Predictable delivery of prioritized messages in multi-hop wireless networks is important for a variety of applications. Because the wireless medium is shared, a medium access control protocol is necessary to prevent collisions. Among the media access protocols that are currently used in wireless sensor networks, the dominance protocol is an attractive protocol because we can estimate the worst-case end-to-end latency. Unfortunately, current realizations of the dominance protocol in the wireless domain have left an unresolved problem, called the Multi-hop Competing Problem (MCP), that limits the Quality of Service. This seminar presents a new characterization for MCP; we show that MCP is an exposed terminal problem that manifests when certain confluences of priorities occur in adjacent two-hop neighborhoods of a transmitting node. When the priority identifiers used by the nodes are derived from a coloring of an underlying graph, we can guarantee that MCP will not occur. Using a family of random disk-graphs as models for wireless systems, we show that MCP occurs often. The MCP free labels we propose enables the predictable delivery of multi-hop messages and improves end-to-end latency and throughput.

Dr. Shiva Sastry received his Ph.D. degree in Computer Engineering and Science from Case Western Reserve University. He has extensive industry experience in software engineering and automation systems and is an expert in graph algorithms and modeling. His current interests are in sensor-actuator systems for automation, provable adaptation, diagnostics and prognostics, and predictable monitoring. He has published several research papers and holds two U.S. Patents. He is currently Associate Professor at The University of Akron. Prior to joining Akron, he was Senior Research Scientist and Advisory Software Developer with Rockwell Automation.