



INDEPENDENT DRIVE TEST REPORT

For

Aizwal

2019

March

NORTH EAST ZONE

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

The Independent Drive Test has been carried out by M/s PhiMetrics Technologies Pvt. Ltd. on behalf of TRAI in Aizwal City & adjoining areas from 9:00 AM to 9:00 PM; 6th March 2019 to 8th March 2019 . The drive test covered an drive route of 255 KMs & 4 hotspot over a period of 3 days. Approximately 450 calls were made for each of the 10 networks: four 2G networks, four 3G networks and Two LTE network covering 4 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 **6th March 2019 to 8th March 2019** covering various locations in Aizwal City & surrounding region. The performance of **Airtel, BSNL, Vodafone Idea Limited (VIL(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.**

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

Drive Test Details For Aizwal:

Independent Drive test was conducted for a period of three days from 6th March 2019 to 8th March 2019 in Aizwal 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 255 KMs over a period of 2 days from 6th March 2019 to 8th March 2019. Approximately 450 calls were made for each of the 10 networks: four 2G (Lock Mode) networks, four 3G (Dual mode) networks and two VoLTE network covering 4 unique TSPs.

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

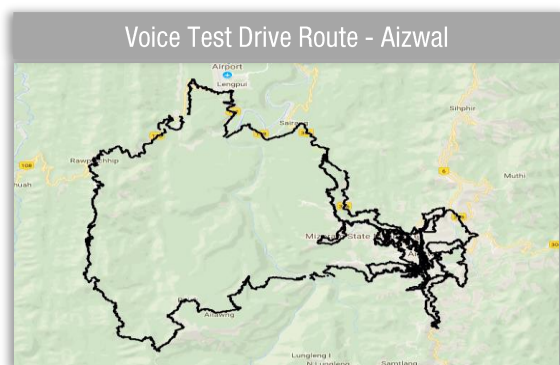
Data Tests: Data Tests were performed at 4 static locations for 1 day on 8th March 2019; four 2G (Lock mode) networks, four 3G (Dual mode) networks and Four 4G (Dual mode) networks covering 4 unique TSPs were tested.

* 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 Dual 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 Dual mode included samples and events of 2G & 3G.

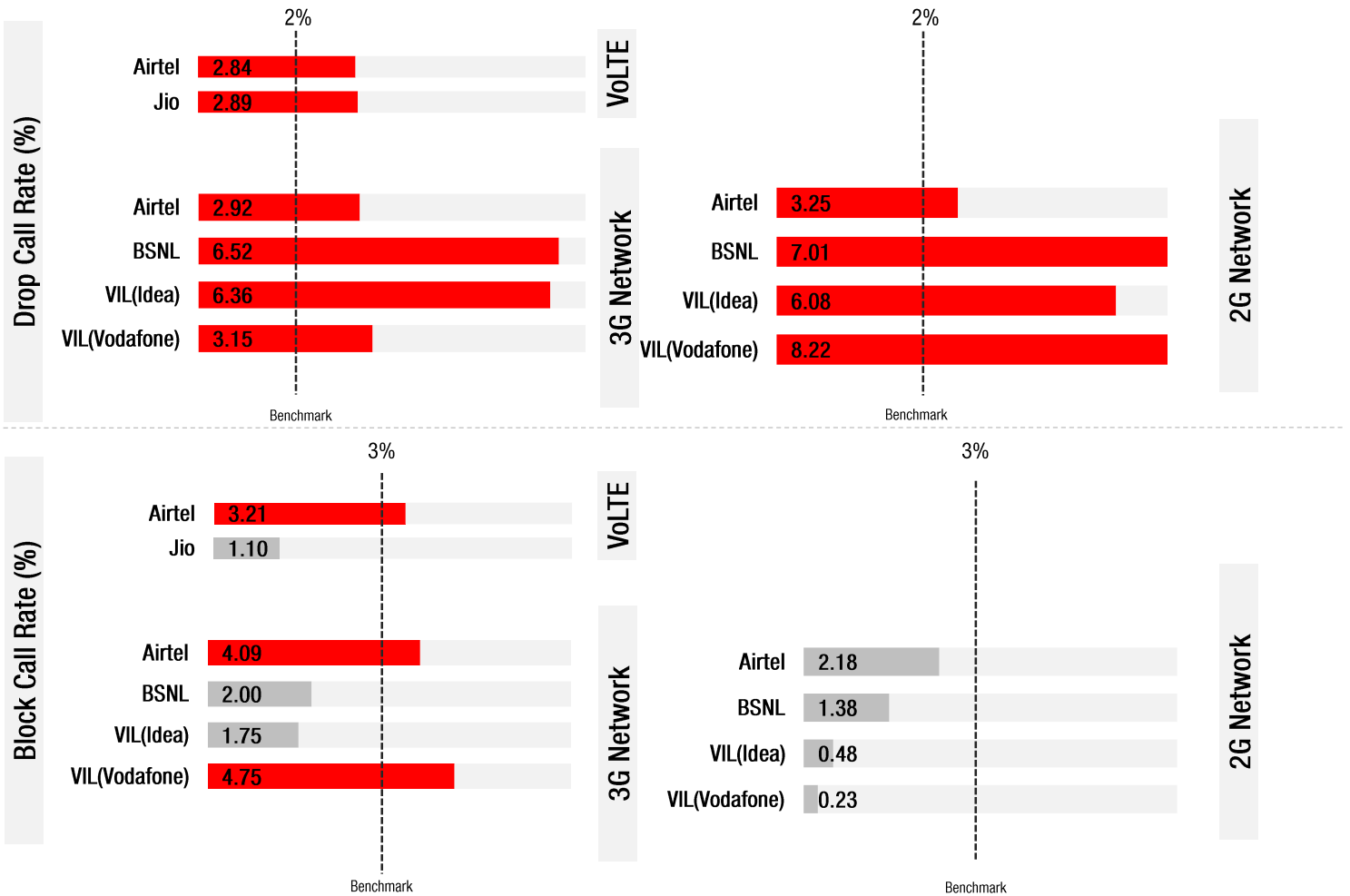
Service	Specifications
Download	2G (Locked) - 500KB, 3G (Dual) - 20 MB, 4G (Free) - 40 MB
Upload	2G (Locked) - 100KB, 3G (Dual) - 5 MB, 4G (Free) - 10 MB
Web Browsing	3 links of e/m commerce website www.amazon.in, www.flipkart.com and PayTm
Video Streaming	130 sec clip
Latency	32 Bytes on www.google.com



Voice Calls

Key Observations

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



KPI	2G Networks			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
SDCCH Congestion(<=1%)	1.78%	0.79%	0.00%	0.00%
TCH Congestion (<=2%)	0.40%	0.59%	0.48%	0.23%

KPI	3G Networks			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
CSFB Failure %	0.00%	NA	0.00%	2.25%
SDCCH Congestion%	1.51%	0.60%	0.00%	0.00%
RRC Congestion%	2.36%	0.40%	1.75%	2.00%
SDCCH & RRC Congestion(<=1%)	3.87%	1.00%	1.75%	2.00%
TCH Congestion %	0.22%	0.80%	0.00%	0.50%
RAB Congestion %	0.00%	0.20%	0.00%	0.00%
TCH & RAB Congestion (<=2%)	0.22%	1.00%	0.00%	0.50%

a) All TSPs have fail to met the 2% QoS benchmark of Drop Call Rate (DCR%).

b) Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's except Airtel 3G,VIL(Vodafone) 3G,and Airtel VoLTE.

*VIL= (Idea, Vodafone)

*NA = Not Applicable

Not meeting Benchmark

Voice Calls

Key Observations

Coverage

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

TSPs	2G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
Coverage%	68.11%	73.69%	66.12%	69.78%

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

TSPs	3G				VoLTE	
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio
Coverage %	69.23%	75.83%	65.99%	72.63%	79.38%	90.59%

c) Percentage of time spent on 3G network:

TSPs	3G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
Time Spent on 3G%	63.45%	10.52%	55.16%	31.11%

d) Percentage of RLT \geq 48:

TSPs	2G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
%RLT \geq 48	0.00%	17.06%	0.00%	0.00%

e) Average CST Second

TSPs	2G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
CST(sec)	2.48	2.60	3.13	2.87

TSPs	3G				VoLTE	
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio
CST(sec)	4.98	2.44	3.13	3.74	2.64	1.13

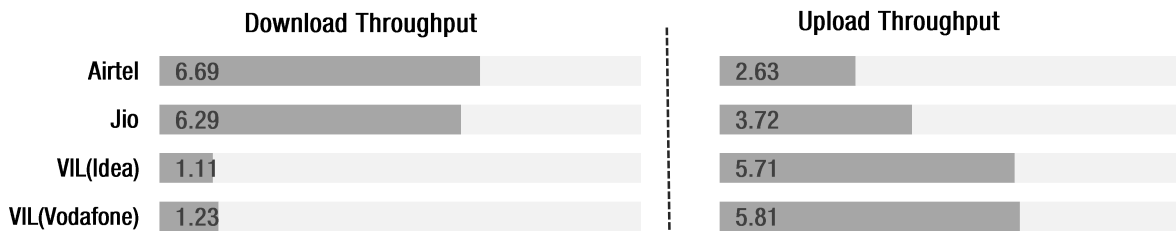
Data Services Static

Key Observations

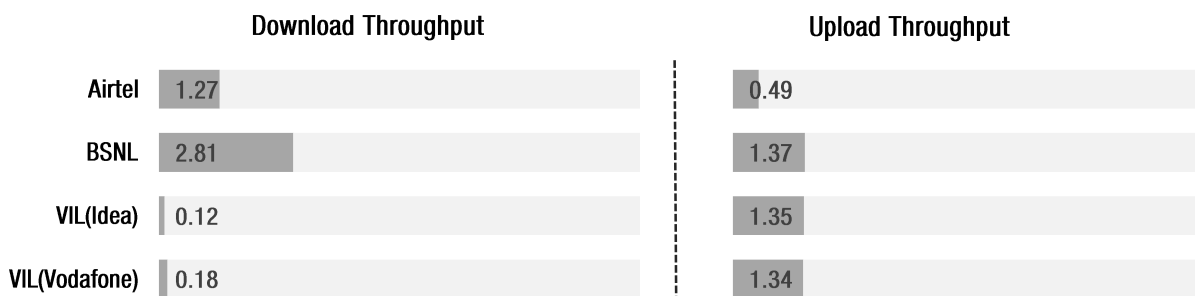
Data was tested at 4 locations .Following services were tested: Data Download/Upload, Latency (www.google.com), Video Streaming (YouTube) and Web browsing (Flipkart, Amazon, PayTm)

Data Download and Upload Performance (Mbps)

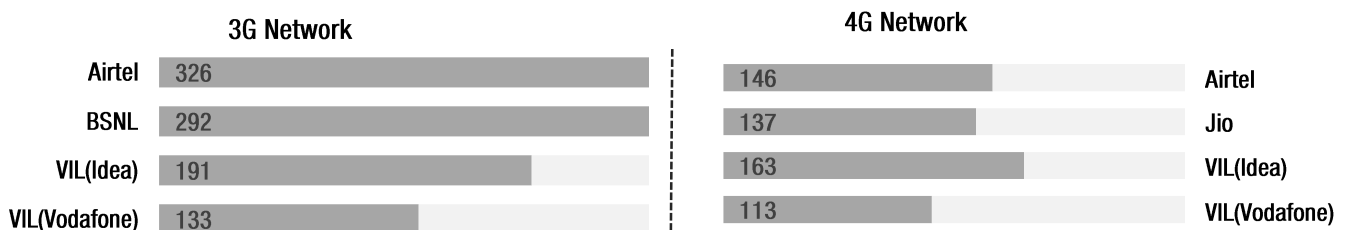
4G Network:



3G Network:



Latency (msec)

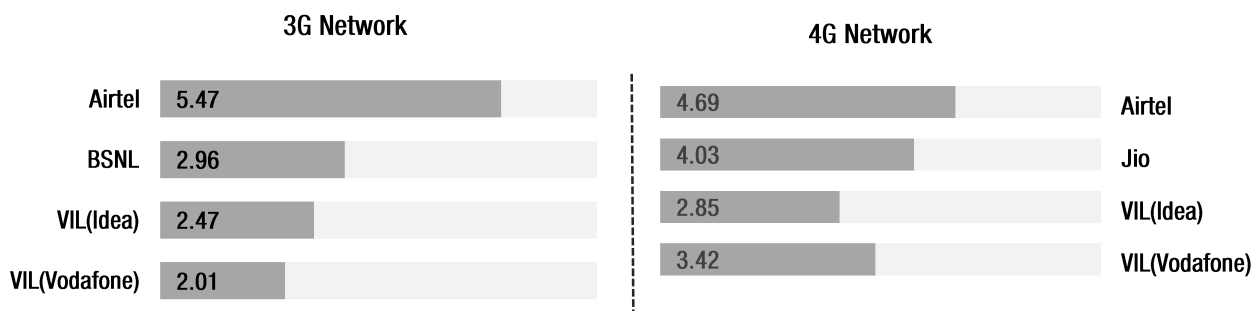


Data Services Static

Key Observations

Video Streaming Performance (130 sec YouTube video sample sizes)

Streaming (sec)

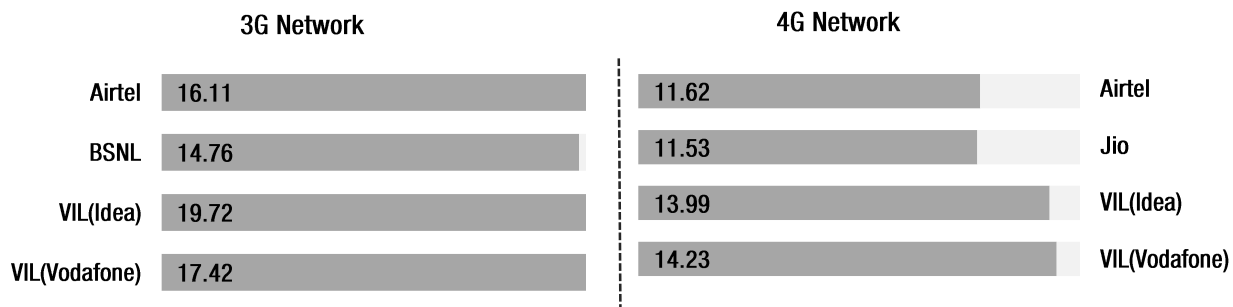


Streaming Delay further broken into 2 parameters which form the end-user perception to assess consistency on Video streaming.

