



INDEPENDENT DRIVE TEST REPORT

For

Jhansi

2018

August

NORTH ZONE

Key Performance Indicators: All TSPs have met the Drop Call Rate (DCR) benchmark of 2% except 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 Jhansi City & adjoining areas from 9:00 AM to 9:00 PM; 28th August to 30th August 2018. The drive test covered an drive route of 270 KMs & 6 hotspot over a period of 3 days. Approximately 365 calls were made for each of the 11 networks: five 2G networks, five 3G networks and one LTE network covering 6 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 **28th August to 30th August 2018** covering various locations in Jhansi City & surrounding region. The performance of **Airtel, BSNL, Idea, Tata, 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.**

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

Drive Test Details For Jhansi:

Independent Drive test was conducted for a period of 3 days from 28th August to 30th August 2018 in Jhansi 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 270 KMs over a period of 2 day from 28th August to 29th August 2018. Approximately 365 calls were made for each of the 11 networks: five 2G (Lock Mode) networks, five 3G (Dual mode) networks and one VoLTE network covering 6 unique TSPs.

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

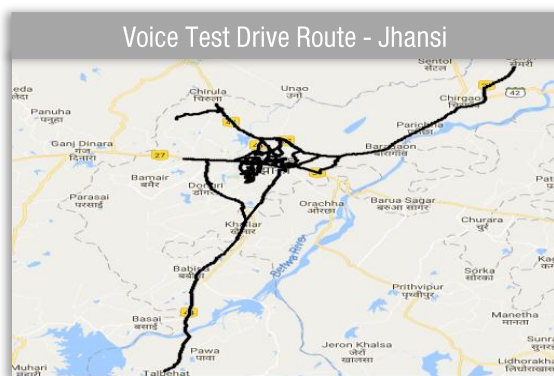
Data Tests: Data Tests were performed at 6 static locations for 1 day on 30th August 2018; five 2G (Lock mode) networks, five 3G (Dual mode) networks and Four 4G (Free mode) networks covering 6 unique TSPs were tested.

* 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.

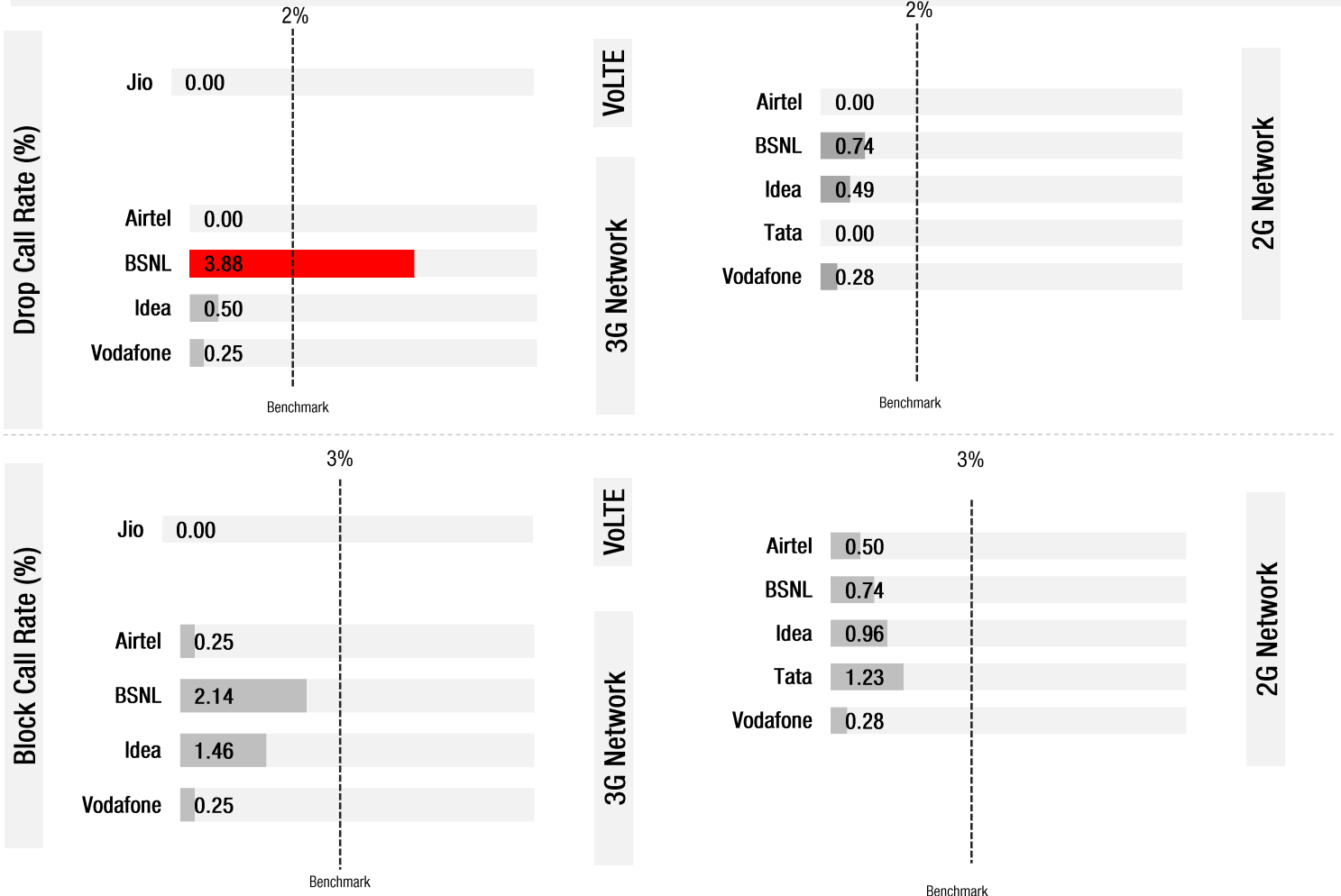
Service	Specifications
Download	2G (Locked) - 500KB, 3G (Dual) - 20 MB, 4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Dual) - 5 MB, 4G (Free) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in, www.flipkart.com and PayTm
Video Streaming	130 sec clip
Latency	32 Bytes on www.google.com



Voice Calls

Key Observations

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



KPI	2G Networks				
	Airtel	BSNL	Idea	Tata	Vodafone
SDCCH Congestion%	0.25%	0.49%	0.24%	0.98%	0.00%
TCH Congestion %	0.25%	0.25%	0.72%	0.25%	0.28%

KPI	3G Networks			
	Airtel	BSNL	Idea	Vodafone
CSFB Failure %	0.25%		0.00%	0.00%
SDCCH Congestion%	0.25%	0.24%	0.73%	0.00%
RRC Congestion%	0.00%	1.66%	0.00%	0.00%
SDCCH & RRC Congestion%	0.25%	1.90%	0.73%	0.00%
TCH Congestion %	0.00%	0.24%	0.73%	0.00%
RAB Congestion %	0.00%	0.00%	0.00%	0.25%
TCH & RAB Congestion %	0.00%	0.24%	0.73%	0.25%

- 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 achieved by all TSP's.

Not meeting Benchmark

Voice Calls

Key Observations

Coverage

a) Percentage of coverage samples for 2G \geq -85 dBm & CDMA \geq -90 dbm.

TSPs	2G				
	Airtel	BSNL	Idea	Tata	Vodafone
Coverage%	85.49%	79.70%	90.51%	94.20%	76.00%

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

TSPs	3G				VoLTE
	Airtel	BSNL	Idea	Vodafone	Jio
Coverage %	90.65%	74.17%	89.59%	70.54%	97.74%

c) Percentage of time spent on 3G network:

TSPs	3G			
	Airtel	BSNL	Idea	Vodafone
Time Spent on 3G%	73.02%	84.20%	13.17%	79.39%

d) Percentage of RLT \geq 48:

TSPs	2G				
	Airtel	BSNL	Idea	Tata	Vodafone
%RLT \geq 48	0.00%	5.78%	0.00%	0.00%	0.00%

e) Average CST Second

TSPs	2G				
	Airtel	BSNL	Idea	Tata	Vodafone
CST(sec)	3.15	2.52	2.66	3.97	2.53

TSPs	3G				VoLTE
	Airtel	BSNL	Idea	Vodafone	Jio
CST(sec)	3.94	2.56	3.01	2.82	0.41

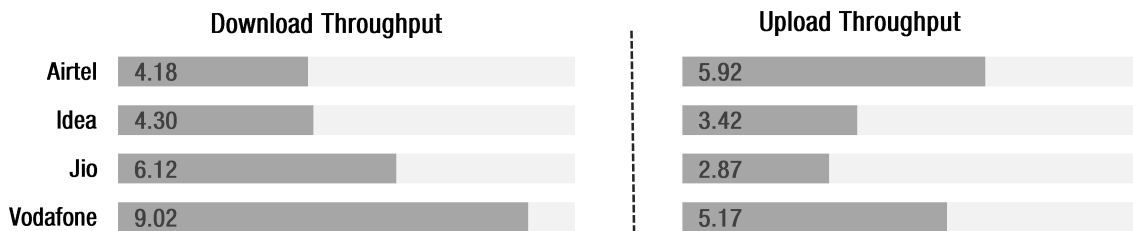
Data Services Static

Key Observations

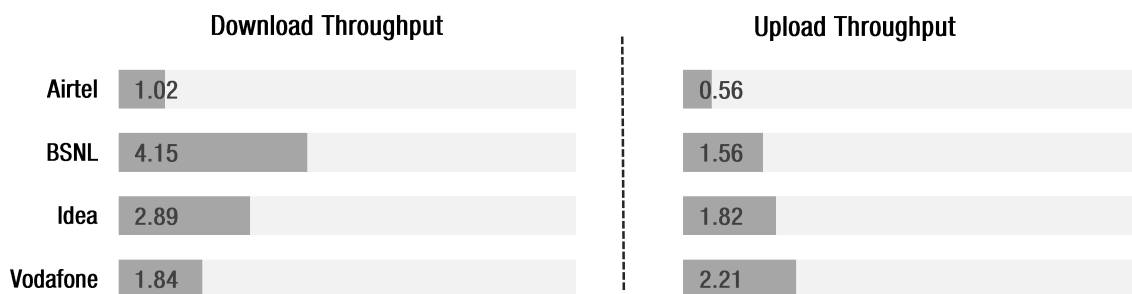
Data was tested at 6 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), Video Streaming (YouTube) and Web browsing (Flipkart, Amazon, PayTm)

Data Download and Upload Performance (Mbps)

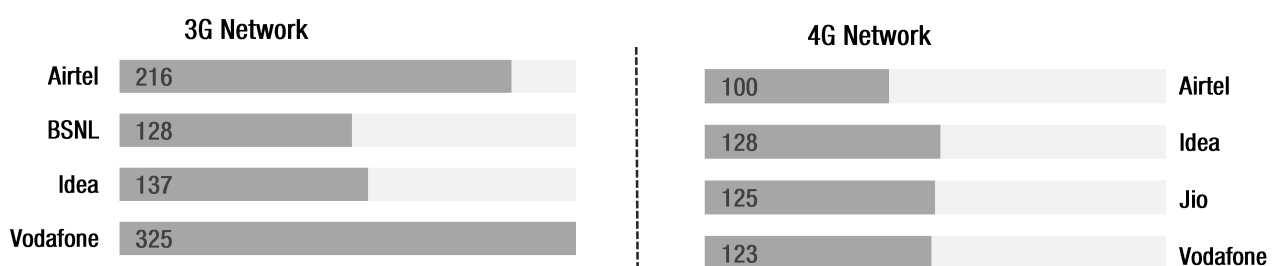
4G Network:



3G Network:



Latency (msec)

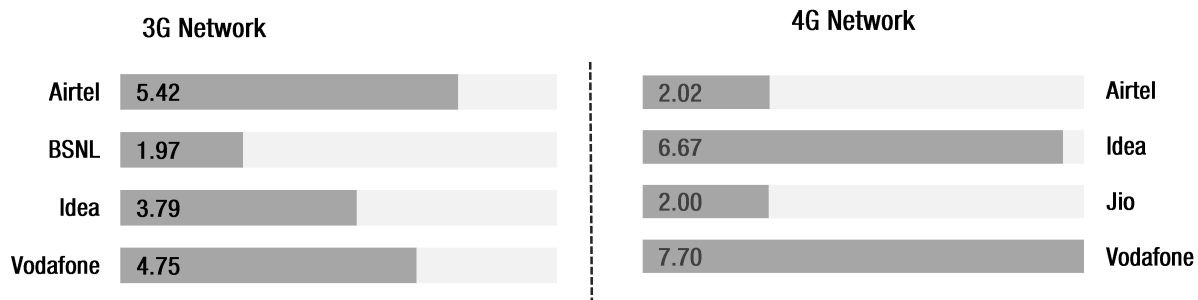


Data Services Static

Key Observations

Video Streaming Performance (130 sec YouTube video sample sizes)

Streaming (sec)

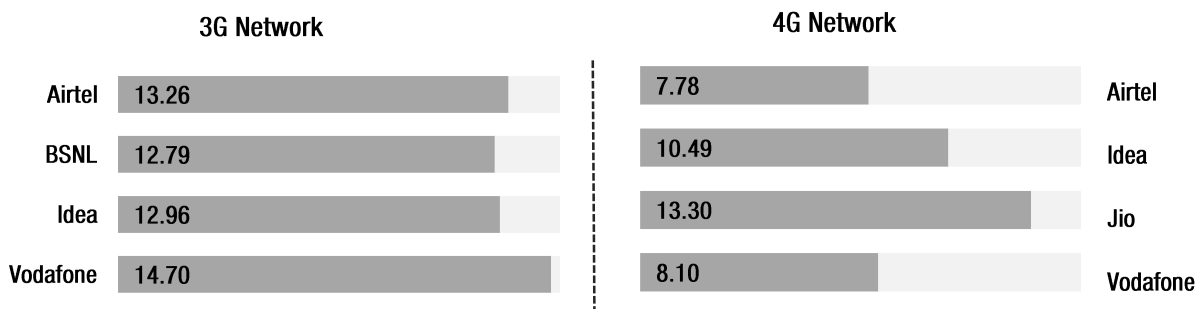


Streaming Delay further broken into 2 parameters which form the end-user perception to assess consistency on Video streaming.

