INDEPENDENT DRIVE TEST REPORT

For

Kohima

March 2018

EAST ZONE

Key Performance Indicators: All TSPs have failed to met the Drop Call Rate (DCR) benchmark of 2% except Airtel 2G & Jio VoLTE. All TSPs have met the Call Setup Success Rate (CSSR) of 95% except BSNL 2G, Airtel 3G & BSNL 3G .

The Independent Drive Test has been carried out by M/s PhiMetrics Technologies Pvt. Ltd. on behalf of TRAI in Kohima City & adjoining areas from 9:00 AM to 9:00 PM; 21st March to 23rd March 2018. The drive test covered an drive route of 200 KMs & 5 hotspots. Approximately 420 calls were made for each of the 9 networks: four 2G networks, four 3G networks and one LTE network covering 5 unique TSPs

Overview | Voice Summary | Data Summary

Overview

Overview:

Telecom Regulatory Authority of India has been entrusted with the task of laying down the standards of quality of service to be provided by the service providers and ensuring its enforcement; and also TRAI is 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

TRAI is regularly monitoring the performance of Telecom Service Providers (TSP) against the benchmarks for the various Quality of Service (QoS) parameters laid down by the Authority. TSPs submit Performance Monitoring Reports to TRAI every quarter. TRAI also undertakes audit and assessment of Quality of Service through independent agencies to verify the Quality of Service claimed. The Audit agencies conduct sample 'Drive tests' across various cities in the country as part of audit and assessment of the TSPs' performance.

In view of complaints on call drops and other network quality issues, on behalf of TRAI, an Independent Drive Test (IDT) was conducted by PhiMetrics Technologies Pvt. Ltd. From **21st March to 23rd March 2018** covering various locations in Kohima City & surrounding region. The performance of **Airtel, BSNL, Idea, Vodafone and Jio** were monitored across various technologies (2G, 3G and 4G). The drive test route was defined on the basis of several factors that include - areas from where call drop complaints are commonly received; areas of heavy usage; residential areas away from arterial roads; office areas; areas where previous Drive tests showed network issues; etc.

The test results obtained from these drive tests were utilized to assess the network quality for Voice and Data services in terms of

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

Date: Download and Upload Throughputs, Web Browsing Delay, Video Streaming Delay and Latency

Drive Test Details For Kohima:

Independent Drive test was conducted from 21st March to 23rd March 2018 in Kohima city & surrounding areas from 9:00 AM to 9:00 PM. Calls were made for 90 sec duration with wait time of 10 sec between calls in all technologies.

Voice Tests: The drive test covered a drive route of approximately 200 KMs from 21st March to 22nd March 2018. Approximately 420 calls were made for each of the 9 networks: four 2G (Lock Mode) networks, four 3G (Dual mode) networks and 1 VoLTE network covering 5 unique TSPs.

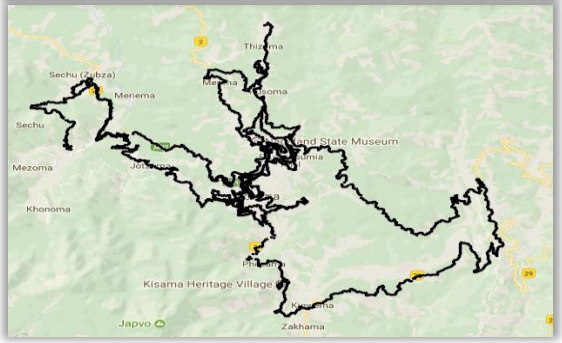
* In case of multiple call failure in similar geo location in given period of 60sec has been counted as one call failure

Data Tests: Data Tests were performed at 5 static locations on 23rd March 2018; four 2G (Lock mode) networks, four 3G (Dual mode) networks and four 4G (Free mode) networks covering 5 unique TSPs were tested.

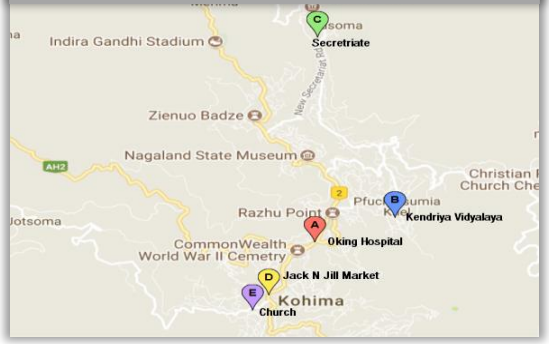
* Outlier values are discarded to calculate the Data KPI's
* For Voice and Data KPI's, 2G measurement is done with UE locked on 2G, 3G measurement is done with UE in Dual mode (2G & 3G) and 4G measurement is done with UE in Free Mode.
* 3G KPI's which are calculated from UE in Dual Mode (2G & 3G) includes samples and events of 2G.
* 4G KPI's which are calculated from the UE in Free Mode included samples and events of 2G & 3G.

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
Video Streaming	130 sec clip
Latency	32 Bytes on www.google.com

Voice Test Drive Route - Kohima



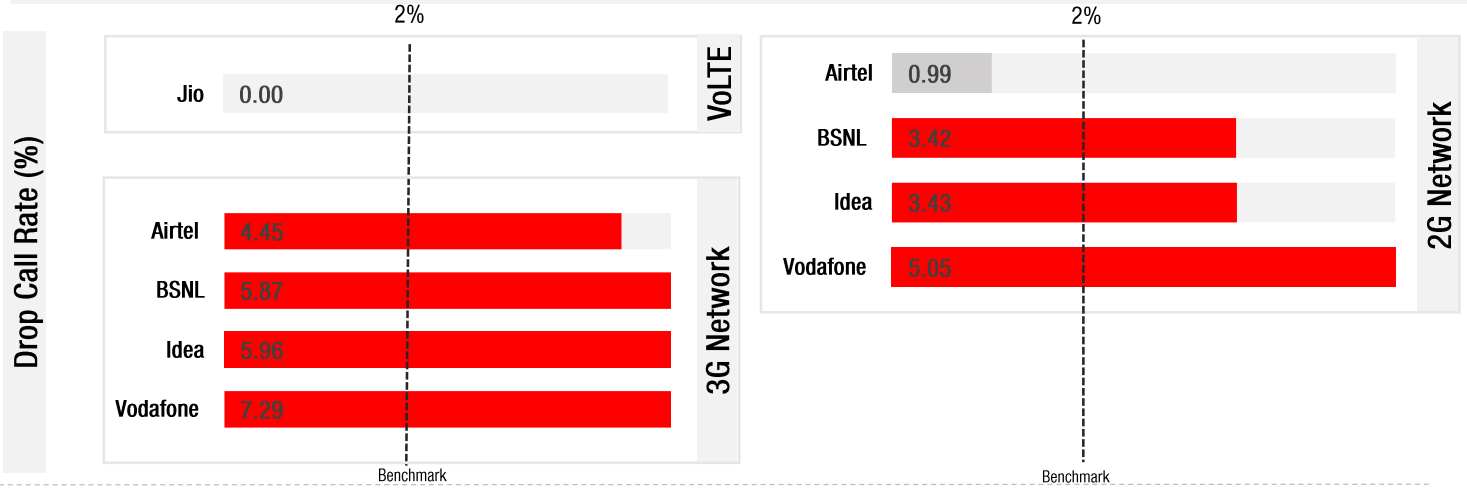
Data Service testing across 23 Static Locations

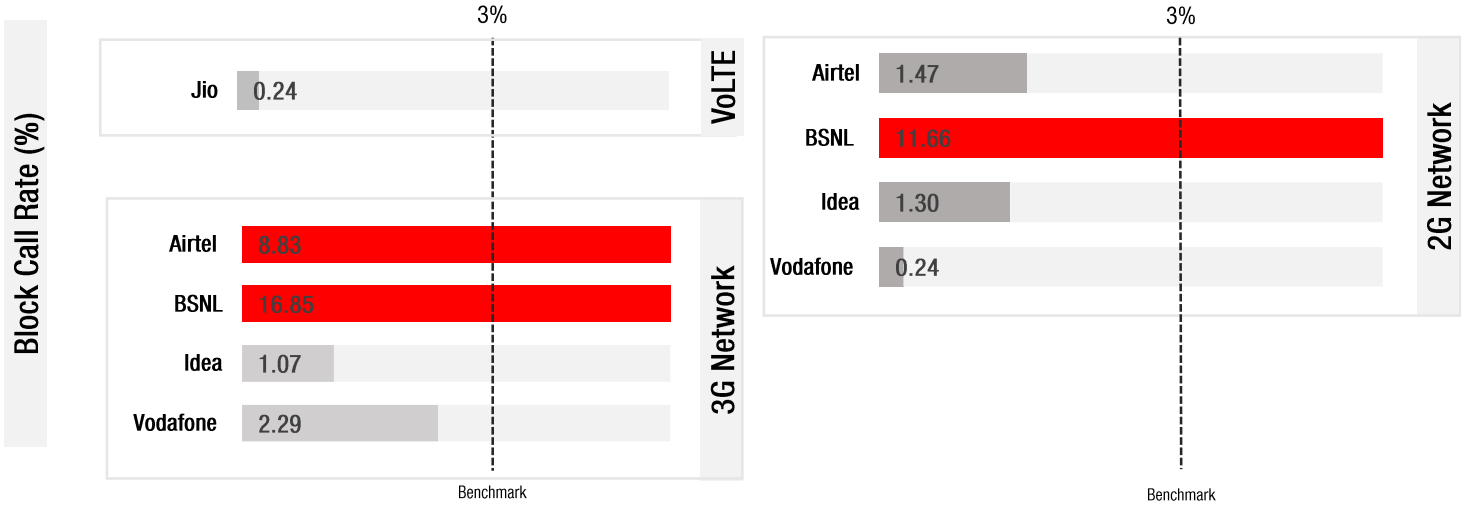


Voice Calls

Key Observations

QoS compliance of the TSPs in Kohima for Voice across technologies 2G/3G/4G-VoLTE is given below:





KPI	2G Networks			
	Airtel	BSNL	Idea	Vodafone
SDCCH Congestion%	0.00%	0.22%	0.00%	0.00%
TCH Congestion %	1.47%	11.44%	1.30%	0.24%

KPI	3G Networks			
	Airtel	BSNL	Idea	Vodafone
SDCCH Congestion%	0.00%	0.22%	0.00%	0.76%
RRC Congestion%	6.20%	2.88%	1.07%	0.00%
SDCCH & RRC Congestion%	6.20%	3.10%	1.07%	0.76%
TCH Congestion %	0.24%	7.54%	0.00%	0.00%
RAB Congestion %	2.39%	6.21%	0.00%	1.53%
TCH & RAB Congestion %	2.63%	13.75%	0.00%	1.53%

* Calls may move to 2G network, hence both technologies are covered

a) All TSPs have failed to met the 2% QOS benchmark of Drop Call Rate (DCR%) except Airtel 2G & Jio VoLTE.

b) Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's except BSNL 2G, Airtel 3G & BSNL 3G .

Not meeting Benchmark

Voice Calls

Key Observations

Coverage

a) Percentage of coverage samples for 2G ≥ -85 dBm.

TSPs	2G			
	Airtel	BSNL	Idea	Vodafone
Coverage%	80.87%	63.69%	61.87%	76.31%

b) Percentage of coverage samples for 2G ≥ -85 dBm, 3G ≥ -90 dBm & LTE ≥ -110 dBm.

TSPs	3G				VoLTE
	Airtel	BSNL	Idea	Vodafone	Jio
Coverage %	68.22%	69.73%	65.38%	79.70%	94.91%

c) Percentage of time spent on 3G network:

TSPs	3G			
	Airtel	BSNL	Idea	Vodafone
Time Spent on 3G%	71.90%	31.07%	29.84%	56.25%

d) Percentage of RLT >=48

TSPs	2G			
	Airtel	BSNL	Idea	Vodafone
%RLT >=48	16.05%	68.22%	0.00%	0.00%

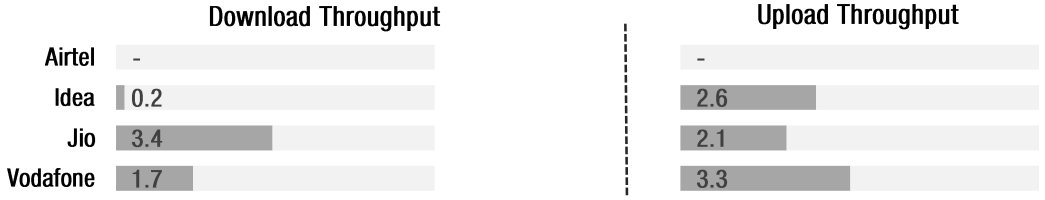
Data Services

Key Observations

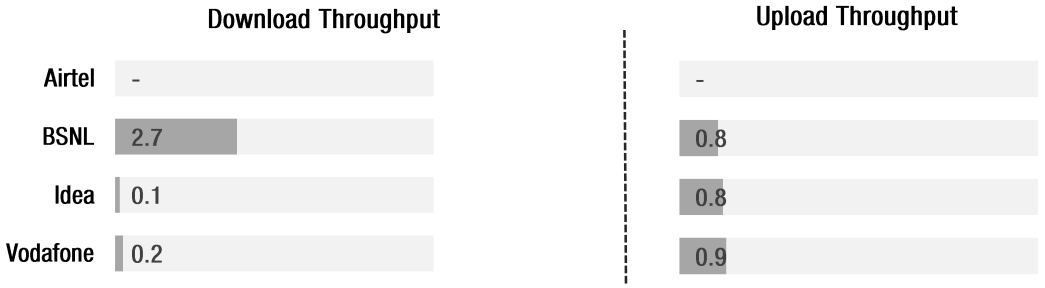
Data was tested at 5 locations viz Jack N Jill Market, Kendriya Vidyalaya, Minister's Hill Church, Oking Hospital & Secretariat. Following services were tested: Data Download/Upload, Latency (www.google.com), Video Streaming (YouTube) and Web browsing (Flipkart, Amazon, PayTm)

Data Download and Upload Performance (Mbps)

4G Network:



3G Network:



Latency (msec)

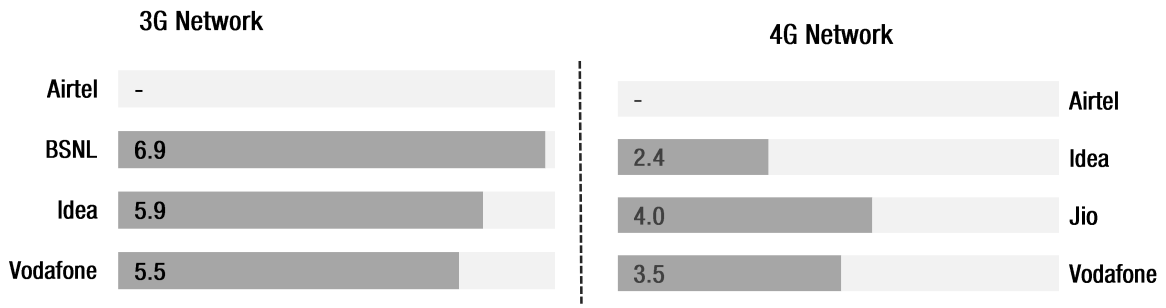
*Due to Major technical issue in Network all data test were failed for Airtel .

