भादूविप्रा
TRAI

TELECOM REGULATORY AUTHORITY OF INDIA

Independent Drive Test Report

Andhra Pradesh LSA

January 2025

Contents

1. Introduction

TRAI Act, 1997 mandates the Authority to ensure the services delivered through various telecommunications networks meet required quality standards prescribed, to protect the interest of the consumers of telecommunication services. TRAI is also responsible for conducting the periodical audit of such services provided by the service providers so as to protect the interest of the consumers of telecommunications service.

Accordingly, TRAI has engaged M/s RedMango Analytics Pvt. Ltd. to undertake assessment of Quality of Service of mobile service through Independent Drive Test (IDT).

In IDT, the performance of all service providers providing service in a Licensed Service Area (LSA) through various technologies (like 2G/ 3G/ 4G/ 5G) for voice and data are measured by conducting drive test. The drive test routes are finalised based on various objective criteria like reported network performance, consumer complaints etc. Methodology adopted for conducting IDT is elaborated in **APPENDIX-I**.

2. Executive Summary (LSA)

2.1 Drive test details

This report covers the findings of the IDT undertaken in Andhra Pradesh License Service Area (LSA) during the month of January-2025 under the supervision of TRAI Regional Office (RO), Hyderabad. Details of route / area covered during the IDT is as given below:

Sl. No	Drive test route	Type of route	Distance covered (KMs)	From date	To date
1	Vijayawada-Guntur	City	352.5	28-Jan-2025	31-Jan-2025
2	Vijayawada-Guntur	Inter Operator Calling	11.2	31-Jan-2025	31-Jan-2025
3	Vijayawada-Guntur-Amaravati	Hotspot	8 Locations	29-Jan-2025	30-Jan-2025
4	Vijayawada-Guntur	Walk Test	5.5	29-Jan-2025	31-Jan-2025
5	Hyderabad - Vijayawada	Highway	268.0	27-Jan-2025	27-Jan-2025

Table-1: Drive test summary

2.2 Drive test routes

The map provides overview of drive test routes indicating city drive, inter-operator call test, hotspots, walk test and Highway as per the legends shown on the map.

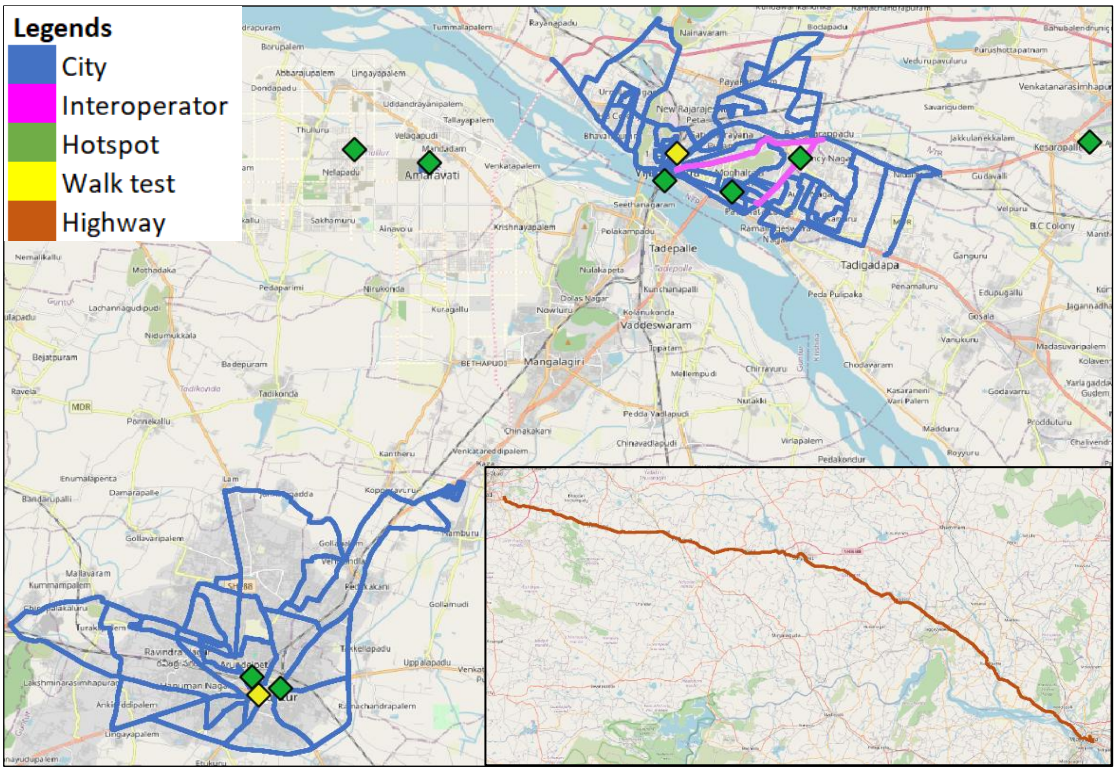


Figure-1: Drive test routes

2.3 Summary of areas covered

a) City- Nearby Hanumanpet, Labbipet, Bharathi nagar, Auto nagar, Kanuru, Vambay colony, Vidhyadharapuram, Interim government complex Amaravati, Guntur bypass, Nallapadu, Guntur Amaravati road, Mahatma Gandhi inner ring road and NH16 etc.

b) Hotspot-

1. PVP square mall
2. Vijayawada bus station
3. GG hospital
4. Vijayawada Airport
5. Amaravati secretariat
6. High court, Amaravati
7. Guntur railway station
8. Guntur bus stand

c) Walk Test

1. Vijayawada railway station
2. Vegetables market, Guntur

d) Highway-

1. Hyderabad to Vijayawada via NH65, Choutuppal, Narkatpalli, Suryapet, Nandigama etc.

2.4 Telecom service providers detected frequency bands

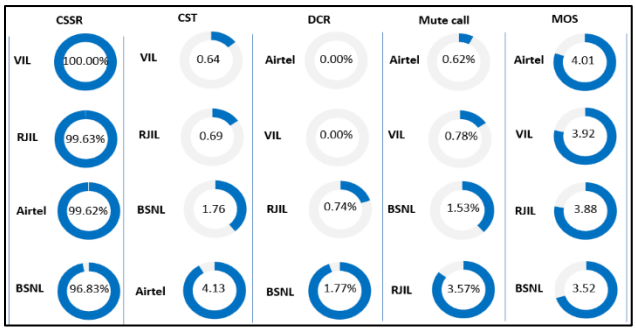
Technologies covered during the IDT and frequency bands in use are summarised in below table

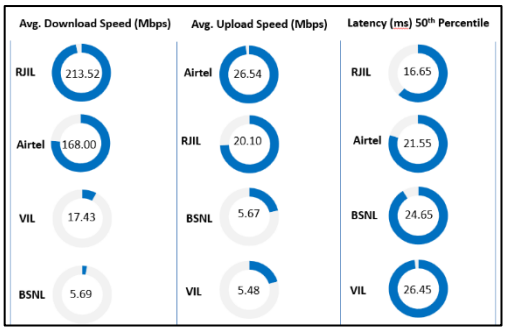
S.no.	Name of TSP	Technology	Frequency Bands (In MHz)
1	Bharti Airtel Ltd.	2G	900,1800
2	Bharti Airtel Ltd.	4G	900, 1800, 2300
3	Bharti Airtel Ltd.	5G	3500
4	BSNL	2G	900
5	BSNL	3G	2100
6	BSNL	4G	700,2100
7	Reliance JIO Infocomm Ltd.	4G	850,1800,2300
8	Reliance JIO Infocomm Ltd.	5G	700,3500
9	Vodafone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

Table-2: Telecom service provider (TSP) covered in IDT

2.5 Performance against key QoS parameters

CSSR: Call setup success rate, **CST:** Call setup time, **DCR:** Drop call rate





Summary-Voice services

Call Setup Success Rate: VIL, RJIL, Airtel & BSNL have 100.00%, 99.63%, 99.62% and 96.83% call setup success rate respectively in Auto-selection mode (5G/4G/3G/2G).

Call Setup Time: Airtel has taken comparatively longer time (4.13 seconds) to establish the voice call, whereas VIL, RJIL and BSNL call setup time is 0.64, 0.69 & 1.76 second respectively in Auto-selection mode (5G/4G/3G/2G).

Call Drop Rate: Airtel, VIL, RJIL and BSNL have 0.00%, 0.00%, 0.74% and 1.77% call drop rate respectively in Auto-selection mode (5G/4G/3G/2G).

Call Silence/Mute Rate: In packet switched network (4G/5G) Airtel, VIL, BSNL and RJIL have 0.62%, 0.78%, 1.53 & 3.57% silence call rate respectively.

Mean Opinion Score (MOS): Quality of speech of Airtel (4.01) is having a MOS score >4, whereas VIL (3.92), RJIL (3.88) and BSNL (3.52) is having a MOS score <4.

Summary-Data services

Data Download performance (Dynamic): BSNL offers a download speed of 5.69 Mbps while VIL provides 17.43 Mbps, utilizing legacy technologies respectively. In contrast, Airtel and RJIL achieve significantly higher average download speeds of 168.00 Mbps and 213.52 Mbps.

Data Upload performance (Dynamic): BSNL (5.67 Mbps) and VIL (5.48 Mbps), operating on 4G/3G legacy technologies respectively, have comparatively lower upload speeds. In contrast, Airtel and RJIL offer faster speeds of 26.54 Mbps and 20.10 Mbps, respectively.

QoS Performance Analysis- Andhra Pradesh LSA

3. QoS performance analysis-LSA level

3.1 Overview

This section provides summary of overall QoS performance of the telecom service provider's network in the LSA by aggregating the results of drive tests conducted in the LSA during the month of January-2025 covering City, Hotspots, walk test and Highway. (Refer Table 1)

3.2 Voice performance

(a) Voice Call Performance in 3G/2G network mode only: 3G/2G network mode testing has been done to reflect experience for respective users as they have only 3G/2G compatible handsets.

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	646	662	666
Call Setup Success Rate %	99.38	99.40	99.25
Drop Call Rate %	0.93	0.76	0.15
Call Setup Time-Average (Second)	6.04	2.79	3.57
Handover Success Rate %	98.03	99.33	98.90

Table-3: Summary of voice call performance in 3G/2G network mode only.

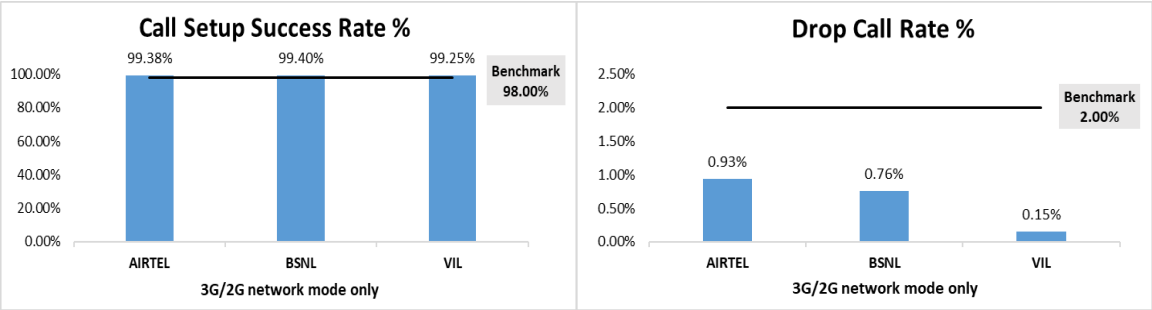


Figure-2: Call setup success rate and drop call rate performance.

Number of unique cell Id's covered in Voice test- Technology wise			
Technology	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
3G	NA	38	NA
2G	1027	589	713

Table-4: Technology wise number of network cell Id's latched during drive test.

Note-
- RJIL does not have 3G/2G network.
- NA- Service provider doesn't provide services in respective technology.

(b) Voice Call Performance in auto network selection mode (5G/4G/3G/2G)

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	786	819	817	817
Call Setup Success Rate %	99.62	96.83	99.63	100.00
Drop Call Rate %	0.00	1.77	0.74	0.00
Call Setup Time-Average (Second)	4.13	1.76	0.69	0.64
Handover Success Rate %	99.83	99.81	99.97	99.94

Table-5: Summary of voice call performance in network auto-selection mode.

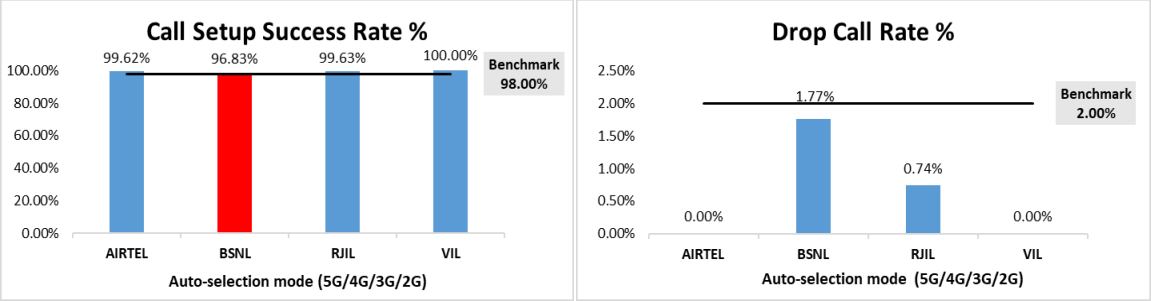


Figure-3: Performance for call setup success rate and drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	641	654	644	640
Number of silence call for >4 Sec	4	10	23	5
Silence Call Rate %	0.62	1.53	3.57	0.78
Number of silence instances for >4 Sec	4	10	29	5
Number of silence instances for >3 Sec	12	10	33	15
Number of silence instances for >2 sec	37	19	56	42
RTP Jitter (4G & 5G) in ms	4.11	13.59	12.03	14.76
Packet loss Rate Downlink %	0.70	1.23	0.78	1.59
Packet loss Rate Uplink %	0.48	0.43	0.86	0.64

Table-6: Summary of silence instances & packet loss rate for mobile to mobile call.

Number of unique cell Id's covered in Voice test- Technology wise				
Technology	Service Provider			
	Auto Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
5G	0	NA	1178	NA
4G	2000	527	1014	1619
3G	NA	36	NA	NA
2G	7	307	NA	15

Table-7: Technology wise number of network cell Id's latched during drive test.

Note-

- NA- Service provider doesn't provide services in respective technology.
- 0- No cell Id's were found in respective technology.

(c) Mean Opinion Score (MOS) performance for speech quality:

Mean opinion score indicates quality of speech observed during the drive test across different technologies. This parameter has been calculated for mobile-to-mobile calls made within same operator network in auto mode (5G/4G/3G/2G). As per ITU-T Recommendation P.863.1, MOS score values means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
Total Number of MOS Samples for calls in table-6	4599	4479	4540	4567
Speech Quality (Average MOS Score)	4.01	3.52	3.88	3.92
Number of samples with MOS >=4 to <5 (Excellent)	3937	1992	3063	3012
Number of samples with MOS >=3 to <4 (Good)	553	1453	1241	1367
Number of samples with MOS >=2 to <3 (Fair)	47	778	148	110
Number of samples with MOS >=1 to <2 (Poor)	62	256	88	78
%age of samples with MOS >=4 to <5 (Excellent)	85.61%	44.47%	67.47%	65.95%
%age of samples with MOS >=3 to <4 (Good)	12.02%	32.44%	27.33%	29.93%
%age of samples with MOS >=2 to <3 (Fair)	1.02%	17.37%	3.26%	2.41%
%age of samples with MOS >=1 to <2 (Poor)	1.35%	5.72%	1.94%	1.71%

Table-8: Summary of speech quality (MOS) samples.

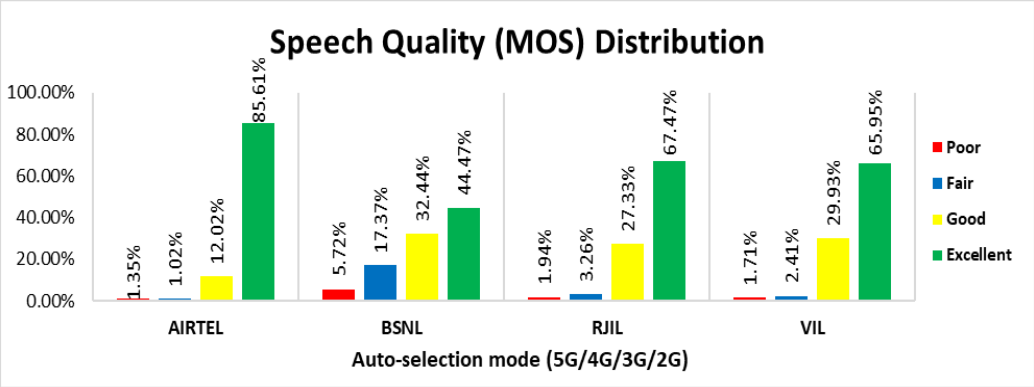


Figure- 4: Distribution of samples in MOS score range.

(d) Inter-service provider voice call performance: To check the performance of inter-service provider call setup success rate, total 39 to 42 inter operator calls were attempted. The call setup success rate and call setup time observation are as below.

Call setup success rate %				
From Service Provider	To Service Provider			
	AIRTEL	BSNL	RJIL	VIL
AIRTEL	NA	100.00	100.00	100.00
BSNL	92.50	NA	97.56	97.50
RJIL	100.00	100.00	NA	100.00
VIL	100.00	95.00	100.00	NA

Table-9: Call setup success rate across service providers.

Note-
- NA-Only Inter-operator calls were measured during test.

Call setup time average (seconds)				
From Service Provider	To Service Provider			
	AIRTEL	BSNL	RJIL	VIL
AIRTEL	NA	2.18	1.28	2.39
BSNL	1.96	NA	1.61	2.50
RJIL	1.80	1.96	NA	2.13
VIL	2.13	2.09	1.54	NA

Table-10: Call setup time across service providers.

Note-
- NA- Only inter-operator calls were measured during test.

3.3 Data performance

(a) Data Parameters (Auto-selection mode- 5G/4G/3G/2G)

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	168.00	5.69	213.52	17.43
	80th Percentile	239.09	8.83	321.60	30.93
	20th Percentile	78.76	1.28	92.37	7.81
Upload Throughput (Mbits/s)	Average	26.54	5.67	20.10	5.48
	80th Percentile	45.44	9.16	34.94	8.32
	20th Percentile	6.19	1.80	4.14	2.27
Latency (ms)	50th Percentile	21.55	24.65	16.65	26.45

Table-11: Summary of data performance in network auto-selection mode.

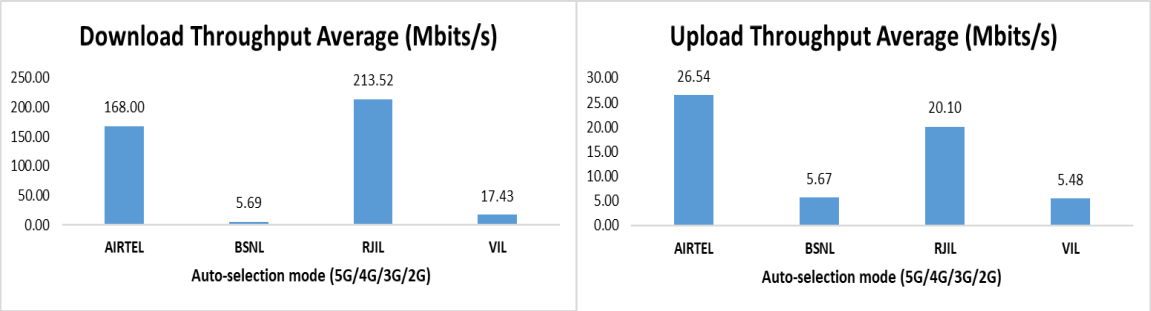


Figure- 5: Download and Upload throughput

Number of unique cell Id's covered in Data test- Technology wise				
Technology	**Service Provider**			
	Auto-selection mode 5G/4G/3G/2G			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	0	NA	1203	NA
4G	2029	589	272	1612
3G	NA	46	NA	NA
2G	2	43	NA	17

Table-12: Technology wise number of network cell Id's latched during drive test.

Note-
- NA**-** Service provider doesn't provide services in respective technology.
- 0- No cell Id's were found in respective technology.

Detailed QoS Performance Analysis

4. Detailed QoS performance analysis

4.1 Overview

This section covers analysis on performance of various categories of drives like City, Hotspots, Walk Tests and Highway for all telecom service providers, the results of drive tests conducted is shown individually for respective areas/locations.

4.2 City

Drive test has been conducted from 28th January 2025 to 31st January 2025 in Vijayawada-Guntur. (Refer Table-1)

4.2.1 Drive test route

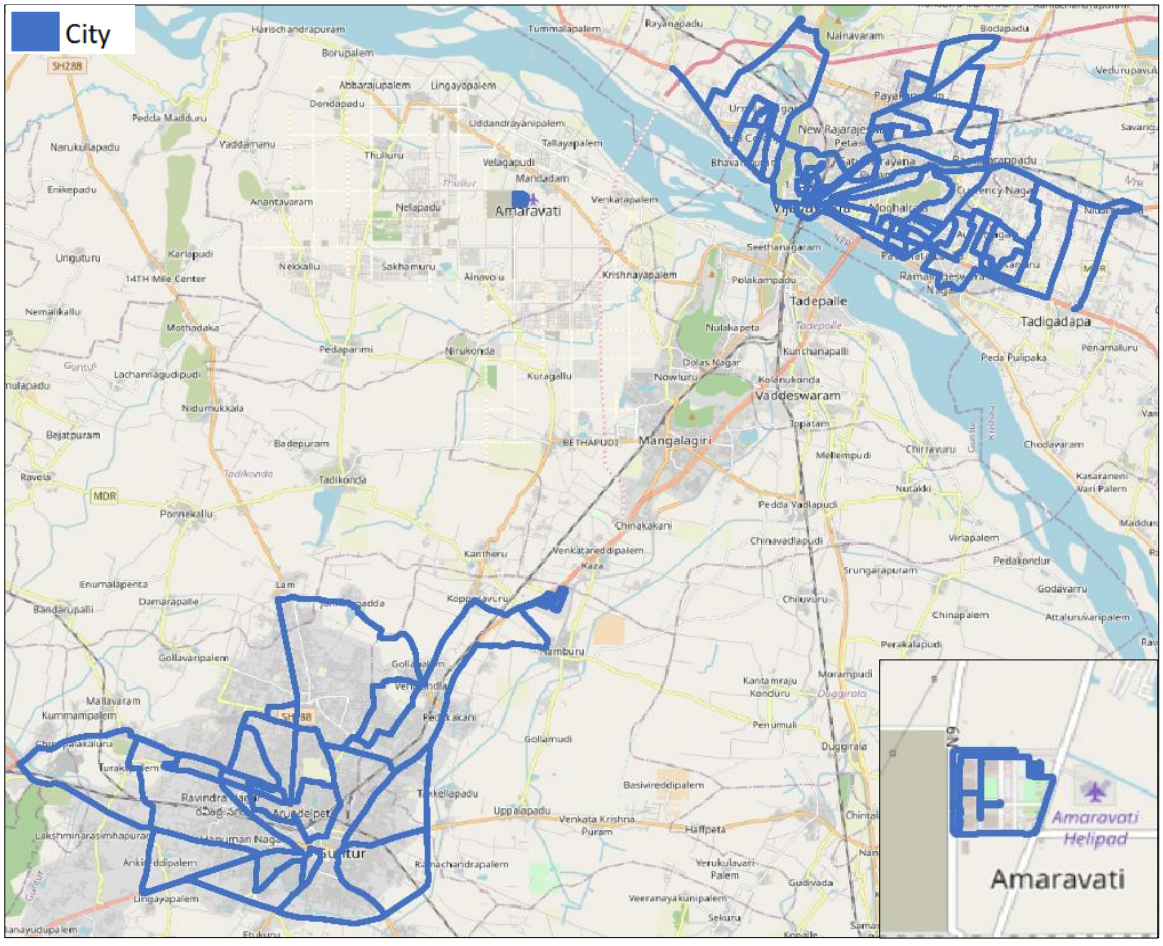


Figure- 6: Drive test routes

4.2.2 Areas covered

Nearby Hanumanpet, Labbipet, Bharathi nagar, Auto nagar, Kanuru, Vambay colony, Vidhyadharapuram, Interim government complex Amaravati, Guntur bypass, Nallapadu, Guntur Amaravati road and Mahatma Gandhi inner ring road etc.

