



INDEPENDENT DRIVE TEST REPORT

For

Pondicherry

June

2019

SOUTH ZONE

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

The Independent Drive Test has been carried out by M/s PhiMetrics Technologies Pvt. Ltd. on behalf of TRAI in Pondicherry City & adjoining areas from 9:00 AM to 9:00 PM; 24th June 2019 to 26th June 2019. The drive test covered an drive route of 278 KMs & 5 hotspot over a period of three days. Approximately 382 calls were made for each of the 11 networks: five 2G networks, four 3G networks and two 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 24th June 2019 to 26th June 2019 covering various locations in Pondicherry City & surrounding region. The performance of **Airtel, BSNL, Tata, Vodafone Idea Limited (VIL(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.

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

Drive Test Details For Pondicherry:

Independent Drive test was conducted for a period of three days from 24th June 2019 to 26th June 2019 in Pondicherry 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 278 KMs over a period of two days from 24th June 2019 & 25th June 2019 . Approximately 382 calls were made for each of the 11 networks: five 2G (Lock Mode) networks, four 3G (Dual mode) networks and two VoLTE network covering 5 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 5 static locations for two day on 24th June 2019 & 26th June 2019 ; five 2G (Lock mode) networks, four 3G (Dual mode) networks and four 4G (Free mode) networks covering 5 unique TSPs were tested.

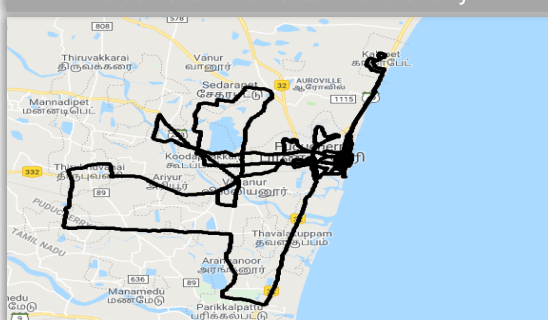
* For Voice and Data KPI's, 2G measurement is done with UE locked on 2G, 3G measurement is done with UE in Dual mode (2G & 3G) and 4G measurement is done with UE in Free Mode.

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

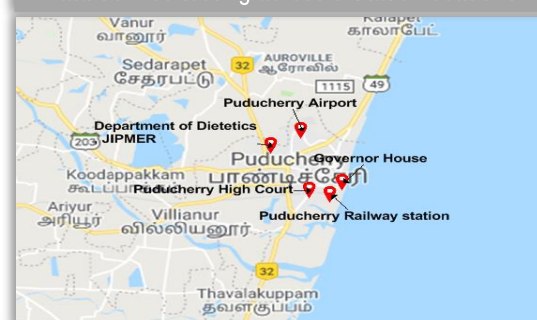
* 4G KPI's which are calculated from the UE in Free Mode included samples and events of 2G & 3G.

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 Test Drive Route - Pondicherry



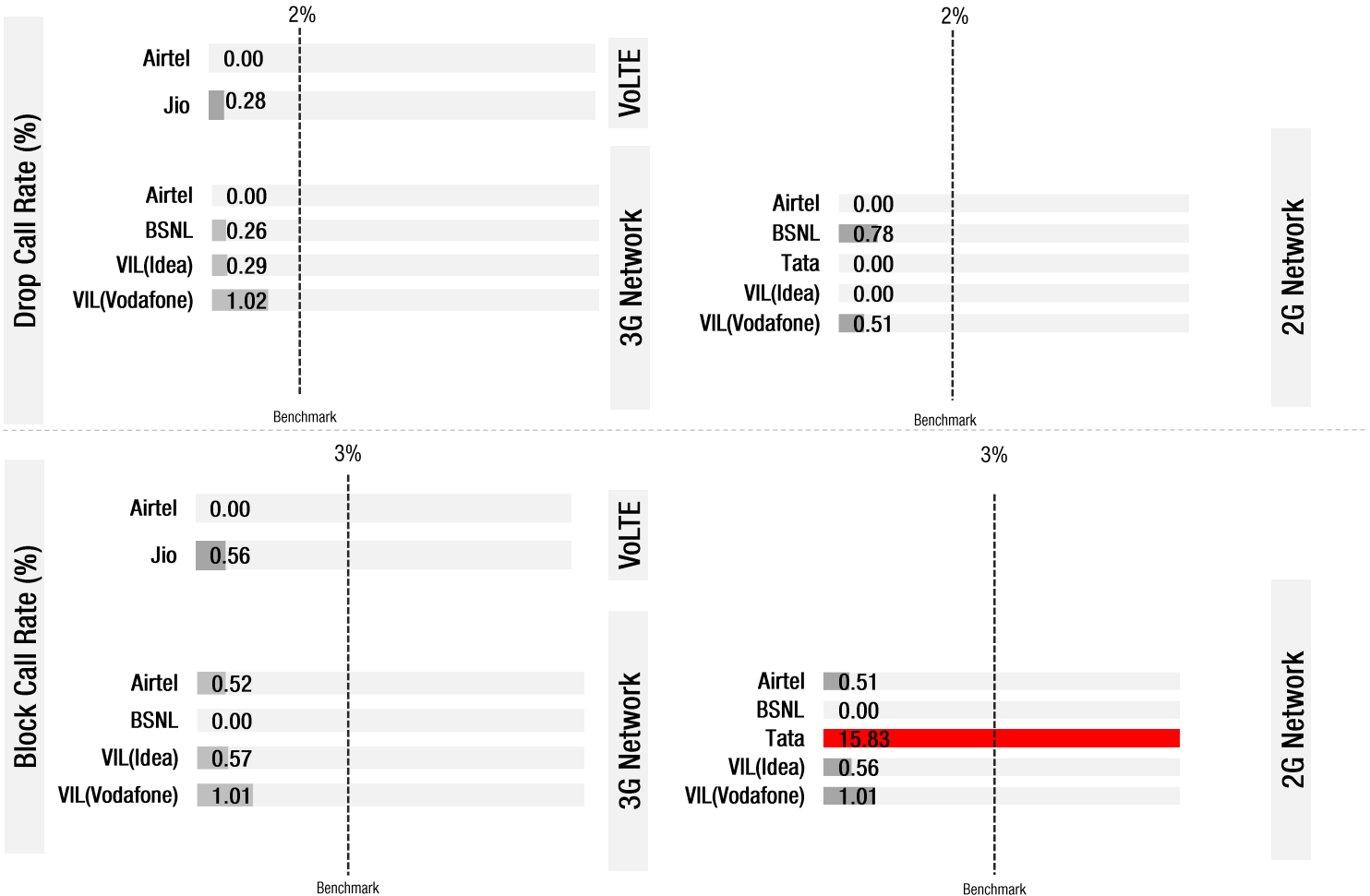
Data Service testing across 5 Static Locations



Voice Calls

Key Observations

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



KPI	2G Networks				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
SDCCH Congestion(<=1%)	0.51%	0.00%	0.00%	0.28%	0.51%
TCH Congestion (<=2%)	0.00%	0.00%	15.83%	0.28%	0.51%

KPI	3G Networks			
	Airtel	BSNL	VIL	
			Idea	Vodafone
CSFB Failure %	0.00%	NA	0.57%	0.00%
SDCCH Congestion%	0.00%	0.00%	0.00%	0.25%
RRC Congestion%	0.52%	0.00%	0.00%	0.51%
SDCCH & RRC Congestion(<=1%)	0.52%	0.00%	0.00%	0.76%
TCH Congestion %	0.00%	0.00%	0.00%	0.00%
RAB Congestion %	0.00%	0.00%	0.00%	0.25%
TCH & RAB Congestion (<=2%)	0.00%	0.00%	0.00%	0.25%

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

*VIL= (Idea, Vodafone)

*NA = Not Applicable

Not meeting Benchmark

Voice Calls

Key Observations

Coverage

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

TSPs	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Coverage%	79.61%	95.35%	80.49%	89.40%	90.87%

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

TSPs	3G				VoLTE	
	Airtel	BSNL	VIL		Airtel	Jio
			Idea	Vodafone		
Coverage %	86.36%	89.31%	88.24%	93.07%	94.91%	96.82%

c) Percentage of time spent on 3G network:

TSPs	3G				
	Airtel	BSNL	VIL		
			Idea	Vodafone	
Time Spent on 3G%	84.58%	66.83%	5.60%	76.83%	

d) Percentage of RLT \geq 48:

TSPs	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
%RLT \geq 48	0.00%	0.00%	0.00%	0.00%	0.57%

e) Average CST Second

TSPs	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
(Sec.)	3.18	2.82	2.99	2.16	2.29

TSPs	3G				VOLTE	
	Airtel	BSNL	VIL		Airtel	Jio
			Idea	Vodafone		
(Sec.)	4.04	2.67	5.03	3.04	2.14	0.36

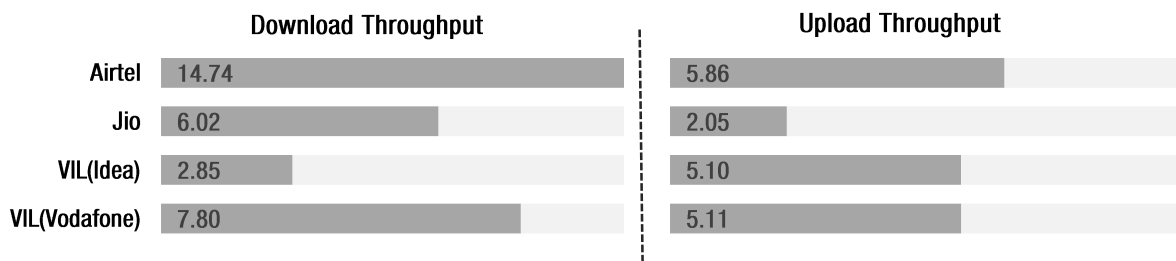
Data Services Static

Key Observations

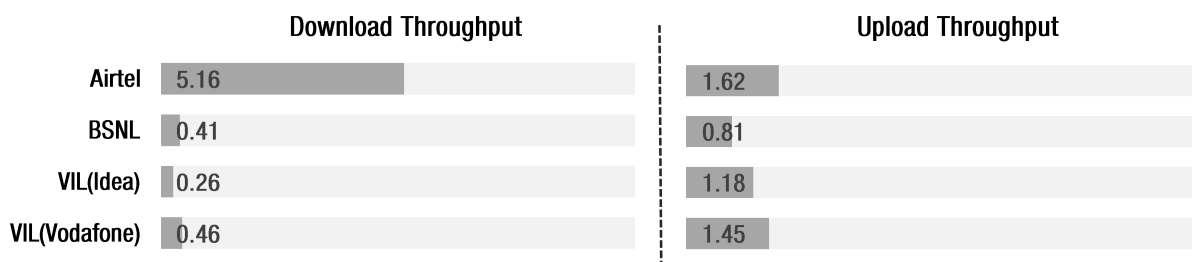
Data was tested at 5 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), Video Streaming (YouTube) and Web browsing (Flipkart, Amazon, PayTm)

Data Download and Upload Performance (Mbps)

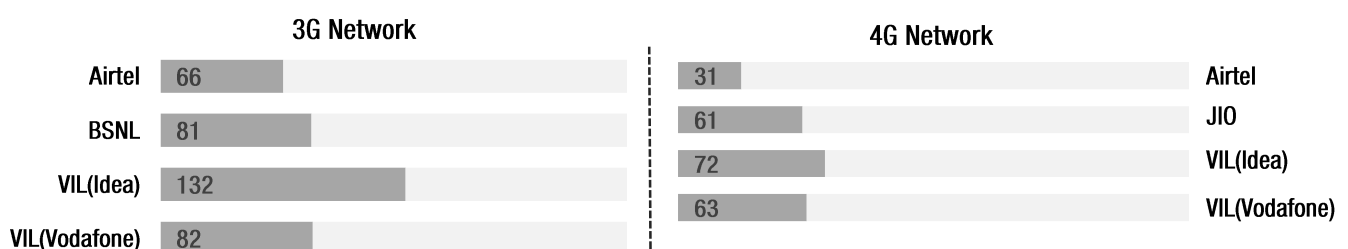
4G Network:



3G Network:



Latency (msec)

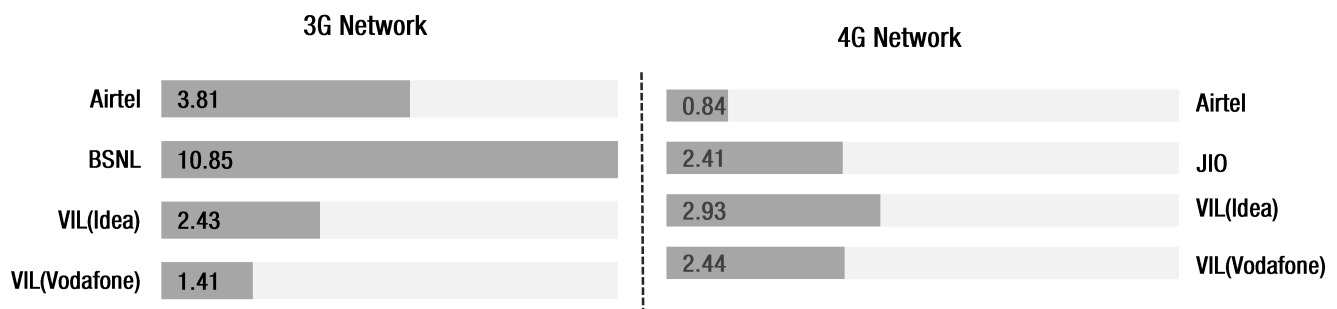


Data Services Static

Key Observations

Video Streaming Performance (130 sec YouTube video sample sizes)

Streaming (sec)

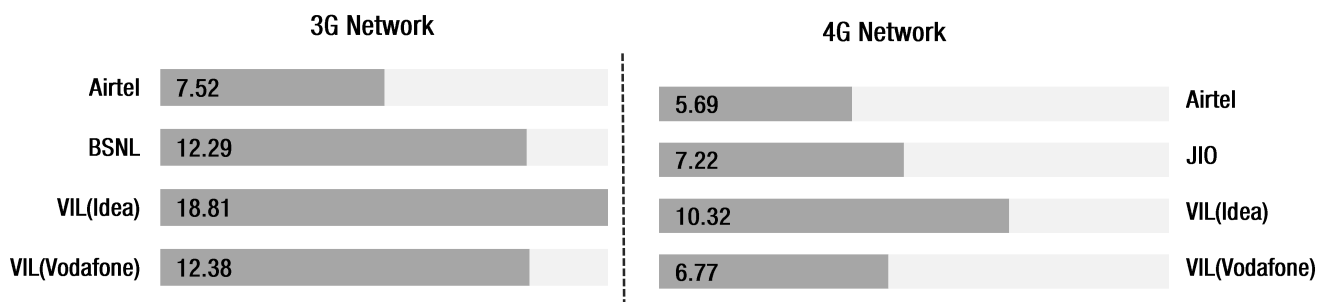


Streaming Delay further broken into 2 parameters which form the end-user perception to assess consistency on Video streaming.

