



प्रभावी विनियमन – सुगम संचार
Effective Regulation – Ease of Communication

Operator Assisted Drive Test Report

Varanasi-Lucknow Highway via Purvanchal Expressway

25/11/2022 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 Varanasi to Lucknow Highway from 9:00 AM to 8:00 PM on 25/11/2022. The drive test covered drive route of around 314 KMs. Approximately 200 calls were made for each of the 2G/3G/4G..

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

Key Performance Indicators:

KPI	Benchmark	Observations
Block call rate %	$\leq 3\%$	All TSPs achieved the benchmark
Drop call rate %	$\leq 2\%$	All TSPs achieved the benchmark
CSSR %	$\geq 95\%$	All TSPs achieved the benchmark
Mobility HOSR %	$\geq 95\%$	All TSPs achieved the benchmark
Good RX Quality %	$\geq 95\%$	None of the TSP achieved the benchmark in any of the technology

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:

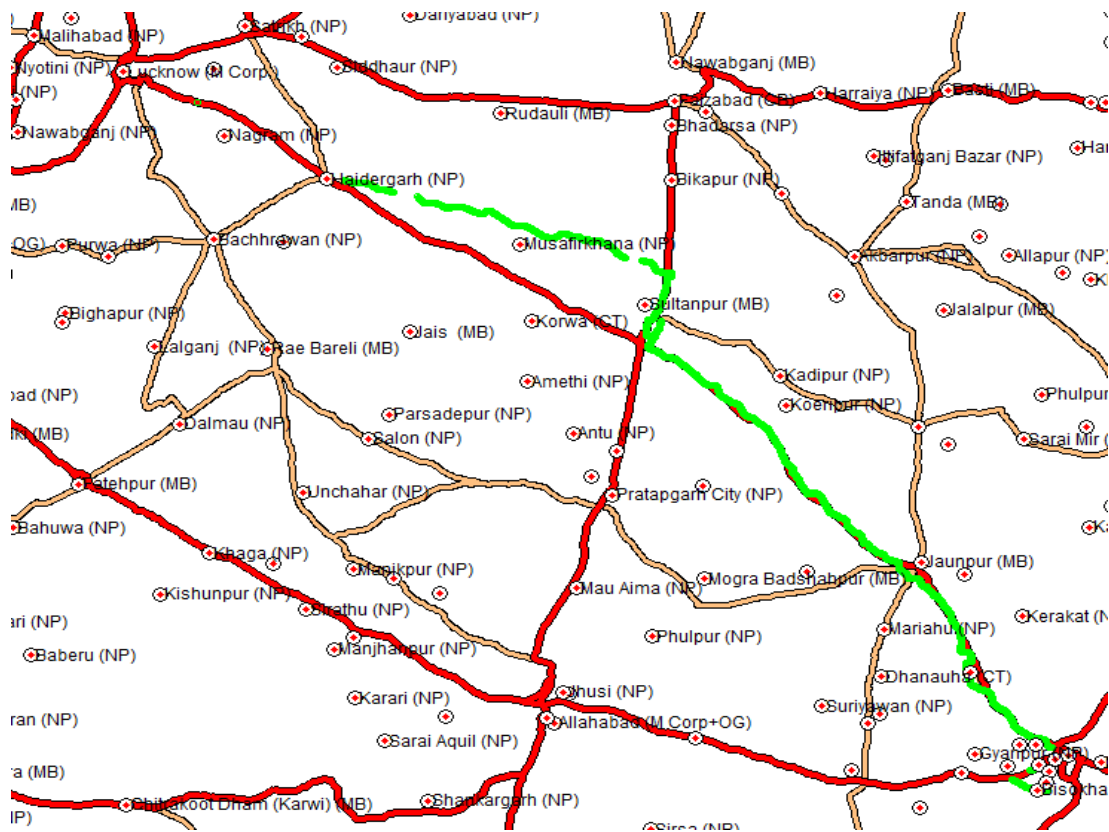
Dynamic data – repeat data file download (to check throughput on the entire route)

- 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

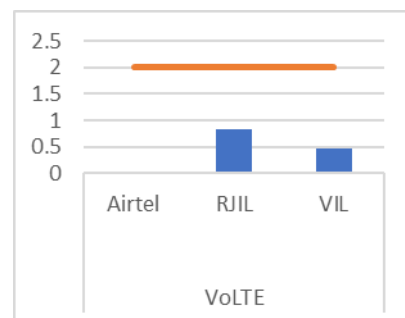
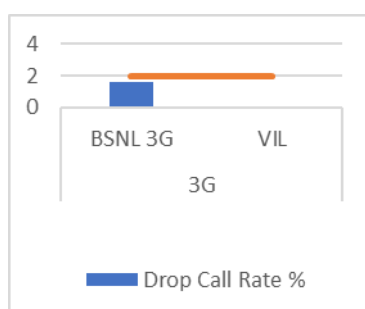
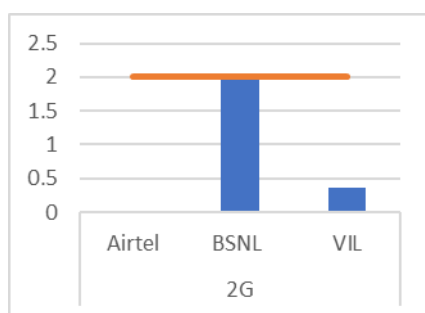
- 1-Varanasi
- 2-BABATPUR AIRPORT
- 3- VNS-JAUNPUR HIWAY
- 4-JAUNPUR- SULTANPUR HIWAY
- 5- SULTANPUR LKW PURVANCHAL HIWAY

Voice Calls

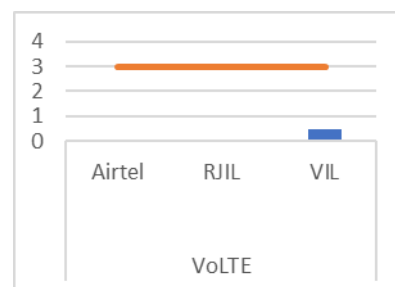
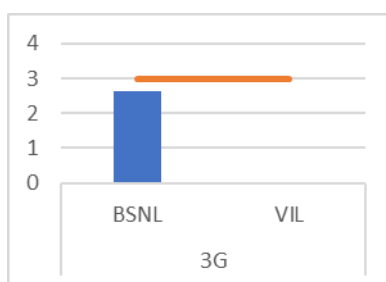
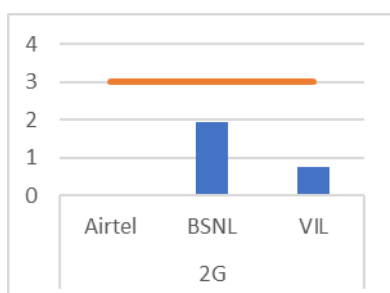
Key Observations

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

Drop Call Rate (%)



Block Call Rate (%)



KPIs	2G			3G		VoLTE		
	Airtel	BSNL	VIL	BSNL	VIL	Airtel	RJIL	VIL
Drop Call Rate %	0	1.96	0.37	1.63	NA	0	0.82	0.47
Block Call Rate %	0	1.94	0.75	2.63	NA	0	0	0.47

- All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%) .
- 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 %	53.51%	48.27	88.81

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

TSPs	3G	
	BSNL	VIL
Coverage %	86	NA

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	92.71	98.76	81.40

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

TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	VIL	JIO
Time Spent on 3G/4G %	45.27	NA	99.64	82.78	0

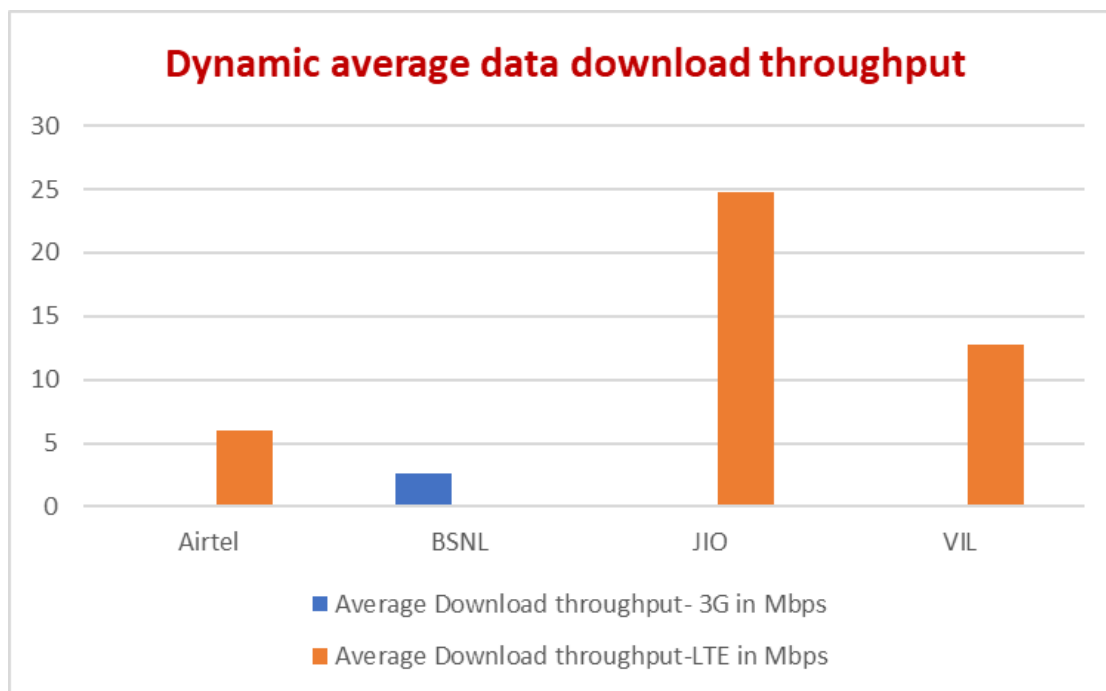
Data Services Dynamic

Key Observations

Dynamic data-download Throughput was tested.

Data Download Performance - Dynamic

3G/4G/ Network:



TSP	Airtel	BSNL	JIO	VIL
Average Download throughput- 2G In Kbps	22.34	108.22	NA	26.00
Average Download throughput- 3G In Mbps	NA	2.574	NA	NA
Average Download throughput-LTE In Mbps	5.98	NA	24.75	12.77

Summary

Highway Summary- Voice

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Call attempts	245	206	NA	266
Block call rate %	0.81	1.94	NA	0.75
CSSR %	99.18	99.03	NA	99.25
Drop call rate %	0	1.96	NA	0.37
Mobility HOSR %	100	95.62	NA	98.04
RX Quality %	94.87	81	NA	94.81
Average CST Sec	4.25	3.80	NA	2.63

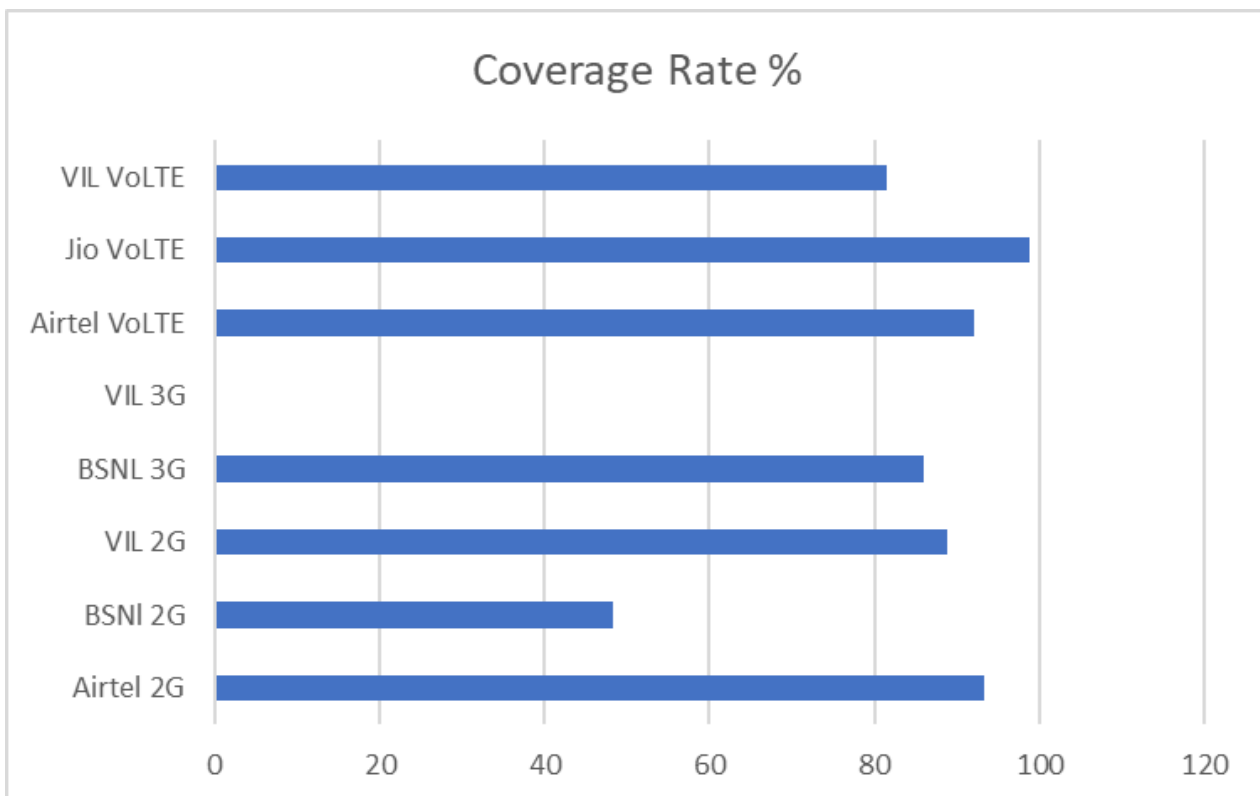
TSP (For 3G)	Airtel	BSNL	JIO	VIL
Call attempts	NA	190	NA	NA
Block call rate %	NA	2.63	NA	NA
CSSR %	NA	96.84	NA	NA
Drop call rate %	NA	1.63	NA	NA
Mobility HOSR %	NA	96	NA	NA
RX Quality %	NA	93	NA	NA
Average CST (Sec)	NA	2.89	NA	NA

TSP (For VoLTE)	Airtel	BSNL	JIO	VIL
Call attempts	249	NA	244	210
Block call rate %	0.81	NA	0	0.47
CSSR %	99.18	NA	99.18	99.52
Drop call rate %	0	NA	0.82	0.47
Mobility HOSR %	100	NA	98.74	99.48
RX Quality %	62.27	NA	92.95	82.86
Average CST(Sec)	1.21	NA	0.56	0.61

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 \geq -85 dBm, RSCP is \geq -90 dBm & RSRP \geq -110dBm. The details are as follows.

