For Immediate Release

Information note to the Press (Press Release No.94/2019)

Telecom Regulatory Authority of India

TRAI Releases Report on Independent Drive Tests conducted in six cities viz. Cochin, Dharbanga, Jaipur, Lucknow, Shimla & Solan and Vijayawada

New Delhi, 15 October, 2019: TRAI, through its agency, conducted Independent Drive Tests (IDT) in six cities viz. Cochin, Dharbanga, Jaipur, Lucknow, Shimla & Solan and Vijayawada. Drive tests were conducted to assess the network quality provided by cellular mobile telephone service providers for voice and data services. The details of drive tests conducted are given below: -

Cities

S. No	City	Licensed Service Area (LSA)	Period of Conducting IDT	Summary of Results of IDT
1)	Cochin	Kerala	17th to 21st June 2019	Annexure-A
2)	Dharbanga	Bihar	10th to 12th June 2019	Annexure-B
3)	Jaipur	Rajasthan	17th to 21st June 2019	Annexure-C
4)	Lucknow	UP - East	17th to 20th June 2019	Annexure-D
5)	Shimla & Solan	HP	28th to 30th May 2019	Annexure-E
6)	Vijayawada	AP	20th to 24th May 2019	Annexure-F

2. The Key Performance Indicators (KPIs) were assessed for the networks of all telecom service providers operating in the region. KPIs for voice services are Coverage; Call Setup Success Rate (CSSR); Drop Call Rate; Block Call Rate, Handover Success Rate; Rx Quality. KPIs for data services are Download and Upload Throughputs, Web Browsing Delay, Video Streaming Delay and Latency. The complete report is available at TRAI website www.analytics.trai.gov.in

3. The key findings of Drive test are summarized below:

(i) Cochin City: All the TSPs have met the $\leq 2\%$ of Drop Call Rate and $>=95\%$ of CSSR. Maximum throughput has been observed in 3G & 4G network of VIL(Vodafone) & Airtel respectively.

(ii) Dharbanga City: All the TSPs have met the $\leq$2% of Drop Call Rate except BSNL 2G, VIL(Idea) 2G, Airtel 3G, BSNL 3G & VIL(Idea) 3G. All the TSPs have met the =95% of CSSR. Maximum throughput has been observed in 3G & 4G network of BSNL & VIL(Idea) respectively.

(iii) Jaipur City: All the TSPs have met the $\leq$2% of Drop Call Rate except Tata 2G & VIL(Vodafone) 3G. All the TSPs have met the =95% of CSSR. Maximum throughput has been observed in 3G & 4G network of Tata & RJio respectively.

(iv) Lucknow City: All the TSPs have met the $\leq$2% of Drop Call Rate except VIL(Idea) 2G, BSNL 2G & VIL(Vodafone) VoLTE. All the TSPs have met the =95% of CSSR. Maximum throughput has been observed in 3G & 4G network of BS3NL & Airtel respectively.

(v) Shimla & Solan City: All the TSPs have met the $\leq$2% of Drop Call Rate except Airtel 3G & BSNL 3G. All the TSPs have met the =95% of CSSR except RJio VoLTE. Maximum throughput has been observed in 3G & 4G network of VIL(Idea) & RJio respectively.

(vi) Vijayawada City: All the TSPs have met the $\leq$2% of Drop Call Rate and >=95% of CSSR. Maximum throughput has been observed in 3G & 4G network of Airtel respectively.

4.   The complete report is available at TRAI website www.analytics.trai.gov.in In case of any clarification, please contact, Shri. Asit Kadayan, Advisor (QoS) at Tel. No. +91-11-2323-0404 or at email.id: advqos@trai.gov.in

(S.K. Gupta)
Secretary

Report on Independent Drive Test conducted in Cochin from 17th to 21st June 2019

The drive test in the city of Cochin in Kerala LSA was conducted for a period of 5 days during 17th to 21st June 2019. It covered a route of approximately 570 KMs and data tests conducted on 6 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Tata, Vodafone Idea Ltd (VIL (Idea & Vodafone), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

