Operator Assisted Drive Test Report

SANGAREDDY - SSA
APRIL - 2023

(RO, Hyderabad)

<u>Key Performance Indicators:</u> All TSPs have met the Drop Call Rate (DCR) benchmark of 2% except BSNL 2G & 3G Networks. All TSPs have met the Call Setup Success Rate (CSSR) of 95%. All TSPs have met the Rx Quality of 95% except BSNL 2G & 3G, JIO VoLTE, VIL 2G & VoLTE networks.

The Operator Assisted Drive Test (OADT) has been carried out by TRAI RO Hyderabad with the help of Service Providers in Sangareddy City and Zaheerabad, Narsapur, Medak, Tupran, Patancheruvu, Gajwel & Siddipet from 9:00 AM to 8:00 PM during 25th to 28th April 2023. The drive test covered drive route of 485 KMs & 6 hotspot over a period of 4 days. Approximately 645 calls were made for each of the 7 networks: Three 2G networks, One 3G networks and Three LTE networks covering four TSPs.

Overview

Voice Summary

Data Summary

Overview

TRAI RO Hyderabad conducted Operator Assisted Drive Test from 25th to 28th April 2023 covering various locations in Sangareddy City, Zaheerabad, Narsapur, Medak, Tupran, Patancheruvu, Gajwel & Siddipet. The performance of Airtel, BSNL, Jio and Vodafone Idea Limited were 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 in terms of

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

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

Drive Test Details :

Voice Tests: Calls were made for 90 sec duration with wait time of 10 sec between calls in all technologies. The drive test covered a drive route of approximately 485KMs over a period of 4 days from 25th to 28th April 2023. Approximately 645 calls were made for each of the 7 networks: three 2G (Lock Mode) networks, one 3G (Dual mode) networks and three VoLTE network covering 4 unique TSPs.

Data Tests:

1.Dynamic data test was conducted for 485KMs over a period of 3 days for download throughput for 3G & 4G technologies.

Data Tests were performed at 6 static locations for 2G, 3G & 4G technologies.

2. For Voice and Data KPI's, 2G measurement is done with UE locked mode, 3G measurement is done with UE in Dual mode (2G & 3G) and 4G measurement is done with UE in Free Mode.

* 3G KPI's which are calculated from UE in Dual Mode (2G & 3G) includes samples and events of 2G.

* 4G KPI's which are calculated from the UE in Free Mode included samples and events of 2G & 3G.

| 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 www.myntra.com
Video Streaming	130 Sec Clip
Latency	32 Bytes on www.google.com

Overview

Voice & Dynamic Data Test Drive Route
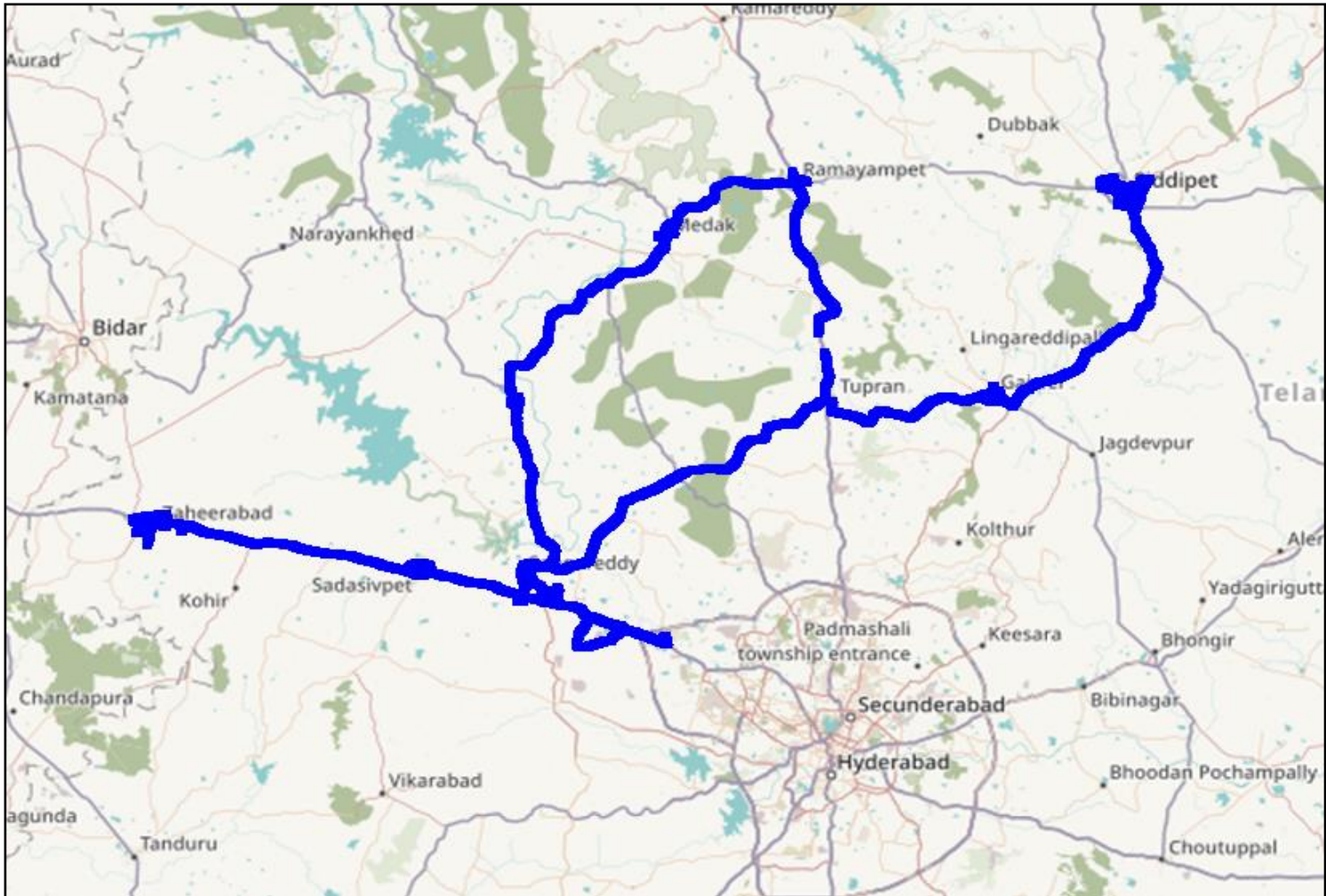
Areas Covered –Sangareddy Town, Sangareddy to Zahirabad.	
Peddapur	Kamkole
Sadashivpet	Digwal
Budhera	Zahirabad
Areas Covered- Sangareddy to Patancheruvu	
Kandi	Rudraram
IIT Hyderabad	Isnapur
Koulampet	Patancheruvu

Areas Covered - Sangareddy to Ramayampet	
Patancheruvu	Ramayampet
Ismailkhanpet	Narsingi
Jogipet	Chegunta
Rangampet	Tupran
Pthamsettpally	Shivampet
Medak	Narsapur
Pathur	Doultabed
Areas Covered - Tupran to Siddipet	
Nacharam	Duddeda
Gajwel	Ponnal
Pragnapur	Siddipet

Data Service Test- Static Locations
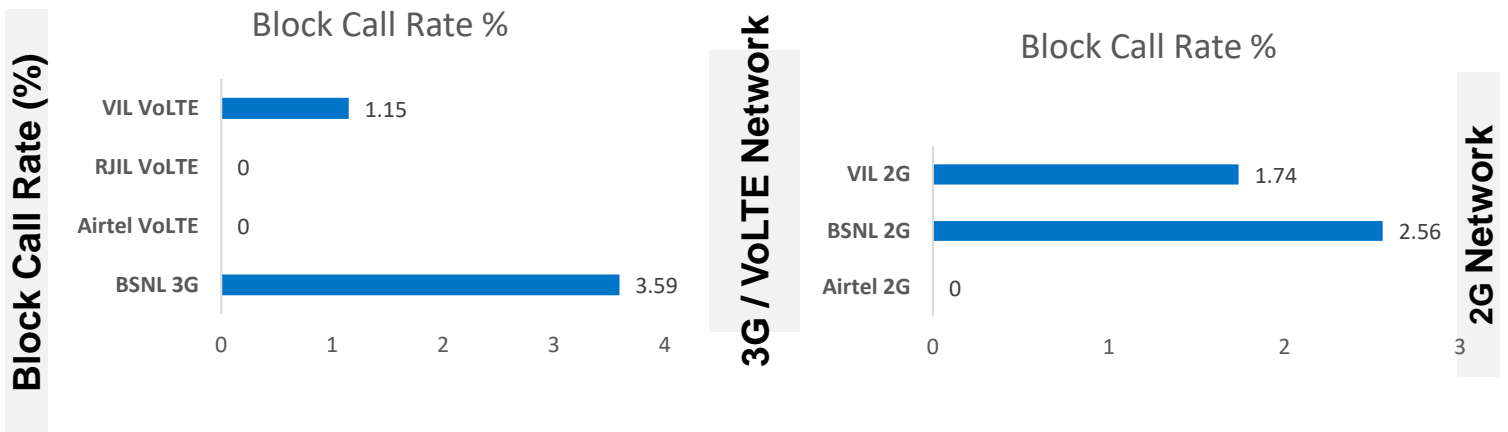
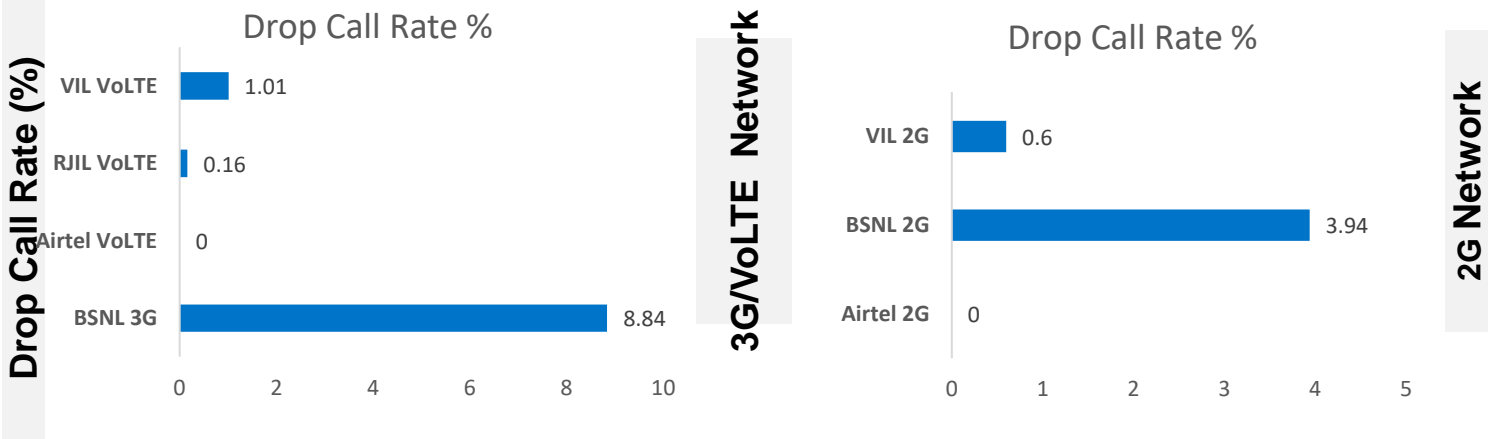| 6 Static Locations |
| --- |
| 1.Zaheerabad Railway Station |
| 2.Sangareddy Bus Stand |
| 3.Patancheruvu Bus Stand |
| 4.Medak Church |
| 5.Gajwel Bus Stand |
| 6.Siddipet Collectorate |
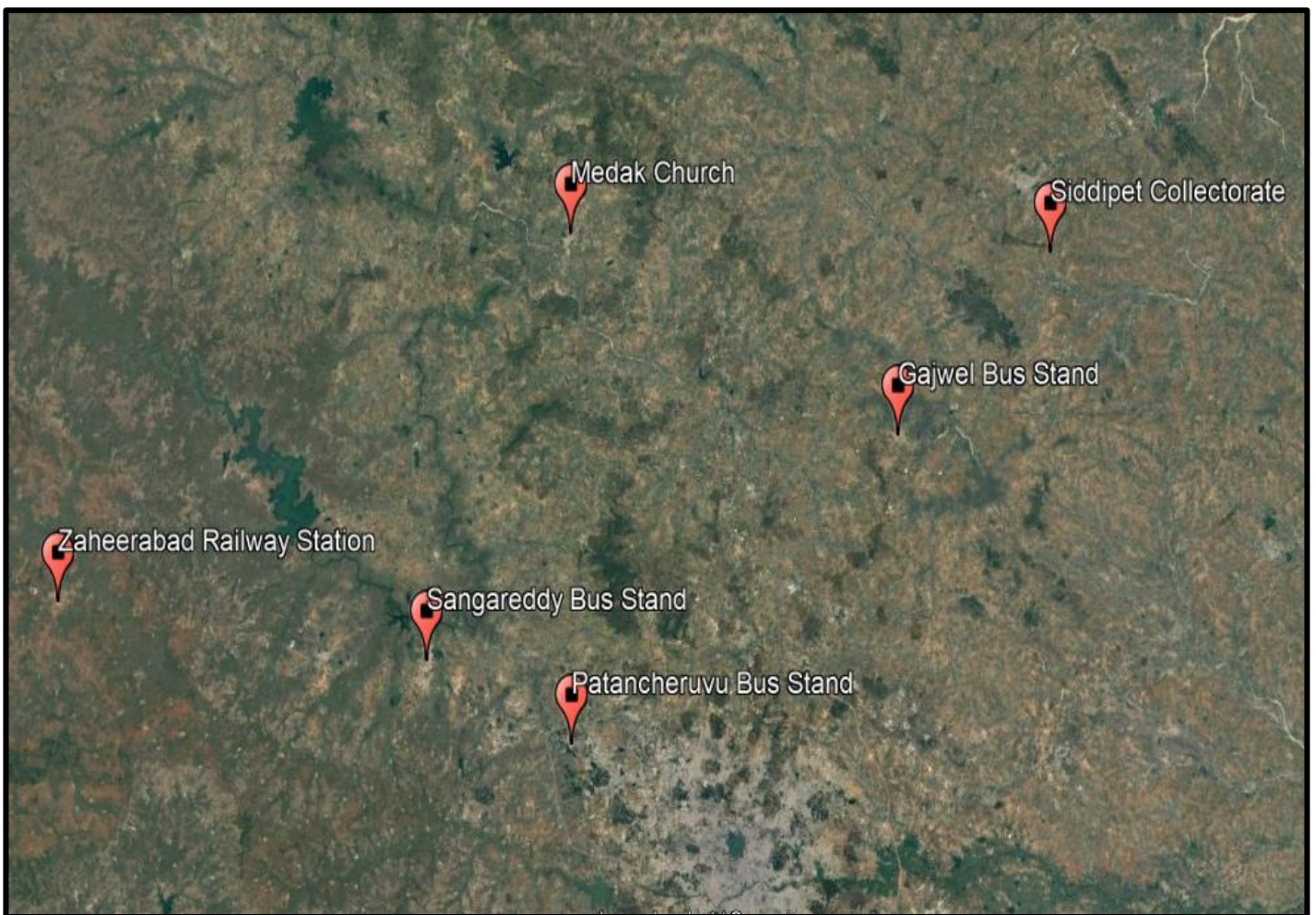
Voice Calls

