



प्रभावी विनियमन – सुगम संचार
Effective Regulation – Ease of Communication

Operator Assisted Drive Test Report

Gwalior – Guna Highway

27/05/2022

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 Gwalior- Guna Highway from 9:00 AM to 8:00 PM on 27/05/2022. The drive test covered drive route of around 218 KMs. Approximately 150 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 %	≤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 for Airtel 2G, Airtel, VIL & 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)

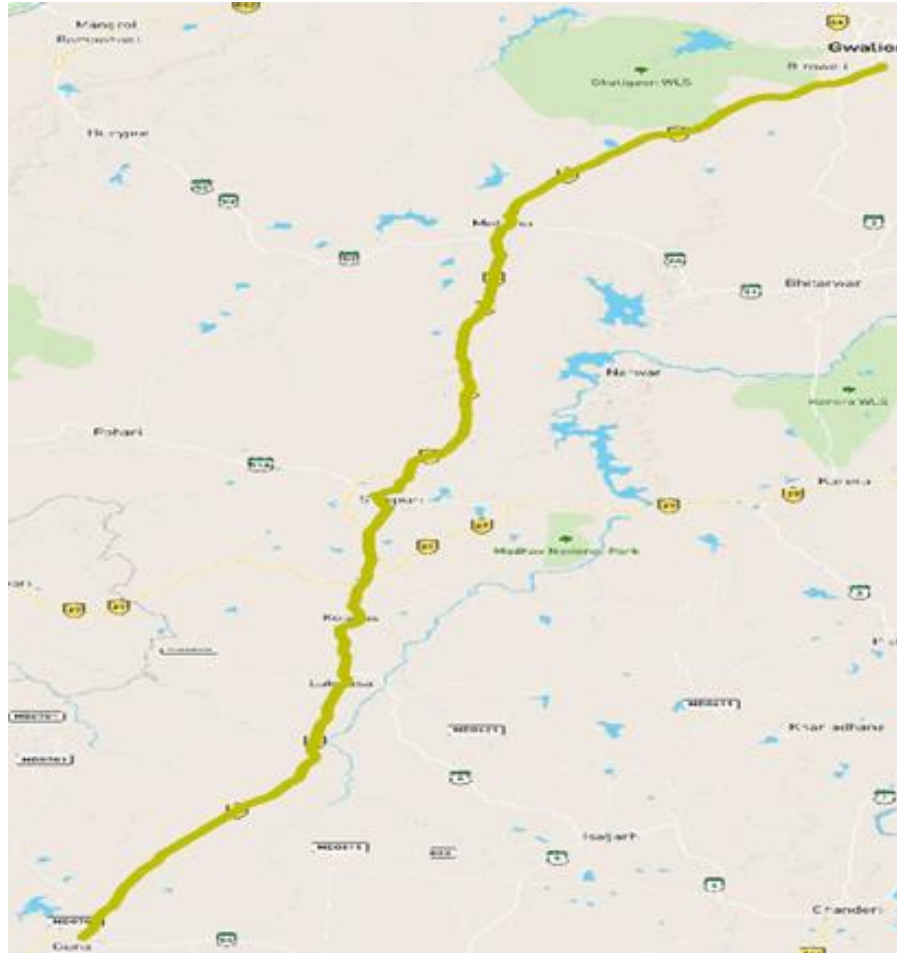
- i. 2G – measurement – UE Locked in 2G file size- 500KB
- ii. 3G – measurement – UE in 3G File Size- 20MB
- iii. 4G – measurement – UE in LTE File Size- 40MB

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.

Overview

Voice & Dynamic Data Test Drive Route



list of important area covered during the drive test

VICKYFACTORY

GHATIGAON

MOHNA

SHIVPURI LOCAL BYPASS

KOLARAS

BADARWAS

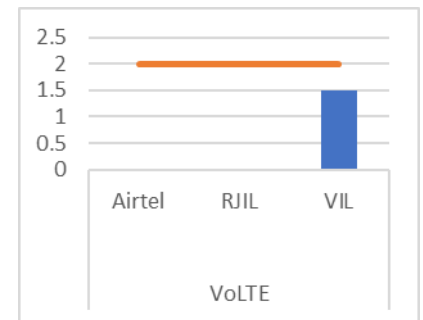
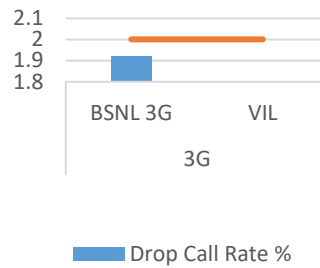
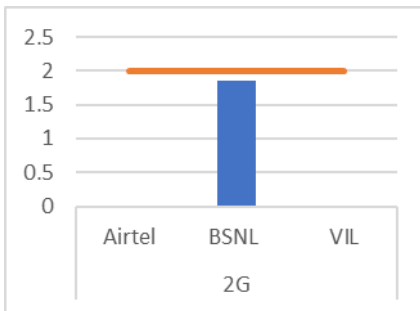
AB ROAD GUNA

Voice Calls

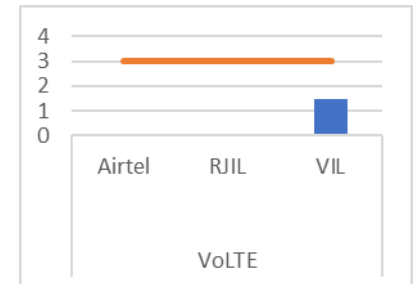
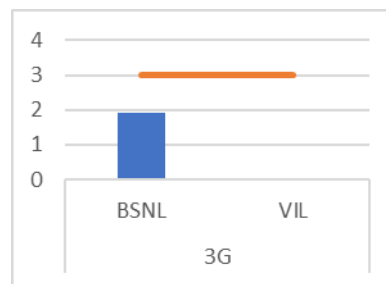
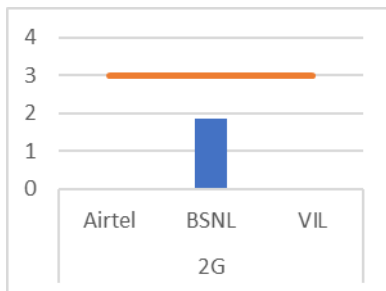
Key Observations

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	1.85	0	1.92	NA	0	0	1.49
Block Call Rate %	0	1.85	0	1.92	NA	0	0	1.49

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 %	67.86	80	92.53

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

TSPs	3G	
	BSNL	VIL
Coverage %	70	NA

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	97.85	95.83	88.48

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

TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	VIL	JIO
Time Spent on 3G/4G %	40.2	NA	100	NA	100

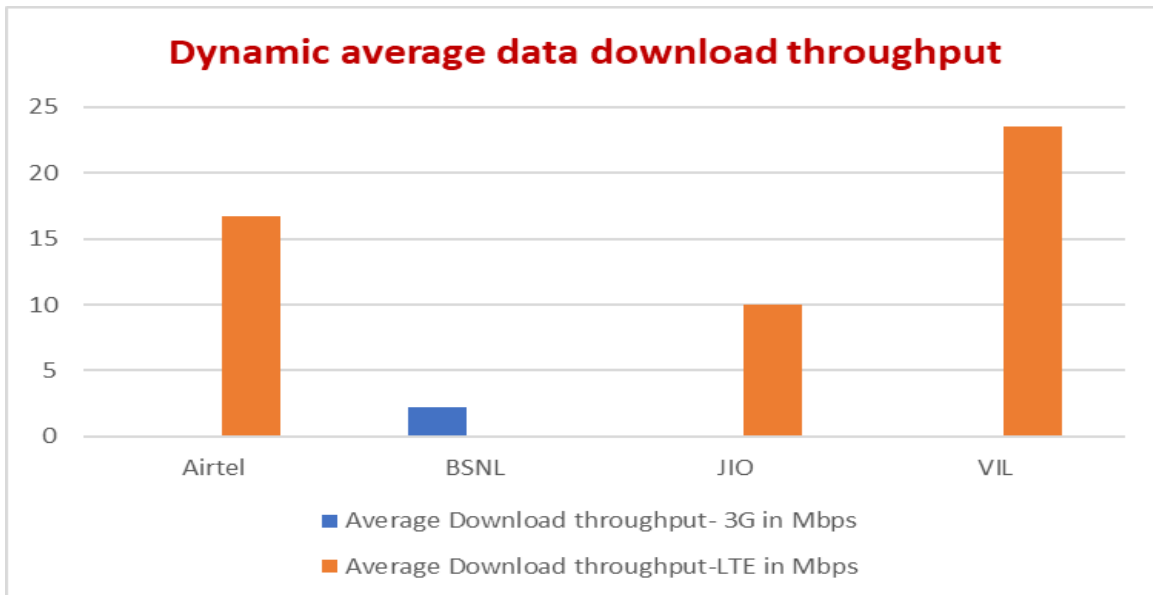
Data Services Dynamic

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	141.03	112	NA	47.8
Average Download throughput- 3G In Mbps	NA	2.21	NA	NA
Average Download throughput-LTE In Mbps	16.70	NA	10.03	23.54

Summary

Highway Summary- Voice

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Call attempts	180	140	NA	123
Block call rate %	0	1.85	NA	0.0
CSSR %	100	98.15	NA	100.00
Drop call rate %	0	1.85	NA	0.0
Mobility HOSR %	100	95.60	NA	100.00
RX Quality %	94.40	95.1	NA	97.71
Average CST Sec	4.05	2.2	NA	2.31

