Operator Assisted Drive Test Report

Nalgonda SSA
December. 2021

(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%.**

The Operator Assisted Drive Test has been carried out by Regional Office, Hyderabad with the help of Service Providers in Nalgonda SSA and surrounding areas Bhongir, Suryapet, Kodada, Miryalaguda from 9:00 AM to 8:00 PM during 20th December to 23rd Dec 2021. The drive test covered drive route of 380 plus KMs & 6 hotspot over a period of 4 days. Approximately 500+ 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

Regional Office, TRAI Hyderabad conducted Operator Assisted Drive Test from 20th to 23h Dec. 2021 covering various locations in Nalgonda town & surrounding regions Bhongir, Miryalaguda, Suryapeta and Kodada. The performance of Airtel, BSNL, Vodafone Idea and Jio 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 380 + KMs over a period of 3 days from 20th to 23th Dec. 2021. Approximately 500 + 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 Test:

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

* 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 PayTm
Latency	32 Bytes on www.google.com

Overview

Voice & Dynamic Data Test Drive Route
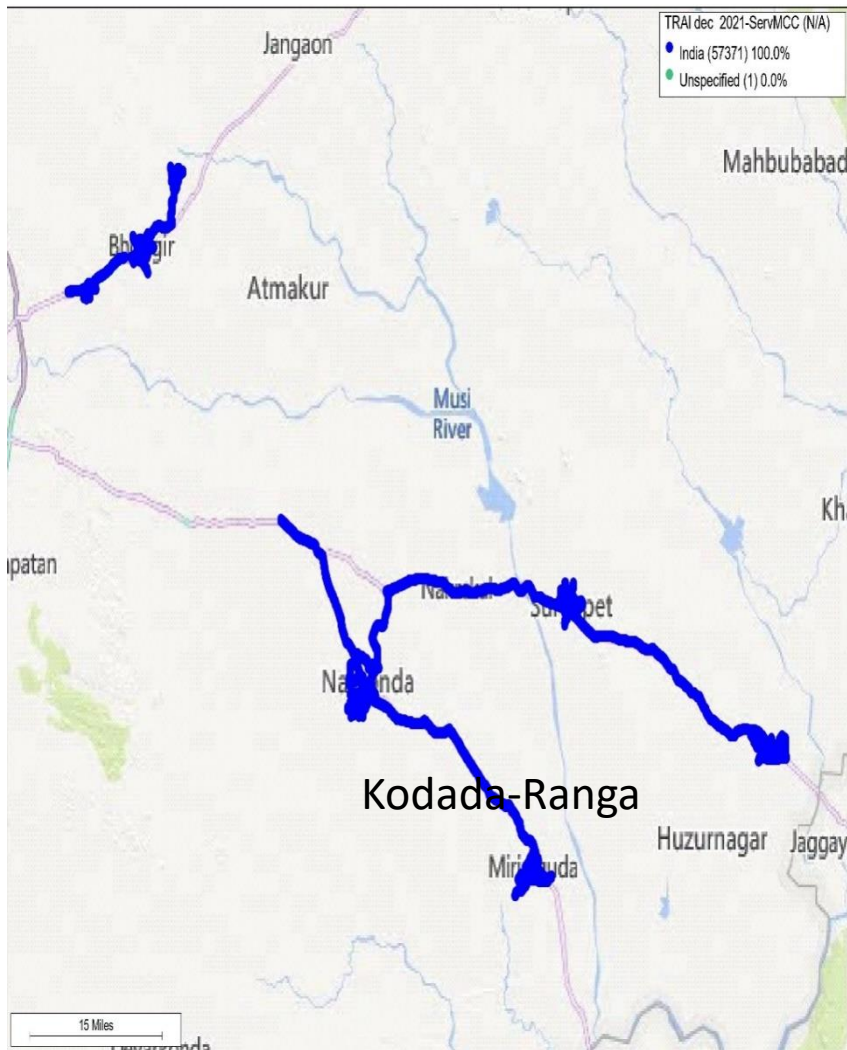
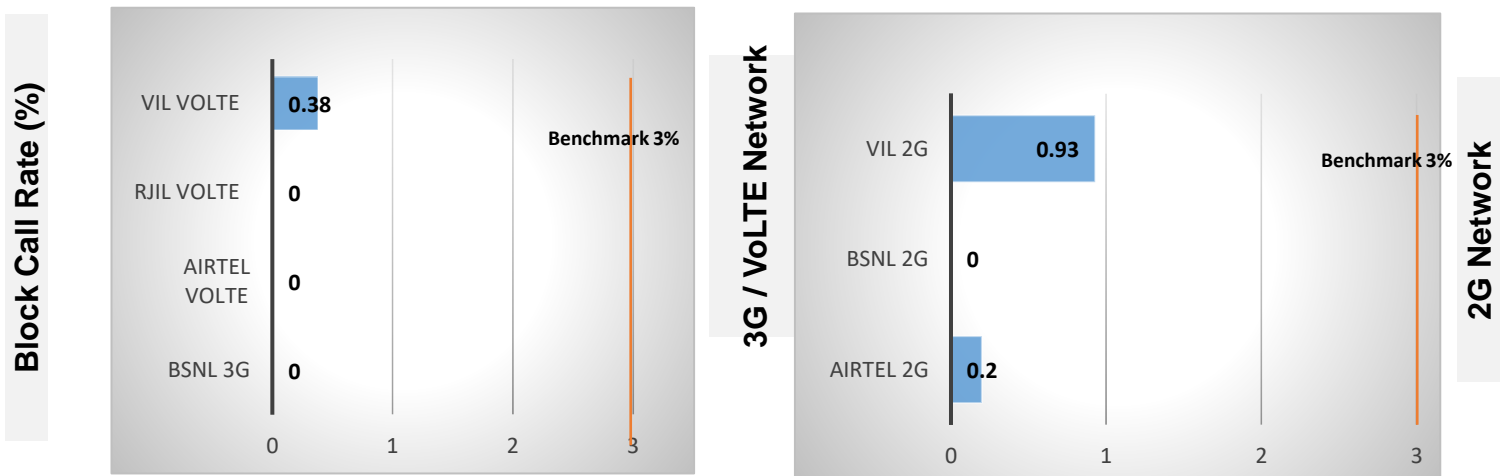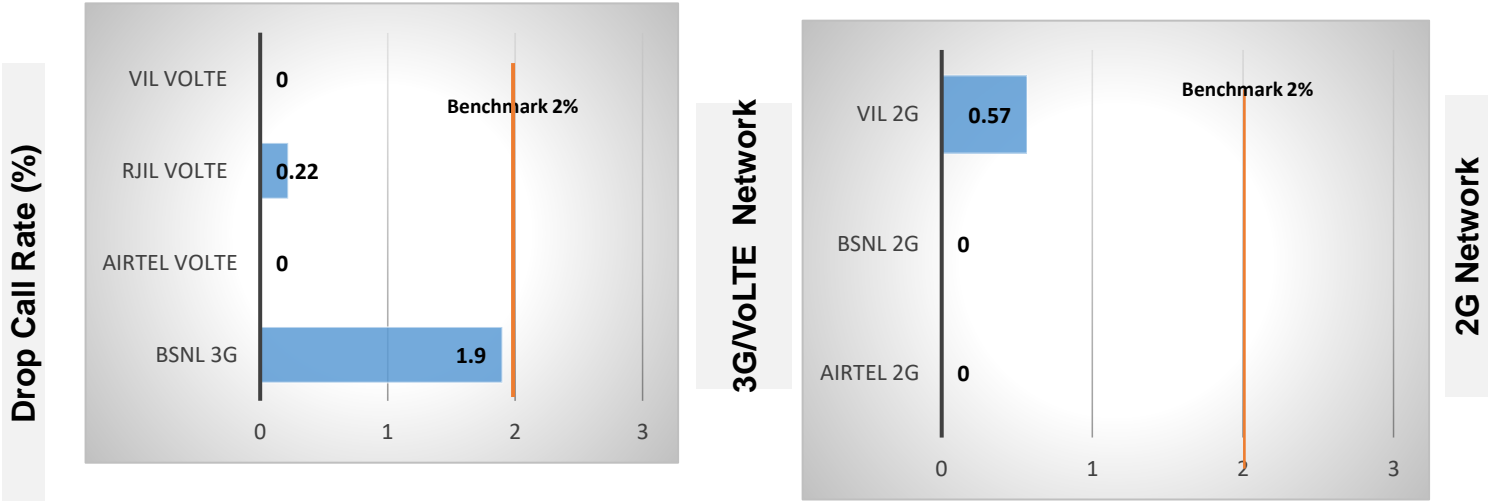| Areas Covered –Nalgonda	
Railway station area	Bhongiri hyd road
Clock Tower Road	Chityala to Nalgonda Main road
NG collage Area	Areas covered – Suryapet
Nalgonda Town	Suryapet town
Prakasham Bazaar Road	New Bus stand area
Bus stand area	Kuda Kuda Road
VT colony area	Govt Jr. collage area
Sri nagar Colony	Patha Bus stand area
Miryalaguda Town	Jongon X roads
Sagar Road	PJR Centre area
Nalgonda to Miryalaguda Main Road	Nalgonda to Suryapet Main Road
Reddy colony	Kodad Town
Areas Covered-Yadagiri Bhongiri	**Suryapet to Kodad Main Road**
Bibinagar Town	Khamama/ Huzurnagar Rd
Bhongiri town	Kodad Bus stand area
Pahadi Nagar	Gunji bazaar area
Bhongiri Nalgonda Road	Sri nagar Colony
Samd Chaursta Road	Ranga Theater X Roads

