



प्रभावी विनियमन – सुगम संचार
Effective Regulation – Ease of Communication

Operator Assisted Drive Test Report Agra – Bareilly Highway 16/06/2023

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 Agra to Bareilly Highway from 9:00 AM to 8:00 PM on 16/06/2023. The drive test covered drive route of around 220 KMs.

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

Key Performance Indicators:

KPI	Benchmark	Observations
Block call rate %	$\leq 3\%$	All TSPs achieved the benchmark except BSNL in 2G
Drop call rate %	$\leq 2\%$	All TSPs achieved the benchmark except BSNL in 2G&3G
CSSR %	$\geq 95\%$	All TSPs achieved the benchmark except BSNL in 2G
Mobility HOSR %	$\geq 95\%$	All TSPs achieved the benchmark except BSNL in 2G
Good RX Quality %	$\geq 95\%$	All TSPs achieved the benchmark, Except BSNL in 2G & 3G and Airtel in 2G & VoLTE and 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.

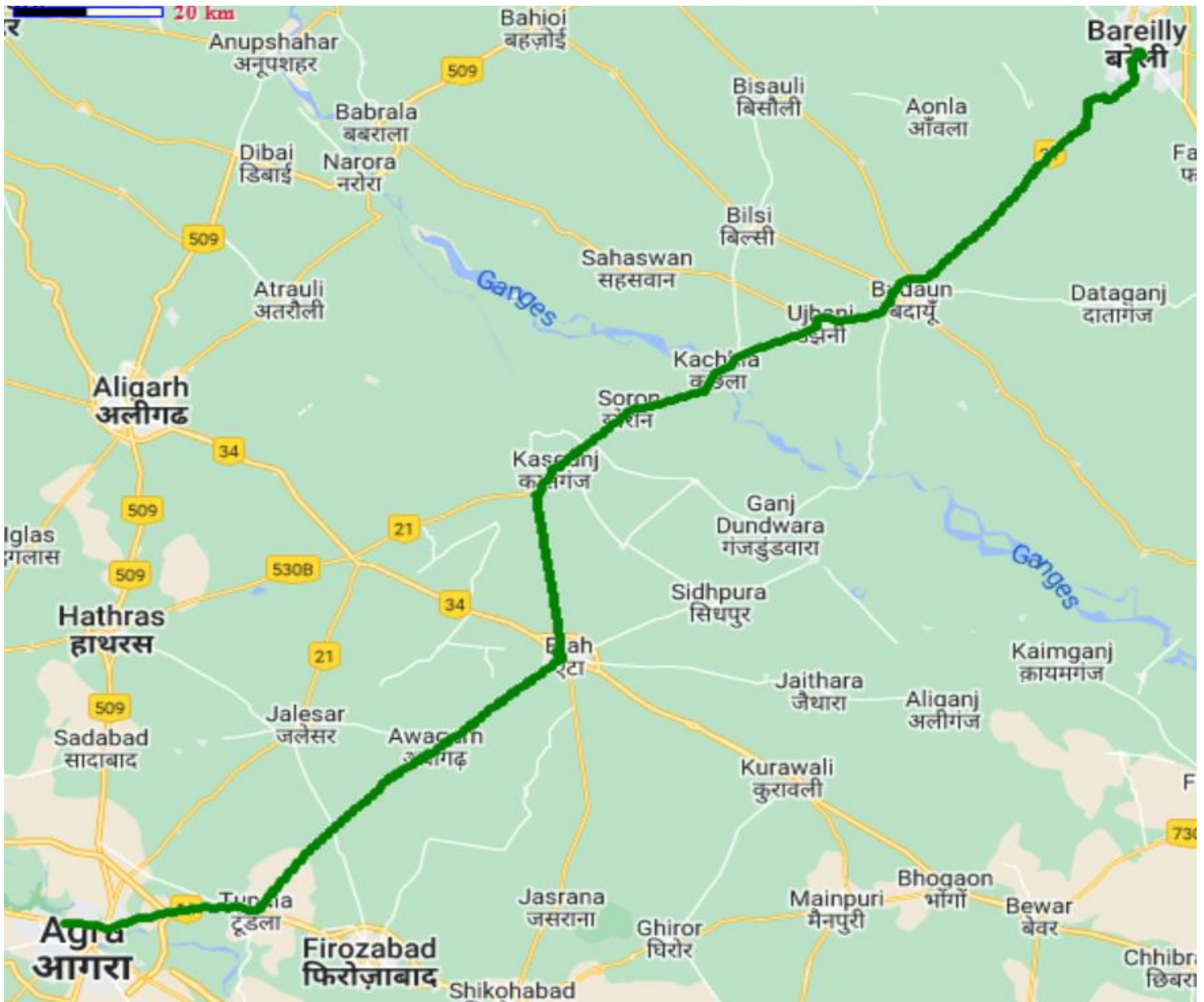
Data Tests:

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

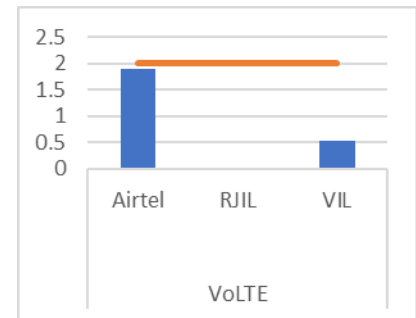
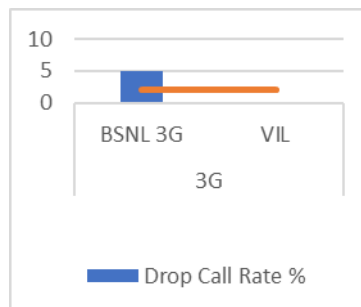
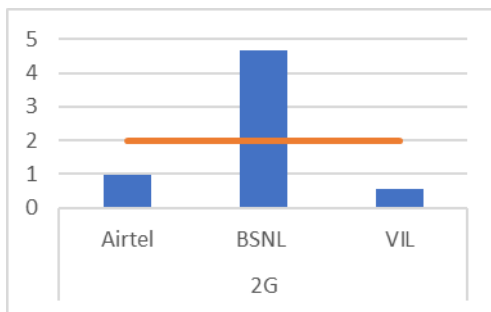
**AGRA ISBT TO BHAGWAN TALKIES , AITMADPUR , TUNDLA,
AWAGARH, ETAH, KASGANJ, SOROH,
KACHHLA , UJHANI , BUDAUN, LAL PHATAK BAREILLY,
BAREILY CANTT TO SATELLITE BUS STAND**

Voice Calls

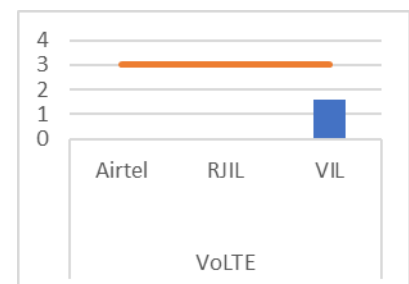
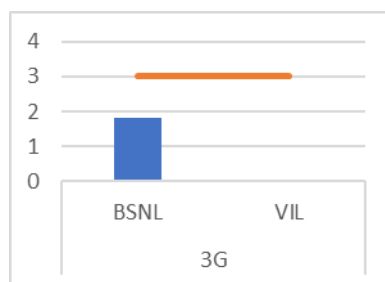
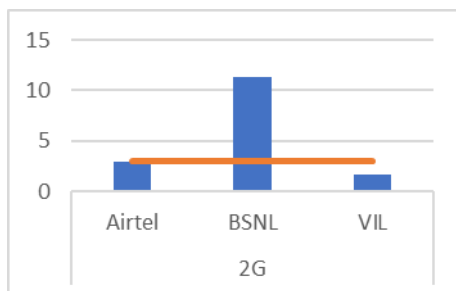
Key Observations

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 %	0.97	4.65	0.55	5.05	NA	1.9	0	0.54
Block Call Rate %	2.9	11.34	1.65	1.80	NA	0	0	1.61

a) All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%) except BSNL in 2G& 3G

b) Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's. Except BSNL in 2G

Voice Calls

Key Observations

Coverage

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

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	79.3	58	72.5

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

TSPs	3G
	BSNL
Coverage %	51

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	98.7	99.11	95.8

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

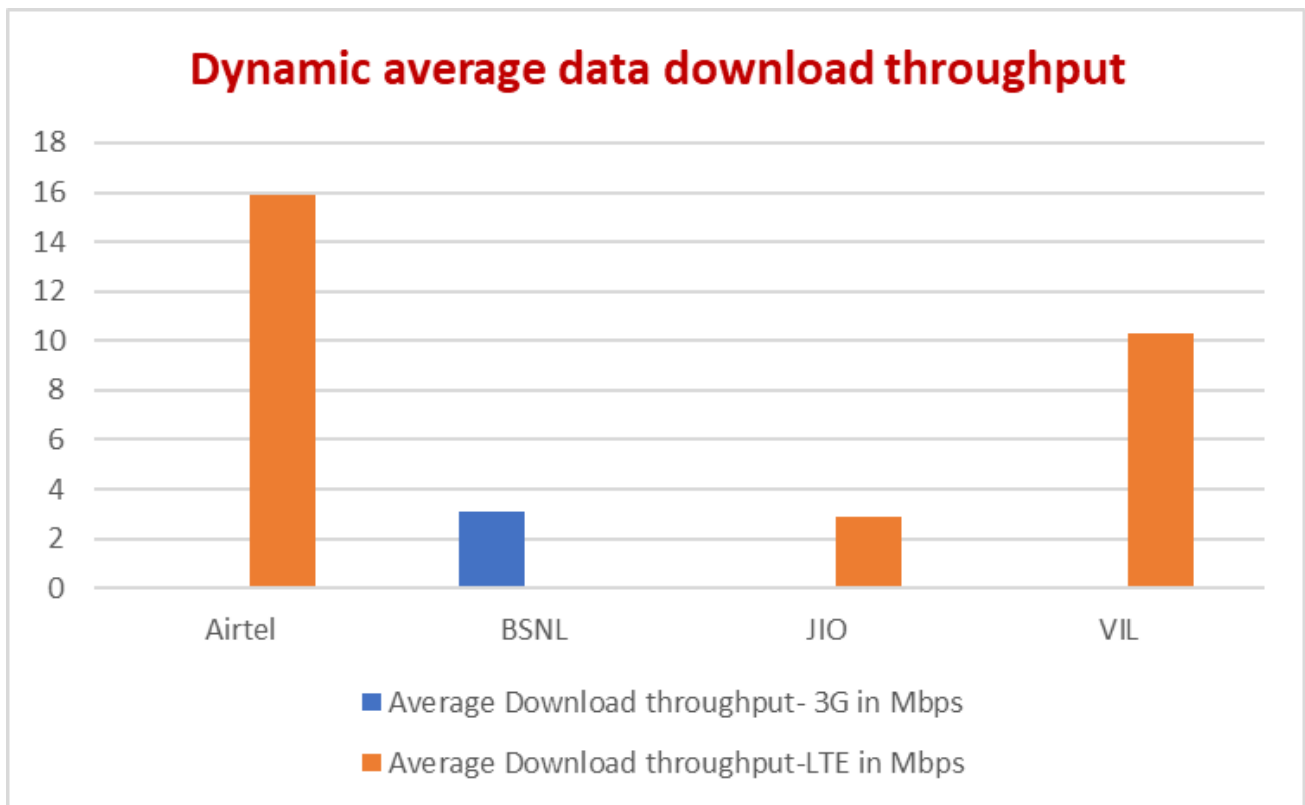
TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Time Spent on 3G/4G %	32.12	NA	100	100	100

