



प्रभावी विनियमन – सुगम संचार  
Effective Regulation – Ease of Communication

# Operator Assisted Drive Test Report

## Jabalpur– Chakghat 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 Jabalpur to Chakghat ( MP-UP Border) Highway from 9:00 AM to 8:00 PM on 04/03/2023. The drive test covered drive route of around 320 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 by Airtel & JIO 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)

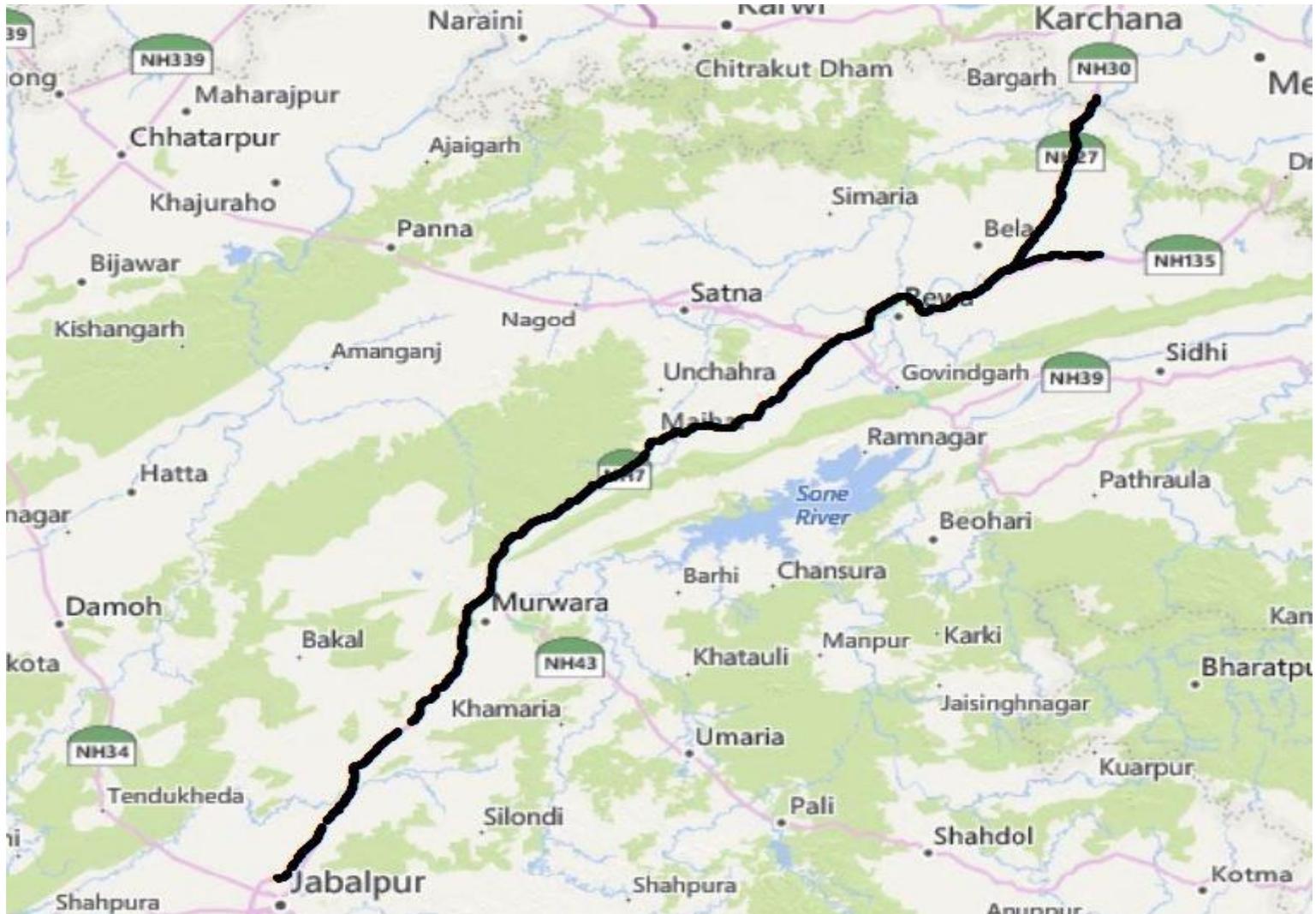
- i. 2G – measurement – UE Locked in 2G file size- 500KB
- ii. 3G – measurement – UE in 3G File Size- 20MB
- iii. 4G – measurement – UE in LTE File Size- 40MB

**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](http://www.google.com).

# Overview

## Voice & Dynamic Data Test Drive Route



### list of important area covered during the drive test

Jabalpur-Sihora By pass

Sihora-Katni By Pass

Katni-Maihar By pass

Maihar-Amarpatan By pass

Amarpatan-Rewa Bypass

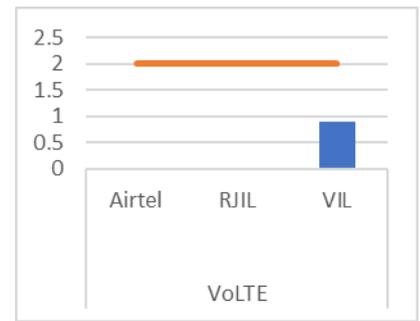
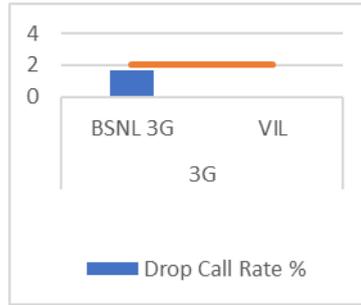
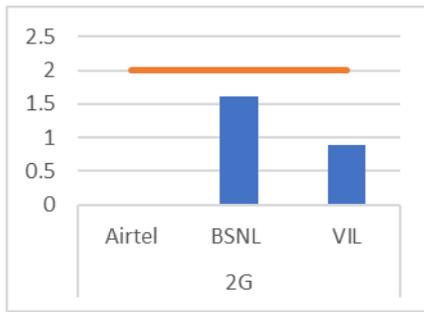
Rewa-Chakghat Bypass

# Voice Calls

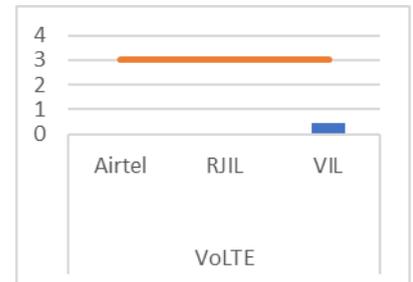
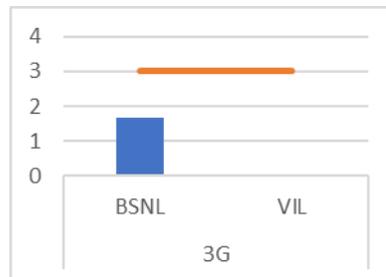
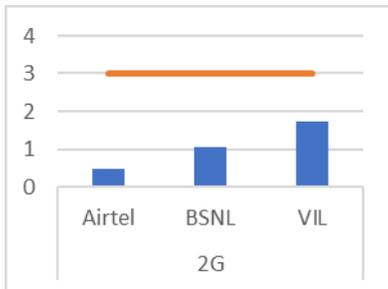
## Key Observations

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	1.62	0.88	1.69	NA	0	0	0.89
Block Call Rate %	0.47	1.06	1.73	1.66	NA	0	-	0.44

- 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 %	77.21	84.6	96.39

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

TSPs	3G	
	BSNL	VIL
Coverage %	80.19	NA

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	99.28	96.46	96.10

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

TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	VIL	JIO
Time Spent on 3G/4G %	79	NA	100	83.31	100

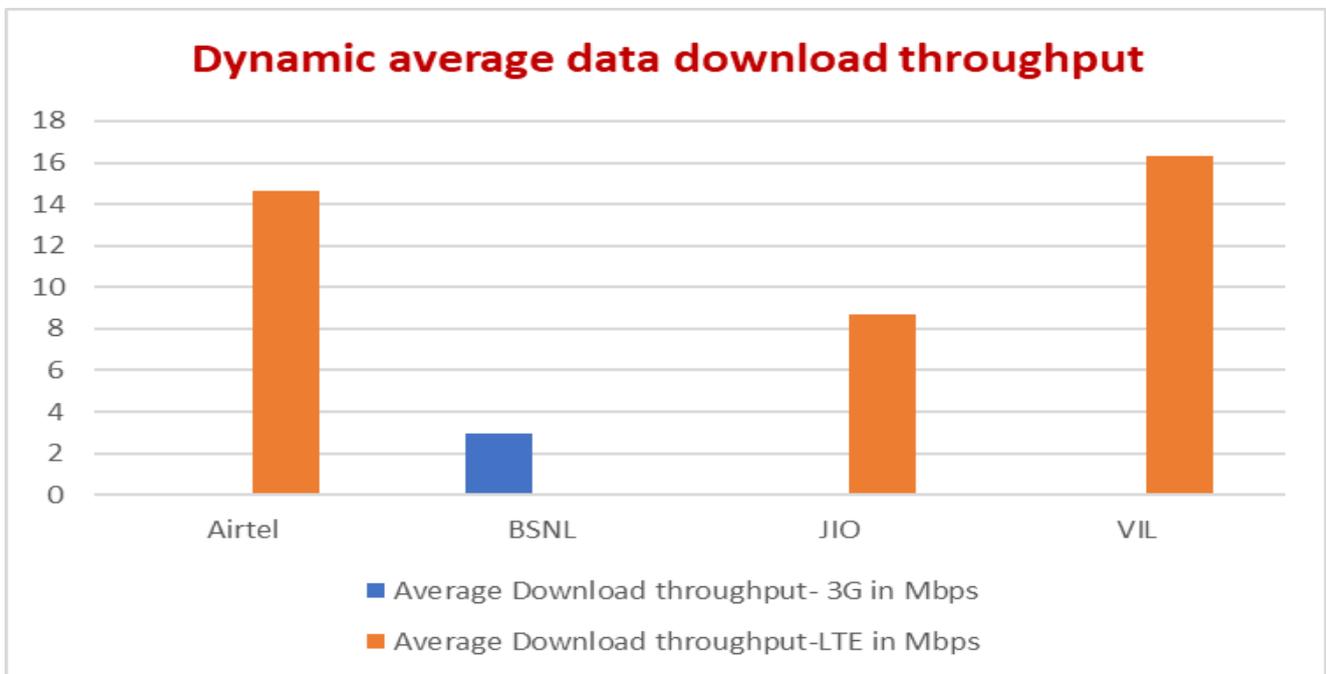
# Data Services Dynamic

## 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	79.56	170	NA	141.79
Average Download throughput- 3G In Mbps	NA	2.92	NA	NA
Average Download throughput-LTE In Mbps	14.62	NA	8.7	16.34

# Summary

## Highway Summary- Voice

TSP ( For 2G)	Airtel	BSNL	JIO	VIL
Call attempts	211	187	NA	231
Block call rate %	0.47	1.06	NA	1.73
CSSR %	99.53	98.93	NA	98.27
Drop call rate %	0	1.62	NA	0.88
Mobility HOSR %	99.65	96.55	NA	97.95
RX Quality %	96.47	96.72	NA	96.83
Average CST Sec	3.94	2.05	NA	2.46

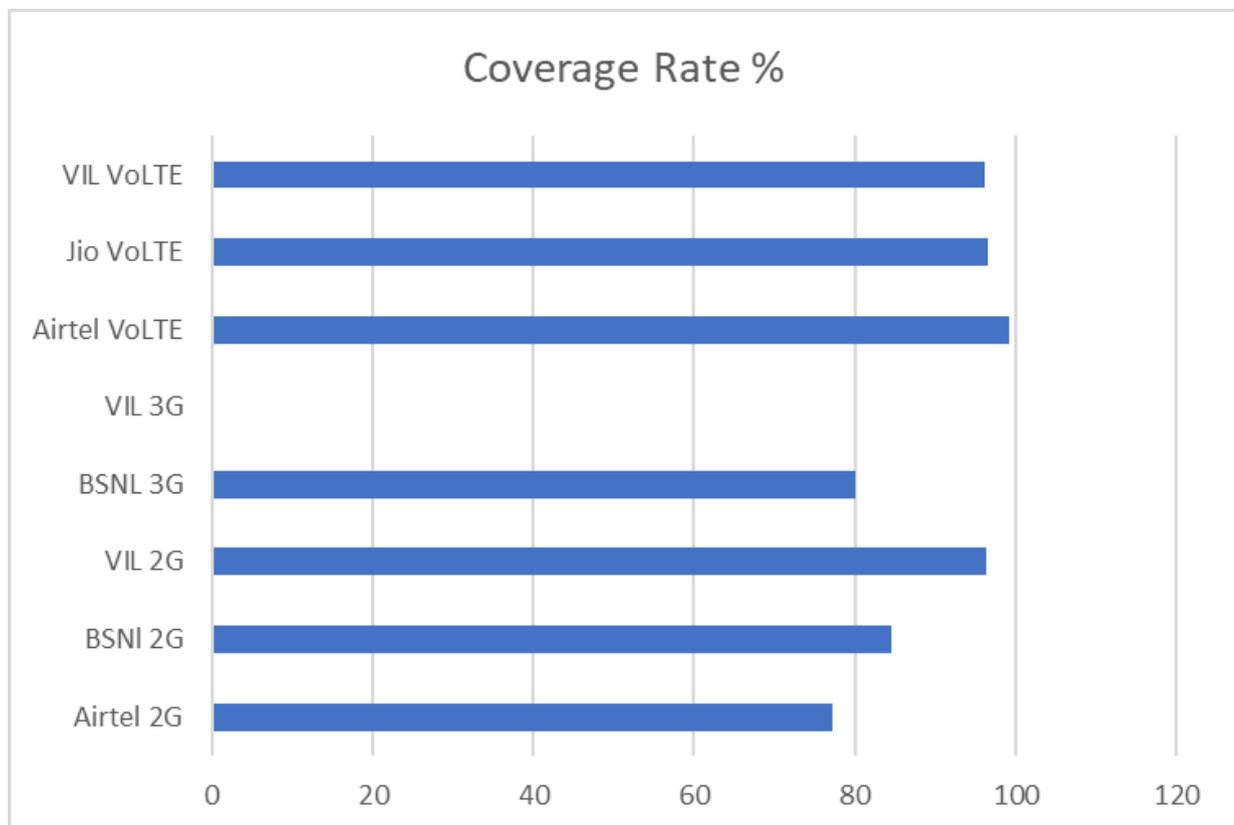
TSP ( For 3G)	Airtel	BSNL	JIO	VIL
Call attempts	NA	180	NA	NA
Block call rate %	NA	1.66	NA	NA
CSSR %	NA	98.33	NA	NA
Drop call rate %	NA	1.69	NA	NA
Mobility HOSR %	NA	97.70	NA	NA
RX Quality %	NA	95.49	NA	NA
Average CST (Sec)	NA	2.23	NA	NA

