



# Operator Assisted Drive Test Report

## Jalandhar to Moga, Ludhiana, Jalandhar Highway

26<sup>th</sup> & 29<sup>th</sup> July 2023

By

TRAI Regional office Jaipur

**Key Performance Indicators:** All TSPs have met the Drop Call Rate (DCR) benchmark of 2%. All TSPs have met the Call Setup Success Rate (CSSR) of 95%.

The Operator Assisted Drive Test has been carried out by Regional Office, Jaipur with the help of Service Providers in Moga-Jalandhar Highway Via Nakodar & Ludhiana area from 9:00 AM to 8:00 PM during 26<sup>th</sup> July & 29<sup>th</sup> July 2023. The drive test covered drive route of 209 KMs & 1 no hotspots over a period of 2 days. Approximately 240 calls were made for each of the TSPs networks: three 2G networks, one 3G networks and three LTE /5G networks covering four TSPs.

Overview

Voice Summary

Data Summary

# Overview

Regional Office, TRAI Jaipur conducted Operator Assisted Drive Test from 26<sup>th</sup> & 29<sup>th</sup> July 2023 covering Jalandhar-Moga Highway and back to Jalandhar via Ludhiana Highway. The performance of Airtel, BSNL, Vodafone Idea and Jio was monitored across various technologies (2G, 3G and 4G). The test results obtained from these drive tests were utilized to assess the network quality for Voice and Data services.

**Voice:** Coverage, Quality, Handover Success Rate, Call Setup Success Rate, Drop Call Rate and Block Call Rate.

**Data:** Download Throughputs, Upload Throughputs, Web Browsing Delay and Latency.

## Drive Test Details :

**Voice Tests:** Calls were made for 90 sec duration with a wait time of 10 sec between calls in all technologies. The drive test covered a drive route of approximately 209 KMs. Approximately 230 calls were made for each of the TSPs networks: three 2G (Lock Mode) networks, One 3G (Dual mode) networks and three VoLTE networks covering 4 unique TSPs.

## Data Tests:

**Dynamic data test** was conducted for 209 kms for download throughput in all technologies.

2G – measurement – UE Locked in 2G file size- 500KB

3G – measurement – UE in 3G File Size- 20MB

4G – measurement – UE in LTE File Size- 40MB

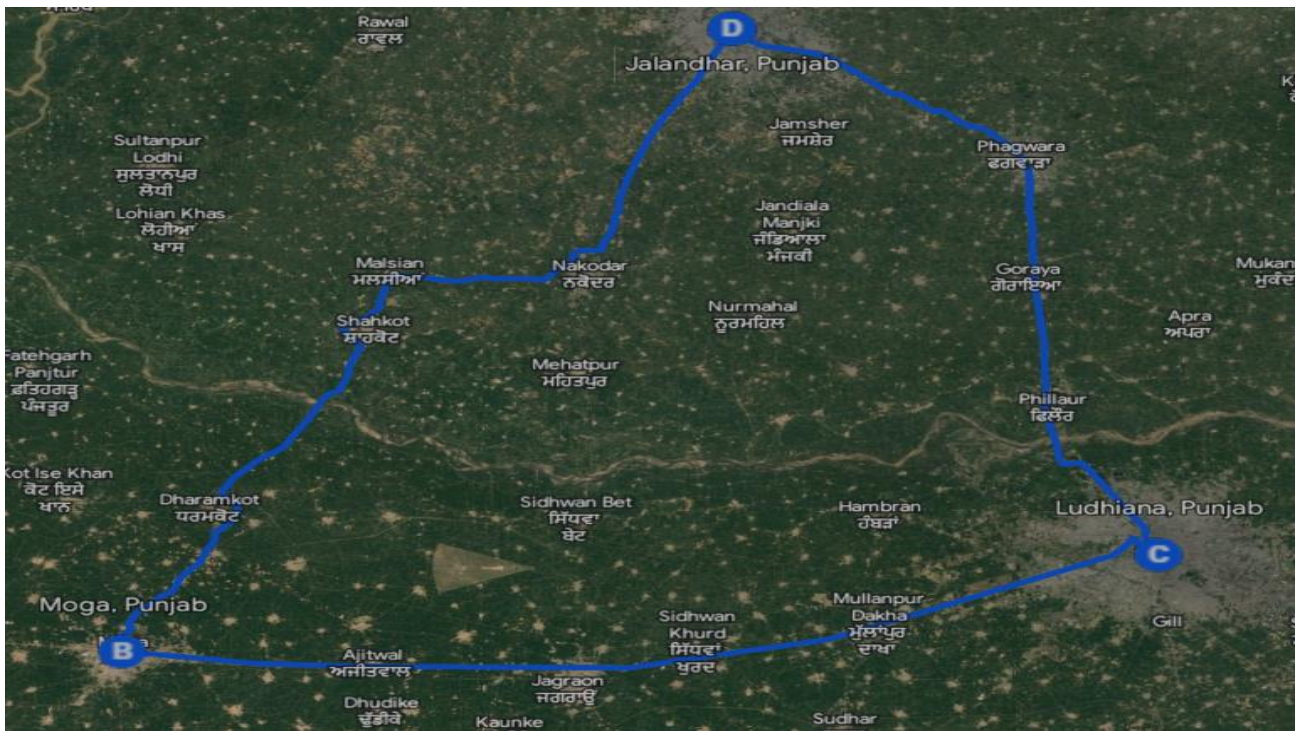
## Static data tests on 1 hotspots

### 1. Gurudwara Nanaksar

Service	Specifications
Download	2G (Locked) - 500KB, 3G (Dual) - 20 MB, 4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Dual) - 5 MB, 4G (Free) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in, www.flipkart.com and PayTm
Latency	32 Bytes on www.google.com

# Overview

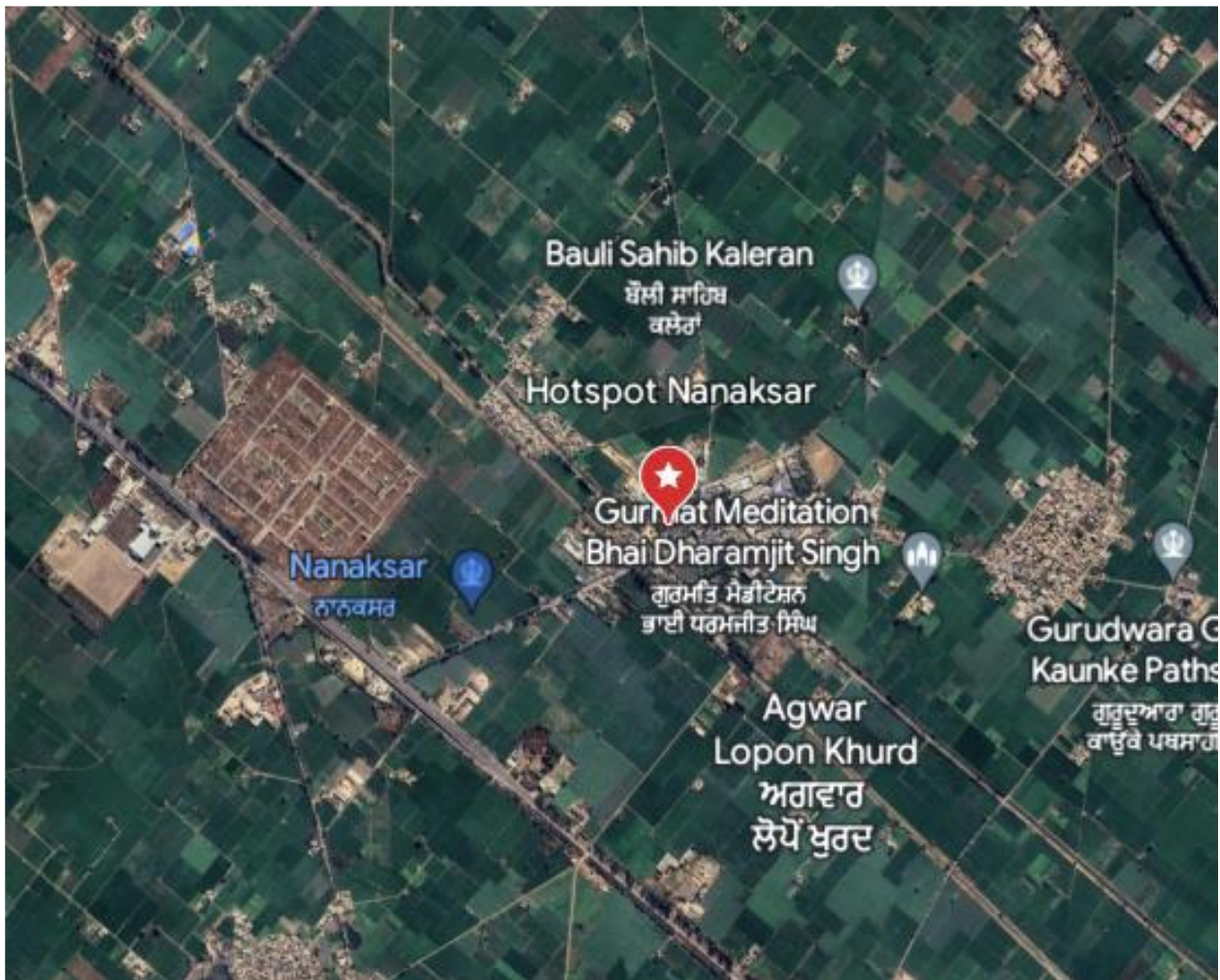
## Voice & Dynamic Data Test Drive Route