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	3.09	NA	NA
Average Download throughput-LTE in Mbps	15.92	NA	2.88	10.27
Average Download throughput- 5G in Mbps	NA	NA	NA	NA

Summary

City Level Summary- Voice

TSP (For 2G)	Airtel	BSNL	VIL
Call attempts	103	97	182
Block call rate %	2.9	11.34	1.65
CSSR %	97.1	88.66	100
Drop call rate %	0.97	4.65	0.55
Mobility HOSR %	98.63	94.73	95
RX Quality %	91.95	83	95.3
Average CST Sec	2.86	4.86	4.1

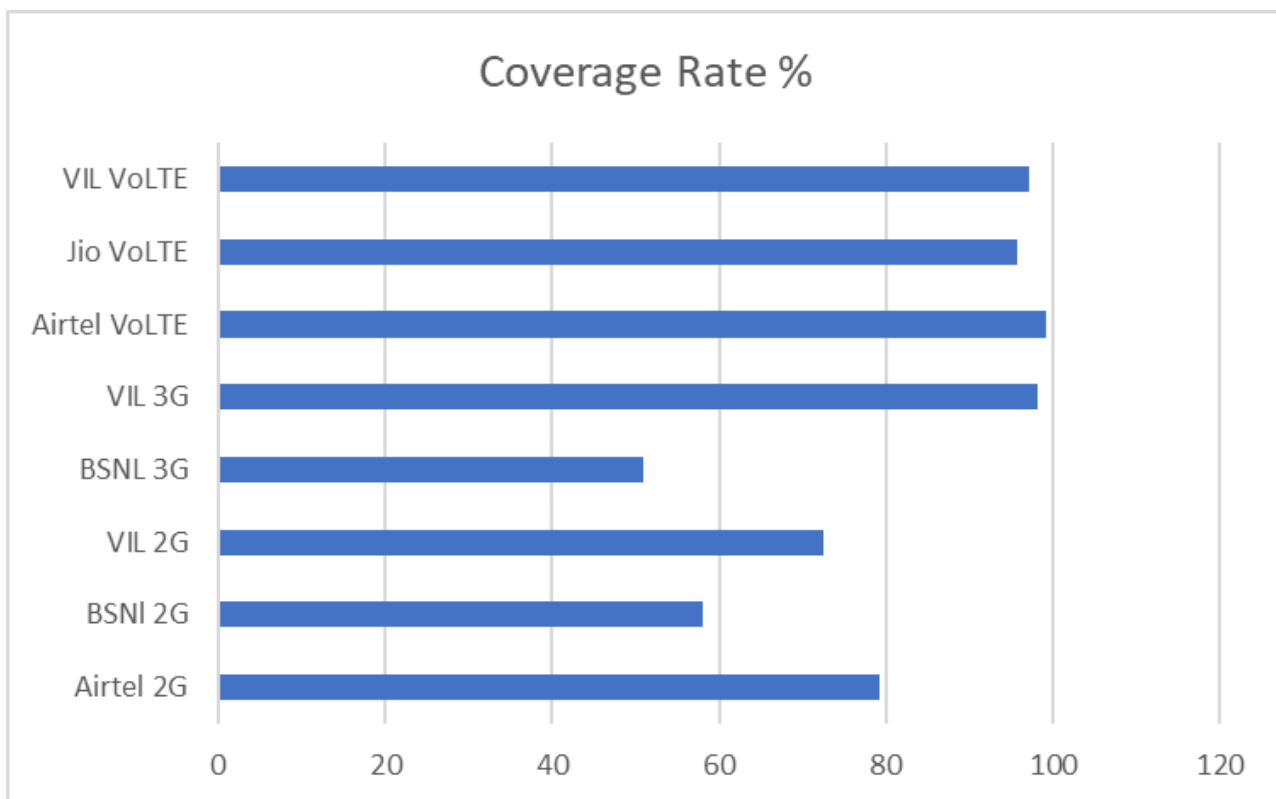
TSP (For 3G)	BSNL
Call attempts	111
Block call rate %	1.80
CSSR %	98.2
Drop call rate %	4.58
Mobility HOSR %	99.56
RX Quality %	82.45
Average CST (Sec)	3.30

TSP (For Volte)	Airtel	BSNL	JIO	VIL
Call attempts	102	NA	85	186
Block call rate %	0	NA	0	1.61
CSSR %	100	NA	100	100
Drop call rate %	1.9	NA	0	0.54
Mobility HOSR %	100	NA	99.31	95
RX Quality %	78.82	NA	87.25	96.3
Average CST(Sec)	1.83	NA	0.45	1.2

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.

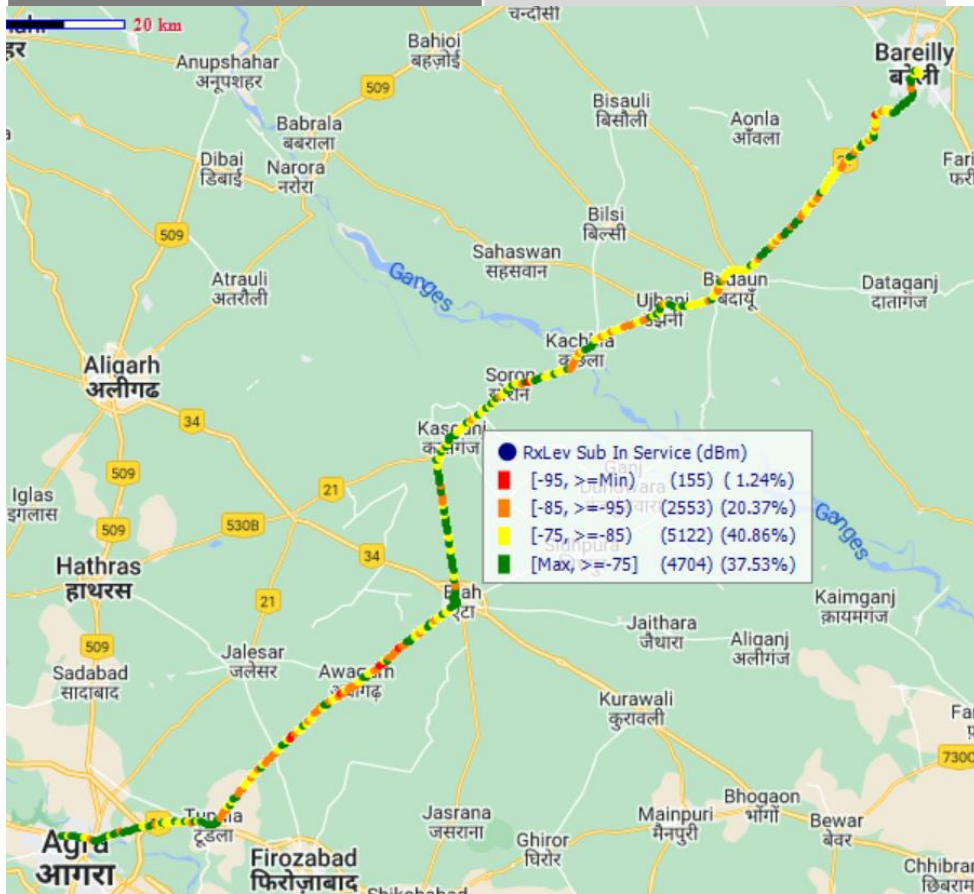
TSP	Coverage Rate %
Airtel 2G	79.3
BSNI 2G	58
VIL 2G	72.5
BSNL 3G	51
Airtel VoLTE	98.2
Jio VoLTE	99.11
VIL VoLTE	95.8