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

Video Streaming	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Avg. Initial Start Time (sec)	4.46	1.97	3.79	4.75	1.88	6.24	1.85	7.32
Avg. Interruption Time (sec)	0.96				0.14	0.43	0.15	0.38

Web Page Download Time (sec)



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

Data Services Dynamic

Key Observations

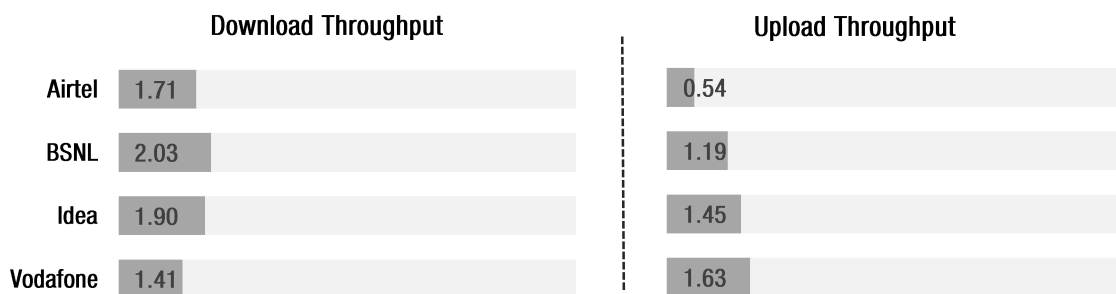
Data was tested between one location to another location .Following services were tested: Data Download/Upload, Latency (www.google.com), Video Streaming (YouTube) and Web browsing (Flipkart, Amazon, PayTm)

Data Download and Upload Performance (Mbps)

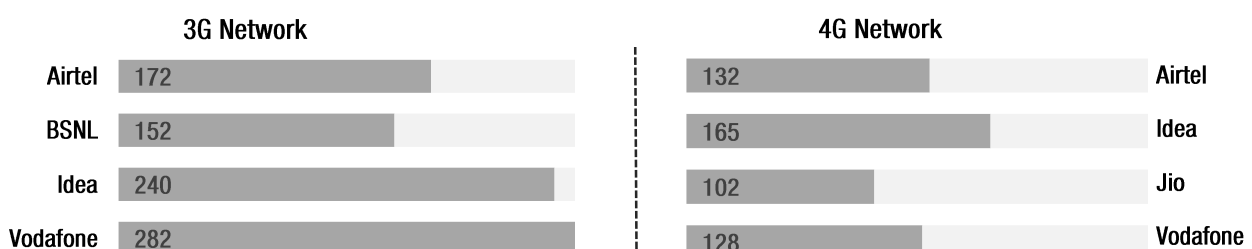
4G Network:



3G Network:



Latency (msec)

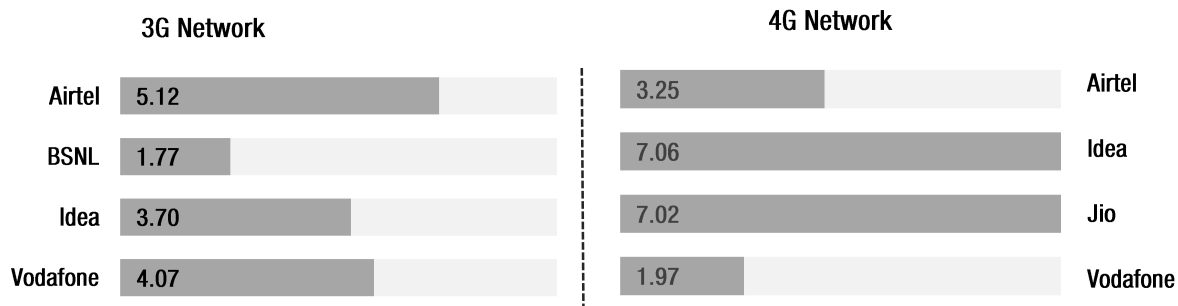


Data Services Dynamic

Key Observations

Video Streaming Performance (130 sec YouTube video sample sizes)

Streaming (sec)

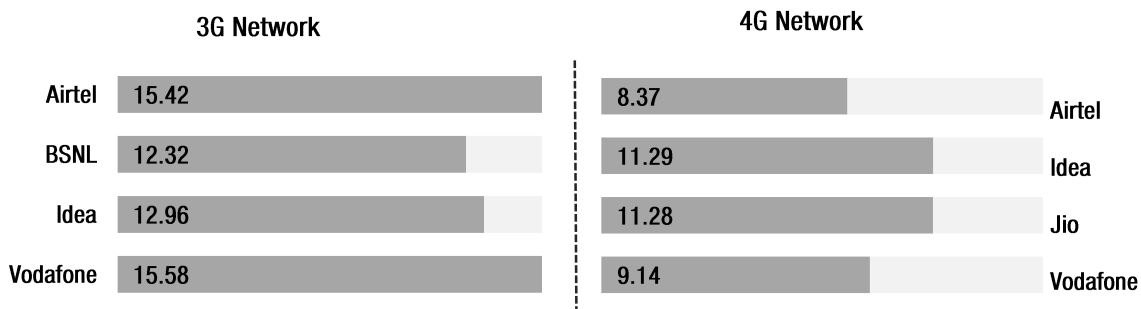


Streaming Delay further broken into 2 parameters which form the end-user perception to assess consistency on Video streaming.

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

Video Streaming	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Avg. Initial Start Time (sec)	5.12	1.77	1.76	2.13	1.71	2.08	3.31	1.97
Avg. Interruption Time (sec)			1.94	1.94	1.54	4.98	3.71	

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	Tata	Vodafone
Call Attempt	403	407	416	407	352
Blocked Call Rate (%)	0.50%	0.74%	0.96%	1.23%	0.28%
CSSR% (Accessibility)	99.50%	99.26%	99.04%	98.77%	99.72%
Drop Call Rate (%)	0.00%	0.74%	0.49%	0.00%	0.28%
Mobility HOSR (%)	99.65%	92.88%	99.09%	99.59%	99.07%
Rx Quality (%)	96.12%	98.34%	98.12%	95.41%	98.16%

Voice Call	3G				VoLTE
	Airtel	BSNL	Idea	Vodafone	Jio
Call Attempt	396	421	410	400	416
Blocked Call Rate (%)	0.25%	2.14%	1.46%	0.25%	0.00%
CSSR% (Accessibility)	99.75%	97.86%	98.54%	99.75%	100.00%
Drop Call Rate (%)	0.00%	3.88%	0.50%	0.25%	0.00%
Mobility HOSR (%)	99.96%	99.87%	99.08%	99.92%	96.85%
Rx Quality (%)	97.00%	95.38%	97.68%	97.67%	86.34%

Summary

City Level Summary(contd.)

Data Test - Stationary

Data Services	2G				
	Airtel	BSNL	Idea	Tata	Vodafone
Download Throughput (Kbps)	88.49	113.29	110.75	64.36	97.29
Upload Throughput (kbps)	96.43	112.75	127.02	100.81	90.41
Web Browsing Delay (sec)	38.79	30.75	29.98	42.68	32.21
Latency (msec)	543	340	355	610	561

Data Services	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	1.02	4.15	2.89	1.84	4.18	4.30	6.12	9.02
Upload Throughput (Mbps)	0.56	1.56	1.82	2.21	5.92	3.42	2.87	5.17
Web Browsing Delay (sec)	13.26	12.79	12.96	14.70	8.10	13.30	10.49	7.78
Video Streaming Delay (sec)	5.42	1.97	3.79	4.75	2.02	6.67	2.00	7.70
Latency (msec)	216	128	137	325	100	128	125	123

Data Test - Mobility

Data Services	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	1.71	2.03	1.90	1.41	5.15	3.09	2.04	7.09
Upload Throughput (Mbps)	0.54	1.19	1.45	1.63	5.36	2.59	1.74	4.15
Web Browsing Delay (sec)	15.42	12.32	12.96	15.58	8.37	11.29	11.28	9.14
Video Streaming Delay (sec)	5.12	1.77	3.70	4.07	3.25	7.06	7.02	1.97
Latency (msec)	172	152	240	282	132	165	102	128

Summary

City Level Summary(contd.)

Bundelkhand University	2G				
	Airtel	BSNL	Idea	Tata	Vodafone
Download Throughput (Kbps)	41.80	120.17	73.82	41.80	33.84
Upload Throughput (kbps)	70.70	112.52	89.03	77.05	60.60
Web Browsing Delay (sec)	22.08	27.90	25.40	22.08	25.78
Latency (msec)	721	261	369	721	738

Bundelkhand University	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	0.56	4.35	0.97	0.89	0.64	0.20	0.25	4.63
Upload Throughput (Mbps)	0.51	1.71	1.43	1.64	0.21	0.14	1.32	3.37
Web Browsing Delay (sec)	14.17	14.44	12.20	15.35	11.97	25.45	17.47	8.52
Video Streaming Delay (sec)	18.86	1.89	1.97	2.13	4.34	-	-	-
Latency (msec)	211	120	131	276	126	125	91	-

Bus Stand	2G				
	Airtel	BSNL	Idea	Tata	Vodafone
Download Throughput (Kbps)	82.01	68.06	86.67	82.01	120.01
Upload Throughput (kbps)	120.94	111.40	124.63	125.28	112.64
Web Browsing Delay (sec)	46.85	21.83	33.32	46.85	33.98
Latency (msec)	647	348	291	647	599

Bus Stand	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	-	1.46	2.30	1.88	-	4.67	9.01	5.76
Upload Throughput (Mbps)	0.86	1.19	1.58	1.58	5.24	4.34	4.05	3.31
Web Browsing Delay (sec)	9.64	12.26	11.05	16.16	7.05	11.44	9.79	8.31
Video Streaming Delay (sec)	-	2.41	3.01	3.02	0.97	2.24	1.53	4.33
Latency (msec)	400	143	122	277	92	172	85	126

Summary

City Level Summary(contd.)

Chitra Crossing	2G				
	Airtel	BSNL	Idea	Tata	Vodafone
Download Throughput (Kbps)	173.01	173.01	171.73	51.71	116.07
Upload Throughput (kbps)	156.14	153.14	152.14	120.06	87.76
Web Browsing Delay (sec)	31.53	31.53	31.21	35.08	33.65
Latency (msec)	366	366	346	618	527

Chitra Crossing	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	1.64	6.60	5.29	1.69	-	7.92	12.39	10.85
Upload Throughput (Mbps)	0.55	1.64	2.67	3.50	10.47	5.63	6.25	6.86
Web Browsing Delay (sec)	10.02	10.84	11.79	16.07	6.00	12.76	8.31	7.46
Video Streaming Delay (sec)	1.83	1.54	5.09	5.76	1.06	-	1.18	-
Latency (msec)	95	112	126	467	92	117	102	124

Jhansi Fort	2G				
	Airtel	BSNL	Idea	Tata	Vodafone
Download Throughput (Kbps)	71.79	80.59	116.91	97.34	71.79
Upload Throughput (kbps)	93.43	136.93	152.72	87.49	107.79
Web Browsing Delay (sec)	35.90	29.35	35.34	47.57	35.90
Latency (msec)	548	302	349	528	548

Jhansi Fort	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	0.12	5.13	3.65	1.32	8.26	7.32	2.11	8.15
Upload Throughput (Mbps)	0.33	1.71	2.33	3.09	8.71	6.58	2.15	8.86
Web Browsing Delay (sec)	17.92	9.18	13.03	14.94	5.48	11.21	9.69	7.29
Video Streaming Delay (sec)	-	1.67	4.87	6.59	1.07	-	4.17	-
Latency (msec)	148	129	196	266	103	121	267	117

Summary

City Level Summary(contd.)

Medical College	2G				
	Airtel	BSNL	Idea	Tata	Vodafone
Download Throughput (Kbps)	-	56.45	57.85	53.05	127.40
Upload Throughput (kbps)	8.41	66.13	88.52	60.34	73.88
Web Browsing Delay (sec)	59.16	36.27	22.95	47.53	27.96
Latency (msec)	535	704	390	645	284

Medical College	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	-	2.58	2.74	2.49	2.73	1.04	4.91	10.76
Upload Throughput (Mbps)	0.56	1.51	2.17	1.71	6.55	0.97	1.82	4.11
Web Browsing Delay (sec)	16.32	14.93	10.90	12.60	9.87	14.16	11.22	7.38
Video Streaming Delay (sec)	2.46	2.58	1.44	2.36	1.80	10.91	2.53	9.05
Latency (msec)	241	95	113	323	101	118	100	122

