



**CENTER FOR APPLIED
COMMUNICATIONS AND NETWORKS**

DPS/TEXCON

December 4, 2025

AJ Renold

- **Senior Associate Director**
- Lead strategic planning, stakeholder engagement, and research administration for federally and privately funded initiatives focused on wireless and next-generation communications systems.
- Cultivate and sustain partnerships with internal and external stakeholders, including universities, laboratories, and industry organizations.
- Career spans public safety, nonprofit leadership, and higher education.

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What We Do

The Center for Applied Communications and Research is at the forefront of research aimed at enhancing interoperability in communication systems. CACN seeks to address the technical challenges inherent in interoperability, ensuring that communication systems are robust, adaptable, and capable of meeting the demands of mission-critical applications.





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Strategic Focus Areas

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- Next Generation Wireless (4G, 5G, ..., nextG)
- Mission Critical Communications (MCVoice/MCPTT, MCData, MCVideo)
- Next Generation 9-1-1 (NG911, ESInet, PSAP, ECC, PSBN, ...)
- Critical Infrastructure
- Broadband
- Cybersecurity
- IoT / AI / Digital Twin / Simulation
- Defense

Current Projects

- **Federal**

- DHS Backup Network Timing for Mission Critical P25 Networks: Phase 2
- DHS Deploying Defenses for Cellular Networks
- DHS Voice Interoperability Framework - Mission Critical Services
- DHS NG911 – Next Generation 9-1-1 Conformance and Interoperability Testing: Phase 3
- DHS CR911 – 9-1-1 Cybersecurity and Resilience
- DoE Protecting Substations
- DoT Accelerating Vehicle-to-Everything (V2X) Deployment
- NIST Digital Twin Enabled Testbed
- NIST AI3 Smart Communities, Smart Responders: Challenge
- NIST Public Safety Radio Dataset
- NSF TEES RINGS: NextSec – Zero-trust, Programmable and Verifiable Security

- **State and Private Sector**

- TX Comptroller: Texas Broadband Support Services – Phase 3
- Crius Technology Testing
- Squishy Robotics: RF Analysis
- Qualcomm: Phase 2: Extended Private Network with Sidelink
- WiFiber: 4G support for Smart Base (Camp Mabry, USANG – Austin)

