



Operator Assisted Drive Test Report

Bhatinda City & Nearby area

19th Dec to 21st Dec. 2022

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 Bhatinda City, Talwandi Sabo and surrounding areas and Bhatinda to Talwandi Sabo Highway from 9:00 AM to 8:00 PM during 19th December to 21st December 2022. The drive test covered drive route of 205 KMs & 7 no hotspots over a period of 3 days. Approximately 380 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 19th December 2022 to 21st December 2022 covering Bhatinda City, Talwandi Sabo and surrounding areas. 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. (**BSNL is having 4G services (data only) at Bhatinda city instead of 3G and at Talwandi Sabo BSNL is having 3G (voice +data) services*)

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

Data: Download Throughputs,
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 205 KMs. Approximately 380 calls were made for each of the Four networks: three 2G (Lock Mode) networks, two 3G (Dual mode) networks and Three VoLTE networks covering 4 unique TSPs.

Data Tests:

Dynamic data test was conducted for 205 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

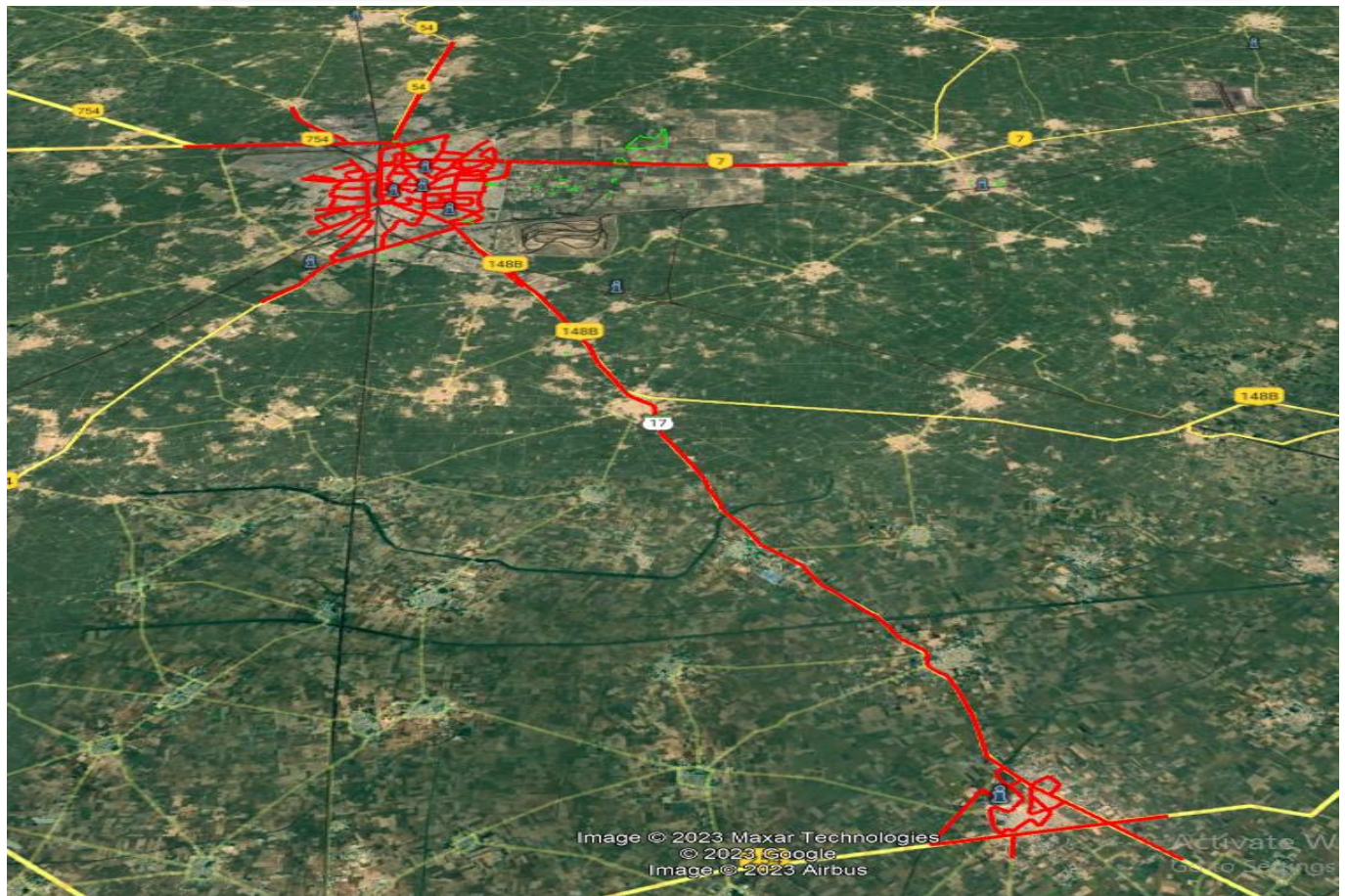
Static data tests on 7 hotspots

1. Damdama Sahib Talwandi Sabo
2. Giani Zail Singh College
3. Civil Hospital Bathinda
4. Bibi Wala chowk
5. Mittal City Mall
6. Railway Station Bathinda
7. Rajindra College

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

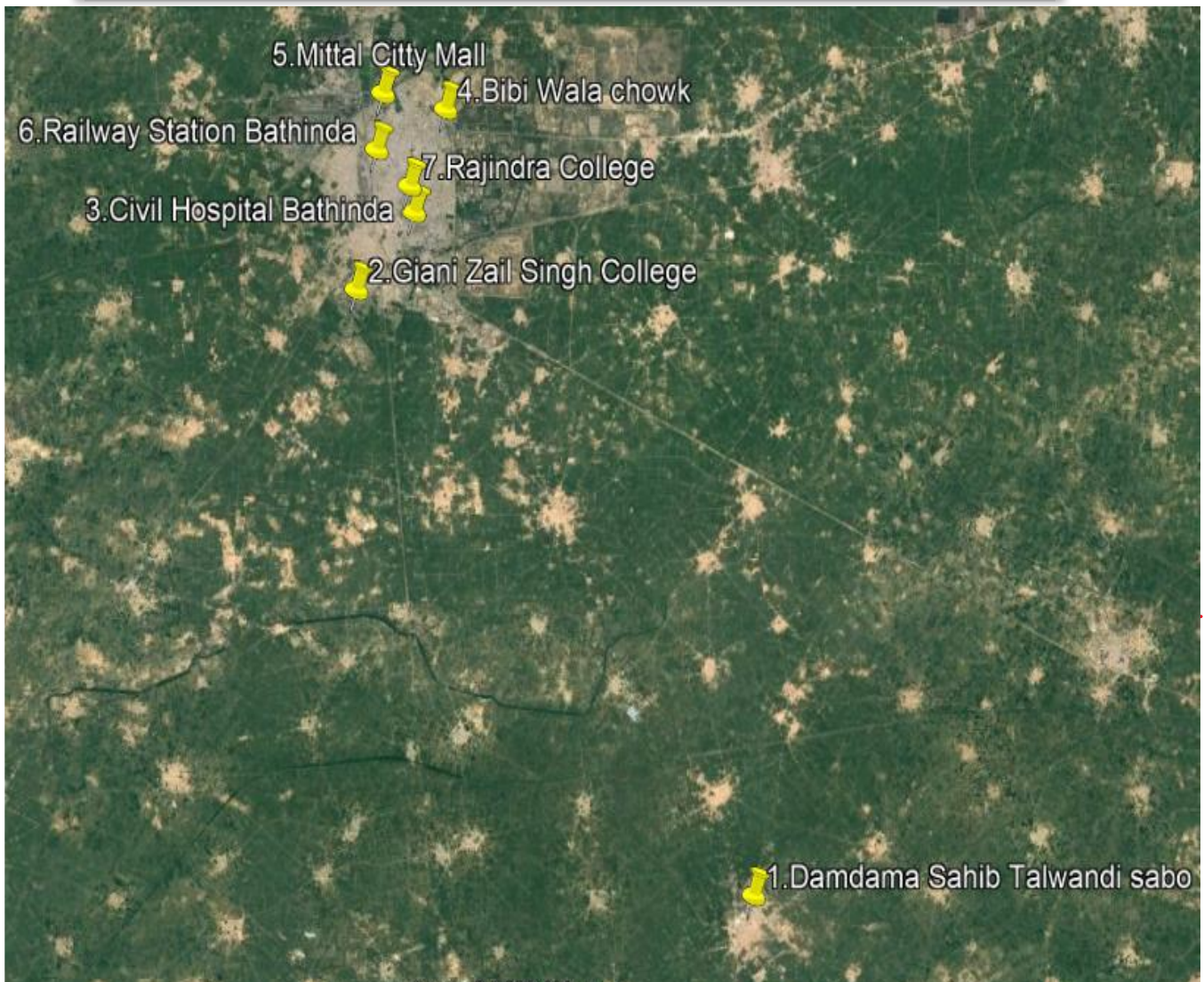
Voice & Dynamic Data Test Drive Route



Date	Test Scenario	Area to be Covered
19-12-2022	2G/3G/4G Voice and 3G/4G Dynamic Data	Starting Point Civil Line BSNL Exchange Near Head Post Office at 9:00 AM. Civil line bathinda, TV tower, Model Town, Barnala Bypass, Barnala Road, Balla Ram Nagar, Thermal colony, Goniana Rd, Sibia Rd, Malout Rd, Pukhraj Colny, DAV Cillage, Stadium, Ajit Rd, Power house rd, Rajindera College, Mehna Chowk, Railway Station, Mall Rd, Teen koni, Mittal Mall, Along nehar, Parshuram Nagar, Bachiter Colony, Partap Nagar, Multania Rd,
20-12-2022	2G/3G/4G Voice and 3G/4G Dynamic Data	Starting Point Civil Line BSNL Exchange Near Head Post Office at 9.00 AM, Sangwa basti, Lal Singh Nagar, Lal singh basti, Engg. Colz, Dabwali Rd, Bathinda to Talwandi sabo Highway, Talwandi sabo town .
21-12-2022	Hot Spots- 2G/3G/4G Static Data Tests	Starting Point Civil Line BSNL Exchange Near Head Post Office at 9.00 AM, one Hot Spot at Talwandi Sabo. 6 nos. Hot Spot Locations as finalized at Bathinda City .

