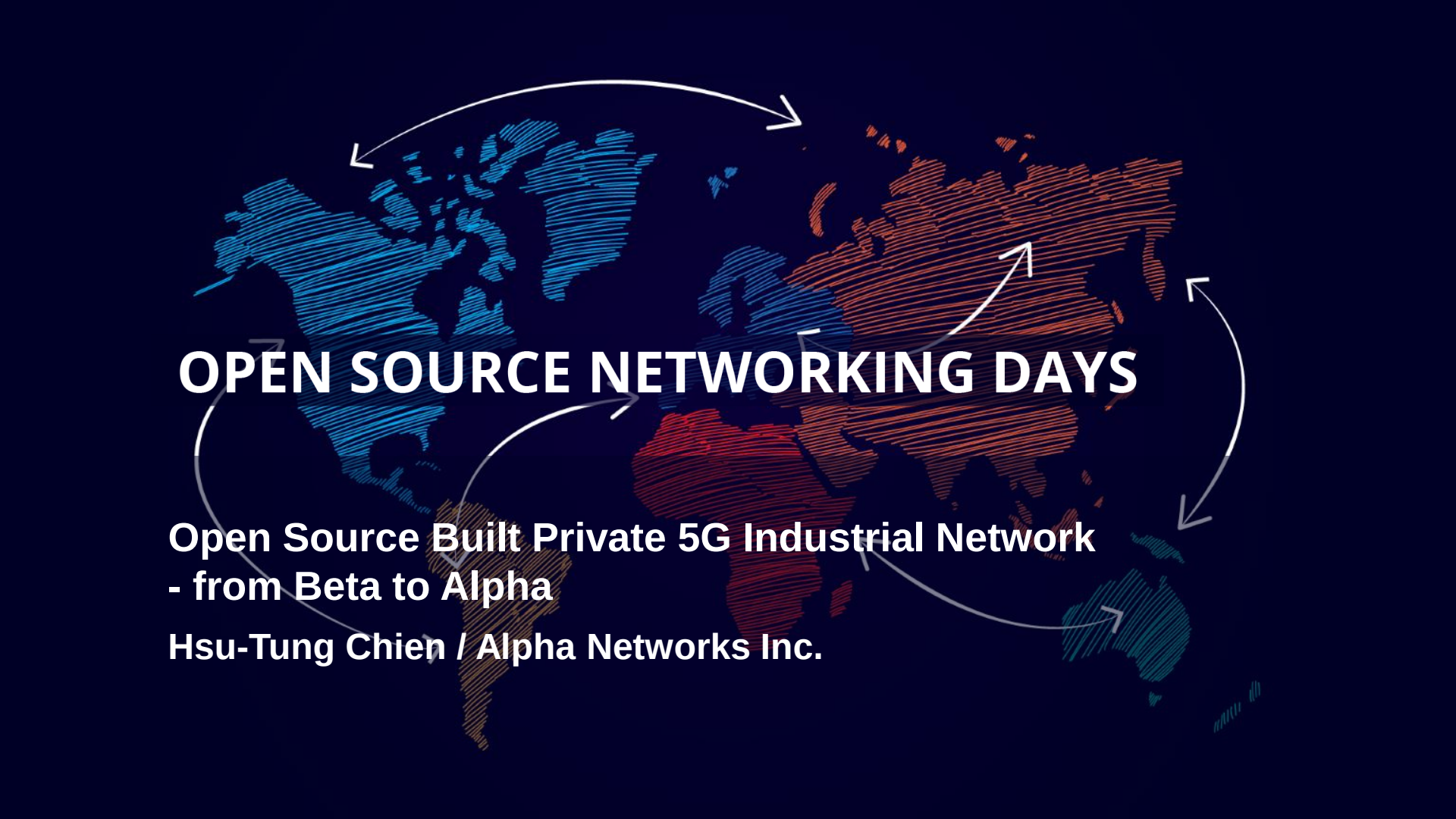


Open Source Built Private 5G Industrial Network - from Beta to Alpha

Hsu-Tung Chien / Alpha Networks Inc.

