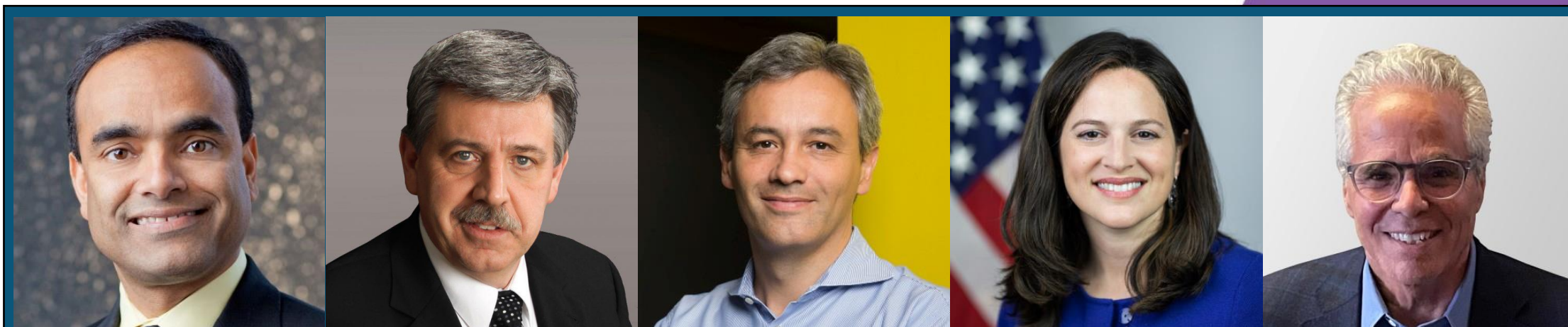


6G SYMPOSIUM  
**BEYOND THE HYPE**  
2023

## Opening Keynotes

Wednesday Oct 18<sup>th</sup>



**Rajesh Pankaj**  
InterDigital

**Mike Nawrocki**  
Next G Alliance

**Tommaso Melodia**  
Northeastern

**Anne Neuberger**  
The White House

**Ray Dolan**  
Cohere & NSTAC



# 6G: What's Ahead?

Rajesh Pankaj

EVP, Chief Technology Officer, InterDigital



**InterDigital's leadership in wireless and video enables the devices and connected industries of tomorrow**

**InterDigital combines five decades of wireless and video research and innovation**

- with one of the strongest technology portfolios in wireless, video, and AI
- to develop and share core technology through standards and licensing,
- resulting in more than 7 billion devices under license in the last decade alone.

# 5G is not done yet...

But we need to start  
thinking about 6G

## New

- Vertical Markets
- Devices

## More

- Spectrum
- Intelligence
- Energy Savings

## Fix

- Issues in 5G

# What Are Some of the Next G Use Cases?

## Connecting People Better

Immersive Experiences



Holographic Media



Extreme Coverage



## New Markets & Sustainability

Industry Automation



Autonomous Vehicles/Swarms



Low-Power & Battery-less Sensing



# Key Wireless Technology Trends

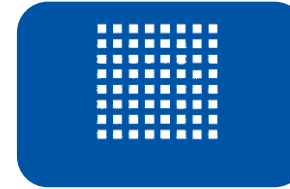
## Integration of Technologies

## Extending The Foundations

AI/ML Integrated with Communications



Advanced Antenna Arrays with MIMO



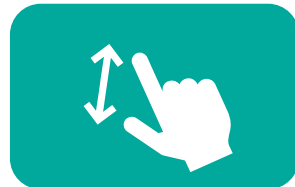
Distributed Computing Integrated with Communications



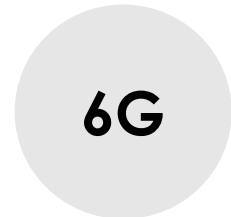
New Waveforms & Spectrum  
(7-24GHz, >100GHz)



Sensing Integrated with Communications



Open Architectures

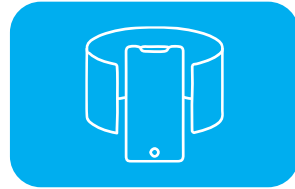


# Key Video Technology Trends

## New data for new use cases

## New Technologies

Volumetric data for immersive communications



Sustainable video chain and responsible distribution



Avatars for interactive and virtual communications



New immersive and AI codecs, AI split models, Edge architecture



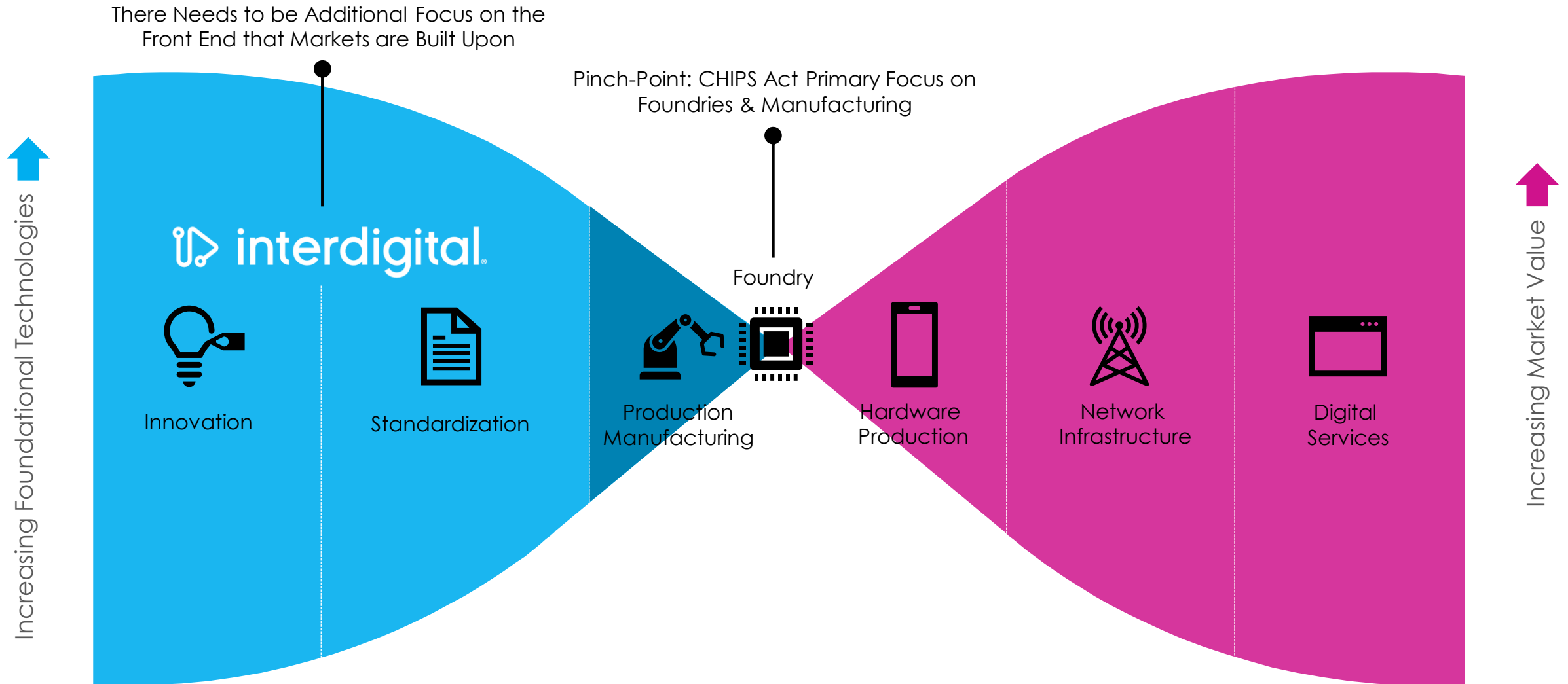
Scene representation for XR, and XR framework



Ultra low latency, multimodal QoE, enhanced protocols for XR and metaverse



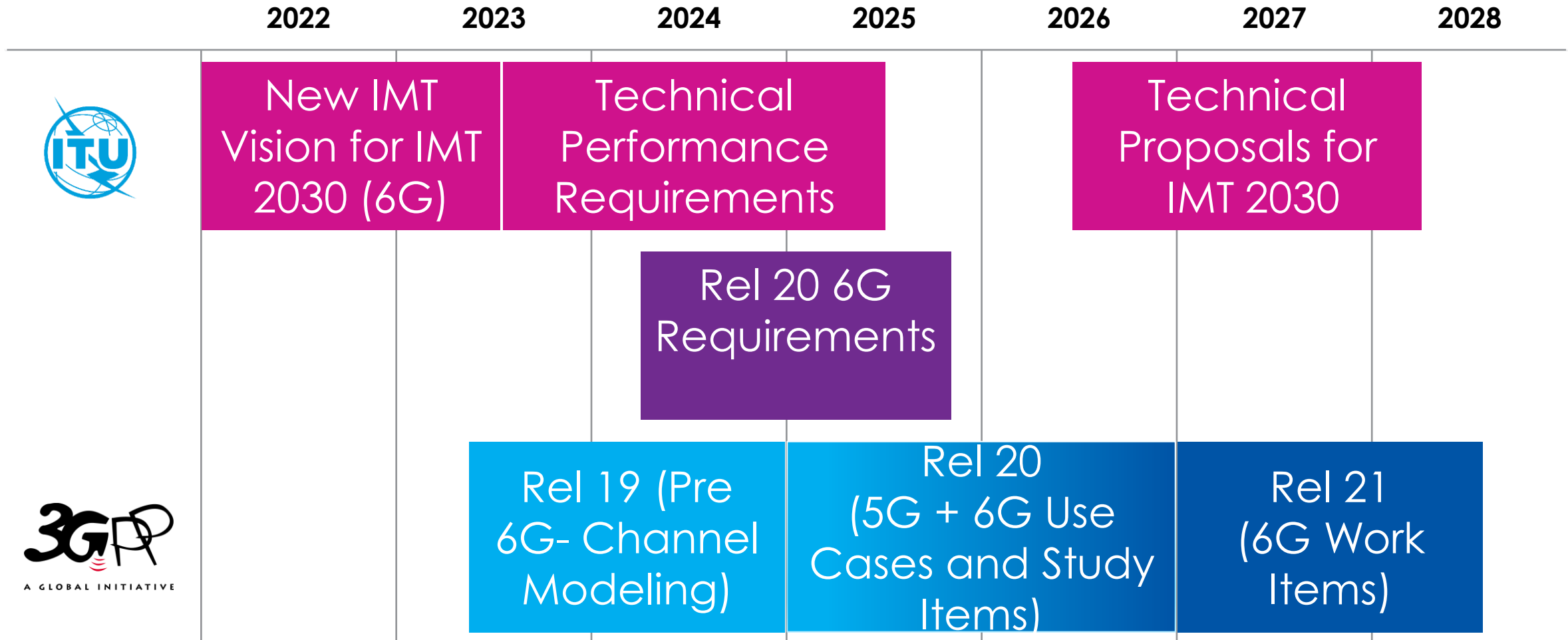
# Why Standards Matter in the Wireless Supply Chain





# Timeline to 6G

Just as 3G, 4G and 5G will coexist for some time, 6G will exist simultaneously with 4G and 5G



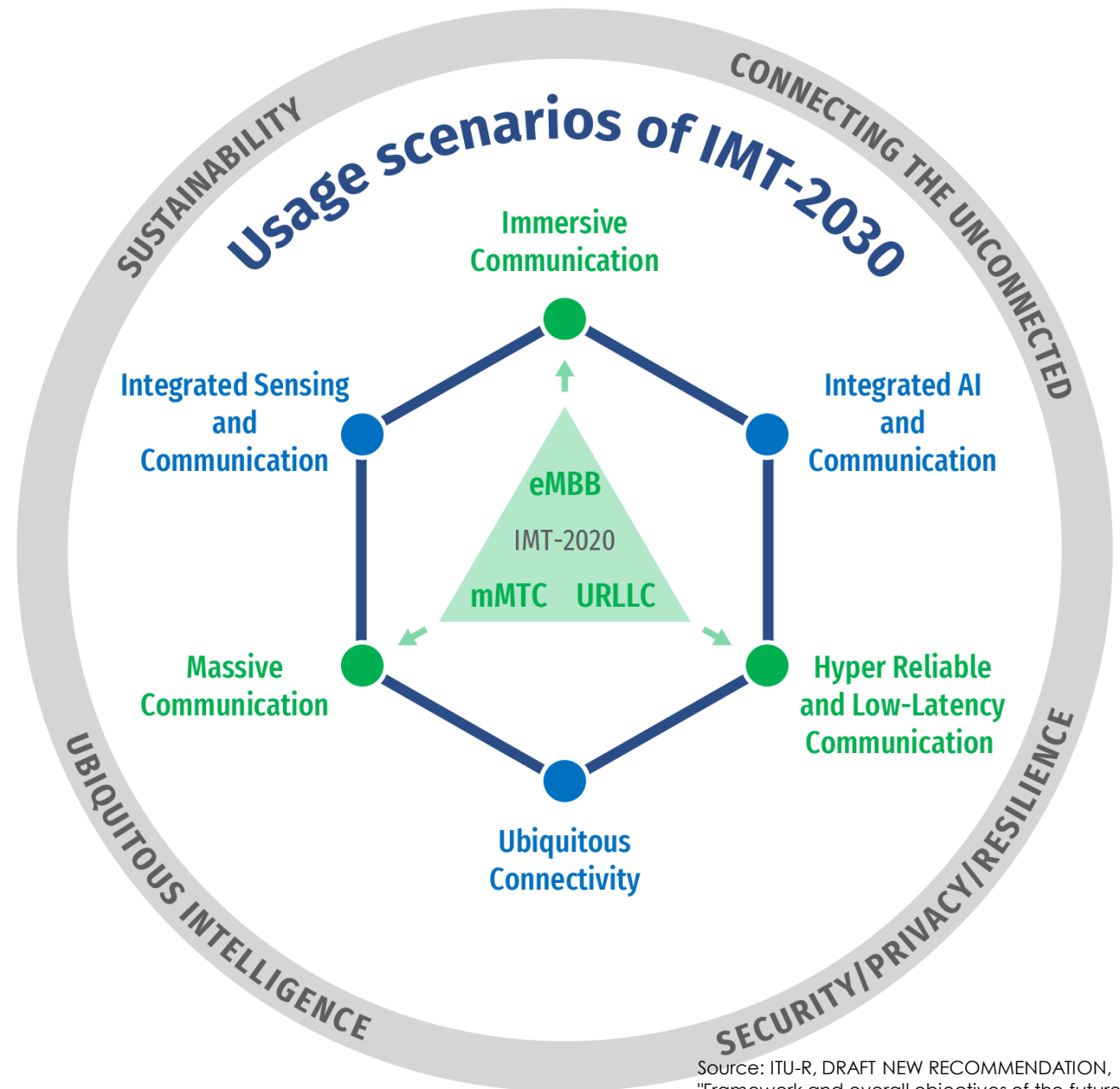
# Emerging IMT-2030 View of 6G

Improve the 5G triangle

- eMBB
- mMTC
- URLLC

Enable new capabilities

- Integrated Sensing and Communication
- Integrated AI and Communication
- Ubiquitous Connectivity



Source: ITU-R, DRAFT NEW RECOMMENDATION, "Framework and overall objectives of the future development of IMT for 2030 and beyond," June 2023.

