EURECOM
Sophia Antipolis

OPEN AIR INTERFACE

OpenAirInterface 5G Core Network: Status and Roadmap

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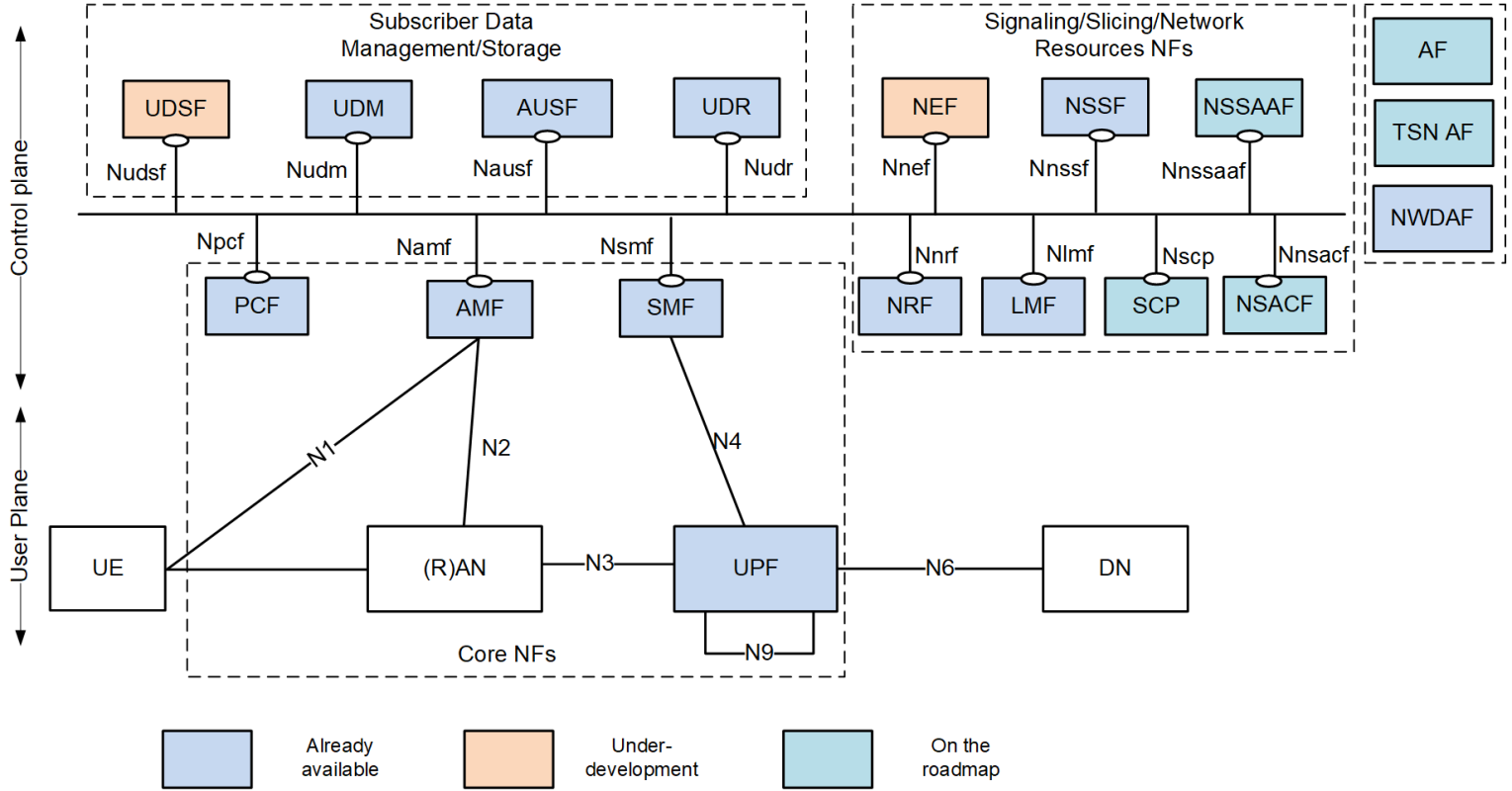
OAI 5G CN Project Group