Outline

- What is the private network for industries?
- Why cellular networks then 5G SA?
- Architecture of cellular networks
  - LTE, 5G-NSA , and 5G-SA
- How to build your own with open sources?
- Move your solution to market

Who am I

- 簡旭彤
- **Hsu-Tung Chien**
- **ht.chien@alphanetworks.com**
- **Experience**
  - **Alpha Networks Inc.**
    - Associated project manager, Nov. 2020 – present
  - **National Chiao-Tung University**
    - Postdoc, Mar. 2020 – Oct. 2020
  - **O'Prueba Technology Inc.**
    - Associated technical manager, Aug. 2019 - Dec. 2019
  - **Industrial Technology Research Institute (ITRI)**
    - Intern, Jul. 2014 - Oct. 2019
      - 4G & 5G EU-TW Projects
- **Education**
  - **National Chiao-Tung University**
    - Ph.D. Sep. 2017 - Oct. 2019
    - M.S. Sep. 2014 - Jun. 2017
  - **Tung-Hai University**
    - B.S. Sep. 2010 - Jun. 2014

Introduce to Alpha Networks Inc.

- **Vision**
  - Forging the Internet to connect people and things.

- **Mission**
  - ALPHA Networks is a globally recognized, professional networking DMS supplier.
  - We use advanced technology to provide our customers with outstanding solutions at the best value.

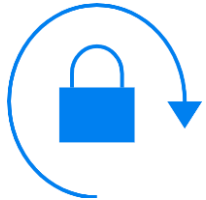
ALPHA Networks, your reliable networking partner!

What is the Private Network for Industries

- **Autonomy**
  - **Device**
    - used exclusively by devices authorized by the end user industries.
  - **Location**
    - deployed in one or more specific locations
  - **Data**
    - keeps sensitive data at local
  - **Management**
    - self-determined network for specific situation such as capacity, coverage or associated policies which are access control, data privacy, QoS, the required SLA, and so on.

Why Cellular Network

- **Security**
  - Cellular-grade level security



- **Specified & Optimized**
  - for specific enterprise services to reach quality of service and latency requirements

- **Coverage & Interoperability**
  - Outdoor/Indoor, Global standard vast ecosystem

