



प्रभावी विनियमन – सुगम संचार
Effective Regulation – Ease of Communication

Operator Assisted Drive Test Report

Sagar – Lakhnadon Highway

16/09/2023

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 Sagar to Lakhnadon Highway from 9:00 AM to 8:00 PM on 16/09/2023. The drive test covered drive route of around 210 KMs.

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

Key Performance Indicators:

KPI	Benchmark	Observations
Block call rate %	$\leq 3\%$	As TSPs achieved the benchmark.
Drop call rate %	$\leq 2\%$	As TSPs achieved the benchmark.
CSSR %	$\geq 95\%$	As TSPs achieved the benchmark.
Mobility HOSR %	$\geq 95\%$	As TSPs achieved the benchmark.
Good RX Quality %	$\geq 95\%$	As TSPs achieved the benchmark. Except for Rx Quality of 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, 4G & 5G). 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 **180-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. 3G – measurement – UE in 3G File Size- 20MB
- ii. 4G – measurement – UE in LTE File Size- 40MB
- iii. 5G – measurement – UE in 5G File Size- 200MB

Overview

Voice & Dynamic Data Test Drive Route



List of important area covered during the drive test

Surkhi

Gourjhamer

Deori

Barmaan

Rajmarg

Nersinghpur

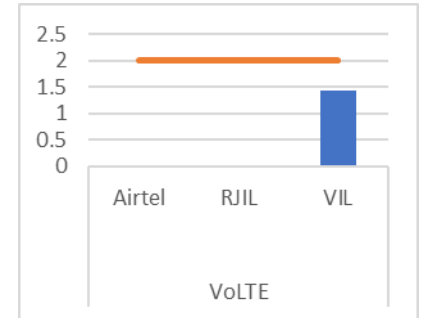
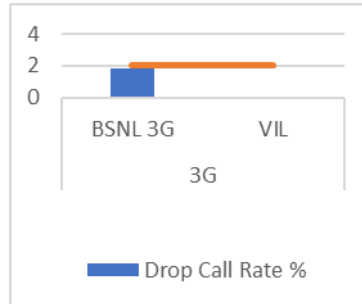
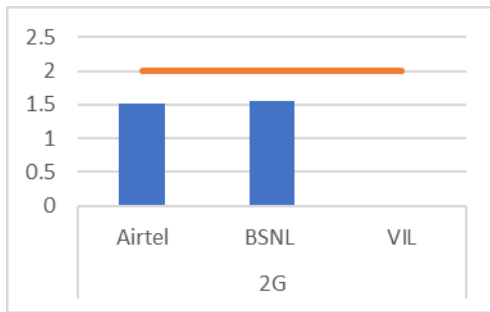
Lakhnadon

Voice Calls

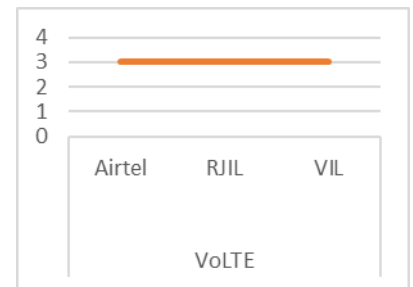
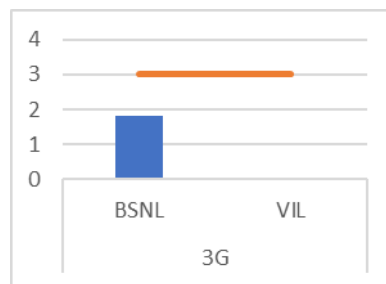
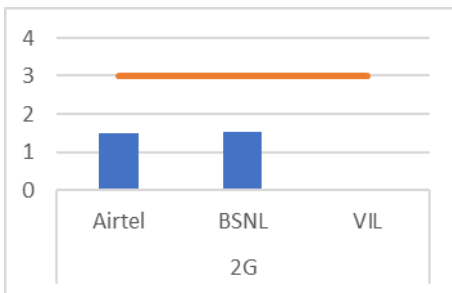
Key Observations

QoS compliance of the TSPs 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 %	1.52	1.56	0	1.85	NA	0	0%	1.43
Block Call Rate %	1.49	1.52	0	1.8	NA	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 %	36.98	80.15	56.45

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

TSPs	3G
	BSNL
Coverage %	75.81

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	84.12	90.33	92.13

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

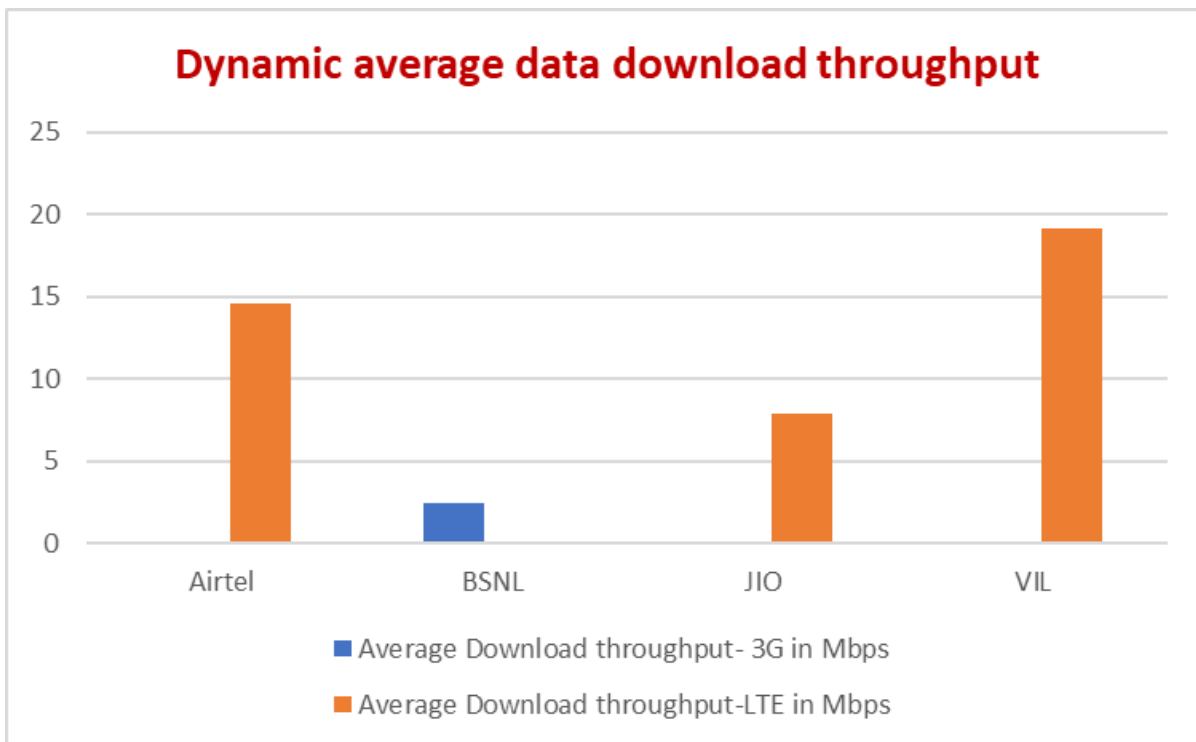
TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Time Spent on 3G/4G %	85	NA	100	100	31.30

Data Services Dynamic

Key Observations

Dynamic Data -Download Throughput was tested.

Data Download Performance – Dynamic 3G/4G/ 5G Network



TSP	Airtel	BSNL	JIO	VIL
Average Download throughput- 3G In Mbps	NA	2.4	NA	NA
Average Download throughput-LTE in Mbps	14.62	NA	7.86	19.13
Average Download throughput- 5G in Mbps	NA	NA	NA	NA

Summary

City Level Summary- Voice

TSP (For 2G)	Airtel	BSNL	VIL
Call attempts	67	66	70
Block call rate %	1.49	1.52	0
CSSR %	99.53	98.48	100
Drop call rate %	1.52	1.56	0
Mobility HOSR %	98.8	96.3	97.41
RX Quality %	97.88	95.01	95.54
Average CST Sec	4.02	6.8	2.41

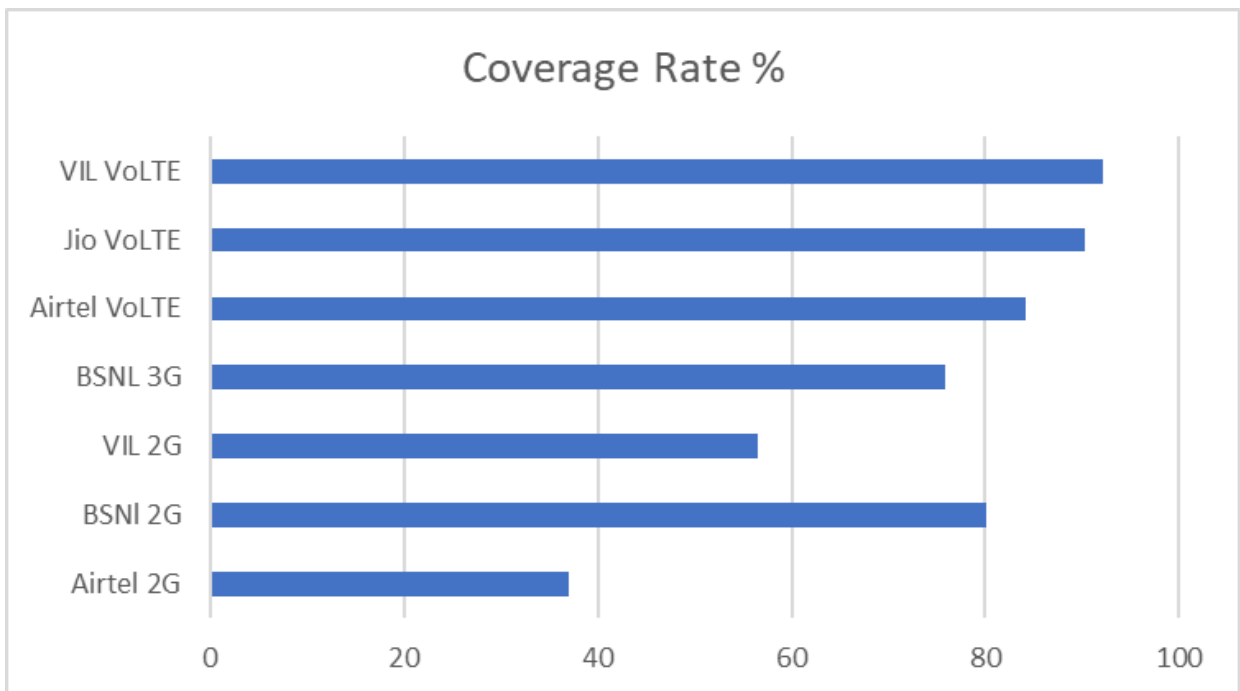
TSP (For 3G)	BSNL
Call attempts	55
Block call rate %	1.8
CSSR %	98.2
Drop call rate %	1.85
Mobility HOSR %	96.2
RX Quality %	95.4
Average CST (Sec)	5.4