# The Path to 6G Around the World

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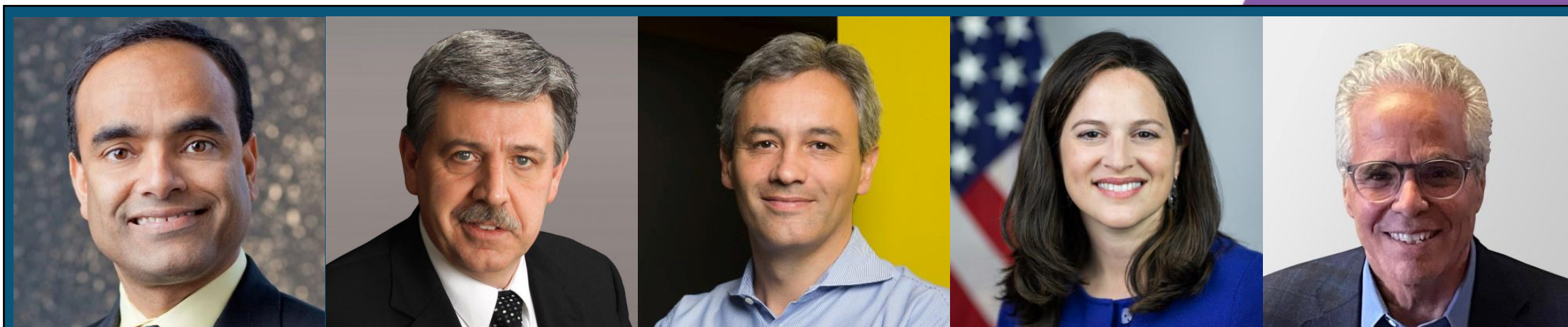
**Governments,  
industry, and  
academia are  
collaborating  
worldwide to  
make 6G a reality**

**We invent the  
technologies that  
make life boundless.**

6G SYMPOSIUM  
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The logo for Next G Alliance features a stylized, circular graphic on the left composed of numerous small blue dots that form a larger, glowing shape. To the right of this graphic, the words "NEXT G" are written in a large, white, sans-serif font, with the "G" being a solid blue color. Below "NEXT G", the word "ALLIANCE" is written in a smaller, white, sans-serif font, with a thin blue horizontal line underneath it.

NEXT G  
ALLIANCE

An ATIS Initiative

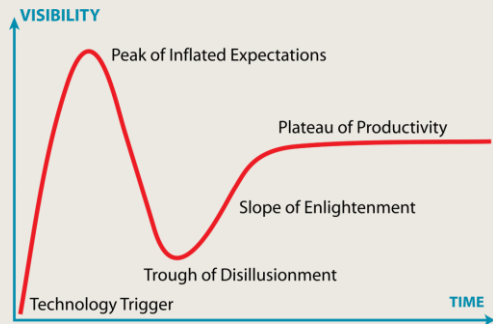
# 6G Symposium – Fall 2023

## Creating a 6G Vision for the Future

Mike Nawrocki, ATIS, VP - Technology & Solutions  
October 18, 2023  
Washington DC

# "Beyond the Hype"

**hype** - to promote or publicize extravagantly  
(Merriam Webster)



what is promised  
what is delivered



**vision** – charting the future with imagination and wisdom



Roadmap to 2030  
and beyond

Combining the revolutionary and evolutionary

# Change How We Live



Home-based patient care  
Remote surgery and scanning  
AI-enabled patient digital twin  
Ambient assisted living

V2V and V2P safety improvement and awareness  
Autonomous, coordinated and remote driving  
Real-time 360° situational awareness

Leveraging EGE innovation for education  
Metaverse experiences  
Immersive knowledge and learning  
Hologram receivers

Next Gen mission critical communications  
AR headsets and glasses  
Networked robots and UAVs  
Connected ambulances



# Change How We Work



Factories of the future

AI-managed automatic guided vehicles

Massive sensors to manage environment and resources

Movement between farming and road infrastructure

High precision irrigation and fertilizer treatments

Massive sensing and remote actuation

Communications across mobile and NTN

Extreme connectivity

Tele-operation for hazardous environments

Use of digital twin replicas

High precision accuracy and tracking

Urbanization density and access to resources

Zero energy IoT devices

AI-driven data decision-making

Government-provided playing fields for 6G innovation

# 6G Roadmap for Vertical Industries



  
*Agriculture*

  
*Automotive*

  
*Education, Gaming  
and Entertainment*

  
*eHealth*

  
*Industrial*

  
*Mining*

  
*Public Safety*

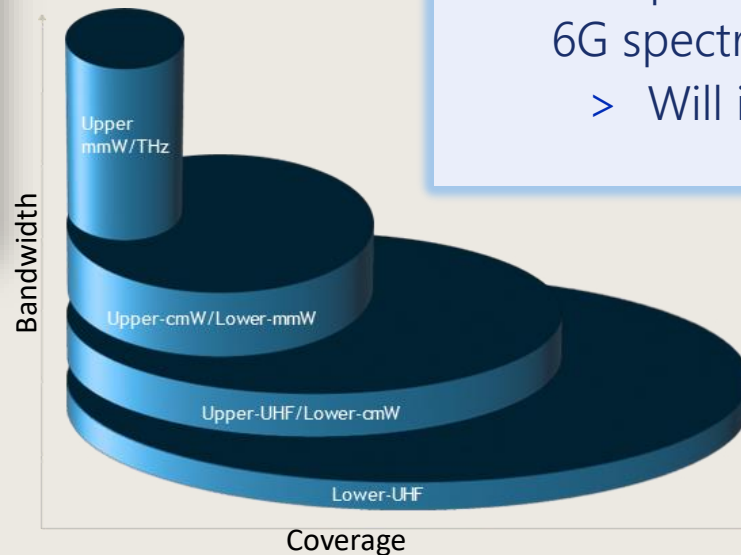
  
*Smart Cities*

- ✓ Translate North American needs to technology outcomes
- ✓ Target shared investments in 6G PoCs and testbeds
- ✓ Connect North American 6G needs to marketplace

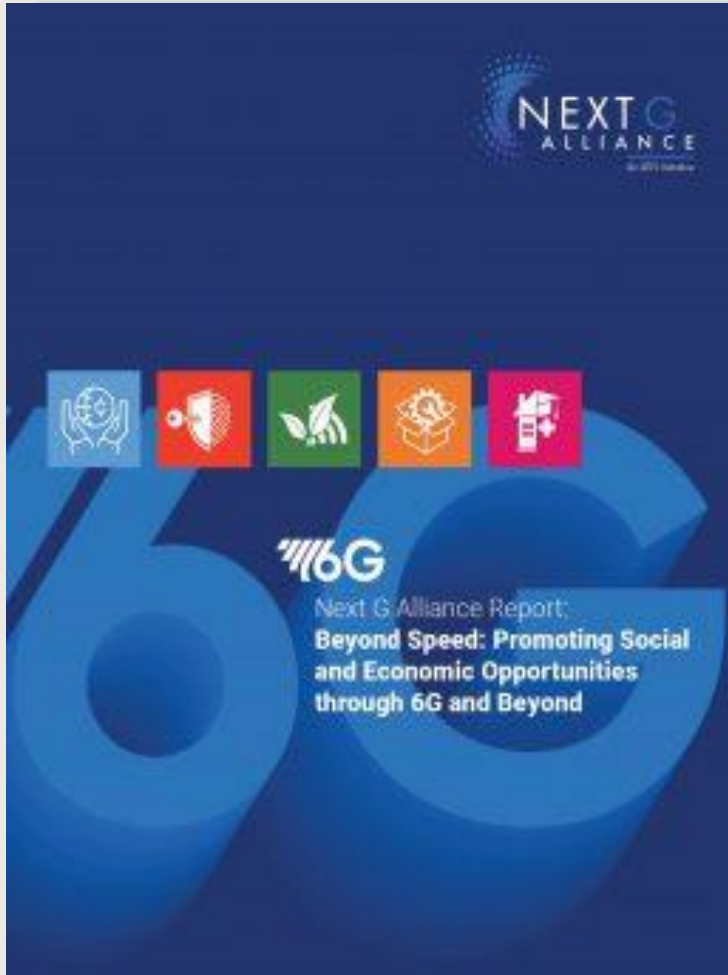
# 6G Spectrum Considerations



- > Published in August 2023 (living document)
- > First comprehensive survey of spectrum bands that have the potential to support 6G in North America
- > Serves as early engagement point for the challenges and promise of future 6G spectrum bands
- > Companion document to follow covering drivers for 6G spectrum needs and characteristics
  - > Will include target performance requirements



# 6G Societal and Economic Needs



Digital equity



Trust



Sustainability



Economic Growth



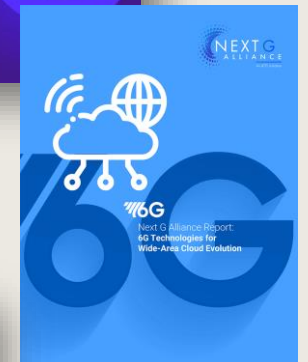
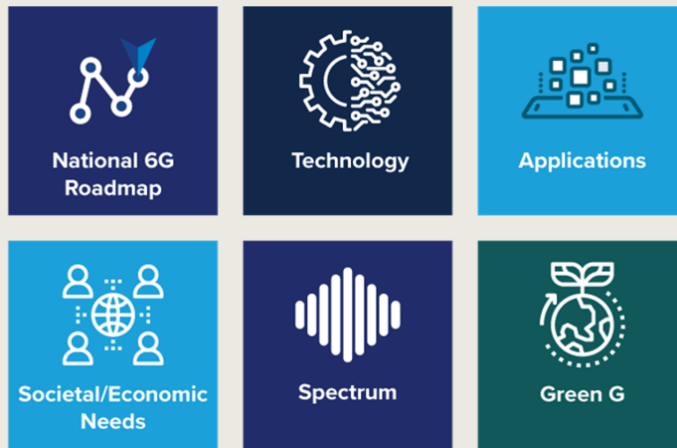
Quality of Life



- > Recently published report looks beyond 6G technologies
- > Identifies key societal NextG Outcomes
- > Societal/economic compass for future 6G research priorities
- > Principles that will influence vision, use cases and applications

**Solutions that are affordable, ubiquitous, broadly available and responsive to societal needs**

# Creating the Foundation



NGA's publications have established a collective view, serving as a future 6G compass for North America

# NGA's Top Ten Research Areas

Security, Trust and Resilience



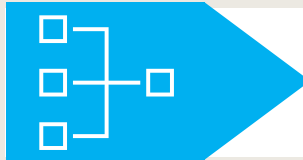
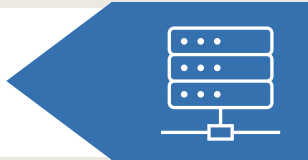
Radio Access Technologies

New Radio Components and Antennas



Joint Communications and Sensing

Network Convergence and Integration



Architecture and Control of Open, Disaggregated Systems

AI/ML



Sustainability / Reduced Energy Consumption and Cost

Spectrum Sharing and Enhanced Spectrum Access



Cloud Native Networks and Distributed Cloud

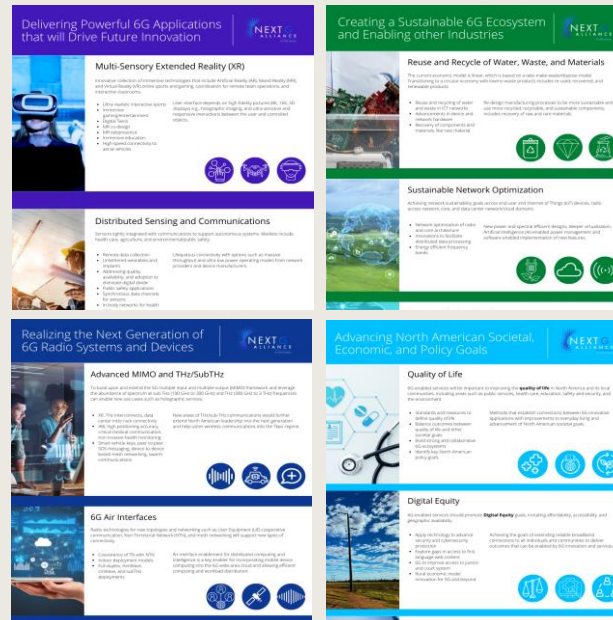
# NGA Global Collaboration



# North American Voice for 6G



Develop North American 6G vision and key foundational documents



<https://www.nextgalliance.org/research-priorities/>

Align on a collective set of 6G Research Priorities



Create 6G Public/Private Partnerships for Next Frontier of Innovation and Investment



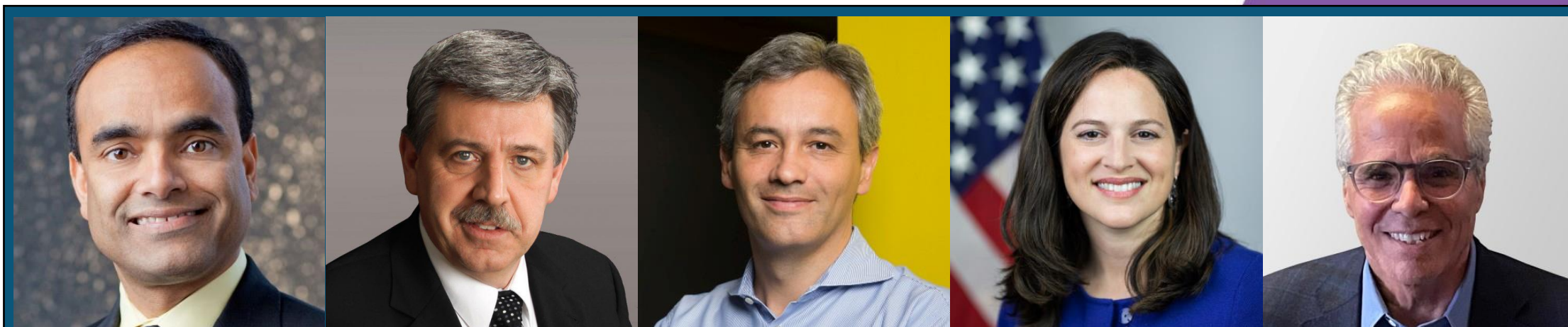


Building the foundation  
for North American  
leadership in 6G and beyond

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**Institute for the Wireless  
Internet of Things**  
at Northeastern University

**N** Institute for the Wireless  
Internet of Things  
at Northeastern

# "Open6G: Toward Open, Programmable, and AI-Driven Wireless Systems"

Prof. Tommaso Melodia  
William Lincoln Smith Professor  
[melodia@northeastern.edu](mailto:melodia@northeastern.edu)

# WIoT Institute Mission



1

**Research:** Be a leading institution for research and development in smart and connected systems

2

**Education:** Train the next generation of researchers and professionals in interdisciplinary and hands-on skills

3

**Think Tank:** Shape and influence the global conversation on the future of connectivity

4

**Technology Incubator:** Generate IP, software, commercialize through spinoffs and industry

# Institute for the Wireless Internet of Things

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# WIoT's Industry Partners

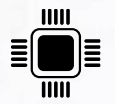
<p>Strategic Partners</p>	       
<p>Industry Partners</p>	     
<p>Small Businesses</p>	        

