

Operator Assisted Drive Test Report

ELURU - SSA November - 2022

(RO, Hyderabad)

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%. Rx Quality of 95% is not achieved by Airtel 2G & VoLTE, BSNL 3G, Jio VoLTE & VIL VoLTE.

The Operator Assisted Drive Test (OADT) has been carried out by TRAI RO Hyderabad with the help of Service Providers in Eluru City and surrounding areas Jangareddigudem, Bhimavaram, Tadepalligudem, Tanuku, Narsapuram, Palakollu from 9:00 AM to 8:00 PM during 29-11-2022 to 02-12- 2022. The drive test covered drive route of 400 KMs & 6 hotspot over a period of 4 days. Approximately 600 calls were made for each of the 7 networks: Three 2G networks, One 3G network and Three LTE network covering four TSPs.

Overview

Voice
Summary

Data
Summary

Overview

TRAI RO Hyderabad conducted Operator Assisted Drive Test from 29-11-2022 to 02-12-2022 covering various locations in Eluru, Bhimavaram, Narsapur, Palakollu, Tanuku, Tadepalligudem and Jangareddigudem. 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 400 KMs over a period of 4 days from 29-11-2022 to 02-12-2022. Approximately 600 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 400 KMs 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.

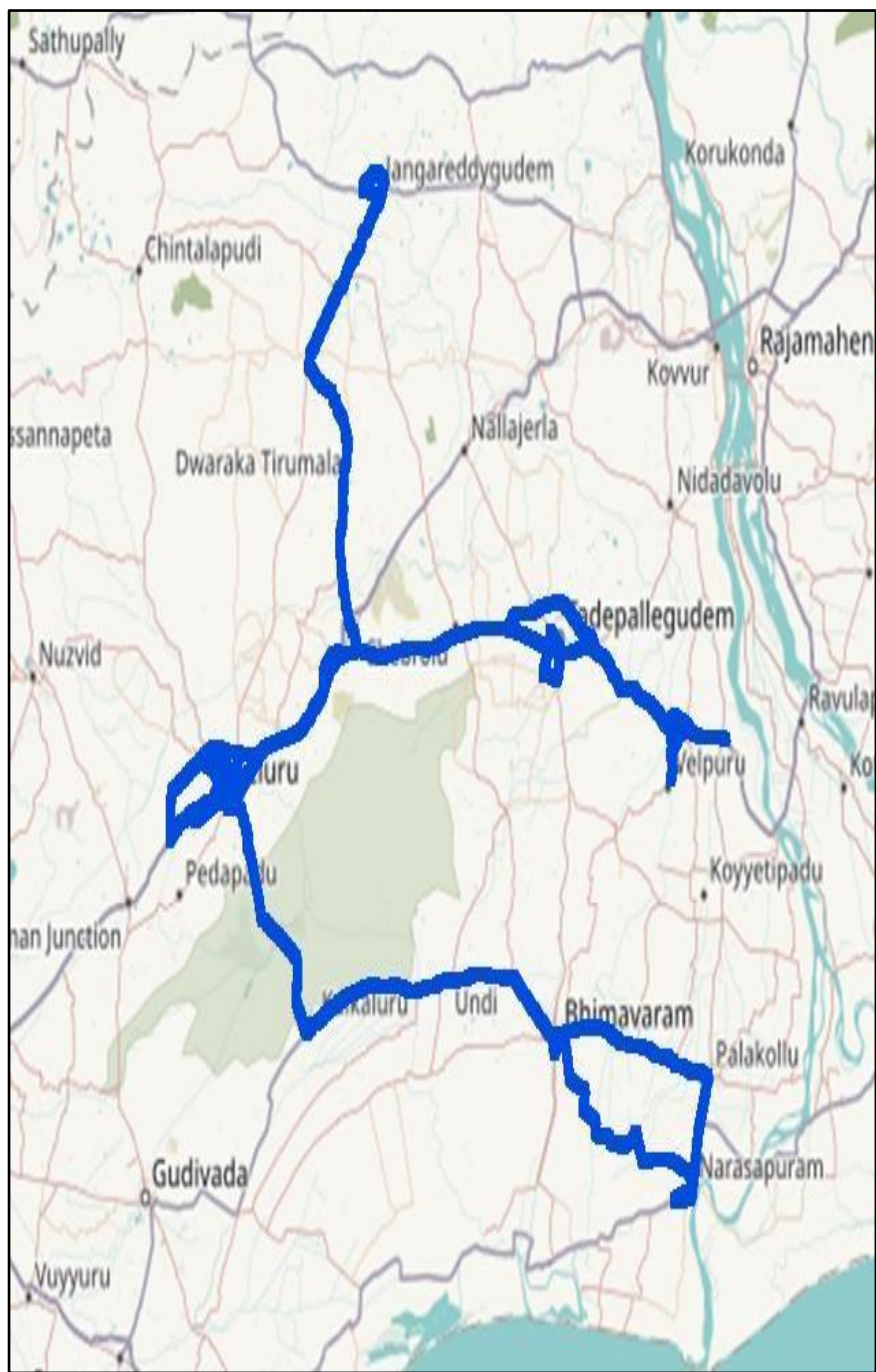
*3G KPI's which are calculated from UE in Dual Mode (2G & 3G) includes samples and events of 2G.

*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

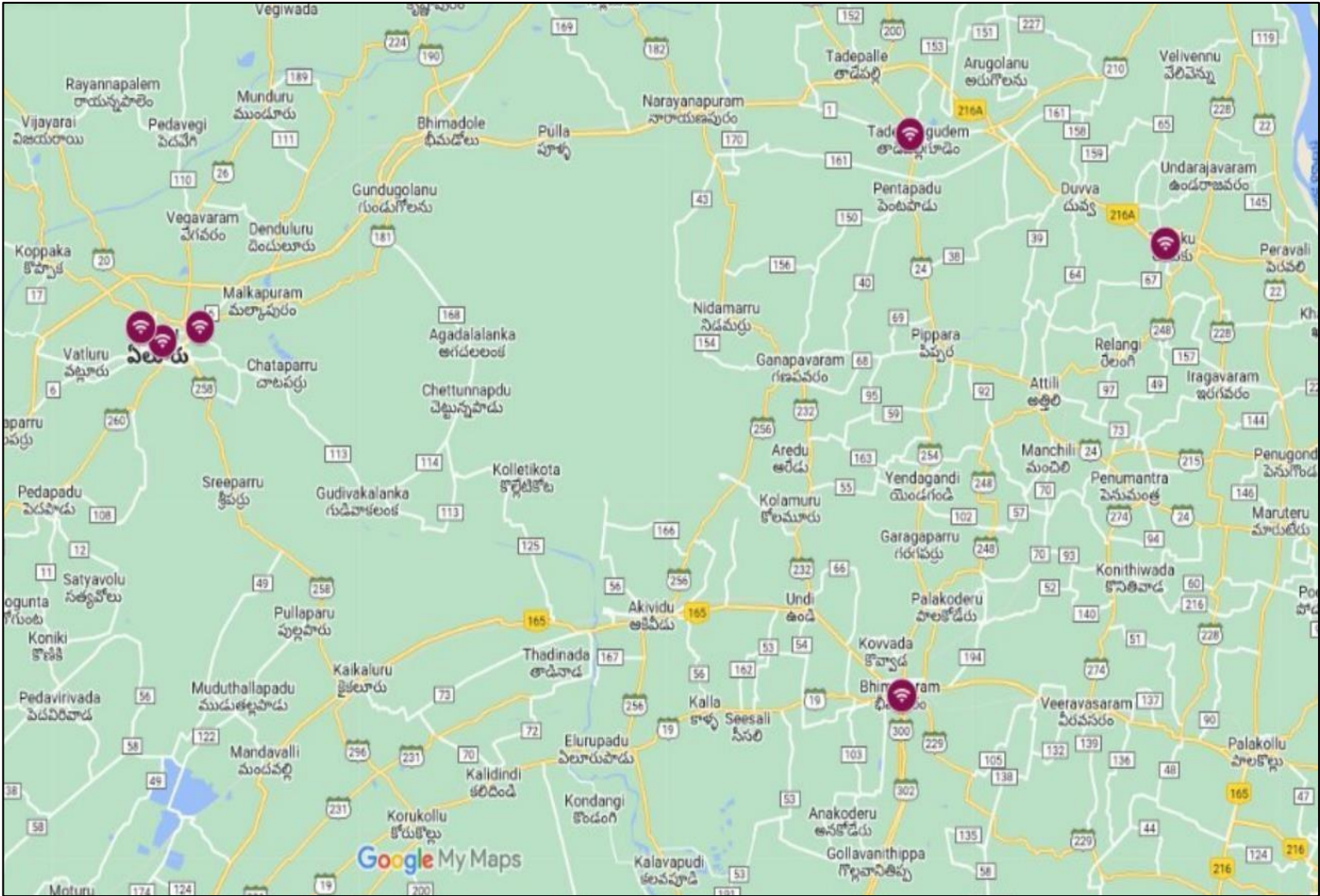
Voice & Dynamic Data Test Drive Route



Areas Covered -	
Eluru bus stop	Eluru RLY Station
Powerpet	Shanivarapupet
Southern street	Islampet
Paidichintapadu	Venkapuram
Nethaji nagar	Arundhathi colony
Jangareddy gudem	VS town ship
JKR street	Jayaprakash nagar
Chodhimella	New bus stop
Areas Covered- Kaikalooru to Bheemavaram	Areas Covered – Eluru Thanuku
Bus stop	Thanuku Bus stop
Kaikaloru road	Thadepalligudem road
Undi road	Eluru road .ravulapalem road
Areas Covered- Thadepalligudem	Areas Covered- Bhimavaram to Narsapuram
Thadepalligudem main road	Bhimavaram bus stop
RTC Bus stand	Narsapuram road
Bheemavaram road	Palakollu
Nidadhavolu Road	Narsapuram
Railway station	Railway station