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

Video Streaming	3G				4G			
	Airtel	BSNL	VIL		Airtel	Jio	VIL	
			Idea	Vodafone			Idea	Vodafone
Avg. Initial Start Time (sec)	1.95	8.39	2.43	1.41	0.84	2.66	1.91	2.44
Avg. Interruption Time (sec)	1.87	2.45	0.00	0.00	0.00	0.27	0.50	0.00

Web Page Download Time (sec)



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

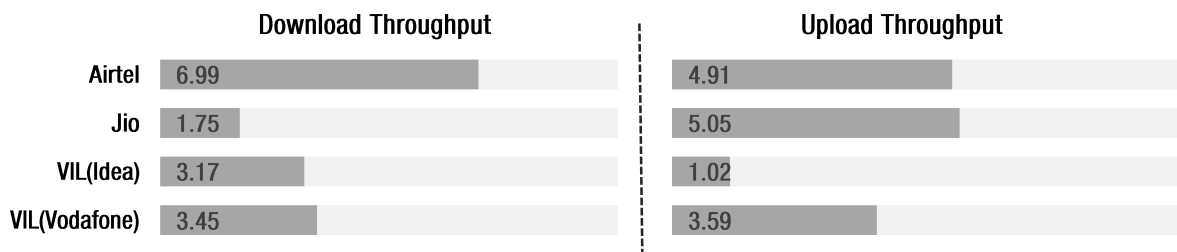
Data Services Dynamic

Key Observations

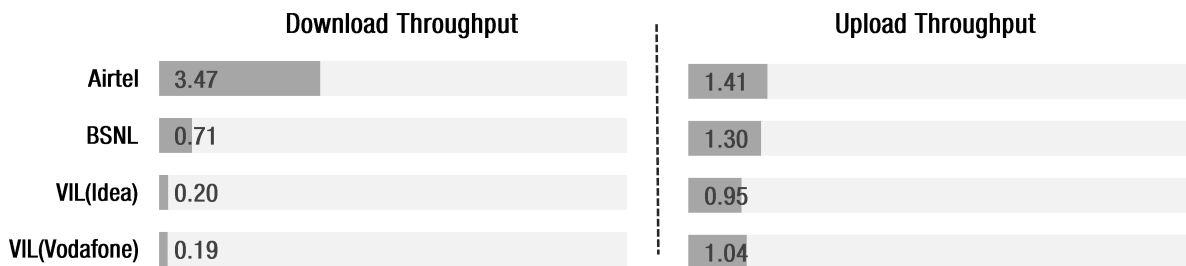
Data was tested between one location to another location .Following services were tested: Data Download/Upload, Latency (www.google.com), Video Streaming (YouTube) and Web browsing (Flipkart, Amazon, PayTm)

Data Download and Upload Performance (Mbps)

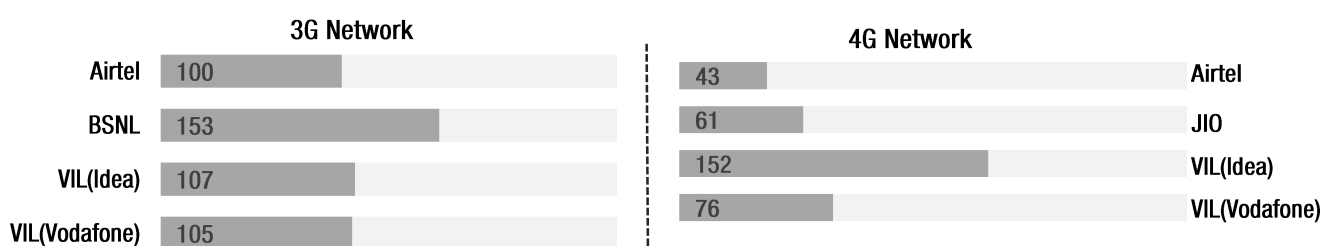
4G Network:



3G Network:



Latency (msec)

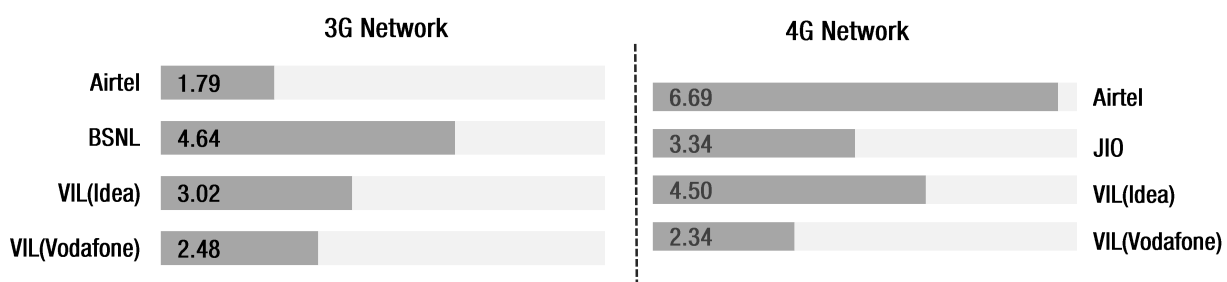


Data Services Dynamic

Key Observations

Video Streaming Performance (130 sec YouTube video sample sizes)

Streaming (sec)

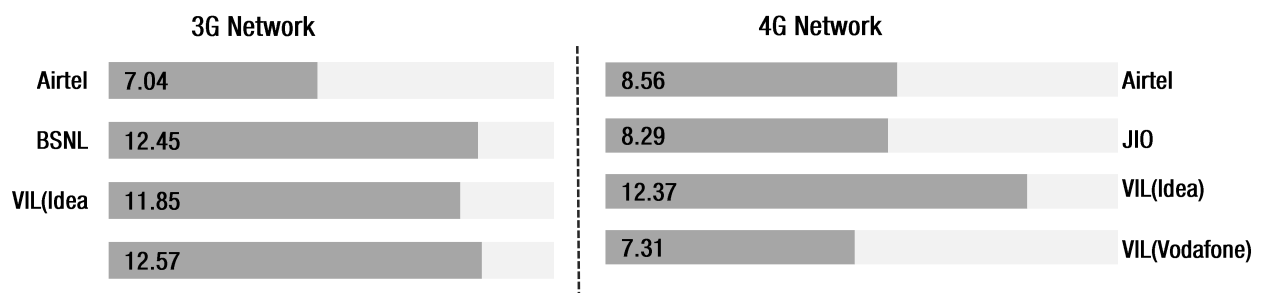


Streaming Delay further broken into 2 parameters which form the end-user perception to assess consistency on Video streaming.

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

Video Streaming	3G				4G			
	Airtel	BSNL	VIL		Airtel	Jio	VIL	
			Idea	Vodafone			Idea	Vodafone
Avg. Initial Start Time (sec)	1.79	4.64	3.02	2.48	6.69	3.34	4.50	2.34
Avg. Interruption Time (sec)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

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	Tata	VIL	
				Idea	Vodafone
Call Attempt	393	385	436	359	396
Blocked Call Rate (%)	0.51%	0.00%	15.83%	0.56%	1.01%
CSSR% (Accessibility)	99.49%	100.00%	84.17%	99.44%	98.99%
Drop Call Rate (%)	0.00%	0.78%	0.00%	0.00%	0.51%
Mobility HOSR (%)	99.29%	99.80%	99.48%	99.76%	98.21%
Rx Quality (%)	98.69%	98.64%	98.86%	98.86%	98.45%

Voice Call	3G				VoLTE	
	Airtel	BSNL	VIL		Airtel	Jio
			Idea	Vodafone		
Call Attempt	386	385	351	395	363	358
Blocked Call Rate (%)	0.52%	0.00%	0.57%	1.01%	0.00%	0.56%
CSSR% (Accessibility)	99.48%	100.00%	99.43%	98.99%	100.00%	99.44%
Drop Call Rate (%)	0.00%	0.26%	0.29%	1.02%	0.00%	0.28%
Mobility HOSR (%)	100.00%	100.00%	100.00%	99.92%	100.00%	99.65%
Rx Quality (%)	96.82%	97.92%	95.60%	91.68%	85.90%	88.15%

Summary

City Level Summary(contd.)

Data Services Static	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Download Throughput (Kbps)	150.33	95.61	145.04	121.18	123.95
Upload Throughput (kbps)	64.19	42.35	65.59	49.51	52.08
Web Browsing Delay (sec)	17.39	11.45	18.64	15.92	16.24
Latency (msec)	242	270	223	289	317

Data Services Static	3G				4G			
	Airtel	BSNL	VIL		Airtel	Jio	VIL	
			Idea	Vodafone			Idea	Vodafone
Download Throughput (Mbps)	5.16	0.41	0.26	0.46	14.74	6.02	2.85	7.80
Upload Throughput (Mbps)	1.62	0.81	1.18	1.45	5.86	2.05	5.10	5.11
Web Browsing Delay (sec)	7.52	12.29	18.81	12.38	5.69	7.22	10.32	6.77
Video Streaming Delay (sec)	3.81	10.85	2.43	1.41	0.84	2.41	2.93	2.44
Latency (msec)	66	81	132	82	31	61	72	63

Data Services Dynamic	3G				4G			
	Airtel	BSNL	VIL		Airtel	Jio	VIL	
			Idea	Vodafone			Idea	Vodafone
Download Throughput (Mbps)	3.47	0.71	0.20	0.19	6.99	1.75	3.17	3.45
Upload Throughput (Mbps)	1.41	1.30	0.95	1.04	4.91	5.05	1.02	3.59
Web Browsing Delay (sec)	7.04	12.45	11.85	12.57	8.56	8.29	12.37	7.31
Video Streaming Delay (sec)	1.79	4.64	3.02	2.48	6.69	3.34	4.50	2.34
Latency (msec)	100	153	107	105	43	61	152	76

Summary

City Level Summary(contd.)

Department of Dietetics, JIPMER	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Download Throughput (Kbps)	169.15	58.08	169.15	63.02	63.02
Upload Throughput (kbps)	74.89	#DIV/0!	74.89	18.74	18.74
Web Browsing Delay (sec)	19.46	0.48	19.46	9.86	14.86
Latency (msec)	285	351	285	186	186

Department of Dietetics, JIPMER	3G				4G			
	Airtel	BSNL	VIL		Airtel	Jio	VIL	
			Idea	Vodafone			Idea	Vodafone
Download Throughput (Mbps)	4.80	1.20	0.34	0.22	18.10	9.29	3.73	2.23
Upload Throughput (Mbps)	1.80	0.33	1.15	0.98	5.74	5.28	7.28	3.54
Web Browsing Delay (sec)	7.19	3.15	20.46	13.87	4.87	5.19	6.93	6.78
Video Streaming Delay (sec)	1.32	8.68	2.09	2.01	0.72	1.18	0.95	1.18
Latency (msec)	95	77	153	93	31	52	75	76

Governor House	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Download Throughput (Kbps)	156.99	120.33	135.65	86.50	118.85
Upload Throughput (kbps)	68.44	48.12	44.53	29.20	29.76
Web Browsing Delay (sec)	15.74	10.07	18.18	19.98	15.97
Latency (msec)	221	189	166	401	405

Governor House	3G				4G			
	Airtel	BSNL	VIL		Airtel	Jio	VIL	
			Idea	Vodafone			Idea	Vodafone
Download Throughput (Mbps)	7.80	0.50	0.38	0.78	16.34	8.87	1.62	7.63
Upload Throughput (Mbps)	1.68	1.22	1.07	1.26	7.03	1.05	2.03	2.94
Web Browsing Delay (sec)	5.82	17.57	17.84	13.17	5.62	6.18	12.66	7.45
Video Streaming Delay (sec)	1.10	13.67	0.85	2.11	0.95	0.70	4.86	1.20
Latency (msec)	45	81	154	82	31	57	72	84

*T0=Timeout

Summary

City Level Summary(contd.)

Puducherry Airport	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Download Throughput (Kbps)	136.62	122.95	124.00	130.08	96.21
Upload Throughput (kbps)	51.74	59.16	67.40	53.63	59.83
Web Browsing Delay (sec)	16.22	14.39	18.51	14.67	19.98
Latency (msec)	323	420	212	316	275

Puducherry Airport	3G				4G			
	Airtel	BSNL	VIL		Airtel	Jio	VIL	
			Idea	Vodafone			Idea	Vodafone
Download Throughput (Mbps)	5.41	0.40	0.19	0.51	6.86	0.95	2.04	2.83
Upload Throughput (Mbps)	1.70	0.44	0.09	1.57	4.76	2.05	4.92	7.72
Web Browsing Delay (sec)	6.46	13.26	18.42	12.27	6.46	10.46	9.08	6.32
Video Streaming Delay (sec)	1.04	12.08	9.37	1.06	0.79	5.35	2.24	6.60
Latency (msec)	40	79	157	74	34	59	55	56

Puducherry High Court	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Download Throughput (Kbps)	156.38	125.24	151.62	85.11	138.53
Upload Throughput (kbps)	66.84	46.73	72.63	60.83	66.52
Web Browsing Delay (sec)	18.08	11.97	18.47	14.46	11.17
Latency (msec)	133	200	186	256	385

Puducherry High Court	3G				4G			
	Airtel	BSNL	VIL		Airtel	Jio	VIL	
			Idea	Vodafone			Idea	Vodafone
Download Throughput (Mbps)	0.92	0.05	0.18	0.17	13.05	6.49	0.48	6.99
Upload Throughput (Mbps)	1.22	0.37	1.77	1.45	5.30	0.86	3.29	4.83
Web Browsing Delay (sec)	12.21	8.31	18.68	13.45	6.77	7.33	14.35	8.58
Video Streaming Delay (sec)	14.71	12.72	1.00	1.21	0.87	0.72	7.72	1.14
Latency (msec)	109	104	115	97	29	68	79	68

*T0=Timeout

Summary

City Level Summary(contd.)

Puducherry Railway station	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Download Throughput (Kbps)	132.49	26.41	144.80	202.43	162.53
Upload Throughput (kbps)	59.05	15.39	68.50	74.89	74.47
Web Browsing Delay (sec)	17.33	13.35	18.58	17.35	18.08
Latency (msec)	248	231	252	215	249