Coverage Details

TSP-Airtel

Technology	Coverage %
2G	79.3



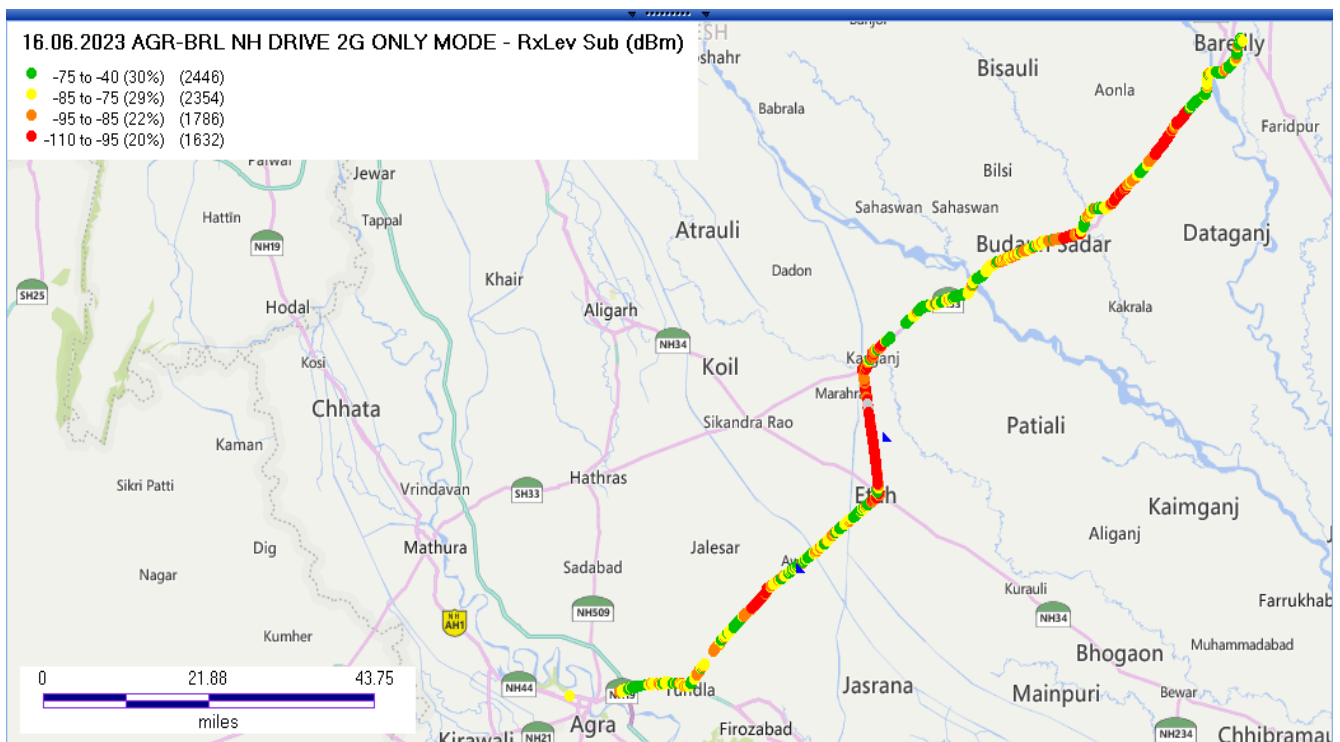
2G

Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	4704	37.53	
[-75, >=-85)	5122	40.86	
[-85, >=-95)	2553	20.37	
[-95, >=Min)	155	1.24	
Total	12534	100	

Coverage Details

TSP-BSNL

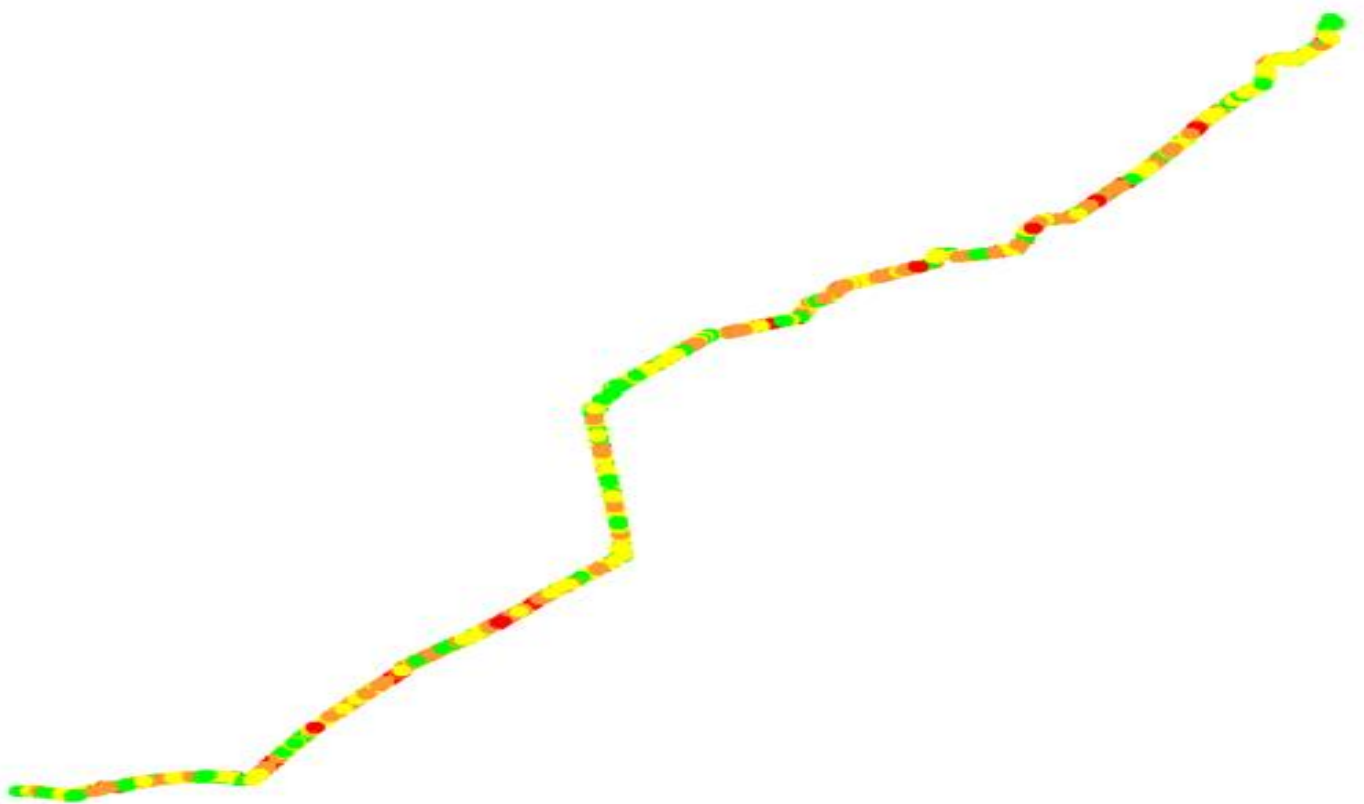
Technology	Coverage %
2G	58%







2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	2446	30	
[-75, >=-85)	2354	29	
[-85, >=-95)	1786	21	
[-95, >=Min)	1632	20	
Total	8218	100	

TSP-VIL

Technology	Coverage %
2G	72.5

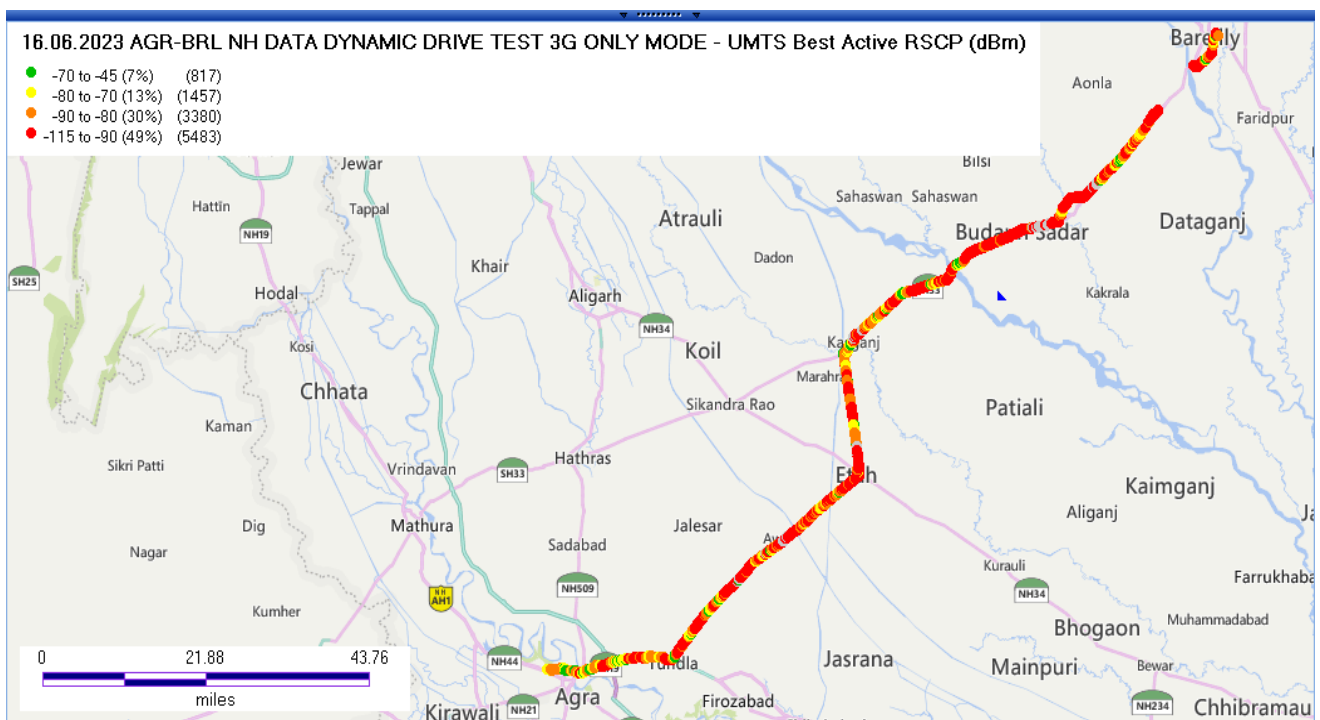


2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	19620	34.27	
[-75, >=-85)	21878	38.22	
[-85, >=-95)	13172	23.01	
[-95, >=Min)	2575	4.5	
Total	57245	100	