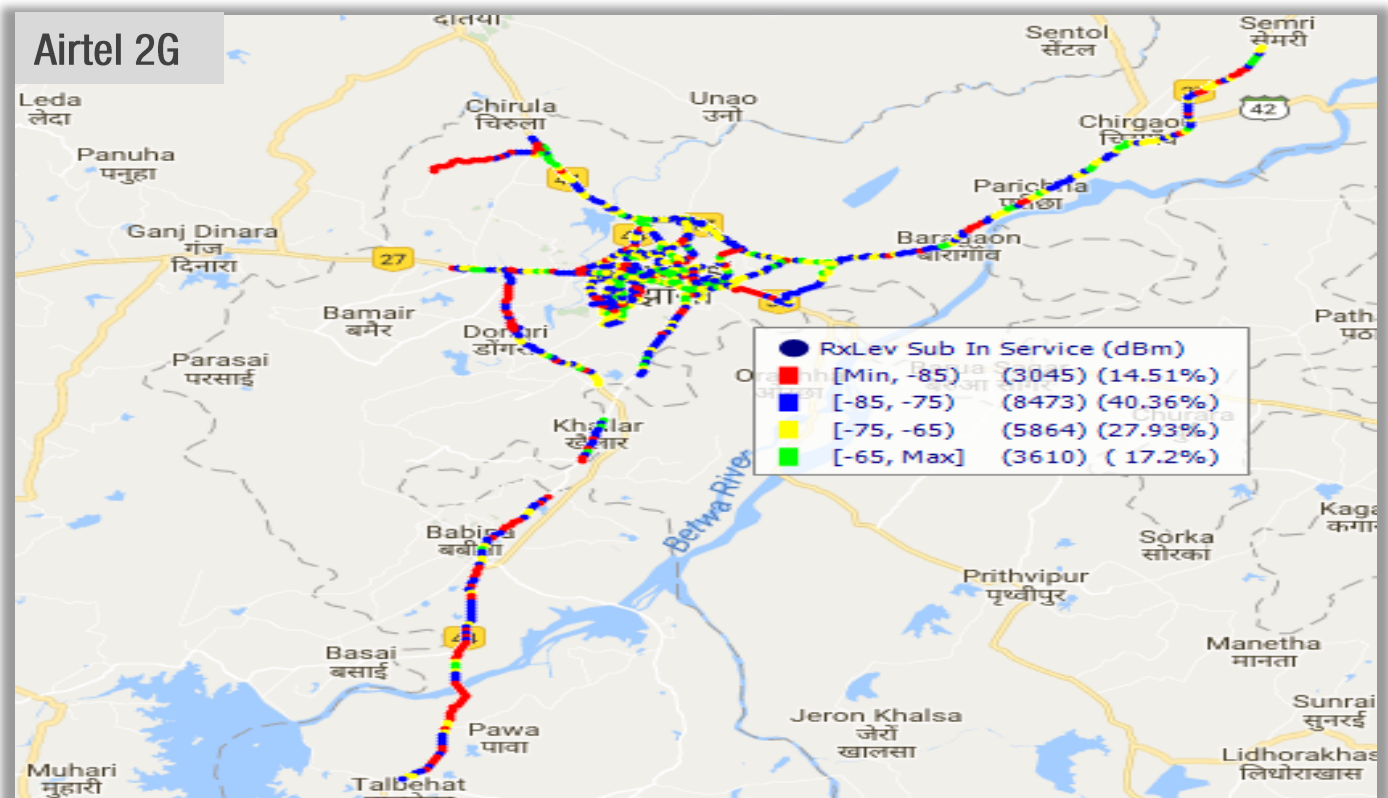
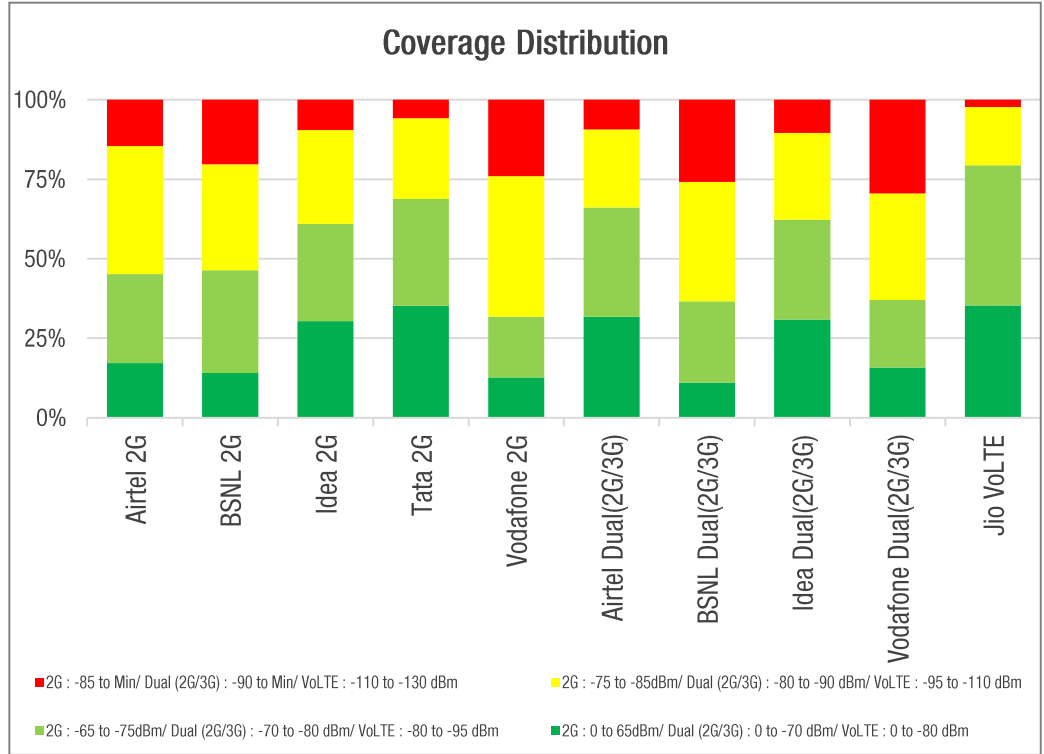
Sadar Bazar	2G				
	Airtel	BSNL	Idea	Tata	Vodafone
Download Throughput (Kbps)	66.12	162.49	157.54	66.12	106.38
Upload Throughput (kbps)	128.94	96.40	155.06	134.62	99.78
Web Browsing Delay (sec)	47.68	37.69	30.13	47.68	34.40
Latency (msec)	570	210	391	570	713

Sadar Bazar	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	1.08	3.88	2.39	2.42	3.33	4.62	8.04	13.97
Upload Throughput (Mbps)	0.41	1.61	0.74	1.73	4.35	1.78	2.78	5.74
Web Browsing Delay (sec)	10.78	15.00	18.72	13.13	8.23	12.91	7.74	7.49
Video Streaming Delay (sec)	2.15	1.86	6.70	9.25	3.59	11.20	1.30	10.61
Latency (msec)	224	169	130	332	95	116	91	123

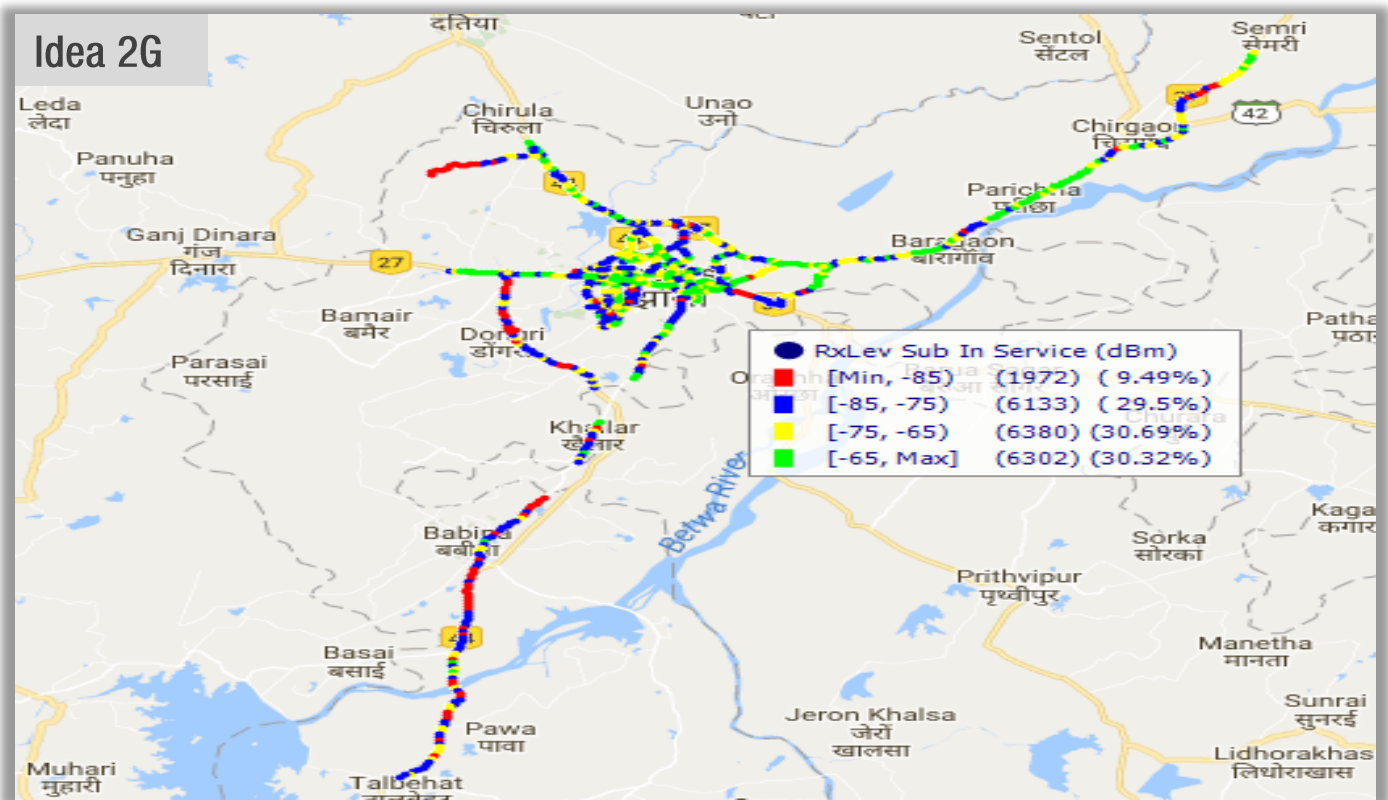
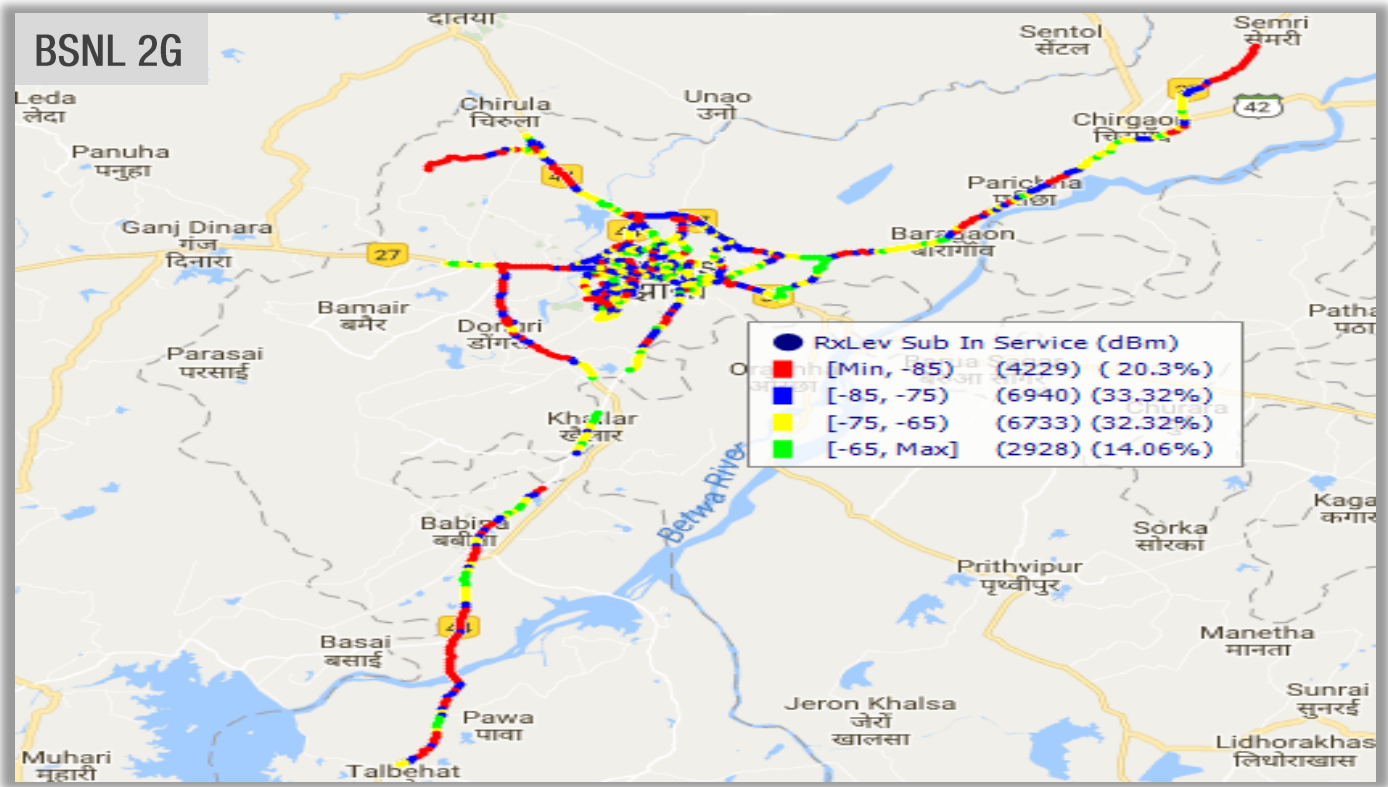
I. Coverage Details

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.

