प्रभावी विनियमन – सुगम संचार
Effective Regulation – Ease of Communication

Operator Assisted Drive Test Report

Prayagraj to Banda Highway
04/03/2023
By
TRAI Regional Office Bhopal

The Operator Assisted Drive Test has been carried out by Regional Office, Bhopal with the help of Telecom Service Providers for Prayagraj to Banda Highway from 9:00 AM to 8:00 PM on 04/03/2023. The drive test covered drive route of around 192. KMs.

TSP	Network tested
Airtel	2G & VoLTE
BSNL	2G & 3G
JIO	VoLTE
VIL	2G, 3G & VoLTE

Key Performance Indicators:

KPI	Benchmark	Observations
Block call rate %	≤3%	All TSPs achieved the benchmark
Drop call rate %	≤2%	All TSPs achieved the benchmark
CSSR %	≥95 %	All TSPs achieved the benchmark
Mobility HOSR %	≥95%	All TSPs achieved the benchmark
Good RX Quality %	≥95%	All TSPs achieved the benchmark, Except Rx Quality of Airtel, JIO and VIL in VoLTE

Overview

Regional Office, TRAI Bhopal conducted Operator Assisted Drive Test. The performance of Airtel, BSNL, Vodafone Idea and Jio was 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.

Voice: Coverage, Quality, Handover Success Rate, Call Setup Success Rate, Drop Call Rate and Block Call Rate.

Data: Download Throughputs

Drive Test Details :
Voice Tests:
i.   2G – measurement – UE Locked in 2G
ii.   3G – measurement – UE in Dual mode (2G and 3G)
iii. 4G – measurement – UE in Free mode

Calls were made for the **90-sec** duration with a wait time of **10 sec** between calls in all technologies.

Data Tests:
Dynamic data – repeat data file download (to check throughput on the entire route)

i.   2G – measurement – UE Locked in 2G file size- 500KB
ii.   3G – measurement – UE in 3G   File Size- 20MB
iii. 4G – measurement – UE in LTE File Size- 40MB

Static Data: Download and Upload Throughputs, Web Browsing Delay, Video Streaming Delay, and Latency
i.   Download- 2G - 500KB ,3G - 20 MB, 4G - 40MB
ii.   Upload - 2G -100KB ,3G - 5 MB, 4G - 10MB
iii. Web browsing -   3 links of e-commerce websites https://www.amazon.in, https://www.flipkart.com, https://paytm.com.
iv.   Video Streaming – 130 sec clip (only in 3G and LTE)
v.   Latency – 32 Bytes on www.google.com.

Voice & Dynamic Data Test Drive Route
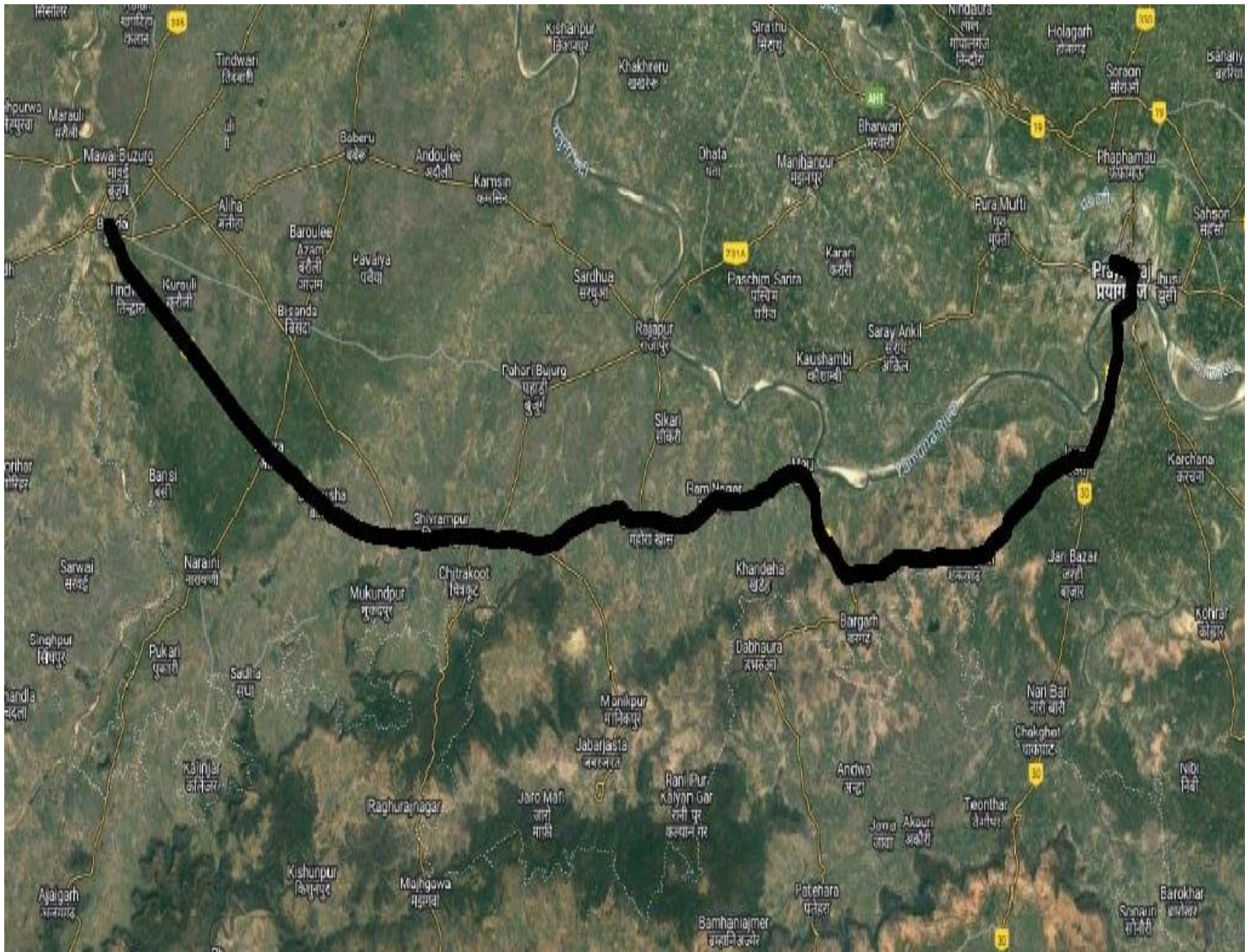
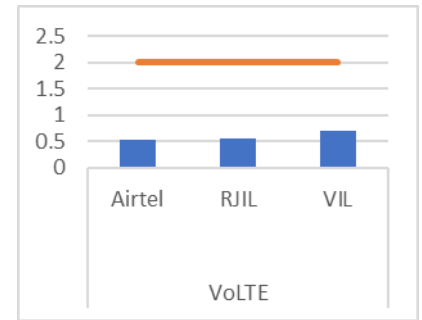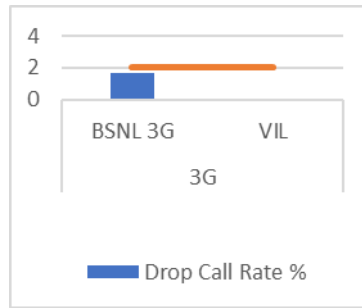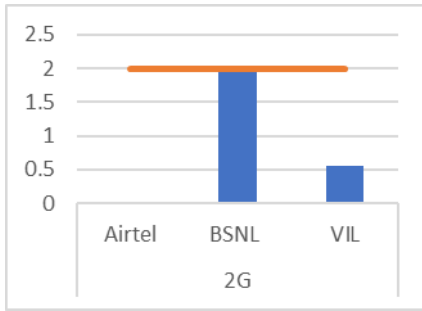| list of important area covered during the drive test |
|---|
| Prayagraj Bus Stand Civil Lines, Ghurpur, Gauhania, Jasra, Mau, Pura, |
| Bandhi, Raipura, Deokali, Bhounri, Khoh, Chitrakot Dham, Ahmad |
| Ganj, Shivrampur, Chitrakot, Bharat Kup, Badausha, Atarra, |
| Khurhand, Mahua, Mathana, Khera, Barokhar Khurd, |
| Banda Bus Deport. |

Voice Calls

QoS compliance of the TSPs in Indore for Voice across technologies 2G/3G/4G-VoLTE:
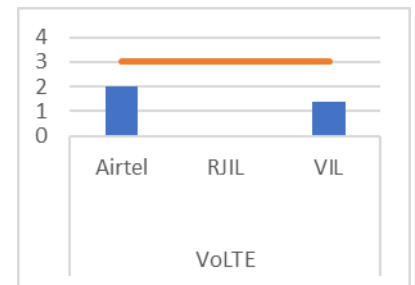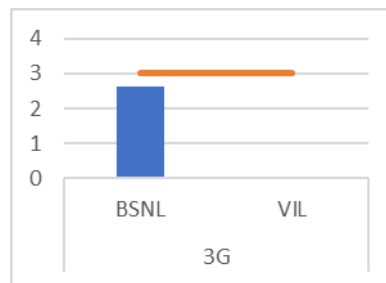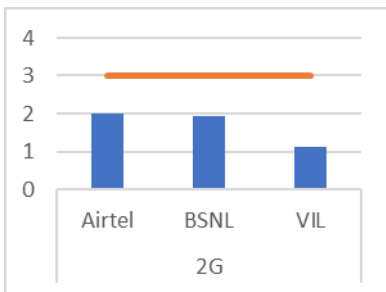
KPIs	2G			3G		VoLTE		
	Airtel	BSNL	VIL	BSNL	VIL	Airtel	RJIL	VIL
Drop Call Rate %	0	1.96	0.55	1.63	NA	0.52	0.55	0.69
Block Call Rate %	2	1.94	1.11	2.63	NA	2	0	1.38

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.

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Voice Calls

Coverage

a) Percentage of coverage samples for 2G **≥** -85 dBm.

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	82	72.14	86

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

TSPs	3G	
	BSNL	VIL
Coverage %	91.4	NA

b) Percentage of coverage samples for LTE ≥ -110 dBm.

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	100	NA	89

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

TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	VIL	JIO
Time Spent on 3G/4G %	83.72		100	80.86	100

Data Services Dynamic

Dynamic data-download Throughput was tested.

