



Operator Assisted Drive Test Report

VISAKHAPATNAM SSA March 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%.

The Operator Assisted Drive Test has been carried out by Regional Office, Hyderabad with the help of Service Providers in Visakhapatnam City and surrounding areas Gajuwaka, Anakapalli, Yelamanchali, Madhurawada, Tagarapuvalasa and Bheemili from 9:00 AM to 8:00 PM during 14th to 17th March 2022. The drive test covered drive route of 330 KMs & 5 hotspot over a period of 4 days. Approximately 620 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 14th to 17th March, 2022 covering various locations in Visakhapatnam City & surrounding areas Gajuwaka, Anakapalli, Yelamanchali, Madhurawada, Tagarapavalasa and Bheemili . 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 330 KMs over a period of 4 days from 14th to 17th Mar. 2022. Approximately 620 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 330 kms over a period of 3 days for download throughput for 3G & 4G technologies.

2. 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.

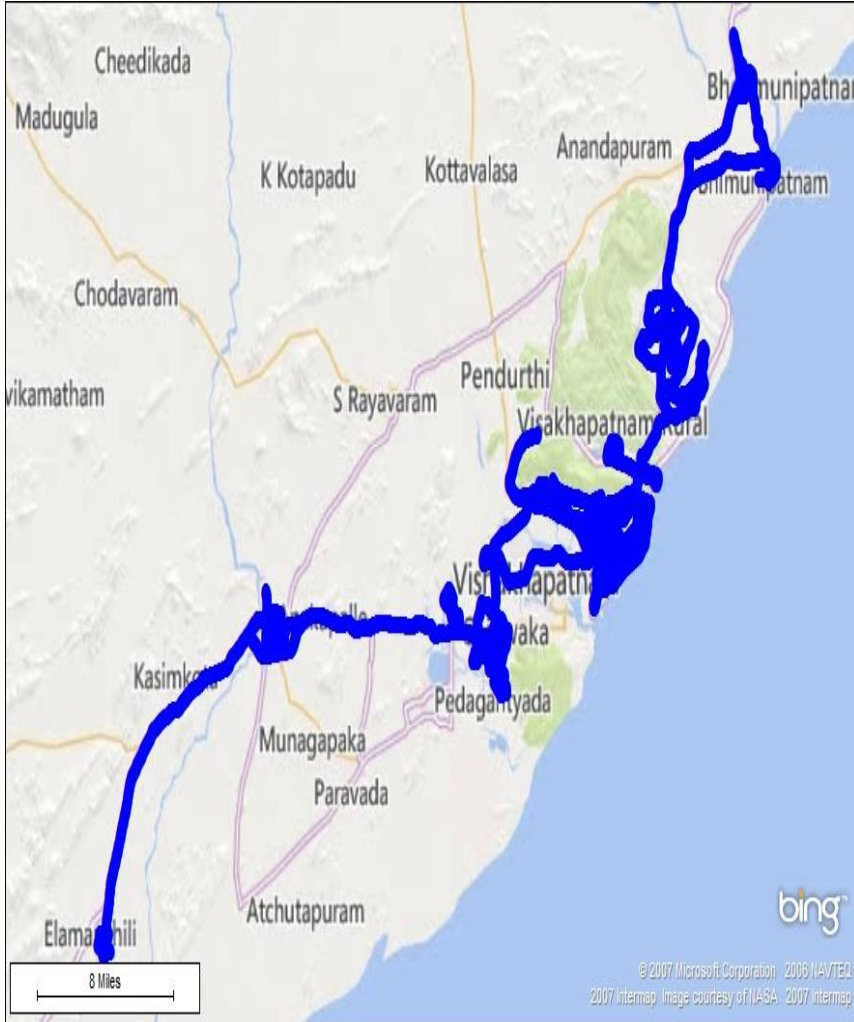
* 3G KPI's which are calculated from UE in Dual Mode (2G & 3G) includes samples and events of 2G.

* 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 Myntra.com
Latency	32 Bytes on www.google.com

Overview

Voice & Dynamic Data Test Drive Route



Areas Covered –Visakhapatnam City

RTC Complex	Gopalapatnam
Dwarakanagar	NAD
Sitamapeta	Railway Station
B S Layout	Diamond Park
Seethammadhara	Dabagardens
M V P Colony	Siripuram
Arilova	Beach Road
Simhachalam	Maddilapalem
Areas Covered- Gajuwaka	Areas Covered- Anakapalli
B.C.Road	Railway station
Pedagantyada	Perugu Bazar
Old Gajuwaka	Gavarapalem
Autonagar	RTC Bus stand
Areas Covered- Yelamanchali	Areas Covered- Madhurawada
Bus stand	Car shed
Railway station	Mithalapuri Colony
Market area	ACA_VDCA Stadium
Areas Covered- Tagarapuvalasa	Areas Covered- Bheemili
Bus stand	Beach Road
ANITS	Market area
Market area	Bus stand

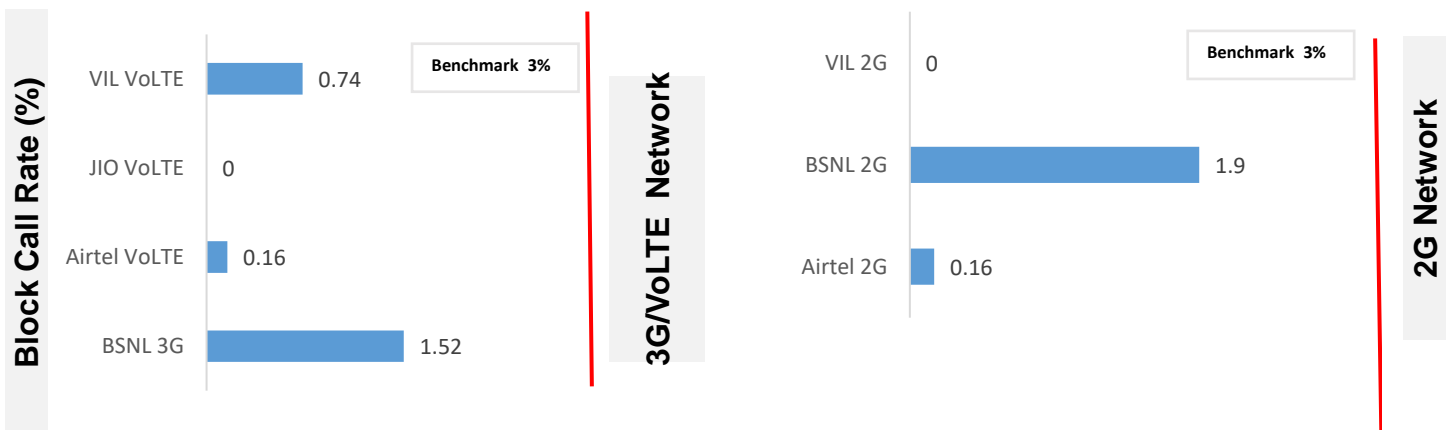
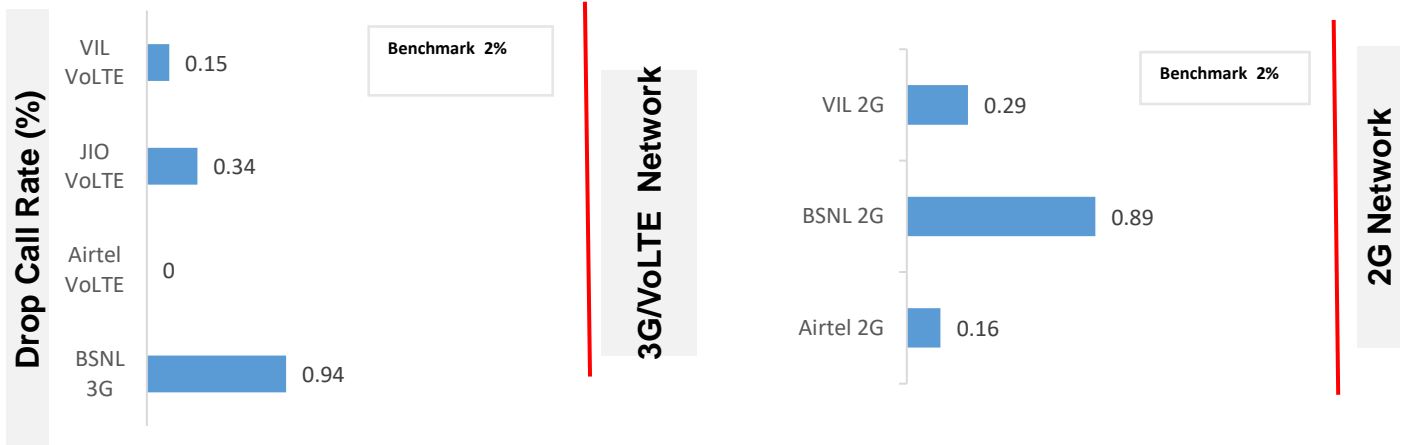
Hotspots for static data test

Static Locations
Anakapalli RTC Complex
Tagarapuvalasa Bus stand
Visakhapatnam Railway station
Jagadamba Junction
Visakhapatnam RTC Complex

Voice Calls

Key Observations

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



KPIs	2G			3G	VoLTE		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0.16	0.89	0.29	0.94	0	0.34	0.15
Block Call Rate %	0.16	1.90	0	1.52	0.16	0	0.74

a) All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%).

a) Block Call Rate (BCR%) benchmark of 3% was achieved by all TSPs.

