Mobile phone

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"Cell Phone" redirects here. For the film, see Cell Phone (film). For the Handphone film, see Handphone (film).

The Qualcomm QCP-2700, a mid-1990s candybar style phone, and an iPhone 5, a current production smartphone.

A **mobile phone** (also known as a **cellular phone**, **cell phone**, and a **hand phone**) is a device that can make and receive telephone calls over a radio link while moving around a wide geographic area. It does so by connecting to a cellular network provided by a mobile phone operator, allowing access to the public telephone network. By contrast, a cordless telephone is used only within the short range of a single, private base station.

In addition to telephony, modern mobile phones also support a wide variety of other services such as text messaging, MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming and photography. Mobile phones that offer these and more general computing capabilities are referred to as smartphones.

The first hand-held mobile phone was demonstrated by John F. Mitchell[1][2][3] and Dr Martin Cooper of Motorola in 1973, using a handset weighing around 2.2 pounds (1 kg).[4] In 1983, the DynaTAC 8000x was the first to be commercially available. From 1990 to 2011, worldwide mobile phone subscriptions grew from 12.4 million to over 6 billion, penetrating about 87% of the global population and reaching the bottom of the economic pyramid.[5][6][7][8]

History

Main article: History of mobile phones

An evolution of mobile phones

Before the devices that are now referred to as mobile phones existed, there were some precursors. The development of mobile telephony began in 1918 with tests of wireless telephony on military trains between Berlin - Zossen.[9] In 1924 public trials started with telephone connection on trains between Berlin - Hamburg.[9] In 1925 Zugtelephonie A. G. is founded to supply train telephony equipment[9] and in 1926 telephone service in trains of the Deutsche Reichsbahn and imperial post on the route between Hamburg and Berlin is approved and used.[9] This phone service was only offered to 1st class travelers, but in 1918, some 5 years after the invention of Meißnerischen tube based transmitters, the German Reichsbahn in Berlin led experiments with telephony via radio. [10]

The first mobile telephone calls were made from cars in 1946. Bell System's Mobile Telephone Service was made on 17 June in St. Louis, Missouri, followed by Illinois Bell Telephone Company's car radiotelephone service in Chicago on 2 October. [11] The MTA phones were composed of vacuum tubes and relays, and weighed over 80 pounds (36 kg).[12][13] There were initially only 3 channels for all the users in the metropolitan area, increasing later to 32 channels across 3 bands. This service continued into the 1980s in large portions of North America. Due to the small number of radio frequencies available, the service quickly reached capacity. In 1956, the world's first partly automatic car phone system, Mobile System A (MTA), was introduced in Sweden.

John F. Mitchell, Motorola's chief of portable communication products in 1973, played a key role in advancing the development of handheld mobile telephone equipment. Mitchell successfully pushed Motorola to develop wireless communication products that would be small enough to use anywhere and participated in the design of the cellular phone.[14][15] Martin Cooper, a Motorola researcher and executive, was the key researcher on Mitchell's team that developed the first hand-held mobile telephone for use on a cellular network.[16] Using a somewhat heavy portable handset, Cooper made the first call on a handheld mobile phone on 3 April 1973 to his rival, Dr. Joel S. Engel of Bell Labs.[17][18]

> As I walked down the street while talking on the phone, sophisticated New Yorkers gaped at the sight of someone actually moving around while making a phone call. Remember that in 1973, there weren't cordless telephones or cellular phones. I made numerous calls, including one where I crossed the street while talking to a New York radio reporter - probably one of the more dangerous things I have ever done in my life.
> —Martin Cooper, *[19]*

The new invention sold for $3,995 and weighed two pounds, leading to the nickname "the brick".

The world's first commercial automated cellular network was launched in Japan by NTT in 1979, initially in the metropolitan area of Tokyo. In 1981, this was followed by the simultaneous launch of the Nordic Mobile Telephone (NMT) system in Denmark, Finland, Norway and Sweden.[20] Several countries then followed in the early to mid-1980s including the UK, Mexico and Canada.

On 6 March 1983, the DynaTAc mobile phone launched on the first US 1G network by Ameritech. It cost $100m to develop, and took over a decade to hit the market.[21] The phone had a talk time of just half an hour and took ten hours to charge. Consumer demand was strong despite the battery life, weight, and low talk time, and waiting lists were in the thousands.[22][23]

In 1991, the second generation (2G) cellular technology was launched in Finland by Radiolinja on the GSM standard, which sparked competition in the sector as the new operators challenged the incumbent 1G network operators.

Ten years later, in 2001, the third generation (3G) was launched in Japan by NTT DoCoMo on the WCDMA standard.[24] This was followed by 3.5G, 3G+ or turbo 3G enhancements based on the high-speed packet access (HSPA) family, allowing UMTS networks to have higher data transfer speeds and capacity.

By 2009, it had become clear that, at some point, 3G networks would be overwhelmed by the growth of bandwidth-intensive applications like streaming media.[25] Consequently, the industry began looking to data-optimized 4th-generation

technologies, with the promise of speed improvements up to 10-fold over existing 3G technologies. The first two commercially available technologies billed as 4G were the WiMAX standard (offered in the U.S. by Sprint) and the LTE standard, first offered in Scandinavia by TeliaSonera.

Features

Main article: Mobile phone features
See also: Smartphone

A printed circuit board inside a Nokia 3210

All mobile phones have a number of features in common, but manufacturers also try to differentiate their own products by implementing additional functions to make them more attractive to consumers. This has led to great innovation in mobile phone development over the past 20 years.

The common components found on all phones are:

- A battery, providing the power source for the phone functions.
- An input mechanism to allow the user to interact with the phone. The most common input mechanism is a keypad, but touch screens are also found in some high-end smartphones.
- Basic mobile phone services to allow users to make calls and send text messages.
- All GSM phones use a SIM card to allow an account to be swapped among devices. Some CDMA devices also have a similar card called a R-UIM.
- Individual GSM, WCDMA, iDEN and some satellite phone devices are uniquely identified by an International Mobile Equipment Identity (IMEI) number.

Low-end mobile phones are often referred to as feature phones, and offer basic telephony. Handsets with more advanced computing ability through the use of native software applications became known as smartphones.

Several phone series have been introduced to address a given market segment, such as the RIM BlackBerry focusing on enterprise/corporate customer email needs; the SonyEricsson Walkman series of musicphones and Cybershot series of cameraphones; the Nokia Nseries of multimedia phones, the Palm Pre the HTC Dream and the Apple iPhone.

Text messaging

Main article: SMS

The most commonly used data application on mobile phones is SMS text messaging. The first SMS text message was sent from a computer to a mobile phone in 1992 in the UK, while the first person-to-person SMS from phone to phone was sent in Finland in 1993.

The first mobile news service, delivered via SMS, was launched in Finland in 2000, and subsequently many organizations provided "on-demand" and "instant" news services by SMS.

SIM card

Main articles: Subscriber Identity Module and Removable User Identity Module

Typical mobile phone SIM card

GSM feature phones require a small microchip called a Subscriber Identity Module or SIM Card, to function. The SIM card is approximately the size of a small postage stamp and is usually placed underneath the battery in the rear of the unit. The SIM securely stores the service-subscriber key (IMSI) and the K_i used to identify and authenticate the user of the mobile phone. The SIM card allows users to change phones by simply removing the SIM card from one mobile phone and inserting it into another mobile phone or broadband telephony device.

The first SIM card was made in 1991 by Munich smart card maker Giesecke & Devrient for the Finnish wireless network operator Radiolinja.[*citation needed*]

Multi-card hybrid phones

A hybrid mobile phone can hold up to four SIM cards. SIM and RUIM cards may be mixed together to allow both GSM and CDMA networks to be accessed.[26][27]

From 2010 onwards they became popular in India and Indonesia and other emerging markets,[28] attributed to the desire to obtain the lowest on-net calling rate. In Q3 2011, Nokia shipped 18 million of its low cost dual SIM phone range in an attempt to make up lost ground in the higher end smartphone market.[29]

Kosher phones

There are Jewish orthodox religious restrictions which standard mobile telephones do not meet. To fulfill this demand, phones without Internet access, text messaging or cameras are required.[30] These restricted phones are known as kosher phones and have rabbinical approval for use in Israel and elsewhere by observant Orthodox Jews. Some are even approved for use by essential workers (such as health, security and public services) on the sabbath, even though use of any electrical device is restricted.[31]

Although these phones are intended to prevent immodesty, some vendors report good sales to adults who prefer the simplicity of the devices.

Mobile phone operators

Main article: Mobile phone operator

Global mobile phone subscribers per country from 1980-2009. The growth in users has been exponential since they were first made available.

The world's largest individual mobile operator by subscribers is China Mobile with over 500 million mobile phone subscribers.[32] Over 50 mobile operators have over 10 million subscribers each, and over 150 mobile operators had at least one million subscribers by the end of 2009.[33] In February 2010, there were 6 billion mobile phone subscribers, a number that is expected to grow.[5]

Manufacturers

See also: List of best-selling mobile phones

Quantity Market Shares by Gartner
(New Sales)

BRAND		Percent
Nokia 2010		28.9%
Nokia 2011		23.8%
Samsung 2010		17.6%
Samsung 2011		17.7%
Apple 2010		2.9%
Apple 2011		5.0%
LG Electronics 2010		7.1%
LG Electronics 2011		4.9%
ZTE 2010		1.9%
ZTE 2011		3.2%
Others-1 2010		30.4%
Others-1 2011		33.7%

Note: Others-1 consist of Sony Ericsson, Motorola, ZTE, HTC and Huawei.(2009-2010)

Prior to 2010, Nokia was the market leader. However, since then competition emerged in the Asia Pacific region with brands such as Micromax, Nexian, and i-Mobile and chipped away at Nokia's market share. Android powered smartphones also gained momentum across the region at the expense of Nokia. In India, their market share also dropped significantly to around 31 percent from 56 percent in the same period. Their share was displaced by Chinese and Indian vendors of low-end mobile phones.[34]

In Q1 2012, based on Strategy Analytics, Samsung surpassed Nokia, selling 93.5 million units and 82.7 million units, respectively. Standard & Poor's has also downgraded Nokia to 'junk' status at BB+/B with negative outlook due to high loss and still declined with growth of Lumia smartphones was not sufficient to offset a rapid decline in revenue from Symbian-based smartphones over the next few quarters.[35]

Top Five Worldwide Total Mobile Phone Vendors, Q4 2012

Rank	Manufacturer	Gartner[36]	IDC[37]
1	Samsung	22.7%	23.0%
2	Nokia	18.0%	17.9%
3	Apple	9.2%	9.9%
4	ZTE	3.4%	3.6%

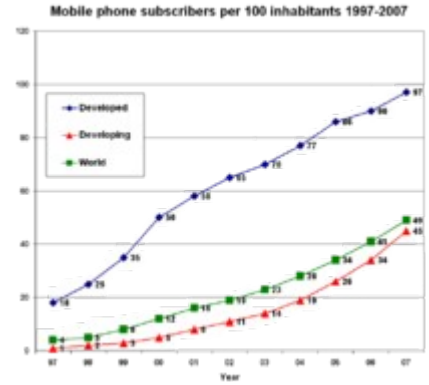
5	LG	3.2%	-
5	Huawei	-	3.3%
	Others	43.5%	42.3%

- Note: Vendor shipments are branded shipments and exclude OEM sales for all vendors

Other manufacturers outside the top five include TCL Communication, Lenovo, Sony Mobile Communications, Motorola. Smaller current and past players include Karbonn Mobile, Audiovox (now UTStarcom), BenQ-Siemens, Casio, CECT, Coolpad, Fujitsu, HTC Corporation, Just5, Kyocera, Micromax Mobile, Mitsubishi Electric, Modu, NEC, Neonode, Openmoko, Panasonic, Palm, Pantech Wireless Inc., Philips, Qualcomm Inc., Research In Motion, Sagem, Sanyo, Sharp, Sierra Wireless, SK Teletech, Soutec, Trium, Toshiba, and Vidalco.