# IoT Core Areas and Verticals

## Applications enabled by core research

- Multiple current and emerging verticals
- Interconnected and reliant on common foundations
- Joint work on multiple core areas necessary to enable a seamless vertical application

# Wireless Internet of the Future



Sensors and Energy Harvesting



Wireless Networking



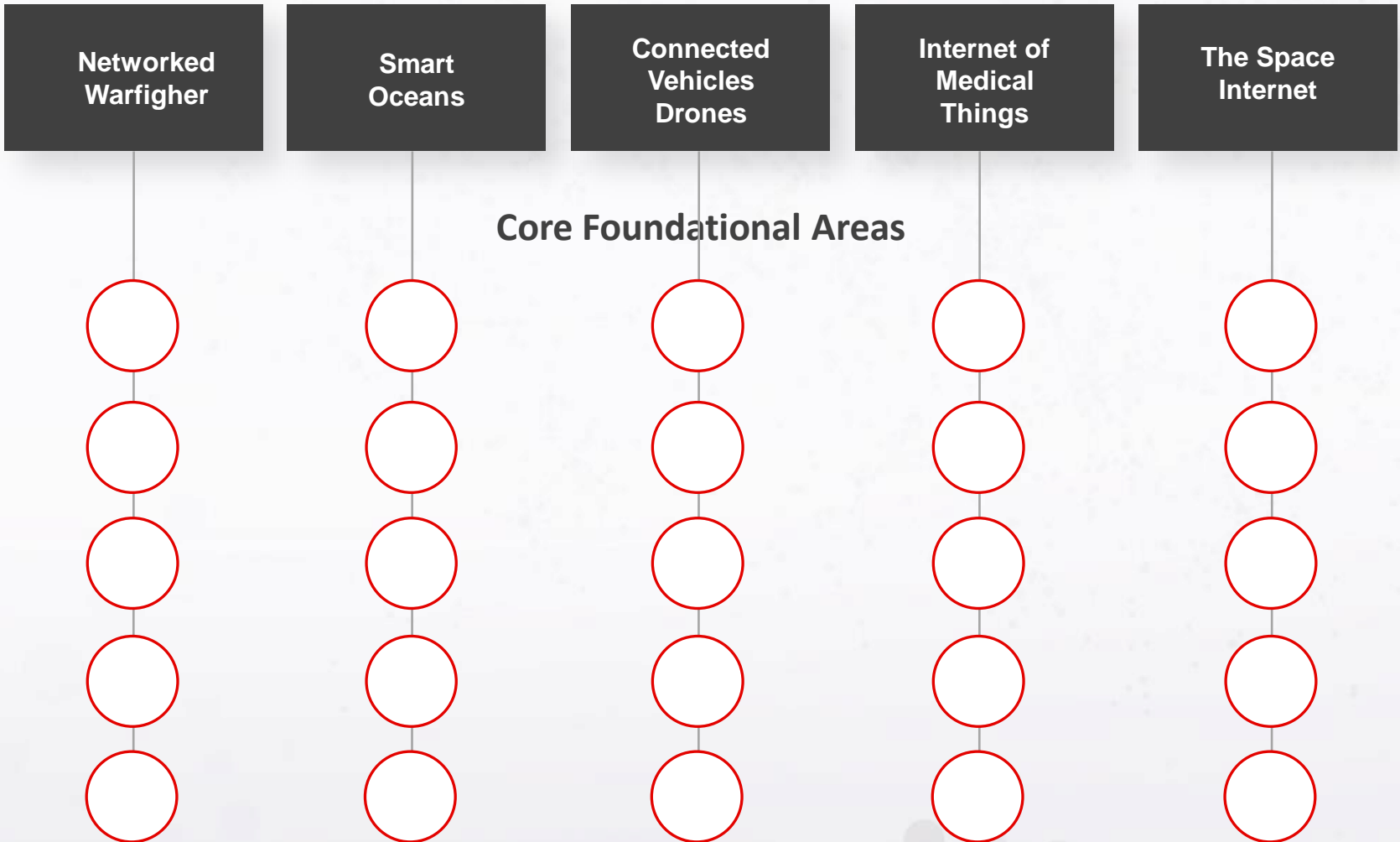
Data Analytics Machine Learning



Security and Blockchains



Policy and Business



# WIoT by the numbers

Over **\$100M** cumulative funding

**152**

109 Ph.D. Students  
25 faculty members  
13 Research Scientists  
5 Staff Members

**WIoT Institute Members**

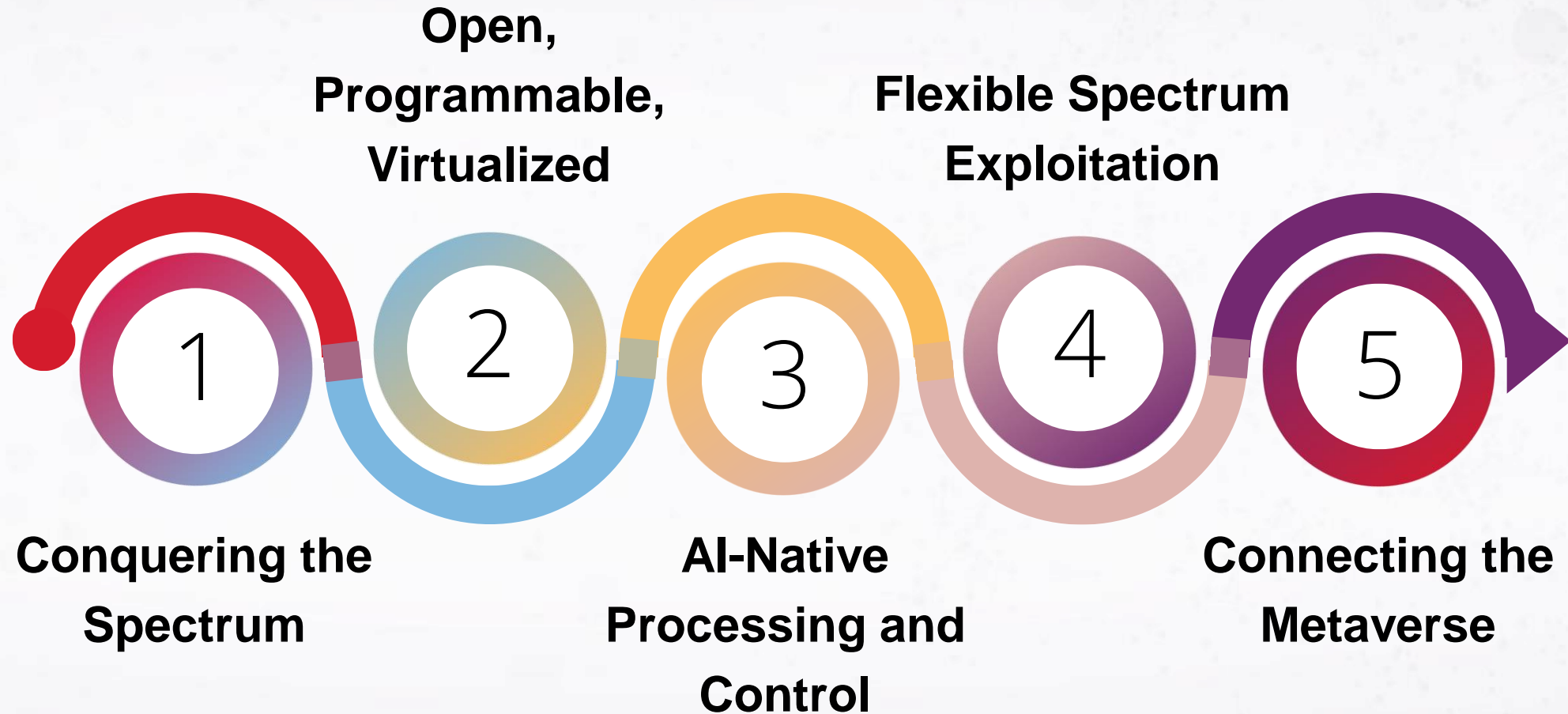
**25+** Industry Partners

**5** Spinoffs



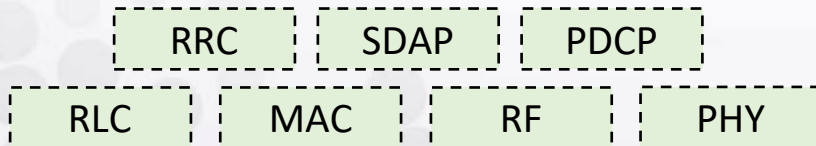
# Strategic Roadmap Toward 6G

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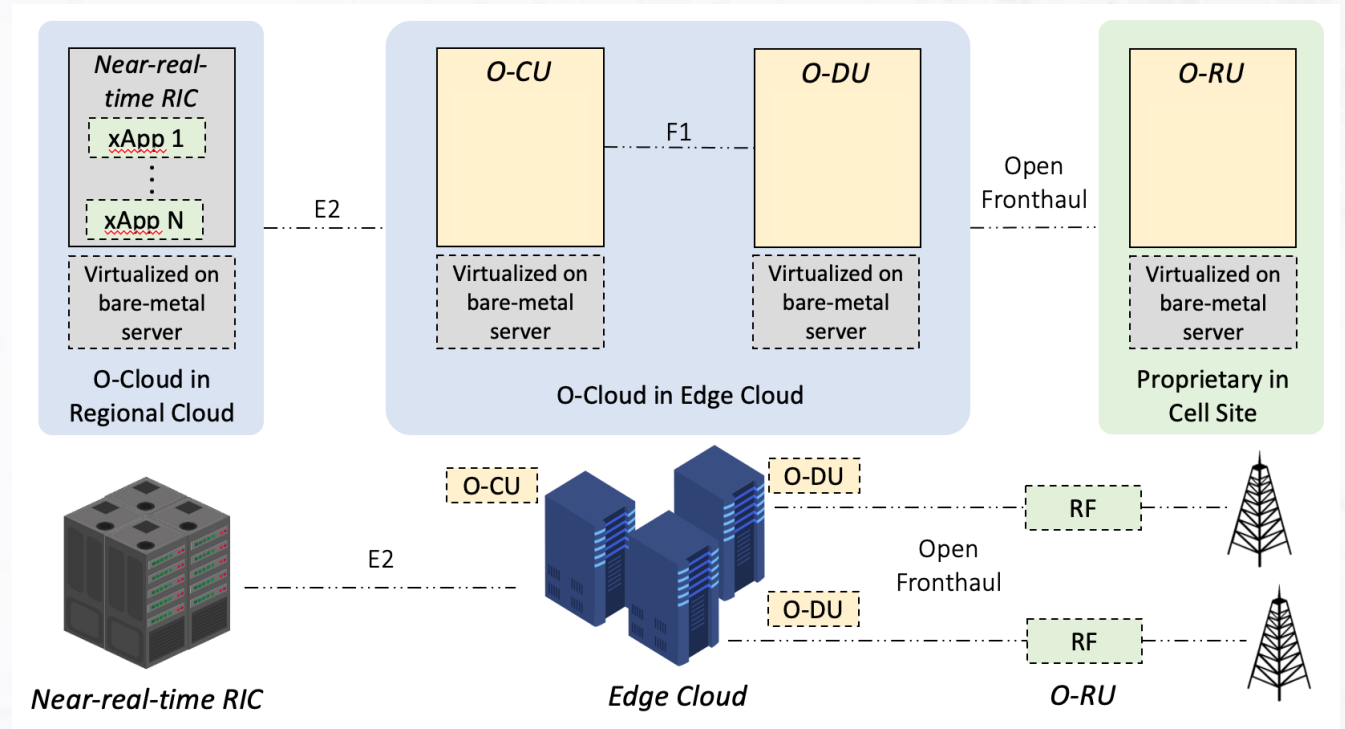


# Open RAN

## Traditional “black-box”



## Open, programmable and virtualized



L. Bonati, M. Polese, S. D'Oro, S. Basagni, and T. Melodia, "Open, Programmable, and Virtualized 5G Networks: State-of-the-Art and the Road Ahead," Computer Networks, vol. 182, Dec 2020.

# Open RAN is an Enabler for Artificial Intelligence

Currently supported by O-RAN

Control and learning objective	Scale	Input data	Timescale	Architecture
Policies, models, slicing	> 1000 devices	Infrastructure-level KPIs	Non real-time > 1 s	
User Session Management e.g., load balancing, handover	> 100 devices	CU-level KPIs e.g., number of sessions, PDCP traffic	Near real-time 10-1000 ms	
Medium Access Management e.g., scheduling policy, RAN slicing	> 100 devices	MAC-level KPIs e.g., PRB utilization, buffering	Near real-time 10-1000 ms	
Radio Management e.g., resource scheduling, beamforming	~10 devices	MAC/PHY-level KPIs e.g., PRB utilization, channel estimation	Real-time < 10 ms	
Device DL/UL Management e.g., modulation, interference, blockage detection	1 device	I/Q samples	Real-time < 1 ms	

For further study or not supported

# Northeastern Open6G



*Open, programmable, virtualized, and intelligent 5G and 6G networks in an Industry-University-Government R&D center*

Architecture

Software Stacks

Testbeds

AI/ML Control



Spectrum Sharing

Automation

Security

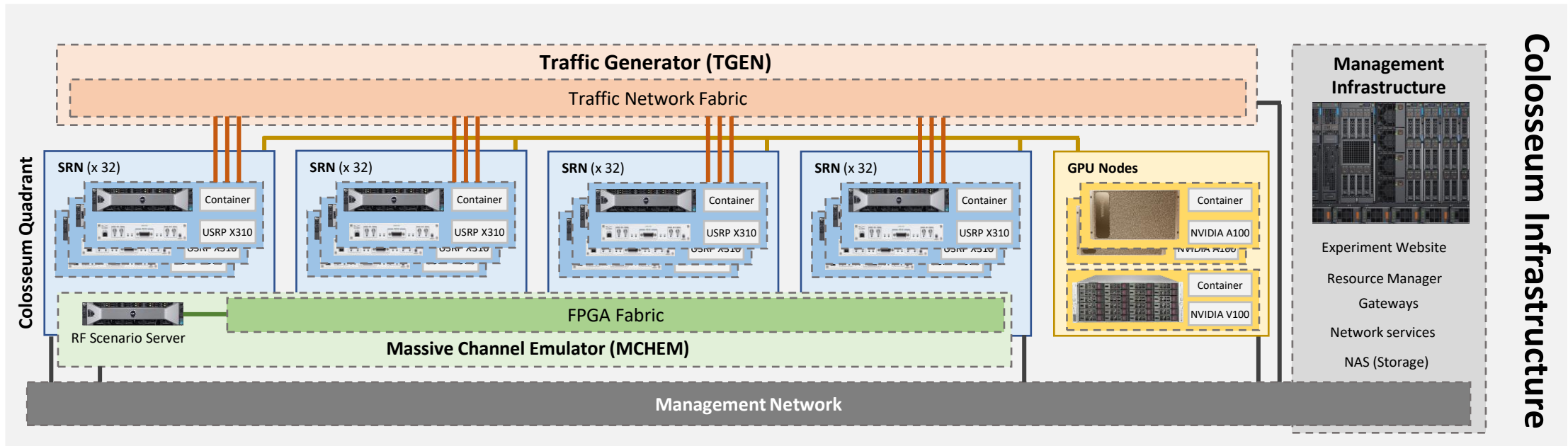
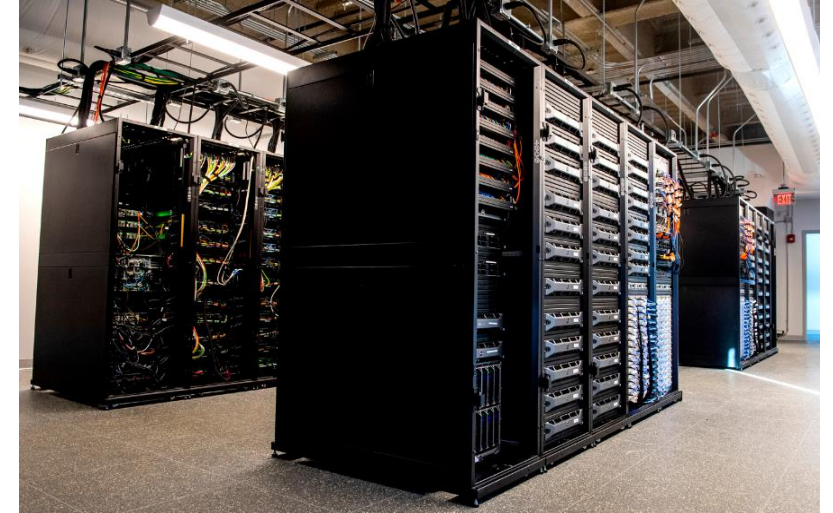
Energy Efficiency

