

# Adaptable Intelligence: From RF to the Core

灵活应变的智能：从射频到核心网

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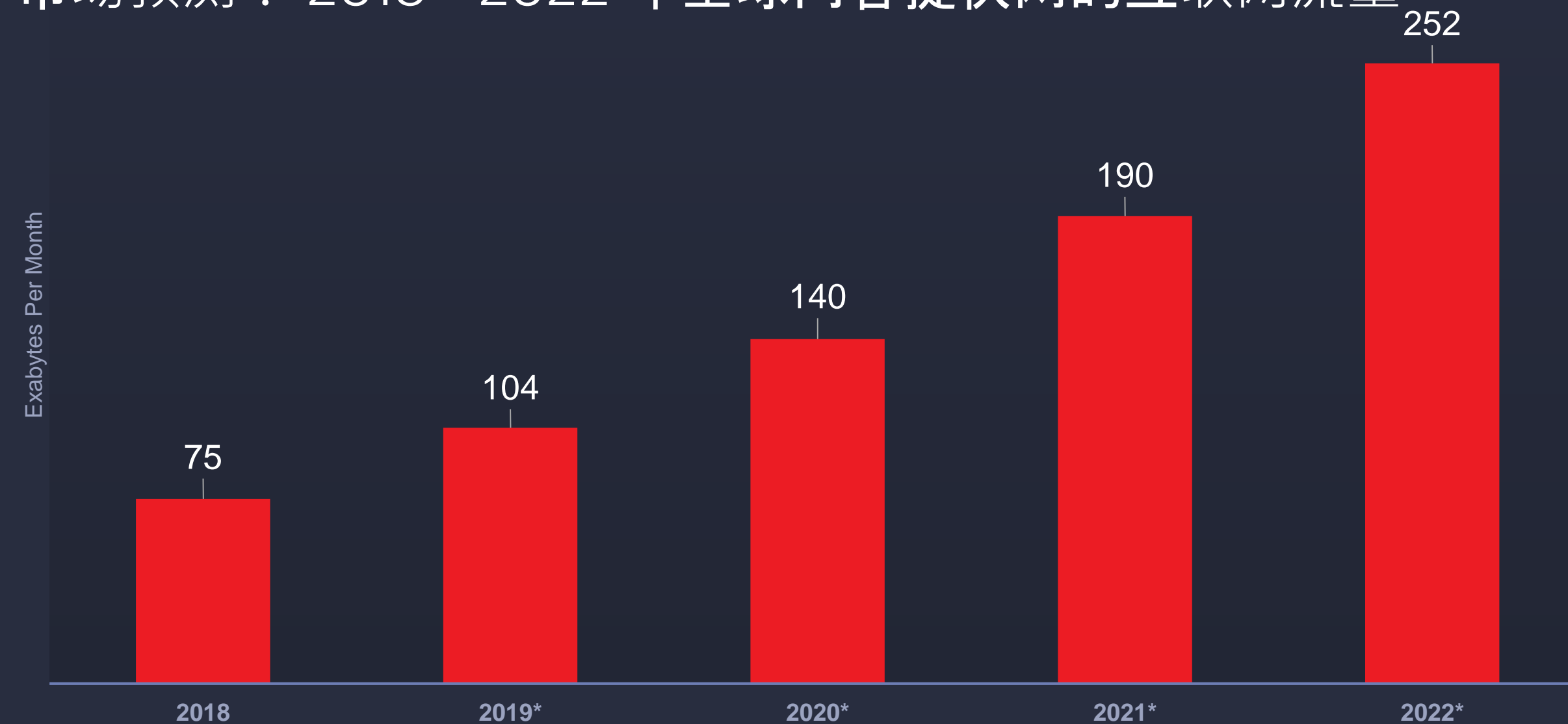
**有线及无线事业部 (WWG) 总经理**



# Market Forces Driving Communications Growth

## 电信业务增长的市场驱动力

Forecast: Global Content Delivery Network Internet Traffic 2018–2022  
市场预测：2018 - 2022 年全球内容提供网的互联网流量