TSP (For Volte)	Airtel	BSNL	JIO	VIL
Call attempts	70	NA	75	70
Block call rate %	0	NA	-	0.0
CSSR %	100	NA	98.66	100.00
Drop call rate %	0	NA	0	1.43
Mobility HOSR %	98.43	NA	96.54	100
RX Quality %	89.68	NA	80	95.4
Average CST(Sec)	0.72	NA	1.56	2.23

Coverage Details

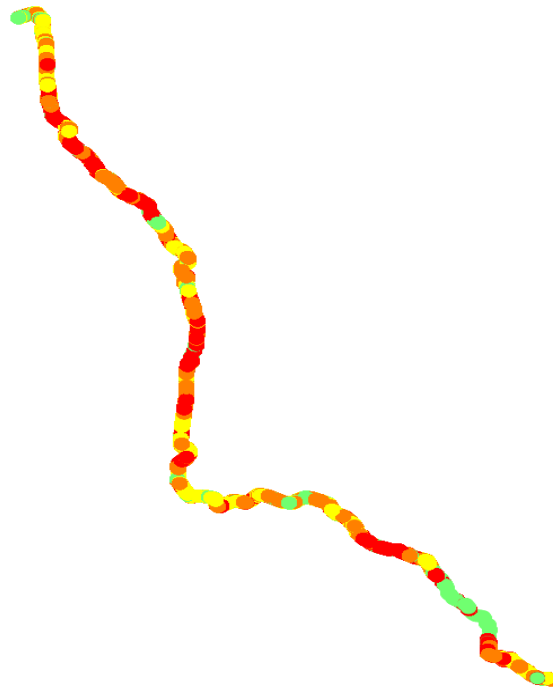
RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call session. The Coverage rate is calculated on the basis of % of samples in which the Rx level \geq -85 dBm, RSCP is \geq -90 dBm & RSRP \geq -110dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	36.98
BSNI 2G	80.15
VIL 2G	56.45
BSNL 3G	75.81
Airtel VoLTE	84.12
Jio VoLTE	90.33
VIL VoLTE	92.13



TSP-Airtel

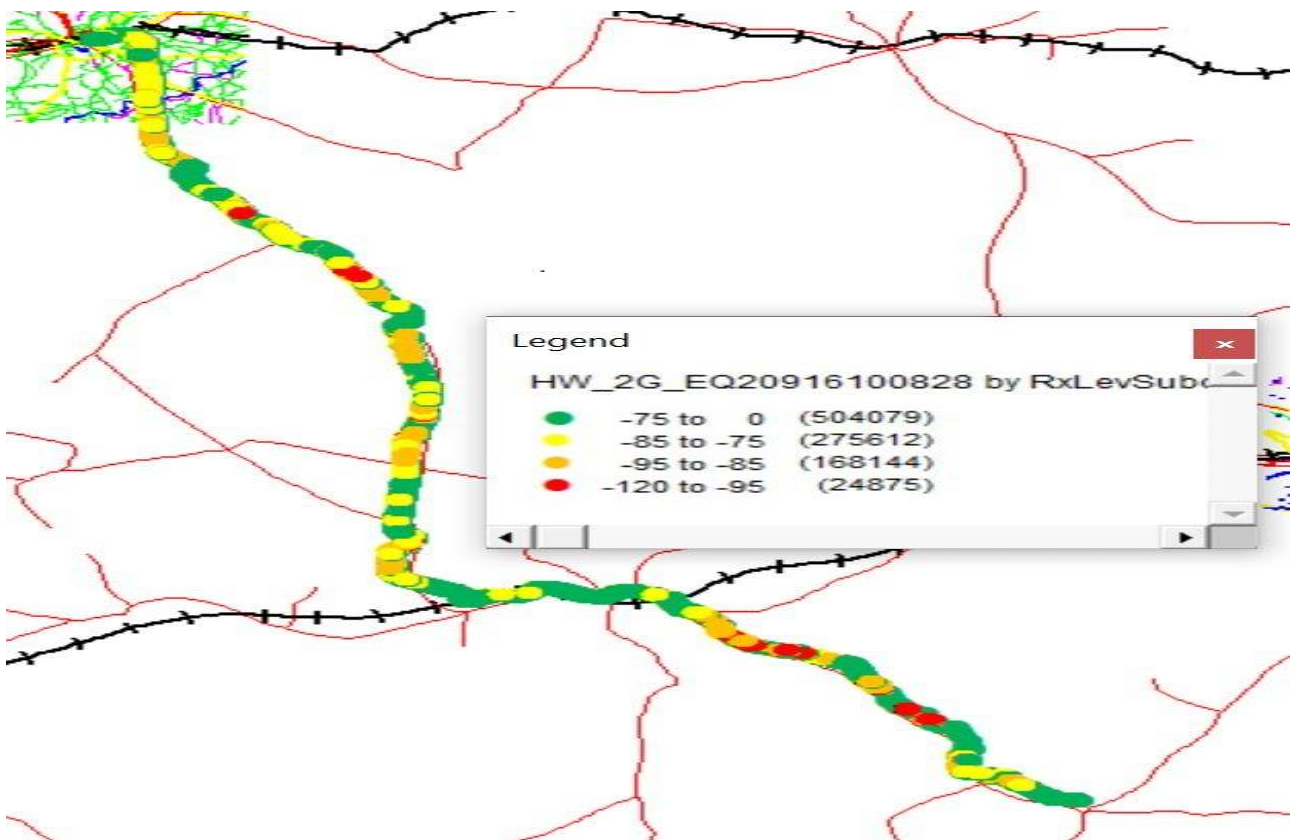
Technology	Coverage %
2G	36.98


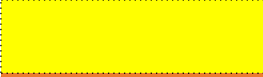




2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	89575	7.28	
[-75, >=-85)	365341	26.69	
[-85, >=-95)	548486	44.58	
[-95, >=Min)	226930	18.44	
Total	1230332	100	

TSP- BSNL

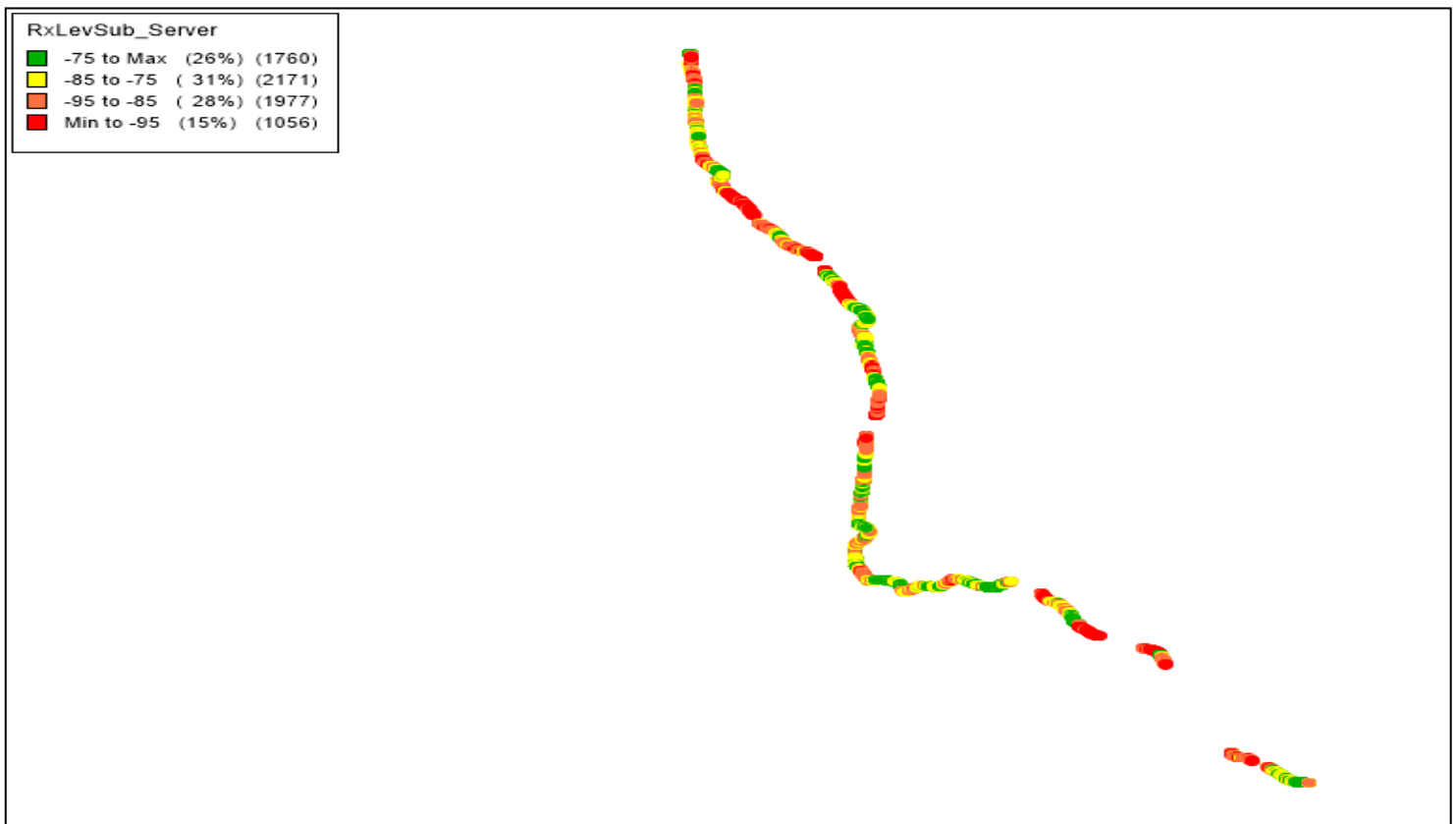
Technology	Coverage %
2G	80.15 %



2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	504079	51.82	
[-75, >=-85)	275612	28.33	
[-85, >=-95)	168144	17.29	
[-95, >=Min)	24875	2.56	
Total	972710		

