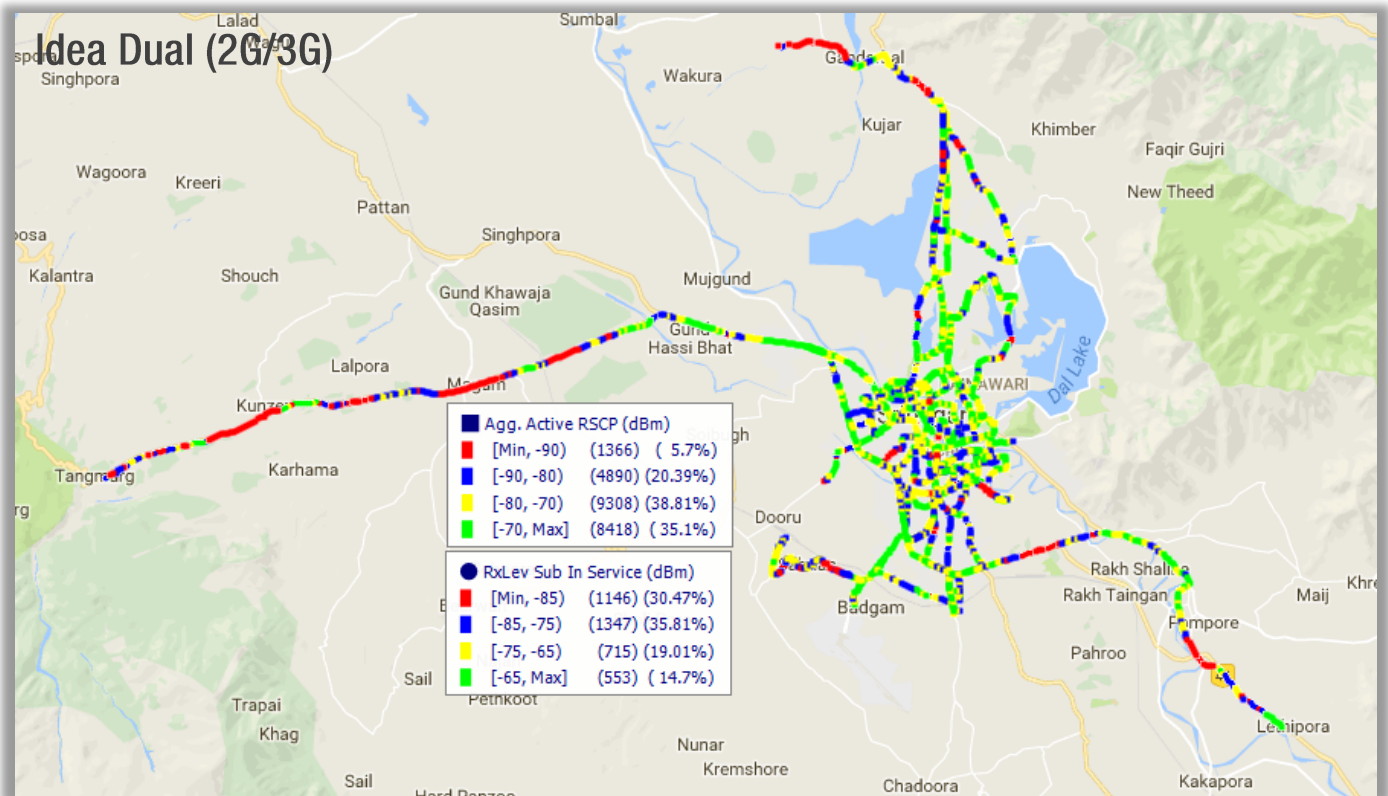
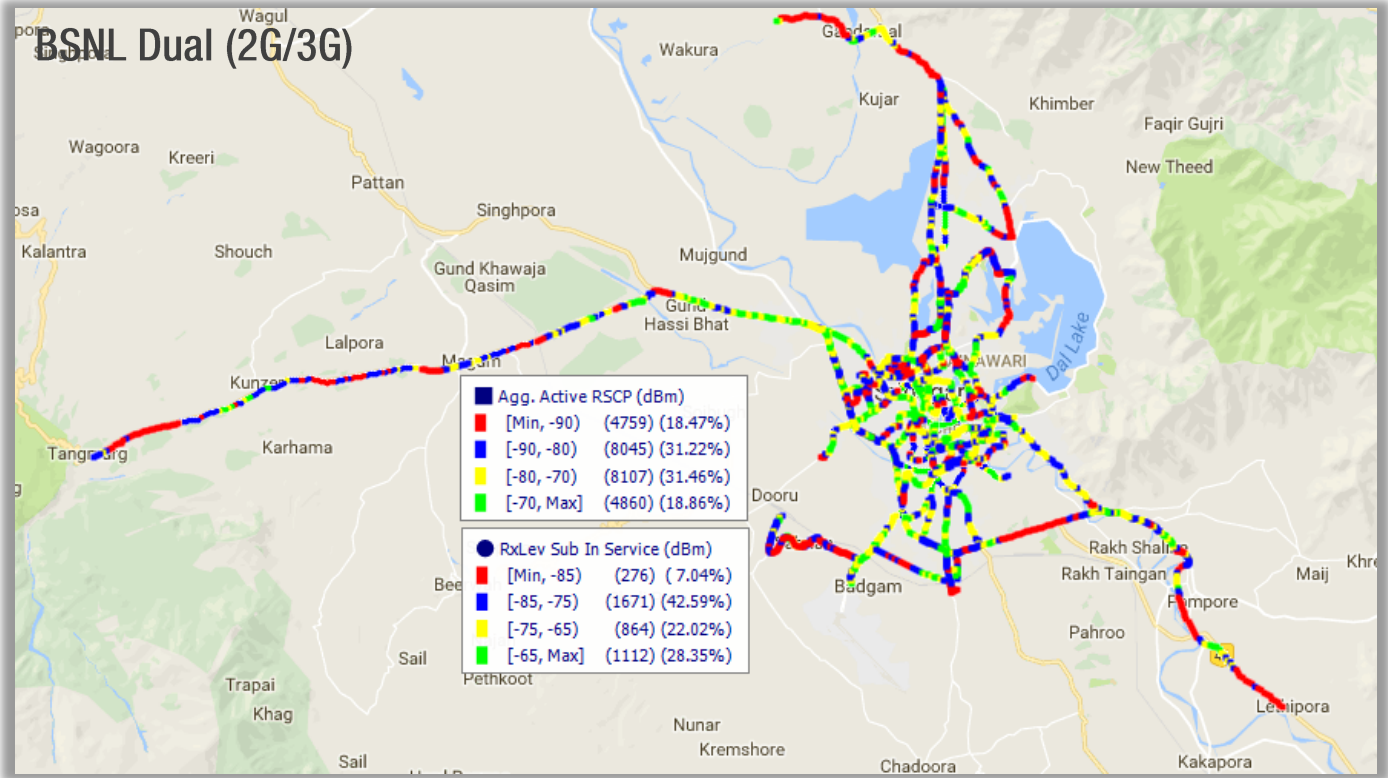
I. Coverage Details (contd.)



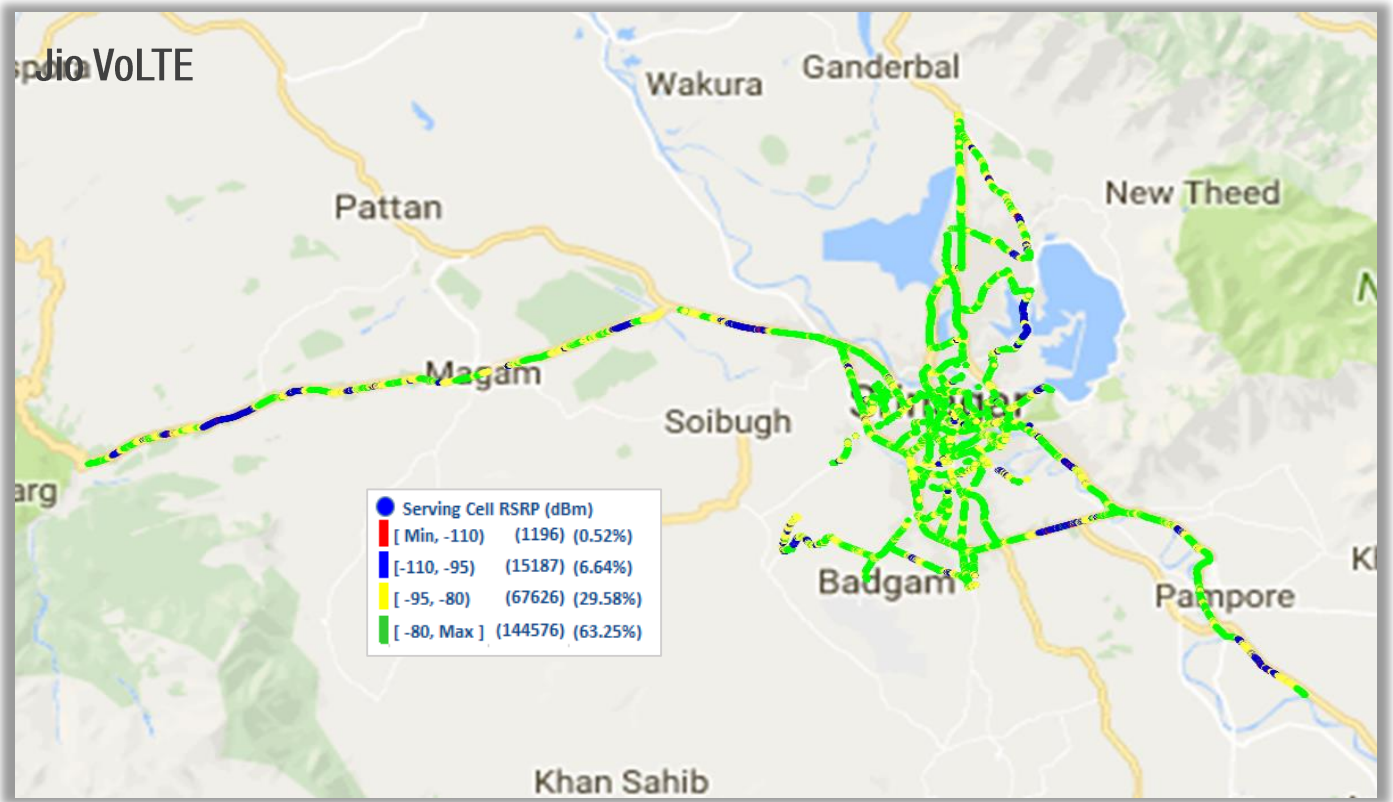