Coverage Details

TSP- BSNL

Technology	Coverage %
3G	50.77%

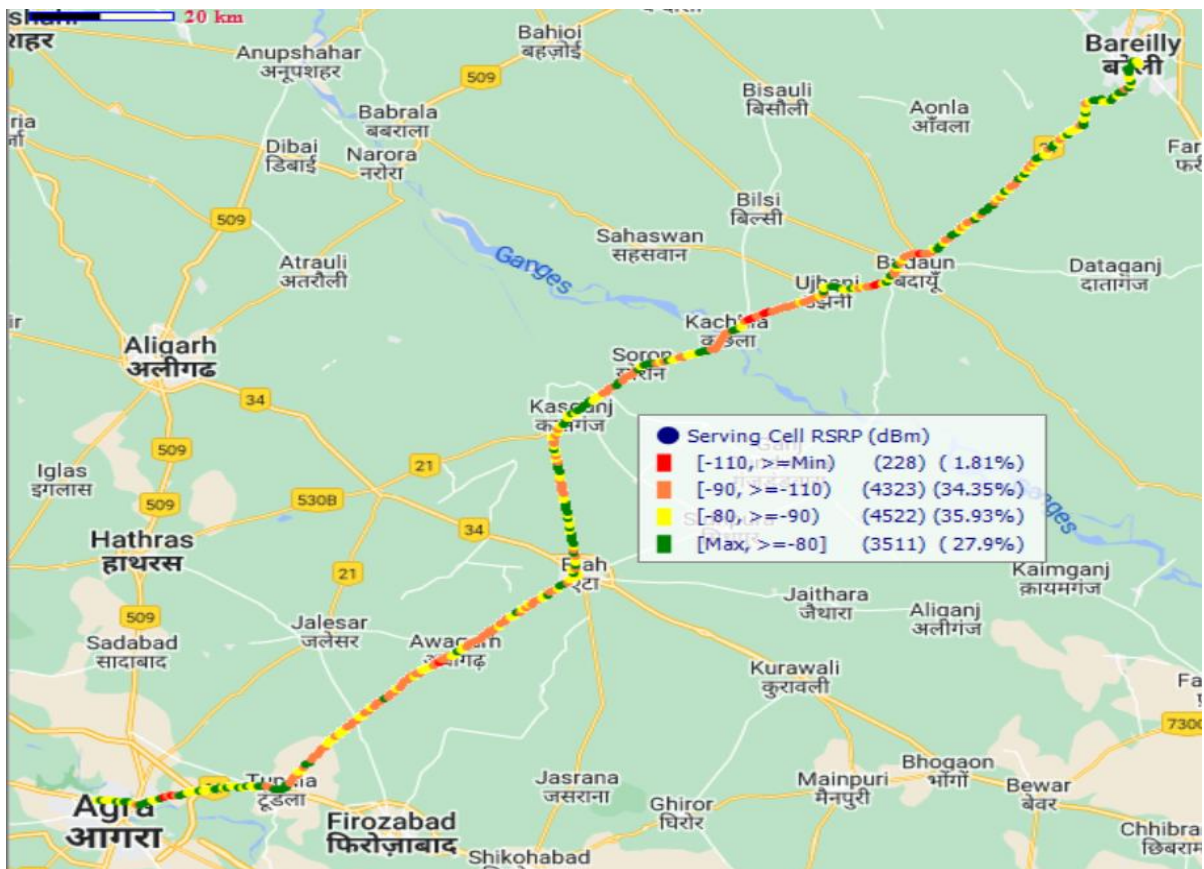


3G			
Overall RSCP	# Samples	% PDF	Legends
[Max, >=-70]	817	7.34	
[-70, >=-80)	1457	13.08	
[-80, >=-90)	3380	30.35	
[-90, >=Min)	5483	49.23	
Total	11137	100	

Coverage Details

TSP-Airtel

Technology	Coverage %
VoLTE	98.2

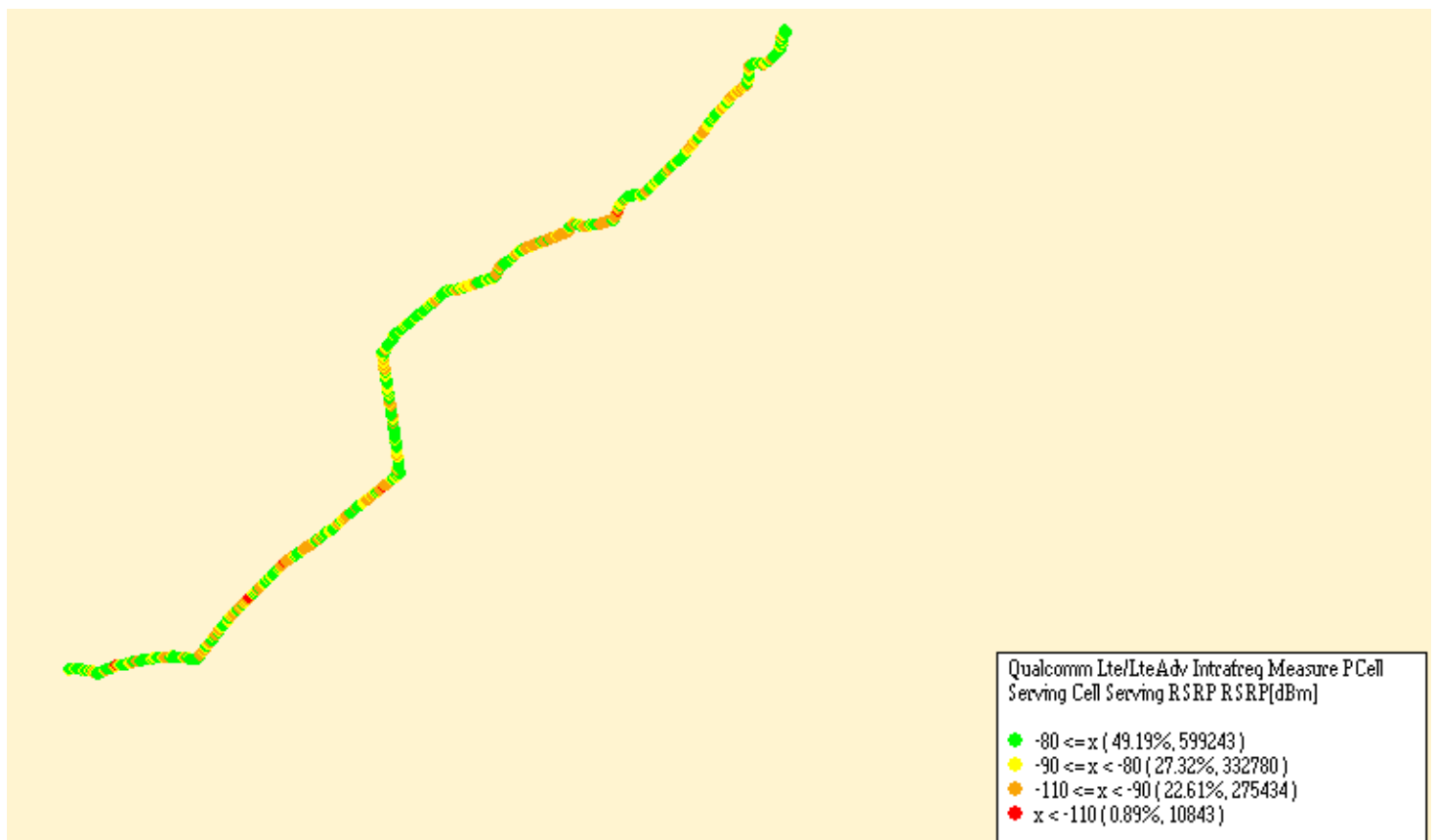


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	3511	27.9	
[-80, >=-90]	4522	35.93	
[-90, >=-110]	4323	34.35	
[-110, >=Min]	228	1.81	
Total	12584	100	

Coverage Details

TSP- Jio

Technology	Coverage %
VoLTE	99.11







VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	599243	49.19	
[-80, >=-90)	332780	27.31	
[-90, >=-110)	275434	22.61	
[-110, >=Min)	10843	0.89	
Total	1218300		

