Operator Assisted Drive Test Report

Indore –Bhopal Highway
25th Jan. 2022
By
TRAI Regional office Bhopal

Key Performance Indicators: All TSPs have met the Drop Call Rate (DCR) benchmark of 2% All TSPs have met the Call Setup Success Rate (CSSR) of 95%.

The Operator Assisted Drive Test has been carried out by Regional Office, Bhopal with the help of Telecom Service Providers for Indore to Bhopal Highway from 9:00 AM to 8:00 PM on 25th Jan. 2022. The drive test covered drive route of around 180 KMs. Approximately 165 calls were made for each of the 2G/3G/4G. Networks: three 2G networks, two 3G networks, and three LTE networks covering four TSPs.

Overview

Voice Summary

Data Summary

Overview

Regional Office, TRAI Bhopal conducted Operator Assisted Drive Test on 25th Jan. 2022 covering Indore- Bhopal Highway. 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: Calls were made for 90 sec duration with a wait time of 10 sec between calls in all technologies. The drive test covered a drive route of approximately 180 KMs. Approximately 165. calls were made for each of the 2G/3G/4G networks: three 2G (Lock Mode) networks, two 3G (Dual mode) networks and three VoLTE networks covering 4 unique TSPs.

Data Tests:

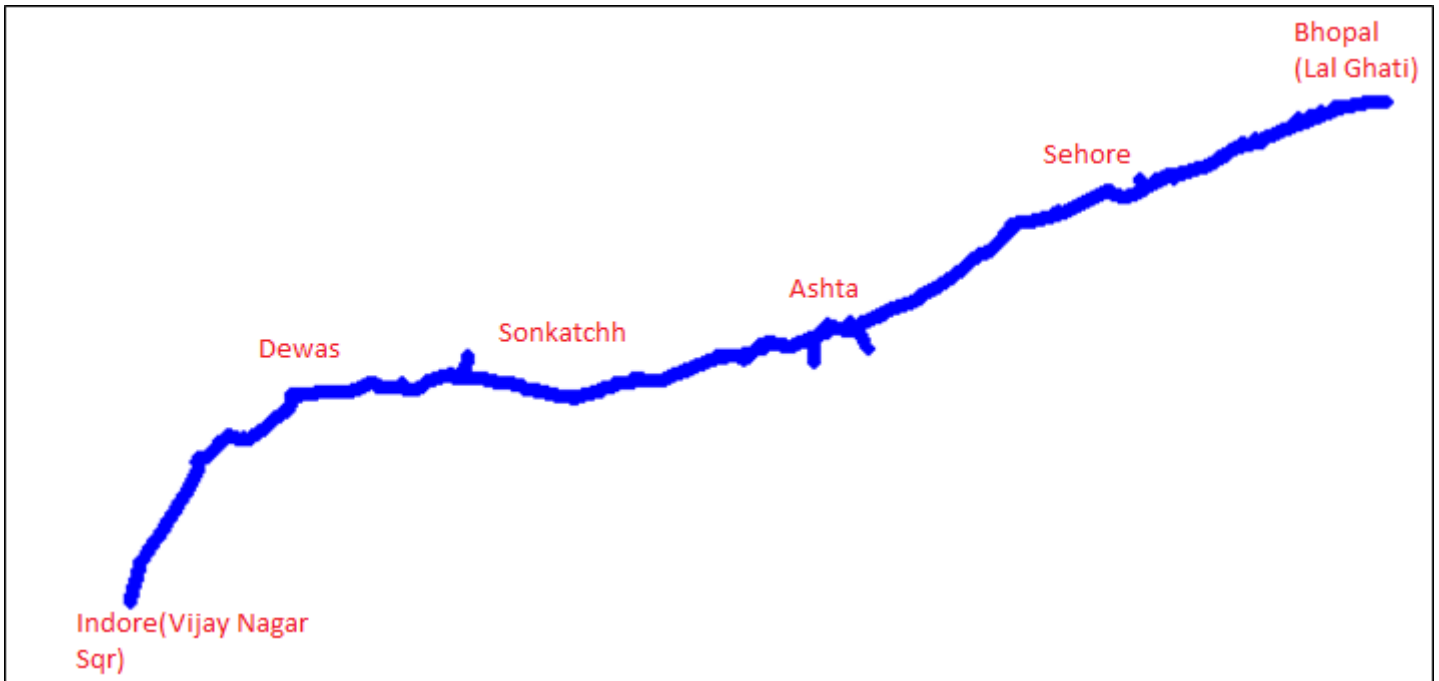Dynamic data test was conducted for around 180 km for download throughput in all technologies.

2G – measurement – UE Locked in 2G file size- 500KB

 3G – measurement – UE in 3G   File Size- 20MB

 4G – measurement – UE in LTE File Size- 40MB

.

2

Overview

Voice & Dynamic Data Test Drive Route

list of important area covered during the drive test

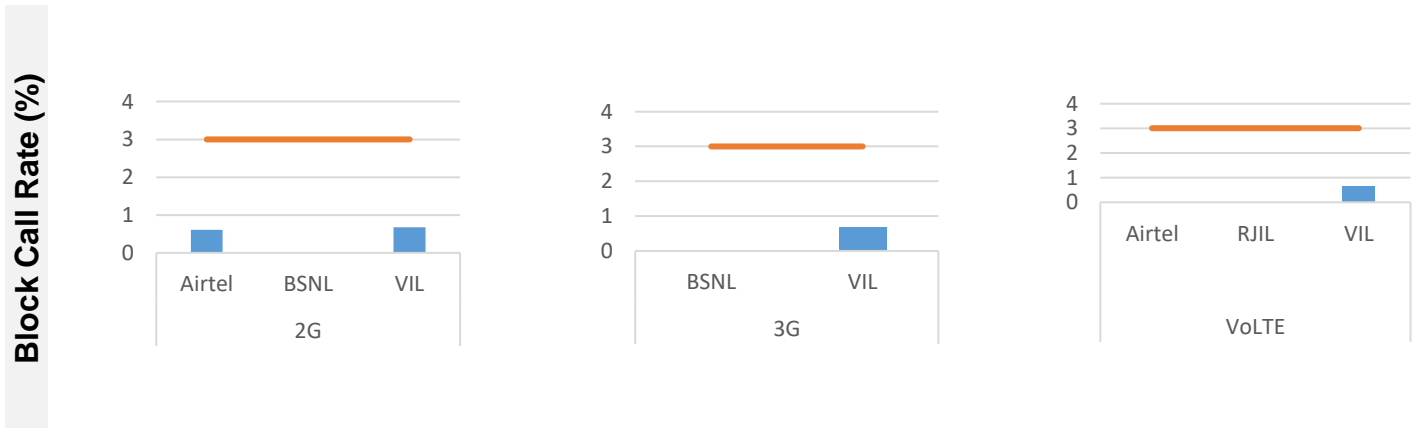| |
|---|
| Mangliya,Dakachya,Chhipra, Dewas Industrial Area |
| Dewas Bypass, Sonkatch, |
| Aastha, |
| Sehor, |
| Bairagarh , Lalghati |

Voice Calls

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

KPIs	2G			3G		VoLTE		
	Airtel	**BSNL**	**VIL**	**BSNL**	**VIL**	**Airtel**	**RJIL**	**VIL**
Drop Call Rate %	0	0	0.69	0	0	0	0.52	0.65
Block Call Rate %	0.61	0	0.68	0	0.68	0	0	0.64

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.

4

Voice Calls

Coverage

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

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	74.37	77.93	73.84

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

TSPs	3G	
	BSNL	VIL
Coverage %	78.66	78.52

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	99.26	98.44	92.11

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

TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	VIL	JIO
Time Spent on 3G/4G %	83.15	16.96	100	71.99	100

Data Services Dynamic

Dynamic Data was tested for 180 Kms. Download Throughput was tested.

Data Download Performance (kbps) - Dynamic

3G/4G/ Network:

Dynamic average data download throughput

■ Average Download throughput- 3G in Mbps   ■ Average Download throughput-LTE in Mbps
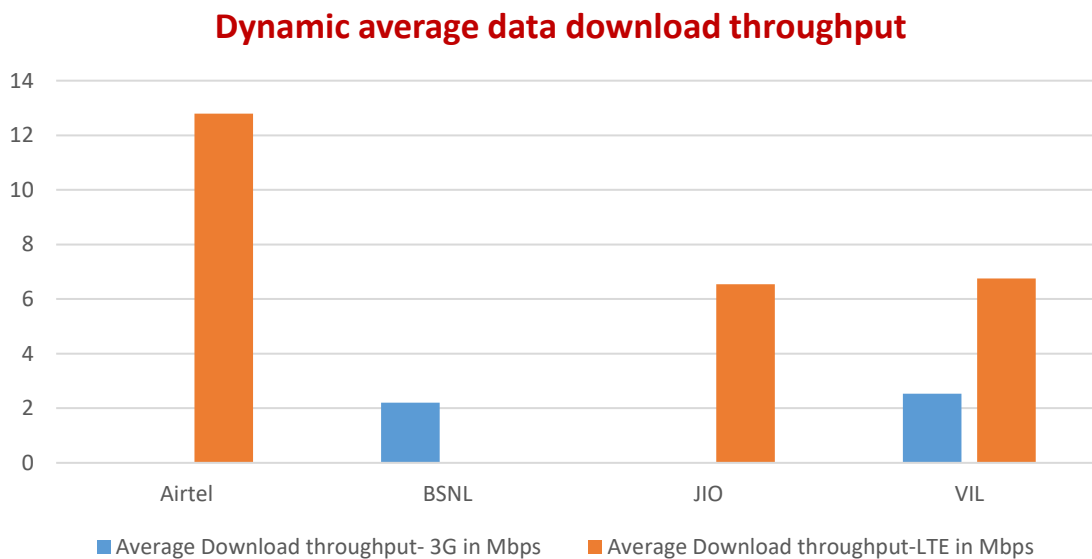
TSP	Airtel	BSNL	JIO	VIL
Average Download throughput- 2G In Kbps	79.40	173	NA	93.88
Average Download throughput- 3G In Mbps	NA	2.21	NA	2.53
Average Download throughput-LTE In Mbps	12.8	NA	6.55	6.75

6

Summary

TSP (For 2G)	Airtel	BSNL	JIO	VIL
Call attempts	164	184	NA	146
Block call rate %	0.63	0.0%	NA	0.68
CSSR %	99.39	100%	NA	99.32
Drop call rate %	0	0.0%	NA	0.69
Mobility HOSR %	100	97.30%	NA	98.68
RX Quality %	95.92	98.65%	NA	97.43
Average CST Sec	4.09	2.2 Sec	NA	4.8

TSP (For 3G)	Airtel	BSNL	JIO	VIL
Call attempts	NA	153	NA	151
Block call rate %	NA	0.0%	NA	0
CSSR %	NA	100%	NA	100%
Drop call rate %	NA	0.0%	NA	0.66
Mobility HOSR %	NA	96.32%	NA	99.76
RX Quality %	NA	96.18%	NA	96.5
Average CST (Sec)	NA	2.1 Sec	NA	3.07

TSP (For VoLTE)	Airtel	BSNL	JIO	VIL
Call attempts	170	NA	194	154
Block call rate %	0	NA	0.00	0.65
CSSR %	100	NA	99.48	99.35
Drop call rate %	0	NA	0.52	0.64
Mobility HOSR %	99.10	NA	98.46	99.83
RX Quality %	76.04	NA	85.49	96.21
Average CST(Sec)	0.47	NA	0.68	1.86

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.

