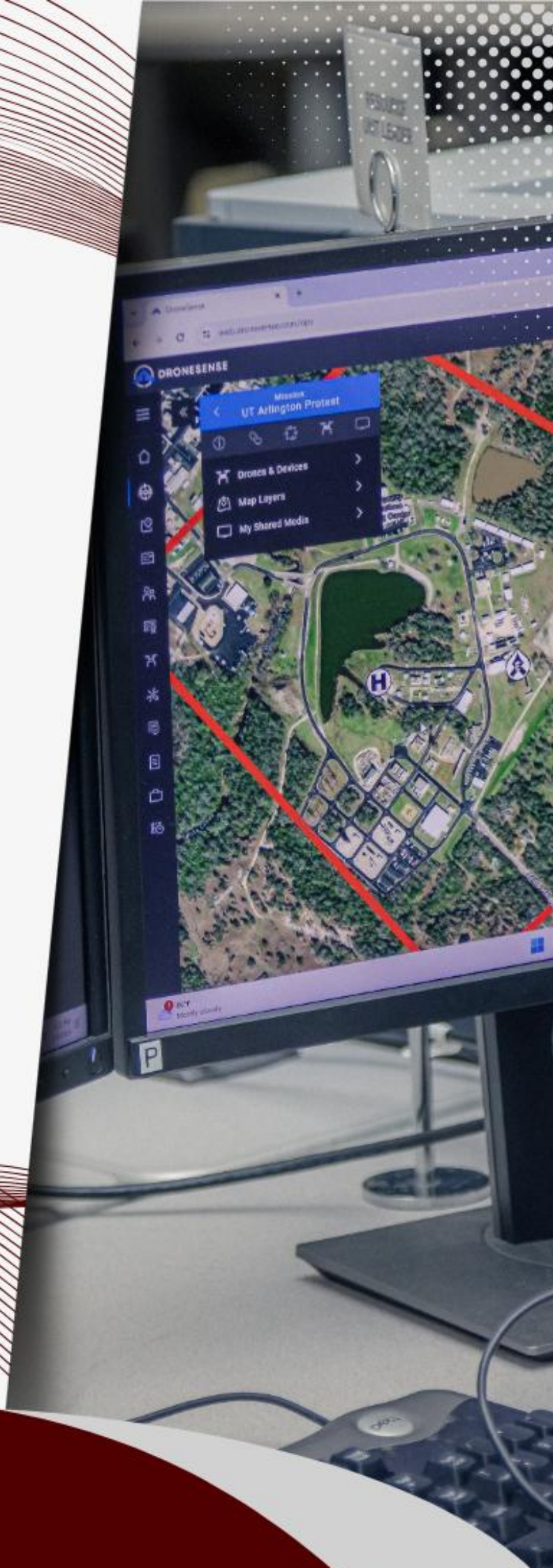
2024

ANNUAL REPORT

TEXAS A&M UNIVERSITY

Internet2 Technology Evaluation Center



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ABOUT US

THE TEXAS A&M UNIVERSITY SYSTEM
CENTER FOR APPLIED COMMUNICATIONS AND NETWORKS

Announcing The Center for Applied Communications and Networks

We are thrilled to announce that the Internet2 Technology Evaluation Center (ITEC) has officially transformed into the Center for Applied Communications and Networks (CACN). This rebranding marks a significant milestone in our journey, broadening our focus to encompass cutting-edge communications and network technologies in applied settings.

As part of this transition, CACN will now operate within The Texas A&M University System aligning more closely with the System's goals of innovation, education, and research excellence. This move enhances our ability to support system members with our expertise in next-generation wireless networks and mission-critical communications systems.

This change of name and organizational transition reflects our commitment to advancing the future of communication and networking technologies. Being part of The Texas A&M University System allows us to leverage an unparalleled network of expertise and resources to tackle real-world challenges effectively.

Celebrating Past Achievements and Looking Forward

Looking ahead, CACN will focus on developing reliable, market-ready technologies and supporting secure information networks crucial for critical operations and public well-being. CACN will continue to lead groundbreaking projects and foster collaboration with industry leaders, academic institutions, and government agencies. Collectively, we are committed to advancing progress, improving connectivity, and influencing the evolution of communication and network systems.

This report outlines the history, mission, and strategic direction of the Center for Applied Communications and Networks, formerly known as the Internet2 Technology Evaluation Center (ITEC).

HISTORY

Founded in 2004 at Texas A&M University, the Internet2 Technology Evaluation Center aimed to lead research in communication technologies by addressing emerging challenges and fostering innovation with partners from academia, industry, and government. Its early work included a proof-of-concept for Next Generation 9-1-1 (NG9-1-1), a project it continues today. Over two decades, the center grew into a strategic resource for interoperable and secure communications. In January 2025, the center transitioned to The Texas A&M University System under the Vice Chancellor for Research, streamlining service across all member universities and agencies. ITEC is now the Center for Applied Communications and Networks to align its name with its stated mission.

June 2004 The Texas A&M Internet2 Technology Evaluation Center (ITEC) is established under the Academy for Advanced Telecommunications and Learning Technologies. Dr. Walt Magnussen named Director of ITEC.

2006 ITEC selected for next Generation (NG) 9-1-1 by Department of Homeland Security as proof-of-Concept leader.

2009 ITEC Completes first NG 9-1-1 Interoperability Plugtest.

2012 Interlocal agreement signed to support Harris County first ever 4G Public Safety Broadband Network

2013 Interlocal agreement signed to support Harris County first ever 4G Public Safety Broadband Network

2015 Dept. Homeland Security CAUSE Experiment with Canada (Inter-border disaster communications)

2017 Global Mission Critical Push to Talk Plugfest held at TAMU

2019 ITEC awarded Phase 1 of NG 9-1-1 Interoperability Testing funding through DHS.

2022 Phase 1 Complete, awarded Phase 2- Iteroperability Task Force is formed.

2022-23 ITEC supports 5G Department of Defense research mission at RELLIS campus.

2023 Funded project total $5.2 million for the year to date (including contracts in progress)

STRATEGIC FOCUS

Through innovative research and collaboration, we aim to enhance connectivity, interoperability, and security across various technological landscapes. ITEC seeks to create practical, scalable, and secure solutions that tackle both current and future challenges in mission-critical communications.

NEXT GENERATION 9-1-1

NG9-1-1 uses digital and IP technology for multimedia support, data integration, and efficient emergency response. ITEC advances NG9-1-1 through research, policy, and training, with a focus on Zero-Trust VoIP Architecture.