Use of mobile phones

In general



Mobile phone subscribers per 100 inhabitants 1997–2007

A cellphone repair kiosk in Mumbai, India

Mobile phones are used for a variety of purposes, including keeping in touch with family members, conducting business, and having access to a telephone in the event of an emergency. Some people carry more than one cell phone for different purposes, such as for business and personal use. Multiple SIM cards may also be used to take advantage of the benefits of different calling plans—a particular plan might provide cheaper local calls, long-distance calls, international calls, or roaming. The mobile phone has also been used in a variety of diverse contexts in society, for example:

- A study by Motorola found that one in ten cell phone subscribers have a second phone that often is kept secret from other family members. These phones may be used to engage in activities including extramarital affairs or clandestine business dealings.[38]
- Some organizations assist victims of domestic violence by providing mobile phones for use in emergencies. They are often refurbished phones.[39]
- The advent of widespread text messaging has resulted in the cell phone novel; the first literary genre to emerge from the cellular age via text messaging to a website that collects the novels as a whole.[40]
- Mobile telephony also facilitates activism and public journalism being explored by Reuters and Yahoo![41] and small independent news companies such as Jasmine New in Sri Lanka.

- The United Nations reported that mobile phones have spread faster than any other technology and can improve the livelihood of the poorest people in developing countries by providing access to information in places where landlines or the Internet are not available, especially in the least developed countries. Use of mobile phones also spawns a wealth of micro-enterprises, by providing work, such as selling airtime on the streets and repairing or refurbishing handsets.[42]

- In Mali and other African countries, people used to travel from village to village to let friends and relatives know about weddings, births and other events, which are now avoided within mobile phone coverage areas, which is usually greater than land line penetration.
- The TV industry has recently started using mobile phones to drive live TV viewing through mobile apps, advertising, social tv, and mobile TV.[43] 86% of Americans use their mobile phone while watching TV.
- In parts of the world, mobile phone sharing is common. It is prevalent in urban India, as families and groups of friends often share one or more mobiles among their members. There are obvious economic benefits, but often familial customs and traditional gender roles play a part.[44] It is common for a village to have access to only one mobile phone, perhaps owned by a teacher or missionary, but available to all members of the village for necessary calls.[45]

For distributing content

In 1998, one of the first examples of distributing and selling media content through the mobile phone was the sale of ringtones by Radiolinja in Finland. Soon afterwards, other media content appeared such as news, video games, jokes, horoscopes, TV content and advertising. Most early content for mobile tended to be copies of legacy media, such as the banner advertisement or the TV news highlight video clip. Recently, unique content for mobile has been emerging, from the ringing tones and ringback tones in music to "mobisodes," video content that has been produced exclusively for mobile phones.

In 2006, the total value of mobile-phone-paid media content exceeded Internet-paid media content and was worth 31 billion dollars.[46] The value of music on phones was worth 9.3 billion dollars in 2007 and gaming was worth over 5 billion dollars in 2007.[47]

While driving

Main article: Mobile phones and driving safety

Texting in stop-and-go traffic in New York City

Mobile phone use while driving is common but controversial. Being distracted while operating a motor vehicle has been shown to increase the risk of accident. Because of this, many jurisdictions prohibit the use of mobile phones while driving. Egypt, Israel, Japan, Portugal and Singapore ban both handheld and hands-free use of a mobile phone; others —including the UK, France, and many U.S. states—ban handheld phone use only, allowing hands-free use.

Due to the increasing complexity of mobile phones, they are often more like mobile computers in their available uses. This has introduced additional difficulties for law enforcement officials in distinguishing one usage from another as drivers use their devices. This is more apparent in those countries which ban both handheld and hands-free usage, rather than those who have banned handheld use only, as officials cannot easily tell which function of the mobile phone is being used simply by looking at the driver. This can lead to drivers being stopped for using their device illegally on a phone call when, in fact, they were using the device for a legal purpose such as the phone's incorporated controls for car stereo or satnav.

A recently published study has reviewed the incidence of mobile phone use while cycling and its effects on behaviour and safety.[48]

In schools

Some schools limit or restrict the use of mobile phones. Schools set restrictions on the use of mobile phones because of the use of cell phones for cheating on tests, harassment and bullying, causing threats to the schools security, distractions to the students, and facilitating gossip and other social activity in school. Many mobile phones are banned in school locker room facilities, public restrooms and swimming pools due to the built-in cameras that most phones now feature.[*citation needed*]

Mobile banking and payments

Main articles: Mobile banking and Mobile payment
See also: Branchless banking and Contactless payment

In many countries, mobile phones are used to provide mobile banking services, which may include the ability to transfer cash payments by secure SMS text message. Kenya's M-PESA mobile banking service, for example, allows customers of the mobile phone operator Safaricom to hold cash balances which are recorded on their SIM cards. Cash may be deposited or withdrawn from M-PESA accounts at Safaricom retail outlets located throughout the country, and may be transferred electronically from person to person as well as used to pay bills to companies.

Branchless banking has also been successful in South Africa and Philippines. A pilot project in Bali was launched in 2011 by the International Finance Corporation and an Indonesian bank Bank Mandiri.[49]

Another application of mobile banking technology is Zidisha, a US-based nonprofit microlending platform that allows residents of developing countries to raise small business loans from web users worldwide. Zidisha uses mobile banking for loan disbursements and repayments, transferring funds from lenders in the United States to the borrowers in rural Africa using the internet and mobile phones.[50]

Mobile payments were first trialled in Finland in 1998 when two Coca-Cola vending machines in Espoo were enabled to work with SMS payments. Eventually, the idea spread and in 1999 the Philippines launched the first commercial mobile payments systems, on the mobile operators Globe and Smart.

Some mobile phone can make mobile payments via direct mobile billing schemes or through contactless payments if the phone and point of sale support near field communication (NFC).[51] This requires the co-operation of manufacturers, network operators and retail merchants to enable contactless payments through NFC-equipped mobile phones.[52][53][54]

Tracking and privacy

See also: Mobile phone tracking

Mobile phones are also commonly used to collect location data. While the phone is turned on, the geographical location of a mobile phone can be determined easily (whether it is being used or not), using a technique known as multilateration to calculate the differences in time for a signal to travel from the cell phone to each of several cell towers near the owner of the phone.[55][56]

The movements of a mobile phone user can be tracked by their service provider and, if desired, by law enforcement agencies and their government. Both the SIM card and the handset can be tracked.[55]

China has proposed using this technology to track commuting patterns of Beijing city residents.[57] In the UK and US, law enforcement and intelligence services use mobiles to perform surveillance. They possess technology to activate the microphones in cell phones remotely in order to listen to conversations that take place near the phone.[58][59]

Health effects

Main article: Mobile phone radiation and health
Further information: Mobile phones on aircraft

The effect mobile phone radiation has on human health is the subject of recent interest and study, as a result of the enormous increase in mobile phone usage throughout the world. Mobile phones use electromagnetic radiation in the microwave range, which some believe may be harmful to human health. A large body of research exists, both

epidemiological and experimental, in non-human animals and in humans, of which the majority shows no definite causative relationship between exposure to mobile phones and harmful biological effects in humans. This is often paraphrased simply as the balance of evidence showing no harm to humans from mobile phones, although a significant number of individual studies do suggest such a relationship, or are inconclusive. Other digital wireless systems, such as data communication networks, produce similar radiation.

On 31 May 2011, the World Health Organization stated that mobile phone use may possibly represent a long-term health risk,[60][61] classifying mobile phone radiation as "possibly carcinogenic to humans" after a team of scientists reviewed studies on cell phone safety.[62] Mobile phones are in category 2B, which ranks it alongside Coffee and other possibly carcinogenic substances.[63][64]

At least some recent studies have found an association between cell phone use and certain kinds of brain and salivary gland tumors. Lennart Hardell and other authors of a 2009 meta-analysis of 11 studies from peer-reviewed journals concluded that cell phone usage for at least ten years “approximately doubles the risk of being diagnosed with a brain tumor on the same ('ipsilateral') side of the head as that preferred for cell phone use.”[65]

One study of past cell phone use cited in the report showed a "40% increased risk for gliomas (brain cancer) in the highest category of heavy users (reported average: 30 minutes per day over a 10-year period)."[66] This is a reversal from their prior position that cancer was unlikely to be caused by cellular phones or their base stations and that reviews had found no convincing evidence for other health effects.[61][67] Certain countries, including France, have warned against the use of cell phones especially by minors due to health risk uncertainties.[68] However, a study published 24 March 2012 in the *British Medical Journal* questioned these estimates, because the increase in brain cancers has not paralleled the increase in mobile phone use.[69]

Future evolution

Main article: 5G

5G is a technology used in research papers and projects to denote the next major phase of mobile telecommunication standards beyond the 4G/IMT-Advanced standards. 5G is not officially used for any specification or official document yet made public by telecommunication companies or standardization bodies such as 3GPP, WiMAX Forum, or ITU-R. New standard releases beyond 4G are in progress by standardization bodies, but are at this time not considered as new mobile generations but under the 4G umbrella.

Deloitte is predicting a collapse in wireless performance to come as soon as 2016, as more devices using more and more services compete for limited bandwidth.[70]

Environmental impact

This section requires expansion. *(December 2011)*
See also: Mobile phone recycling

Studies have shown that around 40-50% of the environmental impact of a mobile phone occurs during the manufacturing of the printed wiring boards and integrated circuits.[71] The average user replaces their mobile phone every 11 to 18 months.[72][73] The discarded phones then contribute to electronic waste.

Mobile phone manufacturers within Europe are subject to the WEEE directive. Australia introduced a mobile phone recycling scheme.[74]

FairPhone is an attempt to develop a mobile phone which does not contain conflict minerals.

Mobile broadband

From Wikipedia, the free encyclopedia
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For fixed wireless Internet access, see Wireless broadband.

A mobile broadband modem in the ExpressCard form factor for laptop computers

HTC ThunderBolt, the second commercially available LTE smartphone

Mobile broadband is the marketing term for wireless Internet access through a portable modem, mobile phone, USB wireless modem, tablet or other mobile devices. The first wireless Internet access became available in 1991 as part of the second generation (2G) of mobile phone technology. Higher speeds became available in 2001 and 2006 as part of the third (3G) and fourth (4G) generations. In 2011, 90% of the world's population lived in areas with 2G coverage, while 45% lived in areas with 2G and 3G coverage.[1]

Contents

Description

Mobile broadband is the marketing term for wireless Internet access delivered through mobile phone towers to computers, mobile phones (called "cell phones" in North

America and South Africa), and other digital devices using portable modems. Although broadband has a technical meaning, wireless-carrier marketing uses the phrase "mobile broadband" as a synonym for mobile Internet access. Some mobile services allow more than one device to be connected to the Internet using a single cellular connection using a process called tethering.[2]

The bit rates available with Mobile broadband devices support voice and video as well as other data access. Devices that provide mobile broadband to mobile computers include:

- PC cards, also known as *PC data cards*, and Express cards
- USB and mobile broadband modems, also known as *connect cards*
- portable devices with built-in support for mobile broadband, such as laptop computers, netbook computers, smartphones, Ipads, PDAs, and other mobile Internet devices.

Internet access subscriptions are usually sold separately from mobile phone subscriptions.

Generations

Roughly every ten years new mobile phone technology and infrastructure involving a change in the fundamental nature of the service, non-backwards-compatible transmission technology, higher peak data rates, new frequency bands, wider channel frequency bandwidth in Hertz becomes available. These transitions are referred to as generations. The first mobile data services became available during the second generation (2G).[3][4][5]

Second generation (2G) from 1991:

Speeds in kbit/s	*down and up*
• GSM CSD	9.6 kbit/s
• *CDPD*	up to 19.2 kbit/s
• GSM GPRS (2.5G)	56–115 kbit/s
• GSM EDGE (2.75G)	up to 237 kbit/s

Third generation (3G) from 2001:

Speeds in Mbit/s	*down*	*up*
• UMTS W-CDMA	0.4 Mbit/s	
• UMTS HSPA	14.4	5.8
• UMTS TDD	16 Mbit/s	
• CDMA2000 1xRTT	0.3	0.15

• *CDMA2000 EV-DO*	2.5–4.9	0.15–1.8
• GSM EDGE-Evolution	1.6	0.5

Fourth generation (4G) from 2006:

Speeds in Mbit/s	*down*	*up*
• HSPA+	21–672	5.8–168
• Mobile WiMAX (802.16)	37–365	17–376
• LTE	100–300	50–75
• LTE-Advanced:		
• moving at higher speeds	100 Mbit/s	
• not moving or moving at lower speeds	up to 1000 Mbit/s	
• *MBWA (802.20)*	80 Mbit/s	

The download (to the user) and upload (to the Internet) data rates given above are peak or maximum rates and end users will typically experience lower data rates.

