Operator Assisted Drive Test Report

Bhavnagar City & Nearby area

23rd May, 24th May & 26th May 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 Bhavnagar City & Nearby area from 9:00 AM to 8:00 PM during 23-05-2023. 24-05-2023 and 26-05-2023. The drive test covered drive route of 200 KMs & 5 no hotspots over a period of 3 days. Approximately 380 calls were made for each of the networks: three 2G networks and Four LTE networks covering four TSPs.

| Overview | Voice Summary | Data Summary |

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Overview

Regional Office, TRAI Jaipur conducted Operator Assisted Drive Test on 23th May 2023, 24th May 2023 and 26th May 2023 covering Bhavnagar City & Nearby Area. The performance of Airtel, BSNL, Vodafone Idea and Jio was monitored across various technologies (2G 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 200 KMs. Approximately **380 calls** were made for each of the networks: three 2G (Lock Mode) networks and four VoLTE networks covering 4 unique TSPs.

Data Tests:

Dynamic data test was conducted for 200 kms for download throughput in all technologies.

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

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

Static data tests on 5 hotspots

1. **Himalya Mall**
2. **Bus stand**
3. **Sir T Hospital**
4. **Railway station**
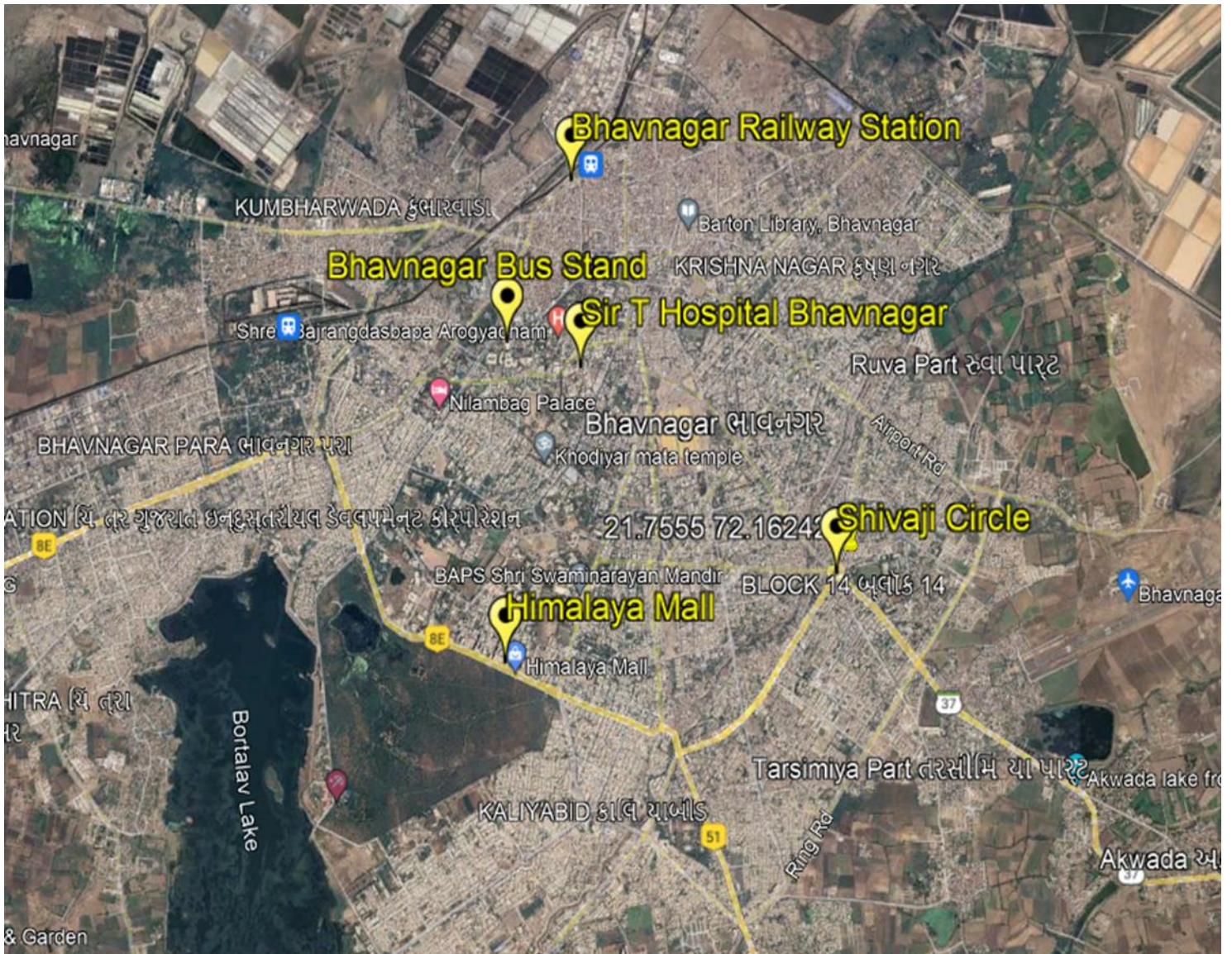5. **Shivaji circle**

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

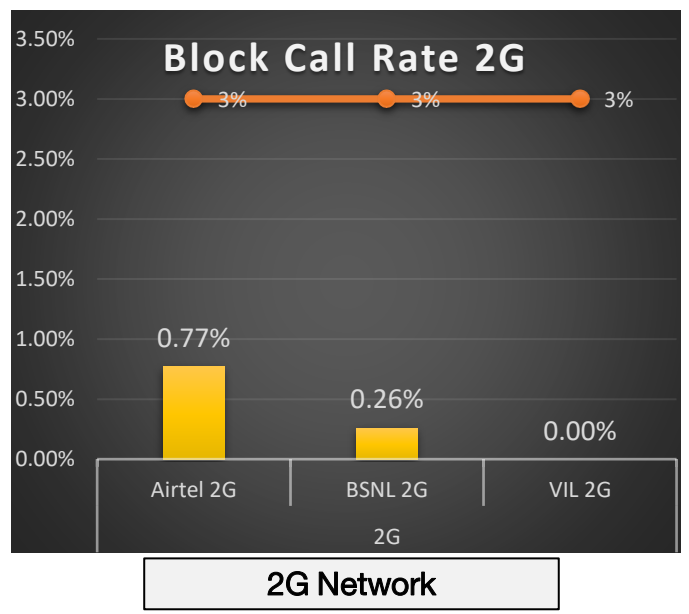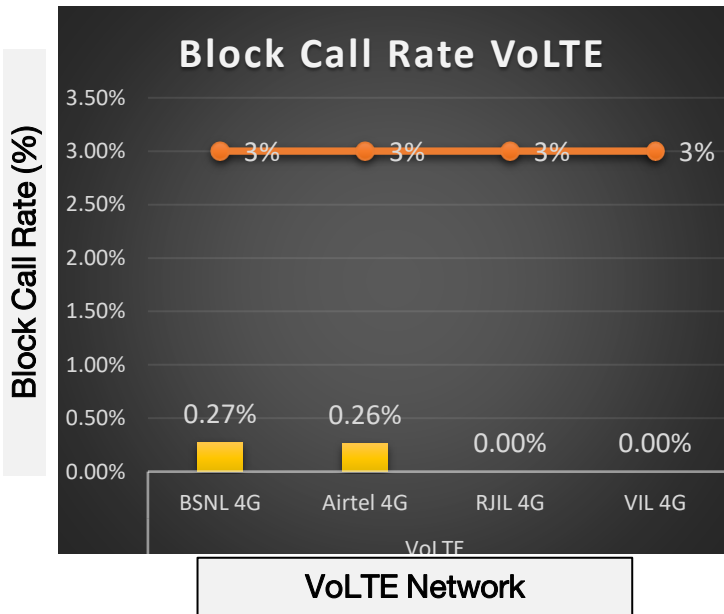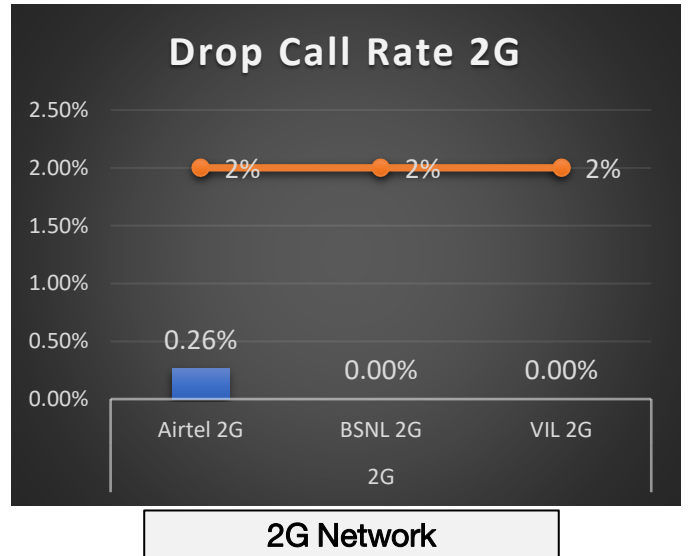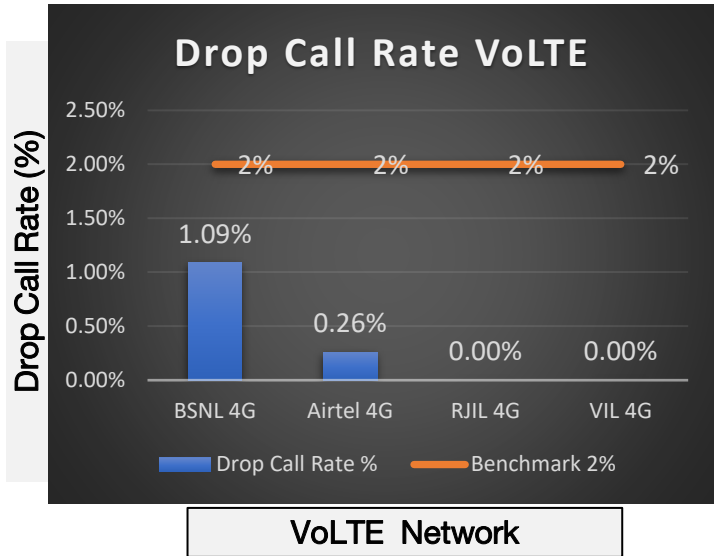| Date	Test Scenario	Area to be Covered
23-May-23	2G/4G Voice and 4G Dynamic Data	Starting Point :Ghogha Circle at 9:30AM :Ambawadi,Subhashnagar,Tilak Nagar, Anand Nagar, Kheduvas,Vora Bazar, Nirmal Nagar, Kumbharwada, Chitra GIDC,Vartej,Shihor,Songadh
24-May-23	2G/4G Voice and 4G Dynamic Data	Starting Point :Water Tank kaliyabid at 9:30AM :Hill Drive,Vidhyanagar,Vijayraj Nagar, Sardar Nagar,Nilkanth Nagar, Bharat Nagar,Kaliya Bid,Tarsamiya, Akwada, Ghogha,Oevbaug, Sarita Society,Chitra,Desai Nagar, Sidsar,Shampara, Vartej,
26-May-23	Hot Spots- 2G/4G Static Data Tests	1. Himalaya Mall 2. Bhavnagar Bus stand 3. Sir T Hospital Bhavnagar 4.Bhavnagar Railway station 5. Shivaji circle

