

# Introduction to 4G-LTE Synchronization

Department of Electrical Engineering

曾柏翔

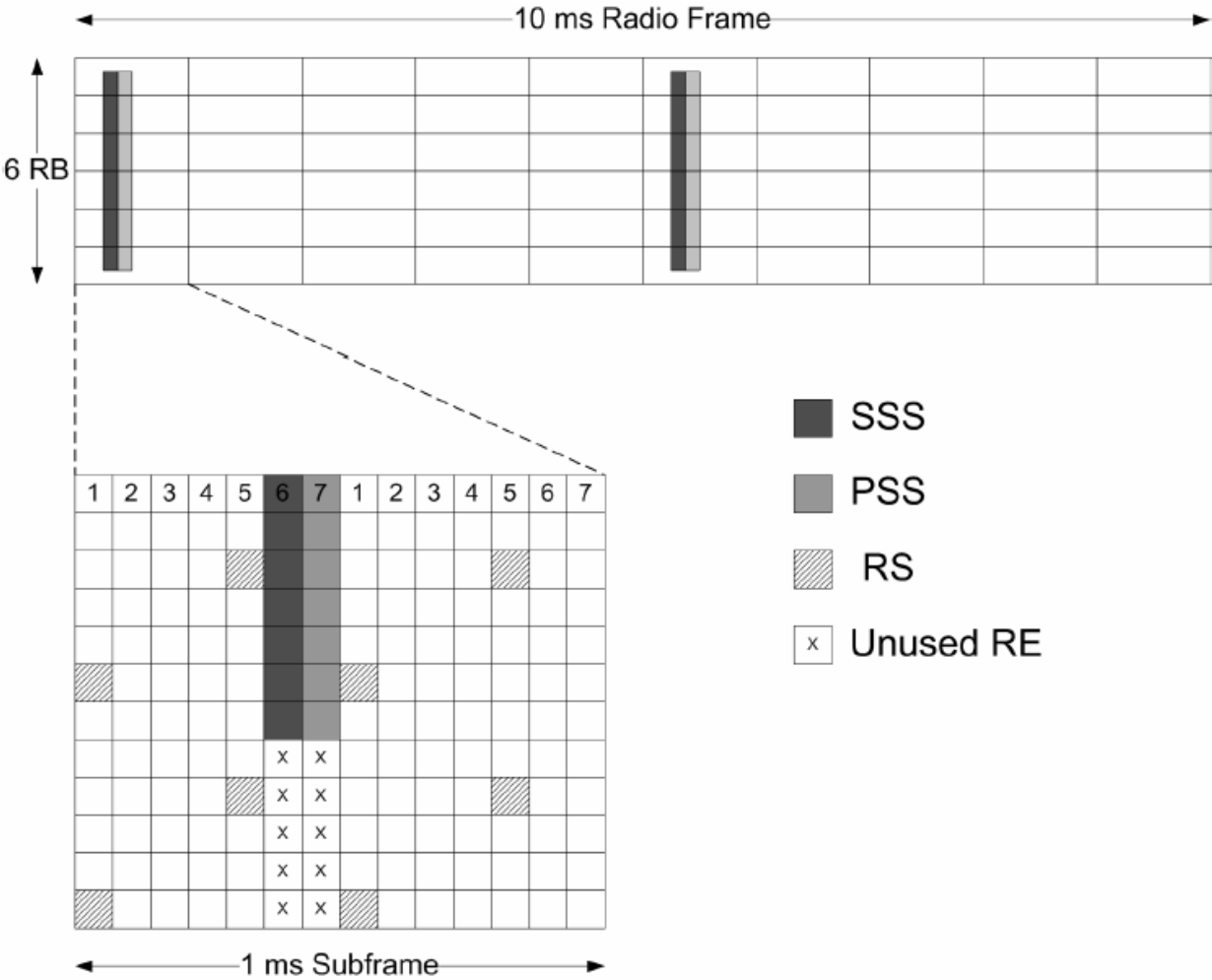
# Introduction to LTE and Synchronization

- 3GPP Long Term Evolution, usually referred to as LTE, is a standard for wireless communication of high-speed data for mobile phones and data terminals.
- In LTE a terminal must perform some certain steps before it receives or transmits data. After these steps called initial access procedure the terminal is able to receive and transmit its user data.

# Introduction to LTE and Synchronization

- Cell Search is the first thing that happens in the access procedure.
- After cell search, the user can get information of the base-station and synchronizes with it.
- PSS(Primary Synchronization Signal) and SSS(Secondary Synchronization Signal) are the important signals which broadcast from the cell periodically and they can offer some useful information to user.

# Positions of PSS and SSS in LTE Frame



# Decoding the Synchronization Signals

- For a 3GPP LTE receiver, cross-correlation needs to be performed to estimate cell identity, time and frequency synchronization error.
- After decoding the synchronization signals, the user finishes the initial synchronization and can establish the connection to the base-station.

# Simulation by MATLAB

- Performing cross-correlation between two signals.
- The appearance of high peak means two signals get synchronizations to each other.