# Colosseum as the Open RAN Digital Twin

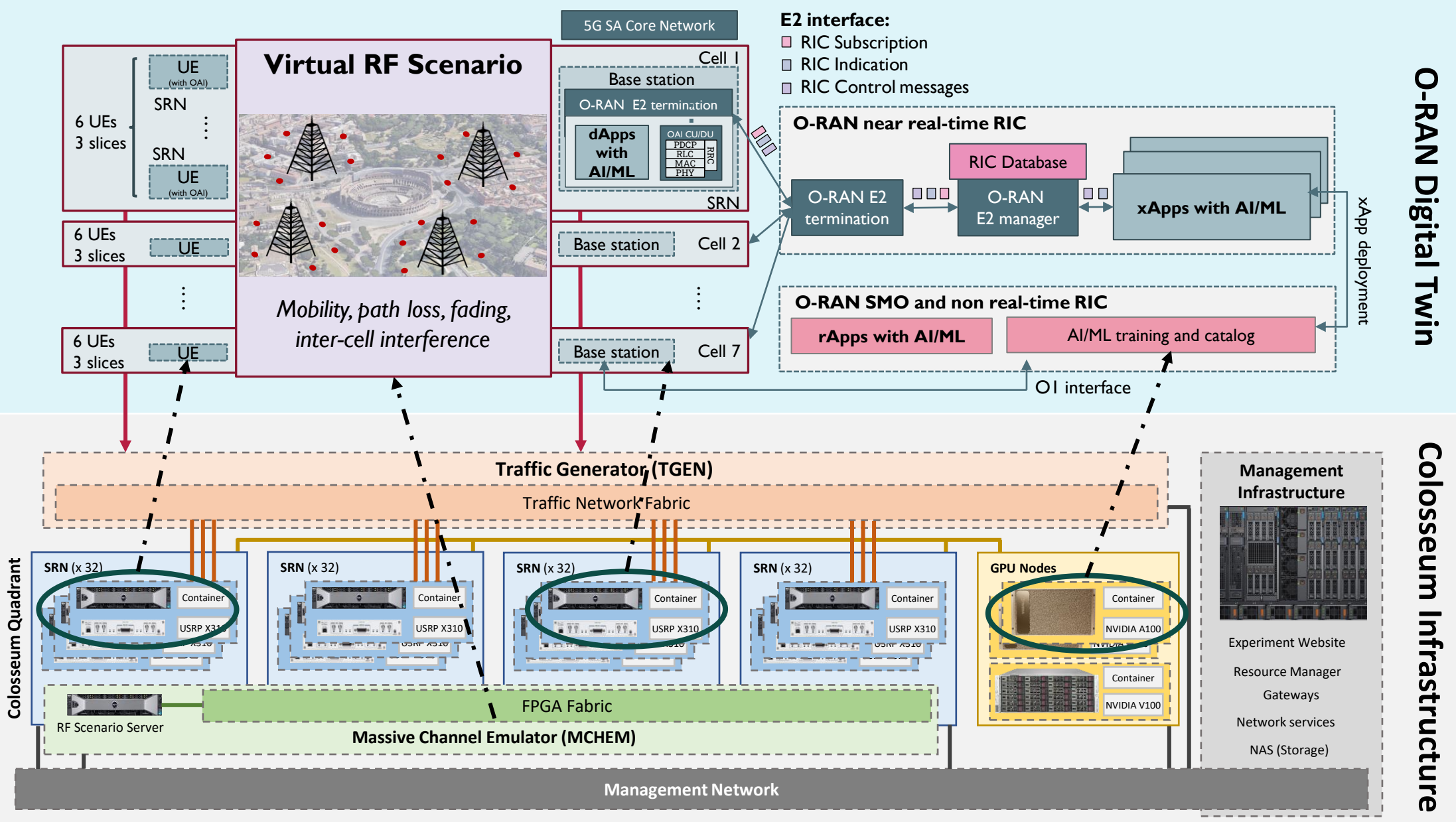


25 racks with

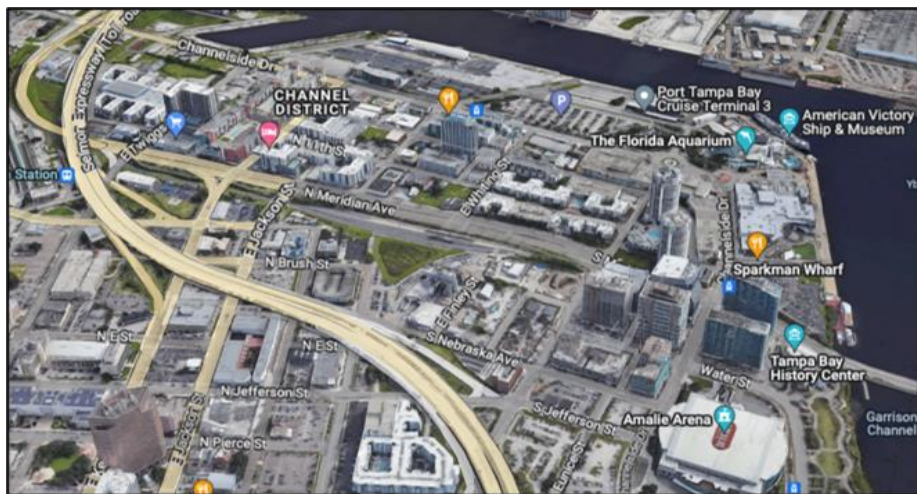
- 256 radio for users and emulation
- MCHM FPGAs
- NVIDIA DGXs and GPUs
- Dell compute
- SDN infrastructure with SONIC



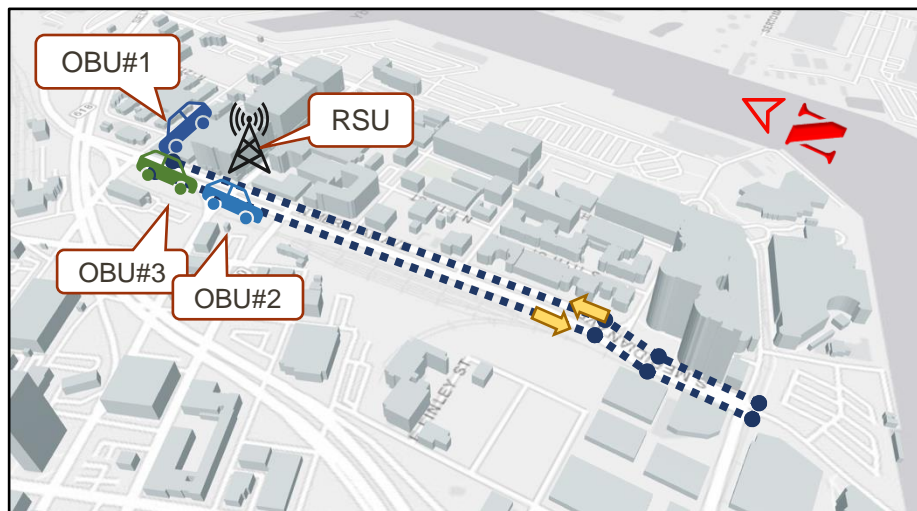
# Colosseum as the Open RAN Digital Twin



# CAST: A Toolchain to Create Colosseum Scenarios

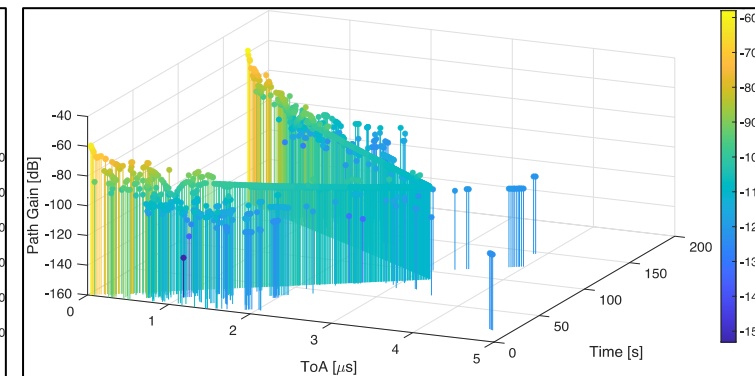
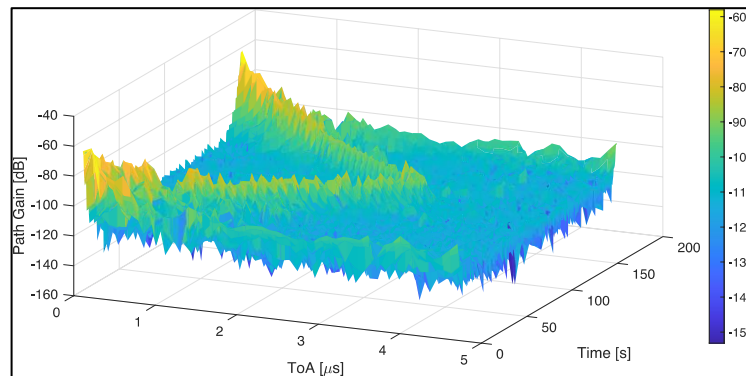


Real World Environment

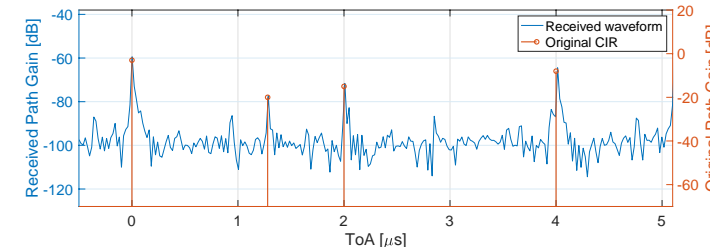
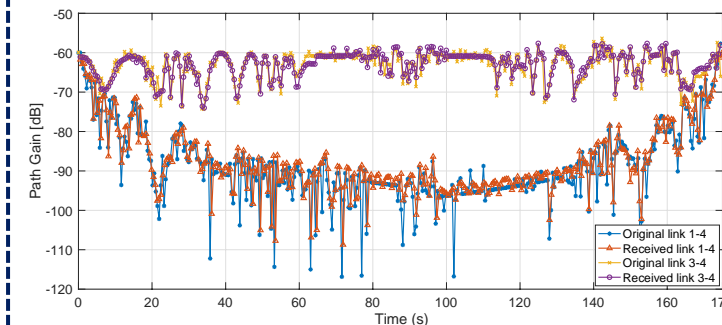