4.2.3 Voice performance

(a) Voice Call Performance in 3G/2G network mode only: 3G/2G network mode testing has been done to reflect experience for respective users as they have only 3G/2G compatible handsets.

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	519	531	539
Call Setup Success Rate %	99.23	99.62	99.07
Drop Call Rate %	0.78	0.57	0.19
Call Setup Time-Average (Second)	6.05	2.74	3.47
Handover Success Rate %	98.16	99.42	98.92

Table-13: Summary of voice call performance in 3G/2G network mode only**.**

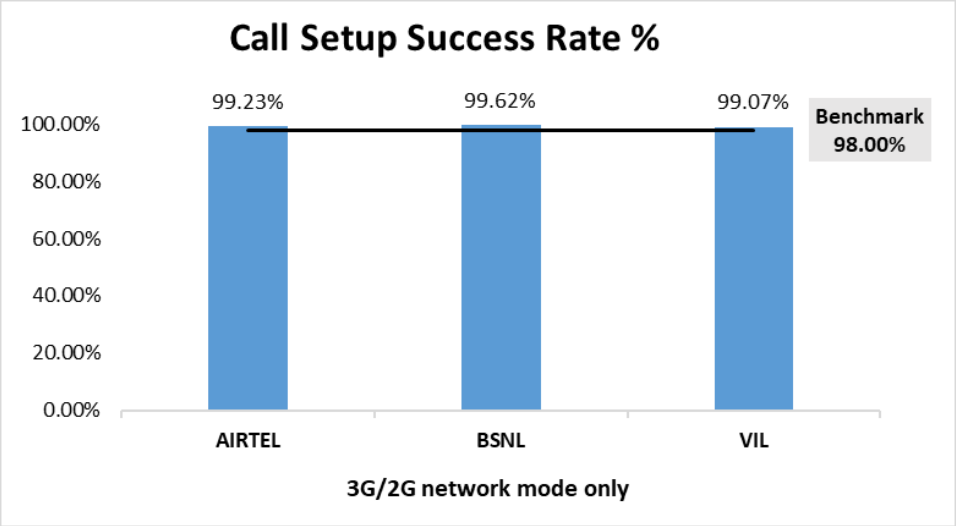


Figure-7: Performance for call setup success rate.

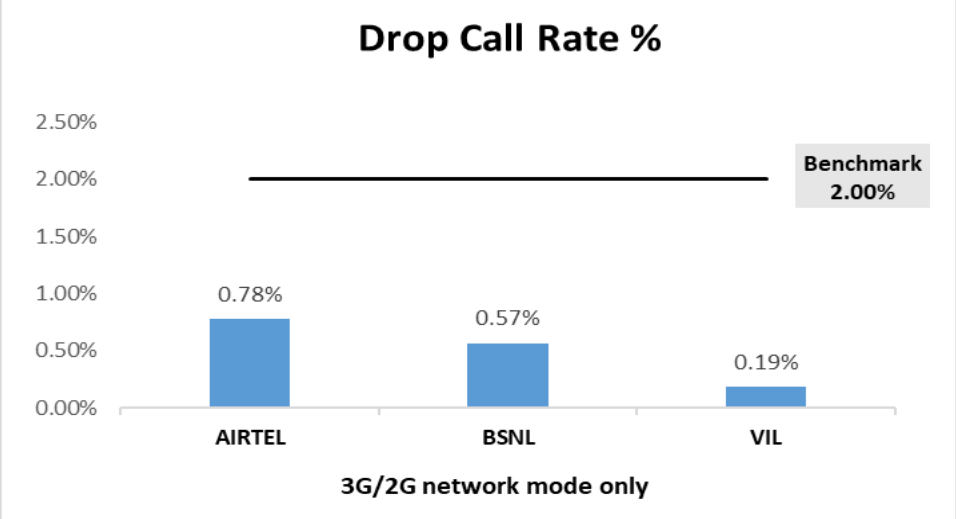


Figure-8: Performance for drop call rate.

(b) Network Technology: This section represent time spent on various network technologies.

Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	0.15%	NA
2G	99.98%	99.85%	99.96%
Limited Service	0.02%	0.01%	0.04%

Table-14: Time spent on technology during drive test 3G/2G network mode.

Note-
- NA**-** Service provider doesn't provide services in respective technology.

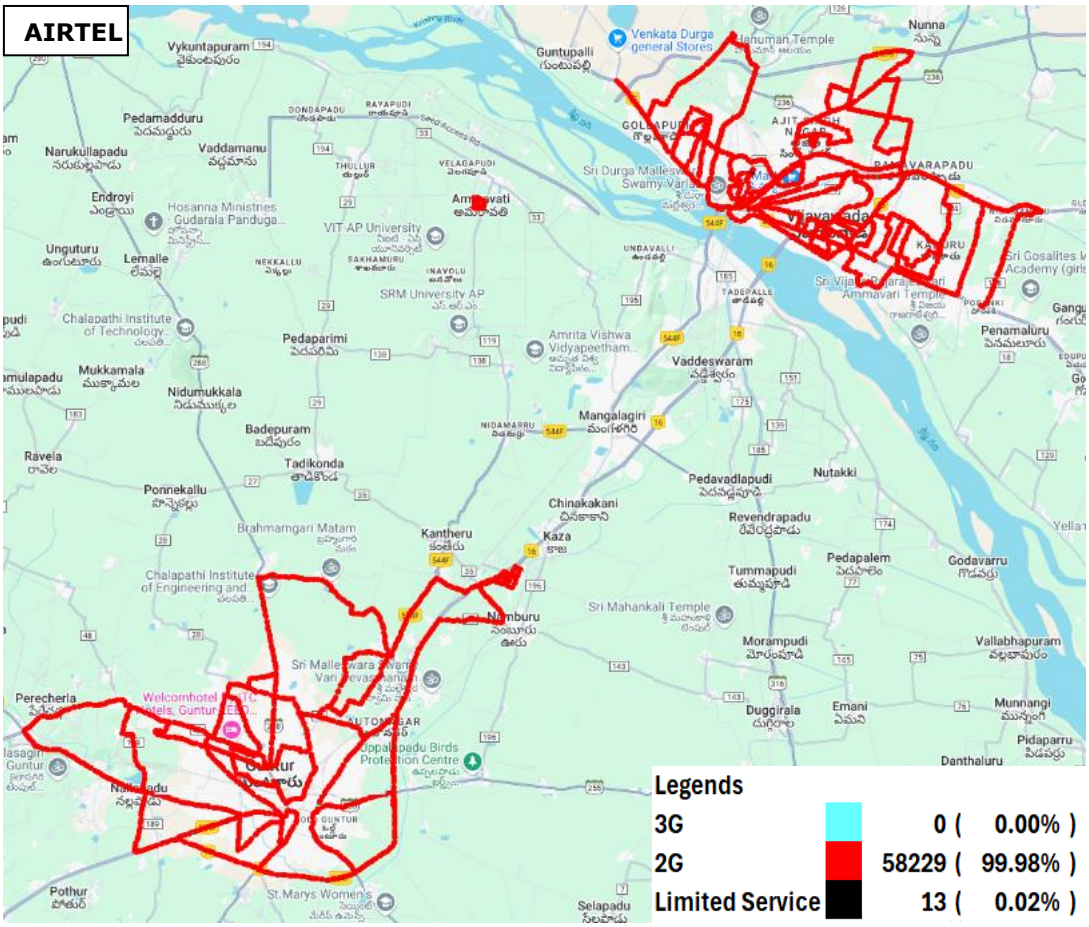


Figure-9: Serving technology plots 3G/2G network mode – AIRTEL.

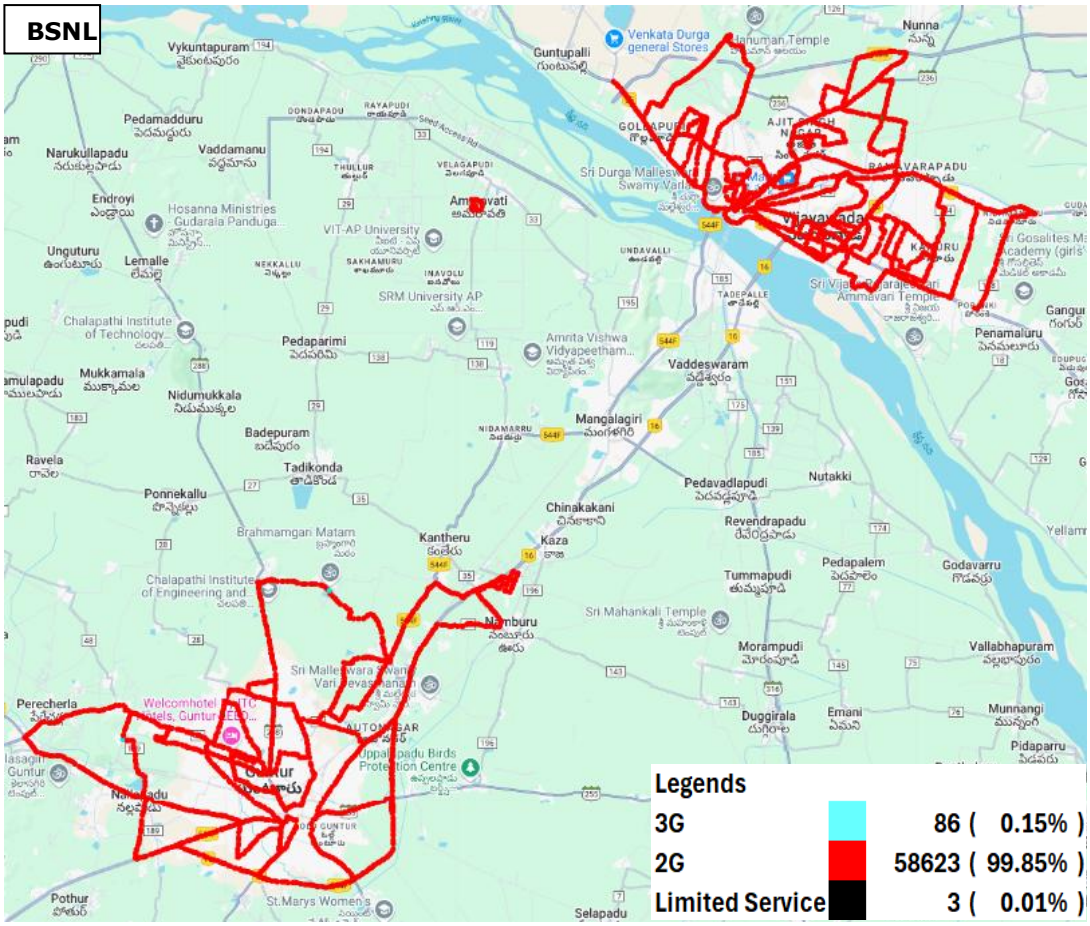


Figure-10: Serving technology plots 3G/2G network mode –BSNL.

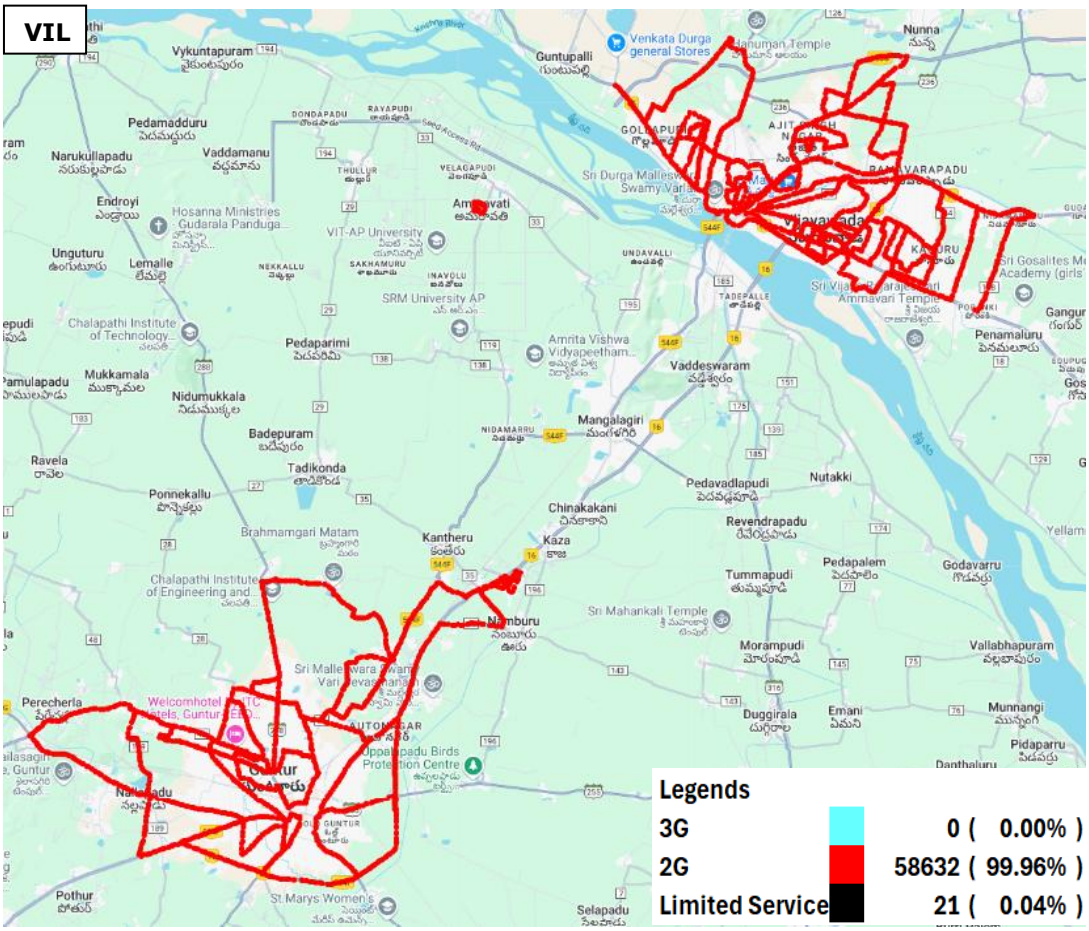


Figure-11: Serving technology plots 3G/2G network mode –VIL.

(c) Network Signal Strength Distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure- 42, 43 & 44 for map view)

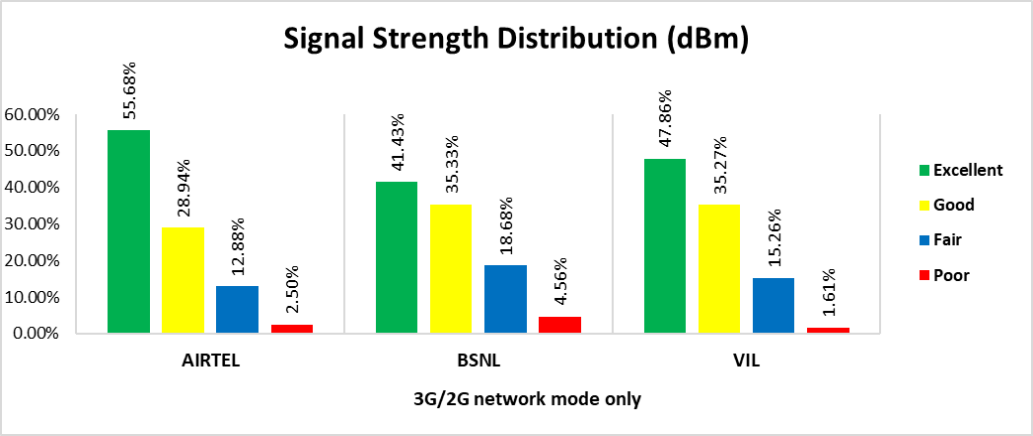


Figure-12: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 56% of samples falling in the excellent signal strength category.
- BSNL has 41% of samples falling in the excellent signal strength category.
- VIL has 48% of samples falling in the excellent signal strength category.

(d) Voice Call Performance in auto network selection mode (5G/4G/3G/2G)

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	534	564	558	559
Call Setup Success Rate %	99.44	96.81	99.46	100.00
Drop Call Rate %	0.00	1.65	0.90	0.00
Call Setup Time Average (Second)	4.12	1.56	0.67	0.63
Handover Success Rate %	99.88	99.82	99.95	99.94

Table-15: Summary of voice call performance in network auto-selection mode.

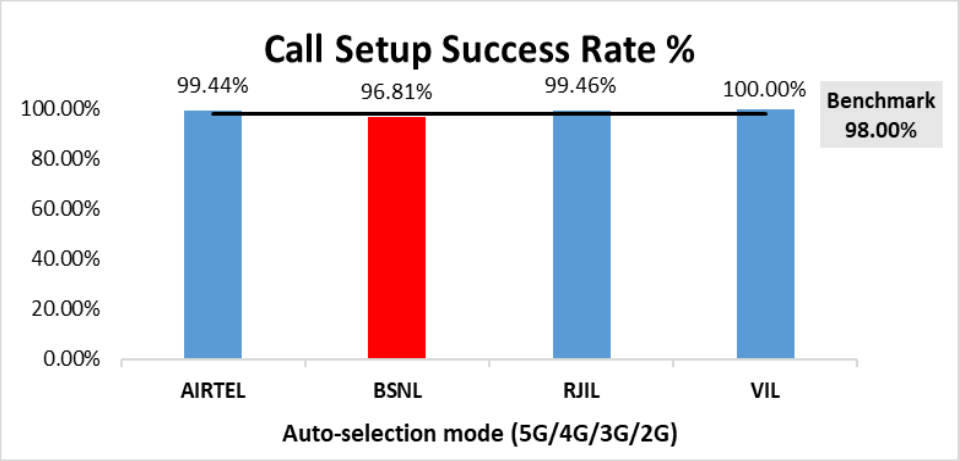


Figure-13: Performance for call setup success rate.

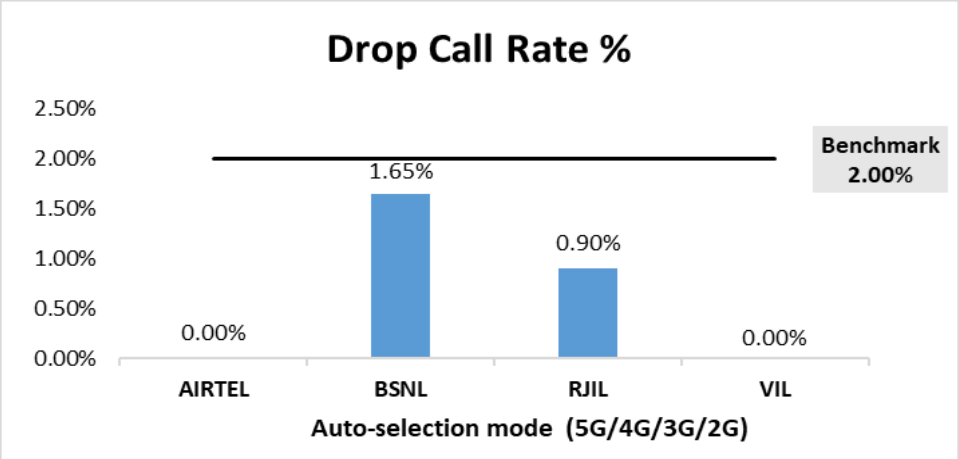


Figure-14: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	529	534	533	530
Number of silence call for >4 Sec	4	9	22	2
Silence Call Rate %	0.76	1.69	4.13	0.38
Number of silence instances for >4 Sec	4	9	28	2
Number of silence instances for >3 Sec	11	9	32	8
Number of silence instances for >2 sec	29	18	50	33
RTP Jitter (4G & 5G) in ms	4.13	13.66	13.32	14.38
Packet loss Rate Downlink %	0.64	1.06	0.89	1.54
Packet loss Rate Uplink %	0.49	0.42	0.98	0.63

Table-16: Summary of silence instances & packet loss rate for mobile to mobile call.

(e) Mean Opinion Score (MOS) performance for speech quality:

Mean opinion score indicate quality of speech observed during the drive test across different technologies. This parameter has been calculated for mobile to mobile calls made within same operator network in auto mode (5G/4G/3G/2G). As per ITU-T Recommendation P.863.1, MOS score value means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
Total Number of MOS Samples for calls in table-16	3157	3014	3115	3148
Speech Quality (Average MOS Score)	4.01	3.82	3.85	3.95
Number of samples with MOS >=4 to <5 (Excellent)	2701	1828	1989	2225
Number of samples with MOS >=3 to <4 (Good)	385	917	933	806
Number of samples with MOS >=2 to <3 (Fair)	27	173	112	64
Number of samples with MOS >=1 to <2 (Poor)	44	96	81	53
%age of samples with MOS >=4 to <5 (Excellent)	85.56%	60.65%	63.85%	70.68%
%age of samples with MOS >=3 to <4 (Good)	12.20%	30.42%	29.95%	25.60%
%age of samples with MOS >=2 to <3 (Fair)	0.86%	5.74%	3.60%	2.03%
%age of samples with MOS >=1 to <2 (Poor)	1.39%	3.19%	2.60%	1.68%

Table-17: Summary of speech quality (MOS) samples

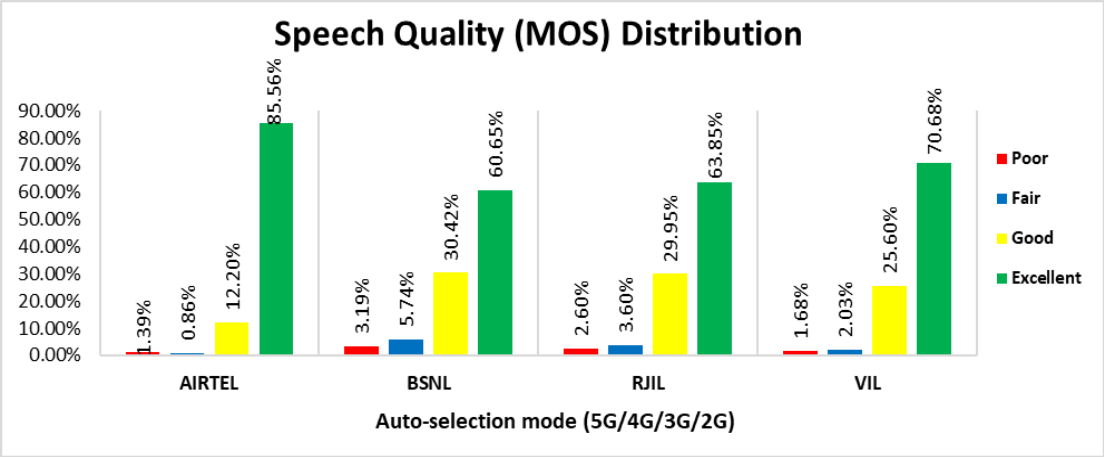


Figure-15: Distribution of samples in MOS score range.

