



**TELECOM REGULATORY AUTHORITY OF INDIA**

*Independent Drive Test Report*

*North East LSA*

*June 2025*

## Contents

1. Introduction .....	3
2. Executive Summary (LSA) .....	3
2.1 Drive test details .....	3
2.2 Drive test routes .....	4
2.3 Summary of areas covered .....	5
2.4 Telecom service providers detected frequency bands .....	6
2.5 Performance against key QoS parameters .....	6
3. QoS performance analysis-LSA level .....	7
3.1 Overview .....	8
3.2 Voice performance .....	8
3.3 Data performance .....	11
4. Detailed QoS performance analysis .....	13
4.1 Overview .....	13
4.2 City .....	13
4.2.1 Drive test route .....	13
4.2.2 Area Covered .....	13
4.2.3 Voice performance .....	14
4.2.4 Data performance .....	21
4.3 Hotspots .....	23
4.3.1 Locations .....	23
4.3.2 Hotspot covered .....	23
4.3.3 Voice performance .....	24
4.3.4 Data performance (auto-selection mode 5G/4G/3G/2G) .....	31
4.3.5 Data performance (5G Only & 4G Only Download & Upload Speed) .....	40
4.4 Walk Test .....	48
4.4.1 Walk test locations .....	48
4.4.2 Walk test covered .....	48
4.4.3 Voice performance .....	48
4.4.4 Data performance .....	51
4.5 Highway .....	53
4.5.1 Drive test route .....	53
4.5.2 Routes Covered .....	53
4.5.3 Voice performance .....	53
4.5.4 Data performance .....	60

5. Voice & Data Key findings .....	61
5.1 Overall Voice.....	61
5.2 Overall Data .....	61
5.3 Operator wise Key Findings.....	62
6. Annexure .....	67
6.1 Route wise coverage map .....	67
6.1.1 City .....	67
6.1.2 Highway Route.....	71
7. Appendix .....	74
7.1 Appendix-I .....	74
7.1.1 Drive test setup .....	74
7.1.2 Drive test Methodology .....	76
7.2 Appendix-II .....	78
7.2.1 Network Performance Parameters for Voice calls .....	78
7.2.2 Network Performance Parameters Data tests .....	79

## 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 North East License Service Area (LSA) during the month of June-2025 under the supervision of TRAI Regional Office (RO) Kolkata. Details of route / area covered during the IDT is as given below:

S. No	Drive test route	Type of route	Distance covered (KMs)	From date	To date
1	Itanagar city, Naharlagun city & adjoining area and Dimapur city & district, Kohima city & district	City	270.3	02-June-2025	21-June-2025
2	Kohima city and Near Tawang	Inter Operator Calling	2 Locations	06-June-2025	23-June-2025
3	Itanagar city, Naharlagun city & adjoining area and Dimapur city & district, Kohima city & district and across Itanagar to Bumla Pass highway	Hotspot	28 Locations	07-June-2025	23-June-2025
4	Itanagar City, Naharlagun City and adjoining area	Walk Test	1.0	02-June-2025	02-June-2025
5	Itanagar to Bumla Pass (Tawang)- along with NH-13	Highway	526.6	03-June-2025	06-June-2025

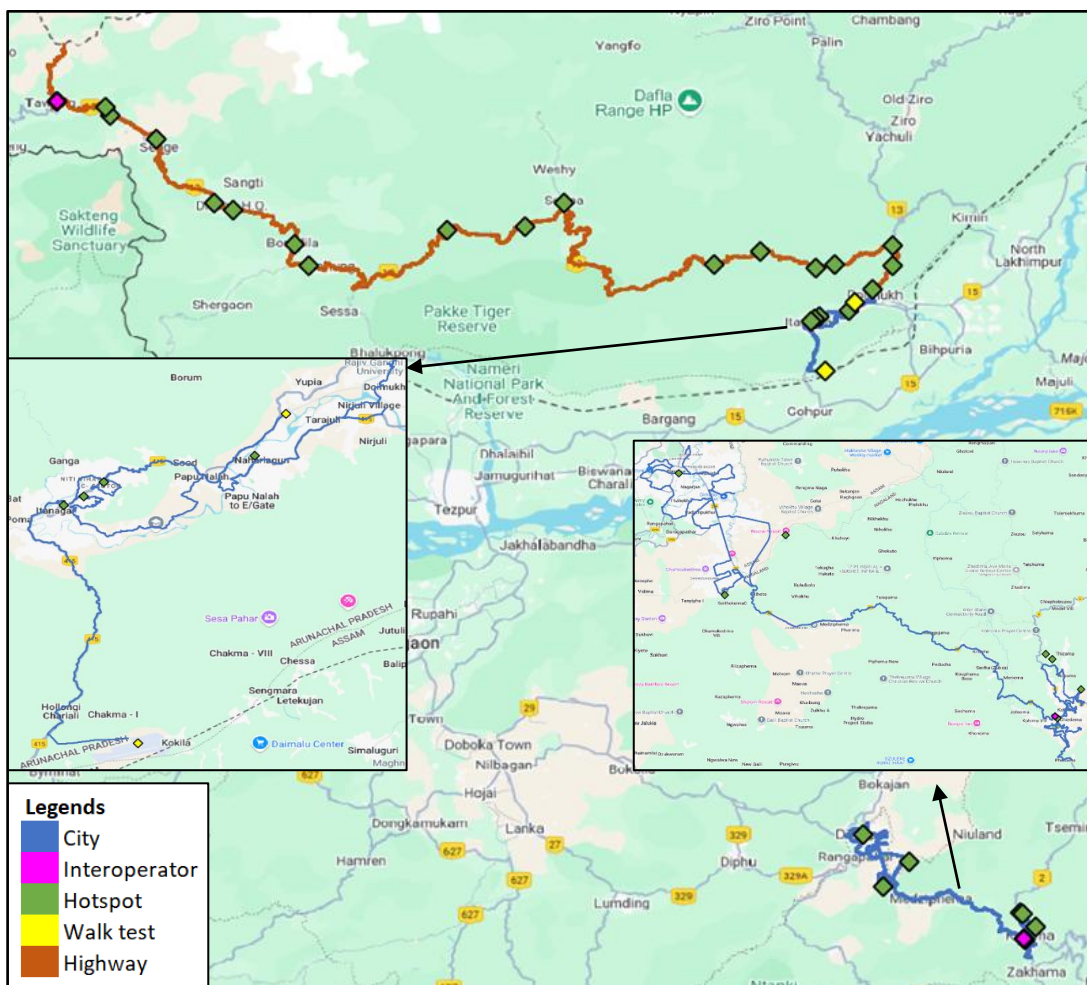
**Table-1:** Drive test summary

**Note-**

- Itanagar City, Naharlagun City and adjoining area drive have been done on 2<sup>nd</sup> June 2025 and Dimapur City & District, Kohima City & District drive have been done on 20<sup>th</sup> June 2025 and 21<sup>st</sup> June 2025.
- Hotspots testing has been done from 7<sup>th</sup> June 2025 to 10<sup>th</sup> June 2025 along the highway Itanagar to Bumla Pass (Tawang) NH-13, on 10<sup>th</sup> June 2025 at Itanagar City, Naharlagun City and adjoining area and from 20<sup>th</sup> June 2025 to 23<sup>rd</sup> June 2025 at Dimapur City & District, Kohima City & District.

## 2.2 Drive test routes

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



**Figure-1:** Drive test routes

## 2.3 Summary of areas covered

**a) City-** Itanagar city, Naharlagun city and adjoining area- Hollongi Chariali, Chakma-6, Pom, Chimpu, Doni Colony, C Sector, B Sector, Sood, Papu Nalah, Lobi Dariya, Himalayan University, Tarajuli, Nirjuli Village and Doimukh etc.  
Dimapur city & Dimapur district and Kohima city & Kohima district- Khushiabil, Nagarjan, Thahekhu, Padampukhari, Nihoto, Medziphema, Mengujuma, Kiruphe, Sechu (Zubza), Meriema, Kohima Vill, Rusoma, Chiedema and Phesama etc.

### **b) Hotspot-**

1. Arunachal Pradesh State Legislative Assembly
2. Ball of Fire Museum
3. Bomdila Market
4. Commissioner of Tax & Excise Office, Itanagar
5. Daily Market New, Naharlagun
6. Dimapur Rly. Stn.
7. Government College, Doimukh
8. Government ITI College, Dirang
9. Government Residential School
10. Govt. Middle School, Longte Tapu
11. Govt. Sec. School, Toru
12. Hoj-Yayee Market
13. Indian Oil, Jang
14. Jaswantgarh War Memorial
15. Kohima New High Court
16. Kohima Raj Bhawan
17. Laptap Baptist Church, 6J59+5HJ, Laptap, 791119
18. Nagaland Medical College
19. Nagaland University Meriema Campus
20. NIT Nagaland
21. Nouna Resort
22. Office of Additional Deputy Commissioner, Sagalee
23. Palizi Catholic Church
24. Post Office, Seppa
25. Ramakrishna Mission Hospital, Itanagar
26. Sela Pass
27. Sopo Market
28. Unit Hospital 4BN ITBP, Dirang

### **c) Walk Test**

1. Donyi Polo Airport, Itanagar
2. Naharlagun (Itanagar) Rly. Station

## 2.4 Telecom service providers detected frequency bands

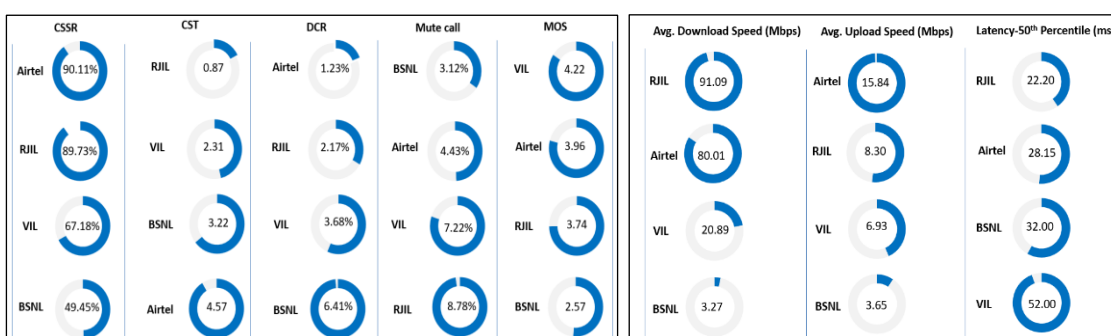
Technologies covered during the IDT and frequency bands in use are summarised in table below:

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
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	1800
10	Vodafone Idea Ltd.	4G	1800,2500

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

## 2.5 Performance against key QoS parameters

CSSR: Call Setup Success Rate (in %), CST: Call Setup Time (in seconds), DCR: Drop Call Rate (in %) & MOS: Mean Opinion Score.



### Summary-Voice services

**Call Setup Success Rate:** Airtel, BSNL, RJIL and VIL have call setup success rate of 90.11%, 49.45%, 89.73% and 67.18% respectively in Auto-selection mode (5G/4G/3G/2G).

**Call Setup Time:** Airtel, BSNL, RJIL and VIL have call setup time of 4.57, 3.22, 0.87 & 2.31 seconds respectively in Auto-selection mode (5G/4G/3G/2G).

**Drop Call Rate:** Airtel, BSNL, RJIL and VIL have drop call rate of 1.23%, 6.41%, 2.17% & 3.68% respectively in Auto-selection mode (5G/4G/3G/2G).

**Call Silence/Mute Rate:** Airtel, BSNL, RJIL and VIL have silence call rate of 4.43, 3.12%, 8.78% and 7.22% respectively in packet switched network (5G/4G).

**Mean Opinion Score (MOS):** Airtel, BSNL, RJIL and VIL have Average MOS of 3.96, 2.57, 3.74 & 4.22 respectively.

### Summary-Data services

#### Data Download performance (Overall):

Average download speed of Airtel (5G/4G/2G) is 80.01 Mbps, BSNL (4G/3G/2G) is 3.27 Mbps, RJIL (5G/4G) is 91.09 Mbps and VIL (4G/2G) is 20.89 Mbps.

#### Data Upload performance (Overall):

Average upload speed of Airtel (5G/4G/2G) is 15.84 Mbps, BSNL (4G/3G/2G) is 3.65 Mbps, RJIL (5G/4G) is 8.30 Mbps and VIL (4G/2G) is 6.93 Mbps.

#### Data performance - Hotspots (in Mbps):

Airtel- 4G D/L: 22.44	4G U/L: 8.50
5G D/L: 155.38	5G U/L: 44.38
BSNL- 4G D/L: 7.54	4G U/L: 9.01
RJIL- 4G D/L: 38.55	4G U/L: 7.45
5G D/L: 299.92	5G U/L: 25.16
VIL- 4G D/L: 16.59	4G U/L: 8.02

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

## QoS Performance Analysis- North East LSA



### 3. QoS performance analysis-LSA level

#### 3.1 Overview

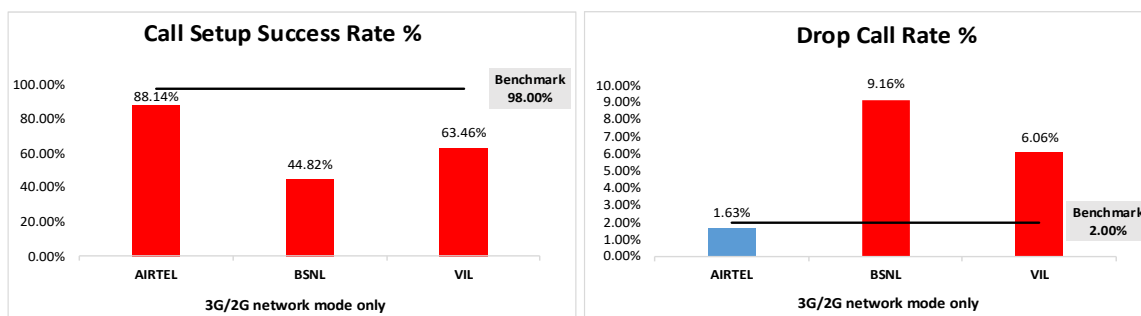
This section provides summary of overall QoS performance of the telecom service provider's network in the LSA by aggregating the results of drive tests conducted in the LSA during the month of June-2025 covering city drive, hotspots, walk test and highway drive. (Refer Table-1)

#### 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	767	1120	936
Call Setup Success Rate %	88.14	44.82	63.46
Drop Call Rate %	1.63	9.16	6.06
Call Setup Time-Average (Second)	4.29	3.36	3.90
Handover Success Rate %	99.52	97.58	99.52

**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	110	NA
2G	692	333	555

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

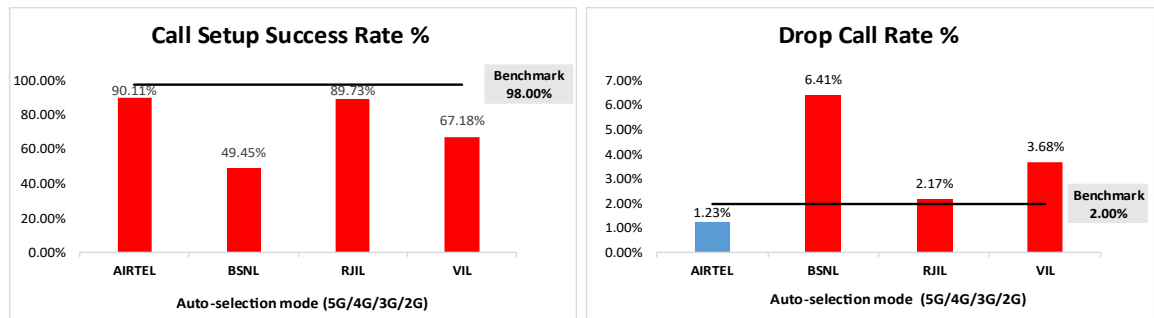
**Note-**

- 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	1082	1452	1130	1295
Call Setup Success Rate %	90.11	49.45	89.73	67.18
Drop Call Rate %	1.23	6.41	2.17	3.68
Call Setup Time-Average (Second)	4.57	3.22	0.87	2.31
Handover Success Rate %	99.87	99.73	99.73	99.80

**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)	677	545	672	554
Number of silence call for >4 Sec	30	17	59	40
Silence Call Rate %	4.43	3.12	8.78	7.22
Number of silence instances for >4 Sec	45	27	108	74
Number of silence instances for >3 Sec	71	36	162	156
Number of silence instances for >2 sec	110	63	313	409
RTP Jitter (4G & 5G) in ms	4.87	17.29	18.28	6.62
Packet loss Rate Downlink %	2.17	12.69	2.40	3.55
Packet loss Rate Uplink %	1.38	11.67	3.07	3.60

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

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	331	NA
4G	1992	336	1691	579
3G	NA	59	NA	NA
2G	17	248	NA	223

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

**Note-**

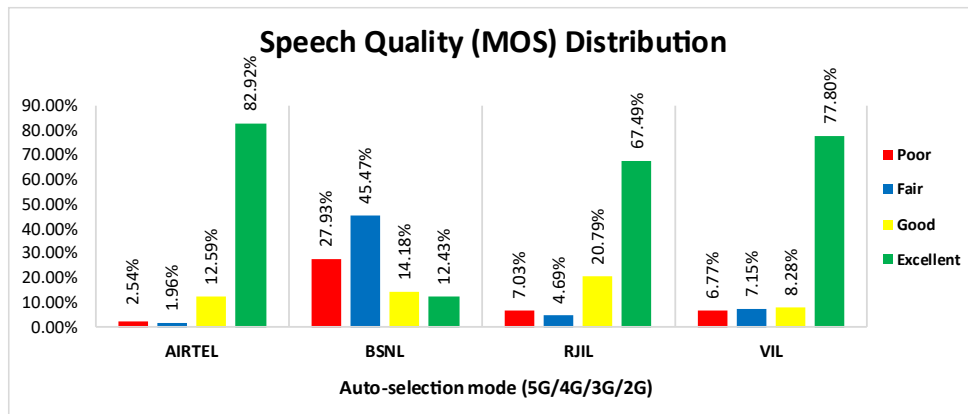
- NA- Service provider doesn't provide services in respective technology.
- 0- No cell Id's were found in respective technology.

### (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	6849	3541	6632	4990
Speech Quality (Average MOS)	3.96	2.57	3.74	4.22
Number of samples with MOS $\geq 4$ to $< 5$ (Excellent)	5679	440	4476	3882
Number of samples with MOS $\geq 3$ to $< 4$ (Good)	862	502	1379	413
Number of samples with MOS $\geq 2$ to $< 3$ (Fair)	134	1610	311	357
Number of samples with MOS $\geq 1$ to $< 2$ (Poor)	174	989	466	338
%age of samples with MOS $\geq 4$ to $< 5$ (Excellent)	82.92%	12.43%	67.49%	77.80%
%age of samples with MOS $\geq 3$ to $< 4$ (Good)	12.59%	14.18%	20.79%	8.28%
%age of samples with MOS $\geq 2$ to $< 3$ (Fair)	1.96%	45.47%	4.69%	7.15%
%age of samples with MOS $\geq 1$ to $< 2$ (Poor)	2.54%	27.93%	7.03%	6.77%

**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 65 to 77 inter operator calls were attempted at two locations which are Hotel Mon Paradise, Tawang and Hotel Eden near Lady Miles Rd Kohima. 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	100.00	100.00	97.30
BSNL	97.06	NA	95.38	100.00
RJIL	100.00	90.77	NA	100.00
VIL	100.00	97.06	96.10	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	4.11	2.38	3.23
BSNL	7.37	NA	8.06	7.94
RJIL	2.03	5.13	NA	1.99
VIL	2.11	4.96	2.22	NA

**Table-10:** Call setup time across service providers.

**Note-**

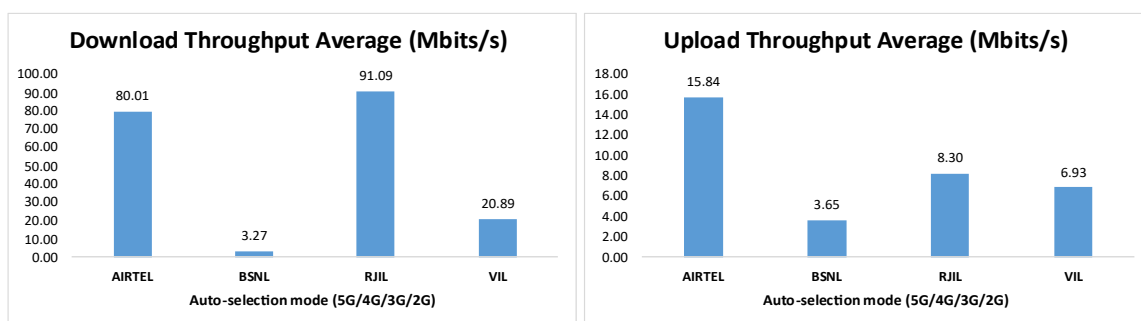
- NA- Only inter-operator calls were measured during test.

### 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	80.01	3.27	91.09	20.89
	80th Percentile	138.83	5.38	162.28	41.20
	20th Percentile	7.85	0.42	2.69	1.92
Upload Throughput (Mbits/s)	Average	15.84	3.65	8.30	6.93
	80th Percentile	27.07	5.01	11.68	9.62
	20th Percentile	1.69	1.26	1.20	2.82
Latency (ms)	50th Percentile	28.15	32.00	22.20	52.00

**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	426	NA
4G	1947	376	1002	580
3G	NA	83	NA	NA
2G	21	213	NA	260

**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 drive, hotspots, walk test and highway drive 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 2<sup>nd</sup> June 2025 to 21<sup>st</sup> June 2025 in Itanagar city, Naharlagun city & adjoining area (2<sup>nd</sup> June 2025) and Dimapur city & district, Kohima city & district (on 20<sup>th</sup> & 21<sup>st</sup> June 2025). (Refer Table-1)

#### 4.2.1 Drive test route



**Figure- 6:** Drive test routes

#### 4.2.2 Area Covered

Itanagar city, Naharlagun city and adjoining area- Hollongi Chariali, Chakma-6, Pom, Chimpu, Doni Colony, C Sector, B Sector, Sood, Papu Nalah, Lobi Dariya, Himalayan University, Tarajuli, Nirjuli Village and Doimukh etc.

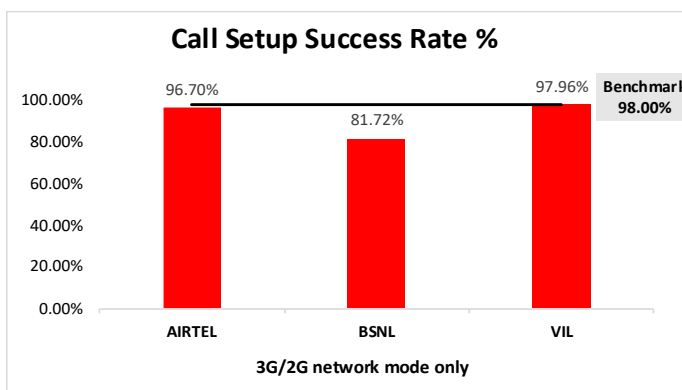
Dimapur city & Dimapur district and Kohima city & Kohima district- Khushiabil, Nagarjan, Thahekhu, Padampukhari, Nihoto, Medziphema, Mengujuma, Kiruphe, Sechu (Zubza), Meriema, Kohima Vill, Rusoma, Chiedema and Phesama etc.