Data Services

Key Observations

Video Streaming Performance (130 sec YouTube video sample sizes)

Streaming (sec)

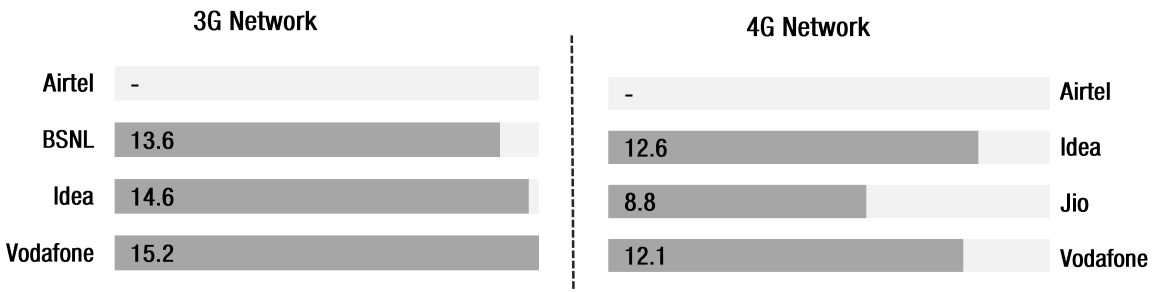


Streaming Delay further broken into 2 parameters which form the end-user perception to assess consistency on Video streaming.

- Initial Start time
- Interruption time while playing the video.

Video Streaming	3G				4G			
	Airtel	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Avg. Initial Start Time (sec)	-	6.9	4.0	5.5	-	2.4	3.4	3.1
Avg. Interruption Time (sec)	-	-	1.9	-	-	-	0.6	0.4

Web Page Download Time (sec)



Web browsing experience is the average time taken to fully load the websites tested.

*Due to Major technical issue in Network all data test were failed for Airtel .

Summary

City Level Summary

Voice Call	2G			
	Airtel	BSNL	Idea*	Vodafone
Call Attempt	409	463	384	417
Blocked Call Rate (%)	1.5%	11.7%	1.3%	0.2%
CSSR% (Accessibility)	98.5%	88.3%	98.7%	99.8%
Drop Call Rate (%)	1.0%	3.4%	3.4%	5.0%
Mobility HOSR (%)	96.3%	84.1%	98.7%	96.8%
Rx Quality (%)	93.6%	94.2%	91.9%	92.1%

Voice Call	3G				VoLTE
	Airtel	BSNL	Idea*	Vodafone	Jio
Call Attempt	419	451	373	393	409
Blocked Call Rate (%)	8.8%	16.9%	1.1%	2.3%	0.2%
CSSR% (Accessibility)	91.2%	83.1%	98.9%	97.7%	99.8%
Drop Call Rate (%)	4.5%	5.9%	6.0%	7.3%	0.0%
Mobility HOSR (%)	99.4%	95.7%	98.8%	98.8%	99.3%
Rx Quality (%)	64.4%	93.7%	87.6%	84.3%	66.6%

*Due to lack of coverage, less calls were initiated for Idea 2G & Idea 3G.

Summary

City Level Summary

Data Service	2G			
	Airtel *	BSNL	Idea	Vodafone
Download Throughput (Kbps)	-	149.1	45.3	114.3
Upload Throughput (kbps)	-	124.7	87.5	116.3
Web Browsing Delay (sec)	-	42.3	33.0	39.2
Latency (msec)	-	380	498	289

Data Services	3G				4G			
	Airtel*	BSNL	Idea	Vodafone	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	-	2.7	0.1	0.2	-	0.2	3.4	1.7
Upload Throughput (Mbps)	-	0.8	0.8	0.9	-	2.6	2.1	3.3
Web Browsing Delay (sec)	-	13.6	14.6	15.2	-	12.6	8.8	12.1
Video Streaming Delay (sec)	-	6.9	5.9	5.5	-	2.4	4.0	3.5
Latency (msec)	-	295	218	203	-	179	124	170

*Due to Major technical issue in Network all data test were failed for Airtel .

Summary

City Level Summary(contd.)

Jack N Jill Market	2G			
	Airtel *	BSNL	Idea	Vodafone
Download Throughput (Kbps)	-	131.4	68.7	158.6
Upload Throughput (kbps)	-	112.4	127.7	139.5
Web Browsing Delay (sec)	-	41.4	37.2	39.6
Latency (msec)	-	318	405	253

Jack N Jill Market	3G				4G			
	Airtel *	BSNL	Idea	Vodafone	Airtel *	Idea	Jio	Vodafone
Download Throughput (Mbps)	-	0.9	0.1	0.2	-	0.3	2.4	2.0
Upload Throughput (Mbps)	-	0.1	0.6	1.3	-	1.6	0.2	0.3
Web Browsing Delay (sec)	-	21.5	14.7	12.8	-	13.7	11.6	10.0
Video Streaming Delay (sec)	-	10.4	8.1	5.8	-	2.1	12.4	2.4
Latency (msec)	-	500	156	157	-	142	148	136

Kendriya Vidyalaya	2G			
	Airtel *	BSNL	Idea	Vodafone
Download Throughput (Kbps)	-	137.4	37.7	180.8
Upload Throughput (kbps)	-	132.9	67.1	155.1
Web Browsing Delay (sec)	-	41.1	24.2	40.6
Latency (msec)	-	370	570	238

Kendriya Vidyalaya	3G				4G			
	Airtel *	BSNL	Idea	Vodafone	Airtel *	Idea	Jio	Vodafone
Download Throughput (Mbps)	-	4.7	0.1	0.2	-	0.2	2.8	0.8
Upload Throughput (Mbps)	-	1.4	0.9	0.8	-	2.2	2.9	6.8
Web Browsing Delay (sec)	-	9.9	16.3	11.3	-	10.3	8.8	11.6
Video Streaming Delay (sec)	-	2.6	4.2	2.8	-	3.5	2.0	6.9
Latency (msec)	-	328	152	177	-	140	106	144

*Due to Major technical issue in Network all data test were failed for Airtel .

Summary

City Level Summary(contd.)

Minister's Hill Church	2G			
	Airtel *	BSNL	Idea	Vodafone
Download Throughput (Kbps)	-	181.7	13.5	10.4
Upload Throughput (kbps)	-	141.7	55.0	25.0
Web Browsing Delay (sec)	-	36.0	34.0	31.9
Latency (msec)	-	434	489	452

Minister's Hill Church	3G				4G			
	Airtel *	BSNL	Idea	Vodafone	Airtel *	Idea	Jio	Vodafone
Download Throughput (Mbps)	-	-	0.0	0.1	-	0.2	2.1	0.1
Upload Throughput (Mbps)	-	0.7	0.3	0.3	-	2.6	0.2	0.2
Web Browsing Delay (sec)	-	14.5	13.4	18.5	-	13.9	10.9	14.3
Video Streaming Delay (sec)	-	13.8	12.9	8.7	-	1.9	6.0	-
Latency (msec)	-	250	245	268	-	173	118	262

Oking Hospital	2G			
	Airtel *	BSNL	Idea	Vodafone
Download Throughput (Kbps)	-	151.4	18.6	48.0
Upload Throughput (kbps)	-	118.9	23.3	91.6
Web Browsing Delay (sec)	-	44.4	25.9	41.5
Latency (msec)	-	289	615	332

Oking Hospital	3G				4G			
	Airtel *	BSNL	Idea	Vodafone	Airtel *	Idea	Jio	Vodafone
Download Throughput (Mbps)	-	2.5	0.1	0.2	-	0.1	5.0	0.3
Upload Throughput (Mbps)	-	0.5	1.0	1.1	-	0.5	5.0	5.4
Web Browsing Delay (sec)	-	12.6	12.9	16.6	-	13.7	6.1	14.9
Video Streaming Delay (sec)	-	6.5	3.8	2.8	-	-	1.4	-
Latency (msec)	-	323	275	188	-	285	125	199

*Due to Major technical issue in Network all data test were failed for Airtel .

Summary

City Level Summary(contd.)

Secretariat	2G			
	Airtel *	BSNL	Idea	Vodafone
Download Throughput (Kbps)	-	132.3	76.7	138.9
Upload Throughput (kbps)	-	102.6	164.2	139.9
Web Browsing Delay (sec)	-	52.2	39.0	40.6
Latency (msec)	-	508	430	248

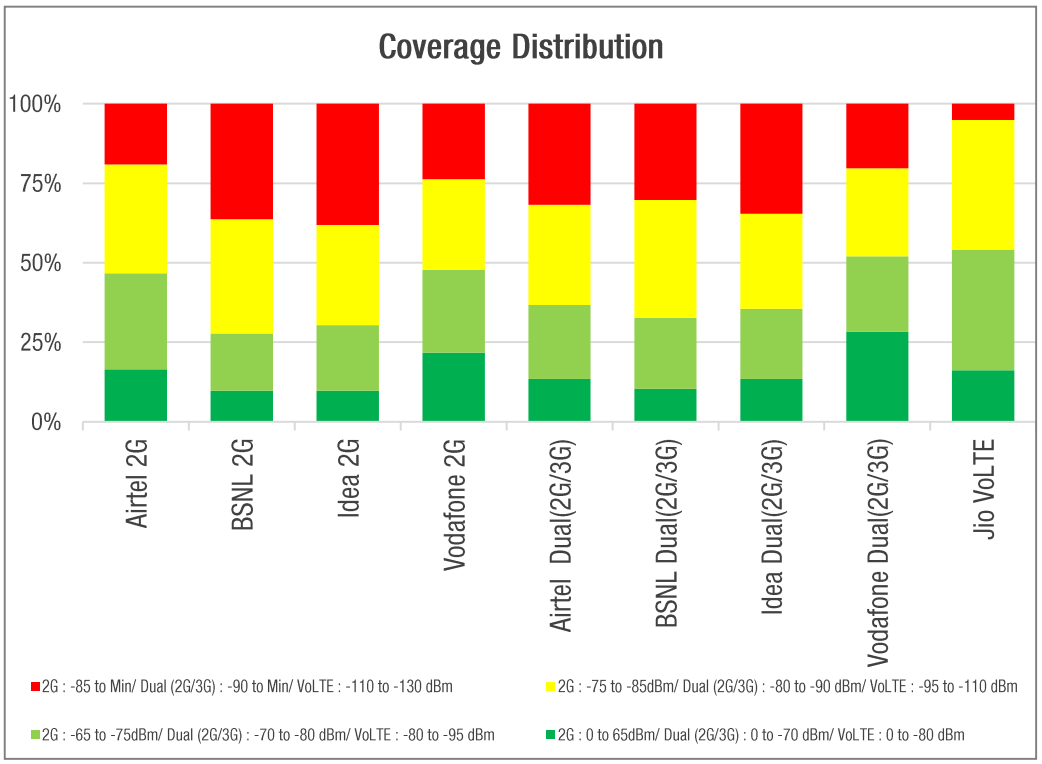
Secretariat	3G				4G			
	Airtel *	BSNL	Idea	Vodafone	Airtel *	Idea	Jio	Vodafone
Download Throughput (Mbps)	-	2.0	0.2	0.3	-	0.2	4.9	5.3
Upload Throughput (Mbps)	-	1.1	1.5	1.1	-	6.4	2.1	3.9
Web Browsing Delay (sec)	-	10.8	15.6	16.6	-	11.4	7.2	9.8
Video Streaming Delay (sec)	-	3.2	2.3	-	-	1.3	1.4	1.3
Latency (msec)	-	118	286	240	-	146	126	128

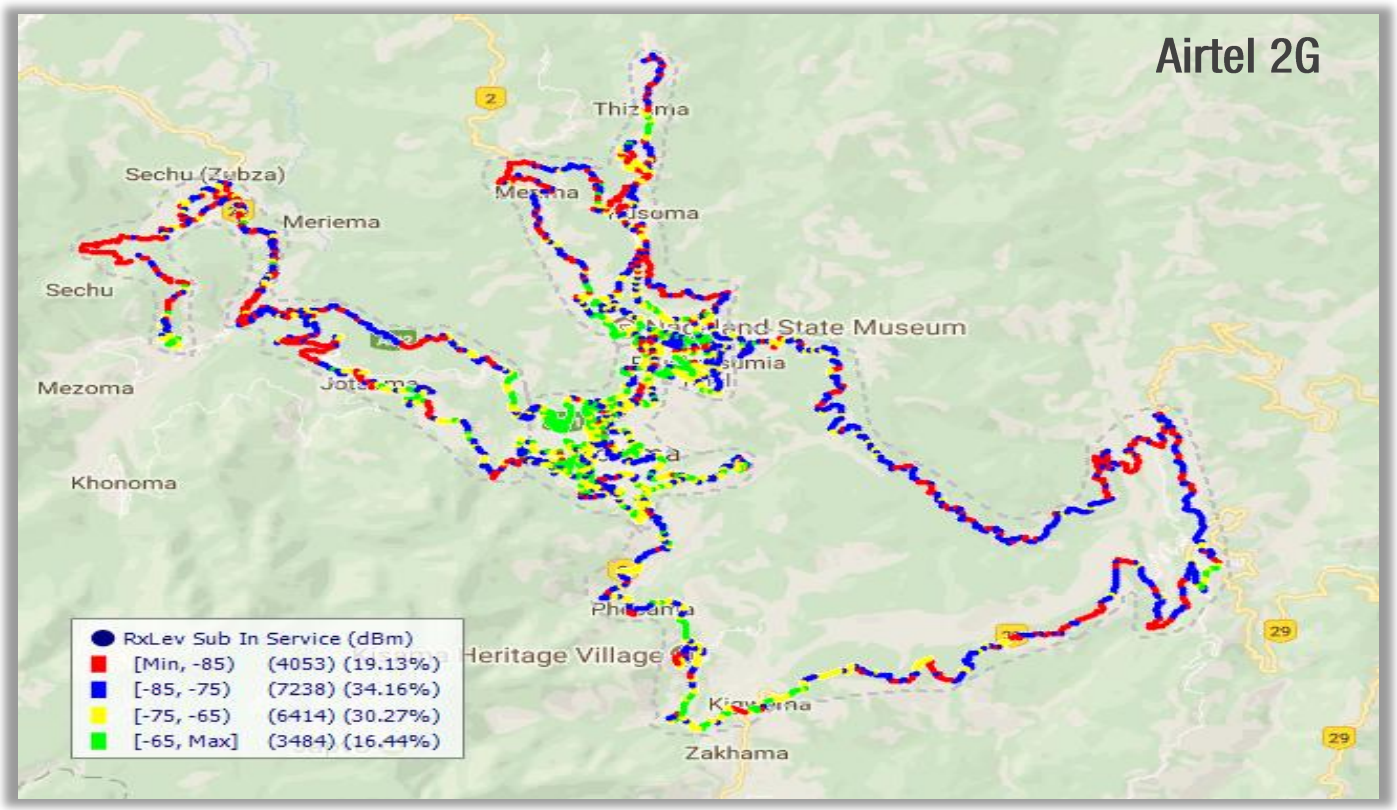
*Due to Major technical issue in Network all data test were failed for Airtel .