Source: Cisco Systems; ID 267184 \* indicates forecast

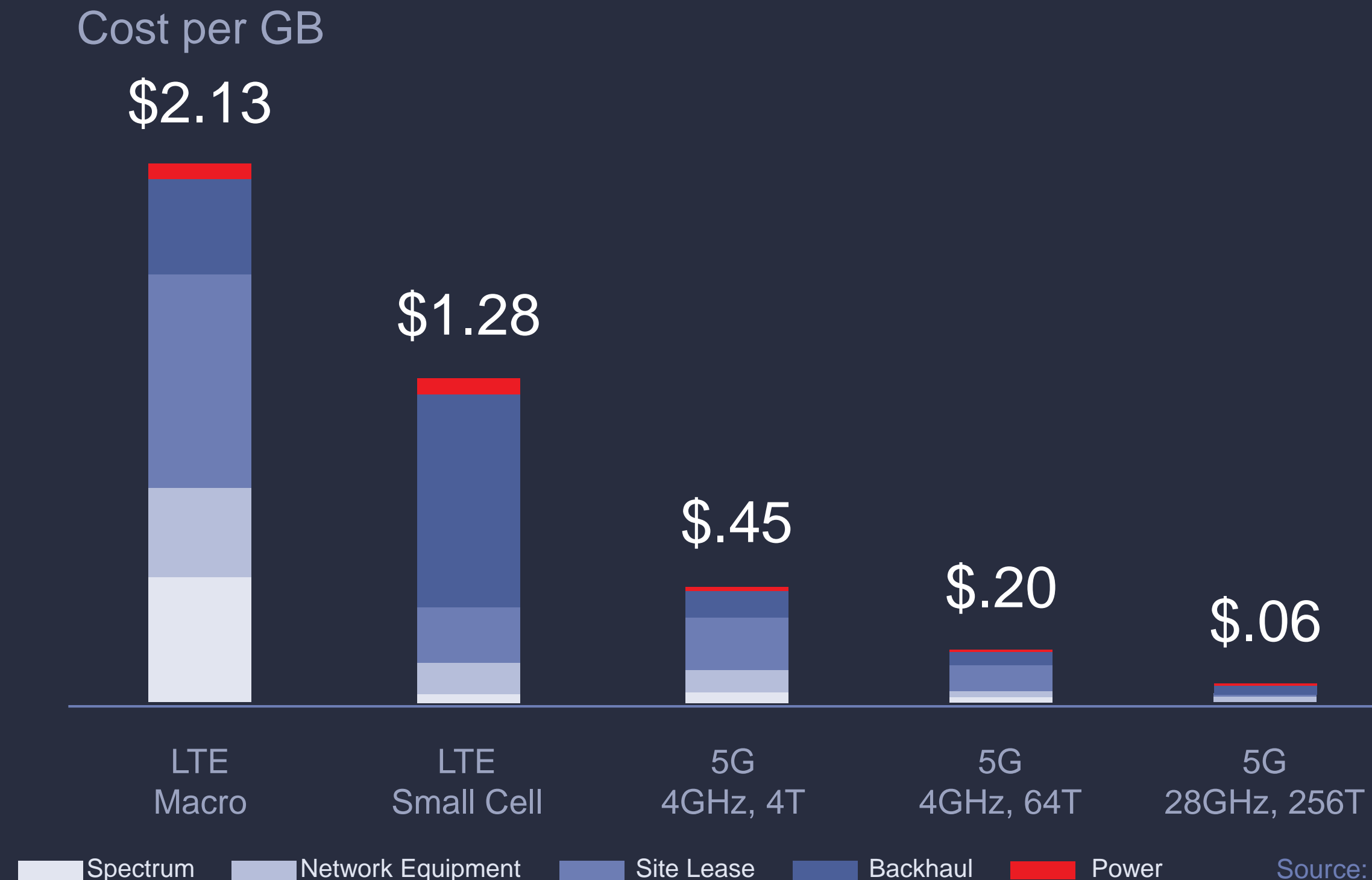
Content Explosion  
内容爆炸性增长

Complexity of Networks Increasing  
网络日趋复杂

Security and Analytics Drive More Intelligence  
安全和分析需求驱动智能升级

# Lower Cost per GB Driving Operator Deployment of 5G

## 运营商为降低每 GB 功耗加速 5G 部署



5G's wide band spectrum increases throughput (more Gb/\$)  
5G 的宽带频段提高了吞吐量 ( 更高Gb/\$ )

Massive-MIMO (mMIMO) makes much more efficient use of the allocated spectrum (more Gb/Hz)  
大规模 MIMO (mMIMO) 可以更有效地利用分配的频段 (更高Gb/Hz)

# Spectrum Complexity

## 频谱复杂性



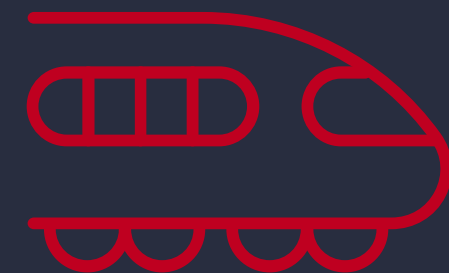
Large Scale Events  
Thousands of Users  
大规模峰会  
数千用户



