



TELECOM REGULATORY AUTHORITY OF INDIA
REGIONAL OFFICE - BHOPAL

Operator Assisted / Self Drive Test Report for January'2026

LSA-UPW

**Hapur City and Nearby Area
Meerut to Hapur Highway
From 08/01/2026 to 09/01/2026**

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1. Overview

The Operator Assisted Drive Test carried out in Hapur City and nearby areas and Meerut to Hapur Highway from date 08/01/2026 to 09/01/2026 & 9:00 AM to 8:00 PM. The drive test covered drive route of around 156 Kms in 2 days and 6 hotspot locations.

1.1 Telecom Service Providers (TSPs), Technologies and frequency bands captured during Drive Test are as below:

S. No.	Name of TSP	Technology	Frequency Bands (In MHz)
1	Bharti Airtel Ltd.	2G	1800
2	Bharti Airtel Ltd.	4G	850,1800,2100,2300
3	Bharti Airtel Ltd.	5G	3500
4	BSNL/MTNL	2G	900
5	BSNL/MTNL	3G	2100
6	BSNL/MTNL	4G	2100/2500/700
7	Reliance JIO Infocomm Ltd.	4G	2300/1800/850
8	Reliance JIO Infocomm Ltd.	5G	3500/700
9	Vodafone Idea Ltd.	2G	900
11	Vodafone Idea Ltd.	4G	L900/L2100/L1800/L2500

1.2 Quality of Service parameters measured:

(1) Voice Service:

Dynamic	Static (Hotspot Location)
Call setup time	Call setup time
Call setup success rate (CSSR)	Call setup success rate (CSSR)
Dropped Call rate	Dropped Call rate
Call Silence Rate	
Handover Success Rate (HOSR)	
Packet Drop Rate (Uplink & Downlink)	
Mean Opinion Score (MOS)	
Signal Strength	

(2) Data Service:

Dynamic	Static (Hotspot Location)
Data speed (DL / UL both)	Data speed (DL/UL both)
Latency	Latency
Jitter	Jitter
	Session Setup Success Rate (DL/UL)
	Packet Drop rate
	Web browsing delay
	Video Streaming performance

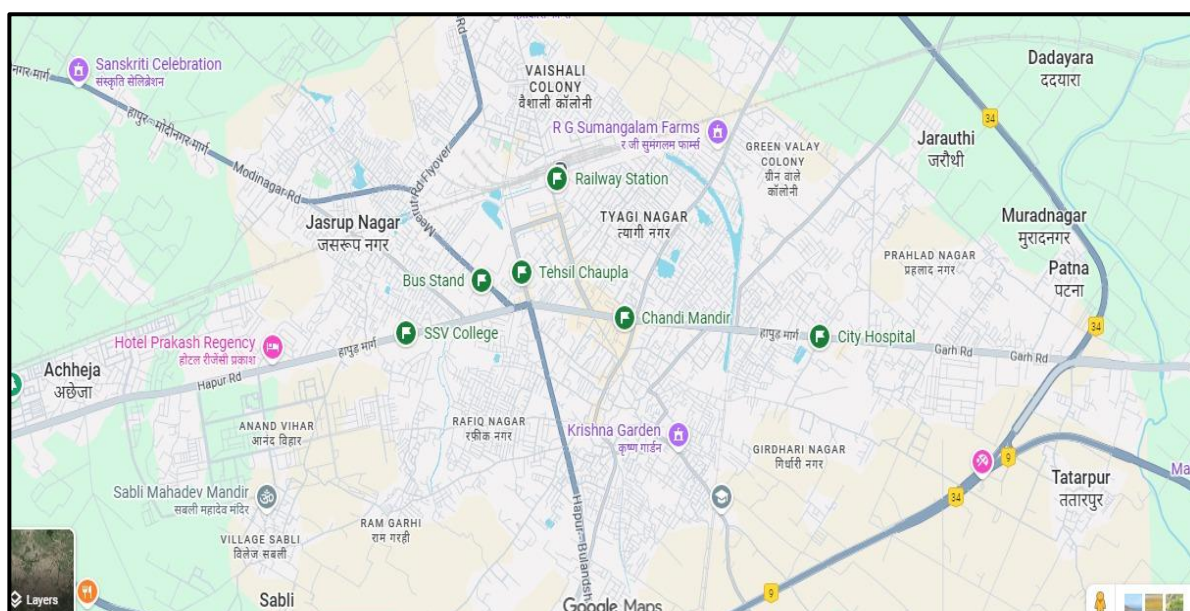
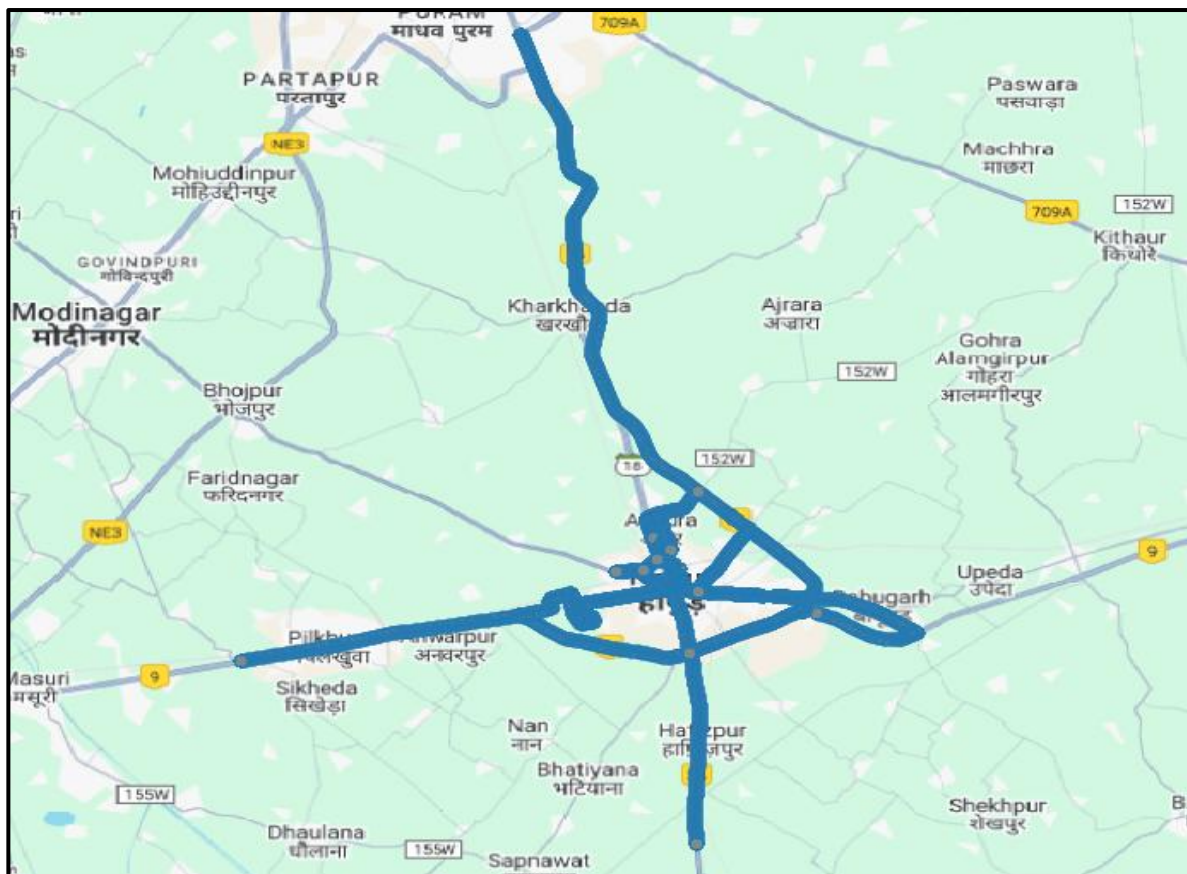
Drive Test Methodology adopted during the Drive test is attached as **Annexure-I**.

QoS Performance Analysis Uttar Pradesh West LSA

2. Executive Summary

This report covers the findings of the OADT undertaken in Uttar Pradesh West License Service Area (LSA) during the month of Jan'2026 under the supervision of TRAI Regional Office (RO), Bhopal. Details of route/ area covered during the DT is as given below:

2.1 Route Map of Drive test & Hotspot locations:



2.2 Drive Test Area detail

Date	Duration AM to PM	Drive test route	Distance covered (in Kms)
9-Jan-26	10:00 am to 6:00 pm	City	100
8-Jan-26	12:00 pm to 6:00 pm	Highway	56

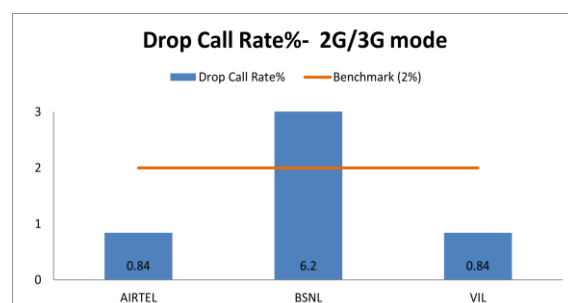
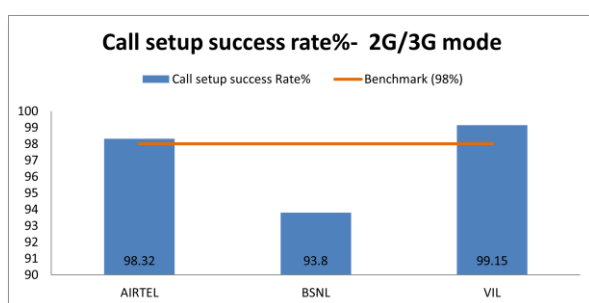
Date	Time	Hotspot Location	Latitude / Longitude
08-01-2026	01:00 pm	District Hospital	28.728490/77.801590
08-01-2026	5:00 pm	Railway Station	28.738339/77.777887
08-01-2026	3:30 pm	Chandi Mandir	28.729230/77.785080
09-01-2026	3:00 pm	Tehsil Chauraha	28.730450/77.776550
09-01-2026	4:30 pm	Bus Stand	28.731910/77.772010
09-01-2026	6:00 pm	SSV College	28.728530/77.765380

2.3 Details of Drive Test Tools used:

TSP	Drive Test tool used
Airtel	TEMS
JIO	XCAL v5.00.174
BSNL	Nemo for 2G/3G, AZQ for auto
VI	TEMS & AZQNS

2.4 Key findings (Voice & Data)

2.4.1 Voice Service performance in 3G/2G mode only

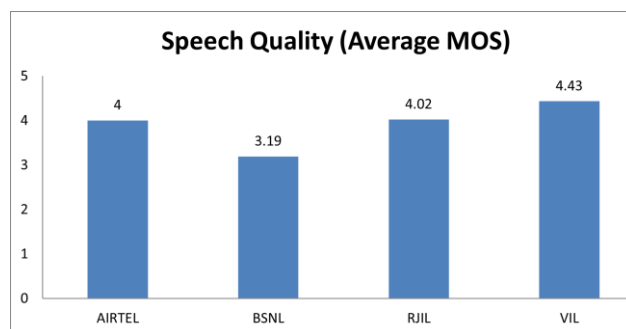
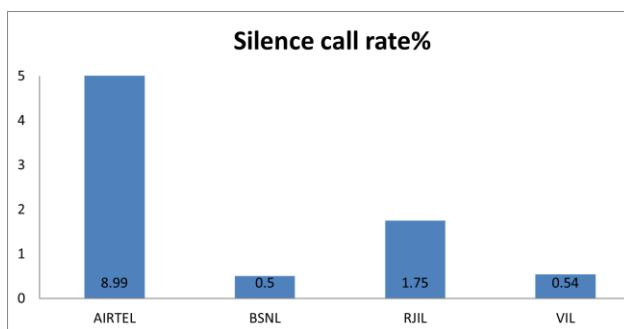
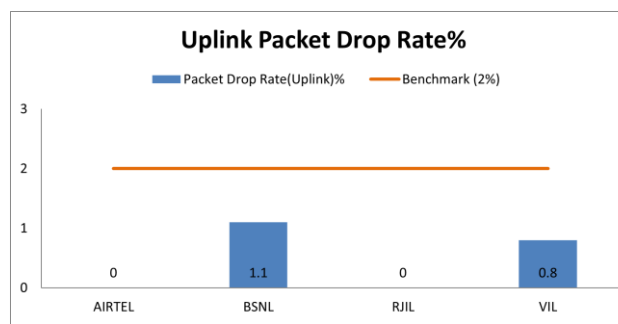
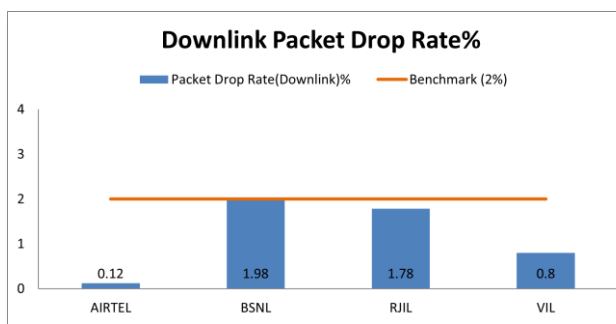
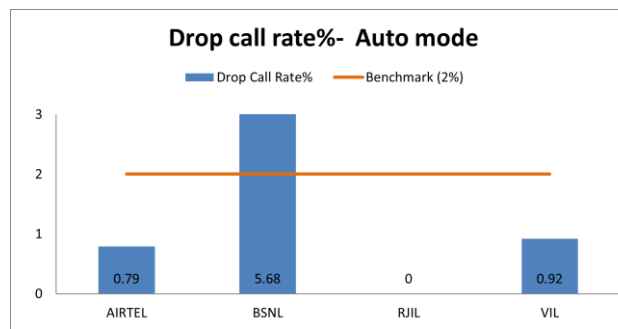
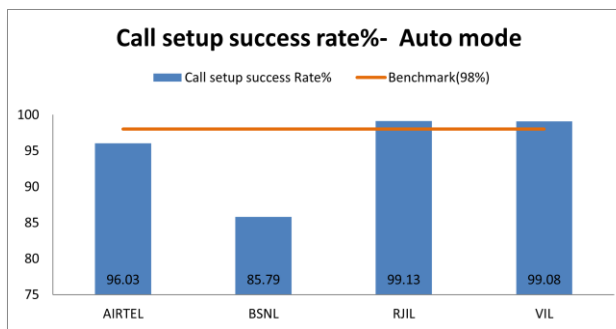


Parameter	Benchmark	AIRTEL	BSNL/MTNL	VIL
Call Attempts		119	129	119
Call Setup Success Rate (in %)	98%	98.32	93.8	99.15
Drop Call Rate (in %)	2%	0.84	6.2	0.84
Call Setup Time-Average (in Seconds)		3.57	5.56	3.09
Handover Success Rate (in %)		93.65	90.22	99.32

2.4.2 Number of Cell ids latched during drive test

Technology	AIRTEL	BSNL/MTNL	VIL
3G	NA	15	NA
2G	176	66	124

2.4.3 Voice Service performance in 5G/4G/3G/2G (Auto mode)

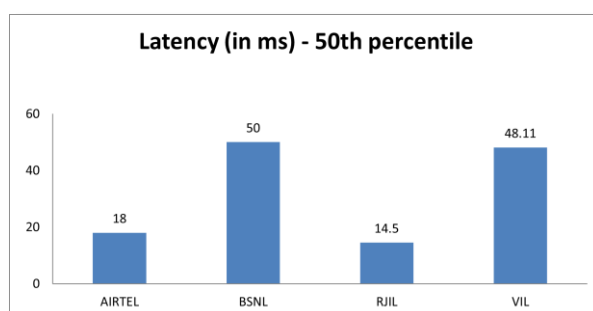
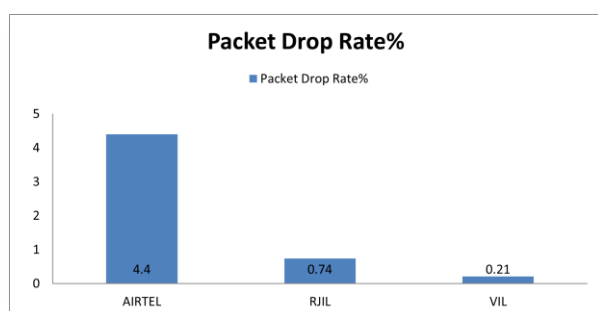
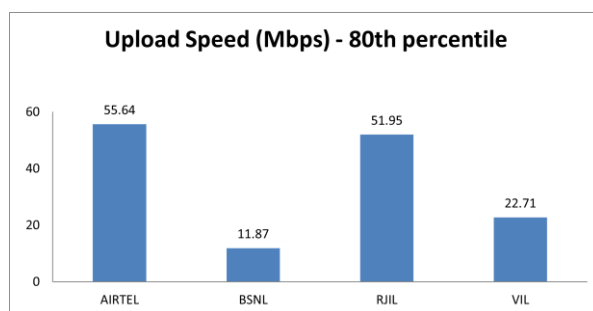
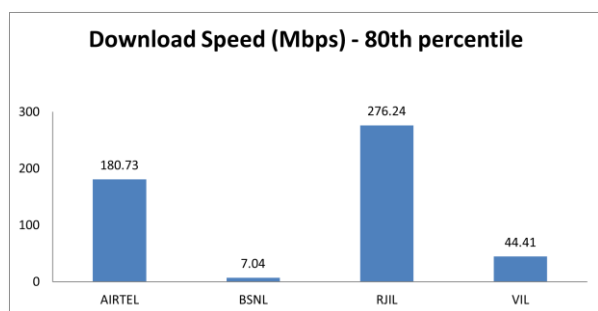


Parameter	AIRTEL	BSNL/MTNL	RJIL	VIL
Call Attempts	126	176	115	108
Call Setup Success Rate %	96.03	85.79	99.13	99.08
Drop Call Rate%	0.79	5.68	0	0.92
Call Setup Time-Average (Second)	1.39	3.75	0.22	1.08
Handover Success Rate %	100	94.3	98.35	99.82
Downlink Packet drop rate %	0.12	1.98	1.78	0.8
Uplink Packet drop rate %	0	1.10	0	0.8
Silence Call Rate %*	8.99	0.5	1.75	0.54
Speech Quality (Average MOS)	4	3.19	4.02	4.43

2.4.4 Number of Cell ids latched during drive test

Technology	AIRTEL	BSNL/MTNL	RJIL	VIL
5G	1		202	
4G	308	52	122	367
3G		33		NA
2G	2	33		NA

2.4.5 Data performance in 5G/4G/3G/2G (Auto mode)



QoS Parameters		AIRTEL	BSNL/MTNL	RJIL	VIL
Download speed (Mbps/s)	20 th Percentile	18.9	0.66	28.23	18.0
	Average	95.27	4.64	162.59	32.61
	80th Percentile	180.73	7.04	276.24	44.41
Download Session Setup Success Rate %		100	100	100	100
Upload speed (Mbps/s)	20 th Percentile	4.45	4.59	4.63	10.01
	Average	23.41	8.47	32.02	16.59
	80th Percentile	55.64	11.87	51.95	22.71
Upload Session Setup Success Rate %		100	100	100	100
Latency (in ms)	50th Percentile	18	50	14.5	48.11
Jitter (in ms)	Average	4.6	3.16	13.97	0.33
Packet Drop Rate %		4.40	NA	0.74%	0.21
Web browsing delay (in sec)		7.83	7.25	1.35	2.34
Video Streaming performance for video		0.87	1.01	0.328	0.78

2.4.6 TSP-wise Key Findings:

TSP	Important finding and benchmark not achieved.
Airtel	Voice 98.32% call setup success rate and 0.84% drop call rate have been observed in the lock mode (3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. 96.03% call setup success rate and 0.79% drop call rate have been observed in the auto-selection mode (5G/4G/3G/2G) for LSA. 100% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. 97.70% call setup success rate and 1.15% drop call rate have been observed in the lock mode (3G/2G) for city drive. 94.57% call setup success rate and 1.10% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. 100.00% call setup success rate and 0.00% drop call rate have been observed in lock mode (3G/2G) for highway drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. Data - Airtel has average download speed of 95.27 Mbps and average upload speed of 23.41 Mbps for LSA. - Airtel has average download speed of 114.33 Mbps and average upload speed of 18.81 Mbps across measured routes for city drive.

