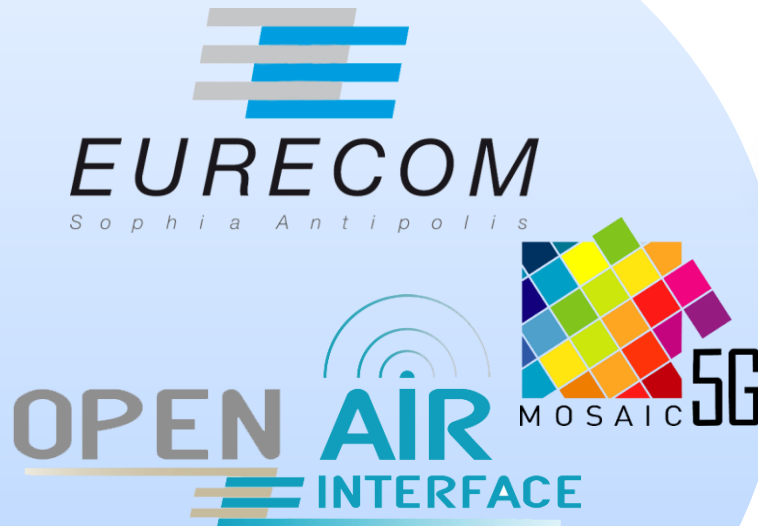


Mosaic5G

Agile 4G/5G Service Delivery Platforms and UCs

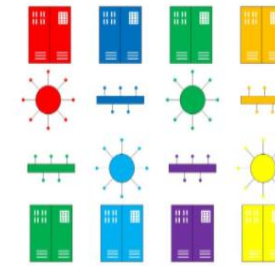
Navid Nikaein (Eurecom, OSA, BubbleRAN)



5G RAN

OAI 5G RAN PROJECT GROUP
OpenAirInterface 5G Radio Access Network
Project The scope of the OAI 5G RAN project
is to develop...

[Read more](#)



5G CORE NETWORK

5G CORE NETWORK The scope of 5G CN
project developments is to deliver a 3GPP
compliant 5G Core Network under the OAI...

[Read more](#)



MOSAIC5G

OAI MOSAIC5G PROJECT GROUP
OpenAirInterface MOSAIC5G Project Group
The newly created MOSAIC5G (M5G) PROJECT
GROUP aims to transform radio access (RAN)
and...

[Read more](#)

Founded by Eurecom and Launched in 2016
Merged with OpenAirInterface in May 2021

Mosaic5G Dual Objectives

Unlocking OpenRAN and OpenCN Models in a multi-vendor env.

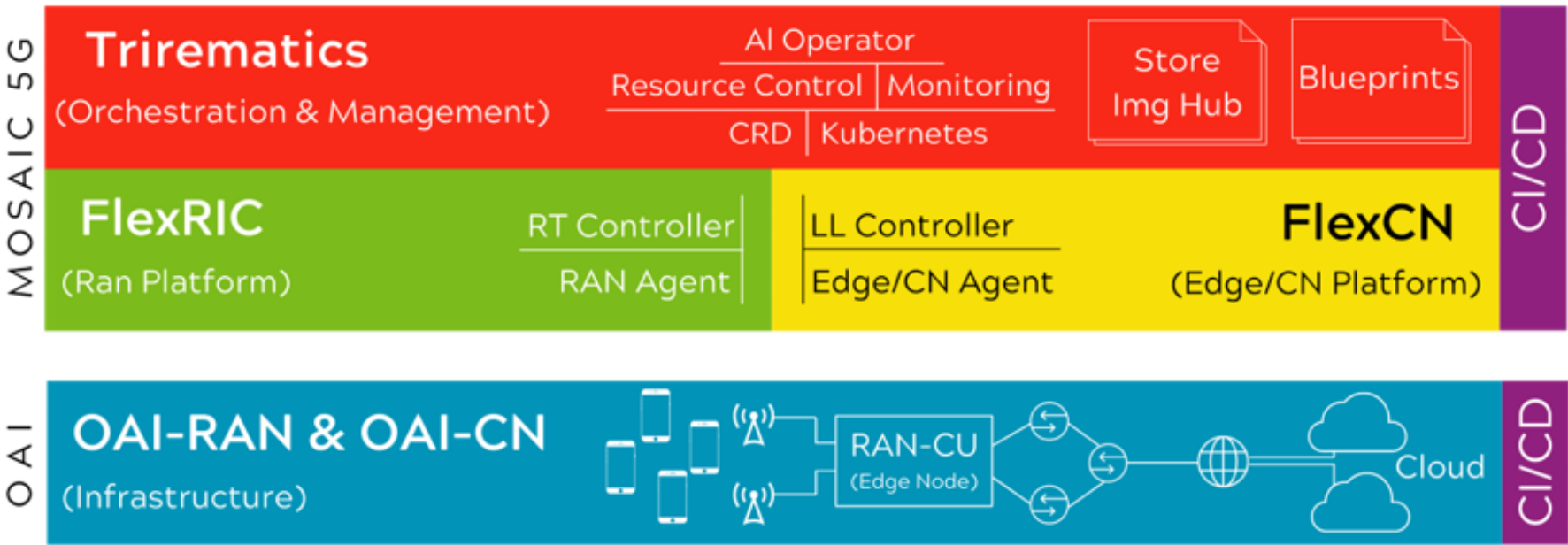
1. Provide an ecosystem of open source 4G/5G service platforms, reusable components (xApps, SM, ...) and use-case descriptions (deployment blueprint)
2. Provide an SDK to design and develop service models and xApps to compose a range of specialized 4G/5G network-service platforms tailored to divers use-cases