TSP- VIL

Technology	Coverage %
VoLTE	95.8

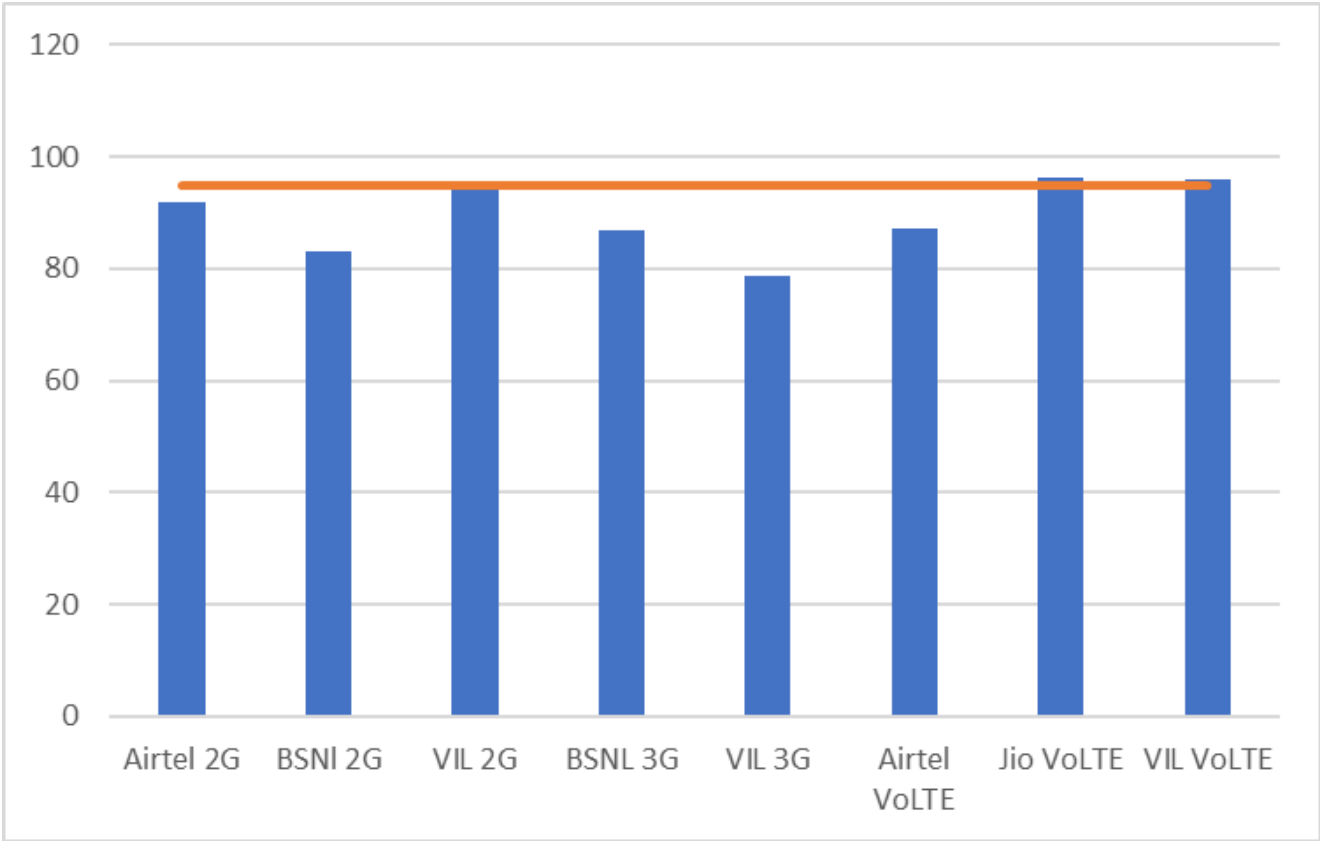


VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	66349	12.1	
[-80, >=-90)	165069	30.2	
[-90, >=-110)	292077	53.5	
[-110, >=Min)	22908	4.2	
Total	546403	100	

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	91.95
BSNI 2G	83
VIL 2G	95.3
BSNL 3G	87
Airtel VoLTE	78.82
Jio VoLTE	87.25
VIL VoLTE	96.3



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	91.95



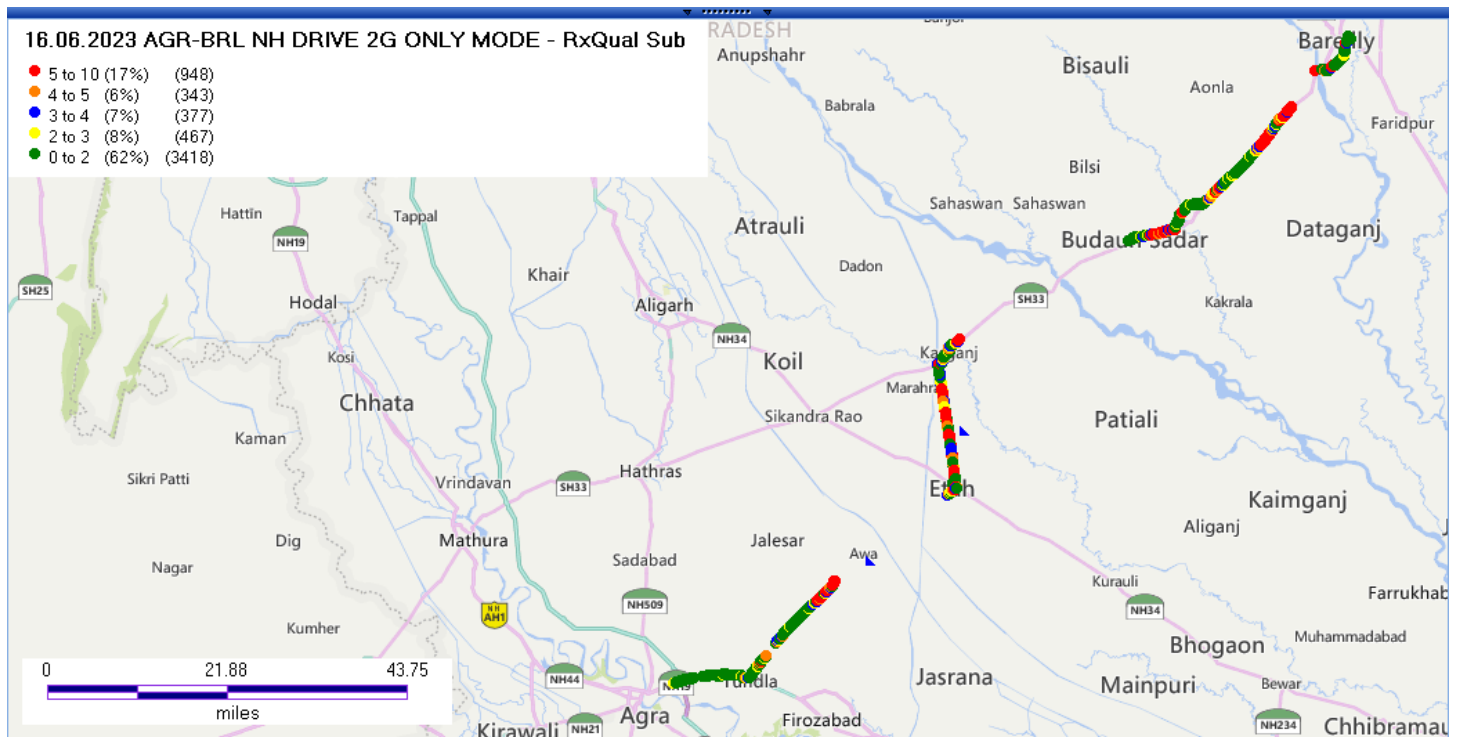
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	7115	60.82	
(2, ≤ 3)	1321	11.29	
(3, ≤ 4)	1082	9.25	
(4, ≤ 5)	1239	10.59	
(5, $\leq \text{Max}$)	942	8.05	
Total	11699	100	

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	83%



Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	3418	62	
(2, ≤ 3)	467	8	
(3, ≤ 4)	377	7	
(4, ≤ 5)	343	6	
(5, \leq Max)	948	17	
Total	5553	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	95.3



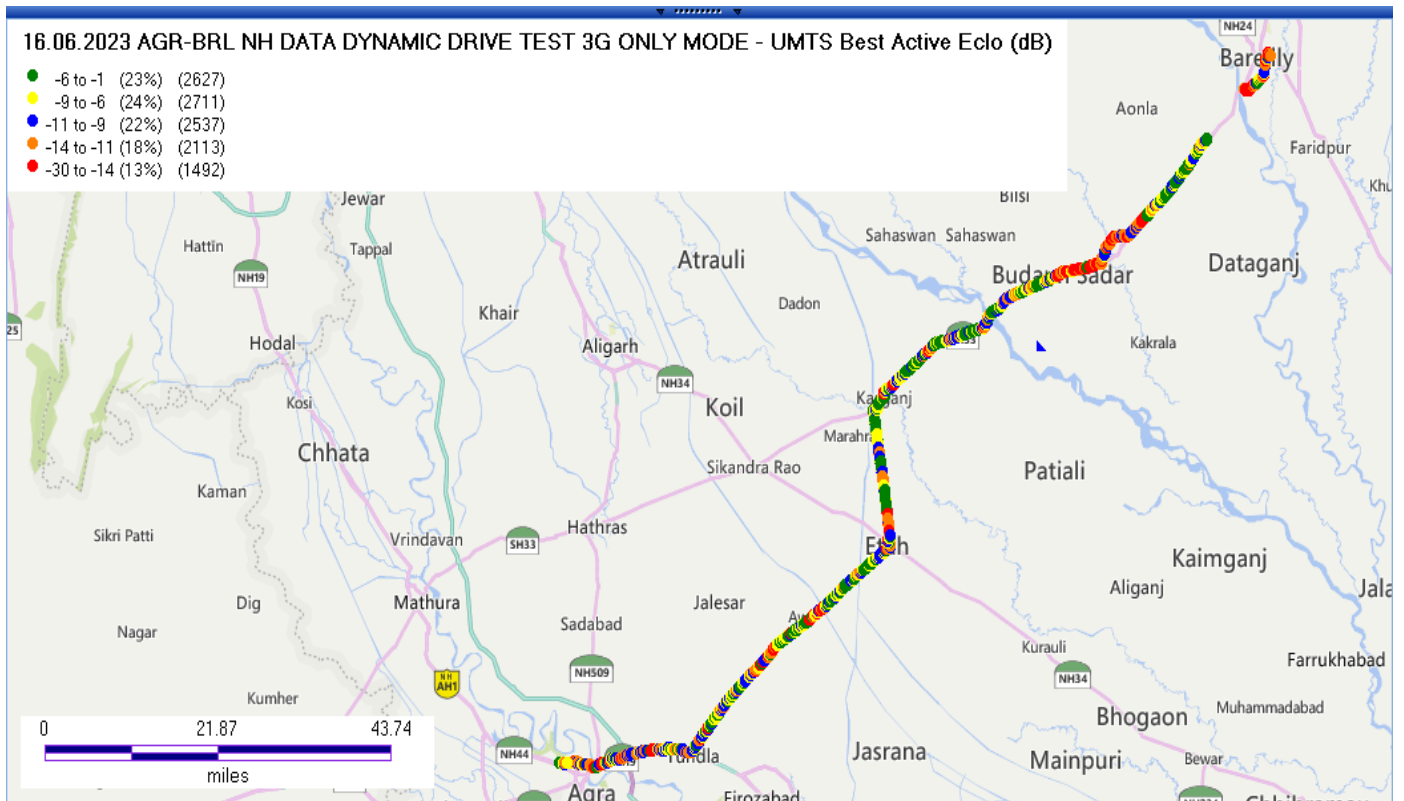
Overall Rx Quality	# Samples	% PDF	Legends
(Min, ≤ 2)	1923685	88.95	
(2, ≤ 3)	45259	2.1	
(3, ≤ 4)	46755	2.16	
(4, ≤ 5)	45752	2.12	
(5, $\leq \text{Max}$)	101062	4.67	
Total	2162553	100	

