



## Operator Assisted Drive Test Report

# Bhiwani, Kalanaur, Charkhidadri towns & nearby Area

19<sup>th</sup> ,20<sup>th</sup> & 22<sup>nd</sup> December.

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 Bhiwani, Kalanaur, Charkhi-dadri towns and surrounding areas from 9:00 AM to 8:00 PM during 19<sup>th</sup> Dec, 20<sup>th</sup> Dec. and 22<sup>nd</sup> Dec.2023. The drive test covered drive route of 156 KMs over a period of 2 days and 6 no hotspots over a period of 1 day. Approximately 350 calls were made TSPs networks.

Overview

Voice Summary

Data Summary

# Overview

Regional Office, TRAI Jaipur conducted Operator Assisted Drive Test from 19<sup>th</sup> Dec. 2023, 20<sup>th</sup> Dec 2023 and 22<sup>nd</sup> Dec 2023 covering Bhiwani, Kalanaur, Charkhidadri Cities and surrounding areas. The performance of TSPs 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,  
**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 156 KMs. Approximately 350 calls were made in all networks.

### Data Tests:

**Dynamic data test** was conducted for 156 kms for download throughput in all technologies.  
2G – measurement – UE Locked in 2G file size- 500KB

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

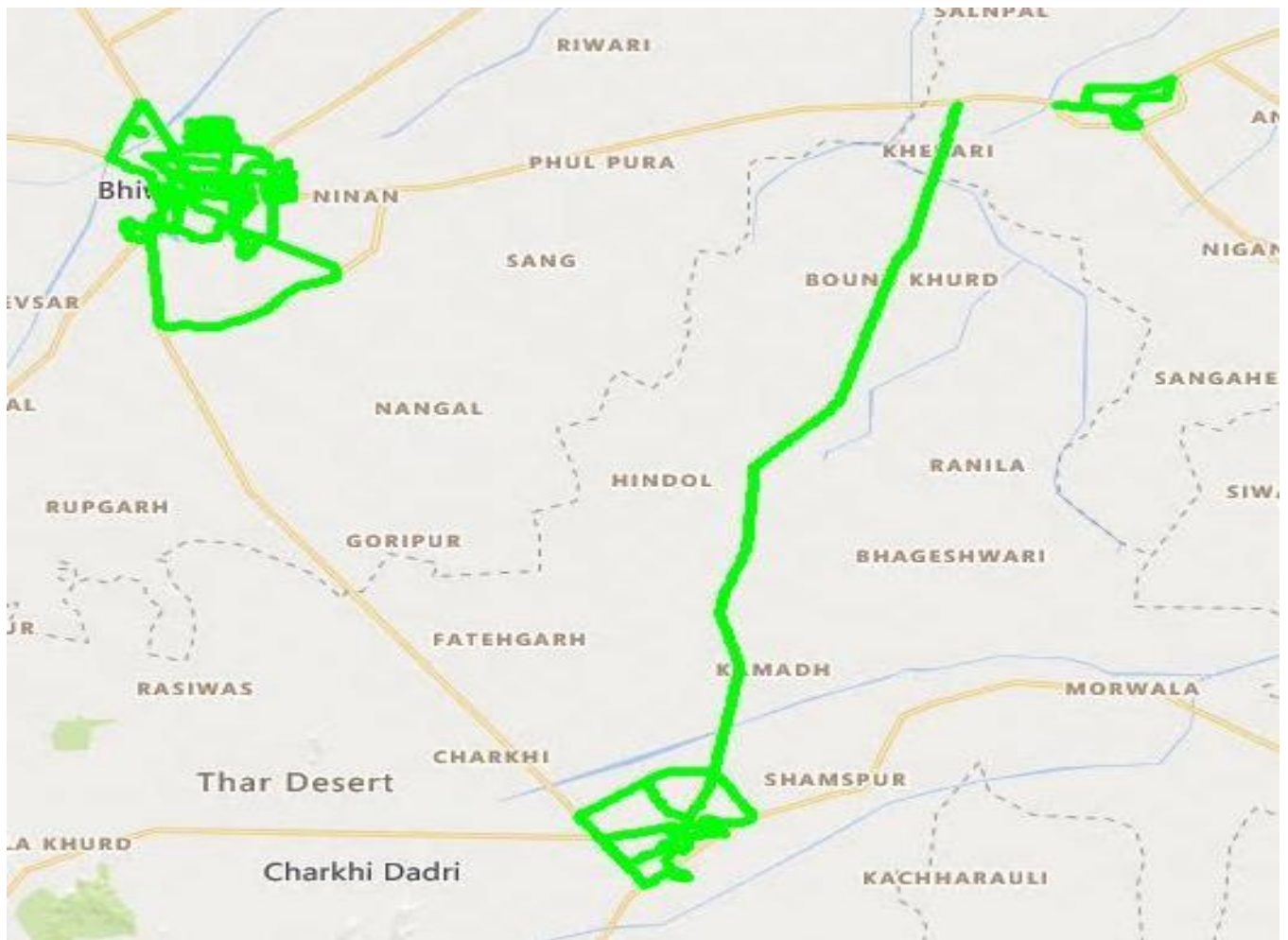
4G – measurement – UE in LTE /5G File Size- 40MB

### Static data tests on 5- 6 hotspots

1. Bus Stand Bhiwani
2. Civil Hospital
3. Railway Station Bhiwani
4. District Court Bhiwani
5. Sun City
6. Bus Stand Charkhidadri

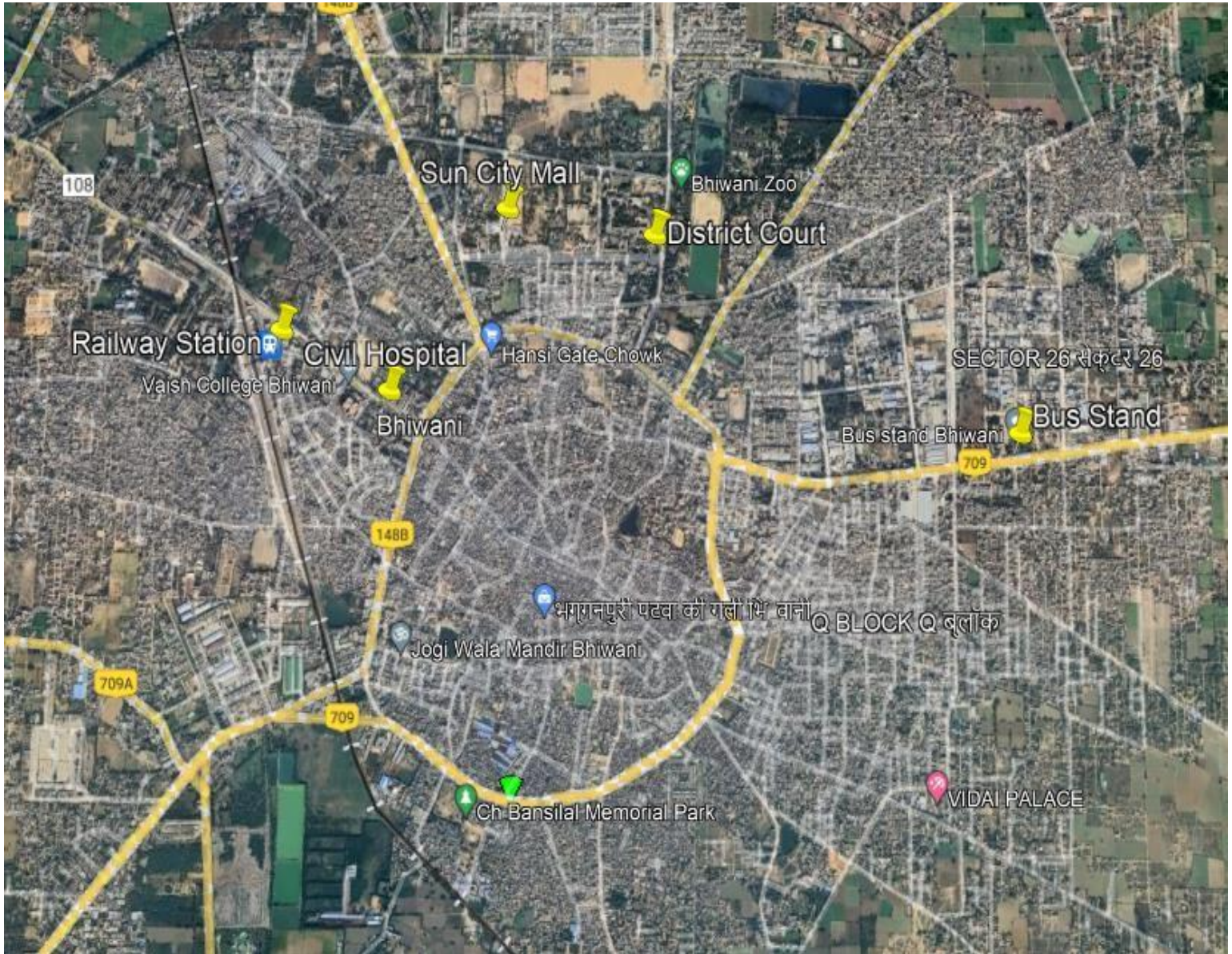
Service	Specifications
Download	2G (Locked)- 500KB, 3G (Dual)- 20 MB, 4G (Free)- 40 MB
Upload	2G (Locked)- 100KB, 3G (Dual)- 5 MB, 4G (Free)- 10 MB
Web Browsing	3 links of e/m commerce website <a href="http://www.amazon.in">www.amazon.in</a> , <a href="http://www.flipkart.com">www.flipkart.com</a> and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