Vehicle  
Communications  
Transport  
Infrastructure  
汽车通讯  
交通基础设施



Environmental  
Monitor and Smart Cities  
环境监测与智慧城市



Transport and  
Infrastructure  
交通基础设施



Improved Residential  
Connections,  
Smart Energy  
改善住宅连接  
智能能源



High Bands  
高频段  
>24 GHz



Mid Bands  
中频段  
1-6GHz

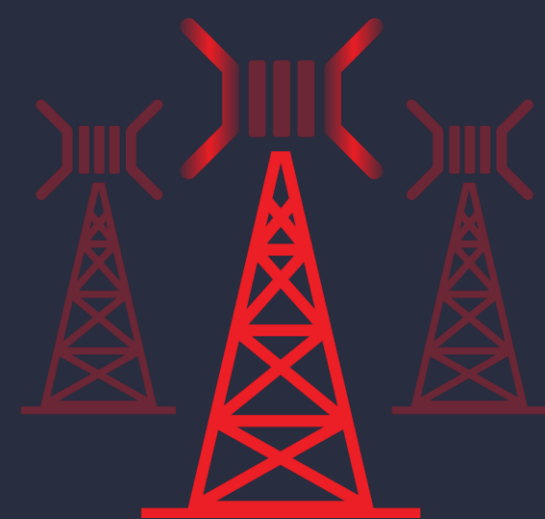


Low Bands  
低频段  
<1GHz

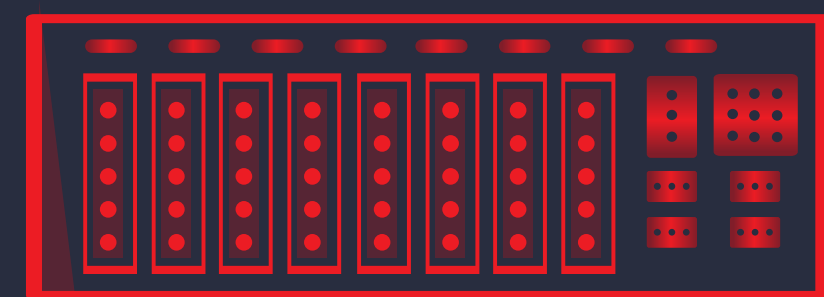
# Xilinx Disruptive Technology in 5G

## 赛灵思颠覆性的5G技术

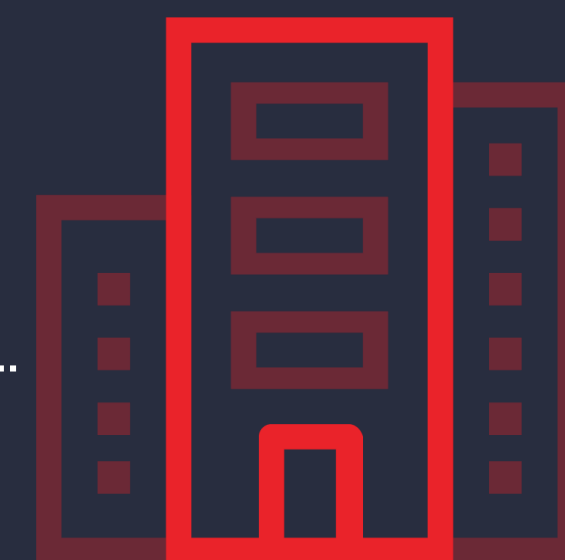
Xilinx RF Integration History  
赛灵思射频集成历史