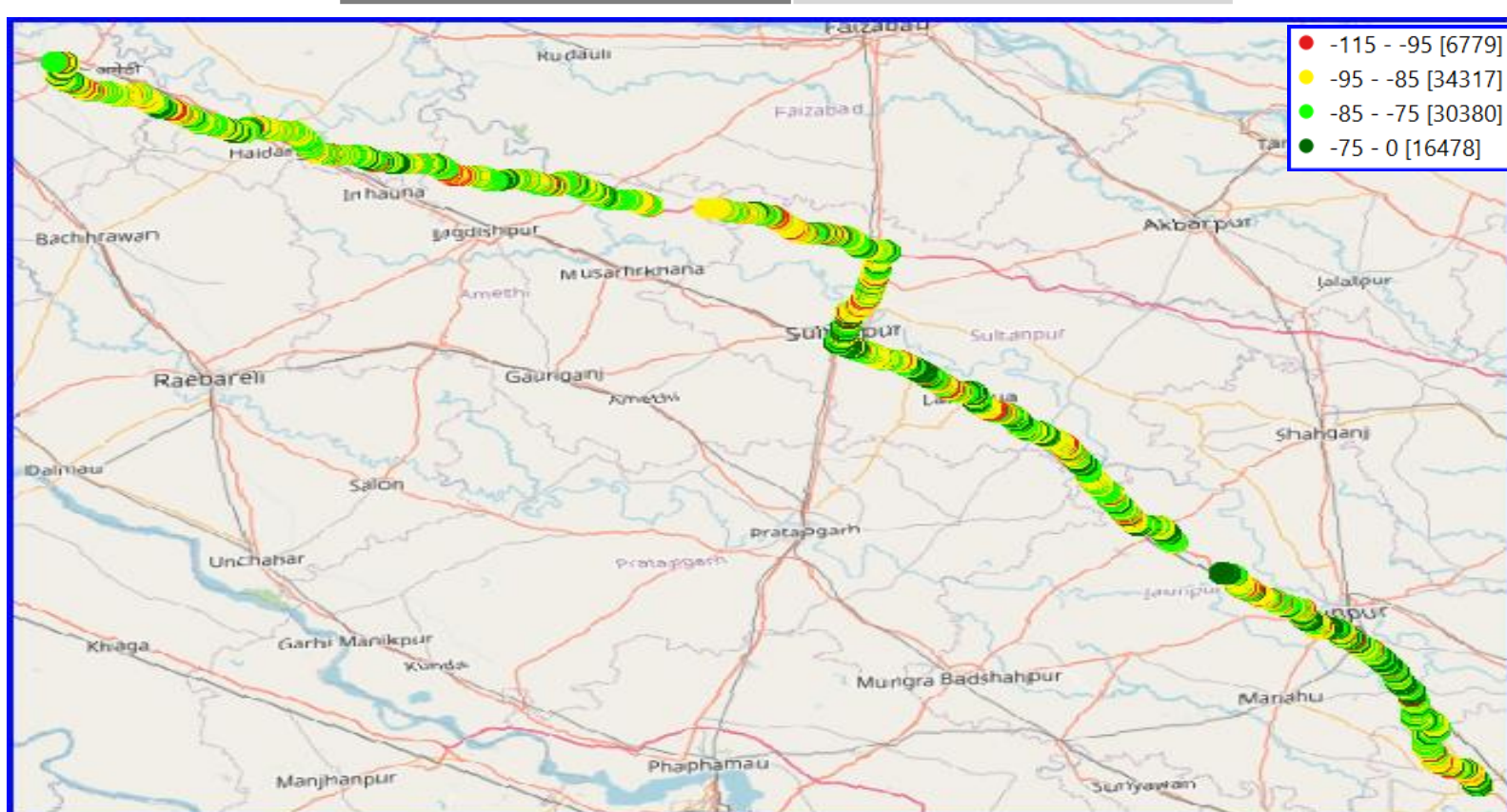
TSP	Coverage Rate %
Airtel 2G	93.32
BSNI 2G	48.27
VIL 2G	88.81
BSNL 3G	86
VIL 3G	NA
Airtel VoLTE	92.07
Jio VoLTE	98.76
VIL VoLTE	81.40



Coverage Details

TSP-Airtel

Technology	Coverage %
2G	93.32%

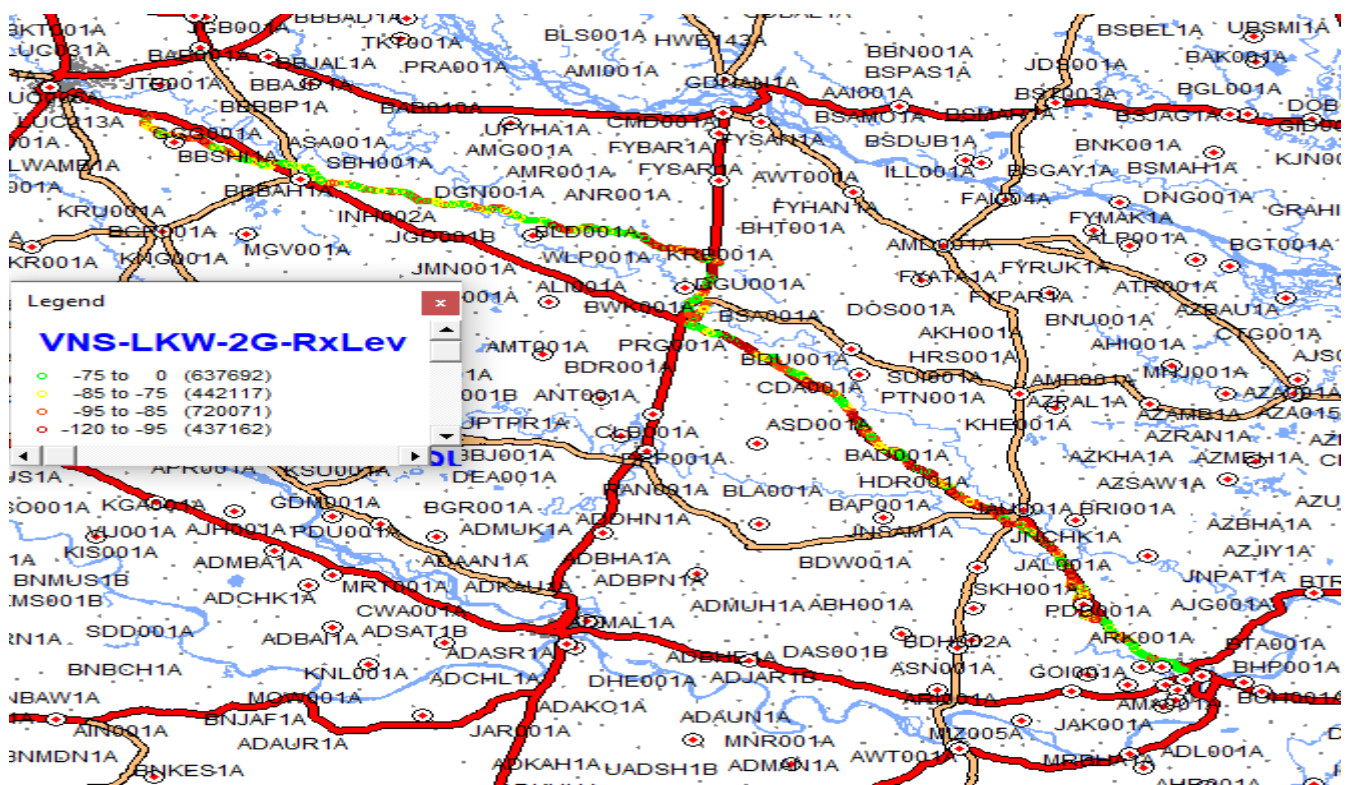


2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	16478	18.64%	
[-75, >=-85)	30830	34.87%	
[-85, >=-95)	34317	38.81%	
[-95, >=Min)	6779	7.66%	
Total	88404	100%	

Coverage Details

TSP- BSNL

Technology	Coverage %
2G	48.27

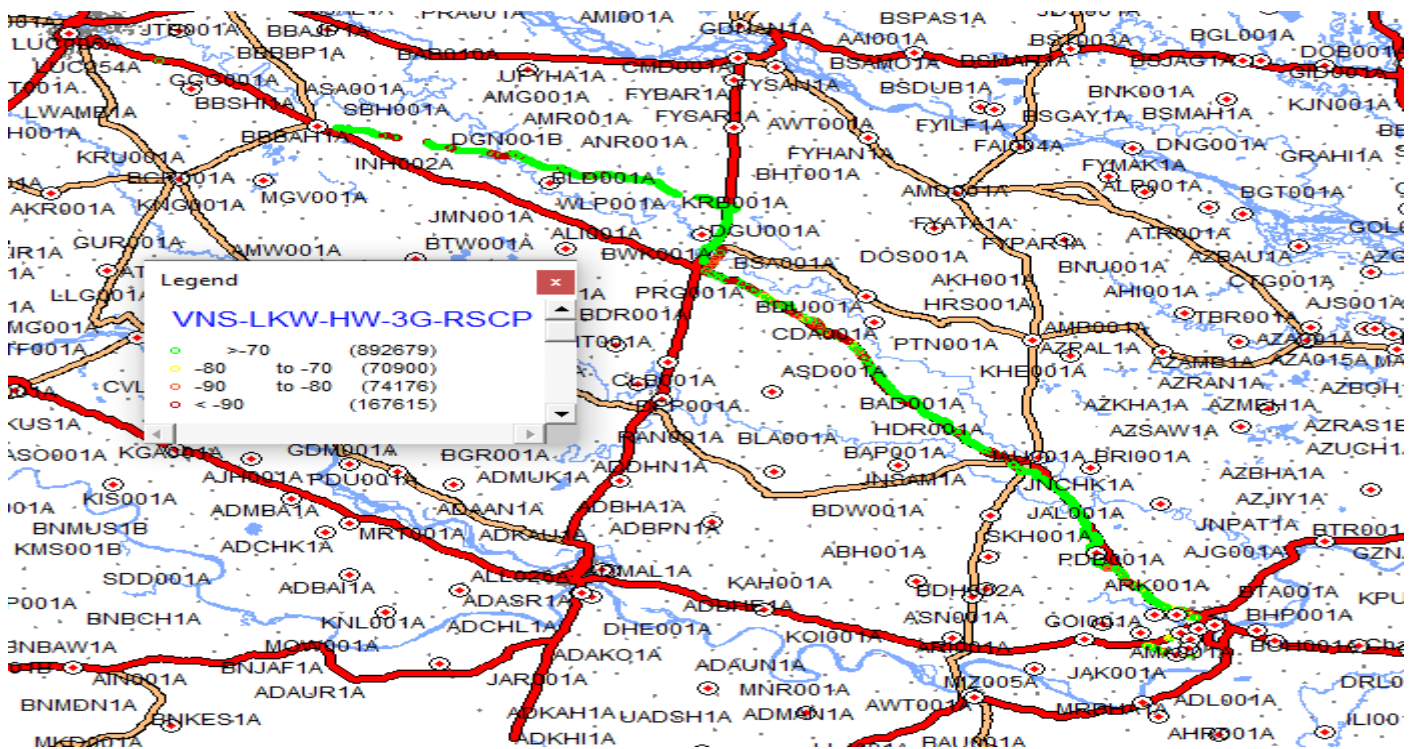


2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	637692	28.51%	
[-75, >=-85)	442117	19.76%	
[-85, >=-95)	720071	32.19%	
[-95, >=Min)	437162	19.54%	
Total		80.46%	

