Video links

YouTube video links

- Mobile Standards Evolution: FDMA, TDMA (3G), CDMA, OFDMA
- 802.11ac MU-MIMO
- OFDMA vs. MU-MIMO in Wi-Fi 6

2G vs 3G vs 4G vs 5G

Comparison	2G	3G	4G	5G
Introduced in year	1993	2001	2009	2018
Technology	GSM	WCDMA	LTE, WiMAX	MIMO, mm Waves
Access system	TDMA, CDMA	CDMA	CDMA	OFDM, BDMA
Switching type	Circuit switching for voice and packet switching for data	Packet switching except for air interference	Packet switching	Packet switching
Internet service	Narrowband	Broadband	Ultra broadband	Wireless World Wide Web
Bandwidth	25 MHz	25 MHz	100 MHz	30 GHz to 300 GHz
Advantage	Multimedia features (SMS, MMS), internet access and SIM introduced	High security, international roaming	Speed, high speed handoffs, global mobility	Extremely high speeds, low latency
Applications	Voice calls, short messages	Video conferencing, mobile TV, GPS	High speed applications, mobile TV, wearable devices	High resolution video streaming, remote control of vehicles, robots, and medical procedures

Generation	Technology standard	Radio access technology
1G – First Generation	AMPS, NMT, TACS, J-TACS, C-Netz	FDMA
2G – Second Generation	GSM, D-AMPS, IS-95	Combination of TDMA & FDMA, and Narrowband CDMA
3G – Third Generation	UMTS (WCDMA) and CDMA2000	Wideband CDMA and Narrowband CDMA
4G – Fourth Generation	LTE (Long Term Evolution)	OFDMA and SC-FDMA
5G – Fifth Generation	NR (New Radio)	OFDMA

—Technologies used by 1G, 2G, 3G, 4G and 5G—

Commsbrief	1G				2G			3G		4G		5G
Technology standard	AMPS	NMT	TACS	C-Netz	GSM	D-AMPS	IS-95 A	UMTS	CDMA2000	LTE		NR
Digital or not?	Analogue				Digital			Digital		Digital		Digital
Launch year (approx.)	~1980				~1990			~2000		~2010		~2020
Enhancements	Commsbrief				GPRS EDGE		IS-95 B	HSPA HSPA+	EVDO Rev. 0 EVDO Rev. A EVDO Rev. B	LTE-Advanced LTE-Pro	Commsbrief	
Services	Voice only				Voice + SMS + Data (Mobile Internet)							
Peak download speeds	-				GPRS	171.2 kbps		UMTS	2 Mbps	LTE	300 Mbps	10 Gbps
								HSPA	14.4 Mbps			
					EDGE	384 kbps		HSPA+	42 Mbps	LTE-A	1 Gbps	
					IS-95 A	14.4 kbps		CDMA2000	153 kbps			
					IS-95 B	115 kbps		EVDO 0	2.4 Mbps	LTE-Pro	3Gbps	
	Commsbrief							EVDO A	3.1 Mbps			
								EVDO B	14.7 Mbps			

Revision #2
Created 2023-05-22 16:13:52 UTC by bluecrow76
Updated 2023-05-22 16:20:53 UTC by bluecrow76