(f) Network Technology: This section represent time spent on various network technologies.

Technology	Service Provider			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	17.26%	NA	70.67%	NA
4G	81.75%	79.26%	29.33%	99.86%
3G	NA	0.19%	NA	NA
2G	0.97%	20.47%	NA	0.14%
Limited Service	0.01%	0.08%	0.00%	0.00%

Table-18: Time spent on technology during drive test.

Note-
- NA**-** Service provider doesn't provide services in respective technology.

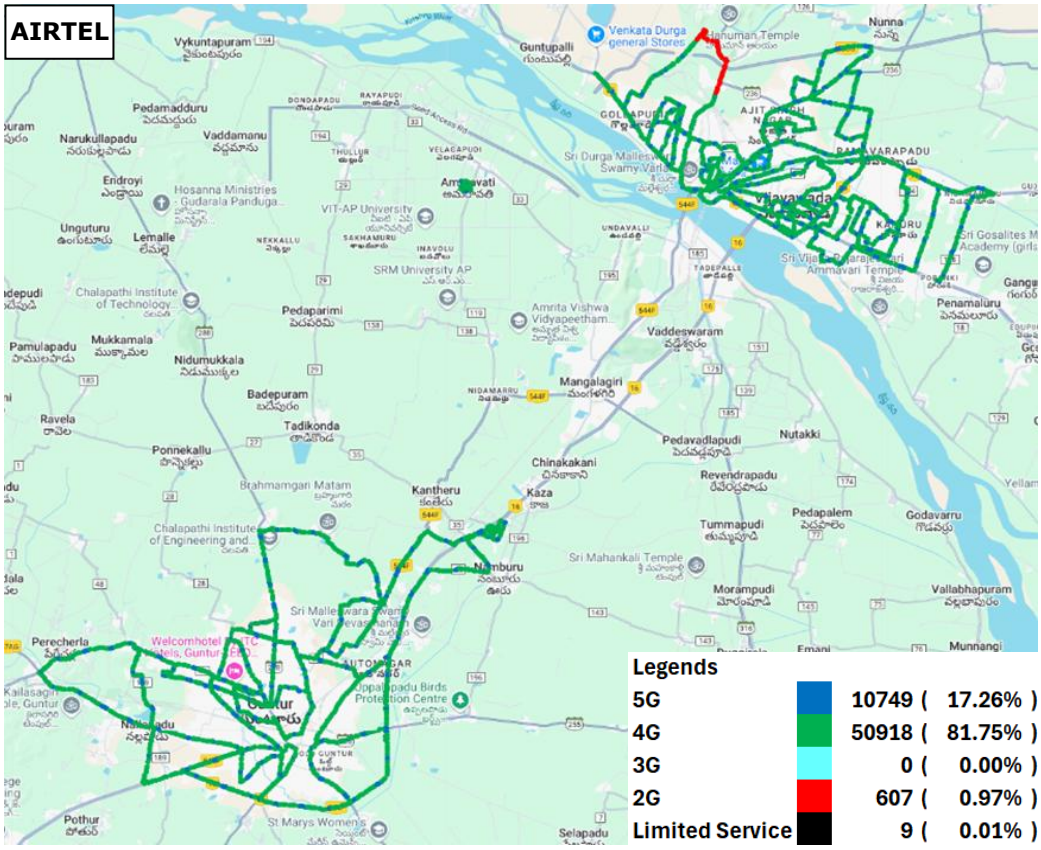


Figure-16: Serving technology plots in auto-selection mode (5G/4G/3G/2G) -AIRTEL.

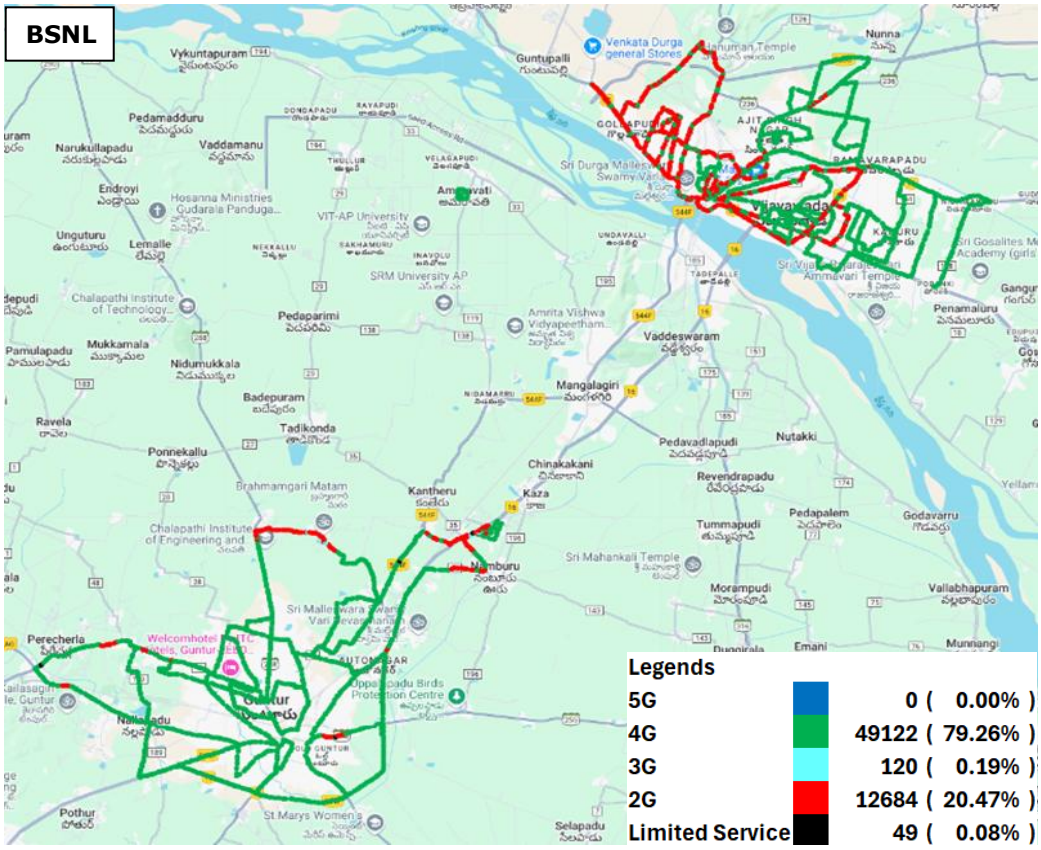


Figure-17: Serving technology plots in auto-selection mode (5G/4G/3G/2G) -BSNL.

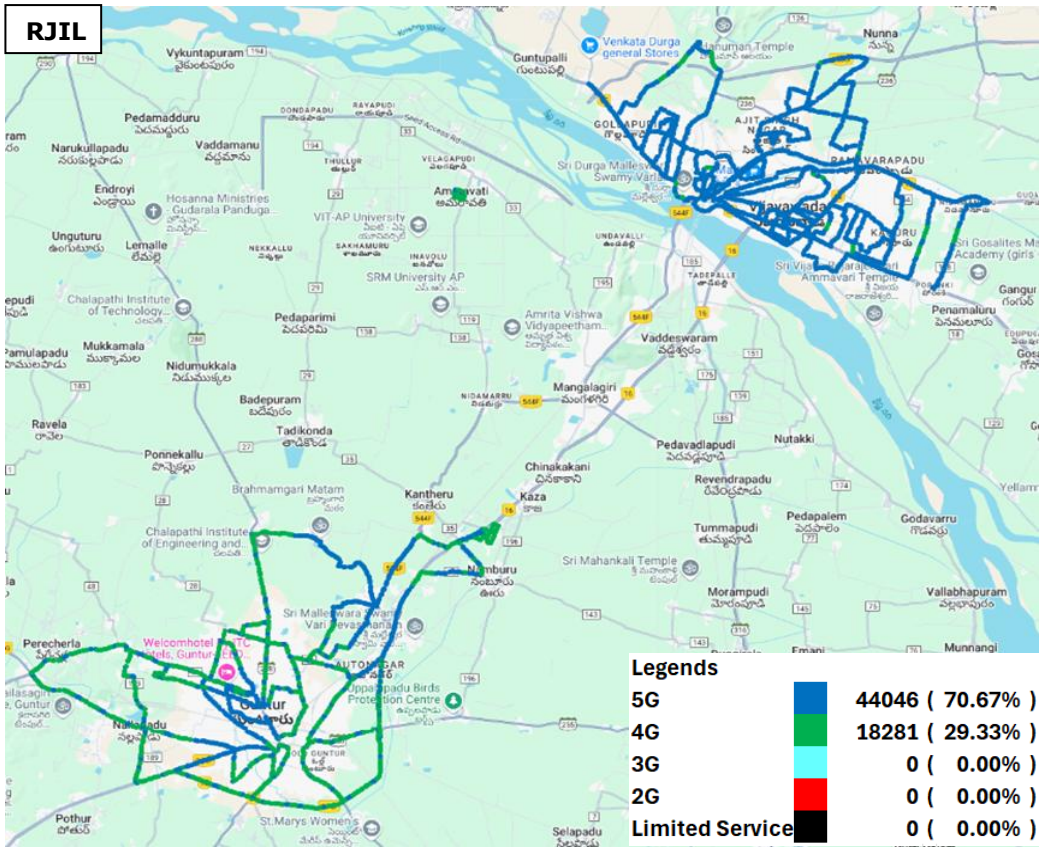


Figure-18: Serving technology plots in auto-selection mode (5G/4G/3G/2G)- RJIL.

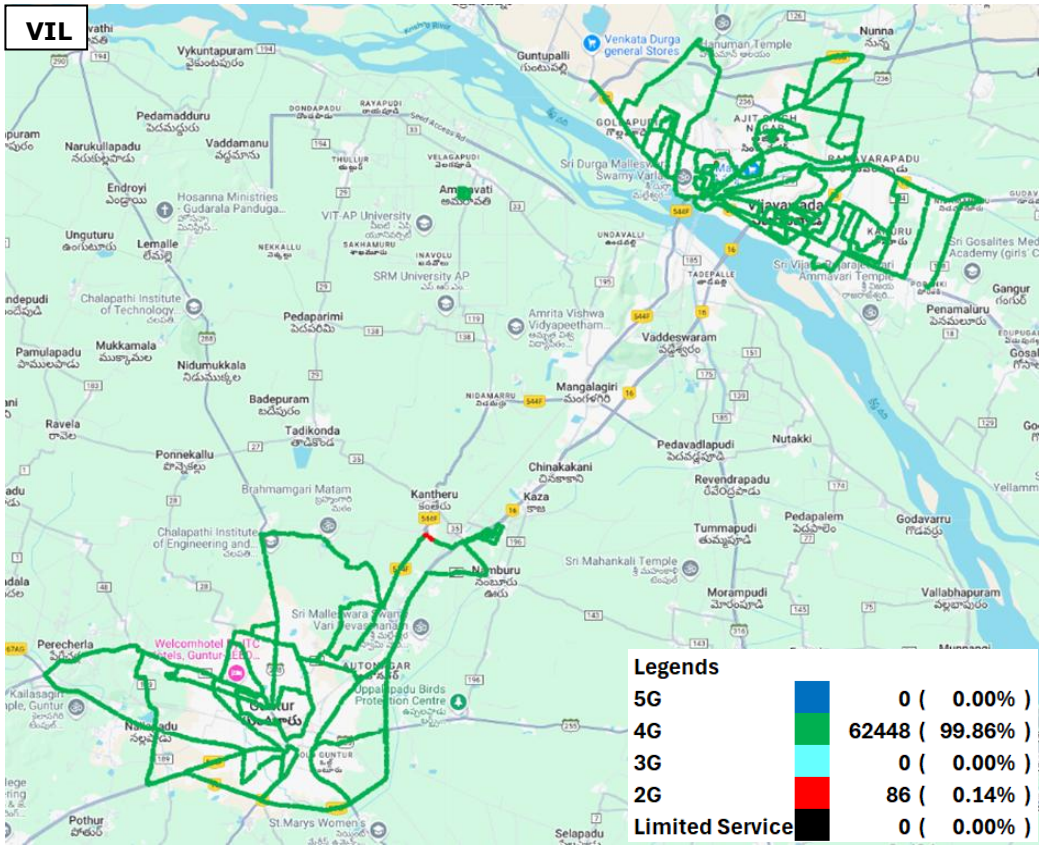


Figure-19: Serving technology plots in auto-selection mode (5G/4G/3G/2G) – VIL.

(g) Network Signal Strength Distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-45, 46, 47 & 48 for map view)

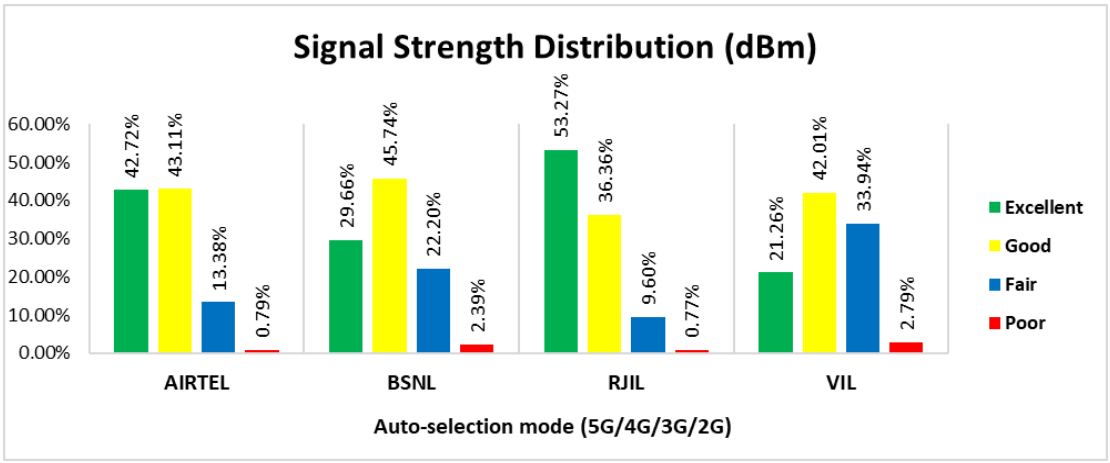


Figure-20: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 43% samples falling in the excellent signal strength category.
- BSNL has 30% samples falling in the excellent signal strength category.
- RJIL has 53% samples falling in the excellent signal strength category.
- VIL has 21% samples falling in the excellent signal strength category.

4.2.4 Data performance

(a) Data Parameters (Auto-selection mode- 5G/4G/3G/2G)

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	166.27	6.12	200.42	21.27
	80th Percentile	231.94	9.65	303.69	35.58
	20th Percentile	96.69	1.21	92.39	8.23
Upload Throughput (Mbits/s)	Average	28.08	6.19	19.50	5.29
	80th Percentile	48.78	9.97	34.81	7.57
	20th Percentile	6.56	2.23	4.01	2.33
Latency (ms)	50th Percentile	20.50	21.85	15.30	26.30

Table-19: Summary of Data performance in network auto-selection mode.

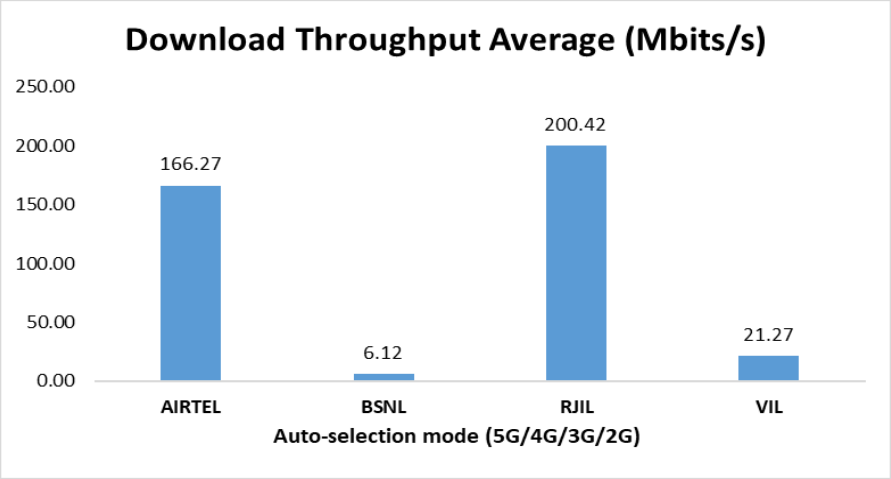


Figure- 21: Download throughput

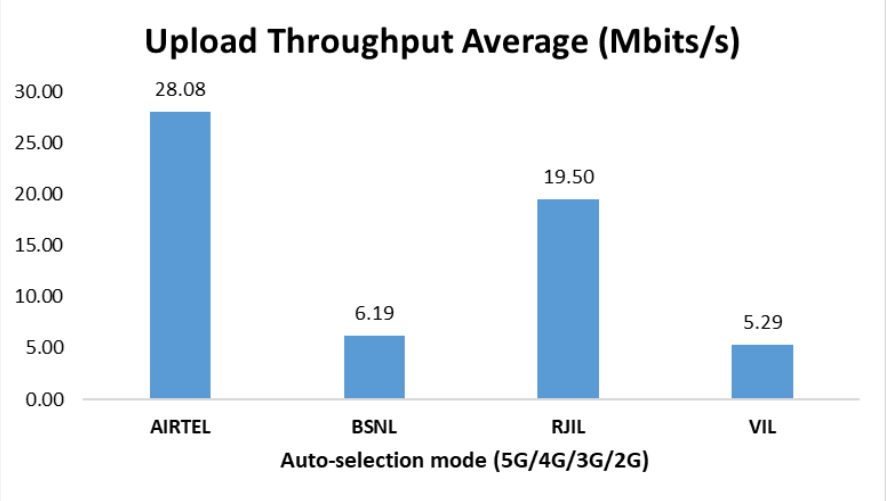


Figure- 22: Upload throughput

4.3 Hotspots

Hotspot testing have been done on 29th January 2025 to 30th January. Eight locations have been tested in the city.

4.3.1 Locations

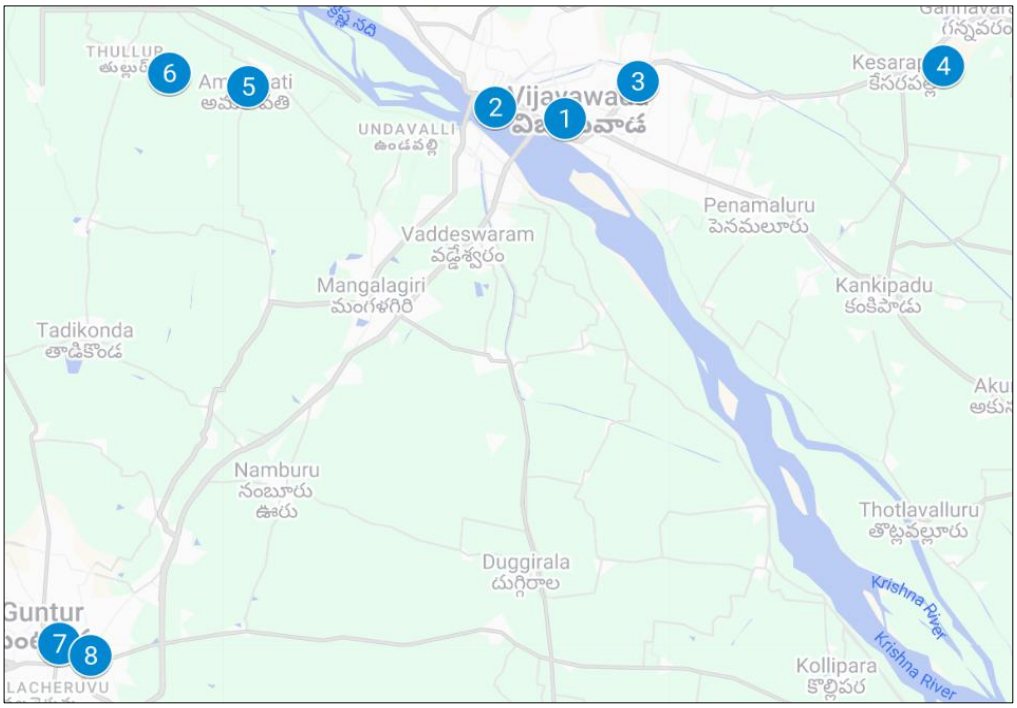


Figure- 23: Hotspot locations

4.3.2 Hotspot covered

1. PVP square mall
2. Vijayawada bus station
3. GG hospital
4. Vijayawada Airport
5. Amaravati secretariat
6. High court, Amaravati
7. Guntur railway station
8. Guntur bus stand

4.3.3 Voice performance

Overall Voice Performance				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	80	80	80	80
Call Setup Success Rate %	100.00	92.50	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	3.95	0.79	0.73	0.59

Table-20: Overall summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

PVP square mall				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	4.01	0.57	0.56	0.52

Table-21: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Vijayawada bus stand				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	4.02	0.57	0.52	0.58

Table-22: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

G.G hospital				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	4.05	0.70	0.56	0.58

Table-23: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Vijayawada Airport				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	3.96	0.76	1.77	0.85

Table-24: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Amaravati secretariat				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	50.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	3.94	1.73	0.59	0.49

Table-25: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

High court, Amaravati				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	90.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	3.94	1.29	0.64	0.54

Table-26: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Guntur railway station				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	3.86	0.57	0.59	0.63

Table-27: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Guntur bus stand				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	3.85	0.66	0.59	0.57

Table-28: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

4.3.4 Data performance (Auto-selection mode 5G/4G/3G/2G)

Overall Data Performance				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	102.43	10.51	222.13	14.08
Download Throughput 80th Percentile (Mbit/s)	179.66	17.68	313.69	19.69
Download Throughput 20th Percentile (Mbit/s)	21.16	4.08	21.39	7.88
Download Session Setup Success Rate %	100.00	100.00	97.50	97.50
Upload Throughput Average (Mbits/s)	17.36	7.53	15.69	4.83
Upload Throughput 80th Percentile (Mbit/s)	27.13	13.66	27.30	5.81
Upload Throughput 20th Percentile (Mbit/s)	1.90	1.60	2.05	1.45
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	4.43	4.04	2.98	3.76
Youtube Initial Buffer Delay (Second)	1.39	2.35	1.19	1.58
Latency (ms) - 50th Percentile	23.15	21.95	16.35	26.25
Jitter (ms)	17.88	18.46	50.15	22.01
Packet Loss Rate%	2.11	6.78	11.69	3.63
Packet Loss Rate- 90th percentile	6.73	15.32	28.97	9.71

Table-29: Overall summary Data performance in network auto-selection mode (5G/4G/3G/2G).