NEXT GENERATION WIRELESS (4G, 5G, NEXTG)

ITEC operates 4G and 5G networks and conducts research on emerging 6G technologies, emphasizing security from hardware to applications.

MISSION CRITICAL SERVICES (MCX)

ITEC develops and tests MCX solutions such as voice, data, and video services to ensure reliable communication for public safety and defense.

DEFENSE

ITEC supports DoD adoption of commercial solutions like IoT and AI for rapid deployment and addresses shared network challenges for national security.

BROADBAND

Under contract with the Texas Broadband Development Office, ITEC reviews funding to expand broadband in underserved areas and supports integration with NG9-1-1 and wireless projects.

CYBERSECURITY

Partnering with Texas A&M Engineering Experiment Station, ITEC includes cybersecurity assessments across multiple communication projects.

IOT / AI / DIGITAL TWIN / SIMULATION

ITEC applies IoT and AI to enhance emergency responder training and planning, collaborating with Texas A&M Extension Service at Disaster City.

OUR TEAM

The ITEC staff is a dedicated group advancing public safety communications. This team blends program management, technical innovation, and research, enabling complex initiatives and effective deployments. With strong organizational leadership and technical expertise, they foster collaboration, mentor team members, and forge impactful partnerships with scholars and industry leaders. All leadership personnel are PI-eligible and serve as PI, Co-PI, or senior personnel on all projects.

LEADERSHIP

Michael E Fox, Executive Director

Michael manages departmental operations—including administrative, financial, research, and technical tasks—and oversees talent development and policy enforcement. He builds partnerships with universities and commercial entities, ensures efficient center operations, promotes excellence, and serves as PI or Co-PI on research projects.

RESEARCH DEVELOPMENT

Dr. Walt Magnussen, Head, Research Development

Walt builds strategic partnerships and advocates for research initiatives with funding agencies and commercial groups. He manages solicitations, prepares research and commercial proposals, leads projects as PI or Co-PI, and participates in outreach through presentations and speaking engagements.

RESEARCH ADMINISTRATION

Anjuli (AJ) Renold, Senior Associate Director

AJ leads departmental operations across administration, finance, research, and technical areas, including talent management, staff development, and policy implementation. The role manages relationships with partners such as universities and labs, ensuring efficient center operations and promoting excellence.

Valerie Vetrone, Program Coordinator II

Valerie manages the proposal and project process, including proposal development management, project task and deliverable tracking, and submission of related project related reports, as well as organizing special events like conferences and workshops, and coordinating meetings for executive support.

OUR TEAM

RESEARCH OPERATIONS

Derek Ladd, Wireless Systems Research Engineer

Derek collaborates with other Systems Engineers and IT personnel to define technology problems and solutions. Provides leadership and oversight of both highly advanced and complex technical projects or business issues requiring state-of-the-art technical or industry knowledge.

Logan Freeman, Network Systems Engineer

Logan collaborates with other Systems Engineers and IT personnel to define technology problems and solutions. Provides leadership and oversight of both highly advanced and complex technical projects or business issues requiring state-of-the-art technical or industry knowledge.

Patrick Newman, Research Systems Administrator

Patrick provides technical leadership and oversight for the deployment and delivery of enterprise-wide system administration projects or services. Participates in mentoring, training, and developing other employees.

ITEC team conducting Qualcom testing at TEEX Disaster City

STUDENT ENGAGEMENT

ITEC fosters a dynamic environment where students from diverse academic backgrounds collaborate on innovative research projects. Students at ITEC engage across disciplines, fostering creativity, knowledge exchange, and meaningful research outcomes.

CROSS-DISCIPLINARY TEAMS

Students engage in research aligned with their interests, gaining practical experience. Students majoring in fields such as computer science and engineering, cybersecurity, and government and public policy come together to form interdisciplinary teams. These teams work on research topics that span multiple disciplines, encouraging fresh perspectives and innovative solutions.

RESEARCH PROJECTS

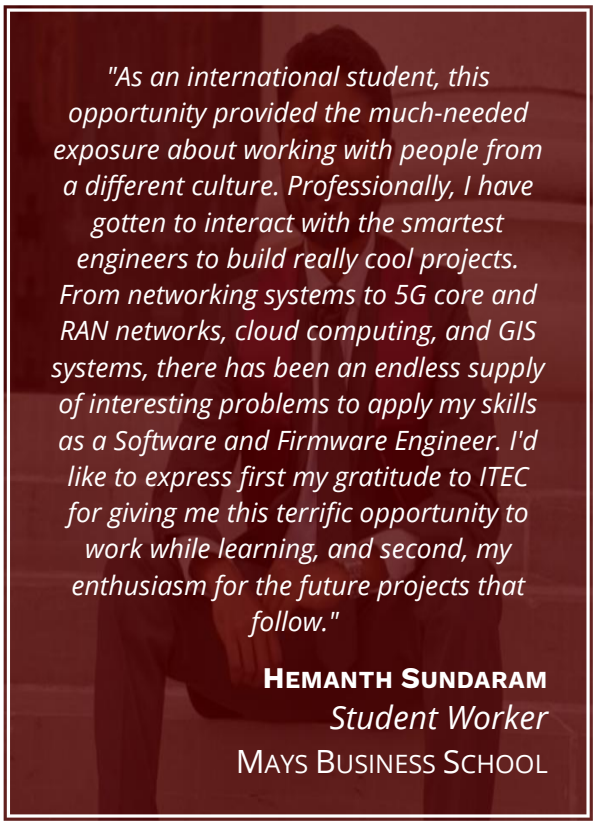
Students engage in research aligned with their interests, gaining practical experience. They contribute their expertise, collaborate with peers, and gain practical experience.

NETWORKING OPPORTUNITIES

The center hosts events for students to connect with professionals and expand their networks.

PUBLICATION AND CONFERENCES

Students present findings at conferences, enhancing their academic profiles. This exposure enhances their academic profiles and prepares them for future careers.



IMPACTFUL RESEARCH OUTPUTS

Through collaboration, students produce impactful research outputs that contribute to scientific advancements. Their work addresses complex technical and societal issues and drives positive changes.

