Agenda

15:00 - 15:10	Openness, inclusivity, transparency, privacy, cooperation, and protection of data: the Next Generation Internet initiative of the European Commission and the importance of EU – US cooperation in NGI. **Opening by Peter Fatelnig,** Minister-Counsellor for Digital Economy Policy chez Delegation of the European Union to the United States.
15:10 - 15:15	What is the NGI Initiative? **Jim Clarke**, WIT, EU Programme Manager, EU Strategic Liaison Manager, NGIatlantic.eu project coordinator.
15:15 - 15:20	NGIatlantic.eu: bridging EU-US research on Next Generation Internet. **Sara Pittonet Gaiarin**, Senior Project Manager, Trust-IT
15:20 - 15:30	NGIatlantic.eu 1st Open Call: topics, experimental platforms, finding your partner. **Jim Clarke**, WIT, , EU Programme Manager, EU Strategic Liaison Manager, NGIatlantic.eu project coordinator.
15:30 - 15:40	Perspective from an US Experimental Platform. **Ivan Seskar**, Rutgers University, NJ, USA
15:40 - 15:45	Open questions and answers

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NGI AT A GLANCE

Launched in 2016, the Next Generation Internet (NGI) initiative aims to shape the development of the Internet of tomorrow into an Internet of Humans that responds to people's fundamental needs, including trust, security and inclusion, and reflects the European values and norms

Restoring **trust**

CHALLENGES

- → Protect personal data
- → Ensure privacy and security
- → Combat disinformation online
- → Guarantee access and freedom of choice
- → Respect fundamental rights
- → Enforce ethics and sustainability by design

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SUPPORTING INTERNET INNOVATION AND COORDINATE EFFORTS ACROSS EUROPE

To attract top talents, €75m of grants are directly supporting innovators including individual researchers, developers, start-ups and social innovators.

○ **Research and Innovation Actions** are acting as intermediaries: 20% of their budget to select, monitor, mentor, train and build the community; 80% to fund individual projects among 3rd party researchers, developers, hi-tech start-ups/SMEs

○ The NGI builds also on **Coordination and Support Actions** to ensure synergies across all stakeholders, with a focus on:
  ⇢ Outreach, community building, business acceleration
  ⇢ Policy and strategic programming
  ⇢ EU-US collaboration

THE NGI TOPICS AND WHO RUNS THE OPEN CALLS

○ **Privacy and Trust Enhancing Technologies**

○ **Decentralised (and better) Data Governance**

○ **Discovery and identification technologies, search and discovery**

○ **Strengthening internet trustworthiness with electronic identities**

○ **Service and data portability**

○ **Open Internet architecture renovation**

& EU-US collaboration on NGI

COORDINATION AND SUPPORT ACTIONS

The NGI initiative is supported by five ongoing Coordination and Support Actions:

○ **NGI4ALL**, coordinates the NGI Outreach Office (NGIO).

○ **Think Nexus**, aims to reinforce EU-US collaboration, through its dedicated Think Tank.

○ **NGI Explorers**, conducts missions to the USA for Top European Researchers & Innovators.

○ **NGI Forward** sets out a strategy as well as a policy and research agenda.

○ **Tetra** is the business accelerator for NGI.

NGIatlantic.eu: bridging EU-US research on Next Generation Internet

Sara Pittonet Gaiarin – s.pittonet@trust-itservices.com

NGIatlantic.eu: bridging EU-US research on NGI

From January 2020 through June 2022, NGIatlantic.eu will fund EU-based researchers and innovators in carrying out **Next Generation Internet** related experiments, in collaboration with **US research teams.**
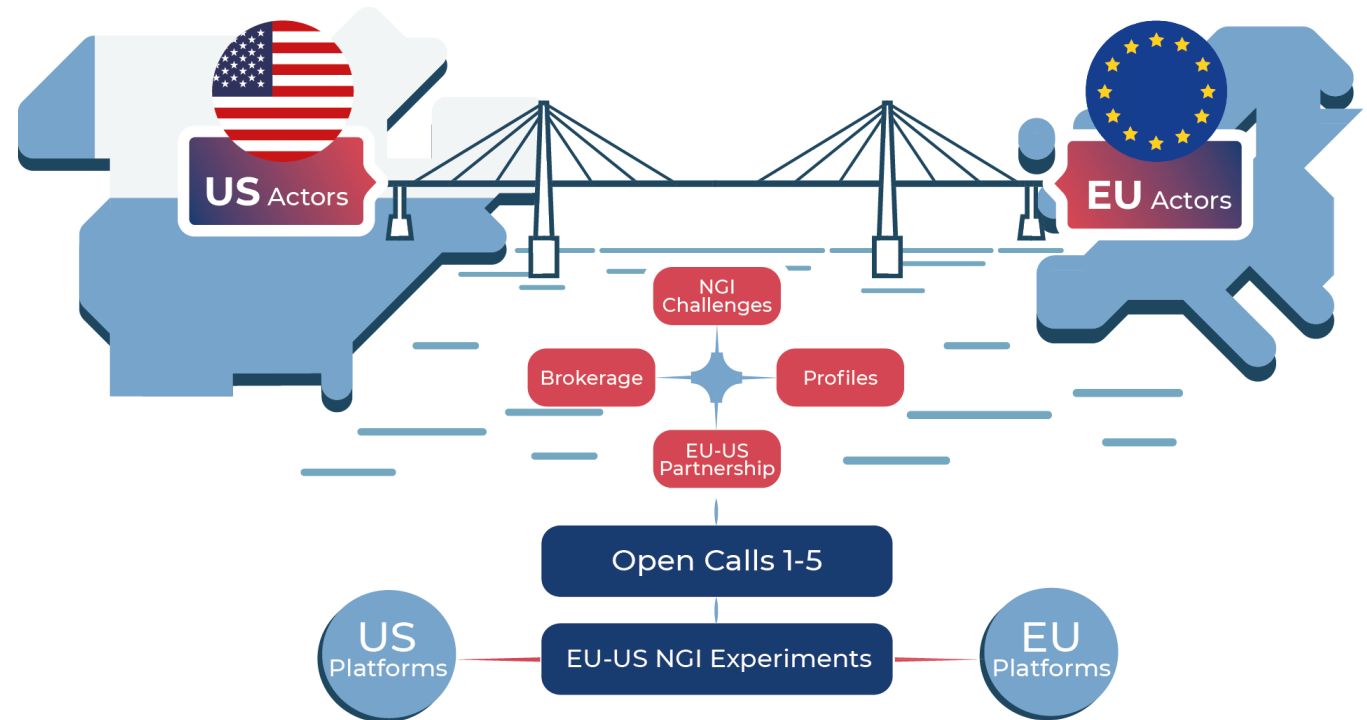
NGIatlantic.eu: bridging EU-US research on NGI

