Operator Assisted Drive Test Report

Surat City & nearby Area
25th July to 31st July 2024
by
TRAI Regional office Jaipur

<u>Key Performance Indicators:</u> 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 Surat City and surrounding areas from 9:00 AM to 8:00 PM during 25th July to 31st July. The drive test covered drive route of 222 KMs & 6 no hotspots over a period of 3 days. Approximately 430 calls were made for each of the networks: three 2G networks, one 3G networks and three LTE /5G networks covering four TSPs.

| Overview | Voice Summary | Data Summary |

Overview

Regional Office, TRAI Jaipur conducted Operator Assisted Drive Test from 30th July 2024 to 31st July 2024 covering **Surat city & 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.

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 222 KMs. Approximately 430 calls were made for each of the networks: three 2G (Lock Mode) networks, two 3G (Dual mode) networks and three VoLTE /5G networks covering 4 unique TSPs.

Data Tests:

Dynamic data test was conducted for 218 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 /5G File Size- 40MB

Static data tests on 6 hotspots

1. Surat Dist Court (Athwa Lines Area)
2. Surat Civil Hospital (Ring road)
3. VR Mall (Dummas road)
4. Prime Arcade (Adajan)
5. PVR INOX (Sarthana)
6. APMC Market (Ring road)

| 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

Voice & Dynamic Data Test Drive Route

Date	Test Scenario	Area to be Covered
25-07-2024	Hot Spots- 2G/3G/4G/5G Static Data Tests	**Hotspot:** Surat Dist Court, Surat Civil Hospital, VR Mall , Prime Arcade
26-07-2024	2G/3G/4G Voice and 3G/4G/5G Dynamic Data	**Starting Point :** Surat , Ankleshwar, Jagadia , Rajpipla , Kevadiya.
27-07-2024	2G/3G/4G Voice and 3G/4G/5G Dynamic Data	**Starting Point :** Kevadiya **,** Nasvadi , Kosindra , Bodeli , Pavijetpur , chhota udaipur
30-07-2024	2G/3G/4G Voice and 3G/4G/5G Dynamic Data	**Starting Point :** Athwagate , Parlepoint , Pipolod, Magdalla Road, Vesu , City Light , Ghod dod road , Bhimrad, Althan , Bamroli , Sachin , Udhna , Adajan , Katargam , Amroli , Ahwinikumar road
31-07-2024	2G/3G/4G Voice and 3G/4G/5G Dynamic Data &Hot Spots- 2G/3G/4G/5G Static Data Tests	**Starting Point :** Majura Gate , Bamroli , Pandesara , Udhana , Dindoli , Limbayat , Godadara , Punagam , varachha , Mota Varachha , Ring road . **Hotspot:-** PVR Index (Varachha) , APMC Market

Data Service Test- Static Locations

Hotspot Locations
1. Surat Dist Court (Athwa Lines Area)
2. Surat Civil Hospital (Ring road)
3. VR Mall (Dummas road)
4. Prime Arcade (Adajan)
5. PVR INOX (Sarthana)
6. APMC Market (Ring Road)

Voice Calls

QoS compliance of the TSPs in **Surat City & Nearby area**
for Voice across technologies 2G/3G/4G-VoLTE:
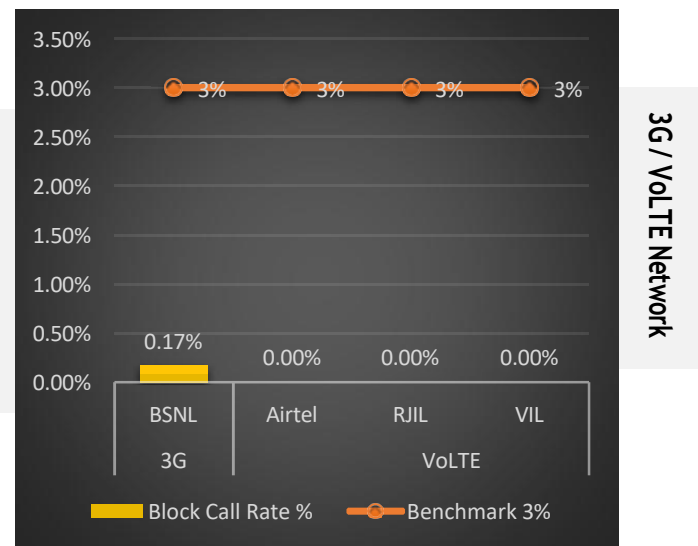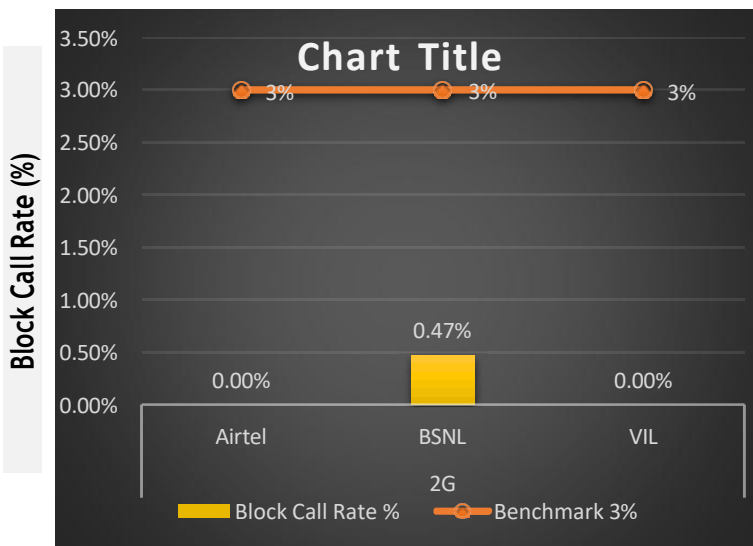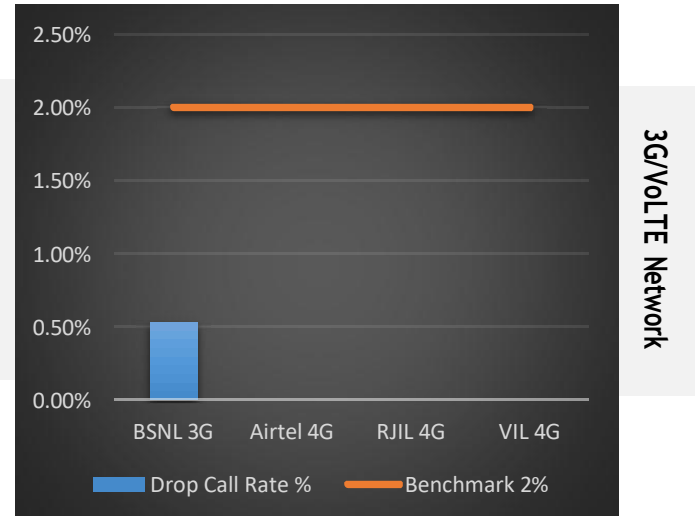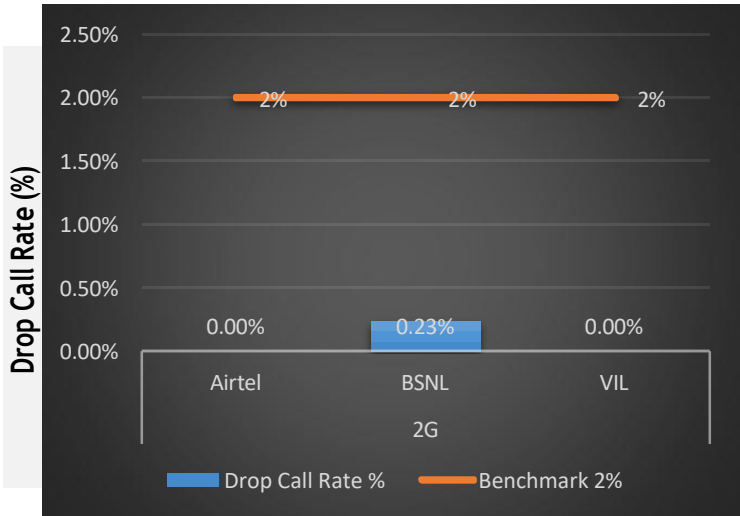
KPIs	2G			3G	4G		
	Airtel	**BSNL**	**VIL**	**BSNL**	**Airtel**	**RJIL**	**VIL**
Drop Call Rate %	0.00%	0.23%	0.00%	0.53%	0.00%	0.00%	0.00%
Block Call Rate %	0.00%	0.47%	0.00%	0.17%	0.00%	0.00%	0.00%