Data Download Performance - Dynamic

3G/4G/ Network:
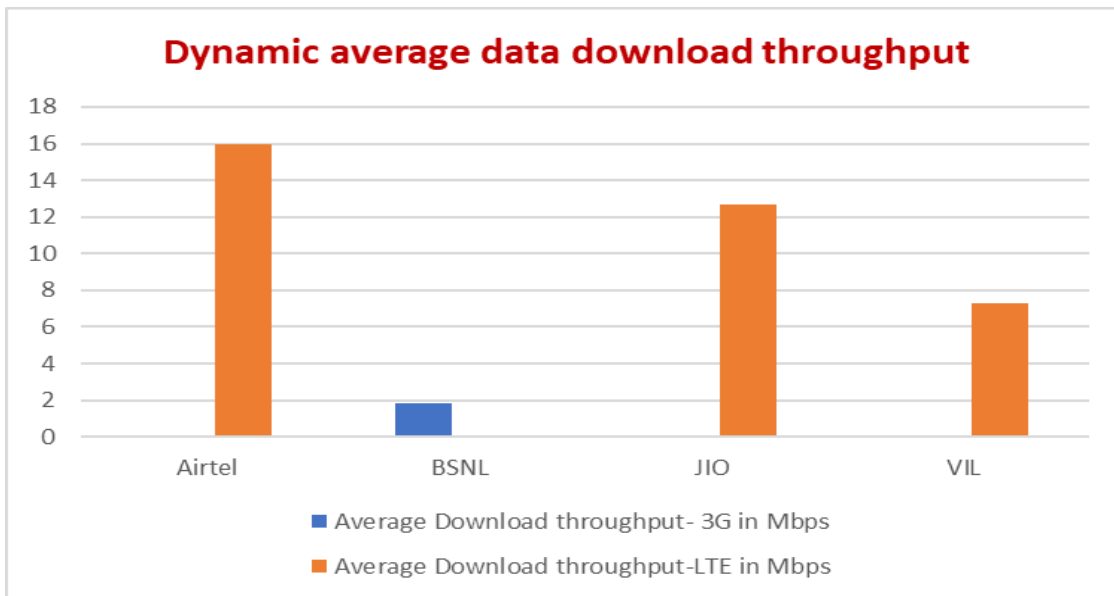
TSP	Airtel	BSNL	JIO	VIL
Average Download throughput- 2G In Kbps	51	114.21	NA	39.12
Average Download throughput- 3G In Mbps	NA	1.82	NA	NA
Average Download throughput-LTE In Mbps	16	NA	12.69	7.32

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Summary

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Call attempts	187	206	NA	180
Block call rate %	2	1.94	NA	1.11
CSSR %	98	99.03	NA	98.33
Drop call rate %	0	1.9	NA	0.55
Mobility HOSR %	0.46	95.62	NA	96.26
RX Quality %	97	95.7	NA	95.15
Average CST Sec	1.20	3.98	NA	7.32

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Call attempts	NA	190	NA	NA
Block call rate %	NA	2.63	NA	NA
CSSR %	NA	96.84	NA	NA
Drop call rate %	NA	1.63	NA	NA
Mobility HOSR %	NA	96.0	NA	NA
RX Quality %	NA	97.5	NA	NA
Average CST (Sec)	NA	2.36	NA	NA

TSP (For VoLTE)	Airtel	BSNL	JIO	VIL
Call attempts	192	NA	182	144
Block call rate %	2	NA	0	1.38
CSSR %	98	NA	99.45	97.91
Drop call rate %	0.52	NA	0.55	0.69
Mobility HOSR %	0.55	NA	99.60	98.71
RX Quality %	66	NA	94.46	88.09
Average CST(Sec)	0.59	NA	0.57	0.261

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.

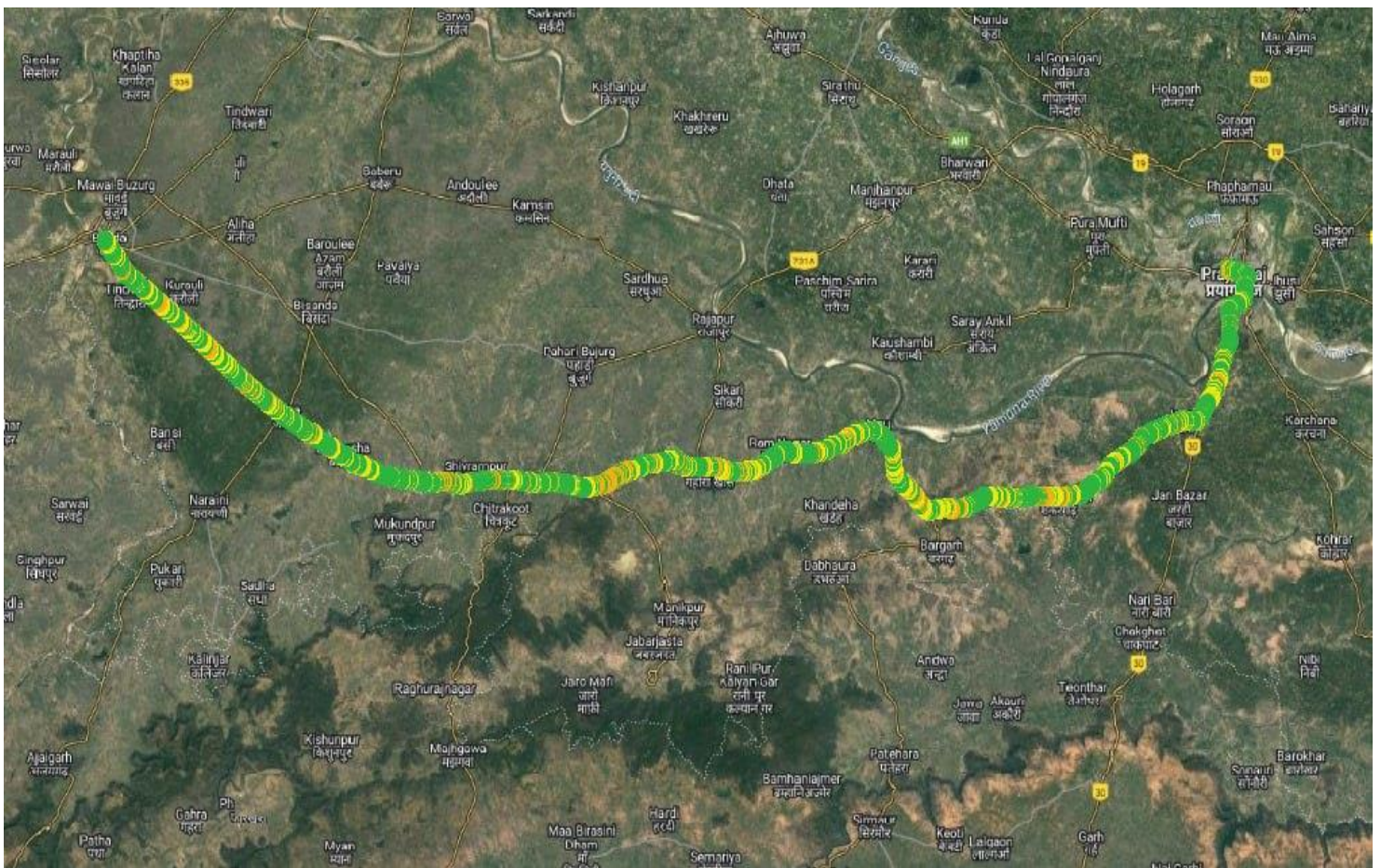| TSP	Coverage Rate %
Airtel 2G	82
BSNl 2G	72.14
VIL 2G	86
BSNL 3G	91.4
VIL 3G	NA
Airtel VoLTE	100
Jio VoLTE	99.83
VIL VoLTE	89
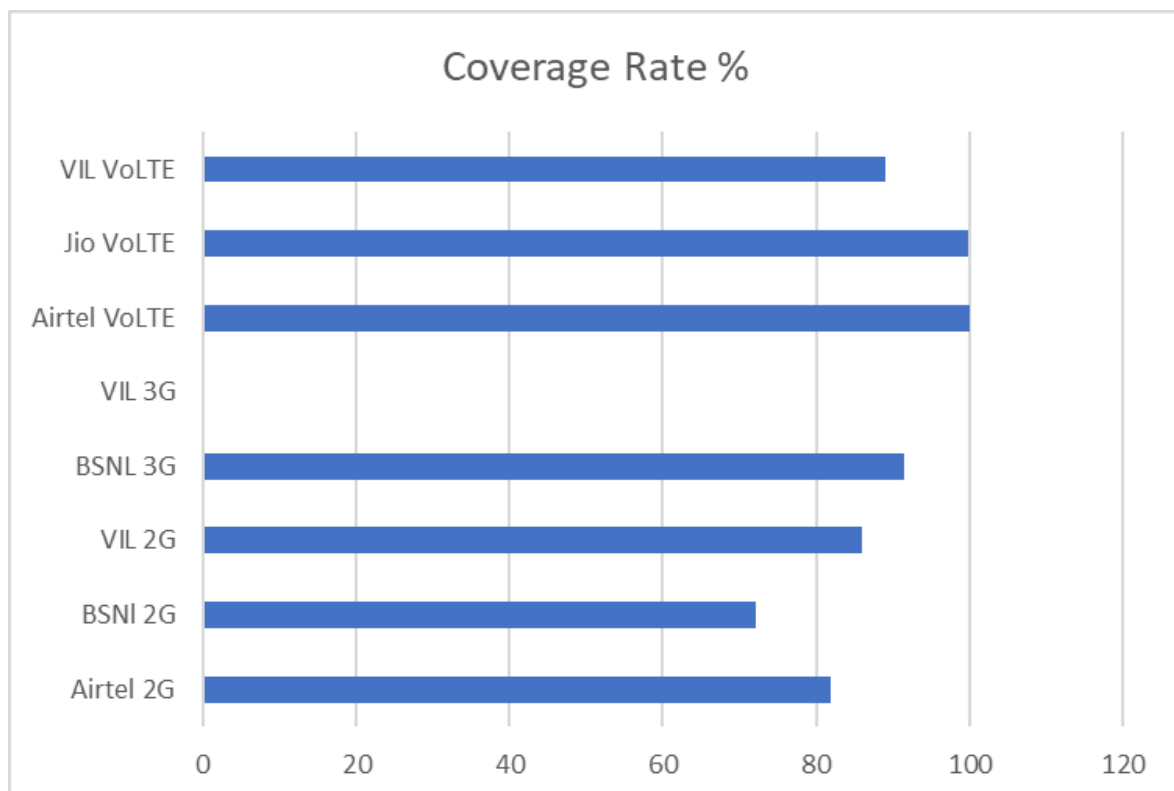
TSP-Airtel

Technology	Coverage %
2G	82%

2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	65078	45%	🟩
[-75, >=-85]	52370	37%	🟨
[-85, >=-95]	25746	18%	🟧
[-95, >=Min]	0	0%	🟥
Total	143194	100%	