Data Service Test- Static Locations

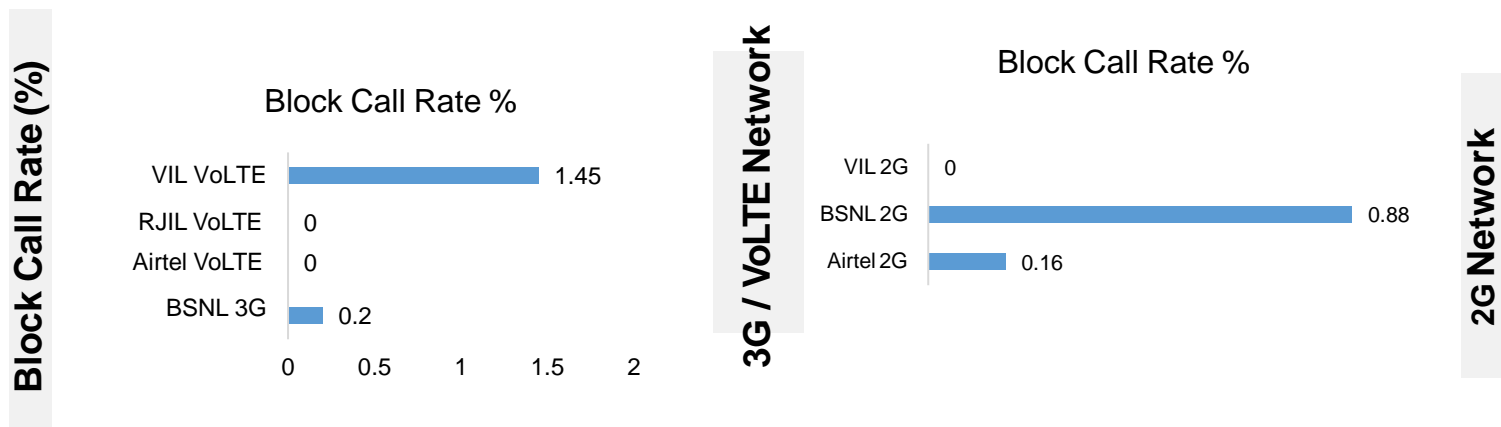
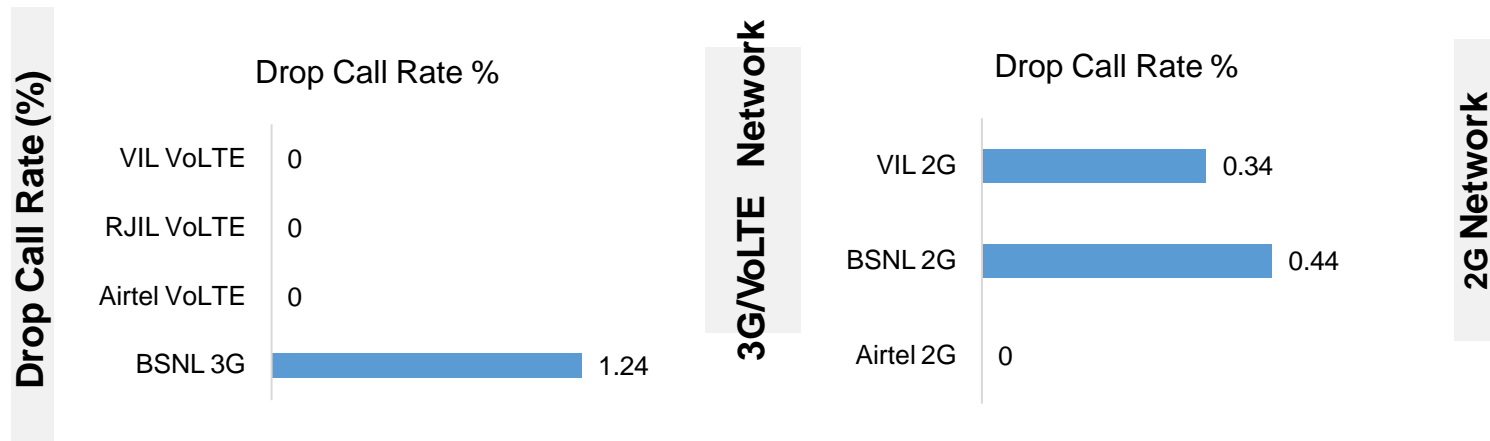
Static Locations
1. Bheemavaram Busstand
2. Thanuku Busstand
3. Thadepalligudem Railway station
4. Eluru Busstand
5.Eluru Govt Haspital
6. Eluru Railway station



Voice Calls

Key Observations

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



KPIs	2G			3G	VoLTE		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0	0.44	0.34	1.24	0	0	0
Block Call Rate %	0.16	0.88	0	0.20	0	0	1.45

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

Key Observations

Coverage

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

TSPS	2G		
	Airtel	BSNL	VIL
Coverage %	83.5	91.1	90.32

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

TSP	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Coverage %	88.7	98.7	98.72	93.88

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

TSP	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Time spent %	64.8	100	100	99.61

Data Services Static

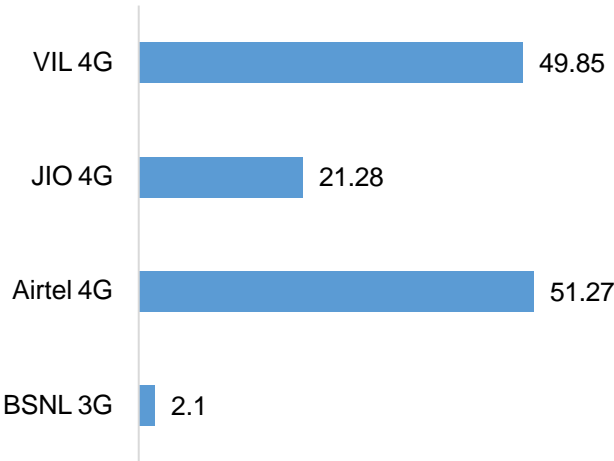
**Key Observations
(Average of 6 Hotspots)**

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

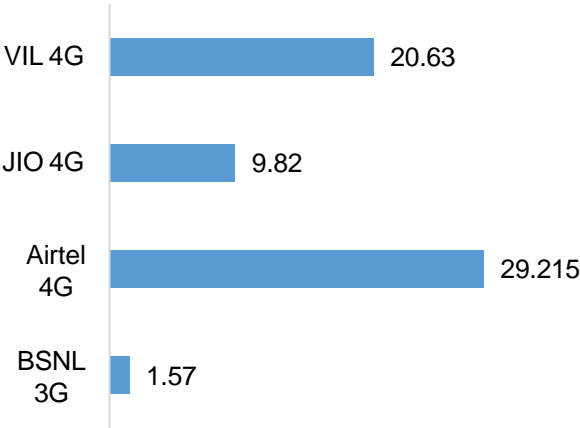
Data Download and Upload Performance (Mbps)

3G/4G Network:

Download throughput in Mbps

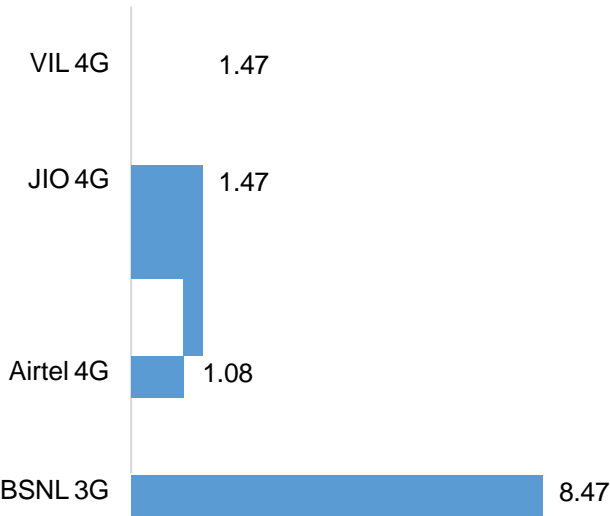


Upload Throughput in Mbps



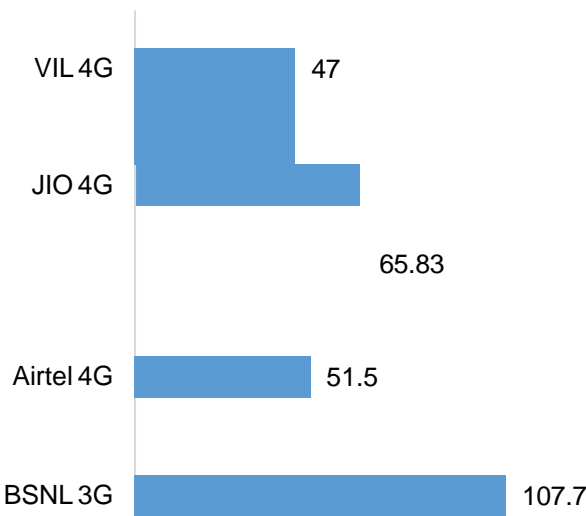
Web Browsing (Sec)

Web browsing delay in sec



Latency (ms)

Latency in msec



Summary

SSA Level Summary (Average of 6 Hotspots) - Data Services

Data Services Static	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	175.8	58.05	78.533
Upload Throughput in Kbps	45.8	83.56	58.003
Web browsing delay in second	4.15	66.03	11.163
Latency in (msec)	271.52	334.36	231.83

Data Services Static	3G / VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Download throughput in Mbps	2.1	51.27	21.28	49.85
Upload Throughput in Mbps	1.57	29.215	9.82	20.63
Video Streaming Delay in Sec		0.51	0	
Web browsing delay in sec	8.47	1.08	1.47	1.47
Latency in msec	107.7	51.5	65.83	47