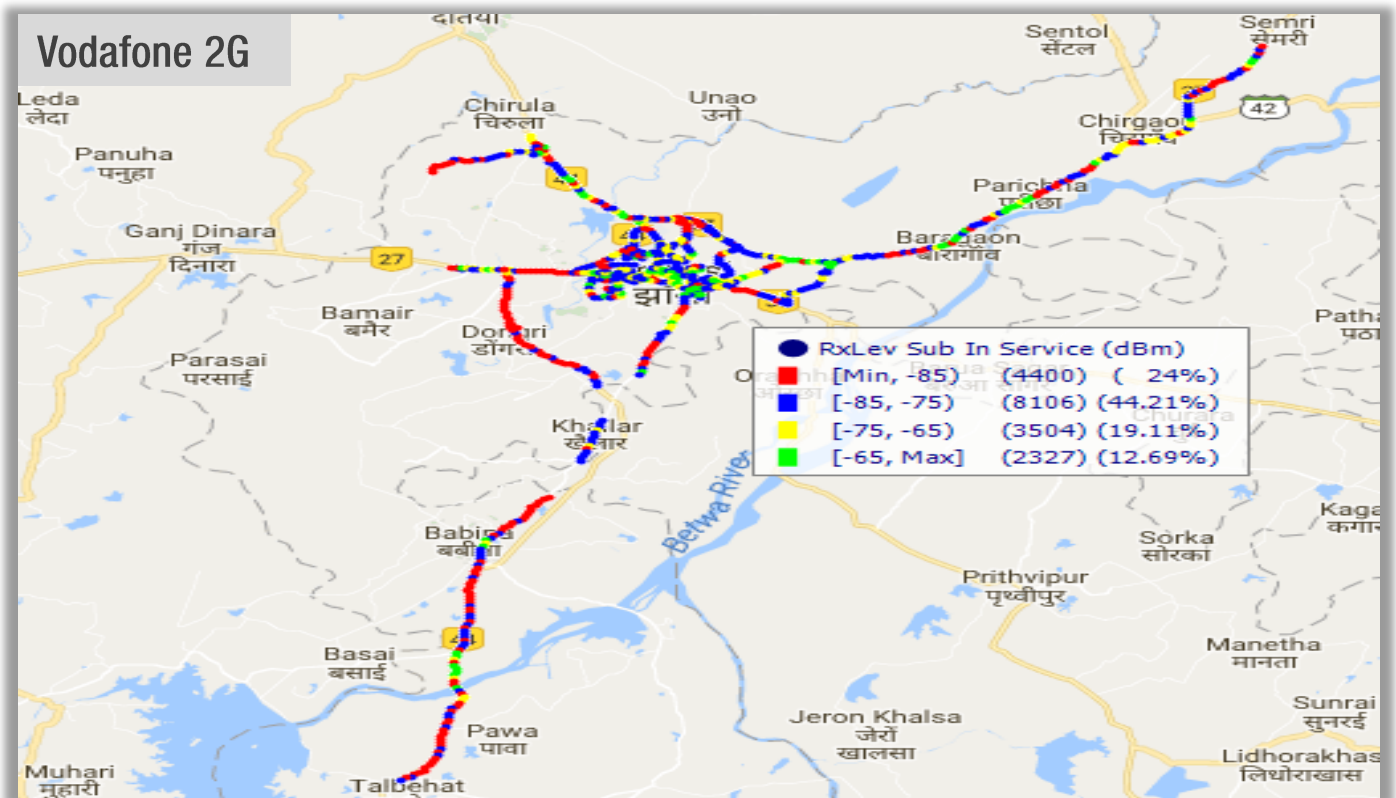
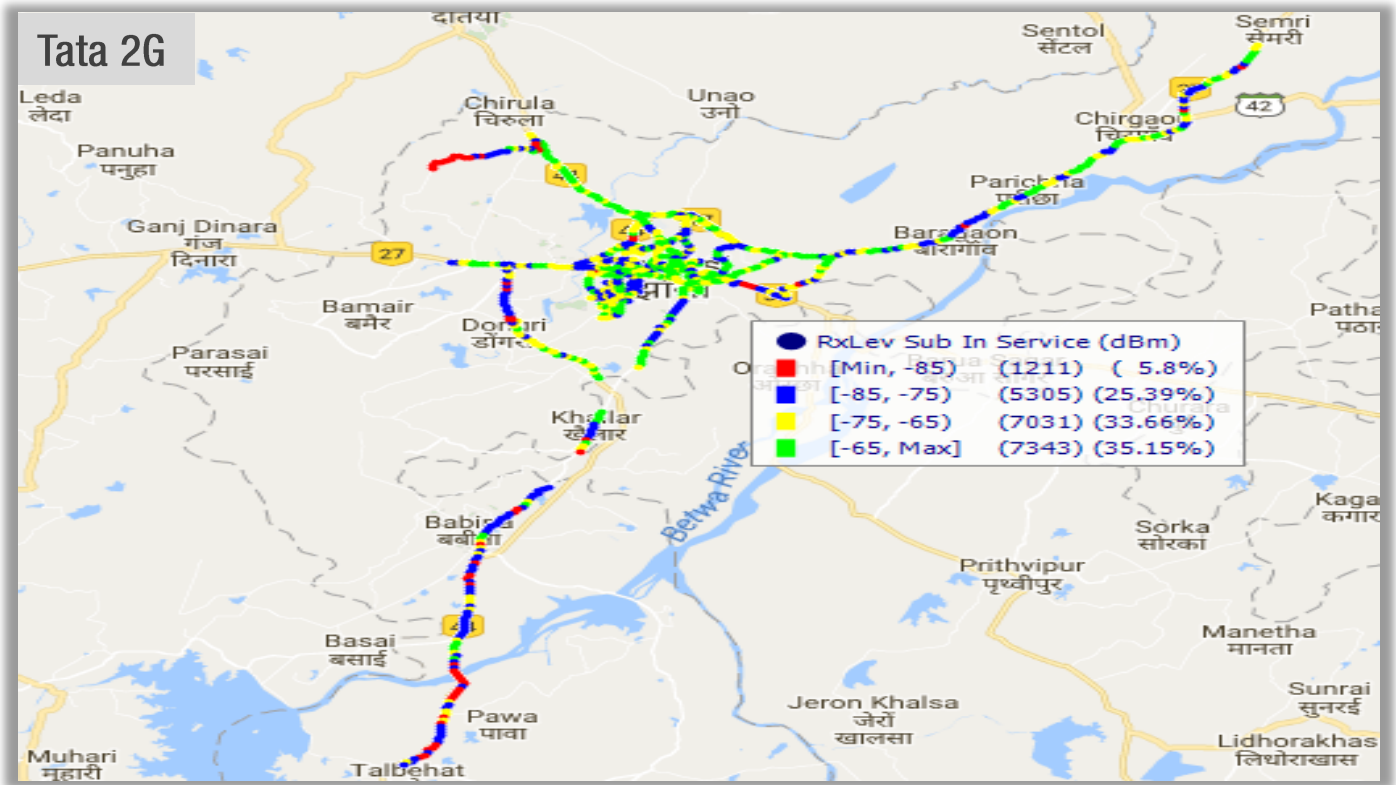
TSP	Coverage Rate
Airtel 2G	85.49%
BSNL 2G	79.70%
Idea 2G	90.51%
Tata 2G	94.20%
Vodafone 2G	76.00%
Airtel Dual(2G/3G)	90.65%
BSNL Dual(2G/3G)	74.17%
Idea Dual(2G/3G)	89.59%
Vodafone Dual(2G/3G)	70.54%
Jio VoLTE	97.74%



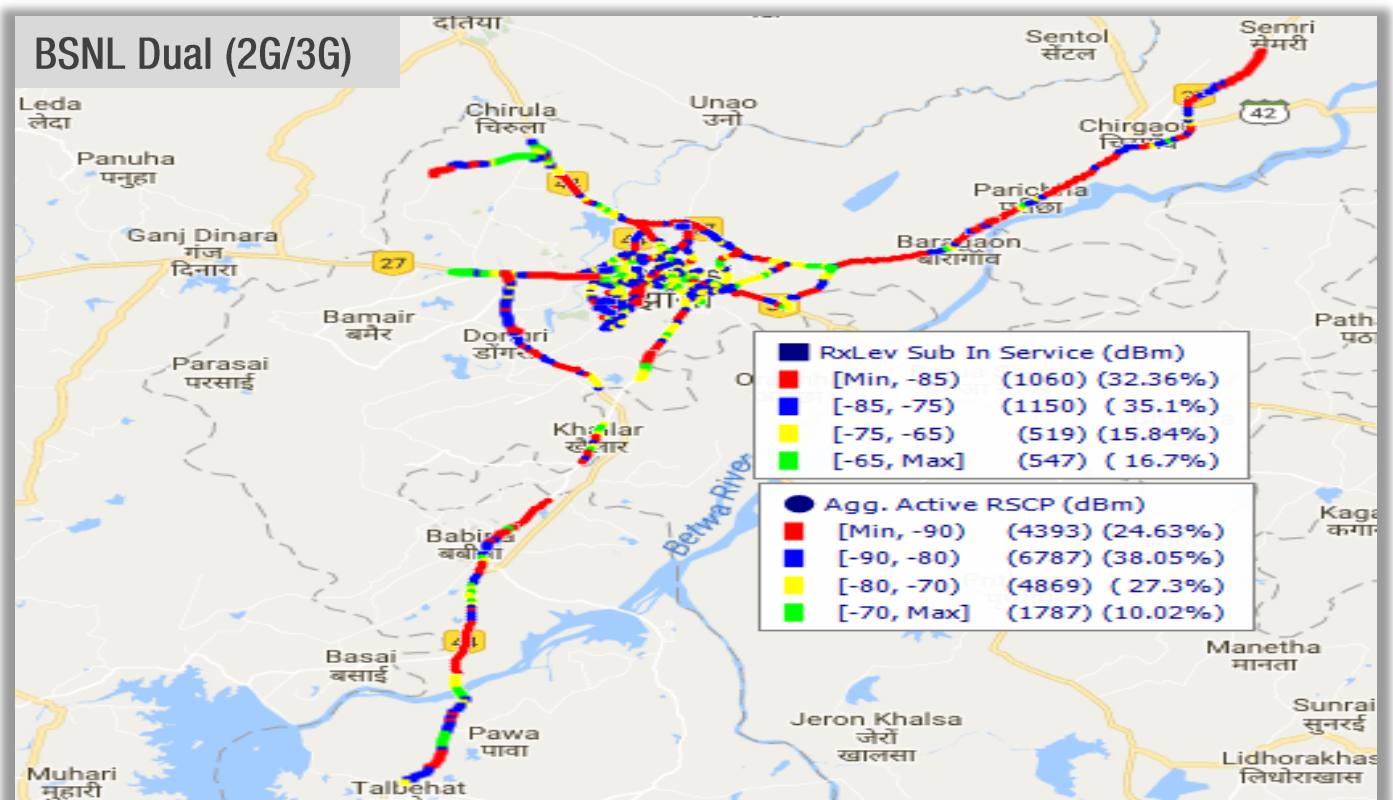
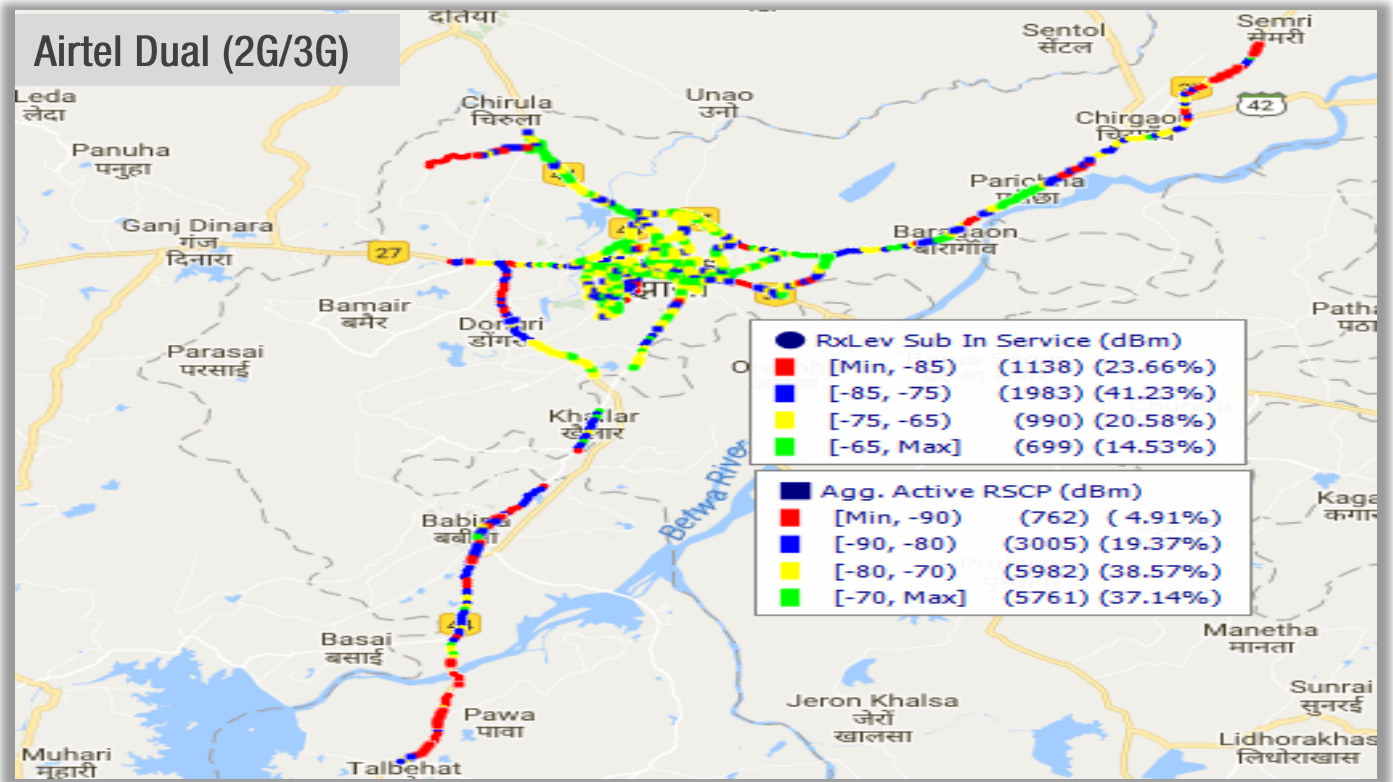
I. Coverage Details (contd.)



