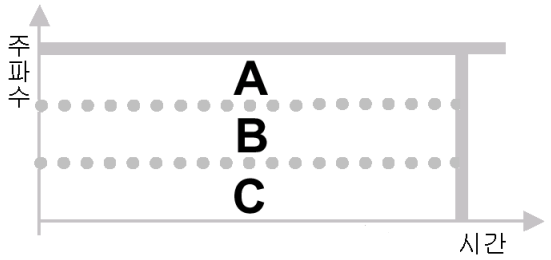
Multiple Access & Duplex

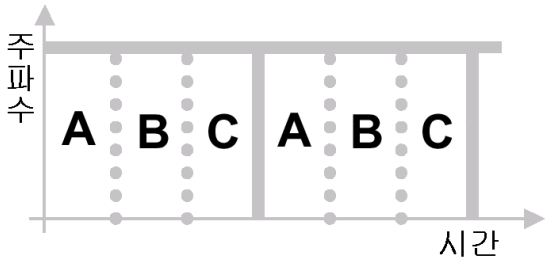
Multiple access

- FDMA
- TDMA
- CDMA
- OFDMA
- MC-CDMA
- Multicarrier DS-CDMA

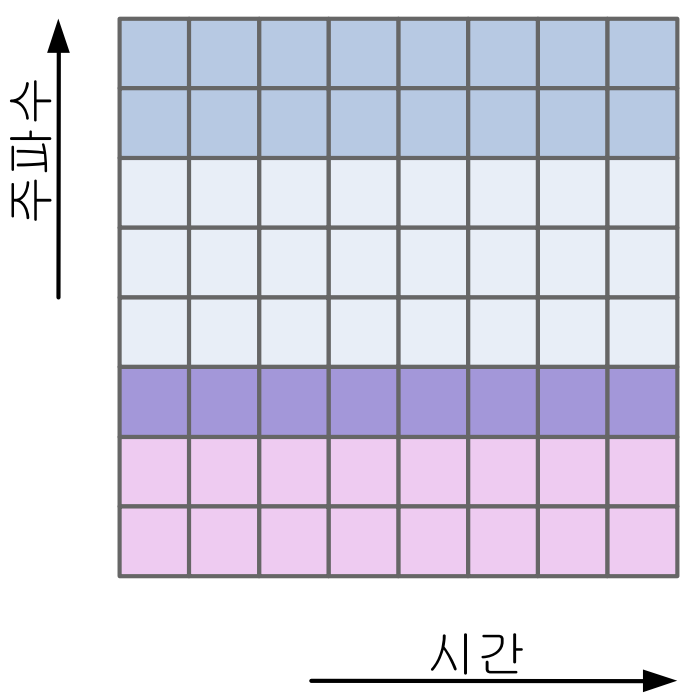
다중접속

- 주파수분할 다중접속 (FDMA)
- 시분할 다중접속 (TDMA)
- 부호분할 다중접속 (CDMA)
- OFDMA