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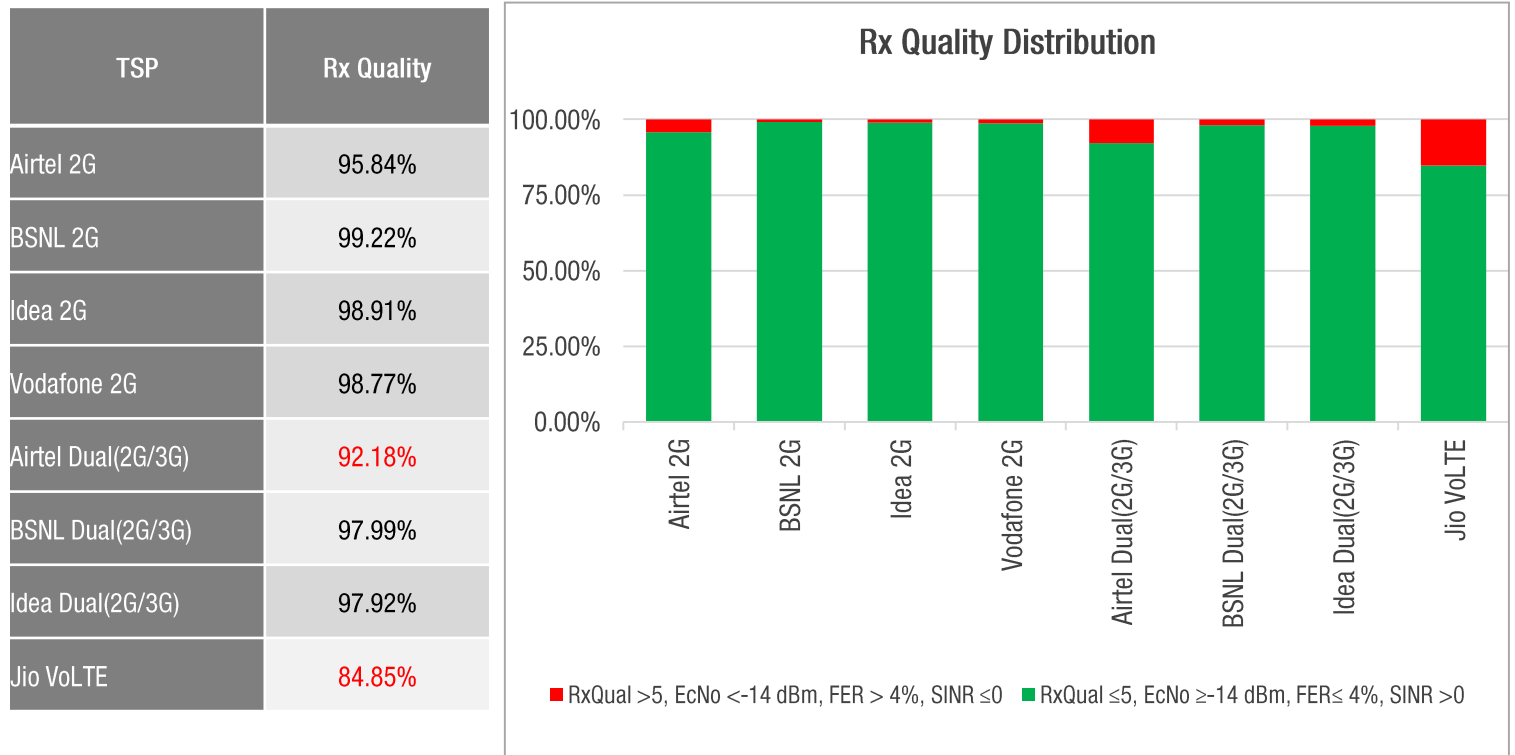


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