Operator Assisted Drive Test Report

Hisar City & Nearby area
25th April to 27th April 2023
By
TRAI Regional office Jaipur

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%.

The Operator Assisted Drive Test has been carried out by Regional Office, Jaipur with the help of Service Providers in Hisar City & Nearby area from 9:00 AM to 8:00 PM during 25-04-2023. to 27-04-2023. The drive test covered drive route of 222 KMs & 6 no hotspots over a period of 3 days. Approximately 425 calls were made for each of the networks: three 2G networks, one 3G networks and three LTE networks covering four TSPs.

| Overview | Voice Summary | Data Summary |

Overview

Regional Office, TRAI Jaipur conducted Operator Assisted Drive Test from 25th April 2023 to 27th April 2023 covering Hisar City & Nearby Area. The performance of Airtel, BSNL, Vodafone Idea and Jio was monitored across various technologies (2G, 3G and 4G). The test results obtained from these drive tests were utilized to assess the network quality for Voice and Data services.

Voice: Coverage, Quality, Handover Success Rate, Call Setup Success Rate, Drop Call Rate and Block Call Rate.

Data: Download Throughputs, Upload Throughputs, Web Browsing Delay and Latency.

Drive Test Details :

Voice Tests: Calls were made for 90 sec duration with a wait time of 10 sec between calls in all technologies. The drive test covered a drive route of approximately 222 KMs. Approximately **425 calls** were made for each of the networks: three 2G (Lock Mode) networks, one 3G (Dual mode) networks and three VoLTE networks covering 4 unique TSPs.

Data Tests:

Dynamic data test was conducted for 95 kms for download throughput in all technologies.

2G – measurement – UE Locked in 2G file size- 500KB

3G – measurement – UE in 3G   File Size- 20MB

4G – measurement – UE in LTE File Size- 40MB

Static data tests on 6 hotspots

1. **Railway Station Hisar**
2. **Sun City Mall Hisar**
3. **Pushpa Complex**
4. **GJU University**
5. **Civil Hospital**
6. **Bus Stand**

| 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
Latency	32 Bytes on www.google.com

Overview

Voice & Dynamic Data Test Drive Route
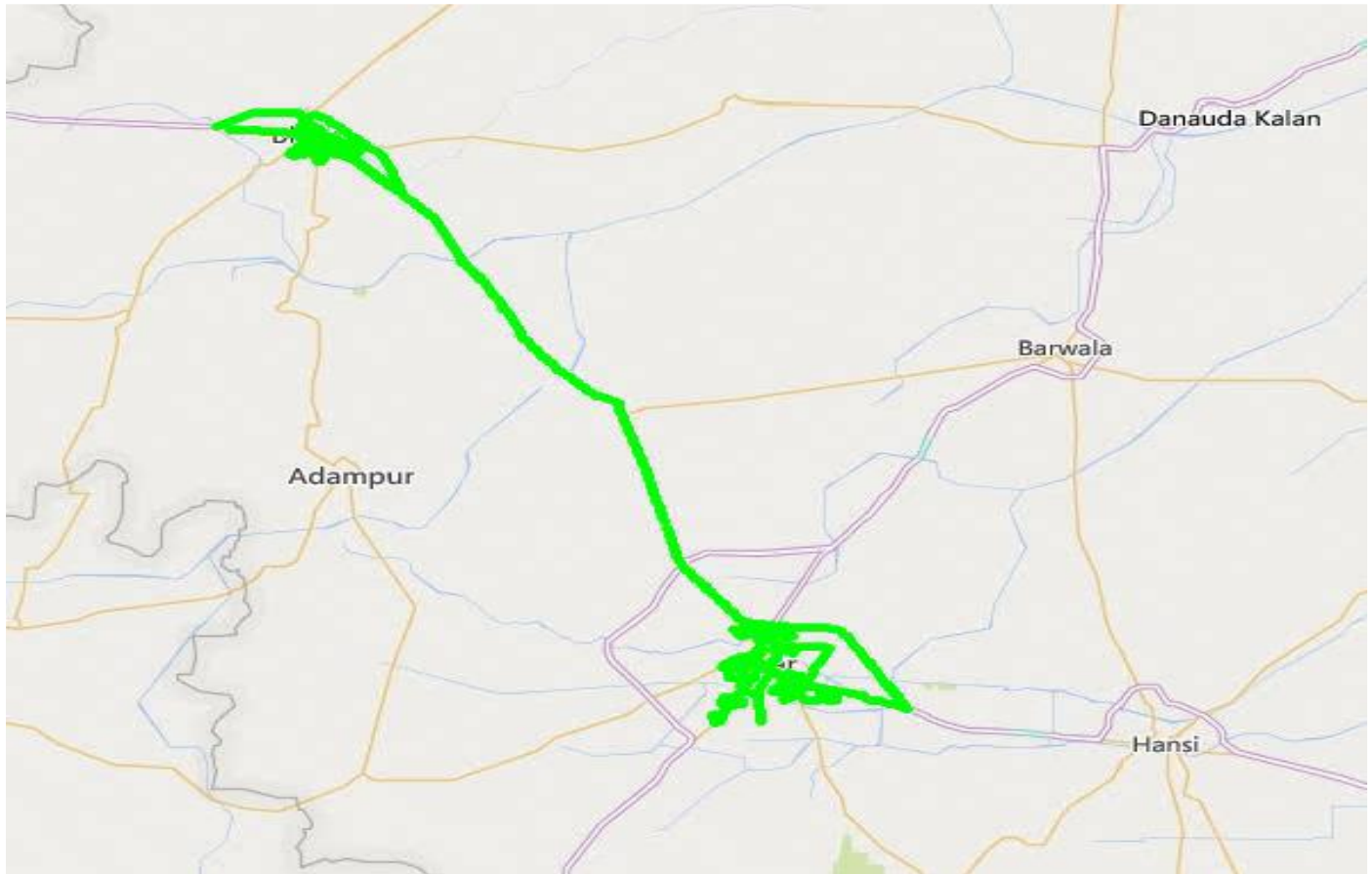
Date	Test Scenario	Area to be Covered
25 APR 2023	2G/3G/4G Voice and 3G/4G/5G Dynamic Data	**Starting Point BSNL EXCHANGE at 9;30 AM** .SEC 14,ANAJ MANDI,GJU,AUTO MARKET,MILL GATE,MODEL TOWN,SEC 9 ,UDYOG NAGAR,SEC 16,SEC 13,,CAMRY ROAD,AZAD NAGAR,GANGWA,HAU,PREM NAGAR,MALIK CHOKH,BUS STAND,URBAN ESTATE,JINDAL INDUSTRY
26V APR 2023	2G/3G/4G Voice and 3G/4G/5G Dynamic Data	**Starting Point BSNL EXHANGE at 9.30 AM**, HISAR TO FATHEABAD HIGHWAY AND CITY AREA COVERED
27 APR 2023	Hot Spots- 2G/3G/4G/5G Static Data Tests	**Starting Point BSNL EXCHANGE at 9.30 AM** RAILWAY STATION ,SUN CITY MALL, PUSHPA COMPLEX, GJU, UNIVERSITY, CIVIL HOSPITAL,BUS STAND