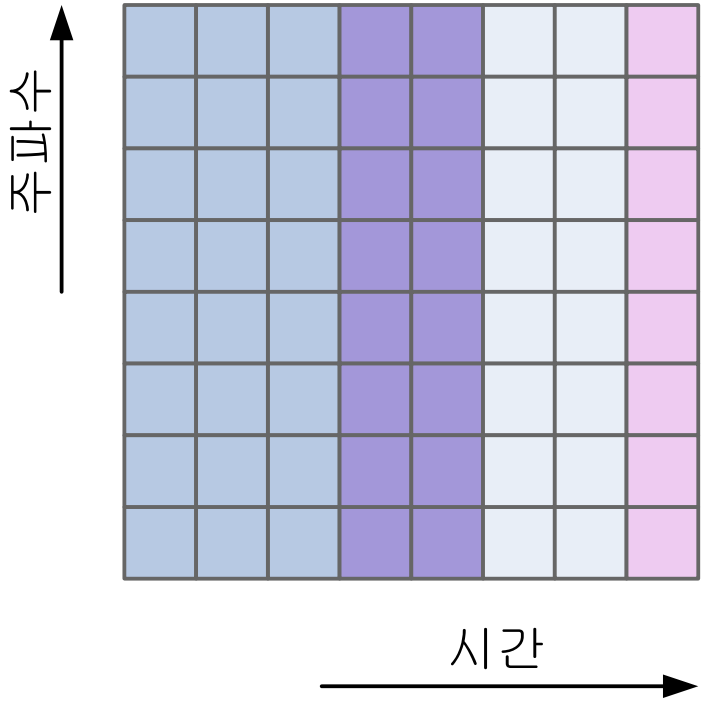




OFDMA



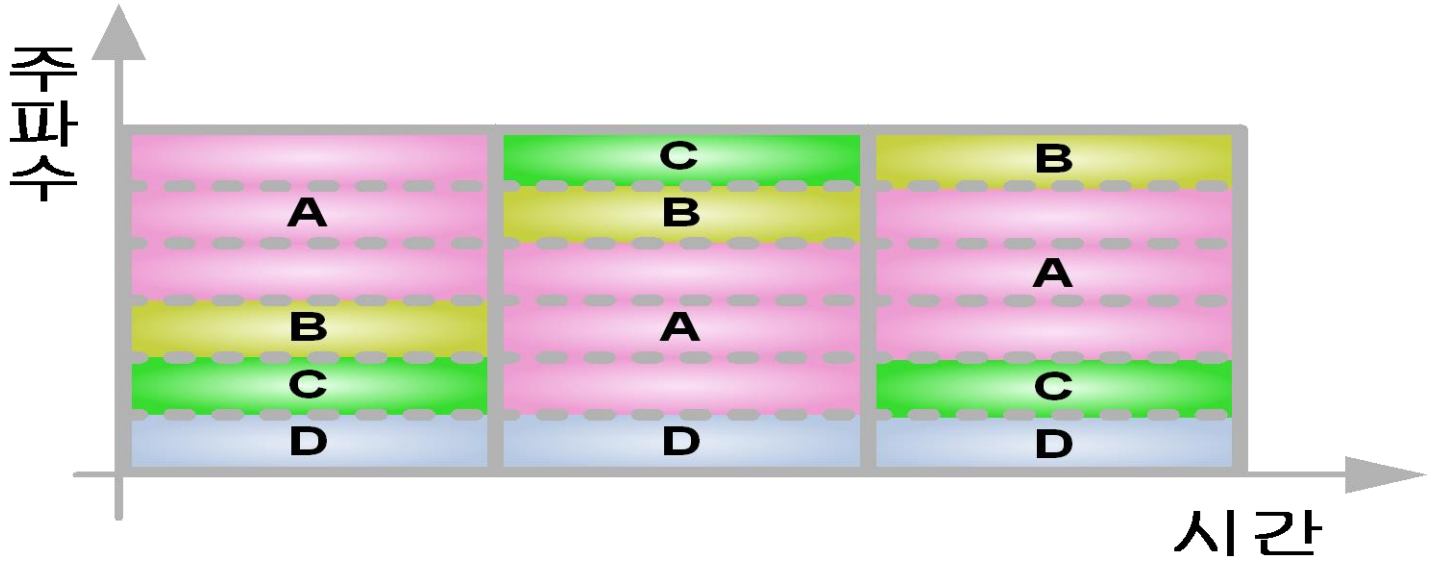
주파수 분할 이용



시분할 이용

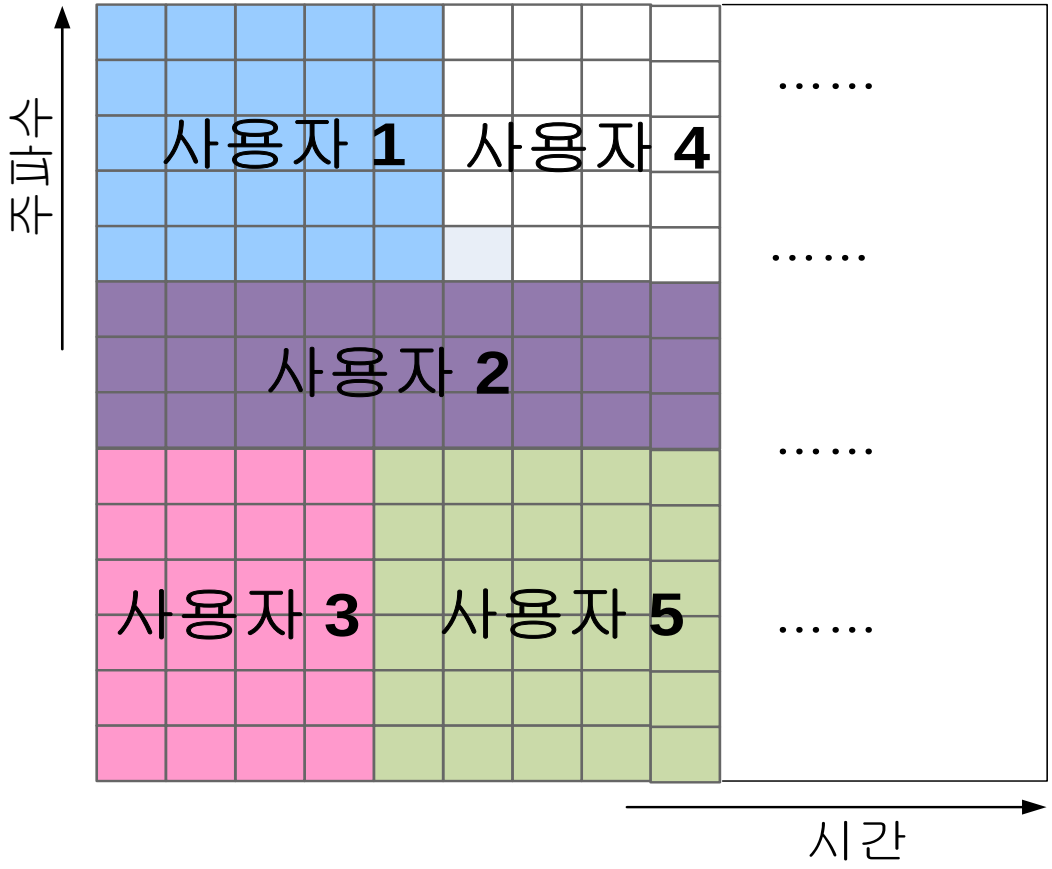
J. Jang and K. B. Lee, "Transmit Power Adaptation for Multiuser OFDM Systems, " IEEE Journal on Selected Areas in Communications , pp. 171-178, Feb. 2003

