

# Communication Systems Design

## Lab 7: LTE-Cell-Scanner

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## 前沿通信系统设计 (32学时)

### 1 WiFi通信系统 (9周)

实验目标: 利用USRP实现802.11a/n图像传输

软件: MATLAB, 硬件: USRP

授课内容: MATLAB通信编程、USRP文本传输、MIMO系统、802.11a/n仿真、802.11a/n图像传输

### 2 5G/4G-LTE系统 (4周)

实验目标: 利用USRP实现LTE图像传输

软件: MATLAB, 硬件: USRP

授课内容: 小区搜索过程、MIB/SIB解码过程、LTE图像传输、基于数据预录的图像恢复、数据集制作

### 3 课程项目5选1 (3周)

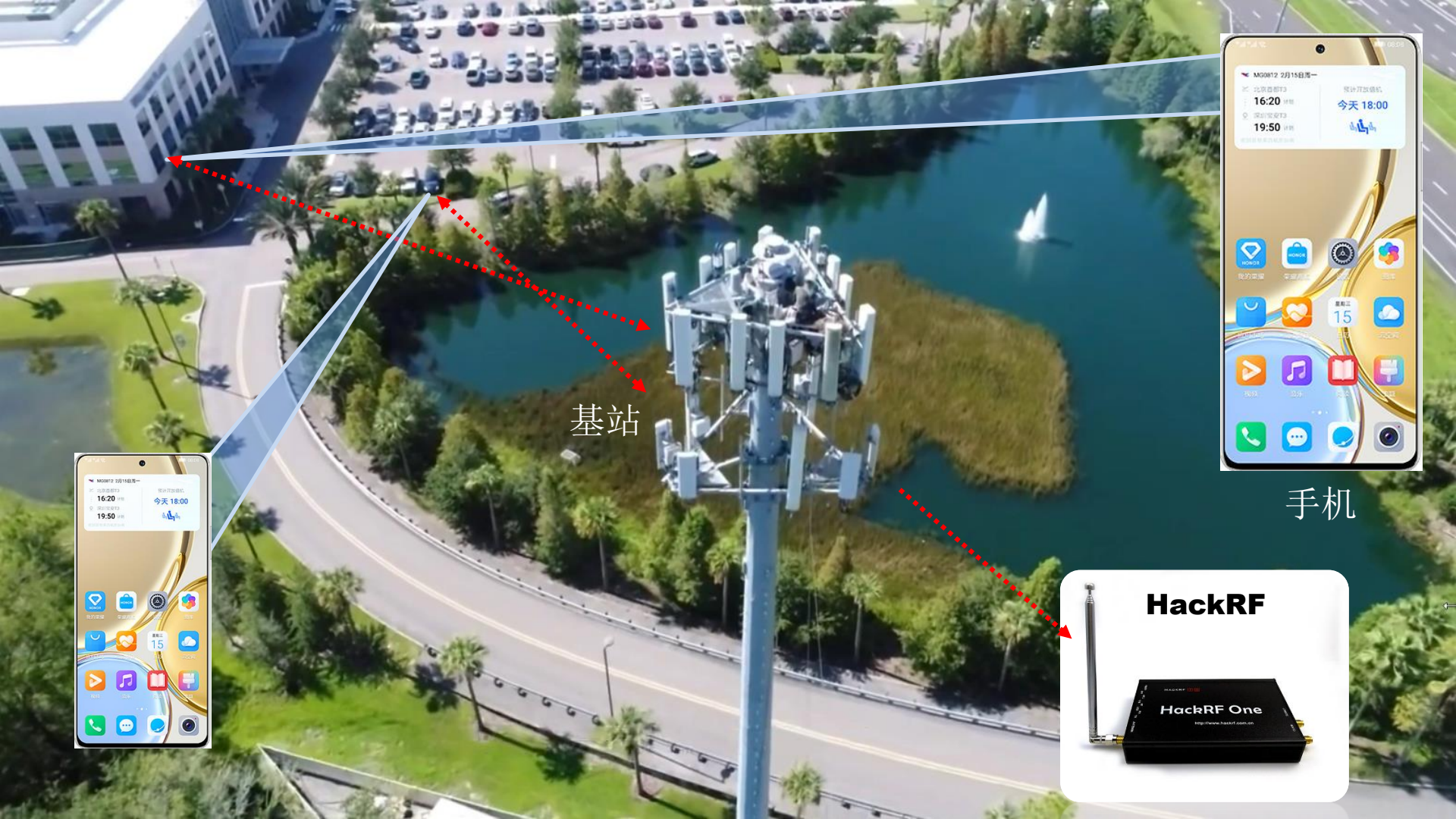
WiFi: 基于USRP的802.11b协议验证平台的搭建, 要点: 利用USRP实现期中WiFi仿真项目

LTE: 基于HackRF的LTE基站扫描、小区搜索和系统信息解码, 要点: 参考开源项目, LTE-Cell-Scanner

雷达感知系统: 基于KerberosSDR的无线测向系统, 要点: 利用树莓派和KerberosSDR实现MUSIC算法

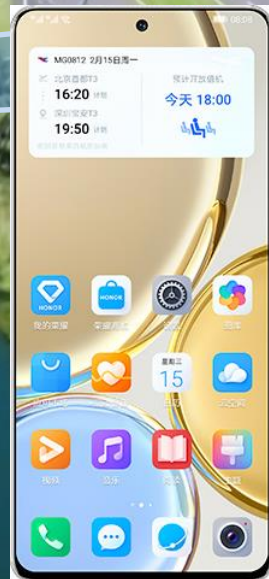
无线传感器网络: 无线网络节点定位系统, 要点: 短距离无线信道建模, 利用无线节点MICAz实现质心定位

