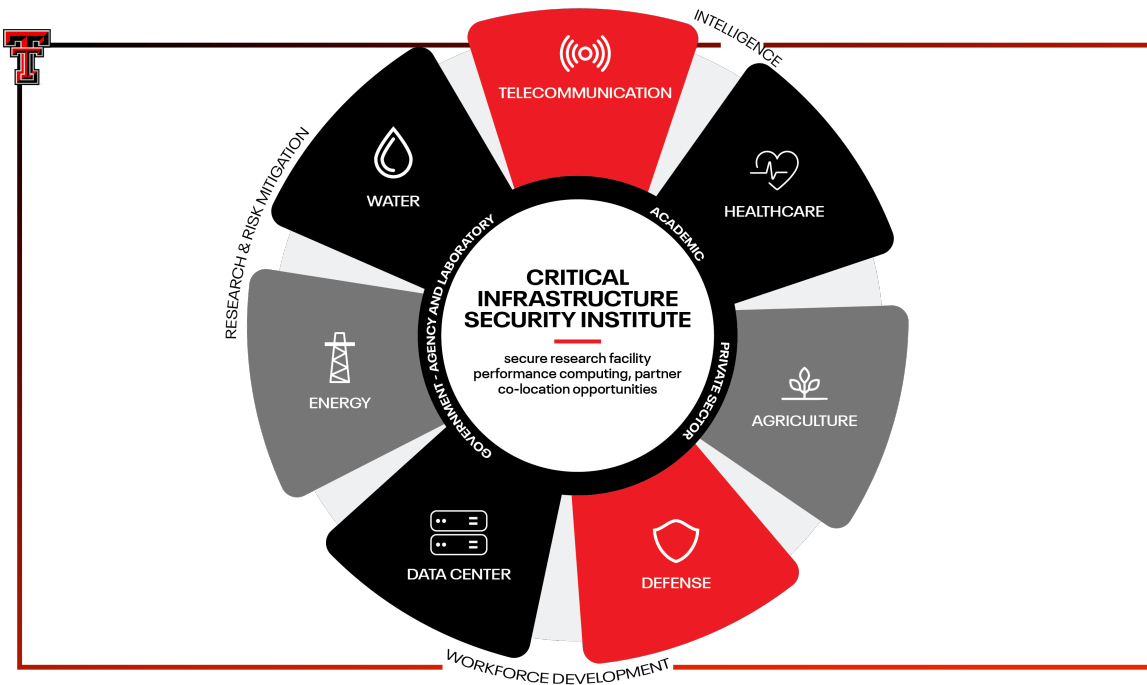


SERIES ONE | TELECOMMUNICATION



LUNCH & LEARN





REESE NATIONAL SECURITY COMPLEX

FORMER U.S. AIR FORCE BASE

- Located 10 miles from campus on over 2,000 acres of land with perimeter fencing and locked gates.
- Private airfield with two active runways for easy access for defense partners.
- Available real estate for new developments
- Vacant buildings for renovations
- Competitive pricing for tax incentives

PATRICK ALBRITTON, ASSOCIATE VICE
PRESIDENT & FACILITIES OPERATIONS, RNSC
PATRICK.ALBRITTON@TTU.EDU



GLEAMM

- Research facility for academic and industrial research on new electrical grid technologies
- Development of control algorithms for microgrid/storage/distributed generation control
- Cyber physical security simulations of microgrid and distributed generation sources
- Deployment and integration of new products related to generation
- Distribution and controls in our existing microgrid test bed for testing and certification



How Do COWs Telecommunicate?



Brenda Connor, Ph.D.

Dual appointment at Texas Tech University:

Professor of Practice, Department of Electrical and Computer Engineering

Senior Technical Managing Director for the Critical Infrastructure Security Institute



CRITICAL INFRASTRUCTURE SECURITY AND OPERATIONAL EFFICIENCY ENABLED BY PRIVATE CELLULAR NETWORKS

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TYPICAL TEXAN'S VIEW OF A COW



Movable Communications Sensing Sentinel (MCSS)

CELL ON WHEELS (COW) EQUIPPED FOR ENERGY AWARE SENSING E.G., DRONE/VEHICLE DETECTION



Illustrative example

What problems are we aiming to accelerate solutions for?