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

Video Streaming	3G				4G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio	VIL(Idea)	VIL(Vodafone)
Avg. Initial Start Time (sec)	2.80	2.96	1.74	2.01	3.09	2.92	1.98	2.97
Avg. Interruption Time (sec)	2.67	0.00	0.73	0.00	1.60	1.11	0.87	0.45

Web Page Download Time (sec)



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

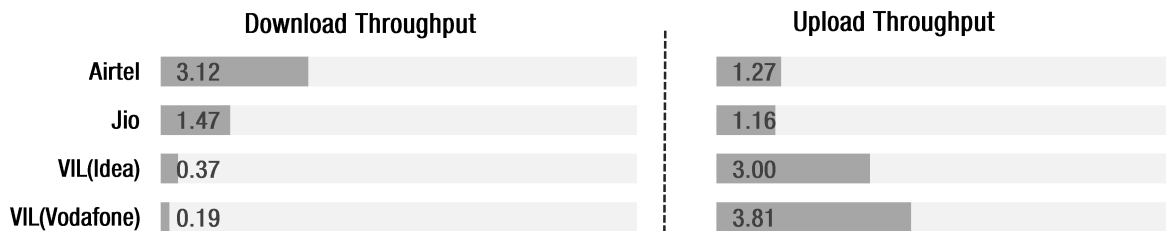
Data Services Dynamic

Key Observations

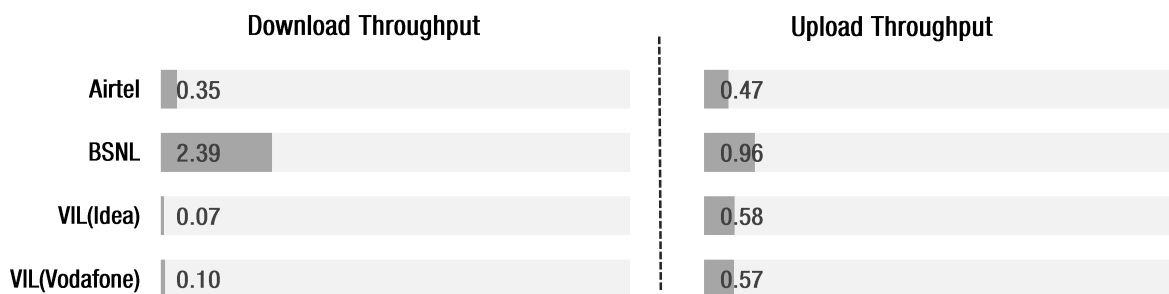
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Data Download and Upload Performance (Mbps)

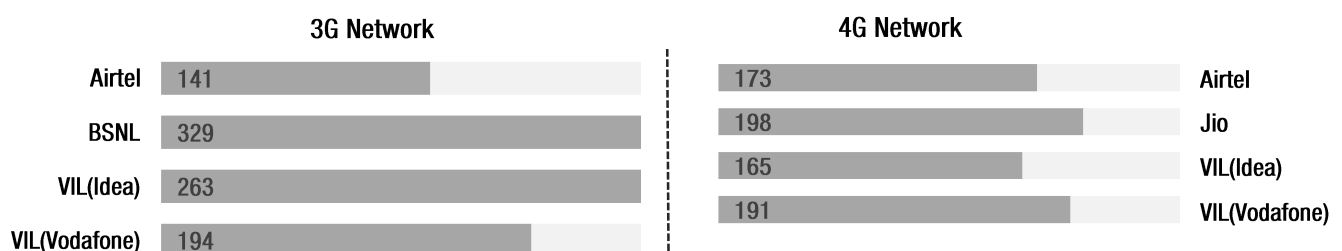
4G Network:



3G Network:



Latency (msec)

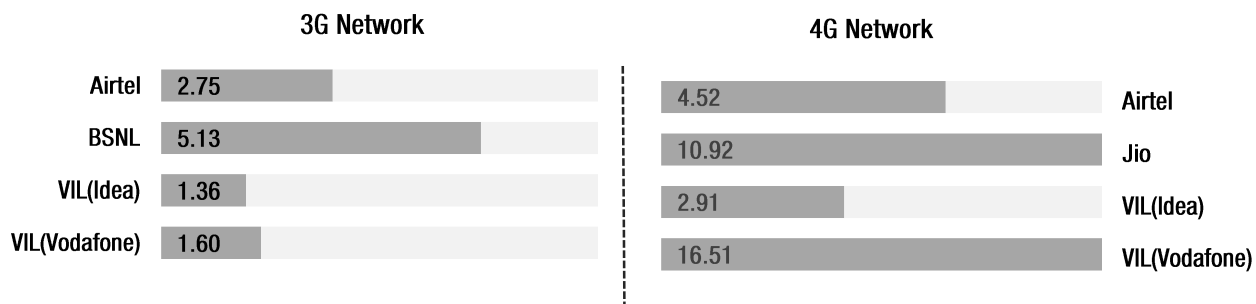


Data Services Dynamic

Key Observations

Video Streaming Performance (130 sec YouTube video sample sizes)

Streaming (sec)

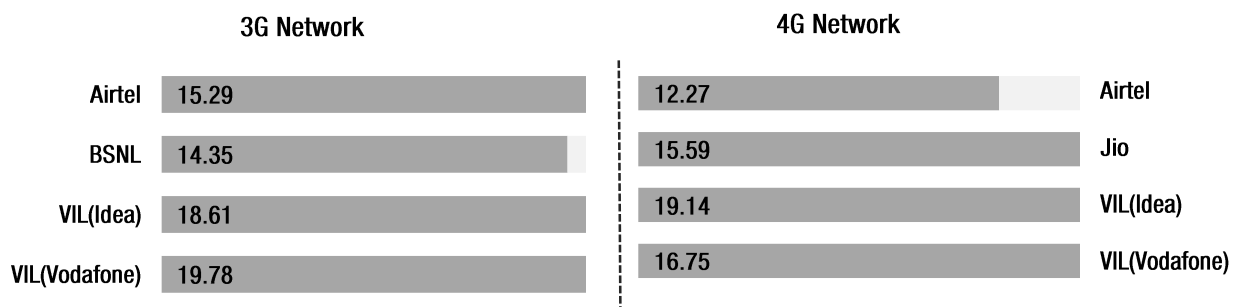


Streaming Delay further broken into 2 parameters which form the end-user perception to assess consistency on Video streaming.

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

Video Streaming	3G				4G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio	VIL(Idea)	VIL(Vodafone)
Avg. Initial Start Time (sec)	2.75	3.65	1.36	1.60	4.52	1.99	2.91	0.69
Avg. Interruption Time (sec)	0.00	1.48	0.00	0.00	0.00	8.93	0.00	15.82

Web Page Download Time (sec)



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

Summary

City Level Summary

Voice Call	2G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
Call Attempt	504	506	413	439
Blocked Call Rate (%)	2.18%	1.38%	0.48%	0.23%
CSSR% (Accessibility)	97.82%	98.62%	99.52%	99.77%
Drop Call Rate (%)	3.25%	7.01%	6.08%	8.22%
Mobility HOSR (%)	91.96%	85.95%	96.21%	94.77%
Rx Quality (%)	87.95%	91.77%	90.84%	89.72%

Voice Call	3G				VoLTE	
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio
Call Attempt	464	501	400	400	436	455
Blocked Call Rate (%)	4.09%	2.00%	1.75%	4.75%	3.21%	1.10%
CSSR% (Accessibility)	95.91%	98.00%	98.25%	95.25%	96.79%	98.90%
Drop Call Rate (%)	2.92%	6.52%	6.36%	3.15%	2.84%	2.89%
Mobility HOSR (%)	99.28%	92.38%	99.86%	98.82%	99.90%	99.00%
Rx Quality (%)	82.94%	92.03%	69.96%	74.44%	36.43%	73.89%

Summary

City Level Summary(contd.)

Data Test - Stationary

Data Services	2G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
Download Throughput (Kbps)	23.68	134.84	117.31	88.87
Upload Throughput (kbps)	23.25	111.69	106.39	122.96
Web Browsing Delay (sec)	47.43	44.60	32.07	31.83
Latency (msec)	467	766	373	391

Data Services	3G				4G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio	VIL(Idea)	VIL(Vodafone)
Download Throughput (Mbps)	1.27	2.81	0.12	0.18	6.69	6.29	1.11	1.23
Upload Throughput (Mbps)	0.49	1.37	1.35	1.34	2.63	5.71	3.72	5.81
Web Browsing Delay (sec)	16.11	14.76	19.72	17.42	11.62	11.53	13.99	14.23
Video Streaming Delay (sec)	5.47	2.96	2.47	2.01	4.69	4.03	2.85	3.42
Latency (msec)	326	292	191	133	146	137	163	113

Data Test - Mobility

Data Services	3G				4G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio	VIL(Idea)	VIL(Vodafone)
Download Throughput (Mbps)	0.35	2.39	0.07	0.10	3.12	1.47	0.37	0.19
Upload Throughput (Mbps)	0.47	0.96	0.58	0.57	1.27	1.16	3.00	3.81
Web Browsing Delay (sec)	15.29	14.35	18.61	19.78	12.27	15.59	19.14	16.75
Video Streaming Delay (sec)	2.75	5.13	1.36	1.60	4.52	10.92	2.91	16.51
Latency (msec)	141	329	263	194	173	198	165	191

*TO=Timeout

Summary

City Level Summary(contd.)

Bara Bazar	2G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
Download Throughput (Kbps)	TO	120.25	TO	34.99
Upload Throughput (kbps)	12.24	118.93	14.63	29.33
Web Browsing Delay (sec)	41.73	40.46	31.29	37.33
Latency (msec)	323	779	354	426

Bara Bazar	3G				4G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio	VIL(Idea)	VIL(Vodafone)
Download Throughput (Mbps)	0.34	4.13	0.09	0.19	8.83	10.16	1.81	TO
Upload Throughput (Mbps)	0.32	0.53	0.89	1.01	3.95	4.19	3.67	TO
Web Browsing Delay (sec)	18.26	11.65	16.81	18.46	9.53	12.04	11.18	11.34
Video Streaming Delay (sec)	TO	1.92	2.23	2.41	1.37	1.57	2.33	3.98
Latency (msec)	652	149	151	159	119	129	185	92

New Secretariat	2G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
Download Throughput (Kbps)	TO	141.61	109.61	89.31
Upload Throughput (kbps)	10.68	93.55	163.45	155.33
Web Browsing Delay (sec)	41.70	39.20	36.01	33.32
Latency (msec)	450	788	370	317

New Secretariat	3G				4G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio	VIL(Idea)	VIL(Vodafone)
Download Throughput (Mbps)	TO	1.96	0.09	0.16	1.58	5.78	0.38	0.30
Upload Throughput (Mbps)	0.47	1.63	0.92	0.92	0.75	6.39	0.91	0.94
Web Browsing Delay (sec)	14.38	13.71	21.04	16.58	14.29	12.27	14.98	15.33
Video Streaming Delay (sec)	5.96	2.96	5.40	3.63	8.02	7.01	14.63	10.44
Latency (msec)	348	323	167	109	176	119	146	119

*TO=Timeout

Summary

City Level Summary(contd.)

Pachhunga University College	2G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
Download Throughput (Kbps)	24.56	112.84	153.17	142.38
Upload Throughput (kbps)	34.47	116.18	156.25	188.45
Web Browsing Delay (sec)	52.03	61.85	34.06	33.97
Latency (msec)	534	752	332	447

Pachhunga University College	3G				4G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio	VIL(Idea)	VIL(Vodafone)
Download Throughput (Mbps)	1.74	1.77	0.23	0.22	14.23	7.18	2.21	3.28
Upload Throughput (Mbps)	0.65	3.01	1.54	1.97	4.46	7.83	5.37	9.09
Web Browsing Delay (sec)	15.40	14.21	18.10	18.88	10.16	9.64	12.10	12.61
Video Streaming Delay (sec)	5.97	3.67	1.04	1.08	1.73	1.28	0.79	1.01
Latency (msec)	345	408	175	144	142	119	167	119

Treasury Square	2G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)
Download Throughput (Kbps)	21.04	166.90	101.11	52.89
Upload Throughput (kbps)	31.94	118.09	91.23	118.72
Web Browsing Delay (sec)	45.38	37.47	25.41	21.99
Latency (msec)	443	736	416	390

