**COLLOQUIUM**

Department of Computer Science and Engineering

University of South Carolina

### **Research Challenges in Low-Duty-Cycle Networks**

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Place: **Swearingen 1A03 (Faculty Lounge)**

# Abstract

For decades, many researchers have been focusing on wireless networks in which devices are assumed to be ready to receive incoming packets, ignoring the fact that idle listening dominates energy consumption, especially in emerging low-rate low-power wireless transceivers (e.g., 802.15.4). To reduce the energy costs of idle listening, a device must reduce its duty-cycle by sampling RF channels very briefly and shutting down for long periods. At any given time, this type of network is actually fragmented and network connectivity becomes intermittent, wherein a sender suffers sleep latency, i.e., a delay waiting for an intended receiver to wake up. With the increasing gap between the long lifetime requirements and slow progress in battery technology, low-duty-cycle networking is a crucial future foundation for many energy-constrained wireless  
applications (e.g., low-power sensing, actuation, tagging and alert). However, the little research that has been done in this area predominately focuses on individual physical designs and the need for network-level research becomes increasing important. This talk introduces the latest developments in low-duty-cycle networking research, focusing on how to optimize network performance (e.g., delay, reliability, and cost) in the presence of sleep latency, unreliable links and dynamic energy availability.

**Dr. Tian He** is currently an associate professor in the Department of Computer Science and Engineering at the University of Minnesota-Twin City. Dr. He is the author and co-author of over 150 papers in premier wireless network journals and conferences with over 14,000 citations (h-index 48). Dr. He is the recipient of the NSF CAREER Award, McKnight Land-Grant Professorship and five best paper awards. Dr. He served as general or program chair positions in several international conferences and on many program committees. He currently serves as an editorial board member for six international journals including *ACM Transactions on Sensor Networks* and *IEEE Transaction on Computers*. His research includes wireless sensor networks, intelligent transportation systems, real-time embedded systems and distributed systems, supported by the National Science Foundation, IBM, Microsoft and other agencies and corporations.