Data Service Test- Static Locations

Static Locations
Yadagiri Gutta Bus Stand
Miryalaguda Bus Stand
Suryapeta New Bus Stand
Ranga Theatre /X Rd - Kodad
RTC Bus Stand - Nalgonda
Railway Station - Nalgonda

Voice Calls

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

Drop Call Rate (%) — 3G/VoLTE Network

- VIL VOLTE: 0
- RJIL VOLTE: 0.22
- AIRTEL VOLTE: 0
- BSNL 3G: 1.9

Benchmark 2%

2G Network

- VIL 2G: 0.57
- BSNL 2G: 0
- AIRTEL 2G: 0

Benchmark 2%

Block Call Rate (%) — 3G / VoLTE Network

- VIL VOLTE: 0.38
- RJIL VOLTE: 0
- AIRTEL VOLTE: 0
- BSNL 3G: 0

Benchmark 3%

2G Network

- VIL 2G: 0.93
- BSNL 2G: 0
- AIRTEL 2G: 0.2

Benchmark 3%

KPIs	2G			3G	VoLTE		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0	0	0.57	1.9	0	0.22	0
Block Call Rate %	0.20	0	0.93	0	0	0	0.38

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 %	85	98.5	92.70

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

TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Coverage %	76.4	99	98.22	98.43

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

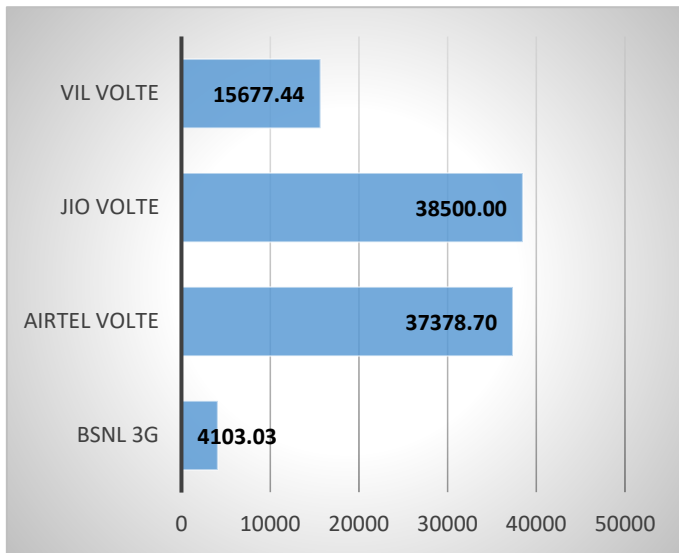| TSPs	3G	VoLTE		
	BSNL	Airtel	VIL	JIO
Time Spent on 3G/4G %	27.2	100	99.67	100

Data Services Static

Data was tested at 6 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing delay (Flipkart, Amazon, PayTm)
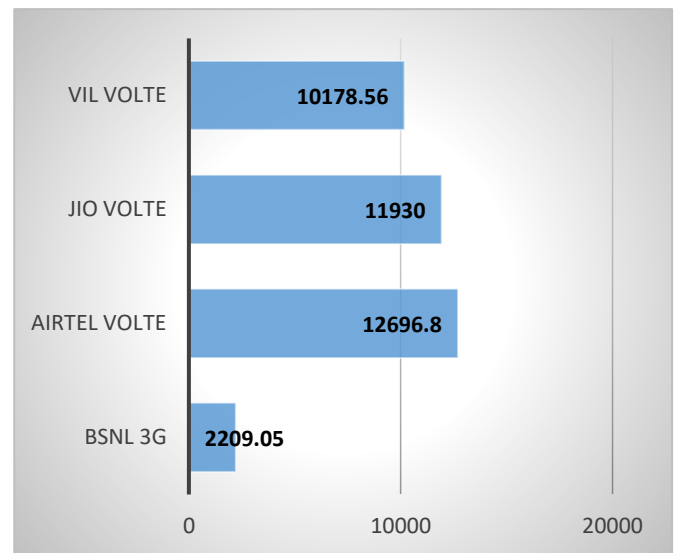
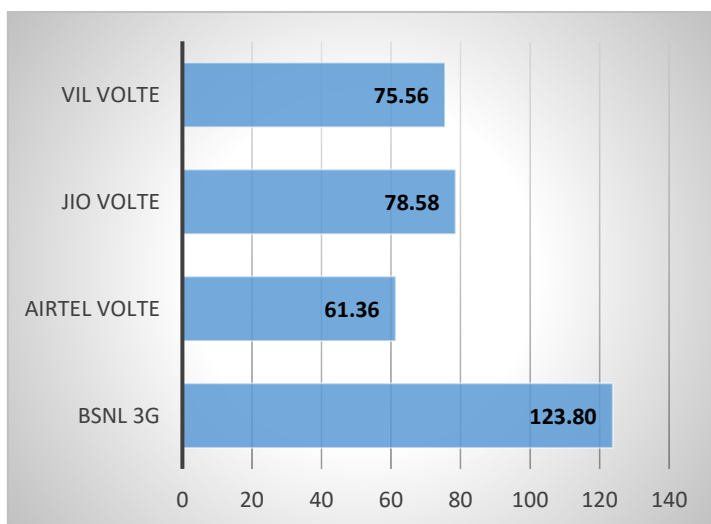## Data Download and Upload Performance (kbps)
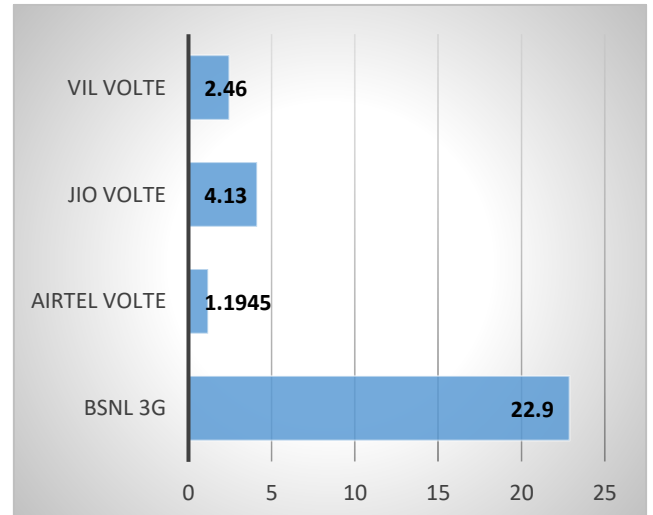
3G/4G/ Network:

Download Throughput (kbps)

VIL VOLTE	15677.44
JIO VOLTE	38500.00
AIRTEL VOLTE	37378.70
BSNL 3G	4103.03

(x-axis: 0, 10000, 20000, 30000, 40000, 50000)

Upload Throughput (kbps)

VIL VOLTE	10178.56
JIO VOLTE	11930
AIRTEL VOLTE	12696.8
BSNL 3G	2209.05

(x-axis: 0, 10000, 20000)

Latency (ms)

VIL VOLTE	75.56
JIO VOLTE	78.58
AIRTEL VOLTE	61.36
BSNL 3G	123.80

(x-axis: 0, 20, 40, 60, 80, 100, 120, 140)