TSP- Vodafone Idea

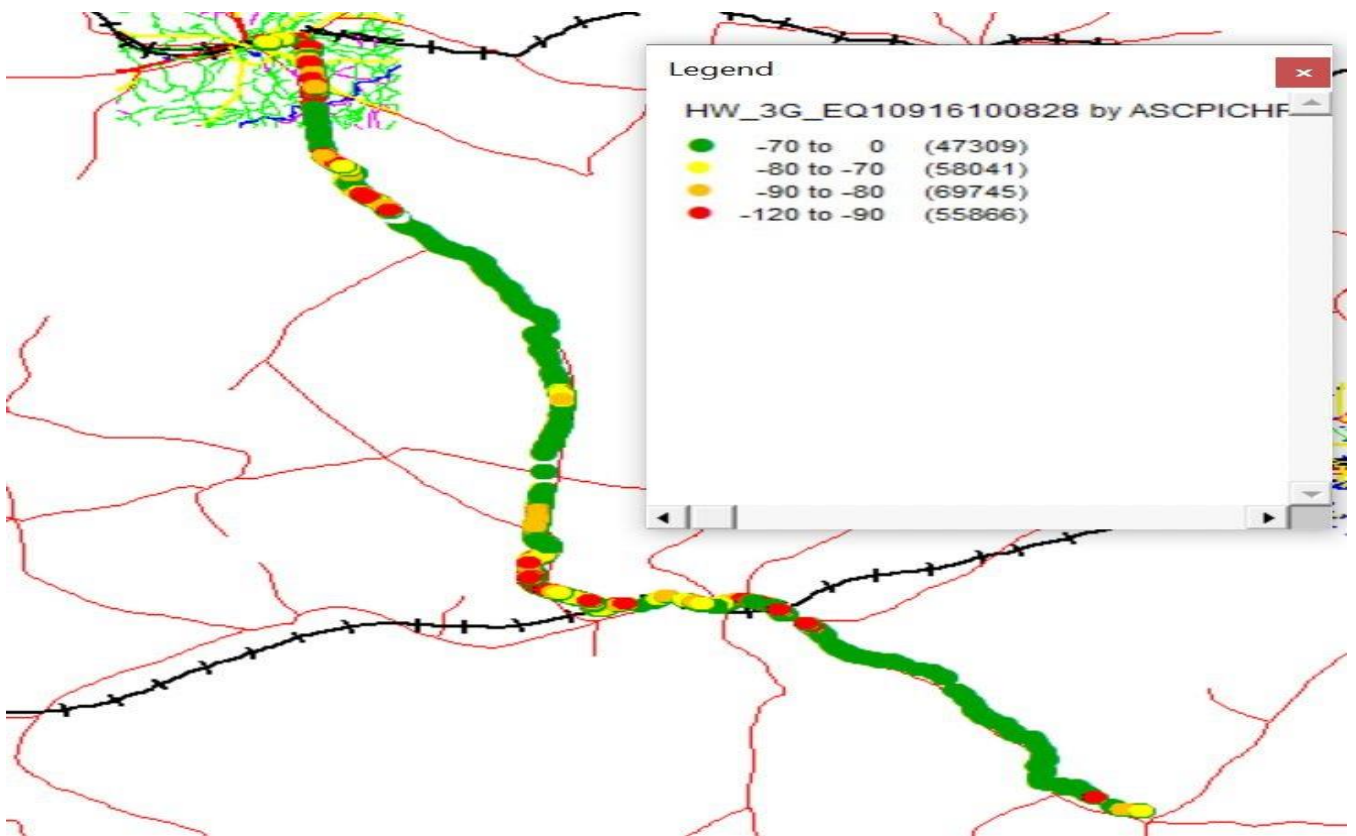
Technology	Coverage %
2G	56.45







2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	1760	25.27%%	
[-75, >=-85)	2171	31.18%	
[-85, >=-95)	1977	28.39%	
[-95, >=Min)	1056	15.16%	
Total	6964	100%	

TSP- BSNL

Technology	Coverage %
3G	75.81 %







3G			
Overall RSCP	# Samples	% PDF	Legends
[Max, >=-70]	47309	20.48	
[-70, >=-80)	58041	25.13	
[-80, >=-90)	69745	30.2	
[-90, >=Min)	55866	24.19	
Total	230961		

TSP-Airtel

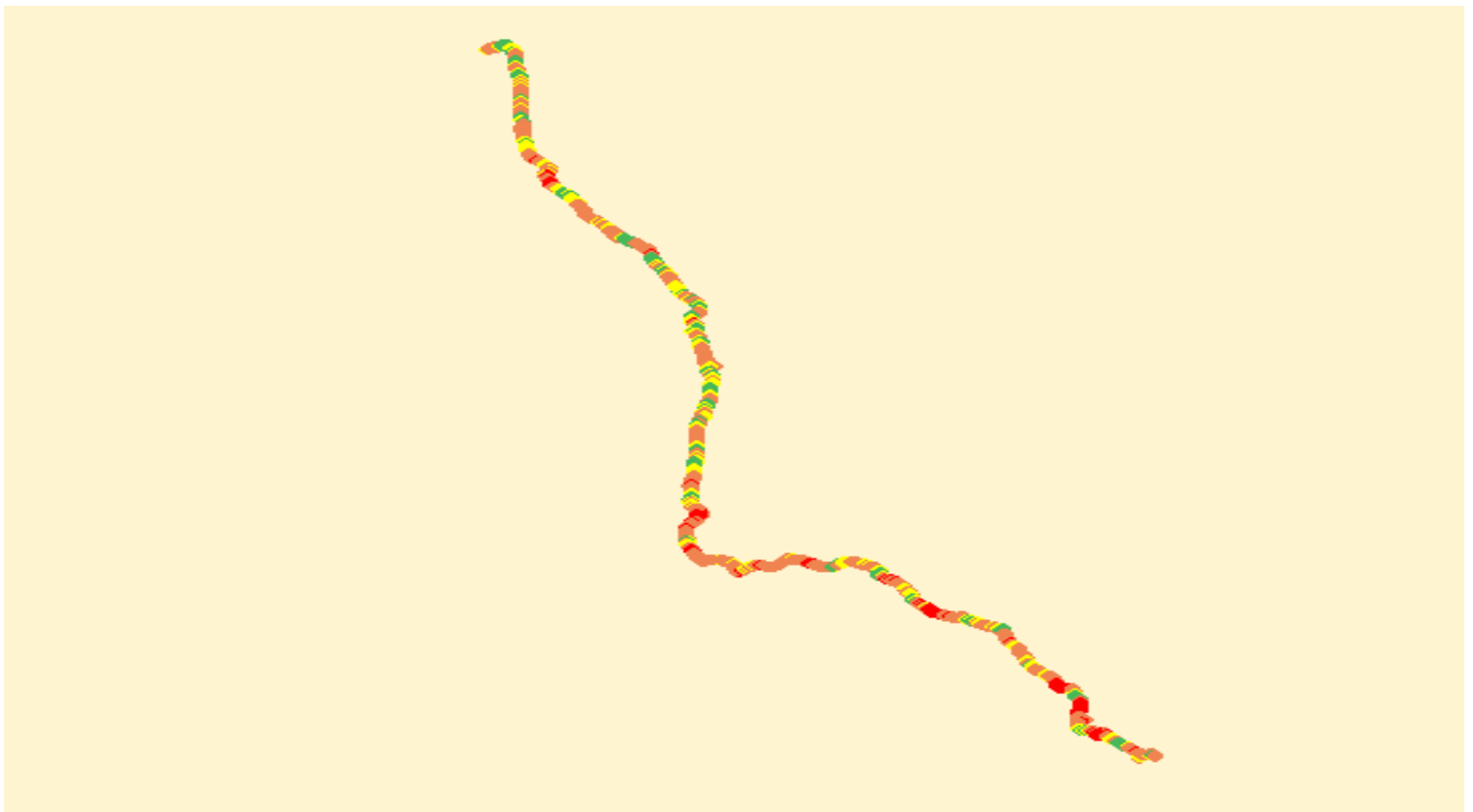
Technology	Coverage %
VoLTE	84.12



VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	167234	7.24	
[-80, >=-90)	608505	26.33	
[-90, >=-110)	1168531	50.56	
[-110, >=Min)	367043	15.88	
Total	2311313	100	

TSP- JIO

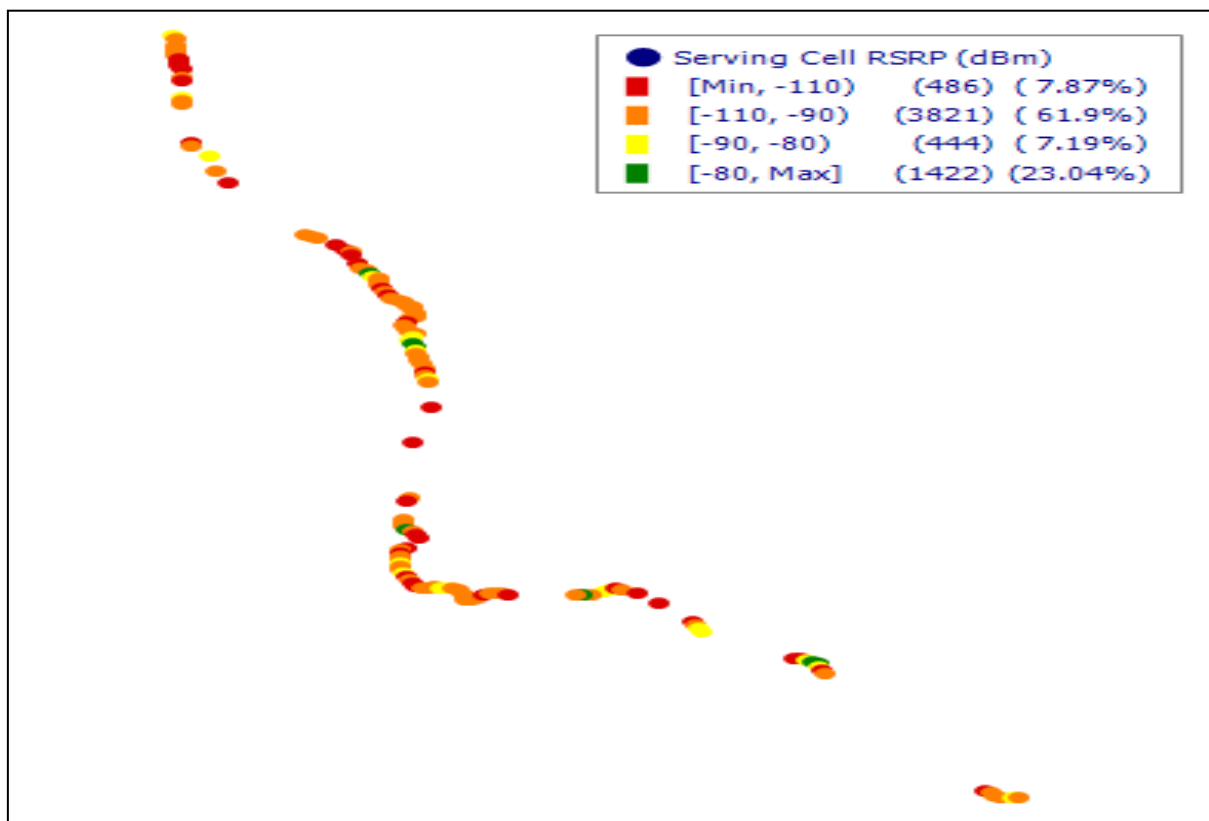
Technology	Coverage %
VoLTE	90.33%



VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	1766	11.61%	
[-80, >=-90)	3834	25.20%	
[-90, >=-110)	8145	53.53%	
[-110, >=Min)	1472	9.67%	
Total	15217		