WiMAX was originally developed to deliver fixed wireless service with wireless mobility added in 2005. CDPD, CDMA2000 EV-DO, and MBWA are no longer being actively developed.

Coverage

In 2011, 90% of the world's population lived in areas with 2G coverage, while 45% lived in areas with 2G and 3G coverage,[1] and 5% lived in areas with 4G coverage. By 2017 more than 90% of the world's population is expected to have 2G coverage, 85% is expected to have 3G coverage, and 50% will have 4G coverage.[6]

A barrier to mobile broadband use is the coverage provided by the mobile phone networks. This may mean no mobile phone service or that service is limited to older and slower mobile broadband technologies. Customers will not always be able to achieve the speeds advertised due to mobile data coverage limitations including distance to the cell tower. In addition, there are issues with connectivity, network capacity, application quality, and mobile network operators' overall inexperience with data traffic.[7] Peak speeds experienced by users are also often limited by the capabilities of their smartphone or other mobile device.[6]

Subscriptions and usage

Worldwide broadband subscriptions

	2007[a]	2010[a]	2013[a,b]
World population	6.6 billion	6.9 billion	7.1 billion
Fixed broadband	5.2%	7.6%	9.8%
Developing world	2.3%	4.2%	6.1%
Developed world	18.0%	23.6%	27.2%
Mobile broadband	4.0%	11.3%	29.5%
Developing world	0.8%	4.4%	19.8%
Developed world	18.5%	42.9%	74.8%

[a] Per 100 inhabitants. [b] Estimate.

Source: International Telecommunications Union.[8]

Broadband subscriptions by region

Fixed subscriptions:	**2007**[a]	**2010**[a]	**2013**[a,b]
Africa	0.1%	0.2%	0.3%
Americas	10.9%	14.1%	17.1%
Arab States	0.9%	1.9%	3.3%
Asia and Pacific	3.2%	5.5%	7.6%
Commonwealth of Independent States	2.3%	8.2%	13.5%
Europe	18.4%	23.6%	27.0%
Mobile subscriptions:	**2007**[a]	**2010**[a]	**2013**[a,b]
Africa	0.2%	1.8%	10.9%
Americas	6.4%	22.9%	48.0%
Arab States	0.8%	5.1%	18.9%
Asia and Pacific	3.1%	7.4%	22.4%
Commonwealth of Independent States	0.2%	22.3%	46.0%
Europe	14.7%	28.7%	67.5%

[a] Per 100 inhabitants. [b] Estimate.

Source: International Telecommunications Union.[9][8]

It is estimated that there were 6.6 billion mobile phone subscriptions worldwide at the end of 2012 (89% penetration), representing roughly 4.4 billion subscribers (many people have more than one subscription). Growth has been around 9% year-on-year.[10] Mobile phone subscriptions are expected to reach 9.3 billion in 2018.[6]

At the end of 2012 there were roughly 1.5 billion mobile broadband subscriptions growing at a 50% year-on-year rate.[10] Mobile broadband subscriptions are expected to reach 6.5 billion in 2018.[6]

Mobile data traffic doubled between the end of 2011 (~620 Petabytes in Q4 2011) and the end of 2012 (~1280 Petabytes in Q4 2012).[10] This traffic growth is and will

continue to be driven by large increases in the number of mobile subscriptions and by increases in the average data traffic per subscription due to increases in the number of smartphones being sold, the use of more demanding applications and in particular video, and the availability and deployment of newer 3G and 4G technologies capable of higher data rates. By 2018 total mobile broadband traffic is expected to increase by a factor of 12 to roughly 13,000 PetaBytes.[6]

On average, a mobile PC generates approximately seven times more traffic than a smartphone (3 GB vs. 450 MB/month). By 2018 this ratio is likely to fall to 5 times (10 GB vs. 2 GB/month). Traffic from smartphones that tether (share the data access of one device with multiple devices) can be up to 20 times higher than that from non-tethering users and averages between 7 and 14 times higher.[6]

Note too that there are large differences in subscriber and traffic patterns between different provider networks, regional markets, device and user types.[6]

Demand from emerging markets has and continues to fuel growth in both mobile phone and mobile broadband subscriptions and use. Lacking a widespread fixed line infrastructure, many emerging markets leapfrog developed markets and use mobile broadband technologies to deliver high-speed internet access to the mass market.

Development

Service mark for GSMA mobile broadband

In 1995 telecommunication, mobile phone, integrated-circuit, and laptop computer manufacturers formed the GSM Association to push for built-in support for mobile-broadband technology on notebook computers. The association established a service mark to identify devices that include Internet connectivity.[11]

Established in early 1998, the global Third Generation Partnership Project (3GPP) develops the evolving GSM family of standards, which includes GSM, EDGE, WCDMA, HSPA, and LTE.[12] In 2011 these standards were the most used method to deliver mobile broadband.[*citation needed*] With the development of the 4G LTE signalling

standard, download speeds could be increased to 300 Mbps per second within the next several years.[13]

Established in late 1998, the global Third Generation Partnership Project 2 (3GPP2) develops the evolving CDMA family of standards, which includes cdmaOne, CDMA2000, and CDMA2000 EV-DO.[14]

In 2002, the Institute of Electrical and Electronics Engineers (IEEE) established a Mobile Broadband Wireless Access (MBWA) working group.[15] They developed the IEEE 802.20 standard in 2008, with amendments in 2010.[16]

Another IEEE working group, IEEE 802.16, produces standards adopted in products using the WiMAX trademark. The original "Fixed WiMAX" standard was released in 2001 and "Mobile WiMAX" was added in 2005.[17]

The WiMAX Forum is a non-profit organization formed to promote the adoption of WiMAX compatible products and services.[18]

See also

- Broadband Internet access
- Digital Britain
- MiFi
- Mobile Enterprise
- Mobile phone
- Mobile VoIP
- SDIO card, an extension of the SD specification to include I/O functions
- Tethering
- 3rd Generation Partnership Project (3GPP), evolving GSM family of specifications
- 3rd Generation Partnership Project 2 (3GPP2), evolving CDMA family of specifications

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External links


Wikimedia Commons has media related to: ***Mobile phones***


Wikimedia Commons has media related to: ***Wireless modems***

- GSM Association, official website for the worldwide trade group representing GSM operators
- 3GPP official website
- 3GPP2 official website
- LTE Encyclopedia
- WiMAX Forum official website

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Cellular network standards

0G (radio telephones)

- MTS
- MTA * MTB * MTC
- IMTS
- MTD
- AMTS
- OLT
- Autoradiopuhelin
- B-Netz

1G

AMPS family

- AMPS (TIA/EIA/IS-3, ANSI/TIA/EIA-553)
- N-AMPS (TIA/EIA/IS-91)
- TACS
- ETACS

Other

- NMT
- C-450
- Hicap
- Mobitex
- DataTAC

2G

GSM/3GPP family

- GSM
- CSD

3GPP2 family

- cdmaOne (TIA/EIA/IS-95 and ANSI-J-STD 008)

AMPS family

- D-AMPS (IS-54 and IS-136)

Other

- CDPD
- iDEN
- PDC
- PHS

2G transitional (2.5G, 2.75G)	**GSM/3GPP family**	• HSCSD • GPRS • EDGE/EGPRS (UWC-136)
	3GPP2 family	• CDMA2000 1X (TIA/EIA/IS-2000) • 1X Advanced
	Other	• WiDEN
3G (IMT-2000)	**3GPP family**	• UMTS (UTRAN) • WCDMA-FDD • WCDMA-TDD • UTRA-TDD LCR (TD-SCDMA)
	3GPP2 family	CDMA2000 1xEV-DO Release 0 (TIA/IS-856)
3G transitional (3.5G, 3.75G, 3.9G)	**3GPP family**	• HSPA • HSPA+ • LTE (E-UTRA)
	3GPP2 family	CDMA2000 1xEV-DO Revision A (TIA/EIA/IS-856-A) • EV-DO Revision B (TIA/EIA/IS-856-B) • DO Advanced
	IEEE family	• Mobile WiMAX (IEEE 802.16e) • Flash-OFDM • IEEE 802.20
4G (IMT Advanced)	**3GPP family**	• LTE Advanced (E-UTRA)
	IEEE family	• WiMAX-Advanced (IEEE 802.16m)

5G	Research concept, not under formal development

Links

Related articles

- Cellular networks
- Mobile telephony
- History
- List of standards
- Comparison of standards
- Channel access methods
- Spectral efficiency comparison table
- Cellular frequencies
- GSM frequency bands
- UMTS frequency bands
- **Mobile broadband**
- NGMN Alliance
- MIMO

External links

- 3rd Generation Partnership Project (3GPP)
- Third Generation Partnership Project 2 (3GPP2)
- IMT-2000/IMT-Advanced Portal
- Institute of Electrical and Electronics Engineers Inc. (IEEE)
- International Telecommunication Union (ITU)
- Telecommunications Industry Association (TIA)

Dual mode mobile

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Dual mode mobiles refer to mobile phones that are compatible with more than one form of data transmission or network.

Contents

Dual-Mode Phone

A dual-mode phone is a telephone which uses more than one technique for sending and receiving voice and data. This could be for wireless mobile phones or for wired phones.

There are three types of dual mode phones.

Network Compatibility

Mobile phones containing two types of cellular radios for voice and data. These phones include combination of GSM and CDMA technology. They can be used as a GSM or CDMA phone according to the user's preference. These handsets are also called global phones. A good example of this is the Samsung SCH-A790.

These dual mode handsets are compatible with both GSM and CDMA networks and are essentially 2 phones in one device.

Such phones make sense in those countries that have both GSM & CDMA networks or international CDMA roamers who want to keep a single handset with 2 numbers on it.

Most dual mode handsets require two identifying cards (one SIM and one RUIM), though some recent dual-mode phones (for example, the iPhone 4S) only require one SIM and one ESN. Not all dual SIM handsets are dual mode (for example dual SIM GSM phones).

Cellular and Non-cellular Radios

Mobile phones containing both cellular and non-cellular radios used for voice and data communication. There are also 2 types of dual mode phones which use cellular radio which will contain GSM/CDMA/W-CDMA as well as other technology like IEEE 802.11 (Wi-Fi) radio or DECT (Digital Enhanced Cordless

Telecommunications) radio. These phones can be used as cellular phones when connected to a wide area cellular network. When within range of a suitable WiFi or DECT network, the phone can be used as a WiFi/DECT phone for all communications purposes. This method of operation can reduce cost (for both the network operator and the subscriber), improve indoor coverage and increase data access speeds.

Wired Phones

Wired phones with VoIP and POTS technology. These phones can be used for making VoIP calls and also used for phones on the circuit switchnetwork. These phones require compatible routers and modem to make VoIP calls.

Dual SIM

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This article's **tone or style may not reflect the encyclopedic tone used on Wikipedia**. See Wikipedia's guide to writing better articles for suggestions. *(May 2013)*

This article **relies on references to primary sources**. Please add references to secondary or tertiary sources. *(March 2011)*

A dual-SIM phone.

A **Dual SIM** mobile phone is one which holds two SIM cards. Initially, dual-SIM adapters were made available to use in regular mobile phones to allow them to contain two SIMs, and to switch from one to the other as required. This combination is called a **standby dual-SIM phone**. The first Dual SIM mobile phone was Benefon Twin manufactured by Benefon in Finland. It was launched on the market in 2000.