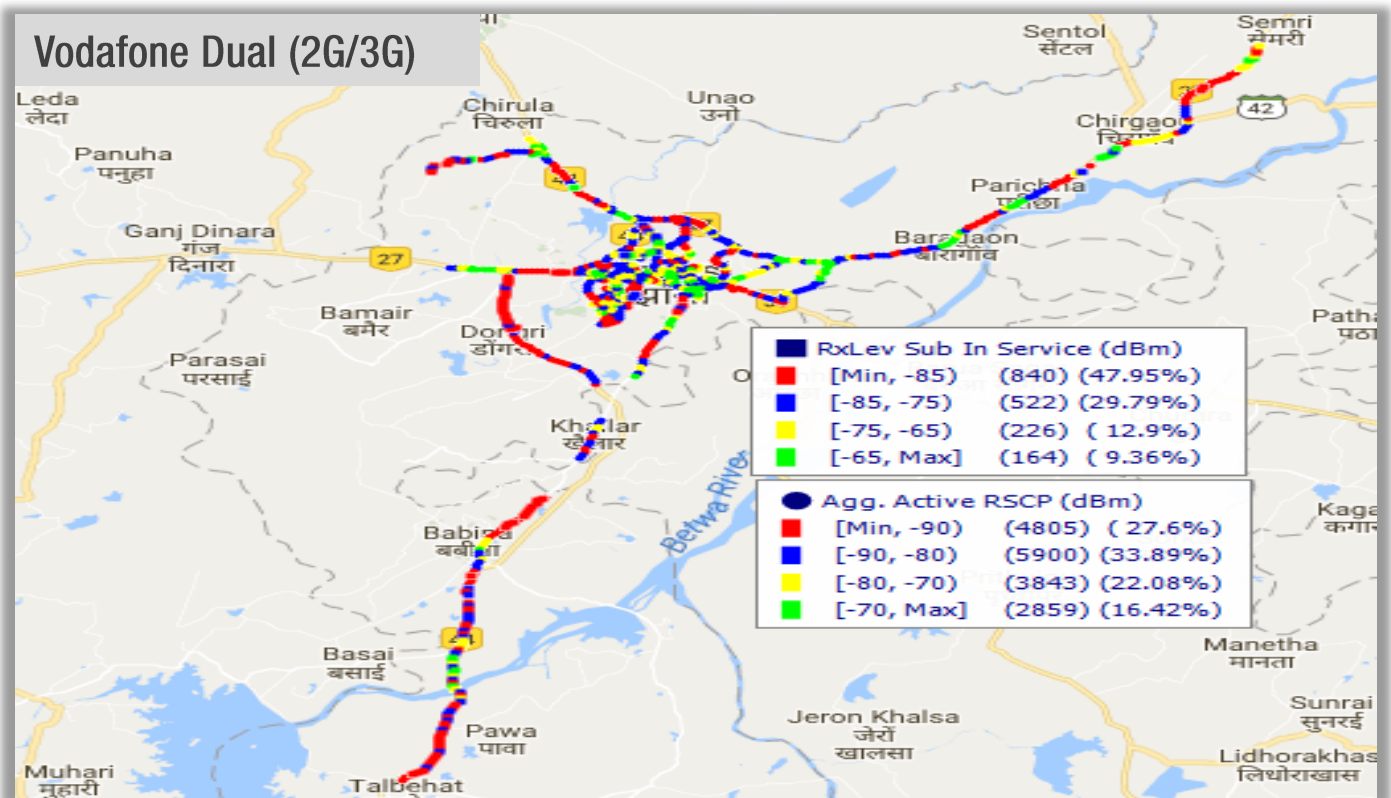
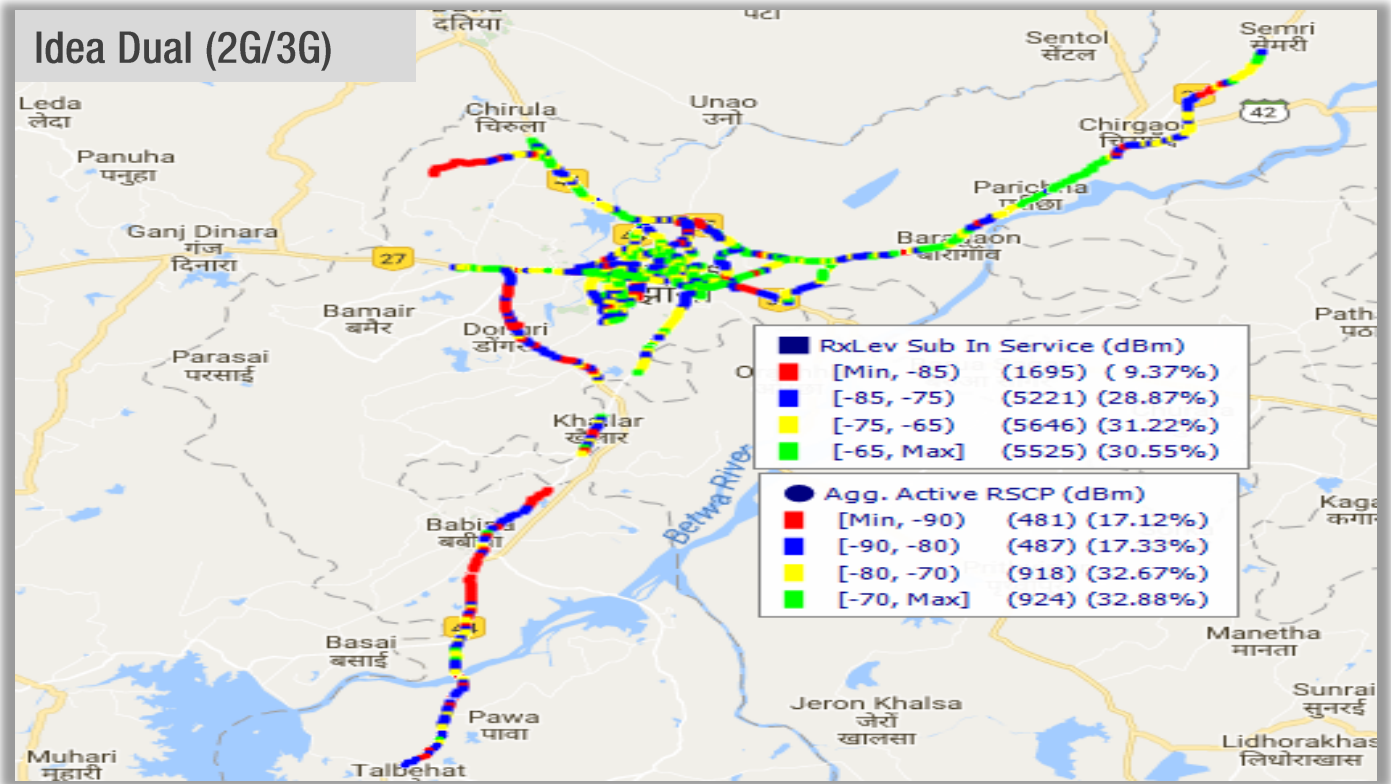
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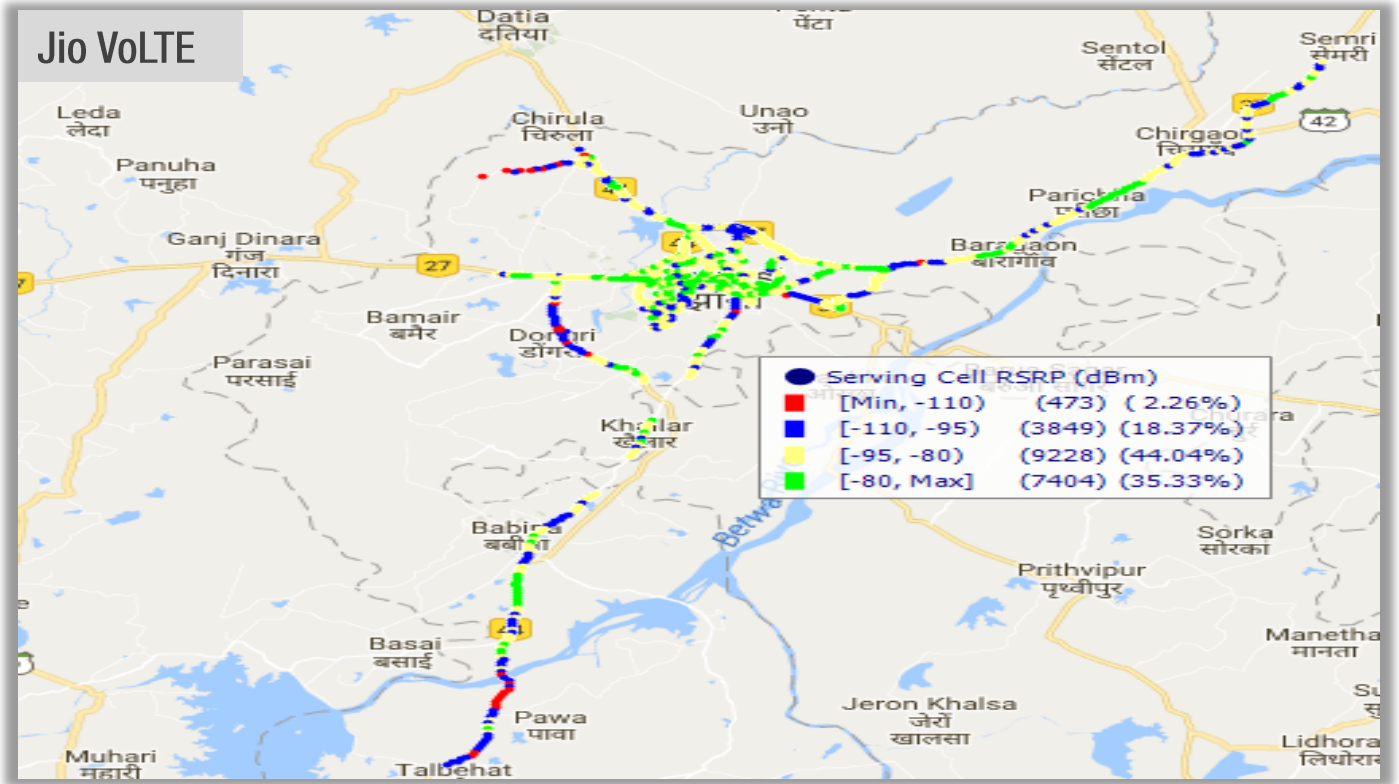
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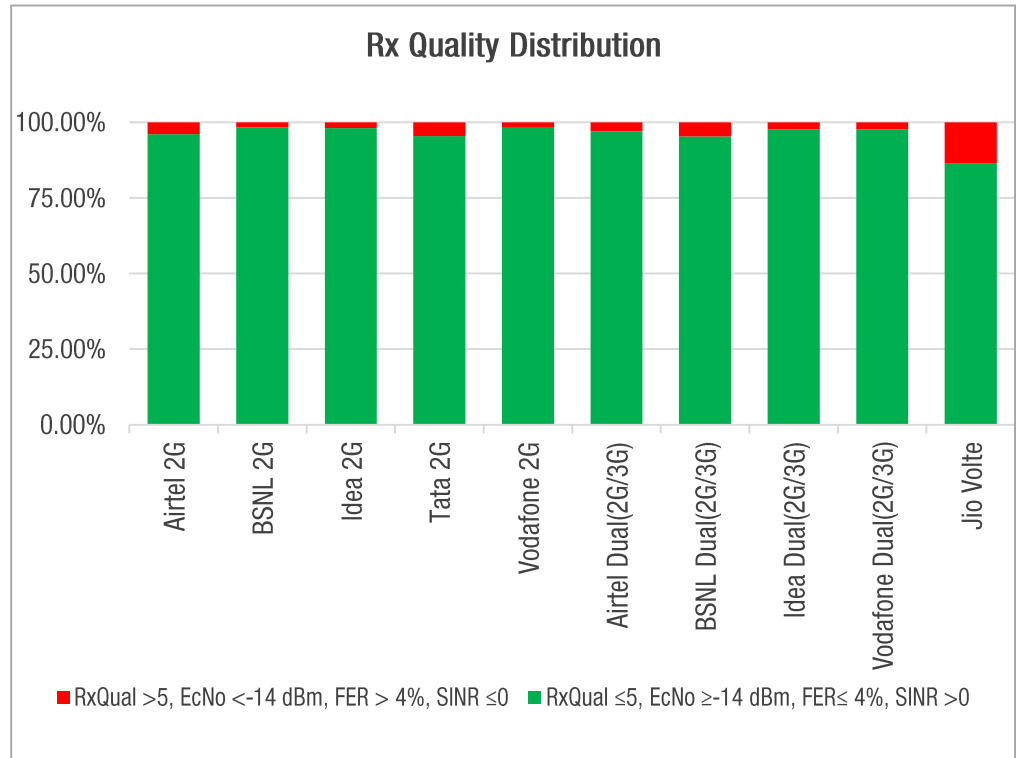
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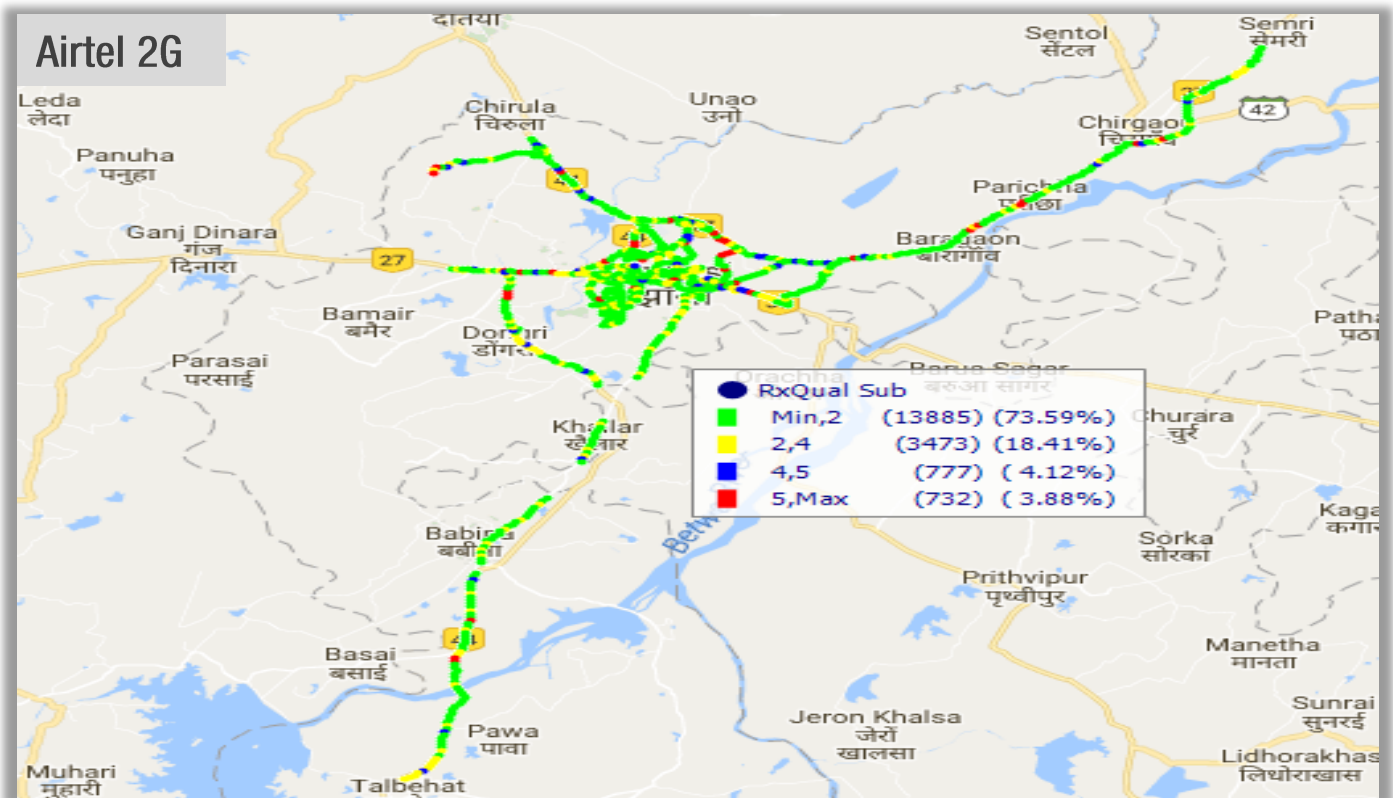
II. Quality Details

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 $\geq 95\%$.

