**Baltimore Avenue Connected Communities: Smart Roundtable**

June 6, 2019, 9:30 am – 11:00 am

College Park Airport, 909 Corporal Frank Scott Drive College Park, MD 20740

**Agenda**

1. Introductions/Updates – Gerrit Knaap 9:30 – 9:40 am

**Presentations**

1. Overview of 5G for the Non-expert – Rikin Thakker 9:40 - 10:10 am
2. Smart IOT Stormwater Project – Marccus Hendricks 10:10 -10:30 am
3. Sustainability and Optimal Demand Response in Power Markets

for Master-Metered Buildings - Steven Gabriel 10:30 -10:50 am

1. Wrap up 10:50 - 11:00 am

**Minutes**

**\*Tara will send out presentation slides\***

**Steven Gabriel – Master-Metered Buildings and Demand Response**

* Steve is interested in submitting to the NSF call with a “demand response” (DR) project, which studies how you can incentivize users to shift the energy load over time to avoid expensive and polluting plants. The cost savings are then shared between the producer and consumer. These programs are voluntary in which people have to agree to participate. Have been used mostly in commercial and industrial applications, but has great potential in residential areas.
* Direct vs. master metering:
	+ Direct metering – 1 meter per utility type or residential unit, after reading the meter, the utility charges the resident directly
	+ Master metering – Measure the electricity (or natural gas or water) of multiple tenants with the same meter, the owner/landlord gets the bill. Master metering gives wholesale rates which are less costly.
* UMD participates in the DR model & receives a check every month
* As a result of Monte Carlo simulations, Gabriel et al find that shifting under the “best” case scenario generates the most profit (savings of $10 - $25 / customer / year)
* Aiming to have letters of support by week after July 4th

**Questions for Steven**

* Did your study incorporate co-generation? No, but UMD has co-generation on site
* Who are the institutional partners you’re seeking? UMD, apartment complexes, homeowners’ associations, etc.
* What technological solution are you proposing? Software, machine learning, etc.

**Marccus Hendricks – IOT Stormwater**

* Has experience and has partnered with other faculty on campus to study stormwater management
* Received a UMD sustainability grant to enhance UMD’s compliance with EPA stormwater regulations
* Partners: NCSG, Clark Engineering School, Facilities Management, Department of Environmental Risk, and iSchool
* Under EPA MS4 requirements, UMD must retrofit 20% of untreated impervious areas by 2025
* Project objectives: install smart IoT sensors that measure water quality in 3-4 locations on campus; conceptualize, design, and develop a robust and flexible database to house the data (iSchool graduate student capstone); and use students to analyze the data as the student learning component of the sustainability grant
* Basic sensor measurements: temperature, turbidity, pH, dissolved oxygen, salinity, conductivity
* Project timeline - Phase 1: On campus, summer & fall 2019 & spring 2020. Phase 2: In the community, fall 2020 & spring 2021
* Anacostia watershed affects many downstream communities & UMD affects the watershed

**Questions for Marccus**

* Once you have all this information and are monitoring it, what decisions are you hoping to inform? Help UMD become compliant with permits, convert impervious spaces to greenspaces
* What are the implications for this project on water quantity? A few years ago, EPA regulations shifted from water quantity to quality concerns, so permitting revolves around water quality, but this project can and should address both.
* Nine Ponds – existing stormwater management system @ PG Plaza affecting Riverdale Park, Hyattsville, etc.
* Has UMD experienced flooding? Yes, dorms have had mold issues due to significant rain and high humidity, and water has been pooling on sidewalks & roads
* Which pollutants are of particular concern for water quality on campus? No current management system in place for managing runoff; legacy building materials can have harmful chemical levels.
* Have you worked with PG County to see what data is available? Not yet, since this project is just getting off the ground, but will be open to several conversations in the near future

**Rikin Thakker – 5G: Future of Wireless Communications**

* Where do we stand now with respect to our wireless communications? AT&T discontinued 2G because it is inefficient for accessing the wireless spectrum. LTE is projected to grow. 5G devices will enter the market (in mass) by 2025
* 5G is the next phase in wireless, with increased network speeds and data capacity. It’s an end-to-end ecosystem to enable a fully mobile and connected society
* 4G was released in 2009, but was not designed for modern innovations, such as autonomous vehicles, which require a low-latency connection
* Mobile penetration (# of cell phones per polulation) exceeds 100% in many countries
* 52% of U.S. adults live in “cell phone only” households, up from 26% in 2010
* Data consumption on smartphones is expected to grow from less than 7GB/month to over 49GB/month
* The [International Telecommunication Union](https://www.itu.int/en/Pages/default.aspx) (ITU) is responsible for creating [IMT-2000](http://www.telecomabc.com/i/imt-2000.html), [IMT-Advanced (LTE advanced)](https://www.itu.int/en/ITU-R/study-groups/rsg5/rwp5d/imt-adv/Pages/default.aspx), and [IMT-2020](https://en.wikipedia.org/wiki/IMT-2020), the regulations governing the standards for 3G, 4G, and 5G, respectively
* What will 5G provide? Higher area traffic capacity, peak data rate, user-experienced data rate, spectrum efficiency, mobility, latency, connection density, and network energy efficiency relative to 4G
* Key requirements for 5G: user experienced data rate, spectrum efficiency, low latency, connection density.
* 5G use cases –
	+ Enhanced mobile broadband
	+ Ultra-reliable and ultra-low-latency communications (self-driving cars, VR, networked robots, etc.)
	+ Massive machine-type communications
* Small cells will supplement cell towers. Small cells need both a fiber backhaul & power source
* The high-band standardization process will be complete by the end of 2019
* Verizon has pilot networks in Chicago & Minneapolis & users can access the network by standing in the physical space with a special phone

**Questions for Rikin**

* Do you have any recommendations for municipalities negotiating right-of-way with telecommunications companies? Increased access to information/education on 5G for local governments and a need for translating regulations for local governments