Overview

Data Service Test- Static Locations



Hotspot Locations

1.Damdama Sahib / Talwandi Sabo

2.Giani Zail Singh College

3.Civil Hospital Bathinda

4.Bibi Wala chowk

5.Mittal City Mall

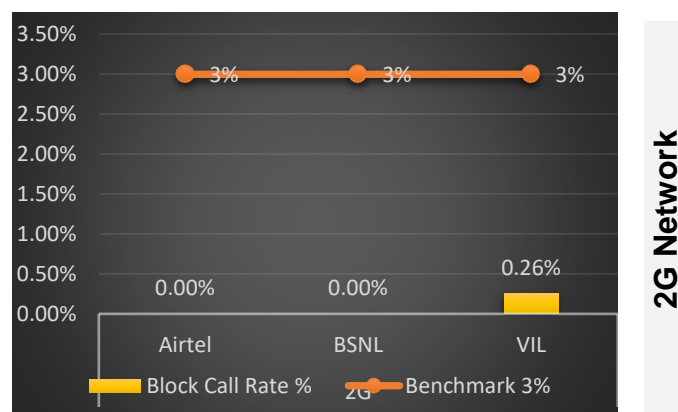
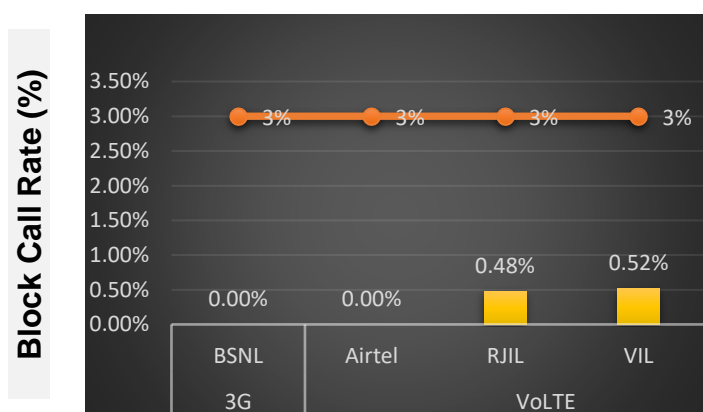
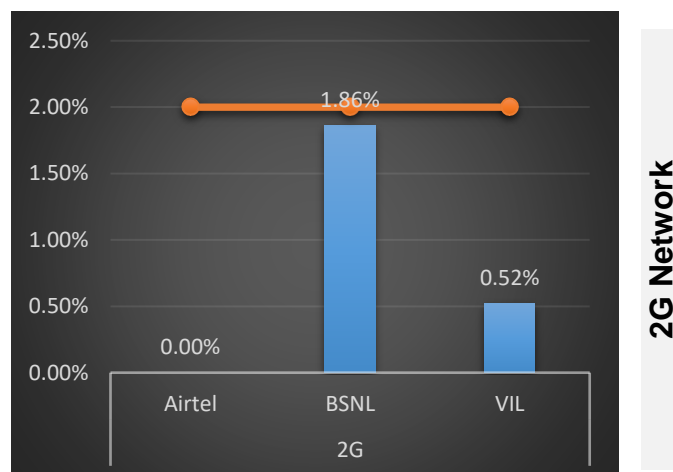
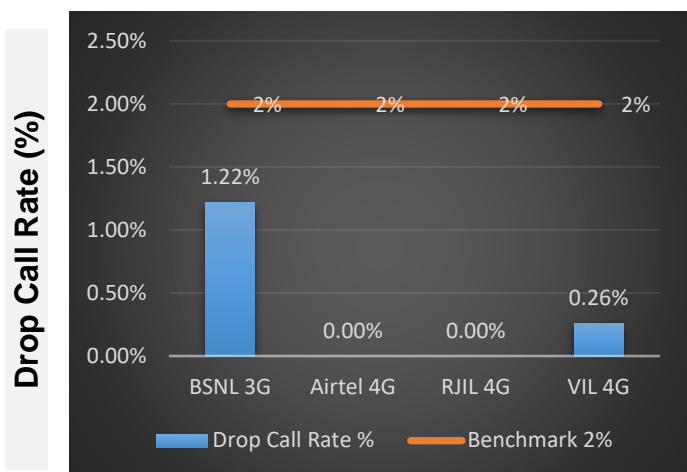
6.Railway Station Bathinda

7.Rajindra College

Voice Calls

Key Observations

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



KPIs	2G			3G	4G		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0.00%	1.86%	0.52%	1.22%	0.00%	0.00%	0.26%
Block Call Rate %	0.00%	0.00%	0.26%	0.00%	0.00%	0.48%	0.52%

- All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%)
- Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's.

Voice Calls

Key Observations

Coverage

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

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	99.35%	97.36%	91.54%

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

TSPs	3G at Talwandi Sabo
	BSNL
Coverage %	52.00%

c) Percentage of coverage samples for 4G / LTE \geq -110 dBm.

TSPs	VoLTE/4G			
	Airtel	JIO	VIL	BSNL 4G
Coverage %	98.90%	98.72%	99.87%	100.00%

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

TSPs	3G	VoLTE/4g			
	BSNL	Airtel	VIL	JIO	BSNL 4G
Time Spent on 3G/4G %	27.00%	100.00%	100.00%	100.00%	73.00%

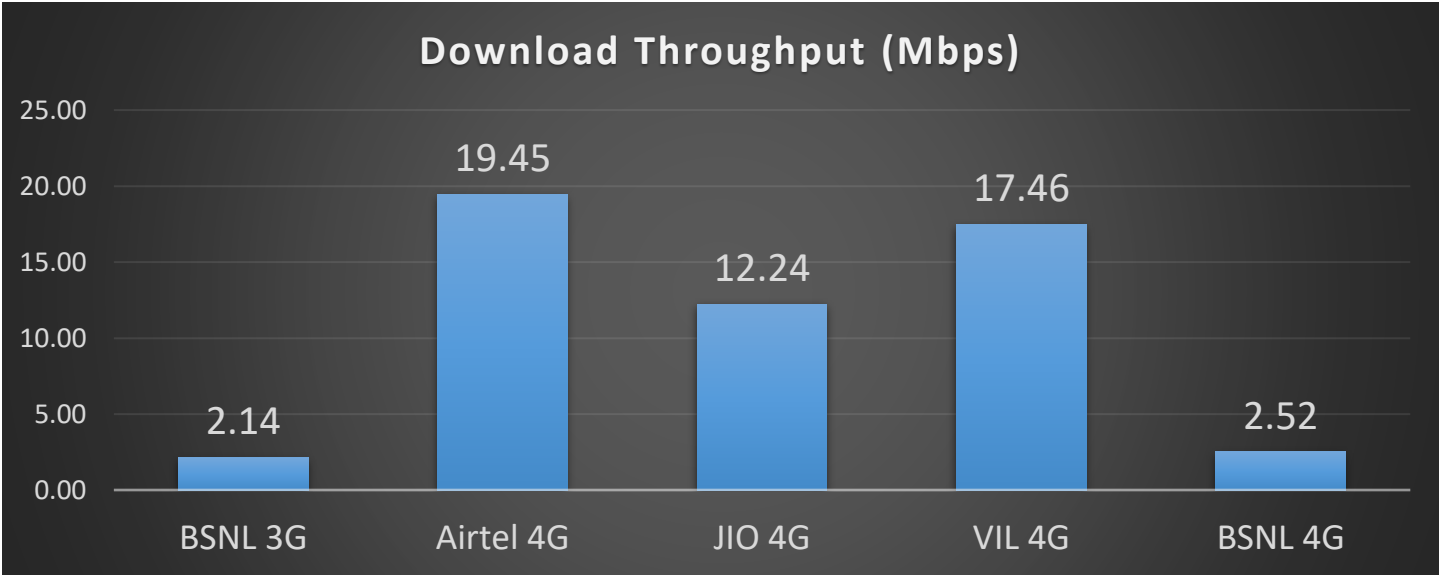
Data Services Dynamic

Key Observations

Dynamic Data was tested for 205 Kms. Download Throughput was tested.

Data Download Performance (kbps) - Dynamic

3G/4G/ Network:



TSP	Airtel	BSNL	JIO	VIL
Average Download throughput- 3G in Mbps	NA	2.14	NA	NA
Average Download throughput- 4G in Mbps	19.45	2.52	12.24	17.46

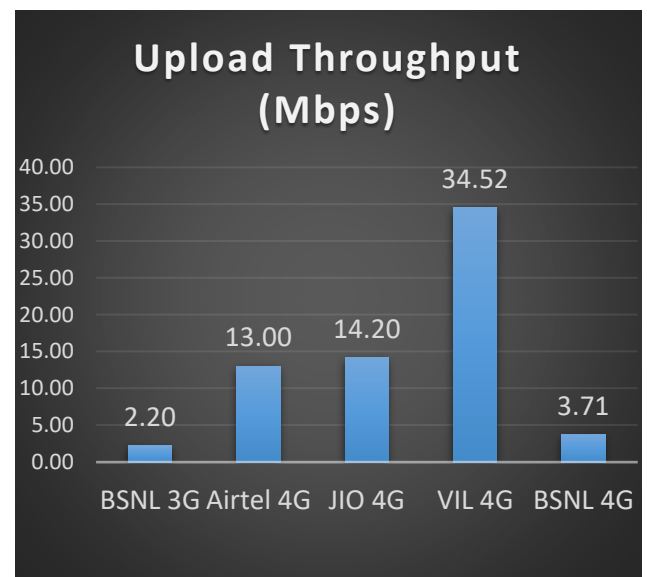
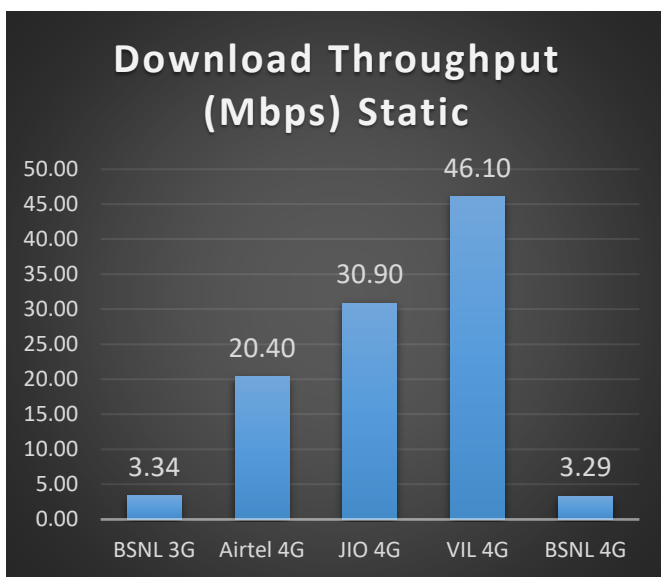
Data Services Static

Key Observations

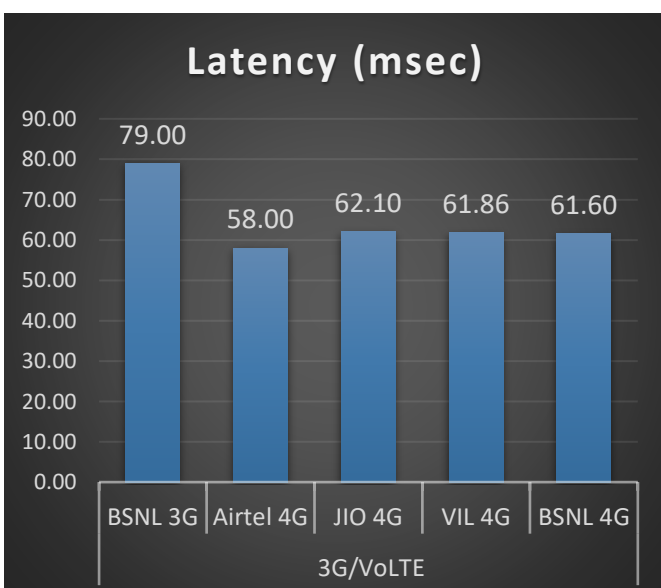
Data was tested at 7 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing (Flipkart, Amazon, PayTm)