PVP square mall				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	223.43	5.07	269.61	23.72
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	31.74	5.21	11.88	2.46
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	3.85	3.79	3.07	2.63
Youtube Initial Buffer Delay (Second)	0.60	2.91	1.26	2.32
Latency (ms)- 50th Percentile	33.85	18.00	17.45	23.08
Jitter (ms)	7.79	15.41	17.50	6.73
Packet Loss Rate%	0.00	0.60	1.40	0.50

Table-30: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Vijayawada bus stand				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	53.41	2.96	148.47	5.95
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	22.11	3.73	4.35	2.29
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	3.21	4.97	2.65	3.14
Youtube Initial Buffer Delay (Second)	1.02	5.13	0.91	2.03
Latency (ms) - 50th Percentile	26.10	18.60	16.23	23.05
Jitter (ms)	17.76	12.41	12.04	2.45
Packet Loss Rate%	8.90	1.00	0.40	0.80

Table-31: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

G.G hospital				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	172.35	8.82	296.55	8.24
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	23.82	12.63	24.34	5.76
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	3.69	2.56	2.28	3.08
Youtube Initial Buffer Delay (Second)	0.72	1.43	0.75	0.84
Latency (ms) - 50th Percentile	26.88	17.95	14.60	25.05
Jitter (ms)	10.57	12.84	6.87	5.75
Packet Loss Rate%	0.30	0.20	0.00	1.00

Table-32: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Vijayawada Airport				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	3.80	14.90	19.88	6.43
Download Session Setup Success Rate %	100.00	100.00	100.00	80.00
Upload Throughput Average (Mbits/s)	1.82	1.49	2.50	1.71
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	12.36	8.84	3.94	8.55
Youtube Initial Buffer Delay (Second)	-	4.99	2.99	3.84
Latency (ms) - 50th Percentile	32.00	31.90	23.70	34.25
Jitter (ms)	29.04	26.64	30.27	76.20
Packet Loss Rate%	5.80	2.80	3.80	18.60

Table-33: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "-" Youtube test were failed at this location for Airtel.

Amaravati secretariat				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	111.22	4.60	215.09	42.55
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	12.86	1.32	2.05	16.11
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.90	7.02	3.73	2.59
Youtube Initial Buffer Delay (Second)	3.82	3.56	1.18	0.70
Latency (ms) - 50th Percentile	19.85	24.78	12.50	22.05
Jitter (ms)	5.67	25.35	10.02	3.99
Packet Loss Rate%	0.00	2.80	0.10	1.00

Table-34: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

High court, Amaravati				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	30.09	19.35	1.91	7.63
Download Session Setup Success Rate %	100.00	100.00	80.00	100.00
Upload Throughput Average (Mbits/s)	1.28	6.38	0.43	1.44
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	7.59	2.39	16.75	5.06
Youtube Initial Buffer Delay (Second)	4.35	1.21	-	4.79
Latency (ms) - 50th Percentile	24.65	29.20	371.00	31.45
Jitter (ms)	51.20	33.31	394.91	73.72
Packet Loss Rate%	1.00	41.50	87.70	5.90

Table-35: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note- "-" Youtube test were failed at this location for RJIL.

Guntur railway station				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	106.49	15.78	581.47	8.39
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	15.15	14.65	54.11	2.99
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.25	2.55	2.26	2.98
Youtube Initial Buffer Delay (Second)	0.48	1.39	0.66	1.02
Latency (ms) - 50th Percentile	17.90	26.05	15.20	27.40
Jitter (ms)	8.13	14.06	6.83	3.82
Packet Loss Rate%	0.20	4.10	0.10	0.70

Table-36: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Guntur bus stand				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	118.66	12.59	200.05	8.20
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	30.14	14.85	25.85	5.84
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.11	3.22	2.06	2.69
Youtube Initial Buffer Delay (Second)	0.48	0.81	0.56	0.82
Latency (ms)- 50th Percentile	18.75	18.50	11.60	26.65
Jitter (ms)	12.98	13.62	4.98	3.54
Packet Loss Rate%	0.70	1.20	0.00	0.50

Table-37: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

4.3.5 Data performance (Auto-selection mode 4G/3G/2G)

Overall Data Performance				
Parameters	Service Provider			
	Auto-selection mode (4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	32.10	12.03	36.74	11.88
Download Throughput 80th Percentile (Mbit/s)	44.11	18.29	66.80	22.20
Download Throughput 20th Percentile (Mbit/s)	11.83	3.79	7.12	7.87
Download Session Setup Success Rate %	100.00	97.50	100.00	100.00
Upload Throughput Average (Mbits/s)	11.80	9.85	6.98	6.51
Upload Throughput 80th Percentile (Mbit/s)	20.01	16.23	17.65	8.70
Upload Throughput 20th Percentile (Mbit/s)	5.65	3.68	1.43	3.71
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-38: Overall Summary of Data performance in network auto-selection mode (4G/3G/2G).

PVP square mall				
Parameters	Service Provider			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	12.73	5.19	64.33	24.90
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	9.88	11.17	19.44	6.23
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-39: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Vijayawada bus station				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	9.98	2.22	15.44	25.17
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	7.18	5.50	1.26	8.38
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-40: Summary of Data performance in network auto-selection mode (4G/3G/2G).

G.G hospital				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	21.76	11.10	72.26	7.86
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	7.99	16.14	6.21	8.34
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-41: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Vijayawada Airport				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	4.95	20.37	38.73	4.72
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	1.18	2.51	4.13	1.54
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-42: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Amaravati secretariat				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	32.91	7.42	29.25	8.34
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	9.47	3.74	1.96	10.22
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-43: Summary of Data performance in network auto-selection mode (4G/3G/2G).

High court, Amaravati				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	32.34	19.48	6.54	7.53
Download Session Setup Success Rate%	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	5.64	5.89	0.94	3.39
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-44: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Guntur railway station				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	102.28	19.15	60.87	8.32
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	31.81	19.18	18.10	6.86
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-45: Summary of Data performance in network auto-selection mode (4G/3G/2G).

Guntur bus stand				
Parameters	**Service Provider**			
	Auto-Selection Mode (4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	39.87	12.79	6.50	8.22
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	21.26	14.65	3.83	7.12
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00

Table-46: Summary of Data performance in network auto-selection mode (4G/3G/2G).

4.4 Walk Test

Walk Test has been conducted from 29th January 2025 to 31st January 2025.Two locations have been tested in the city.

4.4.1 Drive test route

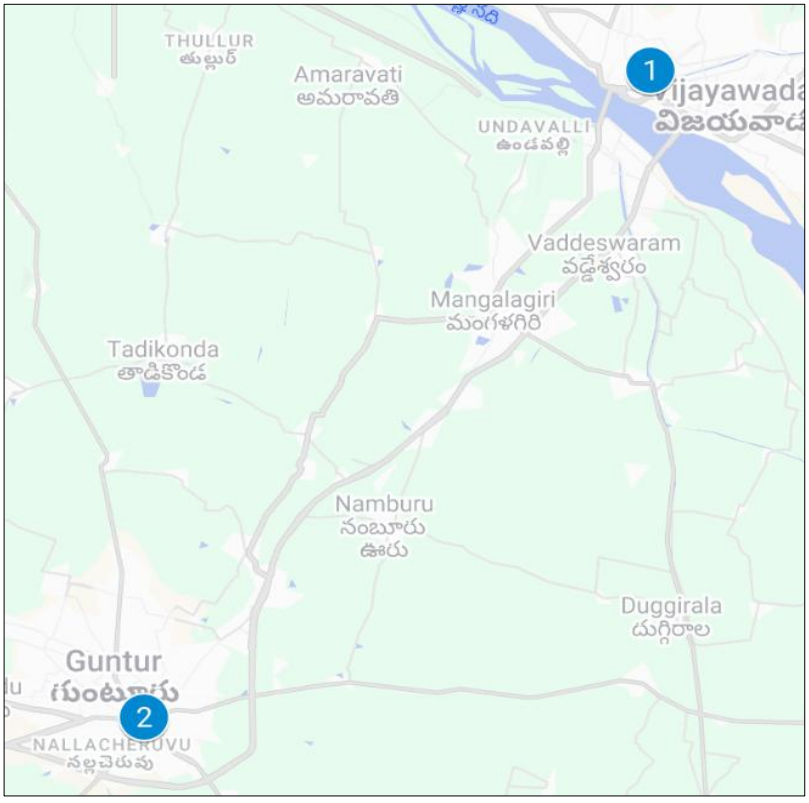


Figure-24: Walk Test locations.

4.4.2 Walk Test Covered

1. Vijayawada railway station
2. Vegetables market, Guntur

4.4.3 Voice Performance

Vijayawada junction railway station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	19	20	20	22
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	5.88	0.65	0.54	0.57

Table-47: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Vegetables market, Guntur				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	23	23	23	23
Call Setup Success Rate %	100.00	100.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	3.93	0.73	0.59	0.58

Table-48: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

4.4.4 Data Performance

(a) Data Parameters (Auto-selection mode- 5G/4G/3G/2G)

Vijayawada junction railway station				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	87.87	2.14	119.08	6.03
Download Session Setup Success Rate %	100.00	95.83	100.00	100.00
Upload Throughput Average (Mbits/s)	10.03	3.18	20.15	3.62
Upload Session Setup Success Rate %	100.00	95.83	100.00	100.00
Latency (ms) - 50th Percentile	18.70	22.70	21.00	24.90

Table-49: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G)

Vegetables market, Guntur				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	197.08	3.72	201.05	13.70
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	35.38	8.51	22.31	3.75
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Latency (ms) - 50th Percentile	17.45	27.73	12.85	25.15

Table-50: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

4.5 Highway

Drive test has been conducted on 27th January 2025 covering Highway routes. (Refer Table-1)

4.5.1 Drive test routes

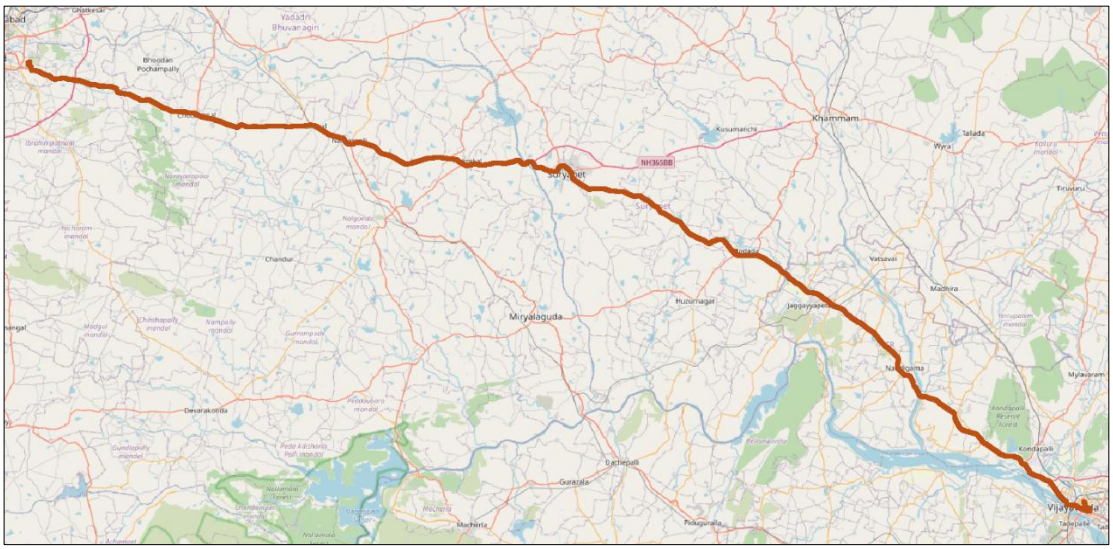


Figure-25: Drive test route highway.

4.5.2 Routes Covered

1. Hyderabad to Vijayawada via NH65, Choutuppal, Narkatpalli, Suryapet, Nandigama etc. Drive test for this route has been conducted from 27th January 2025.

4.5.3 Voice performance

(a) Voice Call Performance in 3G/2G network mode only: 3G/2G network mode testing has been done to reflect the experience for respective users as they have only 3G/2G compatible handsets.

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	127	131	127
Call Setup Success Rate %	100.00	98.47	100.00
Drop Call Rate %	1.57	1.55	0.00
Call Setup Time-Average (Second)	6.01	2.98	3.98
Handover Success Rate %	97.71	99.12	98.83

Table-51: Summary of voice call performance in 3G/2G network mode only.

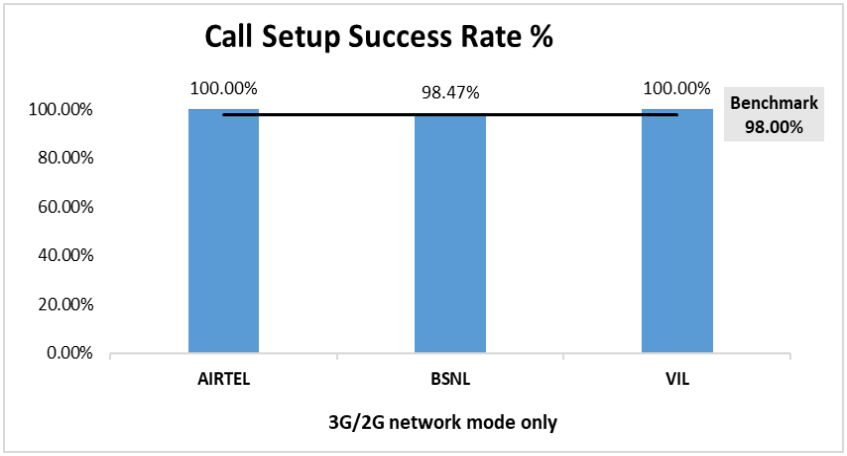


Figure-26: Performance for call setup success rate.

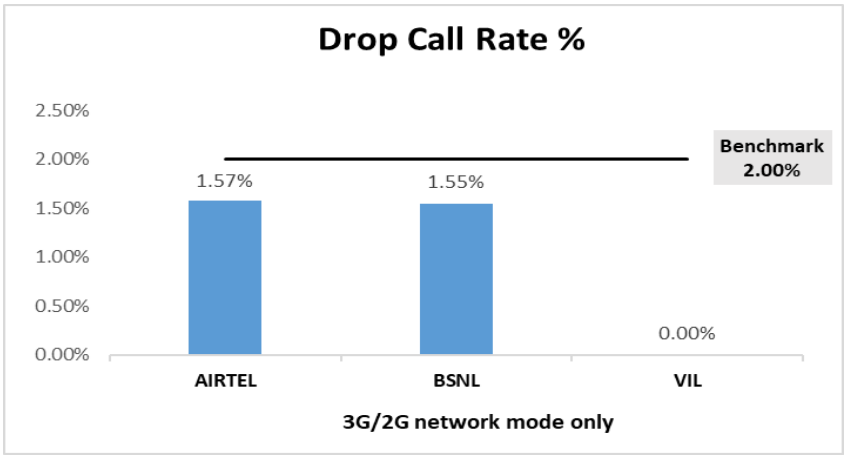


Figure-27: Performance for drop call rate.

(b) Network Technology: This section represents time spent on various network technologies.

Technology	Service Provider		
	AIRTEL	**BSNL**	**VIL**
3G	NA	5.84%	NA
2G	99.97%	94.16%	99.98%
Limited Service	0.03%	0.00%	0.02%

Table-52: Time spent on technology during drive test 3G/2G network mode.

Note-
- NA- Service provider doesn't provide services in respective technology.

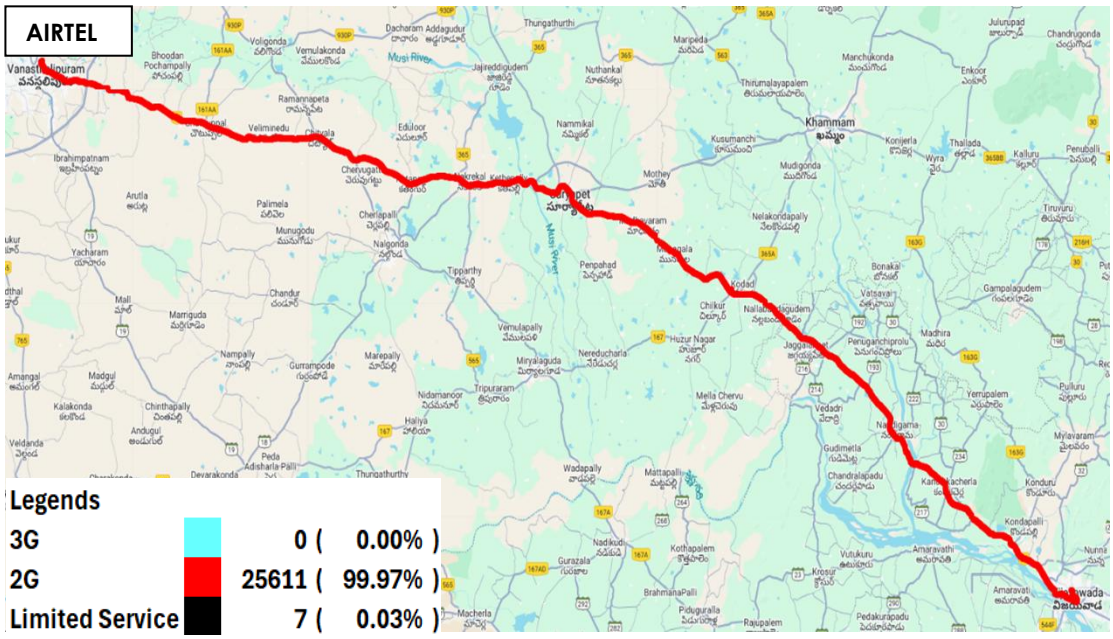


Figure-28: Serving technology plots 3G/2G network mode – AIRTEL.

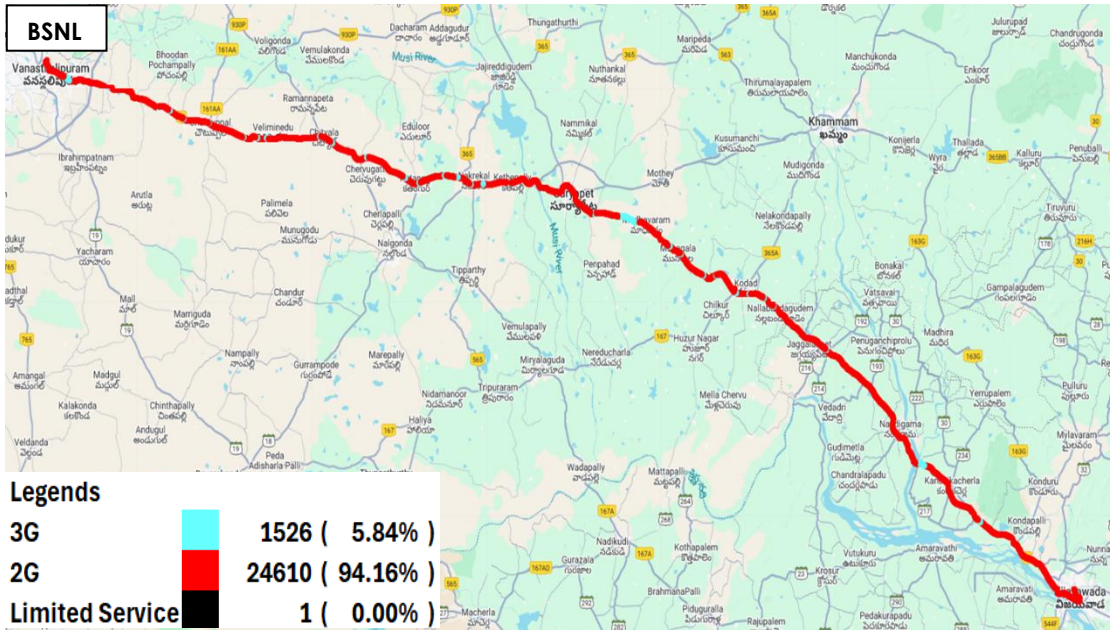


Figure-29: Serving technology plots 3G/2G network mode – BSNL.

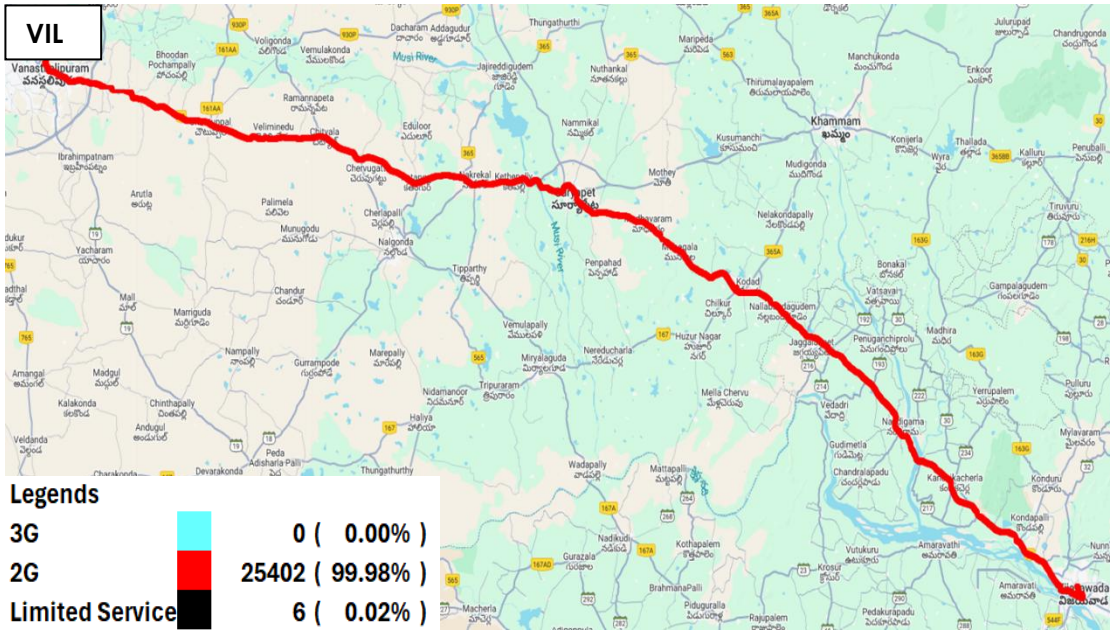


Figure-30: Serving technology plots 3G/2G network mode –VIL.