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	87.00%



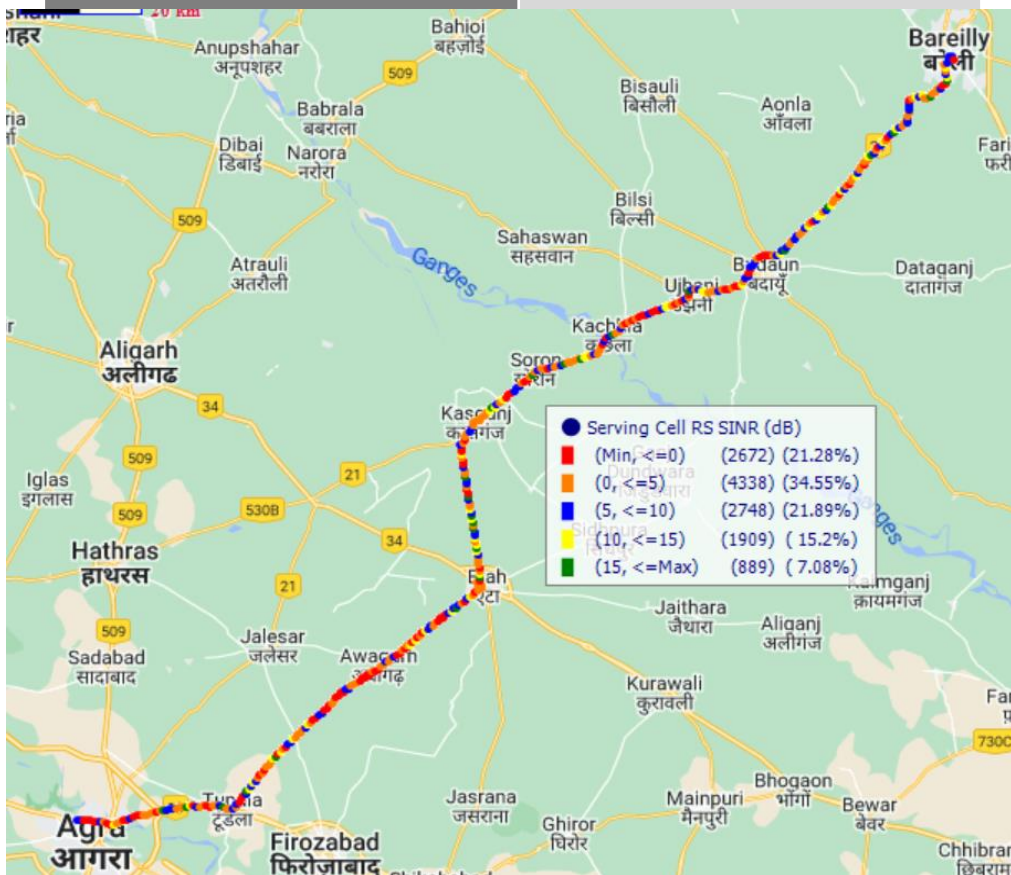
Overall Ec/No	# Samples	% PDF	Legends
(Max, ≤ -6)	2627	22.88	
(-6, ≤ -9)	2711	23.61	
(-9, ≤ -11)	2537	22.10	
(-11, ≤ -14)	2113	18.41	
(-14, \leq Min)	1492	13.00	
Total	4214	100	

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	78.82



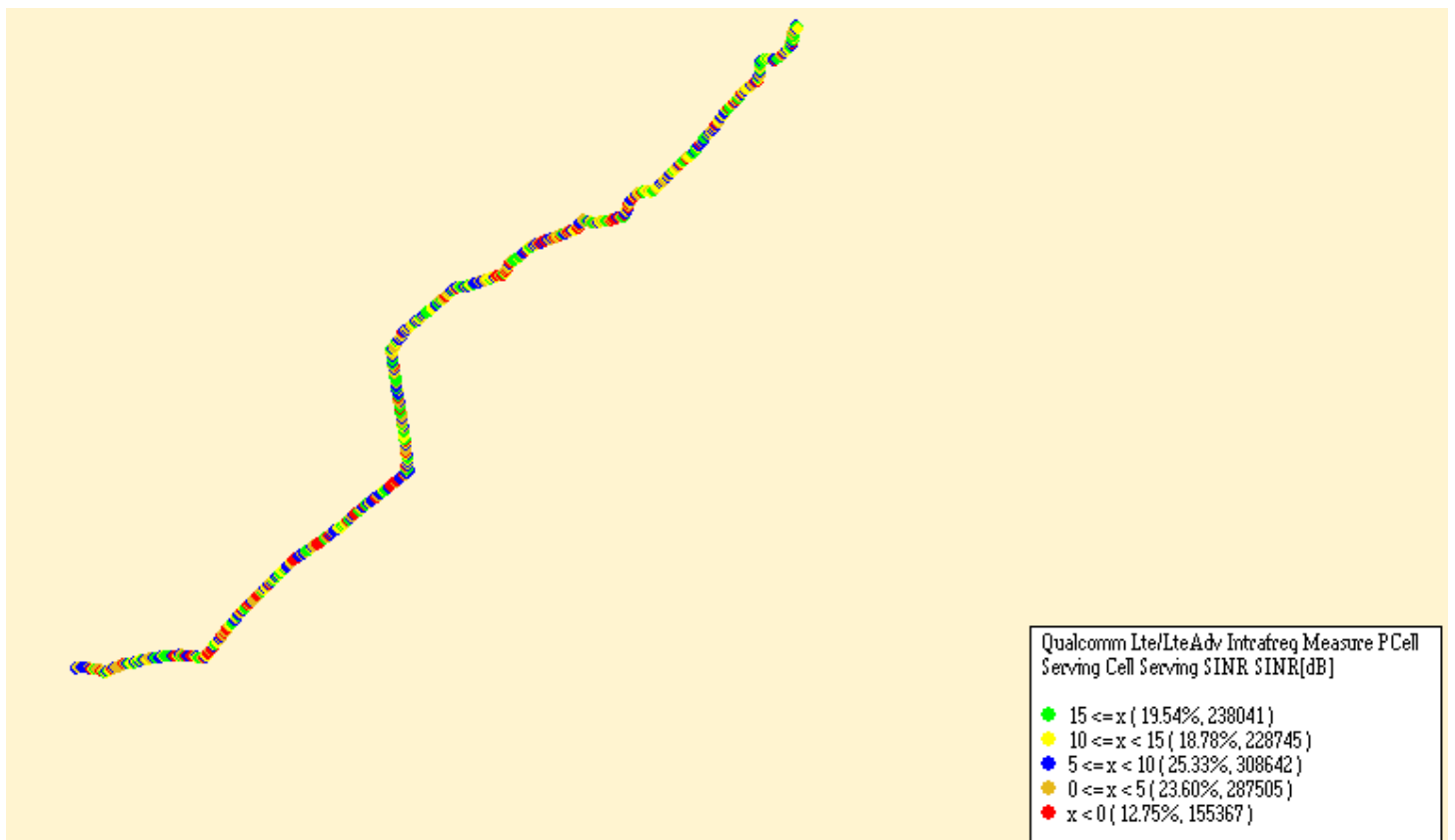
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	2672	21.28	
(0, ≤ 5)	4338	34.55	
(5, ≤ 10)	2748	21.89	
(10, ≤ 15)	1909	15.2	
(15, $\leq \text{Max}$)	889	7.08	
Total	12556	100	

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	87.25



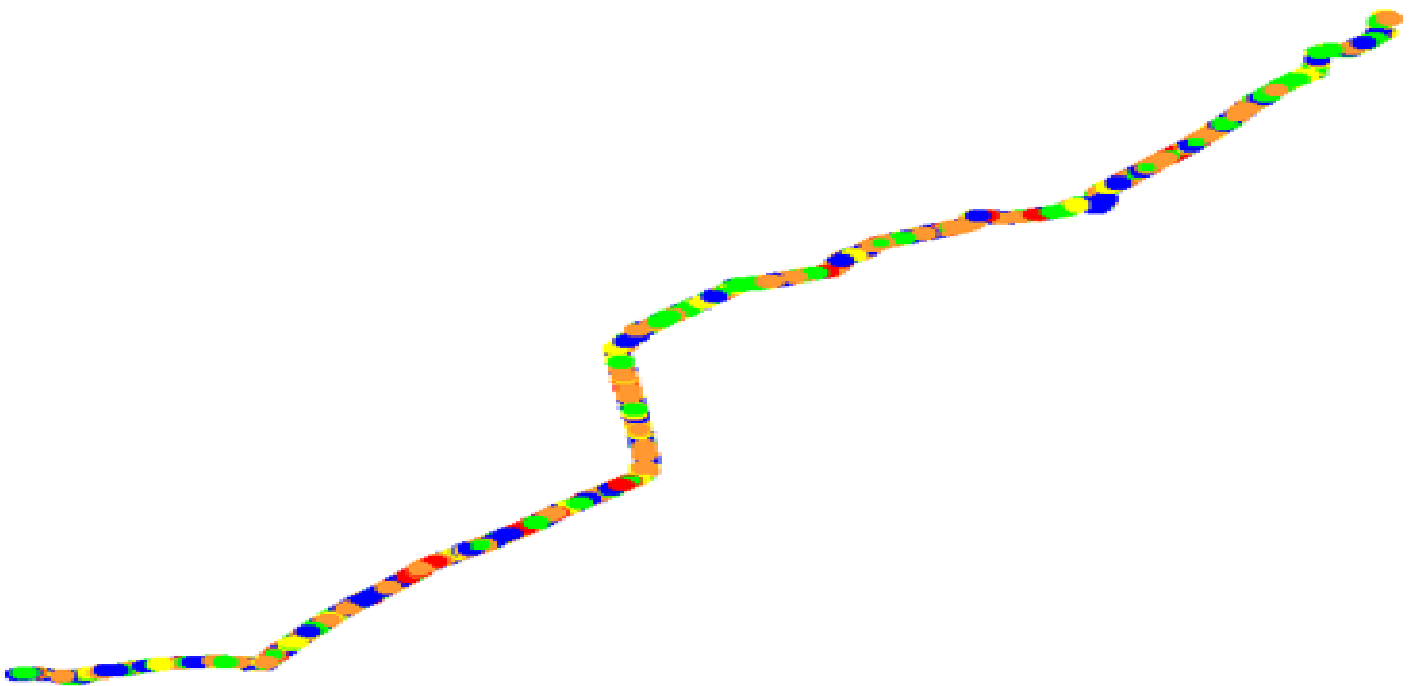
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	155367	12.75	
(0, ≤ 5)	287505	23.6	
(5, ≤ 10)	308642	25.33	
(10, ≤ 15)	228745	18.78	
(15, $\leq \text{Max}$)	238041	18.78	
Total	1218300		

