High Performance Reconfigurable Software Defined Radio Platform

IMECAS

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1. Introduction

- IMECAS main R&D directions： IC design/IC manufacturing process/Electronic system engineering.
- **Communications & Information Engineering Center** is mainly focused on theory research and project application about complex signal processing, innovative communications, computer vision, radio-frequency technologies, integrated information platform, etc., the center has solid technical strength, abundant engineering experience and high-qualified professional technicians, the main R&D directions include:
  - Software Defined Radio & Software Communications architecture
  - High performance Power Amplifier
  - Radio-Frequency SoC
  - Cognitive Radio & Dynamic Spectrum Access

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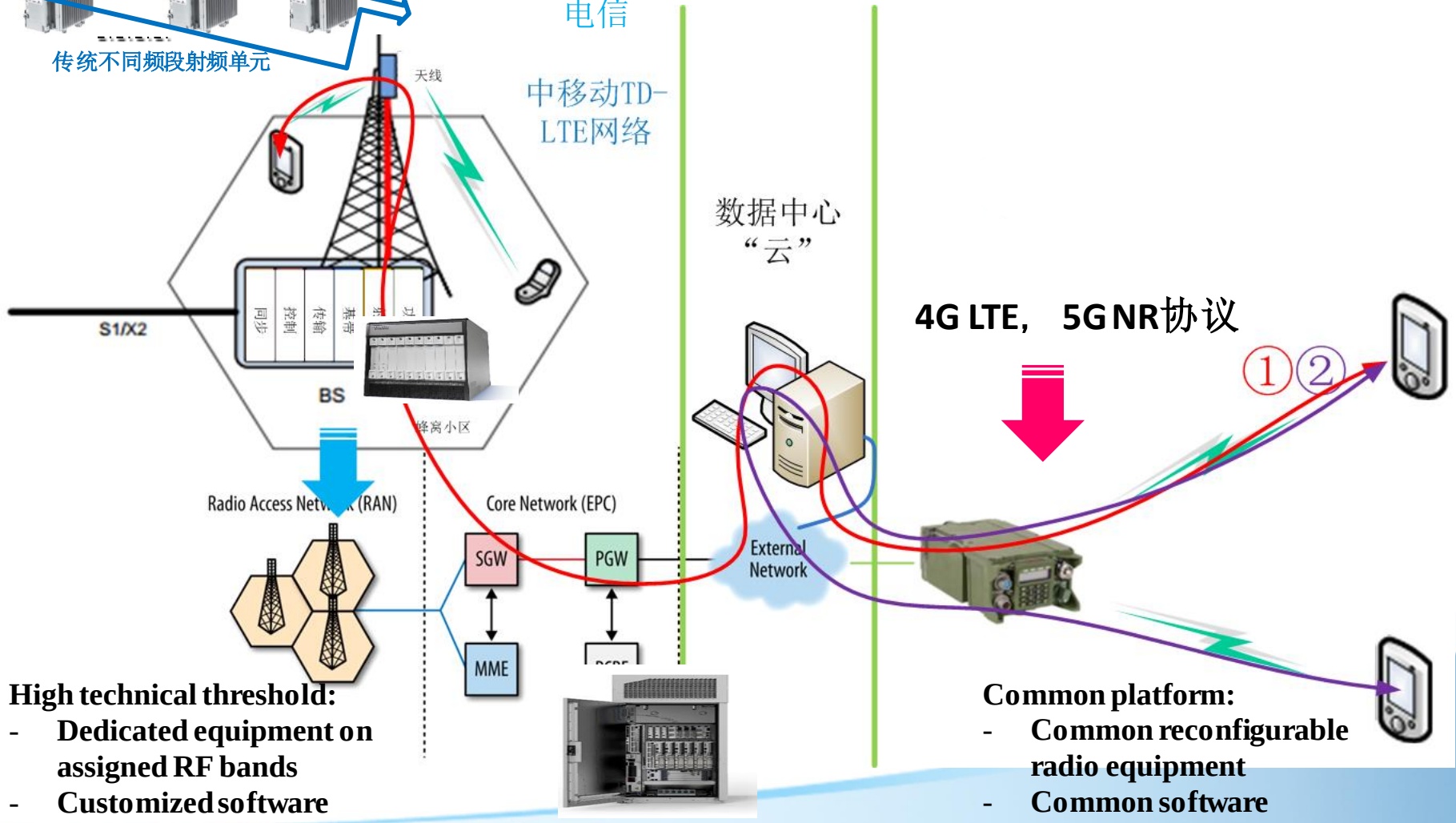
2.1 SDR02 platform: introduction

传统不同频段射频单元



High technical threshold:

- **Dedicated equipment on assigned RF bands**
- **Customized software**

Common platform:

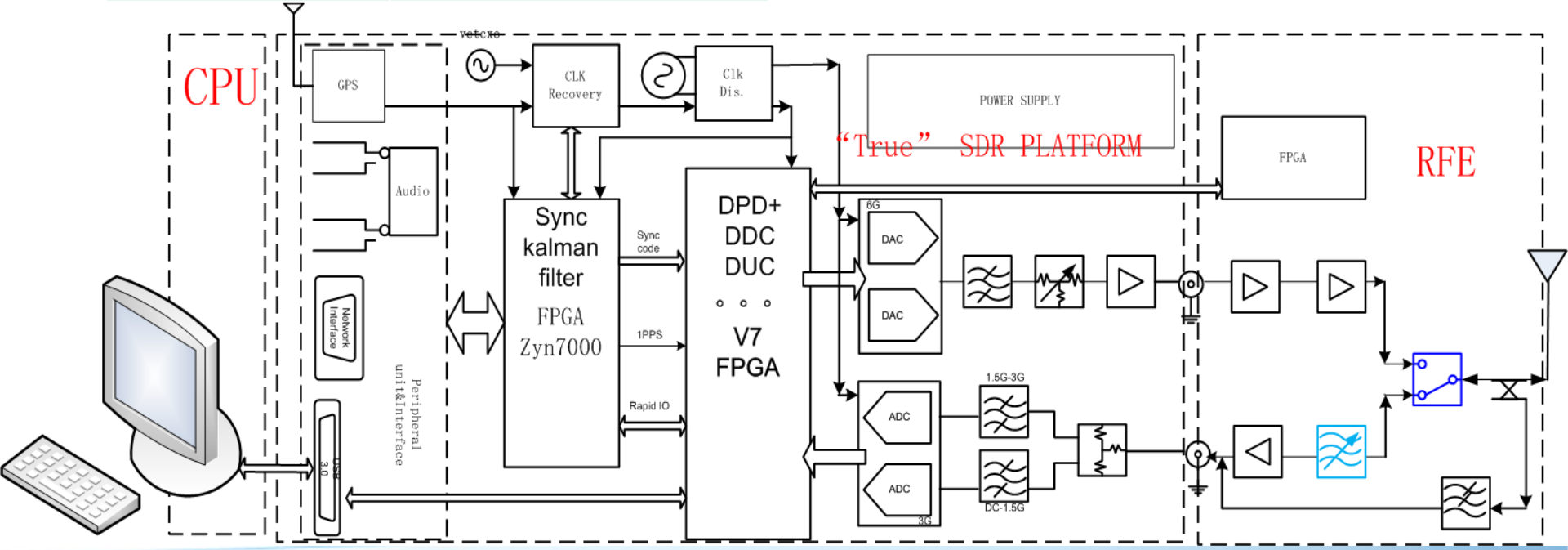
- **Common reconfigurable radio equipment**
- **Common software**

2.2 SDR02 platform: specification

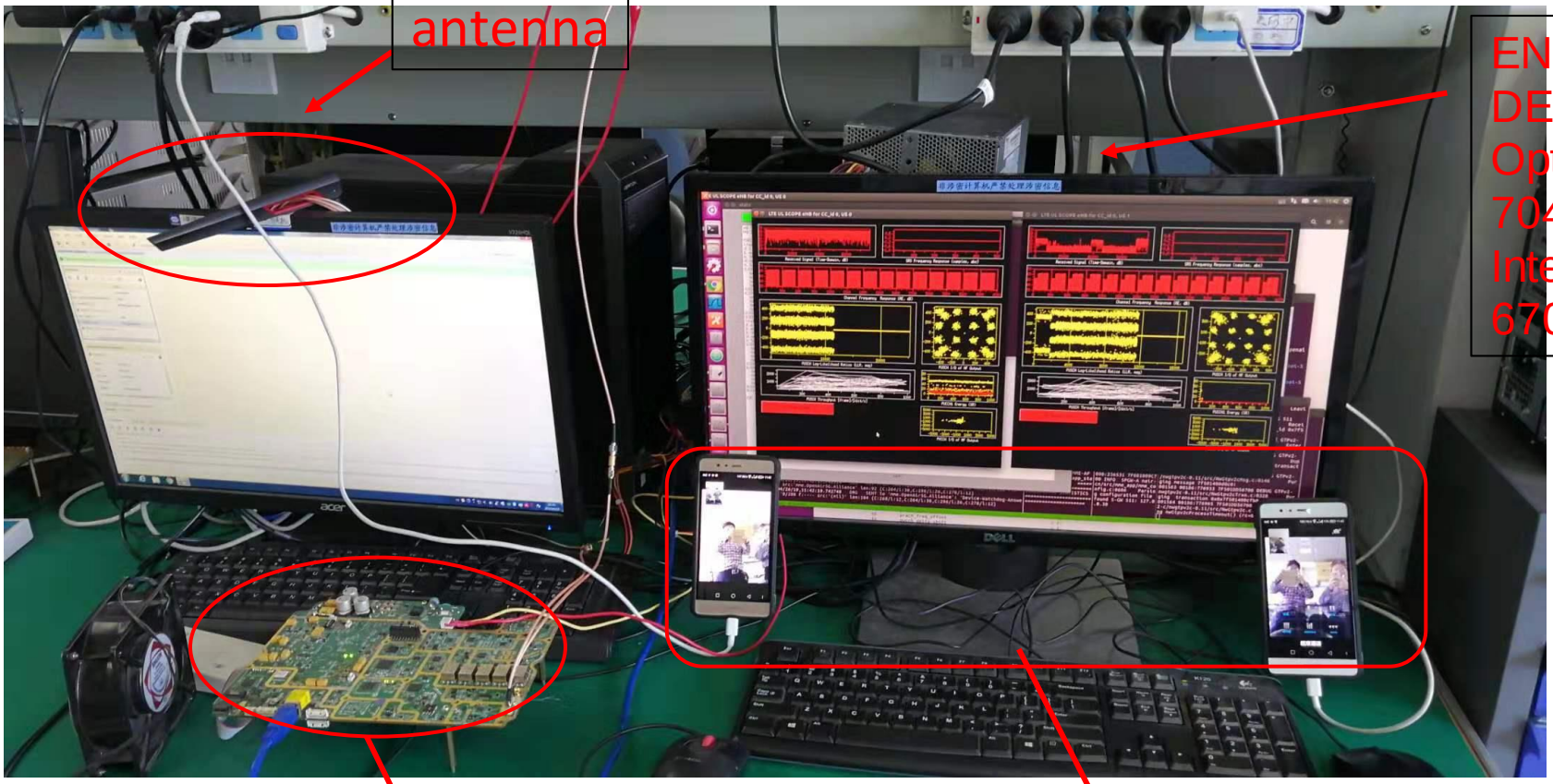
Item	Description
Frequency range	30MHz~3000MHz
Noise figure	<7dB
Max. output level	>10W±1.5dB
GPS accuracy	≤2.5m（GPS）
Frequency stability	≤±0.2ppm（GPS timing）
services	voice、data、video、PTP
interfaces	LAN、USB3.0
power	220V AC
dimension(W×H×D)	205×83×264mm
others	Support software & waveform upgrade