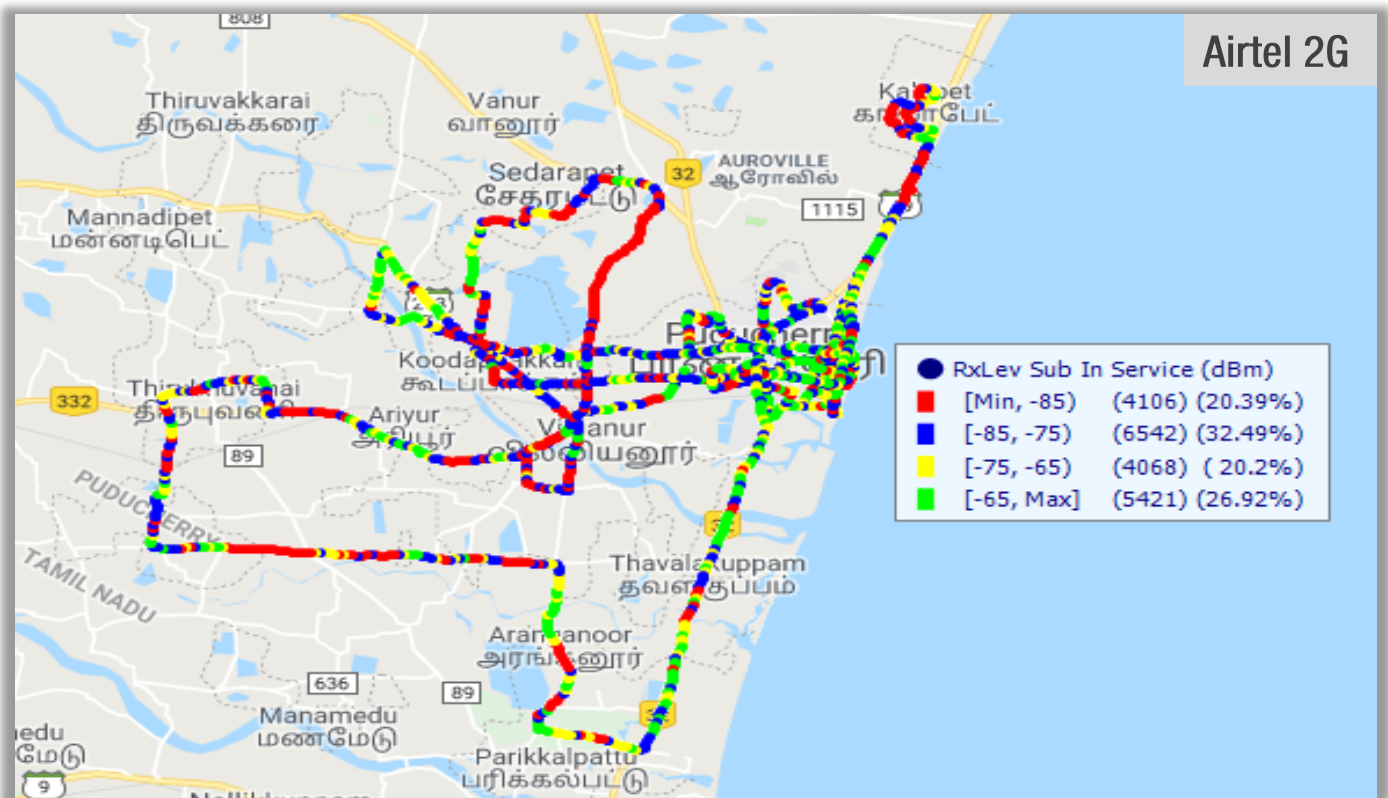
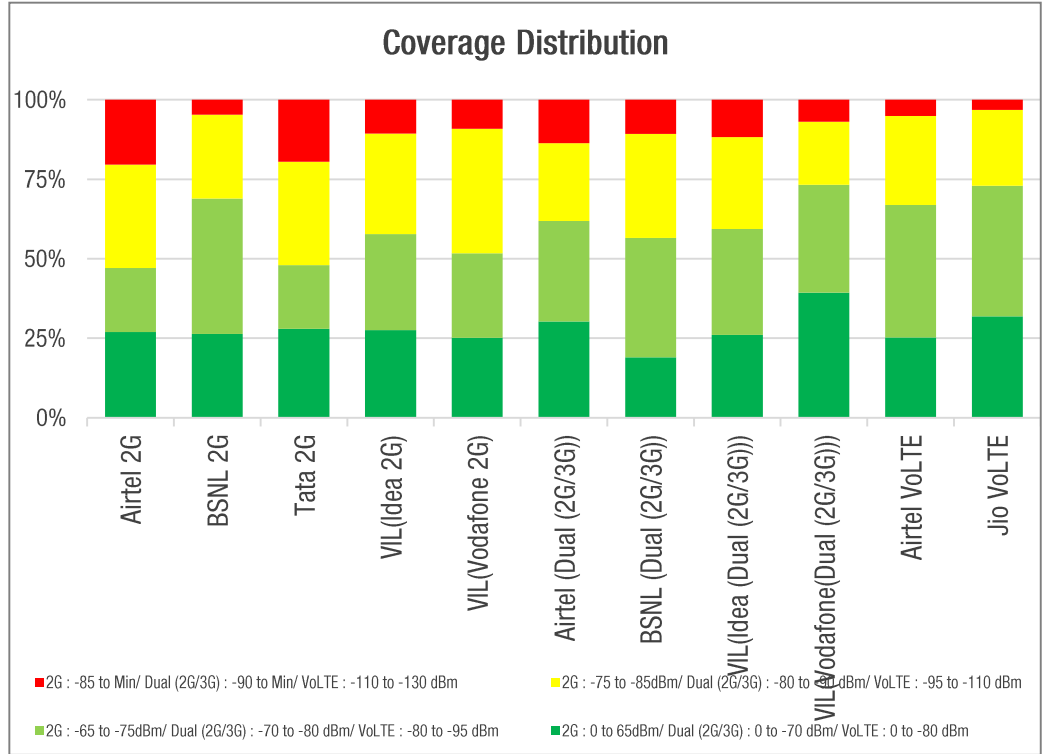
Puducherry Railway station	3G				4G			
	Airtel	BSNL	VIL		Airtel	Jio	VIL	
			Idea	Vodafone			Idea	Vodafone
Download Throughput (Mbps)	6.88	0.41	0.21	0.62	19.34	4.51	6.00	19.34
Upload Throughput (Mbps)	1.70	1.36	1.44	2.01	6.50	0.99	7.67	6.50
Web Browsing Delay (sec)	5.91	12.86	18.51	9.03	4.70	6.92	8.58	4.70
Video Streaming Delay (sec)	0.89	10.53	0.70	0.96	0.89	1.43	0.69	1.34
Latency (msec)	41	67	75	67	30	70	78	30

*TO=Timeout

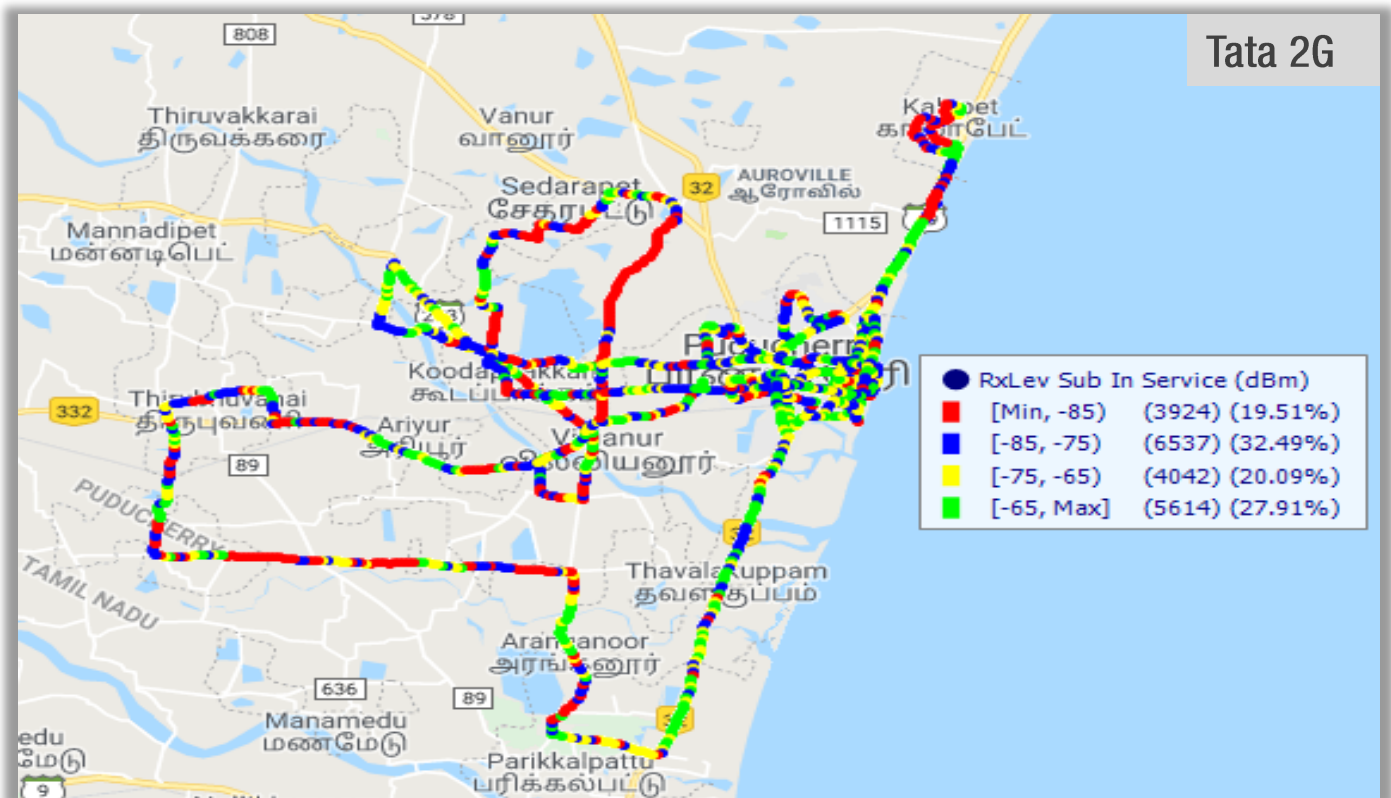
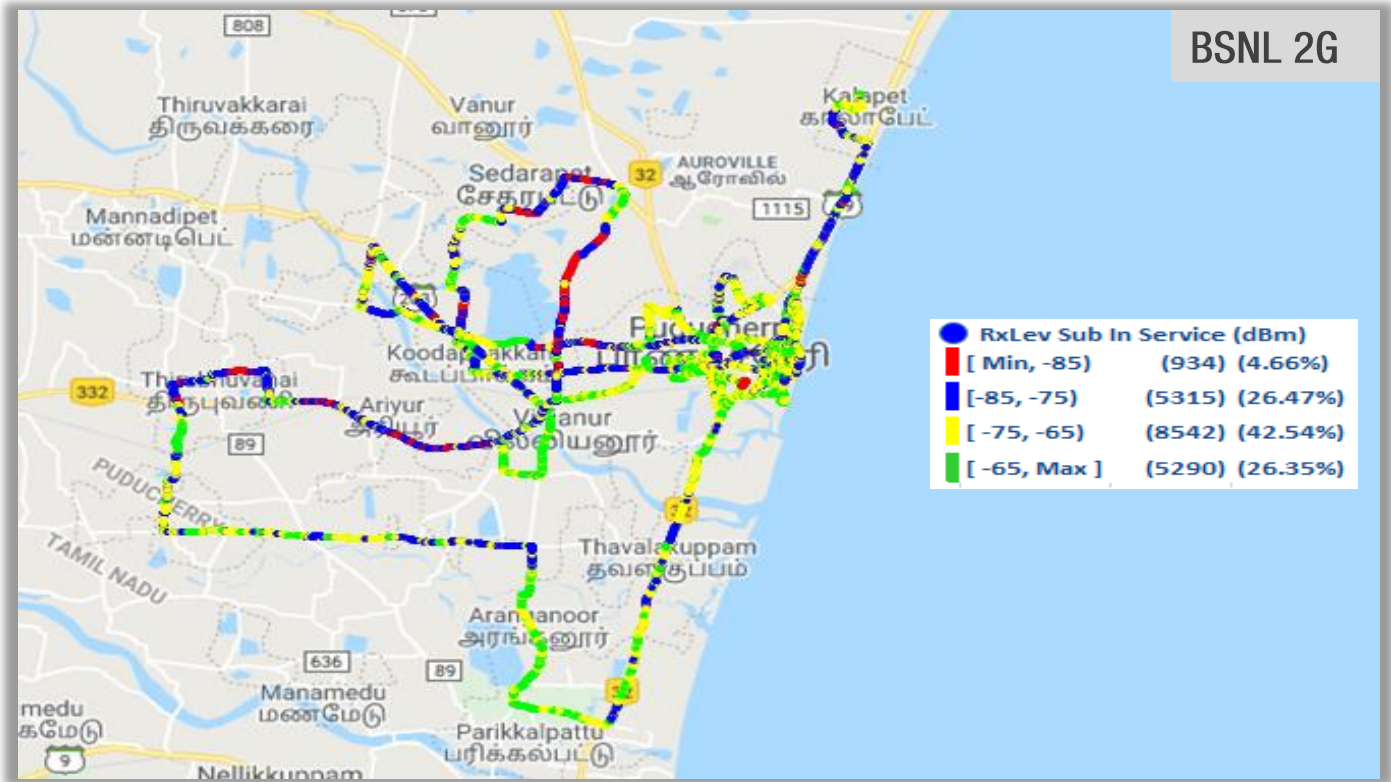
I. Coverage Details

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.

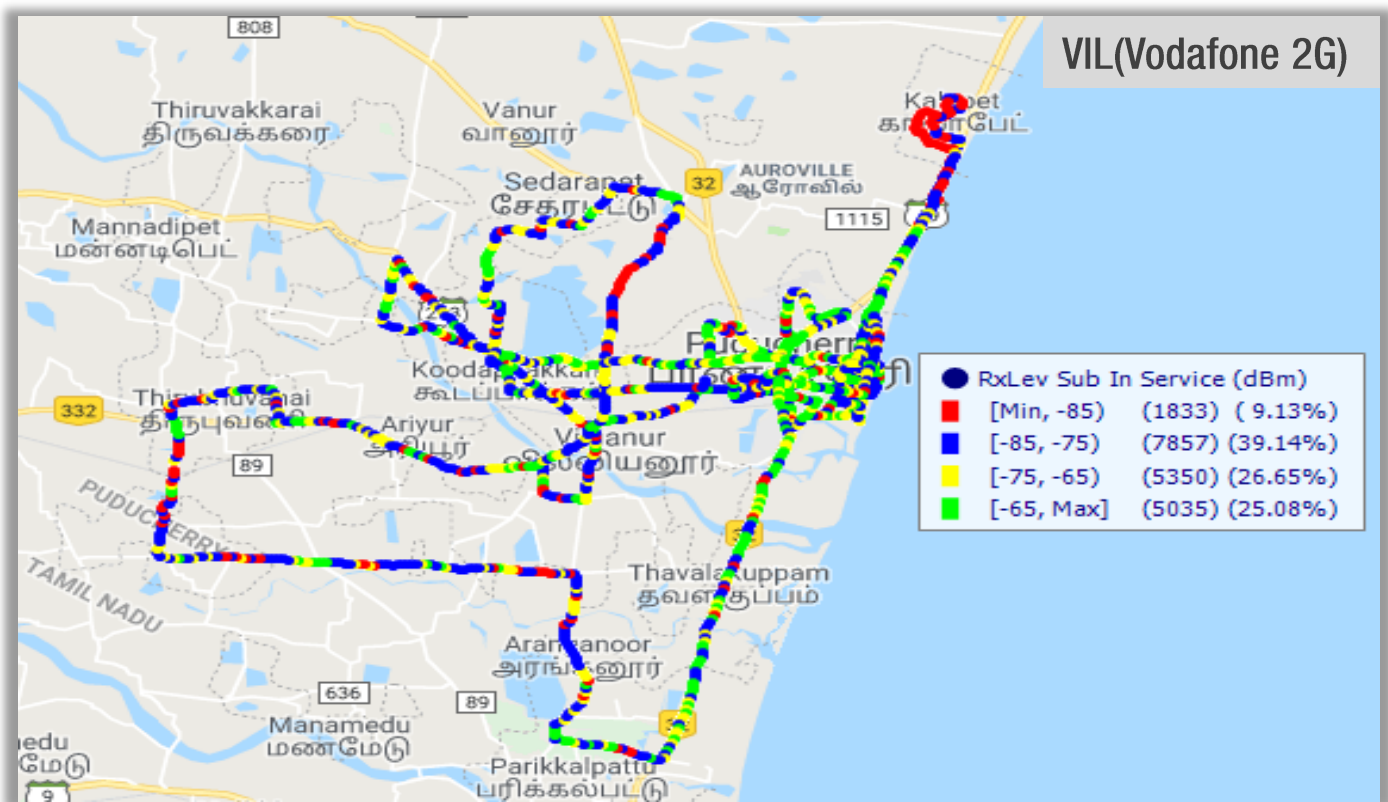
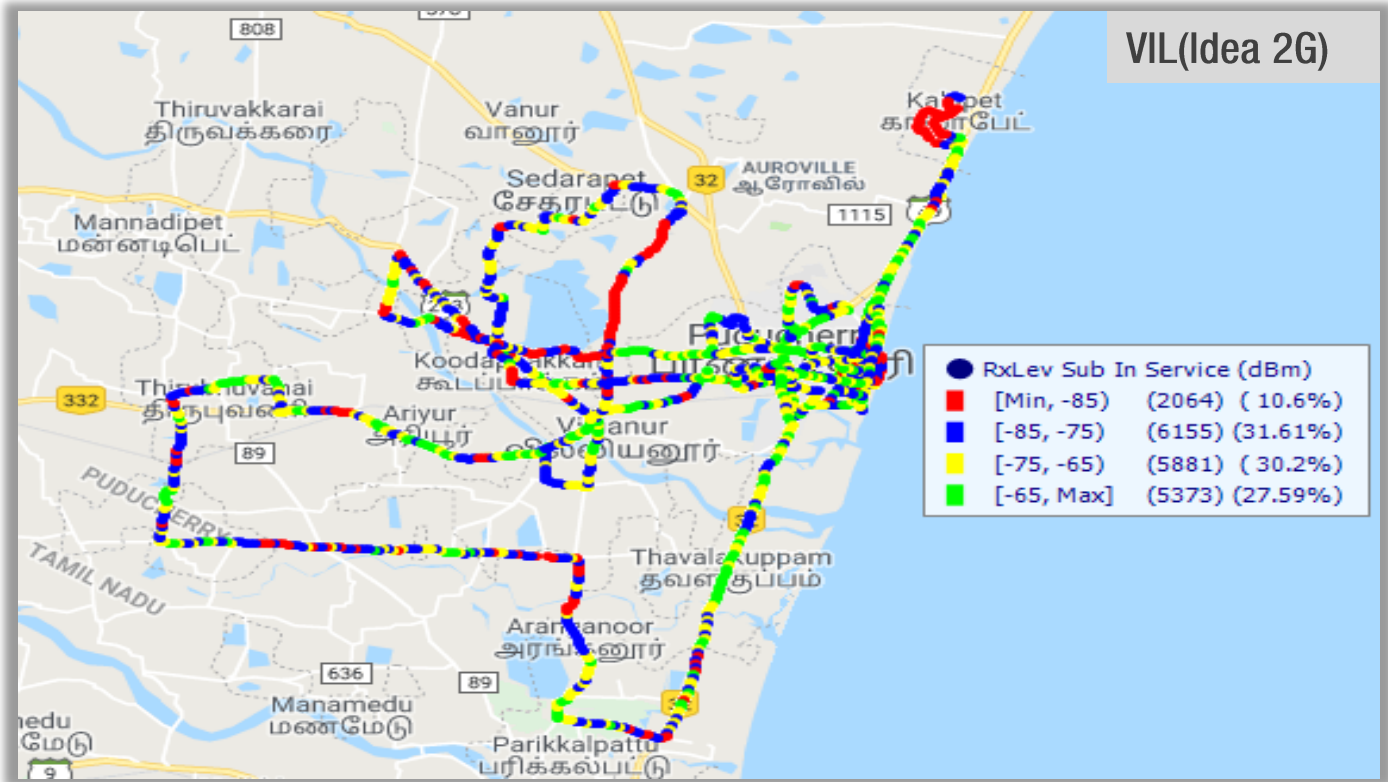
TSP	Coverage Rate
Airtel 2G	79.61%
BSNL 2G	95.35%
Tata 2G	80.49%
VIL(Idea 2G)	89.40%
VIL(Vodafone 2G)	90.87%
Airtel Dual (2G/3G)	86.36%
BSNL Dual (2G/3G)	89.31%
VIL(Idea Dual (2G/3G))	88.24%
VIL(Vodafone Dual (2G/3G))	93.07%
Airtel (VoLTE)	94.91%
Jio (VoLTE)	96.82%