Data Service Test- Static Locations
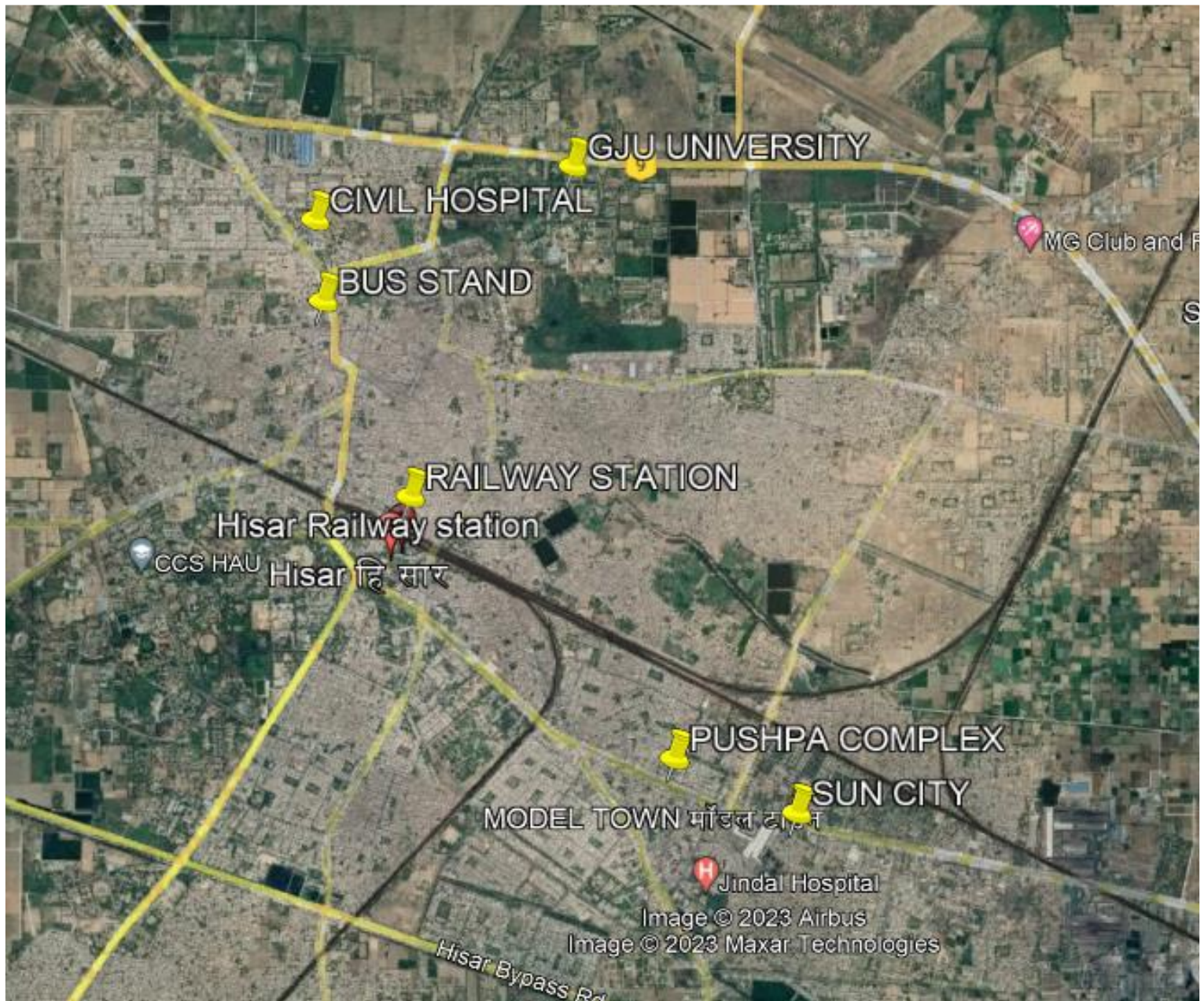
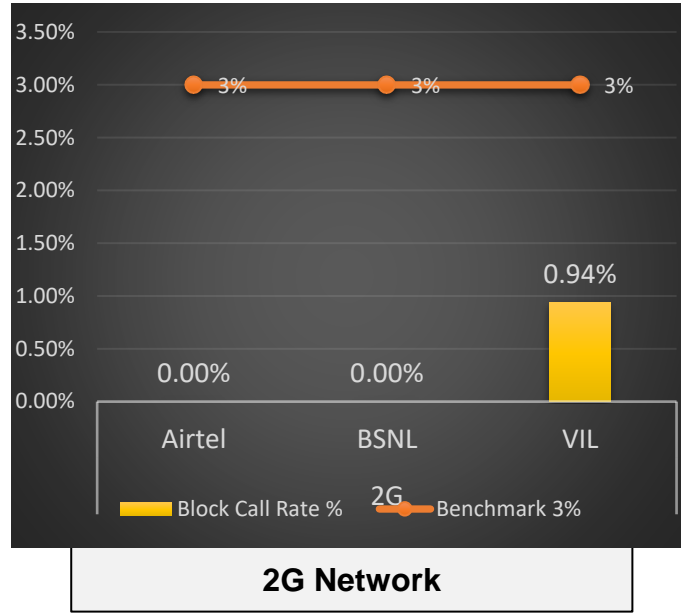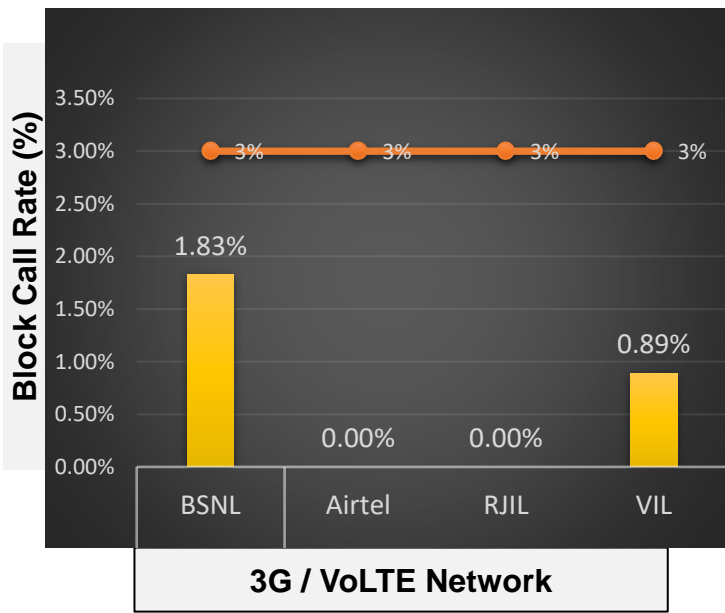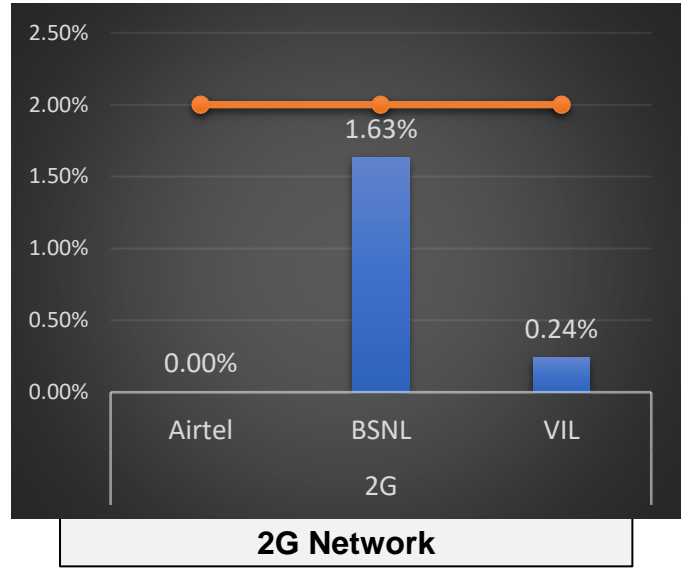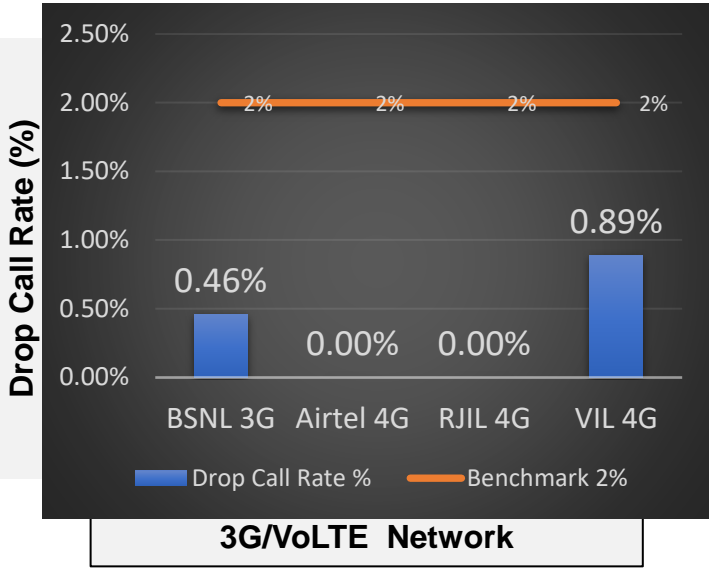| Hotspot Locations |
| --- |
| 1. Railway station |
| 2. Suncity complex |
| 3.Pushpa complex |
| 4.GJU University |
| 5.Civil hospital |
| 6.Bus stand |
| |

Voice Calls

QoS compliance of the TSPs in **Hisar** for Voice across technologies 2G/3G/4G-VoLTE:

3G/VoLTE Network

2G Network

3G / VoLTE Network

2G Network

KPIs	2G			3G	4G		
	Airtel	**BSNL**	**VIL**	**BSNL**	**Airtel**	**RJIL**	**VIL**
Drop Call Rate %	0.00%	1.63%	0.24%	0.46%	0.00%	0.00%	0.89%
Block Call Rate %	0.00%	0.00%	0.94%	1.83%	0.00%	0.00%	0.89%

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.

Voice Calls

Coverage

a) Percentage of coverage samples for 2G **≥** -85 dBm.

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	95.00%	67.28%	92.00%

b) Percentage of coverage samples for 3G ≥ -90 dBm

TSPs	3G
	BSNL
Coverage %	80.28%

c) Percentage of coverage samples for LTE ≥ -110 dBm.

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	99.00%	99.67%	99.68%

d) Percentage of time spent on 3G/4G network

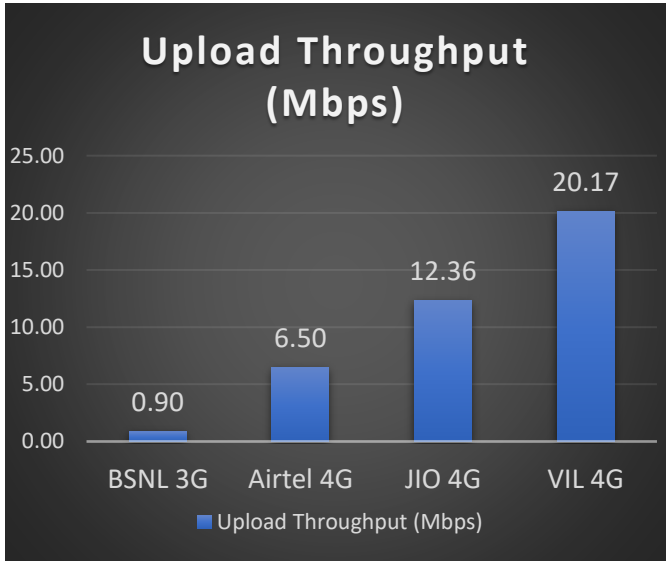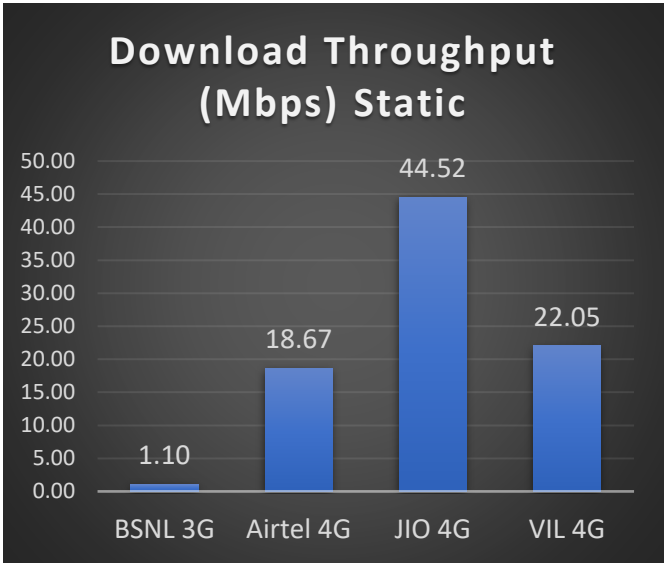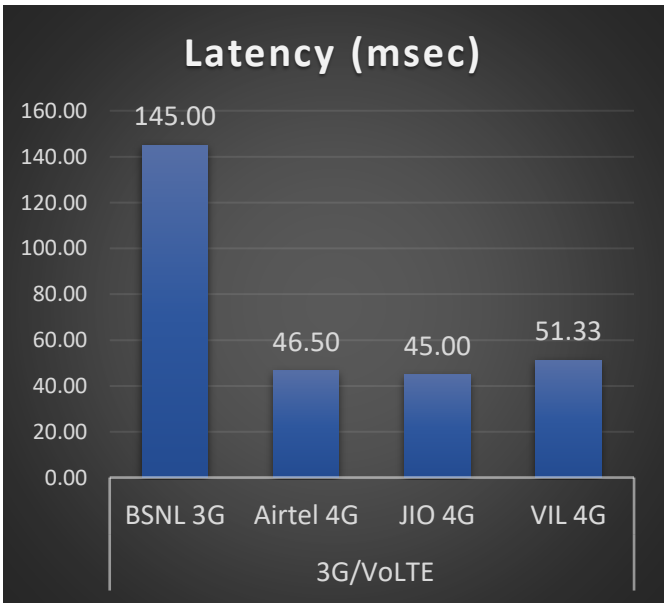| TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Time spent on 3G/4G Network %	85.70%	100.00%	100.00%	100.00%