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 %	99.19%	75.38%	99.99%

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

TSPs	3G
	BSNL
Coverage %	74.13%

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

TSPs	VoLTE			
	Airtel	JIO	VIL	BSNL
Coverage %	99.99%	99.99%	99.26%	24.62%

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

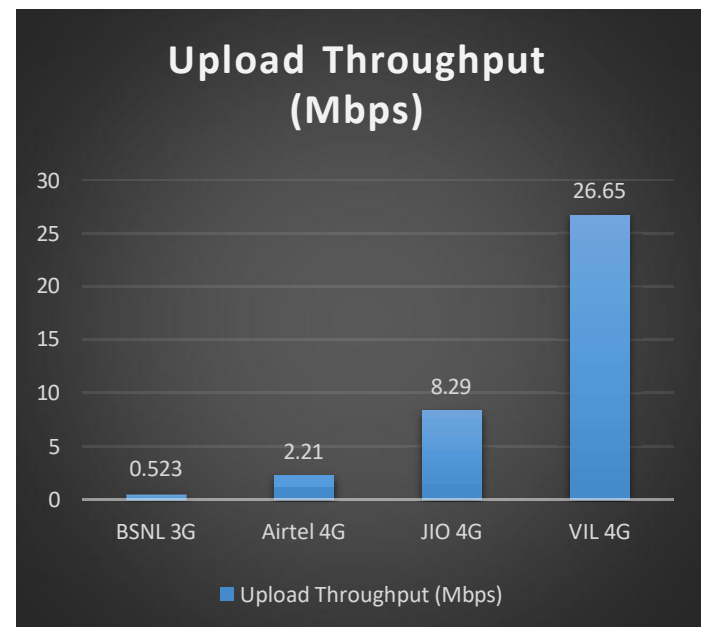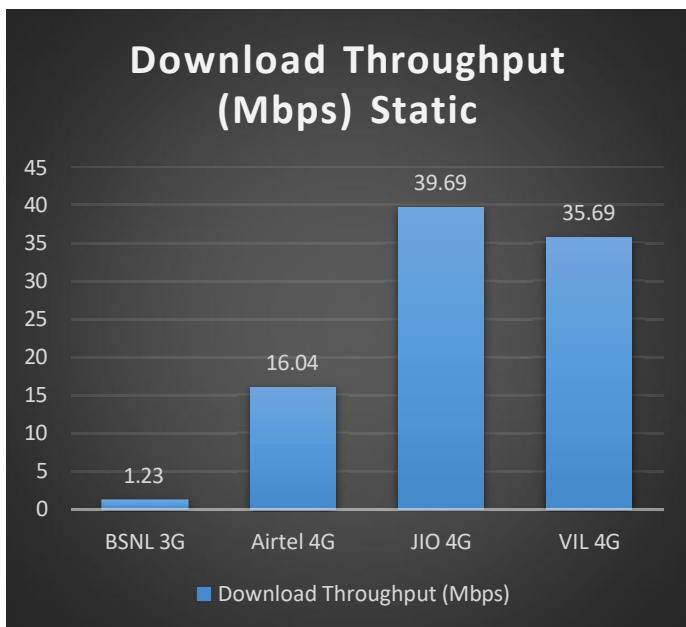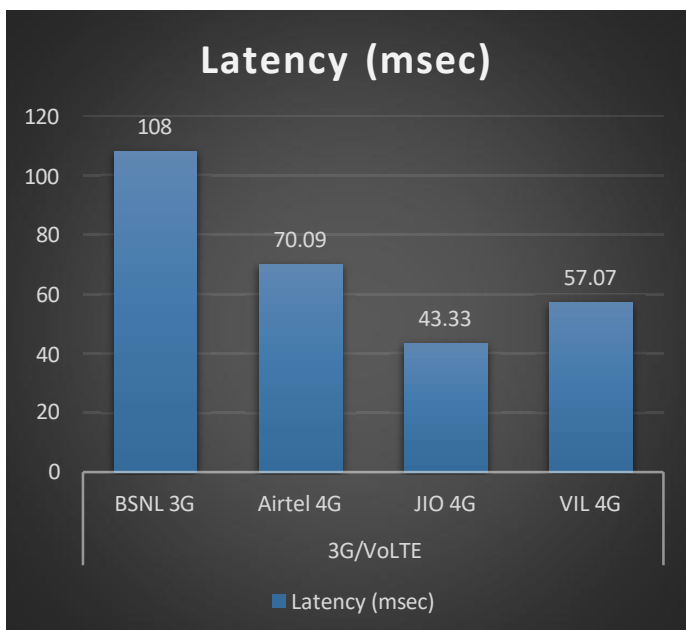| TSPs	3G	VoLTE			
	BSNL	Airtel	JIO	VIL	BSNL
Time spent on 3G/4G Network %	99.67%	100%	100%	99.93%	0.25%

Data Services Static

Data was tested at 5 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

Network	Download Throughput (Mbps)
BSNL 3G	1.23
Airtel 4G	16.04
JIO 4G	39.69
VIL 4G	35.69

Upload Throughput (Mbps)

Network	Upload Throughput (Mbps)
BSNL 3G	0.523
Airtel 4G	2.21
JIO 4G	8.29
VIL 4G	26.65

Latency (ms)

Web Browsing (Sec)

Latency (msec)

Network (3G/VoLTE)	Latency (msec)
BSNL 3G	108
Airtel 4G	70.09
JIO 4G	43.33
VIL 4G	57.07

Web Browsing Delay (sec)