Data Service Test- Static Locations

Hotspot Locations
1. Himalaya Mall
2. Bhavnagar Bus Stand
3. Sir T Hospital Bhavnagar
4. Bhavnagar Railway Station
5. Shivaji Circle

Voice Calls

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

Drop Call Rate VoLTE

VoLTE Network

Drop Call Rate 2G

2G Network

Block Call Rate VoLTE

VoLTE Network

Block Call Rate 2G

2G Network

KPIs	2G			4G			
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0.26%	0.00%	0.00%	1.09%	0.26%	0.00%	0.00%
Block Call Rate %	0.77%	0.26%	0.00%	0.27%	0.26%	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 %	97.62%	88.47%	98.34%

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

TSPs	VoLTE			
	Airtel	BSNL	JIO	VIL
Coverage %	99.35%	97.97%	99.79%	99.09%

c) Percentage of time spent on 4G network

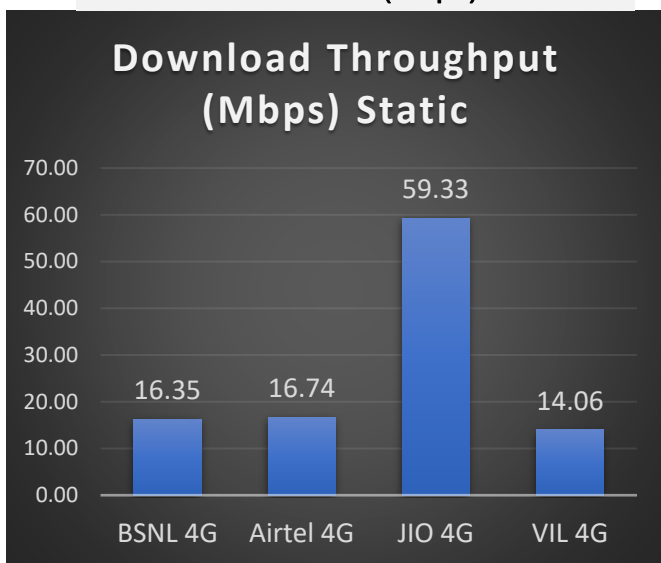| TSPs	VoLTE			
	BSNL	Airtel	JIO	VIL
Time spent on 4G Network %	92.09%	100.00%	100.00%	100.00%

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)
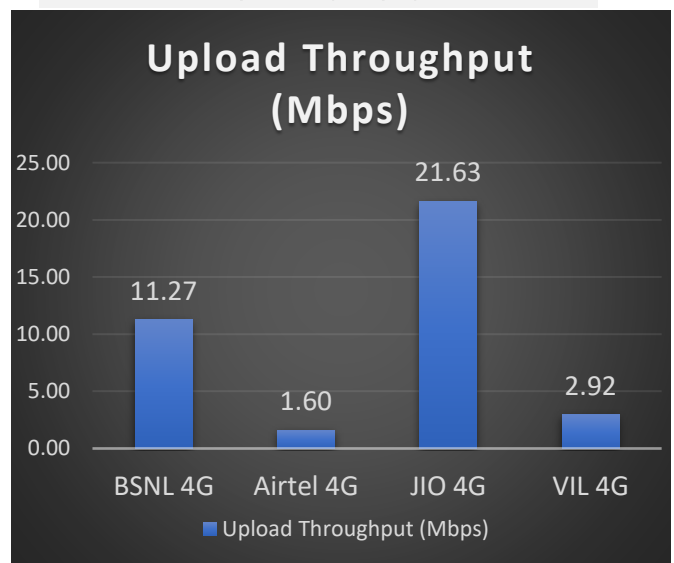
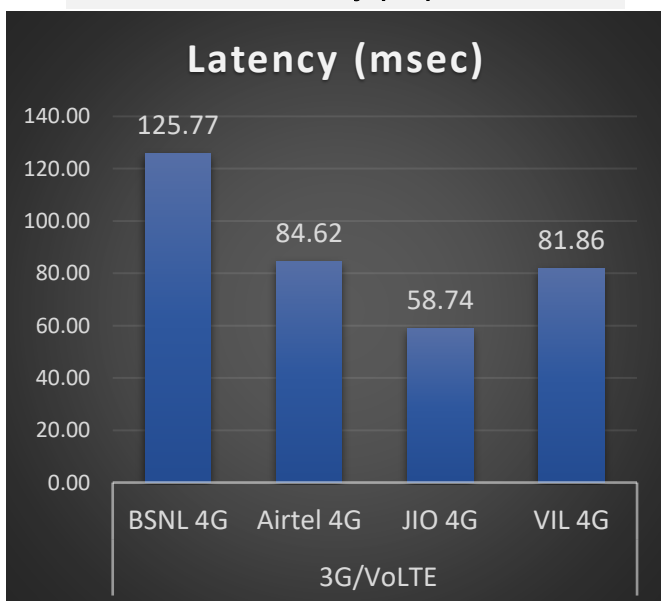## Data Download,Upload, Latency and Web browsing Performance (Mbps)

3G/4G/ Network:

Download (mbps)

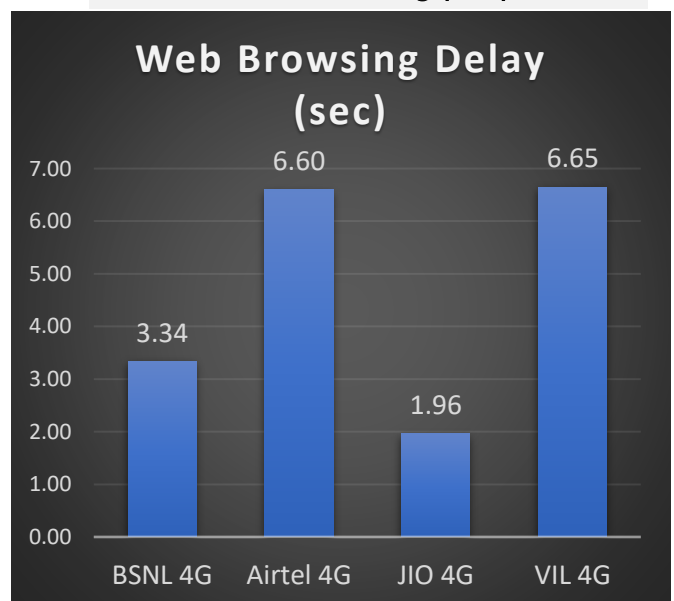**Download Throughput (Mbps) Static**

Network	Value
BSNL 4G	16.35
Airtel 4G	16.74
JIO 4G	59.33
VIL 4G	14.06

Upload (mbps)

Upload Throughput (Mbps)

Network	Value
BSNL 4G	11.27
Airtel 4G	1.60
JIO 4G	21.63
VIL 4G	2.92

Upload Throughput (Mbps)

Latency (ms)

Latency (msec)

Network	Value
BSNL 4G	125.77
Airtel 4G	84.62
JIO 4G	58.74
VIL 4G	81.86

3G/VoLTE

Web Browsing (Sec)