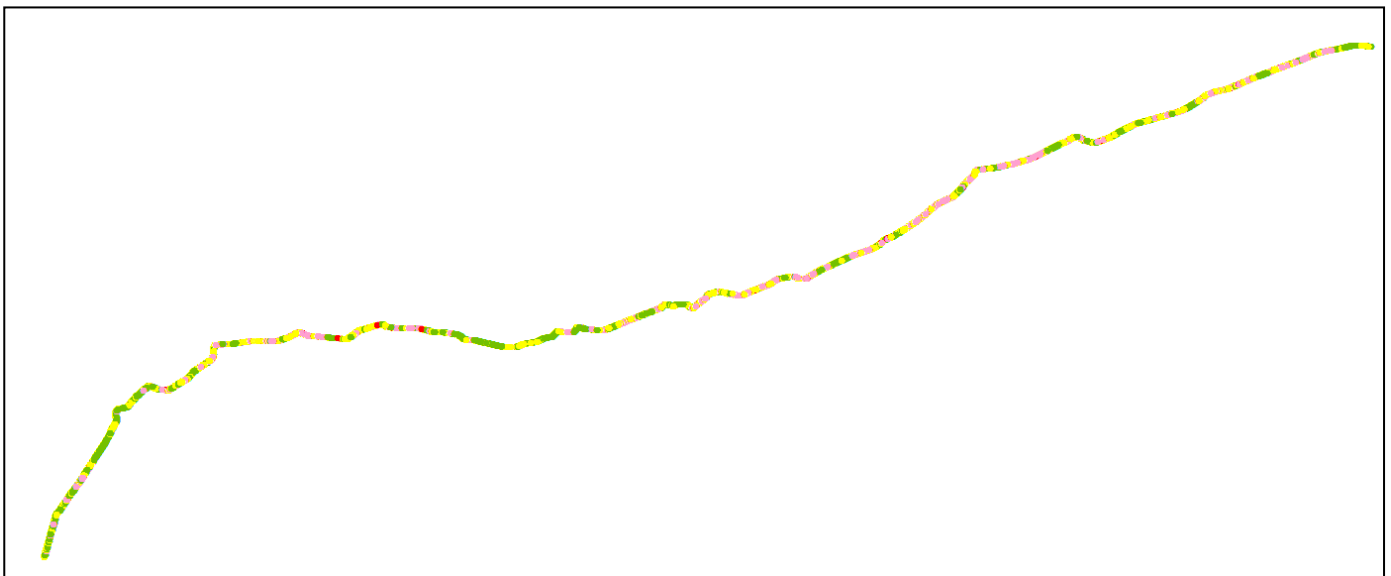| TSP	Coverage Rate %
Airtel 2G	74.37
BSNl 2G	77.93
VIL 2G	73.84
BSNL 3G	78.66
VIL 3G	78.52
Airtel VoLTE	99.26
Jio VoLTE	98.44
VIL VoLTE	92.11

Coverage Rate %

8
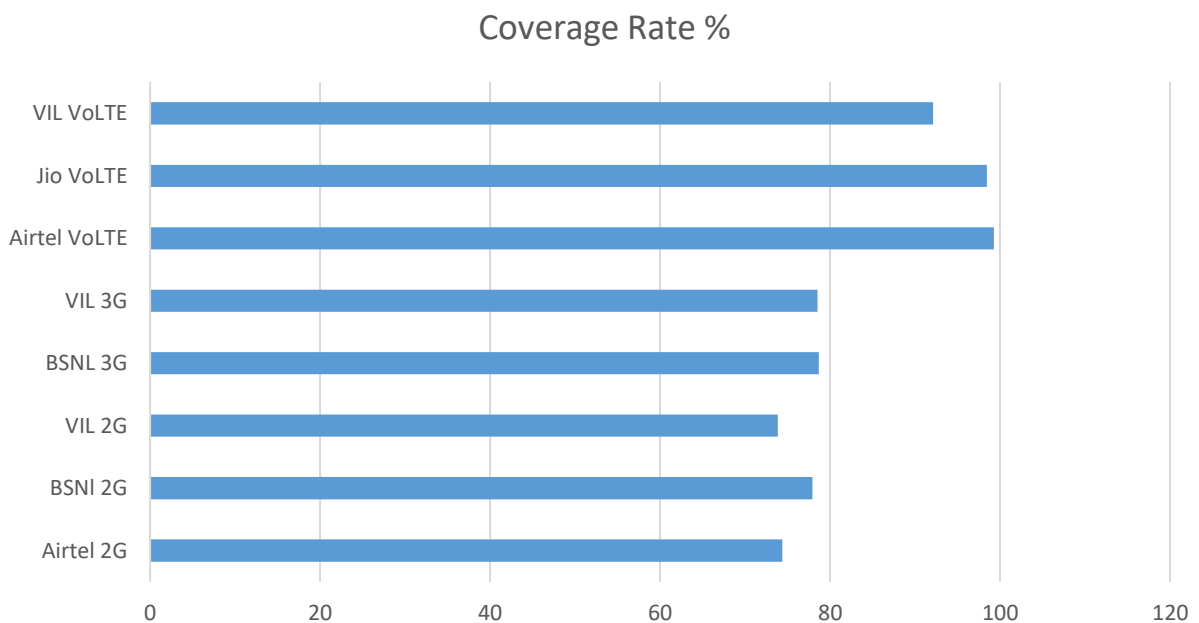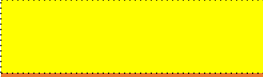
TSP- Airtel

Technology	Coverage %
2G	74.37
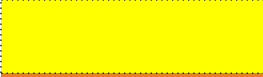
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	1271359	35.00	
[-75, >=-85)	1430052	39.37	
[-85, >=-95)	897487	24.71	
[-95, >=Min)	33702	0.93	
Total	3632600	100%	

TSP- BSNL

Technology	Coverage %
2G	100%
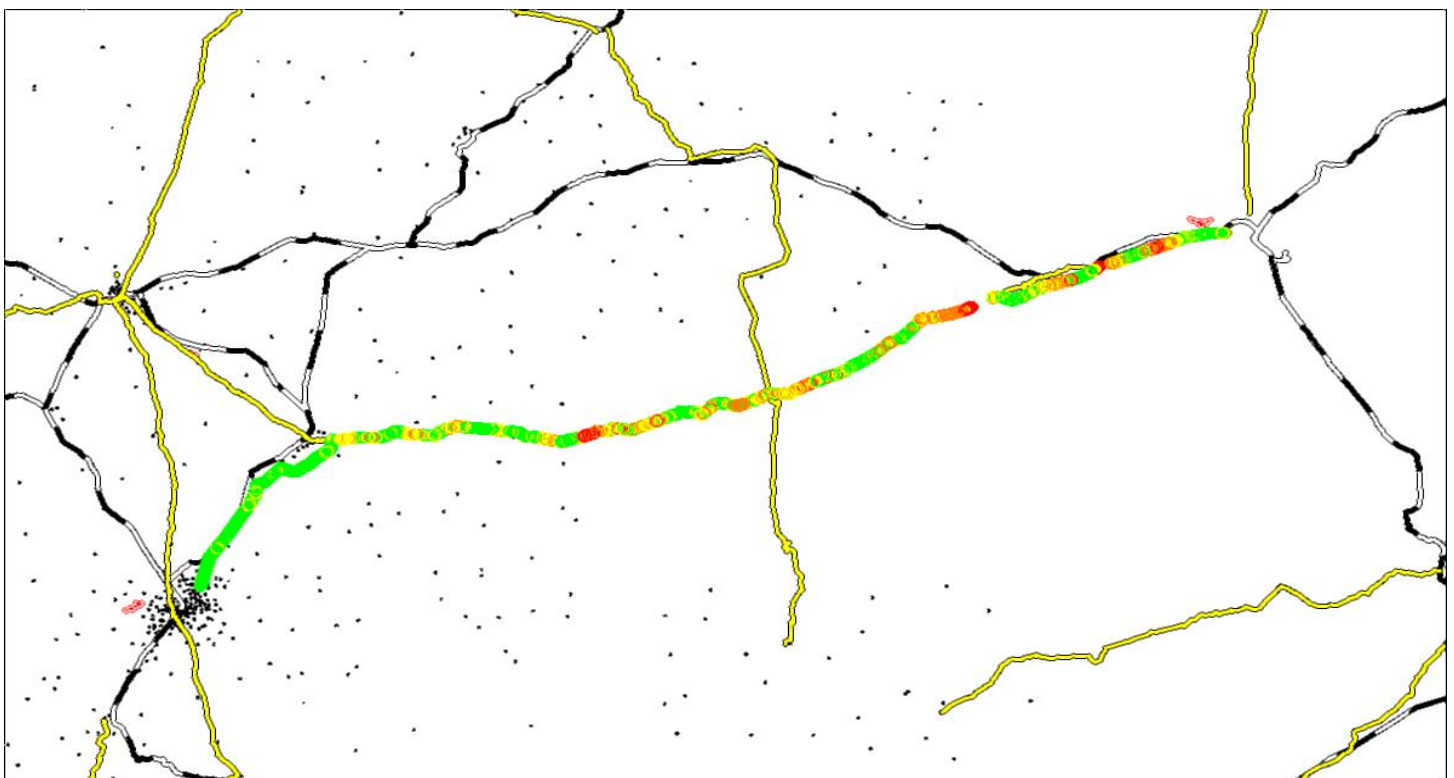
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	452592	45.09%	
[-75, >=-85)	329612	32.84%	
[-85, >=-95)	183294	18.26%	
[-95, >=Min)	38208	3.81%	
Total		**100%**	
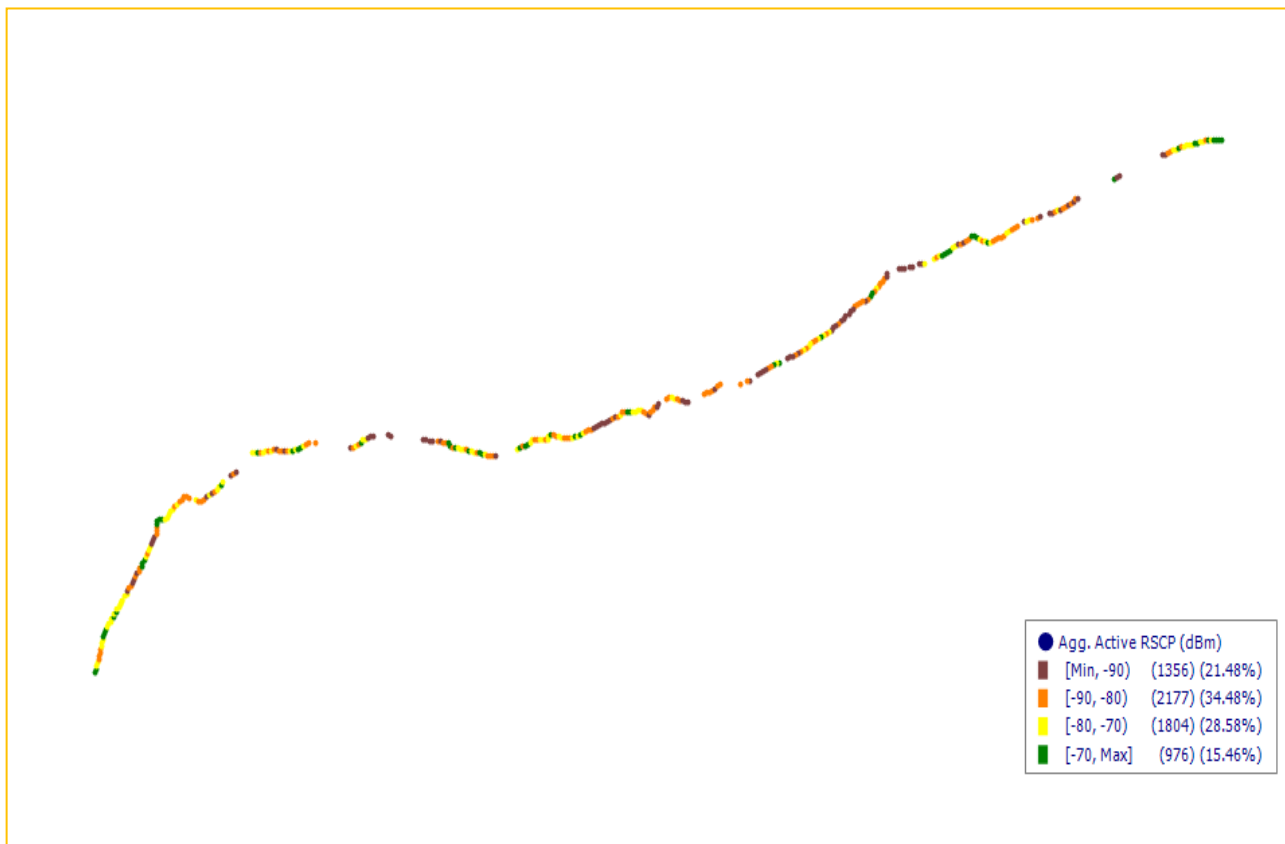
10

TSP- VIL

Technology	Coverage %
3G	78.52

Agg. Active RSCP (dBm)
- [Min, -90)   (1356) (21.48%)
- [-90, -80)   (2177) (34.48%)
- [-80, -70)   (1804) (28.58%)
- [-70, Max]   (976) (15.46%)

3G			
Overall RSCP	**# Samples**	**% PDF**	**Legends**
[Max, >=-70]	976	15.46%	
[-70, >=-80)	1804	28.58%	
[-80, >=-90)	2177	34.48%	
[-90, >=Min)	1356	21.48%	
Total	6313	100%	

11

TSP- BSNL

Technology	Coverage %
3G	81.35%

3G			
Overall RSCP	**# Samples**	**% PDF**	**Legends**
[Max, >=-70]	97767	21.79%	
[-70, >=-80)	164580	36.68%	
[-80, >=-90)	90583	20.19%	
[-90, >=Min)	95727	21.34%	
Total		**100%**	