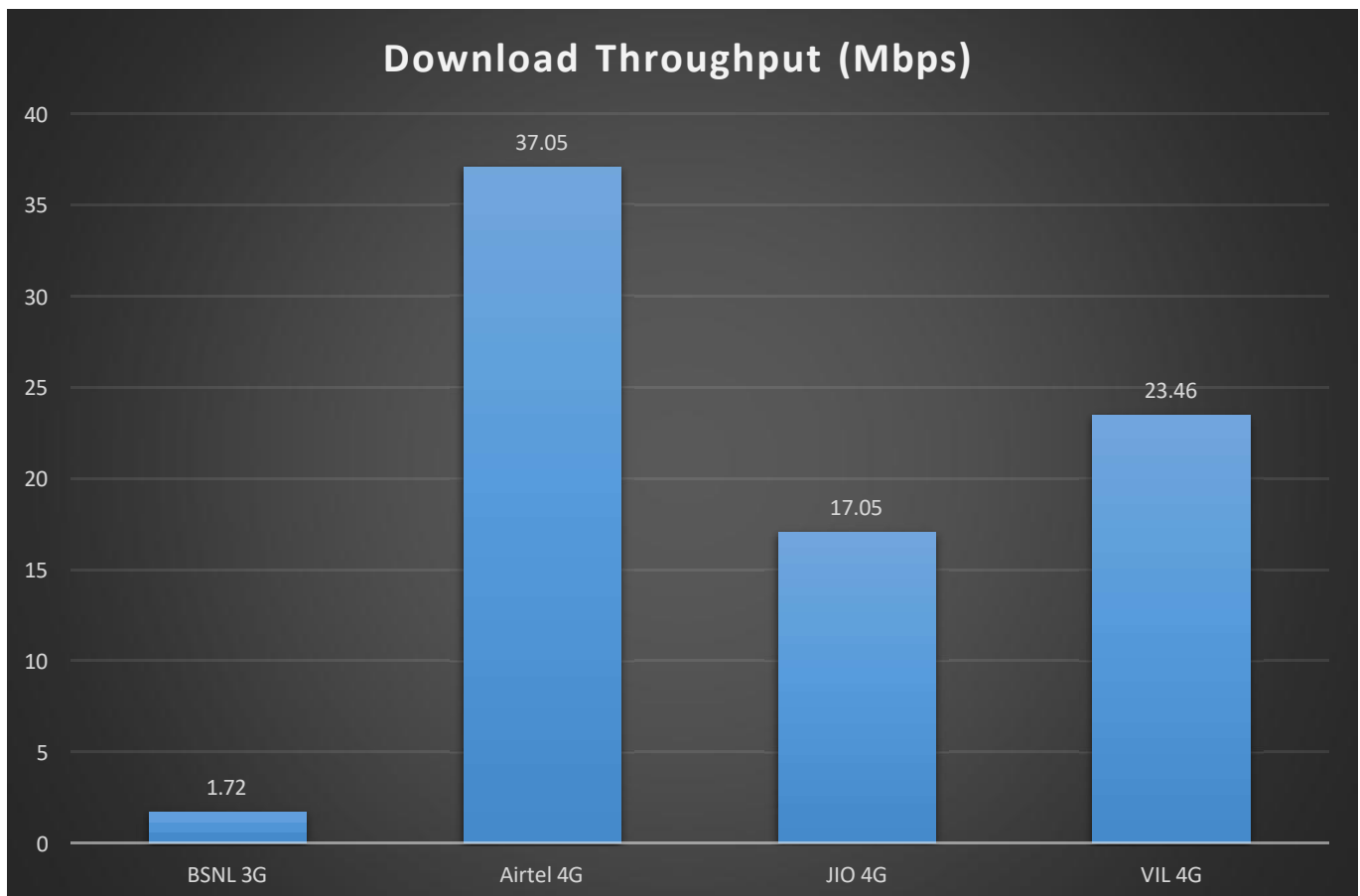| Network	Web Browsing Delay (sec)
BSNL 3G	2.81
Airtel 4G	5.33
JIO 4G	1.23
VIL 4G	5.25
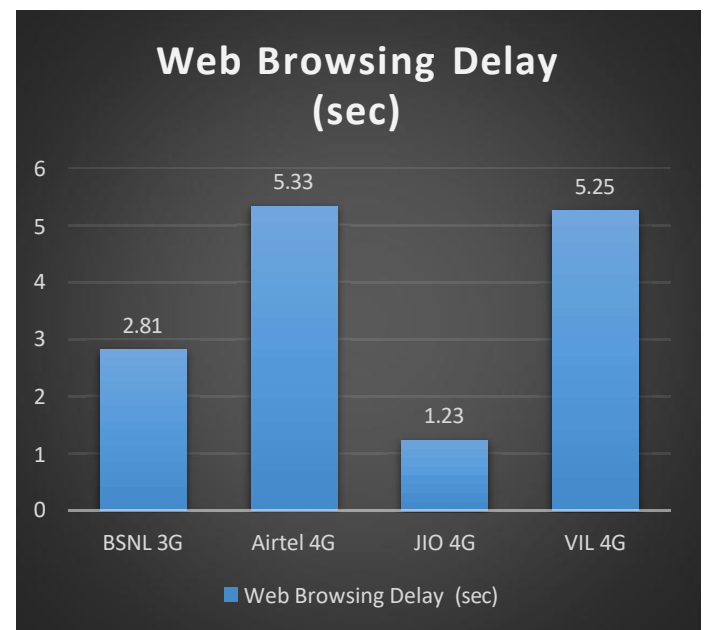
Data
Services Dynamic

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)	1.72	37.05	17.05	23.46

Download Throughput (Mbps)

Summary

Voice Call	2G		
	Airtel	**BSNL**	**VIL**
Call Attempt	409	429	461
Blocked Call Rate (%)	0%	0.47%	0%
CSSR% (Accessibility)	100%	99.53%	100%
Drop Call Rate (%)	0%	0.23%	0%
Mobility HOSR (%)	97.75%	98.39%	98.18%
Rx Quality (%)	93.74%	95.18%	94.61%
Average CST Sec	3.74	4.24	3.06

Voice Call	3G/VoLTE			
	BSNL 3G	**Airtel VoLTE**	**JIO VoLTE**	**VIL VoLTE**
Call Attempt	450	434	415	466
Blocked Call Rate (%)	0.17%	0%	0%	0%
CSSR% (Accessibility)	98.24%	100%	100%	100%
Drop Call Rate (%)	0.53%	0%	0%	0%
Mobility HOSR (%)	98.46%	99.9%	99.97%	100%
Rx Quality (%)	95.02%	91.61%	94.27%	87.61%
Average CST Sec	3.21	1.34	1.05	0.51

Summary

Data Services Static	2G		
	Airtel	**BSNL**	**VIL**
Download Throughput (kbps)	162.43	70	124.93
Upload Throughput (kbps)	61.79	30	57.98
Web Browsing Delay (sec)	27.60	9.28	32.28
Latency (msec)	291.32	270	191.67

Data Services Static	3G / 4G			
	BSNL 3G	**Airtel 4G**	**JIO 4G**	**VIL 4G**
Download Throughput (Mbps)	1.23	16.04	39.69	35.69
Upload Throughput(Mbps)	0.523	2.21	8.29	26.65
Video Streaming Delay (sec)	5.78	0.96	0.29	NA
Web Browsing Delay (sec)	2.81	5.33	1.23	5.25
Latency (msec)	108	70.09	43.33	57.07

Surat Dist Court (Athwa Lines Area)	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	209.46	56	120
Upload Throughput (kbps)	52.6	23	92.7
Web Browsing Delay (sec)	26.29	7.8	36.1
Latency (msec)	185.35	456	170

Civil Hospital	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	161.97	76	96.1
Upload Throughput (kbps)	37.22	44	46.17
Web Browsing Delay (sec)	28.31	8.6	26.64
Latency (msec)	264.14	532	191

VR Mall (dummas road)	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	149.47	82	109
Upload Throughput (kbps)	81.27	51	22.4
Web Browsing Delay (sec)	27.2	5.2	36
Latency (msec)	273.98	532	229

Prime Arcade (Adajan)	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	130.1	87	177
Upload Throughput (kbps)	69.37	43	124
Web Browsing Delay (sec)	26.79	6.7	25
Latency (msec)	278.39	553	163

PVR INOX (Sarthana)	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	214.66	82	131
Upload Throughput (kbps)	67.53	36	30.15
Web Browsing Delay (sec)	28.01	9.3	42
Latency (msec)	315.18	632	189

APMC (Market yard)	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	108.94	77	116.47
Upload Throughput (kbps)	62.76	32	32.48
Web Browsing Delay (sec)	29	13.7	27.91
Latency (msec)	430.87	436	208

Data Services static

Surat Dist Court (Athwa Lines Area)	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (mbps)	1.92	15.15	68.82	40.7
Upload Throughput (mbps)	0.432	0.6	8.36	28
Video Streaming Delay (Secs.)	5.6	1.18	0.31	NA
Web Browsing Delay (sec)	2.9	5.37	1.09	4.67
Latency (msec)	112	66.48	42	49.7

Civil Hospital	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (mbps)	1.82	16.24	23.85	25.81
Upload Throughput (mbps)	0.732	1.11	7.95	28.15
Video Streaming Delay (Secs.)	5.4	0.88	0.28	NA
Web Browsing Delay (sec)	4.2	5.09	1.23	5.86
Latency (msec)	124	75.34	35	53.73

VR Mall (dummas road)	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (mbps)	1.72	20.25	31.48	23.4
Upload Throughput (mbps)	0.652	1.26	8.13	11
Video Streaming Delay (Secs.)	13.2	0.85	0.30	NA
Web Browsing Delay (sec)	4.1	5.03	1.24	5.3
Latency (msec)	118	66.1	43	49.8

Data Services static

Prime Arcade (Adajan)	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (mbps)	1.42	19.25	56.33	41
Upload Throughput (mbps)	0.814	1.17	8.7	36
Video Streaming Delay (Secs.)	12.8	1.04	0.27	NA
Web Browsing Delay (sec)	6.2	5.37	1.31	5
Latency (msec)	114	74.48	56	73

PVR INOX (Sarthana)	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (mbps)	1.53	16.16	31.95	26.7
Upload Throughput (mbps)	0.35	1.22	8.61	24
Video Streaming Delay (Secs.)	7.2	0.89	0.30	NA
Web Browsing Delay (sec)	3.4	6.01	1.3	5.7
Latency (msec)	127	72.6	42	61.87

APMC (Market yard)	3G	4G		
	BSNL	Airtel	JIO	VIL
Download Throughput (mbps)	1.32	16.04	25.74	56.53
Upload Throughput (mbps)	0.65	7.88	8	32.73
Video Streaming Delay (Secs.)	8.5	0.91	0.28	NA
Web Browsing Delay (sec)	3.1	5.13	1.26	4.95
Latency (msec)	118	65.52	42	54.3