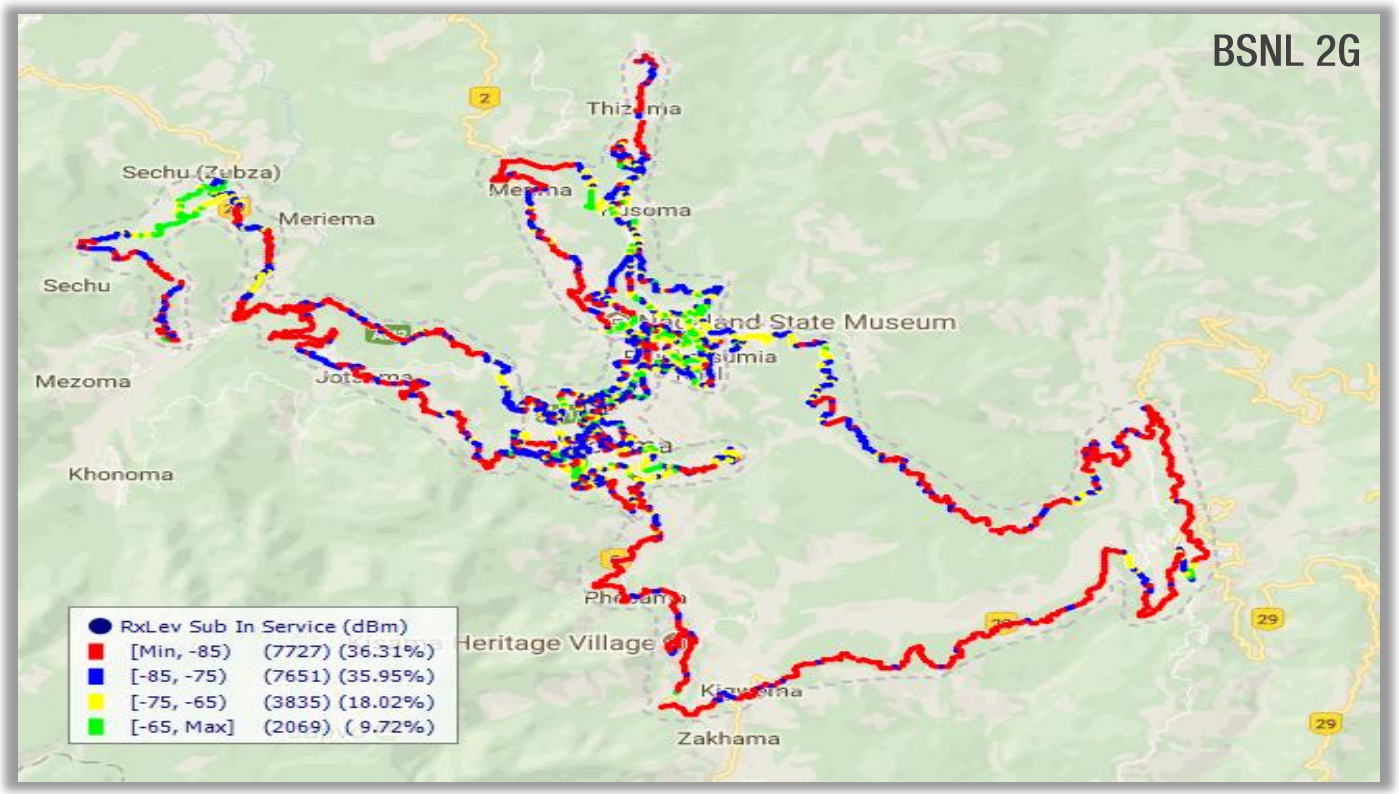
I. Coverage Details

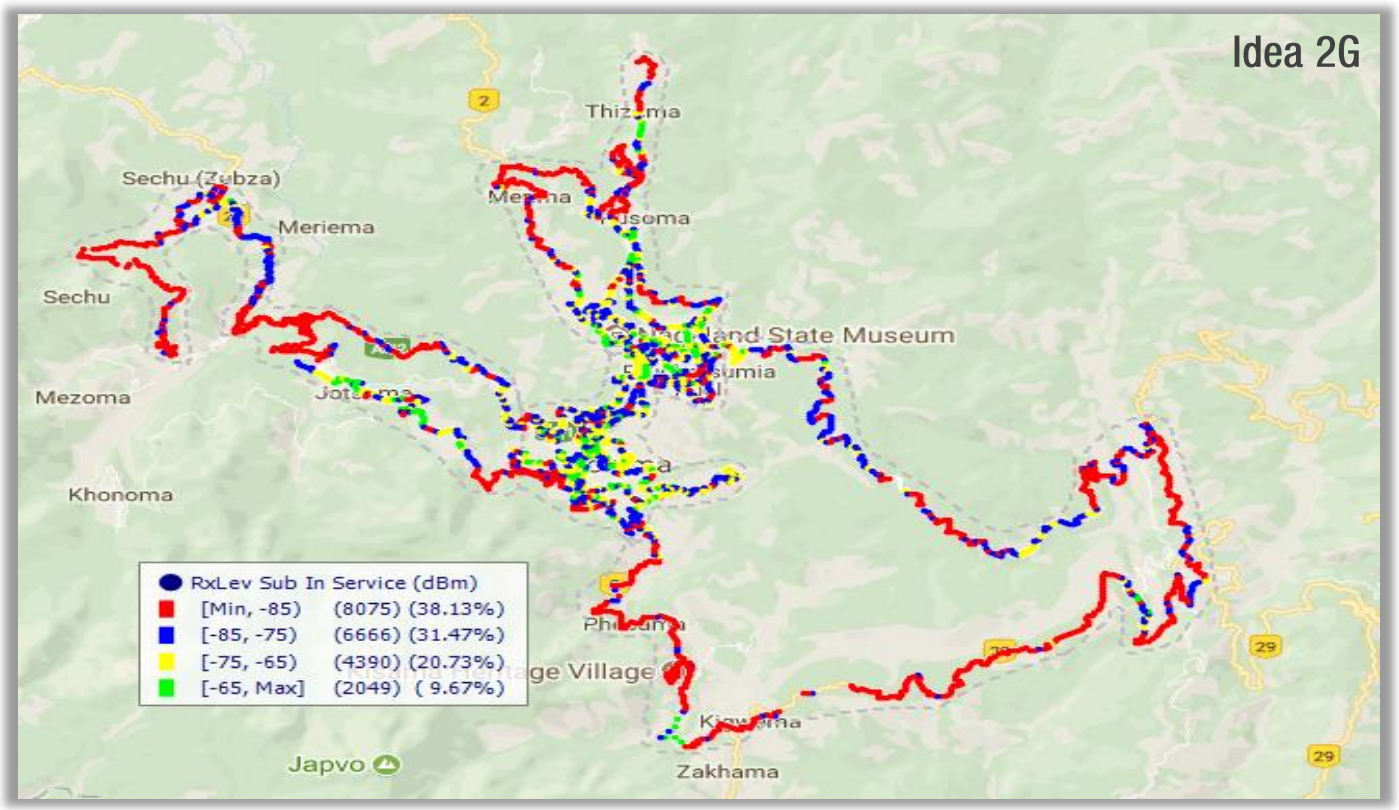
RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call/data session. The Coverage rate of an TSP is calculated on the basis of % of samples in which the Rx level ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110dBm. The details are as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

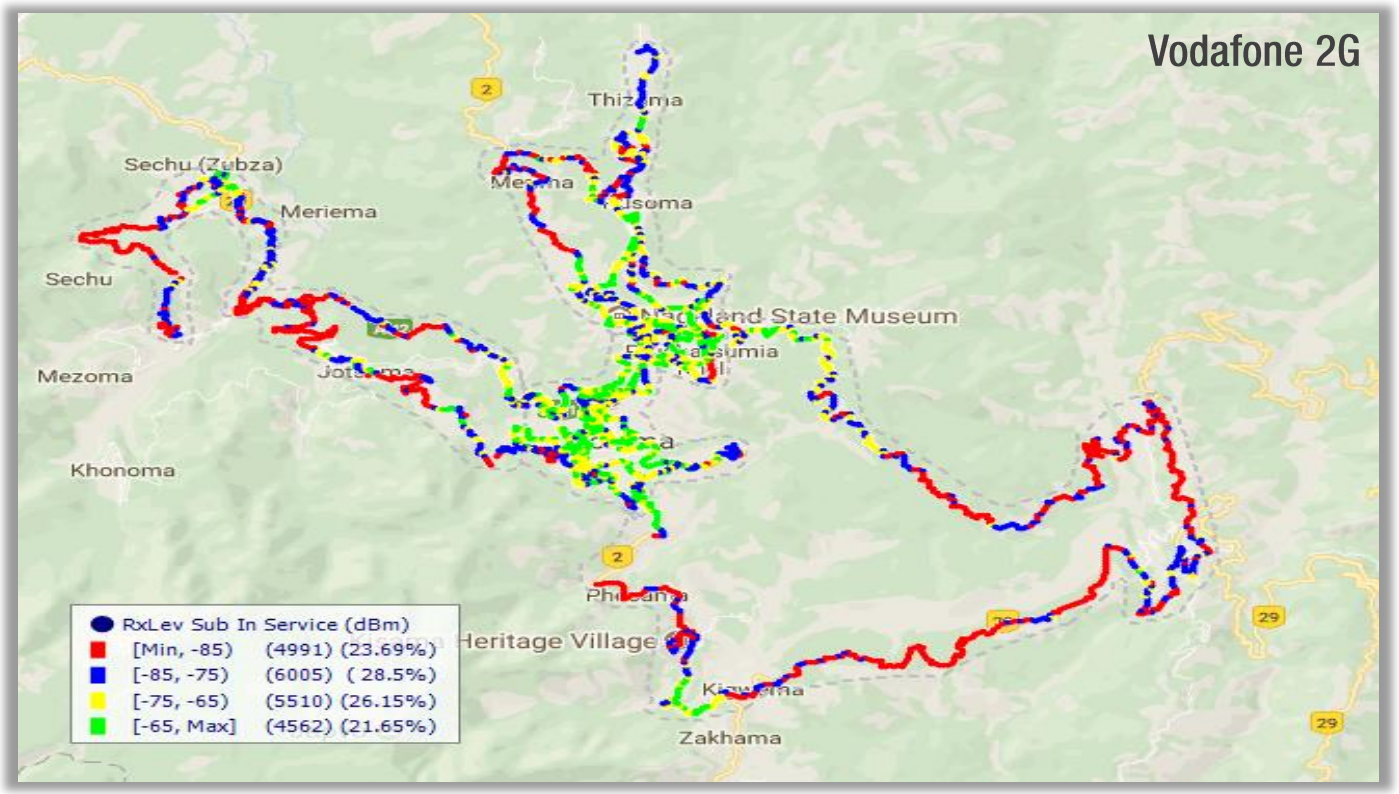
TSP	Coverage Rate
Airtel 2G	80.87%
BSNL 2G	63.69%
Idea 2G	61.87%
Vodafone 2G	76.31%
Airtel Dual(2G/3G)	68.22%
BSNL Dual(2G/3G)	69.73%
Idea Dual(2G/3G)	65.38%
Vodafone Dual(2G/3G)	79.70%
Jio VoLTE	94.91%

