Operator Assisted Drive Test Report

Gwalior to Delhi Rail route
Date – 28th & 29th June 2024
By
TRAI Regional Office Bhopal

The Operator Assisted Drive Test has been carried out by Regional Office, Bhopal with the help of Telecom Service Providers for Gwalior to Delhi Rail route from 7:00 AM to 6:00 PM 28/06/2024 by Airtel, Jio & VI and on 29/6/2024 by BSNL. The drive test covered drive route of around 350 KMs.

TSP	Network tested
Airtel	2G & VoLTE
BSNL	2G & 3G
JIO	VoLTE
VIL	2G & VoLTE

Key Performance Indicators:

KPI	Benchmark	Observations
Block call rate %	≤3%	All TSPs achieved the benchmark.
Drop call rate %	≤2%	All TSPs achieved the benchmark. Except VI in 2G and JIO in VoLTE
CSSR %	≥95 %	All TSPs achieved the benchmark, Except JIO.
Mobility HOSR %	≥95%	All TSPs achieved the benchmark, except VI in 2G
Good RX Quality %	≥95%	No TSP achieved the benchmark, except BSNL in all technologies.

Overview

Regional Office, TRAI Bhopal conducted Operator Assisted Drive Test. The performance of Airtel, BSNL, Vodafone Idea and Jio was monitored across various technologies (2G, 3G, 4G & 5G). 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:
i.   2G – measurement – UE Locked in 2G
ii.   3G – measurement – UE in Dual mode (2G and 3G)
iii. 4G – measurement – UE in Free mode

Calls were made for the **180-sec** duration with a wait time of **10 sec** between calls in all technologies.
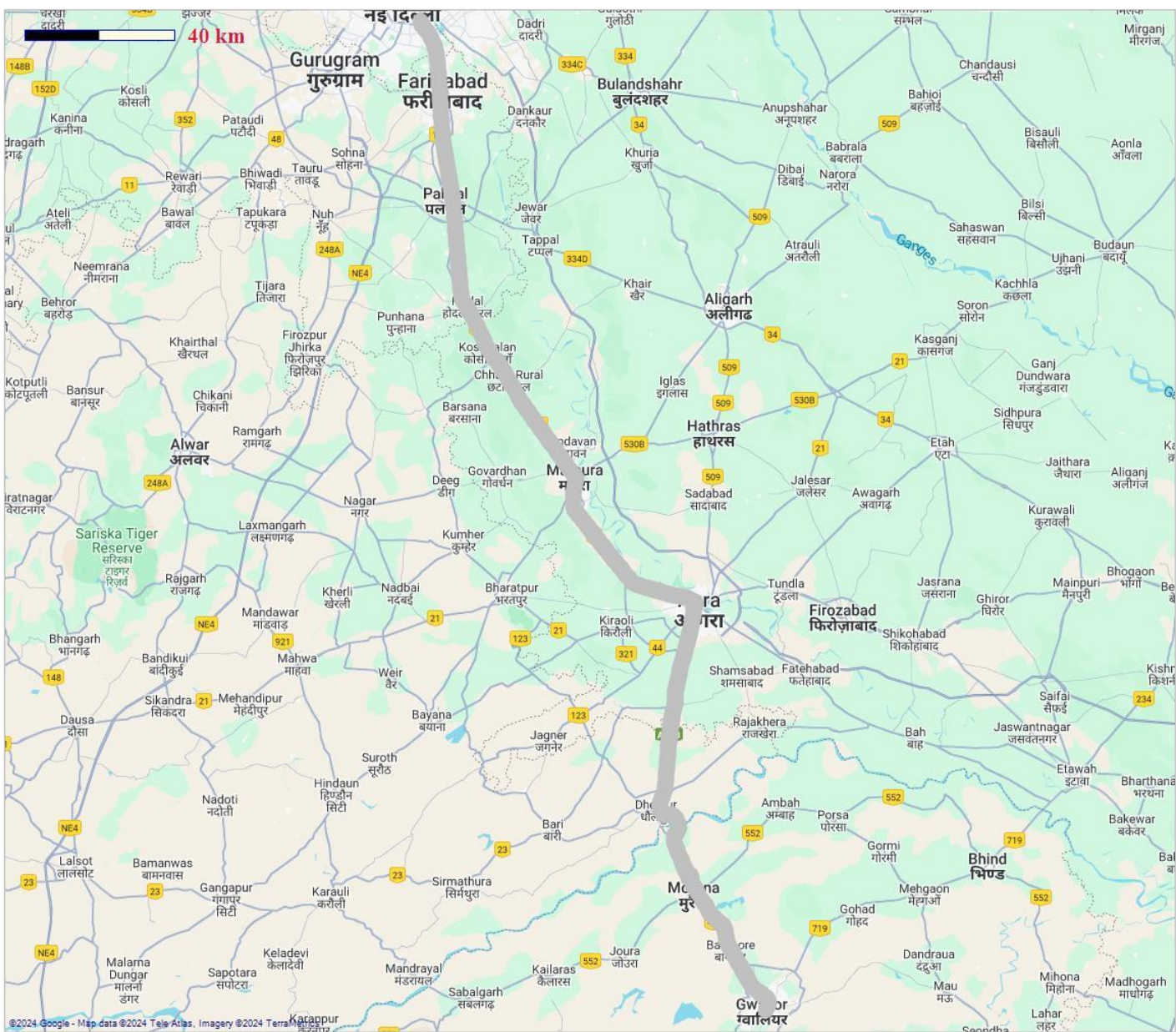
Data Tests:
Dynamic data – repeat data file download (to check throughput on the entire route)

i.   3G – measurement – UE in 3G   File Size- 20MB
ii.   4G – measurement – UE in LTE File Size- 40MB

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Voice & Dynamic Data Test Drive Route

List of important area covered during the drive test
Gwalior, Banmore, Morena
Dholpur , Mania, Agra
Mathura, Koshi kala, Palwal, Hodal
Faridabad, Ballabhgarh, Delhi NCR

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Voice Calls

QoS compliance of the TSPs for Voice across technologies 2G/3G/4G-VoLTE:
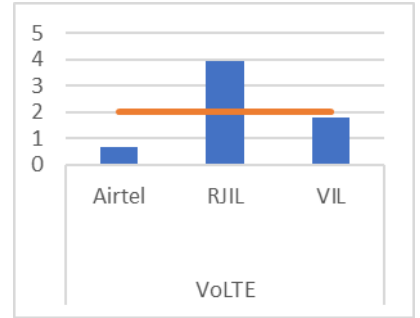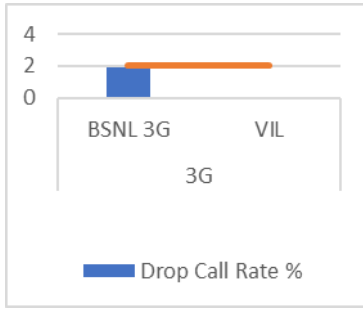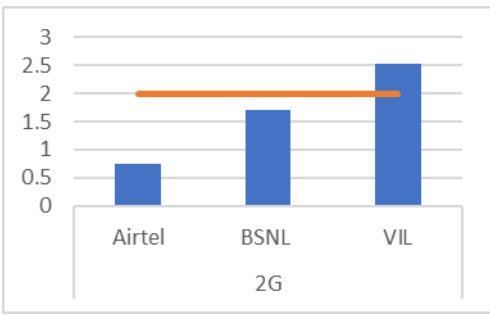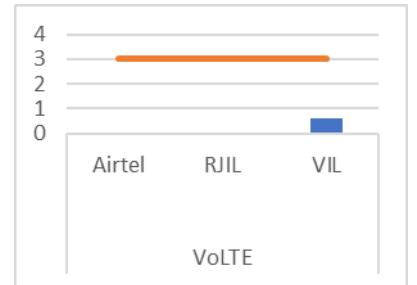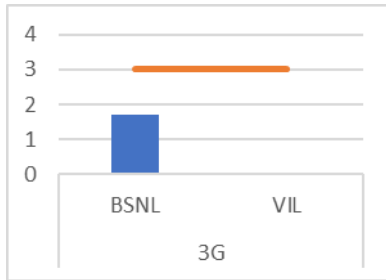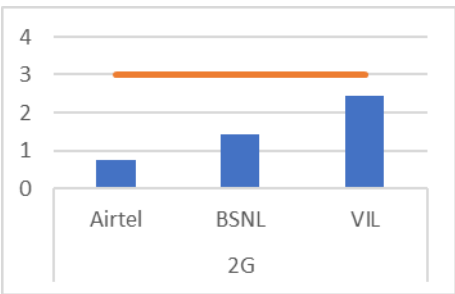
Benchmark ——— KPI achieved

KPIs	2G			3G		VoLTE		
	Airtel	BSNL	VIL	BSNL	VIL	Airtel	JIO	VIL
Drop Call Rate %	0.74	1.71	2.52	1.89	NA	0.69	3.92	1.81
Block Call Rate %	0.75	1.42	2.45	1.72	NA	0	-	0.60

a) All TSPs have met the 2% QOS benchmark of Drop Call Rate (DCR%) except VI in 2G and JIO in VoLTE.
b) Call Block Rate (CBR%) benchmark of 3% was achieved by all TSP's.

Voice Summary

Voice Calls

Coverage

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

TSPs	2G		
	Airtel	BSNL	VIL
Coverage %	**90.35**	**80.37**	**69.94**

b) Percentage of coverage samples for 3G ≥ -90 dBm

TSPs	3G
	BSNL
Coverage %	**77.13**

b) Percentage of coverage samples for LTE ≥ -110 dBm.

TSPs	VoLTE		
	Airtel	JIO	VIL
Coverage %	**98.63**	**97.47**	**92.56**

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

TSPs	3G		VoLTE		
	BSNL	VIL	Airtel	JIO	VIL
Time Spent on 3G/4G %	**73.2**	**NA**	**100**	**100**	**79.23**

Dynamic Data -Download Throughput was tested.