	- Airtel has average download speed of 171.79 Mbps and average upload speed of 53.46 Mbps across measured routes at Hotspot Locations. - Airtel has average download speed of 36.62 Mbps and average upload speed of 15.83 Mbps across measured routes for highway drive.
BSNL	Voice 93.80% call setup success rate and 6.2% drop call rate have been observed in the lock mode (3G/2G) for LSA. 85.79% call setup success rate and 5.68% drop call rate have been observed in the auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not within the benchmark of 98.00% & 2.00% respectively. 98.34% call setup success rate and 1.67% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. 77.86% call setup success rate and 3.27% drop call rate have been observed in the lock mode (3G/2G) for city drive. Performance is not within the benchmark of 98.00% & 2.00% respectively. 77.17% call setup success rate and 5.43% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. 96.29% call setup success rate and 3.70% drop call rate have been observed in lock mode (3G/2G) for highway drive. Performance is not within the benchmark of 98.00% & 2.00% respectively. 87.5% call setup success rate and 16.67% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is not within the benchmark of 98.00% & 2.00% respectively. Data - BSNL has average download speed of 4.64 Mbps and average upload speed of 8.47 Mbps for LSA. - BSNL has average download speed of 3.02 Mbps and average upload speed of 7.85 Mbps across measured routes for city drive.

	- BSNL has average download speed of 12.66 Mbps and average upload speed of 6.36 Mbps across measured routes at Hotspot Locations. - BSNL has average download speed of 5.66 Mbps and average upload speed of 9.09 Mbps across measured routes for highway drive.
RJIL	Voice 99.13% call setup success rate and 0.00% drop call rate have been observed in the auto-selection mode (5G/4G/3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. 98.33% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. 98.30% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. Data - RJIL has average download speed of 162.59 Mbps and average upload speed of 32.02 Mbps for LSA. - RJIL has average download speed of 171.13 Mbps and average upload speed of 37.13 Mbps across measured routes for city drive. - RJIL has average download speed of 233.59 Mbps and average upload speed of 114.65 Mbps across measured routes at Hotspot Locations. - RJIL has average download speed of 149.69 Mbps and average upload speed of 25.61 Mbps across measured routes for highway drive. 68% Drive has been done on highway, so UL speed Benchmark not been achieved.

	High Atmospheric Interference observed on Drive dates (8-Jan-26 & 9-Jan-26), impacted 32 Sites in 5G & 24 Sites in 4G.
VIL	Voice 99.15% call setup success rate and 0.84% drop call rate have been observed in the lock mode (3G/2G) for LSA. Performance is within the benchmark of 98.00% & 2.00% respectively. 99.08% call setup success rate and 0.92% drop call rate have been observed in the auto-selection mode (5G/4G/3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. 100% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. 98.90% call setup success rate and 1.09% drop call rate have been observed in the lock mode (3G/2G) for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. 100% call setup success rate and 1.12% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. 100.00% call setup success rate and 0.00% drop call rate have been observed in lock mode (3G/2G) for highway drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. Data - VIL has average download speed of 32.61 Mbps and average upload speed of 16.59 Mbps for LSA.

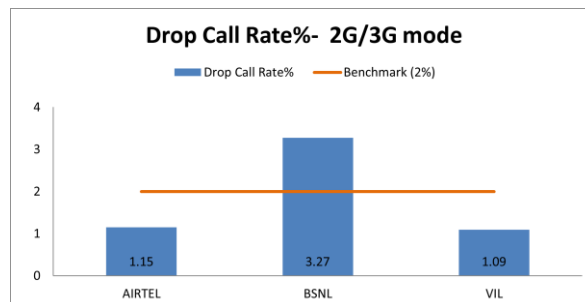
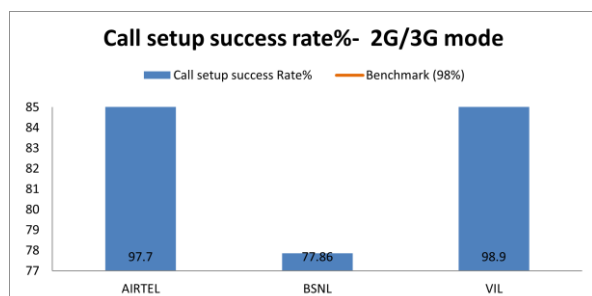
	• VIL has average download speed of 40.76 Mbps and average upload speed of 20.09 Mbps across measured routes for city drive. • VIL has average download speed of 23.7 Mbps and average upload speed of 13.15 Mbps across measured routes at Hotspot Locations. • VIL has average download speed of 54.79 Mbps and average upload speed of 21.6 Mbps across measured routes for highway drive.
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Detailed QoS Performance Analysis

City – Hapur

3.0 QoS Performance Analysis - Dynamic

3.1 Voice Service Performance (3G/2G Lock mode) - Dynamic



Parameters	Airtel	BSNL/MTNL	RJIL	VIL
Total Distance covered (in Kms)	100	100	N/A	100
No. of Call Attempts	87	122	N/A	91
No. of Call Established	85	95	N/A	90
Call setup success rate (CSSR) %	97.70	77.86	N/A	98.9
No. of Drop Call	1	4	N/A	1
Drop Call Rate %	1.15	3.27	N/A	1.09
Call Setup Time Average (Sec.)	3.63	5.84	N/A	3.08
No. of Handover Attempts	190	42	N/A	90
No. of Handover success	178	40	N/A	90
HOSR %	93.68	95.23	N/A	100
Total no of RLT Occurrence	33	3419	N/A	1
No of RLT > 48	0	282	N/A	0

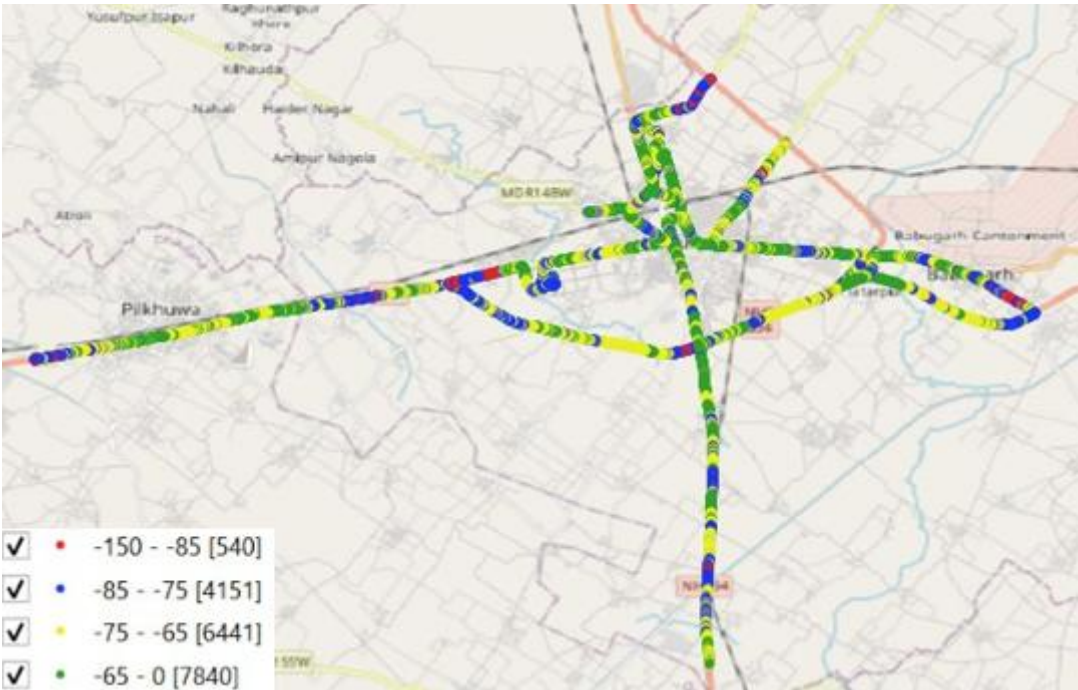
3.1.2 Number of Cell ids latched during drive test (3G/2G - Lock mode)

Number of unique Cell ids covered in Voice test				
Technology	AIRTEL	BSNL/MTNL	RJIL	VIL
3G	NA	11		NA
2G	139	48		93

3.1.3 Signal Strength Map (3G/2G - Lock mode)

Parameter Name	Technology	Signal Strength (dBm)			
		Excellent	Good	Fair	Poor
Rx Level	GSM	0 to $\geq$ -65	<-65 to $\geq$ -75	<-75 to $\geq$ -85	<-85 to min
RSCP	WCDMA	0 to $\geq$ -70	<-70 to $\geq$ -80	<-80 to $\geq$ -90	<-90 to min
RSRP	LTE	0 to $\geq$ -80	<-80 to $\geq$ -95	<-95 to $\geq$ -110	<-110 to min
SS_RSRP	NR	0 to $\geq$ -80	<-80 to $\geq$ -95	<-95 to $\geq$ -110	<-110 to min

TSP - Airtel



Parameter	Technology	Signal Strength(dBm)			
		Excellent	Good	Fair	Poor
Rx Level	GSM	7840	6441	4151	540

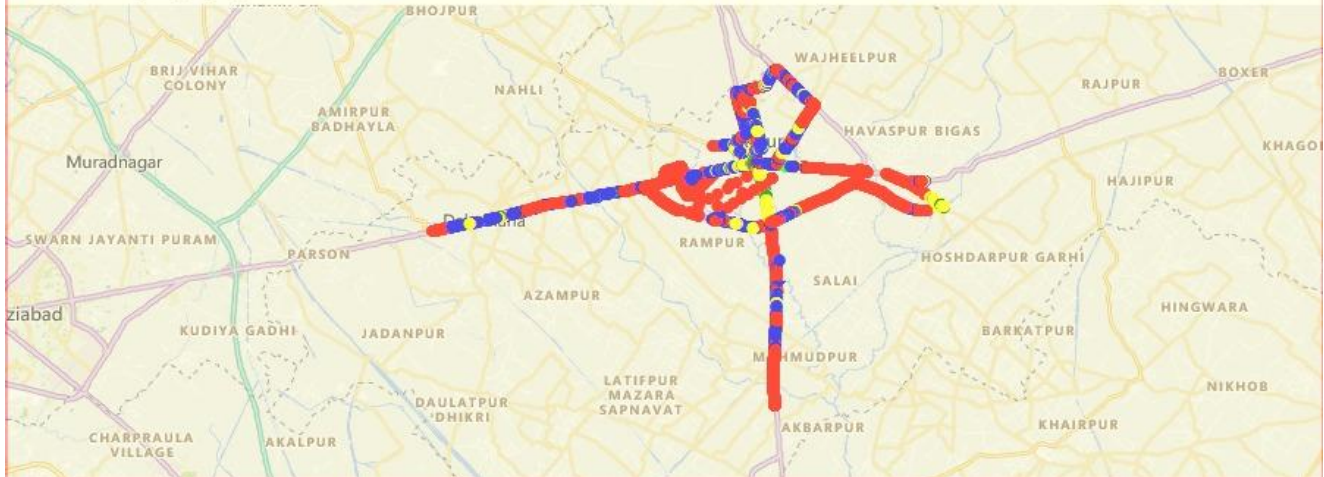
TSP - BSNL

Device - 1 Phone Sony/F8331 QUALCOMM (1) + Nemo Handy + 404541170741886 - RxLev Sub (dBm)

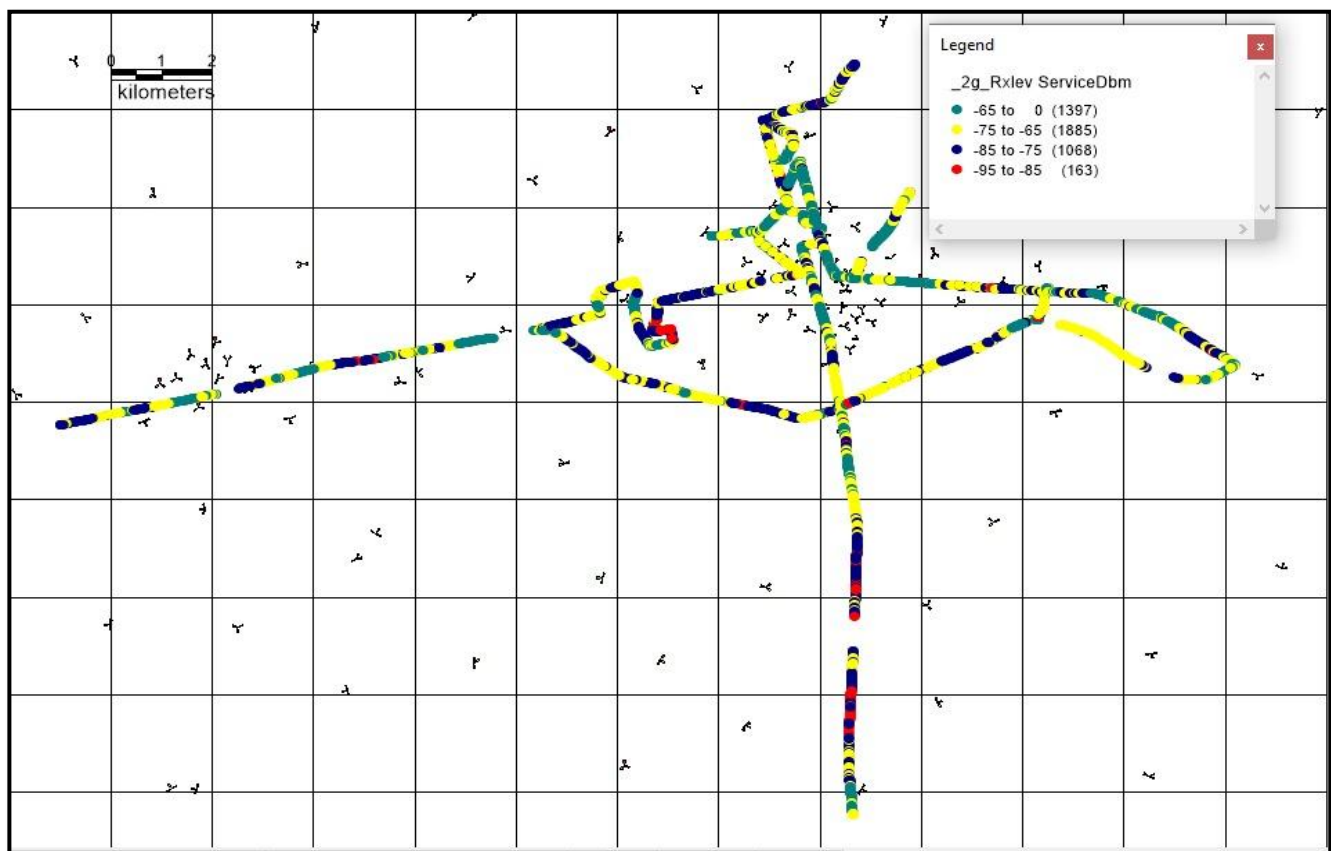
- -65 to 0 (3%) (134)
- -75 to -65 (12%) (523)
- -85 to -75 (36%) (1579)
- -140 to -85 (49%) (2141)

Device - 1 Phone Sony/F8331 QUALCOMM (1) + Nemo Handy + 404541170741886 - UMTS Best Active RSCP (dBm)

- -70 to 0 (5%) (28)
- -80 to -70 (20%) (114)
- -90 to -80 (21%) (123)
- -140 to -90 (54%) (311)