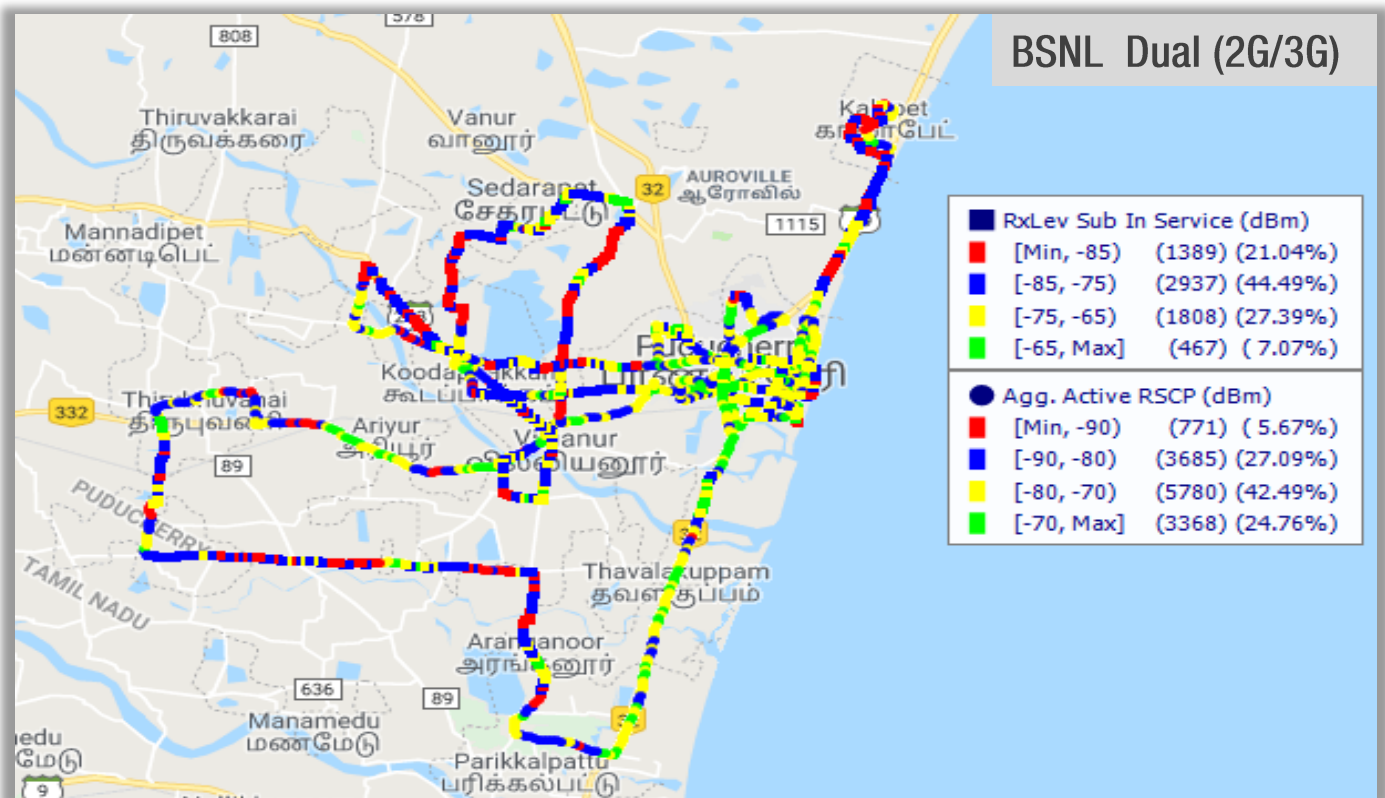
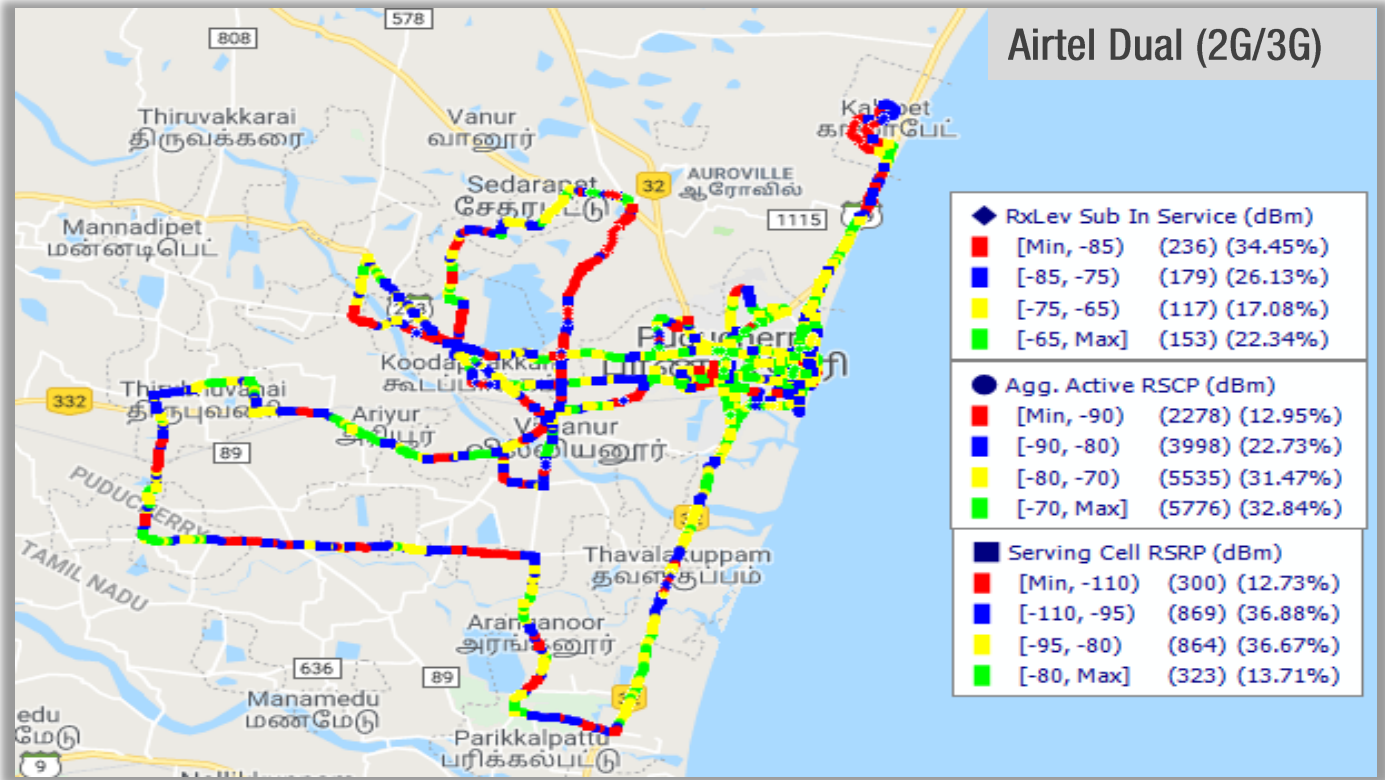
I. Coverage Details (contd.)



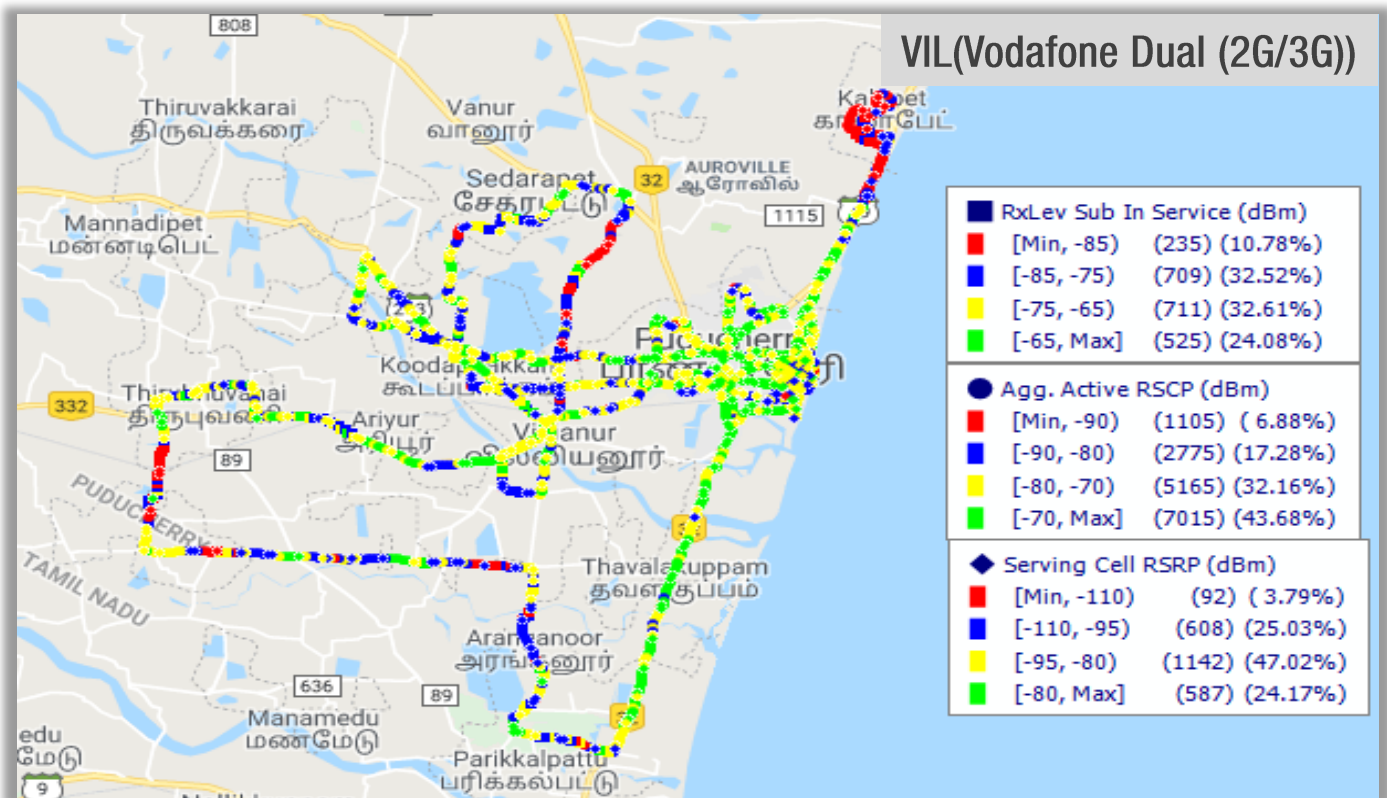
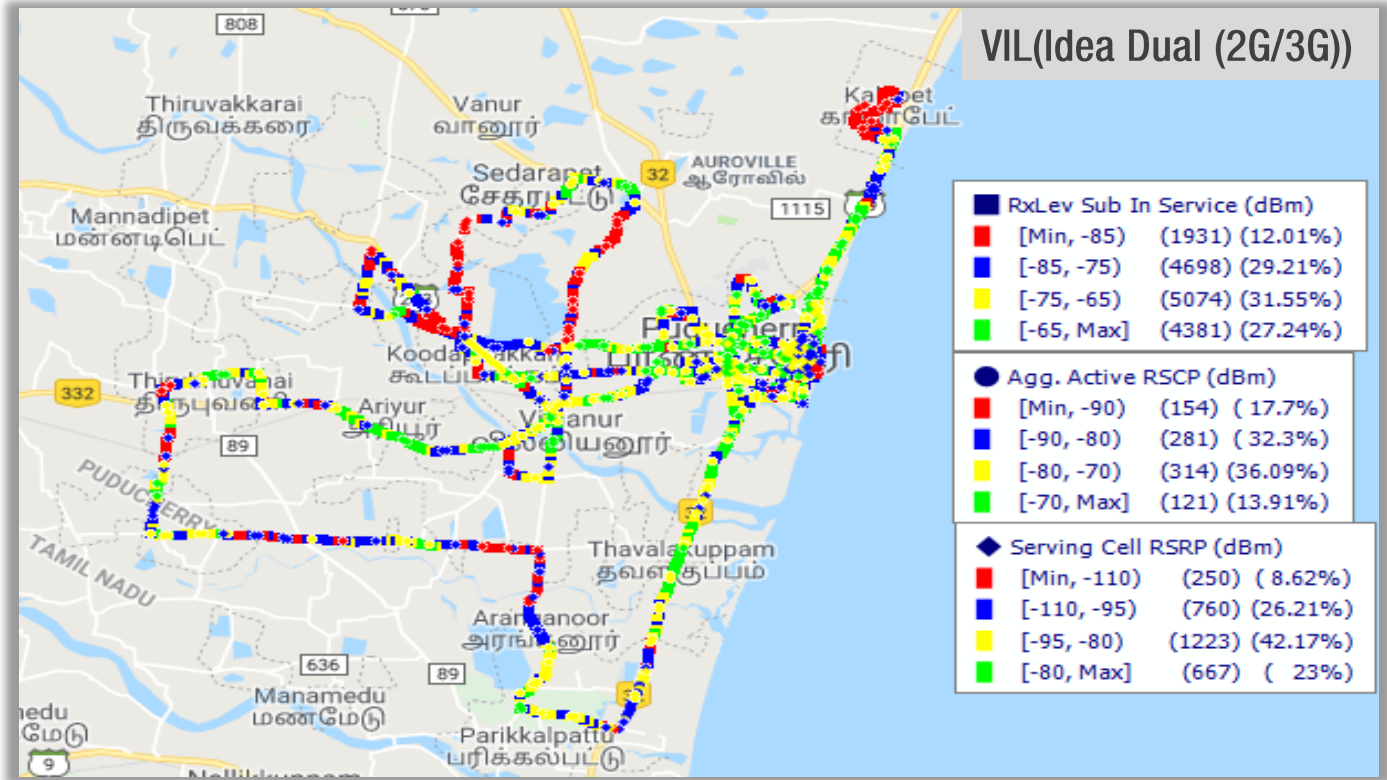
I. Coverage Details (contd.)