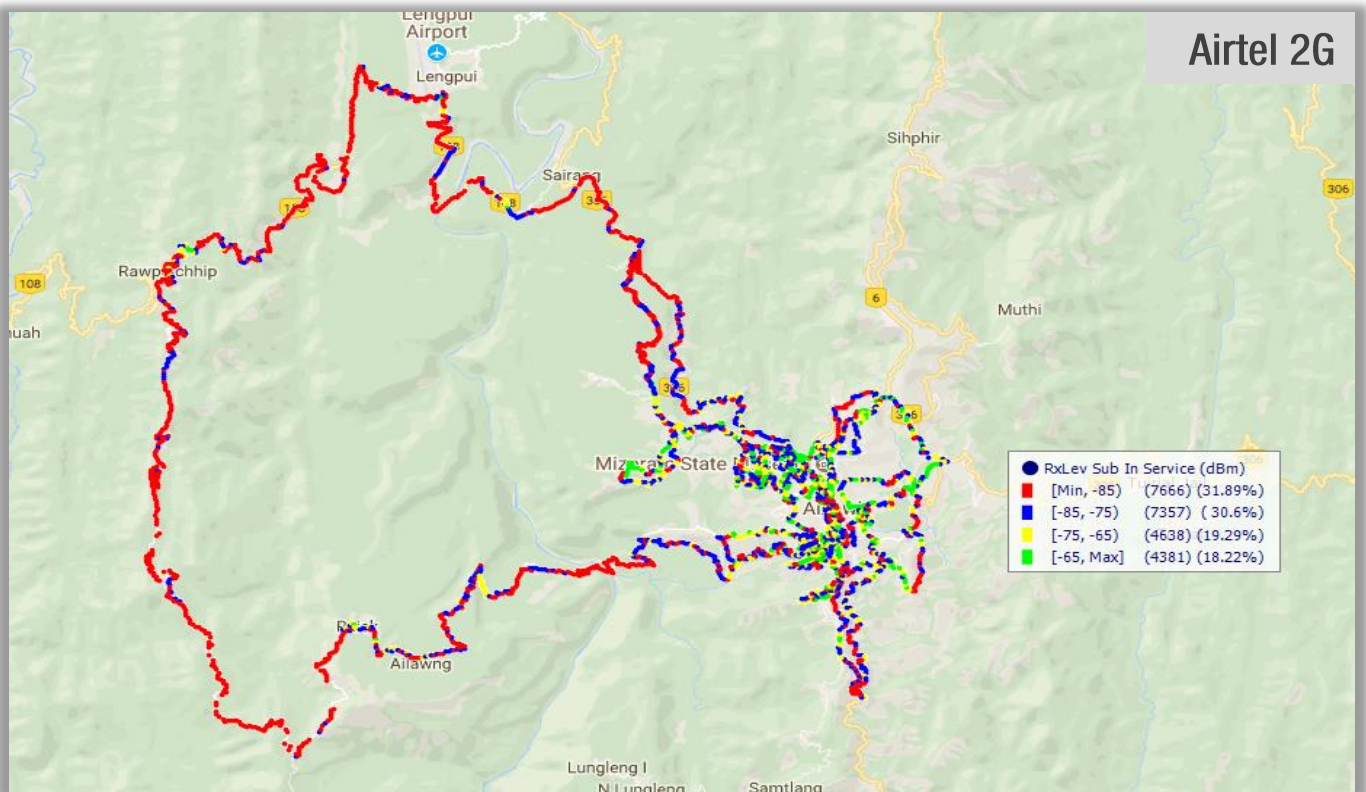
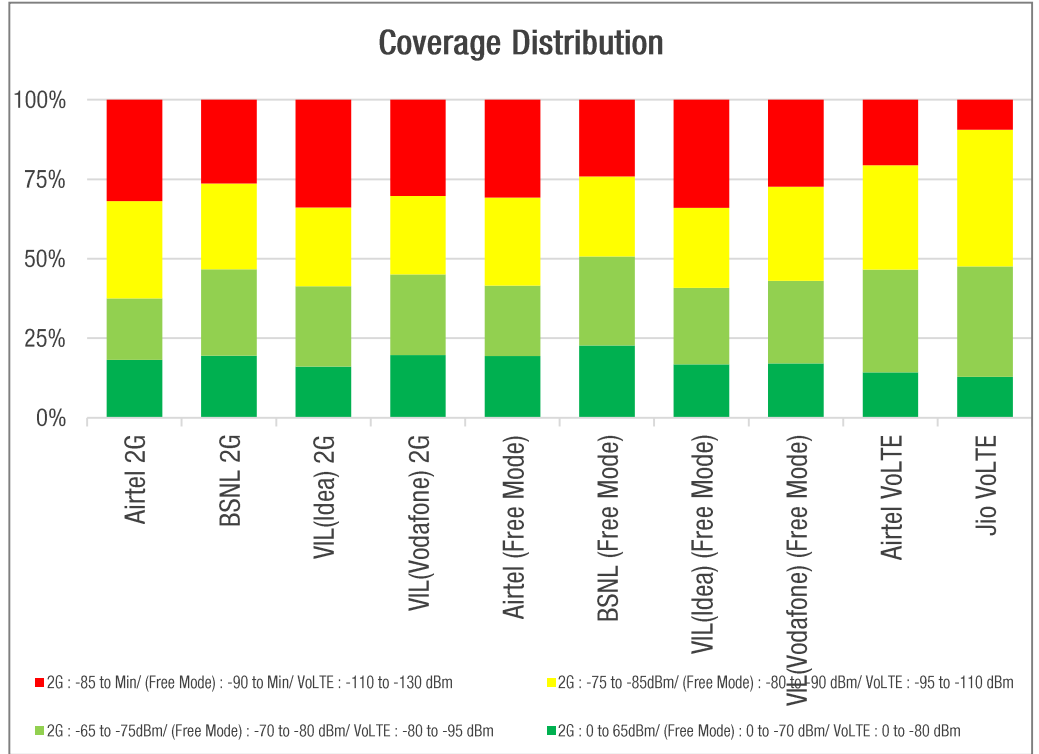
Treasury Square	3G				4G			
	Airtel	BSNL	VIL(Idea)	VIL(Vodafone)	Airtel	Jio	VIL(Idea)	VIL(Vodafone)
Download Throughput (Mbps)	T0	3.37	0.06	0.15	2.13	3.00	0.03	0.11
Upload Throughput (Mbps)	0.52	0.32	2.03	1.47	1.37	4.44	4.95	7.40
Web Browsing Delay (sec)	17.58	19.34	22.72	15.37	12.49	12.22	18.30	18.46
Video Streaming Delay (sec)	3.97	3.29	1.23	1.47	7.64	6.23	1.53	2.70
Latency (msec)	236	322	287	122	147	179	155	104

*T0=Timeout

I. Coverage Details

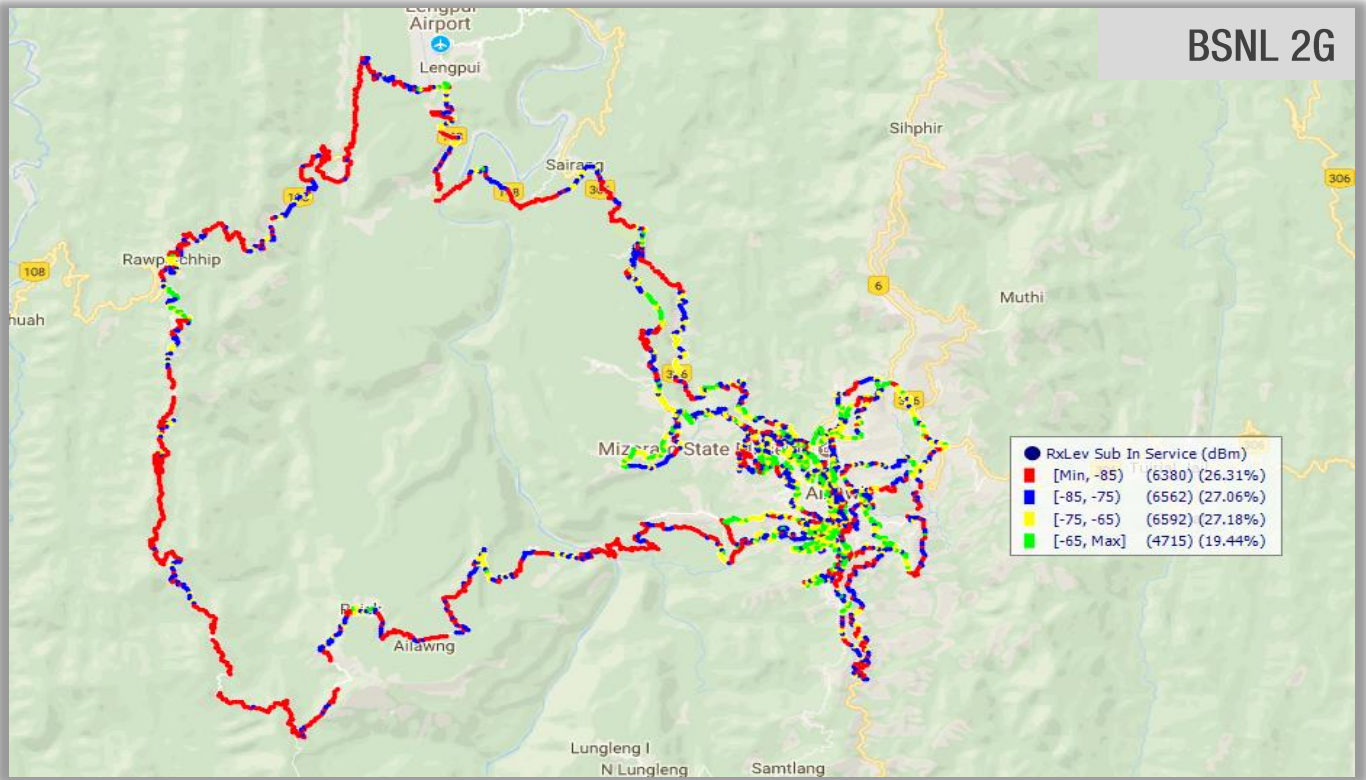
RF Coverage relates to the geographical footprint within the system that has sufficient RF signal strength to provide for a call/data session. The Coverage rate of an TSP is calculated on the basis of % of samples in which the Rx level ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110 dBm. The details are as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

TSP	Coverage Rate
Airtel 2G	68.11%
BSNL 2G	73.69%
VIL(Idea) 2G	66.12%
VIL(Vodafone) 2G	69.78%
Airtel (Free Mode)	69.23%
BSNL (Free Mode)	75.83%
VIL(Idea) (Free Mode)	65.99%
VIL(Vodafone) (Free Mode)	72.63%
Airtel VoLTE	79.38%
Jio VoLTE	90.59%

