TELECOM REGULATORY AUTHORITY OF INDIA

Independent Drive Test Report

Bihar LSA

April 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 Bihar License Service Area (LSA) during the month of April-2025 under the supervision of TRAI Regional Office (RO) Kolkata. 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	Districts of Bihar Sharif, Sheikhpura, Munger and Jamui and Patna city	City	354.5	02-Apr-2025	08-Apr-2025
2	Munger District	Inter Operator Calling	2 Locations	07-Apr-2025	07-Apr-2025
3	Patna city	Walk Test	3.1	01-Apr-2025	01-Apr-2025
4	Districts of Bihar Sharif, Sheikhpura, Munger and Jamui and Patna city	Hotspot	16 Locations	03-Apr-2025	07-Apr-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 and walk test as per the legends shown on the map.

Figure-1: Drive test routes

> **Note**-
> - Inter-operator calling test has been performed at Sangrampur Police Station & Tarapur Block Office hotspot location.

2.3 Summary of areas covered

a) **City**-Nearby Pataliputra Colony, Rajendra Nagar, Mithapur, Harnaut, Bihar Sharif, Asthawan, Barbigha, Sheikhpura, Sirari, Chewara, Ariari, Sikandra, Jamui, Sono, Jhajha, Chakai, Simultala, Sangrampur, Tarapur, Asarganj etc.

b) **Hotspot**-
1. Asthawan Block Office
2. Barbigha Block Office-Sheikhpura
3. K M College Sambhugunj Asarganj Rd-Dhandhi Belari
4. Middle School Sabaijor Math-Tola Sabaijor
5. NIT Patna
6. Patna Museum
7. Phalguni Prasad Yadav P P Y College Chakai
8. Primary Health Centre Chewara
9. R.P.S College Harnaut
10. Raj Bhawan
11. S.K College Lohanda Sikandra
12. Sadar Hospital Bihar Sharif
13. Sadar Hospital Sheikhpura
14. Sangrampur Police Station-Sangrampur
15. Tarapur Block Office-Tarapur
16. Telwa Bazar Bus Stop-Tola Siantanr

c) Walk Test

1. AIIMS Patna
2. Patna Airport
3. Patna Medical College & Hospital
4. Patna Railway Junction
5. Patna Secretariat

2.4 Telecom service providers detected frequency bands

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

S.no.	Name of TSP	Technology	Frequency Bands (In MHz)
1	Bharti Airtel Ltd.	2G	900
2	Bharti Airtel Ltd.	4G	900,1800,2100,2300
3	Bharti Airtel Ltd.	5G	3500
4	BSNL	2G	900,1800
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	900,1800
10	Vodafone Idea Ltd.	4G	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
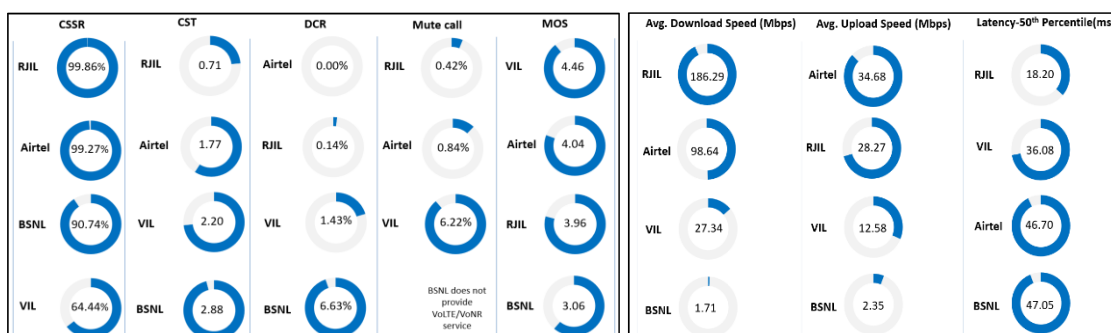
Summary-Voice services

Call Setup Success Rate: Airtel, BSNL, RJIL and VIL have 99.27%, 90.74%, 99.86% and 64.44% call setup success rate respectively in Auto-selection mode (5G/4G/3G/2G).

Call Setup Time: Airtel, BSNL, RJIL & VIL have call setup time of 1.77, 2.88, 0.71 and 2.20 seconds respectively in Auto-selection mode (5G/4G/3G/2G).

Drop Call Rate: Airtel, BSNL, RJIL and VIL have drop call rate 0.00%, 6.63%, 0.14% and 1.43% respectively in Auto-selection mode (5G/4G/3G/2G).

Call Silence/Mute Rate: Airtel, RJIL and VIL have silence call rate 0.84%, 0.42% and 6.22% respectively in packet switched network (4G/5G).

Mean Opinion Score (MOS): Airtel, BSNL, RJIL and VIL have average MOS of 4.04, 3.06, 3.96 and 4.46 respectively.

Summary-Data services

Data Download performance (Overall): Average download speed of Airtel (5G/4G/2G) is 98.64 Mbps, BSNL (4G/3G/2G) is 1.71 Mbps, RJIL (5G/4G) is 186.29 Mbps and VIL (4G/2G) is 27.34 Mbps.

Data Upload performance (Overall): Average upload speed of Airtel (5G/4G/2G) is 34.68 Mbps, BSNL (4G/3G/2G) is 2.35 Mbps, RJIL (5G/4G) is 28.27 Mbps and VIL (4G/2G) is 12.58 Mbps.

Data performance - Hotspots (in Mbps):
Airtel- 4G D/L: 66.08   4G U/L: 15.34
        5G D/L: 154.13   5G U/L: 41.83
BSNL- 4G D/L: 6.39   4G U/L: 10.96
RJIL- 4G D/L: 51.08   4G U/L: 12.00
        5G D/L: 255.46   5G U/L: 33.68
VIL-   4G D/L: 24.07   4G U/L: 18.33

Note- "D/L" Download speed, "U/L" Upload speed

QoS Performance Analysis- Bihar 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 April-2025 covering City drive, Hotspots and Walk test (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	469	553	615
Call Setup Success Rate %	98.93	78.48	68.46
Drop Call Rate %	0.00	5.07	2.38
Call Setup Time-Average (Second)	5.85	2.68	3.46
Handover Success Rate %	99.54	95.58	98.93

Table-3: Summary of voice call performance in 3G/2G network mode only.
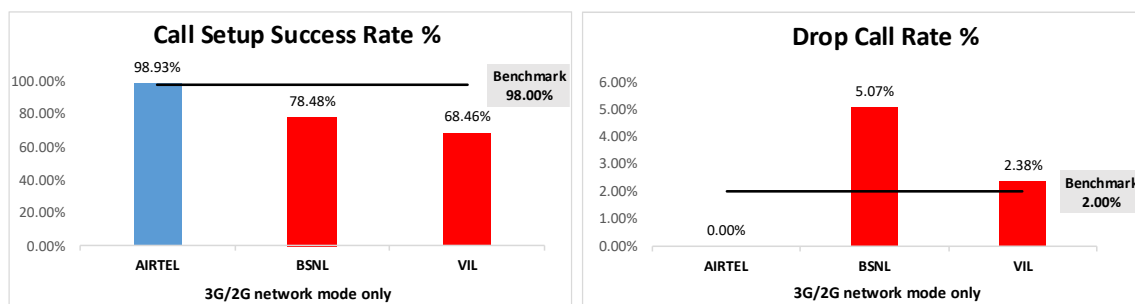
Figure-2: Call setup success rate and drop call rate performance.

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	55	NA
2G	659	289	439

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	688	648	691	869
Call Setup Success Rate %	99.27	90.74	99.86	64.44
Drop Call Rate %	0.00	6.63	0.14	1.43
Call Setup Time-Average (Second)	1.77	2.88	0.71	2.20
Handover Success Rate %	100.00	96.94	99.85	99.82

Table-5: Summary of voice call performance in network auto-selection mode.
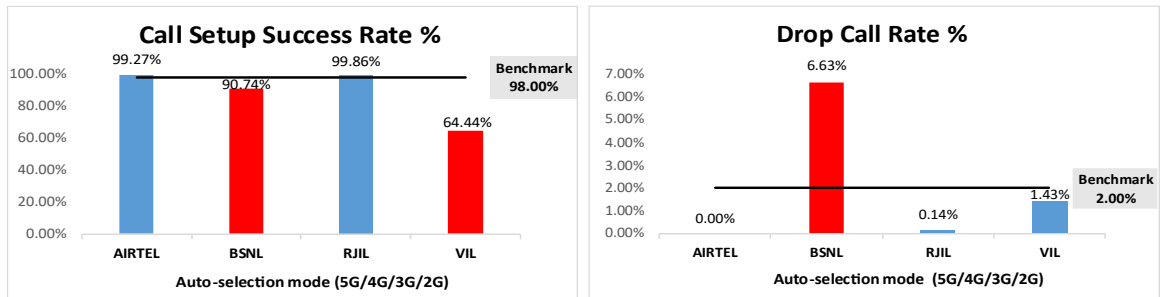
Figure-3: Performance for call setup success rate and drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	475	382	478	386
Number of silence call for >4 Sec	4	NA	2	24
Silence Call Rate %	0.84	NA	0.42	6.22
Number of silence instances for >4 Sec	7	NA	3	29
Number of silence instances for >3 Sec	9	NA	8	55
Number of silence instances for >2 sec	16	NA	19	149
RTP Jitter (4G & 5G) in ms	4.08	NA	7.09	13.13
Packet loss Rate Downlink %	0.50	NA	0.33	2.45
Packet loss Rate Uplink %	0.35	NA	0.43	2.95

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

> **Note**-
> * NA- Due to unavailability of packet switched (VoLTE & VoNR) network in BSNL silence instances are not captured.

Number of unique cell Id's covered in Voice test- Technology wise				
Technology	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
5G	0	NA	506	NA
4G	1356	279	1680	498
3G	NA	28	NA	NA
2G	2	348	NA	124

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 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 table-6	4233	3095	4214	3287
Speech Quality (Average MOS)	4.04	3.06	3.96	4.46
Number of samples with MOS >=4 to <5 (Excellent)	3690	0	3261	2898
Number of samples with MOS >=3 to <4 (Good)	465	2163	773	198
Number of samples with MOS >=2 to <3 (Fair)	46	691	129	66
Number of samples with MOS >=1 to <2 (Poor)	32	241	51	125
%age of samples with MOS >=4 to <5 (Excellent)	87.17%	0.00%	77.38%	88.17%
%age of samples with MOS >=3 to <4 (Good)	10.99%	69.89%	18.34%	6.02%
%age of samples with MOS >=2 to <3 (Fair)	1.09%	22.33%	3.06%	2.01%
%age of samples with MOS >=1 to <2 (Poor)	0.76%	7.79%	1.21%	3.80%

Table-8: Summary of speech quality (MOS) samples.
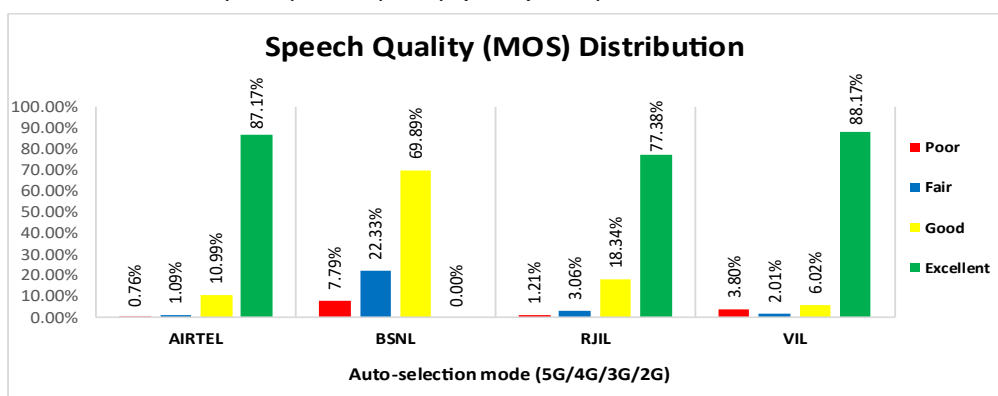
Figure- 4: Distribution of samples in MOS range.

(d) Inter-service provider voice call performance:
To check the performance of inter-service provider call setup success rate, total 55 to 64 inter operator calls were attempted at 2 hotspots. The Call setup success rate and call setup time observation is as below.

Call Setup Success Rate %				
From Service Provider	To Service Provider			
	AIRTEL	BSNL	RJIL	VIL
AIRTEL	NA	75.00	100.00	100.00
BSNL	96.67	NA	81.82	88.14
RJIL	100.00	77.97	NA	100.00
VIL	100.00	87.93	98.39	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	3.46	1.50	2.84
BSNL	8.41	NA	8.85	8.74
RJIL	1.80	3.42	NA	3.22
VIL	3.10	5.04	3.60	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**	98.64	1.71	186.29	27.34
	80th Percentile	163.84	4.58	301.41	43.69
	20th Percentile	26.90	0.01	32.82	10.91
Upload Throughput (Mbits/s)	**Average**	34.68	2.35	28.27	12.58
	80th Percentile	62.84	2.90	52.60	21.99
	20th Percentile	8.67	1.21	4.42	3.34
Latency (ms)	**50th Percentile**	46.70	47.05	18.20	36.08

Table-11: Summary of data performance in network auto-selection mode.
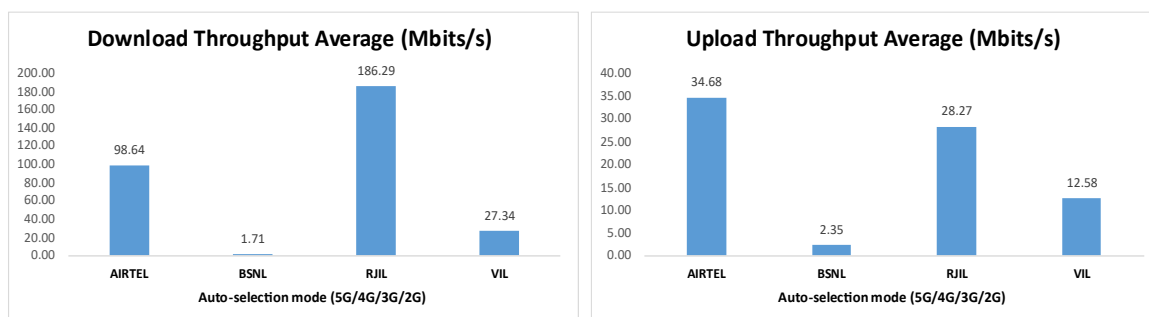
Figure- 5: Download and Upload throughput

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	809	NA
4G	1435	401	242	510
3G	NA	20	NA	NA
2G	6	62	NA	108

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 and Walk test 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 02nd April 2025 to 08th April 2025 in Districts of Bihar Sharif, Sheikhpura, Munger and Jamui and Patna city (Refer Table-1)

4.2.1 Drive test route
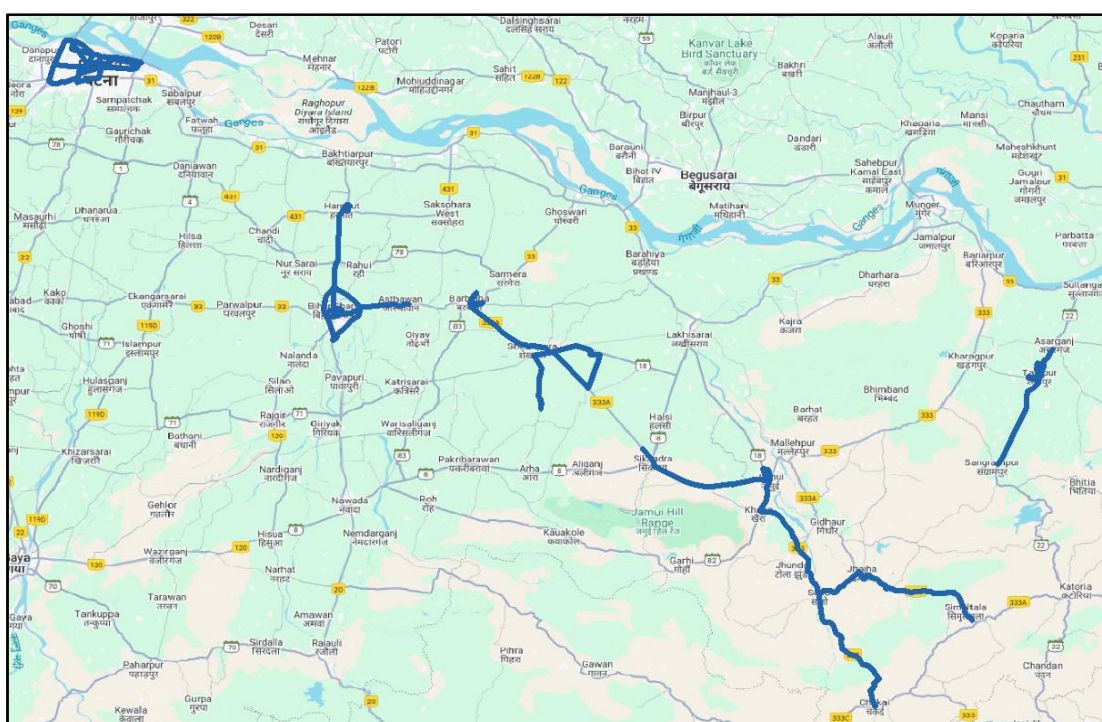
Figure- 6: Drive test routes

4.2.2 Areas covered

Nearby Pataliputra Colony, Rajendra Nagar, Mithapur, Harnaut, Bihar Sharif, Asthawan, Barbigha, Sheikhpura, Sirari, Chewara, Ariari, Sikandra, Jamui, Sono, Jhajha, Chakai, Simultala, Sangrampur, Tarapur, Asarganj 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	469	553	615
Call Setup Success Rate %	98.93	78.48	68.46
Drop Call Rate %	0.00	5.07	2.38
Call Setup Time-Average (Second)	5.85	2.68	3.46
Handover Success Rate %	99.54	95.58	98.93