Data Services Static

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

Data Download and Upload Performance Static (Mbps)

3G/4G/ Network:

Download Throughput (Mbps) Static
- BSNL 3G: 1.10
- Airtel 4G: 18.67
- JIO 4G: 44.52
- VIL 4G: 22.05

Upload Throughput (Mbps)
- BSNL 3G: 0.90
- Airtel 4G: 6.50
- JIO 4G: 12.36
- VIL 4G: 20.17

Latency (ms)

Latency (msec) 3G/VoLTE
- BSNL 3G: 145.00
- Airtel 4G: 46.50
- JIO 4G: 45.00
- VIL 4G: 51.33

Web Browsing (Sec)

Web Browsing Delay (sec)
- BSNL 3G: 8.32
- Airtel 4G: 0.35
- JIO 4G: 1.38
- VIL 4G: 0.30
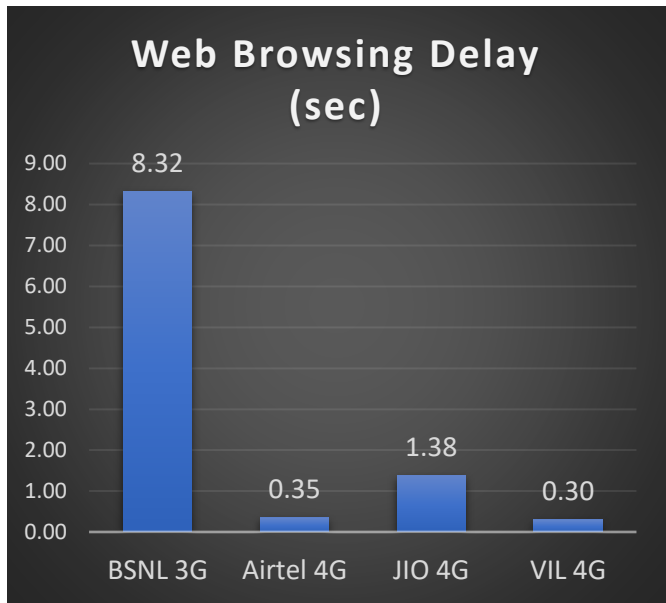
Data Services Dynamic

Dynamic Data was tested for whole voice route. Download Throughput was tested.

Data Download Performance (kbps) - Dynamic

3G/4G/ Network:

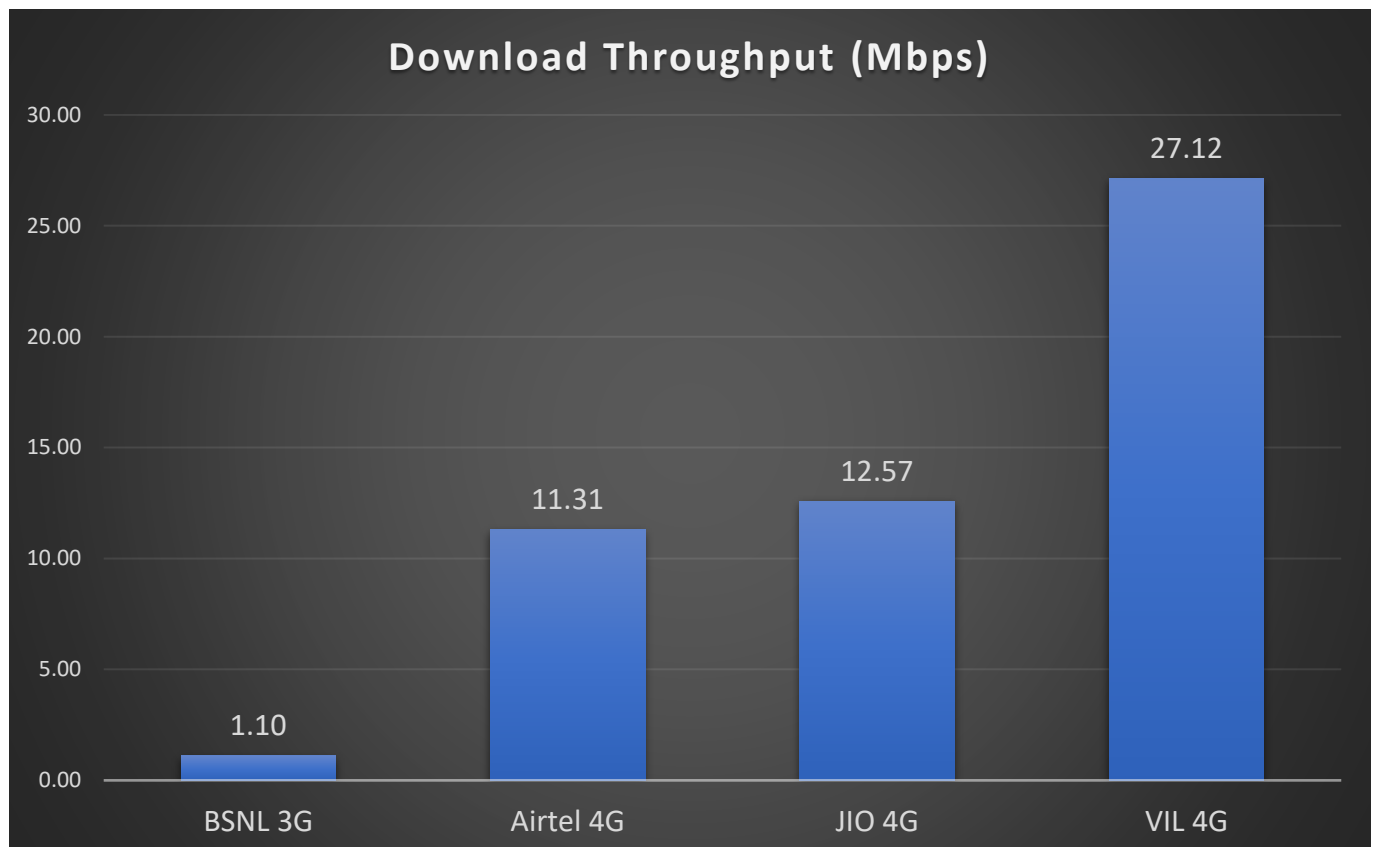| Data Services Dynamic	3G/VoLTE			
	BSNL 3G	**Airtel 4G**	**JIO 4G**	**VIL 4G**
Download Throughput (Mbps)	**1.10**	**11.31**	**12.57**	**27.12**

Download Throughput (Mbps)

Summary

Voice Call	2G		
	Airtel	**BSNL**	**VIL**
Call Attempt	426	428	424
Blocked Call Rate (%)	0.00%	0.00%	0.94%
CSSR% (Accessibility)	100.00%	100.00%	99.05%
Drop Call Rate (%)	0.00%	1.63%	0.24%
Mobility HOSR (%)	98.24%	96.10%	97.75%
Rx Quality (%)	95.00%	98.84%	99.78%
Average CST Sec	3.80	3.10	5.07

Voice Call	3G/VoLTE			
	BSNL 3G	**Airtel VoLTE**	**JIO VoLTE**	**VIL VoLTE**
Call Attempt	437	442	454	449
Blocked Call Rate (%)	1.83%	0.00%	0.00%	0.89%
CSSR% (Accessibility)	98.24%	100.00%	100.00%	99.10%
Drop Call Rate (%)	0.46%	0.00%	0.00%	0.89%
Mobility HOSR (%)	100.00%	99.63%	99.39%	99.75%
Rx Quality (%)	91.88%	95.42%	92.27%	96.73%
Average CST Sec	2.90	1.50	0.56	2.38

a) All TSPs have to met the 95% QOS benchmark of Rx Quality .
b) Drop Call Rate (DCR%) Benchmark is 2% and Call Block Rate (CBR%) benchmark is 3%

Summary

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	152.00	127.00	92.49
Upload Throughput (kbps)	74.00	25.12	81.63
Web Browsing Delay (sec)	0.53	52.00	0.74
Latency (msec)	193.75	132.00	180.00

Data Services Static	3G / 4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	1.10	18.67	44.52	22.05
Upload Throughput(Mbps)	0.90	6.50	12.36	20.17
Video Streaming Delay (sec)	5.80	0.44	0.37	0.46
Web Browsing Delay (sec)	8.32	0.35	1.38	0.30
Latency (msec)	145.00	46.50	45.00	51.33

Data Services Static

Railway Station	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	186.40	163.30	70.04
Upload Throughput (kbps)	80.40	14.34	92.90
Web Browsing Delay (sec)	0.68	52.83	0.82
Latency (msec)	247.00	162.00	169.00