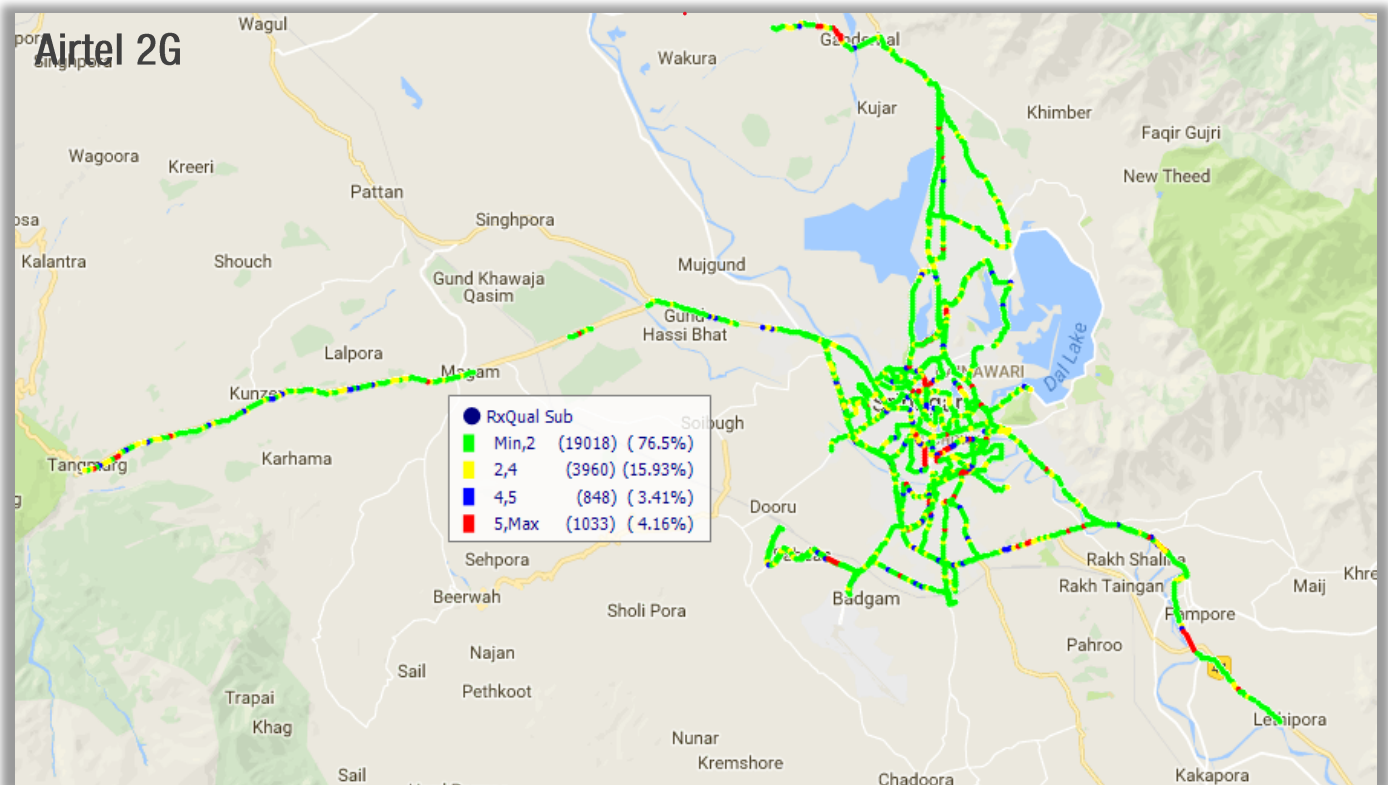


II. Quality Details

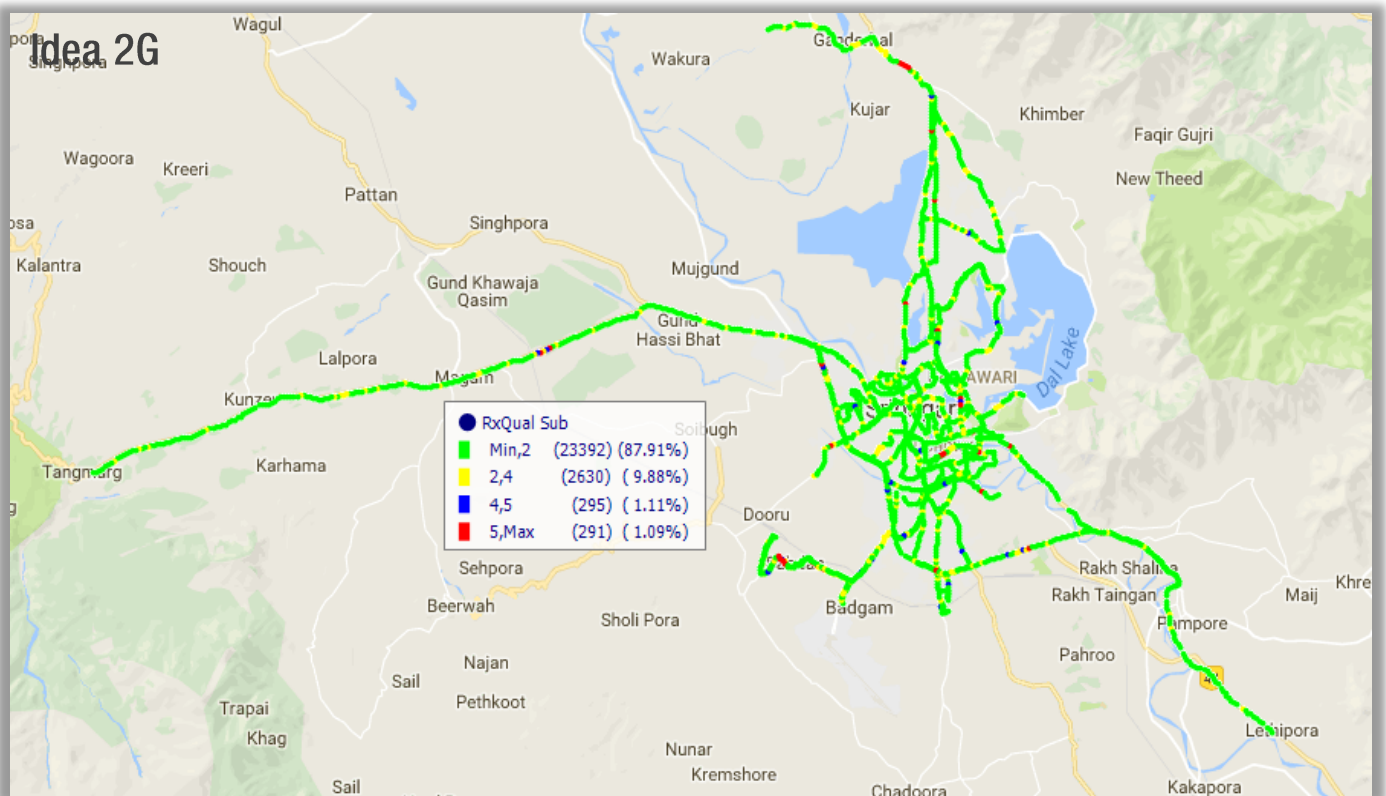
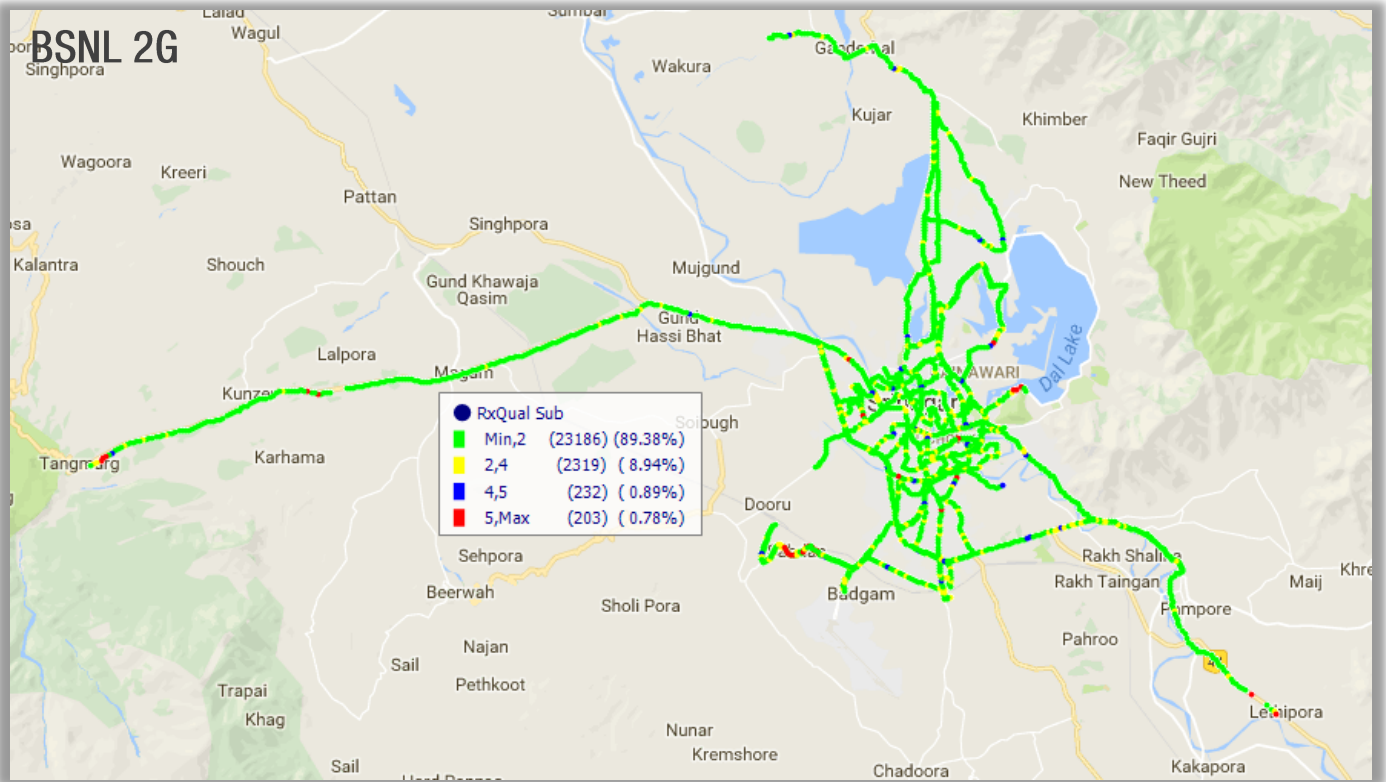
For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP sand SINR > 0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be $\geq 95\%$.