Voice Call	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Call Attempt	823	816	814	794	814
Blocked Call Rate (%)	0.24%	0.00%	0.49%	2.90%	0.00%
CSSR% (Accessibility)	99.76%	100.00%	99.51%	97.10%	100.00%
Drop Call Rate (%)	0.00%	0.12%	0.25%	1.04%	0.12%
Mobility HOSR (%)	97.76%	98.45%	97.79%	99.57%	99.77%
Rx Quality (%)	97.83%	99.18%	97.96%	97.13%	99.12%

Voice Call	3G					VoLTE	
	Airtel	BSNL	Tata	VIL		Airtel	Jio
				Idea	Vodafone		
Call Attempt	821	819	815	825	837	798	720
Blocked Call Rate (%)	0.37%	0.49%	1.23%	0.85%	0.96%	1.00%	0.14%
CSSR% (Accessibility)	99.63%	99.51%	98.77%	99.15%	99.04%	99.00%	99.86%
Drop Call Rate (%)	0.49%	0.49%	0.25%	0.24%	0.36%	0.38%	0.56%
Mobility HOSR (%)	99.94%	99.20%	99.85%	99.76%	99.95%	99.75%	99.76%
Rx Quality (%)	95.28%	89.31%	97.88%	93.19%	94.69%	71.00%	87.39%

Data Services Static	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Download Throughput (Kbps)	119.01	38.13	132.79	116.69	62.79
Upload Throughput (kbps)	130.43	48.50	121.05	132.94	111.19
Web Browsing Delay (sec)	32.93	26.97	27.73	39.08	36.86
Latency (msec)	574	266	588	339	410

Data Services Static	3G					4G			
	Airtel	BSNL	Tata	VIL		Airtel	JIO	VIL	
				Idea	Vodafone			Idea	Vodafone
Download Throughput (Mbps)	1.02	0.36	1.26	1.02	2.01	9.44	4.89	3.79	2.33
Upload Throughput (Mbps)	0.63	0.67	0.70	1.15	0.65	3.59	0.74	0.97	5.09
Web Browsing Delay (sec)	12.15	15.31	12.91	13.31	12.68	9.01	8.29	10.97	9.14
Video Streaming Delay (sec)	8.28	6.55	2.79	1.89	3.71	3.67	2.72	1.18	2.48
Latency (msec)	135	132	161	94	137	73	74	71	75

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Report on Independent Drive Test conducted in Darbhanga from 10th to 12th June 2019

The drive test in the city of Darbhanga in Bihar LSA was conducted for a period of 3 days during 10th to 12th June 2019. It covered a route of approximately 211 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, RJio and Vodafone Idea Ltd (VIL (Idea), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

Voice Call	2G			
	Airtel	BSNL	Tata	VIL(Idea)
Call Attempt	330	331	292	310
Blocked Call Rate (%)	0.30%	2.11%	0.68%	2.90%
CSSR% (Accessibility)	99.70%	97.89%	99.32%	97.10%
Drop Call Rate (%)	0.00%	2.78%	0.00%	2.33%
Mobility HOSR (%)	98.91%	96.34%	99.26%	96.42%
Rx Quality (%)	96.28%	96.06%	96.17%	93.07%

Voice Call	3G				VoLTE
	Airtel	BSNL	Tata	VIL(Idea)	JIO
Call Attempt	299	334	284	275	326
Blocked Call Rate (%)	4.35%	2.99%	0.00%	2.55%	0.31%
CSSR% (Accessibility)	95.65%	97.01%	100.00%	97.45%	99.69%
Drop Call Rate (%)	2.80%	6.48%	0.00%	5.22%	0.62%
Mobility HOSR (%)	99.28%	97.33%	99.46%	98.87%	99.42%
Rx Quality (%)	90.69%	94.67%	95.09%	93.56%	87.71%

Data Services Static	2G			
	Airtel	BSNL	Tata	VIL(Idea)
Download Throughput(Kbps)	78.57	105.07	91.61	106.00
Upload Throughput (kbps)	92.38	87.99	80.50	151.09
Web Browsing Delay (sec)	23.73	41.40	25.58	32.51
Latency (msec)	711	322	690	262