STUDENT ENGAGEMENT

TEXAS A&M UNIVERSITY ENGINEERING EXTENSION

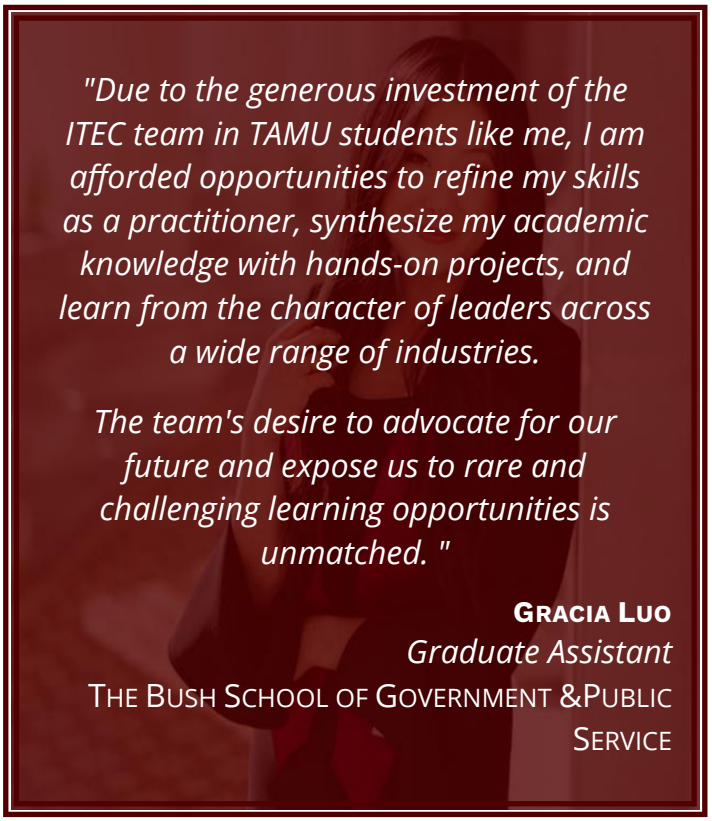
Sidarth Anil, *Computer Science and Engineering*
Karthik Krishnamoorthy, *Computer Science & Engineering*
William Norman, *Computer Science & Engineering*
Vanishree Raghavendraprasad, *Computer Science & Engineering*
Ningze Wang, *Computer Science & Engineering*
Gael Arriaga, *Electronic Systems Engineering Technology*

THE BUSH SCHOOL OF GOVERNMENT & PUBLIC SERVICE

Gracia Luo, *International Affairs*
Kurt Sernett, *Public Policy*

MAYS BUSINESS SCHOOL

Kurt Sernett, *Management Information Systems*
Anuja Kumethekar, *Management Information Systems*
Hemanth Sundaram, *Management Information Systems*



2023 GRADUATES

Jannat Manchanda
Amazon, Senior Supply Chain Manager
Deitrick Maximillian
Capital One, Associate Software Engineer
Reuben Mendoza
General Motors, Software Developer
Seth Riley
U.S. Army Corps of Engineers, Cartographer

ADVISORY COMMITTEE

ITEC continues to enjoy the benefits of a strong advisory council representing both public safety practitioners and academic research advisors. The ITEC Advisory Committee brings together experts in the field to provide expert advice, feedback, and recommendations on key initiatives and challenges; to generate and develop broad ideas for the improvement and ultimate development of the ITEC; and to advise the ITEC's leadership on matters of importance.

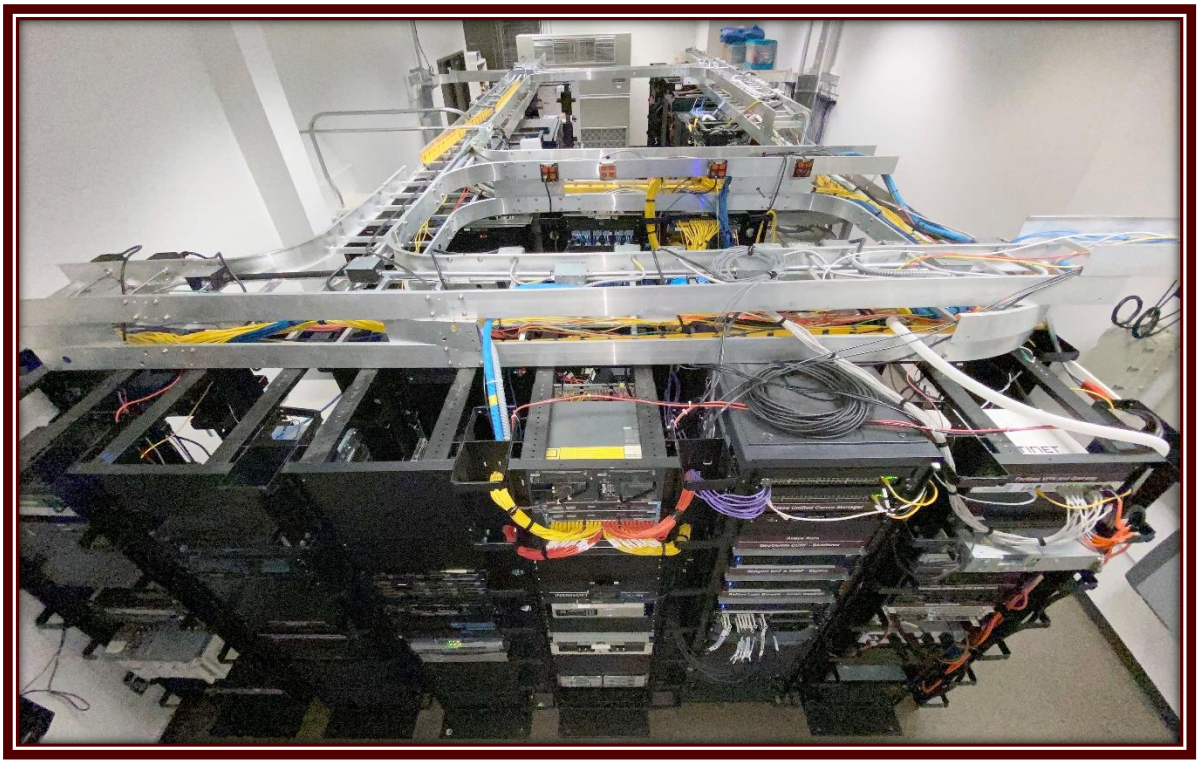
JOHNATHON CREE
Pacific Northwest National Labs
JOHNATHON DIEM
Bush Combat Development Complex
JOSEPH FOURNIER
Government of Canada Defense Research & Development Centre for Security Science
CHARLES GUDDEMI
District of Columbia Homeland Security and Emergency Management Agency
RAY IVIE
Texas A&M Engineering Experiment Station (TEES)
KARLA JURRENS
Texas Department of Public Safety
BRIAN KASSA
Texas A&M University System Texas Task Force 1
KELLI MERRIWEATHER
Texas Commission on State Emergency Communications (CSEC)
JASON MOATS
Texas A&M University School of Public Health
ROBIN MURPHY
Texas A&M Engineering Experiment Station
DAVID NOLAN
Cybersecurity & Infrastructure Security Agency (CISA)
THOMAS RANDALL
First Responder Network Authority
JARED REINHARDT
Texas Military Department
BRIAN TEGTMEYER
National Highway Traffic Safety Administration
MICHAEL TESSLER
True North Advisors
JARED VANDENHEUVEL
Texas Department of Public Safety
GARY WILKS
Texas Division of Emergency Management (TDEM)

THANK YOU!