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.
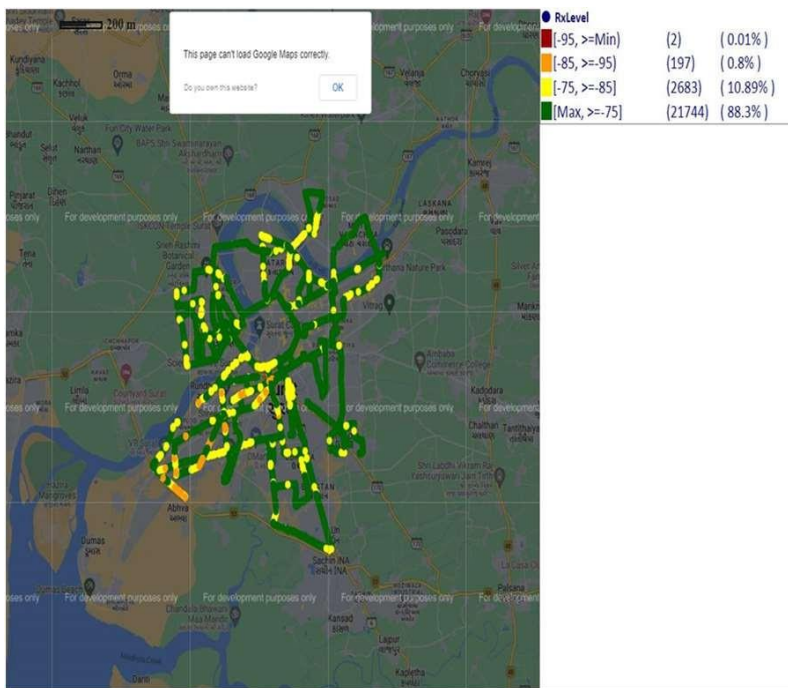
TSP	Coverage Rate %
Airtel 2G	99.19%
BSNL 2G	75.38%
VIL 2G	99.99%
BSNL 3G	74.13%
BSNL 4G	24.62%
Airtel VoLTE	99.99%
Jio VoLTE	99.99%
VIL VoLTE	99.26%

Coverage Rate

	Airtel 2G	BSNL 2G	VIL 2G	BSNL 3G	BSNL 4G	Airtel VoLTE	Jio VoLTE	VIL VoLTE
Top (orange)	0.81	24.62	0.01	25.87	75.38	0.01	0.01	0.74
Bottom (blue)	99.19	75.38	99.99	74.13	24.62	99.99	99.99	99.26
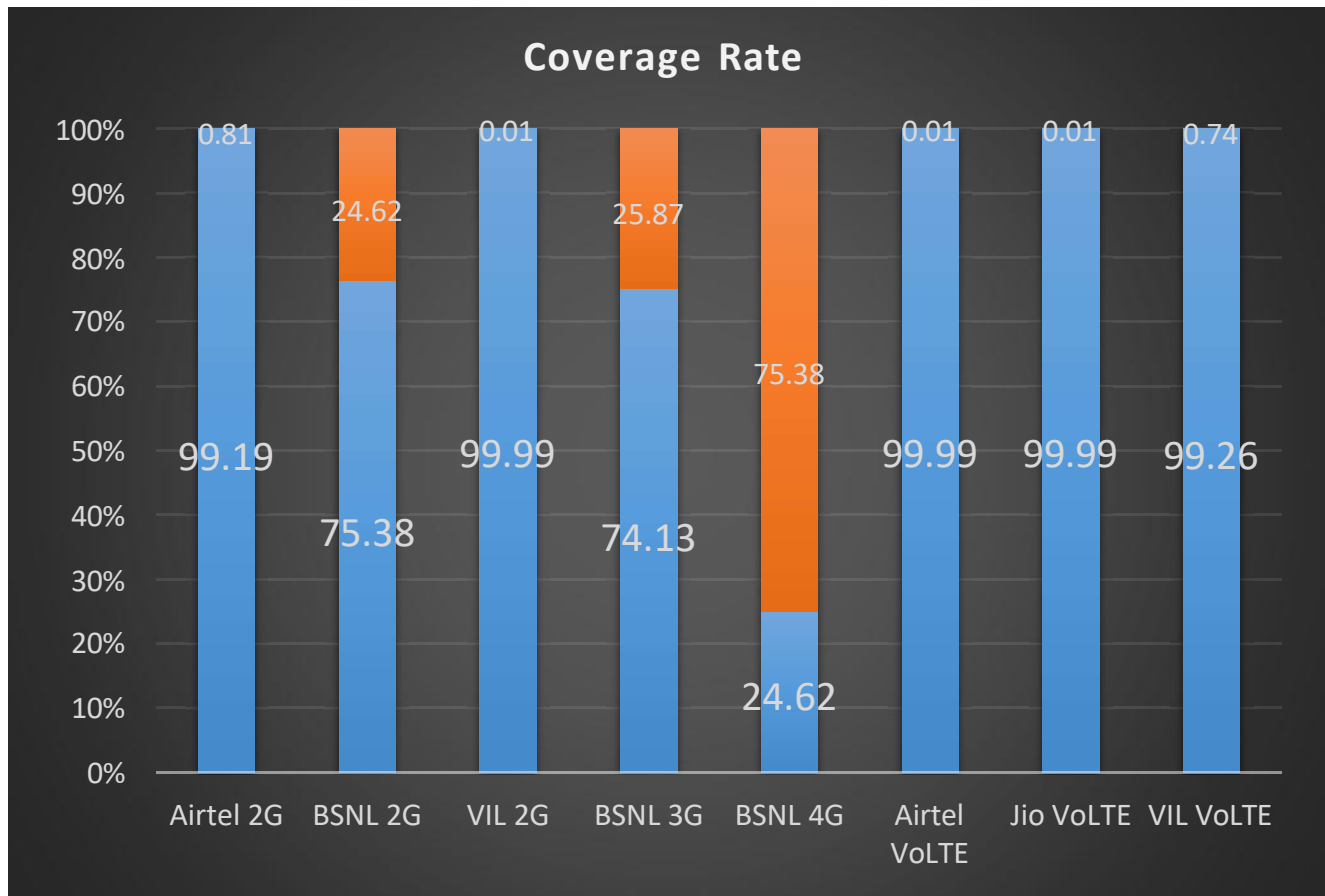
TSP-AIRTEL

Technology	Coverage %
2G	99.19%
VoLTE	99.99%

2G

2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	21744	88.30%	🟩
[-75, >=-85)	2683	10.89%	🟨
[-85, >=-95)	197	0.80%	🟧
[-95, >=Min)	2	0.01%	🟥
Total	24626	100.00	

VoLTE
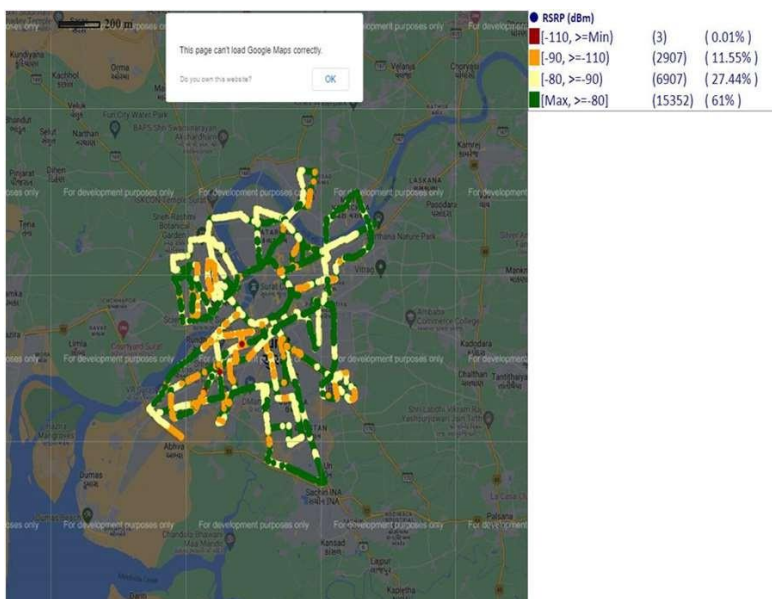
VoLTE /5G			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	15352	61.00%	🟩
[-80, >=-90)	6907	27.44%	🟨
[-90, >=-110)	2907	11.55%	🟧
[-110, >=Min)	3	0.01%	🟥
Total	25169	100.00	