More recently, some phones have been produced that can natively work with two SIMs, both of which may be active at the same time. These are **active dual-SIM phones**. There are also some Chinese triple-SIM phones.[1]

Dual-SIM operation allows the use of two services without the need to carry two phones at the same time. For example, the same handset can be used for business and private use with separate numbers and bills; or for travel, with an additional SIM for the country visited. Using multiple SIM cards allows the user to take advantage of different pricing plans for calls and text messages to certain destinations as well as mobile data usage.

These phones have until recent years been largely eschewed by the larger phone manufacturers partly due to their close ties with mobile phone networks who would prefer that customers use only one network exclusively. However more recently manufacturers such as Nokia and Samsung have started producing these phones, which will target customers mostly from developing countries.[2][3]

Contents

Types

- **Pseudo-Dual** - for convenience to use second SIM (as rule, it has «no major» slot for this) without both SIMs connected with owner's mobile service providers (MSP).

- **Dual SIM Shift** - basic phones which have 2 SIM Card Slots, only one SIM is active (able to receive calls), and is shown on the screen, the users may switch to another SIM by choosing from the menu.

- **Dual SIM Stand-by (DSS)** - allows two SIM cards to be on standby waiting for a call. When a call is established on one SIM card, the other is no longer active. Callers to the other SIM will hear a message that the phone is switched off or they'll be redirected to voicemail.

- **Dual SIM Active (DSA)** - allows the device to be connected to both networks at the same time. The device can switch between two calls without dropping either, so while you are on a call you can still receive calls on the other number. These devices need to have two transceivers. Nowadays these phones are not manufactured by the big brand names, because it's said to be hard not to exceed acceptable SAR (Specific absorption rate) levels in a single device.

- **Dual SIM Dual Call/Dual talk** - Both SIMs are able to receive calls, once active call on one SIM is established, a call can still be received on the other SIM. If user likes he can switch between two calls without disconnecting any of them. This is mostly used in China. These phones have 2 RFs, 2 SIMs and 2 Modem Stacks. Also known as DSDA (Dual SIM Dual Active), Dual SIM Active or Duos. (LG GX500)

When one SIM has PS Data active call, other SIM can still get voice (CS) calls.

Chinese Dual SIM phones

There are many dual SIM phones now available from the Chinese market. Due to comfort and usability they are getting more and more popular for both: business and private use, all over the world. The phones, which also usually include touch screen interfaces and other modern features, typically retail for a much lower price than branded models. Due to the extra battery usage of the additional sim slot it can happen the phones can be supplied with two battery packs also. Popular in Asia, these inexpensive dual SIM mobile phones are now also available to buy directly from Europe via eBay or internet sites, with reports that all slots are compatible with the major EU mobile networks.

Active Dual SIM phones

Mobile phones with built-in simultaneous dual SIM capability allow both SIMs to be active simultaneously and allow calls to be received on either number at any given time. Most such phones have two transceivers built in one of which may support 2G and 3G while another may only support 2G.

Though a new generation of Dual SIM Phones, called "Dual SIM Dual Standby" (DSDS) provide the ability to have 2 active SIM simultaneously, using only one transceiver. This is for example technology used in Freeyourmobile M180 Dual SIM

Mobile Phone, K-Touch A982, LG-GX200, Philips Xenium - X100, Samsung B7722, Samsung B5722 and Samsung E2152.

Battery life (talk time and standby time) of active dual-SIM mobile phones is reduced, typically by about a third. For instance, Device manufacturer Samsung declares a standby time for its Champ Duos E2652 Dual SIM phone of 476 hours when used with one SIM card and of 322 hours when used with two SIM cards. To compensate the shorter battery life, some Dual SIM phones ship with better capacity batteries, or in the case of Chinese-made phones, bundle their units with two batteries.

In November 2007, Verzio — a Singapore-based 3C (computing, communications, consumer electronics) brand launched the world's first 3G Dual-Triband dual-SIM model named Duplii. The same brand also launched the Twinn, 2.75G dual-SIM model. Powered by 2 processors, the Duplii and Twinn provide real dual-SIM real dual-connecting capability.

There are some little-known Chinese companies supplying inexpensive dual-SIM mobiles, mainly in Asian countries. The latest models includes W006 WiFi Dual Sim Mobile Phone, The M60 - Quadband Dual SIM Touchscreen mobile phone was launched in April 2010 being the 1st of the Chinese touch screen only mobiles with no keypad, including many features WiFi, Dual IMEI, Media playback & camera etc. to rival normal mobile phones.

Philips has made models Xenium 9@9w and 699 with this capability belonging to the restart to change active-line generation. Samsung also released the D880 DuoS in November 2007, a slider which can hold two SIM cards with simultaneous standby and the D780 which came much later both have limited function on the 2nd SIM card, and there is a Windows Mobile based dual-SIM phone too, called E-TEN glofiish DX900 (released in November 2008, been renamed to Acer Tempo DX900 in January 2009, after Acer bought E-TEN).

Popular Indian mobile companies such as Karbonn Mobiles, Micromax Mobile, Spice, Lemon Mobiles, LAVA Mobiles launch many feature phones with Dual SIM technology. Even few smart phones from these companies are Dual SIM based.

Nokia

Nokia has launched two dual SIM phone models C2-00 and X1-01. Both are 2G phones. Also, Nokia will launch more dual SIM devices such as C2-03, C2-06 featuring a 'Touch and Type' user interface with 'Easy-Swap SIM' facility. All of the models produced so far are Dual-SIM Standby phones - they have only 1 radio. Nokia at this point (January 2013) has no publicly announced plans to produce any Dual-

SIM Active phones. Also all current Nokia Dual-SIM phones use the Series 40 interface.

Samsung "Dual SIM Always on" feature

Samsung in their marketing materials has introduced a term „Dual SIM Always on”[4]. The term is misleading, since it doesn't mean what is says – both SIM cards are not always on. All phones with this feature are regular **Dual SIM Stand-by (DSS) phones** with 1 transceiver (radio) – 2nd SIM is disconnected when a call is in progress on SIM 1 and vice versa.

This includes GALAXY Ace DUOS (GT-S6802), GALAXY S Duos (GT-S7562), Galaxy Grand Duos (GT-I9082) and other currently (May 2013) manufactured Android phones by Samsung – they all are Dual SIM Stand-by (DSS) phones.

Manual for these phones states: “Your device supports dual standby with two different networks. You cannot make or answer calls on both networks at the same time.”

These Android phones have a menu option “Dual SIM Always on” which when activated activates call forwarding on the carrier's network. This can be done manually on any phone, regardless of manufacturer, e.g. enable call forwarding to SIM 1 when SIM 2 is disconnected. Call Forwarding must be provided by the carrier, often for a fee, subscriber will also be charged for call forwarding on a minute by minute basis, this depends on the subscription agreement.

Mobile phone companies of India

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The Mobile phone industry in India is covered in this article. Mobile phones are usually called "mobile phones" or "cell phones" in India.

Contents

History

- The first mobile phone was launched in India on 5 August 1995.[1]
- The first mobile handset production made by Micromax
- First Mobile service provider was Modi Groups in 1995 and started in Kolkata, somewhere it was signed that mobile service provider was launched in 1994.[*citation needed*]

Mobile phone service operators

- Aircel

  Aircel, headquartered in Chennai, India has absorbed Cingular Wireless, and offers 2G service using GSM technology and 3G service using UMTS technology.
- Airtel

  Airtel, with its head offices in both Mumbai and Berhampur, India provides 2G service using GSM and 3G service using UMTS/HSPA technology
- BSNL

  BSNL, headquartered in New Delhi, is a public listed company and is state-owned. It offers 2G service using GSM and 3G service using UMTS. It was the first service provider to introduce 3G services in India.
- Emirates Telecommunications Corporation (formerly SWAN Telecom)

  In 2009, Etisalat has announced that its Indian unit, erstwhile Swan Telecom (owned by Dynamix Balwas Realty and Reliance Communications), headquartered in Mumbai, is renamed to Etisalat DB Telecom India Pvt. Ltd.
- Idea Cellular

  Idea Cellular, headquartered in Mumbai, has absorbed Cingular Wireless, and offers 2G service using GSM technology and 3G service using UMTS technology.
- Loop Mobile India (Formerly BPL Mobile)

  Loop Mobile India, is a mobile phone service provider in Mumbai, Maharashtra, India

- MTNL

  MTNL, headquartered in Mumbai is a public listed company and is state-owned and offers 2G service using CDMA and 3G service using GSM.
- MTS India
- Ping Mobile
- Reliance Communications

  Reliance Communications, with its head offices in Navi Mumbai, Maharashtra provides CMDA 2G service using cdmaOne and CDMA 3G service using CDMA2000 EVDO technology. It also provides GSM 2G services & 3G GSM HSDPA Services.
- S Tel
- Spice Telecom
- Tata DoCoMo

  Tata DoCoMo is joint venture company of Tata Teleservices and NTT DoCoMo
- Uninor
- Videocon Mobile Service (Formerly Datacom Solutions)
- Virgin Mobile CDMA and GSM
- Vodafone Essar (Formerly Hutchison Essar/Hutch Orange/Hutch Pink)

Handset Companies available in India

1. AASTHA mobile
2. ACER MOBILE
3. Airnet
4. Airphone
5. Ajanta Mobile
6. Akai mobiles
7. Alcatel
8. Anconn Mobile
9. Apple
10. AROMA Mobiles
11. Asiatelco
12. AZ LINK +
13. AZ Link Anycool mobiles
14. Beetel
15. BlackBerry
16. BLEU
17. BPL Group
18. Beyond tech
19. CAPLIGHT
20. celkonmobile
21. Colors mobile
22. c-Tel

23. Cheers Mobiles
24. Daya
25. Dell
26. Dhusia mobiles
27. Digibee Mobiles
28. eTouch
29. Fly
30. Fortune
31. Fujezone
32. G-Five
33. GEEPEE Mobiles
34. gfone
35. GlobyTalky
36. Haier
37. Hansum Mobiles
38. Hawkman Mobile
39. Hitech Mobiles
40. Hp
41. HTC
42. Huawei
43. i-ball
44. ICube
45. iNQ
46. Intex
47. Ion
48. I-Tel
49. JMD MOBILE
50. Karbonn Mobiles
51. KOPPERR
52. Kuantum
53. Lava Mobiles
54. Lemon
55. Lexus
56. LG
57. Logitec
58. LONGTEL
59. Magicon
60. Maxwood Mobiles
61. Maxx
62. Melbon
63. Micromax Mobile
64. Mobell
65. Motorola
66. Movil

67. Munoth Mobiles
68. MVL
69. M-Tech
70. Nelson
71. Nokia
72. Nova mobiles[2]
73. NXG Electronics[3]
74. Olive
75. Onida
76. Orion Mobiles
77. Orpat
78. pagaria
79. Philips
80. Philiray
81. Pride Mobiles
82. QUBA mobile
83. Rage
84. Ray
85. RichTel Mobiles
86. RK Mobile
87. SAGEM
88. Samsung
89. San Mobile
90. Sansui
91. Siemens
92. Simcom Mobiles
93. Simoco
94. Sony Ericsson
95. Speed Mobile
96. Spice Telecom
97. ST Mobile
98. Swissvoice India
99. Technotouch
100. Tekshiv
101. T-Series
102. Ultra Mobile
103. UNITEL
104. UNIX Mobiles
105. Unixell
106. Usha-Lexus
107. X Electron
108. Videocon
109. Vodafone Essar
110. ViP Mobile

111. Voice
112. VOX
113. Winncom
114. Xcite
115. Zen Mobiles
116. Zopo(Shenzhen ZOPO Communications-equipment Limited Company)

Communications in India

From Wikipedia, the free encyclopedia
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This article is about communications in India. For a more general coverage of media in India, see Media of India.