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

Drop Call Rate % — 3G/VoLTE Network

- VIL VoLTE: 1.01
- RJIL VoLTE: 0.16
- Airtel VoLTE: 0
- BSNL 3G: 8.84

Drop Call Rate % — 2G Network

- VIL 2G: 0.6
- BSNL 2G: 3.94
- Airtel 2G: 0

Block Call Rate % — 3G / VoLTE Network

- VIL VoLTE: 1.15
- RJIL VoLTE: 0
- Airtel VoLTE: 0
- BSNL 3G: 3.59

Block Call Rate % — 2G Network

- VIL 2G: 1.74
- BSNL 2G: 2.56
- Airtel 2G: 0

KPIs	2G			3G	VoLTE		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0	3.94	0.60	8.84	0	0.16	1.01
Block Call Rate %	0	2.56	1.74	3.59	0	0	1.15

a) All TSPs have met the 2% QoS benchmark of Drop Call Rate (DCR%) except BSNL 2G & 3G networks

b) Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's except BSNL 3G network.

Voice Calls

Coverage

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

TSPS	2G		
	Airtel	**BSNL**	**VIL**
Coverage %	84.4	97.4	71.2

b) Percentage of coverage samples for 3G ≥ -90dBm &LTE ≥ -110 dBm.

TSP	3G	VoLTE		
	BSNL	**Airtel**	**JIO**	**VIL**
Coverage %	58.6	98.12	95.80	91.23

c) Percentage of time spent on 3G/VoLTE network

TSP	3G	VoLTE		
	BSNL	**Airtel**	**JIO**	**VIL**
Time spent %	100	100	100	98.7

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, Myntra)
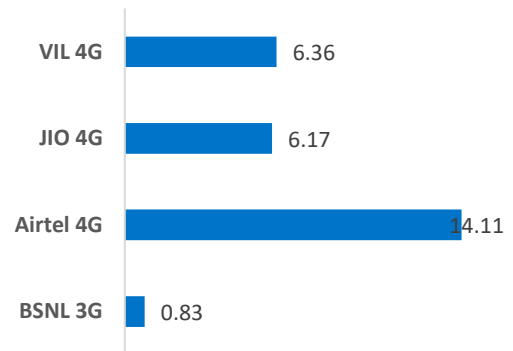
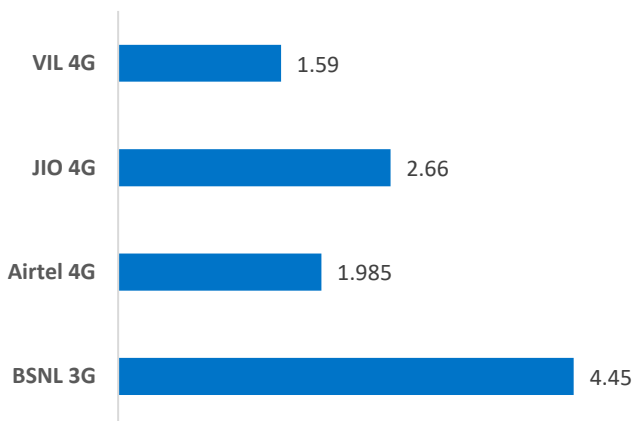## Data Download and Upload Performance (Mbps)

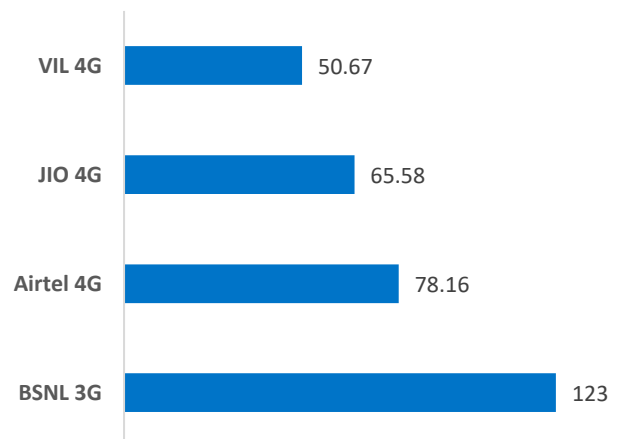### 3G/4G Network:

Download throughput in Mbps
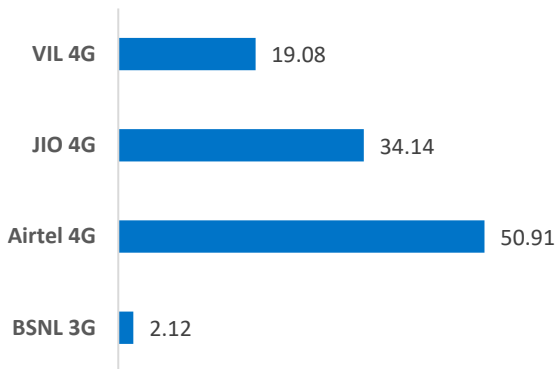
VIL 4G	19.08
JIO 4G	34.14
Airtel 4G	50.91
BSNL 3G	2.12

Upload Throughput in Mbps

VIL 4G	6.36
JIO 4G	6.17
Airtel 4G	14.11
BSNL 3G	0.83

Web browsing delay in sec

VIL 4G	1.59
JIO 4G	2.66
Airtel 4G	1.985
BSNL 3G	4.45

Latency in msec

VIL 4G	50.67
JIO 4G	65.58
Airtel 4G	78.16
BSNL 3G	123

Dynamic Data was tested for 485 KMs. Download Throughput was tested.

Data Download Performance (Mbps) - Dynamic

Download throughput in Mbps

Carrier	Value
VIL 4G	13.62
JIO 4G	14.31
Airtel 4G	39.18
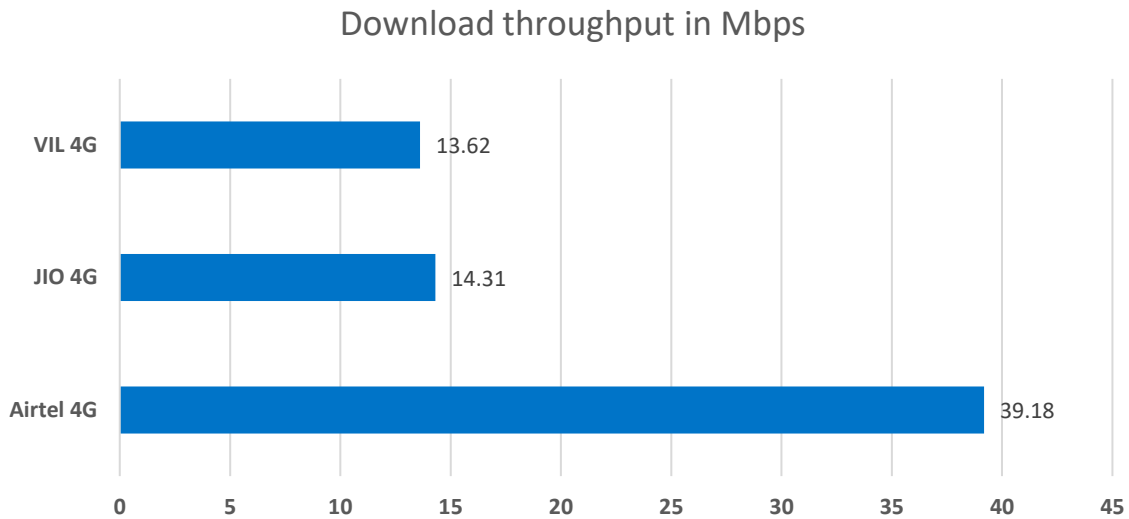
Data Services Dynamic	3G/VoLTE		
	Airtel 4G	**JIO 4G**	**VIL 4G**
Download throughput in Mbps	39.18	14.31	13.62

Summary

Data Services Static	2G		
	Airtel	**BSNL**	**VIL**
Download throughput in Kbps	164.8	54.36	145.00
Upload Throughput in Kbps	42.9	30.23	61.88
Web browsing delay in second	4.992	23.97	11.17
Latency in (msec)	345.7	260.33	222.00

Data Services Static	3G / VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Download throughput in Mbps	2.12	50.91	34.14	19.08
Upload Throughput in Mbps	0.83	14.11	6.17	6.36
Video Streaming Delay in Sec	4.4	0	1.13	1.63
Web browsing delay in sec	4.45	1.985	2.66	1.59
Latency in msec	123	78.16	65.58	50.67

Summary

Voice Calls	2G		
	Airtel	**BSNL**	**VIL**
Call attempts	644	391	693
Block call rate %	0	2.56	1.15
CSSR %	100	97.30	98.84
Drop call rate %	0	3.94	1.01
Mobility HOSR %	100	96.71	96.9
Rx Quality %	96.09	89.0	80.62