TEXAS A&M UNIVERSITY

INTEROP
INSTITUTE

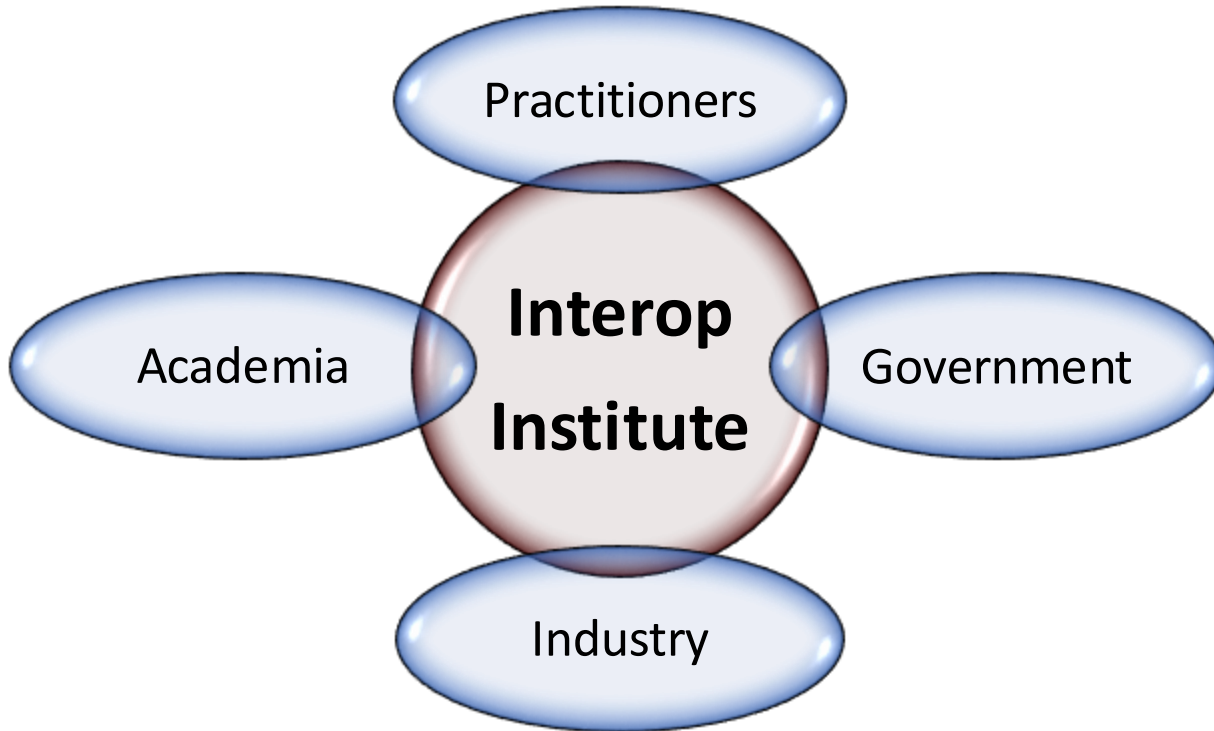


Outreach is an important part of our work at the Center for Applied Communications and Research. Through our principal outreach event, Interoperability Institute, publications, and speaking engagements, we foster a culture of collaboration and thought leadership within the field.

JOIN US!

<https://interopinstitute.com>

Interop Collaboration is Broad and Diverse



Interop 2024:

- ~300 attendees at workshop, from
 - 4 countries
 - 13 US federal agencies
 - 12 DC and state public safety agencies
 - 25 city and county public safety agencies
 - 4 universities
 - 7 industry associations
 - 44 technology companies
- ~140 attendees at live exercise
 - First Responders (University, local, state, federal)
 - Public safety thought leaders, decision makers
 - Technology providers

2024 Keynote Speakers



Daniel Cotter

Executive Director of the Office of Science and Engineering (OSE) in the Science and Technology Directorate (S&T), U.S. Department of Homeland Security (DHS)



Charles (Charlie) Guddemi

District of Columbia's Homeland Security and Emergency Management Agency's (HSEMA) Statewide Interoperability Coordinator (SWIC)



Joe Wassel

Executive Director (CEO) of the First Responder Network Authority



2025 Workshops

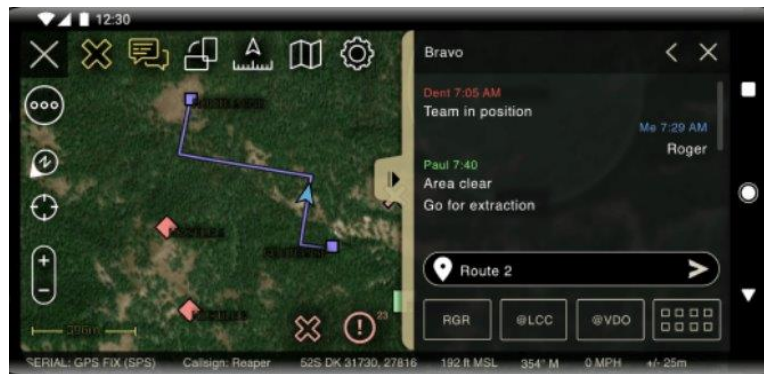
- Public Safety Broadband Network
- Mission Critical Services
- Next Generation 9-1-1
- Information Sharing Framework
- Inter-jurisdictional messaging
- Situational Awareness
- Drone video sharing
- IoT Integration

Interop 2024 Example: IoT / Digital Twin / SA / AI Integration

- Location: RELLIS Campus, BCDC IPG Fusion Cell
- Integrated Components:
 - IoT Sensors at Disaster City from NIST AI3 project
 - PI: Dr. Walt Magnussen, CACN
 - Digital Twin from NIST Digital Twin project
 - PI: Dr. Jian Tao, College of Performance, Visualization & Fine Arts/TAMIDS
 - Team Awareness Kit (TAK) from DoD Situational Awareness project
 - CACN team
 - Vantiq AI from DoT project
 - PI: TTI
 - Overall use case and systems integration: CACN team
- Result: sensor status and exercise personnel movements were displayed as 2D icons in TAK and 3D avatars in digital twin; Vantiq AI warned of danger areas and made recommendations for action



Team Awareness Kit (TAK) Exercise Objective



- Provide situational awareness to participants in all areas and levels of the exercise.
- Texas Department of Public Safety provided a QR code that would enable others not participating in the exercise access to TX DPSTAK servers for monitoring the exercise.
- During the exercise, data containing participant GPS coordinates, team and role information would be ingested into an MQTT server for inclusion in Digital Twin and Vantiq Edge products.