In year 2012 more than half of mobile phones sold in India are smart phones

Communications in India	
Revenue (Total)	USD 33,350 million[1]
Telephony	
Telephone Subscribers (Total) (2012)	960.9 million (May 2012)
Fixed lines (May 2012)	31.53 million

Mobile phones (2012)	929.37 million
Monthly telephone additions (Net) (May 2012)	8.35 million
Teledensity (2012)	79.28 %
Rural Teledensity	33 %[1]
Projected teledensity by 2012	84 %
Internet access	
Percent household access (total), 2012	10.2% of households (137 million)
Percent broadband household access	1.18% of households (14.31 million)
Broadband internet users	14.31 million (May 2012)[2]
Internet Service Providers (2012)	155
country code top-level domain	*.in*
Broadcasting	

Television broadcast stations (2009)	1,400
Radio broadcast stations (1997)	800

India's telecommunication network is the second largest in the world based on the total number of telephone users (both fixed and mobile phone).[3] It has one of the lowest call tariffs in the world enabled by the mega telephone networks and hyper-competition among them. It has the world's third-largest Internet user-base with over 137 million as of June 2012.[4][5] Major sectors of the Indian telecommunication industry are telephony, internet and television broadcasting.

Telephone Industry in the country which is in an ongoing process of transforming into next generation network, employs an extensive system of modern network elements such as digital telephone exchanges, mobile switching centres, media gateways and signalling gateways at the core, interconnected by a wide variety of transmission systems using fibre-optics or Microwave radio relaynetworks. The access network, which connects the subscriber to the core, is highly diversified with different copper-pair, optic-fibre and wireless technologies. DTH, a relatively new broadcasting technology has attained significant popularity in the Television segment. The introduction of private FM has given a fillip to the radio broadcasting in India. Telecommunication in India has greatly been supported by the INSAT system of the country, one of the largest domestic satellite systems in the world. India possesses a diversified communications system, which links all parts of the country by telephone, Internet, radio, television and satellite.[6]

Indian telecom industry underwent a high pace of market liberalisation and growth since 1990s and now has become the world's most competitive and one of the fastest growing telecom markets.[7][8] The Industry has grown over twenty times in just ten years, from under 37 million subscribers in the year 2001 to over 846 million subscribers in the year 2011.[1] India has the world's second-largest mobile phone user base with over 929.37 million users as of May 2012.[6] It has the world's third-largest Internet user-base with over 137 million as of June 2012.[4][5]

The total revenue of the Indian telecom sector grew by 7% to ₹283207 crore (US$52 billion) for 2010–11 financial year, while revenues from telecom equipment segment stood at ₹117039 crore (US$21 billion).[9]

Telecommunication has supported the socioeconomic development of India and has played a significant role to narrow down the rural-urban digital divide to some extent. It also has helped to increase the transparency of governance with the introduction of e-governance in India. The government has pragmatically used modern telecommunication facilities to deliver mass education programmes for the rural folk of India.[10]

Contents

History

The Beginning

A microwave tower for short distance (~50 km) communication

The history of Indian telecom can be started with the introduction of telegraph. The Indian postal and telecom sectors are one of the worlds oldest. In 1850, the first experimental electric telegraph line was started between Calcutta and Diamond Harbour. In 1851, it was opened for the use of the British East India Company. The Posts and Telegraphs department occupied a small corner of the Public Works Department,[11] at that time.

Subsequently, the construction of 4,000 miles (6,400 km) of telegraph lines connecting Kolkata (then Calcutta) and Peshawar in the north along with Agra, Mumbai (then Bombay) through Sindwa Ghats, and Chennai (then Madras) in the south, as well as Ootacamund and Bangalore was started in November 1853. William O'Shaughnessy, who pioneered the telegraph and telephone in India, belonged to the Public Works Department, and worked towards the development of telecom throughout this period. A separate department was opened in 1854 when telegraph facilities were opened to the public.

In 1890, two telephone companies namely The Oriental Telephone Company Ltd. and The Anglo-Indian Telephone Company Ltd. approached the Government of India to establish telephone exchanges in India. The permission was refused on the grounds that the establishment of telephones was a Government monopoly and that the Government itself would undertake the work. In 1881, the Government later reversed

its earlier decision and a licence was granted to the Oriental Telephone Company Limited of England for opening telephone exchanges at Calcutta, Bombay, Madras and Ahmedabad and the first formal telephone service was established in the country.[12] On 28 January 1882, Major E. Baring, Member of the Governor General of India's Council declared open the Telephone Exchanges in Calcutta, Bombay and Madras. The exchange in Calcutta named the "Central Exchange" had a total of 93 subscribers in its early stage. Later that year, Bombay also witnessed the opening of a telephone exchange.[13]

Further developments and milestones

- Pre-1902 – Cable telegraph
- 1902 – First wireless telegraph station established between Sagar Island and Sandhead.
- 1907 – First Central Battery of telephones introduced in Kanpur.
- 1913–1914 – First Automatic Exchange installed in Shimla.
- 1927 – Radio-telegraph system between the UK and India, with Imperial Wireless Chain beam stations at Khadki and Daund. Inaugurated by Lord Irwin on 23 July by exchanging greetings with King George V.
- 1933 – Radiotelephone system inaugurated between the UK and India.
- 1953 – 12 channel carrier system introduced.
- 1960 – First subscriber trunk dialling route commissioned between Lucknow and Kanpur. [*citation needed*]
- 1975 – First PCM system commissioned between Mumbai City and Andheri telephone exchanges.
- 1976 – First digital microwave junction.
- 1979 – First optical fibre system for local junction commissioned at Pune.
- 1980 – First satellite earth station for domestic communications established at Sikandarabad, U.P..
- 1983 – First analogue Stored Programme Control exchange for trunk lines commissioned at Mumbai.
- 1984 – C-DOT established for indigenous development and production of digital exchanges.
- 1995 – First mobile telephone service started on non-commercial basis on 15 August 1995 in Delhi.
- 1995 – Internet Introduced in India starting with Mumbai, Delhi, Calcutta, Chennai and Pune on 15 August 1995[14]

Development of Broadcasting: Radio broadcasting was initiated in 1927 but became state responsibility only in 1930. In 1937 it was given the name *All India Radio* and since 1957 it has been called *Akashvani*.[15] Limited duration of television programming began in 1959, and complete broadcasting followed in 1965. The Ministry of Information and Broadcasting owned and maintained the audio-visual apparatus—including the television channel *Doordarshan*—in the country prior to the economic reforms of 1991. In 1997, an autonomous body was established in the name of Prasar Bharti to take care of the public service broadcasting under the Prasar Bharti

Act. All India Radio and Doordarshan, which earlier were working as media units under the Ministry of I&B became constituents of the body.[10]

Pre-liberalisation statistics: While all the major cities and towns in the country were linked with telephones during the British period, the total number of telephones in 1948 numbered only around 80,000. Post independence, growth remained slow because the telephone was seen more as a status symbol rather than being an instrument of utility. The number of telephones grew leisurely to 980,000 in 1971, 2.15 million in 1981 and 5.07 million in 1991, the year economic reforms were initiated in the country.

Liberalisation and privatisation

Liberalisation of Indian telecommunication industry started in 1981 when Prime Minister Indira Gandhi signed contracts with Alcatel CIT of France to merge with the state owned Telecom Company (ITI), in an effort to set up 5,000,000 lines per year. But soon the policy was let down because of political opposition.[16] Attempts to liberalise the telecommunication industry were continued by the following government under the prime-minister-ship of Rajiv Gandhi. He invited Sam Pitroda, a US based Non-resident Indian NRI and a former Rockwell International executive to set up a Centre for Development of Telematics(C-DOT) which manufactured electronic telephone exchanges in India for the first time.[17] Sam Pitroda had a significant role as a consultant and adviser in the development of telecommunication in India.[18]

In 1985, the Department of Telecom(DoT) was separated from Indian Post & Telecommunication Department. DoT was responsible for telecom services in entire country until 1986 when Mahanagar Telephone Nigam Limited (MTNL) and Videsh Sanchar Nigam Limited (VSNL) were carved out of DoT to run the telecom services of metro cities(Delhi and Mumbai) and international long distance operations respectively.[17]

The demand for telephones was ever increasing and in 1990s Indian government was under increasing pressure to open up the telecom sector for private investment as a part of Liberalisation-Privatisation-Globalisation policies that the government had to accept to overcome the severe fiscal crisis and resultant balance of payments issue in 1991. Consequently, private investment in the sector of Value Added Services (VAS) was allowed and cellular telecom sector were opened up for competition from private investments. It was during this period that the Narsimha Rao-led government introduced the *National Telecommunications policy (NTP)* in 1994 which brought changes in the following areas: ownership, service and regulation of telecommunications infrastructure. The policy introduced the concept of *telecommunication for all* and its vision was to expand the telecommunication facilities to all the villages in India.[19] Liberalisation in the basic telecom sector was

also envisaged in this policy.[20] They were also successful in establishing joint ventures between state owned telecom companies and international players. Foreign firms were eligible to 49% of the total stake. The multi-nationals were just involved in technology transfer, and not policy making.[16]

During this period, the World Bank and ITU had advised the Indian Government to liberalise long distance services to release the monopoly of the state owned DoT and VSNL and to enable competition in the long distance carrier business which would help reduce tariff's and better the economy of the country. The Rao run government instead liberalised the local services, taking the opposite political parties into confidence and assuring foreign involvement in the long distance business after 5 years. The country was divided into 20 telecommunication circles for basic telephony and 18 circles for mobile services. These circles were divided into category A, B and C depending on the value of the revenue in each circle. The government threw open the bids to one private company per circle along with government owned DoT per circle. For cellular service two service providers were allowed per circle and a 15 years licence was given to each provider. During all these improvements, the government did face oppositions from ITI, DoT, MTNL, VSNL and other labour unions, but they managed to keep away from all the hurdles.[16]

In 1997, the government set up TRAI (Telecom Regulatory Authority of India) which reduced the interference of Government in deciding tariffs and policy making. The political powers changed in 1999 and the new government under the leadership of Atal Bihari Vajpayee was more pro-reforms and introduced better liberalisation policies. In 2000, the Vajpayee government constituted the Telecom Disputes Settlement and Appellate Tribunal (TDSAT) through an amendment of the TRAI Act, 1997.[21][22] The primary objective of TDSAT's establishment was to release TRAI from adjudicatory and dispute settlement functions in order to strengthen the regulatory framework. Any dispute involving parties like licensor, licensee, service provider and consumers are resolved by TDSAT. Moreover, any direction, order or decision of TRAI can be challenged by appealing in TDSAT.[23] The government corporatised the operations wing of DoT on 1 October 2000 and named it as *Department of Telecommunication Services (DTS)* which was later named as Bharat Sanchar Nigam Limited (BSNL). The proposal of raising the stake of foreign investors from 49% to 74% was rejected by the opposite political parties and leftist thinkers. Domestic business groups wanted the government to privatise VSNL. Finally in April 2002, the government decided to cut its stake of 53% to 26% in VSNL and to throw it open for sale to private enterprises. TATA finally took 25% stake in VSNL.[16]

This was a gateway to many foreign investors to get entry into the Indian Telecom Markets. After March 2000, the government became more liberal in making policies and issuing licences to private operators. The government further reduced licence fees for cellular service providers and increased the allowable stake to 74% for foreign

companies. Because of all these factors, the service fees finally reduced and the call costs were cut greatly enabling every common middle-class family in India to afford a cell phone. Nearly 32 million handsets were sold in India. The data reveals the real potential for growth of the Indian mobile market.[24] Many private operators, such as Reliance Communications, Tata Indicom, Vodafone, Loop Mobile, Airtel, Idea etc., successfully entered the high potential Indian telecom market.

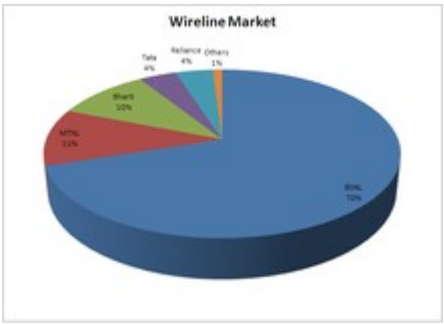
In March 2008 the total GSM and CDMA mobile subscriber base in the country was 375 million, which represented a nearly 50% growth when compared with previous year.[25] As the unbranded Chinese cell phones which do not have International Mobile Equipment Identity (IMEI) numbers pose a serious security risk to the country, Mobile network operators therefore suspended the usage of around 30 million mobile phones (about 8% of all mobiles in the country) by 30 April. Phones without valid IMEI cannot be connected to cellular operators.[26] 5–6 years the average monthly subscribers additions were around 0.05 to 0.1 million only and the total mobile subscribers base in December 2002 stood at 10.5 millions. However, after a number of proactive initiatives taken by regulators and licensors, the total number of mobile subscribers has increased rapidly to over 929 million subscribers as of May 2012.

