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[Main page](#)  
[Contents](#)  
[Featured content](#)  
[Current events](#)  
[Random article](#)  
[Donate to Wikipedia](#)  
[Wikipedia store](#)

Interaction

[Help](#)  
[About Wikipedia](#)  
[Community portal](#)  
[Recent changes](#)  
[Contact page](#)

Tools

[What links here](#)  
[Related changes](#)  
[Upload file](#)  
[Special pages](#)  
[Permanent link](#)  
[Page information](#)  
[Wikidata item](#)  
[Cite this page](#)

Print/export

[Create a book](#)  
[Download as PDF](#)  
[Printable version](#)

Languages

[Dansk](#)  
[Español](#)  
[Français](#)  
[日本語](#)

[Українська](#)

[Edit links](#)

Not logged in [Talk](#) [Contributions](#) [Create account](#) [Log in](#)

Article [Talk](#)

Read [Edit](#) [View history](#)



# Mobile broadband

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*For all wireless Internet access, see [Wireless broadband](#).*

**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.<sup>[1]</sup> Mobile broadband uses the spectrum of 225 MHz to 3700 MHz.<sup>[2]</sup>



A [mobile broadband modem](#) in the [ExpressCard](#) form factor for laptop computers

## Contents [hide]

- [Description](#)
- [Generations](#)
- [Coverage](#)
- [Subscriptions and usage](#)
- [Development](#)
  - [In use and under active development](#)
    - [GSM family](#)
    - [IEEE 802.16 \(WiMAX\)](#)
  - [In use, but moving to other protocols going forward](#)
    - [CDMA family](#)
    - [IEEE 802.20](#)
- [See also](#)
- [References](#)
- [External links](#)

## Description [edit]

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



[HTC ThunderBolt](#), the second commercially available LTE smartphone

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](#).<sup>[3]</sup>

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](#), [tablets](#), [PDAs](#), and other [mobile Internet devices](#).

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

## Generations [edit]

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).<sup>[4][5][6]</sup>

### Second generation (2G) from 1991:

	<i>Speeds in kbit/s</i>	<i>down and up</i>
• <a href="#">GSM CSD</a>		9.6 kbit/s
• <a href="#">CDPD</a>		up to 19.2 kbit/s
• <a href="#">GSM GPRS (2.5G)</a>		56–115 kbit/s
• <a href="#">GSM EDGE (2.75G)</a>		up to 237 kbit/s

### Third generation (3G) from 2001:

	<i>Speeds in Mbit/s</i>	
	<i>down</i>	<i>up</i>
• <a href="#">UMTS W-CDMA</a>	0.4 Mbit/s	
• <a href="#">UMTS HSPA</a>	14.4	5.8
• <a href="#">UMTS TDD</a>	16 Mbit/s	
• <a href="#">CDMA2000 1xRTT</a>	0.3	0.15
• <a href="#">CDMA2000 EV-DO</a>	2.5–4.9	0.15–1.8
• <a href="#">GSM EDGE-Evolution</a>	1.6	0.5

### Fourth generation (4G) from 2006:

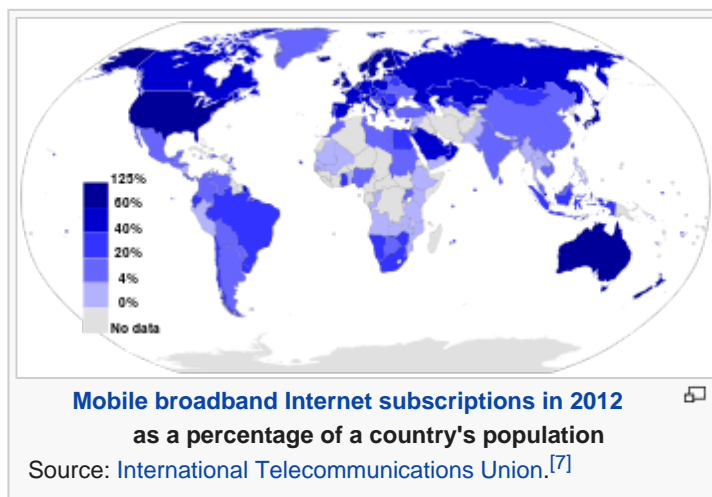
	<i>Speeds in Mbit/s</i>	
	<i>down</i>	<i>up</i>
• <a href="#">HSPA+</a>	21–672	5.8–168
• <a href="#">Mobile WiMAX (802.16)</a>	37–365	17–376
• <a href="#">LTE</a>	100–300	50–75
• <a href="#">LTE-Advanced:</a>		
• while moving at high speeds	100 Mbit/s	
• while stationary or moving at low speeds	up to 1000 Mbit/s	
• <a href="#">MBWA (802.20)</a>	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 [edit]