TSP- Vodafone Idea

Technology	Coverage %
VoLTE	92.13

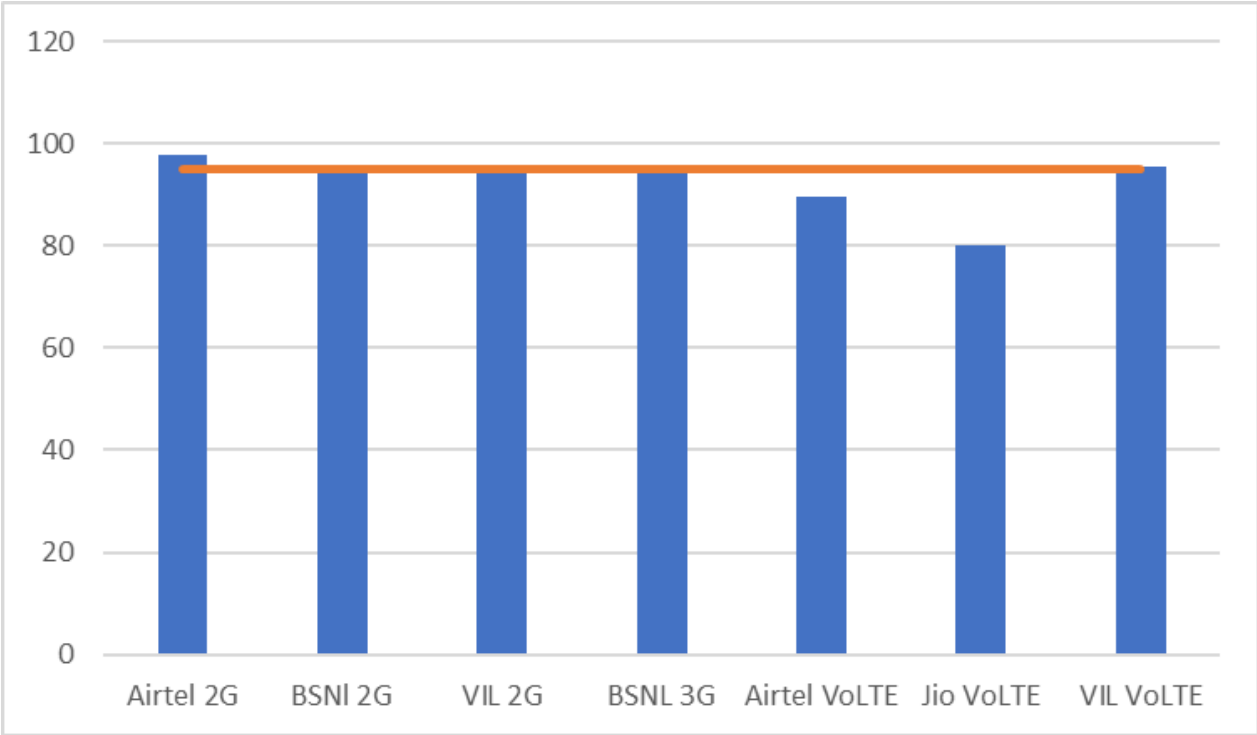


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	1422	23.04	Green
[-80, >=-90)	444	7.19	Yellow
[-90, >=-110)	3821	61.9	Orange
[-110, >=Min)	486	7.87	Red
Total	6173	100	

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	97.88
BSNI 2G	95.01
VIL 2G	95.54
BSNL 3G	95.44
Airtel VoLTE	89.68
Jio VoLTE	80
VIL VoLTE	95.4

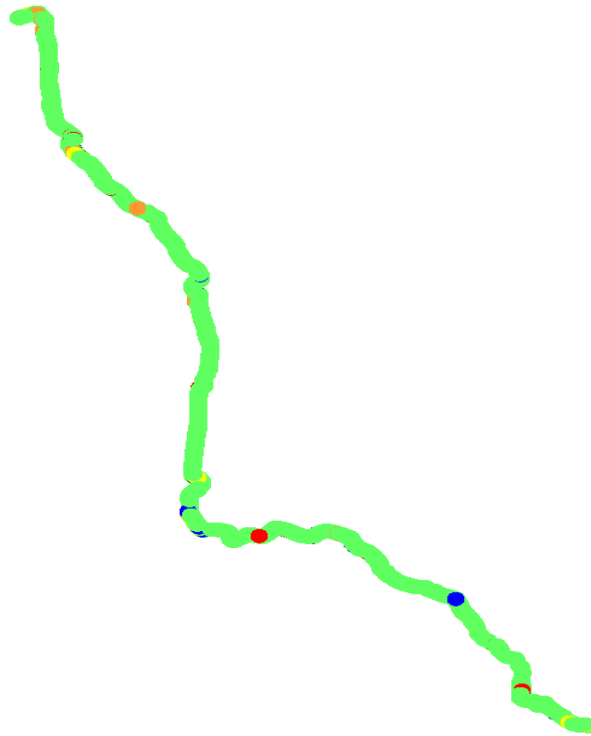


Quality Details

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	97.88



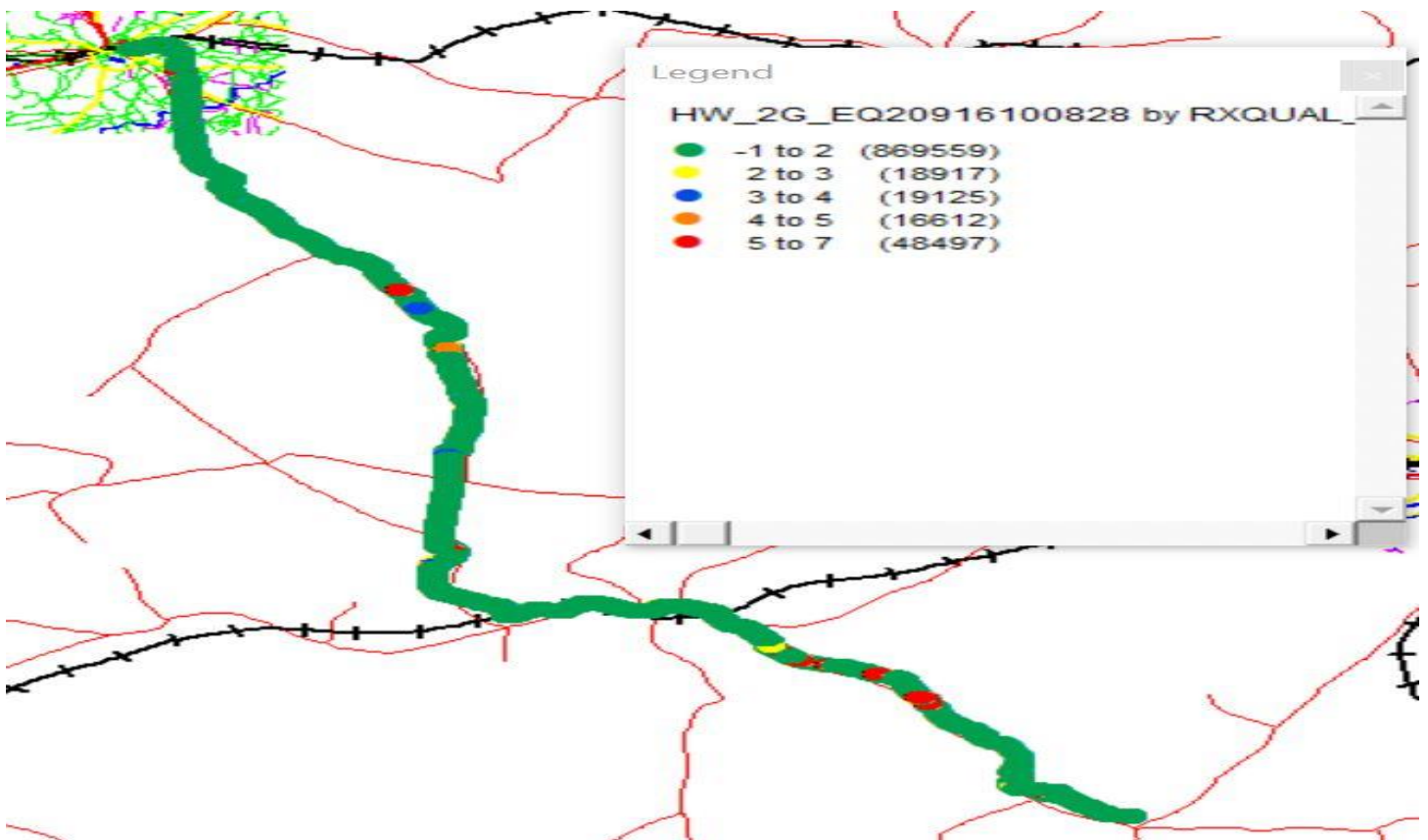
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	1111069	90.31	
(2, ≤ 3)	28243	2.30	
(3, ≤ 4)	25105	2.04	
(4, ≤ 5)	39796	3.23	
(5, $\leq \text{Max}$)	26119	2.12	
Total	1230332	100	






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	95.01 %



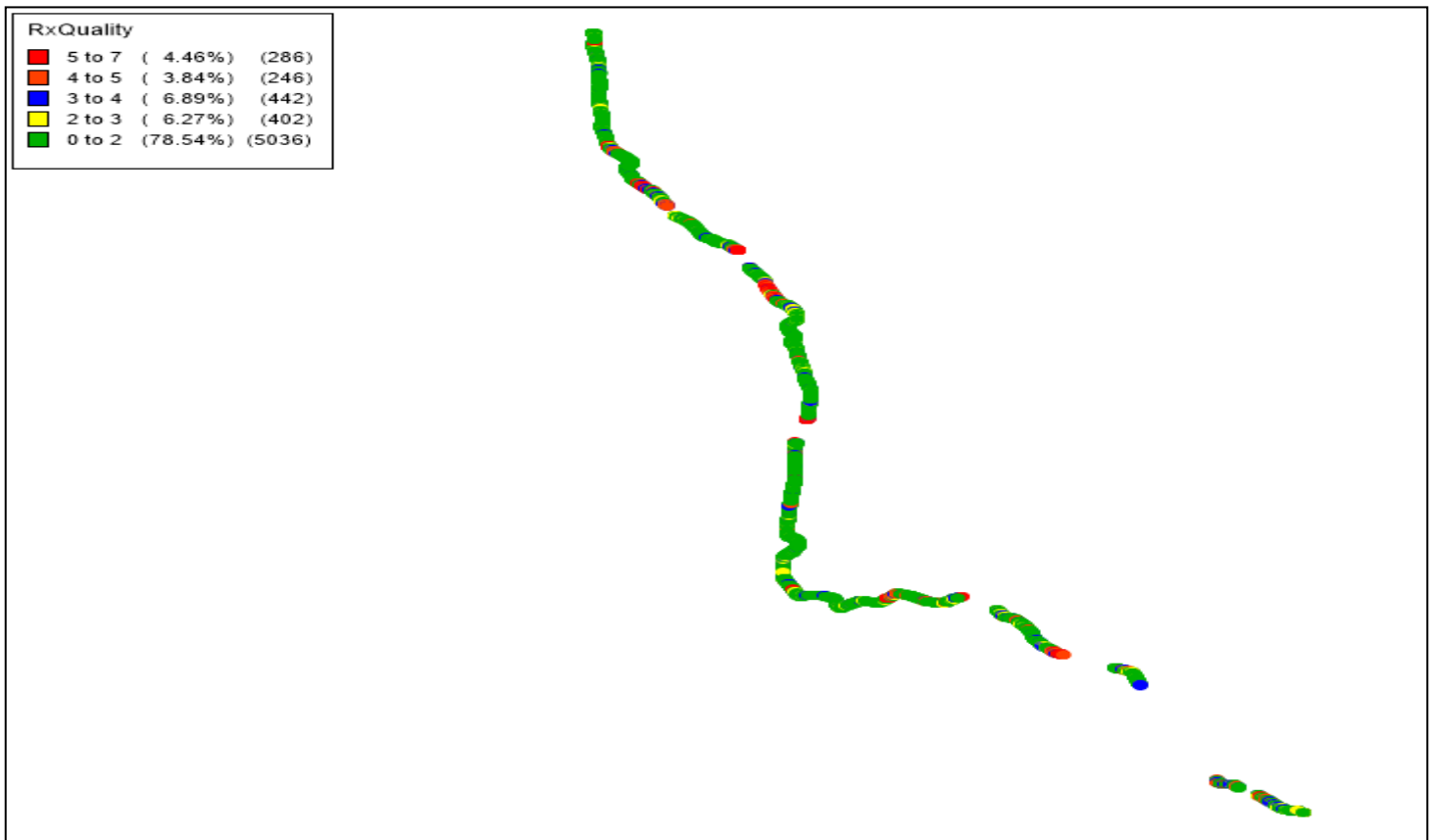
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	869559	89.40	
(2, ≤ 3)	18917	1.94	
(3, ≤ 4)	19125	1.97	
(4, ≤ 5)	16612	1.71	
(5, $\leq \text{Max}$)	48497	4.99	
Total			

