A Fixed Wireless LTE test bed using OAI

4’th OAI Workshop, Nov 2017

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Cambium Networks: background

• Divested from Motorola in 2011
  – over 500 employees today: design centres in USA, UK, India, Ukraine

• Wireless products
  – Antennas, circuitry, mechanics, software, planning, management
  – PMP (point to multi point) PMP450 & ePMP families
    • Evolved from Motorola Canopy PMP system introduced in 2002
  – PTP (point to point)
  – WiFi access points
  – IIOT radios
  – Cloud management

• PMP proprietary air interfaces
  – TDMA
  – Network TDD sync using GPS
  – 90 degree sector, ABAB freq reuse, cell
    • PMP450: fpga
    • ePMP: 802.11 SOC based
Fixed Wireless Access in unlicensed bands

• Unlicensed fixed deployment model
  – EIRP limited to 30/36 dBm (5 GHz bands)
  – Engineer links for low excess path loss
    • LOS or near LOS deployment
    • Eave or roof mount (like satellite TV)
  – Optional high gain CPE antenna > 25 dBi
    • Narrow beam width reduces interference

• Fixed vs Mobile
  – Simpler core network
    • No paging, tracking or handover
  – Mains powered CPE (POE)
  – Propagation channel (operator installed high gain CPE)
    • Low delay spread
    • Long coherence time
  – Relaxed interoperability needs

• LTE for Fixed Wireless Access
  – Reducing cost of LTE CPEs
  – Higher data rates and spectral efficiencies
    • Multi-antenna techniques / frequency aggregation
LTE test bed objectives

- Extend existing PMP test beds
  - Cabled and radiating rigs

- Learn about LTE
  - Developers familiar with PMP but not LTE

- Performance testing
  - RF and phy
  - MAC
  - End to end traffic (TCP/UDP)

- Evaluate ideas
  - UE features
  - Schedulers
  - Beamforming/MUMIMO
  - Frequency aggregation
  - Re-bandling opportunities
  - MulteFire
Exploring OAI: current configuration

- **OAI EPC and eNodeB**
  - Tag 2017.w30
  - Based on open-cells configuration with EPC and eNodeB on same PC
  - Dell i7 PC
  - 1 GE IQ sample interface to RRH (10 MHz BW)
  - TDD mode 1

- **Cambium TDD RRH**
  - Ethernet IQ to 5.5 GHz RF interface
  - IQ sniffer interface
    - Demodulated PUSCH and PDSCH output to Wireshark

- **COTS UE**
  - Sierra Wireless MC7455 cat6 UE
  - Band 41, mixed up to 5.5 GHz
  - SIMs from open-cells
Exploring OAI: RRH and UEs
OAI wish list

• Mainly interested in the OAI eNodeB software
  – UE will be COTS devices cat4 or cat6
  – eNodeB with a proprietary RRH

• Reliable multi-UE operation
  – At least 20 active UEs

• TDD
  – No interest in FDD operation

• TM modes 1..3
  – At least 2 DL TX antennas

• Frequency aggregation
  – Two 20 MHz channels
Thank you