



Commonwealth
Cyber Initiative

CCI xG Testbed: End-to-End Open-Source Open-RAN Platform for Experimentation, Testing, and Workforce Development

First IEEE Next G Summit
JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LAB, USA
TUESDAY, JUNE 14, 2022, 8:00 AM - 6:00 PM EDT

Dr. Aloizio P. DaSilva

CCI xG Testbed Director

Research Faculty ECE Virginia Tech

aloiziops@vt.edu



Agenda

- Commonwealth Cyber Initiative (CCI)
- CCI xG Testbed
 - ✓ Experimentation, Testing and Workforce Development
 - ✓ Radio Network
 - ✓ Platform as a Service
 - ✓ Key Components
 - ✓ System Architecture
 - ✓ Software Architecture
 - ✓ Software Intelligence



Commonwealth
Cyber Initiative
cyberinitiative.org

The Commonwealth Cyber Initiative

The Commonwealth Cyber Initiative (CCI) serves as an engine for research, innovation, talent development, and commercialization of technologies at the intersection between security, autonomy, and intelligence

CCI is the result of a partnership between the VA General Assembly, Governor's office, academia, and industry

300
researchers
+

41 institutions

CCI xG Testbed
Virginia Tech Research Center
Arlington Ballston



Commonwealth
Cyber Initiative
cyberinitiative.org

CCI xG Testbed

- Consist of two sites
 1. Radio Network (Indoor - Arlington) → “Today’s Talk”
 2. CBRS Private Network (Outdoor – Blacksburg)
 - Virginia Tech Campus and Montgomery County





Commonwealth
Cyber Initiative



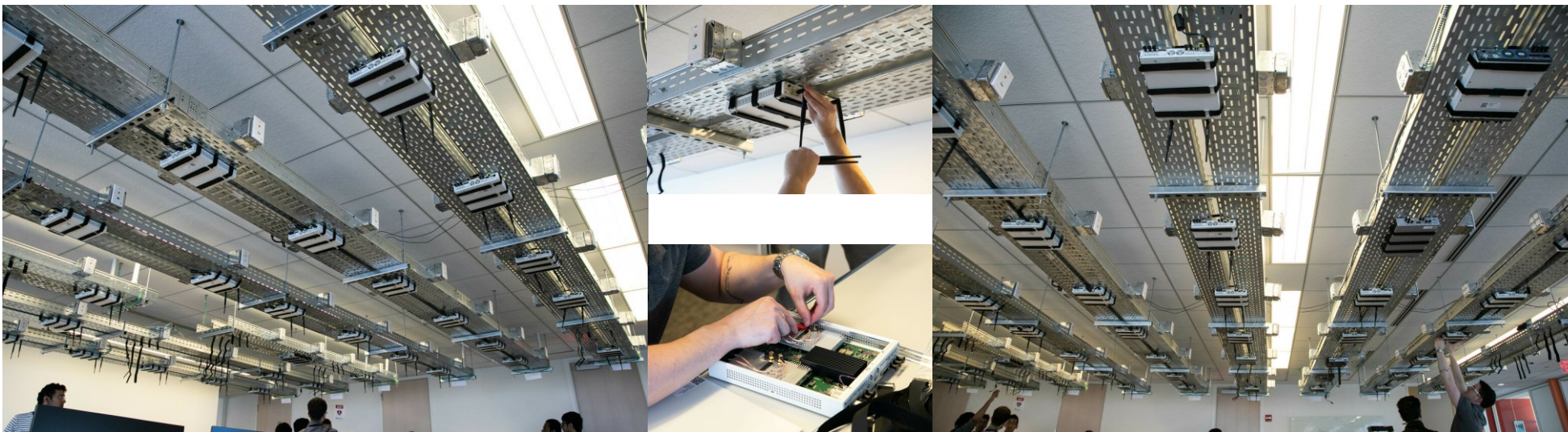
Radio Network

SDR and O-RAN Based

Radio Network Platform as a Service (PaaS)



1. O-RAN based testbed for experimentation, testing and workforce development
2. Alignment with CCI Vision
 - a) R&D – advanced wireless communication and autonomous systems
 - b) Innovation – cutting-edge technologies software and hardware
 - c) Workforce Development - providing practices, knowledge, principles, and skills that integrate a range of approaches to expedite the O-RAN and SDR hands-on experience



