From the desk of Rouzbeh

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Hello,

After reading the ITU report on the State of Broadband 2017 I have mixed feelings about our global broadband usage. On the one hand, more people are on broadband networks, ITU says. But then again billions more are not. There are a variety of reasons offered in the report, but that's a lot of people off the net. Obviously more work needs to be done to broaden the reach of this important utility.

Separately, I was quite pleased with the progress of work we are funding to create an economically feasible way to gain high resolution broadband based networks to monitor water quality. And then there is the ongoing work by the IEEE 802 committees, as reported by my colleague Paul Nikolich.

IEEE 802.1 Bridging and Architecture Working Group; Time Sensitive Networking,

by Paul Nikolich, Chairman of IEEE 802 LAN/MAN Standards Committee

On the IEEE 802 standards front, about 55 participants in the IEEE 802 LAN/MAN Standards Committee 802.1 Bridging and Architecture Working Group gathered in St. John's, Newfoundland, at an interim meeting session[1] in early September to work on a very important area for application in real-time control systems such as industrial automation and autonomous vehicles and for distribution of real-time flows such as audio and video.

Users of these applications want to have readily available IEEE 802 packet networking technology due to its ubiquity, familiarity, multi-vendor interoperability and low cost; however conventional packet networks suffer from unpredictable end-to-end delays that prevent them from being used in real-time control networks. The 802.1 Time Sensitive Networking Task Group has been working on a set of enhancements. Generally, their work is divided into four major functional areas: **(1)** Timing and Sync, **(2)** Ultra Reliability, **(3)** Bounded Low Latency and **(4)** Dedicated Resource Reservations.

The work initially was responding to professional audio and video applications in 2005, but has since grown to include progressively the more stringent time-sensitive applications mentioned earlier; industrial and automotive. The standards and draft standards specify a path through a bridged 802 packet network that ensures time is distributed accurately with high precision by allocating, controlling and reserving network resources to the high priority time sensitive traffic.

Mechanisms to attain these results include frame preemption, enhanced scheduling, physical layer time-stamping, per stream filtering and policing, traffic shaping, synchronized cyclic enqueuing and queue draining.

For those that would like to dive into the details, please see **LINK**. All-in-all this is an exciting area for IEEE 802 and continues to receive tremendous support from the participants and their sponsors. These techniques will be commonplace in short order.

1. IEEE 802 Working Groups typically meet six times a year; January, May, September in interim session meetings and March, July and November in plenary session meetings.

Broadband Catalyzing Sustainable Development

The ITU report on the State of Broadband 2017, released last month, continues to portray improvements in the deployment and usage of broadband with the largest increases in wireless broadband, not surprisingly.

Produced by the Broadband Commission for Sustainable Development, this year's paper states that there were an estimated 3.58B total internet users in 2017, up from 3.39B in '16, with only 979M of them being fixed broadband users.

"Mobile networks have brought voice and Internet services to billions of people around the globe over the last 25 years, and the technology is now accessible to nearly 50% of the world's population. However, more than 50 percent of the world's population still does not have Internet access," the report states.

As for policy recommendations, the report urges countries "review and update regulatory frameworks", "develop and enhance" national plans, and "encourage investment" in infrastructure. The full report is available at the **ITU SITE**.

Water Quality Monitoring

The UNH team working under a BCoE grant to implement a broadband-platform sensor network for water quality monitoring has created a unique sensor for the work, has settled on an Internet of Things network technology for collecting data, and is investigating solutions on resolving the critical problem of intrusive layers of film building on the surfaces of — and impairing — measurement devices and glass coverings. This according to an interim report from the team delivered to BCoE this month.

In addition, the team is seeking to improve the spatial and temporal resolution of sensor-based water quality monitoring systems. The team hopes to have its measurement network in place by the end of 2017 at six sites in the Nashua-Durham area. If successful, this technology may be more broadly licensed by UNH. The work is scheduled to conclude my mid-2018.

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