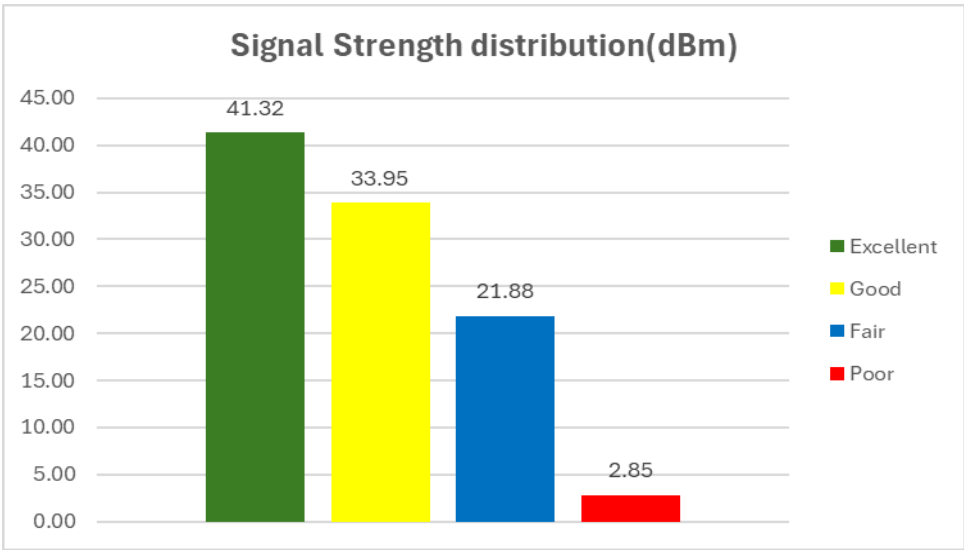


TSP - VIL

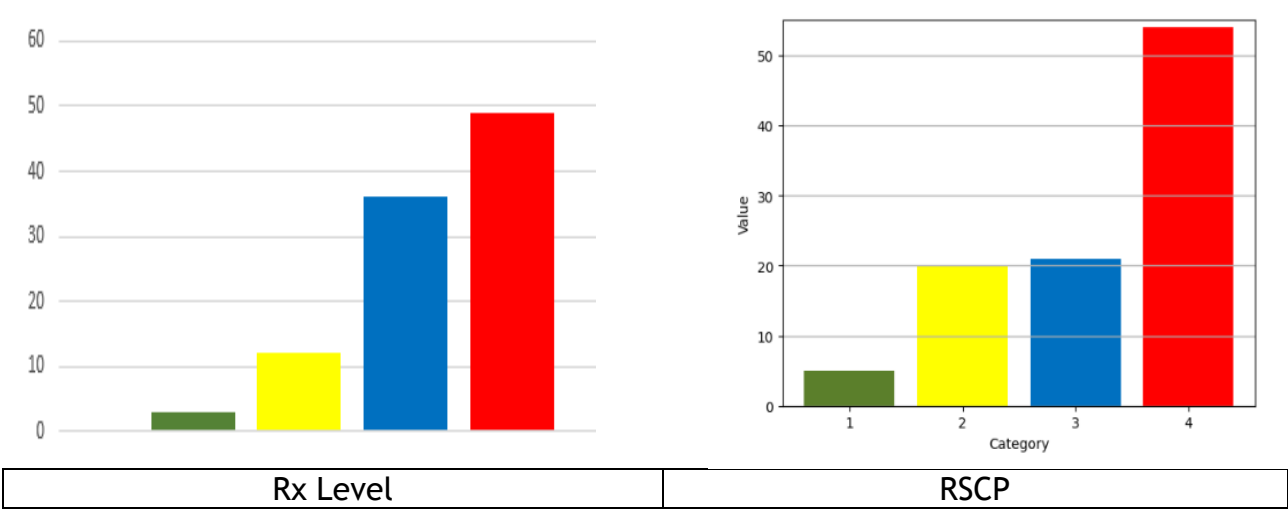


3.1.4 Signal Strength distribution: (3G/2G - Lock mode)

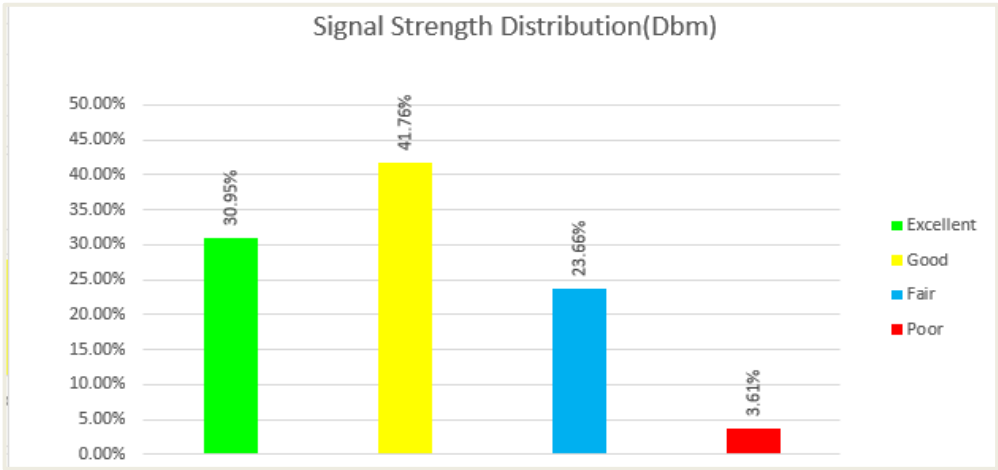
TSP - Airtel



TSP - BSNL



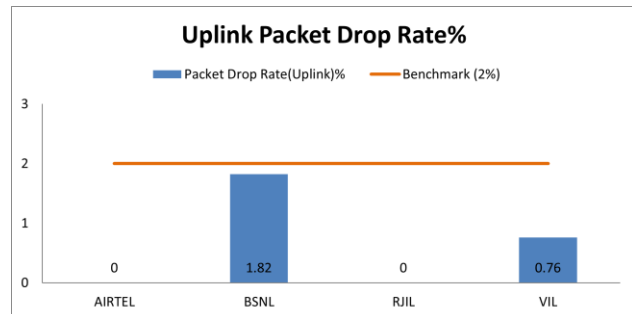
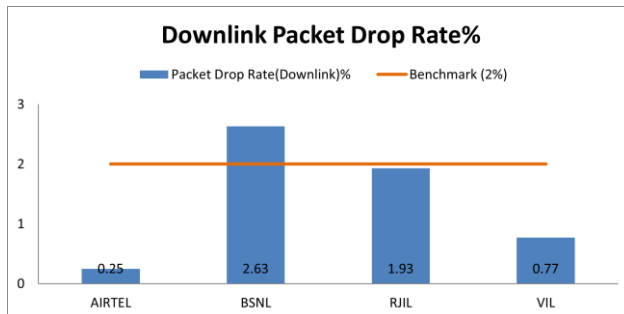
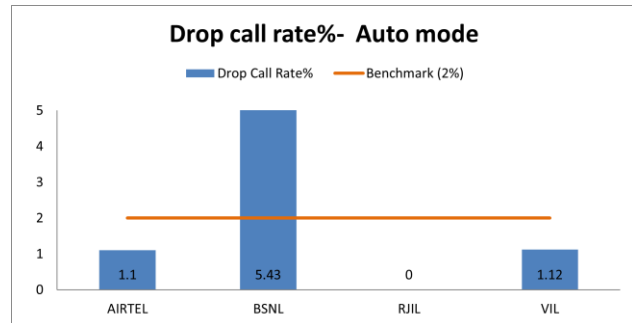
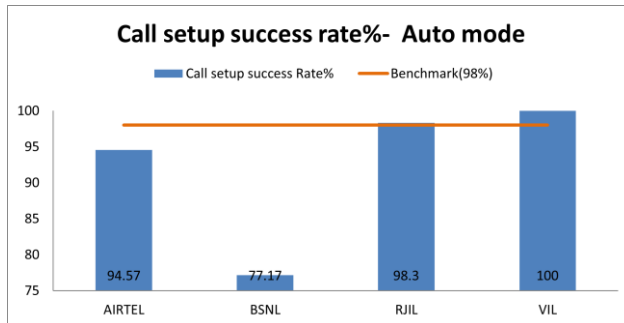
TSP - VIL

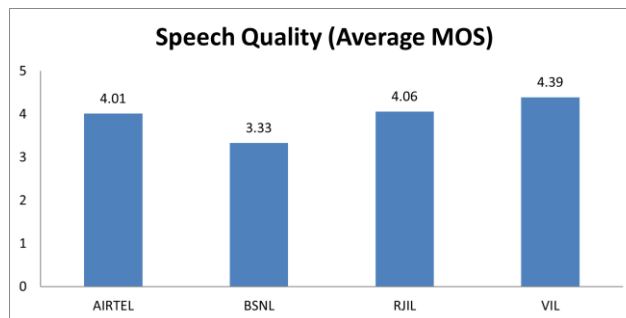
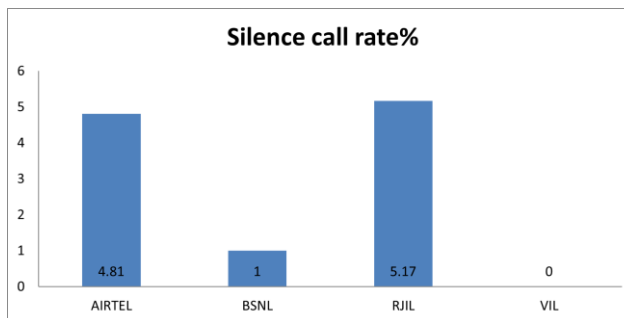


Rx Level -2G								
Overall Rx Level	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-65]	7840	134	NA	1397	41.32	3	NA	30.95
[-65, ≥-75)	6441	523	NA	1885	33.95	12	NA	41.76
[-75, ≥-85)	4151	1579	NA	1068	21.88	36	NA	23.66
[-85, ≥Min)	540	2141	NA	163	2.85	49	NA	3.61
Total	18972	4377	NA	4513	100	100	NA	99.98

Rx Level -3G								
Overall RSCP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-70]	NA	28	NA	NA	NA	5	NA	NA
[-70, ≥-80)	NA	114	NA	NA	NA	20	NA	NA
[-80, ≥-90)	NA	123	NA	NA	NA	21	NA	NA
[-90, ≥Min)	NA	311	NA	NA	NA	54	NA	NA
Total	NA	576	NA	NA	NA	100	NA	NA

3.2 Voice Service Performance in 5G/4G/3G/2G (Auto mode) - Dynamic





Parameters	Airtel	BSNL/MTNL	RJIL	VIL
Total Distance covered (in Kms)	100	100	100	100
No. of Call Attempts	92	92	59	82
No. of Call Established	87	71	58	82
Call setup success rate (CSSR) %	94.57	77.17	98.30	100
No. of Drop Call	1	5	0	1
Drop Call Rate %	1.1	5.43	0	1.12
Call Setup Time Average (Sec.)	1.42	4.77	0.24	1.92
No. of Handover Attempts	650	107	336	402
No. of Handover success	650	103	330	401
HOSR %	100	96.26	98.21	99.75
Packet Drop Rate (Downlink)	0.25	2.63	1.93	0.77
Packet Drop Rate (Uplink)	0	1.82	0	0.76
Number of silence call for > 2 sec.	8	6	1.72	0
Silence Call Rate %	4.81	1.0	5.17	0
Number of MOS samples	544	16311	242	2181
Average MOS score	4.01	3.33	4.06	4.39

3.2.1 Number of Cell ids latched during drive test 5G/4G/3G/2G - Auto mode)

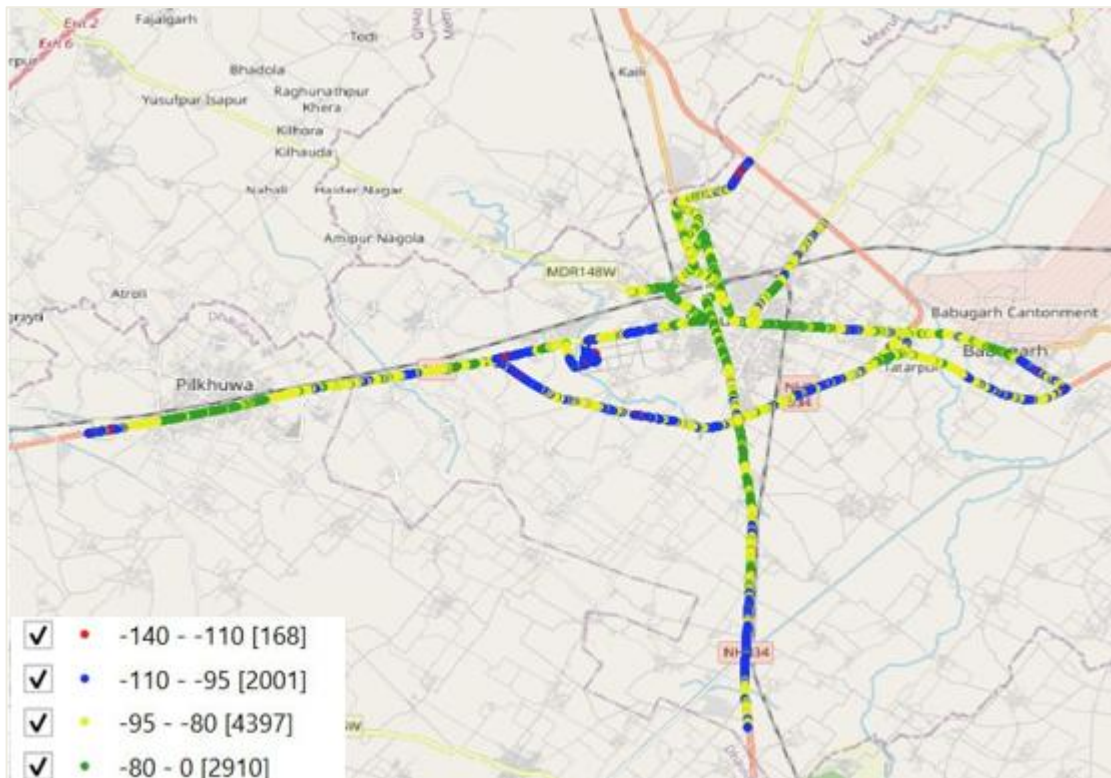
Number of unique cell ids covered in Voice test				
Technology	Service Provider			
	AIRTEL	BSNL/MTNL	RJIL	VIL
3G	0	17	NA	NA
2G	2	24	NA	NA
4G	228	33	77	82
5G	56	NA	53	NA

Table-6

3.2.3 Signal Strength Map (5G/4G/3G/2G - Auto mode)

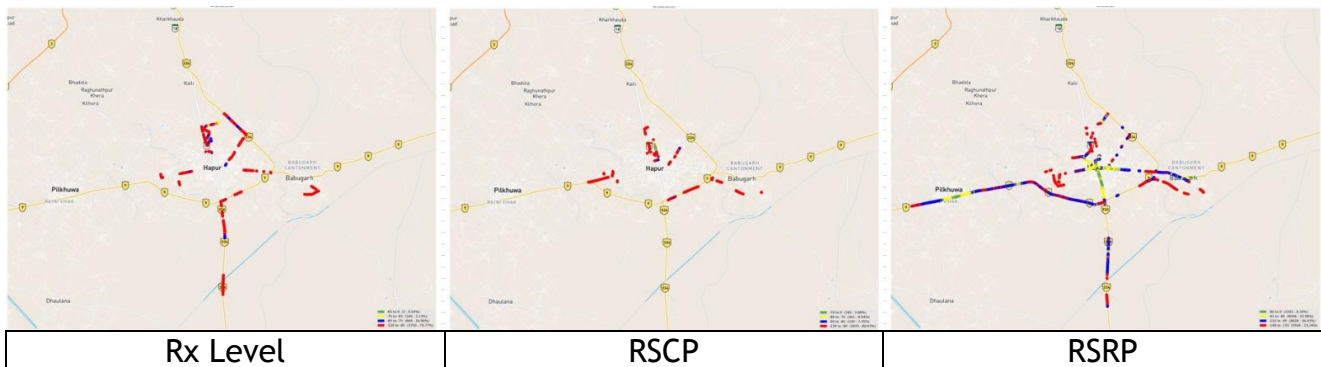
Parameter Name	Technology	Signal Strength (dBm)			
		Excellent	Good	Fair	Poor
Rx Level	GSM	0 to ≥ -65	< -65 to ≥ -75	< -75 to ≥ -85	< -85 to min
RSCP	WCDMA	0 to ≥ -70	< -70 to ≥ -80	< -80 to ≥ -90	< -90 to min
RSRP	LTE	0 to ≥ -80	< -80 to ≥ -95	< -95 to ≥ -110	< -110 to min
SS_RSRP	NR	0 to ≥ -80	< -80 to ≥ -95	< -95 to ≥ -110	< -110 to min

TSP- Airtel

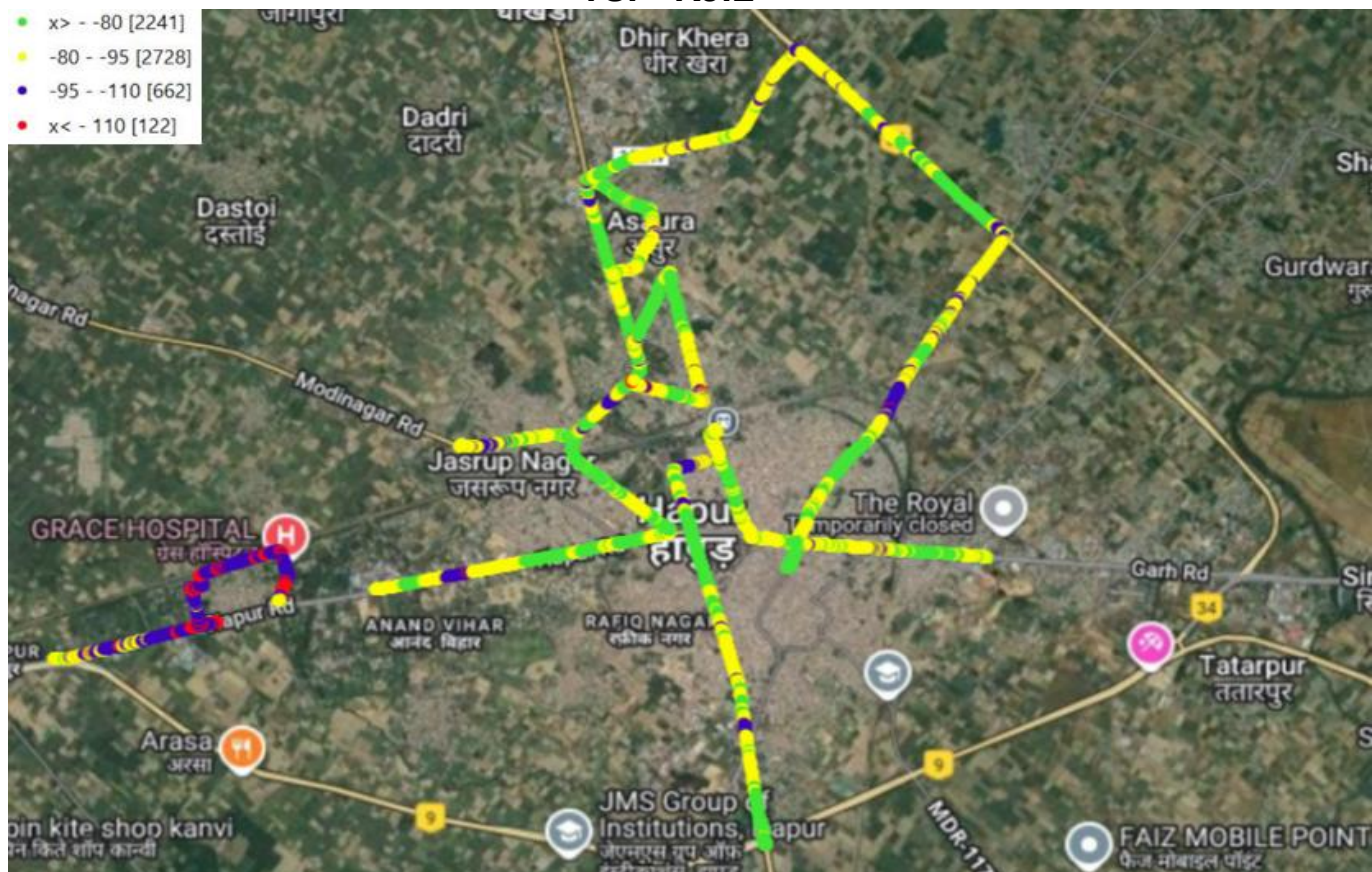


Parameter	Technology	Signal Strength(dBm)			
		Excellent	Good	Fair	Poor
Rx Level	GSM	66	63	3	0
RSCP	WCDMA				
RSRP	LTE	2844	4334	1998	168
SS_RSRP	NR	190	308	196	19