Date	Test Scenario	Area to be Covered
26-07-2023	2G/3G Voice and 3G Dynamic Data.	Starting Jalandhar, Khambra, Lambra, Partappura, Kang Sabnu, Nakodar, Bajwa Kalan, Dharamkot, Jalalabad, Lohara Chowk, Moga. Hotel president Jalandhar, TV tower, Shahkot,
29-07-2023	2G/3G Voice and 3G Dynamic Data	Starting Moga Bugipura Chowk, Ajitwal, Nava Chrarchak, Nanaksar, Jagraon, Aligarh, Chowkiman, Mullanpur, Baddowal, Threeke, Ludhiana, Ladhowal, Phillur, Goraya, Phagwara, Jalandhar. Moga Bus stand, Bugipura chowk, Nanaksar gurudwara Sahib
29-07-2023	Hot Spots- 2G/3G Static Data Test.	1) Gurudwara Nanaksar

# Overview

## Data Service Test- Static Locations



Hotspot Locations
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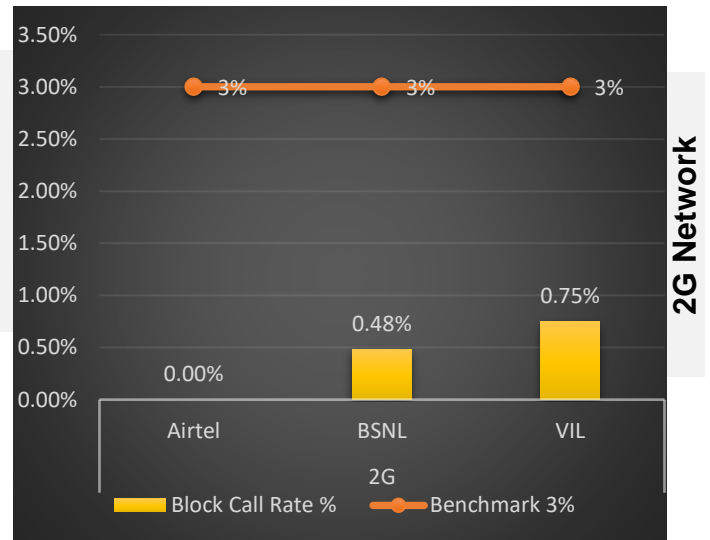
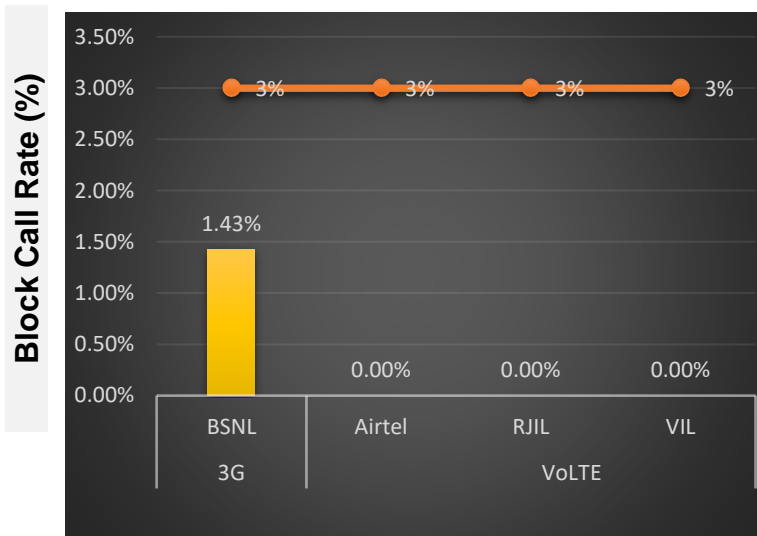
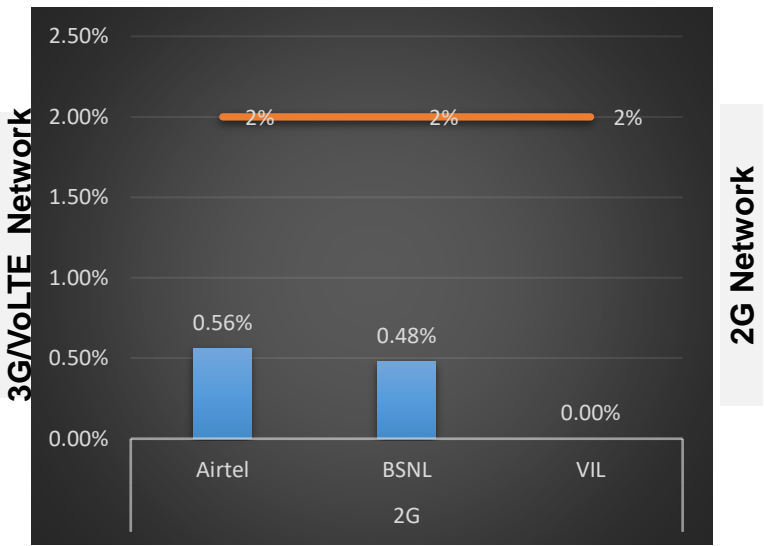
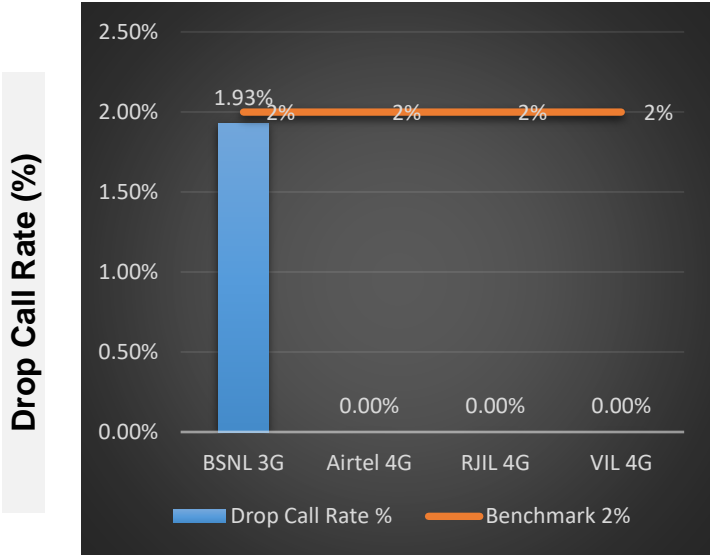
1).Gurudwara Nanaksar Sahib
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# Voice Calls

## Key Observations

**QoS compliance** of the TSPs in Gurudwara Nanaksar Sahib for Voice across technologies 2G/3G/4G-VoLTE:



KPIs	2G			3G	4G		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0.56%	0.48%	0.00%	1.93%	0.00%	0.00%	0.00%
Block Call Rate %	0.00%	0.48%	0.75%	1.43%	0.00%	0.00%	0.00%

- a) All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%).
- b) Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's.