TSP- VIL

Technology	Coverage %
3G	78.52
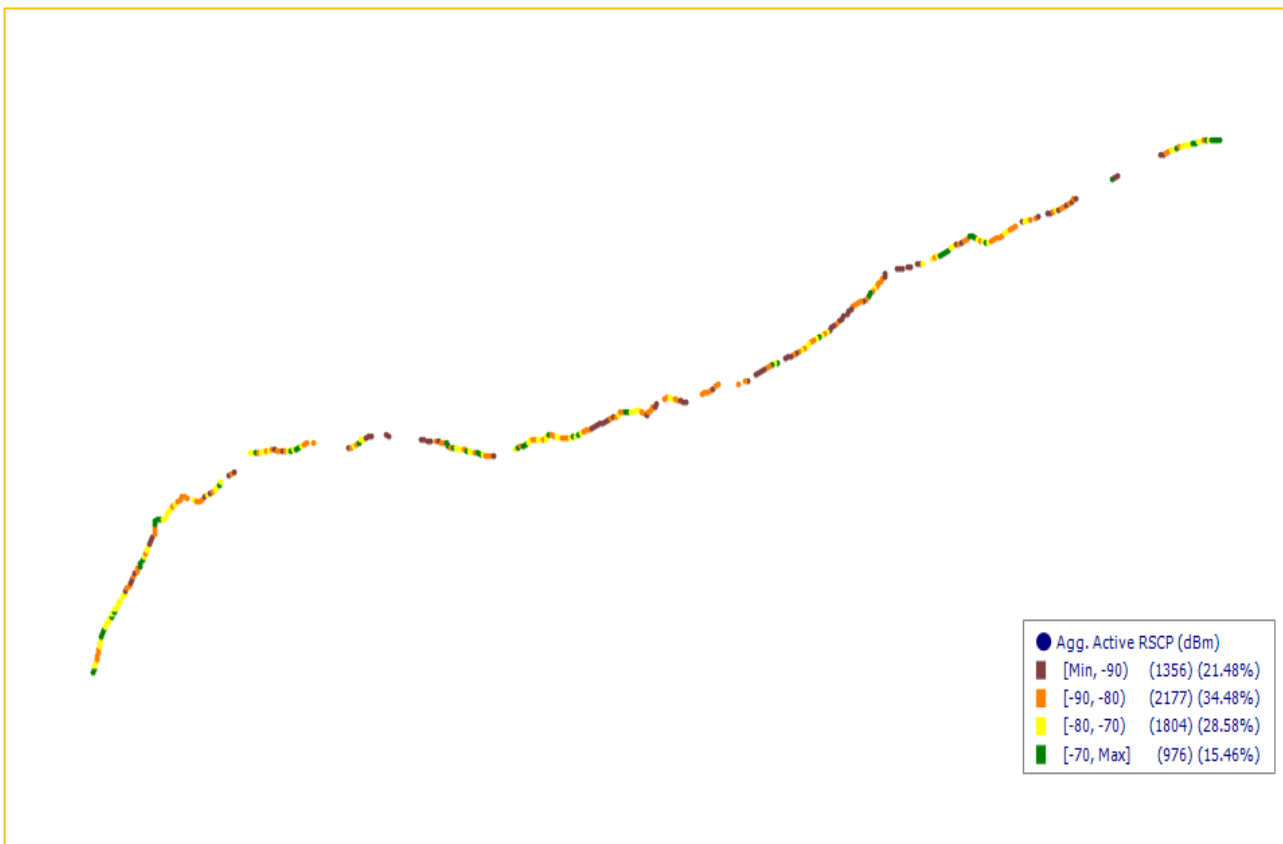
Legend:
- Agg. Active RSCP (dBm)
- [Min, -90) (1356) (21.48%)
- [-90, -80) (2177) (34.48%)
- [-80, -70) (1804) (28.58%)
- [-70, Max] (976) (15.46%)

3G			
Overall RSCP	**# Samples**	**% PDF**	**Legends**
[Max, >=-70]	976	15.46%	
[-70, >=-80)	1804	28.58%	
[-80, >=-90)	2177	34.48%	
[-90, >=Min)	1356	21.48%	
Total	6313	100%	

TSP- Airtel

Technology	Coverage %
VoLTE	99.26
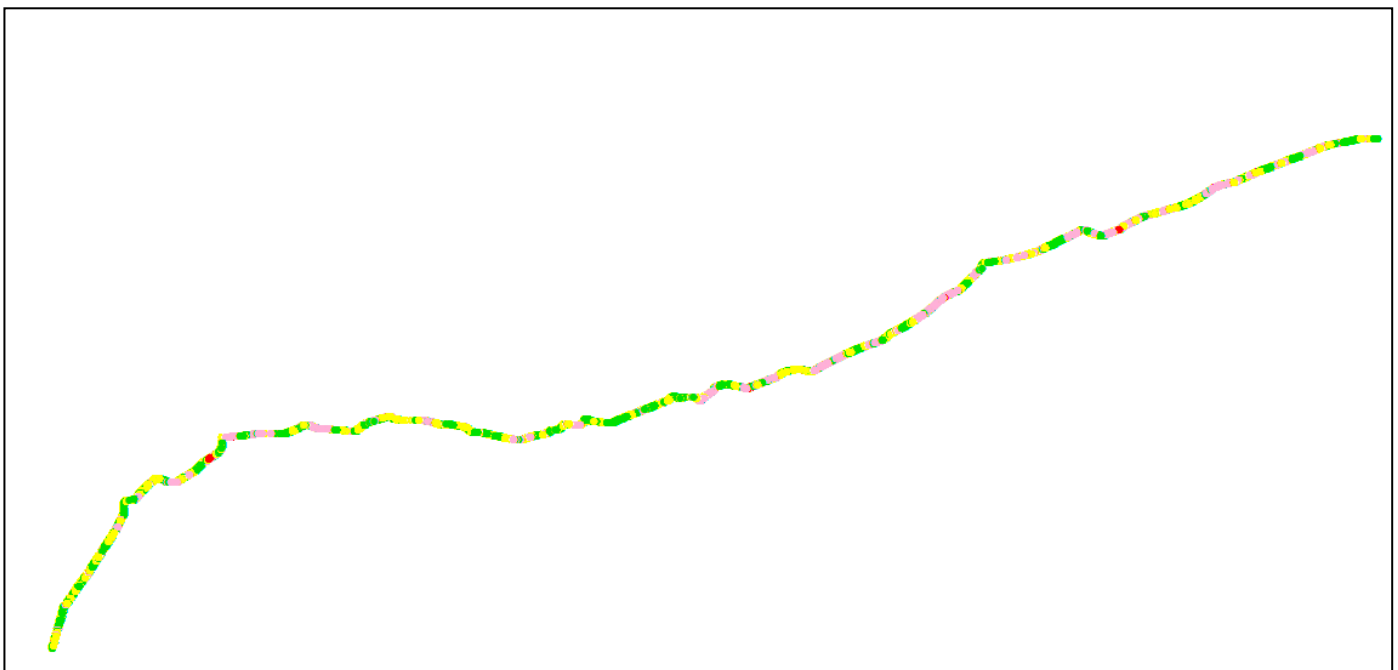
VoLTE			
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	1945850	39.11	
[-80, >=-90)	1509553	30.34	
[-90, >=-110)	1482768	29.80	
[-110, >=Min)	36992	0.74	
Total	4975163	100%	

TSP- JIO

Technology	Coverage %
VoLTE	98.44
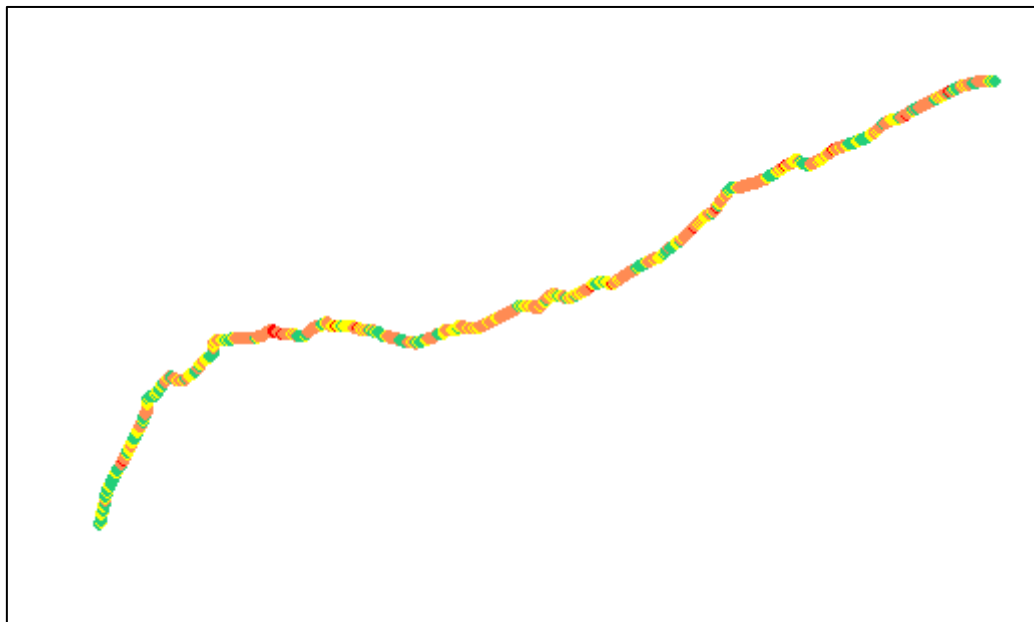
VoLTE			
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	5679	27.46	
[-80, >=-90)	5658	27.36	
[-90, >=-110)	9020	43.62	
[-110, >=Min)	322	1.56	
Total	**20679**	**100%**	

15

TSP- VIL

Technology	Coverage %
VoLTE	92.11

Serving Cell RSRP (dBm)
- [Min, -110) (660) (7.89%)
- [-110, -90) (3903) (46.66%)
- [-90, -80) (2059) (24.62%)
- [-80, Max] (1742) (20.83%)
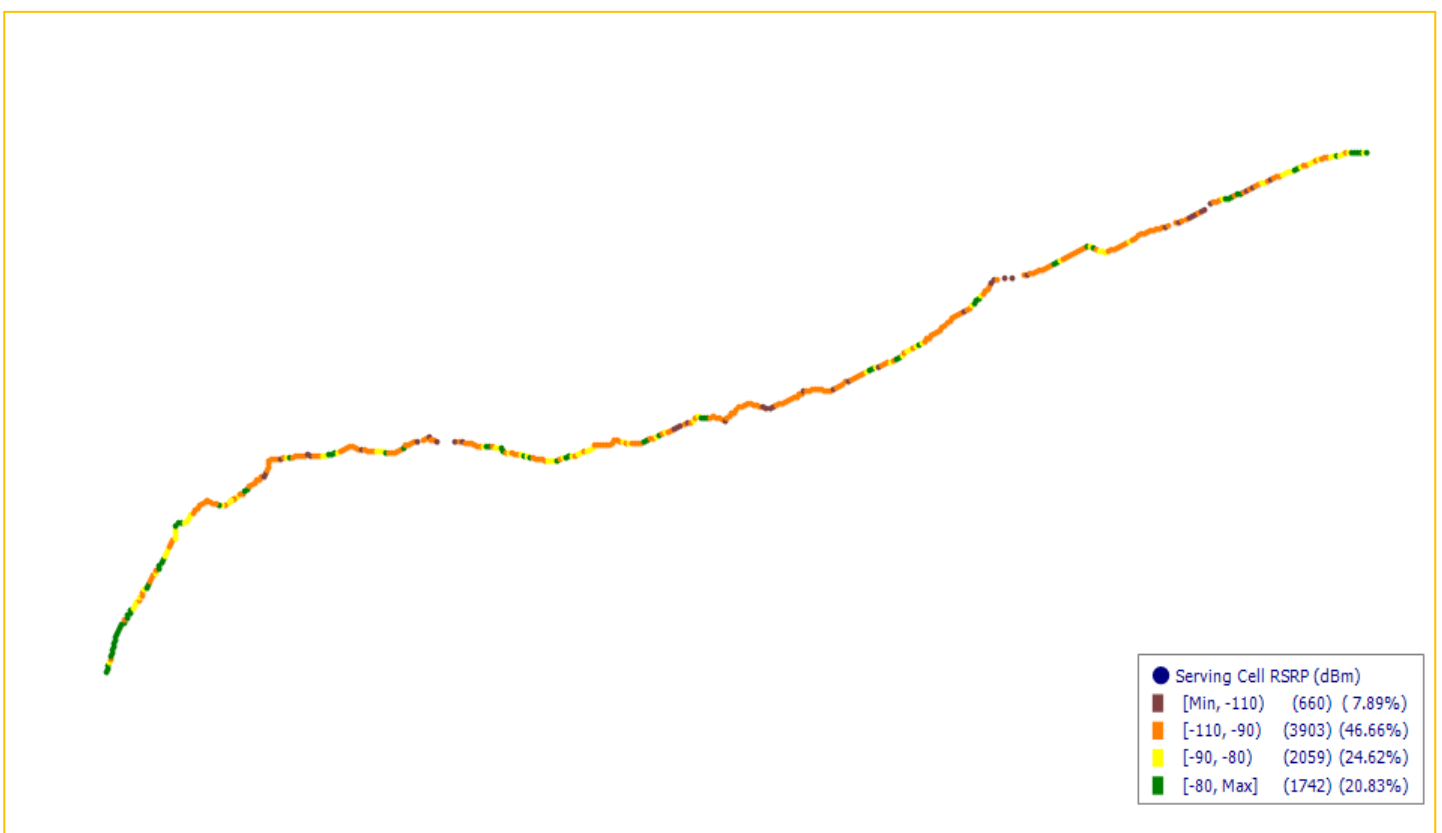
VoLTE			
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	1742	20.83%	
[-80, >=-90)	2059	24.62%	
[-90, >=-110)	3903	46.66%	
[-110, >=Min)	660	7.89%	
Total	8364	100%	