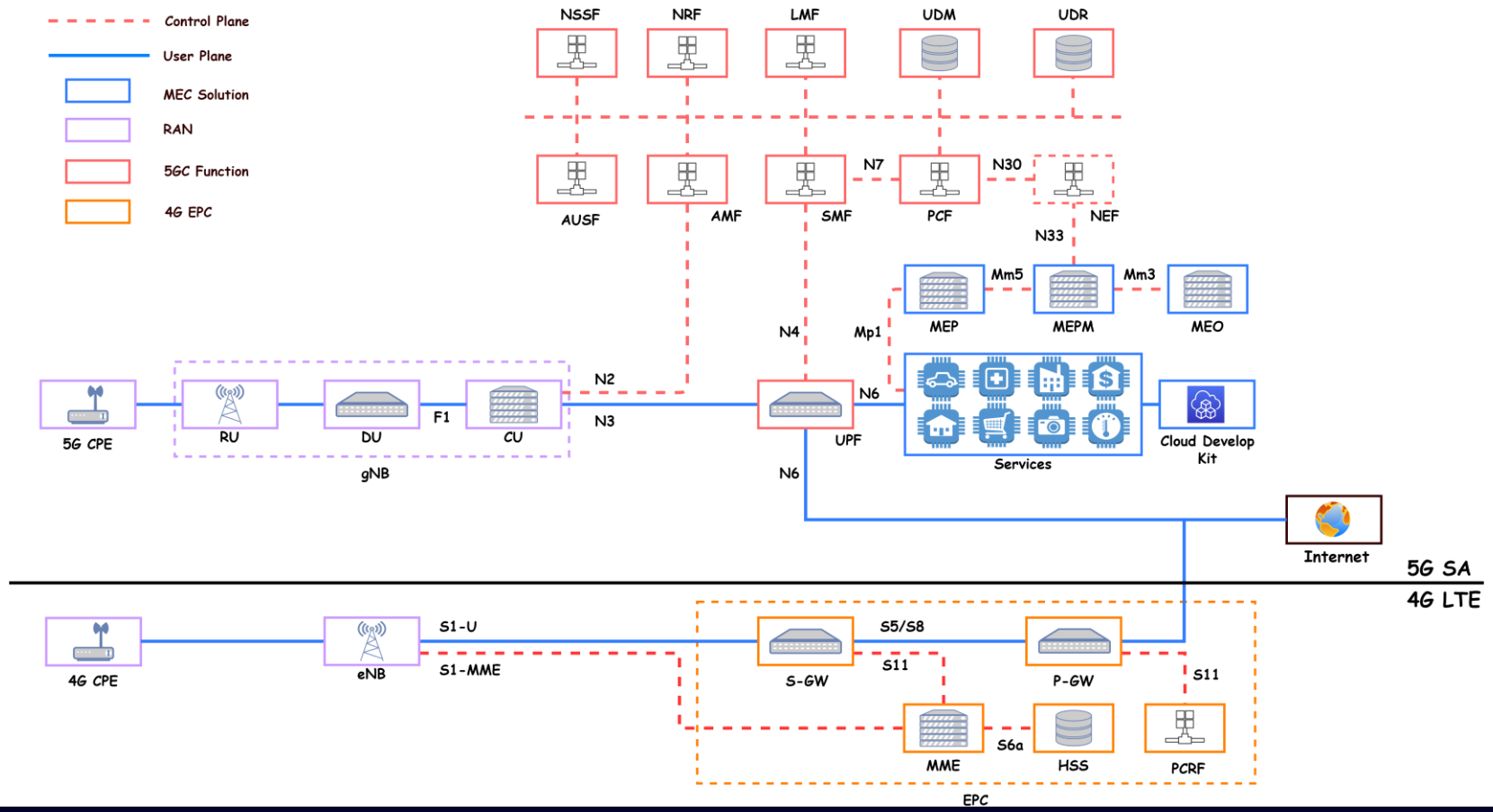
Why 5G SA

- **Dedicated**
  - Dedicated frequency for mobile private network (e.g., Band N79 4.8-4.9 GHz in Taiwan)

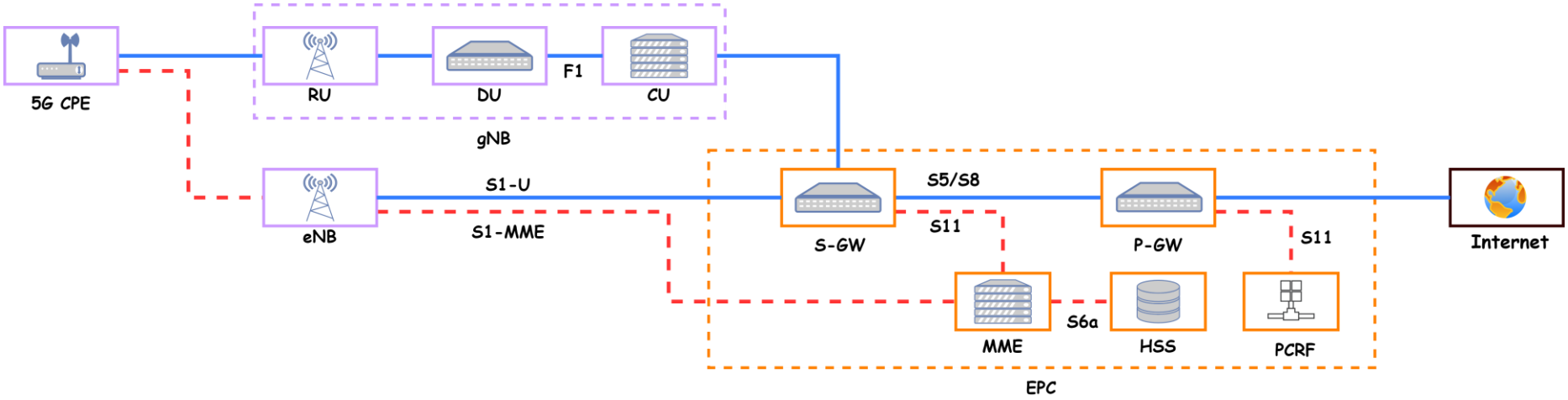
- **Agility, Sensitive & Reliability**
  - Edge computing in standard and telco-grade reliability also synchronization (URLLC and TSN)

- **Enhanced Security and Capacity**
  - Secure radio site and high data rate with low latency