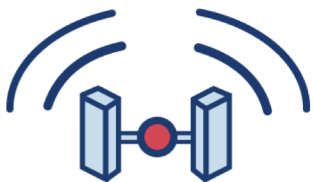**5** OPEN CALLS FROM *APRIL 2020* TO *NOVEMBER 2021*

PROJECTS FROM **50,000€** TO **150,000€**

A TOTAL OF **2.8M€** FUNDING FOR EU ORGANISATIONS

5 WEBINARS TO BE GUIDED THROUGH THE CALL'S PRIORITIES

4 WORKSHOPS EXPLAINING THE NGI VISION & ECOSYSTEM
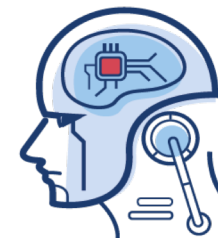
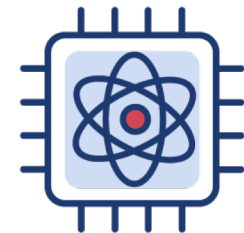## Sample of relevant areas in NGI

5G

BIG DATA

IoT

CYBERSECURITY

A.I.

OTHER TOPICS

NGI ATLANTIC.EU

NGIatlantic.eu key features

5 Open Calls – Call#1: April 2020
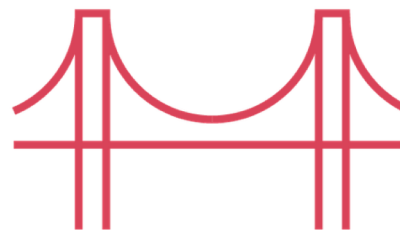
2.8 Million Euros funding

NGI Experiments to be funded

The External Advisory Group (EAG)

The External Pool of Evaluators (EPE)

The Twinning Lab

APPLY WITH YOUR TEAM

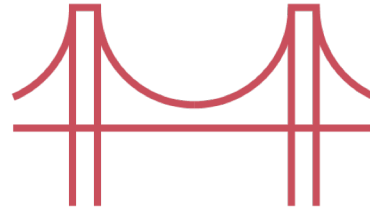Prepare and submit your project addressing the call's priorities

WEBINARS & WORKSHOP

Content-rich sessions to learn the full background and criteria of our open calls

CONTINUOUS COACHING AND MENTORING

From pre-proposal to exploitation to maximise your project's success

The Twinning Lab

A space for researchers, innovators and start-ups from EU and US to **discover and connect with transatlantic actors and establish complementary partnerships.**

JOIN THE TWINNING LAB NOW

ngiatlantic.eu/twinning-lab

JOIN THE TWINNING LAB!
- ✓ Showcase your expertise in addressing NGI challenges
- ✓ Find the ideal partner for your EU-US NGI experiment

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NGIatlantic.eu Open Calls

Cascade funding to EU-based researchers and innovators in carrying out NGI related experiments with US research teams in **Privacy and Trust enhancing technologies, Decentralised data governance, Discovery and identification technologies, and others**

GET READY FOR OUR 1ST OPEN CALL! APRIL 2020

- ✓ 5 Open Calls for Proposals, with a total 2.8 Million Euros budget
- ✓ funding range from 50.000€ to 150.000€
- ✓ Long-term & short-term experiments, with R&I activities lasting up to 3 or 6 months

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NGIatlantic.eu 1st Open Call: topics, experimental platforms, finding your partner

Jim Clarke – jclarke@tssg.org

Main goal: to incentivize EU – US NGI teams to carry out experiments using EU and/or US based experimental platforms

- **Duration of Open call:** 1st April – 29th May, 2020 at 17:00 CET. Evaluation and notification will take place in June, 2020
- **Total indicative funding available for Open call 1:** 600,000 euros
- **Expected Start dates of projects:** 1st July, 2020
- **Two types of proposals →**

Proposal type	Description	Maximum Contract duration	Monitoring frequency	Funding range*
LT – Long term contributions	EU-US NGI experiment project with R&I activities	6 months	Monthly	€50,000 - €150,000
ST – Short-Term contributions	EU-US NGI experiment project with R&I activities.	3 months	Fortnightly	€25,000 - €75,000

* Eligible Costs: Cost of personnel (inclusive of 25% overhead) and travel & subsistence (cost-reimbursement contracts).

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1st Open call topics

○ **Call topic 1. Privacy and Trust enhancing technologies –** experimentation of results on the NGI call topic related to the development of robust and easy to use technologies to help users gain improved trust and greater control when sharing their personal data, attributes and information.

○ **Call topic 2. Decentralised data governance** - experimentation of results on the NGI call topic related to leveraging distributed open hardware and software ecosystems based on blockchains, distributed ledger technology, open data and peer-to-peer technologies with particular focus on ethical, legal and privacy issues, as well the concepts of autonomy, data sovereignty and ownership, values and regulations.

○ **Call topic 3. Discovery and identification technologies -** experimentation of results on the NGI call topic related to new methods of search, discovery, and access of large heterogeneous data sources, services, objects and sensors, devices, multi-media content, etc. and which may include aspects of numbering; providing contextual querying, personalised information retrieval and improved quality of experience

Strategy is to use the open calls to team up EU innovators to experiment with NGI results with US teams to carry out experiments on an Experimental Platform of the proposer's choice. Note that while the 1st Open call topics are mapping the NGI topics in other RIAs, the NGIatlantic.eu open calls are open to all innovators.

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EU – US Experimental platforms

The calls are open to all EU or US experimental platforms (or even some combination)

Some examples of the types of platforms that could be involved are:

○ EU - NGI Experimentation (NGI-EXP), FED4FIRE+, 5G-PPP, among others;

○ US - NSF's Wired and Wireless funded programs, such as ENTeR / GENI, FABRIC, and Future Cloud Platform, Platforms for Advanced Wireless Research (PAWR), US Ignite, and dedicated US-EU Internet Core & Edge (ICE-T) program, among others. We are compiling these links in our Twinning Lab.

Some examples of EU – US project teams*

1. **Innovator(s) in EU that have developed an NGI-based solution to improve new ways of search and discovery functionality teamed up with a US based experimental platform funded by the NSF;**

2. **Innovator(s) in US funded by NSF that have developed NGI - based solutions on decentralised data governance that want to team up with an EU based partner who has also developed similar solutions and team up for further development and testing on an EU based experimental platform e.g. FED4FIRE+ or 5G-PPP.**

* In both of these examples, according to the funding rules, NGIatlantic.eu would fund the EU – based partners and the NSF would fund the US partners, either under their existing project funds or new US – EU project funds e.g. similar to the dedicated US-EU Internet Core & Edge (ICE-T) program.

