For Immediate Release

Information note to the Press (Press Release No. 99/2017)

Telecom Regulatory Authority of India

TRAI Releases Report on Independent Drive Tests conducted in seven cities viz. Agartala, Asansole, Bangalore, Chennai, Goa, Pune and Vadodara

New Delhi, 27th November, 2017: TRAI through its agency conducted Independent Drive Tests (IDT) in seven cities viz. Agartala, Asansol, Bangalore, Chennai, Goa, Pune and Vadodara. 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 in the seven cities are given below:-

S.No	City	Licensed Service	Period of Conducting IDT	Summary of Results of IDT
1)	Agartala	North East	30th Aug to 1st September	Annexure-A
2)	Asansol	West Bengal	18th to 22nd September 2017	Annexure-B
3)	Bangalore	Karnataka	13th to 22nd September 2017	Annexure-C
4)	Chennai	Tamil Nadu	16th to 25th August 2017	Annexure-D
5)	Goa	Maharastra	29th to 31st August 2017	Annexure-E
6)	Pune	Maharastra	11th to 15th September 2017	Annexure-F
7)	Vadodara	Gujarat	18th to 22nd September 2017	Annexure-G

2. The Key Performance Indicators (KPIs) were assessed for the networks of all telecom service providers operating in the region. KPIs for voice services were Coverage; Call Setup Success Rate; Drop Call Rate; Block Call Rate, Handover Success Rate; Rx Quality. KPIs for data services were 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. 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

27/11/2017

(S K Gupta)
Secretary

Report on Independent Drive Test conducted in Agartala from 30th Aug to 1st September 2017

The drive test in the city of Agartala in North East LSA was conducted for a period of 3 days during 18th to 30th Aug to 1st September, 2017. It covered a route of approximately 310 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Idea, RCOM, Vodafone and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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						CDMA
	Aircel	Airtel	BSNL	Idea	RCOM	Vodafone	BSNL*
Call Attempt*	535	531	555	516	516	556	347
Blocked Call Rate (%)	0.9%	0.9%	0.2%	1.2%	1.4%	0.5%	3.2%
CSSR% (Accessibility)	99.1%	99.1%	99.8%	98.8%	98.6%	99.5%	96.8%
Dropped Call Rate (%)	1.5%	0.8%	1.1%	2.2%	0.4%	0.9%	16.7%
Mobility HOSR(%)	98.1%	98.7%	95.8%	99.6%	97.6%	99.5%	100.0%
Rx Quality	96.0%	95.1%	95.5%	94.1%	95.8%	96.7%	73.3%

Voice Call	3G						VoLTE
	Aircel	Airtel	BSNL	Idea	RCOM	Vodafone	Jio
Call Attempt*	514	552	569	523	504	546	523
Blocked Call Rate (%)	0.8%	1.8%	0.4%	1.5%	2.2%	1.3%	1.9%
CSSR% (Accessibility)	99.2%	98.2%	99.6%	98.5%	97.8%	98.7%	98.1%
Dropped Call Rate (%)	1.6%	2.2%	1.6%	1.0%	1.8%	0.2%	1.4%
Mobility HOSR(%)	98.0%	100.0%	92.1%	100.0%	94.1%	99.8%	99.6%
Rx Quality	95.5%	76.7%	95.7%	93.8%	93.5%	95.9%	85.5%

*In BSNL CDMA calls did not initiate at the outskirts of Agartala city due to lack of coverage

Data Services	2G					
	Aircel	Airtel	BSNL	Idea	RCOM	Vodafone*
Download Throughput (Kbps)	82.3	167.8	117.1	119.5	72.7	110.9
Upload Throughput (Kbps)	152.6	84.0	106.4	125.8	134.8	151.4
Web Browsing Delay (sec)	26.7	28.1	28.8	27.8	28.9	27.4
Latency (msec)	260	284	473	524	274	-

Data Services	3G						4G			
	Aircel	Airtel	BSNL	Idea	RCOM	Vodafone*	Airtel	Idea	Jio	Vodafone*
Download Throughput (Mbps)	1.4	2.1	2.5	0.9	2.7	1.7	9.2	3.4	8.7	3.6
Upload Throughput (Mbps)	0.6	1.2	2.0	1.8	1.0	1.7	3.2	6.1	3.0	6.2
Web Browsing Delay (sec)	11.6	7.2	6.3	11.8	10.1	14.7	6.6	5.3	5.3	13.6
Video Streaming Delay (sec)	4.4	3.6	4.6	3.5	6.0	5.3	2.9	2.1	2.3	1.6
Latency (msec)	213	272	167	290	208	-	173	167	196	-