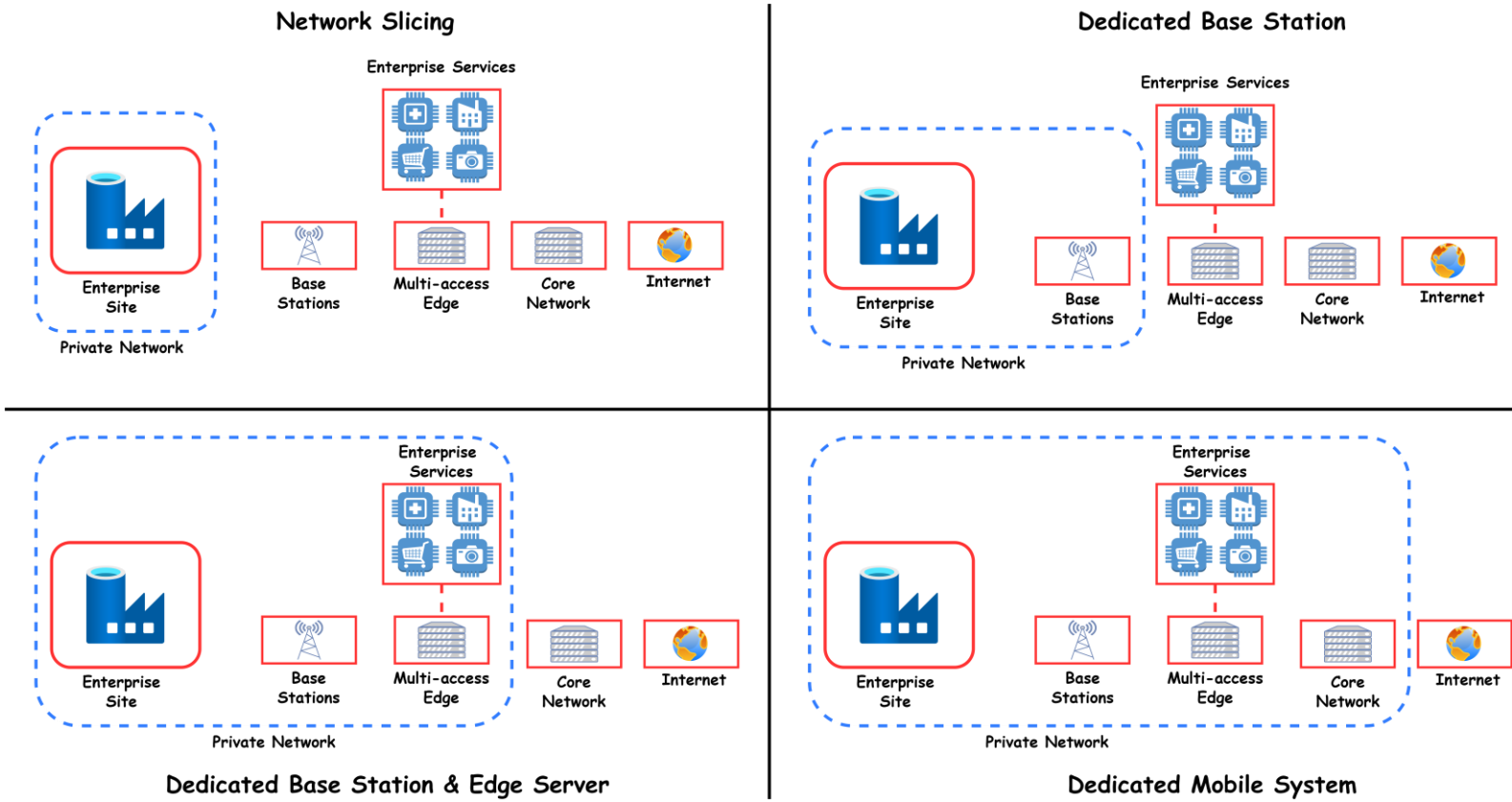
The Arch. of 5G SA and 4G LTE



The Arch. of 5G NSA

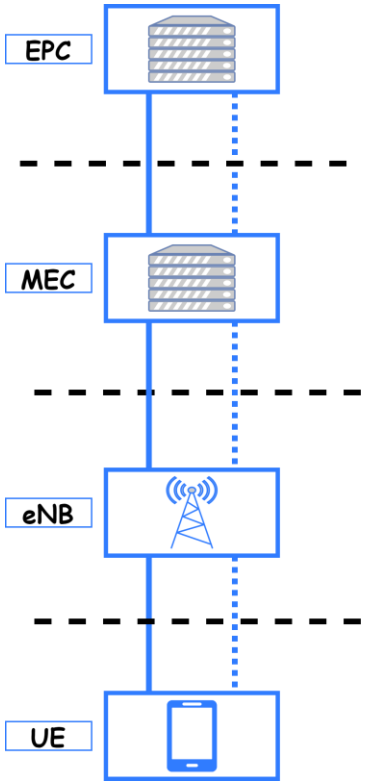


Different Cases



Build your own - 4G LTE

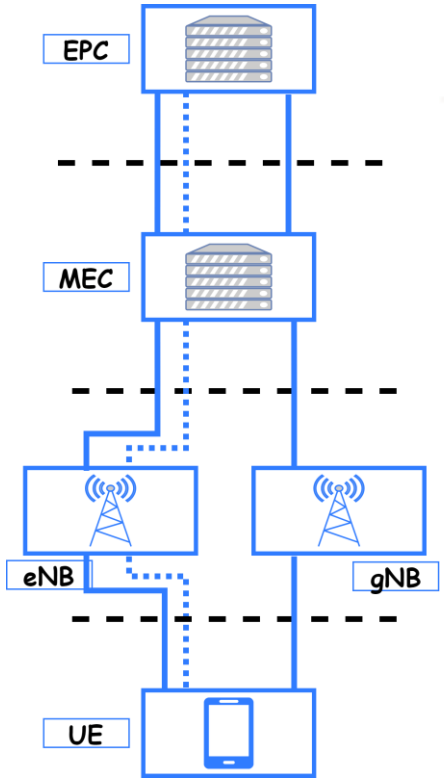
- **Core network**
  - srsLTE
  - OpenAirInterface
  - nextEPC
- **MEC**
  - NCTU NEMS
- **RAN**
  - srsLTE
  - OpenAirInterface
