Open Source Built Private 5G Industrial Network
- from Beta to Alpha
Hsu-Tung Chien / Alpha Networks Inc.
• 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

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Experience
- Alpha Networks Inc.
  - Associated project manager, Nov. 2020 – present
- National Chiao-Tung University
  - Postdoc, Mar. 2020 – Oct. 2020
- O’Prueba Technology Inc.
- Industrial Technology Research Institute (ITRI)
    - 4G & 5G EU-TW Projects

Education
- National Chiao-Tung University
- Tung-Hai University
• 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
Build your own - 4G LTE

- **Core network**
  - srsLTE
  - OpenAirInterface
  - nextEPC

- **MEC**
  - NCTU NEMS

- **RAN**
  - srsLTE
  - OpenAirInterface

- **Simulated UE**
  - srsLTE
  - OpenAirInterface
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

- Core Functions (Supported by Open Source): 8.3%
- Debug for Open Source: 16.6%
- Operation Functions: 25%
- Core Functions (Self-Build): 50%
5G Private Network at NCTU (Band N79)
Thank you for your attention!
OPEN SOURCE NETWORKING DAYS