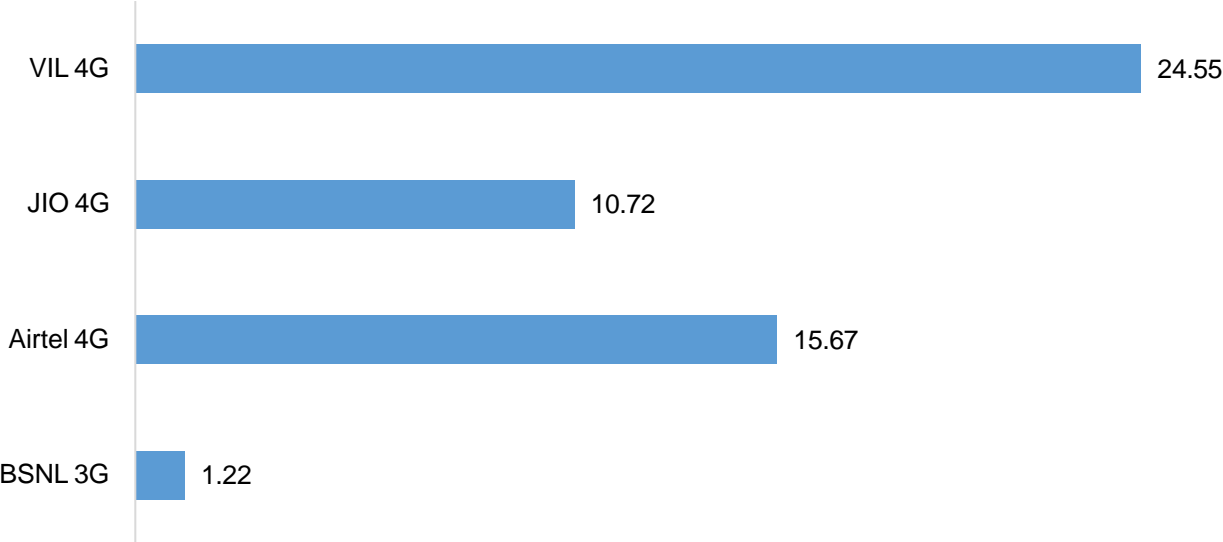
Data Services Dynamic

Key Observations

Dynamic Data was tested for 400 KMs. Download Throughput was tested.

Data Download Performance (Mbps) - Dynamic

Download throughput in Mbps



Data Services Dynamic	3G / 4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download throughput in Mbps	1.22	15.67	10.72	24.55

Summary

SSA Level Summary-Voice

Voice Calls	2G		
	Airtel	BSNL	VIL
Call attempts	615	678	595
Block call rate %	0.16	0.88	0
CSSR %	99.84	99.12	100
Drop call rate %	0	0.44	0.34
Mobility HOSR %	98.70	97.81	96.91
Rx Quality %	94.2	98.4	96.01

	3G	VoLTE		
TSP (For 3G)	BSNL	Airtel	JIO	VIL
Call attempts	482	648	590	621
Block call rate %	0.20	0	0	1.45
CSSR %	99.79	100	99.15	98.55
Drop call rate %	1.24	0	0	0
Mobility HOSR %	100	100	98.66	99.26
RX Quality %	93.9	93.95	90.5	84.94

Bheemavaram Busstand	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	261.7	27.63	70.3
Upload Throughput in Kbps	73.6	80.36	34.5
Web browsing delay in second	4.2	108.10	7.51
Latency in (msec)	339.8	445.07	176

Thanuku Busstand	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	183.8	89.37	66.5
Upload Throughput in Kbps	52.3	86.72	45.13
Web browsing delay in second	3.4	27.40	14.21
Latency in (msec)	233.4	305.32	279

Thadepalligudem Railway station	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	165.8	60.44	77.5
Upload Throughput in Kbps	55.2	80.97	85.9
Web browsing delay in second	4.19	79.81	3.59
Latency in (msec)	317.76	434.09	295

Eluru Busstand	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	117.4	41.22	80.8
Upload Throughput in Kbps	29.2	72.60	65.3
Web browsing delay in second	4.4	71.22	10.05
Latency in (msec)	317.38	308.31	273

Eluru Govt Hospital	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	169.2	51.89	101.5
Upload Throughput in Kbps	32.7	92.10	47.0
Web browsing delay in second	4.15	55.06	13.35
Latency in (msec)	208.5	279.74	185

Eluru Railway station	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	156.9	77.77	74.8
Upload Throughput in Kbps	31.87	88.66	70.2
Web browsing delay in second	4.5	54.63	29.
Latency in (msec)	212.3	233.67	183

Data Services static

SSA Level Summary (contd.)

Bheemavaram Busstand	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	1.26	54.3	15.14	39.94
Upload Throughput in Mbps	1.13	43.9	7.4	21.86
Web browsing delay in second	36.50	1.15	1.7	1.37
Latency in (msec)	253.73	47.8	78	73
Thanuku Busstand	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	3.05	36.18	11.46	33.82
Upload Throughput in Mbps	1.73	26.75	8.12	24.11
Web browsing delay in second	2.94	1.23	1.7	1.19
Latency in (msec)	73.89	40.24	65	45
Thadepalligudem Railway station	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	2.89	55.3	28.3	40.82
Upload Throughput in Mbps	1.68	17.02	7.3	21.14
Web browsing delay in second	2.29	1.13	0.96	1.53
Latency in (msec)	41.29	43.66	75	39
Eluru Busstand	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	1.58	63.04	33.6	58.06
Upload Throughput in Mbps	1.46	54.19	19.75	23.39
Web browsing delay in second	2.87	1.18	1.78	1.07
Latency in (msec)	90.79	48.64	43	51
Eluru Govt Haspital	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	2.39	36.39	25.88	59.34
Upload Throughput in Mbps	1.69	16.79	7.02	23.68
Web browsing delay in second	2.78	0.92	1.73	2.12
Latency in (msec)	103.30	62.66	66	36

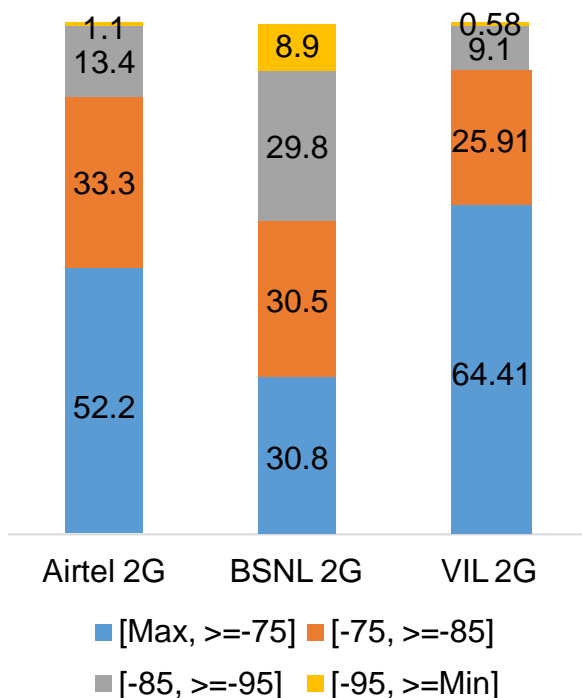
Eluru Railway station	3G	4G		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	2.034	62.05	13.3	67.12
Upload Throughput in Mbps	1.76	16.64	9.3	9.60
Web browsing delay in second	3.46	0.89	0.96	1.59
Latency in (msec)	83.2	66.02	68	38

I. Coverage Details

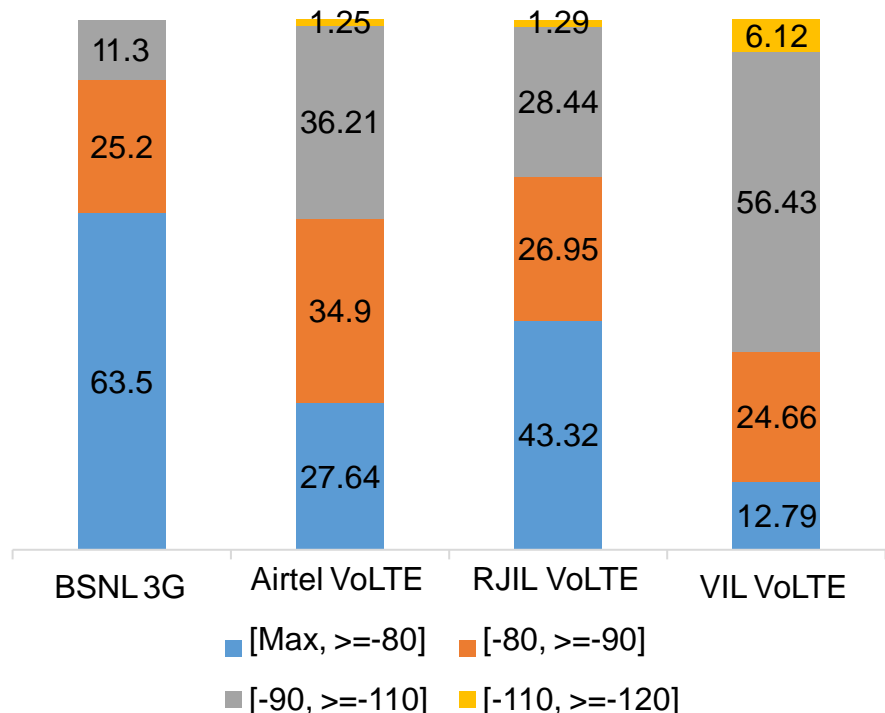
RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call session. The Coverage rate is calculated on the basis of % of samples in which the Rx level ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110 dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	85.5
BSNL 2G	91.1
VIL 2G	90.32
BSNL 3G	88.7
Airtel VoLTE	98.7
Jio VoLTE	98.72
VIL VoLTE	93.88