*Vodafone has disabled ICMP on its network

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

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Report on Independent Drive Test conducted in Asansol from 18th to 22nd September 2017

The drive test in the city of Asansol in West Bengal LSA was conducted for a period of 5 days during 18th to 22nd September, 2017. It covered a route of approximately 620 KMs and data tests conducted on 6 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Tata, Idea, RCOM, Vodafone, MTS and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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							CDMA	
	Aircel	Airtel	BSNL	Idea	RCOM	Tata	Vodafone	MTS	Tata
Call Attempt	1146	1156	1106	1103	1081	1098	1156	1032	948
Blocked Call Rate (%)	0.2%	0.3%	0.9%	0.7%	0.3%	0.1%	0.4%	1.5%	9.0%
CSSR% (Accessibility)	99.8%	99.7%	99.1%	99.3%	99.7%	99.9%	99.6%	98.5%	91.0%
Drop Call Rate (%)	0.3%	0.9%	0.6%	0.3%	0.5%	0.2%	0.1%	4.3%	3.5%
Mobility HOSR (%)	99.1%	92.0%	95.6%	99.4%	98.9%	98.6%	98.8%	100.0%	100.0%
Rx Quality (%)	97.1%	96.1%	97.8%	98.2%	96.8%	96.8%	99.9%	88.7%	90.3%

*Calls in RCOM & Tata CDMA did not initiate at the outskirts of Asansol City due to lack of coverage.

Voice Call	3G						VoLTE
	Aircel	Airtel	BSNL	Idea	RCOM	Vodafone	Jio
Call Attempt	1132	1108	1146	1105	1075	1166	1138
Blocked Call Rate (%)	0.7%	1.0%	1.0%	0.5%	2.6%	0.3%	0.0%
CSSR% (Accessibility)	99.3%	99.0%	99.0%	99.5%	97.4%	99.7%	100.0%
Drop Call Rate (%)	0.7%	0.7%	1.0%	0.5%	1.7%	0.5%	0.4%
Mobility HOSR (%)	99.2%	96.8%	99.3%	100.0%	100.0%	99.8%	100.0%
Rx Quality (%)	82.9%	94.8%	97.1%	97.2%	95.8%	97.4%	87.9%

Data Services	2G							CDMA
	Aircel	Airtel	BSNL	Idea	RCOM	Tata	Vodafone*	MTS
Download Throughput (kbps)	56.12	106.10	119.45	122.17	55.05	43.53	125.69	1849.9
Upload Throughput (kbps)	58.35	110.15	117.29	77.13	109.39	102.35	87.82	1038.7
Web Browsing Delay (sec)	29.30	39.87	37.92	43.29	32.97	21.80	38.65	15.5
Latency (sec)	611	530	377	481	613	652	-	151

Data Services	3G						4G			
	Aircel	Airtel	BSNL	Idea	RCOM	Vodafone*	Airtel	Idea	Jio	Vodafone
Download Throughput (Mbps)	2.27	4.04	2.88	3.25	3.88	3.79	6.93	6.80	5.92	10.53
Upload Throughput (Mbps)	0.95	1.29	1.42	1.73	1.51	1.90	3.37	6.06	3.01	10.49
Web Browsing Delay (sec)	9.32	10.33	9.18	9.00	9.41	10.26	6.32	7.41	9.12	6.09
Video Streaming Dealy(sec)	5.08	2.89	3.67	1.90	1.98	1.34	2.33	0.93	1.22	0.80
Latency (sec)	106	160	122	146	165	-	81	127	173	-

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

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Report on Independent Drive Test conducted in Bangalore from 13th to 22nd September 2017

