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Low-Power Wide-Area Network over White Spaces

Speaker: **Abusayeed Saifullah**

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Abusayeed Saifullah is an assistant professor of Computer Science at Wayne State University. He received PhD in Computer Science and Engineering with Turner Dissertation Award from Washington University in St Louis. His research concerns Internet-of-Things, cyber-physical systems, real-time embedded systems, and low-power networks. He published 60 papers in top-tier conferences including ACM SenSys, IEEE RTSS, IEEE RTAS, ACM/IEEE IoTDI, ECRTS, ACM MobiHoc, IEEE ICNP, IEEE INFOCOM, and in journals including ACM/IEEE Trans. on Networking, ACM Trans. on Sensor Networks, IEEE Trans. on Parallel and Distributed Systems, IEEE Trans. on Computers, ACM Trans. on Embedded Computing Systems, IEEE Trans. on Industrial Informatics, Springer Real-Time Systems, and IEEE Internet of Things. He received 7 Best Paper Awards/Nominations in highly competitive conferences including ACM SenSys (2016 nomination), IEEE RTSS (2019, 2014, 2011), IEEE ICII (2018), and IEEE RTAS (2012 nomination). He also received NSF CRII Award (2016), NSF CAREER award (2019), and Wayne State University's College of Engineering Faculty Research Excellence Award (2020). He is serving as a program chair of IEEE ICESS 2020, served as a track chair of IEEE ICCCN 2019, and as a TPC member of ACM SenSys, IEEE RTSS, ACM/IEEE IoTDI, IEEE RTAS, ACM/IEEE ICCPS, ACM MobiHoc, and IEEE INFOCOM. He is an editor of Elsevier Pervasive and Mobile Computing journal.

Abstract

As a key technology driving the Internet-of-Things, Low-Power Wide-Area Networks (LPWANs) are evolving to overcome the range limits and scalability challenges in traditional wireless sensor networks. In this talk, I shall present a new LPWAN architecture called SNOW (Sensor Network Over White Spaces) by exploiting the TV white spaces. SNOW is the first highly scalable LPWAN over the TV white spaces that enables asynchronous, bi-directional, and massively concurrent communication between numerous sensors and a base station. This is achieved through a set of novel techniques. SNOW has a new OFDM based physical layer that allows the base station using a single antenna-radio (1) to send different data to different nodes concurrently and (2) to receive concurrent transmissions made by the sensor nodes asynchronously. It has a lightweight MAC protocol that (1) efficiently implements per-transmission acknowledgments of the asynchronous transmissions by exploiting the adopted OFDM design; (2) combines CSMA/CA and location-aware spectrum allocation for mitigating hidden terminal effects, thus enhancing the flexibility of the nodes in transmitting asynchronously. I shall also present an implementation of SNOW on hardware and some experimental results through deployments in three radio environments - a large metropolitan city, a rural area, and an indoor environment.

When: Wednesday, 9th September, 2020 (8:00 PM)

Where: Online. Zoom Meeting ID: 687 0042 0405, Password: 673297

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