Voice Calls	3G	VoLTE		
TSP (For 3G)	**BSNL**	**Airtel**	**JIO**	**VIL**
Call attempts	223	665	629	600
Block call rate %	3.59	0	0	1.5
CSSR %	96.4	100	99.37	97.08
Drop call rate %	8.84	0	0.16	0.6
Mobility HOSR %	91.2	99.86	98.46	97.2
RX Quality %	94.5	96.28	85.29	85.6

Zaheerabad Railway Station	2G		
	Airtel	**BSNL**	**VIL**
Download throughput in Kbps	181.8	52.07	121.4
Upload Throughput in Kbps	31.3	19.2	41.10
Web browsing delay in second	3.47	25.7	7.62
Latency in (msec)	328.72	251.0	187

Sangareddy Bus Stand	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	154.6	145.0	210.3
Upload Throughput in Kbps	34.6	106.0	66.2
Web browsing delay in second	6.29	18.4	11.33
Latency in (msec)	480.46	225.0	270

Patan Chervu Bus Stand	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	149.8	20.4	230.7
Upload Throughput in Kbps	41.4	11.8	39.1
Web browsing delay in second	5.7	24.8	9.68
Latency in (msec)	377.46	233.0	190

Medak Church	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	170.0	61.2	125.3
Upload Throughput in Kbps	41.8	18.6	65.2
Web browsing delay in second	3.11	31.6	15.05
Latency in (msec)	232.84	278.0	280

Gajwel Bus Stand	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	173.3	32.7	90.1
Upload Throughput in Kbps	39.5	14.6	82.9
Web browsing delay in second	5.9	20.11	13.35
Latency in (msec)	433.04	330.0	210

Siddipet collecorate	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	159.3	14.8	92.2
Upload Throughput in Kbps	68.8	11.19	76.8
Web browsing delay in second	5.48	23.26	10.01
Latency in (msec)	221.46	245.0	195

Zaheerabad Railway Station	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	2.23	42.56	56.07	21.56
Upload Throughput in Mbps	0.78	18.89	5.74	9.76
Web browsing delay in second	5.13	2.4	2.02	1.53
Latency in (msec)	145.0	72.6	63.5	56

Sangareddy Bus Stand	4G			
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	7.13	54.81	63.29	25.53
Upload Throughput in Mbps	0.40	13.92	9.08	9.072
Web browsing delay in second	5.29	1.79	3.76	1.30
Latency in (msec)	140.0	91.44	72	53

Patan Chervu Bus Stand	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	1.77	45.81	20.46	19.42
Upload Throughput in Mbps	1.02	14.97	3.7	13.01
Web browsing delay in second	4.82	2.6	2.63	1.02
Latency in (msec)	137.0	66.27	60.5	44

Medak Church	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	2.309	49.18	11.35	11.98
Upload Throughput in Mbps	0.4	10.36	4.07	2.014
Web browsing delay in second	3.81	0.97	3.48	1.43
Latency in (msec)	158.0	94.85	63.5	49

Gajwel Bus Stand	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	1.87	46.71	13.28	19.74
Upload Throughput in Mbps	0.64	11.46	3.51	1.97
Web browsing delay in second	4.75	1.34	2.12	2.01
Latency in (msec)	81.0	62.86	66.50	56

Siddipet collecorate	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	2.41	66.4	43.62	16.23
Upload Throughput in Mbps	1.31	15.08	6.45	2.32
Web browsing delay in second	3.76	2.81	2.37	2.23
Latency in (msec)	94.0	80.95	67.5	46

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	84.3
BSNL 2G	84.0
VIL 2G	71.2
BSNL 3G	58.6
Airtel VoLTE	98.12
Jio VoLTE	95.80
VIL VoLTE	91.23

Chart Title

	Airtel 2G	BSNl 2G	VIL 2G	BSNL 3G	Airtel VoLTE	Jio VoLTE	VIL VoLTE
2G:[Max,>=-75] / 3G:Max,>=-70 / VoLTE:>=80	49.8	84	32.6	8.8	20.91	31.28	9.96
2G:[-75,>=-85] / 3G:[-70,>=-80] / VoLTE:[-80,>=-90]	34.5		38.6	21.9	34.93	21.62	22.87
2G:[-85,>=-95] / 3G:[-80,>=-90] / VoLTE:[-90,>=-110]	14.4	13.4	21.5	27.9	42.27	42.9	58.4
2G:[-95,>=Min] / 3G:[-90,>=Min] / VoLTE:[-110,>=Min]	1.3	0.3	7.3	41.4	1.89	4.2	8.77
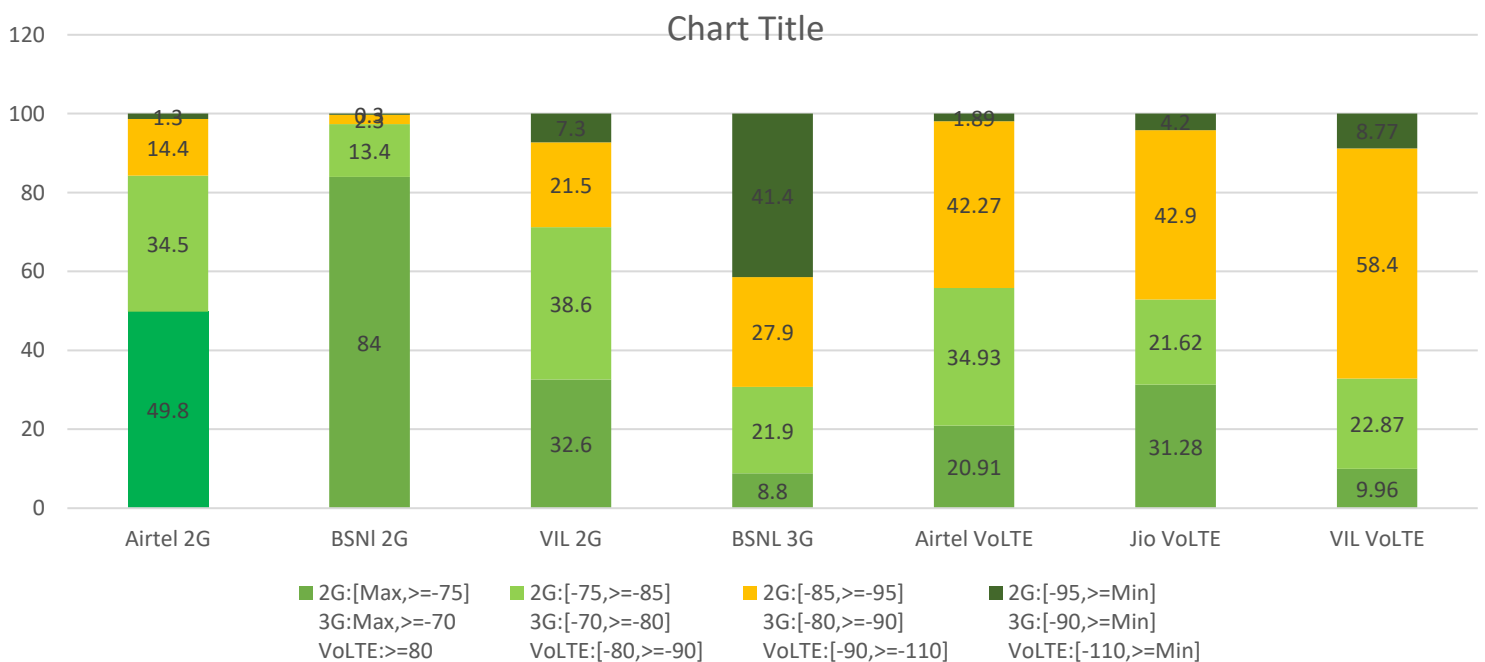
AIRTEL

Technology	Coverage Rate %
2G	84.4
VoLTE	98.12
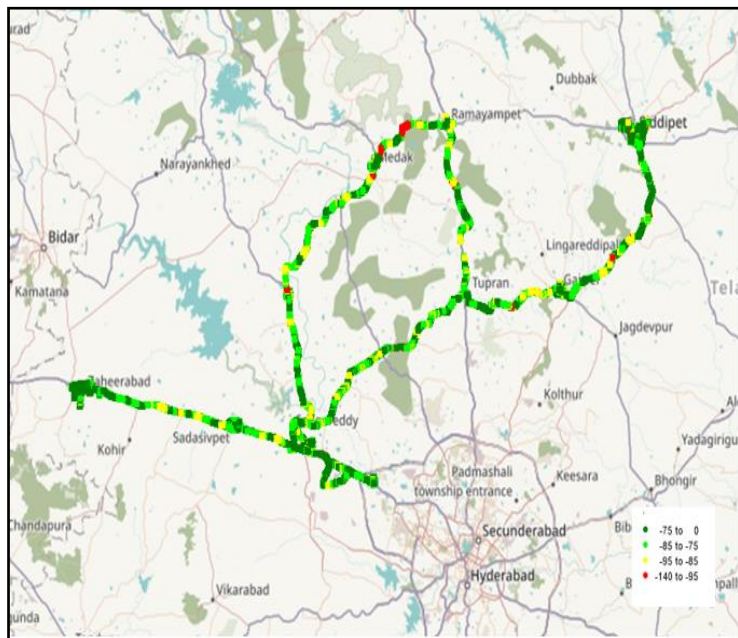
2G	**VoLTE**
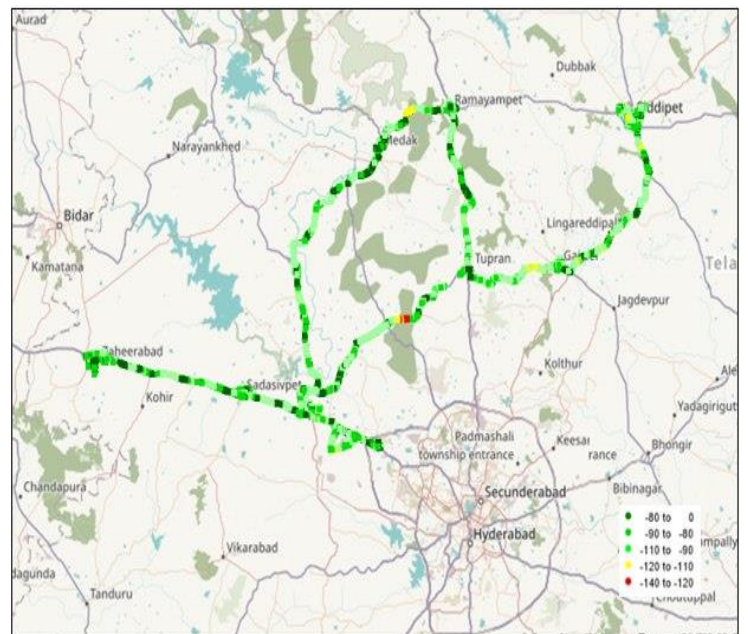
2G		
Overall RxLevel	**# Samples**	**%**
[Max, >=-75]	3093333	49.8
[-75, >=-85]	2142810	34.5
[-85, >=-95]	891778	14.4
[-95, >=Min]	78763	1.3
Total	6206684	

VoLTE		
Overall RSRP	**# Samples**	**%**
[Max, >=-80]	3655815	20.91
[-80, >=-90]	6107339	34.93
[-90, >=-110]	7393908	42.27
[-110, >=-120]	301675	1.73
[-120, >=Min]	27422	0.16
Total	17486159	