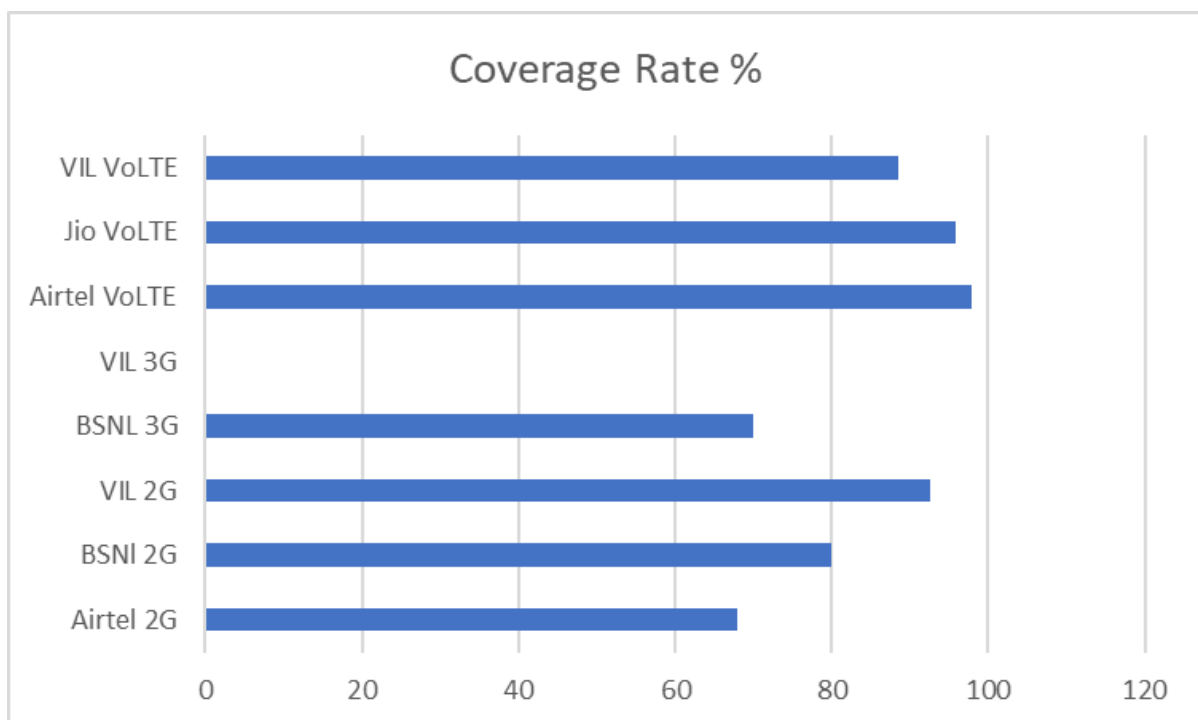
TSP (For 3G)	Airtel	BSNL	JIO	VIL
Call attempts	NA	80	NA	NA
Block call rate %	NA	1.92	NA	NA
CSSR %	NA	98.08	NA	NA
Drop call rate %	NA	1.92	NA	NA
Mobility HOSR %	NA	95.3	NA	NA
RX Quality %	NA	95.9	NA	NA
Average CST (Sec)	NA	2.1	NA	NA

TSP (For VoLTE)	Airtel	BSNL	JIO	VIL
Call attempts	231	NA	122	134
Block call rate %	0	NA	-	1.49
CSSR %	100	NA	100	98.51
Drop call rate %	0	NA	0	1.49
Mobility HOSR %	100	NA	98.31	100
RX Quality %	84.37	NA	89.92	89.69
Average CST(Sec)	0.40	NA	0.391	1.78

Coverage Details

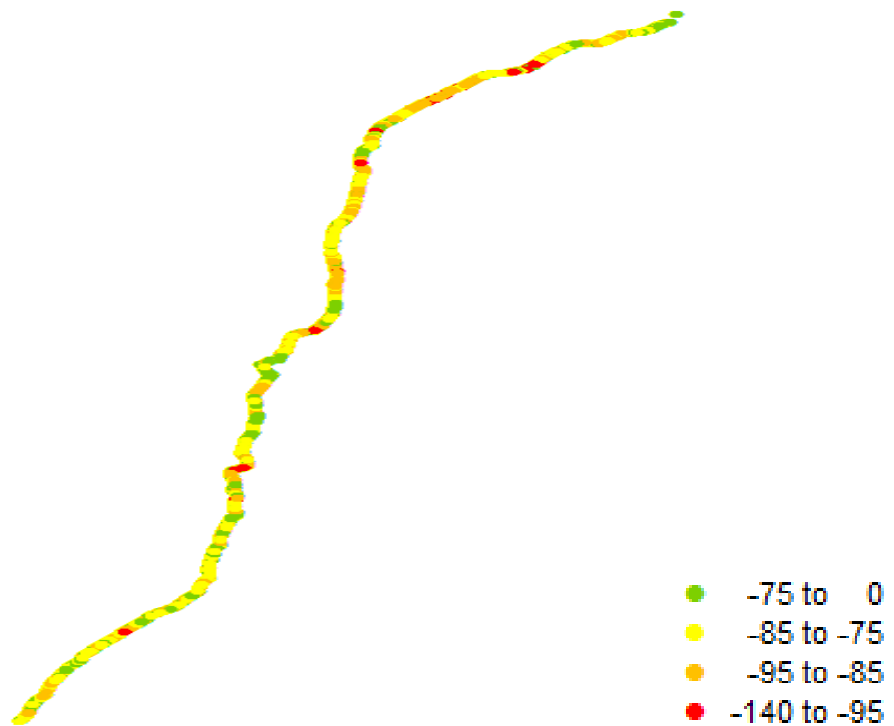
RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call session. The Coverage rate is calculated on the basis of % of samples in which the Rx level \geq -85 dBm, RSCP is \geq -90 dBm & RSRP \geq -110dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	67.86
BSNI 2G	80
VIL 2G	92.53
BSNL 3G	70
VIL 3G	NA
Airtel VoLTE	97.85
Jio VoLTE	95.83
VIL VoLTE	88.48



TSP-Airtel

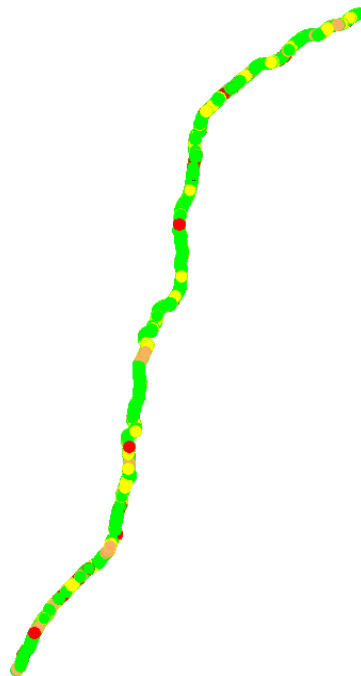
Technology	Coverage %
2G	67.86







2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	672231	30.35	Green
[-75, >=-85)	831034	37.51	Yellow
[-85, >=-95)	656071	29.62	Orange
[-95, >=Min)	55938	2.525	Red
Total	2215274	100	

TSP- BSNL

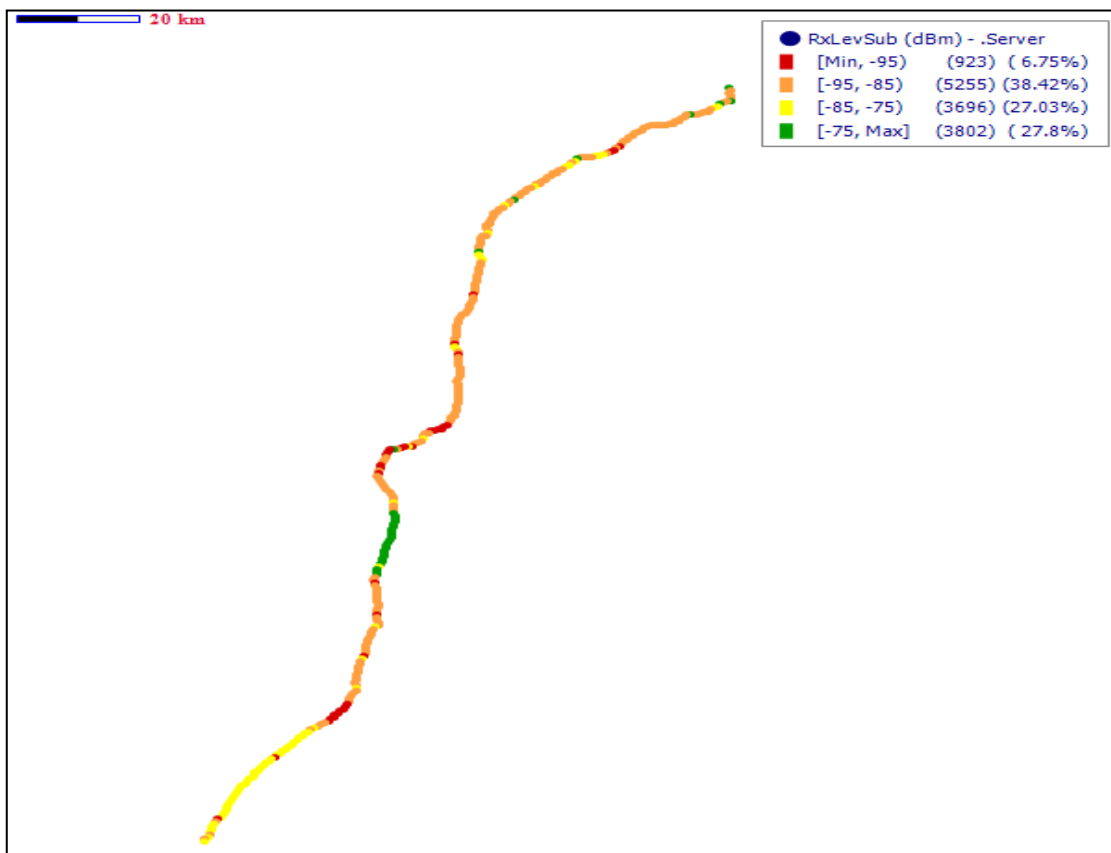
Technology	Coverage %
2G	80%



2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	554805	50.7%	
[-75, >=-85)	210678	19.3%	
[-85, >=-95)	110020	10.1%	
[-95, >=Min)	218673	20.0%	
Total	1094176	100%	