Coverage Details

TSP-BSNL

Technology	Coverage %
3G	86%

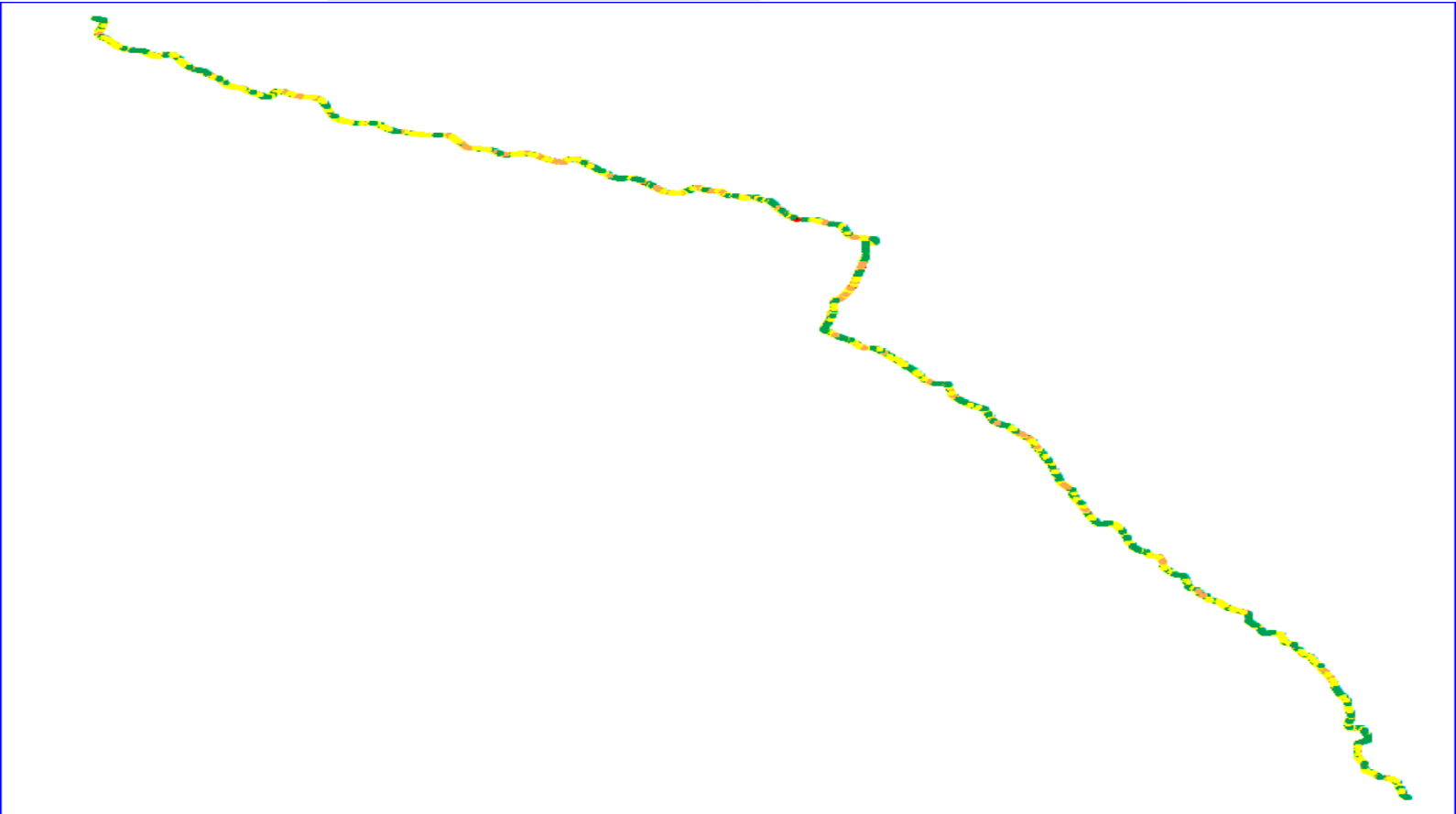


3G			
Overall RSCP	# Samples	% PDF	Legends
[Max, >=-70]	892679	74%	
[-70, >=-80)	70900	6%	
[-80, >=-90)	74176	6%	
[-90, >=Min)	167615	14%	
Total		86%	

Coverage Details

TSP- VIL

Technology	Coverage %
2G	88.81%

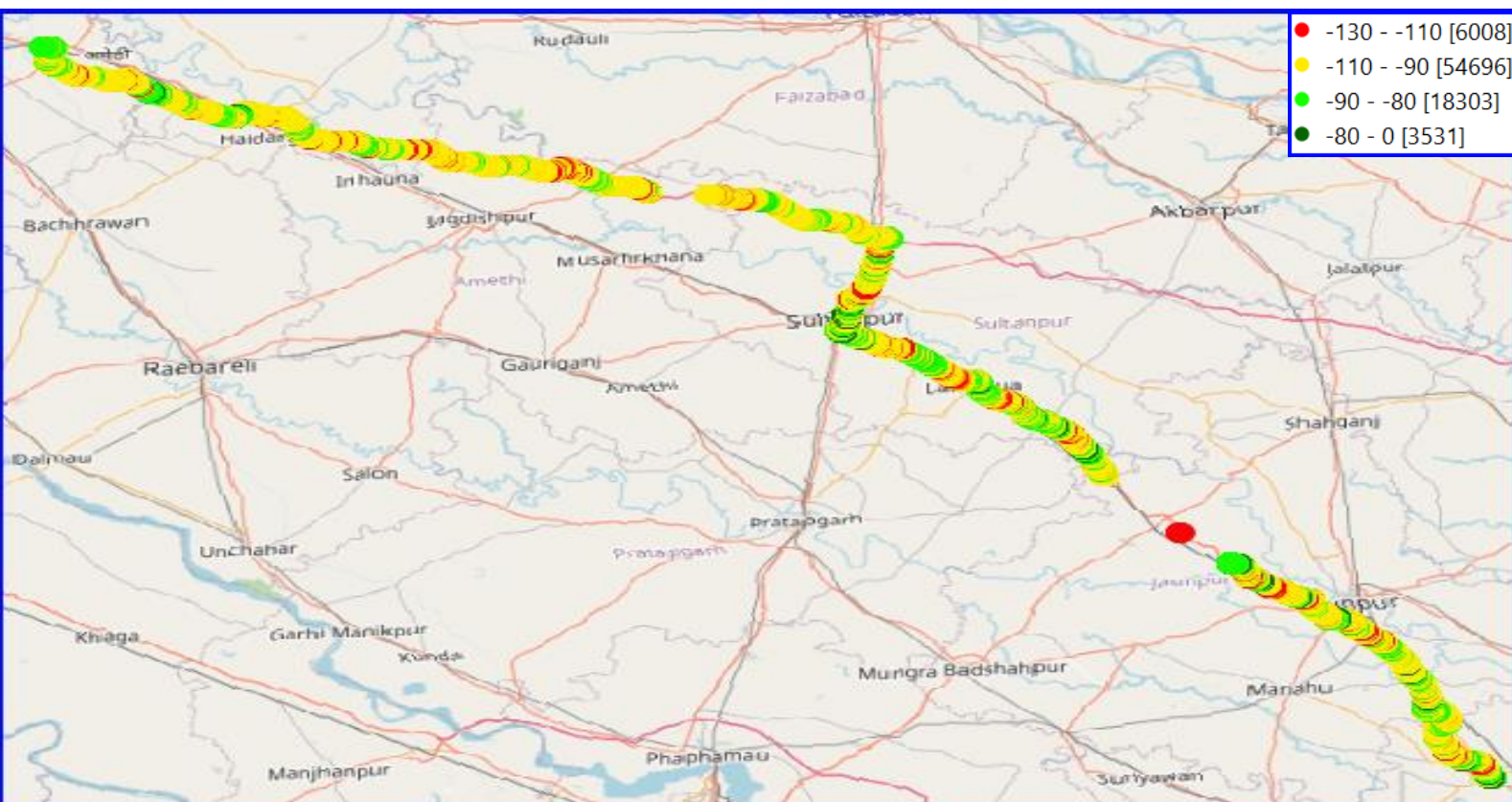


2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	973122	43.68%	<div></div>
[-75, >=-85)	1005310	45.13%	<div></div>
[-85, >=-95)	239614	10.75%	<div></div>
[-95, >=Min)	9616	0.44%	<div></div>
Total			

Coverage Details

TSP- Airtel

Technology	Coverage %
VoLTE	92.07%

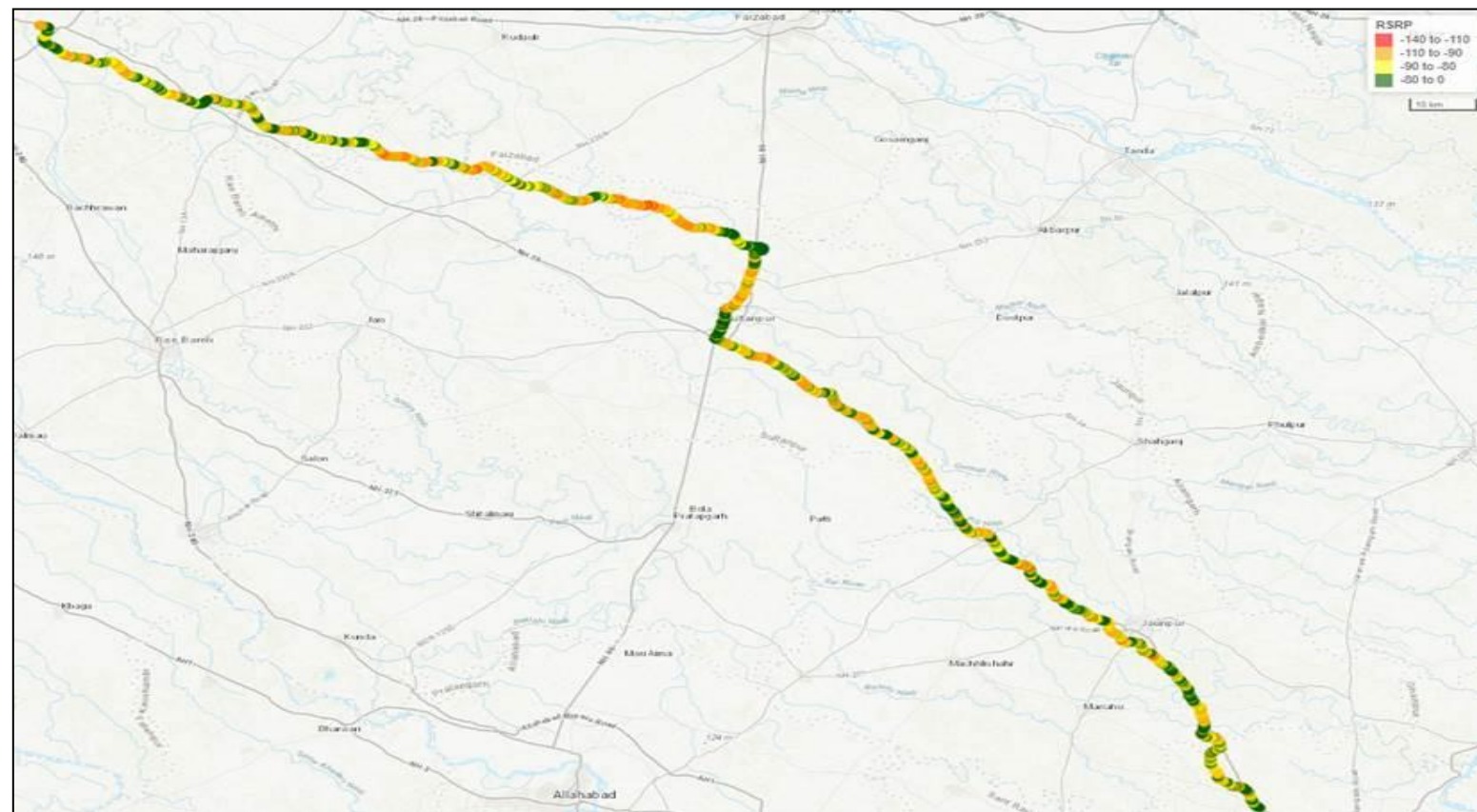


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	3531	4.27%	
[-80, >=-90)	18303	22.17%	
[-90, >=-110)	54696	66.26%	
[-110, >=Min)	6008	7.27%	
Total	82538	100%	