### 4.2.3 Voice performance

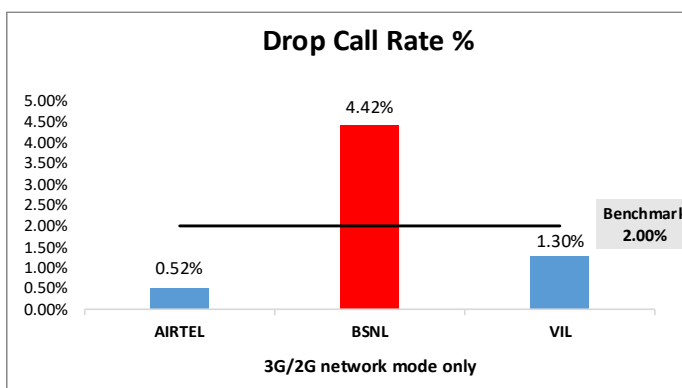
**(a) Voice Call Performance in 3G/2G network mode only:** 3G/2G network mode testing has been done to reflect experience for respective users as they have only 3G/2G compatible handsets.

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	394	443	393
Call Setup Success Rate %	96.70	81.72	97.96
Drop Call Rate %	0.52	4.42	1.30
Call Setup Time-Average (Second)	4.35	3.08	3.44
Handover Success Rate %	99.47	97.51	99.34

**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.

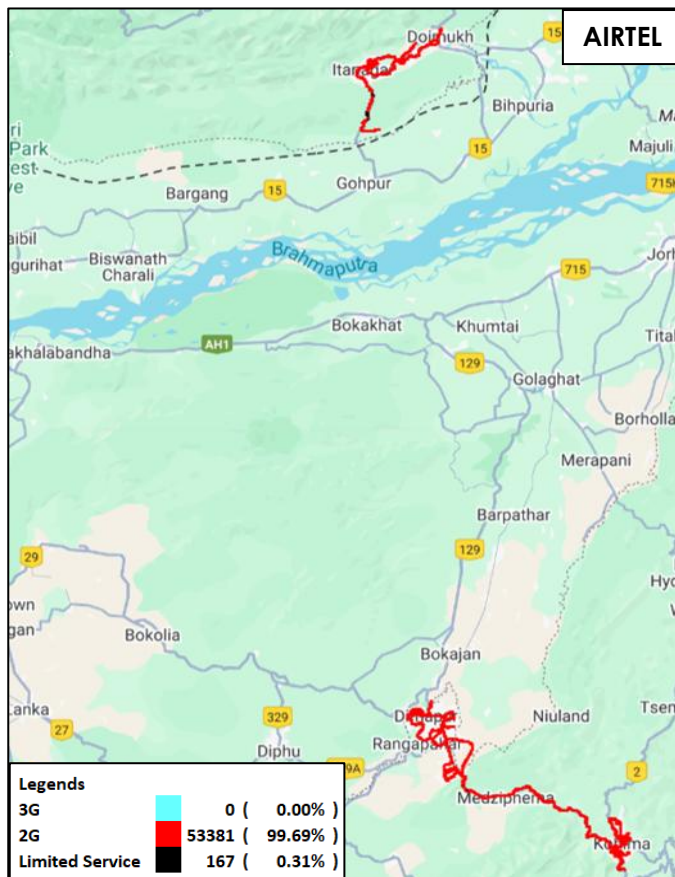
**(b) Network Technology:** This section represent time spent on various network technologies.

Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	31.22%	NA
2G	99.69%	65.29%	99.87%
Limited Service	0.31%	3.49%	0.13%

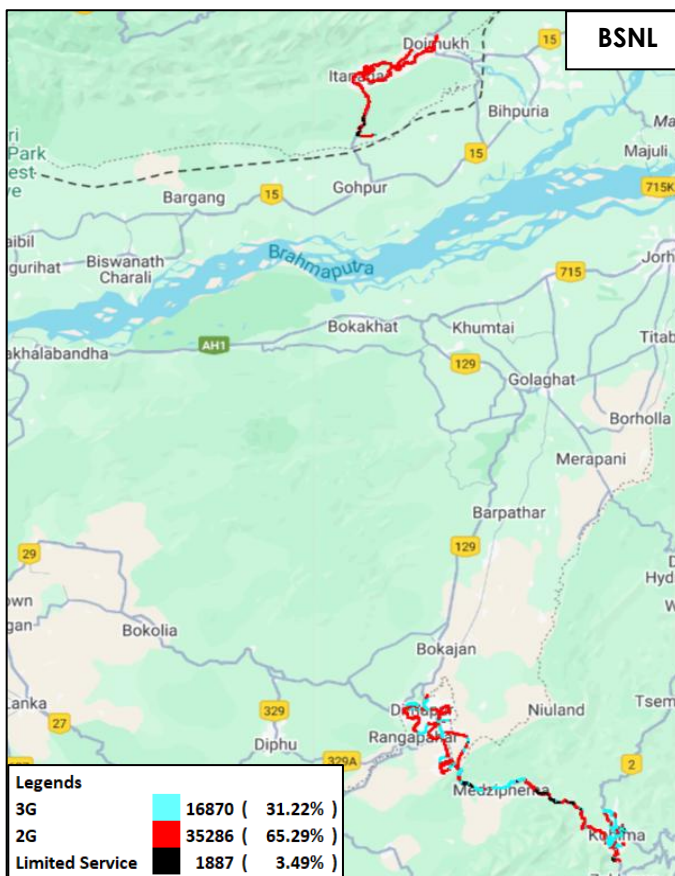
**Table-14:** Time spent on technology during drive test 3G/2G network mode.

**Note-**

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

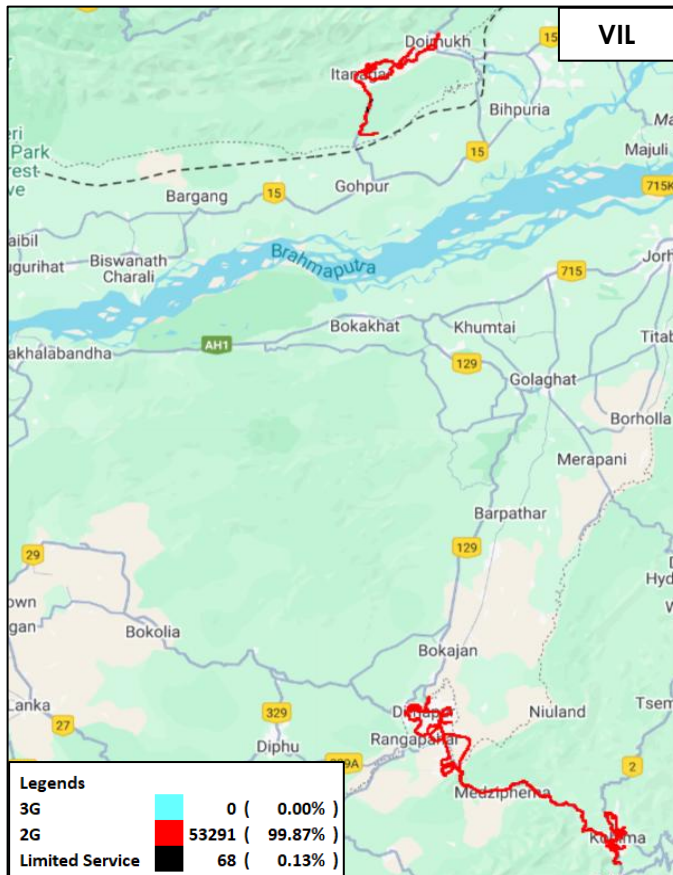


**Figure-9:** Serving technology plots 3G/2G network mode – AIRTEL



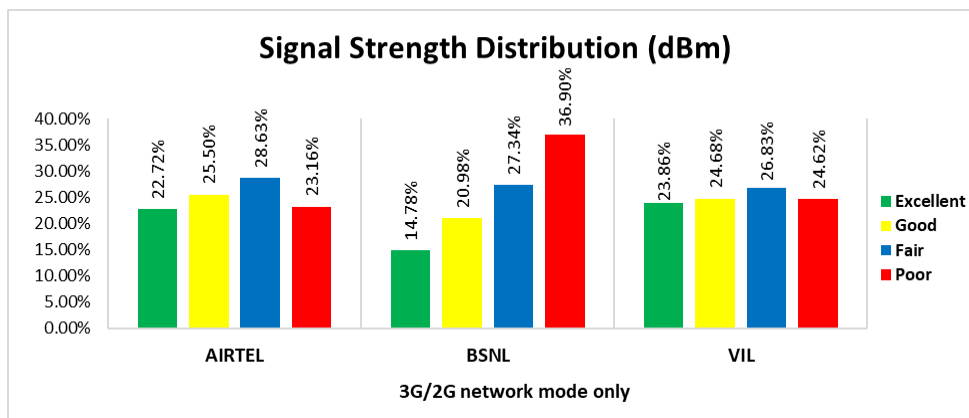
**Figure-10:** Serving technology plots 3G/2G network mode –BSNL.





**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- 48, 49 & 50 for map view)



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

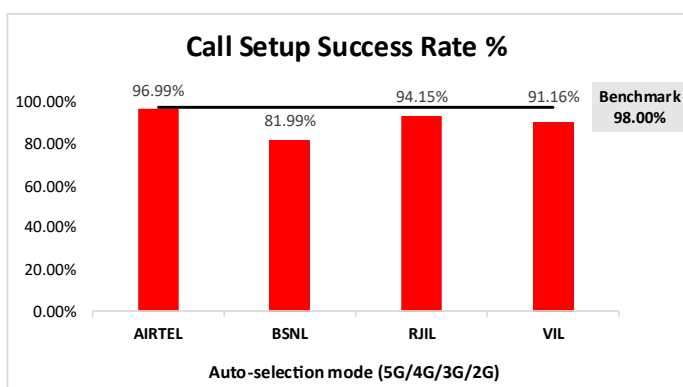
#### Observations:

- Airtel has 23% of samples falling in the excellent signal strength category.
- BSNL has 15% of samples falling in the excellent signal strength category.
- VIL has 24% of samples falling in the excellent signal strength category.

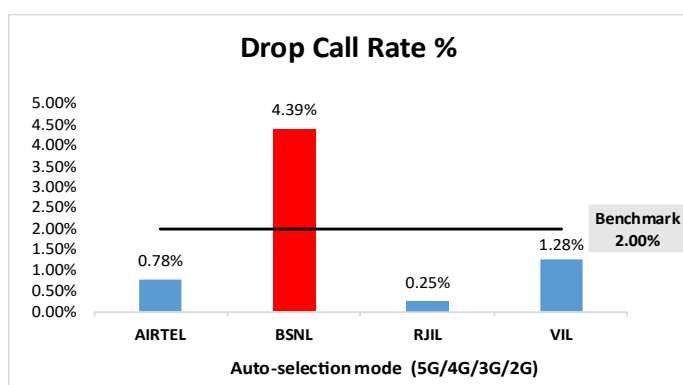
**(d) Voice Call Performance in auto network selection mode (5G/4G/3G/2G)**

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	399	472	427	430
Call Setup Success Rate %	96.99	81.99	94.15	91.16
Drop Call Rate %	0.78	4.39	0.25	1.28
Call Setup Time Average (Second)	4.88	2.89	0.79	1.94
Handover Success Rate %	99.84	99.90	99.82	99.94

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



**Figure-13:** Performance for call setup success rate.



**Figure-14:** Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
Call Established (within service provider Network)	382	386	383	375
Number of silence call for >4 Sec	9	11	12	17
Silence Call Rate %	2.36	2.85	3.13	4.53
Number of silence instances for >4 Sec	16	12	17	30
Number of silence instances for >3 Sec	34	19	28	52
Number of silence instances for >2 sec	61	35	59	127
RTP Jitter (4G & 5G) in ms	4.12	18.40	9.24	7.30
Packet loss Rate Downlink %	1.67	11.54	1.01	1.70
Packet loss Rate Uplink %	1.02	10.46	1.60	1.53

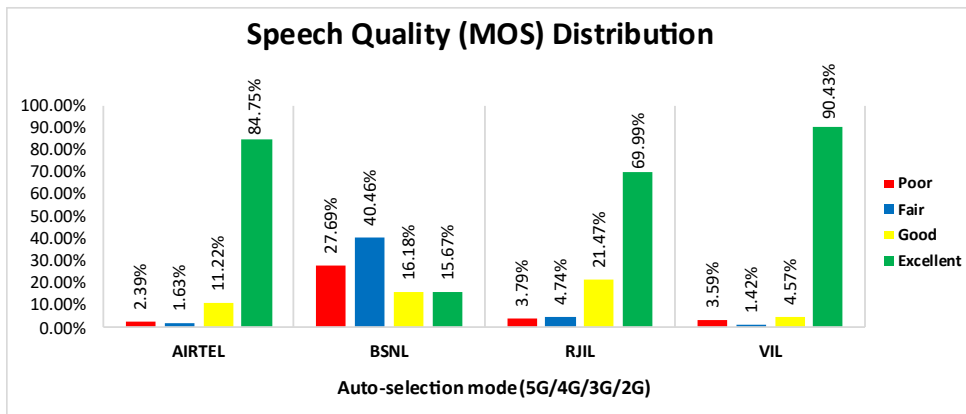
**Table-16:** Summary of silence instances & packet loss rate for mobile to mobile call.

### (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	3306	2521	3269	3176
Speech Quality (Average MOS)	3.97	2.65	3.83	4.50
Number of samples with MOS $\geq 4$ to $< 5$ (Excellent)	2802	395	2288	2872
Number of samples with MOS $\geq 3$ to $< 4$ (Good)	371	408	702	145
Number of samples with MOS $\geq 2$ to $< 3$ (Fair)	54	1020	155	45
Number of samples with MOS $\geq 1$ to $< 2$ (Poor)	79	698	124	114
%age of samples with MOS $\geq 4$ to $< 5$ (Excellent)	84.75%	15.67%	69.99%	90.43%
%age of samples with MOS $\geq 3$ to $< 4$ (Good)	11.22%	16.18%	21.47%	4.57%
%age of samples with MOS $\geq 2$ to $< 3$ (Fair)	1.63%	40.46%	4.74%	1.42%
%age of samples with MOS $\geq 1$ to $< 2$ (Poor)	2.39%	27.69%	3.79%	3.59%

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



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

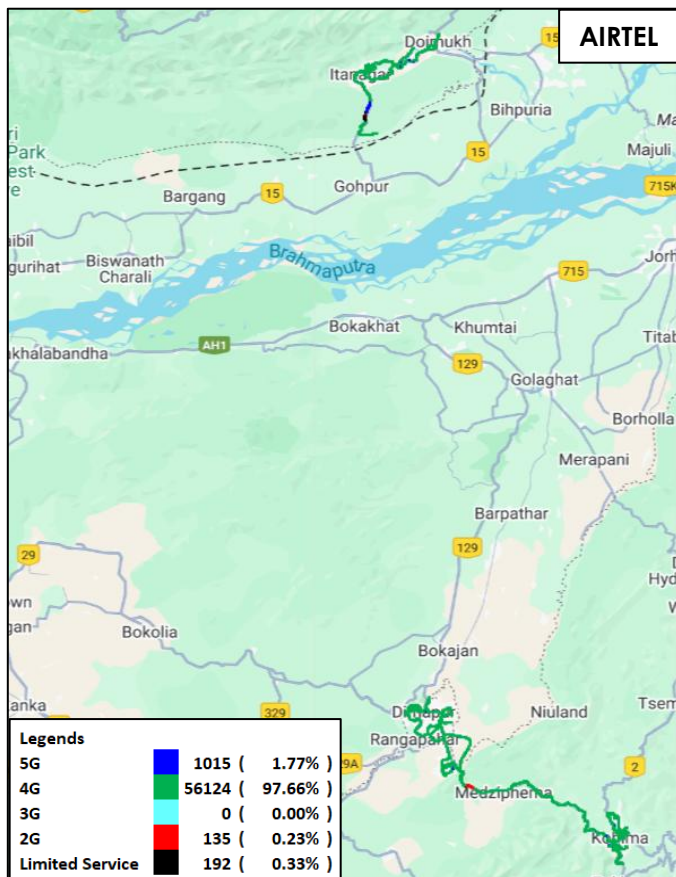
**(f) Network Technology:** This section represent time spent on various network technologies.

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	1.77%	NA	13.06%	NA
4G	97.66%	67.08%	86.01%	85.46%
3G	NA	7.27%	NA	NA
2G	0.23%	23.27%	NA	13.62%
Limited Service	0.33%	2.38%	0.93%	0.92%

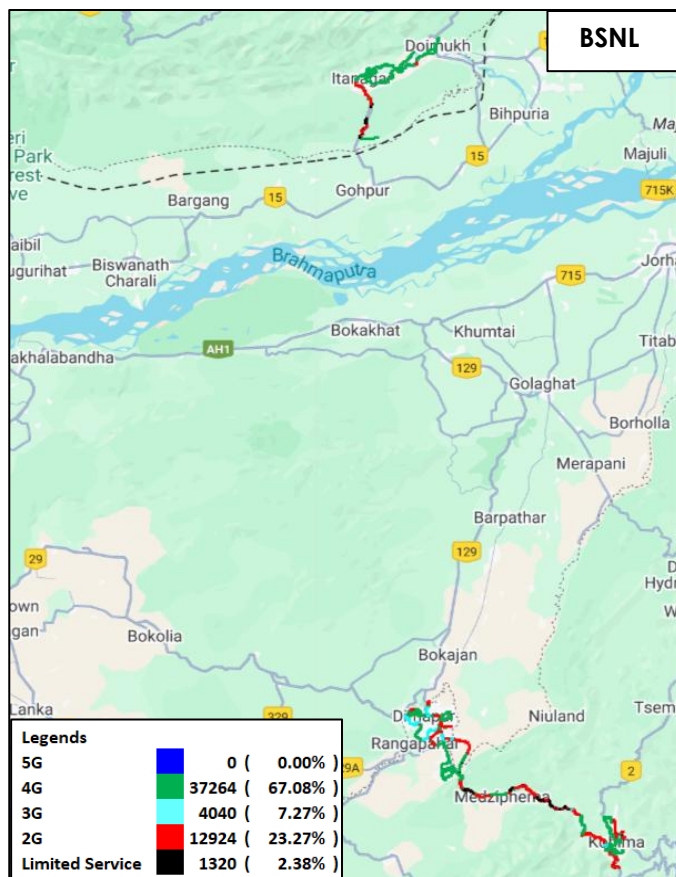
**Table-18:** Time spent on technology during drive test.

**Note-**

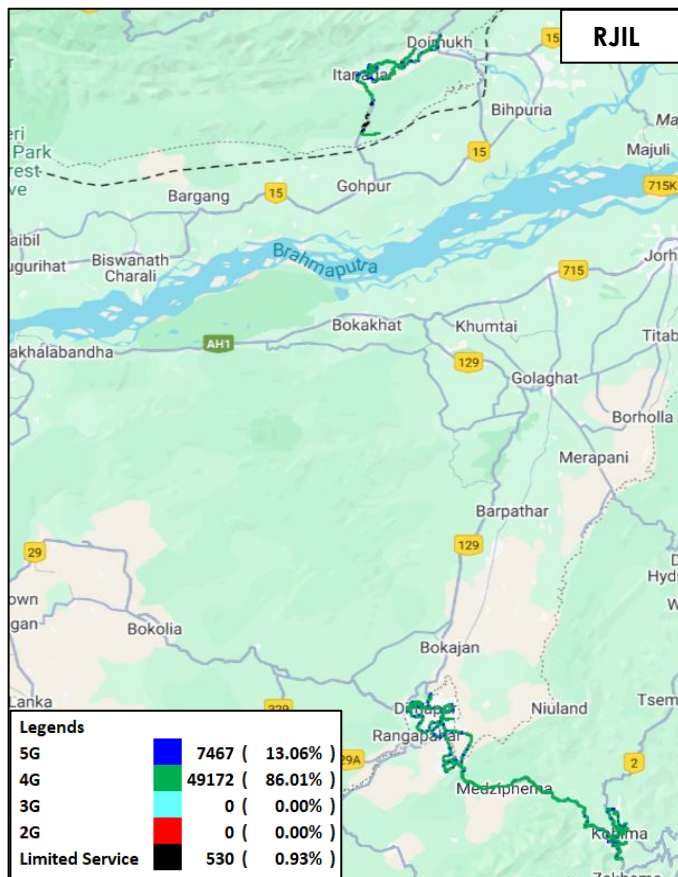
- NA- Service provider doesn't provide services in respective technology.



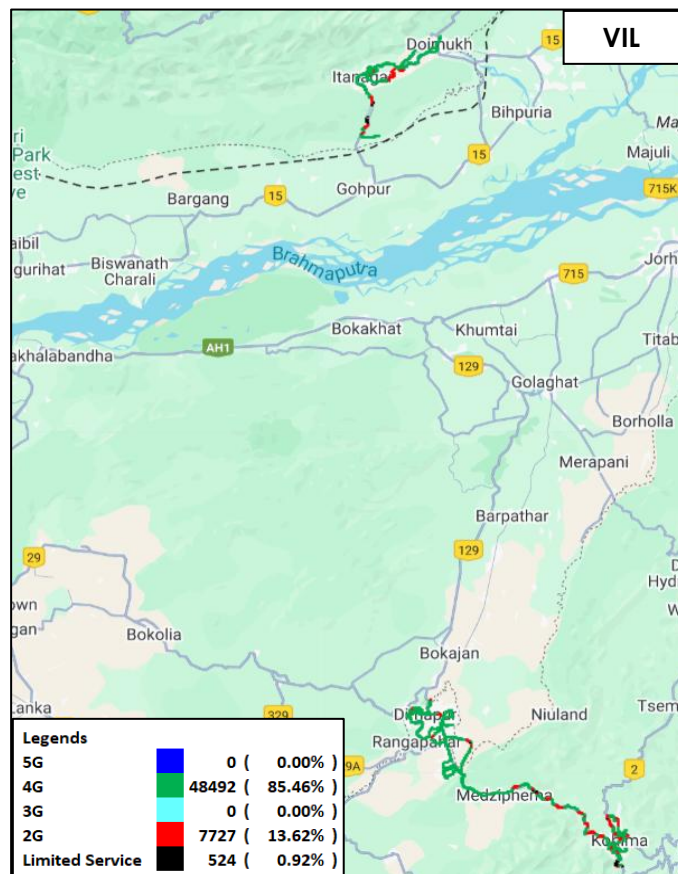
**Figure-16:** Serving technology plots in auto-selection mode (5G/4G/3G/2G) -AIRTEL.