Table-13: Summary of voice call performance in 3G/2G network mode only.
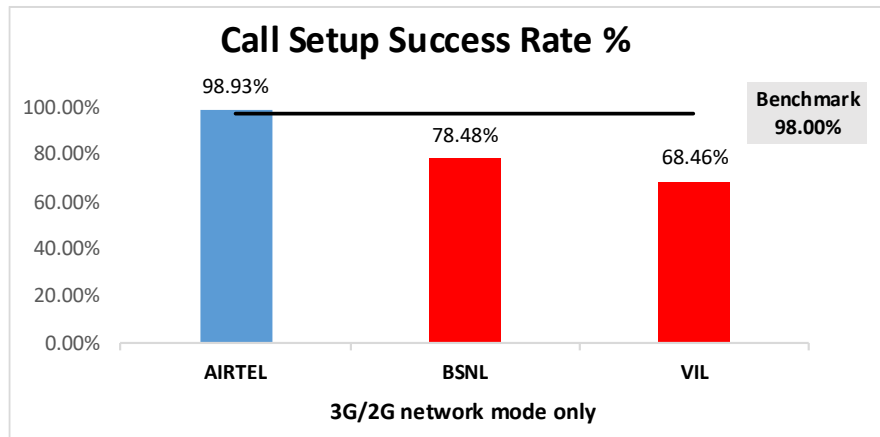
Figure-7: Performance for call setup success rate.
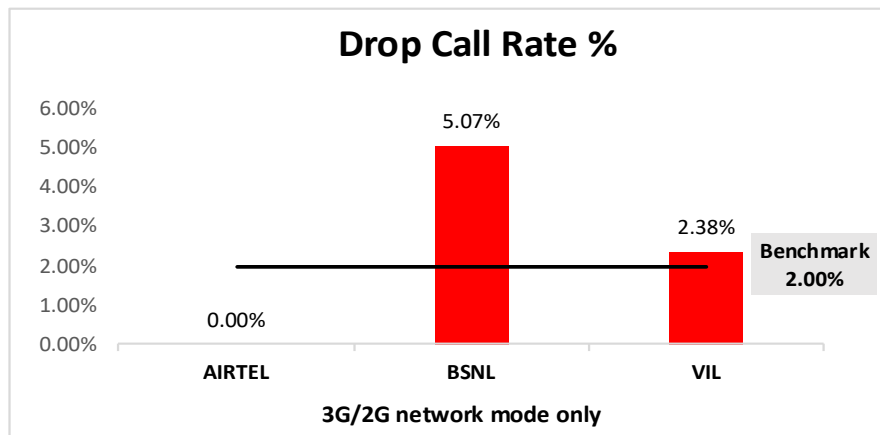
Figure-8: Performance for drop call rate.

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

Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	4.15%	NA
2G	99.94%	93.21%	99.32%
Limited Service	0.06%	2.64%	0.68%

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

Note-
- NA- Service provider doesn't provide services in respective technology.
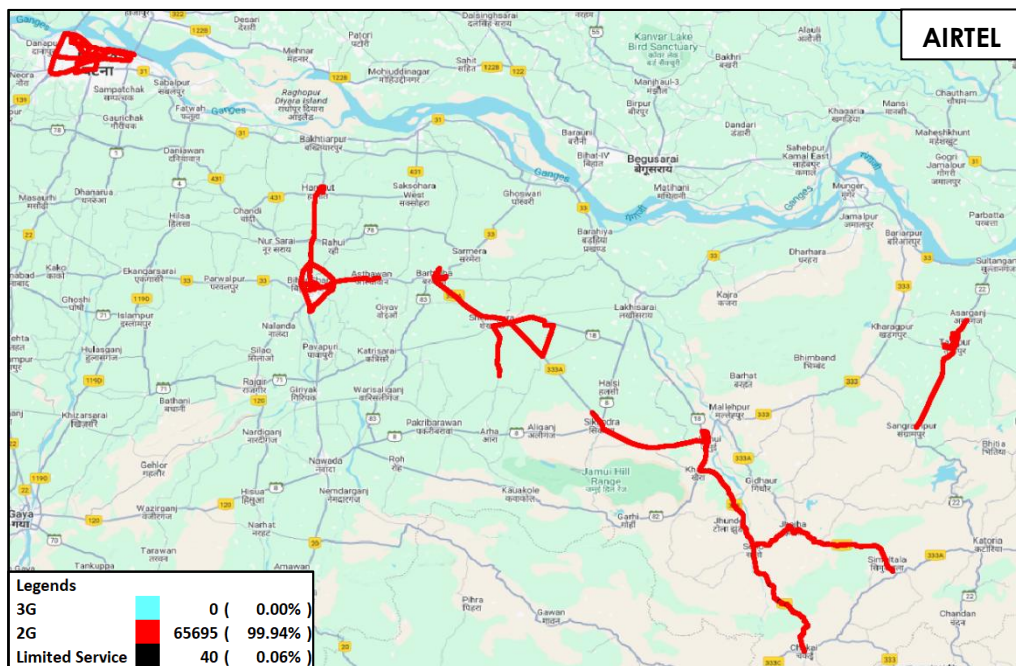
Figure-9: Serving technology plots 3G/2G network mode – AIRTEL
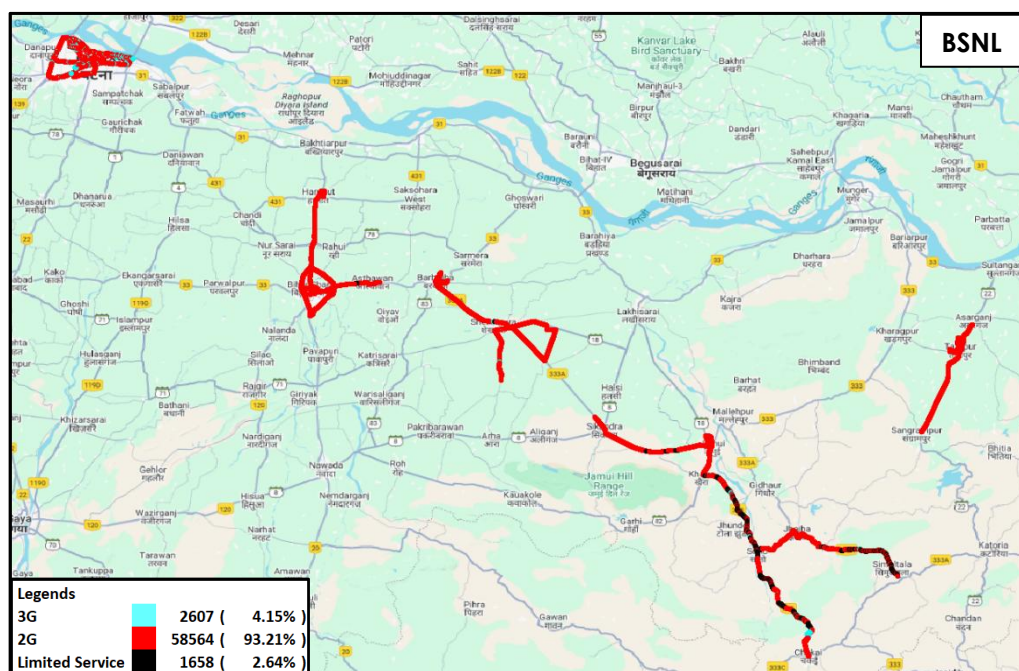
Figure-10: Serving technology plots 3G/2G network mode –BSNL.

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- 40, 41 & 42 for map view)
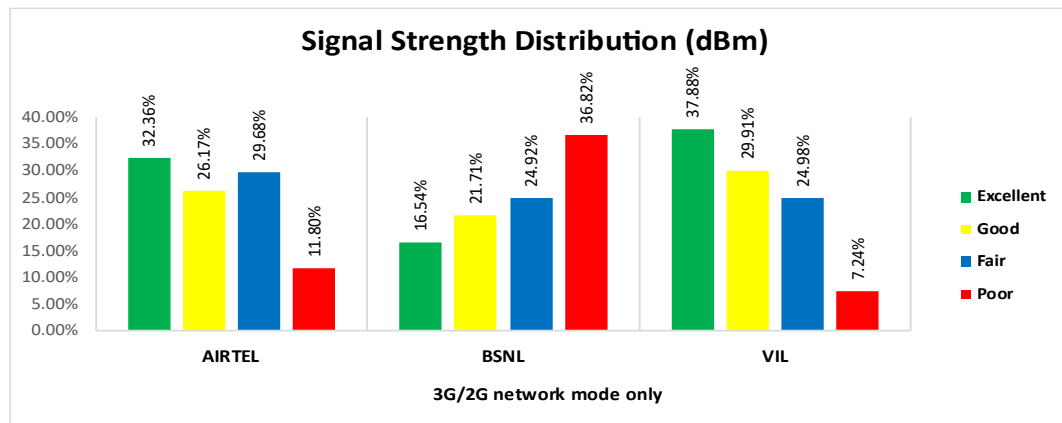
Figure-12: Signal strength distribution 3G/2G network mode only.

Observations:

- Airtel has 32% of samples falling in the excellent signal strength category.
- BSNL has 17% of samples falling in the excellent signal strength category.
- VIL has 38% 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	492	453	497	669
Call Setup Success Rate %	98.98	94.48	99.80	61.73
Drop Call Rate %	0.00	8.64	0.20	0.97
Call Setup Time Average (Second)	1.69	2.98	0.74	2.23
Handover Success Rate %	100.00	96.16	99.86	99.80

Table-15: Summary of voice call performance in network auto-selection mode.
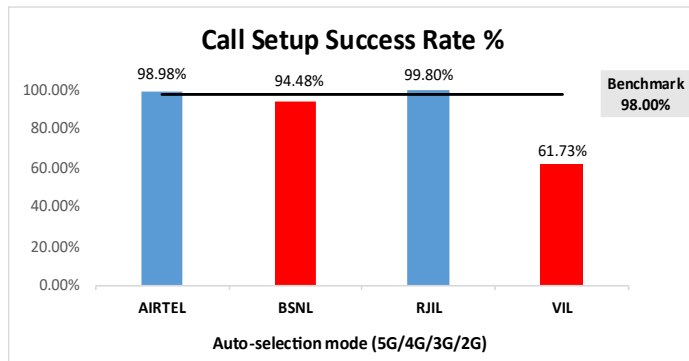
Figure-13: Performance for call setup success rate.
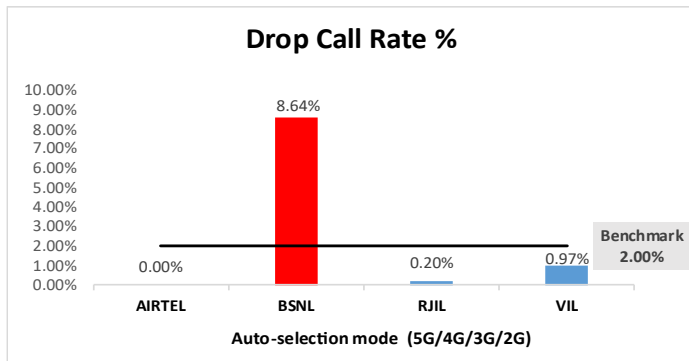
Figure-14: Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	475	382	478	386
Number of silence call for >4 Sec	4	NA	2	24
Silence Call Rate %	0.84	NA	0.42	6.22
Number of silence instances for >4 Sec	7	NA	3	29
Number of silence instances for >3 Sec	9	NA	8	55
Number of silence instances for >2 sec	16	NA	19	149
RTP Jitter (4G & 5G) in ms	4.08	NA	7.09	13.13
Packet loss Rate Downlink %	0.50	NA	0.33	2.45
Packet loss Rate Uplink %	0.35	NA	0.43	2.95

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 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	4233	3095	4214	3287
Speech Quality (Average MOS)	4.04	3.06	3.96	4.46
Number of samples with MOS >=4 to <5 (Excellent)	3690	0	3261	2898
Number of samples with MOS >=3 to <4 (Good)	465	2163	773	198
Number of samples with MOS >=2 to <3 (Fair)	46	691	129	66
Number of samples with MOS >=1 to <2 (Poor)	32	241	51	125
%age of samples with MOS >=4 to <5 (Excellent)	87.17%	0.00%	77.38%	88.17%
%age of samples with MOS >=3 to <4 (Good)	10.99%	69.89%	18.34%	6.02%
%age of samples with MOS >=2 to <3 (Fair)	1.09%	22.33%	3.06%	2.01%
%age of samples with MOS >=1 to <2 (Poor)	0.76%	7.79%	1.21%	3.80%

Table-17: Summary of speech quality (MOS) samples.
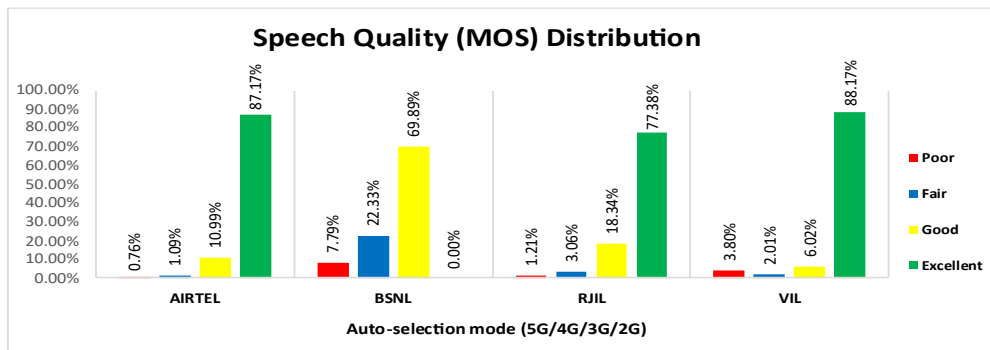
Figure-15: Distribution of samples in MOS range.