BSNL

Technology	Coverage Rate %
2G	84.0
3G	58.6

2G
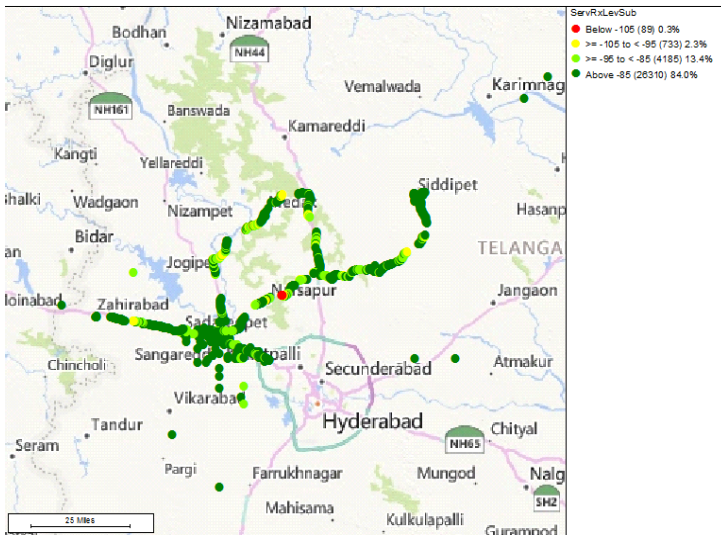
3G (Dual mode)
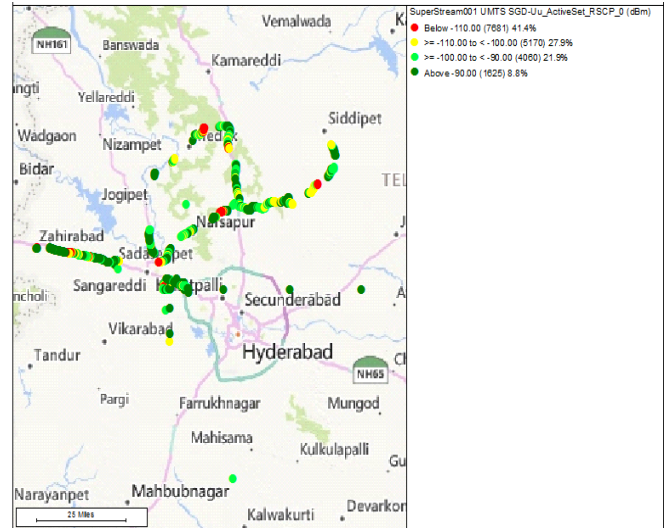
2G		
Overall RxLevel	# Samples	% PDF
[Max, >=-85]	26310	84.0
[-85, >=-95)	4185	13.4
[-95, >=-105)	733	2.3
[-105, >=Min)	89	0.3
Total	31317	100

3G		
Overall RSCP	# Samples	% PDF
[Max, >=-90]	1625	8.8
[-90, >=-100)	4060	21.9
[-100,>=-110)	5170	27.9
[-110, >=Min)	7681	41.4
Total	18536	100

JIO

Technology	Coverage Rate %
VoLTE	95.80
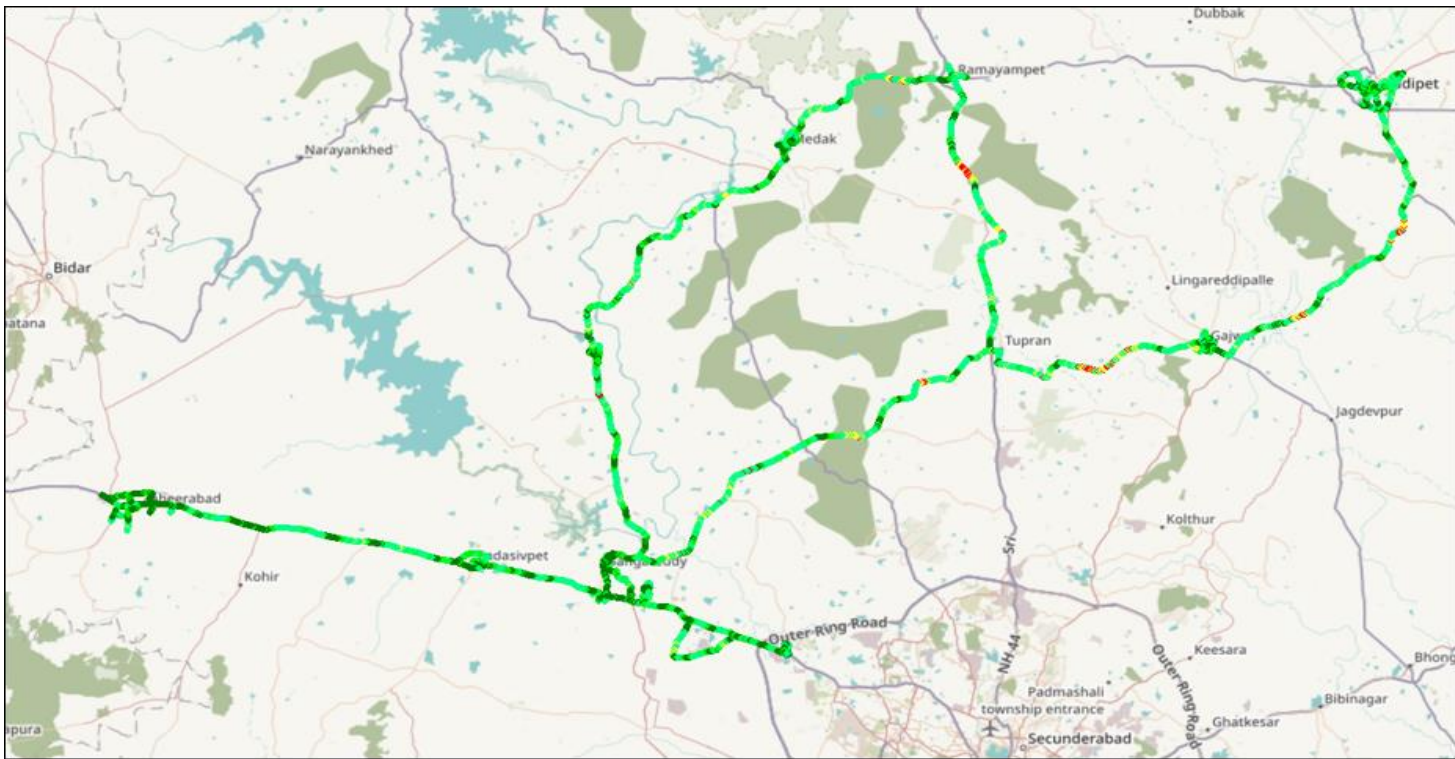
VoLTE		
Overall RSRP	**# Samples**	**%**
[Max, >=-80]	18785	31.28
[-80, >=-90]	12983	21.62
[-90, >=-110]	25763	42.90
[-110, >=-120]	1952	3.25
[-120, >=Min]	571	0.95
Total	**60054**	**100**

VIL

Technology	Coverage Rate %
2G	71.2
4G	91.3

2G
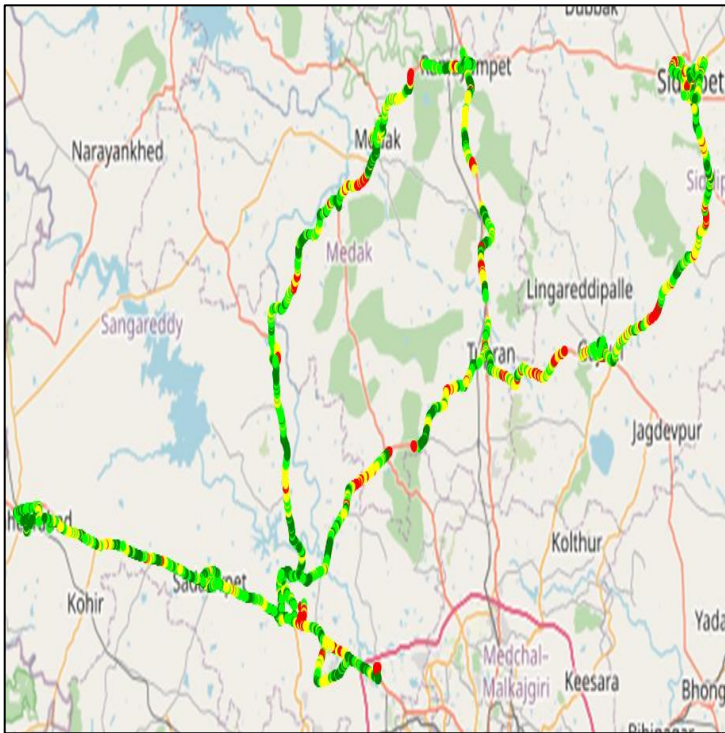
4G
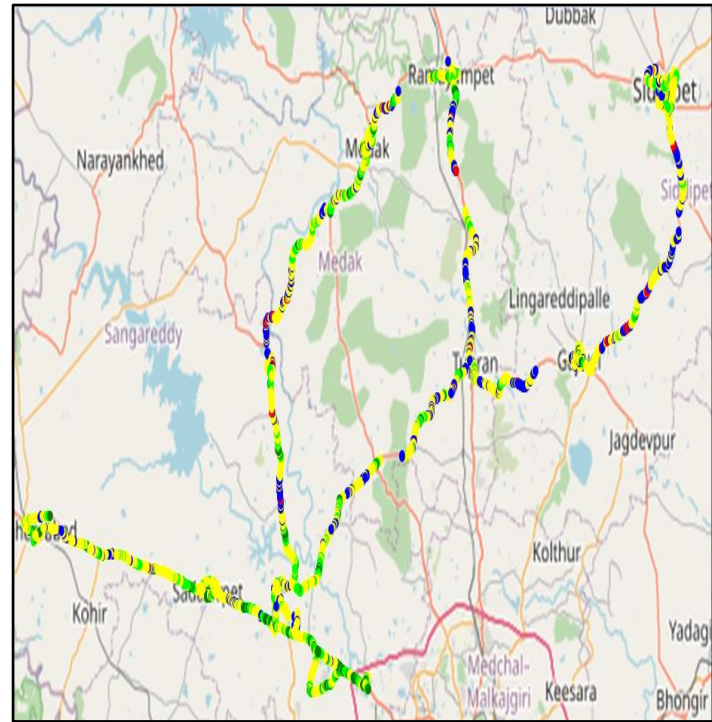
2G		
Overall RxLevel	**# Samples**	**% PDF**
[Max, >=-75]	134524	32.6
[-75, >=-85)	159455	38.6
[-85, >=-95)	88841	21.5
[-95, >=Min)	30047	7.3
Total	**412867**	**100**

4G		
Overall RSRP	**# Samples**	**% PDF**
[Max, >=-80]	101558	9.96
[-80, >=-90)	233114	22.87
[-90, >=-110)	595227	58.40
[-110, >=120)	85491	8.39
[-120, >=Min]	3918	0.38
Total	**1019308**	**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, whereas quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

TSP	Rx Quality %
Airtel 2G	95.63
BSNL 2G	89.00
VIL 2G	80.60
BSNL 3G	94.50
Airtel VoLTE	96.28
Jio VoLTE	85.29
VIL VoLTE	85.60