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



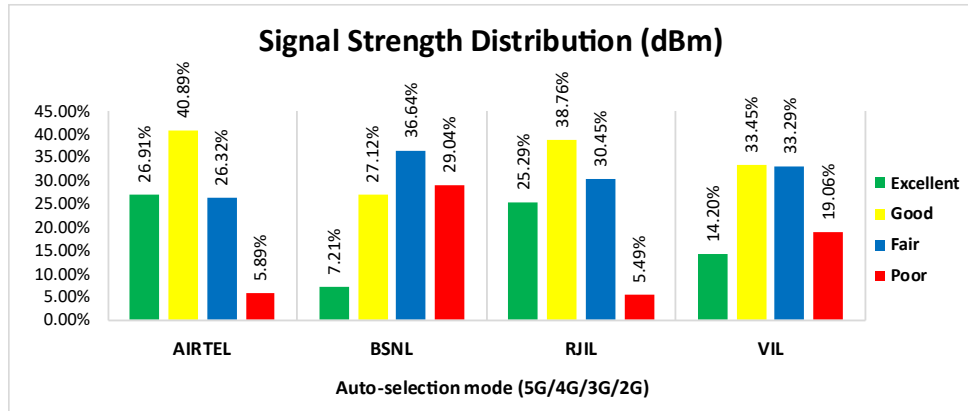
**Figure-18:** Serving technology plots in auto-selection mode (5G/4G/3G/2G)- RJIL.



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



**(g) Network Signal Strength Distribution:** The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-51, 52, 53 & 54 for map view)



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

#### Observations:

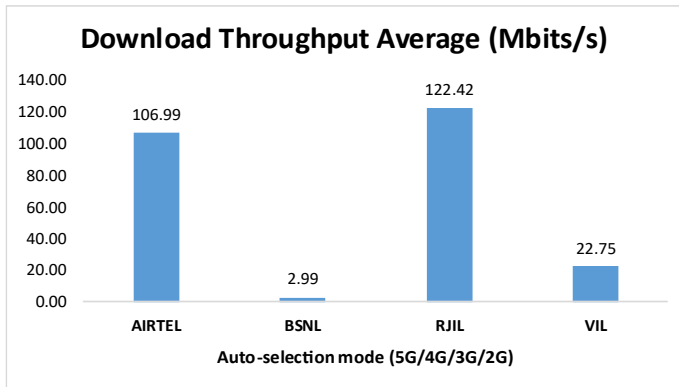
- Airtel has 27% of samples falling in the excellent signal strength category.
- BSNL has 7% of samples falling in the excellent signal strength category.
- RJIL has 25% of samples falling in the excellent signal strength category.
- VIL has 14% of samples falling in the excellent signal strength category.

### 4.2.4 Data performance

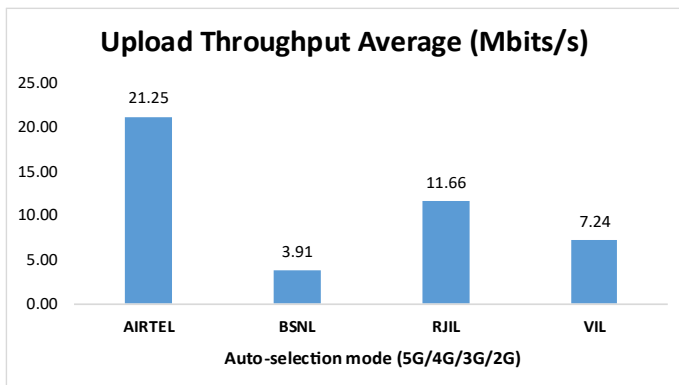
#### (a) Data Parameters (Auto-selection mode- 5G/4G/3G/2G)

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	106.99	2.99	122.42	22.75
	80th Percentile	172.32	5.02	226.16	40.24
	20th Percentile	27.61	0.41	3.27	5.83
Upload Throughput (Mbits/s)	Average	21.25	3.91	11.66	7.24
	80th Percentile	37.77	5.68	19.70	9.61
	20th Percentile	3.13	1.30	1.58	3.96
Latency (ms)	50th Percentile	25.95	34.40	23.50	50.50

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



**Figure- 21:** Download throughput

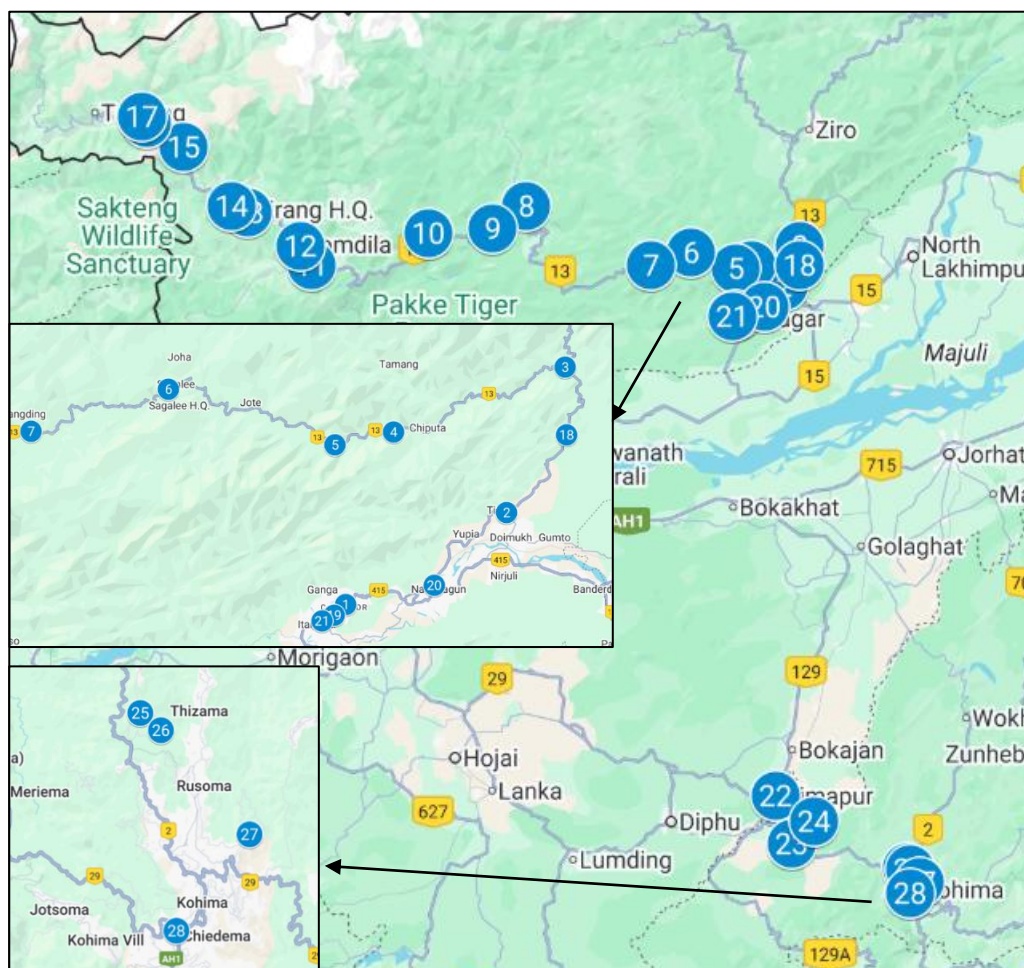


**Figure- 22:** Upload throughput

### 4.3 Hotspots

Hotspot testing has been done from 7<sup>th</sup> June 2025 to 23<sup>rd</sup> June 2025. Twenty-eight locations have been tested in Itanagar city, Naharlagun city & adjoining area (On 10<sup>th</sup> June 2025) and Dimapur city & district, Kohima city & district (from 20<sup>th</sup> to 23<sup>rd</sup> June 2025) and across Itanagar to Bumla Pass highway (from 7<sup>th</sup> to 10<sup>th</sup> June 2025).

#### 4.3.1 Locations



**Figure- 23:** Hotspot locations

#### 4.3.2 Hotspot covered

1. Arunachal Pradesh State Legislative Assembly
2. Ball of Fire Museum
3. Bomdila Market
4. Commissioner of Tax & Excise Office, Itanagar
5. Daily Market New, Naharlagun
6. Dimapur Rly. Stn.
7. Government College, Doimukh
8. Government ITI College, Dirang
9. Government Residential School
10. Govt. Middle School, Longte Tapu
11. Govt. Sec. School, Toru



12. Hoj-Yayee Market
13. Indian Oil, Jang
14. Jaswantgarh War Memorial
15. Kohima New High Court
16. Kohima Raj Bhawan
17. Laptap Baptist Church, 6J59+5HJ, Laptap, 791119
18. Nagaland Medical College
19. Nagaland University Meriema Campus
20. NIT Nagaland
21. Noune Resort
22. Office of Additional Deputy Commissioner, Sagalee
23. Palizi Catholic Church
24. Post Office, Seppa
25. Ramakrishna Mission Hospital, Itanagar
26. Sela Pass
27. Sopo Market
28. Unit Hospital 4BN ITBP, Dirang

### 4.3.3 Voice performance

Overall Voice Performance				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	280	280	280	280
Call Setup Success Rate %	95.00	62.86	100.00	88.21
Drop Call Rate %	0.00	2.27	0.00	0.00
Call Setup Time-Average (Second)	6.19	3.51	0.68	2.01

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

Arunachal Pradesh State Legislative Assembly				
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)	2.31	2.10	0.60	1.26

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

Ball of Fire 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	80.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	2.75	2.93	1.60	3.50

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

Bomdila Market				
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)	2.45	2.38	0.59	1.33

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

Commissioner of Tax & Excise Office, Itanagar				
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)	18.13	4.86	0.85	1.43

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

Daily Market New, Naharlagun				
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)	2.35	1.81	0.57	1.29

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

Dimapur Rly. Stn.				
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)	2.19	2.51	0.67	1.46

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

Government College, Doimukh				
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)	2.72	3.32	0.66	1.48

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

Government ITI College, Dirang				
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	20.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	2.25	13.05	0.52	1.33

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

Government Residential School				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	90.00	0.00	100.00	100.00
Drop Call Rate %	0.00	-	0.00	0.00
Call Setup Time-Average (Second)	8.11	-	0.75	4.32

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

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

Govt. Middle School, Longte Tapu				
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)	2.22	-	0.62	-

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

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

Govt. Sec. School, Toru				
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)	18.11	-	0.71	4.21

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

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

Hoj-Yayee Market				
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)	18.23	4.58	0.66	3.84

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

Indian Oil, Jang				
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)	18.22	5.09	0.60	1.30

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

Jaswantgarh War Memorial				
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)	18.28	-	0.65	2.10

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

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

Kohima New High Court				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	70.00	80.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	5.03	3.01	0.63	1.47

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

Kohima 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	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	2.38	1.94	0.56	3.88

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

Laptap Baptist Church, 6J59+5HJ, Laptap, 791119				
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)	18.33	-	0.67	4.06

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

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

Nagaland Medical College				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	100.00	90.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	2.23	3.72	0.59	1.39

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

Nagaland University Meriema Campus				
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)	2.23	2.92	1.25	1.28

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

NIT Nagaland				
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)	2.24	2.35	0.61	1.45

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

Noune Resort				
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	40.00	100.00	90.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	2.29	3.08	0.53	1.58

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

Office of Additional Deputy Commissioner, Sagalee				
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)	2.36	-	0.56	1.30

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

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

Palizi Catholic Church				
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)	2.30	-	0.64	-

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

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

Post Office, Seppa				
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	100.00
Drop Call Rate %	0.00	25.00	0.00	0.00
Call Setup Time-Average (Second)	2.31	10.96	0.65	1.28

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

Ramakrishna Mission Hospital, Itanagar				
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	40.00	100.00	100.00
Drop Call Rate %	0.00	0.00	0.00	0.00
Call Setup Time-Average (Second)	2.30	2.40	0.57	1.35

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

Sela Pass				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	10	10	10	10
Call Setup Success Rate %	0.00	70.00	100.00	100.00
Drop Call Rate %	-	14.29	0.00	0.00
Call Setup Time-Average (Second)	-	2.46	0.57	1.26

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

**Note-** “-” Call setup time & drop call rate have not been reported as all calls were failed at this location.

Sopo Market				
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	40.00	100.00	0.00
Drop Call Rate %	0.00	0.00	0.00	-
Call Setup Time-Average (Second)	2.31	3.28	0.67	-

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

**Note-** “-” Call setup time & drop call rate have not been reported as all calls were failed at this location.

Unit Hospital 4BN ITBP, Dirang				
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)	2.29	2.63	0.57	1.23

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

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

Overall Data Performance				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	95.43	6.11	192.17	18.64
Download Throughput 80th Percentile (Mbit/s)	148.09	10.23	393.89	36.71
Download Throughput 20th Percentile (Mbit/s)	20.48	1.93	16.01	2.07
Download Session Setup Success Rate %	90.00	27.66	90.00	97.35
Upload Throughput Average (Mbits/s)	24.64	4.87	13.20	6.76
Upload Throughput 80th Percentile (Mbit/s)	49.60	8.60	26.16	9.64
Upload Throughput 20th Percentile (Mbit/s)	3.43	1.62	1.26	2.16
Upload Session Setup Success Rate %	91.43	28.57	95.71	78.01
Web Browsing Delay (Second)	2.24	3.14	2.88	2.60
Youtube Initial Buffer Delay (Second)	1.03	2.76	1.24	1.22
Latency (ms) - 50th Percentile	28.05	28.30	20.65	53.00
Jitter (ms)	63.64	318.88	19.92	105.92
Packet Loss Rate%	10.43	73.70	7.99	33.69
Packet Loss Rate- 90th percentile	35.16	100.00	9.91	100.00

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

Arunachal Pradesh State Legislative Assembly				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	100.91	-	6.69	25.54
Download Session Setup Success Rate %	100.00	0.00	60.00	100.00
Upload Throughput Average (Mbits/s)	14.30	-	1.20	9.61
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	1.62	3.07	5.52	2.12
Youtube Initial Buffer Delay (Second)	0.71	1.03	5.81	0.93
Latency (ms) - 50th Percentile	24.25	-	44.45	56.50
Jitter (ms)	6.01	-	34.28	3.14
Packet Loss Rate%	0.10	100.00	6.00	0.20

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

**Note--"** Download, Upload and Ping tests were failed.

Ball of Fire Museum				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	0.22	4.67	0.18	-
Download Session Setup Success Rate %	100.00	100.00	40.00	0.00
Upload Throughput Average (Mbits/s)	0.40	2.06	0.68	-
Upload Session Setup Success Rate %	100.00	100.00	40.00	0.00
Web Browsing Delay (Second)	6.33	2.52	14.28	-
Youtube Initial Buffer Delay (Second)	-	4.34	-	-
Latency (ms) - 50th Percentile	57.00	42.45	192.75	-
Jitter (ms)	120.58	9.45	328.68	-
Packet Loss Rate%	36.70	5.60	87.30	100.00

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

**Note--"** All data tests were failed.



Bomdila Market				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	312.01	-	351.09	30.06
Download Session Setup Success Rate %	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	108.69	-	8.25	9.65
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	1.52	2.83	1.45	1.64
Youtube Initial Buffer Delay (Second)	0.65	1.26	0.89	0.73
Latency (ms) - 50th Percentile	24.30	-	19.60	48.60
Jitter (ms)	4.04	-	8.75	4.30
Packet Loss Rate%	0.00	100.00	0.00	0.30

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

**Note--"** Download, Upload and Ping tests were failed.

Commissioner of Tax & Excise Office, Itanagar				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	107.77	-	44.23	41.06
Download Session Setup Success Rate %	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	12.98	-	3.16	9.60
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	1.44	3.14	1.68	2.14
Youtube Initial Buffer Delay (Second)	0.69	2.42	0.85	0.86
Latency (ms) - 50th Percentile	24.45	-	29.05	51.00
Jitter (ms)	4.91	-	31.41	2.82
Packet Loss Rate%	0.20	100.00	4.60	0.20

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

**Note--"** Download, Upload and Ping tests were failed.

Daily Market New, Naharlagun				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	32.90	-	45.43	12.02
Download Session Setup Success Rate%	100.00	0.00	80.00	100.00
Upload Throughput Average (Mbits/s)	8.88	-	3.38	9.65
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	2.15	3.27	2.48	2.49
Youtube Initial Buffer Delay (Second)	1.10	4.50	1.23	1.00
Latency (ms)- 50th Percentile	32.00	-	23.25	51.50
Jitter (ms)	14.02	-	14.90	3.96
Packet Loss Rate%	1.90	100.00	0.70	0.20

**Table-54:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note--"** Download, Upload and Ping tests were failed.

Dimapur Rly. Stn.				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	255.23	4.27	297.72	44.53
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	57.02	11.69	12.57	9.69
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.56	2.51	2.33	2.60
Youtube Initial Buffer Delay (Second)	0.79	2.17	0.78	0.77
Latency (ms) - 50th Percentile	24.05	21.85	23.05	45.80
Jitter (ms)	10.74	17.40	12.97	3.22
Packet Loss Rate%	0.10	19.40	0.50	0.30

**Table-55:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Government College, Doimukh				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	1.45	-	15.18	4.69
Download Session Setup Success Rate %	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	0.99	-	0.89	2.01
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	6.85	3.73	4.79	2.32
Youtube Initial Buffer Delay (Second)	-	1.61	-	1.99
Latency (ms) - 50th Percentile	40.35	3699.75	22.53	60.00
Jitter (ms)	127.56	4065.78	8.51	12.65
Packet Loss Rate%	17.70	100.00	0.20	1.70

**Table-56:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

<b>Note</b> -"-" Download and Upload tests were failed.				
Government ITI College, Dirang				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	245.92	-	579.89	19.09
Download Session Setup Success Rate %	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	34.10	-	25.11	9.60
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	1.44	-	1.43	1.82
Youtube Initial Buffer Delay (Second)	0.63	-	0.96	0.75
Latency (ms) - 50th Percentile	23.58	-	14.10	48.45
Jitter (ms)	3.86	-	2.64	8.25
Packet Loss Rate%	0.00	100.00	0.00	0.30

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

<b>Note</b> -"-" All data tests were failed.				
--	--	--	--	--

Government Residential School				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	21.73	-	27.57	-
Download Session Setup Success Rate %	100.00	0.00	80.00	0.00
Upload Throughput Average (Mbits/s)	11.45	-	1.55	-
Upload Session Setup Success Rate %	100.00	0.00	100.00	0.00
Web Browsing Delay (Second)	1.67	-	2.59	-
Youtube Initial Buffer Delay (Second)	0.97	-	2.65	-
Latency (ms) - 50th Percentile	26.05	-	21.30	-
Jitter (ms)	42.14	-	21.08	-
Packet Loss Rate%	1.00	100.00	1.90	100.00

**Table-58:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note-**-" All data tests were failed.

Govt. Middle School, Longte Tapu				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	40.14	-	71.10	-
Download Session Setup Success Rate %	100.00	0.00	100.00	0.00
Upload Throughput Average (Mbits/s)	11.12	-	5.74	-
Upload Session Setup Success Rate %	100.00	0.00	100.00	0.00
Web Browsing Delay (Second)	1.48	-	1.85	-
Youtube Initial Buffer Delay (Second)	0.90	-	1.01	-
Latency (ms) - 50th Percentile	26.45	-	21.00	-
Jitter (ms)	7.66	-	7.71	-
Packet Loss Rate%	0.00	100.00	0.20	100.00

**Table-59:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note-**-" All data tests were failed.

Govt. Sec. School, Toru				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	20.88	-	1.03	-
Download Session Setup Success Rate %	60.00	0.00	40.00	0.00
Upload Throughput Average (Mbits/s)	31.85	-	0.42	-
Upload Session Setup Success Rate %	80.00	0.00	60.00	0.00
Web Browsing Delay (Second)	1.64	-	7.78	-
Youtube Initial Buffer Delay (Second)	0.73	-	-	-
Latency (ms) - 50th Percentile	33.85	-	-	26135.00
Jitter (ms)	3.78	-	-	3624.40
Packet Loss Rate%	0.10	100.00	100.00	100.00

**Table-60:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note-**-" All data tests were failed.

Hoj-Yayee Market				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	205.56	1.81	3.49	0.01
Download Session Setup Success Rate %	100.00	80.00	100.00	100.00
Upload Throughput Average (Mbits/s)	69.48	0.83	1.12	0.04
Upload Session Setup Success Rate %	80.00	100.00	100.00	100.00
Web Browsing Delay (Second)	1.47	4.37	7.42	10.58
Youtube Initial Buffer Delay (Second)	0.70	10.07	-	-
Latency (ms) - 50th Percentile	36.98	64019.50	32.55	1825.00
Jitter (ms)	4.79	2607.23	15.39	162.24
Packet Loss Rate%	0.00	95.40	9.10	100.00

**Table-61:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

<b>Note</b> -"-" Youtube tests were failed.				
Indian Oil, Jang				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	42.83	13.09	12.41	0.23
Download Session Setup Success Rate%	100.00	20.00	100.00	100.00
Upload Throughput Average (Mbits/s)	4.14	3.88	5.26	2.10
Upload Session Setup Success Rate %	80.00	20.00	100.00	100.00
Web Browsing Delay (Second)	2.58	1.95	1.70	4.29
Youtube Initial Buffer Delay (Second)	2.28	1.53	1.45	-
Latency (ms)- 50th Percentile	28.55	-	19.70	56.00
Jitter (ms)	12.58	-	3.71	10.51
Packet Loss Rate%	0.60	100.00	0.00	20.80

**Table-62:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

<b>Note</b> -"-" Ping and Youtube tests were failed.				
Jaswantgarh War Memorial				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	1.29	-	14.02	10.36
Download Session Setup Success Rate %	80.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	1.27	-	0.81	9.36
Upload Session Setup Success Rate %	80.00	0.00	100.00	100.00
Web Browsing Delay (Second)	4.19	-	7.57	3.09
Youtube Initial Buffer Delay (Second)	4.00	-	-	0.89
Latency (ms) - 50th Percentile	45.00	-	24.90	46.15
Jitter (ms)	293.28	-	7.01	4.03
Packet Loss Rate%	66.40	100.00	0.30	8.60

**Table-63:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

<b>Note</b> -"-" All data tests were failed.				
--	--	--	--	--

Kohima New High Court				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	111.34	-	492.92	27.19
Download Session Setup Success Rate %	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	15.37	-	9.07	4.18
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	3.21	-	2.36	3.05
Youtube Initial Buffer Delay (Second)	0.64	-	0.94	0.87
Latency (ms) - 50th Percentile	27.55	-	19.70	53.50
Jitter (ms)	1113.36	-	3.76	14.74
Packet Loss Rate%	29.00	100.00	0.00	0.90