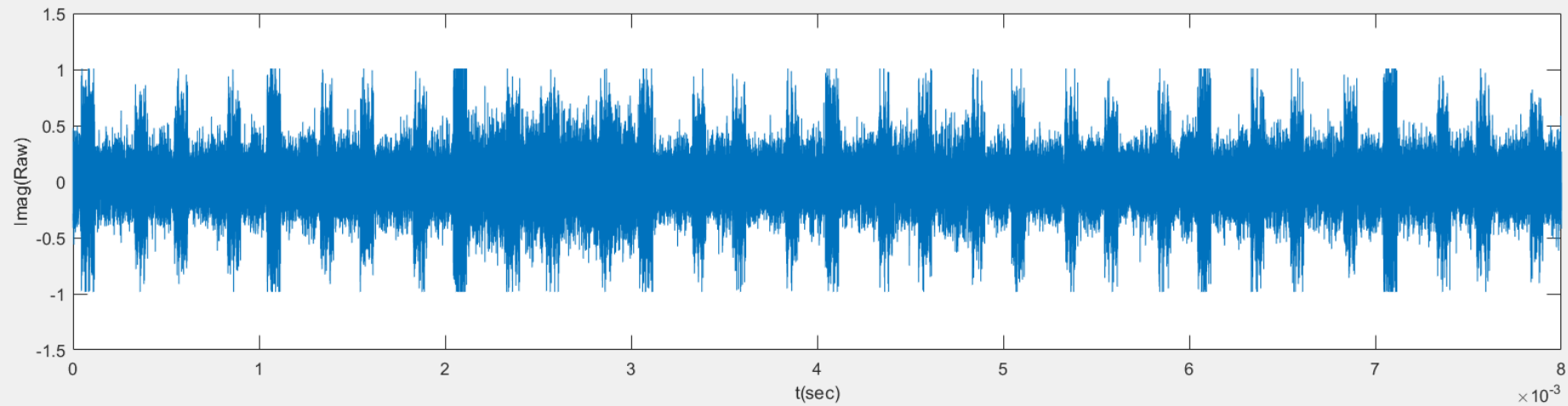
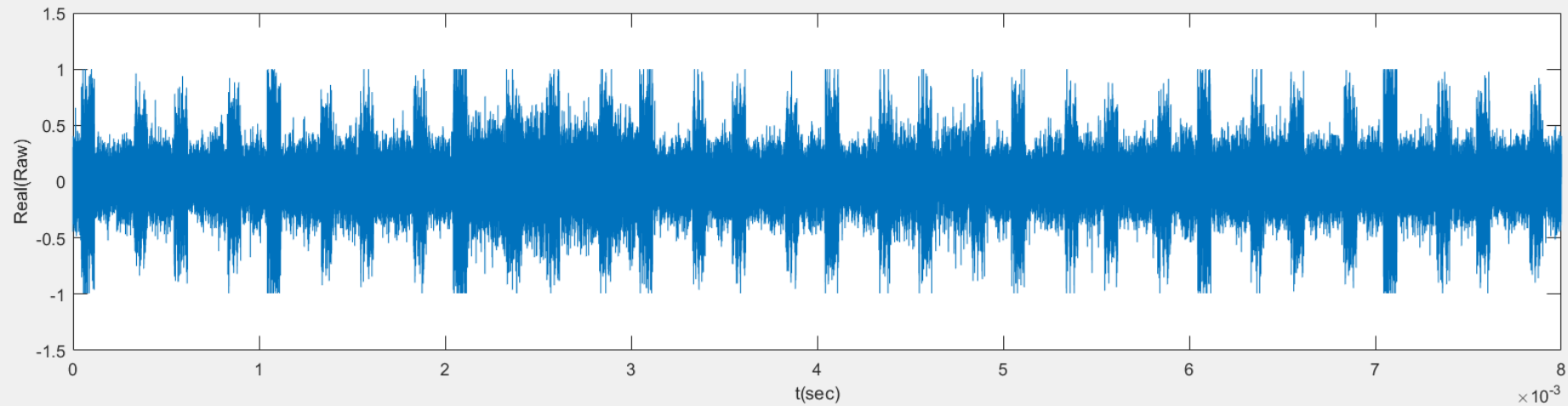
运动检测系统: 基于通信信号的运动检测系统, 要点: 根据给定的数据, 实现基于4G-LTE信号的人体运动检测