RX Quality Distribution

	Airtel 2G	BSNl 2G	VIL 2G	BSNL 3G	Airtel VoLTE	Jio VoLTE	VIL VoLTE
Rx Quality 2G:[>5] 3G:[EcNo<-14 dBm] VoLTE:[SINR<=0]	4.4%	11.0%	19.4%	5.5%	3.7%	14.7%	14.4%
Rx Quality 2G:[<=5] 3G:[EcNo>=-14 dBm] VoLTE:[SINR>0]	95.63%	89.00%	80.60%	94.50%	96.28%	85.29%	85.60%
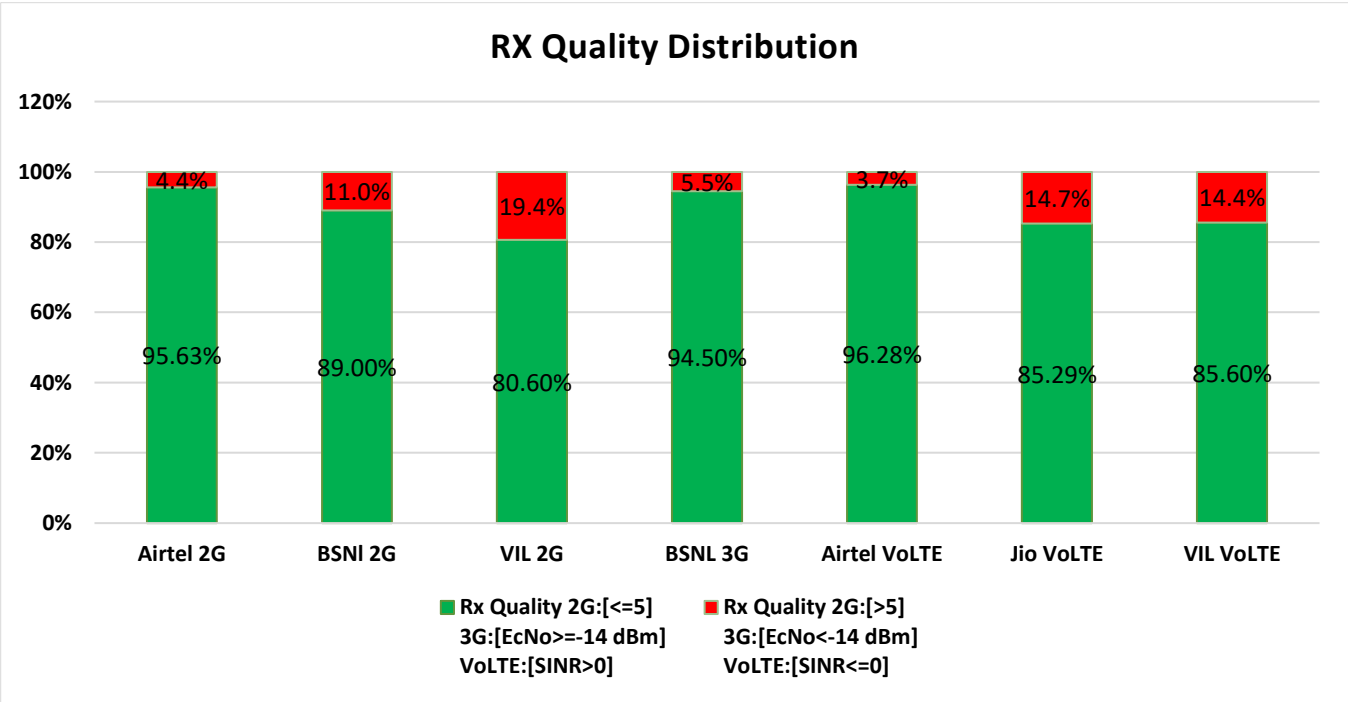
Airtel

Technology	Rx Quality %
2G	**95.63**
VoLTE	**96.28**
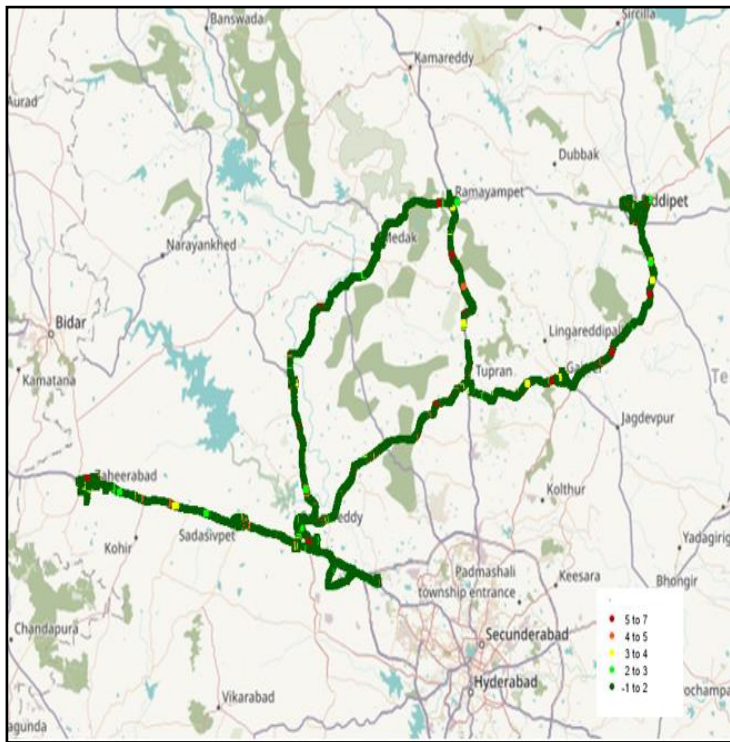
2G	VoLTE
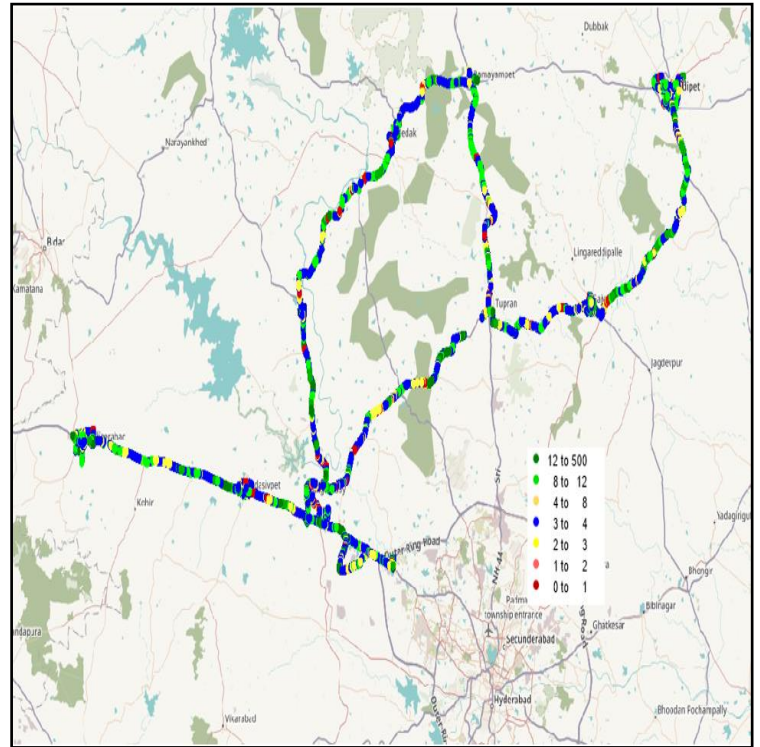
Overall Rx Quality	# Samples	%
(Min, <=2)	4959894	88.75
(2, <=3)	132107	2.36
(3 , <=4)	134067	2.40
(4 , <=5)	118029	2.11
(5 , <=Max)	244425	4.37
Total	5588522	

Overall SINR	# Samples	%
(Min, <=-3)	200066	1.10
(-3, <=0)	480066	2.63
(0, <=5)	8751543	47.91
(5, <=10)	4711836	25.79
(10, <=15)	2276053	12.46
(15, <=Max)	1847714	10.11
Total	18267277	

BSNL

Technology	Rx Quality %
2G	89.0
3G	94.5
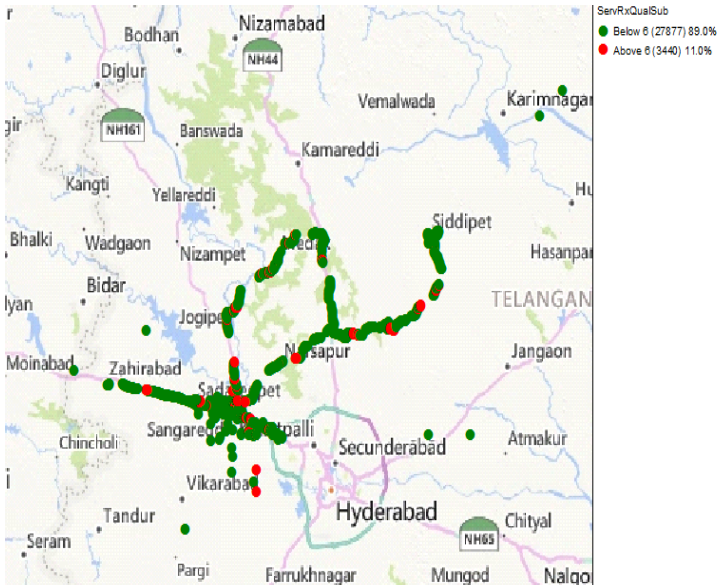
2G	3G (Dual mode)
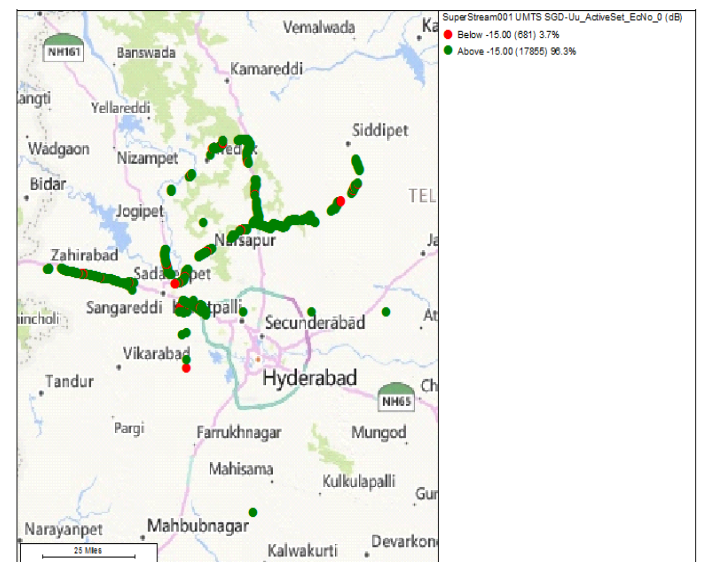
Overall Rx Quality	# Samples	% PDF
(Above 5)	3440	11.0%
4 to 5	1316	4.2%
Below 4	26561	84.8
Total	31,317	100%

Overall EcNo	# Samples	% PDF
(Above-10)	11339	64.8%
-10 TO -12	3681	21.6%
-12 TO -14	1515	8.1%
Below -14	968	5.5%
Total	17503	100%

JIO

Technology	Rx Quality %
VoLTE	85.29
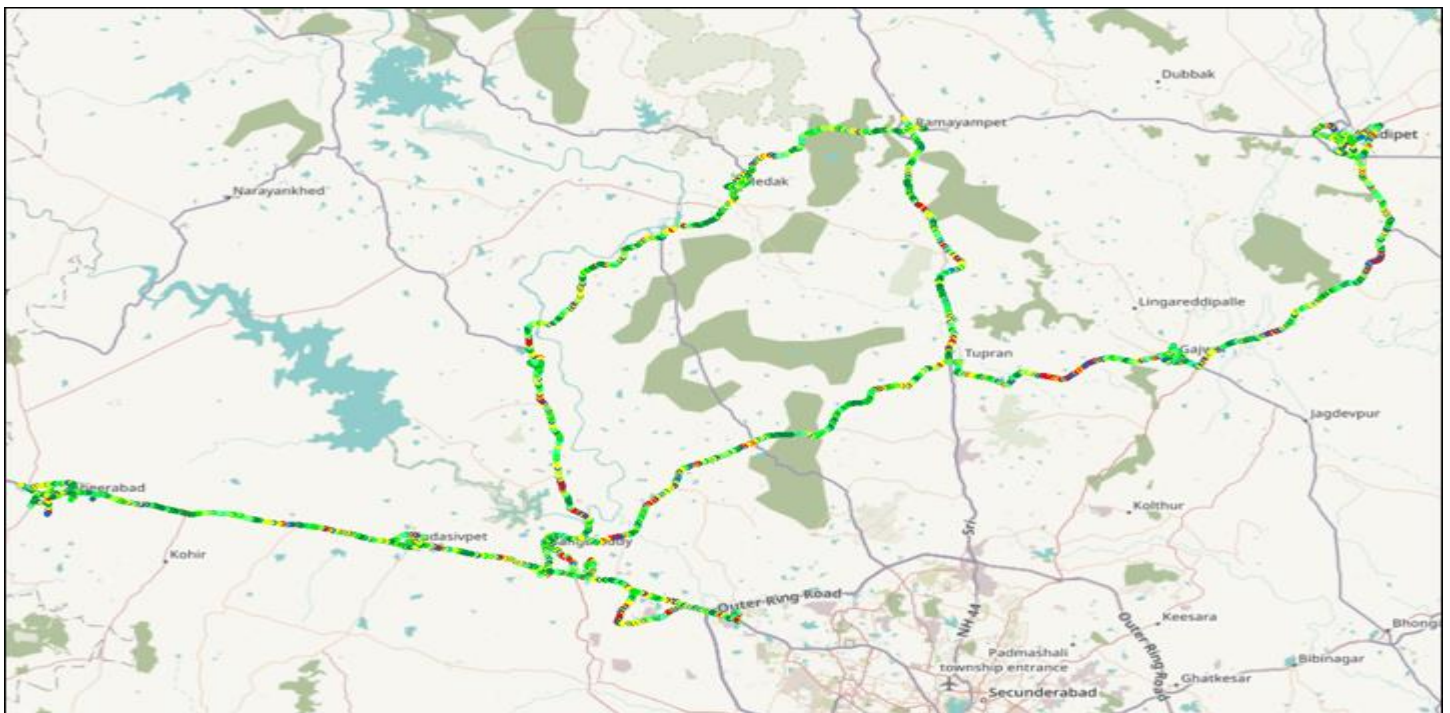
Overall SINR	# Samples	%
(Min, <=-3)	3344	5.57
(-3, <=0)	5495	9.15
(0, <=5)	14380	23.95
(5, <=10)	14106	23.49
(10, <=15)	10927	18.20
(15, <=Max)	11802	19.65
Total	**60054**	**100**

