



CREW



Cognitive Radio Experimentation World

MUCO

[AED Engineering GmbH]

Testing and Validation of the multi-channel IEEE 802.15.4 coordinator

Goals

- Evaluate developed hardware platform
- Use large sensor network to test the AED coordinator in a realistic environment
- Compare to standard coordinators

Multi-channel coordinator

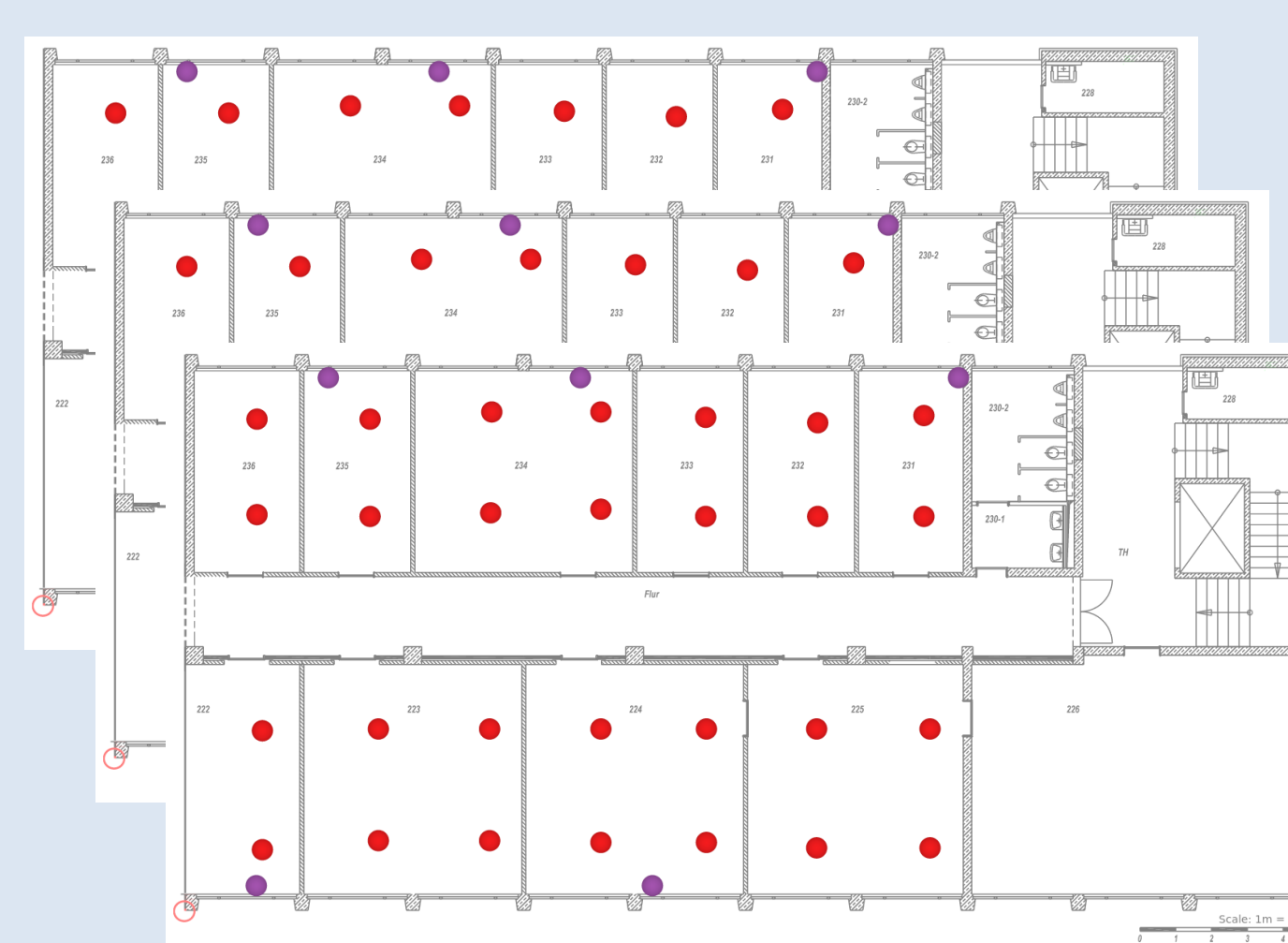
- Custom built by AED Engineering GmbH
- FPGA and PCB for IEEE 802.15.4
- Designed to handle all IEEE802.15.4 channels within 2.4GHz band simultaneously