Mosaic5G Service Platforms

1. **FlexRIC (SD-RAN): Flexible RIC and E2 Agent**
2. **FlexCN (SD-CN): Flexible CN Controller**
3. **Trirematics (T9s): Intelligent RAN and CN service operator in a multi-x cloud-native environments**
4. **FlexSDK: Flexible xApp/SDK RAN+CN framework**

→ Programmable and Data-driven 4G and 5G networking and more ...

Mosaic5G Stack



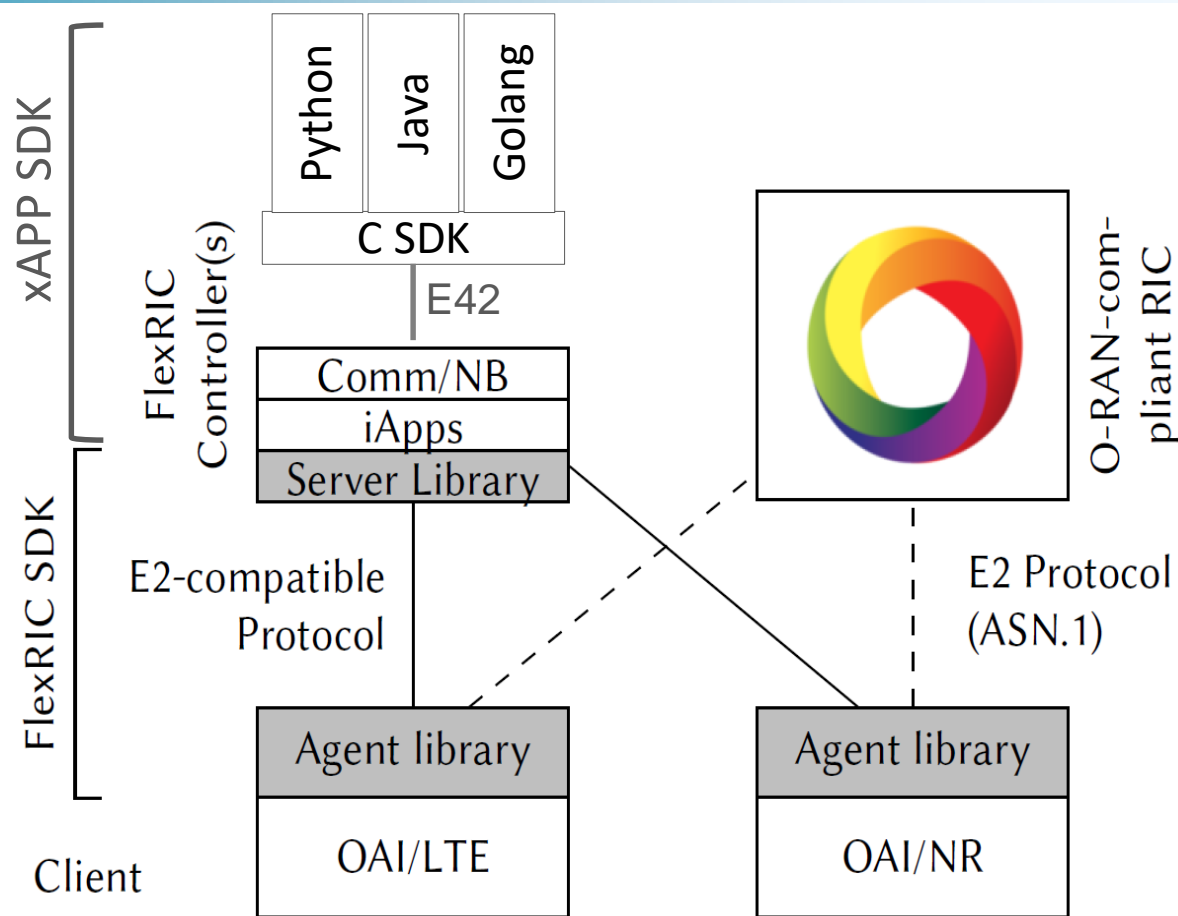
OAI public license 1.1 (4G+5G RAN, 5GCN, SPGW-C, SPGW-U, Mosaic5G)
3-Clause BSD License (4G MME & HSS, Mosaic5G SDK/xAPP)