(c) Network Signal Strength distribution: The following chart represents signal strength distribution for 3G/2G network mode only. (Refer figure-49, 50 & 51 for map view)

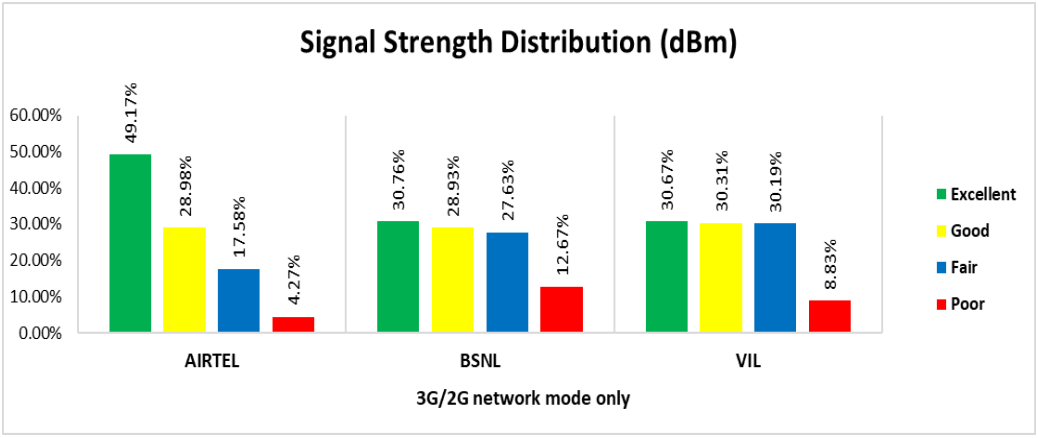


Figure-31: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 49% of samples falling in the excellent signal strength category.
- BSNL has 31% of samples falling in the excellent signal strength category.
- VIL has 31% of samples falling in the excellent signal strength category.

(d) Voice Call Performance in auto network selection mode (5G/4G/3G/2G)

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	130	132	136	133
Call Setup Success Rate %	100.00	98.48	100.00	100.00
Drop Call Rate %	0.00	3.85	0.74	0.00
Call Setup Time Average (Second)	4.02	3.45	0.81	0.73
Handover Success Rate %	99.64	99.75	100.00	99.90

Table-53: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

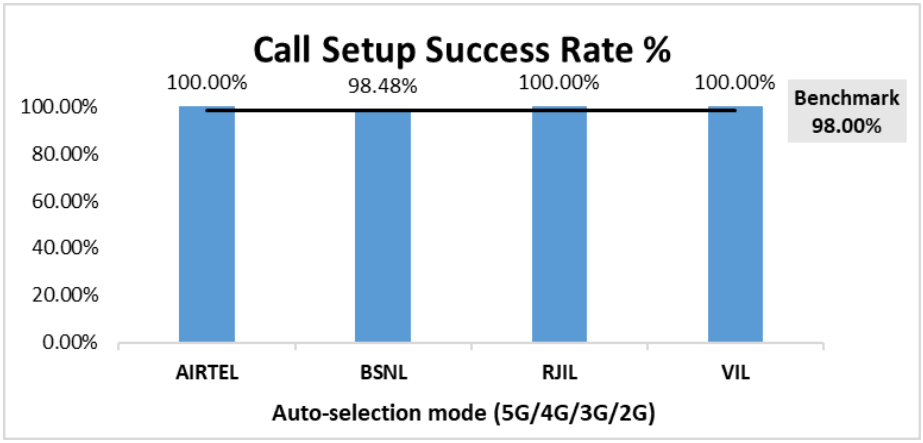


Figure-32: Performance for call setup success rate.

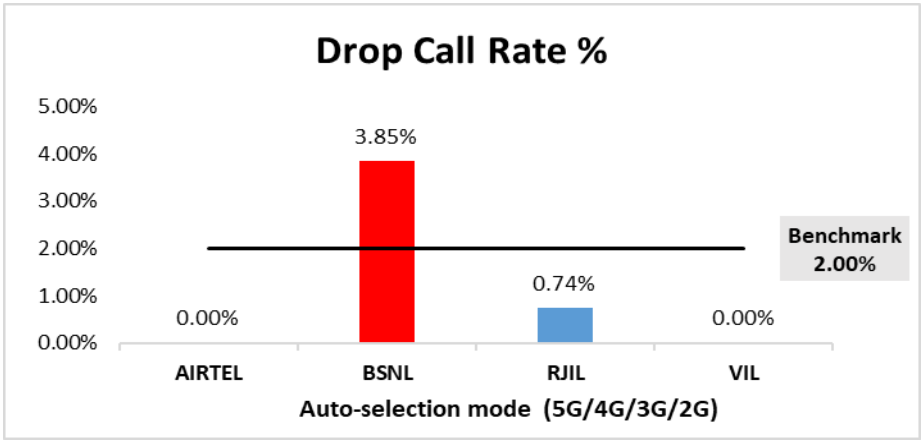


Figure-33: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	112	120	111	110
Number of silence call for >4 Sec	0	1	1	3
Silence Call Rate %	0.00	0.83	0.90	2.73
Number of silence instances for >4 Sec	0	1	1	3
Number of silence instances for >3 Sec	1	1	1	7
Number of silence instances for >2 sec	8	1	6	9
RTP Jitter (4G & 5G) in ms	4.05	13.08	8.90	15.72
Packet loss Rate Downlink %	0.98	2.47	0.21	1.82
Packet loss Rate Uplink %	0.44	0.60	0.26	0.71

Table-54: Summary of silence instances & packet loss rate for mobile to mobile call.

(e) Mean Opinion Score (MOS) performance for speech quality:

Mean opinion score indicate quality of speech observed during the drive test across different technologies. This parameter has been calculated for mobile to mobile calls made within same operator network in auto mode (5G/4G/3G/2G). As per ITU-T Recommendation P.863.1, MOS score values means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
Total Number of MOS Samples for calls in table-53	1442	1465	1425	1419
Speech Quality (Average MOS Score)	4.01	2.90	3.97	3.85
Number of samples with MOS >=4 to <5 (Excellent)	1236	164	1074	787
Number of samples with MOS >=3 to <4 (Good)	168	536	308	561
Number of samples with MOS >=2 to <3 (Fair)	20	605	36	46
Number of samples with MOS >=1 to <2 (Poor)	18	160	7	25
%age of samples with MOS >=4 to <5 (Excellent)	85.71%	11.19%	75.37%	55.46%
%age of samples with MOS >=3 to <4 (Good)	11.65%	36.59%	21.61%	39.53%
%age of samples with MOS >=2 to <3 (Fair)	1.39%	41.30%	2.53%	3.24%
%age of samples with MOS >=1 to <2 (Poor)	1.25%	10.92%	0.49%	1.76%

Table-55: Summary of speech quality (MOS) samples.

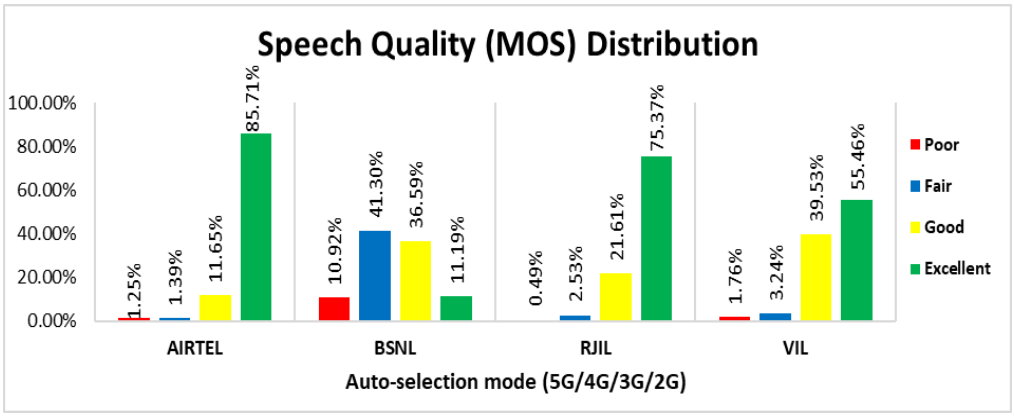


Figure-34: Distribution of samples in MOS score range.

(f) Network Technology: This section represents time spent on various network technologies.

Technology	Service Provider			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	6.37%	NA	32.03%	NA
4G	93.63%	3.26%	67.97%	96.44%
3G	NA	7.79%	NA	NA
2G	0.00%	88.37%	NA	3.56%
Limited Service	0.00%	0.57%	0.00%	0.00%

Table-56: Time spent on technology during drive test**.**

Note-

- RJIL does not have 3G/2G network.
- NA- Service provider doesn't provide services in respective technology.

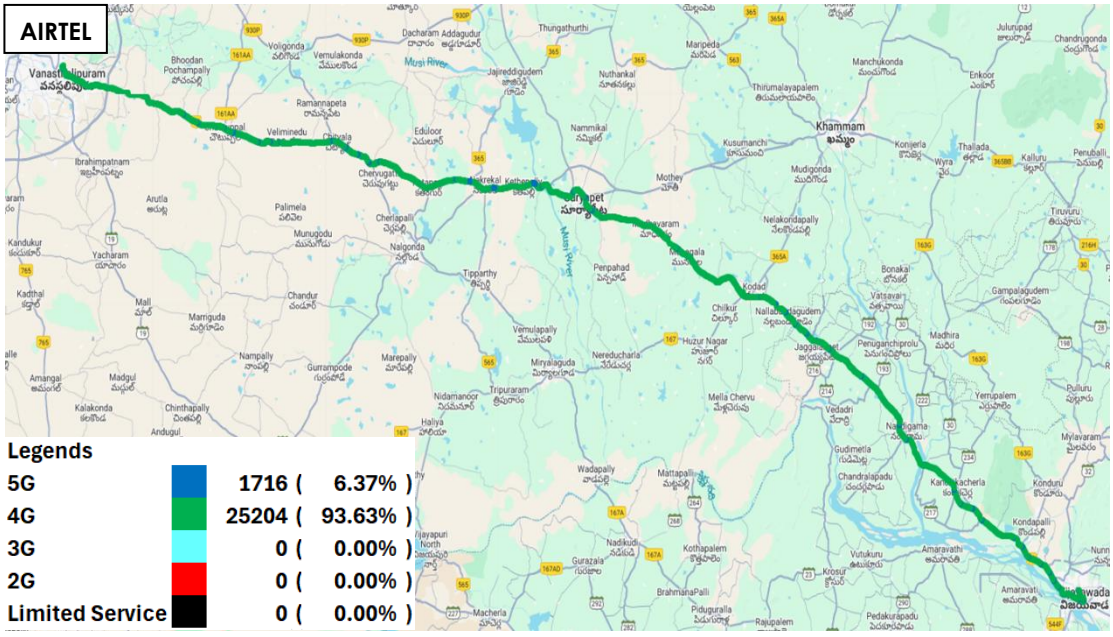


Figure-35: Serving technology plots in auto-selection mode (5G/4G/3G/2G) –AIRTEL.

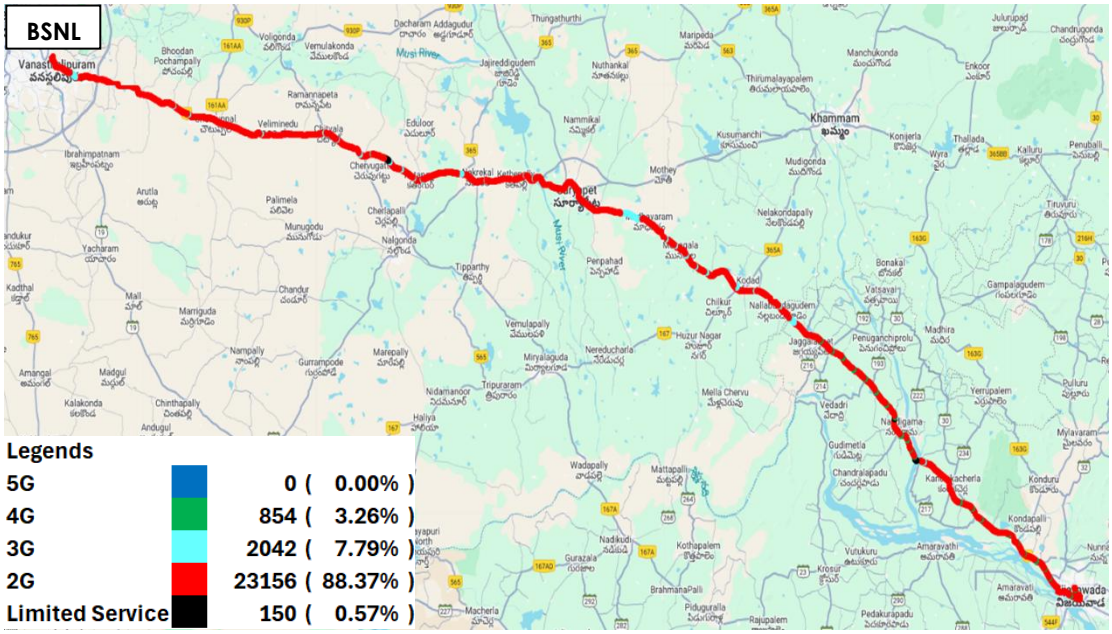


Figure-36: Serving technology plots in auto-selection mode (5G/4G/3G/2G) –BSNL.

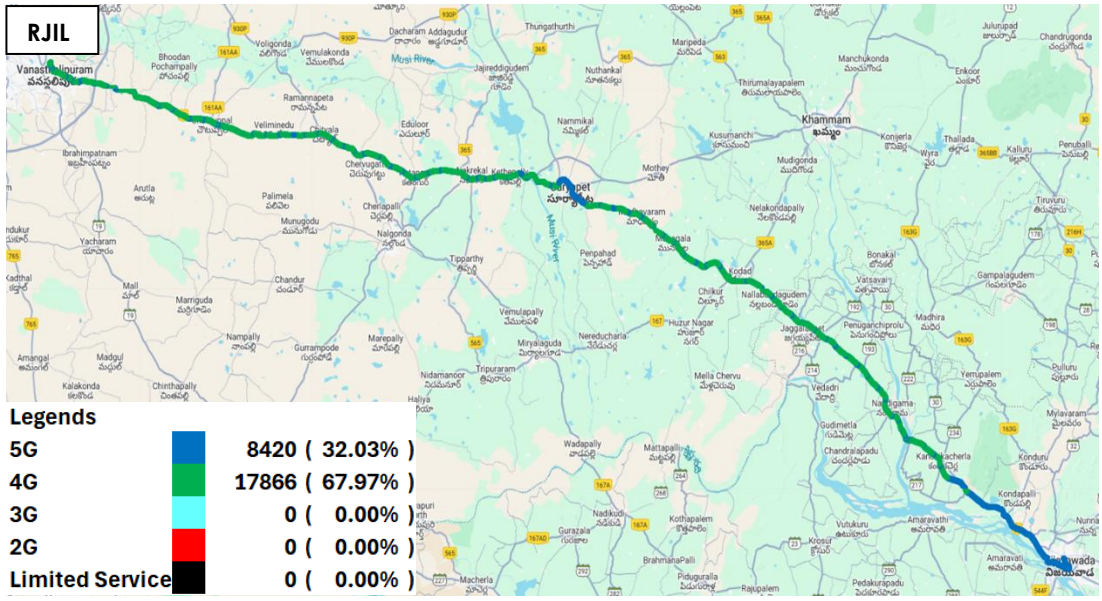


Figure-37: Serving technology plots in auto-selection mode (5G/4G/3G/2G)- RJIL.

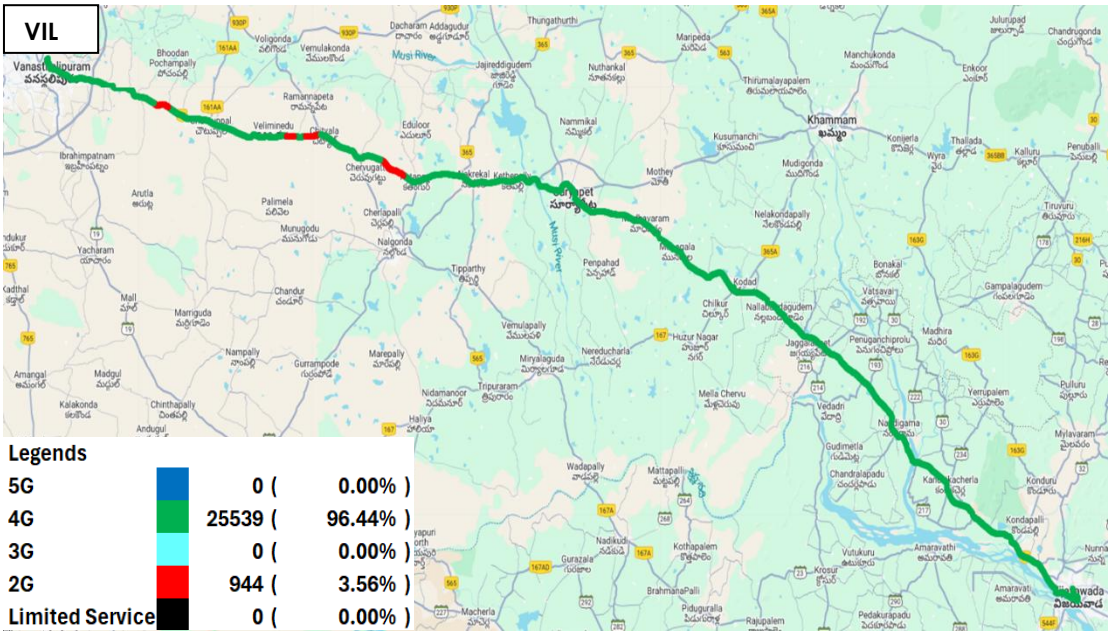


Figure-38: Serving technology plots in auto-selection mode (5G/4G/3G/2G) – VIL.

(g) Network Signal Strength distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-52, 53, 54 & 55 for map view)

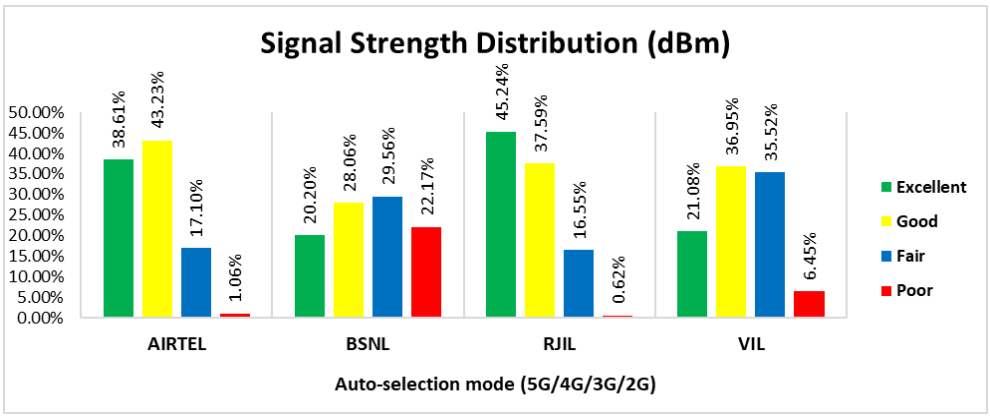


Figure-39: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 39% samples falling in the excellent signal strength category.
- BSNL has 20% samples falling in the excellent signal strength category.
- RJIL has 45% samples falling in the excellent signal strength category.
- VIL has 21% samples falling in the excellent signal strength category.

4.5.4 Data performance

(a) Data Parameters (Auto-selection mode- 5G/4G/3G/2G)

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	188.39	4.21	252.56	10.31
	80th Percentile	333.66	6.55	375.56	8.56
	20th Percentile	38.32	0.75	93.98	7.71
Upload Throughput (Mbits/s)	Average	24.28	3.69	21.96	6.39
	80th Percentile	41.31	5.41	36.34	9.90
	20th Percentile	5.13	1.07	5.02	2.20
Latency (ms)	50th Percentile	23.45	38.95	19.50	28.00

Table-57: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

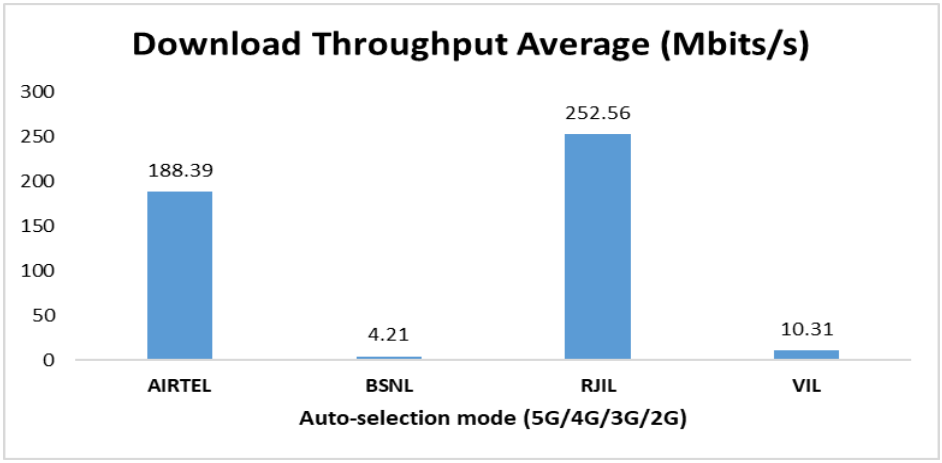


Figure-40: Download throughput.

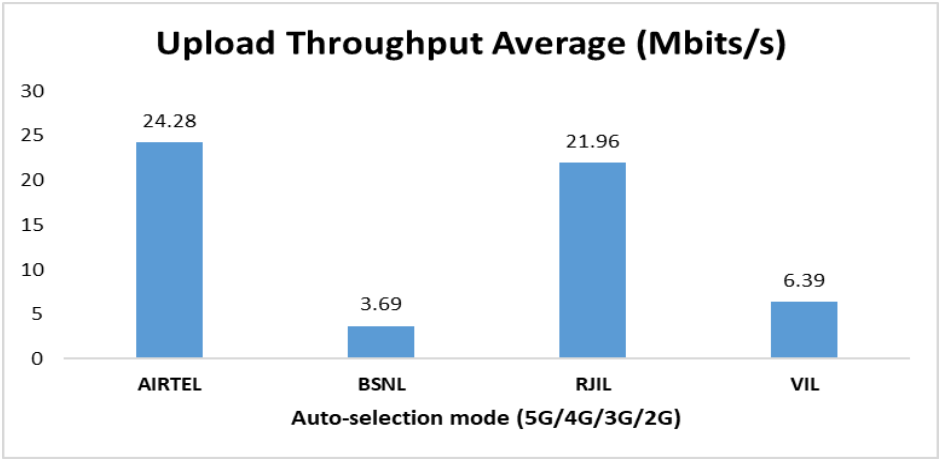


Figure-41: Upload throughput.