Web Browsing delay (Sec)

VIL VOLTE	2.46
JIO VOLTE	4.13
AIRTEL VOLTE	1.1945
BSNL 3G	22.9

(x-axis: 0, 5, 10, 15, 20, 25)

Summary

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	506	573	535
Blocked Call Rate (%)	0.20	0	0.93
CSSR% (Accessibility)	99.80	100	99.07
Drop Call Rate (%)	0	0	0.57
Mobility HOSR (%)	99.37	99.56	98.38
Rx Quality (%)	95.05	98.8	96.90

Voice Call				
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	157	515	446	521
Blocked Call Rate (%)	0	0	0	0.38
CSSR% (Accessibility)	100	100	100	99.62
Drop Call Rate (%)	1.9	0.0	0.22	0
Mobility HOSR (%)	100	100	98.33	99.51
Rx Quality (%)	97.8	91.1	94.13	78.25

Summary

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	67.59	142.27	184.50
Upload Throughput (kbps)	29.55	129.38	163.48
Web Browsing Delay (sec)	6.51	59.27	33.56
Latency (msec)	248.1	275.41	267.66

Data Services Static				
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Download Throughput (kbps)	4103.03	37378.7	38500.00	15677.44
Upload Throughput (kbps)	2209.05	12696.8	11930.00	10178.56
Web Browsing Delay (sec)	22.90	1.1945	4.13	2.46
Latency (msec)	123.8	61.3633	78.58	75.555

Yadagiri Gutta 9Yadadri) Pilgrim place	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	49.12	123.83	207.75
Upload Throughput (kbps)	30.77	172.08	114.28
Web Browsing Delay (sec)	8.12	75.19	43.05
Latency (msec)	270	266.2	332.0

Miryalaguda TSRTC Bus Stand	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	64.72	129.0	151.13
Upload Throughput (kbps)	30.09	116	148.40
Web Browsing Delay (sec)	6.65	35.36	19.68
Latency (msec)	345.6	447.27	230

Suryapet TSRTCBus Stand	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	75.64	99.76	160.89
Upload Throughput (kbps)	31.45	98.11	146.80
Web Browsing Delay (sec)	4.21	74.65	33.49
Latency (msec)	227	271.1	299

KodadaSai Ranga Theatre	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	75.61	199.5	134.83
Upload Throughput (kbps)	31.04	169.97	255.82
Web Browsing Delay (sec)	5.25	45.91	37.56
Latency (msec)	221	339.5	291

Nalgonda Railway Station	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	65.17	217.47	258.25
Upload Throughput (kbps)	24.74	148.14	164.31
Web Browsing Delay (sec)	6.6	46.74	32.71
Latency (msec)	206	191.8	213

Nalgonda TS RTC Bus Stand	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	65.21	84.10	194.20
Upload Throughput (kbps)	29.21	72.03	151.31
Web Browsing Delay (sec)	8.3	77.81	34.91
Latency (msec)	220	136.7	241

Data Services static

Yadagiri Gutta 9Yadadri) Pilgrim place	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (kbps)	BSNL is not offering 3G services in Yadagirigutta	41150.54	42270.00	13690.88
Upload Throughput (kbps)		11938.69	17280.00	9492.48
Web Browsing Delay (sec)		1.29	4.23	3.11
Latency (msec)		63.35	70.17	75

Miryalaguda TSRTC Bus Stand	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (kbps)	BSNL is not offering 3G services in Miryalagiuda	26723.46	36570.00	17633.28
Upload Throughput (kbps)		9147.57	15220.00	6205.44
Web Browsing Delay (sec)		1.24	3.54	2.45
Latency (msec)		61.35	62.83	81

Suryapet TSRTCBus Stand	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (kbps)	BSNL is not offering 3G services in Suryapet	51804.22	32420.00	18186.24
Upload Throughput (kbps)		15041.92	3210.00	8161.28
Web Browsing Delay (sec)		1.24	4.24	2.32
Latency (msec)		54.16	82.83	83

Summary

Kodada Sai Ranga Theatre	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (kbps)	4103.03	26047.68	26450.00	16128
Upload Throughput (kbps)	2209.05	14723.84	14910.00	17582.08
Web Browsing Delay (sec)	22.90	1.0	4.8	2.23
Latency (msec)	123.8	87.01	72.5	72

Nalgonda Railway Station	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (kbps)	*BSNL is not offering 3G services in Nalgonda Town	34829.65	43440.00	49880.00
Upload Throughput (kbps)		11183.93	13190.00	7790.00
Web Browsing Delay (sec)		1.32	3.97	4.04
Latency (msec)		51.11	100.17	83

Nalgonda TS RTC Bus Stand	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download Throughput (kbps)	*BSNL is not offering 3G services in Nalgonda Town	40299.90	49880.00	14940.16
Upload Throughput (kbps)		14144.32	7790.00	9820.16
Web Browsing Delay (sec)		0.97	4.04	2.58
Latency (msec)		51.2	83	72.33

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	83.63
BSNl 2G	98.5
VIL 2G	92.7
BSNL 3G	76.4
Airtel VoLTE	98.74
Jio VoLTE	98.22
VIL VoLTE	98.43

COVERAGE DISTRIBUTION %

Legend:
- 2G:[Max,>=-75] 3G:Max,>=-70 VoLTE:>=80
- 2G:[-75,>=-85] 3G:[-70,>=-80] VoLTE:[-80,>=-90]
- 2G:[-85,>=-95] 3G:[-80,>=-90] VoLTE:[-90,>=-110]
- 2G:[-95,>=Min] 3G:[-90,>=Min] VoLTE:[-110,>=Min]
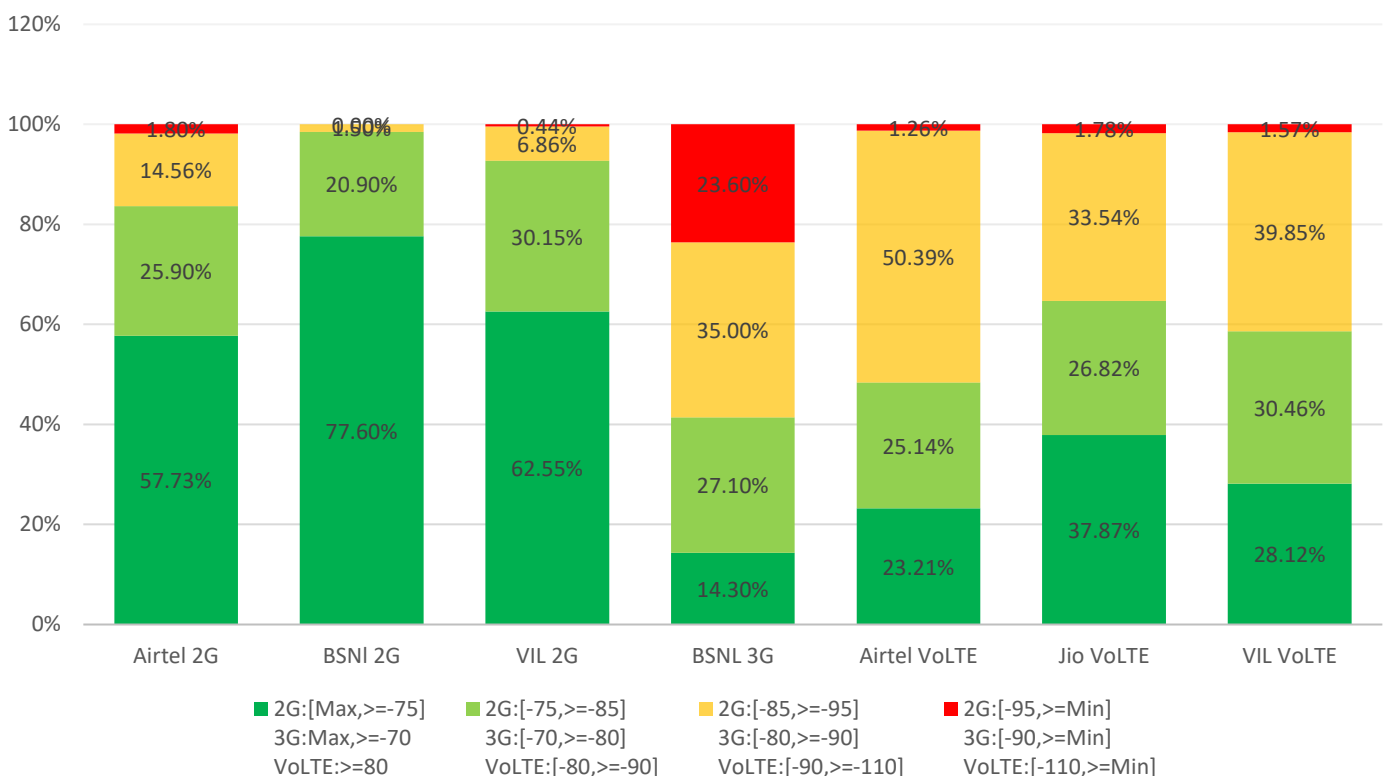
AIRTEL