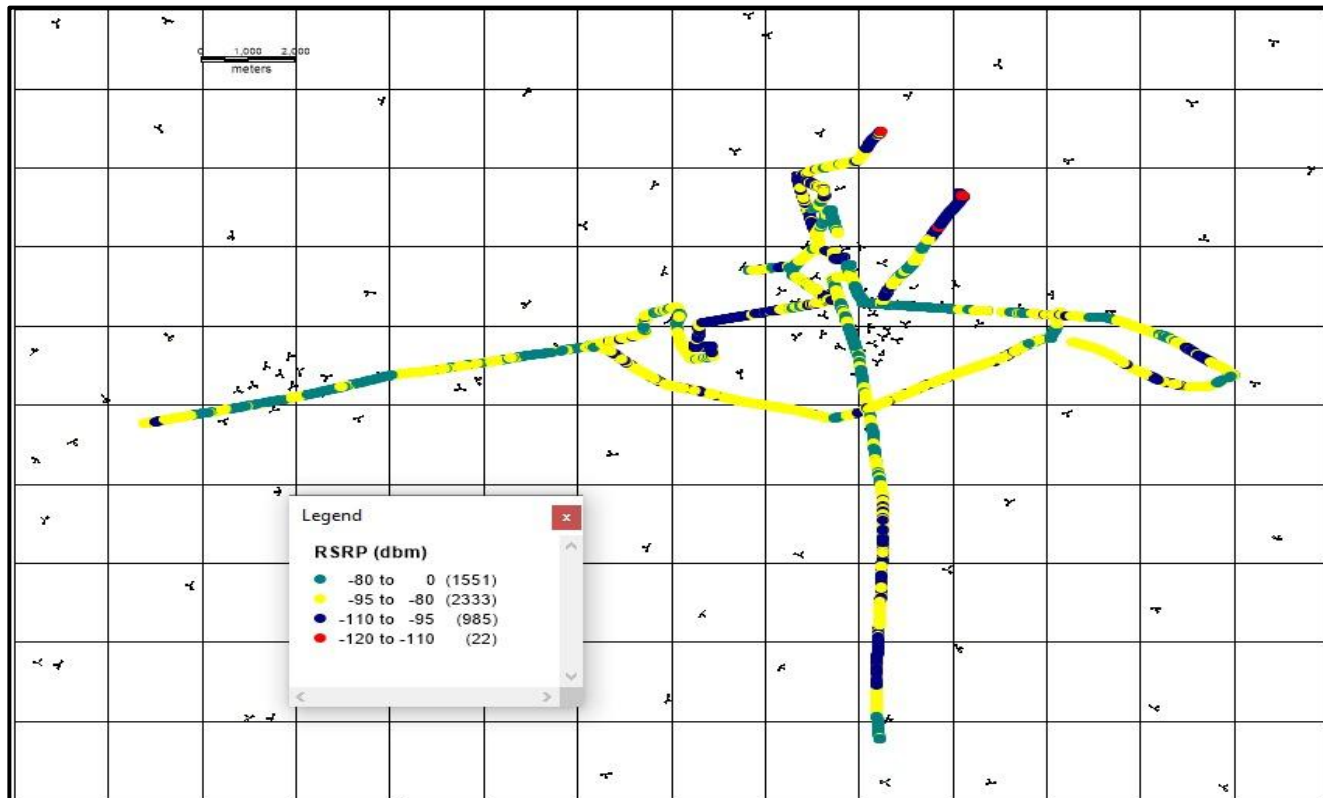
TSP- BSNL



TSP- RJIL

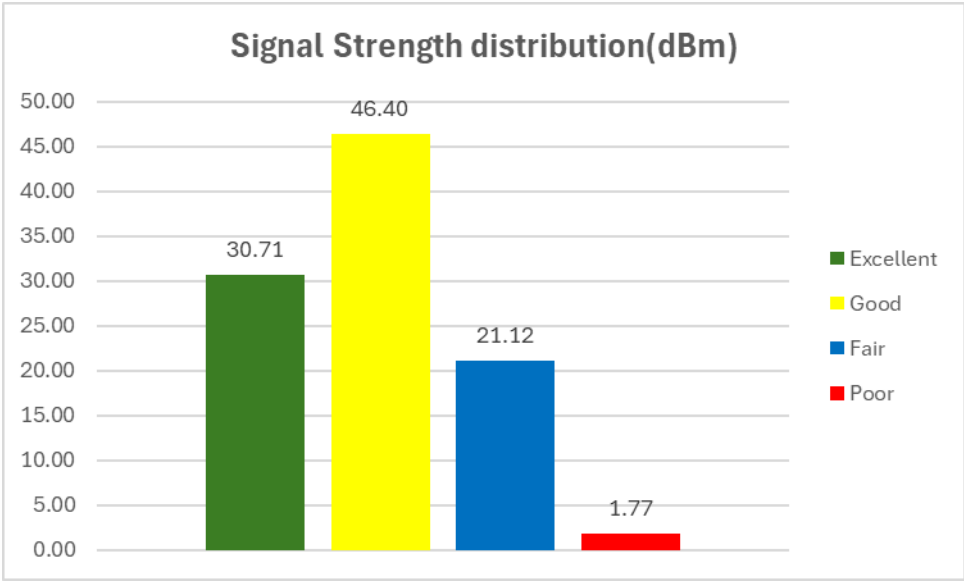


TSP- VIL

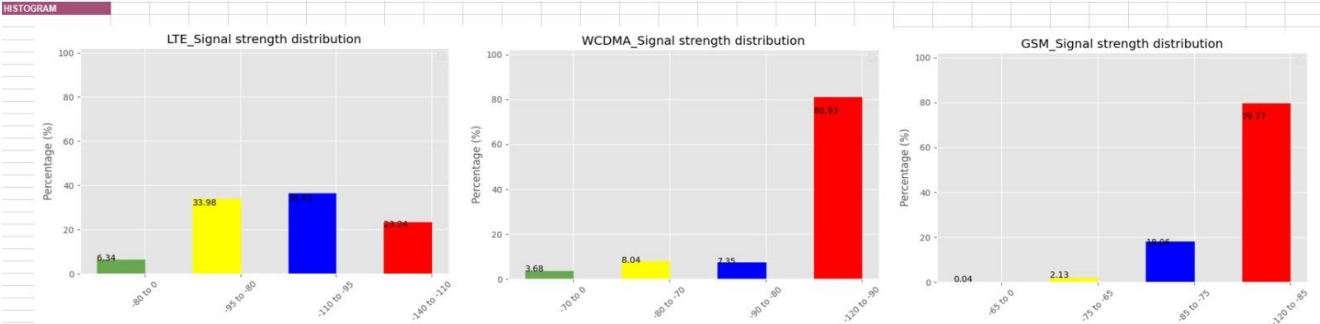


3.2.4 Signal Strength distribution: (5G/4G/3G/2G - Auto mode)

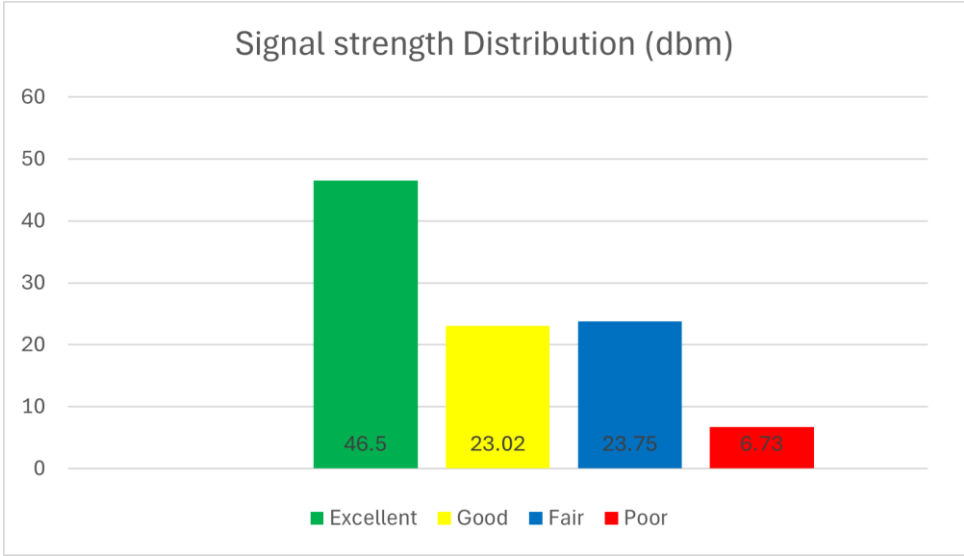
TSP- Airtel



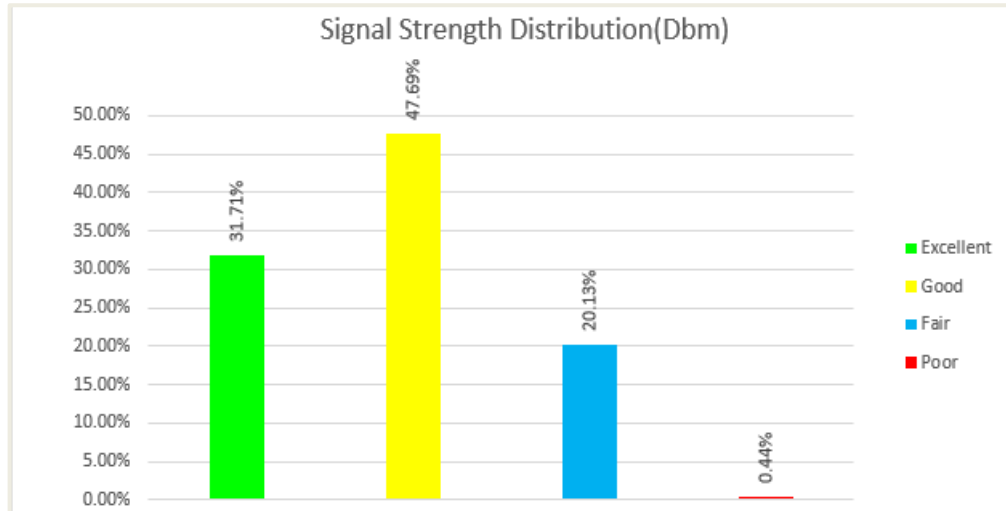
TSP- BSNL



TSP- RJIL



TSP- VIL



Rx Level -2G								
Overall Rx Level	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-65]	66	2	NA	NA	50.00	0.04	NA	NA
[-65, ≥-75)	63	100	NA	NA	47.73	2.20	NA	NA
[-75, ≥-85)	3	849	NA	NA	2.27	18.69	NA	NA
[-85, ≥Min)	0	3592	NA	NA	0.00	79.07	NA	NA
Total	132	4543	NA	NA	100.00	100.00	NA	NA

Rx Level -3G								
Overall RSCP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-70]	NA	165	NA	NA	NA	3.58	NA	NA
[-70, ≥-80)	NA	361	NA	NA	NA	7.84	NA	NA
[-80, ≥-90)	NA	330	NA	NA	NA	7.16	NA	NA
[-90, ≥Min)	NA	3750	NA	NA	NA	81.42	NA	NA
Total	NA	4606	NA	NA	NA	99.87	NA	NA

Rx Level -4G								
Overall RSRP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-80]	2844	1502	705	1551	30.44	6.34	46.50 %	31.71
[-80, ≥-95]	4334	8048	349	2333	46.38	33.99	23.02 %	47.69
[-95, ≥-110]	1998	8628	360	985	21.38	36.44	23.75 %	20.13
[-110, ≥Min]	168	5500	102	22	1.80	23.22	6.73 %	0.44
Total	9344	23678	1516	4891	100.00	100.00	100 %	99.97

Rx Level -5G								
Overall RSRP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-80]	190	NA	1537	NA	26.65	NA	36.19 %	NA
[-80, ≥-95]	308	NA	2384	NA	43.20	NA	56.13 %	NA
[-95, ≥-110]	196	NA	305	NA	27.49	NA	7.18 %	NA
[-110, ≥Min]	19	NA	21	NA	2.66	NA	0.49 %	NA
Total	713	NA	4227	NA	100.00	NA	100 %	NA

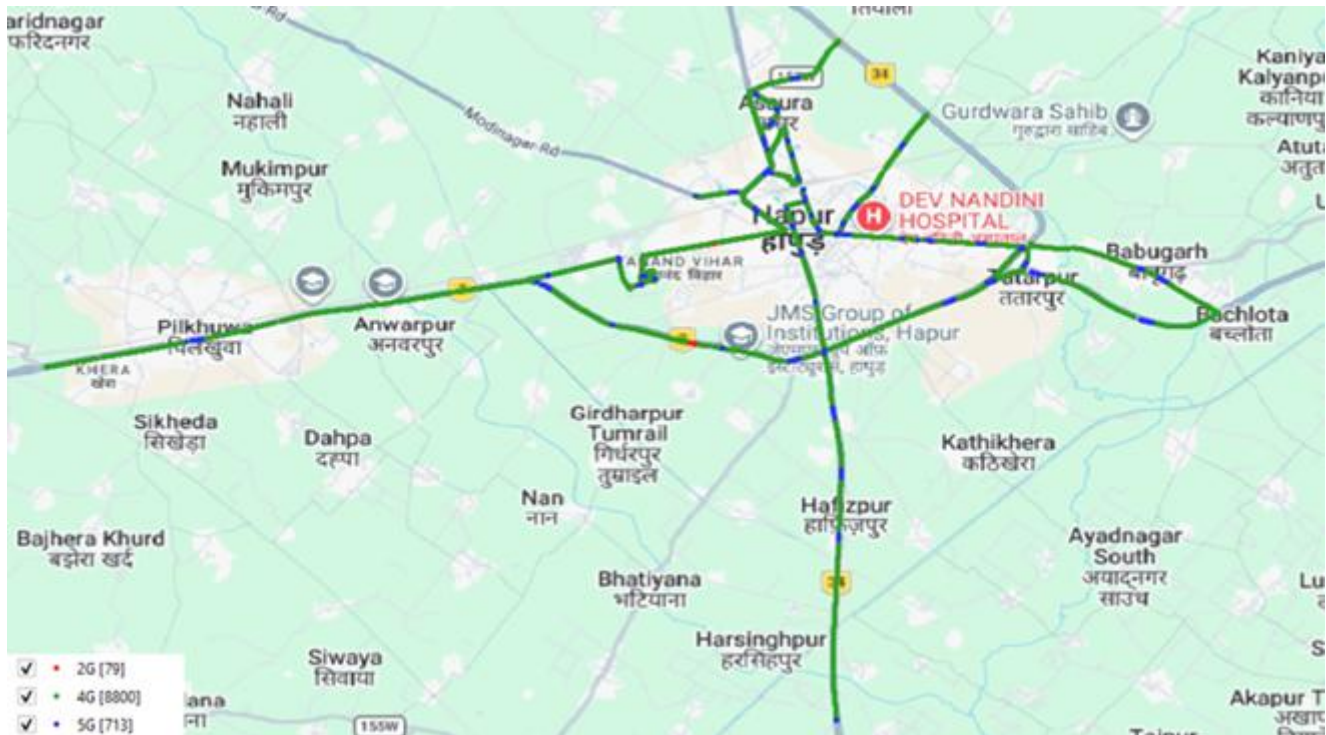
3.3 Data Service performance in 5G/4G/3G/2G (Auto mode) - Dynamic

QoS Parameters		AIRTEL	BSNL/MTNL	RJIL	VIL
Download speed (Mbps/s)	Average	114.33	3.02	171.13	40.76
	80th Percentile	204.73	4.45	281.74	55.89
	20th Percentile	19.75	0.45	34.75	20.03
Upload speed (Mbps/s)	Average	18.81	7.85	37.13	20.09
	80th Percentile	35.63	11.48	59.93	29.83
	20th Percentile	1.61	4.48	4.38	11.17
Latency (ms)	Average	59.4	57	16.54	59.71
	50th Percentile	22	54	14.5	59.71
Jitter (ms)	Average	2.2	3.13	10.46	0.31

3.4 Time Spent (Technology-wise)

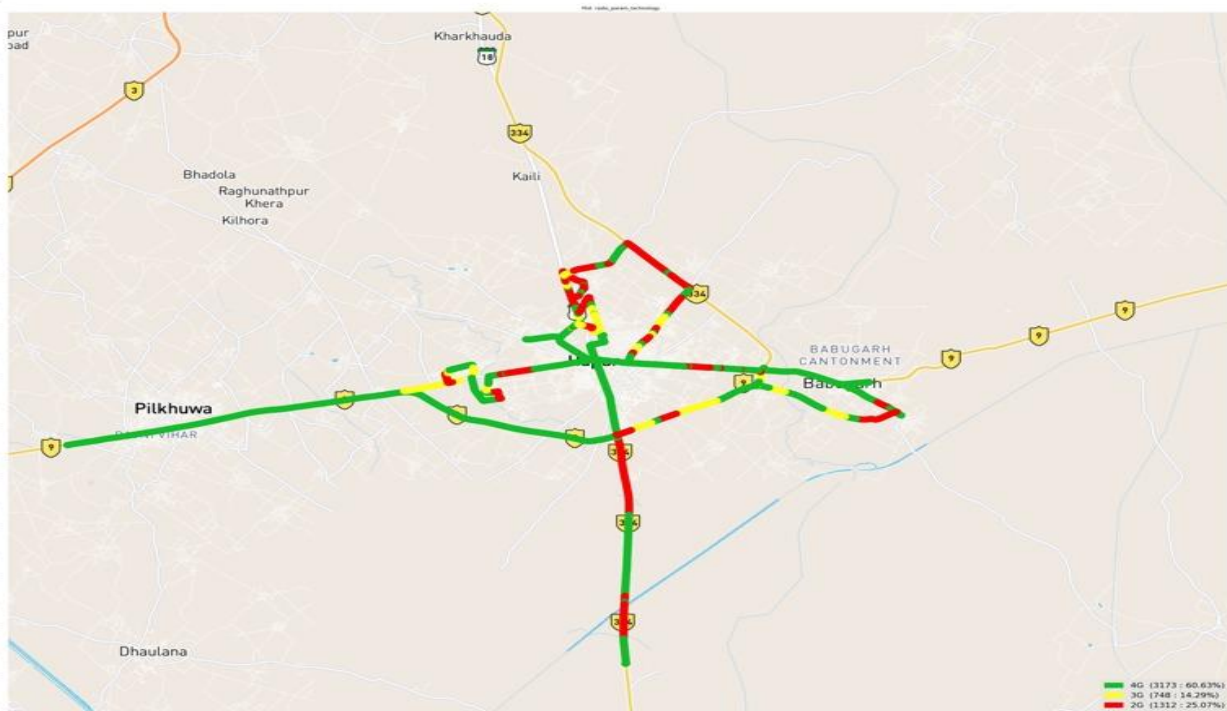
Time Spent Map (for each TSP)	Map Legend: 2G – Red 3G – Yellow 4G – Green 5G - Blue
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TSP – Airtel



