



Operator Assisted Drive Test Report

BALASORE - SSA

January - 2023

(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%. All TSPs have met the Rx Quality of 95% except Airtel VoLTE, BSNL 2G & JIO VoLTE Networks.

The Operator Assisted Drive Test (OADT) has been carried out by TRAI RO Hyderabad with the help of Service Providers in Balasore City and surrounding areas Baripada, Jaleswar, Balasore, Bhadrak, Soro, Chandaneswar and Chandipur from 9:00 AM to 8:00 PM during 23rd to 25th January 2023 and 27th January 2023. The drive test covered drive route of 430 KMs & 6 hotspot over a period of 4 days. Approximately 390 calls were made for each of the 8 networks: Three 2G networks, two 3G networks and Three LTE networks covering four TSPs.

Overview

Voice
Summary

Data
Summary

Overview

TRAI RO Hyderabad conducted Operator Assisted Drive Test from 23rd January 2023 to 25th January 2023 and 27th January 2023 covering various locations in Balasore City & surrounding areas Baripada , Jaleswar , Balasore , Bhadrak, Soro, Chandaneswar and Chandipur. 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 430 KMs over a period of 4 days from 23rd January 2023 to 25th January 2023 and 27th January 2023. Approximately 390 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:

1. Dynamic data test was conducted for 430 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



Area Covered -Balasore City

ITI Chhak	TV Tower
Remuna Golai	Govt Medical
FM Golai	Chandipur
Station square	Defense colony
Govt ITI	FM College

Area Covered-Baripda

Betanati square	Rajabati
Bombay Chhak	Bus stand
Bada Bazar	Keonjhar bypass road
Jagannath Temple Road	College Road

Area covered Jaleswar

Bus Stand	Batagaon
Chandenswar	Baliapal
Digha	Ghandichhak

Area covered -Soro

Sore Market	Soro College
Kupari Road	Medical chhak

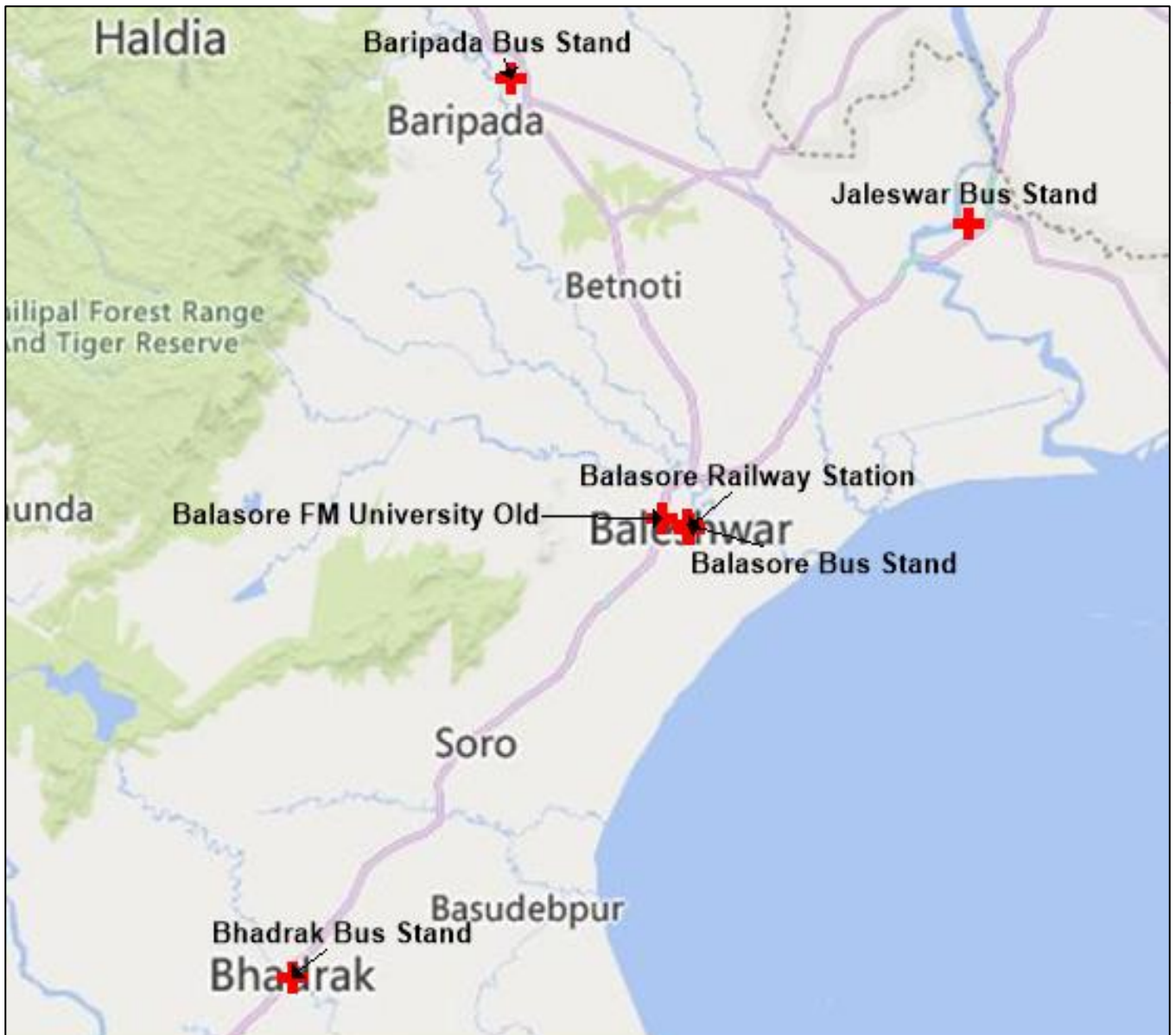
Area Covered -Bhadrak

Pathanmahala	Bus stand
Aradi Road	Sarkar Nagar
Banth chhak	Puruna Bazar

Overview

Data Service Test- Static Locations

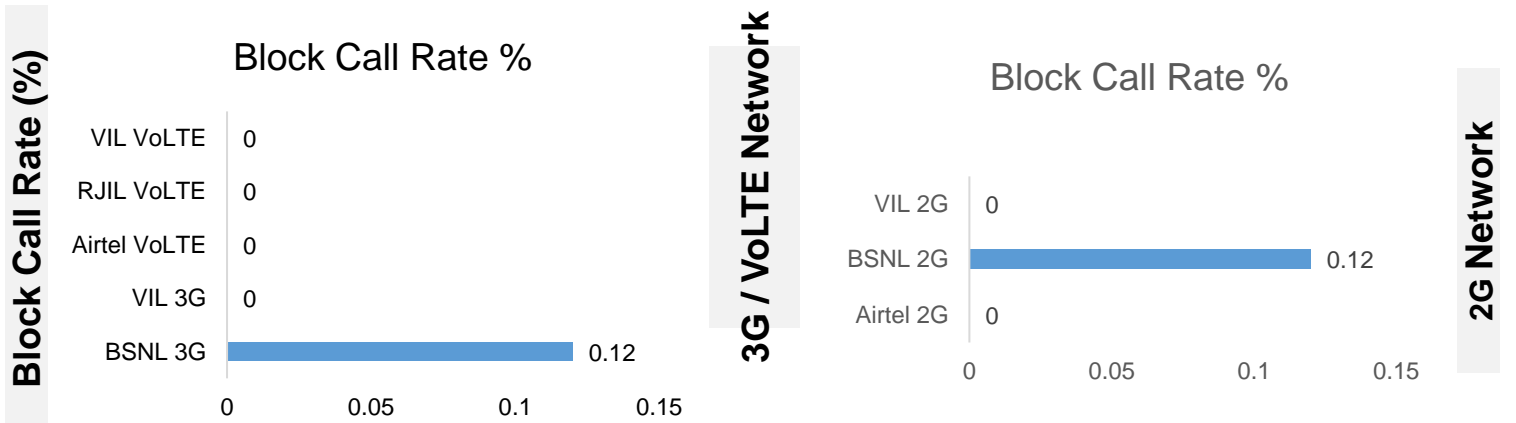
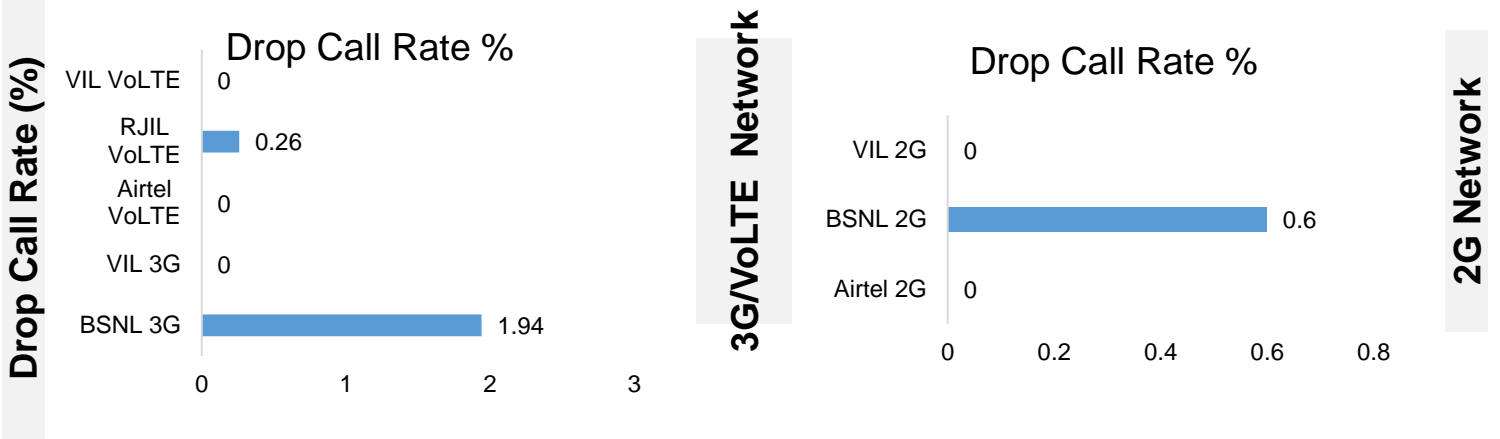
Static Locations
Baripada Bus stand
Jaleswar Bus stand
Balasore Bus stop
Balasore Railway station
Bhadrak bus stop
F M University Old campus, Balasore



Voice Calls

Key Observations

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



KPIs	2G			3G		VoLTE		
	Airtel	BSNL	VIL	BSNL	VIL	Airtel	RJIL	VIL
Drop Call Rate %	0	0.6	0	1.94	0	0	0.26	0
Block Call Rate %	0	0.12	0	0.12	0	0	0	0

- 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 -85 dBm.