FlexRIC SDK

A Flexible SD-RAN Platform

- FlexRIC is an O-RAN compliant E2 Agent, near-RT RIC, and xAPP SDK
 - Multi-X support: Vendor, RAT, Language, Agent, xApp
 - E42 protocol: RIC-xAPP interface
 - Recursion and specialized controller
- Pluggable Service Models
 - E2SM-RRC, E2SM-PDCP, E2SM-RLC, E2SM-MAC, E2SM-SC
 - E2SM-HW, E2SM-KPM, E2SM-TC
- Highly Efficient and Ultra-lean
 - Low-Latency or resource-restricted UCs



FlexRIC SDK Comparison

Criteria	O-RAN RIC	ONOS RIC	FlexRIC
Zero Overhead	No	No	Yes
Enc/Dec	ASN1.c	ASN1.c	ASN1.c, FB, Plain
E2AP version	v2.0	v2.0	v1.26
E2AP Messages / IEs	7/26	10/26	20/26, 12/26
Multi-language	Yes	Yes	Yes
E2 Nodes	Radisys	OAI, SRS, Radisys	OAI, SRS, AMR
Memory footprint	1	?	0.17
E2 Agent-xApp latency	>1ms	>1ms	100us
Service Models	Embedded	Embedded	Pluggable, Extendable

FlexRIC paper <https://bit.ly/3uOXuCV>

FlexCN

A Flexible SD-CN Platform

Multi-Roles (scenario-dependent AF, NWDAF,)