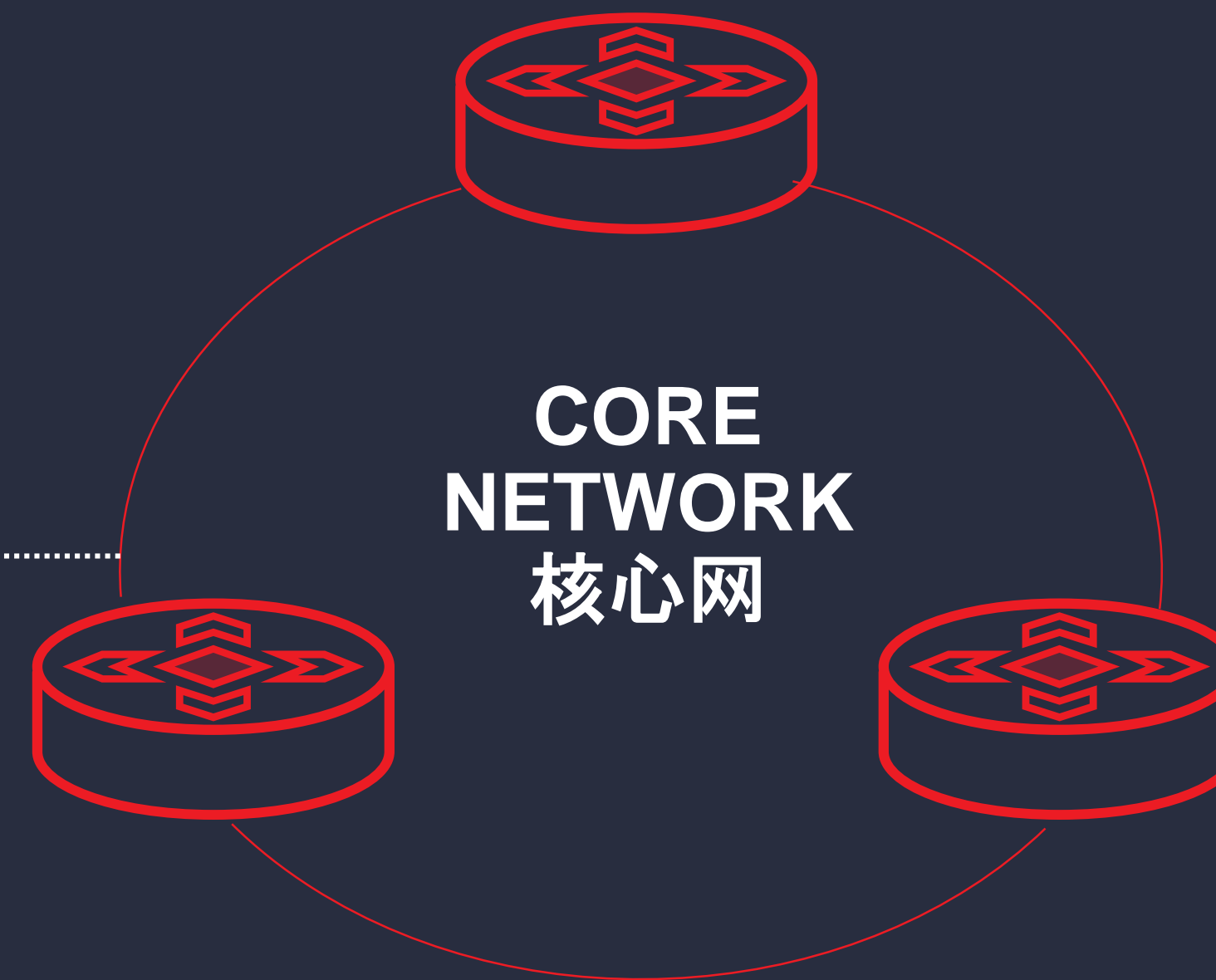
Massive-MIMO  
Radio  
mMIMO 射频



Distributed  
Unit  
分布式单元



Central Unit  
中央单元



# 5G Radio's Start with RF

## 5G 无线电始于射频

### Xilinx RF Integration History

