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Internet in India

Internet in India began in 1986 and was available only to the educational and research community. It was publicly available from 15 August 1995. As of 2020, there are 718.74 million active internet users that comprise 54.29% of the population.[1]

As of May 2014, the Internet is delivered to India mainly by 9 different undersea fibres, including SEA-ME-WE 3, Bay of Bengal Gateway and Europe India Gateway, arriving at 5 different landing points.[2] India also has one overland internet connection, at the city of Agartala near the border with Bangladesh.[3]

The Indian Government has embarked on projects such as BharatNet, Digital India, Made in India and Startup India to further expedite the growth of internet-based ecosystems.

Contents

History

The history of internet in India began with the launch of the Educational Research Network (ERNET) in 1986.[4] The network was made available only to educational and research communities.[5] ERNET was initiated by the Department of Electronics (DoE), with funding from the Government of India and United Nations Development Program (UNDP), involving eight premier institutions as participating agencies—NCST Bombay, Indian Institute of Science, five Indian Institutes of Technology (Delhi, Mumbai, Kanpur, Kharagpur and Chennai), and the DoE in New Delhi. ERNET began as a multi protocol network with both the TCP/IP and the OSI-IP protocol stacks running over the leased-line portion of the backbone. Since 1995, however, almost all traffic is carried over TCP/IP.[6] The first leased line of 9.6 kbit/s was installed in January 1991 between Delhi and

Mumbai. ERNET was allotted Class B IP address 144.16.0.0 by InterNIC in 1990. Subsequently, Class C addresses were allotted to ERNET by APNIC. All IITs, IISc Bangalore, DOE Delhi and NCST Mumbai were connected by 9.6 kbit/s leased line by 1992. In the same year, 64 kbit/s Internet gateway link was commissioned from NCST Mumbai to UUNet in Virginia, United States.

NICNet was established in 1995 for communications between government institutions. The network was operated by the National Informatics Centre.[5]

The first publicly available internet service in India was launched by state-owned Videsh Sanchar Nigam Limited (VSNL) on 15 August 1995.[7][8] At the time, VSNL had a monopoly over international communications in the country and private enterprise was not permitted in the sector. The internet service, known as the Gateway Internet Access Service (GIAS), provided a speed of 9.6 kbit/s speed and was priced at $160 for 250 hours for individuals, $500 for institutional dial-up SLIP/PPP accounts, and higher for leased line services. GIAS was available immediately from Mumbai, Delhi, Kolkata and Chennai. It was made available in Pune and Bangalore by the end of 1995, while users from other locations could connect through the Department of Telecommunications' I-NET, an X.25 network accessed through leased lines or at a concessional dial-up rate from almost anywhere. The connection between VSNL and MCI Inc. in the United States was made with multiple 64kbit/s links.[9]

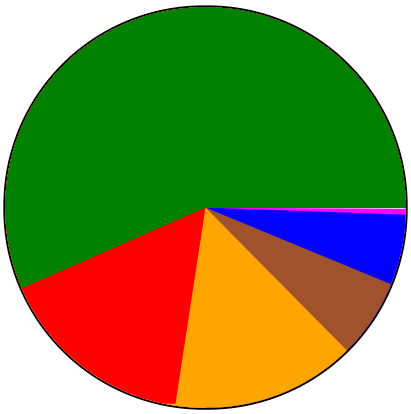
The service was plagued by several hardware and network issues. B.K. Syngal, then chairman and managing director of VSNL, publicly apologized and took responsibility for the issues. Syngal stated that the company had not conducted any survey of the potential demand for the service. The modems used by VSNL were of poor quality, and often would make a beeping sound every three minutes and subsequently disconnect. The connections also faced junction issues when users attempted to connect between internet exchanges. VSNL had designed each line to handle 30 customers at a time, which would quickly swell to full capacity. VSNL invested ₹2-2.5 crore on the launch. Recalling the launch in 2015, Syngal described the amount as "pathetic".[7]

Despite the issues, VSNL's internet service garnered 10,000 subscribers within the first 6 months of the launch. The company invested ₹10-15 crore to re-design the service. The internet service got a boost in popularity after a successful demo at the NASSCOM meeting at the Nehru Centre in Mumbai in 1996. VSNL's booth demonstrating the capabilities of the internet received a large number of visitors.[7] However, for the next 10 years the Internet experience in the country remained less attractive with narrow-band connections having speeds less than 56 kbit/s (dial-up).[10] To meet the growing demand for internet access, VSNL, in cooperation with the DoT, added new points of presence (POP) on the Internet. In 1997, new POPs opened in Kanpur, Lucknow, Chandigarh, Jaipur, Hyderabad, Patna and Goa. By 1998, the network comprised around 40 POPs.[11]