Data Download and Upload Performance (kbps)

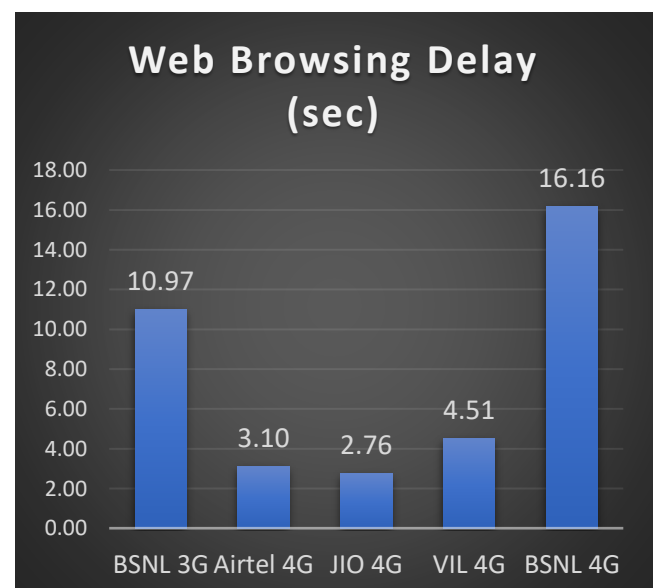
3G/4G/ Network:



Latency (ms)



Web Browsing (Sec)



Summary

City Level Summary-Voice

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	387	386	381
Blocked Call Rate (%)	0.00%	0.00%	0.26%
CSSR% (Accessibility)	100.00%	99.74%	98.68%
Drop Call Rate (%)	0.00%	1.81%	0.52%
Mobility HOSR (%)	98.34%	99.97%	99.29%
Rx Quality (%)	96.44%	98.35%	97.00%
Average CST Sec	3.55	2.83	3.62

Voice Call	3G / VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	82	372	418	383
Blocked Call Rate (%)	0.00%	0.00%	0.48%	0.52%
CSSR% (Accessibility)	100.00%	100.00%	99.52%	98.43%
Drop Call Rate (%)	1.22%	0.00%	0.00%	0.26%
Mobility HOSR (%)	100.00%	98.90%	99.17%	99.91%
Rx Quality (%)	97.86%	95.51%	91.50%	96.00%
Average CST Sec	2.35	1.41	1.14	1.81

Summary

City Level Summary- Data Services

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	180.00	157.00	126.61
Upload Throughput (kbps)	86.00	66.10	18.56
Web Browsing Delay (sec)	8.60	136.40	14.39
Latency (msec)	424.00	178.50	453.00

Data Services Static	3G / 4G				
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G	BSNL 4G
Download Throughput (Mbps)	3.34	20.40	30.90	46.10	3.29
Upload Throughput(Mbps)	2.20	13.00	14.20	34.52	3.71
Video Streaming Delay (sec)	1.43	1.23	0.01	0.52	1.33
Web Browsing Delay (sec)	10.97	3.10	2.76	4.51	16.16
Latency (msec)	79.00	58.00	62.10	61.86	61.60

<u>Damdama Sahib / Talwandi Sabo</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	216.00	119.00	98.14
Upload Throughput (kbps)	82.00	80.00	16.86
Web Browsing Delay (sec)	10.50	264.00	21.57
Latency (msec)	424.00	372.00	474.00

<u>Giani Zail Singh College</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	116.60	162.00	120.34
Upload Throughput (kbps)	65.70	26.00	24.36
Web Browsing Delay (sec)	8.70	208.00	9.73
Latency (msec)	488.00	139.00	432.00

<u>Civil Hospital Bhatinda</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	221.20	104.00	126.37
Upload Throughput (kbps)	51.20	57.00	20.33
Web Browsing Delay (sec)	8.29	195.50	10.73
Latency (msec)	474.00	131.00	482.00

<u>Bibi Wala Chowk</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	224.40	117.00	134.94
Upload Throughput (kbps)	97.30	79.00	20.78
Web Browsing Delay (sec)	7.51	108.00	10.75
Latency (msec)	418.70	138.00	400.00

<u>Mittal City Mall</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	188.60	190.00	167.73
Upload Throughput (kbps)	98.80	95.00	17.24
Web Browsing Delay (sec)	8.24	59.73	9.48
Latency (msec)	383.00	119.00	484.00

<u>Railway Station Bhatinda</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	121.00	257.00	104.77
Upload Throughput (kbps)	80.00	54.00	14.37
Web Browsing Delay (sec)	9.20	58.54	20.20
Latency (msec)	477.00	122.00	453.00

<u>Rajindra College</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	178.30	150.00	132.00
Upload Throughput (kbps)	118.80	72.00	16.04
Web Browsing Delay (sec)	8.20	61.68	18.30
Latency (msec)	632.00	229.00	446.00

Data Services static

City Level Summary(contd.)

<u>Damdama Sahib / Talwandi Sabo</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	3.34	19.40	26.90	34.99
Upload Throughput (mbps)	2.20	15.90	18.40	38.49
Video Streaming Delay (Secs.)	1.43	1.15	0.01	0.75
Web Browsing Delay (sec)	10.97	3.10	2.52	5.61
Latency (msec)	79.00	96.00	60.60	73.00

<u>Giani Zail Singh College</u>	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	8.67	18.60	12.90	40.25
Upload Throughput (mbps)	4.56	14.90	14.70	36.00
Video Streaming Delay (Secs.)	1.25	1.27	0.01	0.36
Web Browsing Delay (sec)	6.86	3.55	3.13	4.33
Latency (msec)	67.00	79.00	46.50	61.00

<u>Civil Hospital Bhatinda</u>	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	1.24	16.00	79.00	35.08
Upload Throughput (mbps)	1.69	10.30	9.21	28.95
Video Streaming Delay (Secs.)	1.55	1.18	0.00	0.56
Web Browsing Delay (sec)	5.32	2.50	2.68	3.02
Latency (msec)	80.00	63.00	53.20	45.00

Data Services static

City Level Summary(contd.)

<u>Bibi Wala Chowk</u>	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	4.03	18.80	13.20	72.40
Upload Throughput (mbps)	5.06	17.20	16.70	30.86
Video Streaming Delay (Secs.)	1.20	1.26	0.01	0.45
Web Browsing Delay (sec)	5.95	2.30	2.57	3.45
Latency (msec)	41.00	61.00	56.20	70.00

<u>Mittal City Mall</u>	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	2.48	23.60	40.90	47.60
Upload Throughput (mbps)	5.86	14.60	5.96	44.06
Video Streaming Delay (Secs.)	1.23	1.15	0.01	0.36
Web Browsing Delay (sec)	14.04	2.60	2.59	5.22
Latency (msec)	46.00	36.00	58.00	63.00

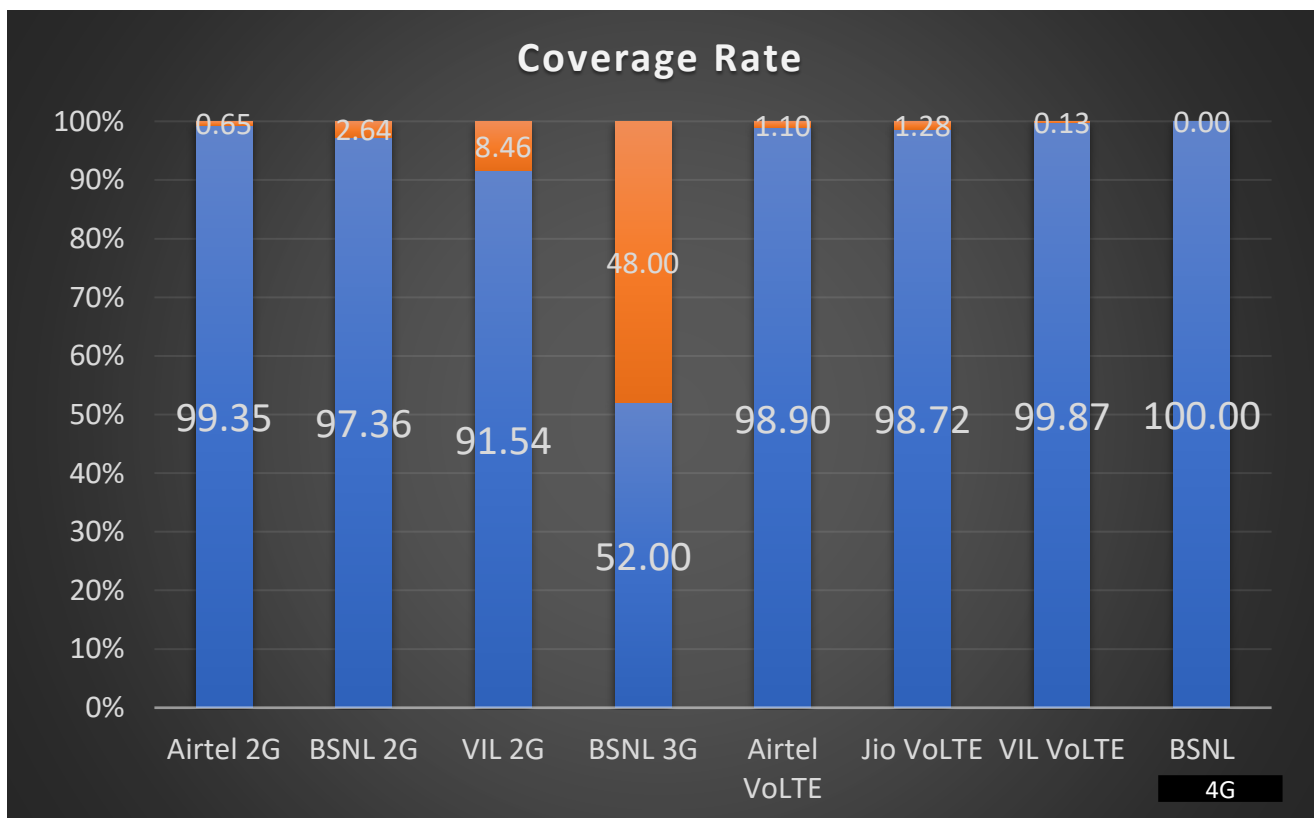
<u>Railway Station Bhatinda</u>	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	1.11	23.10	21.50	54.90
Upload Throughput (mbps)	2.00	16.40	18.00	40.66
Video Streaming Delay (Secs.)	1.20	1.16	0.01	0.75
Web Browsing Delay (sec)	6.23	2.89	2.66	5.61
Latency (msec)	41.00	92.00	85.40	56.00

<u>Rajindra College</u>	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	2.24	23.40	31.60	29.91
Upload Throughput (mbps)	3.09	12.70	15.40	16.96
Video Streaming Delay (Secs.)	1.60	1.17	0.00	0.38
Web Browsing Delay (sec)	58.56	2.88	3.04	4.33
Latency (msec)	95.00	70.00	74.20	65.00

Coverage Details

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 \geq -85 dBm, RSCP is \geq -90 dBm & RSRP \geq -110dBm. The details are as follows.