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

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	5.44%	NA	13.59%	NA
4G	94.50%	15.15%	86.41%	75.69%
3G	NA	2.38%	NA	NA
2G	0.06%	79.69%	NA	22.96%
Limited Service	0.01%	2.79%	0.00%	1.35%

Table-18: Time spent on technology during drive test.
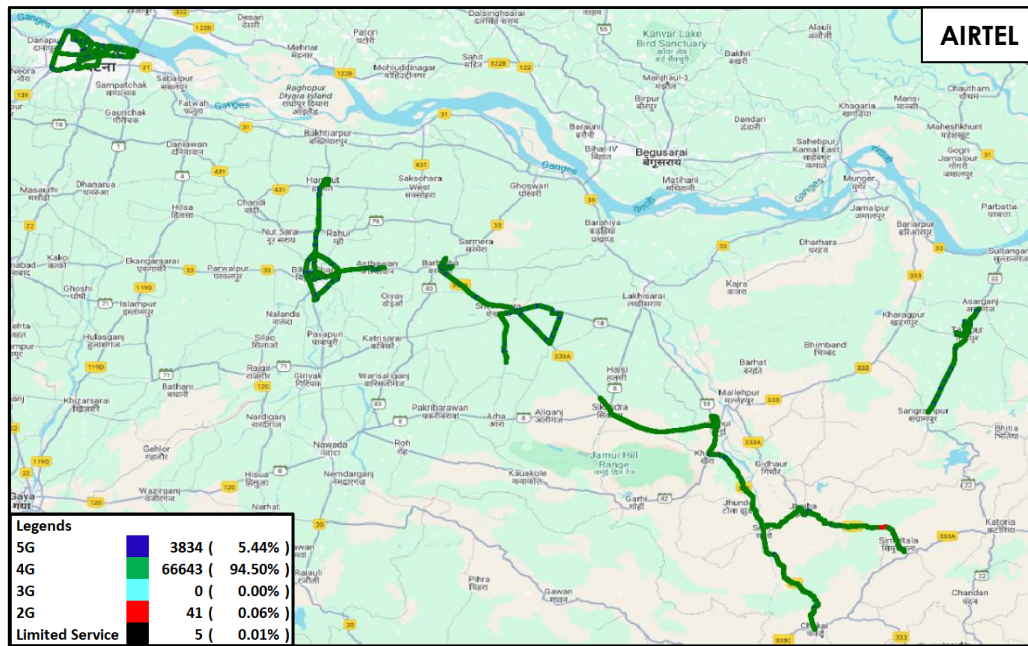
Figure-16: Serving technology plots in auto-selection mode (5G/4G/3G/2G) -AIRTEL.
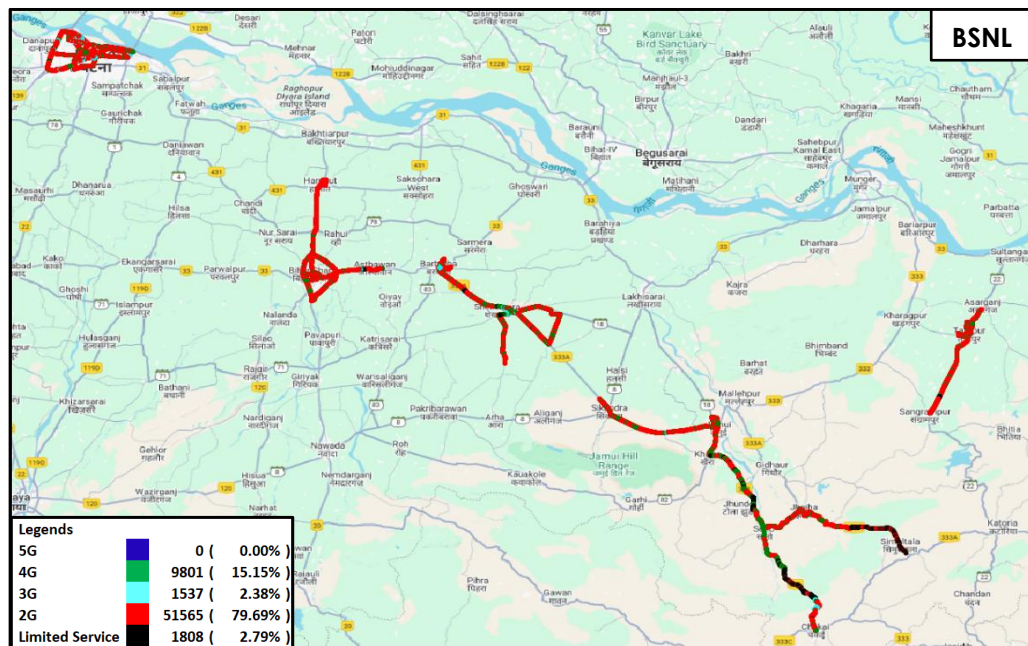
Figure-17: Serving technology plots in auto-selection mode (5G/4G/3G/2G) -BSNL.
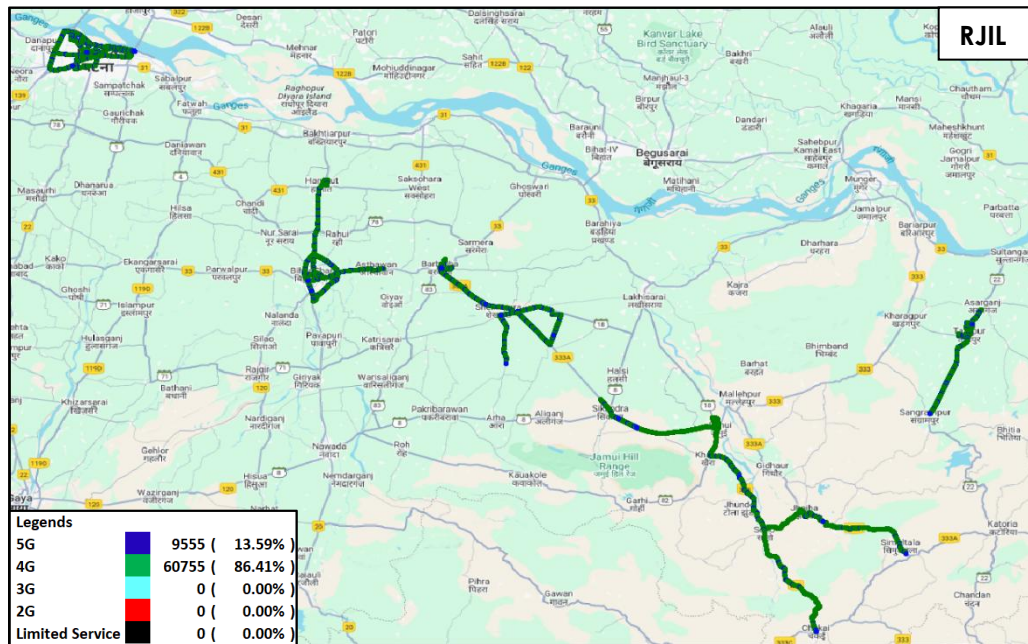
Figure-18: Serving technology plots in auto-selection mode (5G/4G/3G/2G)- RJIL.
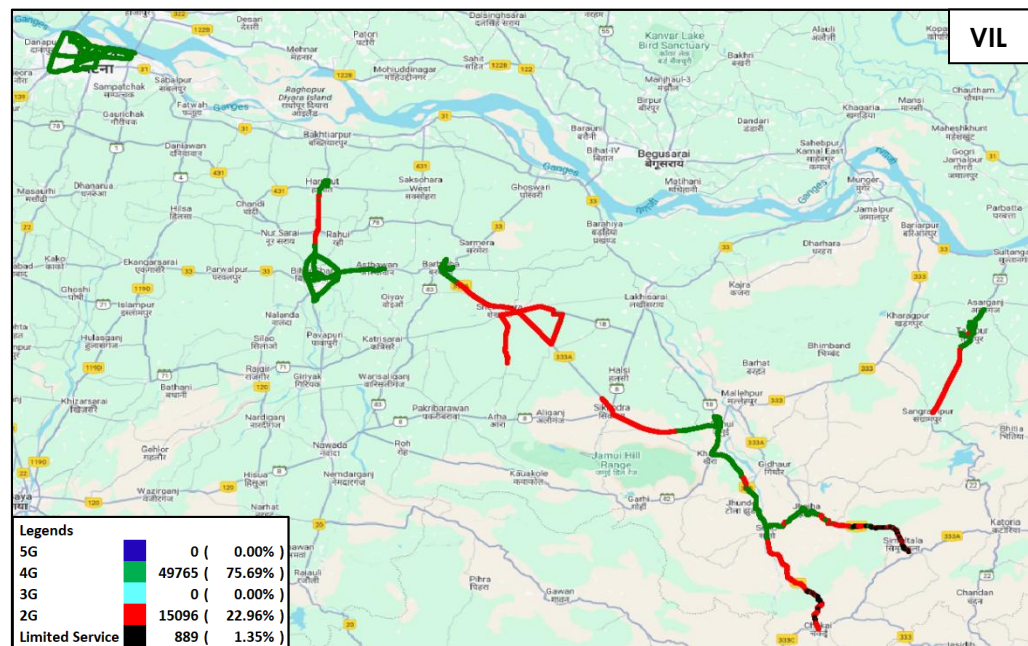
Figure-19: Serving technology plots in auto-selection mode (5G/4G/3G/2G) – VIL

(g) Network Signal Strength Distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-43, 44, 45 & 46 for map view)
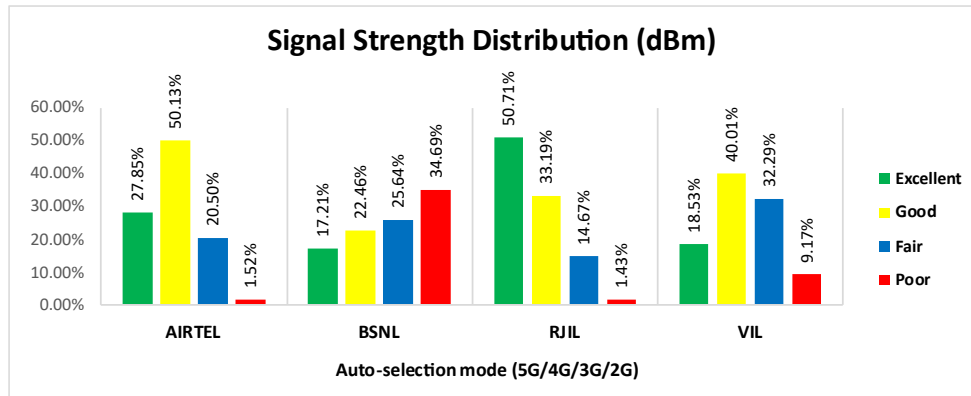
Figure-20: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

Observations:

- Airtel has 28% of samples falling in the excellent signal strength category.
- BSNL has 17% of samples falling in the excellent signal strength category.
- RJIL has 51% of samples falling in the excellent signal strength category.
- VIL has 19% of 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**	99.13	1.61	184.76	28.00
	80th Percentile	163.18	4.41	291.94	45.19
	20th Percentile	27.36	0.01	38.34	10.25
Upload Throughput (Mbits/s)	**Average**	35.67	2.45	29.71	12.96
	80th Percentile	63.31	3.35	54.94	22.23
	20th Percentile	9.91	1.21	4.94	3.45
Latency (ms)	**50th Percentile**	44.60	62.50	16.60	35.95

Table-19: Summary of Data performance in network auto-selection mode.
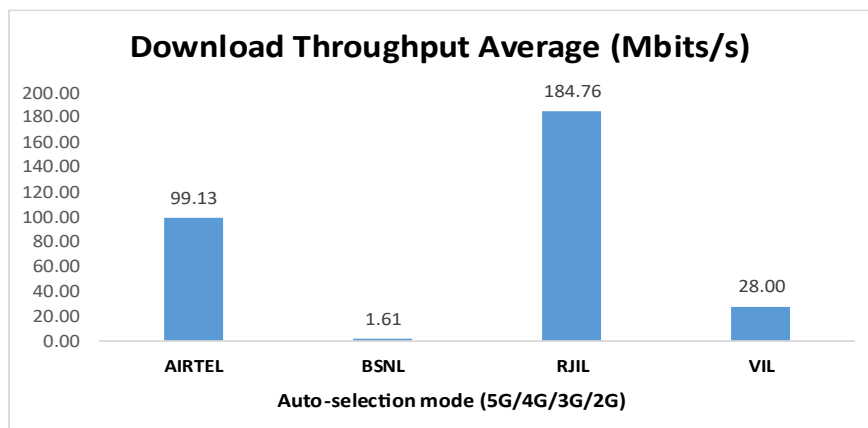
Figure- 21: Download throughput
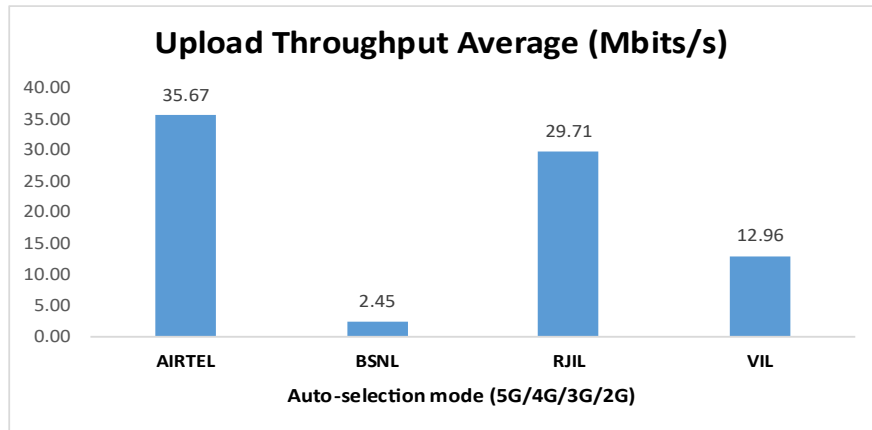
Figure- 22: Upload throughput

4.3 Hotspots

Hotspot testing have been done from 03rd April 2025 to 07th April 2025. Sixteen locations have been tested in Districts of Bihar Sharif, Sheikhpura, Munger and Jamui and Patna city.

4.3.1 Locations
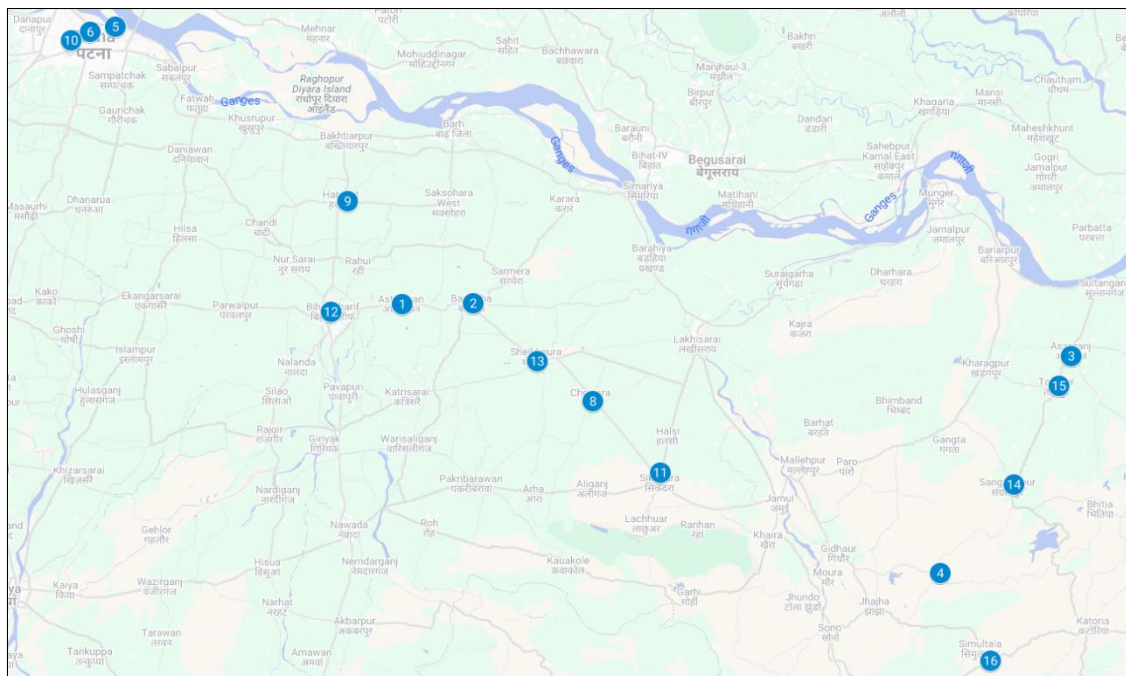
Figure- 23: Hotspot locations

4.3.2 Hotspot covered

1. Asthawan Block Office
2. Barbigha Block Office-Sheikhpura
3. K M College Sambhugunj Asarganj Rd-Dhandhi Belari
4. Middle School Sabaijor Math-Tola Sabaijor
5. NIT Patna
6. Patna Museum
7. Phalguni Prasad Yadav P P Y College Chakai
8. Primary Health Centre Chewara
9. R.P.S College Harnaut
10. Raj Bhawan
11. S.K College Lohanda Sikandra
12. Sadar Hospital Bihar Sharif
13. Sadar Hospital Sheikhpura
14. Sangrampur Police Station-Sangrampur
15. Tarapur Block Office-Tarapur
16. Telwa Bazar Bus Stop-Tola Siantanr

4.3.3 Voice performance

Overall Voice Performance				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	160	160	160	160
Call Setup Success Rate %	100.00	78.13	100.00	70.63
Drop Call Rate %	0.00	1.60	0.00	0.88
Call Setup Time-Average (Second)	1.94	2.69	0.59	2.15

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

Asthawan Block Office				
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	0.00	100.00	100.00
Drop Call Rate %	0.00	-	0.00	0.00
Call Setup Time-Average (Second)	1.78	-	0.64	1.95

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

> **Note**- "-" Call setup time & drop rate has not been reported as all calls were failed at this location.

Barbigha Block Office-Sheikhpura				
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)	1.75	2.15	0.55	1.63

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

K M College Sambhugunj Asarganj Rd-Dhandhi Belari				
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)	1.79	2.45	0.57	0.96

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

Middle School Sabaijor Math-Tola Sabaijor				
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	0.00	100.00	0.00
Drop Call Rate %	0.00	-	0.00	-
Call Setup Time-Average (Second)	1.63	-	0.64	-

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

> **Note**- "-" Call setup time & drop rate has not been reported as all calls were failed at this location.