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- VI

Technology	Rx Quality %
2G	95.54



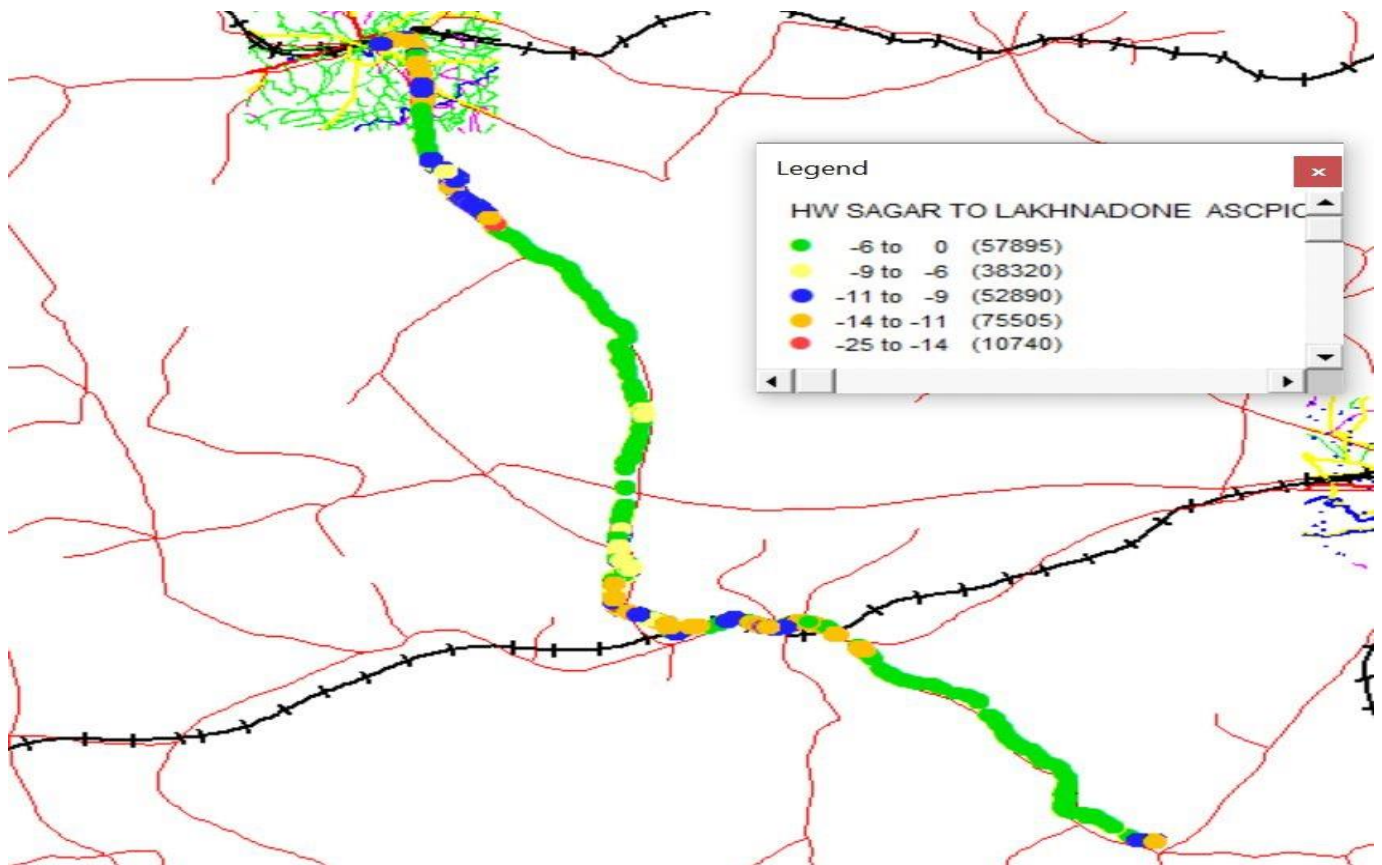
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	5036	78.54	
(2, ≤ 3)	402	6.27	
(3, ≤ 4)	442	6.89	
(4, ≤ 5)	246	3.84	
(5, $\leq \text{Max}$)	286	4.46	
Total	6412	100	

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	95.44 %

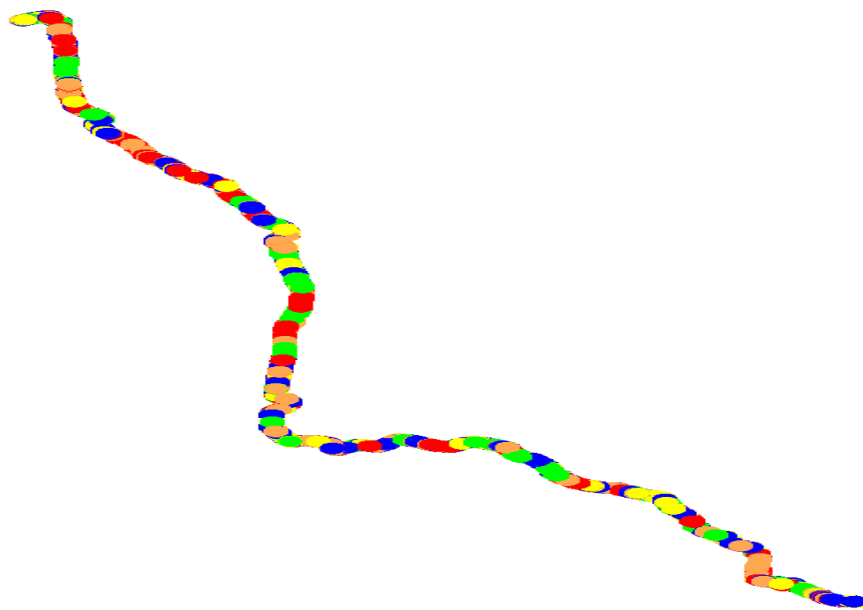


Overall Ec/No	# Samples	% PDF	Legends
(Max, ≤ -6)	57895	24.60	
(-6, ≤ -9)	38320	16.28	
(-9, ≤ -11)	52890	22.47	
(-11, ≤ -14)	75505	32.08	
(-14, \leq Min)	10740	4.56	
Total			

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 $\geq 95\%$.

TSP-Airtel

Technology	Rx Quality %
VoLTE	89.68



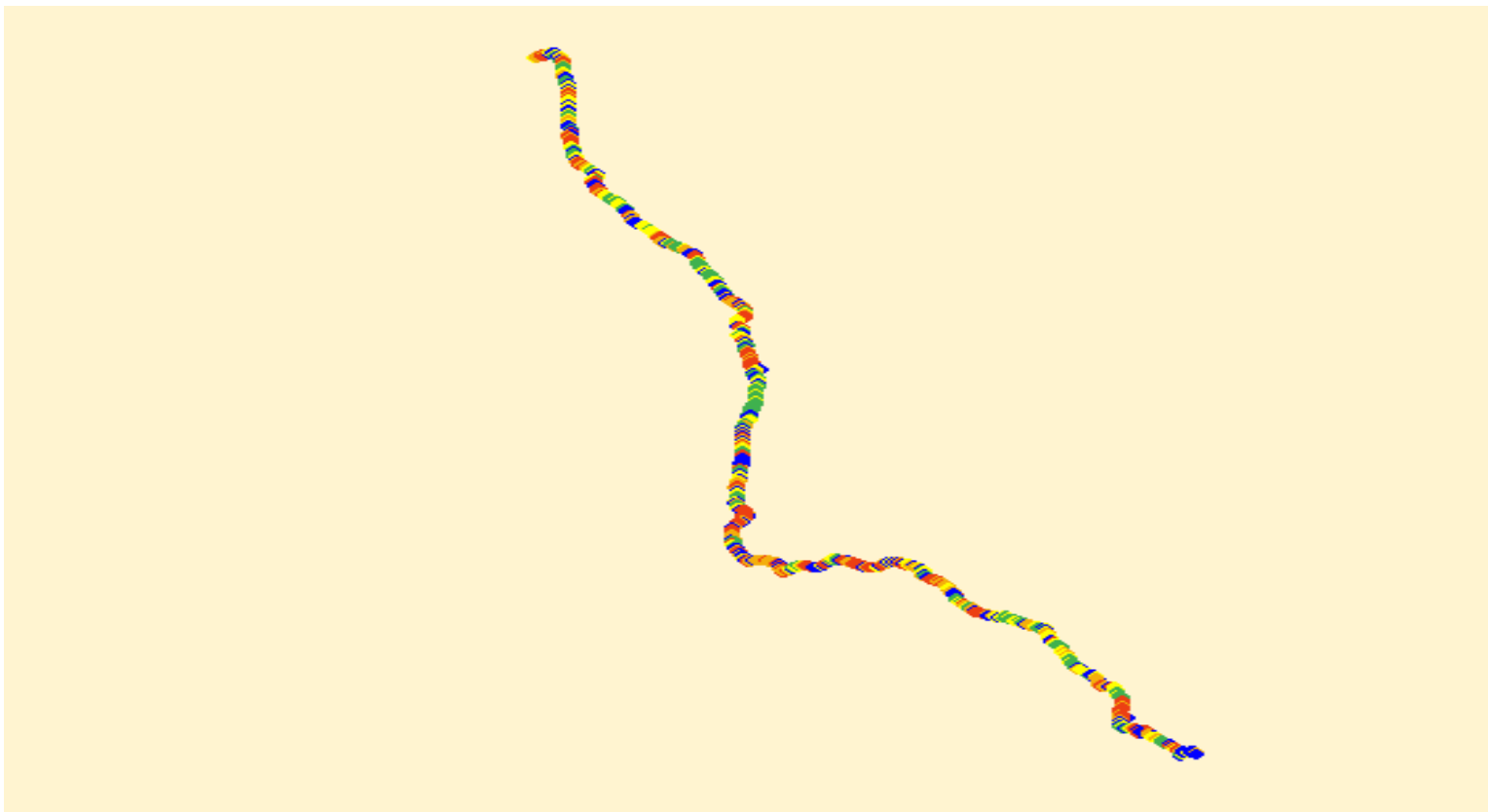
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	238542	10.32	
(0, ≤ 5)	419619	18.16	
(5, ≤ 10)	600356	25.97	
(10, ≤ 15)	496359	21.48	
(15, $\leq \text{Max}$)	556437	24.07	
Total	2311313	100	