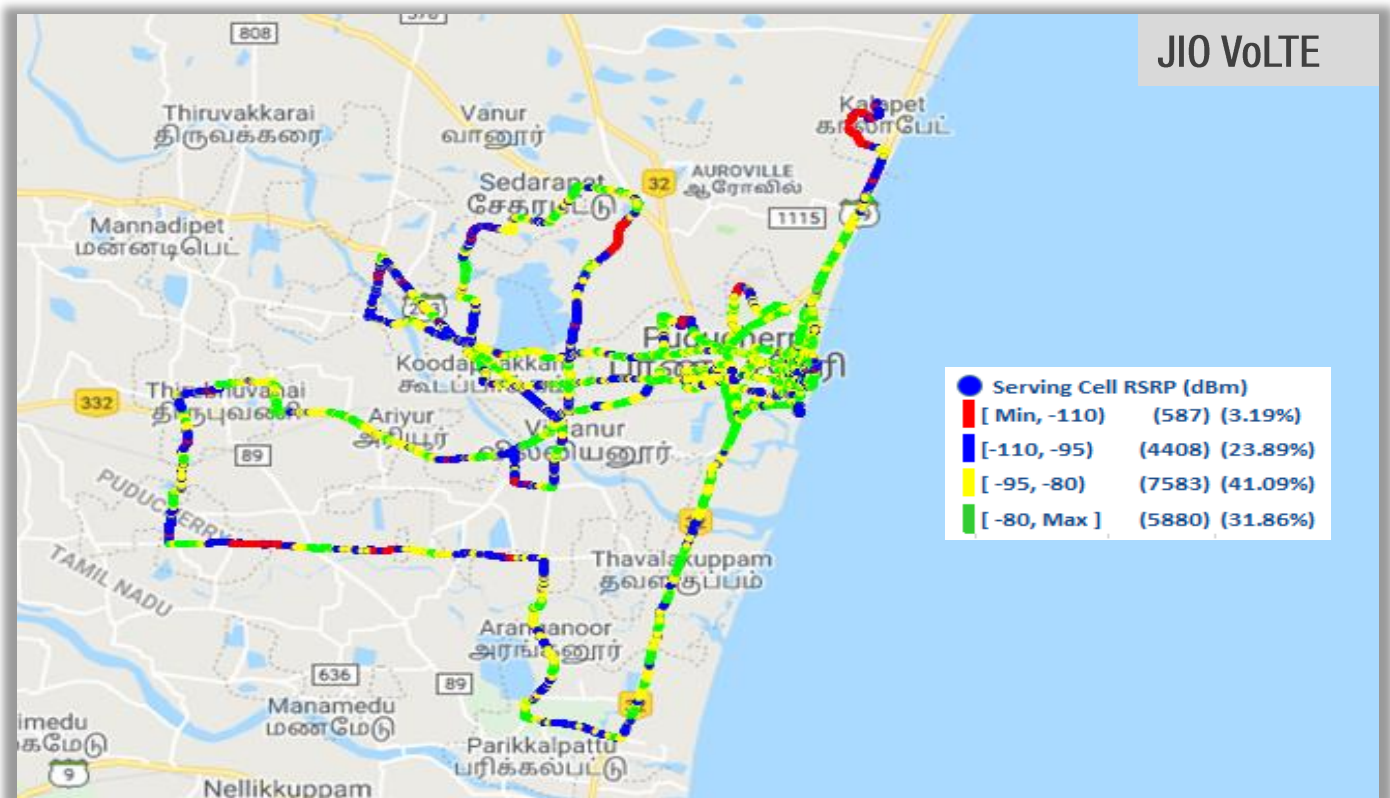
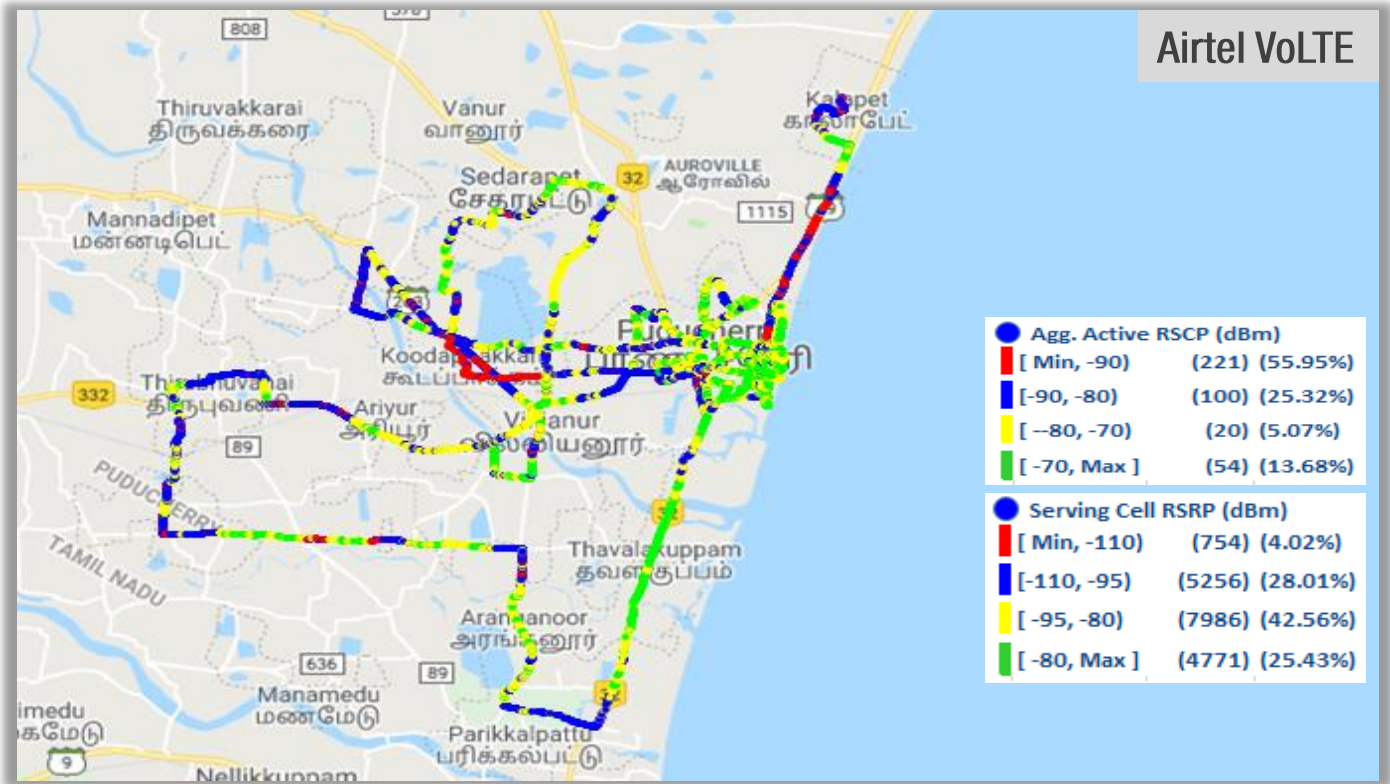
I. Coverage Details (contd.)



I. Coverage Details (contd.)



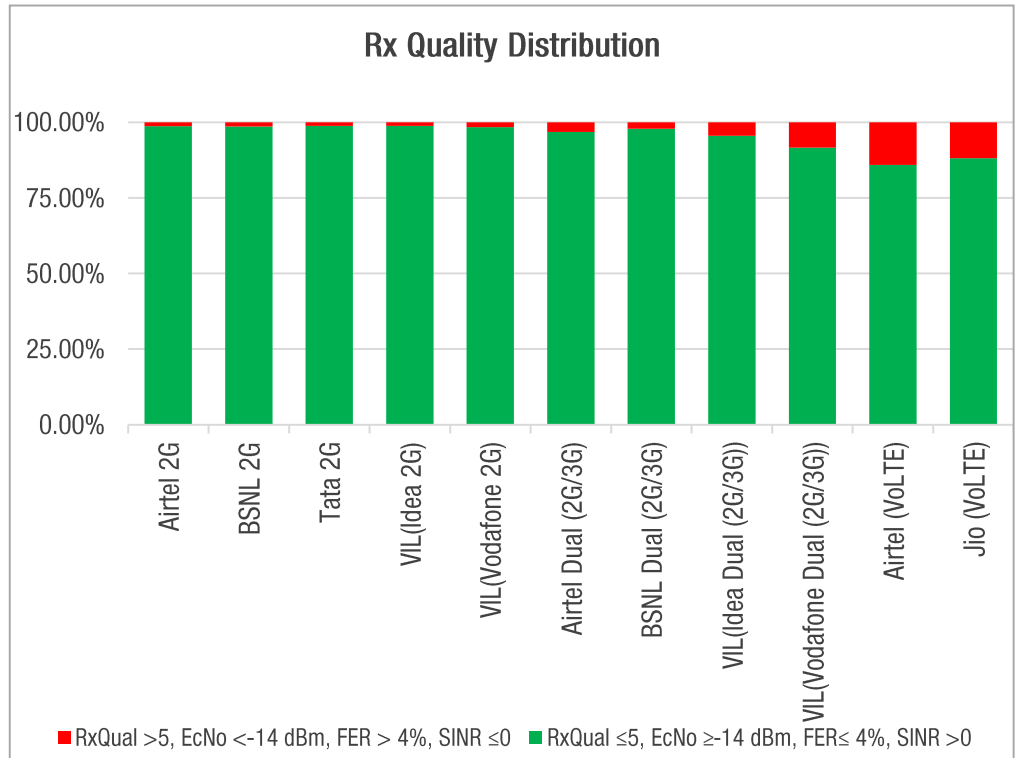
I. Coverage Details (contd.)



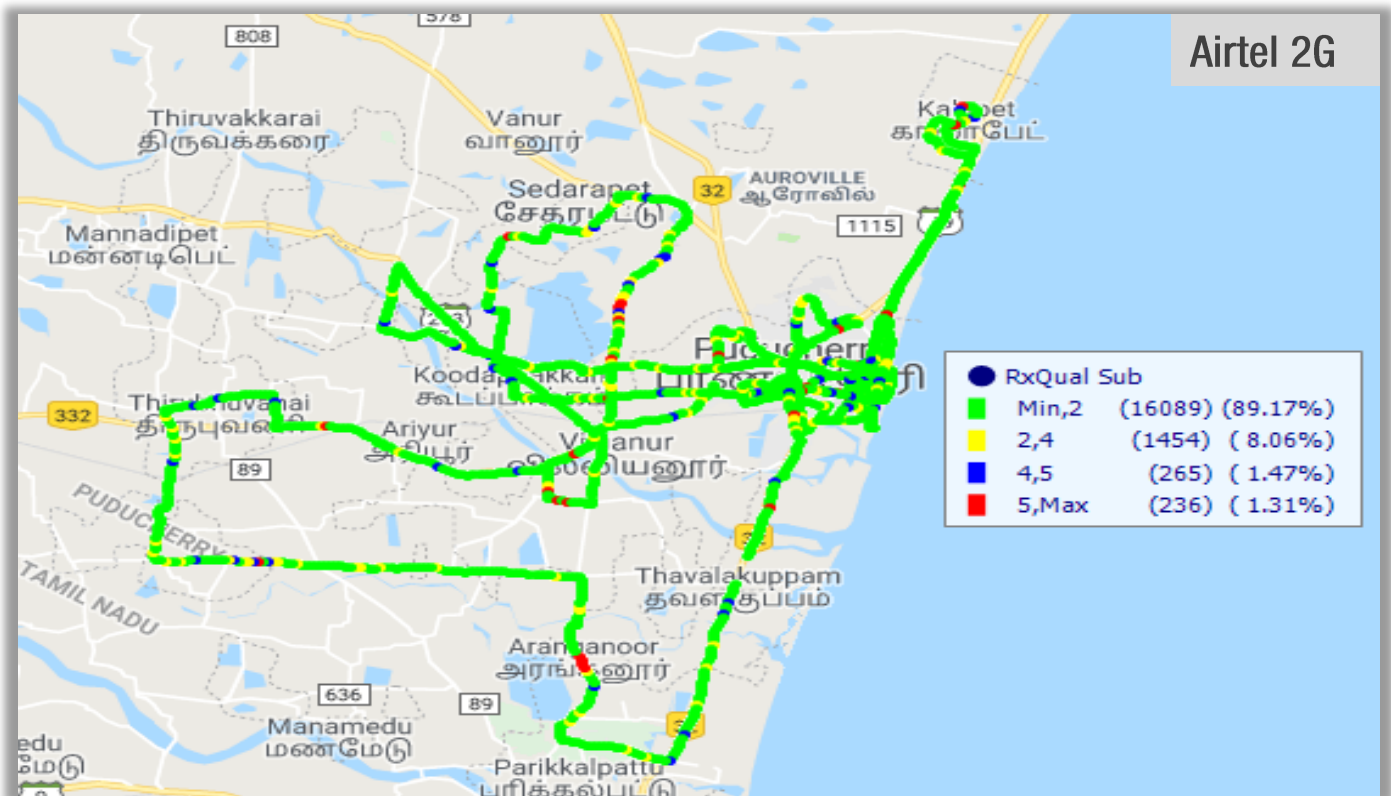
II. Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G 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 $\geq 95\%$.