The drive test in the city of Bangalore in Karnataka LSA was conducted for a period of 8 days during 13th to 22nd September, 2017. It covered a route of approximately 940 KMs and data tests conducted on 10 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Idea, RCom, Tata, Vodafone, MTS and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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							CDMA	
	Aircel	Airtel	BSNL	Idea	RCOM	Tata	Vodafone	MTS	Tata
Call Attempt	1872	1962	1958	1988	1964	1979	1969	1993	1863
Blocked Call Rate (%)	0.2%	0.1%	0.7%	0.5%	1.2%	0.2%	0.5%	7.3%	4.9%
CSSR% (Accessibility)	99.8%	99.9%	99.3%	99.5%	98.8%	99.8%	99.9%	92.7%	95.1%
Drop Call Rate (%)	0.9%	0.8%	1.3%	2.2%	1.6%	0.9%	0.2%	3.9%	5.0%
Mobility HOSR (%)	97.8%	98.0%	98.1%	98.4%	98.3%	98.5%	99.5%	100.0%	100.0%
Rx Quality (%)	96.8%	96.5%	98.2%	98.0%	96.1%	96.9%	99.11%	93.1%	95.2%

* Calls in Aircel & CDMA TSP's did not initiate at the outskirts of Bangalore City due to lack of coverage.

Voice Call	3G						VoLTE
	Aircel	Airtel	BSNL	Idea	Tata	Vodafone	Jio
Call Attempt	1834	1969	1934	1946	1920	1967	1989
Blocked Call Rate (%)	0.3%	2.0%	1.7%	0.3%	0.5%	0.3%	0.4%
CSSR% (Accessibility)	99.7%	98.0%	98.3%	99.7%	99.5%	99.7%	99.6%
Drop Call Rate (%)	1.1%	0.7%	1.9%	0.6%	0.9%	0.4%	0.2%
Mobility HOSR (%)	99.1%	99.9%	99.5%	99.8%	99.8%	99.9%	99.3%
Rx Quality (%)	97.3%	91.4%	97.6%	97.1%	97.3%	97.8%	88.2%

Data Services	2G							CDMA	
	Aircel	Airtel	BSNL	Idea	RCOM	Tata	Vodafone	MTS	TATA
Download Throughput (kbps)	103.12	98.29	73.95	98.45	104.01	151.23	149.51	960.5	736.6
Upload Throughput (kbps)	92.81	75.38	77.11	106.43	89.38	133.86	109.53	523.1	414.6
Web Browsing Delay (sec)	34.5	30.2	30.2	36.53	45.18	42.01	40.44	26.1	26.4
Latency (sec)	592	273	577	289	593	301	-	176	152

Data Services	3G						4G				
	Aircel	Airtel	BSNL	Idea	Tata	Vodafone	Airtel	Idea	Jio	RCOM	Vodafone
Download Throughput (Mbps)	1.05	2.28	1.92	1.70	2.23	1.75	4.98	4.83	5.08	2.63	5.02
Upload Throughput (Mbps)	1.64	1.14	1.11	0.85	1.54	0.81	3.85	4.89	2.16	1.90	5.30
Web Browsing Delay (sec)	11.78	10.7	10.52	10.78	7.94	11.13	7.66	5.50	8.71	10.08	7.60
Video Streaming Dealy(sec)	14.19	6.93	5.39	4.81	2.47	4.91	1.61	0.80	2.31	13.30	0.98
Latency (sec)	167	66	87	116	121	-	96	67	112	129	-

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

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Report on Independent Drive Test conducted in Chennai from 16th to 25th August 2017

The drive test in the city of Chennai in Tamil Nadu LSA was conducted for a period of 8 days during 16th to 25th August, 2017. It covered a route of approximately 910 KMs and data tests conducted on 8 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Idea, RCOM, Tata, Vodafone, MTS and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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							CDMA	
	Aircel	Airtel	BSNL	Idea	RCOM	Tata	Vodafone	MTS	Tata
Call Attempt	2059	2059	2128	2085	2046	2055	2099	2114	2070
Blocked Call Rate (%)	0.0%	0.3%	1.6%	0.0%	0.3%	0.0%	0.6%	1.9%	1.9%
CSSR% (Accessibility)	100.0%	99.7%	98.4%	100.0%	99.7%	100.0%	99.4%	98.1%	98.1%
Drop Call Rate (%)	0.4%	0.0%	1.7%	0.0%	0.2%	0.1%	0.3%	1.4%	1.0%
Mobility HOSR (%)	99.1%	99.6%	95.3%	99.6%	99.1%	99.1%	98.8%	100.0%	100.0%
Rx Quality (%)	99.5%	99.0%	98.4%	99.2%	98.7%	99.6%	99.1%	96.0%	96.6%