TSP-BSNL

Technology	Coverage %
2G	72.14%
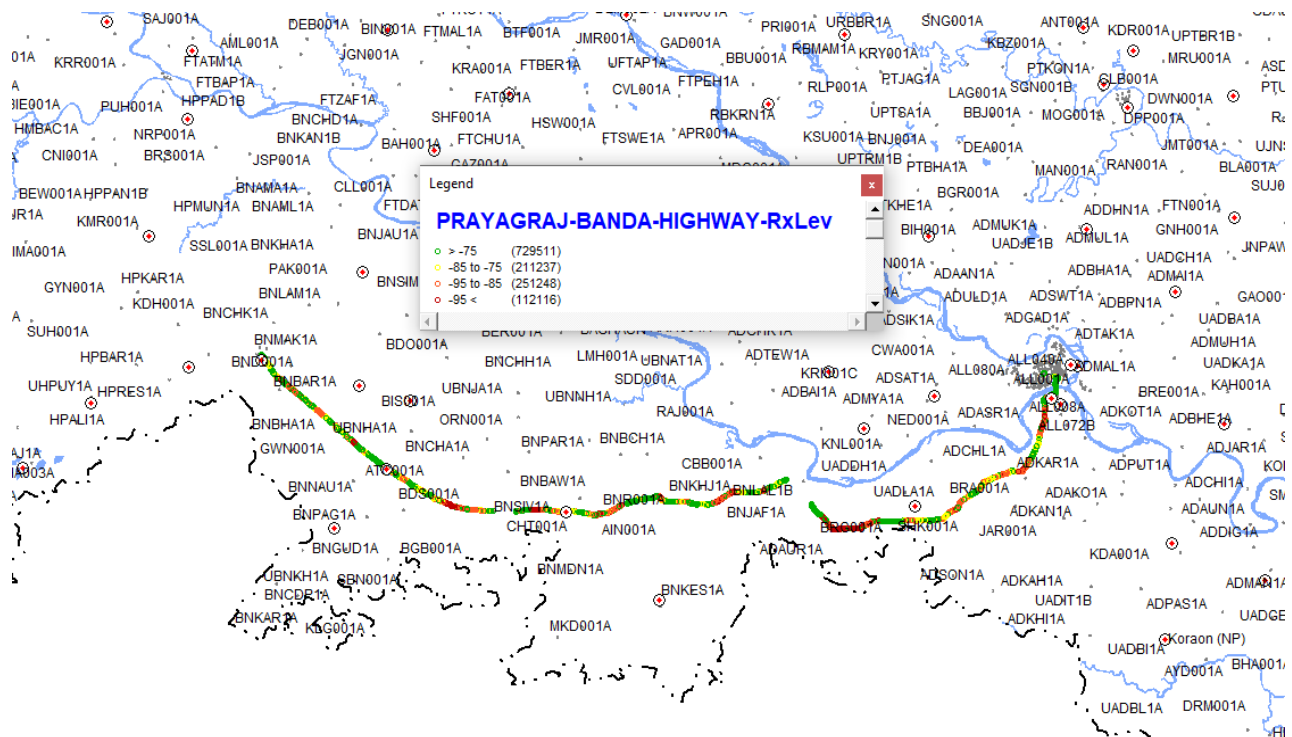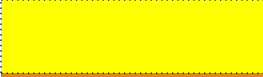
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	729511	55.94%	
[-75, >=-85)	211237	16.20%	
[-85, >=-95)	251248	19.27%	
[-95, >=Min)	112116	8.60%	
Total			

TSP - VIL

Technology	Coverage %
2G	86%
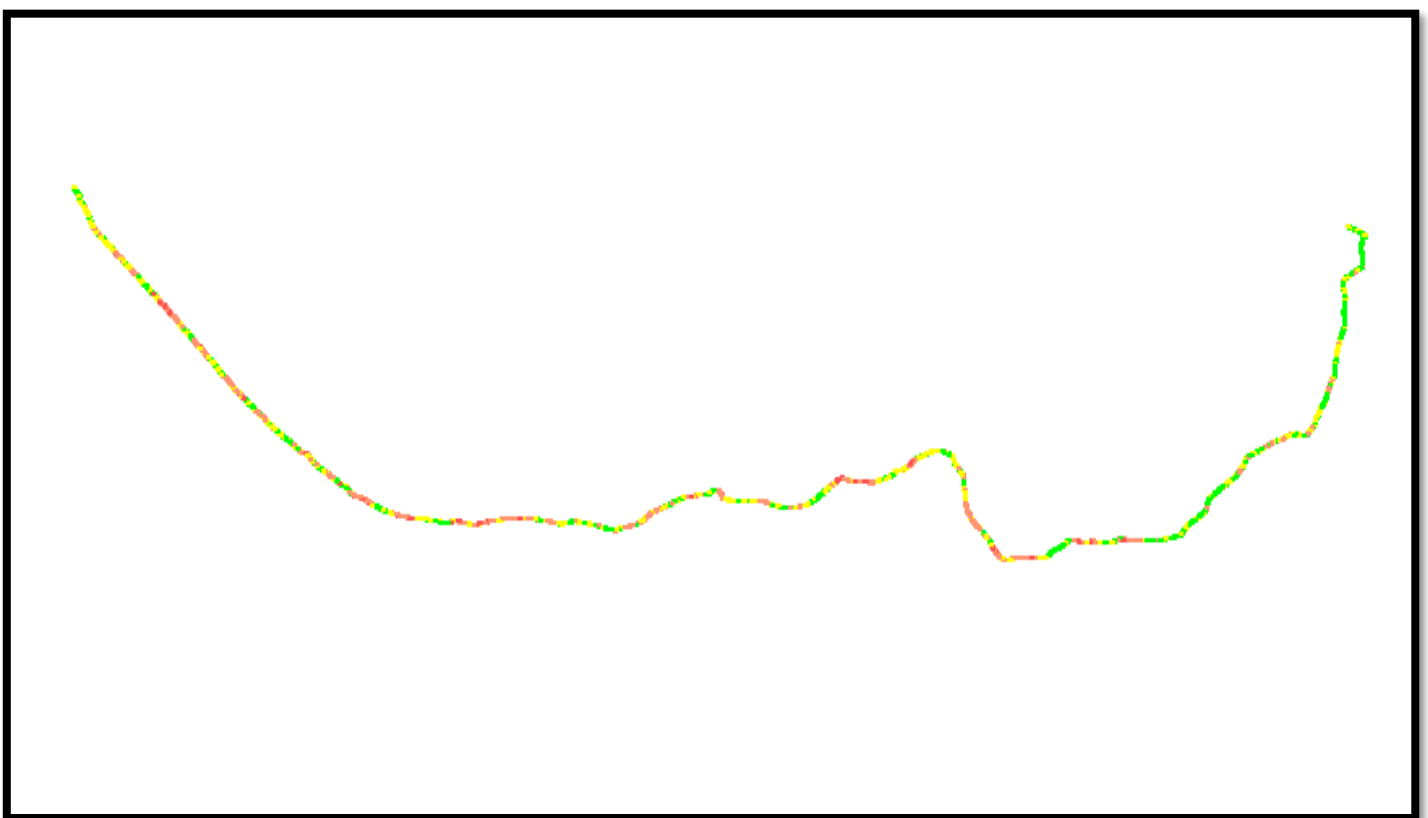
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	**4960453**	**70%**	🟩
[-75, >=-85)	**1142768**	**16%**	🟨
[-85, >=-95)	**852409**	**12%**	🟧
[-95, >=Min)	**169466**	**2%**	🟥
Total	**7125096**	**100%**	

TSP-BSNL

Technology	Coverage %
3G	91.4%

3G			
Overall RSCP	**# Samples**	**% PDF**	**Legends**
[Max, >=-70]	1291546	75.1%	
[-70, >=-80)	143855	8.4%	
[-80, >=-90)	135532	7.9%	
[-90, >=Min)	148118	8.6%	
Total			

Airtel

Technology	Coverage %
VoLTE	100%
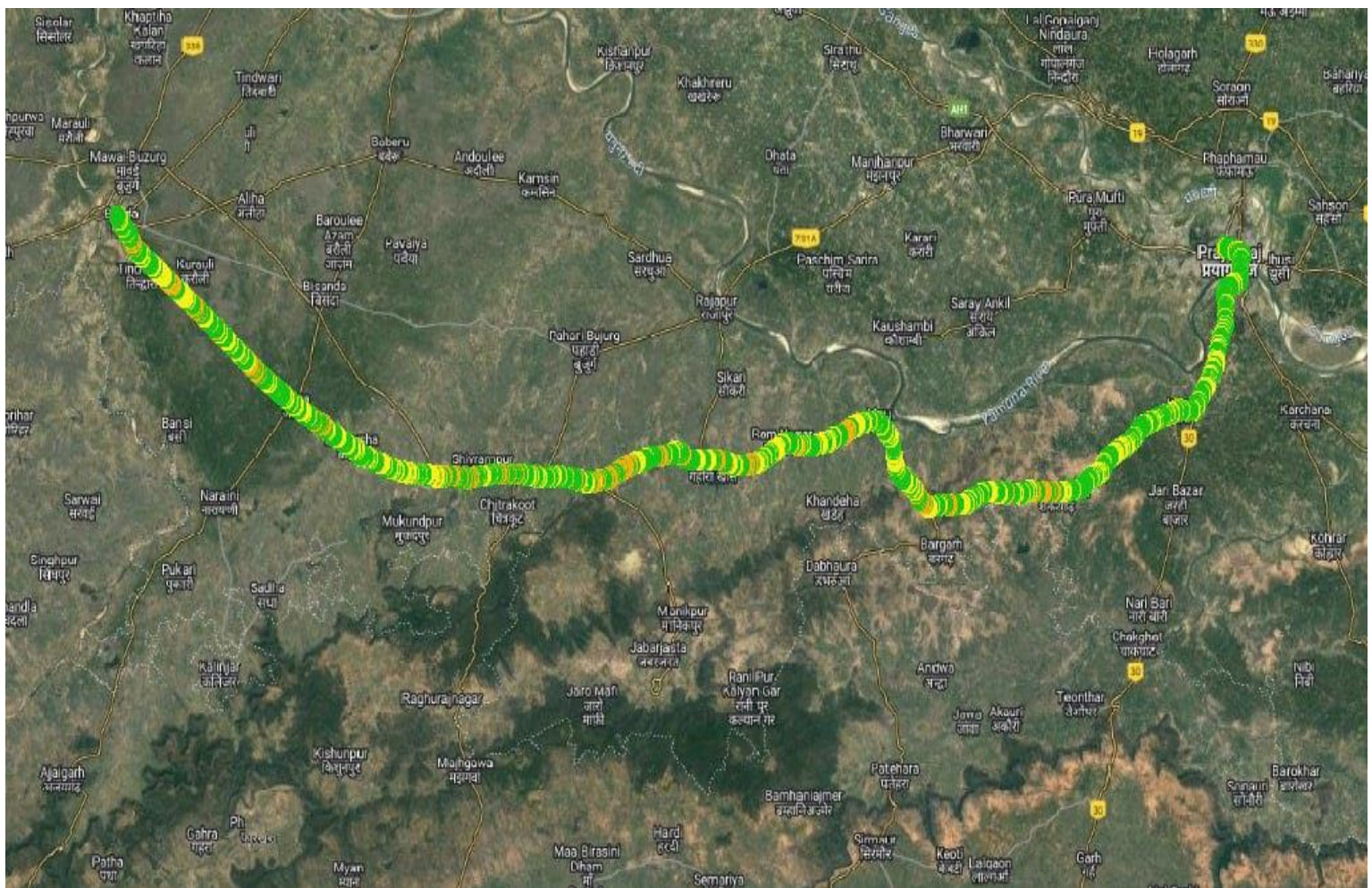
VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	125401	50%	
[-80, >=-90)	84448	34%	
[-90, >=-110)	40658	16%	
[-110, >=Min)	0	0%	
Total	250507	100%	