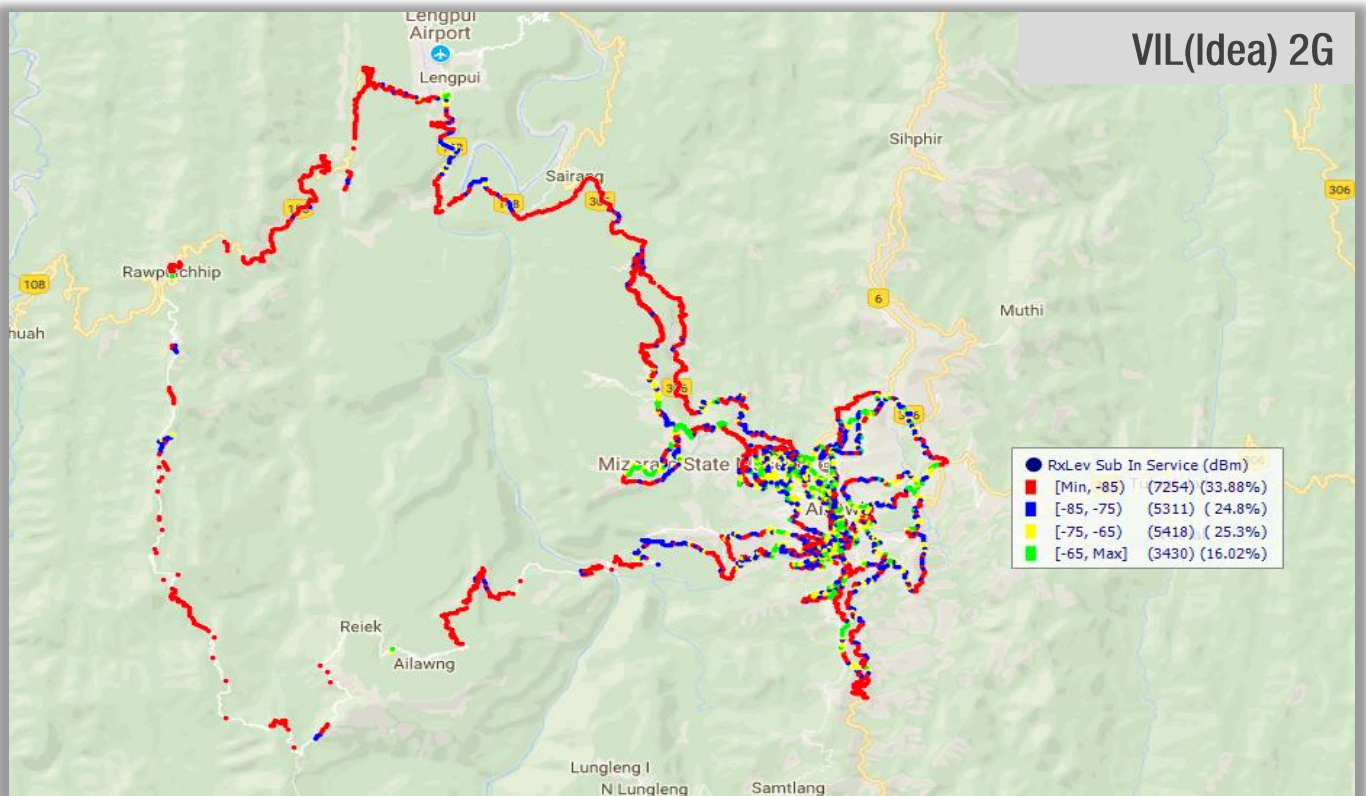


I. Coverage Details (contd.)

BSNL 2G

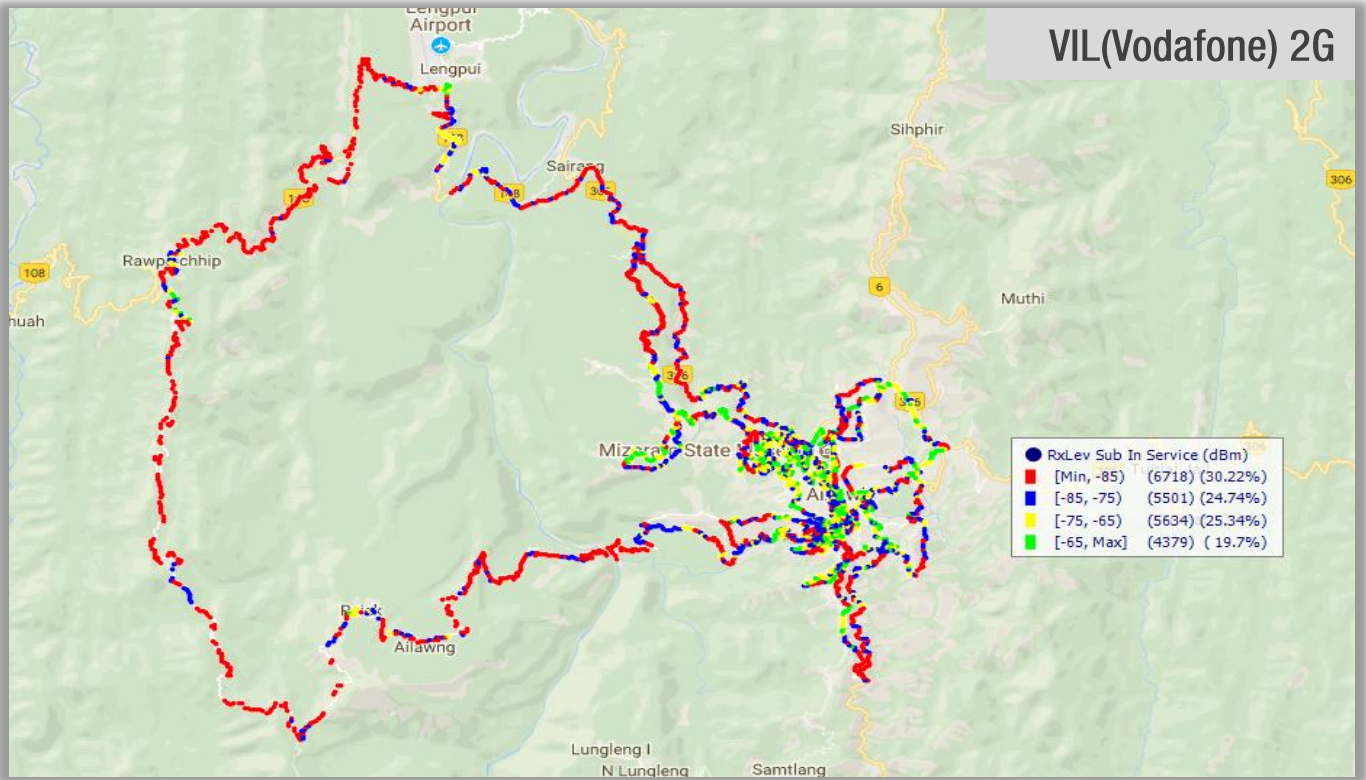


VIL(Idea) 2G

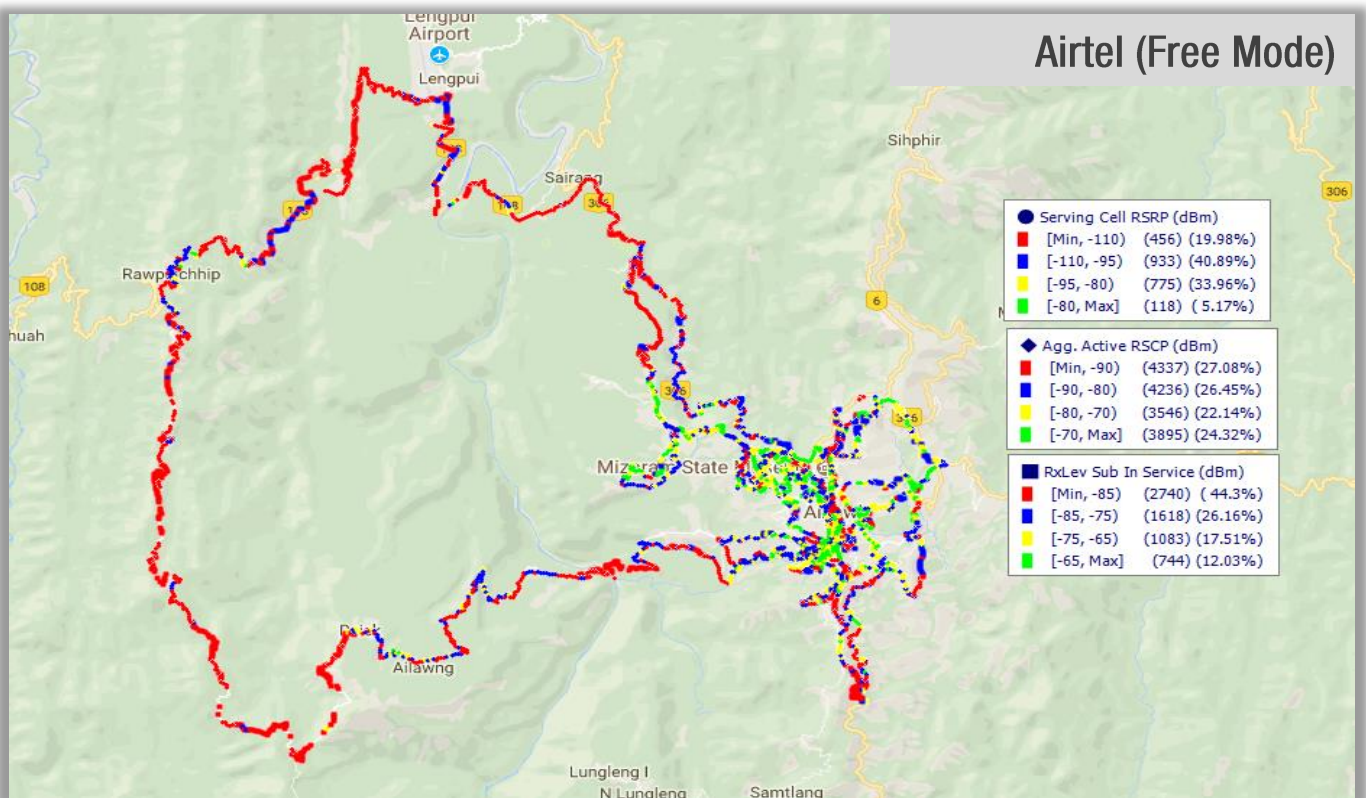


I. Coverage Details (contd.)

VIL(Vodafone) 2G

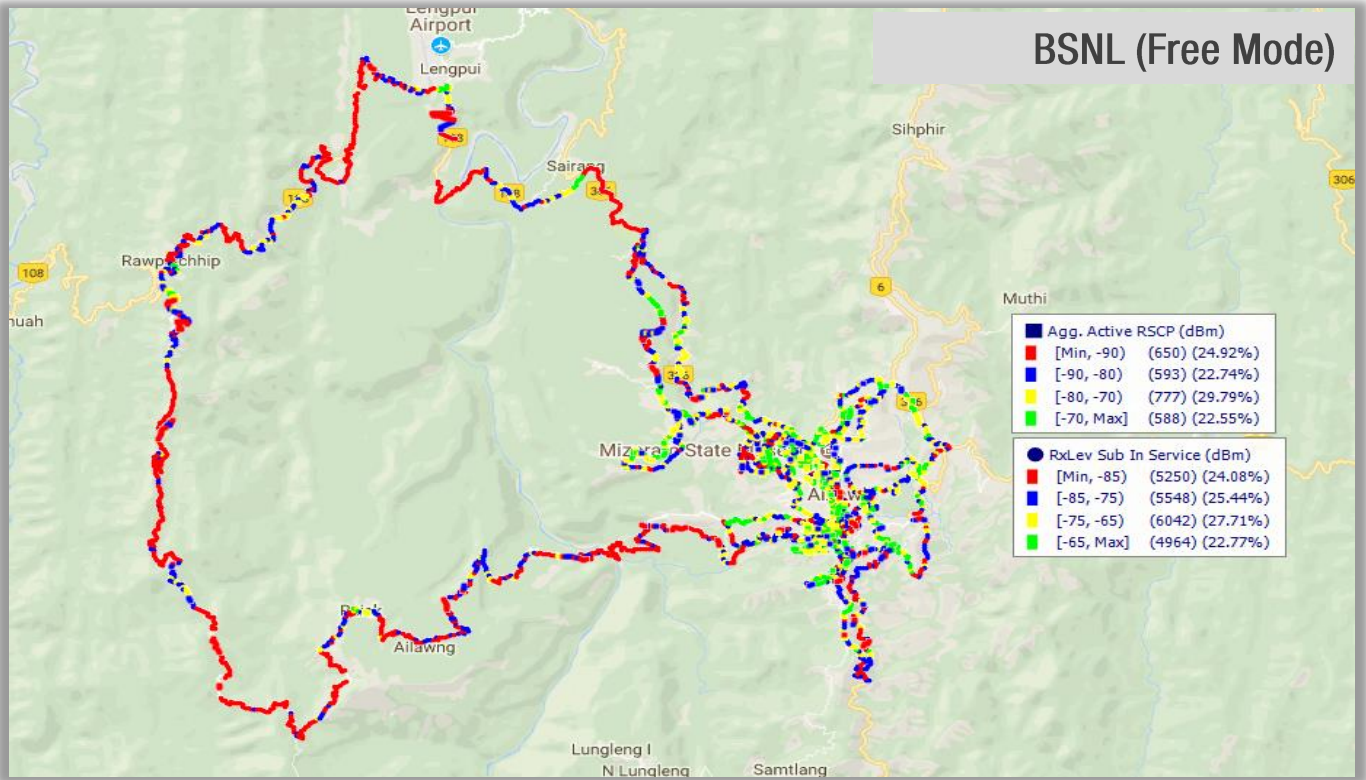


Airtel (Free Mode)