Commonwealth
Cyber Initiative
cyberinitiative.org

Radio Network Platform as a Service (PaaS)

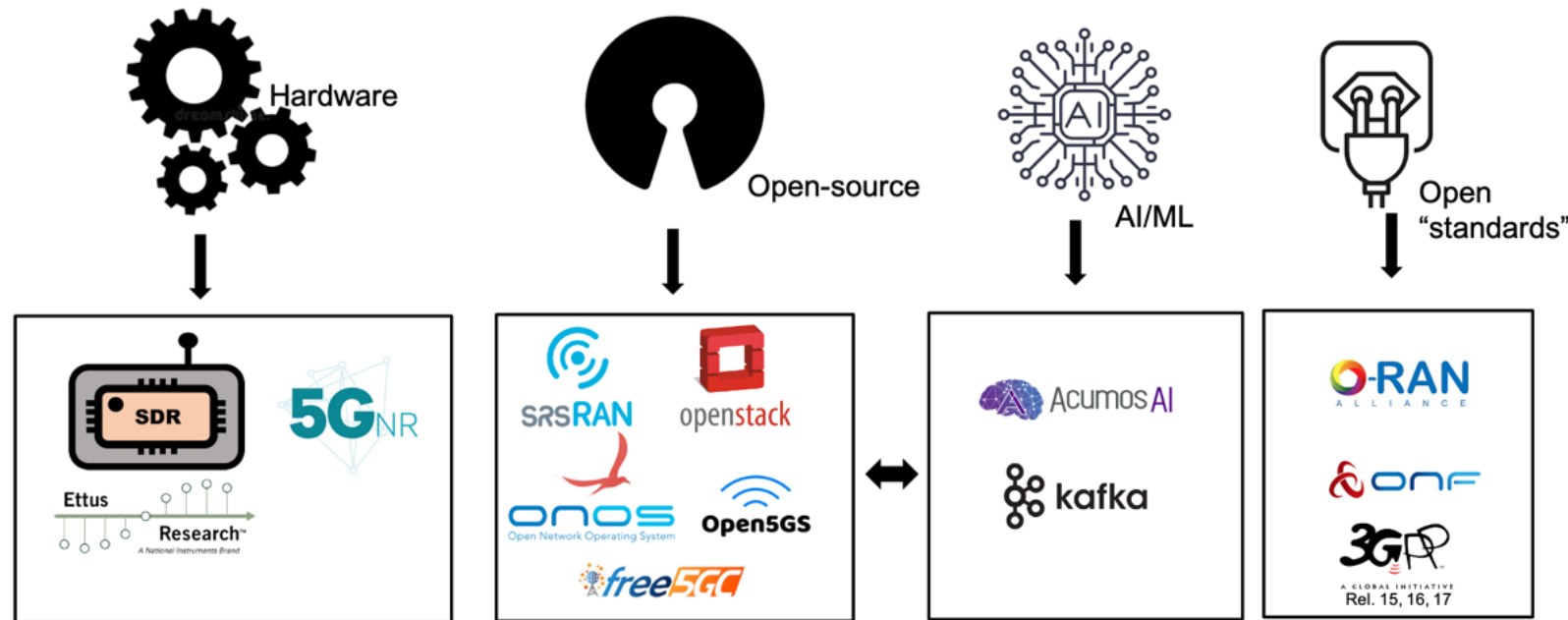
- Workforce Development: Cyber Camp training on next generation of telecommunication network