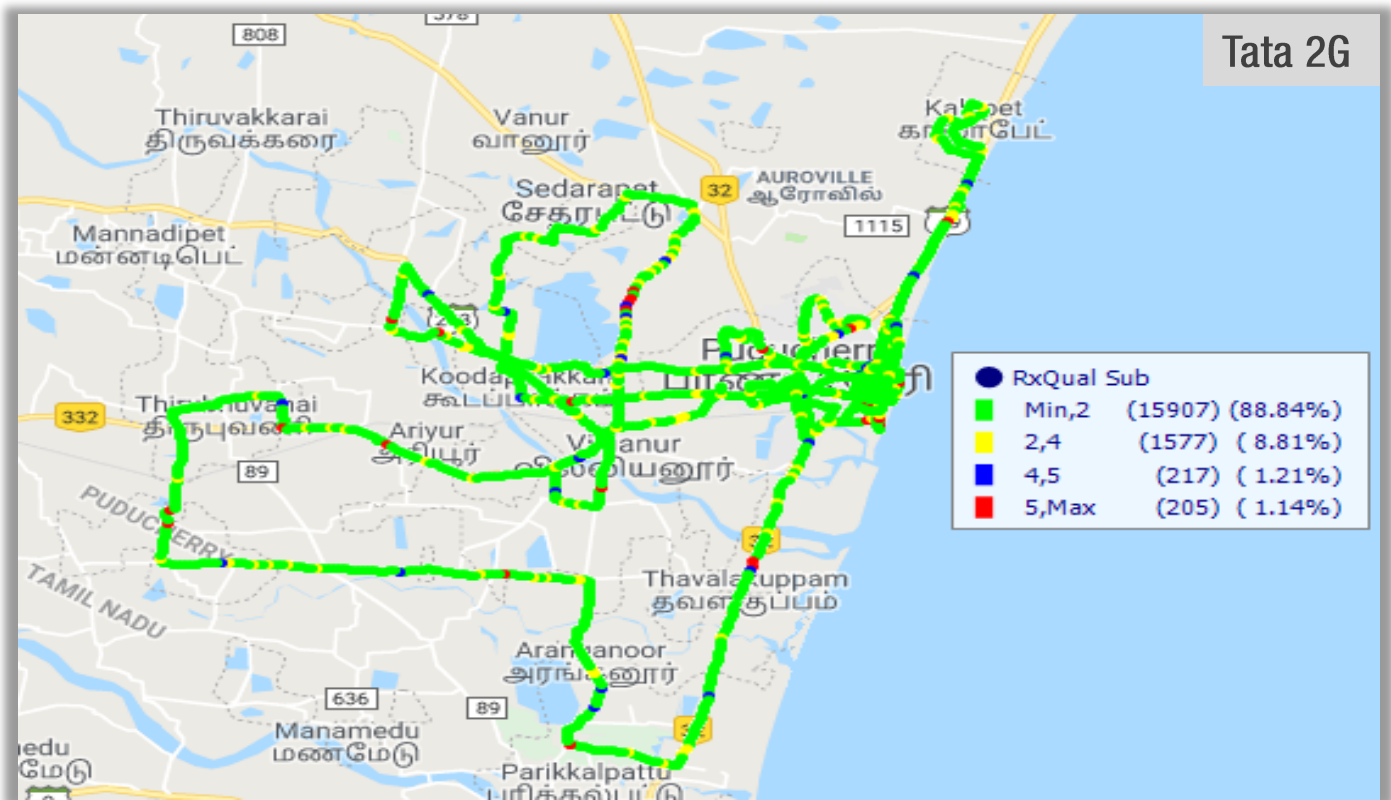
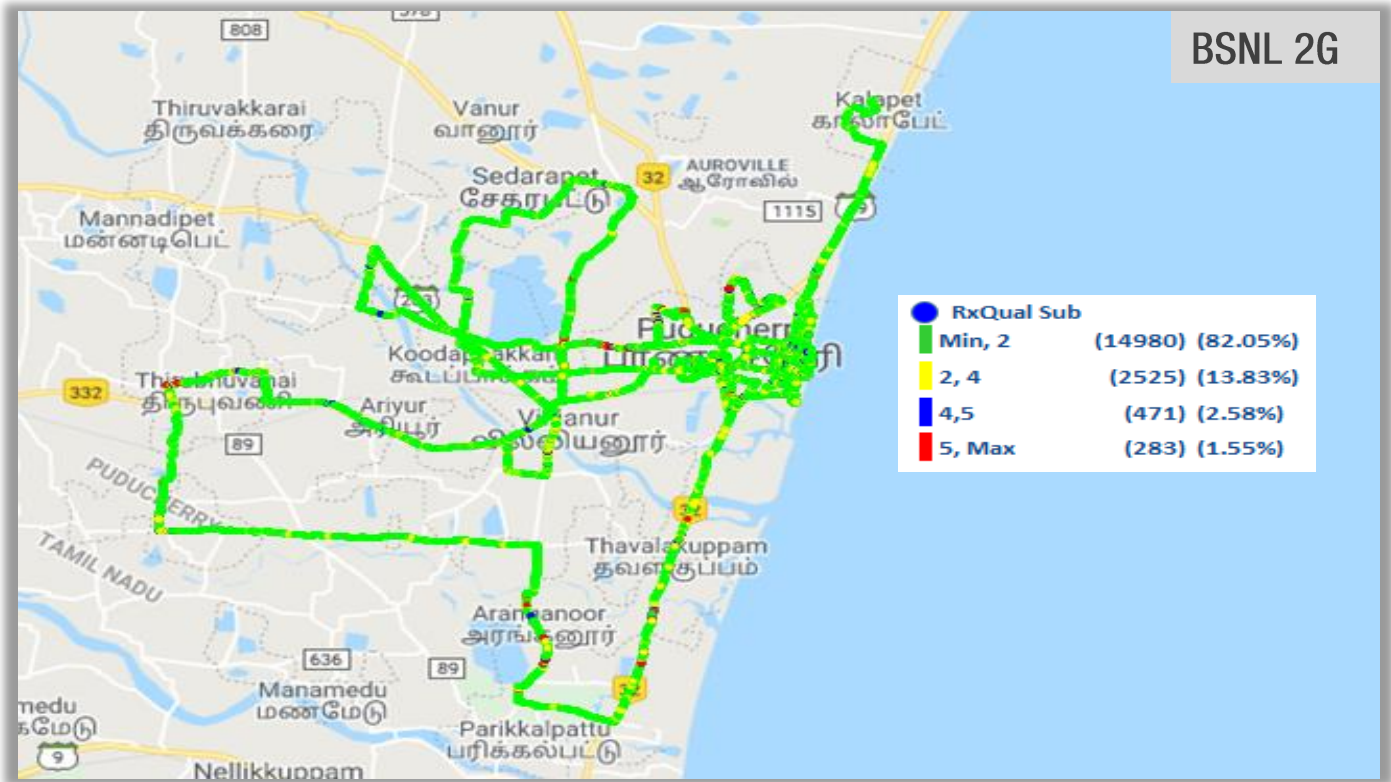
TSP	Rx Quality
Airtel 2G	98.69%
BSNL 2G	98.64%
Tata 2G	98.86%
VIL(Idea 2G)	98.86%
VIL(Vodafone 2G)	98.45%
Airtel Dual (2G/3G)	96.82%
BSNL Dual (2G/3G)	97.92%
VIL(Idea Dual (2G/3G))	95.60%
VIL(Vodafone Dual (2G/3G))	91.68%
Airtel (VoLTE)	85.90%
Jio (VoLTE)	88.15%



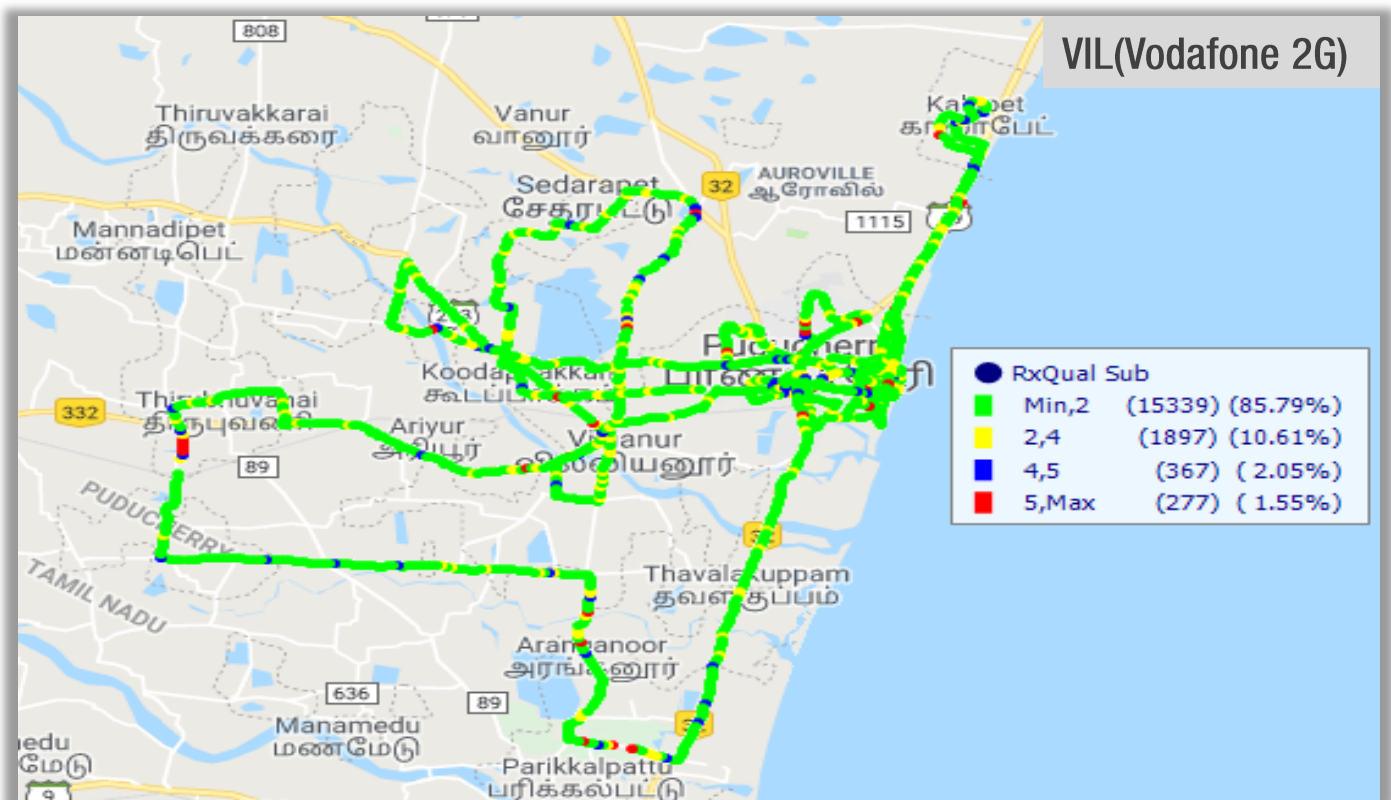
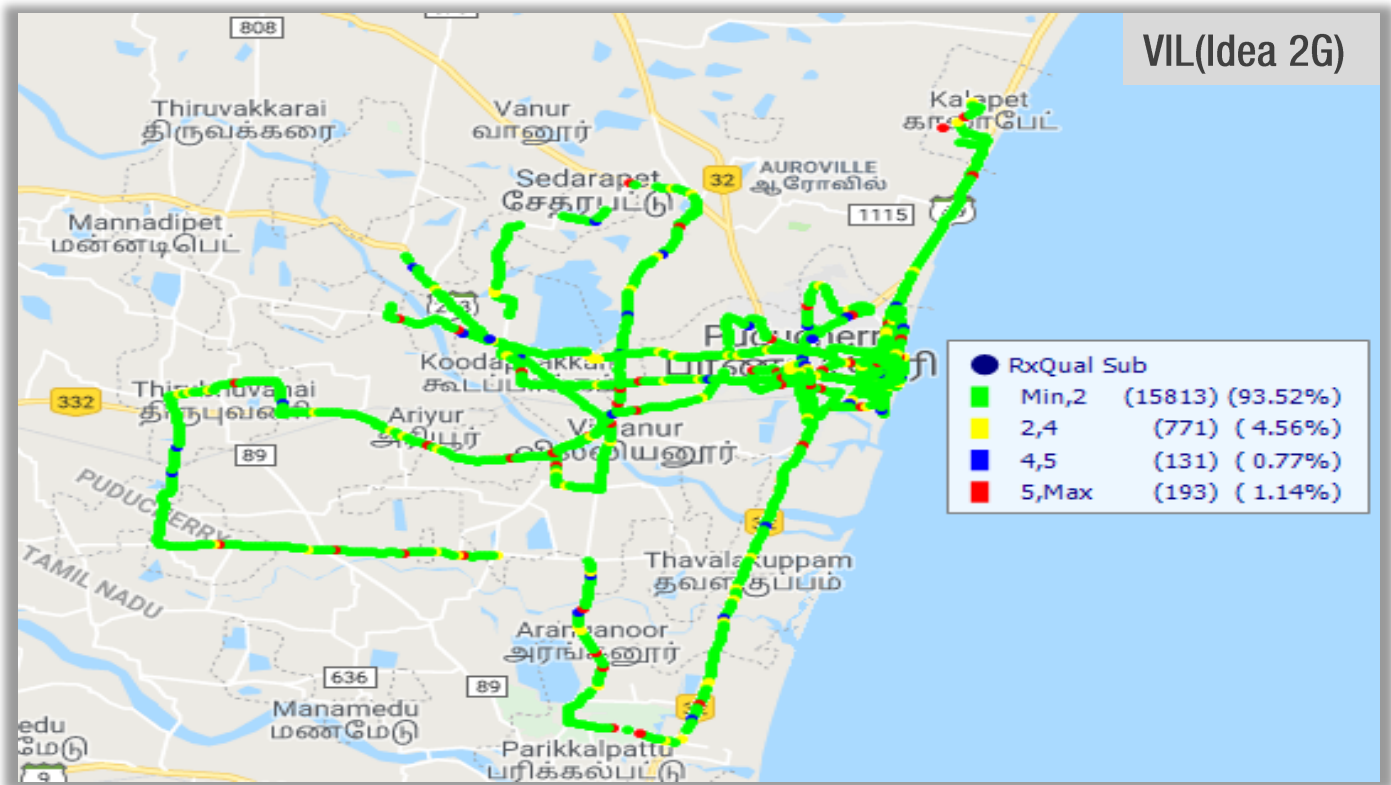
— TSPs not meeting the Benchmark