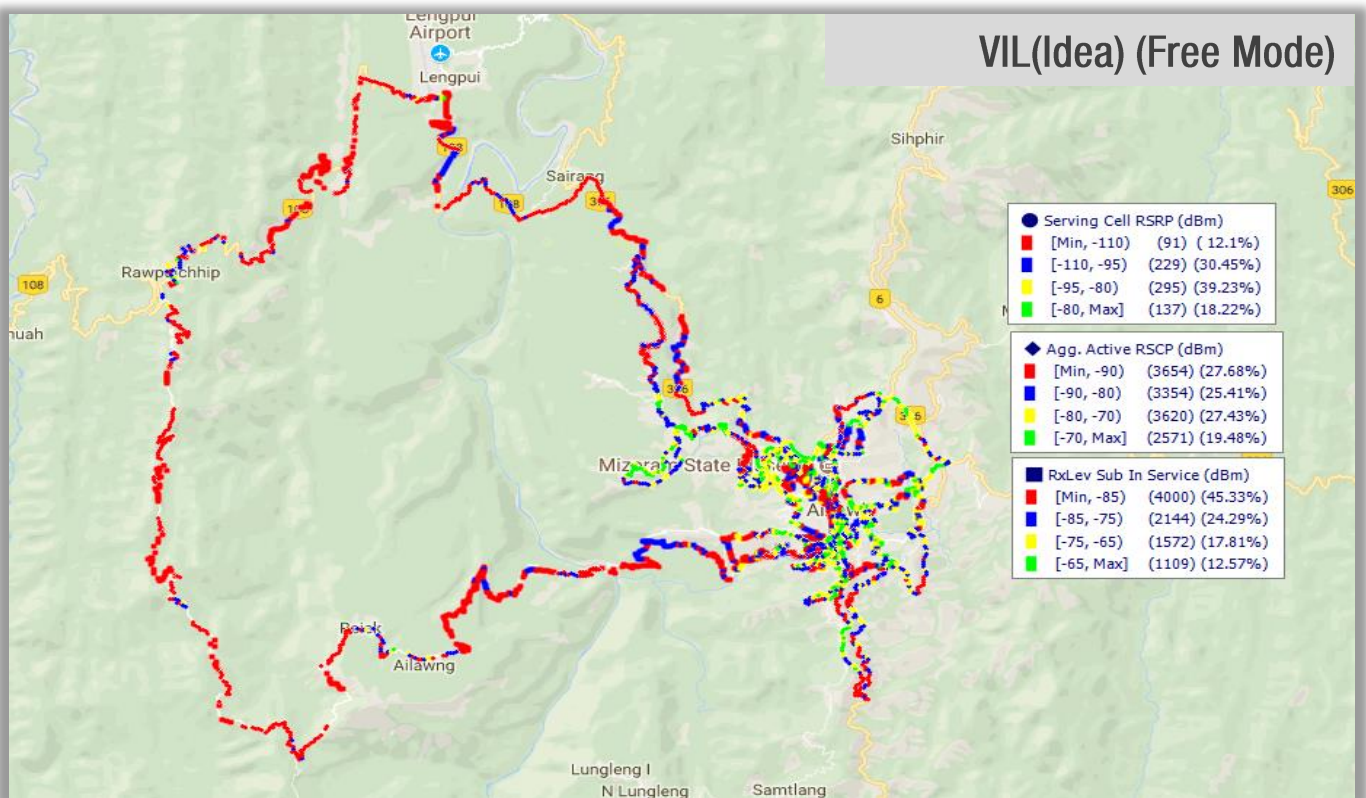


I. Coverage Details (contd.)

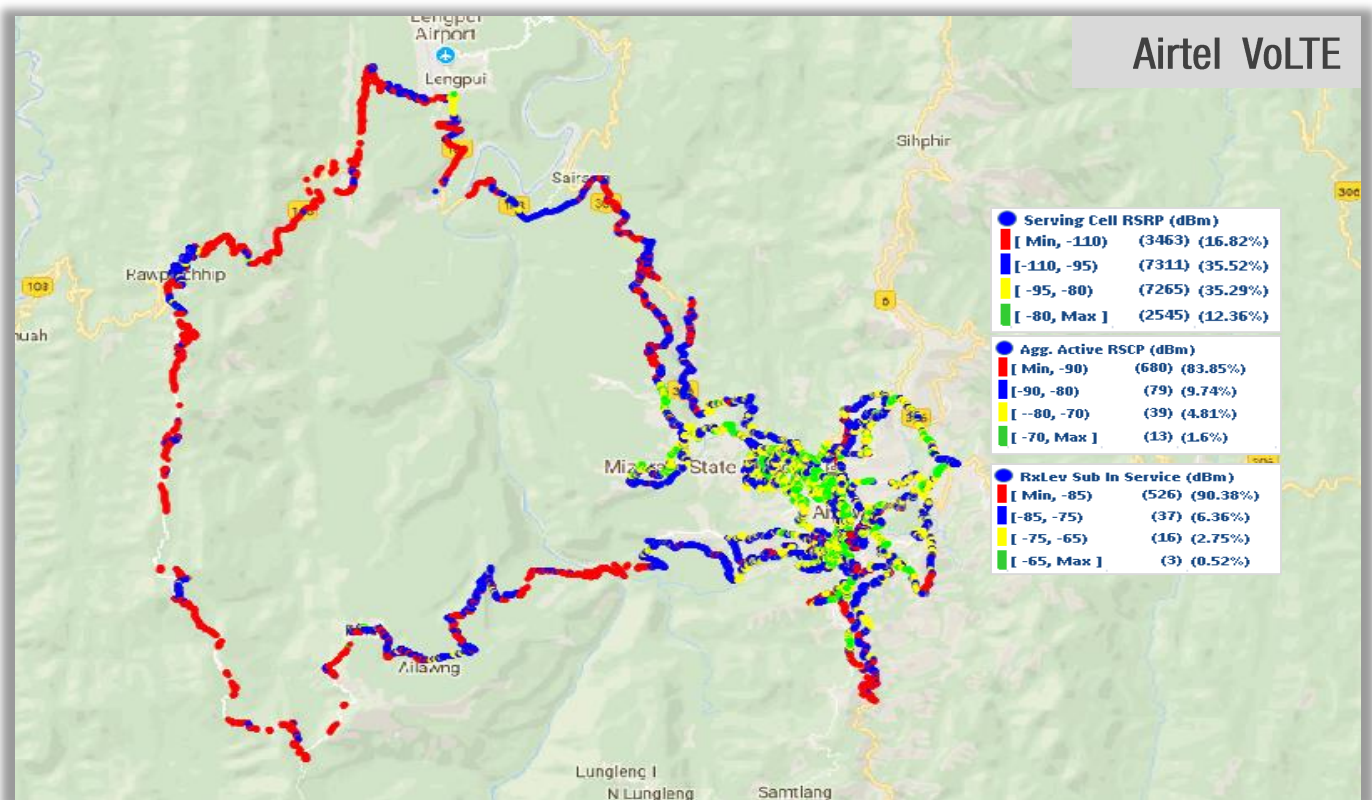
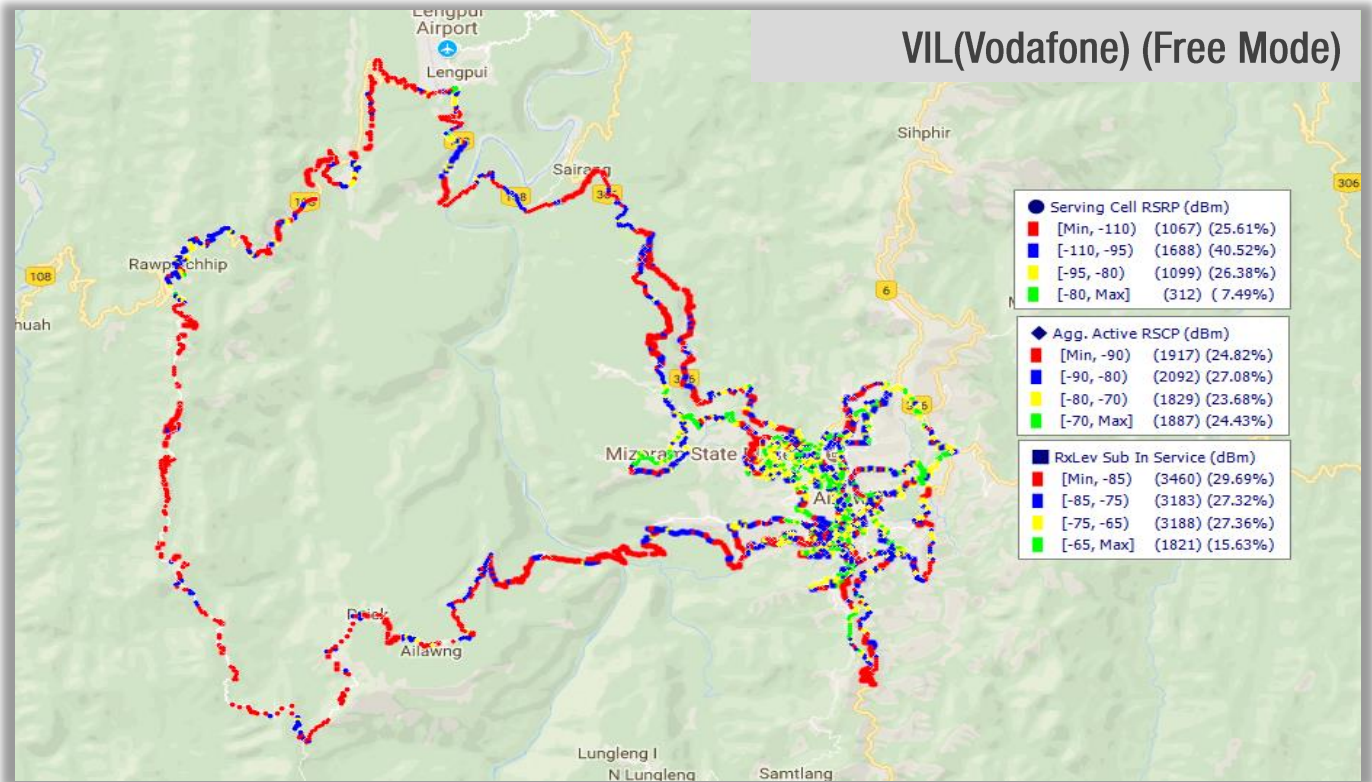
BSNL (Free Mode)



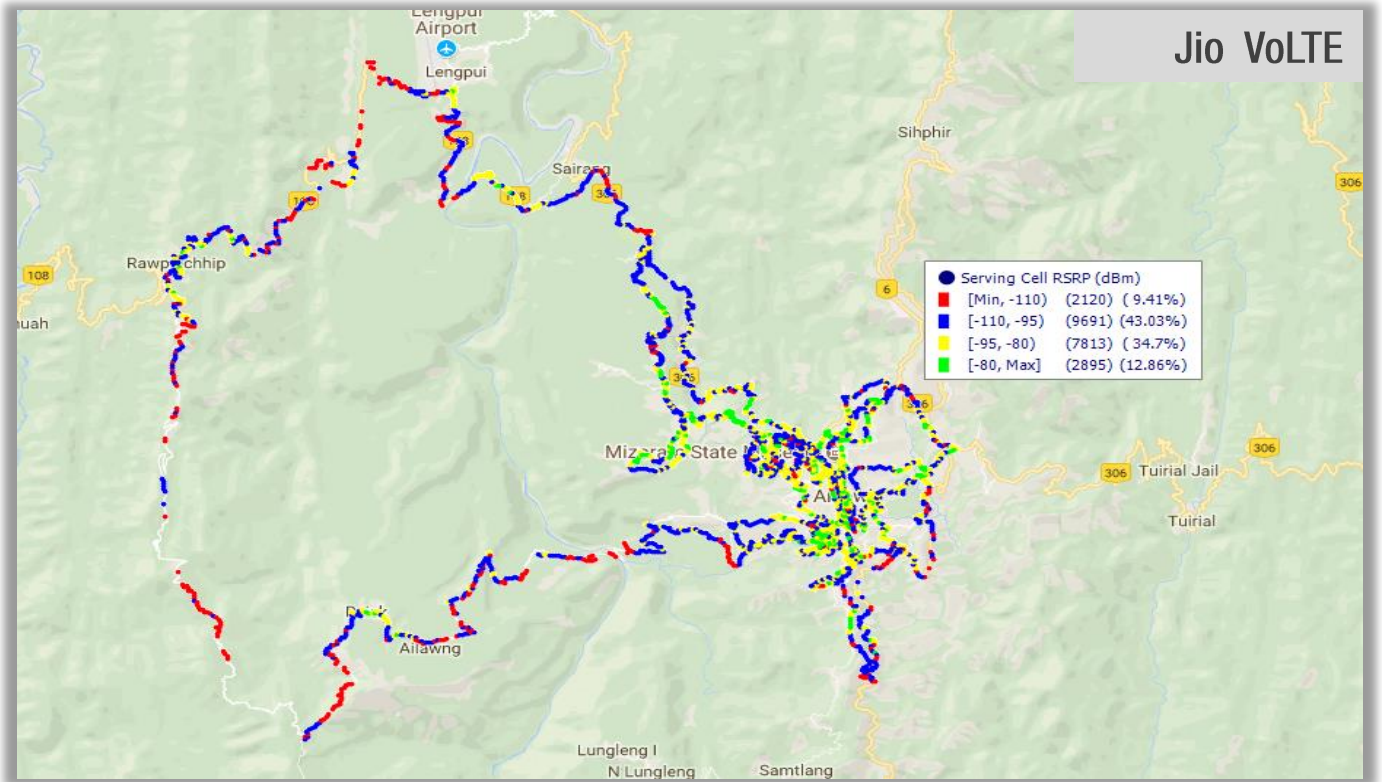
VIL(Idea) (Free Mode)



I. Coverage Details (contd.)



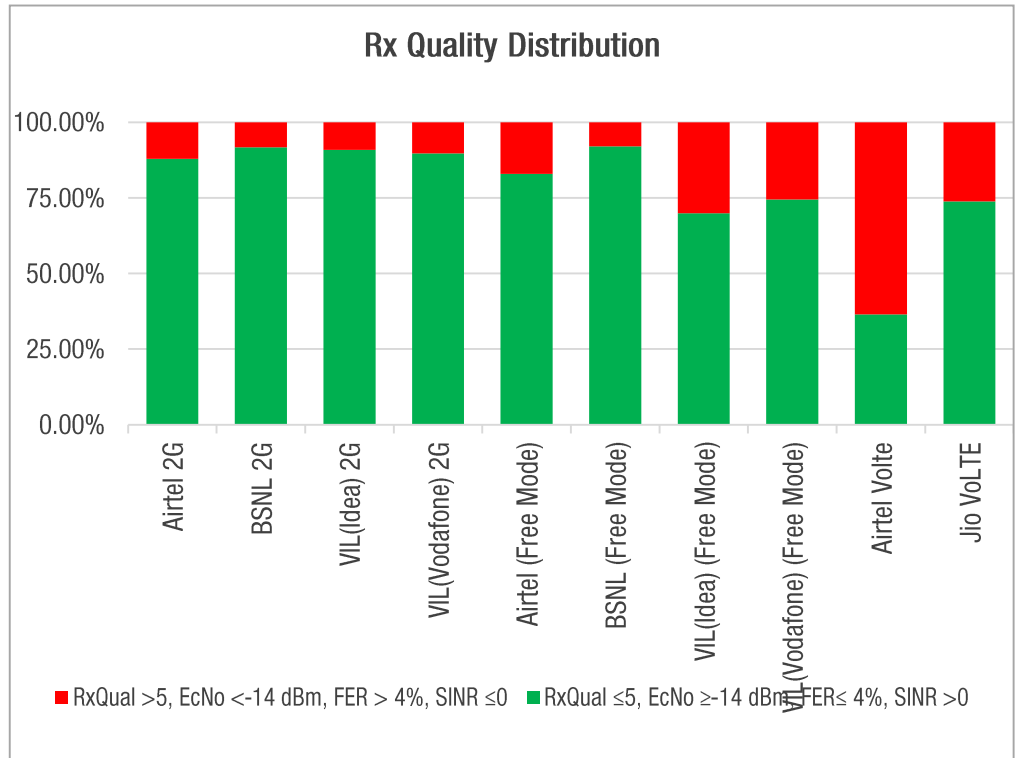
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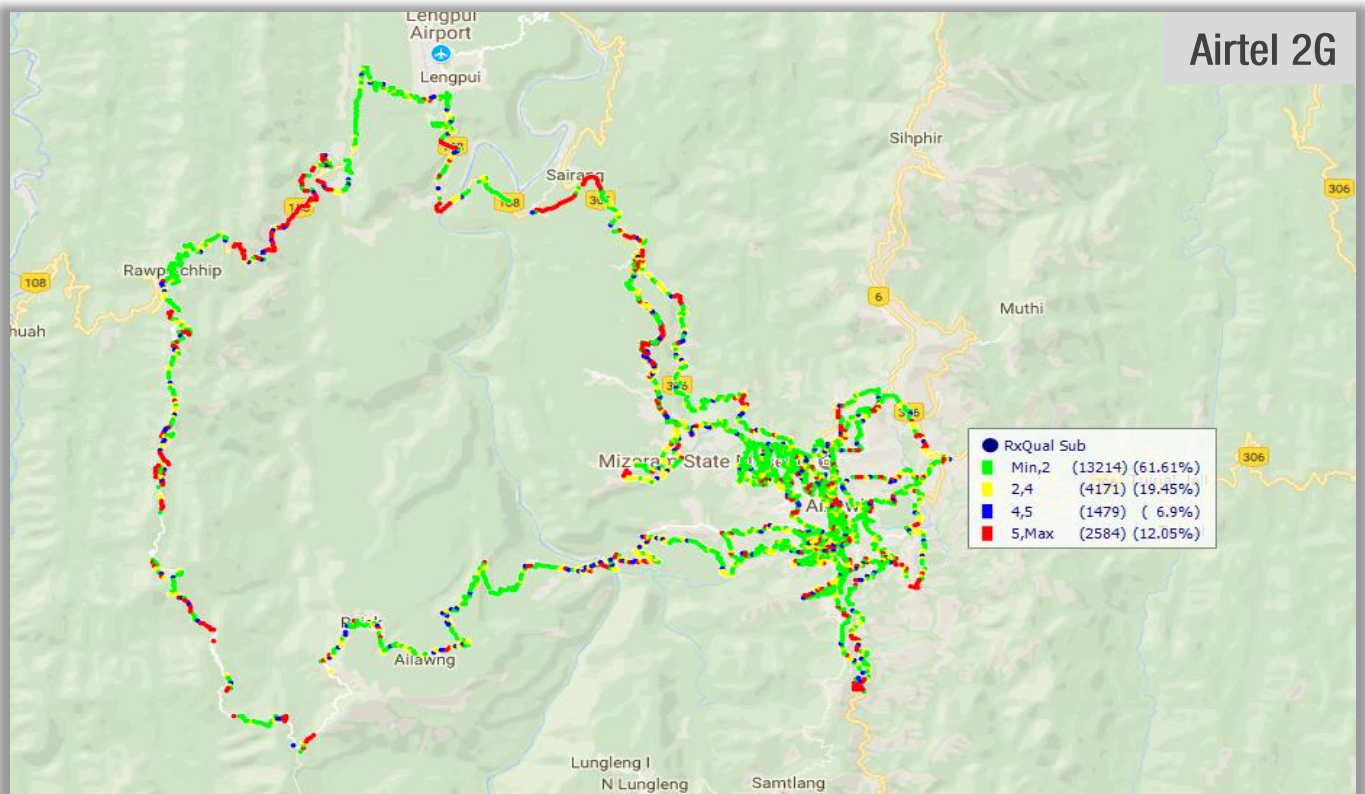
II. Quality Details

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 $\geq 95\%$.