Technology	Coverage Rate %
2G	83.63
VoLTE	98.74
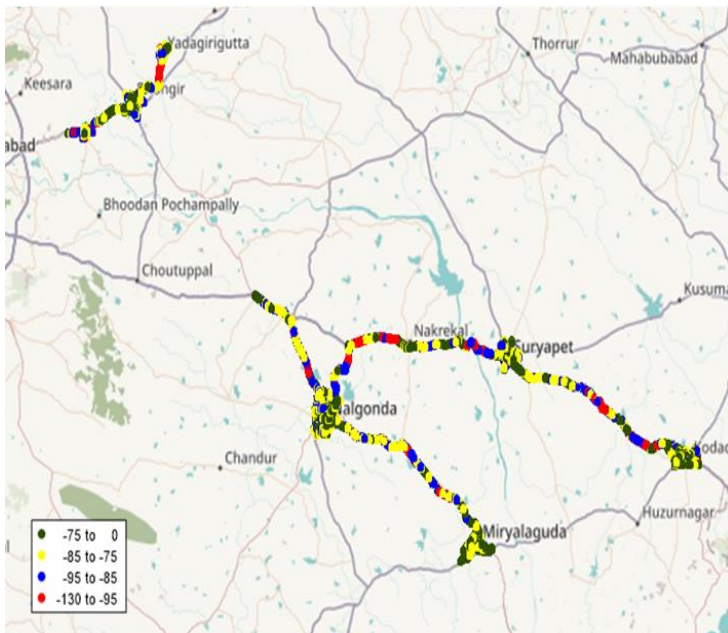
2G	**VoLTE**

2G
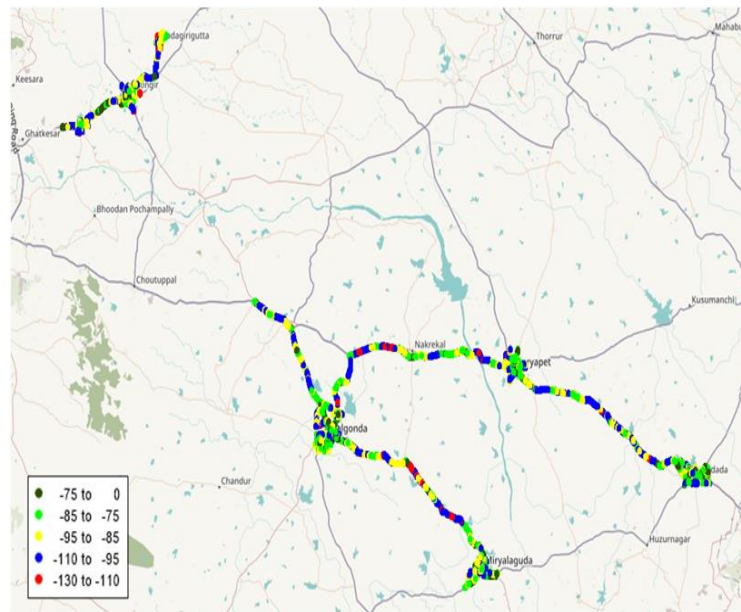
Overall RxLevel	# Samples	% PDF
[Max, >=-75]	11044773	57.73%
[-75, >=-85)	4955617	25.90%
[-85, >=-95)	2785451	14.56%
[-95, >=Min)	344485	1.80%
Total	19130326	100%

VoLTE

Overall RSRP	# Samples	% PDF
[Max, >=-80]	3903479	23.21%
[-80, >=-90)	4227262	25.14%
[-90, >=-110)	8473502	50.39%
[-110, >=Min)	211339	1.26%
Total	16815582	100%

BSNL

Technology	Coverage Rate %
2G	98.5
3G	76.4
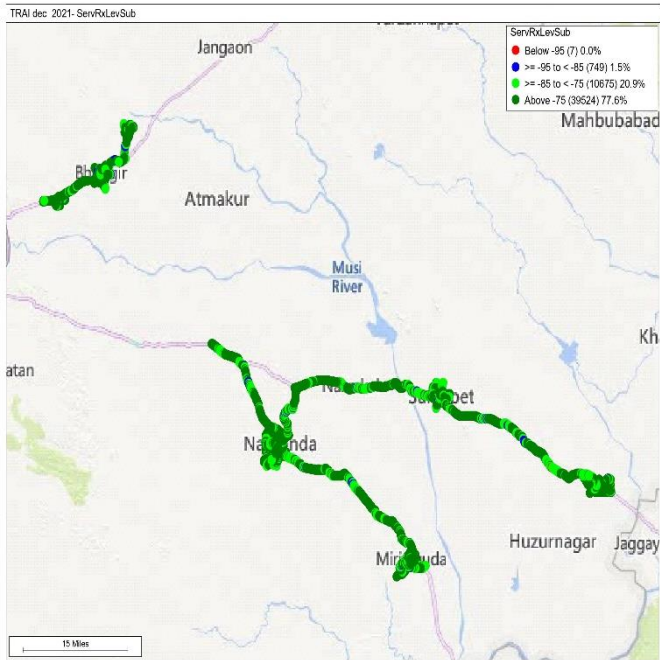
2G	3G
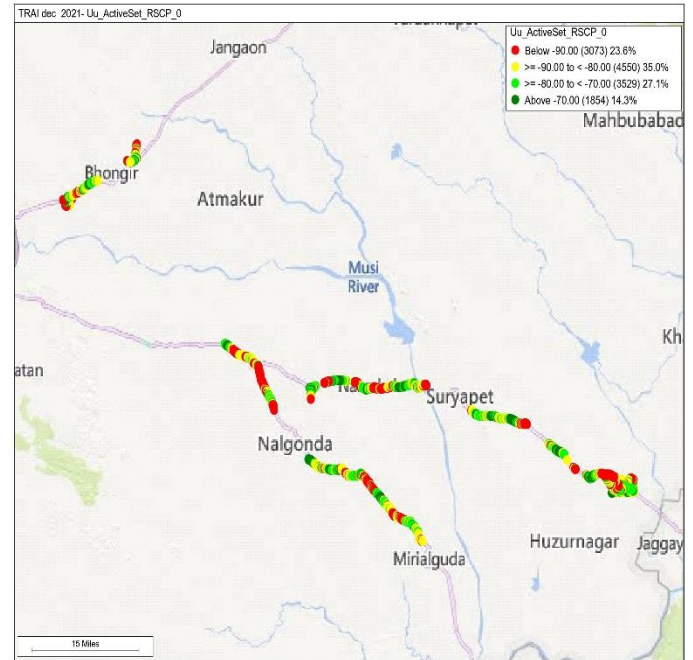
2G		
Overall RxLevel	# Samples	% PDF
[Max, >=-75]	39524	77.6%
[-75, >=-85)	10675	20.9%
[-85, >=-95)	749	1.5%
[-95, >=Min)	7	0.0%
Total	50206	100%

3G		
Overall RSCP	# Samples	% PDF
[Max, >=-70]	1854	14.3%
[-70, >=-80)	3529	27.1%
[-80, >=-90)	4550	35.0%
[-90, >=Min)	3073	23.6%
Total	13006	100%

JIO

Technology	Coverage Rate %
VoLTE	98.22

LTE KPI PCell Serving RSRP[dBm]