#### 赛灵思射频集成历史

**2012**

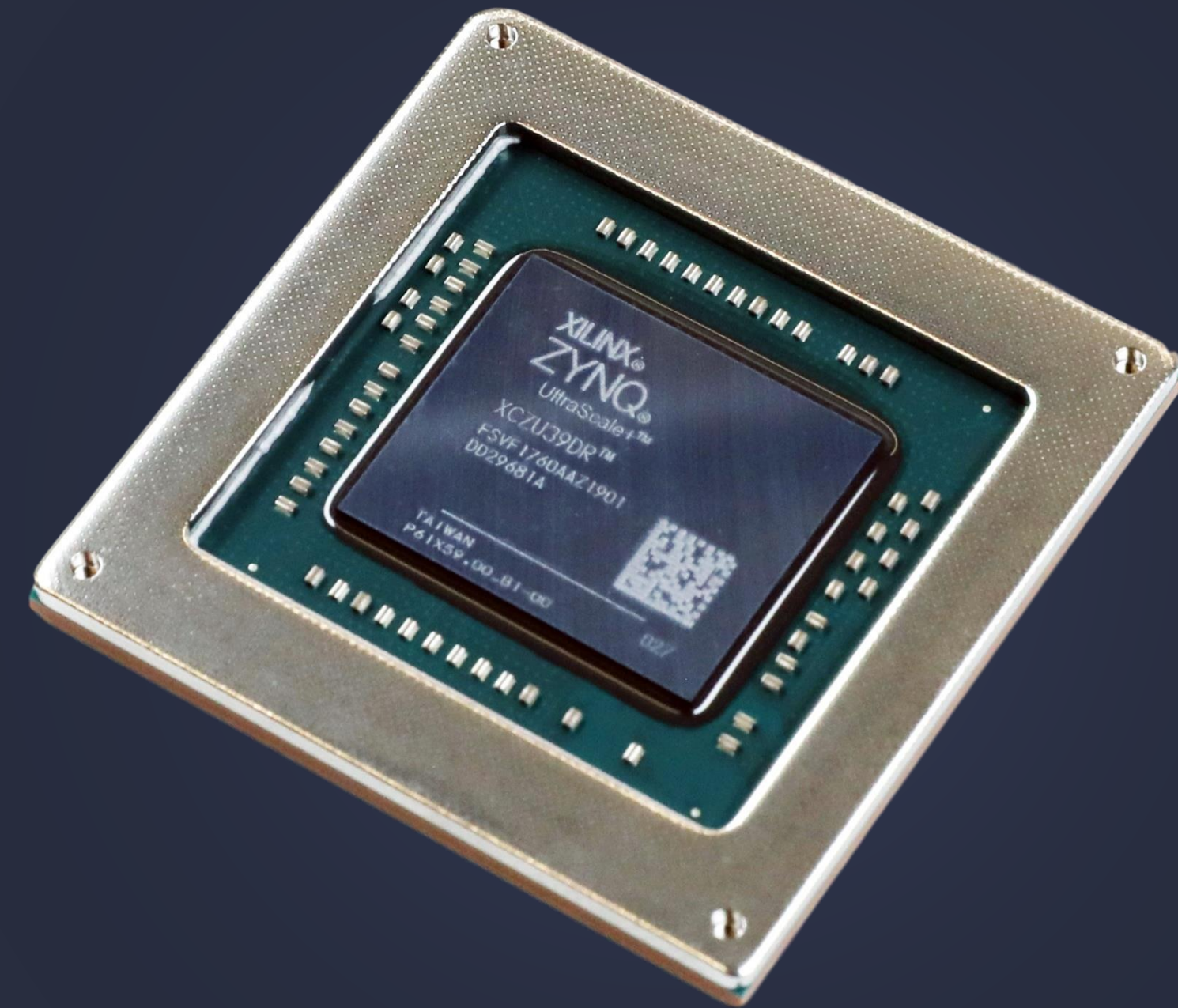
First RF Test Chips  
首款射频测试芯片

**2017**

First ZU+ RFSoc Shipped  
首款 ZU+ RFSoc 出货

**2018**

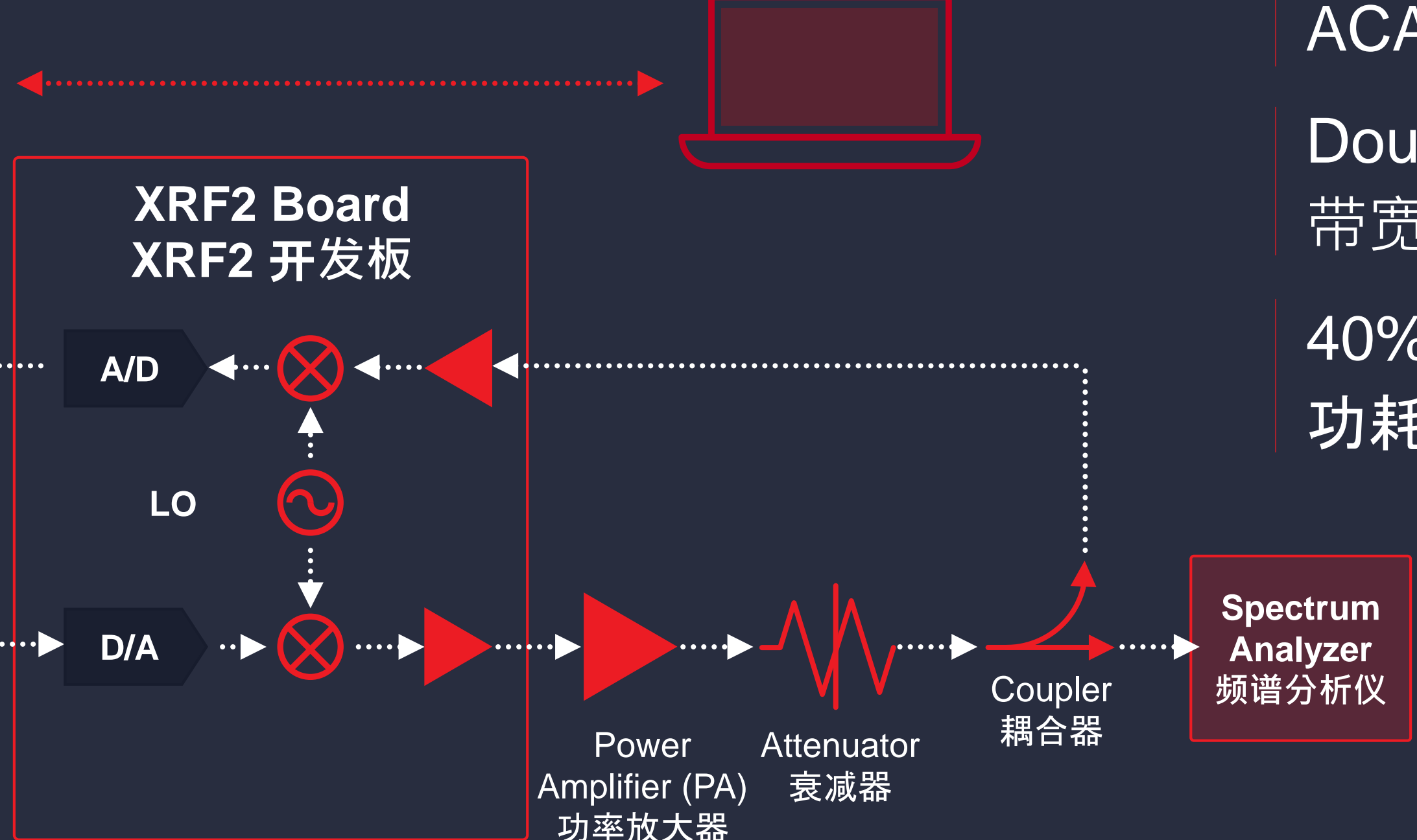
