



Tosia Communications Inc. Overview

Mobile Ad-Hoc Systems Perspective

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Introduction

- Research and development on networks, transceivers, and algorithms.
 - Focused on MAC/PHY/Radio layers
 - Power, range, throughput, QoS “cube” adaptive designs
- Focused
 - Technical: Successful integration to higher protocol layers and implementation platform.
 - Corporate: Long term relationships.
- Government funded R&D sub-contract track record
 - From contractors to ARL, AFRL.
- Ad-Hoc oriented techniques .
- Proof of concept HW design and PM capability.
- Presenter:
 - Murat F. Karsi
 - Ph.D. Communication Systems, Phase Locked Loops, Univ. Southern Calif., 1998.
 - Experience in government funded research and development and commercial world, (IBM, TI, smaller companies). See web page for more.

Mobile Ad Hoc Networking

- Network controller may have high sophistication (distributed or centralized).
- Yet, cannot do much without
 - Cross layer monitoring of channel, BER, FER, localization, resources.
 - Cross layer control of PHY and MACs efficiently by higher layers.
 - Adaptive, fine tuned PHY and MAC.
- Analogy: Sword fight. Fighting and trying to coordinate.
 - Commander (Network control) should know how fighters are doing (Cross layer reporting).
 - What the warrior (PHY and MAC) is dealing with (channel monitoring – multipath, interference),
 - Where the warriors are (localization)
 - How the warrior is doing (BER, FER reporting, error types).
 - What are warriors capabilities: Type and number of antennas, modulations, coding depths, battery levels.
 - Commander should be able to access warriors for the goal of winning the battle
 - Tight cross layer control; Energy, latency, throughput, platform aware algorithms.
 - Warriors need a appropriate set of sharpened weapons (Adaptive PHY, Modulation, coding).
 - Warriors also need to coordinate locally (MAC)
- A lot needs to be analyzed, developed.

TosiaComm Technologies

- Modulations: Spread spectrum (DSSS, Freq. hopping), OFDM, QAM, FSK, PSK family, MIMO techniques
- Multiple access protocols, architectures and tradeoffs: TDMA, CDMA, CSMA-CD, CSMA CA, low power MAC protocols.
- FEC : Turbo, convolutional, block (RS, BCH), CRC, LDPC encoders, decoders
- Algorithms: Low power PHY techniques, detection, bit/frequency acquisition/tracking, equalization, automatic gain control (AGC), power amplifier linearization, radio compensation/calibration, rake receivers
- Radio architectures, tradeoffs: Direct down conversion, super-het., low IF, ADCs (flash, delta, sigma delta), adjacent channel interference, and blocker rejection.
- Technologies: WiMax, Ultra wide band - UWB, GSM, IS-95, Wideband CDMA (WCDMA), IS-54, and WLAN 802.11 a/b/g/n.