● -80 <= x (37.87%, 16740)
● -90 <= x < -80 (26.82%, 11855)
● -110 <= x < -90 (33.54%, 14826)
● x < -110 (1.78%, 788)
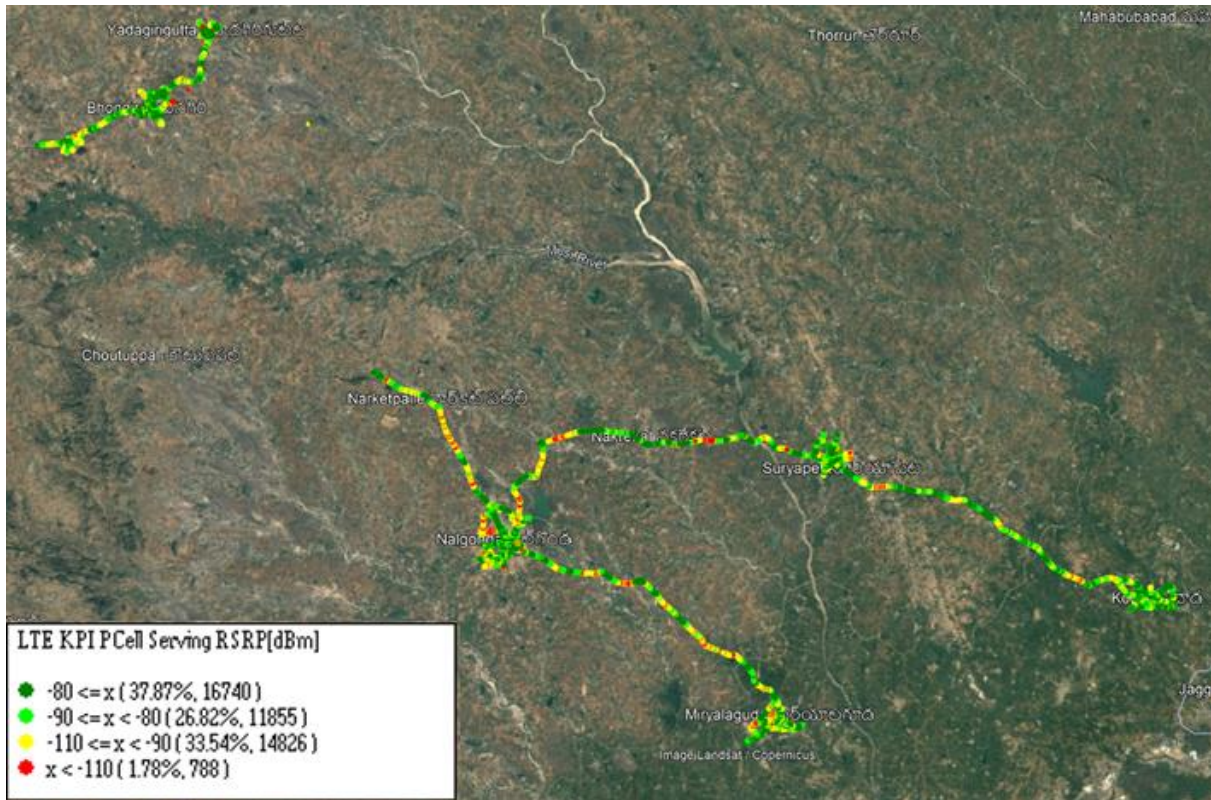
VoLTE		
Overall RSRP	# Samples	% PDF
[Max, >=-80]	16740	37.87%
[-80, >=-90)	11855	26.82%
[-90, >=-110)	14826	33.54%
[-110, >=Min)	788	1.78%
Total	44209	100%

VIL

Technology	Coverage Rate %
2G	92.70
VoLTE	98.43

2G	VoLTE
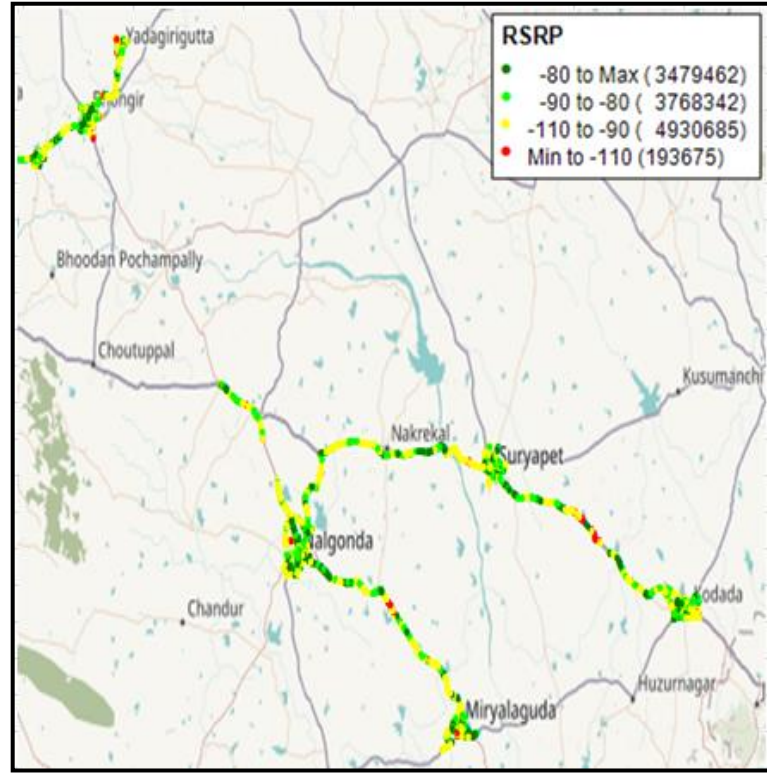
2G			VoLTE		
Overall RxLevel	# Samples	% PDF	Overall RSRP	# Samples	% PDF
[Max, >=-75]	2867844	62.55%	[Max, >=-80]	3479462	28.12%
[-75, >=-85)	1382469	30.15%	[-80, >=-90)	3768342	30.46%
[-85, >=-95)	314721	6.86%	[-90, >=-110)	4930685	39.85%
[-95, >=Min)	19570	0.44%	[-110, >=Min)	193675	1.57%
Total	4584604	100 %	Total	12372164	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	94.8
BSNl 2G	99.5
VIL 2G	96.9
BSNL 3G	96.8
Airtel VoLTE	91.00
Jio VoLTE	94.13
VIL VoLTE	78.25

Rx Quality Distribution

Rx Quality 2G:[<=5] 3G:[EcNo>=-14 dBm] VoLTE:[SINR>0]
Rx Quality 2G:[>5] 3G:[EcNo<-14 dBm] VoLTE:[SINR<=0]
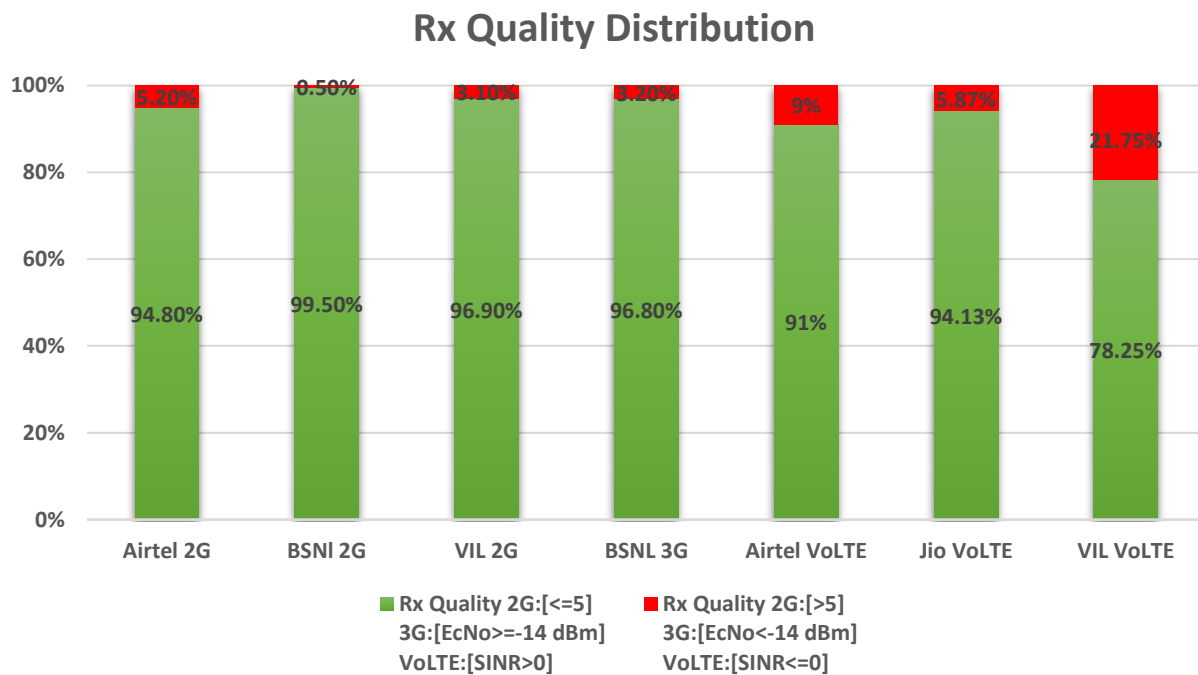
Airtel