Voice Calls

Key Observations

Coverage

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

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	84.1	87.8	94.24

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

TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Coverage %	91.6	99.02	98.91	96.51

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

TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Time Spent on 3G/4G %	77.9	100	100	99.42

Data Services Static

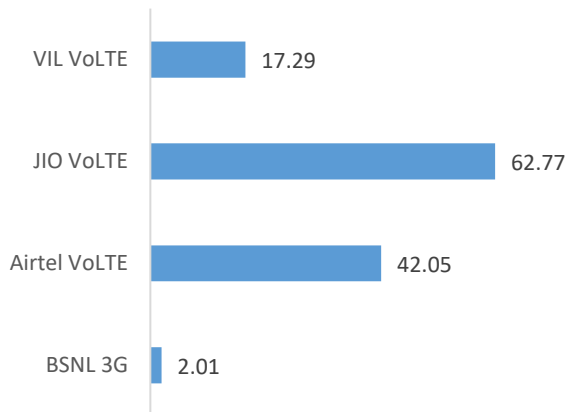
**Key Observations
(Average of 5
Hotspots)**

Data was tested at 5 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing (Flipkart, Amazon, PayTm)

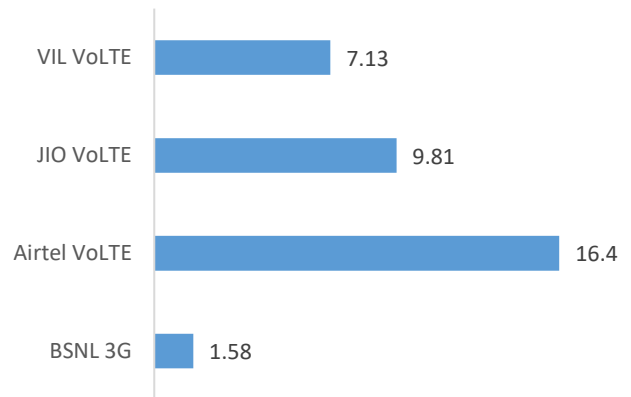
Data Download and Upload Performance (kbps)

3G/4G Network:

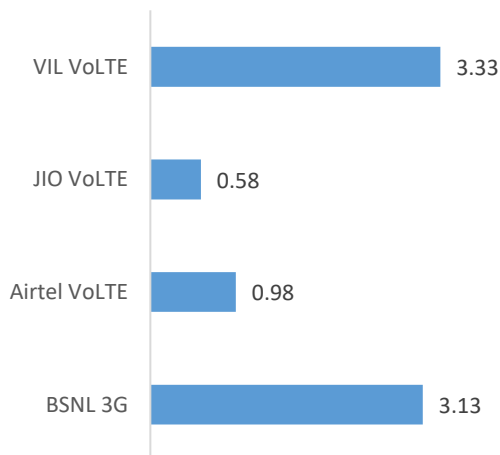
Download Throughput (Mbps)



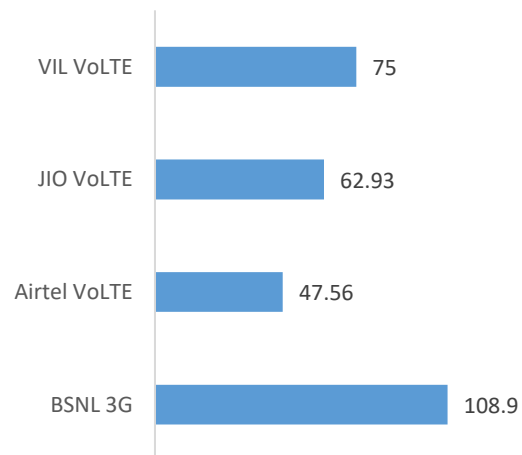
Upload Throughput (Mbps)



Web Browsing Delay (sec)



Latency (msec)



Data Services Dynamic

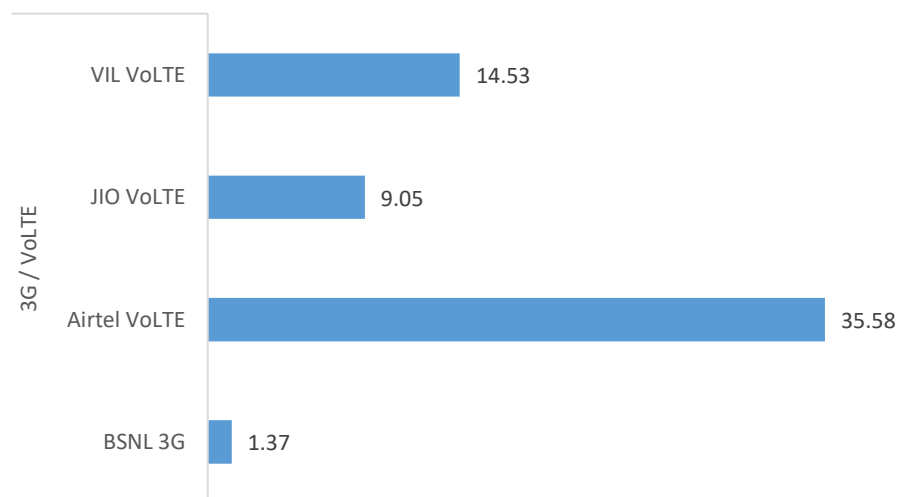
Key Observations

Dynamic Data was tested for 330 Kms. Download Throughput was tested.

Data Download Performance (Mbps) - Dynamic

3G/4G/ Network:

Download throughput in Mbps - Dynamic



Data Services Dynamic	3G / VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Download throughput in Mbps	1.37	35.58	9.05	14.53

Summary

SSA Level Summary-Voice

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	605	686	701
Blocked Call Rate (%)	0.16	1.90	0
CSSR% (Accessibility)	99.83	98.10	100
Drop Call Rate (%)	0.16	0.89	0.29
Mobility HOSR (%)	99.4	98.13	99.98
Rx Quality (%)	89.8	95.5	97.51

Voice Call	3G/VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	532	614	584	680
Blocked Call Rate (%)	1.52	0.16	0	0.74
CSSR% (Accessibility)	98.48	99.83	99.66	99.30
Drop Call Rate (%)	0.94	0	0.34	0.15
Mobility HOSR (%)	100	99.87	99.56	99.86
Rx Quality (%)	85.6	91.4	99.41	75.66

Summary

SSA Level Summary (Average of 5 Hotspots) - Data Services

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	66.736	98.32	286.71
Upload Throughput (kbps)	35.718	75.14	216.9
Web Browsing Delay (sec)	7.448	28.31	7.00
Latency (msec)	168.32	122.90	207.36

Data Services Static	3G/VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Download Throughput (Mbps)	2.01	42.05	62.77	17.29
Upload Throughput (Mbps)	1.58	16.4	9.81	7.13
Web Browsing Delay (sec)	3.13	0.98	0.58	3.33
Latency (msec)	108.90	47.56	62.93	75.00

Anakapalli RTC Complex	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	58.54	138.23	208.80
Upload Throughput (kbps)	24.6	84.87	114.10
Web Browsing Delay (sec)	9.4	22.17	11.52
Latency (msec)	195.6	120.21	176.00

Tagarapuvalasa Bus stand	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	53.05	183.54	42.18
Upload Throughput (kbps)	25.26	140.18	81.50
Web Browsing Delay (sec)	13.6	19.33	13.21
Latency (msec)	180.1	74.89	231.45

Visakhapatnam Railway Station	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	54.6	45.41	265.80
Upload Throughput (kbps)	30.37	70.32	189.3
Web Browsing Delay (sec)	6.5	58.5	8.07
Latency (msec)	183.2	136.38	197.00

Visakhapatnam Jagadamba Junction	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	104.68	35.73	240.80
Upload Throughput (kbps)	71.15	18.27	151.40
Web Browsing Delay (sec)	3.9	45.94	7.83
Latency (msec)	138.6	154.97	167.00

Visakhapatnam RTC Complex	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	62.81	88.68	209.80
Upload Throughput (kbps)	27.21	62.06	190.80
Web Browsing Delay (sec)	3.84	23.87	8.63
Latency (msec)	144.1	128.03	161.00

Anakapalli RTC Complex	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	1.82	42.29	53.82	8.16
Upload Throughput in Mbps	1.56	12.9	19.55	3.04
Web browsing delay in second	4.29	0.8	0.67	3.17
Latency in (msec)	115.50	47.5	59	92.00

Tagarapualasa Bus stand	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	4.08	31.9	41.31	8.84
Upload Throughput in Mbps	2.09	17.5	4.1	0.36
Web browsing delay in second	2.27	1.2	0.84	4.12
Latency in (msec)	71.55	48.8	55	97.00

Visakhapatnam Railway Station	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	1.32	57.03	106.75	21.46
Upload Throughput in Mbps	1.43	15.97	9.44	7.74
Web browsing delay in second	3.76	0.7	0.33	3.46
Latency in (msec)	122.88	48.8	66.33	74.00

Visakhapatnam Jagadamba Junction	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	1.63	36.35	77.18	20.07
Upload Throughput in Mbps	1.64	19.35	8.44	6.04
Web browsing delay in second	6.77	1.5	0.51	2.17
Latency in (msec)	154.93	49.6	65.33	78.00

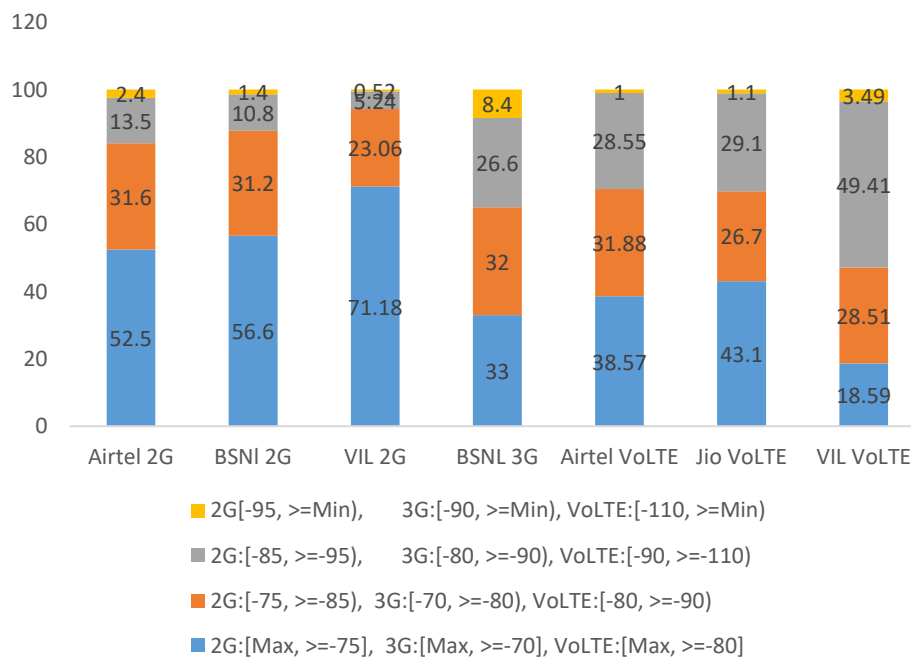
Visakhapatnam RTC Complex	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Download throughput in Mbps	1.20	41.88	34.79	5.18
Upload Throughput in Mbps	1.16	15.87	7.49	7.44
Web browsing delay in second	1.69	0.7	0.83	1.98
Latency in (msec)	79.66	43.1	69	82.00