**Table-64:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note-** "-" All data tests were failed.

Kohima Raj Bhawan				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	55.20	2.23	325.03	2.10
Download Session Setup Success Rate %	100.00	100.00	80.00	100.00
Upload Throughput Average (Mbits/s)	9.39	3.46	29.65	6.96
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.61	4.47	2.37	4.91
Youtube Initial Buffer Delay (Second)	1.50	3.53	0.81	4.28
Latency (ms) - 50th Percentile	28.20	29.70	18.95	56.50
Jitter (ms)	29.20	10.40	4.26	8.92
Packet Loss Rate%	0.60	0.60	0.10	0.80

**Table-65:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Laptap Baptist Church, 6J59+5HJ, Laptap, 791119				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	46.05	-	64.25	0.18
Download Session Setup Success Rate %	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	6.24	-	4.72	0.18
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	1.68	-	3.65	1.50
Youtube Initial Buffer Delay (Second)	0.87	-	3.30	-
Latency (ms) - 50th Percentile	29.90	-	21.20	295.00
Jitter (ms)	8.09	-	7.46	144.66
Packet Loss Rate%	0.10	100.00	0.10	100.00

**Table-66:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note-** "-" All data tests were failed.

Nagaland Medical College				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	139.59	4.21	385.69	21.48
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	26.51	4.22	25.45	9.58
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.42	3.44	2.29	2.91
Youtube Initial Buffer Delay (Second)	0.80	2.60	1.03	0.86
Latency (ms) - 50th Percentile	28.35	27.65	20.15	48.80
Jitter (ms)	11.89	5.32	6.32	6.76
Packet Loss Rate%	0.20	0.40	0.00	0.40

**Table-67:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

Nagaland University Meriema Campus				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	105.97	6.55	49.57	7.88
Download Session Setup Success Rate %	100.00	80.00	80.00	100.00
Upload Throughput Average (Mbits/s)	3.44	3.02	2.94	3.59
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.86	4.91	3.09	3.17
Youtube Initial Buffer Delay (Second)	0.94	4.84	1.00	3.22
Latency (ms) - 50th Percentile	29.60	26.30	24.33	59.00
Jitter (ms)	26.26	2.79	51.48	5.71
Packet Loss Rate%	1.20	1.50	11.80	0.60

**Table-68:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

NIT Nagaland				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	264.95	16.47	542.54	43.04
Download Session Setup Success Rate %	100.00	100.00	100.00	100.00
Upload Throughput Average (Mbits/s)	66.08	10.03	50.34	9.56
Upload Session Setup Success Rate %	100.00	100.00	100.00	100.00
Web Browsing Delay (Second)	2.29	2.68	2.34	3.36
Youtube Initial Buffer Delay (Second)	0.62	0.87	0.74	0.81
Latency (ms) - 50th Percentile	23.40	24.05	17.20	50.00
Jitter (ms)	5.08	7.87	2.01	10.89
Packet Loss Rate%	0.10	2.50	0.00	4.00

**Table-69:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).\

Noune Resort				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	40.57	-	171.61	0.08
Download Session Setup Success Rate%	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	4.53	-	5.74	0.10
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	3.53	-	3.45	0.00
Youtube Initial Buffer Delay (Second)	2.37	-	0.98	-
Latency (ms)- 50th Percentile	24.90	22.83	15.63	1110.75
Jitter (ms)	10.89	3.89	7.33	307.83
Packet Loss Rate%	0.30	13.40	0.40	100.00

**Table-70:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note-** Download, Upload, Browse and Youtube tests were failed.

Office of Additional Deputy Commissioner, Sagalee				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	46.93	-	525.01	33.73
Download Session Setup Success Rate %	40.00	0.00	80.00	100.00
Upload Throughput Average (Mbits/s)	73.43	-	56.98	9.63
Upload Session Setup Success Rate %	60.00	0.00	100.00	100.00
Web Browsing Delay (Second)	1.14	-	1.11	1.81
Youtube Initial Buffer Delay (Second)	0.69	-	0.67	0.89
Latency (ms) - 50th Percentile	25.10	-	15.95	57.50
Jitter (ms)	4.00	-	3.58	2.68
Packet Loss Rate%	0.00	100.00	0.00	0.10

**Table-71:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note-** All data tests were failed.

Palizi Catholic Church				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	38.03	-	54.31	-
Download Session Setup Success Rate %	100.00	0.00	100.00	0.00
Upload Throughput Average (Mbits/s)	2.47	-	1.71	-
Upload Session Setup Success Rate %	100.00	0.00	100.00	0.00
Web Browsing Delay (Second)	1.77	-	1.97	-
Youtube Initial Buffer Delay (Second)	1.04	-	2.37	-
Latency (ms) - 50th Percentile	33.35	-	21.65	-
Jitter (ms)	12.78	-	6.47	-
Packet Loss Rate%	0.40	100.00	0.00	100.00

**Table-72:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note-** All data tests were failed.

Post Office, Seppa				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	61.62	-	171.86	40.80
Download Session Setup Success Rate %	100.00	0.00	80.00	100.00
Upload Throughput Average (Mbits/s)	14.63	-	6.02	9.45
Upload Session Setup Success Rate %	100.00	0.00	80.00	100.00
Web Browsing Delay (Second)	1.99	-	1.54	2.26
Youtube Initial Buffer Delay (Second)	1.08	-	0.79	0.80
Latency (ms) - 50th Percentile	26.80	-	21.15	48.40
Jitter (ms)	7.40	-	7.28	23.27
Packet Loss Rate%	0.20	100.00	0.10	1.00

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

**Note-** All data tests were failed.

Ramakrishna Mission Hospital, Itanagar				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	69.64	-	273.36	24.98
Download Session Setup Success Rate %	40.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	6.76	-	48.14	9.57
Upload Session Setup Success Rate %	80.00	0.00	100.00	100.00
Web Browsing Delay (Second)	1.84	2.56	1.51	2.17
Youtube Initial Buffer Delay (Second)	0.78	1.87	0.71	0.87
Latency (ms) - 50th Percentile	37.60	-	19.75	55.50
Jitter (ms)	8.25	-	6.19	6.60
Packet Loss Rate%	0.40	100.00	0.10	2.20

**Table-74:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note-** All data tests were failed.

Sela Pass				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	-	-	79.27	10.13
Download Session Setup Success Rate %	0.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	-	-	2.19	6.40
Upload Session Setup Success Rate %	0.00	0.00	100.00	100.00
Web Browsing Delay (Second)	-	-	1.89	1.96
Youtube Initial Buffer Delay (Second)	-	-	1.13	0.79
Latency (ms) - 50th Percentile	-	-	20.70	45.45
Jitter (ms)	-	-	32.07	2.34
Packet Loss Rate%	100.00	100.00	0.10	0.10

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

**Note-** All data tests were failed.



Sopo Market				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	69.31	6.54	20.56	-
Download Session Setup Success Rate %	100.00	100.00	100.00	0.00
Upload Throughput Average (Mbits/s)	27.00	3.61	0.96	-
Upload Session Setup Success Rate %	100.00	80.00	100.00	0.00
Web Browsing Delay (Second)	1.60	3.80	5.69	-
Youtube Initial Buffer Delay (Second)	0.77	2.97	-	-
Latency (ms) - 50th Percentile	25.30	31.65	20.85	-
Jitter (ms)	30.14	40.87	5.13	-
Packet Loss Rate%	0.30	24.70	0.10	100.00

**Table-76:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

**Note-** "-" All data tests were failed.

Unit Hospital 4BN ITBP, Dirang				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	45.26	-	448.85	10.92
Download Session Setup Success Rate %	100.00	0.00	100.00	100.00
Upload Throughput Average (Mbits/s)	60.30	-	41.40	8.18
Upload Session Setup Success Rate %	100.00	0.00	100.00	100.00
Web Browsing Delay (Second)	1.99	1.99	1.54	1.79
Youtube Initial Buffer Delay (Second)	1.01	1.53	0.77	0.76
Latency (ms) - 50th Percentile	39.48	-	9.80	48.70
Jitter (ms)	69.51	-	1.43	4.18
Packet Loss Rate%	34.50	100.00	0.00	0.70

**Table-77:** 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)	155.38	-	299.92	-
	Upload Throughput Average (Mbits/s)	44.38	-	25.16	-
4G	Download Throughput Average (Mbits/s)	22.44	7.54	38.55	16.59
	Upload Throughput Average (Mbits/s)	8.50	9.01	7.45	8.02

**Table-78:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Arunachal Pradesh State Legislative Assembly					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	98.82	-	3.27	-
	Upload Throughput Average (Mbits/s)	32.19	-	2.32	-
4G	Download Throughput Average (Mbits/s)	7.77	-	31.65	22.35
	Upload Throughput Average (Mbits/s)	10.12	-	9.86	9.61

**Table-79:** Overall Summary of 5G only & 4G only data download & upload speed.

<b>Note-</b> "-"Respective technology was not observed during the test.					
Ball of Fire Museum					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	1.12	-
	Upload Throughput Average (Mbits/s)	-	-	1.27	-
4G	Download Throughput Average (Mbits/s)	0.27	-	2.33	-
	Upload Throughput Average (Mbits/s)	0.61	-	1.39	-

**Table-80:** Overall Summary of 5G only & 4G only data download & upload speed.

<b>Note-</b> "-"Respective technology was not observed during the test.					
Bomdila Market					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	473.22	-	339.35	-
	Upload Throughput Average (Mbits/s)	128.50	-	15.11	-
4G	Download Throughput Average (Mbits/s)	20.98	-	10.99	19.81
	Upload Throughput Average (Mbits/s)	16.75	-	5.11	9.69

**Table-81:** Overall Summary of 5G only & 4G only data download & upload speed.

<b>Note-</b> "-"Respective technology was not observed during the test.					
Commissioner of Tax & Excise Office, Itanagar					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	88.24	-	39.89	-
	Upload Throughput Average (Mbits/s)	21.76	-	4.32	-
4G	Download Throughput Average (Mbits/s)	7.14	-	27.38	14.20
	Upload Throughput Average (Mbits/s)	1.92	-	4.99	9.57

**Table-82:** Overall Summary of 5G only & 4G only data download & upload speed.

<b>Note-</b> "-"Respective technology was not observed during the test.					
---	--	--	--	--	--

Daily Market New, Naharlagun					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	25.97	-	21.91	-
	Upload Throughput Average (Mbits/s)	7.45	-	3.68	-
4G	Download Throughput Average (Mbits/s)	2.74	-	20.31	4.39
	Upload Throughput Average (Mbits/s)	3.58	-	8.74	9.63

**Table-83:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Dimapur Rly. Stn.					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-		327.18	
	Upload Throughput Average (Mbits/s)	-		9.84	
4G	Download Throughput Average (Mbits/s)	48.86	4.09	5.73	41.15
	Upload Throughput Average (Mbits/s)	29.00	13.69	1.70	9.53

**Table-84:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Government College, Doimukh					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	-	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	2.11	-	23.97	3.97
	Upload Throughput Average (Mbits/s)	1.29	-	1.38	1.51

**Table-85:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Government ITI College, Dirang					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	258.74	-	714.59	-
	Upload Throughput Average (Mbits/s)	71.15	-	37.74	-
4G	Download Throughput Average (Mbits/s)	43.83	-	80.56	16.30
	Upload Throughput Average (Mbits/s)	5.87	-	5.57	9.68

**Table-86:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Government Residential School					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	-	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	6.05	-	51.78	14.15
	Upload Throughput Average (Mbits/s)	4.82	-	5.18	1.43

**Table-87:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Govt. Middle School, Longte Tapu					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	-	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	33.46	-	97.45	-
	Upload Throughput Average (Mbits/s)	25.22	-	22.32	-

**Table-88:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Govt. Sec. School, Toru					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	-	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	27.98	-	1.11	-
	Upload Throughput Average (Mbits/s)	13.06	-	0.98	-

**Table-89:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Hoj-Yayee Market					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	340.09	-	-	-
	Upload Throughput Average (Mbits/s)	99.31	-	-	-
4G	Download Throughput Average (Mbits/s)	100.31	-	15.54	-
	Upload Throughput Average (Mbits/s)	12.23	-	1.66	-

**Table-90:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Indian Oil, Jang					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	193.93	-	-	-
	Upload Throughput Average (Mbits/s)	27.12	-	-	-
4G	Download Throughput Average (Mbits/s)	5.82	-	8.37	0.23
	Upload Throughput Average (Mbits/s)	1.42	-	2.97	5.34

**Table-91:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Jaswantgarh War Memorial					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	-	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	0.08	-	83.73	0.18
	Upload Throughput Average (Mbits/s)	1.05	-	4.74	9.58

**Table-92:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Kohima New High Court					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	124.72	-	481.07	-
	Upload Throughput Average (Mbits/s)	19.06	-	14.14	-
4G	Download Throughput Average (Mbits/s)	5.70	-	10.33	17.84
	Upload Throughput Average (Mbits/s)	1.60	-	1.14	6.27

**Table-93:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Kohima Raj Bhawan					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	59.03	-	428.19	-
	Upload Throughput Average (Mbits/s)	11.03	-	62.43	-
4G	Download Throughput Average (Mbits/s)	19.16	5.36	60.78	1.88
	Upload Throughput Average (Mbits/s)	4.88	5.59	15.36	8.09

**Table-94:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Laptap Baptist Church, 6J59+5HJ, Laptap, 791119					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	-	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	35.27	-	69.85	-
	Upload Throughput Average (Mbits/s)	11.02	-	12.46	-

**Table-95:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Nagaland Medical College					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	139.21	-	366.92	-
	Upload Throughput Average (Mbits/s)	33.79	-	24.33	-
4G	Download Throughput Average (Mbits/s)	26.96	2.70	2.74	11.77
	Upload Throughput Average (Mbits/s)	6.93	3.14	1.33	8.56

**Table-96:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Nagaland University Meriema Campus					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	7.04	-
	Upload Throughput Average (Mbits/s)	1.65	-	1.33	-
4G	Download Throughput Average (Mbits/s)	19.86	12.43	13.63	3.75
	Upload Throughput Average (Mbits/s)	5.62	4.80	3.36	6.11

**Table-97:** Overall Summary of 5G only & 4G only data download & upload speed.

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

NIT Nagaland					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	560.97	-
	Upload Throughput Average (Mbits/s)	-	-	61.18	-
4G	Download Throughput Average (Mbits/s)	59.31	12.75	62.63	45.09
	Upload Throughput Average (Mbits/s)	13.78	11.07	12.14	9.53

**Table-98:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Noune Resort					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	176.47	-
	Upload Throughput Average (Mbits/s)	-	-	6.23	-
4G	Download Throughput Average (Mbits/s)	47.15	7.91	3.70	-
	Upload Throughput Average (Mbits/s)	19.05	14.94	1.77	1.15

**Table-99:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Office of Additional Deputy Commissioner, Sagalee					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	156.71	-	529.42	-
	Upload Throughput Average (Mbits/s)	66.67	-	68.96	-
4G	Download Throughput Average (Mbits/s)	10.36	-	111.32	45.86
	Upload Throughput Average (Mbits/s)	5.00	-	23.32	9.65

**Table-100:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Palizi Catholic Church					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	-	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	53.26	-	49.76	-
	Upload Throughput Average (Mbits/s)	4.53	-	5.22	-

**Table-101:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Post Office, Seppa					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	78.66	-	171.32	-
	Upload Throughput Average (Mbits/s)	44.00	-	6.92	-
4G	Download Throughput Average (Mbits/s)	16.93	-	17.90	25.16
	Upload Throughput Average (Mbits/s)	4.07	-	3.65	9.13

**Table-102:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Ramakrishna Mission Hospital, Itanagar					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	76.00	-	268.37	-
	Upload Throughput Average (Mbits/s)	19.25	-	47.08	-
4G	Download Throughput Average (Mbits/s)	6.27	-	45.30	20.00
	Upload Throughput Average (Mbits/s)	4.05	-	16.83	9.61

**Table-103:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Sela Pass					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	-	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	-	-	86.55	11.48
	Upload Throughput Average (Mbits/s)	-	-	25.57	9.69

**Table-104:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Sopo Market					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	-	-	-	-
	Upload Throughput Average (Mbits/s)	-	-	-	-
4G	Download Throughput Average (Mbits/s)	10.69	-	34.95	-
	Upload Throughput Average (Mbits/s)	24.36	-	2.18	-

**Table-105:** Overall Summary of 5G only & 4G only data download & upload speed.

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

Unit Hospital 4BN ITBP, Dirang					
Parameters		Service Provider			
		AIRTEL	BSNL	RJIL	VIL
5G	Download Throughput Average (Mbits/s)	44.75	-	469.77	-
	Upload Throughput Average (Mbits/s)	53.83	-	51.25	-
4G	Download Throughput Average (Mbits/s)	23.56	-	40.56	12.18
	Upload Throughput Average (Mbits/s)	5.55	-	7.59	9.60

**Table-106:** 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 02<sup>nd</sup> June 2025. Two locations have been tested in the Itanagar city, Naharlagun city and adjoining area.

### 4.4.1 Walk test locations



**Figure-24:** Walk Test locations.

### 4.4.2 Walk test covered

1. Donyi Polo Airport, Itanagar
2. Naharlagun (Itanagar) Rly. Station

### 4.4.3 Voice performance

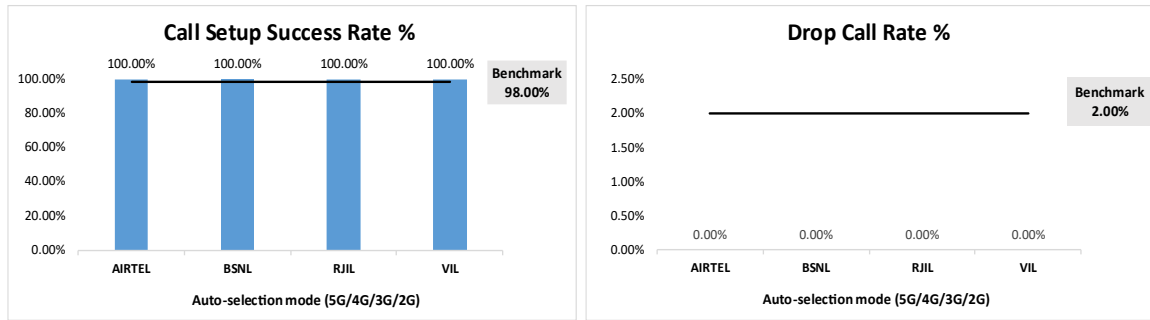
#### i) Donyi Polo Airport, Itanagar

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

Donyi Polo Airport, Itanagar				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	11	11	11	11
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)	2.28	1.92	0.65	1.25
Handover Success Rate %	100.00	-	100.00	-

**Table-107:** Summary of Voice performance in network auto-selection mode (5G/4G/3G/2G).

**Note** “-” Handover did not attempt.



**Figure-25:** Performance for call setup success rate and drop call rate.

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

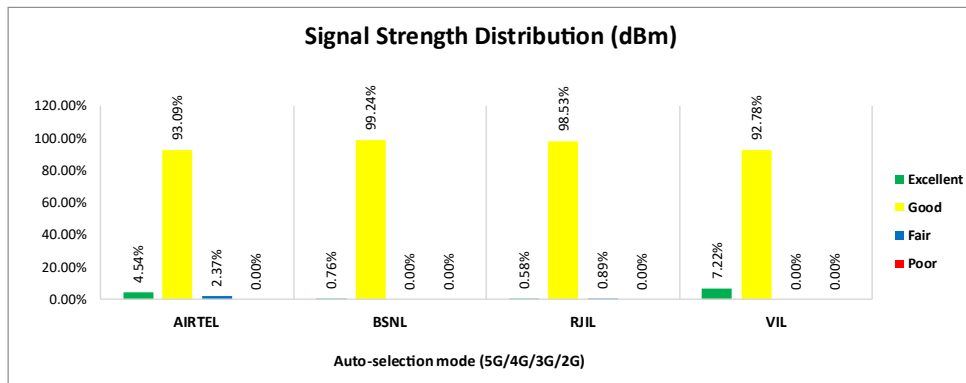
Donyi Polo Airport, Itanagar				
Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	0.00%	NA	0.00%	NA
4G	100.00%	100.00%	100.00%	100.00%
3G	NA	0.00%	NA	NA
2G	0.00%	0.00%	NA	0.00%
Limited service	0.00%	0.00%	0.00%	0.00%

**Table-108:** Time spent on technology during walk test.

**Note-**

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

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



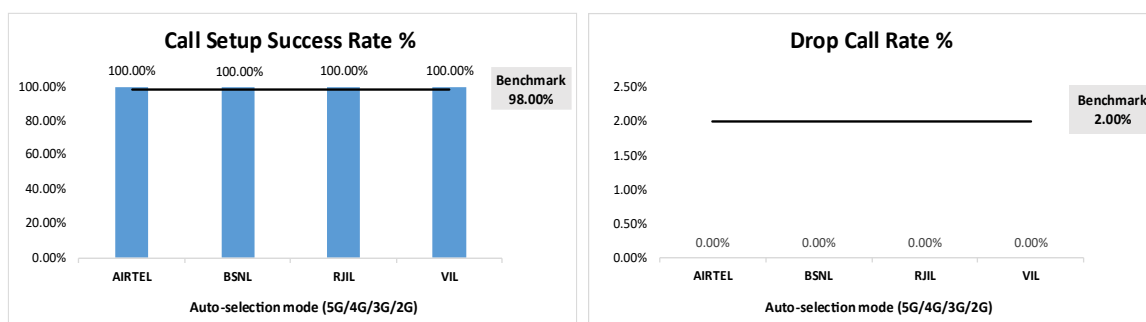
**Figure-26:** Signal strength distribution auto-selection mode 5G/4G/3G/2G.