Coverage Details

TSP- JIO

Technology	Coverage %
VoLTE	98.76

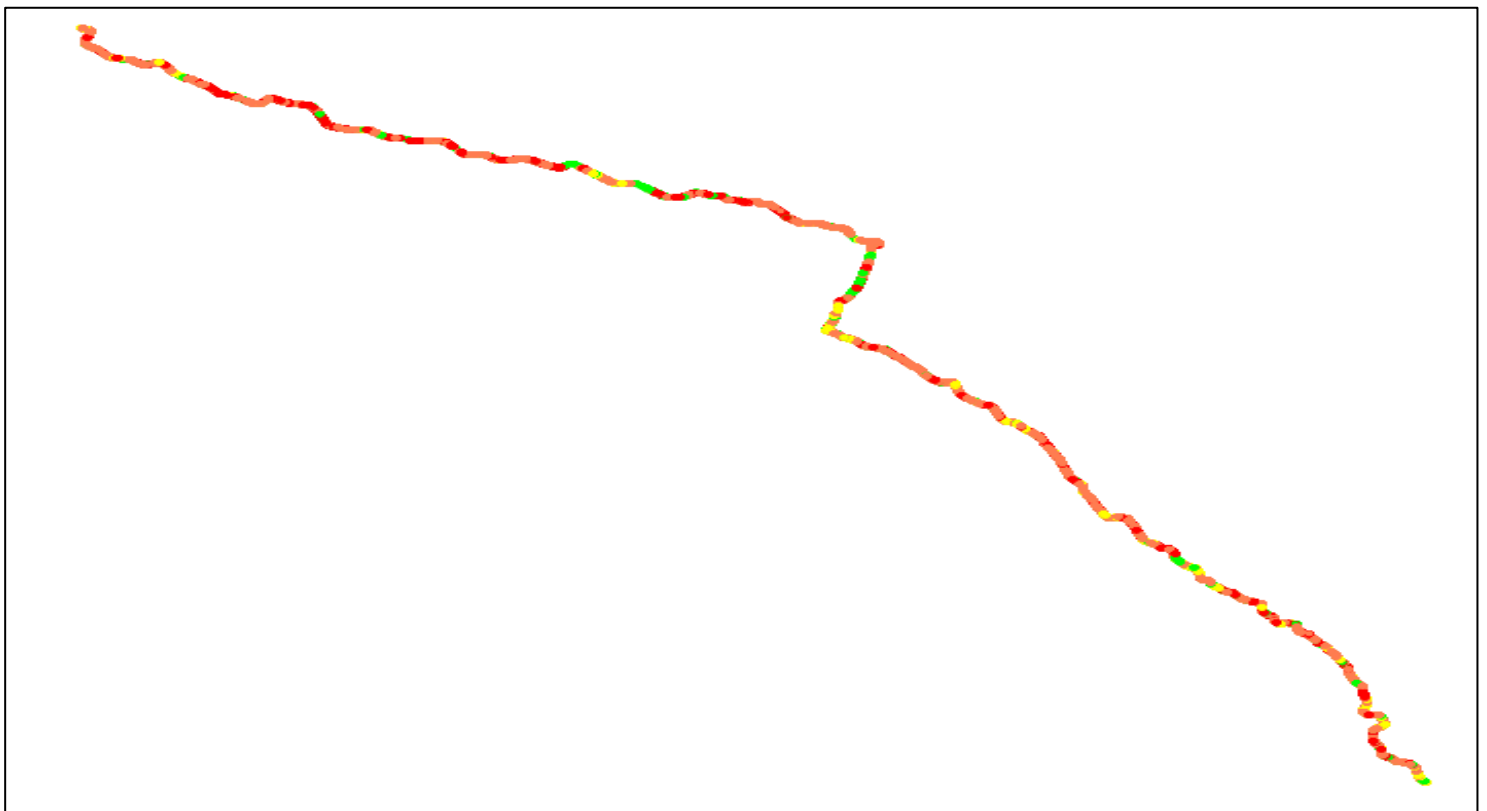


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	9908	37.95%	
[-80, >=-90)	7720	29.57%	
[-90, >=-110)	8155	31.24%	
[-110, >=Min)	110	1.24%	
Total	26107		

Coverage Details

TSP- VIL

Technology	Coverage %
VoLTE	81.40%

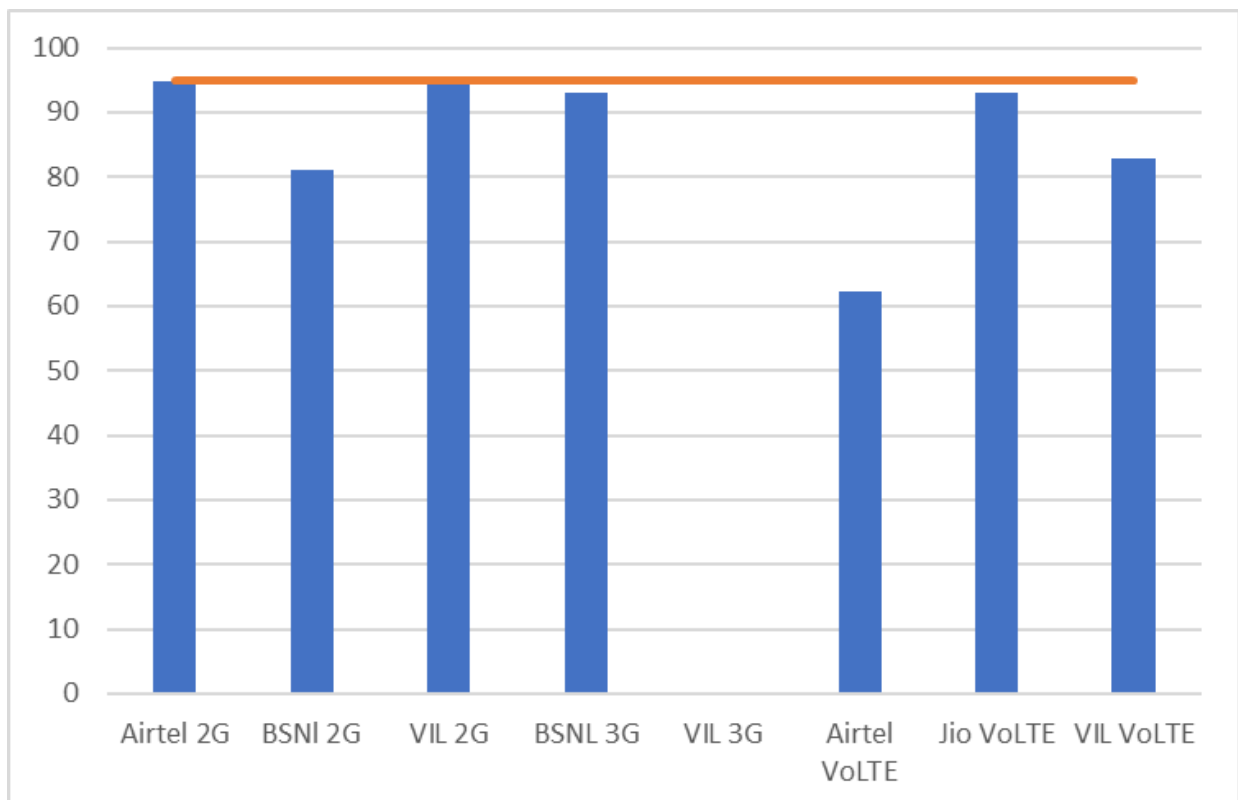


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	136860	8.20%	
[-80, >=-90)	386161	23.00%	
[-90, >=-110)	843036	50.20%	
[-110, >=Min)	311842	18.60%	
Total	1677899	100%	

Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP 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	94.83
BSNI 2G	81
VIL 2G	94.81
BSNL 3G	93
VIL 3G	NA
Airtel VoLTE	62.27
Jio VoLTE	92.95
VIL VoLTE	82.86

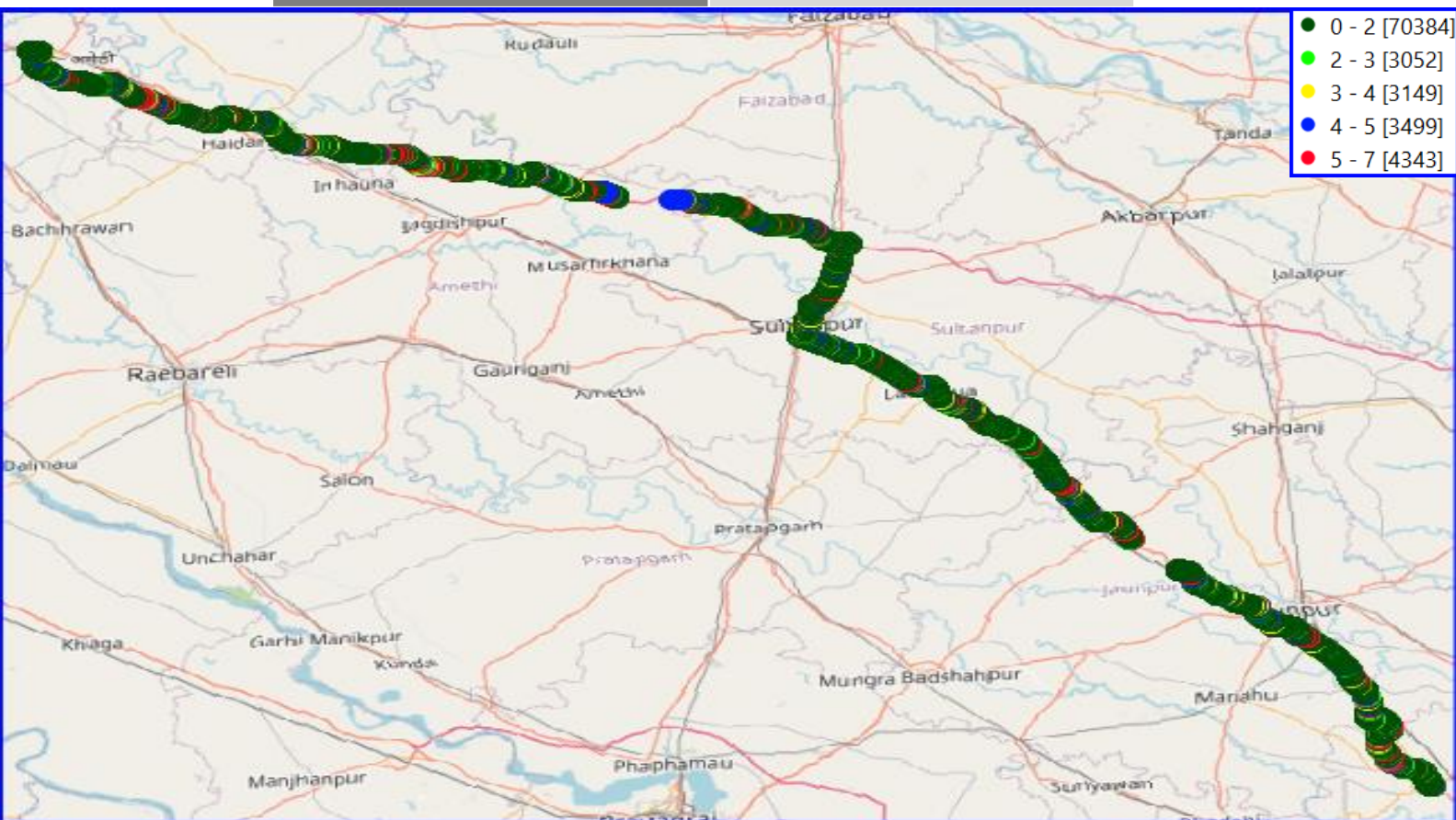


Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP 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- Airtel

Technology	Rx Quality %
2G	94.83%



Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	70384	83.36%	
(2, ≤ 3)	3052	3.61%	
(3, ≤ 4)	3149	3.72%	
(4, ≤ 5)	3499	4.14%	
(5, $\leq \text{Max}$)	4343	5.14%	
Total	84427	100%	

Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP 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-BSNL

Technology	Rx Quality %
2G	81%



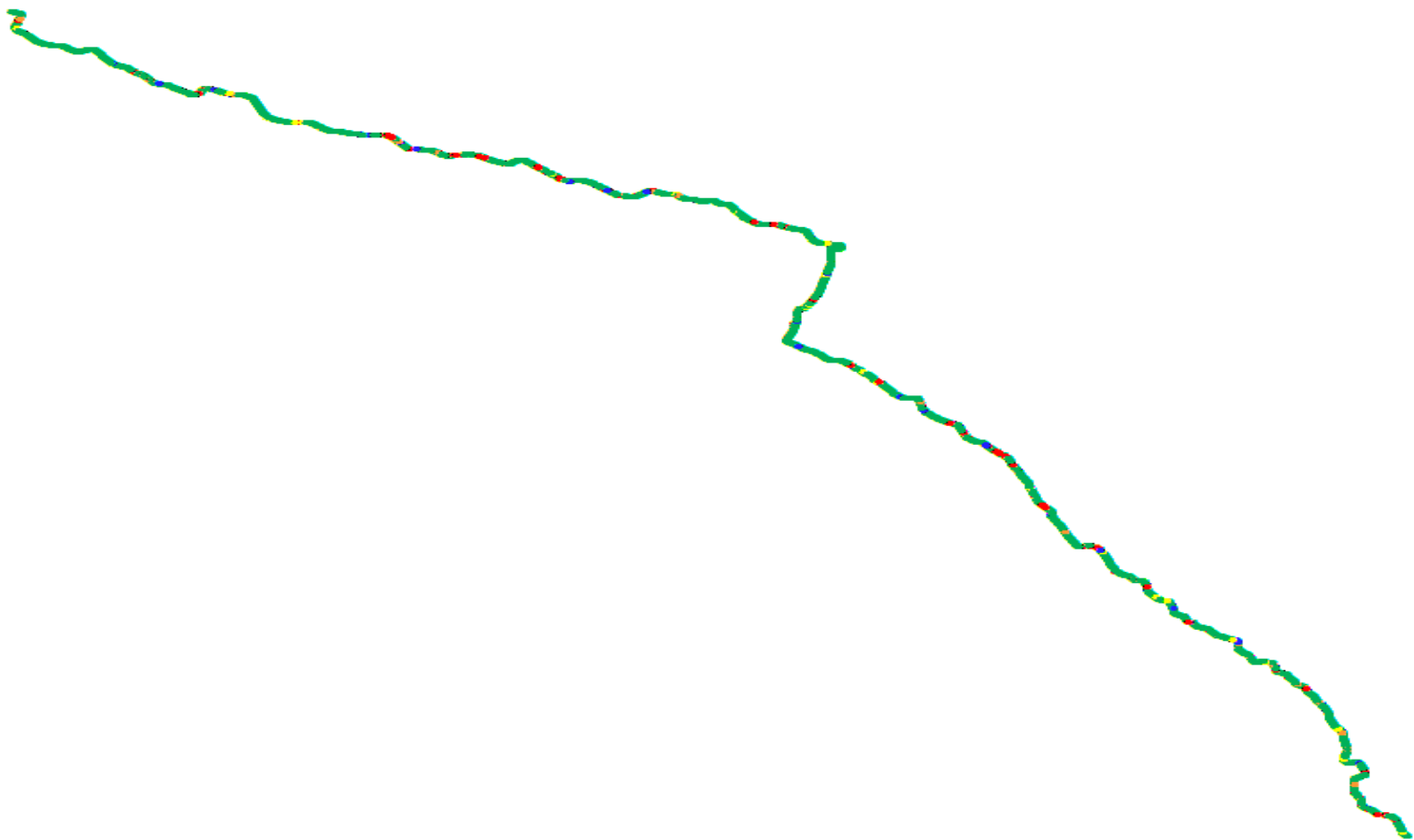
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	1561573	70%	
(2, ≤ 3)	65715	3%	
(3, ≤ 4)	80910	4%	
(4, ≤ 5)	102738	5%	
(5, $\leq \text{Max}$)	426106	19%	
Total		81%	

Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP 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- VIL

Technology	Rx Quality %
2G	95.92%



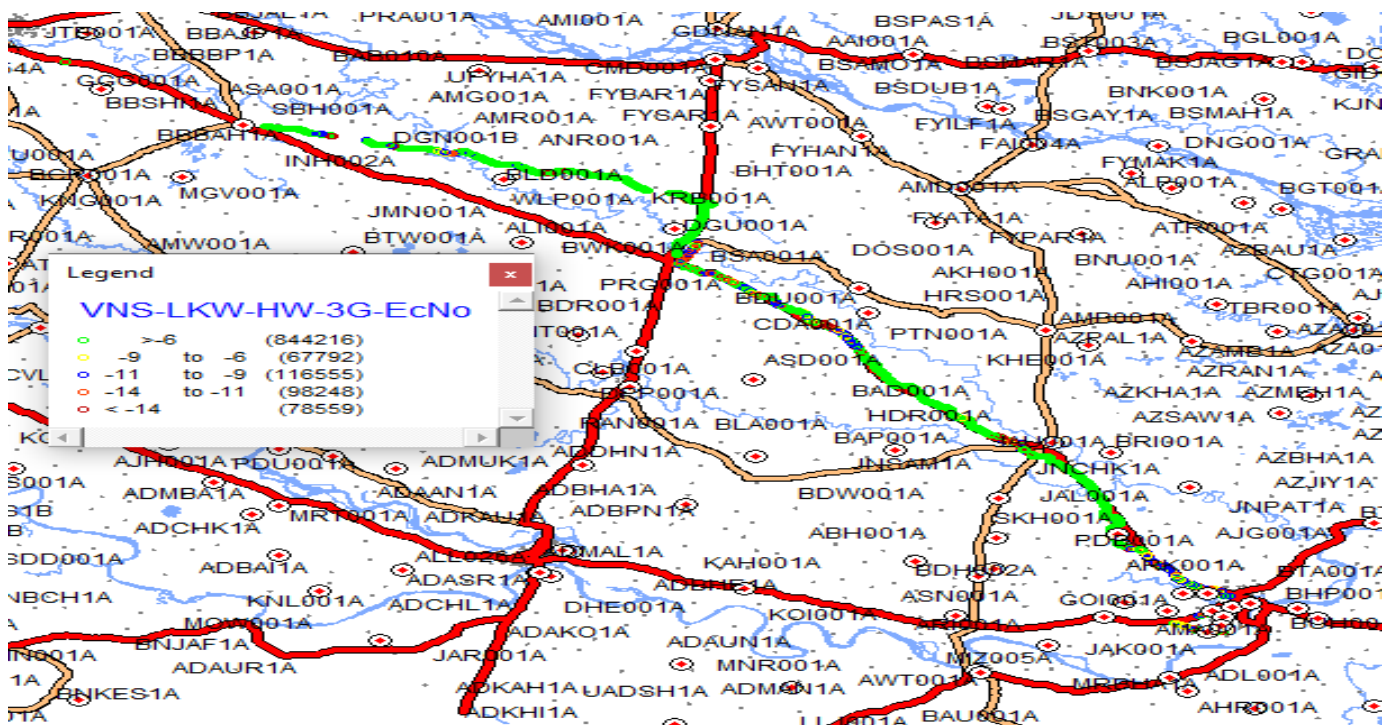
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	2427350	89.56%	
(2, ≤ 3)	59943	2.21%	
(3, ≤ 4)	61353	2.27%	
(4, ≤ 5)	51061	1.88%	
(5, $\leq \text{Max}$)	110534	4.08%	
Total	2710241	100%	

Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP 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- BSNL

Technology	Rx Quality %
3G	93%



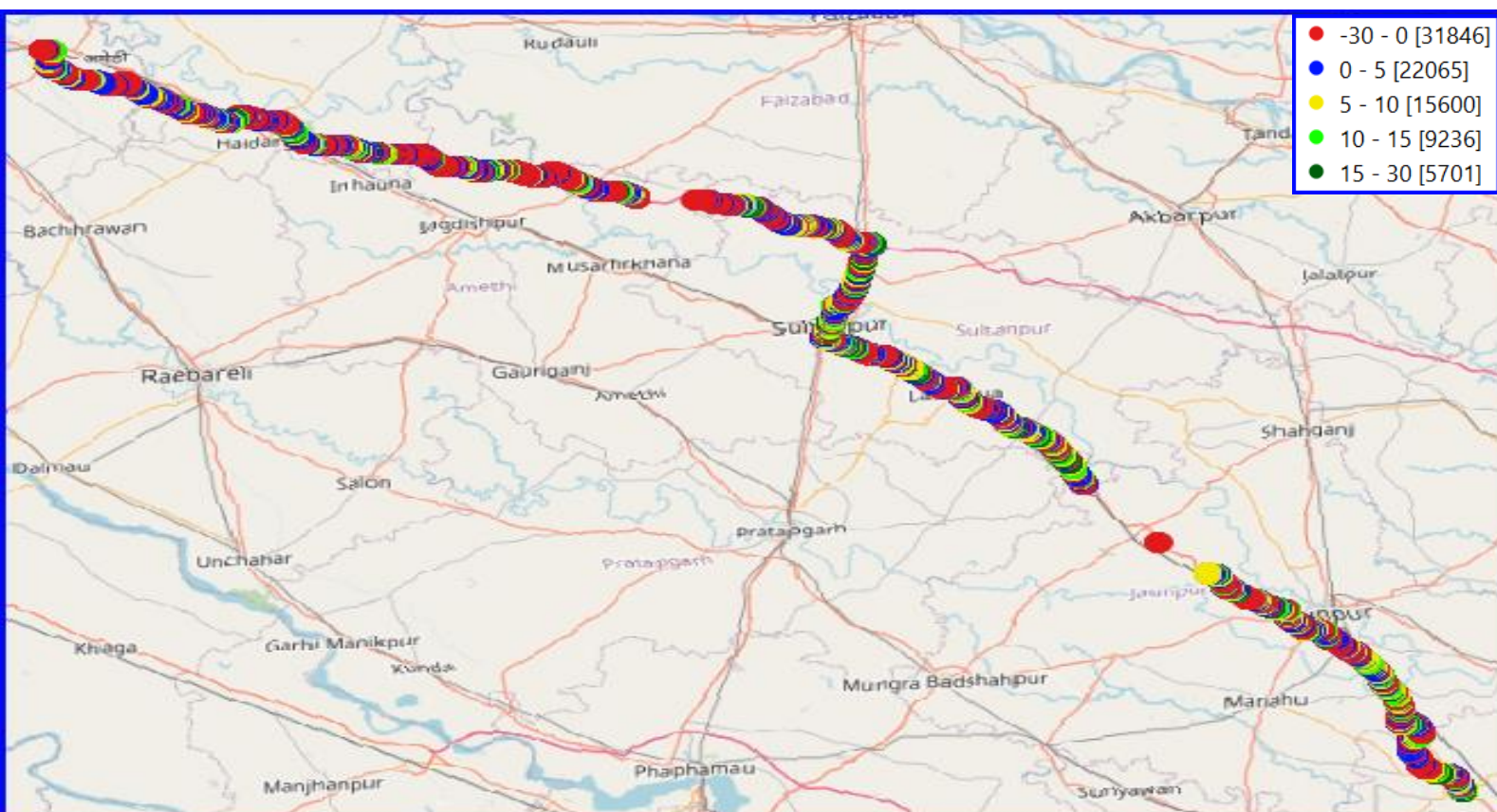
Overall Ec/No	# Samples	% PDF	Legends
(Max, ≤ -6)	844216	70.04%	
(-6 , ≤ -9)	67792	5.6%	
(-9 , ≤ -11)	116555	9.7%	
(-11 , ≤ -14)	98248	8.2%	
(-14 , \leq Min)	78559	6.5%	
Total		93%	

Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP 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- AIRTEL

Technology	Rx Quality %
VoLTE	62.27%



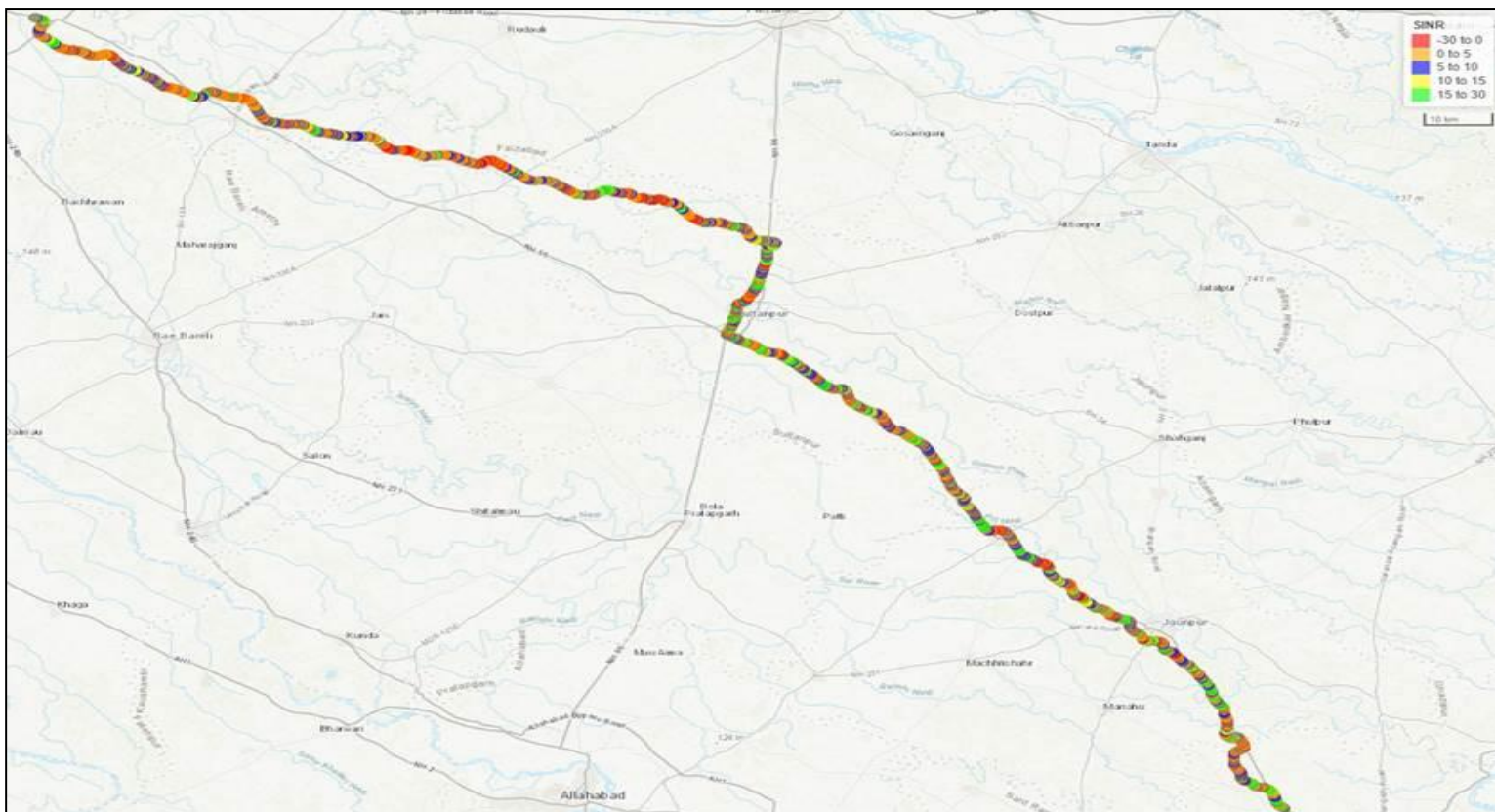
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	31846	37.70%	
(0, ≤ 5)	22065	26.12%	
(5, ≤ 10)	15600	18.47%	
(10, ≤ 15)	9236	10.93%	
(15, $\leq \text{Max}$)	5701	6.75%	
Total	84456	100%	

Quality Details

For measuring voice quality, as per the QoS norms, RxQual ≤ 5 for GSM TSPs, EcNo ≥ -14 dBm for 3G TSP 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 $\geq 95\%$.