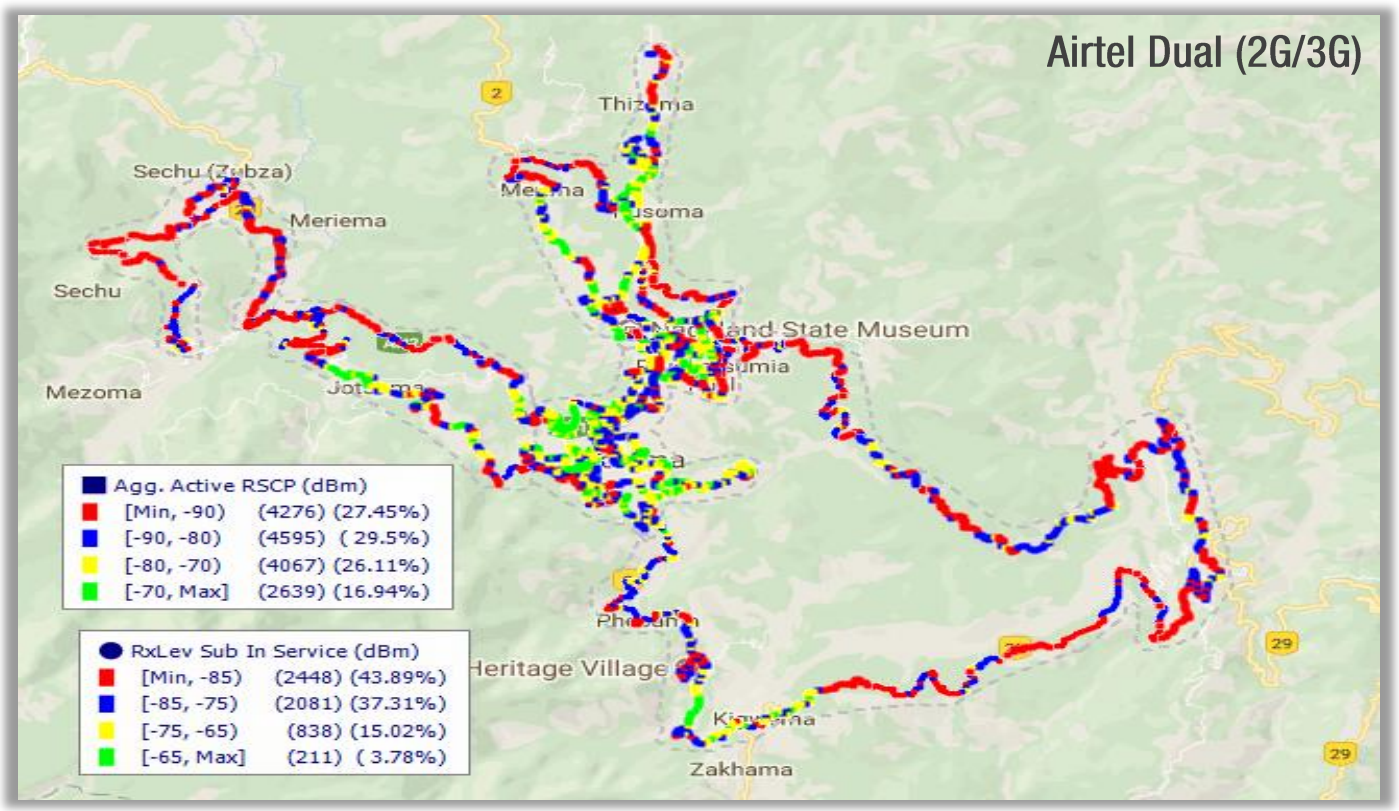


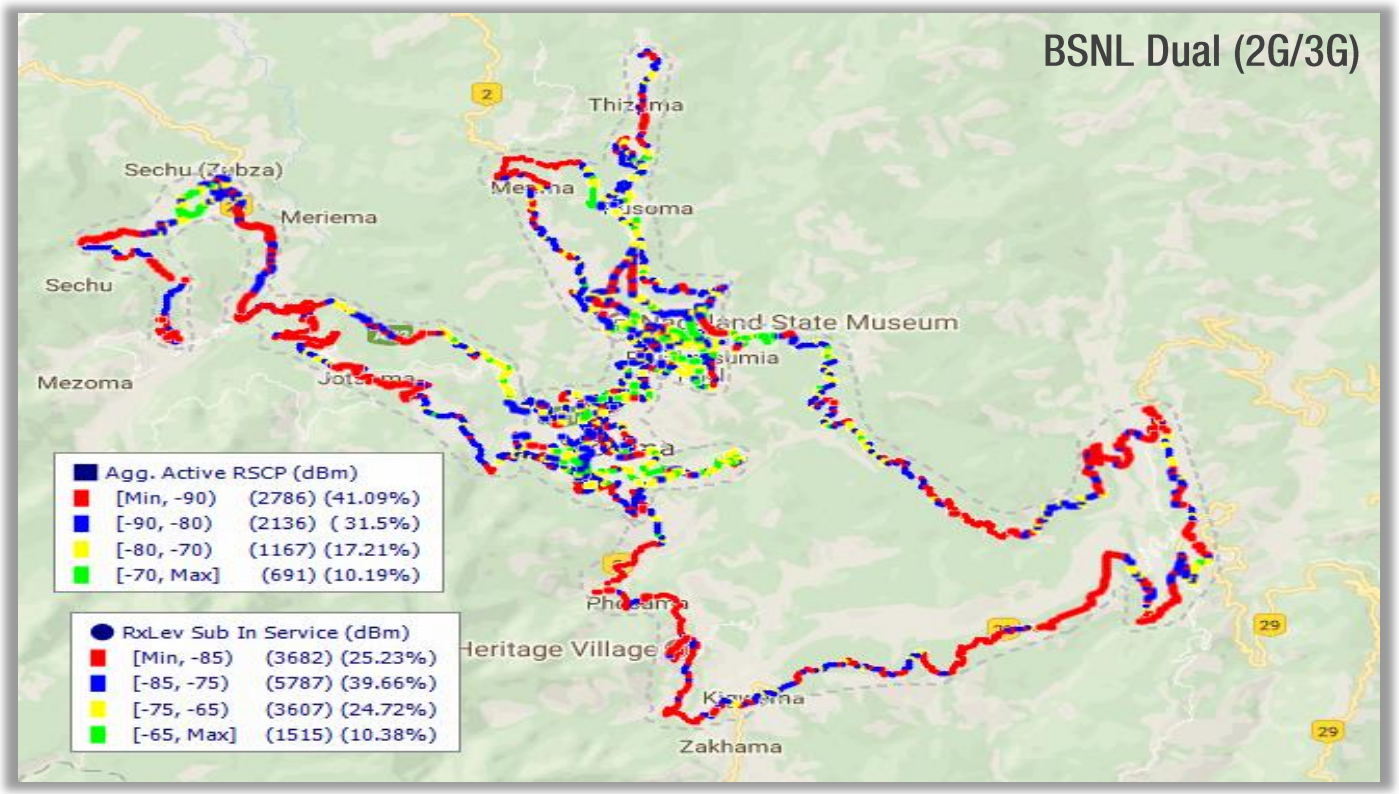


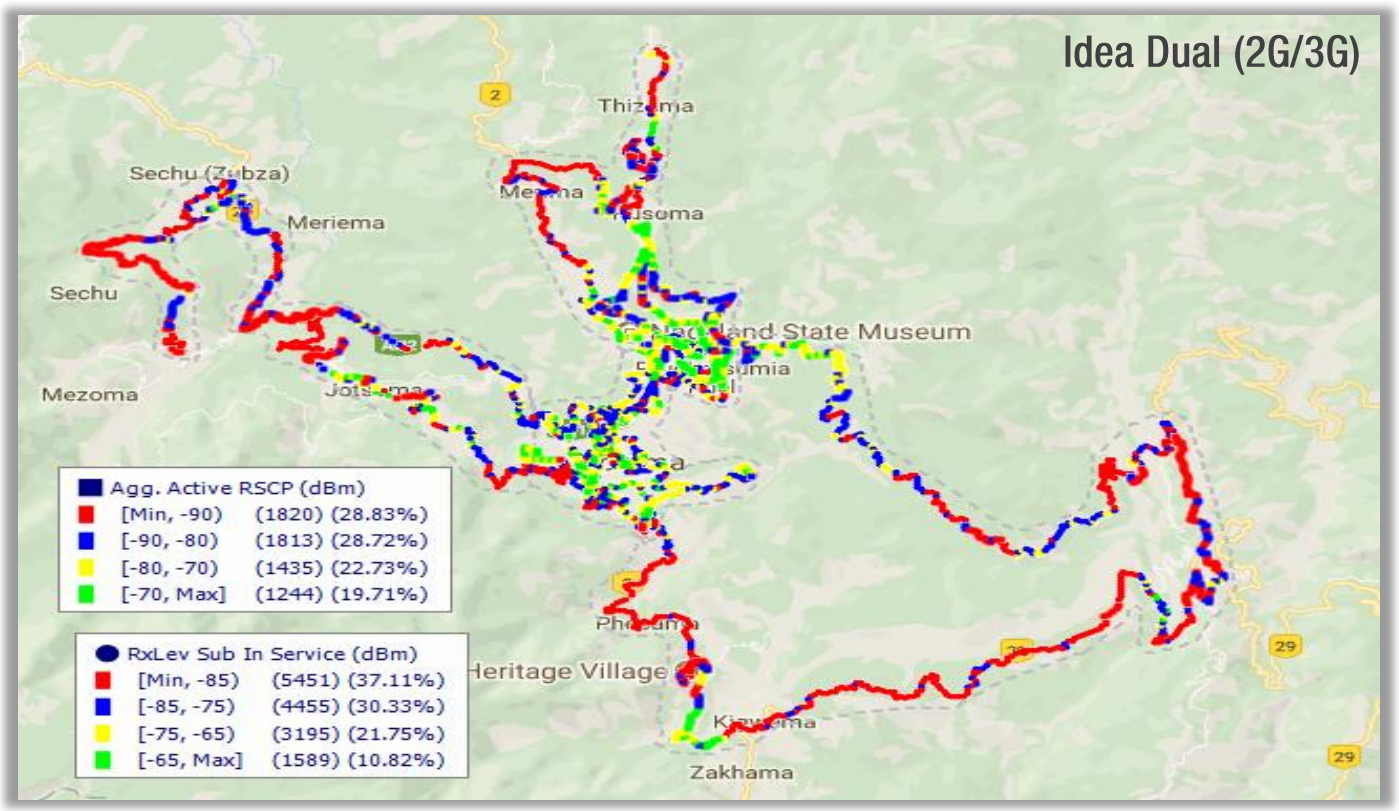

BSNL 2G
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Zakhama
RxLev Sub In Service (dBm)
[Min, -85) (7727) (36.31%)
[-85, -75) (7651) (35.95%)
[-75, -65) (3835) (18.02%)
[-65, Max] (2069) (9.72%)

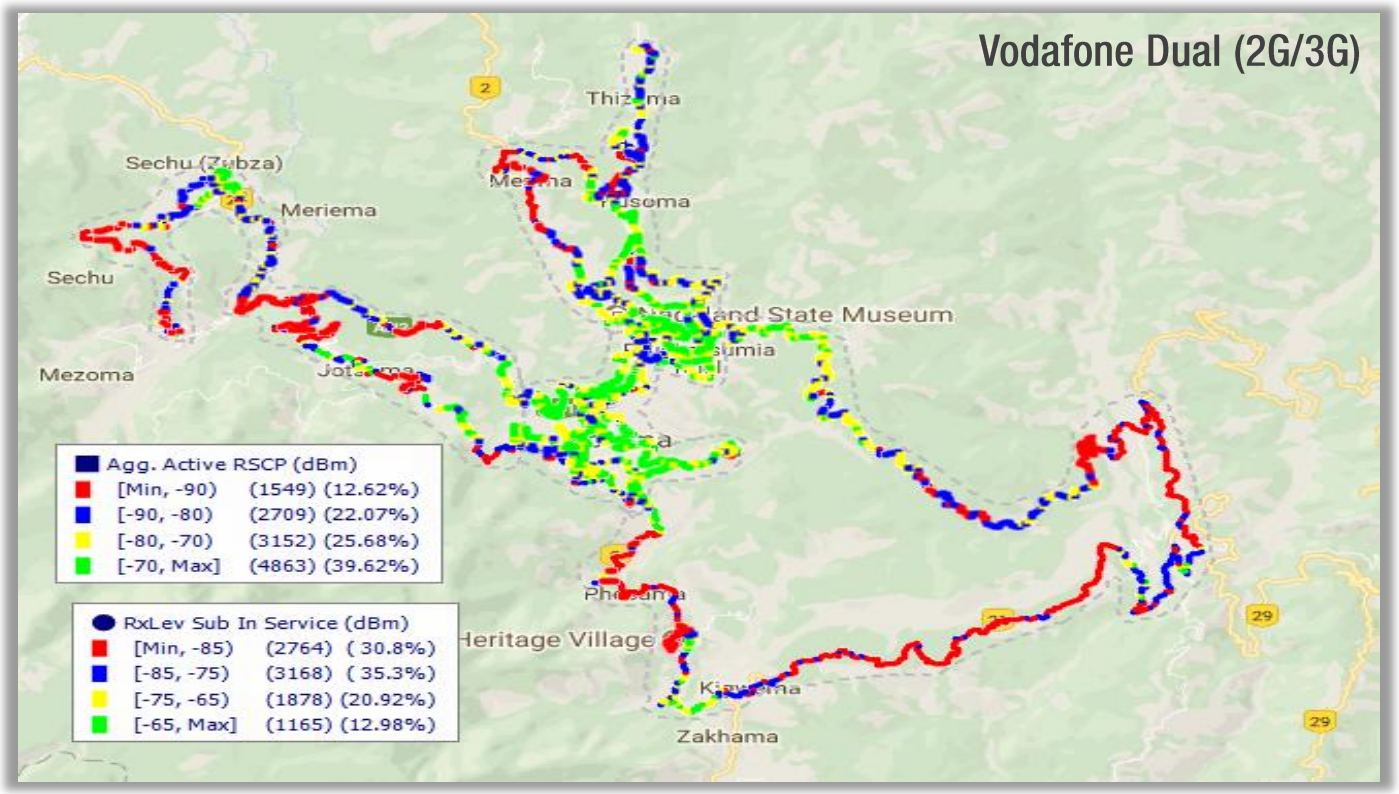

Idea 2G
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Japvo
Zakhama
RxLev Sub In Service (dBm)
[Min, -85) (8075) (38.13%)
[-85, -75) (6666) (31.47%)
[-75, -65) (4390) (20.73%)
[-65, Max] (2049) (9.67%)

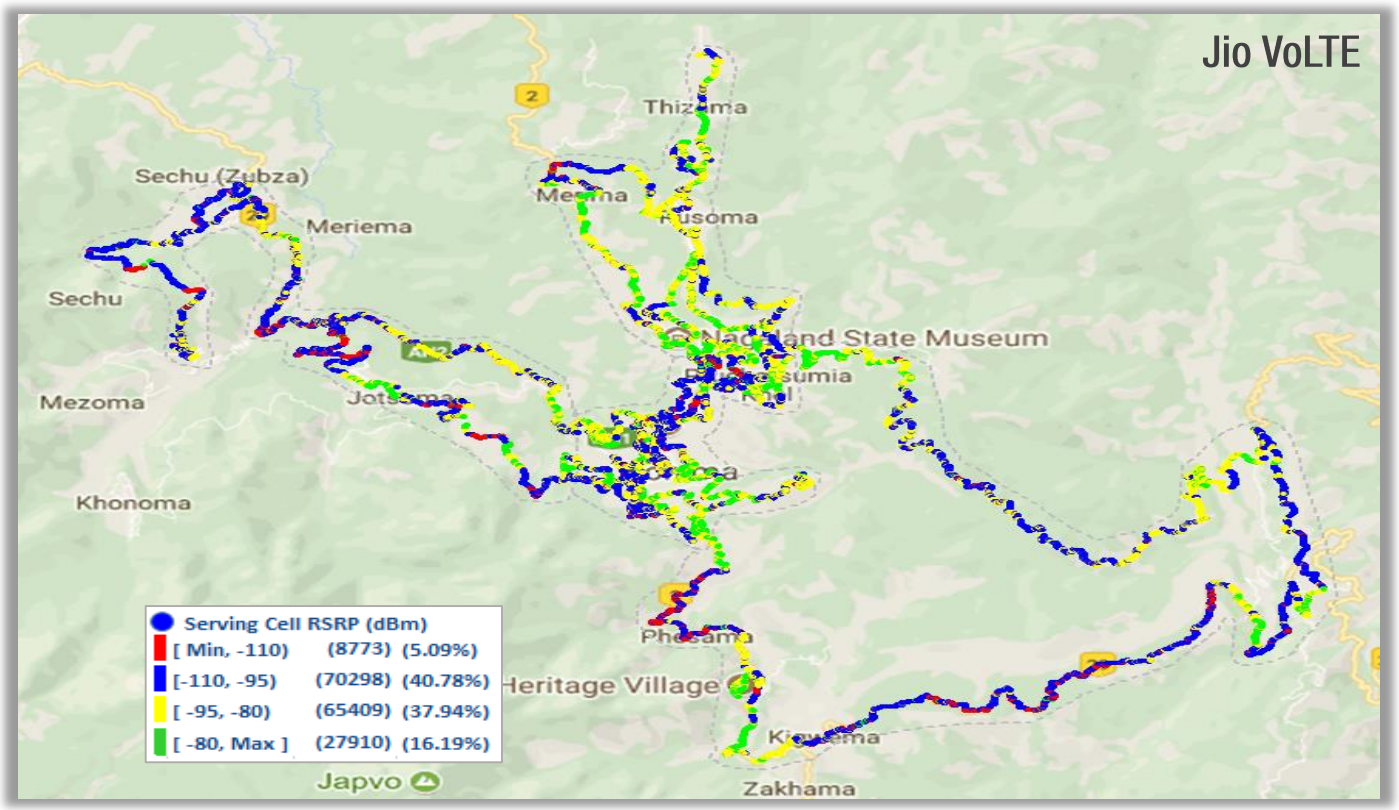

Vodafone 2G
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Zakhama
RxLev Sub In Service (dBm)
[Min, -85) (4991) (23.69%)
[-85, -75) (6005) (28.5%)
[-75, -65) (5510) (26.15%)
[-65, Max] (4562) (21.65%)


Airtel Dual (2G/3G)
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Zakhama
Agg. Active RSCP (dBm)
[Min, -90) (4276) (27.45%)
[-90, -80) (4595) (29.5%)
[-80, -70) (4067) (26.11%)
[-70, Max] (2639) (16.94%)
RxLev Sub In Service (dBm)
[Min, -85) (2448) (43.89%)
[-85, -75) (2081) (37.31%)
[-75, -65) (838) (15.02%)
[-65, Max] (211) (3.78%)


BSNL Dual (2G/3G)
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Agg. Active RSCP (dBm)
[Min, -90) (2786) (41.09%)
[-90, -80) (2136) (31.5%)
[-80, -70) (1167) (17.21%)
[-70, Max] (691) (10.19%)
RxLev Sub In Service (dBm)
[Min, -85) (3682) (25.23%)
[-85, -75) (5787) (39.66%)
[-75, -65) (3607) (24.72%)
[-65, Max] (1515) (10.38%)
Zakhama