5. Voice & Data Key findings

5.1 Overall Voice

1. **Call Setup Success Rate:**
   a) Airtel, BSNL and VIL have 99.38%, 99.40% and 99.25% call setup success rate respectively in 3G/2G network mode. (refer table-3)

   b) Airtel, BSNL, RJIL and VIL have 99.62%, 96.83%, 99.63% and 100.00% call setup success rate respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

   c) Airtel and RJIL have 100% call setup success rate while calling on peer service provider's network, while BSNL and VIL have block call rate for inter-operator calls. (refer table-9)

2. **Call Setup Time**:
   a) Airtel has taken comparatively longer time (6.04 second) to establish the voice call, whereas BSNL and VIL call setup time is 2.79 & 3.57 seconds respectively in 3G/2G network mode. (refer table-3)

   b) Airtel has taken comparatively longer time (4.13 second) to establish the voice call, whereas BSNL, RJIL and VIL call setup time is 1.76, 0.69 & 0.64 seconds respectively in Auto-selection mode (5G/4G/3G/2G). (refer table-5)

3. **Call Silence/Mute Rate**: In packet switched network (4G/5G), RJIL, BSNL, VIL and Airtel have 3.57%, 1.53%, 0.78% & 0.62% silence call rate respectively. Further VIL has higher RTP packet loss rate in downlink (1.59%) compared to BSNL (1.23%), RJIL (0.78%) and Airtel (0.70%). In uplink the RTP packet loss rate is higher for RJIL (0.86%) compared to VIL (0.64%), Airtel (0.48%) and BSNL (0.43%). (refer table-6)

4. **Call Drop Rate**:
   a) Overall Airtel's, BSNL's & VIL's drop call rate 0.93%, 0.76% and 0.15% respectively in 3G/2G network mode. (refer table-3)

   b) Overall Airtel's, BSNL's, RJIL's & VIL's drop call rate 0.00%, 1.77%, 0.74 and 0.00% in Auto-selection mode (5G/4G/3G/2G). (refer table-5)

5.2 Overall Data

1. **Data download and upload performance (Dynamic i.e. while moving):**
   a) BSNL (5.69 Mbps) and VIL (17.43 Mbps) being on 3G & 4G as top technology, have comparatively lower data speeds respectively. While Airtel and RJIL have average download speed of 168.0 Mbps and 213.52 Mbps respectively. (refer table-11)

   b) BSNL (5.67 Mbps) and VIL (5.48 Mbps) being on 3G & 4G as top technology, have comparatively lower data speeds respectively. While Airtel and RJIL have average upload speed of 26.54 Mbps and 20.10 Mbps respectively. (refer table-11)

2. **Data download and upload performance (static i.e. while stationary):**
   a) At Hotspots, RJIL has better 5G QoS performance comparatively, with average download speed of 222.13 Mbps. (refer table-29)

   b) At Hotspots, Airtel has better 5G QoS performance comparatively, with average upload speed of 17.36 Mbps. (refer table-29)

3. **Data session setup success rate (static i.e. while stationary):**
   a) Airtel, BSNL, RJIL and VIL have 100.00%, 100.00%, 97.50% and 97.50% download session setup success rate respectively. (refer table-29)

   b) Airtel, BSNL, RJIL and VIL have 100.00% upload session setup success rate. (refer table-29)

5.3 Operator wise Key Findings

1. Airtel:

Voice

- 99.38% call setup success rate and 0.93% call drop rate have been observed in 3G/2G network mode. Performance is well within the benchmark of 98.00% & 2.00% respectively for LSA. (refer table-3)

- 99.62% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively for LSA. (refer table-5)

- 99.44% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively for LSA. (refer table-15)

- 100.00% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for all hotspot locations. (refer table-20)

- 100.00% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) at both walk test locations. (refer table-47 & 48)

- 100.00% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for highway drive. (refer table-53)

Data

- Airtel has 168.00 Mbps average download throughput & 26.54 Mbps average upload throughput for LSA. (refer table-11)

- Airtel has 166.27 Mbps average download throughput & 28.08 Mbps average upload throughput across measured routes for city drive. (refer table-19)

- Vijayawada bus stand, Vijayawada Airport and High court, Amaravati have less download speed (less than 100 Mbps) out of total 8 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-31, 33 & 35)

- Vijayawada Airport, Amaravati secretariat, High court, Amaravati, Guntur railway station hotspot has less upload speed (less than 20 Mbps) out of total 8 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-33, 34, 35 and 36)

- Vijayawada bus station and Vijayawada Airport have less download speed (less than 10 Mbps) out of total 8 hotspots for auto-selection mode (4G/3G/2G). (refer table-40 & 42)

- Vijayawada Airport has less upload speed (less than 2 Mbps) out of total 8 hotspots for auto-selection mode (4G/3G/2G). (refer table-42)

- Vijayawada junction railway station has less download speed (less than 100 Mbps) out of total 2 walk test locations. (refer table-49)

- Vijayawada junction railway station has less upload speed (less than 20 Mbps) out of 2 walk test locations. (refer table- 49)

- Airtel has 188.39 Mbps average download throughput & 24.28 Mbps average upload throughput across measured routes for highway drive. (refer table-57)

2. BSNL:

Voice

- 99.40% call setup success rate and 0.76% call drop rate have been observed in 3G/2G network mode. Performance is meeting the benchmark of 98.00% & 2.00% respectively for LSA. (refer table-3)

- 96.83% call setup success rate and 1.77% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G). Performance is not meeting the benchmark of 98.00% in call setup success rate for LSA. (refer table-5)

- 96.81% call setup success rate and 1.65% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is not meeting the benchmark of 98.00% in call setup success rate for LSA. (refer table-15)

- 92.50% 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. (refer table-20)

- 100.00% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) at both walk test locations. (refer table-47 & 48)

- 98.48% call setup success rate and 3.85% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. (refer table-53)

Data

- BSNL has 5.69 Mbps average download throughput & 5.67 Mbps average upload throughput for LSA. (refer table-11)

- BSNL has 6.12 Mbps average download throughput & 6.19 Mbps average upload throughput across measured routes for city drive. (refer table-19)

- PVP Square mall, Vijayawada bus stand, G.G hospital, Amaravati secretariat Hotspots have less download speed (less than 10 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-30, 31, 32 & 34)

- Vijayawada Airport and Amaravati secretariat hotspots have less upload speeds (less than 2 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table-33 & 34)

- PVP square mall, Vijayawada bus station and Amaravati secretariat have less download speed (less than 10 Mbps) out of total 8 hotspots for auto-selection mode (4G/3G/2G). (refer table-39, 40 & 43)

- Vijayawada junction railway station and Vegetables market, Guntur both have less download speed (less than 10 Mbps) in walk test locations. (refer table-49 & 50)

- BSNL has 4.21 Mbps average download throughput & 3.69 Mbps average upload throughput across measured routes for highway drive. (refer table-57)

3. RJIL:

Voice

- 99.63% call setup success rate and 0.74% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G). Performance is well within the benchmark of 98.00% & 2.00% respectively for LSA. (refer table-5)

- 99.46% call setup success rate and 0.90% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G). Performance is well within the benchmark of 98.00% & 2.00% respectively for city drive. (refer table-15)

- 100.00% call setup success rate and 0.00% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G) at both hotspot locations. (refer table-20)

- 100.00% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) at both walk test location. (refer table-47 & 48)

- 100.00% call setup success rate and 0.74% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. (refer table-53)

Data

- RJIL has 213.52 Mbps average download speed & 20.10 Mbps average upload speed for LSA. (refer table-11)

- RJIL has 200.42 Mbps average download speed & 19.50 Mbps average upload speed across measured routes in city drive. (refer table-19)

- Vijayawada Airport and High court, Amaravati hotspot have less download speed (less than 100 Mbps) out of total 8 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-33 & 35)

- PVP Square mall, Vijayawada bus stand, Vijayawada Airport, Amaravati secretariat, High court, Amaravati have less upload speed (less than 20 Mbps) out of total 8 hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-30, 31, 33, 34 & 35)

- High court, Amaravati and Guntur bus stand have less download speed (less than 10 Mbps) out of total 8 hotspots for auto-selection mode (4G/3G/2G). (refer table-44 & 46)

- Vijayawada bus station, Amaravati secretariat, High court, Amaravati have less upload speed (less than 2 Mbps) out of total 8 hotspots for auto-selection mode (4G/3G/2G). (refer table-40, 43 & 44)

- RJIL has 252.56 Mbps average download speed & 21.96 Mbps average upload speed across measured routes in highway drive. (refer table-57)

4. VIL:

Voice

- 99.25% call setup success rate and 0.15% call drop rate have been observed in 3G/2G network mode. Performance is meeting the benchmark of 98.00% & 2.00% respectively for LSA. (refer table-3)

- 100.00% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) for LSA. (refer table-5)

- 100.00% call setup success rate and 0.00% call drop rate have been observed for auto-selection mode (5G/4G/3G/2G). Performance is meeting the benchmark of 98.00% & 2.00% respectively for city drive. (refer table-15)

- 100.00% call setup success rate and 0.00% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. (refer table-20)

- 100.00% call setup success rate and 0.00% call drop rate have been observed in auto-selection mode (5G/4G/3G/2G) at both walk test locations. (refer table-47 & 48)

- 100.00% call setup success rate and 0.00% call drop rate have been observed for auto-selection mode (5G/4G/3G/2G) for highway drive. (refer table-53)

Data

- VIL has 17.43 Mbps average download speed & 5.48 Mbps average upload speed for LSA. (refer table-11)

- VIL has 21.27 Mbps average download speed & 5.29 Mbps average upload speed across measured routes in city drive. (refer table-19)

- Vijayawada bus stand, G.G Hospital, Vijayawada Airport, High court, Amaravati, Guntur railway station and Guntur bus stand have less download speeds (less than 10 Mbps) out of total 8 hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-31, 32, 33, 35, 36 & 37)

- Vijayawada Airport and High court, Amaravati have less upload speed (less than 2 Mbps) out of total 8 hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-33 & 35)

- G.G hospital, Vijayawada Airport, Amaravati secretariat, High court, Amaravati Guntur railway station and Guntur bus stand have less download speed (less than 10 Mbps) out of total 8 hotspots for auto-selection mode (4G/3G/2G). (refer table-41, 42, 43, 44, 45 & 46)

- Vijayawada Airport has less upload speed (less than 2 Mbps) out of total 8 hotspots for auto-selection mode (4G/3G/2G). (refer table-42)

- Vijayawada junction railway station has less download speed (less than 10 Mbps) out of total 2 walk test locations. (refer table-49)

- VIL has 10.31 Mbps average download speed & 6.39 Mbps average upload speed across measured routes in highway drive. (refer table-57)

6. Annexure

6.1 Route wise coverage map

6.1.1 City

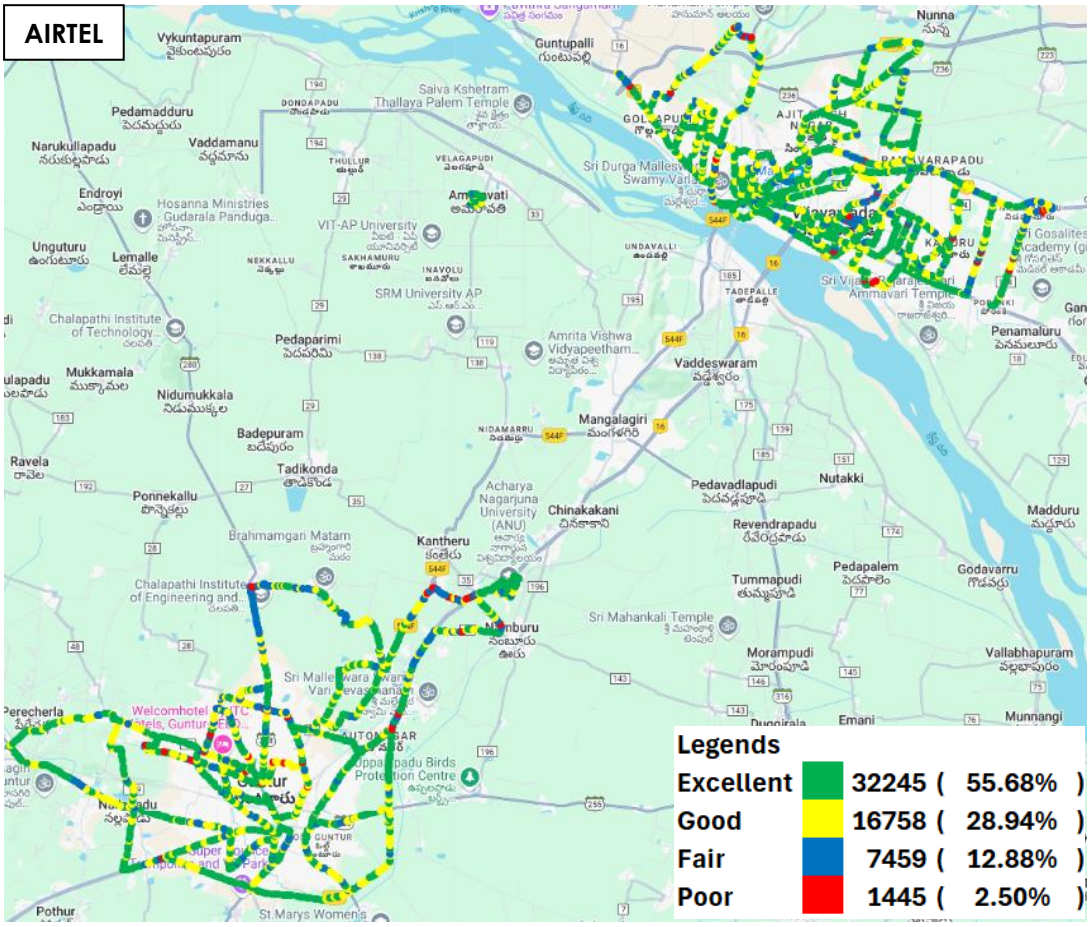


Figure-42: Signal strength 3G/2G network mode – AIRTEL.

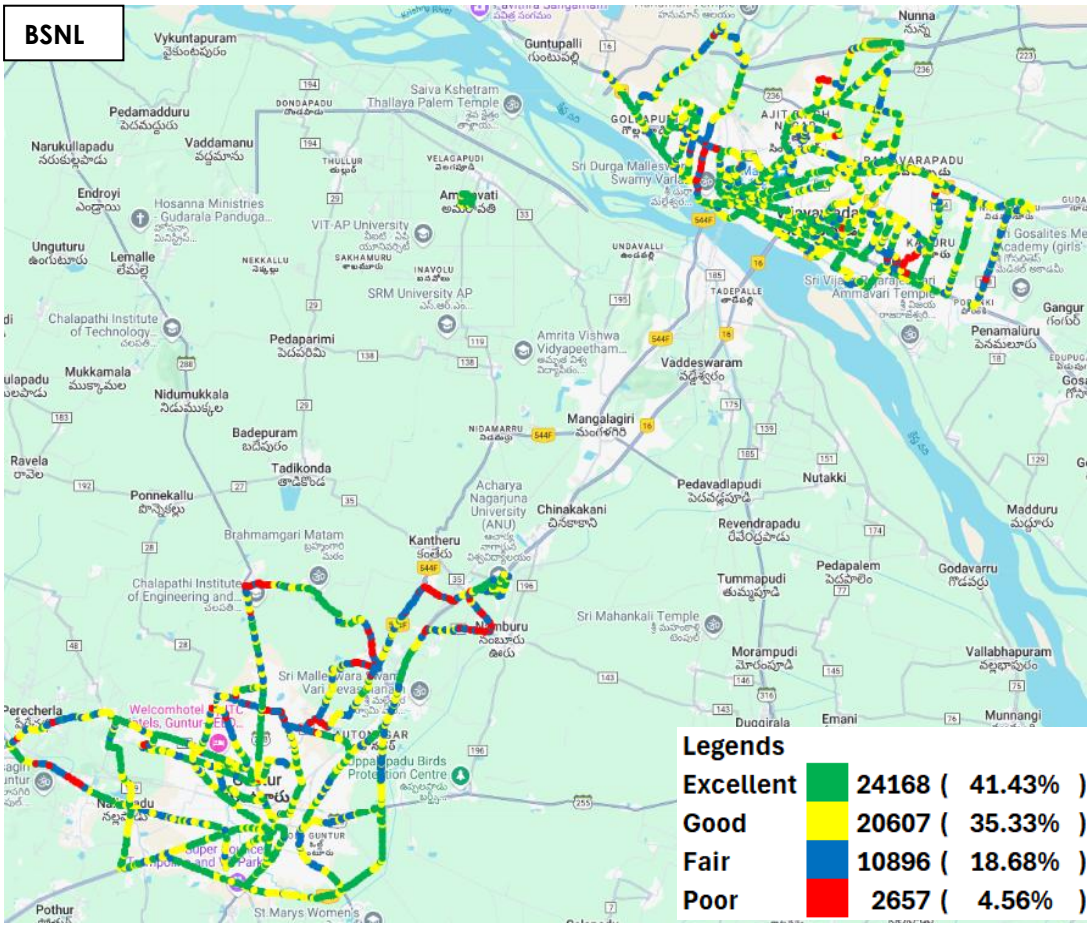


Figure-43: Signal strength 3G/2G network mode – BSNL.

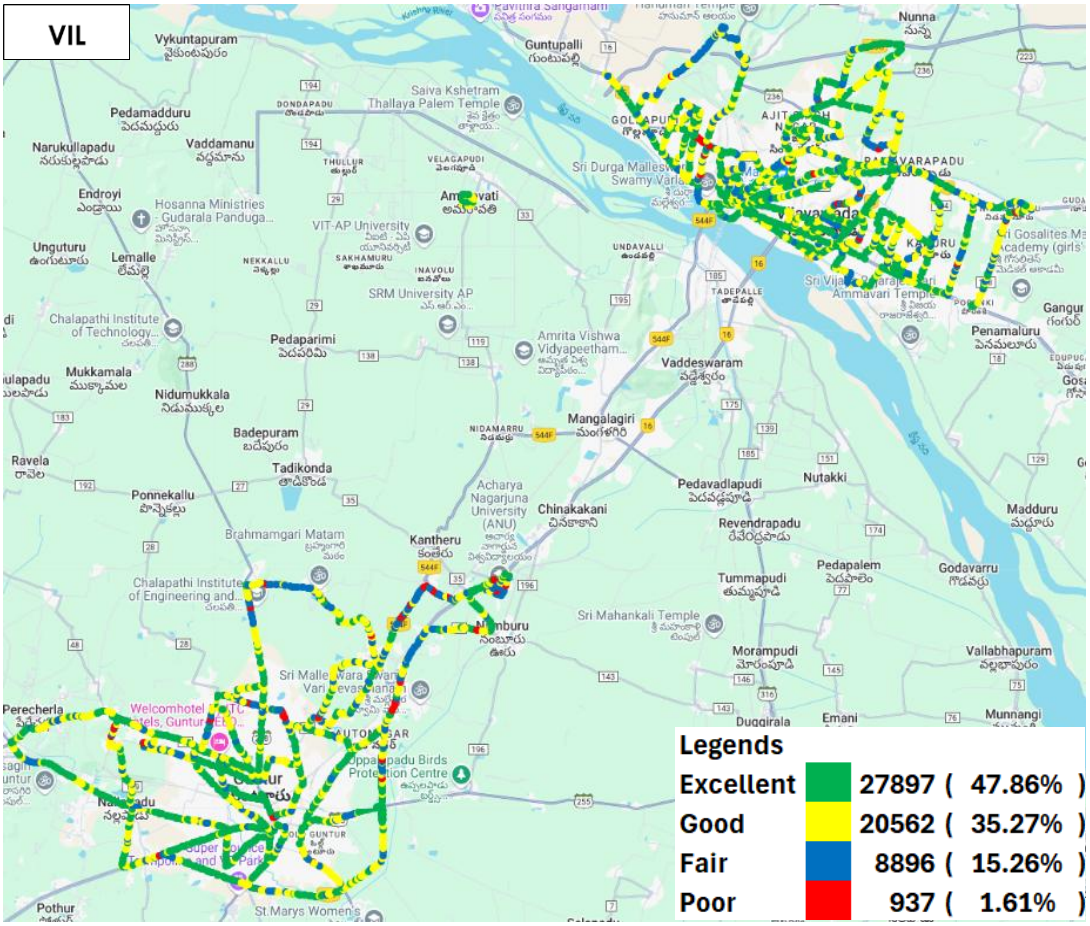


Figure-44: Signal strength 3G/2G network mode – VIL.

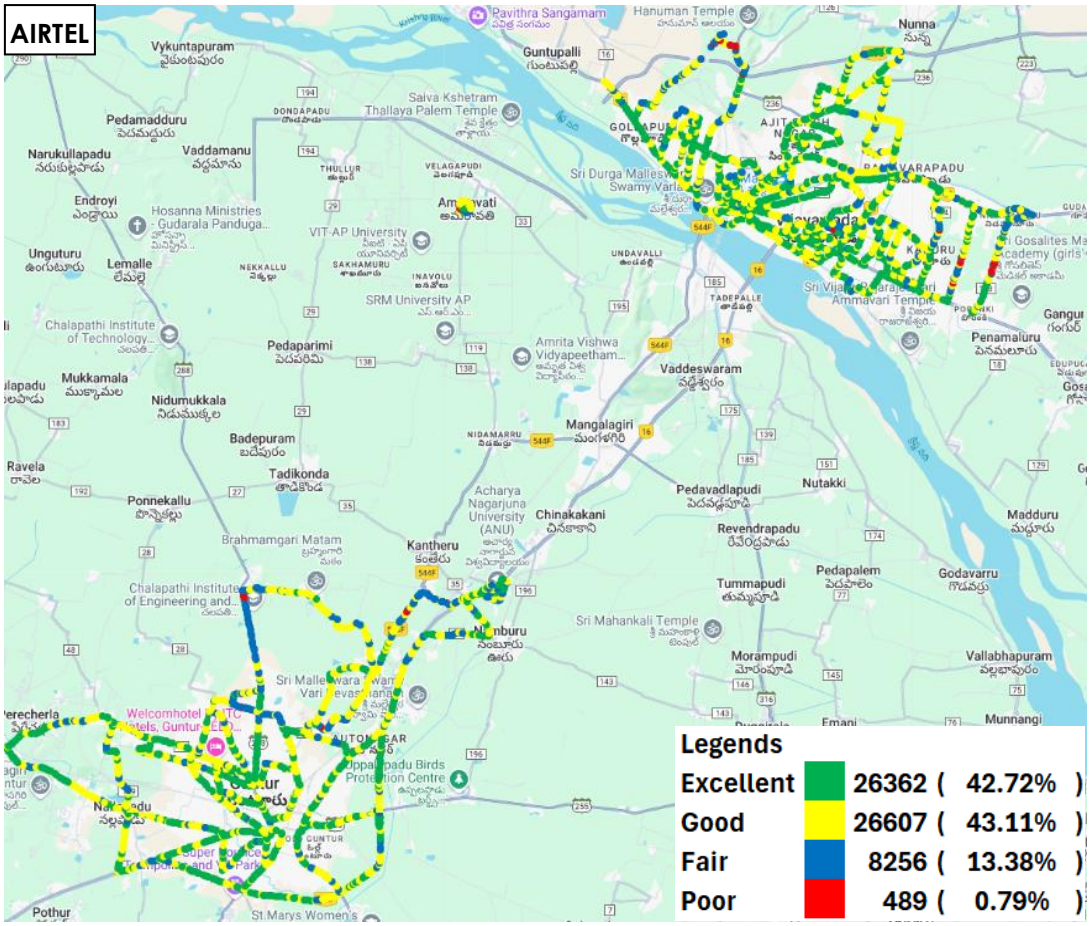


Figure-45: Signal strength auto-selection mode 5G/4G/3G/2G – AIRTEL.

