Operator Assisted Drive Test Report

Bhubaneswar SSA
Nov. 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% except BSNL in 3G & JIO in VoLTE Networks.**

The Operator Assisted Drive Test (OADT) has been carried out by TRAI RO Hyderabad with the help of Service Providers in Bhubaneswar SSA and nearby areas from 9:00 AM to 9:00 PM of 18th,19th, 20th and 22nd November 2021. The drive test covered a drive route of 365 KMs & 5 Hotspot over a period of 4 working days. Approximately 450 calls were made for each of the 8 networks: three 2G networks, two 3G network and three LTE network covering four TSPs.

Overview

Voice Summary

Data Summary

Overview

TRAI Regional Office Hyderabad has conducted the drive test with the help of telecom Service Providers of Odisha LSA from 18th,19th, 20th and 22nd November 2021 covering various locations Bhubaneswar SSA and nearby areas. The performance of Airtel, BSNL, Jio and Vodafone Idea Limited (VIL) 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 365 + KMs over a period of 4 days from 18th,19th, 20th and 22nd November 2021 . Approximately 450 + calls were made for each of the 8 networks: three 2G (Lock Mode) networks, two 3G (Dual mode) networks and three VoLTE network covering 4 unique TSPs.

Data Tests:

Data Tests were performed at 5 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
Video Streaming	130 Sec Clip
Latency	32 Bytes on www.google.com

Overview

Voice Test Drive Route
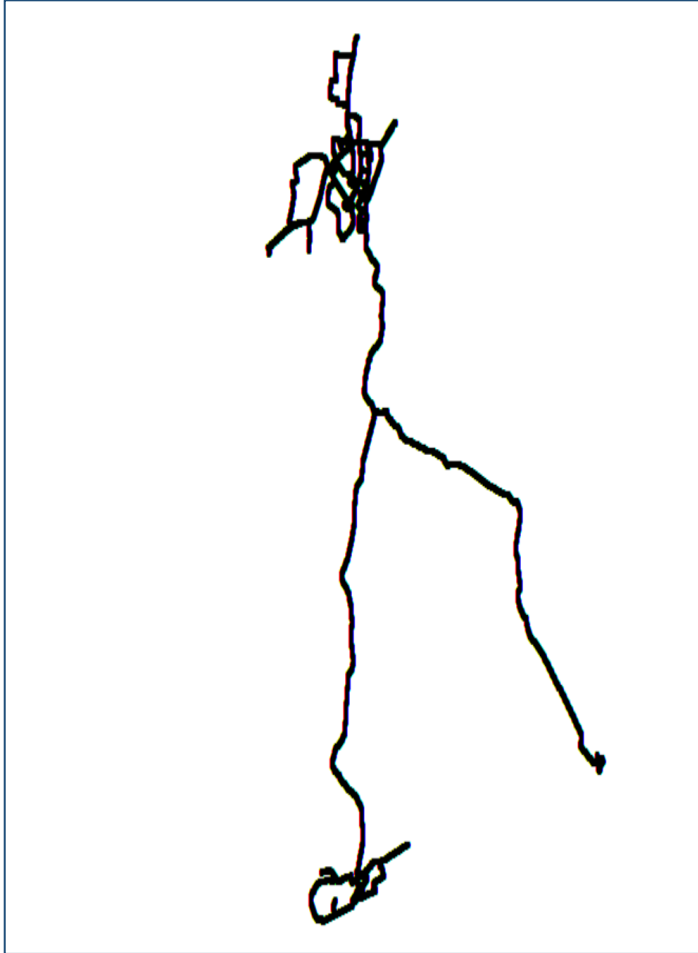
Areas Covered -Bhubaneswar	
Rajpath	Forum Mart
Kalpana Talkies	Kendriya Vidyalay
Hotel Pushpak	Railway Station
Rajmahal Flyover	Rajbhavan
AG Square	Airport
Sachivalaya Marg	Kalinga Stadium
Indira Gandhi Park	Forest Park
Odisha State Secretariat	Aryapalli
Head Post Office	Care Hospital
RBI Regional Office	Mayfair Hotel
Utkal University	KIMS
Janpath	Raghunathpur

| Areas Covered - Puri	Areas Covered - Konark
Puri Temple	Konark Police Station
Kanthapur	Museum
Gopalpur	Konark Bus stand
Govt Hospital	Ram mandir
Basanta Road	Konark Govt High school

Data Service Test- Static Locations

Static Locations
1. Konark Sun Temple
2. Puri Jagannath Temple
3. Secretariat Office Bhubaneswar
4. Bhubaneswar Airport
5. Bhubaneswar Railway Station