SDR02——

- "True" SDR module:
  - Multiple LO & flexible clock tree
  - High performance FPGA
  - High speed AD/DA supporting direct RF sampling
- RF front-end:
  - Efficient & high quality linear PA
  - Wide band LNA & tuning filter
- PC：
  - Fully function EPC/BBU

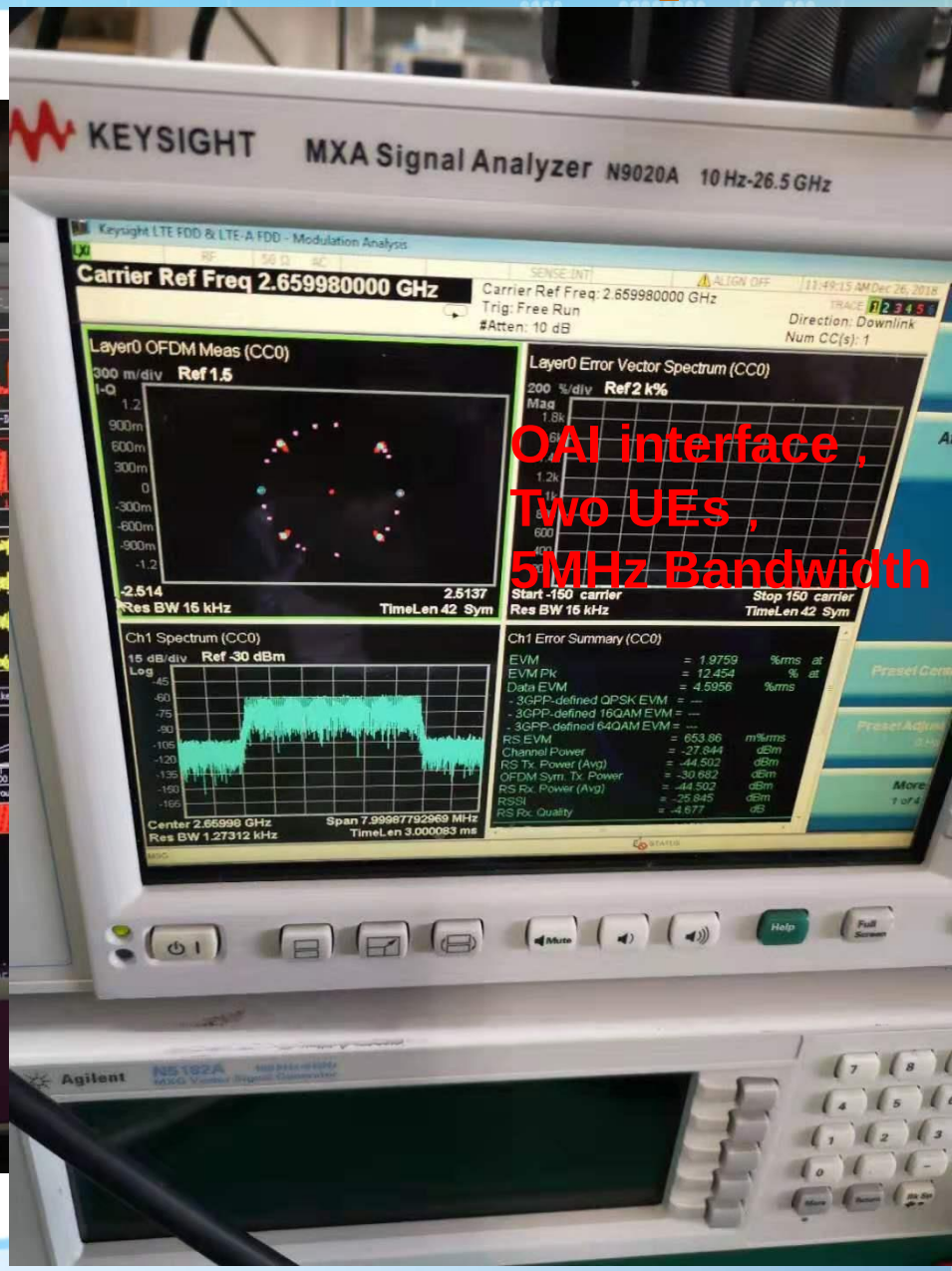


2.3 SDR02 platform