**ii) Naharlagun (Itanagar) Rly. Station**

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

Naharlagun (Itanagar) Rly. Station				
Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempt	11	11	11	11
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)	2.31	1.71	0.64	1.29
Handover Success Rate %	100.00	100.00	100.00	100.00

**Table-109:** Summary of Voice 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.

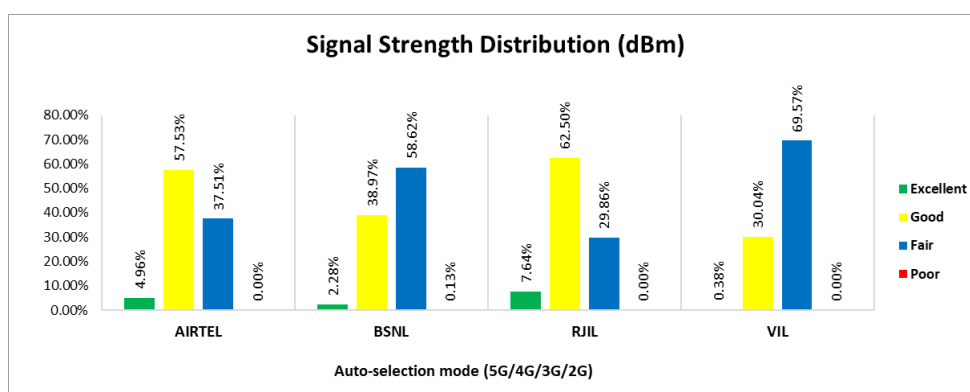
Naharlagun (Itanagar) Rly. Station				
Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	1.69%	NA	14.38%	NA
4G	98.31%	100.00%	85.62%	100.00%
3G	NA	0.00%	NA	NA
2G	0.00%	0.00%	NA	0.00%
Limited service	0.00%	0.00%	0.00%	0.00%

**Table-110:** Time spent on technology during walk test.

**Note-**

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

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



**Figure-28:** Signal strength distribution auto-selection mode 5G/4G/3G/2G.

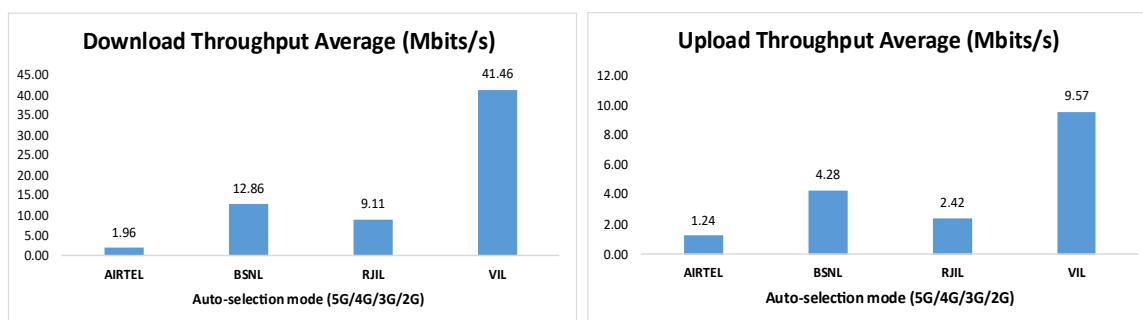
#### 4.4.4 Data performance

##### i) Donyi Polo Airport, Itanagar

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

Donyi Polo Airport, Itanagar				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	1.96	12.86	9.11	41.46
Download Throughput 80th Percentile	3.12	12.86	11.75	46.79
Download Throughput 20th Percentile	0.81	12.86	4.52	37.05
Download Session Setup Success Rate %	100.00	6.25	100.00	100.00
Upload Throughput Average (Mbits/s)	1.24	4.28	2.42	9.57
Upload Throughput 80th Percentile	1.33	4.28	4.10	9.66
Upload Throughput 20th Percentile	1.13	4.28	0.87	9.47
Upload Session Setup Success Rate %	93.33	6.67	93.33	100.00
Latency (ms)-50th Percentile	75.00	33.55	51.50	54.50

**Table-111:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).



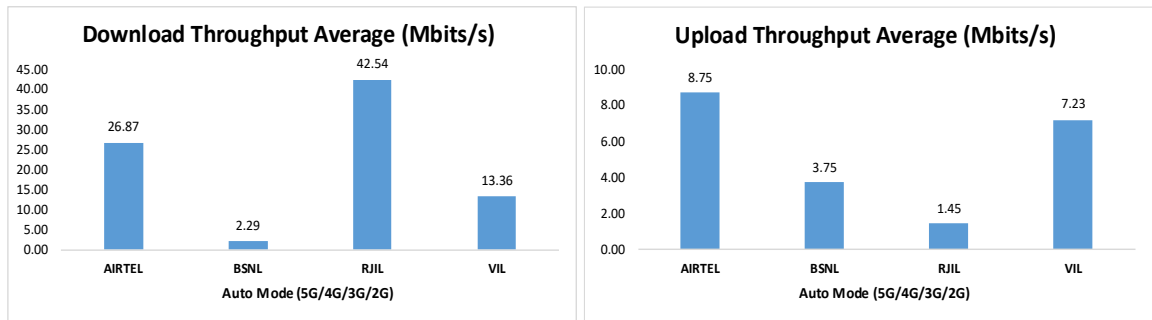
**Figure- 29:** Download and Upload throughput.

##### ii) Naharlagun (Itanagar) Rly. Station

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

Naharlagun (Itanagar) Rly. Station				
Parameters	Service Provider			
	Auto-Selection Mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Download Throughput Average (Mbits/s)	26.87	2.29	42.54	13.36
Download Throughput 80th Percentile	32.01	2.95	62.38	17.94
Download Throughput 20th Percentile	12.09	1.20	21.94	8.89
Download Session Setup Success Rate %	100.00	100.00	50.00	100.00
Upload Throughput Average (Mbits/s)	8.75	3.75	1.45	7.23
Upload Throughput 80th Percentile	12.07	4.73	2.28	9.56
Upload Throughput 20th Percentile	4.64	1.78	0.00	5.10
Upload Session Setup Success Rate %	100.00	100.00	93.33	100.00
Latency (ms)-50th Percentile	29.70	35.95	235.00	52.50

**Table-112:** Summary of Data performance in network auto-selection mode (5G/4G/3G/2G).

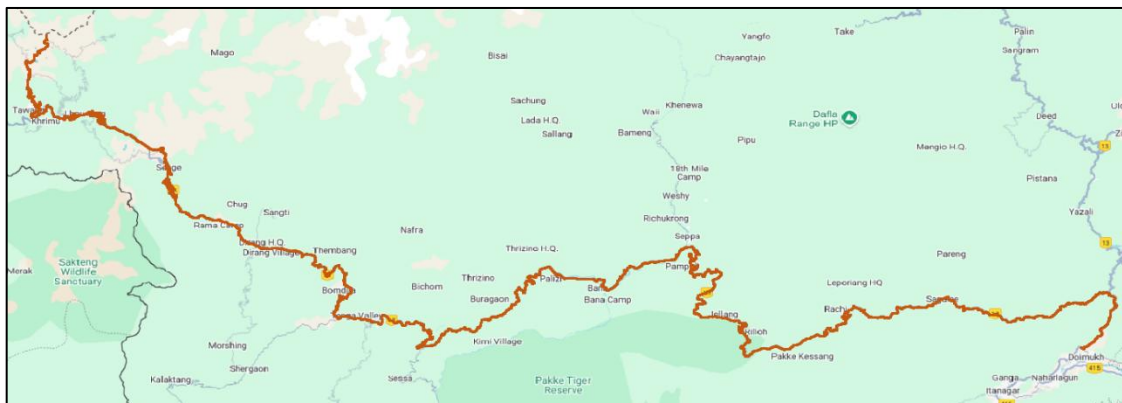


**Figure- 30:** Download and Upload throughput

## 4.5 Highway

Drive test has been conducted from 3<sup>rd</sup> June 2025 to 6<sup>th</sup> June 2025 covering the highway route. (Refer Table-1)

### 4.5.1 Drive test route



**Figure-31:** Drive test route Highway.

### 4.5.2 Routes Covered

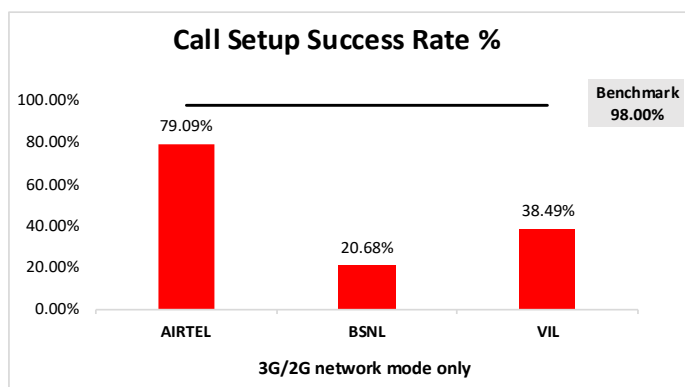
Itanagar to Bumla Pass (Tawang) passing through Sagalee, Rachi, Pakke Kessang, Rilloh, Jollang, Pampoli, Bana, Palizi, Buragaon, Kimi Village, Tenga Valley, Bomdila, Thembang, Dirang Village, Rama Camp, Senge, Lhou Jang, Khrimu and Twang, etc.

### 4.5.3 Voice performance

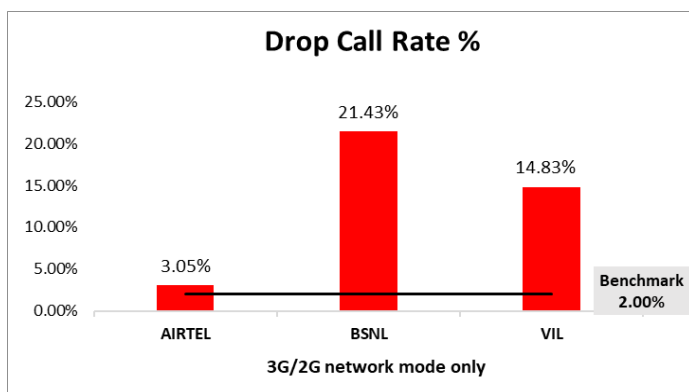
**(a) Voice Call Performance in 3G/2G network mode only:** 3G/2G network mode testing has been done to reflect the experience for respective users as they have only 3G/2G compatible handsets.

Parameters	Service Provider		
	3G/2G network mode only		
	AIRTEL	BSNL	VIL
Call Attempts	373	677	543
Call Setup Success Rate %	79.09	20.68	38.49
Drop Call Rate %	3.05	21.43	14.83
Call Setup Time-Average (Second)	4.21	4.09	4.73
Handover Success Rate %	99.66	97.89	100.00

**Table-113:** Summary of voice call performance in 3G/2G network mode only.



**Figure-32:** Performance for call setup success rate.



**Figure-33:** Performance for drop call rate.

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

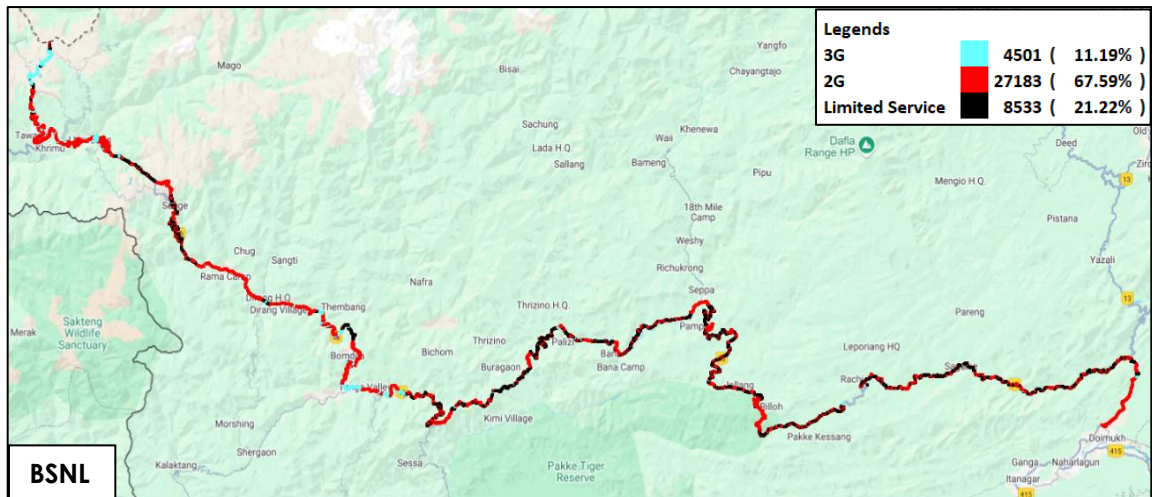
Technology	Service Provider		
	AIRTEL	BSNL	VIL
3G	NA	11.19%	NA
2G	97.12%	67.59%	86.41%
Limited Service	2.88%	21.22%	13.59%

**Table-114:** Time spent on technology during drive test 3G/2G network mode only.

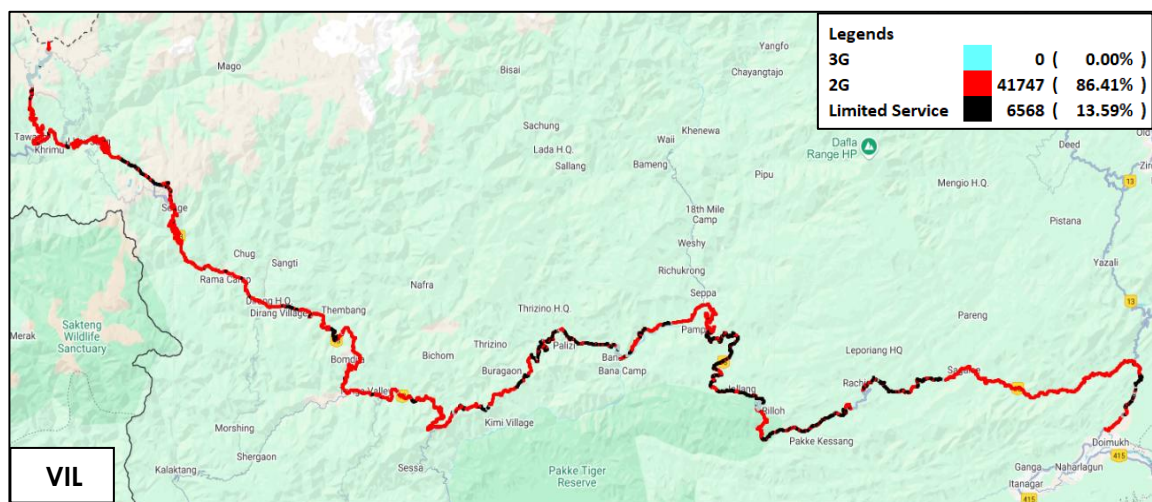


**Figure-34:** Serving technology plots 3G/2G network mode – AIRTEL.



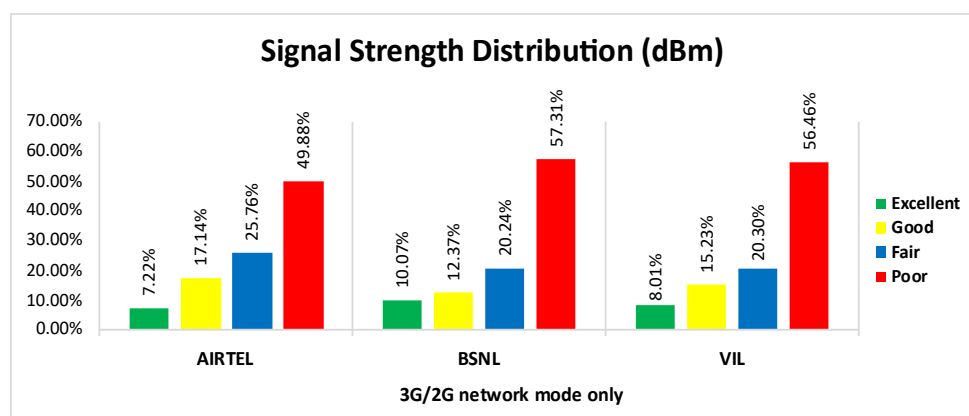


**Figure-35:** Serving technology plots 3G/2G network mode – BSNL.



**Figure 36:** 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-55, 56 & 57 for map view)



**Figure-37:** Signal strength distribution 3G/2G network mode only.



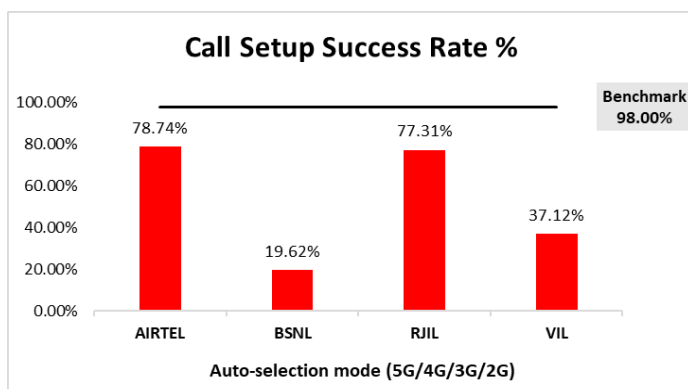
### Observations:

- Airtel has 7% of samples falling in the excellent signal strength category.
- BSNL has 10% of samples falling in the excellent signal strength category.
- VIL has 8% of samples falling in the excellent signal strength category.

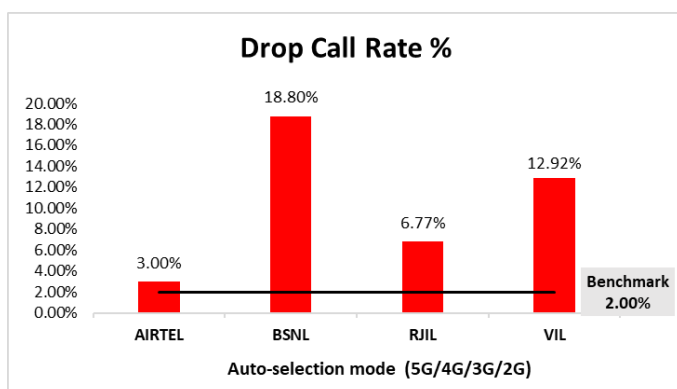
### (d) Voice Call Performance in auto network selection mode (5G/4G/3G/2G)

Parameters	Service Provider			
	Auto-selection mode (5G/4G/3G/2G)			
	AIRTEL	BSNL	RJIL	VIL
Call Attempts	381	678	401	563
Call Setup Success Rate %	78.74	19.62	77.31	37.12
Drop Call Rate %	3.00	18.80	6.77	12.92
Call Setup Time Average (Second)	2.91	4.01	1.17	3.46
Handover Success Rate %	99.90	98.56	99.25	99.40

**Table-115:** Summary of voice call performance in network auto-selection mode.



**Figure-38:** Performance for call setup success rate.



**Figure-39:** Performance for drop call rate.

Parameter	Service Provider			
	Mobile-to-Mobile (5G/4G - Open Mode)			
	AIRTEL	BSNL	RJIL	VIL
<b>Call Established (within service provider Network)</b>	295	159	289	179
<b>Number of silence call for &gt;4 Sec</b>	21	6	47	23
<b>Silence Call Rate %</b>	7.12	3.77	16.26	12.85
<b>Number of silence instances for &gt;4 Sec</b>	29	15	91	44
<b>Number of silence instances for &gt;3 Sec</b>	37	17	134	104
<b>Number of silence instances for &gt;2 sec</b>	49	28	254	282
<b>RTP Jitter (4G &amp; 5G) in ms</b>	5.59	13.69	26.80	5.39
<b>Packet loss Rate Downlink %</b>	2.94	18.58	4.09	7.54
<b>Packet loss Rate Uplink %</b>	1.83	16.85	5.05	8.48

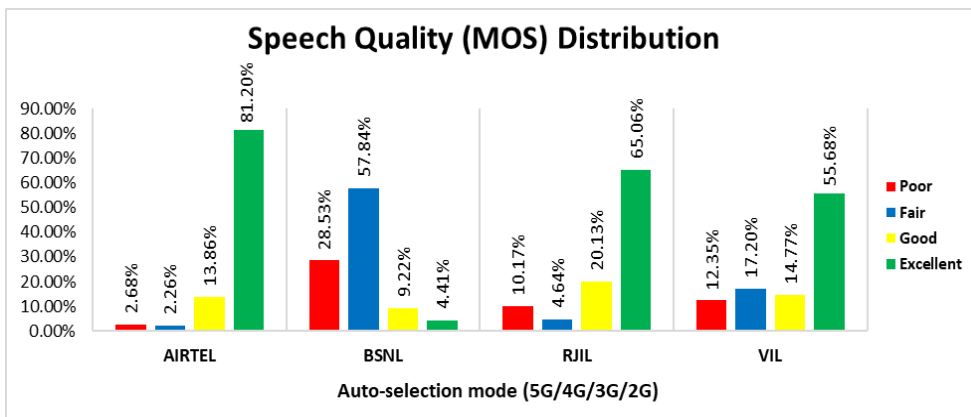
**Table-116:** Summary of silence instances & packet loss rate for mobile to mobile call.

### (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 values means: 5-Excellent, 4-Good, 3-Fair, 2-Poor, 1-Bad.

Speech Quality (MOS) distribution	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
<b>Total Number of MOS Samples for calls in table-116</b>	3543	1020	3363	1814
<b>Speech Quality (Average MOS)</b>	3.95	2.36	3.66	3.72
<b>Number of samples with MOS &gt;=4 to &lt;5 (Excellent)</b>	2877	45	2188	1010
<b>Number of samples with MOS &gt;=3 to &lt;4 (Good)</b>	491	94	677	268
<b>Number of samples with MOS &gt;=2 to &lt;3 (Fair)</b>	80	590	156	312
<b>Number of samples with MOS &gt;=1 to &lt;2 (Poor)</b>	95	291	342	224
<b>%age of samples with MOS &gt;=4 to &lt;5 (Excellent)</b>	81.20%	4.41%	65.06%	55.68%
<b>%age of samples with MOS &gt;=3 to &lt;4 (Good)</b>	13.86%	9.22%	20.13%	14.77%
<b>%age of samples with MOS &gt;=2 to &lt;3 (Fair)</b>	2.26%	57.84%	4.64%	17.20%
<b>%age of samples with MOS &gt;=1 to &lt;2 (Poor)</b>	2.68%	28.53%	10.17%	12.35%

**Table-117:** Summary of speech quality (MOS) samples.



**Figure-40:** Distribution of samples in MOS range.

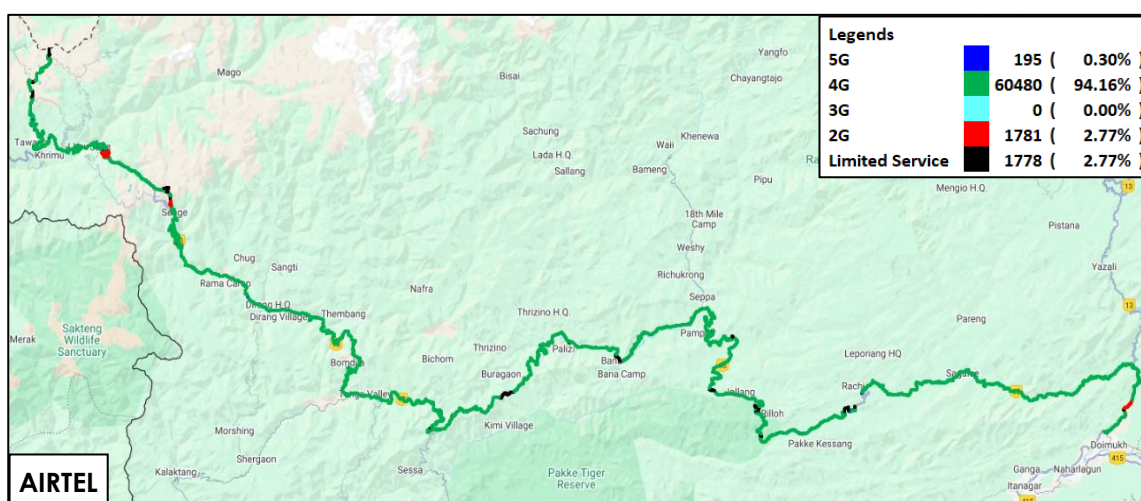
**(f) Network Technology:** This section represents time spent on various network technologies.

