

CDMA

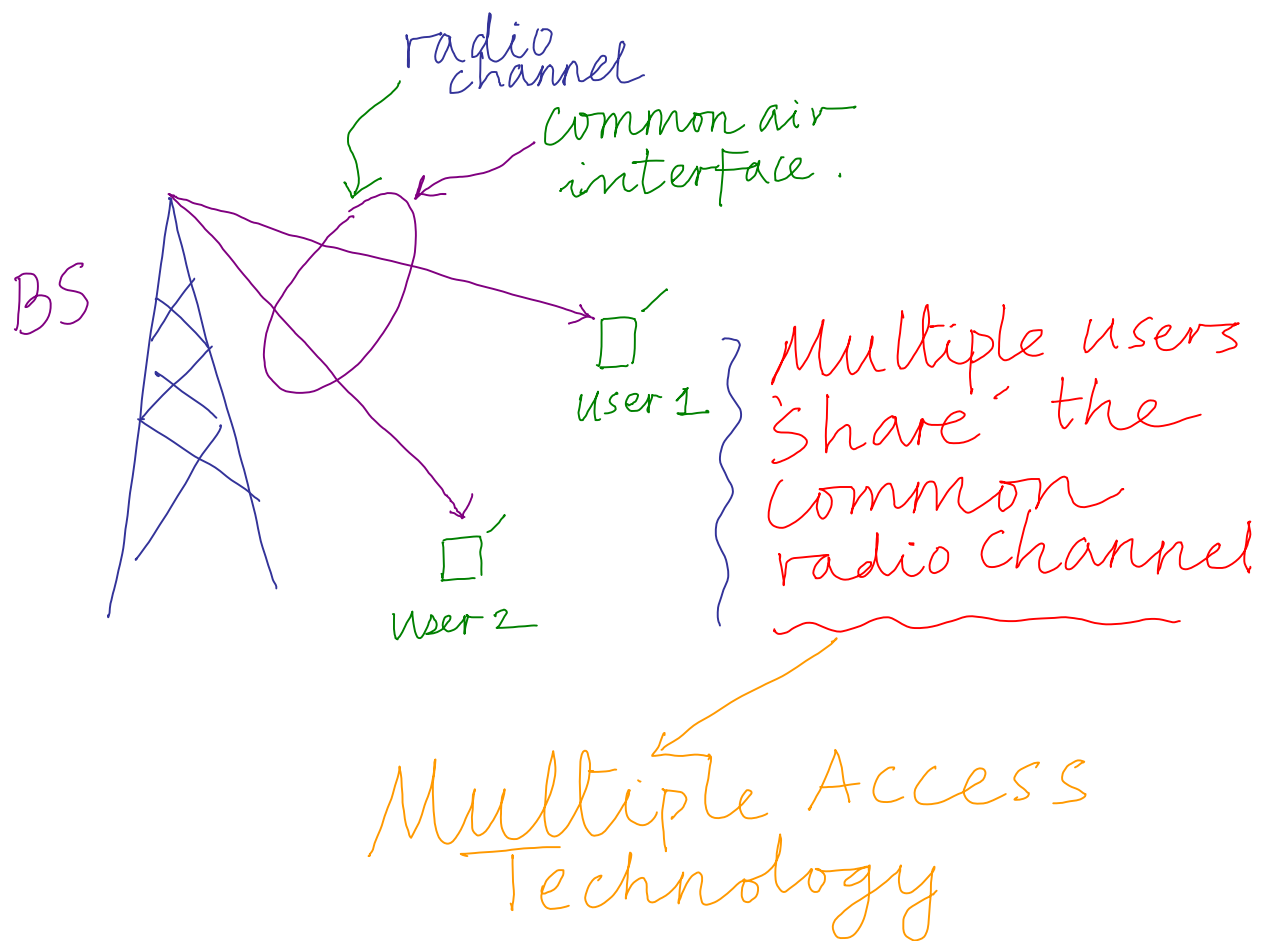
= Code Division For
Multiple Access.