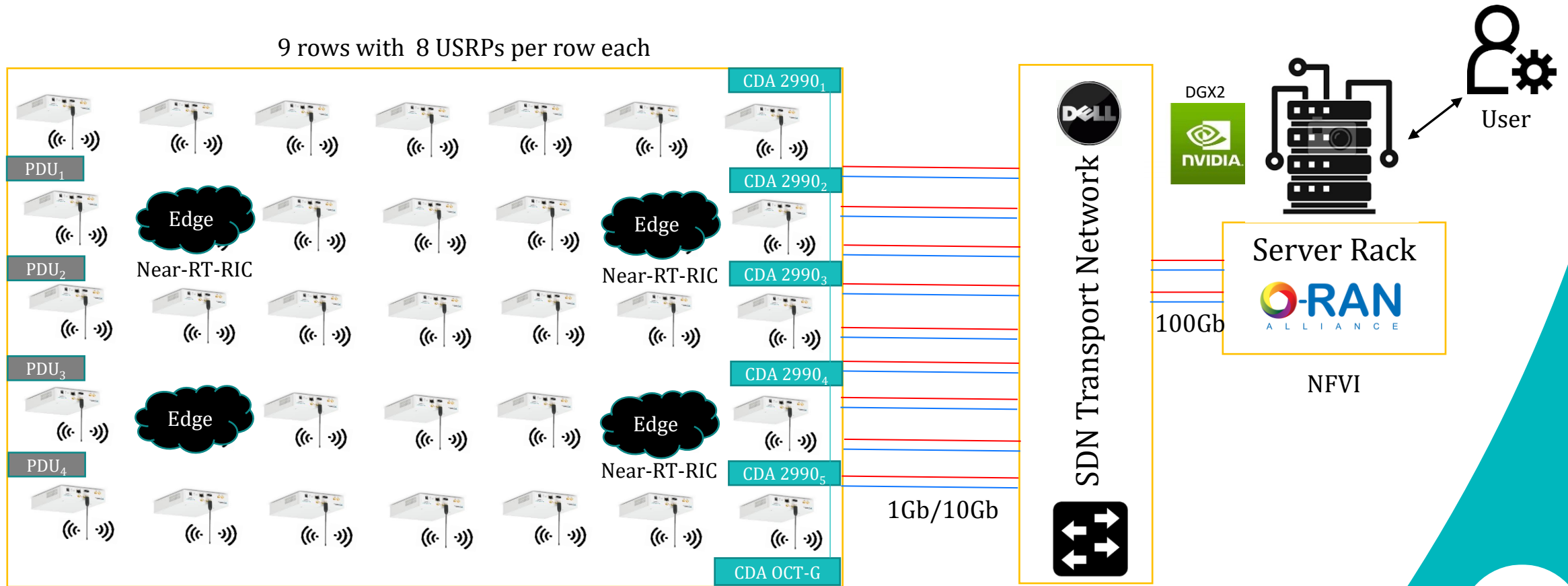
Radio Network Key Components



1. Mix and match of 72 software defined radios (X310, X410, N310)
2. End-to-end O-RAN based (AI/ML -> Non-RT-RIC (SMO) -> Near-RT-RIC -> RAN)
3. End-to-end Open-Source



Radio Network System Architecture



X410 – N310 – X310

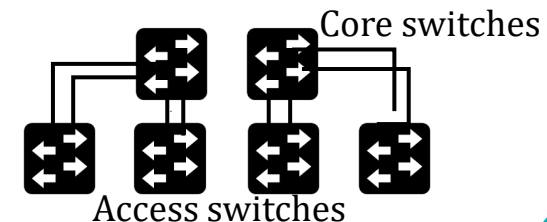
PDU : Power Distribution Unit

Near-RT-RIC: Near Real Time Radio Intelligent Control

CDA 2990: OctoClock for high-accuracy time and frequency reference distribution.
It accepts 10 MHz and PPS signals