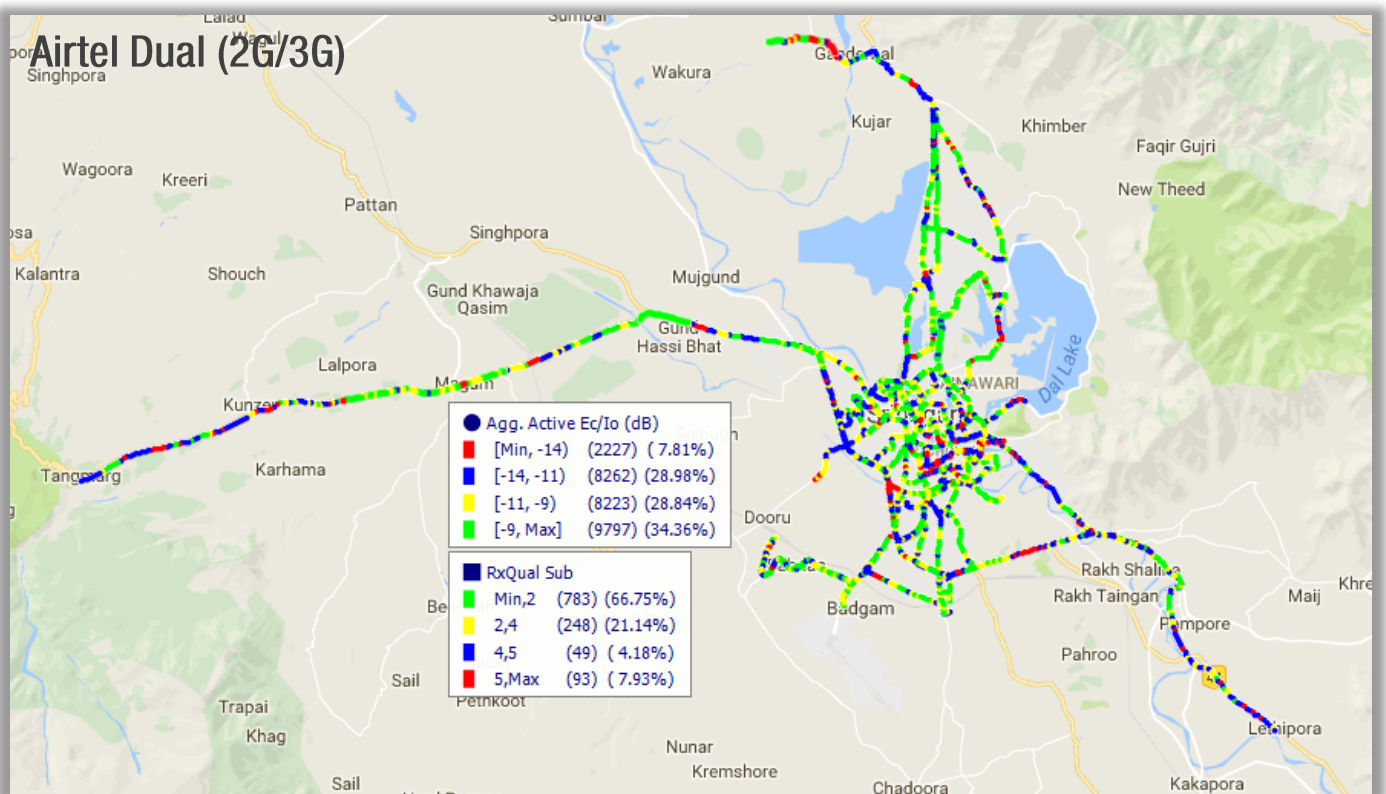
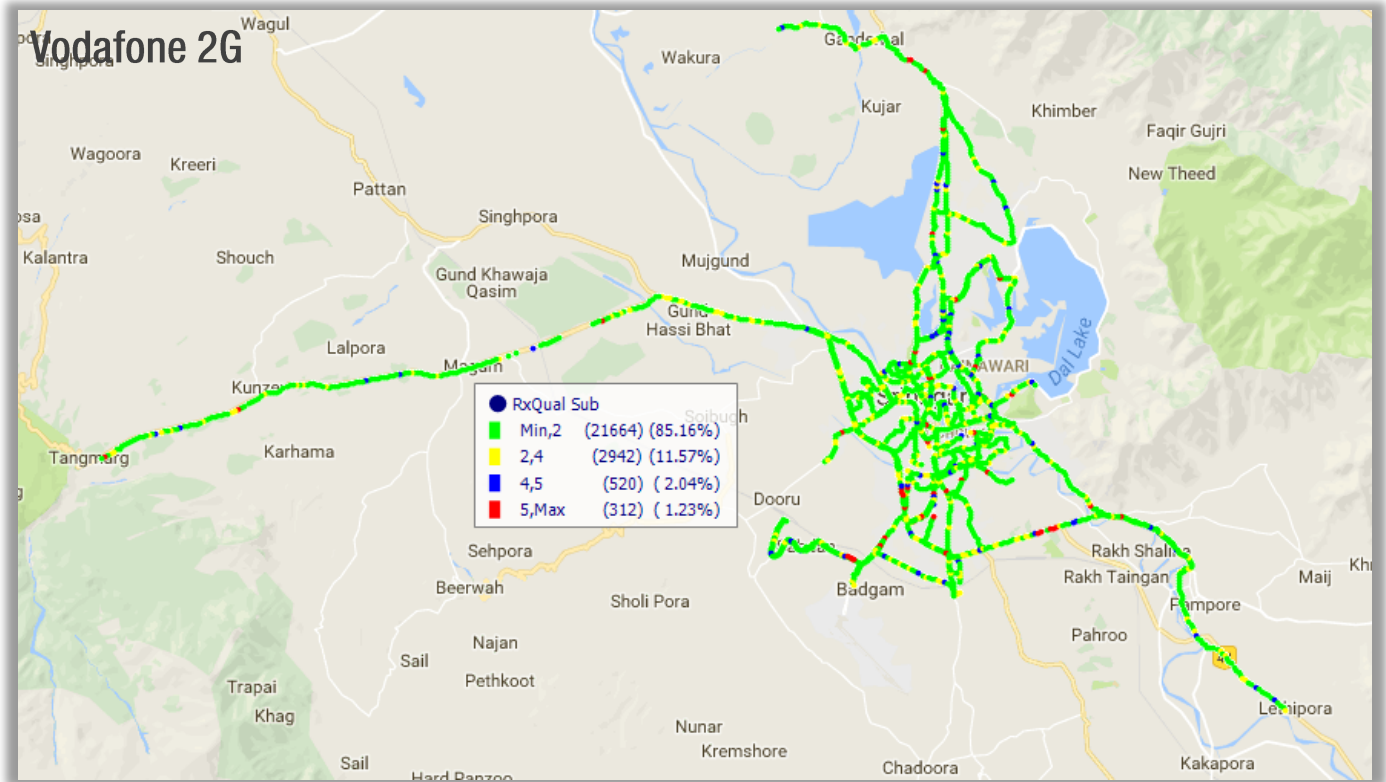