# Voice Calls

## Key Observations

### Coverage

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

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	93.63%	86.53%	91.18%

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

TSPs	3G
	BSNL
Coverage %	81.28%

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	99.54%	98.88%	98.64%

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

TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Time spent on 3G/4G Network %	73.20%	100.00%	100.00%	100.00%

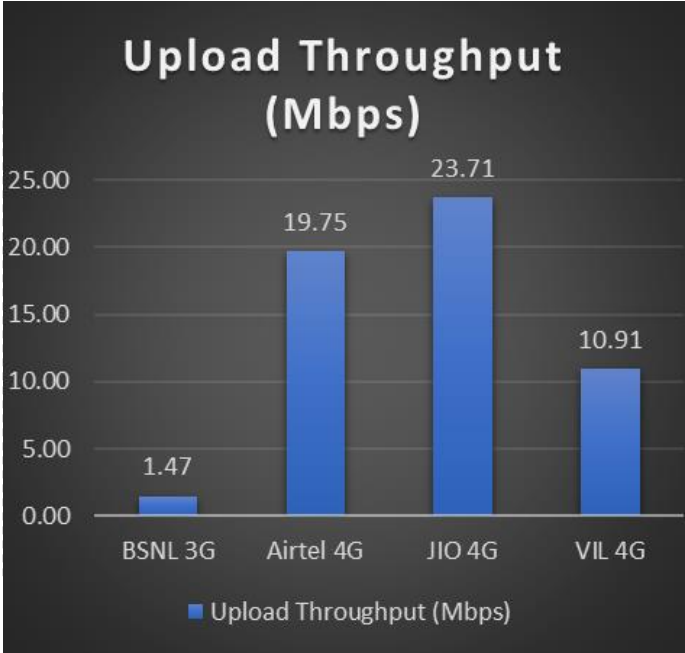
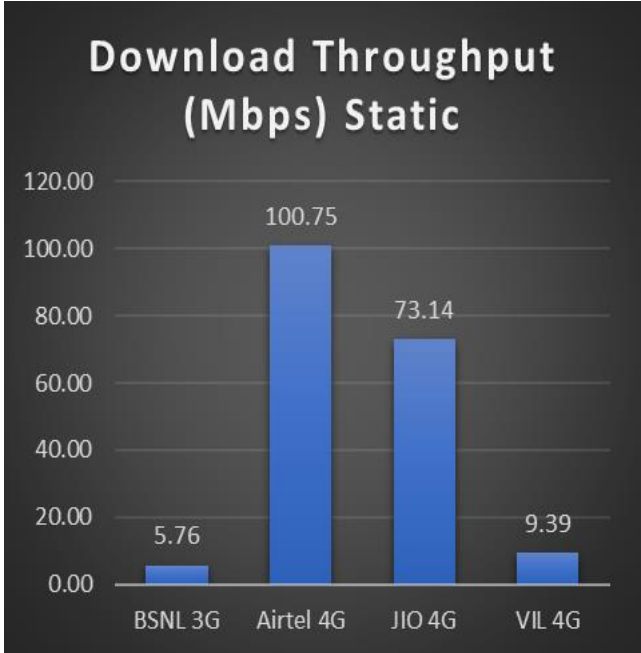
# Data Services Static

## Key Observations

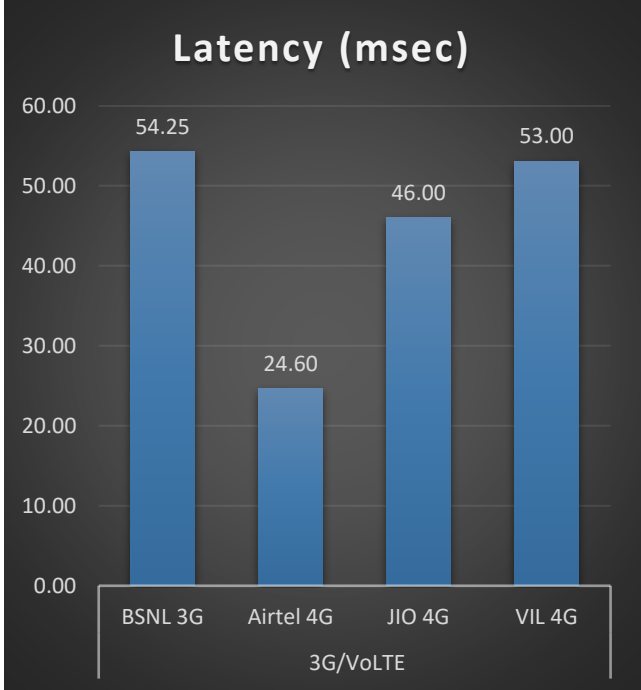
Data was tested at 1 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing (Flipkart, Amazon, Paytm)

### Data Download and Upload Performance Static (Mbps)

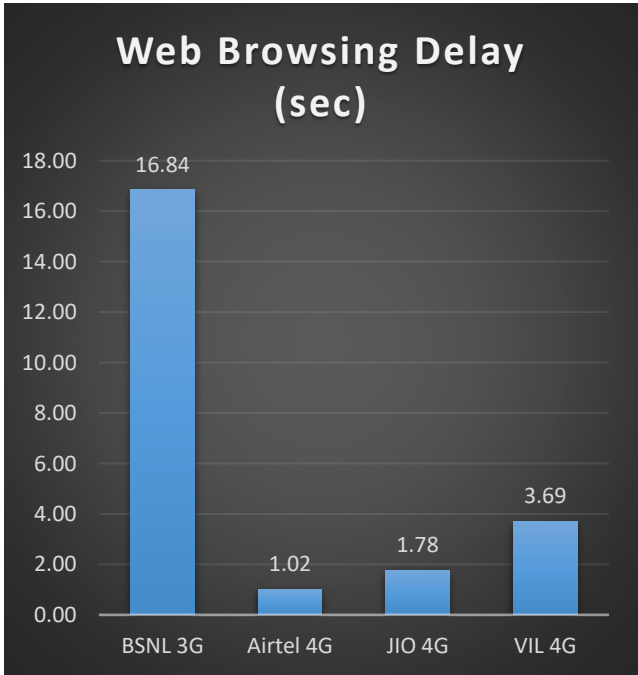
3G/4G/ Network:



### Latency (ms)



### Web Browsing (Sec)



# Data Services Dynamic

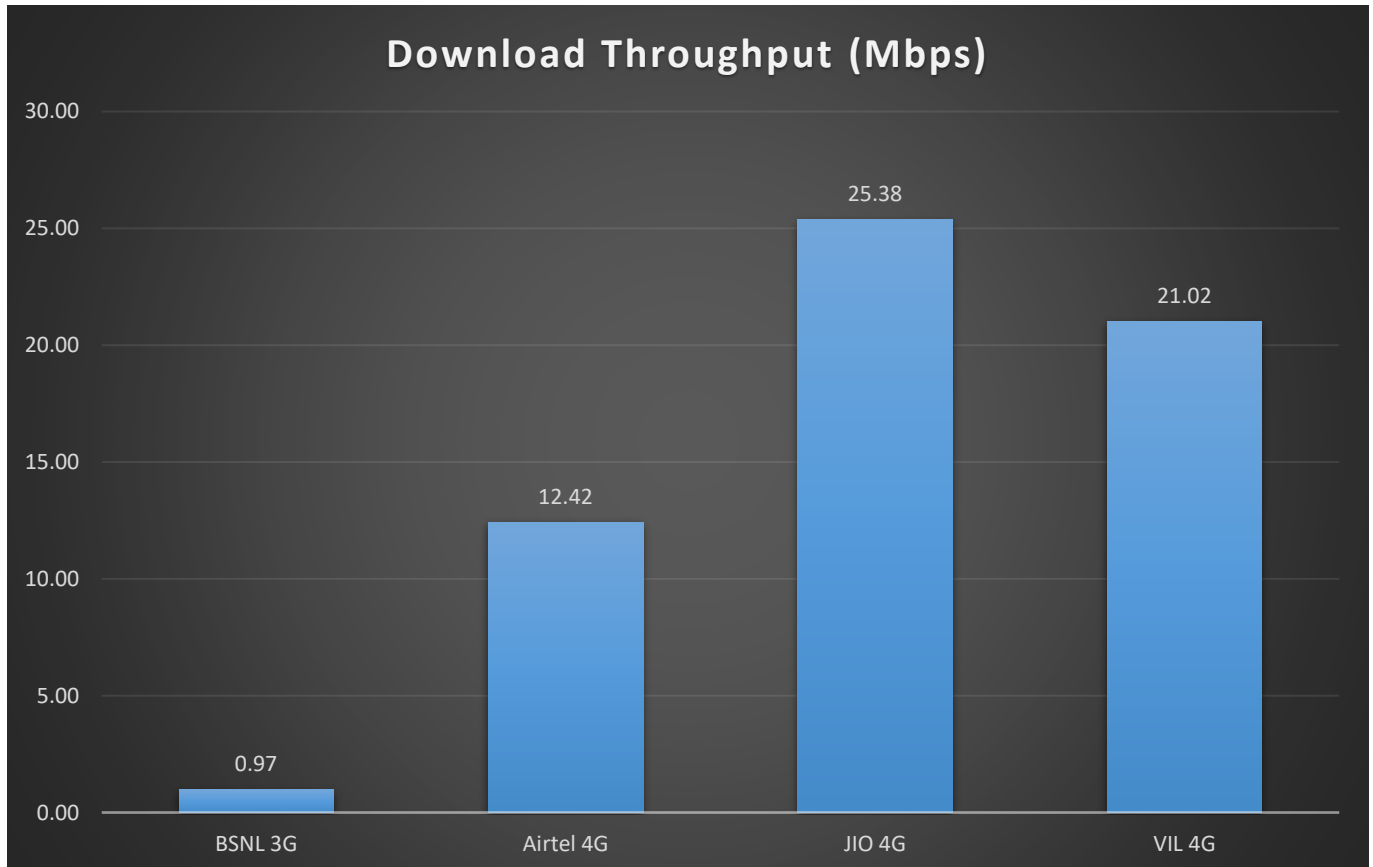
**Key Observations**

Dynamic Data was tested for whole voice route. Download Throughput was tested.

## Data Download Performance (kbps) - Dynamic

3G/4G/ Network:

Data Services Dynamic	3G/VoLTE			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	<b>0.97</b>	<b>12.42</b>	<b>25.38</b>	<b>21.02</b>





# Summary

## City Level Summary-Voice

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	283	210	264
Blocked Call Rate (%)	0.62%	0.48%	0.75%
CSSR% (Accessibility)	99.38%	99.52%	99.25%
Drop Call Rate (%)	0.00%	0.48%	0.00%
Mobility HOSR (%)	99.15%	98.50%	98.60%
Rx Quality (%)	96.03%	96.23%	95.90%
Average CST Sec	3.37	2.93	3.68

Voice Call	3G/VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	210	280	173	266
Blocked Call Rate (%)	1.43%	0.00%	0.00%	0.00%
CSSR% (Accessibility)	98.57%	100.00%	100.00%	100.00%
Drop Call Rate (%)	1.93%	0.00%	0.00%	0.00%
Mobility HOSR (%)	100.00%	99.63%	98.58%	99.46%
Rx Quality (%)	84.02%	92.09%	86.99%	91.00%
Average CST Sec	1.02	1.35	0.64	2.46

# Summary

## City Level Summary- Data Services

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	251.00	230.00	145.90
Upload Throughput (kbps)	83.00	76.00	70.80
Web Browsing Delay (sec)	38.90	38.51	52.60
Latency (msec)	281.00	0.00	159.00

Data Services Static	3G / 4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	5.76	100.75	73.14	9.39
Upload Throughput(Mbps)	1.47	19.75	23.71	10.91
Video Streaming Delay (sec)	-	2.32	0.65	1.19
Web Browsing Delay (sec)	16.84	1.02	1.78	3.69
Latency (msec)	54.25	24.60	46.00	53.00

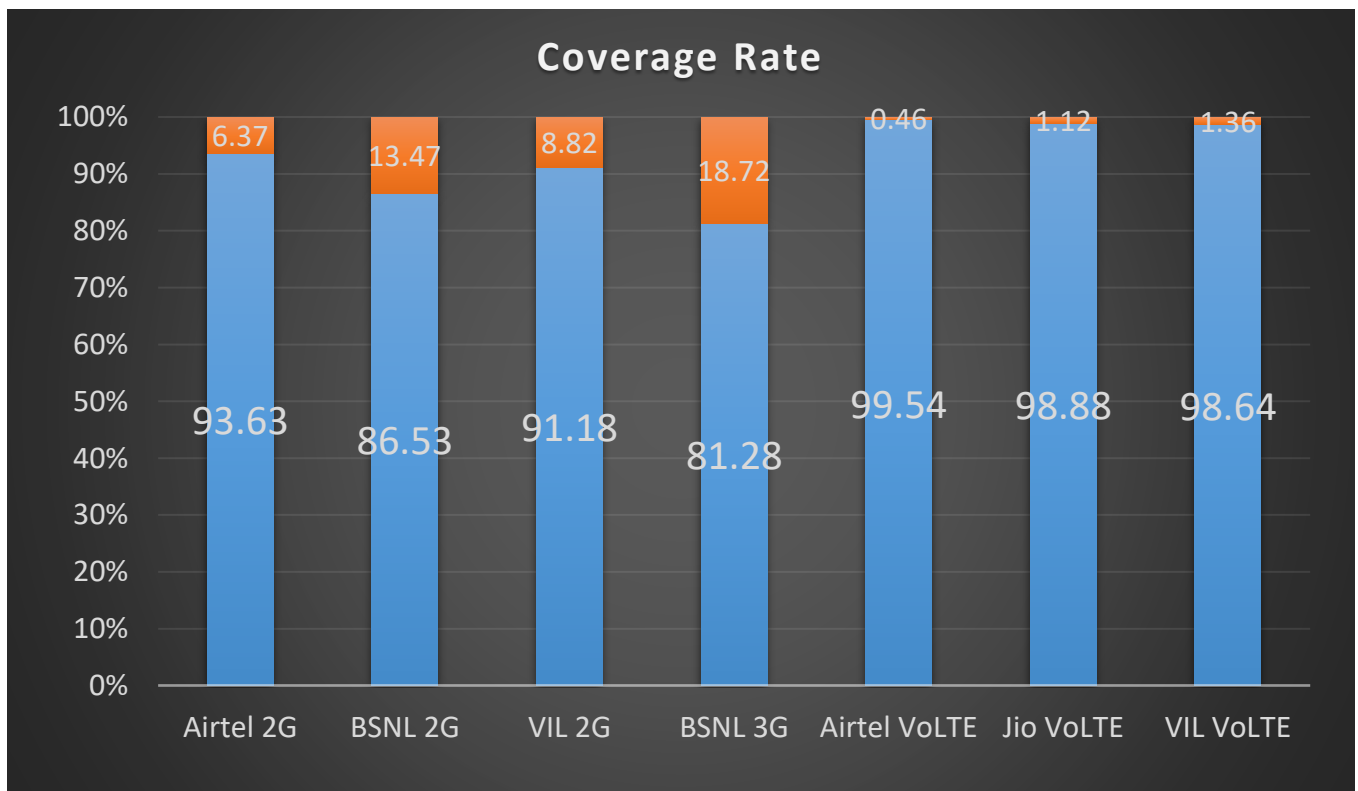
<u>Gurudwara NanaksarSahib</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	251.10	230.00	145.00
Upload Throughput (kbps)	83.00	76.00	70.80
Web Browsing Delay (sec)	38.90	38.51	52.60
Latency (msec)	281.00	0.00	159.00

<u>Gurudwara NanaksarSahib</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	3.61	50.14	53.73	15.94
Upload Throughput (mbps)	1.52	29.37	19.48	17.20
Video Streaming Delay ( Secs.)	-	0.34	0.31	1.31
Web Browsing Delay (sec)	1.20	1.00	1.99	9.71
Latency (msec)	56.00	37.00	47.00	111.00

## Coverage Details

RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call session. The Coverage rate is calculated on the basis of % of samples in which the Rx level  $\geq -85$  dBm, RSCP is  $\geq -90$  dBm & RSRP  $\geq -110$ dBm. The details are as follows.