Data Services Static	3G				4G		
	Airtel	BSNL	Tata	VIL(Idea)	Airtel	Jio	VIL(Idea)
Download Throughput (Mbps)	1.12	3.86	T0	3.39	4.24	4.89	6.30
Upload Throughput (Mbps)	0.35	2.85	T0	1.49	2.91	4.34	5.44
Web Browsing Delay (sec)	14.93	11.25	T0	11.58	13.74	10.82	7.75
Video Streaming Delay (sec)	2.42	1.53	T0	2.25	2.45	5.73	1.04
Latency (msec)	119	94	T0	127	152	93	74

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Report on Independent Drive Test conducted in Jaipur from 17th to 21st June 2019

The drive test in the city of Jaipur in Rajasthan LSA was conducted for a period of 5 days during 17th to 21st June 2019. It covered a route of approximately 641 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Vodafone Idea Ltd (VIL (Idea, Vodafone), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

Voice Call	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Call Attempt	909	943	840	892	922
Blocked Call Rate (%)	1.43%	0.74%	3.10%	0.45%	0.76%
CSSR% (Accessibility)	98.57%	99.26%	96.90%	99.55%	99.24%
Drop Call Rate (%)	0.11%	1.18%	2.46%	0.23%	0.00%
Mobility HOSR (%)	97.08%	96.62%	96.43%	97.33%	99.91%
Rx Quality (%)	92.88%	98.27%	98.59%	93.61%	98.29%

Voice Call	3G					VoLTE			
	Airtel	BSNL	Tata	VIL		Airtel	Jio	VIL	
				Idea	Vodafone			Idea	Vodafone
Call Attempt	918	942	820	762	914	831	1065	537	665
Blocked Call Rate (%)	1.53%	0.32%	0.49%	2.49%	1.97%	0.60%	0.19%	0.56%	0.60%
CSSR% (Accessibility)	98.47%	99.68%	99.51%	97.51%	98.03%	99.40%	99.81%	99.44%	99.40%
Drop Call Rate (%)	1.66%	1.28%	1.23%	0.81%	3.57%	0.61%	0.85%	0.75%	0.15%
Mobility HOSR (%)	98.26%	96.29%	96.98%	96.30%	95.81%	99.79%	99.67%	99.84%	99.85%
Rx Quality (%)	92.48%	96.66%	93.78%	92.83%	91.74%	80.56%	85.08%	83.55%	75.54%

Data Services Static	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Download Throughput (Kbps)	119.59	109.52	142.90	137.40	92.95
Upload Throughput (kbps)	80.48	87.86	74.26	88.37	53.17
Web Browsing Delay (sec)	20.82	18.45	23.60	21.16	20.33
Latency (msec)	272	332	307	327	380

Data Services Static	3G					4G			
	Airtel	BSNL	Tata	VIL		Airtel	Jio	VIL	
				Idea	Vodafone			Idea	Vodafone
Download Throughput (Mbps)	1.31	1.65	3.58	1.76	1.24	6.96	7.22	5.44	3.10
Upload Throughput (Mbps)	0.58	1.07	1.92	0.66	0.95	2.91	5.34	5.46	3.36
Web Browsing Delay (sec)	13.48	13.62	13.53	15.10	14.02	6.43	6.87	12.56	8.92
Video Streaming Delay (sec)	6.28	4.09	4.93	2.36	5.28	1.39	0.90	3.25	0.81
Latency (msec)	297	125	95	279	73	67	94	68	TO

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Report on Independent Drive Test conducted in Lucknow from 17th to 20th June 2019

The drive test in the city of Lucknow in UP -East LSA was conducted for a period of 4 days on 17th to 20th June 2019. It covered a route of approximately 414 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Tata, Vodafone Idea Ltd (VIL (Idea & Vodafone)), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

