Survey on Generation of 1G, 2G, 3G,4G, and 5G Mobile Network Comparison

Submitted by

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1G - First Generation

1G mobile wireless communication system is an analog frequency modulation system and the technologies which form the base for this generation are NMT (Nordisk Mobile Telephony), AMPS(Advanced Mobile Phone Service), and CDPD(Cellular Digital Packet Data) [1]. The other standards which have been used in different countries around the world for this technology are listed in [2][3][4].

Features	Corresponding values
Frequency	824 - 894 MHZ(GSM)
Data capacity (speed)	Up to 2.4 KBPS
Technology	Analog wireless
Standard	AMPS, NMT and CDPD
Multiplexing	FDMA
Service	Only voice calls
Main network	PSTN

Table 1: Features of 1G System

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2G - Second Generation

2G uses digital signals when compared to 1G which uses analog signals this technology was launched on the global system for mobile communication (GSM) standard in Finland by Radiolinja in 1991 [5]. The main purpose of the invention of 2G to the world is for voice transmission with digital signals with up to 64 kbps as speed and the demand to manage a large number of calls without any disturbances like interferences and dropped calls in the densely populated countries. This generation was a step ahead when compared to 1G in providing services such as short message services (SMS), picture message services, and Multi-Media Message services (MMS) [6] [7]. Greater penetration intensity of the communication system is possible in this generation. This generation is more efficient when compared to the previous two generations as it provides security for the users (both sender and receivers) [2].

Features	Corresponding values
Frequency	800 MHz, 1900 MHz(CDMA)
Data capacity (speed)	9.6 to 14.4KBPS
Technology	(TDMA)-based GSM
Standard	CDMA,TDMA, GSM
Multiplexing	TDMA, CDMA
Service	Text messages, picture messages, and MMS (multimedia messages)
Main network	PSTN

Table 2: Features of 2G System

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3G - Third generation

3G which was introduced in 2000 is used to denote the third generation of mobile communication and technology is a CDMA-based generation and it supersedes 2G and preceding 4G. This generation system eradicates problems faced in previous generations in particular the low speed and incompatible technologies like TDMA and CDMA [1][2][6].

Features	Corresponding values
Frequency	800 MHz - 2,100 MHz
Data capacity (speed)	7.2 MBPS
Technology	TDMA, CDMA
Standard	IMT-2000
Multiplexing	CDMA,
Service	wireless voice telephony, mobile Internet access, fixed wireless Internet access, video calls, and mobile TV.
Main network	Packet network

Table 3: Features of 3G System

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4G - Fourth generation

The term Fourth-Generation or 4G which is a new version for third and second generation can be used to describe the next complete evolution in wireless communications. [10]. It is a conceptual framework that transmits multimedia data at high speed in a wireless network. It supports about 100 Mbps and 1Gbps in full-mobility and low mobility area coverage [9]. Commercially, this generation of mobile phones provides data transfer rates of 100Mbit/s to 1Gbit/s and spectral bandwidth up to 40MHz which were not available in wired networks [8].

Features	Corresponding values
Frequency	2 - 8 GHz
Data capacity (speed)	200 Mbps - 1 Gbps
Technology	LTE, Wi-Max
Standard	IP, LAN /WAN /PAN
Multiplexing	CDMA,
Service	Amended mobile web access, IP telephony, gaming services, High-definition mobile TV, Video conferencing, and 3D television.
Main network	Internet

Table41: Features of 4G System

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5G Fifth Generation

The 5th generation of mobile network communication is a complete set of wireless communication. At present 5G network is not launched by any companies or standardization bodies, such as 3GPP, WiMAX Forum, or ITU-R. New 3GPP, normal releases beyond 4G, and LTE advanced are in development, but not measured as new mobile generation. We can send data much faster than that of the previous generation of mobile computing. 5G will bring almost perfect real-world wireless or called "WWWW: worldwide wireless web. 5G there is no issue of wireless communication and wearable devices with Artificial intelligence capabilities.[11]

Features	Corresponding values
Frequency	28 GHz and 39GHz
Data capacity (speed)	up to 20 Gbps
Technology	Unified IP and seamless combination of broadband LAN/WAN/PAN and WLAN.
Standard	3GPP
Multiplexing	CDMA
Service	Dynamic Information Access, Wearable devices with IA capabilities
Main network	Internet

Table 5: Features of 5G System

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