



TELECOM REGULATORY AUTHORITY OF INDIA
Regional Office – Vijayawada

Operator Assisted Drive Test (OADT)

Vijayawada City

OADT for Voice - 13th, 14th and 15th July 2021

OADT for Data – 16th July 2021

The Operator Assisted Drive Test (OADT) has been carried out by TRAI in Vijayawada City & adjoining areas from 9:00 AM to 9:00 PM; 13th March to 16th July 2021. The drive test covered a drive route of 360 KMs & 5 Hotspot over a period of 4 working days. Approximately 600 calls were made for each of 9 networks: Three 2G networks, Two 3G networks, Four LTE networks covering 4 unique TSPs.

Hotspots locations for Data Testing in Vijayawada City:

- 1 RTC Bus Stand
- 2 Railway station
- 3 PVP Complex
- 4 Airport, Gannavaram
- 5 Siddhartha Engineering College Campus (VRSES)

Technology	Airtel	BSNL	RJIL	VIL
2G	Y	Y	N	Y
3G	Y	N	N	N
4G	Y	N	Y	Y
Tools used	TEMS Investigation 22.3	AGILENT 16.2	X-CIL Version 4.09.601	TEMS Investigation 19.2.3

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 to verify the Quality of Service claimed.

In view of complaints on call drops and other network quality issues as per the instructions of TRAI HQ, TRAI Regional Office Hyderabad has conducted the drive test with the help of Telecom Service Providers of AP LSA (Vijayawada) from 13th July 2021 to 16th July 2021 covering various locations in Vijayawada City & surrounding region. The performance of Airtel, BSNL, Vodafone Idea Limited (VIL) and RJIL were monitored across various technologies (2G, 3G and 4G). The drive test route was defined based on 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, 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 Vijayawada:

Operator Assisted Drive Test (OADT) was conducted for a period of 4 working days from 13th July to 16th July 2021 in Vijayawada City & Surrounding areas from 9:00 AM to 9:00 PM. Calls were made for 90 sec durations with wait time of 10 sec between call in all technologies.

Voice Tests: The drive test covered a drive route of approximately 600 calls were made for each of the 9 networks: Three 2G networks, Two 3G networks, Four LTE networks covering 4 unique TSPs.

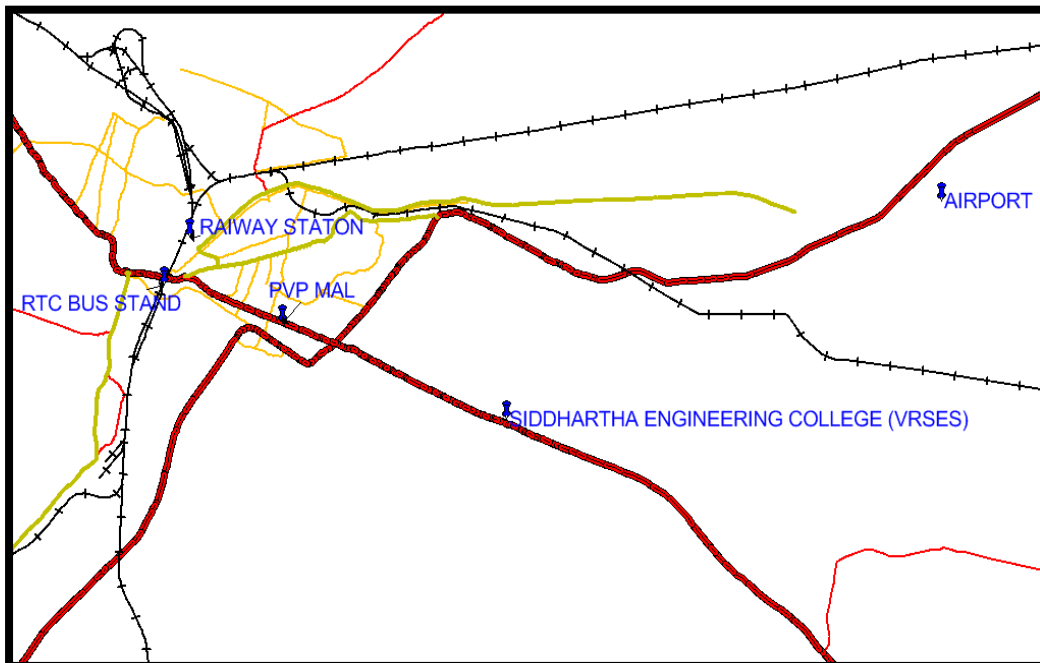
Data Tests: Data Tests were performed at 5 static locations for one day on 16th July 2021: Three 2G (Lock Mode) networks, Two 3G (Dual Mode) networks, Four LTE (Free mode) networks covering 4 unique TSPs were tested.

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

Voice drive test route (Map):



Data testing hotspot locations (Map):



Key observations of Voice Call

Drop call Rate % (Benchmark < 2%)

TSP	VoLTE Network	3G Network	2G Network
Airtel	0%	0%	0%
BSNL	NA	NA	0.34%
RJIL	0.88%	NA	NA
VIL	0.81	NA	0.31

Block call Rate % (Benchmark < 3%)

TSP	VoLTE Network	3G Network	2G Network
Airtel	0%	0%	0%
BSNL	NA	NA	0%
RJIL	-	NA	NA
VIL	0.49	NA	0

Technology	Parameter	Airtel	BSNL	RJIL	VIL
2G	SDCCH Congestion (<=1%)	0%	0%	NA	-
	TCH Congestion (<=2%)	0%	0%	NA	-
3G	CSFB Failure %	0%	NA	NA	NA
	SDCCH Congestion %	0%	NA	NA	NA
	RRC Congestion %	0%	NA	NA	NA
	SDCCH and RRC Congestion % (<=1%)	0%	NA	NA	NA
	TCH Congestion %	0%	NA	NA	NA
	RAB Congestion %	0%	NA	NA	NA
	TCH and RAB Congestion % (<=2%)	0%	NA	NA	NA

Coverage

1. Percentage of Coverage sample of 2G >= - 85 dBm

TSP	Airtel	BSNL	RJIL	VIL
Coverage %	91%	98.31%	NA	97.16

2. Percentage of Coverage sample of 3G >= - 90 dBm

TSP	Airtel	BSNL	RJIL	VIL
Coverage %	81.7%	NA	NA	NA

3. Percentage of Coverage sample of VoLTE >= -110 dBm

TSP	Airtel	BSNL	RJIL	VIL
Coverage %	100%	98.88%	98.07	99.39

4. Percentage of time spent on 3G Network

TSP	Airtel	BSNL	RJIL	VIL
Time spent %	97%	NA	NA	0

5. Percentage of time spent on VoLTE Network

TSP	Airtel	BSNL	RJIL	VIL
Time spent %	100%	NA	100	100

6. Percentage of RLT >= 48

TSP	Airtel	BSNL	RJIL	VIL
Percentage of RLT >=48	0	0	NA	0

7. Average CST in seconds

TSP	Airtel	BSNL	RJIL	VIL
2G network	3.7	2.8	NA	3.12
3G network	2.72	NA	NA	NA
VoLTE Network	0.9	NA	0.54	0.65