Voice Call	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Call Attempt	603	570	578	608	586
Blocked Call Rate (%)	0.17%	0.18%	0.35%	1.64%	0.34%
CSSR% (Accessibility)	99.83%	99.82%	99.65%	98.36%	99.66%
Drop Call Rate (%)	0.00%	0.18%	0.17%	2.01%	0.86%
Mobility HOSR (%)	98.58%	94.69%	98.70%	92.98%	97.93%
Rx Quality (%)	95.36%	97.08%	95.45%	95.45%	94.25%

Voice Call	3G				VoLTE		
	Airtel	BSNL	VIL		Airtel	Jio	VIL(Vodafone)
			Idea	Vodafone			
Call Attempt	578	570	596	578	476	555	390
Blocked Call Rate (%)	1.04%	1.05%	2.18%	1.21%	0.63%	0.54%	0.77%
CSSR% (Accessibility)	98.96%	98.95%	97.82%	98.79%	99.37%	99.46%	99.23%
Drop Call Rate (%)	0.17%	2.30%	0.86%	0.53%	0.21%	1.09%	4.13%
Mobility HOSR (%)	99.87%	99.66%	99.40%	99.92%	99.96%	99.69%	99.32%
Rx Quality (%)	94.97%	91.82%	95.53%	90.31%	74.50%	87.59%	73.68%

Data Services Static	2G				
	Airtel	BSNL	Tata	VIL	
				Idea	Vodafone
Download Throughput (Kbps)	61.39	106.91	38.39	88.58	74.41
Upload Throughput (kbps)	67.18	102.90	75.03	104.15	41.10
Web Browsing Delay (sec)	23.24	44.00	41.47	47.37	26.17
Latency (msec)	610	315	647	264	186

Data Services Static	3G				4G			
	Airtel	BSNL	VIL		Airtel	Jio	VIL	
			Idea	Vodafone			Idea	Vodafone
Download Throughput (Mbps)	1.50	3.36	1.50	1.79	11.31	5.67	4.71	2.92
Upload Throughput (Mbps)	0.76	0.79	0.85	0.72	4.95	5.83	3.89	2.77
Web Browsing Delay (sec)	11.56	14.21	13.09	13.82	8.86	6.23	12.08	12.30
Video Streaming Delay (sec)	2.45	1.50	1.37	3.71	2.13	1.82	1.24	3.18
Latency (msec)	78	92	79	79	88	80	91	69

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Report on Independent Drive Test conducted in Shimla & Solan from 28th to 30th May 2019

The drive test in the city of Shimla & Solan in Himachal Pradesh LSA was conducted for a period of 3 days during 28th to 30th May 2019. It covered a route of approximately 217 KMs and data tests conducted on 6 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Tata, Vodafone Idea Ltd (VIL (Idea), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

Voice Call	2G			
	Airtel	BSNL	Tata	VIL(Idea)
Call Attempt	400	393	386	389
Blocked Call Rate (%)	0.75%	0.51%	0.78%	0.51%
CSSR% (Accessibility)	99.25%	99.49%	99.22%	99.49%
Drop Call Rate (%)	1.01%	1.79%	0.78%	0.26%
Mobility HOSR (%)	95.86%	97.06%	94.83%	97.41%
Rx Quality (%)	93.83%	97.25%	93.35%	97.62%

Voice Call	3G			VoLTE	
	Airtel	BSNL	VIL(Idea)	Airtel	JIO
Call Attempt	387	402	407	361	395
Blocked Call Rate (%)	2.07%	0.25%	0.00%	0.28%	5.82%
CSSR% (Accessibility)	97.93%	99.75%	100.00%	99.72%	94.18%
Drop Call Rate (%)	2.11%	4.49%	0.00%	0.83%	0.81%
Mobility HOSR (%)	99.90%	99.03%	99.00%	99.69%	99.56%
Rx Quality (%)	86.25%	97.35%	94.27%	84.14%	86.21%

Data Services Static	2G			
	Airtel	BSNL	Tata	VIL(Idea)
Download Throughput (Kbps)	42.08	66.25	31.87	91.36
Upload Throughput (kbps)	92.88	100.36	55.35	139.54
Web Browsing Delay (sec)	27.87	45.94	28.09	32.29
Latency (msec)	273	401	323	448