TSP- Vodafone Idea

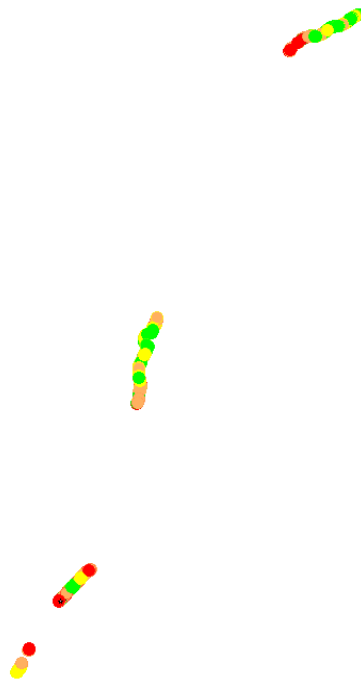
Technology	Coverage %
2G	92.53







2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	3802	27.08	
[-75, >=-85)	3696	27.03	
[-85, >=-95)	5255	38.42	
[-95, >=Min)	923	6.75	
Total	13676	100.00	

TSP- BSNL

Technology	Coverage %
3G	70.0%

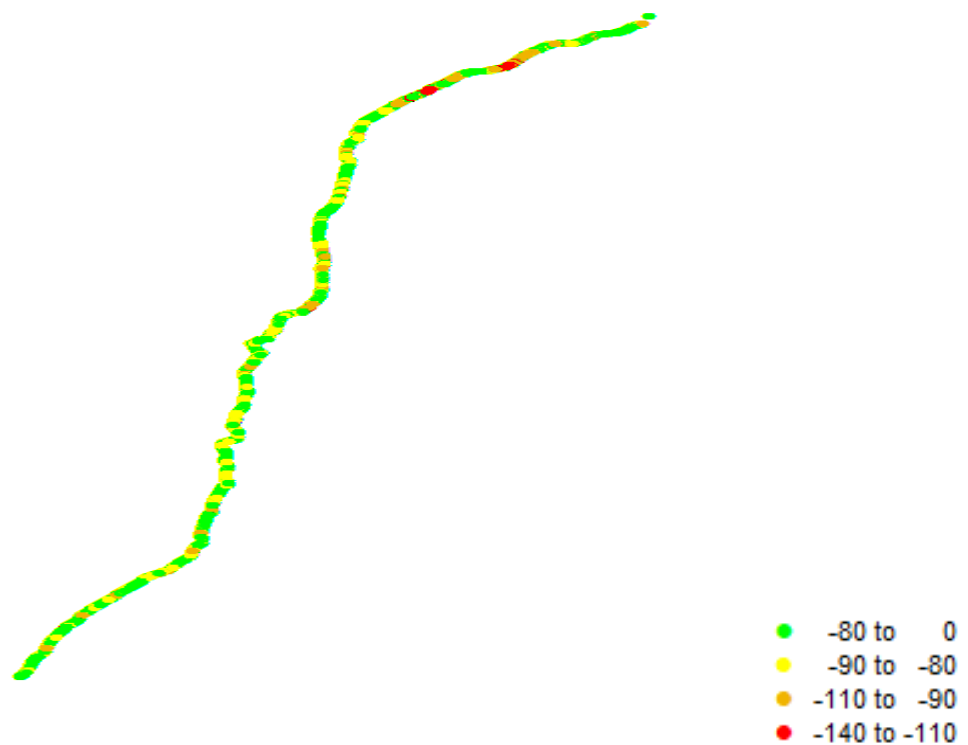


3G			
Overall RSCP	# Samples	% PDF	Legends
[Max, >=-70]	40023	20.5%	
[-70, >=-80)	49601	25.4%	
[-80, >=-90)	47190	24.1%	
[-90, >=Min)	58717	30.0%	
Total	195531	100%	

Coverage Details

TSP- Airtel

Technology	Coverage %
VoLTE	97.85







VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	1815717	48.68	
[-80, >=-90)	955667	25.62	
[-90, >=-110)	878654	23.56	
[-110, >=Min)	80075	2.15	
Total	3730113	100	

Coverage Details

TSP- JIO

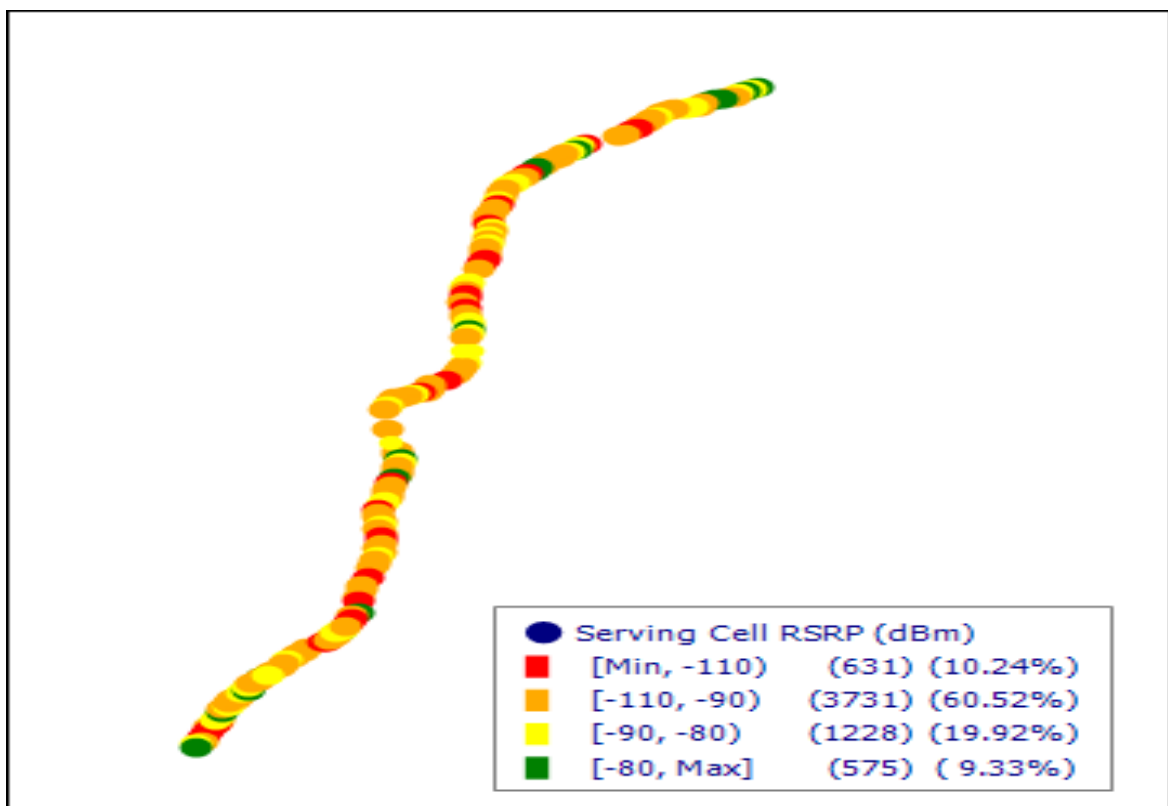
Technology	Coverage %
VoLTE	95.83%



VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	2343	17.64%	
[-80, >=-90)	3902	29.38%	
[-90, >=-110)	6480	48.80%	
[-110, >=Min)	554	4.17%	
Total	13279	100%	

TSP- Vodafone Idea

Technology	Coverage %
VoLTE	88.48

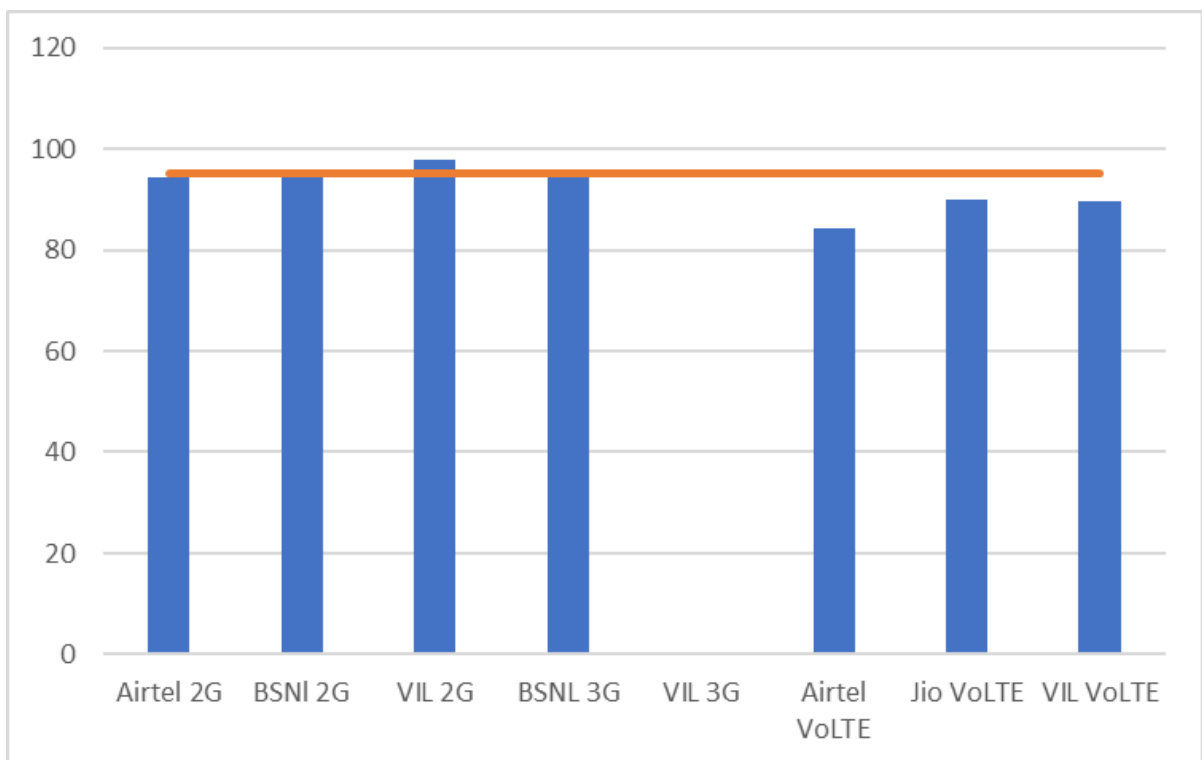


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	575	9.33	
[-80, >=-90)	1228	19.92	
[-90, >=-110)	3731	60.52	
[-110, >=Min)	631	10.24	
Total	6165	100	