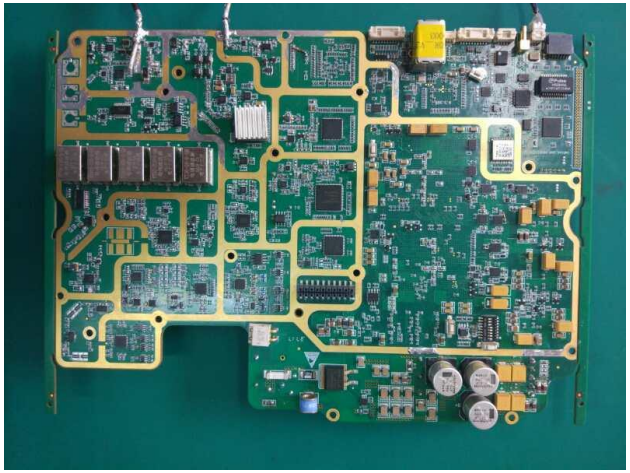


2.3 SDR02 platform

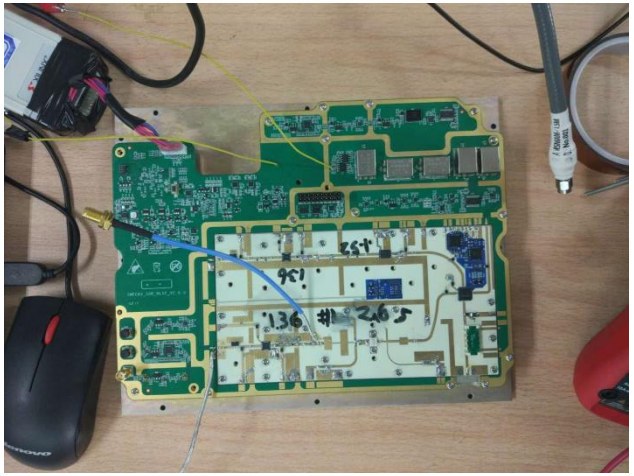
Band: band7
Bandwidth :5M,
EVM<3%



- “True”SDR module



- RF Front End



Problem：

The USB interface is limited in speed and can only run up to 10MHz LTE

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3.1 SDR03 platform: 设计需求