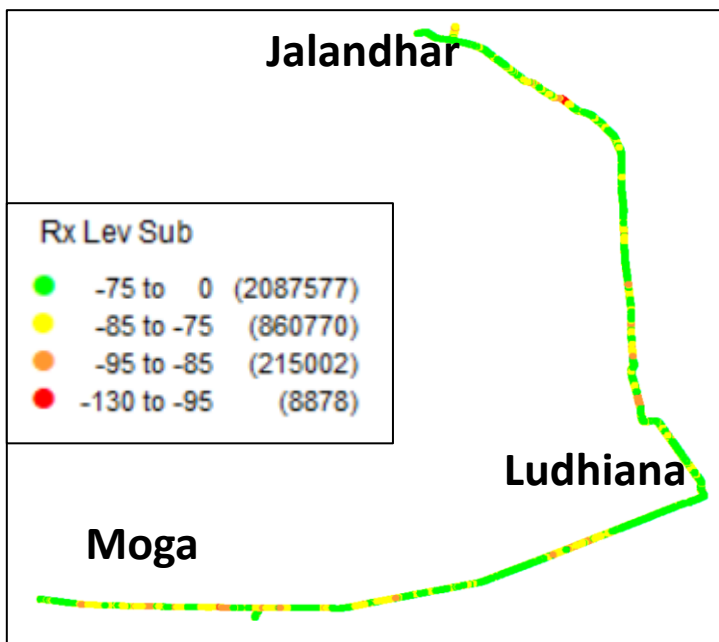
TSP	Coverage Rate %
Airtel 2G	93.63
BSNL 2G	86.53
VIL 2G	91.18
BSNL 3G	81.28
Airtel VoLTE	99.54
Jio VoLTE	98.88
VIL VoLTE	98.64



## TSP-AIRTEL

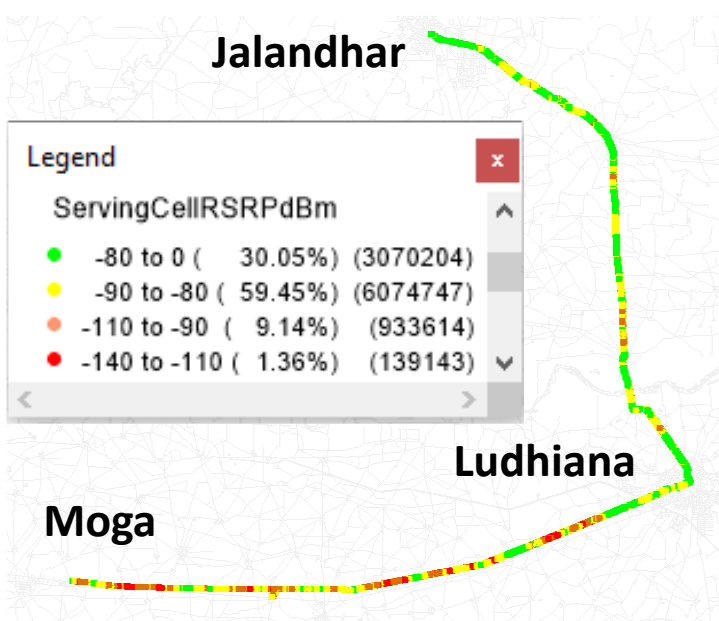
Technology	Coverage %
2G	93.63%
VoLTE	99.54%

2G



2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	2087577	65.81%	
[-75, >=-85)	860770	27.13%	
[-85, >=-95)	215002	6.78%	
[-95, >=Min)	8878	0.28%	
<b>Total</b>	<b>3172227</b>	<b>100%</b>	

VoLTE



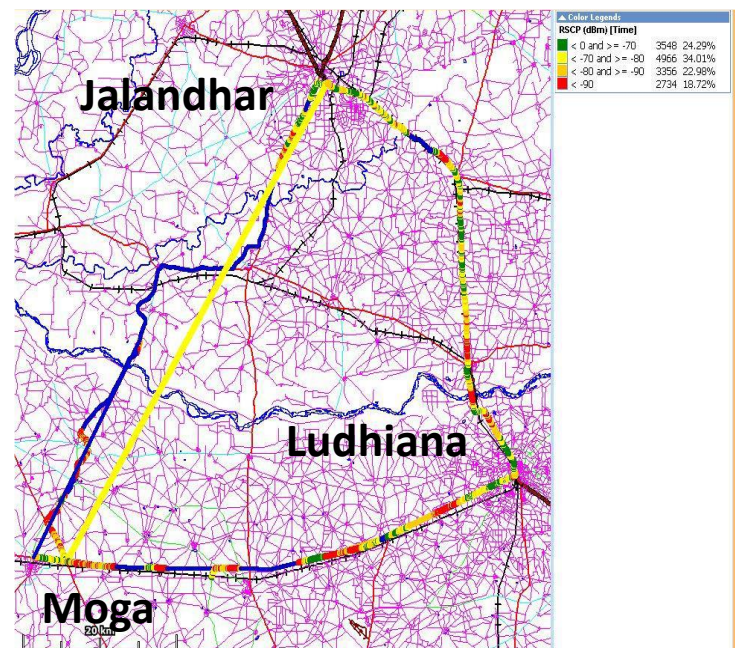
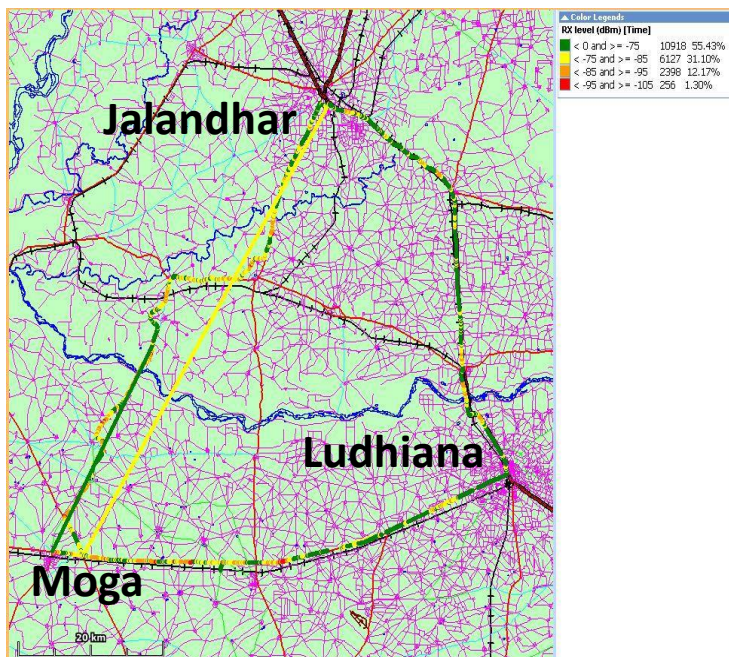
VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	3070204	30.5%	
[-80, >=-90)	6074747	59.45%	
[-90, >=-110)	933614	9.14%	
[-110, >=Min)	139143	1.36%	
<b>Total</b>	<b>10217708</b>	<b>100%</b>	