Coverage Rate 2G



Coverage Rate 3G/VoLTE

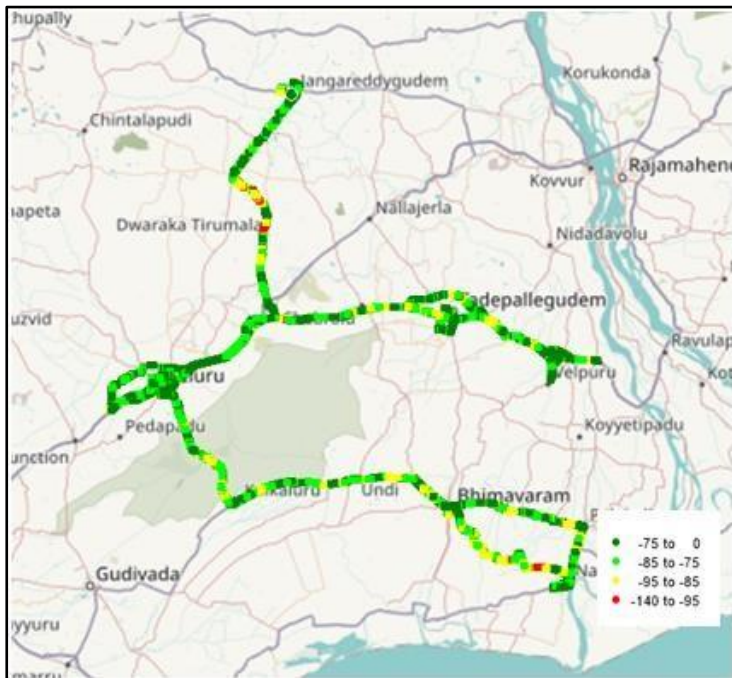


I. Coverage Details

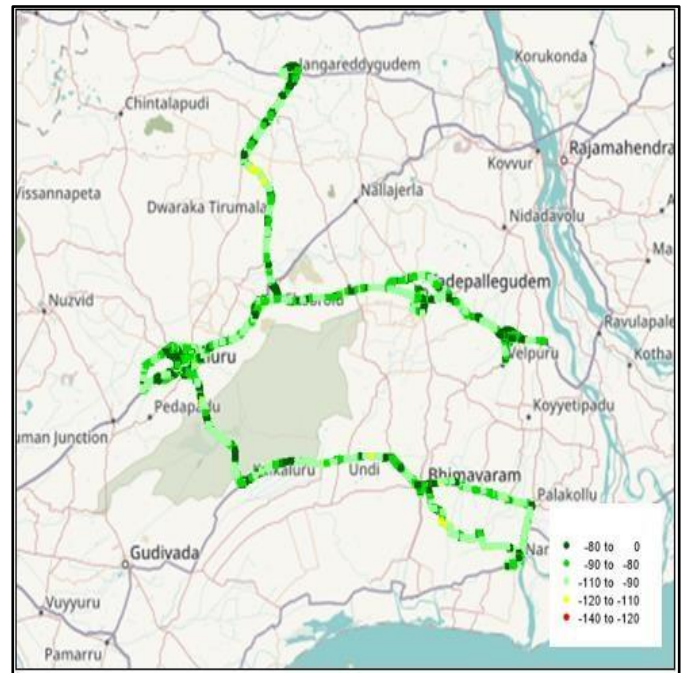
AIRTEL

Technology	Coverage Rate %
2G	85.5
VoLTE	98.7

2G



VoLTE



2G

Overall RxLevel	# Samples	%
[Max, >=-75]	7495365	52.2
[-75, >=-85]	4777009	33.3
[-85, >=-95]	1921474	13.4
[-95, >=Min]	154926	1.1
Total	14348774	100

VoLTE

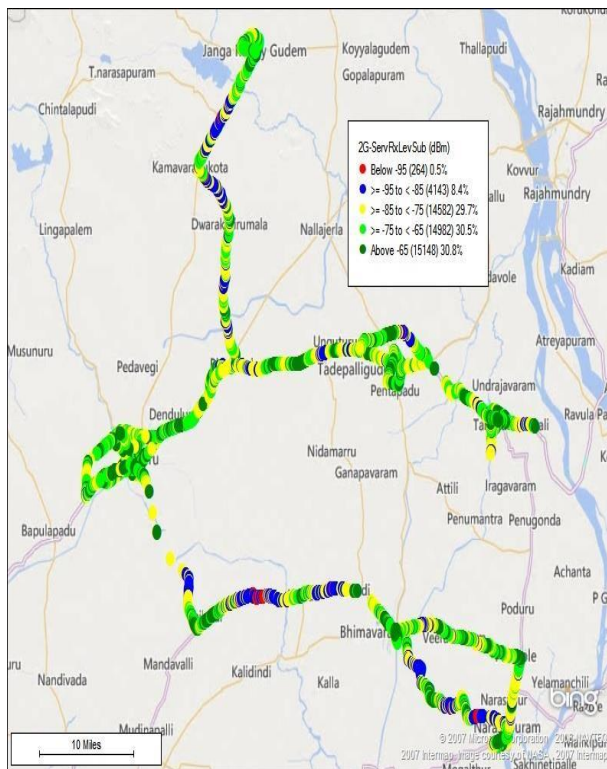
Overall RSRP	# Samples	%
[Max, >=-80]	4787945	27.64
[-80, >=-90]	6046287	34.90
[-90, >=-110]	6272910	36.21
[-110, >=-120]	210553	1.22
[-120, >=Min]	4675	0.03
Total	17322370	100

I. Coverage Details

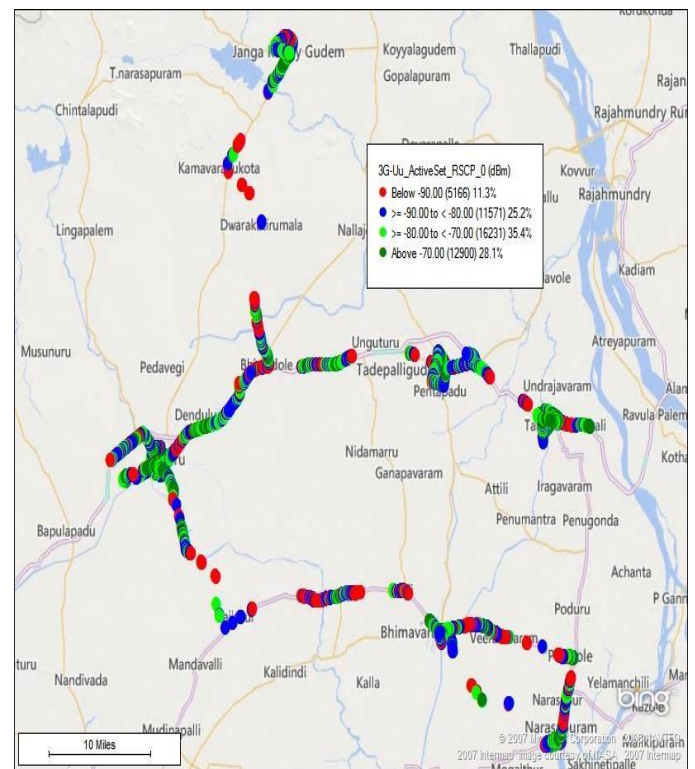
BSNL

Technology	Coverage Rate %
2G	91.1
3G	88.7

2G



3G (Dual mode)



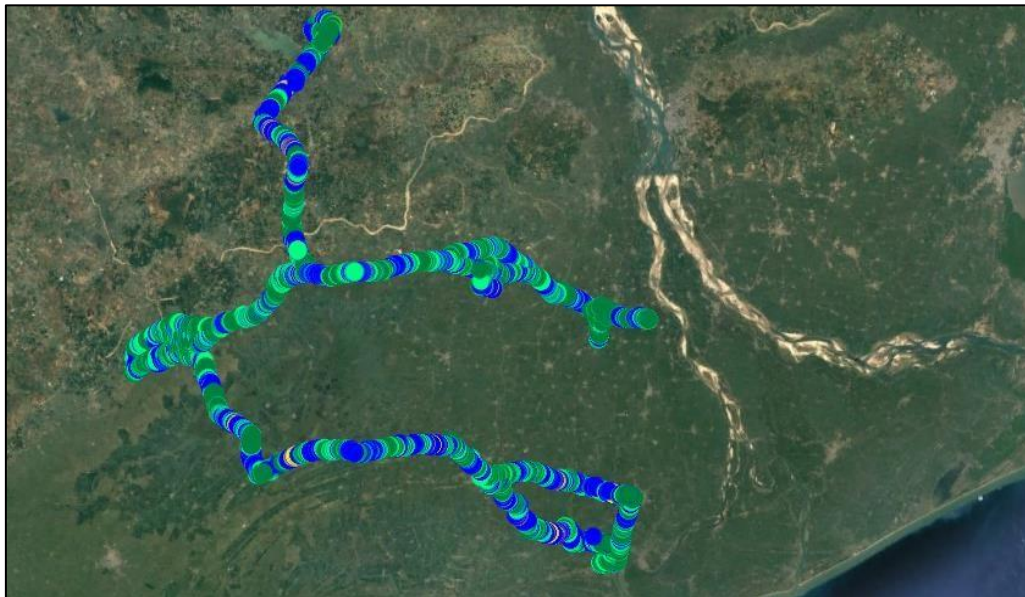
2G		
Overall RxLevel	# Samples	%
[Max, >=-65]	15148	30.8
[-65, >=-75)	14982	30.5
[-75, >=-85)	14582	29.7
[-85, >=-95]	4143	8.4
[-95, >=Min)	264	0.5
Total	49119	100

3G		
Overall RSCP	# Samples	%
[Max, >=-70]	12900	28.1
[-70, >=-80)	16231	35.4
[-80, >=-90)	11571	25.2
[-90, >=Min)	5166	11.3
Total	45868	100