Technology	Service Provider			
	AIRTEL	BSNL	RJIL	VIL
5G	0.30%	NA	0.70%	NA
4G	94.16%	27.20%	95.87%	41.20%
3G	NA	4.46%	NA	NA
2G	2.77%	42.23%	NA	33.47%
Limited Service	2.77%	26.10%	3.43%	25.32%

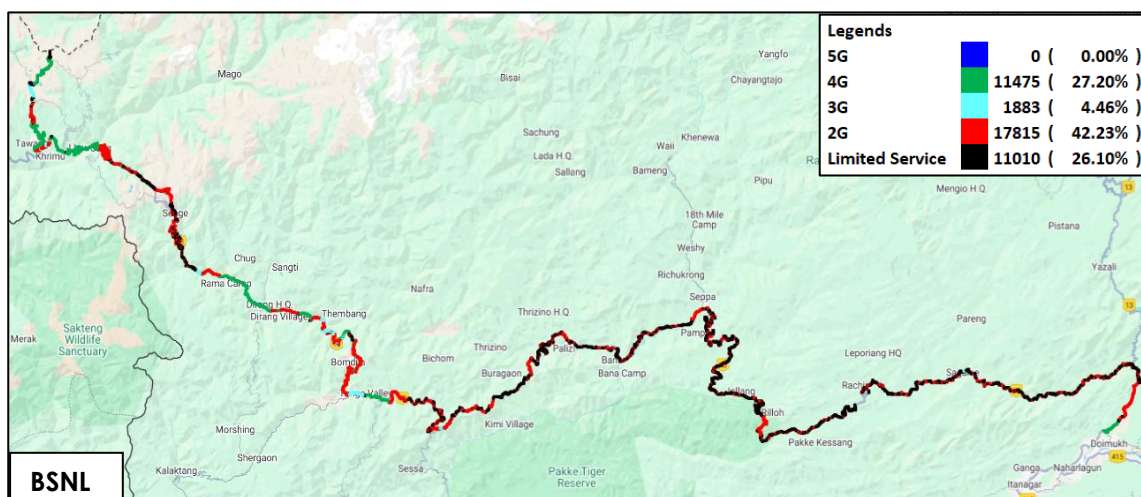
**Table-118:** Time spent on technology during drive test.

**Note-**

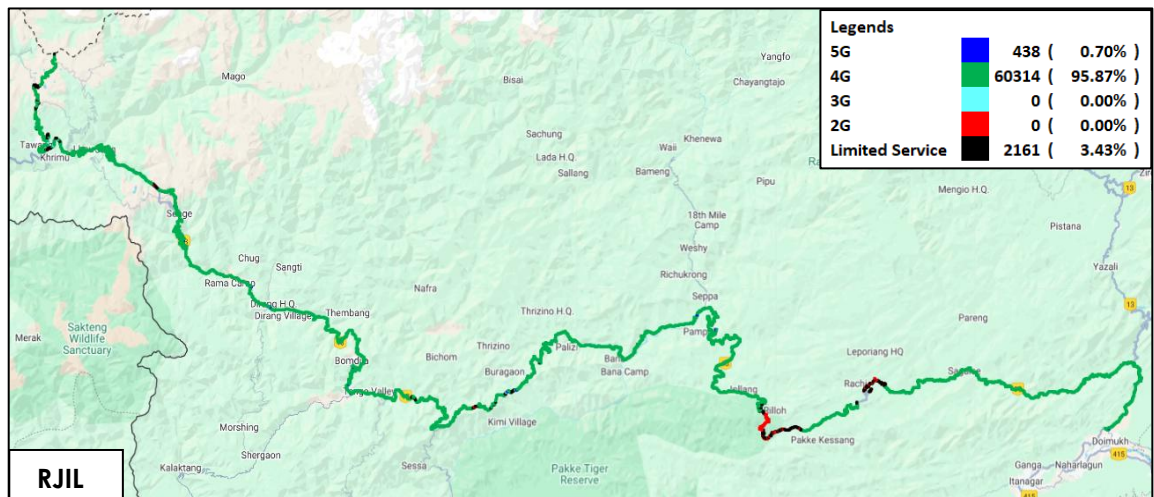
- NA- Service provider doesn't provide services in respective technology.



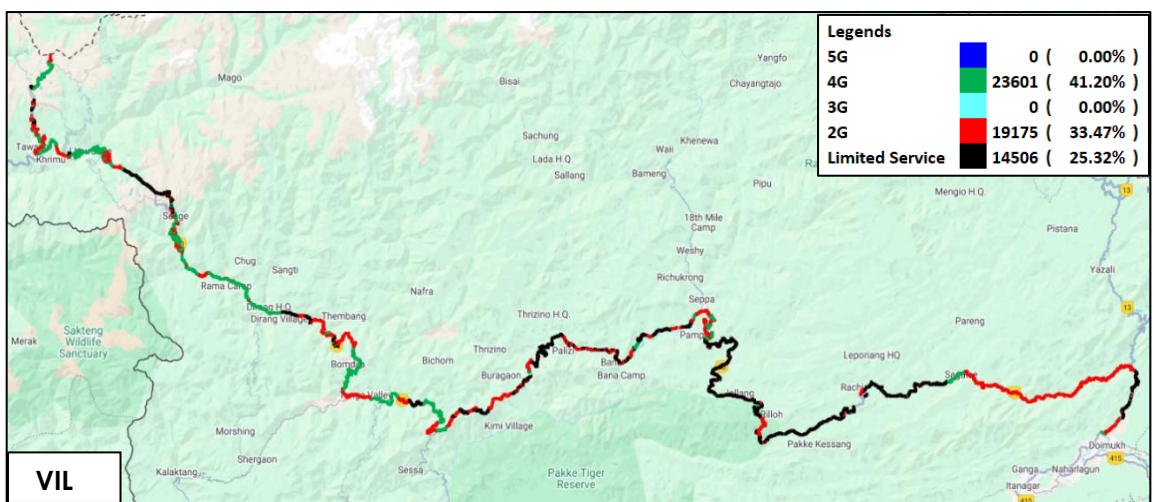
**Figure-41:** Serving technology plots in auto-selection mode (5G/4G/3G/2G)-AIRTEL



**Figure-42:** Serving technology plots in auto-selection mode (5G/4G/3G/2G)-BSNL.

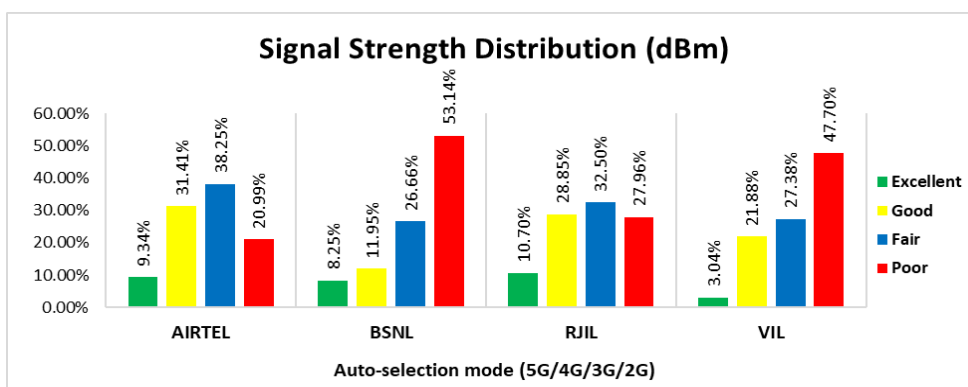


**Figure-43:** Serving technology plots in auto-selection mode (5G/4G/3G/2G)-RJIL.



**Figure-44:** Serving technology plots in auto-selection mode (5G/4G/3G/2G)-VIL.

**(g) Network Signal Strength Distribution:** The following chart provides signal strength distribution for auto-selection mode (5G/4G/3G/2G). (Refer figure-58, 59, 60 & 61 for map view)



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

### Observations:

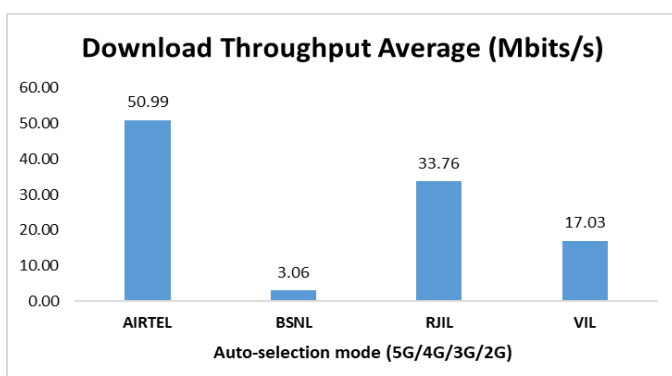
- Airtel has 9% of samples falling in the excellent signal strength category.
- BSNL has 8% of samples falling in the excellent signal strength category.
- RJIL has 11% of samples falling in the excellent signal strength category.
- VIL has 3% of samples falling in the excellent signal strength category.

## 4.5.4 Data performance

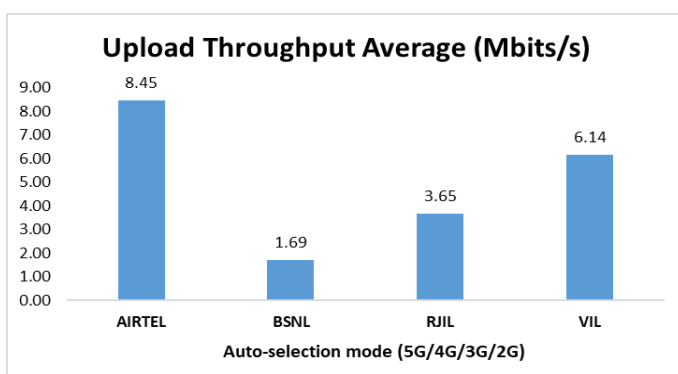
### (a) Data Parameters (Auto-selection mode- 5G/4G/3G/2G)

Parameters		Service Provider			
		Auto-selection mode (5G/4G/3G/2G)			
		AIRTEL	BSNL	RJIL	VIL
Download Throughput (Mbits/s)	Average	50.99	3.06	33.76	17.03
	80th Percentile	89.39	6.01	55.32	43.15
	20th Percentile	3.56	0.05	1.20	0.16
Upload Throughput (Mbits/s)	Average	8.45	1.69	3.65	6.14
	80th Percentile	10.73	2.97	4.00	9.63
	20th Percentile	1.16	0.07	1.10	1.16
Latency (ms)	50th Percentile	31.30	56.00	29.50	53.00

**Table-119:** Summary of Data performance in network auto-selection mode.



**Figure 46:** Download throughput.



**Figure-47:** Upload throughput.



## 5. Voice & Data Key findings

### 5.1 Overall Voice

#### 1. Call Setup Success Rate:

- a) Airtel, BSNL and VIL have 88.14%, 44.82% and 63.46% call setup success rate respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, BSNL, RJIL and VIL have 90.11%, 49.45%, 89.73% and 67.18% 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 BSNL and RJIL whereas call blocking was observed when calling VIL. (refer to Table-9)
- d) BSNL had a 100.00% call setup success rate while calling VIL whereas call blocking was observed when calling Airtel and RJIL. (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 4.29, 3.36 and 3.90 seconds respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, BSNL, RJIL & VIL call setup time is 4.57, 3.22, 0.87 and 2.31 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, BSNL, RJIL & VIL have 4.43%, 3.12%, 8.78% & 7.22% silence call rate respectively. Further Airtel, BSNL, RJIL & VIL downlink RTP packet loss is 2.17%, 12.69%, 2.40% & 3.55% respectively. In uplink Airtel, BSNL, RJIL & VIL RTP packet loss is 1.38%, 11.67%, 3.07% & 3.60% respectively. (refer table-6)

#### 4. Drop Call Rate:

- a) Airtel, BSNL and VIL drop call rate is 1.63%, 9.16% and 6.06% respectively in 3G/2G network mode. (refer table-3)
- b) Airtel, BSNL, RJIL and VIL drop call rate is 1.23%, 6.41%, 2.17% and 3.68% 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 80.01 Mbps, 3.27 Mbps, 91.09 Mbps and 20.89 Mbps respectively. (refer table-11)
- b) Airtel, BSNL, RJIL and VIL average upload speeds are 15.84 Mbps, 3.65 Mbps, 8.30 Mbps and 6.93 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 95.43 Mbps, 6.11 Mbps, 192.17 Mbps and 18.64 Mbps respectively. (refer table-49)
- b) Airtel, BSNL, RJIL and VIL average upload speeds are 24.64 Mbps, 4.87 Mbps, 13.20 Mbps and 6.76 Mbps respectively. (refer table-49)

### **3. Data session setup success rate (static i.e. while stationary):**

- a) Airtel, BSNL, RJIL and VIL have 90.00%, 27.66%, 90.00% and 97.35% download session setup success rate respectively. (refer table-49)
- b) Airtel, BSNL, RJIL and VIL have 91.43%, 28.57%, 95.71% and 78.01% upload session setup success rate respectively. (refer table-49)

## **5.3 Operator wise Key Findings**

### **1. Airtel:**

#### **Voice**

- 88.14% call setup success rate and 1.63% drop call rate have been observed in 3G/2G network mode for LSA. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-3)
- 90.11% call setup success rate and 1.23% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-5)
- 96.70% call setup success rate and 0.52% drop call rate have been observed in 3G/2G network mode for city drive. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-13)
- 96.99% call setup success rate and 0.78% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-15)
- 95.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-20)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for both walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-107 & 109)
- 79.09% call setup success rate and 3.05% drop call rate have been observed in 3G/2G network mode for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-113)
- 78.74% call setup success rate and 3.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-115)

#### **Data**

- Airtel has 80.01 Mbps average download speed & 15.84 Mbps average upload speed for LSA. (refer table-11)
- Airtel has 106.99 Mbps average download speed & 21.25 Mbps average upload speed across the measured routes for city drive. (refer table-19)
- Ball of Fire Museum, Daily Market New Naharlagun, Government College Doimukh, Government Residential School, Govt. Middle School Longte Tapu, Govt. Sec. School Toru, Indian Oil Jang, Jaswantgarh War Memorial, Kohima Raj Bhawan, Laptap Baptist Church 6J59+5HJ-Laptap-791119, Nouna Resort, Office of Additional Deputy Commissioner-Sagalee, Palizi Catholic Church, Post Office Seppa, Ramakrishna Mission Hospital Itanagar, Sela Pass, Sopo Market and Unit Hospital 4BN ITBP Dirang have less download speed (less than 100

Mbps) out of total 28 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-51, 54, 56, 58, 59, 60, 62, 63, 65, 66, 70, 71, 72, 73, 74, 75, 76 & 77)

- Arunachal Pradesh State Legislative Assembly, Ball of Fire Museum, Commissioner of Tax & Excise Office Itanagar, Daily Market New Naharlagun, Government College Doimukh, Government Residential School, Govt. Middle School Longte Tapu, Indian Oil Jang, Jaswantgarh War Memorial, Kohima New High Court, Kohima Raj Bhawan, Laptap Baptist Church 6J59+5HJ-Laptap-791119, Nagaland University Meriema Campus, Nouna Resort, Palizi Catholic Church, Post Office Seppa, Ramakrishna Mission Hospital Itanagar and Sela Pass have less upload speed (less than 20 Mbps) out of total 28 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-50, 51, 53, 54, 56, 58, 59, 62, 63, 64, 65, 66, 68, 70, 72, 73, 74 & 75)
- Both walk test locations have less download speed (less than 100 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table- 111 & 112)
- Both walk test locations have less upload speed (less than 20 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table- 111 & 112)
- Airtel has 50.99 Mbps average download speed & 8.45 Mbps average upload speed across the measured routes for highway drive. (refer table-119)

## **2. BSNL:**

### **Voice**

- 44.82% call setup success rate and 9.16% drop call rate have been observed for 3G/2G network mode for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-3)
- 49.45% call setup success rate and 6.41% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 81.72% call setup success rate and 4.42% drop call rate have been observed in 3G/2G network mode for city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-13)
- 81.99% call setup success rate and 4.39% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-15)
- 62.86% call setup success rate and 2.27% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is not meeting 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 in auto-selection mode (5G/4G/3G/2G) for both walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-107 & 109)
- 20.68% call setup success rate and 21.43% drop call rate have been observed in 3G/2G network mode for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-113)
- 19.62% call setup success rate and 18.80% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-115)



**Data**

- BSNL has 3.27 Mbps average download speed & 3.65 Mbps average upload speed for LSA. (refer table-11)
- BSNL has 2.99 Mbps average download speed & 3.91 Mbps average upload speed across the measured routes for city drive. (refer table-19)
- All hotspot locations have less download speed (less than 10 Mbps) except Indian Oil Jang and NIT Nagaland for auto-selection mode (5G/4G/3G/2G). (refer table- 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 63, 64, 65, 66, 67, 68, 70, 71, 72, 73, 74, 75, 76 & 77)
- Arunachal Pradesh State Legislative Assembly, Bomdila Market, Commissioner of Tax & Excise Office Itanagar, Daily Market New Naharlagun, Government College Doimukh, Government ITI College Dirang, Government Residential School, Govt. Middle School Longte Tapu, Govt. Sec. School Toru, Hoj-Yayee Market, Jaswantgarh War Memorial, Kohima New High Court, Laptap Baptist Church 6J59+5HJ-Laptap-791119, Nouna Resort, Office of Additional Deputy Commissioner Sagalee, Palizi Catholic Church, Post Office Seppa, Ramakrishna Mission Hospital Itanagar, Sela Pass and Unit Hospital 4BN ITBP Dirang have less upload speed (less than 2 Mbps) out of total 28 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table- 50, 52, 53, 54, 56, 57, 58, 59, 60, 61, 63, 64, 66, 70, 71, 72, 73, 74, 75 & 77)
- Naharlagun (Itanagar) Rly. Station walk test location has less download speed (less than 10 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table- 112)
- BSNL has 3.06 Mbps average download speed & 1.69 Mbps average upload speed across the measured routes for highway drive. (refer table-119)

**3. RJIL:****Voice**

- 89.73% call setup success rate and 2.17% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 94.15% call setup success rate and 0.25% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is not meeting the benchmark of 98.00% for call setup success rate. (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) for all 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 in auto-selection mode (5G/4G/3G/2G) for both walk test locations. Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-107 & 109)
- 77.31% call setup success rate and 6.77% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-115)

**Data**

- RJIL has 91.09 Mbps average download speed & 8.30 Mbps average upload speed for LSA. (refer table-11)

- RJIL has 122.42 Mbps average download speed & 11.66 Mbps average upload speed across the measured routes for city drive. (refer table-19)
- Arunachal Pradesh State Legislative Assembly, Ball of Fire Museum, Commissioner of Tax & Excise Office Itanagar, Daily Market New Naharlagun, Government College Doimukh, Government Residential School, Govt. Middle School Longte Tapu, Govt. Sec. School Toru, Hoj-Yayee Market, Indian Oil Jang, Jaswantgarh War Memorial, Laptap Baptist Church 6J59+5HJ-Laptap-791119, Nagaland University Meriema Campus, Palizi Catholic Church, Sela Pass and Sopo Market download speed (less than 100 Mbps) out of total 28 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-50, 51, 53, 54, 56, 58, 59, 60, 61, 62, 63, 66, 68, 72, 75 & 76)
- Arunachal Pradesh State Legislative Assembly, Ball of Fire Museum, Bomdila Market, Commissioner of Tax & Excise Office Itanagar, Daily Market New Naharlagun, Dimapur Rly. Stn., Government College Doimukh, Government Residential School, Govt. Middle School Longte Tapu, Govt. Sec. School Toru, Hoj-Yayee Market, Indian Oil Jang, Jaswantgarh War Memorial, Kohima New High Court, Laptap Baptist Church 6J59+5HJ-Laptap-791119, Nagaland University Meriema Campus, Nouna Resort, Palizi Catholic Church, Post Office Seppa, Sela Pass and Sopo Market have less upload speed (less than 20 Mbps) out of total 28 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table- 50, 51, 52, 53, 54, 55, 56, 58, 59, 60, 61, 62, 63, 64, 66, 68, 70, 72, 73, 75 & 76)
- Both walk test locations have less download speed (less than 100 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table- 111 & 112)
- Both walk test locations have less upload speed (less than 20 Mbps) for auto-selection mode (5G/4G/3G/2G). (refer table- 111 & 112)
- RJIL has 33.76 Mbps average download speed & 3.65 Mbps average upload speed across the measured routes for highway drive. (refer table-119)

#### **4. VIL:**

##### **Voice**

- 63.46% call setup success rate and 6.06% drop call rate have been observed in 3G/2G network mode for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-3)
- 67.18% call setup success rate and 3.68% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for LSA. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-5)
- 97.96% call setup success rate and 1.30% drop call rate have been observed in 3G/2G network mode for city drive. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-13)
- 91.16% call setup success rate and 1.28% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for city drive. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-15)
- 88.21% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for all hotspot locations. Performance is not meeting the benchmark of 98.00% for call setup success rate. (refer table-20)
- 100.00% call setup success rate and 0.00% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for both walk test locations.

