Operator Assisted Drive Test Report

Neemuch –Ujjain.Highway
15/12/2023
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 Neemuch to Ujjain Highway from 9:00 AM to 8:00 PM. The drive test covered drive route of around 204 KMs.

TSP	Network tested
Airtel	2G & VoLTE
BSNL	2G & 3G
JIO	VoLTE
VIL	2G & 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%	None of the TSP achieved the benchmark 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.
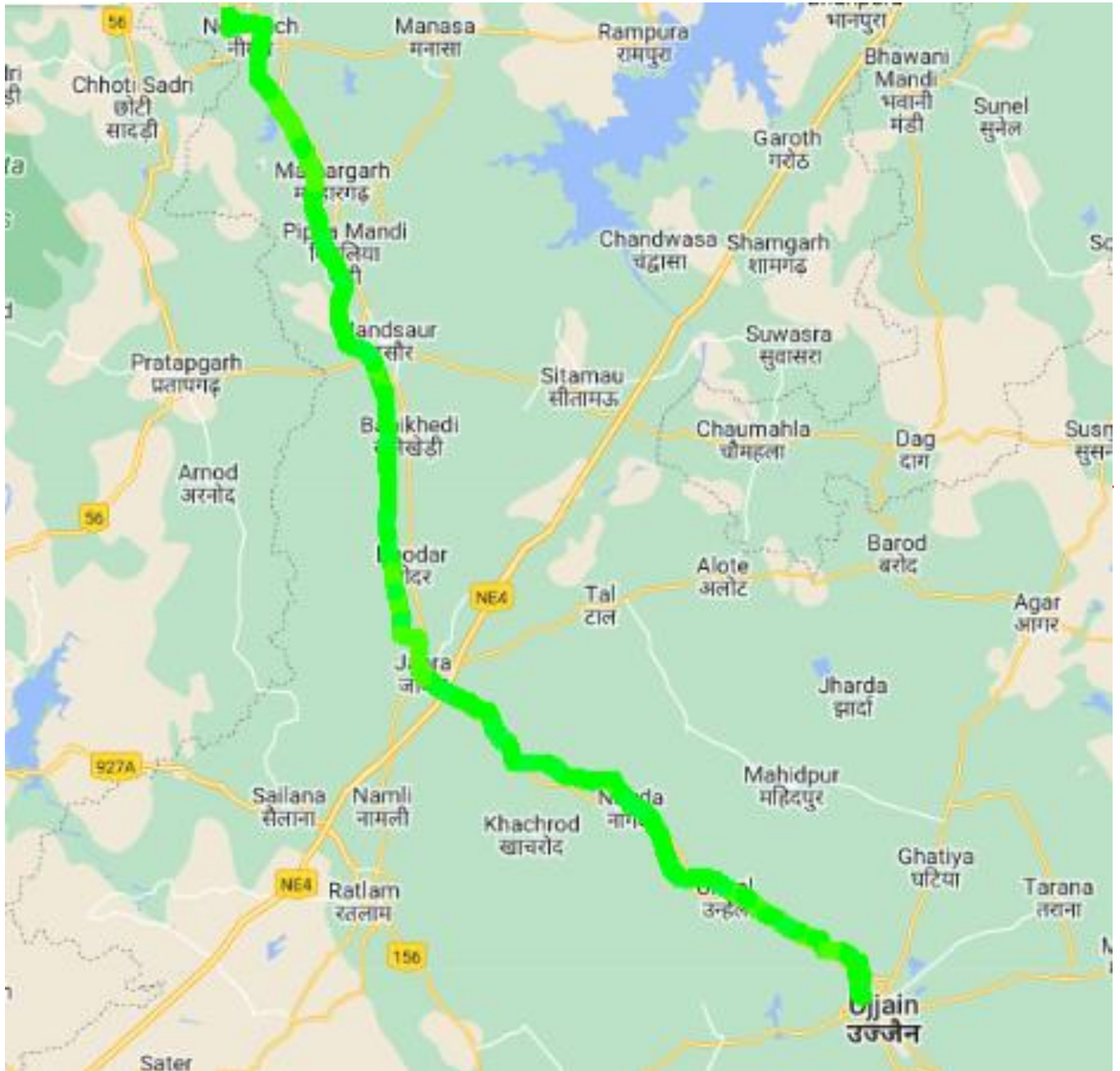
Data Tests:
Dynamic data – repeat data file download (to check throughput on the entire route)

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

Voice & Dynamic Data Test Drive Route

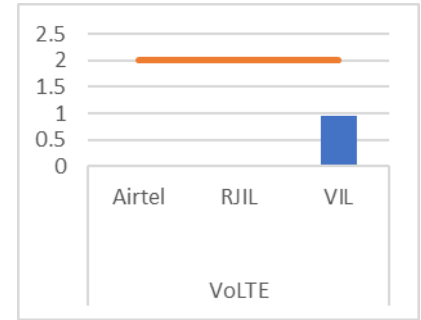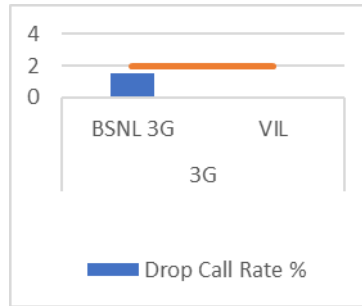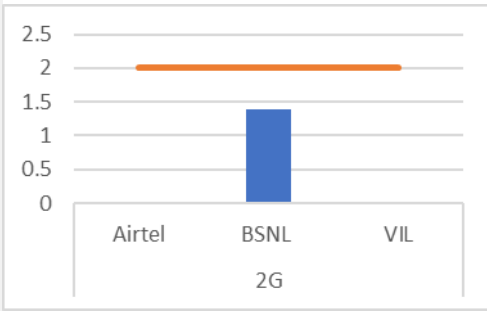| List of important area covered during the drive test |
|:---:|
| Neemuch |
| Jaora |
| Nagda |
| Ujjain |

Voice Calls

QoS compliance of the TSPs   for Voice across technologies 2G/3G/4G-VoLTE:
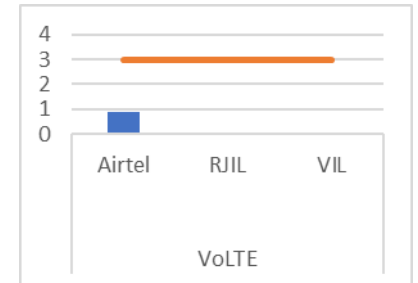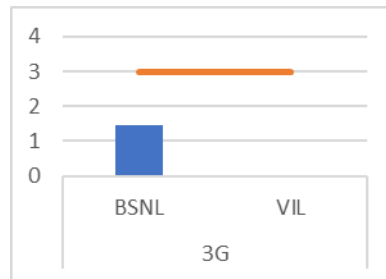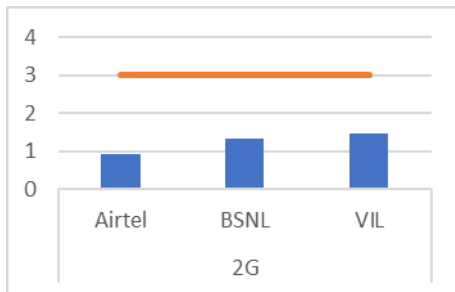
KPIs	2G			3G		VoLTE		
	Airtel	**BSNL**	**VIL**	**BSNL**	**VIL**	**Airtel**	**RJIL**	**VIL**
Drop Call Rate %	0	1.38	0	1.49	NA	0	0	0.95
Block Call Rate %	0.92	1.32	1.47	1.47	NA	0.89	NA	0

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.

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Voice Calls

Coverage

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

TSPs	2G		
	Airtel	**BSNL**	**VIL**
Coverage %	**57.59**	**74.18**	**69.93**

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

TSPs	3G
	BSNL
Coverage %	**73.42**

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	**97.7**	**98.44**	**96.04**

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

TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Time Spent on 3G/4G %	**98**	**NA**	**100**	**100**	**78.93**

Data Services Dynamic

Key Observations

Dynamic Data -Download Throughput was tested.

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

Dynamic average data download throughput
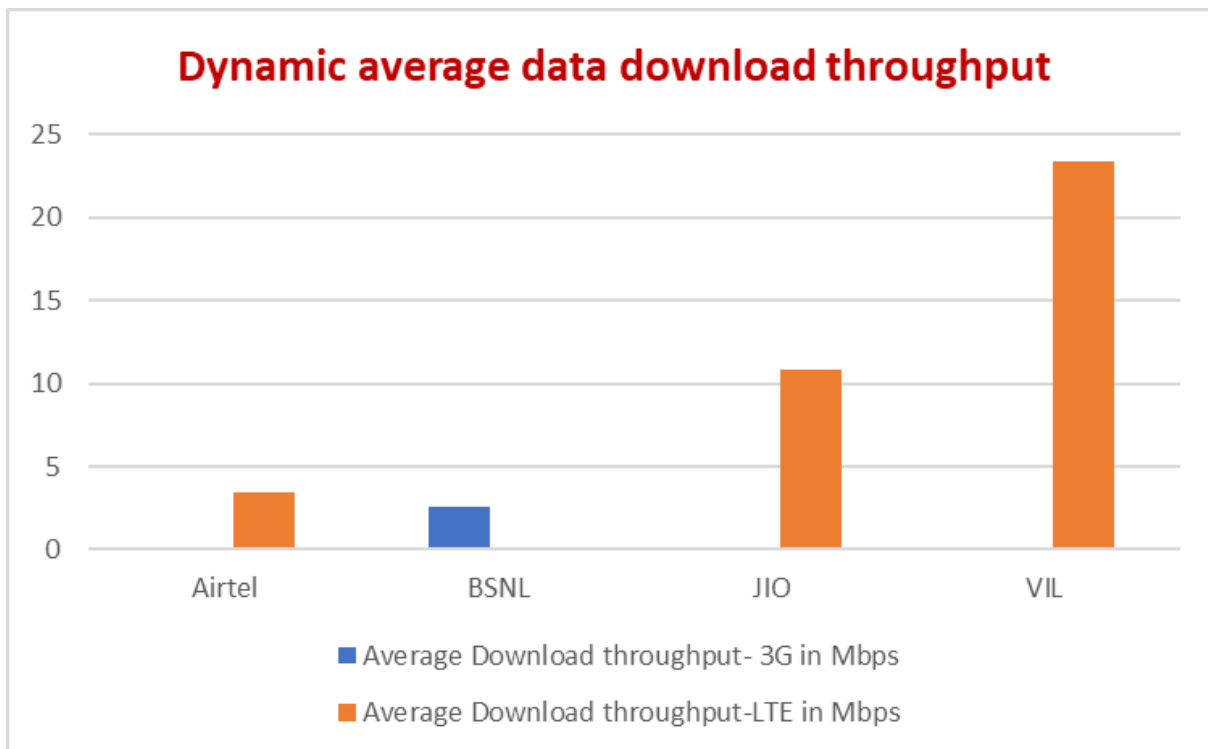
TSP	Airtel	BSNL	JIO	VIL
Average Download throughput- 3G In Mbps	NA	2.6	NA	NA
Average Download throughput-LTE in Mbps	3.46	NA	10.87	23.39
Average Download throughput- 5G in Mbps	NA	NA	NA	NA

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Summary

TSP (For 2G)	Airtel	BSNL	VIL
Call attempts	109	151	136
Block call rate %	0.92	1.32	1.47
CSSR %	99.08	96.03	98.53
Drop call rate %	0	1.38	0.00
Mobility HOSR %	96.63	96.27	98.91
RX Quality %	97.73	96.13	98.18
Average CST Sec	3.19	2.2	2.4

TSP (For 3G)	BSNL
Call attempts	136
Block call rate %	1.47
CSSR %	98.53
Drop call rate %	1.49
Mobility HOSR %	97.70
RX Quality %	95.11
Average CST (Sec)	2.1