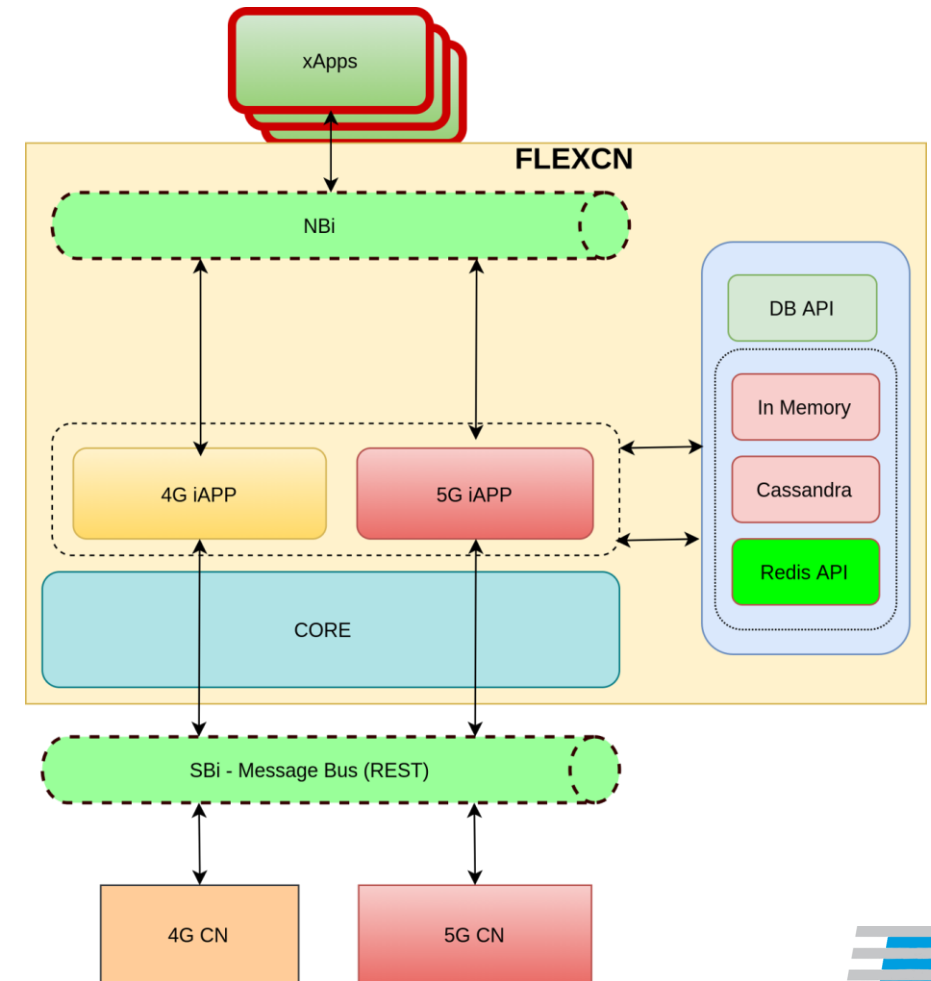
Monitoring per UE/QFI/Slice

Traffic Control (AF/SMF/PCF/UPF)