16

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	95.92
BSNl 2G	98.65
VIL 2G	97.43
BSNL 3G	96.18
VIL 3G	96.5
Airtel VoLTE	76.04
Jio VoLTE	85.49
VIL VoLTE	96.21
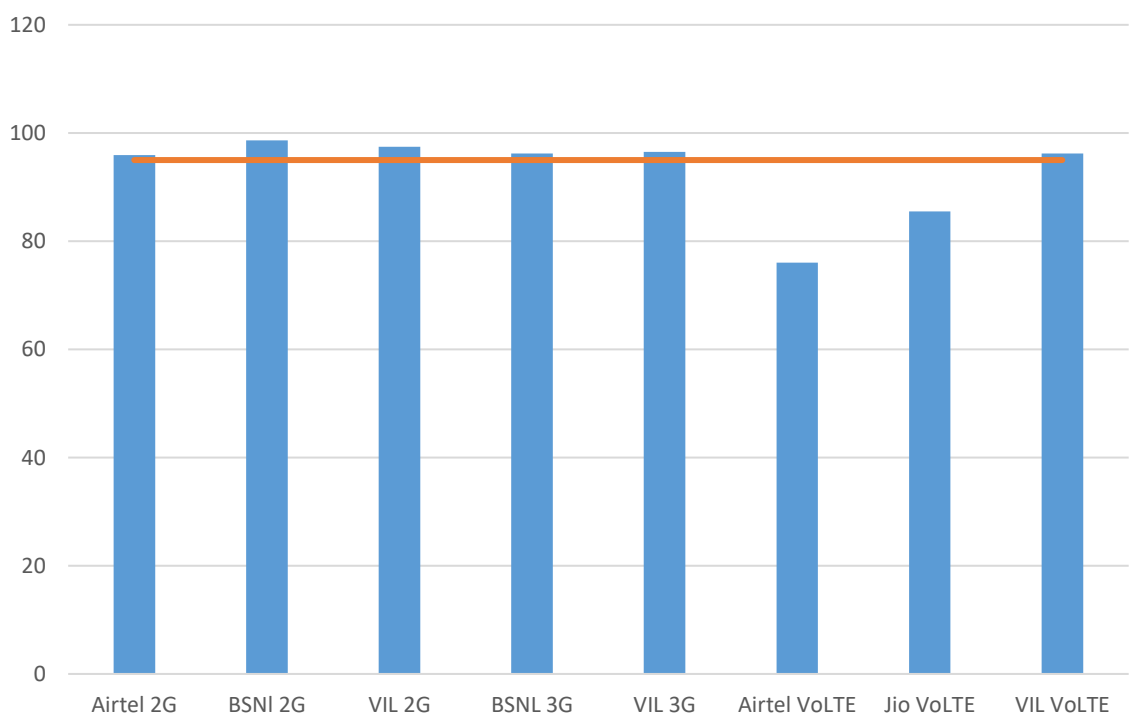
For measuring voice quality, as per the QoS norms, RxQual <=5 for GSM TSPs, EcNo >= -14 dBm for 3G TSP sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

TSP- Airtel

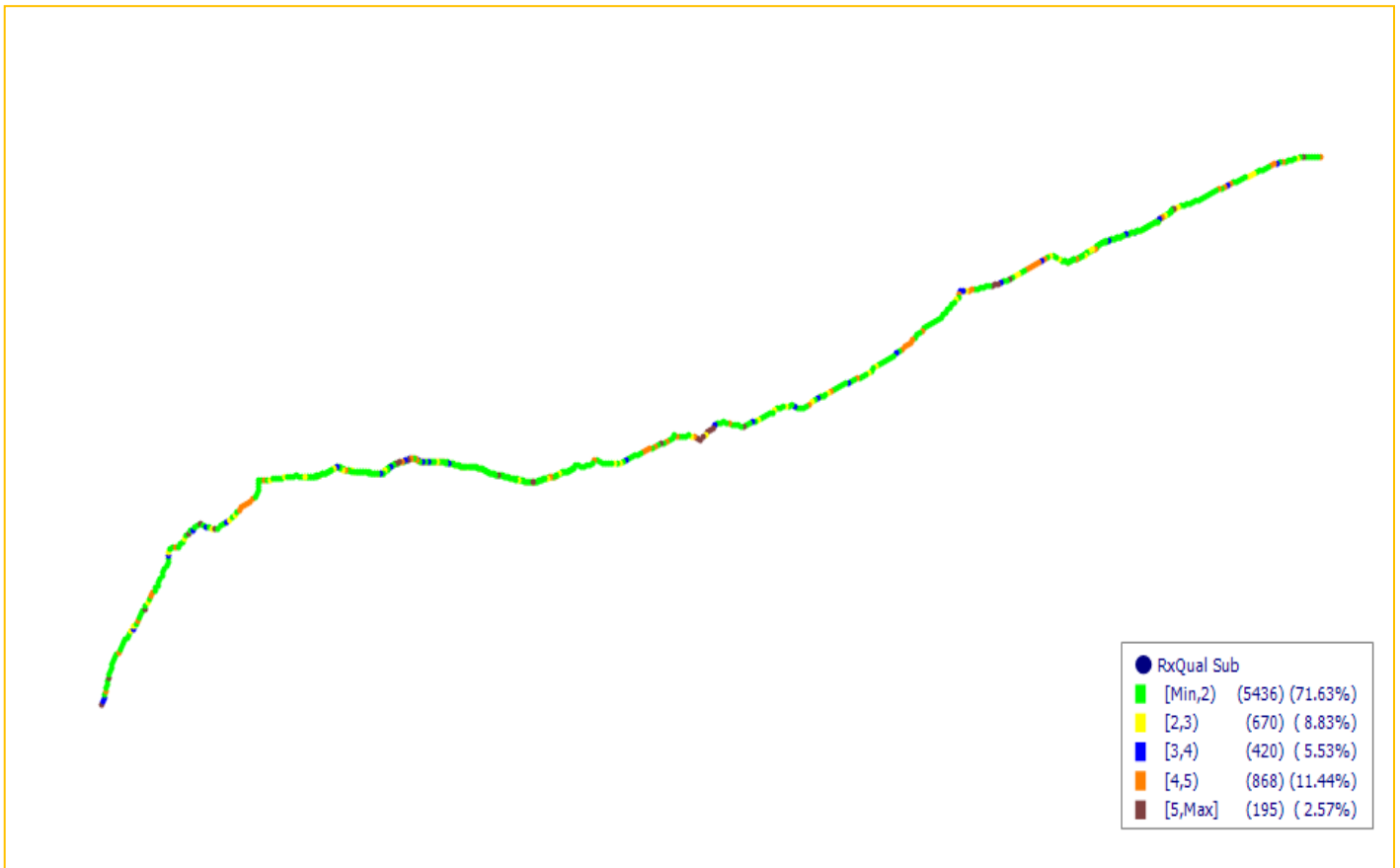| Technology	Rx Quality %
2G	95.92
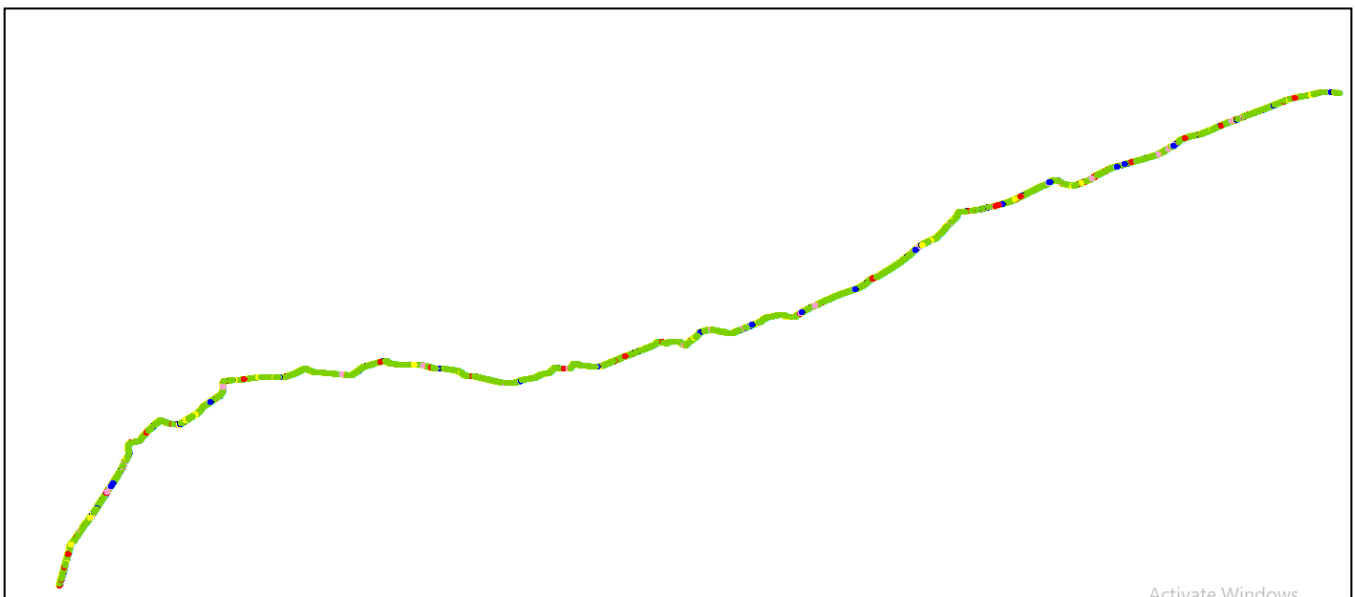
Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	3007827	82.80	
(2, <=3)	161168	4.44	
(3 , <=4)	156336	4.30	
(4 , <=5)	158949	4.38	
(5 , <=Max)	148320	4.08	
Total	3632600	100%	

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- VIL

| Technology	Rx Quality %
2G	97.43

Legend:
- RxQual Sub
- [Min,2) (5436) (71.63%)
- [2,3) (670) (8.83%)
- [3,4) (420) (5.53%)
- [4,5) (868) (11.44%)
- [5,Max] (195) (2.57%)