I. Coverage Details

JIO

Technology	Coverage Rate %
VoLTE	98.72



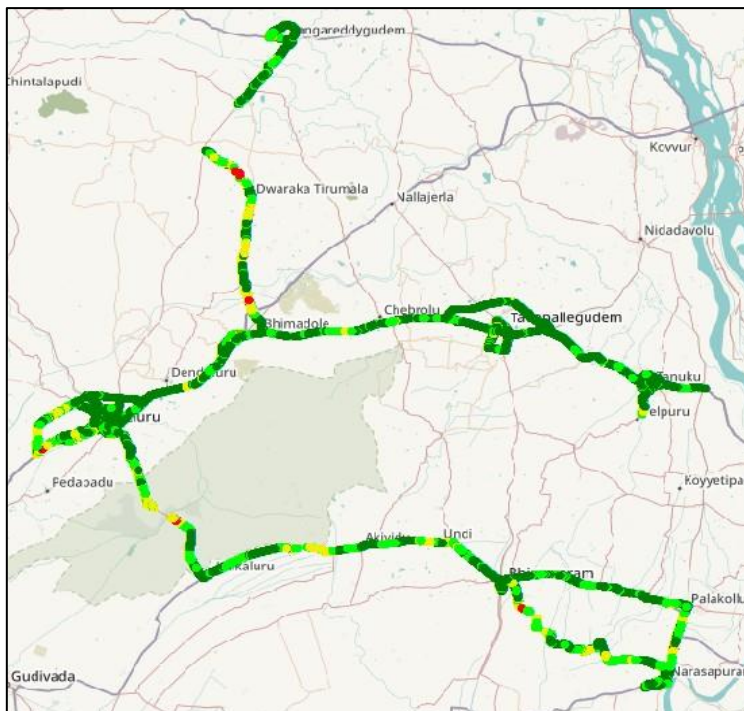
VoLTE		
Overall RSRP	# Samples	%
[Max, >=-80]	25098	43.32
[-80, >=-90]	15619	26.96
[-90, >=-110]	16745	28.44
[-110, >=-120]	711	1.23
[-120, >=Min]	32	0.06
Total	58205	100

I. Coverage Details

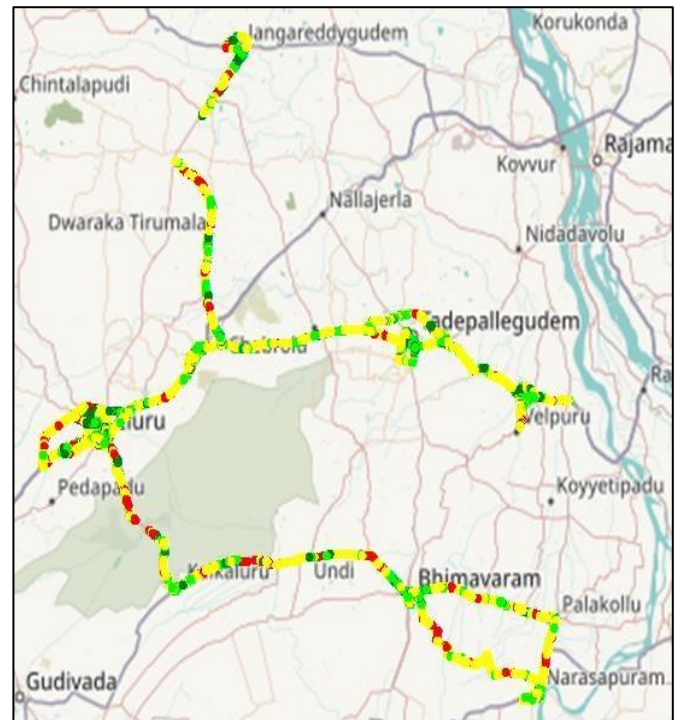
VIL

Technology	Coverage Rate %
2G	90.32
VoLTE	93.88

2G



VoLTE



2G

Overall RxLevel	# Samples	%
[Max, >=-75]	3294181	64.41
[-75, >=-85)	1325064	25.91
[-85, >=-95)	465484	9.10
[-95, >=Min)	29477	0.58
Total	5114206	100

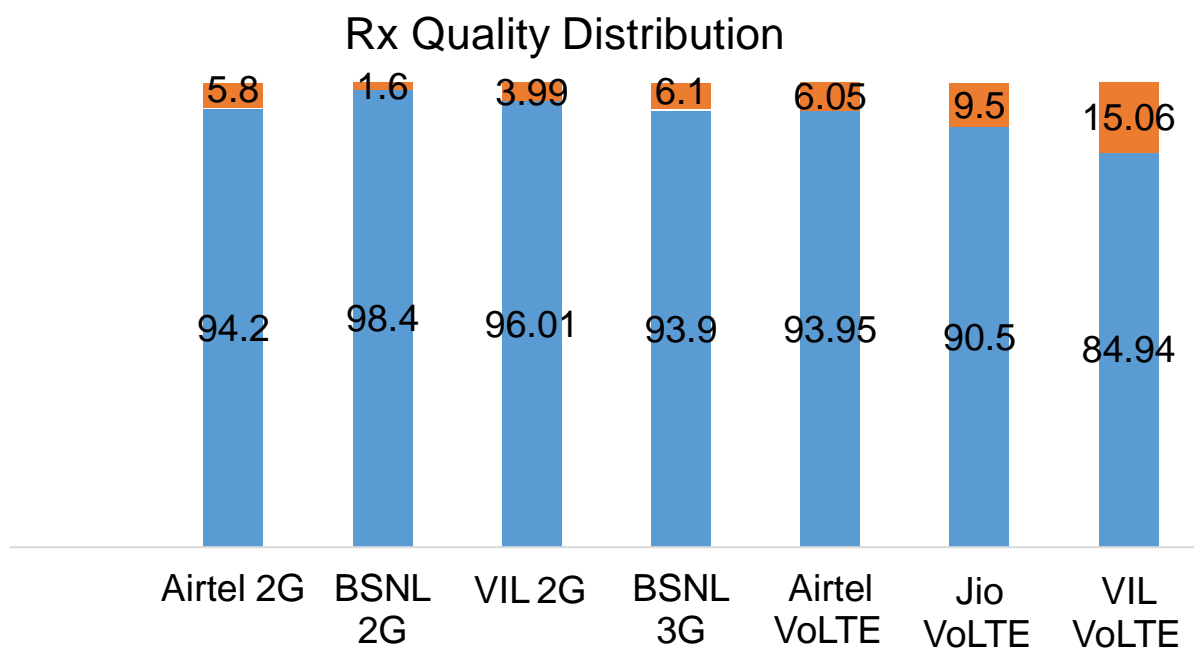
VoLTE

Overall RSRP	# Samples	%
[Max, >=-80]	1549483	12.79
[-80, >=-90)	2988353	24.66
[-90, >=-110)	6838339	56.43
[-110, >=Min)	742100	6.12
Total	12118275	100

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	94.2
BSNL 2G	98.4
VIL 2G	96.01
BSNL 3G	93.9
Airtel VoLTE	93.95
Jio VoLTE	90.5
VIL VoLTE	84.94

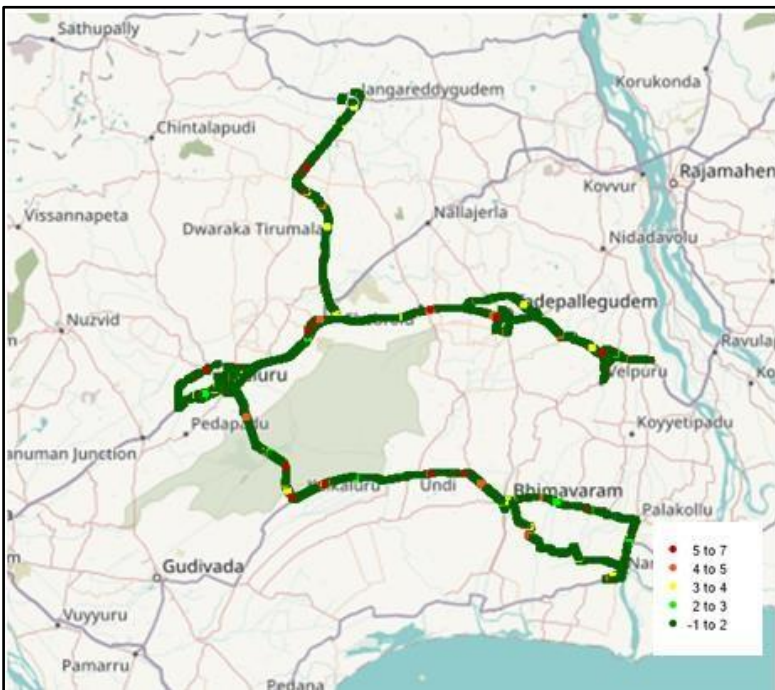


II. Quality Details

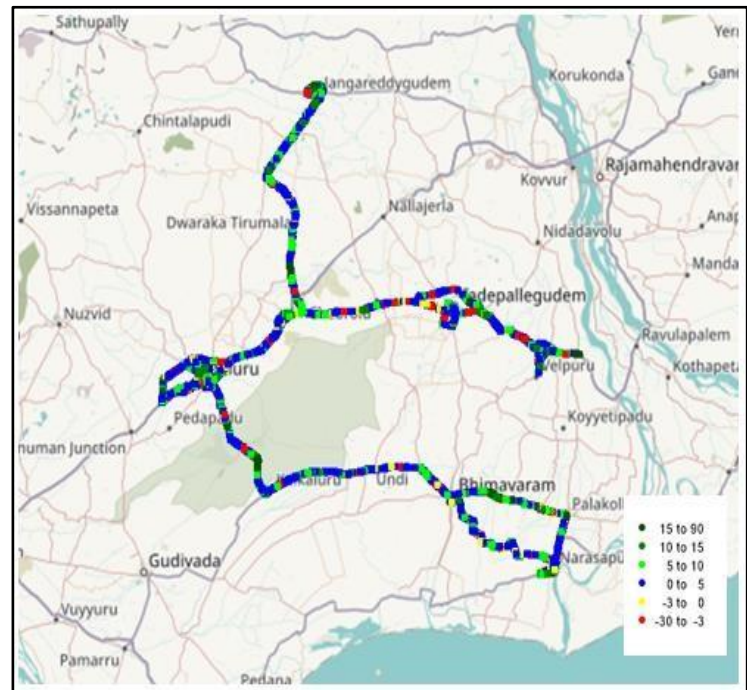
Airtel

Technology	Rx Quality %
2G	94.2
VoLTE	93.95

2G



VoLTE



Overall Rx Quality	# Samples	%
(Min, <=2)	12427316	86.59
(2, <=3)	433300	3.02
(3 , <=4)	371578	2.59
(4 , <=5)	286669	2.00
(5 , <=Max)	832259	5.80
Total	14351122	100