Orthogonal Frequency Division Multiplexing Access (OFDMA)

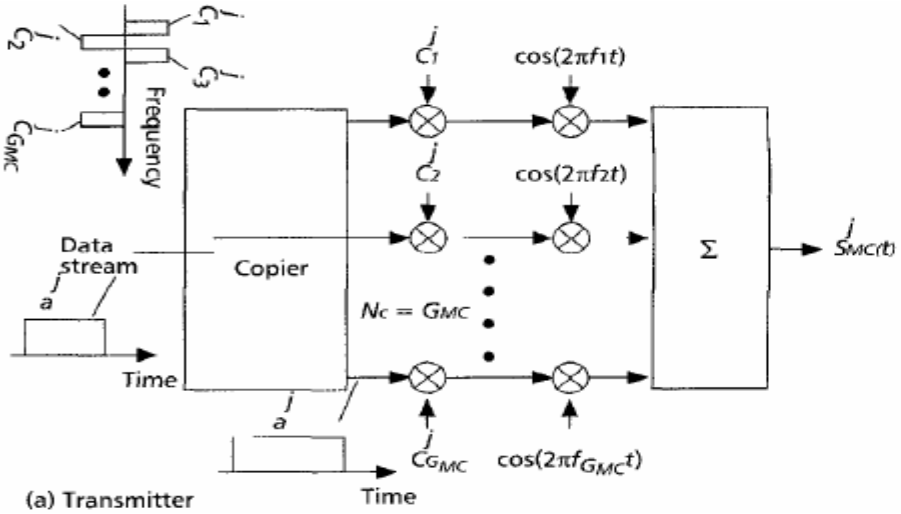


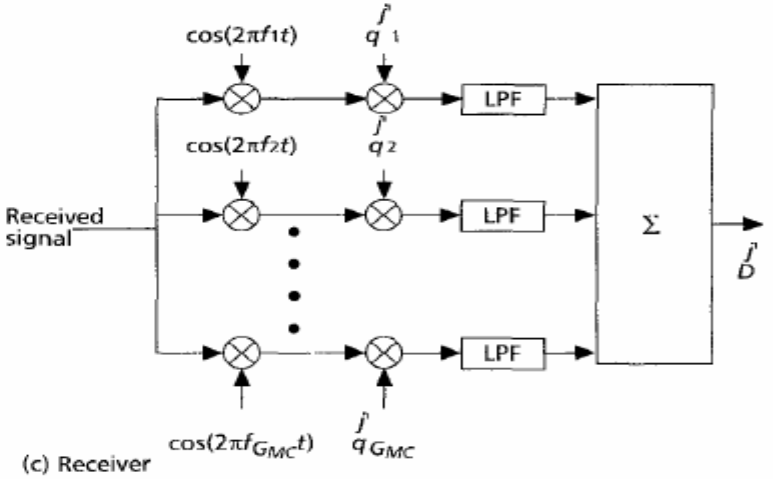
LTE & WiBro

- 물리계층의 다운링크 프레임 구조



MC-CDMA





$\{ c_1^j, c_2^j, c_3^j, \cdots, c_{MC}^j \}$: j-th user's code

- 두 사용자의 신호가 *i* 번째 수신기에 도착한 경우

$$\sum_k \left(d_i \cdot c_k^i + d_j \cdot c_k^j \right) c_k^i = d_i + d_j \sum_k c_k^j c_k^i$$

