Welcome to the monthly PAWR update. Each month we deliver technical summaries on: POWDER, COSMOS, AERPAW, ARA, and Colosseum.

POWDER-RENEW

The POWDER team is currently redeploying a programmable massive MIMO array on the rooftop of the University of Utah Merrill Engineering Building (MEB). To improve coverage between the array and a set of mMIMO clients, the team is also deploying three “client nodes” on the same roof, each with up to three mMIMO client devices.
For many months, the POWDER team has also been working to optimize a high-power RF frontend to work with OAI open source software for over-the-air operation. The photos here show a “connectorized” version of the frontend both in the indoor POWDER lab, and being installed for testing on a rooftop.

**COSMOS**

After COVID construction delays, COSMOS has now started work to deploy additional large and medium nodes along Amsterdam and Convent Avenues to extend the testbed’s outdoor footprint. See node site pictured below.
The team also just announced an extension of its 4.0/5G+ sandbox in collaboration with Siemens and Rutgers University. The extension is focused on evaluation of low-latency feedback control scenarios which arise in industrial automation and smart manufacturing. As shown below, one large programmable software defined COSMOS radio node sector and a pair of small nodes have been deployed in the New Jersey Advanced Manufacturing Institute operated by the Mechanical & Aerospace department at Rutgers. The objective of this prototype is to work with industry partners on the design and development of advanced manufacturing techniques that require low latency and high reliability communications integrated with edge computing.
In a bring-your-own-device effort, COSMOS is pleased to support a new project run by Professor Javad Ghaderi at Columbia University, who has secured a $200,000 DURIP award from the Army Research Office to study “Real-Time Processing and Inference in Distributed Edge-Cloud Networks”. Professor Ghaderi’s research focuses on the design of networking architectures needed to implement machine learning algorithms. This DURIP will specifically focus on real-time object recognition and tracking in distributed edge-cloud networks.

AERPAW

The AERPAW team recently participated in the workshop on Future Networks Testbed Requirements, Challenges and Opportunities, organized and hosted by the IEEE Future Networks community. Rudra Dutta from the AERPAW team made a presentation on the AERPAW platform, with special reference to the challenges posed by a cyberphysical facility intended to be used completely remotely. The presentation videos are available online.
The AERPAW team has started the process of re-fitting space, acquiring equipment, and configuring infrastructure to create the new Data-and-Compute-Store (DCS) backend for the AERPAW platform. This will enable the AERPAW DCS to move out of the temporary space and facilities that supported Phase 1, and into the more long-term facility that will support Phase 2 and beyond.

ARA

As part of the ARA platform, a team from University of California, Irvine, led by Dr. Ozdal Boyraz, is building a free space optical communication (FSOC) system for use as a long-distance backhaul link. It is designed for data capacity up to 160 Gigabits per second (across 16 channels), and it will allow dynamic network configuration between nodes through optical switch boxes. It includes tunable power levels and enables aggregate data rates for different weather conditions. A dynamic tracking system will help compensate for vibrations and variable weather patterns.
In addition to the optical challenges of the FSOC system, the Irvine team is also creating custom mounting for its equipment to allow for movement of the lasers. The design for the full assembly has been verified in software, and the housing will be fabricated as soon as outdoor tests are complete.

The team is also working on the final control algorithm, the user interface for the ARA platform, and remote-access algorithms for maintenance purposes.
Colosseum

Colosseum now offers standard radio nodes connected to an Octoclock clock distributor. This is a useful accessory for users who would like to build multi-channel systems that are synchronized to a common timing source. Users can book these SRNs by checking the appropriate box in the reservation website.

The Colosseum ACM MobiCom tutorial will now be held on March 28, 2022. More information is available on the Colosseum website.