TSPS	2G		
	Airtel	BSNL	VIL
Coverage %	96.11	91.96	86.91

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

TSP	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Coverage %	83.77	90.16	97.58	96.14	91.41

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

TSP	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Time spent %	99	83.78	100	100	68.53

Data Services Static

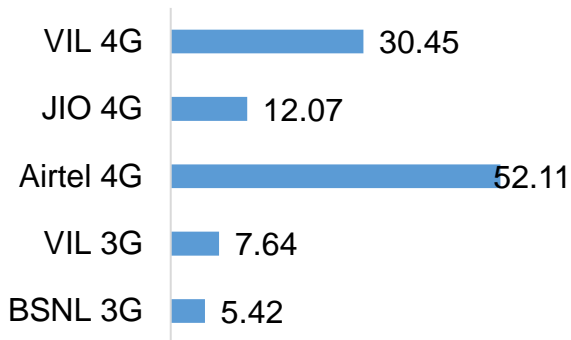
**Key Observations
(Average of 6
Hotspots)**

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

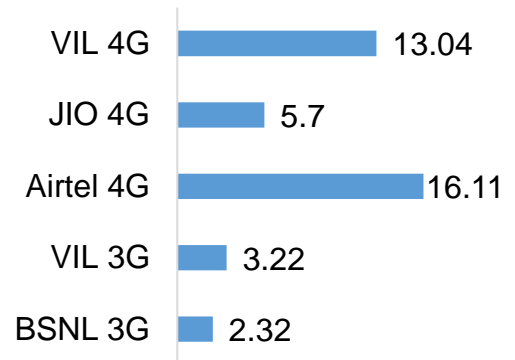
Data Download and Upload Performance (Mbps)

3G/4G Network:

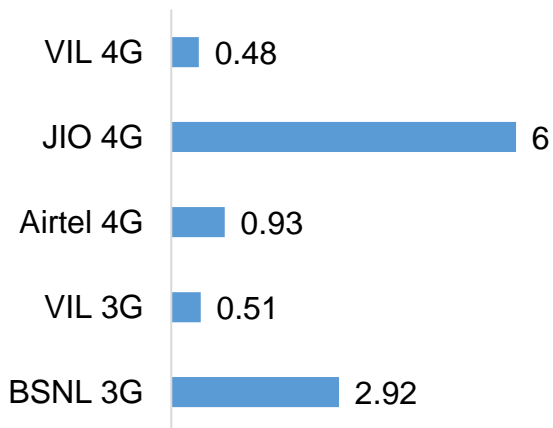
Download throughput in Mbps



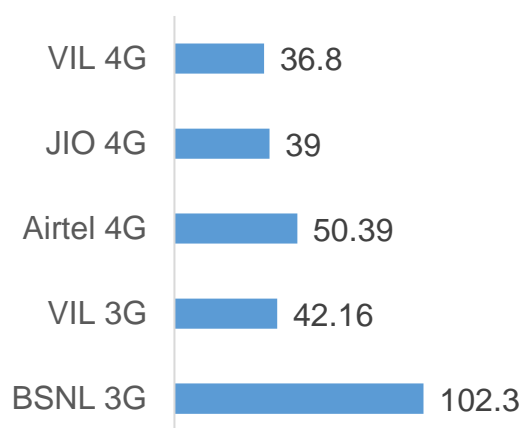
Upload Throughput in Mbps



Web browsing delay in sec



Latency in msec



Summary

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

Data Services Static	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	195.97	168.33	165.76
Upload Throughput in Kbps	117.4	128.33	88.27
Web browsing delay in second	12.25	31.17	0.39
Latency in (msec)	170.32	141.70	122.62

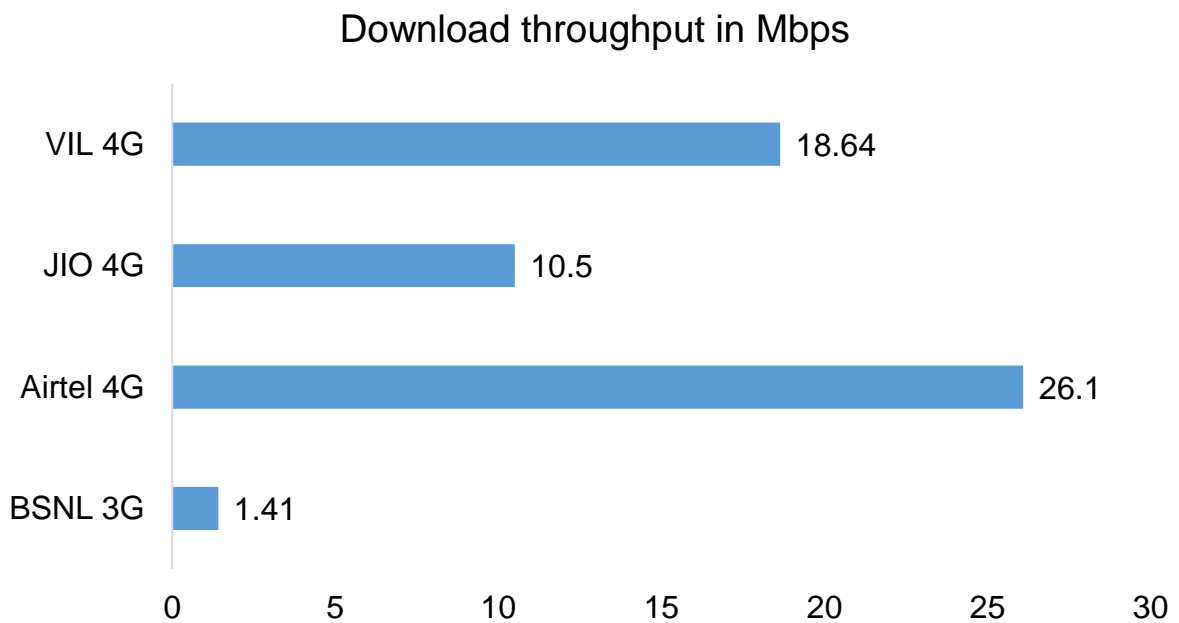
Data Services Static	3G / VoLTE				
	BSNL 3G	VIL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Download throughput in Mbps	5.42	7.64	52.11	12.07	30.45
Upload Throughput in Mbps	2.32	3.22	16.11	5.7	13.04
Video Streaming Delay in Sec		0.95	0	2.2	0.43
Web browsing delay in sec	2.92	0.51	0.93	6	0.48
Latency in msec	102.30	42.16	50.39	39	36.8

Data Services Dynamic

Key Observations

Dynamic Data was tested for 430 KMs. Download Throughput was tested.

Data Download Performance (Mbps) - Dynamic



Data Services Dynamic	3G / 4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download throughput in Mbps	1.41	26.1	10.5	18.64

Summary

SSA Level Summary-Voice

Voice Calls	2G		
	Airtel	BSNL	VIL
Call attempts	368	823	357
Block call rate %	0	0.12	0.00
CSSR %	100	99.51	100.00
Drop call rate %	0	0.6	0.00
Mobility HOSR %	99.96	97.00	98.40
Rx Quality %	95.05	93.6	97.88

TSP (For 3G)	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Call attempts	823	309	392	372	252
Block call rate %	0.12	0	0	0	0
CSSR %	99.51	100	100	100	100
Drop call rate %	1.94	0	0	0.26	0
Mobility HOSR %	99.40	100	100	98.12	100
RX Quality %	97.09	96.91	85.7	83.7	97.74

Baripada Busstand	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	210.3	140	170.10
Upload Throughput in Kbps	172.65	140	63.21
Web browsing delay in second	10.6	35.07	0.55
Latency in (msec)	180.4	1197	97

Jaleswar Busstand	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	232.77	220	161.87
Upload Throughput in Kbps	110.2	150	112.43
Web browsing delay in second	14.8	35.92	0.17
Latency in (msec)	172.32	911	106

Bhadrak Busstand	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	178.66	130	155.51
Upload Throughput in Kbps	98.20	80	102.21
Web browsing delay in second	8.3	57.45	0.41
Latency in (msec)	166.8	423	102

Balasore Busstand	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	220.22	170	190.21
Upload Throughput in Kbps	116.7	110	98.23
Web browsing delay in second	12.44	59.63	0.35
Latency in (msec)	162.3	457	126

Balasore Railway station	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	193.8	150	151.12
Upload Throughput in Kbps	114.3	180	65.25
Web browsing delay in second	12.66	41.72	0.45
Latency in (msec)	168.5	701	132.1

FM University Old Campus	2G		
	Airtel	BSNL	VIL
Download throughput in Kbps	140.1	200	221.53
Upload Throughput in Kbps	92.4	110	96.7
Web browsing delay in second	17.71	57.95	0.75
Latency in (msec)	171.63	853	126

Data Services static

SSA Level Summary (contd.)