Data Download Performance – Dynamic 3G/4G/ 5G Network
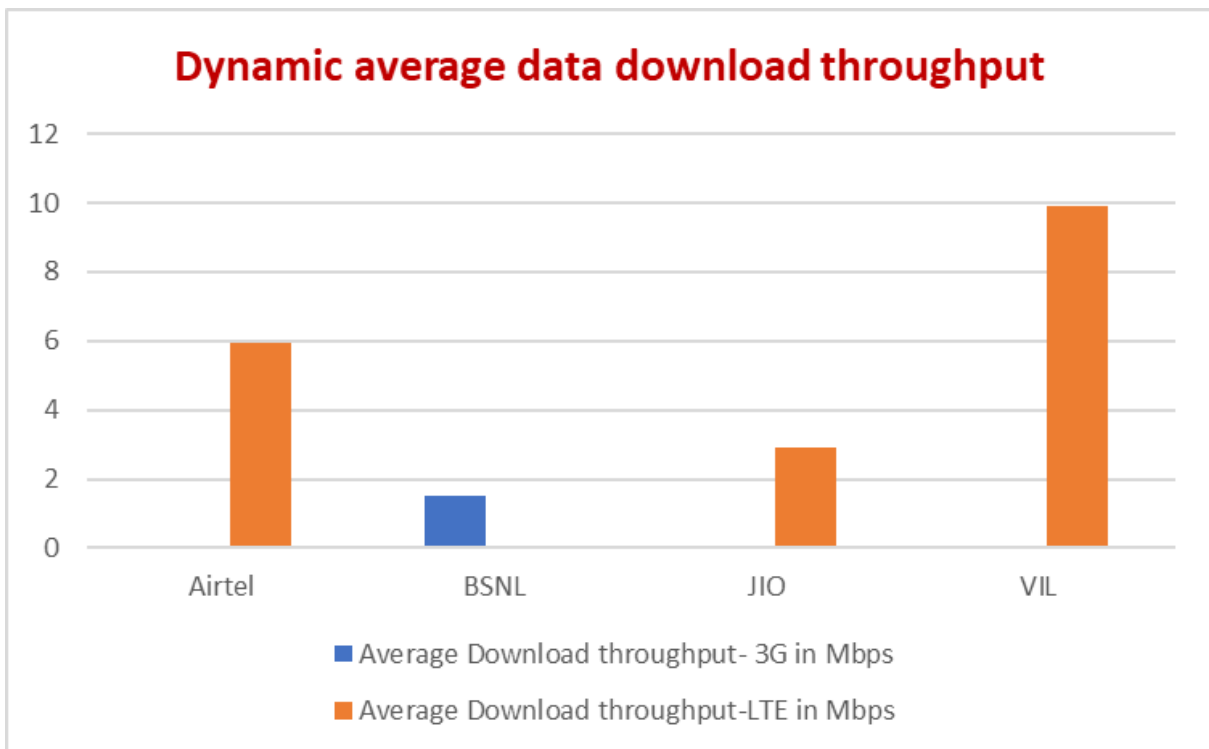
TSP	Airtel	BSNL	JIO	VIL
Average Download throughput- 3G In Mbps	NA	1.52	NA	NA
Average Download throughput-LTE in Mbps	5.93	NA	2.9	9.93
Average Download throughput- 5G in Mbps	NA	NA	NA	NA

Data Summary

Summary

TSP (For 2G)	Airtel	BSNL	VIL
Call attempts	134	138	163
Block call rate %	0.75	1.42	2.45
CSSR %	99.25	96.32	97.55
Drop call rate %	0.74	1.708	2.52
Mobility HOSR %	95.25	95.20	94.39
RX Quality %	90.85	95.07	89.22
Average CST Sec	3.92	2.708	4.16

TSP (For 3G)	BSNL
Call attempts	124
Block call rate %	1.72
CSSR %	95.54
Drop call rate %	1.73
Mobility HOSR %	95.04
RX Quality %	95.08
Average CST (Sec)	2.73

TSP (For Volte)	Airtel	BSNL	JIO	VIL
Call attempts	144	NA	102	167
Block call rate %	0	NA	0	0.60
CSSR %	100	NA	93.14	99.40
Drop call rate %	0.69	NA	3.92	1.81
Mobility HOSR %	98.53	NA	99.20	99.28
RX Quality %	80.42	NA	80.70	75.33
Average CST(Sec)	0.81	NA	2.12	1.64

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 ≥ -85 dBm, RSCP is ≥ -90 dBm & RSRP ≥ -110dBm. The details are as follows.

TSP	Coverage Rate %
Airtel 2G	90.35
BSNI 2G	80.37
VIL 2G	69.94
BSNL 3G	77.13
Airtel VoLTE	98.63
Jio VoLTE	97.47
VIL VoLTE	92.56

Coverage Rate %

VIL VoLTE
Jio VoLTE
Airtel VoLTE
BSNL 3G
VIL 2G
BSNI 2G
Airtel 2G

0   20   40   60   80   100   120
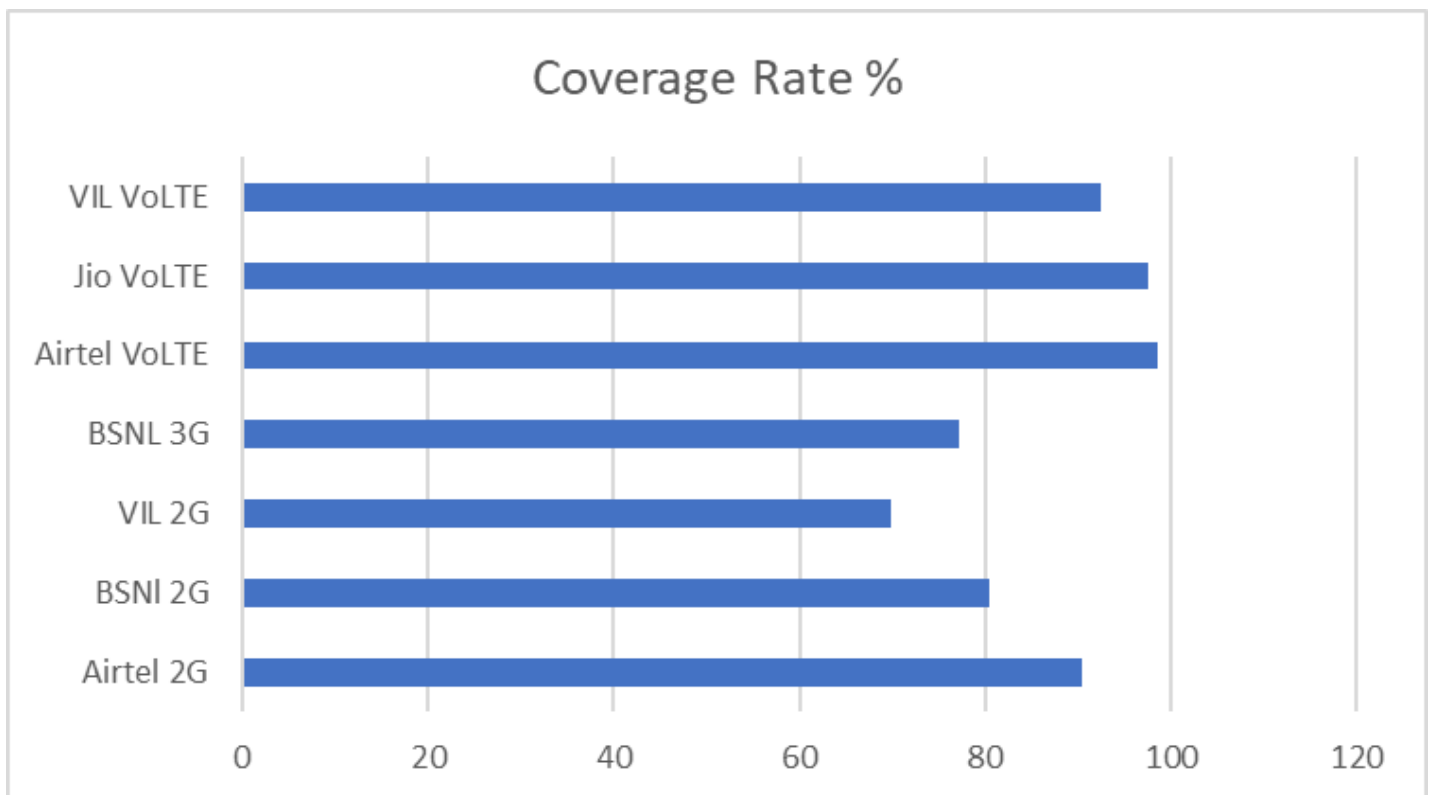
TSP- Airtel

Technology	Coverage %
2G	90.35
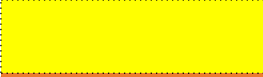
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	**2705860**	**68.49**	
[-75, >=-85)	**863887**	**21.87**	
[-85, >=-95)	**340312**	**8.61**	
[-95, >=Min)	**40795**	**1.03**	
Total			

TSP BSNL

Technology	Coverage %
2G	80.37
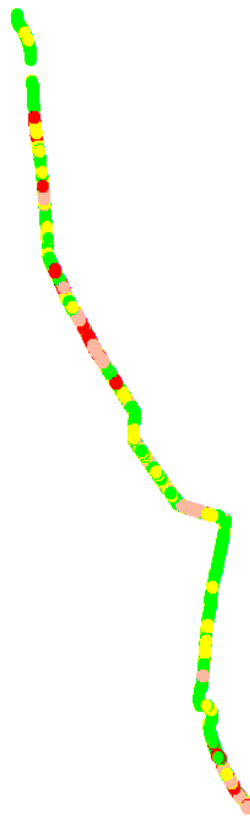
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	162993	49.66	
[-75, >=-85)	100805	30.71	
[-85, >=-95)	30876	9.41	
[-95, >=Min)	33565	10.23	
Total	328239		

TSP- VI

Technology	Coverage %
2G	69.94

RxLev Full In Service (dBm)
[Min, -95)   (800) (6.17%)
[-95, -85)   (3097) (23.89%)
[-85, -75)   (5093) (39.29%)
[-75, Max]   (3974) (30.65%)
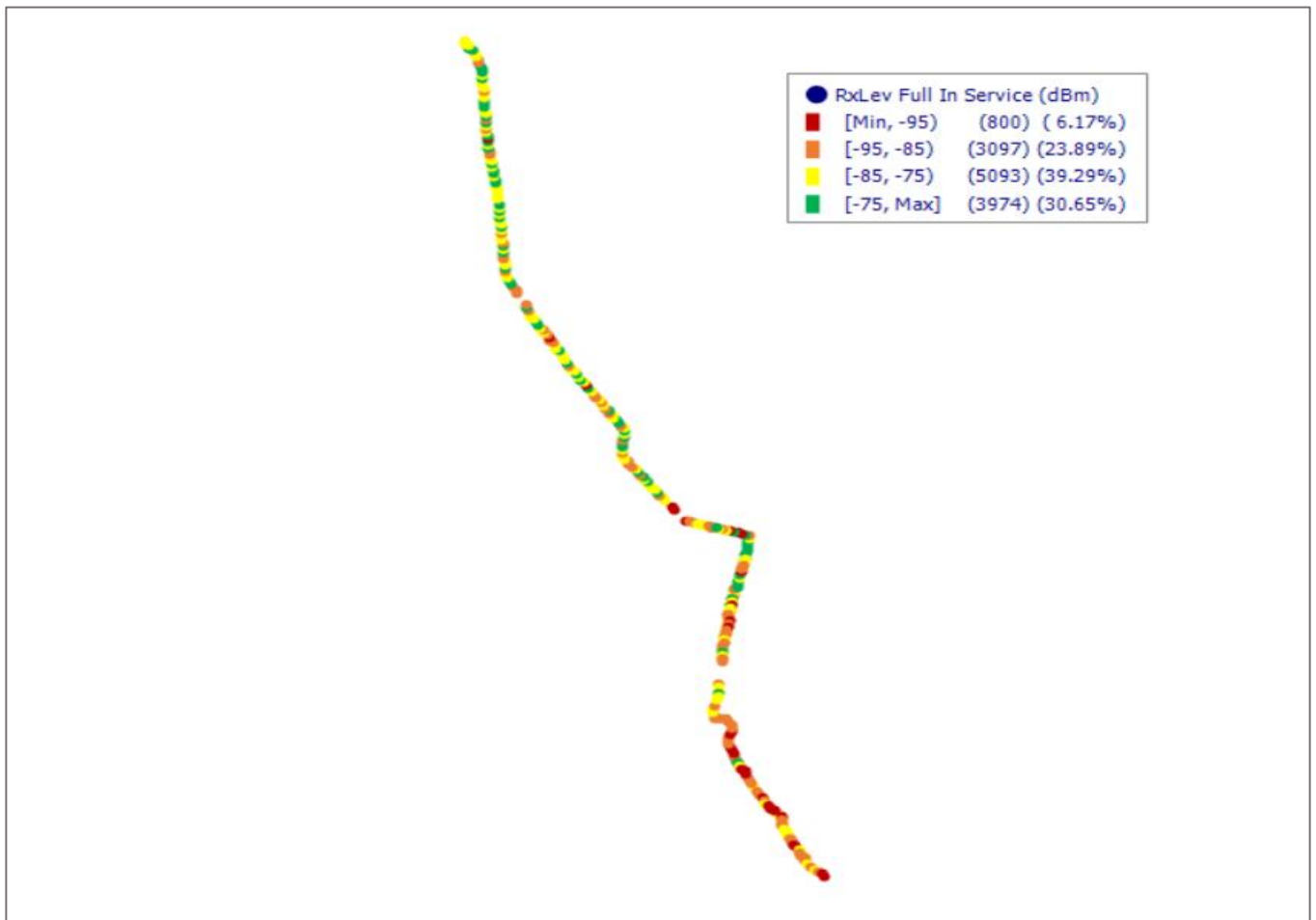
2G			
Overall RxLevel	**# Samples**	**% PDF**	**Legends**
[Max, >=-75]	**3974**	**30.65**	
[-75, >=-85)	**5093**	**39.29**	
[-85, >=-95)	**3097**	**23.89**	
[-95, >=Min)	**800**	**6.17**	
Total	12964	100	