Technology	Rx Quality %
2G	94.8
VoLTE	91.00

2G	VoLTE
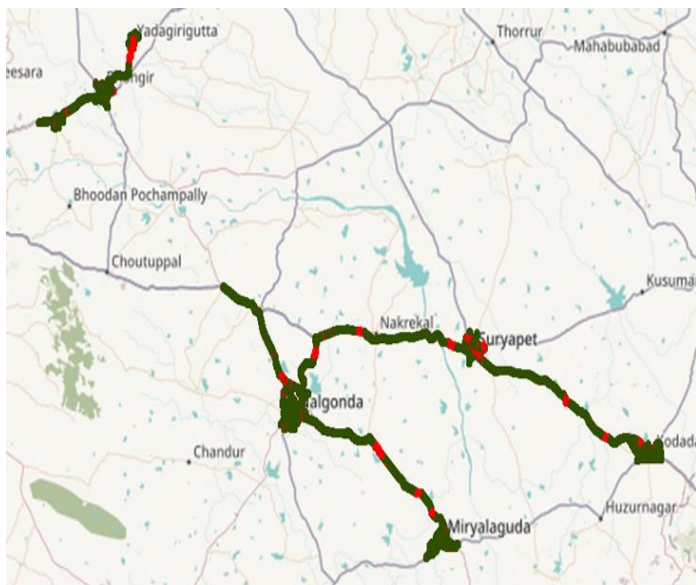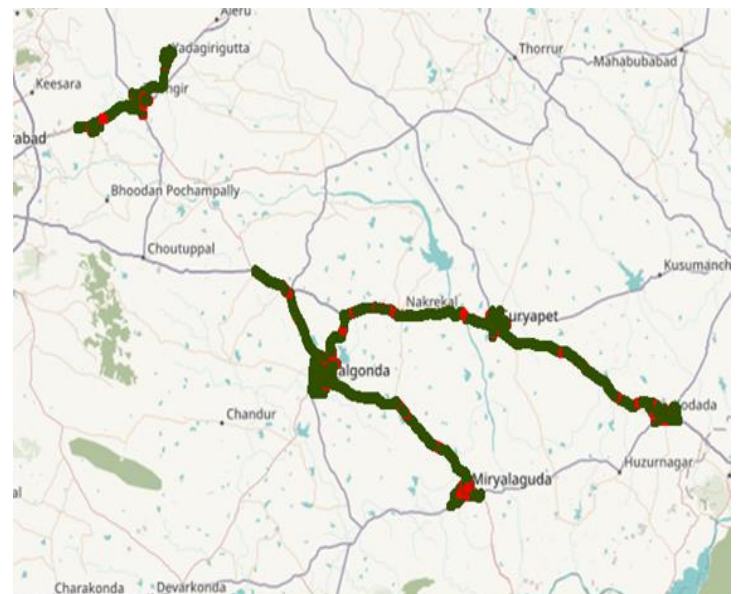
Overall Rx Quality	# Samples	% PDF
(Min, <=2)	10811652	72.77%
(2, <=3)	888628	5.98%
(3 , <=4)	1332944	8.97%
(4 , <=5)	1051544	7.08%
(5 , <=Max)	772003	5.20%
Total	14856771	100%

Overall SINR	# Samples	% PDF
(Min, <=0)	1517192	9.00%
(0, <=5)	3987711	23.66%
(5, <=10)	4447831	26.39%
(10, <=15)	1993855	11.83%
(15, <=Max)	4907952	29.12%
Total	16854541	100.00%

BSNL

Technology	Rx Quality %
2G	99.5
3G	96.8

2G
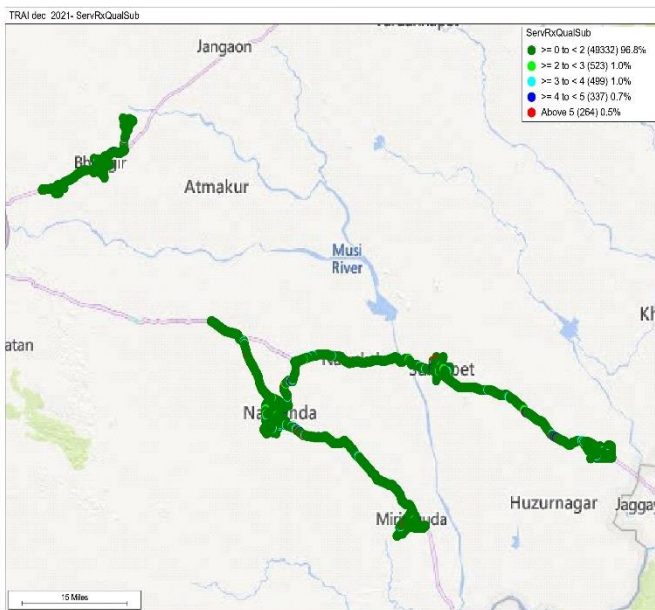
3G

Overall Rx Quality	# Samples	% PDF
(Min, <=2)	49332	96.8%
(2, <=3)	523	1.0%
(3 , <=4)	499	1.0%
(4 , <=5)	337	0.7%
(5 , <=Max)	264	0.5
Total	50955	100%

Overall EcNo	# Samples	% PDF
(Max, <=-6)	4029	31.0%
(-6, <=-9)	4090	31.4%
(-9, <=-11)	3089	23.8%
(-11, <=-14)	1386	10.7%
(-14, <= Min)	412	3.2%
Total	13006	100%

JIO

Technology	Rx Quality %
VoLTE	94.13

LTE KPI PCell SINR[dB]

- 15 <= x < 30 (29.80%, 13128)
- 10 <= x < 15 (21.38%, 9417)
- 5 <= x < 10 (21.82%, 9610)
- 0 <= x < 5 (21.13%, 9309)
- x < 0 (5.87%, 2587)
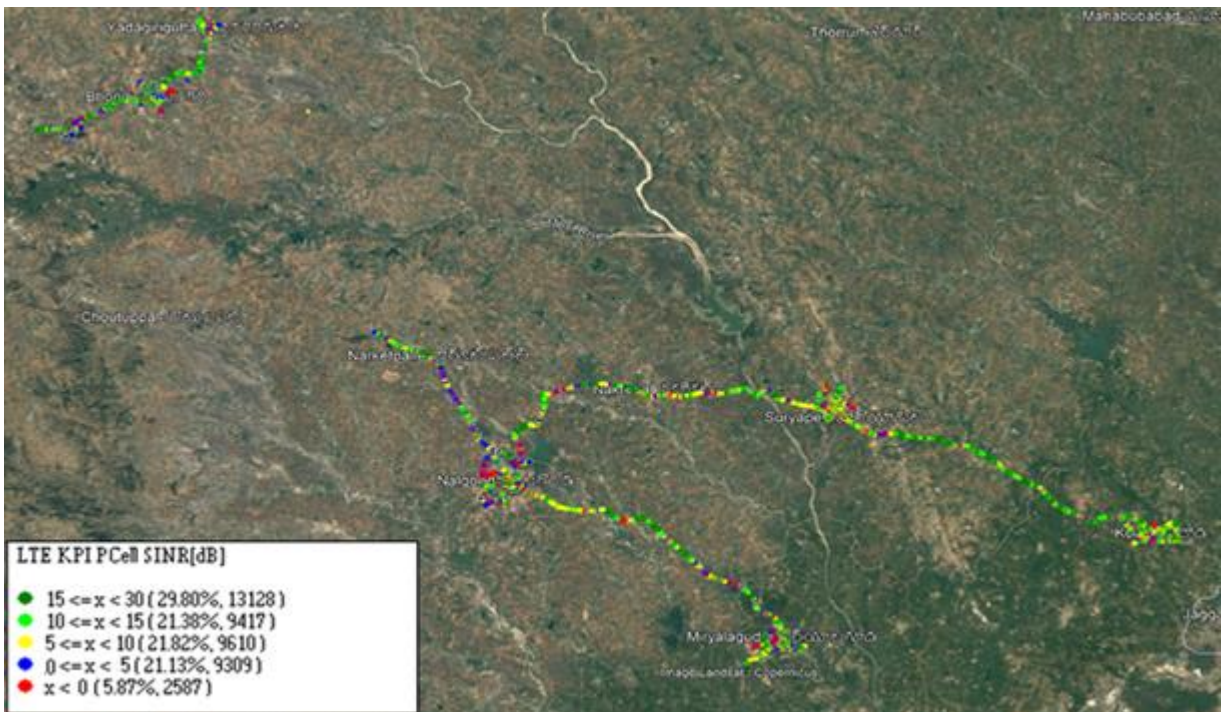
Overall SINR	# Samples	% PDF
(Min, <=0)	2587	5.87%
(0, <=5)	9309	21.13%
(5, <=10)	9610	21.82%
(10, <=15)	9417	21.28%
(15, <=Max)	13128	29.80%
Total	**38051**	**100%**