JIO

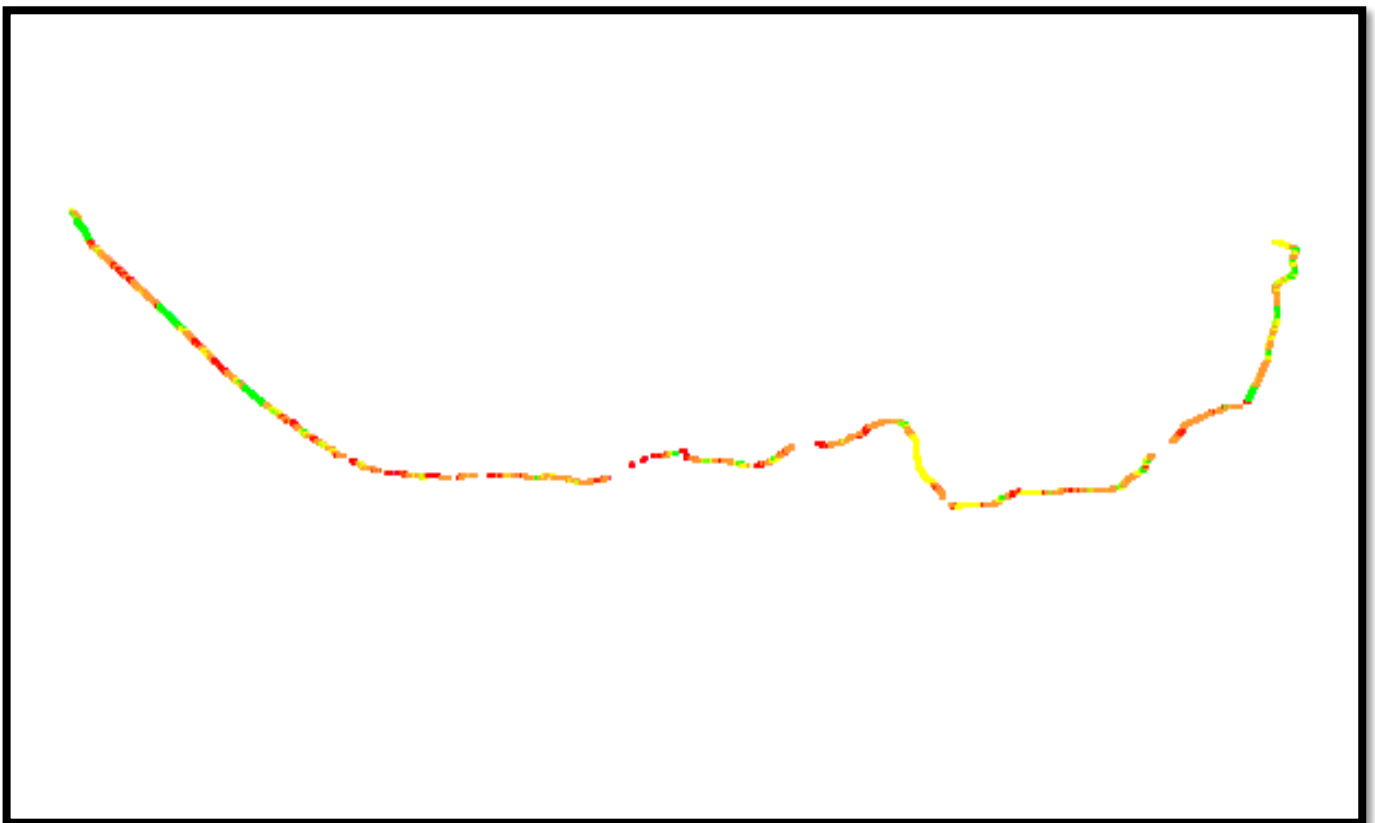| Technology	Coverage %
VoLTE	99.83%

VoLTE			
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	12322	65.33%	
[-80, >=-90)	58886	31.21%	
[-90, >=-110)	621	3.29%	
[-110, >=Min)	33	0.17%	
Total	18862		

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TSP - VIL

| Technology	Coverage %
VoLTE	89%

	VoLTE		
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	2815	18%	
[-80, >=-90)	4098	26%	
[-90, >=-110)	7107	45%	
[-110, >=Min)	1729	11%	
Total	15749	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%.

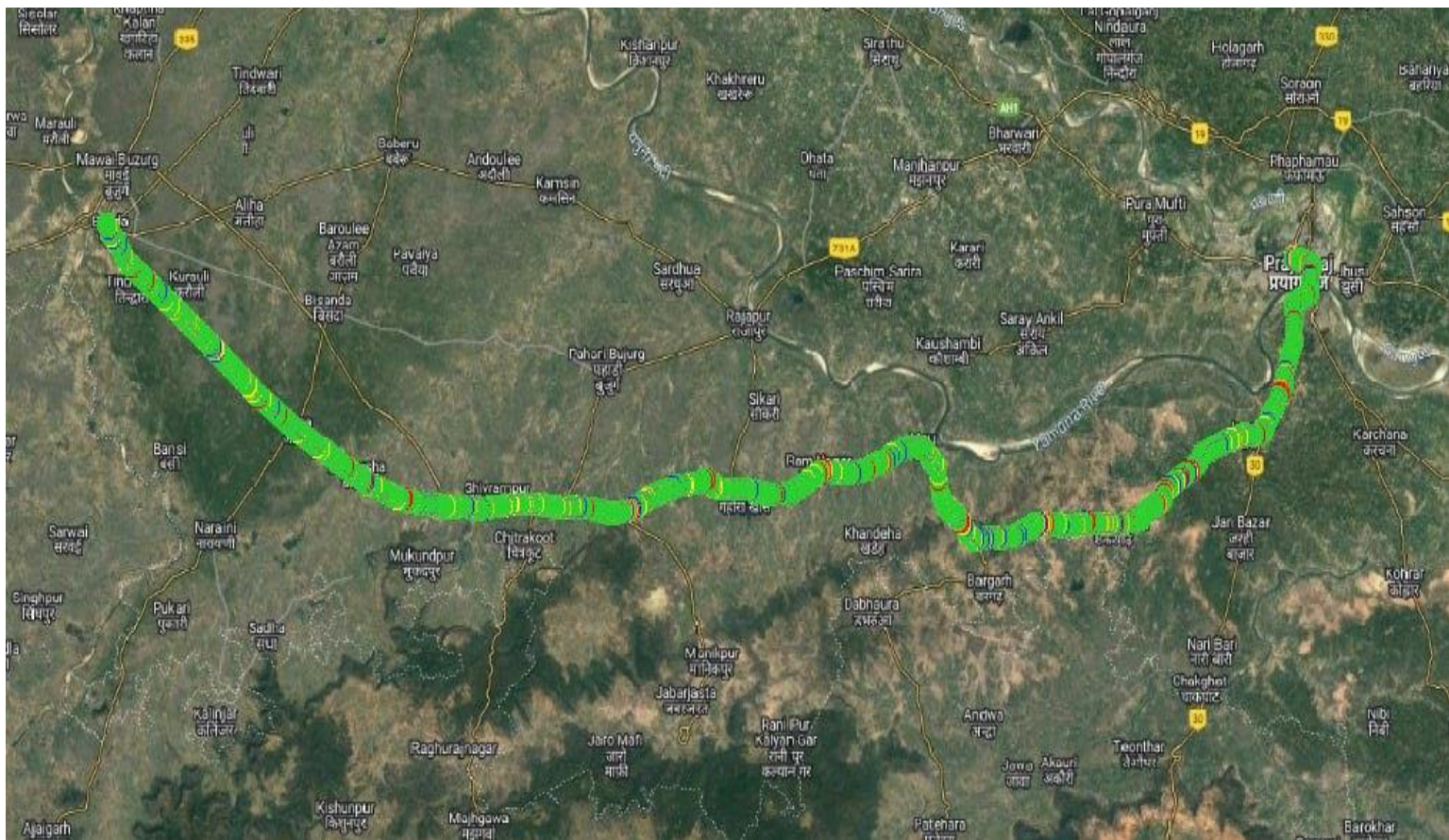| TSP	Rx Quality %
Airtel 2G	97
BSNI 2G	95.7
VIL 2G	95.15
BSNL 3G	97.5
VIL 3G	NA
Airtel VoLTE	66
Jio VoLTE	93.46
VIL VoLTE	88.09
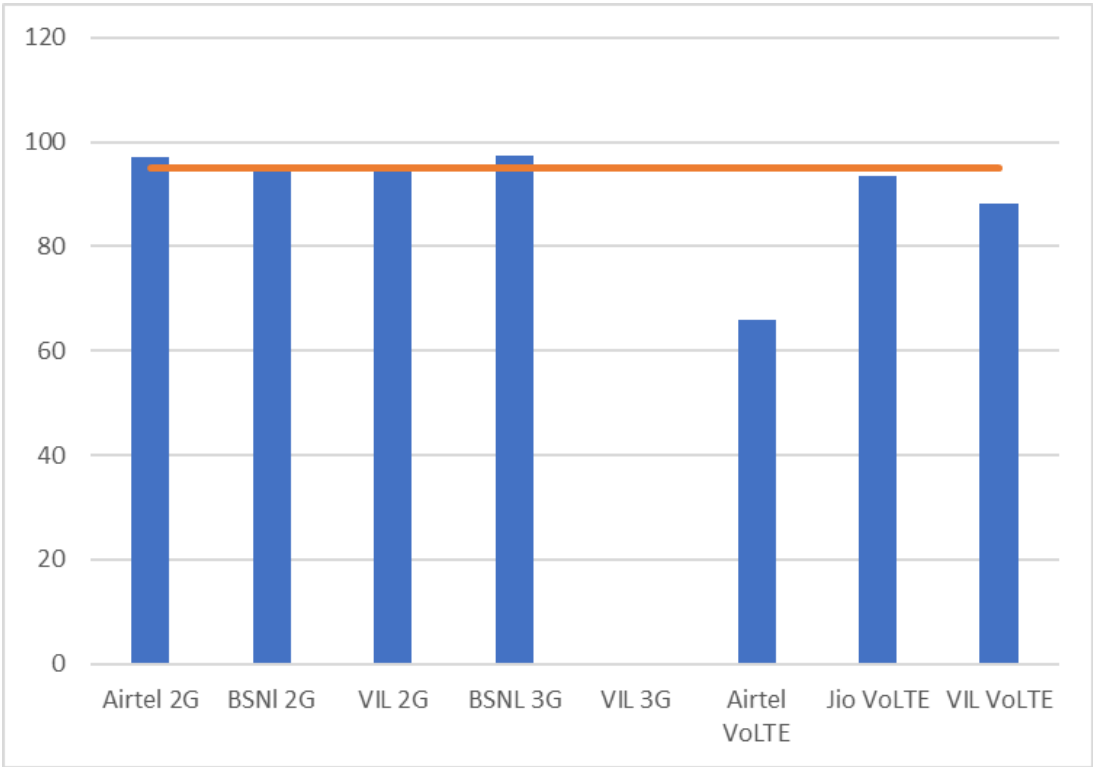
For measuring voice quality, as per the QoS norms, RxQual <=5 for GSM TSPs, EcNo >= -14 dBm for 3G TSP sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