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- JIO

Technology	Rx Quality %
VoLTE	80%



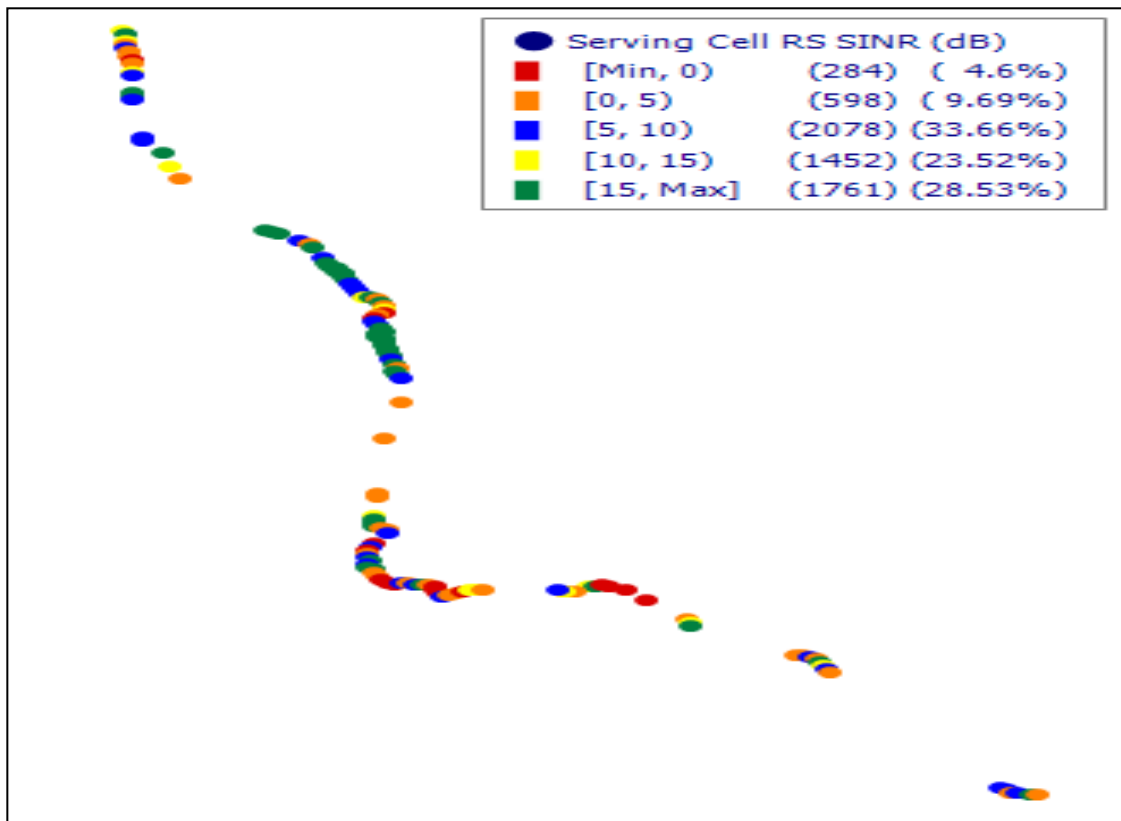
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	3044	20.00%	
(0, ≤ 5)	3127	20.55%	
(5, ≤ 10)	3196	21.00%	
(10, ≤ 15)	3009	19.77%	
(15, $\leq \text{Max}$)	2841	18.67%	
Total	15217		

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-Vodafone Idea

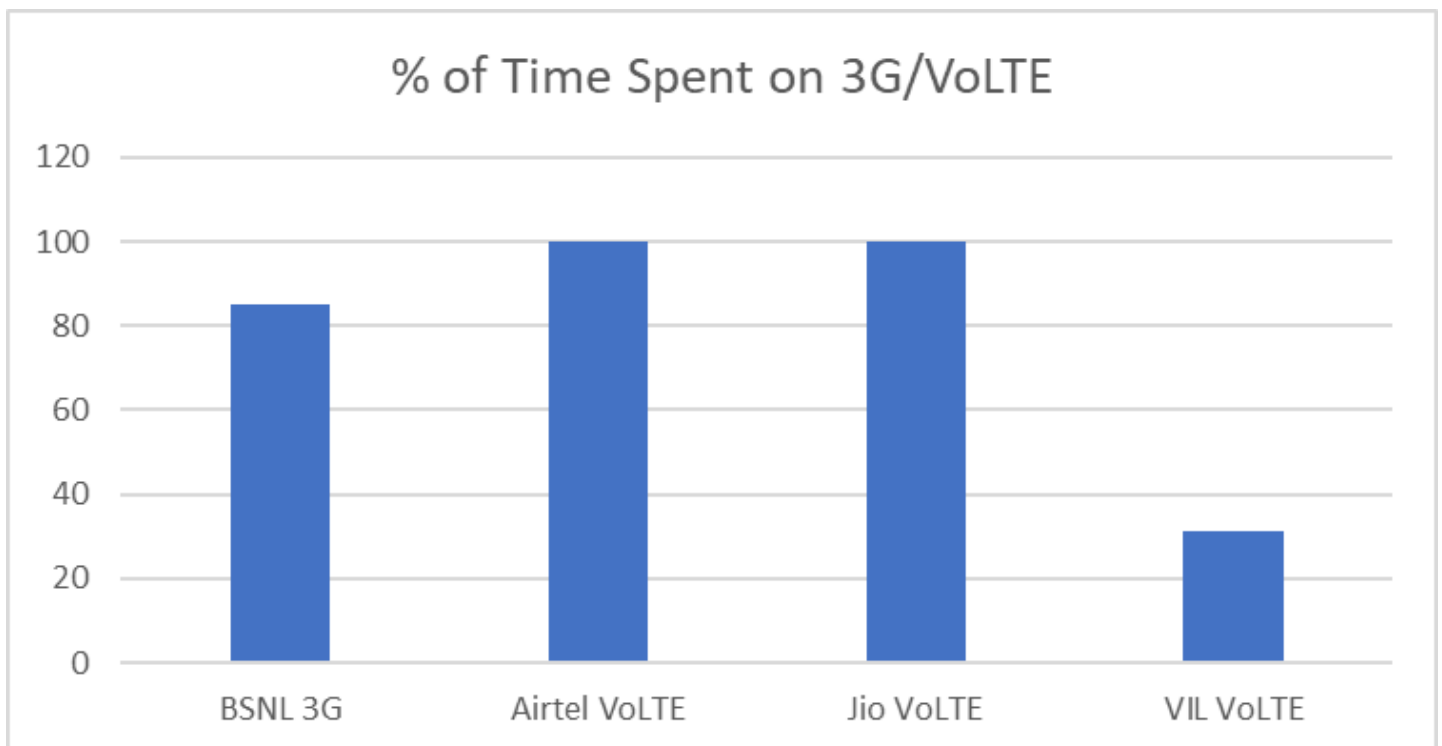
Technology	Rx Quality %
VoLTE	95.4



Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	284	4.6	
(0, ≤ 5)	598	9.69	
(5, ≤ 10)	2078	33.66	
(10, ≤ 15)	1452	23.52	
(15, $\leq \text{Max}$)	1761	23.52	
Total	6173	100	

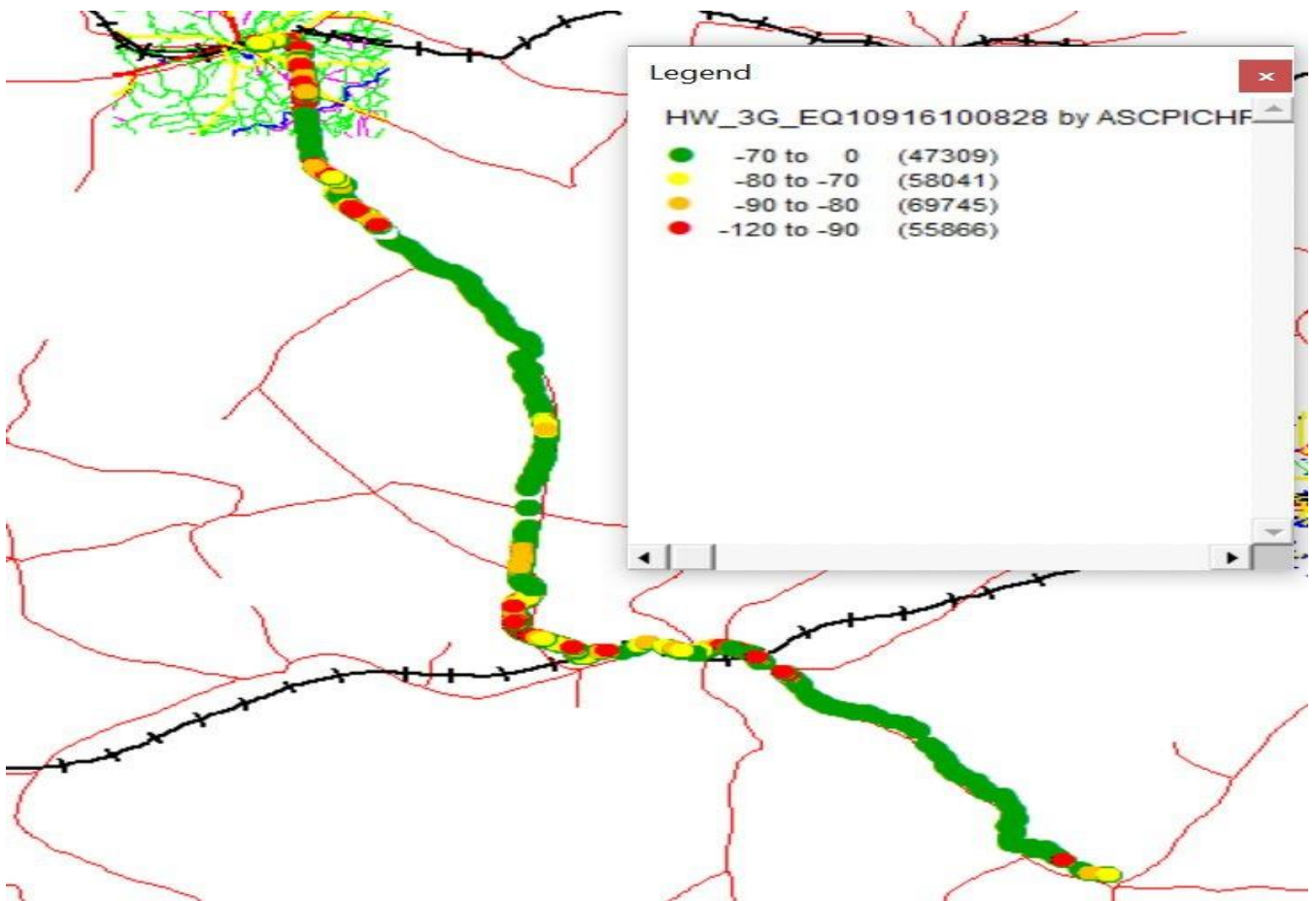
Technology Details

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	85
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	31.30