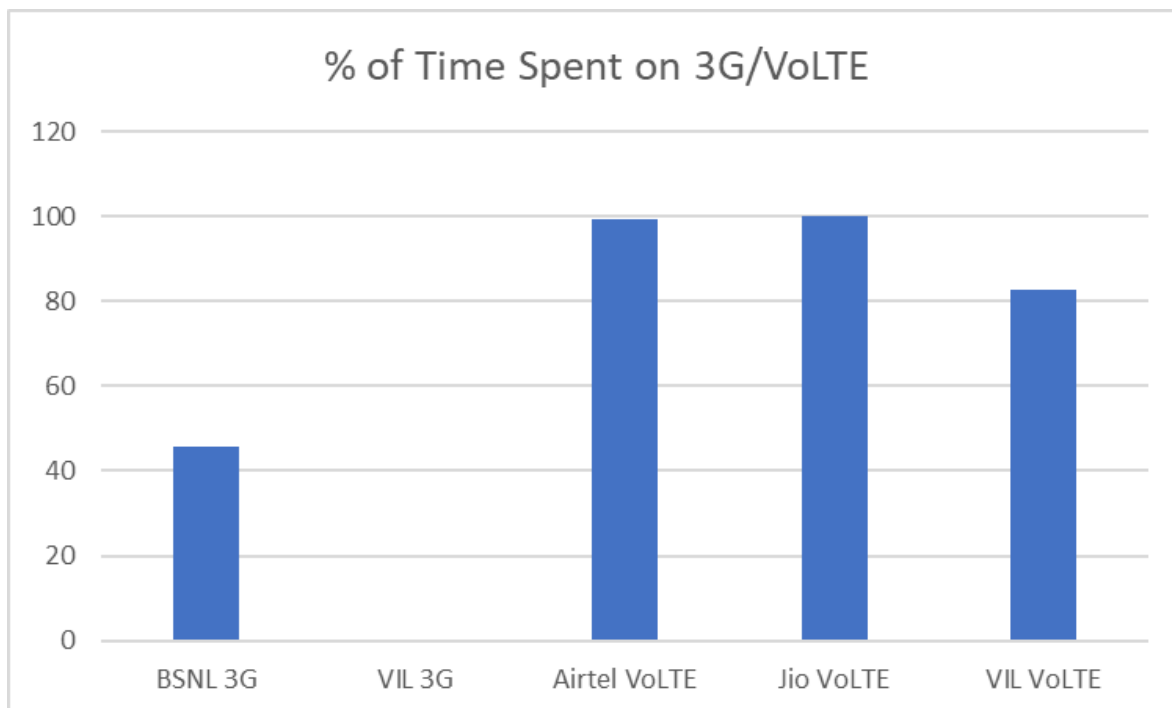
TSP-JIO

Technology	Rx Quality %
VoLTE	92.95



Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	1834	7.05%	Red
(0, ≤ 5)	9482	36.32%	Orange
(5, ≤ 10)	6634	25.41%	Blue
(10, ≤ 15)	4377	16.76%	Yellow
(15, $\leq \text{Max}$)	3810	14.56%	Green
Total	26107		

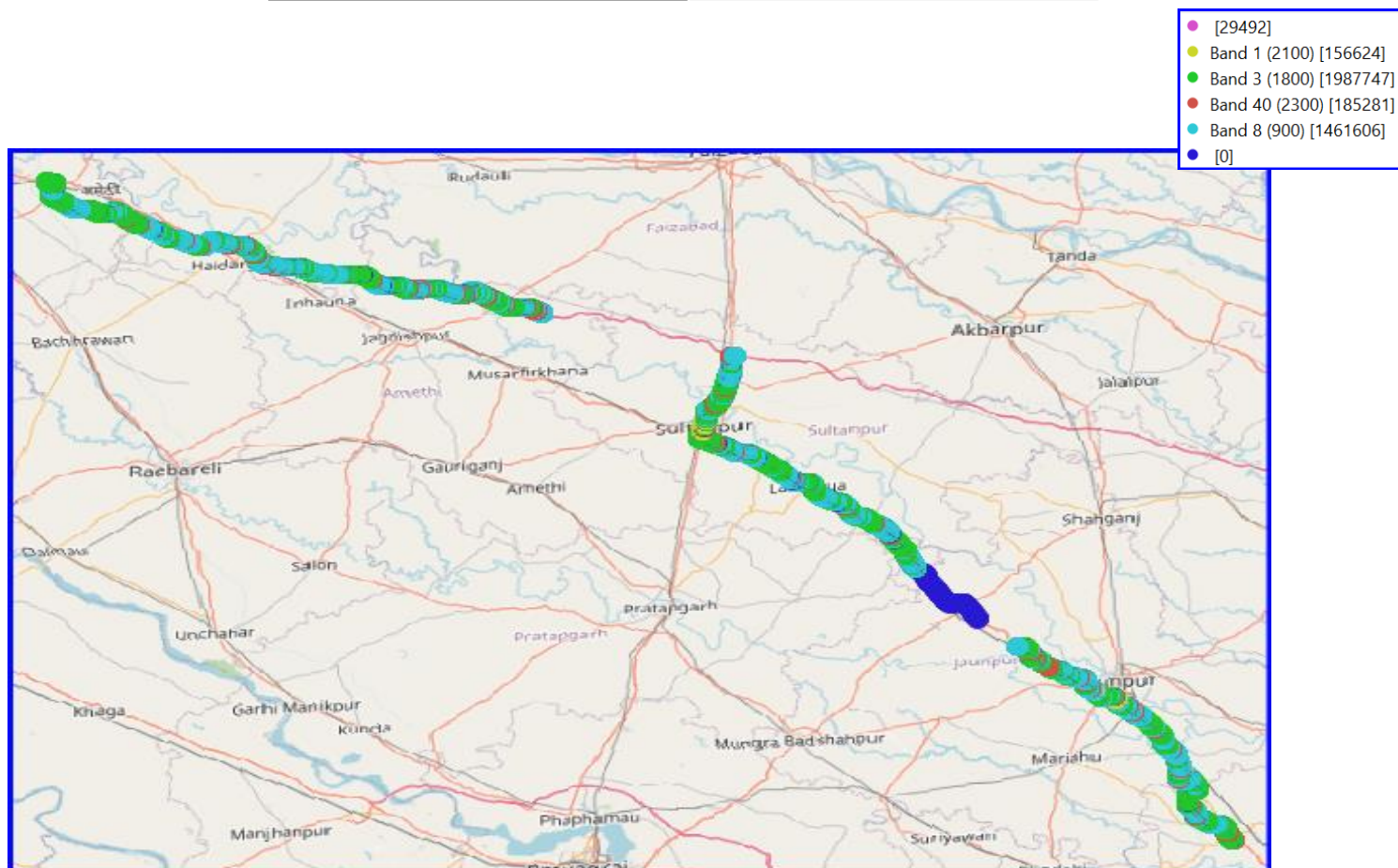
TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	45.72
VIL 3G	NA
Airtel VoLTE	99.22
Jio VoLTE	100
VIL VoLTE	82.76



Technology Details

TSP- Airtel

Technology	% of Time Spent on
3G	
VoLTE	99.22%



Technology Details

TSP- BSNL

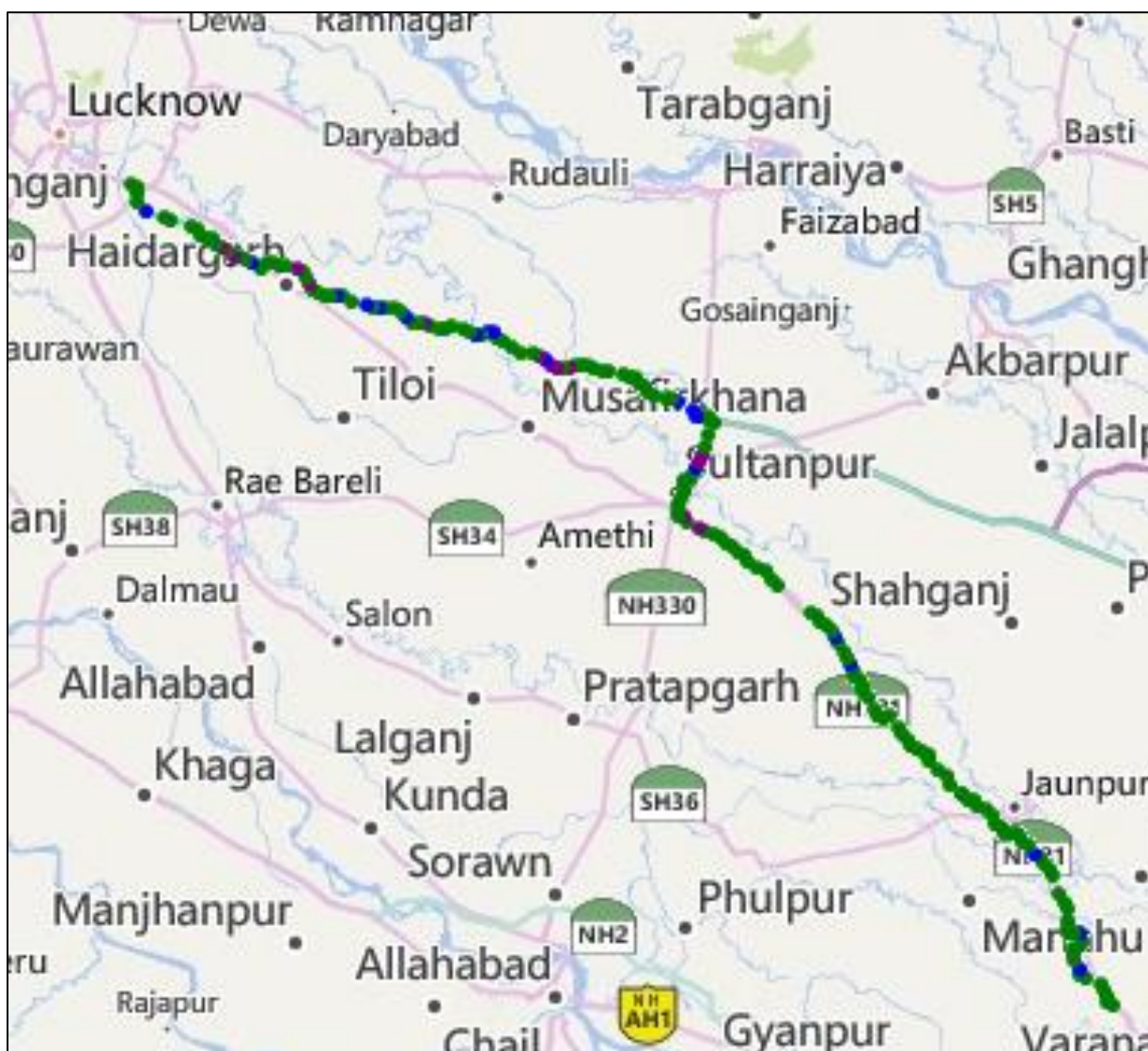
Technology	% of Time Spent on
3G	45.72%
VoLTE	



Technology Details

TSP- VIL

Technology	% of Time Spent on
3G	
VoLTE	82.76%

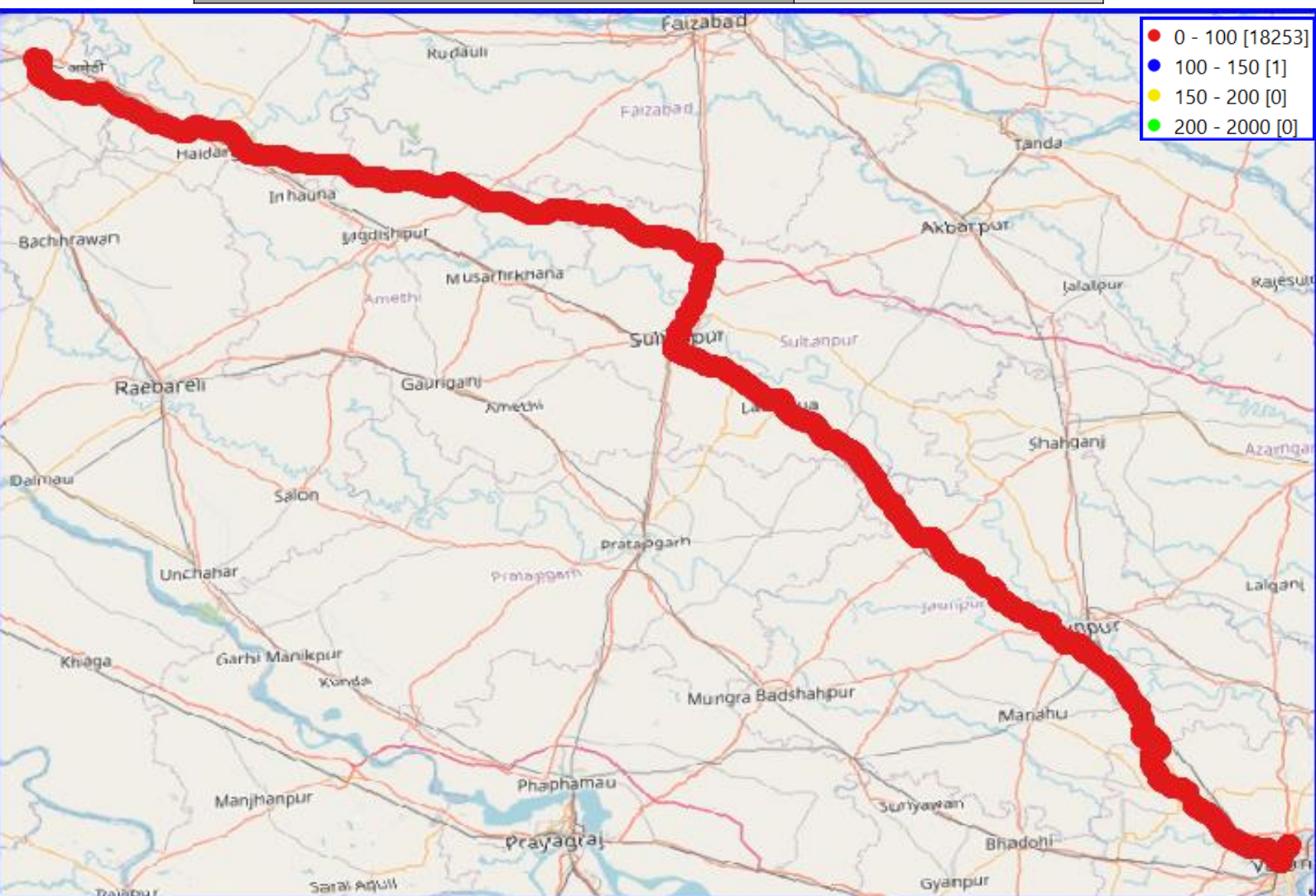


Dynamic Data Test

TSP- Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	2G
Download Throughput (Kbps)	99.99%