Web Browsing Delay (sec)

Network	Value
BSNL 4G	3.34
Airtel 4G	6.60
JIO 4G	1.96
VIL 4G	6.65

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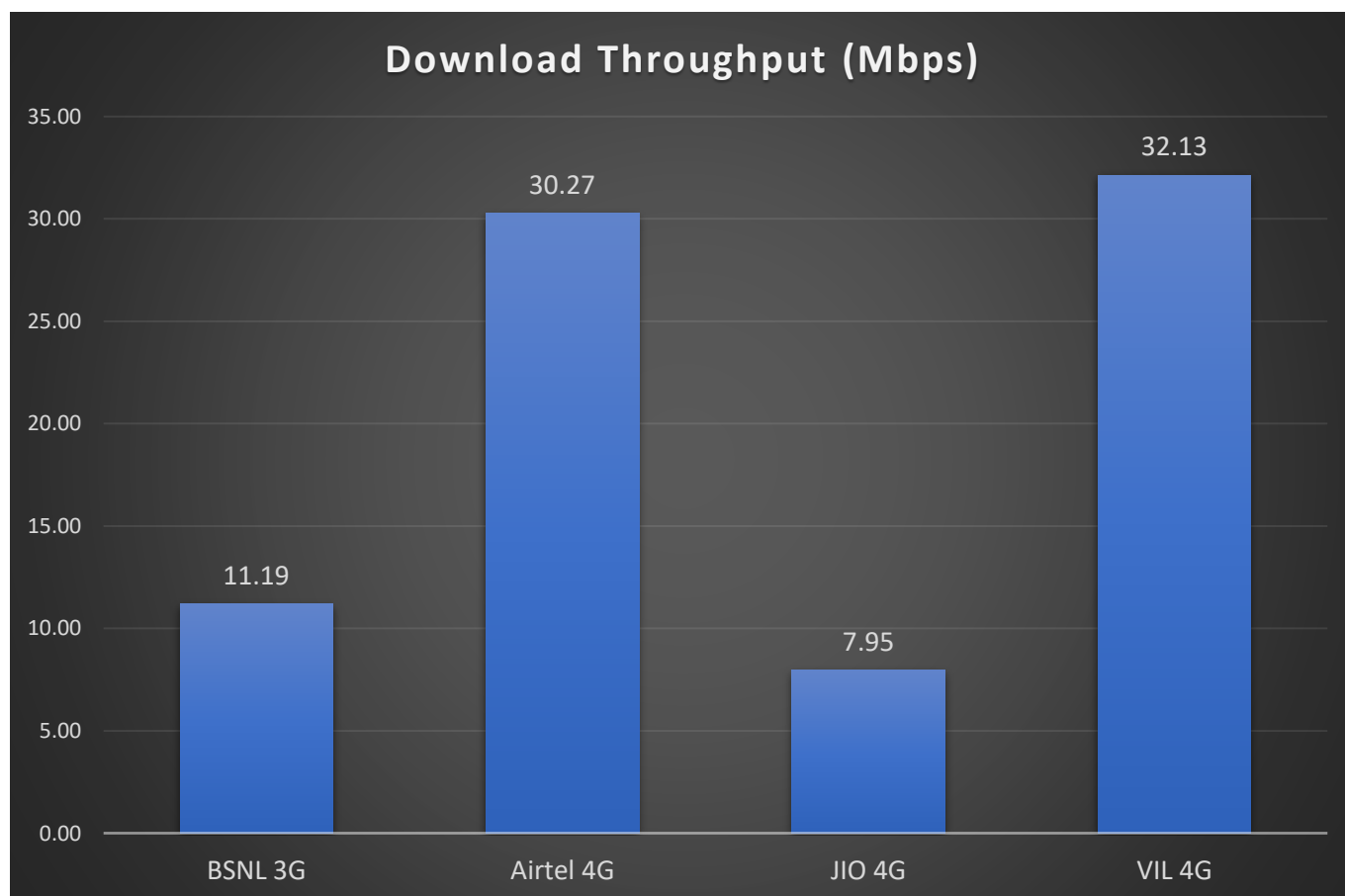
Dynamic Data was tested for whole voice route. Download Throughput was tested.

Data Download Performance (kbps) - Dynamic

3G/4G/ Network:

Data Services Dynamic	3G/VoLTE			
	BSNL 4G	**Airtel 4G**	**JIO 4G**	**VIL 4G**
Download Throughput (Mbps)	**11.19**	**30.27**	**7.95**	**32.13**

Download Throughput (Mbps)

Summary

Voice Call	2G		
	Airtel	**BSNL**	**VIL**
Call Attempt	389	386	398
Blocked Call Rate (%)	0.77%	0.26%	0.00%
CSSR% (Accessibility)	98.20%	99.74%	100.00%
Drop Call Rate (%)	0.26%	0.00%	0.00%
Mobility HOSR (%)	98.97%	99.12%	98.83%
Rx Quality (%)	**93.38%**	97.77%	95.96%
Average CST Sec	3.72	2.60	2.46

Voice Call	VoLTE			
	BSNL VoLTE	**Airtel VoLTE**	**JIO VoLTE**	**VIL VoLTE**
Call Attempt	367	374	406	414
Blocked Call Rate (%)	0.27%	0.26%	0.00%	0.00%
CSSR% (Accessibility)	99.73%	99.74%	100.00%	100.00%
Drop Call Rate (%)	1.09%	0.26%	0.00%	0.00%
Mobility HOSR (%)	99.15%	99.70%	99.52%	99.89%
Rx Quality (%)	97.25%	**74.43%**	**93.28%**	**85.03%**
Average CST Sec	2.51	1.33	0.48	0.38

a) All TSPs have to met the 95% QOS benchmark of Rx Quality .

b) Drop Call Rate (DCR%) Benchmark is 2% Call Block Rate (CBR%) benchmark is 3%.

Summary

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	109.42	125.24	154.37
Upload Throughput (kbps)	38.31	69.66	44.38
Web Browsing Delay (sec)	27.89	15.19	26.32
Latency (msec)	314.27	240.87	165.94

Data Services Static	3G / 4G			
	BSNL 4G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	16.35	16.74	59.33	14.06
Upload Throughput(Mbps)	11.27	1.60	21.63	2.92
Video Streaming Delay (sec)	1.32	0.90	0.57	0.68
Web Browsing Delay (sec)	3.34	6.60	1.96	6.65
Latency (msec)	125.77	84.62	58.74	81.86

Data Services Static

Himalaya Mall	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	214.23	74.12	165.34
Upload Throughput (kbps)	45.78	58.78	43.46
Web Browsing Delay (sec)	28.27	15.18	26.75
Latency (msec)	283.00	219.33	163.38

Bus Stand	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	71.18	159.64	139.65
Upload Throughput (kbps)	27.93	75.64	48.08
Web Browsing Delay (sec)	9.99	15.39	22.33
Latency (msec)	343.05	187.00	169.35

Railway Station	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	81.34	145.50	159.18
Upload Throughput (kbps)	41.47	81.26	30.28
Web Browsing Delay (sec)	32.97	14.69	27.71
Latency (msec)	310.26	233.00	161.32

Data Services Static

Sir T Hospital	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	81.20	98.62	120.15
Upload Throughput (kbps)	35.45	59.17	49.53
Web Browsing Delay (sec)	30.15	15.29	27.88
Latency (msec)	310.83	374.33	166.23

Shivaji Circle	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	99.18	148.32	187.55
Upload Throughput (kbps)	40.92	73.43	50.55
Web Browsing Delay (sec)	38.09	15.41	26.94
Latency (msec)	324.05	190.67	169.44

Data Services static

Himalaya Mall	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	22.91	42.78	42.72	11.20
Upload Throughput (mbps)	13.78	1.50	16.61	3.10
Video Streaming Delay (Secs.)	0.80	0.97	0.42	0.81
Web Browsing Delay (sec)	2.74	7.28	2.23	3.90
Latency (msec)	143.33	81.50	58.70	77.44

Bus Stand	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	11.01	16.17	59.24	22.90
Upload Throughput (mbps)	11.22	0.60	35.37	2.40
Video Streaming Delay (Secs.)	0.93	0.90	0.54	0.28
Web Browsing Delay (sec)	3.01	5.05	1.62	4.47
Latency (msec)	115.33	77.00	71.00	84.31

Railway Station	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	23.70	12.13	80.35	14.50
Upload Throughput (mbps)	11.11	1.70	16.53	3.00
Video Streaming Delay (Secs.)	0.97	0.45	0.64	1.47
Web Browsing Delay (sec)	3.58	5.90	1.87	4.82
Latency (msec)	117.00	77.79	48.00	74.16

Data Services static

Sir T Hospital	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	13.61	10.47	31.73	8.50
Upload Throughput (mbps)	10.35	2.80	21.68	3.00
Video Streaming Delay (Secs.)	0.90	0.55	0.61	0.40
Web Browsing Delay (sec)	2.75	5.48	1.77	15.94
Latency (msec)	125.67	85.57	57.00	85.46