Idea Dual (2G/3G)
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Agg. Active RSCP (dBm)
[Min, -90) (1820) (28.83%)
[-90, -80) (1813) (28.72%)
[-80, -70) (1435) (22.73%)
[-70, Max] (1244) (19.71%)
RxLev Sub In Service (dBm)
[Min, -85) (5451) (37.11%)
[-85, -75) (4455) (30.33%)
[-75, -65) (3195) (21.75%)
[-65, Max] (1589) (10.82%)
Zakhama

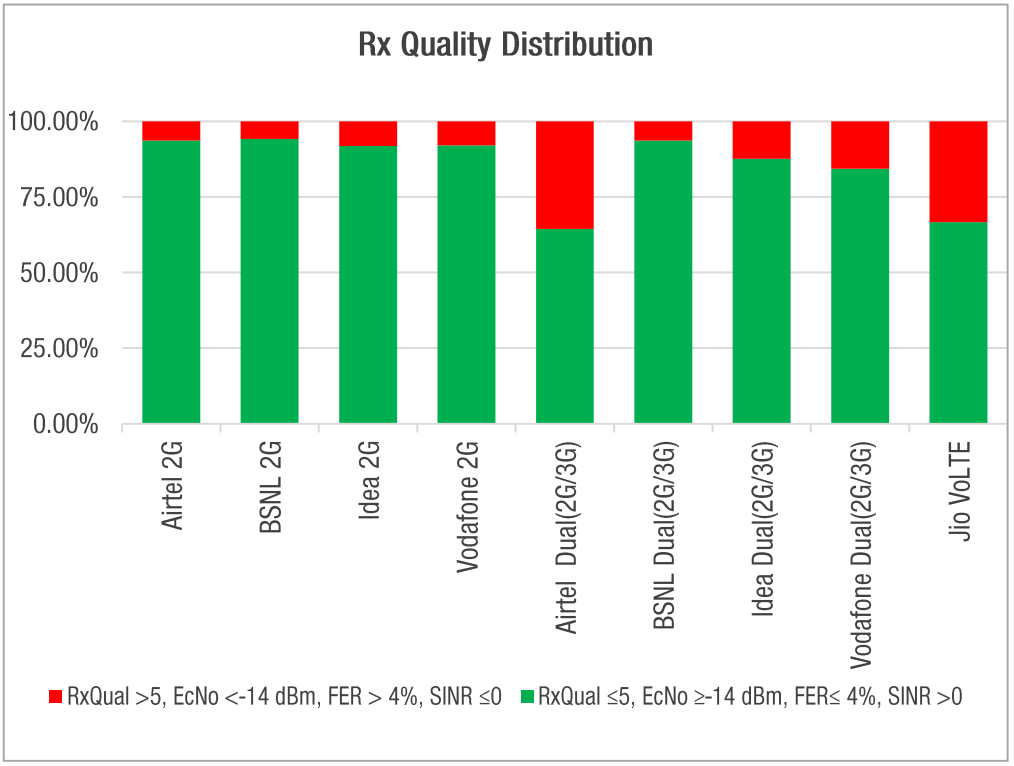

Vodafone Dual (2G/3G)
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Agg. Active RSCP (dBm)
[Min, -90) (1549) (12.62%)
[-90, -80) (2709) (22.07%)
[-80, -70) (3152) (25.68%)
[-70, Max] (4863) (39.62%)
RxLev Sub In Service (dBm)
[Min, -85) (2764) (30.8%)
[-85, -75) (3168) (35.3%)
[-75, -65) (1878) (20.92%)
[-65, Max] (1165) (12.98%)
Zakhama


Jio VoLTE
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Serving Cell RSRP (dBm)
[Min, -110) (8773) (5.09%)
[-110, -95) (70298) (40.78%)
[-95, -80) (65409) (37.94%)
[-80, Max] (27910) (16.19%)
Japvo
Zakhama

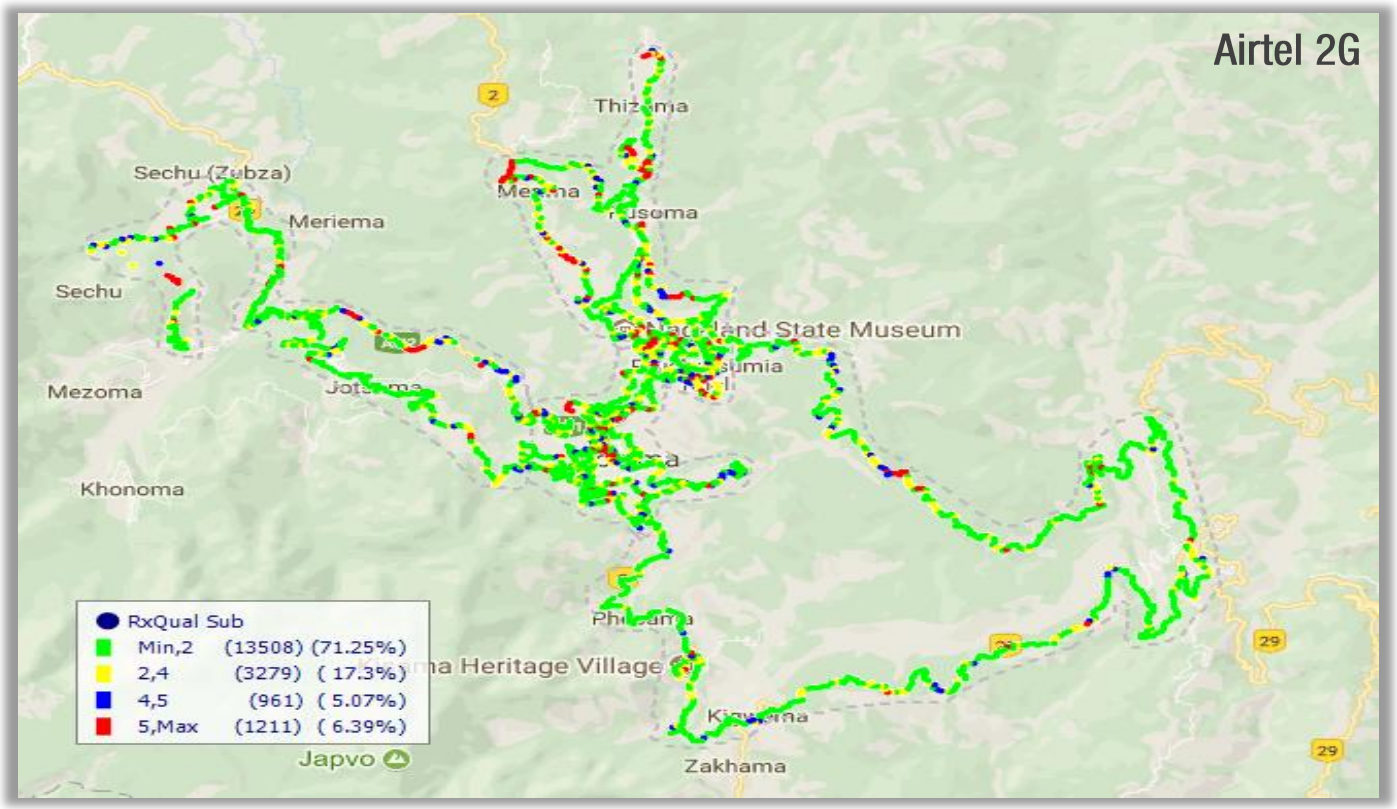
II. Quality Details

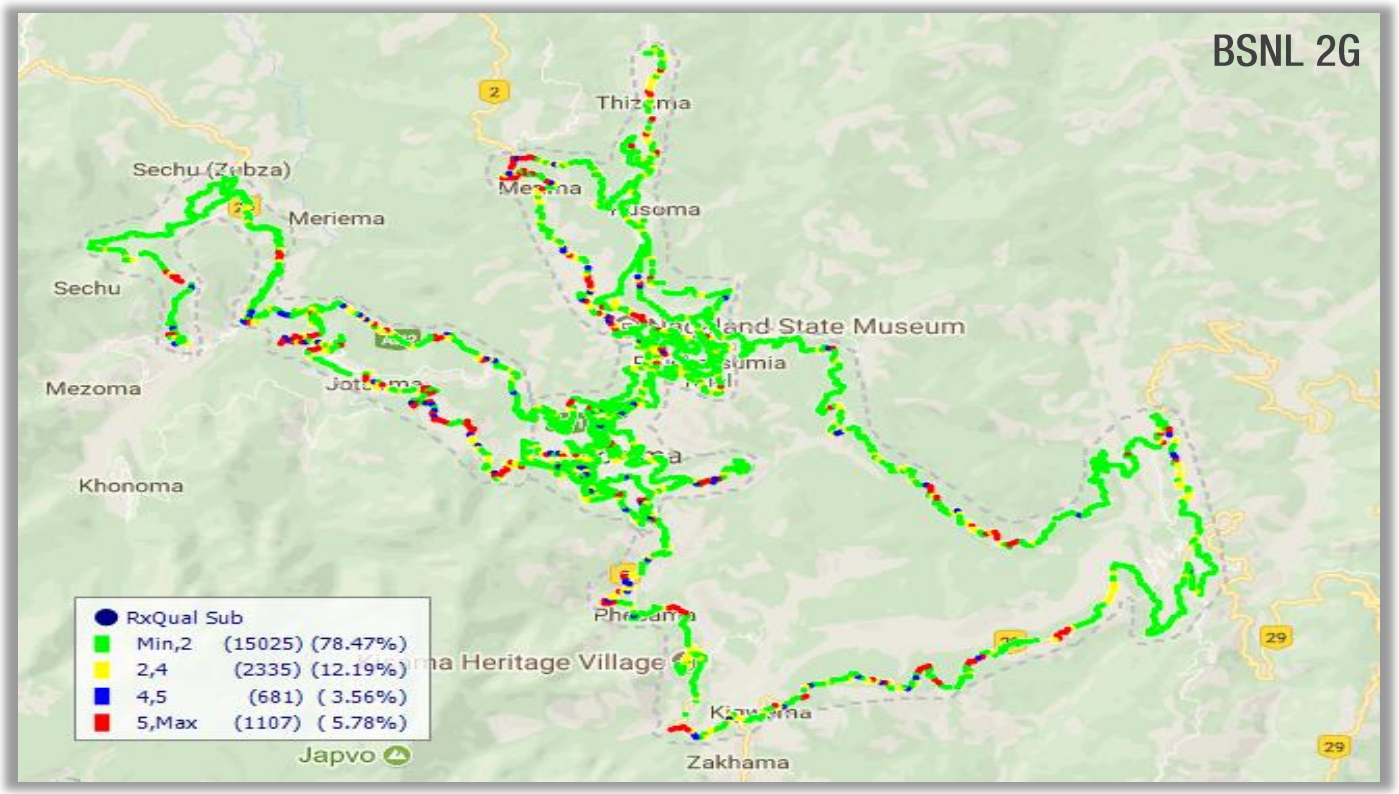
For measuring voice quality, as per the QoS norms, RxQual <=5 for GSM TSPs, EcNo >= -14 dBm for 3G TSP sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

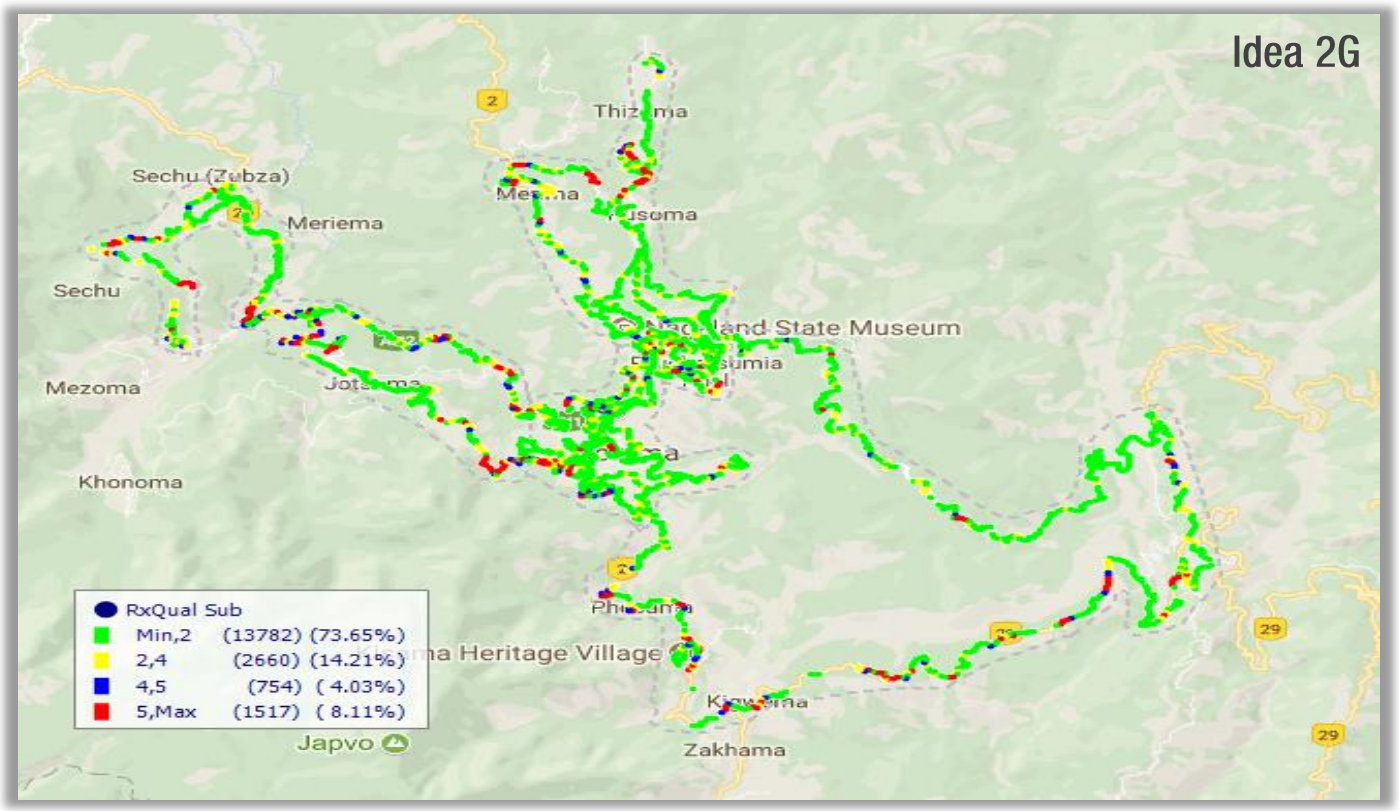
TSP	Rx Quality
Airtel 2G	93.61%
BSNL 2G	94.22%
Idea 2G	91.89%
Vodafone 2G	92.10%
Airtel Dual(2G/3G)	64.40%
BSNL Dual(2G/3G)	93.68%
Idea Dual(2G/3G)	87.63%
Vodafone Dual(2G/3G)	84.33%
Jio VoLTE	66.62%