TSP (For Volte)	Airtel	BSNL	JIO	VIL
Call attempts	112	NA	101	105
Block call rate %	0.89	NA	-	0
CSSR %	99.11	NA	100	100
Drop call rate %	0	NA	0	0.95
Mobility HOSR %	97.88	NA	98.44	98.68
RX Quality %	89.38	NA	84.81	90.20
Average CST(Sec)	0.64	NA	1.73	1.15

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.
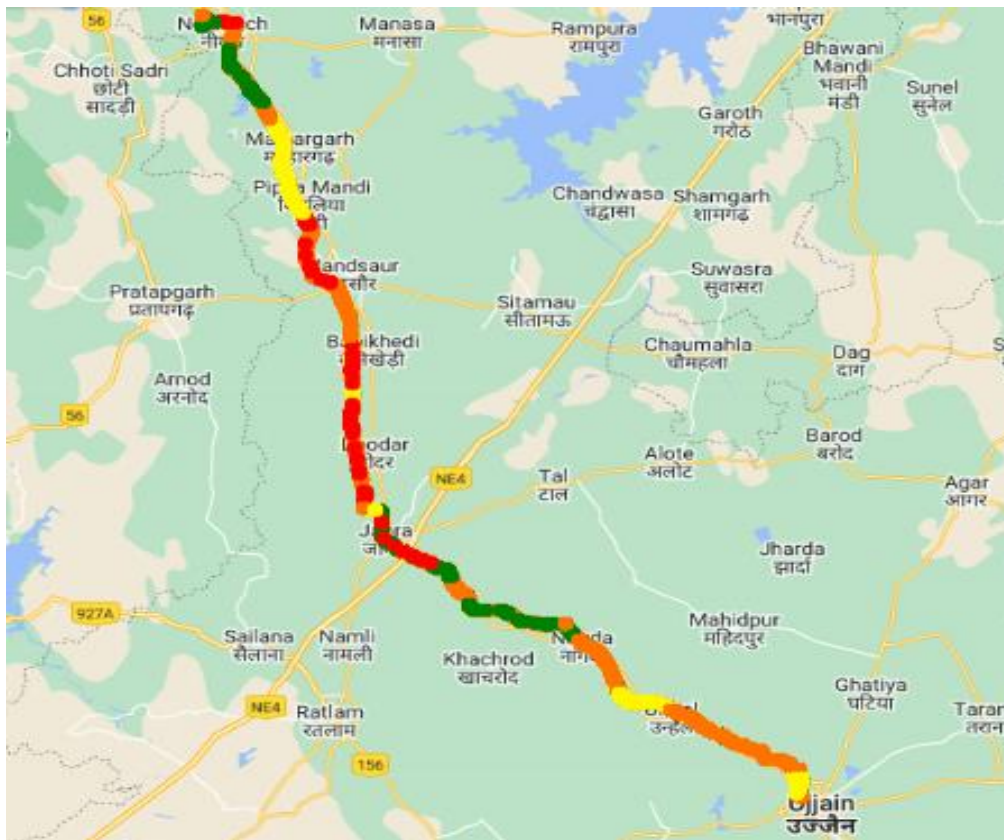
TSP	Coverage Rate %
Airtel 2G	57.59
BSNI 2G	74.18
VIL 2G	69.93
BSNL 3G	73.42
Airtel VoLTE	97.7
Jio VoLTE	98.44
VIL VoLTE	96.04

Coverage Rate %

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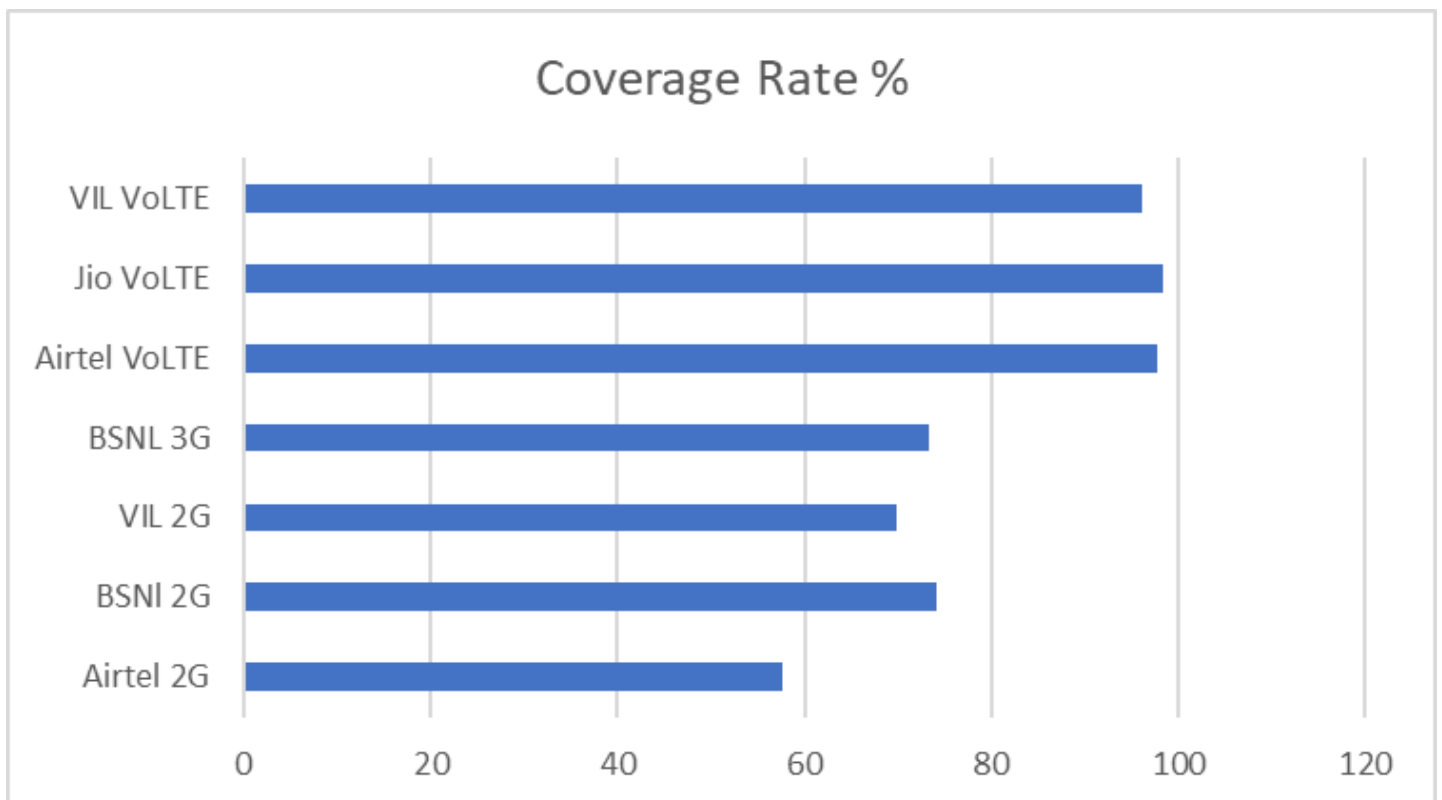
TSP- Airtel

Technology	Coverage %
2G	57.59
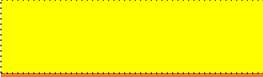
Color	Range	Count	Per
	[Min to -95)	(243)	(2.17%)
	[-95 to -85)	(4502)	(40.23%)
	[-85 to -75)	(4332)	(38.71%)
	[-75, Max)	(2113)	(18.88%)

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TSP- BSNL

Technology	Coverage %
2G	74.18 %
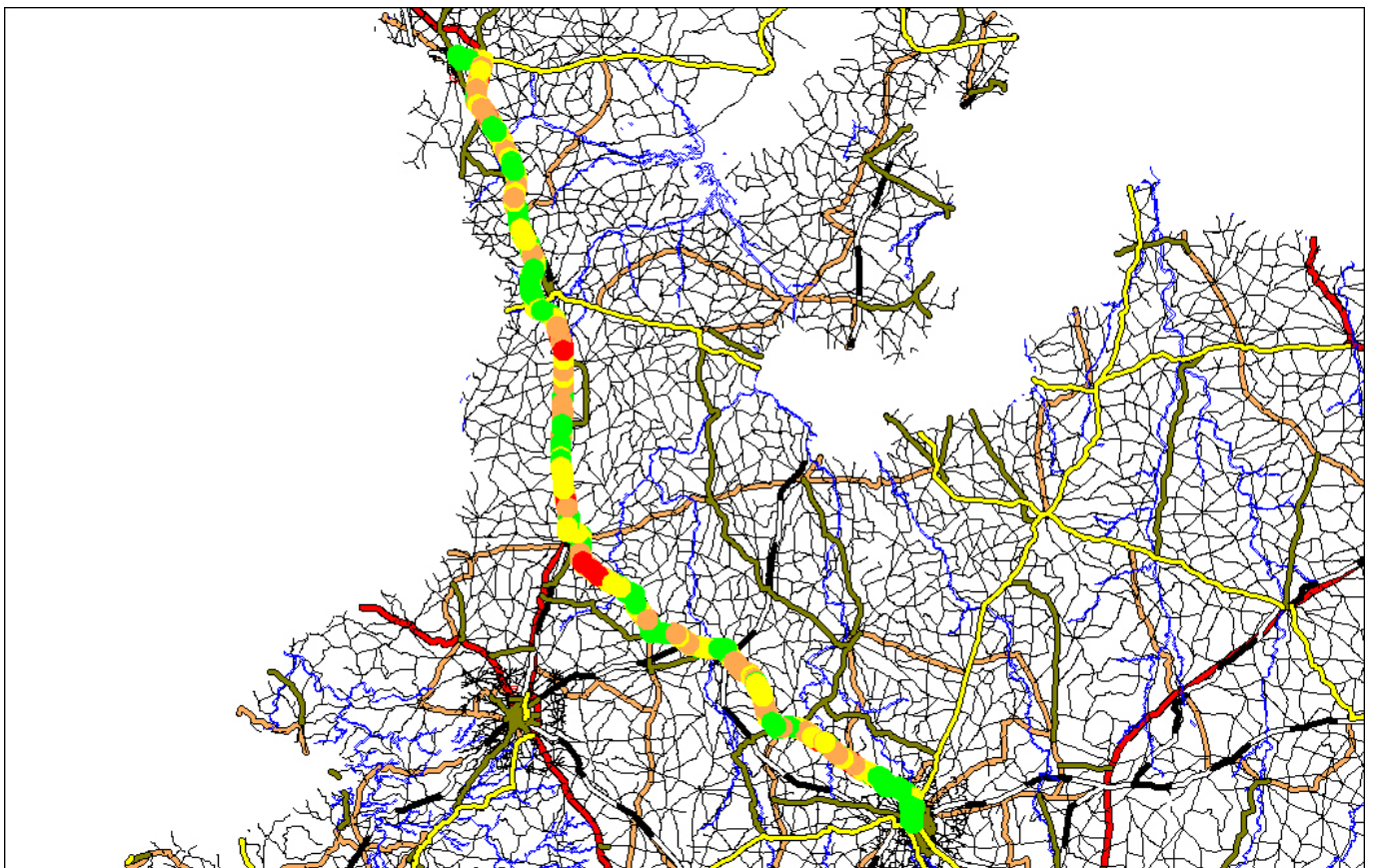
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	856252	44.59	
[-75, >=-85)	568183	29.59	
[-85, >=-95)	448364	23.35	
[-95, >=Min)	47349	2.47	
Total	1920148		