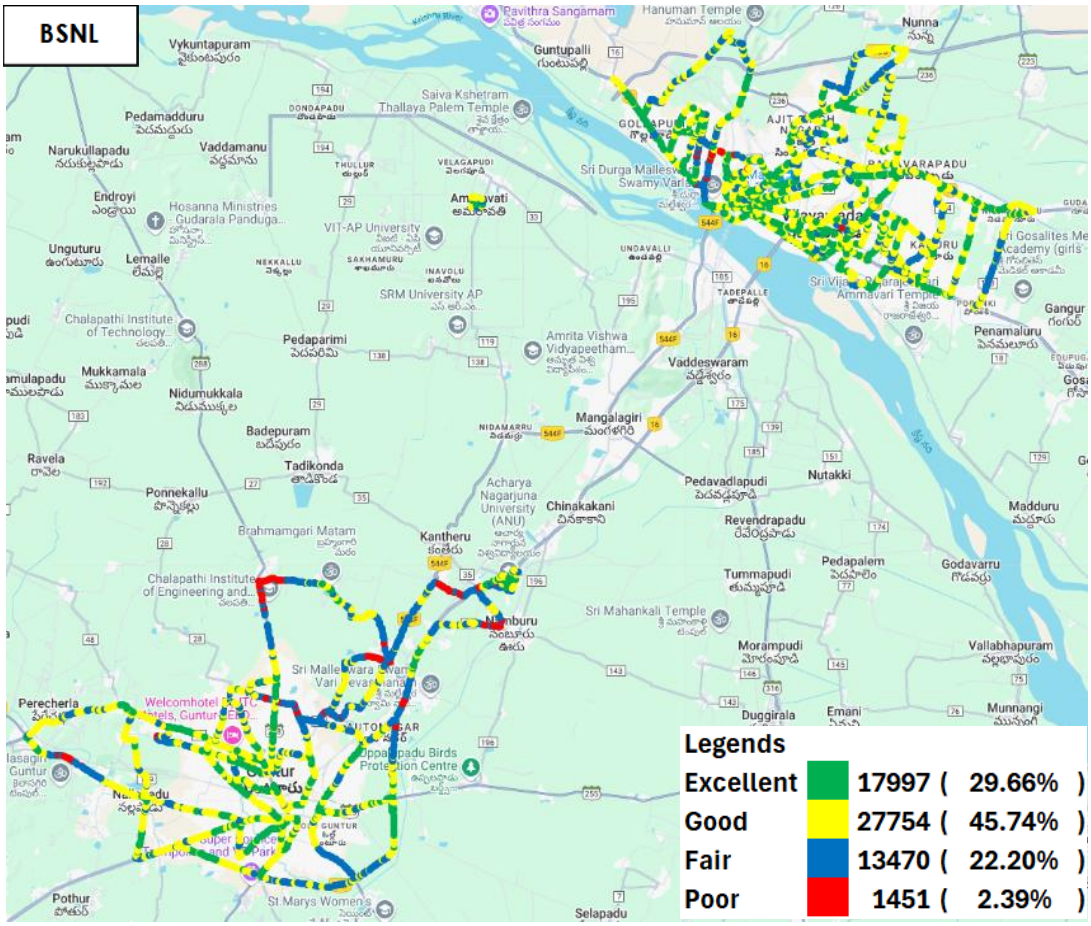


Figure-46: Signal strength auto-selection mode 5G/4G/3G/2G – BSNL.

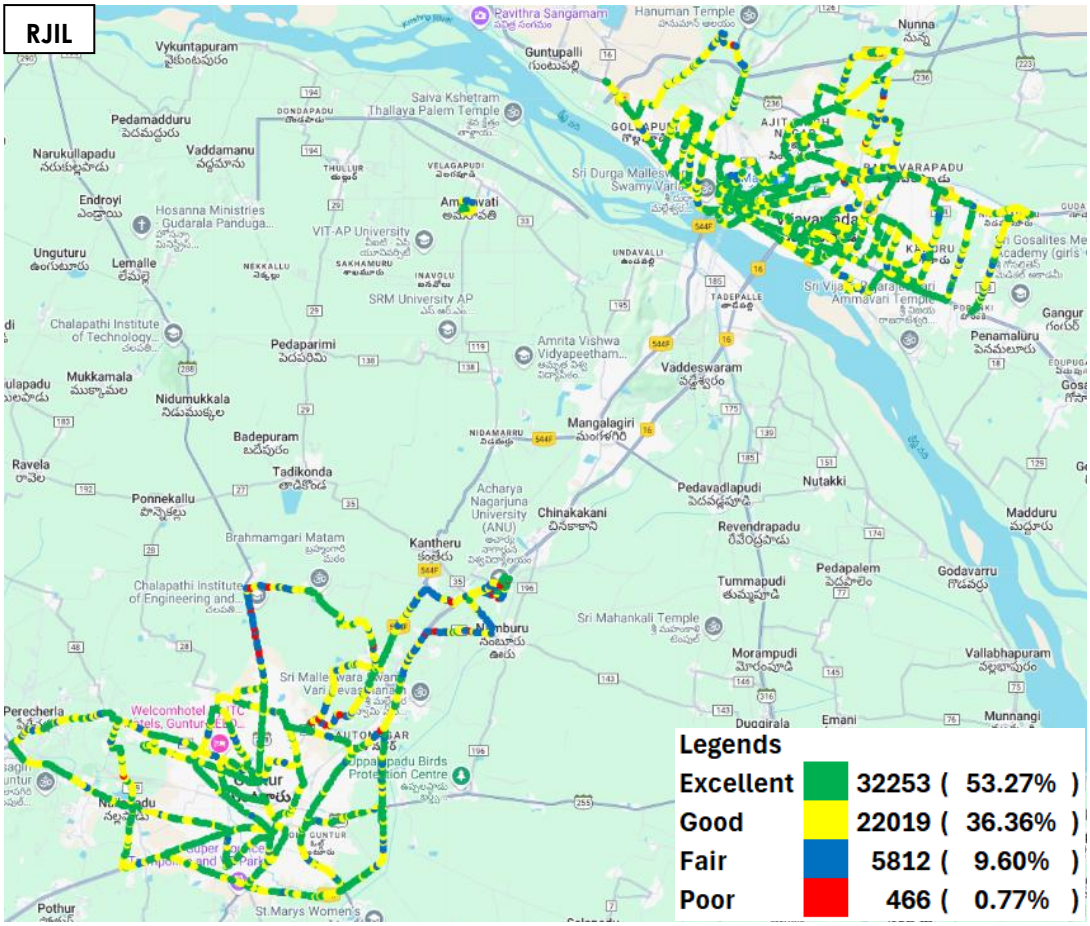


Figure-47: Signal strength auto-selection mode 5G/4G/3G/2G – RJIL.

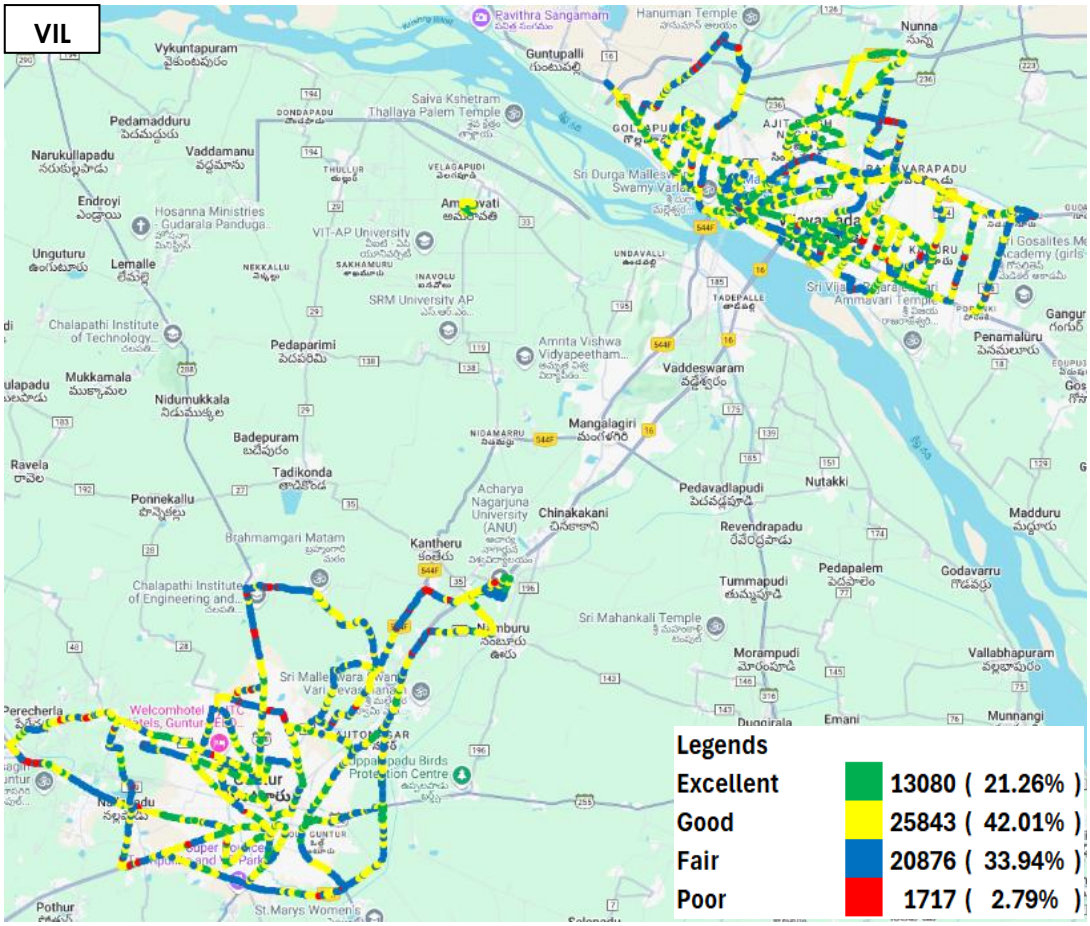


Figure-48: Signal strength auto-selection mode 5G/4G/3G/2G – VIL.

6.1.2 Highway

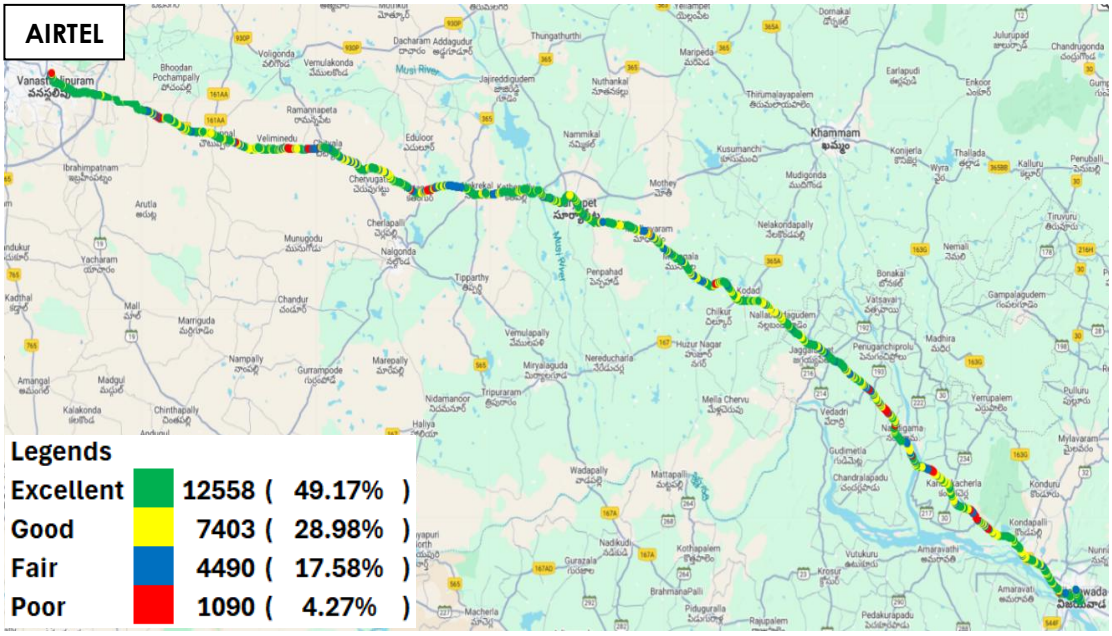


Figure-49: Signal strength 3G/2G network mode – AIRTEL.

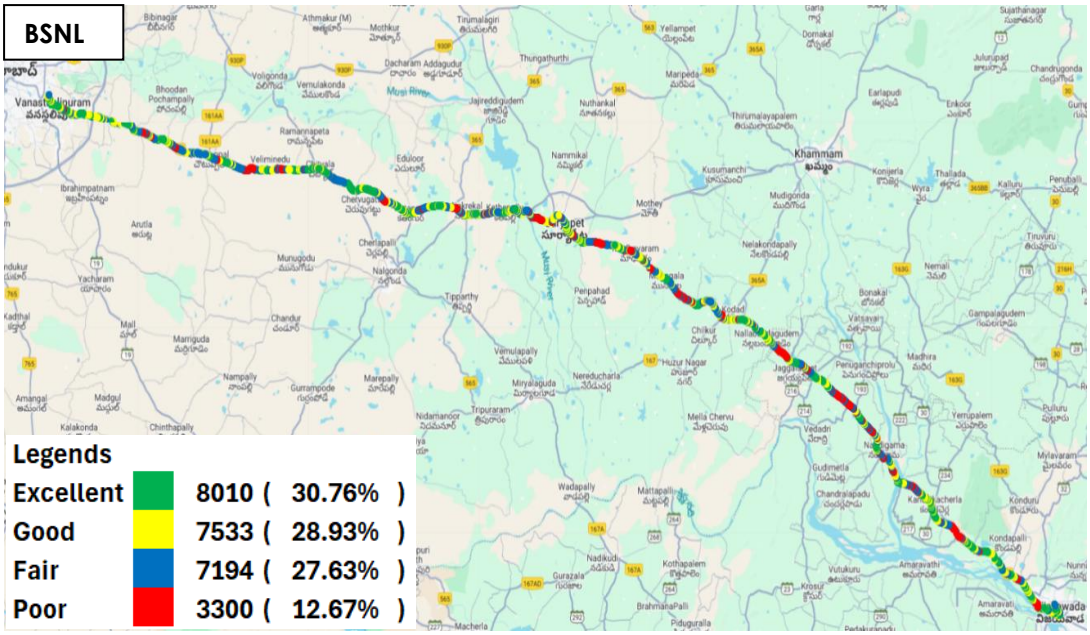


Figure-50: Signal strength 3G/2G network mode – BSNL.

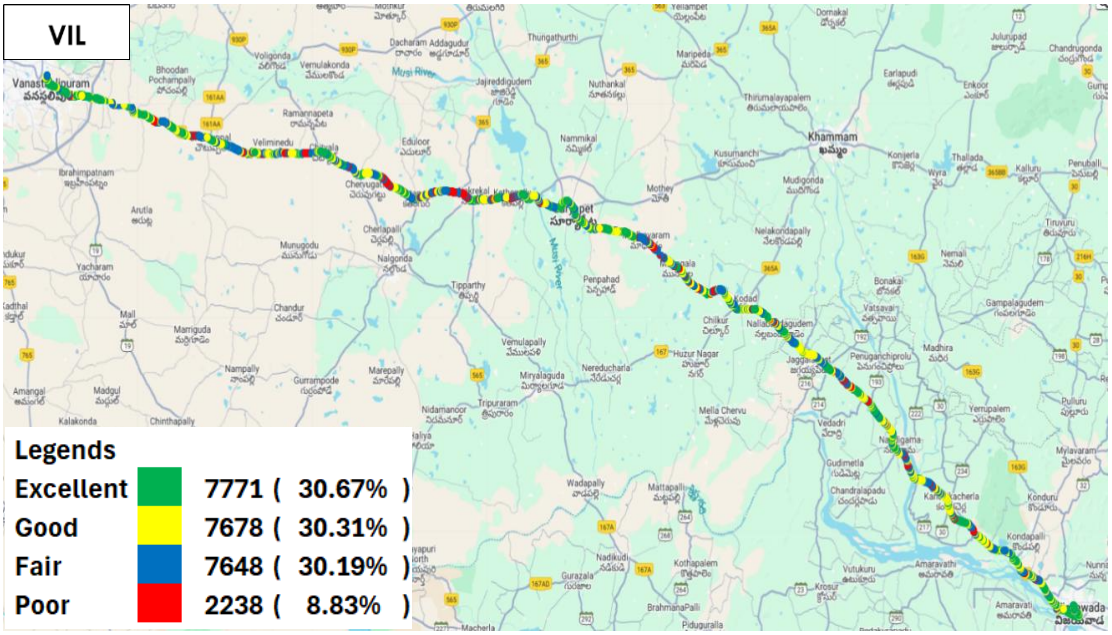


Figure-51: Signal strength 3G/2G network mode – VIL.

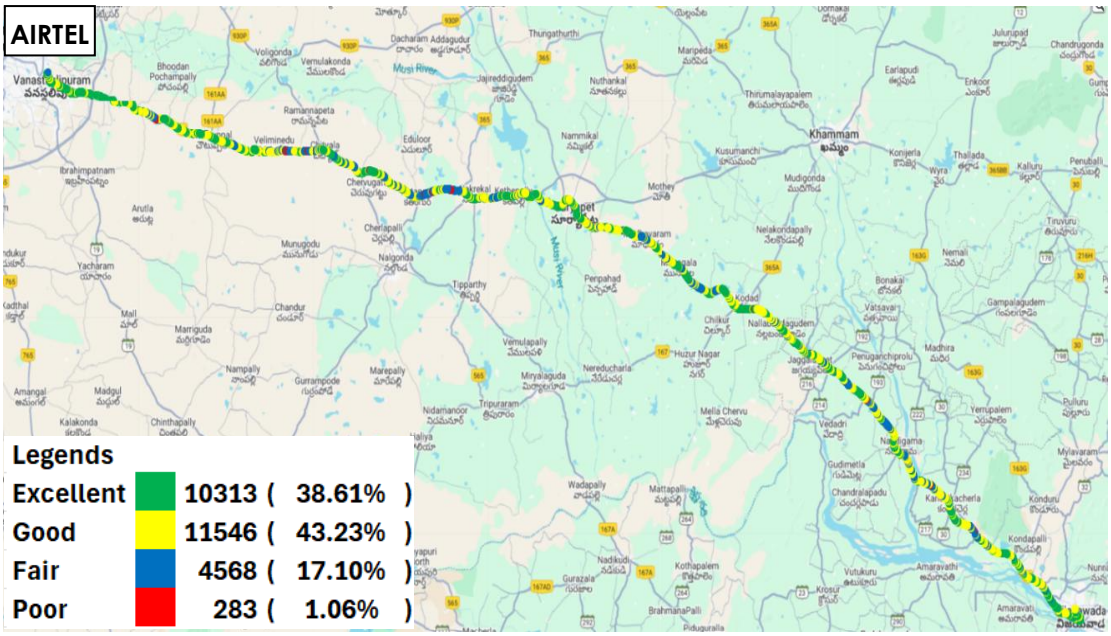


Figure-52: Signal strength auto-selection mode 5G/4G/3G/2G – AIRTEL.

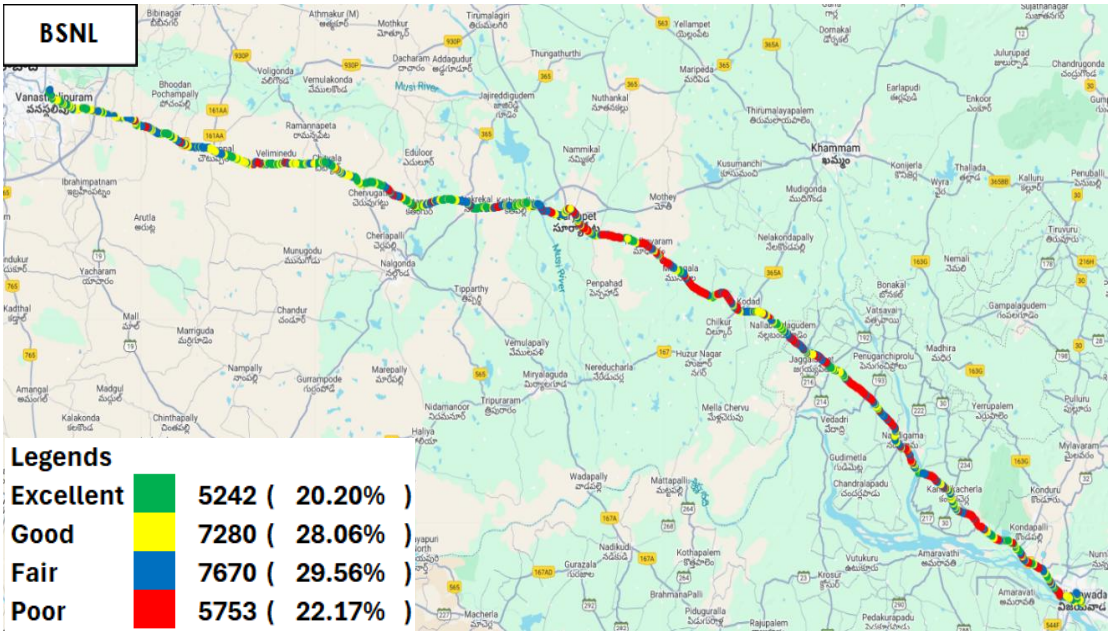


Figure-53: Signal strength auto-selection mode 5G/4G/3G/2G – BSNL.

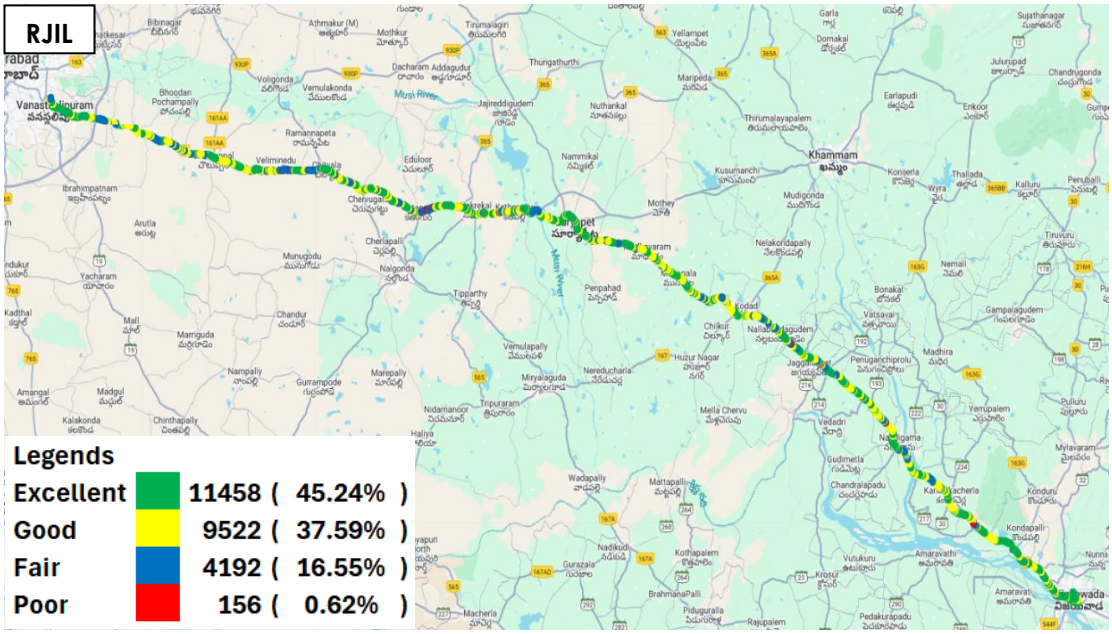


Figure-54: Signal strength auto-selection mode 5G/4G/3G/2G – RJIL.