TSP- BSNL

Technology	Coverage %
3G	77.13
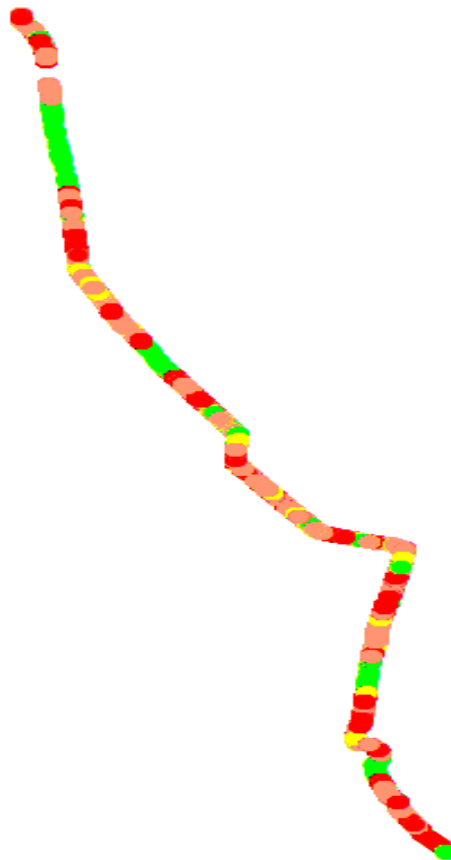
3G			
Overall RSCP	**# Samples**	**% PDF**	**Legends**
[Max, >=-70]	36810	6.97	
[-70, >=-80)	79635	15.08	
[-80, >=-90)	290834	55.08	
[-90, >=Min)	120758	22.87	
Total	528037		

TSP- Airtel

Technology	Coverage %
VoLTE	98.63
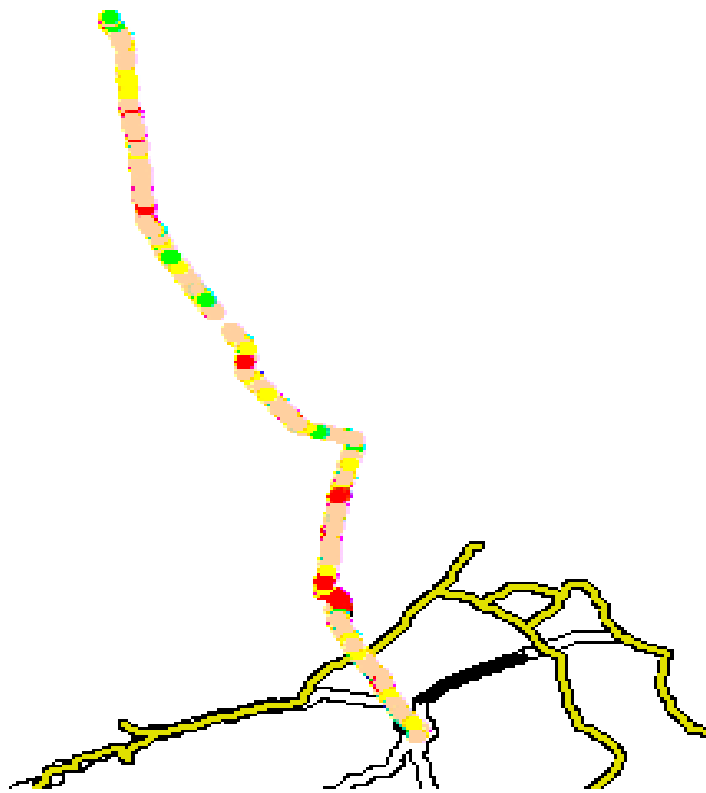
VoLTE			
Overall RSRP	**# Samples**	**% PDF**	**Legends**
[Max, >=-80]	1062317	16.96	
[-80, >=-90)	2708793	43.24	
[-90, >=-110)	2408157	38.44	
[-110, >=Min)	85782	1.37	
Total			

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TSP-JIO

Technology	Coverage %
VoLTE	97.47
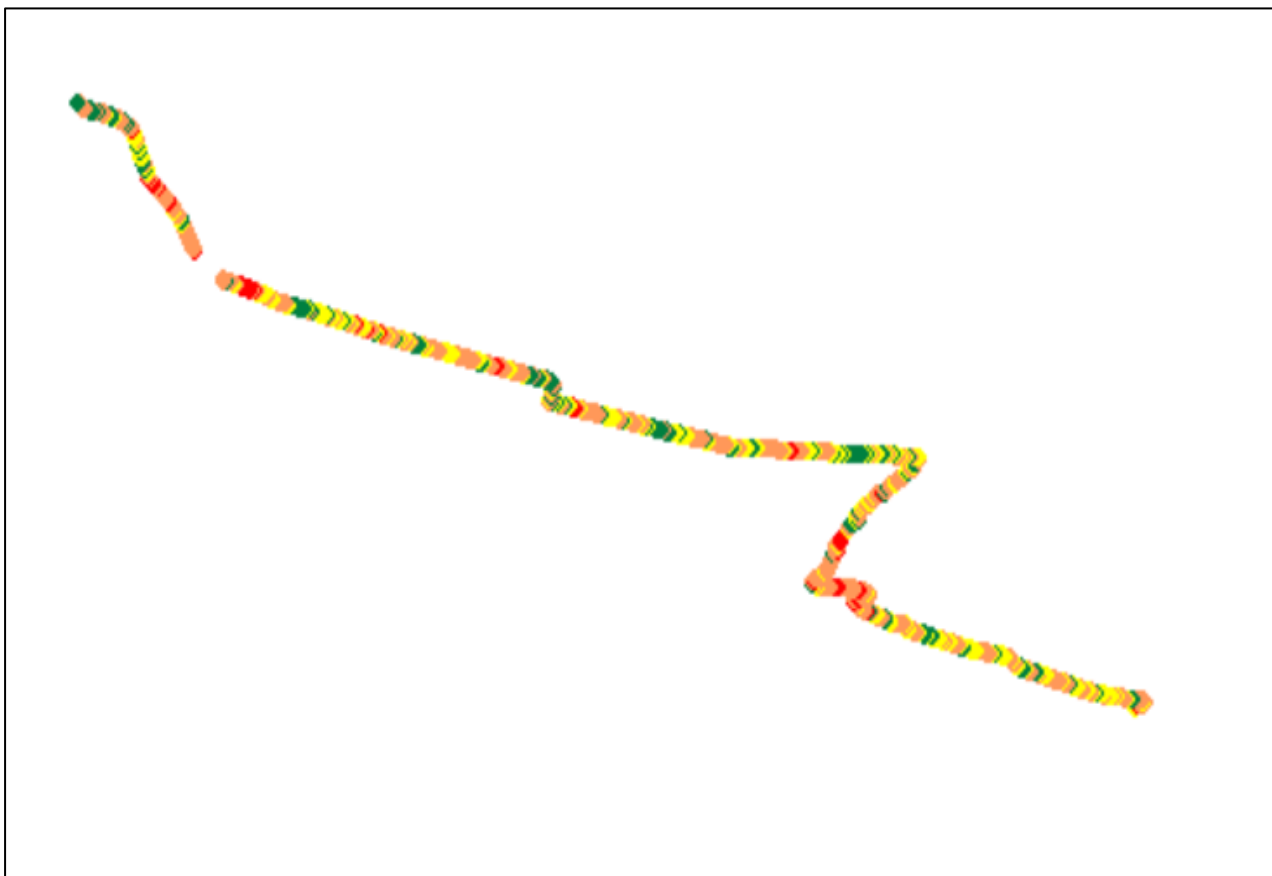
VoLTE

Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	4220	24.98	
[-80, >=-90)	5610	33.21	
[-90, >=-110)	6638	39.29	
[-110, >=Min)	427	2.53	
Total			