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TSP-VIL 2G

Technology	Coverage %
2G	69.93%

RxLevSub (dBm) - .Server
[Min, -95)   (775) (6.29%)
[-95, -85)   (2933) (23.79%)
[-85, -75)   (3898) (31.61%)
[-75, Max]   (4724) (38.31%)
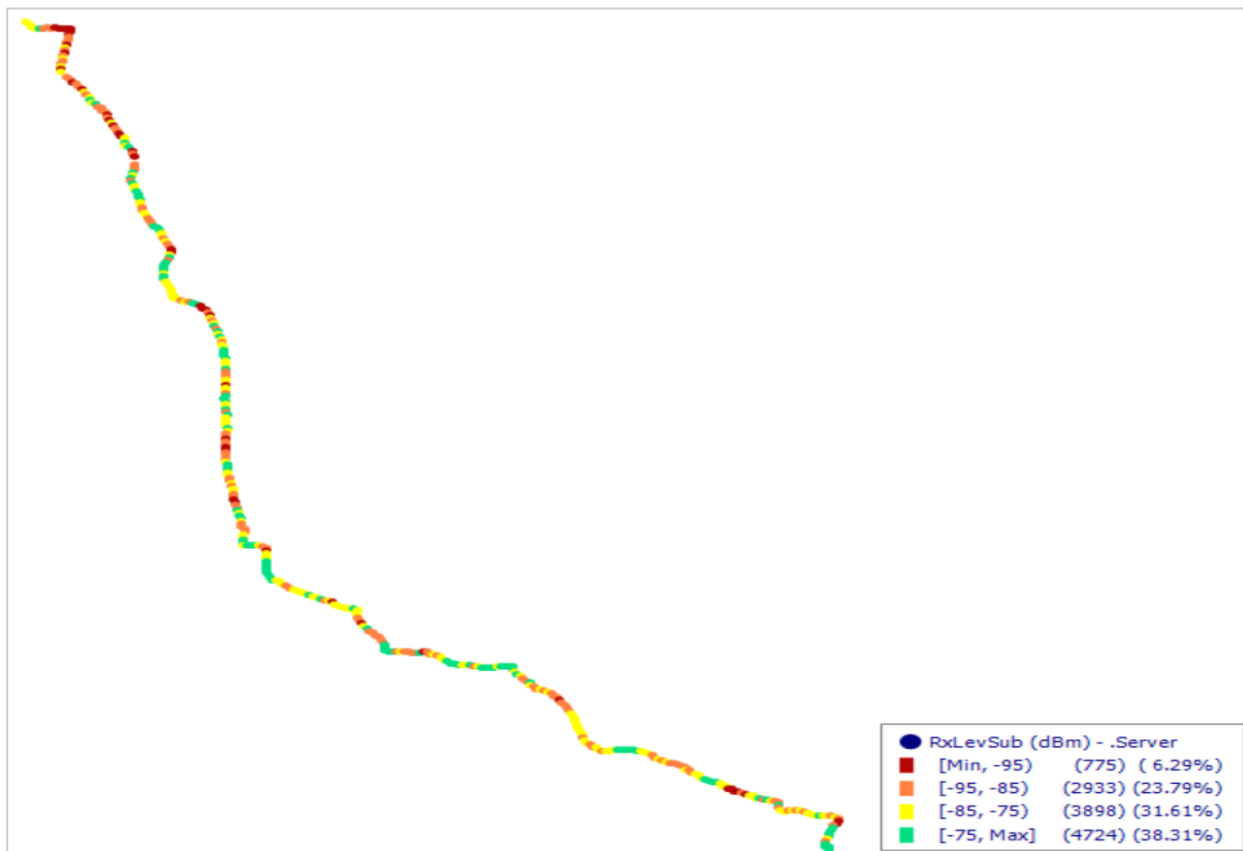
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	4742	38.31%	
[-75, >=-85)	3898	31.61%	
[-85, >=-95)	2933	23.79%	
[-95, >=Min)	775	6.29%	
Total	**12348**	**100%**	

TSP- BSNL

Technology	Coverage %
3G	73.42 %
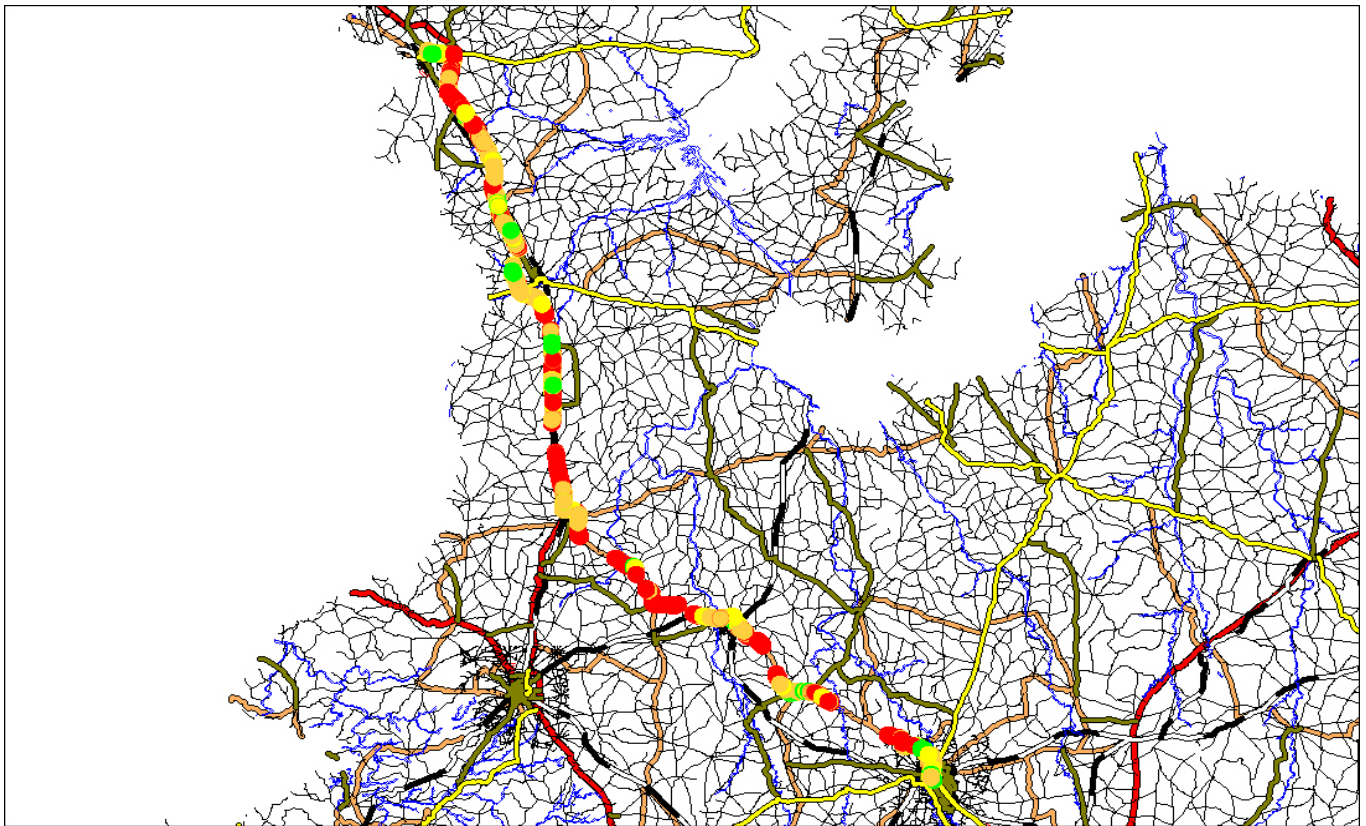
3G			
Overall RSCP	**# Samples**	**% PDF**	**Legends**
[Max, >=-70]	116696	17.43	
[-70, >=-80)	154080	23.02	
[-80, >=-90)	220712	32.97	
[-90, >=Min)	177961	26.58	
Total	669449		

TSP- Airtel

Technology	Coverage %
VoLTE	97.7
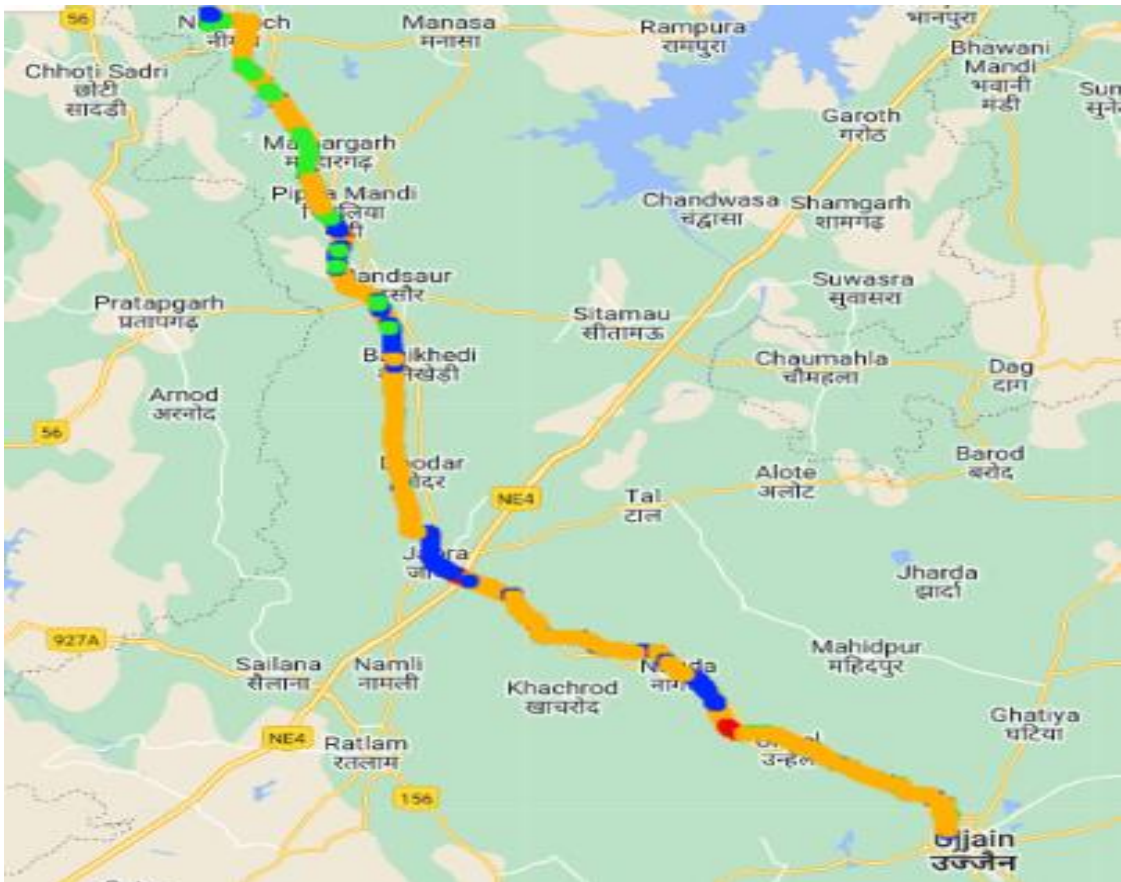
Color	Range	Count	Per
🟥	[Min, -110)	(259)	(2.31 %)
🟧	[-110, -90)	(6019)	(53.63%)
🟦	[-90, -80)	(3092)	(27.55%)
🟩	[-80, Max]	(1854)	(16.52%)