## Voice & Dynamic Data Test Drive Route



Date	Test Scenario	Area to be Covered
19 Dec 2023	2G/3G/4G Voice and 3G/4G/5G Dynamic Data	<b>Starting Point BSNL EXCHANGE at 9:30 AM</b> .Ghantaghar,Hansi Gate,Court,Sec.13,Gvt.Collage,Rohtak Gate,Industrial Area,Anaz Mandi,Puranan Bus stand,Sec 26,MC Colony,
20 DEC 2023	2G/3G/4G Voice and 3G/4G/5G Dynamic & Static Data	<b>Starting Point BSNL EXCHANGE at 9.30 AM</b> , Kalanor-Charkhi Dadri city and BUS STAND Charkhidadri HotSpot
22 DEC 2023	Hot Spots- 2G/3G/4G/5G Static Data Tests	<b>Starting Point BSNL EXCHANGE at 9.30 AM</b> , RAILWAY STATION ,SUN CITY MALL, District Court,, CIVIL HOSPITAL,BUS STAND

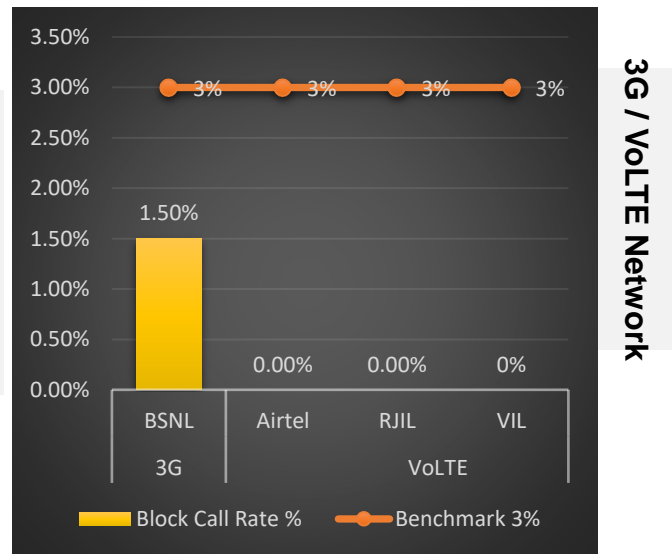
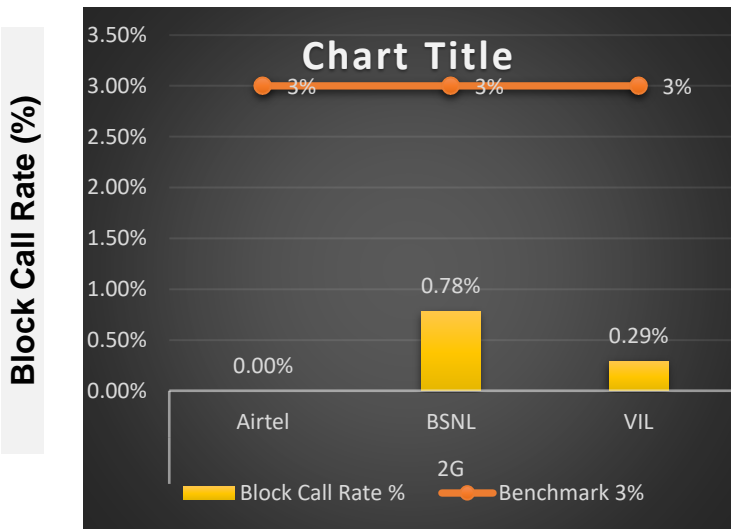
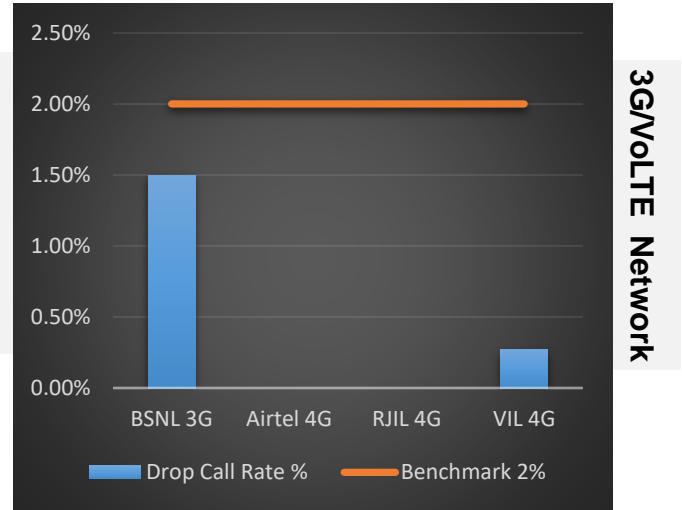
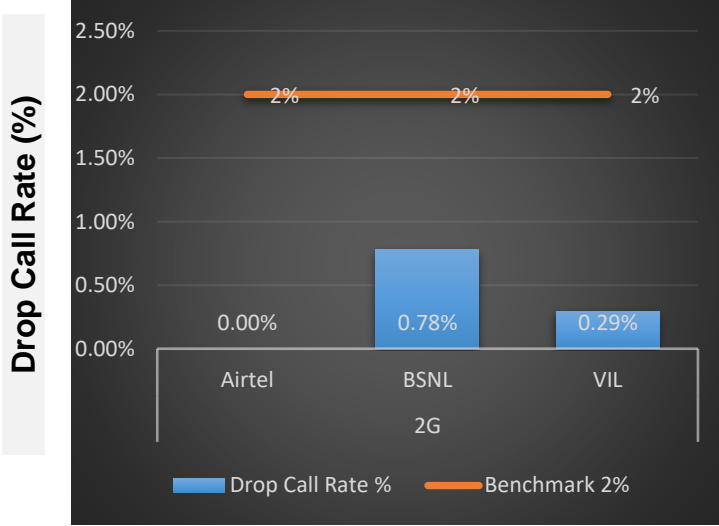
## Data Service Test- Static Locations



### Hotspot Locations

1. BUS STAND BHIWANI
2. CIVIL HOSPITAL BHIWANI
3. RAILWAY STATION BHIWANI
4. DISTRICT COURT BHIWANI
5. SUN CITY BHIWANI
6. BUS STAND CHARKHIDADRI

### QoS compliance of the TSPs in Bhiwani City & Nearby area for Voice across technologies 2G/3G/4G-VoLTE:



KPIs	2G			3G	4G		
	Airtel	BSNL	VIL	BSNL	Airtel	RJIL	VIL
Drop Call Rate %	0.00%	0.78%	0.29%	1.50%	0.00%	0.00%	0.27%
Block Call Rate %	0.00%	0.78%	0.29%	1.50%	0.00%	0.00%	0%

- 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 %	98.50%	95.51%	92.23%

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

TSPs	3G
	BSNL
Coverage %	82.04%

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

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	99.50%	99.66%	99.92%

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

TSPs	3G	VoLTE		
	BSNL	Airtel	JIO	VIL
Time spent on 3G/4G Network %	70.10%	100%	100%	100%

