Jack Langner Proposes to Recreate 802.11

or at least he hopes to

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***Abstract*—This document is intended to be a short proposal for the Simulation Project for ECE408: Wireless Communications. The intent of the project is for the student to select a current or soon to be deployed wireless standard and implement a portion of the physical layer (PHY). Ultimately, the goal is to develop a simulation of a channel that introduces additive white Gaussian noise (AWGN) and demonstrate the effective Bit Error Rate (BER) of the proposed standard.**

***Index Terms*—component, formatting, style, styling, insert, inifinite sorrow**

I. Introduction

Mankind is constantly pioneering new techniques to communicate. At first, it was a series of grunts which steadily developed more structure and became spoken language. There was eventually a realization that speaking was limited in range, this could be mitigated by yelling, but this did not lead reliable, long range communication. Important updates came in the form of smoke signaling, which enabled users to relay information over greater distances, but this is very resource intensive and has a short operating life. Also, mail services were a great improvement as users could send messages with precise wording, but mail can always get lost or sunk at sea. Now, if we step forward in time hundreds of years, we get to wireless networks which build on these original ideas of communication. In 1997, the Institute of Electrical and Electronics Engineers (IEEE) released the initial revision of the 802.11 standard, which was intended to bring order to Wireless Local Area Networks (WLAN). Since the release of the 802.11 standard, there have been numerous amendments and updates, with the intent of improving the standard as new technology becomes available. Here improving the standard means increased quality of service so higher data rates, more efficient transmission, better reception, etc.

II. The Proposal

A. 802.11n-2009

The fundamental attempt will be to recreate the PHY specifications within the 802.11n-2009 standard. This amendment to the 802.11 structure served as the introduction of Multiple-Input Multiple-Output (MIMO) to WLAN and sought to increase the data rate from a maximum of 72 Mbits/s up to 600 Mbits/s, over an 8 times increase. This increase in data rates is accomplished through the use of multiple antennas, and thus introduces beamforming into the 802.11 family. Additionally, Orthogonal frequency-division multiplexing (OFDM) is used to divide the channel into different subcarriers. Each of these subcarriers can then different orders of Quadature Amplitude Modulation (QAM) or Quadrature Phase Shift Keying (QPSK). Furthermore, since the BER is degraded as the order of modulation increases, Error Correcting Codes (ECC's) are used to improves the performance of the complaint systems. Both Binary Convolutional Codes (BCC) and Low Density Parity Check (LDPC) are available for use in the standard. Moreover, different code rates are discussed and puncturing patterns in order to achieve a desired rate.

B. Later Amendments

At this point in time, I have only been able to acquire the standard for 802.11n. However, 802.11ac has already been deployed and 802.11ax has been accepted. Both of these amendments build on 802.11n, with data rates that outperform the former, i.e. 802.11n $<$ 802.11ac $<$ 802.11ax in terms of theoretical data rates.It is realistic to assume that all three standards support the same ECC's, due to backwards compatibility requirements. Changes come in standardized beamforming practices and the introduction of Space-division multiple access (SDMA) and Orthogonal frequency-division multiple access (OFDMA) as well as 256QAM and 1024QAM. Just as a note, 802.11ax seems to only exist as a draft and I cannot find 802.11ac. So depending on available time and your requirements it may be possible to implement several amendments.

Identify applicable funding agency here. If none, delete this.