TSP- BSNL

Technology	Coverage %
2G	75.38%
3G in Auto Mode	74.13%

2G

3G
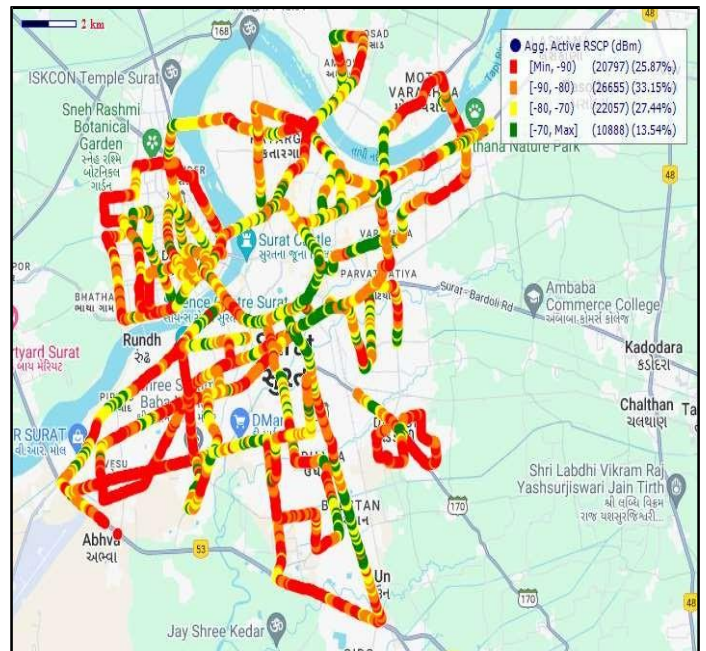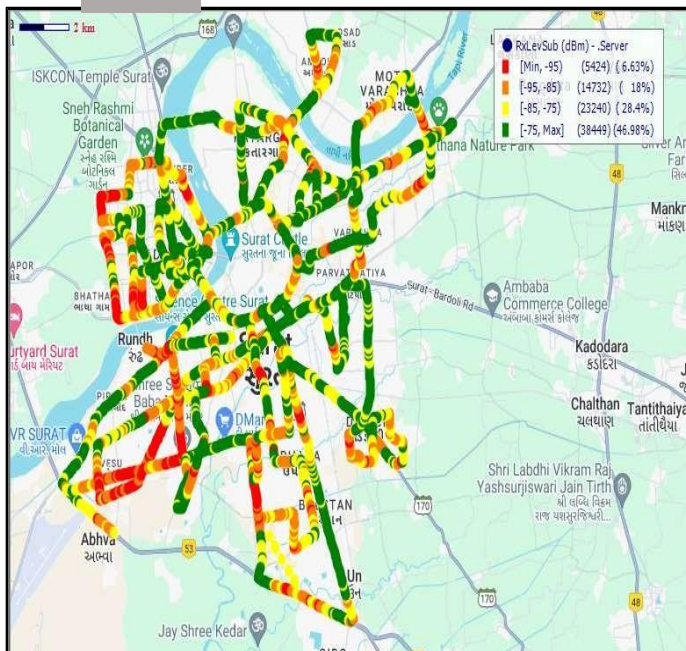
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	38449	46.98%	
[-75, >=-85)	23240	28.4%	
[-85, >=-95)	14732	18%	
[-95, >=Min)	5424	6.62%	
Total	81845	100%	

3G			
Overall RSCP	**# Samples**	**% PDF**	**Legends**
[Max, >=-70]	10888	13.54%	
[-70, >=-80)	22057	27.44%	
[-80, >=-90)	26655	33.15%	
[-90, >=Min)	20797	25.87%	
Total	80397	100%	

TSP- BSNL

Technology	Coverage %
VoLTE in Auto Mode	24.62%
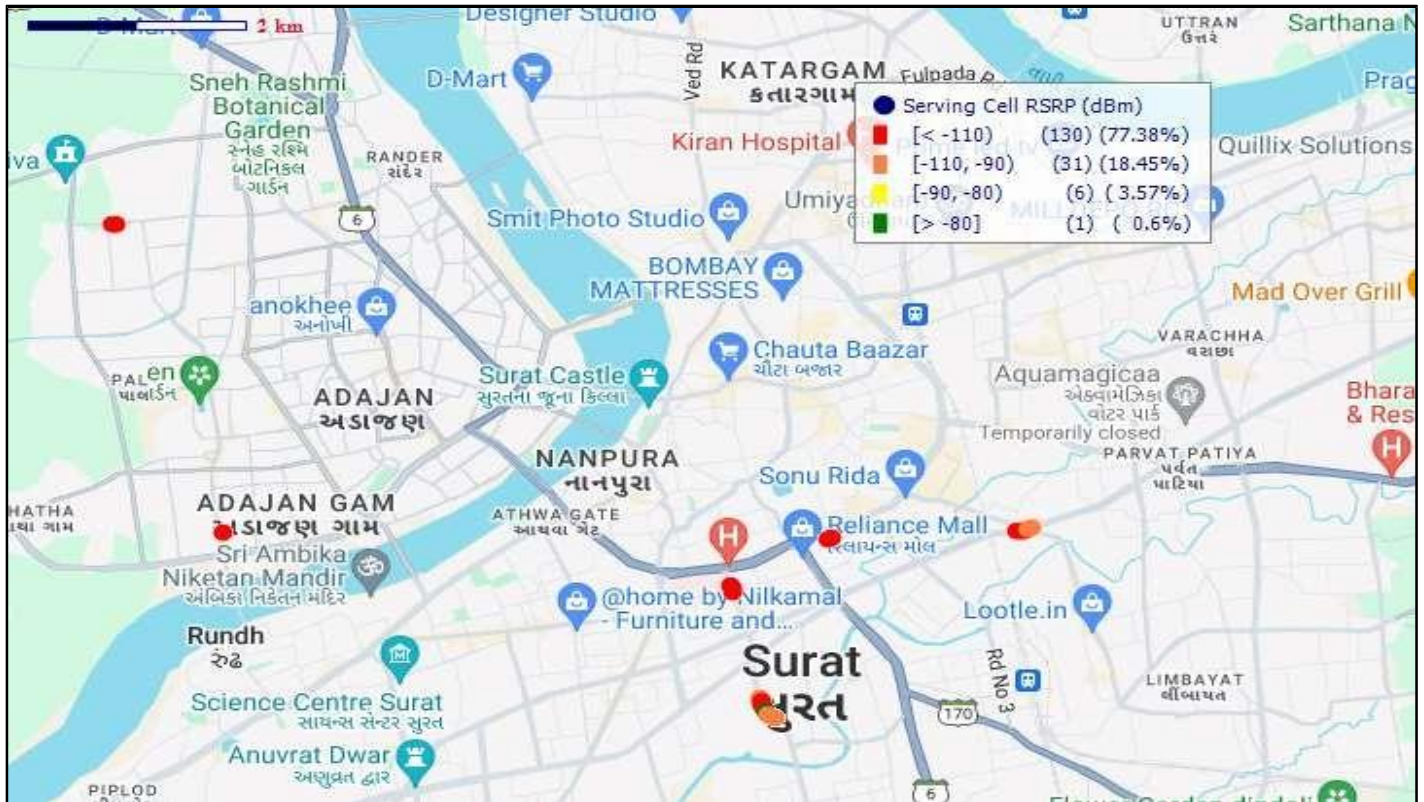
VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	1	0.6%	
[-80, >=-90)	6	3.57%	
[-90, >=-110)	31	18.45%	
[-110, >=Min)	130	77.38%	
Total	168	100%	