- Objective: develop a fully 3GPP compatible 5G CN stack (SA) as open source software for the OAI community
- Website: https://openairinterface.org/oai-5g-core-network-project/
- Git repository: https://gitlab.eurecom.fr/oai/cn5g
- Main contributors: EURECOM/OAI, BUPT, Phine.tech
- Releases:
  - First release: Rel 1.0.0, September 2020
  - Current release: Rel 2.1.0, August 2024

OAI 5G CN – Current Status (1): Release 2.1.0 (Aug 2024)



https://gitlab.eurecom.fr/oai/cn5g/oai-cn5g-fed/-/blob/master/CHANGELOG.md

OAI 5G CN – Current Status (2)

- **Solid and functional 5GC**
  - Basic procedures (with multiple UEs/PDU sessions): connection and registration procedures (UE registration/de-registration, service request), session management procedures (PDU session establishment, modification, release)
  - Basic features: NF registration, NF discovery, HTTP1/2, FQDN
- **Advanced features**
  - N2 handover
  - Static UE IP address allocation
  - Event exposure services for SMF (7 events), AMF (6 events), UDM/UDR (on-going)
  - Customize APIs for User provisioning, for configuring NFs on the fly
  - Network slicing with NSSF and multiple AMFs
  - Multiple UPFs in the same data path/Support UL Classifier
  - Location services (AMF and LMF)
  - QoS support for both control and data plane (on-going, integration test)

OAI 5G CN – Current Status (3)

- **Different flavors**
  - Three 5GC modes
    - Minimalist 5GC with AMF, SMF, UPF and NRF (deprecated)
    - Basic 5GC with AMF, SMF, UPF, NRF, UDM, AUSF and UDR
    - Full 5GC with AMF, SMF, UPF, NRF, UDM, AUSF, UDR, PCF, NSSF and NWDAF
  - Two options for database: MySQL and MongoDB
  - Three UPF flavors:
    - UPF Simple-Switch
    - eBPF/XDP
    - VPP-UPF (relying on VPP-Travelping, with DPDK support, soon to be deprecated)
- **Deployment options**
  - Traditional/classic deployment on Servers/Virtual machines
  - Automated deployment of NFs in Docker containers using Docker-Compose
  - Cloud-native deployment using Helm Chart (on OpenShift cluster)

OAI 5G CN – Current Status (4)

- **Validation, CI/CD with**
  - Functional, stability, reliability and performance (support +5000 User with traffic) tests
  - OAI gNB/OAI UE, COTS UEs (***Rel 15/Rel 16*** UEs e.g., Quectel/SIMcom modules (including RM520-GL, RM502Q-AE), Iphone 14/14 Pro, Huawei P40/P40 Pro, Pixel 5/6/7, One Plus 8, etc), Amarisoft UE
  - Open-source RAN simulators (gNBSim, UERANSIM, My5g-RANTester, Omec-gnbsim)
  - Commercial gNBs/ COTS UEs
  - In house “NGAP/NAS tester”
- **Performance validation**
  - Support 5000+ UEs with traffic
  - UPF:
    - UPF Simple-Switch: ~800Mpbs UL/DL with Dockers, ~1Gbps UL/DL with bare-metal
    - eBPF/XDP: ~100Gbps DL/UL with bare-metal

Roadmap

- **Focusing on stabilizing OAI CN and improving performance**
  - Improving the code quality of 5G CN, to make it more stable and robust: Regularly refactoring the code base, simplifying the code base by relying on the common sub-modules
  - Providing bug fixes to make OAI CN more stable and work with a wider range of COTS UE
  - Adding unit tests for main components/libraries
- **New features/components**
  - Release 17/18 for NAS/NGAP/PFCP (on-going)
  - Configure the Core Network Functions with a Dashboard (on-going)
  - Support Ethernet type PDU session (5G LAN-type services, to be released soon)
  - Support TSN
  - Traffic steering for Service Function Chaining
  - Support ECIES (Elliptic Curve Integrated Encryption Scheme) profile A/B (for SUPI concealment)
  - Release UDSF, NEF
  - Stateless Network Functions Support (AMF/SMF)
  - Adding more Unit tests (on-going)
  - Multiple PLMNs support

Thank you for your attention!

Q&A!