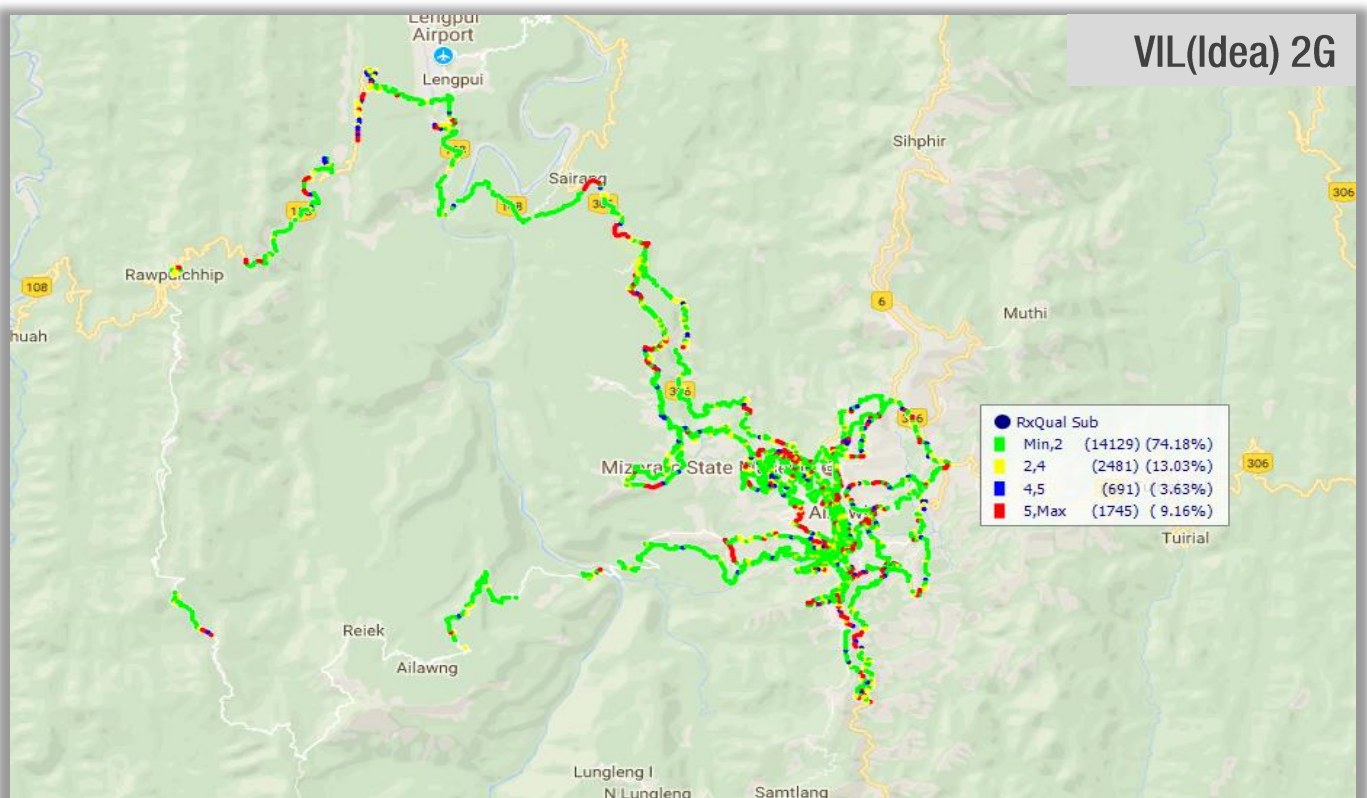
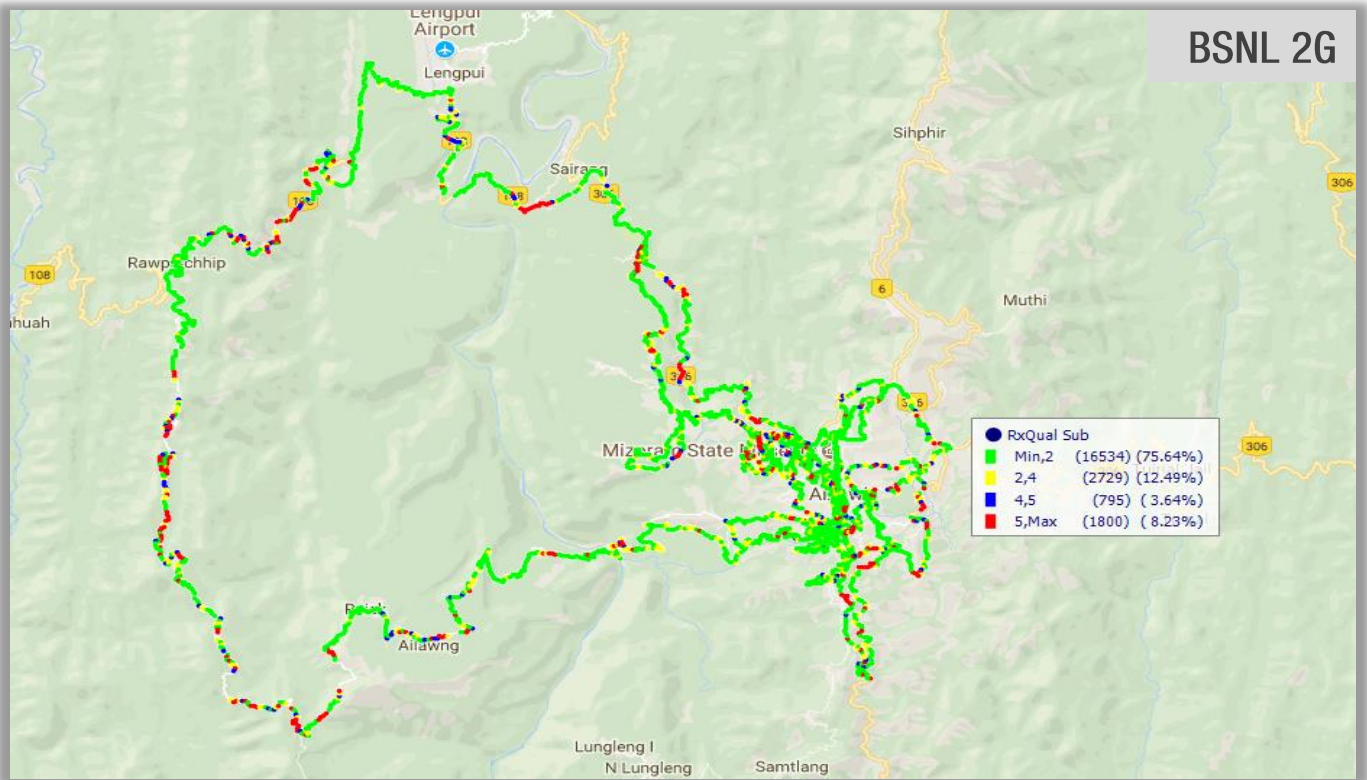
TSP	Rx Quality
Airtel 2G	87.95%
BSNL 2G	91.77%
VIL(Idea) 2G	90.84%
VIL(Vodafone) 2G	89.72%
Airtel (Free Mode)	82.94%
BSNL (Free Mode)	92.03%
VIL(Idea) (Free Mode)	69.96%
VIL(Vodafone) (Free Mode)	74.44%
Airtel VoLTE	36.43%
Jio VoLTE	73.89%



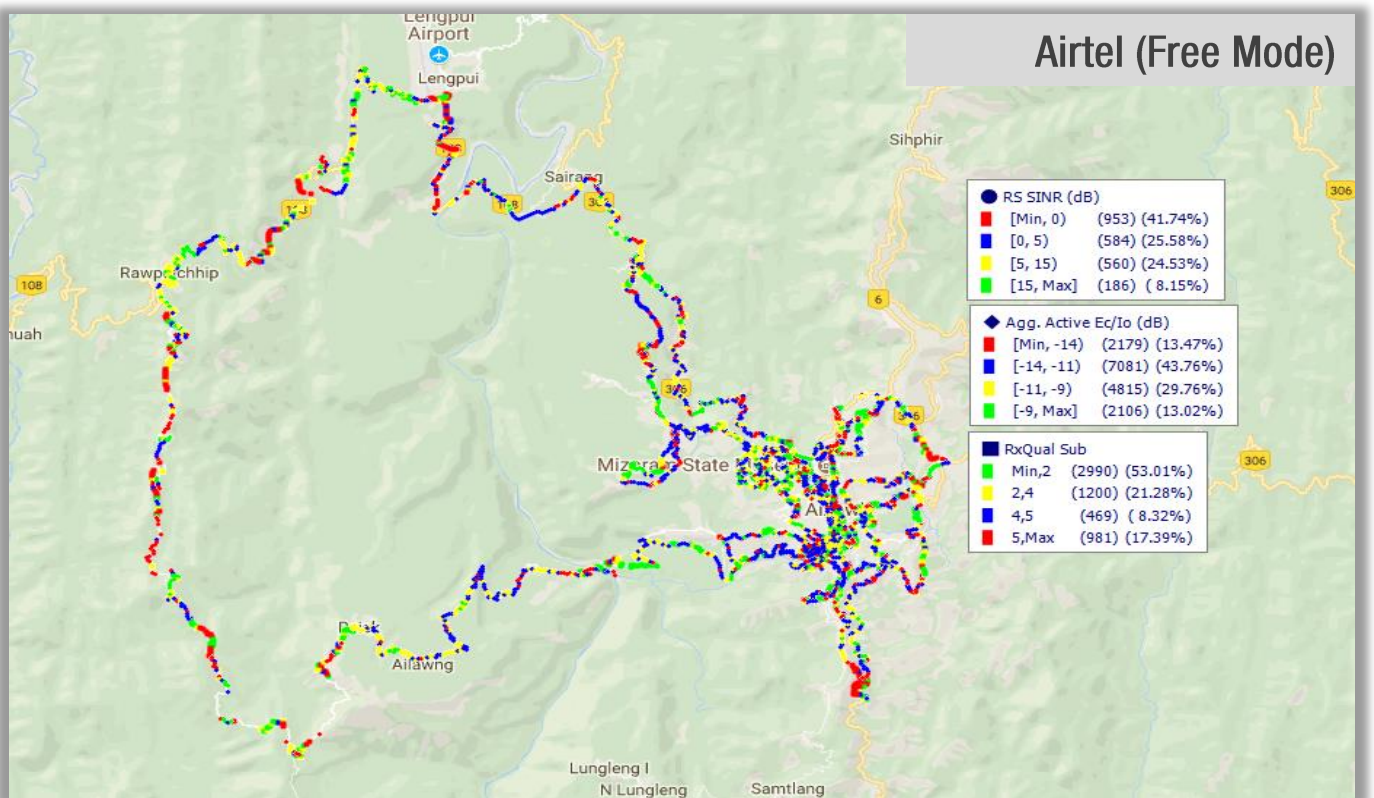
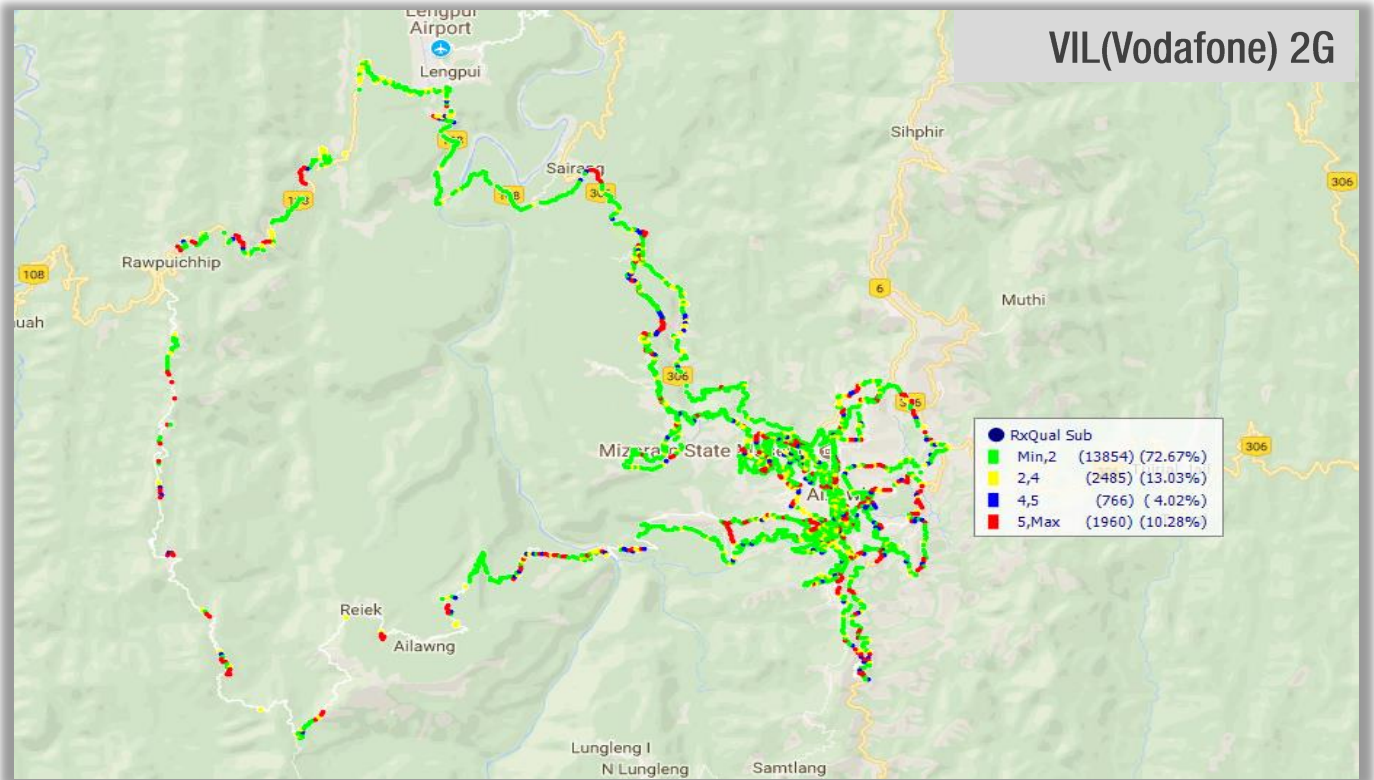
— TSPs not meeting the Benchmark