基站

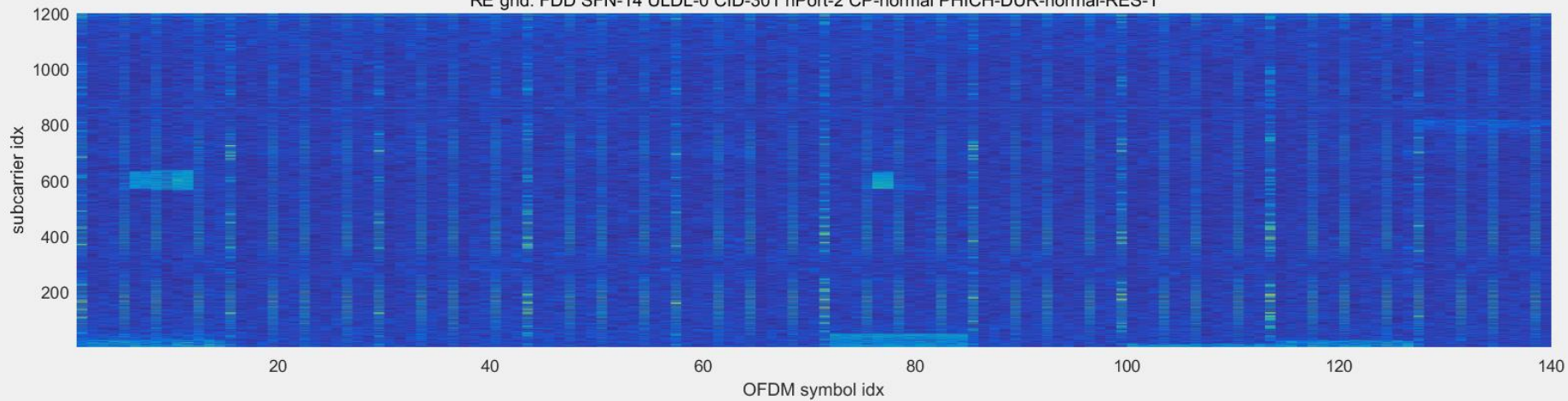
手机



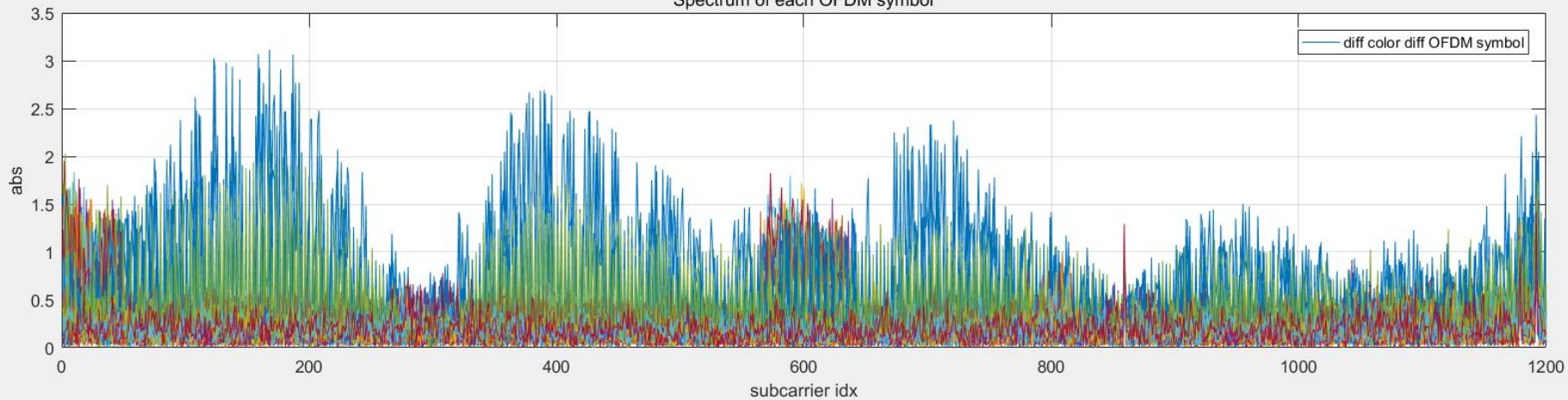


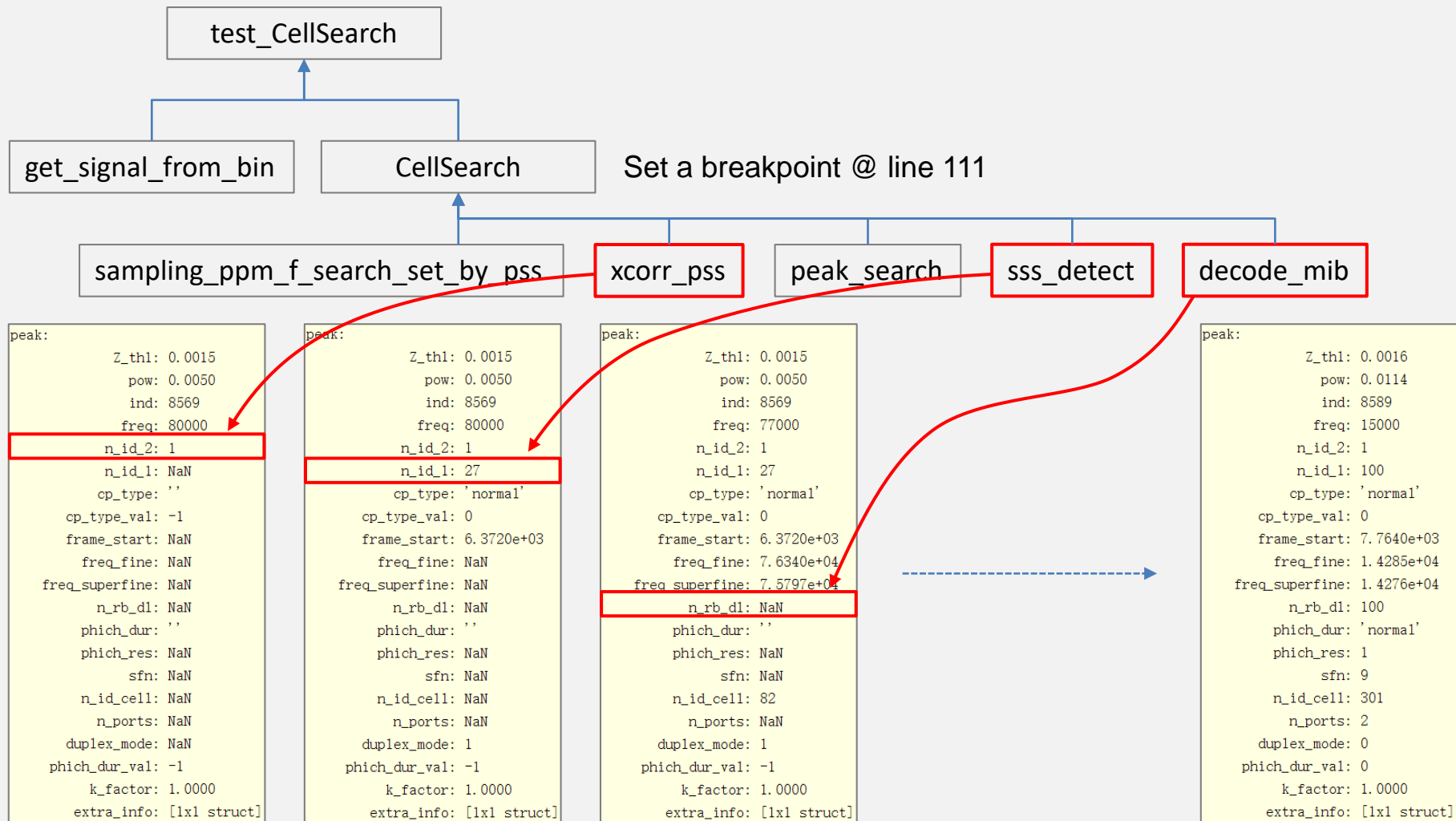


RE grid: FDD SFN-14 ULDL-0 CID-301 nPort-2 CP-normal PHICH-DUR-normal-RES-1