VIL

Technology	Rx Quality %
2G	80.60
3G	85.6
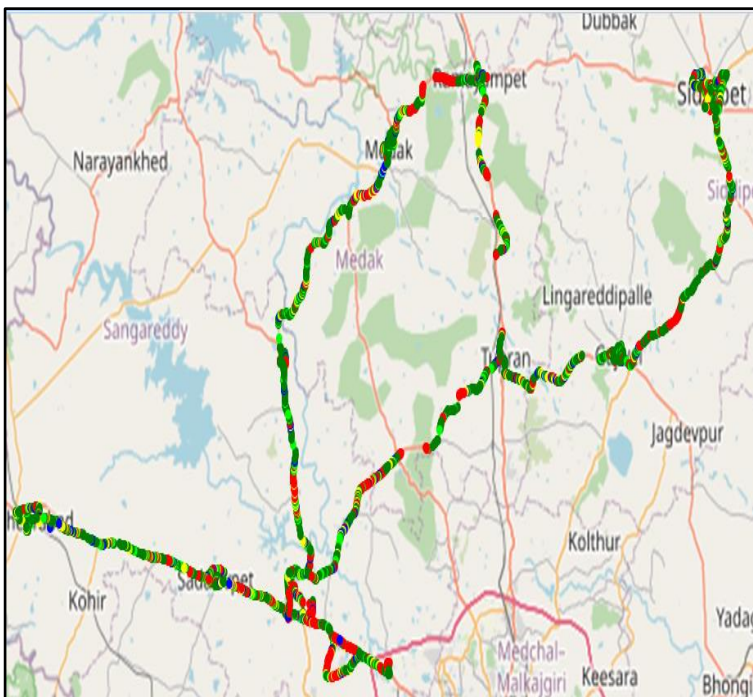
2G	4G
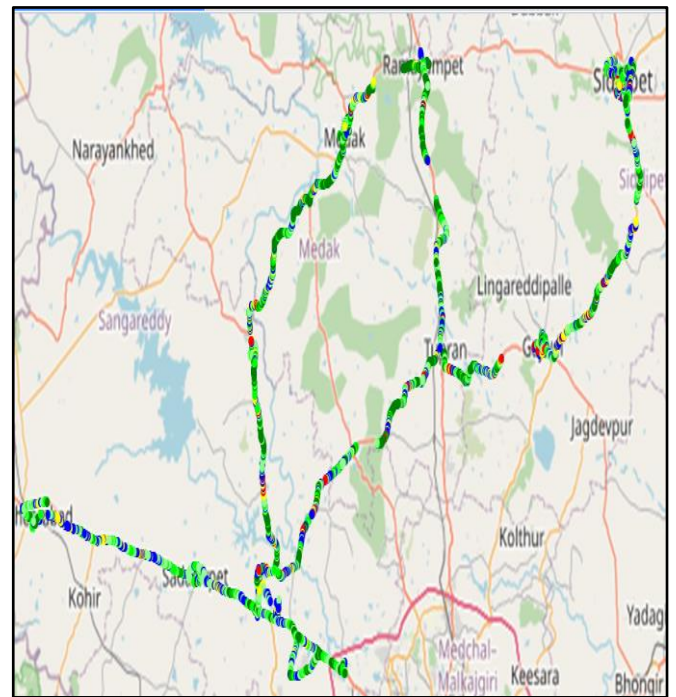
Overall Rx Quality	# Samples	% PDF
(Min, <=2)	279988	71.71%
(2, <=3)	11025	2.82%
(3 , <=4)	12245	3.14%
(4 , <=5)	11486	2.94%
(5 , <=Max)	75681	19.38%
Total	**390425**	**100%**

Overall SINR	# Samples	% PDF
(Min, <= -3)	31334	5.5%
(-3, <=0)	51329	8.9%
(0, <=5)	119316	20.8%
(5, <=10)	128815	22.4%
(10, <=15)	108016	18.8%
(15, <=Max)	135782	23.6%
Total	**574592**	**100%**

TSP	% of Time Spent on
BSNL 3G	100
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	98.7
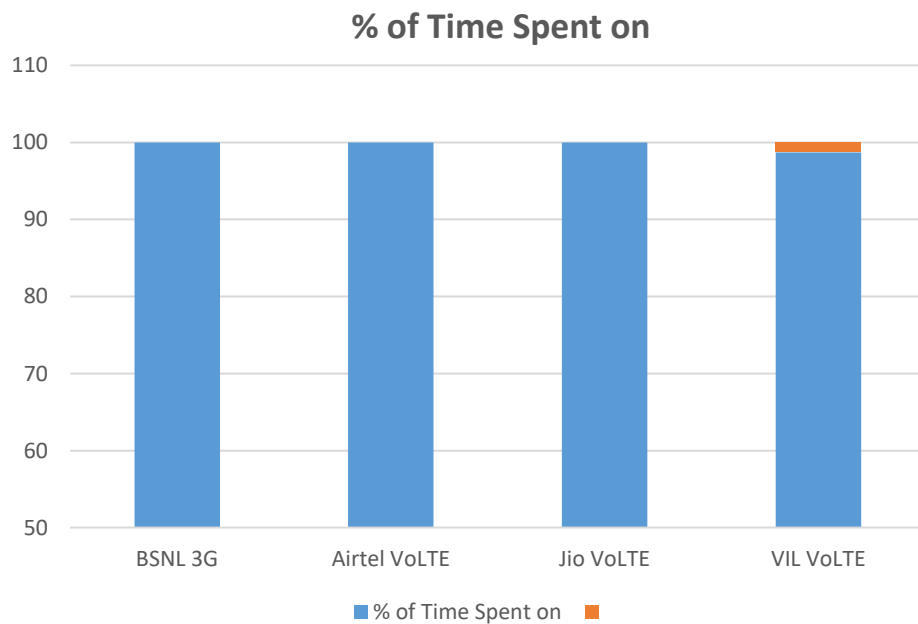
% of Time Spent on

Airtel

Technology	Time Spent %
3G / VoLTE	100
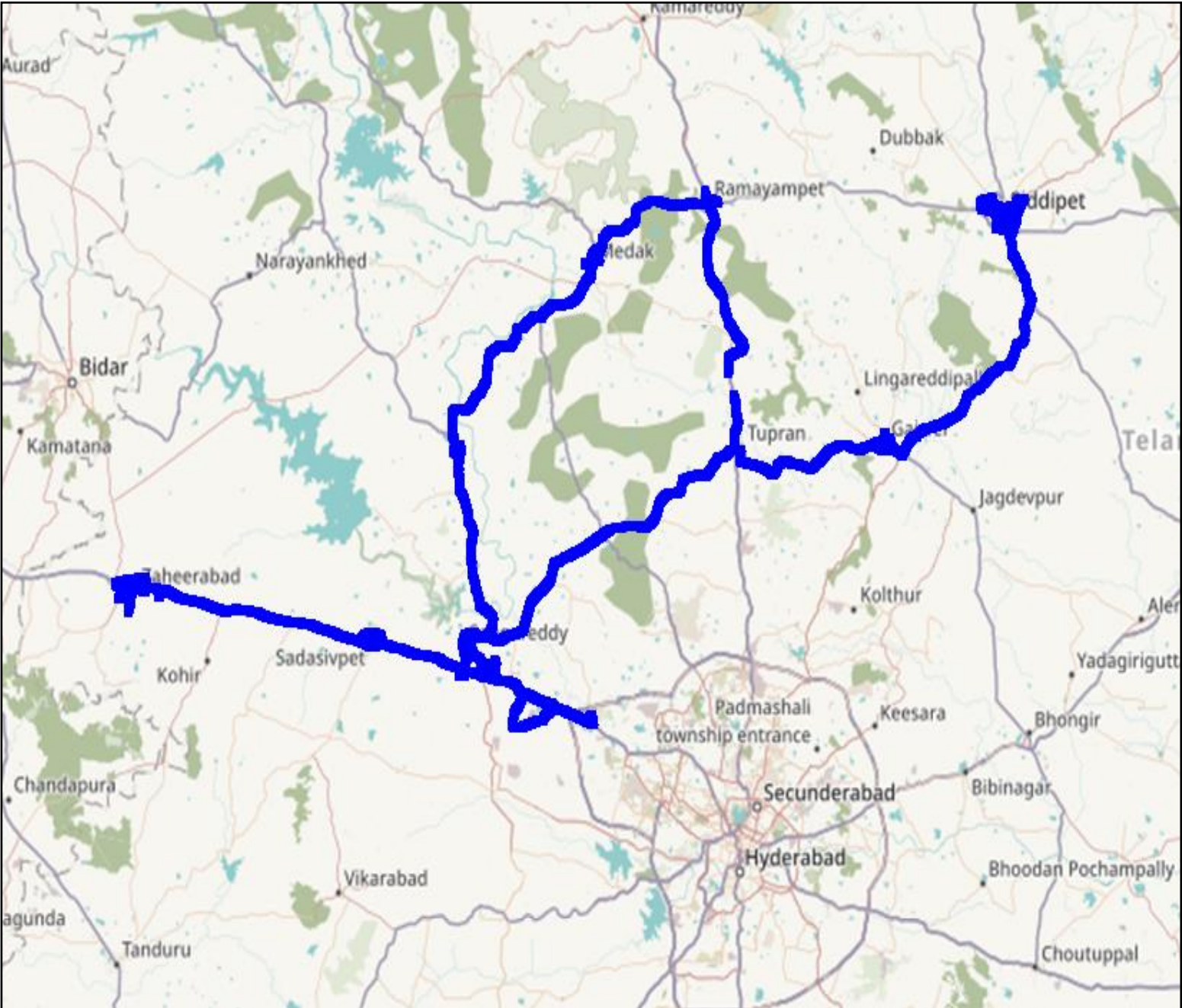
BSNL