ROVER at Crimson Viper 2025 (Thailand)

- 5G Core
 - Connect5G on HawkeyeTech HK-5140
- Network
 - Router & Switch - CRS309-1G-8S+IN
- RAN
 - Ericsson BBU 6647 + RRU 4408 B48
 - Antenna – Nokia AAQA 2 x directional
- MEC
 - Server: Dell XR4000z + XR4510c
 - MCX: Alea server
 - TAK (Team Awareness Kit) server
- GPS
 - Antenna + Mount
- Backhaul
 - Dejero GateWay 211
- UE
 - Moto 5G; Alea MCX client; ATAK + plug-ins



RELLIS Campus

- 9 miles from TAMU main campus
- 3200 acres; academics and applied research
- Home to:
 - Texas Semiconductor Institute (TSI)
 - Bush Combat Development Complex (BCDC)
 - Innovation Proving Grounds (IPG)
 - Ballistic Aero-Optical Materials Facility (BAM)
 - Texas A&M Engineering Extension Service (TEEX)
 - Texas A&M Engineering Experiment Station (TEES)
 - Critical Infrastructure Renewal (CIR)
 - Smart Energy Grid Laboratory
 - Texas Transportation Institute (TTI)
 - Smart Intersection Testbed
 - And ...



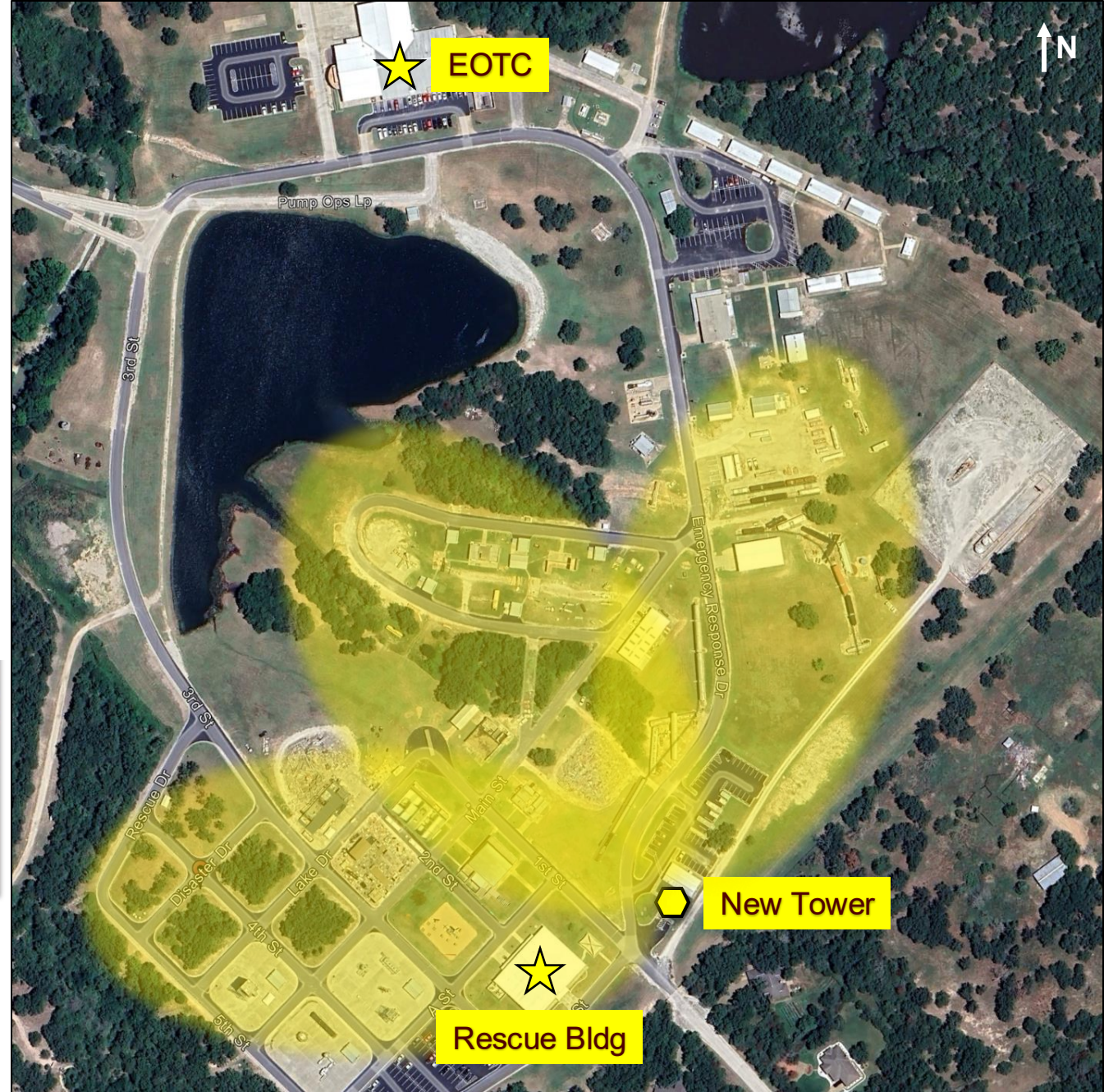
Apps: Team Awareness Kit (TAK) & MCPTT

(Example: Crimson Viper 2025)



TEEX Disaster City

- TEEX:
 - 52-acre public safety training facility
 - ~210K first responders trained each year
- CACN:
 - IoT, Digital Twin w/RF modeling
 - 43' tower & key locations connected to AWARE Transport Network



BRAZOS VALLEY RESEARCH RANGE (BVRR)

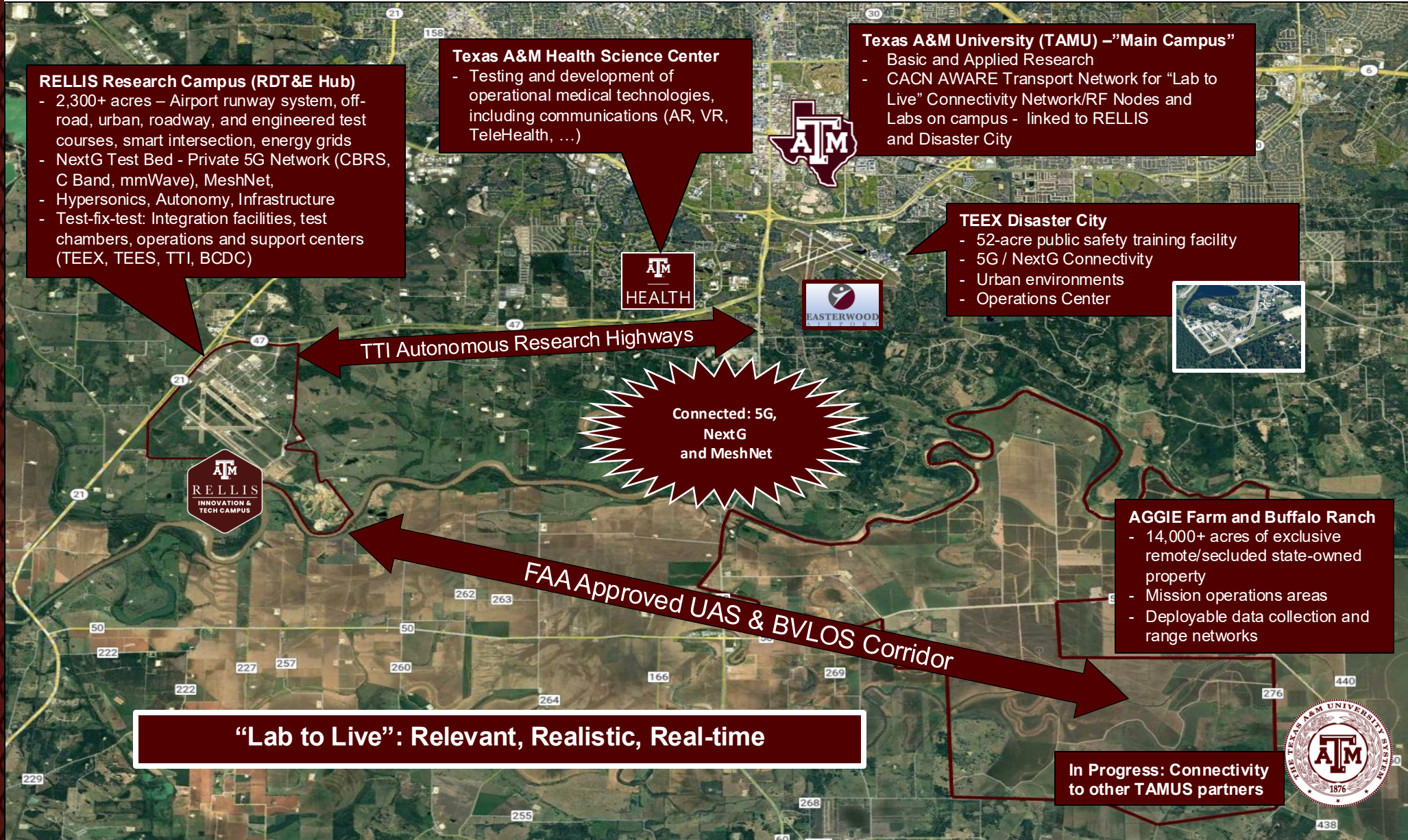
Supporting Research, Development, Experimentation, and Testing