Sun City Mall	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	136.00	71.96	119.00
Upload Throughput (kbps)	74.00	21.30	99.90
Web Browsing Delay (sec)	0.36	74.00	0.39
Latency (msec)	246.00	121.00	153.00

Pushpa Complex	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	91.00	141.23	96.10
Upload Throughput (kbps)	74.00	15.40	63.60
Web Browsing Delay (sec)	0.83	59.17	0.77
Latency (msec)	213.00	271.00	213.00

GJU University	2G		
	Airtel	**BSNL**	**VIL**
Download Throughput (kbps)	171.00	172.18	98.90
Upload Throughput (kbps)	97.00	22.85	93.90
Web Browsing Delay (sec)	0.53	56.00	0.66
Latency (msec)	137.00	134.00	165.00

Civil Hospital	2G		
	Airtel	**BSNL**	**VIL**
Download Throughput (kbps)	145.00	155.60	86.00
Upload Throughput (kbps)	61.00	19.18	71.50
Web Browsing Delay (sec)	0.58	73.13	0.82
Latency (msec)	224.00	177.00	190.00

Bus Stand	2G		
	Airtel	**BSNL**	**VIL**
Download Throughput (kbps)	149.00	144.20	84.90
Upload Throughput (kbps)	65.00	33.10	68.00
Web Browsing Delay (sec)	0.57	56.13	0.95
Latency (msec)	201.00	193.00	190.00

Data Services static

Railway Station	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	3.17	11.50	48.14	28.80
Upload Throughput (mbps)	1.06	4.40	11.96	27.90
Video Streaming Delay (Secs.)	4.10	0.45	0.38	0.36
Web Browsing Delay (sec)	6.86	0.94	1.33	0.21
Latency (msec)	72.00	59.00	42.00	38.00

Sun City Mall	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	6.58	29.40	57.20	16.30
Upload Throughput (mbps)	1.98	7.50	20.83	22.30
Video Streaming Delay (Secs.)	8.90	0.37	0.38	0.42
Web Browsing Delay (sec)	6.90	0.05	1.29	0.39
Latency (msec)	39.00	50.00	42.00	35.00

Pushpa Complex	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	4.19	23.00	37.63	14.30
Upload Throughput (mbps)	1.80	6.20	6.58	3.34
Video Streaming Delay (Secs.)	4.03	0.53	0.35	0.56
Web Browsing Delay (sec)	6.12	0.09	1.39	0.43
Latency (msec)	48.00	77.00	43.00	41.00

Data Services static

GJU University	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	2.84	16.40	42.62	10.90
Upload Throughput (mbps)	0.88	5.50	19.25	19.90
Video Streaming Delay (Secs.)	6.30	0.55	0.36	0.58
Web Browsing Delay (sec)	9.16	0.03	1.36	0.25
Latency (msec)	134.00	38.00	47.00	40.00

Civil Hospital	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	3.16	9.40	54.90	49.40
Upload Throughput (mbps)	1.55	5.80	8.52	27.60
Video Streaming Delay (Secs.)	6.50	0.49	0.35	0.32
Web Browsing Delay (sec)	88.50	0.07	1.46	0.19
Latency (msec)	188.00	86.00	50.00	80.00

Bus Stand	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	4.39	35.10	29.63	12.60
Upload Throughput (mbps)	1.50	8.60	7.12	20.01
Video Streaming Delay (Secs.)	4.10	0.42	0.42	0.53
Web Browsing Delay (sec)	8.45	0.08	1.45	0.34
Latency (msec)	62.00	34.00	45.00	74.00

RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call session. The Coverage rate is calculated on the basis of % of samples in which the Rx level ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110dBm. The details are as follows.
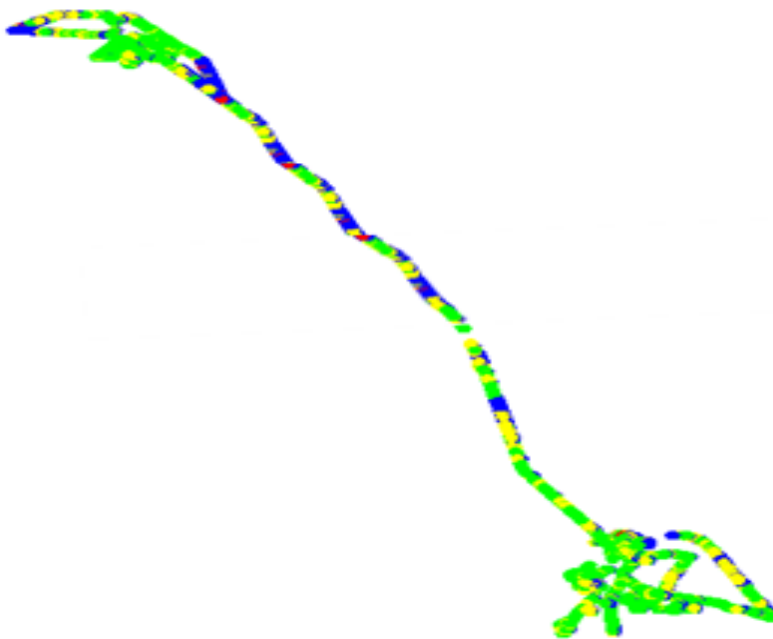
TSP	Coverage Rate %
Airtel 2G	95.00%
BSNL 2G	67.28%
VIL 2G	92.00%
BSNL 3G	80.28%
Airtel VoLTE	99.00%
Jio VoLTE	99.67%
VIL VoLTE	99.68%

Coverage Rate

	Airtel 2G	BSNL 2G	VIL 2G	BSNL 3G	Airtel VoLTE	Jio VoLTE	VIL VoLTE
Orange	5.00	32.72	8.00	19.72	1.00	0.33	0.32
Blue	95.00	67.28	92.00	80.28	99.00	99.67	99.68
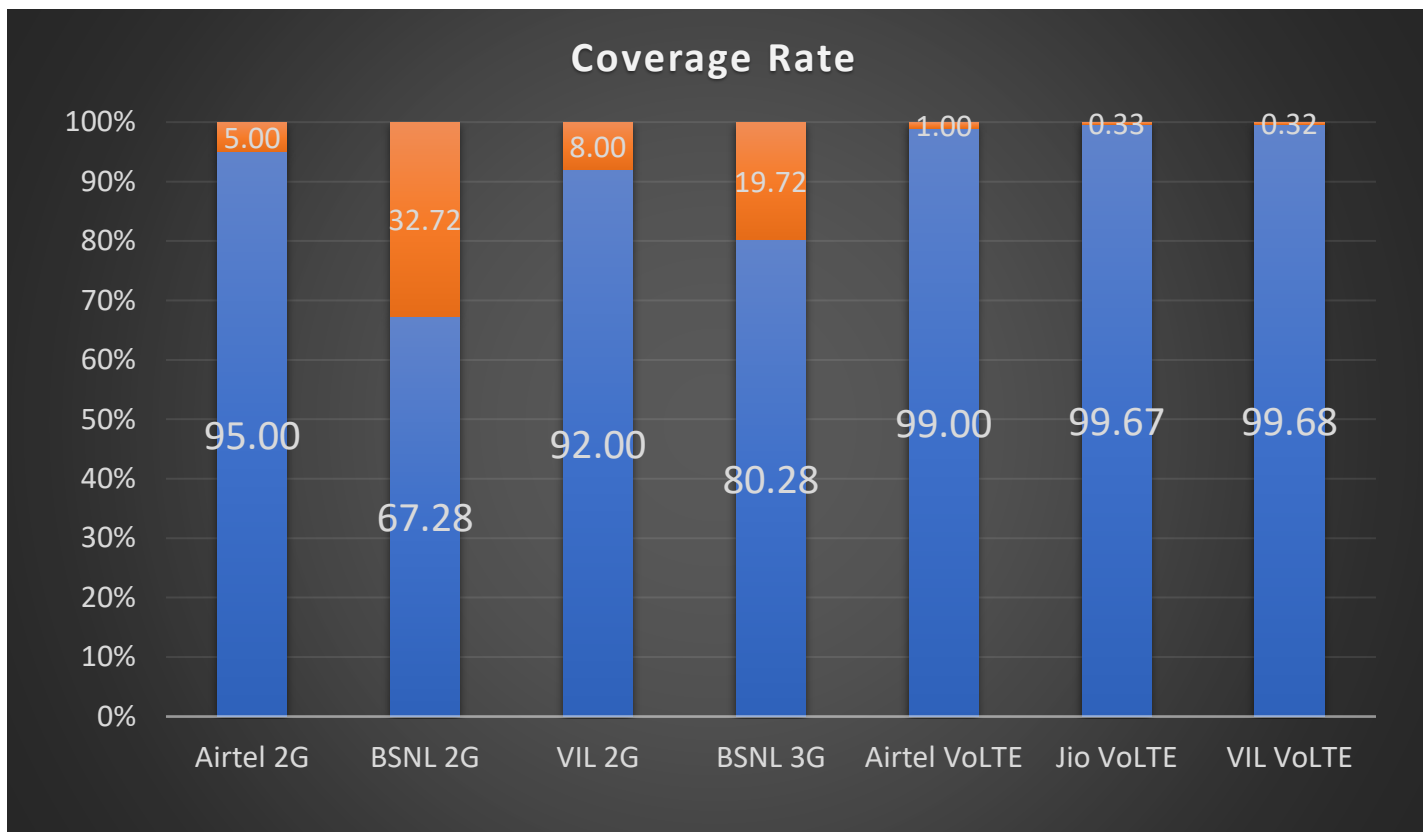
TSP-AIRTEL

Technology	Coverage %
2G	95.00%
VoLTE	99.00%

2G

2G

Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	3380591	72%	
[-75, >=-85)	1101309	23%	
[-85, >=-95)	184737	4%	
[-95, >=Min)	28303	1%	
Total	4694940	100%	