Baripada Busstand	3G		4G		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	4.29	8.2	48.9	11.7	32.46
Upload Throughput in Mbps	1.42	4.56	12.2	3.2	23.34
Web browsing delay in second	3.92	0.78	0.69	6.2	0.32
Latency in (msec)	86	49.8	53.44	44.5	38
Jaleswar Busstand					
Jaleswar Busstand	3G		4G		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	8.20	8.23	55.28	16.1	14.32
Upload Throughput in Mbps	1.98	3.21	18.77	4	11.21
Web browsing delay in second	2.12	0.31	0.82	6	0.39
Latency in (msec)	132	43	48.33	42	31
Bhadrak Busstand					
Bhadrak Busstand	3G		4G		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	4.60	5.81	63.46	10.6	16.41
Upload Throughput in Mbps	1.96	2.98	16.5	9.7	9.81
Web browsing delay in second	3.14	0.17	0.89	6.8	0.39
Latency in (msec)	71	45	50.1	32	32
Balasore Busstand					
Balasore Busstand	3G		4G		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	3.09	2.56	54.8	12.6	43.45
Upload Throughput in Mbps	2.88	1.31	17.23	6.9	10.68
Web browsing delay in second	4.71	0.37	0.69	8	0.48
Latency in (msec)	73	38	52.2	34	38
Balasore Railway station					
Balasore Railway station	3G		4G		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	5.71	13.41	68.14	9.4	45.6
Upload Throughput in Mbps	2.61	4.04	22.5	3.5	10.16
Web browsing delay in second	2.41	0.92	0.9	5	0.81
Latency in (msec)	77	54	48.6	43.7	23
FM University Old Campus					
FM University Old Campus	3G		4G		
	BSNL	VIL	Airtel	JIO	VIL
Download throughput in Mbps	6.62	4.00	22.10	12.3	10.23
Upload Throughput in Mbps	3.06	2.3	7.5	6.9	8.2
Web browsing delay in second	1.91	0.77	1.6	6	0.58
Latency in (msec)	87	63	49.7	40	38

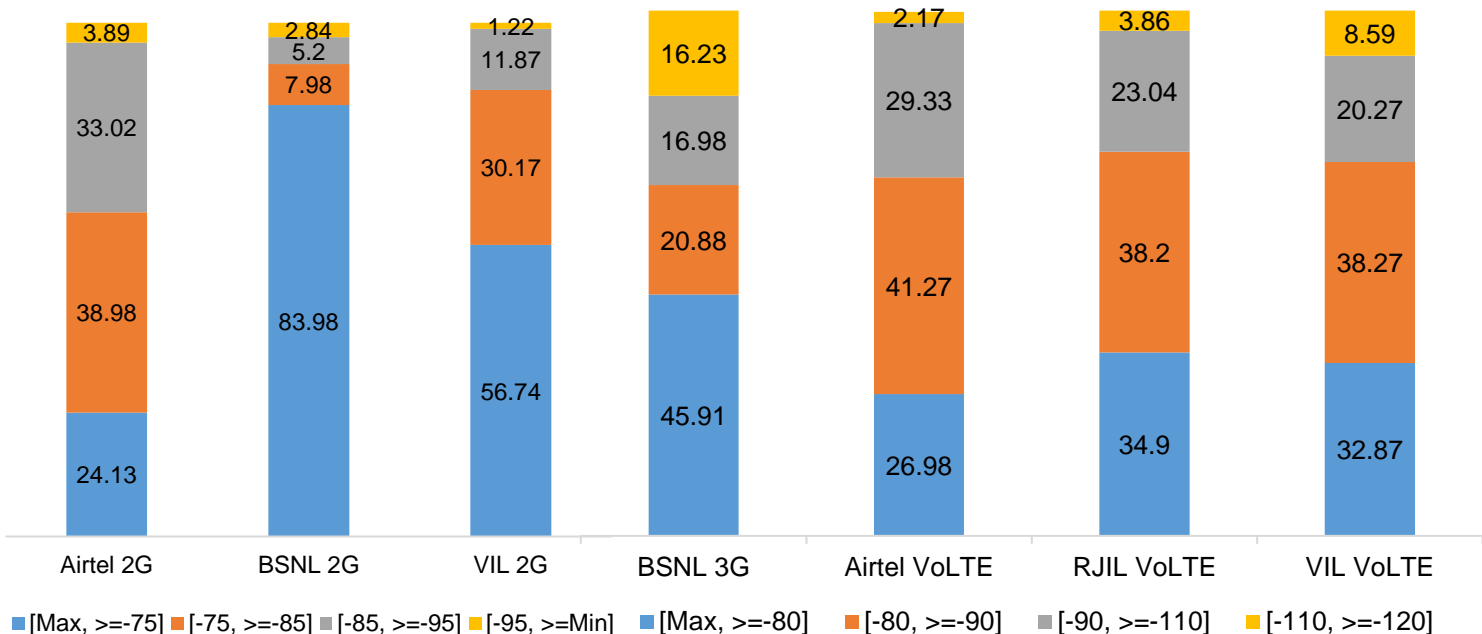
I. Coverage Details

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	96.11
BSNL 2G	91.97
VIL 2G	86.91
BSNL 3G	83.77
VIL 3G	90.16
Airtel VoLTE	97.58
Jio VoLTE	96.14
VIL VoLTE	91.41

Coverage Rate 2G

Coverage Rate 3G/VoLTE

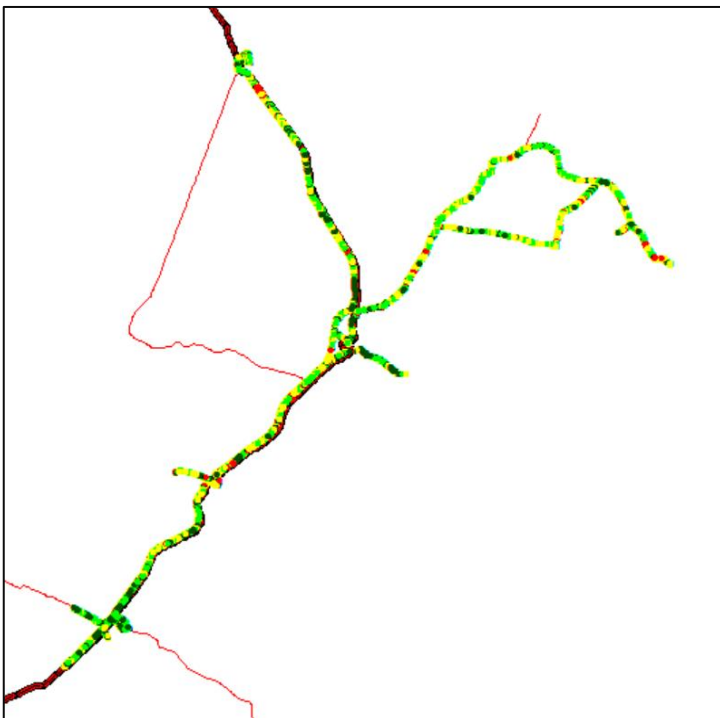


I. Coverage Details

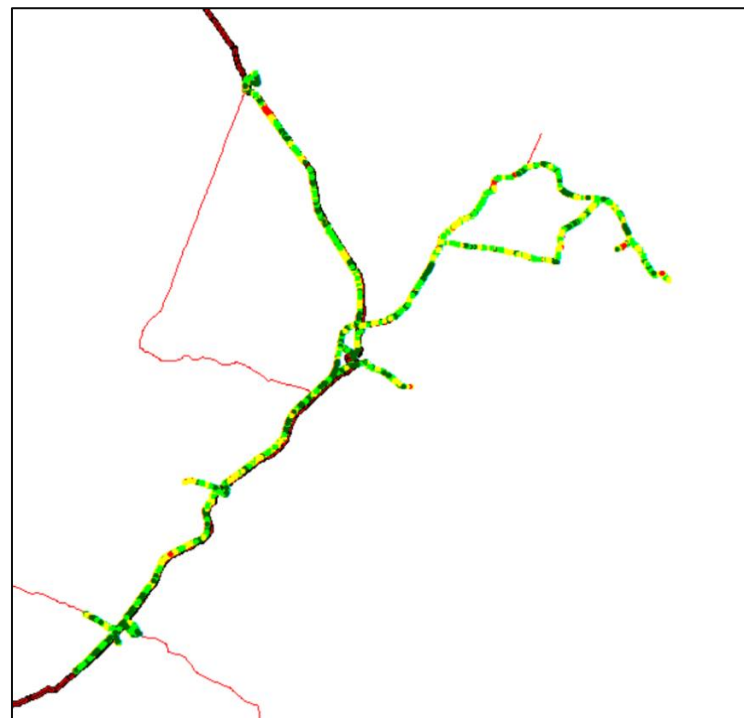
AIRTEL

Technology	Coverage Rate %
2G	96.11
VoLTE	97.58

2G



VoLTE



2G

Overall RxLevel	# Samples	%
[Max, >=-75]	2520219	24.13
[-75, >=-85)	4069758	38.96
[-85, >=-95)	3448762	33.02
[-95, >=Min)	406118	3.89
Total	10444857	100

VoLTE

Overall RSRP	# Samples	%
[Max, >=-80]	2880863	26.98
[-80, >=-90)	4406908	41.27
[-90, >=-110)	3131405	29.33
[-110, >=Min)	258244	2.17
Total	10677420	100

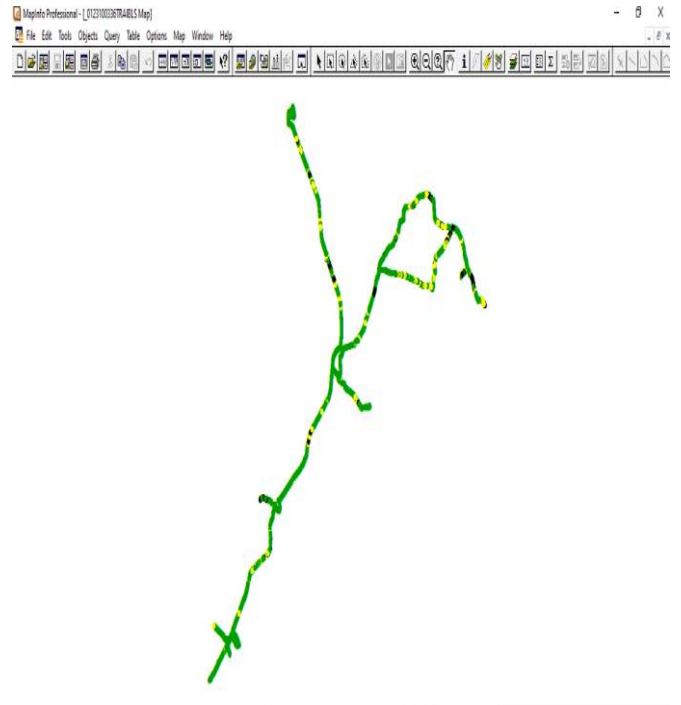
I. Coverage Details

BSNL

Technology	Coverage Rate %
2G	91.97
3G	83.77

2G

3G (Dual mode)



2G		
Overall RxLevel	# Samples	%
[Max, >=-75]	3721917	83.98
[-75, >=-85)	353639	7.98
[-85, >=-95)	230159	5.20
[-95, >=Min)	126005	2.84
Total	4431720	100

3G		
Overall RSCP	# Samples	%
[Max, >=-70]	2046100	45.91
[-70, >=-80)	930435	20.88
[-80, >=-90)	757000	16.98
[-90, >=Min)	723433	16.23
Total	4456968	100