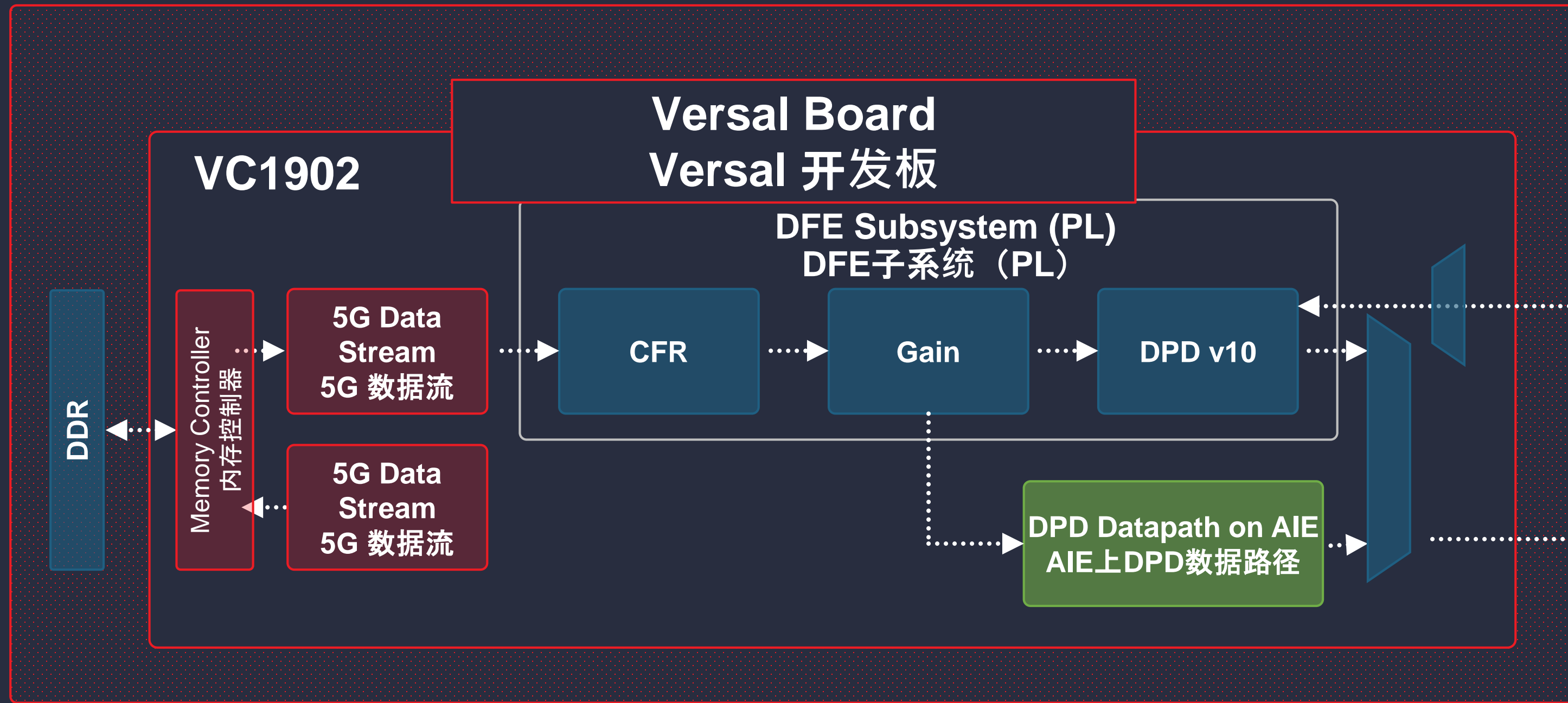
First 5G Radio  
Deployment with RFSoc  
首次以RFSoc进行5G无线部署



Multiple 5G Radio Deployments  
Underway with Xilinx Zynq US+ RFSoc  
多个基于赛灵思 Zynq US+ RFSoc 的 5G 无线电部署正在进行