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1st Open call evaluation criteria

Each proposal will be evaluated based on the 4-criterion given below, with a scoring from 1 to 10 and the weighting indicated:

○ Criteria 1: Soundness of the proposal and foreseen impact on the Open Call topic (30%);

○ Criteria 2: Technical excellence & adherence to the Open Call topics (30%);

○ Criteria 3: Experience and qualifications of the applicant (20%);

○ Criteria 4: Economics of the proposal (20%).

The final scoring and ranking will be automatically determined by averaging the scores provided by the 3 independent evaluators identified from NGIatlantic.eu's External Pool of Evaluators.

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Who can receive financial support?

Private and public organisations of any size (not individual researchers) located within the EU Member States or Associated Countries and twinned with a US counterpart, as described to carry out the activities proposed. Please note that the funding is limited to coverage of the work to be carried out by the EU team. For the US teams, please refer to the funding mechanisms of your US partners (e.g. National Science Foundation, or others).

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Supporting Documents

- <u>FAQ</u>

- Full Open Call text soon available on the website

- General information presentation

The following documents will be available when the 1st open call opens.

- Proposal template in pdf & word format (contains brief instructions and its use is mandatory)

- Standard Contract for successful proposals (Cost-reimbursement contract)

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Cannot make it for OpenCall #1?

4 more Open Calls are scheduled!
OpenCall #2 will open in August 2020

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Perspective from an US PAWR Experimental Platform, ORBIT and COSMOS

Ivan Seskar, Rutgers University, New Jersey, USA

Platforms for Advanced Wireless Research

1 **+** **1** **>** **2**

Industry Consortium
<$ + In-Kind>
$50M

NSF
<$>
$50M

Courtesy: RAWR PPO

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Program Figures

$22.5M — Cash + In-Kind Per Platform

City Scale Platforms — 4

5 — Years of Funding

Courtesy: RAWR PPO
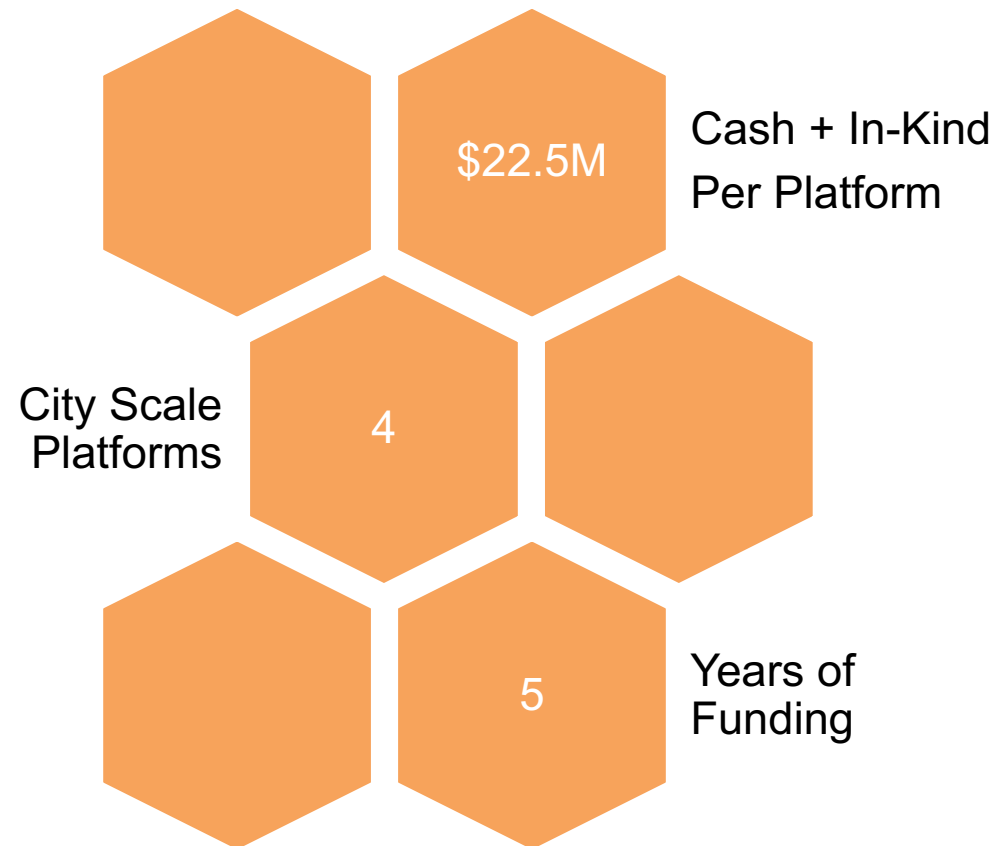
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Platform(s) Go-Live Timeline

Platform A

Early 2018 | 2019- Early Availability | 2021- Full Operations | 2023 and beyond

Platform B

Early 2018 | 2021- Full Operations | 2023 and beyond

Platform C

Late 2019 | Fully Operational | 2024 and beyond

Platform D

Late 2019 | Fully Operational | 2024 and beyond

Courtesy: RAWR PPO

PAWR Project Office
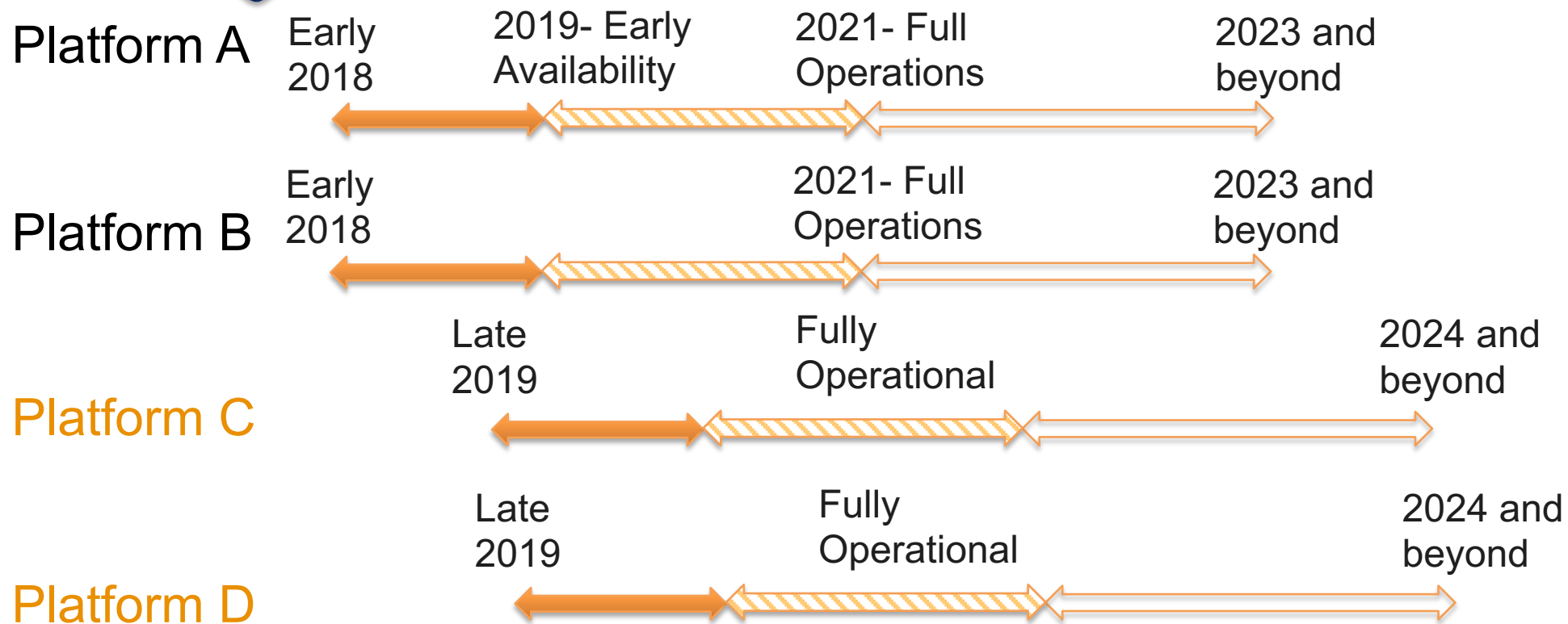
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PAWR Awardees