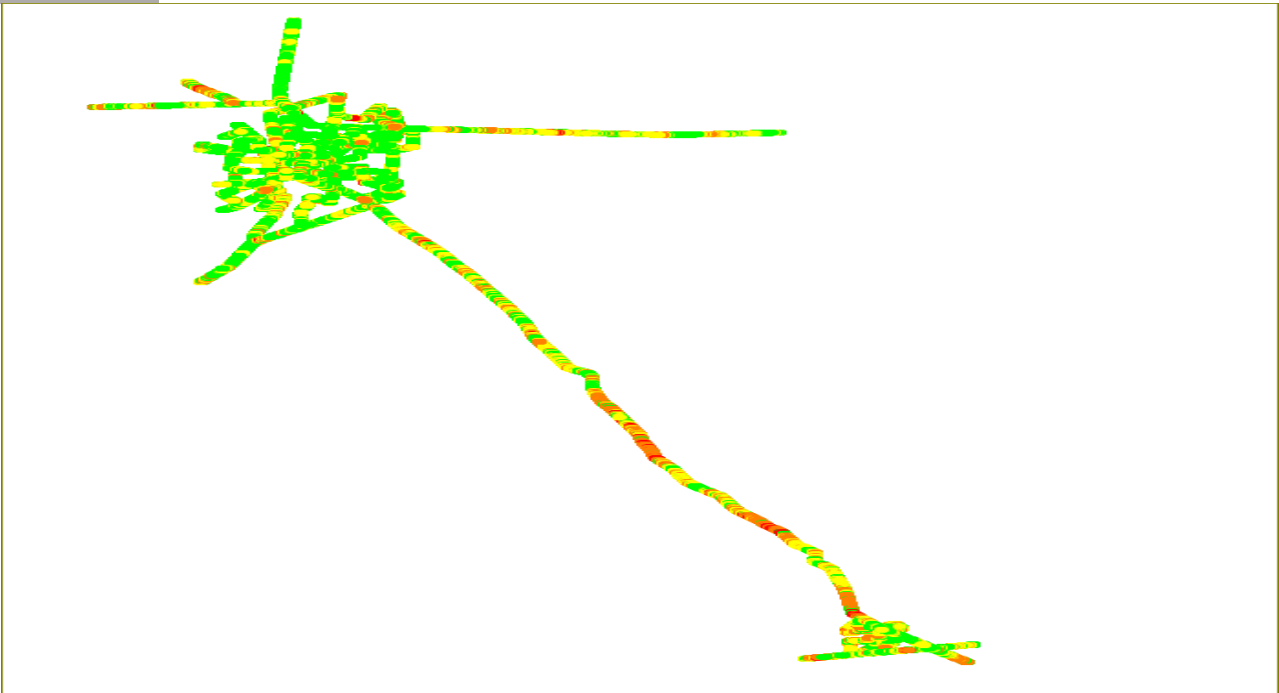
<u>TSP</u>	<u>Coverage Rate %</u>
Airtel 2G	99.35%
BSNL 2G	97.36%
VIL 2G	91.54%
BSNL 3G	52.00%
Airtel VoLTE	98.90%
Jio VoLTE	98.72%
VIL VoLTE	99.87%
BSNL 4G	100.00%