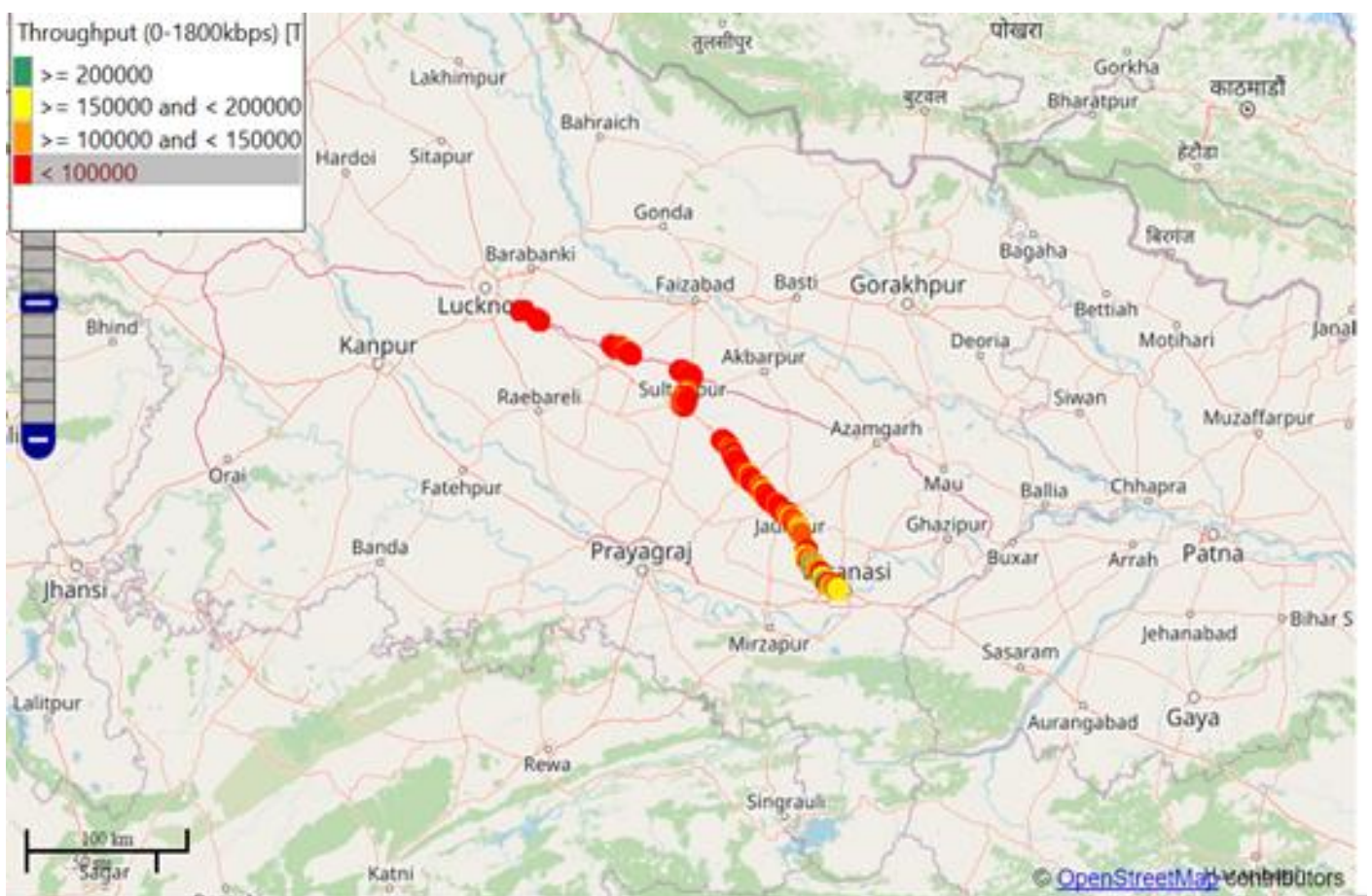


DL throughput	No of Sample	%	Legends
< 100 Kbps	18253	99.99%	
100-150Kbps	1	0.01%	
150-200Kbps	0	0%	
>200Kbps	0	0%	

TSP-BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	2G
Download Throughput (Kbps)	108.22

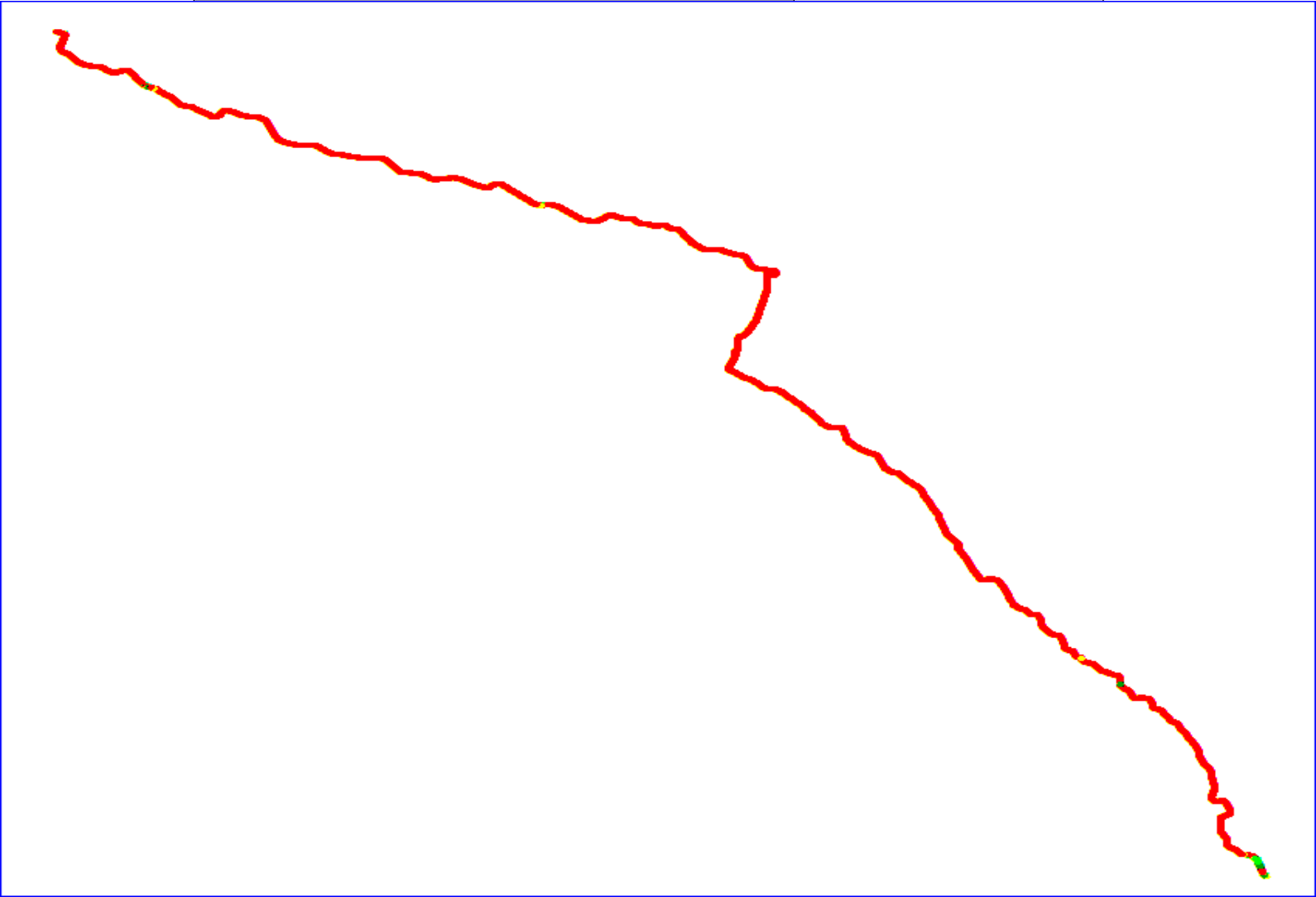


DL throughput	No of Sample	%	Legends
< 100 Kbps	3588	64.08	
100-150Kbps	785	18.89	
150-200Kbps	470	12.61	
>200Kbps	95	4.42	

TSP- VIL

Data Statistics - Dynamic data testing

Data KPIs - Overall	2G
Download Throughput (Kbps)	26

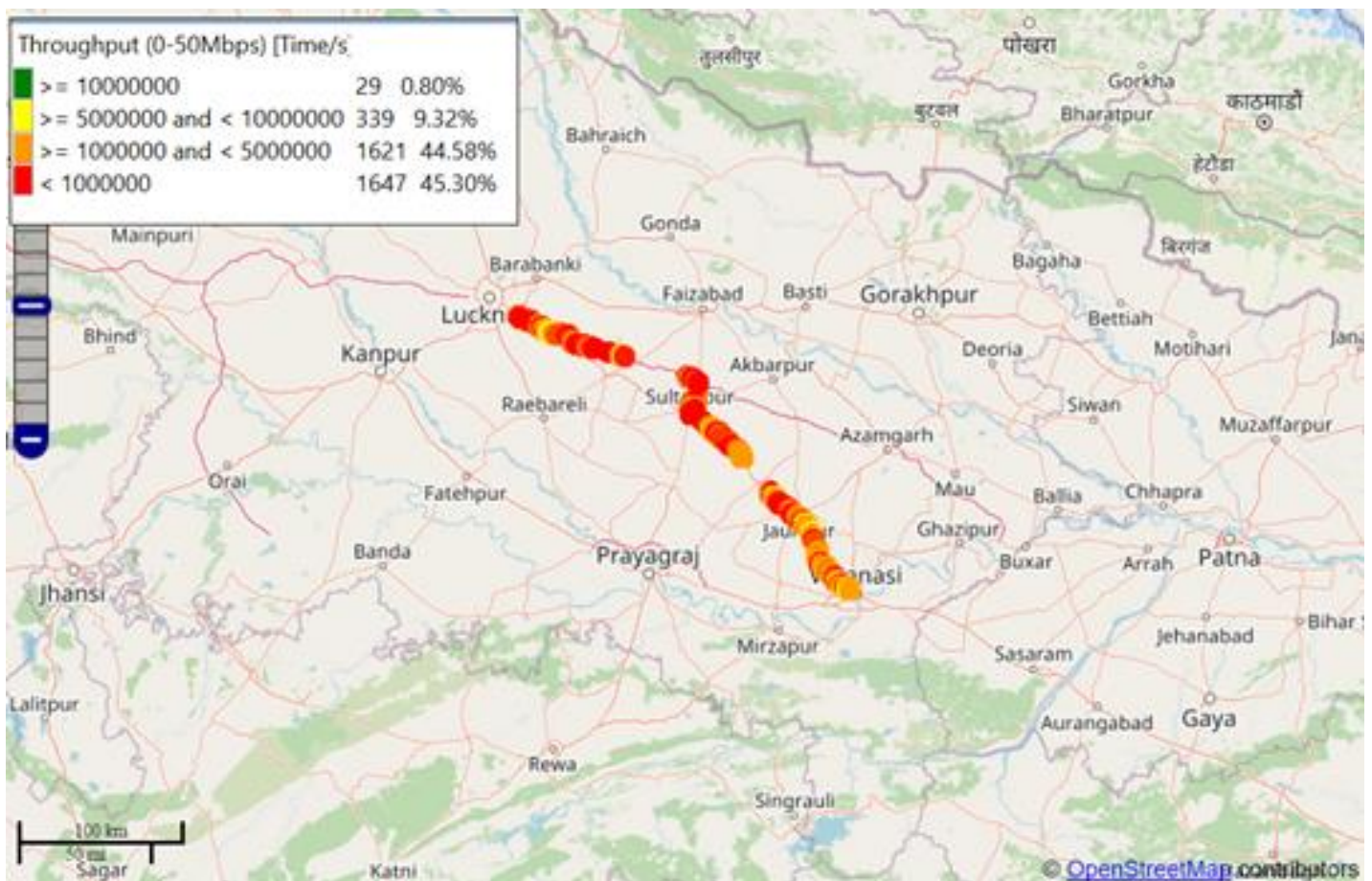


DL throughput	No of Sample	%	Legends
< 100 Kbps	4918206	97.93	
100-150Kbps	36503	0.74	
150-200Kbps	29024	0.57	
>200Kbps	38462	0.76	