Airtel

Technology	Rx Quality %
2G	97%

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	1516711	86%	
(2, <=3)	65844	4%	
(3 , <=4)	65460	4%	
(4 , <=5)	59076	3%	
(5 , <=Max)	57863	3%	
Total	1764954	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-BSNL

Technology	Rx Quality %
2G	95.7%

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	1194722	91.6%	🟩
(2, <=3)	15636	1.2%	🟨
(3 , <=4)	16463	1.3%	🟦
(4 , <=5)	21371	1.6%	🟧
(5 , <=Max)	55920	4.3%	🟥
Total			

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 - VIL

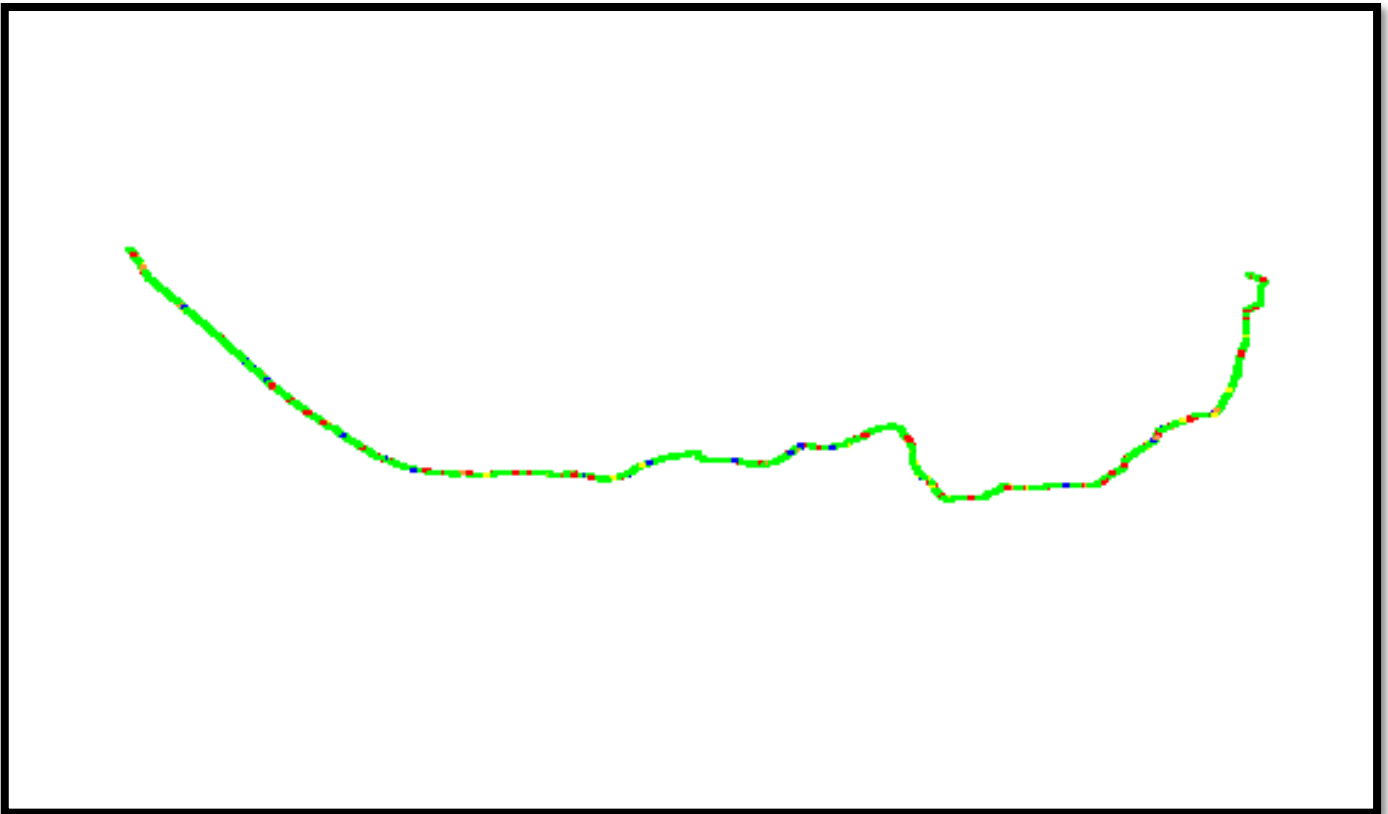| Technology	Rx Quality %
2G	95.15%

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	6465700	90.90%	🟩
(2, <=3)	143318	2.01%	🟨
(3 , <=4)	80082	1.12%	🟦
(4 , <=5)	79491	1.12%	🟧
(5 , <=Max)	356501	4.85%	🟥
Total	7125092	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- BSNL

Technology	Rx Quality %
3G	97.5%

Overall Ec/No	# Samples	% PDF	Legends
(Max, <=-6)	1306968	76.03%	🟩
(-6, <=-9)	176614	10.3%	🟨
(-9, <=-11)	139500	8.1%	🟦
(-11, <=-14)	53198	3.1%	🟧
(-14, <= Min)	42771	2.5%	🟥
Total			

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%.

Airtel

Technology	Rx Quality %
VoLTE	66%

Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	972645	34%	
(0, <=5)	678535	24%	
(5, <=10)	502806	18%	
(10, <=15)	350374	12%	
(15, <=Max)	316896	11%	
Total	2821256	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%.

JIO

Technology	Rx Quality %
VoLTE	93.46%
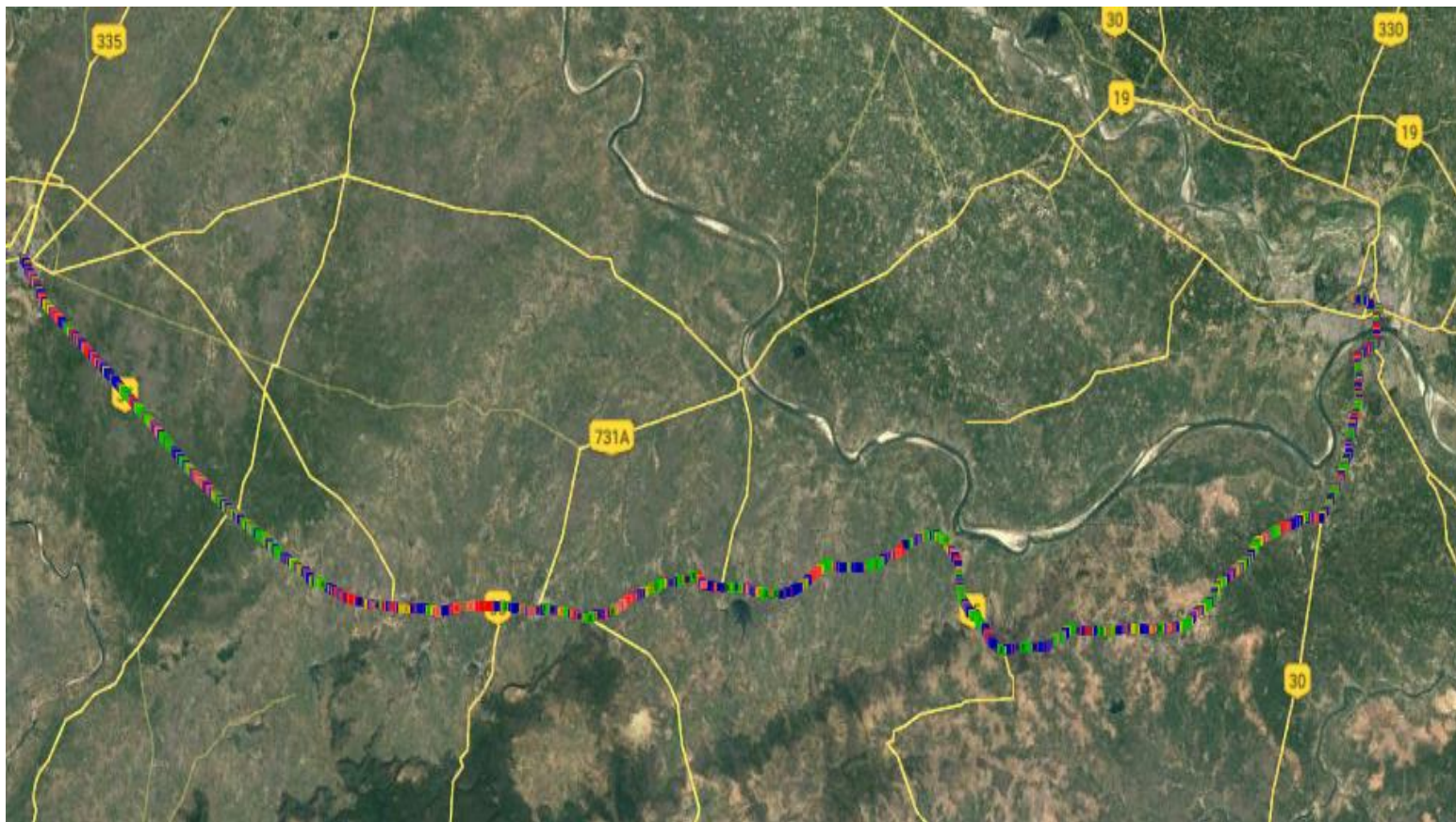
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	1233	6.54%	
(0, <=5)	2754	14.60%	
(5, <=10)	7054	37.40%	
(10, <=15)	3756	19.91%	
(15, <=Max)	4065	21.55%	
Total	18862		