VoLTE
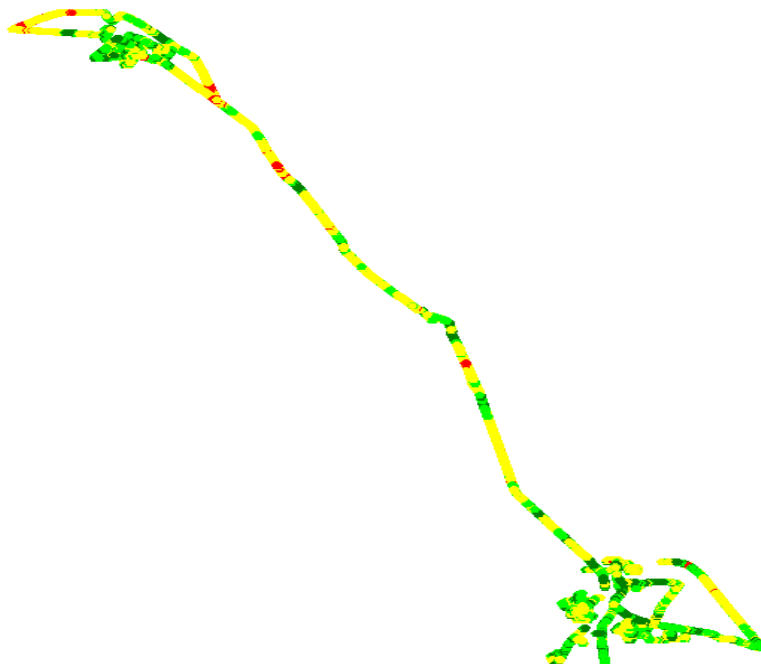
VoLTE

Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	1237047	23%	
[-80, >=-90)	2442116	45%	
[-90, >=-110)	1749892	32%	
[-110, >=Min)	39437	1%	
Total	5468412	100%	

TSP- BSNL

Technology	Coverage %
2G	67.28%
3G	80.28%

2G
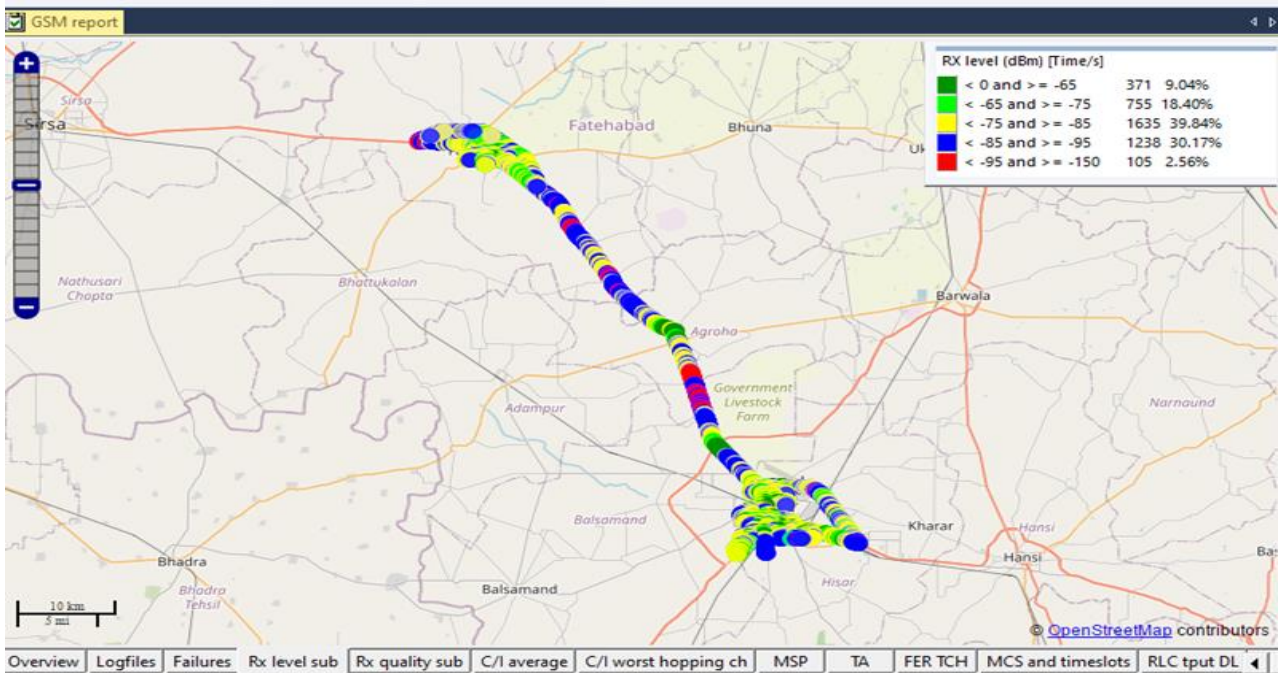
3G
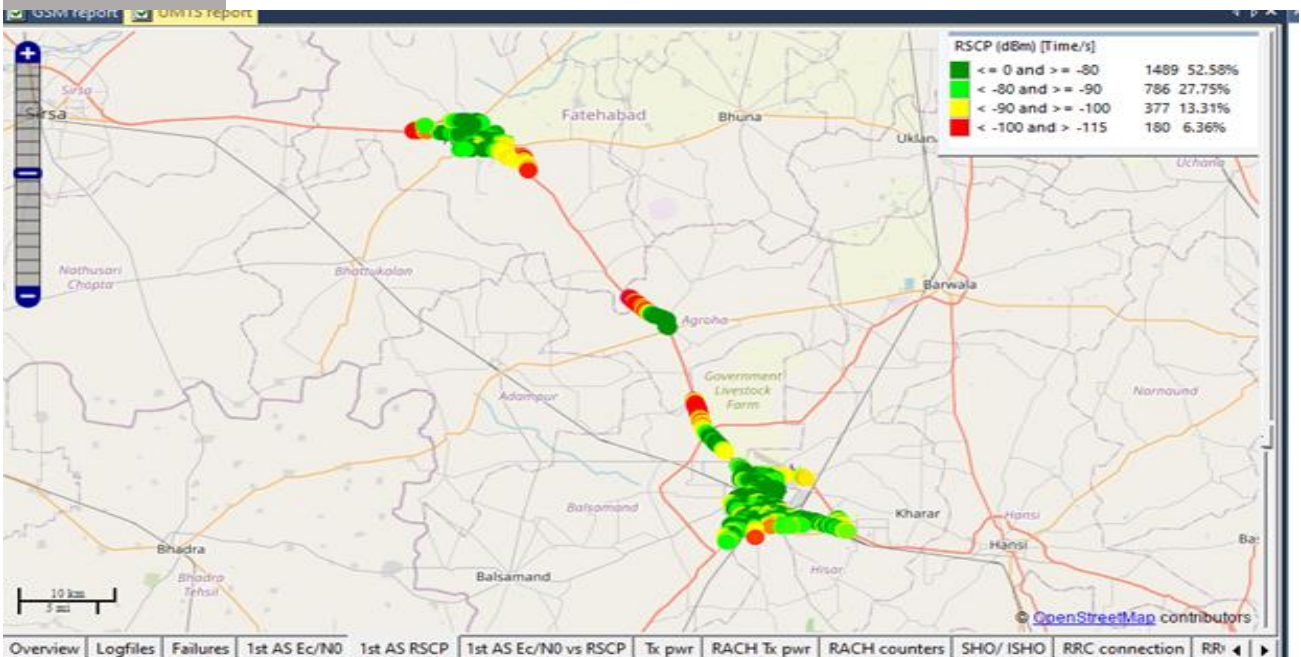
JIO

Technology	Coverage %
VoLTE	99.67%

(75.60023 , 29.31852)
2000 m
1 : 168789

Qualcomm Lte/LteAdv Intrafreq Measure PCell
Serving Cell Serving RSRP RSRP[dBm]
- -80 <= x (49.87%, 24766)
- -90 <= x < -80 (33.47%, 16623)
- -110 <= x < -90 (16.33%, 8107)
- x < -110 (0.33%, 162)
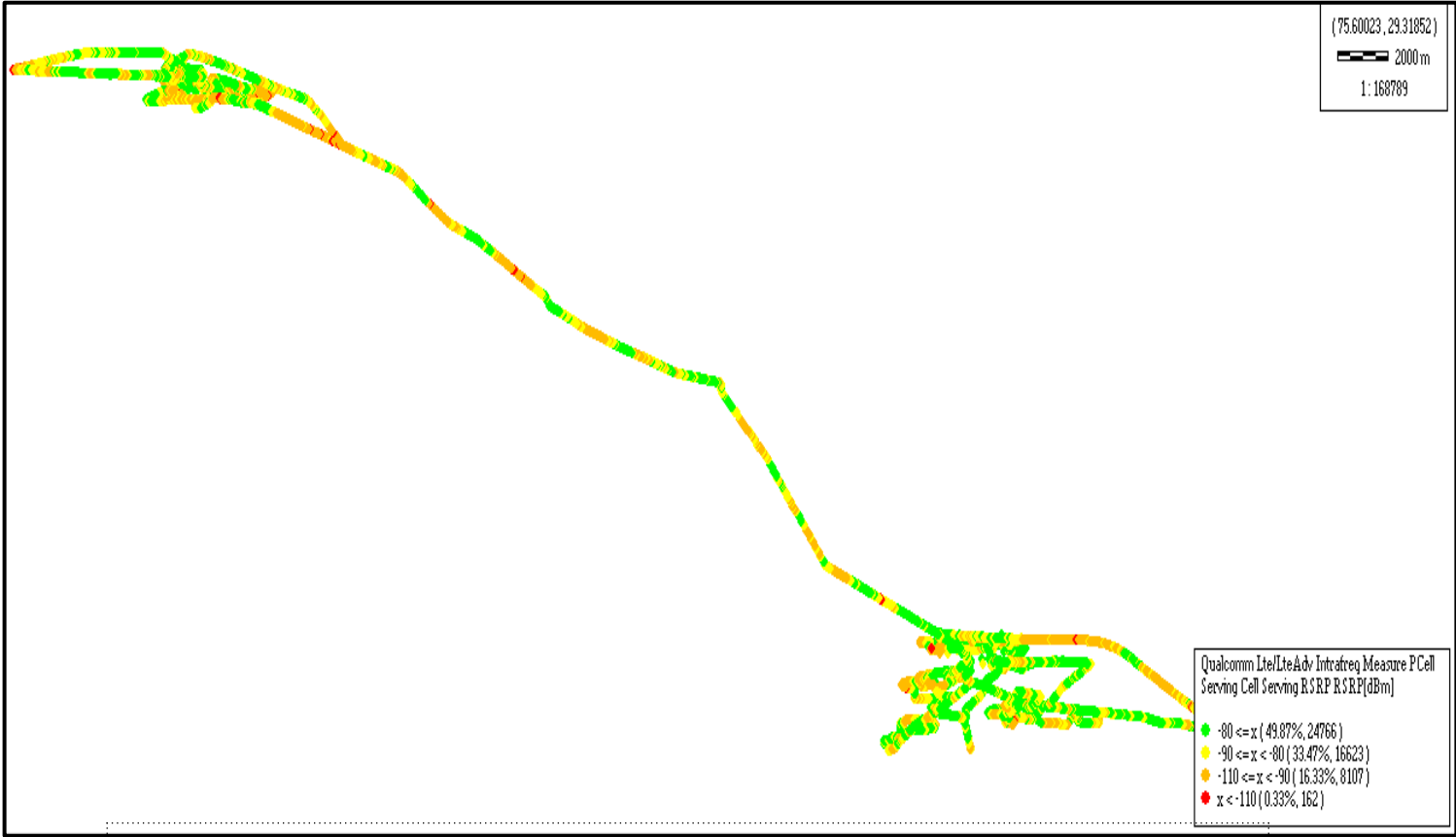
VoLTE

Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	24766	69.71	
[-80, >=-90)	16623	15.61	
[-90, >=-110)	8107	14.29	
[-110, >=Min)	162	.39	
Total	**49658**	**100%**	

VIL

Technology	Coverage Rate %
2G	92.00%
VoLTE	99.68%

2G
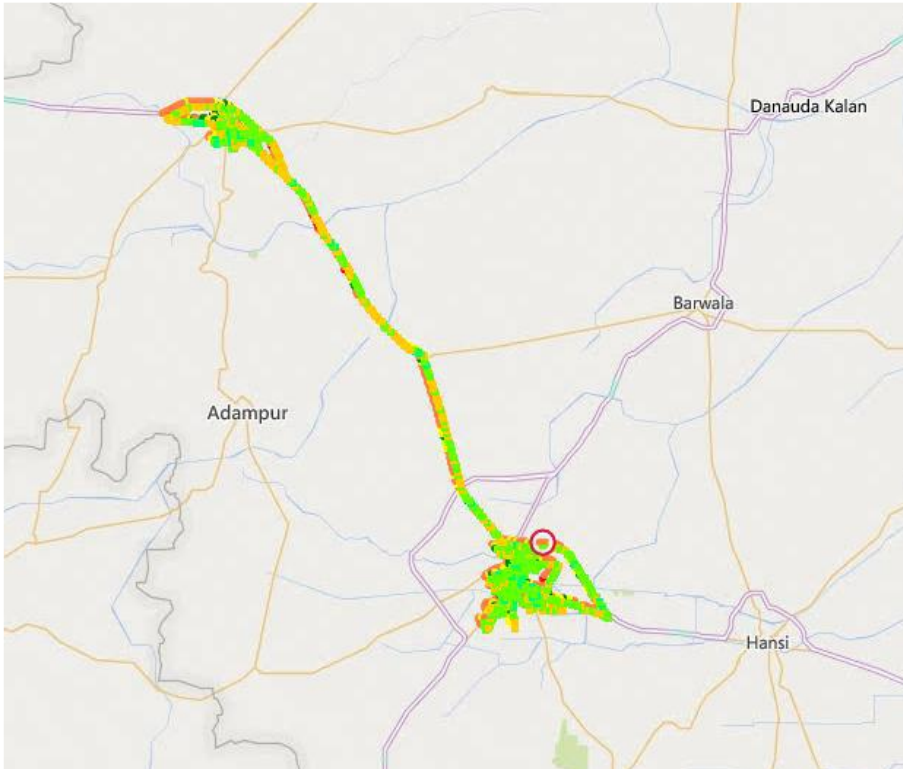
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	805139	65	🟩
[-75, >=-85)	334333	27	🟨
[-85, >=-95)	82252	7	🟧
[-95, >=Min)	8655	1	🟥
Total	1230379	100%	

VoLTE
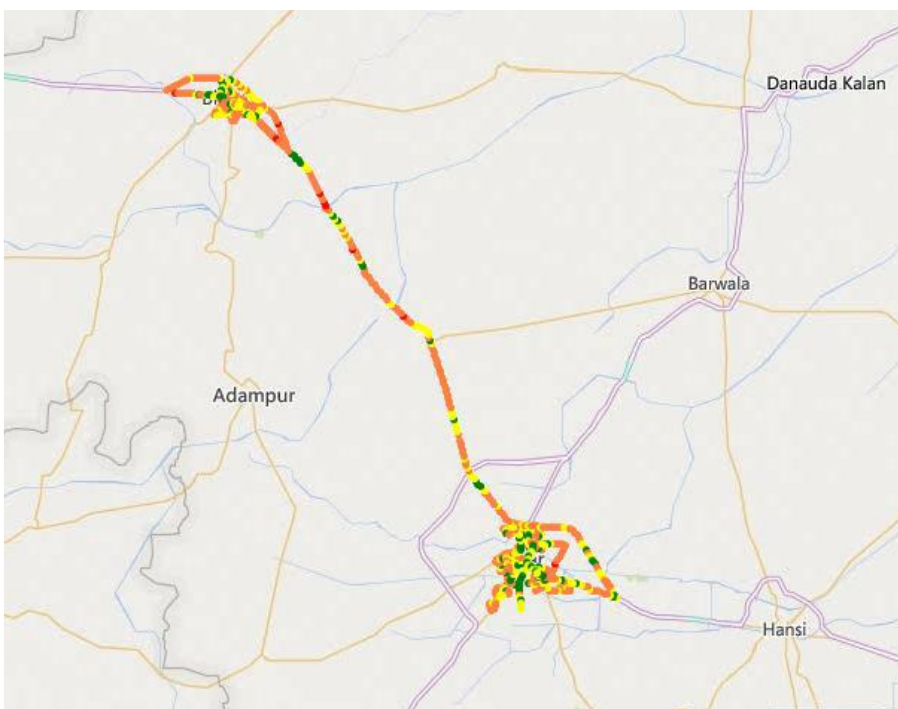
VoLTE /5G			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	5987281	41.07%	🟩
[-80, >=-90)	1426882	9.79%	🟨
[-90, >=-110)	7116476	48.82%	🟧
[-110, >=Min)	46360	0.32%	🟥
Total	14576999	100%	

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 ≥ 95%.

TSP	Rx Quality %
Airtel 2G	95.00%
BSNL 2G	98.84%
VIL 2G	99.78%
BSNL 3G	91.88%
Airtel VoLTE	95.42%
Jio VoLTE	92.27%
VIL VoLTE	96.73%
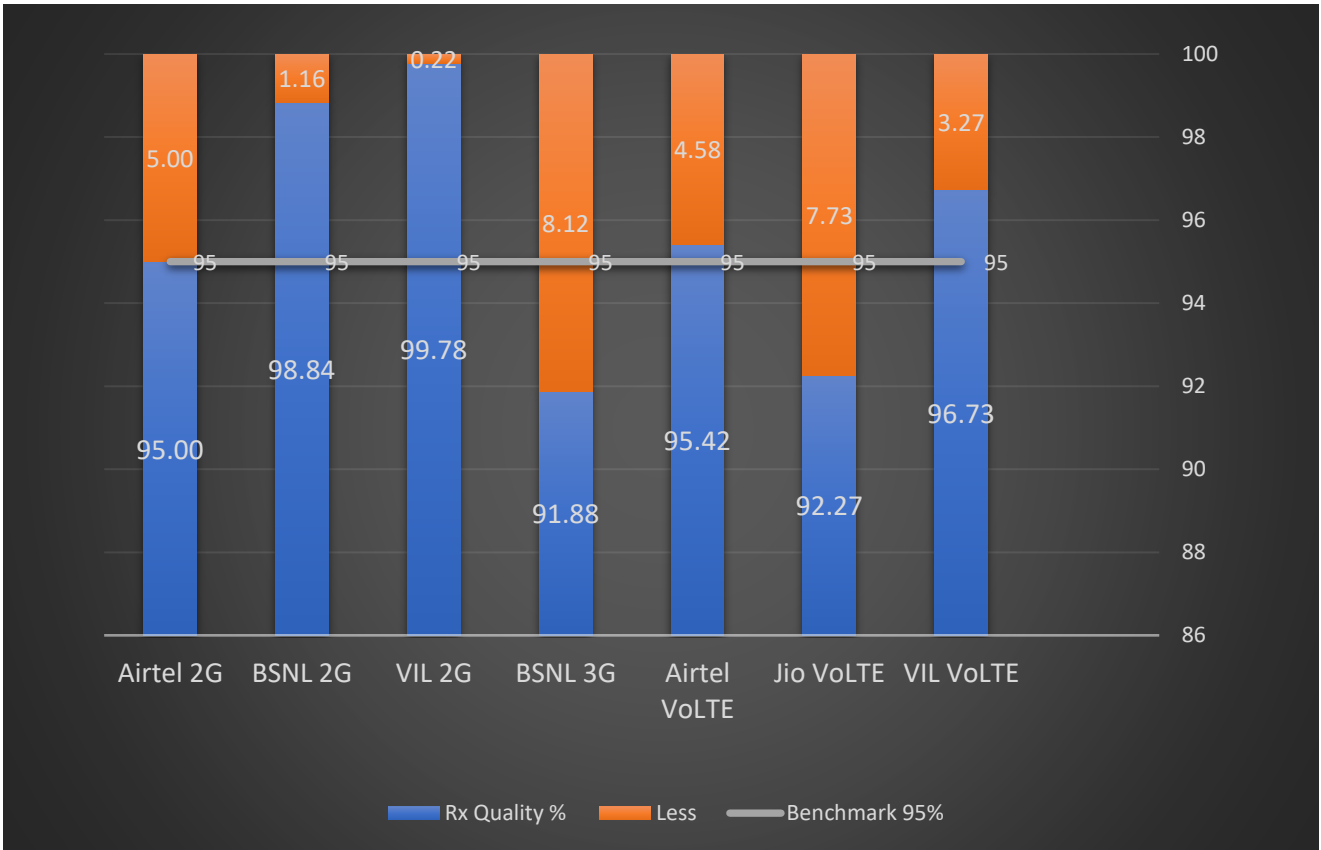
Airtel