TSP ( For VoLTE)	Airtel	BSNL	JIO	VIL
Call attempts	213	NA	190	225
Block call rate %	0	NA	-	0.44
CSSR %	100	NA	100	99.56
Drop call rate %	0	NA	0	0.89
Mobility HOSR %	99.31	NA	98.78	98.37
RX Quality %	76.84	NA	86.75	95.38
Average CST(Sec)	0.72	NA	0.39	0.76

## Coverage Details

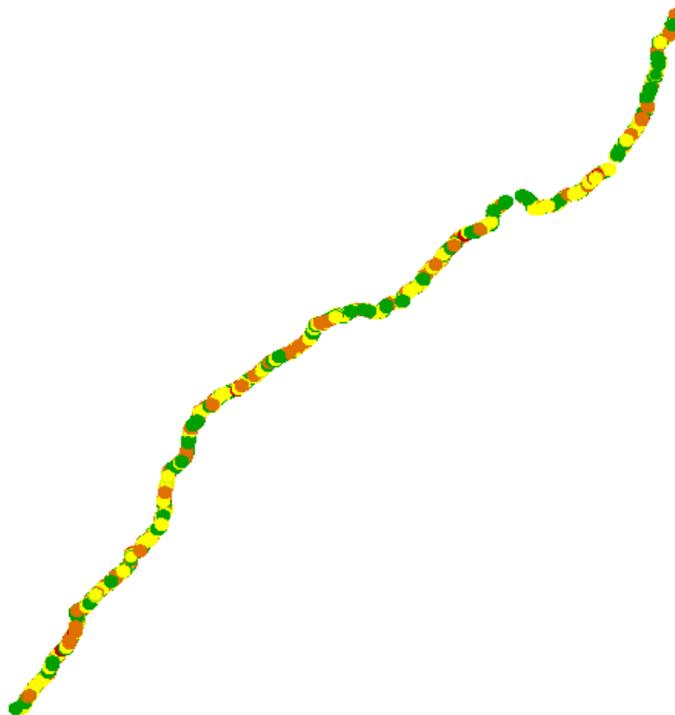
RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call session. The Coverage rate is calculated on the basis of % of samples in which the Rx level  $\geq$  -85 dBm, RSCP is  $\geq$  -90 dBm & RSRP  $\geq$  -110dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	77.21
BSNI 2G	84.6
VIL 2G	96.39
BSNL 3G	80.1
VIL 3G	NA
Airtel VoLTE	99.28
Jio VoLTE	96.46
VIL VoLTE	96.10



## TSP-Airtel

Technology	Coverage %
2G	77.21

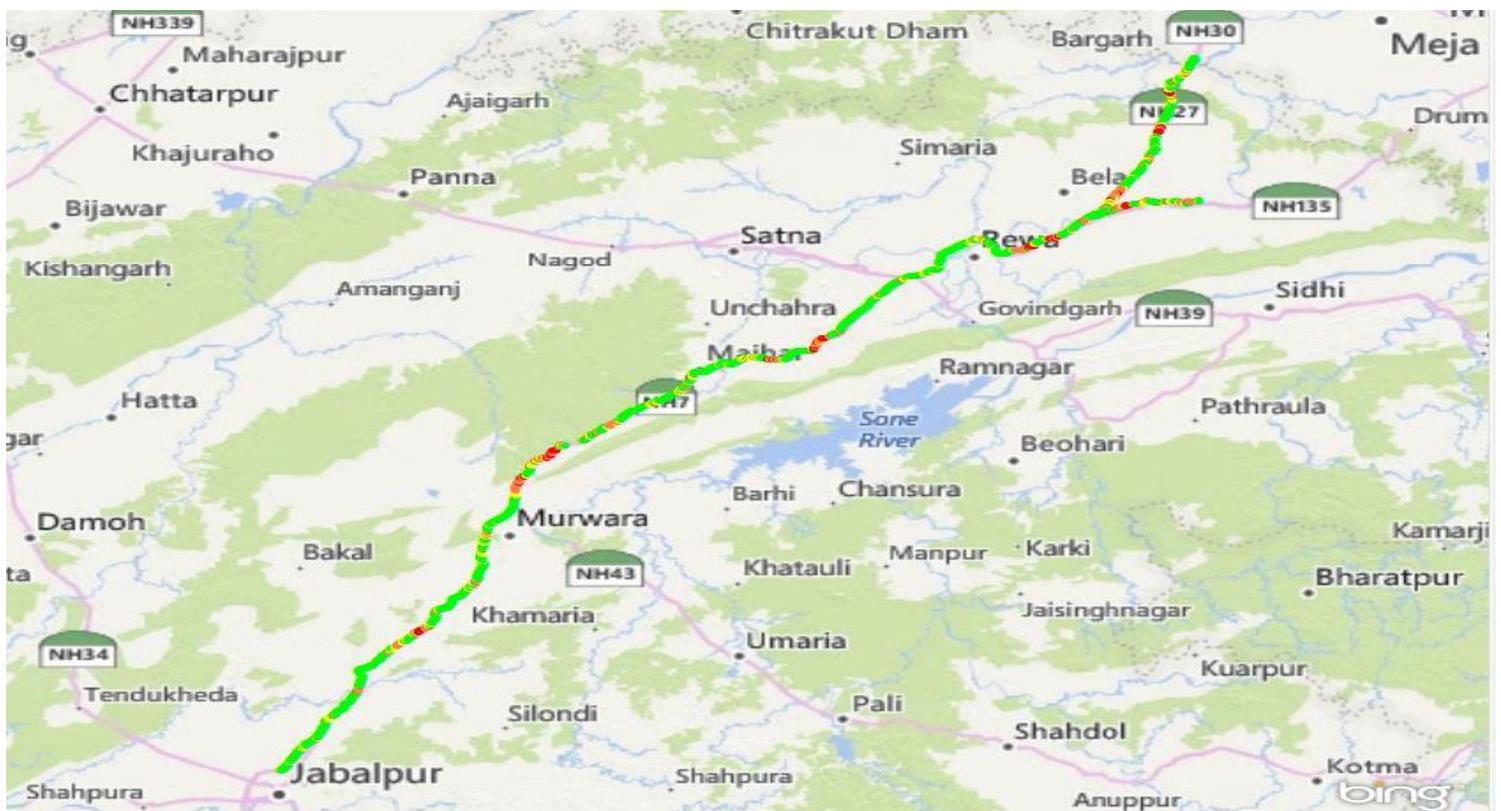


2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	963635	40.95	
[-75, >=-85)	853197	36.26	
[-85, >=-95)	475988	20.23	
[-95, >=Min)	60110	2.55	
<b>Total</b>	<b>2352930</b>	<b>100</b>	

# Coverage Details

## TSP-BSNL

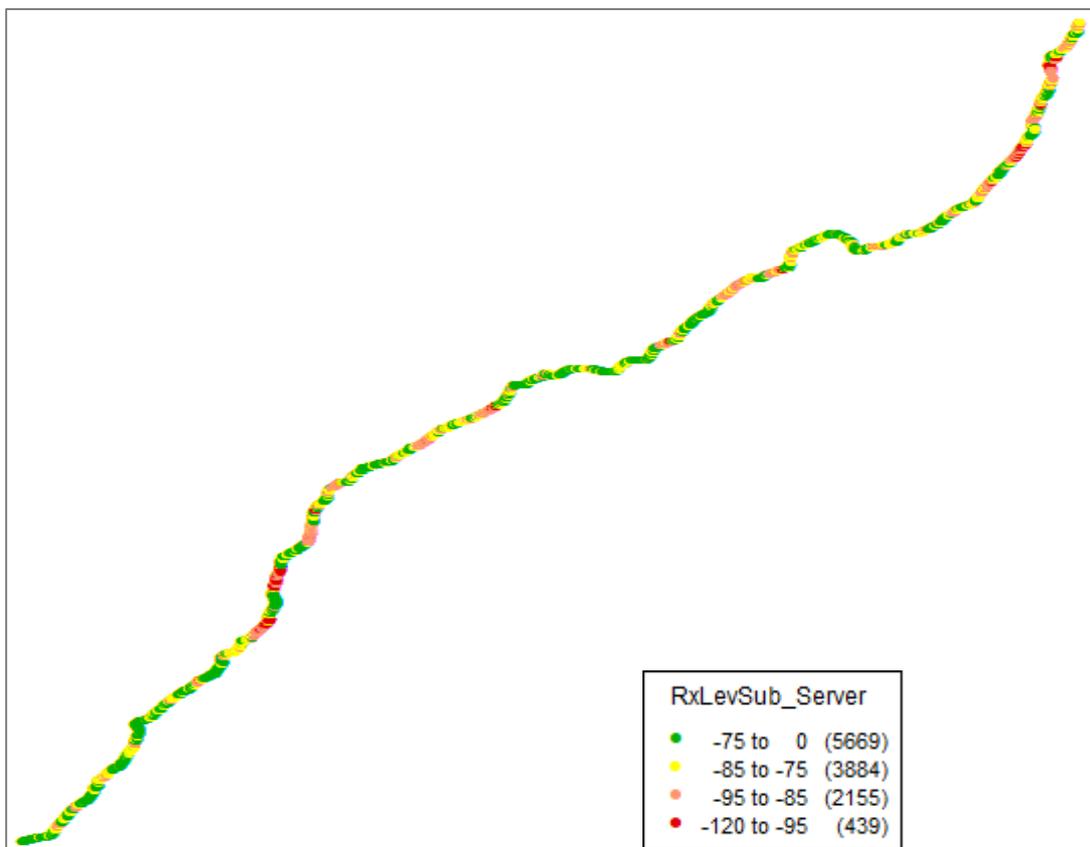
Technology	Coverage %
2G	84.6%



2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	16731	71.8%	
[-75, >=-85)	2991	12.8%	
[-85, >=-95)	2616	11.2%	
[-95, >=Min)	972	4.2%	
<b>Total</b>	<b>22950</b>	<b>100%</b>	

## TSP-VIL

Technology	Coverage %
2G	96.39

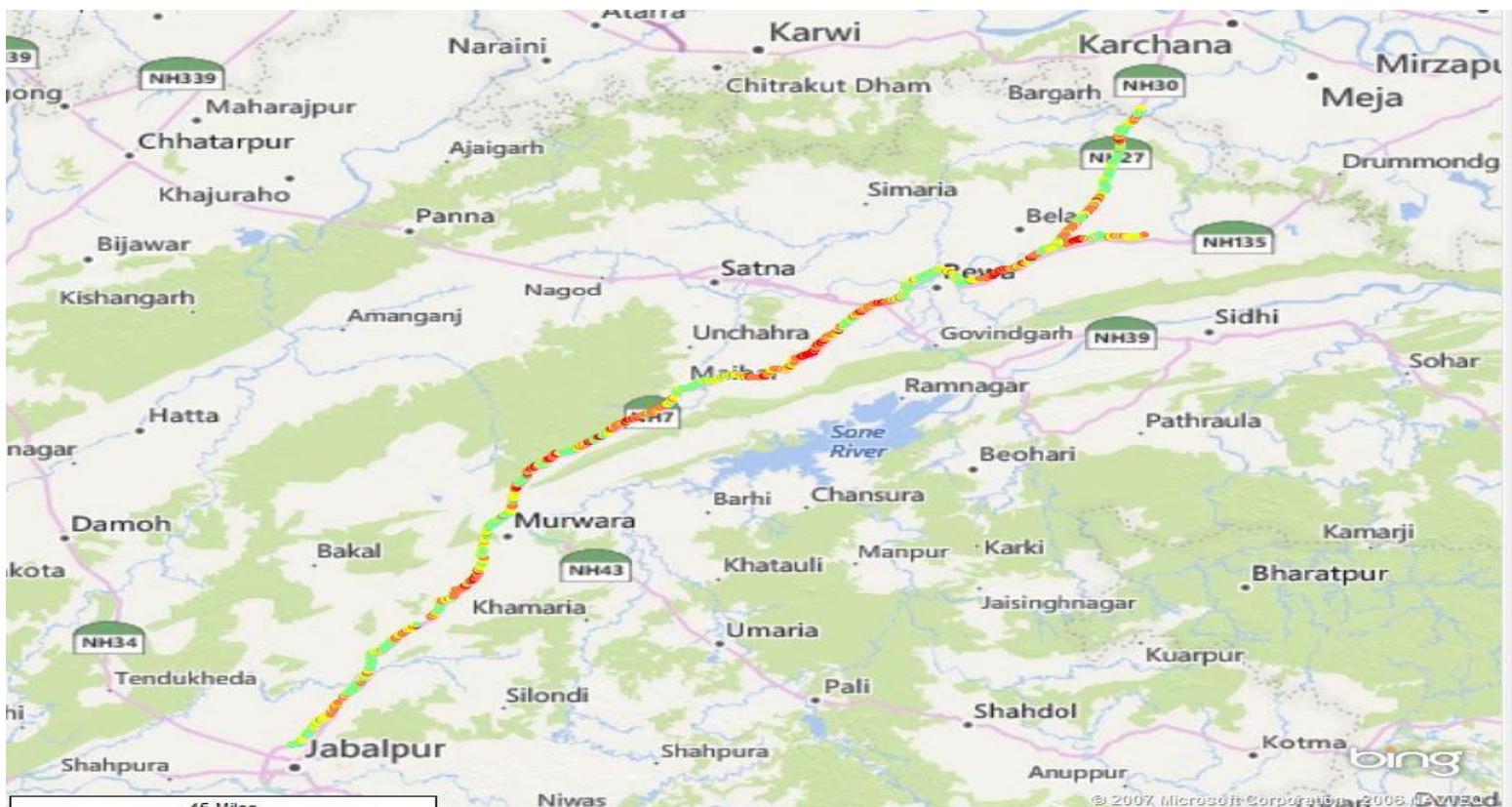


2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	5669	46.67%	
[-75, >=-85)	3884	31.97%	
[-85, >=-95)	2155	17.74%	
[-95, >=Min)	439	3.61%	
<b>Total</b>	<b>12147</b>	<b>100.00%</b>	