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-VIL

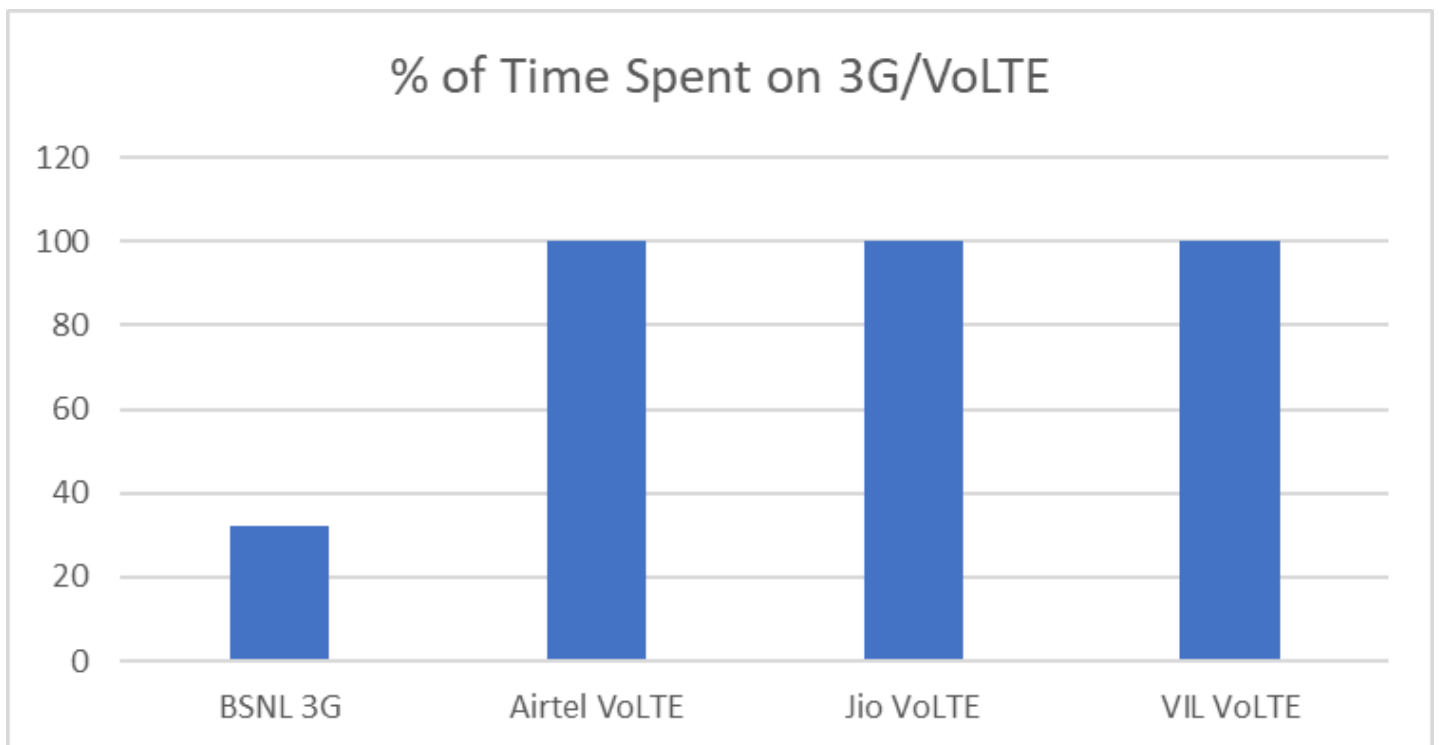
Technology	Rx Quality %
VoLTE	96.11



Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	191044	3.89	Red
(0, ≤ 5)	1621640	33.04	Orange
(5, ≤ 10)	1282561	26.13	Blue
(10, ≤ 15)	858011	17.49	Yellow
(15, $\leq \text{Max}$)	954427	19.45	Green
Total	4907683	100	

Technology Details

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	32.12
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	100