Voice Call	Dual (2G/3G)						VoLTE
	Aircel	Airtel	BSNL	Idea	Tata	Vodafone	Jio
Call Attempt	2007	2078	2100	2048	2039	2047	2052
Blocked Call Rate (%)	0.3%	0.7%	0.9%	0.4%	0.4%	0.8%	0.1%
CSSR% (Accessibility)	99.7%	99.3%	99.1%	99.6%	99.6%	99.2%	99.9%
Drop Call Rate (%)	0.3%	0.1%	0.8%	0.3%	0.4%	0.4%	0.1%
Mobility HOSR (%)	99.3%	100.0%	99.6%	100.0%	100.0%	100.0%	99.9%
Rx Quality (%)	98.6%	95.2%	98.6%	96.9%	96.8%	97.1%	92.8%

Data Services	2G							CDMA	
	Aircel	Airtel	BSNL	Idea	RCOM	Tata	Vodafone *	MTS	Tata
Download Throughput (Kbps)	167	157.5	62.9	139.2	82.4	131	97.4	655.8	886.2
Upload Throughput (Kbps)	103.8	164.7	68.2	152.9	74.5	175.4	91.4	197.3	277.2
Web Browsing Delay (sec)	16.4	18.9	21.1	17.1	19.5	15.8	19.5	44.4	30.4
Latency (msce)	204	270	449	420	392	547	-	150	110

Data Services	Dual (2G/3G)						4G				
	Aircel	Airtel	BSNL	Idea	Tata	Vodafone *	Airtel	Idea	Jio	RCOM	Vodafone *
Download Throughput (Mbps)	4.8	6.2	1.4	4.1	1.3	4.9	7.8	7.4	2.1	4.6	13.1
Upload Throughput (Mbps)	1.1	1.5	1.1	1.9	1.5	1.9	4.4	5.2	1.2	1.9	11.0
Web Browsing Delay (sec)	9.1	7.1	10.2	7.5	8.0	5.6	5.6	4.7	10.5	8.1	3.8
Video Streaming Delay (sec)	1.8	9.5	18.5	3.2	2.0	18.2	2.8	6.1	34.9	23.9	13.7
Latency (msce)	223	82	139	139	137	-	79	99	88	133	-

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

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Report on Independent Drive Test conducted in Goa from 29th to 31st August 2017

The drive test in the city of Goa in Maharashtra LSA was conducted for a period of 3 days during 29th to 31st August, 2017. It covered a route of approximately 320 KMs and data tests conducted on 4 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Idea, RCOM, Tata, Telenor, Vodafone, and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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								CDMA
	*Aircel	Airtel	BSNL	Idea	*RCOM	*Tata	Telenor	Vodafone	Tata
Call Attempt*	452	490	496	482	408	377	430	486	486
Blocked Call Rate (%)	0.2%	0.0%	2.4%	0.4%	6.9%	2.1%	1.2%	0.6%	3.3%
CSSR% (Accessibility)	99.8%	100.0%	97.6%	99.6%	93.1%	97.9%	98.8%	99.4%	96.9%
Dropped Call Rate (%)	0.4%	1.2%	5.4%	3.8%	4.2%	4.6%	0.9%	1.4%	2.3%
Mobility HOSR(%)	99.6%	97.2%	90.1%	98.7%	99.4%	100.0%	96.0%	94.3%	100.0%
Rx Quality	98.2%	97.8%	95.8%	95.0%	96.3%	95.0%	95.6%	96.9%	94.0%

Voice Call	3G						VoLTE
	Airtel	BSNL	Idea	*Tata	Telenor	Vodafone	Jio
Call Attempt*	495	470	494	342	445	483	473
Blocked Call Rate (%)	0.8%	3.6%	1.0%	5.6%	0.7%	0.8%	1.1%
CSSR% (Accessibility)	99.2%	96.4%	99.0%	94.4%	99.3%	99.2%	98.9%
Dropped Call Rate (%)	1.4%	4.4%	1.4%	4.0%	1.8%	0.6%	0.2%
Mobility HOSR(%)	98.3%	98.0%	99.7%	99.7%	100.0%	99.8%	99.7%
Rx Quality	94.2%	94.7%	78.6%	93.0%	82.3%	89.3%	87.8%

*In Aircel 2G, RCOM 2G, & Tata 2G & 3G calls did not initiate at the outskirts of Goa city due to lack of coverage