Voice Calls

QoS **compliance** of the TSPs in Bhubaneswar for Voice across technologies 2G/3G/4G-VoLTE:
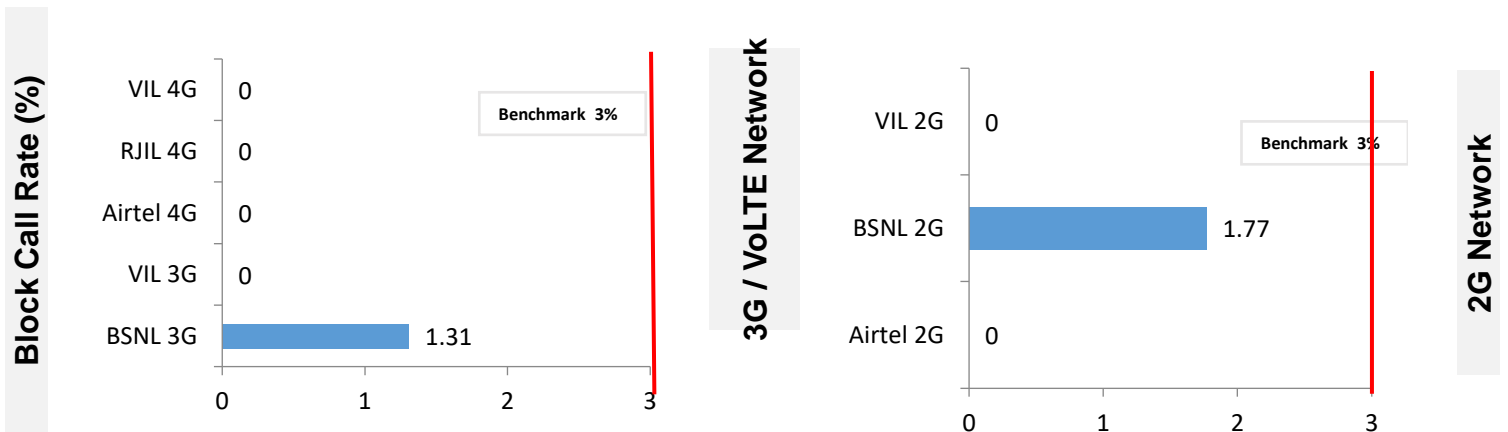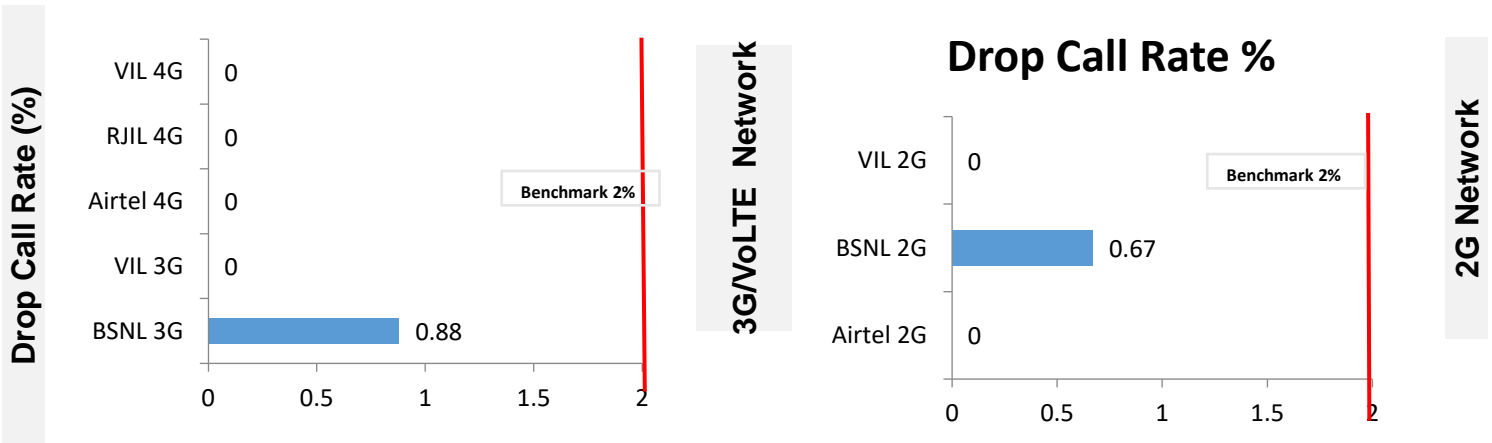
Drop Call Rate %

KPIs	2G			3G		VoLTE`		
	Airtel	**BSNL**	**VIL**	**BSNL**	**VIL**	**Airtel**	**RJIL**	**VIL**
Drop Call Rate %	0	0.67	0	0.88	0	0	0	0
Block Call Rate %	0	1.77	0	1.31	0	0	0	0

a) All TSP's have met the 2% QOS benchmark of Drop Call Rate (DCR%) except BSNL 3G..

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 %	95.2	98	93.47

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

TSP	2G		VoLTE		
	BSNL	**VIL**	**Airtel**	**JIO**	**VIL**
Coverage %	85	94	98.22	99.49	99.88

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

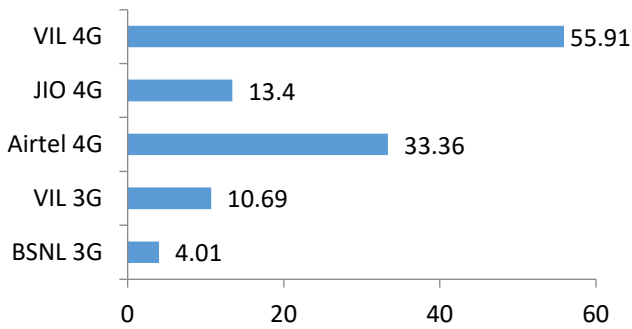| TSP	2G		VoLTE		
	BSNL	**`VIL**	**Airtel**	**JIO**	**VIL**
Time spent %	100	93.3	100	100	97.36

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)
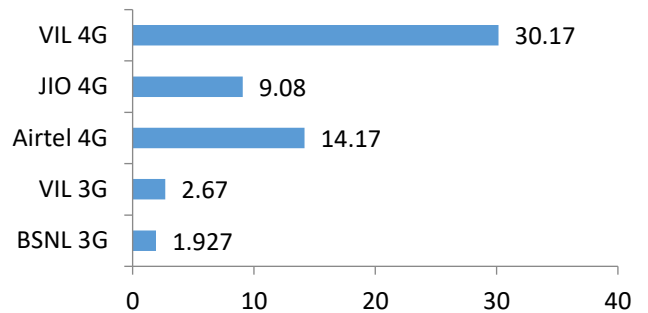
Data Download and Upload Performance (kbps)

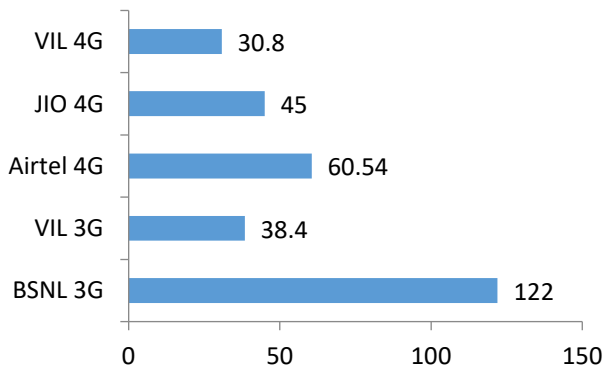### 3G/4G/ Network:

Download throughput in Mbps

Network	Mbps
VIL 4G	55.91
JIO 4G	13.4
Airtel 4G	33.36
VIL 3G	10.69
BSNL 3G	4.01

Upload Throughput in Mbps

Network	Mbps
VIL 4G	30.17
JIO 4G	9.08
Airtel 4G	14.17
VIL 3G	2.67
BSNL 3G	1.927

Latency (ms)