Performance is well within the benchmark of 98.00% & 2.00% respectively. (refer table-107 & 109)

- 38.49% call setup success rate and 14.83% drop call rate have been observed in 3G/2G network mode for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-113)
- 37.12% call setup success rate and 12.92% drop call rate have been observed in auto-selection mode (5G/4G/3G/2G) for highway drive. Performance is not meeting the benchmark of 98.00% & 2.00% respectively. (refer table-115)

#### **Data**

- VIL has 20.89 Mbps average download speed & 6.93 Mbps average upload speed for LSA. (refer table-11)
- VIL has 22.75 Mbps average download speed & 7.24 Mbps average upload speed across the measured routes for city drive. (refer table-19)
- Ball of Fire Museum, Government College Doimukh, Government Residential School, Govt. Middle School Longte Tapu, Govt. Sec. School Toru, Hoj-Yayee Market, Indian Oil Jang, Kohima Raj Bhawan, Laptap Baptist Church 6J59+5HJ -Laptap-791119, Nagaland University Meriema Campus, Nouna Resort, Palizi Catholic Church and Sopo Market have less download speed (less than 10 Mbps) out of total 28 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table-51, 56, 58, 59, 60, 61, 62, 65, 66, 68, 70, 72 & 76)
- Ball of Fire Museum, Government Residential School, Govt. Middle School Longte Tapu, Govt. Sec. School Toru, Hoj-Yayee Market, Laptap Baptist Church 6J59+5HJ-Laptap-791119, Nouna Resort, Palizi Catholic Church and Sopo Market have less upload speed (less than 2 Mbps) out of total 28 hotspot locations for auto-selection mode (5G/4G/3G/2G). (refer table- 51, 58, 59, 60, 61, 66, 70, 72, & 76)
- VIL has 17.03 Mbps average download speed & 6.14 Mbps average upload speed across the measured routes for highway drive. (refer table-119)

6. Annexure

6.1 Route wise coverage map

6.1.1 City

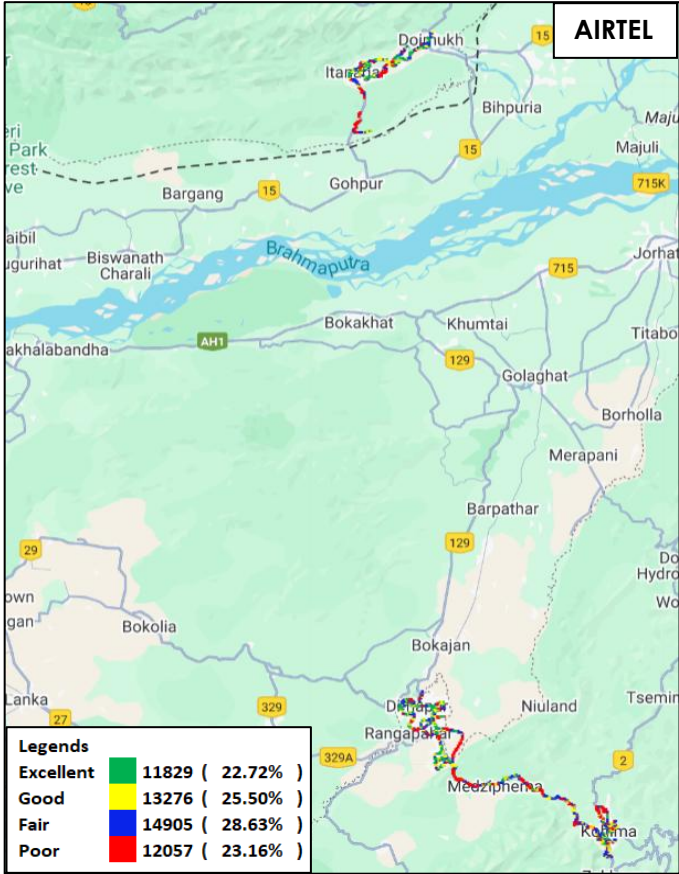
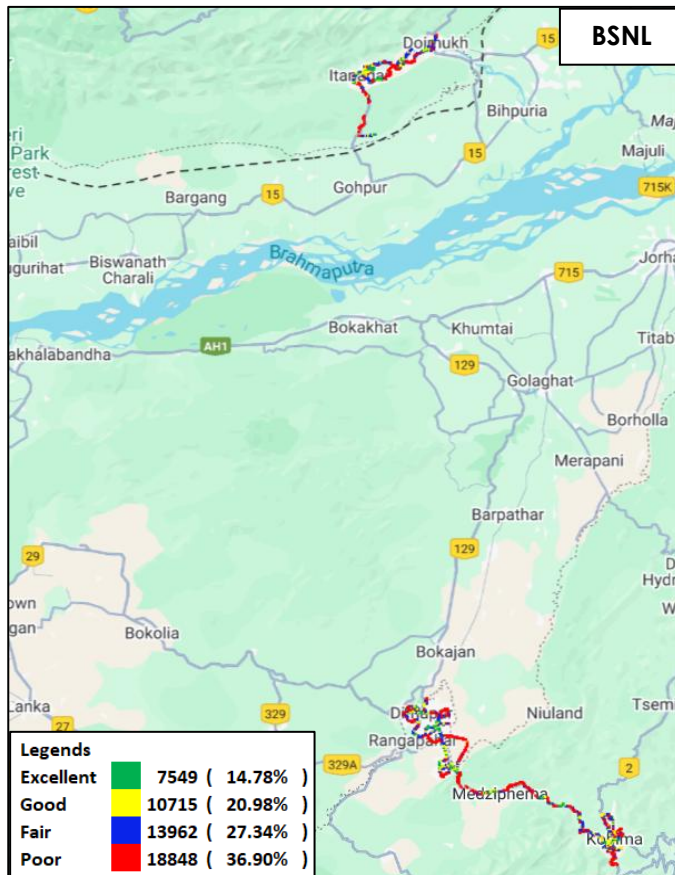
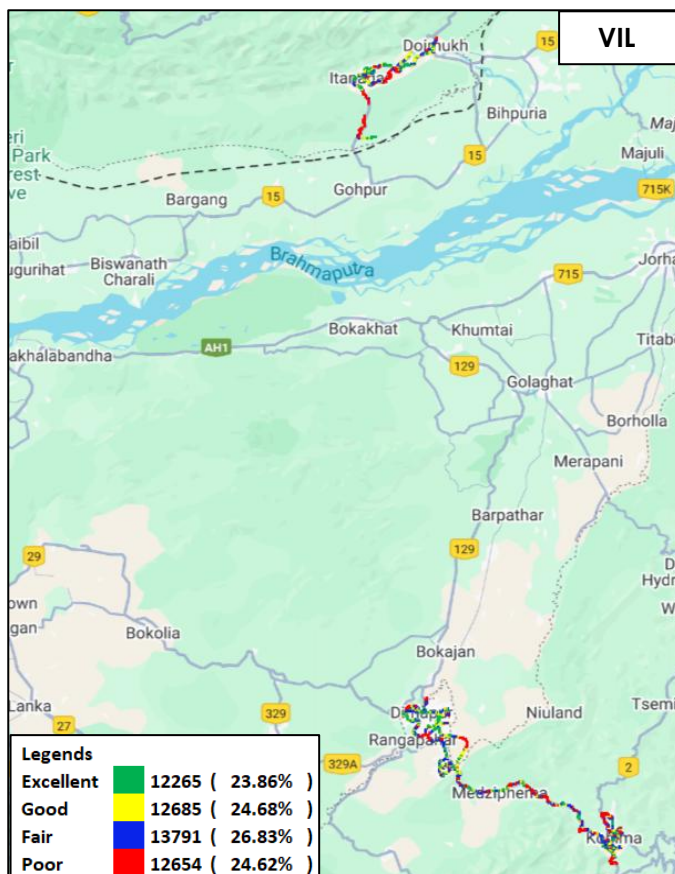


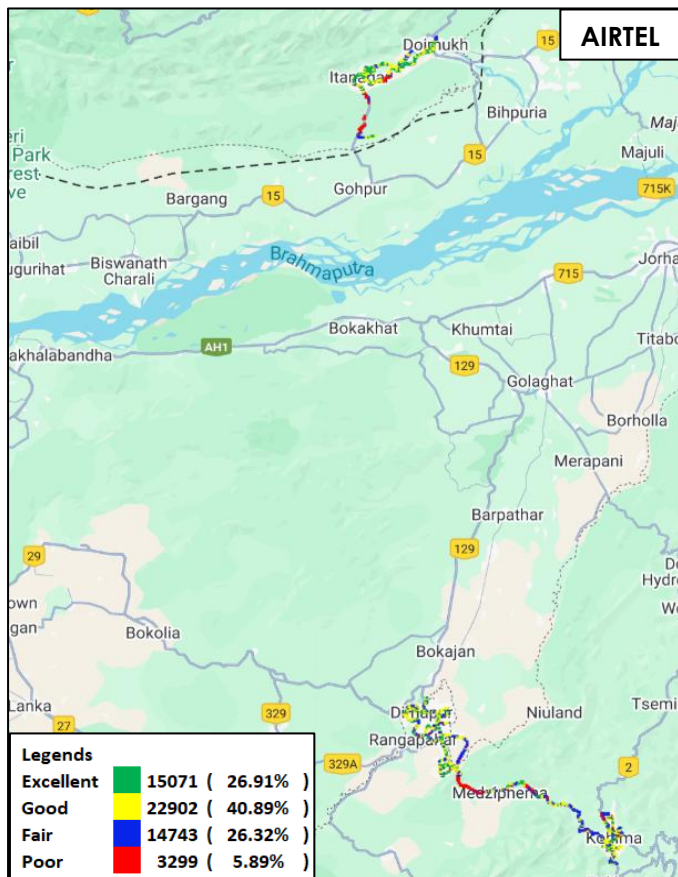
Figure-48: Signal strength 3G/2G network mode – AIRTEL.



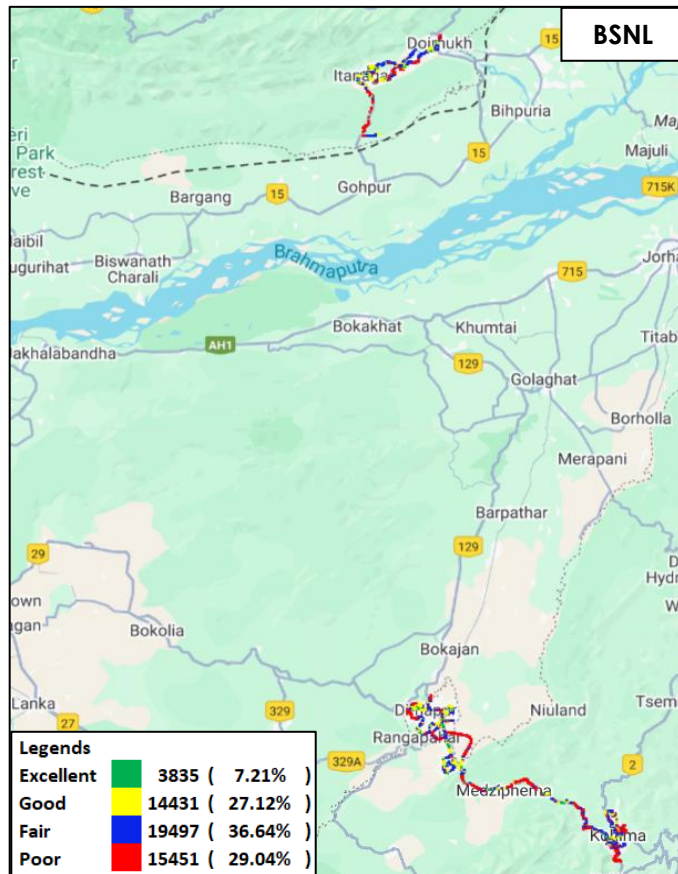
**Figure-49:** Signal strength 3G/2G network mode – BSNL.



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

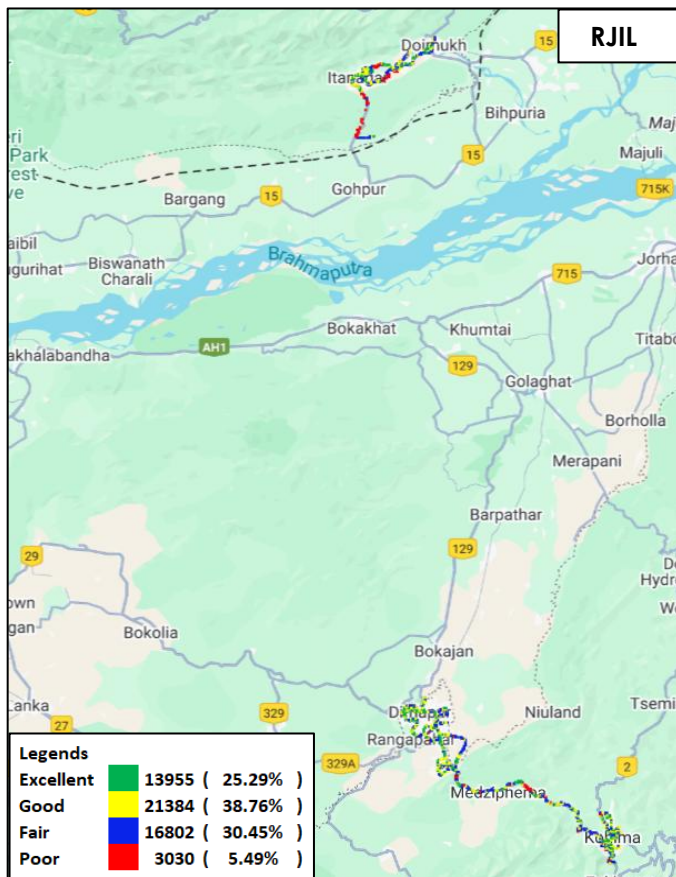


**Figure-51:** Signal strength auto-selection mode 5G/4G/3G/2G – AIRTEL.

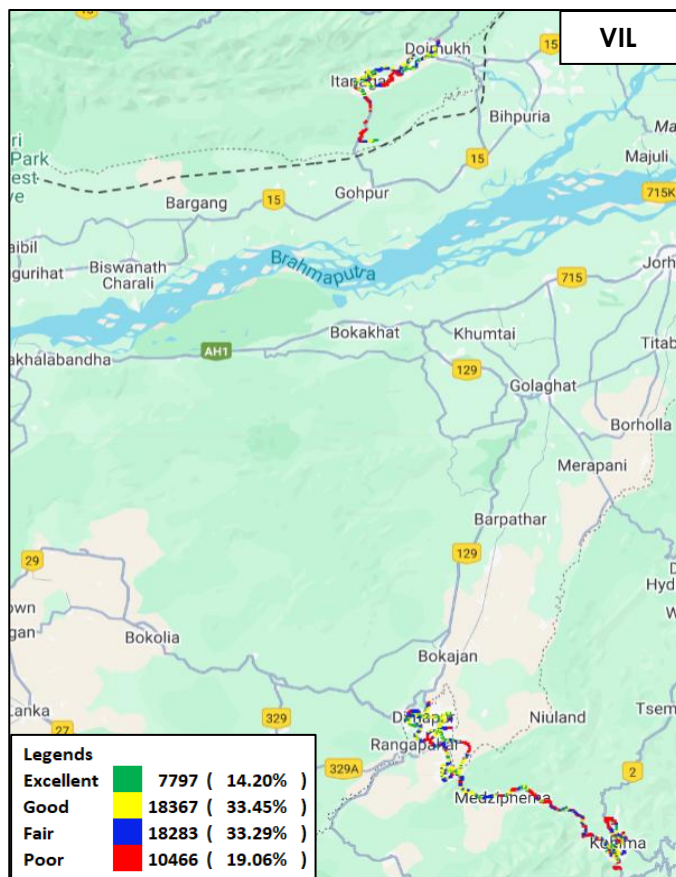


**Figure-52:** Signal strength auto-selection mode 5G/4G/3G/2G – BSNL.





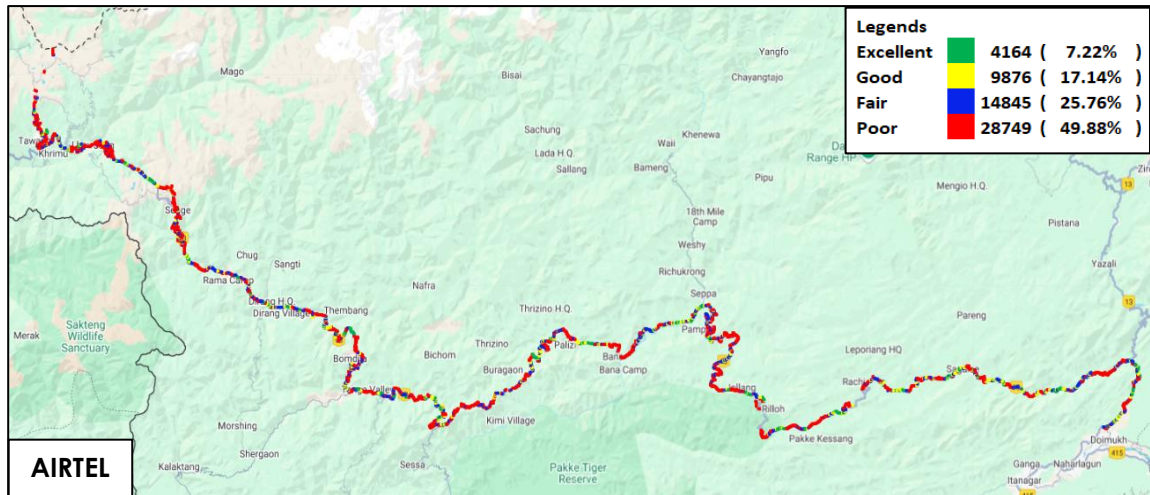
**Figure-53:** Signal strength auto-selection mode 5G/4G/3G/2G – RJIL.



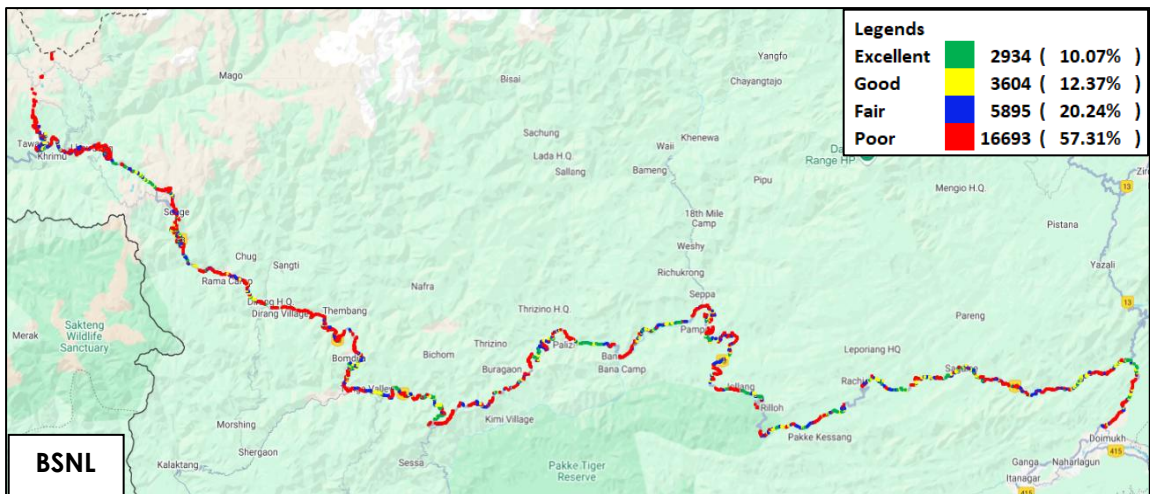
**Figure-54:** Signal strength auto-selection mode 5G/4G/3G/2G – VIL.

## 6.1.2 Highway Route

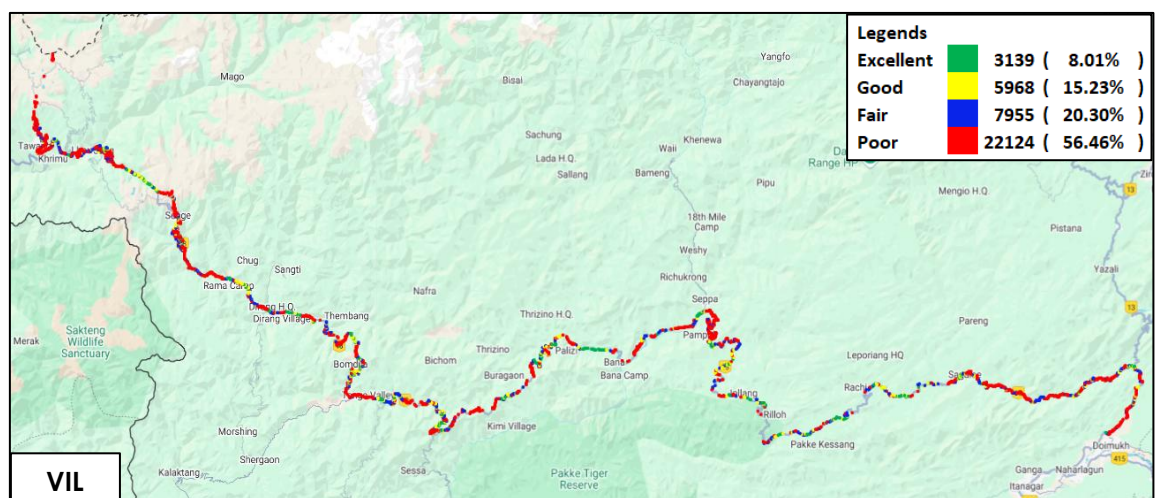
### i) Itanagar to Bumla Pass (Tawang)