Voice call summary

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Call attempts	641	758	NA	638
Block call rate %	0	0%	NA	0
CSSR %	100%	100%	NA	100
Drop call rate %	0	0.34%	NA	0.31
Mobility HOSR %	99.30%	98.47%	NA	97.54
RX Quality %	95.67%	97.60%	NA	96.58

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Call attempts	646	NA	NA	NA
Block call rate %	0%	NA	NA	NA
CSSR %	100%	NA	NA	NA
Drop call rate %	0%	NA	NA	NA
Mobility HOSR %	99.94%	NA	NA	NA
RX Quality %	95.86%	NA	NA	NA

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Call attempts	679	NA	685	621
Block call rate %	0%	NA	NA	0.49
CSSR %	100%	NA	98.68	99.51
Drop call rate %	0%	NA	0.88	0.81
Mobility HOSR %	99.89%	NA	99.44	99.98
RX Quality %	94.37%	NA	95.35	73.28

Data Service Static (on Hotspots)

Hotspot Location -1 (RTC Bus Stand Vijayawada)

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	148.30	166	NA	362.13
Upload Throughput in Kbps	30.77	100	NA	165.87
Web browsing delay in second	3.3956	5.3	NA	35.68
Latency in (msec)	172.5	178	NA	197

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	7.919	NA	NA	NA
Upload Throughput in Mbps	3.41	NA	NA	NA
Video streaming delay in sec	0	NA	NA	NA
Web browsing delay in second	3.3	NA	NA	NA
Latency in (msec)	134.6	NA	NA	NA

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	27.1657	12.21	9.15	17.52
Upload Throughput in Mbps	16.348	0.26	2.14	15.45
Video streaming delay in sec	0	1.16	2.50	0.65

Web browsing delay in second	1.0919	16.9	2.30	2.25
Latency in (msec)	37.7	131	58	111

Hotspot Location -2 (Railway Station Vijayawada)

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	176.45	169	NA	287.70
Upload Throughput in Kbps	20.17	100	NA	168.76
Web browsing delay in second	3.1504	6.7	NA	33.02
Latency in (msec)	313.67	154	NA	136.0

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	4.64	NA	NA	NA
Upload Throughput in Mbps	2.73	NA	NA	NA
Video streaming delay in sec	0	NA	NA	NA
Web browsing delay in second	1.94	NA	NA	NA
Latency in (msec)	123.8	NA	NA	NA

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	16.71	8.01	14.27	23.07
Upload Throughput in Mbps	13.6905	0.23	3.29	15.32
Video streaming delay in sec	0	1.9	2.72	0.67
Web browsing delay in second	0.98	3.6	2.20	2.11
Latency in (msec)	61.117	108	79	44

Hotspot Location -3 (PVP Mall Vijayawada)

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	179.54	140	NA	303.55
Upload Throughput in Kbps	34.78	97	NA	169.72
Web browsing delay in second	3.354	6.44	NA	33.78
Latency in (msec)	376.17	173	NA	198

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	5.29	NA	NA	NA
Upload Throughput in Mbps	2.85	NA	NA	NA
Video streaming delay in sec	0	NA	NA	NA
Web browsing delay in second	1.94	NA	NA	NA
Latency in (msec)	110.9	NA	NA	NA

TSP (For VoLTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	19.2315	13.7	10.45	19.74
Upload Throughput in Mbps	14.0424	1.66	2.31	8.95
Video streaming delay in sec	0	1.1	23.03	0.75
Web browsing delay in second	1.1697	20.2	3.15	2.12
Latency in (msec)	52.1	73	53	43

Hotspot Location -4 (Airport, Gannavaram-Vijayawada)

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	114.82	174.98	NA	206.24
Upload Throughput in Kbps	34.29	71.65	NA	92.07
Web browsing delay in second	3.31	5.5	NA	35.56
Latency in (msec)	143.2	171	NA	219

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	NA	NA	NA	NA
Upload Throughput in Mbps	NA	NA	NA	NA
Video streaming delay in sec	NA	NA	NA	NA
Web browsing delay in second	NA	NA	NA	NA
Latency in (msec)	NA	NA	NA	NA

TSP (For LTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	15.771	24.46	13.59	16.55
Upload Throughput in Mbps	9.3	0.83	2.35	11.54
Video streaming delay in sec	0	1.22	13.03	0.73
Web browsing delay in second	1.094	9.7	19.87	2.23
Latency in (msec)	35.23	83	37	47

Hotspot Location -5 (Siddhartha Engineering College Campus)

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	161.2	139	NA	209.43
Upload Throughput in Kbps	27.59	97	NA	186.34
Web browsing delay in second	3.302	5.33	NA	33.91
Latency in (msec)	259.33	262	NA	196.0

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	6.50	NA	NA	NA
Upload Throughput in Mbps	2.79	NA	NA	NA
Video streaming delay in sec	0	NA	NA	NA
Web browsing delay in second	1.9	NA	NA	NA
Latency in (msec)	123.5	NA	NA	NA

TSP (For LTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	17.1695	13	8.86	9.97
Upload Throughput in Mbps	13.5839	0.68	2.03	7.29
Video streaming delay in sec	0	1.83	2.00	0.69
Web browsing delay in second	1.2	15.6	2.06	2.08
Latency in (msec)	32.317	61	53	55

Summary Data report static

TSP (For 2G)	Airtel	BSNL	RJIL	VIL
Download throughput in Kbps	170.37	158	NA	273.81
Upload Throughput in Kbps	27.59	93	NA	156.52
Web browsing delay in second	3.28511	5.86	NA	34.39
Latency in (msec)	252.967	187	NA	189.2

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	6.08983	NA	NA	NA
Upload Throughput in Mbps	2.9486	NA	NA	NA
Video streaming delay in sec	0	NA	NA	NA
Web browsing delay in second	2.280611	NA	NA	NA
Latency in (msec)	123.2708	NA	NA	NA

TSP (For LTE)	Airtel	BSNL	RJIL	VIL
Download throughput in Mbps	19.2095	14.27	11.26	17.37
Upload Throughput in Mbps	13.395	0.73	2.42	11.71
Video streaming delay in sec	0	1.144	8.66	0.69
Web browsing delay in second	1.1076	13.2	5.92	2.14
Latency in (msec)	43.6933	91.2	56	60