Digital Twin Replica

Outdoor Digital Twin, a V2X scenario in Tampa FL



Indoor Digital Twin, Arena & Colosseum

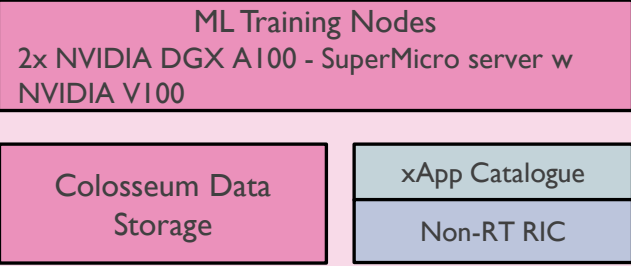


# Open6G Technical Architecture

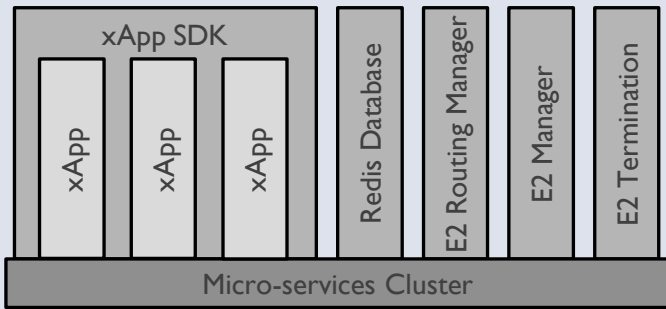
## Open RAN + MEC



### SMO + data collection platform



### ColO-RAN Near-RT RIC



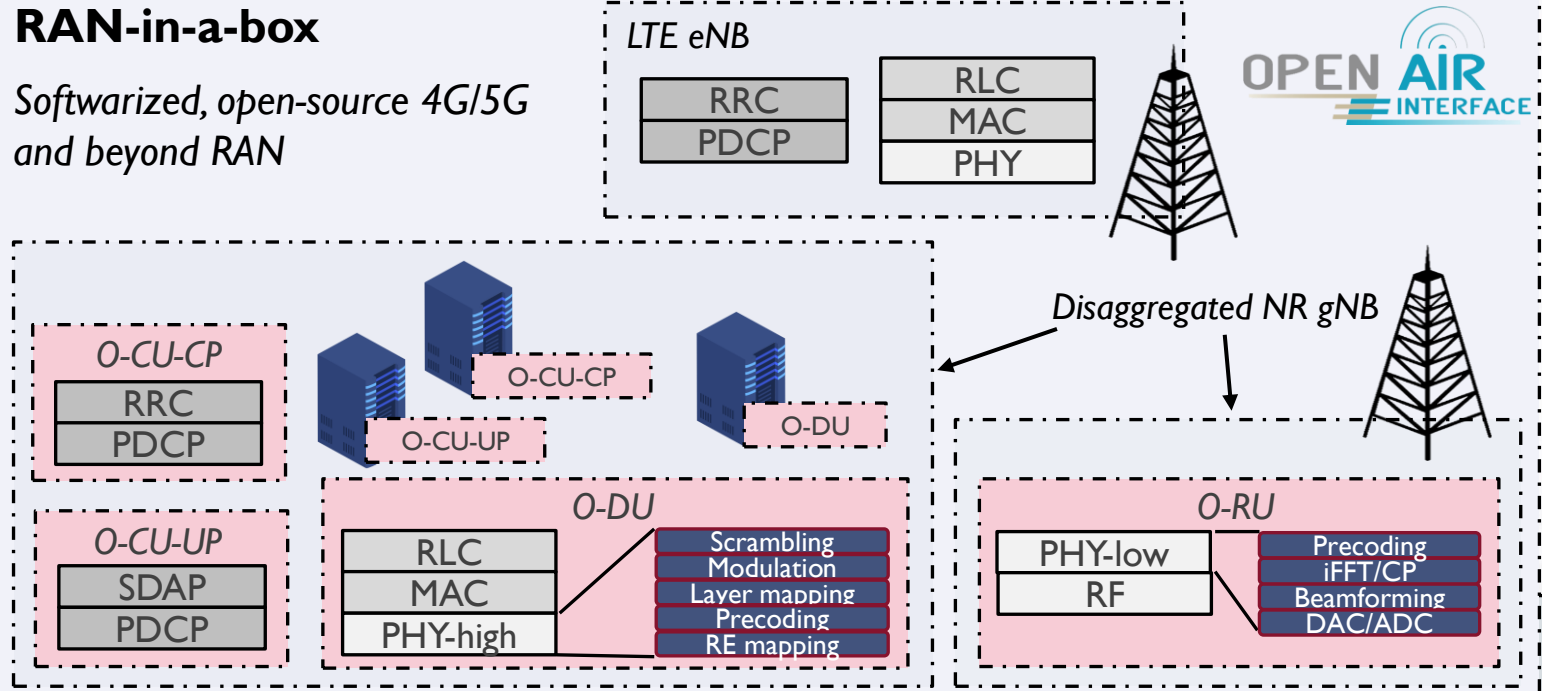
Open interfaces and data pipelines

## Core network EPC and 5G Core on a micro-service-based architecture



## RAN-in-a-box

Softwarized, open-source 4G/5G and beyond RAN



Colosseum



Arena and X-Mili



PAWR Platforms



Experimental platforms and testbeds



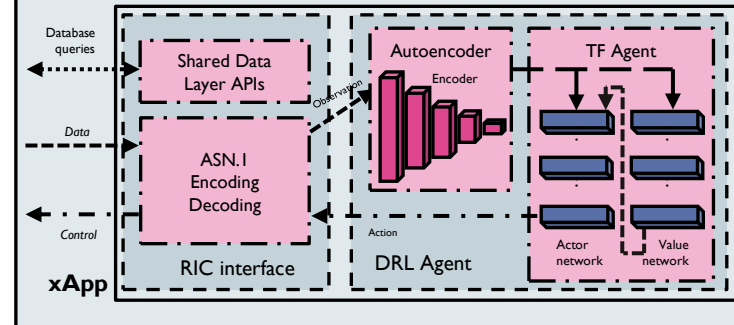
# The OpenRAN Gym vision

*Enable native O-RAN-driven experiments in large-scale experimental testbeds and networks*

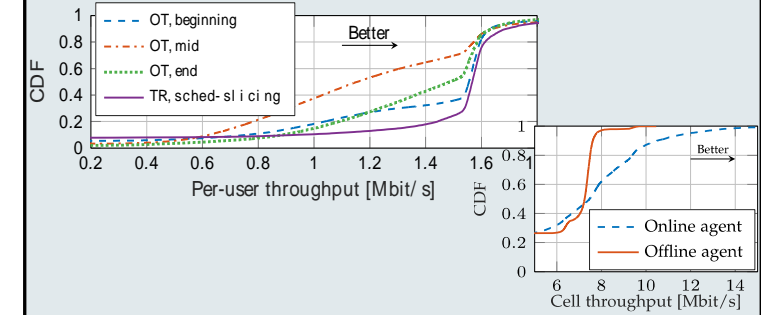
Collect data at scale on virtual RF scenarios



Design, train, and package AI/ML components as xApps



Test and refine on experimental wireless platforms



**Website: [openrangym.com](https://openrangym.com)**

L. Bonati, M. Polese, S. D'Oro, S. Basagni, T. Melodia, "OpenRAN Gym: AI/ML Development, Data Collection, and Testing for O-RAN on PAWR Platforms," Computer Networks, vol. 220, pp. 1-11, January 2023