FACILITIES AND LABS

ITEC LAB

The ITEC lab leverages a broad spectrum of capabilities to spearhead resiliency in multiple domains pertinent to public safety, critical infrastructure, and defense communications and networks.



ITEC Lab

Over the past 20 years, ITEC has acquired an array of system elements from leading manufacturers, including 4G/5G, VoIP, video, virtualized compute environment, NG 9-1-1, network connectivity and security, LMR, IoT, AI and timing. The installed elements are available to all public safety agencies and academic researchers. Participation is open to all researchers and vendors. This state-of-the-art environment is the **AWARE: Advanced Wireless Applications Research Environment.**

The ITEC lab is a state-of-the-art facility supporting research, development, and evaluation of network technologies. It is part of an interconnected 5G Testbed at Texas A&M University. The lab collaborates with industry, the Department of Defense, and the Department of Homeland Security, extending its impact beyond academic research.

FACILITIES AND LABS

Examples of the current and upcoming capabilities include:

- Five **WIRELESS NETWORK CORES** (4G and 5G), including commercial and open source.
- **IMS (VOLTE, VONR)** and **MCX (MISSION CRITICAL VOICE/DATA/VIDEO) APPLICATION SERVERS**
- **4G AND 5G RADIOS** from multiple manufacturers in the lab, plus remote 4G and 5G radios at other research and testing sites.
- Access **TO EBS (2.5 GHZ), CBRS (3.5 GHZ)**, and other spectrum via a **PROGRAM EXPERIMENTAL LICENSE**
- **VIRTUAL COMPUTE/STORAGE** with VMware and Kubernetes environments
- Two complete **NEXT GENERATION 9-1-1 NETWORKS**
- Advanced timing with **PRTC/T-GM**, **RUBIDIUM OSCILLATORS**, and **CLASS C BOUNDARY CLOCK SWITCHES**
- **IOT INFRASTRUCTURE** with residential, commercial, and industrial sensors, including sensors located at TEEX Disaster City
- **GATEWAYS** connecting Land Mobile Radio (LMR) and IP networks.
- **NETWORK CONNECTIVITY** to all Texas A&M University System members.
- Interconnections to **COMMERCIAL AND SERVICE PROVIDER LABORATORIES**, including Verizon and T-Mobile
- **CENTRALIZED NETWORK MANAGEMENT**, monitoring, and logging
- **SECURE REMOTE ACCESS** for researchers and vendors
- Various test tools, network taps, and traffic capture for analysis

AWARE TRANSPORT NETWORK (ATN)

The AWARE Transport Network is a dedicated, isolated “sandbox” running on separate fibers and protected by a firewall. It supports research and testing by allowing researchers to connect to resources across multiple locations, enabling the creation of realistic environments.

The Aware Network itself is part of the research, including slicing, timing, security, management, and network as code. It includes and/or integrates:

Commercial and Open-Source **TECHNOLOGY**

Indoor, Urban, Suburban, Open **TERRAIN**

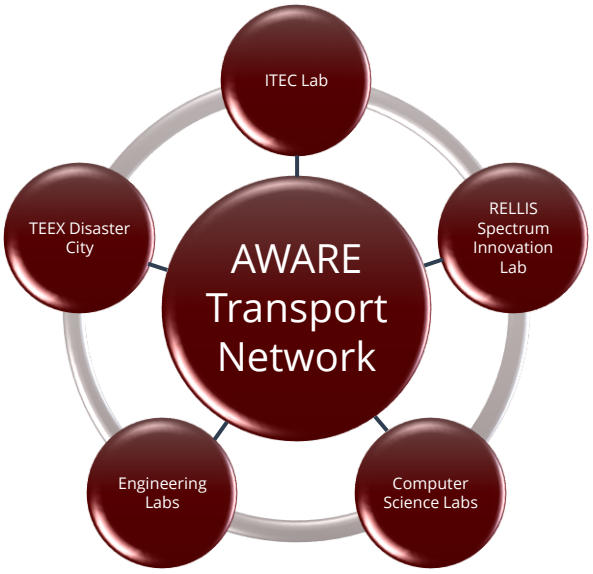
Software Defined, Sliceable **TRANSPORT**

5G-NSA (4G), 5G-SA **CORES**

Traditional, O-RAN, experimental **RAN**

VMs **MEC**

APPLICATIONS



WIRELESS CORE NETWORKS	Multiple 5G-NSA and 5G-SA cores from Affirmed Networks (now Microsoft) and Athonet (now HP). IMS from Athonet.
RADIO ACCESS NETWORK	RAN (Bands 14, 41 and 48) Nokia, Airspan, Parallel Wireless, Star Solutions
EDGE CLOUD	The Edge Cloud supports applications analytics and services managed in our Dell VMware environment. Our current cluster consists of four Dell R740 servers and a SCv3020 storage array, plus additional systems for backup and management.
SOFTWARE DEFINED NETWORK (SDN)	Private fiber access to remote sites on campus including Disaster City. Current connectivity is at 10 Gbps over Cisco routers with a transition to 100 Gbps SDN currently underway.
IoT INFRASTUCTURE	IoT infrastructure includes structures from WiFiber and Schredar and a wide variety of commercial and residential sensors, cameras, and other devices. A distributed network supports the installation and aggregation of sensor and sensor data. It includes 4G/5G connectivity and edge cloud capabilities.
ACCESSING SPECTRUM	ITEC's AWARE Testbed provides access to both EBS and CBRS spectrum: SAS provided by both Google and CommScope. Network IMSI via both CBRS Alliance shared and TAMU shared. TAMU has an EBS license and a CBRS PAL from the FCC.