TSP – BSNL

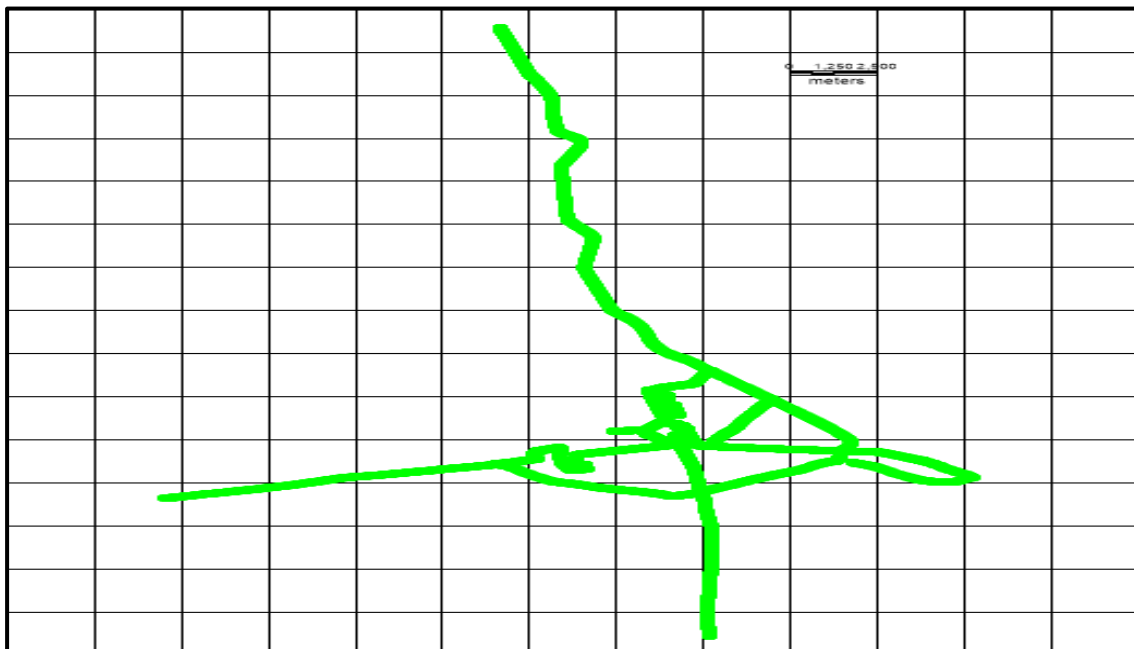
Coverage Map (RAT Type)



TSP – RJIL

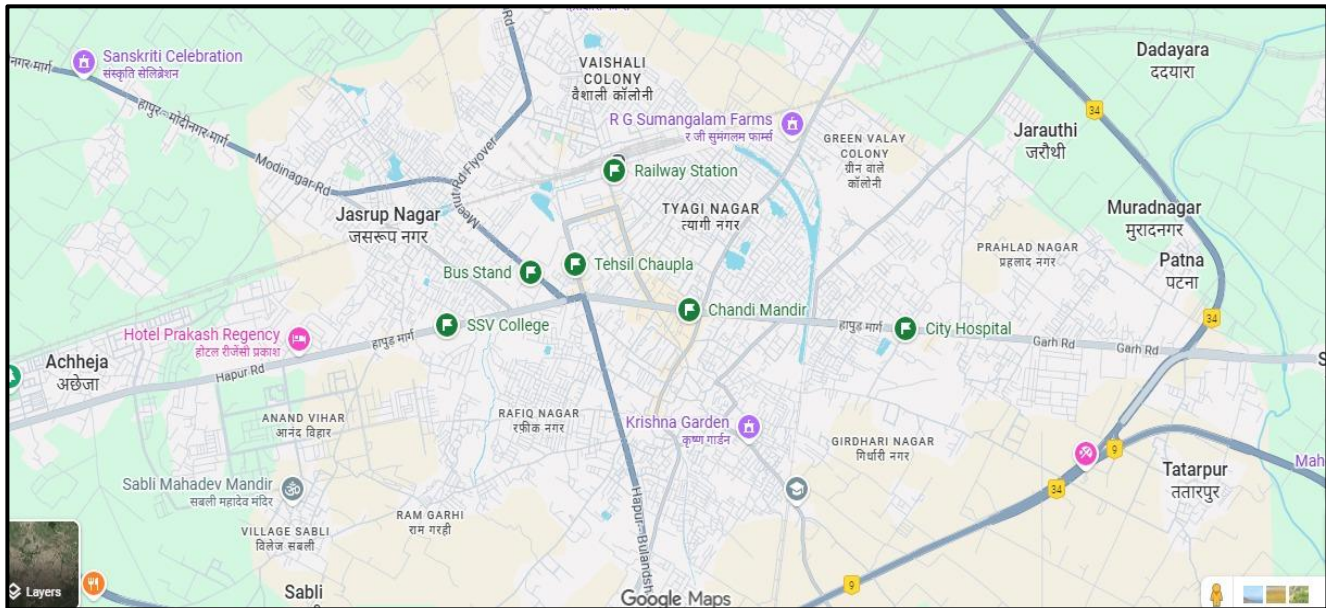


TSP – VIL



4.0 QoS Performance Analysis - Static

4.1 Hot spot Locations



Hotspot Name	Latitude & Longitude	Date of Measurement	Time of Measurement
Bus Stand Hapur	28.731910/77.772010	09-01-2026	16:30:00
Railway Station Hapur	28.738339/77.777887	08-01-2026	17:00:00
SSV PG College	28.728530/77.765380	09-01-2026	18:00:00
Tehsil Chauraha Hapur	28.730450/77.776550	09-01-2026	15:00:00
Shri Chandi Mandir	28.729230/77.785080	08-01-2026	15:30:00
District Hospital	28.728490/77.801590	08-01-2026	13:00:00

4.2 Voice Service Performance (5G/ 4G/ 3G/ 2G - Auto mode) – Over all

Parameters	Airtel	BSNL/MTNL	RJIL	VIL
No of Call Attempts	60	60	60	120
No of Call Established	60	59	59	120
Call setup success rate (CSSR) %	100	98.34	98.33	100
No. of Drop Call	0	1	0	0
Drop Call Rate %	0	1.67	0	0
Call Setup Time Average (Sec.)	1.28	3.45	1.31	2.96

4.3 Data Service Performance (5G/ 4G/ 3G/ 2G - Auto mode) – Over all

QoS Parameters		AIRTEL	BSNL/MTNL	RJIL	VIL
Download speed (Mbps/s)	20 th Percentile	114.15	5.46	163.09	17.9
	Average	171.79	12.66	233.59	23.7
	80 th Percentile	222.12	16.79	305.22	30.10
Download Session Setup Success Rate %		100	100	100	100
Upload speed (Mbps/s)	20 th Percentile	38.07	1.77	77.42	9.58
	Average	53.46	6.36	114.65	13.15
	80 th Percentile	77.78	10.06	153.4	17.4
Upload Session Setup Success Rate %		96.67	100	100	100
Latency (in ms)	50 th Percentile	18	52.67	14.5	34.25
Jitter (in ms)	Average	4.6	1.80	13.97	0.33
Packet Drop Rate %		4.4	NA	0.74	0.28
Web browsing delay (in sec)		7.83	7.25	1.35	2.34
Video Streaming performance for video		0.87	1.05	0.328	0.78

4.4 Voice Service Performance (5G/ 4G/ 3G/ 2G - Auto mode) at each Hotspot location

Name of Hotspot Location	1. Bus Stand Hapur			
Parameters	Airtel	BSNL/MTNL	RJIL	VIL
No of Call Attempts	10	10	10	20
No of Call Established	10	10	10	20
Call setup success rate (CSSR) %	100	100	100	100
No. of Drop Call	00	0	0	0
Drop Call Rate %	100	0.00	0	0
Call Setup Time Average (Sec.)	1.40	3.2	1.36	2.94
Total no of RLT Occurrence	0	NA	0	0
No of RLT > 48	0	NA	0	0

Name of Hotspot Location	2. Railway Station Hapur			
Parameters	Airtel	BSNL/MTNL	RJIL	VIL
No of Call Attempts	10	10	10	20
No of Call Established	10	10	10	20
Call setup success rate (CSSR) %	100	100	100	100
No. of Drop Call	00	0	0	0
Drop Call Rate %	100	0.00	0	0
Call Setup Time Average (Sec.)	1.31	2.9	1.20	2.95
Total no of RLT Occurrence	0	NA	0	0
No of RLT > 48	0	NA	0	0

Name of Hotspot Location	3. SSV PG College			
Parameters	Airtel	BSNL/MTNL	RJIL	VIL
No of Call Attempts	10	10	10	20
No of Call Established	10	10	10	20
Call setup success rate (CSSR) %	100	100	100	100
No. of Drop Call	00	0	0	0
Drop Call Rate %	100	0.00	NA	0
Call Setup Time Average (Sec.)	1.12	3.6	1.29	2.90
Total no of RLT Occurrence	0	NA	0	0
No of RLT > 48	0	NA	0	0

Name of Hotspot Location	4. Tehsil Chauraha Hapur			
Parameters	Airtel	BSNL/MTNL	RJIL	VIL
No of Call Attempts	10	10	10	20
No of Call Established	10	10	10	20
Call setup success rate (CSSR) %	100	100	100	100
No. of Drop Call	00	0	0	0
Drop Call Rate %	100	0.00	0	0
Call Setup Time Average (Sec.)	1.35	2.9	1.41	2.97
Total no of RLT Occurrence	0	NA	0	0
No of RLT > 48	0	NA	0	0

Name of Hotspot Location	5. Shri Chandi Mandir			
Parameters	Airtel	BSNL/MTNL	RJIL	VIL
No of Call Attempts	10	10	10	20
No of Call Established	10	10	10	20
Call setup success rate (CSSR) %	100	100	100	100
No. of Drop Call	00	0	0	0
Drop Call Rate %	100	0.00	0	0
Call Setup Time Average (Sec.)	1.28	2.9	1.19	2.96
Total no of RLT Occurrence	0	NA	0	0
No of RLT > 48	0	NA	0	0

Name of Hotspot Location	6. District Hospital Hapur			
Parameters	Airtel	BSNL/MTNL	RJIL	VIL
No of Call Attempts	10	10	10	20
No of Call Established	10	9	9	20
Call setup success rate (CSSR) %	100	90	90	100
No. of Drop Call	0	1	0	0
Drop Call Rate %	100	10	0	0
Call Setup Time Average (Sec.)	1.26	5.22	1.44	2.92
Total no of RLT Occurrence	0	NA	0	0
No of RLT > 48	0	NA	0	0

4.5 Data Service Performance (5G/4G/3G/2G - auto mode) at each Hotspot location:

Name of Hotspot Location		1. Bus Stand Hapur			
QoS Parameters		AIRTEL	BSNL/MTNL	RJIL	VIL
Download speed (Mbps/s)	Average	189.97	11.08	222.83	20.95
Download Session Setup Success Rate %		100	100	100	100
Upload speed (Mbps/s)	Average	81.48	15.13	98.63	12.31
Upload Session Setup Success Rate %		100	100	100	100
Latency (in ms)	50th Percentile	17.5	47	20	31.7
Jitter (in ms)	Average	4.05	1.74	22.24	0.31
Packet Drop Rate %		9.1	NA	0	0.50
Web browsing delay (in sec)		2.57	8.58	0.98	3.82
Video Streaming performance for video		0.67	1.55	0.353	0.70

Name of Hotspot Location		2. Railway Station Hapur			
QoS Parameters		AIRTEL	BSNL/MTNL	RJIL	VIL
Download speed (Mbps/s)	Average	95.56	12.5	219.58	25.16
Download Session Setup Success Rate %		100	100	100	100
Upload speed (Mbps/s)	Average	19.88	4.82	153.40	13.76
Upload Session Setup Success Rate %		75	100	100	100
Latency (in ms)	50th Percentile	20.5	51	17.5	38.52
Jitter (in ms)	Average	19.1	1.59	4.77	0.39
Packet Drop Rate %		15.61	NA	0	0.01
Web browsing delay (in sec)		3.62	4.98	1.63	1.99
Video Streaming performance for video		1.68	0.93	0.351	0.62

Name of Hotspot Location		3. SSV PG College			
QoS Parameters		AIRTEL	BSNL/MTNL	RJIL	VIL
Download speed (Mbps/s)	Average	174.52	16.77	359.67	28.94
Download Session Setup Success Rate %		100	100	100	100
Upload speed (Mbps/s)	Average	40.76	2.23	113.78	13.03
Upload Session Setup Success Rate %		100	100	100	100
Latency (in ms)	50th Percentile	19.5	51	18	31.86
Jitter (in ms)	Average	3.39	1.97	6	0.30
Packet Drop Rate %		1.67	NA	0	0.47
Web browsing delay (in sec)		18.44	2.87	1.38	2.01
Video Streaming performance for video		0.75	1.64	0.318	0.66

Name of Hotspot Location		4. Tehsil Chauraha Hapur			
QoS Parameters		AIRTEL	BSNL/MTNL	RJIL	VIL
Download speed (Mbps/s)	Average	243.99	20.98	120.53	21.75
Download Session Setup Success Rate %		100	100	100	100
Upload speed (Mbps/s)	Average	77.16	10.57	182.68	10.57
Upload Session Setup Success Rate %		100	100	100	100
Latency (in ms)	50th Percentile	18	47	19.5	31.22
Jitter (in ms)	Average	2.88	1.38	6.70	0.26
Packet Drop Rate %		0	NA	0	0.49
Web browsing delay (in sec)		5.47	2.00	1.46	2.46
Video Streaming performance for video		0.77	0.89	0.340	1.46

Name of Hotspot Location		5. Shri Chandi Mandir			
QoS Parameters		AIRTEL	BSNL/MTNL	RJIL	VIL
Download speed (Mbps/s)	Average	119.19	11.46	305.22	24.58
Download Session Setup Success Rate %		100	100	100	100
Upload speed (Mbps/s)	Average	42.37	5.37	82.57	14.63
Upload Session Setup Success Rate %		100	100	100	100
Latency (in ms)	50th Percentile	18	49	16	35.08
Jitter (in ms)	Average	3	2.31	54.47	0.33
Packet Drop Rate %		0	NA	0	0.17
Web browsing delay (in sec)		7.26	5.03	1.12	1.99
Video Streaming performance for video		0.71	1.08	0.294	0.77

Name of Hotspot Location		6. District Hospital			
QoS Parameters		AIRTEL	BSNL/MTNL	RJIL	VIL
Download speed (Mbps/s)	Average	206.13	3.17	173.73	20.81
Download Session Setup Success Rate %		100	100	100	100
Upload speed (Mbps/s)	Average	52.62	0.02	56.82	14.56
Upload Session Setup Success Rate %		100	100	100	100
Latency (in ms)	50th Percentile	17.5	71	18	37.09
Jitter (in ms)	Average	2.98	NA	48.80	0.37
Packet Drop Rate %		0.05	NA	0	0.03
Web browsing delay (in sec)		12.12	20.06	1.57	2.07
Video Streaming performance for video		0.68	NA	0.315	0.63

4.6 Signal Strength distribution at Static location – Over all

Rx Level -2G								
Overall Rx Level	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-65]	NA	NA	NA	2168	NA	NA	NA	63.28
[-65, ≥-75]	NA	NA	NA	1101	NA	NA	NA	32.13
[-75, ≥-85]	NA	NA	NA	150	NA	NA	NA	4.37
[-85, ≥Min)	NA	NA	NA	7	NA	NA	NA	0.20
Total	NA	NA	NA	3426	NA	NA	NA	100

Rx Level -3G								
Overall RSCP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-70]	NA	NA	NA	NA	NA	NA	NA	NA
[-70, ≥-80]	NA	NA	NA	NA	NA	NA	NA	NA
[-80, ≥-90]	NA	NA	NA	NA	NA	NA	NA	NA
[-90, ≥Min)	NA	NA	NA	NA	NA	NA	NA	NA
Total	NA	NA	NA	NA	NA	NA	NA	NA

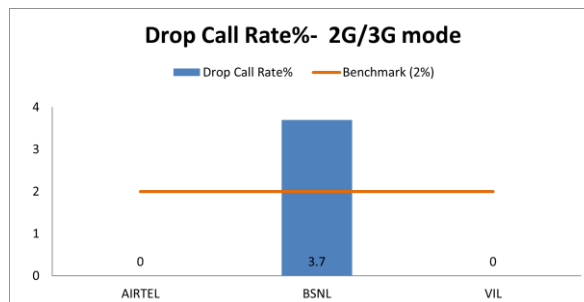
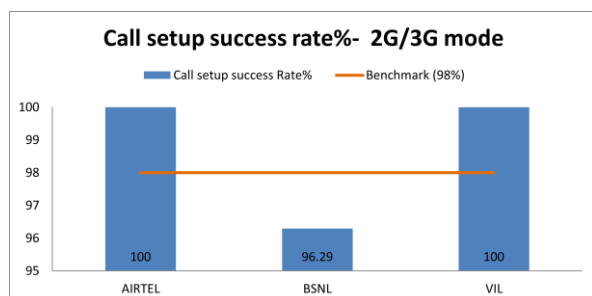
Rx Level -4G								
Overall RSRP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-80]	14599	3681	0	NA	78.60	14.43	0 %	42.95
[-80, ≥-95]	3972	17739	0	NA	21.39	69.52	0 %	49.10
[-95, ≥-110]	2	4083	0	NA	0.01	16.00	0 %	7.94
[-110, ≥Min]	0	12	0	NA	0.00	0.05	0 %	0
Total	18573	25515	0	NA	100.00	100	0 %	100

Rx Level -5G								
Overall RSRP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-80]	389	NA	7240	NA	39.61	NA	56.81 %	NA
[-80, ≥-95]	588	NA	5475	NA	59.88	NA	42.96 %	NA
[-95, ≥-110]	5	NA	28	NA	0.51	NA	0.22 %	NA
[-110, ≥Min]	0	NA	2	NA	0.00	NA	0.02 %	NA
Total	982	NA	12745	NA	100.00	NA	100 %	NA

Highway (Meerut to Hapur)