- **Simulated UE**
  - srsLTE
  - OpenAirInterface



SRSLTE
OPEN AIR INTERFACE
NextEPC
NEMS
SRSLTE
OPEN AIR INTERFACE
SRSLTE
OPEN AIR INTERFACE

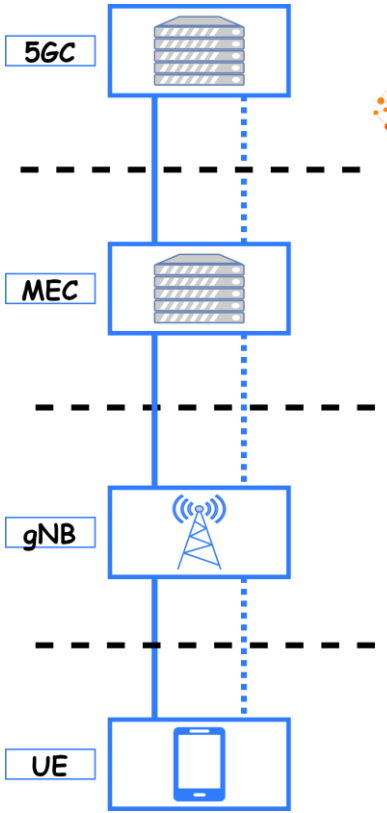
Build your own - 5G-NSA

- **Core network**
  - OpenAirInterface
  - Open5GS (nextEPC)
- **MEC**
  - NCTU NEMS
- **RAN**
  - OpenAirInterface
- **UE**
  - OpenAirInterface