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TSP- VI

Technology	Coverage %
VoLTE	92.56

Serving Cell RSRP (dBm)
- [Min, -110) (913) (7.44%)
- [-110, -90) (8500) (69.26%)
- [-90, -80) (2284) (18.61%)
- [-80, Max] (576) (4.69%)
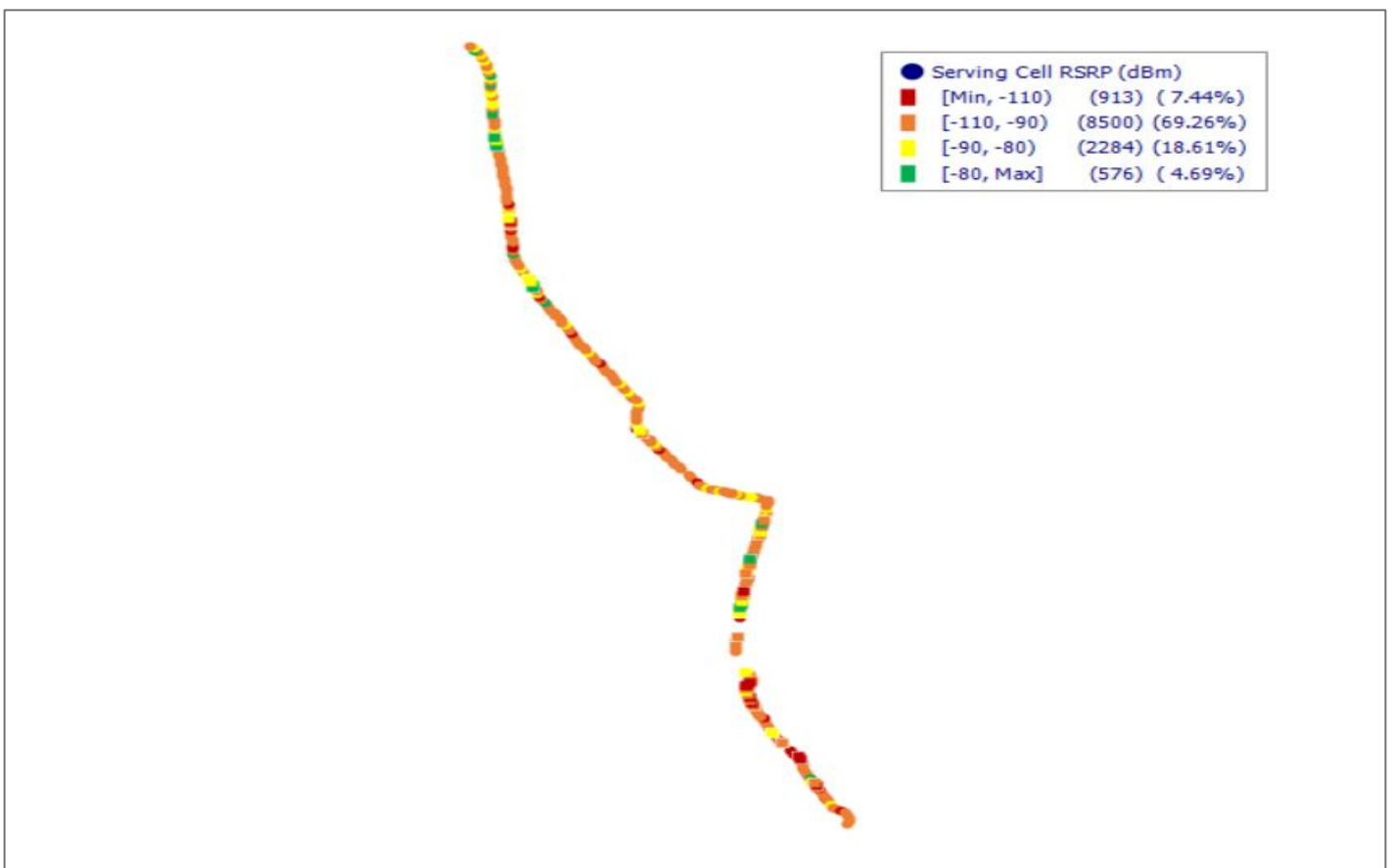
VoLTE			
Overall RSRP	# Samples	% PDF	Legends
[Max, >=-80]	576	4.69	
[-80, >=-90)	2284	18.61	
[-90, >=-110)	8500	69.26	
[-110, >=Min)	913	7.44	
Total	12273	100	

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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	90.85
BSNI 2G	95.07
VIL 2G	89.22
BSNL 3G	95.08
Airtel VoLTE	80.42
Jio VoLTE	80.70
VIL VoLTE	75.33
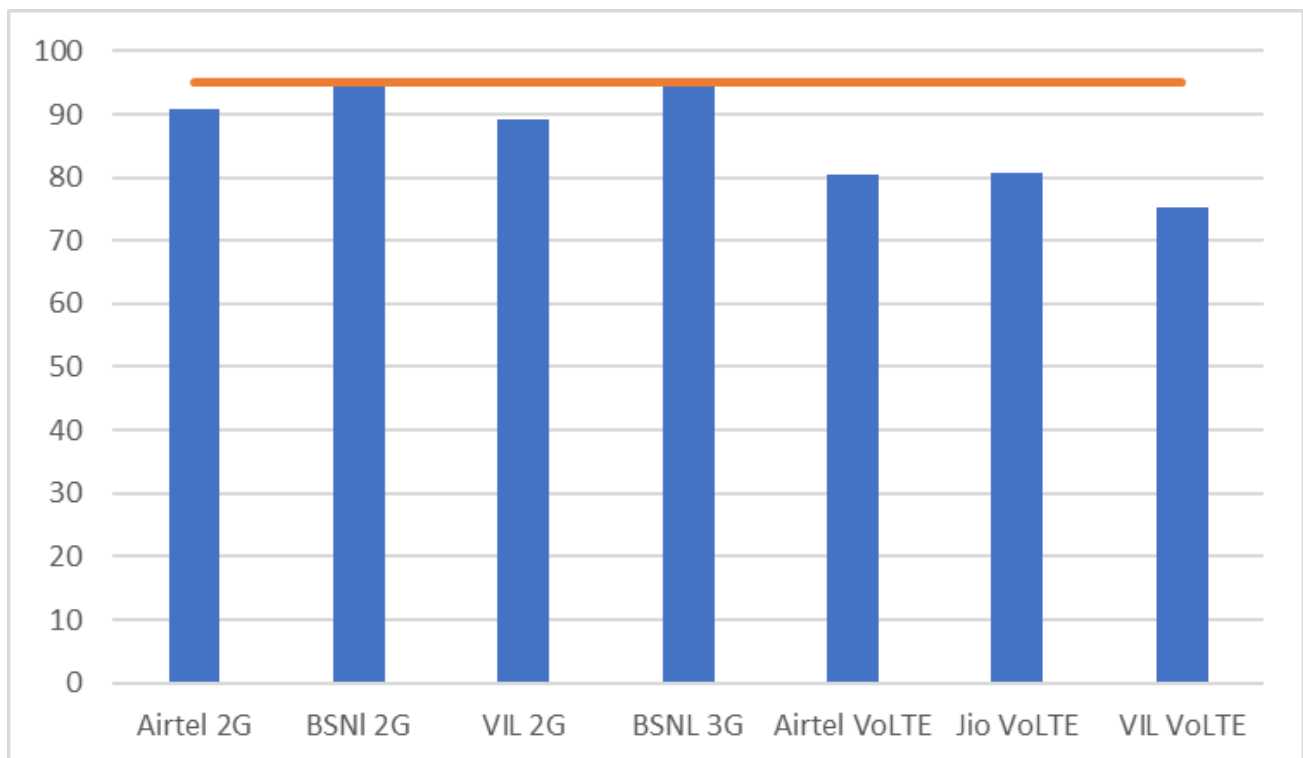
For measuring voice quality, as per the QoS norms, RxQual <=5 for GSM TSPs, EcNo >= -14 dBm for 3G TSP sand SINR >0 in case of VoLTE is considered to be good, where as quality beyond this benchmark is considered to be bad. The benchmark should usually be ≥ 95%.

TSP- Airtel

Technology	Rx Quality %
2G	90.85
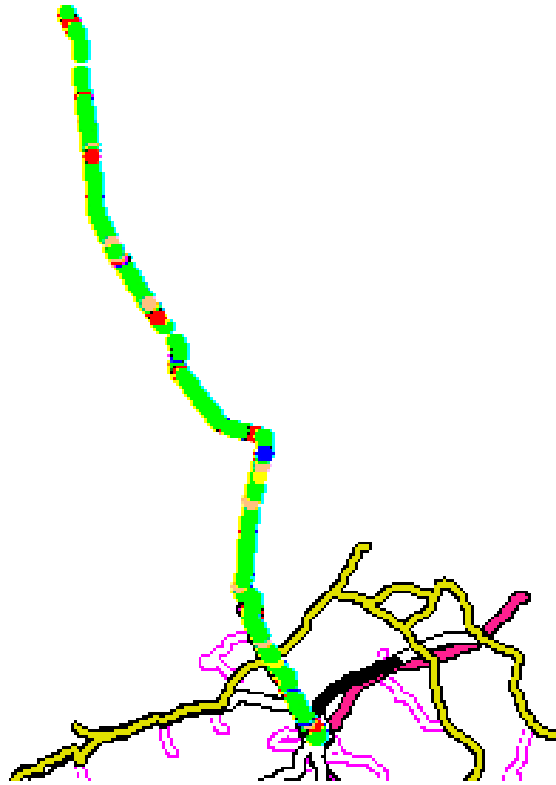
Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	2953710	74.76	🟩
(2, <=3)	139187	3.52	🟨
(3 , <=4)	179997	4.56	🟦
(4 , <=5)	316342	8.01	🟧
(5 , <=Max)	361618	9.15	🟥
Total			

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- BSNL

Technology	Rx Quality %
2G	95.07
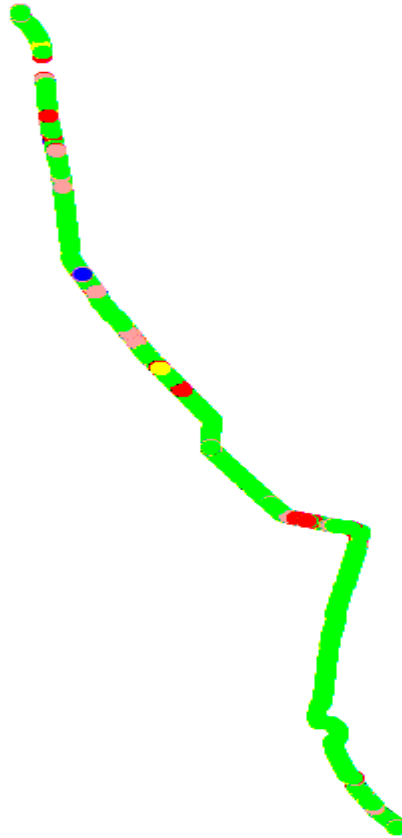
Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	256445	78.49	
(2, <=3)	8053	2.46	
(3 , <=4)	9957	3.05	
(4 , <=5)	36191	11.08	
(5 , <=Max)	16093	4.93	
Total	326739		

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- VI

Technology	Rx Quality %
2G	89.22

● RxQual Sub	
■ [Min, 2)	(9273) (73.01%)
■ [2, 3)	(747) (5.88%)
■ [3, 4)	(789) (6.21%)
■ [4, 5)	(477) (3.76%)
■ [5, Max]	(1415) (11.14%)

Overall Rx Quality	# Samples	% PDF	Legends
(Min, <=2)	9273	73.01	
(2, <=3)	747	5.88	
(3 , <=4)	789	6.21	
(4 , <=5)	477	3.76	
(5 , <=Max)	1415	11.14	
Total	12701	100	