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	94.40
BSNI 2G	95.1
VIL 2G	97.71
BSNL 3G	95.9
VIL 3G	NA
Airtel VoLTE	84.37
Jio VoLTE	89.92
VIL VoLTE	89.69

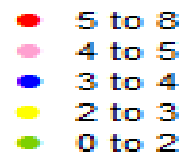


Quality Details

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	94.40



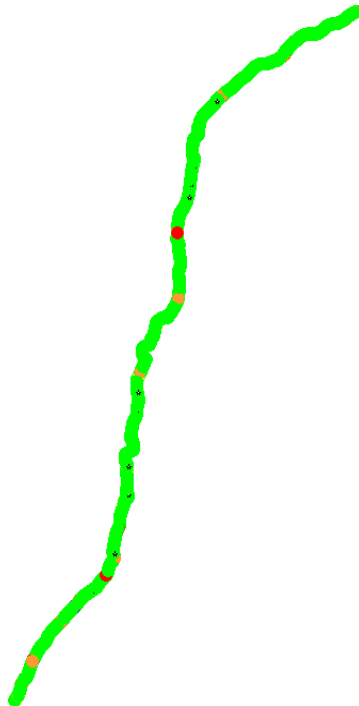
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	1834408	82.81	
(2, ≤ 3)	97362	4.40	
(3, ≤ 4)	86231	3.89	
(4, ≤ 5)	73275	3.31	
(5, $\leq \text{Max}$)	123998	5.60	
Total	2215274	100	

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	95.1%



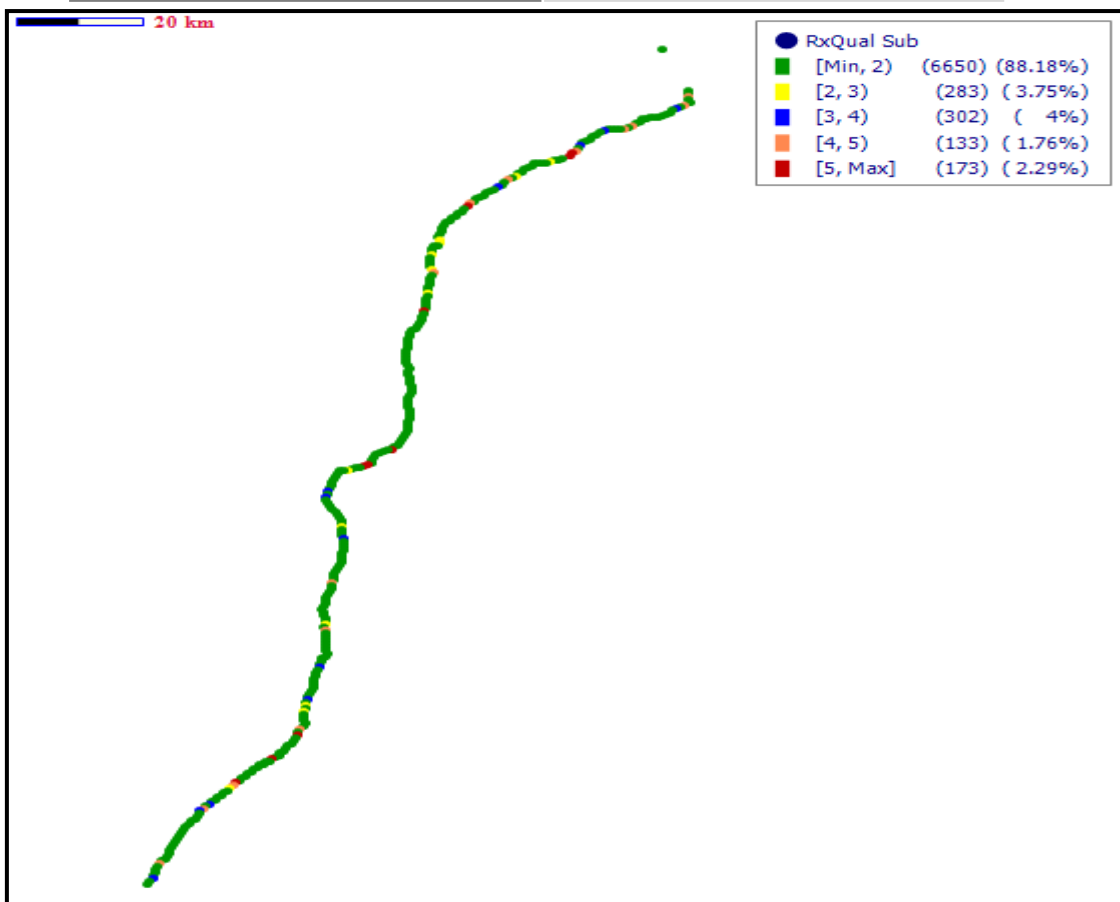
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	937328	77.8%	
(2, ≤ 3)	69989	5.8%	
(3, ≤ 4)	65023	5.4%	
(4, ≤ 5)	73562	6.1%	
(5, $\leq \text{Max}$)	59003	4.9%	
Total	1204905	100%	

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-VIL

Technology	Rx Quality %
2G	97.71



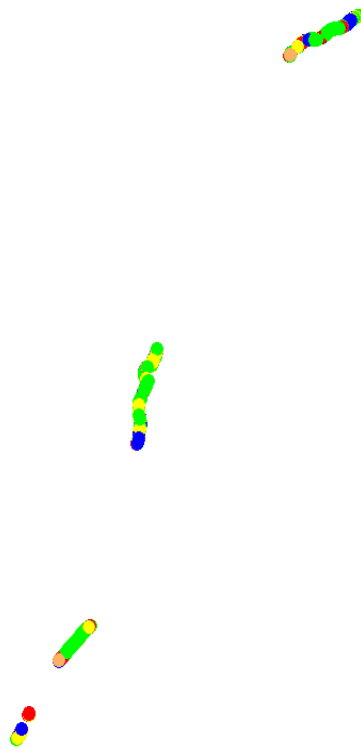
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	6650	88.18	
(2, ≤ 3)	283	3.75	
(3, ≤ 4)	302	4.00	
(4, ≤ 5)	133	1.76	
(5, $\leq \text{Max}$)	173	2.29	
Total	7541	100.00	

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	95.9%



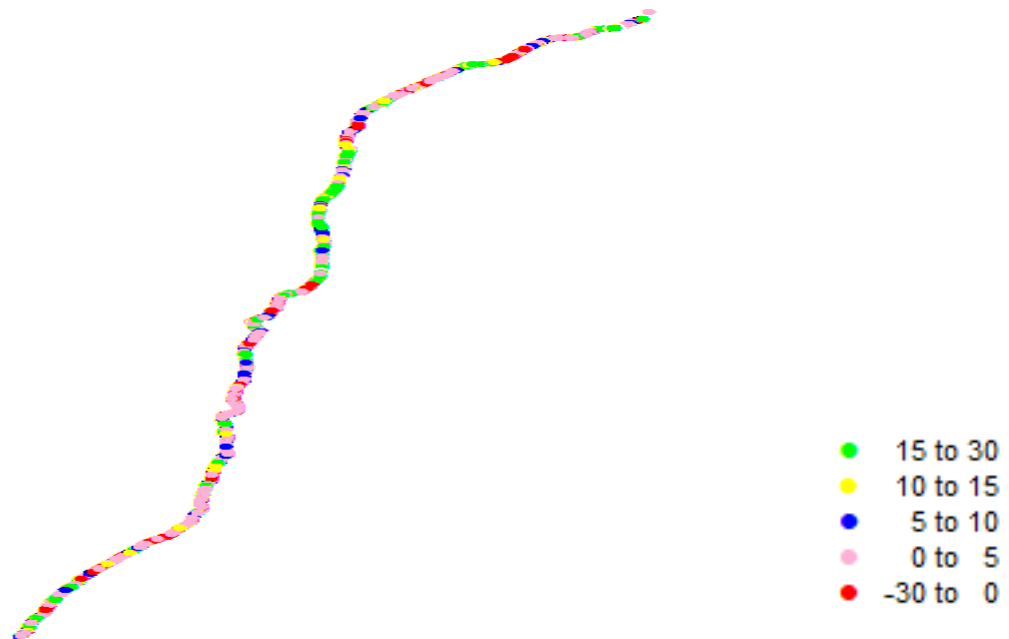
Overall Ec/No	# Samples	% PDF	Legends
(Max, ≤ -6)	75427	49.3%	
(-6, ≤ -9)	38893	25.4%	
(-9, ≤ -11)	26087	17.1%	
(-11, ≤ -14)	6304	4.1%	
(-14, \leq Min)	6198	4.1%	
Total	152909	100%	