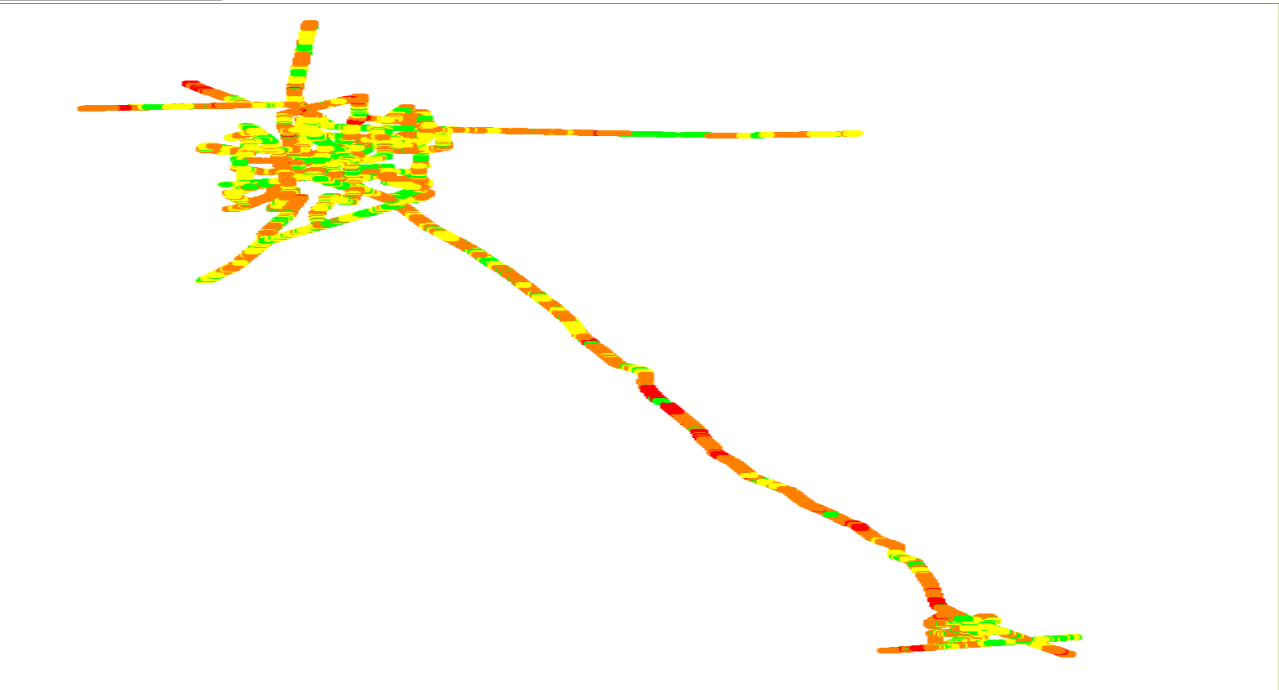
TSP-AIRTEL

Technology	Coverage %
2G	99.35%
VoLTE	98.90%

2G

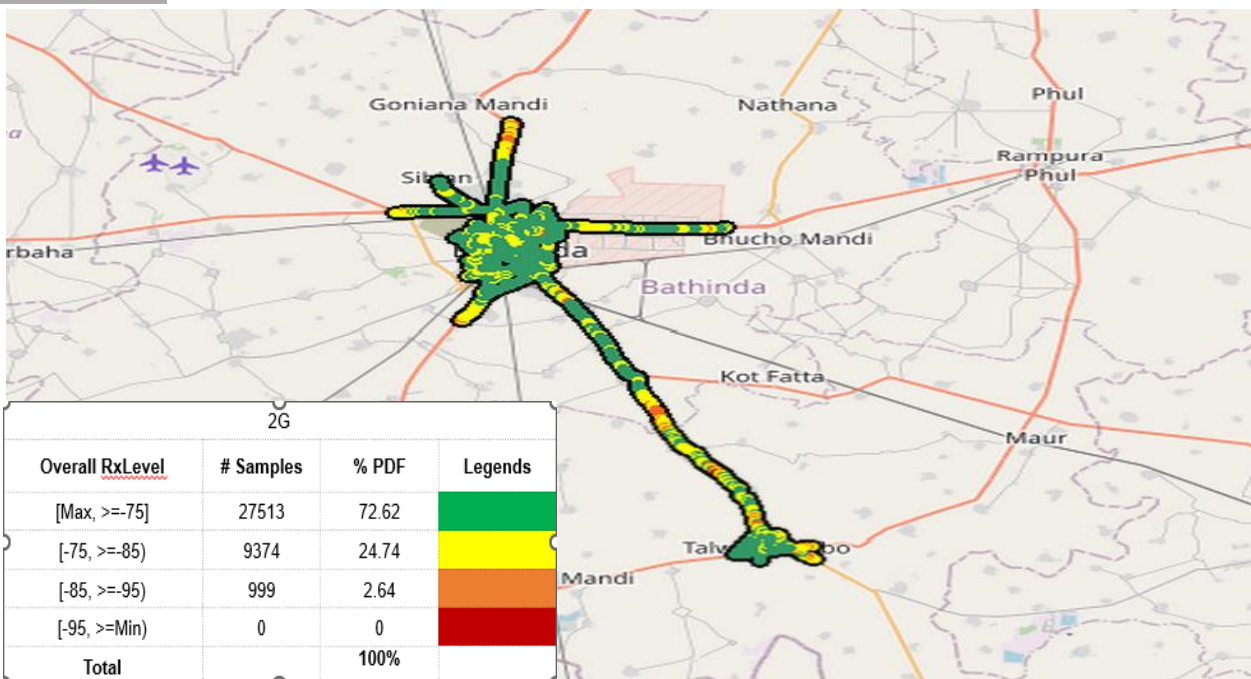


VoLTE

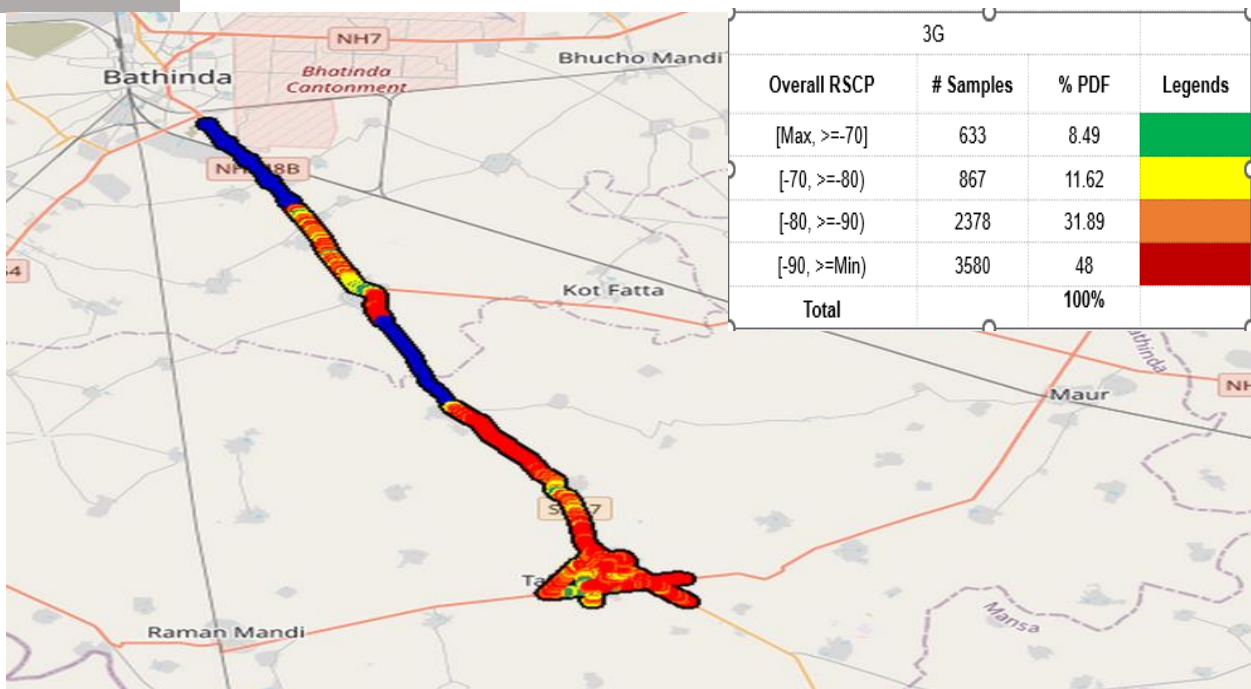


TSP- BSNL

	Technology	Coverage %
	2G	97.36%
	3G	52.00%
2G	4G	100.00%



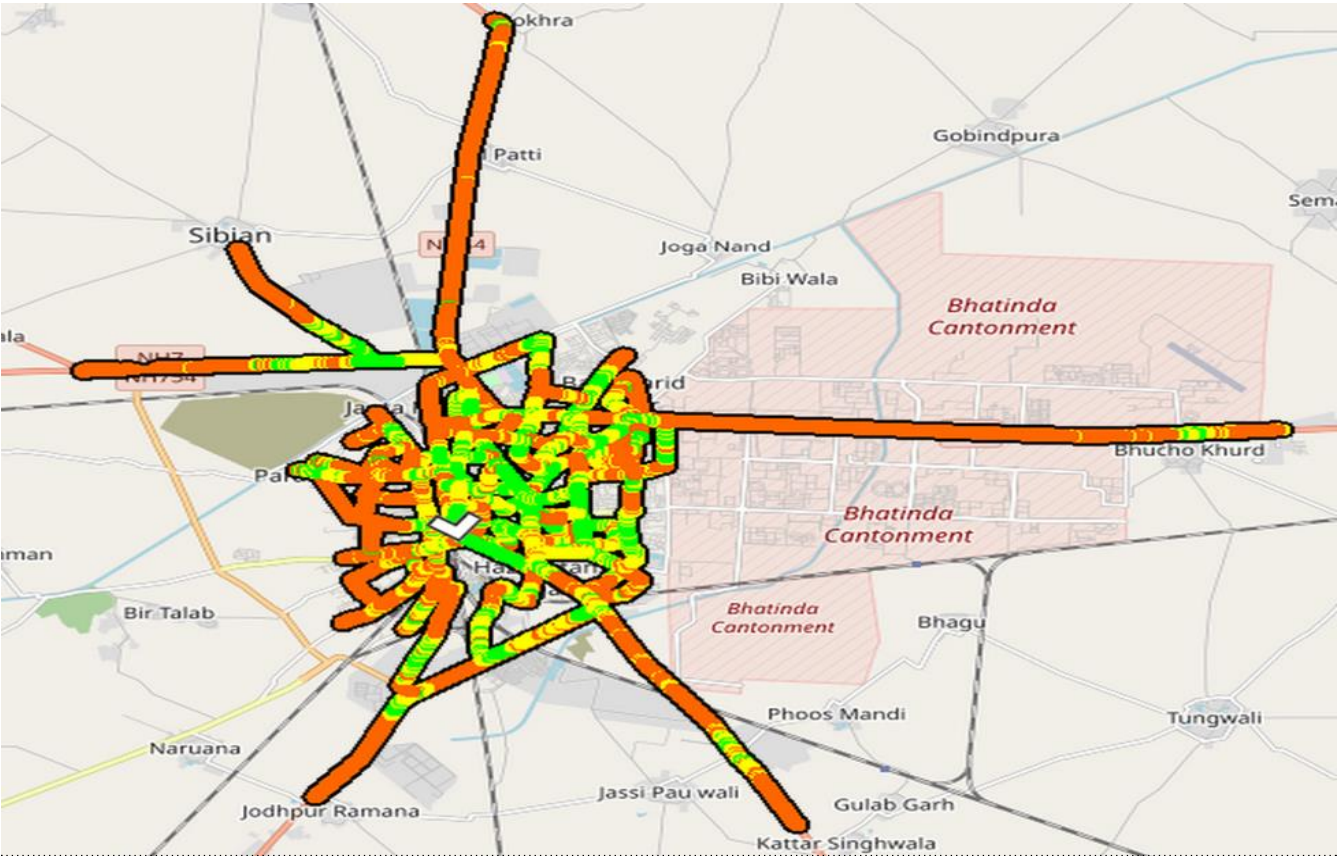
3G



TSP- BSNL

Technology	Coverage %
2G	97.36%
3G	52.00%
4G	100.00%

4G

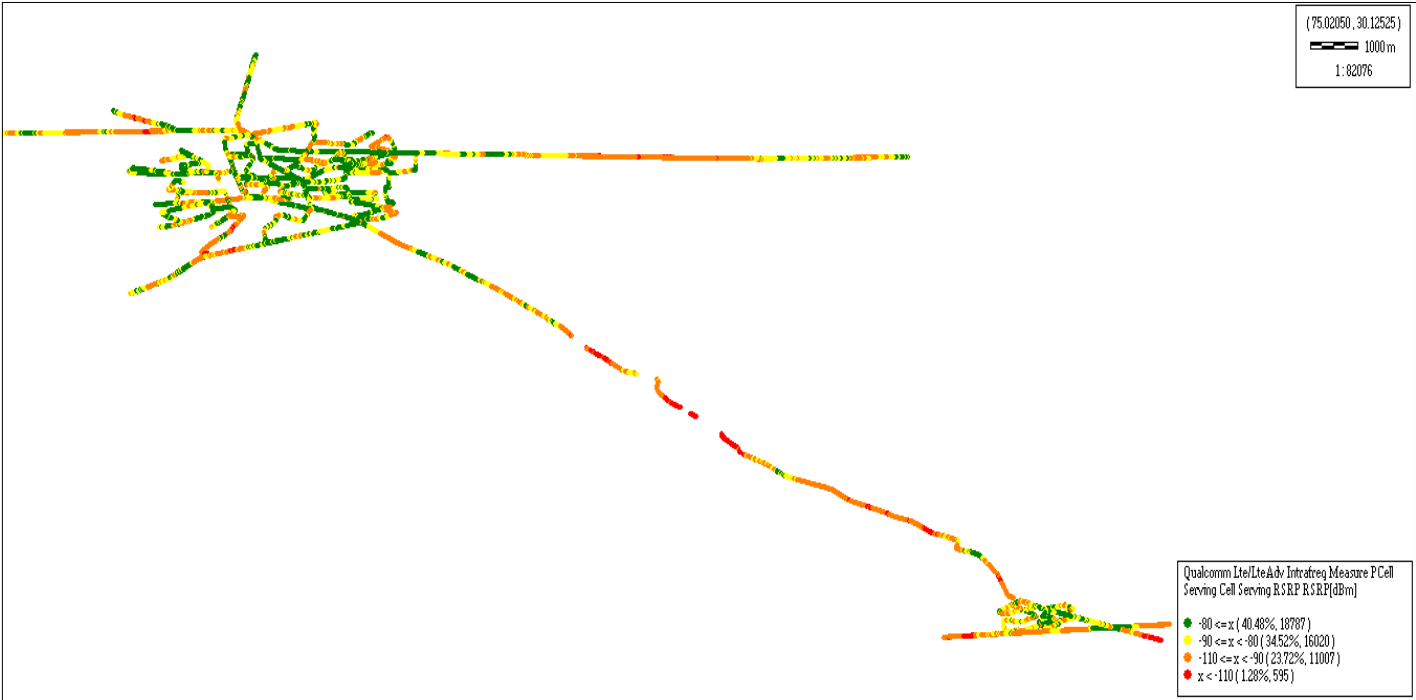


4G

Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	6761	22.3	
[-80, >=-90)	9874	32.56	
[-90, >=-110)	13687	45.14	
[-110, >=Min)	0		
Total	30322	100%	