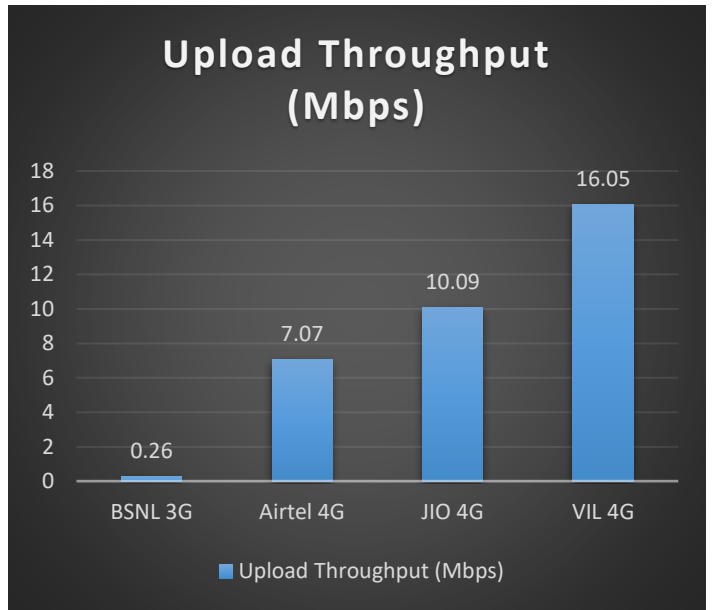
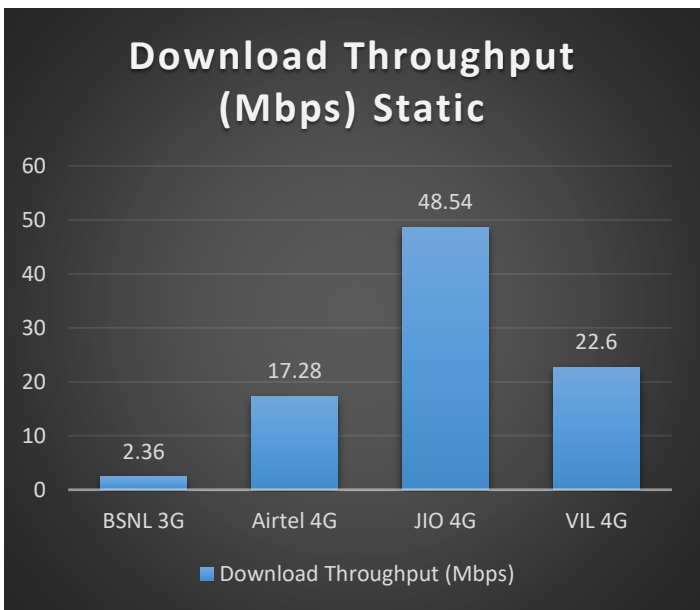
# Data Services Static

## Key Observations

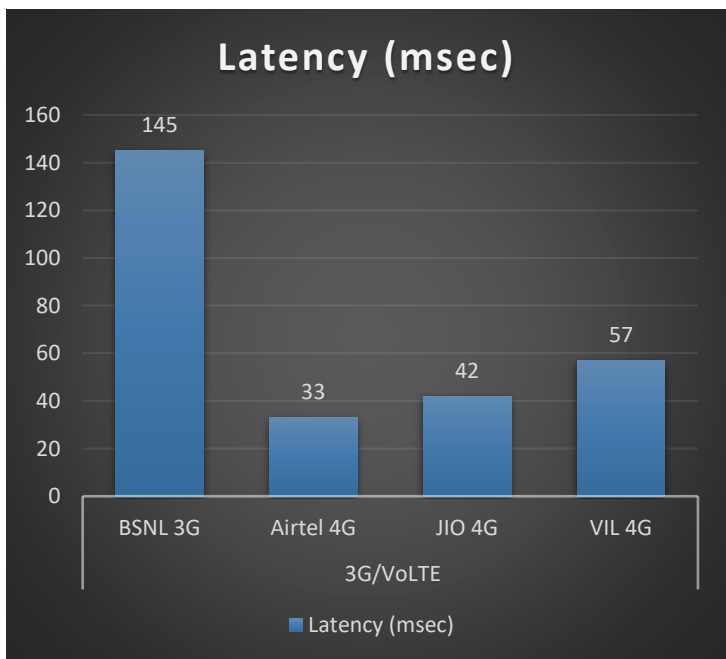
Data was tested at 5 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), and Web browsing (Flipkart, Amazon, Paytm)

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

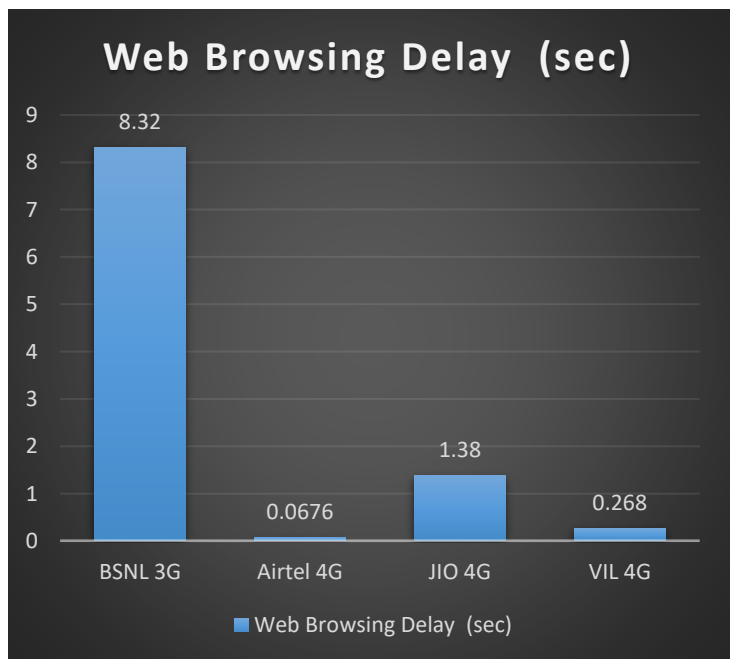
3G/4G/ Network:



### Latency (ms)



### Web Browsing (Sec)



# Data Services Dynamic

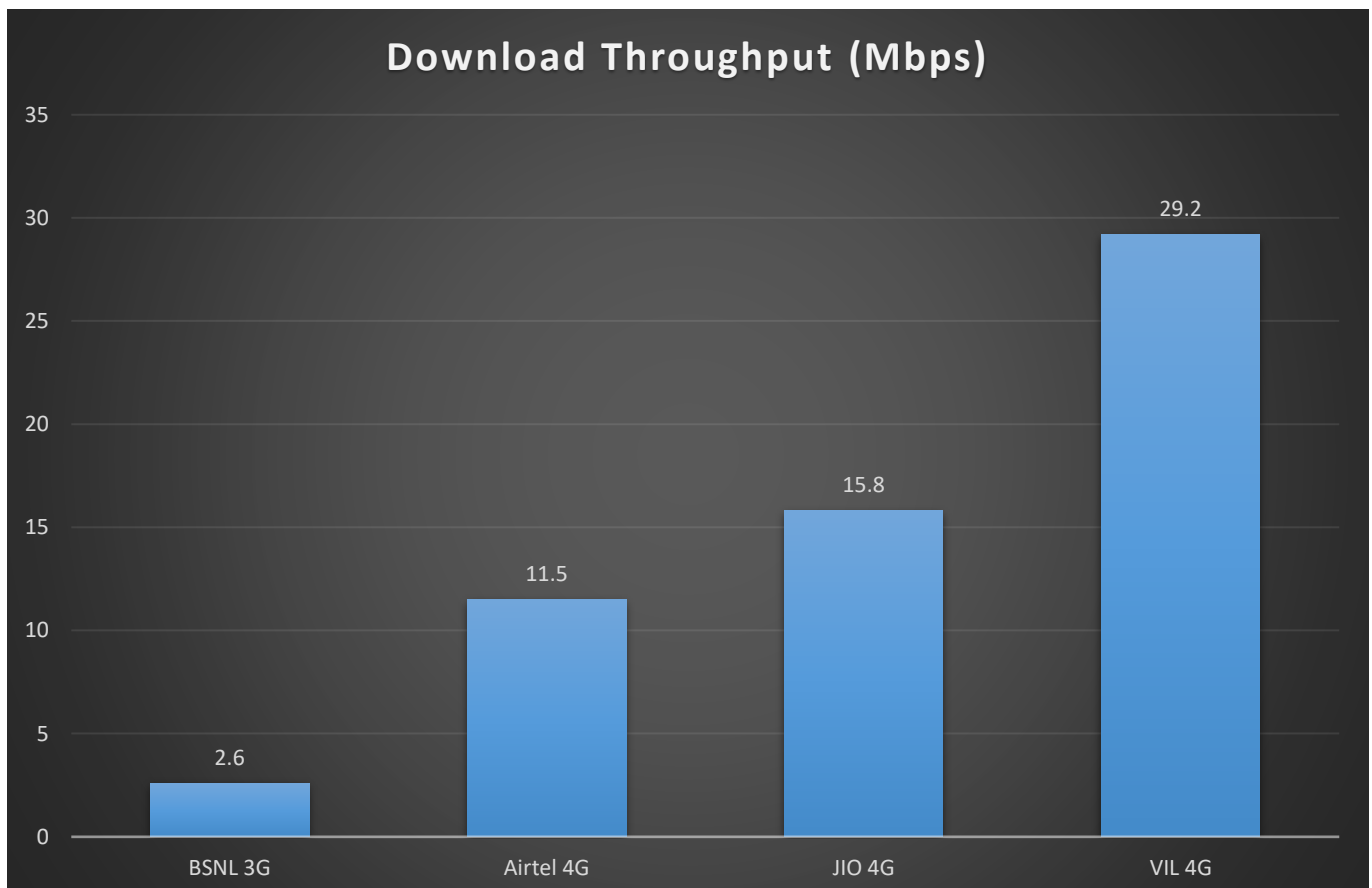
**Key Observations**

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)	2.6	11.5	15.8	29.2





# Summary

## City Level Summary-Voice

Voice Call	2G		
	Airtel	BSNL	VIL
Call Attempt	301	374	348
Blocked Call Rate (%)	0%	0.78%	0.29%
CSSR% (Accessibility)	100%	98.67%	99.71%
Drop Call Rate (%)	0%	0.78%	0.29%
Mobility HOSR (%)	97%	96.6%	97.65%
Rx Quality (%)	97.80%	96.51%	95.22%
Average CST Sec	3.85	3.85	5.07

Voice Call	3G/VoLTE			
	BSNL 3G	Airtel VoLTE	JIO VoLTE	VIL VoLTE
Call Attempt	393	305	368	368
Blocked Call Rate (%)	1.5	0%	0%	0%
CSSR% (Accessibility)	98.73	100%	100%	100%
Drop Call Rate (%)	1.5	0%	0%	0.27%
Mobility HOSR (%)	98.75	99.90%	99.67%	99.75%
Rx Quality (%)	98.75	95.70%	95.64%	95.32%
Average CST Sec	2.9	1.3	0.48	2.38

# Summary

## City Level Summary- Data Services

Data Services Static	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	129.2	130	73.6
Upload Throughput (kbps)	76.38	90	76.7
Web Browsing Delay (sec)	0.486	52	0.668
Latency (msec)	222	193.85	127

Data Services Static	3G / 4G			
	BSNL 3G	Airtel 4G	JIO 4G	VIL 4G
Download Throughput (Mbps)	2.36	17.28	48.54	22.6
Upload Throughput(Mbps)	0.26	7.07	10.09	16.05
Video Streaming Delay (sec)	5.8	0.412	0.37	0.277
Web Browsing Delay (sec)	8.32	0.0676	1.38	0.268
Latency (msec)	145	33	42	57

<u>Bus Stand</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	156.4	155	53.9
Upload Throughput (kbps)	79.3	19.18	35.1
Web Browsing Delay (sec)	0.556	73.13	0.768
Latency (msec)	296	188	114

Hospital	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	124.1	150	88.6
Upload Throughput (kbps)	78	33.1	99.4
Web Browsing Delay (sec)	0.401	56.13	0.621
Latency (msec)	256	193	146

<u>Railway Station</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	146.1	160	96
Upload Throughput (kbps)	71	55	76.2
Web Browsing Delay (sec)	0.455	52.83	0.321
Latency (msec)	166	162	137

<u>Court</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	119.3	141.23	47
Upload Throughput (kbps)	68	15.4	91.1
Web Browsing Delay (sec)	0.596	59.17	0.872
Latency (msec)	223	271	115

<u>Sun City</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	128.2	80	80
Upload Throughput (kbps)	75	21.3	80.6
Web Browsing Delay (sec)	0.412	74	0.475
Latency (msec)	249	121	108

<u>Charkhi Dadri</u>	2G		
	Airtel	BSNL	VIL
Download Throughput (kbps)	101.6	120	75.8
Upload Throughput (kbps)	87	26.15	78
Web Browsing Delay (sec)	0.501	75.2	0.954
Latency (msec)	146	190	141

# Data Services static

<b><u>Bus Stand</u></b>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	2.36	12.8	42.5	19.6
Upload Throughput (mbps)	1.26	3.5	10.38	17.9
Video Streaming Delay (Secs.)	6.5	0.251	0.32	0.26
Web Browsing Delay (sec)	88.5	0.076	1.41	0.253
Latency (msec)	188	23	41	64

<b><u>Hospital</u></b>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	3.3	13	49.56	28
Upload Throughput (mbps)	1.15	9.15	9.15	16
Video Streaming Delay (Secs.)	6.6	0.438	0.42	0.21
Web Browsing Delay (sec)	8.9	0.073	1.42	0.167
Latency (msec)	68	39	41	56

<b><u>Railway Station</u></b>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	2.3	25.7	48.76	19
Upload Throughput (mbps)	0.81	9.2	9.51	10.3
Video Streaming Delay (Secs.)	4.1	0.426	0.34	0.361
Web Browsing Delay (sec)	6.86	0.068	1.33	0.21
Latency (msec)	72	28	45	61

# Data Services static

<u>Court</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	3.36	11.1	47.30	14.3
Upload Throughput (mbps)	1.26	4.3	9.48	6.8
Video Streaming Delay (Secs.)	5.89	0.464	0.42	0.251
Web Browsing Delay (sec)	6.32	0.081	1.34	0.331
Latency (msec)	155	33	42	40

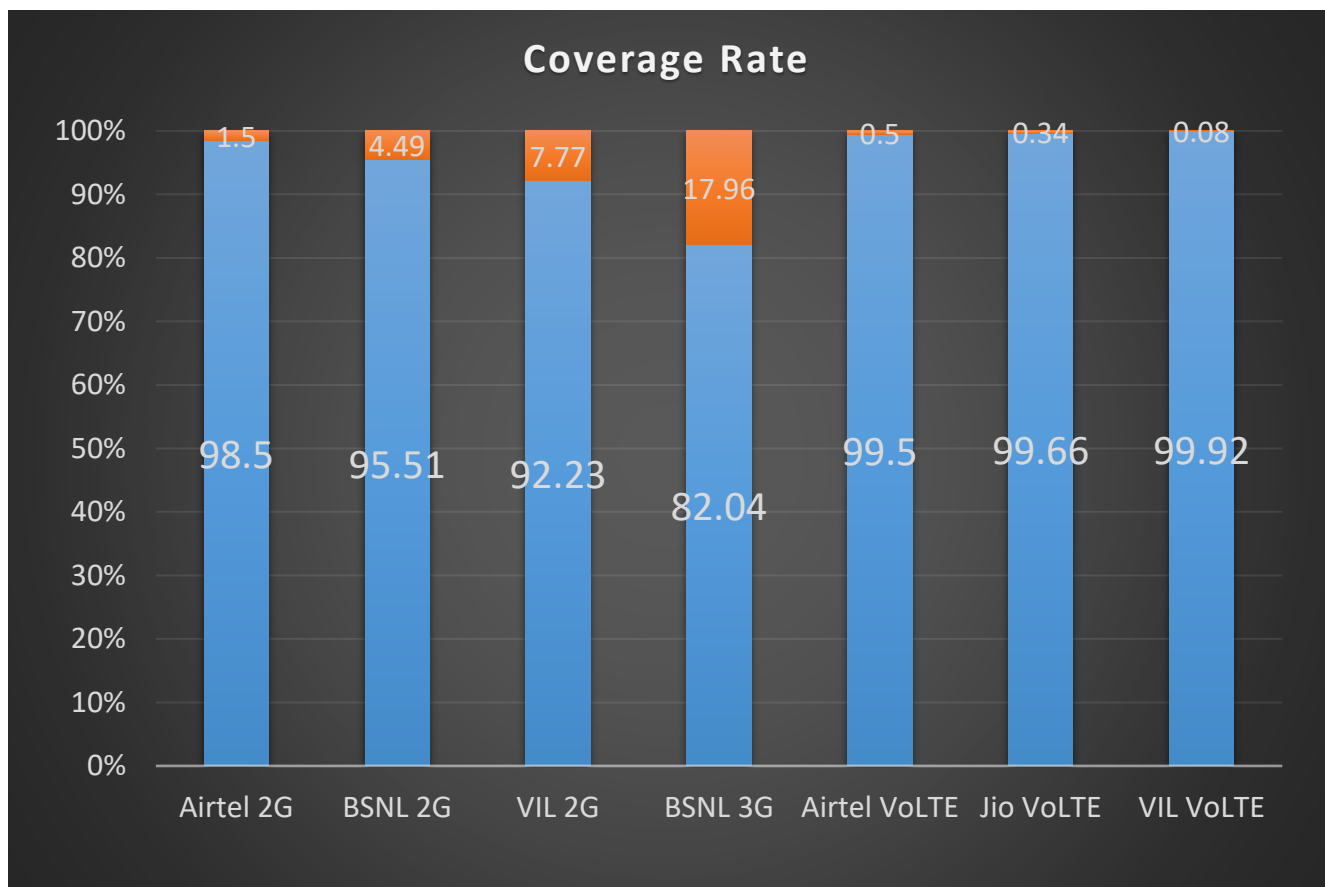
<u>Sun City</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	6.1	16.4	47.97	17
Upload Throughput (mbps)	1.26	6.8	10.61	20.5
Video Streaming Delay (Secs.)	8.5	0.496	0.34	0.424
Web Browsing Delay (sec)	6.9	0.059	1.32	0.41
Latency (msec)	72	47	42	62