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-Airtel

Technology	Rx Quality %
VoLTE	84.37



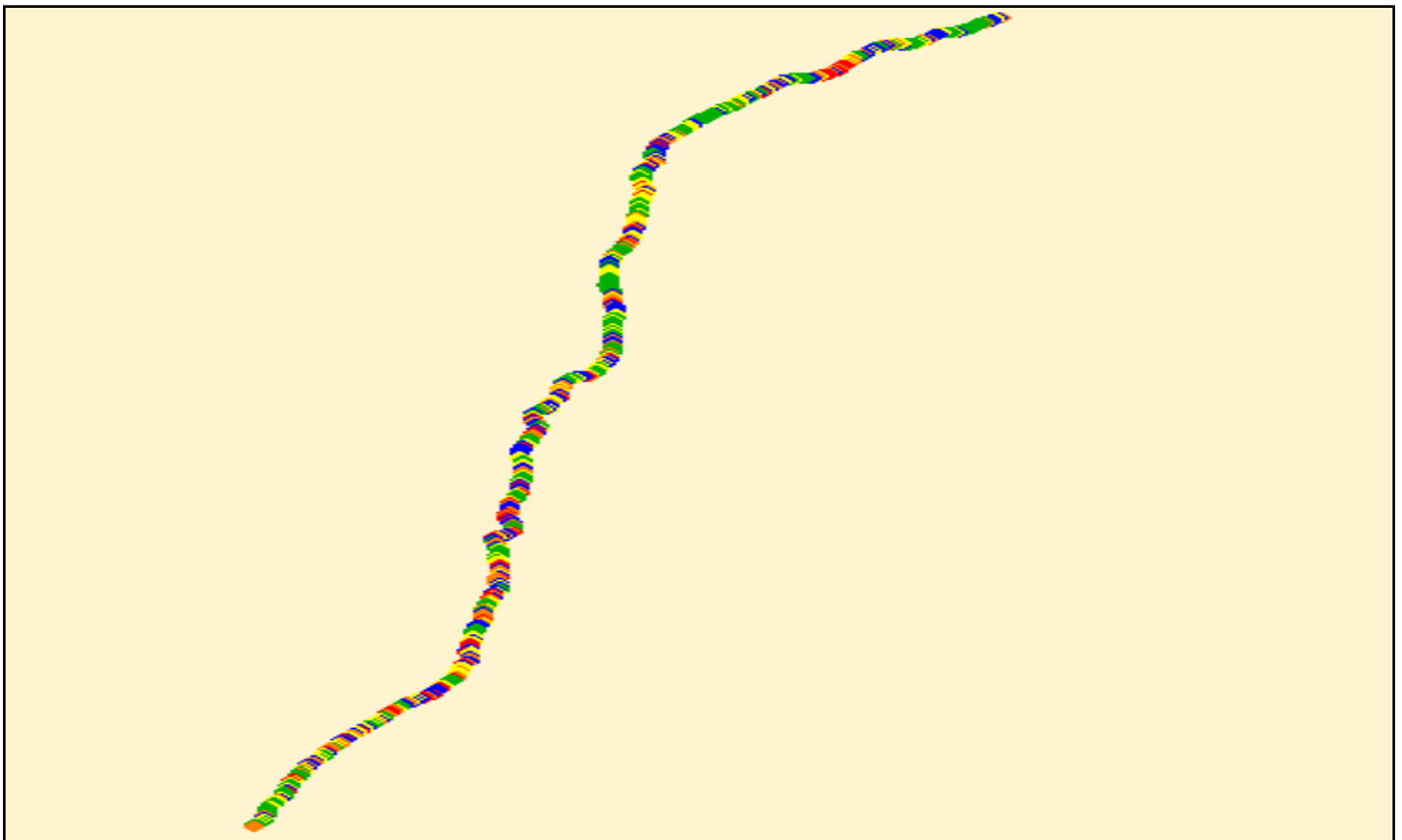
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	583082	15.63	Red
(0, ≤ 5)	1354500	36.31	Orange
(5, ≤ 10)	509677	13.66	Blue
(10, ≤ 15)	452176	12.12	Yellow
(15, $\leq \text{Max}$)	830678	22.27	Green
Total	3730113	100	

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	89.92%



Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	1338	10.08%	Red
(0, ≤ 5)	2269	17.09%	Orange
(5, ≤ 10)	2978	22.43%	Blue
(10, ≤ 15)	2775	20.90%	Yellow
(15, $\leq \text{Max}$)	3919	29.51%	Green
Total	13279	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 $\geq 95\%$.

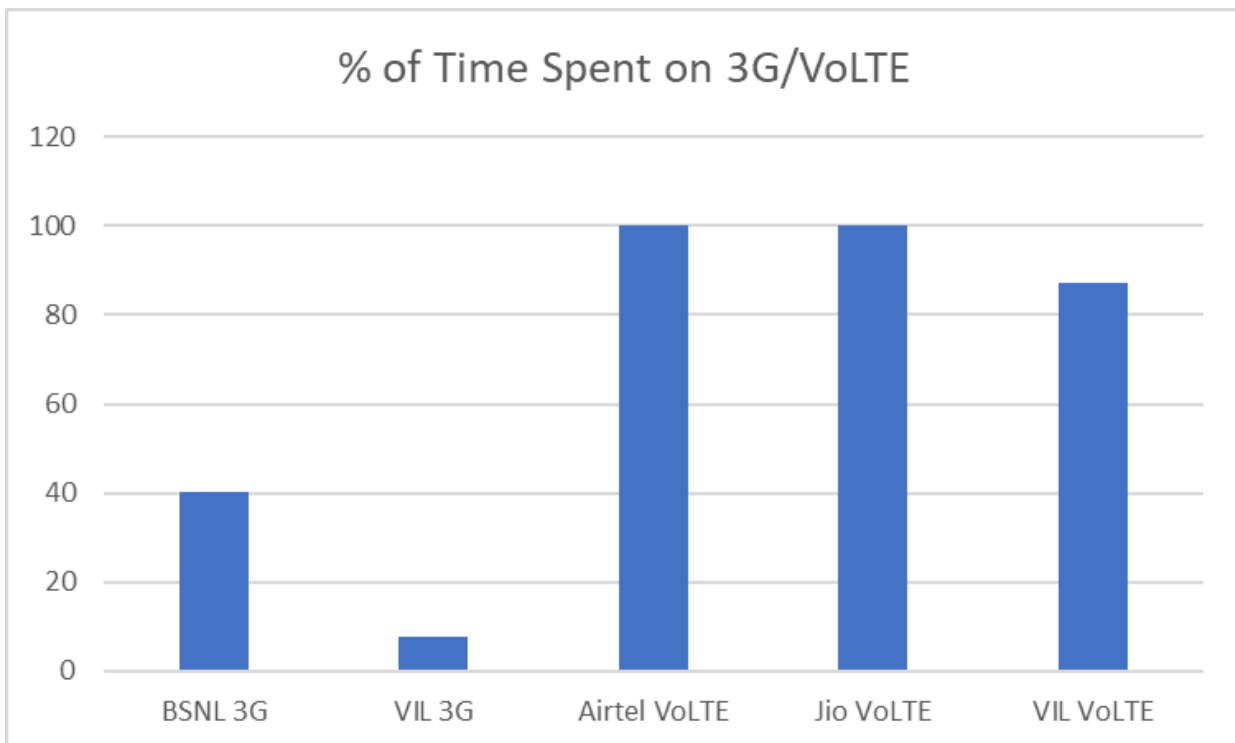
TSP-Vodafone Idea

Technology	Rx Quality %
VoLTE	89.69



Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	635	10.31	
(0, ≤ 5)	938	15.22	
(5, ≤ 10)	1223	19.85	
(10, ≤ 15)	1311	21.28	
(15, $\leq \text{Max}$)	2054	33.34	
Total	5748	100	

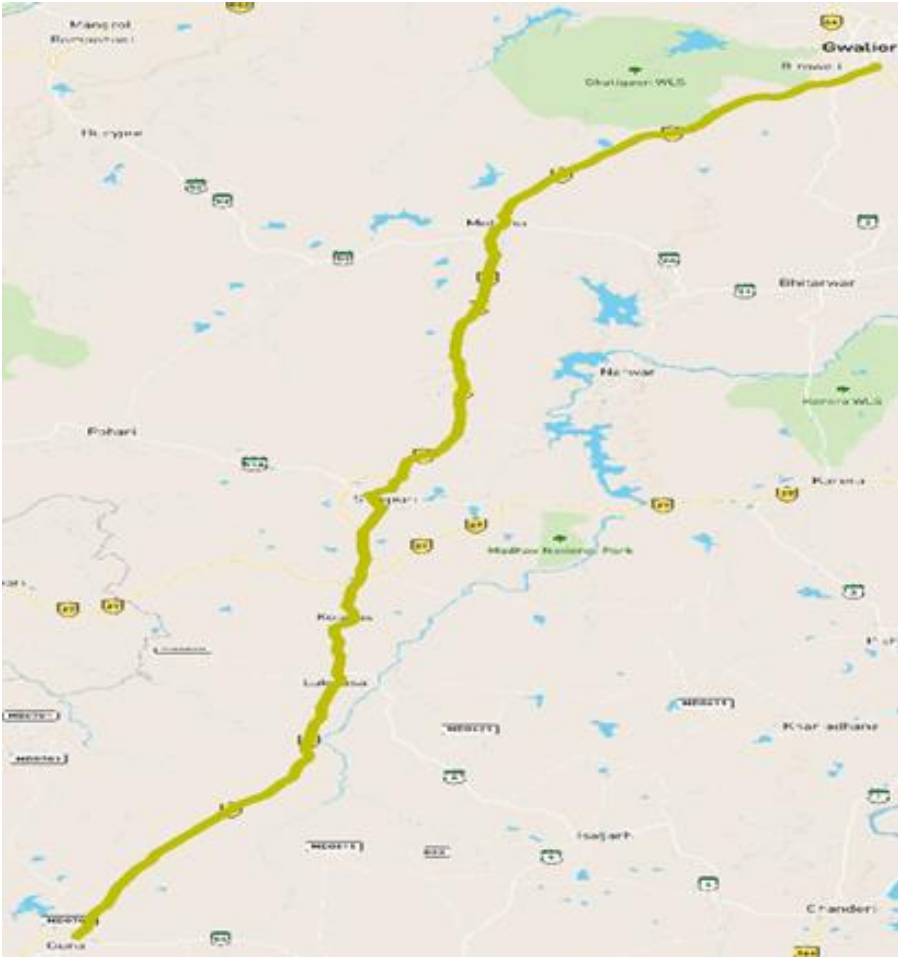
TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	40.2
VIL 3G	7.53
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	87.04