Technology	Time Spent %
3G	100%
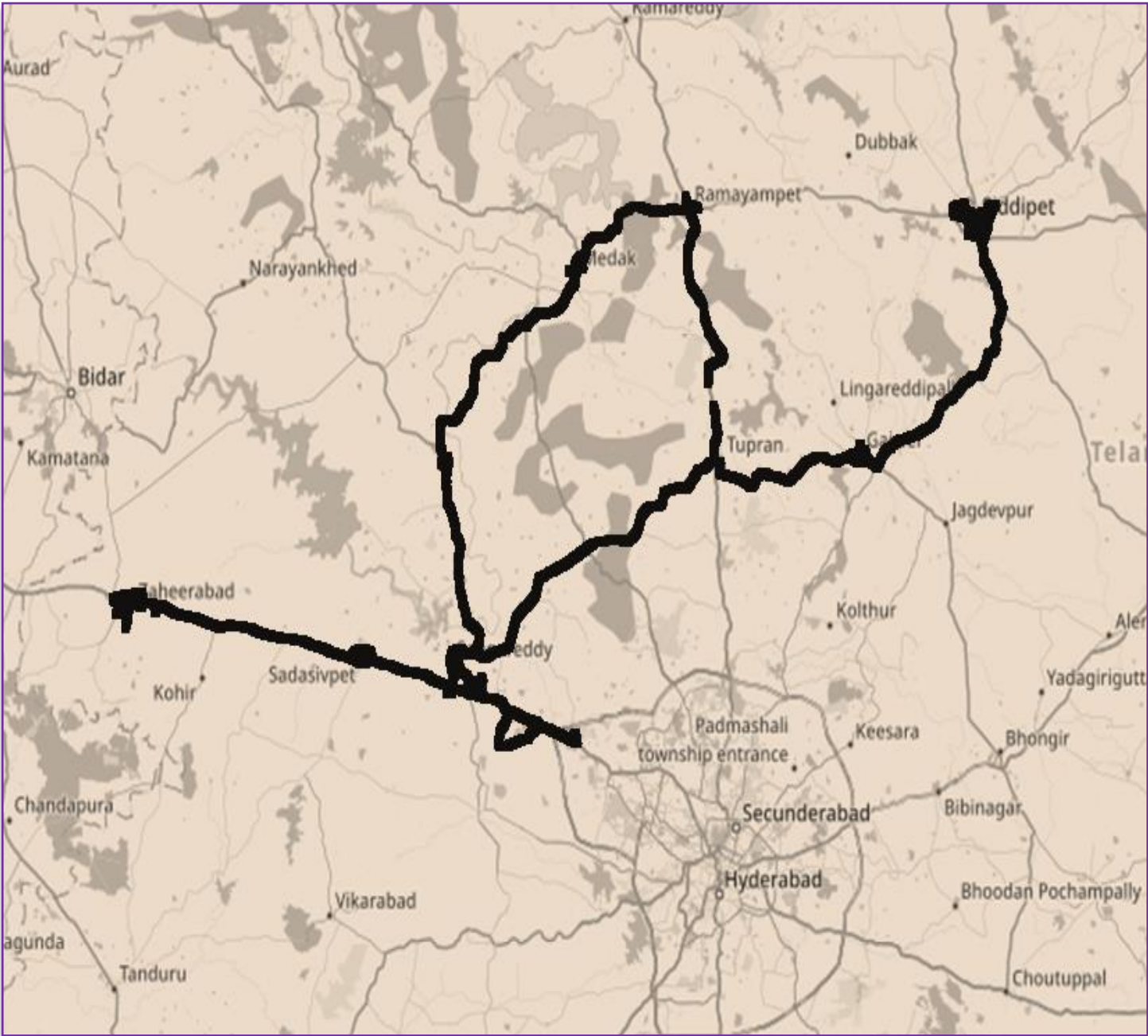
RJIO

Technology	Time Spent %
VoLTE	100
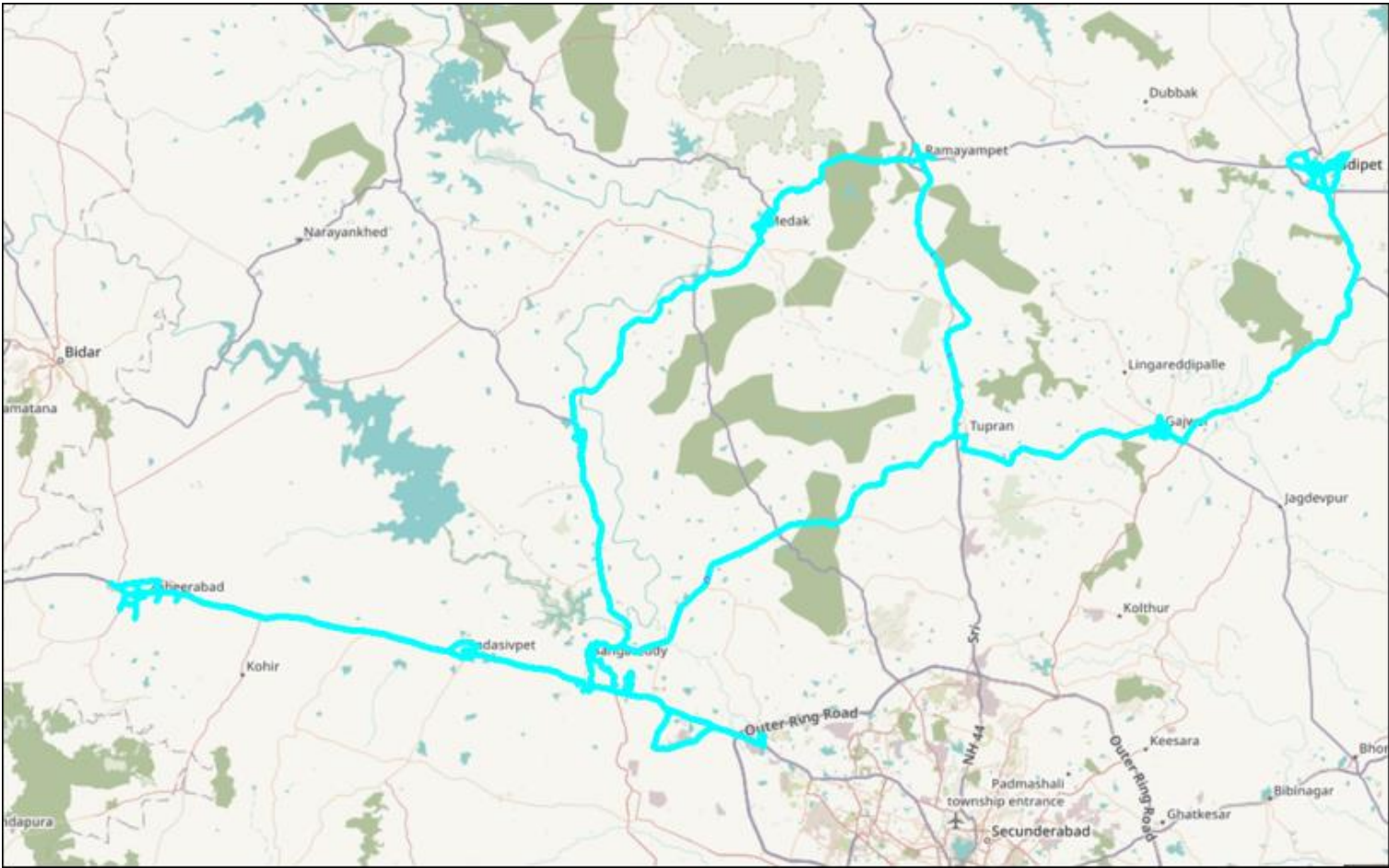
VIL

Technology	Time Spent on 3G
4G	98.7

4G
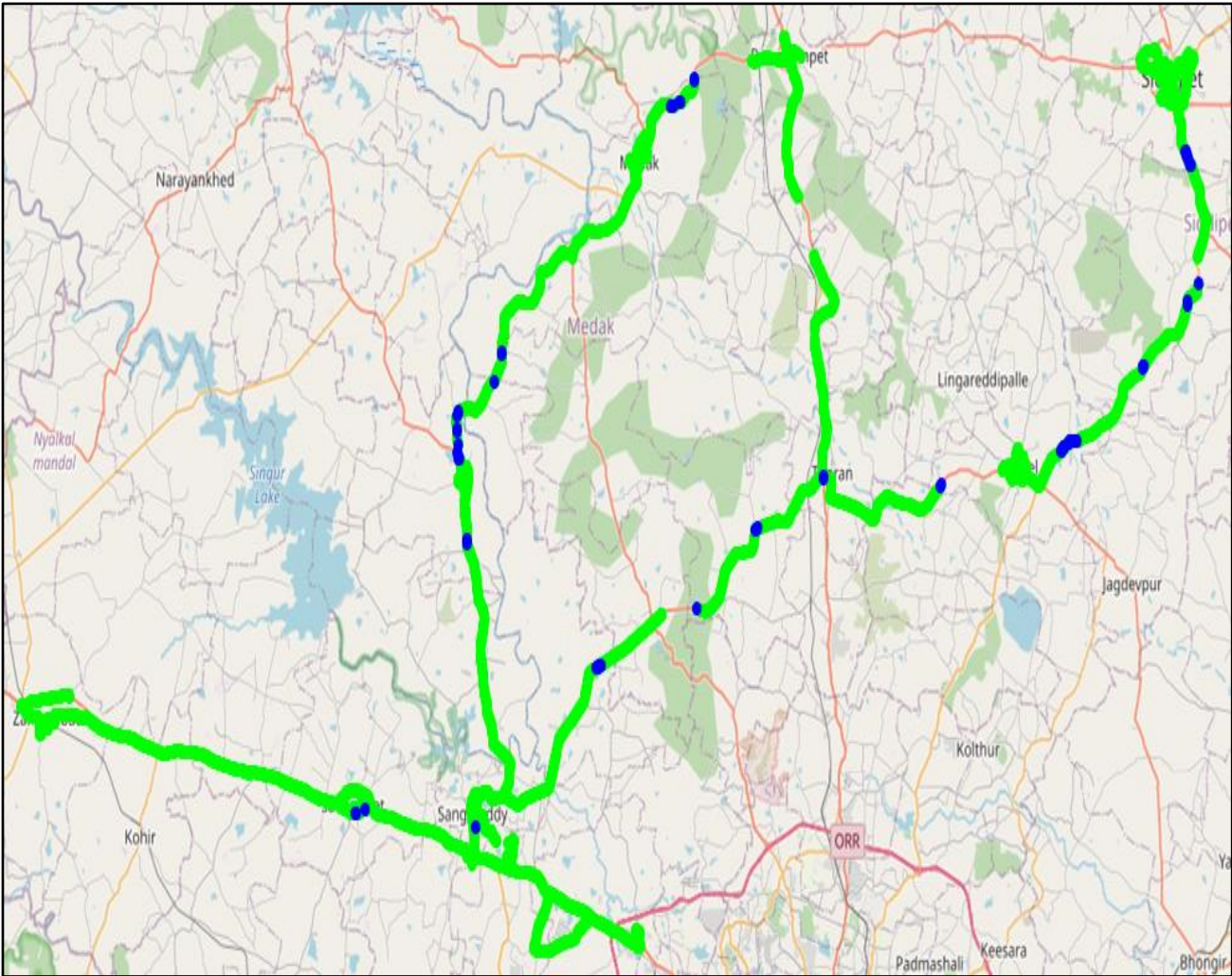
Airtel

Data Statistics - Dynamic Complete SSA 485 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	39.18
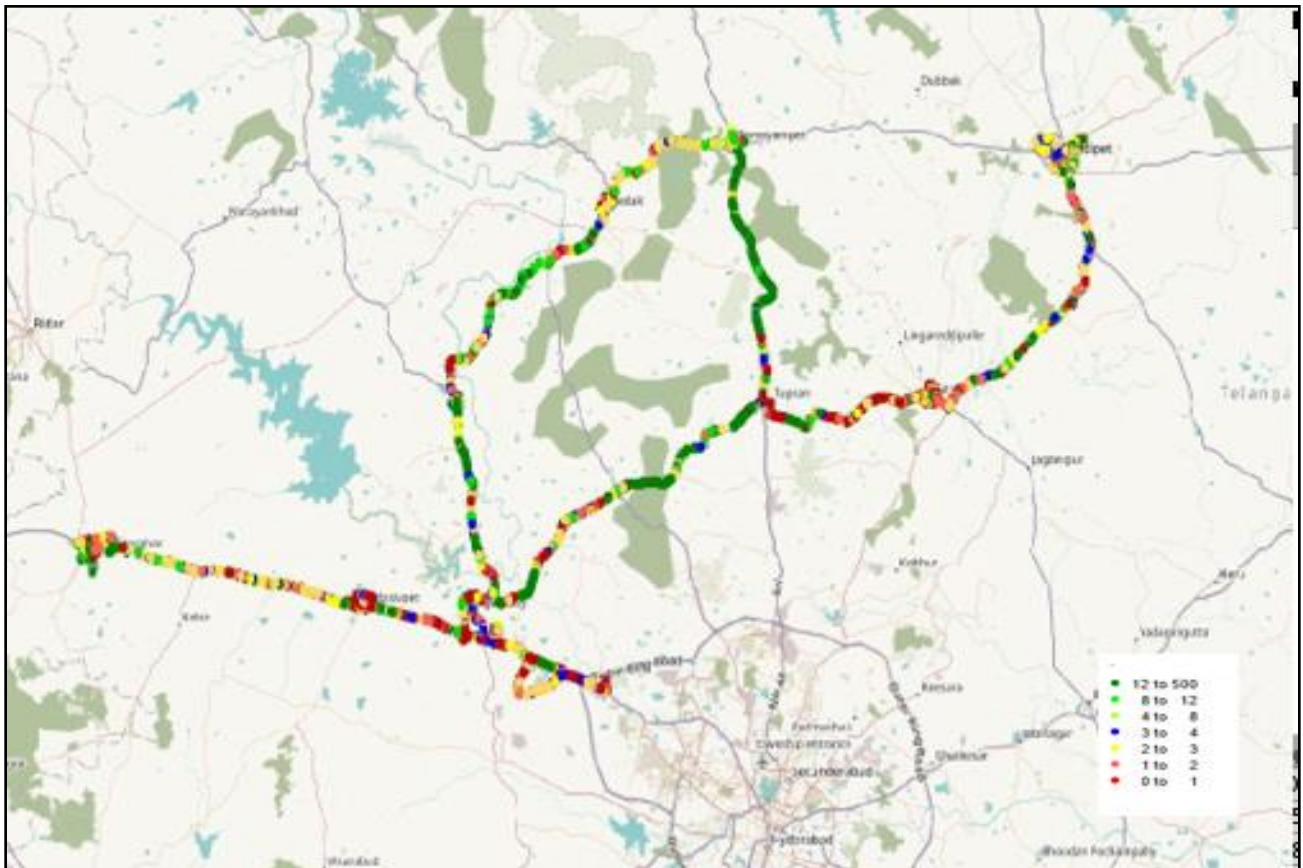
DL throughput	No of Sample	%
0 to 1 Mbps	2702539	18.8%
1 to 2 Mbps	1850191	12.9%
2 to 3 Mbps	1787314	12.4%
3 to 4 Mbps	1384382	9.6%
4 to 8 Mbps	3390069	23.6%
8 to 12 Mbps	1331688	9.3%
>12 Mbps	1926257	13.40%
Total	14372440	