TSP- BSNL

Technology	% of Time Spent on
3G	85 %
VoLTE	



TSP-Airtel

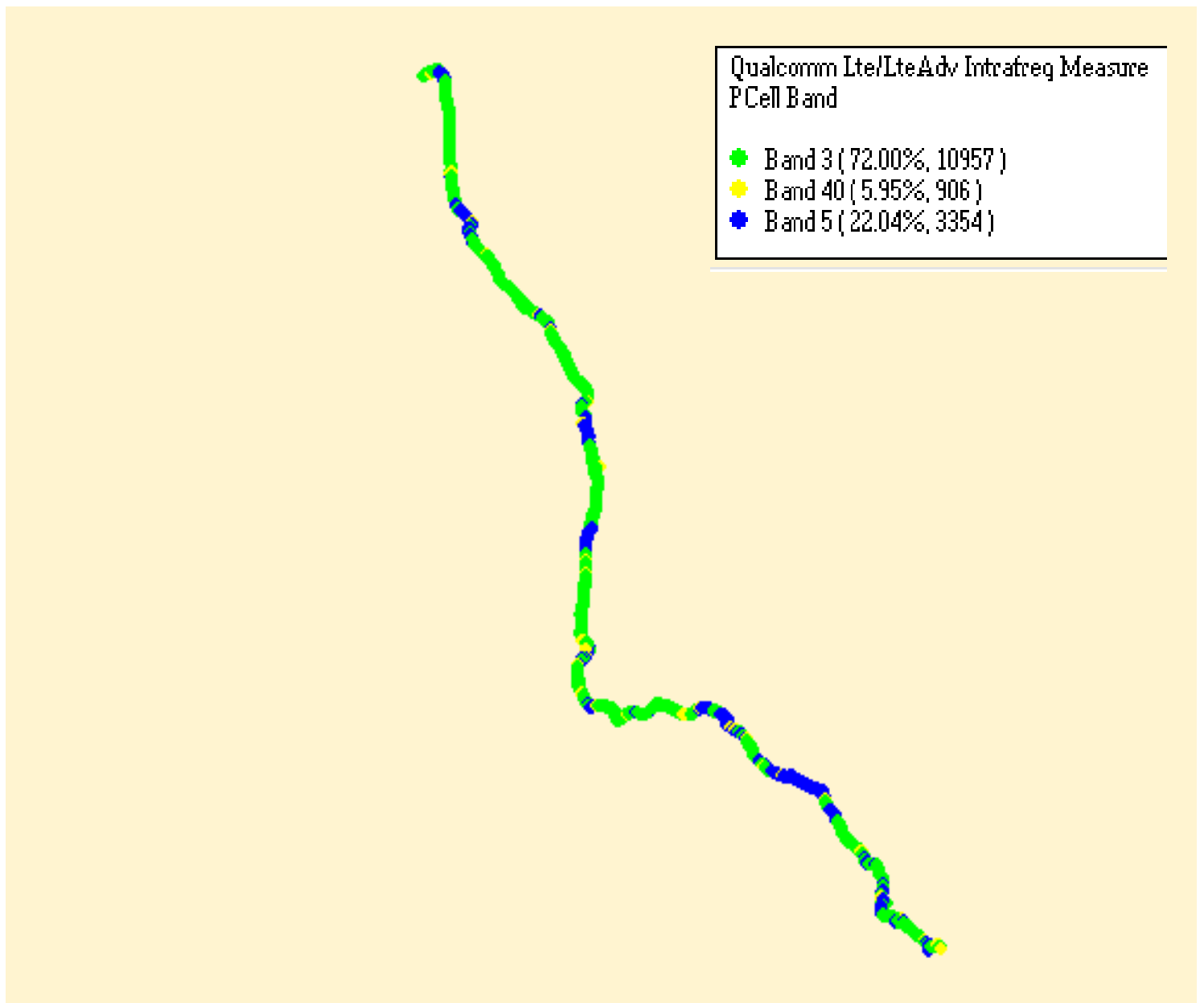
Technology	% of Time Spent on
3G	
VoLTE	100

PI paste plot



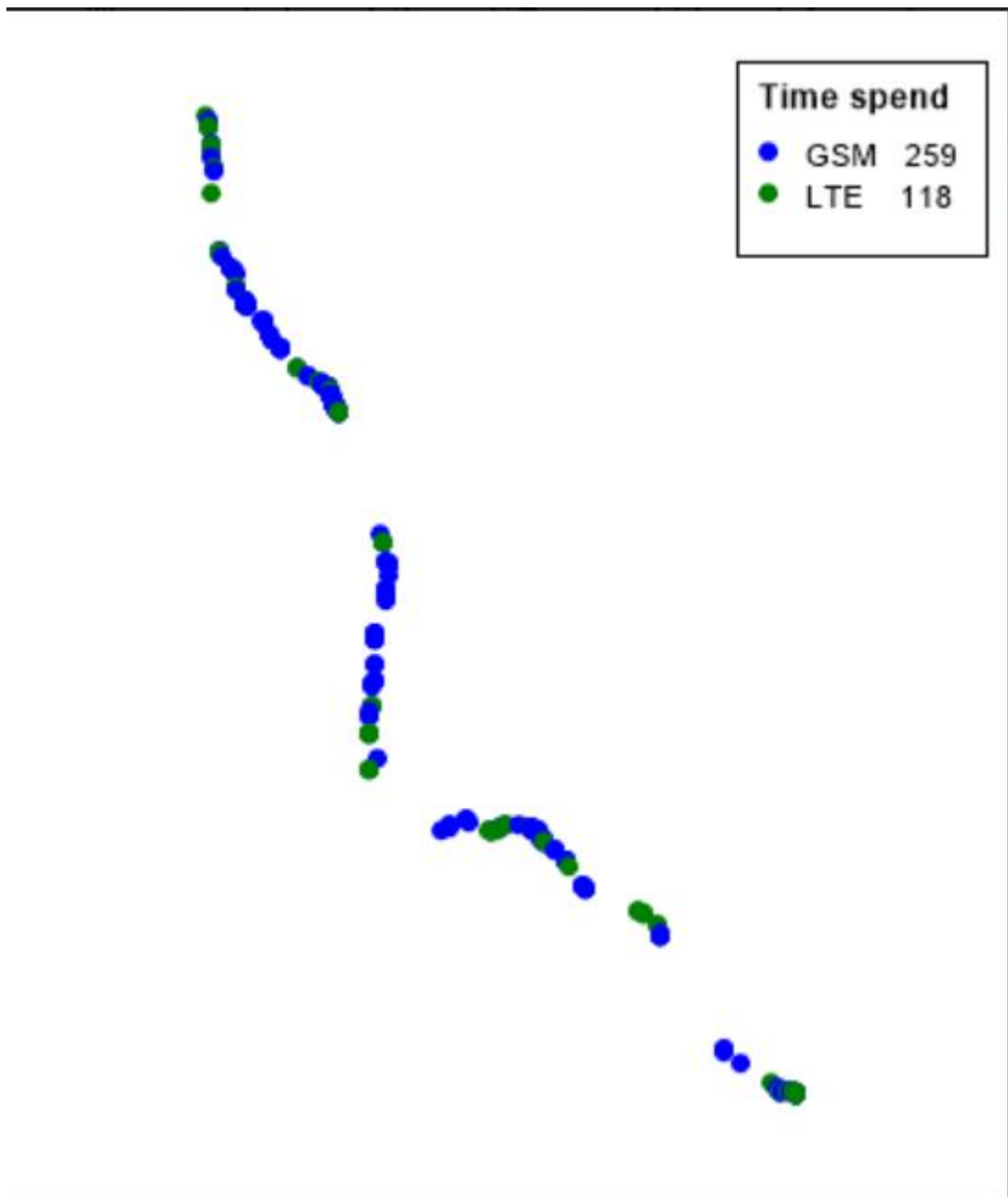
TSP- Jio

Technology	% of Time Spent on
3G	
VoLTE	100%



TSP-Vodafone Idea

Technology	% of Time Spent on
3G	
VoLTE	31.30

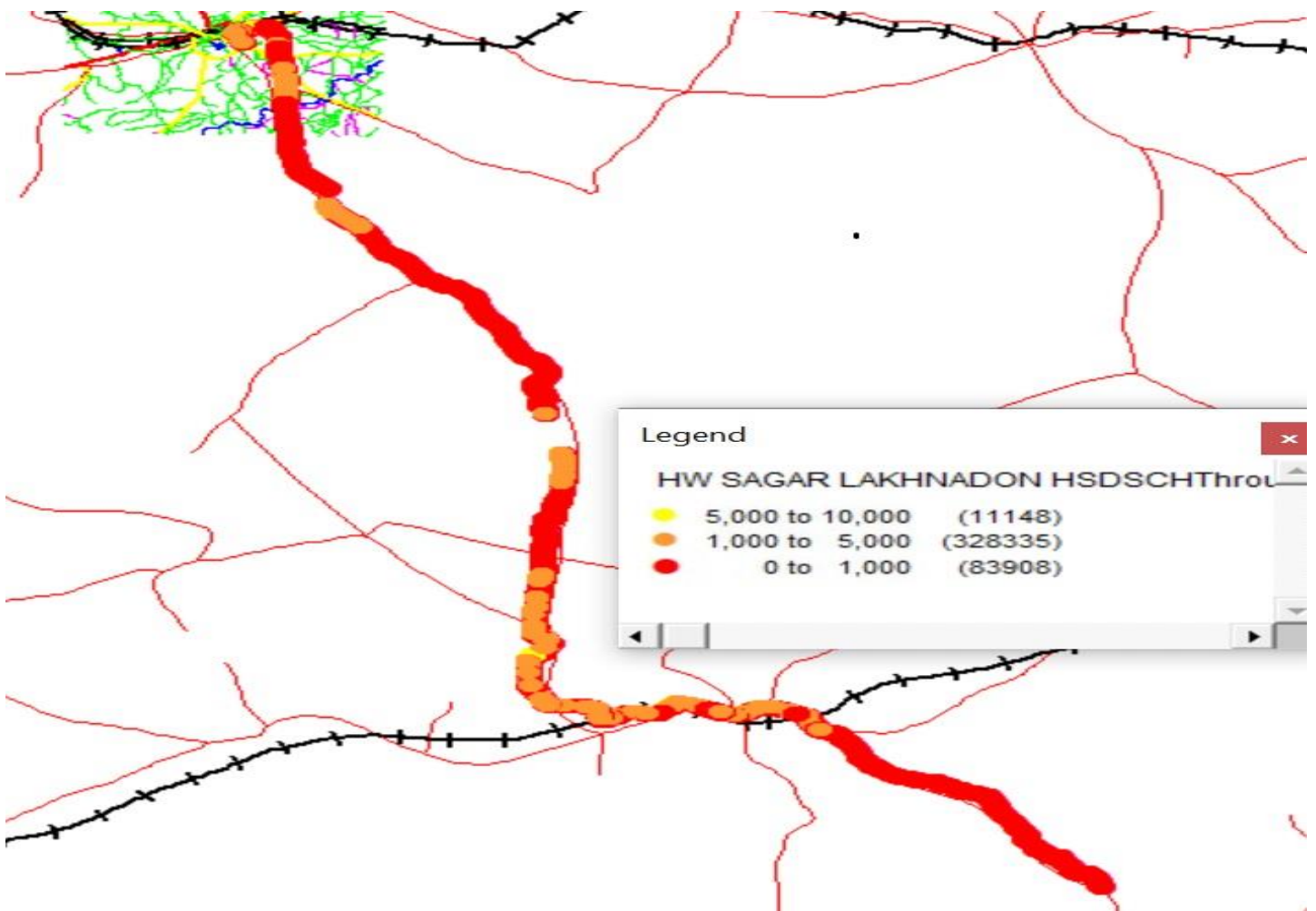


Dynamic Data Test

TSP- BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	3G
Download Throughput (Mbps)	2.4 Mbps