RELLIS SPECTRUM INNOVATION LAB (RSIL)

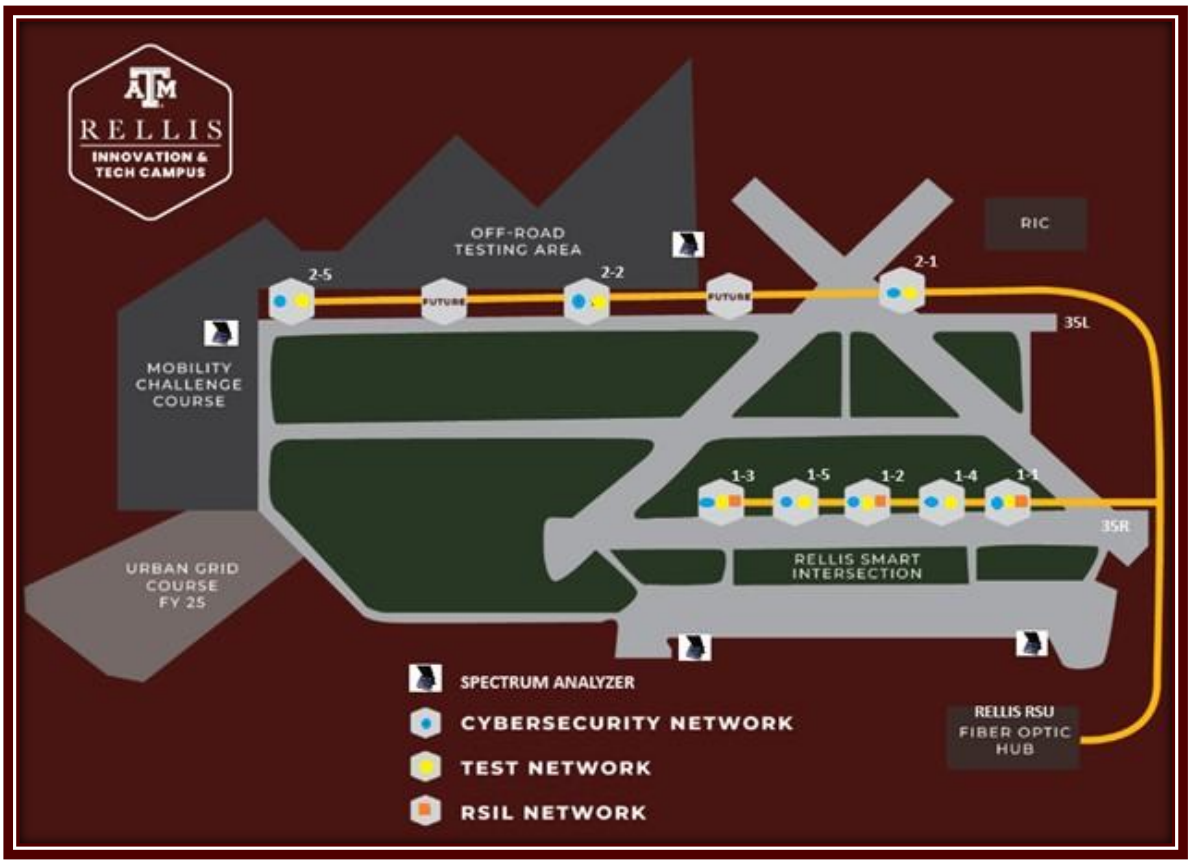
Co-managed by Dr. Srinivas Shakkottai, Professor, Electrical and Computer Engineering and Michael Fox Executive Director, ITEC, the RSIL is a real-time, open-air, distributed research laboratory. It supports a variety of spectrum-related research and development, including:

BASIC SCIENCE SPECTRUM R&D

Open-source core, software-defined radios/antennas, high-performance compute, and dynamic spectrum experiments (e.g., O-RAN, radar, jamming, passive sensing).

APPLIED CELLULAR NETWORK & APPLICATION R&D

Commercial cores, multiple RAN options (O-RAN), sliceable software-defined networks, configuration/control, and performance analysis for custom applications.



RELLIS Spectrum Innovation Lab

SPONSORED RESEARCH

The Texas A&M University Internet2 Technology Evaluation Center (ITEC) conducts sponsored research to strengthen communication technologies, particularly for public safety and infrastructure. Projects include enhancing cellular network security with the University of Florida and the Department of Homeland Security, improving backup timing for P25 LMR networks, and supporting the transition from Land Mobile Radio systems to LTE. ITEC also develops digital twin testbeds and edge computing solutions, reinforcing its leadership in advancing public safety communications.

AFFILIATED RESEARCHERS

ITEC brings together leaders in academia to create a comprehensive network of resources and knowledge for research applications. The affiliated researchers represent a distinguished group of faculty and scholars whose expertise spans a wide array of engineering and scientific disciplines. Their collaborative efforts enrich the center's research portfolio, drawing from deep knowledge in fields such as electrical engineering, computer science, cybersecurity, robotics, and data visualization. Each hold prominent positions at Texas A&M's premier research institutes, including the Texas A&M Engineering Experiment Station (TEES) and Texas A&M University.

These researchers actively contribute to interdisciplinary projects, mentor emerging talent, and drive forward-thinking solutions in their respective domains. Their engagement ensures that the center remains at the forefront of technological progress, research breakthroughs, and industry partnerships, both locally and globally.

TEXAS A&M UNIVERSITY SYSTEM

Dr. Narasimha Annapareddy, *Professor, College of Engineering - Admin - Dean*
Dr. Srinivas Shakkottai, *Professor, Electrical & Computer Engineering (TEES)*
Dr. Eman Hammad, *Professor, Engineering Technology & Industrial Distribution*
Dr. Jian Tao, *Professor, College of Performance, Visualization & Fine Art*
Dr. Radu Stoleru, *Professor, Computer Science*
Dr. Guoffei Gu, *Professor, Computer Science & Engineering (TEES)*
Dr. Nickolas Duffield, *Professor, Electrical & Computer Engineering (TEES)*
Dr. Arnold Vedlitz, *Professor, Public Service & Administration*

SPONSORED RESEARCH

AFFILIATED UNIVERSITIES

ITEC advances research in connectivity, interoperability, and security through strong collaboration with government, industry, and academic partners. The RELLIS Spectrum Innovation Lab and extensive partnerships within the Texas A&M University System drive innovative, interdisciplinary research in communications, public safety, and infrastructure. Student involvement and cross-departmental expertise ensure ITEC's leadership in critical communications research.

PRAIRIE VIEW UNIVERSITY

Electrical & Computer Engineering

TEXAS A&M UNIVERSITY-COMMERCE

Computer Science & Information Systems

RELLIS CAMPUS

Bush Combat Development Complex

Innovation Proving Grounds Research Facility

TEES ENERGY SYSTEMS LAB

TEXAS A&M ENGINEERING EXTENSION SERVICE (TEEX)

TEEX Testing & Innovation Center

Disaster City

UNIVERSITY OF ILLINOIS-URBANA CHAMPAGNE

The Critical Infrastructure Resilience Institute

MASSACHUSETTS INSTITUTE OF TECHNOLOGY

NORTHEASTERN UNIVERSITY

RICE UNIVERSITY

UNIVERSITY OF BUFFALO

UNIVERSITY OF MICHIGAN

UNIVERSITY OF FLORIDA

UNIVERSITY OF THE BASQUE COUNTRY

RESEARCH PROJECTS

The following sponsored research projects were active in fiscal years 23-24.