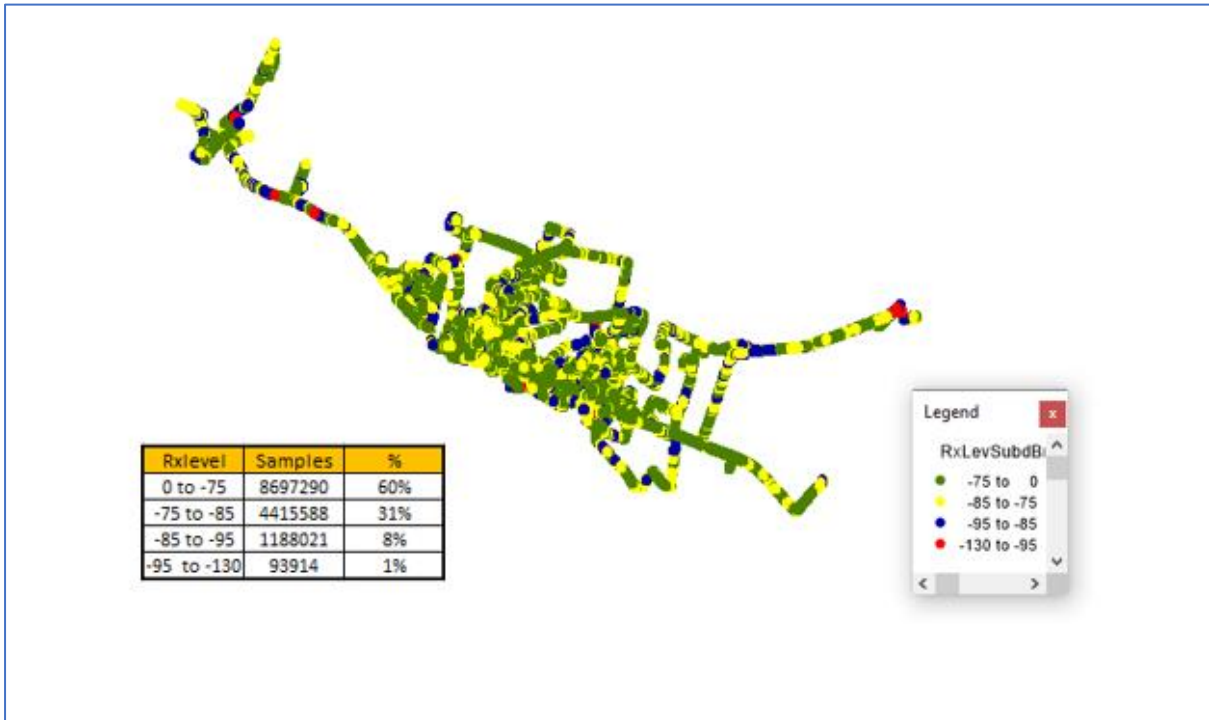
Streaming delay

TSP (For 3G)	Airtel	BSNL	RJIL	VIL
Average Initial Start Time (Sec)	0.915	NA	NA	NA
Average Interruption time in Second	0	NA	NA	NA

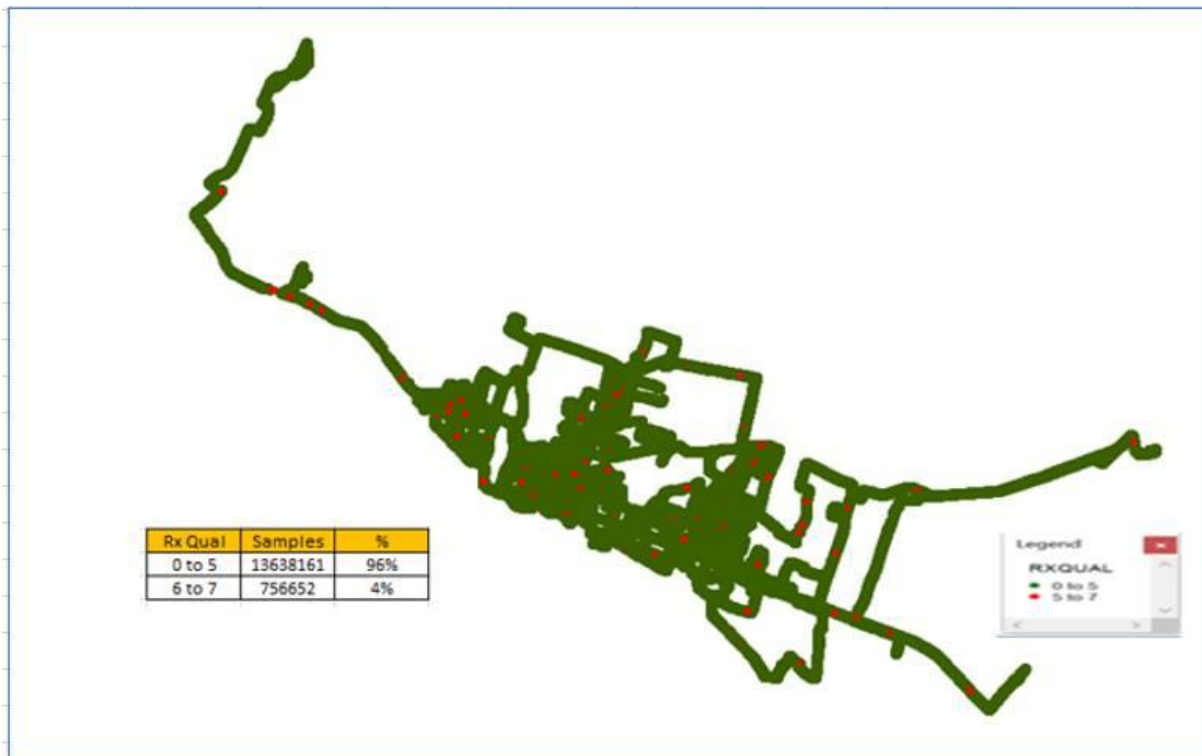
TSP (For LTE)	Airtel	BSNL	RJIL	VIL
Average Initial Start Time (Sec)	0.3918	2	NA	0.12
Average Interruption time in Second	0	0	NA	0