5.0 QoS Performance Analysis - Dynamic

5.1 Voice Service Performance (3G/2G Lock mode) - Dynamic

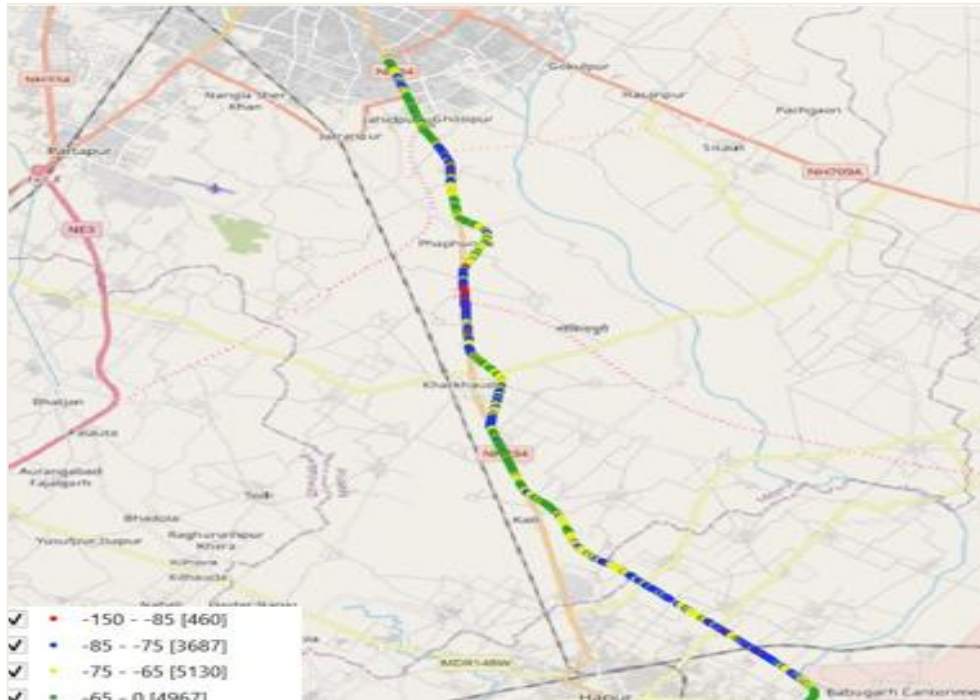


Parameters	Airtel	BSNL/MTNL	RJIL	VIL
Total Distance covered (in Kms)	56	28.67	N/A	29
No. of Call Attempts	32	27	N/A	28
No. of Call Established	32	26	N/A	28
Call setup success rate (CSSR) %	100	96.29	N/A	100
No. of Drop Call	0	1	N/A	0
Drop Call Rate %	0	3.70	N/A	0
Call Setup Time Average (Sec.)	3.51	5.29	N/A	3.09
No. of Handover Attempts	62	50	N/A	57
No. of Handover success	58	43	N/A	56
HOSR %	93.55	86.0	N/A	98.24
Total no of RLT Occurrence	12409	2060	N/A	0
No of RLT > 48	0	758	N/A	0

5.1.1 Signal Strength Map (3G/2G - Lock mode)

Parameter Name	Technology	Signal Strength (dBm)			
		Excellent	Good	Fair	Poor
Rx Level	GSM	0 to ≥ -65	<-65 to ≥ -75	<-75 to ≥ -85	<-85 to min
RSCP	WCDMA	0 to ≥ -70	<-70 to ≥ -80	<-80 to ≥ -90	<-90 to min
RSRP	LTE	0 to ≥ -80	<-80 to ≥ -95	<-95 to ≥ -110	<-110 to min
SS_RSRP	NR	0 to ≥ -80	<-80 to ≥ -95	<-95 to ≥ -110	<-110 to min

TSP - Airtel



Parameter	Technology	Signal Strength(dBm)			
		Excellent	Good	Fair	Poor
Rx Level	GSM	4967	5130	3687	460
RSCP	WCDMA				
RSRP	LTE				
SS_RSRP	NR				

TSP - BSNL

Device - 1 Phone Sony/F8331 QUALCOMM (1) + Nemo Handy + 404541170741886 - RxLev Sub (dBm)

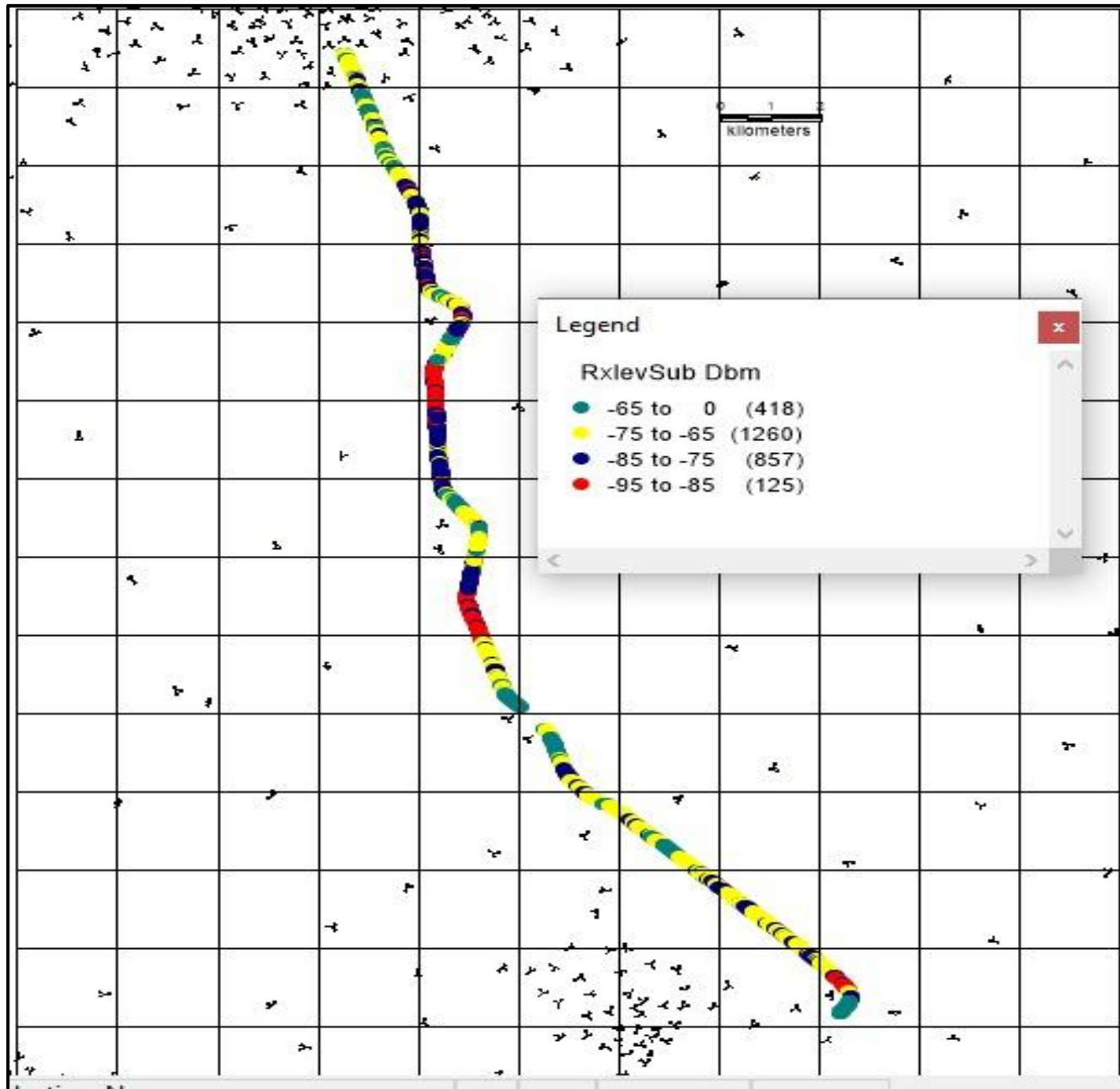
- 65 to 0 (6%) (130)
- 75 to -65 (8%) (177)
- 85 to -75 (40%) (900)
- 130 to -85 (47%) (1064)

Device - 1 Phone Sony/F8331 QUALCOMM (1) + Nemo Handy + 404541170741886 - UMTS Best Active RSCP (dBm)

- 70 to 0 (11%) (11)
- 80 to -70 (32%) (33)
- 90 to -80 (33%) (34)
- 140 to -90 (24%) (24)

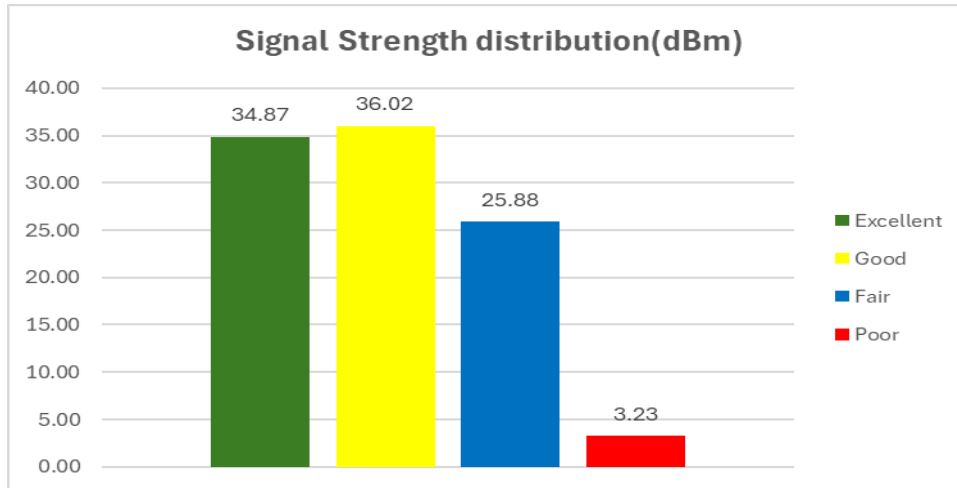


TSP - VIL

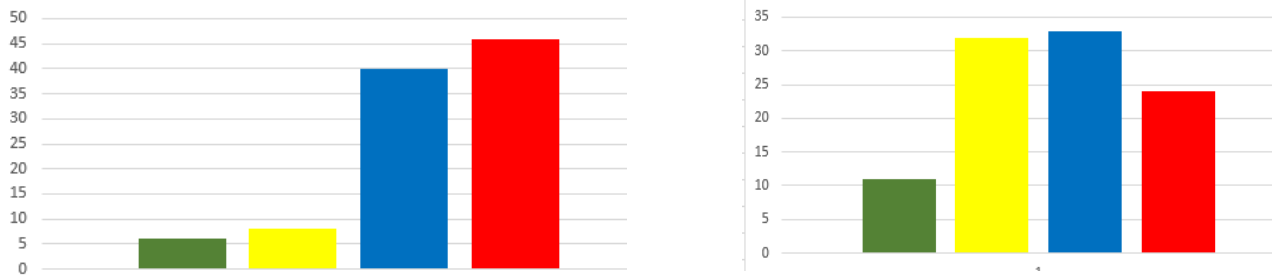


5.1.2 Signal Strength distribution: (3G/2G - Lock mode)

TSP - Airtel



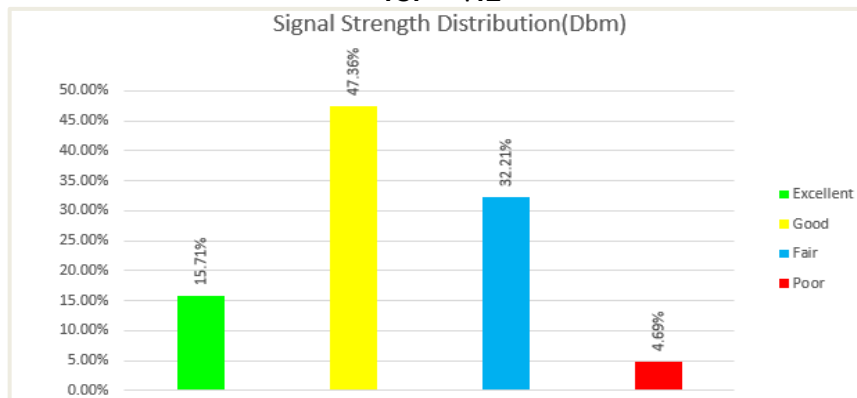
TSP - BSNL



Rx Level

RSCP

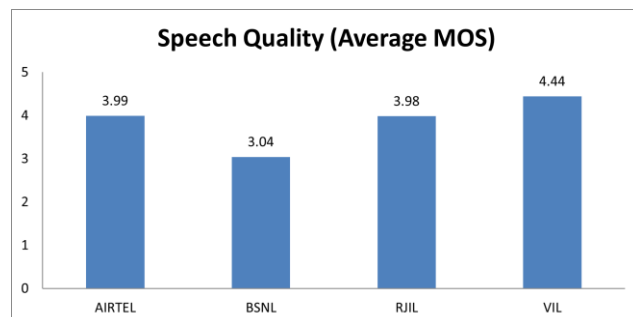
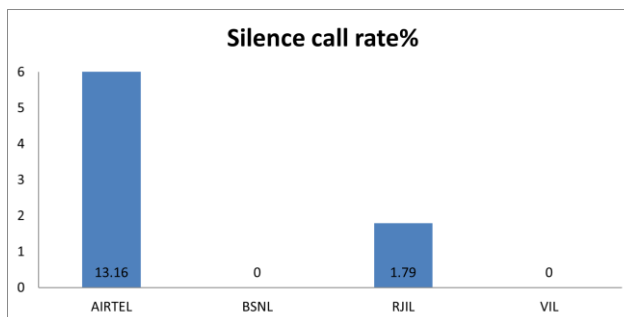
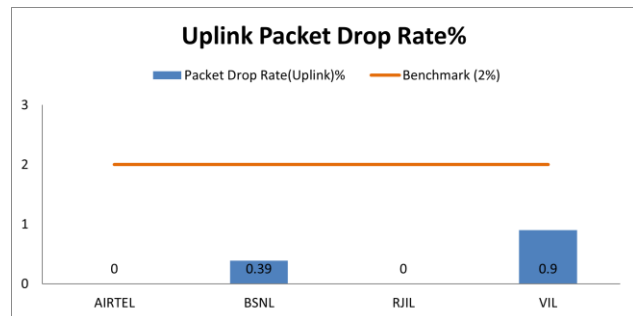
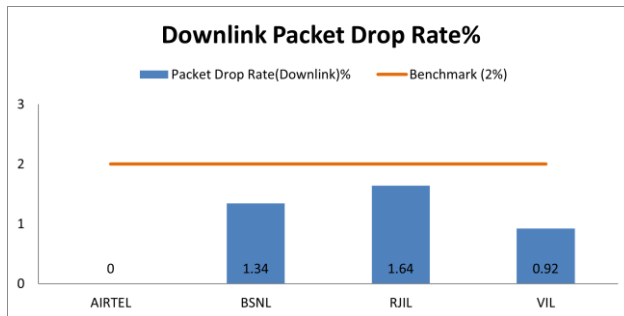
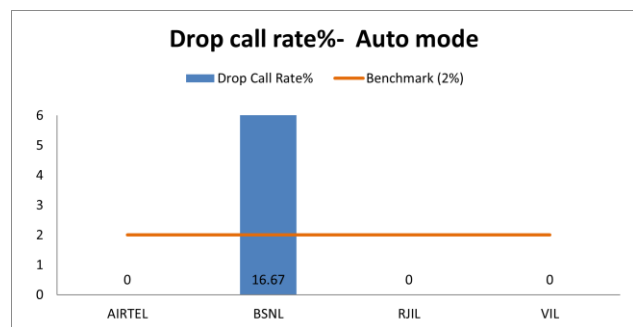
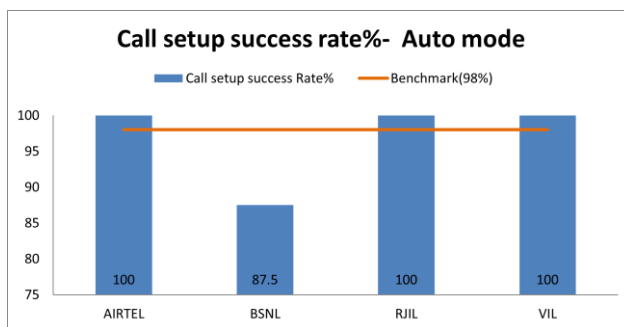
TSP - VIL



Rx Level -2G								
Overall Rx Level	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-65]	4967	130	NA	418	34.87	6	NA	15.71
[-65, ≥-75]	5130	177	NA	1260	36.02	8	NA	47.36
[-75, ≥-85]	3687	900	NA	857	25.88	40	NA	32.21
[-85, ≥Min]	460	1064	NA	125	3.23	46	NA	4.69
Total	14244	2271	NA	2660	100.00	100	NA	99.97

Rx Level -3G								
Overall RSCP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, $\geq$ -70]	NA	11	NA	NA	NA	11	NA	NA
[-70, $\geq$ -80)	NA	32	NA	NA	NA	33	NA	NA
[-80, $\geq$ -90)	NA	33	NA	NA	NA	34	NA	NA
[-90, $\geq$ Min)	NA	24	NA	NA	NA	22	NA	NA
Total	NA	100	NA	NA	NA	100	NA	NA

5.2 Voice Service Performance in 5G/4G/3G/2G (Auto mode) - Dynamic

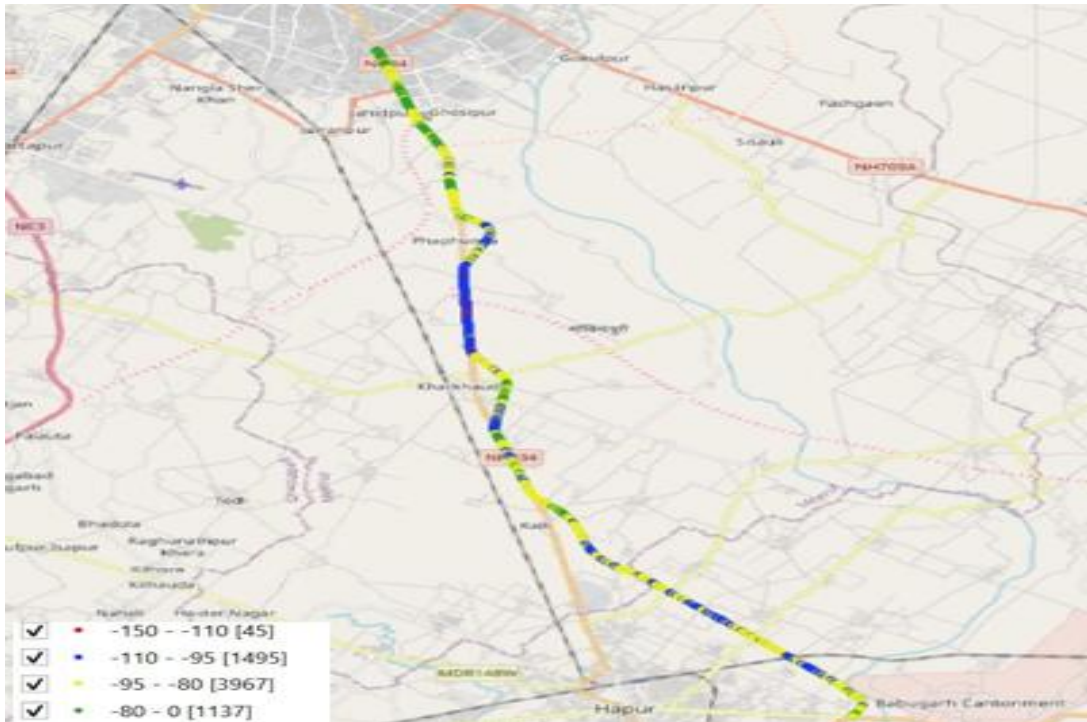


Parameters	Airtel	BSNL/MTNL	RJIL	VIL
Total Distance covered (in Kms)	56	56	56	56
No. of Call Attempts	34	24	56	26
No. of Call Established	34	21	56	26
Call setup success rate (CSSR) %	100	87.5	100	100
No. of Drop Call	0	4	0	0
Drop Call Rate %	0	16.67	0	0
Call Setup Time Average (Sec.)	1.37	3.34	0.20	1.43
No. of Handover Attempts	193	51	395	160
No. of Handover success	193	46	389	160
HOSR %	100	90.20	98.48	100
Packet Drop Rate (Downlink)	0	1.34	1.64	0.92
Packet Drop Rate (Uplink)	0	0.39	0	0.9
Number of silence call for > 2 sec.	5	2	1	0
Silence Call Rate %	13.16	0.00	1.79	0
Number of MOS samples	258	3685	246	1687
Average MOS score	3.99	3.04	3.98	4.44
RTP Jitter (4G & 5G) in ms	2	6.78	19.11	13.7