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 - VIL

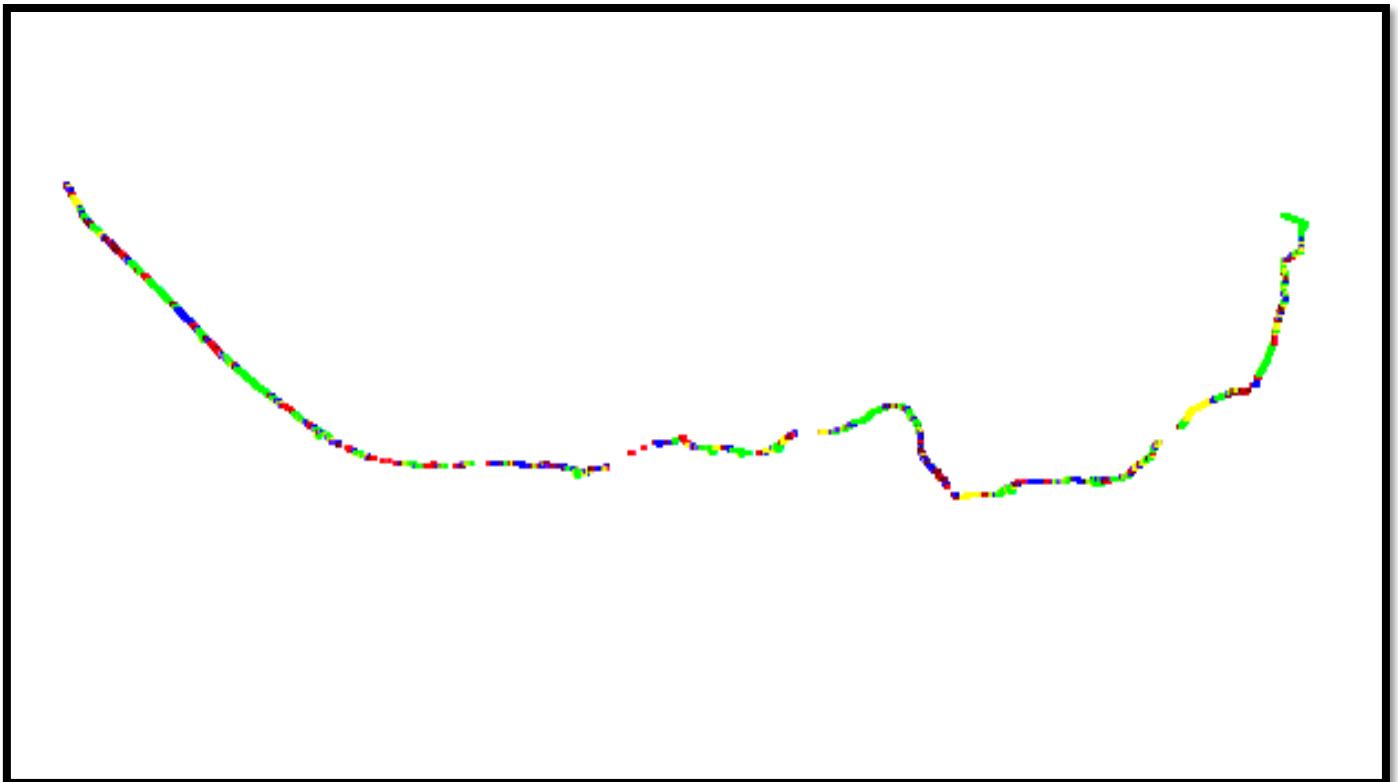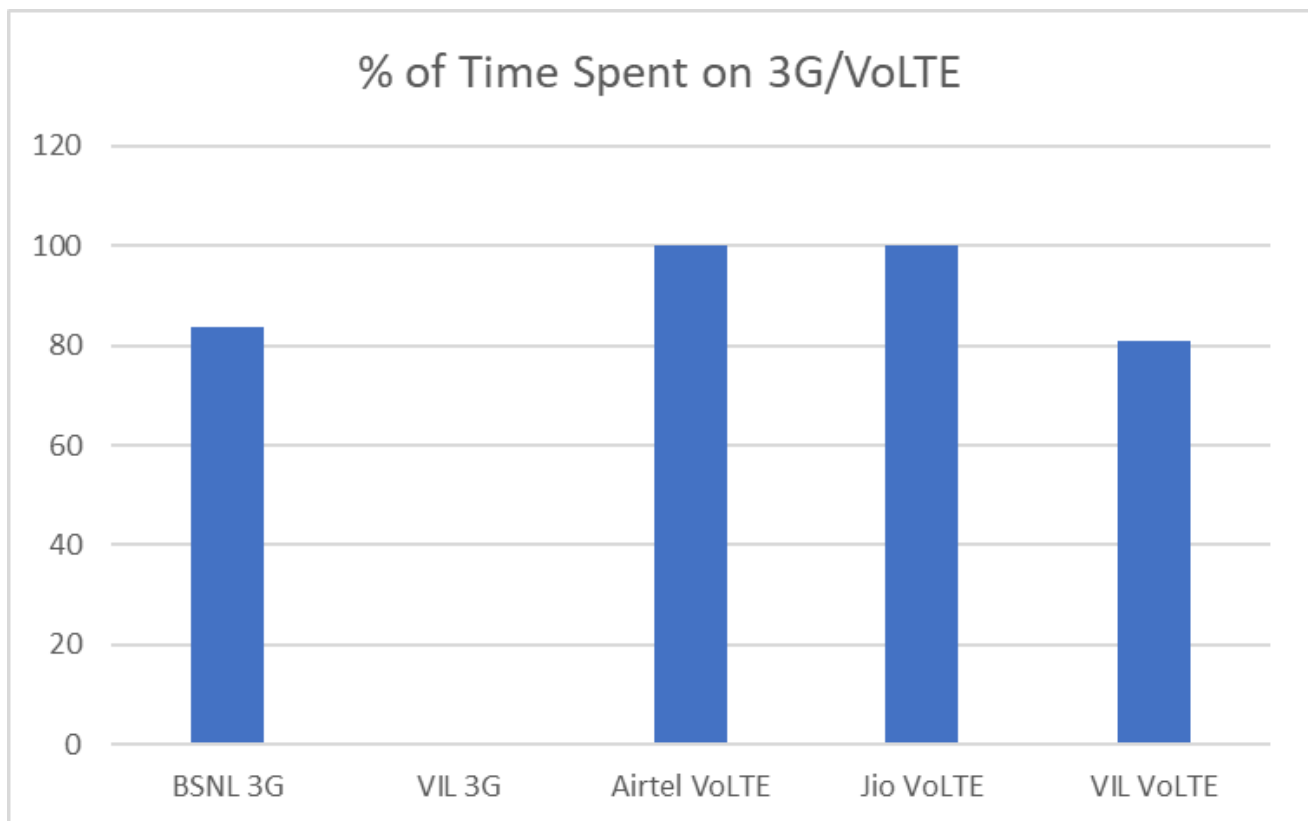| Technology	Rx Quality %
VoLTE	88.09%

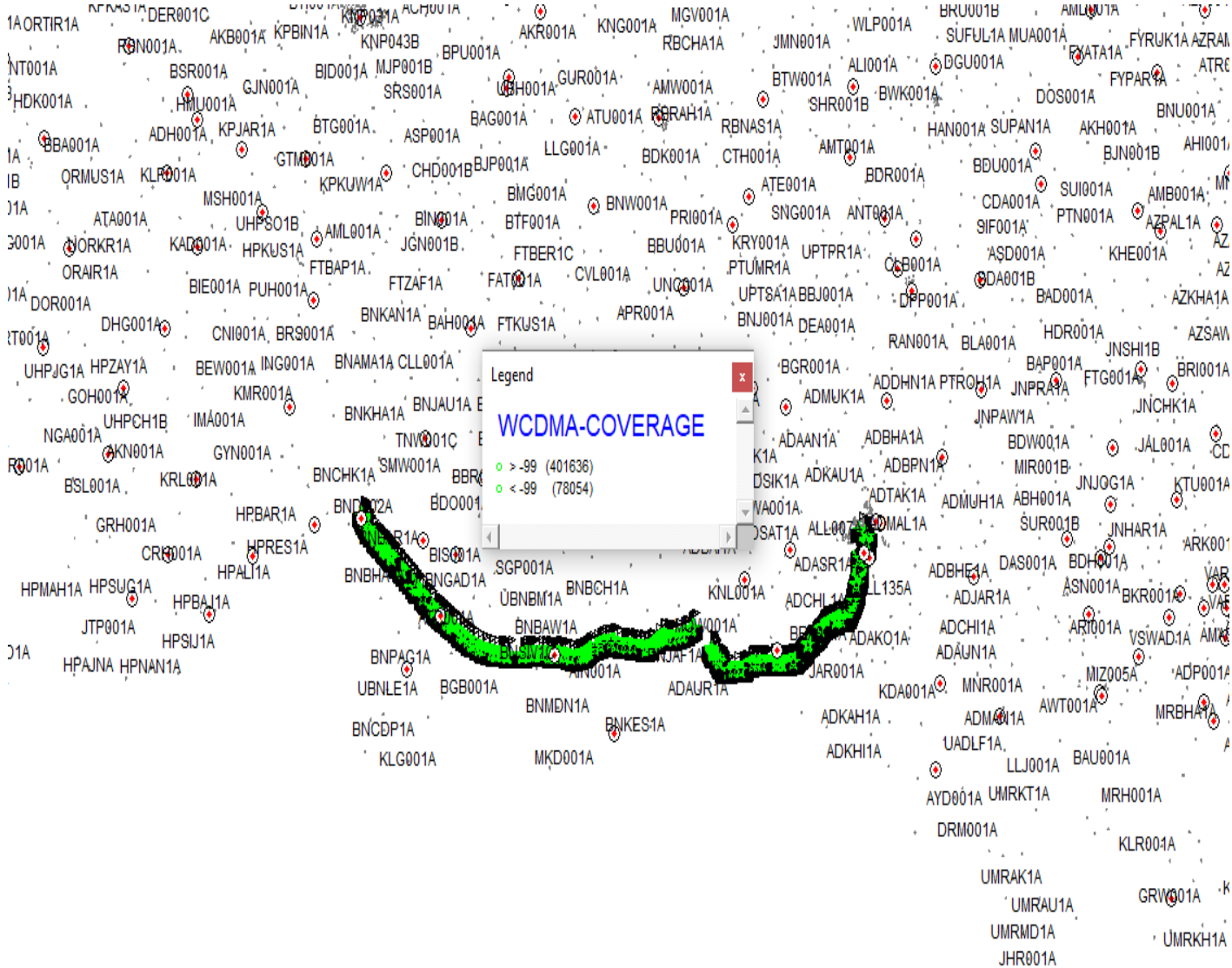| Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	1867	11.91%	
(0, <=5)	2067	13.18%	
(5, <=10)	3388	21.60%	
(10, <=15)	3208	20.45%	
(15, <=Max)	5154	32.86%	
Total	15684	100%	