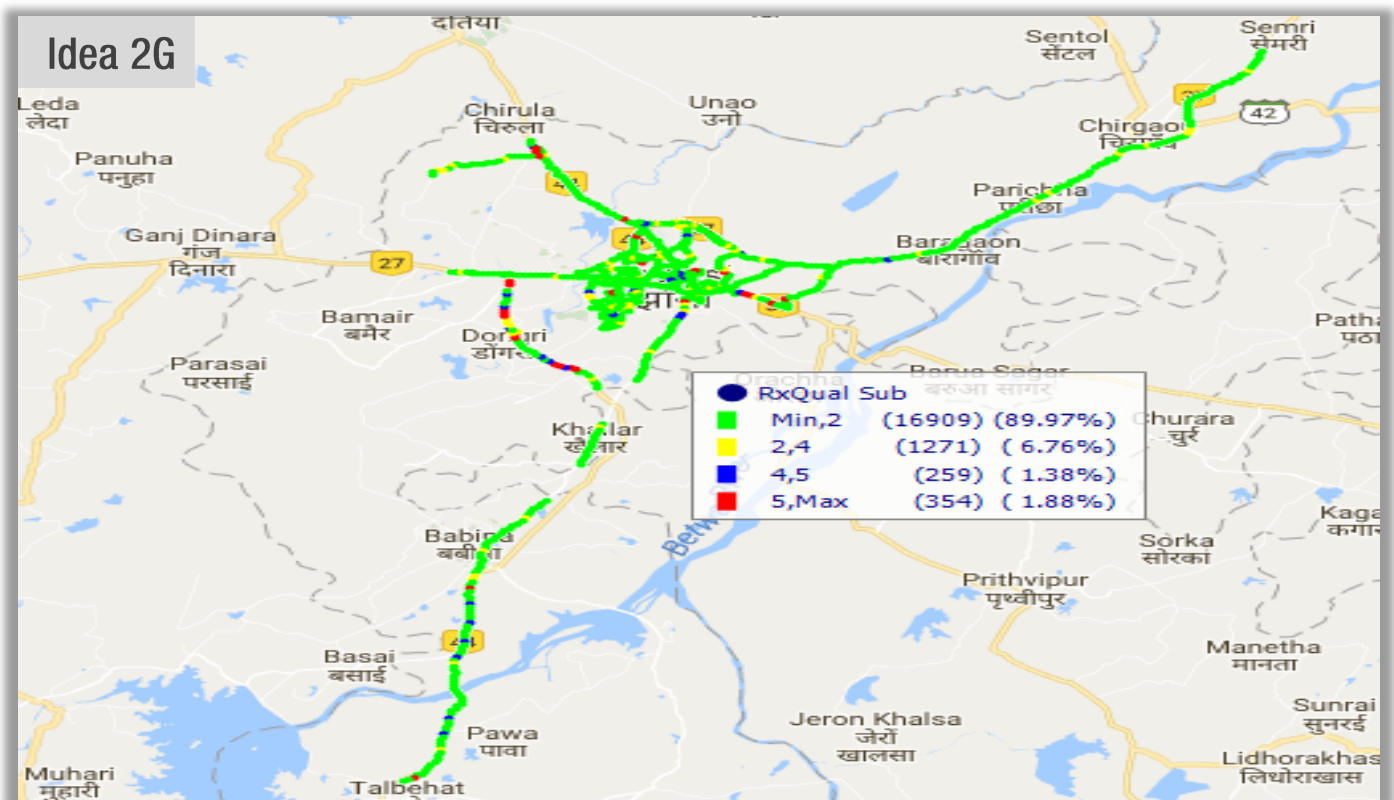
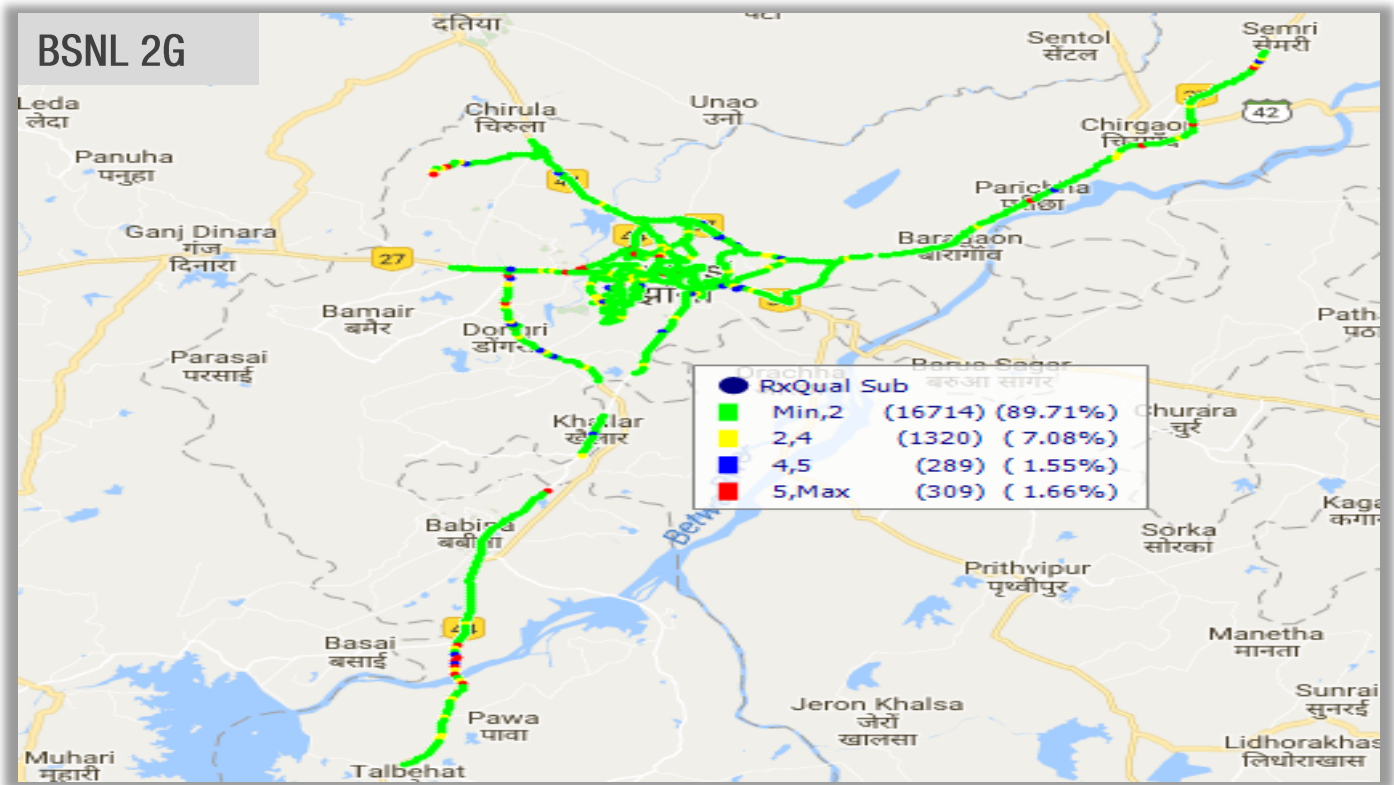
TSP	Rx Quality
Airtel 2G	96.12%
BSNL 2G	98.34%
Idea 2G	98.12%
Tata 2G	95.41%
Vodafone 2G	98.16%
Airtel Dual(2G/3G)	97.00%
BSNL Dual(2G/3G)	95.38%
Idea Dual(2G/3G)	97.68%
Vodafone Dual(2G/3G)	97.67%
Jio VoLTE	86.34%



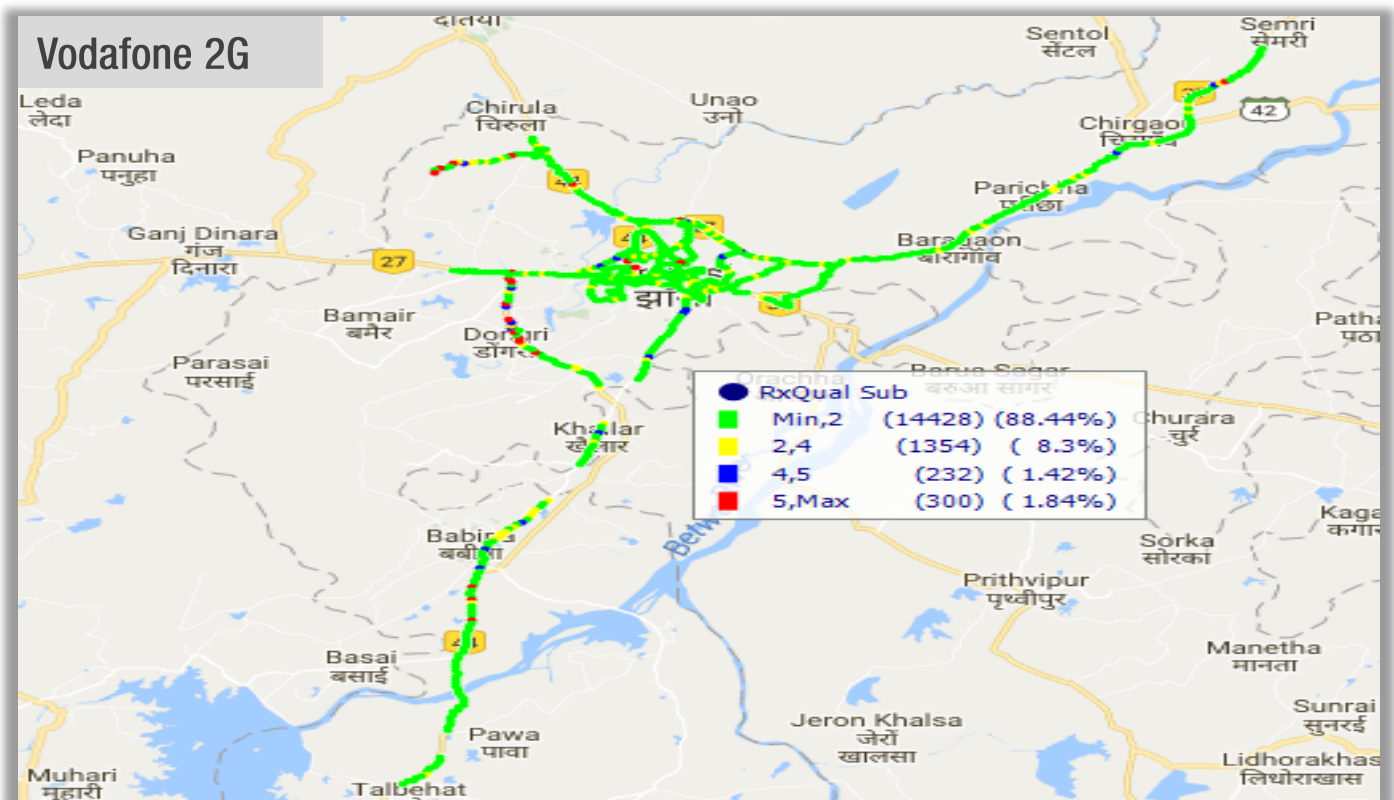
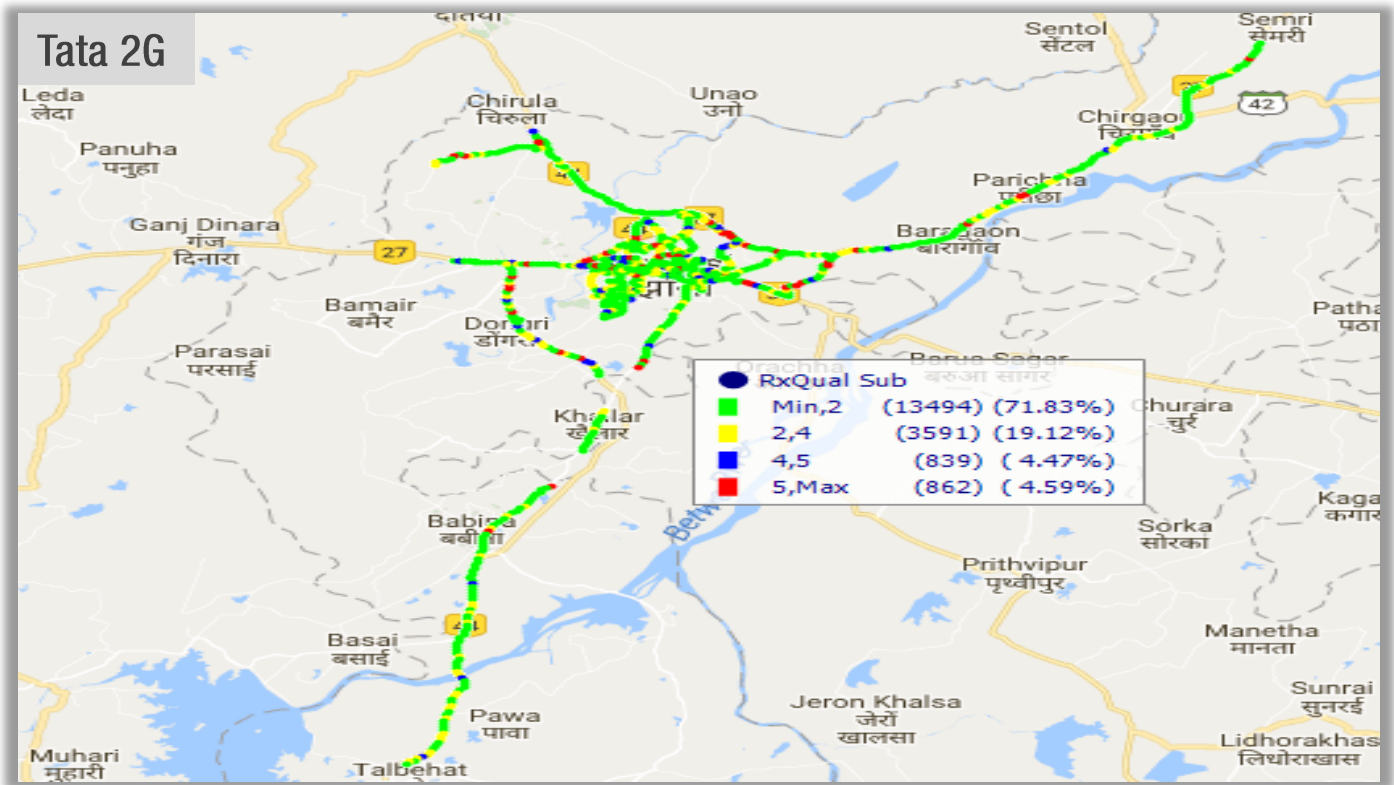
— TSPs not meeting the Benchmark