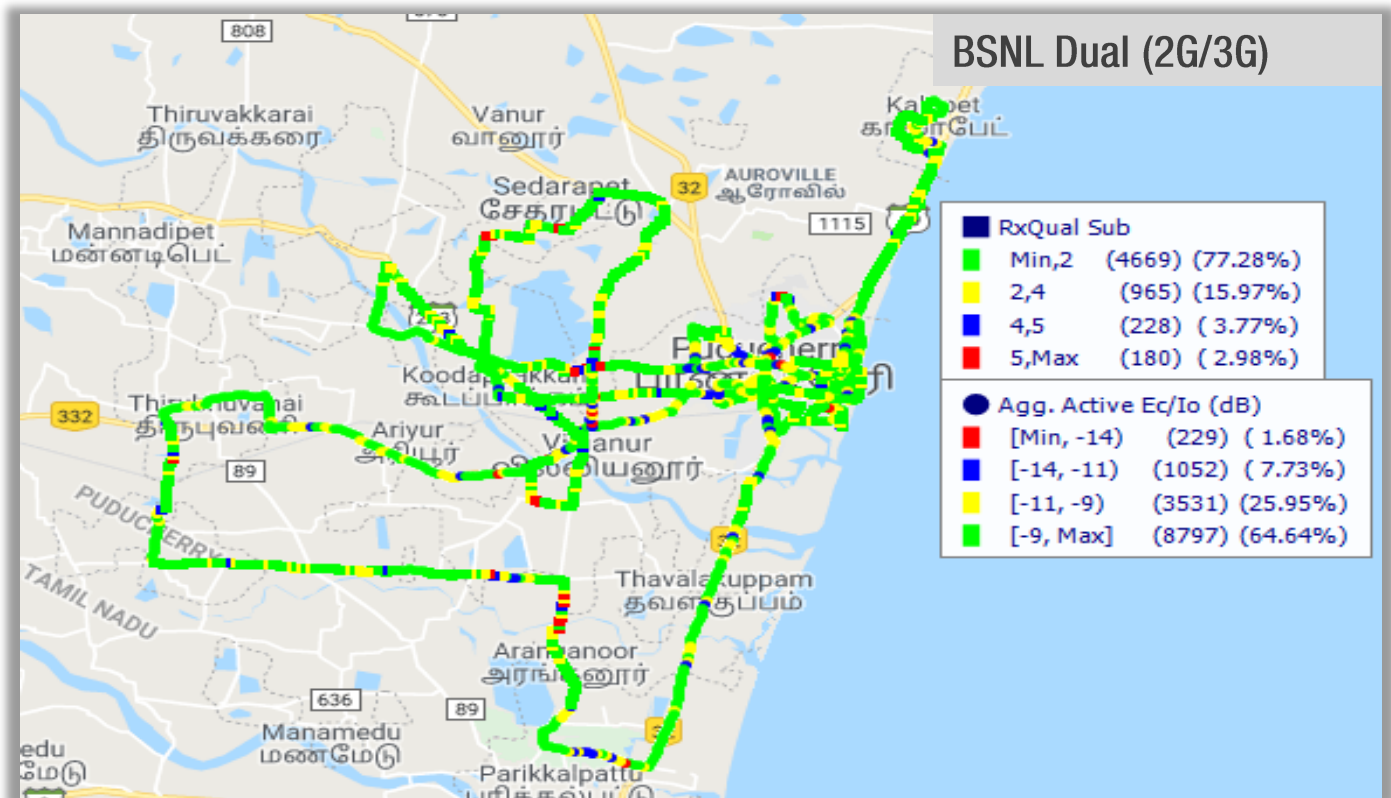
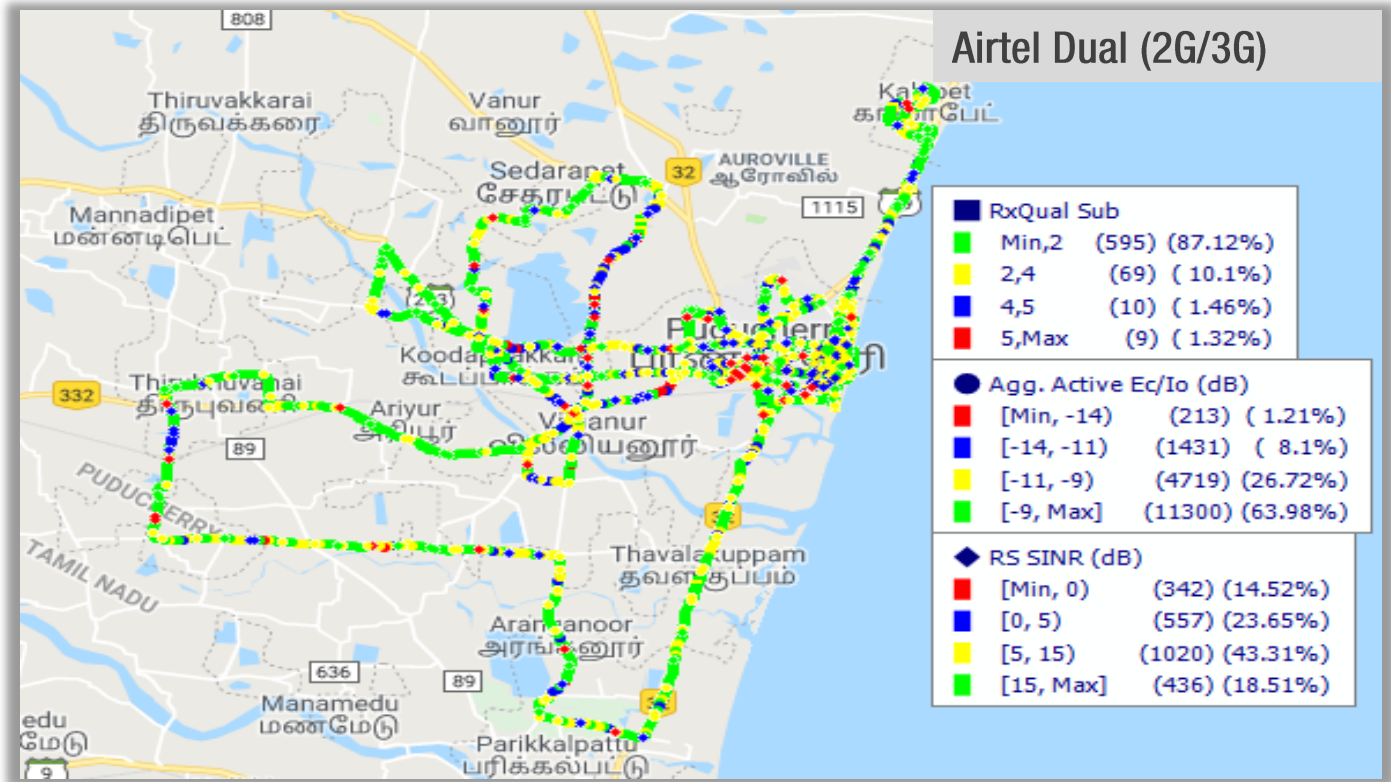
II. Quality Details (contd.)



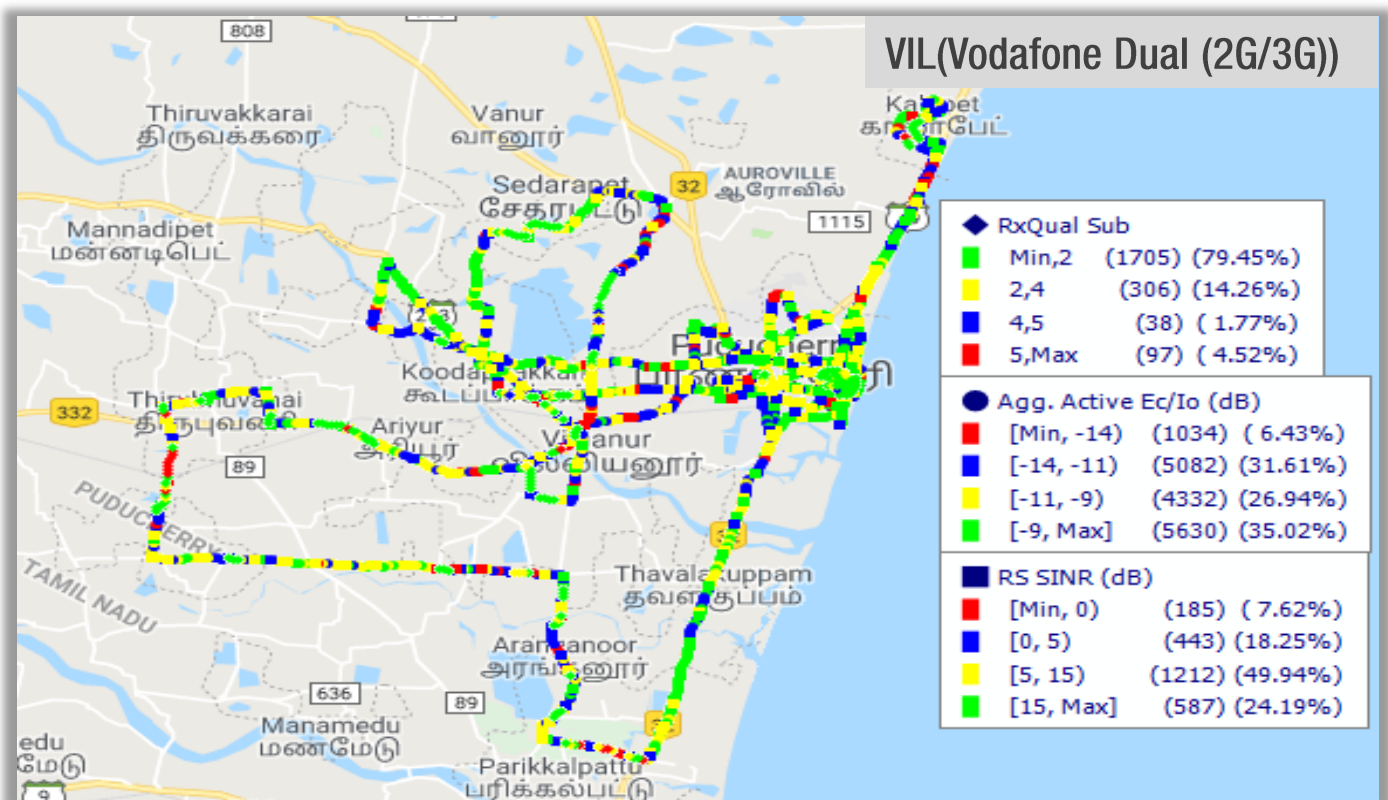
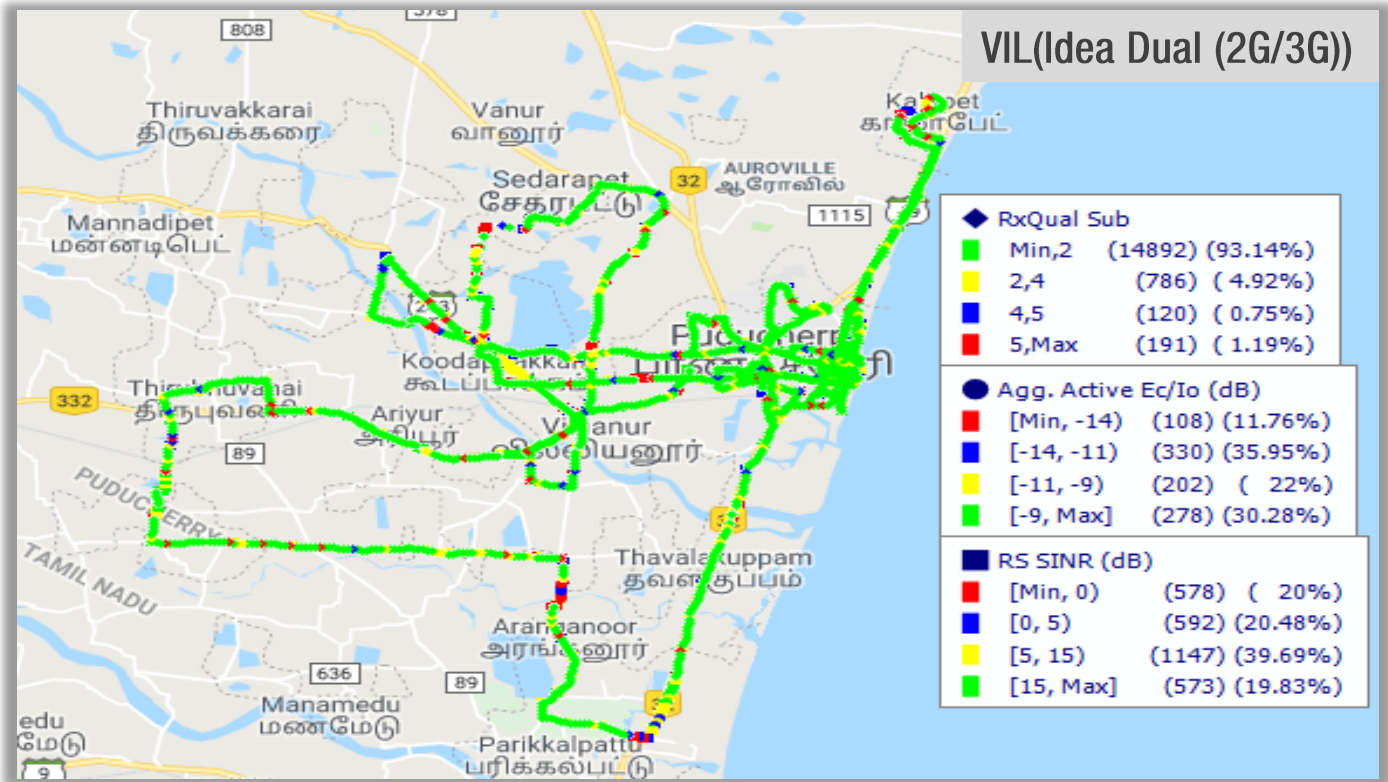
II. Quality Details (contd.)



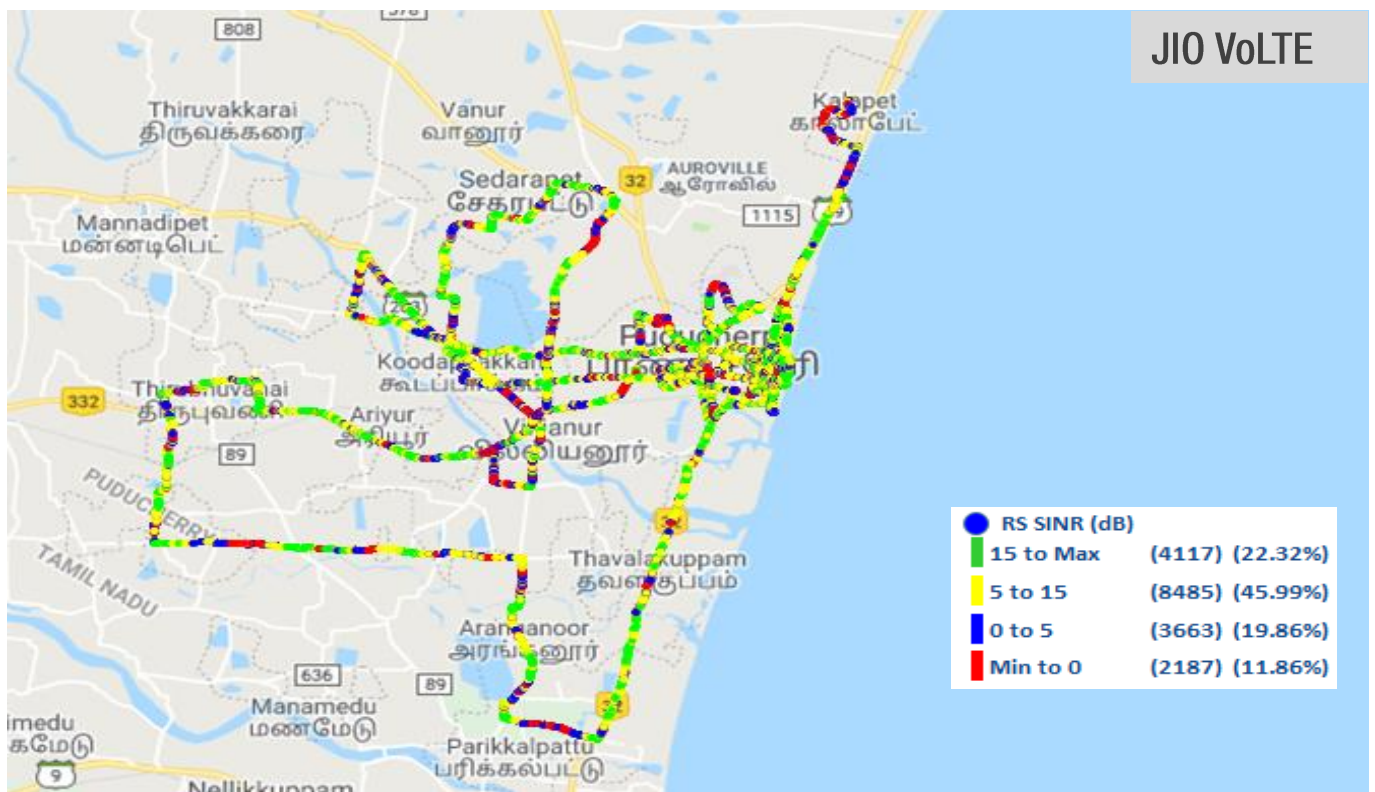
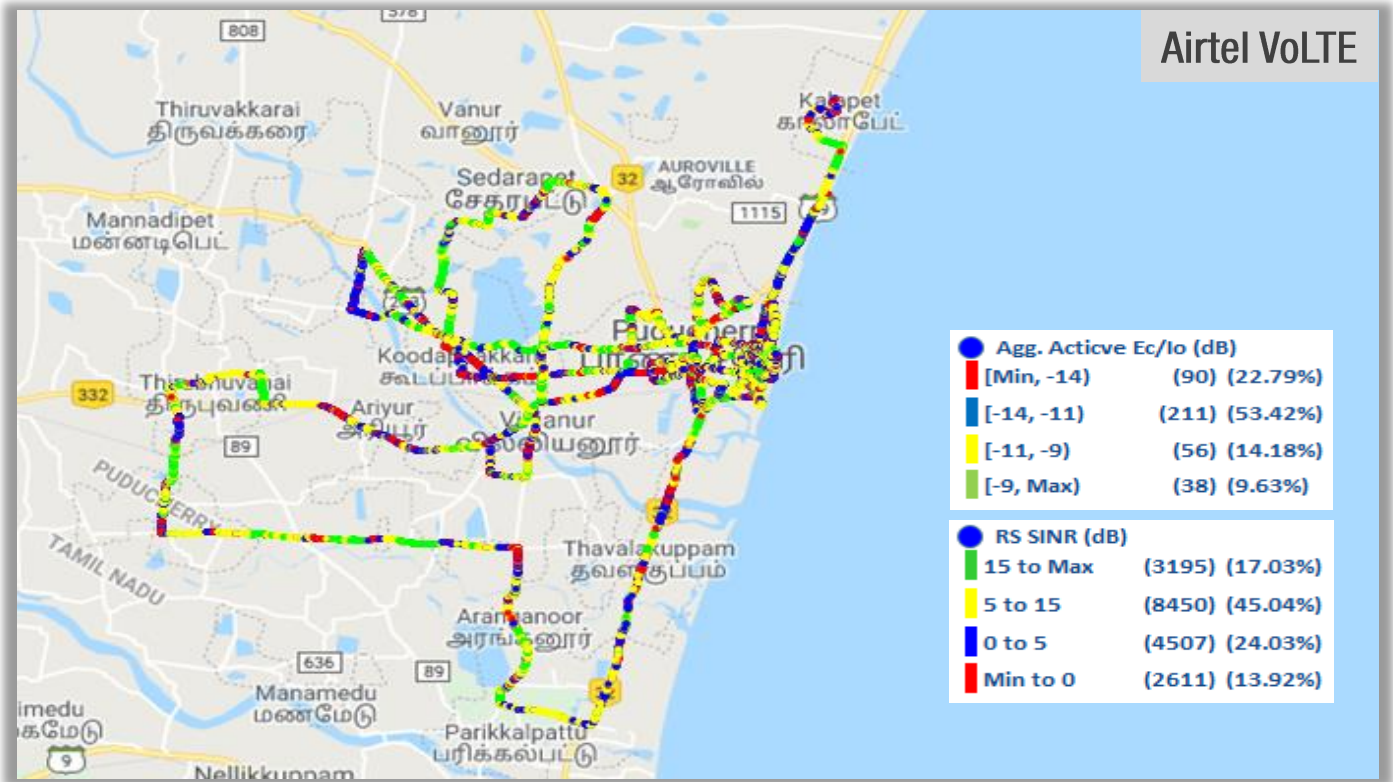
II. Quality Details (contd.)