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%.
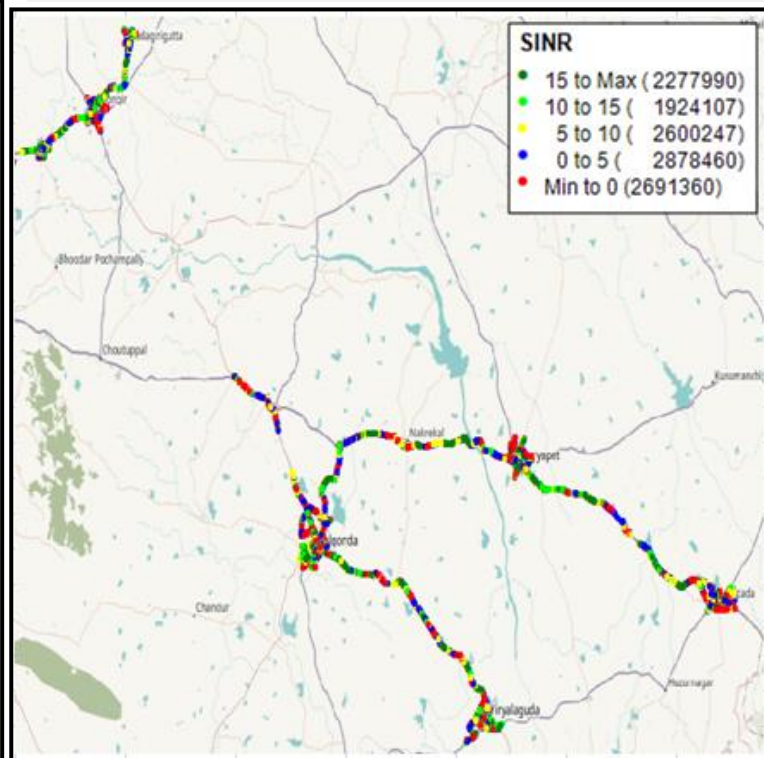
VIL

Technology	Rx Quality %
2G	96.90
VoLTE	78.25

2G	**VoLTE**
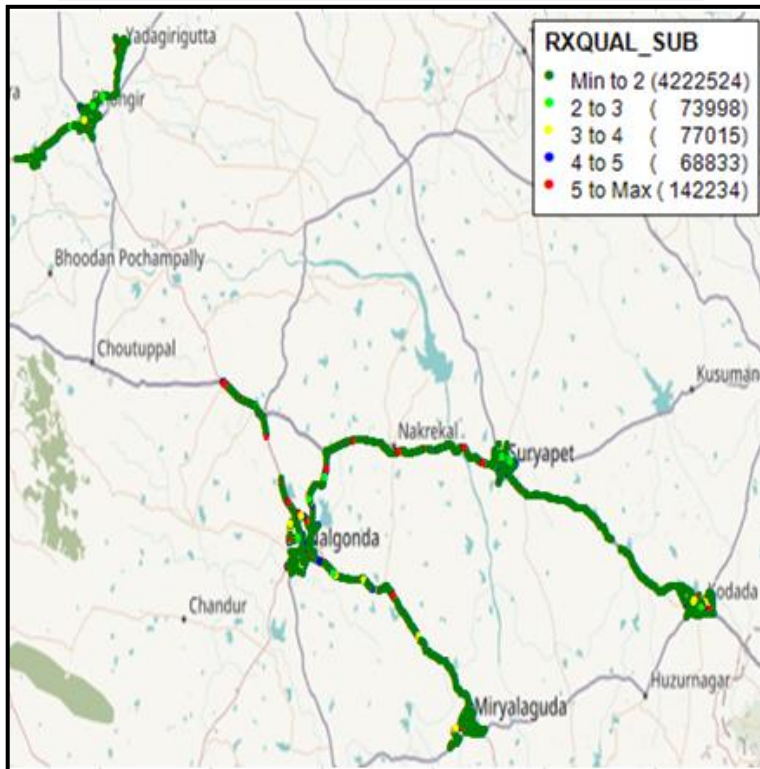
Overall Rx Quality	# Samples	% PDF	Overall SINR	# Samples	% PDF
(Min, <=2)	4222524	92.11%	(Min, <=0)	2691360	21.75%
(2, <=3)	73998	1.61%	(0, <=5)	2878460	23.27%
(3 , <=4)	77015	1.68%	(5, <=10)	2600247	21.02%
(4 , <=5)	68833	1.50%	(10, <=15)	1924107	15.55%
(5 , <=Max)	142234	3.10%	(15, <=Max)	2277990	18.41%
Total	**4584604**	**100%**	**Total**	**12372164**	**100%**

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	27.2
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	99.67