Latency in (msec)

Network	msec
VIL 4G	30.8
JIO 4G	45
Airtel 4G	60.54
VIL 3G	38.4
BSNL 3G	122

Web Browsing (Sec)

Web browsing delay in second

Network	Sec
VIL 4G	0.38
JIO 4G	6
Airtel 4G	1.59
VIL 3G	0.54
BSNL 3G	
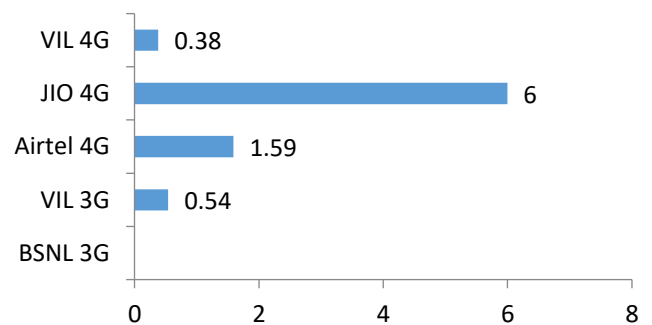
Summary

Voice Calls	2G		
	Airtel	**BSNL**	**VIL**
Call attempts	410	450	418
Block call rate %	0	1.77	0
CSSR %	100	98.23	100
Drop call rate %	0	0.67	0
Mobility HOSR %	100	97.3	98.9
RX Quality %	97.2	99	95

TSP (For 3G)	3G		VoLTE		
	BSNL	**VIL**	**Airtel**	**JIO**	**VIL**
Call attempts	458	390	417	258	407
Block call rate %	1.31	0	0	0	0
CSSR %	98.69	100	100	100	100
Drop call rate %	0.88	0	0	0	0
Mobility HOSR %	100	100	100	98.8	100
RX Quality %	80	97.5	95	90.9	96.7

Summary

Data Services Static	2G		
	Airtel	**BSNL**	**VIL**
Download throughput in Kbps	273.32	200.2	215.44
Upload Throughput in Kbps	161.45	108.6	112.45
Web browsing delay in second	7.07	NA	1.99
Latency in (msec)	164.82	315	89.1

Data Services Static	3G	
	BSNL	**VIL**
Download throughput in Mbps	4.01	10.69
Upload Throughput in Mbps	1.927	2.67
Video streaming delay in sec	NA	0.56
Web browsing delay in second	NA	0.54
Latency in (msec)	122	38.4

Data Services Static	VoLTE		
	Airtel	**JIO**	**VIL**
Download throughput in Mbps	33.36	13.4	55.91
Upload Throughput in Mbps	14.17	9.08	30.17
Video streaming delay in sec	0	2	0.36
Web browsing delay in second	1.59	6	0.38
Latency in (msec)	60.54	45	30.8

Konark Sun Temple	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	269.5	184	236
Upload Throughput in Kbps	154.2	116	177
Web browsing delay in second	5.04	NA	0.7
Latency in (msec)	164.2	289	129

Puri Jagannath Temple	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	256.8	256	236
Upload Throughput in Kbps	133.5	118.2	73
Web browsing delay in second	4.02	NA	1.6
Latency in (msec)	131.7	190	85

Secretariat Office, Bhubaneswar	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	283.5	258	243
Upload Throughput in Kbps	181.7	120	98
Web browsing delay in second	6.21	NA	1
Latency in (msec)	171.9	266	67

Bhubaneswar Airport	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	267.1	211	151
Upload Throughput in Kbps	165.7	114	107
Web browsing delay in second	8.7	NA	6.5
Latency in (msec)	188.2	420	79

Bhubaneswar Railway Station	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	289.8	140	211
Upload Throughput in Kbps	172.2	113	108
Web browsing delay in second	11.4	NA	0.2
Latency in (msec)	168.1	179	87

Data Services static

Konark Sun Temple	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	3.292	8.4	36.08	7	63.2
Upload Throughput in Mbps	1.922	3.8	12.2	5.3	30.3
Video streaming delay in sec	NA	0.7	0	1.5	0.25
Web browsing delay in second	NA	0.4	1.43	6	0.79
Latency in (msec)	89	42	57.22	43	33.5

Puri Jagannath Temple	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	4.065	14	19.23	19	67.38
Upload Throughput in Mbps	1.98	0.7	8.11	5.8	31.82
Video streaming delay in sec	NA	0.5	0	2	0.36
Web browsing delay in second	NA	0.6	1.82	6	0.46
Latency in (msec)	99	42	60.33	48	32.5

Secretariat Office, Bhubaneswar	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	7.711	13	48.36	11	75.95
Upload Throughput in Mbps	1.923	3.7	28.22	15	31.31
Video streaming delay in sec	NA	0.5	0	2.5	0.35
Web browsing delay in second	NA	1	1.72	7	0.12
Latency in (msec)	102	36	62.34	45	28.5

Bhubaneswar Airport	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	2.599	6.8	49.4	20	47.88
Upload Throughput in Mbps	1.942	2.4	14.22	14	31.3
Video streaming delay in sec	NA	0.6	0	1.5	0.42
Web browsing delay in second	NA	0.6	1.66	6	0.44
Latency in (msec)	182	25	59.21	48	29.5

Bhubaneswar Railway Station	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	8.395	11	13.74	11	25.15
Upload Throughput in Mbps	1.903	2.6	8.12	5.5	26.1
Video streaming delay in sec	NA	0.5	0	2.5	0.34
Web browsing delay in second	NA	0.2	1.34	5.5	0.1
Latency in (msec)	85	36	62.6	42	30