5.2.1 Signal Strength Map (5G/4G/3G/2G - Auto mode)

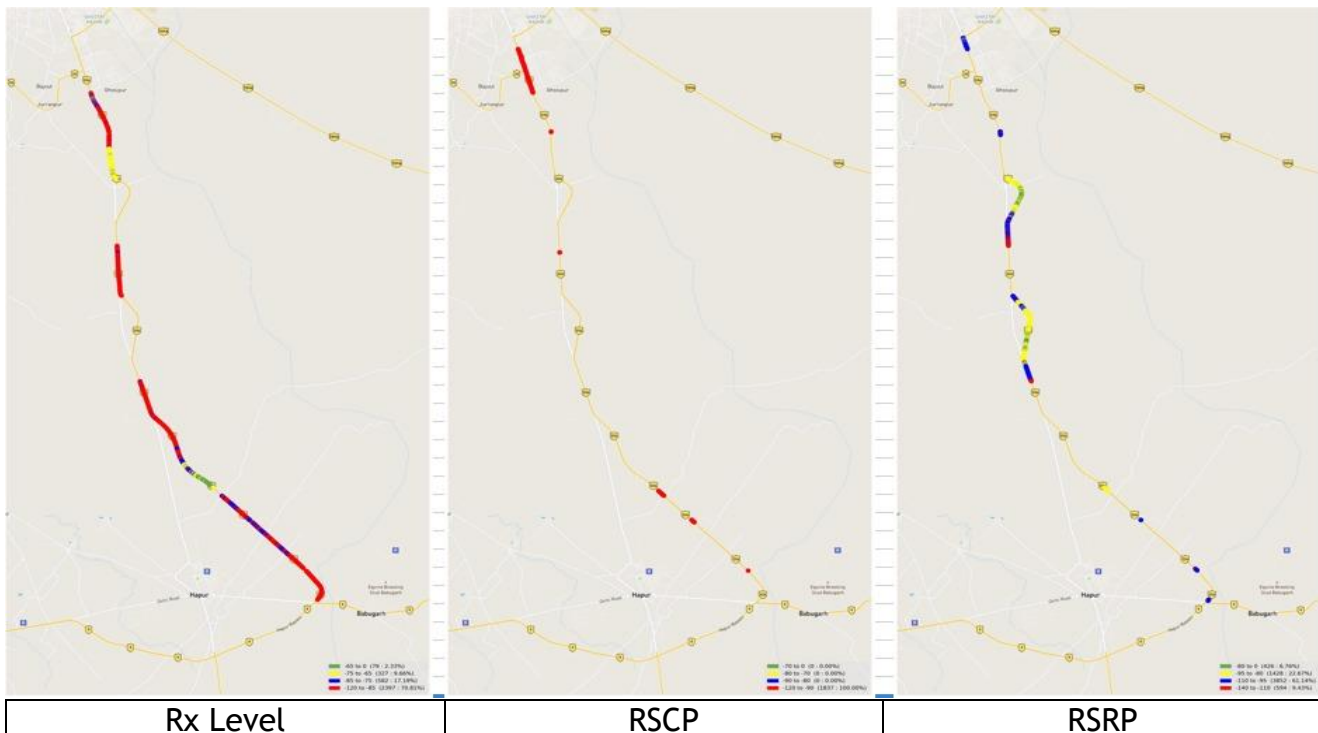
Parameter Name	Technology	Signal Strength (dBm)			
		Excellent	Good	Fair	Poor
Rx Level	GSM	0 to $\geq$ -65	<-65 to $\geq$ -75	<-75 to $\geq$ -85	<-85 to min
RSCP	WCDMA	0 to $\geq$ -70	<-70 to $\geq$ -80	<-80 to $\geq$ -90	<-90 to min
RSRP	LTE	0 to $\geq$ -80	<-80 to $\geq$ -95	<-95 to $\geq$ -110	<-110 to min
SS_RSRP	NR	0 to $\geq$ -80	<-80 to $\geq$ -95	<-95 to $\geq$ -110	<-110 to min

TSP - Airtel

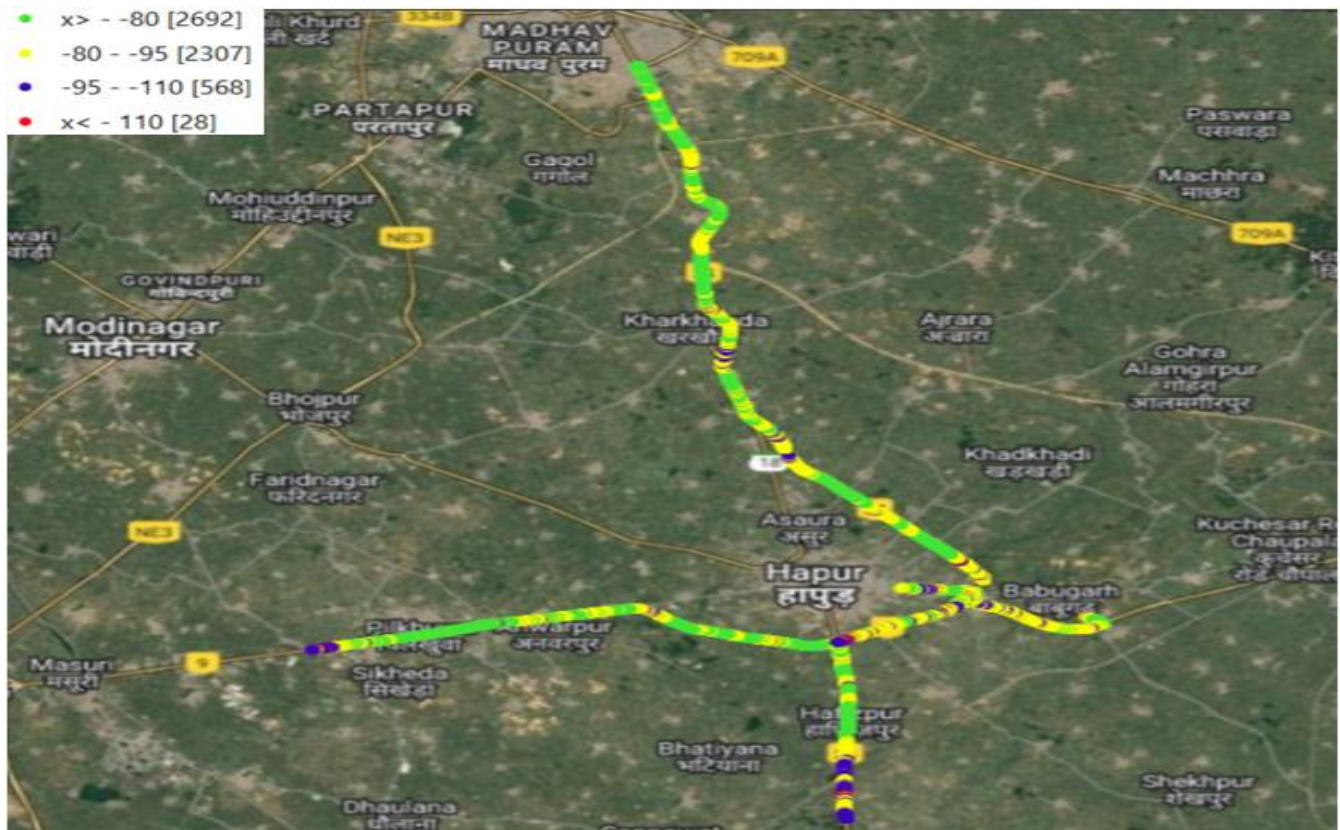


Parameter	Technology	Signal Strength(dBm)			
		Excellent	Good	Fair	Poor
Rx Level	GSM				
RSCP	WCDMA				
RSRP	LTE	1146	3967	1488	43
SS_RSRP	NR	53	113	287	6

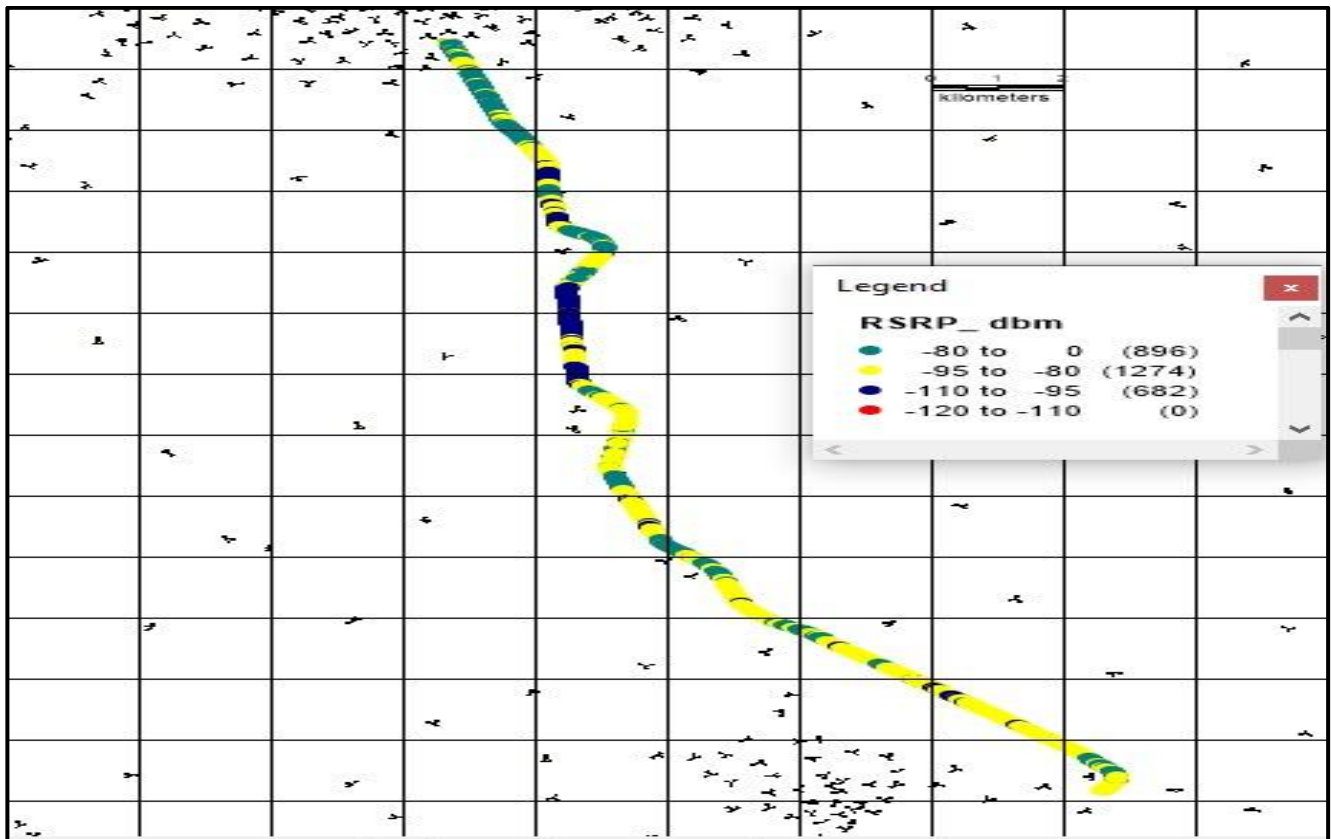
TSP - BSNL



TSP - RJIL

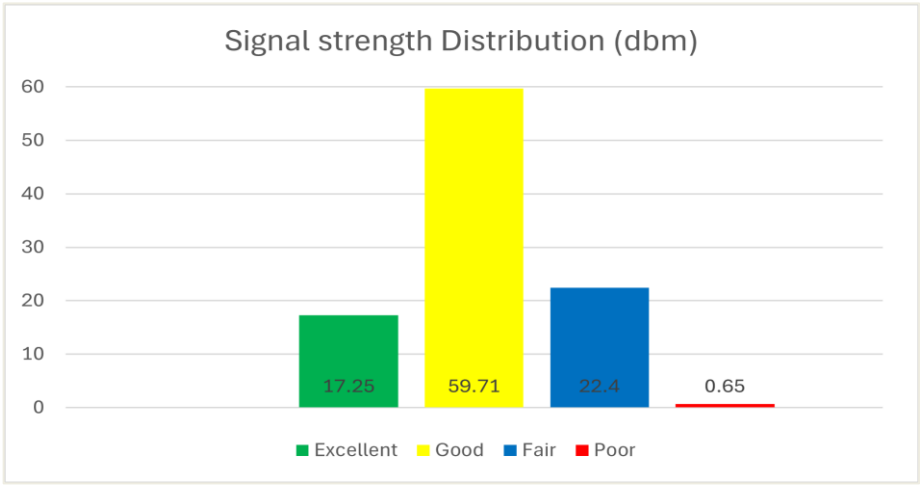


TSP - VIL

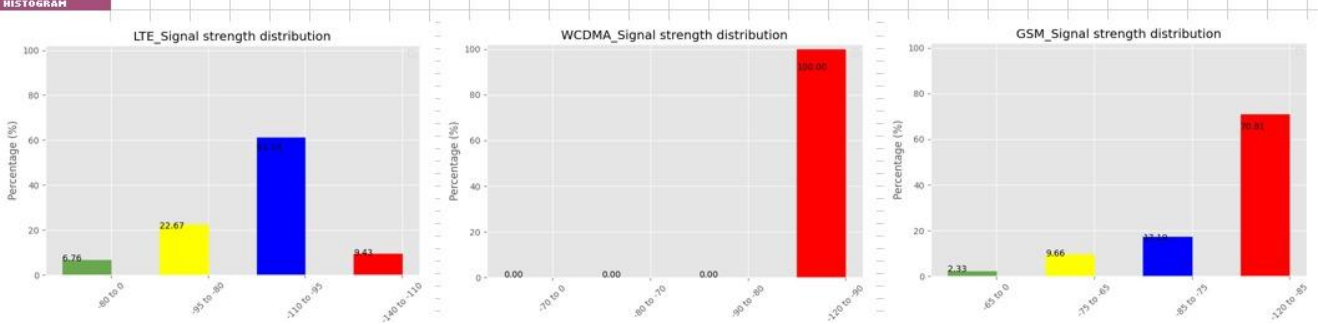


5.2.2 Signal Strength distribution: (5G/4G/3G/2G - Auto mode)

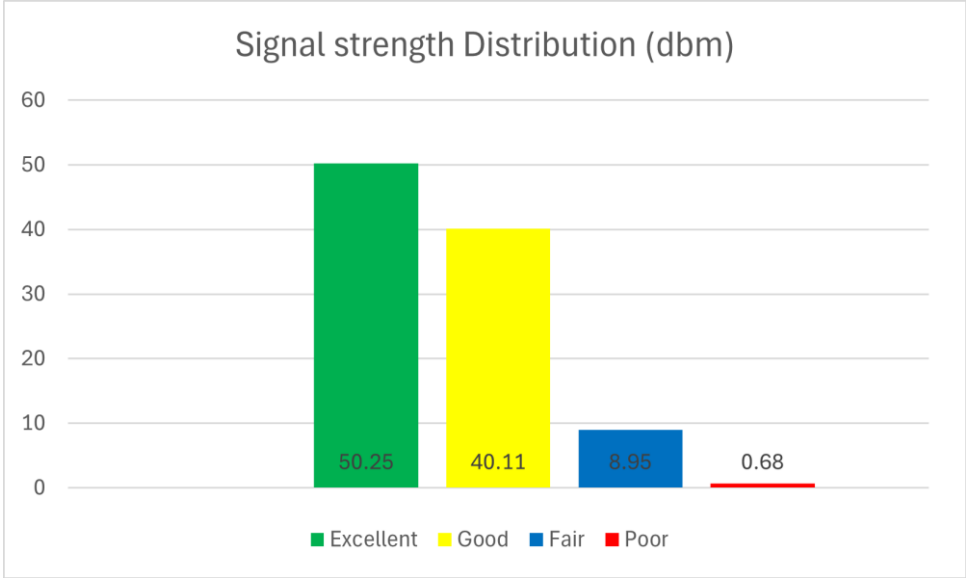
TSP - Airtel



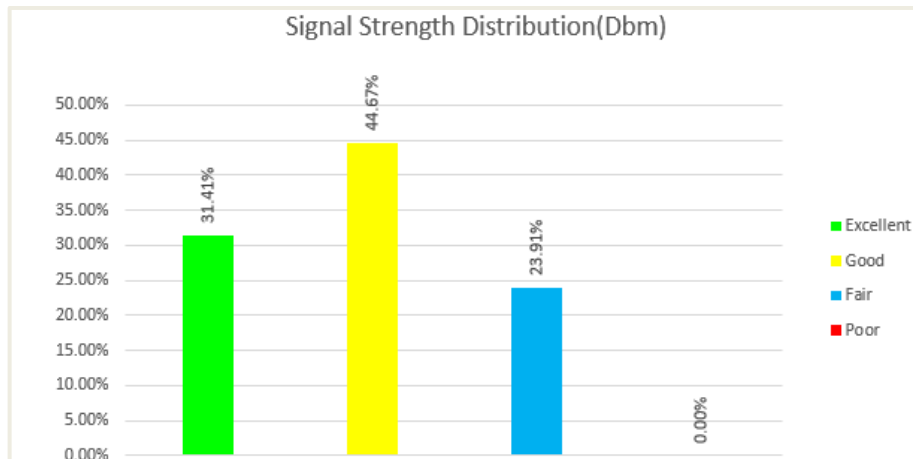
TSP - BSNL



TSP - RJIL



TSP - VIL



Rx Level -2G								
Overall Rx Level	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-65]	NA	79	NA	NA	NA	2.45	NA	NA
[-65, ≥-75)	NA	327	NA	NA	NA	10.13	NA	NA
[-75, ≥-85)	NA	582	NA	NA	NA	18.04	NA	NA
[-85, ≥Min)	NA	2239	NA	NA	NA	69.38	NA	NA
Total	NA	3227	NA	NA	NA	100.00	NA	NA

