ECS455: Chapter 6

Applications

6.2 WiMAX

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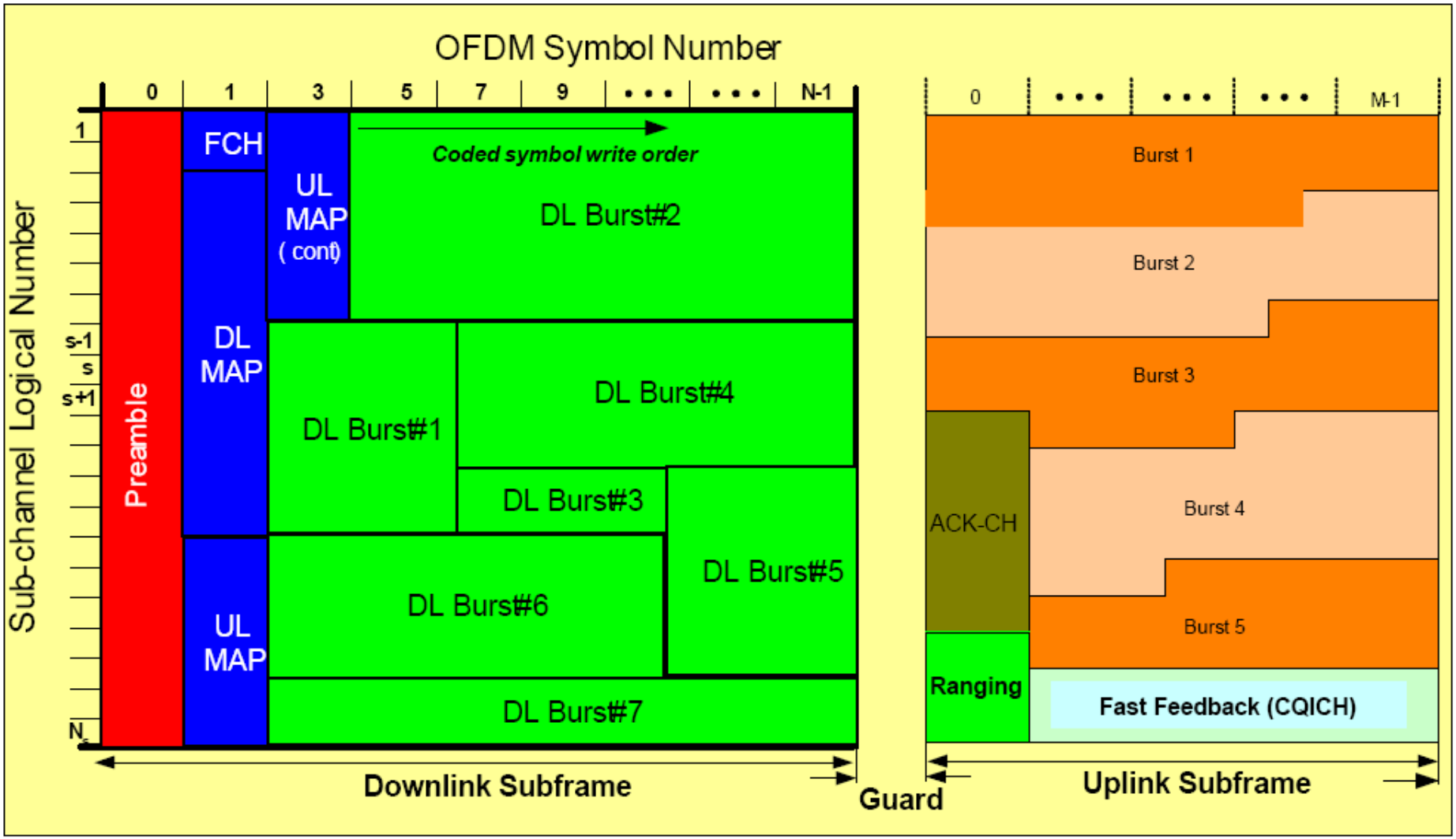
Office Hours:
BKD 3601-7

Tuesday	**9:30-10:30**
Tuesday	**13:30-14:30**
Thursday	**13:30-14:30**

WiMAX OFDMA Frame Structure (TDD)