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.
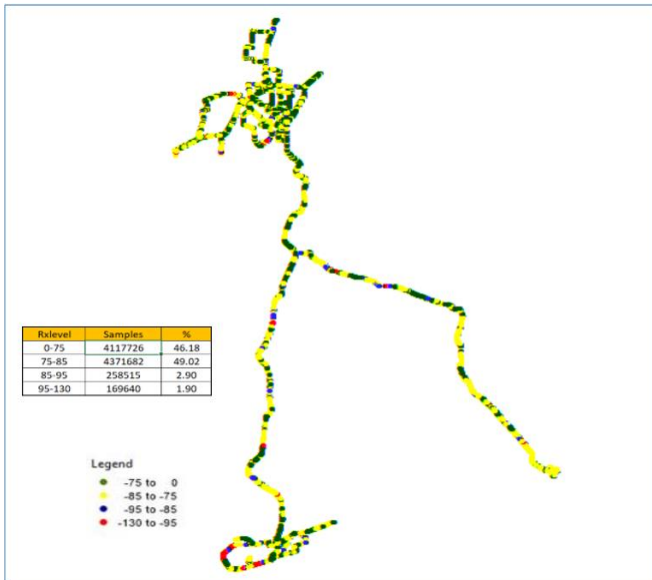
TSP	Coverage Rate %
Airtel 2G	95.20
BSNI 2G	98
VIL 2G	93.47
BSNL 3G	85
VIL 3G	94
Airtel VoLTE	98.22
Jio VoLTE	99.49
VIL VoLTE	99.88

AIRTEL

Technology	Coverage Rate %
2G	95.20
VoLTE	98.22

2G	VoLTE

2G
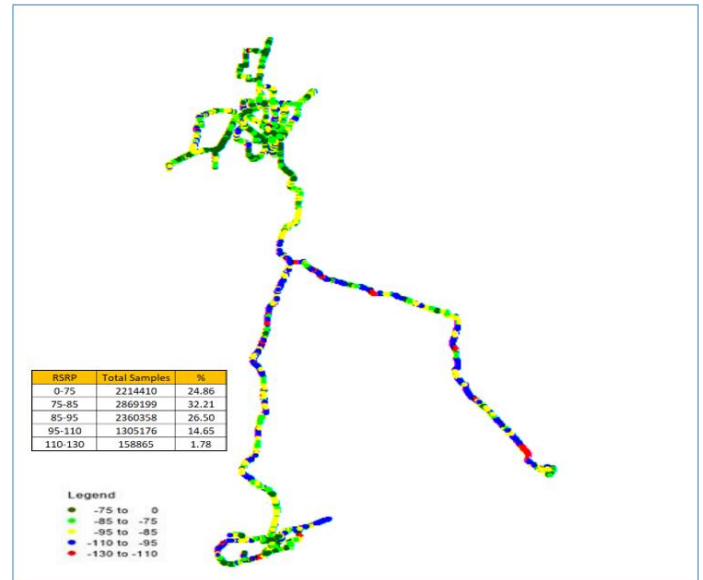
Rxlevel	Samples	%
0-75	4117726	46.18
75-85	4251682	49.02
85-95	258515	2.90
95-130	169640	1.90

VoLTE

RSRP	Total Samples	%
0-75	2214410	24.86
75-85	2869199	32.21
85-95	2360358	16.50
95-110	1305176	14.65
110-130	158865	1.75

BSNL

Technology	Coverage Rate %
2G	98
3G	85
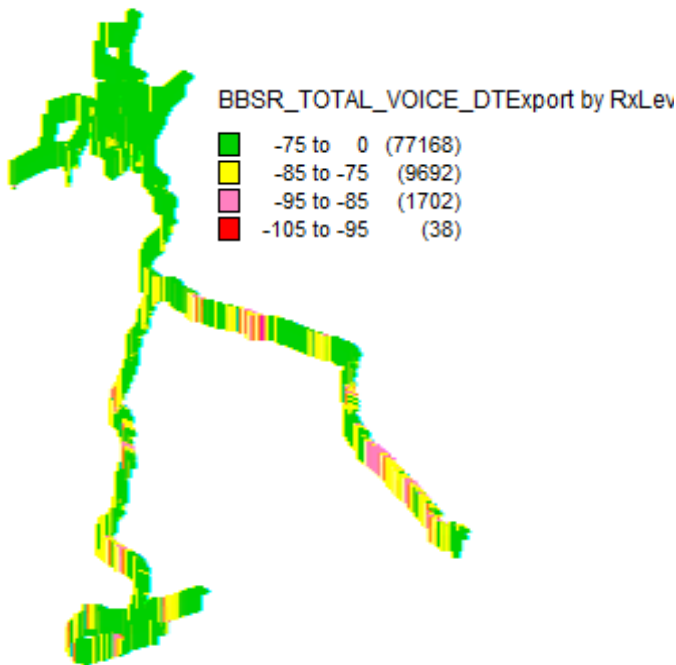
2G	3G
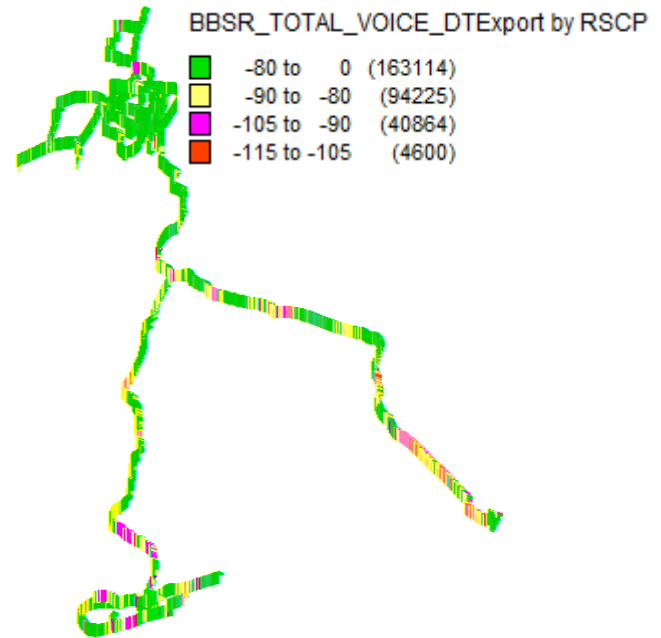
2G		
Rxlevel	**Samples**	**%**
0-75	77168	87.10
75-85	9692	10.94
85-95	1702	1.92
95-130	38	0.04

3G		
RSRP	**Total Samples**	**%**
-80 to 0	163114	53.87
-90 to -80	94225	31.12
-105 to -90	40864	13.50
-115 to -105	4600	1.52