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	83.72
VIL 3G	NA
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	80.86

% of Time Spent on 3G/VoLTE

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TSP-BSNL

Technology	% of Time Spent on
3G	83.72%
VoLTE	

TSP- VIL

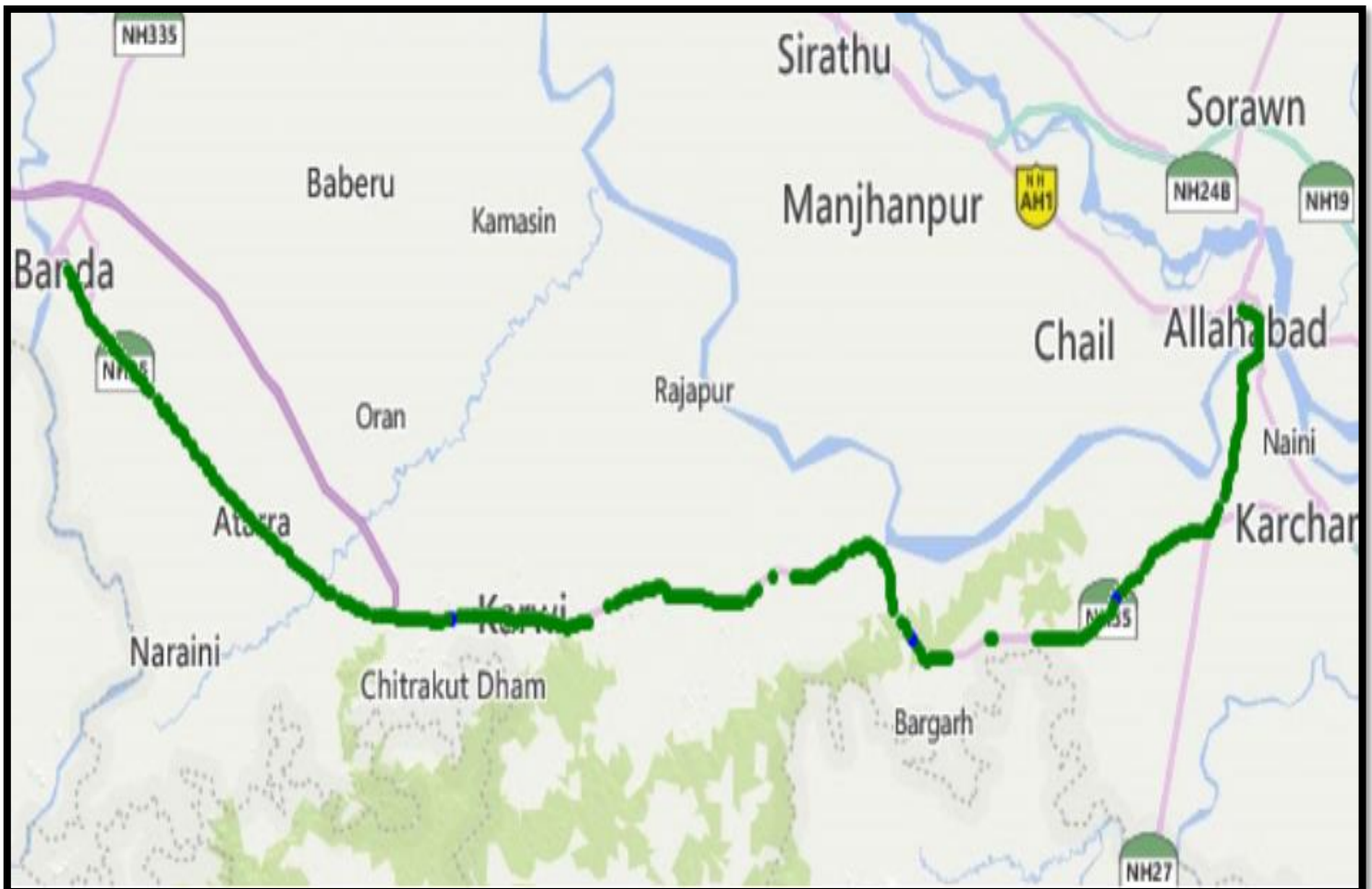| Technology	% of Time Spent on
3G	
VoLTE	80.86%

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Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	2G
Download Throughput (Kbps)	51kbps

DL throughput	No of Sample	%	Legends
< 100 Kbps	101044	99.16%	
100-150Kbps	306	0.30%	
150-200Kbps	344	0.34%	
>200Kbps	208	0.20%	
Total	101902	100%	

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TSP-BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	2G
Download Throughput (Kbps)	114.21

DL throughput	No of Sample	%	Legends
< 100 Kbps	7279830	50	
	5260899	36.13	
100-150Kbps	1123767	7.71	
150-200Kbps	701682	4.81	
>200Kbps	193481	1.32	

TSP - VIL

Data Statistics - Dynamic data testing

Data KPIs - Overall	2G
Download Throughput (Kbps)	39.12
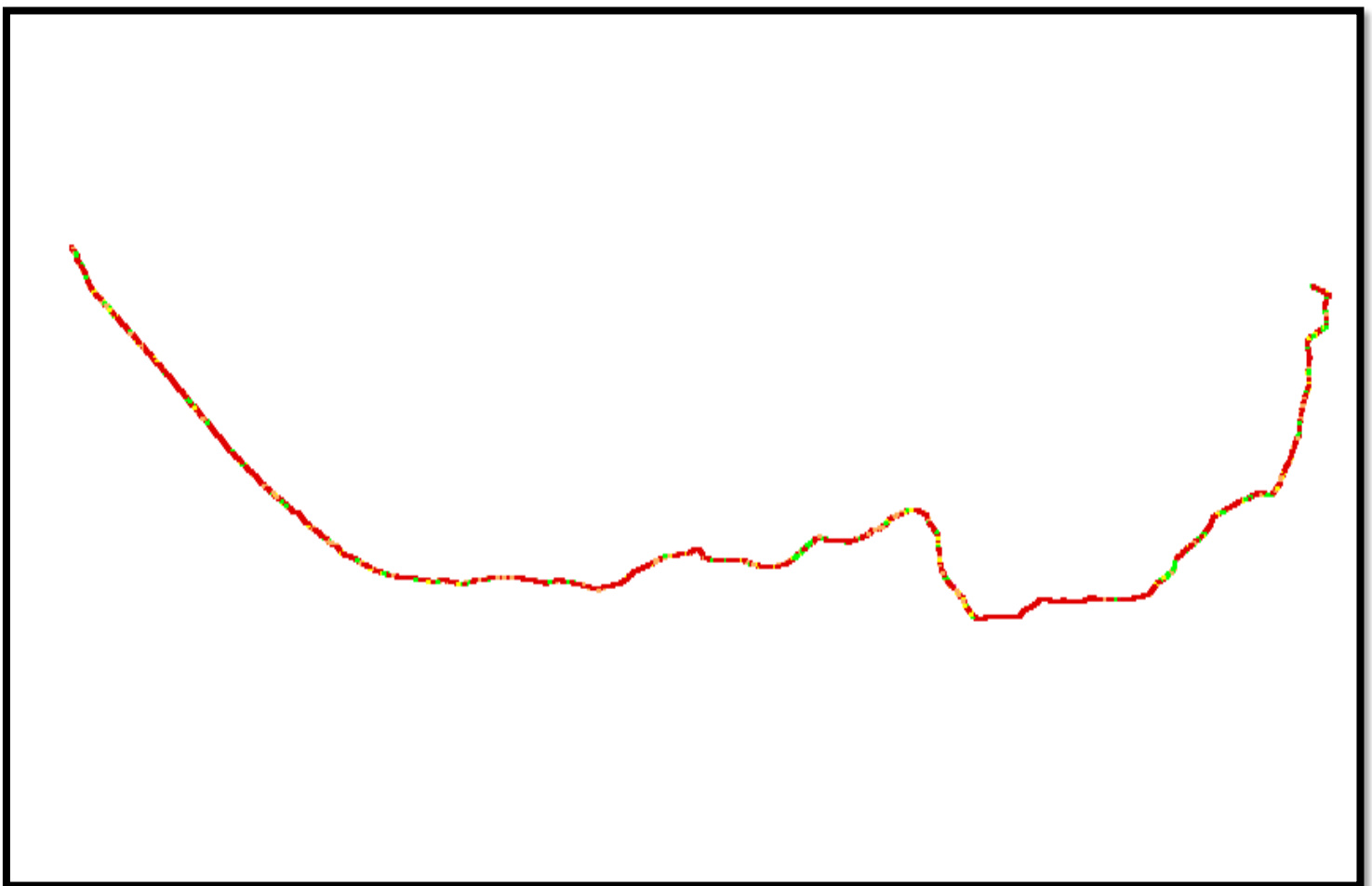
DL throughput	No of Sample	%	Legends
< 100 Kbps	2296355	72%	
100-150Kbps	395565	12%	
150-200Kbps	178828	6%	
>200Kbps	323981	10%	

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TSP-BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	3G
Download Throughput (Mbps)	1.82

