Content

- BT Hackathon
- Experience with OAI
- Our aspirations for OAI in the future
BT acquired a quantity of Lime SDR radios for a ‘hackathon’, which we gave away to universities and research institutions.

Aim was to demonstrate short development times. Traditionally large engineering Companies produce specialist hardware with long development cycles.
BT SDR hackathon to change the landscape of communications….

- BT has partnered with Lime Microsystems for the hardware, and OAI, Amarisoft and Quortus for wireless protocol stacks and EPC, to search for innovative teams who were prepared to explore the art of the possible at the leading edge of technology.
- A competition is currently running with three categories
  Cat A: Short development / implementation of existing features
  Cat B: Solving a known problem (list follows)
  Cat C: Most imaginative and effective use of programmability of SDR
Category B scenarios

- Disaster recovery
  - Autonomous ad-hoc networks
  - Self-Healing networks
  - Search and Rescue
- Remote connectivity
  - Improve Indoor Coverage / “Last Mile” innovation
- Tethered Drone
- Remote coverage
- Device to Device
- Internet of Things,
  - In home,
  - Gateway
- Remote monitoring
Category B scenarios

- Enterprise Network as a Service
- Cloud RAN
  Converged networks
  Ethernet Interfaces
- Entertainment
  Large-scale TV delivery
  4G to 5G Broadcast and multicast evolution
  Dynamic use of multicast
- Details of the 9 finalists and their work can be found at https://www.btplc.com/btinfinitylab/LimeMicro/
Experience with OAI (1)

We attempted to construct a simple LTE system:

- EPC: Amarisoft
- eNB:
  - OAI
  - Lime SDR
- 800MHz/2.6GHz FDD/TDD
- UE
Experience with OAI (1)

- We used single eNB with OAI stack, and an Amarisoft EPC
  We couldn’t get OAI emulated EPC to run, it would initialise and then crash with little information

- We wanted to put the eNB and EPC onto a single PC, but this was not recommended. It may have been possible to use two VMs on the same machine, but this would have needed a more powerful PC than the ones we had.
  So we ran an Amarisoft EPC on one PC and OAI eNB on another one, and packet transfers on S1 looked ok on Wireshark, but the SDR would not transmit any RF

- In the end we ran out of time, but we will have another stab over the next few weeks – any advice would be welcome!
Experience with OAI (2)

We attempted to construct a simple LTE system:

- **eNB (no S1)**
  - OAI
  - Lime SDR

- **UE (no S1)**
  - OAI
  - Lime SDR

2.6GHz
Experience with OAI (2)

- We built OAI eNB without S1 interface\(^1\)
  Following the instructions it built OK

- We built OAI UE\(^1\)
  Following the instructions it built OK

- To get these components to run with the LimeSDR appeared to require the addition of rf-config-file\(^2\)
  The eNB and UE run and display scopes
  However, the channel scan fails on the UE
  Not convinced either component is working correctly

- Currently don’t have any further information to assist in getting it working
  Any help appreciated!

- In general, there is a fair bit of information, but not clear where to start and very little of it is LimeSDR focussed\(^3\)

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1 https://gitlab.eurecom.fr/oai/openairinterface5g/wikis/HowToConnectOAIENBWithOAIUEWithoutS1Interface
2 https://gitlab.eurecom.fr/oai/openairinterface5g/wikis/how-to-setup-oai-with-lmsdr
3 https://gitlab.eurecom.fr/oai/openairinterface5g/wikis/OpenAirUsage
Our aspirations with OAI

- To use OAI for EPC and eNB stacks on the same PC – or ‘no S1’
- No compatibility or stability issues with Lime SDRs
- The ability to use multicast/broadcast
- Lightweight 3/4G for drone use (more info follows)
- Flexibility going forward to 5G NR
  Frame structure, numerology, HARQ, carrier aggregation…
Drone use-cases

- Coverage in remote areas
- Use in emergency response
- RF coverage surveys
- LoS surveys for Transmission links
- Inspection of telecommunication equipment, eg telephone poles
- Delivery of spare parts & equipment
Scottish Innovation Program Lighthouse project - Droneway
Droneway between Stoer and Portnaguran lighthouses in Scotland

Backhaul

Proposed Droneway 23 miles…

Backhaul
uVue drone and small cell

- Quadcopter drone from uVue
- SDR radio and integrated antenna
- 2.6 Kg Payload
- Li-Po battery
- 30 mins flying time

The main challenge was to have the correct drone configuration as larger motors & props = more thrust, but will require larger batteries, thus reducing available payload.
Droneway progress

• Sites have been selected for survey
• EE/BT, Parallel Wireless and Scottish Futures Trust to survey site for installation.
• Drone vendors have been approached for participation
• We plan to use OAI + SDR (preferably Lime – lightweight and low power)
• “Droneway” monitoring software is being discussed
• Trials scheduled to begin next year…