RJIO

Data Statistics - Dynamic Complete SSA 485 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	14.31
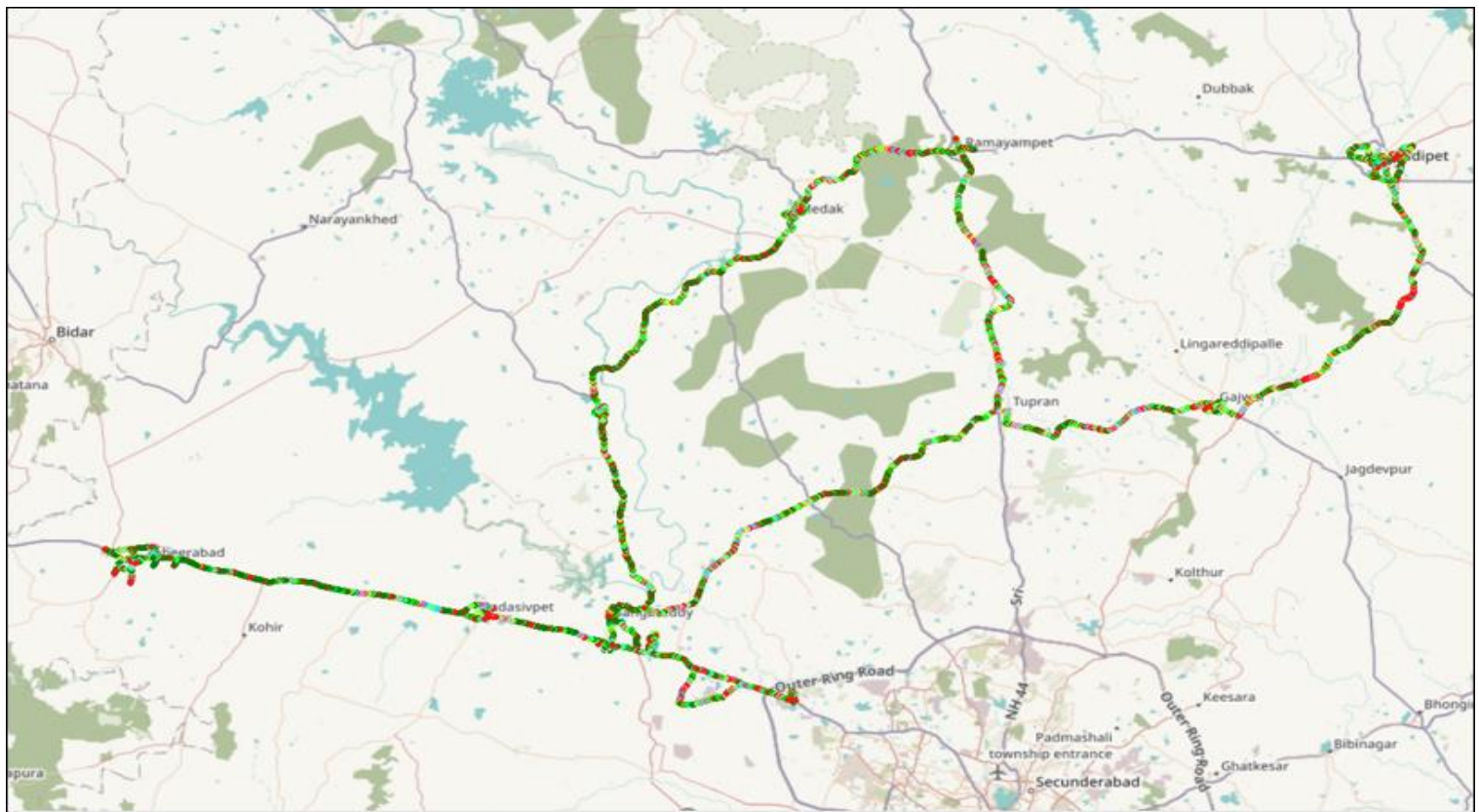
DL throughput	No. of Samples	%
0 to 1 Mbps	15676	22.65
1 to 2 Mbps	4762	6.88
2 to 3 Mbps	5034	7.27
3 to 4 Mbps	4899	7.08
4 to 8 Mbps	17589	25.43
8 to 12 Mbps	11573	16.72
>12 Mbps	9668	13.97
Total	**69201**	**100**

VIL

Data Statistics - Dynamic Complete SSA 485 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	13.62
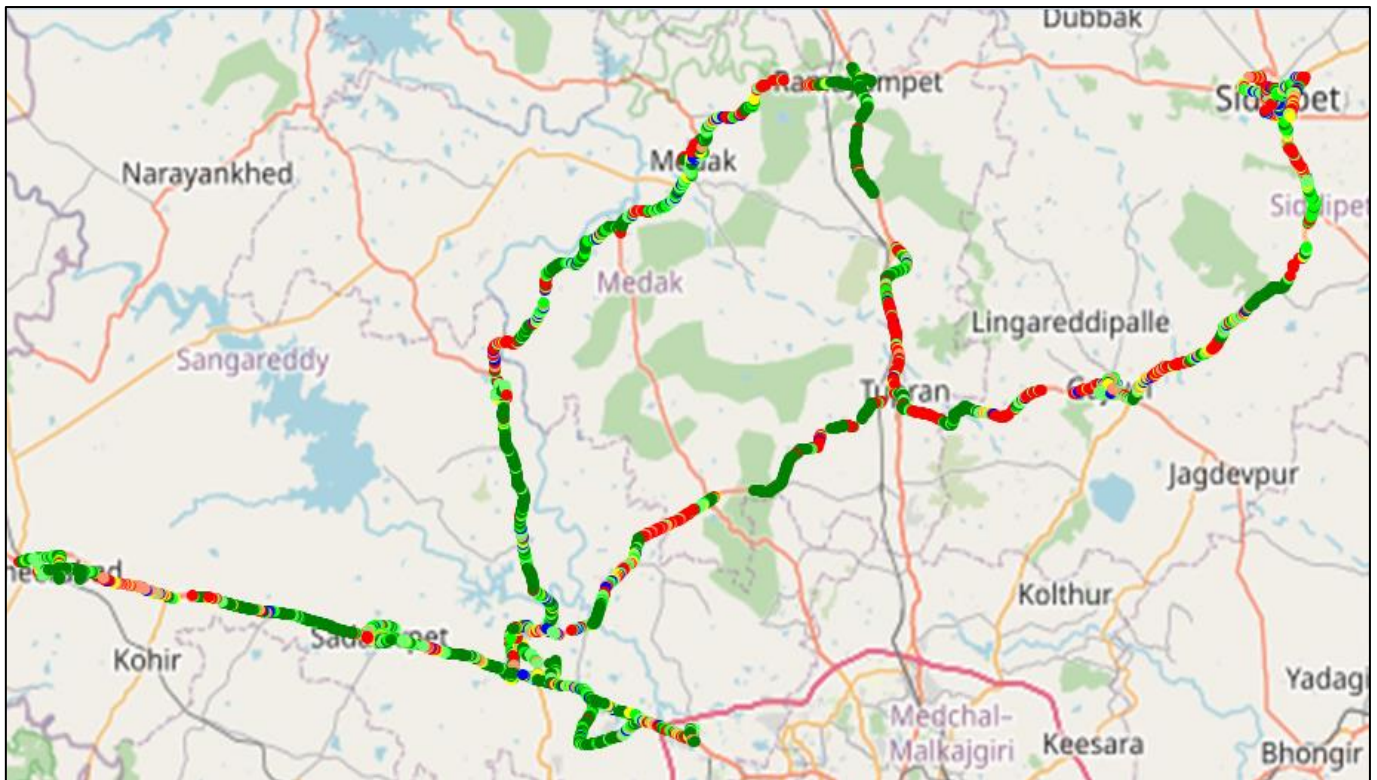
DL throughput	No of Sample	%
0 to 1 Mbps	4795	15.03%
1 to 2 Mbps	2273	7.12%
2 to 3 Mbps	1993	6.25%
3 to 4 Mbps	1963	6.15%
4 to 8 Mbps	6148	19.27%
8 to 12 Mbps	4671	14.64%
>12 Mbps	10060	31.53%
Total	31903	100%

Airtel

Technology - 4G	Zaheerabad Railway Station	Sangareddy Bus Stand	PatanChervu Bus Stand	Medak Church	Gajwel Bus Stand	Siddipet Collectorate
Download in Mbps	45.51	48.34	53.51	61.54	58.52	44.27
Upload in Mbps	16.97	8.70	17.01	16.99	56.12	09.59

BSNL

Technology - 3G/4G	Zaheerabad Railway Station	Sangareddy Bus Stand 4G	PatanChervu Bus Stand	Medak Church	Gajwel Bus Stand	Siddipet Collectorate
Download in Mbps	05.37	07.13	05.58	2.17	05.52	11.51
Upload in Mbps	02.31	0.40	02.01	02.23	01.69	02.08

JIO

Technology - 4G	Zaheerabad Railway Station	Sangareddy Bus Stand	PatanChervu Bus Stand	Medak Church	Gajwel Bus Stand	Siddipet Collectorate
Download in Mbps	85.05	96.92	85.32	93.22	92.94	93.84
Upload in Mbps	9.25	8.72	10.65	10.63	7.36	4.78

VIL

Technology - 4G	Zaheerabad Railway Station	Sangareddy Bus Stand	PatanChervu Bus Stand	Medak Church	Gajwel Bus Stand	Siddipet Collectorate
Download in Mbps	16.14	21.87	12.81	7.28	11.91	7.89
Upload in Mbps	6.97	14.13	10.63	6.61	7.32	5.79

	NH/SH Routes covered in OADT by Airtel / BSNL / RJIL / VIL			
S.No	No of NH/SH routes	NH routes	SH routes	Distance(Km)
1	Sangareddy to Zaheerabad	NH 65,	NH 65,	56 kms
2	Sangareddy to Pantancheruvu	NH 65	NH 65	25 kms
3	Sangareddy to jogipet	NH 161	SH 58	38 kms
4	Jogipet to medak	NH 161,NH 765D		40 kms
5	Medak to Ramayanpet, chegunta	NH 7645d,NH 44	SH 15	45 kms
6	Chegunta to Sangareddy	NH 161,NH 44	SH 17	98 kms