I. Coverage Details

JIO

Technology	Coverage Rate %
VoLTE	96.14



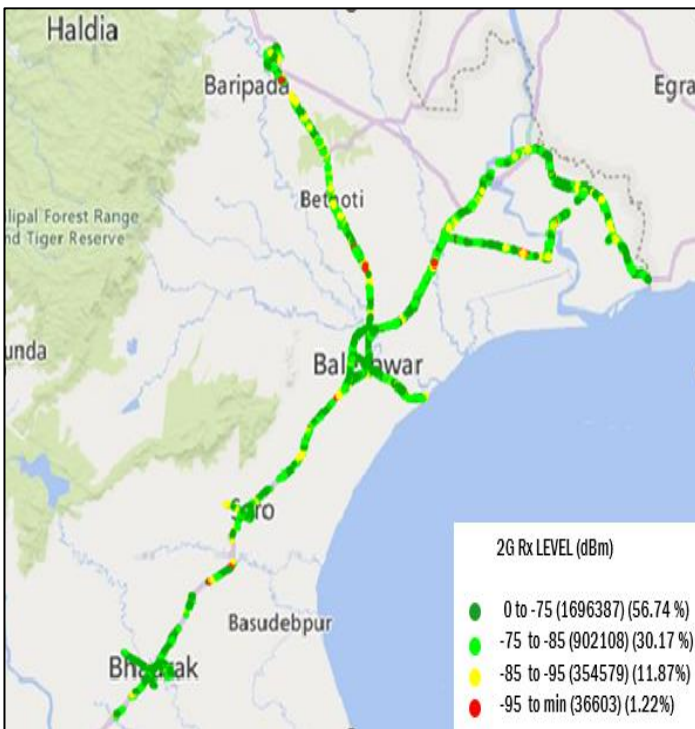
Overall RSRP-VoLTE	# Samples	%
[Min, >=-80]	12289	34.9
[-80, =-90]	13452	38.2
[-90, <=-110]	8114	23.04
[-110, >=Min]	1360	3.86
Total	35215	100

I. Coverage Details

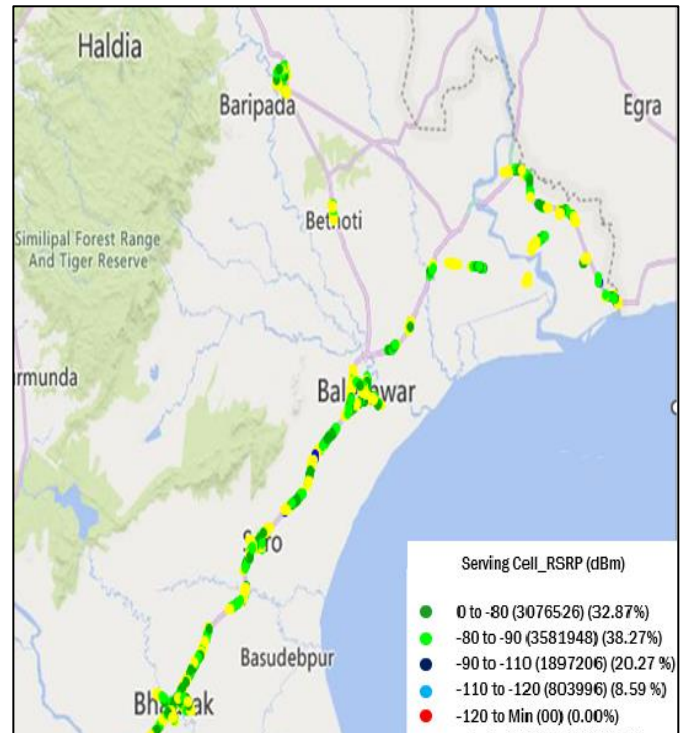
VIL

Technology	Coverage Rate %
2G	86.91
VoLTE	91.41

2G



VoLTE



2G

Overall RxLevel	# Samples	%
[Max, >=-75]	1696387	56.74
[-75, >=-85)	902108	30.17
[-85, >=-95)	354579	11.87
[-95, >=Min)	36603	1.22
Total	2989677	100

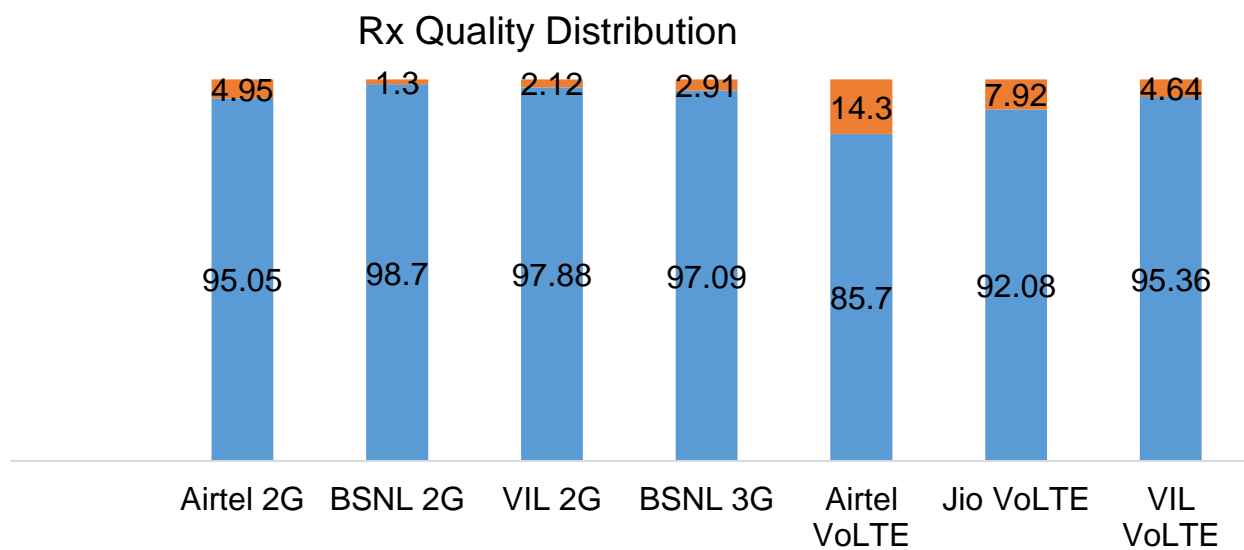
4G

Overall RSRP	# Samples	%
[Max, >=-80]	3076526	32.87
[-80, >=-90)	3581948	38.27
[-90, >=-110)	1897206	20.27
[110, >=Min)	803996	8.59
Total	9359676	100

II. Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSPs 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	95.05
BSNL 2G	93.6
VIL 2G	97.88
BSNL 3G	97.09
Airtel VoLTE	85.7
Jio VoLTE	83.7
VIL VoLTE	97.74

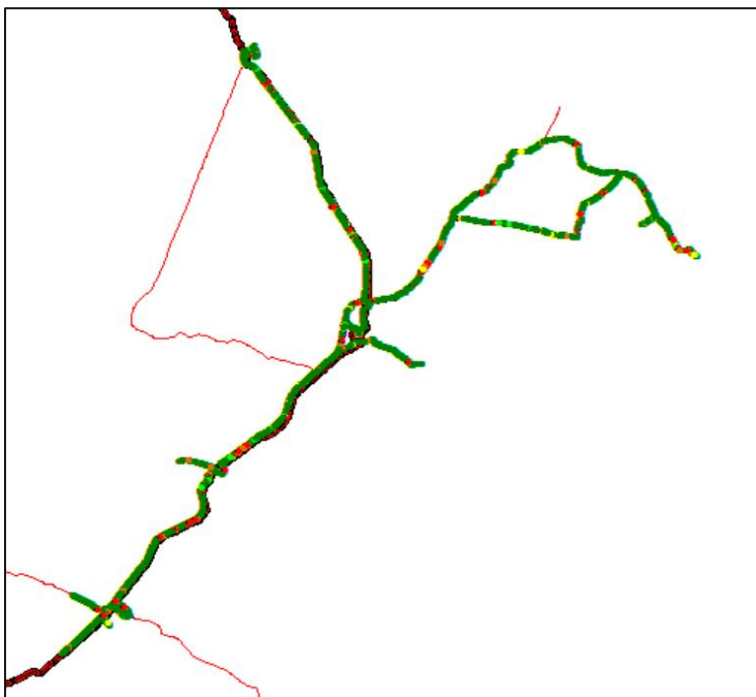


II. Quality Details

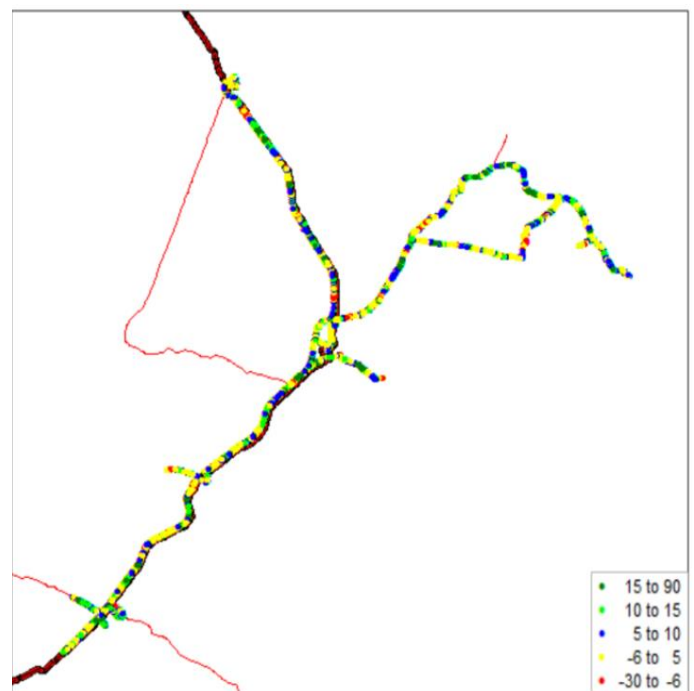
Airtel

Technology	Rx Quality %
2G	95.05
VoLTE	85.7

2G



VoLTE



Overall Rx Quality	# Samples	%
(Min, <=2)	8936071	85.55
(2, <=3)	331095	3.17
(3, <=4)	335255	3.21
(4, <=5)	325611	3.12
(5, <=Max)	516825	4.95
Total	10444857	100

