NEWSLETTER

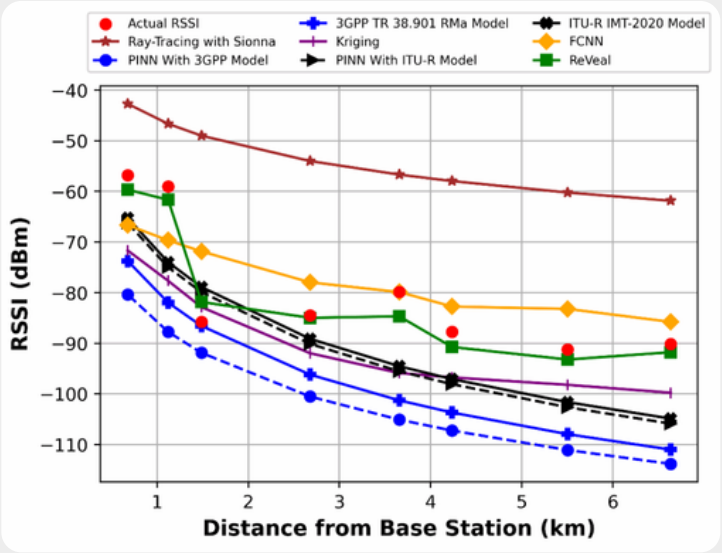
July 2025

ARA USER STORIES

USER STORY #1: EXPLORING DYNAMICS OF LEO SATELLITE NETWORKS

Researchers from the University of Victoria have used the ARA platform to conduct real-world measurement studies on the OneWeb Low-Earth orbit (LEO) satellite network, the second-largest commercial LEO satellite constellation. Motivated by the lack of a comprehensive understanding of the OneWeb LEO satellite network beyond regulatory and simulation analysis, the researchers have managed to measure latency, throughput, and other network characteristics using ARA's satellite access infrastructure. The unique location of the ARA platform, in relation to the OneWeb terrestrial infrastructure, offers an excellent opportunity to assess disruptive handover and reconfiguration events. The study has been reported in the article "Measuring the OneWeb Satellite Network" at the 2025 IEEE/IFIP Network Traffic Measurement and Analysis Conference (TMA'25). It offers data-driven insights to the satellite communication research community and LEO network operators like OneWeb.

For more details, check our ARA Blog here



USER STORY #2: PHYSICS-INFORMED NEURAL NETWORK FOR RADIO ENVIRONMENT MAPPING

Prof. Hongwei Zhang and his team at Iowa State University have developed Reconstructor and Visualizer of Spectrum Landscape (ReVeal), a Physics-Informed Neural Network (PINN) that enables accurate Radio Environment Mapping (REM) using sparse data, addressing key limitations of traditional models. Using real-world data from ARA and a physics-based model, ReVeal outperforms existing techniques, achieving a Root Mean Squared Error (RMSE) as low as 1.95 dB using only 30 sample points across a 514 km² area. ReVeal's capabilities make it a promising tool for dynamic spectrum sharing in rural and underserved areas, with applications in cognitive radio, TV white space, and national spectrum policy planning.

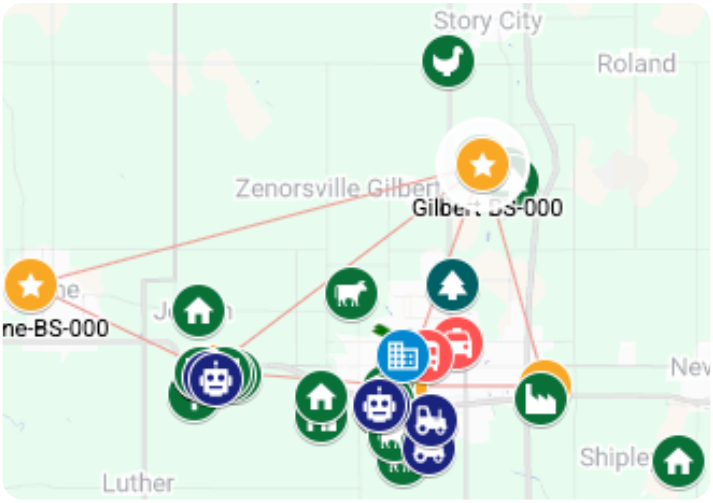
For more details, check our ARA Blog here

NEW ARA RESOURCES AND CAPABILITIES

Expanded ARA Coverage with New Infrastructure

- ARA has deployed **3 new Base Stations (BS)** at Boone (yellow star to the west), Gilbert (to the north), and ISICS (to the east), expanding multi-cell experiments with low-UHF massive MIMO and fully-programmable open-source 5G and O-RAN.
- Connectivity between these BSs is carried through **wireless backhauling** (the orange lines), where ARA added 6 links and 16 dishes to carry the traffic between these BSs.
- ARA has **added 20 new User Equipments (UE)** to serve various experiment needs.

Click the map for the current deployment details



Enhanced Weather Sensing Capability

- Two more advanced weather sensors and disdrometers are deployed at Gilbert and ISICS to expand ARA's sensing capability and enable deeper insights into the environmental impact on wireless systems.
- The sensors provide detailed atmospheric and precipitation measurements, including rain rate, rain and snow particle size and velocity, wind speed, humidity, atmospheric pressure, and temperature. The fine-grained weather information is instrumental in weather-induced wireless channel dynamics.