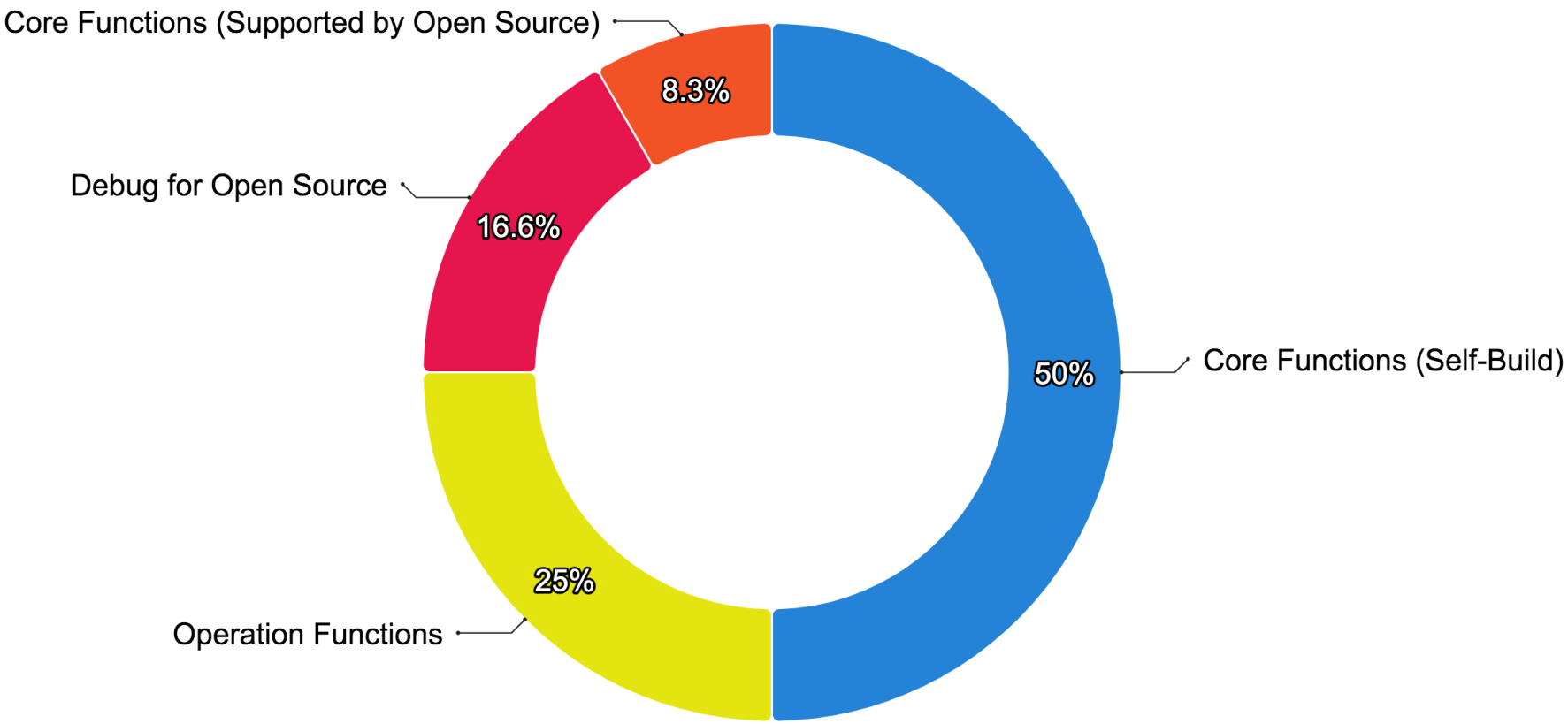


Build your own - 5G-SA

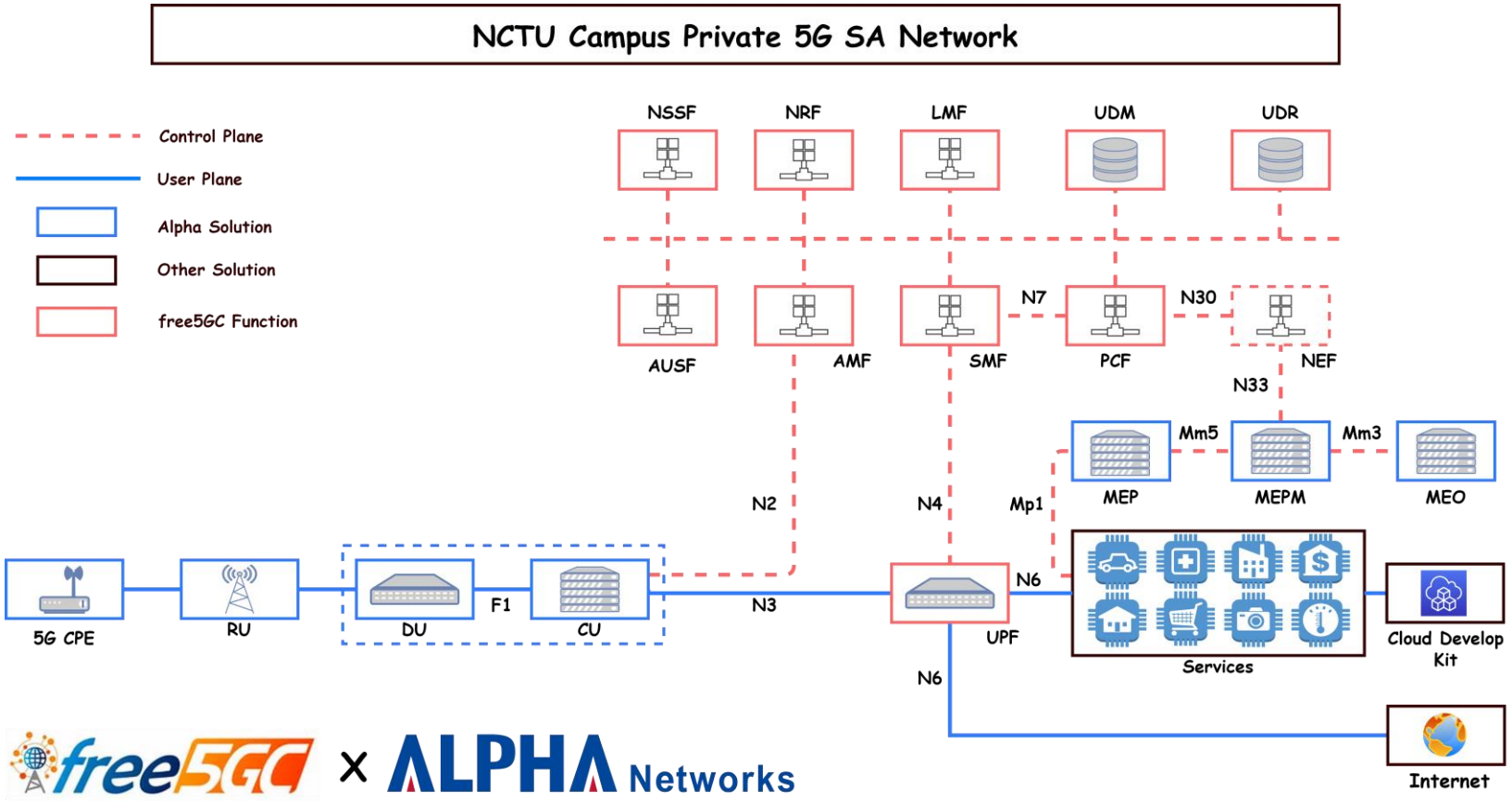
- **Core network**
  - free5GC
  - Open5GS
  - OpenAirInterface
- **MEC**
  - N/A
- **RAN**
  - N/A
- **UE**
  - N/A