## TSP- BSNL

Technology	Coverage %
2G	86.53%
3G	81.28%

2G

3G



2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	10918	55.43%	Green
[-75, >=-85]	6127	31.1%	Yellow
[-85, >=-95]	2398	12.17%	Orange
[-95, >=Min]	256	1.3%	Red
<b>Total</b>	<b>19699</b>	<b>100%</b>	

Dual Mode			
Overall RSCP	# Samples	% PDF	Legends
[Max, >=-70]	3548	24.29%	Green
[-70, >=-80]	4966	34.01%	Yellow
[-80, >=-90]	3356	22.98%	Orange
[-90, >=Min]	2734	18.72%	Red
<b>Total</b>	<b>14604</b>	<b>100%</b>	



## JIO

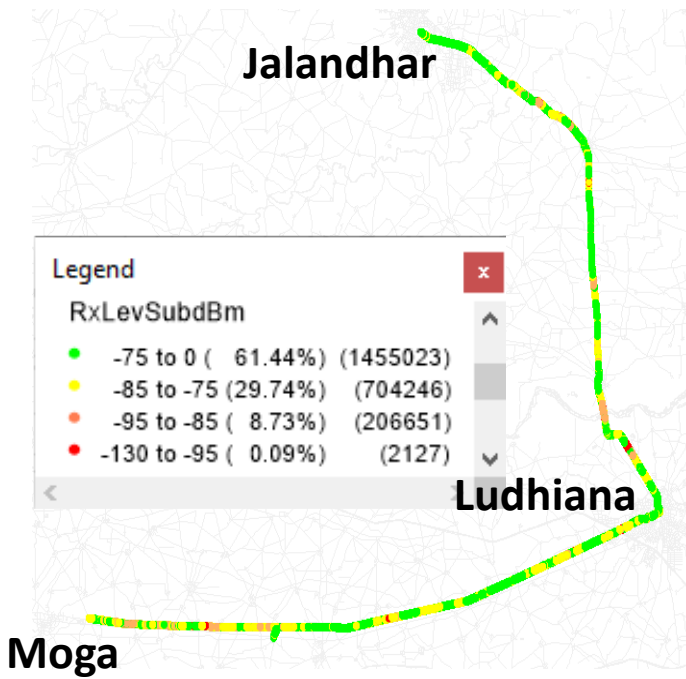
Technology	Coverage %
VoLTE	98.88%



VoLTE /5G			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	8519	47.14%	
[-80, >=-90)	5168	28.60%	
[-90, >=-110)	4183	23.15%	
[-110, >=Min)	202	1.12%	
<b>Total</b>	<b>18072</b>	<b>100%</b>	

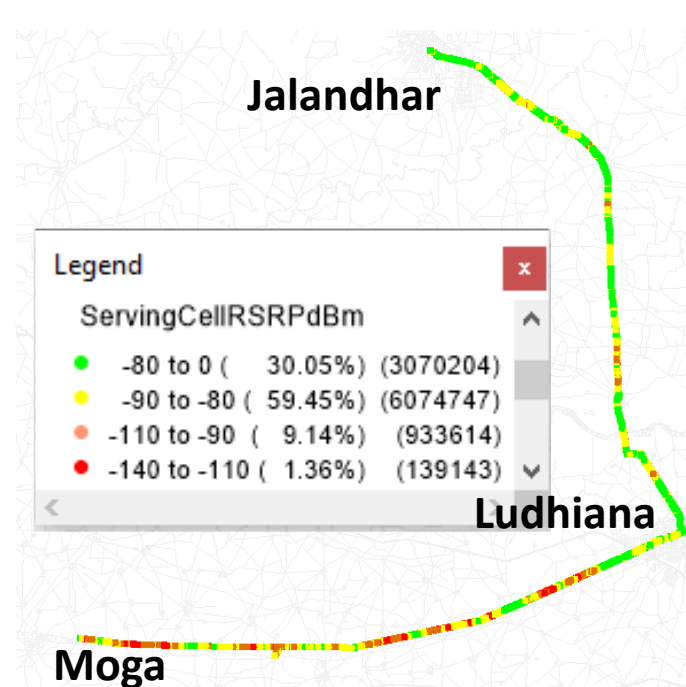
## VIL

	Technology	Coverage Rate %
	2G	<b>91.18%</b>
<b>2G</b>	VoLTE	<b>98.64%</b>



2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	1455023	61.44	
[-75, >=-85)	704246	29.74	
[-85, >=-95)	206651	8.73	
[-95, >=Min)	2127	0.09	
<b>Total</b>	<b>2368047</b>	<b>100%</b>	

## VoLTE

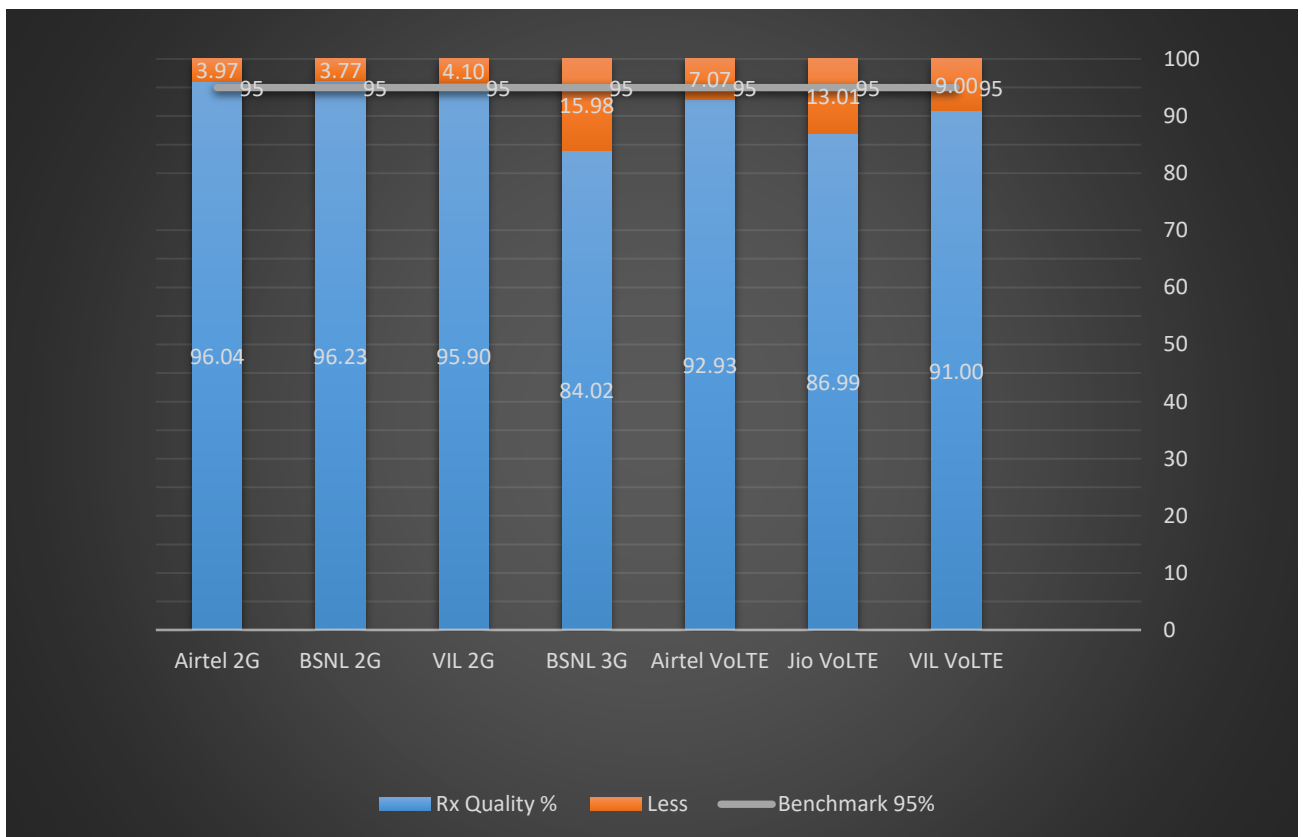


VoLTE /5G			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	3070204	30.5%	
[-80, >=-90)	6074747	59.45%	
[-90, >=-110)	933614	9.14%	
[-110, >=Min)	139143	1.36%	
<b>Total</b>	<b>10217708</b>	<b>100%</b>	

## II. Quality Details

For measuring voice quality, as per the QoS norms, RxQual  $\leq 5$  for GSM TSPs, EcNo  $\geq -14$  dBm for 3G TSP sand SINR  $> 0$  in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be  $\geq 95\%$ .