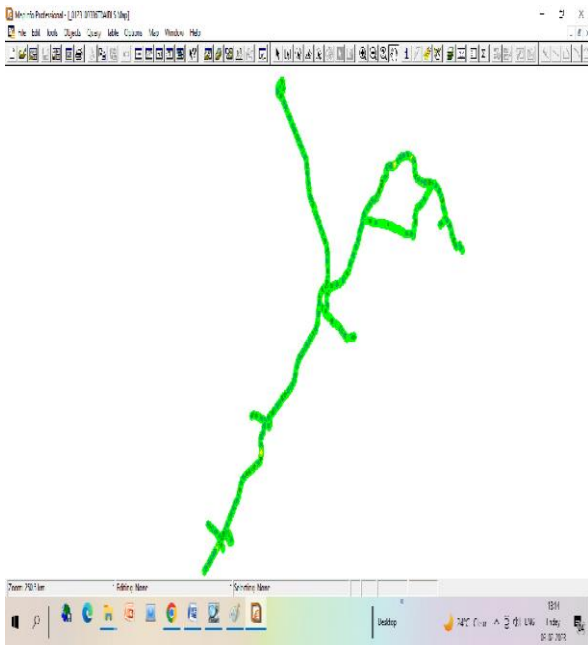
Overall SINR	# Samples	%
(Min, <=-3)	819955	7.68
(-3, <=0)	707182	6.62
(0, <=5)	4298422	40.3
(5, <=10)	2753958	25.8
(10, <=15)	1405980	13.2
(15, <=Max)	691923	6.40
Total	10677420	100

II. Quality Details

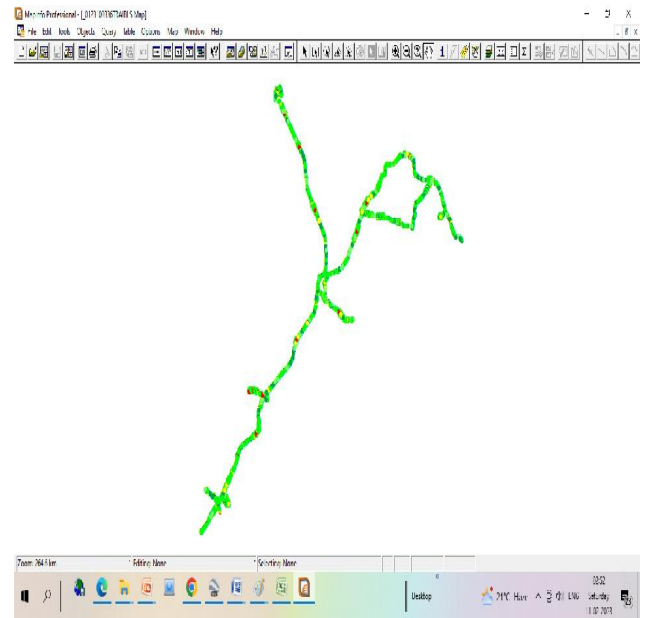
BSNL

Technology	Rx Quality %
2G	93.60
3G	97.09

2G



3G (Dual mode)



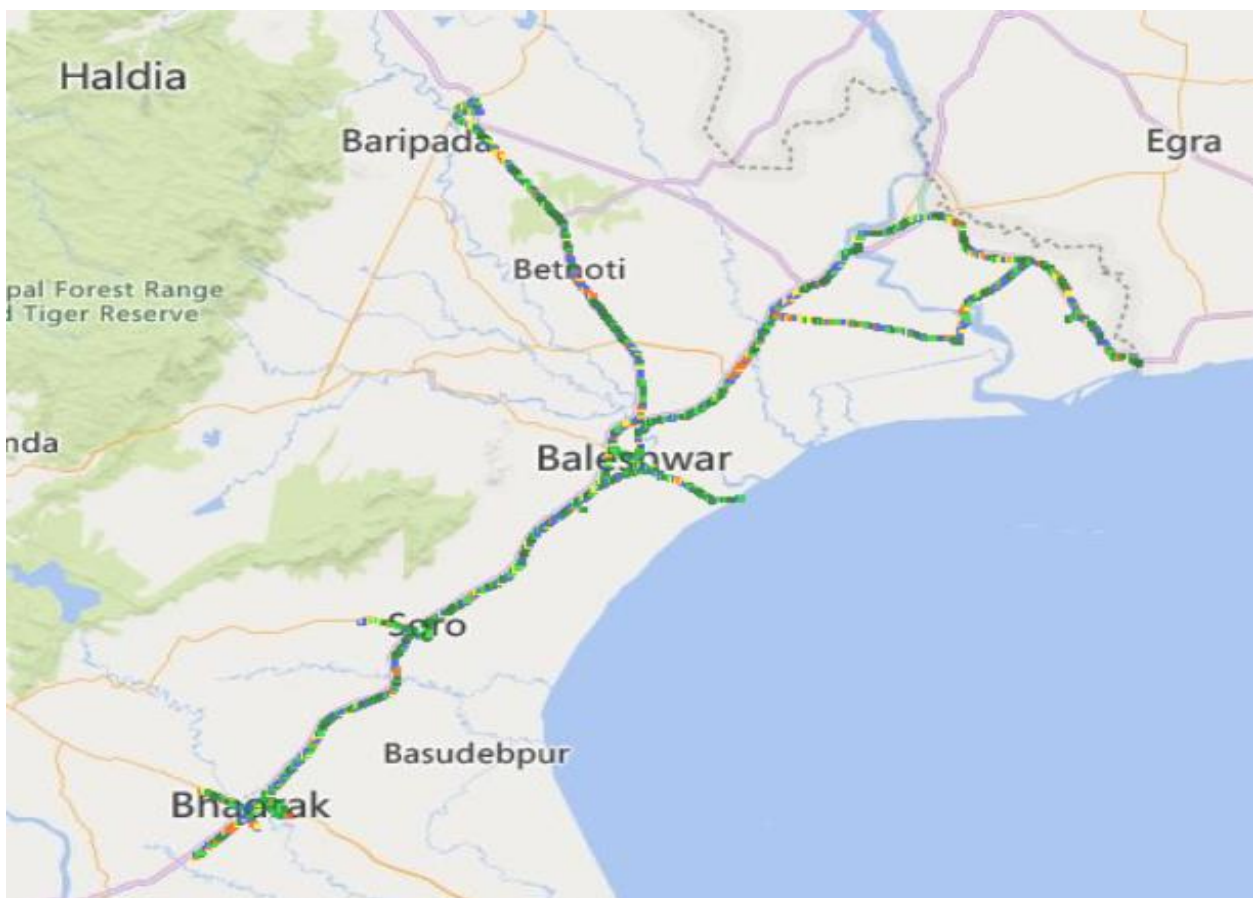
Overall Rx Quality	# Samples	%
(Min, <=2)	1062874	89.57
(2, <=3)	14519	1.23
(3, <=4)	16473	1.39
(4, <=5)	16882	1.41
(5, <=Max)	75851	6.40
Total	1186599	100

Overall EcNo	# Samples	%
(Max, <=-6)	1989457	44.98
(-6, <=-9)	1018571	23.05
(-9, <=-11)	884590	20.00
(-11, <=-14)	401062	9.06
(-14, <= Min)	128817	2.91
Total	4422497	100

II. Quality Details

JIO

Technology	Rx Quality %
VoLTE	83.7



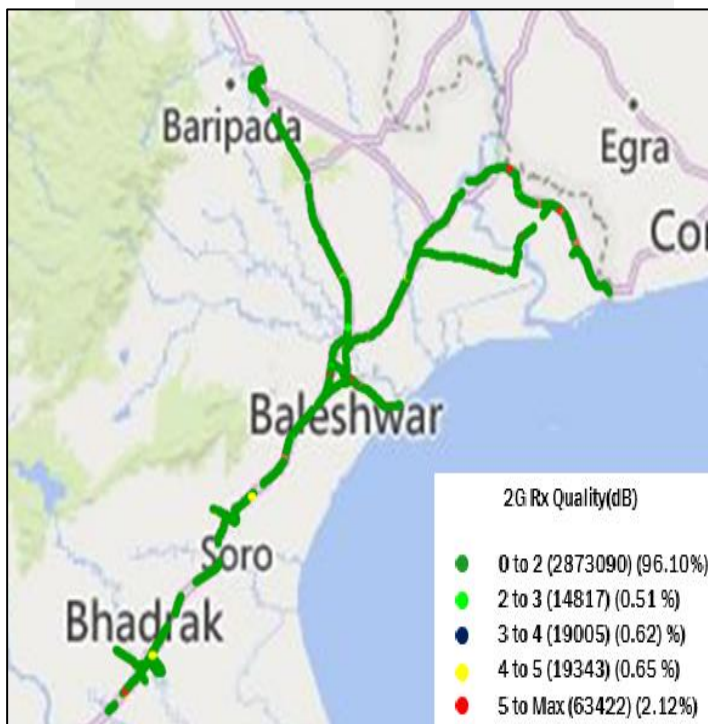
Overall SINR-Volte	# Samples	%
(Min, <=-3)	2789	7.92
(-3, <=-0)	2952	8.38
(0, <= 5)	7157	20.32
(5, <=10)	7786	22.10
(10, <=15)	6858	19.47
(15, <=Max)	7687	21.81
Total	35220	100

II. Quality Details

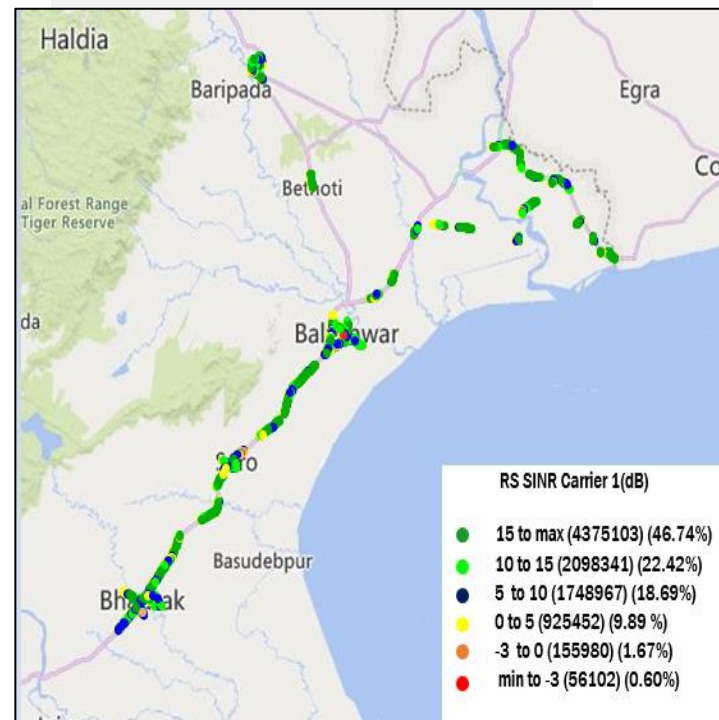
VIL

Technology	Rx Quality %
2G	97.88
VoLTE	97.74

2G



VoLTE



2G

Overall Rx Quality	# Samples	%
[Min, <=2]	2873090	96.10
[2, <=3]	14817	0.51
[3, <=4]	19005	0.62
[4, <=5]	19343	0.65
-5, <=Max	63422	2.12
Total	2989677	100