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- BSNL

Technology	Rx Quality %
3G	95.08
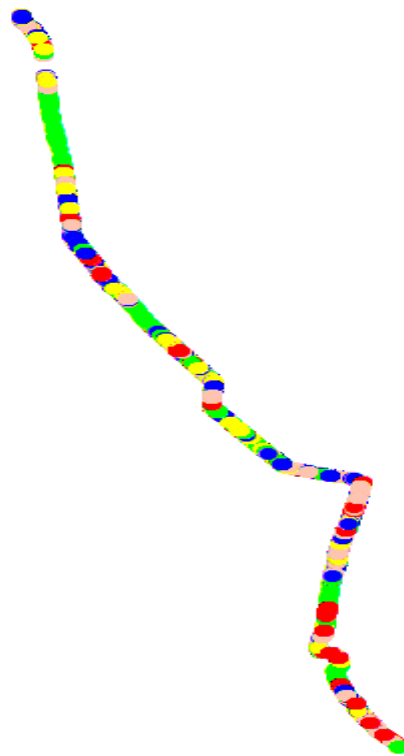
Overall Ec/No	# Samples	% PDF	Legends
(Max, <=-6)	257968	15.19	
(-6, <=-9)	191473	11.28	
(-9, <=-11)	1063562	62.63	
(-11, <=-14)	101442	5.97	
(-14, <= Min)	83598	4.92	
Total	1698043		

TSP- BSNL

Data Statistics - Dynamic data testing

Data KPIs - Overall	3G
Download Throughput (Mbps)	**1.52**
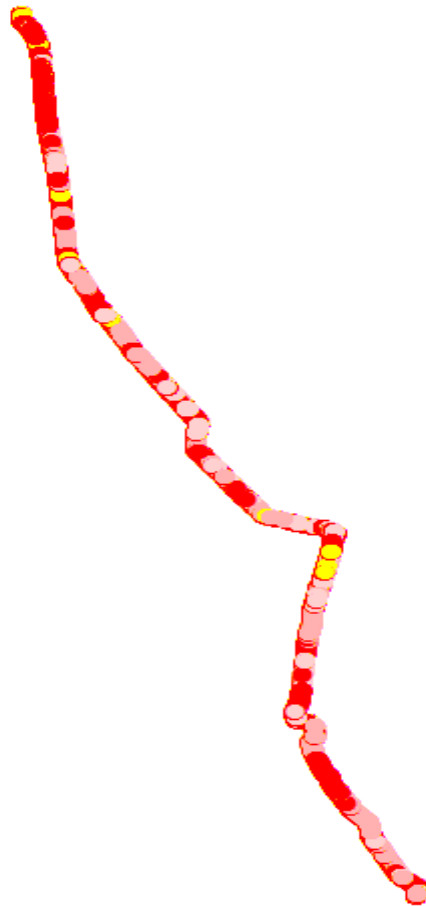
DL throughput	No of Sample	%	Legends
< 1 Mbps	74325	43.71	
	88345	51.95	
1-5 Mbps	7375	4.34	
5-10 Mbps	0	0.00	
>10Mbps	170045		

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- Airtel

Technology	Rx Quality %
VoLTE	80.42
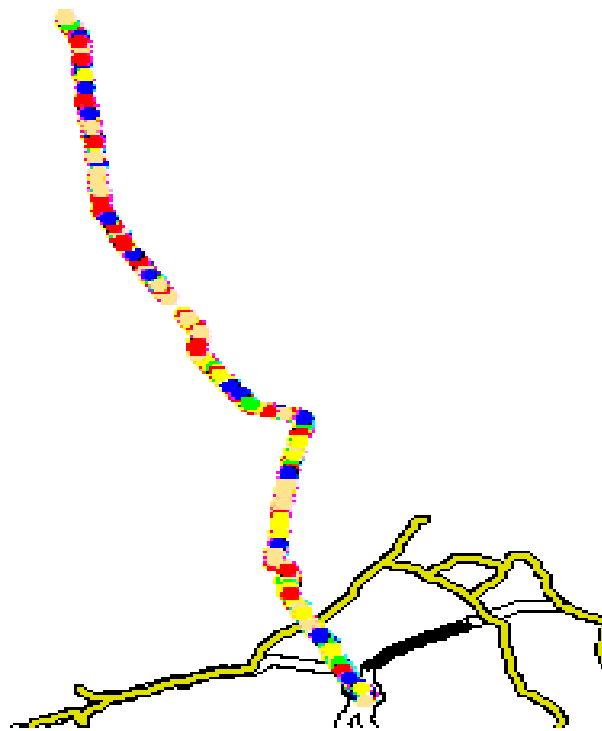
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	1226498	19.58	
(0, <=5)	1893114	30.22	
(5, <=10)	1875824	29.94	
(10, <=15)	826651	13.19	
(15, <=Max)	442962	7.07	
Total			

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%.
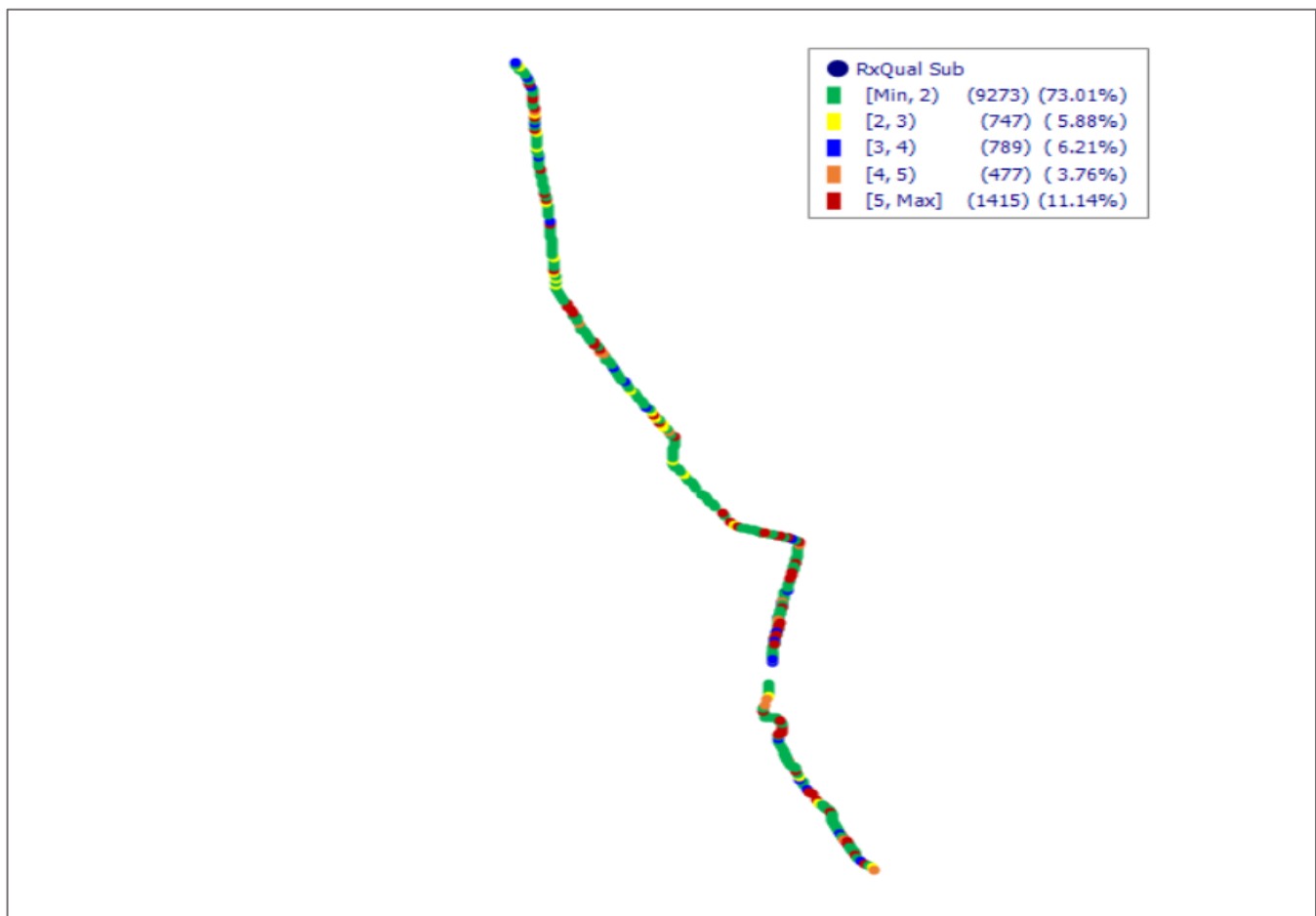
TSP-JIO

Technology	Rx Quality %
VoLTE	80.70

Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	3260	19.30	
(0, <=5)	4911	29.07	
(5, <=10)	4041	23.92	
(10, <=15)	2894	17.13	
(15, <=Max)	1789	10.59	
Total			

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- VI

Technology	Rx Quality %
VoLTE	75.33

Serving Cell RS SINR (dB)
- [Min, 0) (2957) (24.1%)
- [0, 5) (3767) (30.7%)
- [5, 10) (2801) (22.82%)
- [10, 15) (1718) (14%)
- [15, Max] (1029) (8.38%)
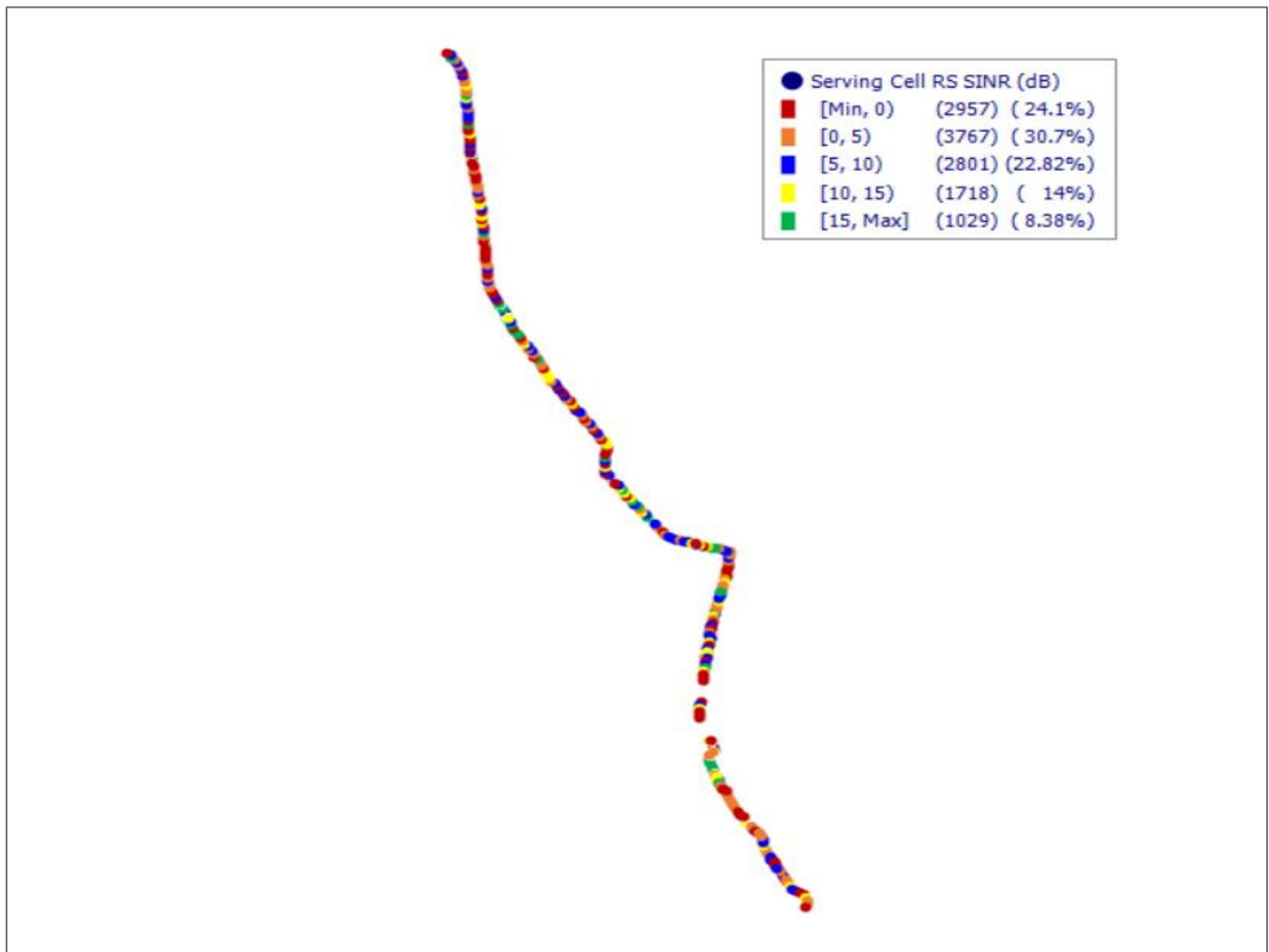
Overall SINR	# Samples	% PDF	Legends
(Min, <=0)	2957	24.1	
(0, <=5)	3767	30.7	
(5, <=10)	2801	22.82	
(10, <=15)	1718	14	
(15, <=Max)	1029	8.38	
Total	12272	100	