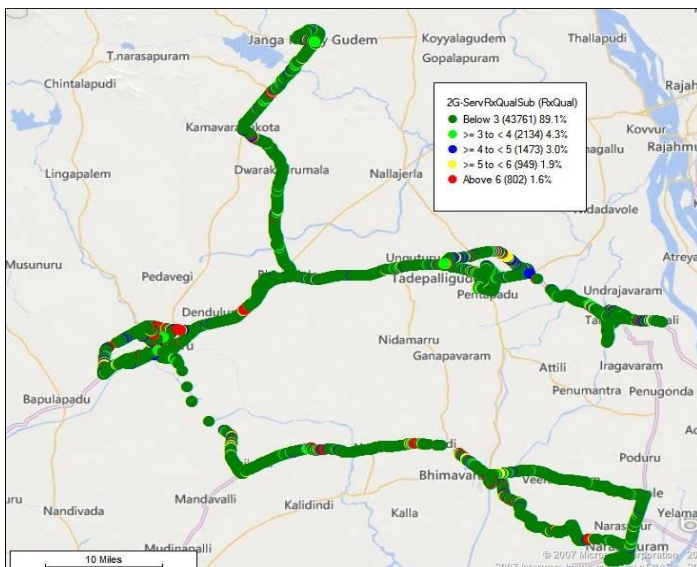
Overall SINR	# Samples	%
(Min, <=-3)	595233	3.03
(-3, <=0)	595249	3.03
(0, <=5)	4519813	26.02
(5, <=10)	8002227	46.08
(10, <=15)	1148299	6.61
(15, <=Max)	1050622	6.05
Total	17367517	100

II. Quality Details

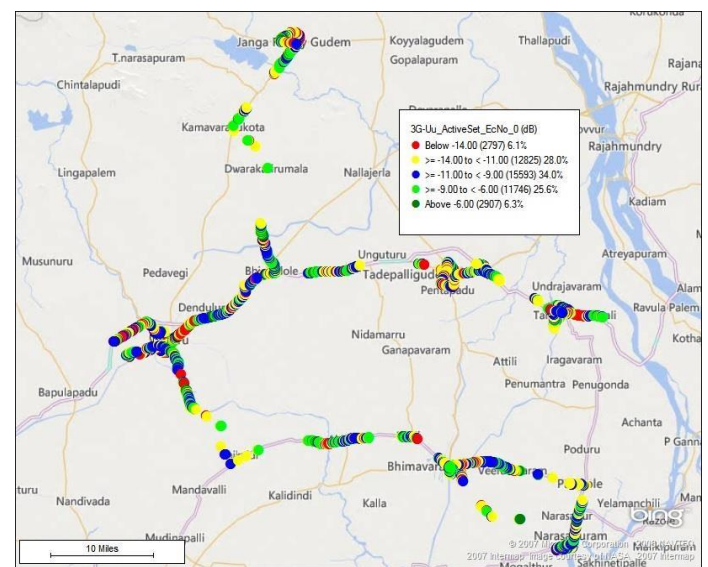
BSNL

Technology	Rx Quality %
2G	98.4
3G	93.9

2G



3G (Dual mode)



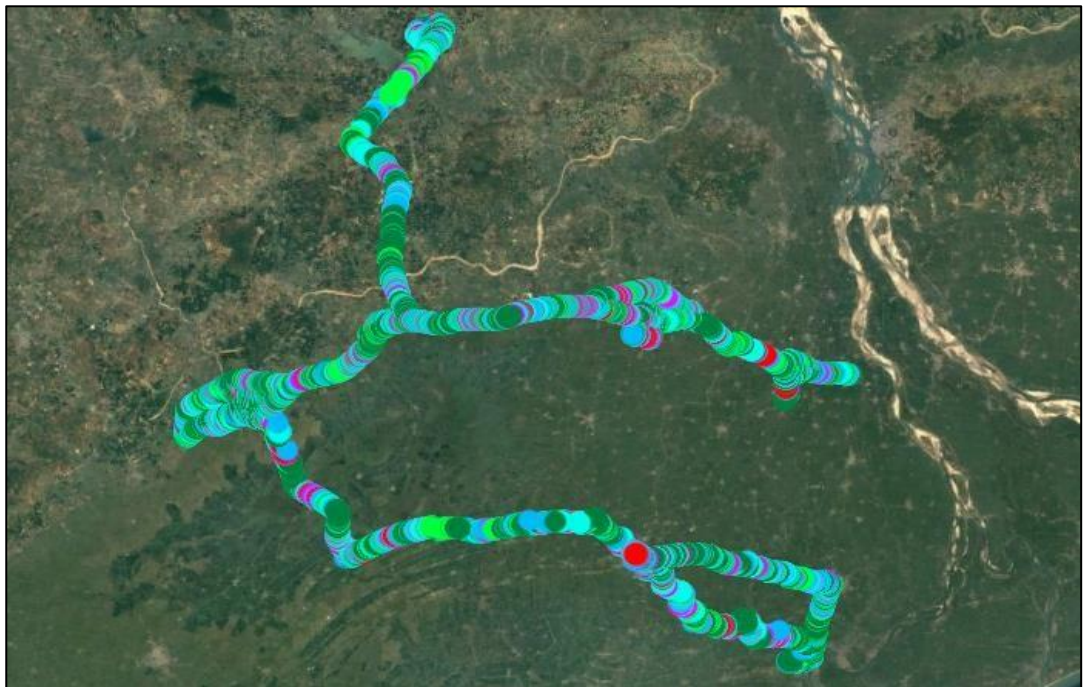
Overall Rx Quality	# Samples	%
(Min, <=2)	43761	89.1
(2, <=3)	2134	4.3
(3, <=4)	1473	3.0
(4, <=5)	949	1.9
(5, <=Max)	802	1.6
Total	49119	100

3G		
Overall EcNo	# Samples	%
(Max, <=-6)	2907	6.3
(-6, <=-9)	11746	25.6
(-9, <=-11)	15593	34.0
(-11, <=-14)	12825	28.0
(-14, <= Min)	2797	6.1
Total	45868	100

II. Quality Details

JIO

Technology	Rx Quality %
VoLTE	90.5



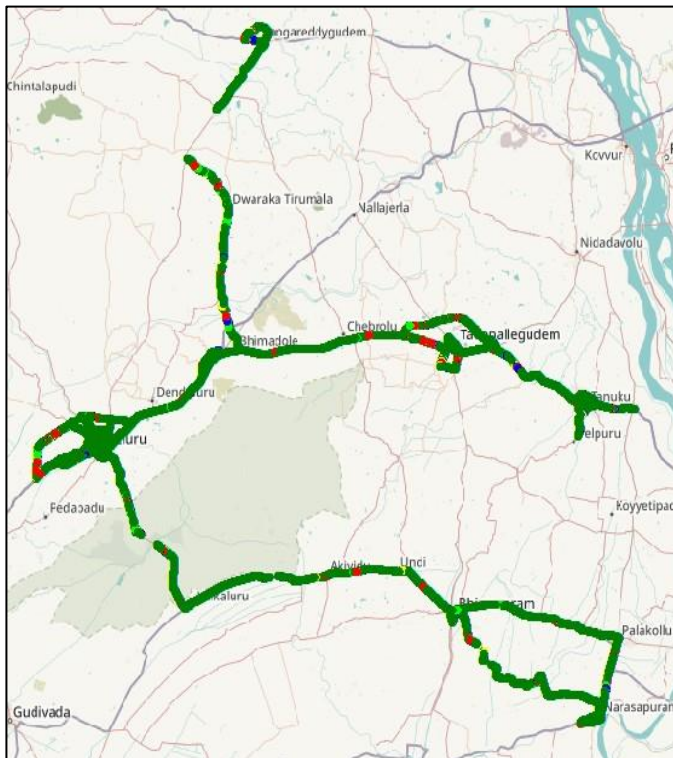
Overall SINR	# Samples	%
(Min, <=-3)	2027	3.50
(-3, <=0)	3496	6.03
(0, <=5)	10509	18.14
(5, <=10)	12336	21.29
(10, <=15)	12200	21.06
(15, <=Max)	17367	29.98
Total	57935	100