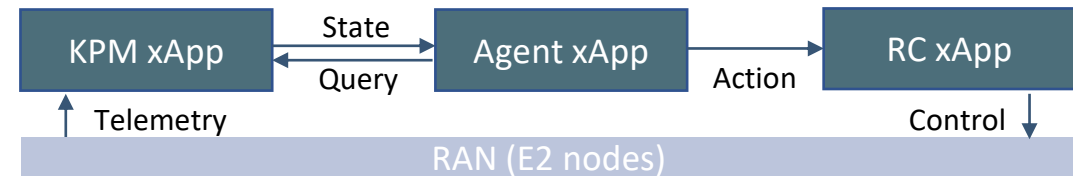
# Intelligent Use Cases



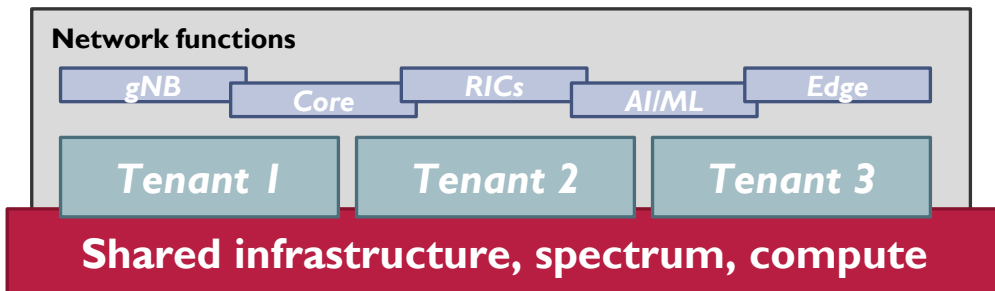
Network slicing and scheduling



Traffic steering



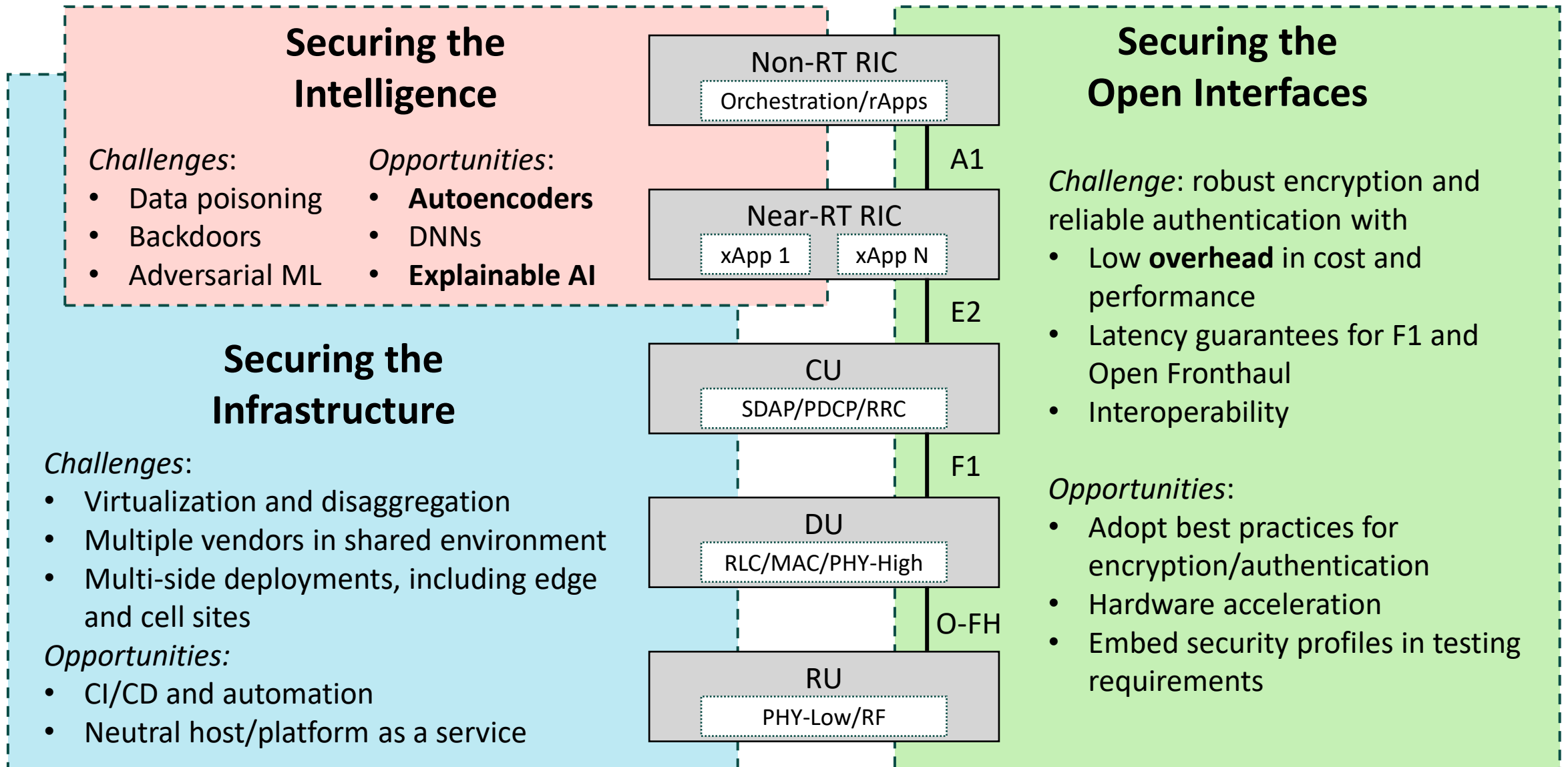
Spectrum sharing



Energy efficiency

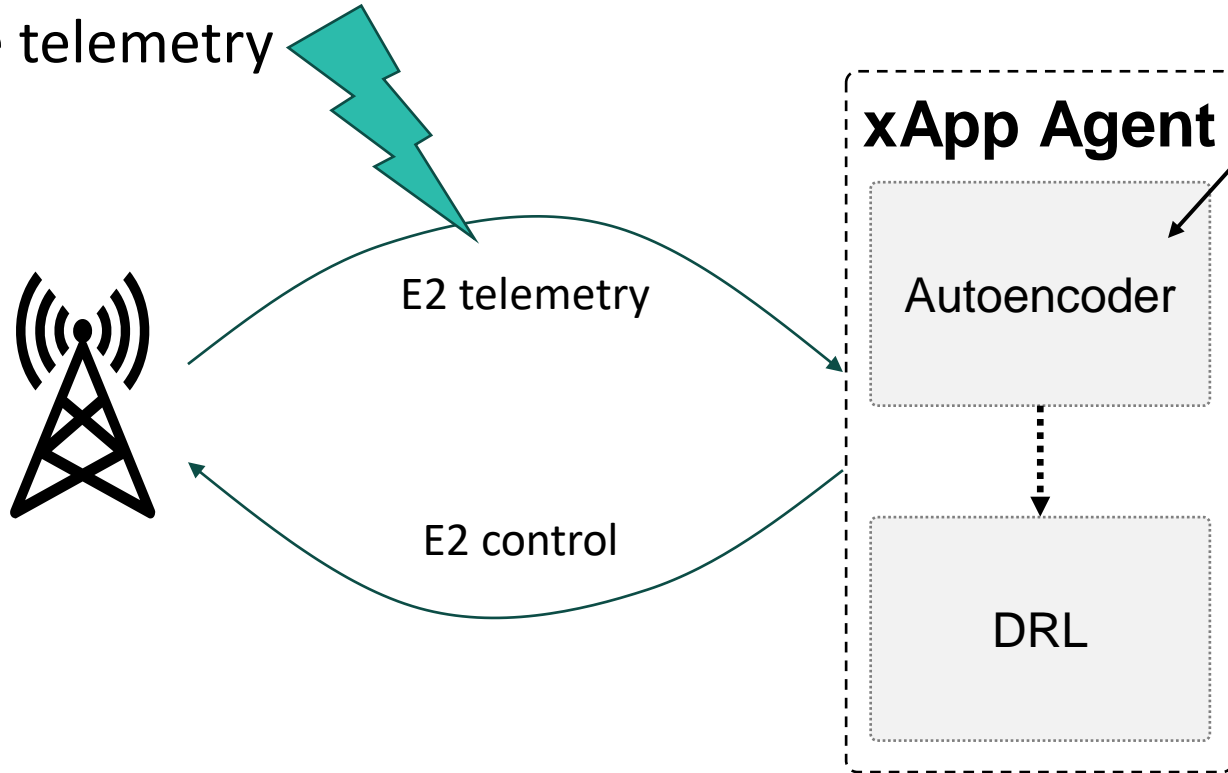


# Open RAN and Security Implications

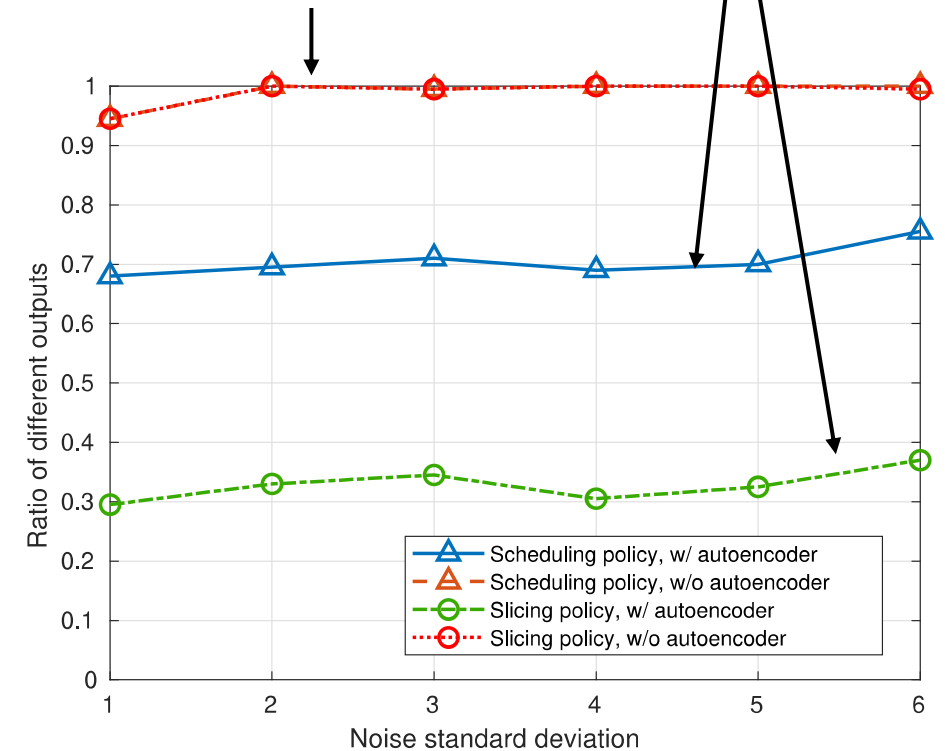


# Protecting the Network Intelligence

Attack: inject random noise in the telemetry



Compare attack effect with and without autoencoder



# TENORAN – Open RAN Energy Efficiency

## Objective:

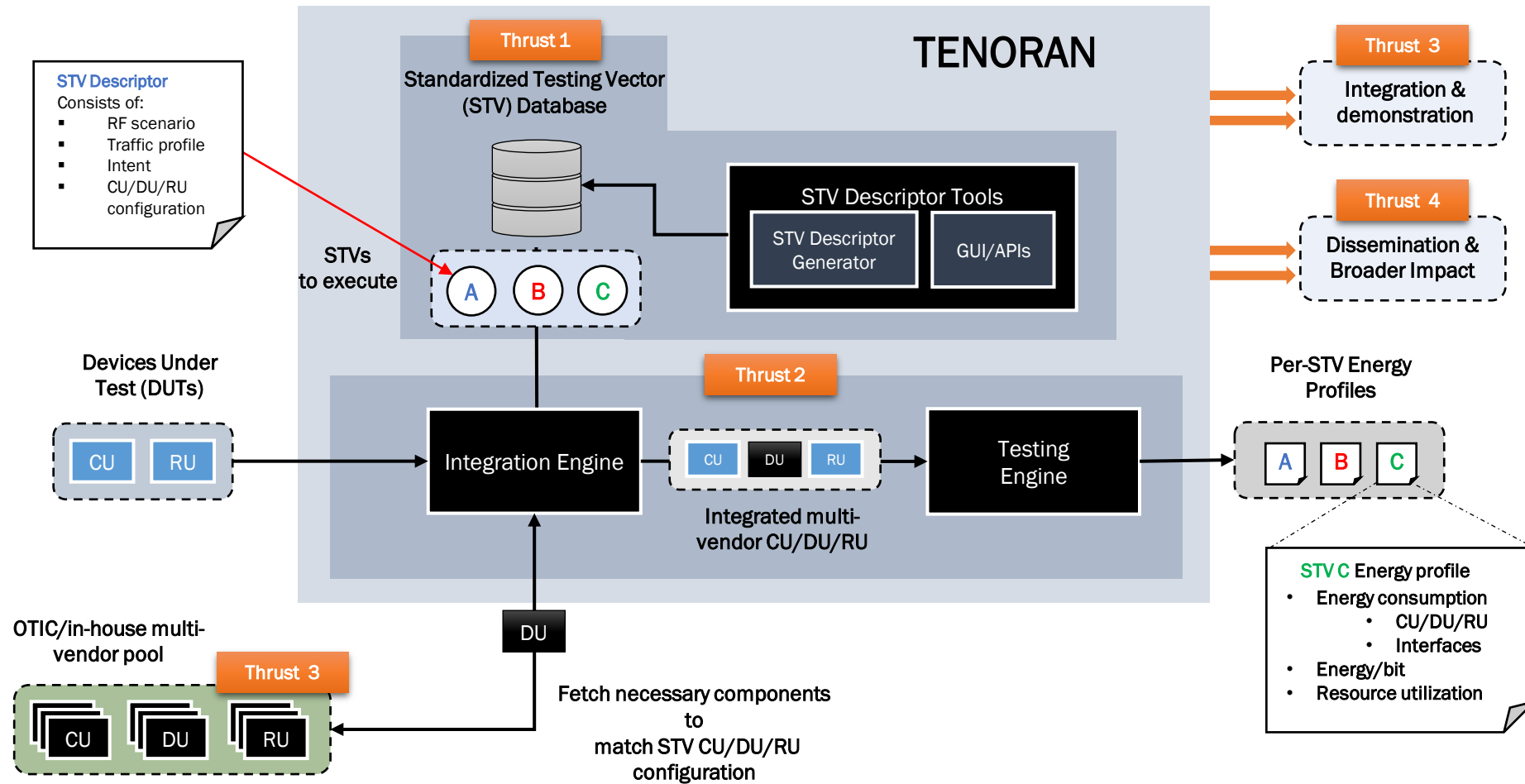
- Fine-grained energy efficiency testing for Open RAN

## Relevance:

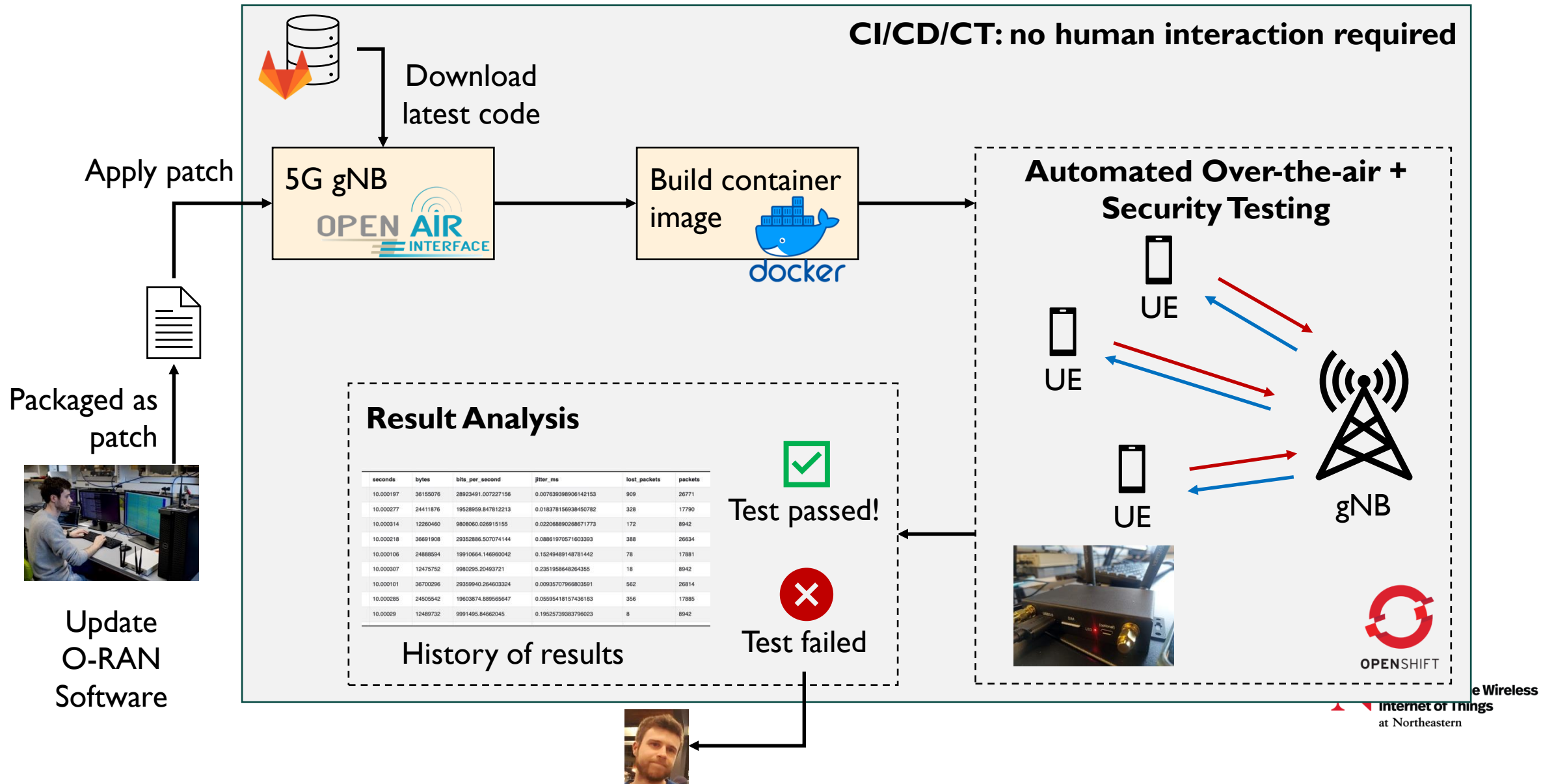
- Open RAN needs to demonstrate energy efficiency
- We will provide the tools to make it happen

## Structure:

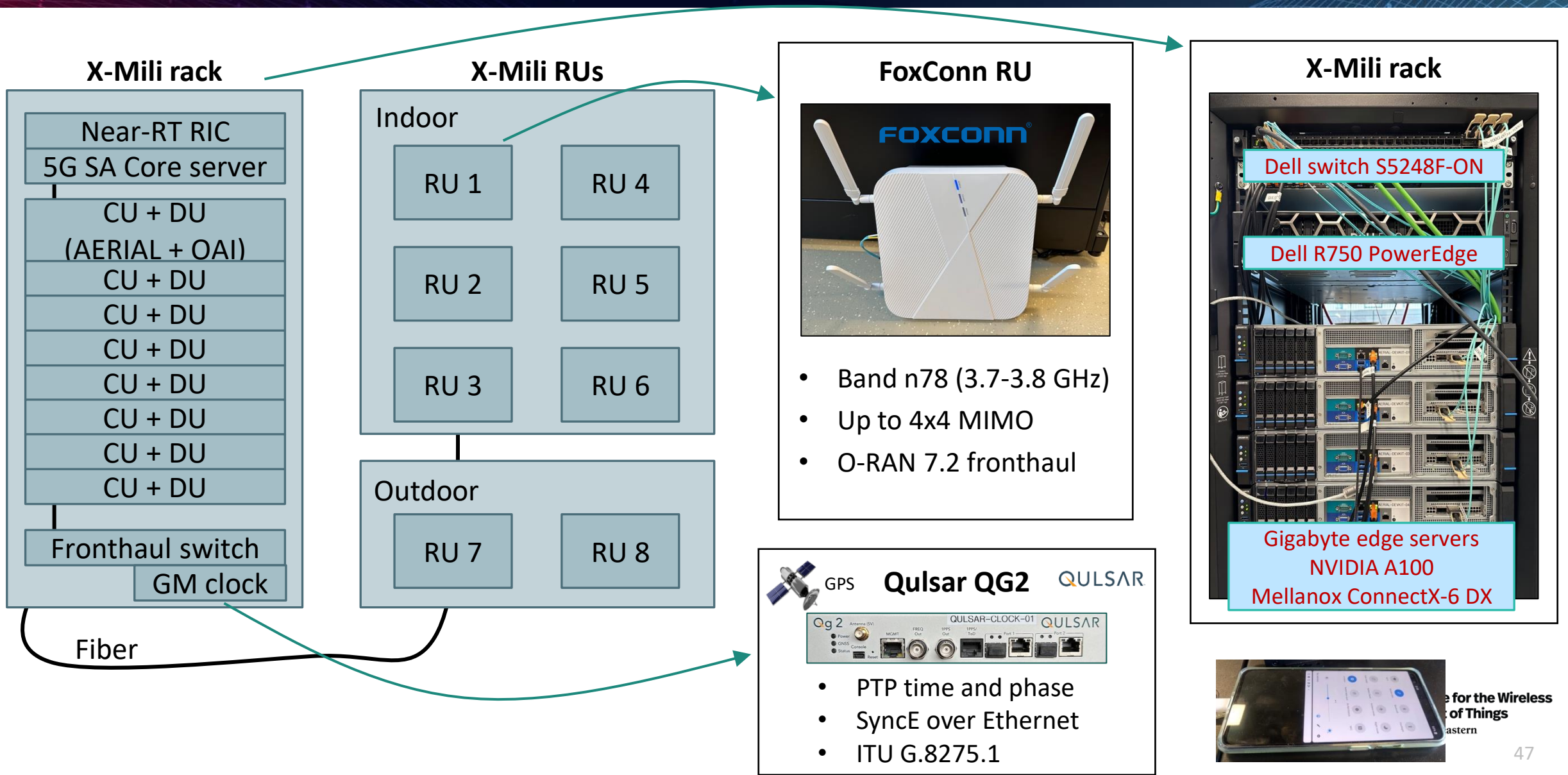
- 3 technical thrusts
- 1 dissemination thrust



# CI/CD/CT and Automation for Secure O-RAN Software

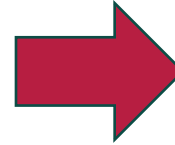


# Private 5G ORAN Multi-Vendor Testbed



# Explainable AI – the EXPLORA framework

## Network slicing and scheduling



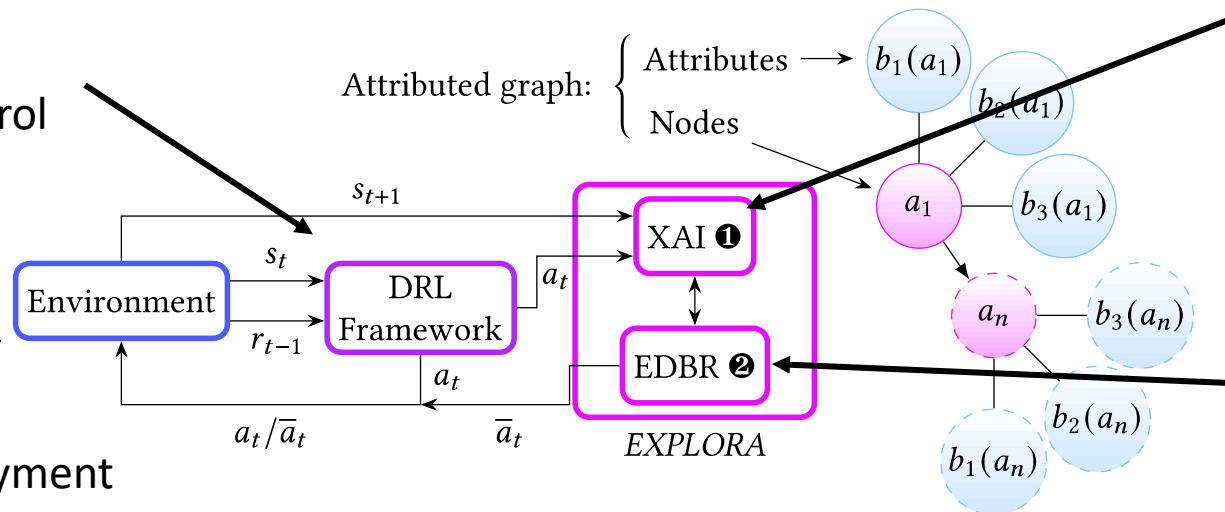
- DRL is effective at controlling and optimizing O-RAN systems
- Inherently hard to explain and interpret
- Operator trust?
- Expected/anomalous behavior?