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	84.1
BSNI 2G	87.8
VIL 2G	99.48
BSNL 3G	91.6
Airtel VoLTE	99.02
Jio VoLTE	98.91
VIL VoLTE	96.51

Coverage Distribution

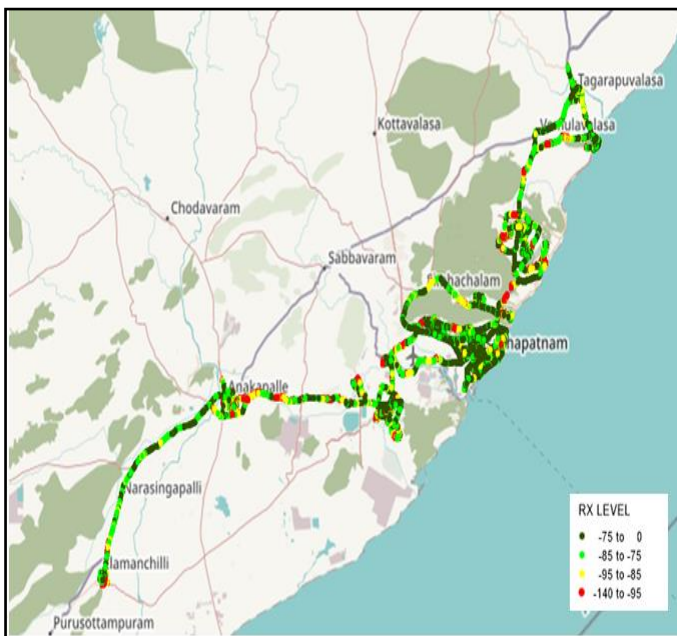


I. Coverage Details

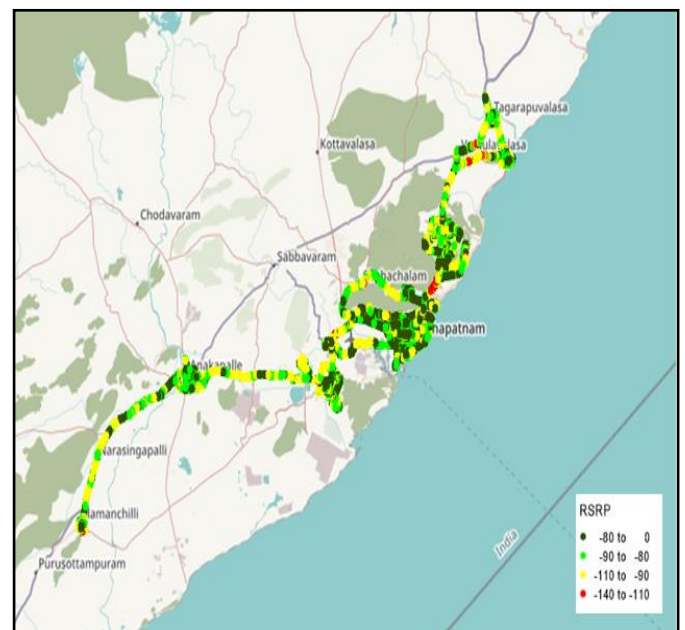
AIRTEL

Technology	Coverage Rate %
2G	84.1%
VoLTE	99.02 %

2G



VoLTE



2G		
Overall RxLevel	# Samples	%
[Max, >=-75]	7373359	52.5
[-75, >=-85)	4434835	31.6
[-85, >=-95)	1887938	13.5
[-95, >=Min)	339740	2.4
Total	14035872	100

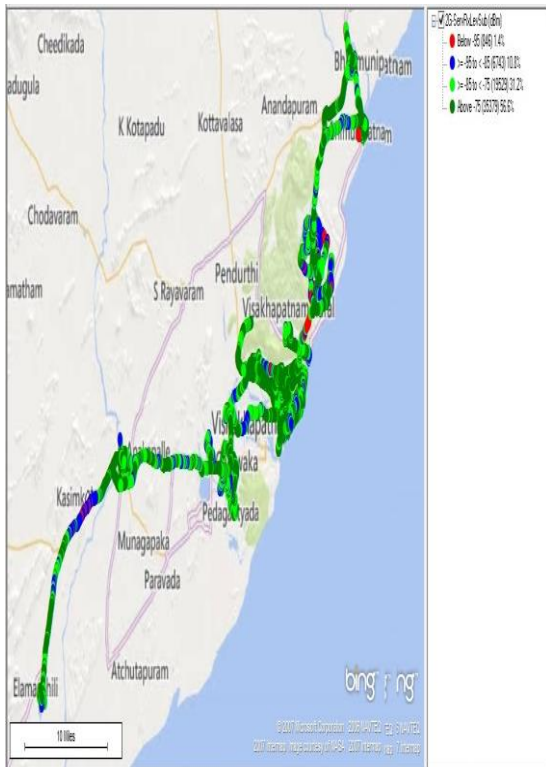
VoLTE		
Overall RSRP	# Samples	%
[Max, >=-80]	5406908	38.57
[-80, >=-90)	4469483	31.88
[-90, >=-110)	4002303	28.55
[-110, >=Min)	137928	1
Total	14016622	100

I. Coverage Details

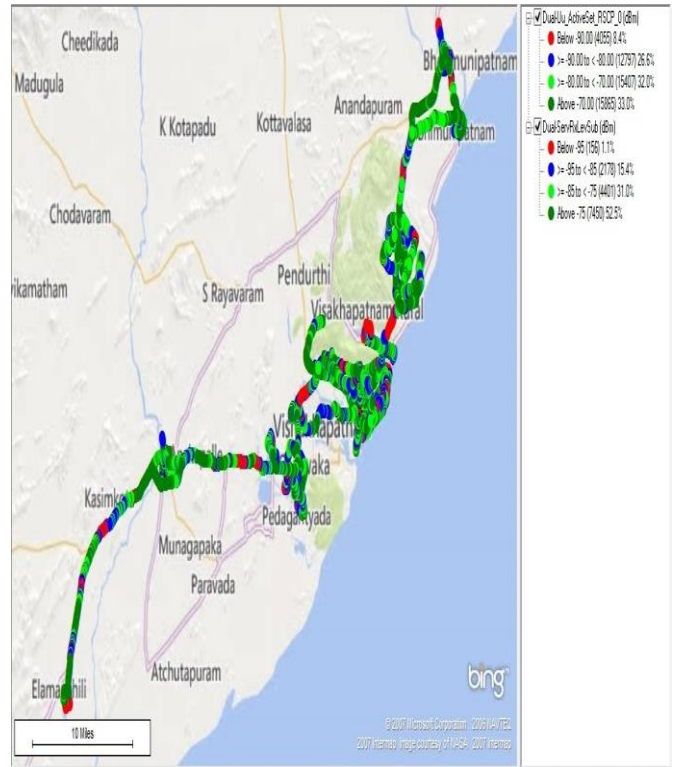
BSNL

Technology	Coverage Rate %
2G	87.8
3G	91.6

2G



3G



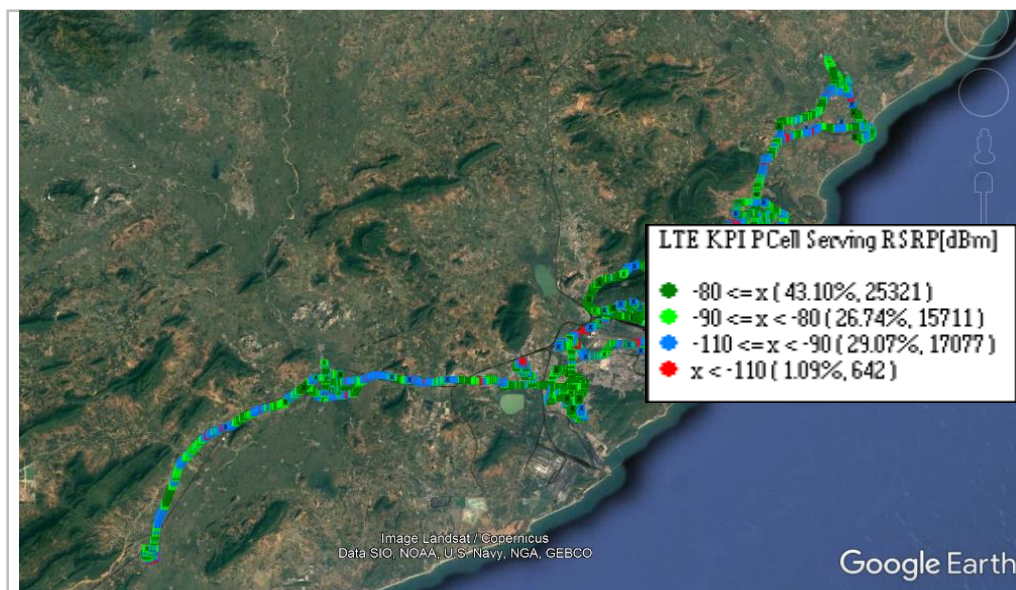
2G		
Overall RxLevel	# Samples	%
[Max, >=-75]	35379	56.6
[-75, >=-85)	19529	31.2
[-85, >=-95)	6743	10.8
[-95, >=Min)	846	1.4
Total	62497	100