II. Quality Details

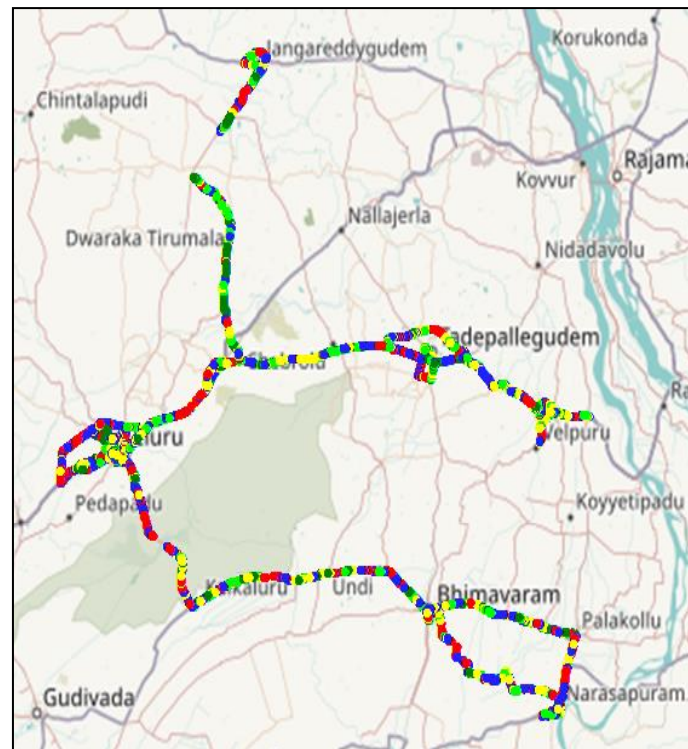
VIL

Technology	Rx Quality %
2G	96.01
VoLTE	84.94

2G



VoLTE

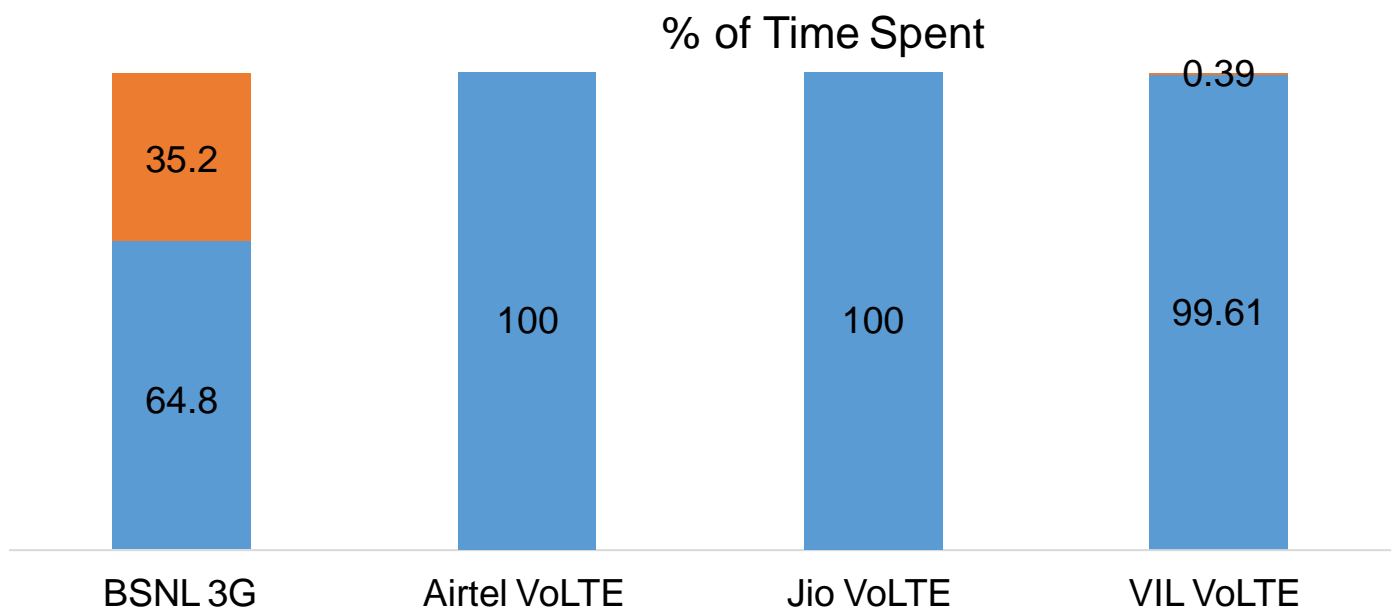


Overall Rx Quality	# Samples	%
(Min, <=2)	4690481	91.72
(2, <=3)	72750	1.42
(3, <=4)	72811	1.42
(4, <=5)	74184	1.45
(5, <=Max)	203980	3.99
Total	5114206	100

Overall SINR	# Samples	% PDF
(Min, <= -3)	555378	3.41%
(-3, <=0)	1249839	7.69%
(0, <=5)	3777601	23.24%
(5, <=10)	3613048	22.23%
(10, <=15)	2947676	18.13%
(15, <=Max)	4112047	25.30%
Total		100%

III. Technology Details

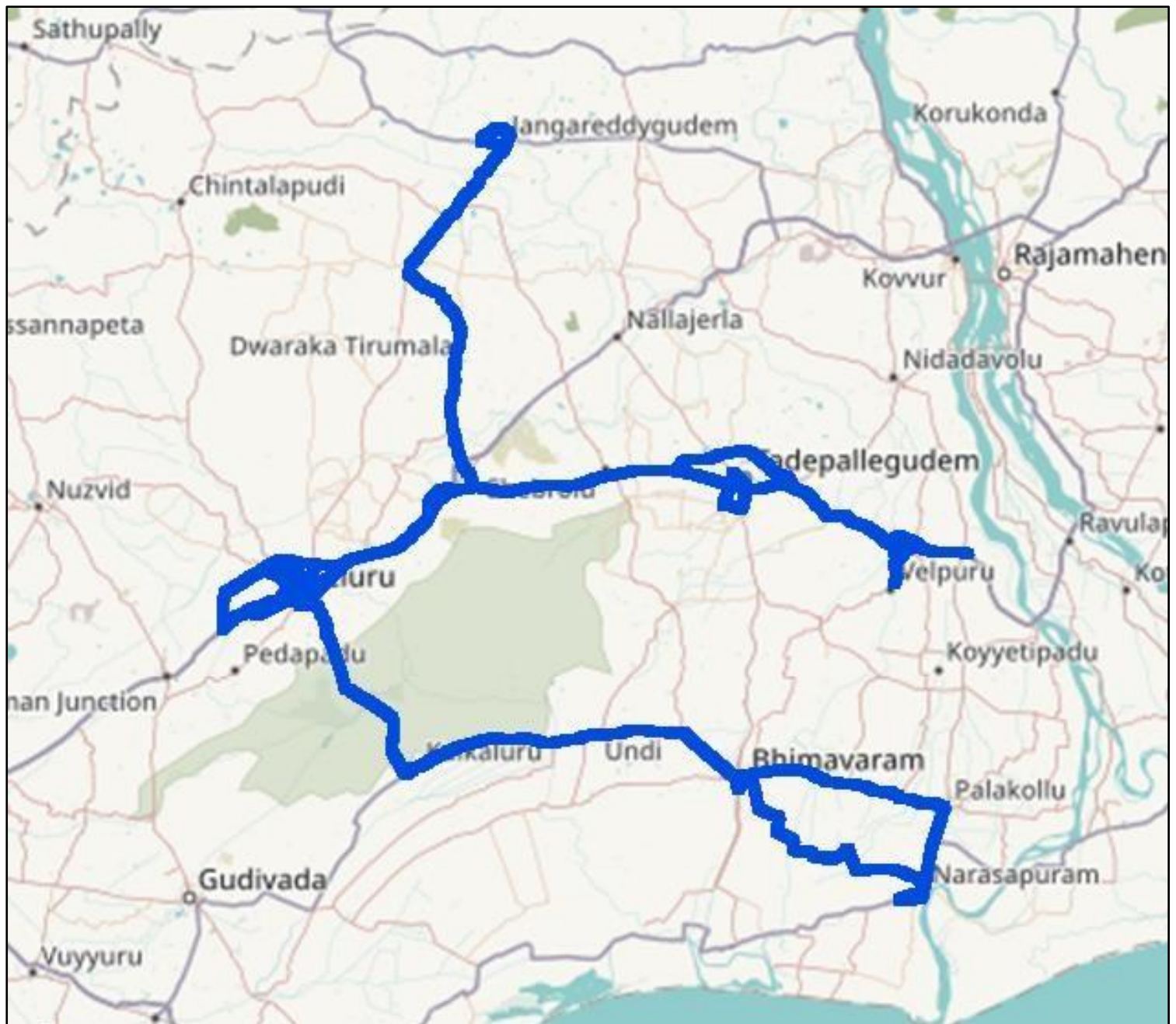
TSP	% of Time Spent on
BSNL 3G	64.8
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	99.61



III. Technology Details

Airtel

Technology	Time Spent %
VoLTE	100



III. Technology Details

BSNL

Technology	Time Spent %
3G	64.8



III. Technology Details

RJIO

Technology	Time Spent %
VoLTE	100



III. Technology Details

VIL

Technology	Time Spent %
VoLTE	99.61



IV. Dynamic Data Test- 4G DL Details

Airtel

Data Statistics - Dynamic Complete SSA 410 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	15.67



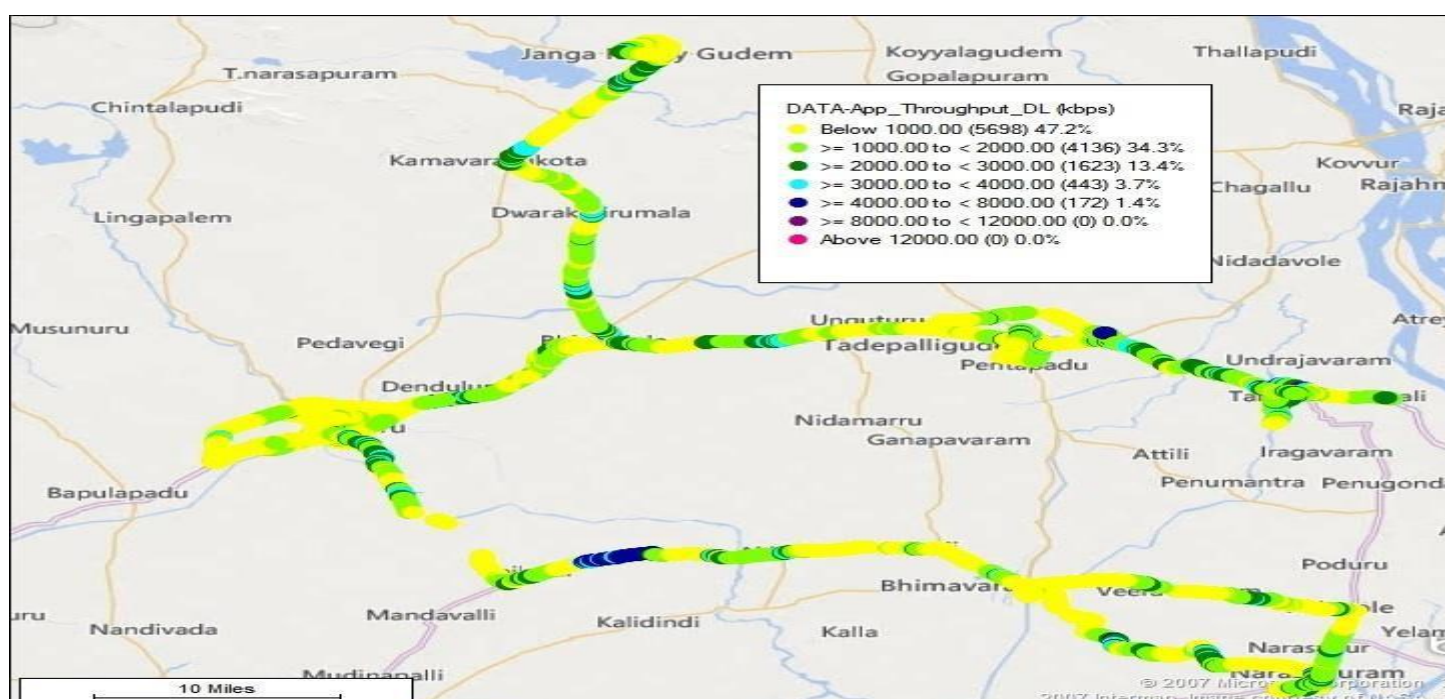
DL throughput	No of Sample	%
0 to 1 Mbps	2059698	14.9
1 to 2 Mbps	819513	5.9
2 to 3 Mbps	900525	6.5
3 to 4 Mbps	606773	4.4
4 to 8 Mbps	1906493	13.8
8 to 12 Mbps	1387494	10.1
>12 Mbps	6097769	44.26
Total	13778265	