Technology	Rx Quality %
2G	95.00%
VoLTE	95.42%

2G

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	7144840	88%	
(2, <=3)	194889	2%	
(3, <=4)	186732	2%	
(4, <=5)	197981	3%	
(5, <=Max)	416808	5%	
Total	8141250	100%	

VoLTE
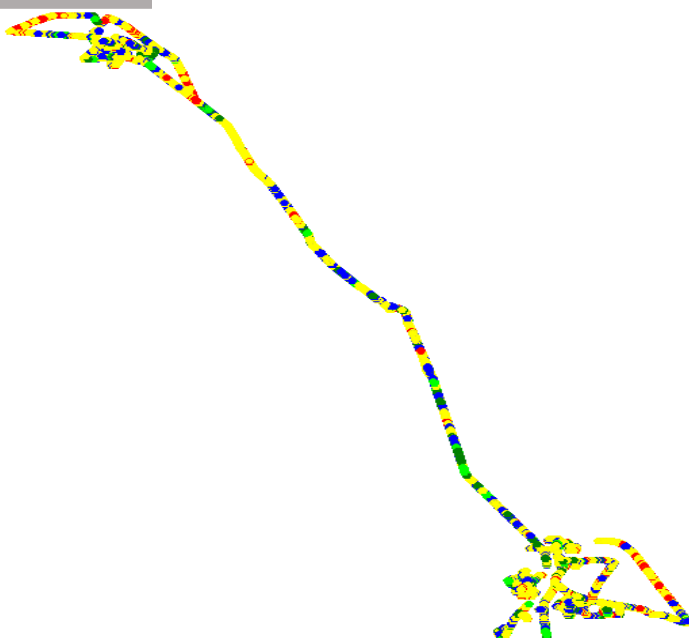
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	255191	4.58%	
(0, <=5)	3131299	56.23%	
(5, <=10)	1264104	22.70%	
(10, <=15)	619401	11.12%	
(15, <=Max)	299089	5.37%	
Total	5569084	100%	

BSNL

Technology	Rx Quality %
2G	**98.84%**
3G	**91.88%**

2G
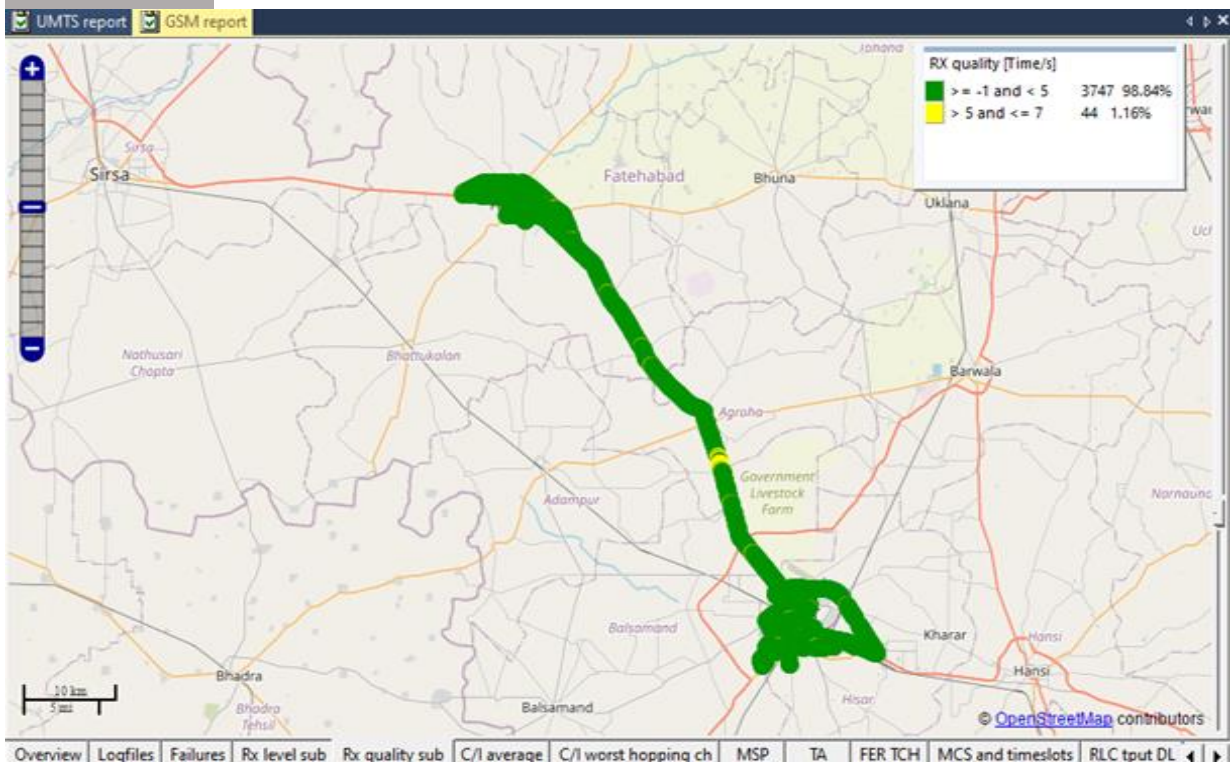
3G
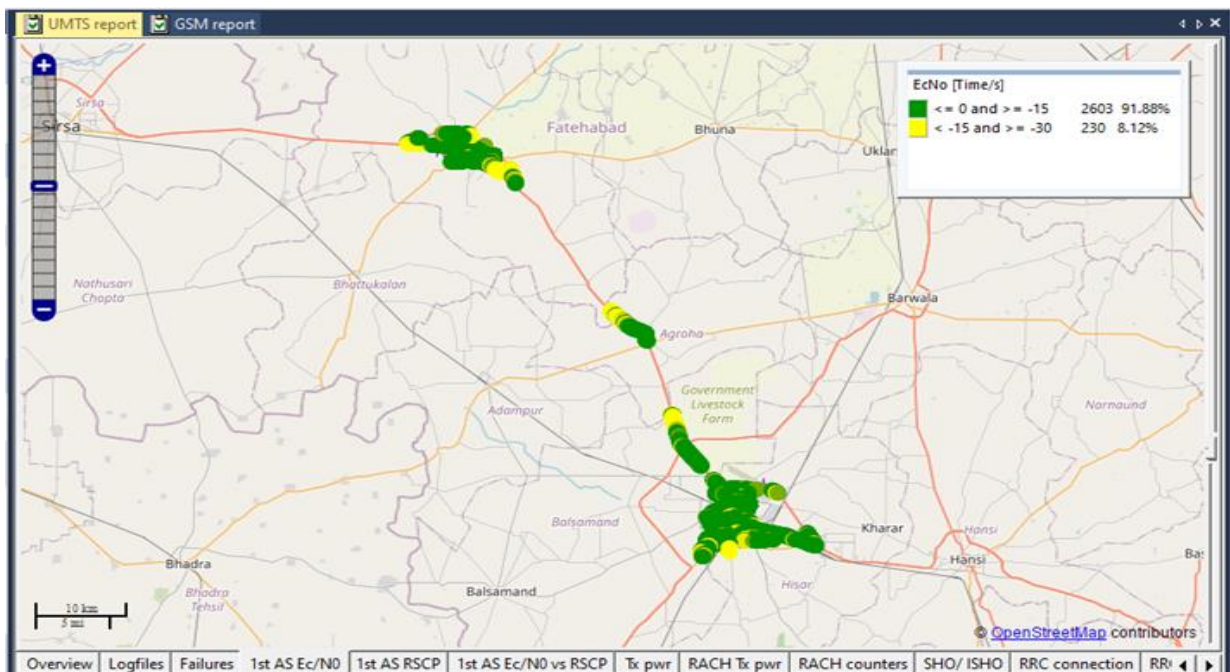
For measuring voice quality, as per the QoS norms, RxQual <=5 for GSM TSPs, EcNo >= -14 dBm for 3G TSP sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

