

**IEEE 802 LAN/MAN Standards Committee Plenary Session  
July 2011 Tutorials  
Monday July 18, 2011**

**Tutorial #1**

**Date:** Monday, July 18, 2011

**Time:** 6:00 – 7:30 pm

**Location:** Grand Ballroom A – Street Level – Hyatt Regency San Francisco

**Title:** ALOHA to the Web

**Sponsored by:** WG 802.15 Chair, Robert Heile

<b>Presenter(s) Name:</b>	<b>Affiliation:</b>	<b>Email Address:</b>
Norman Abramson	University of Hawaii	<a href="mailto:norm@hawaii.edu">norm@hawaii.edu</a>

In June 1971 the first two way wireless transmission of data packets within a computer network was put into operation in the ALOHA Network at the Manoa campus of the University of Hawaii in Honolulu. The ALOHA protocol developed in that project has since formed the basis of almost all wireless and many wired random access MAC protocols. Ethernet, WiFi, a wide variety of CSMA based protocols, DOCSIS and four generations of cellular standards trace the origins of their MAC protocols back to the ALOHA Network.

In this talk we outline and illustrate the history of the development of ALOHA channels at the University of Hawaii and the worldwide application of ALOHA. Various open questions dealing with the efficient and effective use of ALOHA in the networks of tomorrow will be discussed.

This event is presented in cooperation with the Internet History Program at the Computer History Museum, which is underwriting a video recording to be preserved in the Museum's collection.

## Tutorial #2

**Date:** Monday, July 18, 2011

**Time:** 7:30 – 9:00 pm

**Location:** Grand Ballroom A – Street Level – Hyatt Regency San Francisco

**Title:** Geolocation Technologies Suitable to Meet Regulatory Requirements in TV Whitespaces

**Sponsored by:** WG 802.22 Chair, Apurva Mody

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Since geolocation of the terminals used by wireless communication systems is becoming important, and even mandatory in the case of TVWS operation, techniques are being considered to include this functionality in the various IEEE 802 standards. Besides the known satellite-based geolocation approaches (e.g., GPS), the TVWS operating frequencies and operating bandwidths lend themselves to efficient terrestrially-based geolocation techniques that can provide for improved geolocation accuracy as well as operation in obstructed and indoor environments. This tutorial will present terrestrial geolocation techniques for portable (nomadic) and fixed terminals.

The first technique is based on the use of OFDM modulation as implemented in a number of IEEE 802 standards where OFDM/OFDMA is taken advantage of to allow fine ranging down to a 1 meter accuracy using signals inherent in the system transmission. The technique can operate in a multipath environment where line-of-sight may be obstructed. Using the known latitude and longitude of a few reference terminals, other terminals can then be geolocated. A version of this technique has already been incorporated in the 802.22 Standard with minimal impact on complexity.

The second technique is complementary to the first one and consists in post-processing of the results acquired by the first technique to resolve multipath echo delay ambiguity. It is designed for a heavy multipath environment, for example inside buildings, with obstructed direct line-of-sight and includes multipath mitigation algorithms. These algorithms are light-weight and can be executed in software at the base station and/ or at the terminal, including portable (nomadic) terminal. In addition, this technique allows simultaneous tracking-locating of large number of terminals. The proposed techniques leverage the existing IEEE 802 Standard protocols/ infrastructure with a minimal impact (little or no change required). Alternative methods of ranging will also be discussed.