



## Colloquium



*date, time & venue:* Tuesday, February 7th, 2017, 12:00-1:15 in BB368

*title:* **Visible-Light-enhanced WiFi (Li+WiFi)**

*speaker:* **Prof. Abdallah Khreishah, New Jersey Institute of Technology**

*hosted by:* Hany Elgala

**Abstract:** According to Cisco Visual Networking Index, most of the Internet access traffic will happen indoor at fixed locations (about 80% indoor and 20% outdoor). This amount is expected to increase as 54% of the cellular traffic is expected to be offloaded to WiFi by 2019. Based on this projected functionality of the future Internet, the two major types of traffic that the future Internet access networks should support are mobile traffic and small devices Internet of Things (IoT) traffic. The mobile traffic includes traffic for laptops, smart phones, and tablets. The IoT small devices include devices that perform sensing and control for our daily life operation, such as home appliances. It is expected that the traffic generated by more than 95% of the devices connected to the Internet in 2019 will fall under one of the above two types. This projected functionality of the Internet puts more pressure on the WiFi traffic.

In this talk we present novel system architecture to resolve the expected spectrum crunch problem for mobile and IoT devices. The presented system also allows very low power Internet access by the small IoT devices. Our system utilizes both the traditional RF access methods as well as the emerging technology of Visible-light communication (VLC). VLC facilitates the great advantage of being able to jointly perform illumination and communications, and little extra power beyond illumination is required to empower communications, thus rendering wireless access with almost zero power consumption. We present our system architecture, design, implementation, and performance analysis. We show through experimental studies, simulations, and analysis, the advantage of the hybrid RF-VLC system over the stand-alone WiFi system. We also present the novel concept of passive LiFi that allows the small IoT devices to be connected to the Internet by utilizing the reflected indoor light with very low power consumption. Several open questions and challenges in this field will also be discussed.

**Speaker's brief bio:** Abdallah Khreishah received his Ph.D and M.S. degrees in Electrical and Computer Engineering from Purdue University in 2010 and 2006, respectively. Prior to that, he received his B.S. degree with honors from Jordan University of Science & Technology in 2004. During the last year of his Ph.D, he worked with NEESCOM. He is currently an Assistant Professor in the ECE department of New Jersey Institute of Technology. His research spans the areas of green communications and networking, visible-light communications, wireless networks, and network security. His research projects are funded by the National Science Foundation, New Jersey Department of Transportation, and the UAE Research Foundation.