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	5436	71.63%	
(2, <=3)	670	8.83%	
(3 , <=4)	420	5.53%	
(4 , <=5)	868	11.44%	
(5 , <=Max)	195	2.57%	
Total	7589	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 %
2G	98.65%
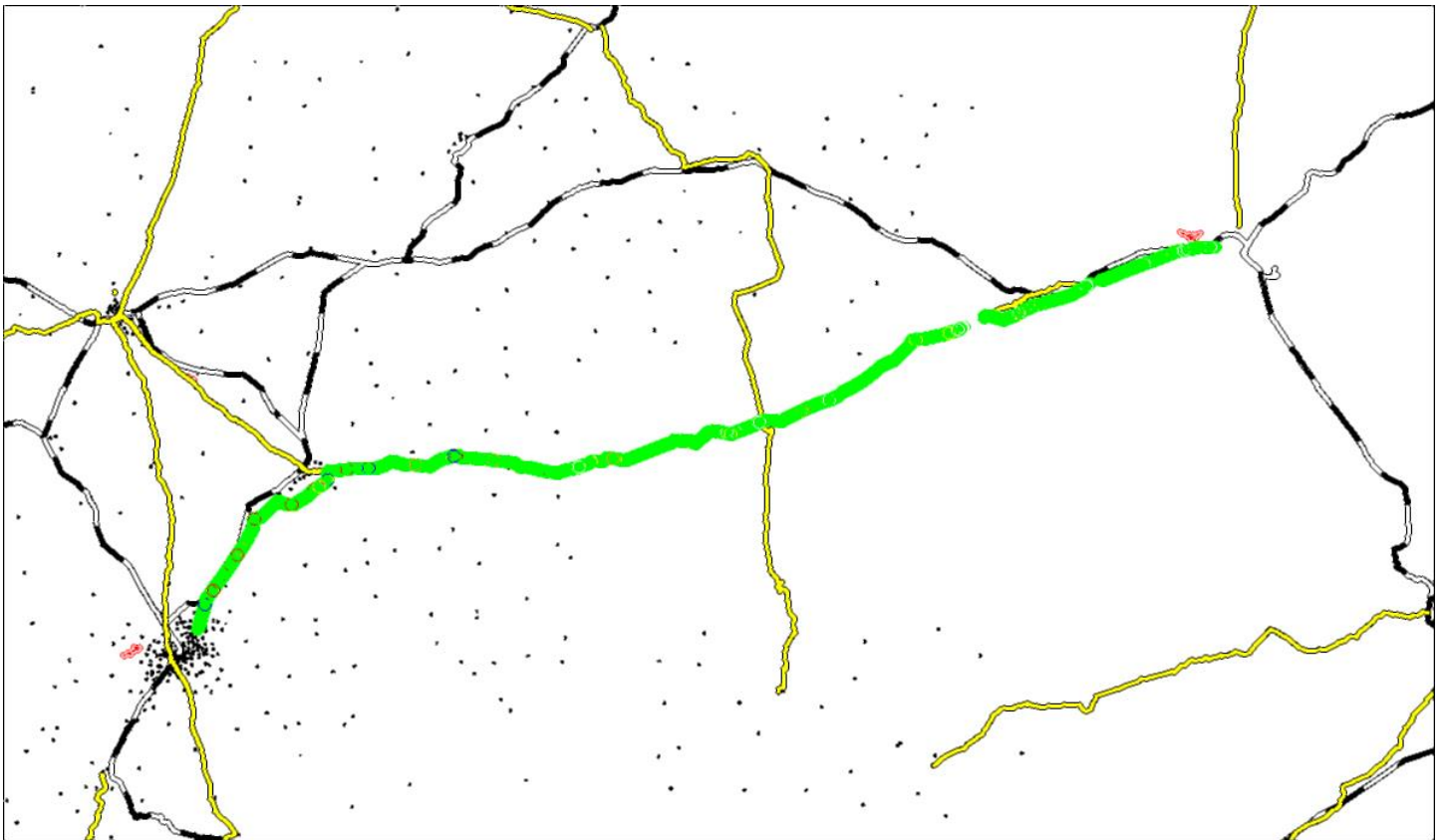
Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	2252903	95.37%	
(2, <=3)	31434	1.33%	
(3 , <=4)	18855	0.80%	
(4 , <=5)	27155	1.15%	
(5 , <=Max)	31974	1.35%	
Total		100%	

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

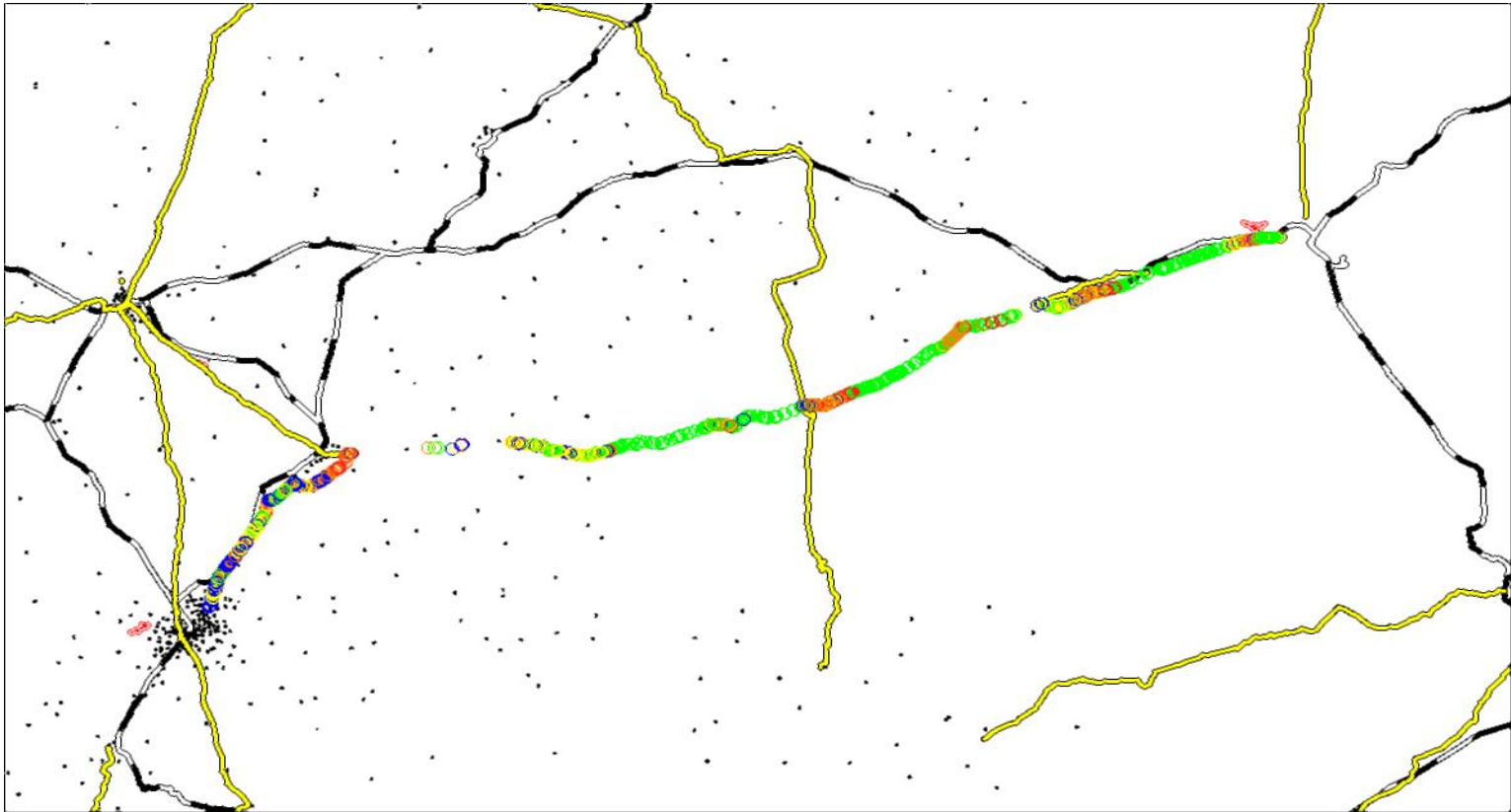| Technology	Rx Quality %
3G	96.18%

Overall Ec/No	# Samples	% PDF	Legends
(Max, <=-6)	76239	16.70%	🟩
(-6, <=-9)	120211	26.33%	🟨
(-9, <=-11)	138082	30.25%	🟦
(-11, <=-14)	104523	22.90%	🟧
(-14, <= Min)	17455	3.82%	🟥
Total		**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- VIL

Technology	Rx Quality %
3G	96.5

Overall Ec/No	# Samples	% PDF	Legends
(Max, <=-6)	587	9.30%	
(-6, <=-9)	1172	18.56%	
(-9, <=-11)	1053	16.68%	
(-11, <=-14)	3280	51.96%	
(-14, <= Min)	221	3.50%	
Total	6313	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- Airtel

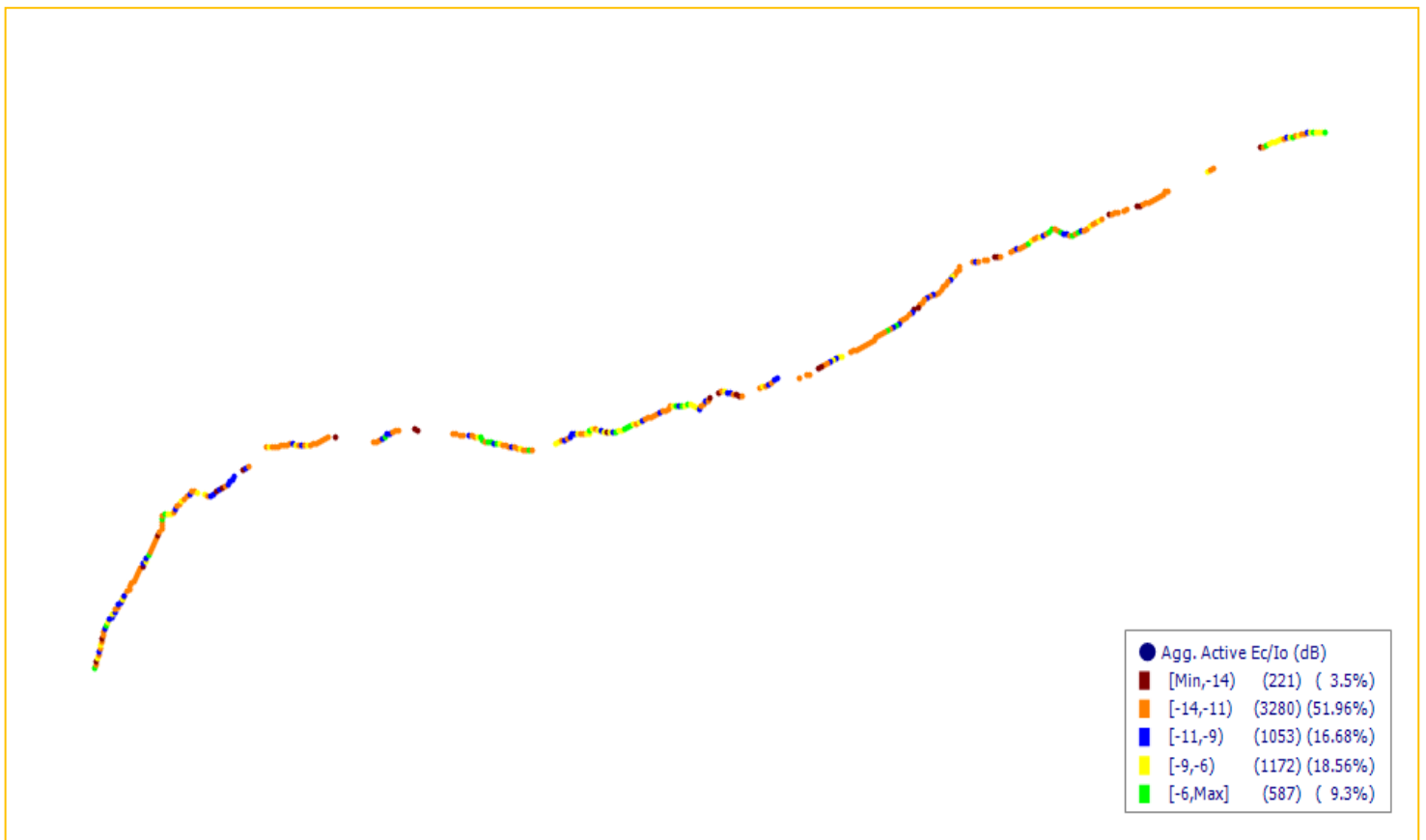| Technology	Rx Quality %
VoLTE	76.04
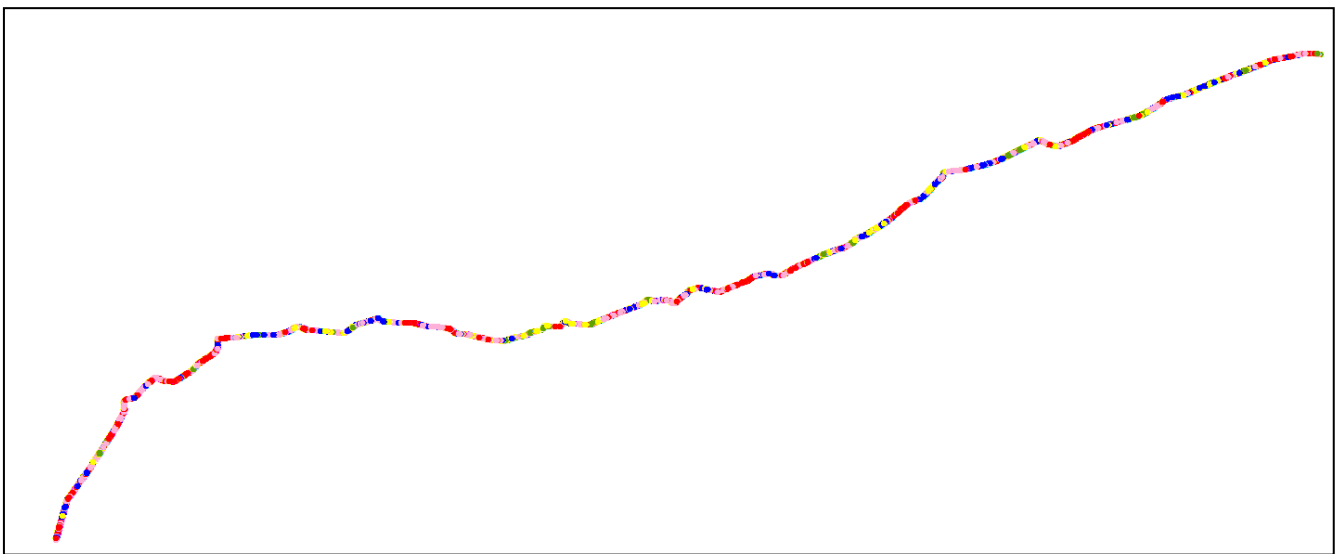
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	1191001	23.96	
(0, <=5)	2026586	40.77	
(5, <=10)	845776	17.01	
(10, <=15)	521148	10.48	
(15, <=Max)	386815	7.78	
Total	4971326	100%	