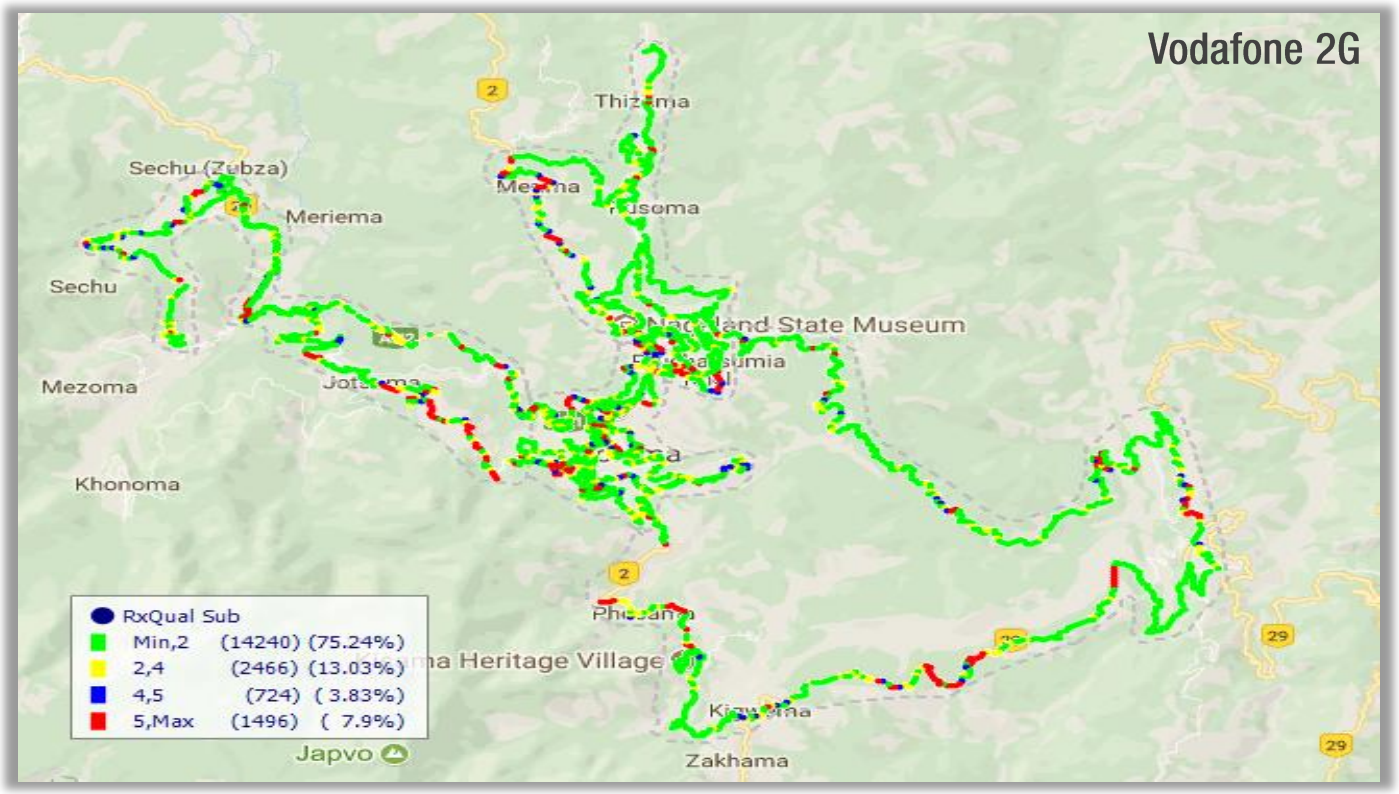


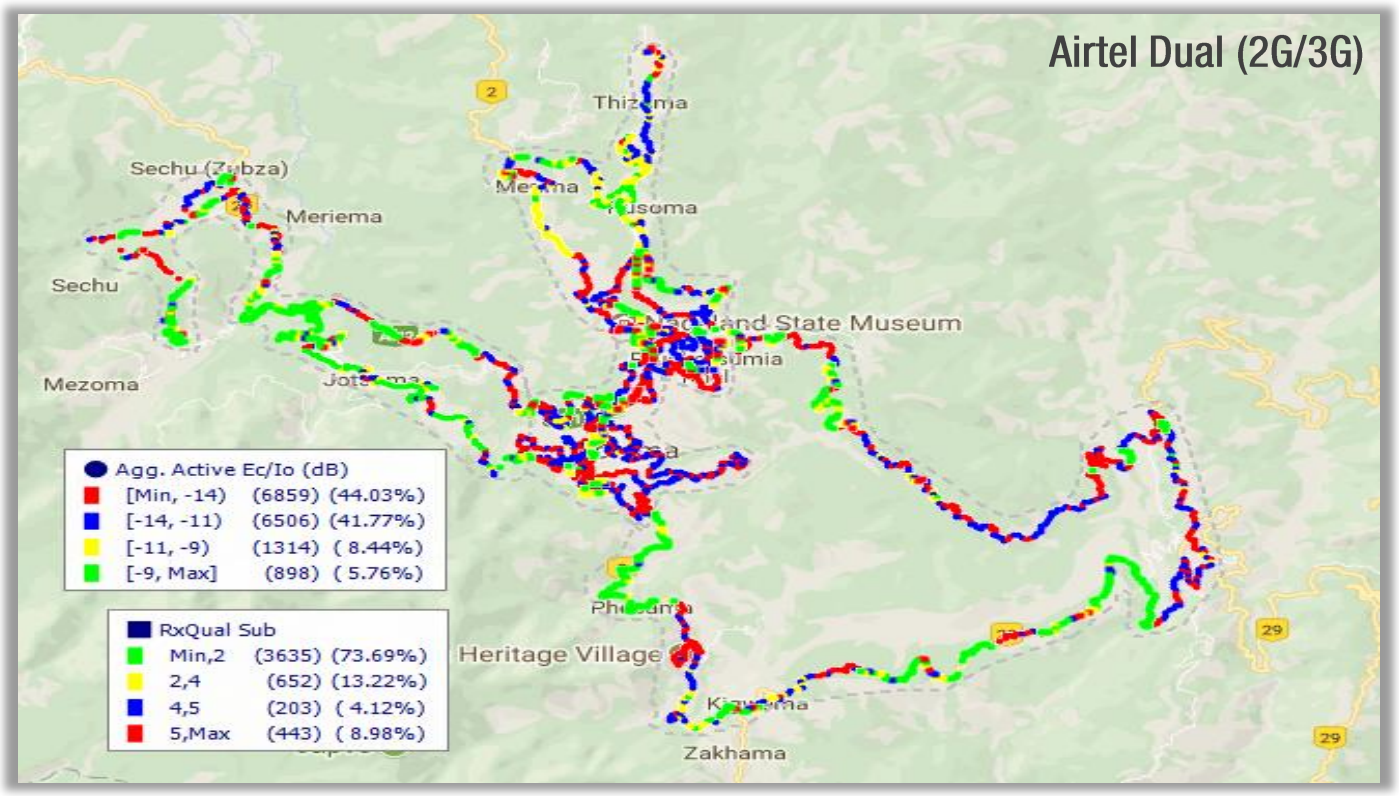
TSPs not meeting the Benchmark

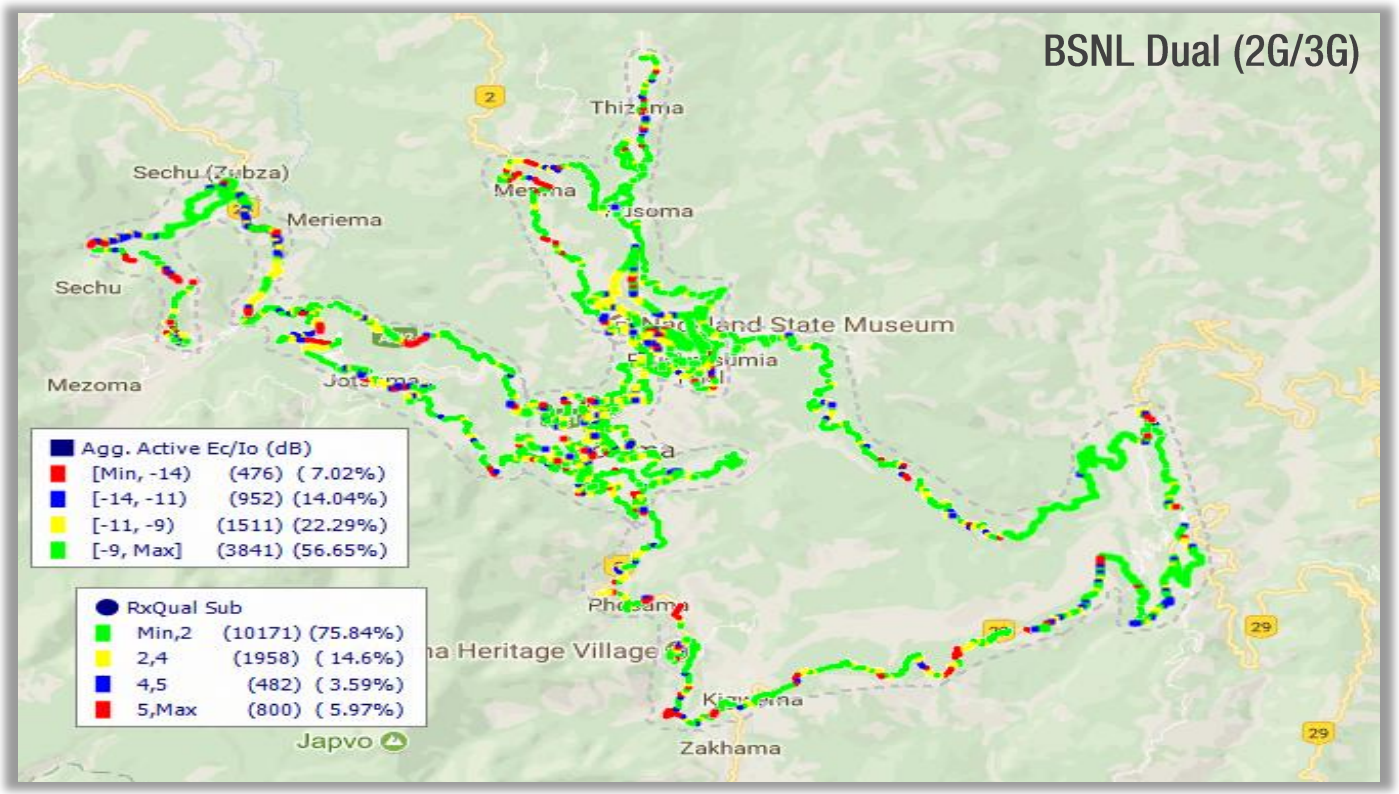


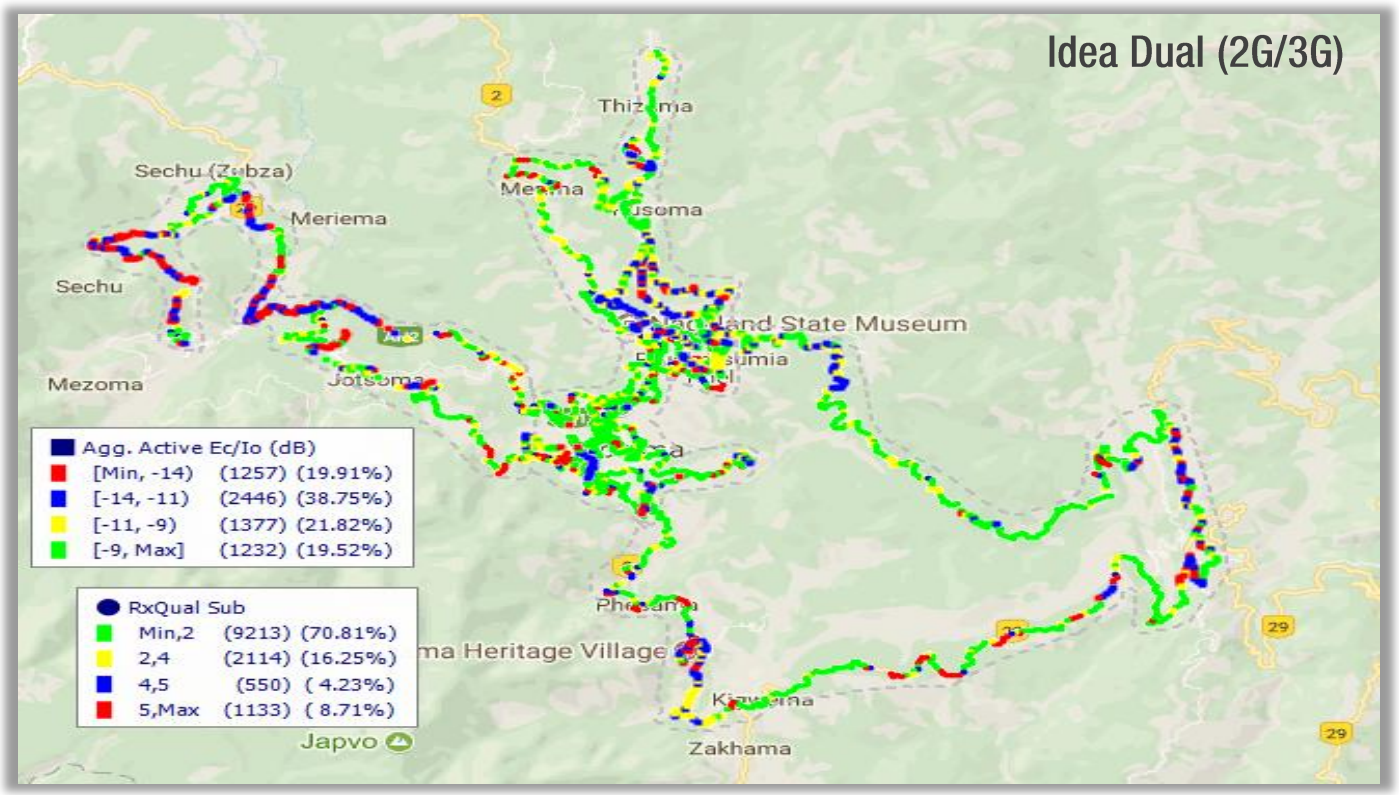

BSNL 2G
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Japvo
Zakhama
RxQual Sub
Min,2 (15025) (78.47%)
2,4 (2335) (12.19%)
4,5 (681) (3.56%)
5,Max (1107) (5.78%)