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

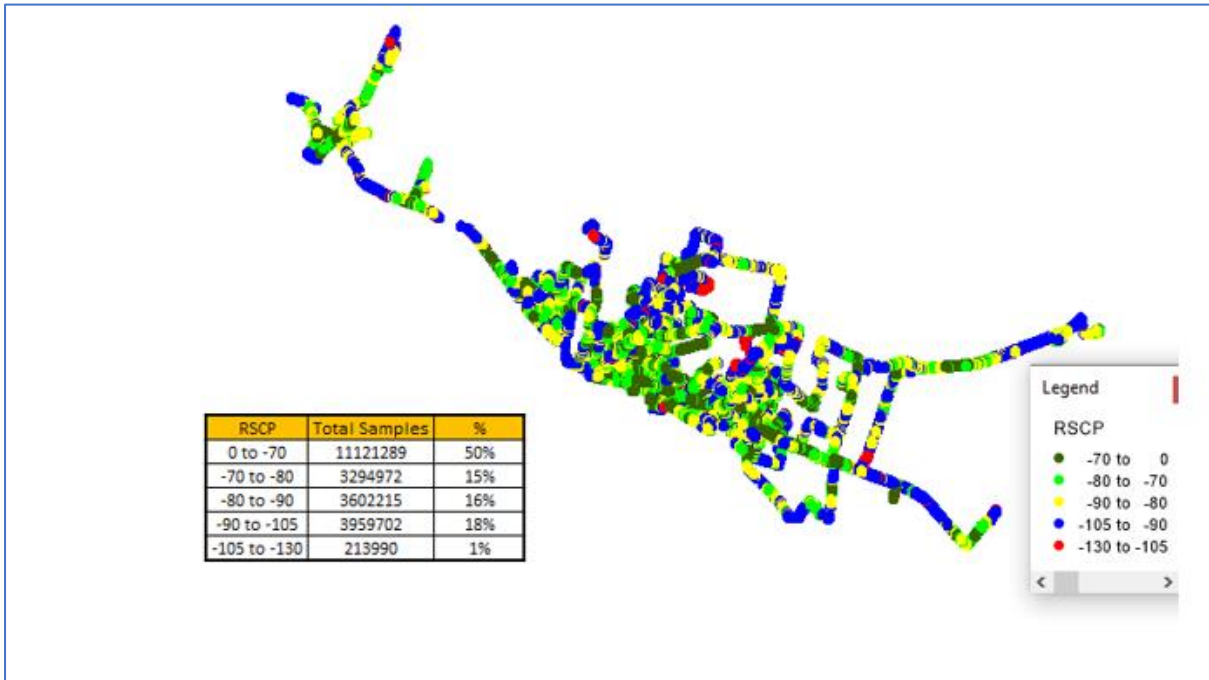
Coverage plots – 2G (Rx level) ---- AIRTEL



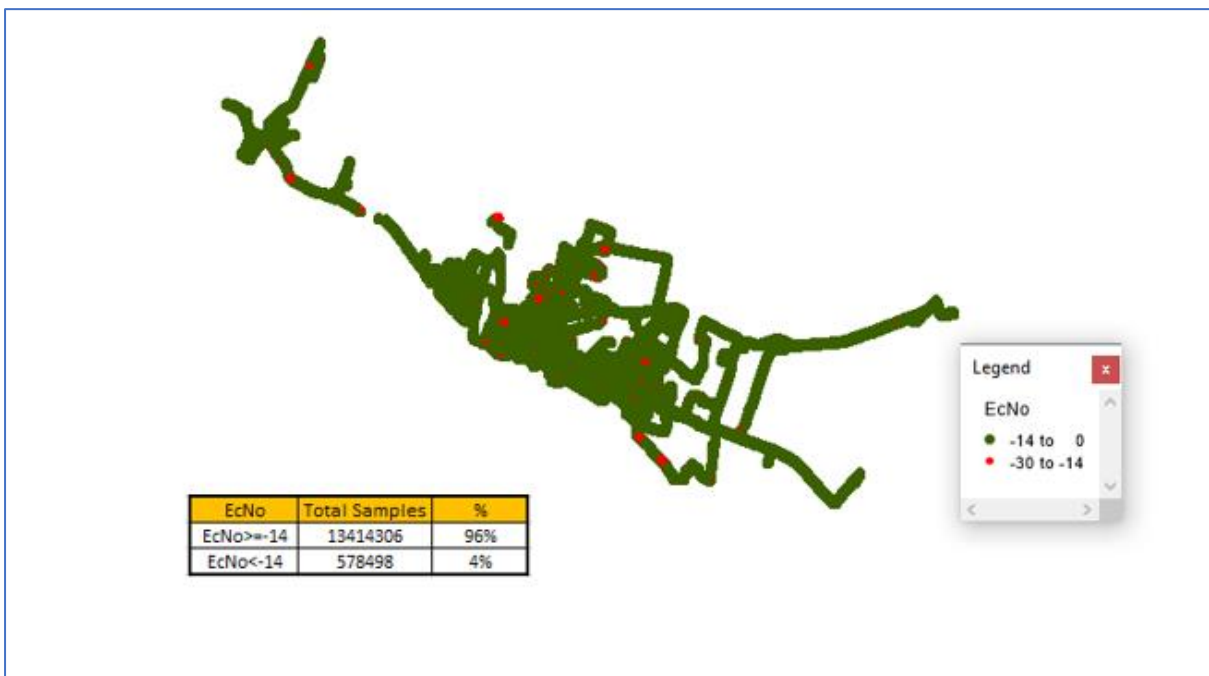
Quality plots- 2G(Rx quality) ---- AIRTEL