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TSP-JIO

Technology	Coverage %
VoLTE	98.44%
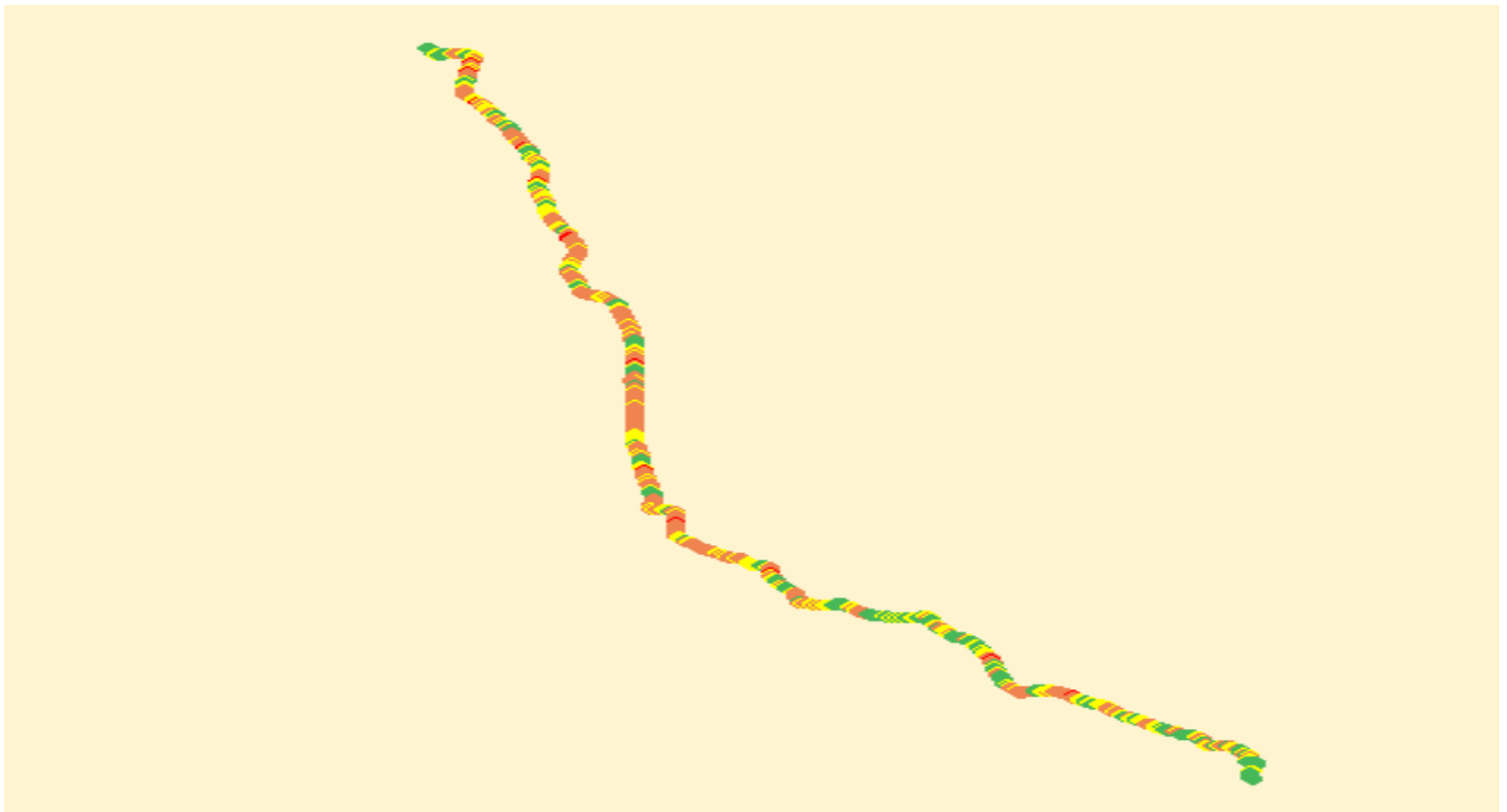
VoLTE			
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	4587	28.63%	
[-80, >=-90)	4865	30.37%	
[-90, >=-110)	6319	39.44%	
[-110, >=Min)	250	1.56%	
Total	16021		

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TSP-VIL Volte

Technology	Coverage %
VoLTE	96.04%

Serving Cell RSRP (dBm)
- [Min, -110)   (455) (3.96%)
- [-110, -90)   (4719) (41.04%)
- [-90, -80)   (3594) (31.25%)
- [-80, Max]   (2731) (23.75%)
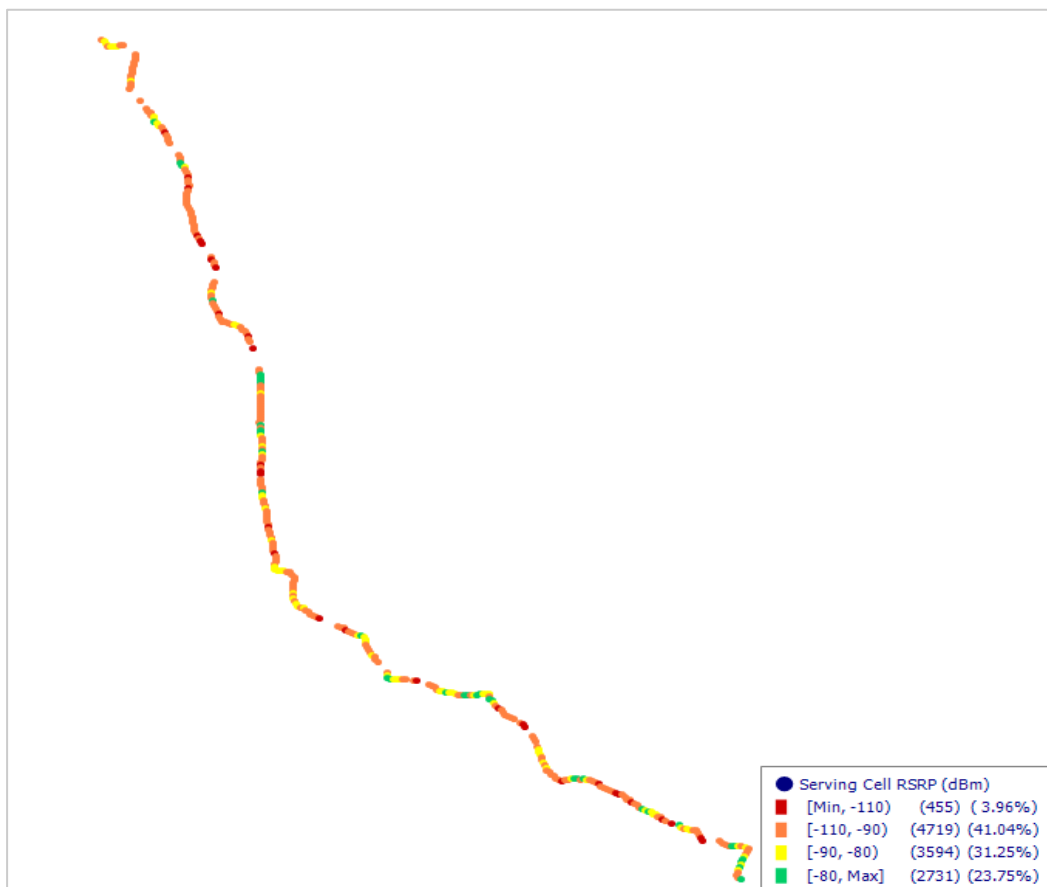
VoLTE			
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	2731	23.75%	🟩
[-80, >=-90)	3594	31.25%	🟨
[-90, >=-110)	4719	41.04%	🟧
[-110, >=Min)	455	3.96%	🟥
Total	11499	100%	

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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	97.73
BSNI 2G	96.13
VIL 2G	98.18
BSNL 3G	95.11
Airtel VoLTE	89.38
Jio VoLTE	84.81
VIL VoLTE	90.20
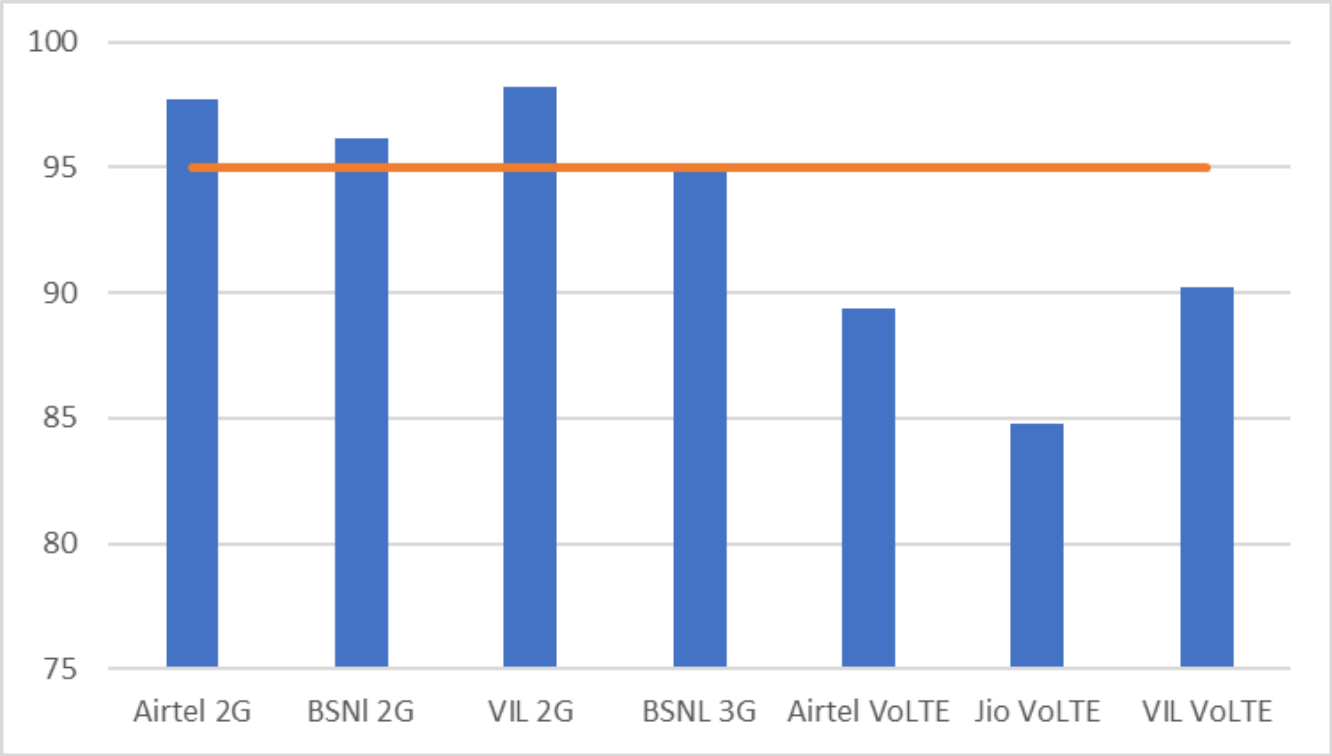
For measuring voice quality, as per the QoS norms, RxQual <=5 for GSM TSPs, EcNo >= -14 dBm for 3G TSP sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.
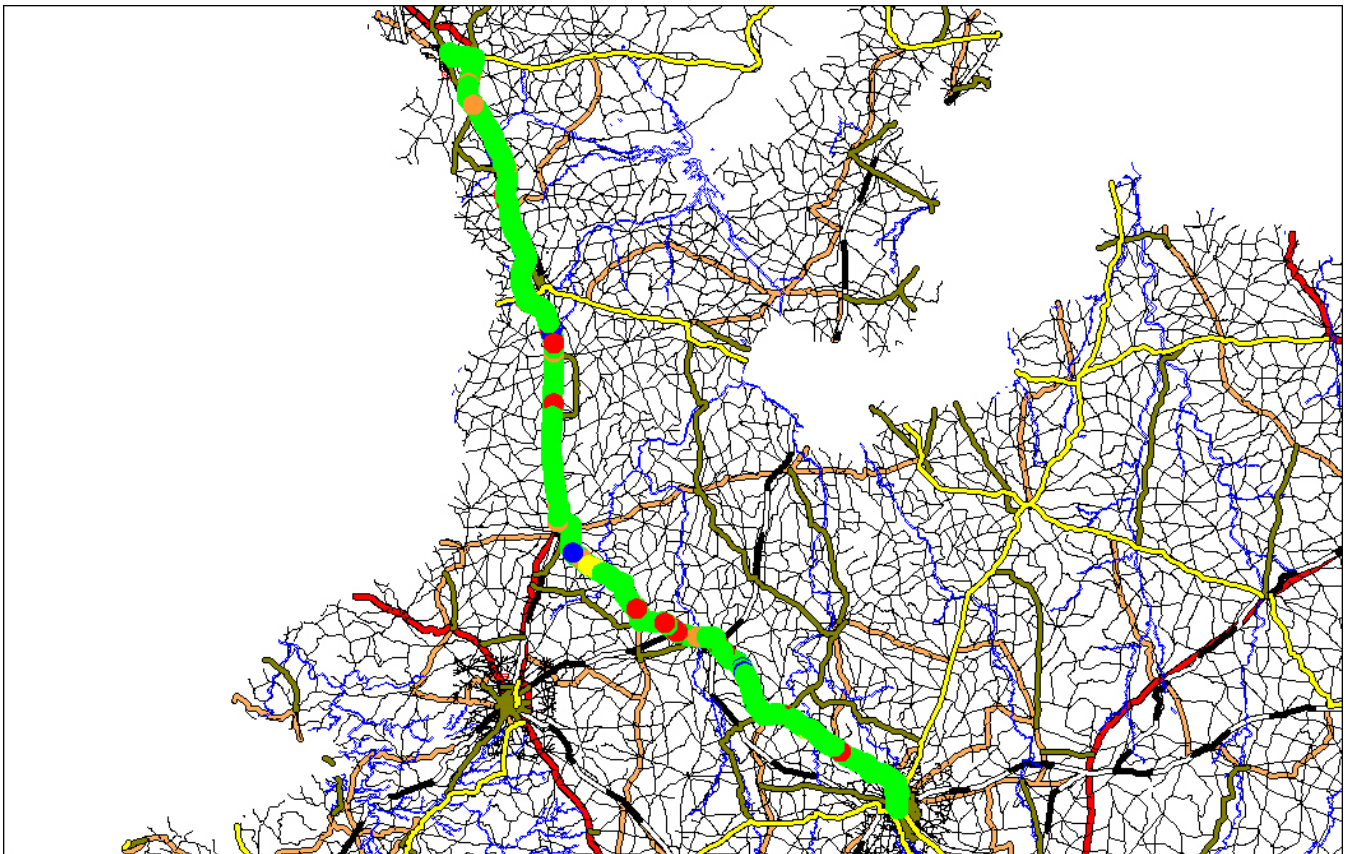
TSP- Airtel