Shivaji Circle	4G			
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	10.53	2.10	75.64	13.20
Upload Throughput (mbps)	9.90	1.40	15.44	3.10
Video Streaming Delay (Secs.)	3.00	1.71	0.65	1.08
Web Browsing Delay (sec)	4.62	9.41	2.27	4.11
Latency (msec)	125.00	101.63	59.00	87.94

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	97.62%
BSNL 2G	88.47%
VIL 2G	98.34%
BSNL VoLTE	97.97%
Airtel VoLTE	99.35%
Jio VoLTE	99.79%
VIL VoLTE	99.09%

Coverage Rate %

	Airtel 2G	BSNL 2G	VIL 2G	BSNL VoLTE	Airtel VoLTE	Jio VoLTE	VIL VoLTE
Orange	2.38	11.53	1.66	2.03	0.65	0.21	0.91
Blue	97.62	88.47	98.34	97.97	99.35	99.79	99.09
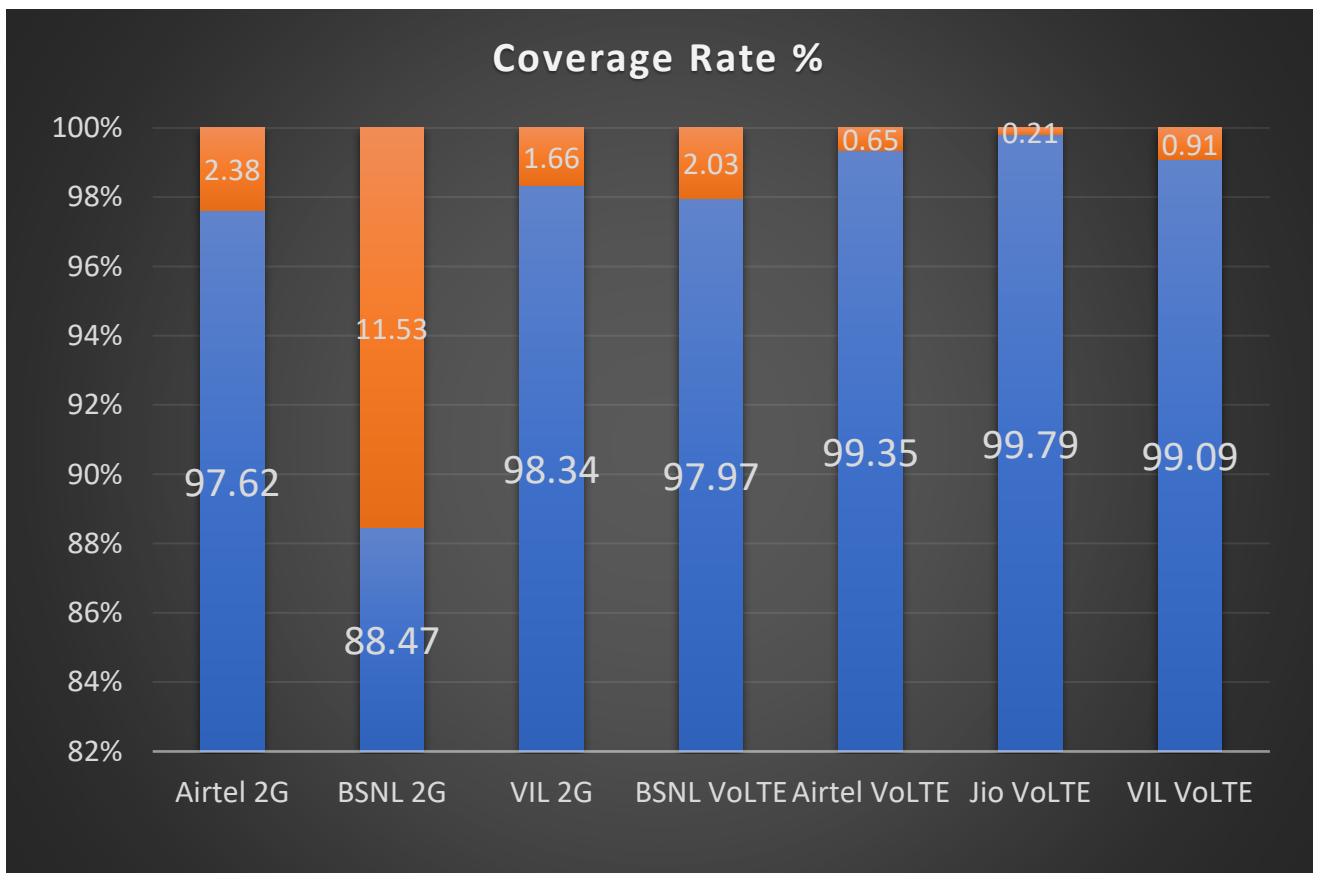
TSP-AIRTEL

Technology	Coverage %
2G	97.62%
VoLTE	99.35%

2G
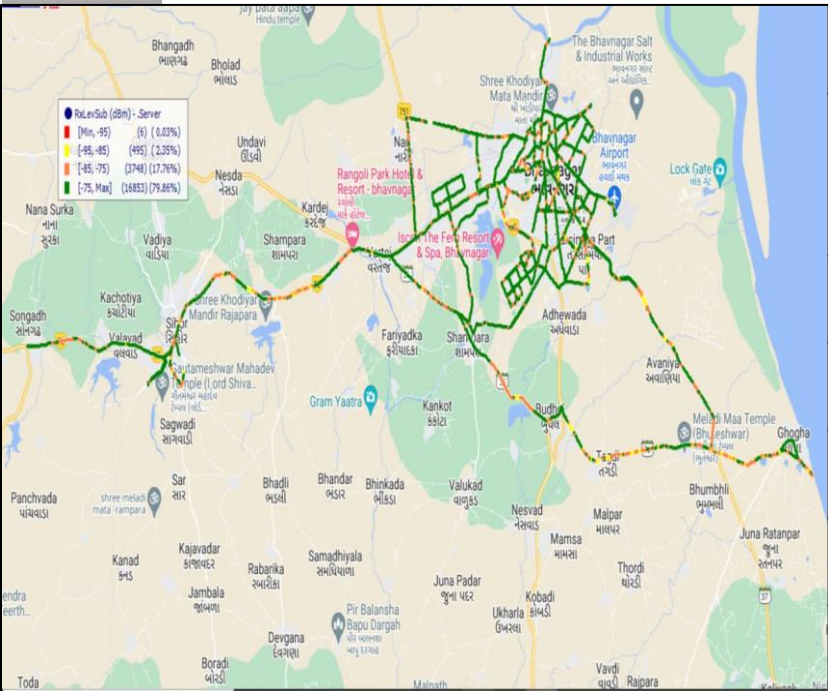
2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	16853	79.86	
[-75, >=-85)	3748	17.76	
[-85, >=-95)	495	2.35	
[-95, >=Min)	6	0.03	
Total	21102	100	

VoLTE
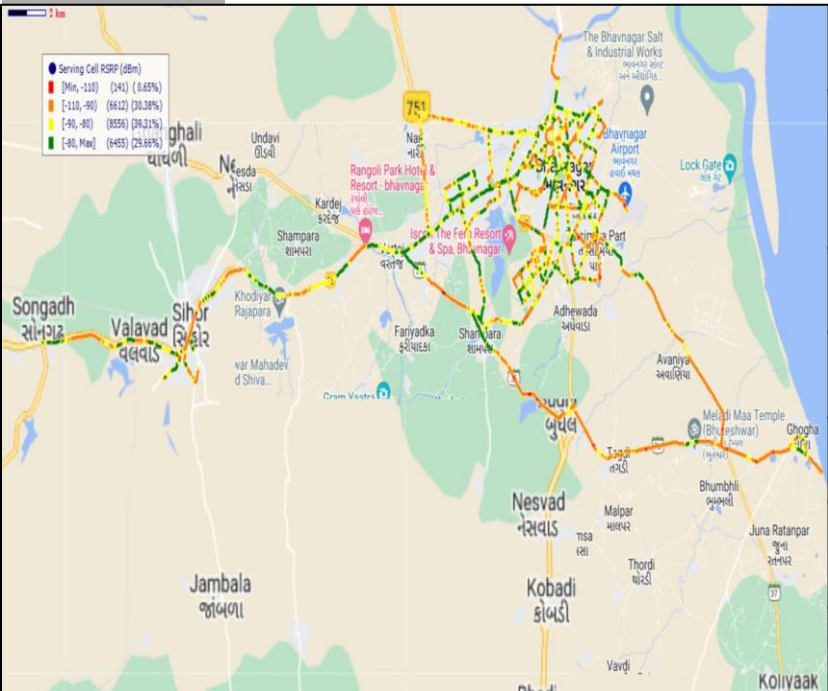
VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	6455	29.66	
[-80, >=-90)	8556	39.31	
[-90, >=-110)	6612	30.38	
[-110, >=Min)	141	0.65	
Total	21764	100	