JIO

Technology	Coverage %
VoLTE	99.99%
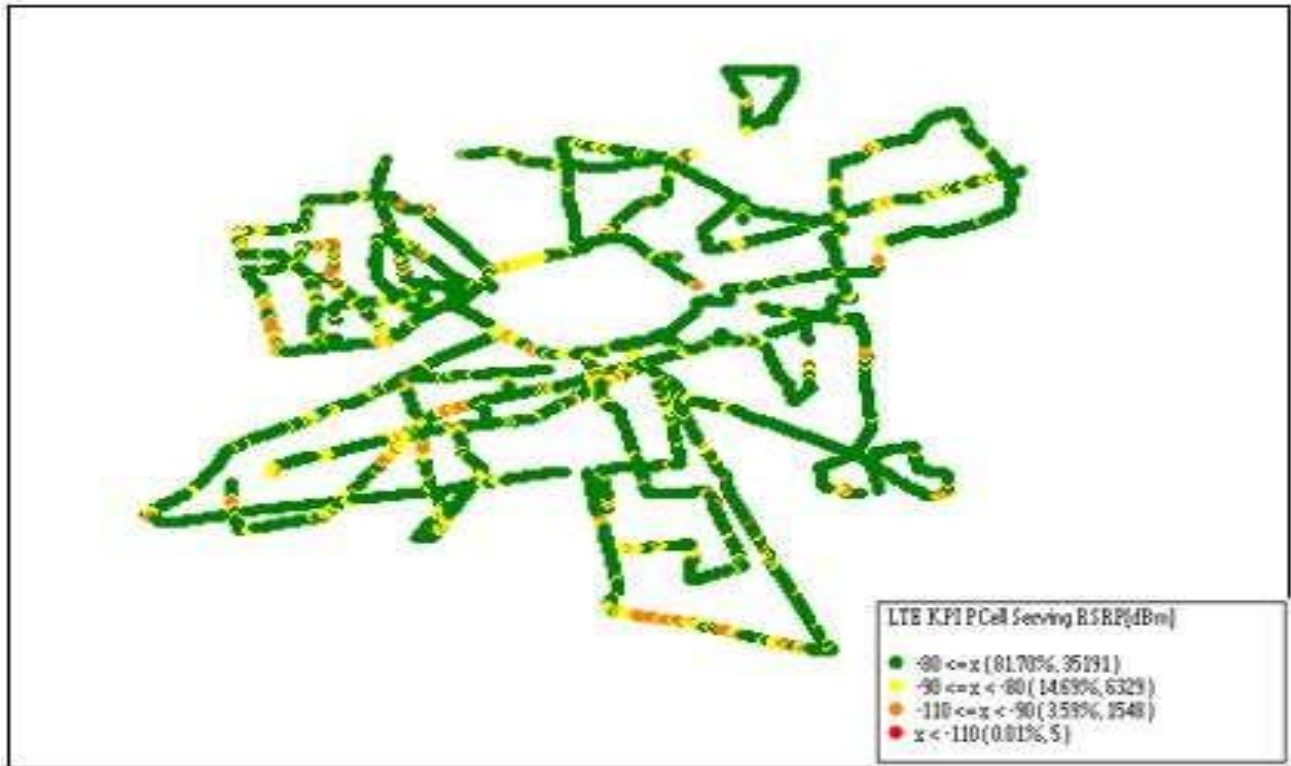
VoLTE /5G			
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	35191	81.70%	🟩
[-80, >=-90)	6329	14.69%	🟨
[-90, >=-110)	1548	3.59%	🟧
[-110, >=Min)	5	0.02%	🟥
Total	43073	100%	

VIL

Technology	Coverage Rate %
2G	99.99%
VoLTE	99.26%

2G

2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	43629	97.2%	
[-75, >=-85)	1248	2.79%	
[-85, >=-95)	6	0.01%	
[-95, >=Min)	0	0%	
Total	44883	100%	

VoLTE
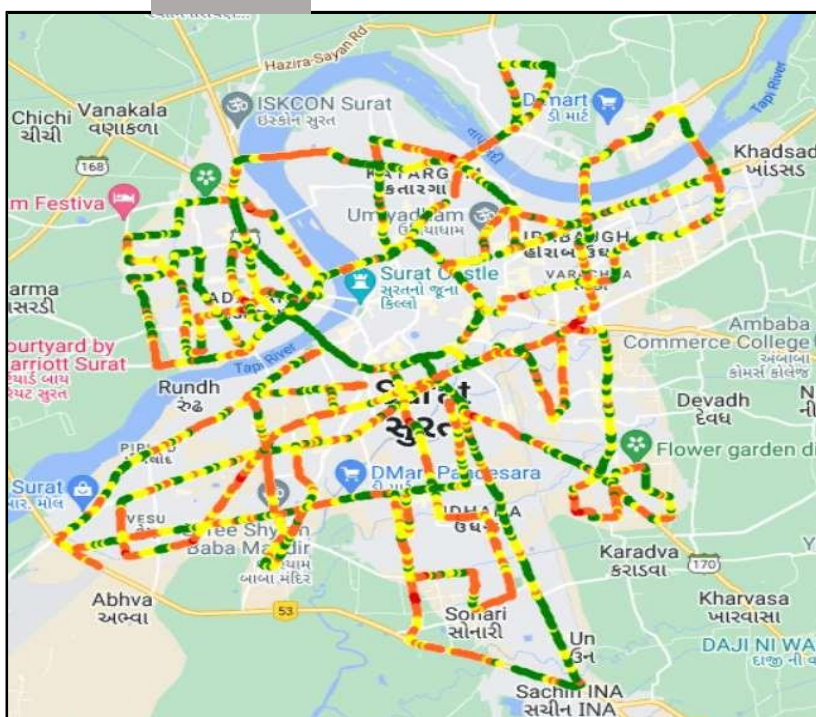
VoLTE /5G			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	8993	35.72%	
[-80, >=-90)	8831	35.08%	
[-90, >=-110)	7164	28.46%	
[-110, >=Min)	185	0.74%	
Total	25173	100	

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	93.74%
BSNL 2G	95.18%
VIL 2G	94.61%
BSNL 3G	95.02%
Airtel VoLTE	91.61%
Jio VoLTE	94.27%
VIL VoLTE	87.61%
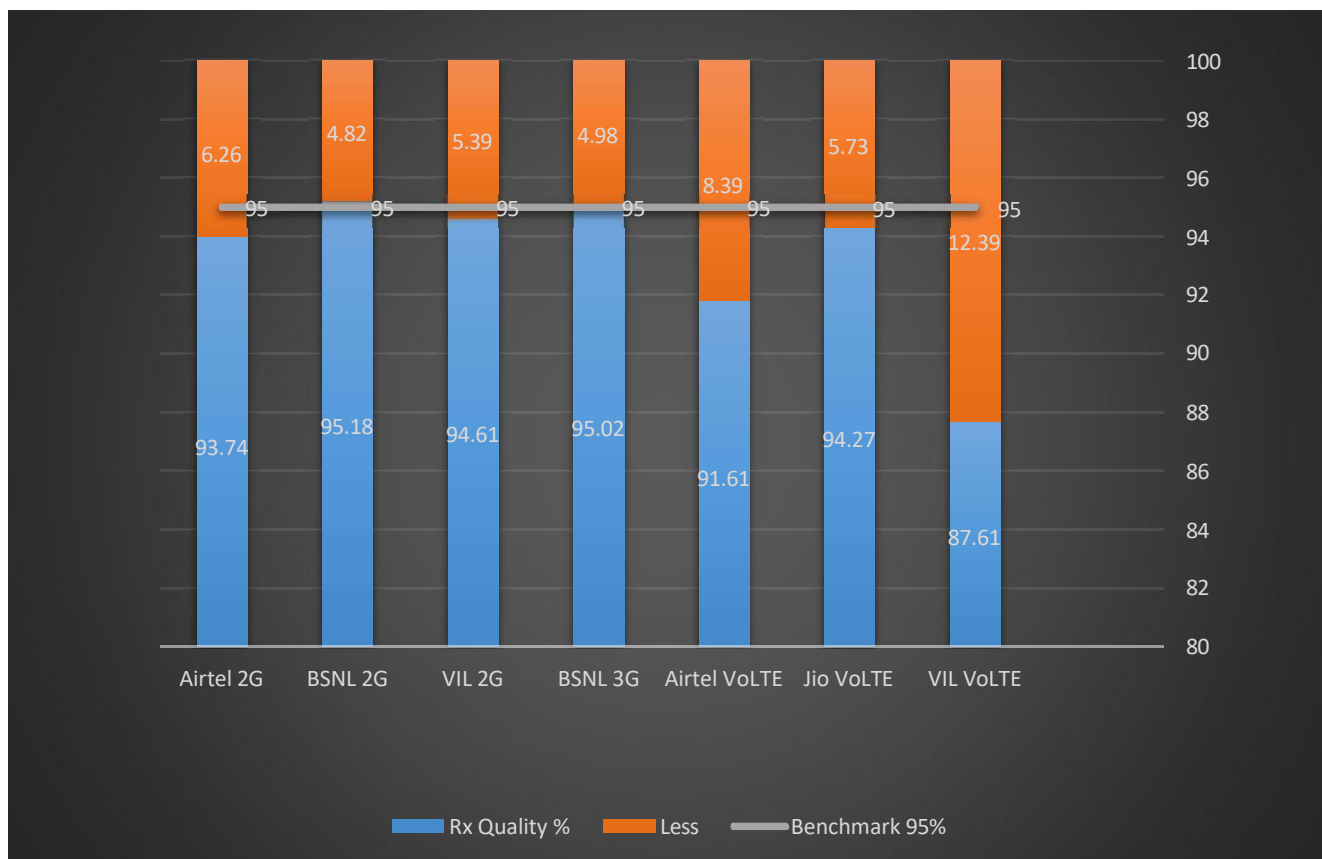
Airtel