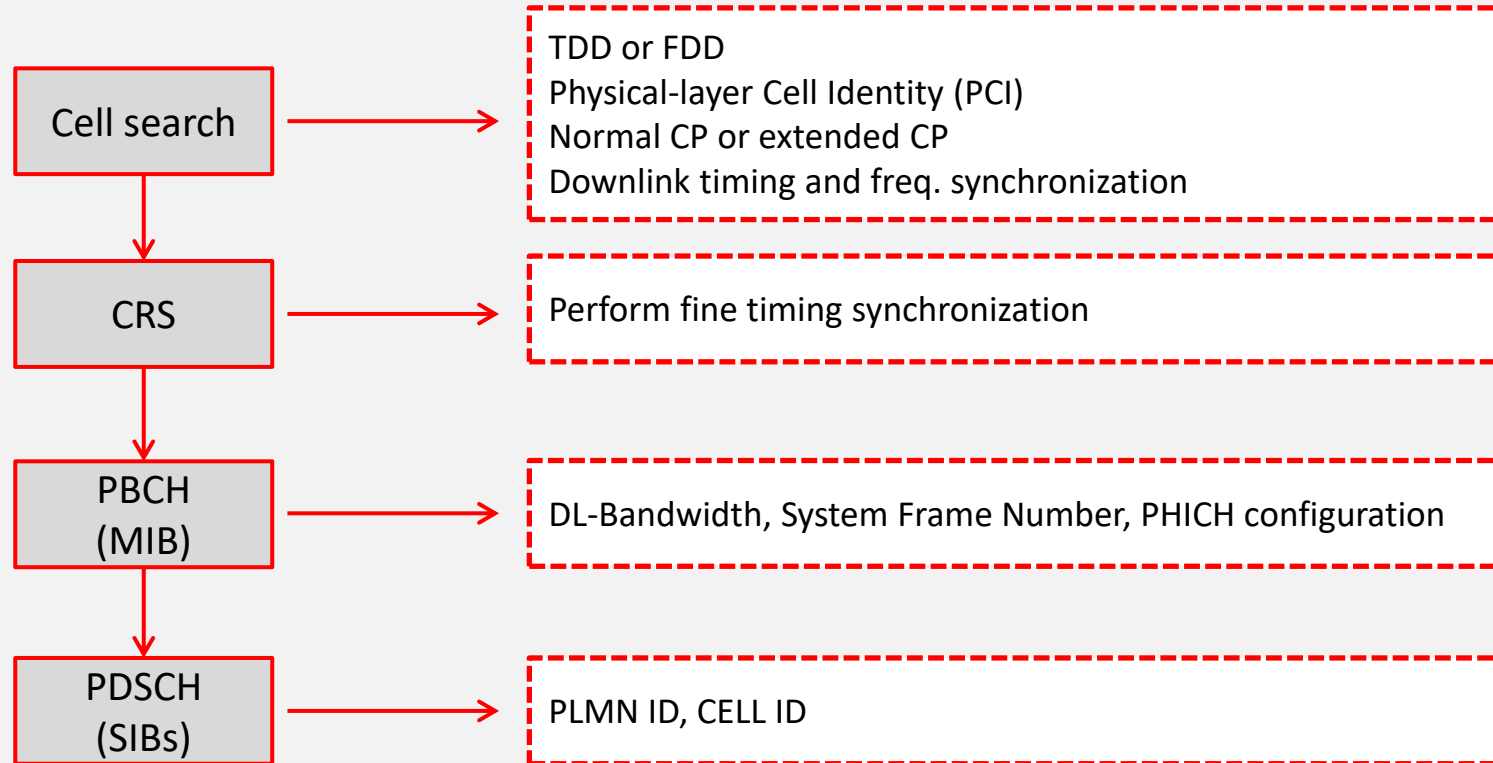


Spectrum of each OFDM symbol

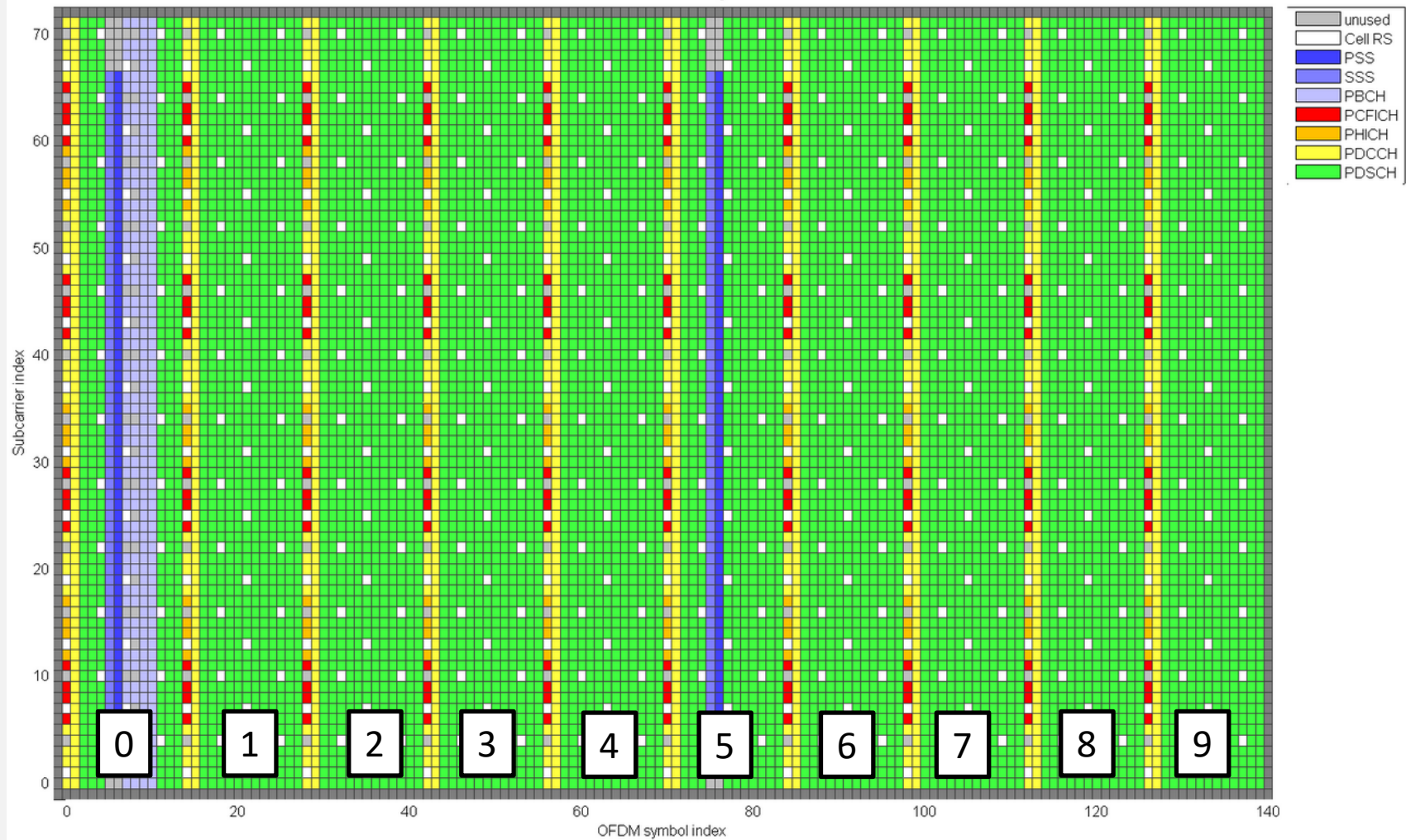




# Flow chart of received signal processing

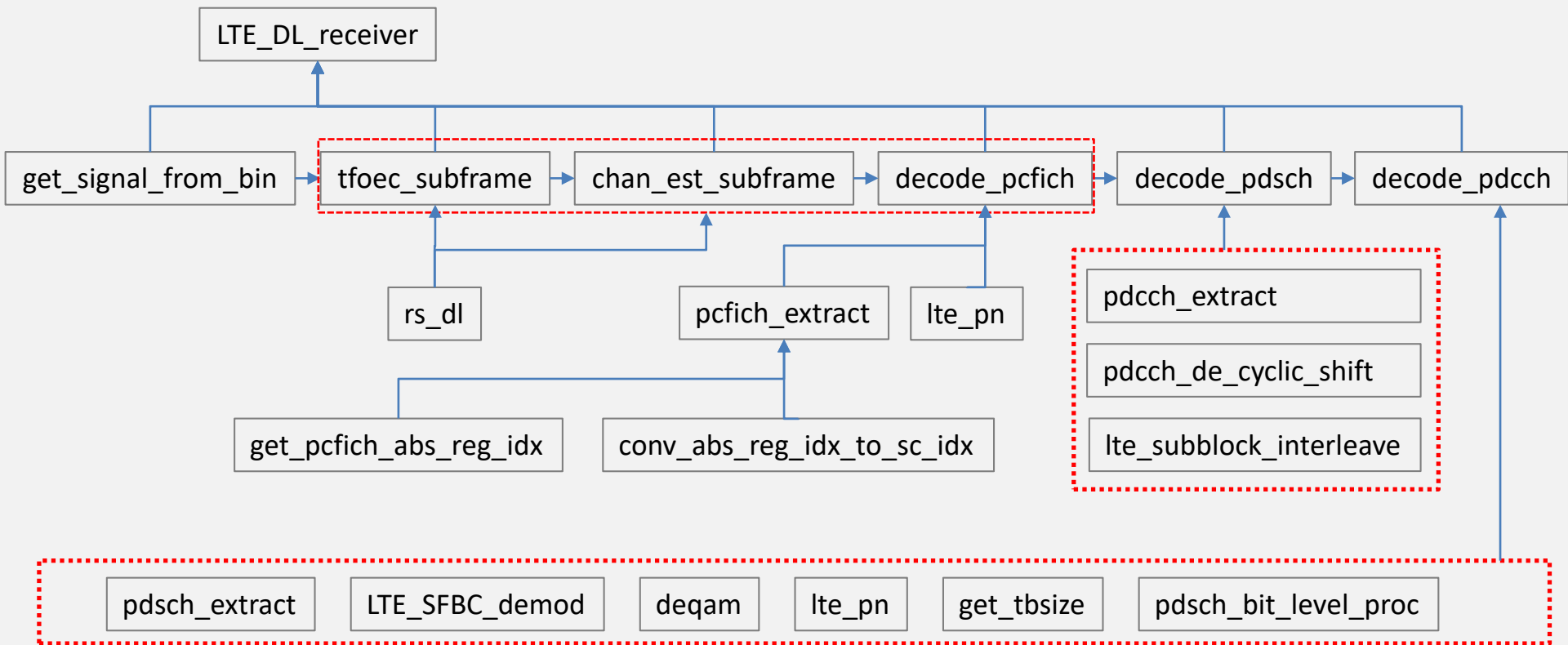