UE management (UDM/UDR)

Mobility Management (AMF)

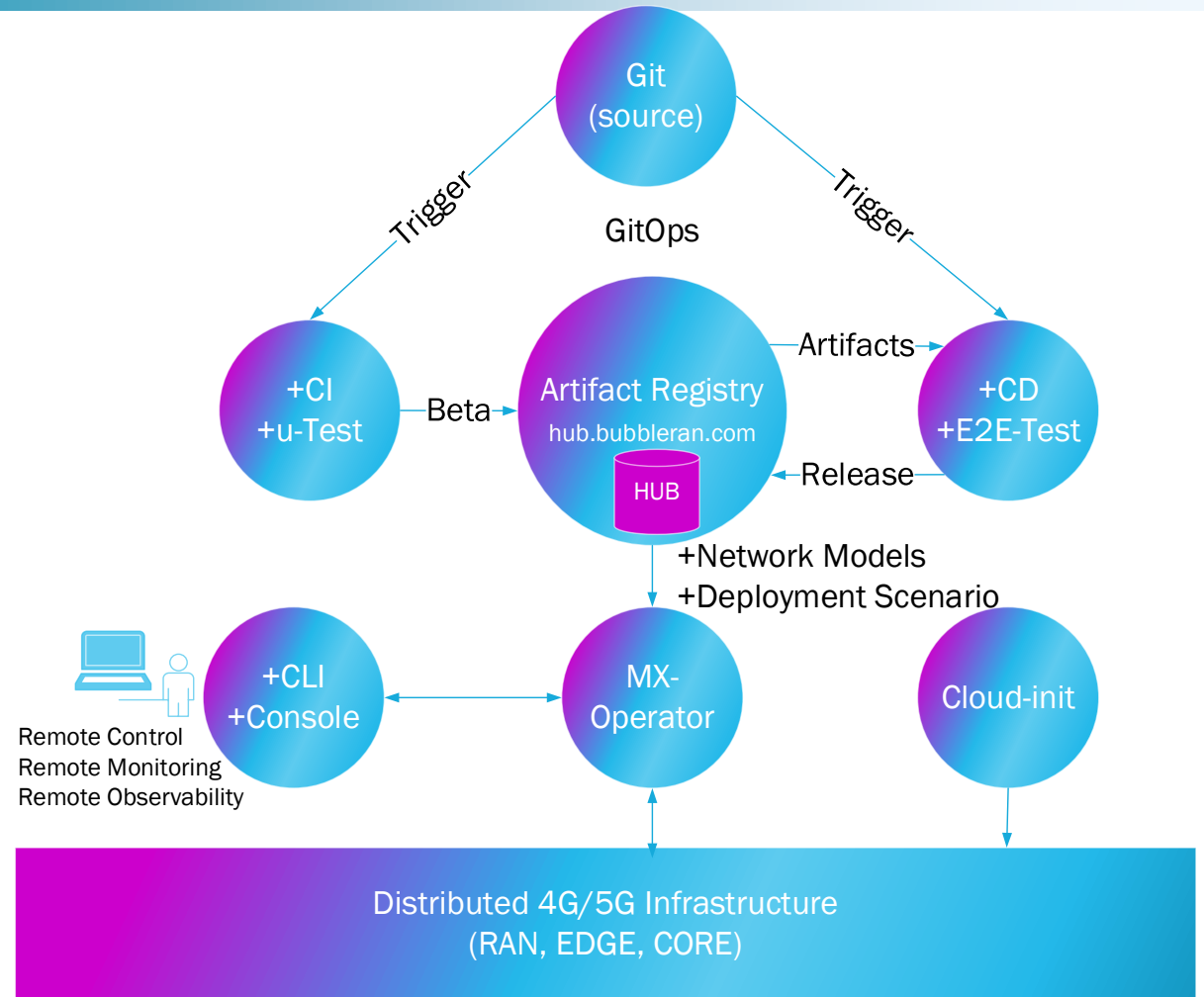
Slice management (NSSF)