JIO

Technology	Coverage Rate %
VoLTE	99.49
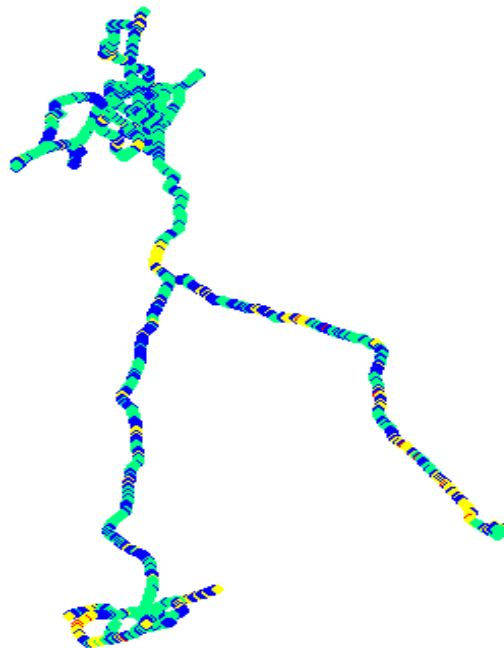
Qualcomm Lte/LteAdv Intrafreq Measure P Cell
Serving Cell Serving RSRP RSRP[dBm]

- -80 <=x < -40 (58.69%, 22971)
- -95 <=x < -80 (32.62%, 12768)
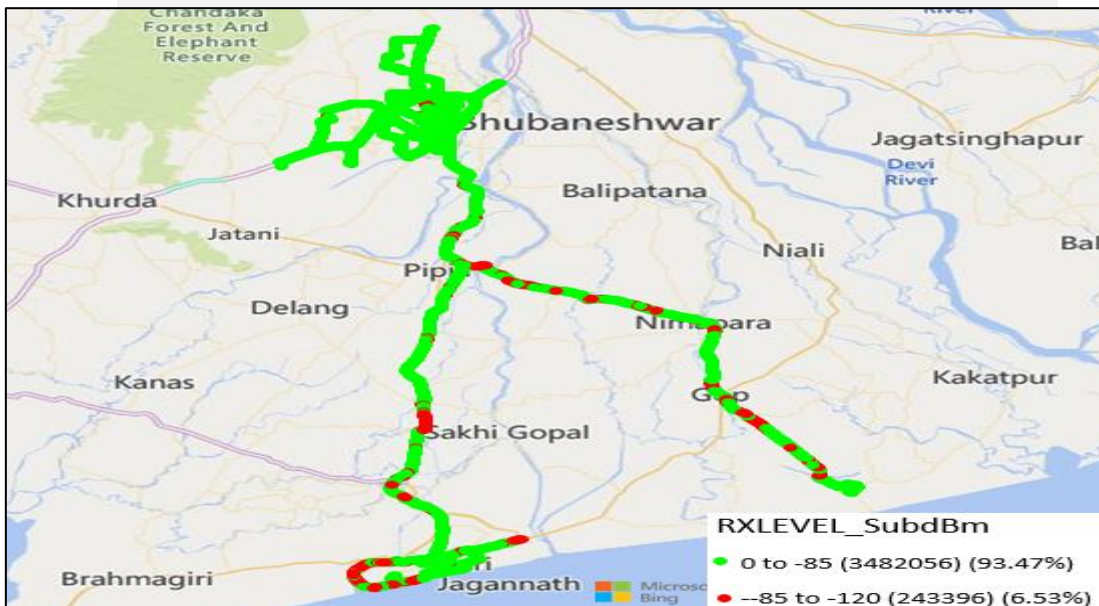- -110 <=x < -95 (8.17%, 3199)
- -140 <=x < -110 (0.51%, 200)

VoLTE		
RSRP	Total Samples	%
-80 to -40	22971	58.69
-95 to -80	12768	32.62
-110 to -95	3199	8.17
-140 to -110	200	0.51

VIL

Technology	Coverage Rate %
2G	93.47

2G

RXLEVEL_SubdBm
- 0 to -85 (3482056) (93.47%)
- -85 to -120 (243396) (6.53%)

2G		
Rxlevel	**Samples**	**%**
0 to -85	3482056	93.47
-85 to -120	243396	6.53

VIL

Technology	Coverage Rate %
3G	94
4G	99.88

3G	4G

Agg. Active RSCP (dBm)
- 0 to -90 (1827316) (94.00%)
- -90 to -120 (116684) (6.00%)

Serving Cell RSRP (dBm)
- 0 to -110 (9997796) (99.88%)
- -110 to -120 (12401) (0.12%)
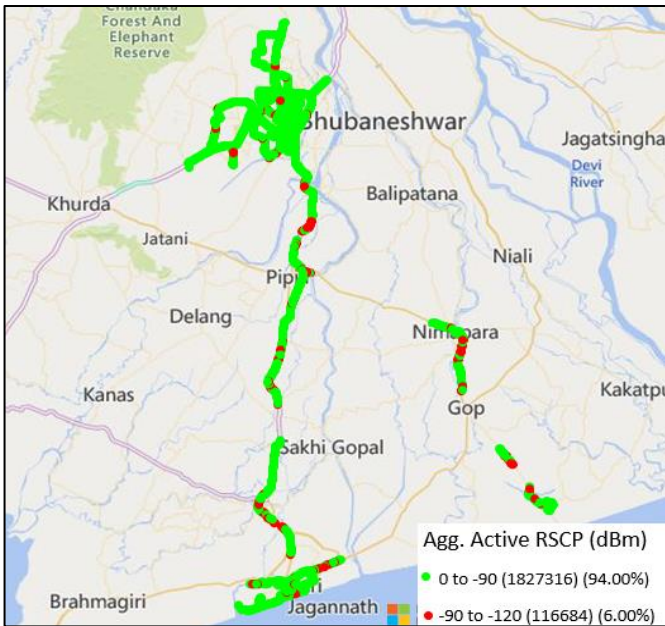
3G		
RSRP	Total Samples	%
0 to -90	1827316	94
-85 to -120	116684	6
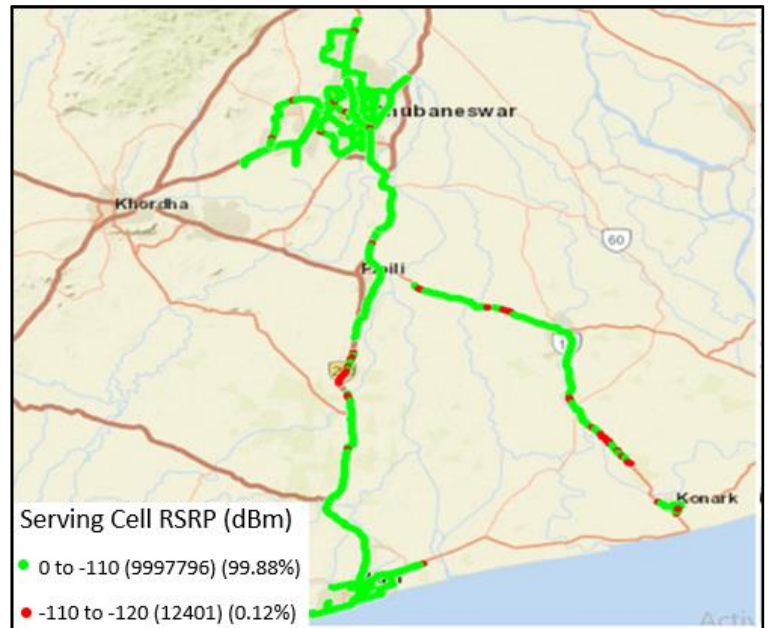
VoLTE		
RSRP	Total Samples	%
0 to -110	9997796	99.88
-110 to -120	12401	0.12