Transmitted resource grid

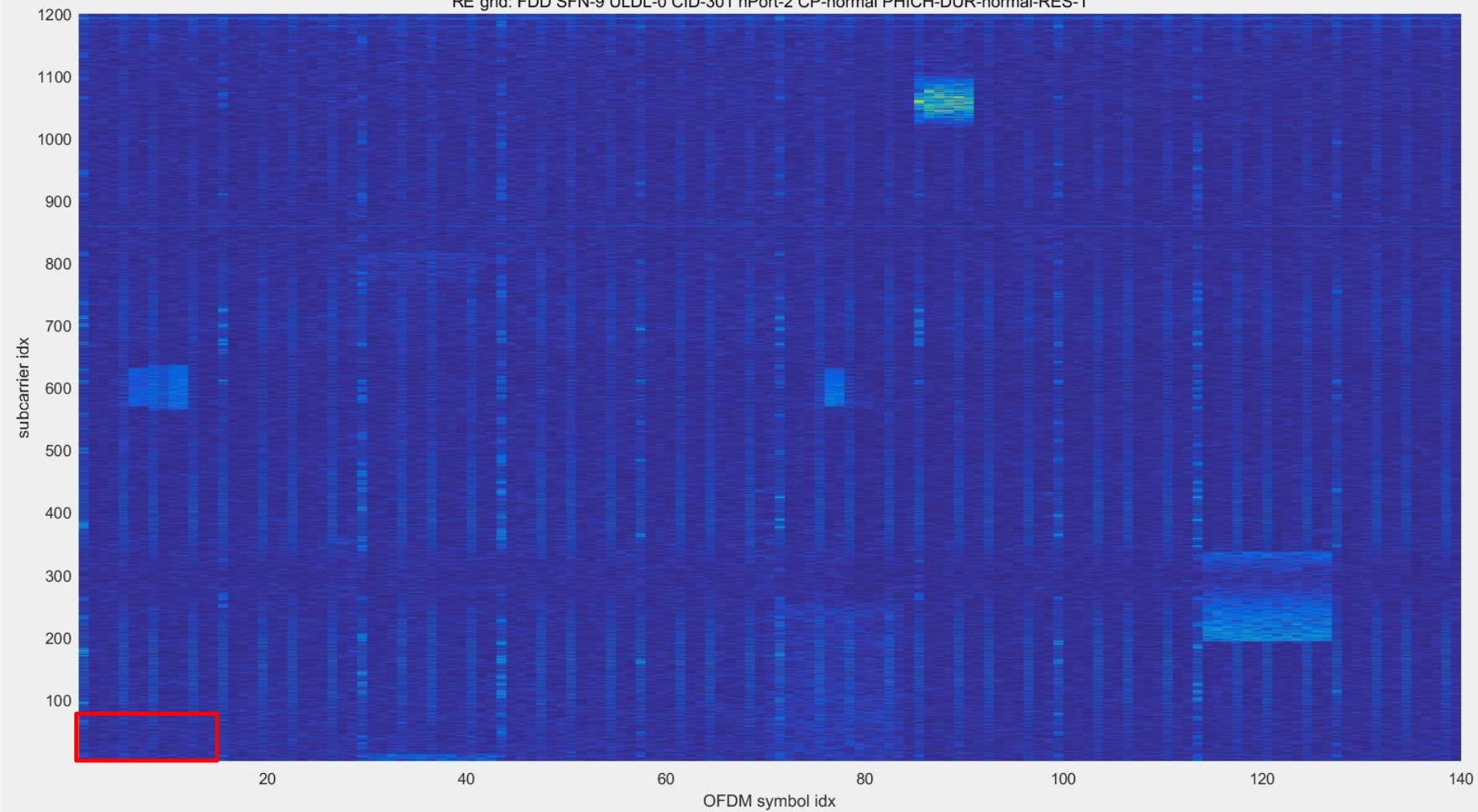




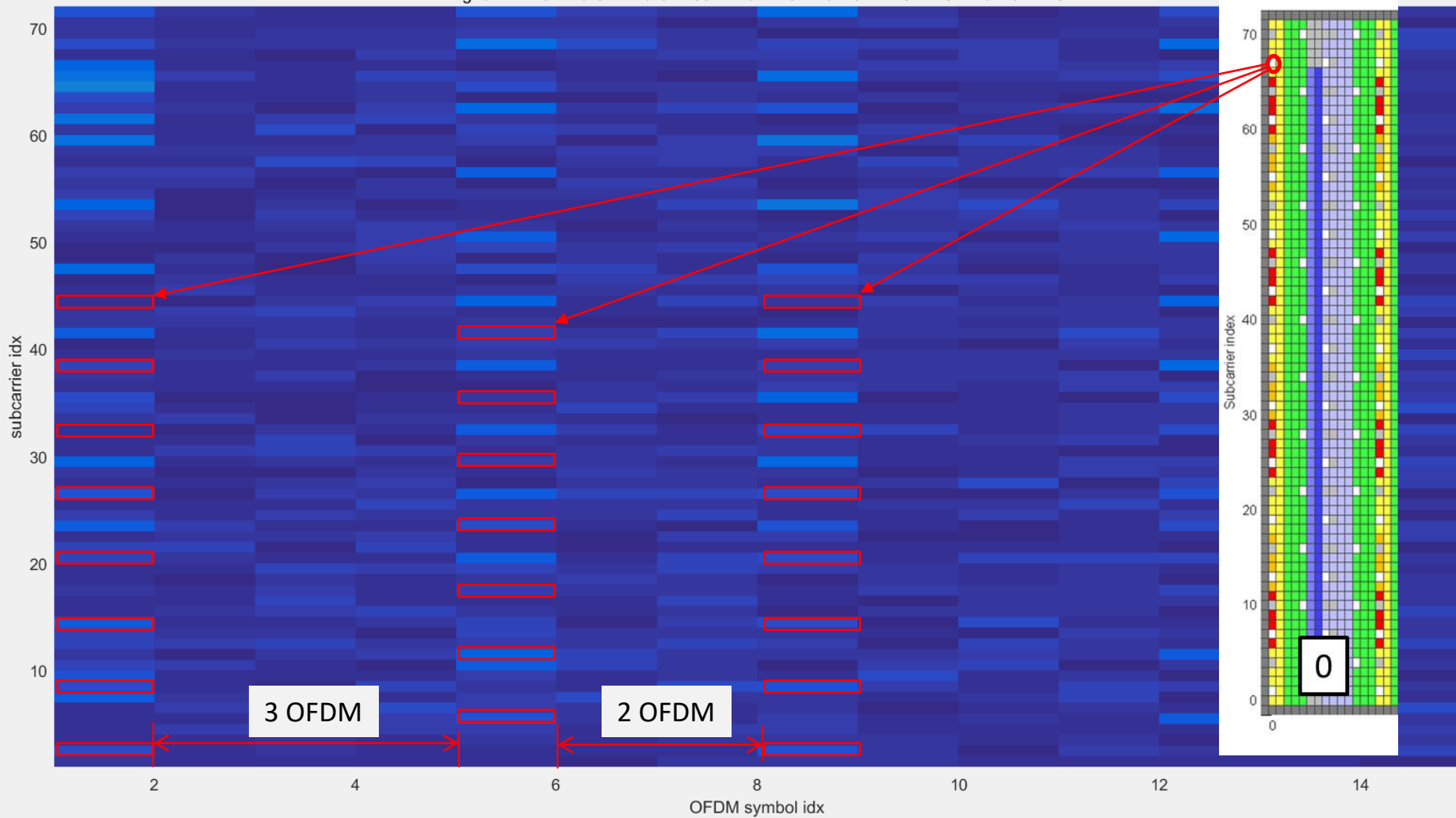


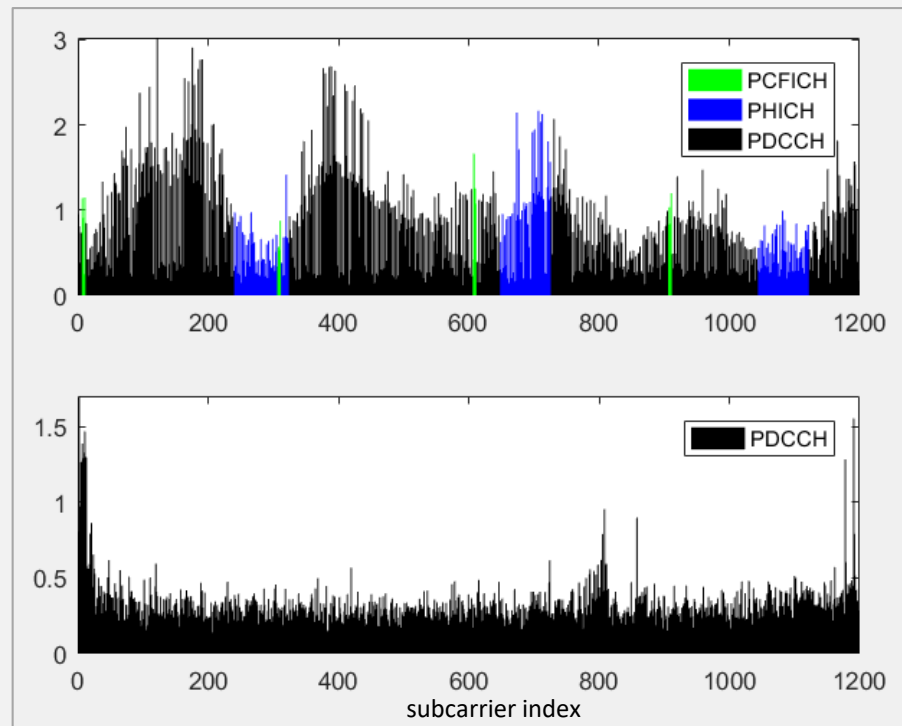
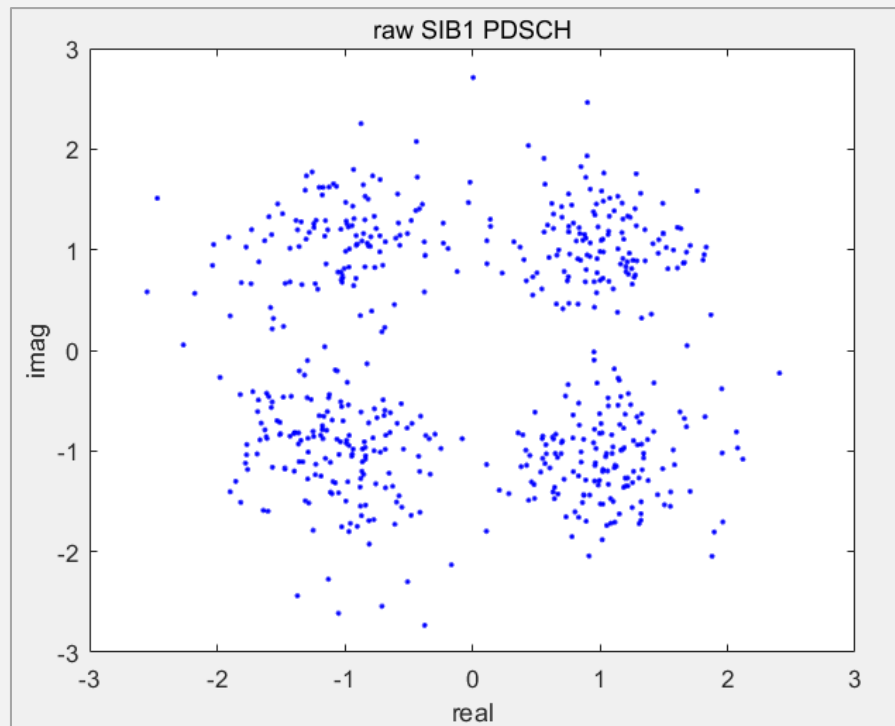


