

1st, 2nd, 3rd, 4th and 5th Generation Cellular Communication

The aim of each different generation development is to improve the speed and capability of the wireless connection. It is only data that is carried by the later generations though, as voice is still mostly carried using 2G technology.

Cellular communication is progressing through different generations. Initially we had first generation (1G), then second generation (2G). This developed into third generation (3G) and now that has advanced into fourth generation (4G) and fifth generation (5G). All of the names refer to the generation of wireless communications that the technology has gone through.

1G - First Generation

This was the first generation of cell phone technology. The very first generation of commercial cellular network was introduced in the late 70's with fully implemented standards being established throughout the 80's.

1G is an analog technology and the phones generally had poor battery life and voice quality was large without much security, and would sometimes experience dropped calls. These are the analog telecommunications standards that were introduced in the 1980s and continued until being replaced by 2G digital telecommunications. The maximum speed of 1G is 2.4 Kbps.

2G - Second Generation

Cell phones received their first major upgrade when they went from 1G to 2G. The main difference between the two mobile telephone systems (1G and 2G), is that the radio signals used by 1G network are analog, while 2G networks are digital. Main motive of this generation was to provide secure and reliable communication channel. It implemented the concept of CDMA and GSM. Provided small data service like sms and mms. Second generation 2G cellular telecom networks were commercially launched in 1991.

During 2G Cellular phones are used for data also along with voice. The advance in technology from 1G to 2G introduced many of the fundamental services that we still use today, such as

- SMS
- internal roaming
- conference calls
- call hold and
- billing based on services e.g. charges based on long distance calls and real time billing.

The max speed of 2G with General Packet Radio Service (GPRS) is 50 Kbps or 1 Mbps with Enhanced Data Rates for GSM Evolution (EDGE).

3G - Third Generation

This generation set the standards for most of the wireless technology we have come to know and love. Web browsing, email, video downloading, picture sharing and other smartphone technology were introduced in the third generation. Introduced commercially in 2001, the goals set out for third generation mobile communication were to facilitate greater voice and data capacity, support a wider range of applications, and increase data transmission at a lower cost.

3G has Multimedia services support along with streaming are more popular. In 3G, Universal access and portability across different device types are made possible (Telephones, PDA's, etc.). 3G increased the efficiency of frequency spectrum by improving how audio is compressed during a call, so more simultaneous calls can happen in the same frequency range. 3G technology is capable of allowing internet speeds that can reach 7 Mbps, but this speed is unrealistic and is often approximately 2 to 3 Mbps.

People felt that the speeds reached by 3G technology were better, but that speed and access could still be improved regarding the internet and mobile devices. This encouraged the development of 4G technology, the 4th generation of mobile communication standard.

4G - Fourth Generation

4G is a very different technology as compared to 3G and was made possible practically only because of the advancements in the technology in the last 10 years. Its purpose is to provide high speed, high quality and high capacity to users while improving security and lower the cost of voice and data services, multimedia and internet over IP. Potential and current applications include;

- mobile web access
- IP telephony
- gaming services
- high-definition mobile TV
- video conferencing
- 3D television, and
- cloud computing

The development of 4G technology provided two main benefits, increased upload and download speeds and reduced latency. 4G technology is approximately five times (and sometimes more) faster than 3G technology. This meant that the speed at which files could be downloaded was significantly increased. This increase in speed meant that files could be downloaded in a much faster time. Typically, with 3G technology, a 2GB file could take approximately 30 minutes to download. However, with 4G technology that download time could be potentially cut to approximately 3–4 minutes. This significantly improved the experience of mobile devices and internet usage for the user.

5G - Fifth Generation

5G is a generation currently under development, that's intended to improve on 4G. 5G promises significantly faster data rates, higher connection density, much lower latency, among other improvements. Some of the plans for 5G include device-to-device communication, better battery consumption, and improved overall wireless coverage.

5G technology is set to dramatically affect the use of mobile internet. In order to provide 5G access there is a major restructure occurring on parts of the radio network that is used to transmit data. This restructure is reported to allow data to be transmitted approximately 100 times faster.

The development from 3G to 4G technology and further developments into 5G technology will enable a number of advancements. These may include:

- greater speed in internet access
- faster loading speeds of applications, such as maps
- the ability to have multiple people in video conferencing calls
- more effective location services to allow for real-time updates, such as traffic and weather
- the ability to stream high-definition (HD).