# Coverage Details

## TSP-BSNL

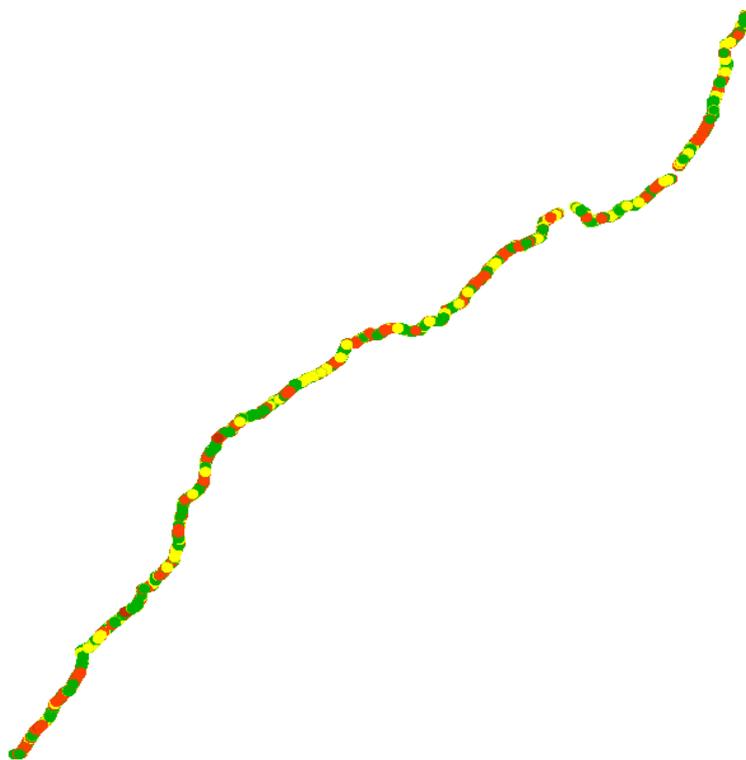
Technology	Coverage %
3G	80.19%



3G			
Overall RSCP	# Samples	% PDF	Legends
[Max, >=-70]	11707	37.99%	Green
[-70, >=-80]	5953	19.32%	Yellow
[-80, >=-90]	7050	22.88%	Orange
[-90, >=Min)	4325	19.80%	Red
<b>Total</b>	<b>29035</b>	<b>100%</b>	

## TSP- Airtel

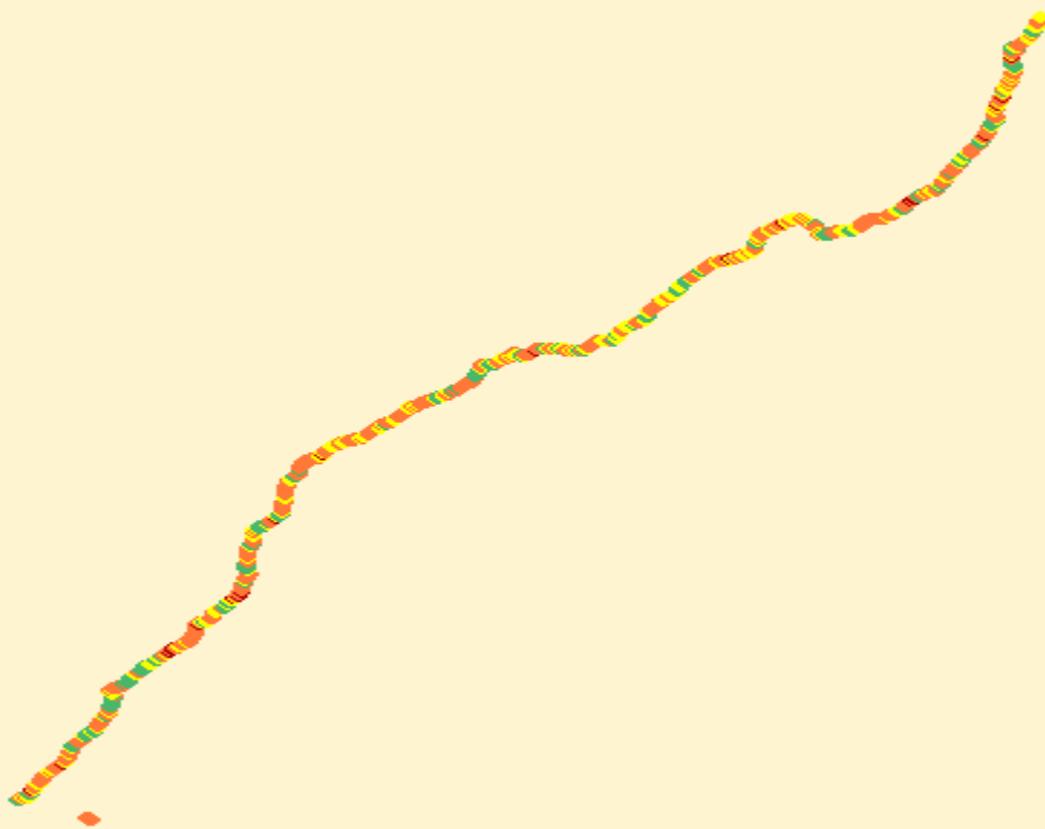
Technology	Coverage %
VoLTE	99.28



VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	1659892	40.47	Green
[-80, >=-90)	1682655	41.03	Yellow
[-90, >=-110)	729101	17.78	Orange
[-110, >=Min)	29498	0.72	Red
<b>Total</b>	<b>4101146</b>	<b>100</b>	

## TSP-JIO

Technology	Coverage %
VoLTE	96.46%

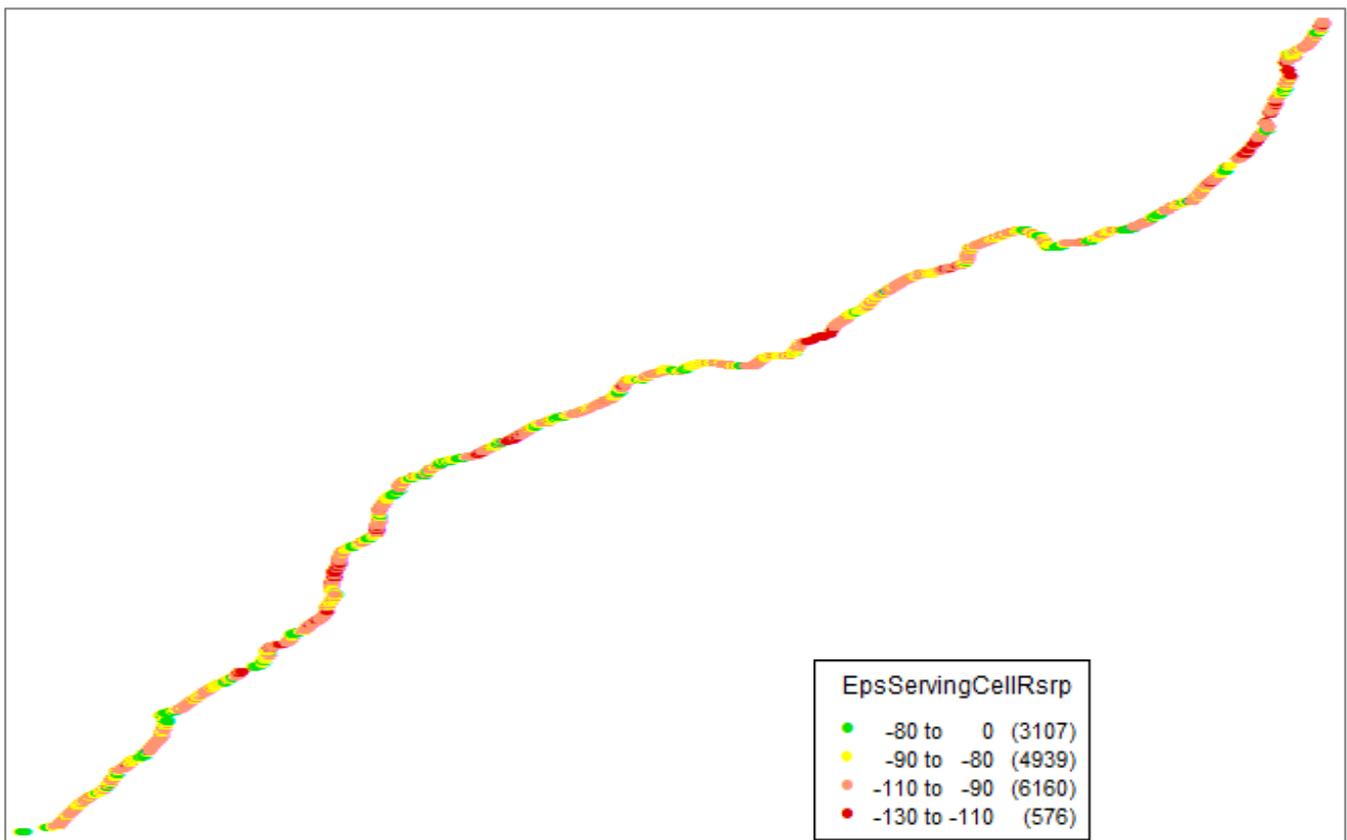


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	3905	19.22%	<span style="background-color: green; width: 20px; height: 10px;"></span>
[-80, >=-90)	5756	28.32%	<span style="background-color: yellow; width: 20px; height: 10px;"></span>
[-90, >=-110)	9942	48.92%	<span style="background-color: orange; width: 20px; height: 10px;"></span>
[-110, >=Min)	719	3.53%	<span style="background-color: red; width: 20px; height: 10px;"></span>
<b>Total</b>	<b>20322</b>		

# Coverage Details

## TSP- VIL

Technology	Coverage %
VoLTE	96.10

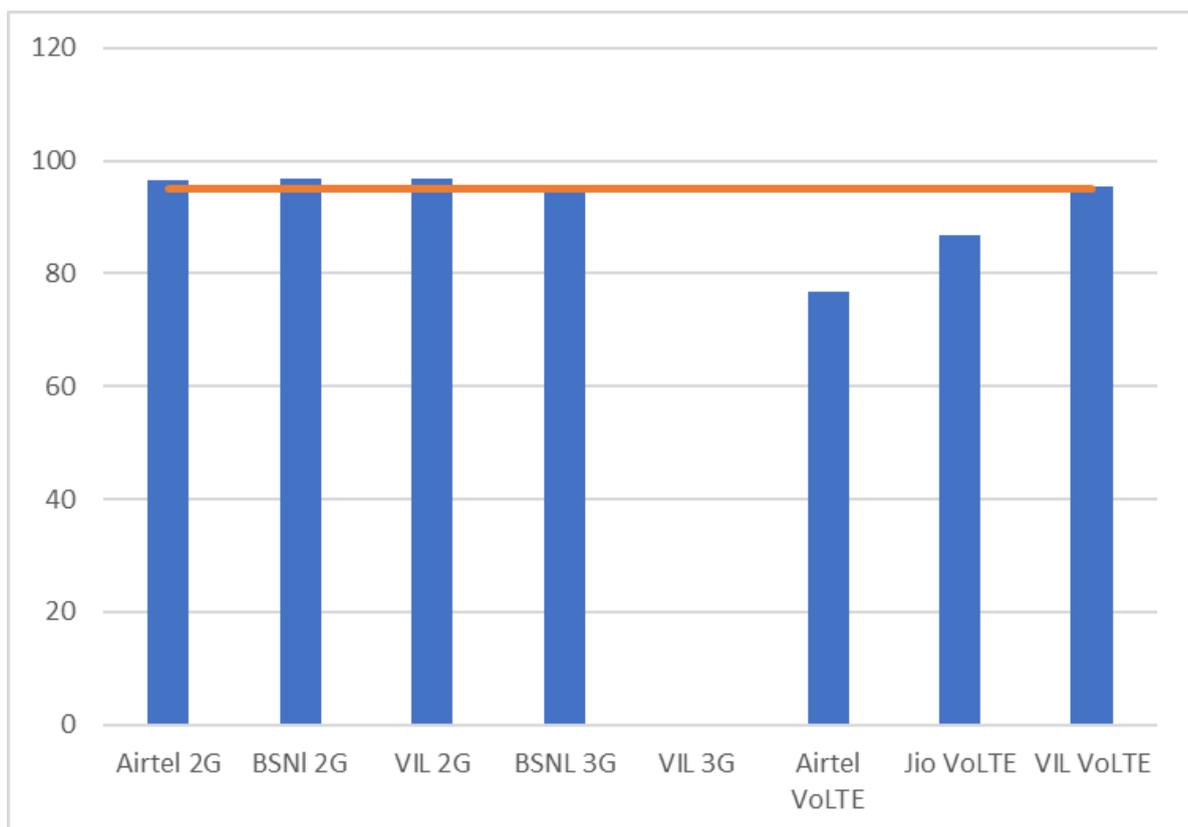


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	3107	21.02%	<span style="background-color: green; width: 20px; height: 10px; display: inline-block;"></span>
[-80, >=-90)	4939	33.41%	<span style="background-color: yellow; width: 20px; height: 10px; display: inline-block;"></span>
[-90, >=-110)	6160	41.67%	<span style="background-color: orange; width: 20px; height: 10px; display: inline-block;"></span>
[-110, >=Min)	576	3.90%	<span style="background-color: red; width: 20px; height: 10px; display: inline-block;"></span>
<b>Total</b>	<b>14782</b>	<b>100.00%</b>	