1000 Gbps

6G

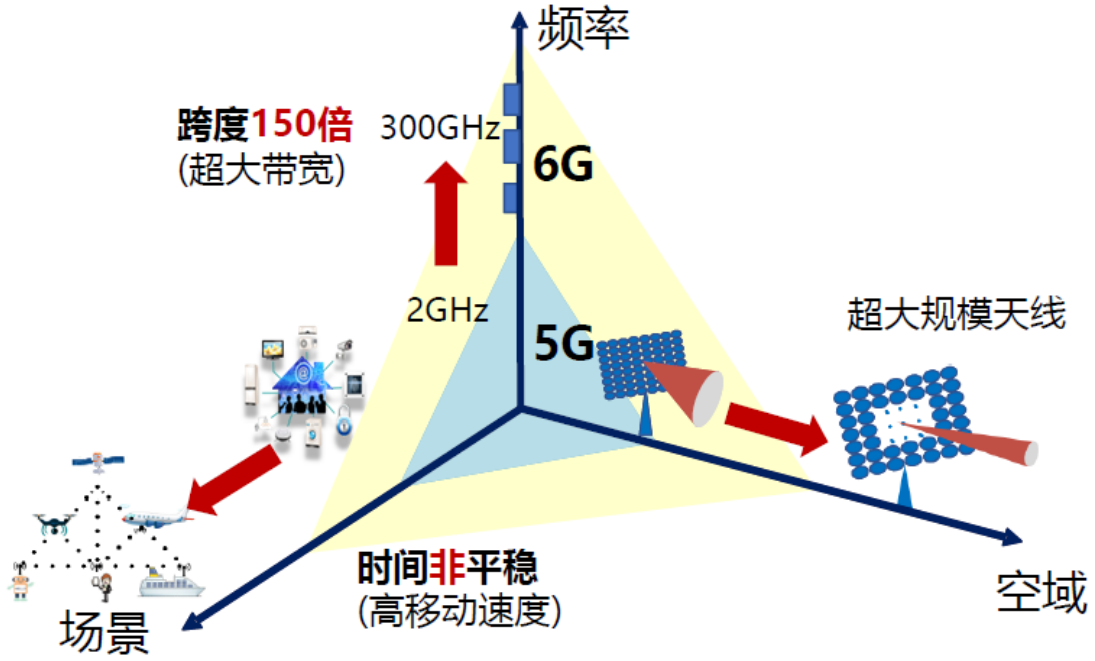
IoT海量连接

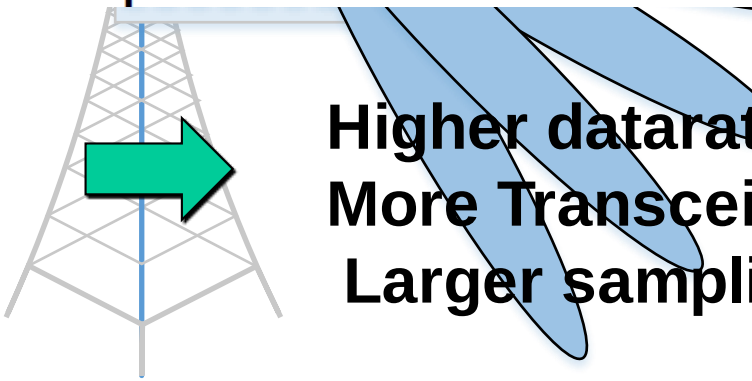
空天地一体化

THz更高频段

超大规模天线

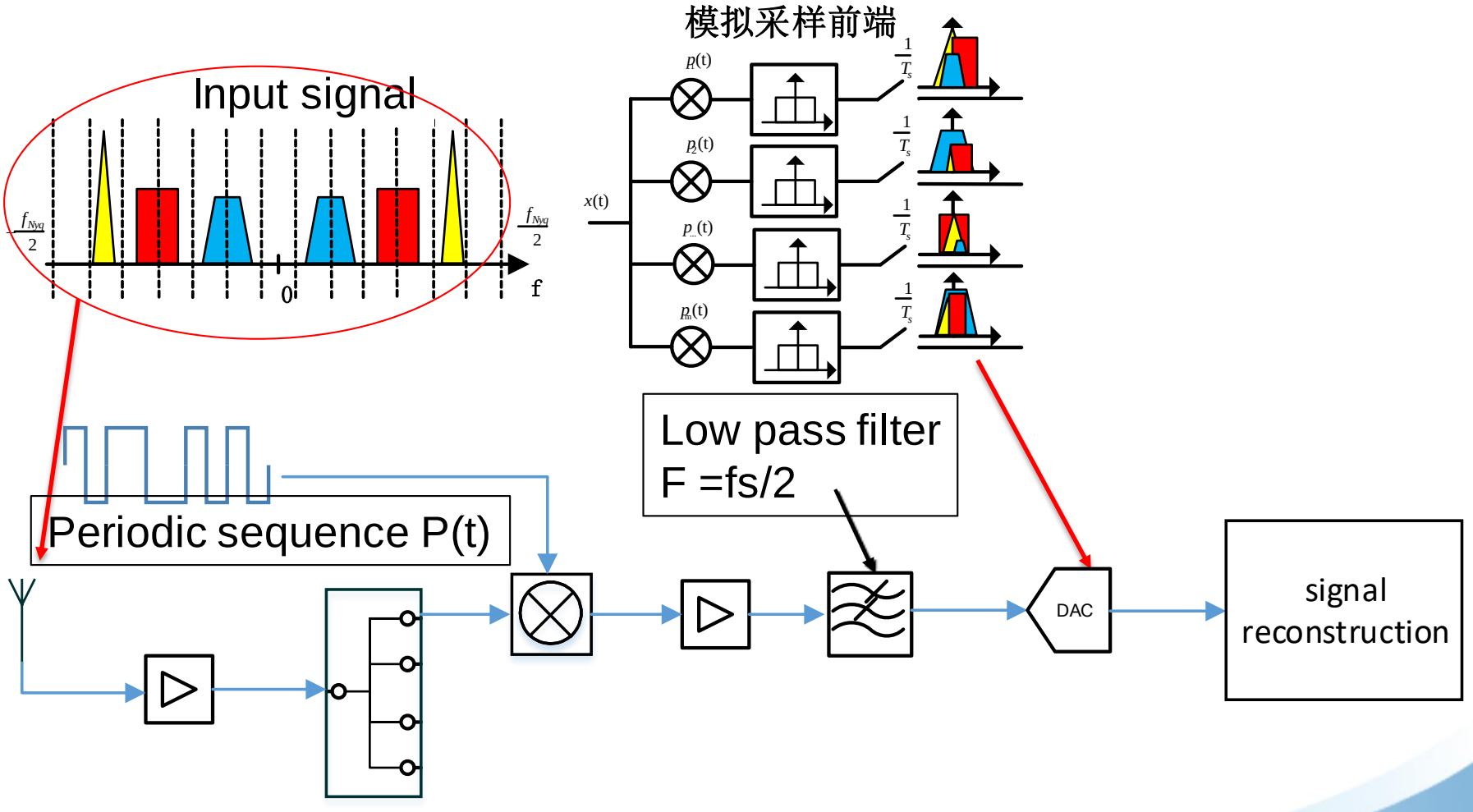
20 Gbps



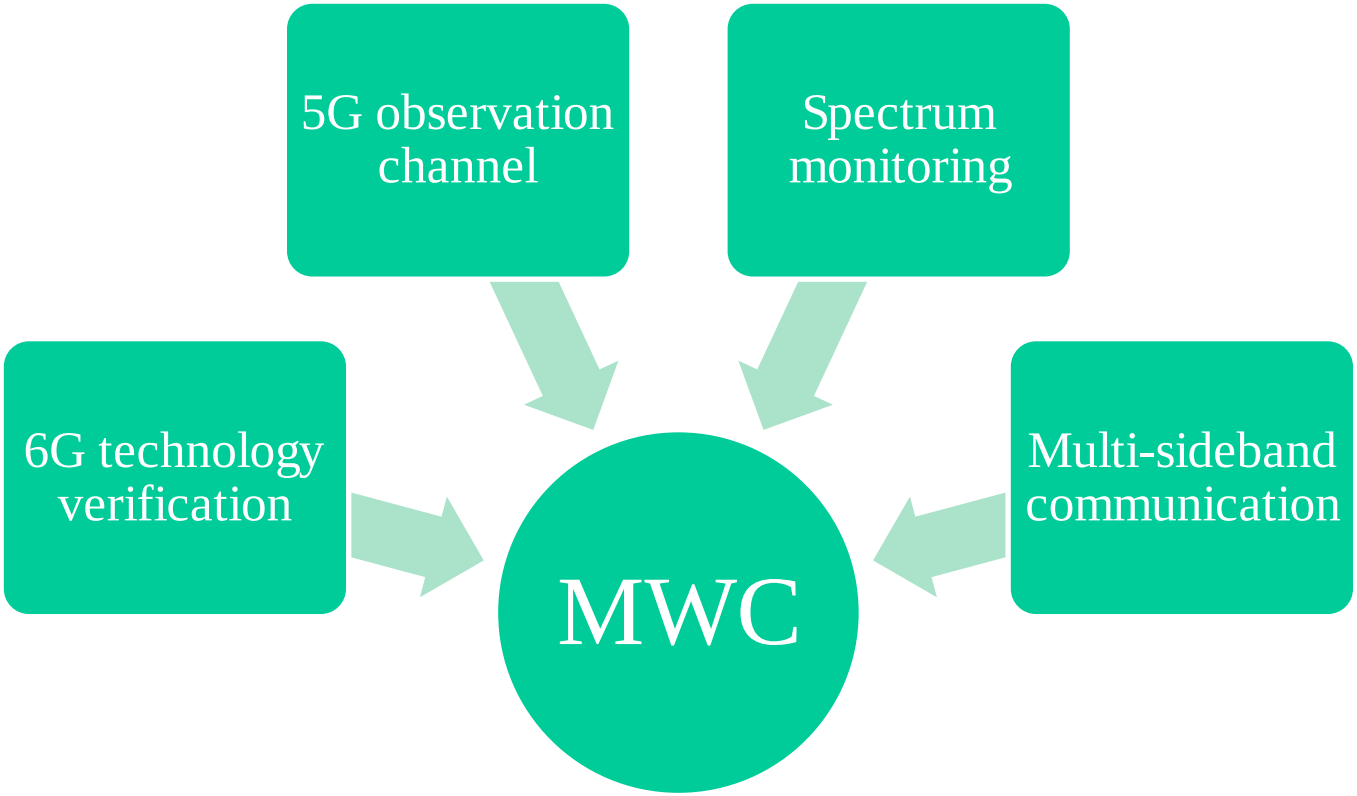


Higher datarates
More Transceiver
Larger sampling rate ADC、DAC