IV. Dynamic Data Test- 3G DL Details

BSNL

Data Statistics - Dynamic Complete SSA 400 Kms

Data KPIs - Overall	3G
Download Throughput (Mbps)	1.22



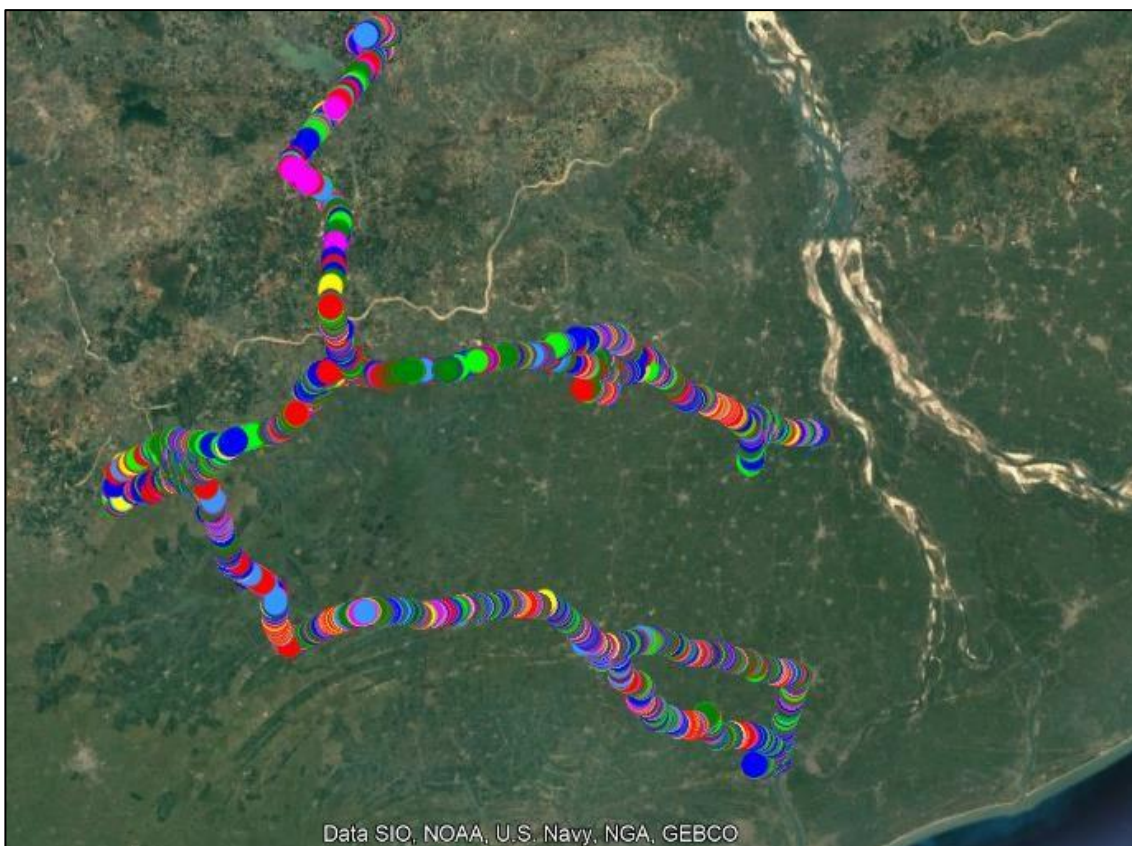
DL throughput	No of Samples	%
0 to 1 Mbps	5698	47.2
1 to 2 Mbps	4136	34.3
2 to 3 Mbps	1623	13.4
3 to 4 Mbps	443	3.7
4 to 8 Mbps	172	1.4
8 to 12 Mbps	0	0
>12 Mbps	0	0

IV. Dynamic Data Test- 4G DL Details

RJIO

Data Statistics - Dynamic Complete SSA 395 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	10.72



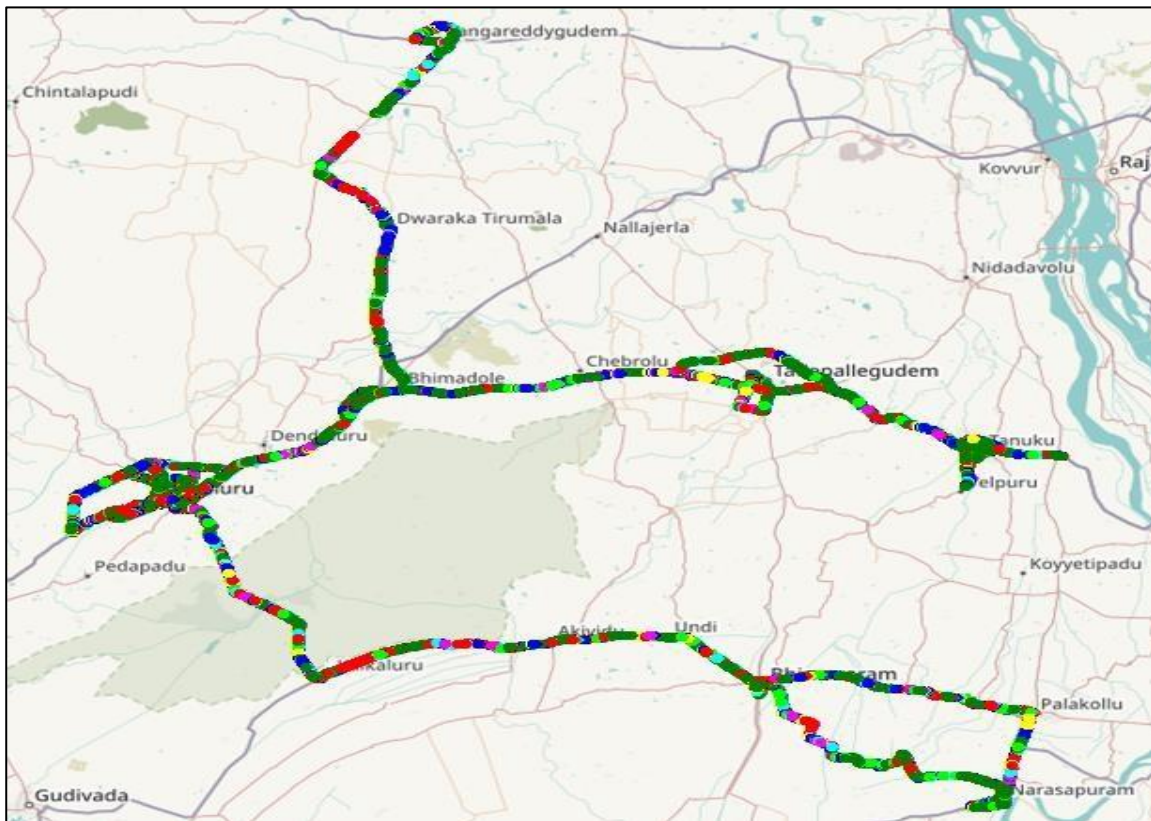
DL Throughput	No of Sample	%
0 to 1 Mbps	12743	22.99
1 to 2 Mbps	3459	6.24
2 to 3 Mbps	3335	6.02
3 to 4 Mbps	3362	6.07
4 to 8 Mbps	12991	23.44
8 to 12 Mbps	11645	21.01
>12 Mbps	7889	14.23

IV. Dynamic Data Test- 4G DL Details

VIL

Data Statistics - Dynamic Complete SSA 400 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	24.55



DL throughput	No of Sample	%
0 to 1 Mbps	1397406	8.99
1 to 2 Mbps	585717	3.78
2 to 3 Mbps	603821	3.89
3 to 4 Mbps	614641	3.96
4 to 8 Mbps	1537385	9.89
8 to 12 Mbps	1744039	11.22
>12 Mbps	9054344	58.27
Total	15537353	100

V. TRAI My Speed App

Airtel

Technology - 4G	1.Bheemavaram Busstand	2. Thanuku Busstand	3 Thadepalli gudem Railway station	4. Eluru Busstand	5. Eluru Govt Haspital	6. Eluru Railway station
Download in Mbps	56.24	77.82	39.00	91.05	103.11	84.33
Upload in Mbps	11.11	19.98	10.09	32.13	52.99	47.29

BSNL

Technology -3G	1.Bheemavaram Busstand	2. Thanuku Busstand	3. Thadepalli gudem Railway station	4. Eluru Busstand	5. Eluru Govt Haspital	6. Eluru Railway station
Download in Mbps	1.20	2.46	4.03	4.51	4.44	5.49
Upload in Mbps	1.15	1.90	1.30	1.77	1.87	1.85

JIO

Technology - 4G	1.Bheemavaram Busstand	2. Thanuku Busstand	3Thadepalli gudem Railway station	4. Eluru Busstand	5. Eluru Govt Haspital	6. Eluru Railway station
Download in Mbps	77.13	73.67	52.63	87.84	86.86	82.85
Upload in Mbps	37.33	35.65	18.52	54.80	76.66	31.97

VIL

Technology - 3G / 4G	1.Bheemavar am Busstand	2. Thanuku Busstand	3Thadepalli gudem Railway station	4. Eluru Busstand	5. Eluru Govt Haspital	6. Eluru Railway station
Download in Mbps	49.77	143.80	129.03	158.49	88.92	180.20
Upload in Mbps	13.60	85.86	60.15	58.98	29.97	83.79