Round I Platforms

Salt Lake City

Click below to learn more about POWDER.

http://powderwireless.net

New York City

Click below to learn more about COSMOS.

http://cosmos-lab.org

Courtesy: RAWR PPO

POWDER: Platform for Open Wireless Data-driven Experimental Research

THE UNIVERSITY OF UTAH®

- Next Generation Wireless Architecture
- Dynamic Spectrum Sharing
- Distinct environments: a dense urban downtown and a hilly campus environment.
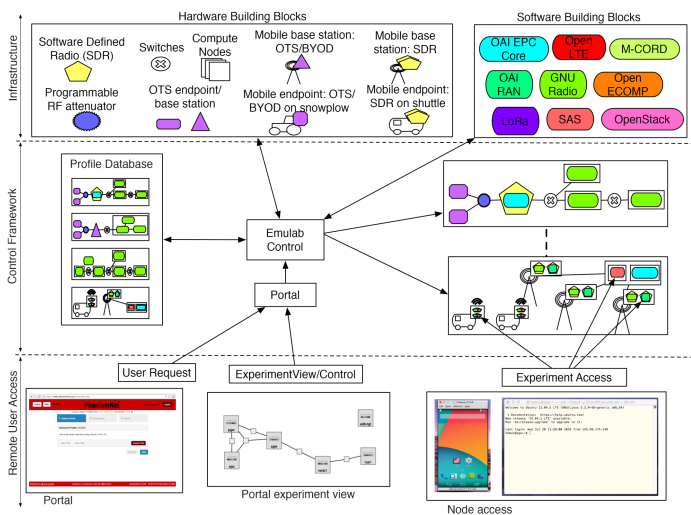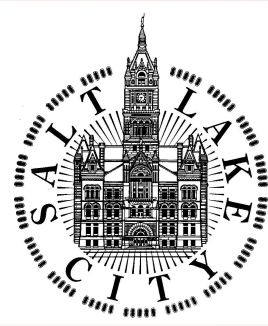
Control Framework with Hardware + Software Building Blocks

Courtesy: ROWDER/RENEW

Deployment Area: UofU Campus +Downtown SLC + Connected Corridor

RENEW: A Reconfigurable Eco-system for Next-generation End-to-end Wireless

RICE®

- RENEW Massive MIMO base station
- End-to-End Programmable
- Diverse Spectrum Access 50 MHz-3.8GHz
- Hybrid Edge computer composed of FPGA and GPU/CPU-based processing,
- Hub Board aggregates/distributes streams of radio samples

IRIS software-defined radio modules
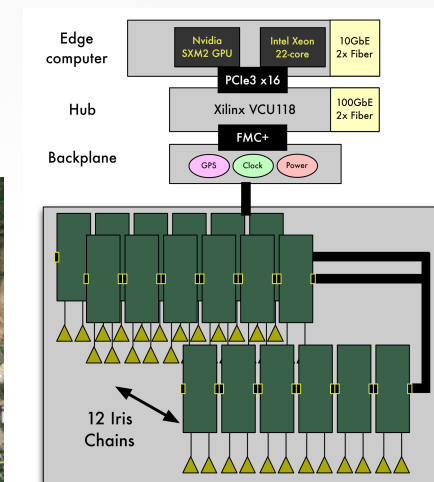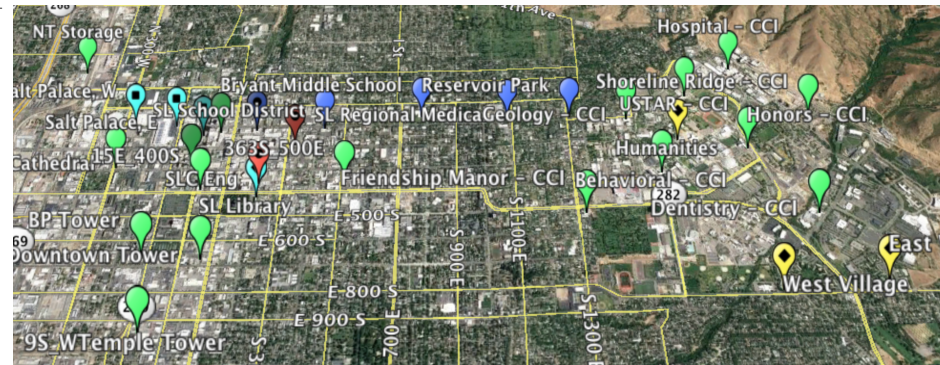
Architectural view of RENEW base station