Critical Infrastructure Oil & Gas: Theft examples – Billion Dollar problem in Permian Basin

<https://www.texastribune.org/2025/06/20/west-texas-oil-field-task-force/>



Critical Infrastructure Food and Agriculture examples: Theft and biosecurity



Critical Infrastructure microgrid, micro-data center examples: Situational Awareness - Physical Security



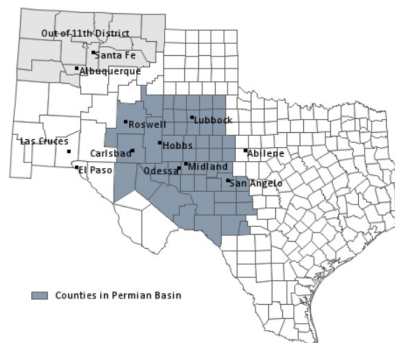
Oil and Gas Example Usage of Movable Communications Sensing Sentinel (MCSS)

Highlights

The Permian Basin covers 55 counties in West Texas and southeast New Mexico. The region has been producing for nearly a century and still contains large resources of oil and natural gas.

What comes first – Drilling or Communications towers?

Location of Permian Basin



SOURCE: Railroad Commission of Texas. Oil Production Zones in Permian Basin

- Typically limited Public network coverage.
- Theft is a big problem!
- Sabotage is a concern!
- Operational efficiency in oil and gas involves maximizing production, reducing costs, and enhancing safety.

Ranching Example Usage of Movable Communications Sentinel (MCSS)



Texas Longhorn Cattle in Wyoming

- Rustling has transitioned from “Old West” to a tech-savvy modern crime.
- Biosecurity predation management is a critical aspect of livestock health and safety.
- Operational efficiency is even more important in fluctuating markets for tracking/managing herds, water supplies, and workforce.

What private cellular solution value are we innovating with?

Workforce Efficiency and Safety

Connectivity where public network coverage may be spotty and/or where disaster recovery is needed.

SCADA Automation

secure resilient communications -> keep data local and close to where actioned.

Dome critical infrastructure for situational awareness

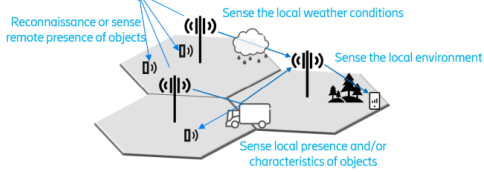
Integrated Sensing and Communications (ISAC) for limited area defense.

Integrated Sensing and Communications provides enhanced situational awareness

Sensing Feature adds additional RAN programmability/insight but also adds RAN threat vectors

Sensing - Cellular Communications Feature implemented in the RAN initially

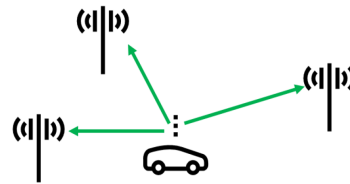
Sensing



- Gather a mapping of the environment
- Determine the location, speed, and direction of passive "non-connected" devices, users, and objects

Location - Cellular Communications Feature implemented in the CORE initially

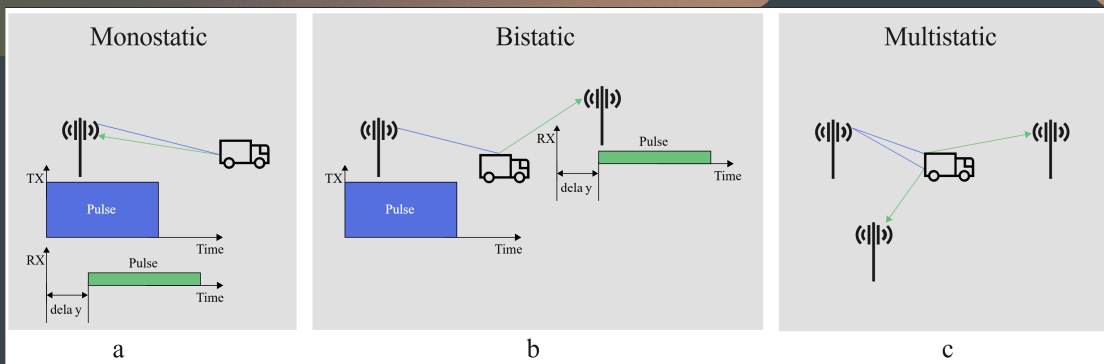
What is not Sensing? Positioning



Determine the location of active, "connected", devices, users, and objects.

