

# Assignment

Network and telecommunication

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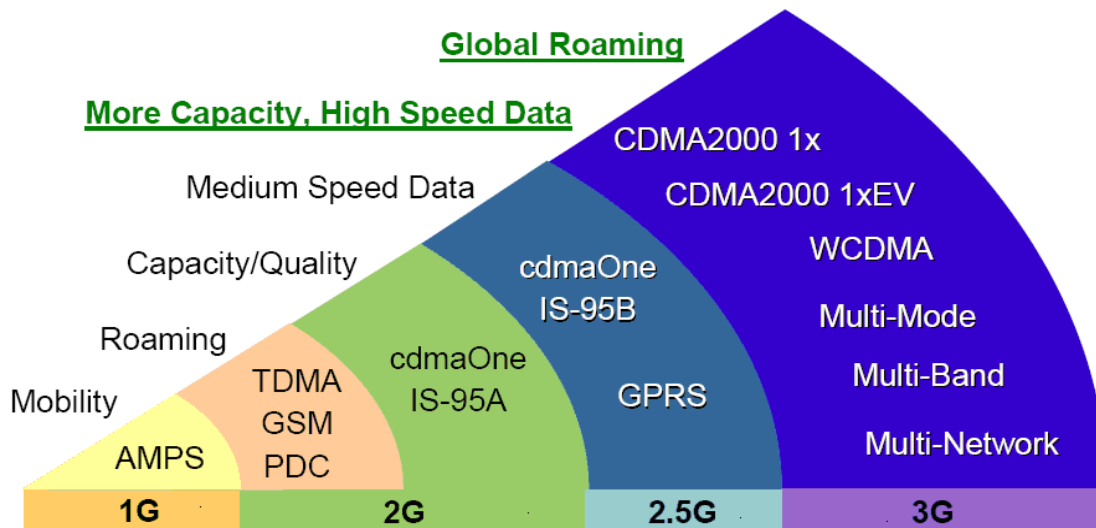
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# 4G ( fourth -generation wireless )

## Mobile Generations – 1G to 4G



### 1G -The first generation

It all started with 1G, the first generation of wireless telephone technology and mobile telecommunications. Introduced sometime in the 1980's, 1G network used analog signals, as opposed to digital signals used by all the successive generations of mobile technologies. In 1G network, voice calls were simply modulated to a higher frequency, typically to 150MHz and up. The first commercially available cellular network using 1G standard was introduced by NTT (Nippon Telegraph and Telephone) in 1979 in Japan.

### 2G-The second generation

The second generation, 2G, was commercially launched for the GSM standard in 1991 by Radiolinja, currently known as Elisa Oyj, in Finland. 2G allowed for enhanced data services and also introduced short messaging service (SMS). Since the introduction of 2G, voice communications were digitally encrypted. This allowed for greater privacy, efficient data transfer and also less expensive equipment. Two revisions or additions to this generation are sometimes referred to 2.5G and 2.75G. The combined introduction of GPRS (General Packet Radio Services) and the usage of CDMAone networks collectively came to be known as 2.5G. GPRS provided data transfer rates from 56-115kbit/s. So, services like WAP (Wireless Application Protocol) and MMS (Multimedia Messaging) were introduced, along with Internet services. 2.75G was the name given to the evolution of EDGE

(Enhanced Data rates for GSM Evolution) or Enhanced GPRS (EGPRS). This was due to the introduction of 8PSK encoding, which facilitated higher data transfer rates of up to 236.8kbits/s, almost triple of the previous rates.

## 3G -The third generation

The third generation, 3G, was introduced by NTT DoCoMo in Japan, in 2001. Although initially limited in scope, it was a leap forward. 3G used completely different radio frequencies from 2G, so it required different equipment to achieve the new high data transfer rates. Also, the enormous costs of additional spectrum licensing fees delayed the introduction of 3G in many countries. 3G data transfer rates are 384kbits/s to 2Mbits/s, so it allows for previously unavailable services like video calls, video conferencing, online conference call, mobile TV, online gaming etc. These speeds are broadband equivalent, so the applications and capabilities are enhanced greatly. Along with these services, 3G provides greater security and privacy. As with 2G, minor evolution of the standards resulted in 3.5G and 3.75G. Again, these standards allowed for higher data transfer rates, exceeding 2Mbits/s, reaching about 14Mbits/s.

## What is 4G?

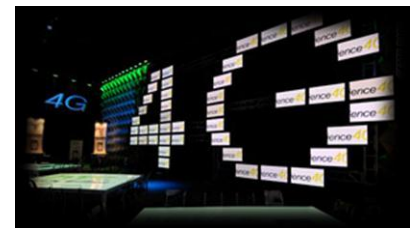
4G technology represents the speed needed for applications like video calling and mobile TV to work quickly. Whilst the mobile Internet tools have improved 3G mobile technology is too slow. 4G wireless and broadband is to step in.

The ITU (International Telecommunication Union) have finally decided on a standard for 4G.

4G represents the fourth generation of mobile wireless standards.

### Planned 4G peak download speeds:

- **100 Mbit/s** = High Mobility comm's (i.e. Cars & Trains)
- **1 Gbit/s** = Low Mobility comm's (such as pedestrians and stationary users).



With increased capacity and speed, with 4G the broadband dongle and modem becomes suitable for ISP's and internet access on home computers. Removing the need for a fixed connection and cabling.

Representing 4G speeds substantially higher than anything on current 3G. Until then, you'll be able to use as much bandwidth as you like so that you can maintain high speeds without your ISP having to slow you down.

Mobile networks in the US

Carriers in the USA, offering 4G services (that may not meet the UK 4G Standard) have adopted different 4G Technology. At the time of writing:

**Sprint:** WiMax technology (5-12Mbps)

**Verizon Wireless:** LTE Long Term Evolution (3-6Mbps)  
**T Mobile:** HSPA+ - 3G with 4G speeds.

## What are the different 4G technologies?

Just as in the 3G world, 4G technologies fork into two broad camps: LTE and WiMax.

They're not aligned with the old GSM vs CDMA split, though. This time, AT&T and Verizon are moving towards LTE, while Sprint has thrown its weight behind WiMax.

There's quite a bit of debate on whether LTE and WiMax meet all the technical requirements to be classified 4G technologies. The International Telecommunications Union suggests that WiMax, the standard that Sprint calls 4G, is actually part of the 3G family, though Sprint markets WiMax as 4G and its speeds are comparable to current LTE speeds.

WiMax has its roots in the wireless broadband access industry and is supported by IEEE, while the LTE standard has been created by a consortium of mobile companies. WiMax requires a new network to be built whereas LTE is an evolution of existing CDMA/HSPA networks.