RE grid: FDD SFN-9 ULDL-0 CID-301 nPort-2 CP-normal PHICH-DUR-normal-RES-1



RE grid: FDD SFN-9 ULDL-0 CID-301 nPort-2 CP-normal PHICH-DUR-normal-RES-1









# Assignments

- Read the example 'An enhanced LTE Cell Scanner/tracker' in the website:

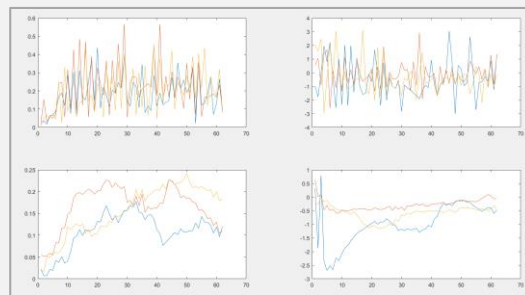
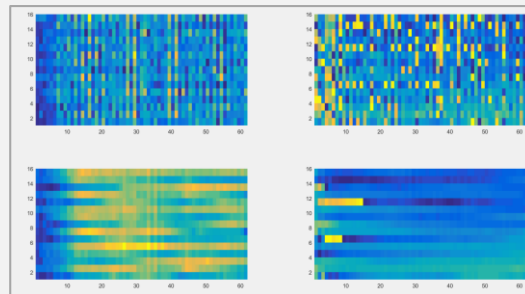
<https://github.com/JiaoXianjun/LTE-Cell-Scanner>

- Explain and add comments to the function, sss\_detect.m (Comments one-by-one line)

- Explain the results, such as the sub figures.

- Lots of captured IQ files are in:

<https://github.com/JiaoXianjun/LTE-Cell-Scanner-big-file>



# Questions