Technology	Rx Quality %
2G	97.73

Color	Range	Count	Per
	[Min,5)	(7991)	(81.77%)
	[2,3)	(773)	(7.91%)
	[3,4)	(539)	(5.52%)
	[4,5)	(247)	(2.53%)
	[5,Max)	(223)	(2.28%)

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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	96.13 %

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	1767595	91.27	
(2, <=3)	33098	1.71	
(3 , <=4)	30402	1.57	
(4 , <=5)	30614	1.58	
(5 , <=Max)	75003	3.87	
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 2G

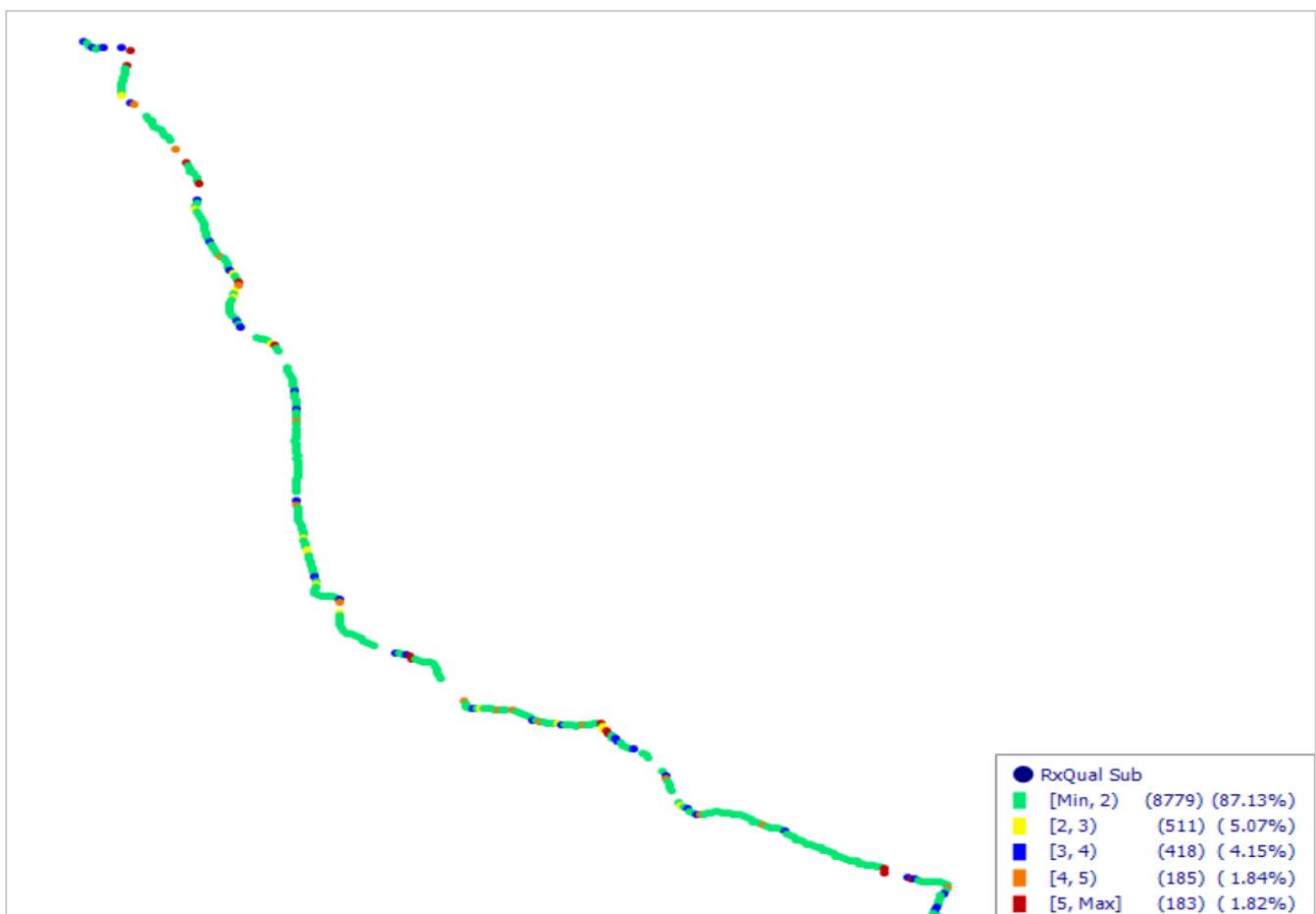| Technology	Rx Quality %
2G	98.18%

RxQual Sub
[Min, 2)   (8779) (87.13%)
[2, 3)   (511) (5.07%)
[3, 4)   (418) (4.15%)
[4, 5)   (185) (1.84%)
[5, Max]   (183) (1.82%)

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	8779	87.13%	
(2, <=3)	511	5.07%	
(3 , <=4)	418	4.15%	
(4 , <=5)	185	1.84%	
(5 , <=Max)	183	1.82%	
Total	10076	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%.
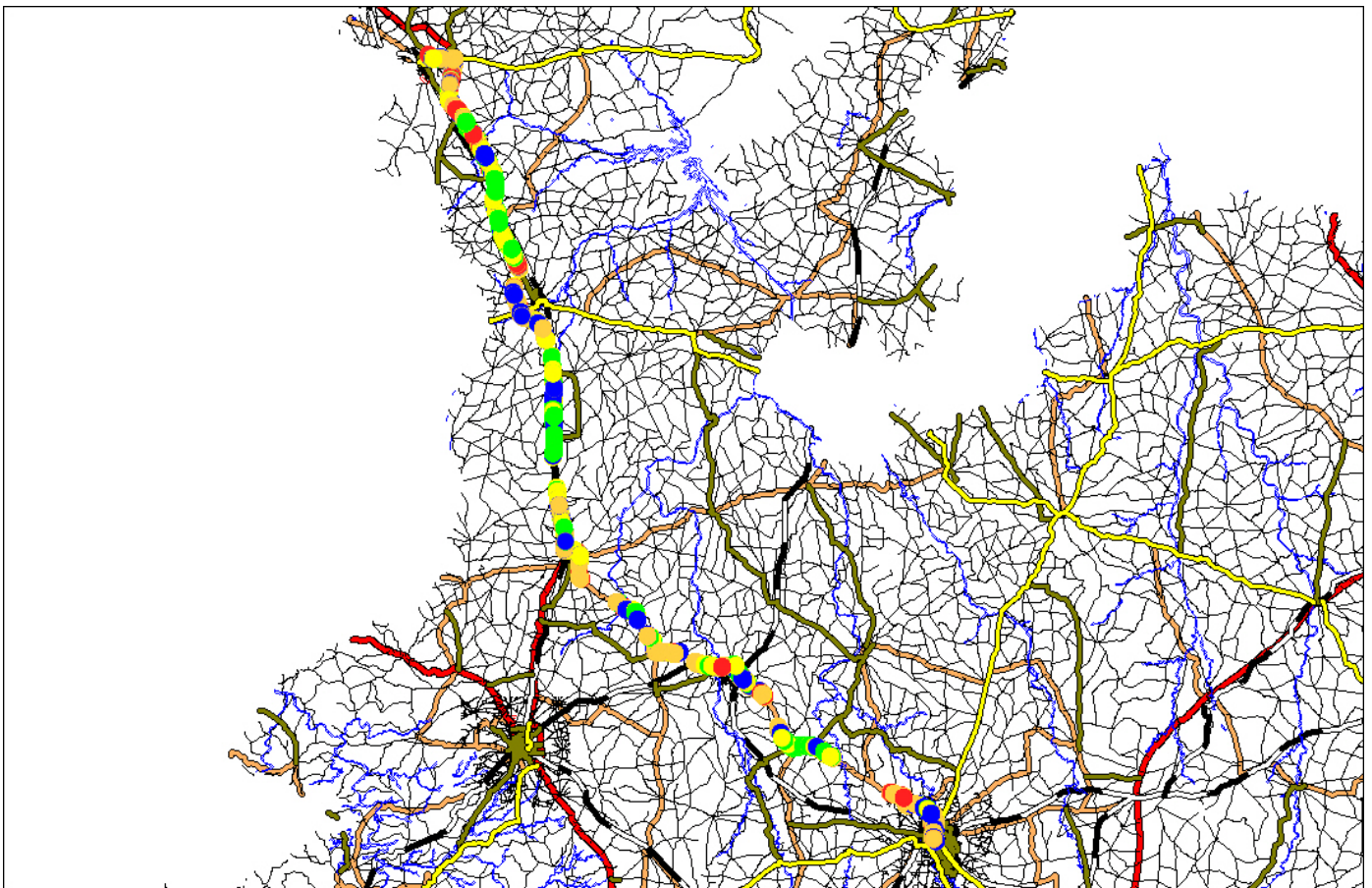
TSP- BSNL

Technology	Rx Quality %
3G	95.11 %

Overall Ec/No	# Samples	% PDF	Legends
(Max, <=-6)	218342	32.80	
(-6, <=-9)	167528	25.17	
(-9, <=-11)	98580	14.81	
(-11, <=-14)	148612	22.33	
(-14, <= Min)	32528	4.89	
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- Airtel

Technology	Rx Quality %
VoLTE	89.38

Color	Range	Count	Per
(red)	(Min, 0)	(1192)	(10.62%)
(orange)	(0, 5)	(3458)	(30.81%)
(blue)	(5, 10)	(2913)	(25.96%)
(yellow)	(10, 15)	(2021)	(18.01%)
(green)	(15, Max)	(1639)	(14.6%)