Technology Details

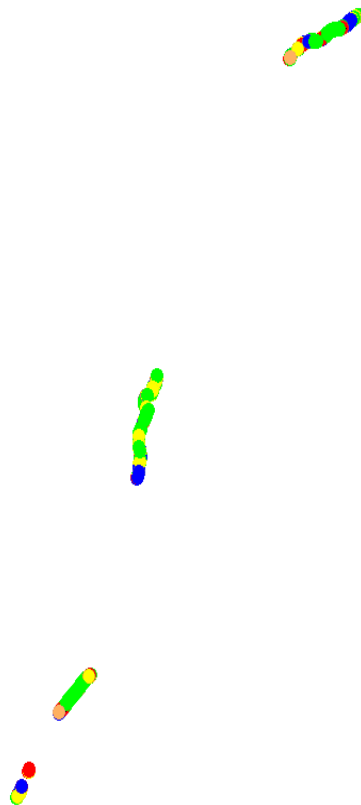
TSP-Airtel

Technology	% of Time Spent on
3G	
VoLTE	100



TSP- BSNL

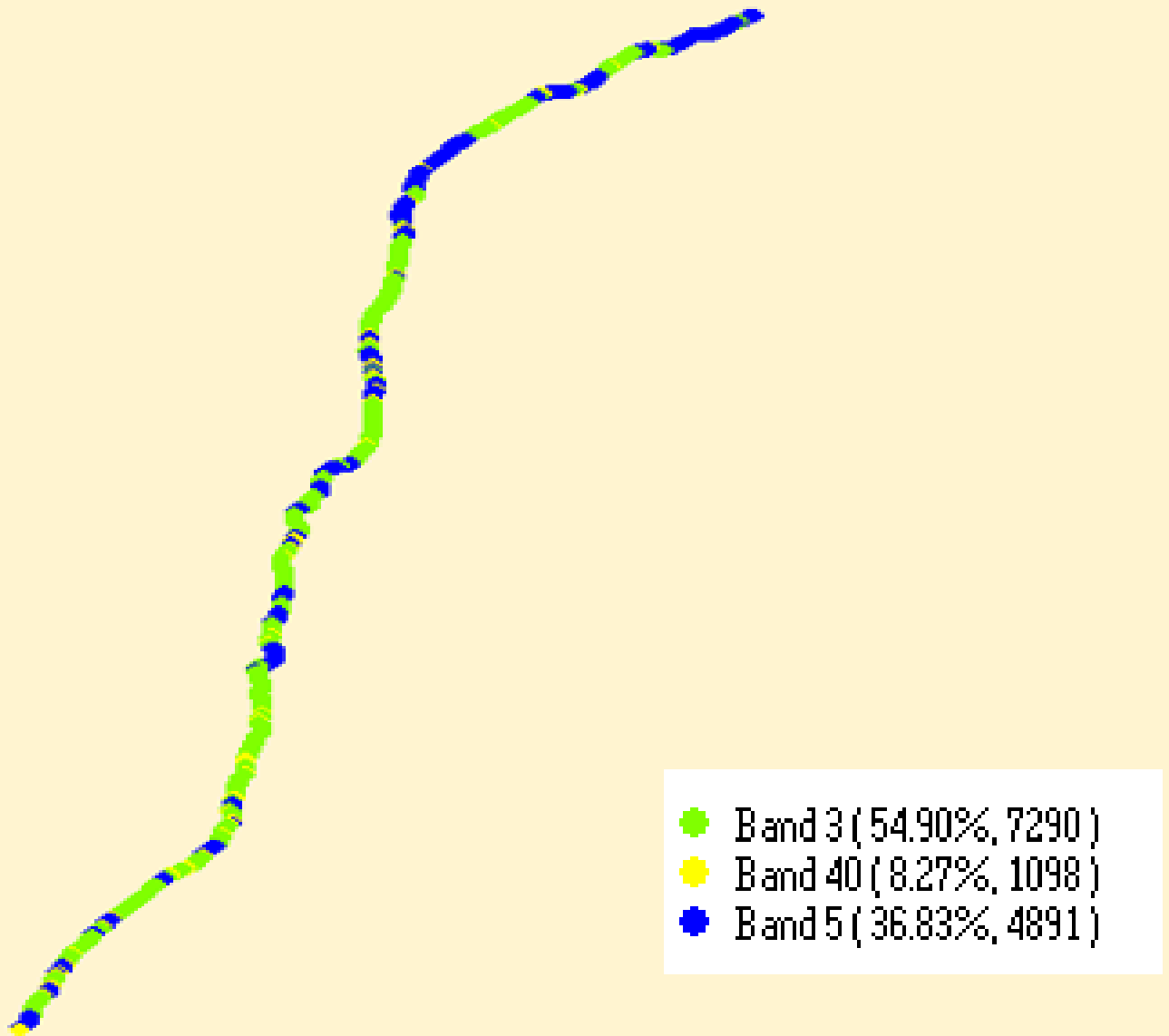
Technology	% of Time Spent on
3G	40.2%
VoLTE	