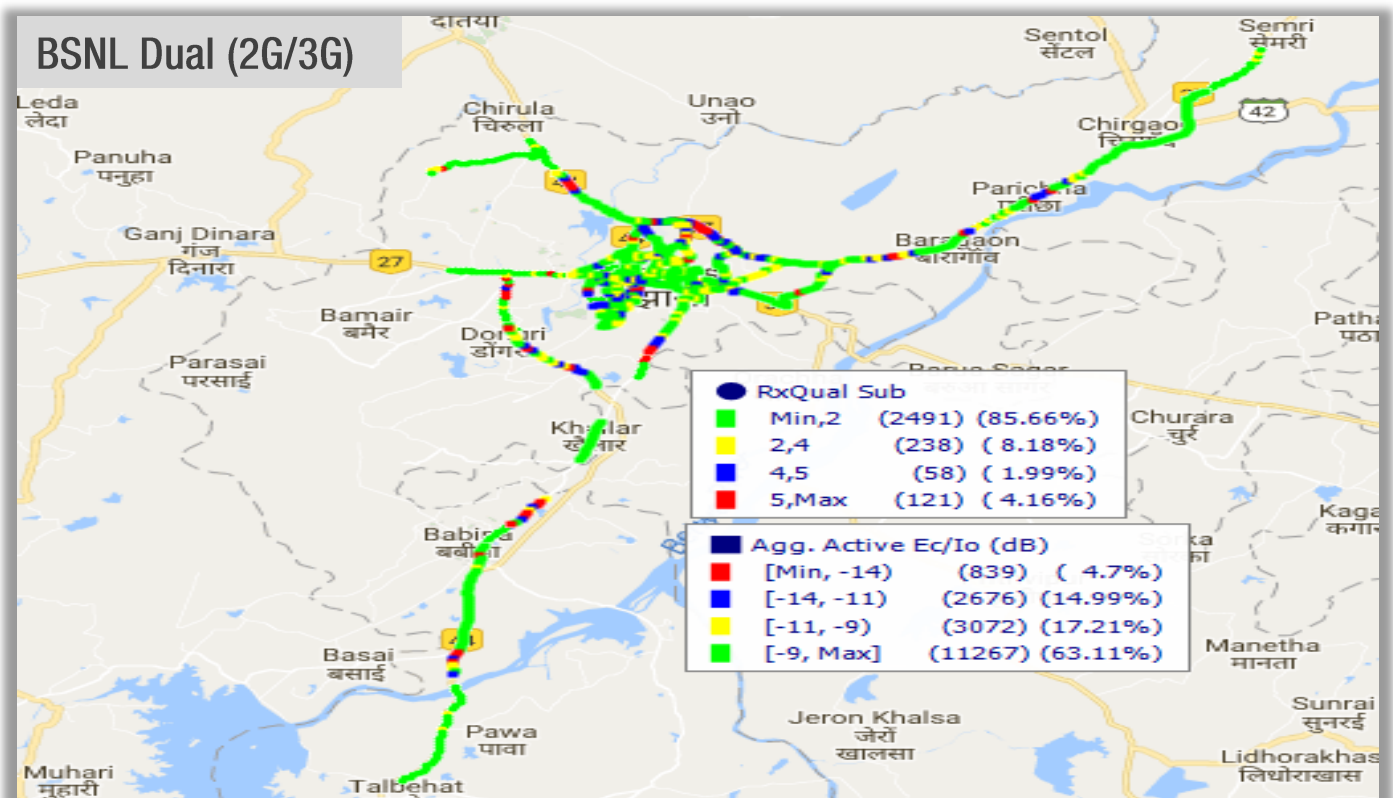
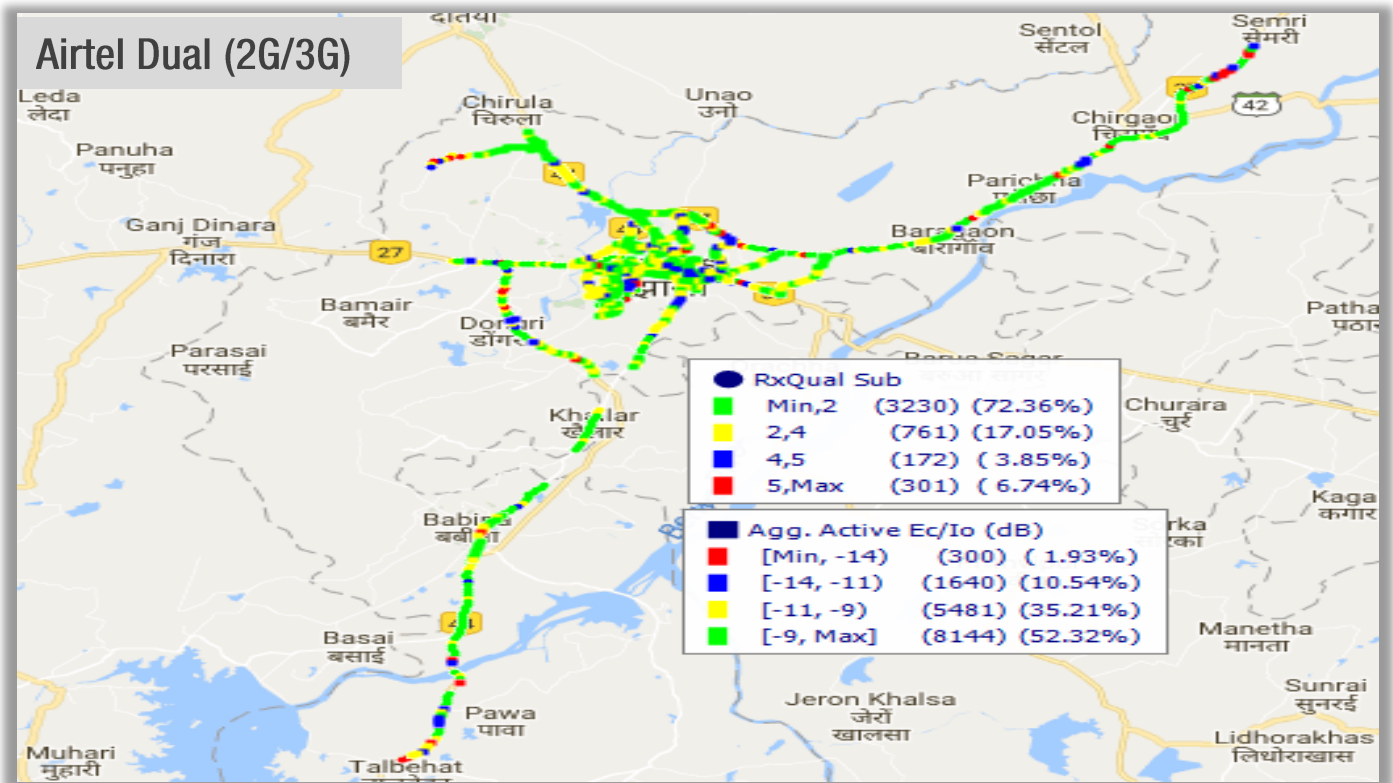
II. Quality Details (contd.)



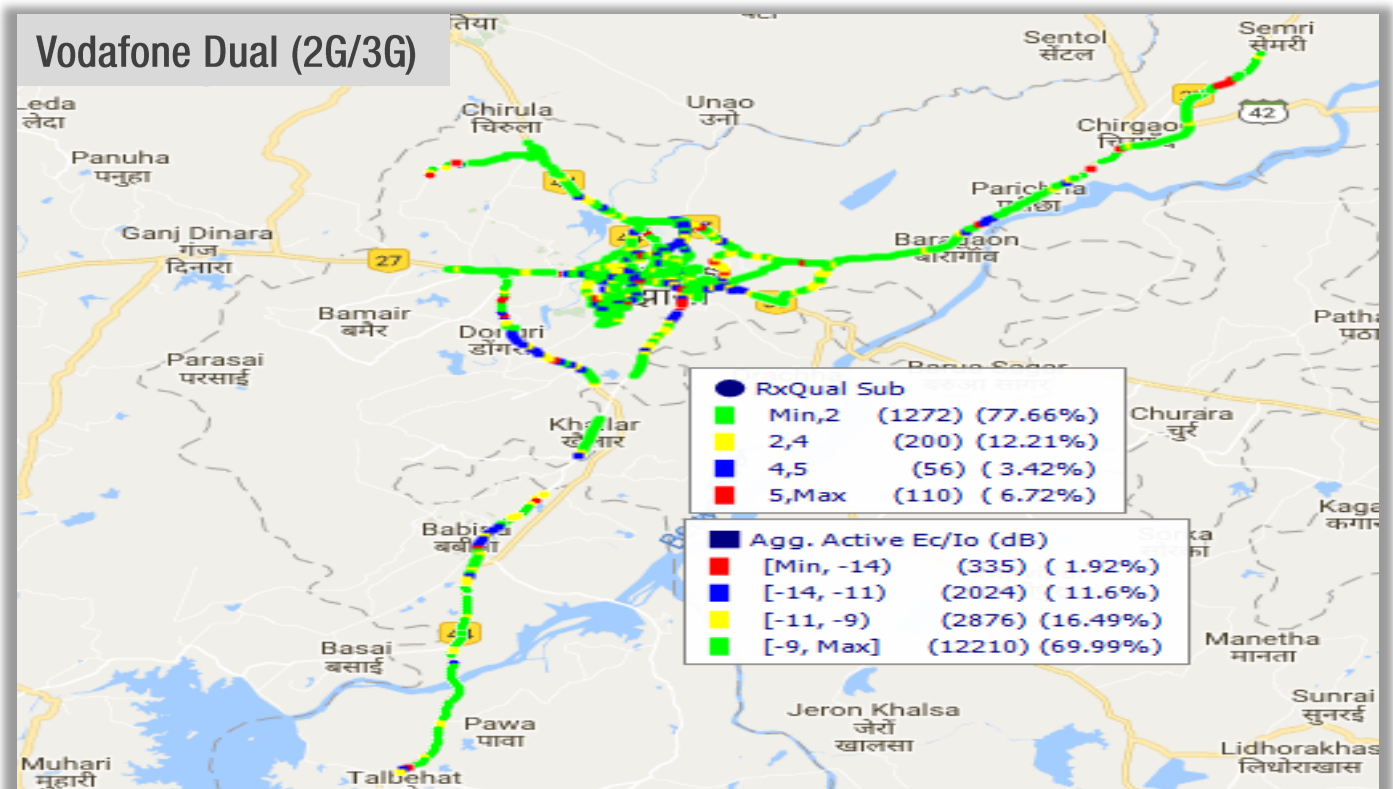
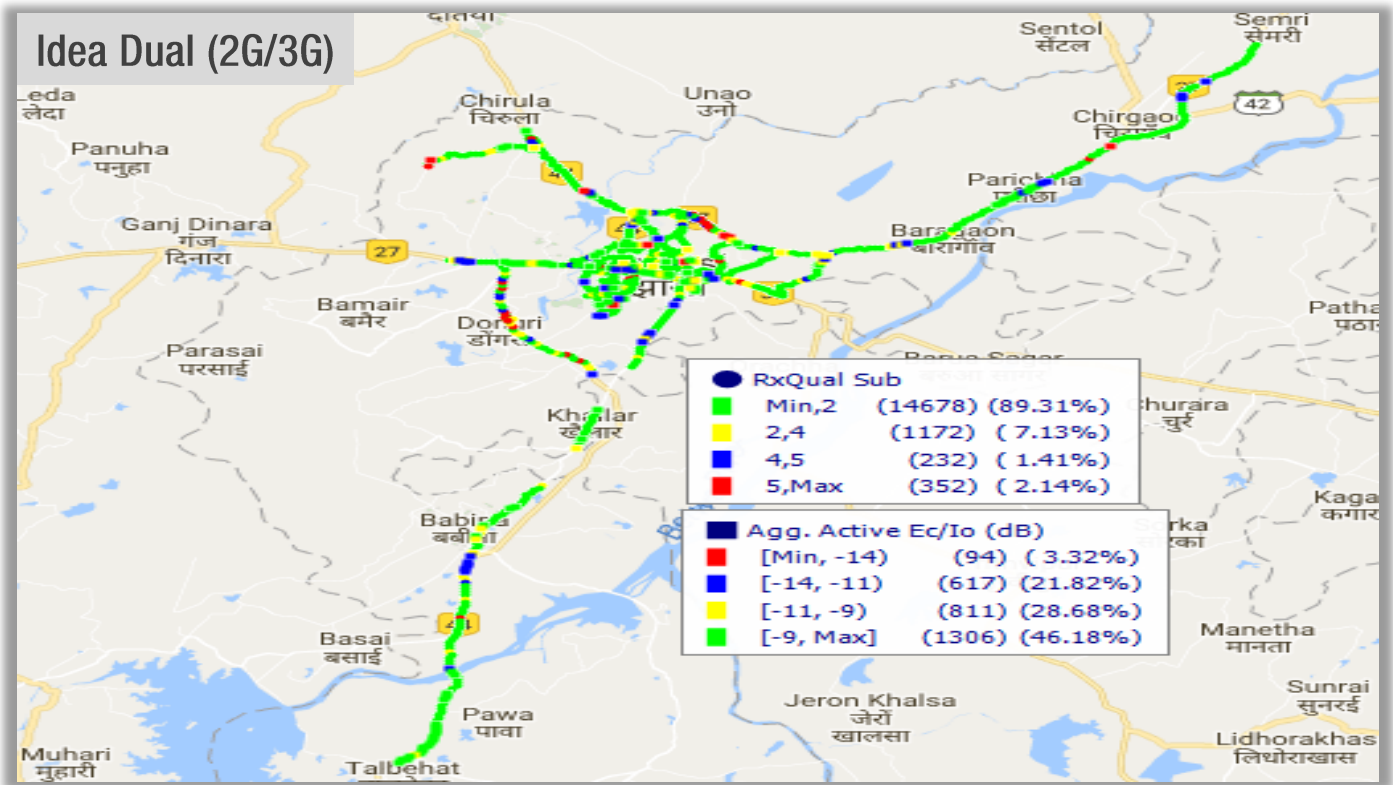
II. Quality Details (contd.)



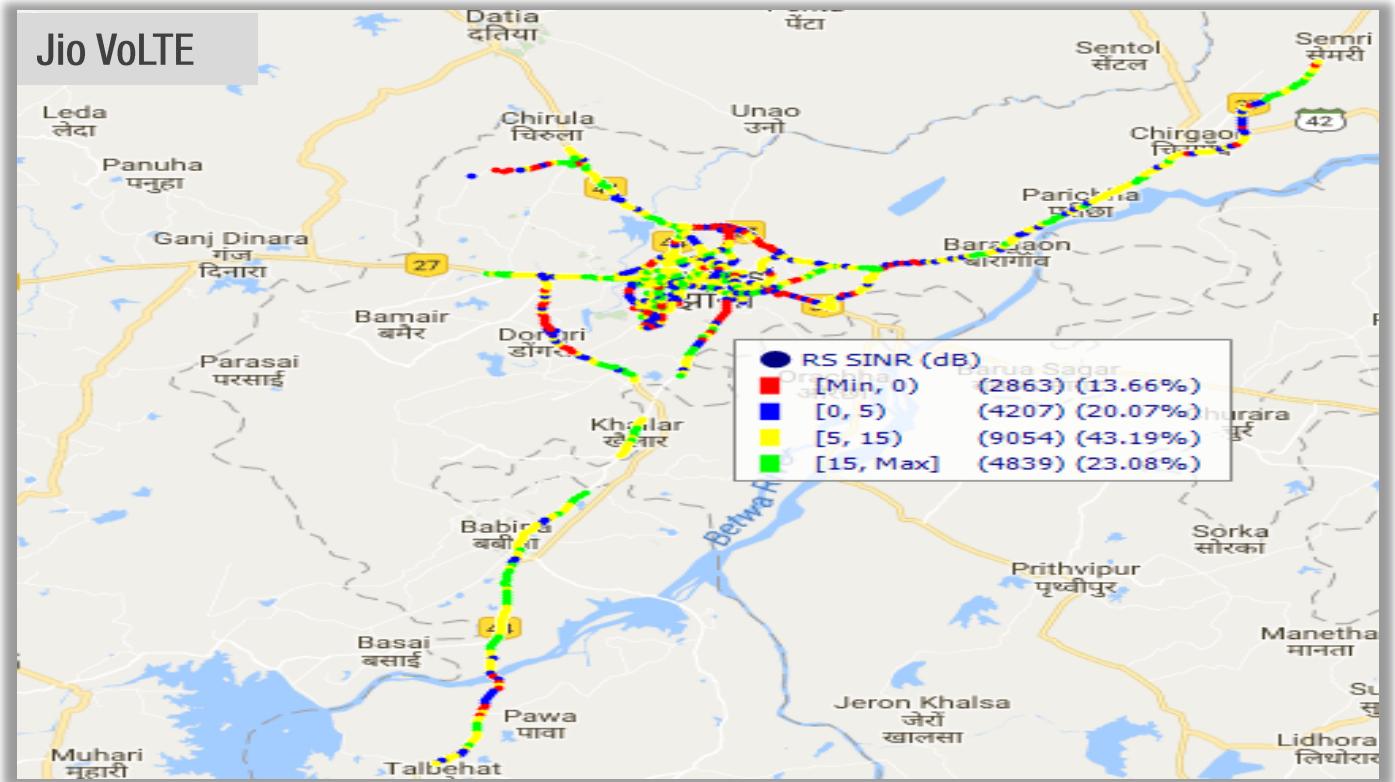
II. Quality Details (contd.)