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	97.2
BSNI 2G	99
VIL 2G	95
BSNL 3G	80
VIL 3G	97.47
Airtel VoLTE	95.04
Jio VoLTE	90.86
VIL VoLTE	96.67

Airtel

Technology	Rx Quality %
2G	97.2
VoLTE	95.04

2G

VoLTE
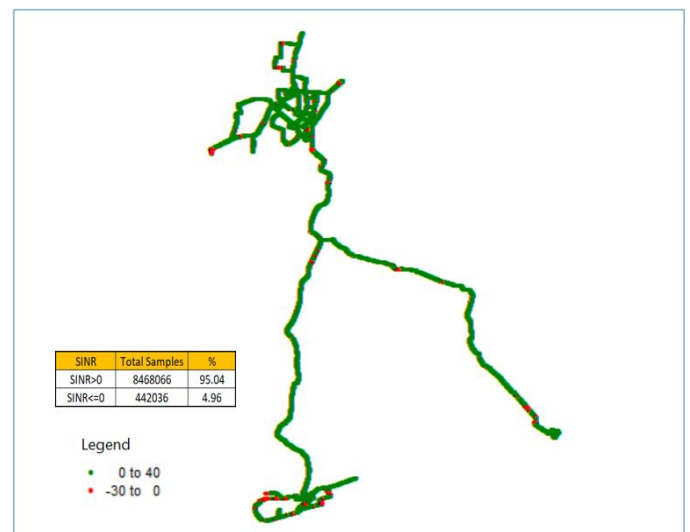
2G		
Rxqual	**Samples**	**%**
0-5	8662589	97.2
6-7	247608	2.80

VoLTE		
SINR	**Total Samples**	**%**
> 0	8468066	95.04
<= 0	442036	4.96

BSNL

Technology	Rx Quality %
2G	99
3G	80

2G	3G

BBSR_TOTAL_VOICE_DTExport by RXQ_sub

- 🟥 6 to 9 (4811)
- 🟨 4 to 6 (7264)
- 🟩 0 to 4 (429546)

BBSR_TOTAL_VOICE_DTExport by EcN0

- 🟩 -14 to 0 (349504)
- 🟨 -22 to -14 (87812)
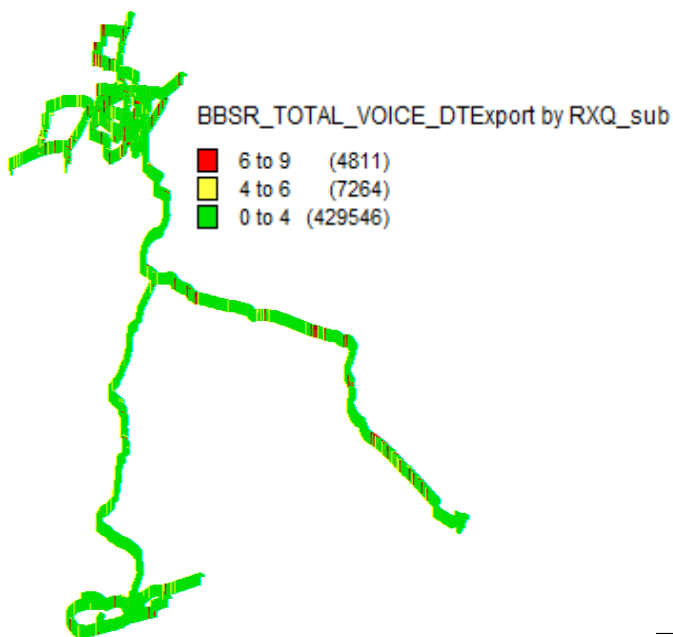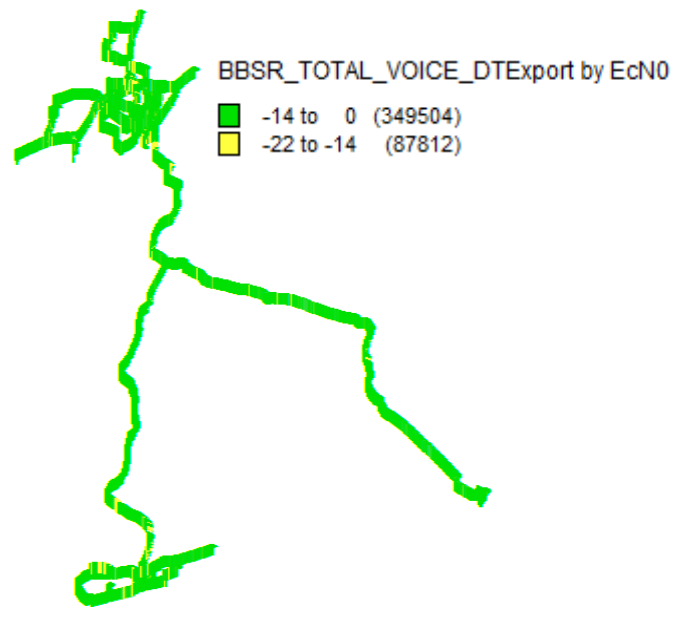
2G		
Rxqual	Samples	%
6 to 9	4811	1.09
4 to 6	7264	1.64
0 to 4	429546	97.27