II. Quality Details (contd.)

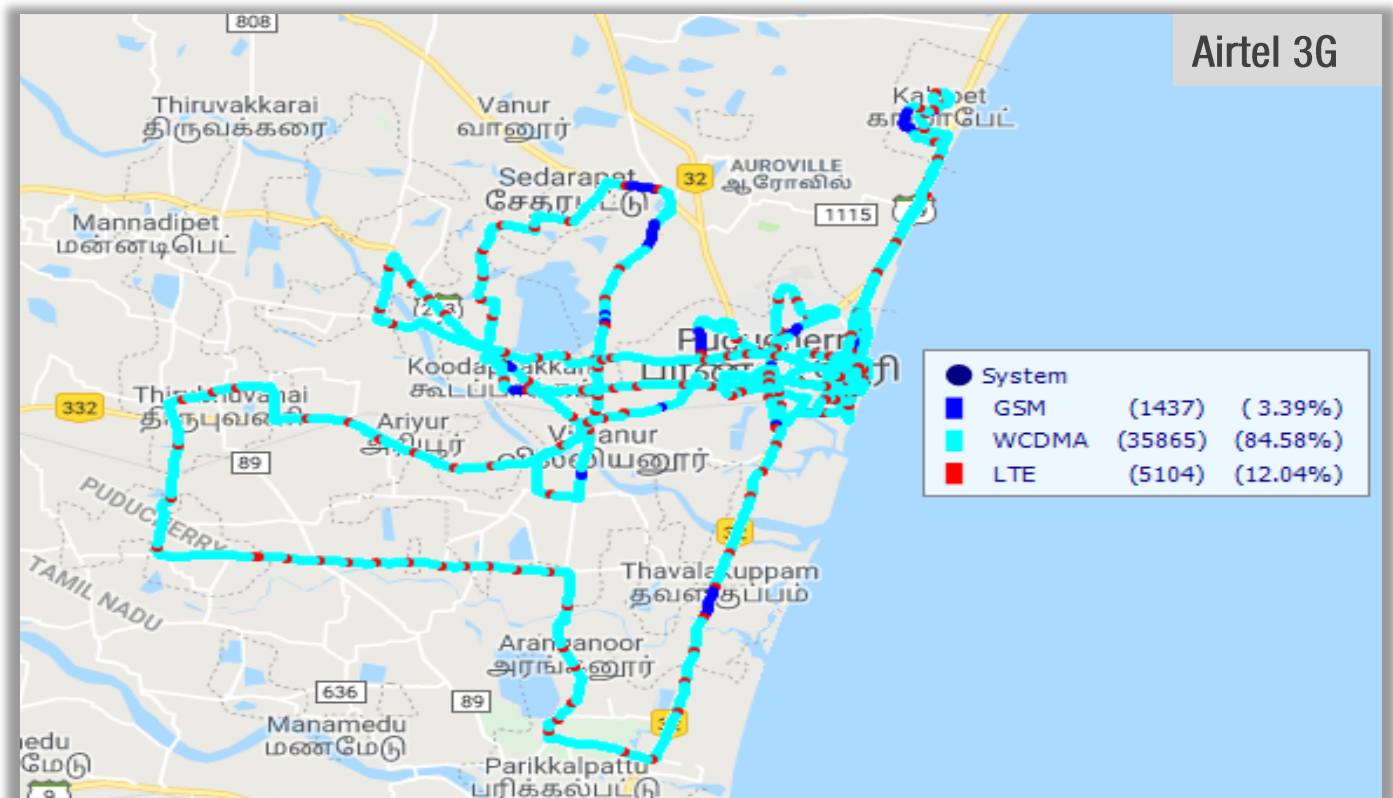
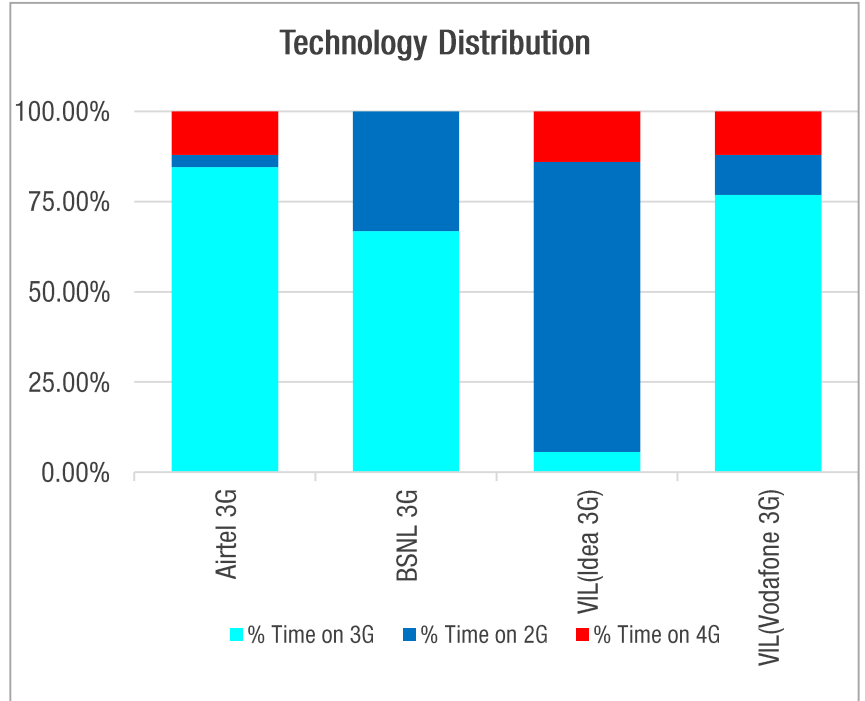


II. Quality Details (contd.)

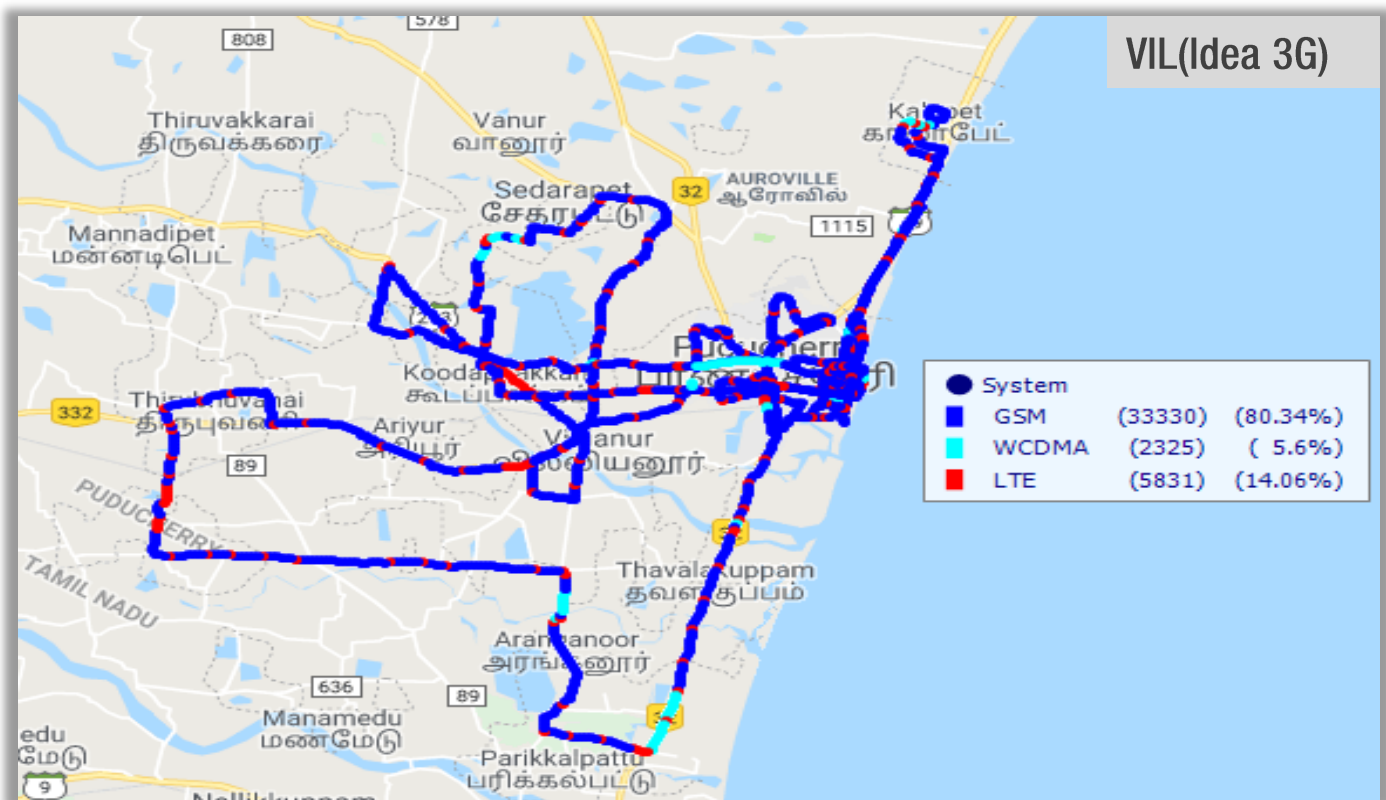
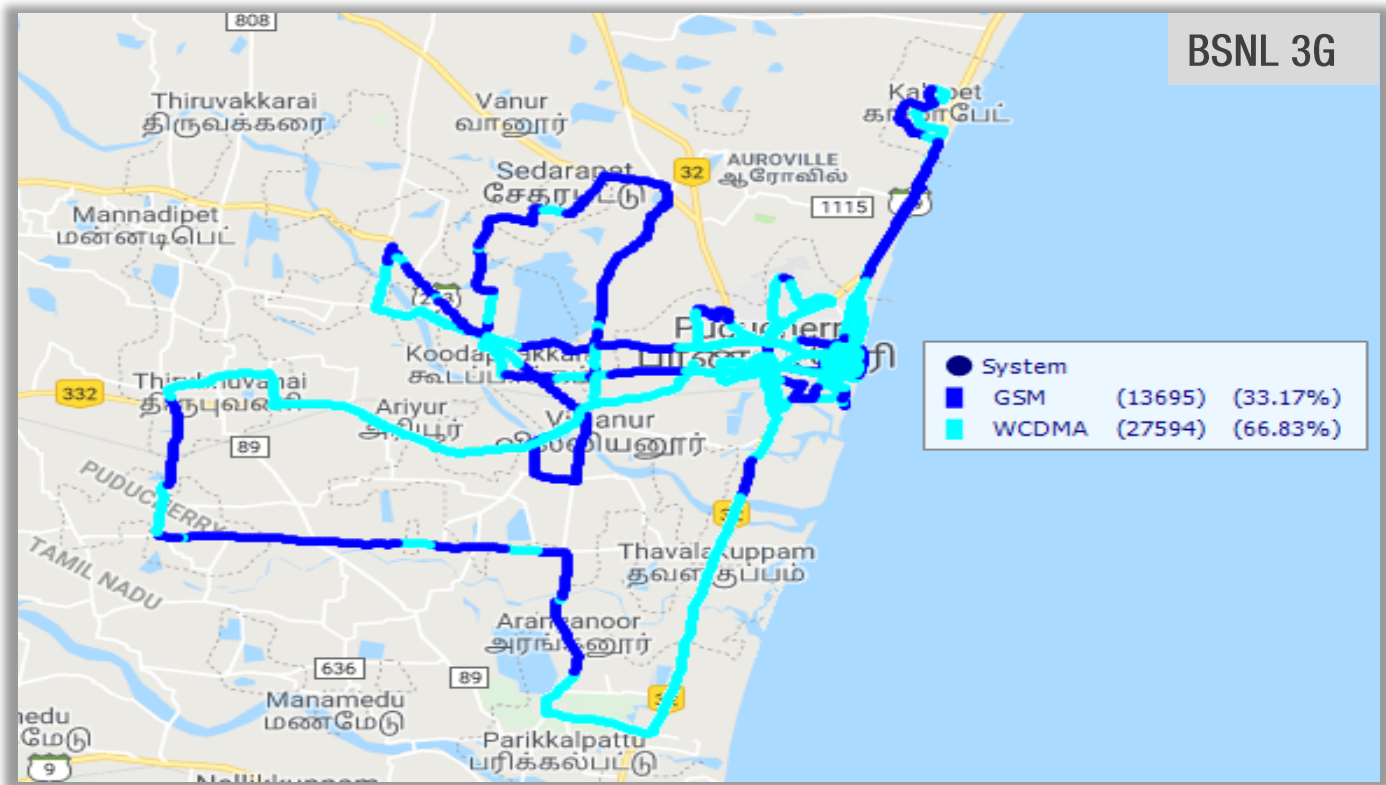


III. Technology Details

TSP	% Time on 3G
Airtel 3G	84.58%
BSNL3G	66.83%
VIL(Idea 3G)	5.60%
VIL(Vodafone 3G)	76.83%



III. Technology Details_(contd.)



III. Technology Details_(contd.)