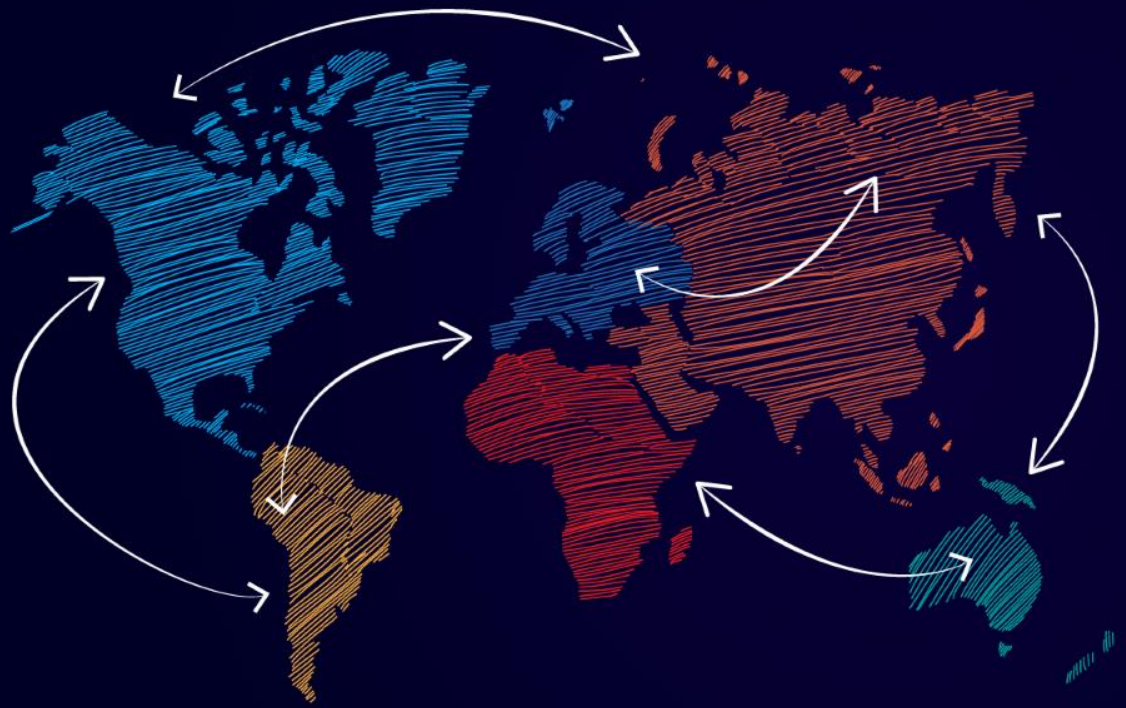
Move your solution to market



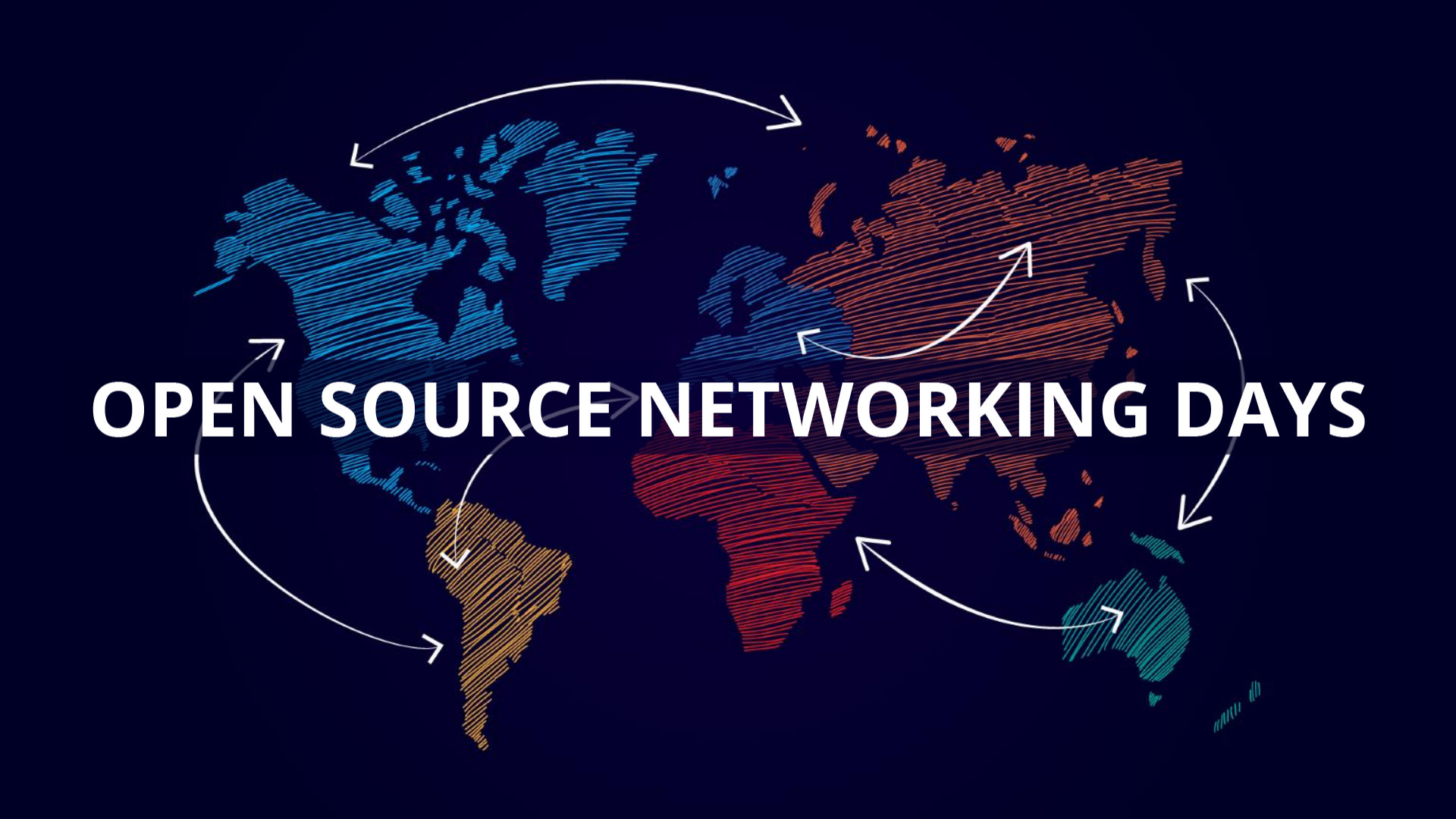
5G Private Network at NCTU (Band N79)



free5GC × ALPHA Networks



Thank you for your attention!


OPEN SOURCE NETWORKING DAYS