— TSPs not meeting the Benchmark



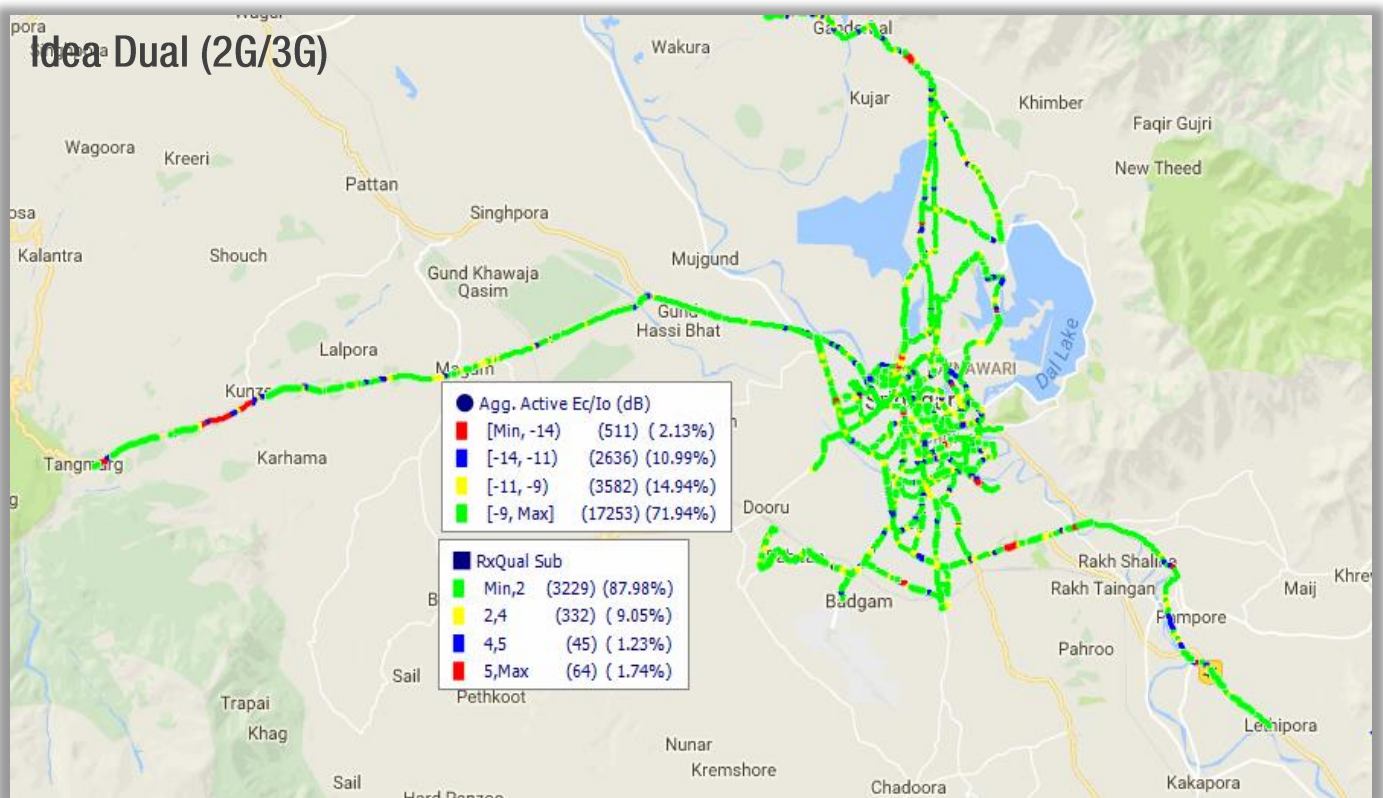
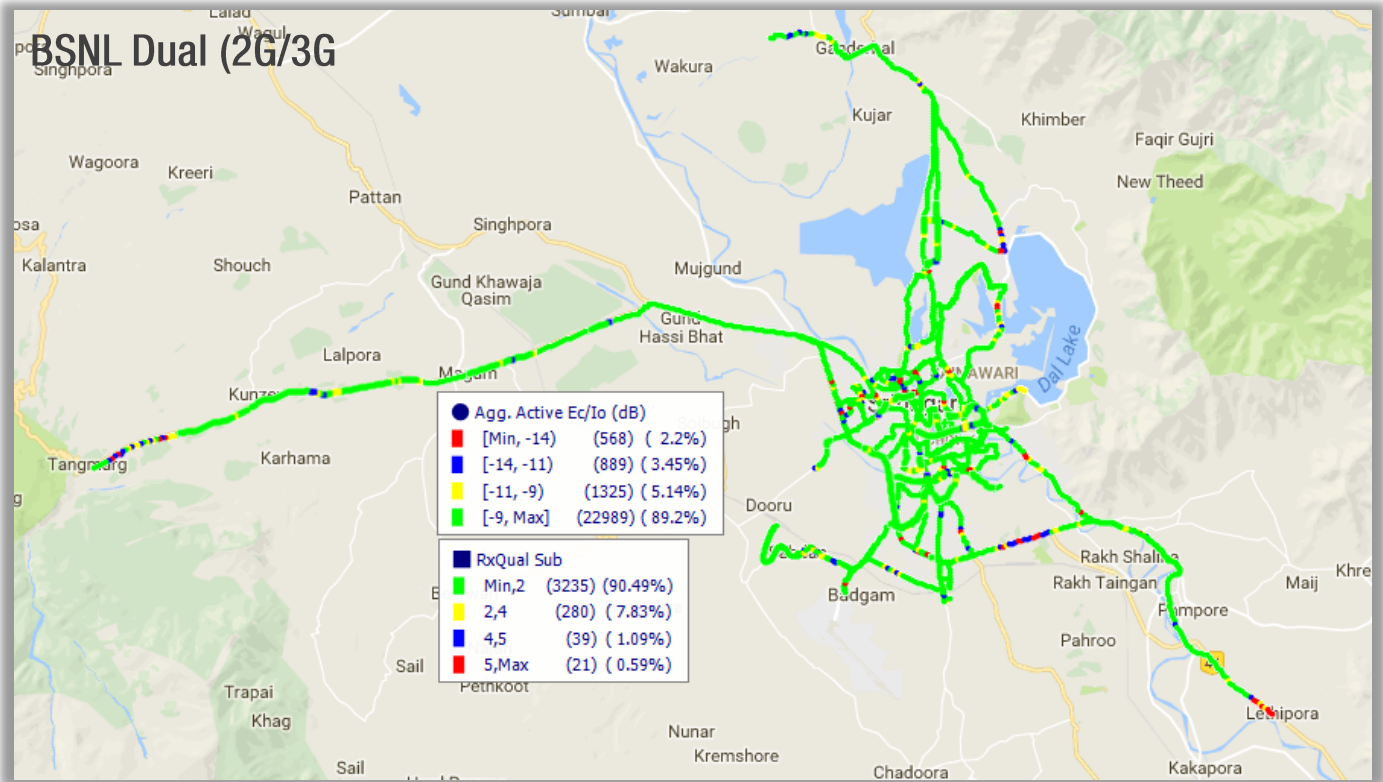