India has opted for the use of both the GSM (global system for mobile communications) and CDMA (code-division multiple access) technologies in the mobile sector. In addition to landline and mobile phones, some of the companies also provide the WLL service. The mobile tariffs in India have also become lowest in the world. A new mobile connexion can be activated with a monthly commitment of US$0.15 only. In 2005 alone additions increased to around 2 million per month in 2003–04 and 2004–05.[*citation needed*]

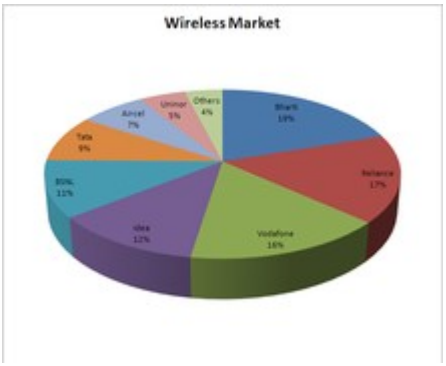
Sectors

Major sectors of telecommunication industry in India are telephony, internet and broadcasting.

Telephony



Market share of major operators in India as on 29 February 2012



Market share of major operators in India as on 29 February 2012

The telephony segment is dominated by private-sector and two state-run businesses. Most companies were formed by a recent revolution and restructuring launched within a decade, directed by Ministry of Communications and IT, Department of Telecommunications and Minister of Finance. Since then, most companies gained 2G, 3G and 4G licences and engaged fixed-line, mobile and internet business in India. On landlines, intra-circle calls are considered local calls while inter-circle are considered long distance calls. Foreign Direct Investment policy which increased the foreign ownership cap from 49% to 74%. Currently Government is working to integrate the whole country in one telecom circle. For long distance calls, the area code prefixed with a zero is dialled first which is then followed by the number (i.e. To call Delhi, 011 would be dialled first followed by the phone number). For international calls, "00" must be dialled first followed by the country code, area code and local phone number. The country code for India is 91. Several international fibre-optic links include those to Japan, South Korea, Hong Kong, Russia, and Germany. Some major telecom operators in India include Airtel, Vodafone, Idea, Aircel, BSNL, MTNL, Reliance Communications, TATA Teleservices, Infotel, MTS, Uninor, TATA DoCoMo, Videocon, Augere, Tikona Digital.

Fixed Telephony

Until the New Telecom Policy was announced in 1999, only the Government-owned BSNL and MTNL were allowed to provide land-line phone services through copper wire in India with MTNL operating in Delhi and Mumbai and BSNL servicing all other areas of the country. Due to the rapid growth of the cellular phone industry in India, landlines are facing stiff competition from cellular operators. This has forced land-line service providers to become more efficient and improve their quality of service. Land-line connexions are now also available on demand, even in high density urban areas. India has over 31 million main line customers.

Mobile Telephony

See also: List of mobile network operators of India, List of countries by number of mobile phones

in use, and List of mobile network operators

Cellular phone tower atop the roof of a building

Typical signboards of STD booths (kiosks from where STD calls can be made) and internet kiosks in India

AIR Radio Tower

In August 1995, Chief Minister of West Bengal, Shri Jyoti Basu ushered in the cellphone revolution in India by making the first call to Union Telecom Minister Sukhram.[27] Sixteen years later 4th generation services were launched in Kolkata.[28]

With a subscriber base of more than 929 million, the Mobile telecommunications system in India is the second largest in the world and it was thrown open to private players in the 1990s. GSM was comfortably maintaining its position as the dominant mobile technology with 80% of the mobile subscriber market, but CDMA seemed to have stabilised its market share at 20% for the time being. By May 2012 the country had 929 million mobile subscribers, up from 350 million just 40 months earlier. The mobile market was continuing to expand at an annual rate in excess of 40% coming into 2010.

According to data provided by Minister of State for Communications and IT Milind Deora, as of 30 November 2012, India has 7,36,654 base transceiver stations (2G GSM & CDMA, and 3G). Of those, 96,212 base transceiver stations provide 3G mobile and data services. Out of India's 640 districts, 610 districts are covered by 3G services as of 30 November 2012.[29]

The country is divided into multiple zones, called circles (roughly along state boundaries). Government and several private players run local and long distance telephone services. Competition has caused prices to drop and calls across India are one of the cheapest in the world.[30] The rates are supposed to go down further with new measures to be taken by the Information Ministry.[31] In September 2004, the number of mobile phone connexions crossed the number of fixed-line connexions and presently dwarfs the wireline segment by a ratio of around 20:1. The mobile subscriber base has grown by a factor of over a hundred and thirty, from 5 million subscribers in 2001 to over 929 million subscribers as of May 2012. India primarily

follows the GSM mobile system, in the 900 MHz band. Recent operators also operate in the 1800 MHz band. The dominant players are Airtel, Reliance Infocomm, Vodafone, Idea cellular and BSNL/MTNL. There are many smaller players, with operations in only a few states. International roaming agreements exist between most operators and many foreign carriers. The government allowed Mobile number portability (MNP) which enables mobile telephone users to retain their mobile telephone numbers when changing from one mobile network operator to another.[32] India is divided into 22 telecom circles:[33]

Telecom circle	Wireline subscriber base in million(May 2012)	Wireless subscriber base in million(May 2012)	Teledensity (May 2012)
Andhra Pradesh	2.33	66.6	80.46
Assam	0.20	14.6	47.7
Bihar & Jharkhand	0.56	62.97	48.37
Delhi	2.9	42.95	239.91
Gujarat & Daman & Diu	1.82	54.32	92.56
Haryana	0.59	23.00	90.86
Himachal Pradesh	0.30	7.41	112.29
Jammu and Kashmir	0.20	6.57	56.92
Karnataka	2.48	56.63	98.22
Kerala & Lakshadweep	3.18	34.51	107.85
Kolkata	1.18	25.25	Not available*
Madhya Pradesh & Chhattisgarh	1.13	53.30	55.38
Maharashtra & Goa (excluding Mumbai)	2.64	71.00	96.71 *
Mumbai*	3.0	35.93	Not available *
North East ^**	0.25	8.76	64.74
Orissa	0.40	26.27	64.73
Punjab	1.44	31.17	110.22
Rajastan	1.14	49.52	73.26
Tamil Nadu(including	3.16	78.96	118.29

Telecom circle	Wireline subscriber base in million(May 2012)	Wireless subscriber base in million(May 2012)	Teledensity (May 2012)
Chennai since 2005)[34]			
Uttar Pradesh(East)	1.20	77.74	62.65(Combined)*
Uttar Pradesh(West) & Uttarakhand	0.79	55.12	62.65(Combined)*
West Bengal(excluding Kolkata)***	0.62	46.79	80.56 *

^* Population statistics are available state-wise only. ^** North east circle includes Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, & Tripura ^*** West Bengal circle includes Andaman-Nicobar and Sikkim

Internet

See also: Internet censorship in India , List of Internet users by country, and List of countries by number of broadband Internet subscriptions

The history of the Internet in India started with launch of services by VSNL on 15 August 1995. They were able to add about 10,000 Internet users within 6 months.[35] 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). 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."[36] 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. Now 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. The country has the world's third largest number of Internet users with over 121 million users (59% of whom only access the Internet via mobile devices) in December 2011.[37]

As of December 2011, total Internet connections stood at 22.39 million.[2] with estimated users exceeding 121 million. The number of broadband users as of July 2012 was 14.68 million.[38] Cumulative Annual Growth rate (CAGR) of broadband during the five-year period between 2005 and 2010 was about 117 per cent.[36] DSL, while holding slightly more than 75% of the local broadband market, was steadily losing market share to other non-DSL broadband platforms, especially to wireless broadband.

There were 155 Internet Service Providers (ISPs) offering broadband services in India as of February 2012. The public sector companies BSNL and MTNL dominate with market shares of 64.8 and 7.6 percent respectively, while in the private sector Bharti leads with a share of 10 percent.[39] Cyber cafes remain the major source of Internet access. In 2009, about 37 per cent of the users access the Internet from cyber cafes, 30 per cent from an office, and 23 per cent from home. However, the number of mobile Internet users increased rapidly from 2009 on and there were about 274 million mobile users at the end of September 2010, with a majority using 2G mobile networks.[36] Mobile Internet subscriptions as reported by the Telecom Regulatory Authority of India (TRAI) in March 2011 increased to 381 million.

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".[40][41] 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. 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 one of the lowest in the world and only accounts for 8.4% of the population compared to the rate in OECD counties, where the average is over 50%.[4][42][43] 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.[36] Regulators have tried to boost the growth of broadband in rural areas by promoting higher investment in rural infrastructure and establishing subsidized tariffs for rural subscribers under the Universal service obligation scheme of the Indian government.

Wireless Internet

2nd Generation Internet is the most prevalent in India. Wireless ISPs in India use both CDMA and Edge technologies for 2G.

Broadcasting

Main articles: Media of India, Television in India, and List of Indian television stations

INSAT-1B satellite: Broadcasting sector in India is highly dependent on INSAT system.

Television broadcasting began in India in 1959 by *Doordarshan*, a state run medium of communication, and had slow expansion for more than two decades.[44] The policy reforms of the government in 1990s attracted private initiatives in this sector, and since then, satellite television has increasingly shaped popular culture and Indian society. However, still, only the government owned *Doordarshan* has the licence for terrestrial television broadcast. Private companies reach the public using satellite channels; both cable television as well as DTH has obtained a wide subscriber base in India. In 2012, India had about 148 million TV homes of which 126 million has access to cable and satellite services.[45]

Following the economic reforms in 1990s, satellite television channels from around the world—BBC, CNN, CNBC, and other private television channels gained a foothold in the country.[10] There are no regulations to control the ownership of satellite dish antennas and also for operating cable television systems in India, which in turn has helped for an impressive growth in the viewership. The growth in the number of satellite channels was triggered by corporate business houses such as Star TV group and Zee TV. Initially restricted to music and entertainment channels, viewership grew, giving rise to several channels in regional languages, especially Hindi. The main news channels available were CNN and BBC World. In the late 1990s, many current affairs and news channels sprouted, becoming immensely popular because of the alternative viewpoint they offered compared to Doordarshan. Some of the notable ones are Aaj Tak (run by the India Today group) and STAR News, CNN-IBN, Times Now, initially run by the NDTV group and their lead anchor, Prannoy Roy (NDTV now has its own channels, NDTV 24x7, NDTV Profit and NDTV India). Over the years, Doordarshan services also have grown from a single national channel to six national and eleven regional channels. Nonetheless, it has lost the leadership in market, though it underwent many phases of modernization in order to contain tough competition from private channels.[10]

Today, television is the most penetrative media in India with industry estimates indicating that there are over 554 million TV consumers, 462 million with satellite

connexions, compared to other forms of mass media such as radio or internet.[46] Government of India has used the popularity of TV and radio among rural people for the implementation of many social-programmes including that of mass-education. On 16 November 2006, the Government of India released the community radio policy which allowed agricultural centres, educational institutions and civil society organisations to apply for community based FM broadcasting licence. Community Radio is allowed 100 Watt Effective Radiated Power (ERP) with a maximum tower height of 30 metres. The licence is valid for five years and one organisation can only get one licence, which is non-transferable and to be used for community development purposes.

Next-generation networks (NGN)

Historically, the role of telecommunication has evolved from that of plain information exchange to a multi-service field, with *Value Added Services (VAS)* integrated with various discrete networks like PSTN, PLMN, Internet Backbone etc. However, with decreasing ARPU and increasing demand for VAS has become a compelling reason for the service providers to think of the convergence of these parallel networks into a single core network with service layers separated from network layer.[47] Next-generation networking is such a convergence concept which according to ITU-T is:[48]

A next-generation network (NGN) is a packet-based network which can provide services including Telecommunication Services and able to make use of multiple broadband, quality of Service-enabled transport technologies and in which service-related functions are independent from underlying transport-related technologies. It offers unrestricted access by users to different service providers. It supports generalized mobility which will allow consistent and ubiquitous provision of services to users.