## EXPLORA: network-oriented explanations that link DRL action to network state

C. Fiandrino, L. Bonati, S. D'Oro, M. Polese, J. Widmer, T. Melodia, EXPLORA: AI/ML EXPLainability for the Open RAN, ACM CoNEXT'23

xApp(s) for network control

O-RAN deployment



### XAI:

- create attributed graph to connect **actions** (nodes) to effects on **RAN** (attributes)
- distill knowledge by analyzing **transitions** between actions (edges)



### Explanation-Driven Behavior Refiner (EDBR):

- identify inefficiencies/anomalies
- adjust agent behavior with action steering

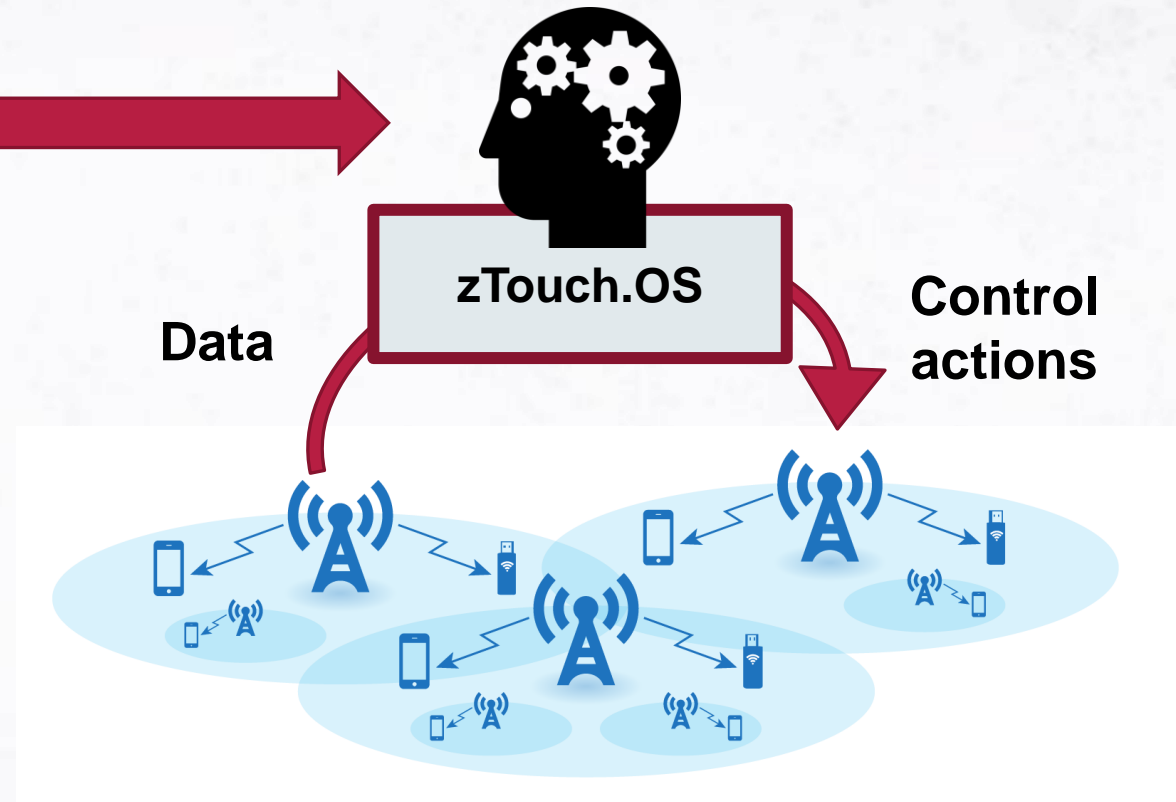


# Putting it all together: zTouch OS

Network operator's intent

I need to stream **4K video** to **100 users** in **Times Square, NY** from **8pm to 9pm**

- **Automated orchestration**
- **Intent recognition**
- **Adapt** to network state and traffic demand
- **Optimal performance**
- **Zero-touch reconfiguration**



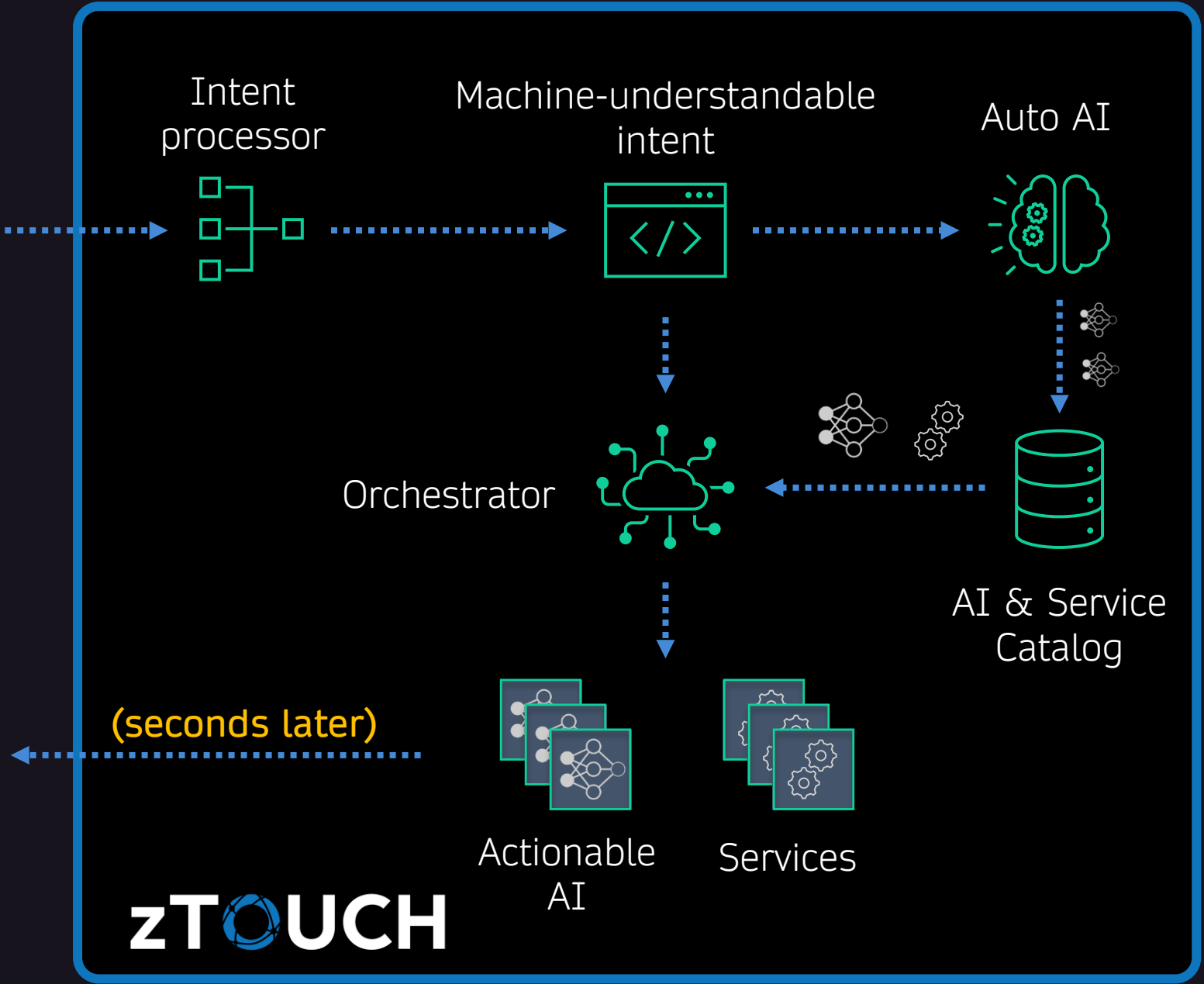
# Intent

Support **ultra-low latency UAV** traffic and **4K video streaming** for **asset tracking**

Customer  
(factory owner)



Factory Automation



# zTOUCH

# Open6G ORAN Testing and Integration Center

## Open6G OTIC

- Testing and Integration center for next-generation wireless networks
- Leverage WIoT testbeds
- interoperability and AI research toward 6G

## 6G Innovation Ecosystem in MA

- Hub for economic development around Open RAN/6G
- Tech incubator for next-generation wireless startups
- WIoT consortium

## 6G Workforce Development in MA

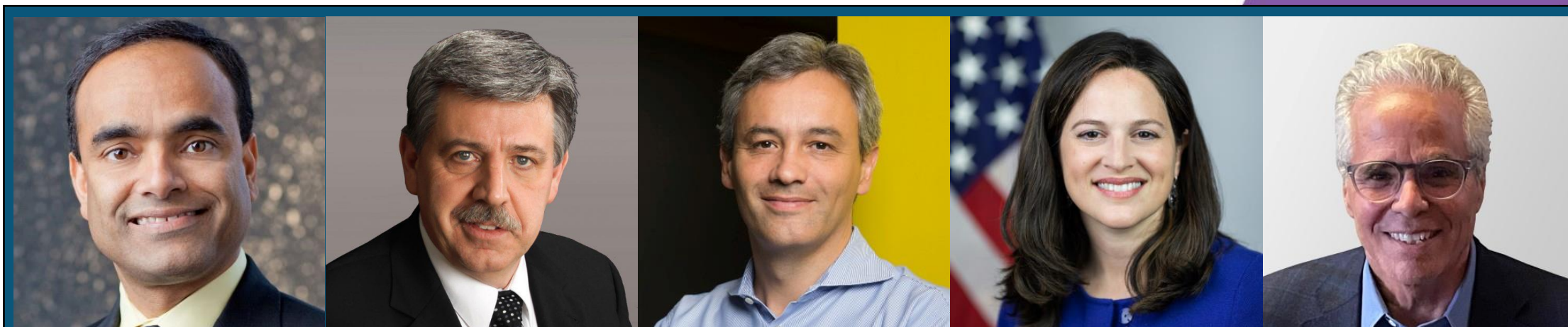
- Unique hands-on training programs
- Outreach activities
- Open RAN 5G and 6G expert certification program



6G SYMPOSIUM  
**BEYOND THE HYPE**  
2023

## Opening Keynotes

Wednesday Oct 18<sup>th</sup>



**Rajesh Pankaj**  
InterDigital

**Mike Nawrocki**  
Next G Alliance

**Tommaso Melodia**  
Northeastern

**Anne Neuberger**  
The White House

**Ray Dolan**  
Cohere & NSTAC



6G SYMPOSIUM  
**BEYOND THE HYPE**  
2023

# CHIPS & Science Act Funding & Its Impact Shaping 6G

Wednesday Oct 18<sup>th</sup>

						
<b>Jack Gold</b> J Gold Associates	<b>Amanda Toman</b> NTIA	<b>Ayodele Okeowo</b> NIST	<b>Erwin Gianchandani</b> NSF	<b>Jaydee Griffith</b> NIST	<b>Mike O'Rielly</b> MPO'Rielly	<b>Chris Greer</b> NIST



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# The Public Wireless Supply Chain Innovation Fund

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6G Symposium  
October 18<sup>th</sup>, 2023





# The Innovation Fund's Goals

***The Innovation Fund was authorized by the FY2021 National Defense Authorization Act and funded by the 2022 CHIPS and Science Act.***

***Per the NDAA, the Innovation Fund is charged with:***

- Promoting and deploying technology that will **enhance competitiveness** in 5G and successor technologies.
- Accelerating **commercial deployments** of open / interoperable equipment.
- Promoting and deploying **compatibility of new 5G equipment** with future equipment.
- Managing **integration of multi-vendor network environments**.
- Identifying criteria to **define equipment as compliant with open standards** for multi-vendor network interoperability.
- Promoting and deploying **security features**.
- Promoting and deploying **network function virtualization**.





# Innovation Fund Vision and Mission

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## *Vision*

- Develop a **competitive global ecosystem** of **trusted telecommunications vendors** that are fielding **open interoperable network equipment** domestically and overseas.

## *Mission*

- Develop and implement a **grant program** that accelerates the **adoption and deployment of open radio access networks** through investments in **interoperability, hardware maturity, security, and supply chain diversity.**





# Program Objectives



## Near-Term Objectives (Years 1-3)

- Support continued refinement and expansion of “Open RAN” specifications.
- Increase 5G Open RAN adoption by carriers and private networks.
- Develop third-party testing/certification in the U.S.
- Accelerate developments in 5G Open RAN performance, security, and interoperability.
- Advance 5G Open RAN trials and pilots.
- Develop 5G Open RAN best practices and training.

## Long-Term Objectives (Years 3-10)

- Support advances in “Open RAN” specifications.
- Open RAN deployed by carriers and private networks.
- The U.S. is a competitive global player in telecommunications and Open RAN development and deployment.
- 6G specifications are inherently open and interoperable.
- Open RAN architecture boasts additional security, power consumption, cost, and product features.



# The Innovation Fund is Meeting Industry Needs



***The Innovation Fund's **request for comment** received **89 responses**, from carriers, cloud/network edge providers, wireless equipment suppliers, academia, industry groups, and more. The responses highlighted the following themes:***

Interoperability Testing	Network Security	Open RAN Specifications
<b>76% of RFC respondents</b> cited the need to prioritize testing through the Innovation Fund.	<b>Nearly 70% of RFC respondents</b> suggested that the Innovation Fund to invest in security.	<b>Nearly half of RFC respondents</b> emphasized the importance of specifications that could assist with Open RAN integration.





*The Innovation Fund is moving rapidly to deliver critical investment into the wireless ecosystem.*



# Deep Dive into NOFO #1



## Background on NOFO #1

- **Focus:** Investing in the testing & evaluation ecosystem for Open RAN and further research & development for testing methods.
- **By the Numbers:** \$140.5M in total funding; grants have a five-year period of performance.
- **Why T&E + R&D:** Aligns with industry's need for advanced testing and our short-term objective to improve the infrastructure around Open RAN.

## Our First Grantees

- **Northeastern University:** Investing in an energy-efficient testing platform that'll help make wireless networks more sustainable.
- **New York University:** Supporting T&E for NextGen ran components with a focus on shared and adversarial spectrum scenarios.
- **DeepSig:** Aiding with its air-interface performance testing that leverages AI to improve accuracy.





## Setting up 6G+ Success via 5G

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- **5G is a Case Study for Proactive Solutions:** USG has made reactive investments to address security and trust challenges associated with already-deployed telecommunications equipment. *We should also proactively address the market dynamics that first allowed untrusted equipment to be deployed.*
- **The 6G Horizon is Shorter Than We Think:** Even if a network refresh is several years away, the R&D and testing that precede a network refresh *take several years.* We have a *2-3-year timescale* to make a major impact, not a decade.
- **5G is the Best Time to Pilot Best Practices for 6G+:** Advancing open, interoperable, and standards-based networks is *a team effort* that will require *new industry-wide communications and organizational mechanisms.* We can't wait till 6G to pilot those best practices. We need to develop and refine them *now.*





# THANK YOU

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**Amanda Toman**

Director, Public Wireless Supply Chain Innovation Fund

[Innovationfund@ntia.gov](mailto:Innovationfund@ntia.gov)



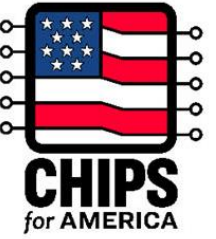
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# CHIPS for America Briefing

6GSymposium Fall 2023

Ayodele Okeowo – Director of Intergovernmental Affairs, CPO



October 18, 2023

NIST





One Hundred Seventeenth Congress  
of the  
United States of America

AT THE SECOND SESSION

*Begun and held at the City of Washington on Monday,  
the third day of January, two thousand and twenty-two*

An Act

Making appropriations for Legislative Branch for the fiscal year ending September 30, 2022, and for other purposes.

*Be it enacted by the Senate and House of Representatives of  
the United States of America in Congress assembled,*

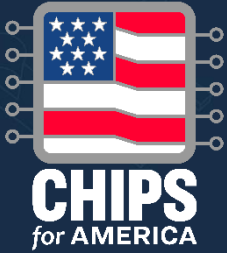
**SECTION 1. TABLE OF CONTENTS.**

The table of contents for this Act is as follows:

- Sec. 1. Table of contents.
- Sec. 2. References.