<u>Charkhi Dadri</u>	3G	4G		
	BSNL	Airtel	Jio	VIL
Download Throughput (mbps)	2.46	24.7	55.2	38.2
Upload Throughput (mbps)	1.15	9.5	11.43	24.8
Video Streaming Delay (Secs.)	6.5	0.397	0.30	0.159
Web Browsing Delay (sec)	9.5	0.049	1.45	0.24
Latency (msec)	134	30	42	57

## 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  $\geq$  -110dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	98.5%
BSNL 2G	95.51%
VIL 2G	92.23%
BSNL 3G	82.04%
Airtel VoLTE	99.5%
Jio VoLTE	99.66%
VIL VoLTE	99.92%



## TSP-AIRTEL

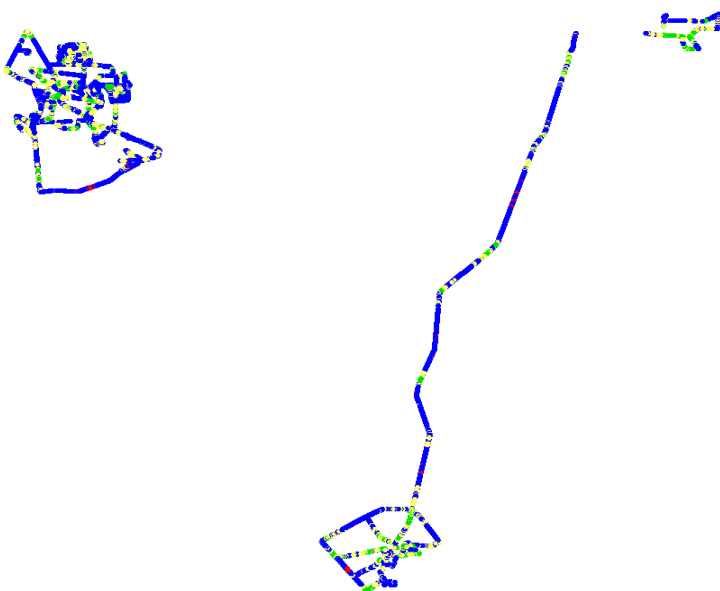
Technology	Coverage %
2G	98.5%
VoLTE	99.5%

2G



2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	2079135	78.5%	
[-75, >=-85)	528967	20.0%	
[-85, >=-95)	37968	1.4%	
[-95, >=Min)	3117	0.1%	
<b>Total</b>	<b>2649187</b>	<b>100%</b>	

VoLTE



VoLTE /5G			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	1439736	29.8%	
[-80, >=-90)	1187549	24.6%	
[-90, >=-110)	2181465	45.1%	
[-110, >=Min)	24566	0.5%	
<b>Total</b>	<b>4833316</b>	<b>100%</b>	

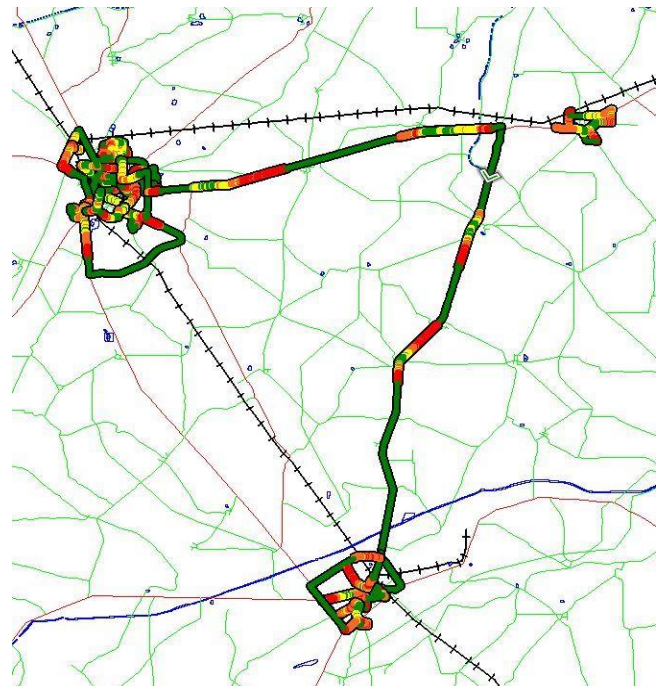
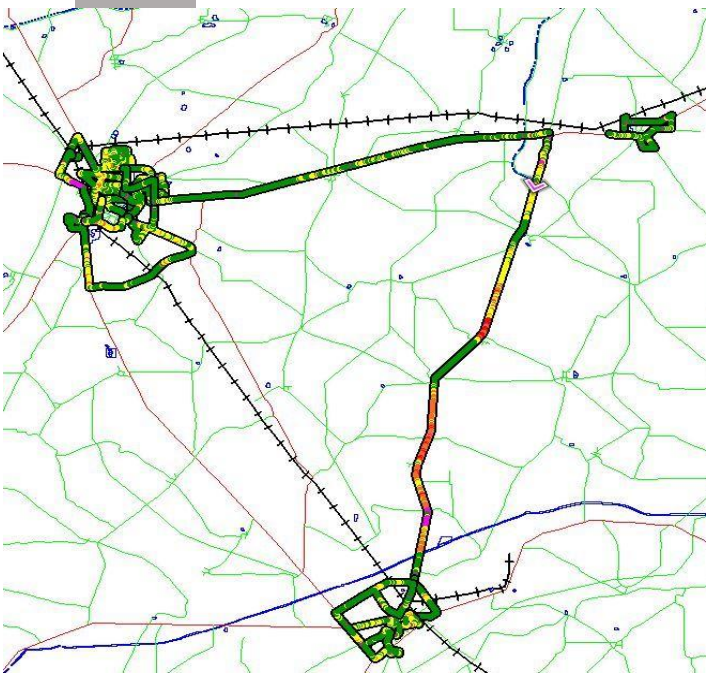