NIT Patna				
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	10.00	0.00	0.00
Call Setup Time-Average (Second)	1.63	2.35	0.55	1.01

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

Patna Museum				
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)	5.30	2.36	0.53	1.50

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

Phalguni Prasad Yadav P P Y College Chakai				
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	90.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.73	1.87	0.59	3.72

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

Primary Health Centre Chewara				
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	0.00
Drop Call Rate %	0.00	0.00	0.00	-
Call Setup Time-Average (Second)	1.56	2.23	0.57	-

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

R.P.S College Harnaut				
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)	1.69	2.56	0.59	1.45

Table-29: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Raj Bhawan				
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	90.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	1.84	2.31	0.64	1.57

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

S.K College Lohanda Sikandra				
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	50.00
Drop Call Rate %	0.00	0.00	0.00	20.00
Call Setup Time-Average (Second)	1.68	1.78	0.58	8.63

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

Sadar Hospital Bihar Sharif				
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)	1.64	3.40	0.56	1.93

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

Sadar Hospital Sheikhpura				
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	80.00	100.00	0.00
Drop Call Rate %	0.00	0.00	0.00	-
Call Setup Time-Average (Second)	1.77	7.38	0.57	-

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

Note- "-" Call setup time & drop rate has not been reported as all calls were failed at this location.

Sangrampur Police Station-Sangrampur				
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	60.00	100.00	100.00
Drop Call Rate %	0.00	16.67	0.00	0.00
Call Setup Time-Average (Second)	1.70	2.76	0.56	3.81

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

Tarapur Block Office-Tarapur				
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)	1.72	2.34	0.65	0.99

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

Telwa Bazar Bus Stop-Tola Siantanr				
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	10.00	100.00	0.00
Drop Call Rate %	0.00	0.00	0.00	-
Call Setup Time-Average (Second)	1.77	3.04	0.60	-

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

> **Note**- "-" Call setup time & drop rate has not been reported as all calls were failed at this location.

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)	118.94	0.02	267.64	18.91
Download Throughput 80th Percentile (Mbit/s)	197.04	0.03	455.26	26.20
Download Throughput 20th Percentile (Mbit/s)	40.69	0.00	51.31	11.27
Download Session Setup Success Rate %	86.25	55.00	98.75	76.56
Upload Throughput Average (Mbits/s)	30.59	1.12	25.73	7.11
Upload Throughput 80th Percentile (Mbit/s)	57.38	1.23	46.47	9.92
Upload Throughput 20th Percentile (Mbit/s)	3.16	1.21	4.27	0.59
Upload Session Setup Success Rate %	92.50	57.50	100.00	70.37
Web Browsing Delay (Second)	1.96	2.11	2.11	3.75
Youtube Initial Buffer Delay (Second)	1.15	-	0.90	2.05
Latency (ms) - 50th Percentile	48.05	43.00	19.40	36.25
Jitter (ms)	11.99	412.41	6.45	40.21
Packet Loss Rate%	6.58	62.33	0.36	44.00
Packet Loss Rate- 90th percentile	22.85	100.00	0.75	100.00

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

> **Note**-"-" Youtube tests were failed.

Asthawan Block Office				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	99.30	0.00	155.81	23.24
Download Session Setup Success Rate %	100.00	20.00	100.00	100.00
Upload Throughput Average (Mbits/s)	60.44	1.21	38.37	8.84
Upload Session Setup Success Rate %	100.00	40.00	100.00	100.00
Web Browsing Delay (Second)	1.77	2.17	1.62	2.11
Youtube Initial Buffer Delay (Second)	0.78	-	0.70	0.80
Latency (ms) - 50th Percentile	37.40	-	13.70	30.90
Jitter (ms)	2.56	-	10.75	2.61
Packet Loss Rate%	1.00	100.00	0.30	0.30

Table-38: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note-"-" Youtube & latency test were failed.

Barbigha Block Office-Sheikhpura				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	66.34	0.02	510.30	34.47
Download Session Setup Success Rate %	80.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	51.78	1.22	58.58	30.44
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	1.63	3.62	1.55	1.97
Youtube Initial Buffer Delay (Second)	0.80	-	0.67	0.79
Latency (ms) - 50th Percentile	45.15	123.50	14.30	37.05
Jitter (ms)	6.86	120.92	3.73	1.62
Packet Loss Rate%	1.50	85.90	0.00	0.00

Table-39: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note-"-" Youtube tests were failed.

K M College Sambhugunj Asarganj Rd-Dhandhi Belari				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	219.58	0.03	293.21	21.98
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	54.22	1.22	15.54	4.21
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	1.26	0.48	1.47	3.13
Youtube Initial Buffer Delay (Second)	0.57	-	0.71	0.91
Latency (ms) - 50th Percentile	38.95	38.25	18.20	38.25
Jitter (ms)	4.01	13.94	2.96	3.74
Packet Loss Rate%	0.00	1.00	0.00	0.40

Table-40: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G)

Note-"-" Youtube tests were failed.

Middle School Sabaijor Math-Tola Sabaijor				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	17.34	-	26.90	-
Download Session Setup Success Rate %	80.00	0.00	100.00	0.00
Upload Throughput Average (Mbits/s)	3.43	-	0.98	-
Upload Session Setup Success Rate %	100.00	0.00	100.00	0.00
Web Browsing Delay (Second)	1.81	-	5.84	-
Youtube Initial Buffer Delay (Second)	1.12	-	4.00	-
Latency (ms) - 50th Percentile	57.00	-	25.20	-
Jitter (ms)	8.58	-	15.10	-
Packet Loss Rate%	0.20	100.00	0.20	100.00

Table-41: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note-"-" All data tests were failed.

NIT Patna				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	163.66	0.03	56.17	15.58
Download Session Setup Success Rate%	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	44.76	1.21	3.18	3.43
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	1.60	0.40	1.56	4.05
Youtube Initial Buffer Delay (Second)	0.97	-	2.28	2.19
Latency (ms)- 50th Percentile	43.50	32.88	15.50	39.05
Jitter (ms)	3.24	16.27	8.80	9.01
Packet Loss Rate%	0.00	5.90	0.10	0.50

Table-42: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note-"-" Youtube tests were failed.

Patna Museum				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	232.24	0.00	471.68	10.25
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	27.09	1.24	50.44	6.27
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	1.24	5.34	1.50	4.06
Youtube Initial Buffer Delay (Second)	1.11	-	0.65	1.89
Latency (ms)- 50th Percentile	35.10	30.50	12.00	30.80
Jitter (ms)	9.19	17.51	3.48	4.84
Packet Loss Rate%	0.20	40.10	0.00	0.50

Table-43: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note-"-" Youtube tests were failed.

Phalguni Prasad Yadav P P Y College Chakai				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	91.76	0.03	509.60	-
Download Session Setup Success Rate%	60.00	40.00	100.00	0.00
Upload Throughput Average (Mbits/s)	33.88	1.24	42.00	-
Upload Session Setup Success Rate %	80.00	40.00	100.00	0.00
Web Browsing Delay (Second)	1.91	0.45	1.86	-
Youtube Initial Buffer Delay (Second)	0.80	-	0.82	-
Latency (ms)- 50th Percentile	47.20	38.05	21.50	-
Jitter (ms)	3.13	15.84	3.71	-
Packet Loss Rate%	0.00	13.80	0.00	100.00

Table-44: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note-"-" All data tests were failed in VIL & Youtube test were failed in BSNL.

Primary Health Centre Chewara				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	98.97	0.00	521.24	0.00
Download Session Setup Success Rate%	100.00	100.00	100.00	50.00
Upload Throughput Average (Mbits/s)	49.45	1.22	46.21	0.06
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.17	4.07	1.67	12.07
Youtube Initial Buffer Delay (Second)	0.74	-	0.64	-
Latency (ms)- 50th Percentile	40.65	37.25	23.65	661.00
Jitter (ms)	3.19	8.75	3.67	458.64
Packet Loss Rate%	0.00	38.20	0.00	100.00

Table-45: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note-"-"Youtube tests were failed.

R.P.S College Harnaut				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	150.14	-	387.43	23.22
Download Session Setup Success Rate%	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	10.34	-	16.35	5.67
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	1.63	-	1.79	-
Youtube Initial Buffer Delay (Second)	0.90	-	1.02	0.80
Latency (ms)- 50th Percentile	88.00	-	31.45	32.65
Jitter (ms)	20.77	-	4.38	3.19
Packet Loss Rate%	46.90	100.00	1.20	0.60

Table-46: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note-"-" All data tests were failed in BSNL & web browsing test were failed in VIL.

Raj Bhawan				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	17.93	0.01	5.11	16.18
Download Session Setup Success Rate%	80.00	20.00	100.00	100.00
Upload Throughput Average (Mbits/s)	1.44	1.27	1.01	3.05
Upload Session Setup Success Rate %	100.00	20.00	100.00	100.00
Web Browsing Delay (Second)	6.51	1.97	6.07	3.30
Youtube Initial Buffer Delay (Second)	8.29	-	-	4.79
Latency (ms)- 50th Percentile	62.50	123.00	23.98	35.53
Jitter (ms)	27.07	3276.23	9.46	9.69
Packet Loss Rate%	3.70	76.00	0.30	0.90

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

Note-"-" Youtube tests were failed.

S.K College Lohanda Sikandra				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	176.12	0.00	264.27	-
Download Session Setup Success Rate%	40.00	100.00	100.00	0.00
Upload Throughput Average (Mbits/s)	28.15	1.22	4.74	0.05
Upload Session Setup Success Rate %	40.00	100.00	100.00	20.00
Web Browsing Delay (Second)	1.74	2.80	1.50	-
Youtube Initial Buffer Delay (Second)	0.72	-	0.80	-
Latency (ms)- 50th Percentile	82.50	32.60	14.80	-
Jitter (ms)	19.80	484.12	4.76	-
Packet Loss Rate%	40.10	44.70	0.00	100.00

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

Note-"-" All data tests were failed except upload in VIL & Youtube test were failed in BSNL.

Sadar Hospital Bihar Sharif				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	65.30	0.02	53.01	11.33
Download Session Setup Success Rate%	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	24.50	1.22	6.52	8.43
Upload Session Setup Success Rate %	100.00	80.00	100.00	100.00
Web Browsing Delay (Second)	1.48	1.67	1.45	-
Youtube Initial Buffer Delay (Second)	1.02	-	0.76	3.04
Latency (ms)- 50th Percentile	44.50	276.50	15.80	38.10
Jitter (ms)	3.30	375.69	4.27	2.73
Packet Loss Rate%	0.00	90.40	0.00	0.80

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

Note-"-" Web Browsing and Youtube tests were failed.

Sadar Hospital Sheikhpura				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	223.71	-	378.52	0.00
Download Session Setup Success Rate%	100.00	0.00	80.00	25.00
Upload Throughput Average (Mbits/s)	73.45	-	31.08	0.06
Upload Session Setup Success Rate %	100.00	0.00	100.00	40.00
Web Browsing Delay (Second)	1.56	-	1.53	-
Youtube Initial Buffer Delay (Second)	0.67	-	0.82	-
Latency (ms)- 50th Percentile	47.40	14470.75	21.65	-
Jitter (ms)	1.93	1277.55	2.07	-
Packet Loss Rate%	0.10	100.00	0.00	100.00

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

Note-"-" Web browsing & Youtube test were failed in BSNL & VIL and Download & Upload test were failed in BSNL.

Sangrampur Police Station-Sangrampur				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	46.26	0.01	211.93	0.00
Download Session Setup Success Rate%	40.00	60.00	100.00	25.00
Upload Throughput Average (Mbits/s)	14.16	0.03	59.64	0.04
Upload Session Setup Success Rate %	60.00	80.00	100.00	80.00
Web Browsing Delay (Second)	2.40	2.30	1.65	-
Youtube Initial Buffer Delay (Second)	1.07	-	0.66	-
Latency (ms)- 50th Percentile	63.50	2552.00	19.50	-
Jitter (ms)	15.28	198.33	3.81	-
Packet Loss Rate%	1.10	100.00	0.00	100.00

Table-51: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G)

Note-"-" Youtube & latency test were failed.

Tarapur Block Office-Tarapur				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	150.51	0.03	320.67	29.10
Download Session Setup Success Rate%	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	1.76	1.22	31.45	10.64
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	3.34	2.00	1.39	-
Youtube Initial Buffer Delay (Second)	3.14	-	0.73	3.28
Latency (ms)- 50th Percentile	56.50	36.03	18.70	32.25
Jitter (ms)	18.53	3.21	19.78	3.60
Packet Loss Rate%	5.60	1.20	3.60	0.00

Table-52: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Note-"-" Web Browsing and Youtube tests were failed.

Telwa Bazar Bus Stop-Tola Siantanr				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average (Mbits/s)	12.64	-	138.53	-
Download Session Setup Success Rate%	100.00	0.00	100.00	0.00
Upload Throughput Average (Mbits/s)	3.20	-	5.62	-
Upload Session Setup Success Rate %	100.00	0.00	100.00	0.00
Web Browsing Delay (Second)	1.73	-	1.89	-
Youtube Initial Buffer Delay (Second)	2.15	-	0.97	-
Latency (ms)- 50th Percentile	65.00	-	21.25	-
Jitter (ms)	44.27	-	2.50	-
Packet Loss Rate%	4.90	100.00	0.00	100.00

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

Note-"-" All data tests were failed.

4.3.5 Data performance (5G Only & 4G Only Download & Upload Speed)

Overall Data Performance					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	**Download Throughput Average (Mbits/s)**	154.13	-	255.46	-
	Upload Throughput Average (Mbits/s)	41.83	-	33.68	-
4G	**Download Throughput Average (Mbits/s)**	66.08	6.39	51.08	24.07
	Upload Throughput Average (Mbits/s)	15.34	10.96	12.00	18.33

Table-54: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Asthawan Block Office					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	**Download Throughput Average (Mbits/s)**	113.09	-	158.25	-
	Upload Throughput Average (Mbits/s)	70.72	-	36.19	-
4G	**Download Throughput Average (Mbits/s)**	58.40	-	32.70	24.58
	Upload Throughput Average (Mbits/s)	5.01	-	8.73	12.99

Table-55: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Barbigha Block Office-Sheikhpura					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	**Download Throughput Average (Mbits/s)**	71.69	-	437.82	-
	Upload Throughput Average (Mbits/s)	74.36	-	31.87	-
4G	**Download Throughput Average (Mbits/s)**	58.21	6.51	124.42	34.04
	Upload Throughput Average (Mbits/s)	18.67	1.58	40.08	34.23

Table-56: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

	K M College Sambhugunj Asarganj Rd-Dhandhi Belari				
	Parameters	**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	219.58	-	254.55	-
	Upload Throughput Average (Mbits/s)	54.22	-	15.97	-
4G	Download Throughput Average (Mbits/s)	127.51	5.59	28.49	31.24
	Upload Throughput Average (Mbits/s)	22.85	13.79	5.23	19.89

Table-57: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

	Middle School Sabaijor Math-Tola Sabaijor				
	Parameters	**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	-	-	-	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	-	-	36.06	-
	Upload Throughput Average (Mbits/s)	-	-	1.85	-

Table-58: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

	NIT Patna				
	Parameters	**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	163.66	-	186.31	-
	Upload Throughput Average (Mbits/s)	44.76	-	10.19	-
4G	Download Throughput Average (Mbits/s)	96.27	6.48	38.32	16.59
	Upload Throughput Average (Mbits/s)	11.89	8.65	3.52	7.38

Table-59: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

	Patna Museum				
	Parameters	**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	232.24	-	469.34	-
	Upload Throughput Average (Mbits/s)	27.09	-	70.94	-
4G	Download Throughput Average (Mbits/s)	74.11	6.70	113.15	31.69
	Upload Throughput Average (Mbits/s)	18.97	6.54	32.92	32.17

Table-60: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

	Phalguni Prasad Yadav P P Y College Chakai				
	Parameters	**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	91.76	-	543.46	-
	Upload Throughput Average (Mbits/s)	33.88	-	46.75	-
4G	Download Throughput Average (Mbits/s)	18.47	5.25	33.75	-
	Upload Throughput Average (Mbits/s)	3.84	14.87	6.69	-

Table-61: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Primary Health Centre Chewara					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	99.72	-	423.21	-
	Upload Throughput Average (Mbits/s)	56.55	-	44.58	-
4G	Download Throughput Average (Mbits/s)	94.83	5.42	31.25	-
	Upload Throughput Average (Mbits/s)	21.23	12.63	9.78	-

Table-62: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

R.P.S College Harnaut					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	150.14	-	501.69	-
	Upload Throughput Average (Mbits/s)	12.17	-	79.39	-
4G	Download Throughput Average (Mbits/s)	50.22	-	90.61	3.91
	Upload Throughput Average (Mbits/s)	19.60	-	15.11	12.71

Table-63: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Raj Bhawan					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	20.98	-	0.90	-
	Upload Throughput Average (Mbits/s)	1.50	-	2.60	-
4G	Download Throughput Average (Mbits/s)	6.04	5.09	19.25	16.87
	Upload Throughput Average (Mbits/s)	1.33	4.09	1.35	6.09

Table-64: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

S.K College Lohanda Sikandra					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	176.12	-	66.58	-
	Upload Throughput Average (Mbits/s)	25.91	-	17.49	-
4G	Download Throughput Average (Mbits/s)	25.38	8.17	30.15	-
	Upload Throughput Average (Mbits/s)	9.81	12.54	3.83	-

Table-65: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Sadar Hospital Bihar Sharif					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	74.37	-	36.86	-
	Upload Throughput Average (Mbits/s)	33.10	-	7.13	-
4G	Download Throughput Average (Mbits/s)	66.37	6.23	9.55	13.65
	Upload Throughput Average (Mbits/s)	11.79	11.86	5.42	11.35

Table-66: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Sadar Hospital Sheikhpura					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	223.71	-	91.21	-
	Upload Throughput Average (Mbits/s)	73.45	-	31.10	-
4G	Download Throughput Average (Mbits/s)	95.65	-	108.34	-
	Upload Throughput Average (Mbits/s)	23.37	-	20.24	-

Table-67: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Sangrampur Police Station-Sangrampur					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	-	-	171.11	-
	Upload Throughput Average (Mbits/s)	-	-	63.33	-
4G	Download Throughput Average (Mbits/s)	87.44	-	65.41	-
	Upload Throughput Average (Mbits/s)	20.80	-	26.46	-

Table-68: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Tarapur Block Office-Tarapur					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	184.64	-	294.89	-
	Upload Throughput Average (Mbits/s)	2.28	-	35.49	-
4G	Download Throughput Average (Mbits/s)	122.23	8.47	48.10	44.05
	Upload Throughput Average (Mbits/s)	28.59	23.02	9.56	28.14

Table-69: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

Telwa Bazar Bus Stop-Tola Siantanr					
Parameters		**Service Provider**			
		AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	Download Throughput Average (Mbits/s)	-	-	176.29	-
	Upload Throughput Average (Mbits/s)	-	-	12.16	-
4G	Download Throughput Average (Mbits/s)	10.10	-	4.08	-
	Upload Throughput Average (Mbits/s)	11.63	-	1.22	-

Table-70: Overall Summary of 5G only & 4G only data download & upload speed.