TSP- BSNL

Technology	Coverage %
2G	88.47%
4G	97.97%

2G
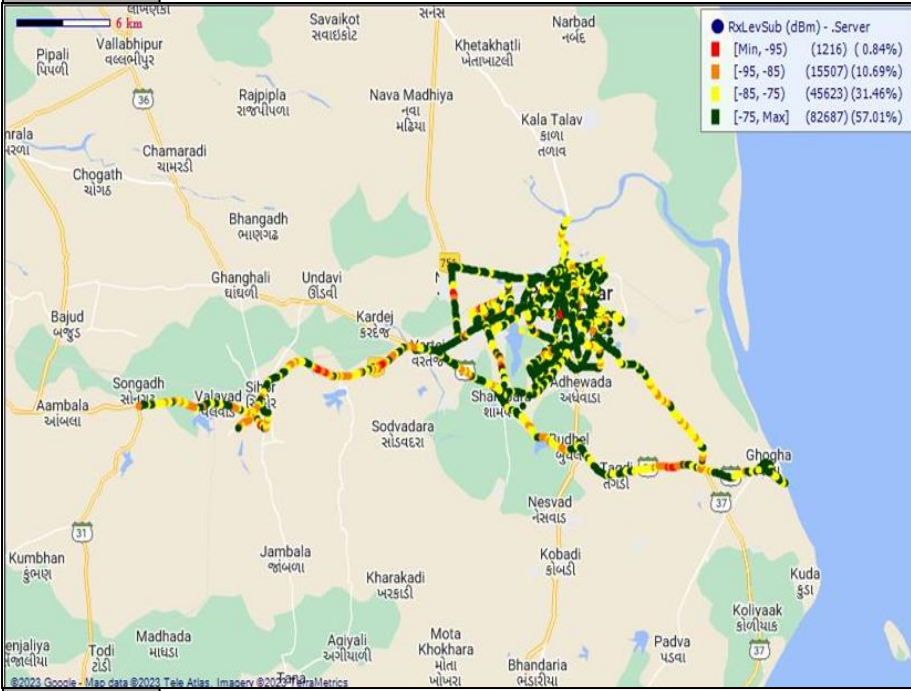
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	82687	57.01%	
[-75, >=-85)	45623	31.46%	
[-85, >=-95)	15507	10.69%	
[-95, >=Min)	1216	0.84%	
Total	**145033**	**100%**	

4G
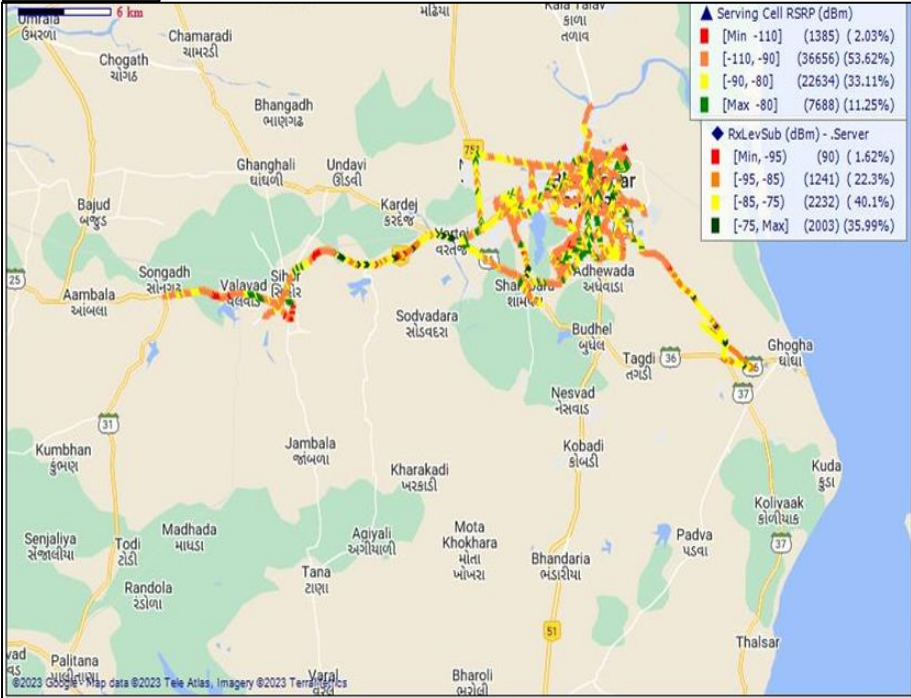
VoLTE			
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	7688	11.25%	
[-80, >=-90)	22634	33.11%	
[-90, >=-110)	36656	53.62%	
[-110, >=Min)	1385	2.03%	
Total	**68363**	**100%**	

JIO

Technology	Coverage %
VoLTE	99.79%
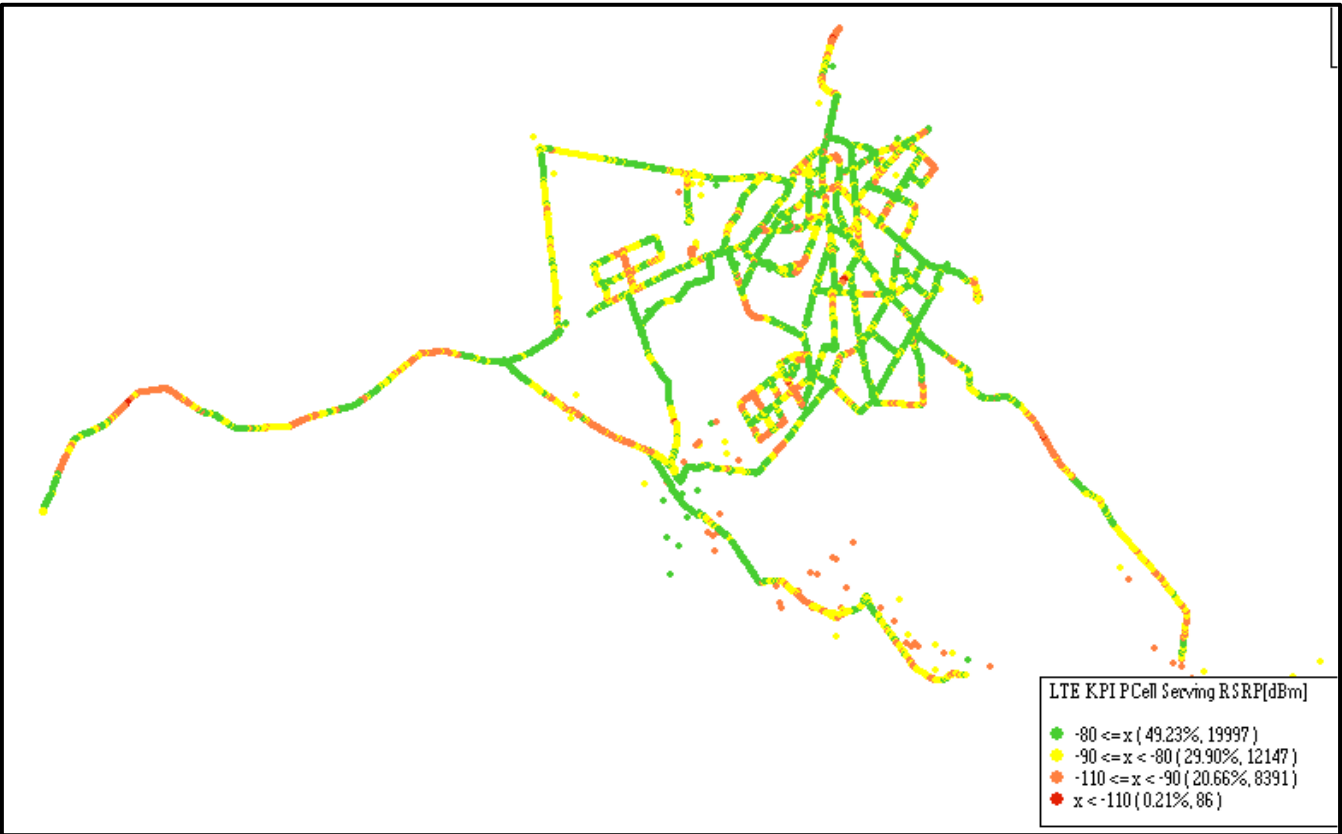
VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	19997	49.23%	
[-80, >=-90)	12147	29.90%	
[-90, >=-110)	8391	20.66%	
[-110, >=Min)	86	00.21%	
Total	**40621**	**100%**	