# COSMOS:Cloud Enhanced Open Software Defined Mobile Wireless Testbed for City-Scale Deployment

- A multi-layered computing system with an RF thin client; flexible signal processing; network function virtualization (NFV) between a local SDR (with FPGA assist) and a remote cloud radio access network (CRAN) with massive CPU/GPU and FPGA assist
- Deployed in New York City, one of the country's most populated urban centers
- Wideband radio signal processing (with bandwidths of ~500 MHz or more)
- Support for mmWave communication (28 and 60 GHz)
- Optical switching technology (~1μs) provides passive WDM switch fabrics and
- radio over fiber interfaces for ultra-low latency connections
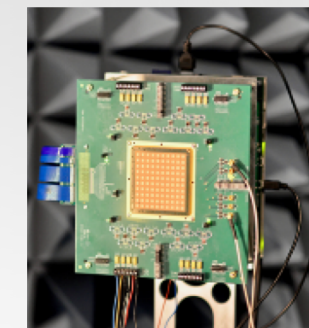
28GHz phased-array ICs and phased-array antenna modules (PAAM)
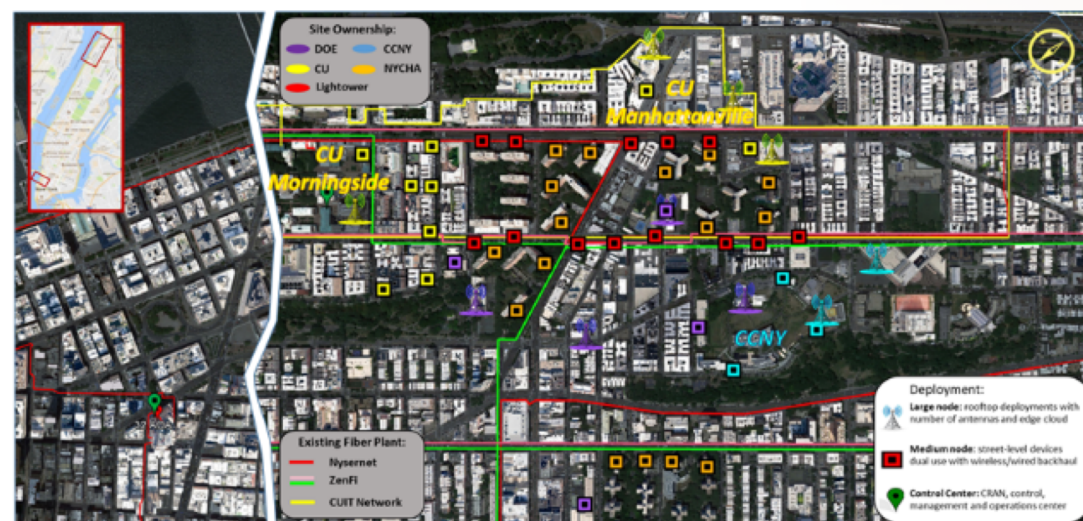

Deployment Area: West Manhattan/Harlem
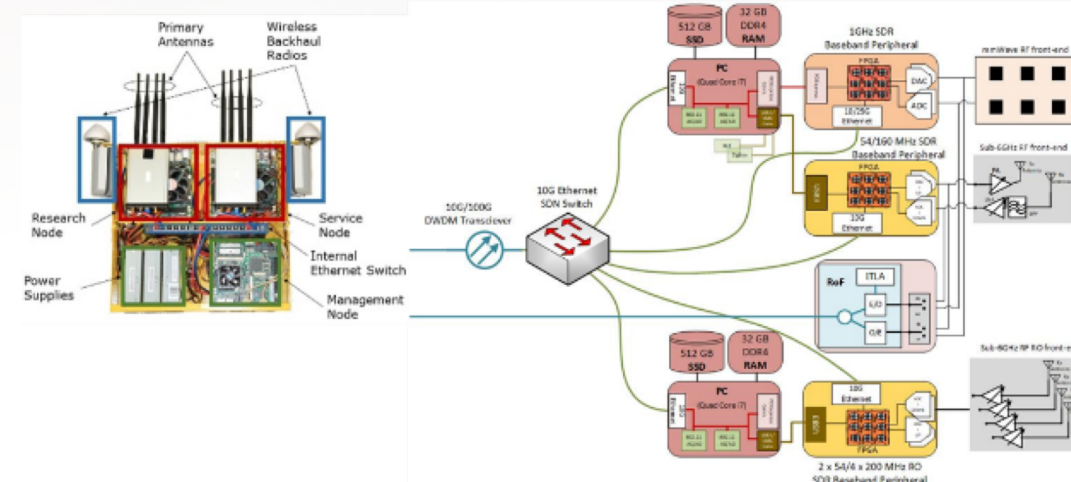
COSMOS Radio Site Design

All-Optical Network Design

Key Technologies – Optical Net

- Fast and low latency optical x-haul network using 3D MEMS switch and WDM ROADM
  - Configure wide range of topologies
  - Experiment on converged fiber/wireless networks
- Enables fast front-haul/mid-haul/back-haul connectivity between radio nodes and edge cloud
- SDN control plane for both optical and Ethernet switching
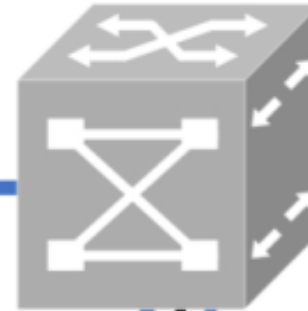- Leverages results from CIAN NSF ERC, EAGER dark fiber project at Columbia
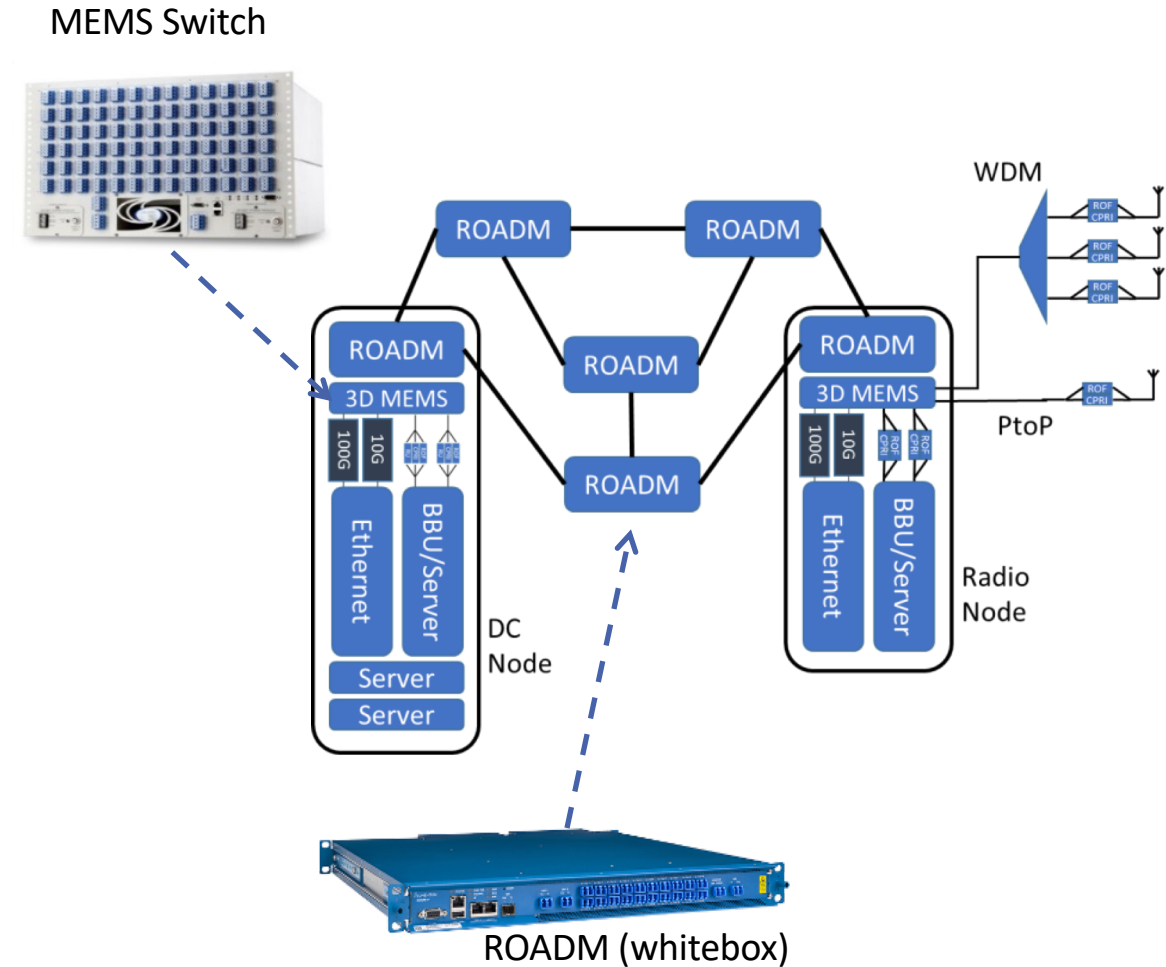
MEMS Switch