Note- "-"Respective technology was not observed during the test.

4.4 Walk Test

Walk Test has been conducted on 01st April 2025. Five locations have been tested in Patna city.

4.4.1 Walk test locations
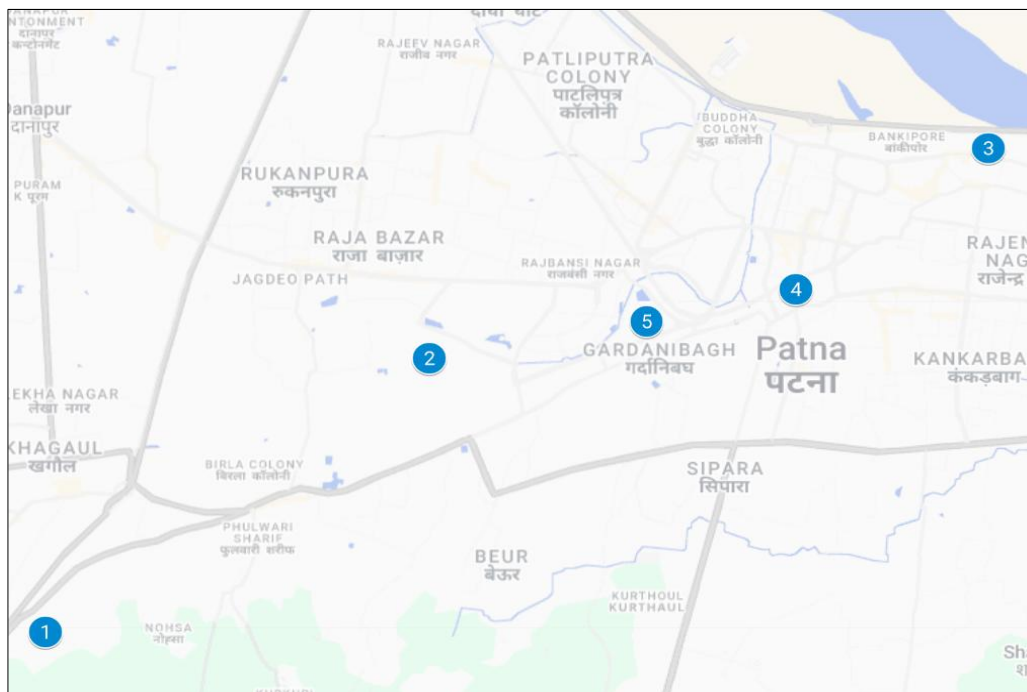
Figure-24: Walk Test locations.

4.4.2 Walk Test Covered

1. AIIMS Patna
2. Patna Airport
3. Patna Medical College & Hospital
4. Patna Railway Jn
5. Patna Secretariat

4.4.3 Voice Performance

i) AIIMS Patna

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

AIIMS Patna				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	8	8	7	9
Call Setup Success Rate %	100.00	100.00	100.00	88.89
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Sec)	1.69	2.42	0.67	2.15
Handover Success Rate %	100.00	100.00	100.00	100.00

Table-71: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).
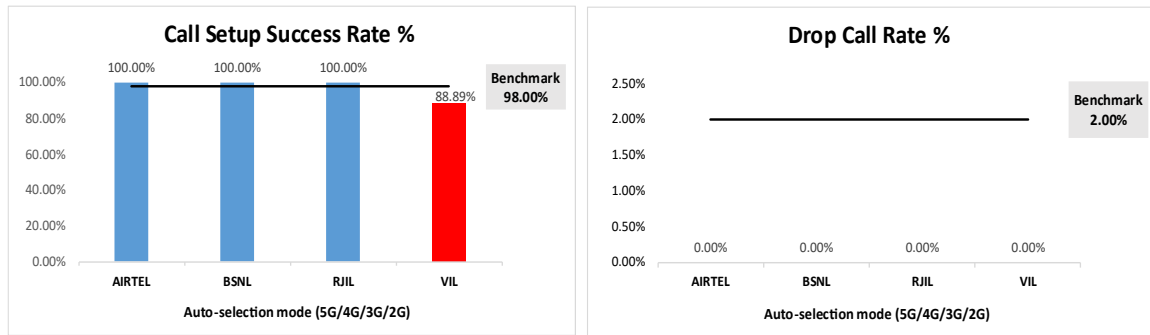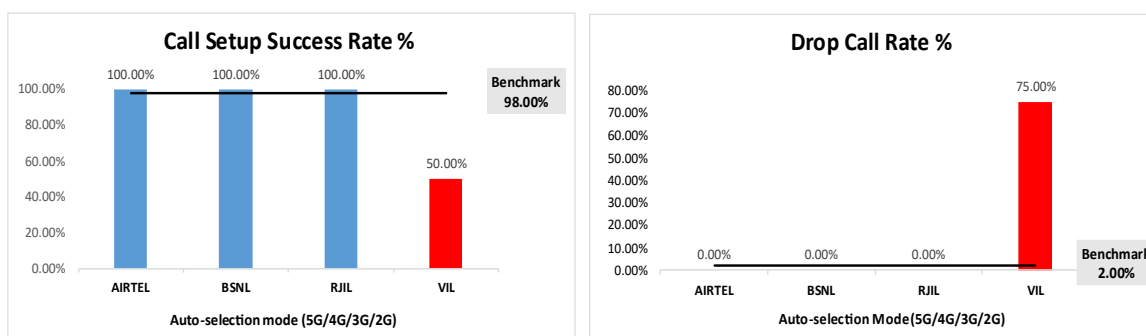
Figure-25: Performance for call setup success rate and drop call rate

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

AIIMS Patna				
Technology	**Service Provider**			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	0.00%	NA	14.56%	NA
4G	100.00%	13.16%	85.44%	73.45%
3G	NA	0.70%	NA	NA
2G	0.00%	86.05%	NA	22.06%
Limited service	0.00%	0.09%	0.00%	2.87%

Table-72: Time spent on technology during Walk test.

(c) Network Signal Strength distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G).
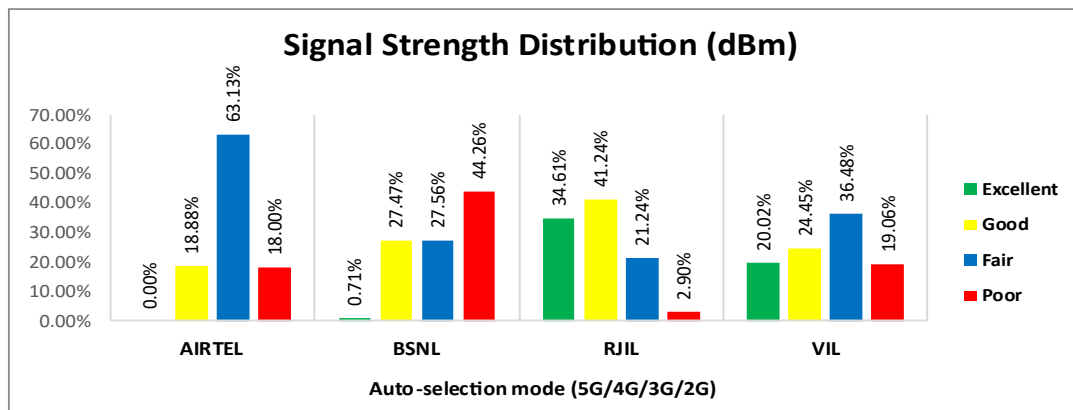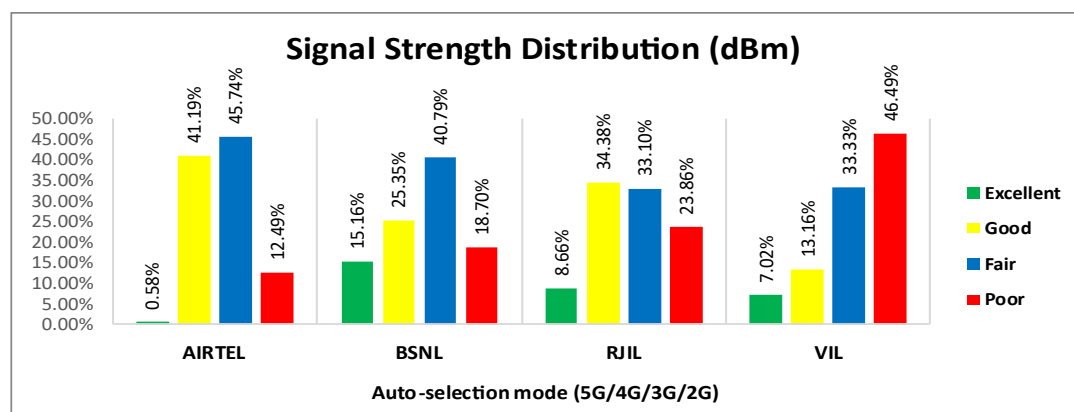

Figure-26: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

ii) Patna Airport

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

Patna Airport				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	7	7	7	7
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 (Sec)	1.65	2.47	0.73	1.62
Handover Success Rate %	100.00	100.00	100.00	100.00

Table-73: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).
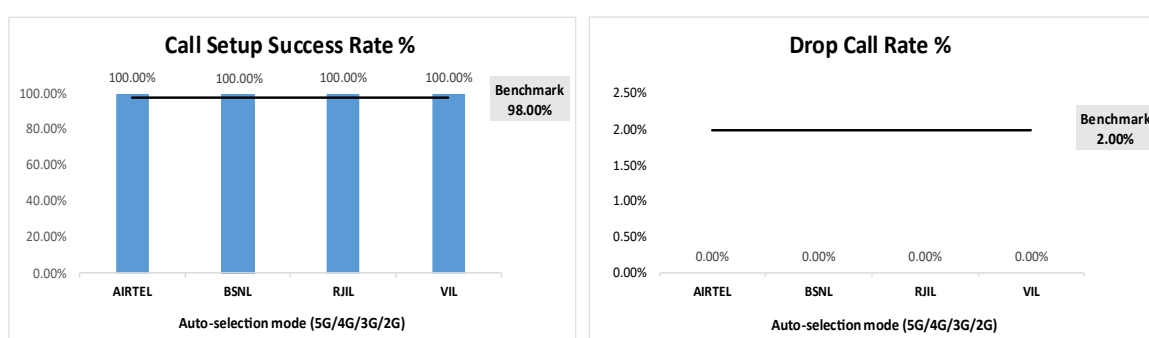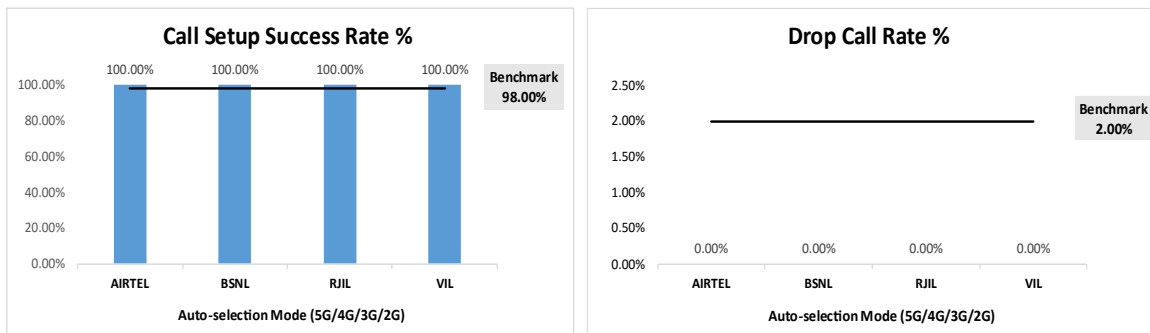

Figure- 27: Performance for call setup success rate and drop call rate.

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

Patna Airport				
Technology	**Service Provider**			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	0.40%	NA	15.05%	NA
4G	99.60%	0.00%	84.95%	79.00%
3G	NA	0.83%	NA	NA
2G	0.00%	99.17%	NA	21.00%
Limited service	0.00%	0.00%	0.00%	0.00%

Table-74: Time spent on technology during Walk test.

(c) Network Signal Strength distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G)
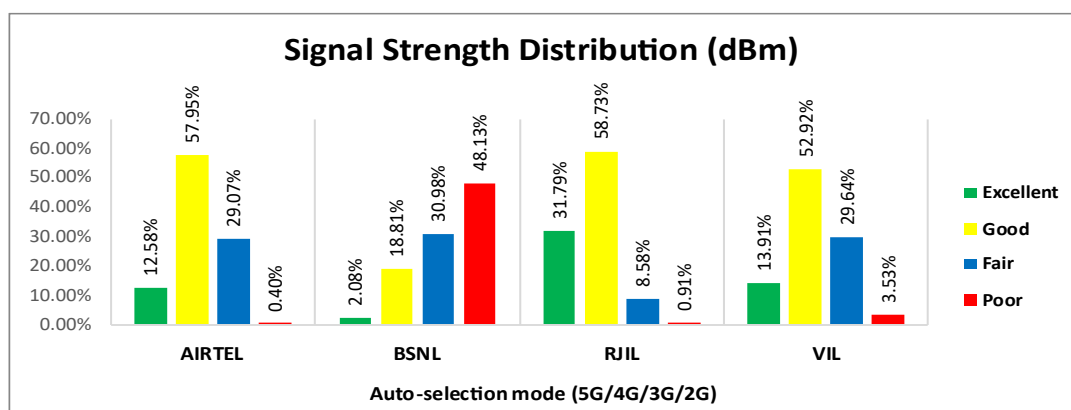
Figure-28: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

iii) Patna Medical College & Hospital
(a) Voice Call Performance in auto network selection mode (5G/4G/3G/2G)

Patna Medical College & Hospital				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	6	5	5	8
Call Setup Success Rate %	100.00	100.00	100.00	50.00
Drop Call Rate %	0.00	0.00	0.00	75.00
Call Setup Time-Average (Sec)	3.57	2.29	2.75	3.80
Handover Success Rate %	100.00	100.00	98.00	100.00

**Table-75:** Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Figure- 29: Performance for call setup success rate and drop call rate.

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

Patna Medical College & Hospital				
Technology	**Service Provider**			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	3.22%	NA	7.64%	NA
4G	96.78%	9.66%	91.53%	37.06%
3G	NA	3.64%	NA	4.37%
2G	0.00%	86.27%	NA	50.65%
Limited service	0.00%	0.42%	0.83%	7.93%

Table-76: Time spent on technology during Walk test.

