

# GSM

Cellular radio is the European standard GSM (Global System for Mobile). This system implemented digital methods right from the start in an attempt to accommodate an increasing number of users and establish compatibility with other systems. In addition, GSM provides a wide array of cell areas (from microcells at 200m to macrocells at 35 km) with the possibility of servicing "in-car communications" at up to 250 km/hr. The proposed design would provide the user with data communications via fax, e-mail, and file transfer, in addition to voice. This wide application requirement results in a higher performance demand. Hence, the details of the signaling scheme under the European standard are more complicated than other schemes. In essence, the system uses TDMA and frequency multiplexes the signals. The signals are transmitted using a Gaussian Minimum Shift Keying (GMSK) scheme.

The bandwidth for GSM is a 25 MHz up-link at 890-915 MHz and down-link at 935-960 MHz. The 25 MHz is divided into 125 channels, each of which is 200 kHz wide. Slight spectral spillage is allowed into neighboring channels (which is minimized by GMSK). This separated transmit/receive frequencies scheme under GSM enables easier duplex filtering.

# CDMA

**Code division multiple** access is a channel access method used by various radio communication technologies. One of the basic concepts in data communication is the idea of allowing several transmitters to send information simultaneously over a single communication channel. This allows several users to share a band of frequencies. This concept is called Multiple Access. CDMA employs spread-spectrum technology and a special coding scheme (where each transmitter is assigned a code) to allow multiple users to be multiplexed over the same physical channel. By contrast, time division multiple access (TDMA) divides access by time, while frequency-division multiple access (FDMA) divides it by frequency. CDMA is a form of spread-spectrum signalling, since the modulated coded signal has a much higher data bandwidth than the data being communicated.

An analogy to the problem of multiple access is a room (channel) in which people wish to talk to each other simultaneously. To avoid confusion, people could take turns speaking (time division), speak at different pitches (frequency division), or speak in different languages (code division). CDMA is analogous to the last example where people speaking the same language can understand each other, but other languages are perceived as noise and rejected. Similarly, in radio CDMA, each group of users is given a shared code. Many codes occupy the same channel, but only users associated with a particular code can communicate.

The bandwidth for CDMA is a 20 MHz up-link at 824-844 MHz and down-link at 869-889 MHz. The 20 MHz is divided into 15 channels, each of which is 1.25 MHz wide.

Comparison chart

	CDMA	GSM
Dominance:	Dominant standard in the U.S.	Dominant standard worldwide except the U.S.
Stands for:	Code Division Multiple Access	Global System for Mobile communication
Data transfer:	Faster on EVDO platform which is applicable in CDMA only	GPRS is again very slowforward
Global market share:	18%	82%
Storage Type:	Internal Memory	SIM (subscriber identity module) Card
Network:	There is one physical channel and a special code for every device in the coverage network. Using this code, the signal of the device is multiplexed, and the same physical channel is used to send the signal	Every cell has a corresponding network tower, which serves the mobile phones in that cellular area.

**Spectrum bands designated for various Radio Services:**

S.No.	Types of Services	Radio Frequency Bands
1.	Maritime Radio Navigation	20 KHz-160 KHz
2.	Aeronautical Radio Navigation	160 KHz- 525 KHz
3.	Broadcasting Mobile	525 KHz-1800 KHz
4.	Amateur Services	1800 KHz-2000 KHz 3500KHz -3700 KHz
5.	Maritime fixed/Mobile Services	2000 KHz-2495 KHz
6.	Standard Frequency & Time Signal	2495 KHz -2501 KHz
7.	Aeronautical Mobile Services	2501 KHz-3000 KHz
8.	Broadcasting Services	3 MHz-30MHz
9.	TV Broadcasting Services	30 MHz-SO MHz
10.	FM Broadcasting Services	88 MHz-I08 MHz
11.	Digital Audio Broadcasting	175 MHz-230 MHz
12.	Short Range Radio Services	350-351 MHz
13.	Trunking Services	338-400 MHz
14.	Digital TV Broadcasting Services	400 MHz- 800 MHz
15.	Trunking Services	800 MHz-824 MHz
16.	CDMA based Mobile Services	824-844 MHz/ 869-889 MHz
17.	GSM based Mobile Services	890-915 MHz/ 935-960 MHz 1710-1785 MHz/1805-1880MHz
18.	Aeronautical Radio Navigation	960-1500 MHz
19.	Satellite Services	1500 MHz-1710 MHz
20.	IMT (3G Services) IMT "	1920-1980MHz/2110-2170MHz
21.	Broadband Wireless Access Services	2300 MHz - 2400 MHz 3300 MHz - 3400 MHz
22.	Meteorological Satellite Services	2535 MHz- 2655 MHz
23.	Satellite Services	5 GHz- 14.5GHz
24.	Terrestrial Microwave Services	14.5 MHz- 23.6 GHz
25.	Space Research (Space to Earth}	30GHz-40 GHz

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