60+ square miles/40,000+ square acres:

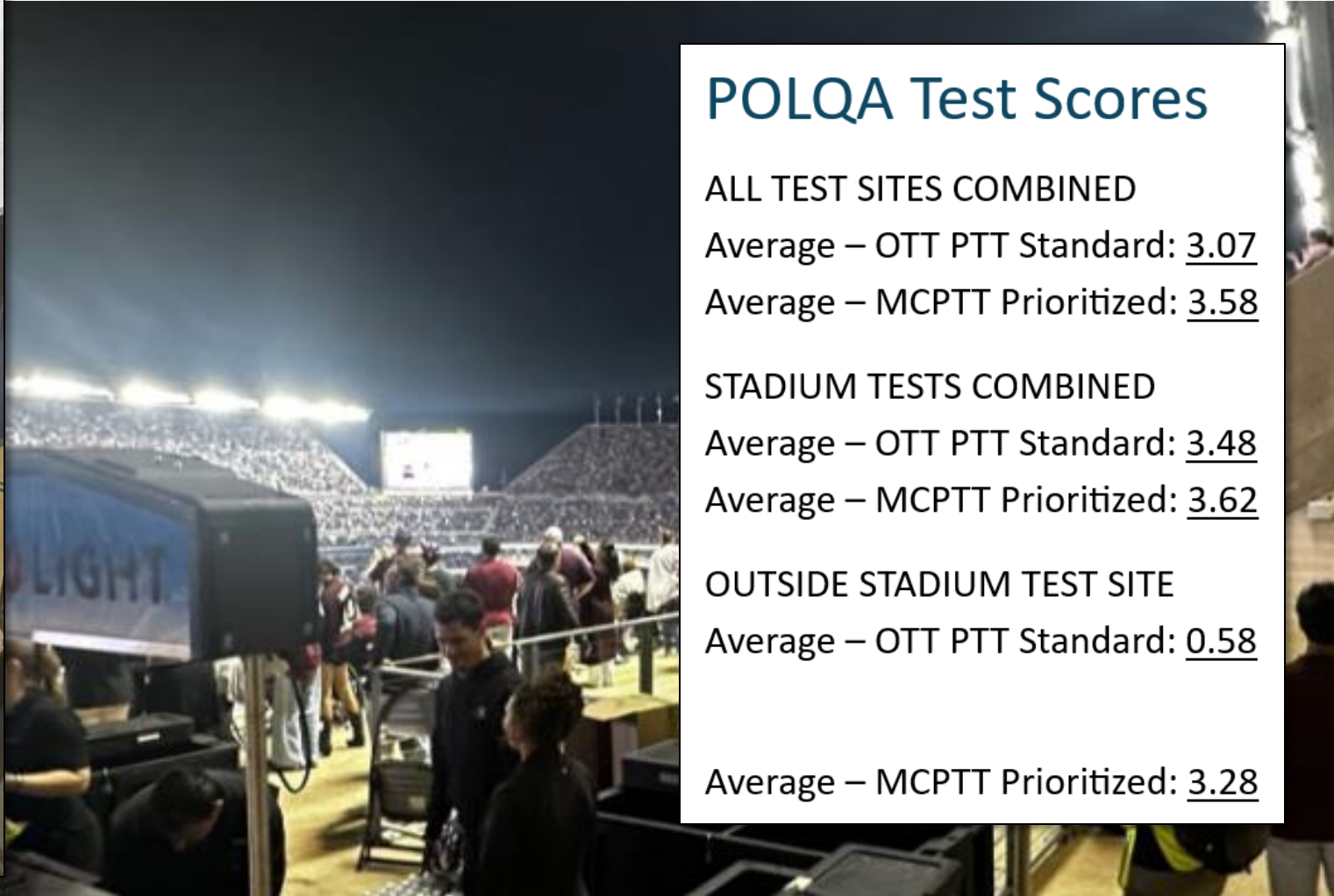
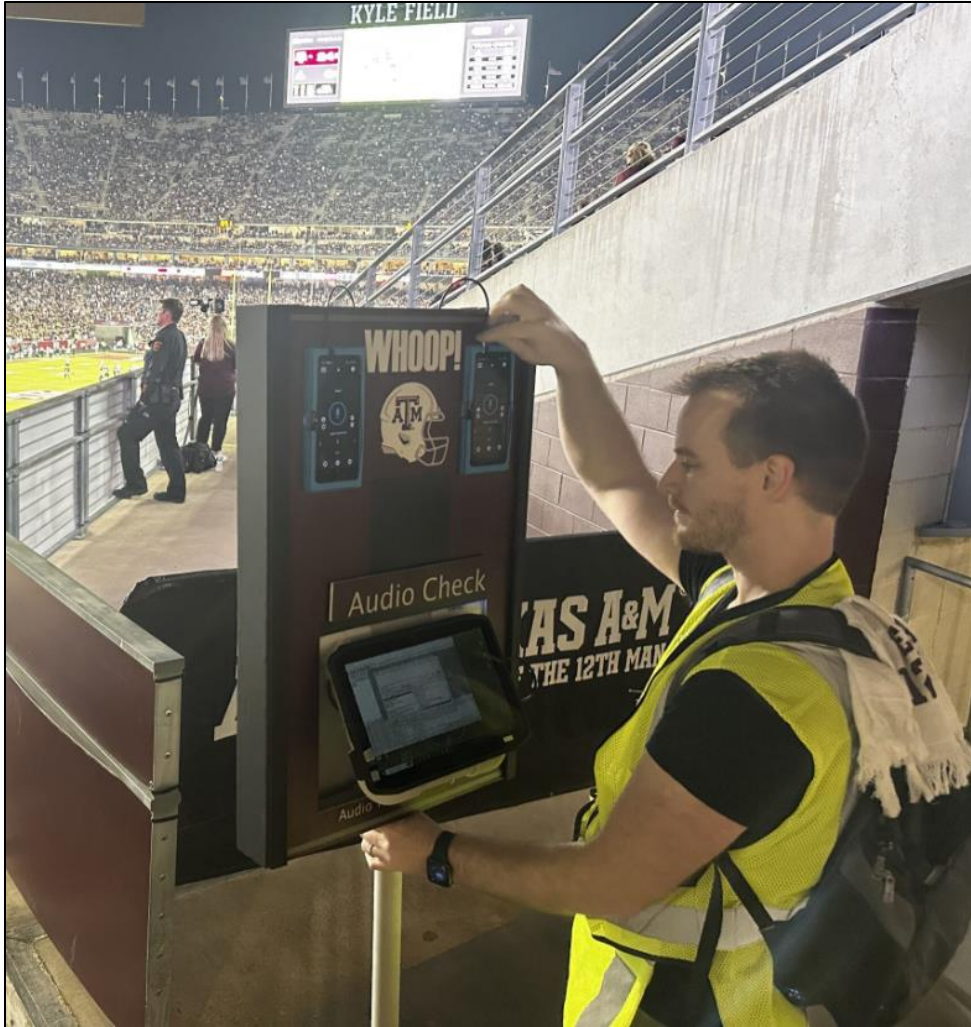
- Connected
- Relevant and realistic environments
- Basic and applied research
- Proving grounds for experimentation and testing