<u>TSP</u>	Rx Quality %
Airtel 2G	96.04
BSNL 2G	96.23
VIL 2G	95.90
BSNL 3G	84.02
Airtel VoLTE	92.93
Jio VoLTE	86.99
VIL VoLTE	91.00

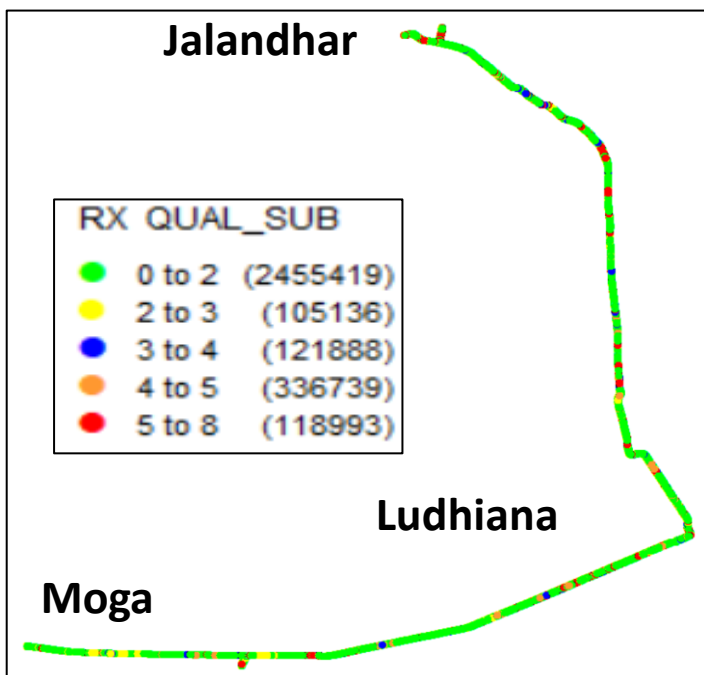


## II. Quality Details

### Airtel

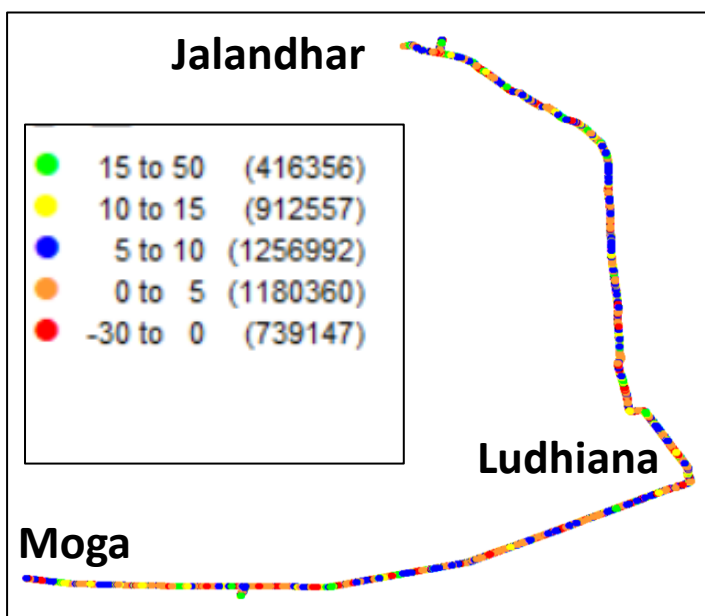
Technology	Rx Quality %
2G	<b>96.04%</b>
VoLTE	<b>92.93%</b>

2G



Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	2455419	78.24%	
(2, <=3)	105136	3.35%	
(3, <=4)	121888	3.88%	
(4, <=5)	336739	10.73%	
(5, <=Max)	118993	3.79%	
<b>Total</b>	<b>3138175</b>	<b>100%</b>	

VoLTE



Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=0)	739147	7.047%	
(0, <=5)	1180360	24.64%	
(5, <=10)	1256992	26.04%	
(10, <=15)	912557	31.02%	
(15, <=Max)	416356	11.24%	
<b>Total</b>	<b>4505412</b>	<b>100%</b>	

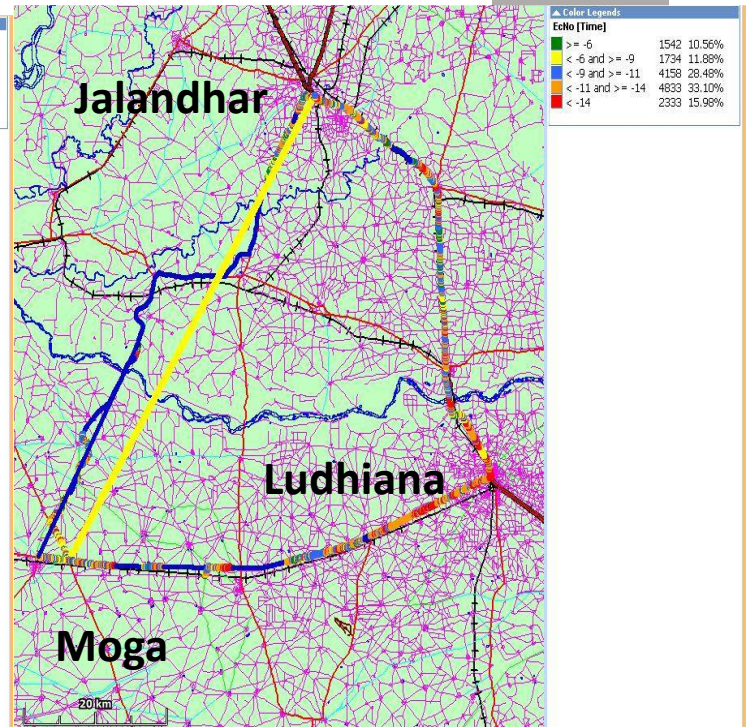
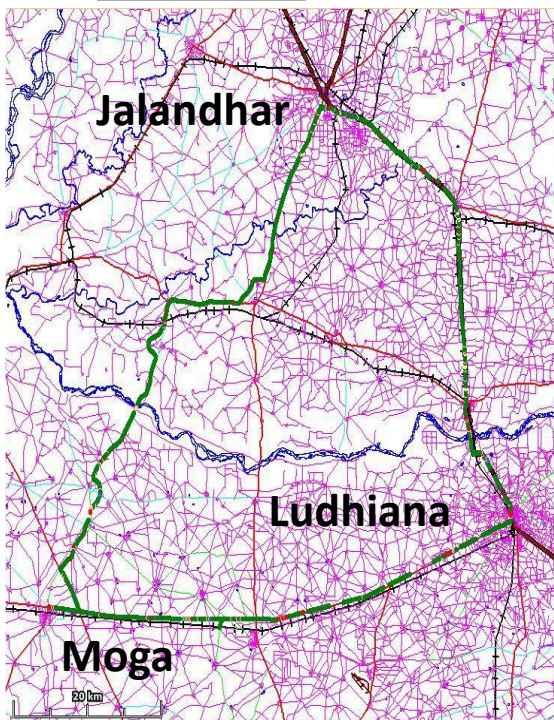
## II. Quality Details

### BSNL

Technology	Rx Quality %
2G	96.23%
3G	84.02%

2G

3G



Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	15675	90.81%	
(2, <=3)	352	2.04%	
(3, <=4)	316	1.83%	
(4, <=5)	267	1.55%	
(5, <=Max)	651	3.77%	
<b>Total</b>	<b>17261</b>	<b>100%</b>	