Integrated Services Digital Network (ISDN) access was introduced in 1997.[11]

In 2004, the government formulated its broadband policy which defined broadband as "an always-on Internet connection with download speed of 256 kbit/s or above."[10] From 2005 onward, the growth of the broadband sector in the country accelerated, but remained below the growth estimates of the government and related agencies due to resource issues in last-mile access which were predominantly wired-line technologies. This bottleneck was removed in 2010 when the government auctioned 3G spectrum followed by an equally high-profile auction of 4G spectrum that set the scene for a competitive and invigorated wireless broadband market. Today, internet access in India is provided by both public and private companies using a variety of technologies and media including dial-up (PSTN), xDSL, coaxial cable, Ethernet, FTTH, ISDN, HSDPA (3G), WiFi, WiMAX, etc. at a wide range of speeds and costs.[12]

Technologies



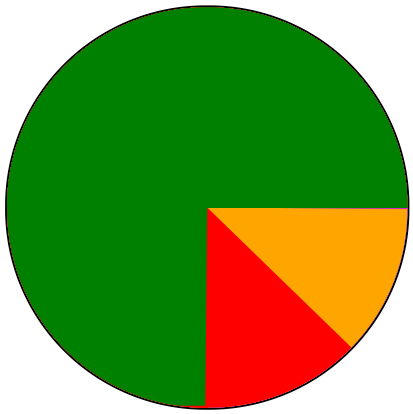
Wired internet access technologies by usage share (December 2018)[13].

- DSL (56.56%)
- Dial up (15.97%)
- Ethernet/LAN (14.90%)
- Cable modem (6.35%)
- Fibre (5.65%)
- Leased line (00.56%)

Wireless internet

The following frequencies are used to provide wireless internet services in India:[14]

- 2G : GSM 900 MHz, GSM 1800 MHz
- 3G : WCDMA UMTS 2100 MHz, 900 MHz
- 4G : TD-LTE 2300 MHz, 2500 MHz, FD-LTE 2100 MHz,1800 MHz, 9000 MHz, 850 MHz
- CDMA : 800 MHz (for 1x voice and data & EVDO Rev A, Rev B, Rev B Phase II data)



Wireless internet access technologies by usage share (December 2018)[13].

- LTE (74.83%)
- GPRS/EDGE (12.97%)
- HSPA/WCDMA (12.12%)
- Wi-Fi (00.07%)
- Radio/WiMAX/VSAT (00.01%)

Wired internet

Fixed-line or wired internet technologies used in India include digital subscriber line, (DSL), Dial-up Internet access, ethernet and local area network (LAN), Cable modem, fibre to the home, and leased line.[13]

Internet speed

The first commercially launched internet service in India offered dial-up speeds of up to 9.6 kbit/s in 1995. With the advent of better modems, the network speed was increased to 14.4. kbit/s, followed by 28.8 and 33.4 kbit/s accesses by 1998. Dial-up was later upgraded to provide speeds up to 56 kbit/s on analog lines.[11] In 2004, the government formulated its broadband policy which defined broadband as "an always-on Internet connection with download speed of 256 kbit/s or above."[10] The definition was amended in July 2013 defining broadband as a "data connection that supports interactive services, including internet access, capable of a minimum download speed of 256 kbps to an individual subscriber."[15][16] The minimum download speed was officially raised from 256 kbit/s to 512 kbit/s in August 2014.[17]

On 31 October 2016, TRAI issued a directive to all fixed broadband ISPs ordering them to ensure that the minimum download speed of a connection would not drop below 512 kbit/s even after a subscriber had used up their assigned data limits. TRAI also ordered all ISPs to notify their subscribers through SMS or email when the subscriber had consumed 50%, 90% and 100% of their assigned data limit. All TSPs are also required to maintain a portal or website where subscribers can view their usage pattern at any time.[18]

In January 2019, *Daily News and Analysis* reported that DoT officials planned to raise the minimum broadband speed to 2 mbps initially and then to 5 mbps, as part of its new "Broadband for All" policy.[19] Connection speeds from 40 Mbit/s to 1 Gbit/s provided through optical fibre are now common in cities of India.