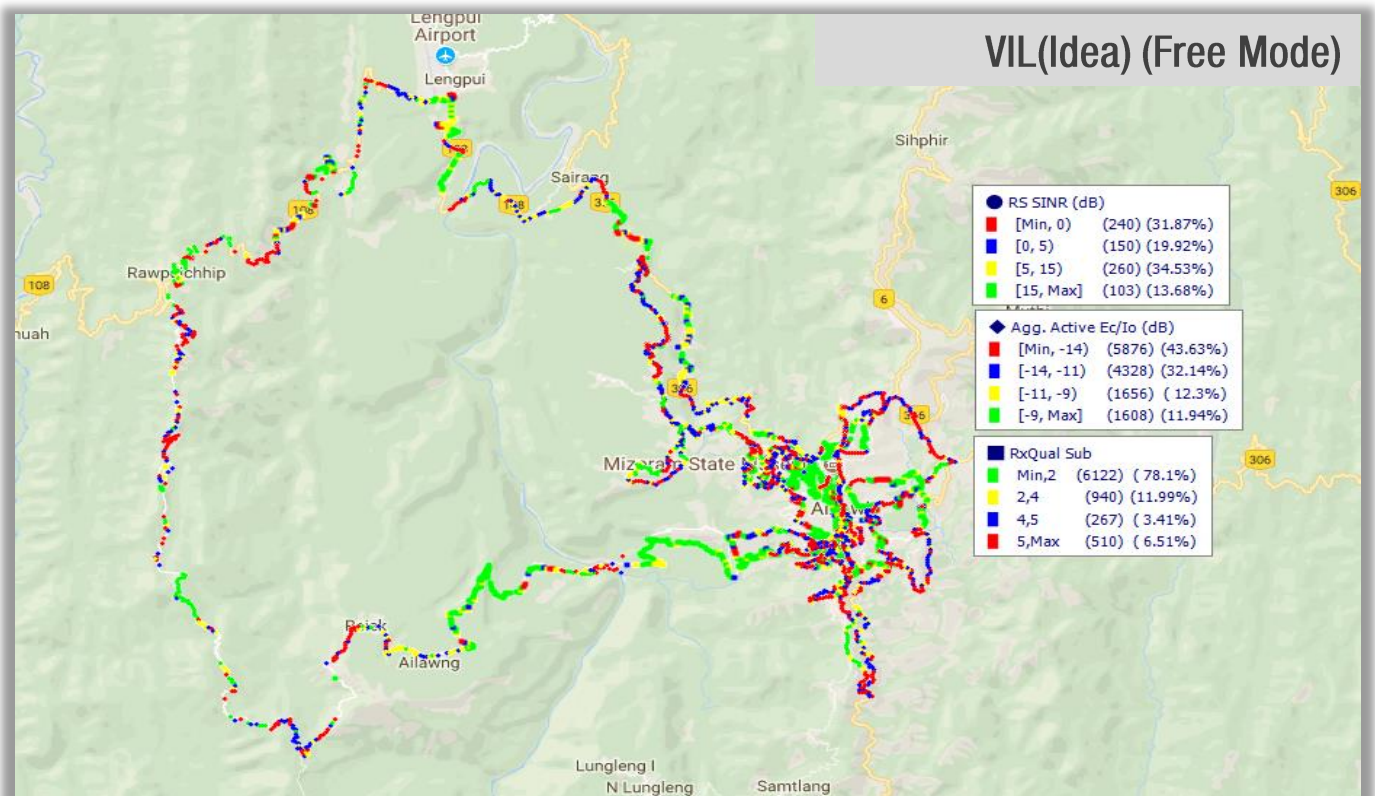
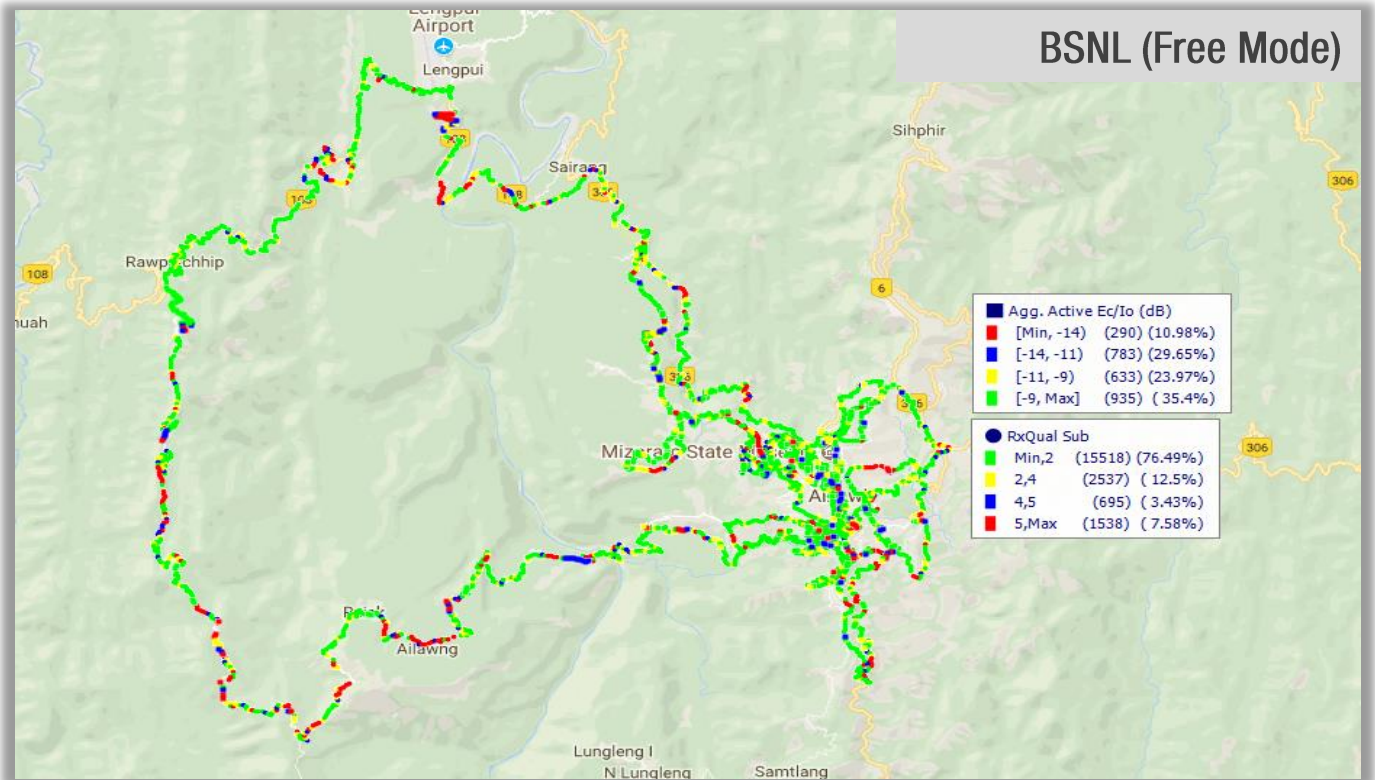
II. Quality Details (contd.)



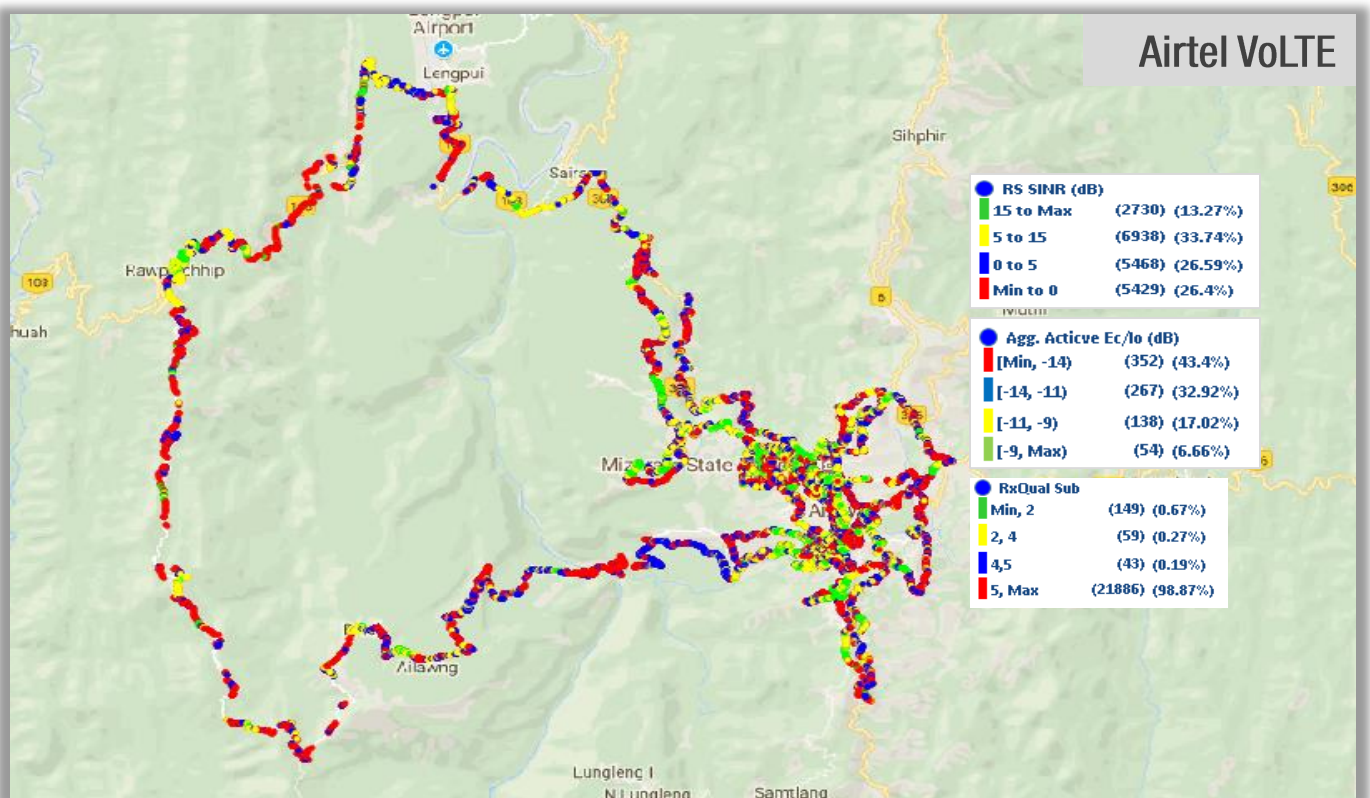
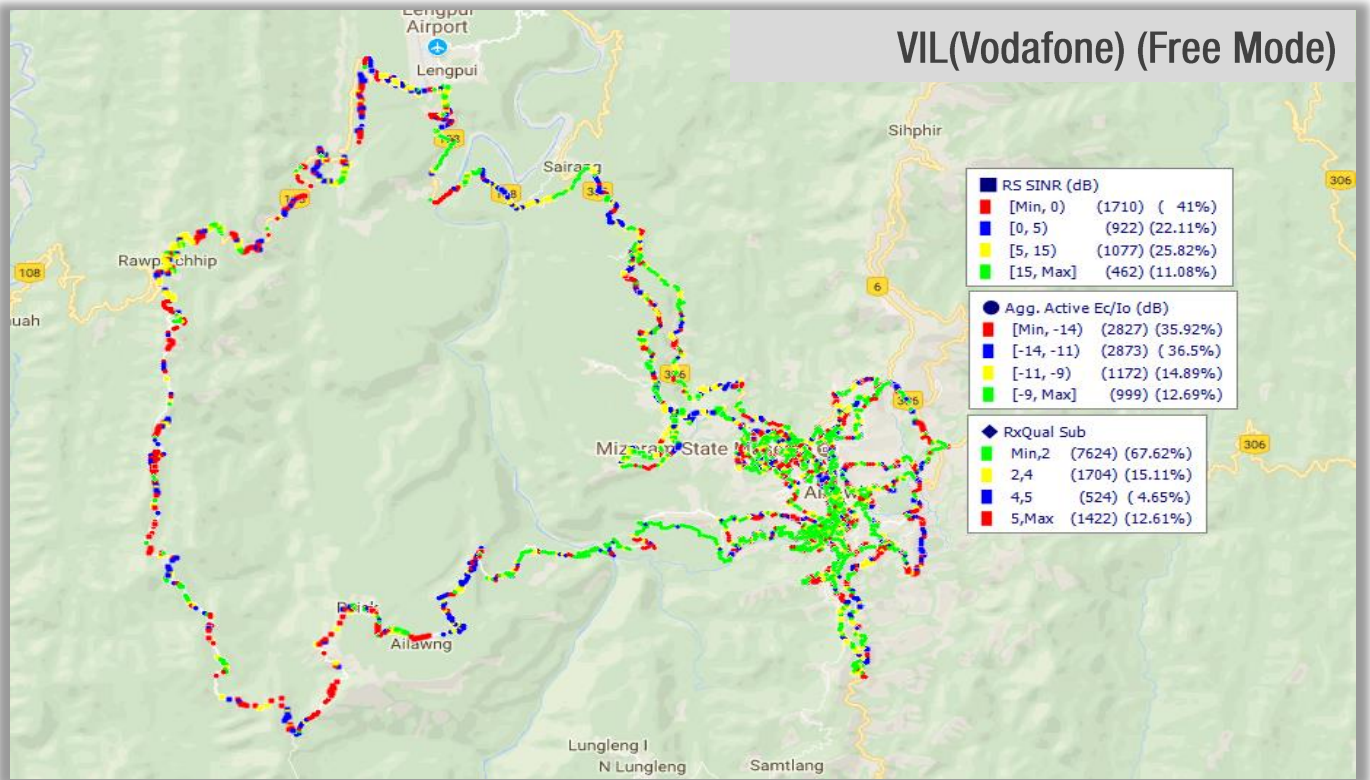
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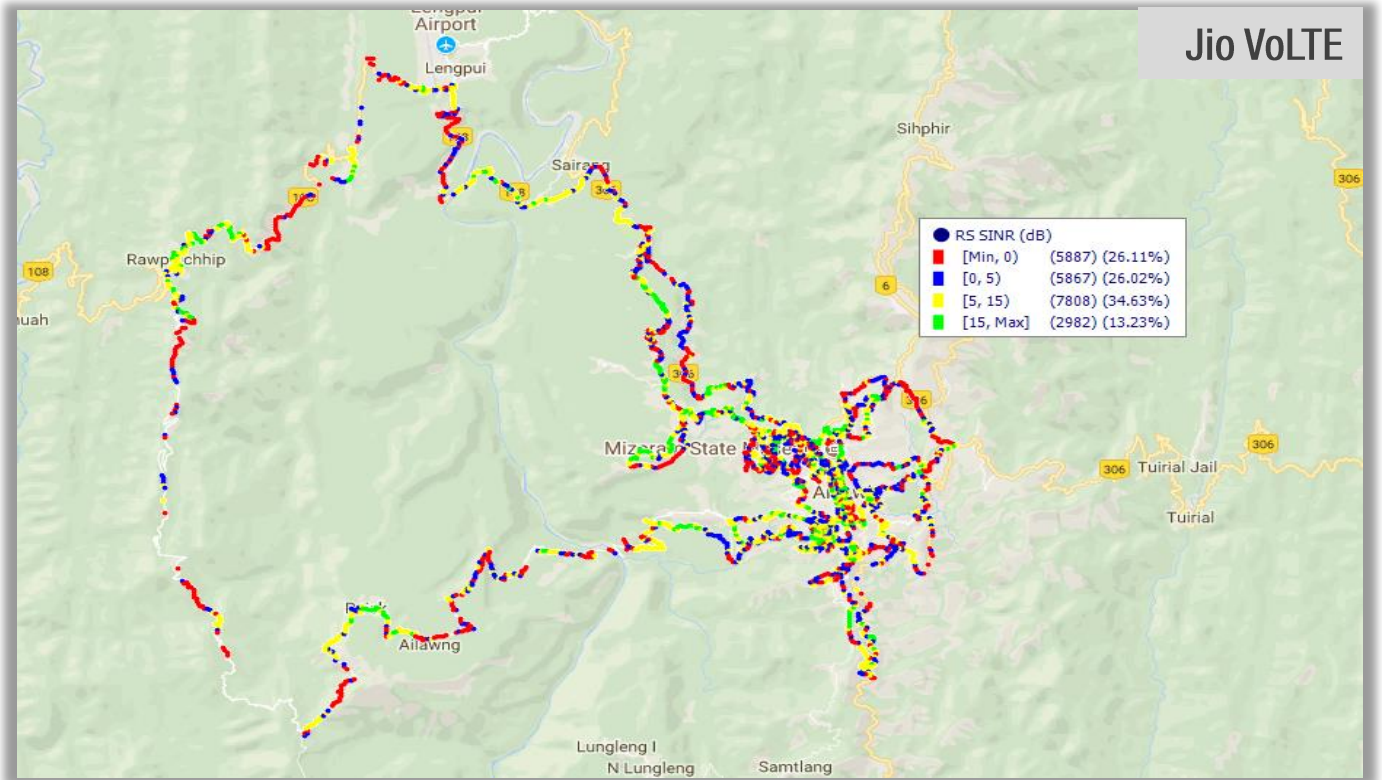
II. Quality Details (contd.)