Sensing Topologies: How does it work?

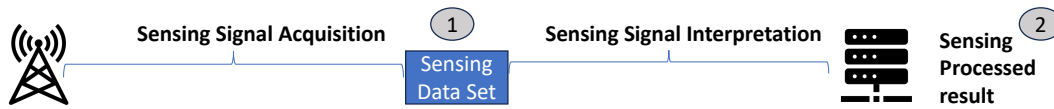
With a distance of 50 m, for example, to the target, the reflected signal arrives 333 ns later. This can be compared with the OFDM symbol duration of 33 μ s used in midband TDD deployments.



Traditional Radar

Avoid self-interference by using different nodes as transmitters and receivers.

WHAT OPEN ISAC INTERFACES ARE WE TARGETING?



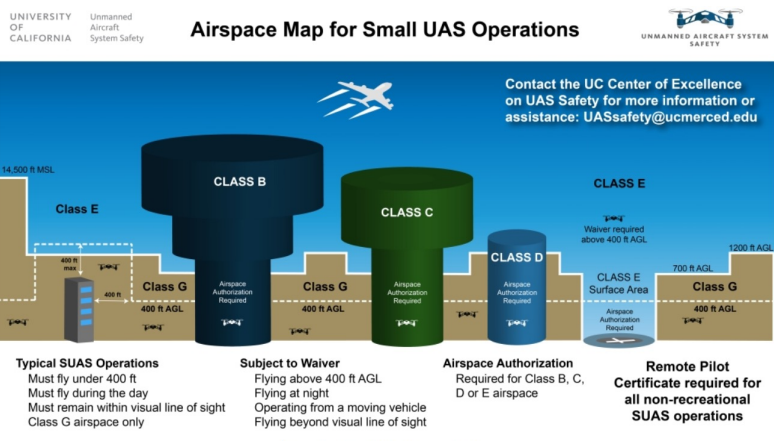
To enable critical infrastructure & DOW value, need to innovate with Open Sensing Interfaces now!

- **Sensing Dataset Interface 1:** The sensing data set interface (1) will be a stream and will have metadata to describe the sensing stream. Example of sensing data set content: there is a Blip and the Blip is moving.
- **Sensing Processed Result Interface 2:** Pattern Recognition (AI enabled) interprets multiple inputs to categorize the Blip e.g., vehicle, drone, livestock. The sensing processed result feeds into Situational Awareness systems for threat assessment and response.

Relevance for ISAC in National Security – Golden Dome - Limited Area Defense

Golden Dome for America Architecture:

- Space Layer
- Upper Layer
- Under Layer
- Limited Area Defense
- Domain Awareness – Common operating Picture across layers



How do we collaborate with Industry partners to accelerate value for remote/rural America?



- **Full Power Outdoor Lab:** Critical Infrastructure Telecom Ecosystem Incubator (CITEI).



- **Innovation Team:** includes collaborators e.g., a tier 1 operator with industry best practice and spectrum that is poised to scale.



- **Right business and technology value mix:** Tripple bottom line value – workforce efficiency, SCADA automation optimization, and situational awareness innovation acceleration.

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FROM HERE, IT'S POSSIBLE

Our mission is to advance the protection, resilience, and security posture of our nation's **critical infrastructure** systems by developing cutting-edge solutions to emerging security challenges through interdisciplinary research, innovative education, and strategic partnerships.



CRITICAL INFRASTRUCTURE
SECURITY INSTITUTE

TEXAS TECH
National Security



THANKS FOR JOINING

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SERIES TWO | MICROGRID & DATA CENTER
COMING JUNE



DEPTS.TTU.EDU/CISI
CISI@TTU.EDU