TSP-BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	3G
Download Throughput (Mbps)	2.574



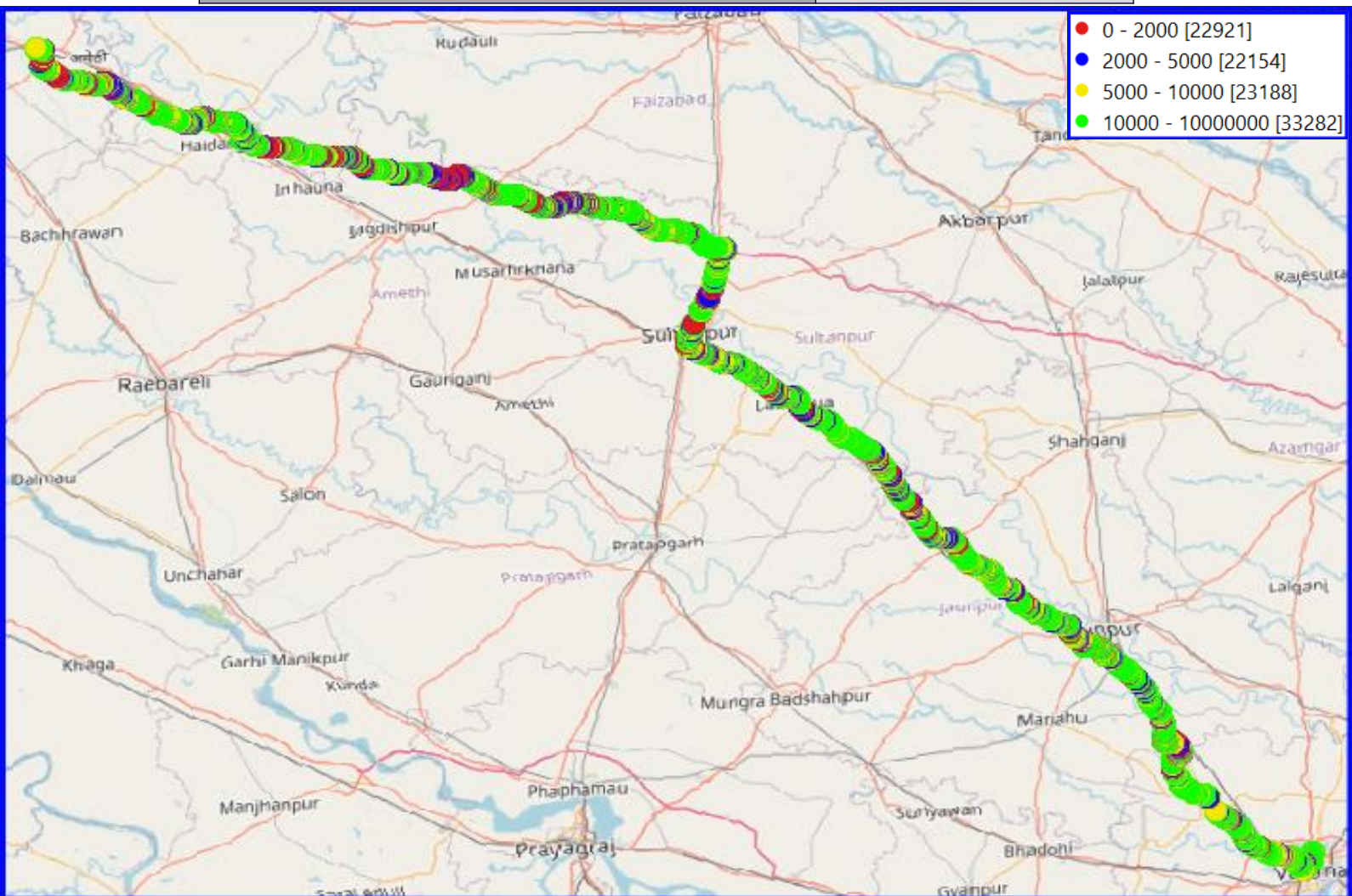
DL throughput	No of Sample	%	Legends
< 1 Mbps	1647	45.3	
1-5 Mbps	1621	44.58	
5-10 Mbps	339	9.32	
>10Mbps	29	0.80	

Dynamic Data Test

TSP- Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	77.41%



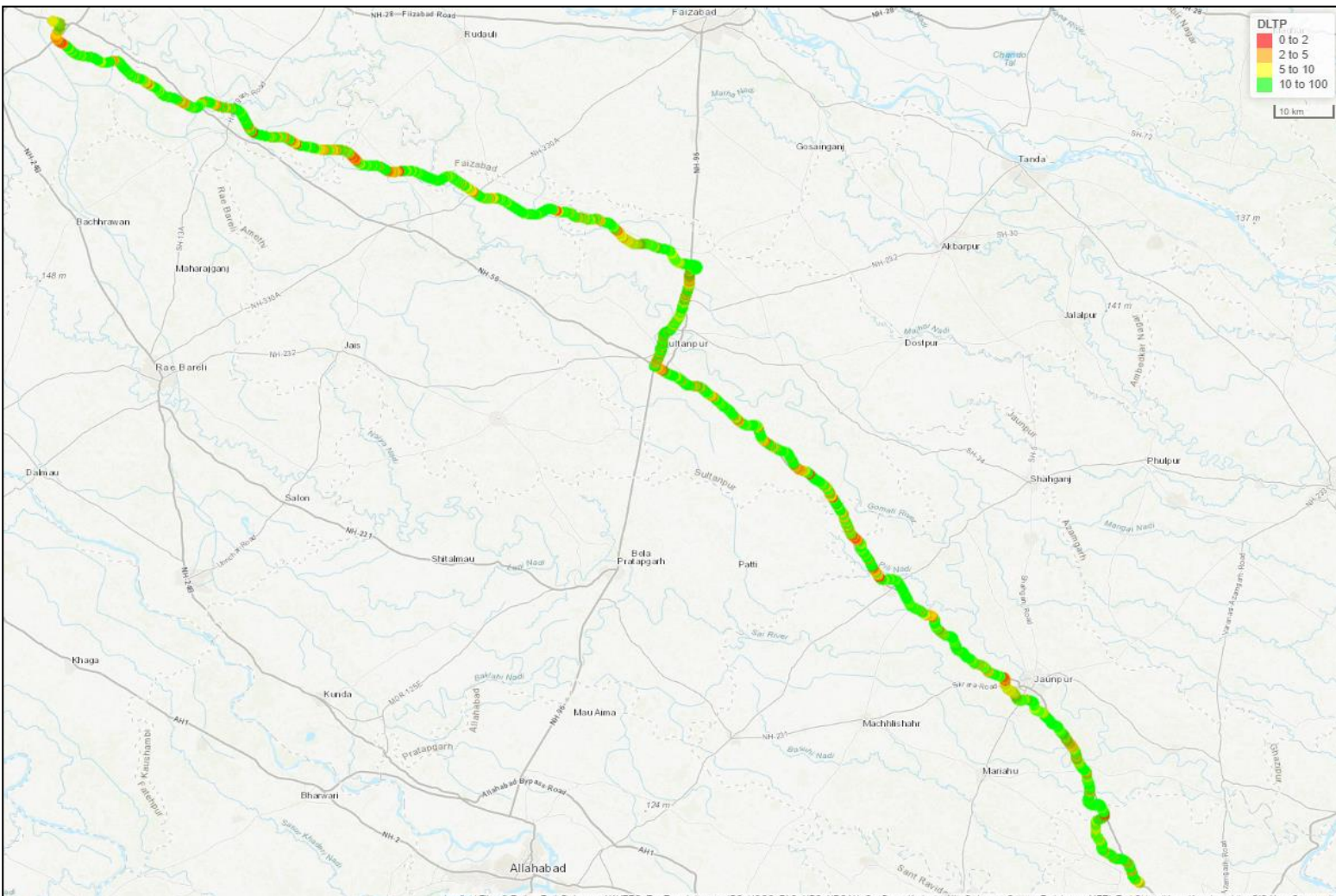
DL throughput	No of Sample	%	Legends
< 2Mbps	22921	22.57%	
2-5 Mbps	22154	21.81%	
5-10 Mbps	23188	22.83%	
>10Mbps	33282	32.77%	

Dynamic Data Test

TSP-JIO

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	24.75

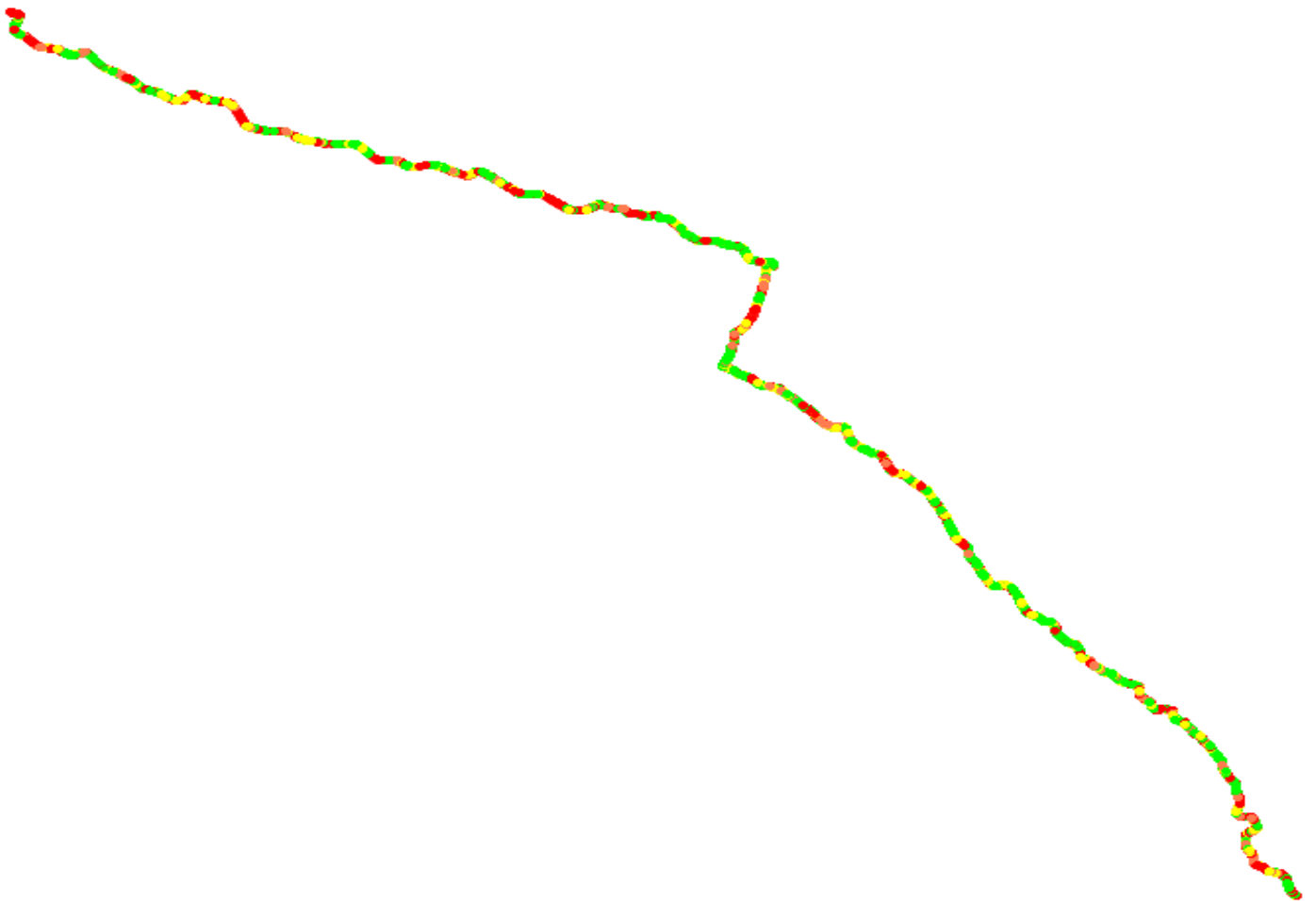


DL throughput	No of Sample	%	Legends
< 2Mbps	2548	5.21%	
2-5 Mbps	1863	12.64%	
5-10 Mbps	2488	16.05%	
>10Mbps	11018	66.10%	

TSP- VIL

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	12.77



DL throughput	No of Sample	%	Legends
< 2Mbps	636149	29.17%	
2-5 Mbps	388609	17.82%	
5-10 Mbps	492260	22.57%	
>10Mbps	663730	30.44%	