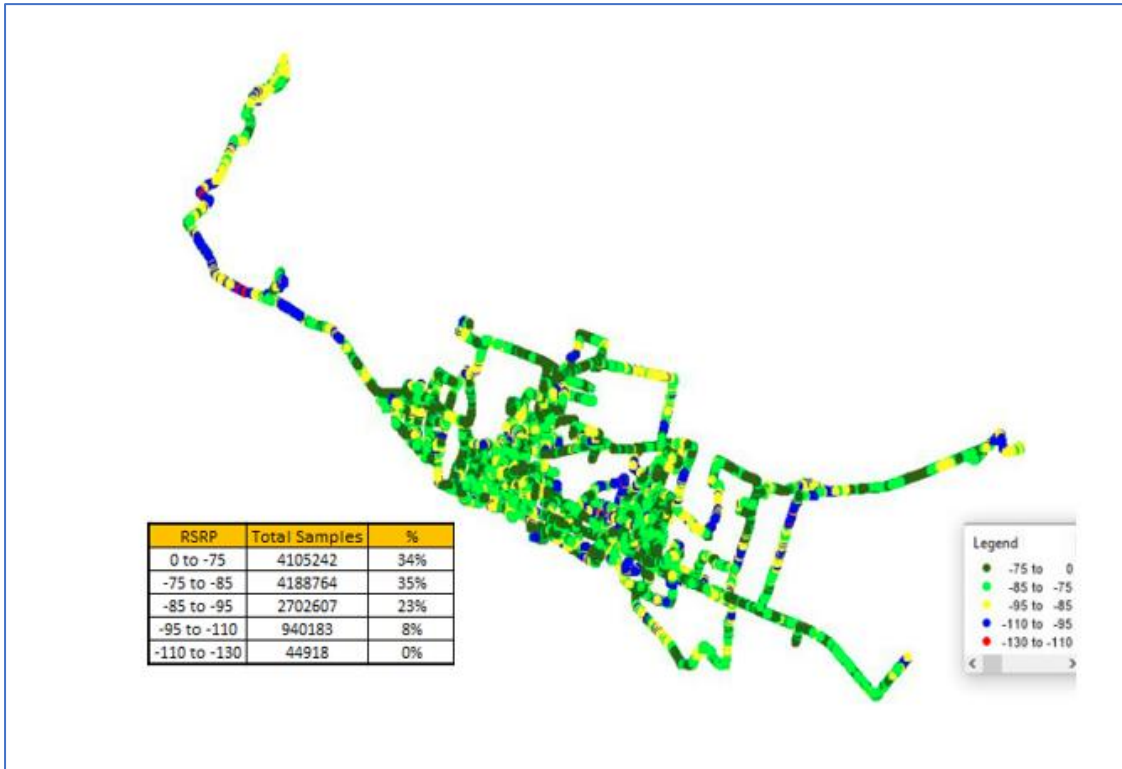
Coverage plots – 3G(RSCP) ---- AIRTEL



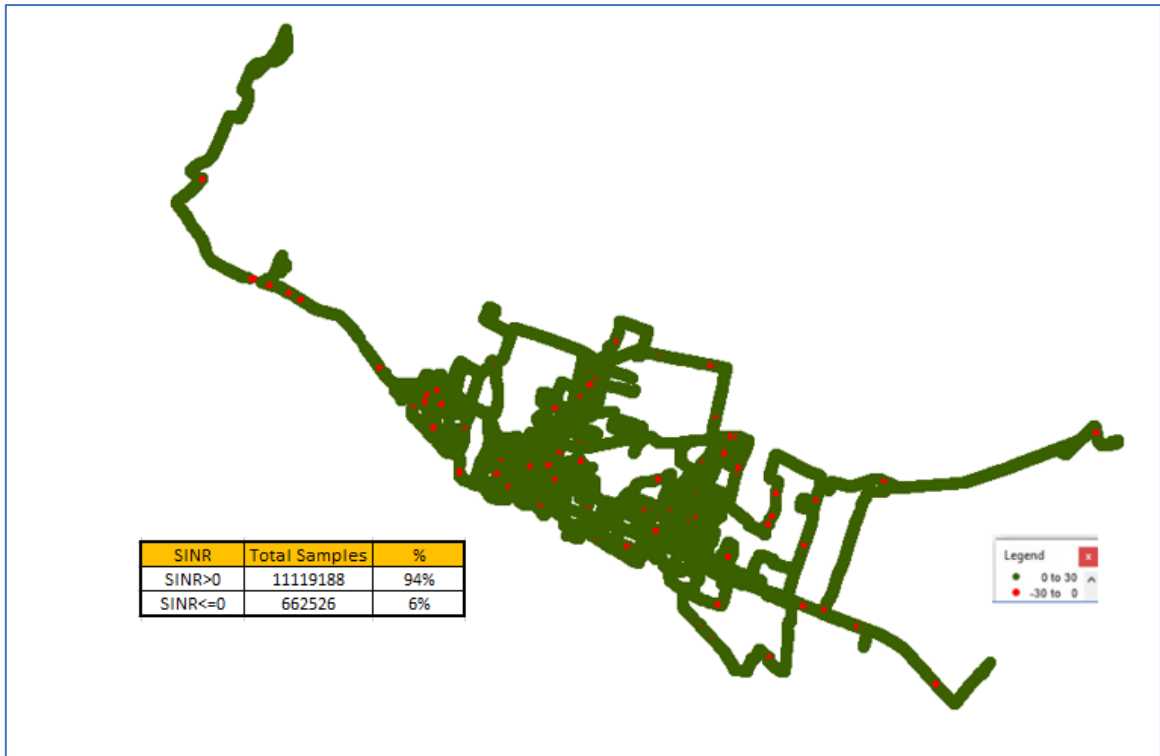
Quality plots- 3G(ECNO) ---- AIRTEL



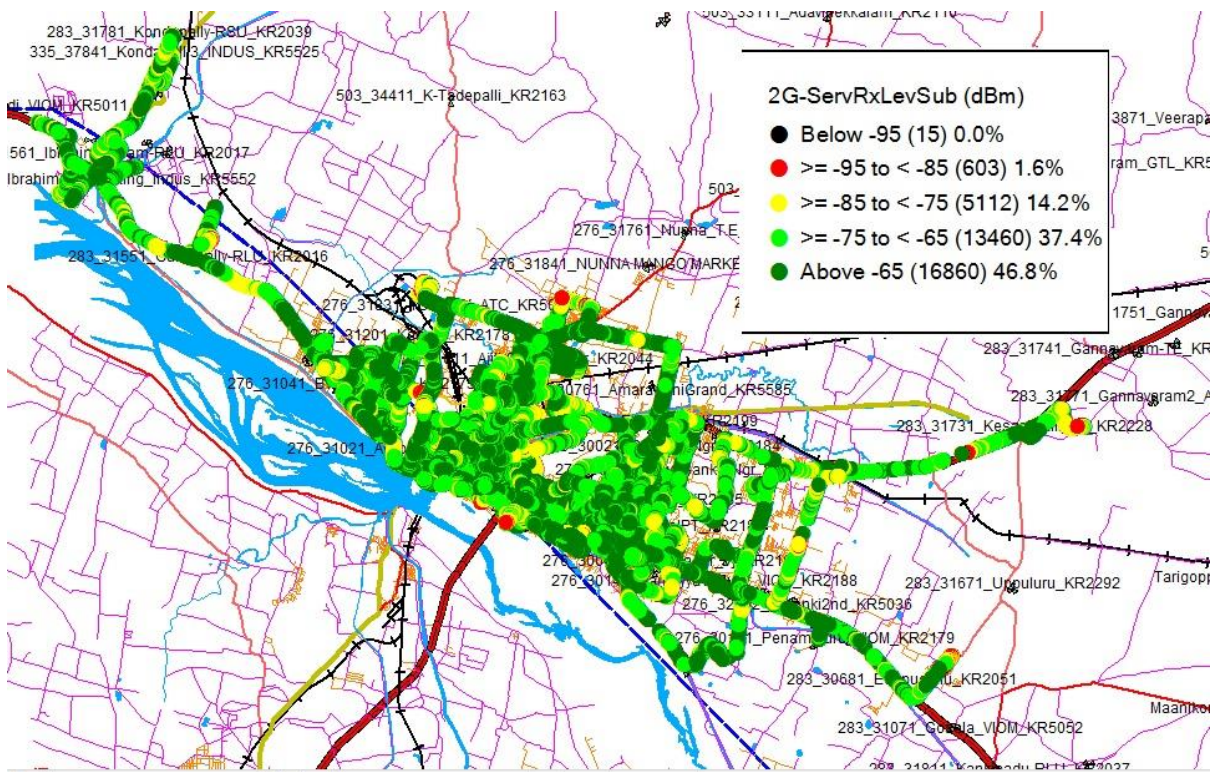
Coverage plots – VoLTE (RSRP) ----- AIRTEL