VIL

Technology	Coverage Rate %
2G	**98.34%**
VoLTE	**99.09%**

2G
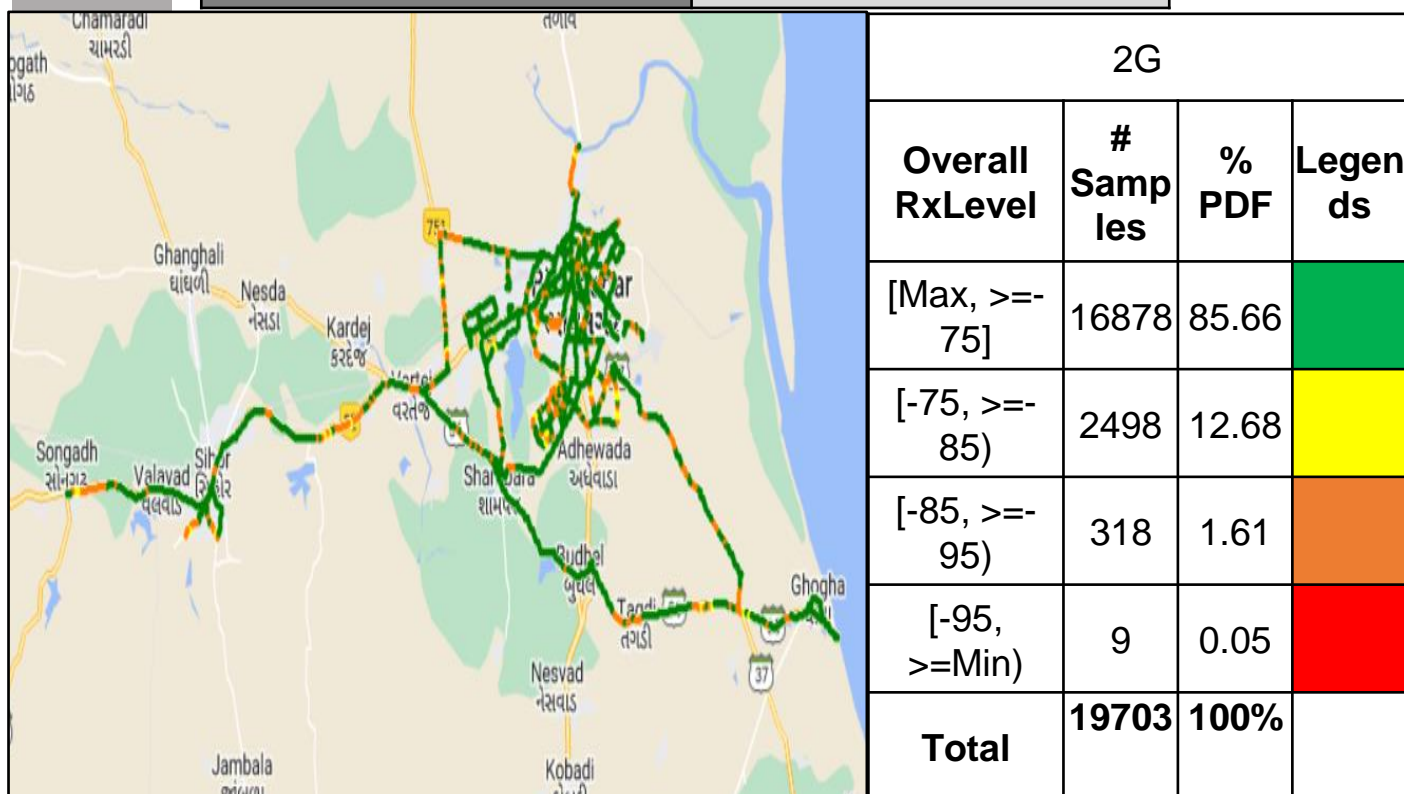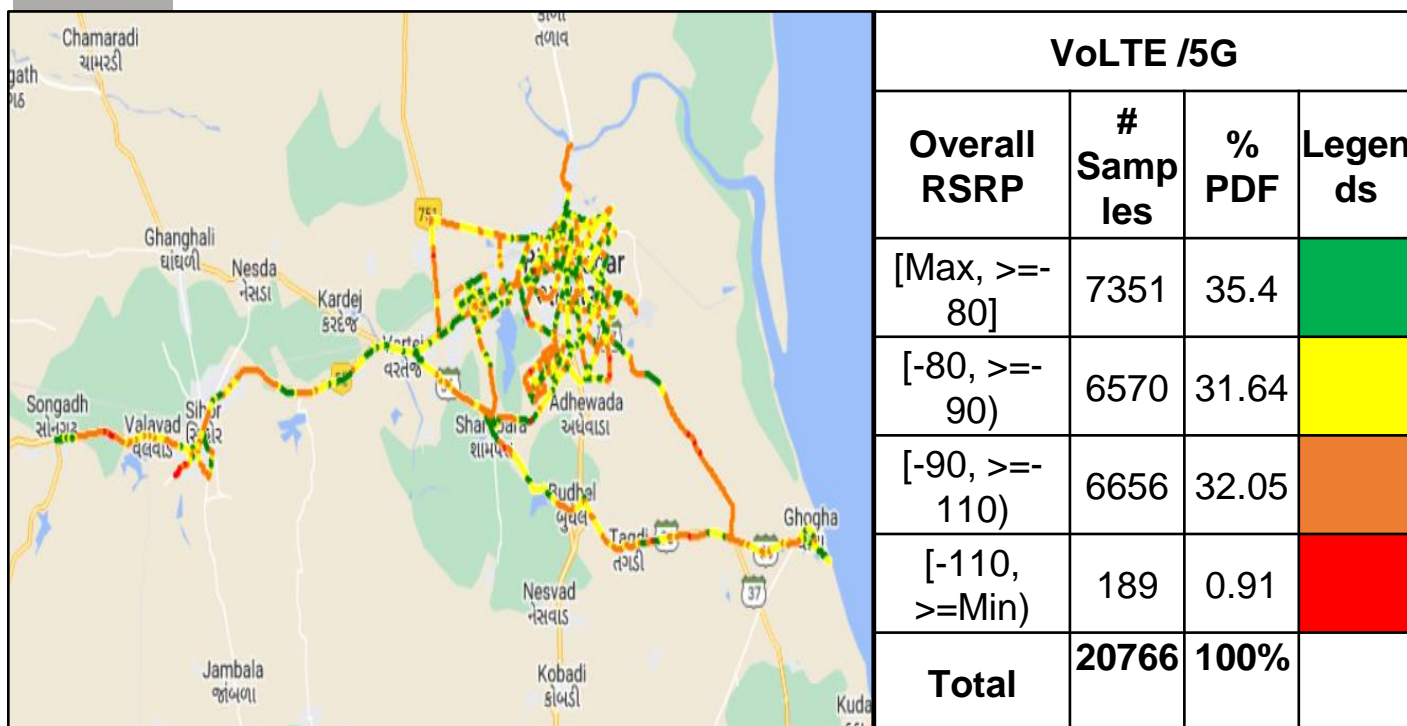
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	16878	85.66	🟩
[-75, >=-85)	2498	12.68	🟨
[-85, >=-95)	318	1.61	🟧
[-95, >=Min)	9	0.05	🟥
Total	**19703**	**100%**	

VoLTE

VoLTE /5G			
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	7351	35.4	🟩
[-80, >=-90)	6570	31.64	🟨
[-90, >=-110)	6656	32.05	🟧
[-110, >=Min)	189	0.91	🟥
Total	**20766**	**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	93.38
BSNL 2G	97.77
VIL 2G	95.96
BSNL VoLTE	97.25
Airtel VoLTE	74.43
Jio VoLTE	93.28
VIL VoLTE	85.03

Rx Quality

TSP	Rx Quality %	Less
Airtel 2G	93.38	6.62
BSNL 2G	97.77	2.23
VIL 2G	95.96	4.04
BSNL VoLTE	97.25	2.75
Airtel VoLTE	74.43	25.57
Jio VoLTE	93.28	6.72
VIL VoLTE	85.03	14.97

Benchmark 95%

Airtel

Technology	Rx Quality %
2G	**93.38%**
VoLTE	**74.43%**

2G
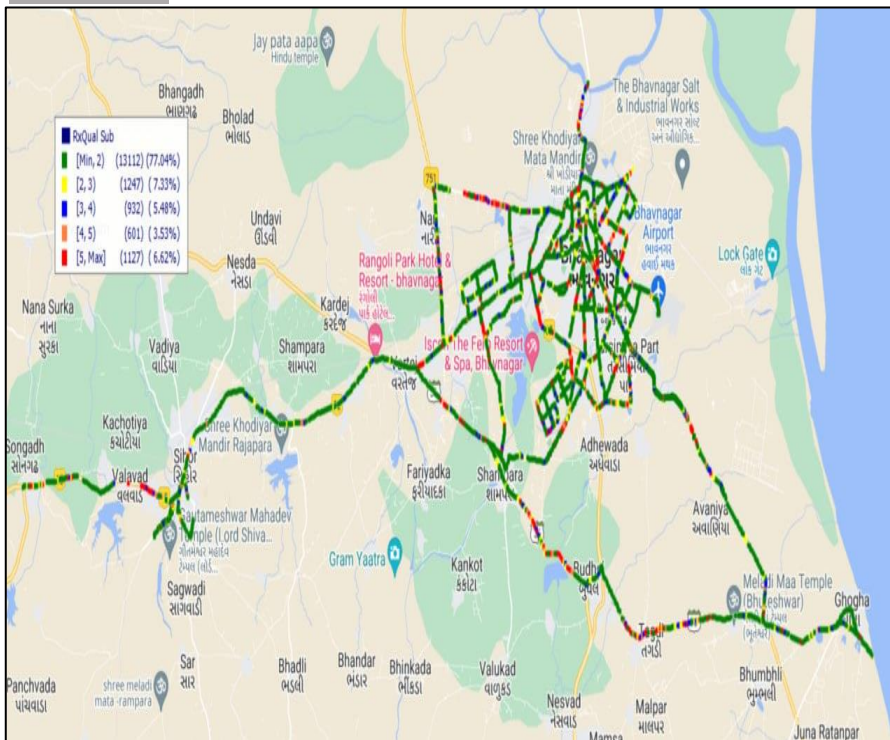
Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	13112	77.04	
(2, <=3)	1247	7.33	
(3 , <=4)	932	5.48	
(4 , <=5)	601	3.53	
(5 , <=Max)	1127	6.62	
Total	17019	100	