## TSP- BSNL

Technology	Coverage %
2G	95.51%
3G	82.04%

2G

3G

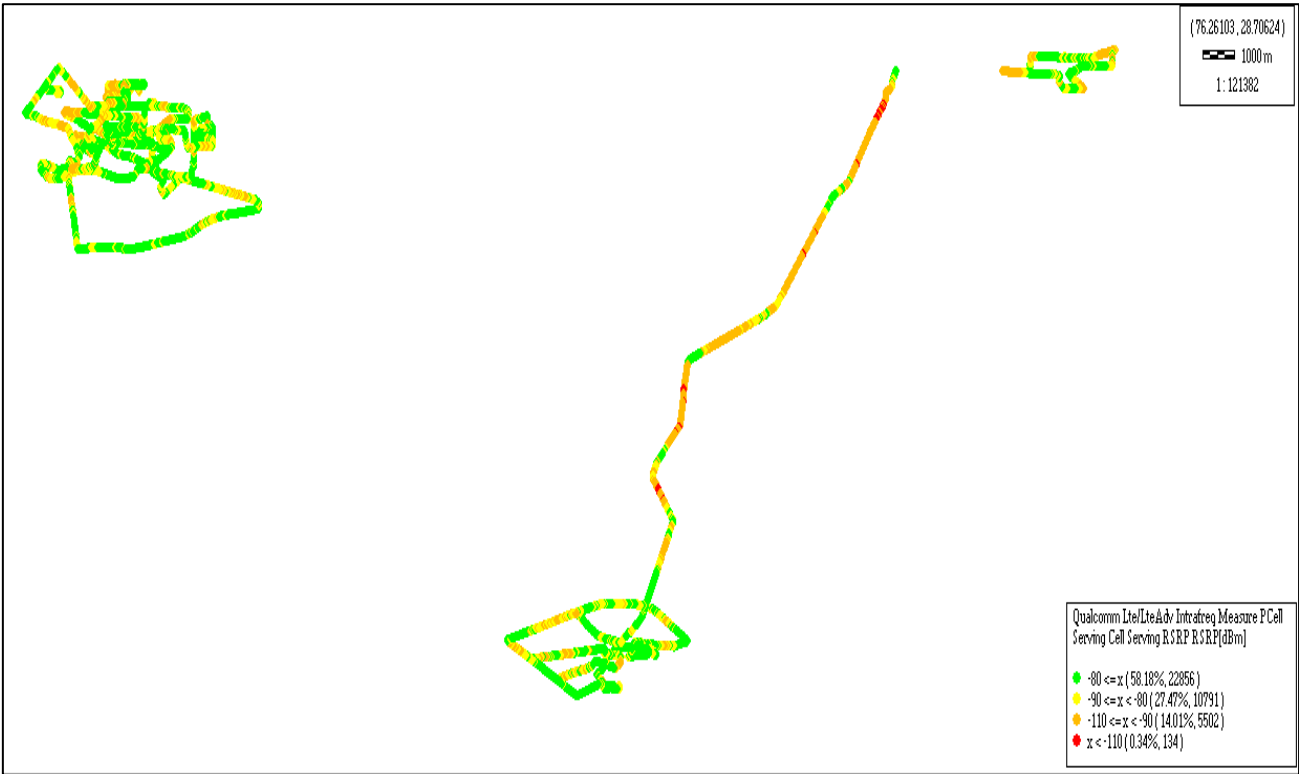


2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	26758	68.58/%	
[-75, >=-85)	10508	26.93%	
[-85, >=-95)	1569	4.02%	
[-95, >=Min)	182	0.47%	
<b>Total</b>	<b>39017</b>	<b>100%</b>	

3G			
Overall RSCP	# Samples	% PDF	Legends
[Max, >=-70]	3959	17.24	
[-70, >=-80)	5023	21.88	
[-80, >=-90)	9854	42.92	
[-90, >=Min)	4124	17.96	
<b>Total</b>	<b>6542</b>	<b>100%</b>	

JIO

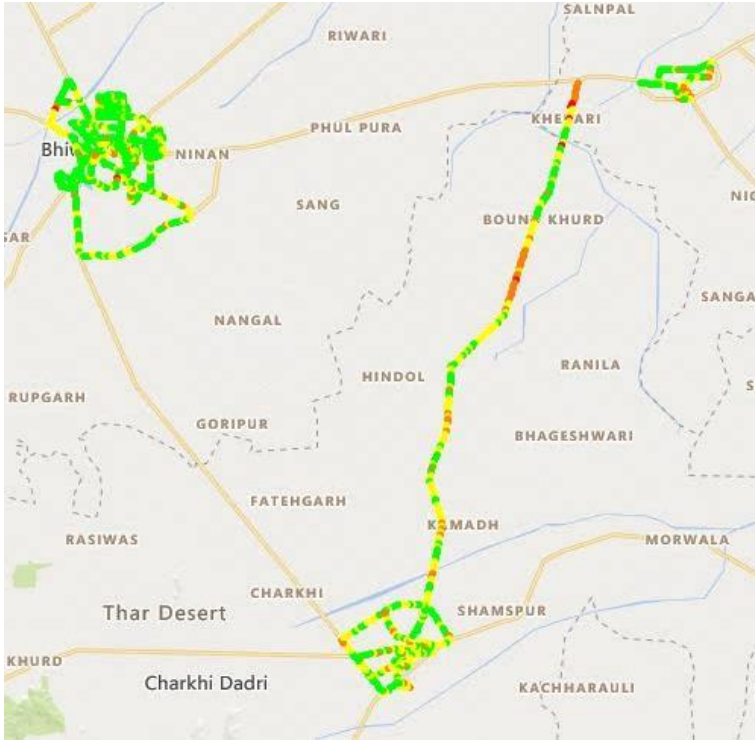
Technology	Coverage %
VoLTE	99.66%



VoLTE /5G			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	22856	58.18%	
[-80, >=-90)	10791	27.47%	
[-90, >=-110)	5502	14.01%	
[-110, >=Min)	134	.34%	
<b>Total</b>	<b>39283</b>	<b>100%</b>	

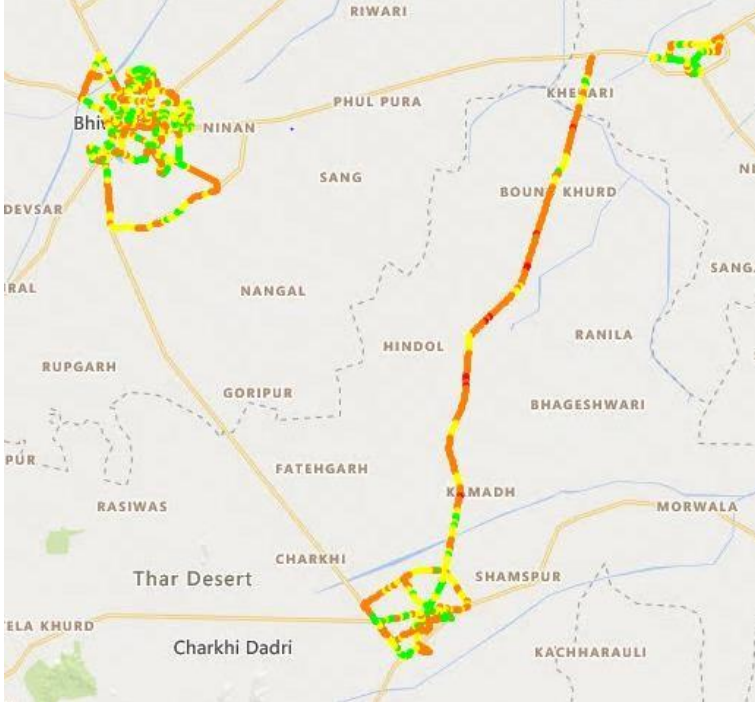
VIL

	Technology	Coverage Rate %
2G	2G	92.23%
	VoLTE	99.92%



2G			
Overall RxLevel	# Samples	% PDF	Legends
[Max, >=-75]	1743467	59.18%	Green
[-75, >=-85)	973825	33.05%	Yellow
[-85, >=-95)	205975	6.99%	Orange
[-95, >=Min)	22842	0.78%	Red
<b>Total</b>	<b>2946109</b>	<b>100%</b>	