## Quality Details

For measuring voice quality, as per the QoS norms, RxQual  $\leq 5$  for GSM TSPs, EcNo  $\geq -14$  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	96.47
BSNI 2G	96.72
VIL 2G	96.83
BSNL 3G	95.49
VIL 3G	NA
Airtel VoLTE	76.84
Jio VoLTE	86.75
VIL VoLTE	95.38

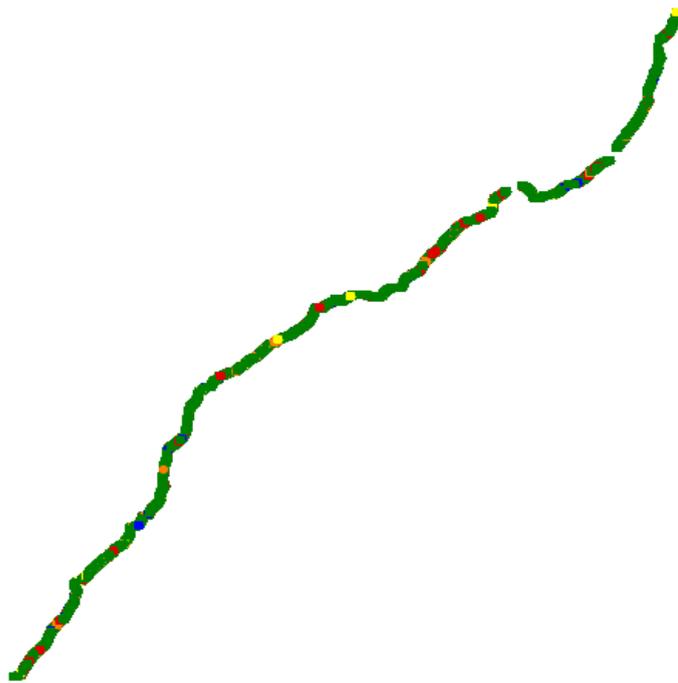


## Quality Details

For measuring voice quality, as per the QoS norms, RxQual  $\leq 5$  for GSM TSPs, EcNo  $\geq -14$  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- Airtel

Technology	Rx Quality %
2G	96.47



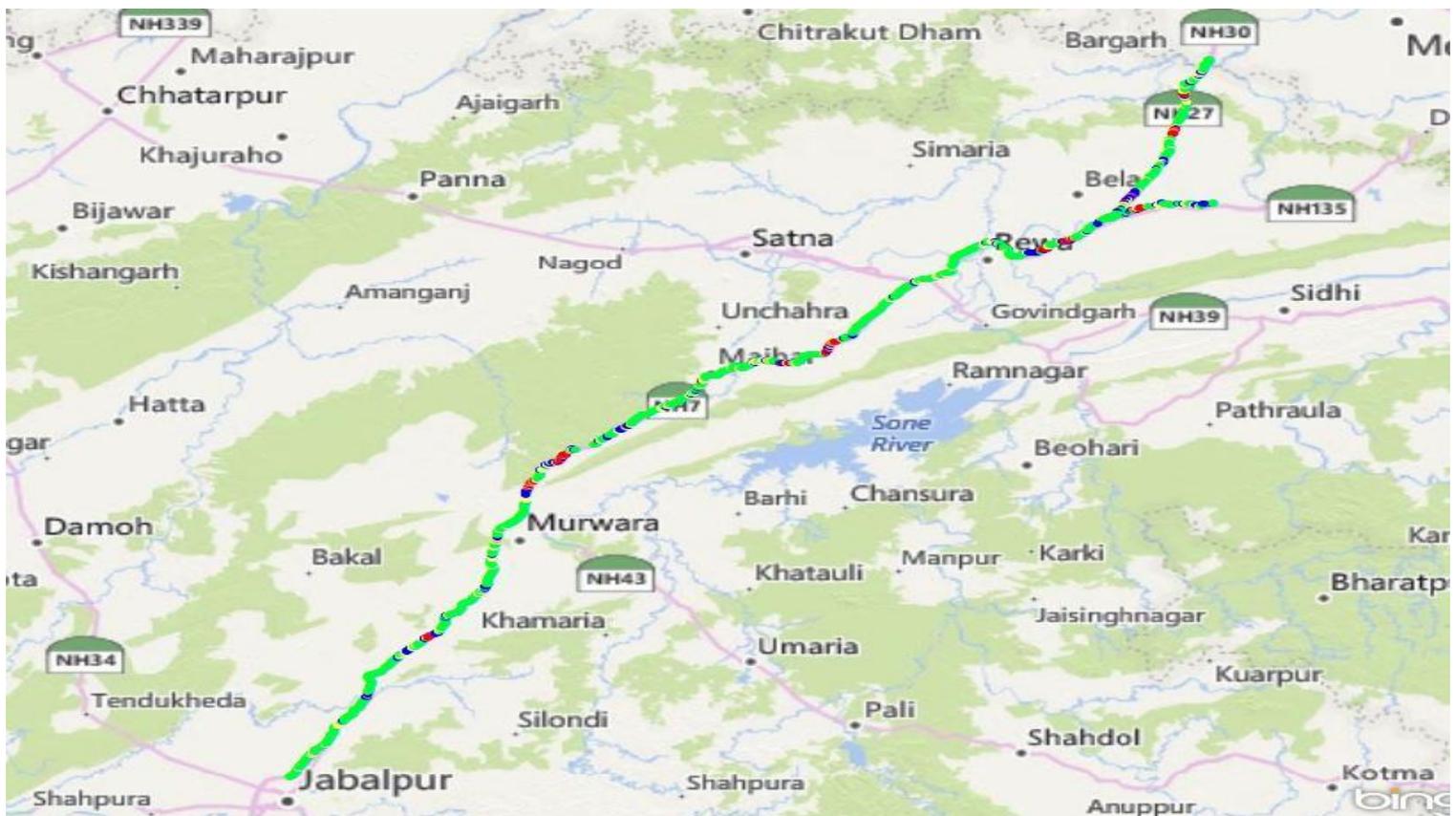
Overall Rx Quality	# Samples	% PDF	Legends
(Min, $\leq 2$ )	1997559	84.90	
(2, $\leq 3$ )	74819	3.18	
(3, $\leq 4$ )	69235	2.94	
(4, $\leq 5$ )	128353	5.46	
(5, $\leq \text{Max}$ )	82964	3.53	
<b>Total</b>	<b>2352930</b>	<b>100</b>	

## Quality Details

For measuring voice quality, as per the QoS norms, RxQual  $\leq 5$  for GSM TSPs, EcNo  $\geq -14$  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	96.72%



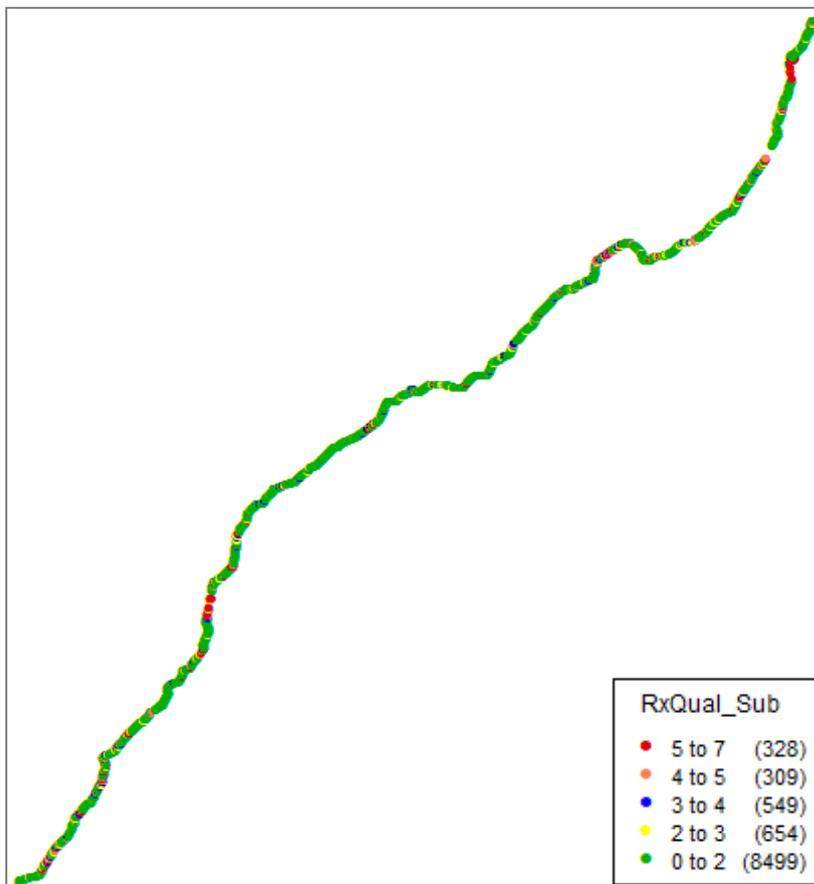
Overall Rx Quality	# Samples	% PDF	Legends
(Min, $\leq 2$ )	54245	91.36%	
(2, $\leq 3$ )	1645	2.77%	
(3, $\leq 4$ )	814	1.37%	
(4, $\leq 5$ )	724	1.21%	
(5, $\leq$ Max)	1947	3.27%	
<b>Total</b>	<b>59375</b>	<b>100%</b>	

## Quality Details

For measuring voice quality, as per the QoS norms, RxQual  $\leq 5$  for GSM TSPs, EcNo  $\geq -14$  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	96.83



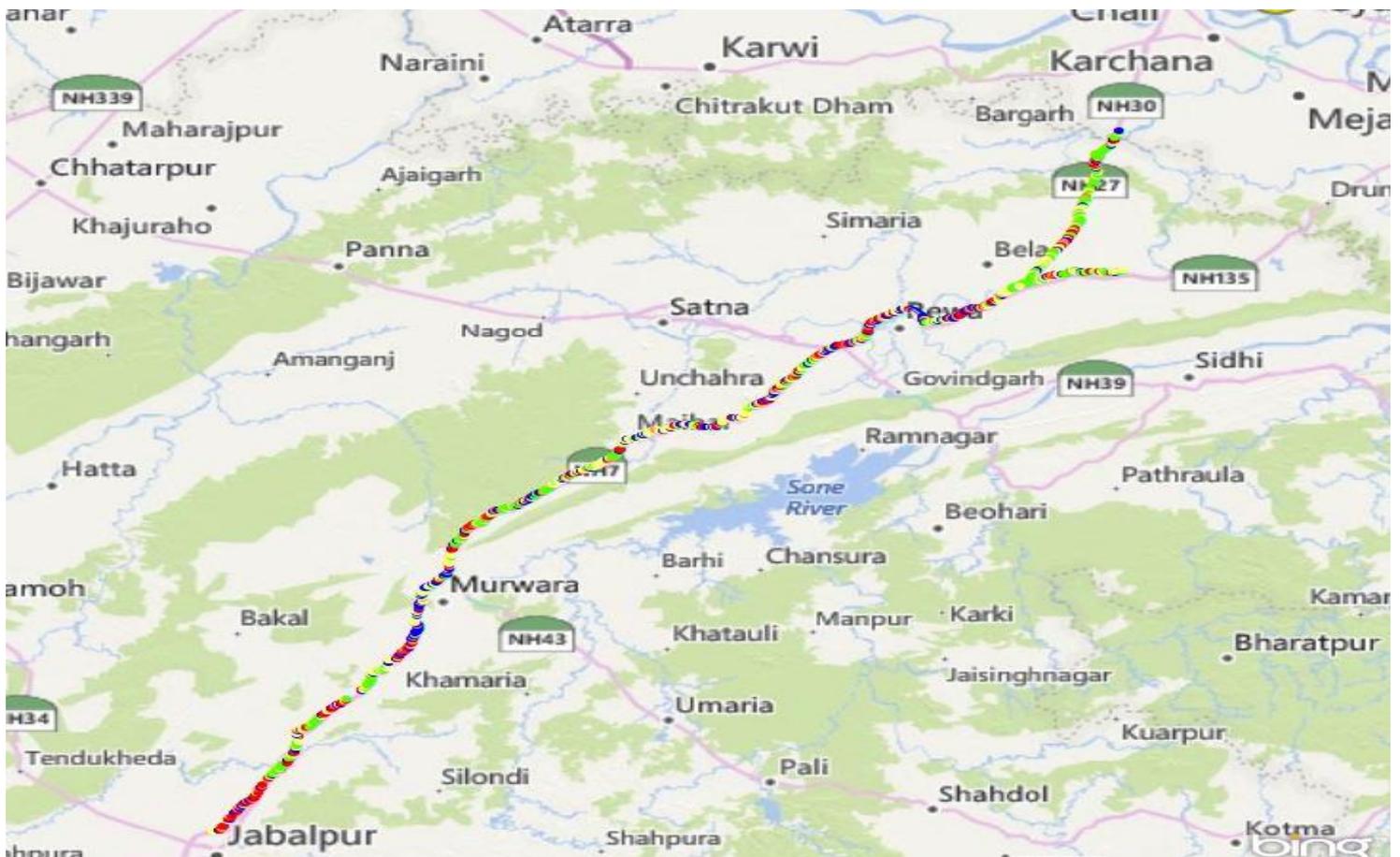
Overall Rx Quality	# Samples	% PDF	Legends
(Min, $\leq 2$ )	8499	82.20%	
(2, $\leq 3$ )	654	6.33%	
(3, $\leq 4$ )	549	5.31%	
(4, $\leq 5$ )	309	2.99%	
(5, $\leq \text{Max}$ )	328	3.17%	
<b>Total</b>	<b>10339</b>	<b>100.00%</b>	