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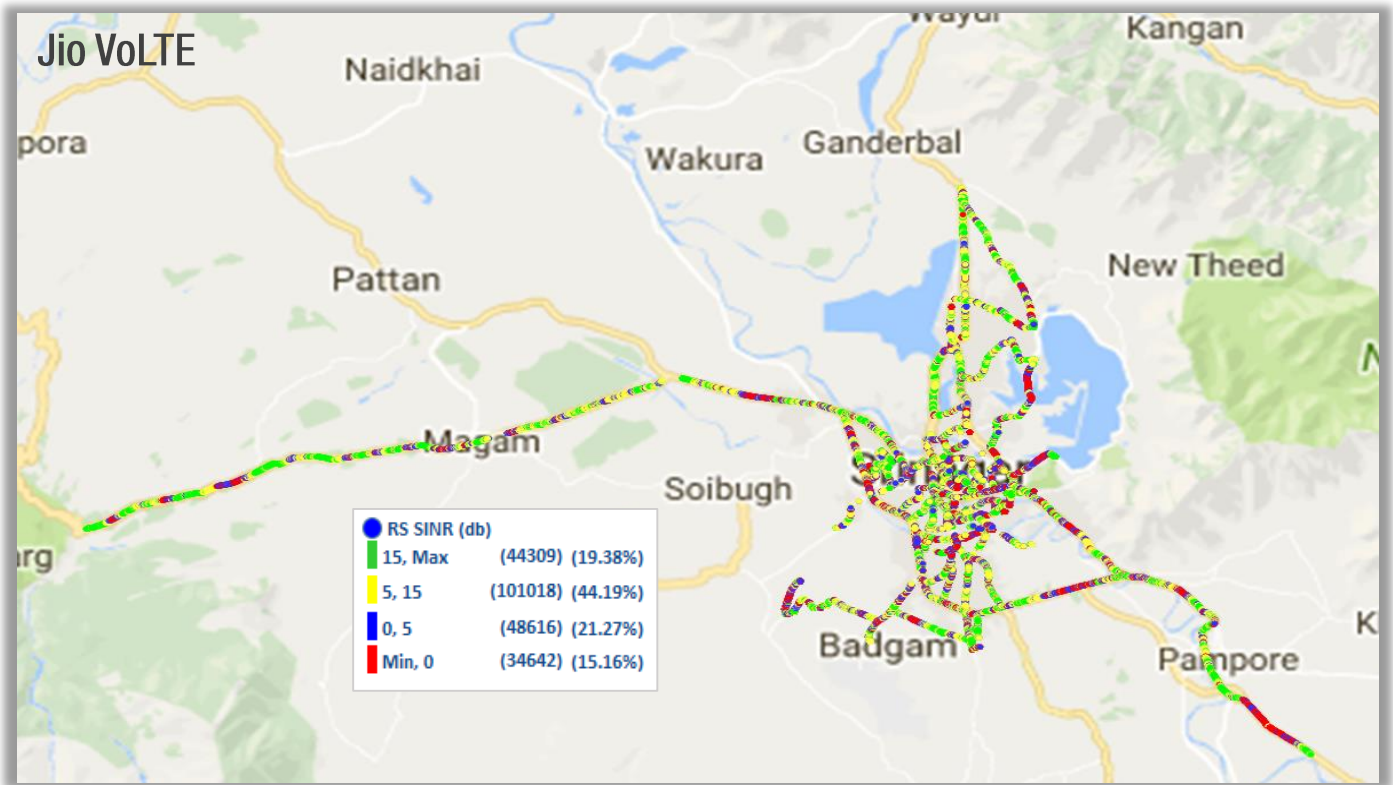