Technology	Rx Quality %
2G	**93.74%**
VoLTE	**91.61%**

2G
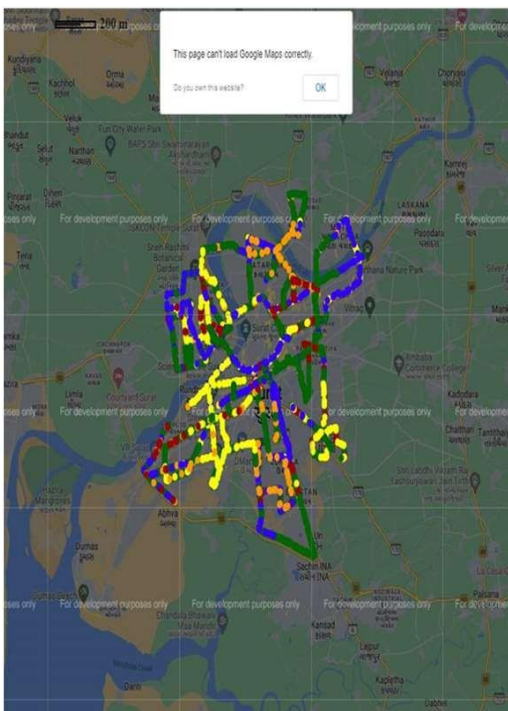
Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	16219	73.60%	🟩
(2, <=3)	2075	9.42%	🟨
(3 , <=4)	1406	6.38%	🟦
(4 , <=5)	958	4.35%	🟧
(5 , <=Max)	1380	6.25%	🟥
Total	22038	100%	

VoLTE
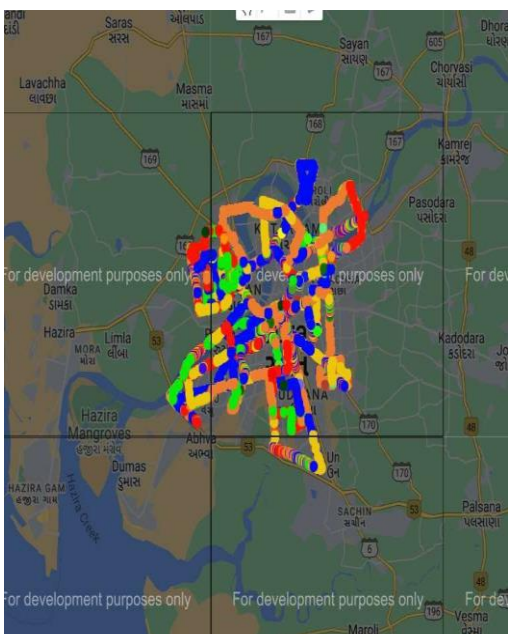
Overall SINR	# Samples	% PDF	Legends
(Min, <=6)	58	0.23%	🟥
(-6, <=0)	2048	8.16%	🟧
(0, <=5)	5673	22.61%	🟧
(5, <=10)	8578	34.19%	🟦
(10, <=15)	6711	26.74%	🟨
(15, <=Max)	2020	8.05%	🟩
Total	25088	100.00	

BSNL

Technology	Rx Quality %
2G	95.18%
3G	95.02%

2G

3G
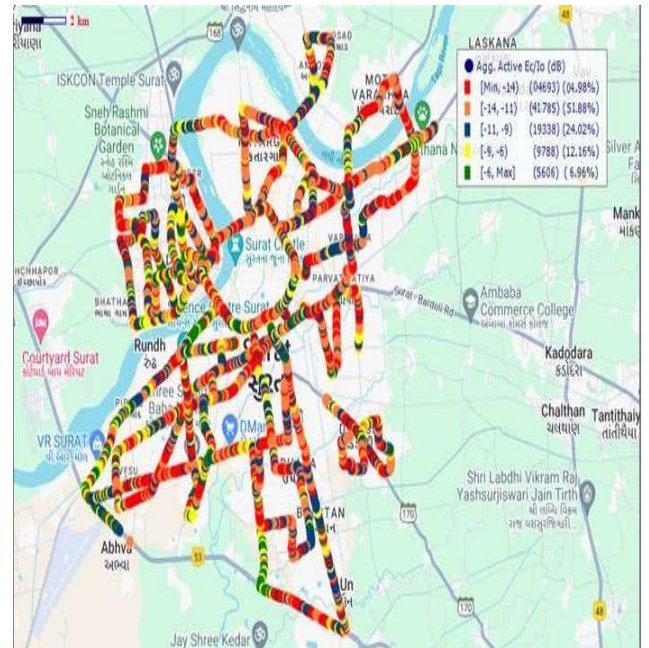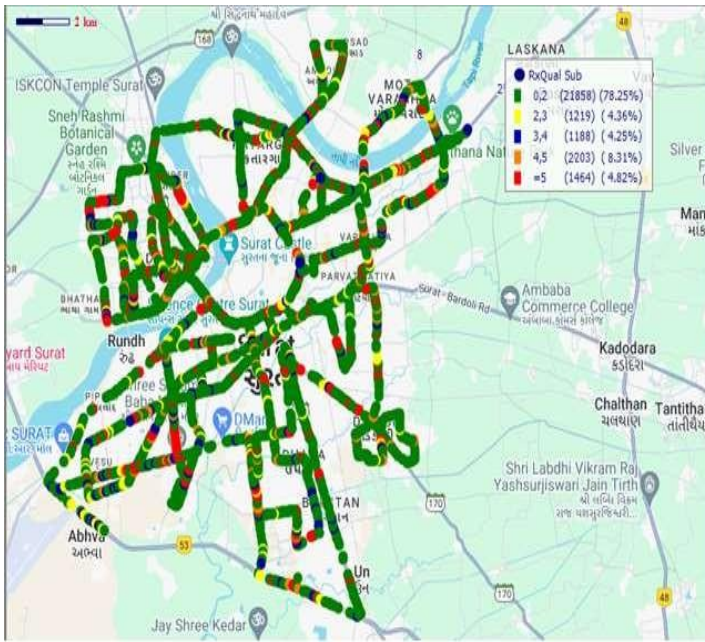
Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	21858	78.25%	
(2, <=3)	1219	4.36%	
(3 , <=4)	1188	4.25%	
(4 , <=5)	2203	8.31%	
(5 , <=Max)	1464	4.83%	
Total	27932	100%	