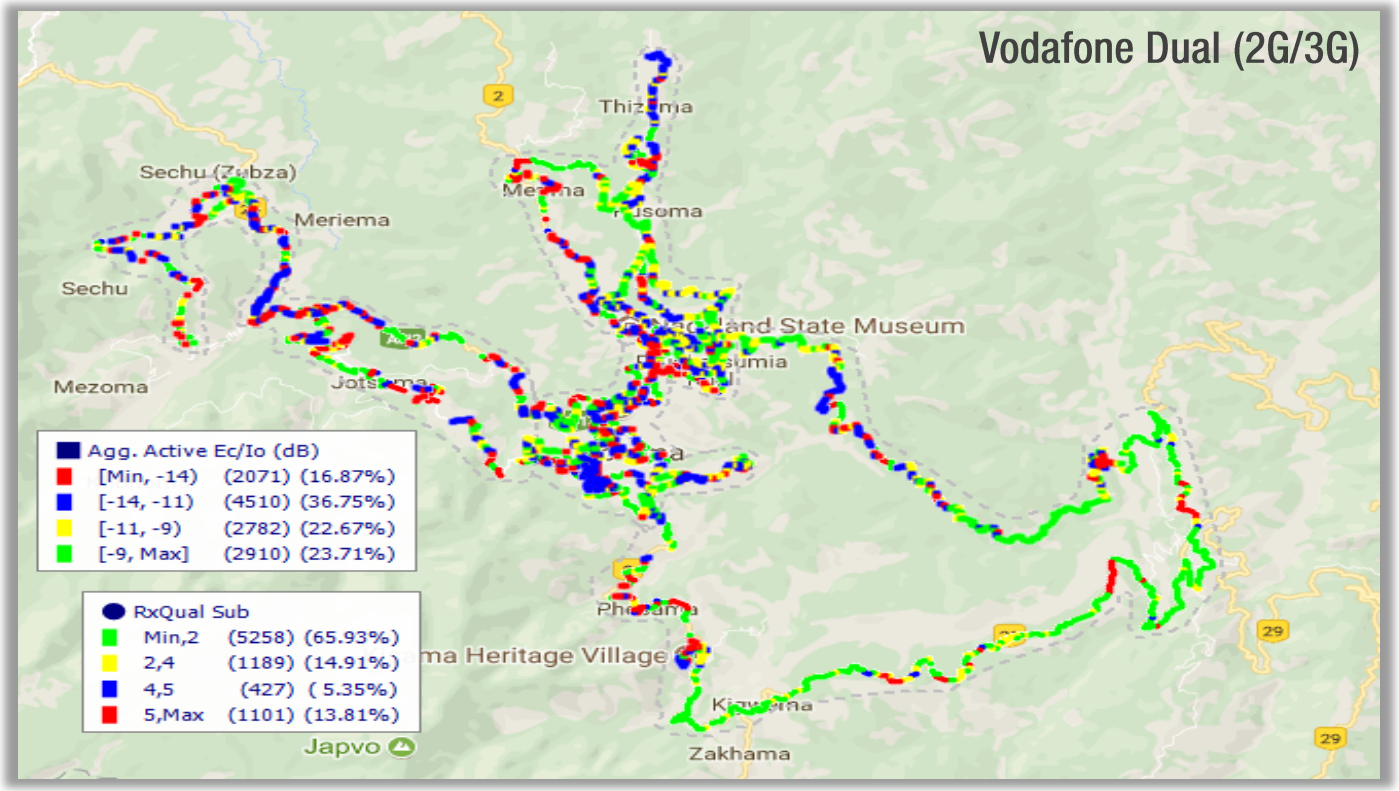

Idea 2G
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Japvo
Zakhama
RxQual Sub
Min,2 (13782) (73.65%)
2,4 (2660) (14.21%)
4,5 (754) (4.03%)
5,Max (1517) (8.11%)

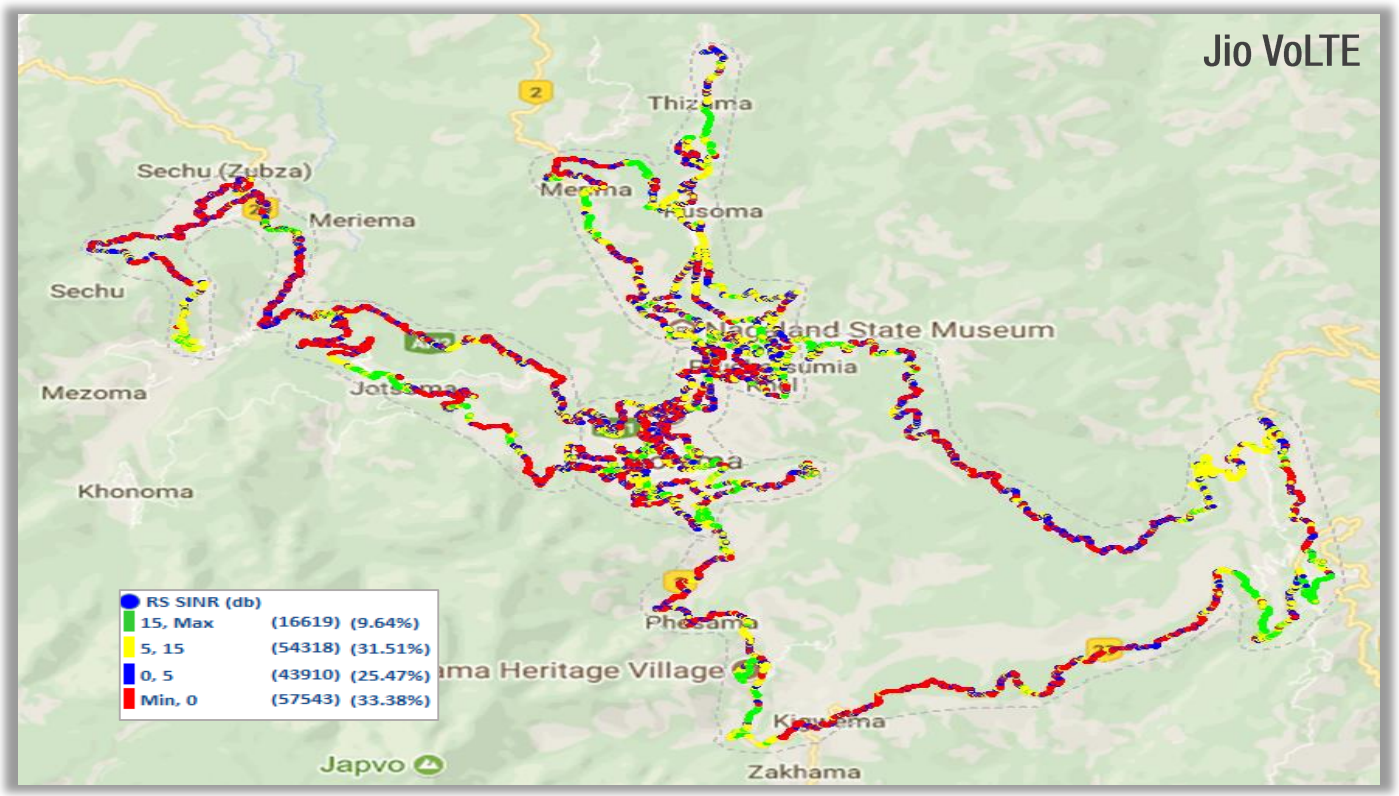

Vodafone 2G
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Japvo
Zakhama
RxQual Sub
Min,2 (14240) (75.24%)
2,4 (2466) (13.03%)
4,5 (724) (3.83%)
5,Max (1496) (7.9%)


Airtel Dual (2G/3G)
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Zakhama
Agg. Active Ec/Io (dB)
[Min, -14) (6859) (44.03%)
[-14, -11) (6506) (41.77%)
[-11, -9) (1314) (8.44%)
[-9, Max] (898) (5.76%)
RxQual Sub
Min,2 (3635) (73.69%)
2,4 (652) (13.22%)
4,5 (203) (4.12%)
5,Max (443) (8.98%)


BSNL Dual (2G/3G)
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Jotsoma
Agg. Active Ec/Io (dB)
[Min, -14) (476) (7.02%)
[-14, -11) (952) (14.04%)
[-11, -9) (1511) (22.29%)
[-9, Max] (3841) (56.65%)
RxQual Sub
Min,2 (10171) (75.84%)
2,4 (1958) (14.6%)
4,5 (482) (3.59%)
5,Max (800) (5.97%)
Japvo
Zakhama
29

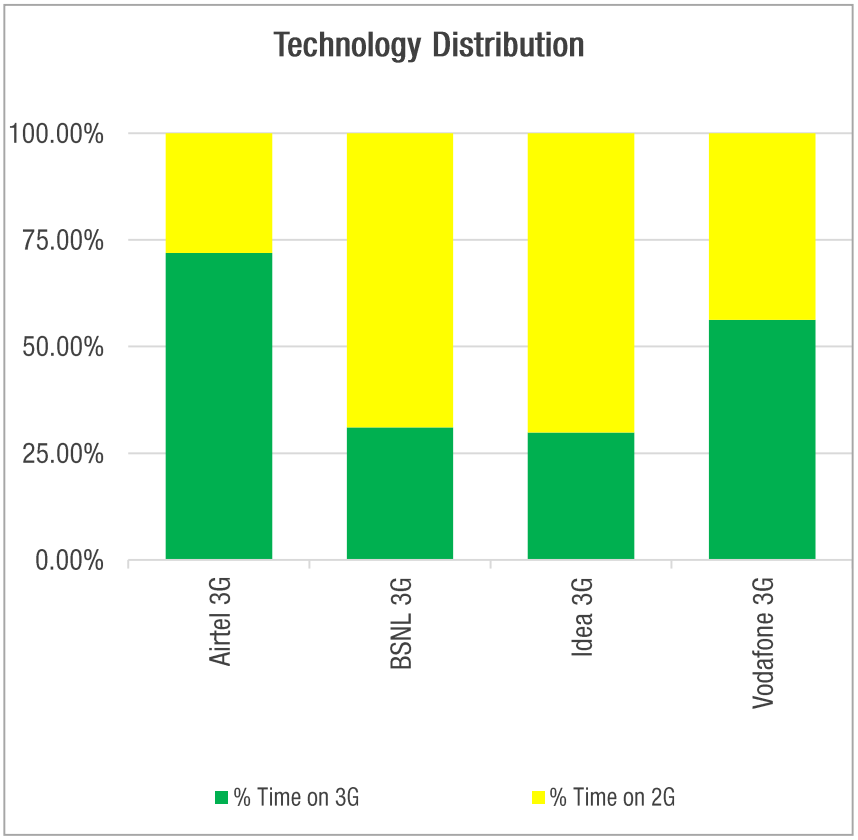

Idea Dual (2G/3G)
Thizama
Sechu (Zubza)
Meriema
Sechu
Mezoma
Jotsoma
Agg. Active Ec/Io (dB)
[Min, -14) (1257) (19.91%)
[-14, -11) (2446) (38.75%)
[-11, -9) (1377) (21.82%)
[-9, Max] (1232) (19.52%)
RxQual Sub
Min,2 (9213) (70.81%)
2,4 (2114) (16.25%)
4,5 (550) (4.23%)
5,Max (1133) (8.71%)
Japvo
Zakhama
29

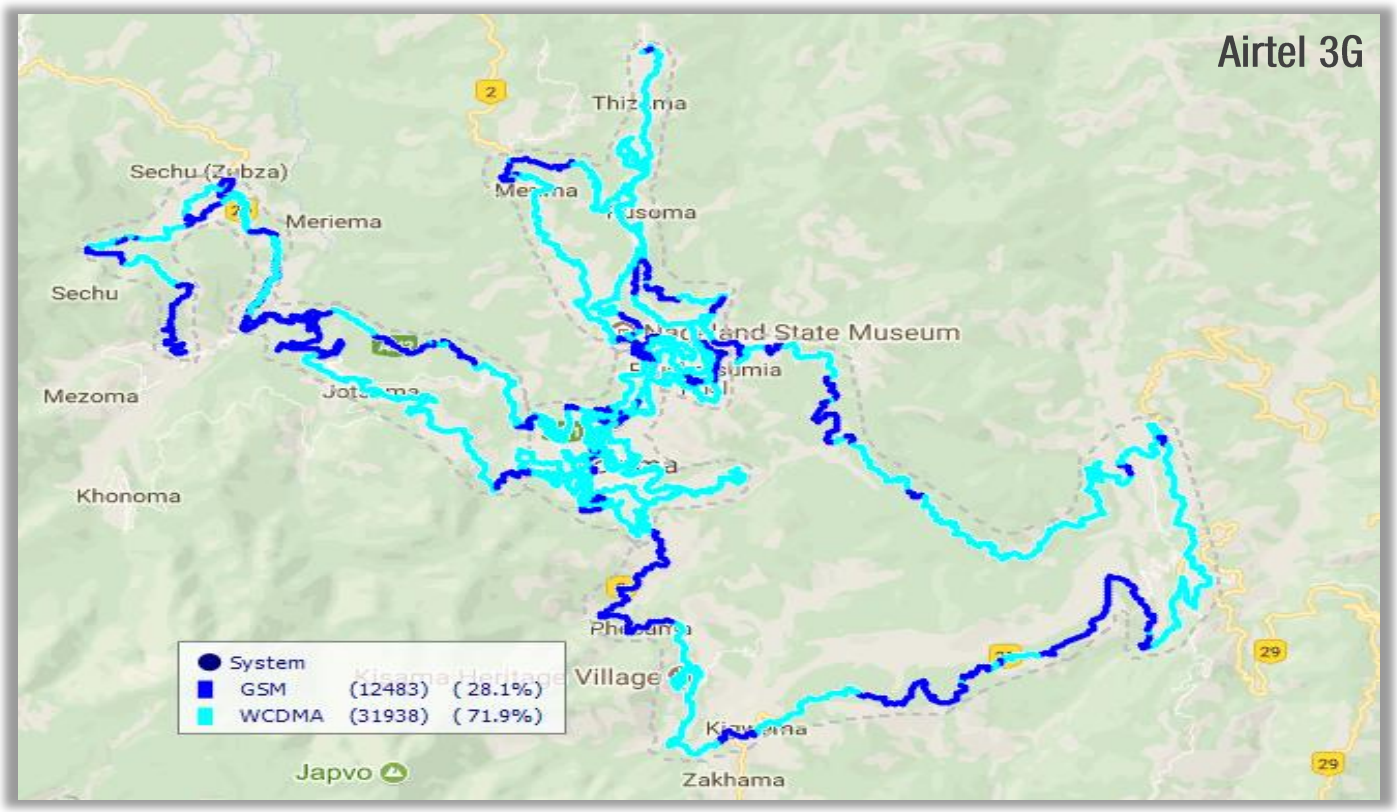

Vodafone Dual (2G/3G)
Sechu (Zubza)
Meriema
Sechu
Mezoma
Thizama
Agg. Active Ec/Io (dB)
[Min, -14) (2071) (16.87%)
[-14, -11) (4510) (36.75%)
[-11, -9) (2782) (22.67%)
[-9, Max] (2910) (23.71%)
RxQual Sub
Min,2 (5258) (65.93%)
2,4 (1189) (14.91%)
4,5 (427) (5.35%)
5,Max (1101) (13.81%)
Japvo
Zakhama