## Quality Details

For measuring voice quality, as per the QoS norms, RxQual  $\leq 5$  for GSM TSPs, EcNo  $\geq -14$  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	95.49%

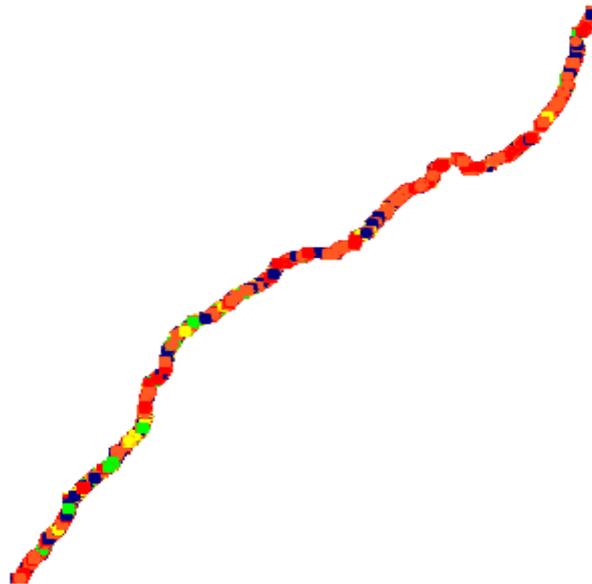


Overall Ec/No	# Samples	% PDF	Legends
(Max, $\leq -6$ )	13155	45.28%	
(-6, $\leq -9$ )	6478	22.29%	
(-9, $\leq -11$ )	5181	17.83%	
(-11, $\leq -14$ )	2928	10.07%	
(-14, $\leq$ Min)	1309	4.5%	
<b>Total</b>	<b>29051</b>	<b>100%</b>	

For measuring voice quality, as per the QoS norms, RxQual  $\leq 5$  for GSM TSPs, EcNo  $\geq -14$  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-Airtel

Technology	Rx Quality %
VoLTE	76.84



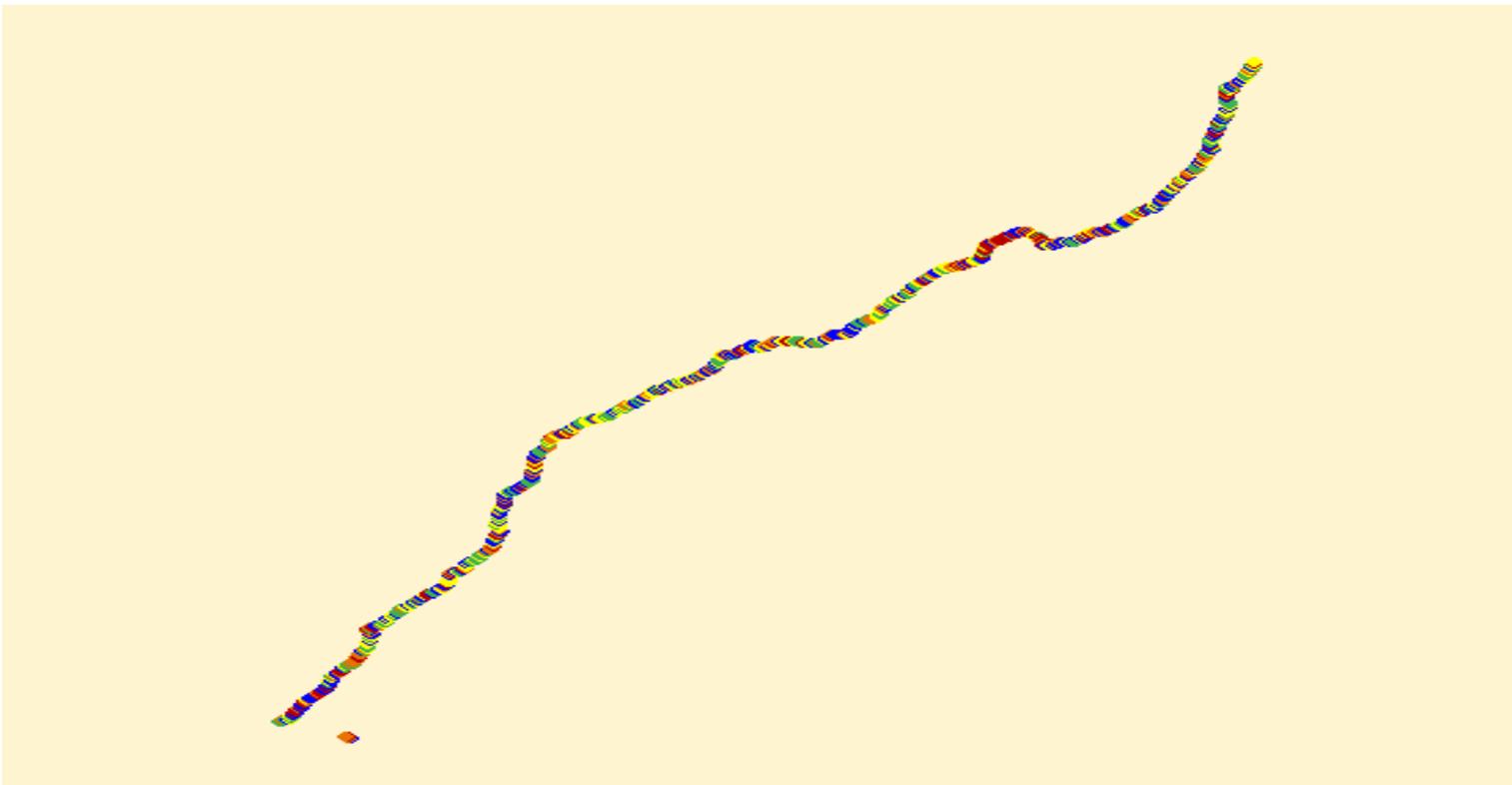
Overall SINR	# Samples	% PDF	Legends
(Min, $\leq 0$ )	949391	23.16	
(0, $\leq 5$ )	2087400	50.91	
(5, $\leq 10$ )	466734	11.38	
(10, $\leq 15$ )	349809	8.53	
(15, $\leq \text{Max}$ )	246805	6.02	
<b>Total</b>	<b>3150748</b>	<b>100</b>	

## Quality Details

For measuring voice quality, as per the QoS norms, RxQual  $\leq 5$  for GSM TSPs, EcNo  $\geq -14$  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-JIO

Technology	Rx Quality %
VoLTE	86.75%



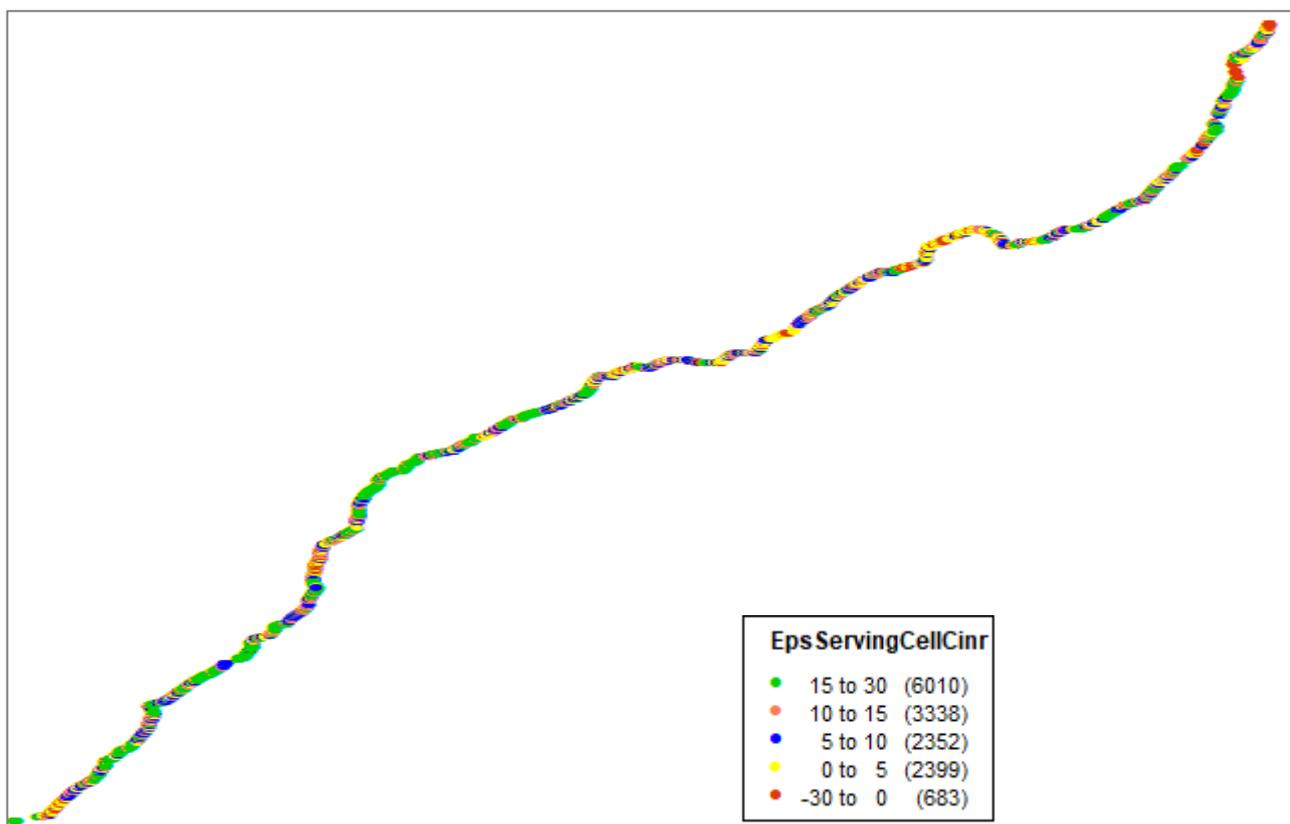
Overall SINR	# Samples	% PDF	Legends
(Min, $\leq 0$ )	2693	13.25%	Red
(0, $\leq 5$ )	3796	18.68%	Orange
(5, $\leq 10$ )	4567	22.47%	Blue
(10, $\leq 15$ )	4651	22.89%	Yellow
(15, $\leq \text{Max}$ )	4615	22.71%	Green
<b>Total</b>	<b>20322</b>		

## Quality Details

For measuring voice quality, as per the QoS norms, RxQual  $\leq 5$  for GSM TSPs, EcNo  $\geq -14$  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  $\geq 95\%$ .