3G		
Overall RSCP	# Samples	%
[Max, >=-70]	15865	33
[-70, >=-80)	15407	32
[-80, >=-90)	12797	26.6
[-90, >=Min)	4055	8.4
Total	48124	100

I. Coverage Details

JIO

Technology	Coverage Rate %
VoLTE	98.91

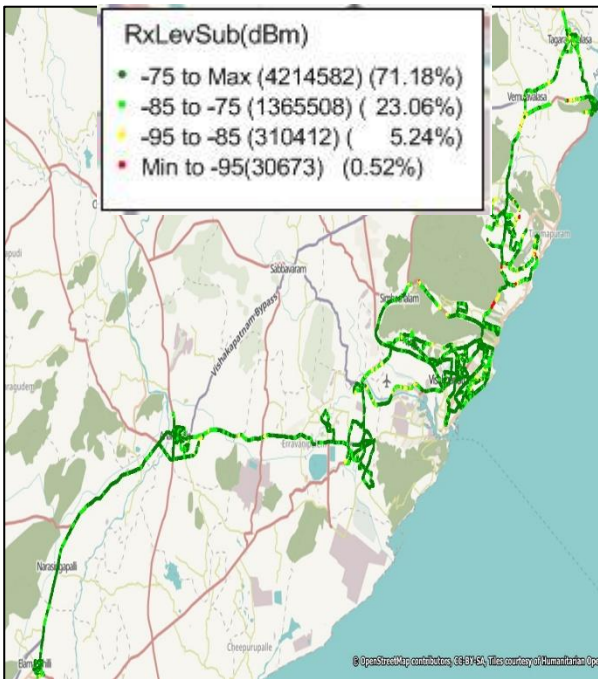


VoLTE		
Overall RSRP	#Samples	%
[Max, >=-80]	25321	43.1
[-80, >=-90)	15711	26.7
[-90, >=-110)	17077	29.1
[-110, >=Min)	642	1.1
Total	58751	100

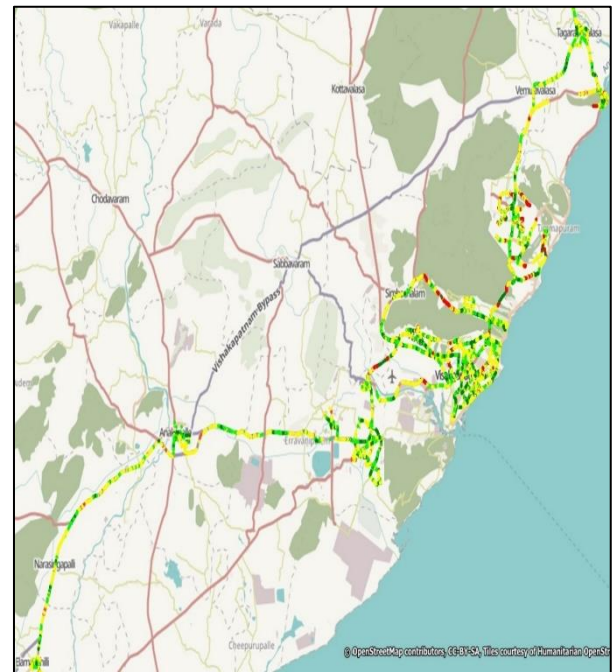
I. Coverage Details

Technology	Coverage Rate %
2G	99.48
VoLTE	96.51

2G



VoLTE



2G		
Overall RxLevel	# Samples	%
[Max, >=-75]	4214582	71.18
[-75, >=-85)	1365508	23.06
[-85, >=-95)	310412	5.24
[-95, >=Min)	30673	0.52
Total	5921175	100

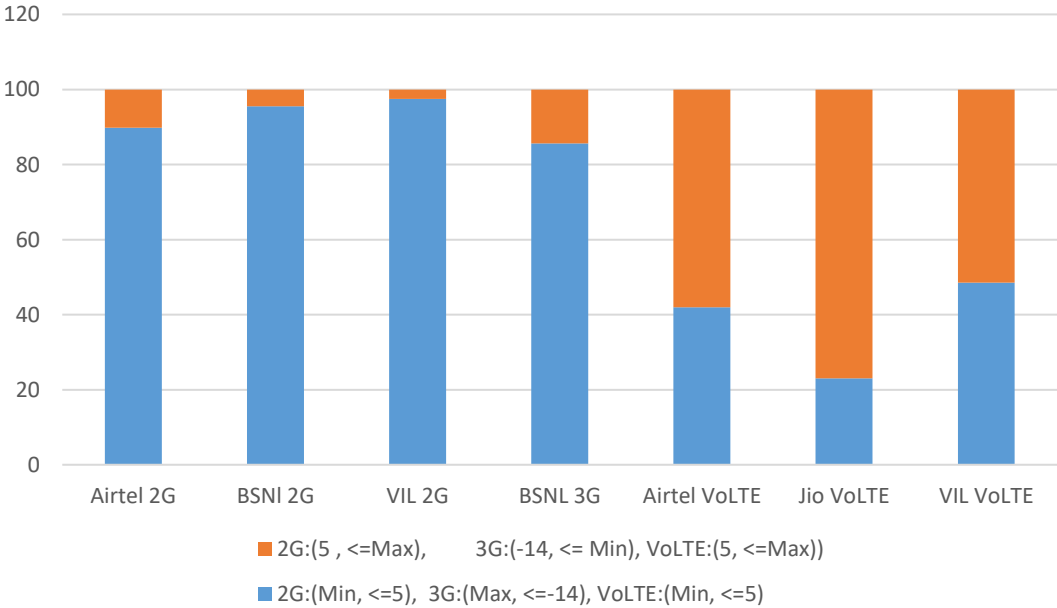
VoLTE		
Overall RxLevel	# Samples	%
[Max, >=-80]	2991144	18.59
[-80, >=-90)	4587807	28.51
[-90, >=-110)	7951530	49.41
[-110, >=Min)	561619	3.49
Total	16092100	100

II. Quality Details

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 $\geq 95\%$.

TSP	Rx Quality %
Airtel 2G	89.8
BSNI 2G	95.5
VIL 2G	97.51
BSNL 3G	85.6
Airtel VoLTE	91.4
Jio VoLTE	99.41
VIL VoLTE	75.66

Rx Quality Distribution

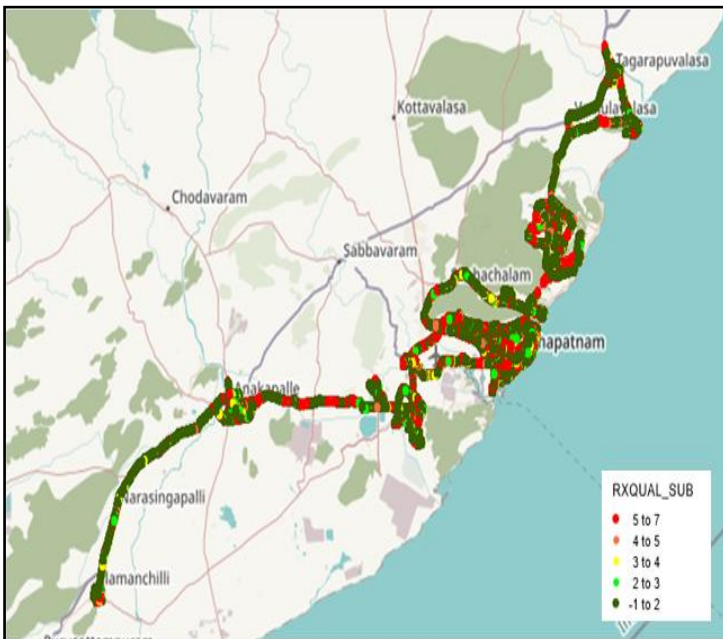


II. Quality Details

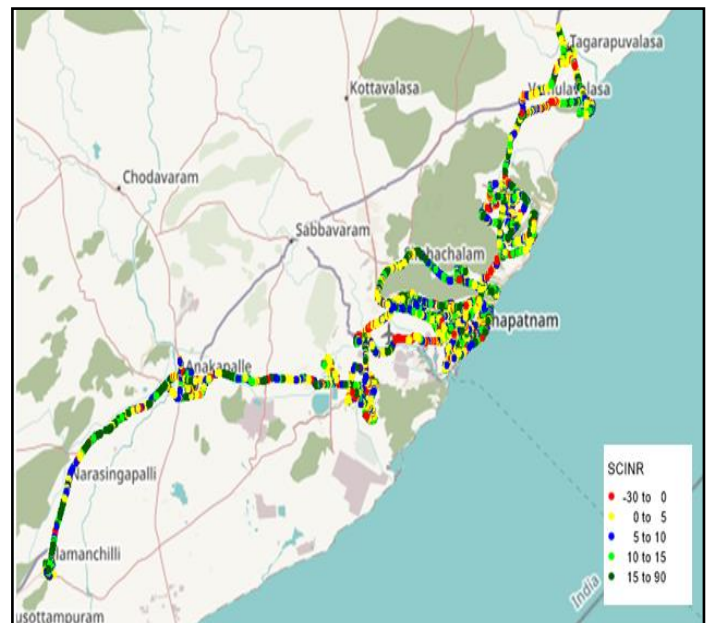
Airtel

Technology	Rx Quality %
2G	89.8
VoLTE	91.4

2G



VoLTE



Overall Rx Quality	# Samples	%
(Min, <=2)	8770891	69.6
(2, <=3)	670922	5.3
(3, <=4)	630680	5.0
(4, <=5)	1249584	9.9
(5, <=Max)	1288229	10.2
Total	12610306	100%