CDMA:

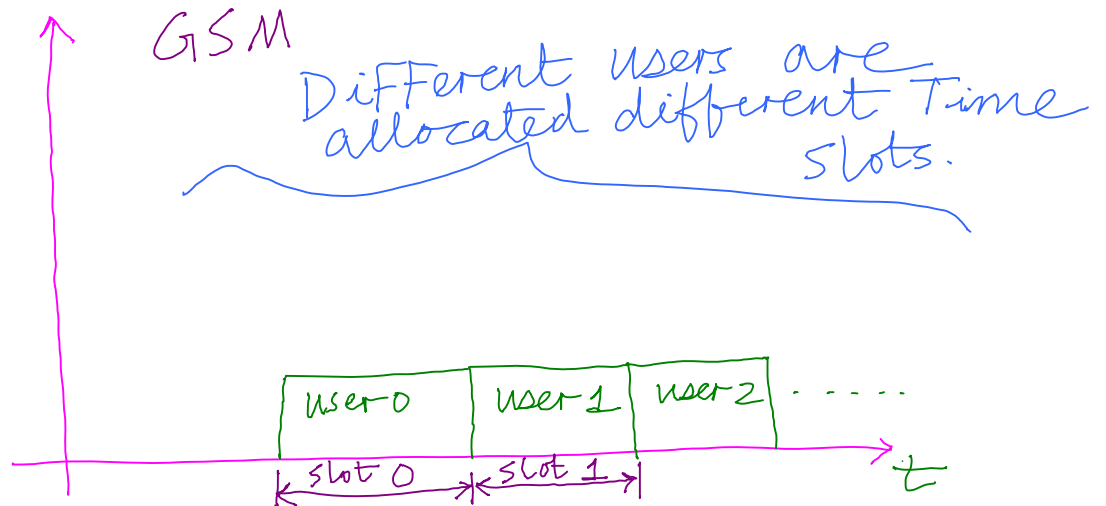
- WCDMA
- HSDPA/HSUPA
- CDMA 2000
- 1xEVDO

} 3G
Wireless
Systems

CDMA: Is a
Multiple Access
Technology.

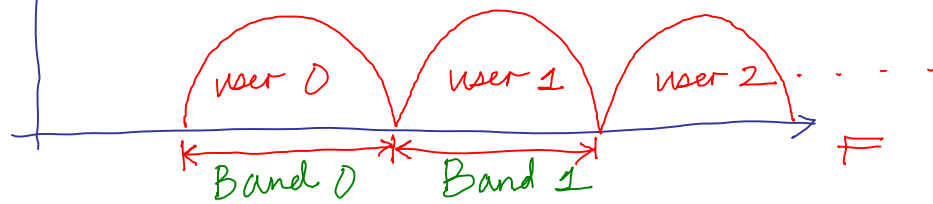


TDMA = Time Division For Multiple Access.



FDMA = Frequency Division
For Multiple Access.

Different users are allocated
Different Frequency Bands



Used in 1st Generation
of wireless systems.

CDMA — Different users
are allocated
Different codes.



Uses CODES For
Multiple Access.

2 users ——— user 0
 \ user 1

$$C_0 = [1, 1, 1, 1]$$

$$C_1 = [1, -1, -1, 1]$$

a_0 = symbol of user 0

a_1 = symbol of user 1

Multiply symbol of each user
with respective code

$$\begin{aligned} a_0 \times C_0 &= a_0 \times [1, 1, 1, 1] \\ &= [a_0, a_0, a_0, a_0] \end{aligned}$$

$$\begin{aligned} a_1 \times C_1 &= a_1 \times [1, -1, -1, 1] \\ &= [a_1, -a_1, -a_1, a_1] \end{aligned}$$

Combined signal is generated
as the sum,

$$= a_0 \times c_0 \\ + a_1 \times c_1$$

$$= [a_0, a_0, a_0, a_0]$$

sum
signal.

$$+ [a_1, -a_1, -a_1, a_1]$$

$$= [a_0 + a_1, a_0 - a_1, a_0 - a_1, a_0 + a_1]$$

Sum signal is transmitted
over the common radio
channel.

From this sum signal each
user has to extract his
corresponding symbol.

User 0 correlates with c_0
ie multiplies element by
element and sum.

$$\begin{array}{cccc} c_0 & 1 & 1 & 1 & 1 \\ & \times a_0 + a_1 & \times a_0 - a_1 & \times a_0 - a_1 & \times a_0 + a_1 \\ \hline & (a_0 + a_1) & + (a_0 - a_1) & + (a_0 - a_1) & + (a_0 + a_1) \\ & = \underline{4a_0} & & & \end{array}$$

symbol of user 0.

User 1:

$$C_1 : \begin{array}{cccc} 1 & -1 & -1 & 1 \\ \times a_0 + a_1 & \times a_0 - a_1 & \times a_0 - a_1 & \times a_0 + a_1 \end{array}$$

$$a_0 + a_1 + (a_1 - a_0) + (a_1 - a_0) + a_0 + a_1$$

$$= 4a_1$$

user 1 is able to
extract or recover
symbol a_1 .

Therefore, this is termed as
Code Division For multiple Access

CDMA.