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%.
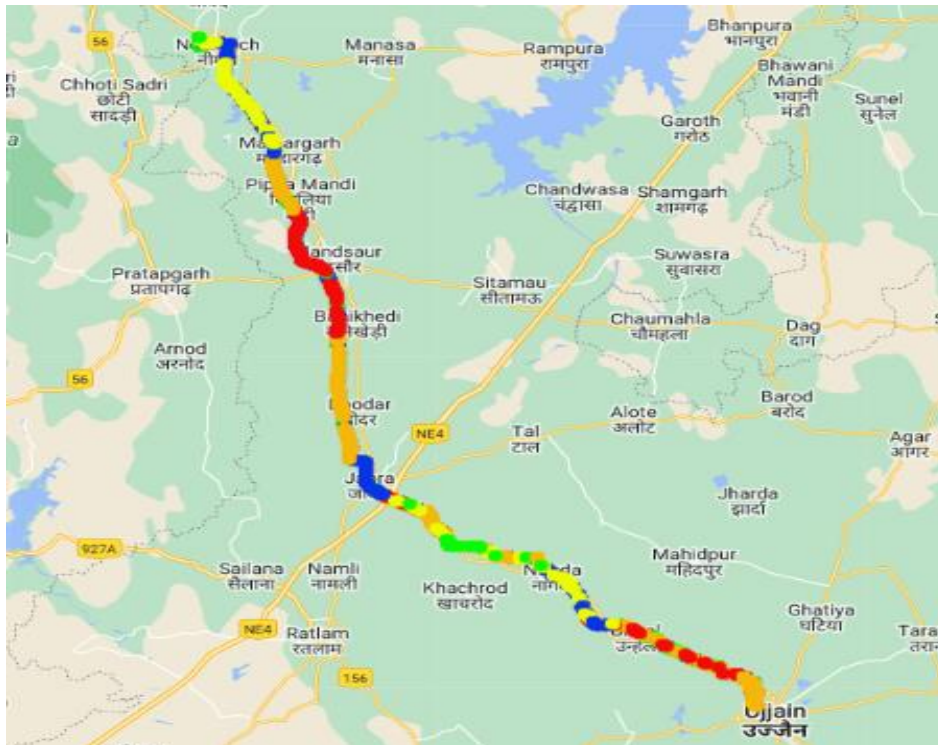
TSP- JIO

Technology	Rx Quality %
VoLTE	84.81%

Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	2433	15.19%	
(0, <=5)	3261	20.35%	
(5, <=10)	3734	23.31%	
(10, <=15)	3393	21.18%	
(15, <=Max)	3200	19.97%	
Total	16021		

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%.
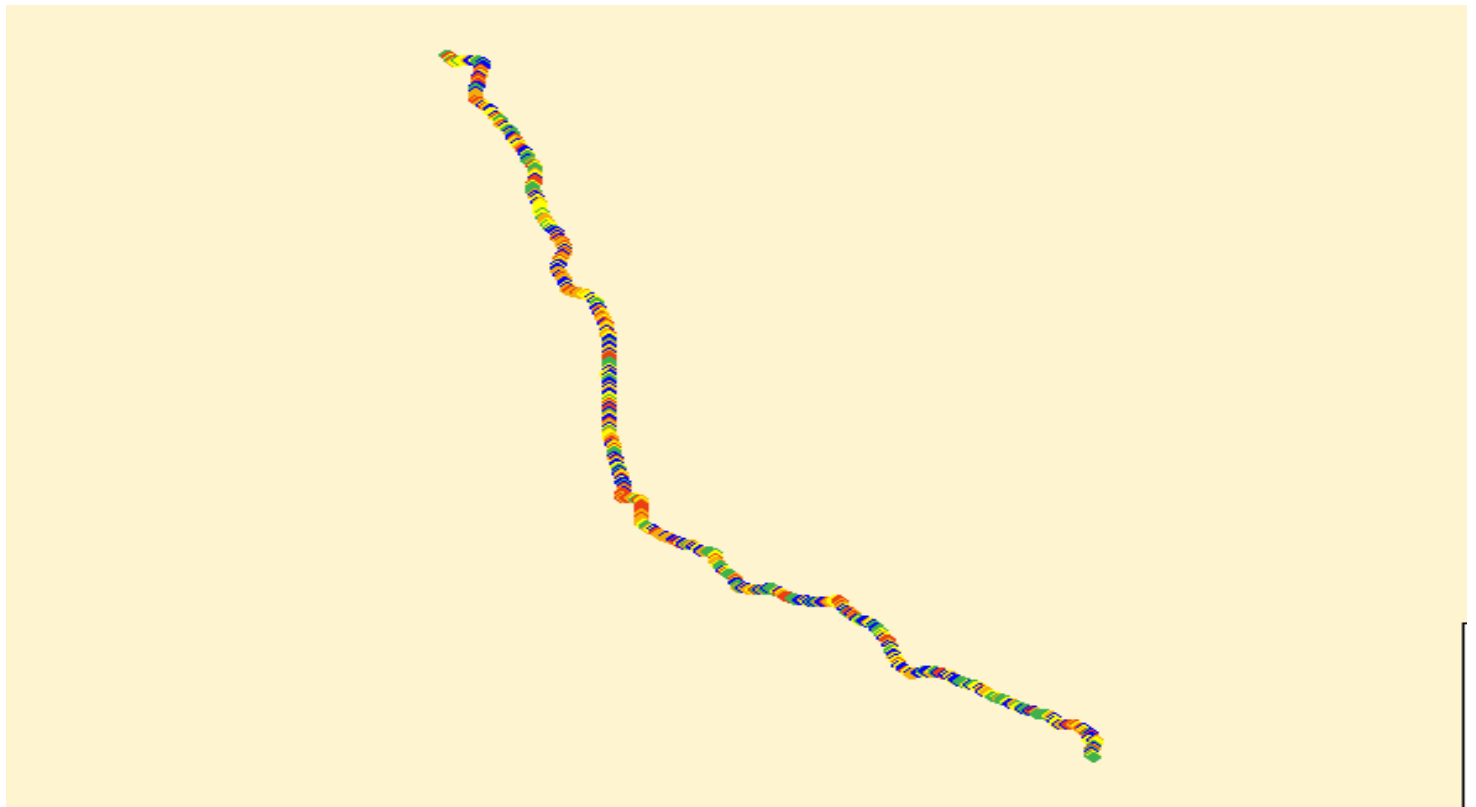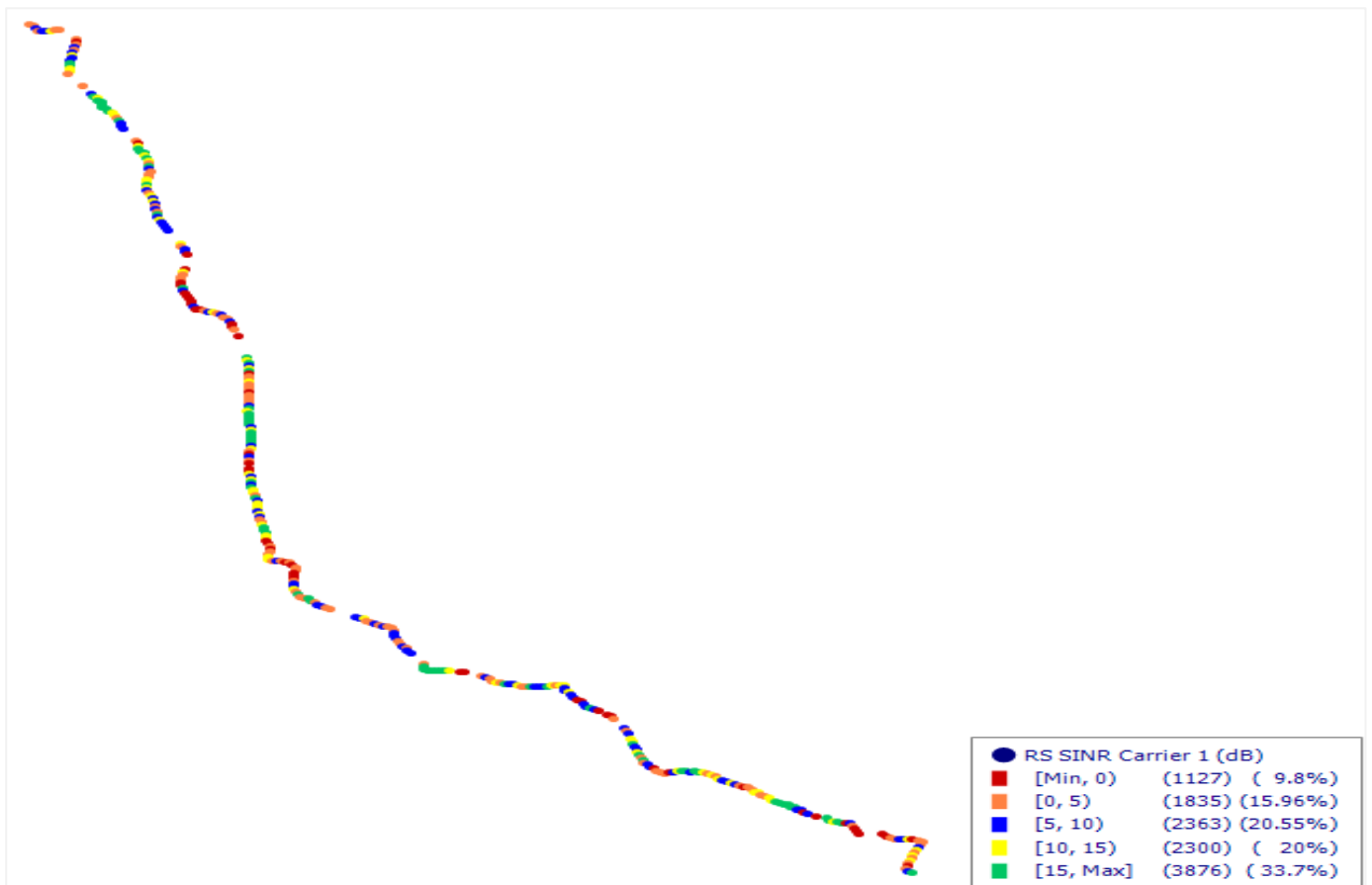
TSP-VIL VoLTE

Technology	Rx Quality %
VoLTE	90.20%

RS SINR Carrier 1 (dB)
- [Min, 0)   (1127) (9.8%)
- [0, 5)   (1835) (15.96%)
- [5, 10)   (2363) (20.55%)
- [10, 15)   (2300) (20%)
- [15, Max]   (3876) (33.7%)

Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	1127	9.80%	
(0, <=5)	1835	15.96%	
(5, <=10)	2363	20.55%	
(10, <=15)	2300	20%	
(15, <=Max)	3876	33.7%	
Total	11501	100%	

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	98
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	78.93

% of Time Spent on 3G/VoLTE

TSP- Airtel

Technology	% of Time Spent on
3G	
VoLTE	100

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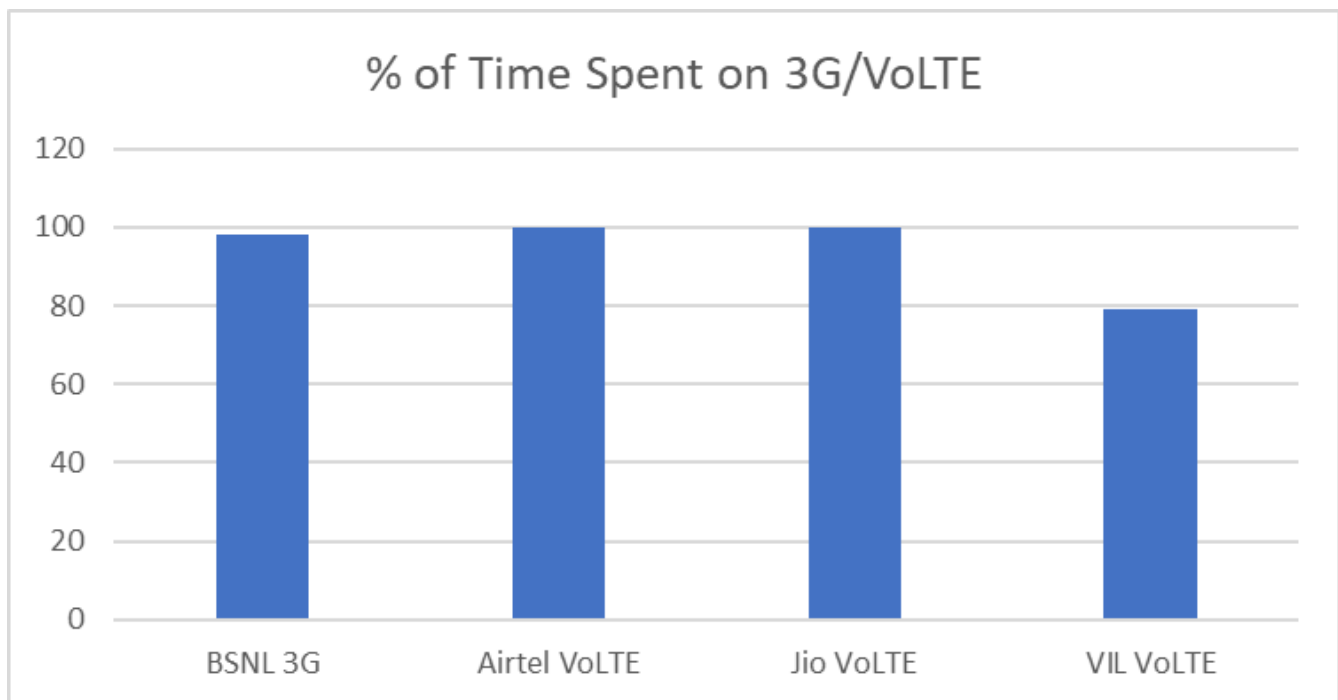
TSP- BSNL