Overall Ec/No	# Samples	% PDF	Legends
(Max, <=-6)	1542	10.56%	
(-6, <=-9)	1734	11.88%	
(-9, <=-11)	4158	28.48%	
(-11, <=-14)	4833	33.10%	
(-14, <= Min)	2333	15.98%	
<b>Total</b>	<b>14600</b>	<b>100.00%</b>	

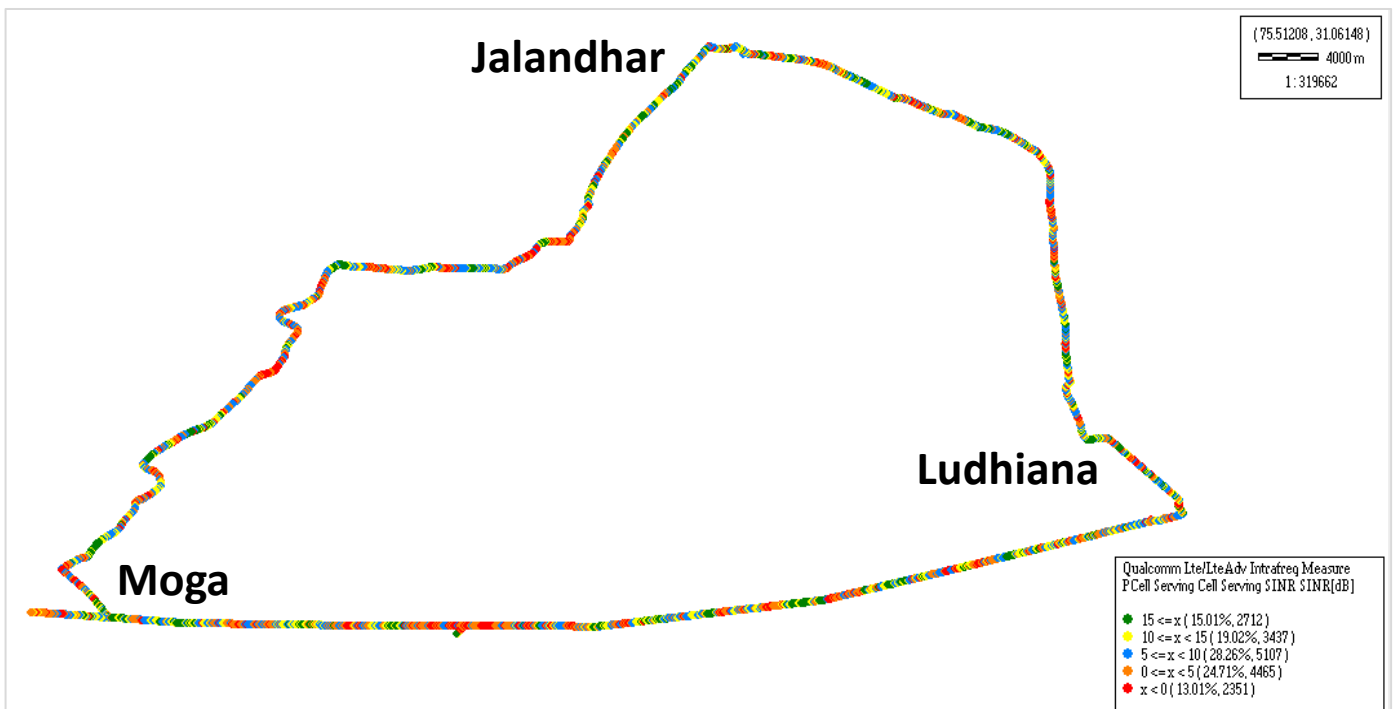


## II. Quality Details

For measuring voice quality, as per the QoS norms, RxQual  $\leq 5$  for GSM TSPs, EcNo  $\geq -14$  dBm for 3G TSP and SINR  $> 0$  in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be  $\geq 95\%$ .

### JIO

Technology	Rx Quality %
VoLTE	<b>86.99%</b>



Overall SINR	# Samples	% PDF	Legends
(Min, $\leq 0$ )	2351	13.01	
(0, $\leq 5$ )	4465	24.71	
(5, $\leq 10$ )	5107	28.26	
(10, $\leq 15$ )	3437	19.02	
(15, $\leq \text{Max}$ )	2712	15.01	
<b>Total</b>	<b>18072</b>	<b>100%</b>	

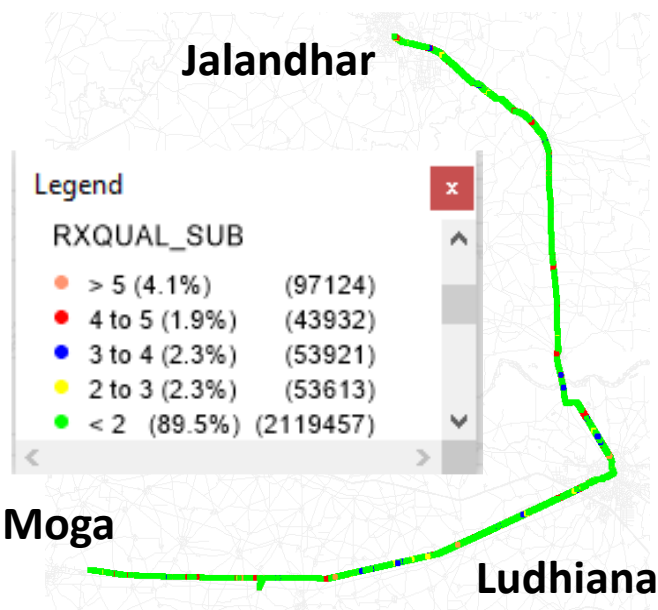


## II. Quality Details

### VIL

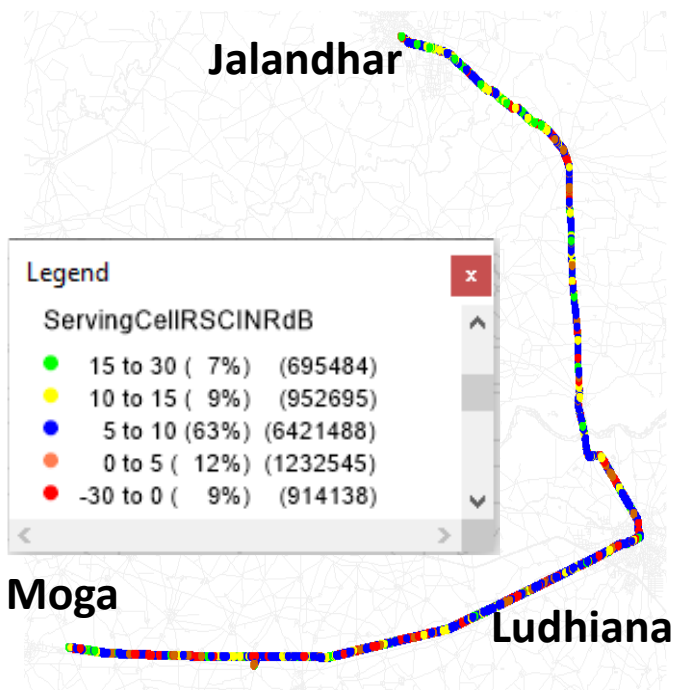
Technology	Rx Quality %
2G	95.90%
4G	91.00%

2G



VoLTE

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	2119457	89.5%	
(2, <=3)	53613	2.3%	
(3, <=4)	53921	2.3%	
(4, <=5)	43932	1.8%	
(5, <=Max)	97124	4.1%	
<b>Total</b>	<b>2368047</b>	<b>100%</b>	



Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	914138	9%	
(0, <=5)	1232545	12%	
(5, <=10)	6421488	63%	
(10, <=15)	952695	9%	
(15, <=Max)	695484	7%	
<b>Total</b>	<b>10216350</b>	<b>100%</b>	

### III. Technology Details

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	73.20%
Airtel VoLTE	100.00%
Jio VoLTE	100.00%
VIL VoLTE	100.00%