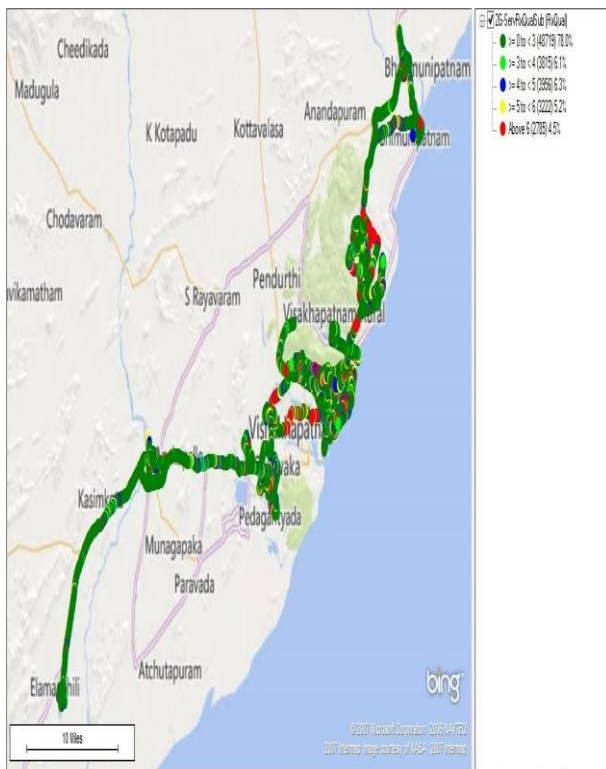
Overall SINR	# Samples	%
(Min, <=0)	1205600	8.6
(0, <=5)	4704536	33.4
(5, <=10)	3061811	21.7
(10, <=15)	2409199	17.1
(15, <=Max)	2698683	19.2
Total	14079829	100

II. Quality Details

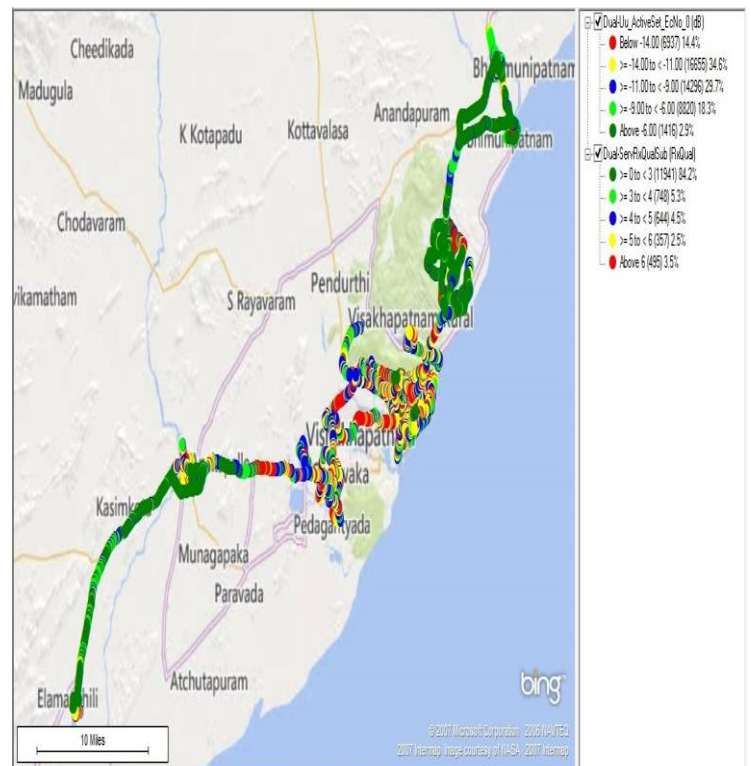
BSNL

Technology	Rx Quality %
2G	95.5
3G	85.6

2G



3G (Dual mode)



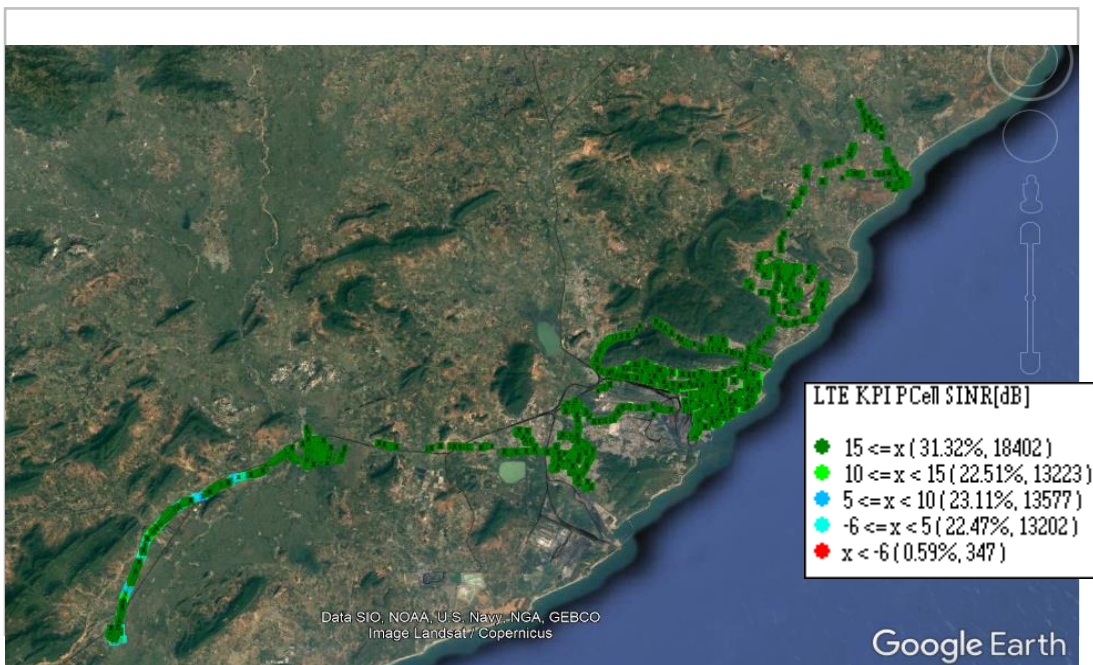
Overall Rx Quality	# Samples	%
(Min, <=2)	48719	78.0
(2, <=3)	3815	6.1
(3, <=4)	3956	6.2
(4, <=5)	3222	5.2
(5, <=Max)	2785	4.5
Total	62497	100

Overall EcNo	# Samples	%
(Max, <=-6)	1416	2.9
(-6, <=-9)	8820	18.3
(-9, <=-11)	14296	29.8
(-11, <=-14)	16655	34.6
(-14, <= Min)	6937	14.4
Total	48124	100

II. Quality Details

JIO

Technology	Rx Quality %
VoLTE	99.41

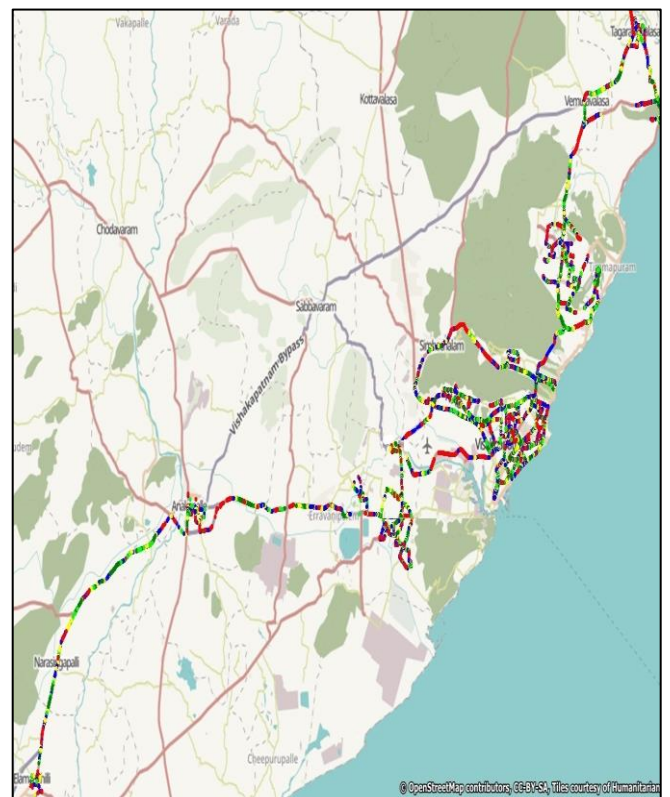
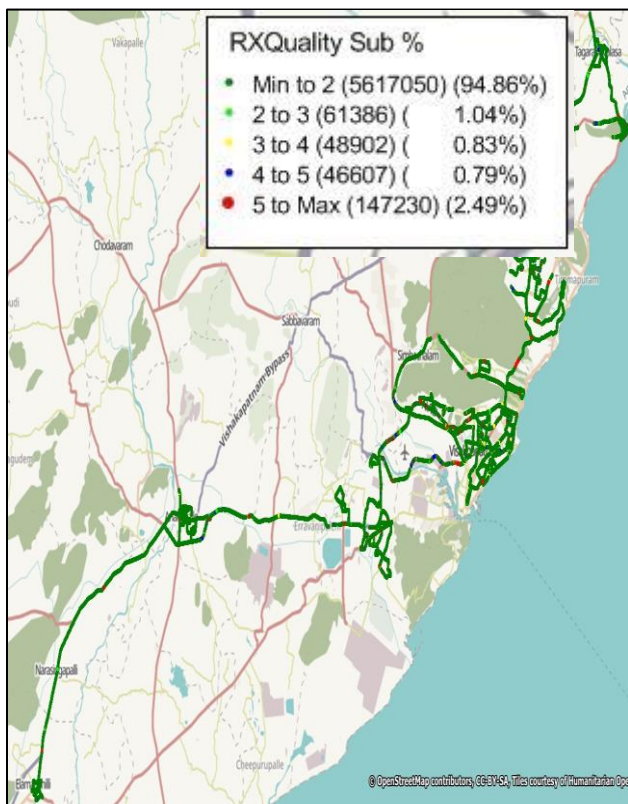