VoLTE
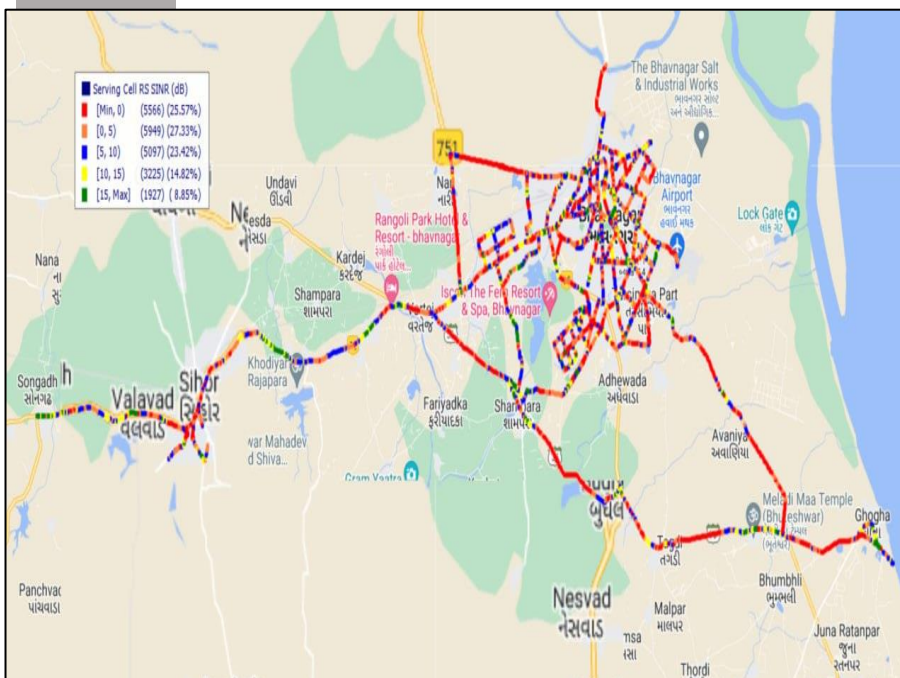
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	5566	25.57	
(0, <=5)	5949	27.33	
(5, <=10)	5097	23.42	
(10, <=15)	3225	14.82	
(15, <=Max)	1927	8.85	
Total	21764	100	

BSNL

Technology	Rx Quality %
2G	97.77%
3G	97.25%
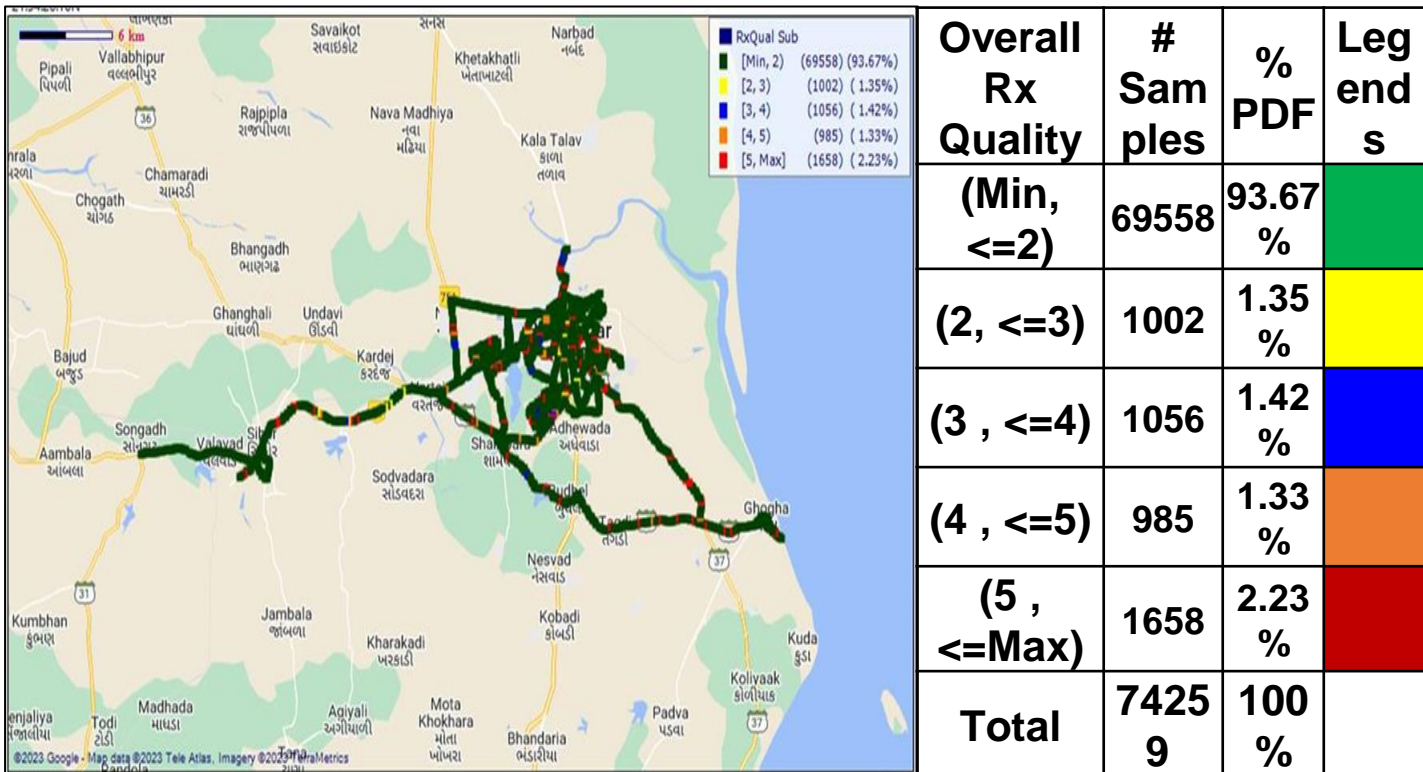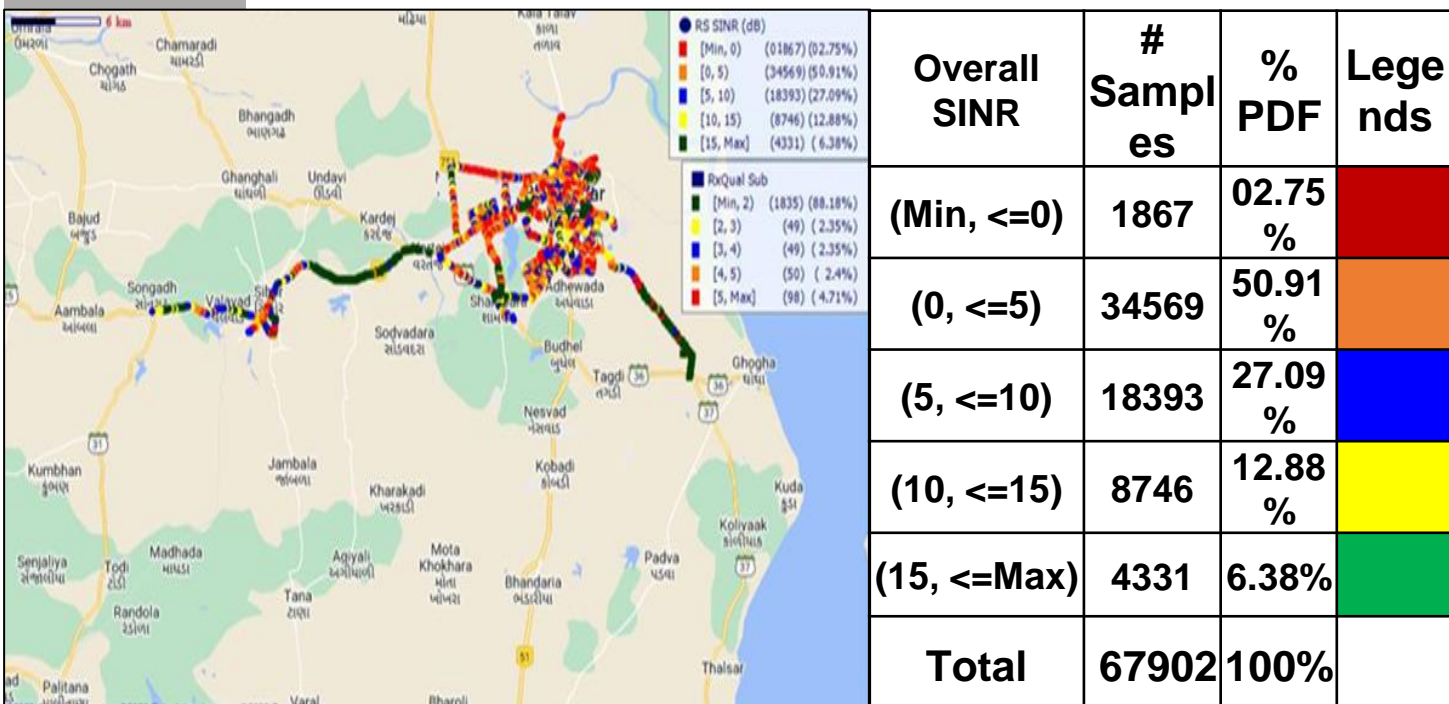
2G