(c) Network Signal Strength distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G)
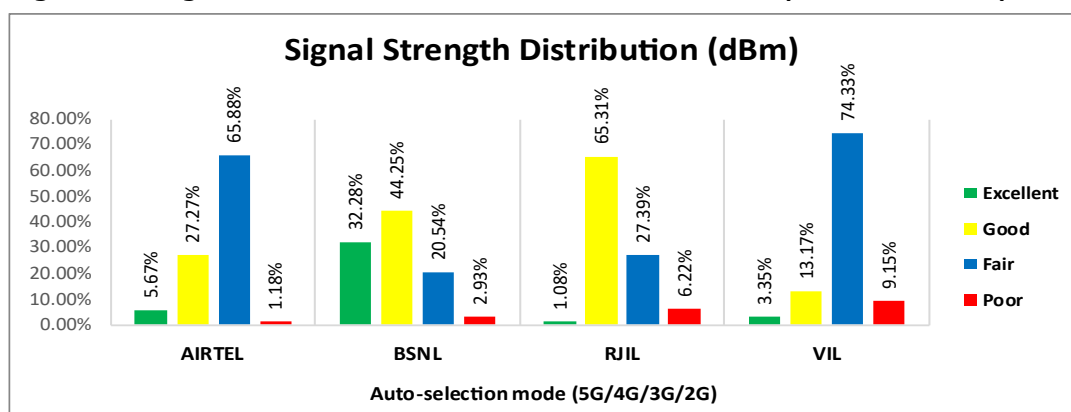

Figure-30: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

iv) Patna Railway Junction

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

Patna Railway Junction				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	9	9	9	9
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 (Sec)	1.76	2.24	0.61	1.53
Handover Success Rate %	100.00	100.00	100.00	100.00

Table-77: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).

Figure- 31: Performance for call setup success rate and drop call rate.

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

Patna Railway Junction				
Technology	**Service Provider**			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	0.15%	NA	16.46%	NA
4G	99.85%	8.72%	83.54%	100.00%
3G	NA	6.54%	NA	0.00%
2G	0.00%	84.74%	NA	0.00%
Limited service	0.00%	0.00%	0.00%	0.00%

Table-78: Time spent on technology during Walk test.

(c) Network Signal Strength distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G).**Figure-32:**
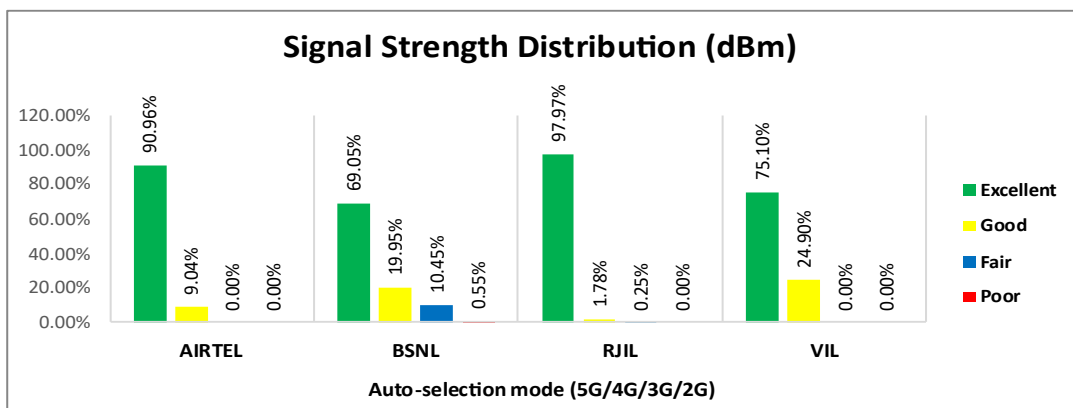
Signal strength distribution auto-selection mode 5G/4G/3G/2G.

v) Patna Secretariat

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

Patna Secretariat				
Parameters	**Service Provider**			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Call Attempt	6	6	6	7
Call Setup Success Rate %	100.00	100.00	100.00	85.71
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Sec)	1.62	2.43	0.67	1.64
Handover Success Rate %	100.00	100.00	100.00	100.00

Table-79: Summary of voice call performance in network auto-selection mode (5G/4G/3G/2G).
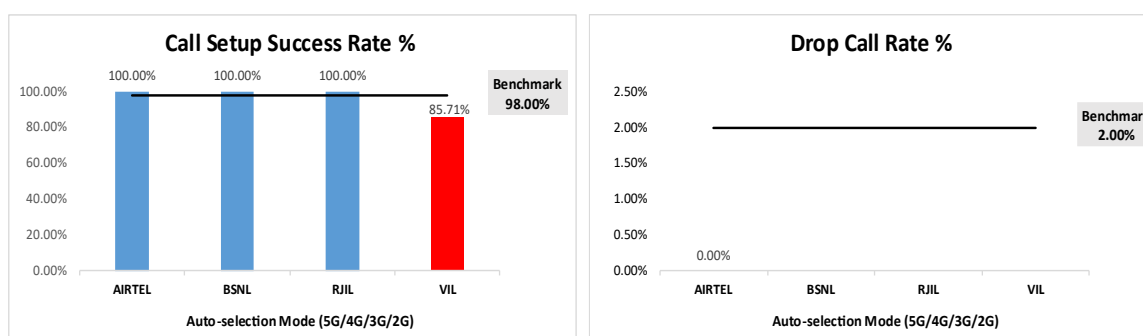
Figure- 33: Performance for call setup success rate and drop call rate.

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

Patna Secretariat				
Technology	**Service Provider**			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
5G	0.00%	NA	14.27%	NA
4G	100.00%	14.80%	85.73%	100.00%
3G	NA	0.00%	NA	NA
2G	0.00%	85.20%	NA	0.00%
Limited service	0.00%	0.00%	0.00%	0.00%

Table-80: Time spent on technology during Walk test.

(c) Network Signal Strength distribution: The following chart provide signal strength distribution for auto-selection mode (5G/4G/3G/2G)

Figure-34: Signal strength distribution auto-selection mode 5G/4G/3G/2G.

4.4.4 Data performance

i) AIIMS Patna

(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 Average(Mbits/s)	37.63	1.45	28.66	38.74
Download Throughput 80th Percentile	55.94	2.40	58.17	59.73
Download Throughput 20th Percentile	18.76	0.48	5.56	16.21
Download Session Setup Success Rate %	100.00	54.55	88.89	85.71
Upload Throughput Average (Mbits/s)	13.45	1.24	3.97	17.90
Upload Throughput 80th Percentile	18.76	1.77	6.35	28.19
Upload Throughput 20th Percentile	6.99	0.76	1.25	9.22
Upload Session Setup Success Rate %	100.00	60.00	100.00	77.78
Latency (ms)-50th Percentile	47.35	43.30	25.35	29.98

Table heading above: AIIMS Patna

Table-81: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).
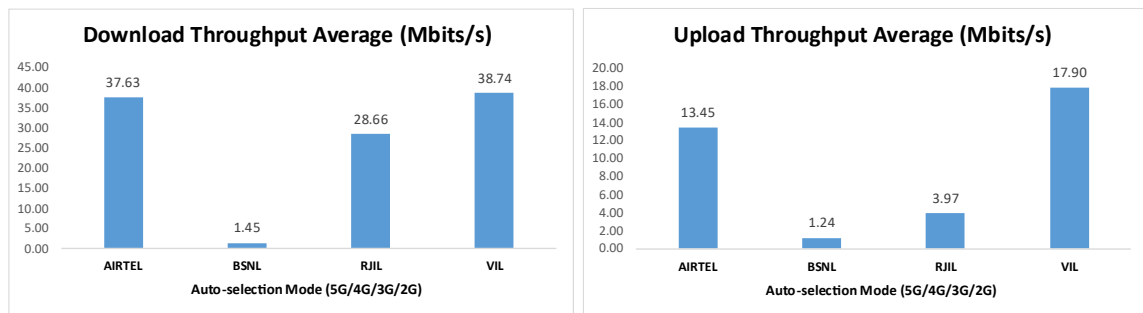
Figure- 35: Download and Upload throughput.

ii) Patna Airport

(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 Average(Mbits/s)	83.66	3.30	18.07	48.00
Download Throughput 80th Percentile	127.29	4.40	41.36	50.93
Download Throughput 20th Percentile	41.33	2.63	0.41	47.23
Download Session Setup Success Rate %	100.00	100.00	87.50	100.00
Upload Throughput Average (Mbits/s)	14.09	2.03	3.81	18.64
Upload Throughput 80th Percentile	22.31	2.93	6.18	22.15
Upload Throughput 20th Percentile	6.05	1.58	1.83	12.03
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Latency (ms)-50th Percentile	50.00	28.80	29.15	29.88

Table heading above: Patna Airport

Table-82: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).
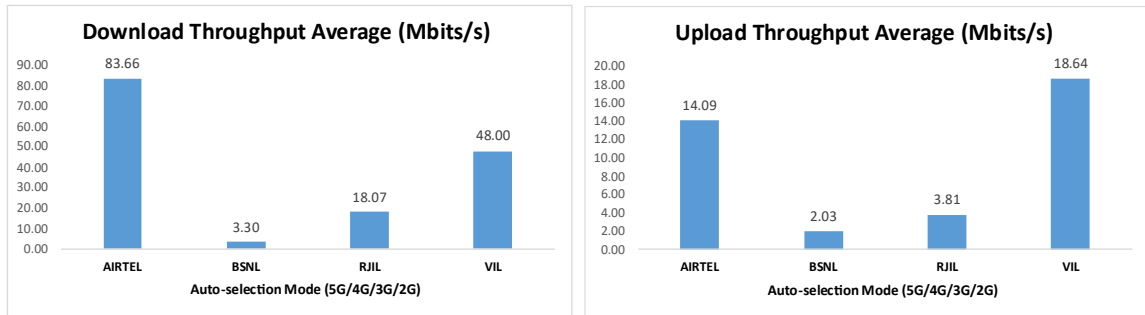
Figure- 36: Download and Upload throughput

iii) Patna Medical College & Hospital

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

Patna Medical College & Hospital				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average(Mbits/s)	33.50	5.53	23.04	3.31
Download Throughput 80th Percentile	56.32	6.01	47.74	3.44
Download Throughput 20th Percentile	11.90	4.90	1.91	3.16
Download Session Setup Success Rate %	100.00	36.36	77.78	100.00
Upload Throughput Average (Mbits/s)	12.41	9.15	4.06	3.41
Upload Throughput 80th Percentile	12.69	10.17	5.96	4.64
Upload Throughput 20th Percentile	4.91	8.07	2.89	2.31
Upload Session Setup Success Rate %	100.00	30.00	87.50	100.00
Latency (ms)-50th Percentile	56.50	31.88	16.60	33.25

Table-83: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).
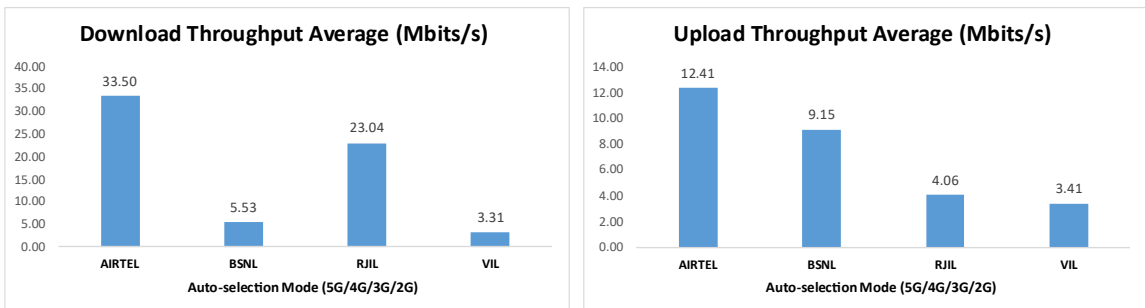
Figure- 37: Download and Upload throughput

iv) Patna Railway Junction

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

Patna Railway Junction				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average(Mbits/s)	94.84	4.97	74.19	20.86
Download Throughput 80th Percentile	174.86	6.43	69.11	24.57
Download Throughput 20th Percentile	36.02	3.01	14.84	17.18
Download Session Setup Success Rate %	100.00	100.00	83.33	100.00
Upload Throughput Average (Mbits/s)	68.84	2.20	31.04	21.17
Upload Throughput 80th Percentile	93.47	2.52	41.02	25.22
Upload Throughput 20th Percentile	33.33	1.98	23.10	15.10
Upload Session Setup Success Rate %	100.00	100.00	90.91	100.00
Latency (ms)-50th Percentile	43.20	24.75	25.05	36.90

Table-84: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).
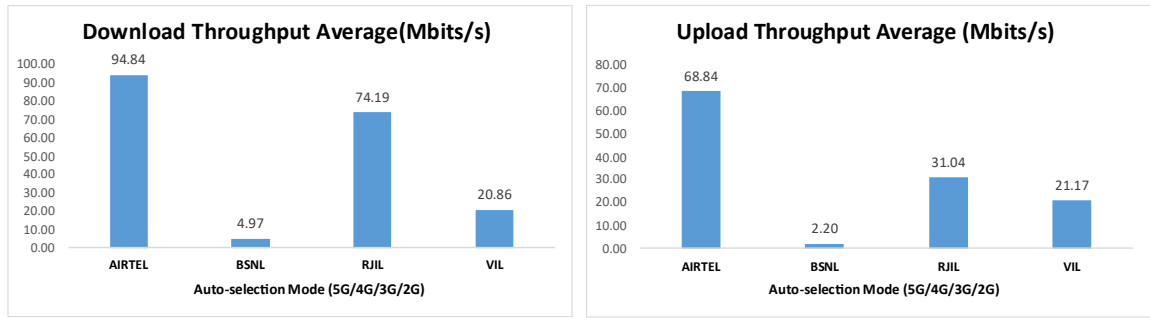
Figure- 38: Download and Upload throughput

v) Patna Secretariat

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

Patna Secretariat				
Parameters	**Service Provider**			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	**BSNL**	**RJIL**	**VIL**
Download Throughput Average(Mbits/s)	29.74	8.00	55.86	23.85
Download Throughput 80th Percentile	49.22	8.99	94.06	30.77
Download Throughput 20th Percentile	1.40	7.22	15.18	15.15
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	1.89	2.97	8.73	2.69
Upload Throughput 80th Percentile	2.53	3.40	12.66	2.24
Upload Throughput 20th Percentile	1.23	2.32	1.78	1.35
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Latency (ms)-50th Percentile	59.50	21.85	30.30	209.00

Table-85: Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).
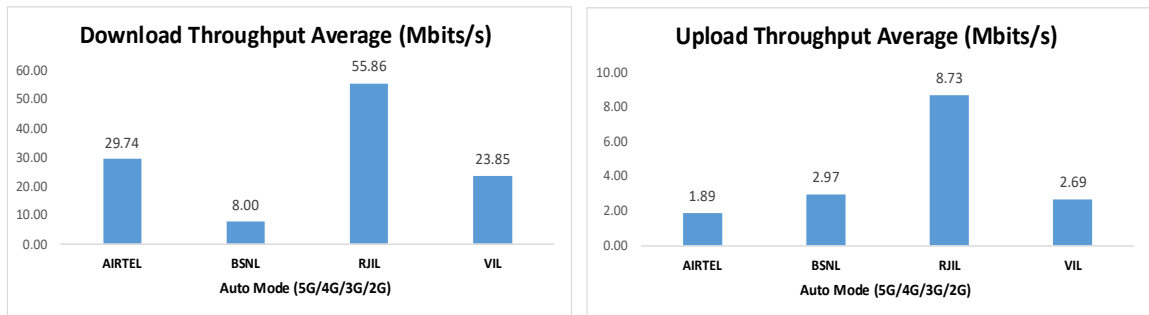
Figure- 39: Download and Upload throughput

5. Voice & Data Key findings

5.1 Overall Voice

1. Call Setup Success Rate:

  a) Airtel, BSNL and VIL have 98.93%, 78.48% and 68.46% call setup success rate respectively in 3G/2G network mode. (refer table-3)

  b) Airtel, BSNL, RJIL and VIL have 99.27%, 90.74%, 99.86% and 64.44% call setup success rate respectively in auto-selection mode (5G/4G/3G/2G). (refer table-5)

  c) Airtel had a 100.00% call setup success rate while calling RJIL and VIL, whereas call blocking was observed when calling BSNL (refer to Table-9).

  d) BSNL experienced call blocking while calling Airtel, RJIL, and VIL (refer to Table-9)

  e) RJIL had a 100.00% call setup success rate while calling Airtel and VIL, whereas call blocking was observed when calling BSNL (refer to Table-9).

  f) VIL had a 100.00% call setup success rate while calling Airtel, whereas call blocking was observed when calling BSNL and RJIL (refer to Table-9).