ECS455: Chapter 6

Applications

6.3 LTE

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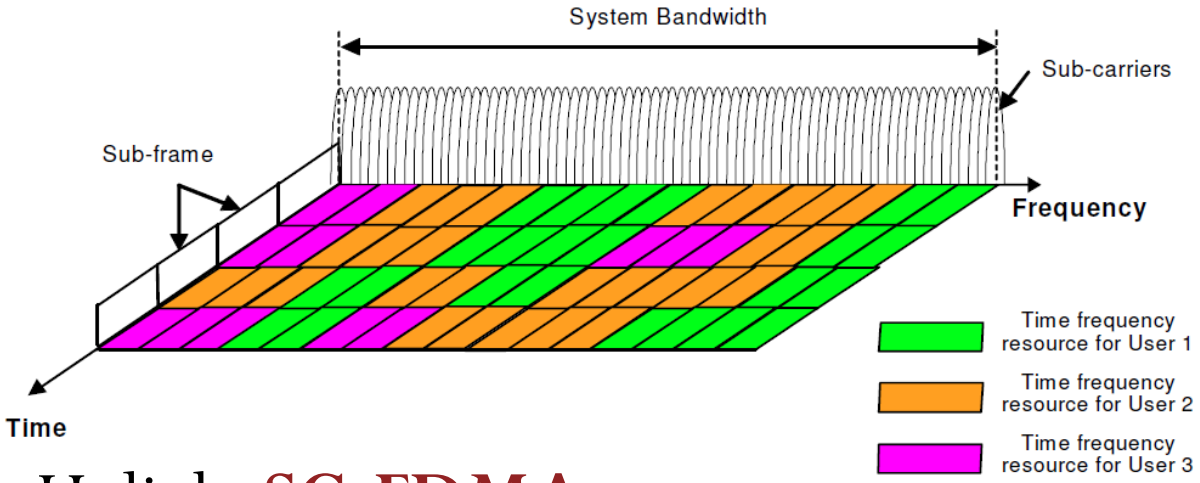
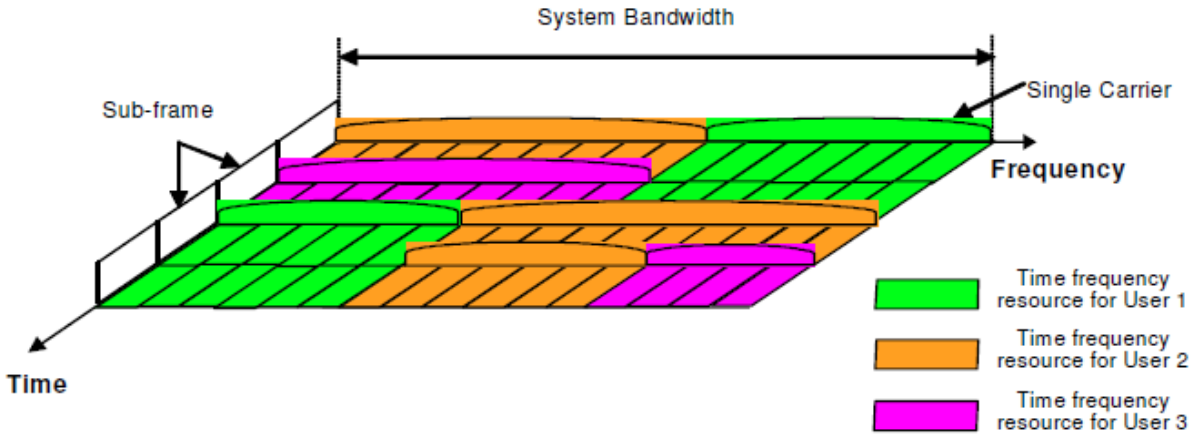
LTE: Multiple Access