II. Quality Details (contd.)

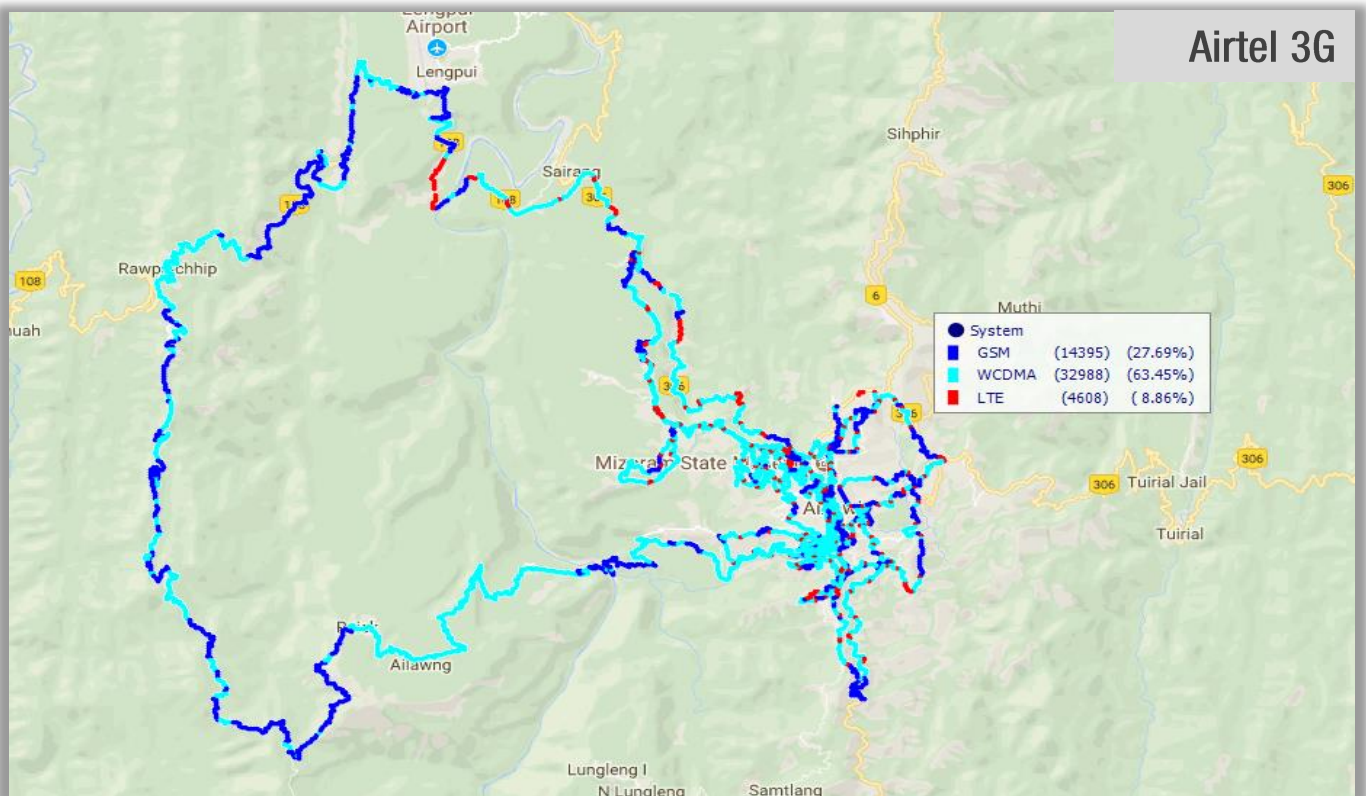
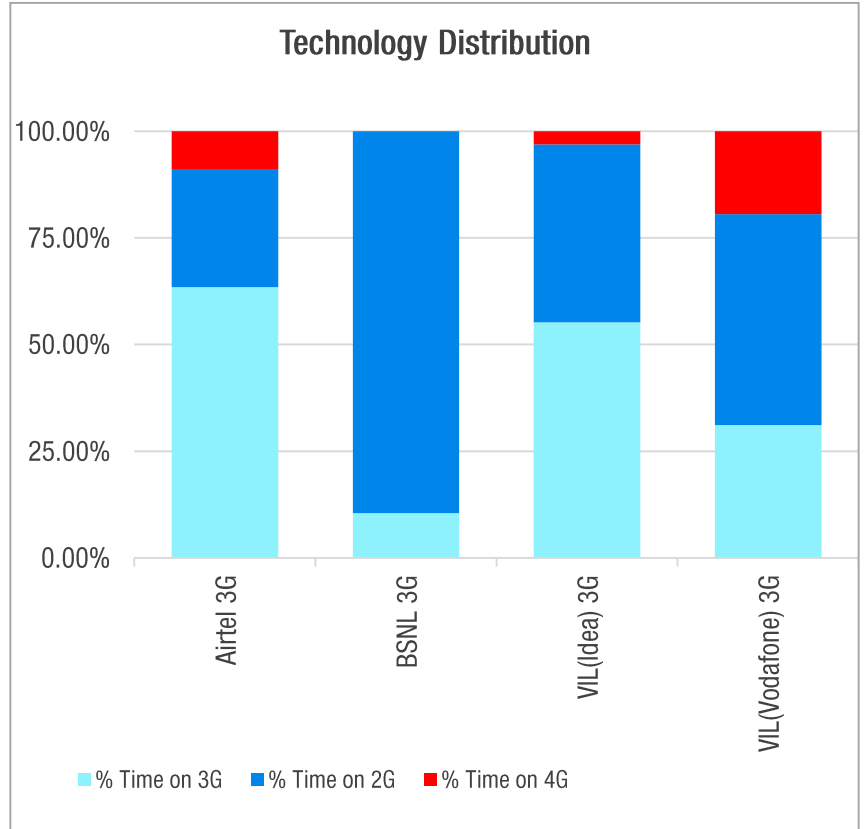


II. Quality Details (contd.)

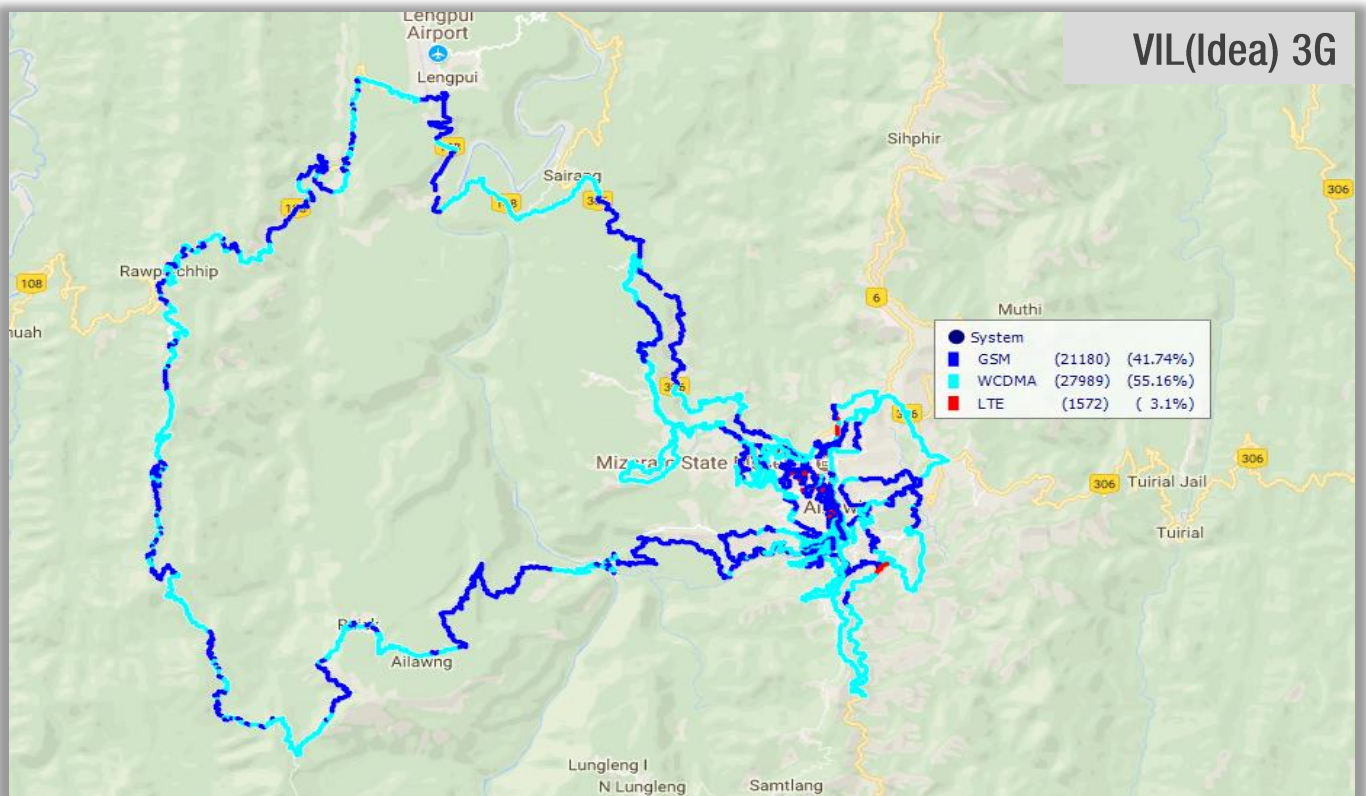
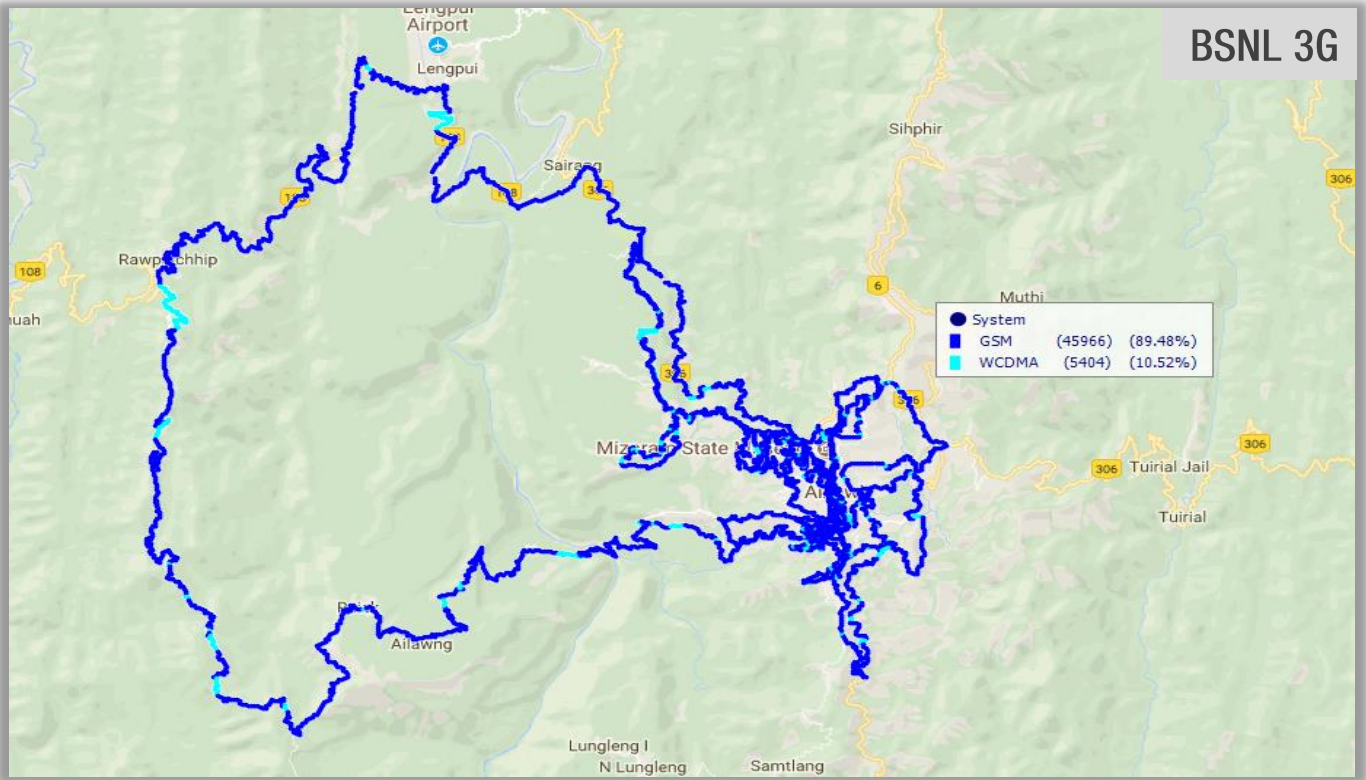


III. Technology Details

TSP	% Time on 3G
Airtel 3G	63.45%
BSNL3G	10.52%
VIL(Idea) 3G	55.16%
VIL(Vodafone) 3G	31.11%



III. Technology Details(contd.)



III. Technology Details(contd.)