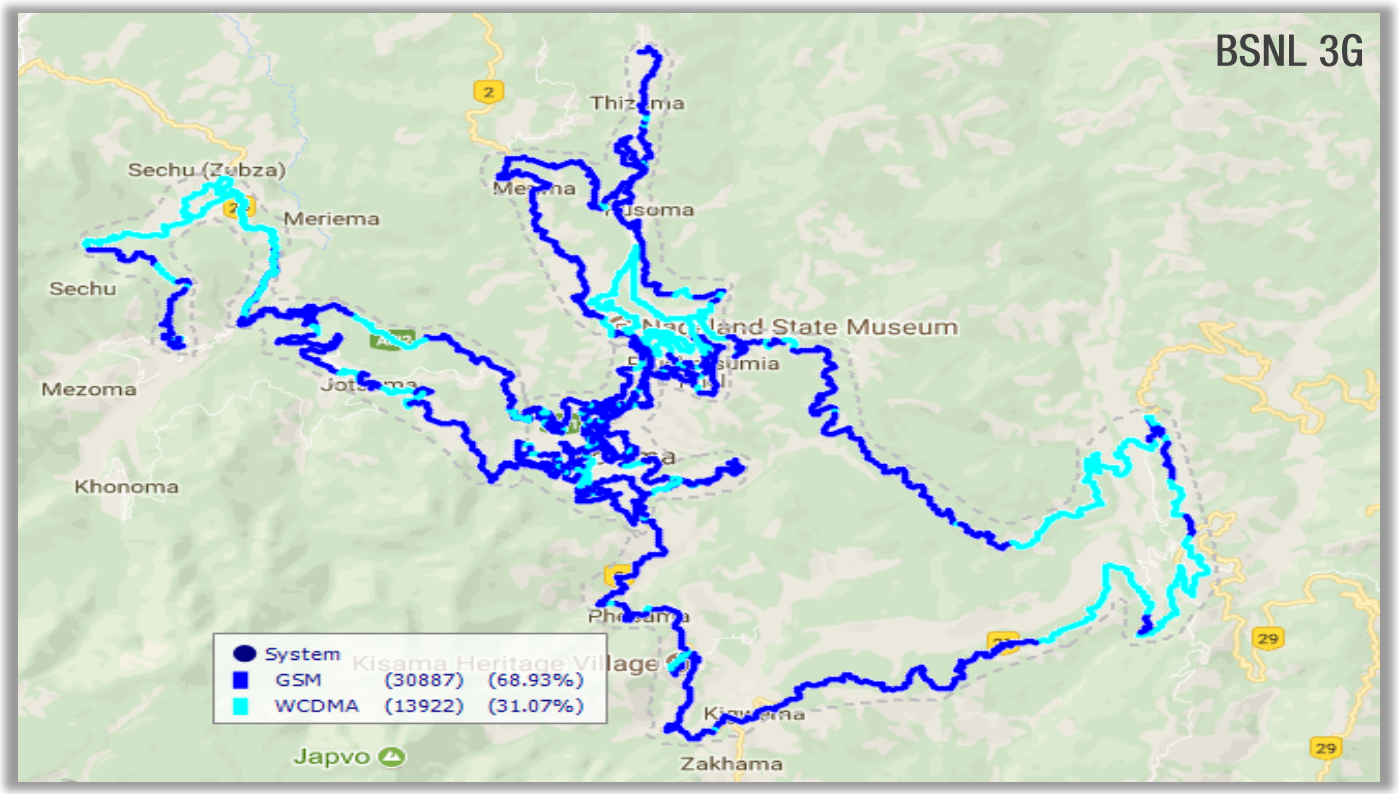

Jio VoLTE
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Thizama
RS SINR (db)
15, Max (16619) (9.64%)
5, 15 (54318) (31.51%)
0, 5 (43910) (25.47%)
Min, 0 (57543) (33.38%)
Japvo
Zakhama

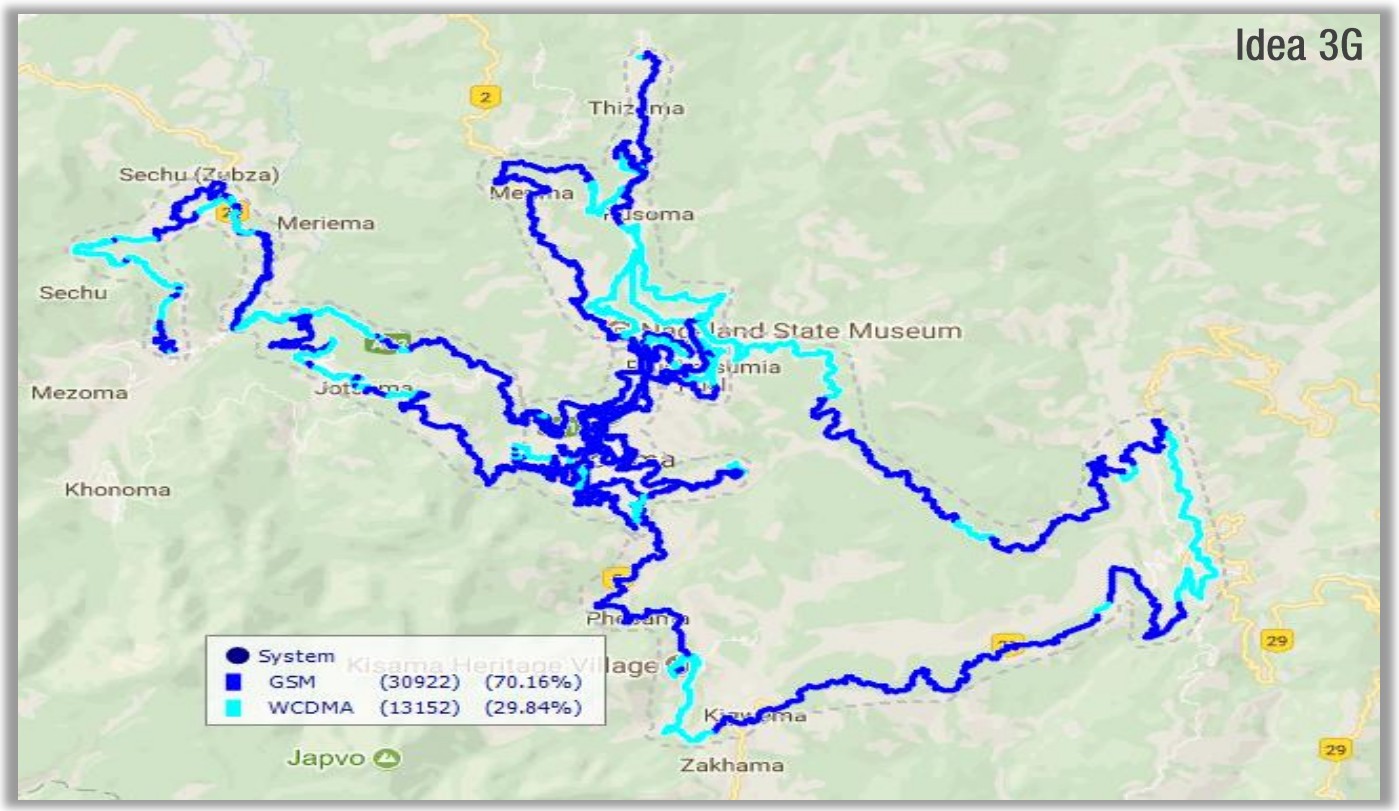
III. Technology Details

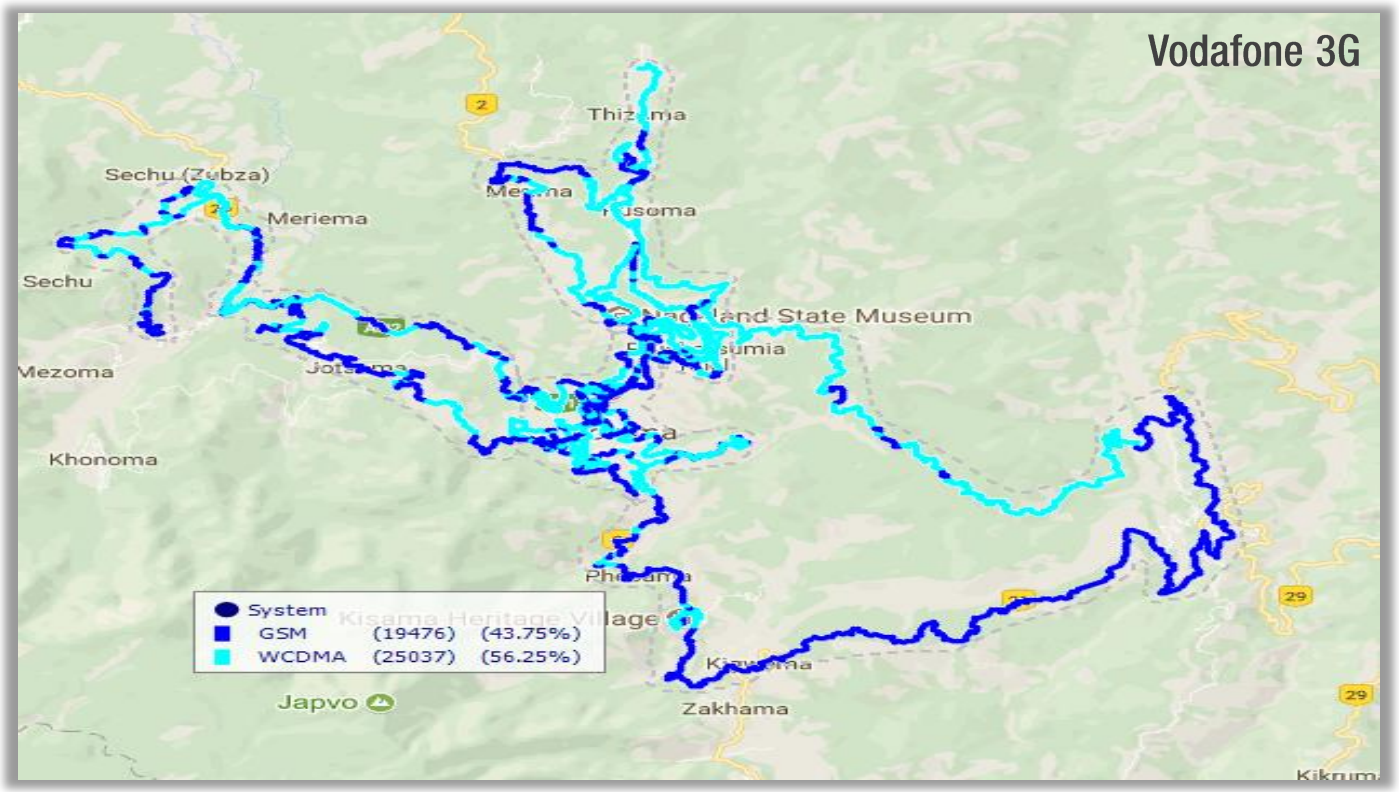
TSP	% Time on 3G
Airtel 3G	71.90%
BSNL 3G	31.07%
Idea 3G	29.84%
Vodafone 3G	56.25%






BSNL 3G
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Thizama
Japvo
Zakhama
System
GSM (30887) (68.93%)
WCDMA (13922) (31.07%)


Idea 3G
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Thizama
Japvo
Zakhama
System
GSM (30922) (70.16%)
WCDMA (13152) (29.84%)


Vodafone 3G
Sechu (Zubza)
Meriema
Sechu
Mezoma
Khonoma
Thizama
Nagaland State Museum
Kisama Heritage Village
Japvo
Zakhama
System
GSM (19476) (43.75%)
WCDMA (25037) (56.25%)

Summary

Cluster Level Summary

Cluster 1	2G			
	Airtel	BSNL	Idea	Vodafone
Call Attempt	88	95	83	87
Blocked Call Rate (%)	1.1%	7.4%	0.0%	0.0%
CSSR% (Accessibility)	98.9%	92.6%	100.0%	100.0%
Drop Call Rate (%)	2.3%	3.4%	6.0%	4.6%
Mobility HOSR (%)	95.2%	81.4%	99.5%	97.2%
Rx Quality (%)	89.05%	93.4%	91.4%	92.4%

Cluster 1	3G				VoLTE
	Airtel	BSNL	Idea	Vodafone	Jio
Call Attempt	93	106	83	88	89
Blocked Call Rate (%)	10.8%	15.1%	1.2%	1.1%	0.0%
CSSR% (Accessibility)	89.2%	84.9%	98.8%	98.9%	100.0%
Drop Call Rate (%)	6.0%	4.4%	8.5%	3.4%	0.0%
Mobility HOSR (%)	98.8%	95.0%	98.7%	98.9%	99.3%
Rx Quality (%)	69.9%	93.6%	89.7%	85.8%	75.1%

Cluster 2	2G			
	Airtel	BSNL	Idea	Vodafone
Call Attempt	97	107	89	97
Blocked Call Rate (%)	1.0%	12.1%	5.6%	1.0%
CSSR% (Accessibility)	99.0%	87.9%	94.4%	99.0%
Drop Call Rate (%)	0.0%	3.2%	3.6%	4.2%
Mobility HOSR (%)	97.3%	82.5%	97.2%	97.7%
Rx Quality (%)	97.03%	93.4%	92.5%	92.5%

Cluster 2	3G				VoLTE
	Airtel	BSNL	Idea	Vodafone	Jio
Call Attempt	102	97	91	97	94
Blocked Call Rate (%)	4.9%	22.7%	1.1%	1.0%	0.0%
CSSR% (Accessibility)	95.1%	77.3%	98.9%	99.0%	100.0%
Drop Call Rate (%)	5.2%	6.7%	11.1%	8.3%	0.0%
Mobility HOSR (%)	98.9%	95.8%	99.7%	99.8%	98.9%
Rx Quality (%)	62.6%	93.4%	88.9%	87.8%	67.3%

Summary

Cluster Level Summary

Cluster 3	2G			
	Airtel	BSNL	Idea	Vodafone
Call Attempt	135	157	102	142
Blocked Call Rate (%)	0.0%	13.4%	0.0%	0.0%
CSSR% (Accessibility)	100.0%	86.6%	100.0%	100.0%
Drop Call Rate (%)	0.0%	2.9%	2.9%	7.0%
Mobility HOSR (%)	97.7%	86.8%	97.9%	96.6%
Rx Quality (%)	93.49%	96.7%	94.6%	92.7%

Cluster 3	3G				VoLTE
	Airtel	BSNL	Idea	Vodafone	Jio
Call Attempt	139	147	122	127	133
Blocked Call Rate (%)	6.5%	11.6%	0.0%	3.1%	0.0%
CSSR% (Accessibility)	93.5%	88.4%	100.0%	96.9%	100.0%
Drop Call Rate (%)	4.6%	3.1%	1.6%	6.5%	0.0%
Mobility HOSR (%)	99.7%	95.7%	98.2%	98.8%	99.7%
Rx Quality (%)	52.6%	96.8%	92.9%	84.7%	65.4%

Cluster 4	2G			
	Airtel	BSNL	Idea	Vodafone
Call Attempt	89	104	85	91
Blocked Call Rate (%)	4.5%	12.5%	0.0%	0.0%
CSSR% (Accessibility)	95.5%	87.5%	100.0%	100.0%
Drop Call Rate (%)	2.4%	4.4%	2.4%	3.3%
Mobility HOSR (%)	94.2%	80.8%	98.9%	96.0%
Rx Quality (%)	94.67%	92.1%	87.0%	90.5%

Cluster 4	3G				VoLTE
	Airtel	BSNL	Idea	Vodafone	Jio
Call Attempt	85	101	77	81	86
Blocked Call Rate (%)	15.3%	20.8%	2.6%	3.7%	1.2%
CSSR% (Accessibility)	84.7%	79.2%	97.4%	96.3%	98.8%
Drop Call Rate (%)	1.4%	11.3%	4.0%	11.5%	0.0%
Mobility HOSR (%)	100.0%	96.3%	98.3%	97.7%	99.0%
Rx Quality (%)	79.9%	89.5%	76.2%	78.5%	58.0%