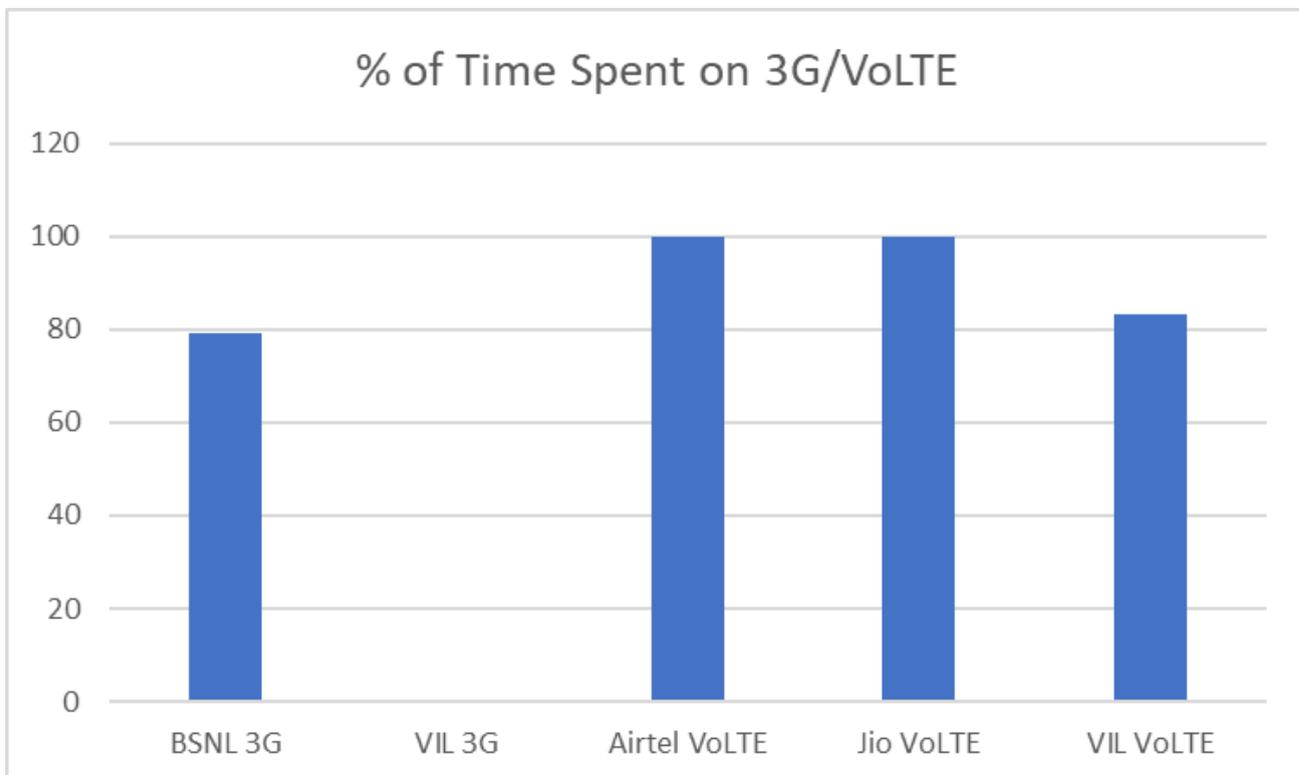
### TSP-VIL

Technology	Rx Quality %
VoLTE	95.38



Overall SINR	# Samples	% PDF	Legends
(Min, $\leq 0$ )	683	4.62%	
(0, $\leq 5$ )	2399	16.23%	
(5, $\leq 10$ )	2352	15.91%	
(10, $\leq 15$ )	3338	22.58%	
(15, $\leq \text{Max}$ )	6010	40.66%	
<b>Total</b>	<b>14782</b>	<b>100.00%</b>	

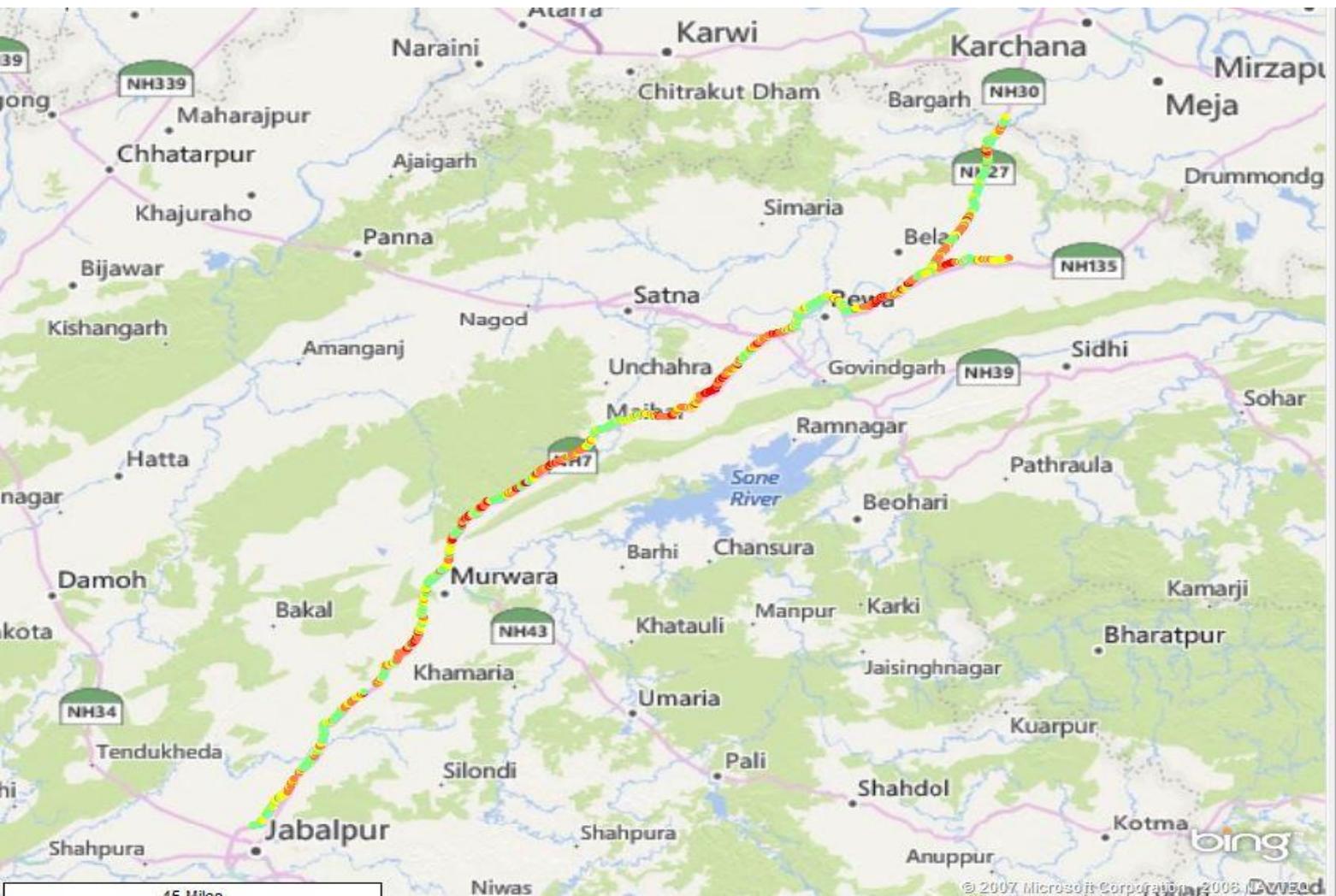
TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	79
VIL 3G	NA
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	83.31