2. Call Setup Time:

  a) Airtel, BSNL and VIL call setup time is 5.85, 2.68 & 3.46 seconds respectively in 3G/2G network mode. (refer table-3)

  b) Airtel, BSNL, RJIL & VIL call setup time is 1.77, 2.88, 0.71 & 2.20 seconds respectively in Auto-selection mode (5G/4G/3G/2G). (refer table-5)

3. Call Silence/Mute Rate: In packet switched network (4G/5G) Airtel, RJIL & VIL have 0.84%, 042% & 6.22% silence call rate respectively. Further Airtel, RJIL & VIL downlink RTP packet loss rate is 0.50%, 0.33% & 2.45% respectively. In uplink Airtel, RJIL & VIL RTP packet loss rate is 0.35%, 0.43% & 2.95% respectively. (refer table-6)

4. Drop Call Rate:

  a) Airtel, BSNL and VIL drop call rate 0.00%, 5.07% and 2.38% respectively in 3G/2G network mode. (refer table-3)

  b) Airtel, BSNL, RJIL and VIL drop call rate 0.00%, 6.63%, 0.14% and 1.43% respectively in Auto-selection mode (5G/4G/3G/2G). (refer table-5)

5.2 Overall Data

1. Data download and upload performance (Overall i.e. LSA):

  a) Airtel, BSNL, RJIL and VIL average download speeds are 98.64 Mbps, 1.71 Mbps, 186.29 Mbps and 27.34 Mbps respectively. (refer table-11)

  b) Airtel, BSNL, RJIL and VIL average upload speeds are 34.68 Mbps, 2.35 Mbps, 28.27 Mbps and 12.58 Mbps respectively. (refer table-11)

2. **Data download and upload performance (static i.e. while stationary):**
   a) Airtel, BSNL, RJIL and VIL average download speeds are 118.94 Mbps, 0.02 Mbps, 267.64 Mbps and 18.91 Mbps respectively. (refer table-37)

   b) Airtel, BSNL, RJIL and VIL average upload speeds are 30.59 Mbps, 1.12 Mbps, 25.73 Mbps and 7.11 Mbps respectively. (refer table-37)

3. **Data session setup success rate (static i.e. while stationary):**
   a) Airtel, BSNL, RJIL and VIL have 86.25%, 55.00%, 98.75% and 76.56% download session setup success rate respectively. (refer table-37)

   b) Airtel, BSNL, RJIL and VIL have 92.50%, 57.50%, 100.00% and 70.37% upload session setup success rate. (refer table-37)

5.3 Operator wise Key Findings

1. Airtel:

Voice
- 98.93% call setup success rate and 0.00% drop call rate have been observed for 3G/2G network mode respectively for LSA and city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-3 & 13)

- 99.27% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) respectively for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-5)

- 98.98% call setup success rate and 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) respectively for city drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (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) respectively for overall hotspot locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (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) respectively for all walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-71, 73, 75, 77 and 79)

Data
- Airtel has 98.64 Mbps average download throughput & 34.68 Mbps average upload throughput across measured routes for LSA. (refer table-11)

- Airtel has 99.13 Mbps average download throughput & 35.67 Mbps average upload throughput across measured routes for city drive. (refer table-19)

- Asthawan Block Office, Barbigha Block Office-Sheikhpura, Middle School Sabaijor Math-Tola Sabaijor, Phalguni Prasad Yadav P P Y College Chakai, Primary Health Centre Chewara, Raj Bhawan, Sadar Hospital Bihar Sharif, Sangrampur Police

Station-Sangrampur and Telwa Bazar Bus Stop-Tola Siantanr have less download speed (less than 100 Mbps) out of total 16 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-38, 39, 41, 44, 45, 47, 49, 51 & 53)

- Middle School Sabaijor Math-Tola Sabaijor, R.P.S College Harnaut, Raj Bhawan, Sangrampur Police Station-Sangrampur, Tarapur Block Office-Tarapur and Telwa Bazar Bus Stop-Tola Siantanr have less upload speed (less than 20 Mbps) out of total 16 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-41, 46, 47, 51, 52 & 53)

- All walk tests have less download speed (less than 100 Mbps) for auto-selection mode (5G/4G/3G/2G) (refer table- 81, 82, 83, 84 & 85)

- All walk test locations except Patna Railway Junction have less upload speed (less than 20 Mbps) for auto-selection mode (5G/4G/3G/2G) (refer table-81, 82, 83 & 85)

2. BSNL:
Voice
- 78.48% call setup success rate and 5.07% drop call rate have been observed for 3G/2G network mode respectively for LSA and city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-3 & 13)

- 90.74% call setup success rate and 6.63% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) respectively for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-5)

- 94.48% call setup success rate and 8.64% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) respectively for city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-15)

- 78.13% call setup success rate and 1.60% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) respectively for overall hotspot locations. Performance is not meeting the benchmark of 98.00% for call setup success rate while within the benchmark for 2.00% for drop call rate. (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) respectively for all walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-71, 73, 75, 77 and 79)

Data
- BSNL has 1.71 Mbps average download throughput & 2.35 Mbps average upload throughput across measured routes for LSA. (refer table-11)

- BSNL has 1.61 Mbps average download throughput & 2.45 Mbps average upload throughput across measured routes for city drive. (refer table-19)

- All hotspots have less download speed (less than 10 Mbps) out of total 16 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table- 38 to 53)

- All hotspots have less upload speed (less than 2 Mbps) out of total 16 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table- 38 to 53)

- All walk tests have less download speed (less than 10 Mbps) for auto-selection mode (5G/4G/3G/2G) (refer table- 81, 82, 83, 84 & 85)

- AIIMS Patna has less upload speed (less than 2 Mbps) out of total 5 walk test for auto-selection mode (5G/4G/3G/2G). (refer table-81)

3. RJIL:
Voice
- 99.86% call setup success rate and 0.14% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) respectively for LSA. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-5)

- 99.80% call setup success rate and 0.20% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) respectively for City Drive. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-15)

- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) respectively for overallall hotspot locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (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) respectively for all walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-71, 73, 75, 77 and 79)

Data
- RJIL has 186.29 Mbps average download throughput & 28.27 Mbps average upload speed across measured routes in LSA. (refer table-11)

- RJIL has 184.76 Mbps average download throughput & 29.71 Mbps average upload speed across measured routes in city drive. (refer table-19)

- Middle School Sabaijor Math-Tola Sabaijor, NIT Patna, Raj Bhawan and Sadar Hospital Bihar Sharif have less download speed (less than 100 Mbps) out of total 16 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-41, 42, 47 & 49)

- K M College Sambhugunj Asarganj Rd-Dhandhi Belari, Middle School Sabaijor Math-Tola Sabaijor, NIT Patna, R.P.S College Harnaut, Raj Bhawan, S.K College Lohanda Sikandra, Sadar Hospital Bihar Sharif and Telwa Bazar Bus Stop-Tola Siantanr have less upload speed (less than 20 Mbps) out of total 16 Hotspots for

auto-selection mode (5G/4G/3G/2G). (refer table-40, 41, 42, 46, 47, 48, 49, 53)

- All walk tests have less download speed (less than 100 Mbps) for auto-selection mode (5G/4G/3G/2G) (refer table- 81, 82, 83, 84 & 85)

- All walk test locations except Patna Railway Junction have less upload speed (less than 20 Mbps) for auto-selection mode (5G/4G/3G/2G) (refer table-81, 82, 83 & 85)

4. VIL:
Voice

- 68.46% call setup success rate and 2.38% drop call rate have been observed for 3G/2G network mode respectively for LSA and city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-3 & 13)

- 64.44% call setup success rate and 1.43% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) respectively for LSA. Performance is not meeting the benchmark of 98.00% for call setup success rate while within the benchmark for 2.00% for drop call rate. (refer table-5)

- 61.73% call setup success rate and 0.97% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) respectively for City Drive. Performance is not meeting the benchmark of 98.00% for call setup success rate while within the benchmark for 2.00% for drop call rate. (refer table-15)

- 70.63% call setup success rate and 0.88% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) respectively for overall hotspot locations. Performance is not meeting the benchmark of 98.00% for call setup success rate while within the benchmark for 2.00% for drop call rate. (refer table-20)

- 88.89%, 100.00%, 50.00%, 100.00%, 85.71% call setup success rate and 0.00%, 0.00%, 75.00%, 0.00% & 0.00% drop call rate have been observed for auto-selection mode (5G/4G/3G/2G) respectively for walk test locations. (refer table-71, 73, 75, 77 and 79)

Data

- VIL has 27.34 Mbps average download throughput & 12.58 Mbps average upload throughput across measured routes for LSA. (refer table-11)

- VIL has 28.00 Mbps average download throughput & 12.96 Mbps average upload throughput across measured routes for city drive. (refer table-19)

- Middle School Sabaijor Math-Tola Sabaijor, Phalguni Prasad Yadav P P Y College Chakai, Primary Health Centre Chewara, S.K College Lohanda Sikandra, Sadar Hospital Sheikhpura, Sangrampur Police Station-Sangrampur and Telwa Bazar Bus Stop-Tola Siantanr have less download speed (less than 10 Mbps) out of total 16 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-41, 44, 45, 48, 50, 51 & 53)

- Middle School Sabaijor Math-Tola Sabaijor, Phalguni Prasad Yadav P P Y College Chakai, Primary Health Centre Chewara, S.K College Lohanda Sikandra, Sadar Hospital Sheikhpura, Sangrampur Police Station-Sangrampur and Telwa Bazar Bus Stop-Tola Siantanr have less upload speed (less than 2 Mbps) out of total 16 Hotspots for auto-selection mode (5G/4G/3G/2G). (refer table-41, 44, 45, 48, 50, 51 & 53)

- Patna Medical College & Hospital has less download speed (less than 10 Mbps) out of total 5 walk test locations for auto-selection mode (5G/4G/3G/2G) (refer table-83)

6. Annexure

6.1 Route wise coverage map

6.1.1 City
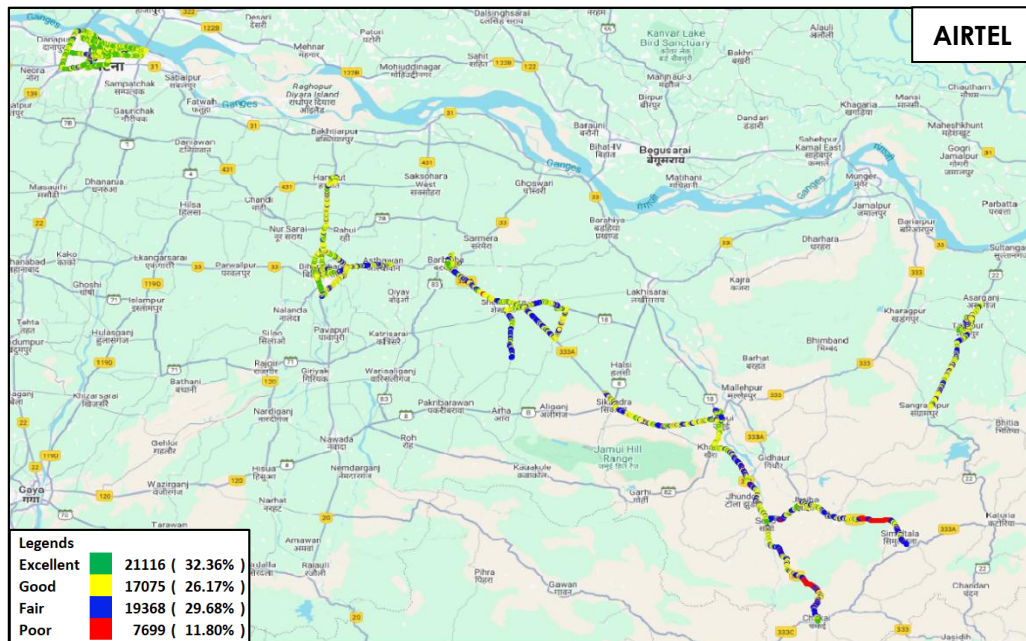
Figure-40: Signal strength 3G/2G network mode – AIRTEL.
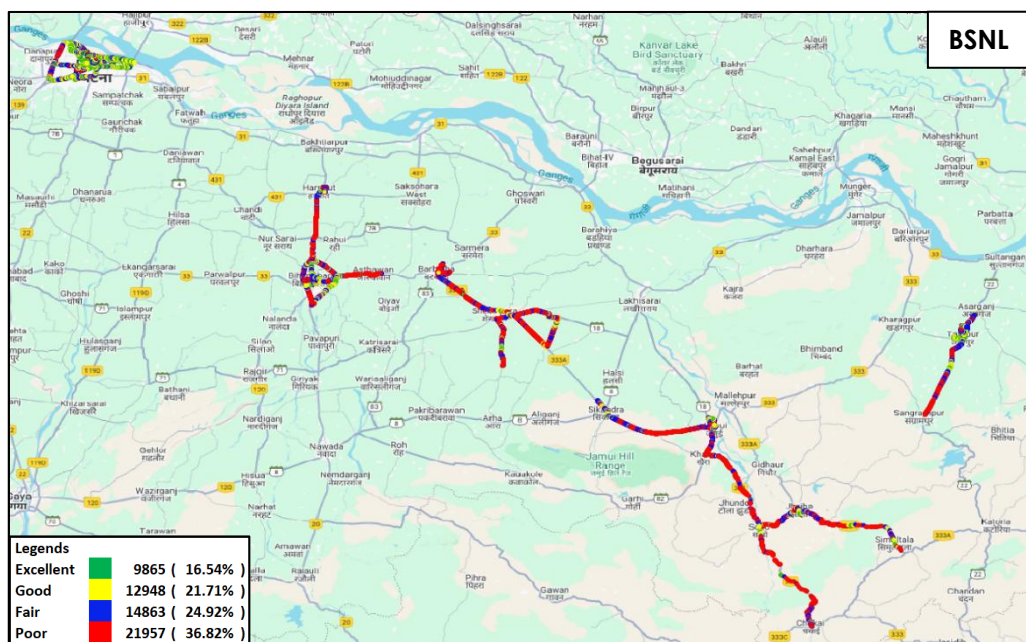
Figure-41: Signal strength 3G/2G network mode – BSNL.

Figure-42: Signal strength 3G/2G network mode – VIL.
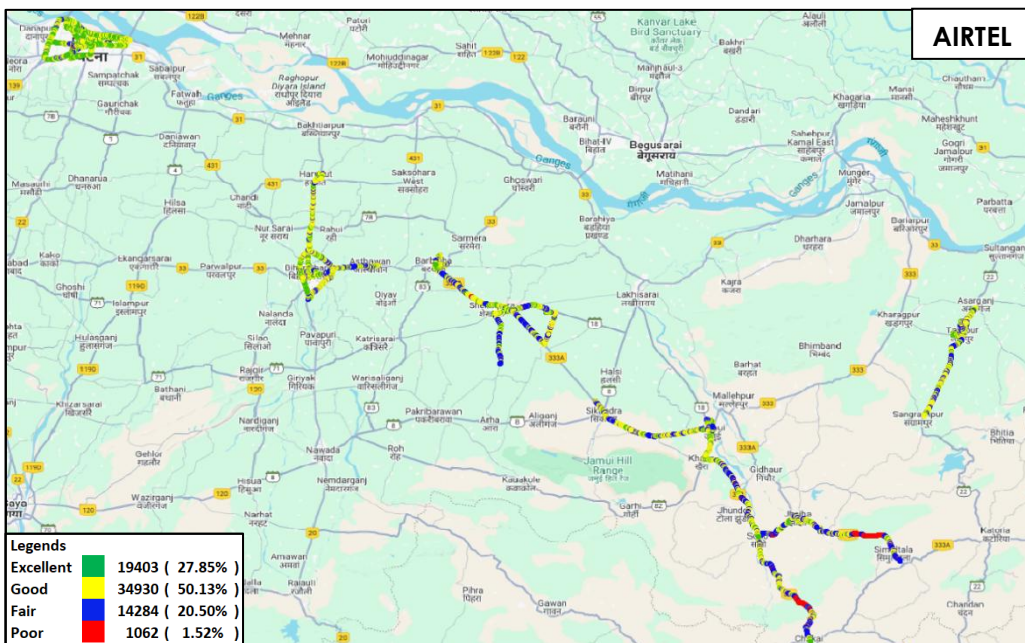
Figure-43: Signal strength auto-selection mode 5G/4G/3G/2G – AIRTEL.
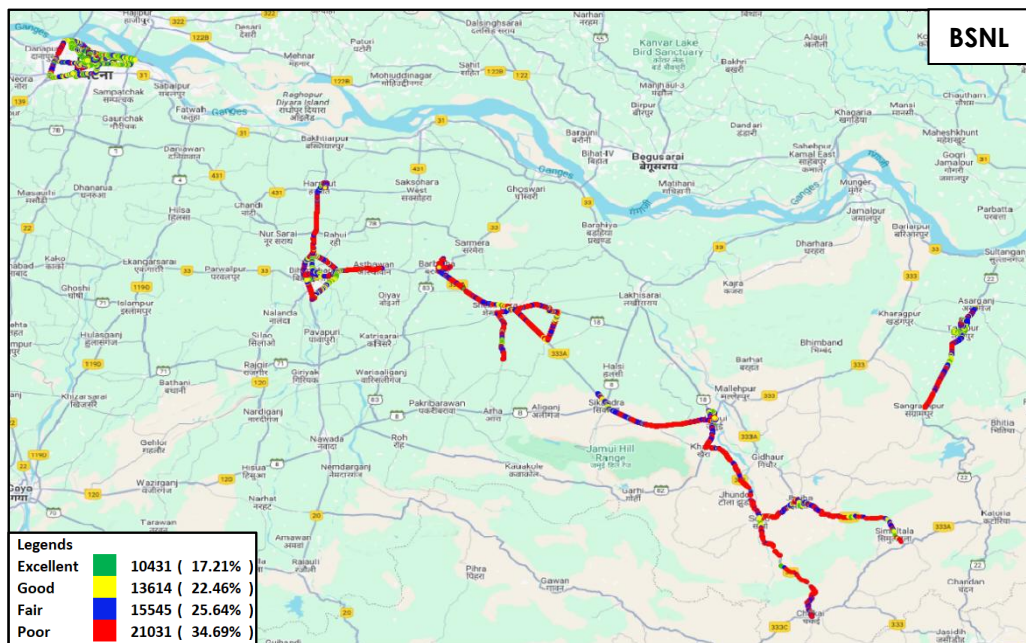
Figure-44: Signal strength auto-selection mode 5G/4G/3G/2G – BSNL.