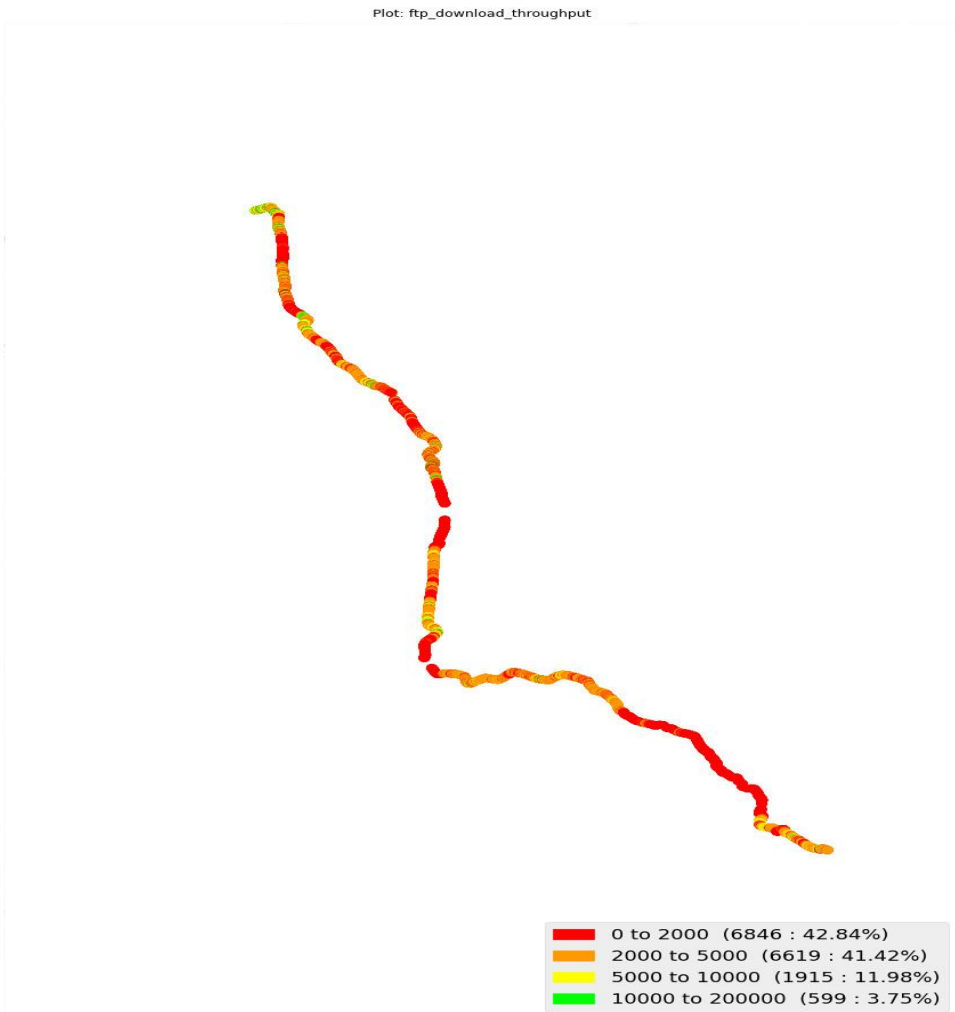


DL throughput	No of Sample	%	Legends
< 1 Mbps	83908	19.82	Red
1-5 Mbps	328335	77.55	Orange
5-10 Mbps	11148	2.63	Yellow
>10Mbps	0	0.00	Green

TSP-Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	6.13

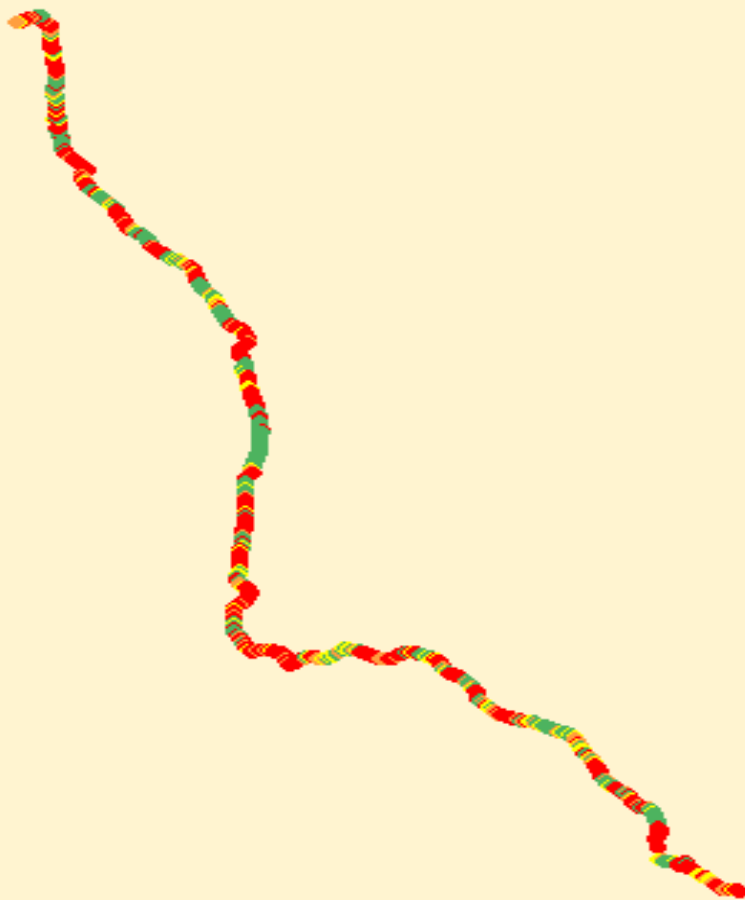


DL throughput	No of Sample	%	Legends
< 2Mbps	6846	42.84	■
2-5 Mbps	6619	41.42	■
5-10 Mbps	1915	11.98	■
>10Mbps	599	3.75	■

TSP- Jio

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	7.86

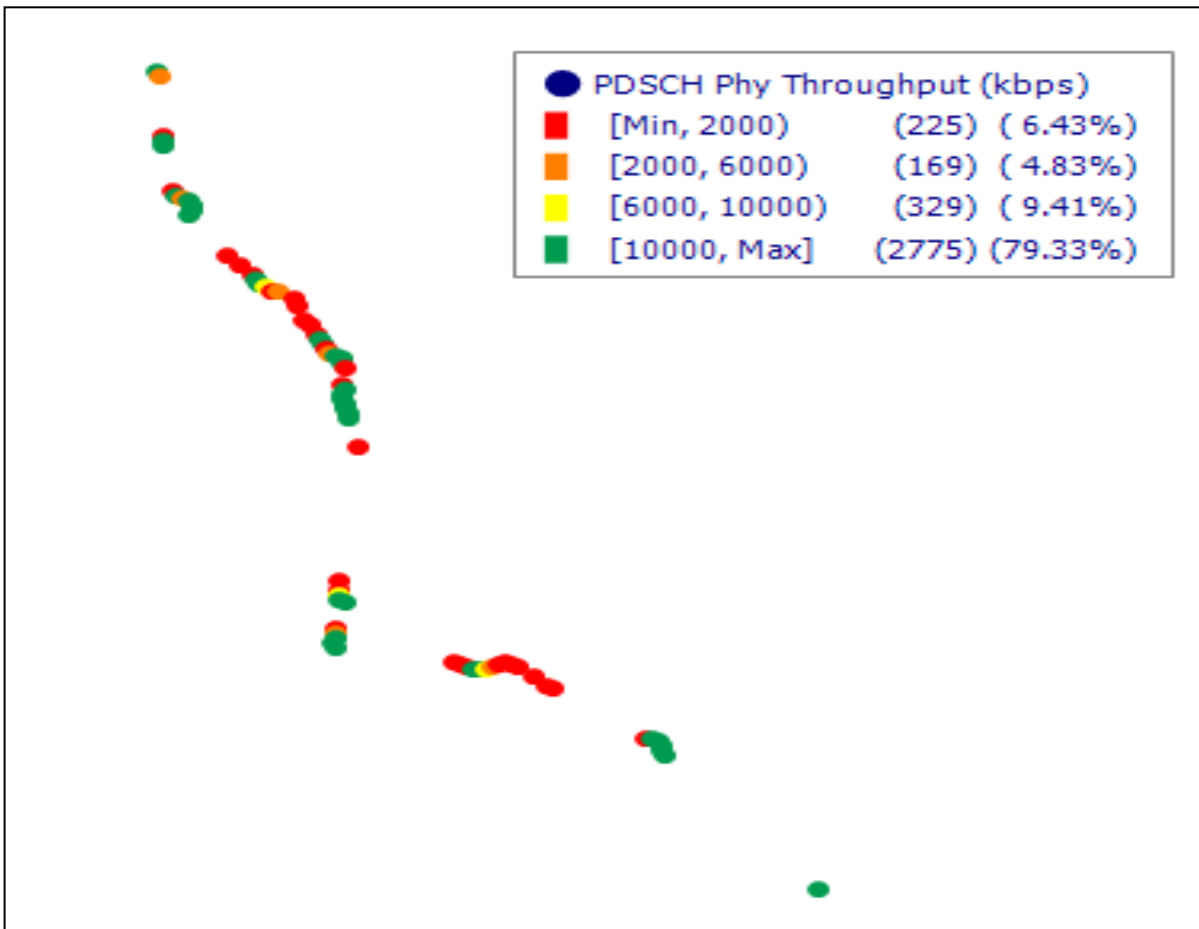


DL throughput	No of Sample	%	Legends
< 2Mbps	6474	47.61%	Red
2-5 Mbps	1586	11.66%	Orange
5-10 Mbps	1694	12.46%	Yellow
>10Mbps	3844	28.27%	Green

TSP- Vodafone Idea

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	20.31



DL throughput	No of Sample	%	Legends
< 2Mbps	225	6.43	Red
2-5 Mbps	169	4.83	Orange
5-10 Mbps	329	9.41	Yellow
>10Mbps	2775	79.33	Green