VoLTE

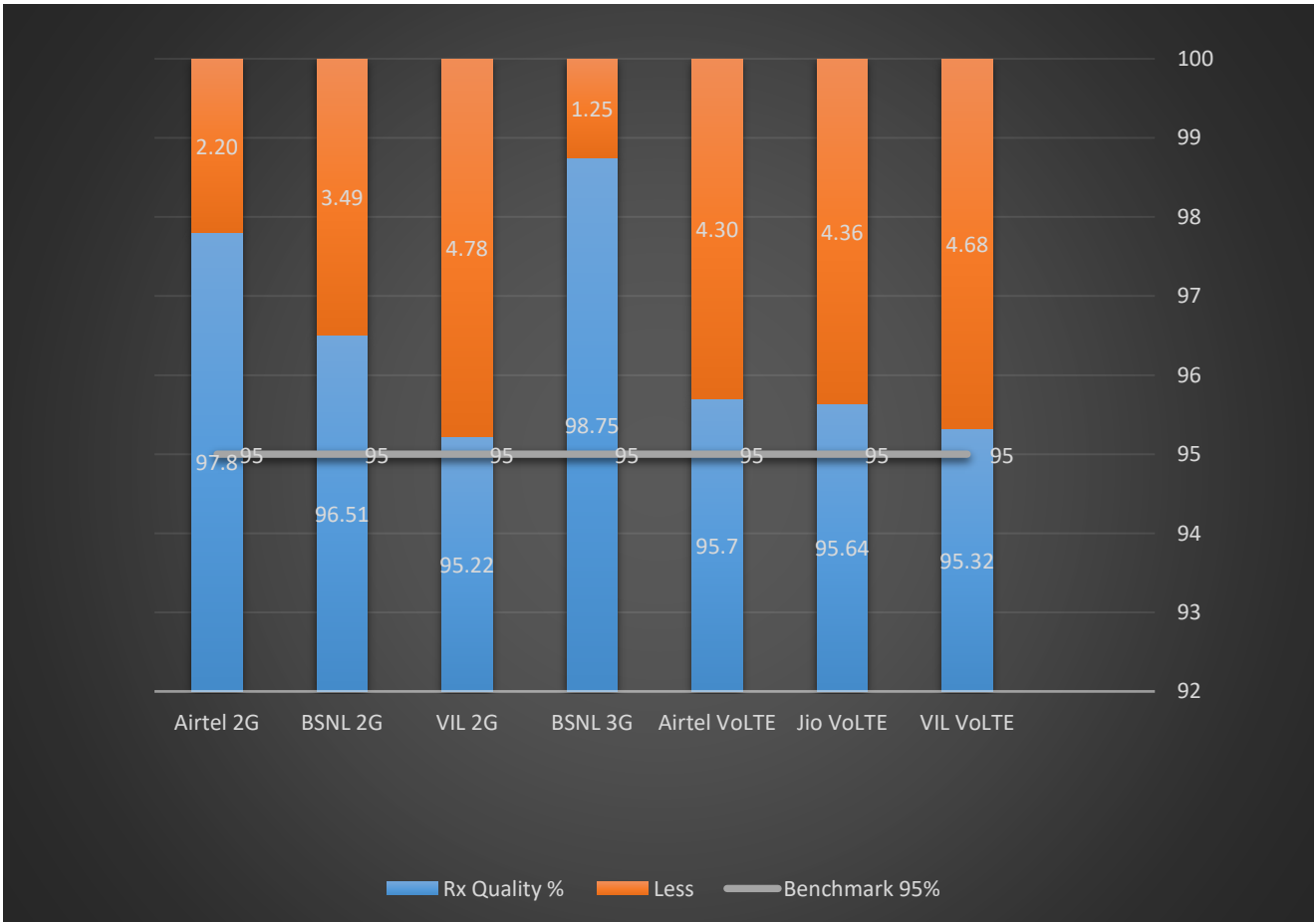


VoLTE /5G			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	1419622	15.65%	Green
[-80, >=-90)	5905384	65.10%	Yellow
[-90, >=-110)	1739082	19.17%	Orange
[-110, >=Min)	6896	0.08%	Red
<b>Total</b>	<b>9070784</b>	<b>100%</b>	

## 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	<b>97.8%</b>
BSNL 2G	<b>96.51%</b>
VIL 2G	<b>95.22%</b>
BSNL 3G	<b>98.75%</b>
Airtel VoLTE	<b>95.7%</b>
Jio VoLTE	<b>95.64%</b>
VIL VoLTE	<b>95.32%</b>



## II. Quality Details

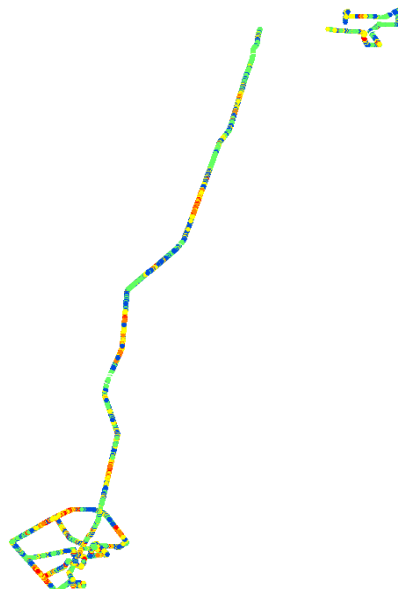
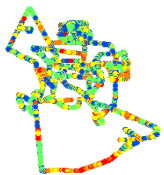
### Airtel

	Technology	Rx Quality %
2G	2G	97.8%
	VoLTE	95.7%



Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	2469720	93.2%	
(2, <=3)	50442	1.9%	
(3, <=4)	44272	1.7%	
(4, <=5)	25410	1.0%	
(5, <=Max)	59343	2.2%	
<b>Total</b>	<b>2649187</b>	<b>100%</b>	

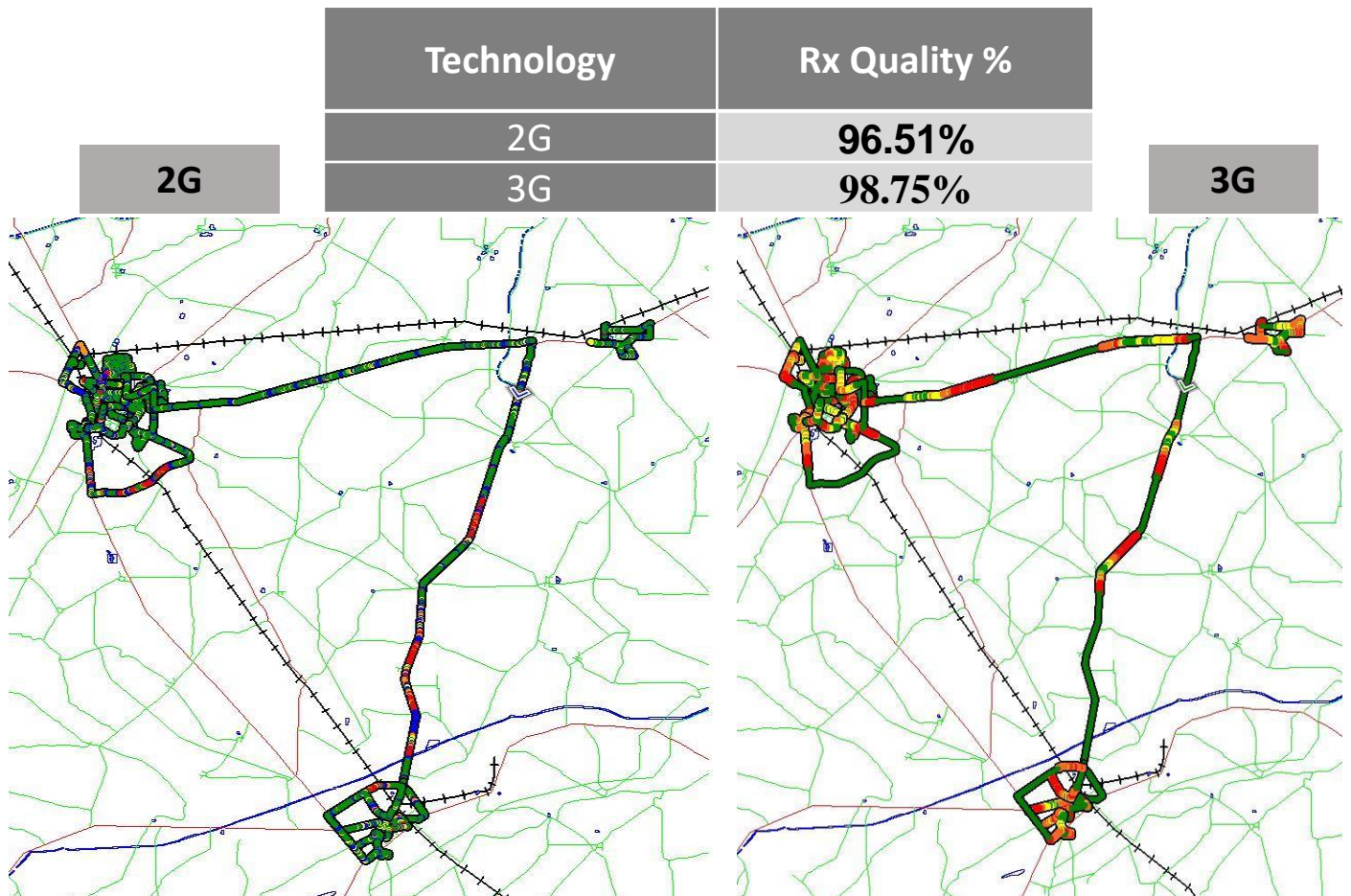
### VoLTE



Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	208453	4.3%	
(0, <=5)	1433190	29.7%	
(5, <=10)	1173625	24.3%	
(10, <=15)	696569	14.5%	
(15, <=Max)	1308553	27.1%	
<b>Total</b>	<b>4820390</b>	<b>100%</b>	

## II. Quality Details

### BSNL



Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	27404	79.92%	
(2, <=3)	2696	7.86%	
(3, <=4)	1794	5.23%	
(4, <=5)	1201	3.51%	
(5, <=Max)	1193	3.48%	
<b>Total</b>	<b>34288</b>	<b>100%</b>	