Ongoing Modernization:

- Building UAS/C-UAS and DE (HEL, EW, HPM) test infrastructure
- Adding urban research and test facilities
- Implementing advance data acquisition & analysis systems
- Extending network coverage (5G / NextG, MeshNet)
- Creating digital twins across the BVRR



MCPTT Audio Testing During Network Congestion



POLQA Test Scores

ALL TEST SITES COMBINED
Average – OTT PTT Standard: 3.07
Average – MCPTT Prioritized: 3.58

STADIUM TESTS COMBINED
Average – OTT PTT Standard: 3.48
Average – MCPTT Prioritized: 3.62

OUTSIDE STADIUM TEST SITE
Average – OTT PTT Standard: 0.58
Average – MCPTT Prioritized: 3.28

Working With CACN

Working with CACN: Academic Partners

How we can help you

- Applied research, testing, evaluation
 - Support basic research; conduct applied research
 - Lab to live; at scale, in realistic and relevant environments
- Indoor and outdoor facilities
 - Wireless networks, software-defined network, radios, applications
 - Secure remote access, connections to other academic and industry labs
- Systems integration, interoperability
 - Deep operational and industry experience
 - Broad-based thought leadership
- Connections
 - Academia, industry, government, ...

How you can help us

- Share your technology vision and challenges
 - What are you working on? What challenges are you seeing? What do you see in the future?
 - We can suggest government, industry, academic partners
- Partner on projects
 - You lead or we lead
 - Link your lab with ours for comprehensive testbed
 - Recognized thought leader, consistently excellent results
- Participate in the Interoperability Institute
 - Speaking, demonstration, and sponsorship opportunities
 - Gain visibility and real-world, hands-on feedback

Working with CACN: Government Agencies

How we can help you

- Research, test, and evaluation
 - Lab to live; at scale, in realistic and relevant environments
- Indoor and outdoor facilities
 - Wireless networks, software-defined network, radios, applications
 - Secure remote access, connections to other academic and industry labs
- Systems integration, interoperability
 - Deep operational and industry experience
 - Broad-based thought leadership
- Connections
 - Academia, industry, government, ...

How you can help us

- Share your technology vision and challenges
 - What are you working on? What challenges are you seeing? What do you see in the future?
 - We can suggest practitioners, vendors and project ideas
- Participate in the Interoperability Institute
 - Speaking, networking, and hands-ons opportunities
 - Interact with vendors and practitioners
- Partner on projects
 - Ideation through implementation
 - Recognized thought leader, consistently excellent results

Working with CACN: Industry Partners

How we can help you

- Support development, test, and evaluation
 - Lab to live; at scale, in realistic and relevant environments
- Indoor and outdoor facilities
 - Wireless networks, software-defined network, radios, applications
 - Secure remote access, connections to other academic and industry labs
- Systems integration, interoperability
 - Deep operational and industry experience
 - Broad-based thought leadership
- Connections
 - Academia, industry, government, ...

How you can help us

- Share your product roadmap and market vision
 - What are you working on? What challenges are you seeing? What do you see in the future?
 - Enables us to pull you into relevant projects quickly
- Participate in the Interoperability Institute
 - Speaking, demonstration, and sponsorship opportunities
 - Gain visibility and real-world, hands-on feedback
- Partner on projects
 - You lead or we lead
 - Private agreements or public solicitations
 - Recognized thought leader, consistently excellent results
- Donate to and support our lab
 - We can be your integration and demonstration site
 - Our team learns and can speak to others about your capabilities

Distinctive CACN Capabilities

- Basic and Applied Research
 - Scale up or down; open source or commercial
- Physical lab assets
 - Proportional costs of multi-million-dollar systems
- Trusted, neutral, 3rd party
 - Open sharing of procedures and results (as appropriate)
- Real-world, systems integration expertise
 - Realistic and relevant implementations
- Interface: Government / Academia / Industry
 - Diversity of backgrounds, perspectives, relationships
- Student involvement
 - Latest innovations, potential interns & future employees, lower cost
- TAMU System resources
 - Breadth and depth of interconnected resources is unparalleled



THE TEXAS A&M UNIVERSITY SYSTEM
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<https://cacn.tamus.edu>