3.2 SDR03 platform: MWC introduction



3.3 SDR03 platform

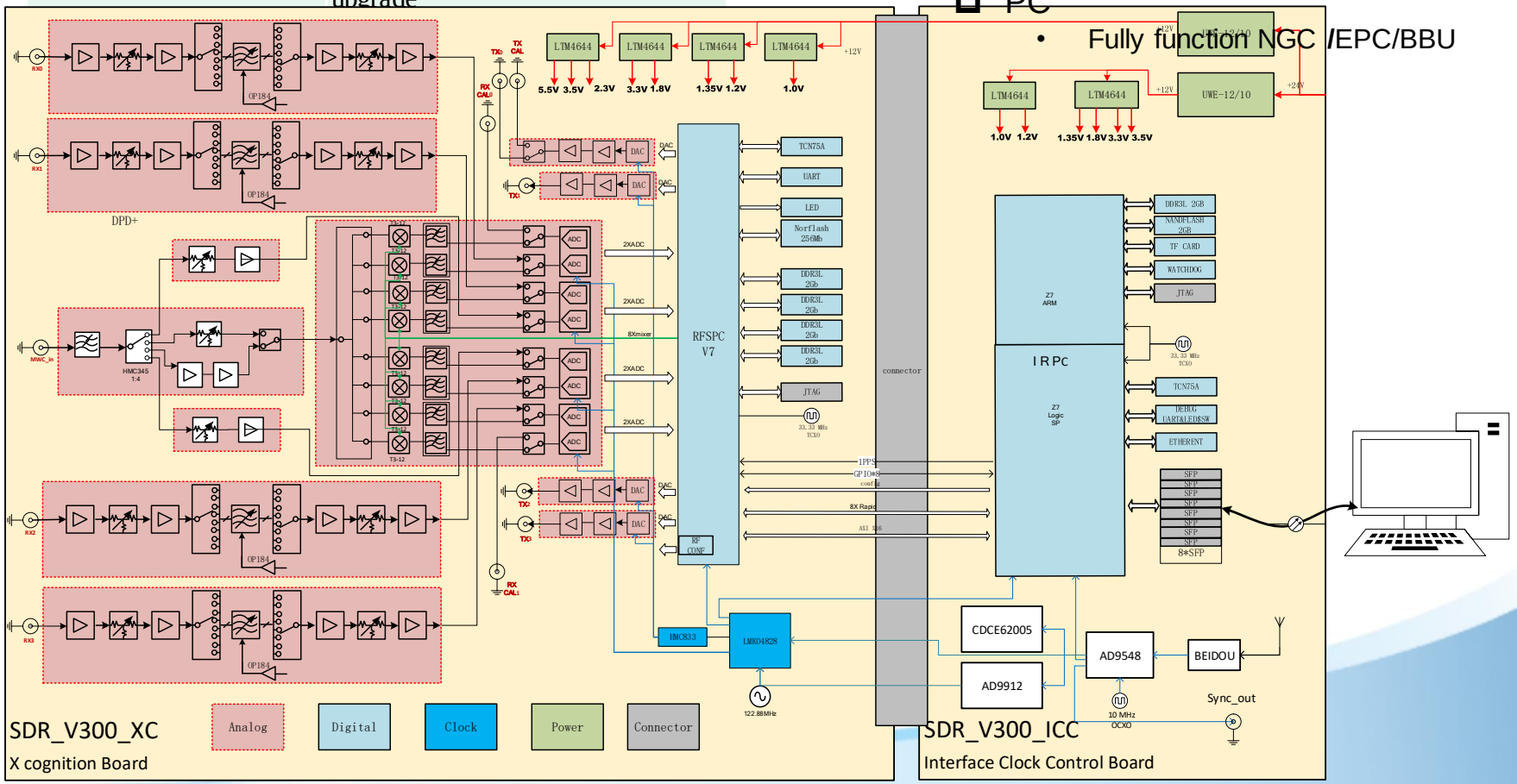


3.4 SDR03 platform: specification

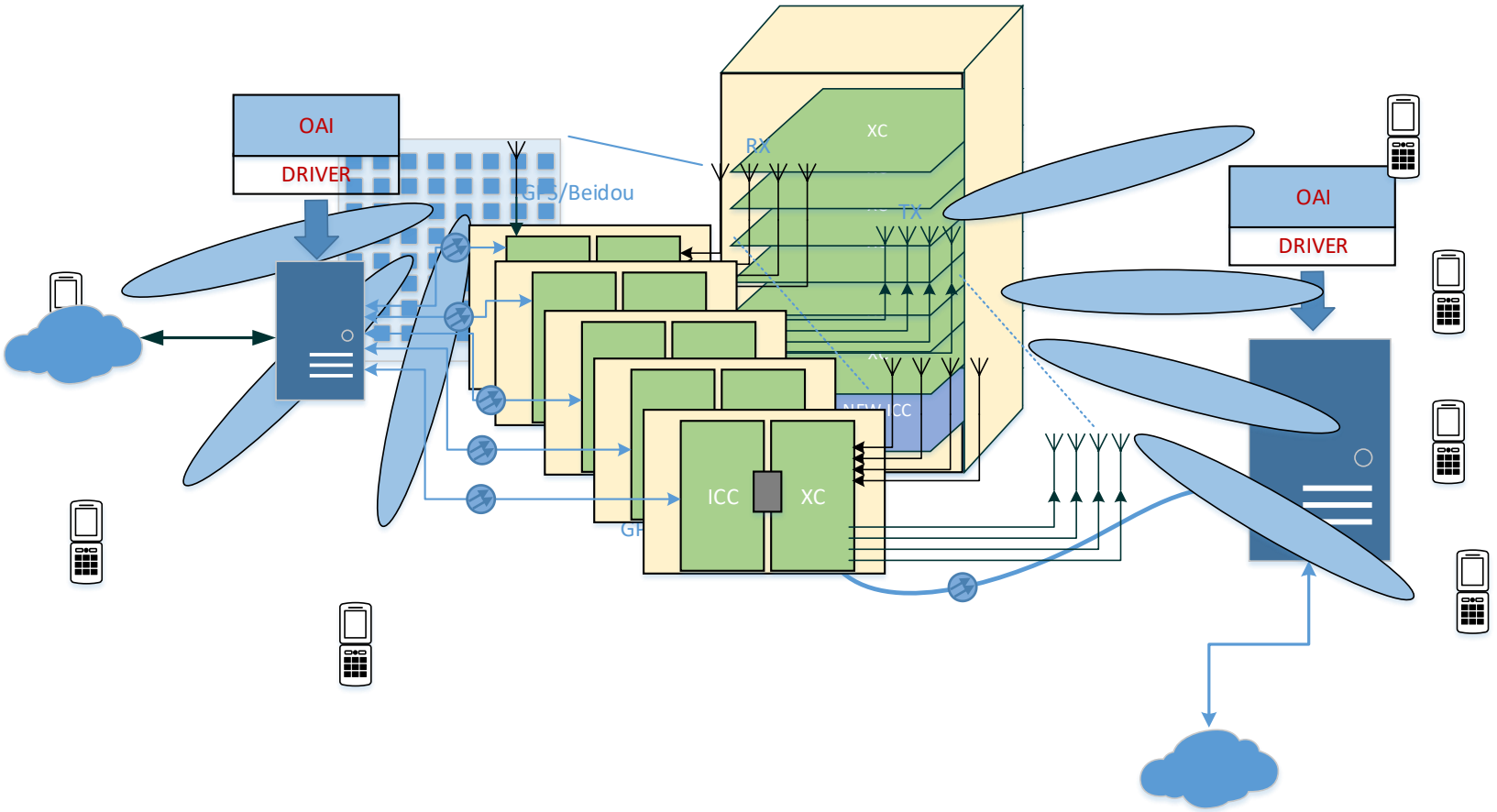
Item	Description
Frequency range	30MHz~6000MHz
Noise figure	<7dB
Max. output level	>10W±1.5dB
GPS accuracy	≤2.5m（GPS）
Frequency stability	≤±0.2ppm（GPS timing）
5G带宽	100M 4*4 MIMO
interfaces	LAN, 8*SFP+
others	Support software & waveform upgrade

SDR03 platform

- X cognition board
  - High performance FPGA
  - MWC channel
  - 4*4 MIMO
- Interface Clock Control board
  - Multiple LO & flexible clock tree
  - High speed data transfer interface
- PC
  - Fully function NGC /EPC/BBU