II. Quality Details (contd.)

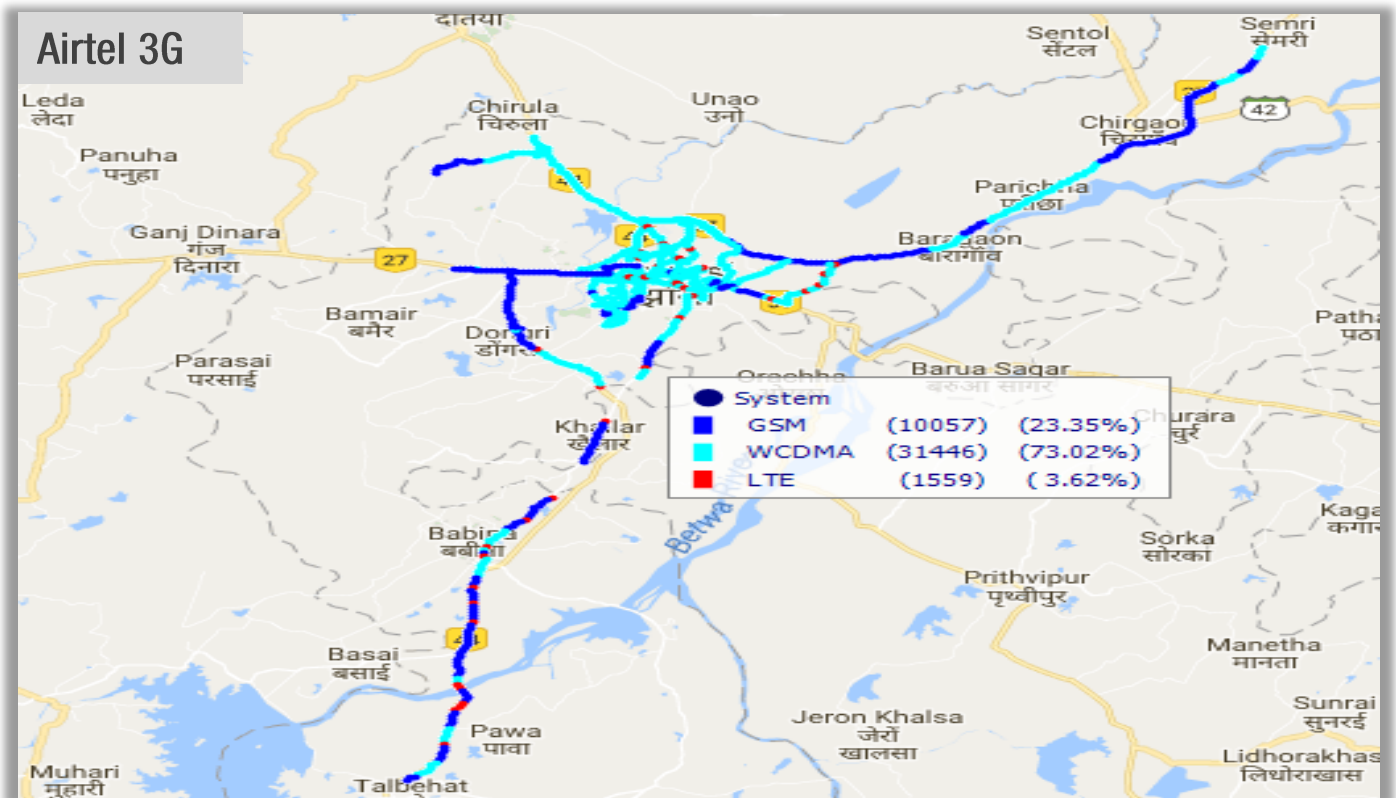
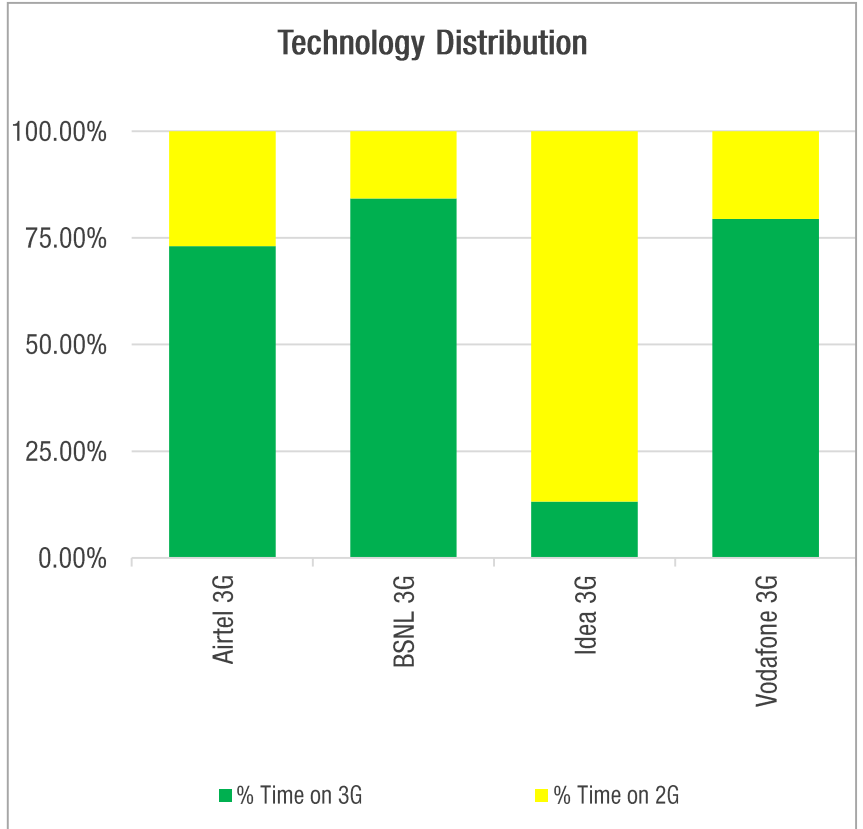


II. Quality Details (contd.)

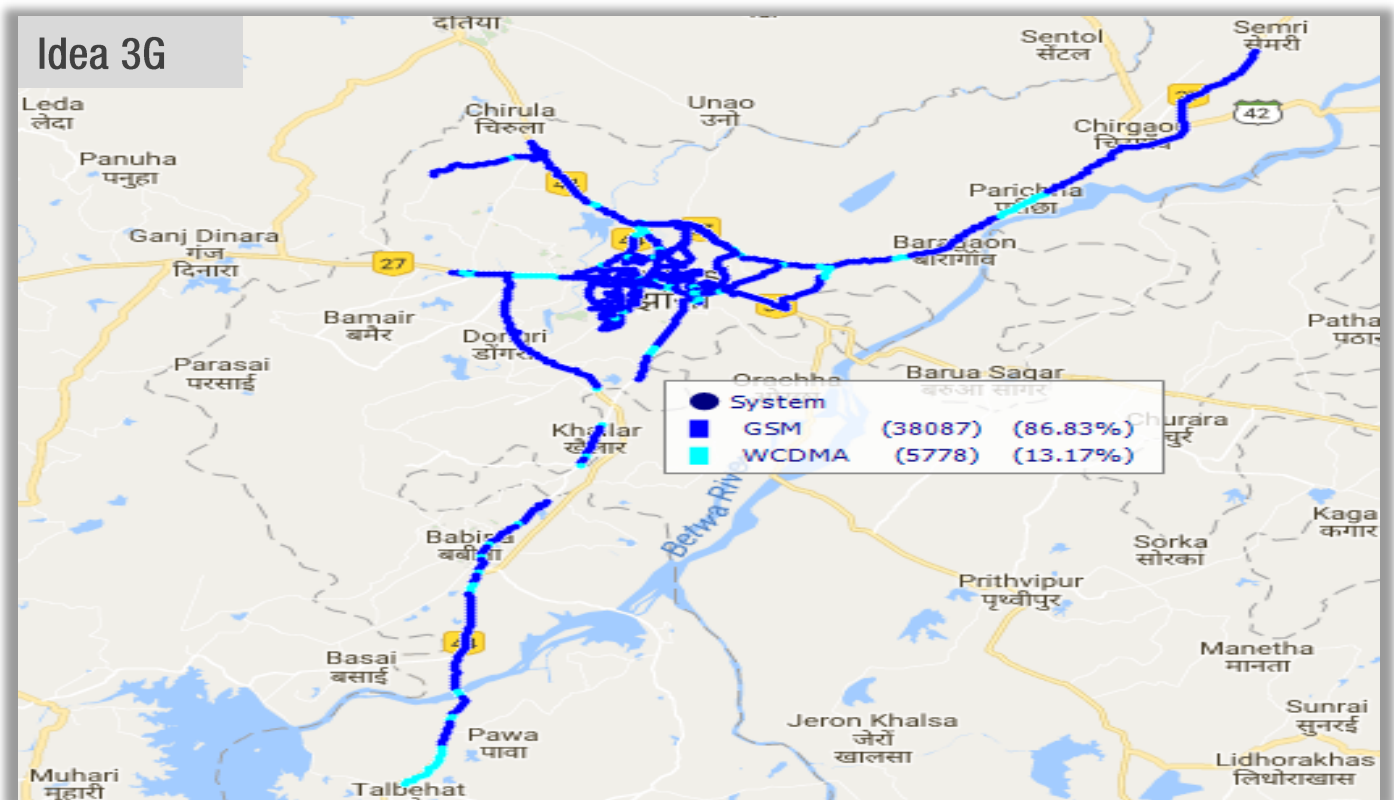
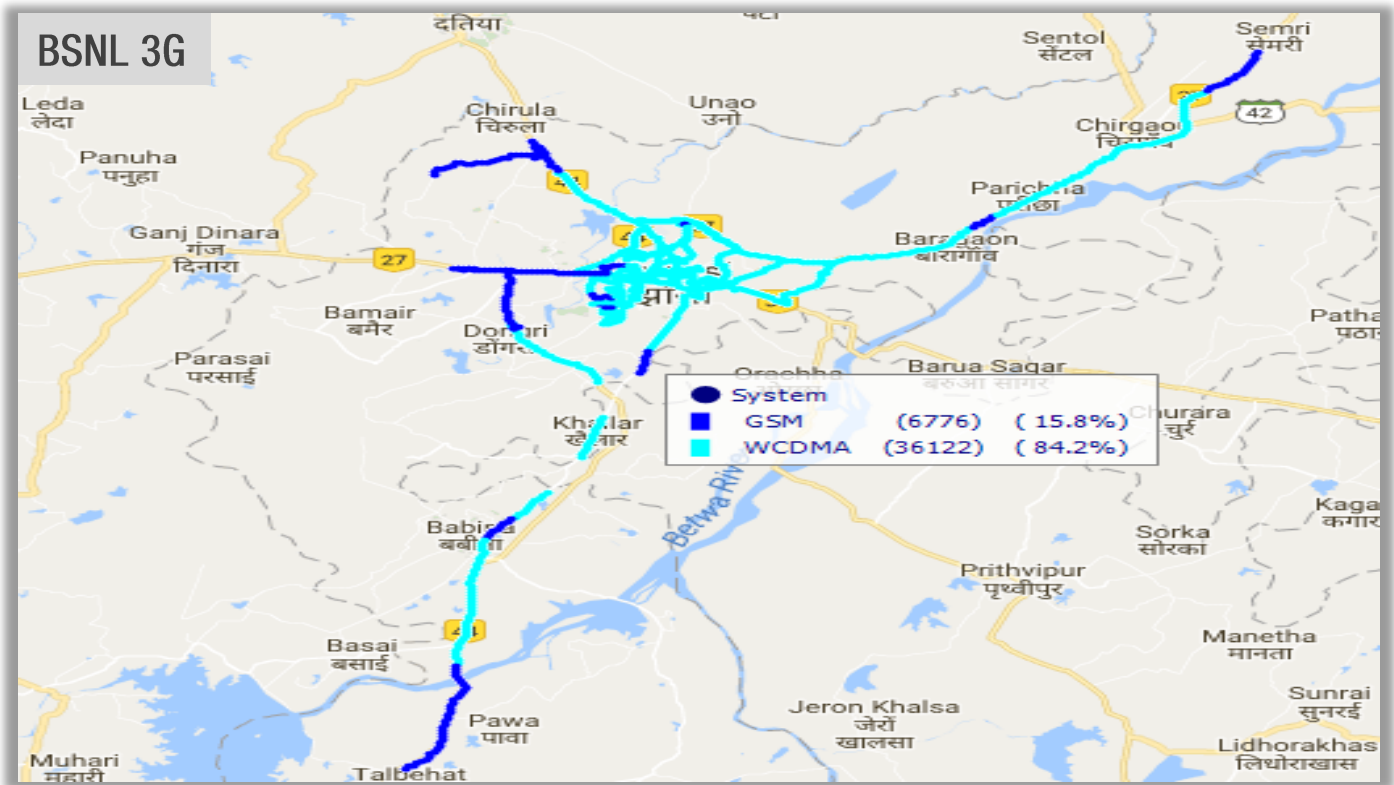


III. Technology Details

TSP	% Time on 3G
Airtel 3G	73.02%
BSNL3G	84.20%
Idea 3G	13.17%
Vodafone 3G	79.39%



III. Technology Details(contd.)



III. Technology Details(contd.)