# 5G Digital Front End Evolution in 7nm

## 7nm 5G 数字前端演进

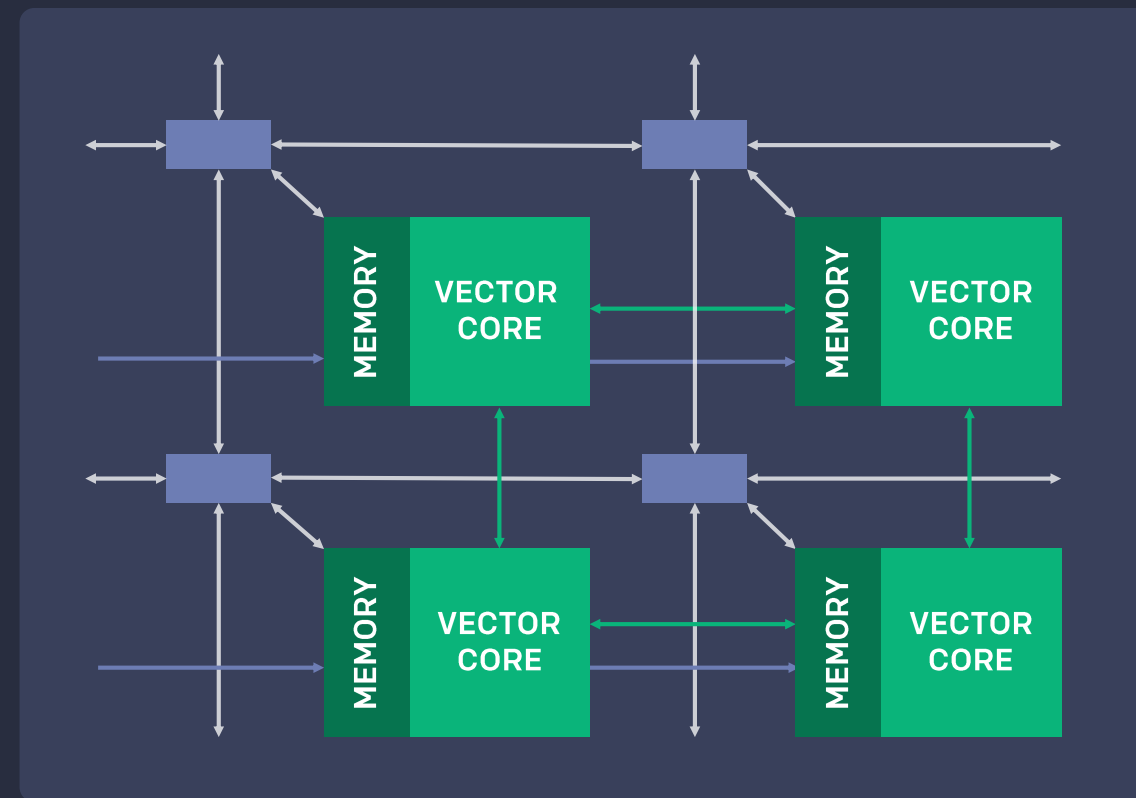


- FPGA = 8T 8R
- ACAP = 16T 16R
- Double the Bandwidth  
带宽加倍
- 40% Lower Power  
功耗降低 40%

# Spectral Re-Use with Beamforming

## 借助波束成形实现频谱复用

Massive-MIMO  
Antenna  
mMIMO 天线



AI Engines = 4x Vector  
Compute for 5G vs. FPGA  
AI 引擎 = 5G 矢量计算量为  
FPGA 的 4 倍