**Figure-55:** Signal strength 3G/2G network mode – AIRTEL.

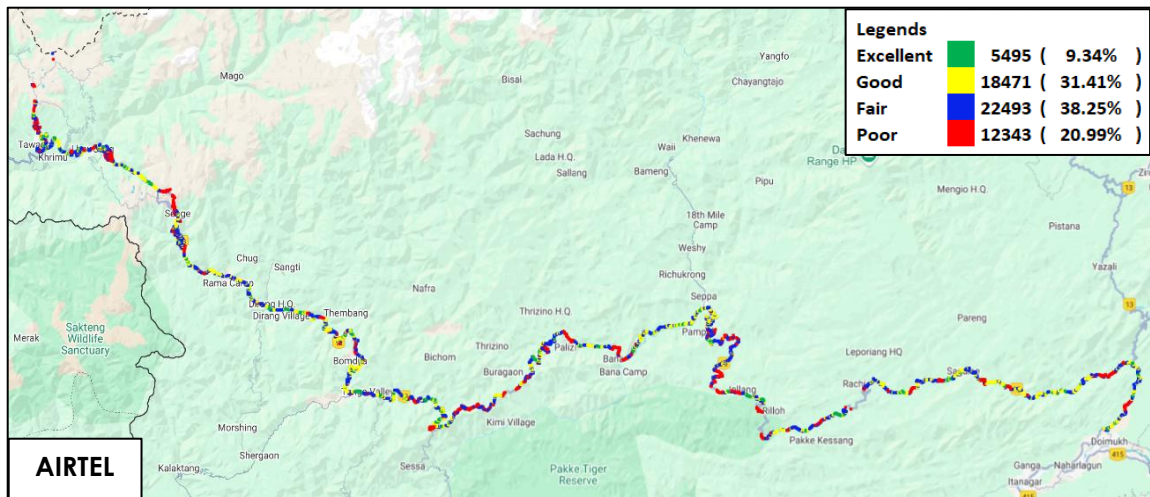


**Figure-56:** Signal strength 3G/2G network mode – BSNL.

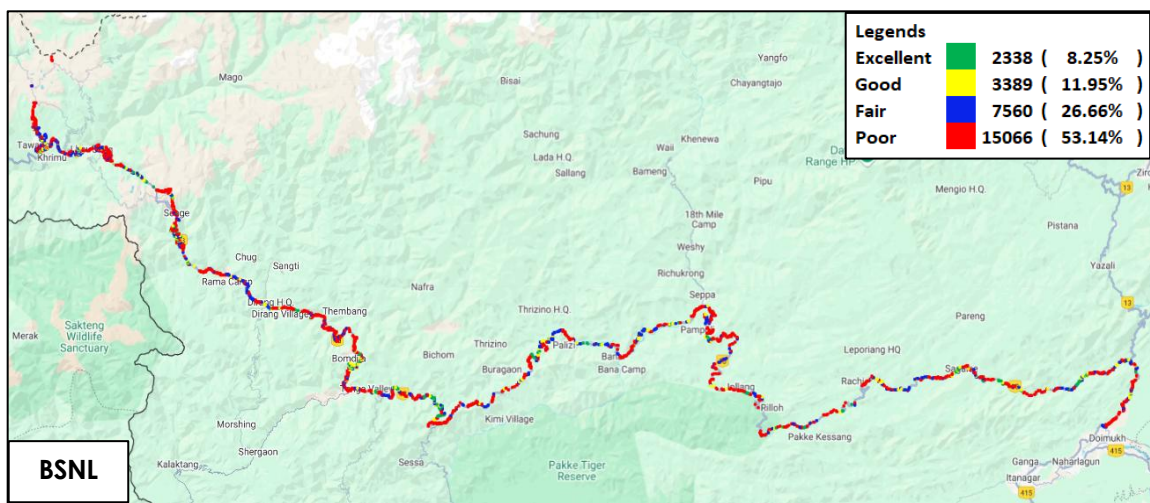


**Figure-57:** Signal strength 3G/2G network mode – VIL.

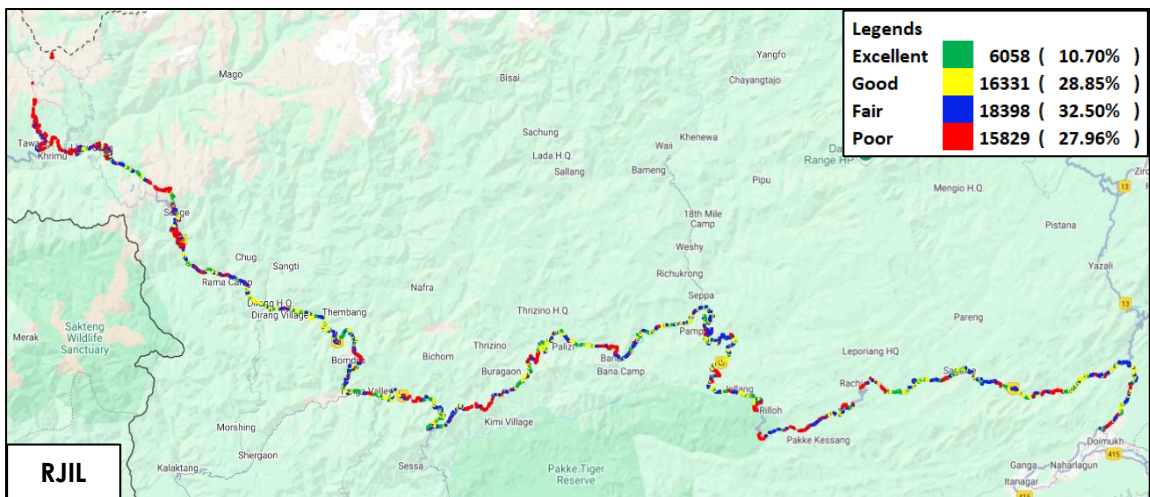




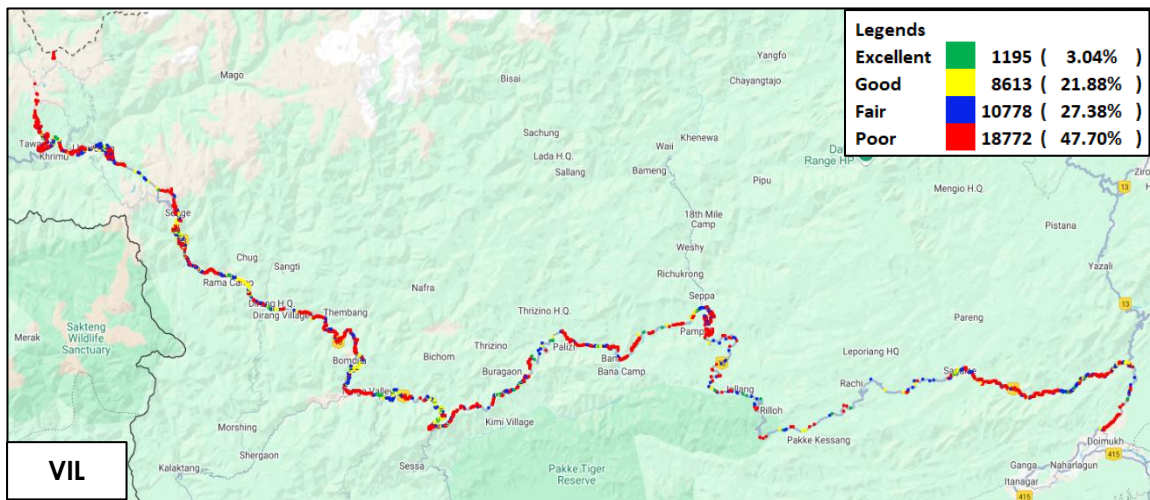
**Figure-58:** Signal strength auto-selection mode 5G/4G/3G/2G – AIRTEL.



**Figure-59:** Signal strength auto-selection mode 5G/4G/3G/2G – BSNL.



**Figure-60:** Signal strength auto-selection mode 5G/4G/3G/2G – RJIL.



**Figure-61:** 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	<ul style="list-style-type: none"> <li>• 3G/2G auto mode- switch Call</li> <li>• 5G/4G/3G/2G auto mode- switch Call</li> <li>• 5G/4G MOS Call</li> </ul>	30 Sec
Call Duration		120 Sec/180 Sec
Wait/ Guard Time		15 Sec

**Table-120:** 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.

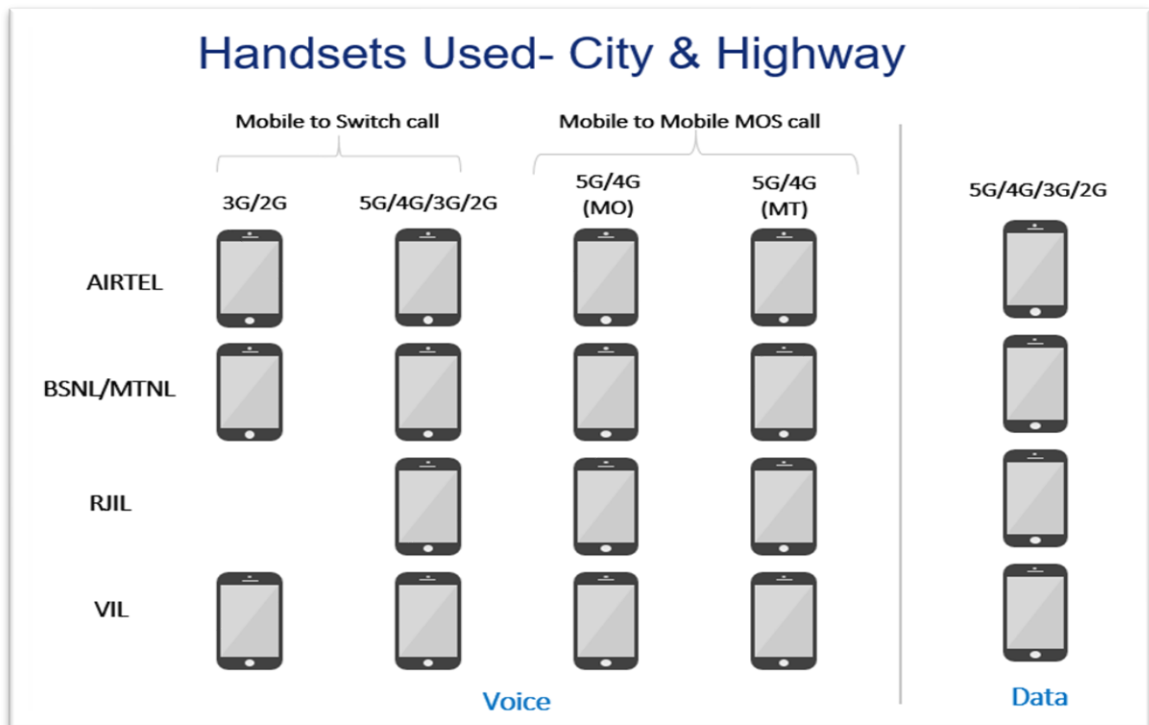
Data Test		
Test Type	Technology	Detail
HTTP/FTP Download	5G/4G/3G/2G Auto Mode	500 MB File- 30 Sec Timeout, (Multithread 3- TCP Connection at a time)
HTTP/FTP Upload		250 MB File- 30 Sec Timeout, (Multithread 3- TCP Connection at a time)
YouTube Streaming		20 Sec Video & 25 sec Timeout (Only at Hotspot)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

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

**Table-121:** 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.

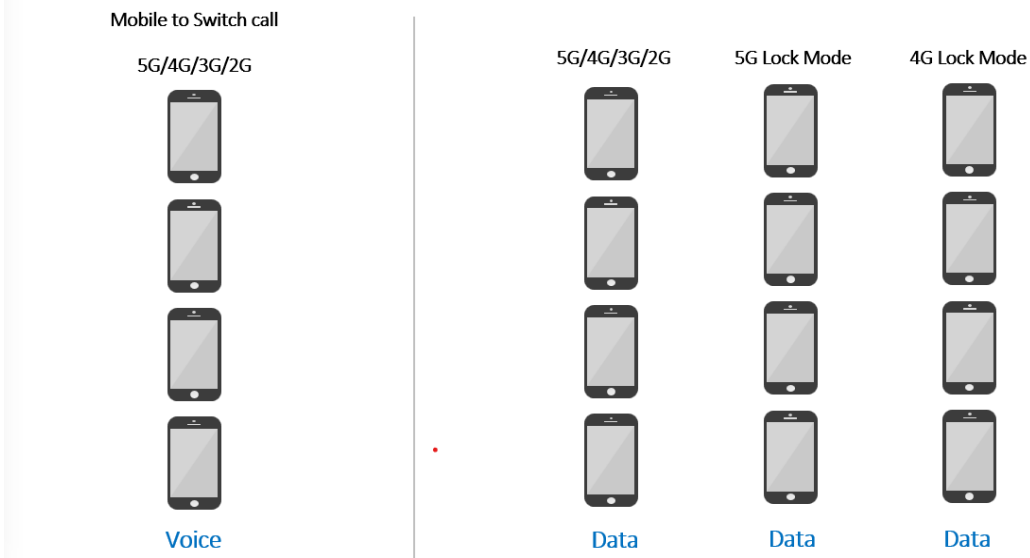


**Figure-62:** Number of handsets used in city & highway drive

MO: Mobile originating

MT: Mobile terminating

## Handsets Used- Railway/Metro/Walk Test/ Hotspot & Coastal Area

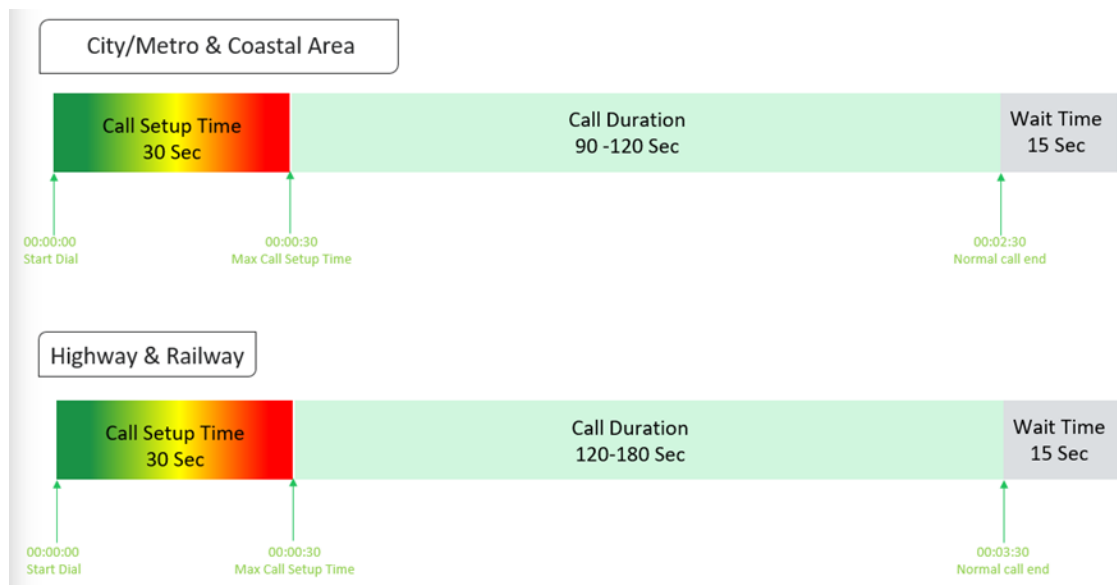


**Figure-63:** Number of handsets used in railway/metro/walktest/hotspot & coastal area

**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-64:** 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.



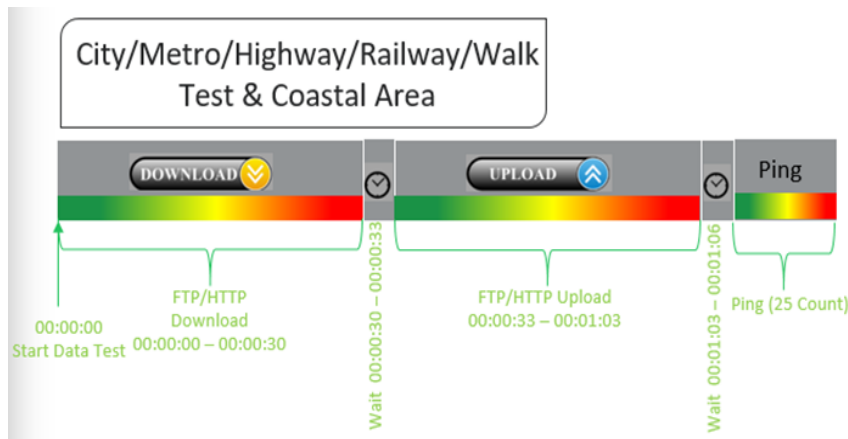
## (b) Hotspot voice testing



**Figure-65:** Voice test script for walktest/hotspot

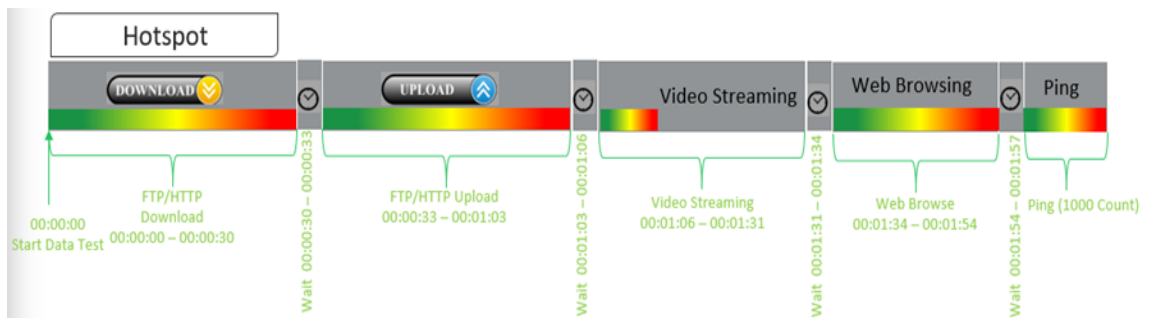
- 10 calls to be made at each Hotspot location.
- Minimum 10 Calls to be made during the walk test. Call count will be increased based on walk test distance.

## (c) Dynamic Data (internet) test



**Figure-66:** Data test script used in city/metro/railway/highway/walk test & coastal area

## (d) Static Data(internet) testing



**Figure-67:** 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	<p>(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:</p> <ul style="list-style-type: none"> <li>(a) Call attempt is made</li> <li>(b) The signaling channel is allocated</li> <li>(c) The call is routed to the outwards path of the terminating network</li> <li>(d) An alert signal is received by caller in the form of ring back tone, busy tone, or an announcement.</li> </ul> <p>CSSR = (Total Call Established/ Total Call Attempt) *100</p> <p>As per QoS Regulation 2024 benchmark value is <b>&gt;=98%</b></p>
Drop Call Rate	<p>Drop call 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</p> <p>Drop Call Rate = (Total Drop Call/Total Call Established) *100</p> <p>As per QoS Regulation 2024 benchmark value is <b>&lt;=2%</b></p>
Call Setup Time	<p>Time taken from call initiate to call alerting/ringing.</p> <p>Call Setup Time = T2- T1</p> <p>T2- Ringing (VoLTE/VoNR) &amp; Alerting (for WCDMA &amp; GSM), T1- Invite (VoLTE/VoNR) &amp; CM Service Request (for WCDMA &amp; GSM)</p>
Voice Quality (MOS)	<p>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:</p> <p>Excellent: MOS <math>\geq 4</math> and <math>&lt; 5</math>            Good : MOS <math>\geq 3</math> and <math>&lt; 4</math>            Fair : MOS <math>\geq 2</math> and <math>&lt; 3</math>            Poor : MOS <math>\geq 1</math> and <math>&lt; 2</math></p>
Handover Success Rate	<p>Handover Success Rate = Count of successful handovers (All Technology Handover combined) / Total count of Handover Attempt (All Technology Handover combined) *100</p> <p>Handover type which are considered- 2G Inter &amp; Intra cell, 3G Soft &amp; IRAT, 4G Inter &amp; Intra frequency &amp; SRVCC, 5G Inter &amp; Intra frequency &amp; 5G to 4G handovers.</p>
Silence Call	<p>A call which has <math>\geq 4</math> sec continuous RTP gap is considered as a Silence Call.</p> <p>Silence call rate = (count of silence call / Total calls established) *100</p> <p>If a call observes multiple silence count <math>\geq 4</math> sec in a particular established call it has been taken as one silent event.</p>

Jitter	<p>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 <math>S_i</math> is the RTP timestamp from packet <math>i</math>, and <math>R_i</math> is the time of arrival in RTP timestamps units for packet <math>i</math>, then for two packets <math>i</math> and <math>j</math> the inter-arrival jitter <math>D</math> can be expressed as:</p> $D(i,j) = (R_j - R_i) - (S_j - S_i)$ <p>The interarrival jitter is calculated continuously as each data packet <math>i</math> is received from source <math>SSRC\_n</math>, using this difference <math>D</math> for that packet and the previous packet <math>i-1</math> in order of arrival (not necessarily in sequence), according to the formula</p> $J(i) = J(i-1) + ( D(i-1,i)  - J(i-1))/16 \text{ or } 8$																																		
Downlink Packet Drop Rate	<p>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.</p> <p>This KPI is calculated from MOS call for packet call only (VoNR/VoLTE)</p>																																		
Uplink Packet Drop Rate	<p>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).</p>																																		
Signal Strength	<p>Signal strength is the signal power level received by the wireless user.</p> <table><tr><th rowspan="2">Parameter Name</th><th rowspan="2">Technology</th><th colspan="4">Signal Strength (dBm)</th></tr><tr><th>Excellent</th><th>Good</th><th>Fair</th><th>Poor</th></tr><tr><td>Rx Level</td><td>GSM</td><td>0 to <math>\geq -65</math></td><td><math>&lt;-65</math> to <math>\geq -75</math></td><td><math>&lt;-75</math> to <math>\geq -85</math></td><td><math>&lt;-85</math> to min</td></tr><tr><td>RSCP</td><td>WCDMA</td><td>0 to <math>\geq -70</math></td><td><math>&lt;-70</math> to <math>\geq -80</math></td><td><math>&lt;-80</math> to <math>\geq -90</math></td><td><math>&lt;-90</math> to min</td></tr><tr><td>RSRP</td><td>LTE</td><td>0 to <math>\geq -80</math></td><td><math>&lt;-80</math> to <math>\geq -95</math></td><td><math>&lt;-95</math> to <math>\geq -110</math></td><td><math>&lt;-110</math> to min</td></tr><tr><td>SS_RSRP</td><td>NR</td><td>0 to <math>\geq -80</math></td><td><math>&lt;-80</math> to <math>\geq -95</math></td><td><math>&lt;-95</math> to <math>\geq -110</math></td><td><math>&lt;-110</math> to min</td></tr></table>	Parameter Name	Technology	Signal Strength (dBm)				Excellent	Good	Fair	Poor	Rx Level	GSM	0 to $\geq -65$	$<-65$ to $\geq -75$	$<-75$ to $\geq -85$	$<-85$ to min	RSCP	WCDMA	0 to $\geq -70$	$<-70$ to $\geq -80$	$<-80$ to $\geq -90$	$<-90$ to min	RSRP	LTE	0 to $\geq -80$	$<-80$ to $\geq -95$	$<-95$ to $\geq -110$	$<-110$ to min	SS_RSRP	NR	0 to $\geq -80$	$<-80$ to $\geq -95$	$<-95$ to $\geq -110$	$<-110$ to min
Parameter Name	Technology			Signal Strength (dBm)																															
		Excellent	Good	Fair	Poor																														
Rx Level	GSM	0 to $\geq -65$	$<-65$ to $\geq -75$	$<-75$ to $\geq -85$	$<-85$ to min																														
RSCP	WCDMA	0 to $\geq -70$	$<-70$ to $\geq -80$	$<-80$ to $\geq -90$	$<-90$ to min																														
RSRP	LTE	0 to $\geq -80$	$<-80$ to $\geq -95$	$<-95$ to $\geq -110$	$<-110$ to min																														
SS_RSRP	NR	0 to $\geq -80$	$<-80$ to $\geq -95$	$<-95$ to $\geq -110$	$<-110$ to min																														

**Table-122:** Network performance parameter and definition voice

## 7.2.2 Network Performance Parameters Data tests

Parameter Name	Definition
<b>Download Speed (Mbps)</b>	<p>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.</p> <p>Download Speed = Total bytes transferred during download / Total time for transfer</p> <ul style="list-style-type: none"> <li>80th percentile (upper range) &amp; 20th percentile (lower range) value has been calculated for download throughput in dynamic drive and Hotspot combine data</li> </ul>
<b>Upload Speed (Mbps)</b>	<p>The upload speed is the data transmission rate that is achieved for uploading a test file from a test device to a test server.</p> <p>Upload Speed = Total bytes transferred during upload / Total time for transfer.</p> <ul style="list-style-type: none"> <li>80th percentile (upper range) &amp; 20th percentile (lower range) value has been calculated for upload throughput in dynamic drive and Hotspot combine data.</li> </ul>
<b>Download Session Setup Success Rate</b>	<p>(total download session established (successfully connected to server)/ total download session attempt) *100.</p> <p>This KPI has been calculated for Hotspot only.</p>



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

**Table-123:** 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.