**Title:**

An Efficient Screening Method for Identifying Parameters and Interactions that Impact Wireless Network Performance

**Abstract:**

Wireless networks rely on a protocol stack to provide connectivity. Not only are the protocols at each layer reconfigurable, potential interactions arise among parameters of the protocol stack, operating system, hardware, and operating environment. Hence, there is a vital need to quickly determine the parameters and interactions that significantly impact the performance of a wireless system. We introduce a new combinatorial design --- a locating array (LA) --- to efficiently identify the parameters impacting audio quality and RF exposure in the w-iLab.t wireless network testbed in Belgium. Different from many conventional techniques, the size of LAs grows logarithmically in the number of parameters. This makes LAs practical for such identification in complex engineered networks, such as w-iLab.t. Existing software tools, such as JMP, cannot be used to analyze the measured performance data directly as they assume a balanced structure in experimentation. Therefore, using a framework from compressive sensing, we propose a new algorithm for the analysis that also provides robustness to noise in the wireless network. Using our analysis technique, we identify the significant parameters impacting audio quality and exposure and separately validate the results.

This is joint work with Charles J. Colbourn of Arizona State University, and Michael T. Mehari, Eli De Poorter, and Ingrid Moerman of Ghent University - imec.

**Bio:**

Violet R. Syrotiuk earned her Ph.D. in Computer Science from the University of Waterloo in Canada. She started her academic career in 1999 with the University of Texas at Dallas, and joined Arizona State University in 2002 where she is now an Associate Professor. Her research interests are diverse, though primarily in wireless networks. These include:
- Applications of designed experiments, statistical analysis, time-series analysis, anomaly detection, and monitoring to cross-layer protocol design and optimization, and protocols adaptive to dynamic network conditions.
- Applications of combinatorics to networking, including topology-transparent scheduling, compressive sensing, and traffic grooming.
- Contention- and scheduled medium access control protocols.
- Experimentation on GENI and FIRE testbeds.

Dr. Syrotiuk is a Senior Scientist in Sustainability.