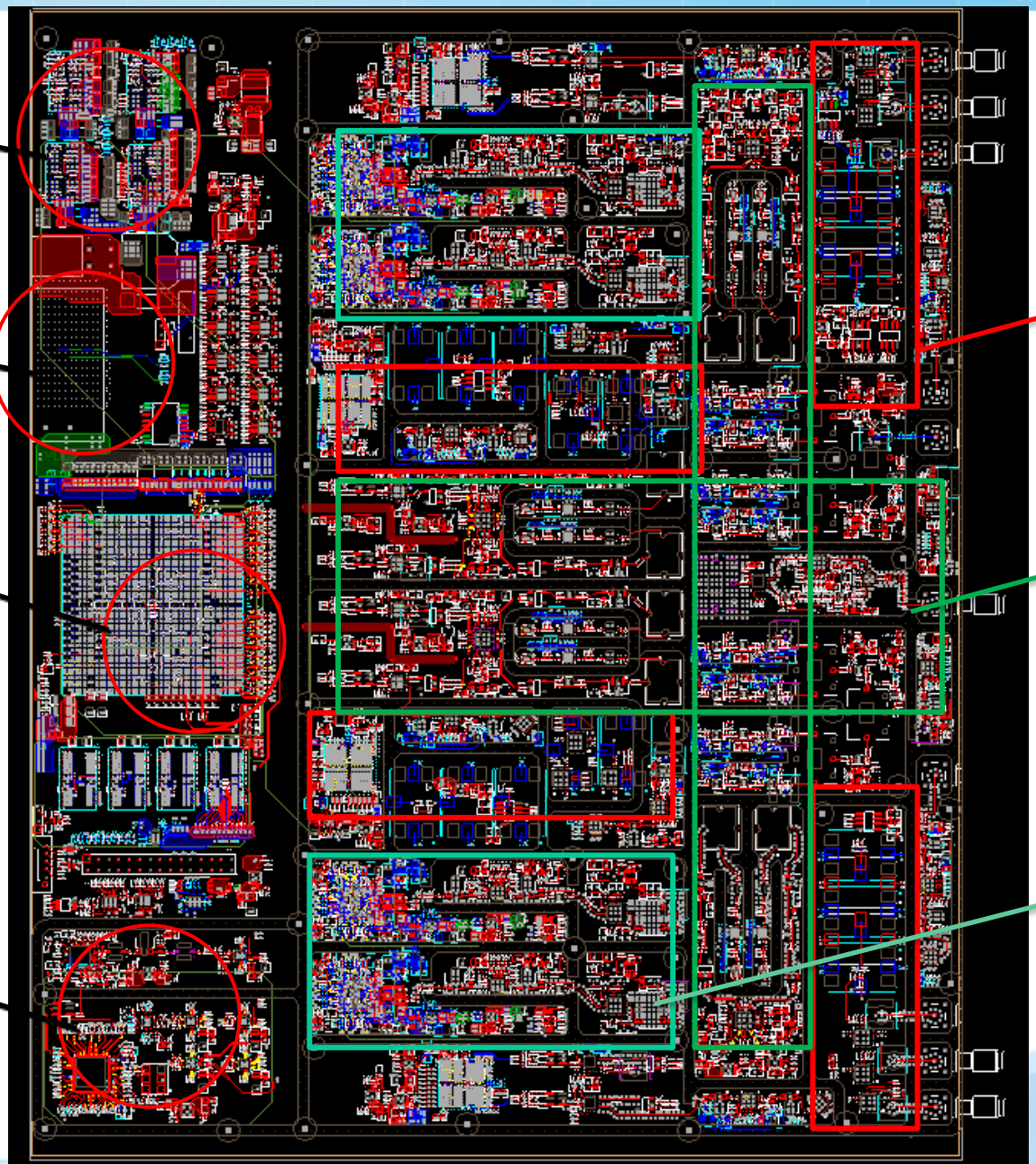


3.5 SDR03 platform: massive MIMO



Multi-board collaboration for massive MIMO

3.6 SDR03 platform



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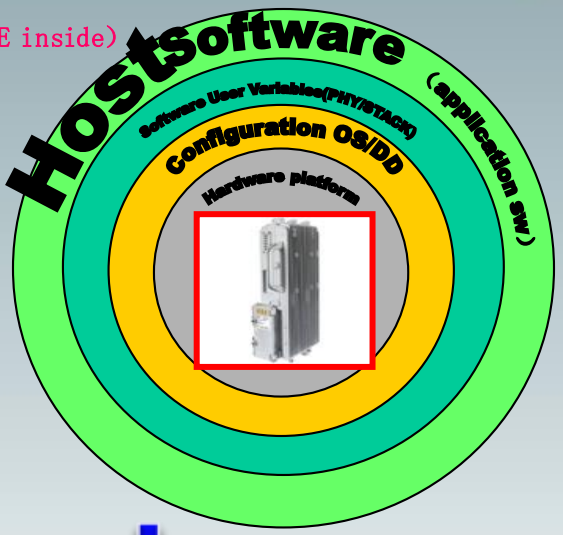
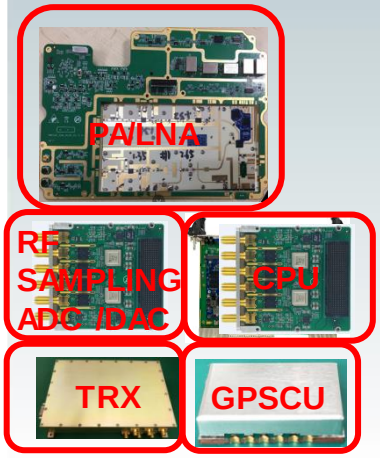
5. Conclusion

Open Lab

（IME inside）





“turn-key” Solution:

- GPP/CPU/FPGA/ADC/DAC all in one series
  - ✓ FPGA+ADC/DAC
  - ✓ GPP/CPU+FPGA
- RF module series
  - ✓ Tx & Rx
  - ✓ T/R component
  - ✓ PA & front-end
  - ✓ Frequency synthesizer
- Complete integration solution
  - ✓ BSP & drivers & IP
  - ✓ Reference design
  - ✓ Hardware + software all in one