- Downlink: **OFDMA**

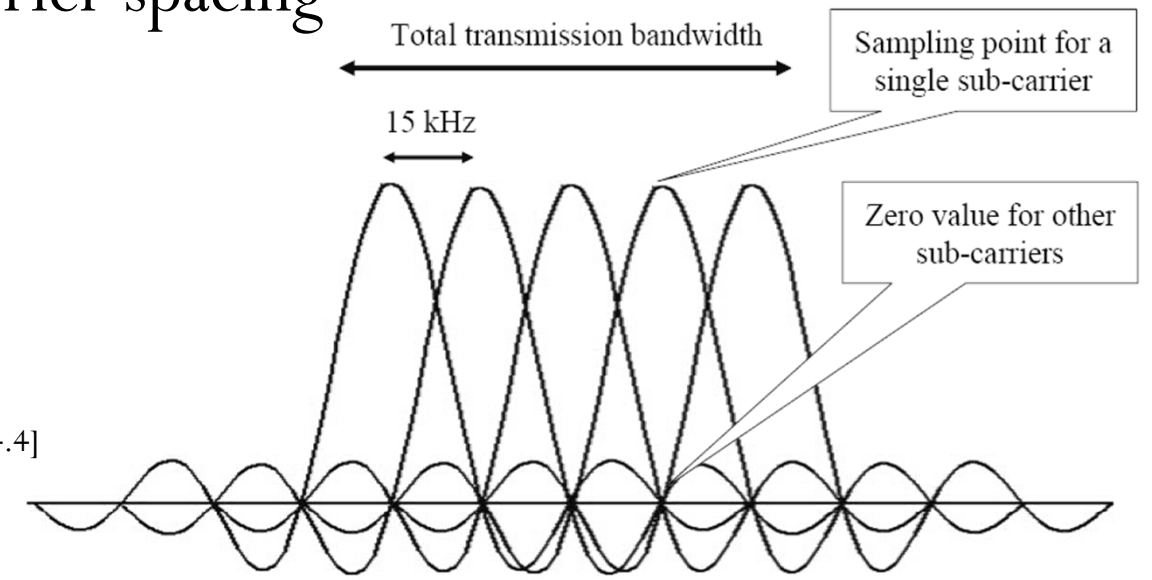


- Uplink: **SC-FDMA**



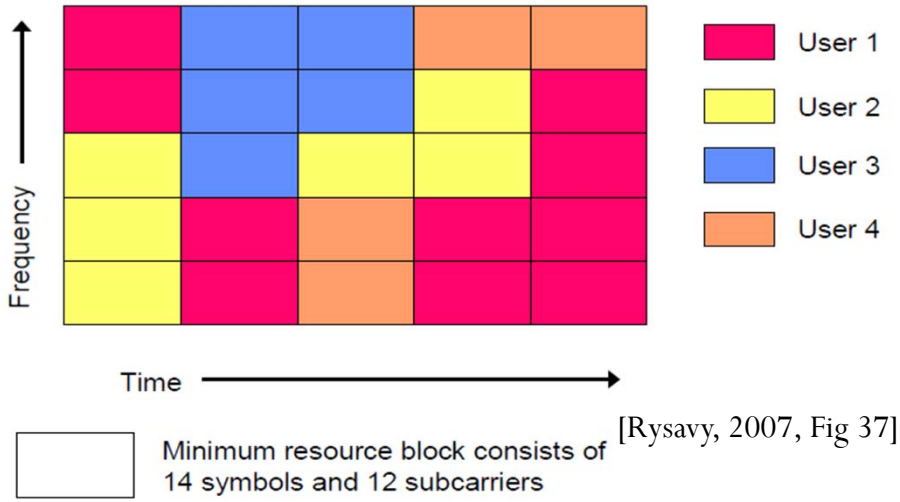
LTE: OFDMA

- 15 kHz subcarrier spacing



[Holma and Toskala, 2009, Fig 4.4]