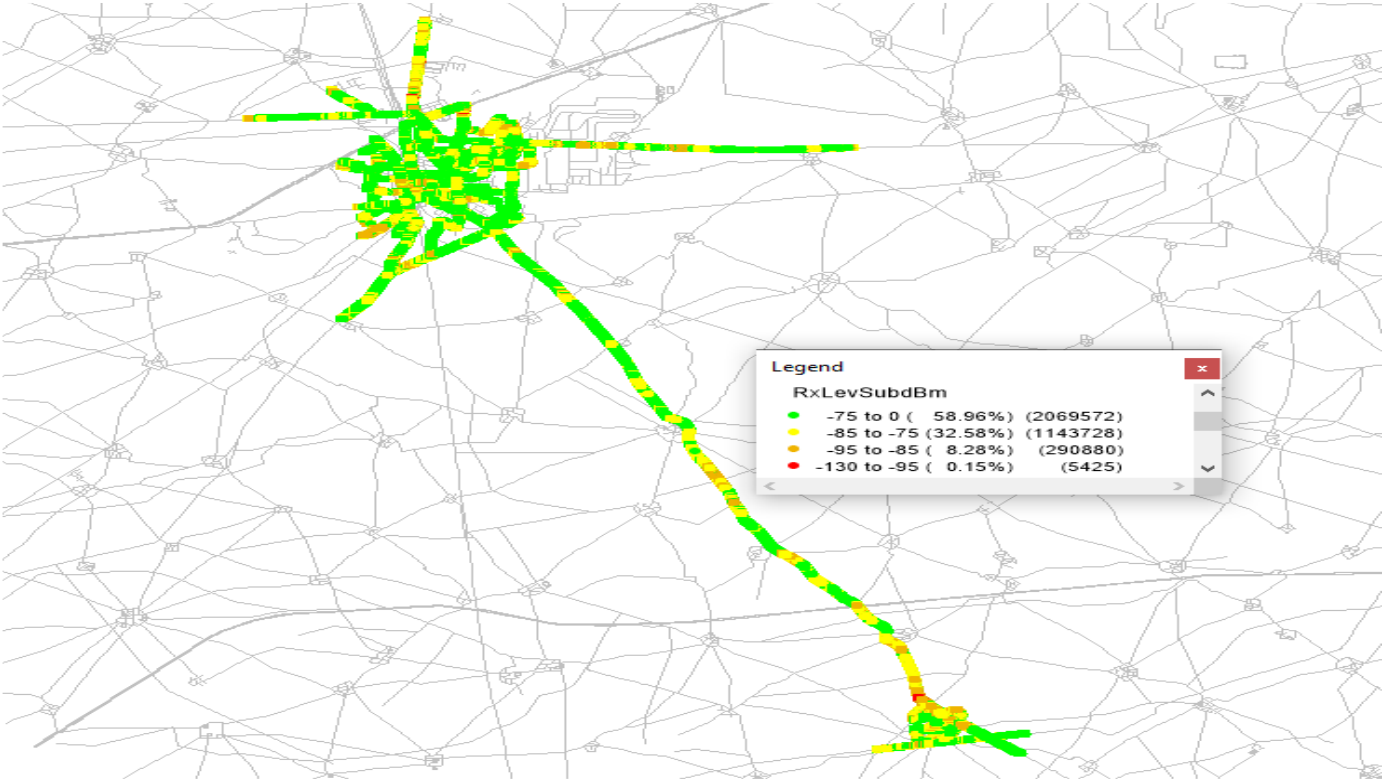
JIO

Technology	Coverage %
VoLTE	98.72%

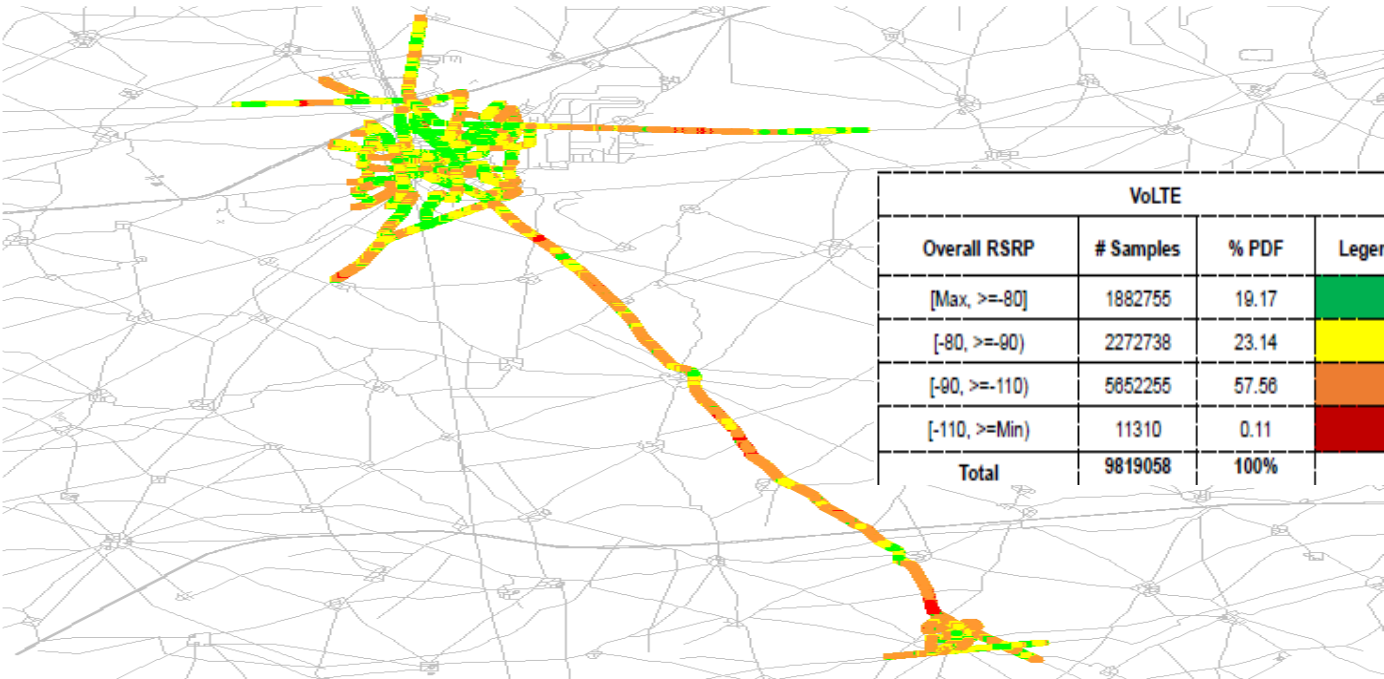


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	18787	40.48	
[-80, >=-90)	16020	34.52	
[-90, >=-110)	11007	23.72	
[-110, >=Min)	595	1.28	
Total	46409	100%	

VIL			
2G	Technology		Coverage Rate %
	2G		91.54%
	VoLTE		99.87%



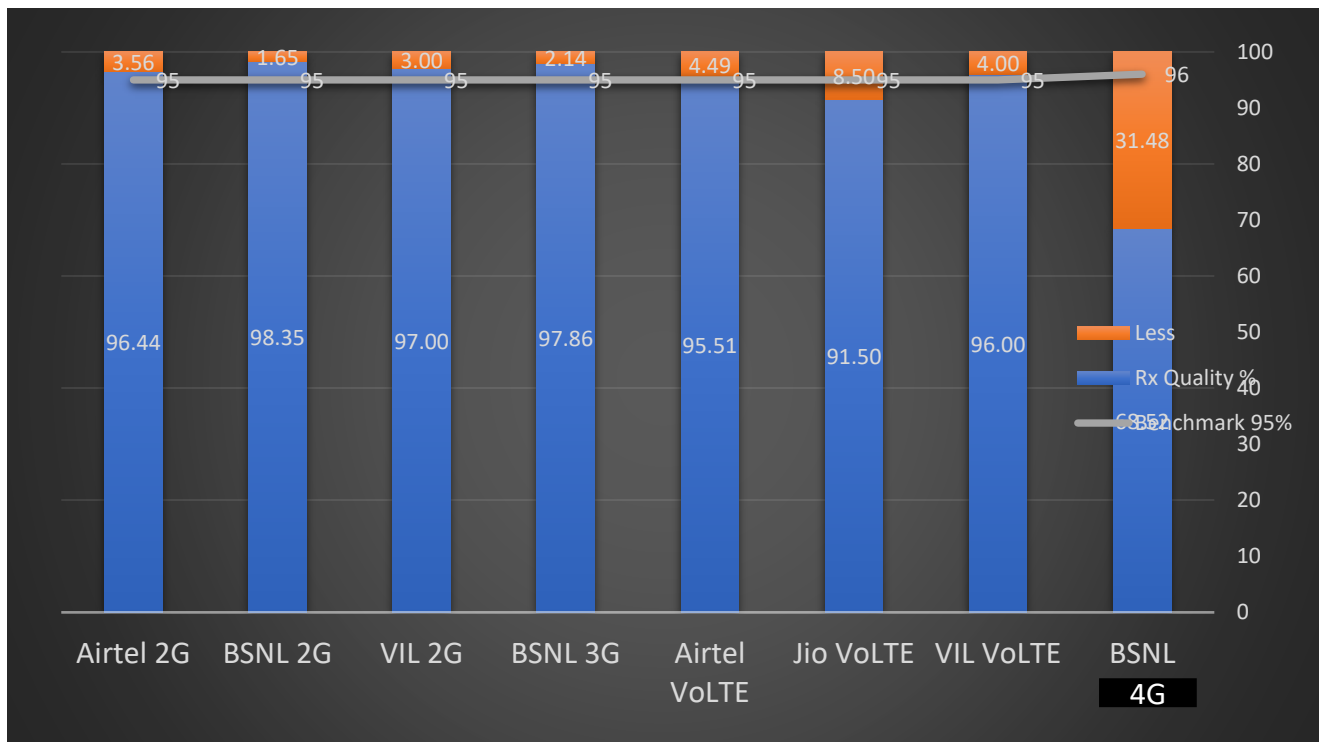
VoLTE



II. Quality Details

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

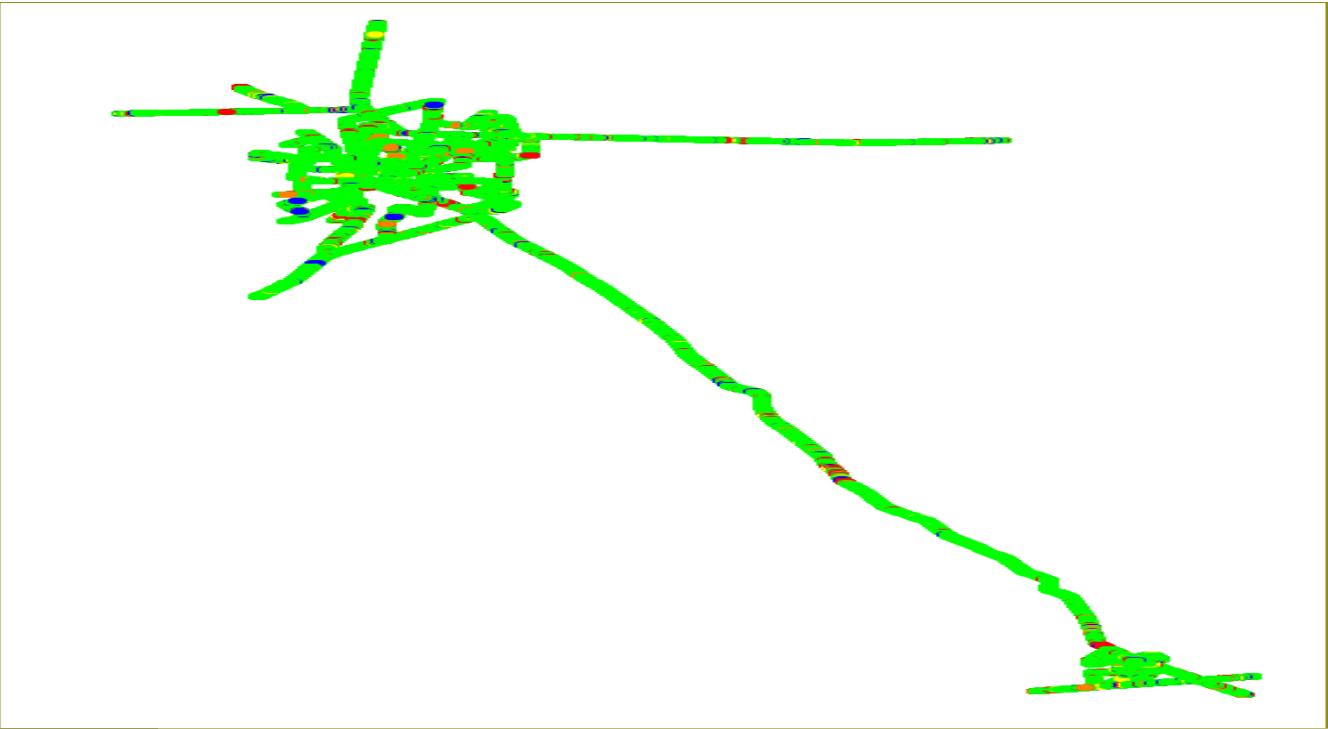
TSP	Rx Quality %
Airtel 2G	96.44%
BSNL 2G	98.35%
VIL 2G	97.00%
BSNL 3G	97.86%
Airtel VoLTE	95.51%
Jio VoLTE	91.50%
VIL VoLTE	96.00%
BSNL 4G	68.52%