Overall SINR	# Samples	%
(Min, <=-6)	347	0.59
(-6, <=5)	13202	22.47
(5, <=10)	13577	23.11
(10, <=15)	13223	22.51
(15, <=Max)	18402	31.32
Total	58751	100

II. Quality Details

VIL

Technology	Rx Quality %
2G	97.51
VoLTE	75.66



Overall Rx Quality	# Samples	%
(Min, <=2)	5617050	94.85
(2, <=3)	61386	1.04
(3, <=4)	48902	0.83
(4, <=5)	46607	0.79
(5, <=Max)	147230	2.49
Total	5921175	100

Overall SINR	# Samples	%
(Min, <=0)	3916075	24.34
(0, <=5)	3888230	24.16
(5, <=10)	3346639	20.80
(10, <=15)	2513813	15.62
(15, <=Max)	2427343	15.08
Total	11752387	100

III. Technology Details

TSP	% of Time Spent
BSNL 3G	77.9
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	99.42

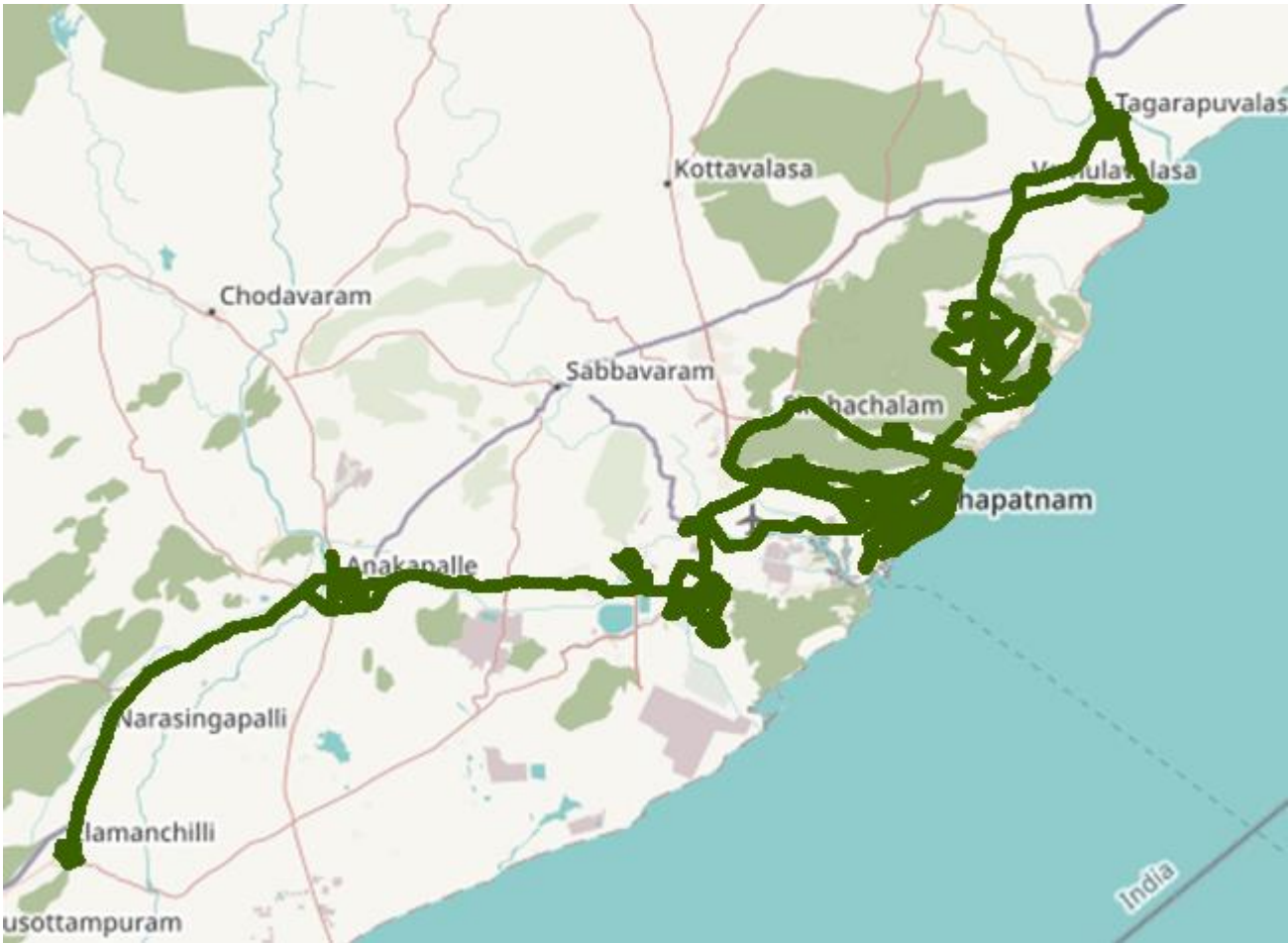
Technology Distribution



III. Technology Details