Technology	% of Time Spent on
3G	98 %
VoLTE	

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TSP- Jio

Technology	% of Time Spent on
3G	
VoLTE	100%

Qualcomm Lte/LteAdv Intrafreq Measure PCell Band

● Band 3 (44.83%, 7183)
● Band 40 (5.37%, 861)
● Band 5 (49.79%, 7977)
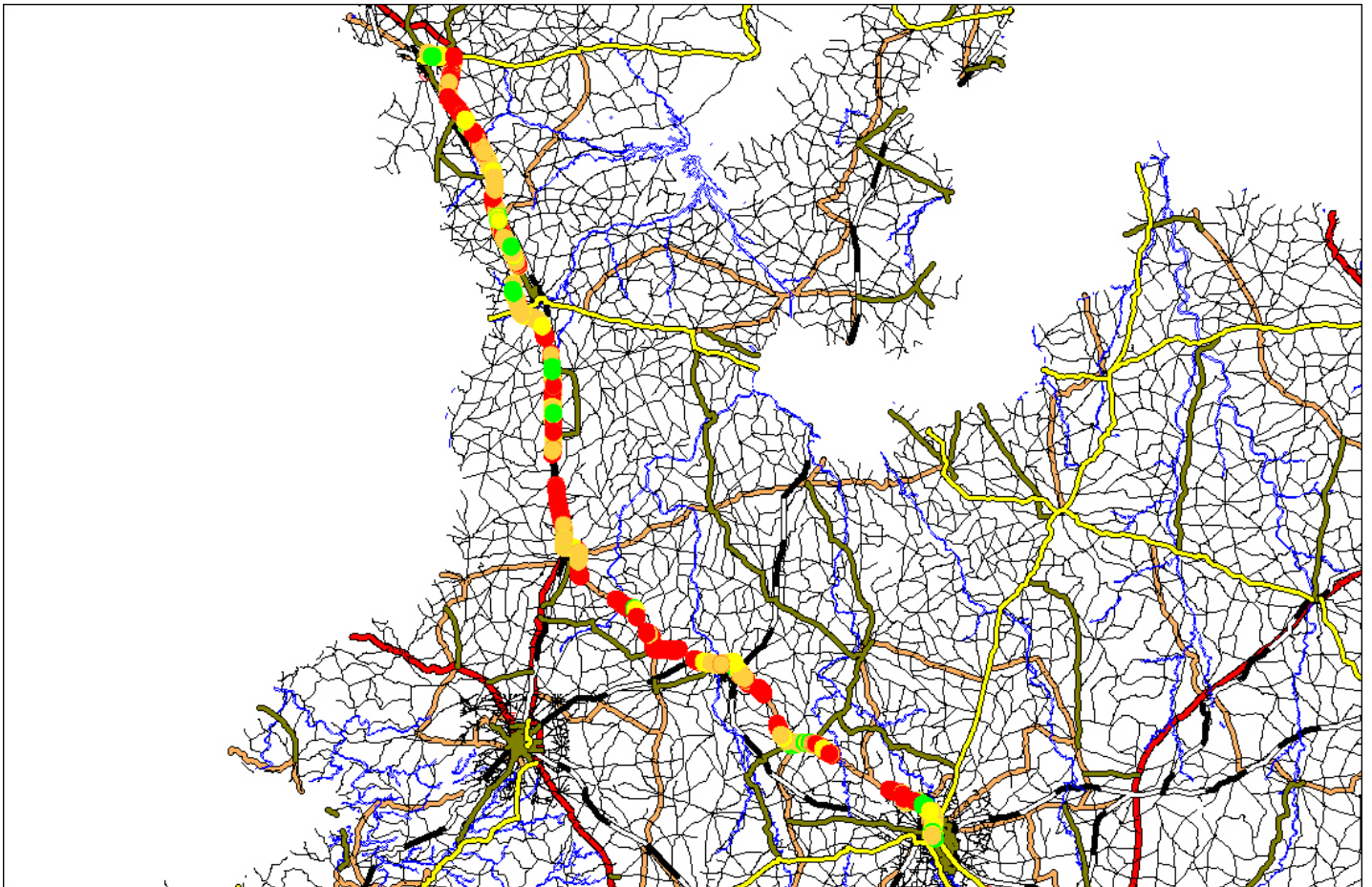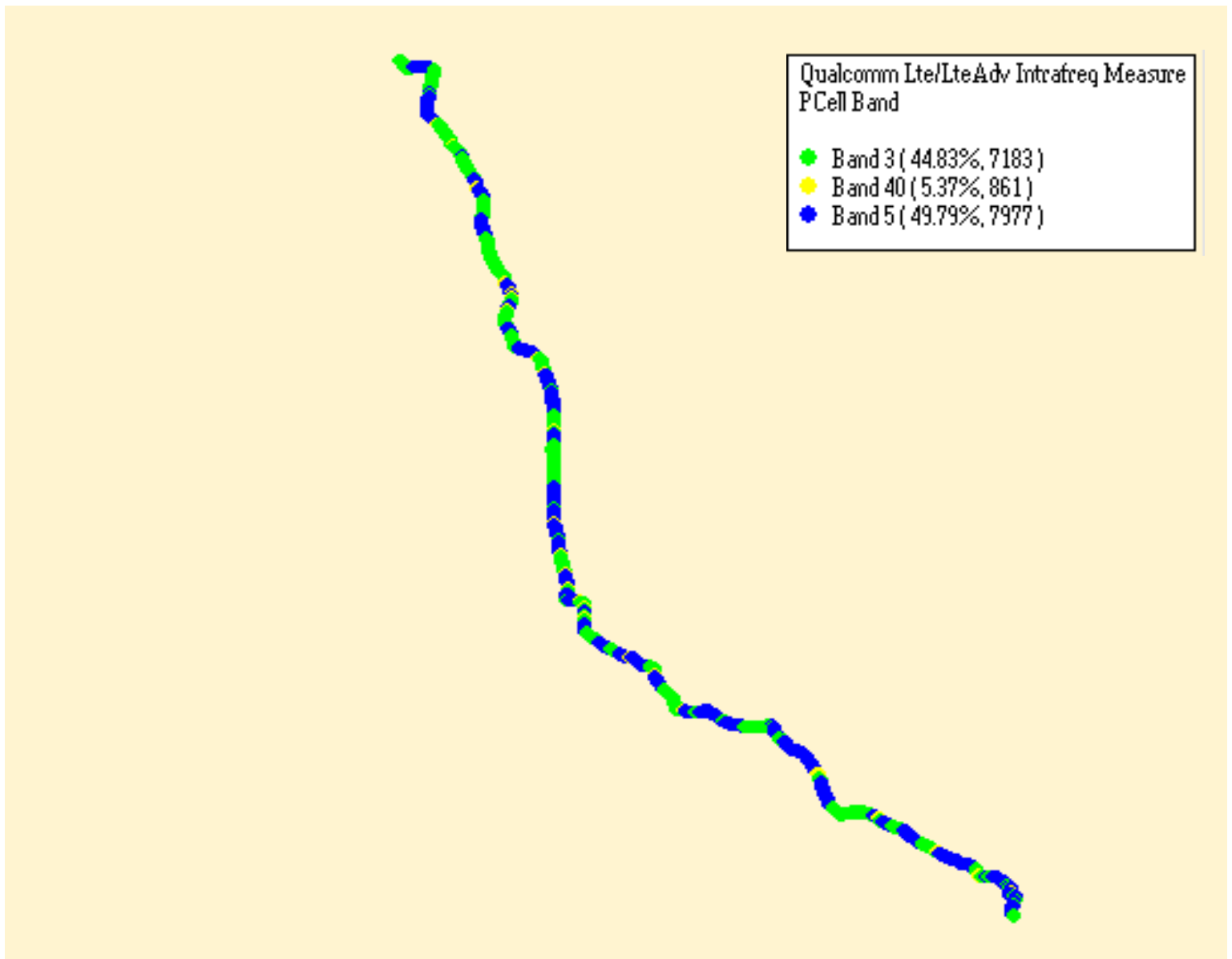
TSP-VIL VoLTE

Technology	% of Time Spent on
3G	
VoLTE	78.93%

Legend

System

- LTE (78.93%) (176)
- GSM (21.07%) (29)
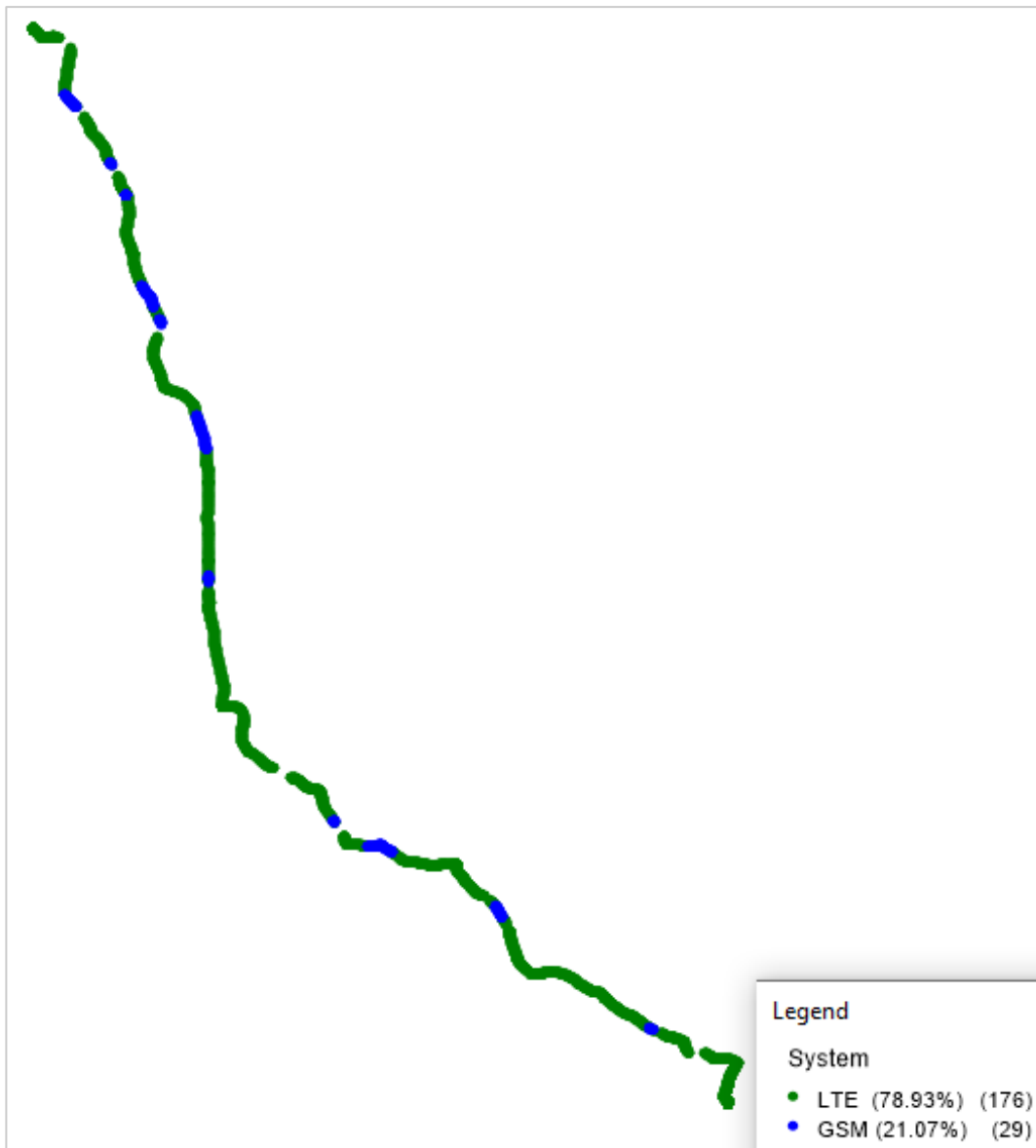
TSP- Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	3.46