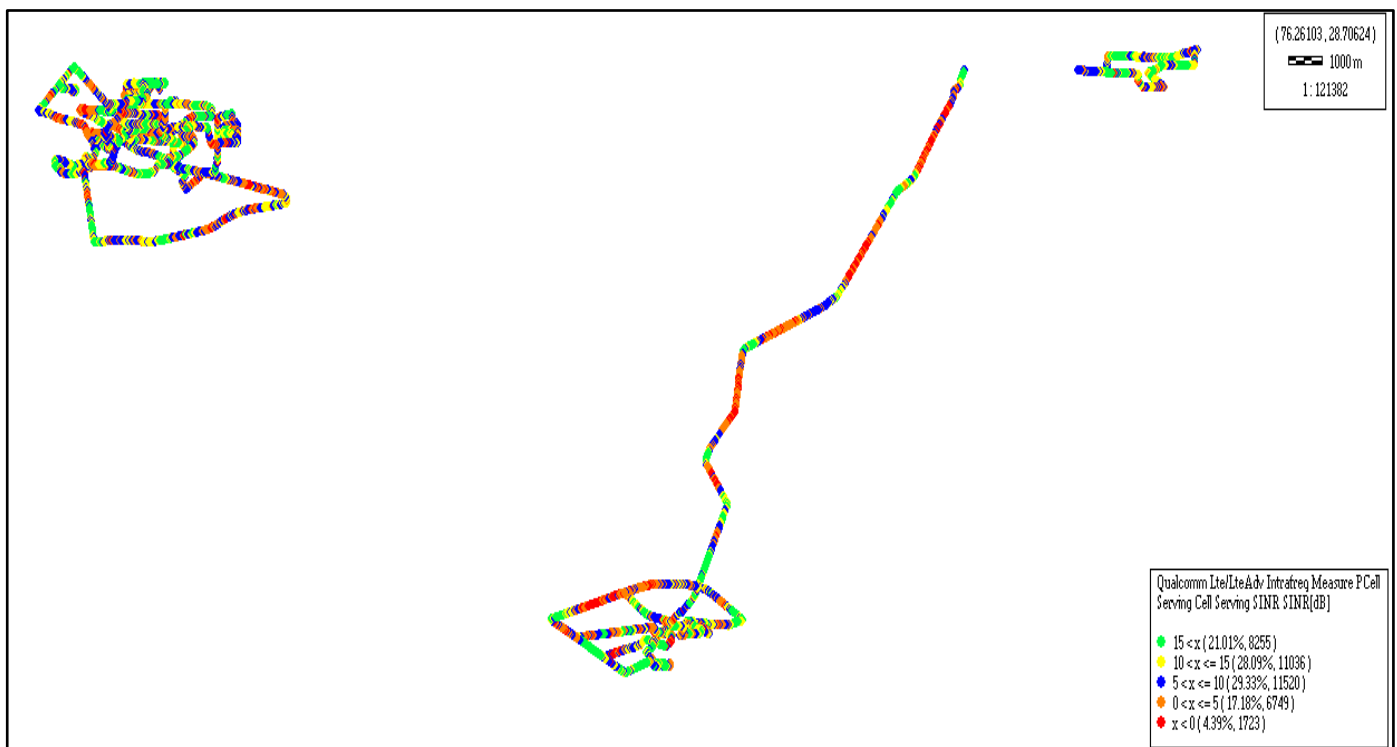
Overall Ec/No	# Samples	% PDF	Legends
(Max, <=-6)	6575	28.64%	
(-6, <=-9)	7709	33.58%	
(-9, <=-11)	5606	24.42%	
(-11, <=-14)	2554	11.12%	
(-14, <= Min)	516	2.25%	
<b>Total</b>	<b>22960</b>	<b>100%</b>	

# 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>95.64%</b>



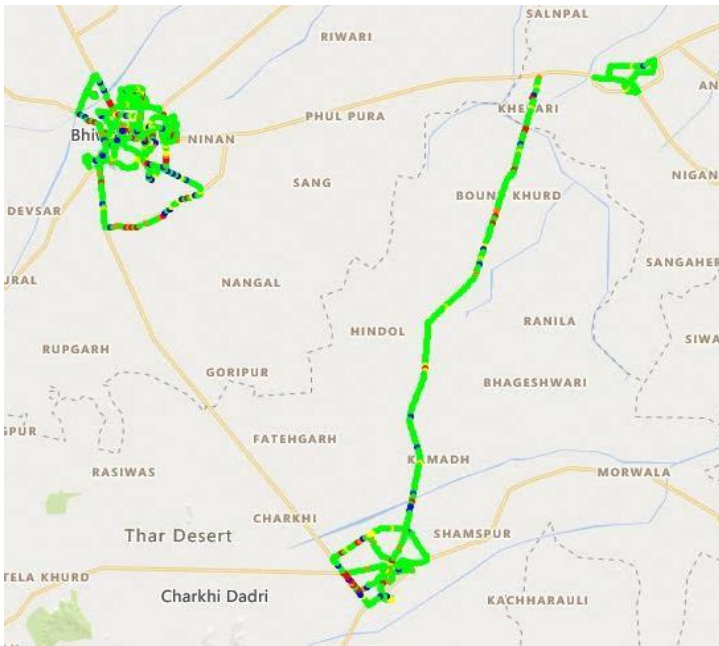
Overall SINR	# Samples	% PDF	Legends
(Min, ≤ 0)	1723	4.39%	
(0, ≤ 5)	6749	17.18%	
(5, ≤ 10)	11520	29.33%	
(10, ≤ 15)	11036	28.09%	
(15, ≤ Max)	8255	21.01%	
<b>Total</b>	<b>39283</b>	<b>100%</b>	

## II. Quality Details

### VIL

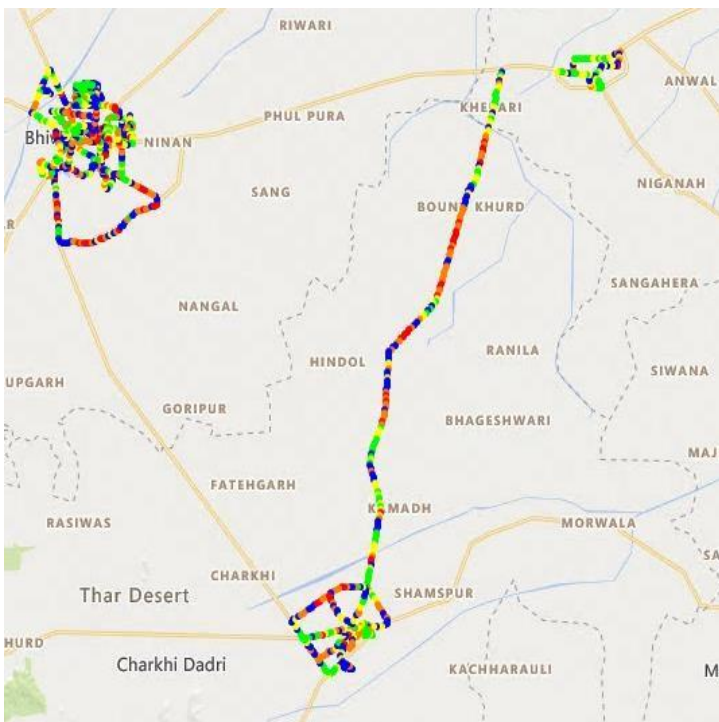
Technology	Rx Quality %
2G	95.22%
4G	95.32%

#### 2G



Overall Rx Quality	# Samples	% PDF	Legend s
(Min, <=2)	2420120	85.98%	Green
(2, <=3)	59752	2.12%	Yellow
(3, <=4)	93937	3.33%	Blue
(4, <=5)	106642	3.79%	Orange
(5, <=Max)	134455	4.78%	Red
<b>Total</b>	<b>2814906</b>	<b>100%</b>	

#### VoLTE



Overall SINR	# Samples	% PDF	Legend s
(Min, <=0)	424078	4.68%	Red
(0, <=5)	1000470	11.00%	Orange
(5, <=10)	1345637	14.84%	Blue
(10, <=15)	1071465	11.81%	Yellow
(15, <=Max)	5227315	57.67%	Green
<b>Total</b>	<b>9068965</b>	<b>100%</b>	



### III. Technology Details

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	70.10%
Airtel VoLTE	100.00%
Jio VoLTE	100.00%
VIL VoLTE	100.00%