Data Services	2G								CDMA
	Aircel	Airtel	BSNL	Idea	RCOM	Tata	Telenor	Vodafone	Tata
Download Throughput (Kbps)	131.5	84.6	55.5	138.9	43.4	147	103.3	114.5	582.7
Upload Throughput (kbps)	91.5	105	61.2	159	65.7	143.8	129.1	91.9	302.5
Web Browsing Delay (sec)	25.6	31.8	30.9	30	32.8	26.2	29.3	27	27.9
Latency (msec)	470	744	605	353	629	404	655	242	168

Data Services	3G						4G					
	Airtel	BSNL	Idea	Tata	Telenor	Vodafone	Airtel	Idea	Jio	RCOM	Telenor	Vodafone
Download Throughput (Mbps)	3.0	1.2	2.7	2.5	1.3	1.9	7.2	3.6	7.8	5.5	9.4	7.7
Upload Throughput (Mbps)	1.0	0.6	2.1	0.7	0.8	1.4	4.4	5.1	3.7	2.7	6.4	6.0
Web Browsing Delay (sec)	7.8	9.7	8.7	10.0	9.8	13.4	7.2	6.6	5.0	7.2	5.8	5.2
Video Streaming Delay (sec)	2.0	3.3	3.0	5.1	9.3	6.0	1.5	2.0	1.7	6.1	2.1	0.8
Latency msec)	168	142	272	170	324	148	143	156	154	151	87	90

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

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Report on Independent Drive Test conducted in
Pune from 11th to 15th September 2017

The drive test in the city of Pune in Maharashtra LSA was conducted for a period of 5 days during 11th to 15th September, 2017. It covered a route of approximately 675 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Idea, RCOM, Tata, Telenor, Vodafone, and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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								CDMA
	Aircel	Airtel	BSNL	Idea	RCOM	Tata*	Telenor	Vodafone	Tata
Call Attempt*	1123	1166	1150	1156	1121	931	1126	1153	1168
Blocked Call Rate (%)	0.1%	1.2%	0.2%	0.1%	0.4%	0.2%	0.1%	0.4%	0.6%
CSSR% (Accessibility)	99.9%	98.8%	99.8%	99.9%	99.6%	99.8%	99.9%	99.6%	99.4%
Dropped Call Rate (%)	0.5%	0.5%	1.6%	0.6%	1.3%	1.6%	0.7%	0.4%	1.8%
Mobility HOSR(%)	98.7%	97.5%	97.3%	97.0%	99.6%	98.6%	98.5%	96.7%	100.0%
Rx Quality (%)	95.7%	97.2%	97.2%	97.0%	96.1%	97.2%	98.5%	97.5%	93.4%

Voice Call	3G						VoLTE
	Airtel	BSNL	Idea	Tata*	Telenor	Vodafone	Jio
Call Attempt	1164	1147	1161	908	1110	1184	1158
Blocked Call Rate (%)	1.3%	0.3%	0.8%	10.6%	2.8%	0.8%	0.9%
CSSR% (Accessibility)	98.7%	99.7%	99.2%	89.4%	97.2%	99.2%	99.1%
Dropped Call Rate (%)	1.6%	1.5%	0.8%	1.4%	3.2%	0.9%	0.9%
Mobility HOSR(%)	99.4%	99.8%	99.5%	99.7%	99.7%	99.3%	99.6%
Rx Quality (%)	90.7%	96.1%	88.1%	97.4%	80.2%	95.8%	88.4%

In Tata 2G and 3G calls did not initiate at the outskirts of Pune city due to lack of coverage

Data Services	Aircel 2G	Airtel 2G	BSNL 2G	Idea 2G	RCOM 2G	Tata 2G	Telenor 2G	Vodafone 2G	Tata CDMA
Download Throughput (Kbps)	114.9	90.8	70.9	88.8	43.1	125.9	169.9	98.5	698.1
Upload Throughput (Kbps)	97.3	76.2	35.8	110.8	85.0	117.0	130.8	102.1	726.5
Web Browsing Delay (sec)	38.8	35.9	34.9	43.7	36.2	41.8	61.3	39.7	31.9
Latency (msec)	505	376	338	319	644	272	379	242	160