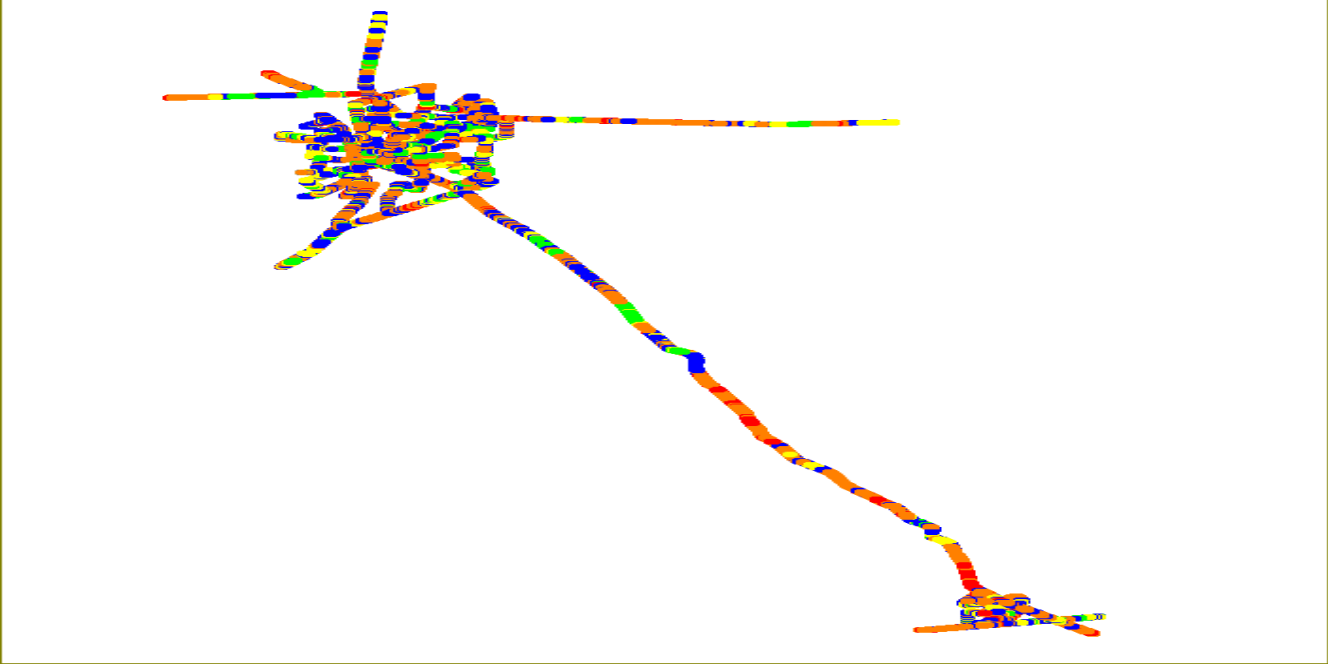
Airtel

Technology	Rx Quality %
2G	96.44%
VoLTE	95.51%

2G



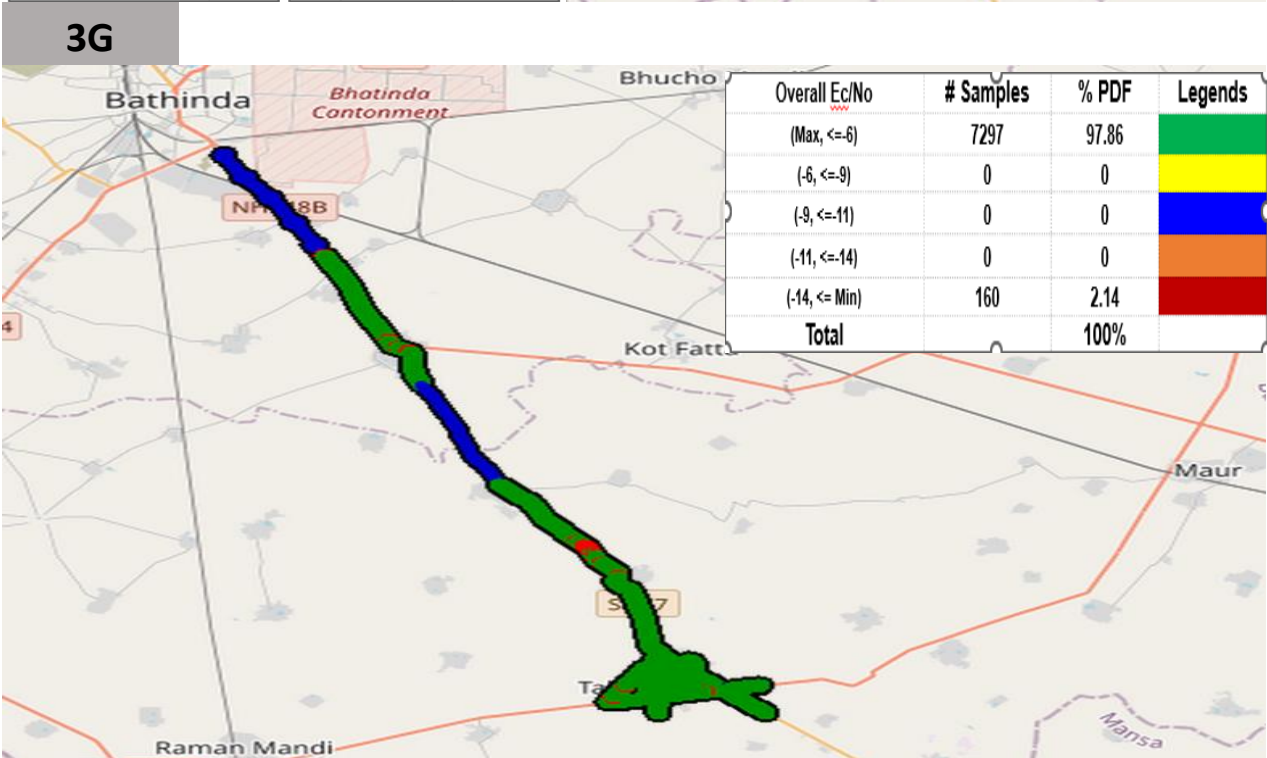
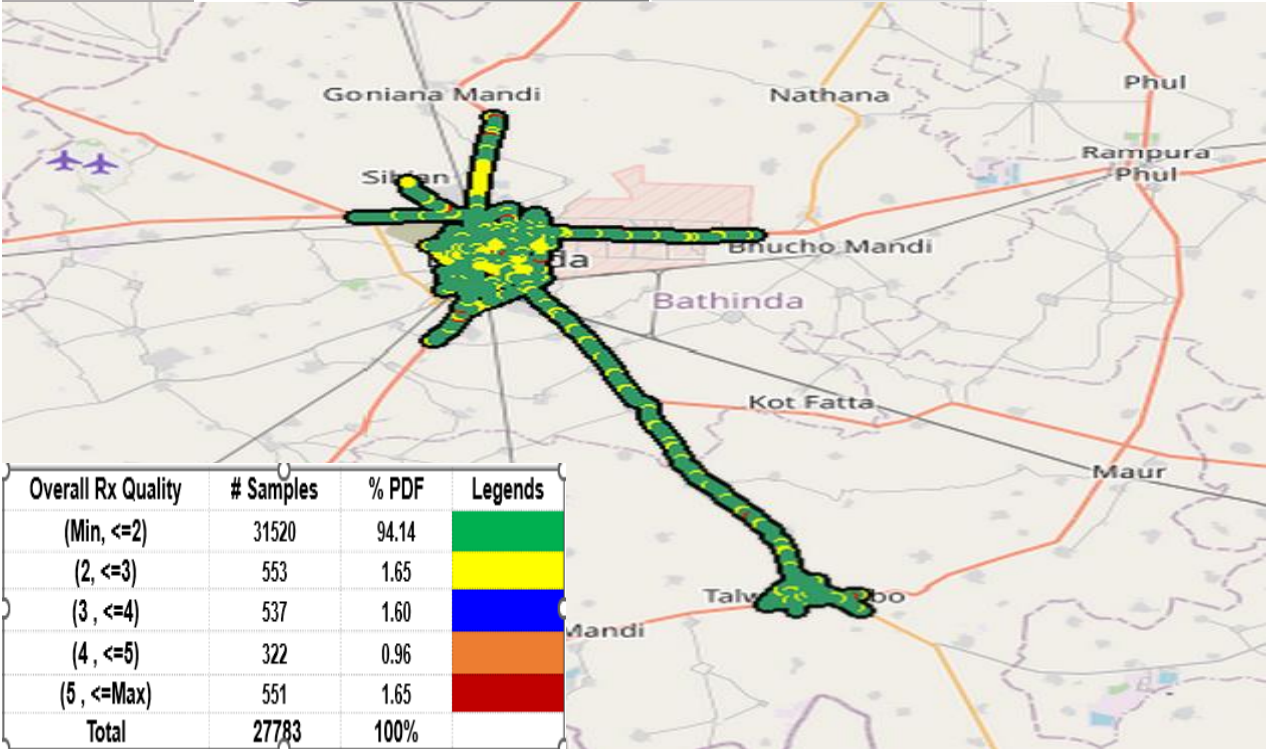
VoLTE