TSP	% of Time Spent on 3G/VoLTE
BSNL 3G	73.20
Airtel VoLTE	100
Jio VoLTE	100
VIL VoLTE	79.23

% of Time Spent on 3G/VoLTE
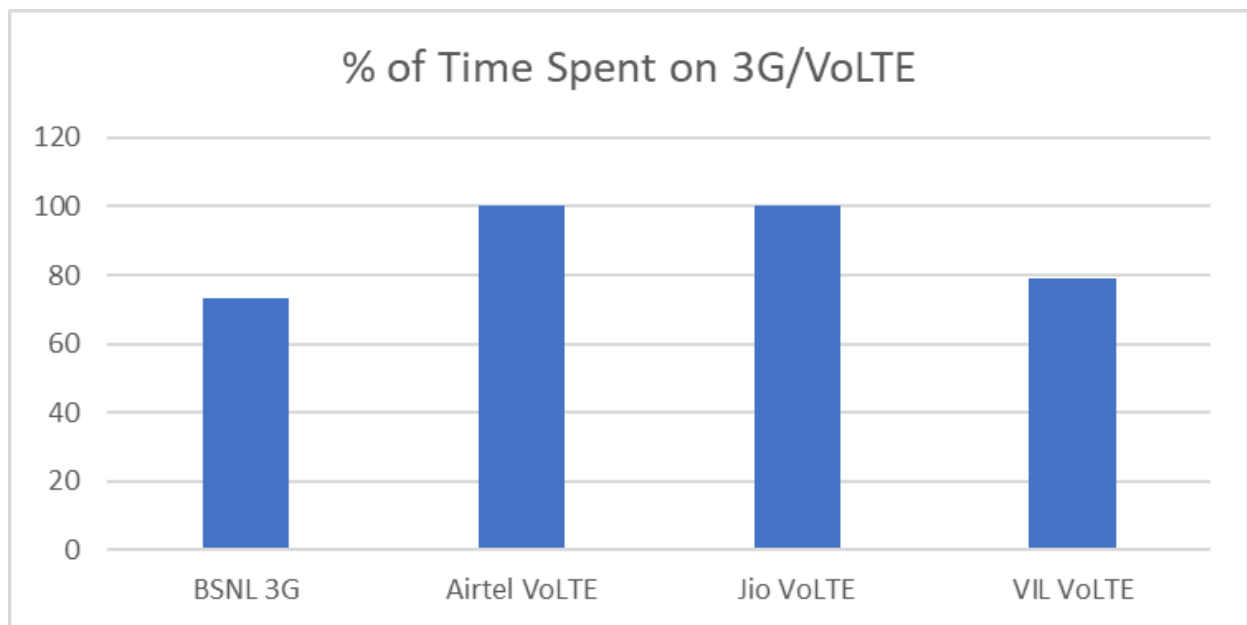
TSP- Airtel

Technology	% of Time Spent on
3G	
VoLTE	100%
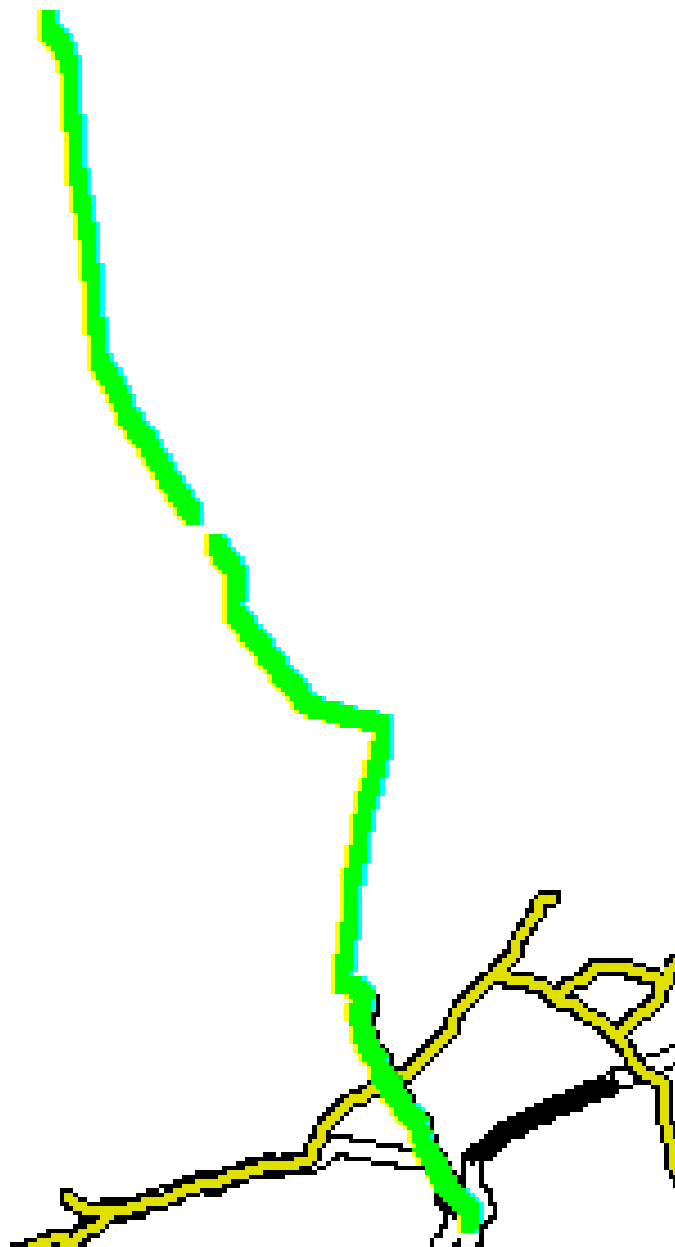
TSP BSNL

Technology	% of Time Spent on
3G	73.20
VoLTE	

TSP-JIO

Technology	% of Time Spent on
3G	
VoLTE	100%

LTE KPI PCell Serving Band

● Band 3 (7.76%, 1328)
● Band 40 (84.61%, 14487)
● Band 5 (7.64%, 1308)

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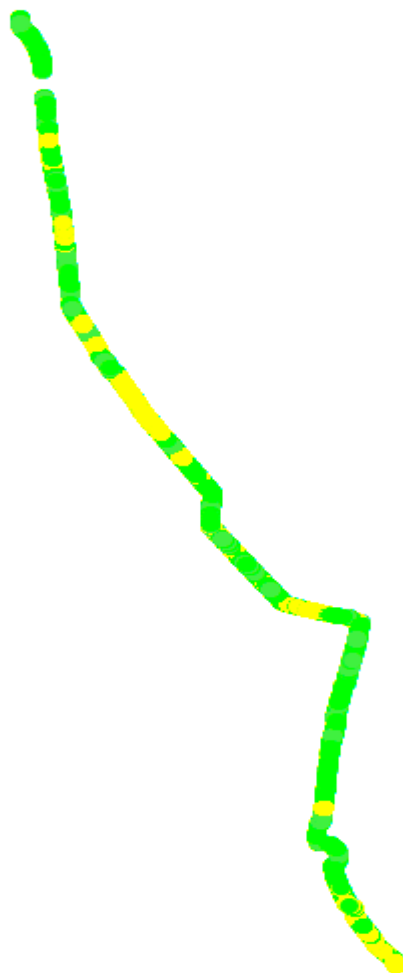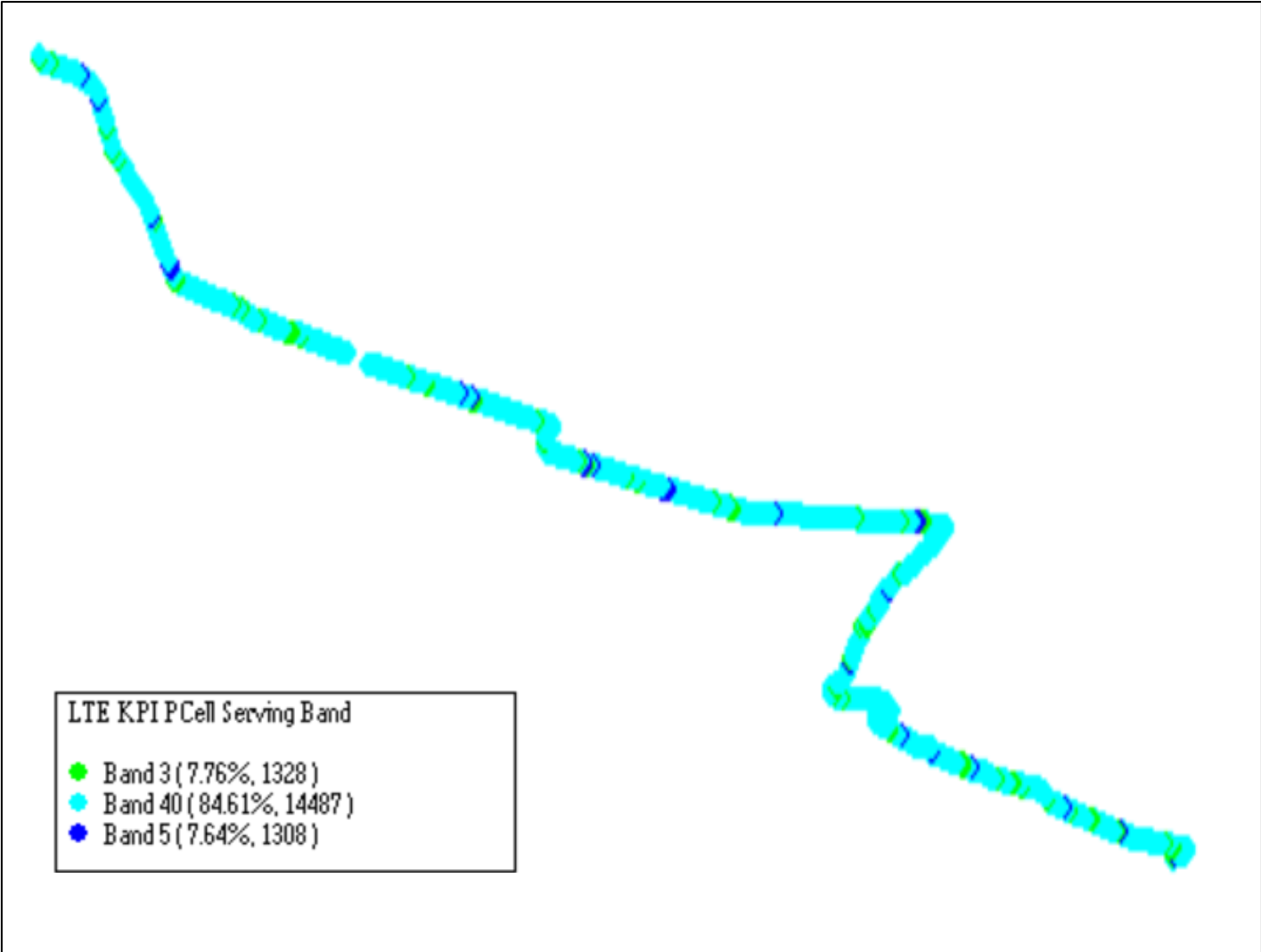
TSP- VI