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- JIO

Technology	Rx Quality %
VoLTE	85.49
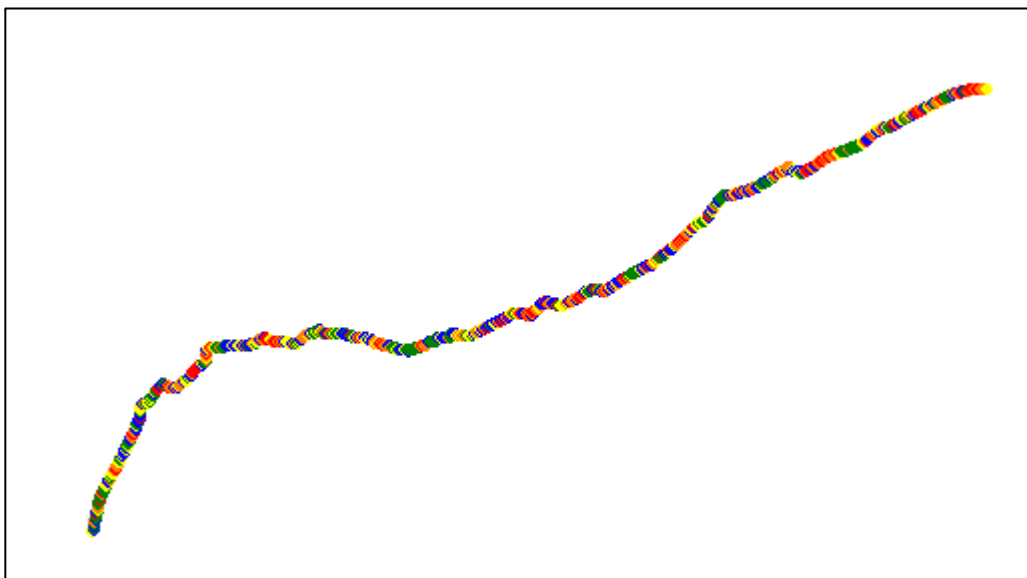
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	3001	14.51	
(0, <=5)	4612	22.30	
(5, <=10)	4609	22.29	
(10, <=15)	4163	20.13	
(15, <=Max)	4294	20.77	
Total	20679	100%	

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- VIL

| Technology	Rx Quality %
VoLTE	96.21

RS SINR Carrier 1 (dB)
- [Min,0)   (317) (3.79%)
- [0,5)   (2248) (26.88%)
- [5,10)   (1866) (22.31%)
- [10,15)   (1560) (18.65%)
- [15,Max]   (2373) (28.37%)

Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	317	3.79%	
(0, <=5)	2248	26.88%	
(5, <=10)	1866	22.31%	
(10, <=15)	1560	18.65%	
(15, <=Max)	2373	28.37%	
Total	8364	100%	

25

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	83.15
VIL 3G	16.96
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	71.99

% of Time Spent on 3G/VoLTE
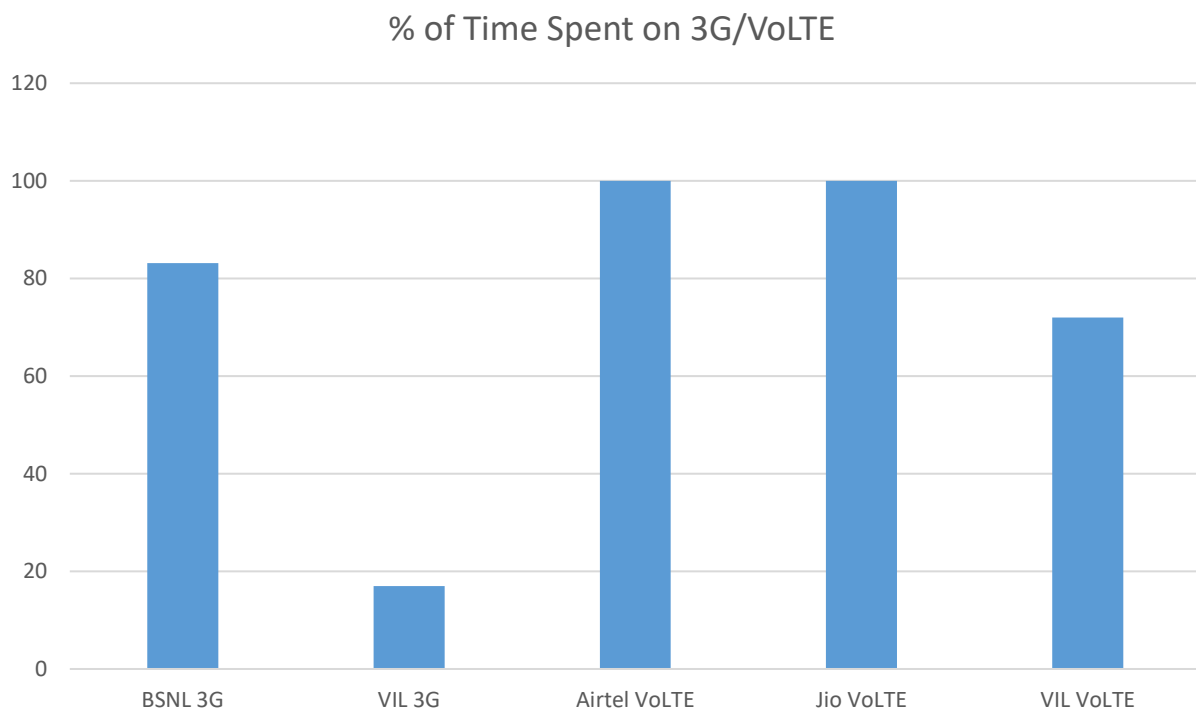
TSP- Airtel

Technology	% of Time Spent on
3G	
VoLTE	100

27
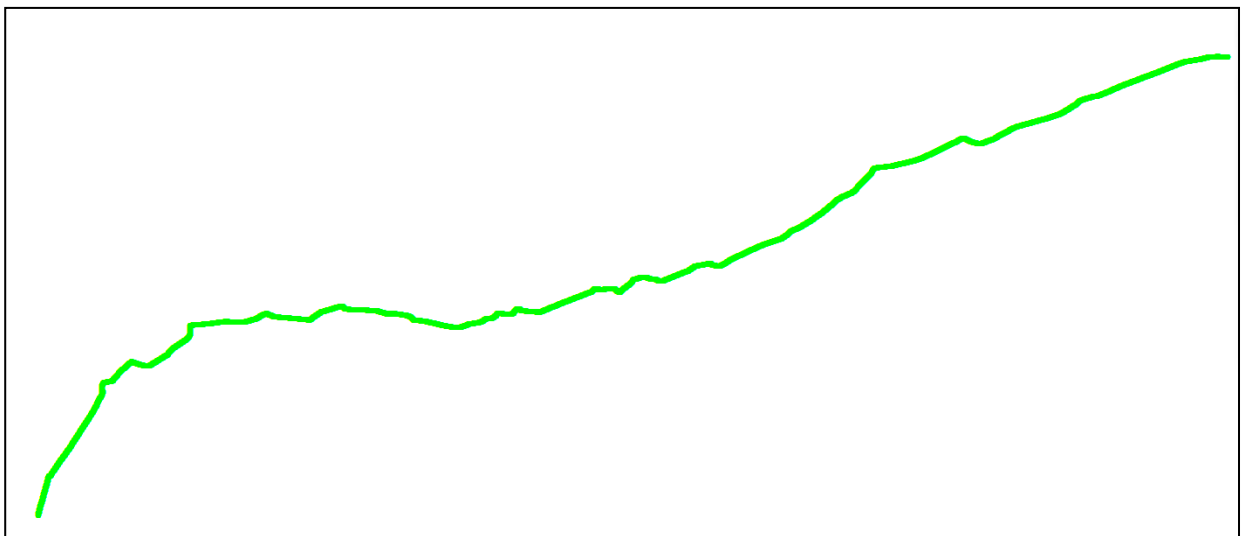
TSP- BSNL

Technology	% of Time Spent on
3G	83.15%
VoLTE	

28
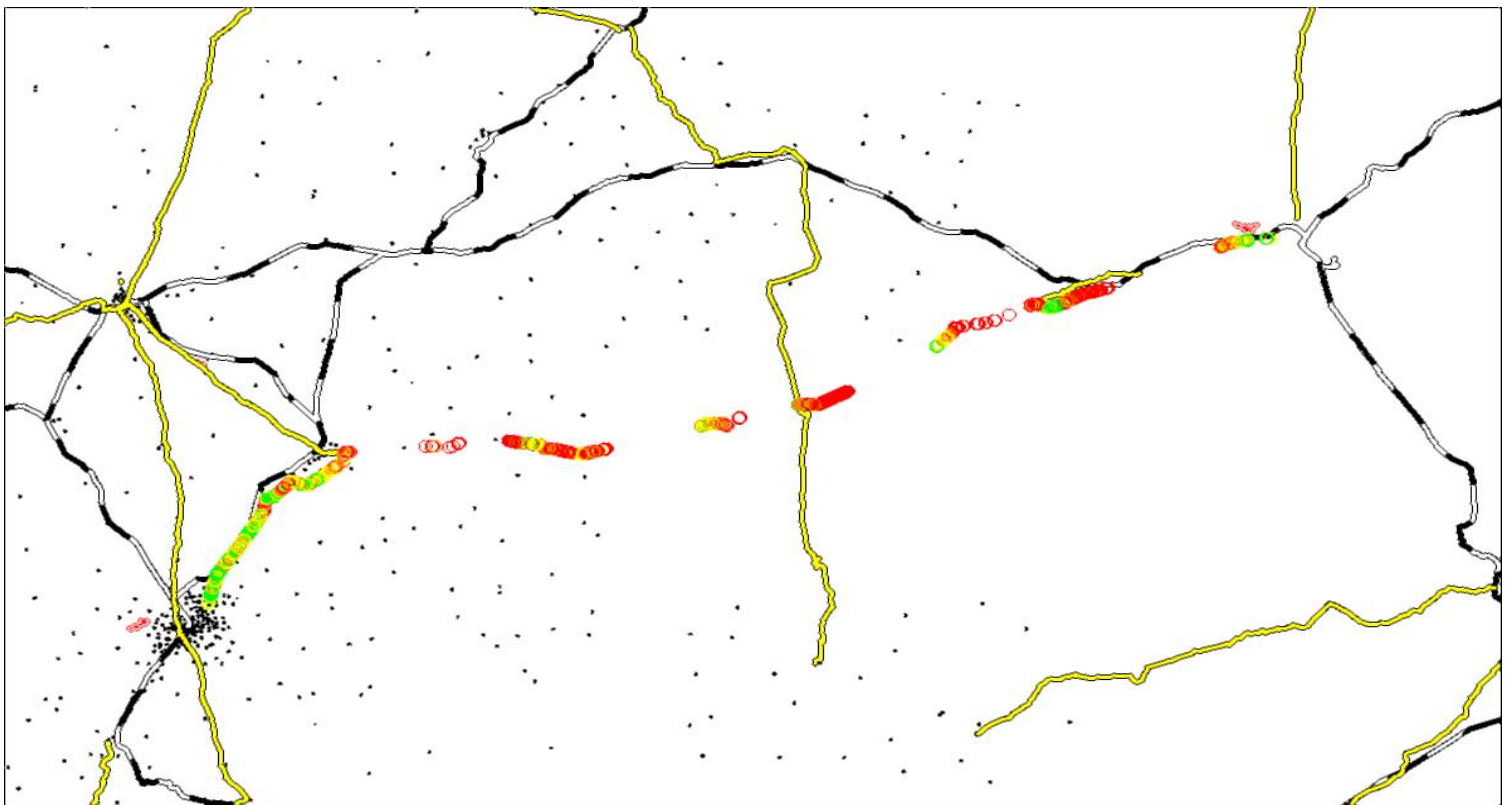
TSP- JIO

Technology	% of Time Spent on
3G	
VoLTE	100

TSP- VIL

Technology	% of Time Spent on
3G	16.96
VoLTE	71.99

System
LTE   (365) (71.99%)
WCDMA   (86)   (16.96%)
GSM   (56)   (11.05%)