Overall Ec/No	# Samples	% PDF	Legends
(Max, <=-6)	5606	6.96%	
(-6, <=-9)	9788	12.16%	
(-9, <=-11)	19338	24.02%	
(-11, <=-14)	41785	51.88%	
(-14, <= Min)	04693	4.98%	
Total	81210	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%.
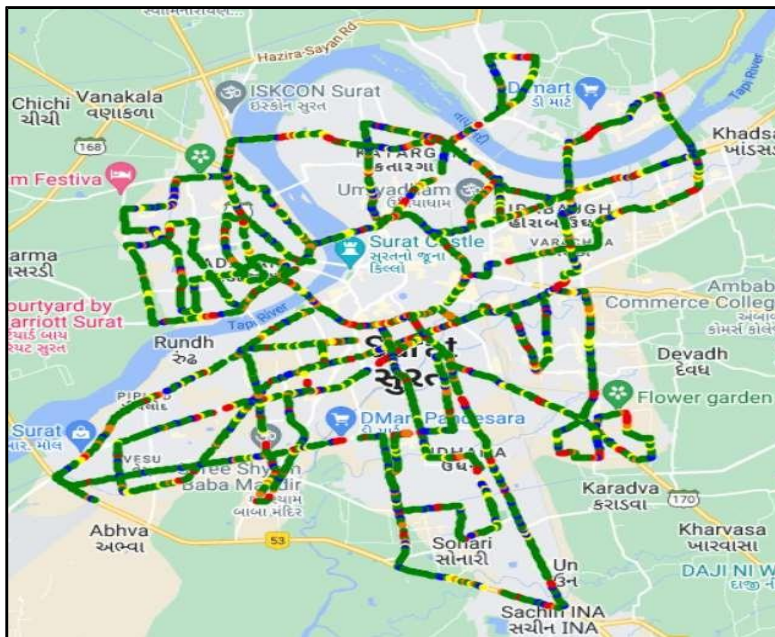
JIO

Technology	Rx Quality %
VoLTE	94.27%

LTE KPI PCeB SINR[dB]

- 15 <=x (17.13%, 7377)
- 10 <=x < 15 (24.50%, 10555)
- 5 <=x < 10 (31.54%, 13585)
- 0 <=x < 5 (21.11%, 9091)
- -6 <=x < 0 (5.46%, 2350)
- x <= -6 (0.27%, 115)
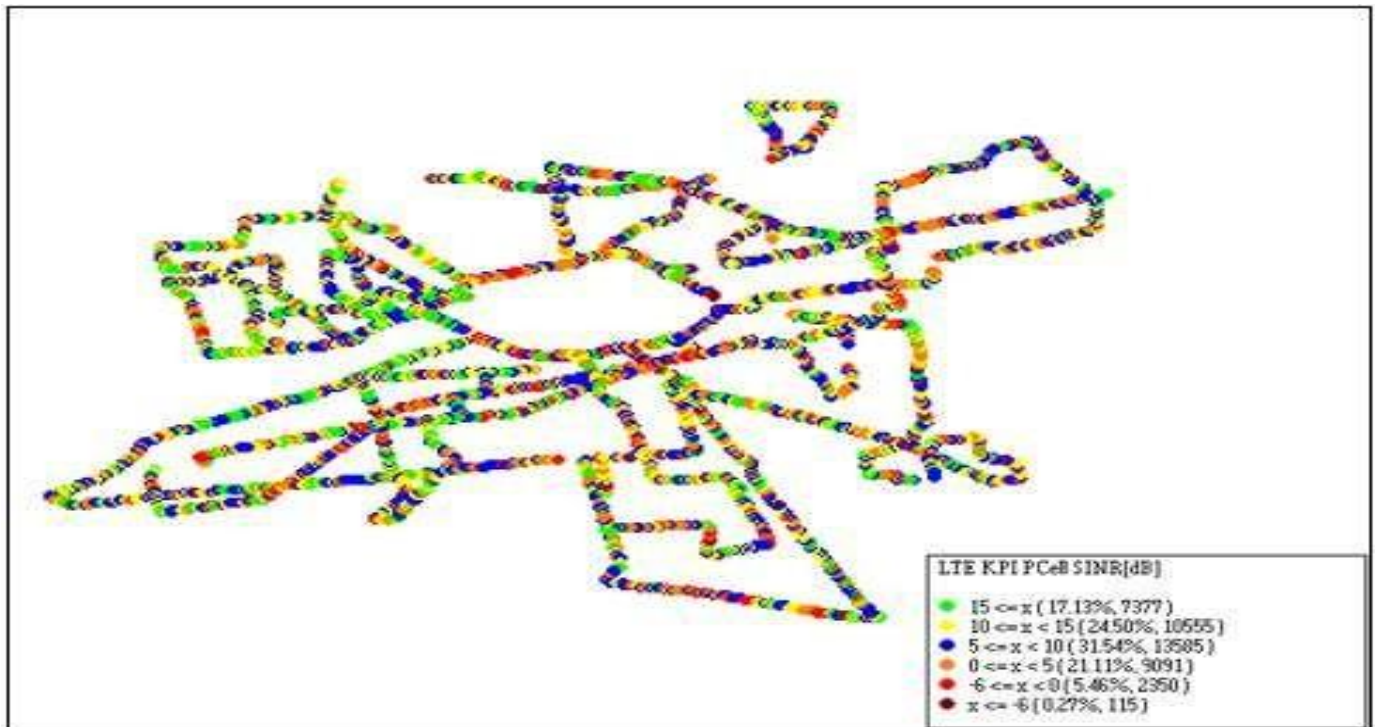
Overall SINR	# Samples	% PDF	Legends
(Min, <=-6)	115	0.27%	
(-6, <=0)	2350	5.46%	
(0, <=5)	9091	21.11%	
(5, <=10)	13585	31.53%	
(10, <=15)	10555	24.5%	
(15, <=Max)	7377	17.13%	
Total	43073	100%	

VIL

Technology	Rx Quality %
2G	94.61%
4G	87.61%

2G

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	15648	73.22%	
(2, <=3)	1854	8.68%	
(3 , <=4)	1819	8.51%	
(4 , <=5)	898	4.2%	
(5 , <=Max)	1151	5.39%	
Total	21370	100	

VoLTE
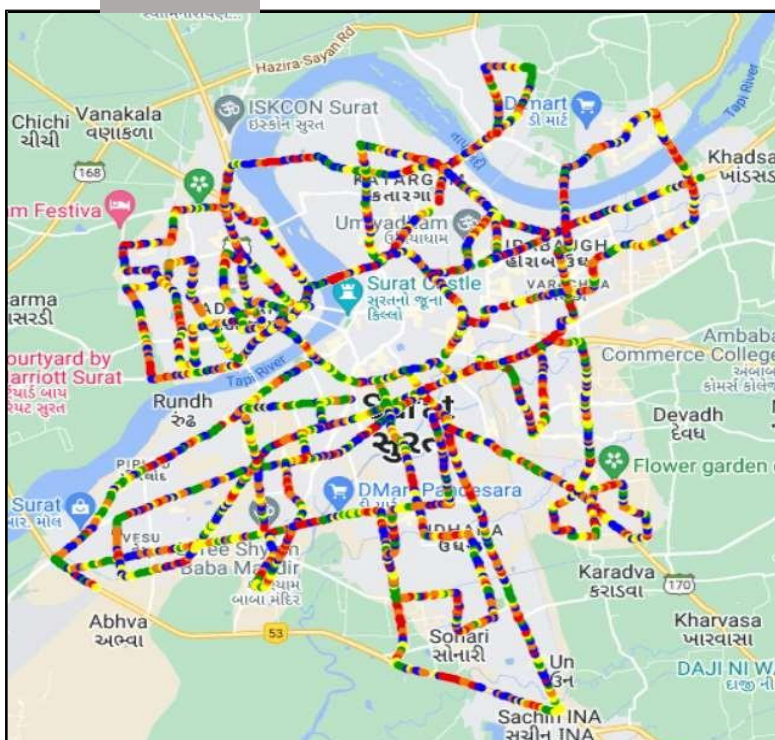
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	3117	12.39%	
(0, <=5)	4874	19.37%	
(5, <=10)	6199	24.63%	
(10, <=15)	5653	22.46%	
(15, <=Max)	5323	21.15%	
Total	25166	100	

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	**99.67%**
BSNL4G	**0.25%**
Airtel VoLTE	**100%**
Jio VoLTE	**100%**
VIL VoLTE	**99.93%**

Time Spent On 3G/4G

	BSNL 3G	BSNL4G	Airtel VoLTE	Jio VoLTE	VIL VoLTE
% Time Spend on 2G (top)	0.33%		0.00%	0.00%	0.07%
% of Time Spent on 3G/VoLTE	99.67%	99.75%	100%	100%	99.93%
(bottom orange)		0.25%			

Legend: ■ % of Time Spent on 3G/VoLTE ■ % Time Spend on 2G