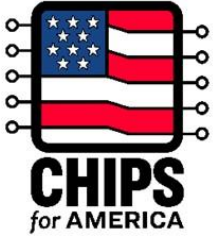
**DIVISION A—CHIPS ACT OF 2022**

- Sec. 101. Short title.
- Sec. 102. Creating helpful incentives to produce semiconductors (CHIPS) for America fund.
- Sec. 103. Semiconductor incentives.
- Sec. 104. Opportunity and inclusion.
- Sec. 105. Additional GAO reporting requirements.
- Sec. 106. Appropriations for wireless supply chain innovation.
- Sec. 107. Advanced manufacturing investment credit.



# The CHIPS and Science Act of 2022

# CHIPS for America Programs



## \$39 billion for manufacturing

Components:

1. Attract large-scale investments in advanced technologies such as leading-edge logic and memory
2. Incentivize expansion of manufacturing capacity for mature and other types of semiconductors

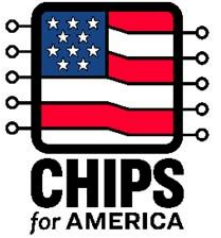
## \$11 billion for R&D

- National Semiconductor Technology Center
- National Advanced Packaging Manufacturing Program
- Manufacturing USA institute(s)
- National Institute of Standards and Technology measurement science

Together with CHIPS initiatives from other agencies, including DOD, State, NSF, and Treasury

Workforce development

# CHIPS for America Vision



## Economic Security

The CHIPS Act will strengthen supply chain security and increase economic resilience in critical sectors.



## National Security

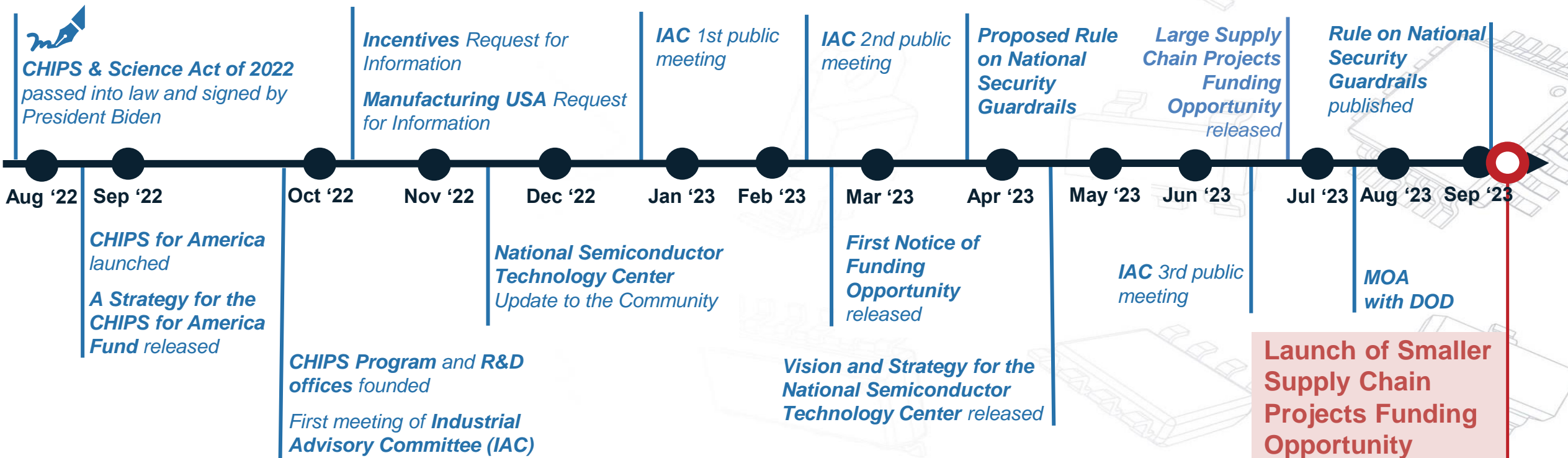
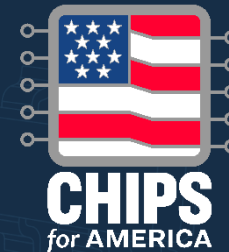
The CHIPS Act will ensure that the U.S. can manufacture advanced technologies, including secure chips for the U.S. military.



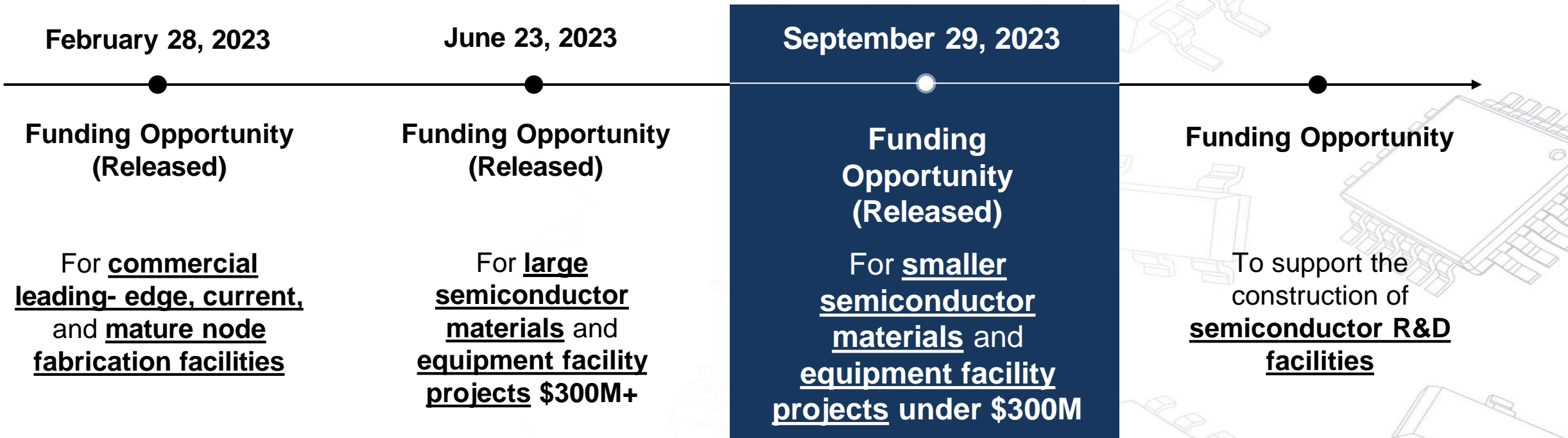
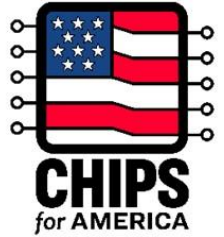
## Future Innovation

The CHIPS Act will spur innovation, increase competitiveness, and ensure long-term U.S. leadership in the sector.

# We are moving quickly to progress against program goals

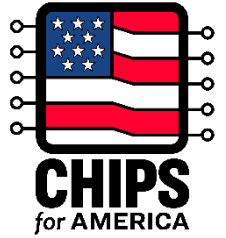


# Funding Opportunities

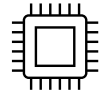


*Focus of today's webinar*

*The CHIPS Program Office has received over 500 statements of interest and 100 pre-applications and full applications*



# Vision for Success



## Leading-Edge Logic

- ✓ The U.S. will have at least **two new large-scale clusters of leading-edge logic fabs**
- ✓ **U.S.-based engineers** will develop the process technologies underlying the **next gen of logic chips**



## Memory

- ✓ U.S.-based fabs will **produce high-volume memory chips on economically competitive terms**
- ✓ **R&D for next-generation memory** technologies critical to supercomputing and other advanced computing applications will be **conducted in the U.S.**



## Advanced Packaging

- ✓ The U.S. will be home to **multiple high-volume advanced packaging facilities**
- ✓ The U.S. will be a **global leader in commercial-scale advanced packaging technology**

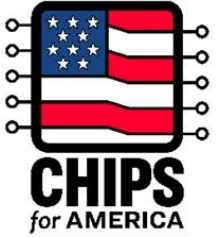


## Current-Generation and Mature

- ✓ The U.S. will have **strategically increased its production capacity** for current-gen and mature chips
- ✓ Chipmakers will also be able to **respond more nimbly** to supply and demand shocks

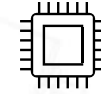


# Vision for Success



## Strengthen Supply Chain Resilience

- ✓ The **U.S. and its allies** will reduce **chokepoint risks** flowing from **geographic concentration**
- ✓ Supply chain participants will improve the **transparency of demand and supply** to **reduce the risks of production disruptions**



## Advance U.S. Technology Leadership

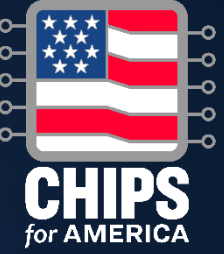
- ✓ The U.S. will have **incentivized major U.S. equipment and materials suppliers** to **increase their footprints** in the U.S.
- ✓ **Non-U.S. suppliers** of the world's most advanced equipment, materials, and subsystems will also **establish large-scale footprints** in the U.S.

By the  
end of the  
decade...



## Support Vibrant U.S. Fab Clusters

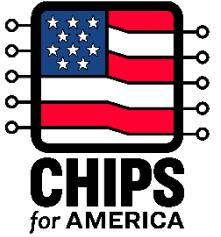
- ✓ Each **CHIPS-funded fab cluster** in the U.S. will be **supported by dozens of suppliers**, including many **investing in the U.S. for the first time**
- ✓ **State and local entities** encouraged to help **facilitate the expansion of these ecosystems**



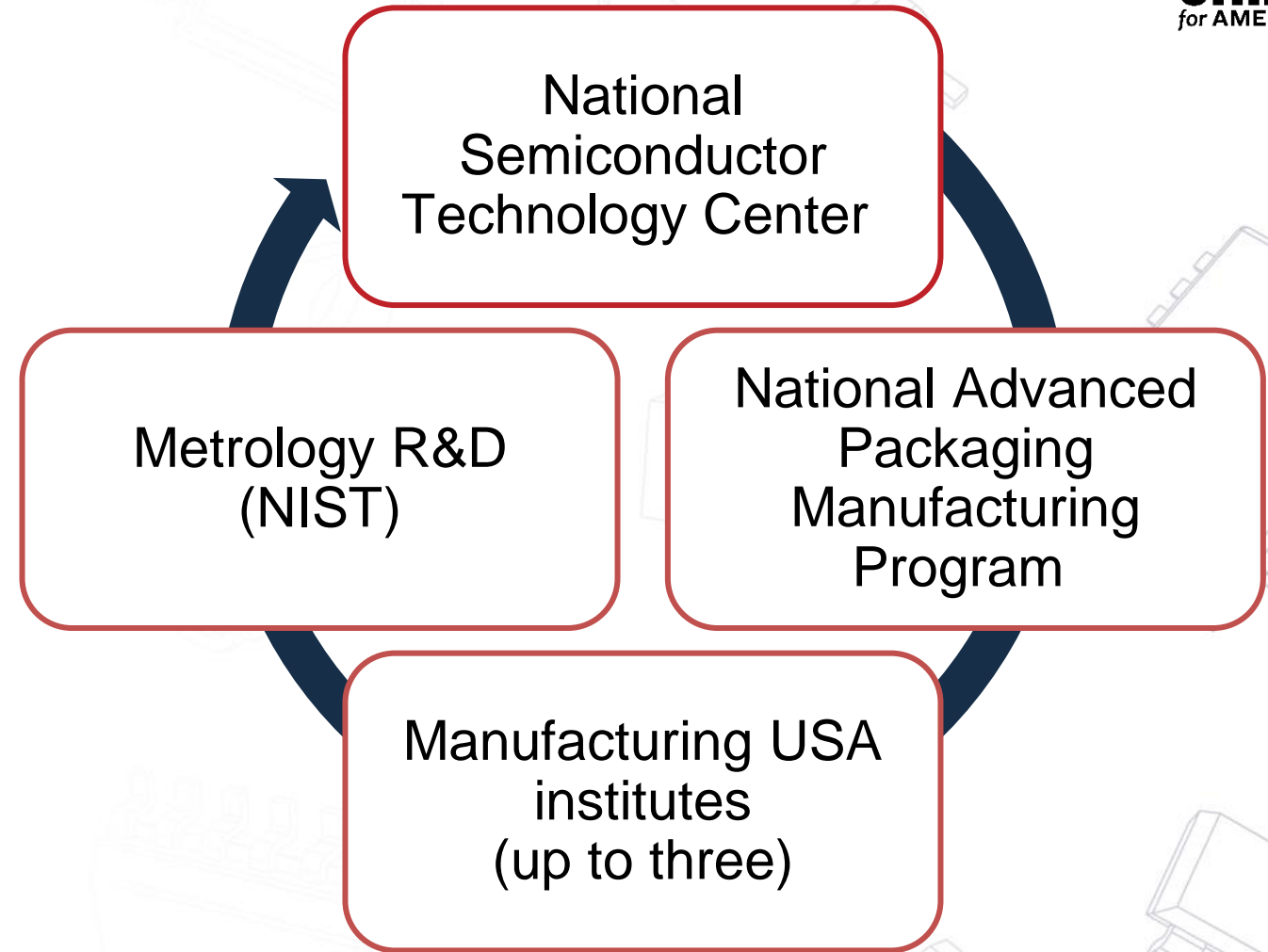
# Research and Development



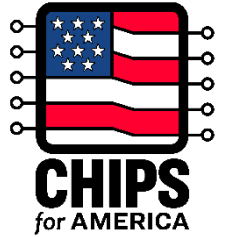
# CHIPS for America R&D



- To strengthen and advance U.S. leadership in R&D
- An integrated ecosystem that drives innovation
- In partnership with industry, academia, government, and allies
- A strategic view of R&D infrastructure, participant value-proposition, and technology focus areas
- Informed by the Industrial Advisory Committee



# Program Development Timeline



SPRING 2023

SUMMER 2023

FALL 2023

WINTER 2023

National Semiconductor Technology Center

Vision/Strategy Paper Published

Selection Committee identifies Board of Trustees

Establish NSTC

National Advanced Packaging Manufacturing Program

NAPMP vision and strategy paper

Manufacturing USA institute(s)

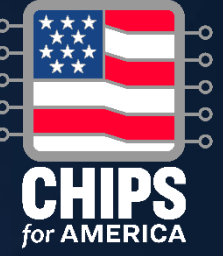
RFI Summary Published

Select topic(s); begin proposal process

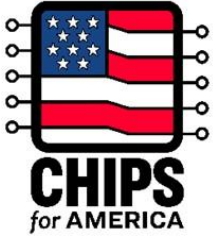
Metrology Program (NIST)

Metrology Gaps Report Published

Select programs to begin

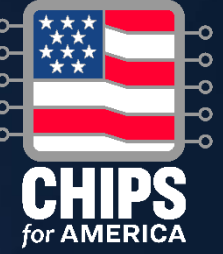


# Resources



# Next Steps

- Visit [CHIPS.gov](https://chips.gov) for resources, including:
  - Notice of Funding Opportunity
  - Vision for Success paper
  - Applicant guides and templates
  - FAQs and fact sheet
  - Webinar schedule (and recordings of prior webinars)
- Teaming Partner List
- Join our mailing list
- Contact us
  - [askchips@chips.gov](mailto:askchips@chips.gov) – general inquiries
  - [apply@chips.gov](mailto:apply@chips.gov) – application-related inquiries



Thank You

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