3G		
SINR	Total Samples	%
-14 to 0	349504	79.92
-22 to -14	87812	20.08

JIO

Technology	Rx Quality %
VoLTE	90.86

Qualcomm Lte/LteAdv Intrafreq Measure P Cell
Serving Cell Serving SINR SINR[dB]

● -2 <= x < 30 (90.86%, 35561)
● -30 <= x < -2 (9.14%, 3578)
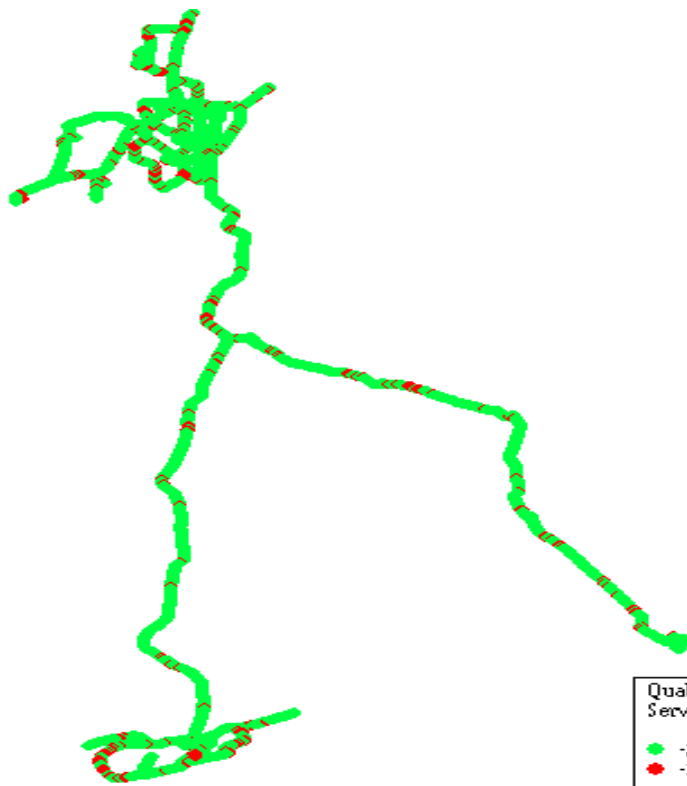
VoLTE		
SINR	Total Samples	%
-2 to -30	35561	90.86
-30 to -2	3578	9.14

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%.
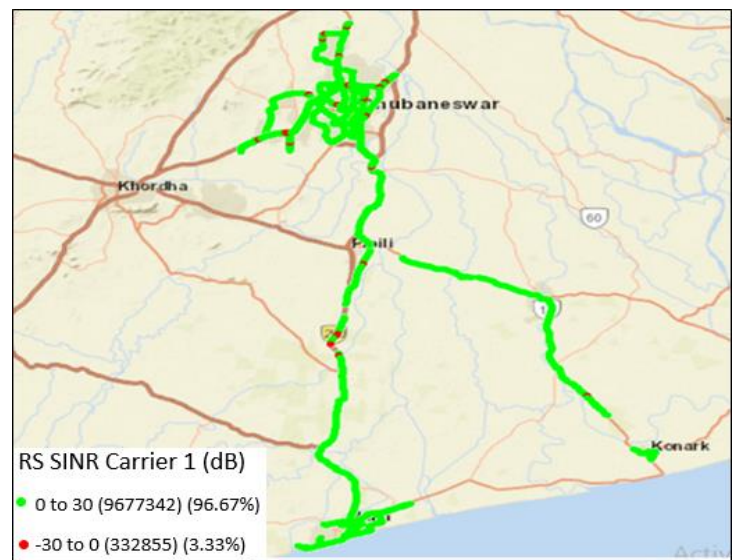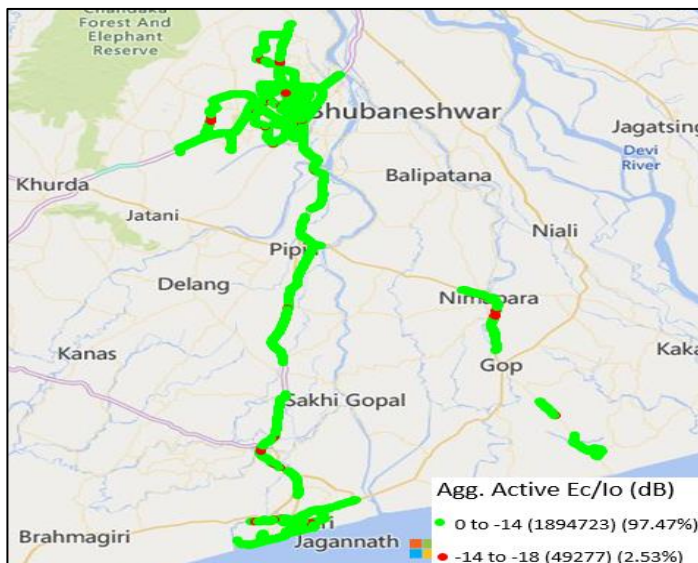
VIL