Airtel

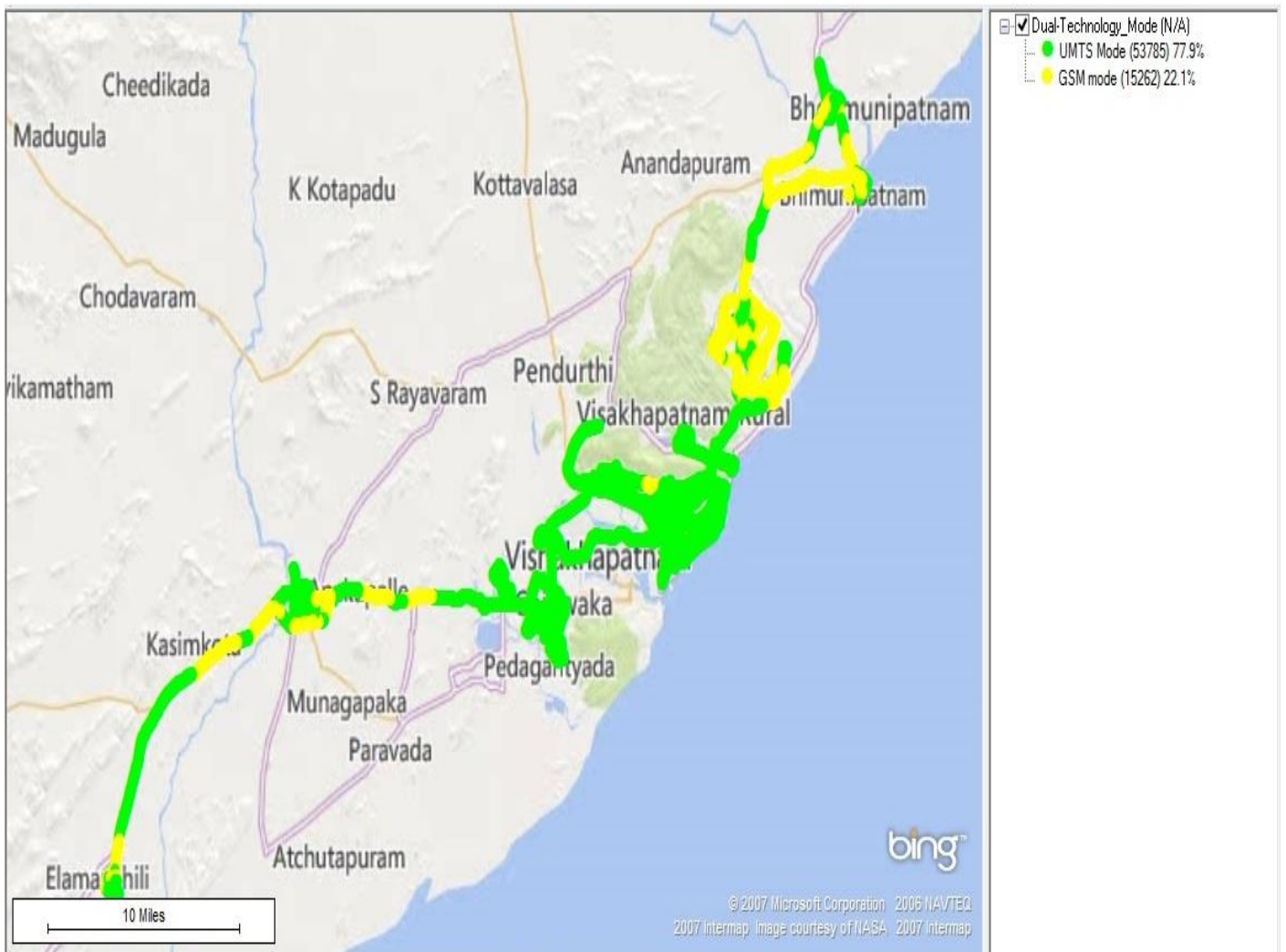
Technology	Time Spent %
VoLTE	100



III. Technology Details

BSNL

Technology	Time Spent %
3G	77.9



III. Technology Details

JIO

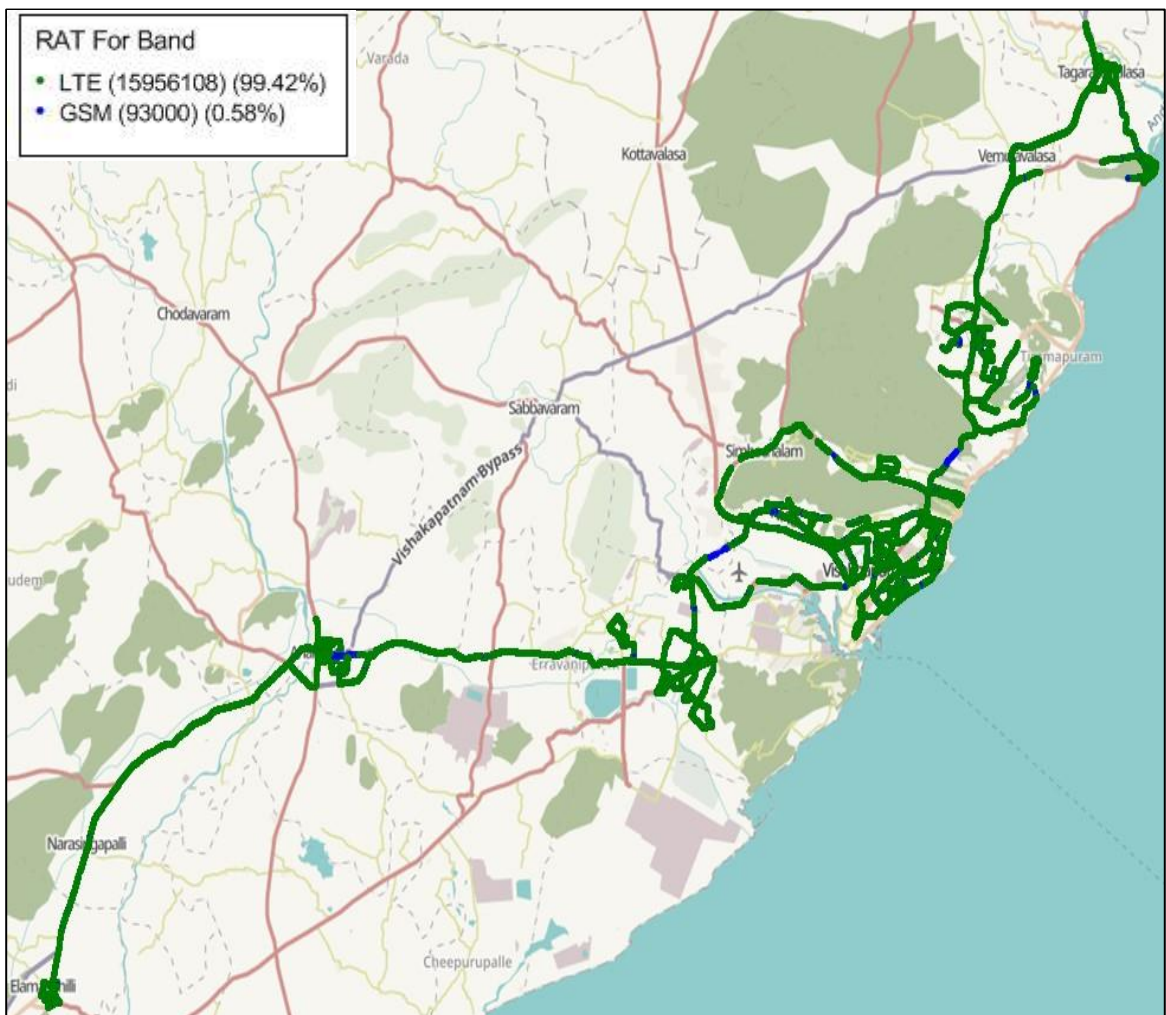
Technology	Time Spent %
VoLTE	100



III. Technology Details

VIL

Technology	Time Spent %
VoLTE	99.42%

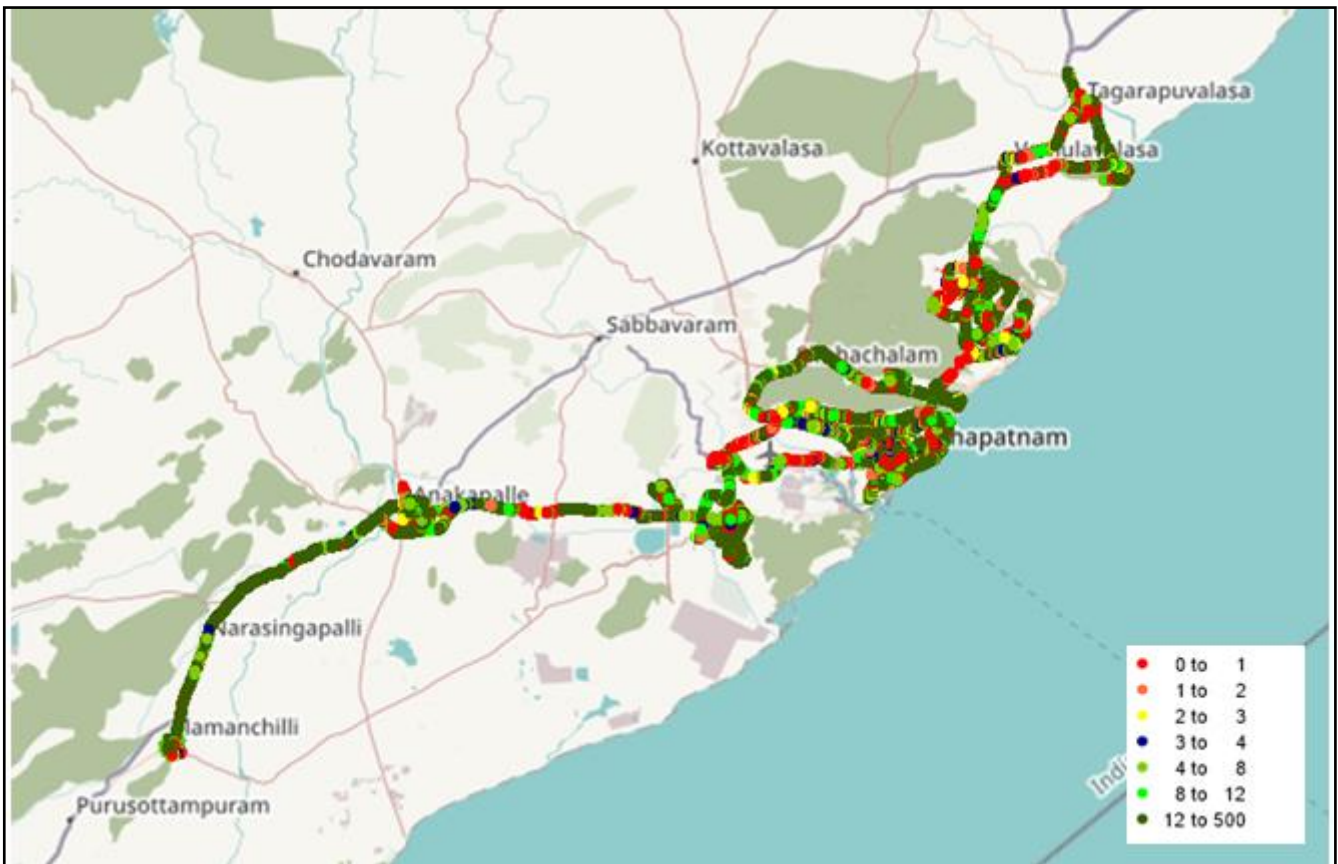


IV. Dynamic Data Test- 4G DL Details

Airtel

Data Statistics - Dynamic Complete SSA 360 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	35.587



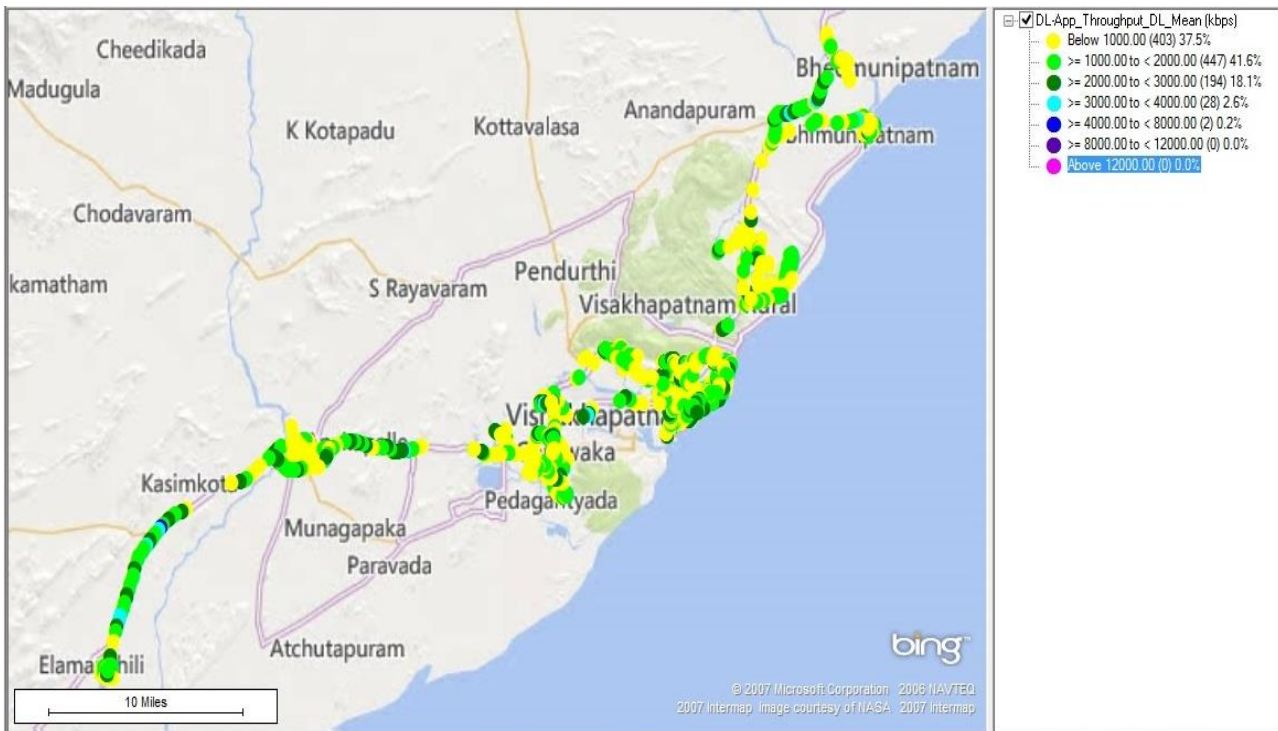
DL throughput	No of Sample	%
0 to 1 Mbps	3788348	28.5
1 to 2 Mbps	978209	7.4
2 to 3 Mbps	1071639	8.1
3 to 4 Mbps	530898	4.0
4 to 8 Mbps	1323291	10.0
8 to 12 Mbps	1111589	8.4
>12 Mbps	4485584	33.75