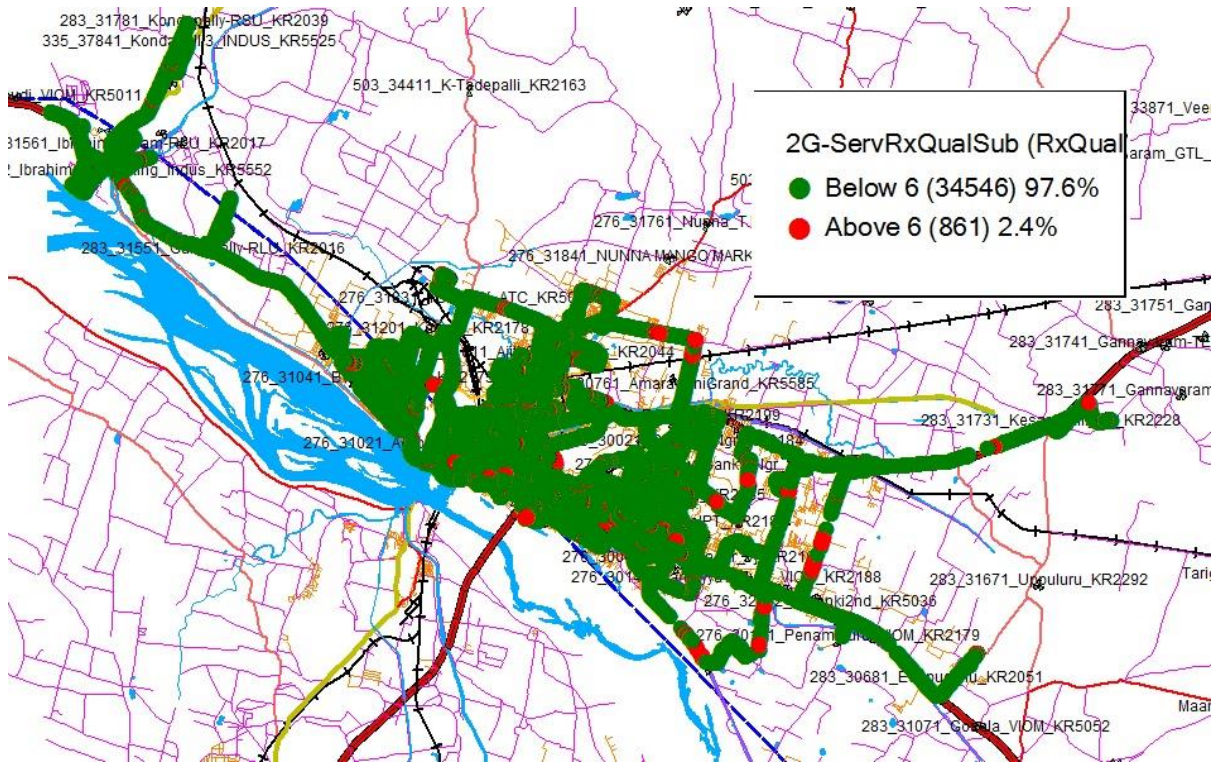
Quality plots- VoLTE (SINR) ----- AIRTEL