II. Quality Details (contd.)



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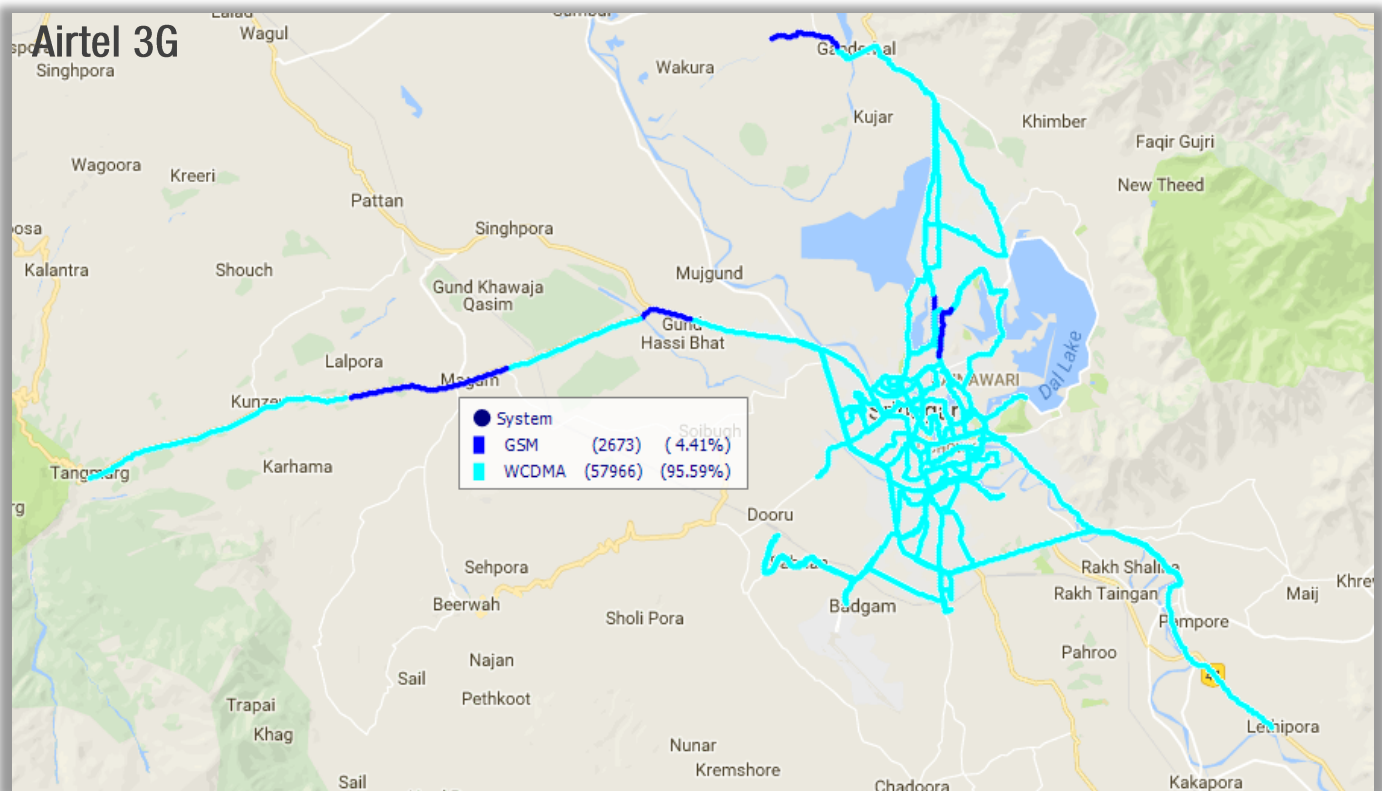
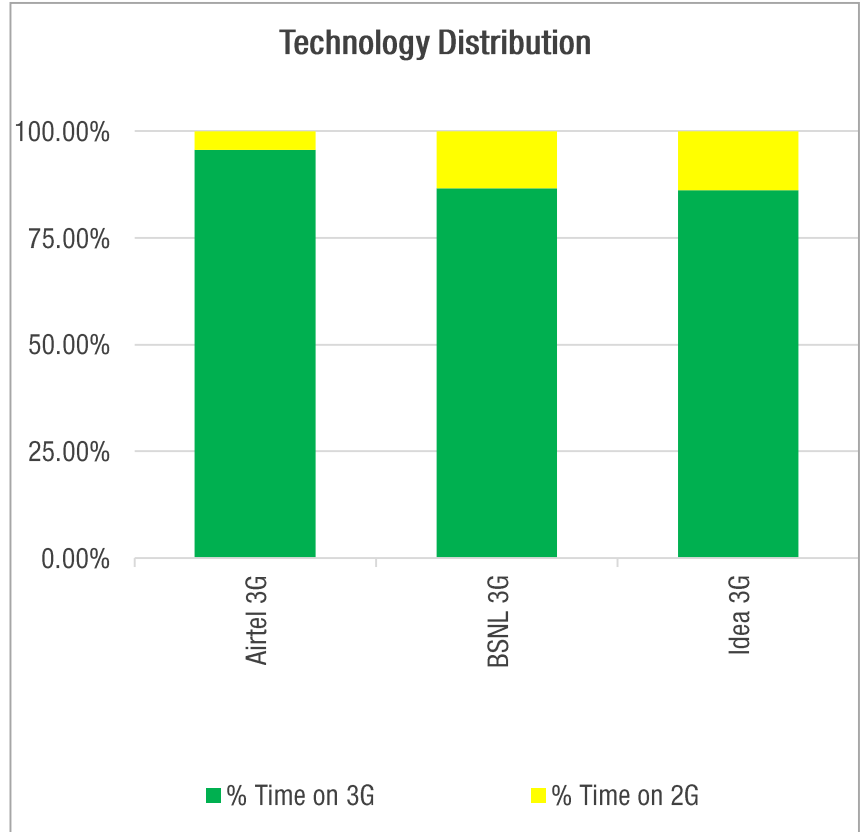


II. Quality Details (contd.)



III. Technology Details

TSP	% Time on 3G
Airtel 3G	95.59%
BSNL3G	86.55%
Idea 3G	86.24%



III. Technology Details(contd.)