The worldwide broadband speed league 2019 published by Cable.co.uk and M-Lab ranked India 74 out of 207 countries with a mean download speed of 8.66 Mbit/s.[20] According to the Akamai Q1 2017 State of the Internet Report, the average internet connection speed in India is 6.5 Mbit/s and the average peak connection speed is 41.4 Mbit/s. Globally, India was ranked 89th out of 149 countries/regions by average internet connection speed and 97th by average peak connection speed. 42% of internet users in India have an average internet connection speed of above 4 Mbit/s, 19% have a speed of over 10 Mbit/s, and 10% enjoy speeds over 15 Mbit/s. The average internet connection speed on mobile networks in India was 4.9 Mbit/s.[21][22]

According to the February 2020 Speedtest Global Index, published by Speedtest.net, India was ranked 69th out of 176 countries by average fixed broadband speed and 128th out of 141 countries by average mobile internet speed. The average fixed broadband download speed in India is 39.65 Mbit/s and the average fixed broadband upload speed is 37.09 Mbit/s. Speedtest recorded the average download speed on mobile connections in India as 11.83 Mbit/s and average upload speed of 4.61 Mbit/s.[23].

Internet user base

India has the second highest number of internet users in the world.[24] The following table provides an overview of key internet subscriber statistics in India as on 31 December 2019.[13]

Statistic	Figures
Total subscribers	718.74 million
Narrowband subscribers	56.806 million
Broadband subscribers	661.938 million
Wired subscribers	22.386 million
Wireless subscribers	696.36 million
Urban subscribers	450.31 million
Rural subscribers	268.43 million
Overall net penetration	54.29 %
Urban net penetration	106.22 %
Rural net penetration	29.83 %

The World Economic Forum (WEF) estimated that about 60% of Indian internet users viewed vernacular content and only about a quarter of internet users were over the age of 35 years in 2019. The WEF also estimated that 1.1 billion Indians would have access to the internet by 2030, with 80% of the subscriber base primarily accessing the internet on mobile devices. The profile of India's internet user base was predicted to diversify by 2030 with 80% of users accessing vernacular content and with users over 25 years making up 45% of the total subscriber base.[25]

Access to the Internet can be divided into dial-up and broadband access. Around the start of the 21st century, most residential access was by dial-up, while access from businesses was usually by higher speed connections. In subsequent years dial-up declined in favour of broadband access. Both types of access generally use a modem, which converts digital data to analog for transmission over a particular analog network (ex. the telephone or cable networks).[26]

Dial-up access is a connection to the Internet through a phone line, creating a semi-permanent link to the Internet.[26] Operating on a single channel, it monopolizes the phone line and is the slowest method of accessing the Internet. Dial-up is often the only form of Internet access available in rural

areas because it requires no infrastructure other than the already existing telephone network. Dial-up connections typically do not exceed a speed of 56 kbit/s, because they are primarily made via a 56k modem.[26]

Broadband access includes a wide range of speeds and technologies, all of which provide much faster access to the Internet than dial-up. The term "broadband" once had a technical meaning, but today it is more often a marketing buzzword that simply means "faster". Broadband connections are continuous or "always on" connections, without the need to dial and hang-up, and do not monopolize phone lines.[26] Common types of broadband access include DSL (Digital Subscriber Lines), Fibre to the x (Optical fibre network), Cable Internet access, Satellite Internet access, mobile broadband via cell phones and other mobile devices among many others.[27]

Internet service providers

There were 358 Internet Service Providers (ISPs) offering broadband and narrowband services in India as on 31 December 2019. The ten largest ISPs account for 99.50% of the total subscriber base. Jio (51.60%), Airtel (23.24%), Vodafone Idea (19.77%), BSNL (4.21%) and Atria Convergence Technologies (0.21%) were the five largest ISPs by subscribers in India as on 31 December 2019.[13]

As on 31 December 2019, the five largest wired broadband providers in India are BSNL (51.75%), Airtel (10.80%), Atria Convergence Technologies (6.78%), Hathway (4.01%) and Jio (3.83%). Other wired ISPs account for the remaining 22.82% of subscribers. The five largest wireless broadband providers are Jio (53.14%), Airtel (23.64%), Vodafone Idea (20.40%) and BSNL (2.68%).[13]

The telecom circles of Maharashtra (40.21 million), Andhra Pradesh & Telangana (38.28 million), Tamil Nadu (35.90 million) Gujarat (32.16 million) and Karnataka (31.74 million) have the most broadband subscribers as on 31 September 2018.[28]

The total International Internet bandwidth owned by Indian ISPs was 2,933 Gbit/s as on 30 June 2017.[13] International Bandwidth is the maximum rate of data transmission from a single country to the rest of the world.[29]

Net neutrality

As of August 2015, there were no laws governing net neutrality in India, which would require that all Internet users be treated equally, without discriminating or charging differentially by user, content, site, platform, application, type of attached equipment, or mode of communication.[30] There have already been a few violations of net neutrality principles by some Indian service providers.[31] The government has once again called in for comments and suggestions regarding net neutrality as of 14 August, and has given the people one day to post their views on the MyGov forum. After this, the final decision regarding the debate was to be made.