# Technology Details

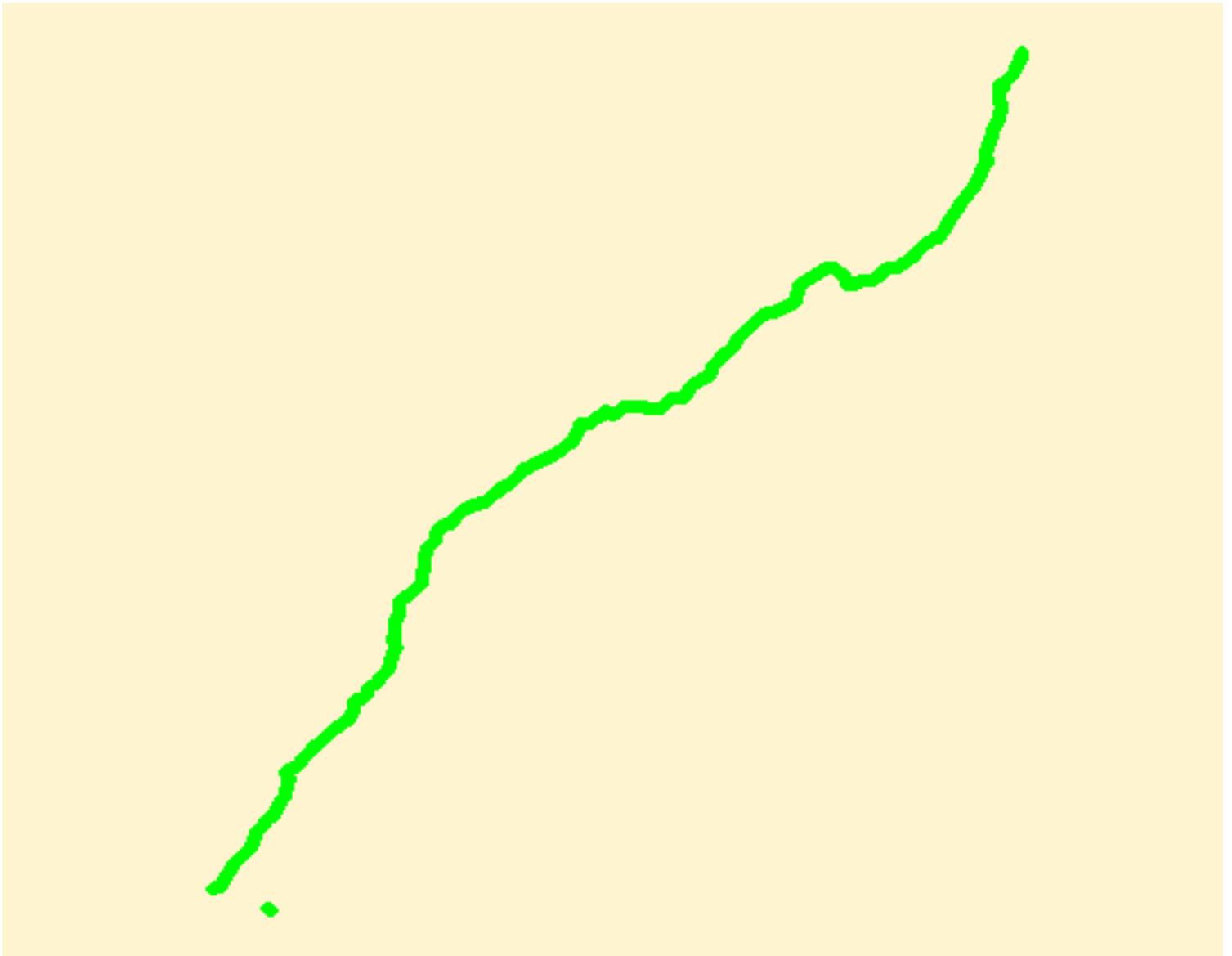
## TSP-BSNL

Technology	% of Time Spent on
3G	79%
VoLTE	



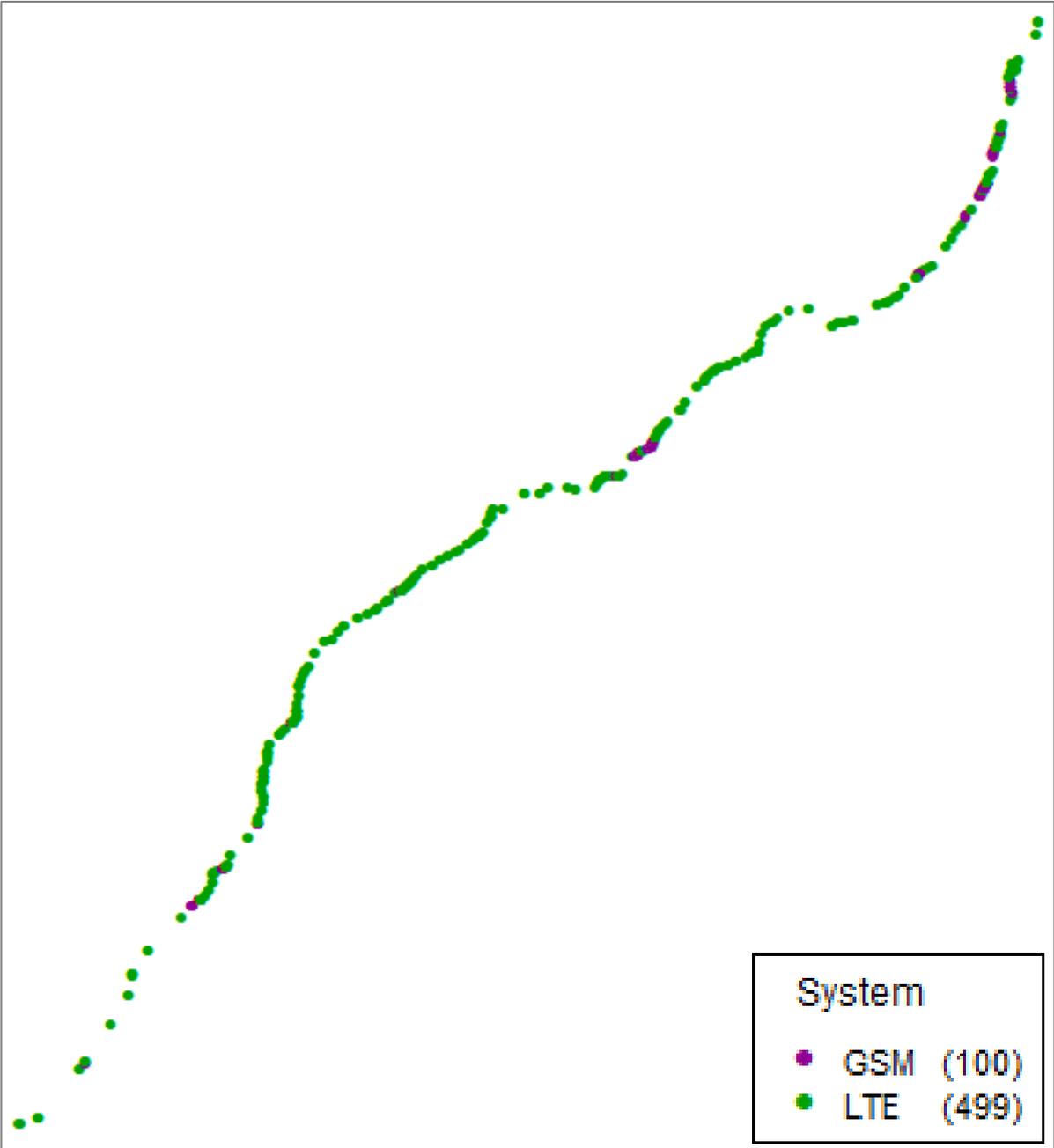
## TSP- JIO

Technology	% of Time Spent on
3G	
VoLTE	100%



TSP-VIL

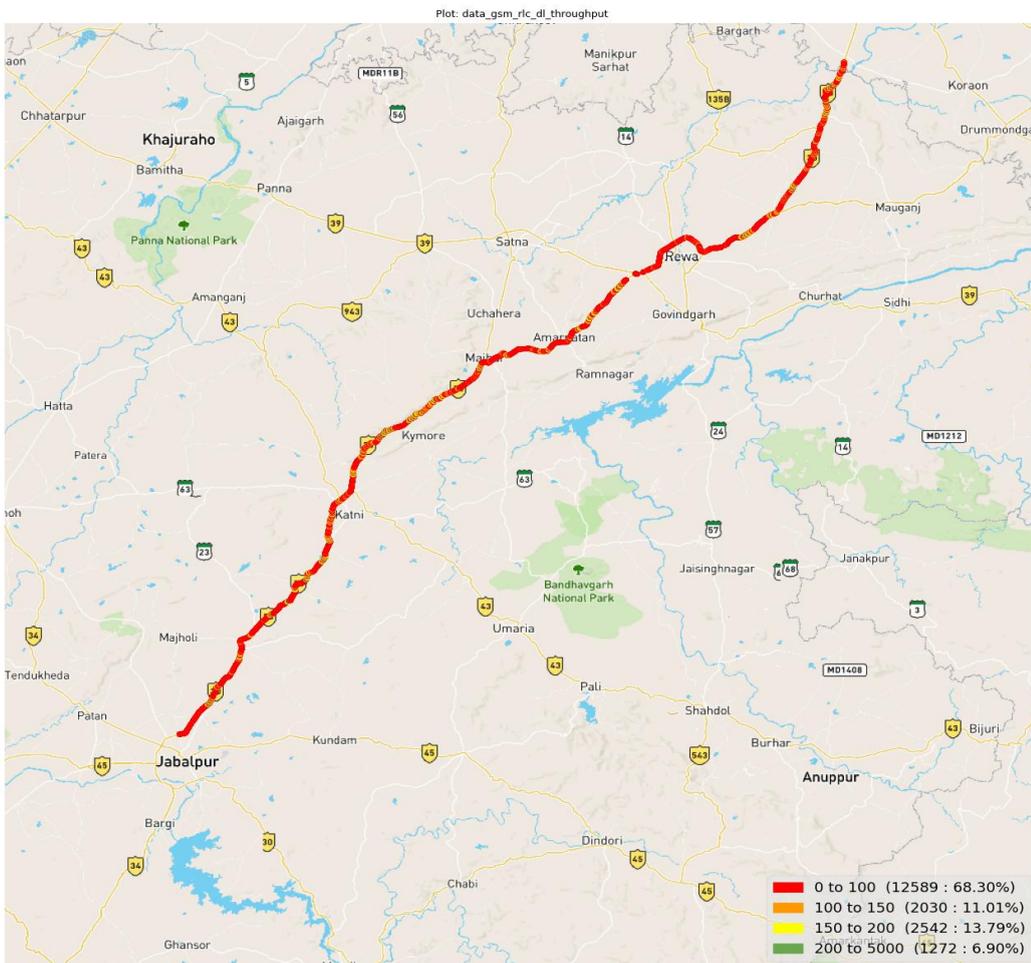
Technology	% of Time Spent on
3G	NA
VoLTE	83.31%



## TSP-Airtel

### Data Statistics - Dynamic data testing

Data KPIs - Overall	2G
Download Throughput (Kbps)	79.56



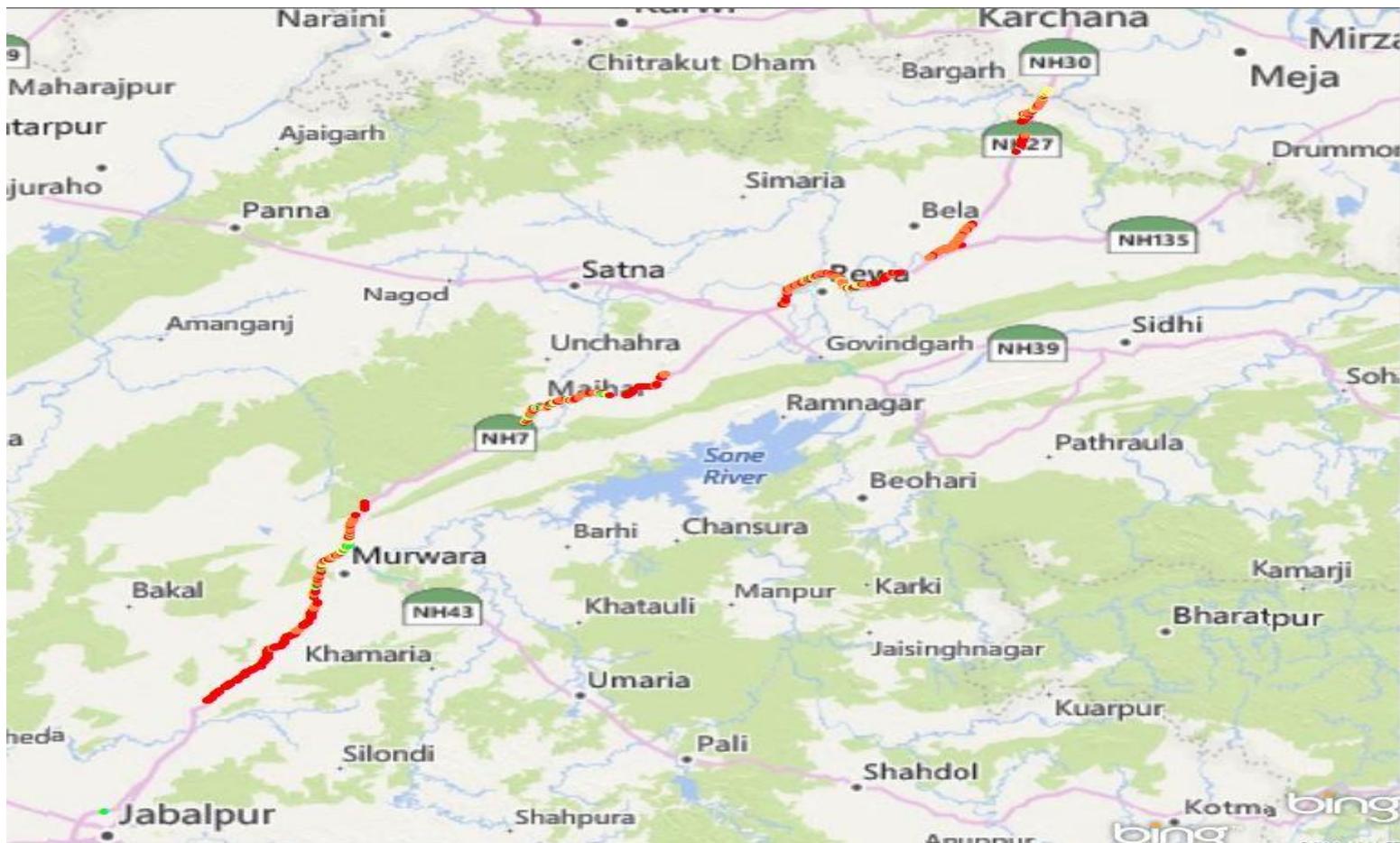
DL throughput	No of Sample	%	Legends
< 100 Kbps	12589	68.30	
100-150Kbps	2030	11.01	
150-200Kbps	2542	13.79	
>200Kbps	1272	6.90	

# Dynamic Data Test

## TSP-BSNL

### Data Statistics - Dynamic data testing

Data KPIs - Overall	2G
Download Throughput (Kbps)	170 Kbps



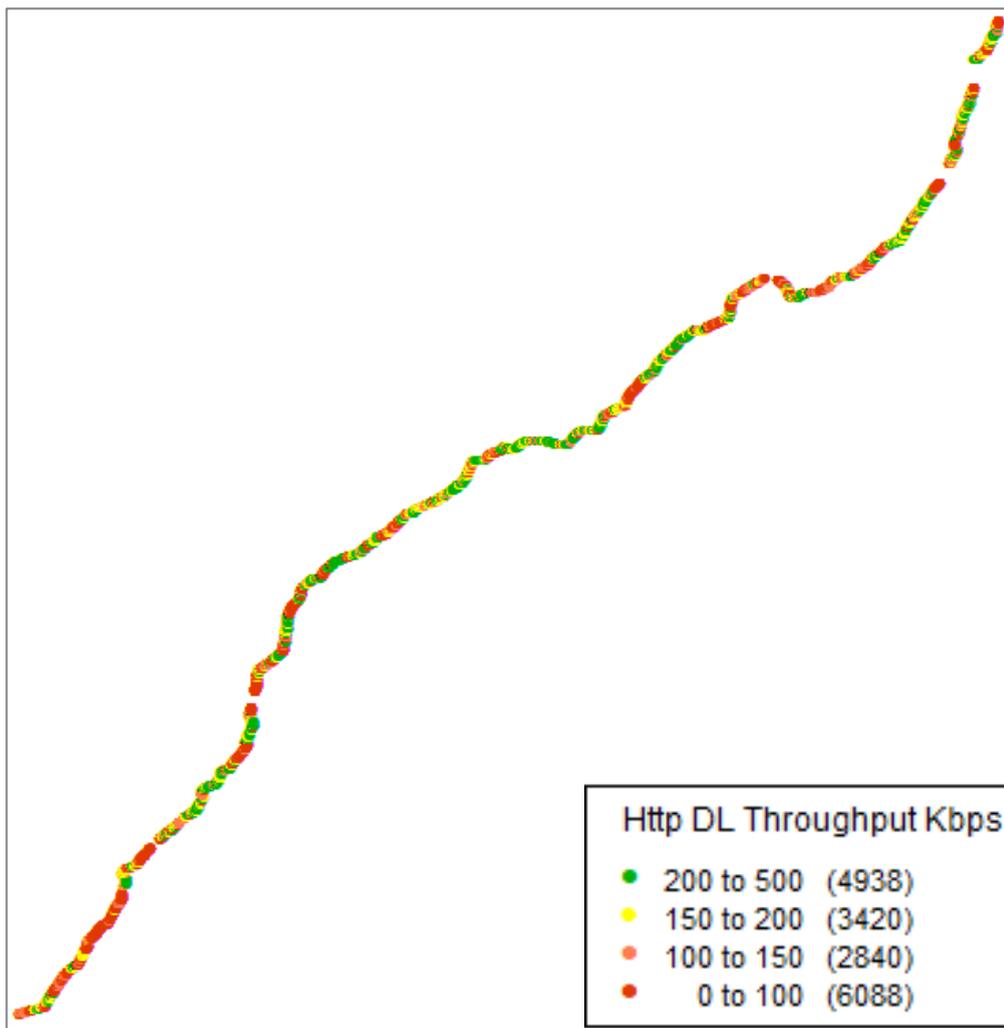
DL throughput	No of Sample	%	Legends
< 100 Kbps	2252	29.7%	Red
100-150Kbps	2932	38.7%	Orange
150-200Kbps	1837	24.3%	Yellow
>200Kbps	552	7.3%	Green