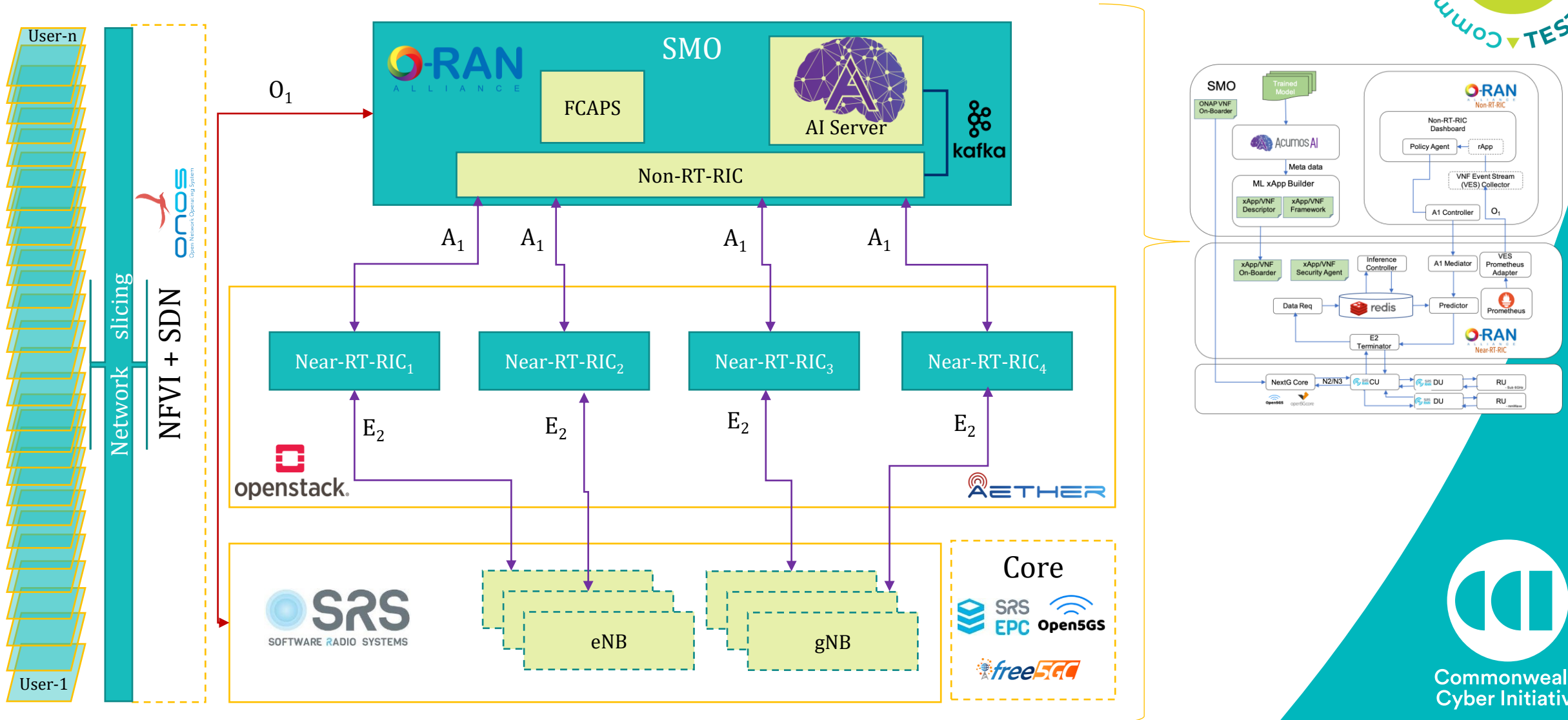
SDN: Software Defined Network

NFVI: Network Function Virtualization Infrastructure



Commonwealth
Cyber Initiative
cyberinitiative.org

Radio Network Software Architecture

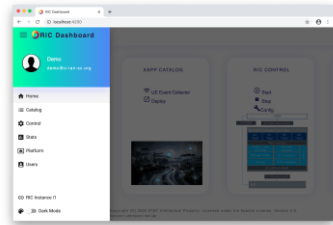


Glossary: FCAPS = Fault, Configuration, Accounting, Performance and Security | SDN = Software Defined Network. | SRS = Software Radio Systems
RT-RIC = Real Time Radio Intelligent Control | NFVI = Network Function Virtualization Infrastructure | SMO = Service Management Orchestrator