Technology	Rx Quality %
2G	95
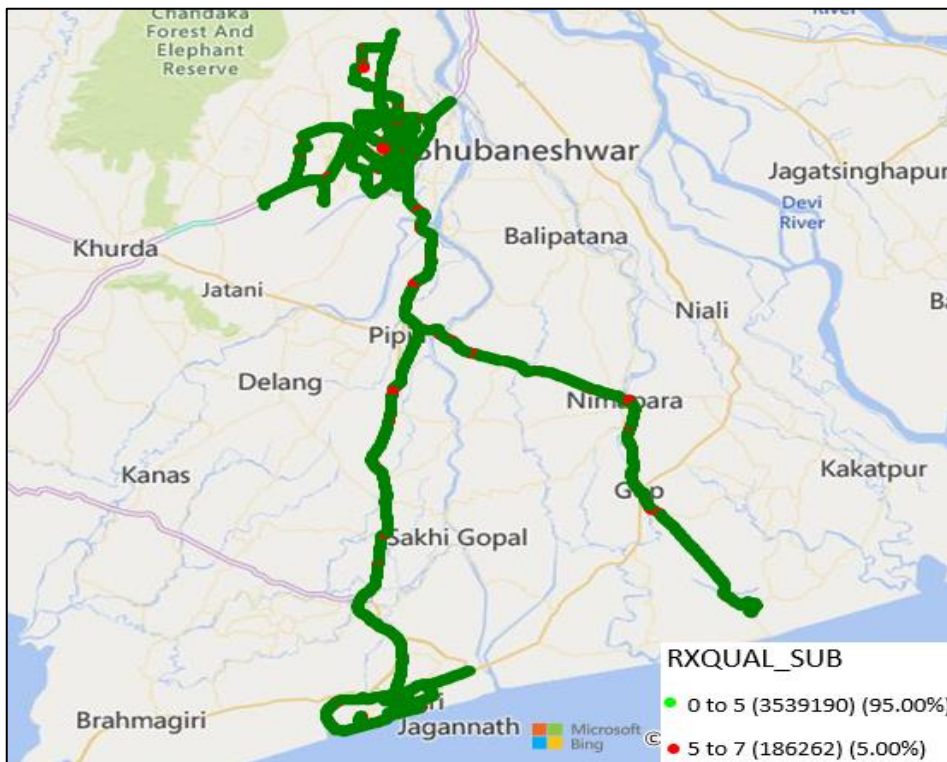
2G		
Rxqual	Samples	%
0 to 5	3539190	95
5 to 7	186262	5

VIL

Technology	Rx Quality %
3G	97.47
4G	96.67

3G		
SINR	Total Samples	%
0 to -14	1894723	97.47
-14 to -18	49277	2.53

VoLTE		
SINR	Total Samples	%
0 to 30	9677342	96.67
-30 to 0	332855	3.33

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	100
VIL 3G	93.3
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	97.36

	BSNL 3G	VIL 3G	Airtel VoLTE	Jio VoLTE	VIL VoLTE
% of Time Spent on 2G	0	6.7	0	0	2.64
% of Time Spent on 3G/VoLTE	100	93.3	100	100	97.36

■ % of Time Spent on 2G   ■ % of Time Spent on 3G/VoLTE
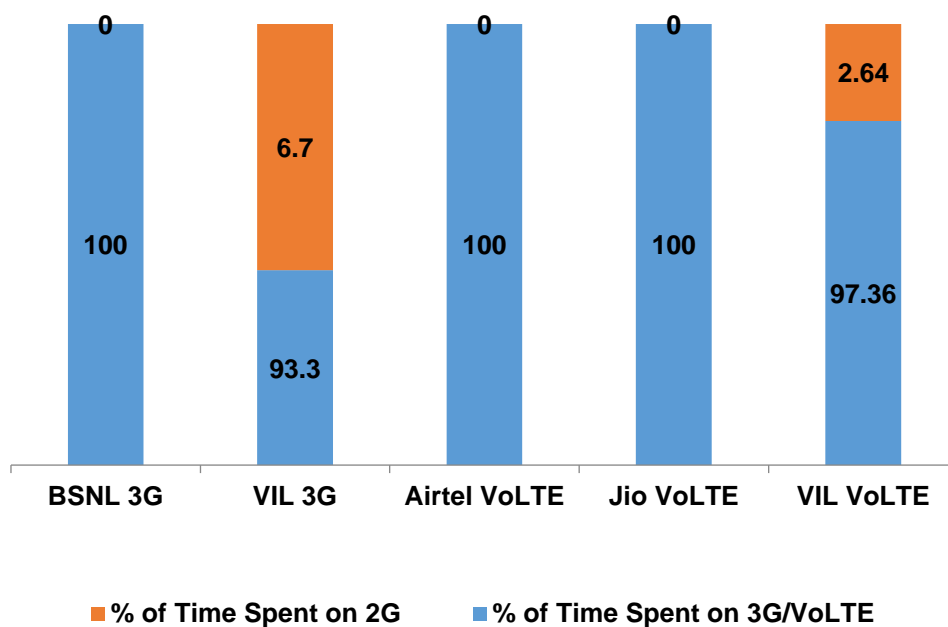
Airtel

Technology	Time Spent on 4G
4G	100%

BSNL

Technology	Time Spent on 3G
3G	100%

JIO

Technology	Time Spent on 4G
4G	100%

VIL

Technology	Time Spent on 4G
3G	93.3%
4G	97.36%

Airtel

Technology - 4G	Konark Sun Temple	Puri Jagannath Temple	Secretariat Office, Bhubaneswar	Bhubaneswar Airport	Bhubaneswar Railway Station
Download in Mbps	20.48	31.25	89.16	55.02	13.34
Upload in Mbps	6.48	8.11	54.6	8.6	4.67

BSNL

Technology - 3G	Konark Sun Temple	Puri Jagannath Temple	Secretariat Office, Bhubaneswar	Bhubaneswar Airport	Bhubaneswar Railway Station
Download in Mbps	5.93	4.04	10.46	3.16	10.33
Upload in Mbps	2.11	2.11	2.2	2.06	1.88

JIO

Technology - 4G	Konark Sun Temple	Puri Jagannath Temple	Secretariat Office, Bhubaneswar	Bhubaneswar Airport	Bhubaneswar Railway Station
Download in Mbps	16.85	11.05	25.98	36.22	12.78
Upload in Mbps	11.72	3.84	5.77	8.13	10.61

VIL

Technology - 4G	Konark Sun Temple	Puri Jagannath Temple	Secretariat Office, Bhubaneswar	Bhubaneswar Airport	Bhubaneswar Railway Station
Download in Mbps	51.31	43.79	71.9	51.27	24.93
Upload in Mbps	25.49	31.12	30.17	33.74	30.63