Trirematics T9S

An Agile 4G/5G Operator

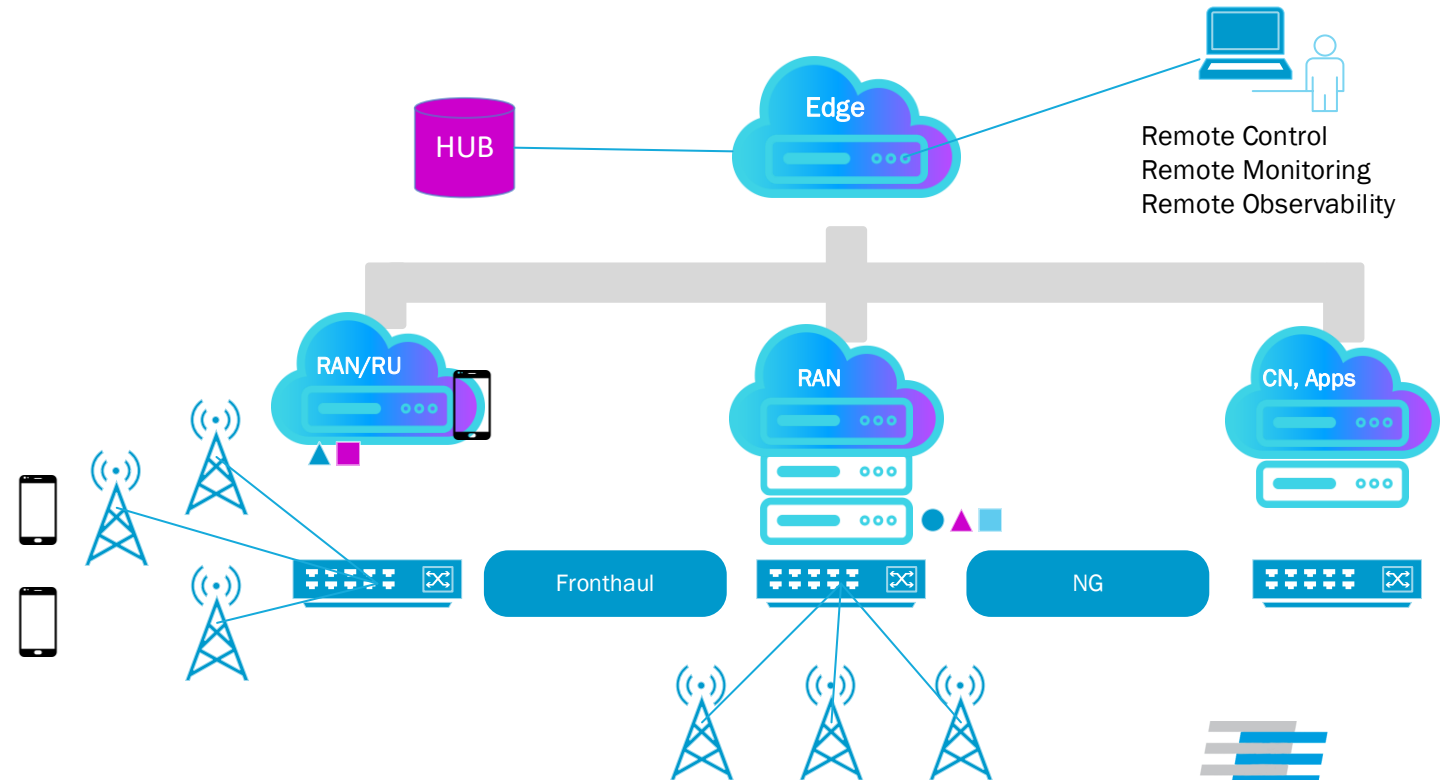
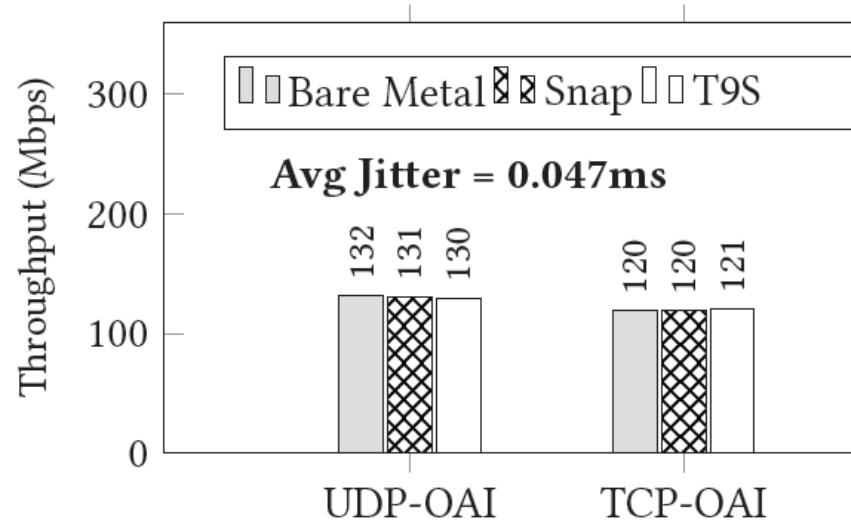
- Multi-X Devs
 - Packaging
 - Testing
 - Distribution
- Multi-X Ops
 - Provisioning
 - Automation
 - Control
 - Observability