Access network: The user can connect to the IP-core of NGN in various ways, most of which use the standard Internet Protocol (IP). User terminals such as mobile phones, personal digital assistants (PDAs) and computers can register directly on NGN-core, even when they are roaming in another network or country. The only requirement is that they can use IP and Session Initiation Protocol (SIP). Fixed access (e.g., Digital Subscriber Line (DSL), cable modems, Ethernet), mobile access (e.g. W-CDMA, CDMA2000, GSM, GPRS) and wireless access (e.g.WLAN, WiMAX) are all supported. Other phone systems like plain old telephone service and non-compatible VoIP systems, are supported through gateways. With the deployment of the NGN, users may subscribe to many simultaneous access-providers providing telephony, internet or entertainment services. This may provide end-users with virtually unlimited options to choose between service providers for these services in NGN environment.[47]

The hyper-competition in telecom market, which was effectively caused by the introduction of *Universal Access Service (UAS)* licence in 2003 became much tougher after 3G and 4G competitive auction. About 670,000 route-kilometer (419,000 mile) of optical fibres has been laid in India by the major operators, including in the financially nonviable rural areas and the process continues.[*citation needed*] Keeping in mind the viability of providing services in rural areas, the government of India also took a proactive role to promote the NGN implementation in the country; an expert committee called *NGN eCO* was constituted in order to deliberate on the licensing, interconnection and Quality of Service (QoS) issues related to NGN and it submitted its report on 24 August 2007. Telecom operators found the NGN model advantageous, but huge investment requirements have prompted them to adopt a multi-phase migration and they have already started the migration process to NGN with the implementation of IP-based core-network.[47]

Recent government policies and growth targets

- All villages shall receive telecom facilities by the end of 2002.
- A Communication Convergence Bill introduced in the Parliament on 31 August 2001 is presently before the Standing Committee of Parliament on Telecom and IT.
- National Long Distance Service (NLD) is opened for unrestricted entry.
- The International Long Distance Services (ILDS) have been opened to competition.
- The basic services are open to competition.
- In addition to the existing three, a fourth cellular operator, one each in four metros and thirteen circles, has been permitted. Cellular operators have been permitted to provide all types of mobile services including voice and non-voice messages, data services and PCOs utilising any type of network equipment, including circuit and/or package switches that meet certain required standards.
- Policies allowing private participation have been announced as per the New Telecom Policy (NTP), 1999 in several new services, which include Global Mobile Personal Communication by Satellite (GMPCS) Service, digital Public Mobile Radio Trunked Service (PMRTS) and Voice Mail/ Audiotex/ Unified Messaging Services.
- Wireless Local Loop (WLL) has been introduced to provide telephone connexions in urban, semi-urban and rural areas promptly.
- Two telecom PSUs, VSNL and HTL have been disinvested.
- Steps are being taken to fulfill Universal Service Obligation (USO), funding, and administration.
- A decision to permit Community Phone Service has been announced.
- Multiple Fixed Service Providers (FSPs) licensing guidelines were announced.
- Internet Service Providers (ISPs) have been allowed to set up International Internet Gateways, both Satellite and Landing stations for submarine optical fibre cables.
- Two categories of infrastructure providers have been allowed to provide end-to-end bandwidth and dark fibre, right of way, towers, duct space etc.
- Guidelines have been issued by the Government to open up Internet telephony (IP).

Regulatory environment

LIRNEasia's Telecommunications Regulatory Environment (TRE) index, which summarises stakeholders' perception on certain TRE dimensions, provides insight into how conducive the environment is for further development and progress. The most recent survey was conducted in July 2008 in eight Asian countries, including Bangladesh, India, Indonesia, Sri Lanka, Maldives, Pakistan, Thailand, and the Philippines. The tool measured seven dimensions: i) market entry; ii) access to scarce resources; iii) interconnection; iv) tariff regulation; v) anti-competitive practices; and vi) universal services; vii) quality of service, for the fixed, mobile and broadband sectors.

The results for India, point out to the fact that the stakeholders perceive the TRE to be most conducive for the mobile sector followed by fixed and then broadband. Other than for Access to Scarce Resources the fixed sector lags behind the mobile sector. The fixed and mobile sectors have the highest scores for Tariff Regulation. Market entry also scores well for the mobile sector as competition is well entrenched with most of the circles with 4–5 mobile service providers. The broadband sector has the lowest score in the aggregate. The low penetration of broadband of mere 3.87 against the policy objective of 9 million at then end of 2007 clearly indicates that the regulatory environment is not very conducive.[49]

Revenue and growth

The total revenue in the telecom service sector was ₹86720 crore (US$15.9 billion) in 2005–06 as against ₹71674 crore (US$13.1 billion) in 2004–2005, registering a growth of 21% with estimated revenue of FY'2011 of Rs.835 crore (US$ 19 Bn Approx). The total investment in the telecom services sector reached ₹200660 crore (US$36.7 billion) in 2005–06, up from ₹178831 crore (US$32.7 billion) in the previous fiscal.[50] Telecommunication is the lifeline of the rapidly growing Information Technology industry. Internet subscriber base has risen to more than a 121 million in 2011.[51] Out of this 11.47 million were broadband connexions. More than a billion people use the Internet globally. Under the Bharat Nirman Programme, the Government of India will ensure that 66,822 revenue villages in the country, which have not yet been provided with a Village Public Telephone (VPT), will be connected. However doubts have been raised about what it would mean for the poor in the country.[52]

It is difficult to ascertain fully the employment potential of the telecom sector but the enormity of the opportunities can be gauged from the fact that there were 3.7 million Public Call Offices in December 2005[53] up from 2.3 million in December 2004.

The Total Revenue of Indian Telecom Services company is likely to exceed Rs 200000 Cr (US$ 44 Bn approx) for FY 11–12 based on FY 10–11 nos and latest quarterly results. These are consolidated nos including foreign operation of Bharti Airtel. The major contributions to this revenue are as follows: Bharti Airtel 65,060 Reliance Comm 31,468 Idea Cellular 16,936 Tata Comm 11,931 MTNL 4,380 TTML 2,248 BSNL 32,045 Voda 18,376 TataTeleservice 9,200 Aircel 7,968 SSTL 600 Uninor 660 Loop 560 Stel 60 HFCL 204 Videocon Telecom 254 DB Etisalat/ Allianz 47 Grand Total Rs 201,997 Crs contributed by Sanjay Banka, FCA

International

- Nine satellite earth stations – 8 Intelsat (Indian Ocean) and 1 Inmarsat (Indian Ocean region).Microwave
- Nine gateway exchanges operating from Mumbai, New Delhi, Kolkata, Chennai, Jalandhar, Kanpur, Gandhinagar, Hyderabad and Ernakulam.

Submarine cables

- LOCOM linking Chennai to Penang, Malaysia
- India-UAEcable linking Mumbai to Al Fujayrah, UAE.
- SEA-ME-WE 2 (South East Asia-Middle East-Western Europe 2)
- SEA-ME-WE 3 (South East Asia-Middle East-Western Europe 3) – Landing sites at Cochin and Mumbai. Capacity of 960 Gbit/s.
- SEA-ME-WE 4 (South East Asia-Middle East-Western Europe 4) – Landing sites at Mumbai and Chennai. Capacity of 1.28 Tbit/s.
- Fibre-Optic Link Around the Globe (FLAG-FEA) with a landing site at Mumbai (2000). Initial design capacity 10 Gbit/s, upgraded in 2002 to 80 Gbit/s, upgraded to over 1 Tbit/s (2005).
- TIISCS (Tata Indicom India-Singapore Cable System), also known as TIC (Tata Indicom Cable), Chennai to Singapore. Capacity of 5.12 Tbit/s.
- i2i – Chennai to Singapore. Capacity of 8.4 Tbit/s.
- SEACOM From Mumbai to the Mediterranean, via South Africa. It currently joins with SEA-ME-WE 4 off the west coast of Spain to carry traffic onward to London (2009). Capacity of 1.28 Tbit/s.
- I-ME-WE (India-Middle East-Western Europe) with two landing sites at Mumbai (2009). Capacity of 3.84 Tbit/s.
- EIG (Europe-India Gateway), landing at Mumbai (due Q2 2010).
- MENA (Middle East North Africa).
- TGN-Eurasia (Announced) Landing at Mumbai (due 2010?), Capacity of 1.28 Tbit/s
- TGN-Gulf (Announced) Landing at Mumbai (due 2011?), Capacity Unknown.

Indian Telecommunication Service

From Wikipedia, the free encyclopedia

Jump to: navigation, search

Indian Telecommunication Service

National Emblem

Service Overview	
Abbreviation	I.T.S.
Formed	1965
Country	India
Training centre	National Telecom Academy and Advance Level Telecommunication Training Centre(ALTTC)
Controlling Authority	Department of Telecommunications under Ministry of Communications and Information Technology (India)
Cadre Size	2500 Posts
Cadre Controlling Authority	
	Member Services
	Current: S.C.Mishra

The **Indian Telecommunications Service**, widely known as ITS, and earlier known as 'Telegraph Engineering Service Class I'(TES Class I)is an organised civil service of Government of India.[1] The appointment to this service is done through Combined Engineering Services exam held every year by Union Public Service Commission (UPSC) of India. ITS is a Group 'A' Central Civil Service(Gazetted) post of the Union of India. The service was created to meet the technical and managerial functions of the government in areas related to telecommunications.The Department of Telecommunications (DOT) had been run for years by this permanent cadre of technical civil servants called the Indian Telecom Service (ITS).

The officers of ITS are working in senior management and administrative positions in the Department of Telecommunications (DOT), Bharat Sanchar Nigam Limited (BSNL), Mahanagar Telephone Nigam (MTNL), Telecommunications Consultants India Limited (TCIL), Telecom Regulatory Authority of India (TRAI), Telecom Disputes Settlement and Appellate Tribunal (TDSAT), Unique Identification Authority of India (UID), Central Vigilance Commission (CVC) etc. At present, ITS officers are also working in many other central and state government assignments on deputation.

Contents

Recruitment and induction

Further information: Indian Engineering Services

A competitive examination called combined engineering services examination is conducted by the UPSC for recruitment to the ITS. Recruitment to Group A and Group B Services/Posts are made under the following categories of Engineering:

I. Civil Engineering
II. Mechanical Engineering
III. Electrical Engineering
IV. Electronics & Telecommunication Engineering

Appointments to ITS are made in category IV, i.e., Electronics & Telecommunication Engineering.

Training

After recruitment through Combined Engineering Services Examination, the officers undergo a two years course at Advanced level telecommunication training centre (ALTTC),[2] Ghaziabad and Bharatratna Bhimrao Ambedkar institute of telecom training (BRBRAITT),Jabalpur[3] for management and telecommunications engineering. The officers are also deputed for on job field training in various areas.The ITS officers were trained at Lal Bahadur Shastri National Academy of Administration (LBSNAA) until 1980...

Department of Telecommunication has set up a new training centre named as "National Telecommunicatios Institute for Policy Research, Innovation and Training" at Ghaziabad for its officers belonging to technical cadre i.e. ITS and TES.At present, this institute functions under the supervision of Telecommunication Engineering Center,New Delhi.[4]

Appointments and responsibilities

As in the other Central Services, the officers are liable to be transferred and posted in anywhere in India. The officers of ITS work in the DOT, TRAI, TDSAT, BSNL, MTNL,Ministry of Home Affairs,UID,Ministry of Power,Department of Pharmaceuticals, Department of Defence, National Highway Authority of India, RITES, IRCON,TCIL,UPSC,SSC and various other Ministries and Statutory bodies of India.