Technology Details

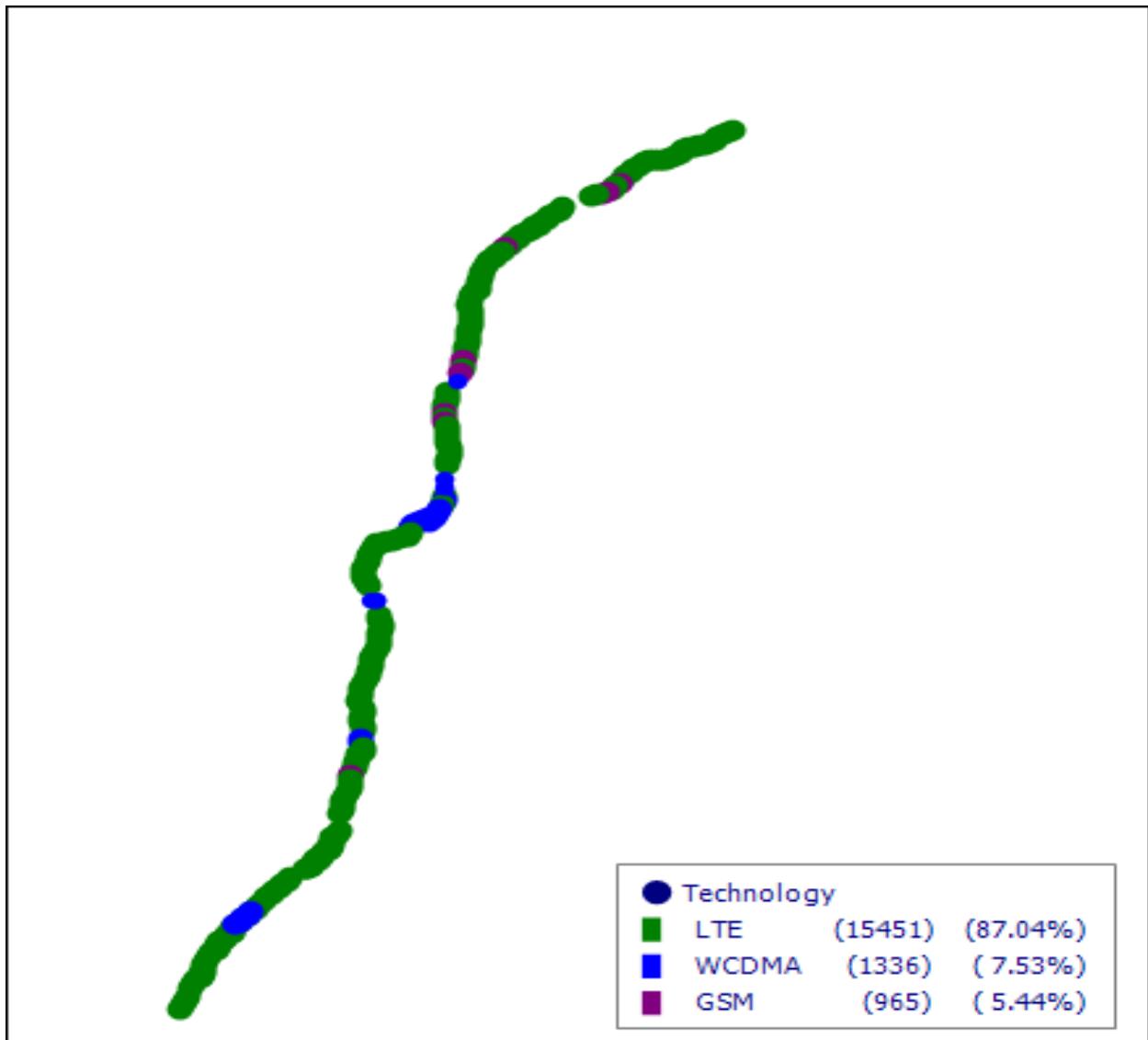
TSP- JIO

Technology	% of Time Spent on
3G	
VoLTE	100%



TSP-Vodafone Idea

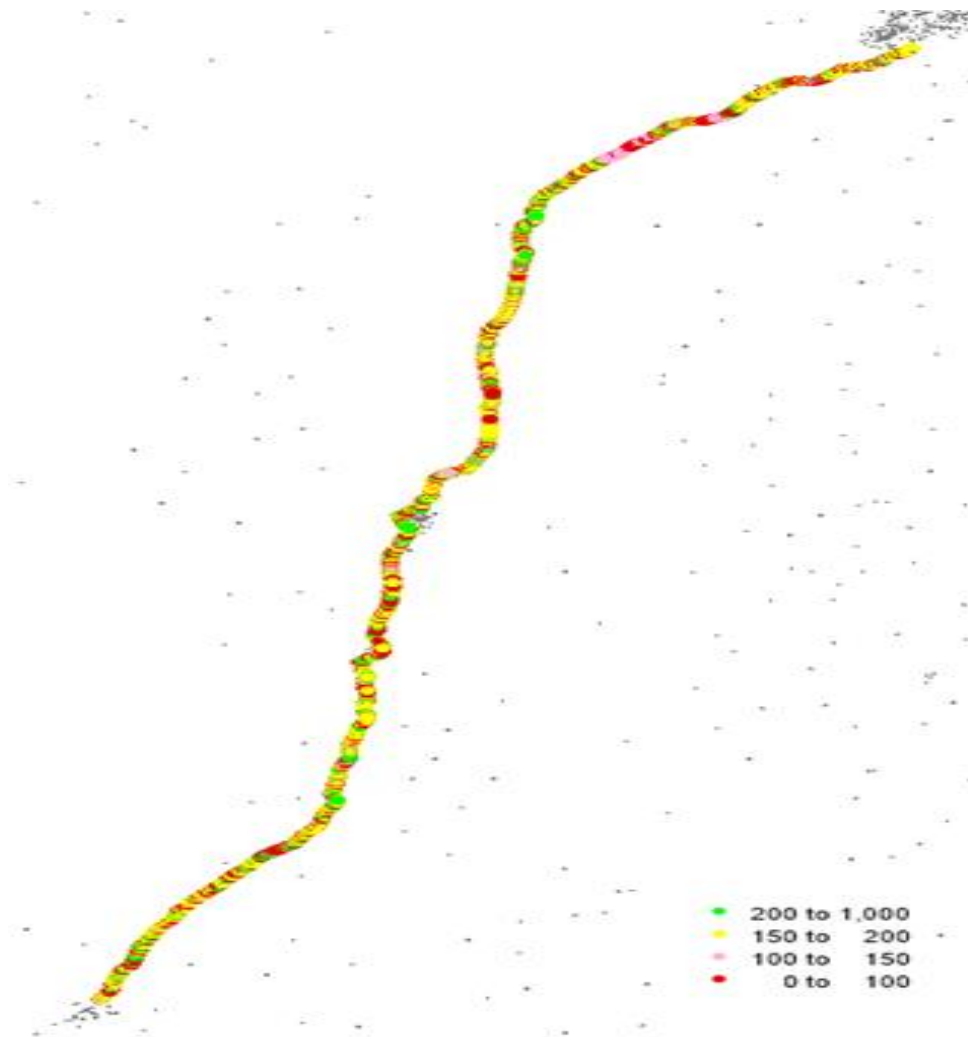
Technology	% of Time Spent on
3G	7.53
VoLTE	87.04



TSP- Airtel

Data Statistics - Dynamic data testing

Data KPIs – Overall	2G
Download Throughput (Kbps)	141.03

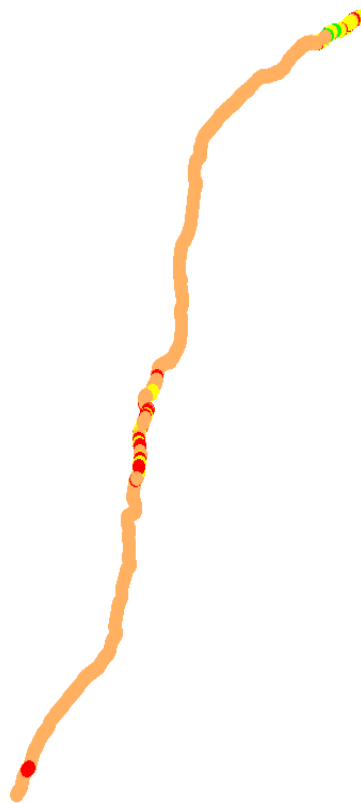


DL throughput	No of Sample	%	Legends
< 100 Kbps	24604	33.38	Red
100-150Kbps	7247	9.83	Orange
150-200Kbps	29086	39.46	Yellow
>200Kbps	12756	17.30	Green

TSP- BSNL

Data Statistics - Dynamic data testing -

Data KPIs - Overall	2G
Download Throughput (Kbps)	112 Kbps

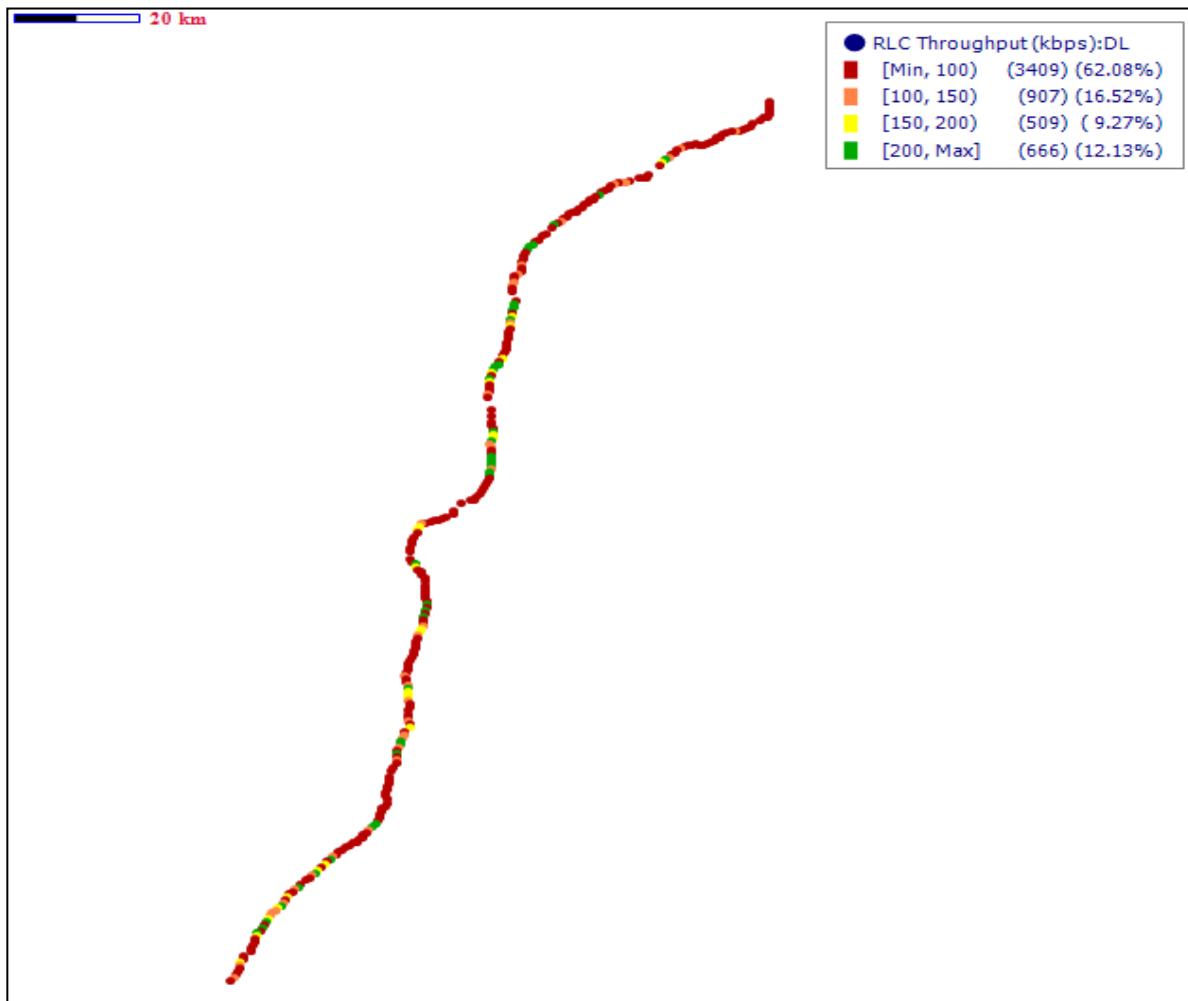


DL throughput	No of Sample	%	Legends
< 100 Kbps	72746	21.5%	Red
100-150Kbps	178739	52.8%	Orange
150-200Kbps	73933	21.8%	Yellow
>200Kbps	13108	3.9%	Green

TSP- Vodafone Idea

Data Statistics - Dynamic data testing

Data KPIs - Overall	2G
Download Throughput (Kbps)	47.8



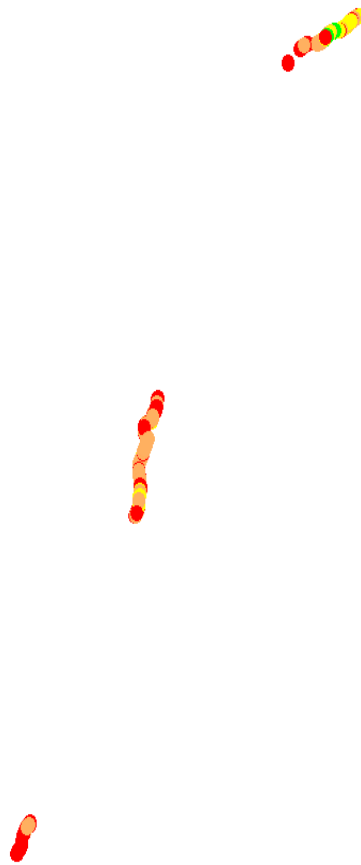
DL throughput	No of Sample	%	Legends
< 100 Kbps	3409	62.08	
100-150Kbps	907	16.52	
150-200Kbps	509	9.27	
>200Kbps	666	12.13	

Dynamic Data Test

TSP- BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	3G
Download Throughput (Mbps)	2.21 Mbps