ROADM (whitebox)

Cloud Architecture
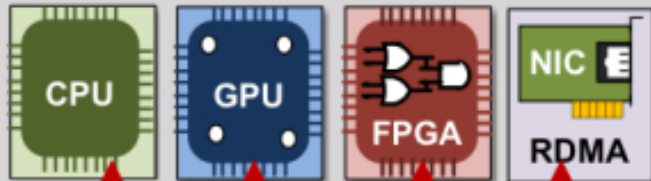
COSMOS Deployment

- Pilot – May 2019
- Phase 1 – Sept. 2020
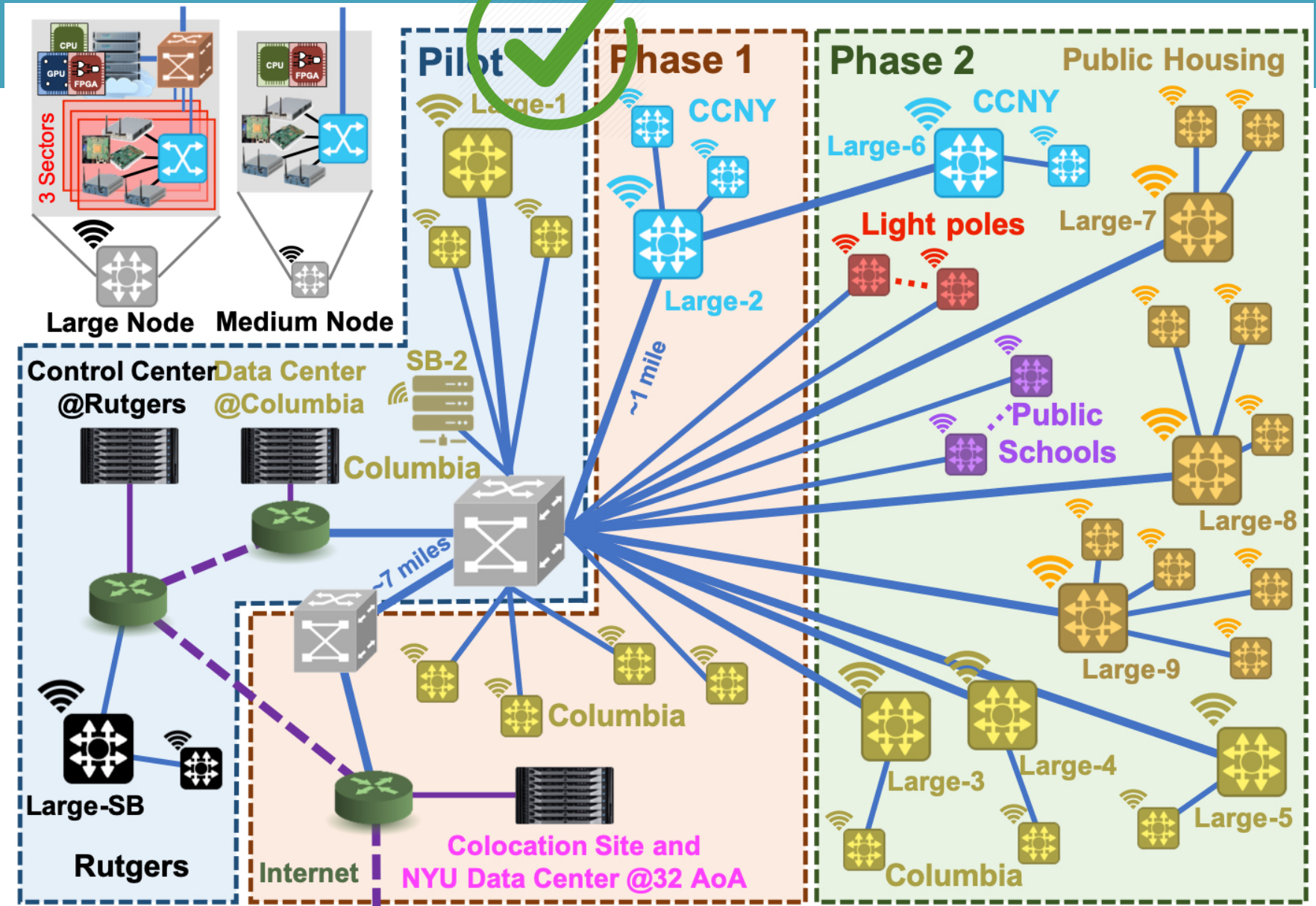
AERPAW's Vision for a New Paradigm