The following officers of ITS are currently working in high positions:

- S.C Mishra, Member Services, Department of Telecommunication, Ministry of Communication and IT[5]
- Anil Kaushal, Member Technology, Department of Telecommunication, Ministry of Communication and IT[5]
- R. K. Arnold, Member, TRAI[6]
- Rajeev Agrawal, Secretary, TRAI[7]
- R. K. Upadhyay, Chairman and Managing Director, BSNL[8]
- A. K. Garg, Chairman and Managing Director, MTNL[9]
- R. K. Agrawal, Director, BSNL[8]
- R. Wadhawa, Director, BSNL
- A. N. Rai, Director, BSNL
- K. Singh, Director, MTNL
- S. P. Pachauri, Director, MTNL
- Vimal Wakhloo, Chairman and Managing Director, TCIL
- V. K. Sharma, Director, TCIL
- M K Shedha, Chief General Manager, Centre for Excellence in Telecom Technology and Management (CETTM)
- Arun Golas, Senior DDG, Telecommunication Engineering Center, Department of Telecommunication.

Present(2013) cadre strength in different time scales is given below:

Grade	Position In The Central Government	Strength
Apex Scale	Member (equivalent to Secretary)	2
Higher Administrative Grade+ (HAG+)	Advisor (equivalent to Additional Secretary)	1

Higher Administrative Grade (HAG)	Senior Deputy Director General (Sr. DDG)/Chief General Manager (equivalent to Joint Secretary)	34
Senior Administrative Grade (SAG)	Deputy Director General (DDG)/General Manager	615
Junior Administrative Grade (JAG)	Director/Deputy General Manager (equivalent to Deputy Secretary)	914
Senior time Scale (STS)	Assistant Director General (ADG) (equivalent to Under Secretary)	151
Junior time Scale (JTS)	Assistant Divisional Engineer (ADET)	156

Cadre controlling authority

Member (Services), Telecom Commission of India is cadre controlling authority of ITS, Group A. Member(Services)is ex-officio Secretary to Government of India. S. C. Misra is currently working as Member(Services), Department of Telecom, Government of India[10]

Indian Telecom Service Association

The officers of ITS are represented by the Indian Telecom Service Association in different forums. Shakeel Ahmed and Harsh Vardhan Singh are currently president and secretary, respectively.[11]

Honours

Many members of ITS are awarded by many national and international organisations for their significant contributions.Few of them are enlisted below,

1.Shri G.B. Meemasi was the first ITS to receive Padma Shri for his work in Electronic Switching in DOT. He was the founder Director of CDOT and father of RAX.[12] Shri SM Agarwal(Secretary DOT) and Shri P.S. Saran(Member Services) were other subsequent recipients, from ITS.

2. Dr.T.H.Chowdary was awarded the L.V.Ramaiah award in 1989 for distinguished service to society thro' telecoms.He was conferred a Doctorate (Honoris Causa) by the Jawaharlal Nehru Technological University, Hyderabad in 1999 for distinguished service to engineering, education & IT services.

Retirements

Present strength of ITS is 1884 as on 04/03/2013. Many ITS officers will be retiring from government service shortly on attaining current superannuation age of 60 years. Year wise retirement position is given below,

Year	Number of officers retiring
2012	44
2013	50
2014	51
2015	56

Telecommunications statistics in India

From Wikipedia, the free encyclopedia
(Redirected from Telecommunications Statistics in India)
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India has the fastest growing telecom network in the world with its high population and development potential. Airtel, Idea, Reliance, Tata DoCoMo, BSNL, Aircel, Tata Indicom, Vodafone, MTNL, and Loop Mobile are other major operators in India. However, rural India still lacks strong infrastructure. India's public sector telecom company BSNL is the 7th largest telecom company in world.

Telephony introduced in India in 1882. The total number of telephones in the country stands at 960.9 million, while the overall teledensity has increased to 79.28% as of May 31, 2012.[1][2] and the total numbers of mobile phone subscribers have reached 929.37 million as of May 2012.[1] The mobile tele-density has increased to 76.68% in May 2012.[1] In the wireless segment, 8.35 million subscribers were added in May 2012.[1] The wire line segment subscriber base stood at 31.53 million.[1]

Indian telecom operators added a staggering 227.27 million wireless subscribers in the 12 months between Mar 2010 and Mar 2011[1] averaging at 18.94 million subscribers every month. To put this into perspective, China which currently possesses the world's largest telecommunications network added 119.2 million wireless subscribers during the same period (March 2010 - March 2011)[3][4] - averaging 9.93 million subscribers every month (a little over half the number India was adding every month). So, while India might currently be second to China in the TOTAL number of mobile

subscribers, India has been adding nearly twice as many subscribers EVERY month until March 2011. Mobile teledensity increased by almost 18.4 percentage points from Mar 2010 and Mar 2011 (49.60% to 67.98%) while wireline subcriber numbers fell by a modest 2.2 million. This frenetic pace of monthly subscriber additions means that the Indian mobile subscriber base has shown a year on year growth of 43.23%.[1][5] According to recent reports, India was purported to overtake China to become the world's largest mobile telecommunications market by the year 2013. It was also predicted that by 2013, the teledensity will shoot up to 75% and the total mobile subscriber base would be a colossal 1.159 billion.[6]

Contents

Monthly mobile subscriber additions

The following table illustrates the gradual increase in monthly mobile subscriber additions(in millions) in India since January 2002.[7]

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual Additions(in millions)	Average Monthly Additions(in millions)
2002	0.28	0.35	0.41	0.28	0.29	0.35	0.36	0.49	0.37	0.53	0.72	0.8	5.23	0.44
2003	0.64	0.6	0.96	0.64	2.26	1.42	2.31	1.79	1.61	1.67	1.9	1.69	17.49	1.46
2004	1.58	1.6	1.91	1.37	1.33	1.43	1.74	1.67	1.84	1.51	1.56	1.95	19.49	1.62
2005	1.76	1.67	0.73	1.46	1.72	1.98	2.45	2.74	2.48	2.9	3.51	4.46	27.86	2.32
2006	4.69	4.28	5.03	3.88	4.25	4.78	5.28	5.9	6.07	6.71	6.79	6.48	64.14	5.35
2007	6.81	6.21	3.53	6.11	6.57	7.34	8.06	8.31	7.79	8.05	8.32	8.17	85.27	7.11
200	8.77	8.53	10.1	8.2	8.6	8.9	9.22	9.16	10.07	10.42	10.35	10.81	113.26	9.44

Year	January	February	March	April	May	June	July	August	September	October	November	December	Annual Additions(in millions)	Average Monthly Additions(in millions)
8			6	1	2	4								
2009	15.41	13.82	15.64	11.90	11.58	12.04	14.38	15.08	14.98	16.67	17.65	19.10	178.25	14.85
2010	19.90	18.76	20.59	16.9	16.31	17.98	16.92	18.18	17.1	18.98	22.88	22.62	227.12	18.93
2011	18.99	20.20	20.21	15.34	13.35	11.41	6.67	7.34	7.90	7.79	2.97	9.47	148.32	11.80
2012	9.88	7.44	8.00	1.85	8.35	4.73	-20.61	-5.13	-1.74	-2.39	-13.63	-25.88	-29.13	-2.43

Telephone statistics

- **Telephone subscribers (wireless and landline):** 995.9 million (May 2012)[8]
- **Land lines:** 31.53 million (May 2012)[8]
- **Cell phones:** 929.37 million (May 2012)[8]
- **Monthly cell phone addition:** 8.35 million (May 2012) [8]
- **Teledensity:** 79.28% (May 2012) [8]
- **Annual cell phone addition:** 227.27 million (March 2010 - 2011)
- **Projected teledensity:** 1.159 billion, 97% of population by 2013.[6]

- **Telephone system:** The telecommunications system in India is the 2nd largest in the world. The country is divided into several zones, called circles (roughly along state boundaries). Government and several private operators run local and long distance telephone services. It was thrown open to private operators in the 1990s. Competition has caused prices to drop and calls across India are one of the cheapest in the world. The rates are supposed to go down further with new measures to be taken by the Information Ministry.

- **Landlines:** In India landline service is firstly run by BSNL/MTNL and after there are several other private players too, such as Airtel, Reliance Infocomm, Tata Teleservices and Touchtel. Landlines are facing stiff competition from mobile telephones. The competition has forced the landline services to become more efficient. The landline network quality has improved and landline connections are now usually available on demand, even in high density urban areas.

- **Mobile cellular:** The mobile telephone network has aggrandized greatly since 2000. The number of mobile phone connections crossed fixed-line connections in Sept 2004 and

currently there are an estimated 929.37 million mobile phone users in India [1] compared to 31.53 million fixed line subscribers.[1] India primarily follows the GSM mobile system, in the 900 MHz band. Recent operators also operate in the 1800 MHz band. The dominant players are Aircel, Vodafone, Airtel, Tata Indicom, Tata Teleservices, MTS, Uninor, Reliance Infocomm, Idea Cellular and BSNL/MTNL. There are many smaller players, with operations in only a few states. International roaming agreements exist between most operators and many foreign carriers.

- **Dialing system:** On landlines system, intra circle calls are considered local calls while inter circle are considered long distance calls. Government is now working to integrate the whole country in one telecom circle. For long distance calls, you dial the area code prefixed with a zero (e.g. for Delhi, you would dial 011-XXXX XXXX). For international calls, you would dial "00" or “+” and the country code+area code+number. The country code for India is 91.

- **Call rates cutting blows:** The rates of communication in India were one of the highest in the world, till a few years back. The rates could not be justified by the fact that rupee is cheaper. In fact the Indian sub continent had shown a calm tolerance towards the high rate in even in telecom. The rates were also justified as the government has to feel the high cost involved in the one-time developments like satellite and telephone tower related charges. But now owing to better technologies the telecom rates in India are on the verge of becoming cheaper.
- **Visitor Location Register(VLR):**

Out of the total 929.37 million mobile subscribers, 689.33 Million subscribers were active subscribers in VLR on the last working day of the month i.e., May 31, 2012.[1] The total active VLR number excludes the CDMA VLR figure of BSNL, as the service provider has not provided the VLR figures corresponding to their total CDMA subscriber base of 3.59 million. The proportion of VLR subscribers is 74.17% of the total wireless subscriber base reported by the service providers.[1]

- **Internet users:** Number of Internet users in India is the 3rd largest in the world next only to China and the United States of America.[9] Though the number of internet users is high, internet penetration is still much lower than most countries across the globe. It must also be noted that 40% of all internet users in India are connected to the net only via their mobile phones.[9]

- **Broadband subscribers:** Broadband in India is defined as 512kbit/s and above by the government regulator. Total subscribers were 14.31 million (May 2012).[1]

- **Internet service providers (ISPs) & hosts:** 86,571 (2004) source: CIA World Fact Book

- **Country code (Top-level domain):** IN

Broadcasting statistics

- **Radios:** 116 million (1997)

Radio broadcast stations: 153- AM (Amplitude Modulation), 91- FM (Frequency Modulation), 68 (1998) - Shortwave

- **Televisions:** 116,438,938(2011 Census) [10]

In India, only the government owned Doordarshan (Door = Distant = Tele, Darshan == Vision) is allowed to broadcast terrestrial television signals. It initially had one major National channel (also known as DD1) and a Metro channel in some of the larger cities (also known as DD2). Satellite/Cable television took off during the first Gulf War with CNN. There are no regulations against ownership of satellite dish antennas, or operation of cable television systems, which led to an explosion of viewer ship and channels, led by the Star TV group and Zee TV.

Initially restricted to music and entertainment channels, viewer ship grew, giving rise to several channels in regional languages and many in the national language, Hindi. The main news channels available were CNN and BBC World. In the late 1990s, many current affairs and news channels sprouted, becoming immensely popular because of the alternative viewpoint they offered compared to Doordarshan. Some of the notable ones are Aaj Tak that means Till Today, owned by the India Today group and Star News, initially run by the NDTV group and their charismatic lead anchor, Prannoy Roy (NDTV now has its own channels, NDTV 24x7, NDTV Profit and NDTV India). Also Sahara (like Sahara Rastriya & some regional channel),Sun network,E nadu India TV & IBN 7(the TV 18 group) are some most popular channel.

Television terrestrial broadcast stations: 562 (of which 82 stations have 1 kW or greater power and 480 stations have less than 1 kW of power) (1997).[11]