- Downlink Resource Assignment in Time and Frequency



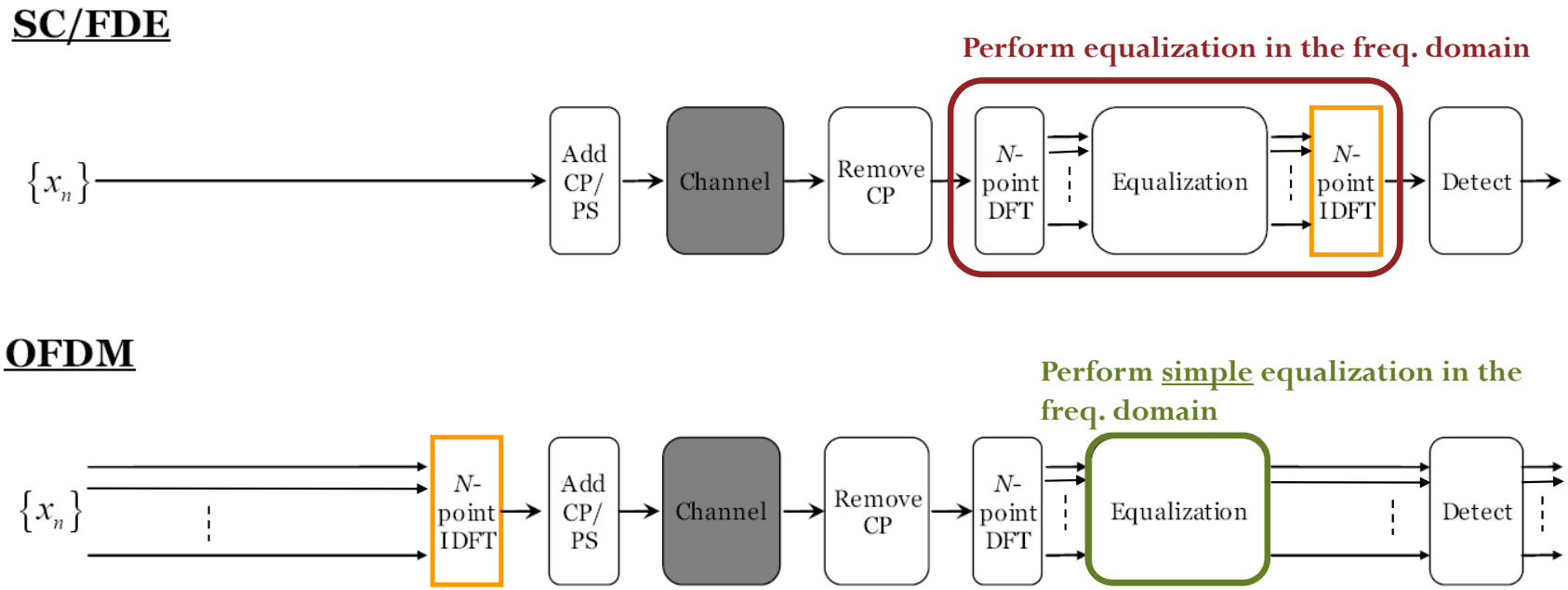
[Rysavy, 2007, Fig 37]

SC/FDE

- Broadband multipath channels.
- **Conventional time domain equalizers are impractical** because of the complexity (very long channel impulse response in the time domain).
- Frequency domain equalization (FDE) is more practical.
- **Single Carrier with Frequency Domain Equalization** (SC/FDE)
  - Another way to fight the frequency-selective fading channel.
  - Deliver performance similar to OFDM with essentially the same overall complexity, even for long channel delay

SC/FDE (2)

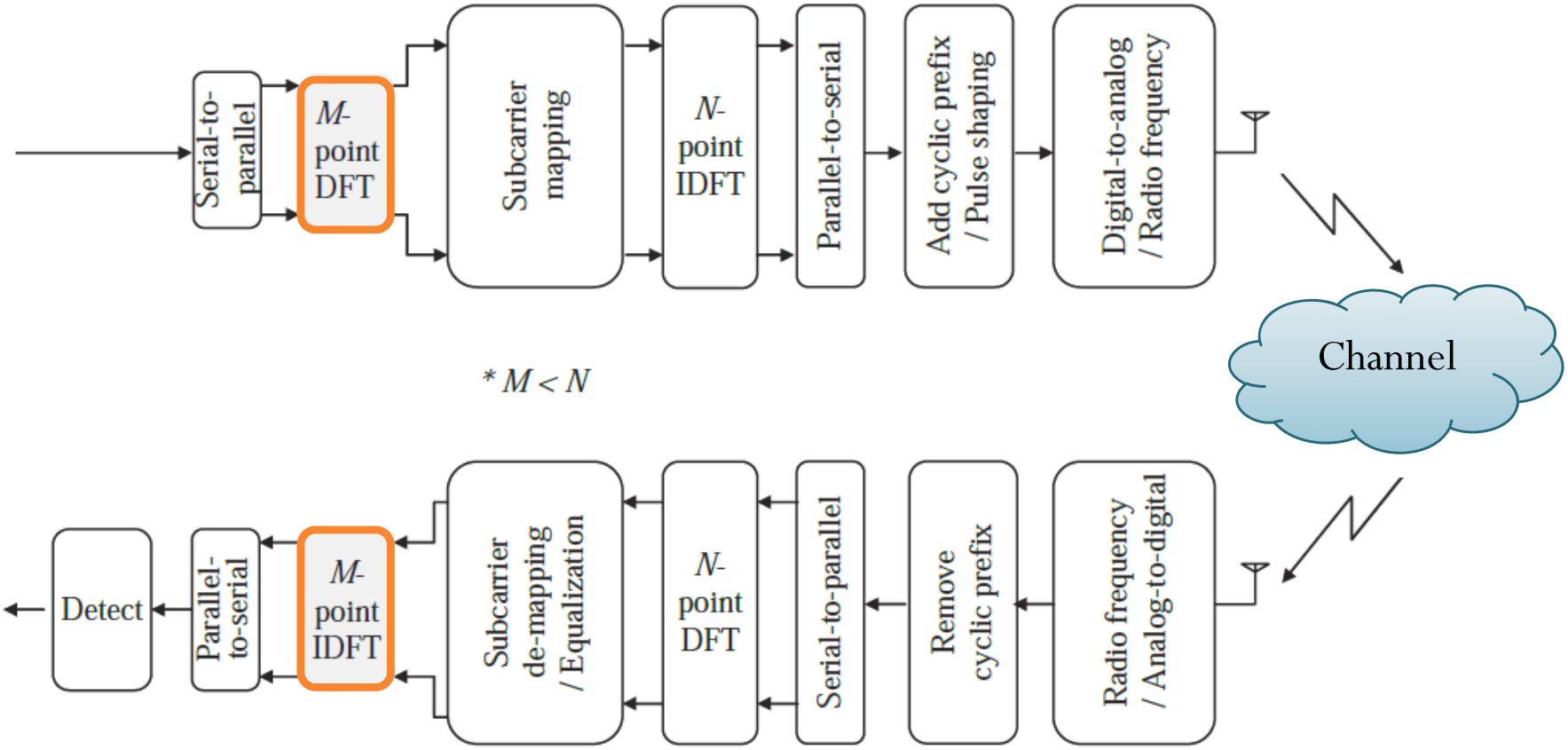
- SC/FDE receiver transforms the received signal to the frequency domain by applying DFT and does the equalization process in the frequency domain.
- Most of the well-known time domain equalization techniques, such as minimum mean-square error (MMSE) equalization, decision feedback equalization, and turbo equalization, can be applied to the FDE