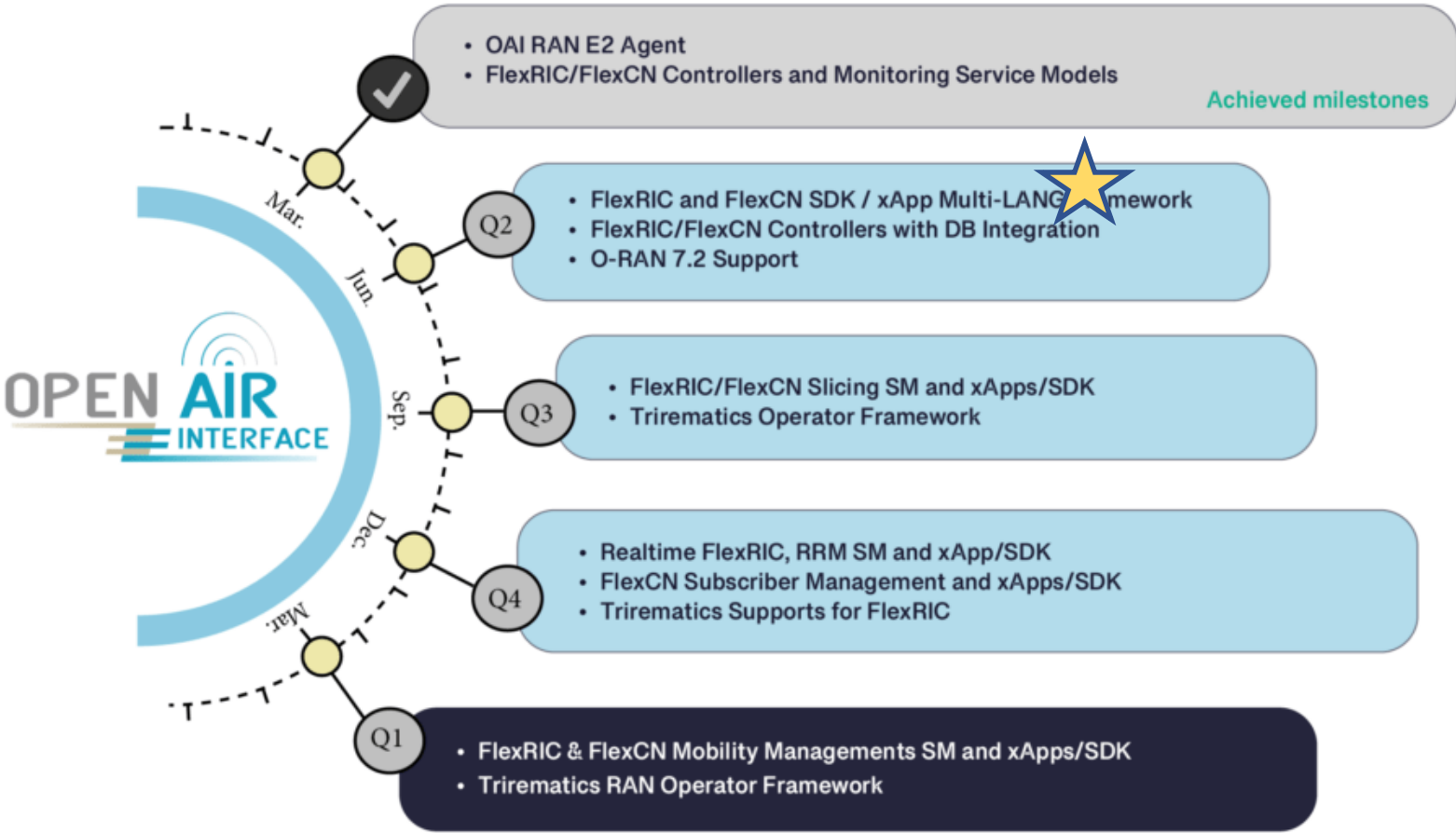
T9S Cloud-Native Deployment

Full Automation and No Performance Loss

Distributed and Heterogeneous Infrastructure



Mosaic5G RoadMap



2022



2023

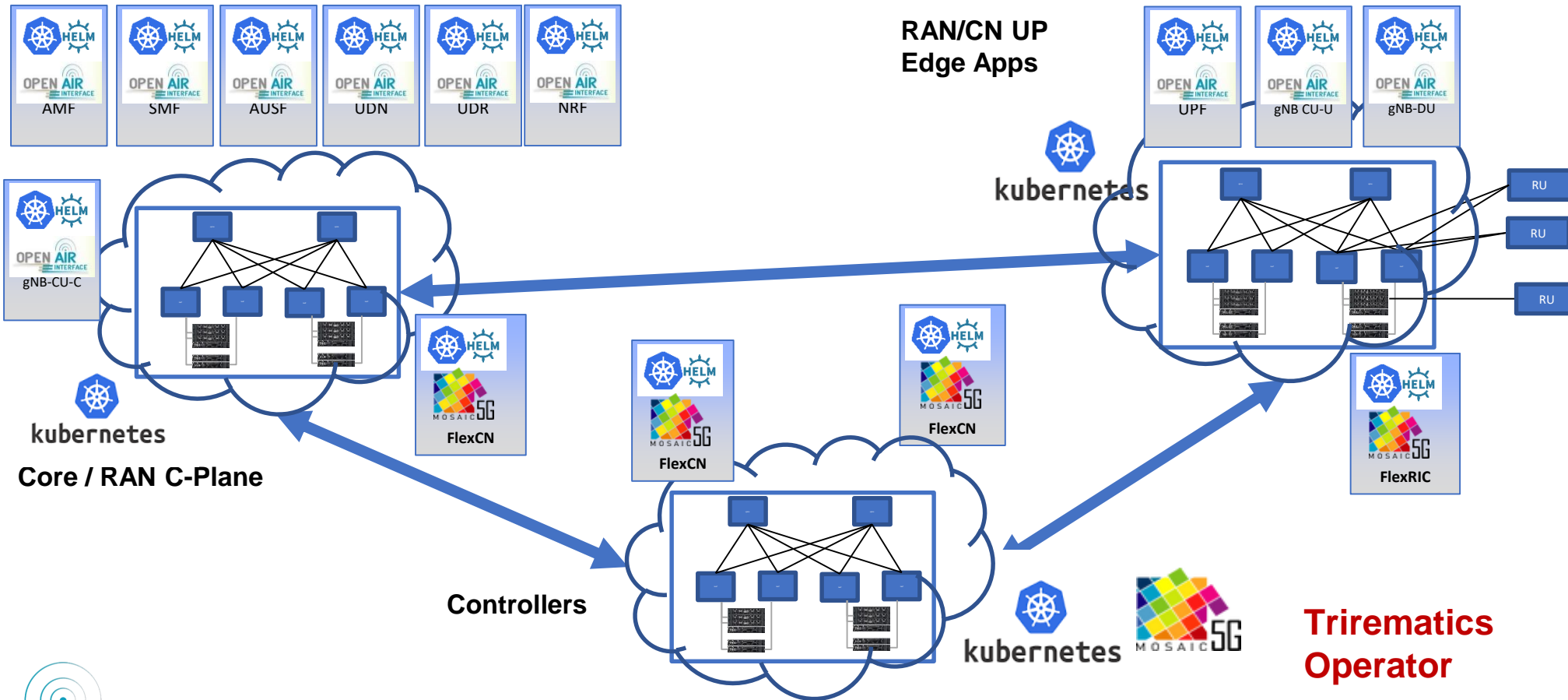


Final Word

Join us on the OSA Mosaic5G Project Group

To unlock open innovations in Open 4G/5G RAN/CN arenas
from a rich ecosystem of reusable platforms, components, and
use-cases

Q & A



FlexRIC SDK

RAN Monitoring Service Models

“MacUeStats” :

```
{
  "rnti": 8442,
  "dlAggrPrb": 3279195,
  "ulAggrPrb": 8665,
  "dlAggrTbs": 80905976,
  "ulAggrTbs": 200474,
  "dlAggrSdus": 84133,
  "ulAggrSdus": 0,
  "dlAggrBytesSdus": 0,
  "ulAggrBytesSdus": 0,
  "dlAggrRetxPrb": 215790,
  "ulAggrRetxPrb": 3,
  "dlMcs1": 0,
  "ulMcs1": 0,
  "puschSnr": 23.5,
  "pucchSnr": 18,
  "phr": 34,
  "bsr": [{"lcid": 0, "bufferSize":
0}], "dlHarq": [31401,
1401, 498, 360], "ulHarq":
[1566, 1, 1, 1]
}
```

“RlcUeStats

```
” : [
{
  "rnti": 8442,
  "rb": [ {
    "rbid": 3,
    "txPduPkts": 84133,
    "rxPduPkts": 1258,
    "txPduBytes": 80641545,
    "rxPduBytes": 30935,
    "txPduDdPkts": 0,
    "rxPduDdPkts": 0,
    "txPduDdBytes": 0,