In 2011, 90% of the world's population lived in areas with 2G coverage, while 45% lived in areas with 2G and 3G coverage,<sup>[1]</sup> 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.<sup>[8]</sup>



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.<sup>[9]</sup> Peak speeds experienced by users are also often limited by the capabilities of their smartphone or other mobile device.<sup>[8]</sup>

## Subscriptions and usage [edit]

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.<sup>[12]</sup> Mobile phone subscriptions are expected to reach 9.3 billion in 2018.<sup>[8]</sup>

At the end of 2012 there were roughly 1.5 billion mobile broadband subscriptions growing at a 50% year-on-year rate.<sup>[12]</sup>

Mobile broadband subscriptions are expected to reach 6.5 billion in 2018.<sup>[8]</sup>

Mobile data traffic doubled between the end of 2011 (~620 Petabytes in Q4 2011) and the end of 2012 (~1280 Petabytes in Q4 2012).<sup>[12]</sup> 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

### Worldwide broadband subscriptions

	2007	2010	2014 <sup>a</sup>
<b>World population</b> <sup>[10]</sup>	6.6 billion	6.9 billion	7.2 billion
<b>Fixed broadband</b>	5%	8%	10%
Developing world	2%	4%	6%
Developed world	18%	24%	27%
<b>Mobile broadband</b>	4%	11%	32%
Developing world	1%	4%	21%
Developed world	19%	43%	84%

<sup>a</sup> Estimate.  
 Source: [International Telecommunications Union](#).<sup>[11]</sup>

### Broadband subscriptions by region

Fixed subscriptions:	2007	2010	2014 <sup>a</sup>
Africa	0.1%	0.2%	0.4%
Americas	11%	14%	17%
Arab States	1%	2%	3%
Asia and Pacific	3%	6%	8%
Commonwealth of Independent States	2%	8%	14%
Europe	18%	24%	28%

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.<sup>[8]</sup>

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.<sup>[8]</sup>

Note too that there are large differences in subscriber and traffic patterns between different provider networks, regional markets, device and user types.<sup>[8]</sup>

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 [edit]

### In use and under active development [edit]

#### GSM family [edit]

*Further information:* [List of LTE networks](#) and [List of HSPA+ networks](#)

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.<sup>[13]</sup> 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.<sup>[14]</sup> In 2011 these standards were the most used method to deliver mobile broadband.<sup>[citation needed]</sup> With the development of the 4G [LTE](#) signalling standard, download speeds could be increased to 300 Mbit/s per second within the next several years.<sup>[15]</sup>

#### IEEE 802.16 (WiMAX) [edit]

*Further information:* [List of deployed WiMAX networks](#)

The IEEE working group [IEEE 802.16](#), produces standards adopted in products using the

#### Mobile subscriptions: 2007 2010 2014

Africa	0.2%	2%	19%
Americas	6%	23%	59%
Arab States	0.8%	5%	25%
Asia and Pacific	3%	7%	23%
Commonwealth of Independent States	0.2%	22%	49%
Europe	15%	29%	64%

<sup>a</sup> Estimate.

Source: [International Telecommunications Union](#).<sup>[11]</sup>



WiMAX" was added in 2005.<sup>[16]</sup> The WiMAX Forum is a non-profit organization formed to promote the adoption of WiMAX compatible products and services.<sup>[17]</sup>

## In use, but moving to other protocols going forward [edit]

### CDMA family [edit]

Further information: *List of Evolution-Data Optimized service providers* and *List of CDMA2000 networks*

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. CDMA2000 EV-DO is no longer being developed.<sup>[18]</sup>

### IEEE 802.20 [edit]

In 2002, the **Institute of Electrical and Electronics Engineers** (IEEE) established a Mobile Broadband Wireless Access (MBWA) working group.<sup>[19]</sup> They developed the **IEEE 802.20** standard in 2008, with amendments in 2010.<sup>[20]</sup>

## See also [edit]

- 3G
- Broadband Internet access
- Digital Britain
- WiFi
- 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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