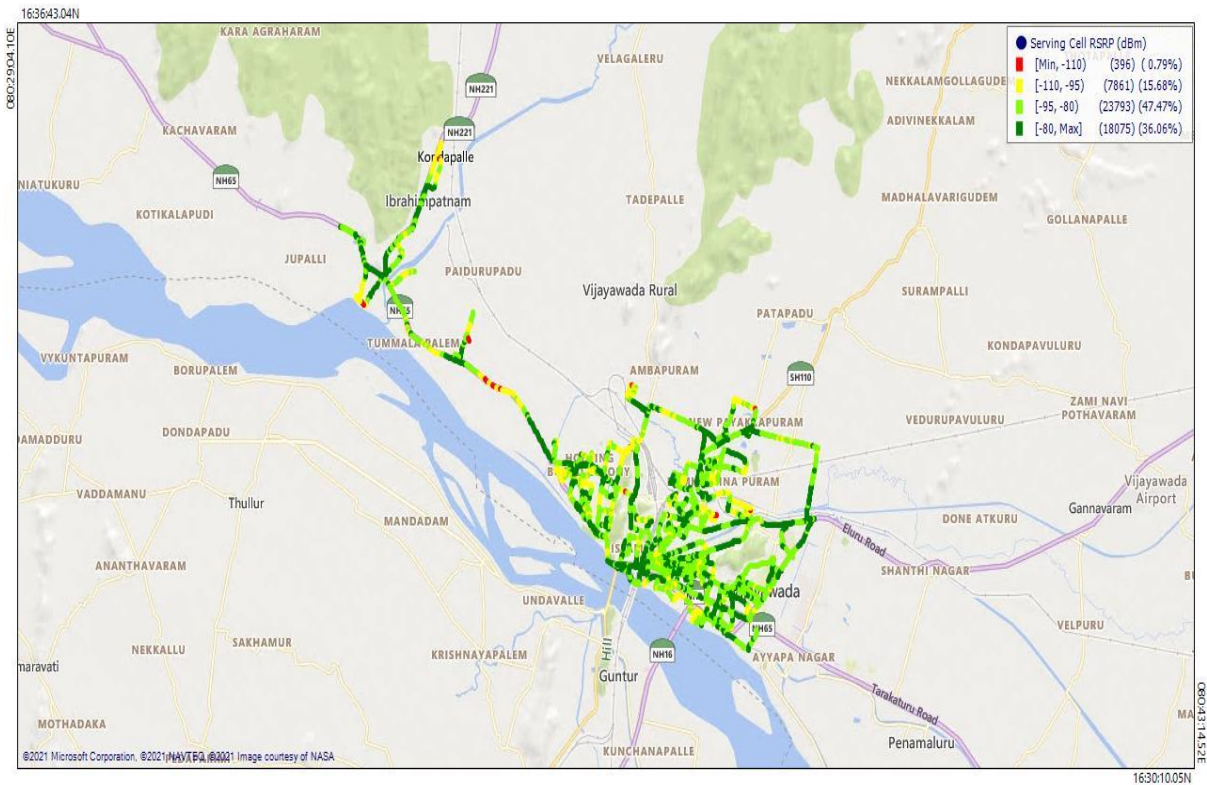
2G Rx Level Map ---- BSNL



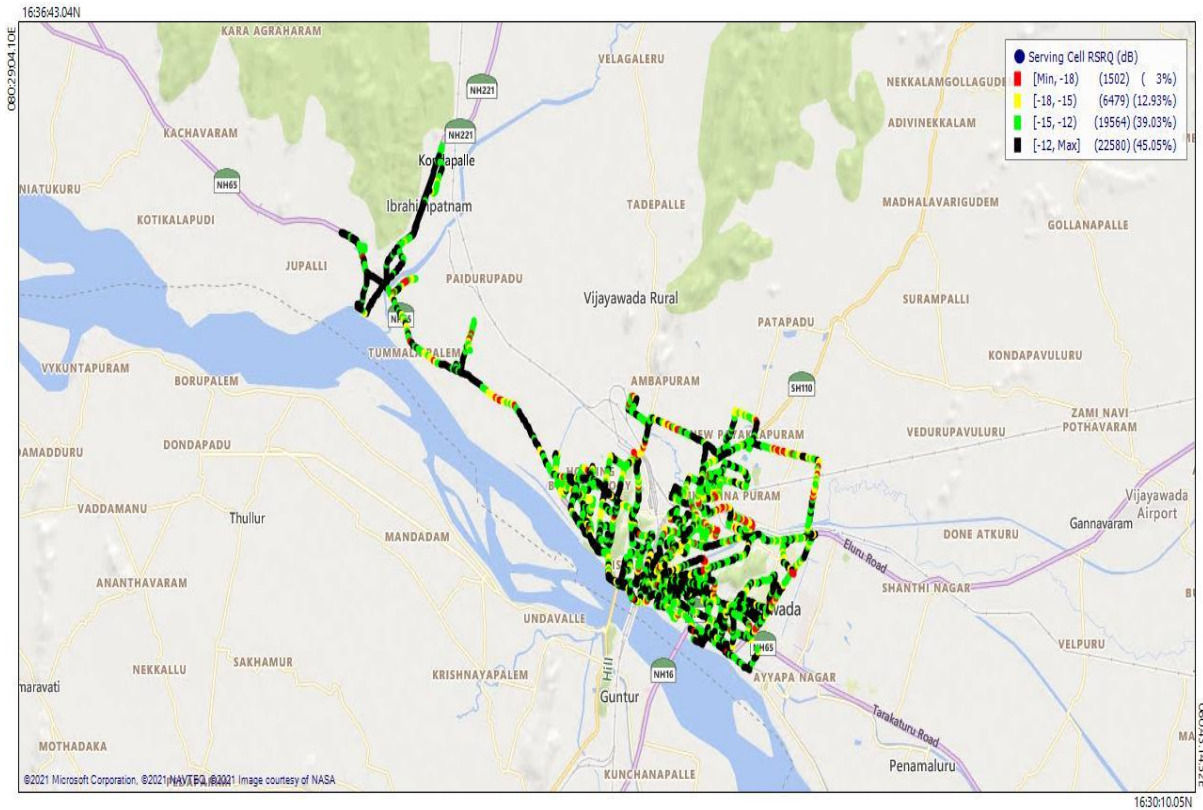
2G Rx Quality Map ---- BSNL



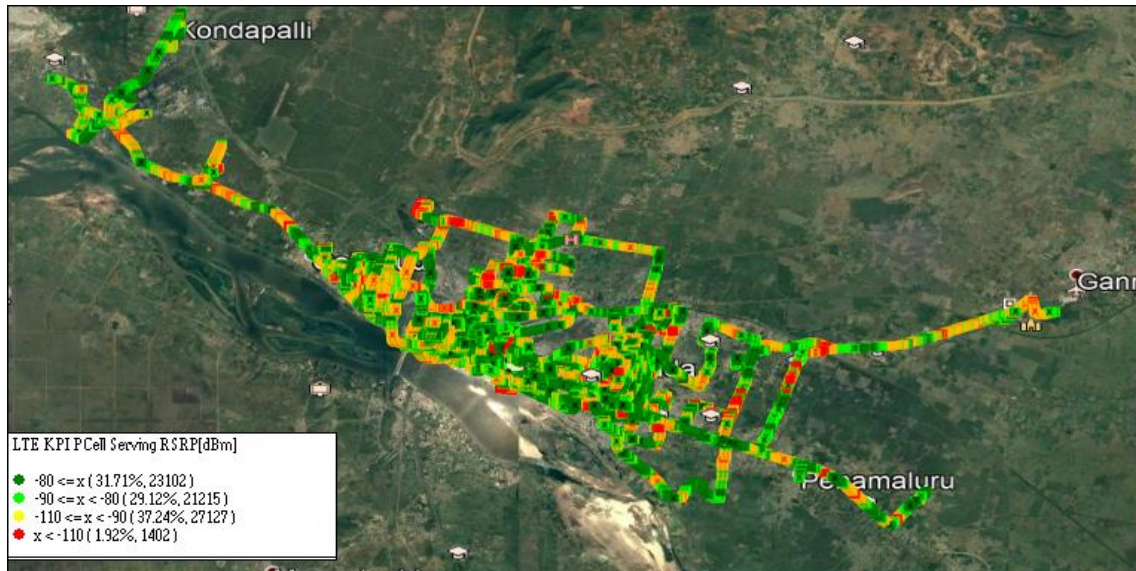
4G Mobile Level (RSRP) Map ---- BSNL



4G Mobile Quality (RSRQ) Map --- BSNL

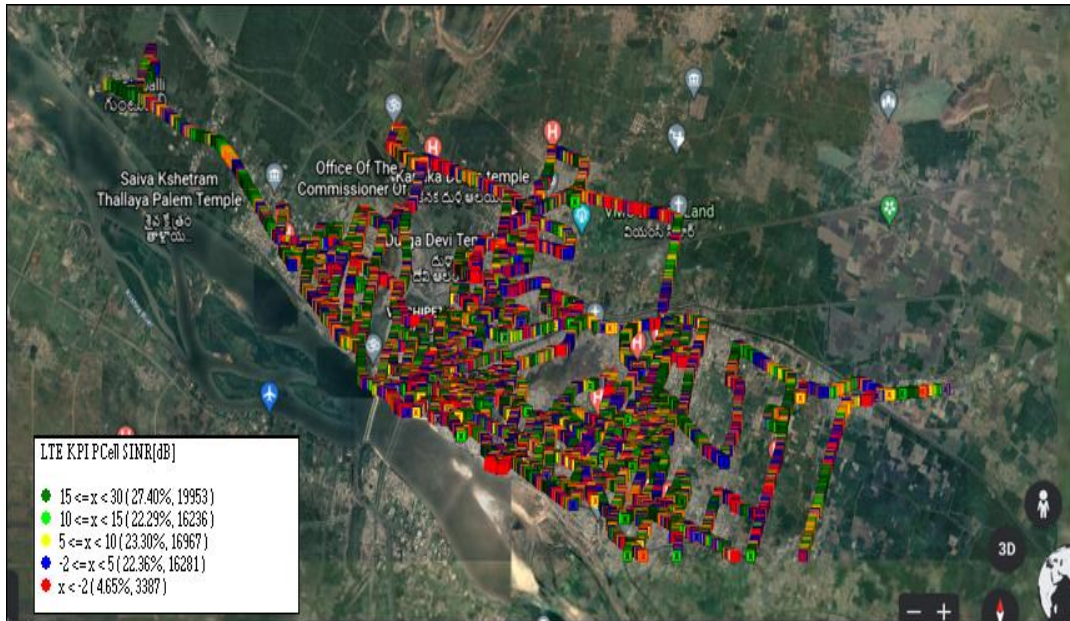


Coverage plots (VoLTE - Free) ---- RJIL





Quality plots (VoLTE - Free) ----- RJIL



Coverage Plots - 2G RX Level: VIL



RX level	Samples	Percentage
0 to -85	5660781	97.16
-85 to -95	157902	2.71
-95 to -120	7513	0.13
total	5826196	100

2G RX QUALITY: VIL



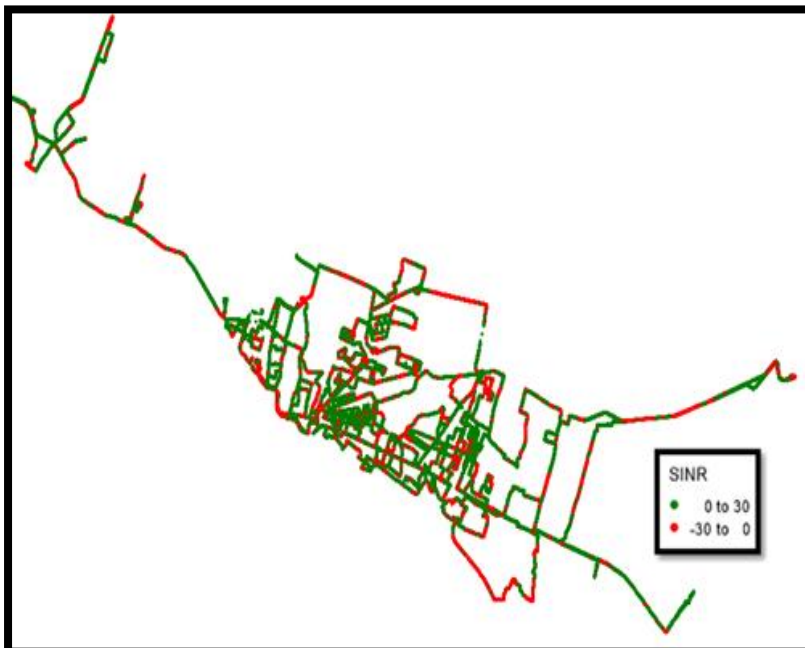
Rx Quality	Samples	Percentage
0 to 5	5626737	96.58
6 to 7	199459	3.42
total	5826196	100

Coverage Plots 4G RSRP: VIL



4G RSRP	Samples	Percentage
0 to -110	16352478	99.39
-110 to -120	90651	0.55
-120 to -140	9021	0.05
total	16452150	100.00

Quality Plots 4G SINR: VIL



4G SINR	Samples	Percentage
0 to 30	12059273	73.28
-30 to 0	4396205	26.72
total	16455478	100.00

Data speed testing by "TRAI My Speed" App					
Hotspot	Network type	Airtel	BSNL	RRJIL	VIL
RTC Bus Stand Vijayawada	2G download in Mbps	0.17	0.18		0.15
	2G upload in Mbps	0.08	0.14		0.07
	3G download in Mbps	8.92	NA		
	3G upload in Mbps	1.09	NA		
	4G download in Mbps	52.3	6.24	16.26	15.85
	4G upload in Mbps	30.0	9.21	6.72	31.17
Railway Station Vijayawada	2G download in Mbps	0.11	0.12		0.14
	2G upload in Mbps	0.08	0.04		0.03
	3G download in Mbps	13.7	NA		
	3G upload in Mbps	0.66	NA		
	4G download in Mbps	70.4	4.35	20.09	57.17
	4G upload in Mbps	31.6	7.7	7.21	18.13
PVP Mall Vijayawada	2G download in Mbps	0.19	0.2		0.17
	2G upload in Mbps	0.14	0.07		0.09
	3G download in Mbps	8.89	NA		
	3G upload in Mbps	1.09	NA		