JIO

Technology	Rx Quality %
VoLTE	**92.27%**
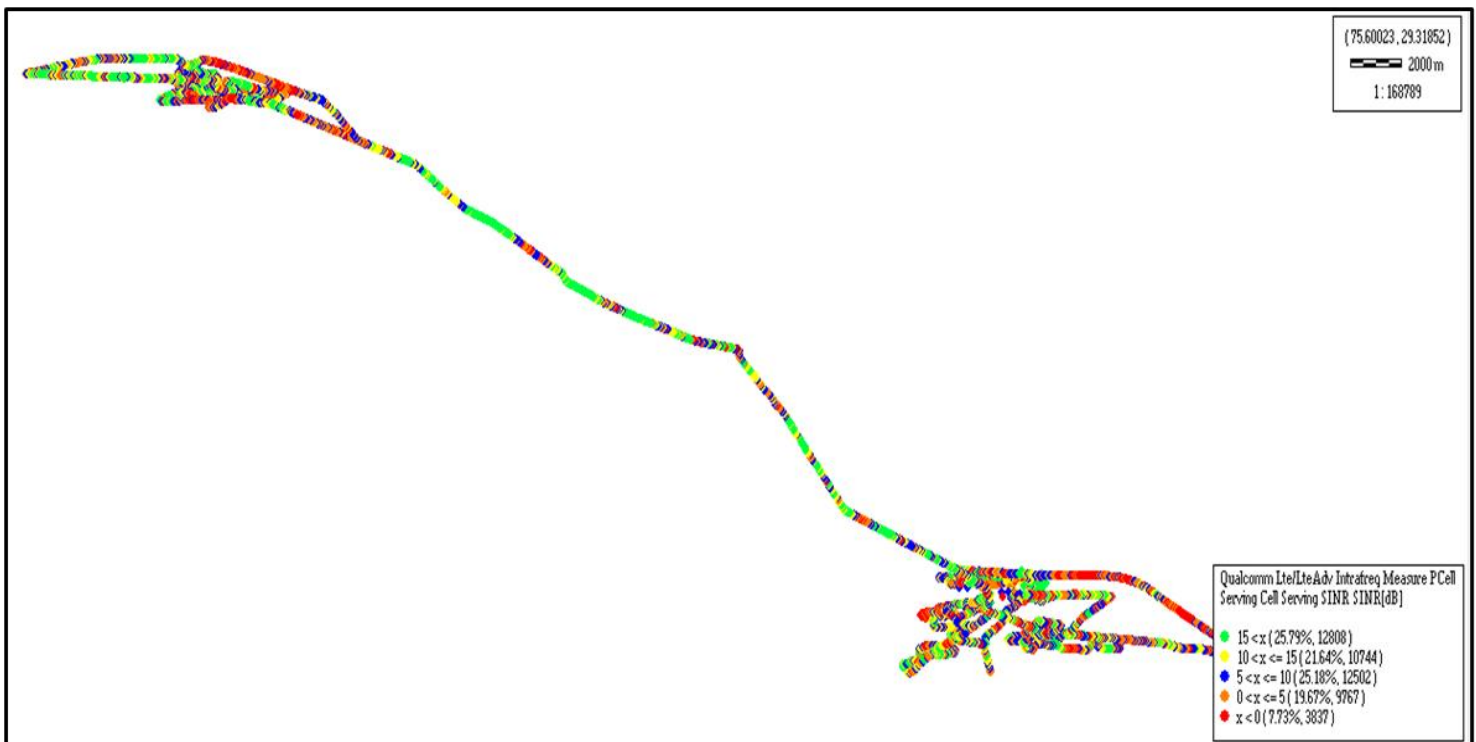
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	3837	7.73	
(0, <=5)	9767	19.67	
(5, <=10)	12502	25.18	
(10, <=15)	10744	21.64	
(15, <=Max)	12808	25.79	
Total	49658	100%	

VIL

Technology	Rx Quality %
2G	**99.78%**
4G	**96.73%**

2G

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	14388006	99.03	
(2, <=3)	27810	0.19	
(3, <=4)	43596	0.30	
(4, <=5)	37481	0.26	
(5, <=Max)	31534	0.22	
Total	14528427	100%	

VoLTE

Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	475150	3.26%	
(0, <=5)	11410763	78.30%	
(5, <=10)	1020728	7.00%	
(10, <=15)	818898	5.62%	
(15, <=Max)	847341	5.81%	
Total	14572880	100%	
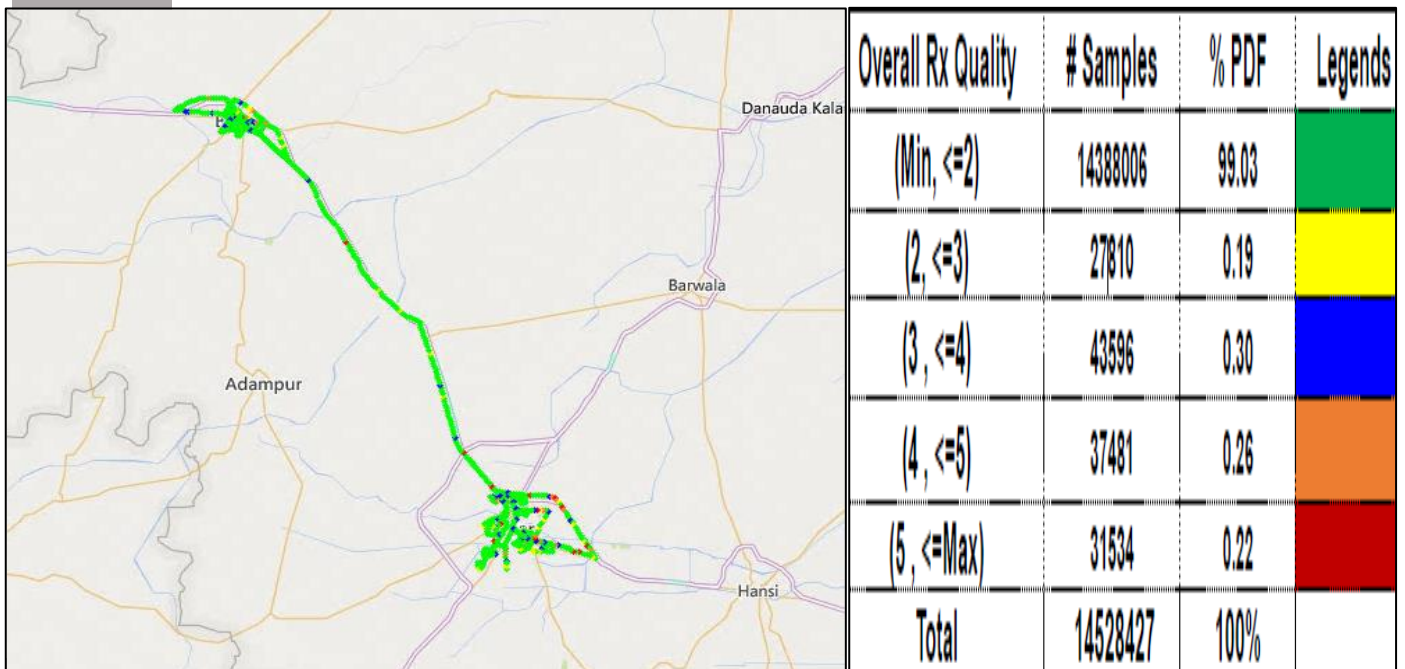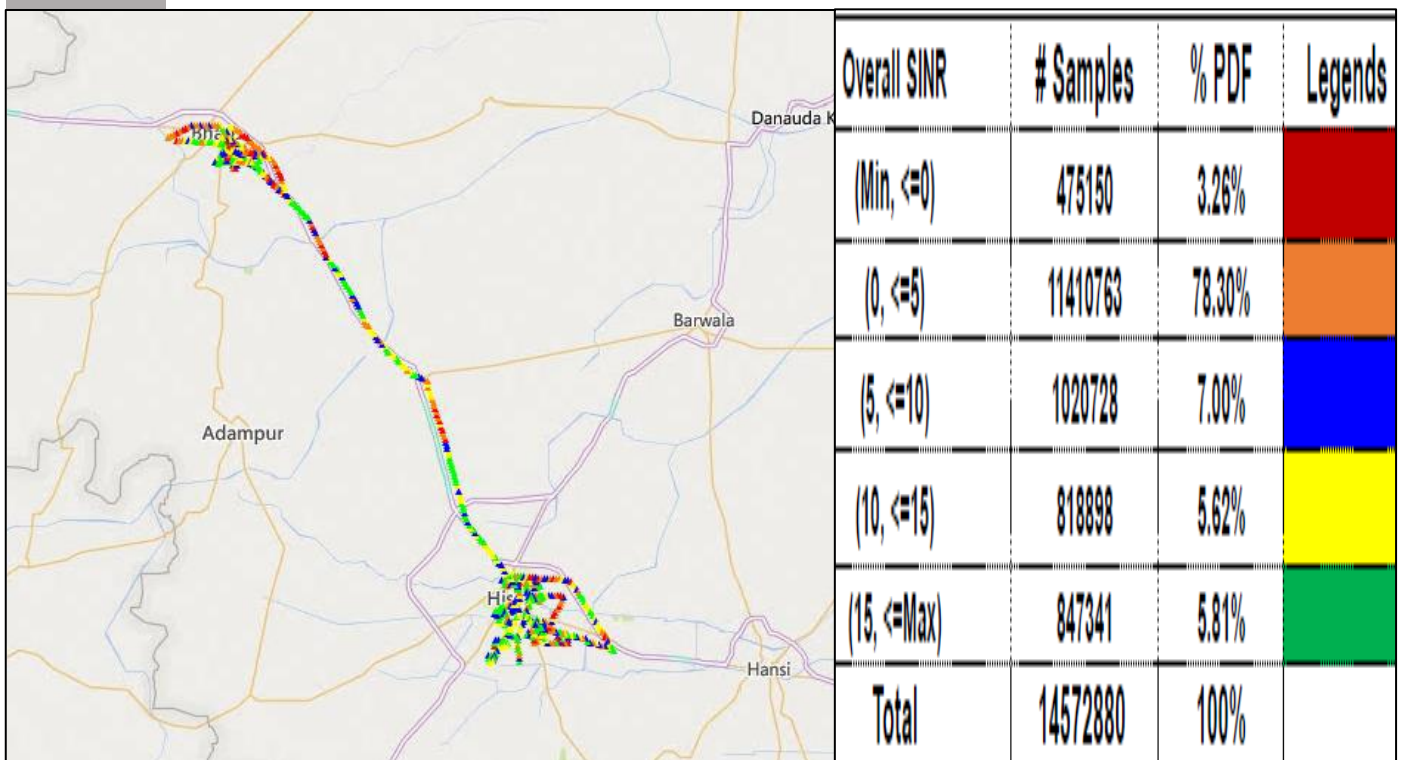
TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	85.70
Airtel VoLTE	100.00
Jio VoLTE	100.00
VIL VoLTE	100.00

Time Spent On 3G/4G