Data Services Static	3G			4G		
	Airtel	BSNL	VIL(Idea)	Airtel	Jio	VIL(Idea)
Download Throughput (Mbps)	2.43	2.96	3.40	4.03	13.54	8.36
Upload Throughput (Mbps)	0.60	0.91	1.65	1.67	6.33	6.85
Web Browsing Delay (sec)	10.86	14.61	10.65	6.17	6.50	8
Video Streaming Delay (sec)	1.58	5.51	2.91	1.90	1.76	1.62
Latency (msec)	245	120	234	145	71	101

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Report on Independent Drive Test conducted in Vijayawada from 20th to 24th May 2019

The drive test in the city of Vijayawda in Andhra Pradesh LSA was conducted for a period of 5 days during 20th to 24th May 2019. It covered a route of approximately 451 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Airtel, BSNL, Tata, Vodafone Idea Ltd (VIL (Idea), and RJio. Tests included 2G, 3G and 4G technologies.

The summary of the Service Provider's performance on the key parameters based on Independent Drive Test is given here under: -

Voice Call	2G		
	Airtel	BSNL	VIL(Idea)
Call Attempt	795	836	847
Blocked Call Rate (%)	0.63%	0.48%	0.35%
CSSR% (Accessibility)	99.37%	99.52%	99.65%
Drop Call Rate (%)	0.38%	0.24%	0.59%
Mobility HOSR (%)	97.31%	97.77%	98.44%
Rx Quality (%)	97.57%	98.99%	96.60%

Voice Call	3G			VoLTE	
	Airtel	BSNL	VIL(Idea)	Airtel	Jio
Call Attempt	787	821	824	724	766
Blocked Call Rate (%)	0.13%	0.24%	1.70%	0.28%	0.26%
CSSR% (Accessibility)	99.87%	99.76%	98.30%	99.72%	99.74%
Drop Call Rate (%)	1.15%	1.10%	1.23%	0.69%	0.26%
Mobility HOSR (%)	99.42%	99.97%	99.53%	100.00%	99.60%
Rx Quality (%)	93.73%	97.55%	91.56%	88.26%	86.53%

Data Services	2G		
	Airtel	BSNL	VIL(Idea)
Download Throughput (Kbps)	81.11	69.78	84.32
Upload Throughput(kbps)	77.56	65.35	102.94
Web Browsing Delay (sec)	26.93	30.91	40.61
Latency (msec)	396	349	247

Data Services Static	3G			4G		
	Airtel	BSNL	VIL(Idea)	Airtel	Jio	VIL(Idea)
Download Throughput (Mbps)	2.32	0.63	0.96	7.23	7.14	1.33
Upload Throughput (Mbps)	0.48	0.69	0.15	6.21	2.78	1.48
Web Browsing Delay (sec)	9.07	17.26	16.12	6.14	12.16	10.96
Video Streaming Delay (sec)	2.37	5.62	4.36	1.57	2.66	3.93
Latency (sec)	170	130	84	79	108	100

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Definitions

Call Attempt: An attempt to achieve a connection to device attached to a telecommunication network.

Block Call <=3%: A call that is not connected because there is no free channel in radio access network to serve a call attempt.

CSSR (Call Setup Success Rate) >=95%: Ratio of Established Calls to Call Attempts.

Drop Call Rate <=2%: An ability to maintain a call once it has been correctly established.

Hand over Success Rate (HOSR) >=95%: Ratio between successful handovers to handover requested. (Handover is a process by which a mobile telephone call is transferred from one base station to another as the subscriber passes the boundary of a cell).

Rx Quality >95%: Measure of quality of voice.

Download Throughput: Data transmission rate for downloading a test file from a test server to a test device.

Upload Throughput: Data transmission rate for uploading a test file from a test device to test server.

Web browsing delay (secs): Average time taken to fully load the website tested.

Video Steaming delay (secs): Average time taken to fully download the video tested.

Latency (m secs): Time taken for a packet to reach the receiving endpoint after transmitted from the sending point.

Time Out (TO): Observation cannot be taken due to Time out.

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