	4G download in Mbps	68.8	7.46	55.03	10.17
	4G upload in Mbps	18.4	6.22	8.16	5.17
Airport Gannavaram, Vijayawada	2G download in Mbps	0.17	0.02		0.13
	2G upload in Mbps	0.08	0.01		0.06
	3G download in Mbps		NA		
	3G upload in Mbps		NA		
	4G download in Mbps	55.7	5.02	55.84	14.66
	4G upload in Mbps	26.4	8.4	11.97	15.76
Siddartha Engineering College Vijayawada	2G download in Mbps	0.14	0.16		0.18
	2G upload in Mbps	0.10	0.09		0.07
	3G download in Mbps	9.32	NA		
	3G upload in Mbps	1.11	NA		
	4G download in Mbps	68.8	5.3	29.92	38.32
	4G upload in Mbps	18.4	8.43	4.27	22.87

Information of Test number used for drive test

TSP		Calling number	Called number
Airtel	Voice 2G	7893009954	9849080077
	Voice 3G	9154698949	9849080077
	Voice VoLTE	7093001682	9849080077
	Data 2G	9121220879	
	Data 3G	9121220879	
	Data LTE	8179987841	
BSNL	Voice 2G	9440143753	127161
	Voice 3G		
	Voice VoLTE		
	Data 2G	9493173447	
	Data 3G		
	Data LTE		
RJIL	Voice VoLTE	6281985809	56287
	Data LTE	8328699794/6281989237	
VIL	Voice 2G	7036897047	4000
	Voice VoLTE	7095616106	4000
	Data 2G	7036897047	
	Data LTE	7036897407/ 8187896939	

Observations

1. Key Performance Indicators: All TSPs have met the Drop Call Rate (DCR) benchmark of 2%.
2. Block Call Rate (BCR) benchmark of 3% was achieved by all TSPs.
3. All TSPs have met the Call Setup Success Rate (CSSR) of 95%.
4. 3G & 4G Download & Upload throughputs are low compared to specifications.
5. Receive Quality for 4G of Airtel & VIL is less than 95%
6. BSNL is not having 3G coverage in Vijayawada.
7. BSNL is having 4G coverage but measured only data at static locations but not having measuring equipment for Voice calls.
8. BSNL not provided TRAI "My Speed App" screen shots for 2G but provided for 4G.