Color	Range	Count	Per
🟥	(Min, 2000)	(2849)	(27.06%)
🟫	(2000, 6000)	(6275)	(59.6%)
🟨	(6000, 10000)	(1107)	(10.51%)
🟩	(10000, Max)	(297)	(2.82%)

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TSP- BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	3G
Download Throughput (Mbps)	2.60 Mbps
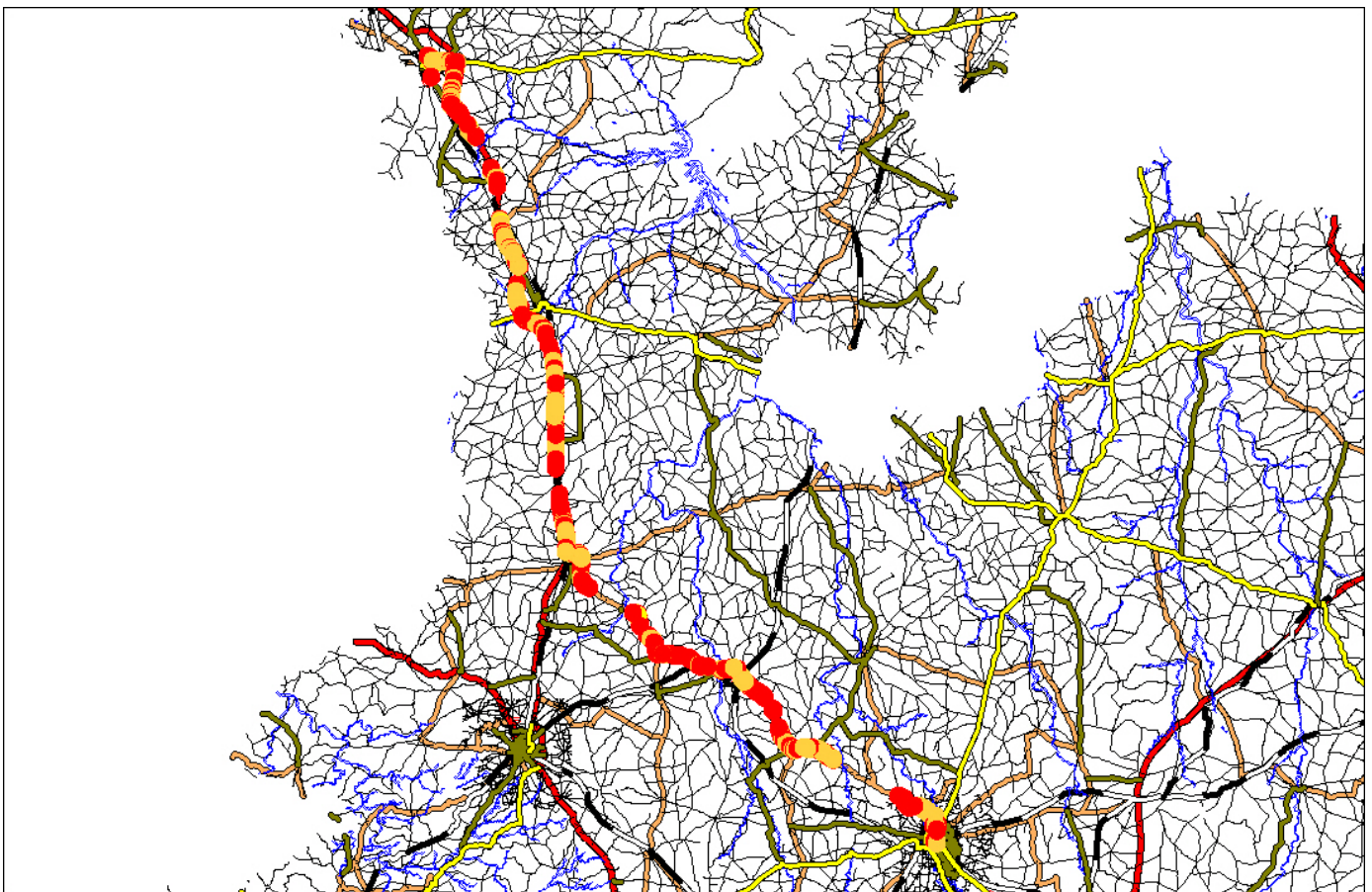
DL throughput	No of Sample	%	Legends
< 1 Mbps	416782	34.79	
1-5 Mbps	750270	62.63	
5-10 Mbps	30499	2.55	
>10Mbps	448	0.04	

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Dynamic Data Test

TSP- Jio

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	**10.87**
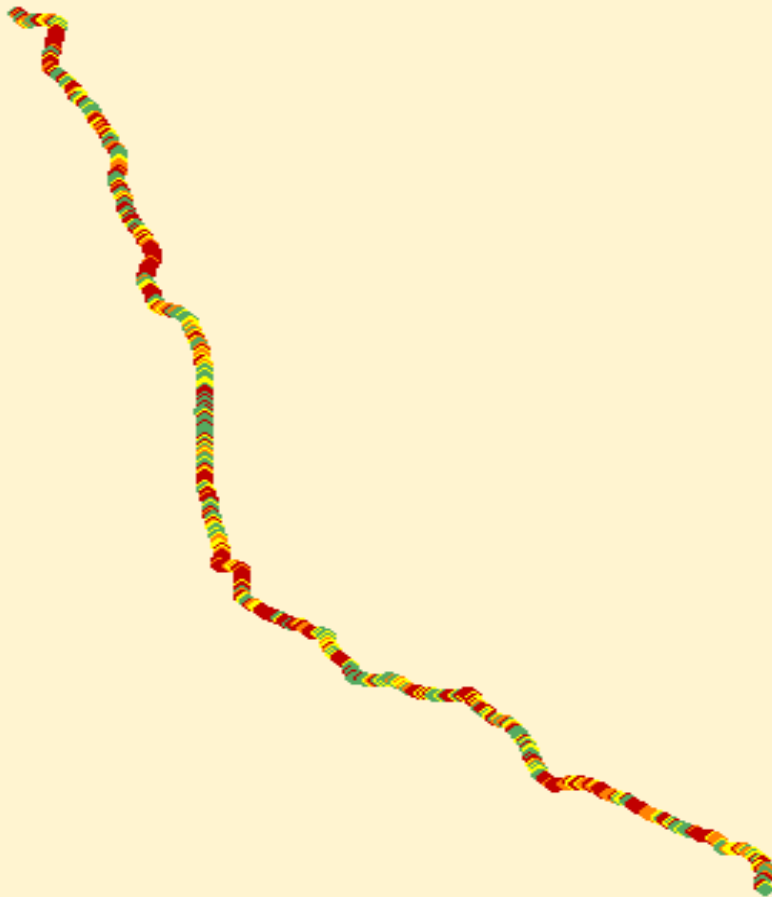
DL throughput	No of Sample	%	Legends
< 2Mbps	4853	31.97%	
2-5 Mbps	2657	17.51%	
5-10 Mbps	3272	21.56%	
>10Mbps	4396	28.96%	

Dynamic Data Test Details

Dynamic Data Test

TSP-VIL LTE Data

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	23.39

Legend in chart:
- PDSCH Phy Throughput (kbps)
- [Min , 2] (1115) (10.39%)
- [2 , 5] (971) (9.05%)
- [5 , 10] (1534) (14.29%)
- [10 , Max] (7114) (66.28%)
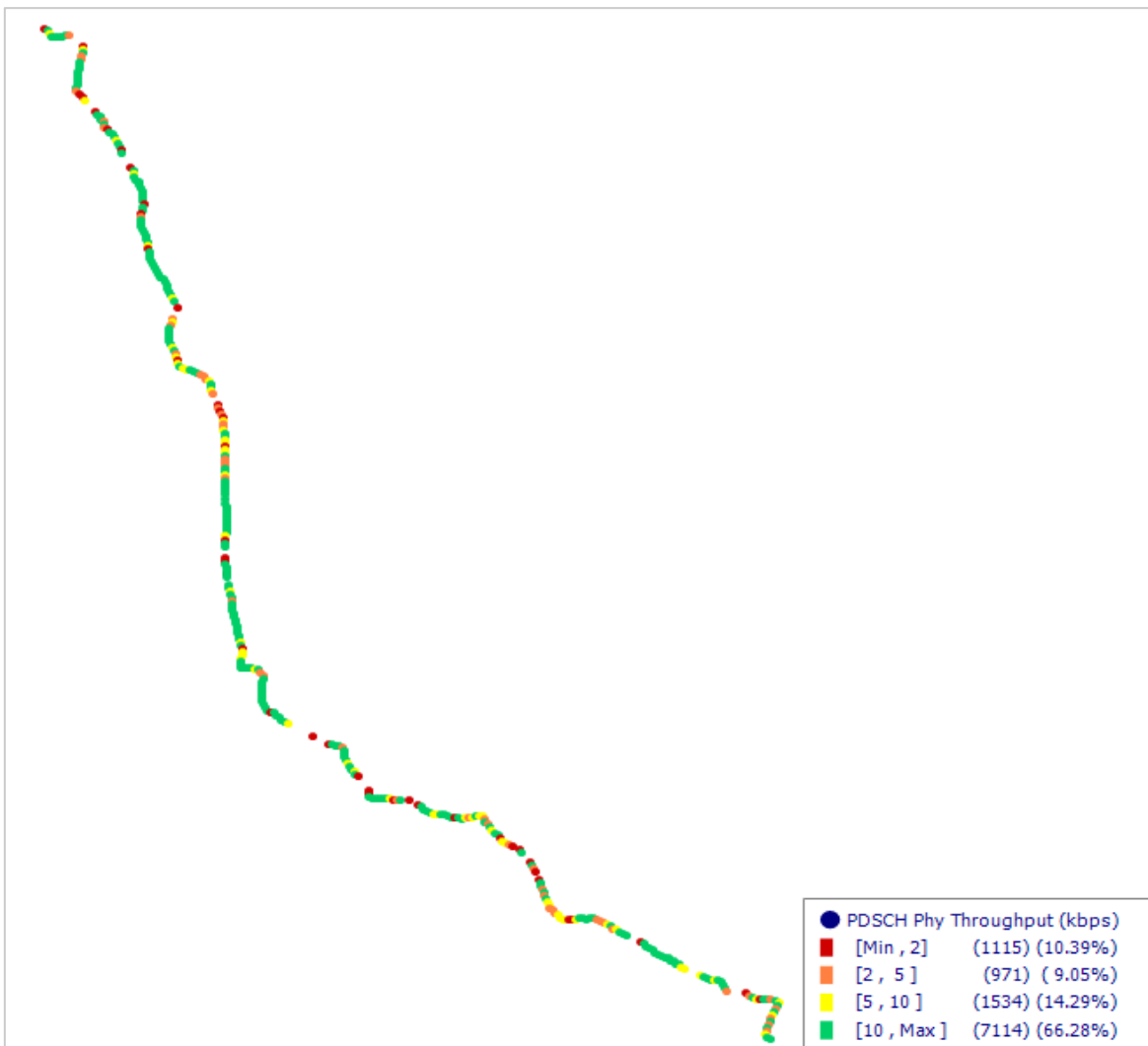
DL throughput	No of Sample	%	Legends
< 2Mbps	1115	10.39%	
2-5 Mbps	971	9.05%	
5-10 Mbps	1534	14.29%	
>10Mbps	7114	66.28%	