- Reference : Overview of Multicarrier CDMA, Shinsuke Hara, Ramjee Prasad, IEEE Comm magazine, Dec, 1997

문제점: fading에 의한 amplitude와 phase 변화가 subcarrier별로 다를 수 있슴

다른 두 경우:

Downlink: 여러 사용자 신호가 같은 채널을 통해서 i번째 수신기에 도착

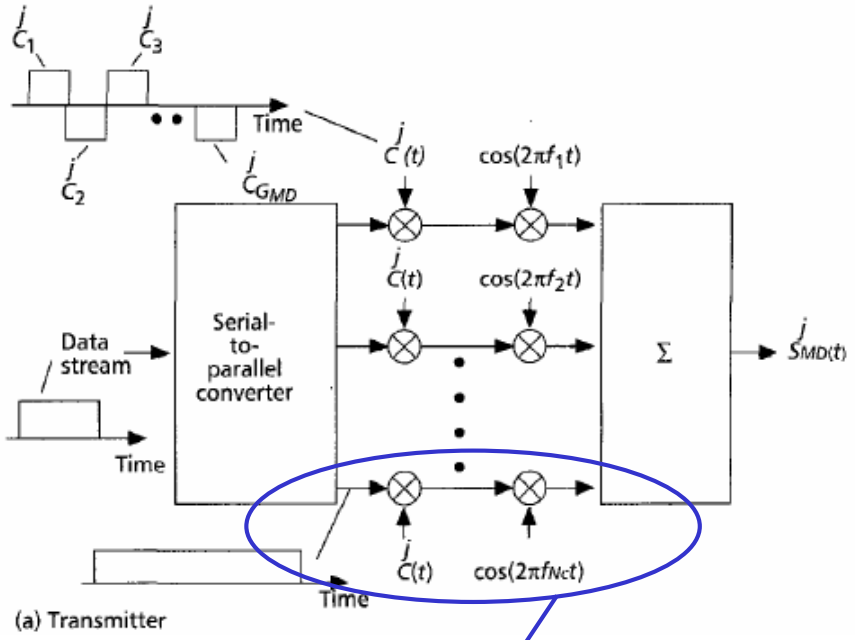
Uplink: 여러 사용자 신호가 다른 채널을 통해서 기지국에 도착

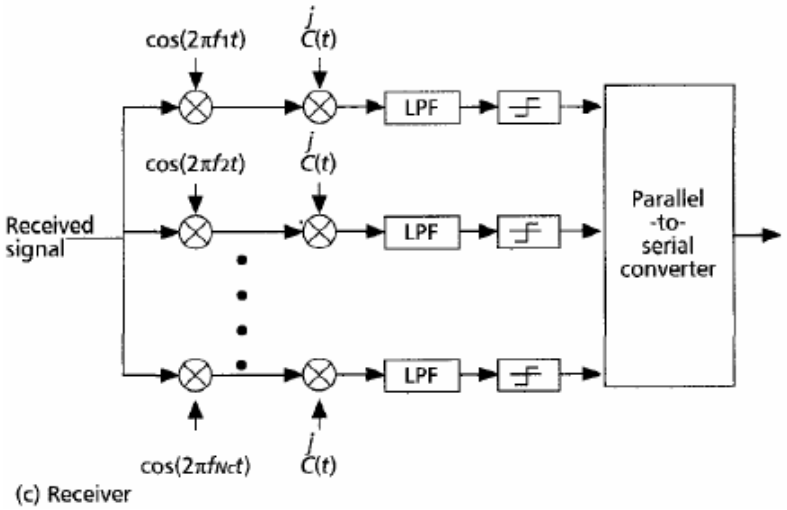
- Channel response가 고려된 경우

$q_m^i = c_m^i \, z_m^* \Big/ |z_m|^2$, z_m : ch response of the mth sub carrier

- Reference : Overview of Multicarrier CDMA, Shinsuke Hara, Ramjee Prasad, IEEE Comm magazine, Dec, 1997

Multicarrier DS-CDMA





DS-CDMA

Duplex

- FDD (Cellular, PCS, …)
- TDD (WiBro….)