II. Quality Details

BSNL

	Technology	Rx Quality %
2G	2G	98.35%
	3G	97.86%
	4G	68.52%

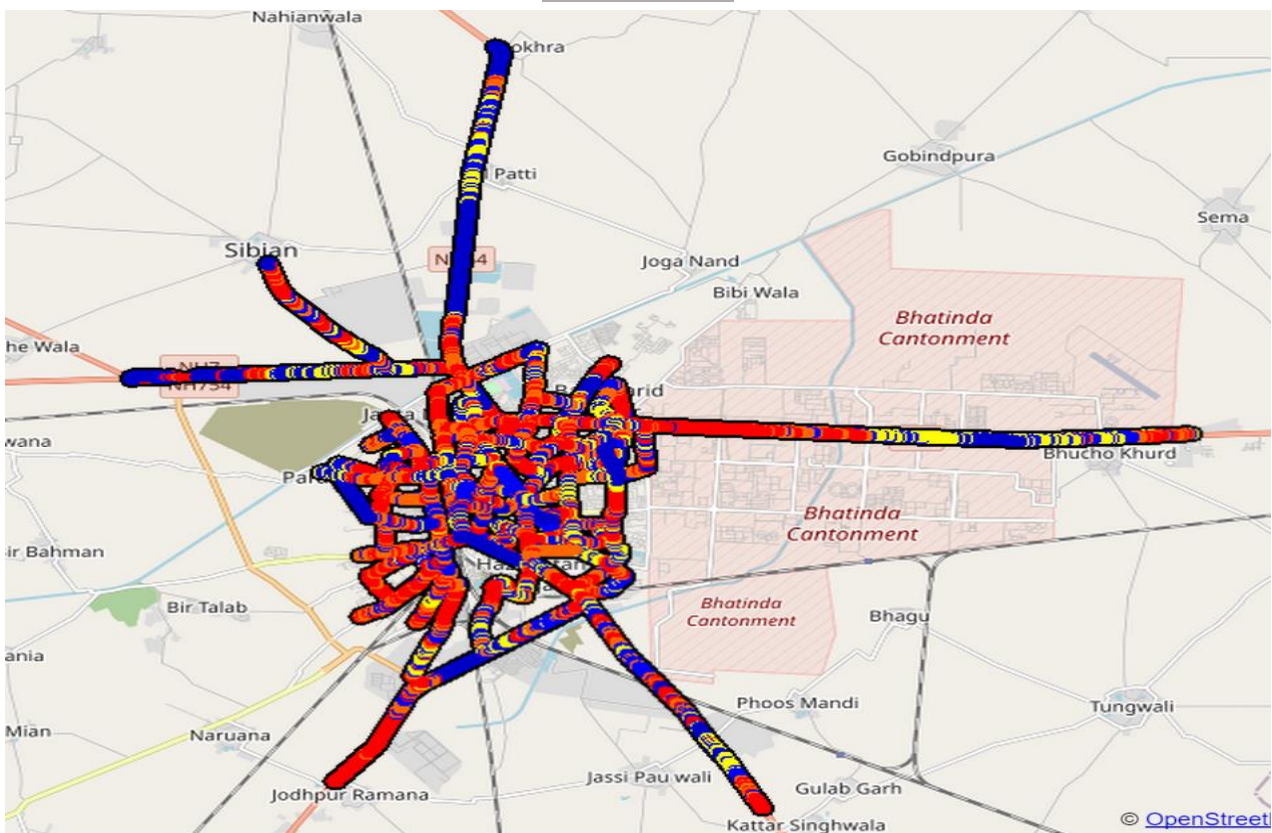


II. Quality Details

BSNL

Technology	Rx Quality %
2G	98.35%
3G	97.86%
4G	68.52%

4G

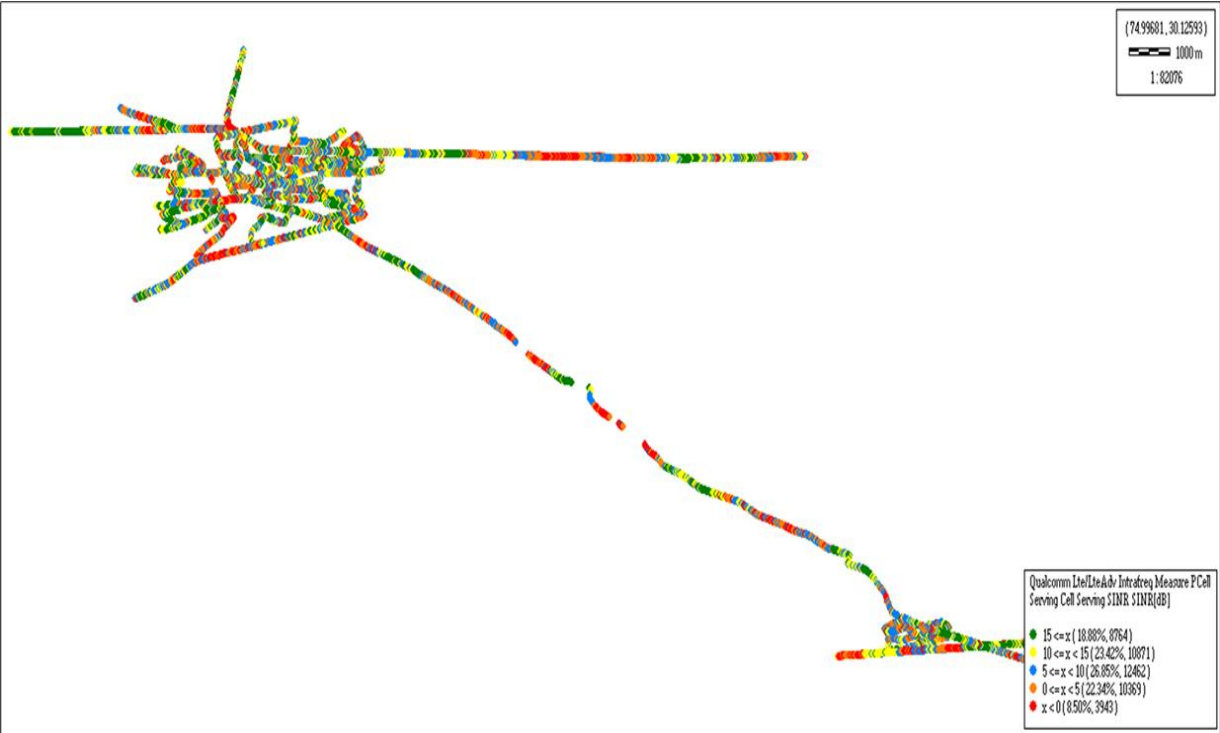


Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	9708	31.48	
(0, <=5)	8165	26.48	
(5, <=10)	6497	21.07	
(10, <=15)	4241	13.75	
(15, <=Max)	2230	7.23	
Total	30841	100%	

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%.

JIO

Technology	Rx Quality %
VoLTE	91.50%



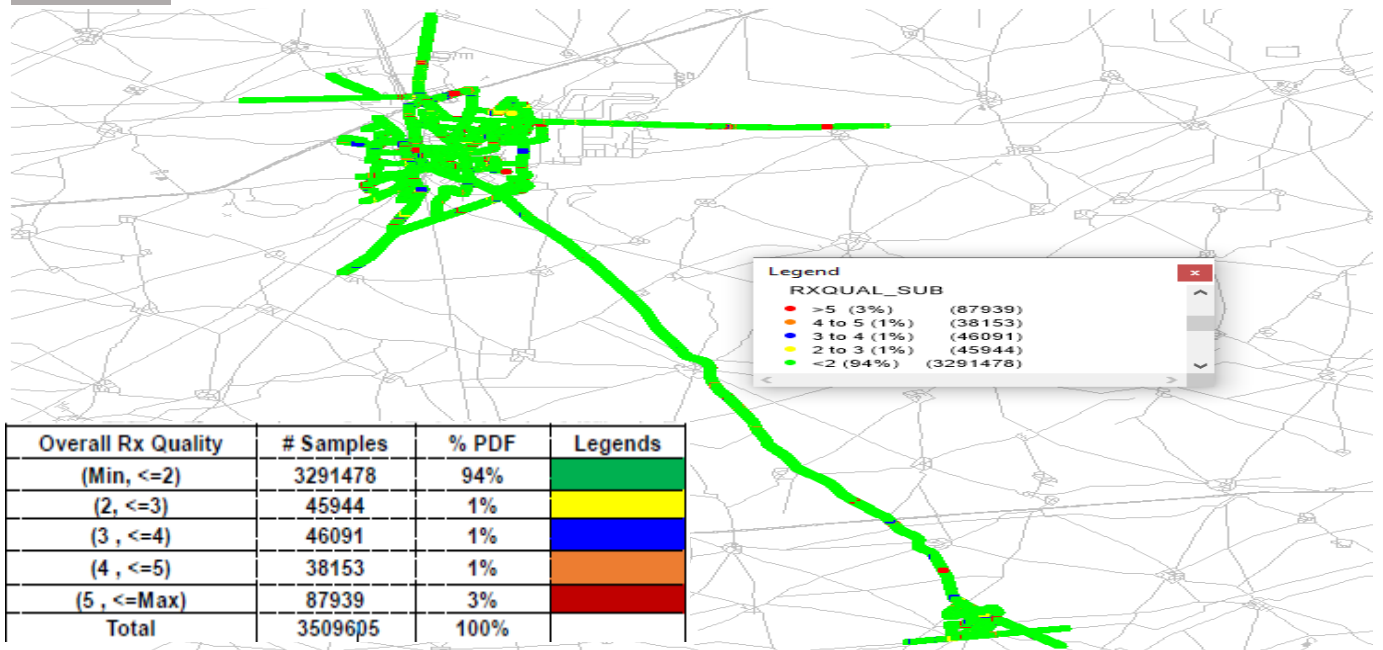
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	8764	18.88	
(0, <=5)	10871	23.42	
(5, <=10)	12462	26.86	
(10, <=15)	10369	22.34	
(15, <=Max)	3943	8.50	
Total	46409	100%	

II. Quality Details

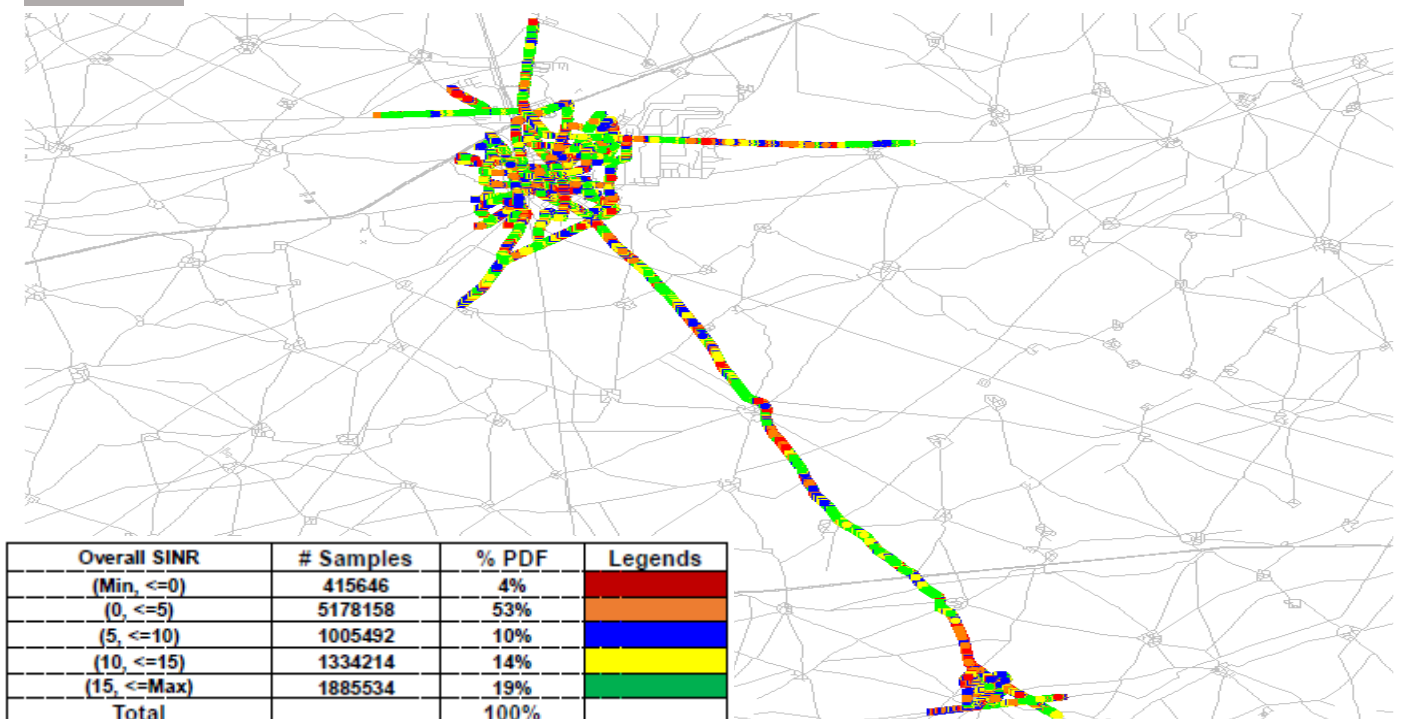
VIL

Technology	Rx Quality %
2G	97.00%
4G	96.00%

2G



VoLTE



III. Technology Details

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	27.00
Airtel VoLTE	100.00
Jio VoLTE	100.00
VIL VoLTE	100.00
BSNL 4G	73.00