Legends
Excellent		10431 (17.21%)
Good		13614 (22.46%)
Fair		15545 (25.64%)
Poor		21031 (34.69%)
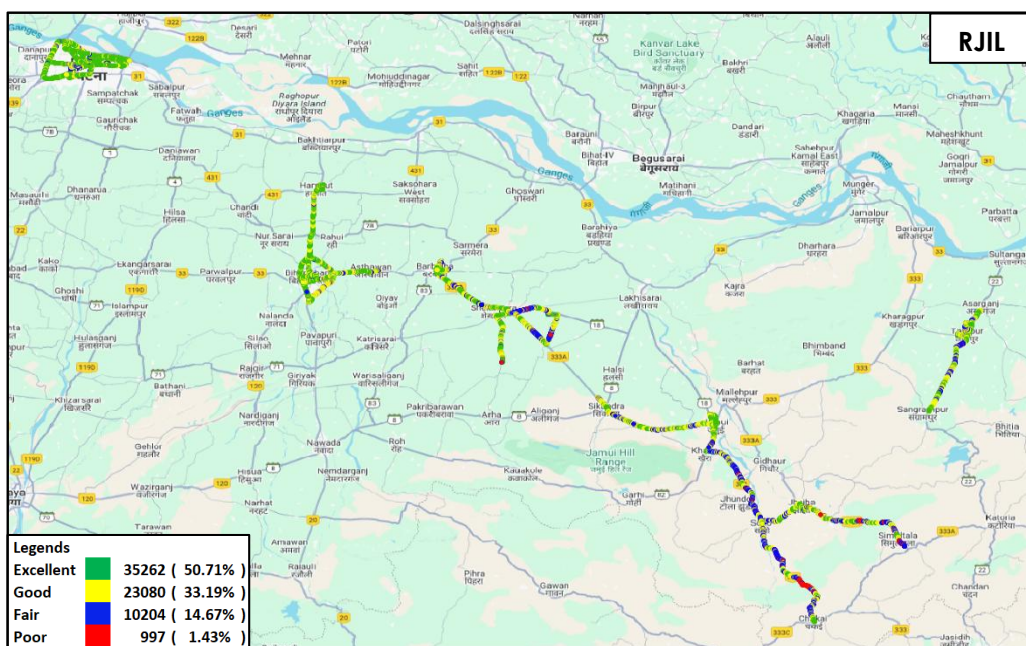
Figure-45: Signal strength auto-selection mode 5G/4G/3G/2G – RJIL.

Legends
Excellent		35262 (50.71%)
Good		23080 (33.19%)
Fair		10204 (14.67%)
Poor		997 (1.43%)
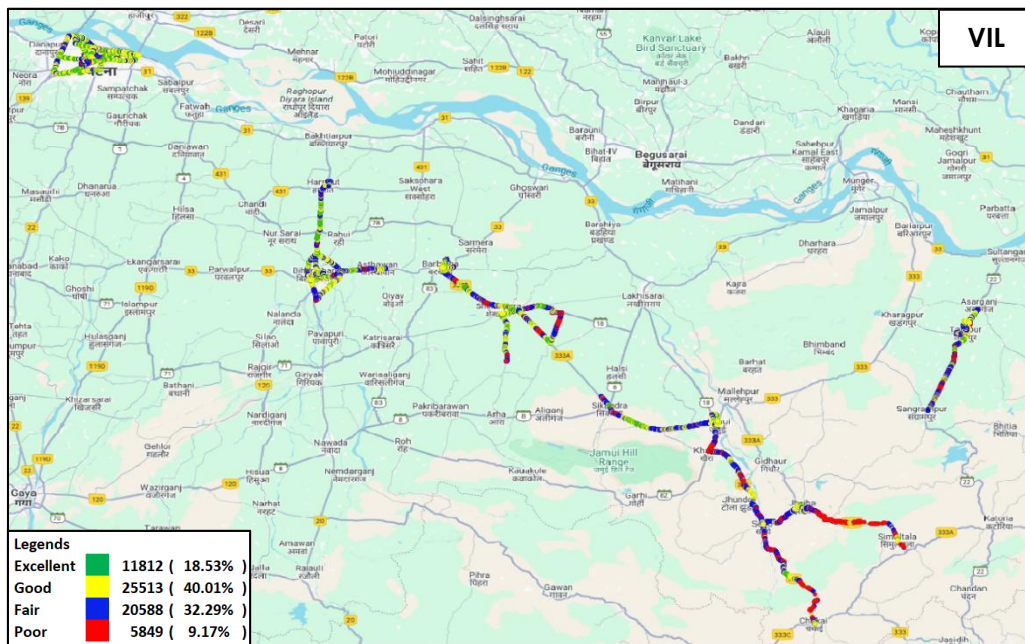
Figure-46: Signal strength auto-selection mode 5G/4G/3G/2G – VIL.

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		120 Sec
Wait/ Guard Time		15 Sec

Table-86: 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.irctc.co.in, www.sbi.co.in) 20 sec timeout (only at Hotspot)

Latency		25 count- Dynamic 1000 count- Hotspot Payload- 512 bytes in all drive

Table-87: 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.
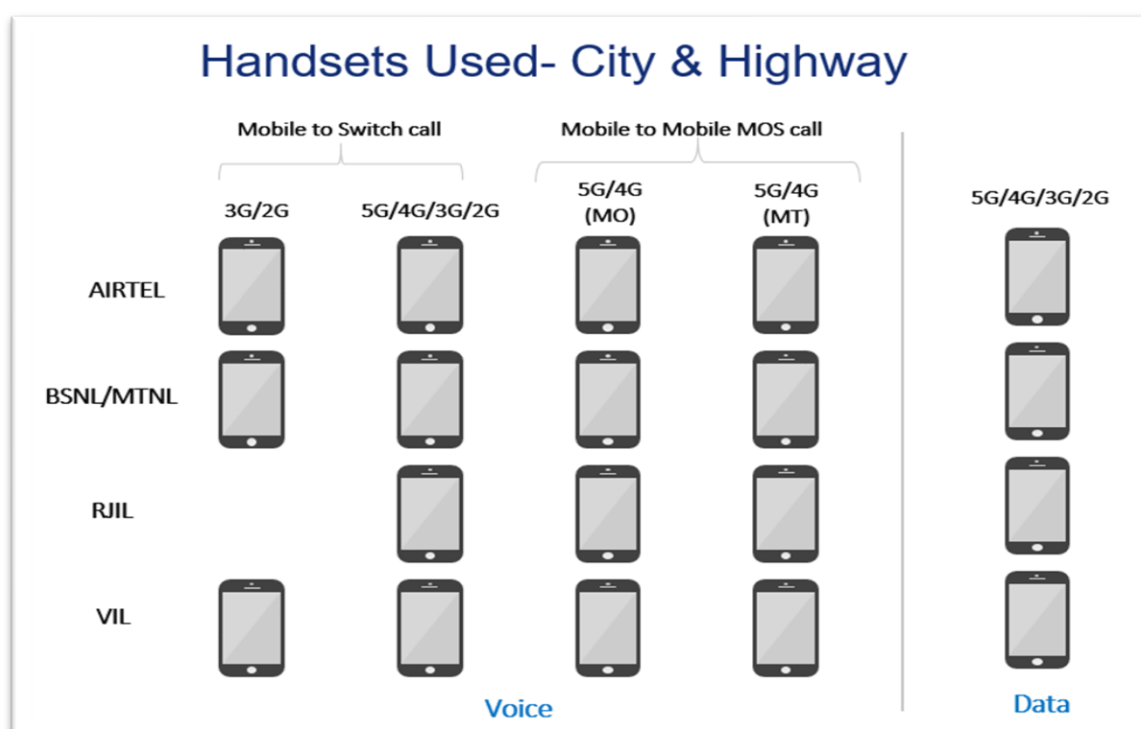
Figure-47: Number of handsets used in city & highway drive

MO: Mobile originating

MT: Mobile terminating
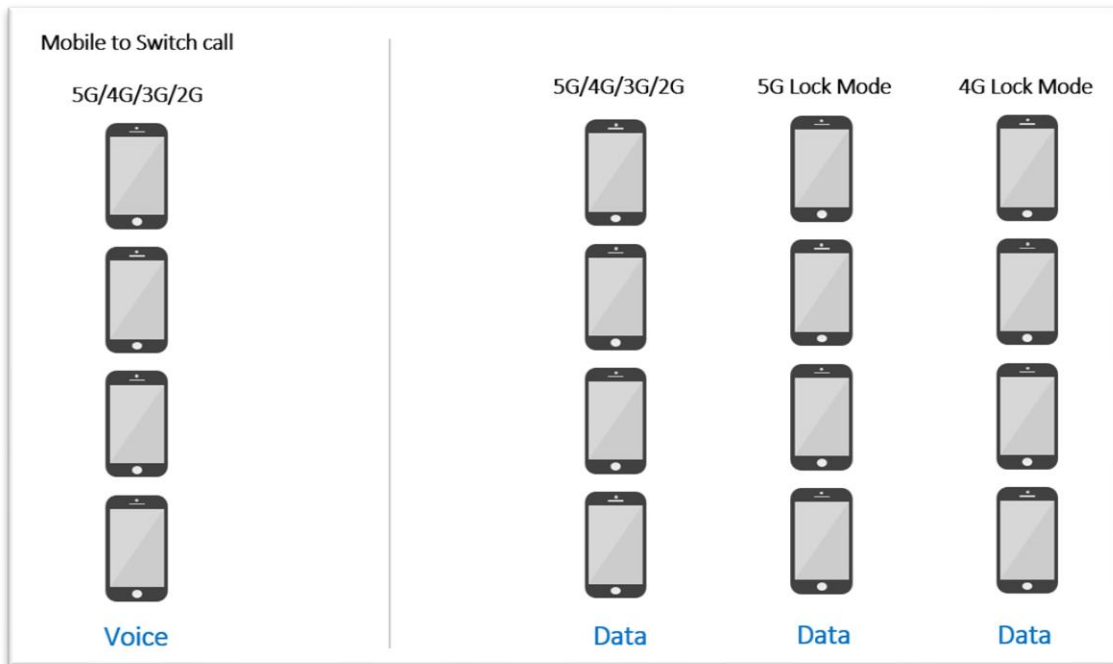
Figure-48: Number of handsets used in railway/metro/walktest/hotspot/ coastal area

Note- 5G & 4G Lock mode testing has been performed at hotspot locations only.

7.1.2 Drive test Methodology

(a) Dynamic voice testing (on the move)
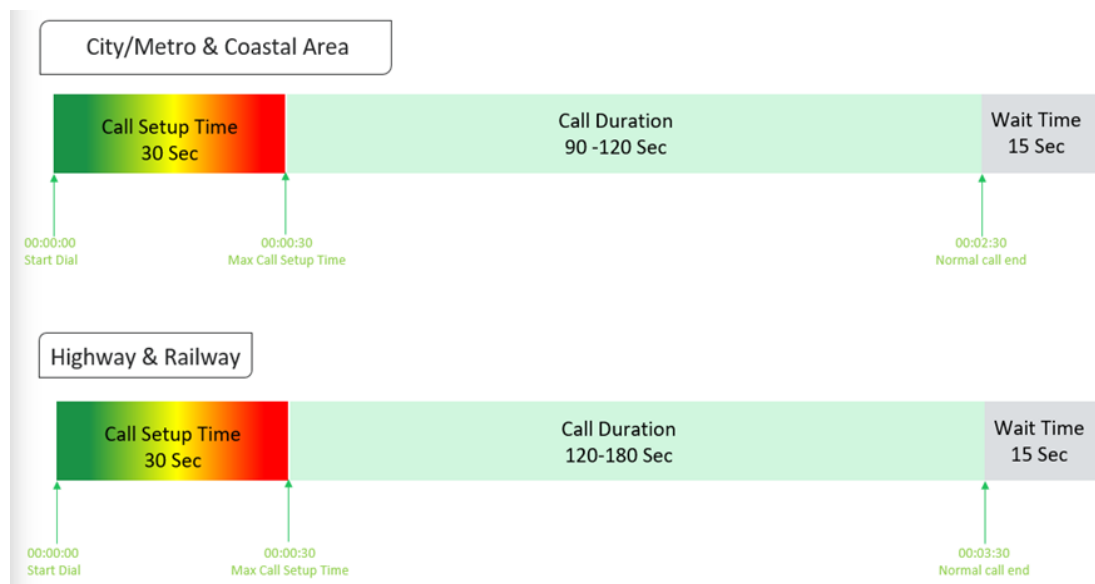
Figure-49: Voice test script for city/railway/metro/highway & coastal area

- 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-50: 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
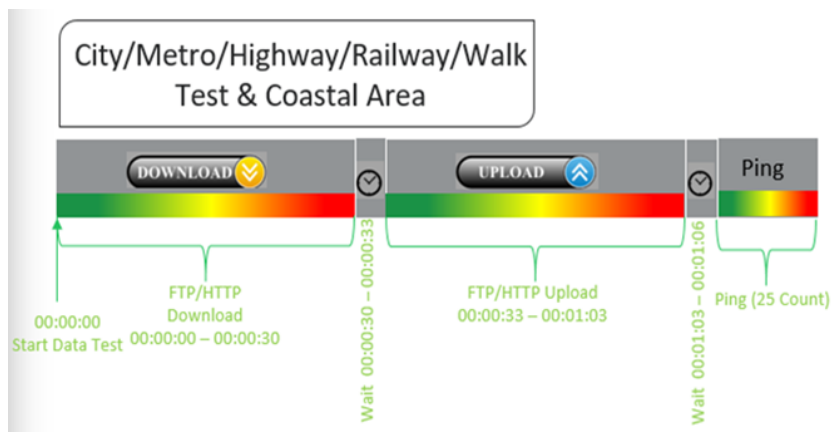
Figure-51: Data test script used in city/metro/railway/highway/walk test & coastal area

(d) Static Data(internet) testing
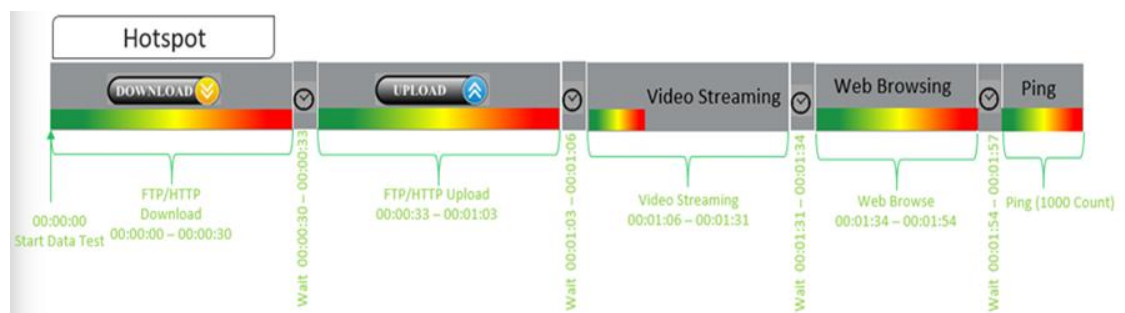
Figure-52: Data test script used at hotspot

- 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.

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%**
Drop Call 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 Drop Call 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 $\geq$ 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.

Jitter	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**
Downlink Packet Drop Rate	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)
Uplink Packet Drop Rate	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).
Signal Strength	Signal strength is the signal power level received by the wireless user. <table><tr><td rowspan="2">Parameter Name</td><td rowspan="2">Technology</td><td colspan="4">Signal Strength (dBm)</td></tr><tr><td>Excellent</td><td>Good</td><td>Fair</td><td>Poor</td></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>

Table-88: 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-89: 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.