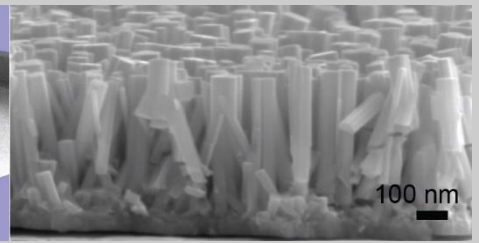
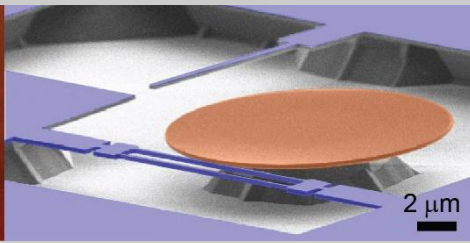
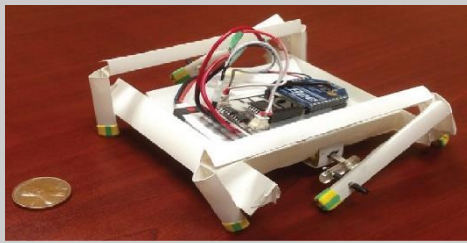




# WPI

## MECHANICAL ENGINEERING



### WPI ME Graduate Seminar Series 2019-2020

#### **ETAdvanced: A New Technology for 5G, and a Journey from Academia, Through a Startup, to Acquisition**

Joel L. Dawson, Ph.D.  
CTO and Founder  
Eta Devices, Inc.

**10:00-10:50 am, Wednesday, January 22**  
**Higgins Labs 218**

Many of the toughest problems in engineering are energy problems, and 5G cellular networks are an excellent illustration of this fact. We already know how to build super-high-bandwidth, high-MIMO-rank, low-latency, software-configurable, intricate-constellation, mm-wave(!) transmitters and receivers. If we were willing to spend unlimited energy, and dissipate unbounded amounts of heat, we could have everything we want for 5G networks...today. But high energy consumption is *the* problem. It dominates operating expenses of cellular carriers; it makes base stations big and heavy; it drains the battery in your handset and creates heat management problems that keep it from being small; and causes many other issues. And this is not a matter for incremental improvement: we are an order of magnitude away from delivering on the promise of 5G. We need breakthroughs.

One such breakthrough occurred in our research group at MIT in 2007. Doherty amplifiers, which are foundational to modern cellular networks and their energy consumption problems, were nevertheless invented in 1936. The physics of radio transmission seemed to allow for higher efficiency, despite the passage of decades during which there was no dramatic improvement. By expanding our focus beyond building blocks to look at a bigger part of the system, we found a dramatic halving of the heat dissipation using off-the-shelf, commonly available components. In 2010, we formed a company, Eta Devices, with \$6M USD of venture capital to develop and commercialize the technology. In

### About the Speaker



Dr. Dawson got his start in electronics as a hobbyist, amateur radio operator, and tinkerer growing up in Northern Virginia. He went to MIT first for his formal training, earning a bachelor's degree (1996) and a master's degree (1997) in EE, and did his master's thesis research at Bell Laboratories in Murray Hill, NJ. He completed the Ph.D. degree in EE at Stanford University in 2003. In 2003 he co-founded Aspendos Communications, a semiconductor company, before joining the MIT EECS faculty in 2004. During his time at MIT, he published numerous papers in conferences and refereed journals. In 2011, he co-founded Eta Devices with three other partners to commercialize a new, high-efficiency radio architecture that he first developed in his research group at

2016, we were successfully acquired by Nokia.

This talk will address the fundamental physics of the technology, its implementation, and the journey from university whiteboard to impacting one of the largest, most conservative, most change-resistant industries in the world.

MIT. Based in Cambridge, MA and backed by Stata Venture Partners and Deutsche Telekom Capital Partners, the Eta Devices team grew to 20 people before being acquired by Nokia in the fall of 2016. Dr. Dawson now leads the team deploying the Eta Devices technology within Nokia for advanced cellular base stations, with the first expected deployment in early 2019. In addition, he is a founder and advisor to Eta Wireless, a spin-out from the Nokia acquisition that is focused on deploying the the technology in cellular handsets, WiFi systems, and 5G wireless networks.

For his work at MIT, Dr. Dawson received the NSF Career Award in 2008. In 2009, he was selected for the Presidential Early Career Award for Scientist and Engineers (PECASE), the highest honor bestowed by the United States government on outstanding scientists and engineers in the early stages of their independent careers. He currently resides in Boston, MA, with his wife and son.