The AERPAW Pyramid

New Mobility Modes

Enhanced Broadband

Low Latency

Massive IoT
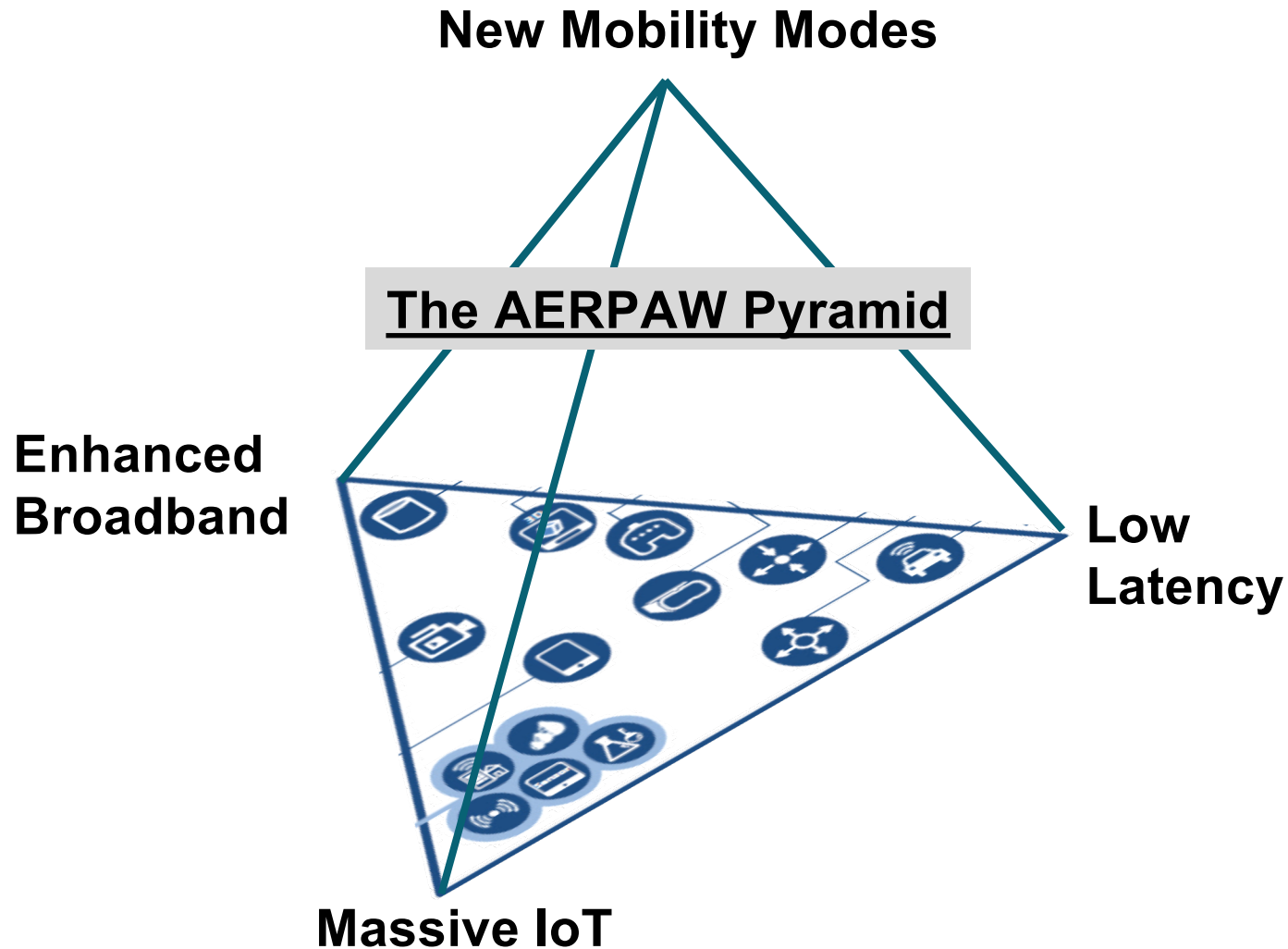
- Advanced wireless to enable new unmanned aerial systems (UAS) capabilities

- Advanced UAS to enable new wireless services

- Will also support other fixed and mobile experiments

AERPAW Capabilities

→ **Mobility** – UAVs and ground vehicles carrying AERPAW radio nodes

→ **Software-defined radios** supporting existing (LTE) and emerging (5G) wireless at 1-6 GHz and then 28 GHz / 39 GHz

→ **Rural to urban wireless environments** – NC State Centennial Campus, Lake Wheeler Field Lab, Town of Cary, Dorothea Dix Park

→ **Reliable, supported, programmable, and remotely-accessible research infrastructure**