Jupyter Notebook for Programmable Experimentation & Community Collaboration

- ARA now offers Jupyter Notebooks, a powerful and user-friendly environment for users to design, execute, and share their experiments in Python.
- It includes a custom ARA-specific Python library that provides APIs for key stages of the experimental workflow, such as creating and deleting leases, launching and managing containers, and executing commands within them.

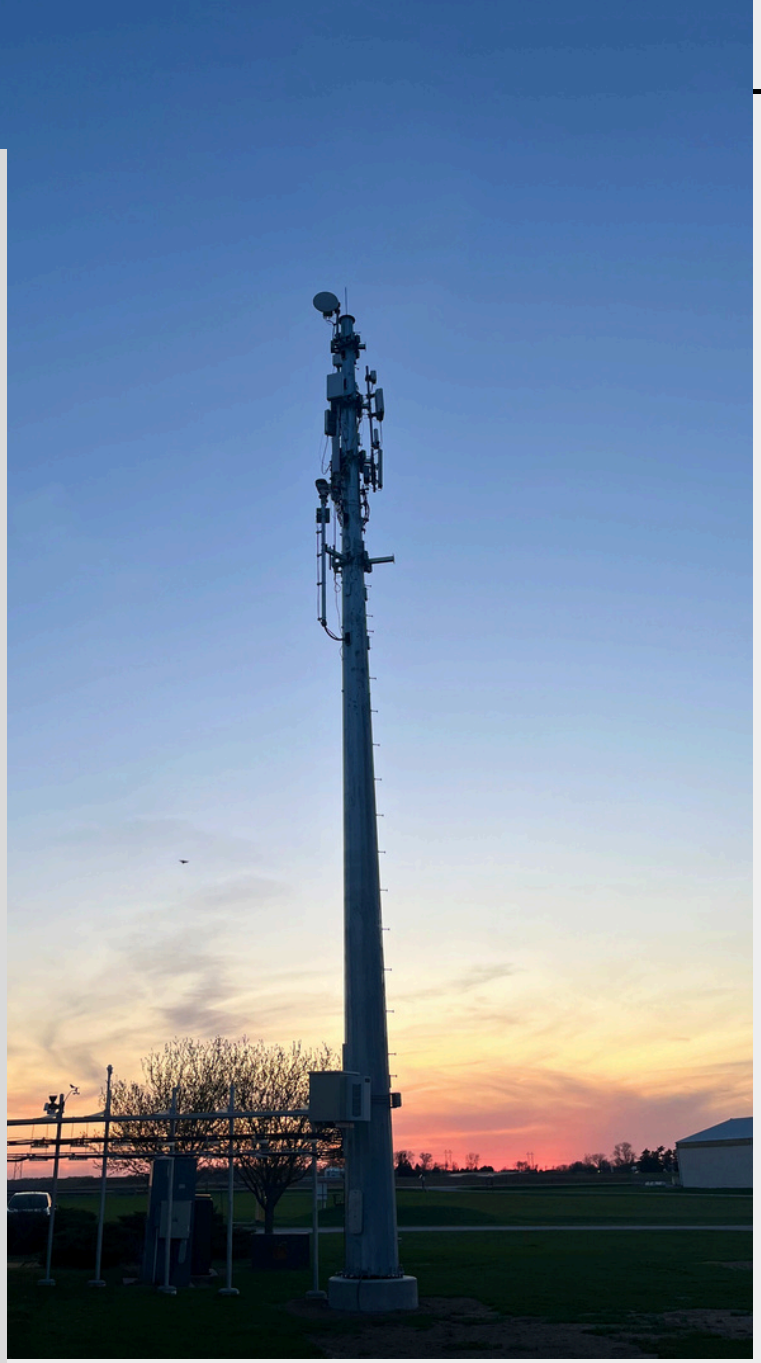
For more details, check the ARA User Manual

ARA-ENABLED RESEARCH & INNOVATION

With first-of-its-kind wireless access, x-haul and satellite communication platforms, end-to-end compute resources from device to edge and core, and real-world integration with applications such as agriculture and public safety, ARA enables unique research and innovation in open-source NextG, O-RAN, TVWS massive MIMO, COTS 5G, long-distance high-capacity x-haul, dynamic spectrum sharing, precision agriculture, and so on.

For more details, check the ARA website here

ARA: Advancing Frontiers of Wireless & Applications in Agriculture, Public Safety, Defense, Smart Communities



Use ARA

Are you interested in using the advanced ARA network for your experiments? Are you a Principal Investigator (PI), Professor, or Research Team Manager? If so, we have some great news for you!

- Fill out the ARA user sign-up form to request Project Administrator access.
- A confirmation email will be sent to grant you access to the portal once approved.
- Check out ARA user management for adding project members.

Share Your Story

Excited about your new findings and insights from ARA-enabled experiments? You are sincerely invited to spread your joy by sharing news on your publications and stories with the broad ARA community!

Co-Shape ARA

ARA is designed for you, and we are genuinely interested in hearing and learning from you! Do you have any thoughts on what worked well, what could have been done better, and what you would like to see in the future? Please help share your wisdom and co-shape the future of ARA through ARA feedback form.

Contact ARA

- Have questions about ARA? Contact us here.
- Interested in advanced wireless and applications? Join the ARA community!
- Check out WiCI career for our researcher/engineer/student openings!

Connect With Us on Social Media to Stay Up to Date on ARA's Latest News and Announcements!