Rx Level -3G								
Overall RSCP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-70]	NA	0	NA	NA	NA	0	NA	NA
[-70, ≥-80)	NA	0	NA	NA	NA	0	NA	NA
[-80, ≥-90)	NA	0	NA	NA	NA	0	NA	NA
[-90, ≥Min)	NA	1840	NA	NA	NA	100	NA	NA
Total	NA	1840	NA	NA	NA	100	NA	NA

Rx Level -4G								
Overall RSRP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-80]	1146	426	887	896	17.25	6.76	50.25	31.41
[-80, ≥-95]	3967	1428	708	1274	59.71	22.67	40.11	44.67
[-95, ≥-110]	1488	3852	158	682	22.40	61.14	8.95	23.91
[-110, ≥Min]	43	594	12	0	0.65	9.43	0.68	0
Total	6644	6300	1765	2852	100.00	100	100	99.99

Rx Level -5G								
Overall RSRP	No of Sample				Sample %			
	Airtel	BSNL	RJIL	VIL	Airtel	BSNL/MTNL	RJIL	VIL
[Max, ≥-80]	53	NA	1811	NA	11.55	NA	47.05 %	NA
[-80, ≥-95]	113	NA	1606	NA	24.62	NA	41.73 %	NA
[-95, ≥-110]	287	NA	415	NA	62.53	NA	10.78 %	NA
[-110, ≥Min]	6	NA	17	NA	1.31	NA	0.44 %	NA
Total	459	NA	3849	NA	100.00	NA	100 %	NA

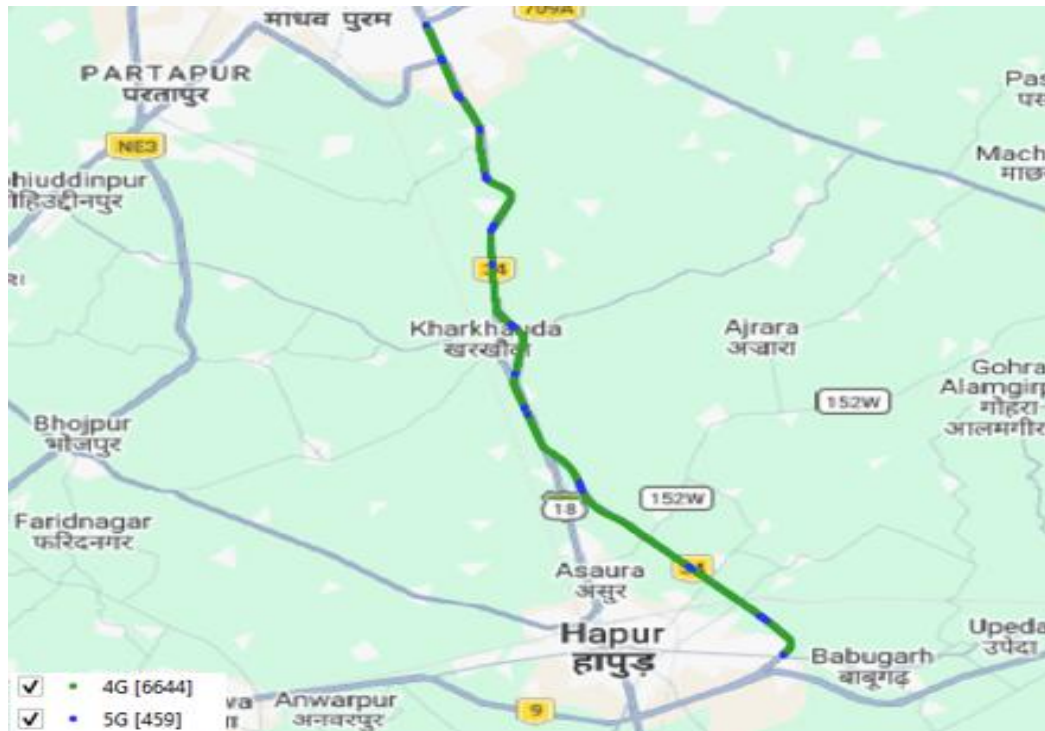
5.3 Data Service performance in 5G/4G/3G/2G (Auto mode) - Dynamic

QoS Parameters		AIRTEL	BSNL/MTNL	RJIL	VIL
Download speed (Mbps/s)	Average	36.62	5.66	149.69	54.79
	80th Percentile	47.33	9.6	264.91	86.10
	20th Percentile	17.80	0.87	20.41	25.58
Upload speed (Mbps/s)	Average	15.83	9.09	25.61	21.6
	80th Percentile	18.4	12.25	39.69	29.78
	20th Percentile	7.37	4.58	4.92	12.21
Latency (ms)	Average	39.78	60	19.65	55.69
	50th Percentile	26	46	14.5	55.69
Jitter (ms)	Average	23.9	3.2	17.59	0.39

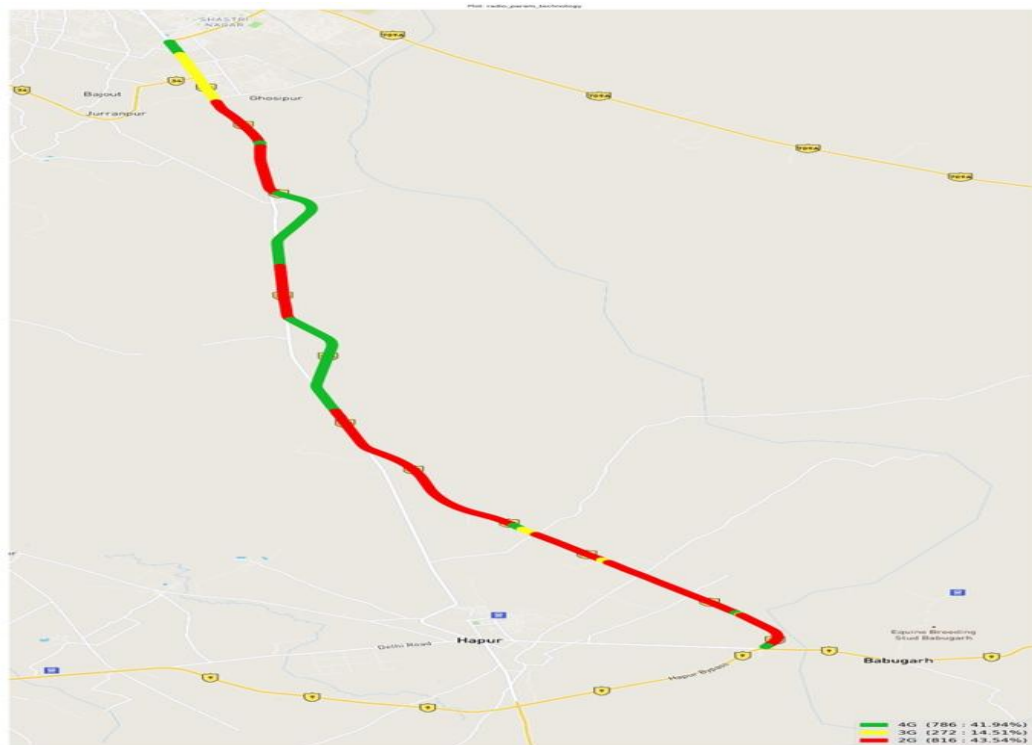
5.4 Time Spent (Technology-wise)

Time Spent Map (for each TSP)	Map Legend: 2G – Red 3G – Yellow 4G – Green 5G - Blue
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TSP - Airtel



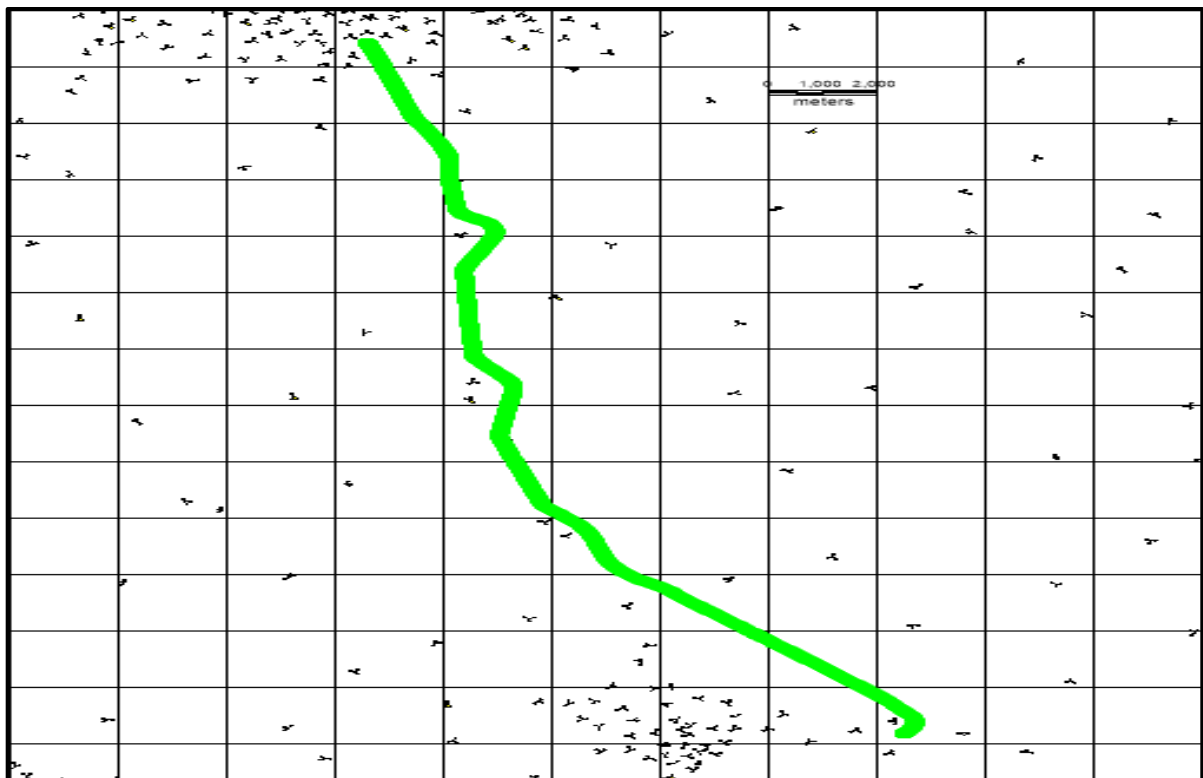
TSP - BSNL



TSP - RJIL



TSP - VIL



6.0 Data testing on hotspots using trainmyspeed app

Hotspot		Airtel	BSNL	JIO	VIL
1. Bus Stand Hapur	3G download in Mbps	NA	2.90	NA	NA
	3G upload in Mbps	NA	1.79	NA	NA
	4G download in Mbps	33.78	3.26	NA	20.03
	4G upload in Mbps	28.82	1.2	NA	16.17
	5G download in Mbps	NA	NA	193.43	NA
	5G upload in Mbps	NA	NA	92.02	NA
2. Railway Station Hapur	3G download in Mbps	NA	1.07	NA	NA
	3G upload in Mbps	NA	1.04	NA	NA
	4G download in Mbps	28.60	3.38	NA	57.31
	4G upload in Mbps	14.02	0.25	NA	38.03
	5G download in Mbps	91.51	NA	102.51	NA
	5G upload in Mbps	58.01	NA	14.89	NA

3. SSV PG College	3G download in Mbps	NA	3	NA	NA
	3G upload in Mbps	NA	1.51	NA	NA
	4G download in Mbps	28.62	NA	NA	34.01
	4G upload in Mbps	14.06	NA	NA	31.18
	5G download in Mbps	291.04	NA	206.82	NA
	5G upload in Mbps	38.22	NA	149.66	NA
4. Tehsil Chauraha	3G download in Mbps	NA	5.52	NA	NA
	3G upload in Mbps	NA	1.37	NA	NA
	4G download in Mbps	32.02	6.29	NA	24.15
	4G upload in Mbps	16.01	2.68	NA	15.60
	5G download in Mbps	128.54	NA	103.41	NA
	5G upload in Mbps	68.02	NA	18.07	NA
5. Shri Chandi Mandir	3G download in Mbps	NA	3.71	NA	NA
	3G upload in Mbps	NA	1.8	NA	NA
	4G download in Mbps	31.02	5.9	NA	53.56

	4G upload in Mbps	15.02	2.05	NA	7.48
	5G download in Mbps	73.53	NA	117.83	NA
	5G upload in Mbps	24.53	NA	57.87	NA
6. District Hospital Hapur	3G download in Mbps	NA	1.74	NA	NA
	3G upload in Mbps	NA	1.02	NA	NA
	4G download in Mbps	28.05	0.23	NA	24.00
	4G upload in Mbps	12.32	0.19	NA	4.35
	5G download in Mbps	199.59	NA	103.65	NA
	5G upload in Mbps	75.35	NA	13.22	NA

Annexure-I

Drive Test Methodology adopted during the Drive test:

(1) Voice Tests:

Sl. No.	QoS Parameter	Measurement Criteria and methodology																																		
1	Call setup time	Time taken from call initiate to call alerting/ringing.																																		
2	Call setup success rate	CSSR = (Total Call Established/ Total Call Attempt) *100 Call Setup attempt time: 30 sec. Call duration (City/Highway): 90/180 sec. Wait/ Guard Time: 15sec.																																		
3	Dropped Call rate (DCR)	Call Drop Rate = (Total Call Drop/Total Call Established) *100																																		
4	Call Silence Rate (Muting)	Silence call rate = (count of silence / Total calls established) *100 Continuous RTP gap ≥ 2 sec																																		
5	Handover Success Rate	Handover Success Rate = Count of successful handovers (All Technology Handover combined) / Total count of Handover Attempt (All Technology Handover combined) *100 Handover types which are considered- 2G Inter & Intra cell, 3G Soft & IRAT, 4G Inter & Intra frequency & SRVCC, 5G Inter & Intra frequency & 5G to 4G handovers.																																		
6	Packet Drop Rate (DL & UL) for Packet Switched Network (4G & 5G)	Number of RTP (Real-time Transport Protocol) Packets lost divided by total RTP packet received (against each source_SSRC and sequence number) at call originating handset. This KPI will be calculated from MOS call for packet call only (VoNR/VoLTE)																																		
7	Mean Opinion Score (MOS) Performance (in 5G/4G/3G/2G: Auto mode)	Voice quality in mobile networks is measured with algorithms based on ITU-T P.863 (POLQA) Excellent: MOS ≥ 4 and < 5, Good: MOS ≥ 3 and < 4, Fair : MOS ≥ 2 and < 3, Poor : MOS ≥ 1 and < 2																																		
8	Signal Strength (Signal strength is the signal power level received by the wireless user)	<table><tr><th rowspan="2">Parameter Name</th><th rowspan="2">Technology</th><th colspan="4">Signal Strength (dBm)</th></tr><tr><th>Excellent</th><th>Good</th><th>Fair</th><th>Poor</th></tr><tr><td>RxLevel</td><td>GSM</td><td>0 to ≥ -65</td><td><-65 to ≥-75</td><td><-75 to ≥-85</td><td><-85 to min</td></tr><tr><td>RSCP</td><td>WCDMA</td><td>0 to ≥ -70</td><td><-70 to ≥-80</td><td><-80 to ≥-90</td><td><-90 to min</td></tr><tr><td>RSRP</td><td>LTE</td><td>0 to ≥ -80</td><td><-80 to ≥-95</td><td><-95 to ≥-110</td><td><-110 to min</td></tr><tr><td>SS_RSRP</td><td>NR</td><td>0 to ≥ -80</td><td><-80 to ≥-95</td><td><-95 to ≥-110</td><td><-110 to min</td></tr></table>	Parameter Name	Technology	Signal Strength (dBm)				Excellent	Good	Fair	Poor	RxLevel	GSM	0 to ≥ -65	<-65 to ≥-75	<-75 to ≥-85	<-85 to min	RSCP	WCDMA	0 to ≥ -70	<-70 to ≥-80	<-80 to ≥-90	<-90 to min	RSRP	LTE	0 to ≥ -80	<-80 to ≥-95	<-95 to ≥-110	<-110 to min	SS_RSRP	NR	0 to ≥ -80	<-80 to ≥-95	<-95 to ≥-110	<-110 to min
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RSRP	LTE	0 to ≥ -80	<-80 to ≥-95	<-95 to ≥-110	<-110 to min																															
SS_RSRP	NR	0 to ≥ -80	<-80 to ≥-95	<-95 to ≥-110	<-110 to min																															

(2) Data Tests:

Sl. No.	QoS Parameter	Measurement Criteria and methodology
1	Data speed in Mbits/s (DL/UL both)	Download Speed = Total bytes transferred during download / Total time for transfer Upload Speed = Total bytes transferred during upload / Total time for transfer. Download: File Size: 500 MB for 120 sec, 30 Sec Timeout Upload: File size: 250 MB for 120 sec, 30 Sec Timeout (Multithread 3- TCP Connection at a time for both DL & UL)
2	Latency (in ms)	Latency is the time taken by a packet to reach the receiving end point after being transmitted from the sending point in broadband service. Test with Packet of size of 512 Bytes - 1000 count on TSP's Test server using UDP packets (TWAMP)
3	Jitter (in ms)	Test with Packet of size of 512/256 Bytes - 1000 count on TSP's own Test server using UDP (TWAMP) & RTP packets separately
4	Session Setup Success Rate (in %) (DL/UL)	(Total DL or UL session established (successfully connected to server)/ Total DL or UL session attempt) x100
5	Packet drop rate (in %)	No. of packets lost out of total packet transferred during the testing. • Packet loss rate = (Total packet lost / Total packet sent) x100 • Packet delay (RTT) >90 ms considered as packet loss and included in Packet drop rate. • The measurement should include all major types of packets i.e., TCP, UDP and RTP in their representative ratio. The 90th percentile value of the packet drop measurements shall be considered the Packet drop rate.
6	Web browsing delay (in seconds)	Time taken to open the web page successfully is considered as web browsing delay / web page download time. LSA-wise 3 popular websites to be taken
7	Video Streaming performance (in seconds)	TRAI Prescribed Video of 20 Sec with 25 sec Timeout & without caching https://www.youtube.com/watch?v=rH2RjvI0DFs