AWARE Deploying Defenses for Cellular Networks

Sponsor: Department of Homeland Security
PI: University of Florida
Co-PIs: TEES – Engineering and Computer Science, Texas A&M University - ITEC
Period: 3 Years (09/2020 - 09/2023)

Telephony systems are vital global communication infrastructures for critical sectors but securing both legacy and future networks poses significant challenges. The University of Florida used ITEC's AWARE Transport Network (ATN) to develop solutions that will detect and mitigate harm to legacy and future cellular systems by third parties.

Backup Network Timing for Mission Critical P25 LMR Networks

Sponsor: Department of Homeland Security
PI: University of Illinois Critical Infrastructure Resilience Institute – a Dept. of Homeland Security Center of Excellence
Co-PIs: Texas A&M University ITEC
Texas A&M University Computer Science
Period: 1 Year (09/2022-09/2023)

The University of Illinois Critical Infrastructure Resilience Institute (CIRI) and the federal government, with Texas A&M ITEC, developed a backup network timing source for Project 25 (P25) Land Mobile Radio (LMR) communications when GPS is unavailable, engaging public safety and industry representatives for insights and requirements.

Creating a Shared Public Safety Radio Data Set for Sharing and Analysis

Sponsor: Department of Commerce – National Institute of Standards and Technology
PI: Texas A&M University ITEC
Co-PIs: Texas A&M University Department of Visualization, Texas A&M University Electrical and Computer Engineering
Period: 3 Years (09/2021 - 08/2024)

ITEC collaborated with data scientists to collect and analyze Land Mobile Radio (LMR) Usage Data for research comparing LMR to Long-Term Evolution (LTE). Data collected from this research will help public safety organizations prepare to transition to LTE.

RESEARCH PROJECTS

Digital Twin Enabled Testbed for Public Safety Communication Technologies

Sponsor: Department of Commerce – National Institute for Science & Technology
PI: Texas A&M University Department of Visualization
Co-PIs: Texas A&M University – ITEC, Texas A&M University Electrical & Computer Engineering
Period: 2 Years (06/2022-05/2024)

ITEC, in partnership with the Texas A&M University Department of Visualization, helped establish a thematic lab to advance digital twin technology research, focusing on innovative computing, networking, and modeling methods for Department of Defense and interagency applications.

Edge Computing and Analytics: Advanced Connectivity for the Airman

Sponsor: Department of Defense – Air Force Research Laboratory
PI: Wi-Fiber
Co-PI: Texas A&M University – ITEC
Period: 2 Years (10/2021 - 03/2023)

ITEC partnered with Wi-Fiber to enhance connectivity for mission-critical devices using a testbed for Citizens Broadband Radio Service User Equipment (CBRS UE), Evolved Node B (eNodeB), and 5G Open Radio Access Network (5G ORAN). Results will promote quality of life through S.M.A.R.T. technology, bringing timely data insights into critical locations.

Government Secure Voice Architecture

Sponsor: Department of Defense – Air Force Research Laboratories
Department of Homeland Security – Science and Technology Directorate
PI: Texas A&M University – ITEC
Co-PIs: Texas A&M University-Commerce, Columbia University
Period: 2 Years (09/2021-04/2023)

ITEC partnered with Columbia University and Texas A&M-Commerce to create a testbed for secure, interoperable voice and data services for federal, state, and local agencies. Results helped address the threats and challenges to the nation's mobile network infrastructure.

RESEARCH PROJECTS

Mission Critical Services Testing as a Service (MCS TaaSting)

Sponsor: Department of Commerce – National Institute of Standards and Technology
PI: University of the Basque Country (Spain)
Co-PI: Texas A&M University - ITEC
Period: 4 Years (12/2019 - 06/2023)

MCS-TaaSting facilitates cost-effective compliance testing for mission-critical communications. ITEC was the proof-of-concept lab to test the TaaS application to verify Mission Critical Push-to-Talk (MCPTT) conformance to 3rd Generation Partnership Project (3GPP) standards.

Mobility Acceleration Coalition

Sponsor: Department of Homeland Security
PI: Mobility 4 Public Safety (M4PS)
Co-PI: Texas A&M University - ITEC
Period: 1 Year (10/2021-09/2022)

ITEC advanced Mobility4PS (M4PS) in mobile public safety tech by developing Low Code App Sheet projects, system diagrams, CAM integration, and providing feature testing and access control consulting.

Next Generation 9-1-1 Interoperability Testing Program Phase 2A

Sponsor: Department of Homeland Security
PI: University of Illinois Critical Infrastructure Resilience Institute – a Dept. of Homeland Security Center of Excellence
Co-PIs: Texas A&M University - ITEC
Period: 4 Years (07/2020 - 06/2024)

ITEC, supported by DHS in collaboration with CIRI, is responsible for developing a sustainable model for NG9-1-1 standards testing.

Next Generation 9-1-1 Interoperability Testing Program Phase 2B

Sponsor: Department of Homeland Security
PI: University of Illinois National Critical Infrastructure Resilience Center of Excellence
Co-PI: Texas A&M University - ITEC
Period: 2 Years (09/2022-09/2024)

ITEC collaborated with CIRI to create a sustainable NG9-1-1 standards testing model, with industry support and upcoming funding for a test lab.

RESEARCH PROJECTS

Next Generation 9-1-1 Interoperability Testing Program Phase 3

Sponsor: Department of Homeland Security
PI: University of Illinois Center for Infrastructure Resilience Center of Excellence
Co-PIs: Texas A&M University ITEC, TAMU Engineering Technology and Industrial Distribution (ETID)
Period: 3 Years (09/2023 - 09/2026)

This project will establish the NG9-1-11 testbed framework at TAMU ITEC and develop protocols for compatibility and interoperability testing, including testing scenarios and result report examples.

Programmable Zero-Trust Security for Operating Through 5G Infrastructure

Sponsor: National Science Foundation
PI: Computer Science and Engineering (TEES)
Co-PIs: Texas A&M University ITEC, TAMU Electrical and Computer Engineering, Massachusetts Institute of Technology, Northeastern University, Rice University, University at Buffalo, University of Michigan
Period: 2 Years (07/2022 - 06/2024)

The zero-trust security framework offers customizable solutions for secure Dept. of Defense and critical infrastructure operations in 5G environments, reducing deployment and management costs.