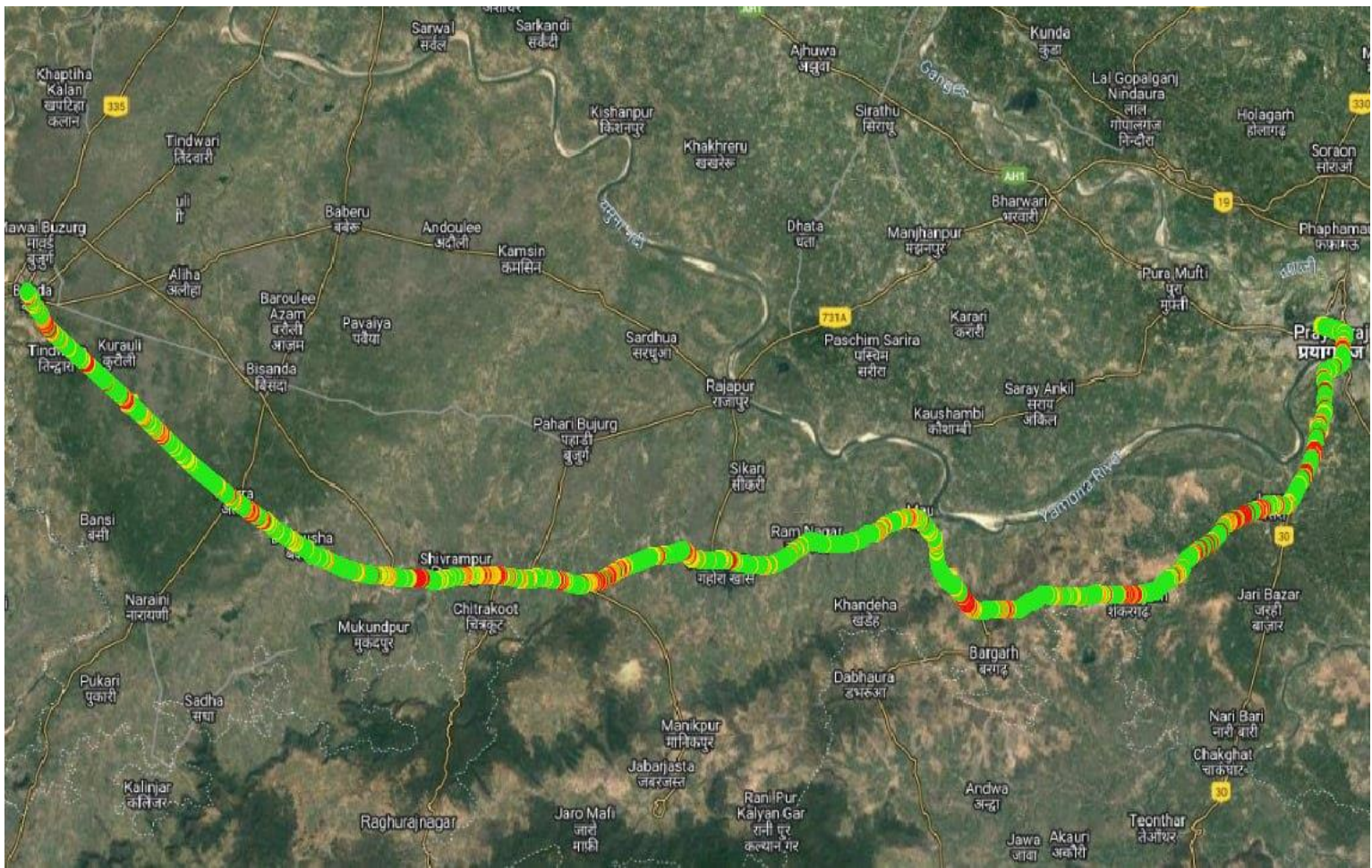| DL throughput	No of Sample	%	Legends
< 1 Mbps	3379258	50	
	2289507	33.87	
1-5 Mbps	824628	12.20	
5-10 Mbps	258124	3.81	
>10Mbps	6997	0.10	

Dynamic Data Test

Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	16Mbps

DL throughput	No of Sample	%	Legends
< 2Mbps	9029	13%	
2-5 Mbps	8121	12%	
5-10 Mbps	10059	15%	
>10Mbps	40041	60%	
Total	67250	100%	

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Dynamic Data Test Details
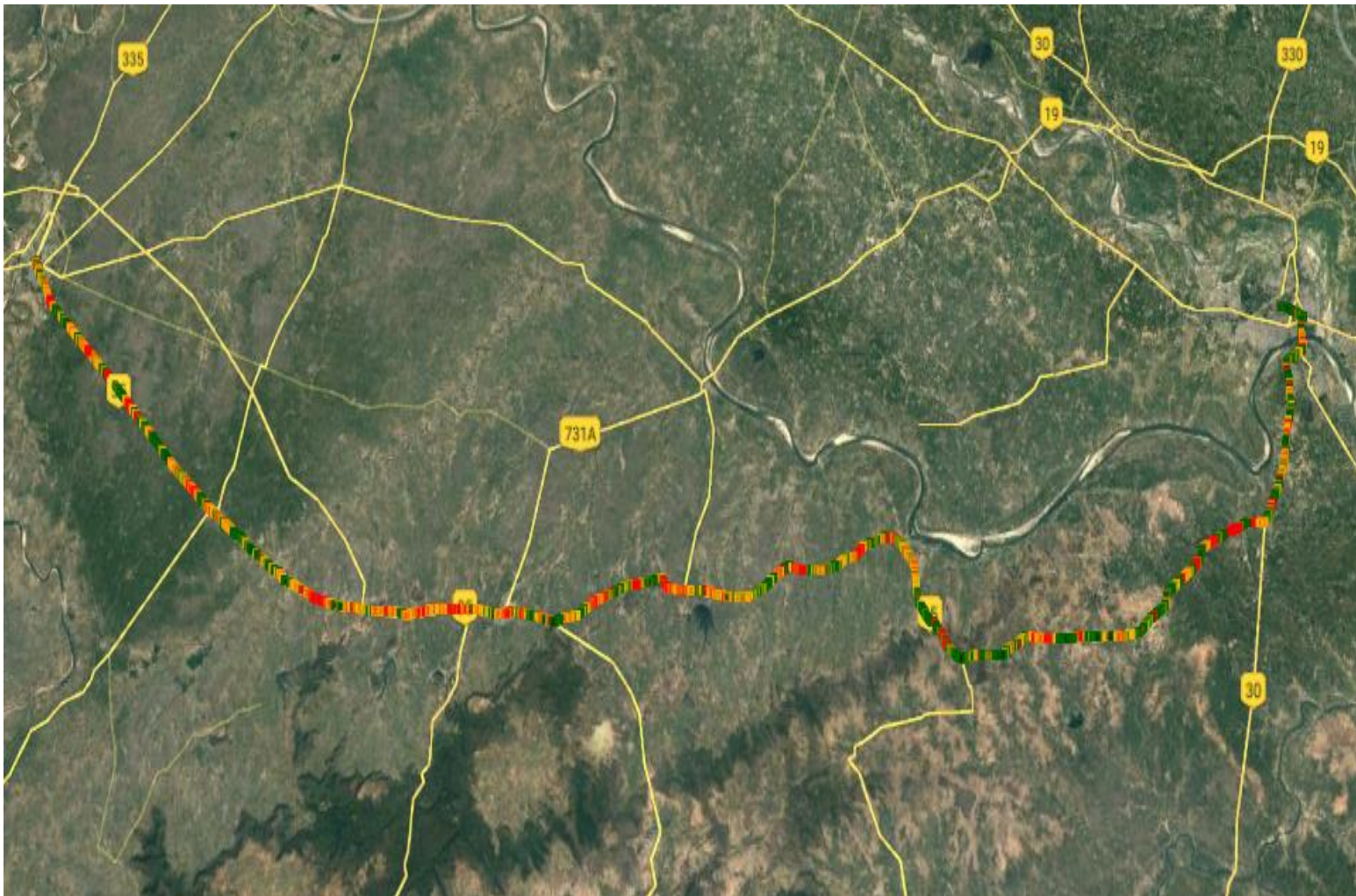
JIO

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	**12.69**

DL throughput	No of Sample	%	Legends
< 2Mbps	3240	16.90%	🟥
2-5 Mbps	3612	18.84%	🟧
5-10 Mbps	3826	19.95%	🟨
>10Mbps	8897	44.31%	🟩
Total	**18862**		

TSP - VIL

Data Statistics - Dynamic data testing

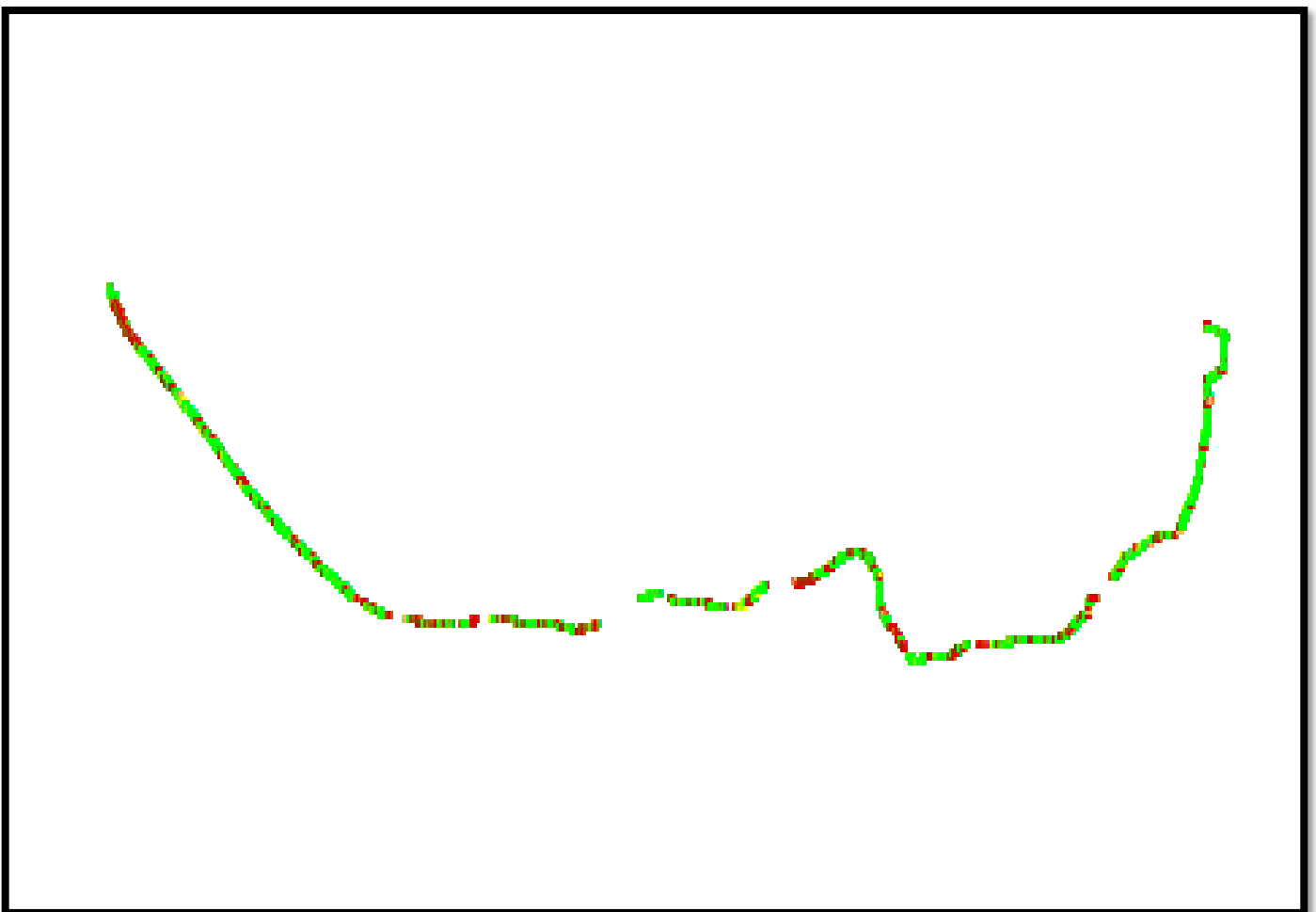| Data KPIs - Overall	LTE
Download Throughput (Mbps)	7.32

DL throughput	No of Sample	%	Legends
< 2Mbps	3433	24%	
2-5 Mbps	306	2%	
5-10 Mbps	283	2%	
>10Mbps	10357	72%	

Dynamic Data Test Details