Technology	% of Time Spent on
Non Volte	20.77
VoLTE	79.23

System
LTE   (1026)   (79.23%)
GSM   (220)   (16.99%)
WCDMA   (49)   (3.78%)
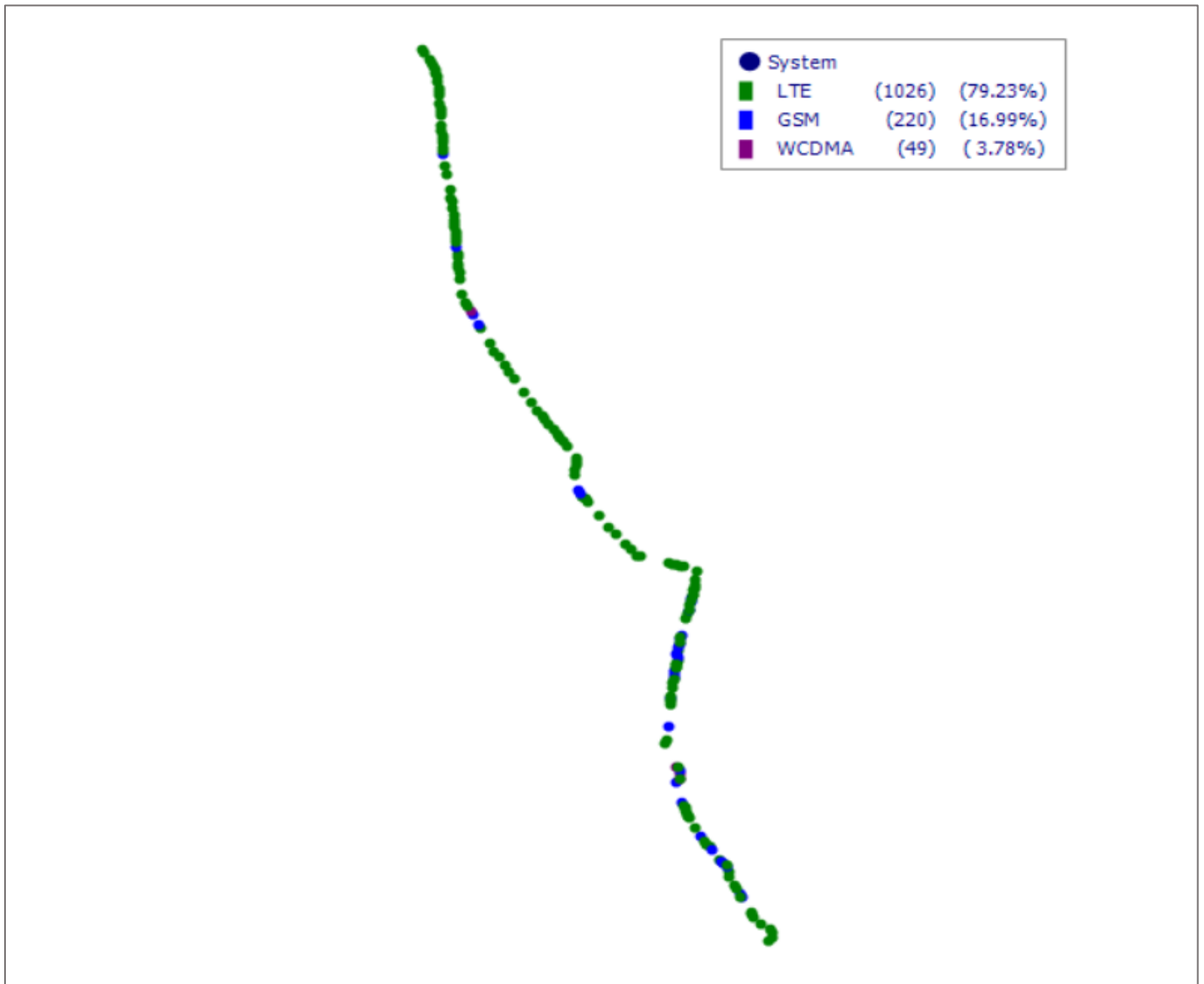
Dynamic Data Test

TSP- Airtel

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	5.93

DL throughput	No of Sample	%	Legends
< 2Mbps	3112101	67.49	
2-5 Mbps	794895	17.24	
5-10 Mbps	207029	4.49	
>10Mbps	497109	10.78	

Dynamic Data Test Details

TSP-JIO

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	**2.9**
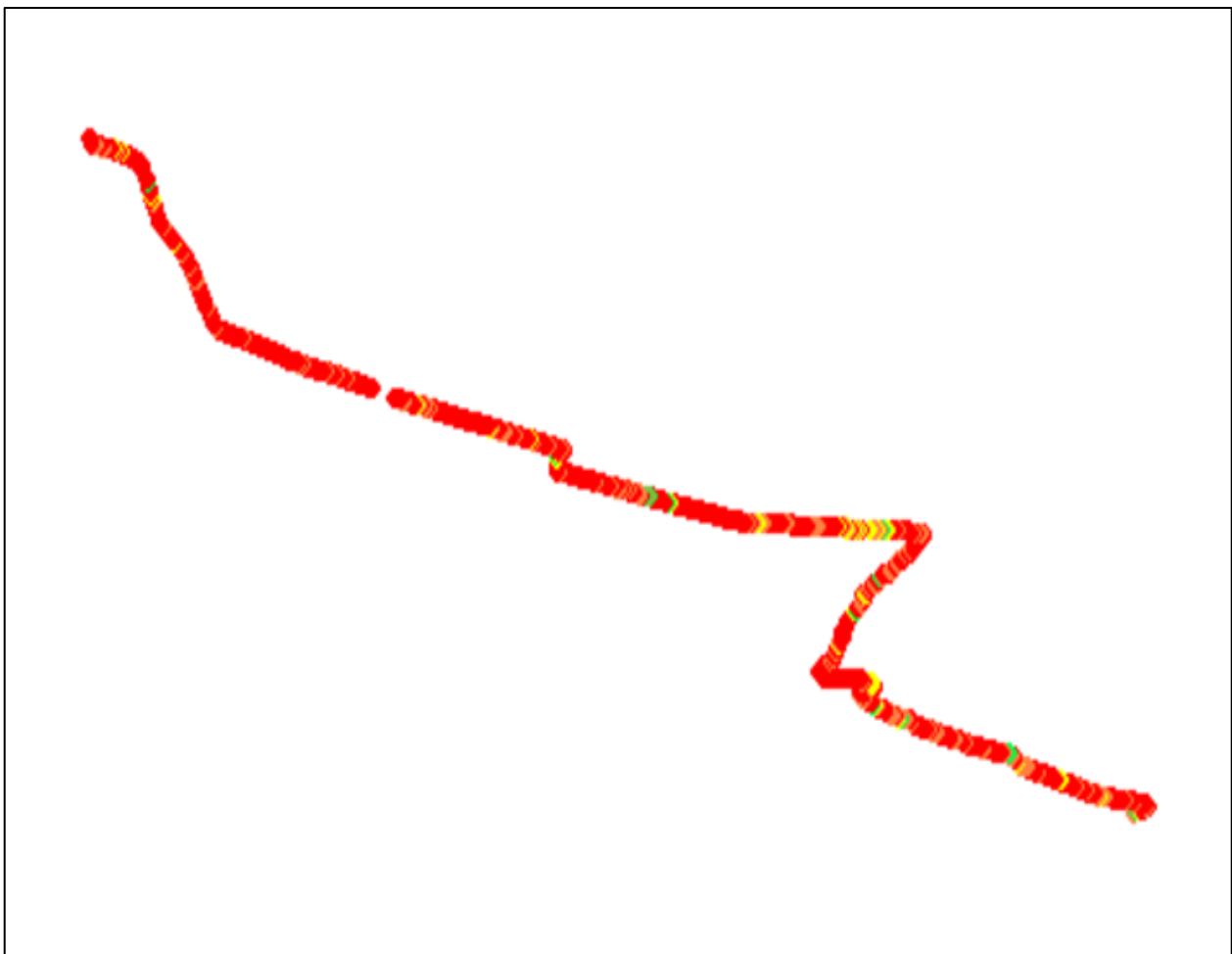
DL throughput	No of Sample	%	Legends
< 2Mbps	11336	67.22	
2-5 Mbps	3706	21.98	
5-10 Mbps	1385	8.21	
>10Mbps	437	2.59	