Technology Distribution
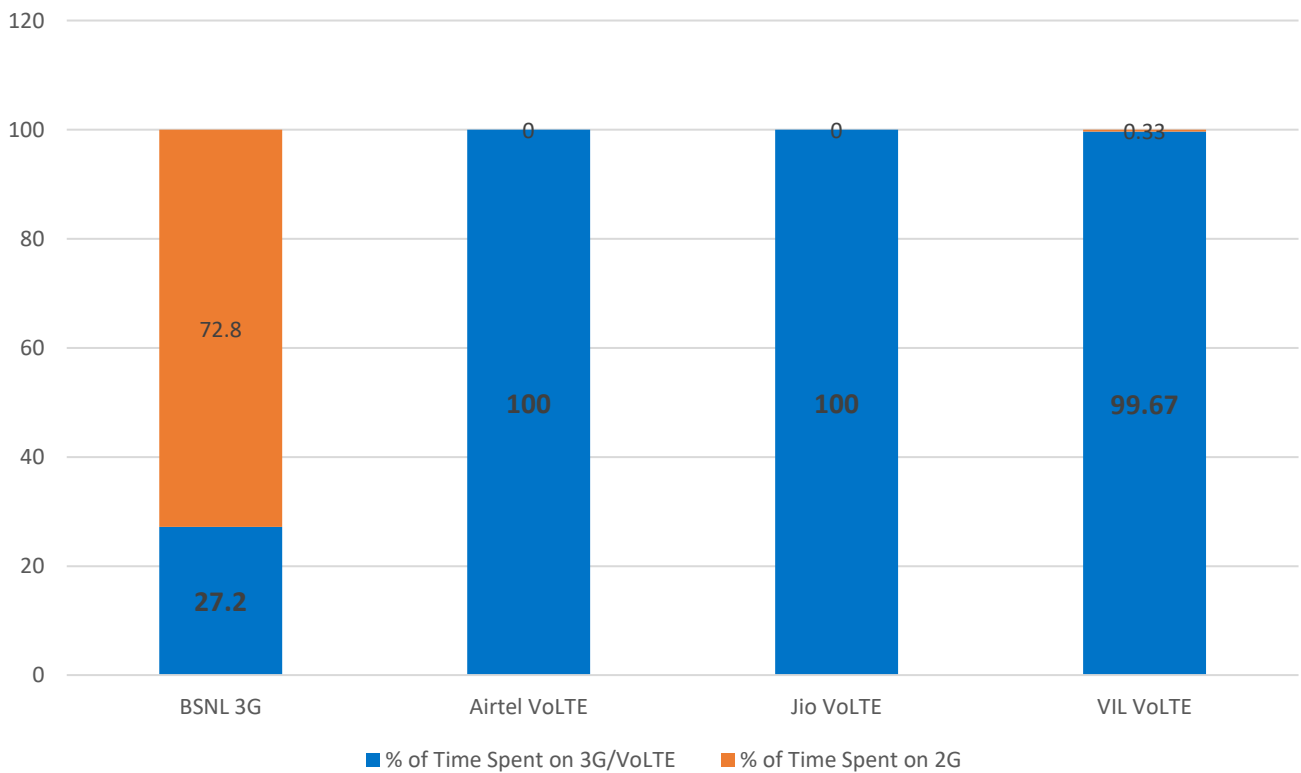
Airtel

Technology	Time Spent on 4G
4G	100%
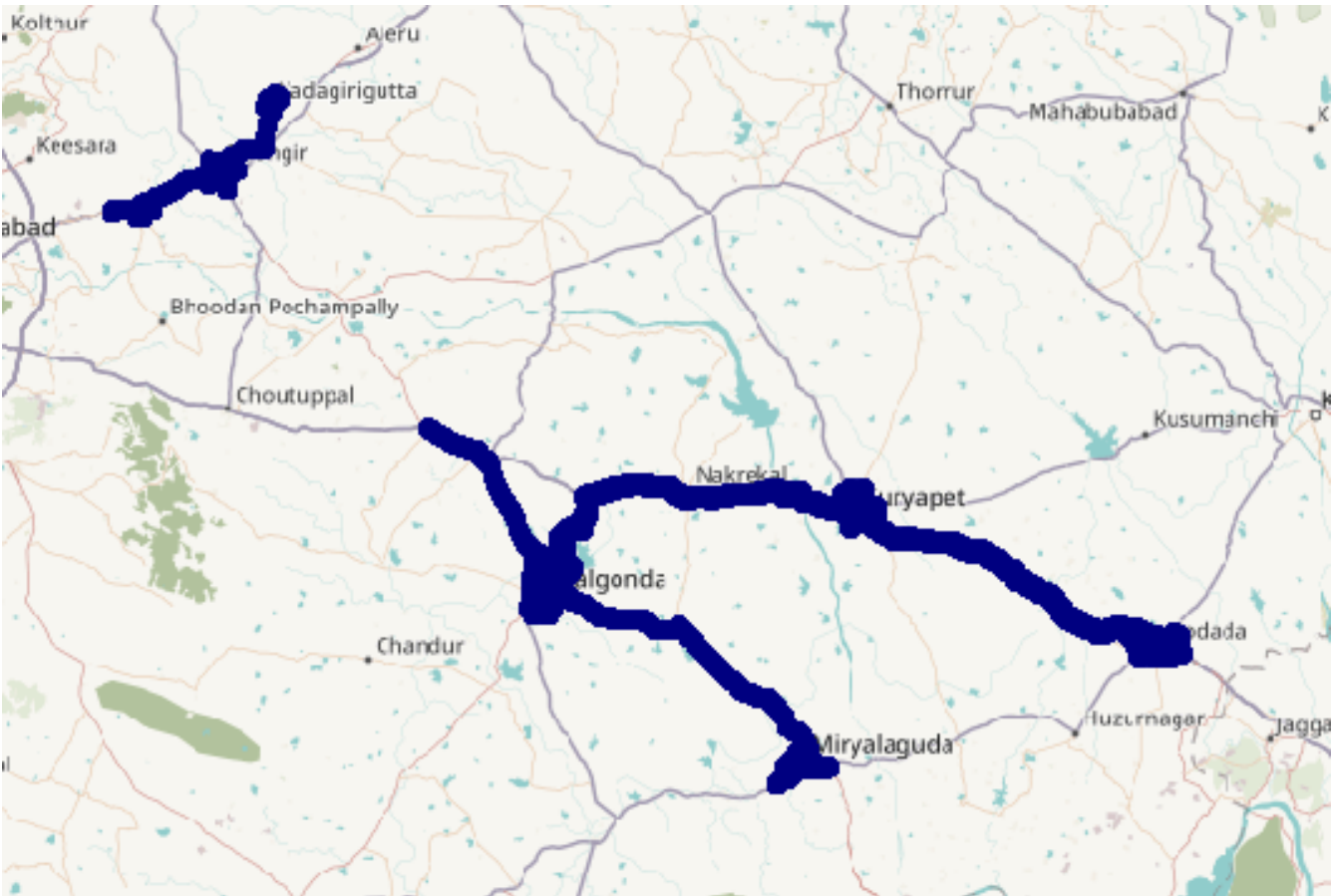
BSNL

Technology	Time Spent on 3G
3G	27.2
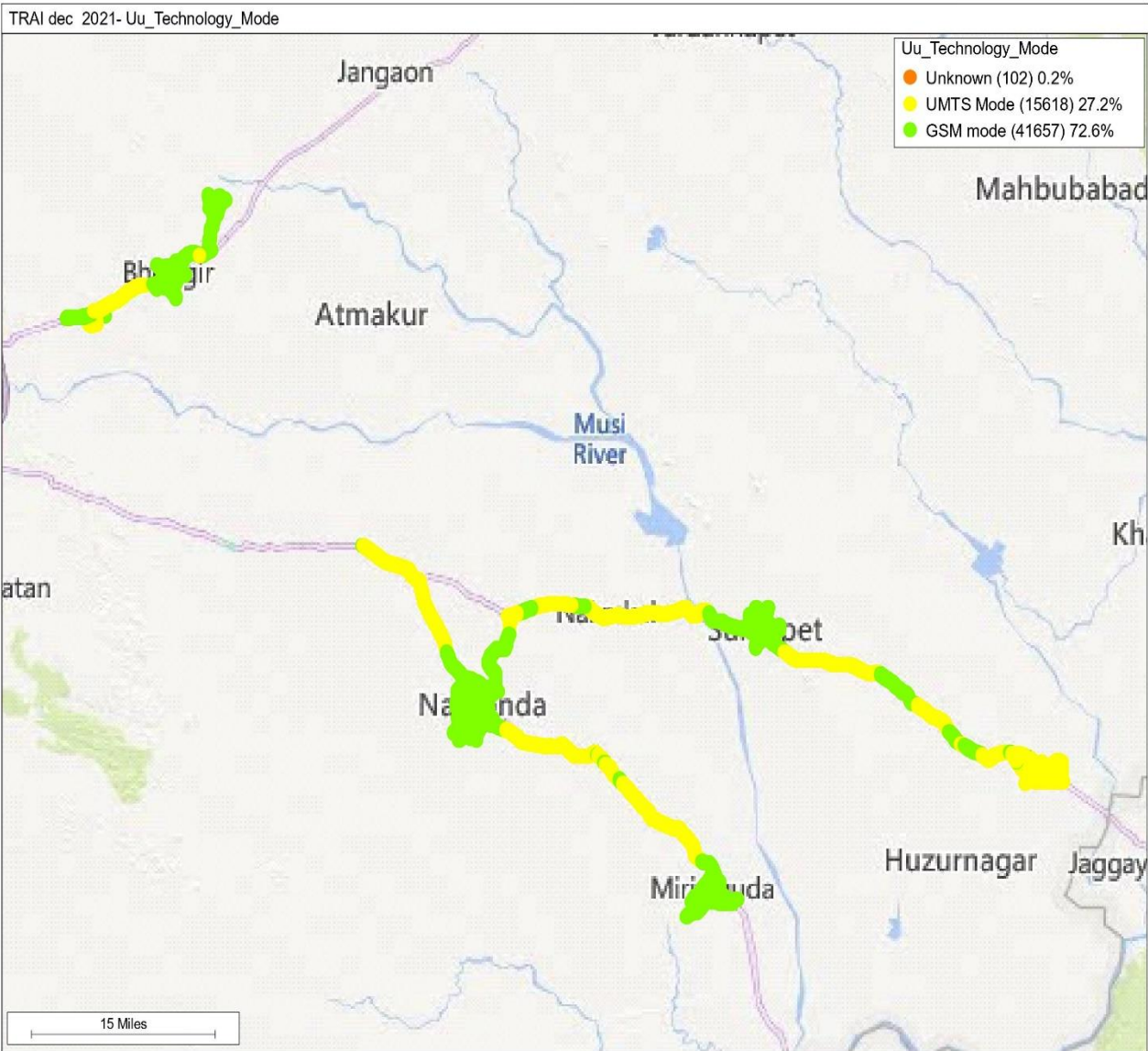
JIO

Technology	Time Spent on 4G
4G	100%

VIL

Technology	% of Time Spent on 4G
4G	99.67