TSP- Airtel

Data Statistics - Dynamic data testing -   180 Kms

Data KPIs - Overall	2G
Download Throughput (Kbps)	79.40

DL throughput	No of Sample	%	Legends
< 100 Kbps	7493	65.07	
100-150Kbps	1627	11.15	
150-200Kbps	2165	14.84	
>200Kbps	1304	8.94	

Dynamic Data Test Details

TSP- BSNL

Data Statistics - Dynamic data testing -   183 Kms

Data KPIs - Overall	2G
Download Throughput (Kbps)	173 Kbps
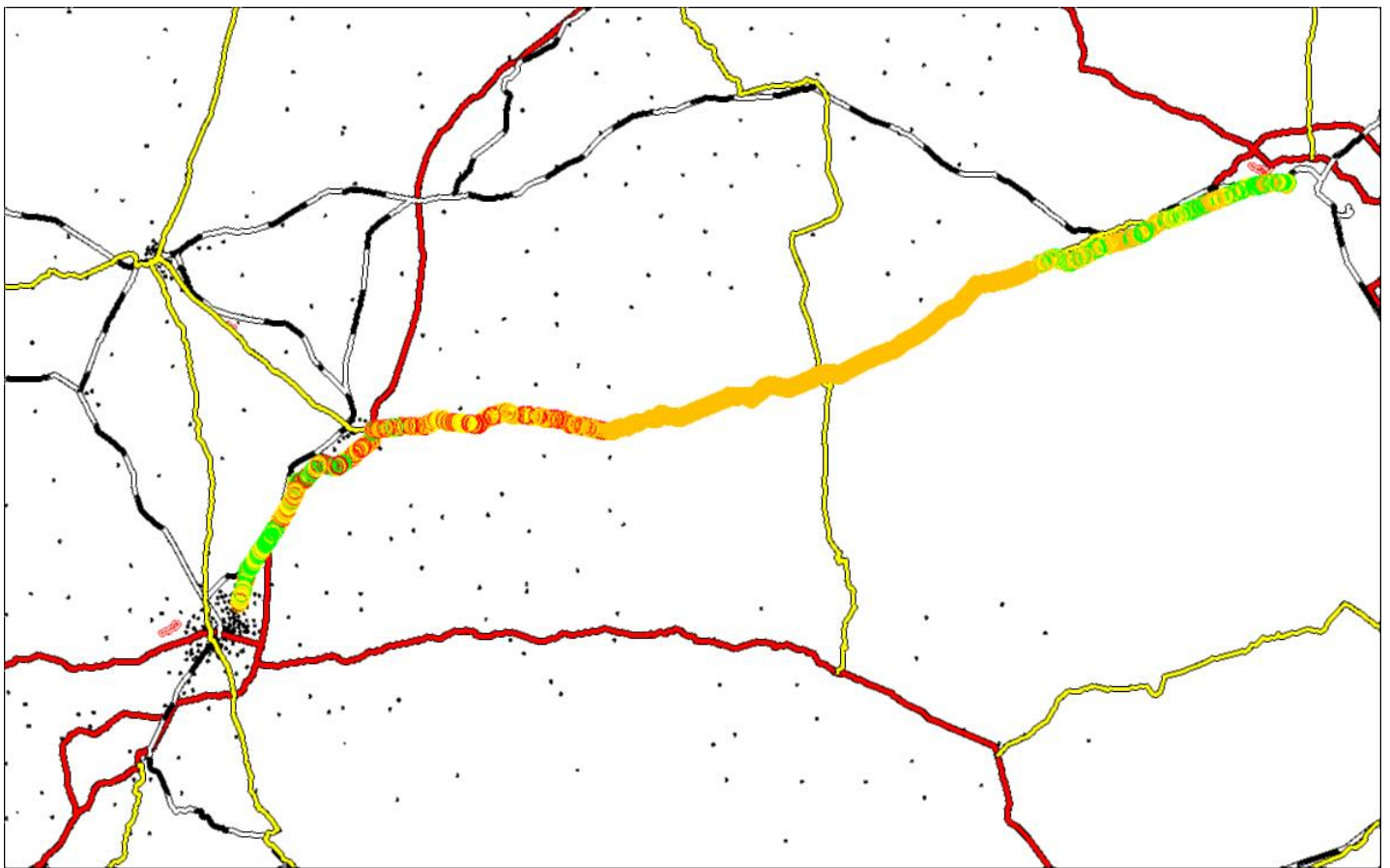
DL throughput	No of Sample	%	Legends
< 100 Kbps	633843	17.82%	
100-150Kbps	1148413	32.28%	
150-200Kbps	894044	25.13%	
>200Kbps	881063	24.77%	

TSP- VIL

Data Statistics - Dynamic data testing -   183 Kms

Data KPIs - Overall	2G
Download Throughput (Kbps)	**93.88**

Legend:
- ● FTP Download Throughput Mean (kbps)
- ■ [Min, 100) (2180) (58.89%)
- ■ [100, 150) (803) (21.69%)
- ■ [150, 200) (477) (12.88%)
- ■ [200, Max] (242) (6.54%)
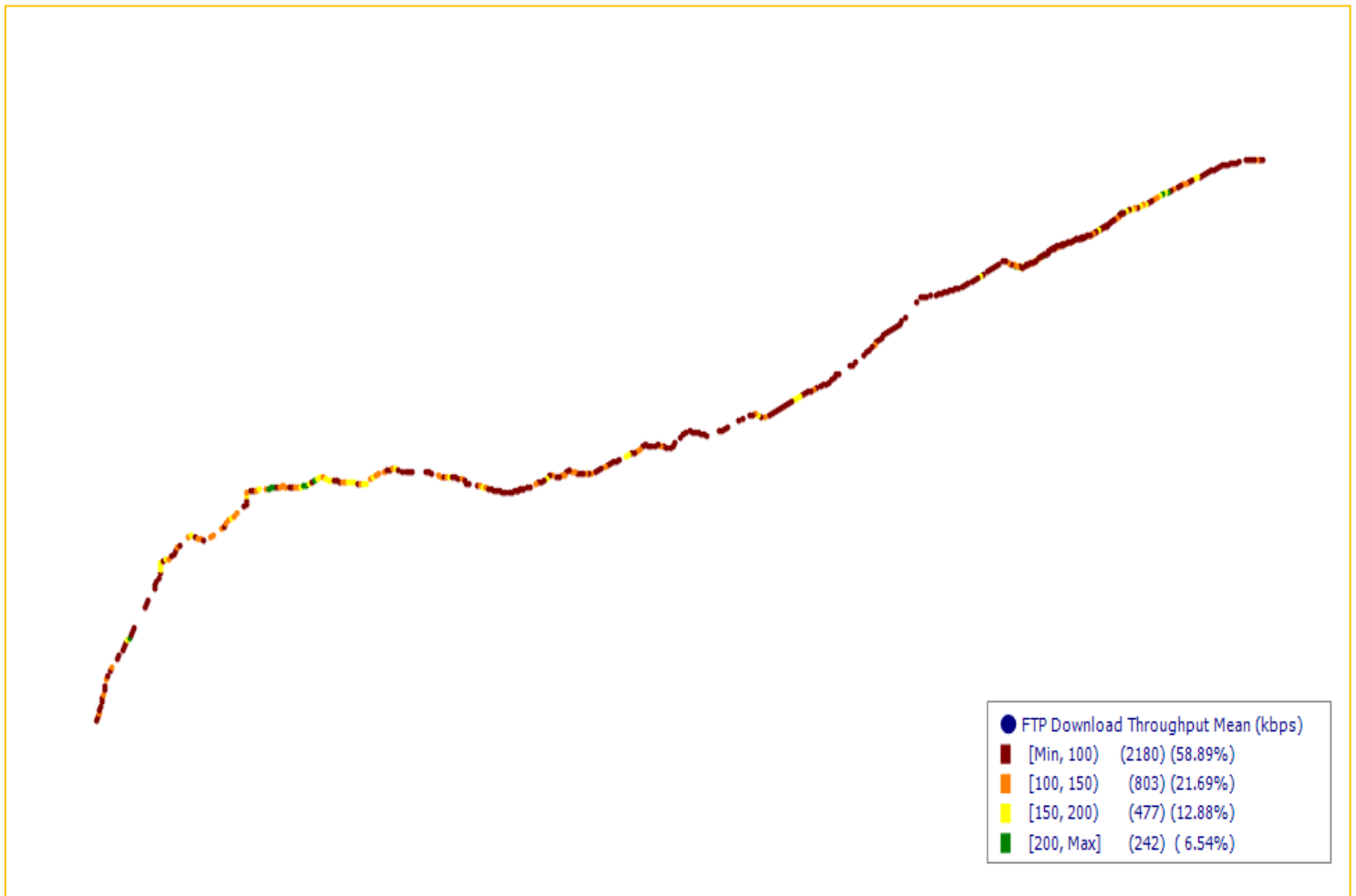
DL throughput	No of Sample	%	Legends
< 100 Kbps	2180	58.89%	
100-150Kbps	803	21.69%	
150-200Kbps	477	12.88%	
>200Kbps	242	6.54%	

TSP- BSNL

Data Statistics - Dynamic data testing -   183 Kms

Data KPIs - Overall	3G
Download Throughput (Mbps)	**2.21 Mbps**
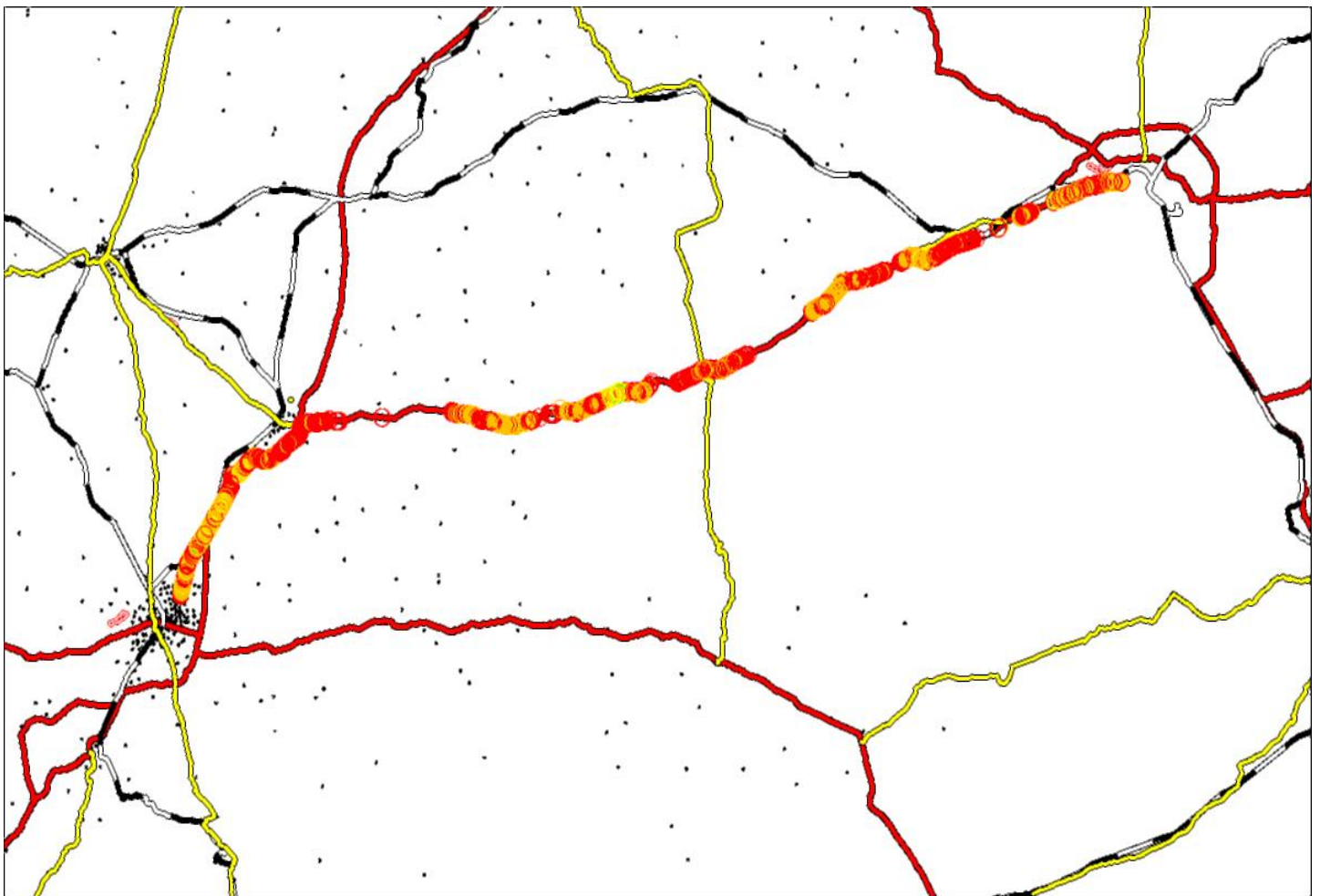
DL throughput	No of Sample	%	Legends
< 1 Mbps	530035	42.82%	🟥
1-5 Mbps	639291	51.64%	🟧
5-10 Mbps	65183	5.27%	🟨
>10Mbps	3406	0.28%	🟩