Data Services	Airtel 3G	BSNL 3G	Idea 3G	Tata 3G	Telenor 3G	Vodafone 3G	Airtel 4G	Idea 4G	Jio 4G	RCOM 4G	Telenor 4G	Vodafone 4G
Download Throughput (Mbps)	2.1	1.2	1.4	3.7	2.2	2.5	8.2	0.4	3.8	4.3	9.9	3.6
Upload Throughput (Mbps)	0.5	0.7	1.2	2.0	0.6	1.6	4.0	3.6	2.3	1.9	3.0	4.8
Web Browsing Delay (sec)	11.1	11.5	10.3	7.2	9.5	10.1	3.7	12.8	7.7	8.2	3.8	9.1
Video Streaming Delay (sec)	3.7	7.8	11.9	5.3	3.1	3.9	1.9	48.3	3.3	5.5	1.3	2.5
Latency (msec)	115	69	338	100	111	115	78	144	145	156	76	87

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

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Report on Independent Drive Test conducted in
Vadodara from 18th to 22nd September 2017

The drive test in the city of Vadodara in Gujarat LSA was conducted for a period of 5 days during 18th to 22nd September, 2017. It covered a route of approximately 635 KMs and data tests conducted on 5 hotspots. Cellular mobile telephone service providers included namely Aircel, Airtel, BSNL, Idea, RCOM, Tata, Telenor, Vodafone, MTS and Jio. Tests included 2G, 3G, 4G and CDMA radio access 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								CDMA	
	Aircel	Airtel	BSNL	Idea	RCOM	Tata	Telenor	Vodafone	MTS	Tata
Call Attempt	807	864	873	865	789	781	806	868	803	827
Blocked Call Rate (%)	0.12%	0.35%	0.34%	0.12%	1.01%	0.26%	0.12%	0.23%	2.99%	1.57%
CSSR% (Accessibility)	99.88%	99.65%	99.66%	99.88%	98.99%	99.74%	99.88%	99.77%	97.01%	98.43%
Drop Call Rate (%)	0.87%	0.58%	0.23%	0.00%	0.90%	0.90%	0.50%	0.35%	3.59%	1.84%
Mobility HOSR (%)	95.78%	98.45%	97.57%	99.56%	99.80%	96.25%	98.37%	95.78%	100.00%	100.00%
Rx Quality (%)	97.41%	98.09%	99.29%	98.98%	97.78%	97.10%	97.23%	97.46%	89.73%	92.78%

Calls in Tata, RCOM, & CDMA TSP's did not initiate at the outskirts of Vadodara City due to lack of coverage.

Voice Call	3G					VoLTE
	Airtel	BSNL	Idea	Tata	Vodafone	Jio
Call Attempt	870	855	855	720	868	880
Blocked Call Rate (%)	0.23%	2.11%	0.47%	2.22%	0.46%	0.68%
CSSR% (Accessibility)	99.77%	97.89%	99.53%	97.78%	99.54%	99.32%
Drop Call Rate (%)	0.46%	0.72%	0.12%	0.99%	0.23%	0.46%
Mobility HOSR (%)	97.52%	99.57%	99.32%	100.00%	99.33%	100.00%
Rx Quality (%)	96.16%	97.90%	96.34%	97.72%	96.16%	96.92%

Data Services	2G								CDMA	
	Aircel	Airtel	BSNL	Idea	RCOM	Tata	Telenor	Vodafone	MTS	TATA
Download Throughput (kbps)	99.34	102.77	80.81	136.21	96.80	62.89	65.08	117.49	1443.34	100.93
Upload Throughput (kbps)	95.88	80.96	87.84	91.50	139.85	68.40	96.27	81.24	480.50	93.96
Web Browsing Delay (sec)	43.76	37.48	40.50	36.03	43.69	34.27	44.14	41.91	26.86	31.97
Latency (sec)	332	444	530	322	633	409	693	-	97	117

Data Services	3G					4G					
	Airtel	BSNL	Idea	Tata	Vodafone	Airtel	Idea	Jio	RCOM	Telenor	Vodafone
Download Throughput (Mbps)	4.88	1.97	2.18	3.56	1.87	11.62	13.40	5.29	4.42	8.94	3.40
Upload Throughput (Mbps)	1.84	1.04	1.72	1.86	1.16	4.34	8.66	4.16	2.25	5.39	3.35
Web Browsing Delay (sec)	5.29	10.18	9.91	5.99	14.85	4.41	5.25	5.02	6.97	4.27	9.17
Video Streaming Dealy(sec)	1.97	2.42	4.06	1.47	3.49	2.88	4.61	2.49	4.72	1.29	1.79
Latency (sec)	81	160	270	106	-	89	104	137	123	95	-

* Vodafone has disabled ping in there network

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.

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