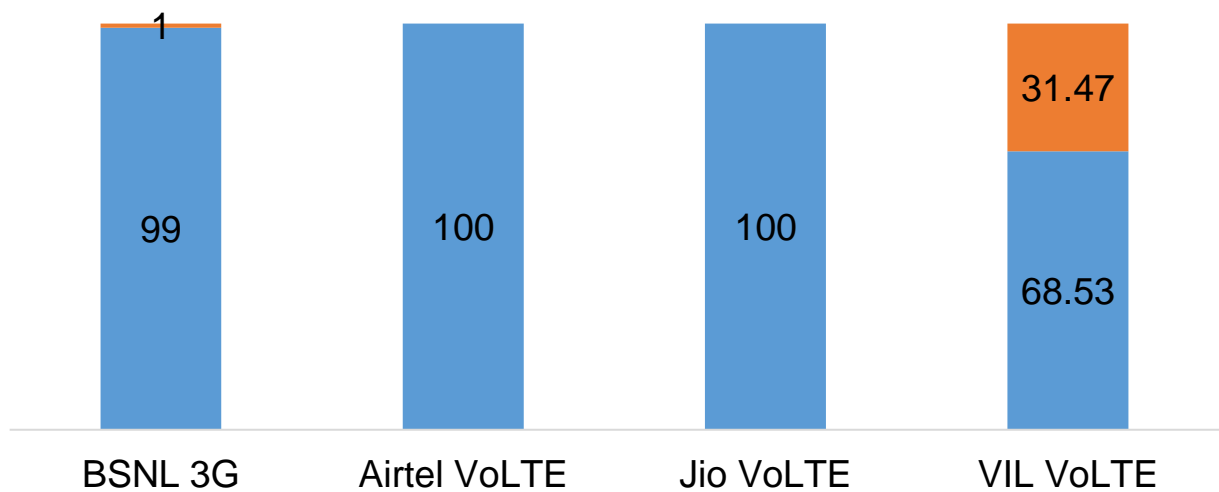
4G

Overall SINR	# Samples	%
[Min, <=-3]	56102	0.6
[-3, <=0)	155984	1.67
[0, <=5)	925452	9.89
[5, <=10)	1748967	18.69
[10, <=15)	2098341	22.42
[15, <=Max)	4375103	46.74
Total	9359949	100

III. Technology Details

TSP	% of Time Spent on
BSNL 3G	99
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	68.53