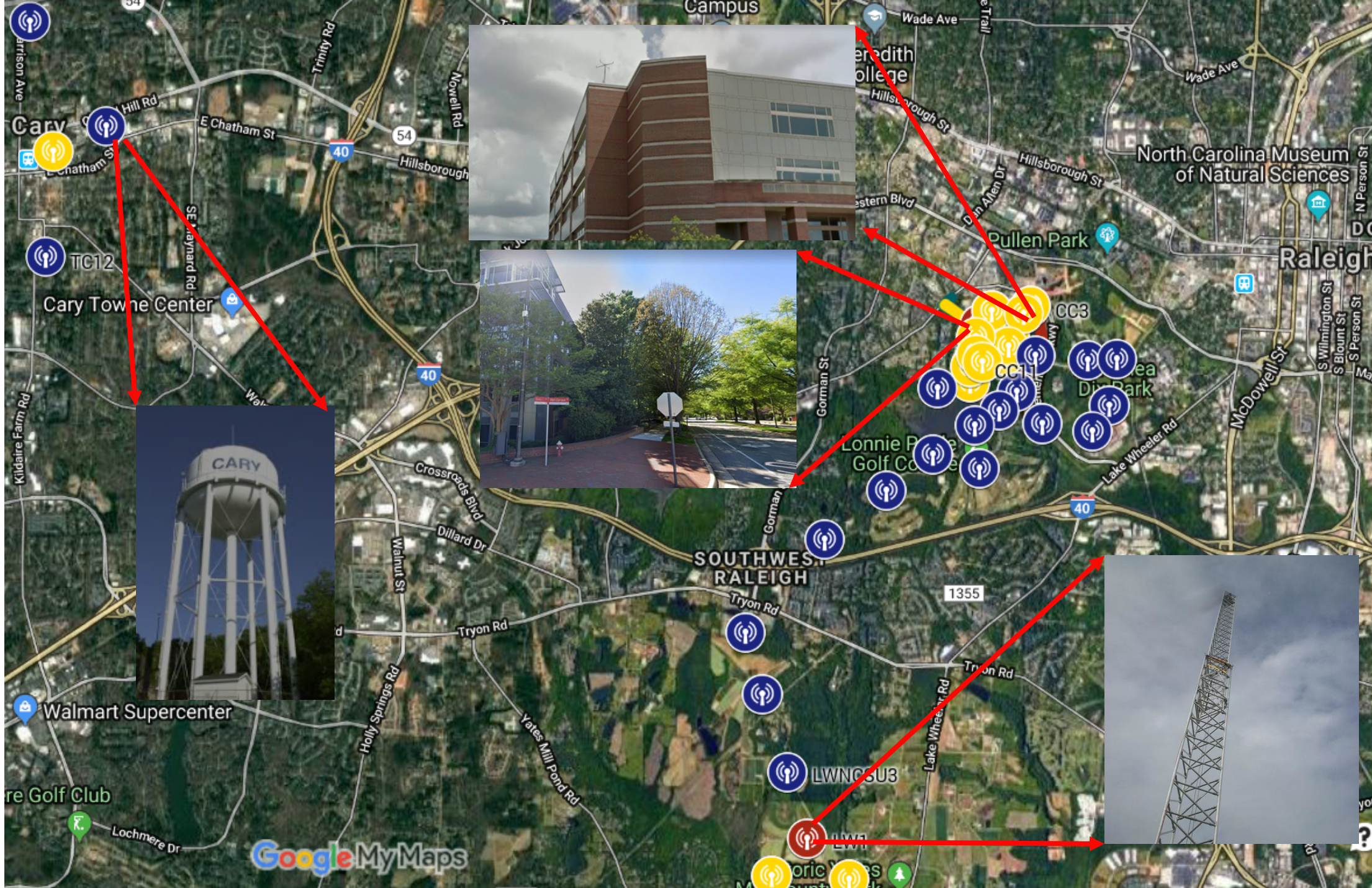**Custom Drones and helikites**

Shuttles and rovers
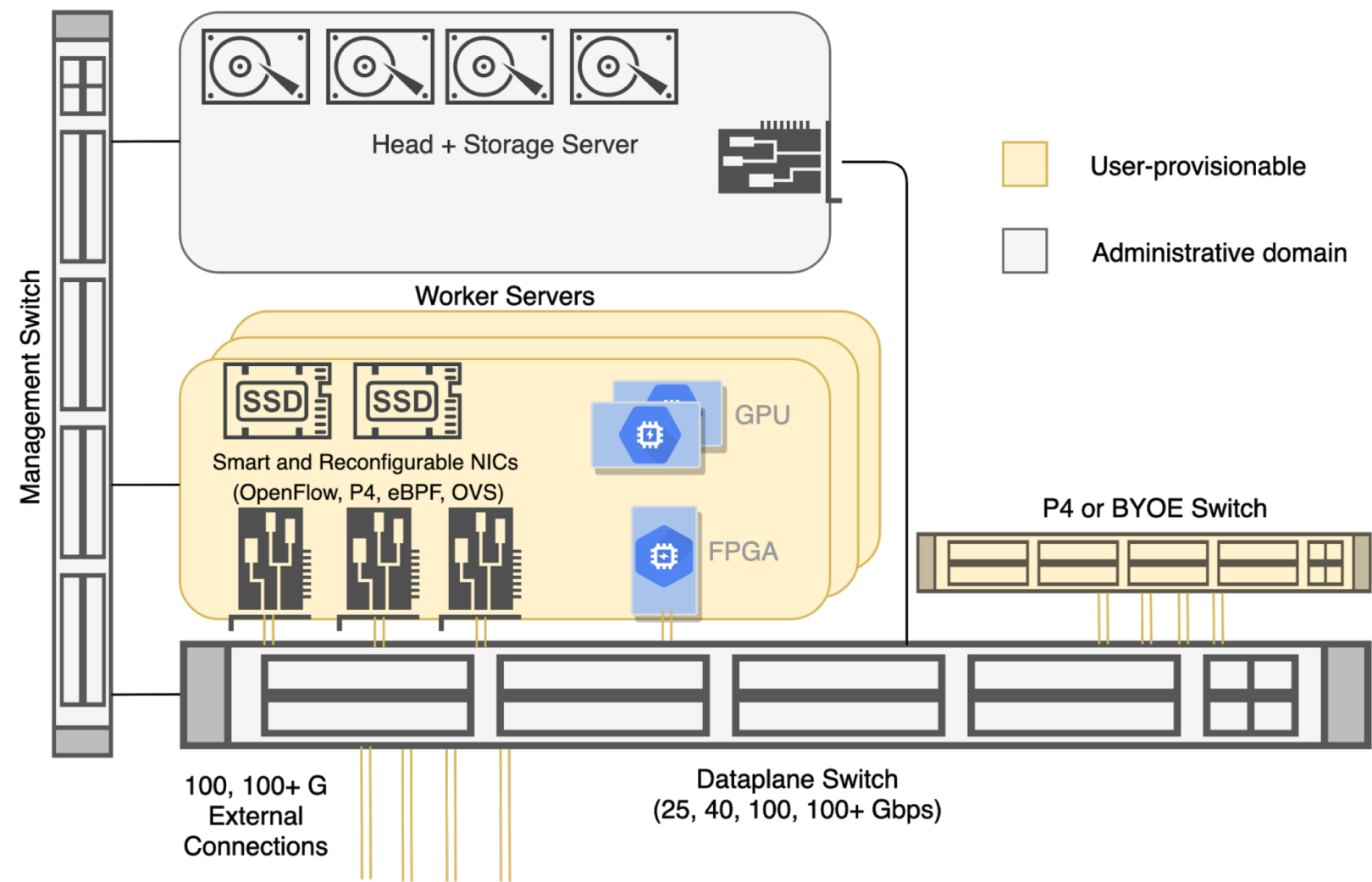
33

Where? When?

FABRIC Core Topology

- Yellow = high speed super core
- Blue = high speed core
- Stars = initial Facility Partners
- A facility partner is another experimental facility
- Many edge sites located on university campuses

FABRIC Node Concept

Head + Storage Server

Worker Servers

User-provisionable

Administrative domain

SSD SSD

GPU

FPGA

Smart and Reconfigurable NICs
(OpenFlow, P4, eBPF, OVS)

Management Switch

P4 or BYOE Switch

100, 100+ G
External
Connections

Dataplane Switch
(25, 40, 100, 100+ Gbps)

FABRIC Node ('hank') Design: Network + Compute

- We refer to it also as a 'disaggregated router'

- Network cards with high speed interfaces (25G, 40G, 100G. 200G+ in future)
  - Programmable interface cards (hardware OVS offload + DPDK)
  - Reconfigurable interface cards (FPGA and P4/network processors)

- High-performance servers equipped with
  - GPUs
  - FPGA compute accelerators
  - NVMe drives
  - Storage: User-provisionable short term & shared high volume. Not meant to be persistent.

- All ports interconnected by a 100G+ switch programmable through testbed control software
  - Acts as a 'patch panel' connecting various ports in the node together

- Users can fully interact with network, compute, storage

- Nodes are "sliceable" for experimenters to use simultaneously

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Thank you! Any questions?

GET READY FOR OUR
1ST OPEN CALL! APRIL 2020

twitter.com/NGIatlantic

linkedin.com/in/ngiatlantic-eu

NEWSLETTER

ngiatlantic.eu/contact-us

WHY THE WHALE? All our calls are branded to raise awarness about environment protection. For more information visit: ngiatlantic.eu/about-our-themes

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