The debate on network neutrality in India gathered public attention after Airtel, a mobile telephony service provider in India, announced in December 2014 additional charges for making voice calls (VoIP) from its network using apps like WhatsApp, Skype, etc.[32]

In March 2015, Telecom Regulatory Authority of India (TRAI) released a formal consultation paper on *Regulatory Framework for Over-the-top (OTT)* services, seeking comments from the public. The consultation paper was criticised for being one sided and having confusing statements. It received condemnation from various politicians and Indian Internet users.[33][34][35] The last date for submission of comment was 24 April 2015 and TRAI received over a million emails.[36]

On 8 February 2016, TRAI took a revolutionary decision, prohibiting telecom service providers from levying discriminatory rates for data,[37] thus ruling in favor of Net Neutrality in India. This move was welcomed not just by millions of Indians but also by various political parties, businesspersons, industry leaders ,[38] and the inventor of the World Wide Web, Tim Berners Lee.[39]

Censorship

Internet censorship in India is selectively practiced by both federal and state governments. DNS filtering and educating service users in better usage is an active strategy and government policy to regulate and block access to Internet content on a large scale. Measures to remove content at the request of content creators through court orders have become more common in recent years.

Freedom House's *Freedom on the Net 2016* report gives India a Freedom on the Net status of "Partly Free" with a rating of 41 (scale from 0 to 100, lower is better). Its Obstacles to Access was rated 12 (0-25 scale), Limits on Content was rated 9 (0-35 scale) and Violations of User Rights was rated 20 (0-40 scale).[40] India was ranked 29th out of the 65 countries included in the report.[41]

Challenges

One of the major issues facing the Internet segment in India is the lower average bandwidth of broadband connections compared to that of developed countries. According to 2007 statistics, the average download speed in India hovered at about 40 KB per second (256 kbit/s), the minimum speed set by TRAI, whereas the international average was 5.6 Mbit/s during the same period. In order to attend this infrastructure issue the government declared 2007 as "the year of broadband".[42][43] To compete with international standards of defining broadband speed the Indian Government has taken the aggressive step of proposing a $13 billion national broadband network to connect all cities, towns and villages with a population of more than 500 in two phases targeted for completion by 2012 and 2013. Google and Tata have launched the Internet Saathi project to help increase digital literacy amongst women in rural areas. The network was supposed to provide speeds up to 10 Mbit/s in 63 metropolitan areas and 4 Mbit/s in an additional 352 cities. Also, the Internet penetration rate in India is medium and accounts for 42% of the population compared to the rate in OECD counties, where the average is over 50%.[44][45][46] Another issue is the digital divide where growth is biased in favour of urban areas; according to 2010 statistics, more than 75 per cent of the broadband connections in the country are in the top 30 cities.[10] Regulators have tried to boost the growth of broadband in rural areas by promoting higher investment in rural infrastructure and establishing subsidised tariffs for rural subscribers under the Universal service obligation scheme of the Indian government.

E-commerce industry

No. of Indian consumers who purchased something online in 2018: 120 million

No. of Indian consumers who are expected to purchase something online in 2020: 175 million

Indian e-commerce Industry in 2017: $38.5 billion

Indian e-commerce industry is expected to grow by 2026: $200 billion

Data centres

- BSNL Internet Data Centers, in collaboration with Dimension Data[47]
- Trimax IT Infrastructure & Services Limited - Tier III data centers in Mumbai and Bengaluru [48]

- Airlive Broadband
- Web Werks Data Centers
- Sify Technologies Limited
- CtrlS Datacenters Ltd
- Tata Communications Limited
- Netmagic Solutions
- Reliance Datacenter
- Web Werks IDC
- Net4 Datacenter
- RackBank Datacenter
- GPX Global Systems Inc.
- CTRLS Data Center
- MegaHostZone
- Digital Ocean
- DeleteZero
- Amazon Web Services[49]
- Google Cloud[50]

Internet Exchanges

- NIXI
- Mumbai Convergence Hub
- Mumbai IX
- AMS IX
- DE-CIX

See also

- National Optical Fibre Network
- List of countries by number of Internet users
- List of countries by number of broadband Internet subscriptions
- List of countries by Internet connection speeds

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- News18 Series:20 Years of Internet in India (http://www.news18.com/newstopics/20-years-of-internet-in-india.html)