    "rxPduDdBytes": 0,
    "txPduRetxPkts": 0,
    "txPduRetxBytes": 0,
    "rxPduOwPkts": 0,
    "rxPduOwBytes": 0,
    "rxPduDupPkts": 0,
    "rxPduDupBytes": 0
  }
]
}
```

“PdcpcUeStat

```
S” : [
{
  "rnti": 8442,
  "rb": [ {
    "rbid": 1,
    "txPduPkts": 54810,
    "rxPduPkts": 129,
    "txPduBytes": 82259668,
    "rxPduBytes": 27095,
    "txPduSn": 54809,
    "rxPduSn": 128,
    "rxPduDdPkts": 2,
    "rxPduDdBytes": 160
  }
]
}
```

FlexCN SDK

Monitoring per UE/QFI/Slice

API	Options
Subscribe	<i>UP Path Change</i> <i>UE IP Addr. Change</i> <i>Access type Change</i> <i>PLMN Change</i> <i>PDU session release</i> <i>Downlink data delivery status</i>
Status /[type]	<i>all</i> <i>ue</i>
Status/[entity]	<i>smf</i> <i>amf</i> ...

```

“SMF”
{
  "plmn": { "mcc": "208", "mnc": "95"},
  "supi": "208950000000031",
  "ue_ipv4_addr": "12.1.1.2"
  "timeStamp": "3840272086",
  "snssai": { "sd": "123", "sst": "222" },
  "pduSeld": 1,
  "pdu_session_type": "IPV4",
  "amf_addr": "192.168.70.132",
  "dnn": "default",
  "qos_flow": [ { "an_addr": { "ipv4":
    "192.168.70.136"}, "qfi": 6,
    "upf_addr": {
      "ipv4": "192.168.70.134" } } ]
}

```