IV. Dynamic Data Test- 3G DL Details

BSNL

Data Statistics - Dynamic Complete SSA 360 Kms

Data KPIs - Overall	3G
Download Throughput (Mbps)	1.37



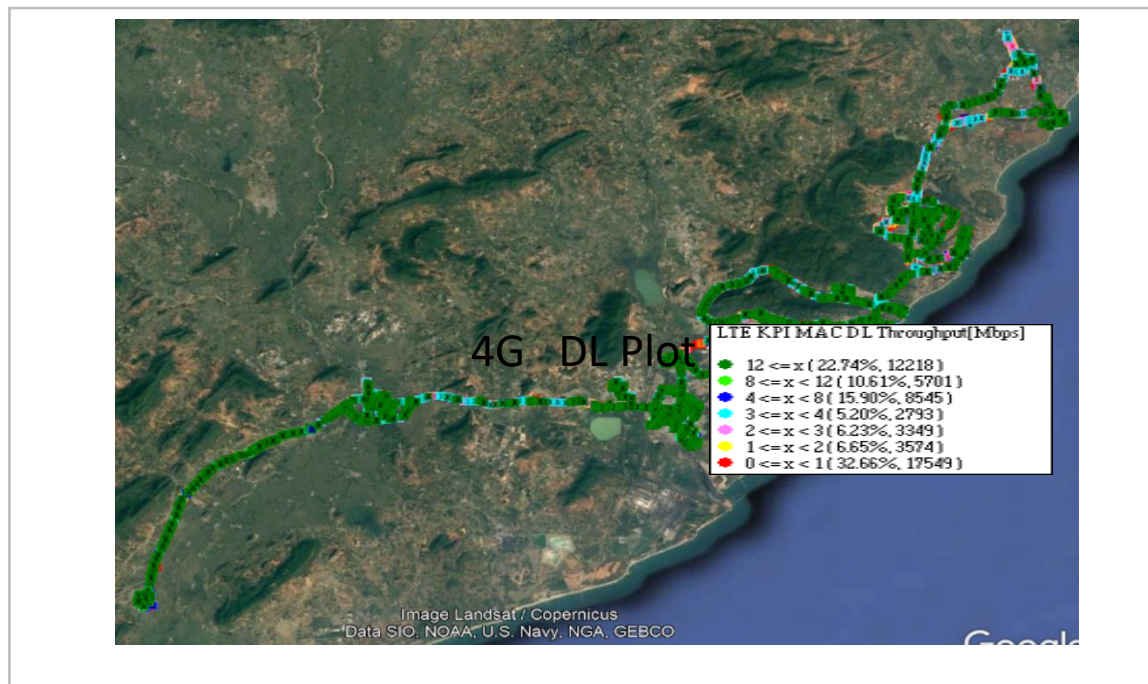
DL throughput	No of Samples	%
0 to 1 Mbps	403	37.5
1 to 2 Mbps	447	41.6
2 to 3 Mbps	194	18.1
3 to 4 Mbps	28	2.6
4 to 8 Mbps	2	0.2
8 to 12 Mbps	0	0
>12 Mbps	0	0

IV. Dynamic Data Test- 4G DL Details

JIO

Data Statistics - Dynamic Complete SSA 350 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	9.05



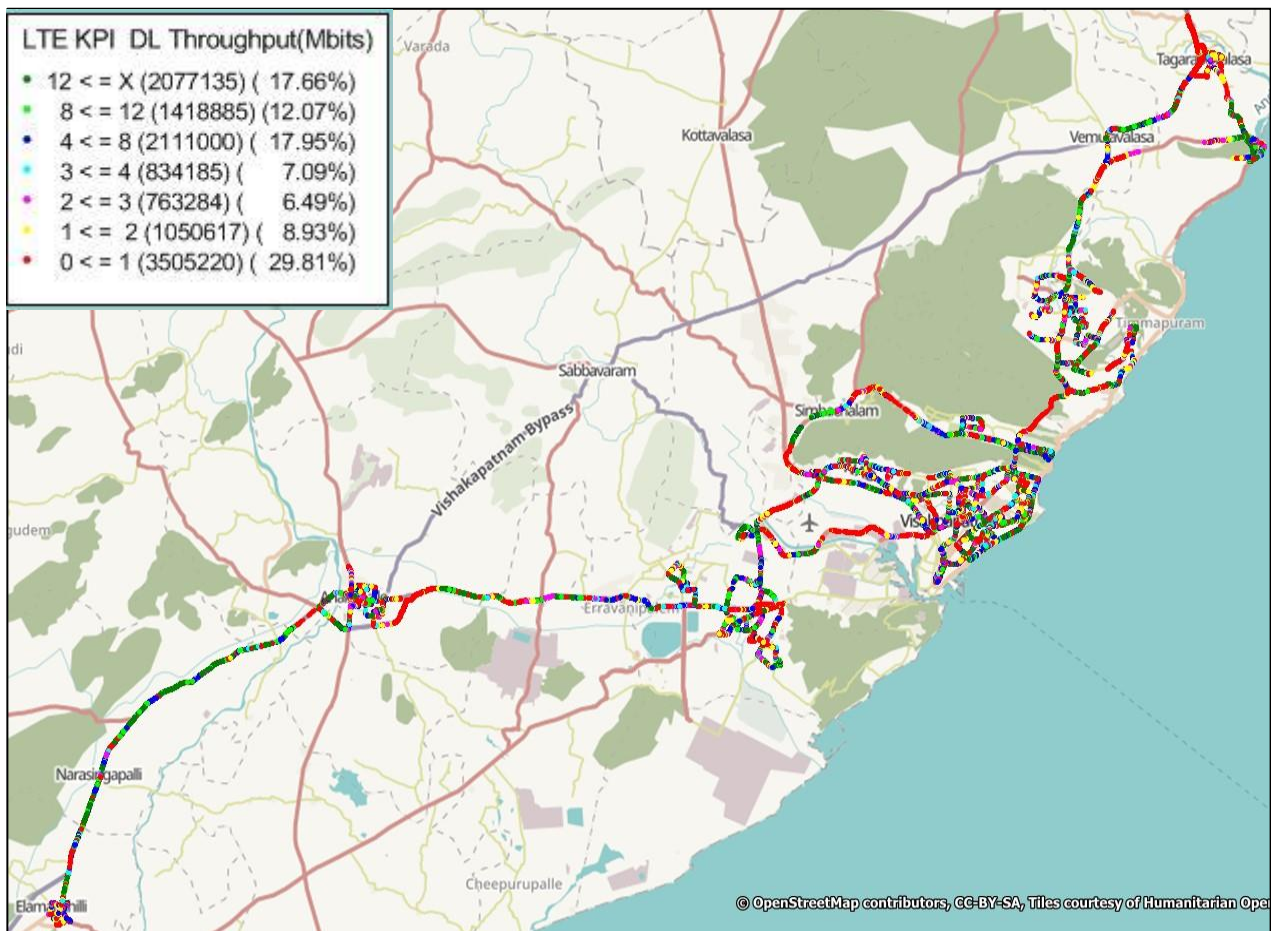
DL throughput	No. of Samples	%
0 to 1 Mbps	17549	32.66
1 to 2 Mbps	3574	6.65
2 to 3 Mbps	3349	6.23
3 to 4 Mbps	2793	5.2
4 to 8 Mbps	8545	15.9
8 to 12 Mbps	5701	10.61
>12 Mbps	12218	22.74
Total	53729	100

IV. Dynamic Data Test-4G DL Details

VIL

Data Statistics - Dynamic Complete SSA 355 Kms

Data KPIs - Overall	4G
Download Throughput (Mbps)	14.53



DL throughput	No of Sample	%
0 to 1 Mbps	3505220	29.81
1 to 2 Mbps	1050617	8.93
2 to 3 Mbps	763284	6.49
3 to 4 Mbps	834185	7.09
4 to 8 Mbps	2111000	17.95
8 to 12 Mbps	1418885	12.07
>12 Mbps	2077135	17.66
Total	11760326	100

V. Screenshots of TRAI MySpeed App

Airtel

Technology - 4G	Anakapalli RTC Complex	Tagarapu valasa bus stop	Visakhapatnam Railway station	Jagadamba Junction	Visakhapatnam RTC Complex
Download Speed Mbps	24.47	45.21	89.90	59.45	58.47
Upload Speed Mbps	9.7	25.22	27.43	34.53	24.21

BSNL

Technology- 3G	Anakapalli RTC Complex	Tagarapuvalasa Bus stand	Visakhapatnam Railway station	Jagadamba Junction	Visakhapatnam RTC Complex
Download Speed Mbps	4.02	8.79	2.76	2.87	3.44
Upload Speed Mbps	1.46	2.60	2.39	2.14	1.57

JIO

Technology- 3G	Anakapalli RTC Complex	Tagarapuvalasa Bus stand	Visakhapatnam Railway station	Jagadamba Junction	Visakhapatnam RTC Complex
Download Speed Mbps	46.78	47.35	104.63	106.41	62.9
Upload Speed Mbps	21.03	4.34	13.76	29.76	9.99

VIL

Techology- 4G	Anakapalli RTC Complex	Tagarapuvalasa-Bus stand	Visakhapatnam Railway station	Jagadamba Junction	Visakhapatnam RTC Complex
Download Speed Mbps	9.19	8.10	39.03	25.16	26.94
Upload Speed Mbps	4.28	0.23	3.16	9.45	2.23