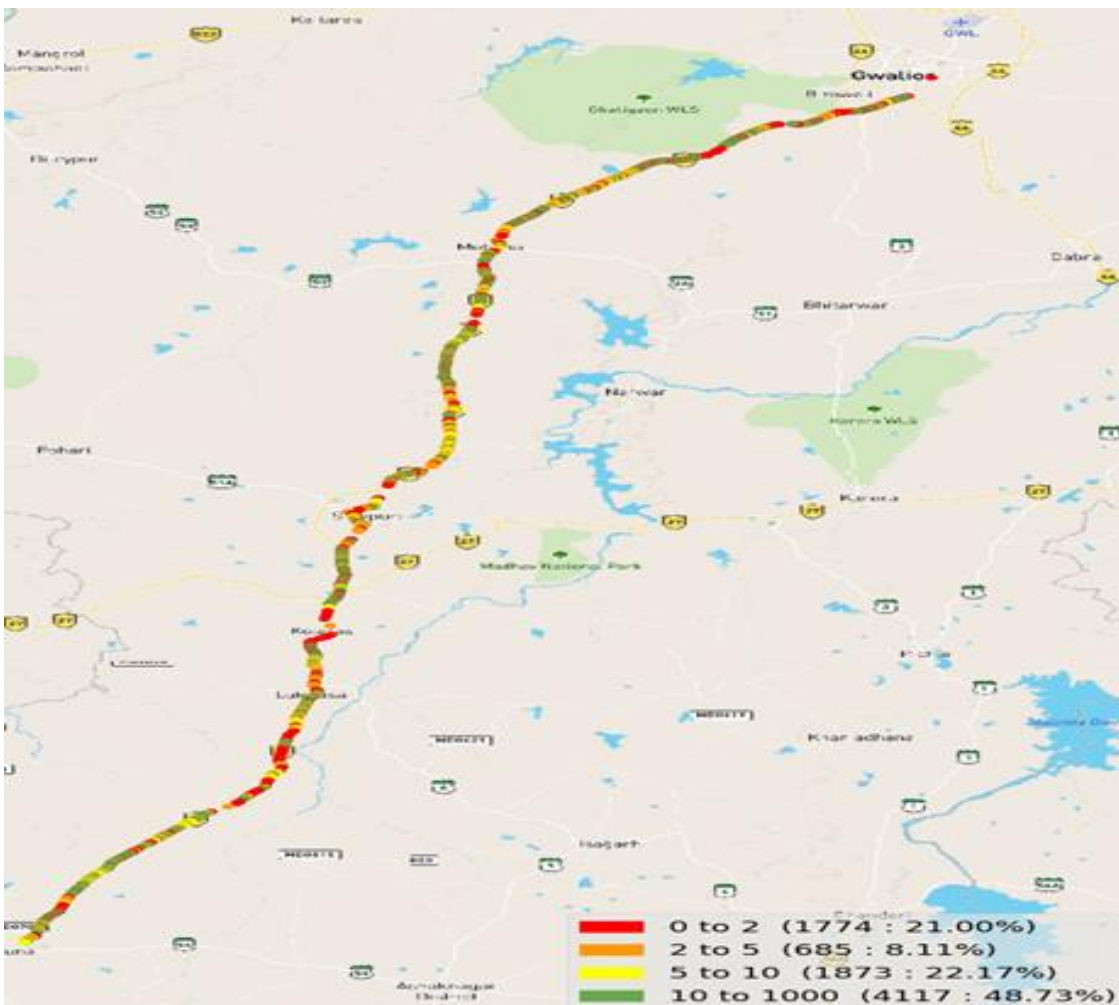
DL throughput	No of Sample	%	Legends
< 1 Mbps	109614	35.0%	Red
1-5 Mbps	156596	50.0%	Orange
5-10 Mbps	35226	11%	Yellow
>10Mbps	13108	4%	Green

Dynamic Data Test

TSP- Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	16.70



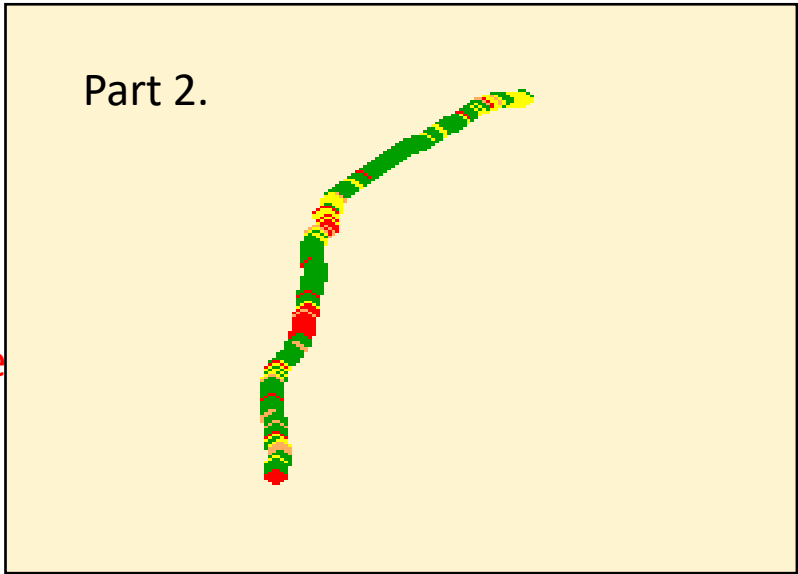
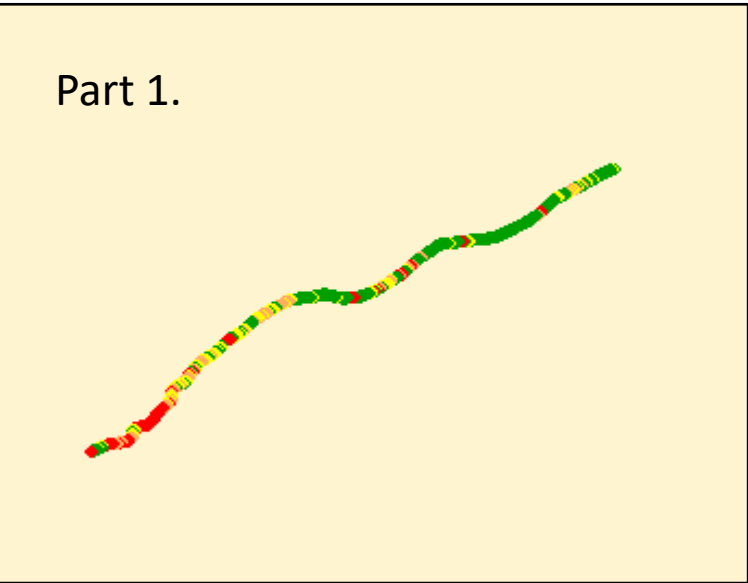
DL throughput	No of Sample	%	Legends
< 2Mbps	1774	21.00	
2-5 Mbps	685	8.11	
5-10 Mbps	1873	22.17	
>10Mbps	4117	48.73	

Dynamic Data Test

TSP- JIO

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	

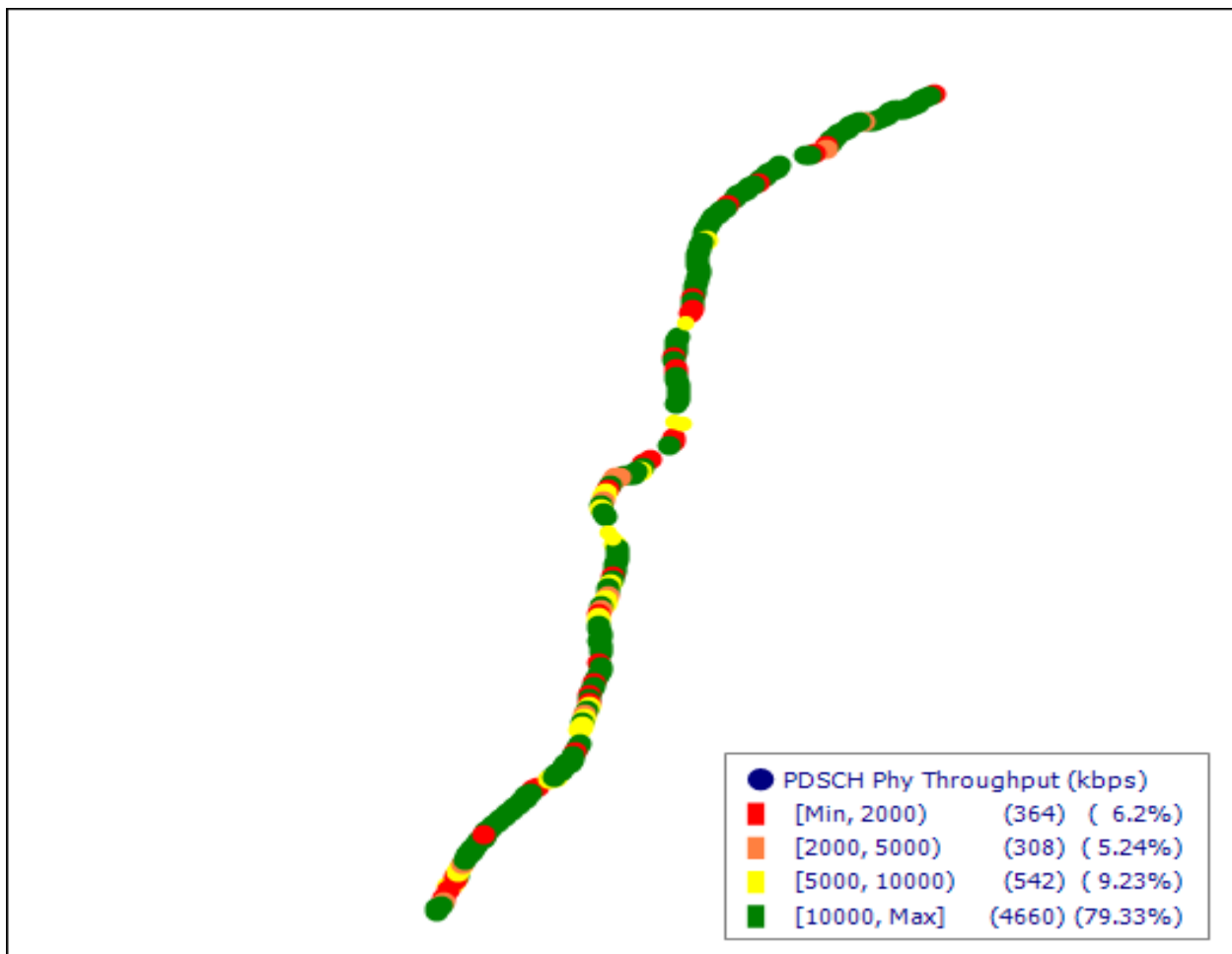


DL throughput	No of Sample	%	Legends
< 2Mbps	2051	14.85	Red
2-5 Mbps	2426	17.57	Yellow
5-10 Mbps	2994	21.68	Light Green
>10Mbps	6336	45.89	Dark Green

TSP- Vodafone Idea

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	23.54



DL throughput	No of Sample	%	Legends
< 2Mbps	364	6.2	■
2-5 Mbps	308	5.24	■
5-10 Mbps	542	9.23	■
>10Mbps	4660	79.33	■