Technology Details

TSP-Airtel

Technology	% of Time Spent on
3G	
VoLTE	100



Technology Details

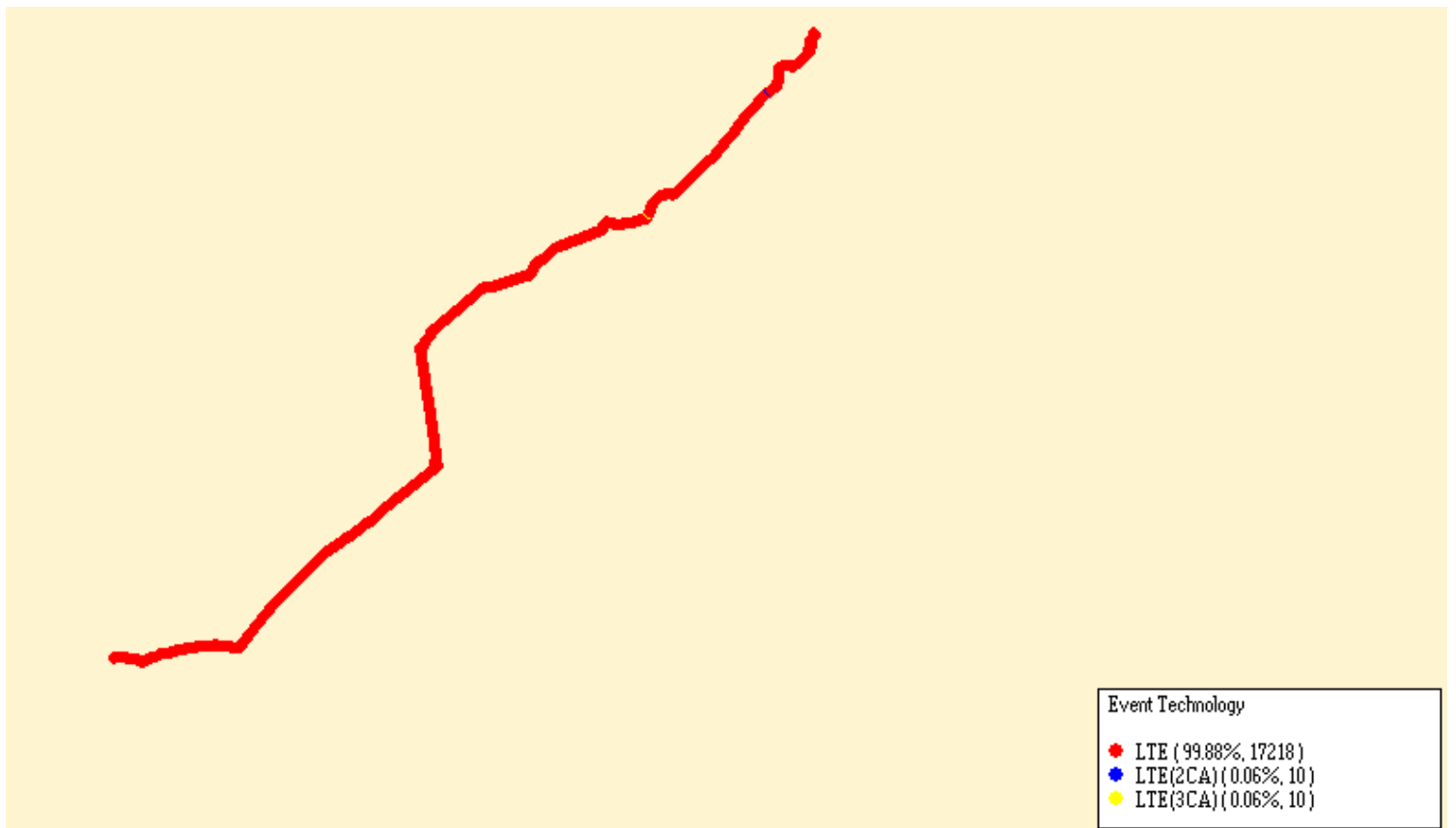
TSP-BSNL

Technology	% of Time Spent on
3G	32.12
VoLTE	



TSP- Jio

Technology	% of Time Spent on
3G	
VoLTE	100%



TSP-VIL

Technology	% of Time Spent on
3G	
VoLTE	100

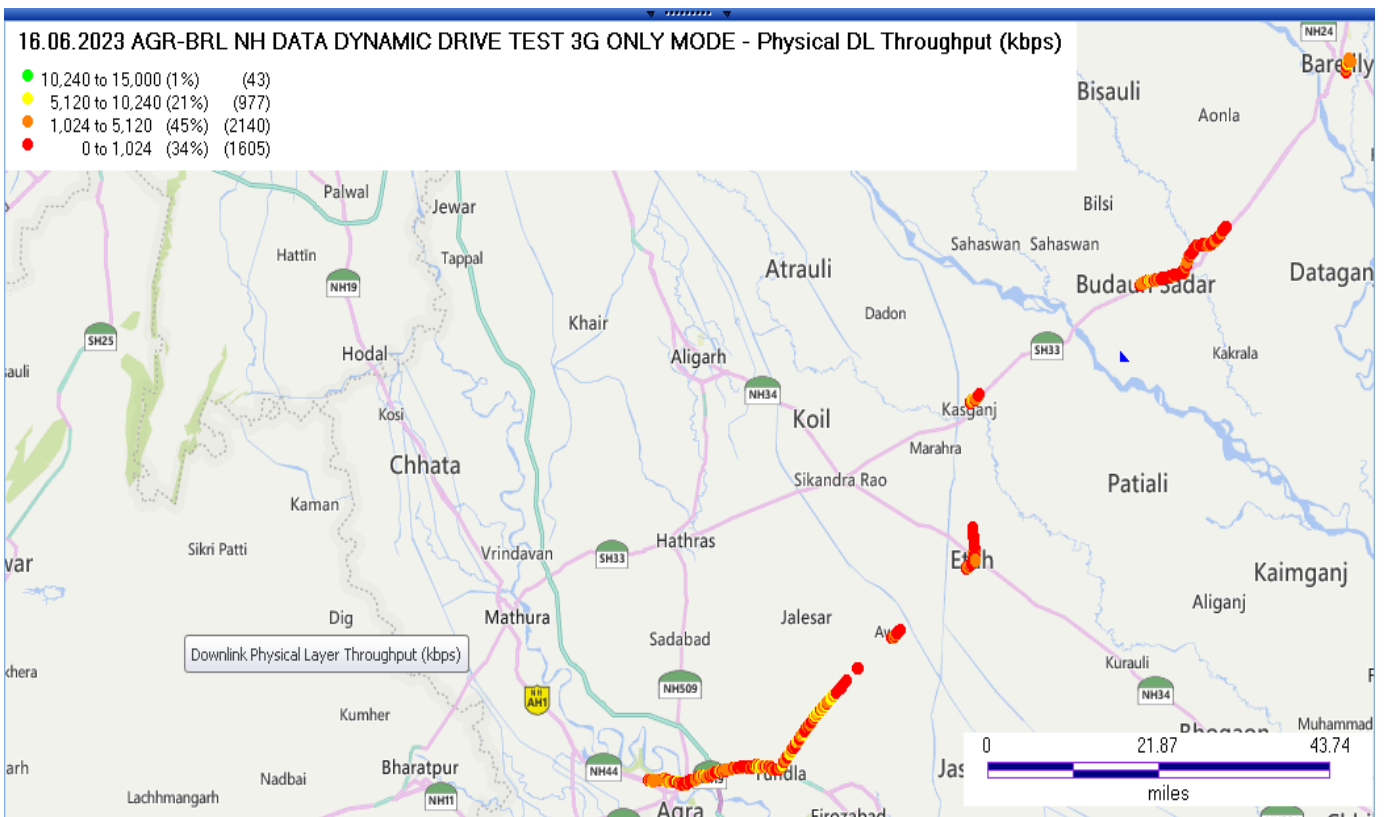


Dynamic Data Test

TSP- BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	3G
Download Throughput (Mbps)	3.09

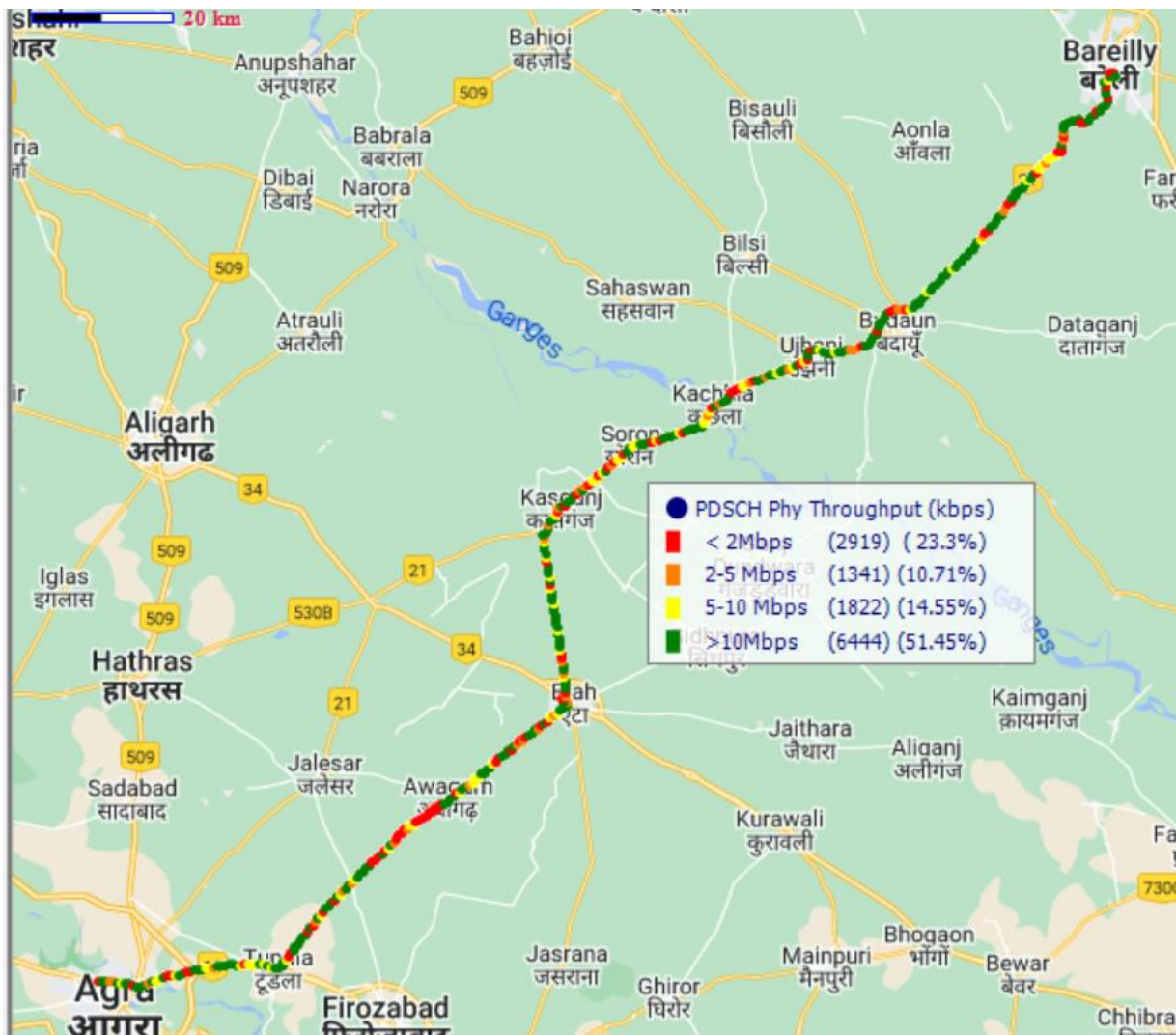


DL throughput	No of Sample	%	Legends
< 1 Mbps	1605	33.68	
1-5 Mbps	2140	44.91	
5-10 Mbps	977	20.50	
>10Mbps	43	0.90	

TSP-Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	15.92



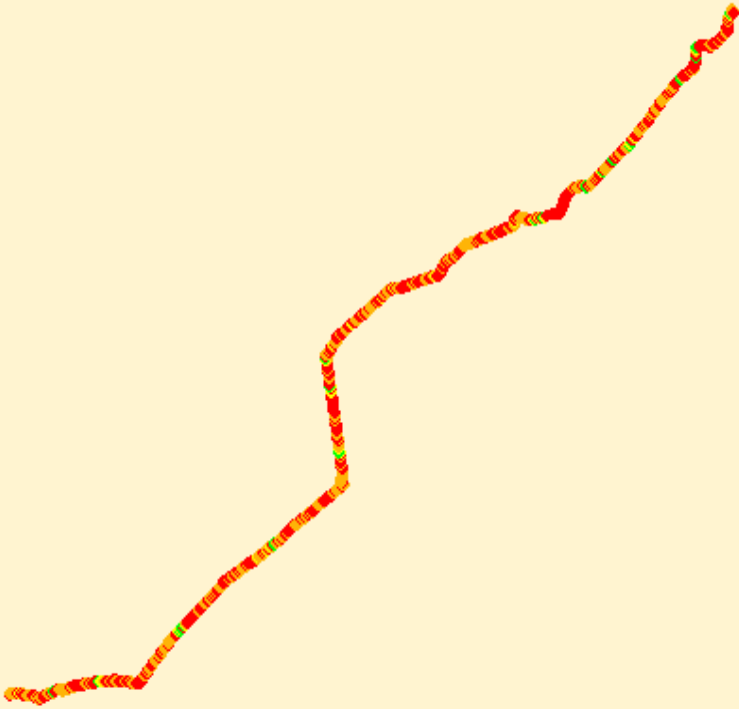
DL throughput	No of Sample	%	Legends
< 2Mbps	2919	23.3	
2-5 Mbps	1341	10.71	
5-10 Mbps	1822	14.55	
>10Mbps	6444	51.45	

Dynamic Data Test

TSP- Jio

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	2.88



Qualcomm Lte/Lte Adv Physical Throughput PDSCH Throughput PCell Total Throughput[Mbps]

- 10 ≤ x (4.05%, 671)
- 5 ≤ x < 10 (4.11%, 681)
- 2 ≤ x < 5 (41.89%, 6938)
- 0 ≤ x < 2 (49.95%, 8272)

DL throughput	No of Sample	%	Legends
< 2Mbps	8272	49.95	
2-5 Mbps	6938	41.89	
5-10 Mbps	681	4.11	
>10Mbps	671	4.05	

TSP-VIL

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	10.27



DL throughput	No of Sample	%	Legends
< 2Mbps	5888	20.7	Red
2-5 Mbps	6394	22.5	Orange
5-10 Mbps	5746	20.2	Yellow
>10Mbps	10426	36.6	Green