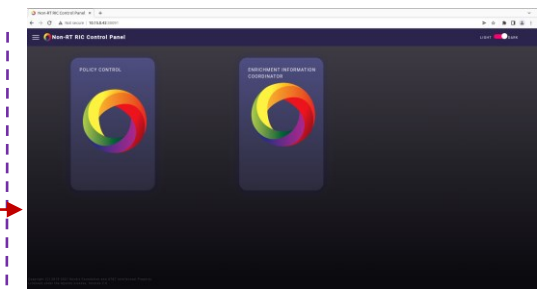
Radio Network Software Intelligence

Closed-Loop Automation
with an Open and Extensible
AI/ML

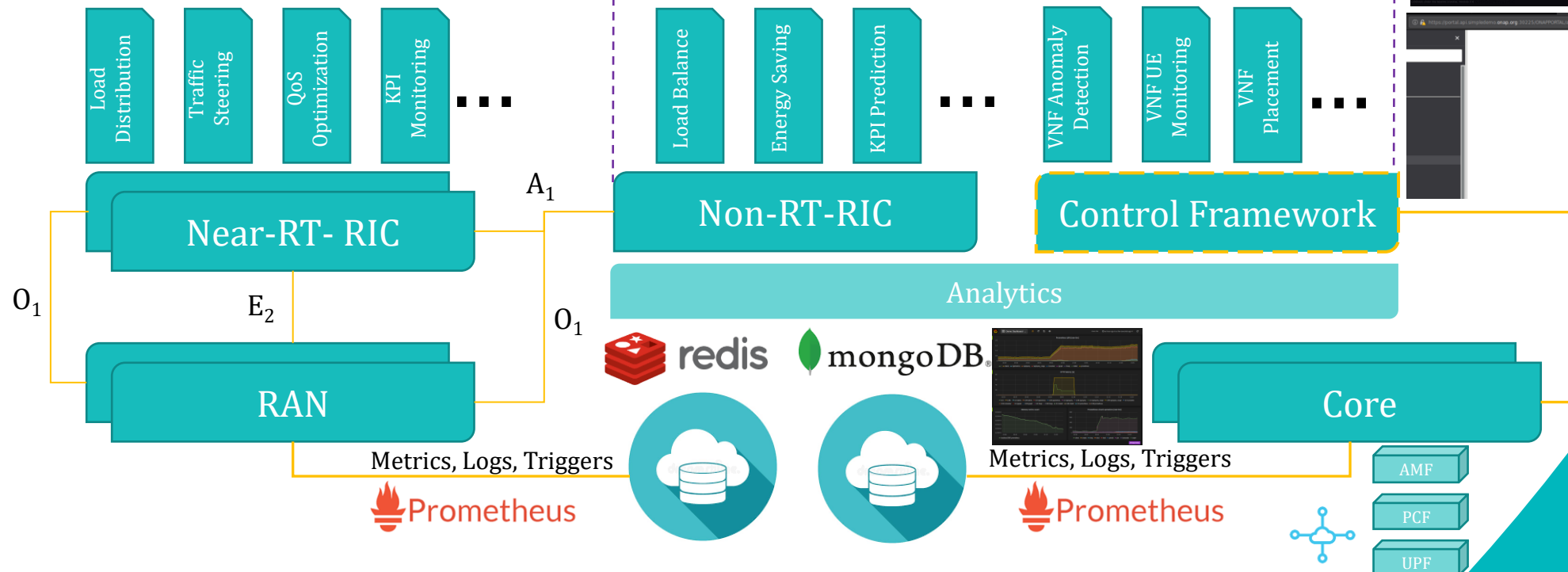
Network
Intelligence-as-
a-Service (NlaaS)



xApps



rApps



Commonwealth
Cyber Initiative
cyberinitiative.org

Join Us at Mobile World Congress “MWC Las Vegas”



September 28-30, 2022

Booth

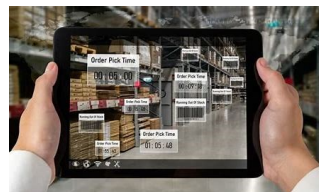
W2.1324

Virginia Tech Applied
Research Corporation
(VT-ARC)



W2.1328

Commonwealth
Cyber Initiative
(CCI)



Commonwealth
Cyber Initiative
cyberinitiative.org



Commonwealth
Cyber Initiative

CCI xG Testbed: End-to-End Open-Source Open-RAN Platform for Experimentation, Testing, and Workforce Development

First IEEE Next G Summit
JOHNS HOPKINS UNIVERSITY APPLIED PHYSICS LAB, USA
TUESDAY, JUNE 14, 2022, 8:00 AM - 6:00 PM EDT

Questions?

Dr. Aloizio DaSilva

CCI xG Testbed Director

Research Faculty ECE Virginia Tech

aloiziops@vt.edu





First IEEE NextG Summit

Questions?

Dr. Aloizio DaSilva

CCI xG Testbed Director

Research Faculty ECE Virginia Tech

aloiziops@vt.edu