34

TSP- VIL

Data Statistics - Dynamic data testing -   183 Kms

Data KPIs - Overall	3G
Download Throughput (Mbps)	2.53

FTP Download Throughput Mean (kbps)
[Min, 1000)   (1226) (20.74%)
[1000, 5000)   (4081) (69.05%)
[5000, 10000)   (596) (10.08%)
[10000, Max]   (7) (0.12%)
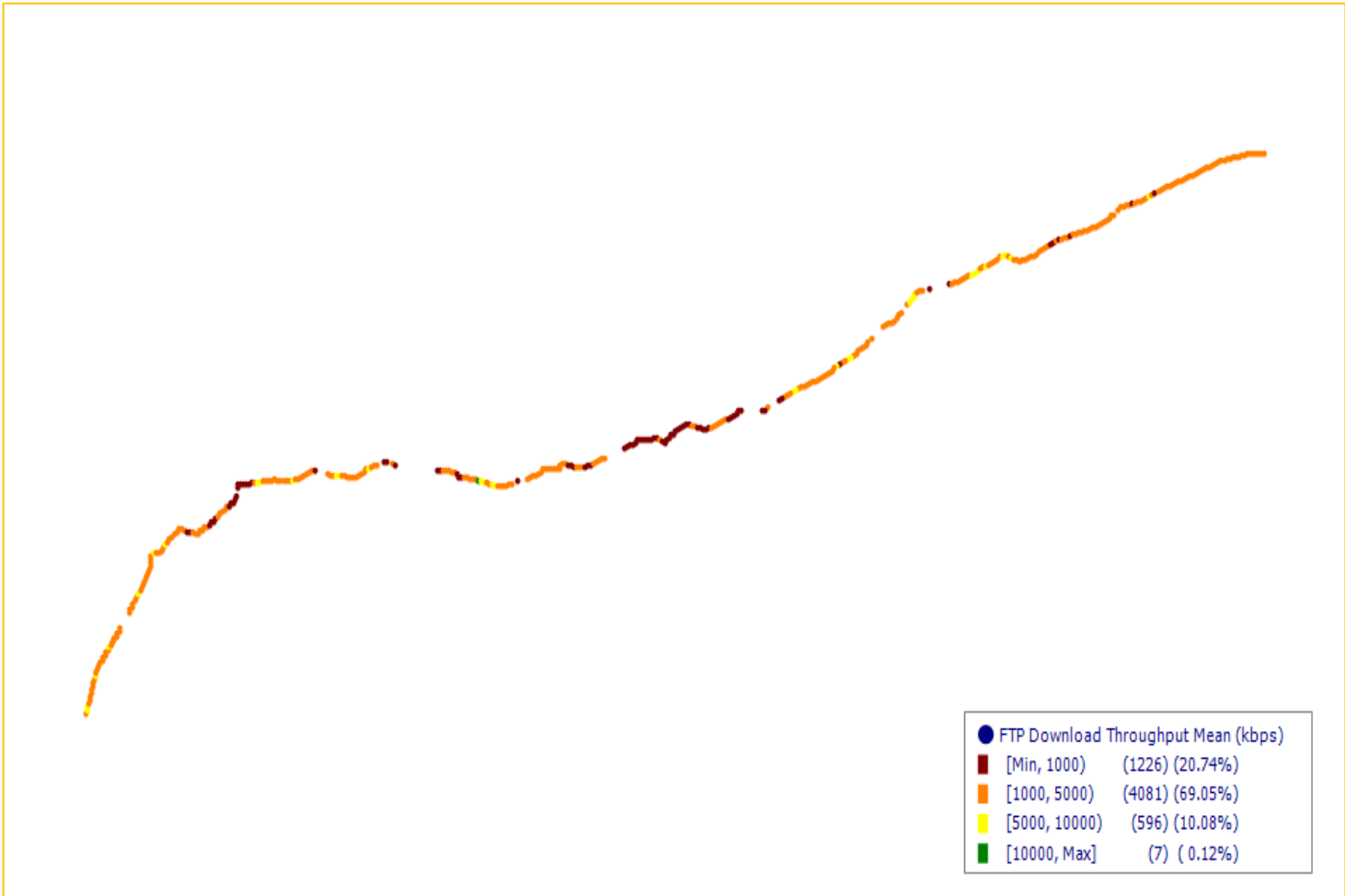
DL throughput	No of Sample	%	Legends
< 1 Mbps	1226	20.74%	
1-5 Mbps	4081	69.05%	
5-10 Mbps	596	10.08%	
>10Mbps	7	0.12%	

Dynamic Data Test

TSP- Airtel

Data Statistics - Dynamic data testing - 180 Kms

Data KPIs - Overall	LTE
Download Throughput (Mbps)	12.8

DL throughput	No of Sample	%	Legends
< 2Mbps	3901	23.02	🟥
2-5 Mbps	3532	20.84	🟧
5-10 Mbps	4628	27.31	🟨
>10Mbps	4885	28.83	🟩

Dynamic Data Test Details

Dynamic Data Test

TSP- JIO

Data Statistics - Dynamic data testing - 178 Kms

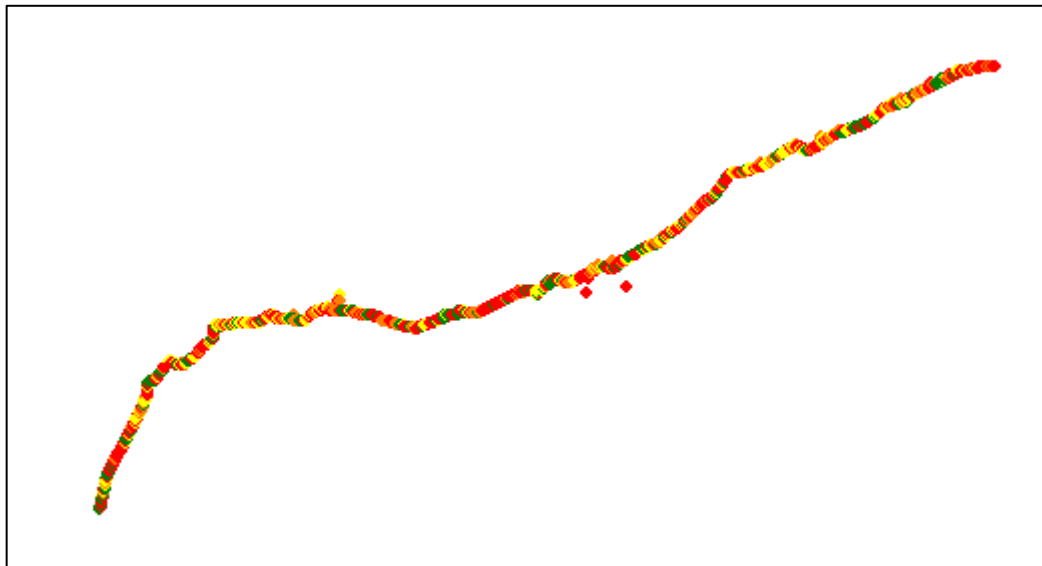| Data KPIs - Overall	LTE
Download Throughput (Mbps)	6.55

DL throughput	No of Sample	%	Legends
< 2Mbps	7105	37.53	
2-5 Mbps	4153	21.94	
5-10 Mbps	3436	18.15	
>10Mbps	4239	22.39	

Dynamic Data Test Details

TSP- VIL

Data Statistics - Dynamic data testing - 183 Kms

Data KPIs - Overall	LTE
Download Throughput (Mbps)	**6.73**

FTP Download Throughput Mean (kbps)
[Min, 2000)   (1504) (23.46%)
[2000, 5000)   (1830) (28.55%)
[5000, 10000)   (1558) (24.31%)
[10000, Max]   (1518) (23.68%)
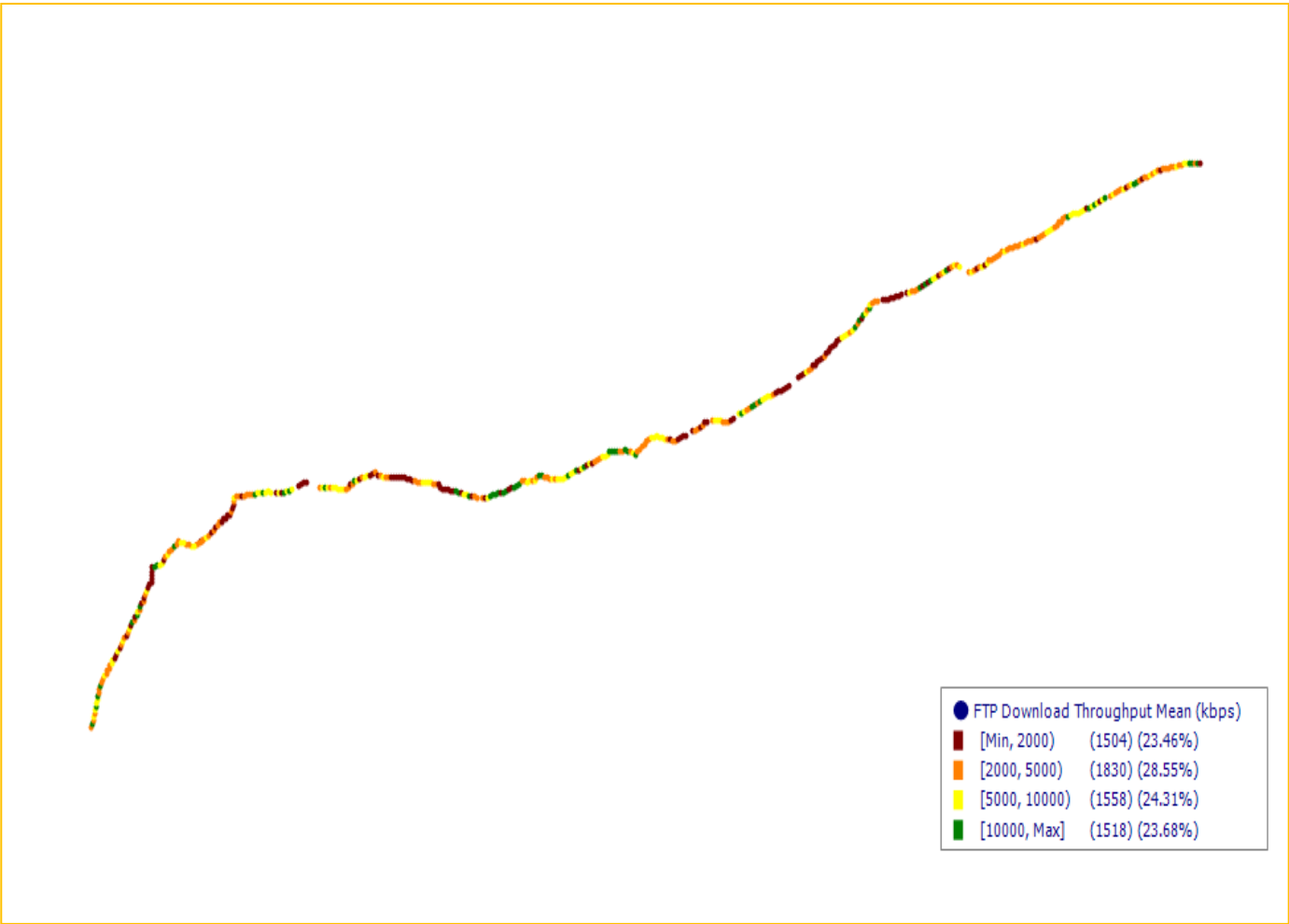
DL throughput	No of Sample	%	Legends
< 2Mbps	1504	23.46%	
2-5 Mbps	1830	28.55%	
5-10 Mbps	1558	24.31%	
>10Mbps	1518	23.68%	