# Dynamic Data Test

## TSP-VIL

### Data Statistics - Dynamic data testing

Data KPIs - Overall	2G
Download Throughput (Kbps)	141.79



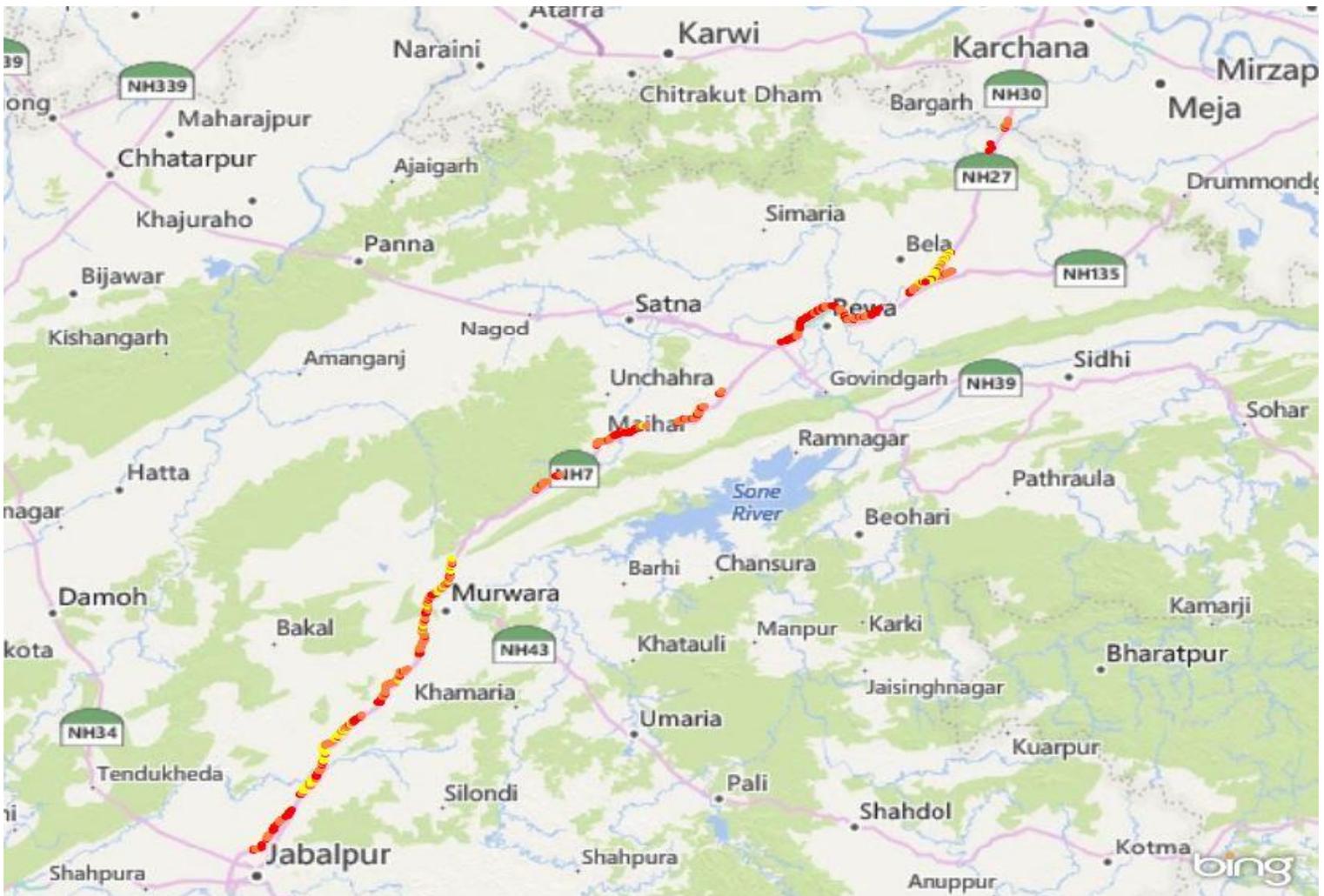
DL throughput	No of Sample	%	Legends
< 100 Kbps	6088	35.22%	
100-150Kbps	2840	16.43%	
150-200Kbps	3420	19.78%	
>200Kbps	4938	28.57%	

# Dynamic Data Test

## TSP-BSNL

### Data Statistics - Dynamic data testing

Data KPIs - Overall	3G
Download Throughput (Mbps)	2.92 Mbps



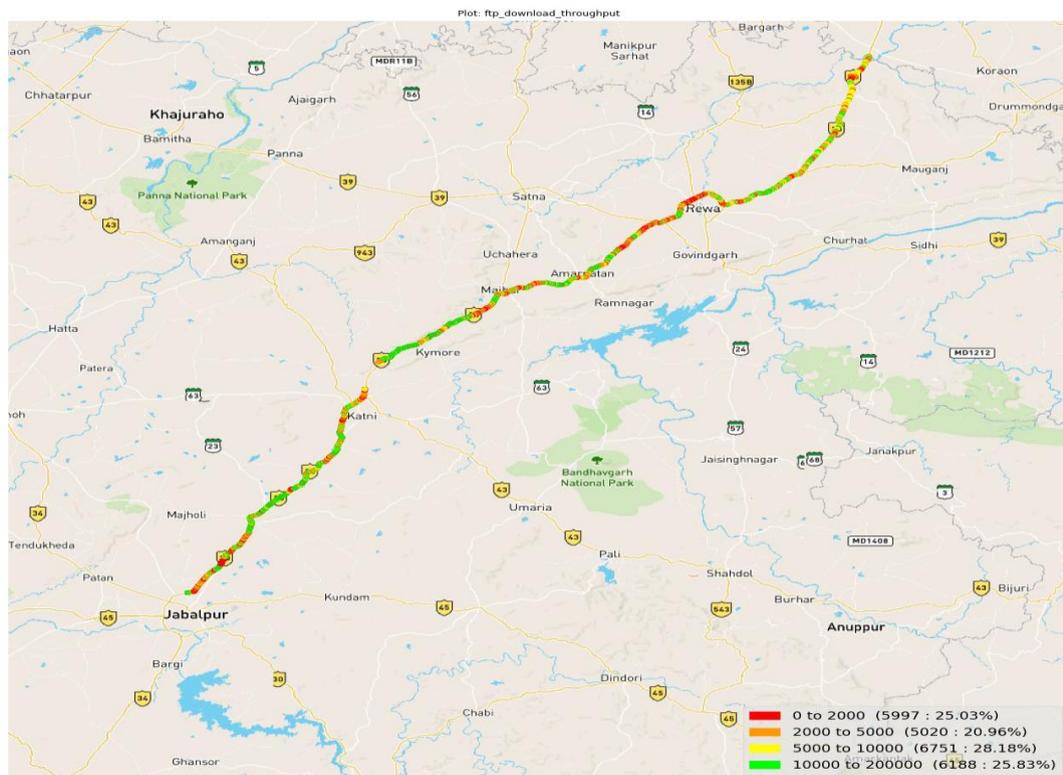
DL throughput	No of Sample	%	Legends
< 1 Mbps	1630	17.1%	Red
1-5 Mbps	5070	53.3%	Orange
5-10 Mbps	2814	29.6%	Yellow
>10Mbps	5	.1%	Green

# Dynamic Data Test

## TSP-Airtel

### Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	14.62

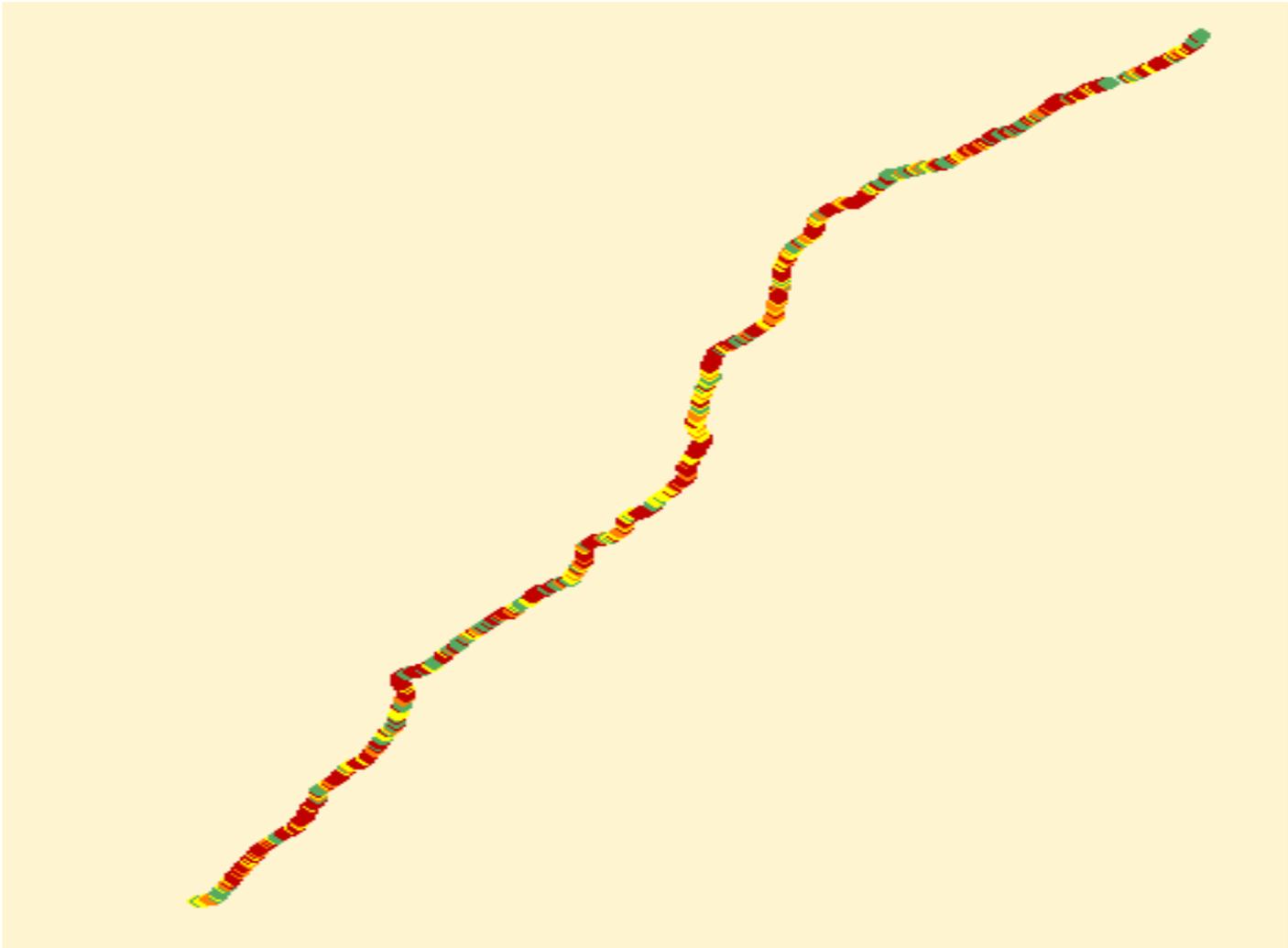


DL throughput	No of Sample	%	Legends
< 2Mbps	5997	25.03	
2-5 Mbps	5020	20.96	
5-10 Mbps	6751	28.18	
>10Mbps	6188	25.83	

## TSP- JIO

### Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	08.7

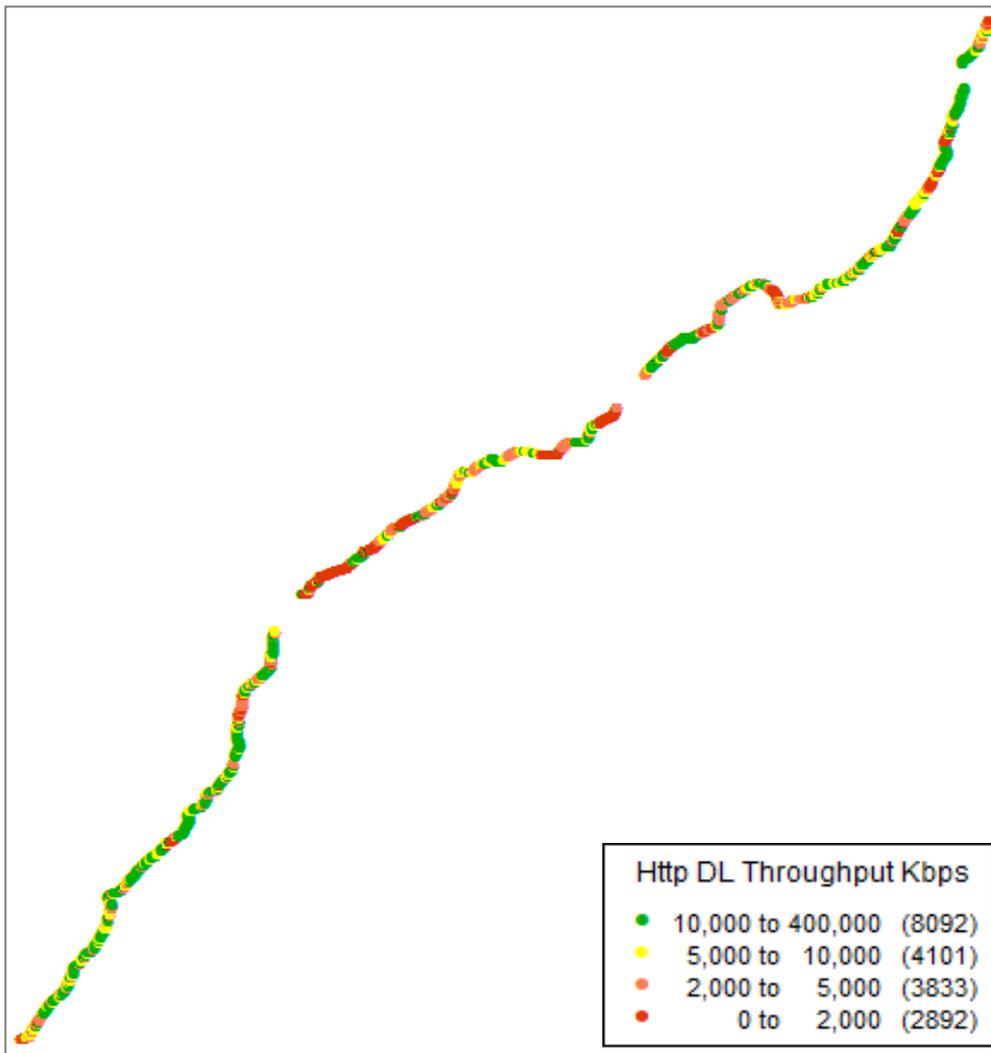


DL throughput	No of Sample	%	Legends
< 2Mbps	3604	39.18%	Red
2-5 Mbps	1687	18.34%	Orange
5-10 Mbps	1877	20.41%	Yellow
>10Mbps	2030	22.07%	Green

## TSP-VIL

### Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	16.34



DL throughput	No of Sample	%	Legends
< 2Mbps	2892	15.29%	<span style="background-color: red; color: black;"> </span>
2-5 Mbps	3833	20.26%	<span style="background-color: orange; color: black;"> </span>
5-10 Mbps	4101	21.68%	<span style="background-color: yellow; color: black;"> </span>
>10Mbps	8092	42.77%	<span style="background-color: green; color: black;"> </span>