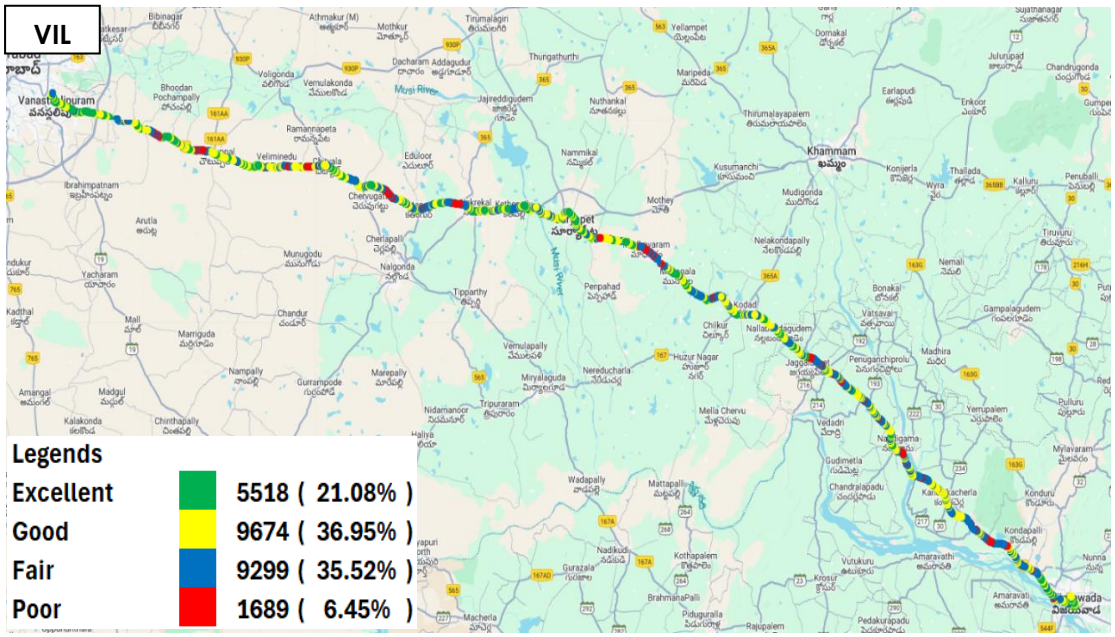


Figure-55: Signal strength auto-selection mode 5G/4G/3G/2G – VIL.

7. Appendix

The details of the setup used for conducting the drive test and the network or performance parameters captured under different conditions may be seen at Appendix-I. The calculation method of each QoS parameter is given in Appendix-II of the report. The summary of key equipment used in technical setup is as under

- **Device-1**: OnePlus Nord CE3 for 3G/2G CAT-15 Smartphone.
- **Device-2**: Samsung Galaxy S23 for 5G/4G/3G/2G CAT-20 Smartphone
- **Drive test Software**: Azenqos Engineering capable Applications to capture actual user experience.

7.1 Appendix-I

7.1.1 Drive test setup

Voice Call		
Call details	**Technology**	**Detail**
Call Setup Timeout	• 3G/2G auto mode- switch Call • 5G/4G/3G/2G auto mode- switch Call • 5G/4G MOS Call	30 Sec
Call Duration		90 Sec/180 sec
Wait/ Guard Time		15 Sec

Table-58: Voice test detail

Note-

- There is 15 sec wait time after locking and before starting first call in 3G/2G call.
- 10 calls to be made at each Hotspot location.
- Minimum 10 Calls to be made during the walk test. Call count will be increased based on walk test distance.
- Speech quality (MOS) has been measured only in city drive & highway by making Mobile to Mobile call.
- 180 Sec calls were made only in highway & railway route drive.

Data Test		
Test Type	**Technology**	**Detail**
HTTP/FTP Download	5G/4G/3G/2G Auto Mode	500 MB File- 30 Sec Timeout, (Multithread 3- TCP Connection at a time)
HTTP/FTP Upload		250 MB File- 30 Sec Timeout, (Multithread 3- TCP Connection at a time)
YouTube Streaming		20 Sec Video & 25 sec Timeout (Only at Hotspot)
Web Browsing		3 popular websites (www.google.co.in, www.amazon.in, www.facebook.com) 20 sec timeout (only at Hotspot)

Latency		25 count- Dynamic 1000 count- Hotspot Payload- 42 bytes in all drive

Table-59: Data test detail

Note-

- 5 Data iteration to be done at each hotspot location.
- Minimum 5 iteration to be made during the walk test. Iteration count will be increased based on walk test distance.
- Ping test to be performed only once at hotspot location.
- Youtube & Web browsing test to be performed at static location only.
- All values are taken up to two decimal places with round off.
- Download and upload testing has been done on FTP server for Airtel, BSNL & RJIL. (Airtel, BSNL & RJIL not provided HTTP server)
- VIL download and upload testing is done on HTTP Server.
- Download & Upload test performed at hotspot in 4G/3G/2G auto-selection also.

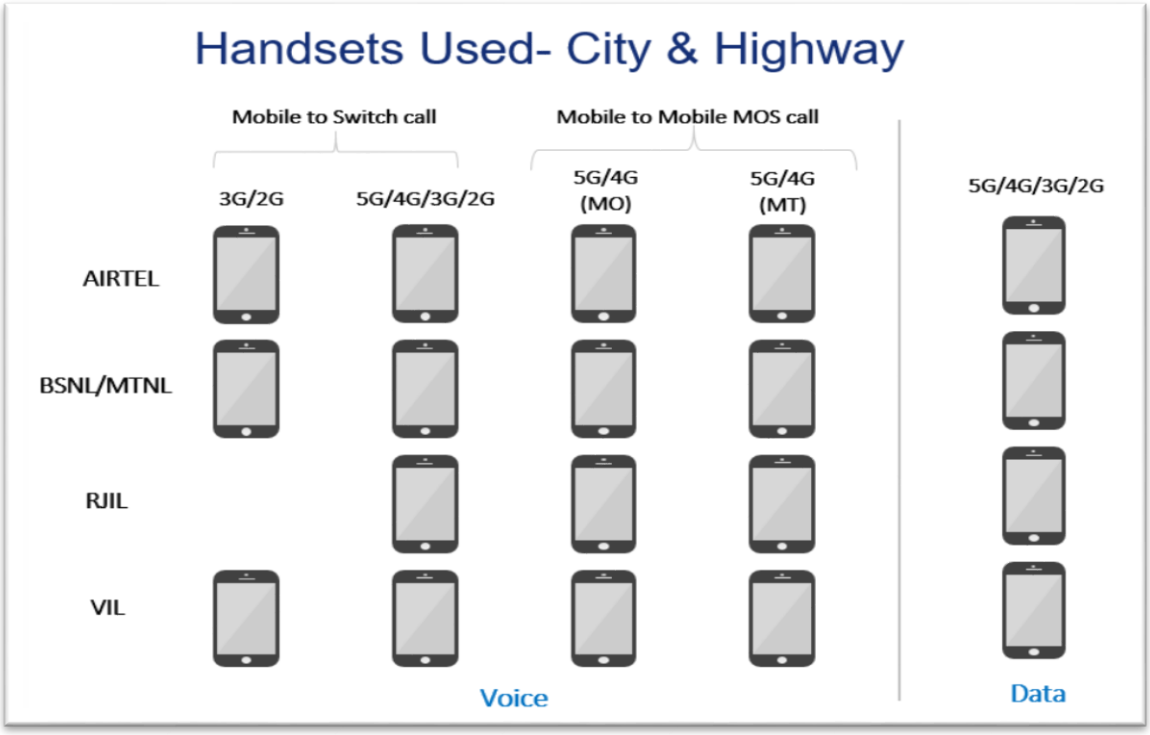


Figure-56: Number of handsets used in city & highway drive

MO: Mobile originating

MT: Mobile terminating

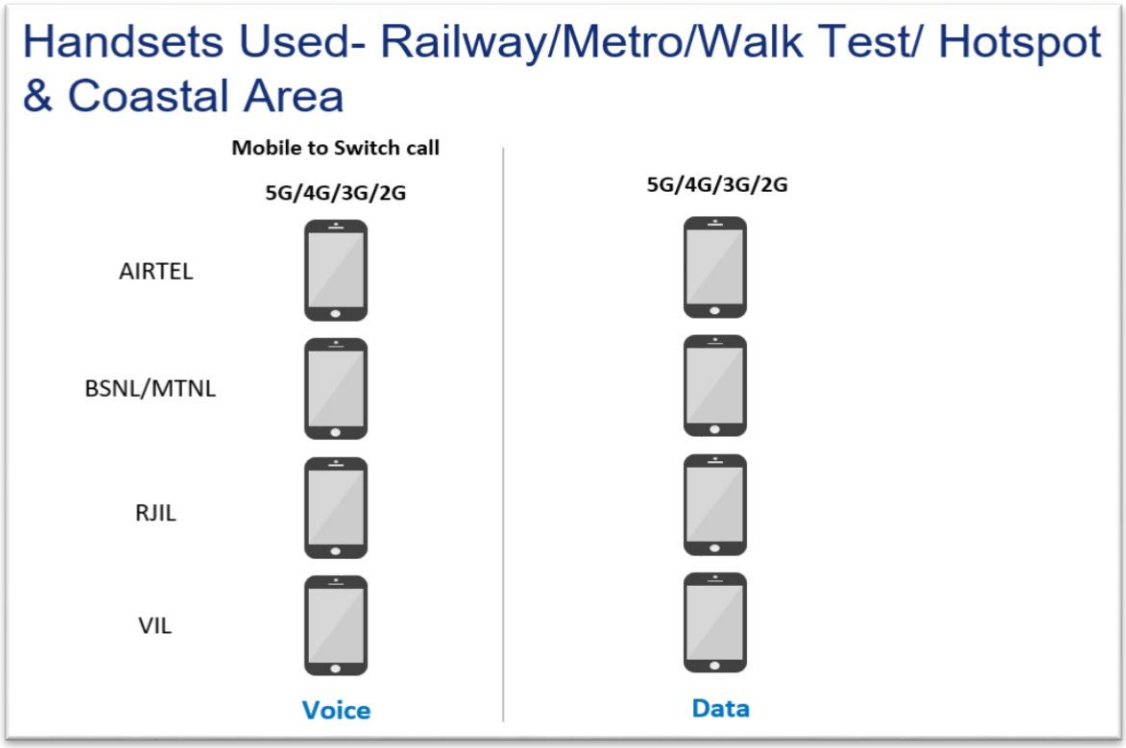


Figure-57: Number of handsets used in railway/metro/walktest/hotspot & coastal area

7.1.2 Drive test Methodology

(a) Dynamic voice testing (on the move)

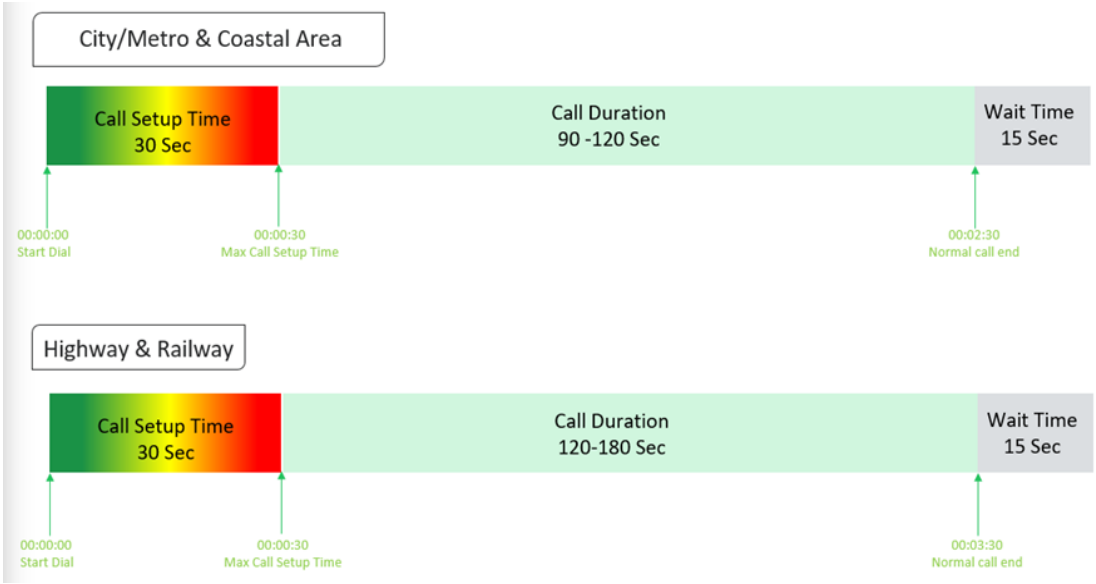


Figure-58: Voice test script for city/railway/metro/highway & coastal area

- 15 sec wait time is applied after locking Radio Access Technology (RAT) to 3G/2G and before starting first call in 3G/2G call.
- Speech quality (MOS) will be measured only City & Highway drive by making Mobile to Mobile calls.

(b) Hotspot voice testing

Figure-59: Voice test script for walktest/hotspot

- 10 calls to be made at each Hotspot location.
- Minimum 10 Calls to be made during the walk test. Call count will be increased based on walk test distance.

(c) Dynamic Data (internet) test

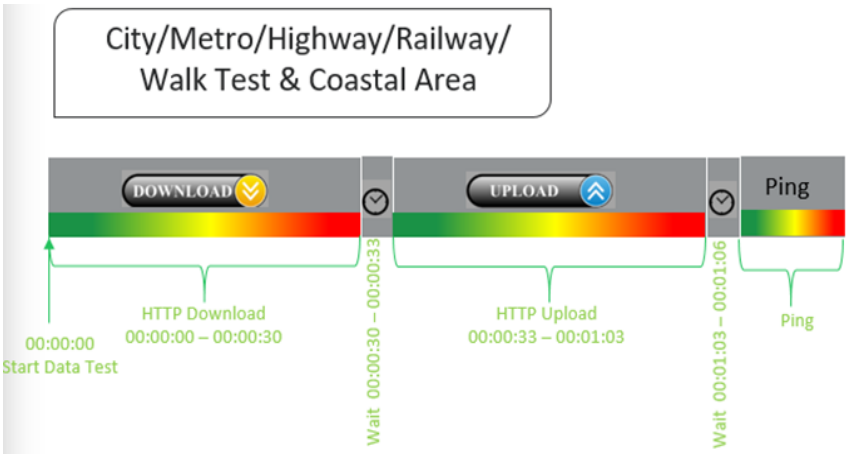


Figure-60: Data test script used in city/metro/railway/highway/walk test & coastal area

(d) Static Data(internet) testing

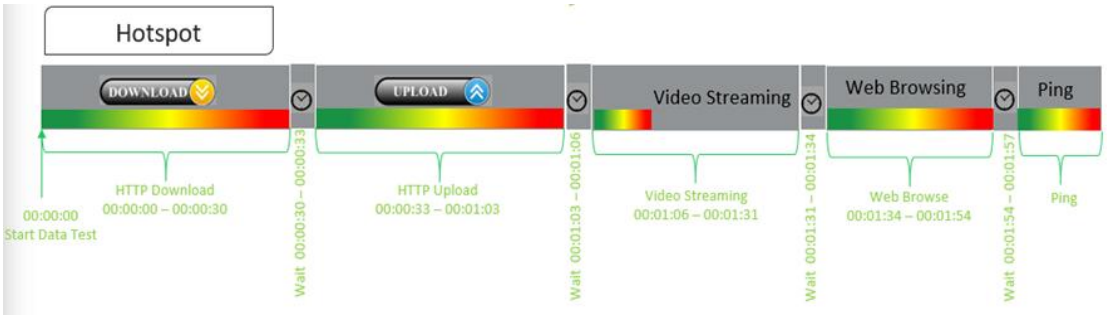


Figure-61: Data test script used at hotspot

- 5 Data iteration done at each hotspot location.
- Min. 5 iteration made during the walk test.
- Web browsing duration mentioned above is for one web site only.
- Only 1 ping iteration (with 1000 Count) done at hotspot location.
- Download & Upload test performed at hotspot in 4G/3G/2G auto-selection also.

7.2 Appendix-II

7.2.1 Network Performance Parameters for Voice calls

Parameter Name	Definition
Call Setup Success Rate	(i) Call Setup Success Rate is defined as the ratio of Established Calls to Call Attempts. 'Established Calls' mean the following events have happened in call setup: (a) Call attempt is made (b) The signaling channel is allocated (c) The call is routed to the outwards path of the terminating network (d) An alert signal is received by caller in the form of ring back tone, busy tone, or an announcement. CSSR = (Total Call Established/ Total Call Attempt) *100 As per QoS Regulation 2024 benchmark value is **>=98%**
Call Drop Rate	Call drop represents the service provider network's ability to maintain a call once it has been successfully established. This parameter shall include both incoming calls and outgoing calls which, once they have been established and have an assigned traffic channel/ bearer, are dropped, or interrupted before their normal completion by the user, the cause of the early termination being within the service provider's network Call Drop Rate = (Total Call Drop/Total Call Established) *100 As per QoS Regulation 2024 benchmark value is **<=2%**
Call Setup Time	Time taken from call initiate to call alerting/ringing. Call Setup Time = T2- T1 T2- Ringing (VoLTE/VoNR) & Alerting (for WCDMA & GSM), T1- Invite (VoLTE/VoNR) & CM Service Request (for WCDMA & GSM)
Voice Quality (MOS)	Voice quality in mobile networks is measured with algorithms based on ITU-T P.863 (POLQA). The grading for Voice quality has been given as: Excellent: MOS $\geq$ 4 and < 5 Good : MOS $\geq$ 3 and < 4 Fair : MOS $\geq$ 2 and < 3 Poor : MOS $\geq$ 1 and < 2
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 type which are considered- 2G Inter & Intra cell, 3G Soft & IRAT, 4G Inter & Intra frequency & SRVCC, 5G Inter & Intra frequency & 5G to 4G handovers.
Silence Call	A call which has ≥ 4 sec continuous RTP gap is considered as a Silence Call. Silence call rate = (count of silence call / Total calls established) *100 If a call observes multiple silence count >=4 sec in a particular established call it has been taken as one silent event.

<table>
<tr><td>Jitter</td><td>The inter arrival jitter is the difference in the relative transit time for two packets. The relative transit time is the difference between a packet's Real-time Transport Protocol (RTP) timestamp and the receiver's clock at the time of arrival, measured in the same units. If Si is the RTP timestamp from packet i, and Ri is the time of arrival in RTP timestamps units for packet i, then for two packets i and j the inter-arrival jitter D can be expressed as:
D(i,j) = (Rj - Ri) - (Sj - Si)

The interarrival jitter is calculated continuously as each data packet i is received from source SSRC_n, using this difference D for that packet and the previous packet i-1 in order of arrival (not necessarily in sequence), according to the formula
J(i) = J(i-1) + (|D(i-1,i)| - J(i-1))/16 or 8</td></tr>
<tr><td>Downlink Packet Drop Rate</td><td>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 is calculated from MOS call for packet call only (VoNR/VoLTE)</td></tr>
<tr><td>Uplink Packet Drop Rate</td><td>Number of RTP (Real-time Transport Protocol) Packets lost divided by total RTP packet received (against each source_SSRC and sequence number) at call terminating handset. This KPI is calculated from MOS call for packet call only (VoNR/VoLTE).</td></tr>
<tr><td>Signal Strength</td><td>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>Rx Level</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>
</td></tr>
</table>

Table-60: Network performance parameter and definition voice

7.2.2 Network Performance Parameters Data tests

Parameter Name	Definition
Download Speed (Mbps)	The download speed is defined as the data transmission rate that is achieved for downloading a test file from a test server to a test device. Download Speed = Total bytes transferred during download / Total time for transfer • 80th percentile (upper range) & 20th percentile (lower range) value has been calculated for download throughput in dynamic drive and Hotspot combine data
Upload Speed (Mbps)	The upload speed is the data transmission rate that is achieved for uploading a test file from a test device to a test server. Upload Speed = Total bytes transferred during upload / Total time for transfer. • 80th percentile (upper range) & 20th percentile (lower range) value has been calculated for upload throughput in dynamic drive and Hotspot combine data.

Download Session Setup Success Rate	(total download session established (successfully connected to server)/ total download session attempt) *100. This KPI has been calculated for Hotspot only.
Upload Session Setup Success Rate	(total upload session established (successfully connected to server)/ total upload session attempt)*100. This KPI need to report for Hotspot only.
Web Page Download Time	Web browsing test is used to measure performance in terms of opening a web/HTTP page. Time taken to open the web page successfully is considered as web browsing delay/web page download time.
Video Streaming Delay	The Video streaming delay is time taken from start of video transfer to First video frame displayed in player.
Latency	Latency is the time it takes for a small data set to be transmitted from a device to a server on the Internet and back to the same device again. The Latency is measured in milliseconds (ms). To calculate the one-way latency we just do half of the round-trip time. 50th percentile of one-way latency has been reported.
Jitter	Measure of variation in time in arrival of packets from a source to destination The consideration of packet delay jitter is considered by standard deviation of Inter Packet Delay Variation. If IPDV is used. By standard deviation is meant the average of standard deviation of IPDV on DL IPDV(i) = D(i) – D(i-1) then Stdvs of IPDV is considered as jitter.
Packet Loss Rate	Number of packets lost out of total packet transferred during test. Packet loss rate = (Total packet lost / Total packet sent) *100 * Packet delay (using ping) >90 ms considered as packet loss and included in packet loss rate. * Packet loss rate is calculated based on ICMP * 90th percentile for Packet loss rate has been reported in overall Hotspot performance summary.

Table-61: Network performance parameter and definition Data

Disclaimer: The observations presented above and, in the reports, represent the performance of the service providers on the area/route under test on the day/time of conducting the drive test and no inference whatsoever may be drawn regarding the quality of the telecom service by the service providers in the whole city/state/licensed service area.

Hardik Rajeshbhai Patel

Digitally signed by Hardik Rajeshbhai Patel
Date: 2025.02.28 23:56:23 +05'30'