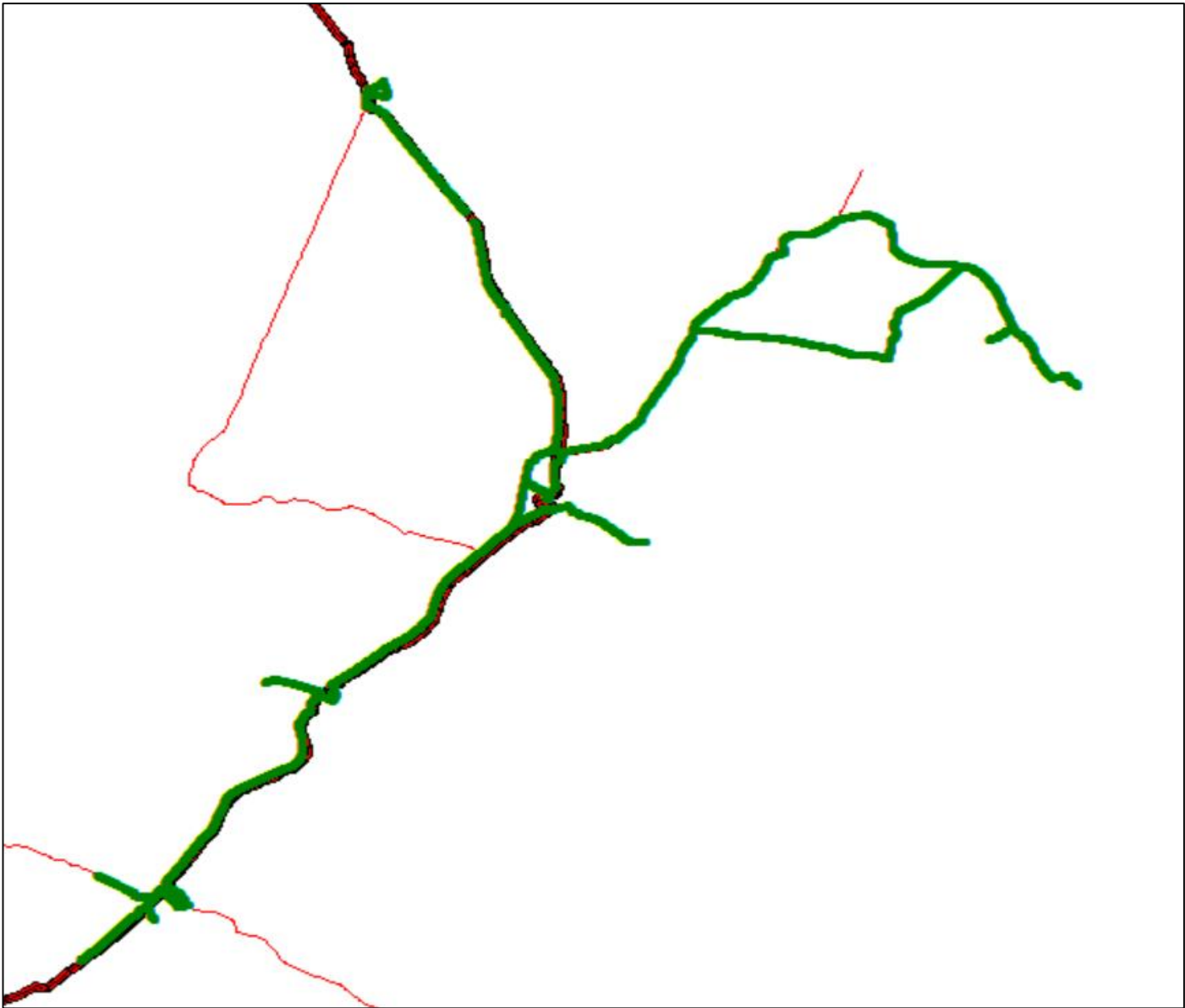
% of Time Spent



III. Technology Details

Airtel

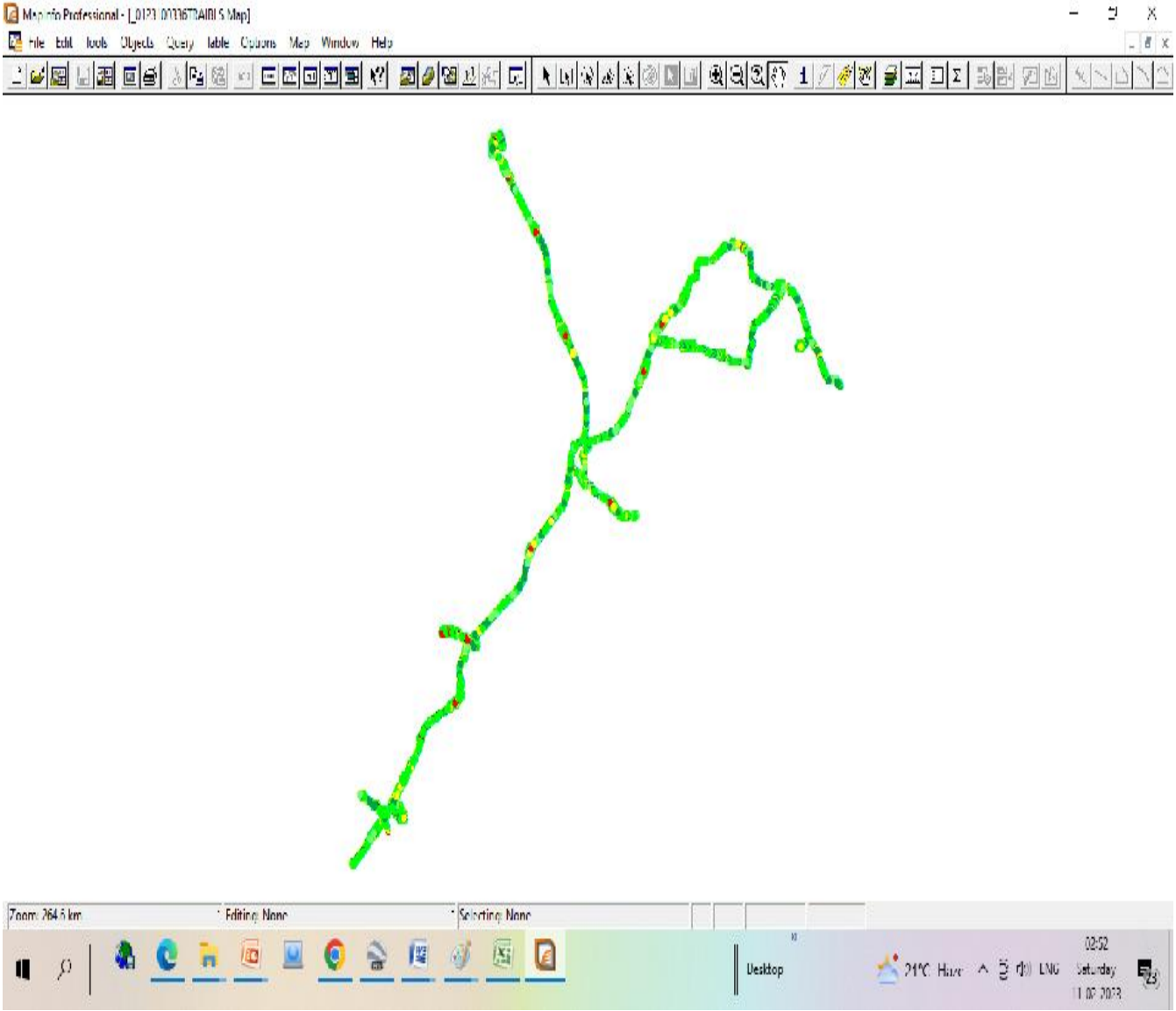
Technology	Time Spent %
VoLTE	100



III. Technology Details

BSNL

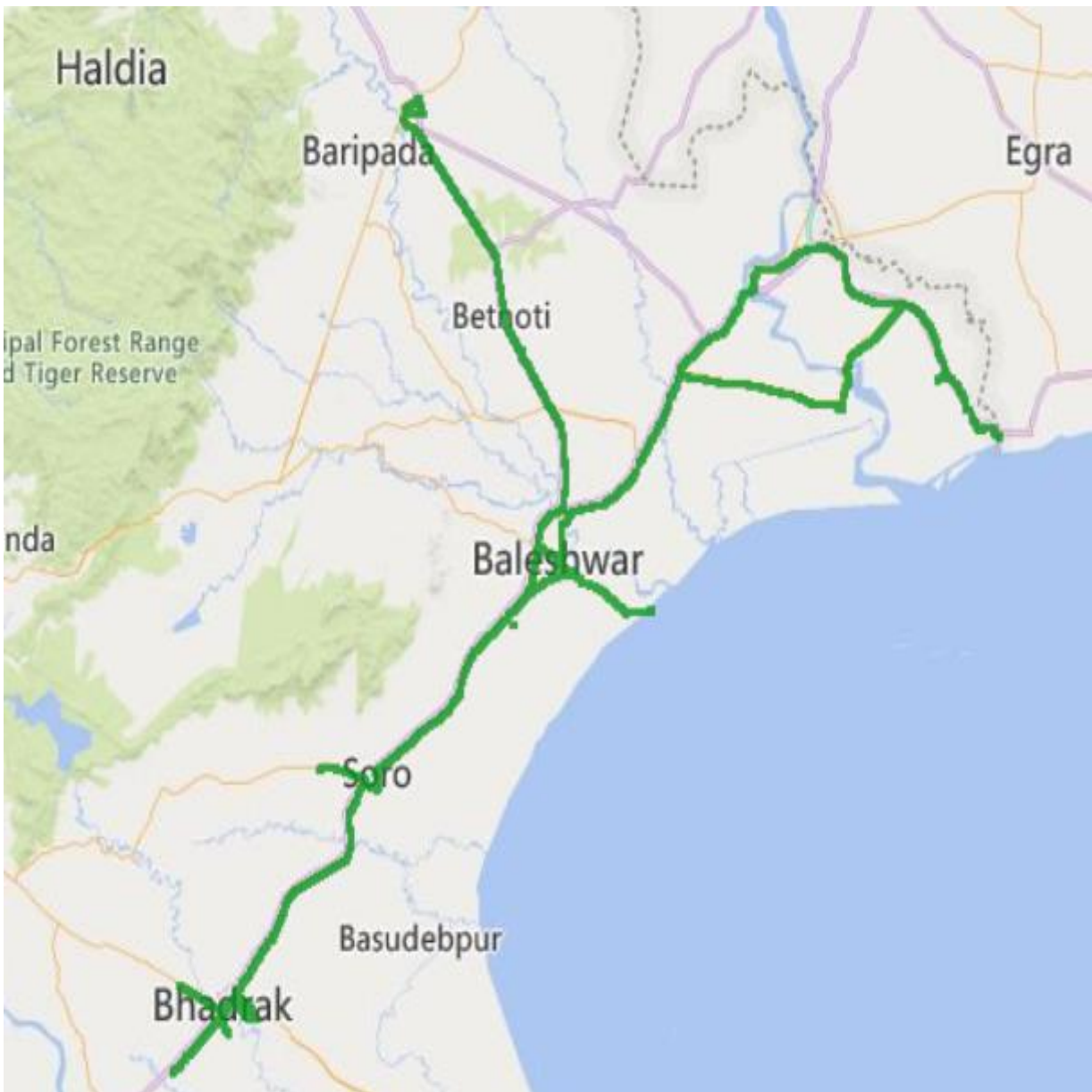
Technology	Time Spent %
3G	99



III. Technology Details

RJIO

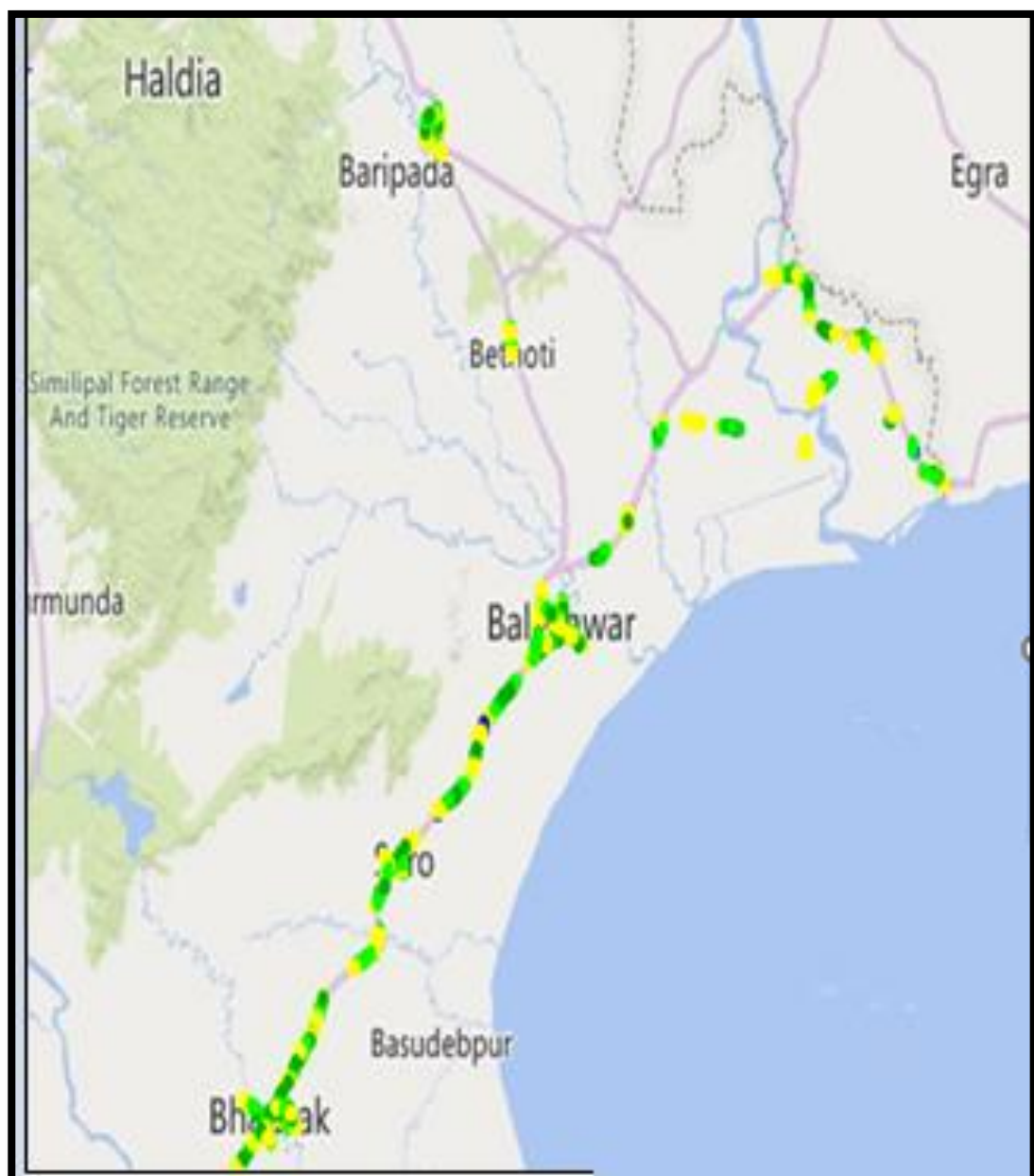
Technology	Time Spent %
VoLTE	100



III. Technology Details

VIL

Technology	Time Spent %
VoLTE	68.53

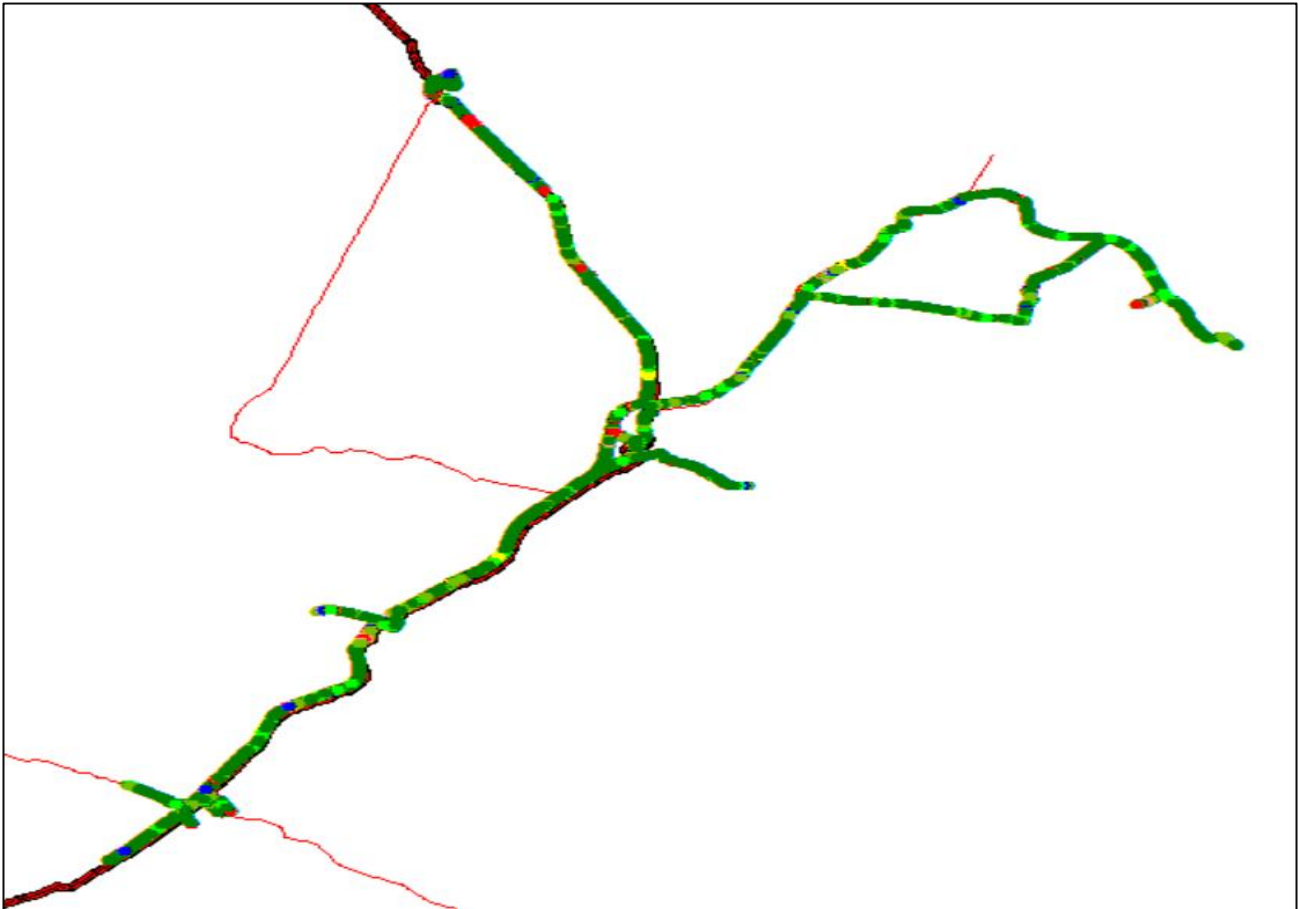


IV. Dynamic Data Test- 4G DL Details

Airtel

Data Statistics - Dynamic Complete SSA 430 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	26.1