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	69558	93.67%	
(2, <=3)	1002	1.35%	
(3 , <=4)	1056	1.42%	
(4 , <=5)	985	1.33%	
(5 , <=Max)	1658	2.23%	
Total	74259	100%	

4G

Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	1867	02.75%	
(0, <=5)	34569	50.91%	
(5, <=10)	18393	27.09%	
(10, <=15)	8746	12.88%	
(15, <=Max)	4331	6.38%	
Total	67902	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	**93.28%**

LTE KPI PCell SINR[dB]

15 <= x (30.23%, 12279)
10 <= x < 15 (23.07%, 9372)
5 <= x < 10 (25.16%, 10219)
0 <= x < 5 (14.83%, 6023)
x < 0 (6.72%, 2728)
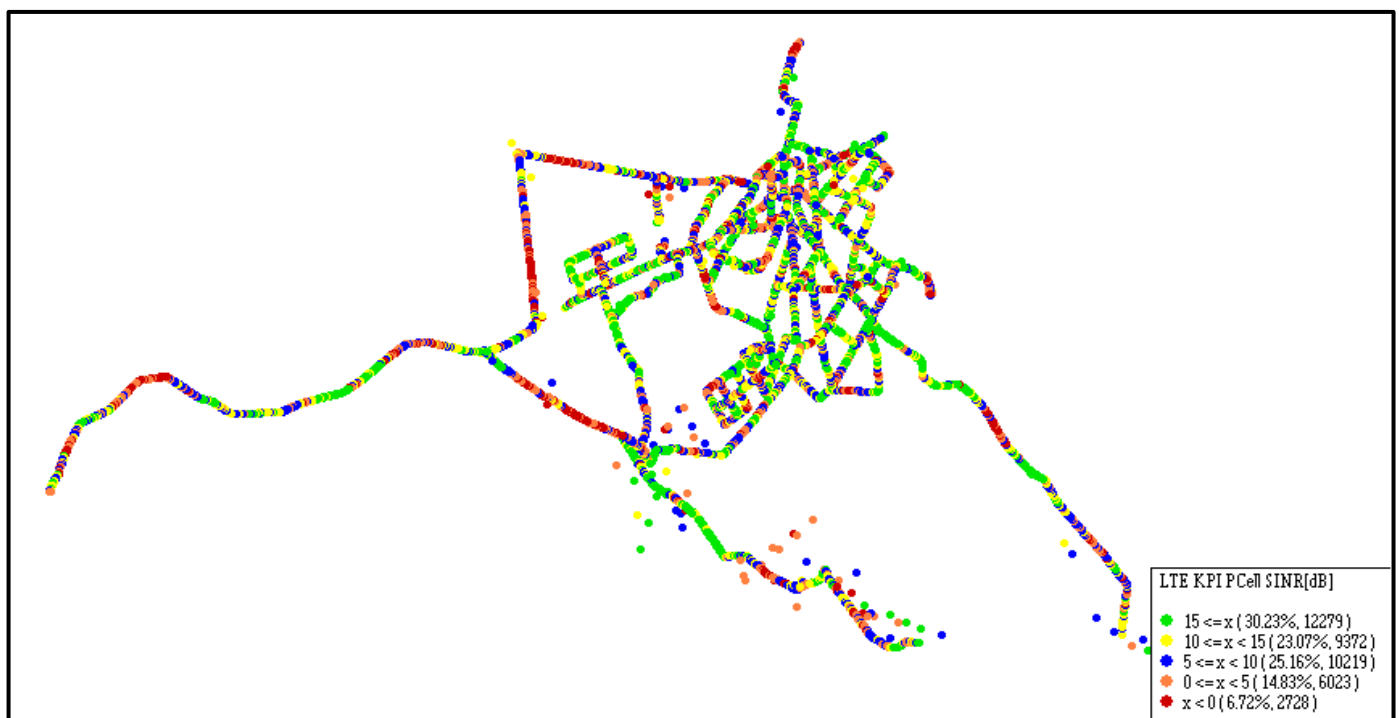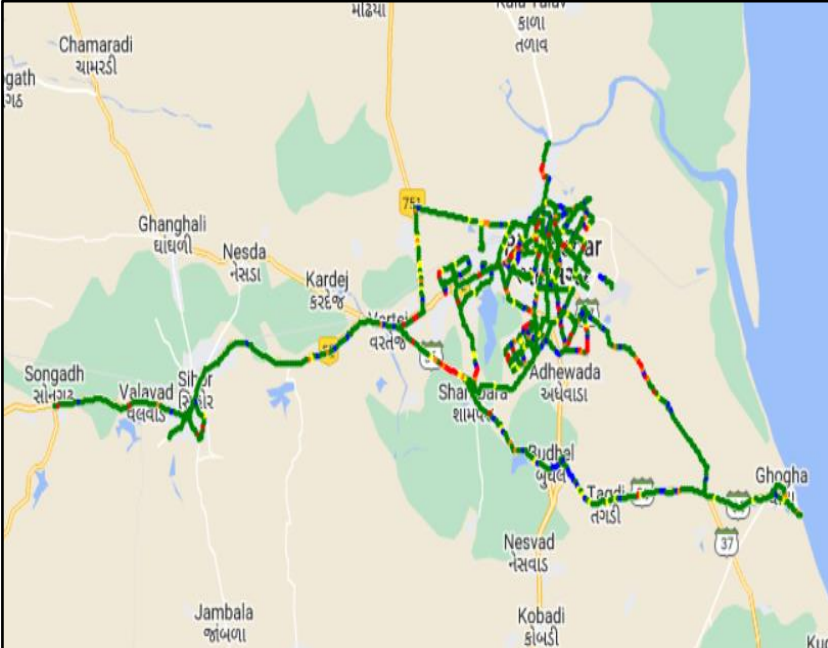
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	2728	6.72%	
(0, <=5)	6023	14.83%	
(5, <=10)	10219	25.16%	
(10, <=15)	9372	23.07%	
(15, <=Max)	12279	30.23%	
Total	40621	100%	
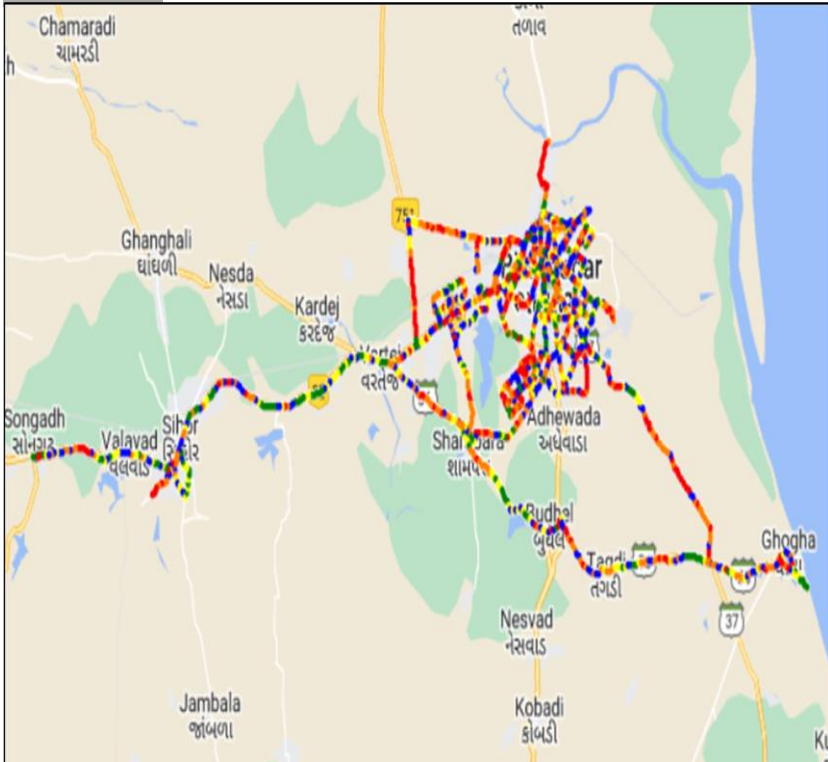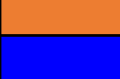
VIL

Technology	Rx Quality %
2G	**95.96%**
4G	**85.03%**

2G

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	15492	81.53	
(2, <=3)	1057	5.56	
(3 , <=4)	1294	6.81	
(4 , <=5)	391	2.06	
(5 , <=Max)	768	4.04	
Total	19002	100%	

VoLTE

Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	3109	14.97	
(0, <=5)	5041	24.28	
(5, <=10)	5493	26.45	
(10, <=15)	3832	18.45	
(15, <=Max)	3291	15.85	
Total	20766	100%	

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	92.09
Airtel VoLTE	100.00
Jio VoLTE	100.00
VIL VoLTE	100.00

Time Spent On 3G/4G