Beamforming is Computationally Expensive  
波束成形技术算下来较为昂贵

High-Density Vector Math Needed  
需要高密度矢量数学

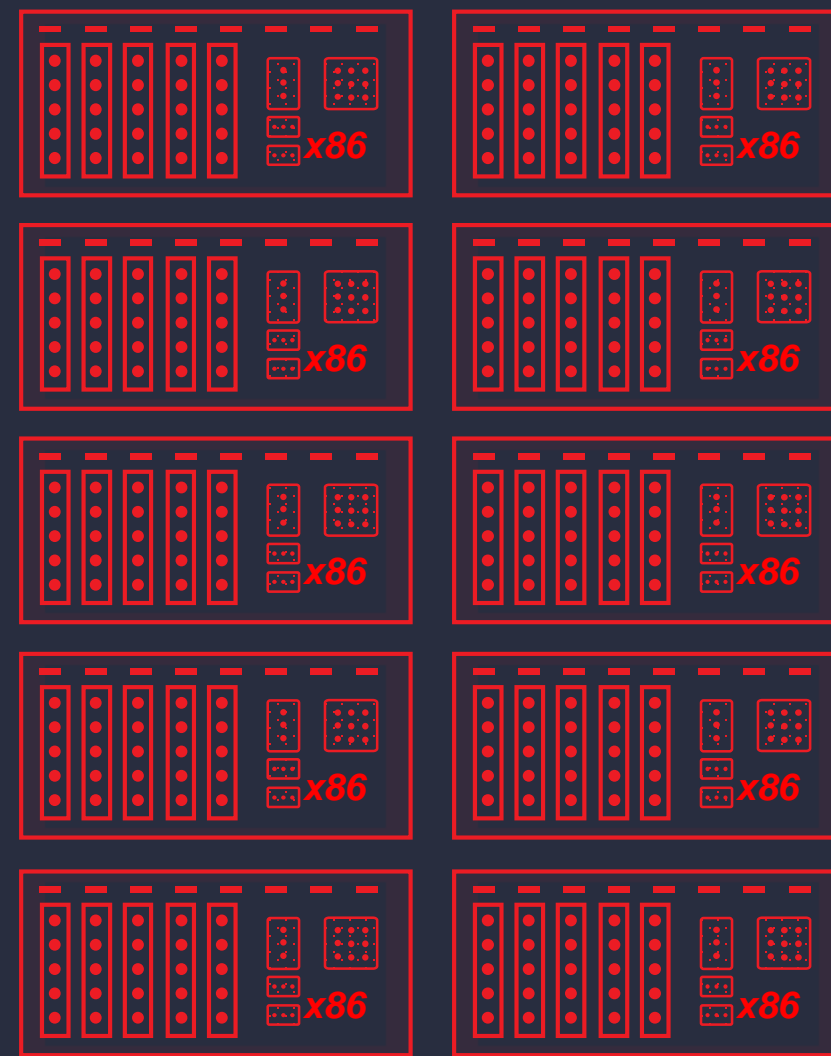
Versal Devices with AI Engine Array  
具备 AI 引擎阵列的 Versal 器件



# Telco Virtual BBU Acceleration Cards

## 电信虚拟 BBU 加速卡

**10** Xeon Servers  
至强服务器



**1**

Xilinx Accelerated  
Server  
赛灵思加速服务器



10x CPU Efficiency With L1 Offload  
借助 L1 卸载使 CPU 效率提高 10 倍

Reference Design Today:

目前参考设计：

- LDPC = 4x Faster with FPGA
- HARQ = 3x Faster with FPGA
- 2-3x more users per cell

Single Server with Xilinx Accelerator Card replaces 10 XEON Commodity Servers!

一台配备赛灵思加速器卡的服务器可替代 10 台至强商用服务器！

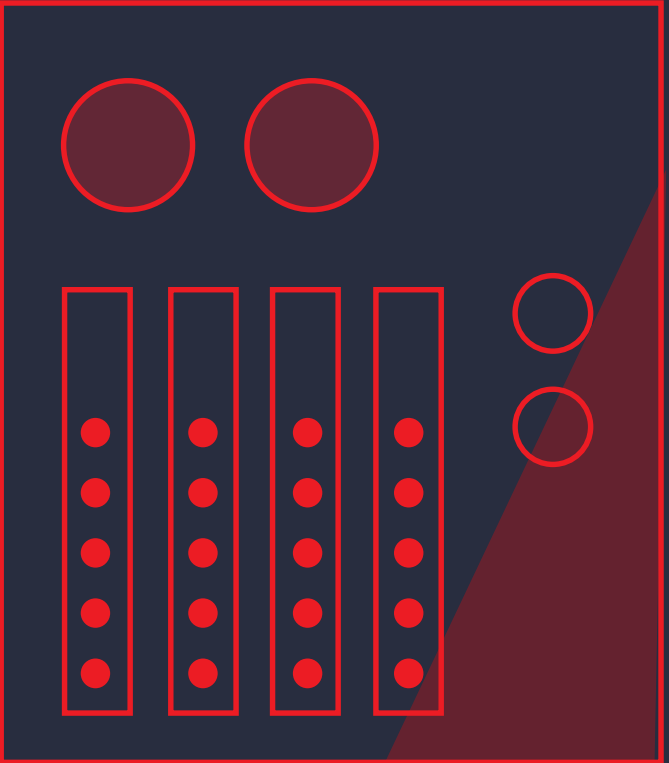
# Core Networks are our Core Strength

## 核心网是我们的核心优势



### Converged Access 融合接入

- DOCSIS
- PON
- Ethernet



### Edge 边缘

- Traffic Management
- Flex-Ethernet
- AI-based Security



### Core 核心网

- Flex-OTN
- Integrated Crypto
- 112G PAM4
- 600G MAC

# WWG Mission

## 有线与无线事业部使命

Enabling End-to-End Communications Infrastructure Upgrades

实现端到端通信基础设施的升级