National Spectrum Consortium Support Services (TIDES)

Sponsor: National Spectrum Consortium
PI: Texas A&M University - ITEC
Co-PIs: None
Period: 1 Year (09/2022 - 04/2023)

ITEC provided the wireless network for TIDES, a testing and evaluation platform for incubating innovative technologies in realistic settings, enabling technologists to address technical issues and test capabilities with warfighter involvement. TIDES fosters collaboration among governments, academia, and industry to meet emerging Department of Defense and interagency needs.

Priority Telecommunications Program Information Sharing Framework

Sponsor: Department of Homeland Security
PI: General Dynamics Information Technology (GDIT)
Co-PI: Texas A&M University - ITEC
Period: 2 Years (04/2022 - 08/2023)

ITEC hosted a stakeholder event to showcase the ISF with a Skyline video gateway, demonstrating video sharing and situational awareness capabilities.

RESEARCH PROJECTS

Smart Communities, Smart Responders: An AI for IoT Prize Competition

Sponsor: Department of Commerce – National Institute of Standards and Technology
PI: Texas A&M University ITEC
Co-PIs: Texas A&M University Department of Visualization, Texas A&M Institute for Data Science, TEEX Testing & Innovation Center, US Ignite
Period: 2 years (02/2022 - 07/2024)

ITEC partnered with US Ignite, Texas A&M Institute for Data Sciences, and TEEX to propose an AI prize competition at TEEX, aimed at establishing a dataset and insights for public safety while providing a platform for innovators in emergency response.

Resilient Network Timing

Sponsor: Department of Homeland Security
PI: University of Illinois Center for Infrastructure Resilience Center of Excellence
Co-PIs: Texas A&M University ITEC, Sam Houston State University, Texas A&M University Computer Science
Period: 1 Year (09/2023 - 09/2024)

The project assessed the position, navigation, and timing (PNT) landscape and evaluated the solution's timing accuracy for P25 communications to determine the need for a follow-on phase involving further study and testing.

Zero-Trust, Programmable and Verifiable Security Transformation for NextG

Sponsor: National Science Foundation
PI: Computer Science and Engineering TEES
Co-PI: Texas A&M University ITEC
Period: 3 years (05/2022 - 04/2025)

ITEC offers infrastructure support for 5G slicing across core, multi-access edge computing (MEC), and transport, ITEC also provides 5G subject matter expertise, documentation, and outreach support. This project seeks to address security challenges in NextG network systems.

RESEARCH PROJECTS

Voice Interoperability Framework and Research Analysis

SPONSOR: DEPARTMENT OF HOMELAND SECURITY
PI: UNIVERSITY OF ILLINOIS CENTER FOR INFRASTRUCTURE RESILIENCE CENTER OF EXCELLENCE
CO-PIS: TEXAS A&M UNIVERSITY ITEC, TAMU ENGINEERING TECHNOLOGY AND INDUSTRIAL DISTRIBUTION (ETID)
PERIOD: 1 YEAR (09/2023 - 09/2024)

ITEC, in partnership with CIRI and TAMU ETID researched and analyzed interoperability issues in Push-to-Talk applications used by DHS and first responders, leading to recommendations for achieving desired interoperability.

Technical Evaluation and Support Services

Task Order 1

PERIOD: 2 YEARS (11/2022 - 03/2024)
SPONSOR: TEXAS COMPTROLLER OFFICE – BROADBAND DEVELOPMENT OFFICE
PI: TEXAS A&M UNIVERSITY ITEC

ITEC provided technical evaluation services for Texas Broadband Office proposals, including response requirements and rating criteria.

Task Order 2

PERIOD: 1 YEAR (12/2023 - 04/2024)
SPONSOR: TEXAS COMPTROLLER OFFICE – BROADBAND DEVELOPMENT OFFICE
PI: TEXAS A&M UNIVERSITY ITEC

TAMU ITEC will provide technical evaluation services for Texas Broadband Office proposals, including response requirements and rating criteria.

NIST Smart Communities, Smart Responders AI3 Competition Group Picture

COMMERCIAL CONTRACTS

ITEC partners with industry leaders to develop and test advanced communication technologies for public safety and infrastructure. In collaboration with Squishy Robotics, ITEC evaluated multi-modal sensor robots in emergencies, and worked with Qualcomm on projects like Smart Engine and Emergency Response Management Testbeds. These initiatives focus on assessing 4G/5G network performance, improving interoperability, and delivering thorough test reports. ITEC's expertise helps drive innovation and strengthen emergency response systems.

SQUISHY ROBOTICS

Impact-Resilient Droppable Robots for Payload Delivery

SPONSOR: SQUISHY ROBOTICS
PI: TEEX – TESTING & INNOVATION CENTER
CO-PI: TEXAS A&M UNIVERSITY - ITEC
PERIOD: 1 YEAR (06/2023 - 09/2023)

Squishy Robotics developed a multi-modal sensor robot for HazMat situational awareness, seeking TEEX's help for functional testing and evaluation, while ITEC provided RF testing to simulate emergency response scenarios.

QUALCOMM

Smart Engine Testbed

PI: TEXAS A&M UNIVERSITY ITEC
CO-PI: TEEX TESTING & INNOVATION CENTER
PERIOD: 1 YEAR (3/2023 - 12/2023)

Assisted Qualcomm in assessing their deployable 4G network performance under various conditions and authored a white paper on 5G's role in public safety.

Emergency Response Management Testbed

PI: TEXAS A&M UNIVERSITY ITEC
CO-PI: TEEX TESTING & INNOVATION CENTER
PERIOD: 1 YEAR (04/2024 - 09/2024)

Assisted Qualcomm with performance evaluations of prototype systems for the Interoperability Institute 2024, including pre-testing support for 5G Sidelink tests and low-power IR sensor assessments, culminating in a comprehensive test report.

PUBLICATIONS

The Texas A&M University Internet2 Technology Evaluation Center (ITEC) actively advances next-generation communication systems through impactful research and publications. Recent work includes studies on zero-trust VoIP and IMS security, presented at the 2023 IEEE Future Networks World Forum, as well as coverage in Critical Communications Review. Collaborations with partners like NGA 9-1-1 LLC further highlight ITEC's leadership in public safety communications research.