[Myung, 2007, Fig. 2.3]

SC-FDMA

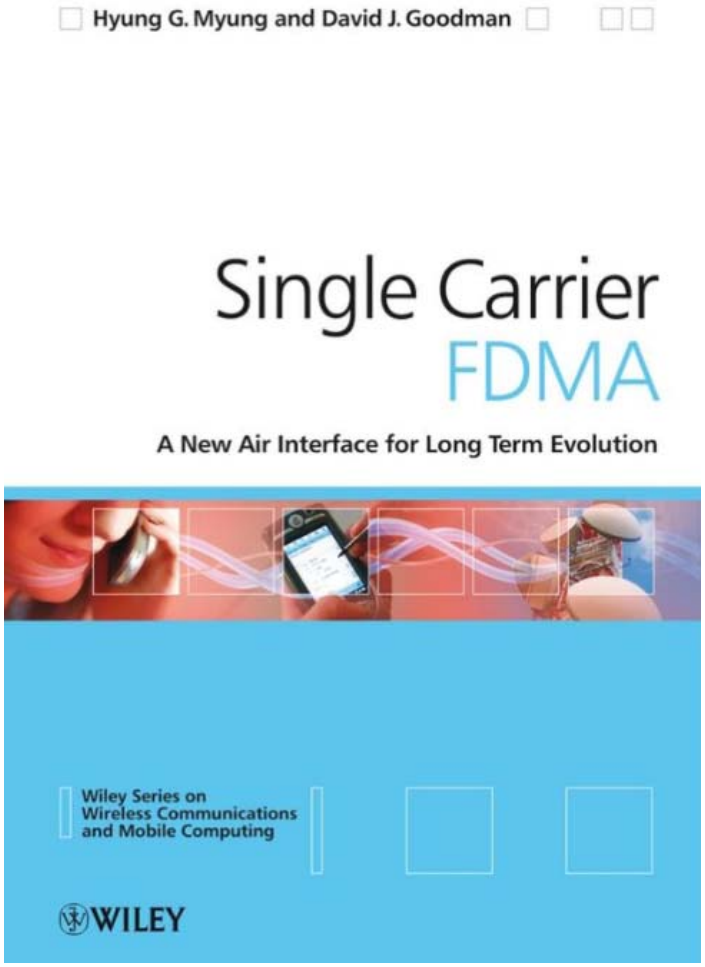
Single carrier FDMA is an extension of SC/FDE to accommodate multi-user access.



SC-FDMA: □ + □

OFDMA: □

Reference for SC-FDMA



H.G. Myung and D.J. Goodman, *Single Carrier FDMA: A New Air Interface for Long Term Evolution*, Wiley, 2008.