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Dynamic Data Test

TSP- VI

Data Statistics - Dynamic data testing

Data KPIs - Overall	LTE
Download Throughput (Mbps)	9.93

PDSCH Phy Throughput (kbps)
- [Min, 2000) (3797) (28.33%)
- [2000, 5000) (2564) (19.13%)
- [5000, 10000) (2495) (18.61%)
- [10000, Max] (4549) (33.94%)
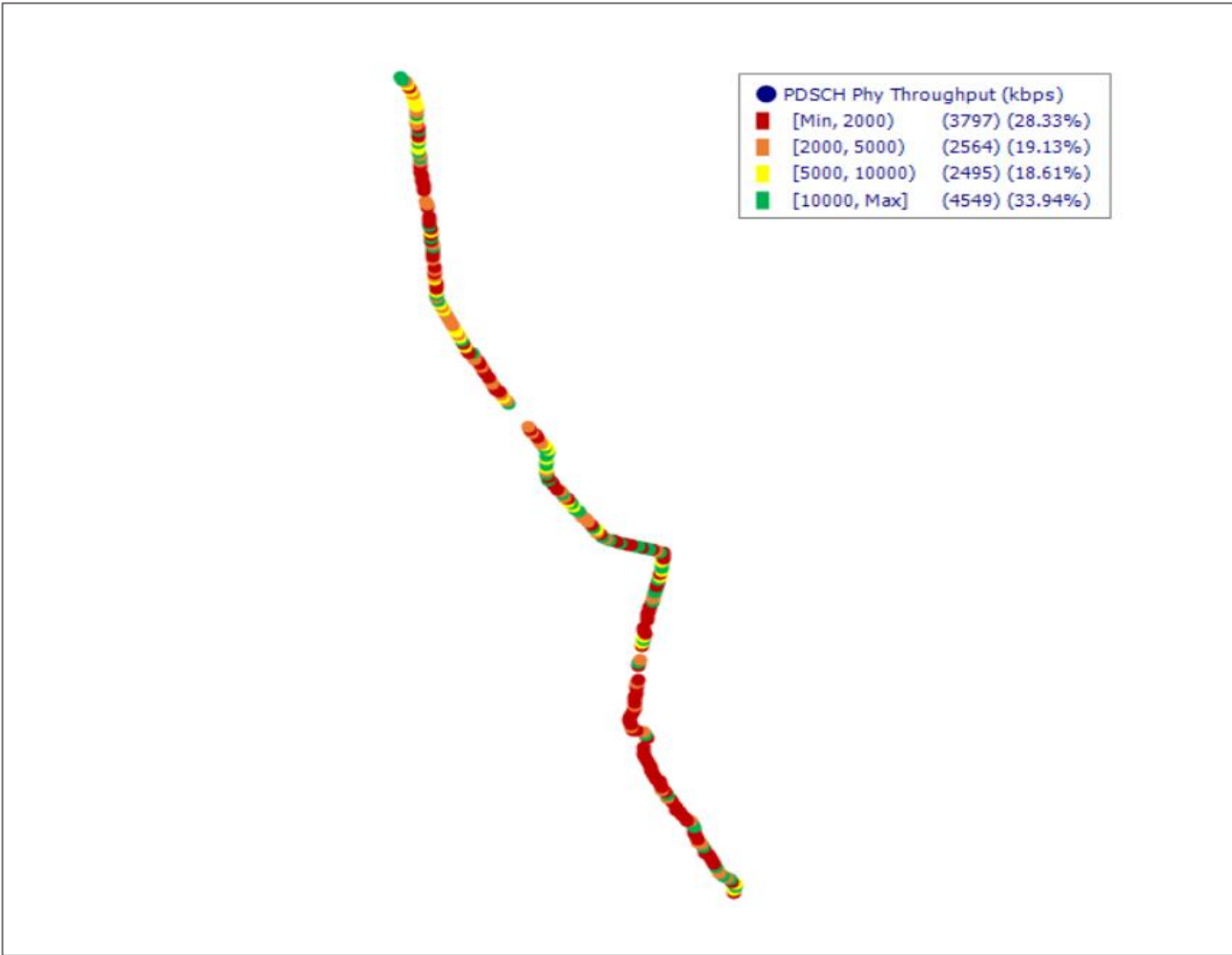
DL throughput	No of Sample	%	Legends
< 2Mbps	3797	28.33%	
2-5 Mbps	2564	19.13%	
5-10 Mbps	2495	18.61%	
>10Mbps	4549	33.94%	

Dynamic Data Test Details

TSP- Airtel

Non / poor coverage area –

Sn	Patch Name	Circle	Inter Site Distance in KM	Remark (No coverage / Poor coverage / other)
1	Near by Nurabad	MP	2KM	Poor Coverage
2	Masood pur to Gher	MP	>7KM	Poor Coverage /Quality
3	Gher	RAJ	>5KM	Poor Caoverage/No coverage
4	Kashimpur to Dhoulpur	RAJ	>3KM	Poor Coverage /Quality
5	Near by Sijorli	RAJ	>3KM	Poor Coverage /Quality
6	Near by sahjadpuri	UPW	>4KM	Poor Coverage /Quality
7	Near by lahchora	UPW	>4KM	Poor Coverage /Quality
8	Farah	UPW	>4KM	Poor Coverage /Quality
9	Near Ajijpur	UPW	2KM	Poor Coverage
10	Chata	UPW	>4KM	Poor Coverage /Quality
11	Bhahi	UPW	>3KM	Poor Coverage /Quality
12	Near Jajru	DEL	>2KM	Poor Quality
13	Near Sarita Vihar	DEL	>2KM	Poor Quality
14	Asoati	DEL	>2KM	Poor Quality/Coverage
15	Banchari to Maroli	DEL	>3KM	Poor Coverage

Dynamic Data Test Details

TSP - BSNL

Non / poor coverage area list

Sn	Patch Name	Circle	Inter Site Distance in KM	Remark (No coverage / Poor coverage / other)
1	Saraichola	Madhya Pradesh	3	Poor Coverage
2	Mania	Rajasthan	2	Poor Coverage
3	Nadbai	Rajasthan	5	Poor Coverage
4	Raya	UP West	3	Poor Coverage
5	Hasanpur	Haryana	5	Poor Coverage
6	Ballabhgarh	UP West	5	Poor Coverage
7				
8				
9				
10				
11				
12				
13				
14				
15				

TSP- JIO

Non / poor coverage area – 14.5 Kms i.e. around 4.75% of the route

Sn	Patch Name	Circle	Inter Site Distance in KM	Remark (No coverage / Poor coverage / other)
1	Chambal River Bank (Chambal Beehad Area)	MP	6.9	Poor Coverage
2	Gher (Chambal Beehad Area)	RJ	5.5	Poor Coverage
3	Gher (Chambal Beehad Area)	RJ	5.5	Poor Coverage
4	Doon Ka Pura	RJ	4.9	Poor Coverage
5	Jalalpur	RJ	4	Poor Coverage
6	Bagcholi Khar	RJ	3.2	Poor Coverage
7	Baad (IOCL Refinery)	UW	1.3	Poor Coverage
8	Vrindavan Road Railway Station	UW	1.8	Poor Coverage
9	Near Chata Railway Station	UW	2.7	Poor Coverage
10	Near Hodal	HR	3	Poor Coverage
11	Hind terminal cold logistics (Devli to Janauli)	HR	4.2	Poor Coverage
12	Asavati to BPCL Piyala	HR	4.9	Poor Coverage

Dynamic Data Test Details

TSP- VI

Non / poor coverage area –

Sn	Patch Name	Circle	Inter Site Distance in KM	Remark (No coverage / Poor coverage / other)
1	Rairu to Banmore	MPC	4.4	Open Area
2	Nurabad to Choundha toll Plaza	MPC	9.5	Open Area
3	Railway Bridge Kunwari Morena	MPC	5.4	Open Area
4	Cholasarai to Chambal railway bridge	MPC	5.0	Open Area

Dynamic Data Test Details

TSP- Airtel

Plan to improve the converge in this route

Sn	Patch Name	Circle	Inter Site Distance in KM	Remark (No coverage / Poor coverage / other)	Improvement Plan
1	Near by Nurabad	MP	2KM	Poor Coverage	2 Sites Physical optimization /Sector reorient towards
2	Masood pur to Gher	MP	>7KM	Poor Coverage /Quality	High AMSL Variation /vegitation area New BTS required for improvement
3	Gher	RAJ	>5KM	Poor Caoverage/No coverage	ISD >5 KM high amsl variation and vegetation area New BTS Required
4	Kashimpur to Dhoulpur	RAJ	>3KM	Poor Coverage /Quality	1 Sites Physical optimization /Sector reorient towards
5	Near by Sijorli	RAJ	>3KM	Poor Coverage /Quality	1 Sites Physical optimization /Sector Addition towards raily route
6	Near by sahjadpuri	UPW	>4KM	Poor Coverage /Quality	New BTS required
7	Near by lahchora	UPW	>4KM	Poor Coverage /Quality	New BTS required
8	Farah	UPW	>4KM	Poor Coverage /Quality	New BTS Plan(DAA37)
9	Near Ajijpur	UPW	2KM	Poor Coverage	New BTS Plan(AJJP01)
10	Chata	UPW	>4KM	Poor Coverage /Quality	New BTS required
11	Bhahi	UPW	>3KM	Poor Coverage /Quality	New BTS required
12	Near Jajru	DEL	>2KM	Poor Quality	New BTS Planed(NT4508)
13	Near Sarita Vihar	DEL	>2KM	Poor Quality	1 Sites Physical optimization overshooter cell
14	Asoati	DEL	>2KM	Poor Quality/Coverage	2 Sites Physical optimization /Sector reorient towards Railway Route
15	Banchari to Maroli	DEL	>3KM	Poor Coverage	New BTS Planed(NT4601)

TSP-BSNL

Plan to improve the converge in this route :
1)   Sites have been planned under BSNL Project
2)   By Hard & Soft optimization

TSP-BSNL

TSP- JIO

Plan to improve the converge in this route

Sn	Patch Name	Circle	Inter Site Distance in KM	Remark (No coverage / Poor coverage / other)	Improvement Plan
1	Chambal River Bank (Chambal Beehad Area)	MP	6.9	Poor Coverage	New Site required
2	Gher (Chambal Beehad Area)	RJ	5.5	Poor Coverage	New Site required
3	Gher (Chambal Beehad Area)	RJ	5.5	Poor Coverage	New Site required
4	Doon Ka Pura	RJ	4.9	Poor Coverage	New Site required
5	Jalalpur	RJ	4	Poor Coverage	Optimization Done on serving Site
6	Bagcholi Khar	RJ	3.2	Poor Coverage	Optimization Done on serving Site
7	Baad (IOCL Refinery)	UW	1.3	Poor Coverage	Site was in outage during the drive period which is now resolved
8	Vrindavan Road Railway Station	UW	1.8	Poor Coverage	Optimization planned on serving site
9	Near Chata Railway Station	UW	2.7	Poor Coverage	Optimization planned on serving site
10	Near Hodal	HR	3	Poor Coverage	Site was in outage during the drive period which is now resolved
11	Hind terminal cold logistics (Devli to Janauli)	HR	4.2	Poor Coverage	Site was in outage during the drive period which is now resolved
12	Asavati to BPCL Piyala	HR	4.9	Poor Coverage	Site was in outage during the drive period which is now resolved

Dynamic Data Test Details

TSP- VI

Sn	Patch Name	Circle	Inter Site Distance in KM	Remark (No coverage / Poor coverage / other)	Improvement Plan
1	Rairu to Banmore	MPC	4.4	Poor coverage	New site Req.
2	Nurabad to Morena toll Plaza	MPC	9.5	No coverage	New site Req.
3	Railway Bridge Kunwari Morena	MPC	5.4	Poor coverage	Optimization Planned
4	Cholasarai to Chambal railway bridge	MPC	5.0	Poor coverage	Optimization Planned

Dynamic Data Test Details