2ND COSMOS RESEARCH COMMUNITY WORKSHOP
TUTORIAL FOR COSMOS TESTBED USERS

OCTOBER 15, 2020
1:00PM-5:00PM US EDT

This tutorial will introduce the NSF-funded PAWR COSMOS ("Cloud enhanced Open Software defined MObile wireless testbed for city-Scale deployment") platform. COSMOS is a joint project involving Rutgers, Columbia, and NYU along with several partner organizations including New York City, City College of New York, University of Arizona, Silicon Harlem, and IBM. The COSMOS advanced wireless testbed is being deployed in New York City with technical focus on ultra-high-bandwidth and low-latency wireless communications with tightly coupled edge computing, and emphasis on the millimeter-wave (mmWave) radio communications and dynamic optical switching.

The first part of the tutorial will focus on the SDR aspects, where attendees will learn the basics of testbed usage and the OMF testbed management framework. These include how to manage reservations, image the nodes, orchestrate their experiments and collect measurements. The second part of the tutorial will introduce the COSMOS Education Toolkit that provides an experimentation curriculum that blends the three disciplines of mathematics, science, and computer science for K-12 students. The third part of the tutorial will focus on experimentation with heterogeneous cloud computing capabilities (i.e., CPUs, GPUs, and server-side FPGAs) of the COSMOS platform. To illustrate the use of distributed computational resources, attendees will deploy the OpenAirInterface (OAI) SDR-based LTE experimental ecosystem by using the Open Source MANO (OSM) orchestrator. The fourth part of the tutorial is devoted to optical experimentation and will show the tools and services designed to configure and monitor the performance of optical paths and topologies of the COSMOS testbed. Customized python scripts along with a Ryu OpenFlow controller will be used to demonstrate the programmability of the COSMOS optical network.

Tutorial Agenda

1:00 – 1:05PM	Welcome Remarks	*Gil Zussman, Columbia University*
1:05 – 1:15PM	Basic Testbed Usage with OMF	*Michael Sherman, WINLAB/Rutgers University*
1:15 – 1:30PM	Basic SDR Tutorial	*Prasanthi Maddala, WINLAB/Rutgers University*
1:30 – 1:45PM	Measurement Tools: OML	*Nilanjan Paul, WINLAB/Rutgers University*
1:45 – 2:00PM	Sub-6 GHz MIMO Channel Sounding	*Tingjun Chen, Columbia University*
2:00 – 2:15PM	Full Duplex	*Manav Kohli, Columbia University*
2:15 – 2:25PM	Education Toolkit	*Panagiotis Skrimponis, NYU*
2:25 – 2:35PM	Education Toolkit Experiments	*Panagiotis Skrimponis, NYU*
2:35 – 3:00PM	Coffee Break + Q&A	*All*
3:00 – 3:15PM	28 GHz Channel Estimation/Sounding	*Tingjun Chen, Columbia University*
3:15 – 3:30PM	60 GHz Channel Estimation/Sounding	*Prasanthi Maddala, WINLAB/Rutgers University*
3:30 – 3:45PM	Next Generation FPGA SDR (RFSoC)	*Panagiotis Skrimponis, NYU*
3:45 – 4:00PM	Optical Communications	*Jiakai Yu, University of Arizona* *Tingjun Chen, Columbia University*
4:00 – 4:20PM	Edge Computing Orchestration (OSM + devstack)	*Michael Sherman, WINLAB/Rutgers University*
4:20 – 4:40PM	SDR-based Cellular Communications (OpenAirInterface)	*Michael Sherman, WINLAB/Rutgers University*
4:40 – 5:00PM	Q&A and Closing Remarks	*All*

Attendees Preparation Instructions:

1. Desktop/Laptop with an SSH client installed
2. Register for an account: https://www.cosmos-lab.org/userManagement/register (Please use "2020 COSMOS-RW" as the "Organization" in the form)
3. Set up SSH client and upload your key(s): https://wiki.cosmos-lab.org/wiki/UserGuide/RemoteAccess/SSH

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