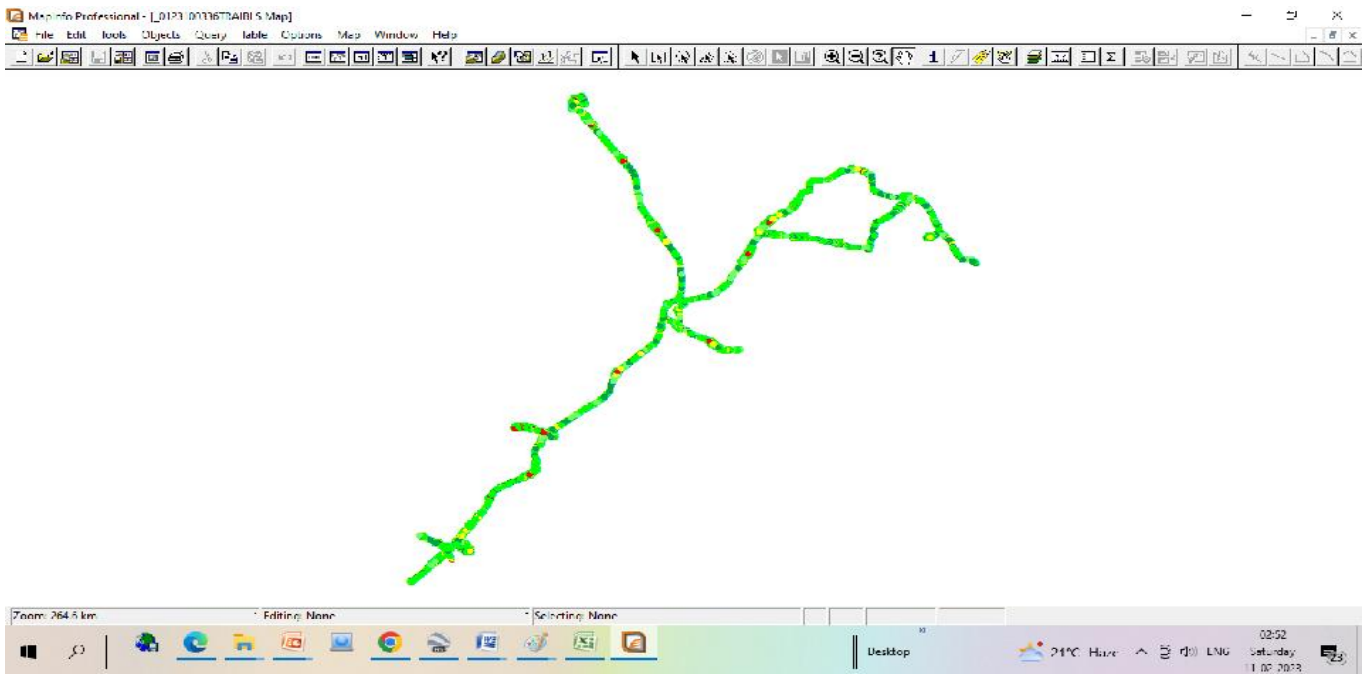
DL throughput	No of Sample	%
0 to 1 Mbps	814563	7.63
1 to 2 Mbps	152137	1.42
2 to 3 Mbps	202177	1.89
3 to 4 Mbps	195895	1.83
4 to 8 Mbps	1050498	9.84
8 to 12 Mbps	1319183	12.36
>12 Mbps	6942463	65.02

IV. Dynamic Data Test- 3G DL Details

BSNL

Data Statistics - Dynamic Complete SSA 430 Kms

Data KPIs - Overall	3G
Download Throughput (Mbps)	1.41



DL throughput	No of Samples	%
0 to 1 Mbps	1305	52.17
1 to 2 Mbps	1196	47.83
2 to 3 Mbps	0	
3 to 4 Mbps	0	
4 to 8 Mbps	0	
8 to 12 Mbps	0	
>12 Mbps	0	

IV. Dynamic Data Test- 4G DL Details

RJIO

Data Statistics - Dynamic Complete SSA 430 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	10.5



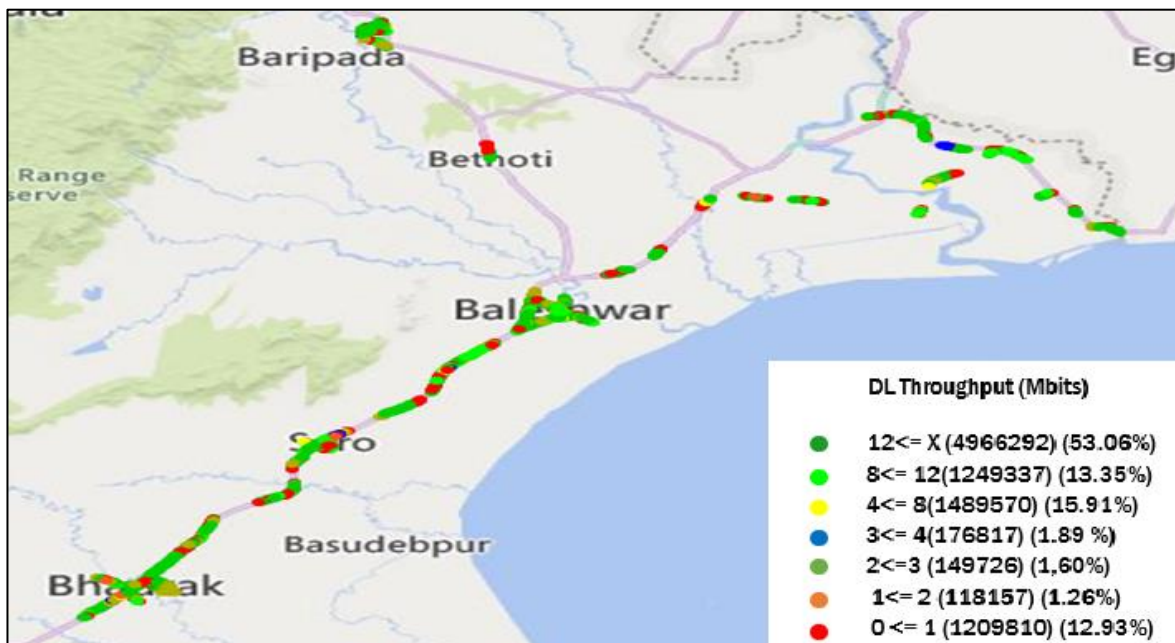
DL Throughput	No of Samples	%
0 to 1Mbps	9158	31.64
1 to 2Mbps	3931	13.58
2 to 3Mbps	6094	21.05
3 to 4Mbps	1918	6.63
4 to 8Mbps	1921	6.64
8 to 12 Mbps	2133	7.37
>12Mbps	3791	13.1

IV. Dynamic Data Test- 4G DL Details

VIL

Data Statistics - Dynamic Complete SSA 400 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	18.64



4G		
DL Throughput	No. of Samples %	%
0 to 1 Mbps	1209810	12.98
1 to 2 Mbps	118157	1.26
2 to 3 Mbps	149726	1.60
3 to 4 Mbps	176817	1.89
4 to 8 Mbps	1489570	15.91
8 to 12Mbps	1249337	13.35
>12 Mbps	4966292	53.06
Total	9359709	100

V. TRAI My Speed App

Airtel

Technology - 4G	Baripada Busstand	Jaleswar Busstand	Bhadrak Busstand	Balasore Busstand	Balasore Railway Station	FM Old University
Download in Mbps	48.68	74.33	47.23	48.65	48.64	21.10
Upload in Mbps	6.88	8.56	11.24	28.60	38.119	28.99

BSNL

Technology -3G	Baripada Busstand	Jaleswar Busstand	Bhadrak Busstand	Balasore Busstand	Balasore Railway Station	FM Old University
Download in Mbps	4.29	8.20	4.60	3.09	5.71	6.62
Upload in Mbps	1.42	1.98	1.96	2.88	2.61	3.06

JIO

Technology - 4G	Baripada Busstand	Jaleswar Busstand	Bhadrak Busstand	Balasore Busstand	Balasore Railway Station	FM Old University
Download in Mbps	23.27	32.99	24.12	20.42	20.07	16.74
Upload in Mbps	8.52	10.09	13.7	16.78	11.06	13.61

VIL

Technology - 3G / 4G	Baripada Busstand	Jaleswar Busstand	Bhadrak Busstand	Balasore Busstand	Balasore Railway Station	FM Old University
Download in Mbps	62.20	21.79	15.30	41.32	41.32	17.31
Upload in Mbps	8.74	2.01	9.73	30.09	30.09	14.86

VI. NH/SH Routes covered

NH/SH Routes covered in OADT by Airtel / BSNL / RJIL / VIL				
S No	No of NH/SH routes	NH routes	SH routes	Distance(K m)
1	Bhadrak to Chandaneswar	NH 16		190 kms
2	Jaleswar to Chandaneswar	NH 316A		35 kms
3	Gandhi Chowk to Kamarda			45 Kms
4	Balasore to Baripada	NH 18		60km
5	Balaosre to Chandipur			18 Km