2024

- Fox, M., Hammad, E., Magnussen, W., & Schulzrinne, H. (2023). Towards Zero-Trust VoIP Architecture: A Testbed Implementation, Approach and Lessons Learned. Accepted at the 2023 IEEE Future Networks World Forum (FNWF23).
- Fox, M., Hammad, E., & Magnussen, W. (2023). IP Multimedia Subsystem (IMS) Security: A Review and Testbed Implementation. Paper accepted at the 2023 IEEE Future Networks World Forum (FNWF23).

2023

- Critical Communications Review. (2023). "Critical Broadband Developments Advance at TCCA's International Plenary Meeting."
- Texas A&M University and NGA 9-1-1 LLC. (2023). Announce Strategic Relationship for Research and Testing of NG9-1-1 Solutions.
- Nicole Hatch, Walt Magnussen, & Jian Tao. (2023). Efforts Towards a Digital Twin-based Testbed for Public Safety. ACM.
- Texas A&M University System. (2023, March). The Texas A&M University System leverages Ribbon's IP Wave Solutions for its private 5G network. Press release.
- Urgent Communications. (March 2023). "IWCE speakers debate state of public-safety interoperability."
- Homeland Security News Wire. "Next Generation 9-1-1 Interoperability."
- International Wireless Communications Expo. Urgent Communications. "The Evolution of 'Interoperable Communications': Given Today's Emerging Technologies, What Does Interoperability Mean, And What Are We Doing About it?"

SYMPOSIA AND SEMINARS

ITEC hosts symposia and seminars that gather experts from academia, industry, and government to discuss advances in next-generation communications. These events promote collaboration and knowledge-sharing on topics such as cybersecurity, interoperability, 5G, and IoT, reinforcing ITEC's leadership in public safety communications research.

2024

NG9-1-1 Interoperability Task Force Summit

> **"NG9-1-1 Conformance and Interoperability Testing Update"**

International Wireless Communication Expo (IWCE)

> **"NG9-1-1 Conformance and Interoperability Testing"**
>
> **"Bringing Mission Critical Services (PTT, Data, and Video) Out of the Silo"**
>
> **"All you need to know about the Information Sharing Framework"**
>
> **"Making Direct Cell to Cell Communications a Reality with Sidelink"**

IEEE Public Safety World Forum

> **"Increased Awareness and Readiness Levels"**

National Emergency Number Association (NENA) Conference

> **"Interoperability Testing to Support Certification: Knowing Your System Adheres to Standards"**

2023

International Wireless Communication Expo (IWCE) 2023

> **"Interoperability for Mission Critical Communications"**

NG9-1-1 Interoperability Task Force Summit

> **"Plan for NG9-1-1 Conformance & Interoperability Testing"**

NIST Public Safety Communications Research Conference

> **"Smart Comm Poster Sessions: "Smart Communities, Smart Responders; an AI for IoT Prize Competition"**
>
> **"Creating a Shared Public Safety Radio Data Set"**

National Emergency Number Association (NENA) Conference

> **"NG9-1-1 Interoperability Task Force"**

Virginia APCO/NENA/Interoperability Fall Conference & Expo

> **"Mission Critical Push-to-Talk"**

INTEROP INSTITUTE

ITEC's most notable outreach event is the Interoperability Institute (Interop). The Texas A&M University ITEC Interoperability Institute unites industry leaders to address first responder communication challenges through workshops and demonstrations aimed at enhancing emergency response effectiveness. The event assesses interoperability during multijurisdictional incidents, including cybersecurity, physical convergence, hazmat situations, terrorist bombings, and telecom failures. ITEC's ability to unite academia, government, industry, and practitioners highlighted its growing influence and solidified its role as a leader in critical communications research.

INTEROP INSTITUTE 2024

After a hiatus in 2023 due to public safety deployments, Interop 2024 experienced a nearly 25% increase in attendance and a 29% increase in exercise participation. Sponsoring vendors more than doubled from eight sponsoring vendors in 2022 to twenty-two in 2024. 2024 Keynote speakers included recognized authorities in public safety. Attendance included public safety thought leaders and first responders from four countries, thirteen federal agencies, twenty-five local agencies, and forty-four tech companies.

INTEROPERABILITY INSTITUTE 2024 KEYNOTE SPEAKERS

DANIEL COTTER

Executive Director of the Office of Science and Engineering (OSE) in the Science and Technology (S&T) Directorate

US DEPARTMENT OF HOMELAND SECURITY

CHARLES GUDDEMI

District of Columbia's Homeland Security and Emergency Management Agency's (HSEMA)

STATEWIDE INTEROPERABILITY COORDINATOR

JOE WASSEL

Executive Director and CEO of the FirstNet

FIRST RESPONDER NETWORK AUTHORITY

SUMMARY

ITEC distinguishes itself as a **TRUSTED**, **NEUTRAL** third-party laboratory, recognized for its commitment to transparency and the open sharing of both procedures and research results. ITEC enables open publication of foundational and practical research. This approach not only fosters greater **SCIENTIFIC COLLABORATION** but also enhances the **CREDIBILITY** and reach of the research conducted within its walls.

A cornerstone of ITEC is its strong emphasis on **STUDENT INVOLVEMENT**. By integrating **UNDERGRADUATE** and **GRADUATE** students into lab projects, ITEC not only supports the **NEXT GENERATION** of engineers and researchers but also helps **COMMERCIAL** and **ACADEMIC** partners access fresh talent and innovative ideas at reduced costs. Our students learn from **FULL-TIME ENGINEERS** with **EXPERIENCE** across government, industry, and academia, connecting **FIRSTHAND LEARNING** to real-world problems. Students graduate with practical skills, while partners gain from their **INGENUITY** and **ENERGY**.

From a technical perspective, ITEC provides access to advanced, multi-million-dollar **LABORATORY SYSTEMS**. This state-of-the-art laboratory network enables both researchers and commercial users to conduct sophisticated experiments and testing within a variety of environments, all at competitive and accessible rates. The level of **INTERCONNECTIVITY** and diversity in **TESTING ENVIRONMENTS** offered by ITEC is unmatched elsewhere.

ITEC's experienced team of engineers build and manage **OPEN-SOURCE** as well as **COMMERCIAL-GRADE PLATFORMS.** This infrastructure allows ITEC to develop research proposals that address a broad spectrum of needs and challenges. Additionally, **SECURE NETWORK CONNECTIONS** facilitate collaborative research within an interdisciplinary and multi-sector environment.

In conclusion, ITEC's distinctive environment, integration of academia and industry, **TECHNICAL EXPERTISE**, and active student participation position ITEC as a highly competitive and **VALUABLE ASSET** for researchers, commercial partners, and emerging professionals.

Visit our website to learn more www.cacn.tamus.edu.