PHY interface tests

- Experiment 1
 - Add nodes on one channel (with 2 frames per second)
 - Monitor PER
 - Determine maximal number of nodes per channel
- Experiment 2
 - Add nodes on different channels with max throughput
 - Monitor SNR and PER

Large scale setup

TWIST testbed with ~100 nodes



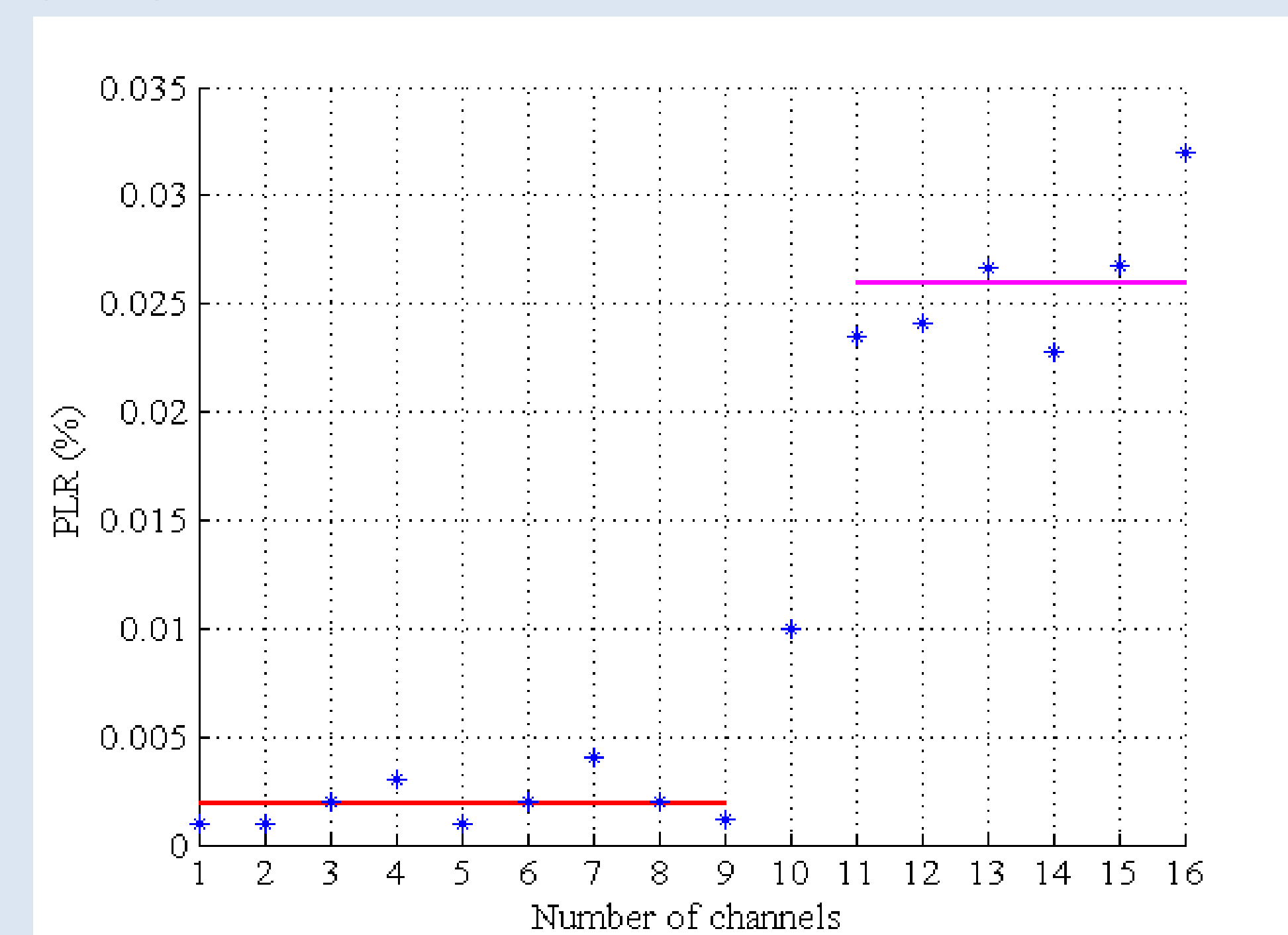
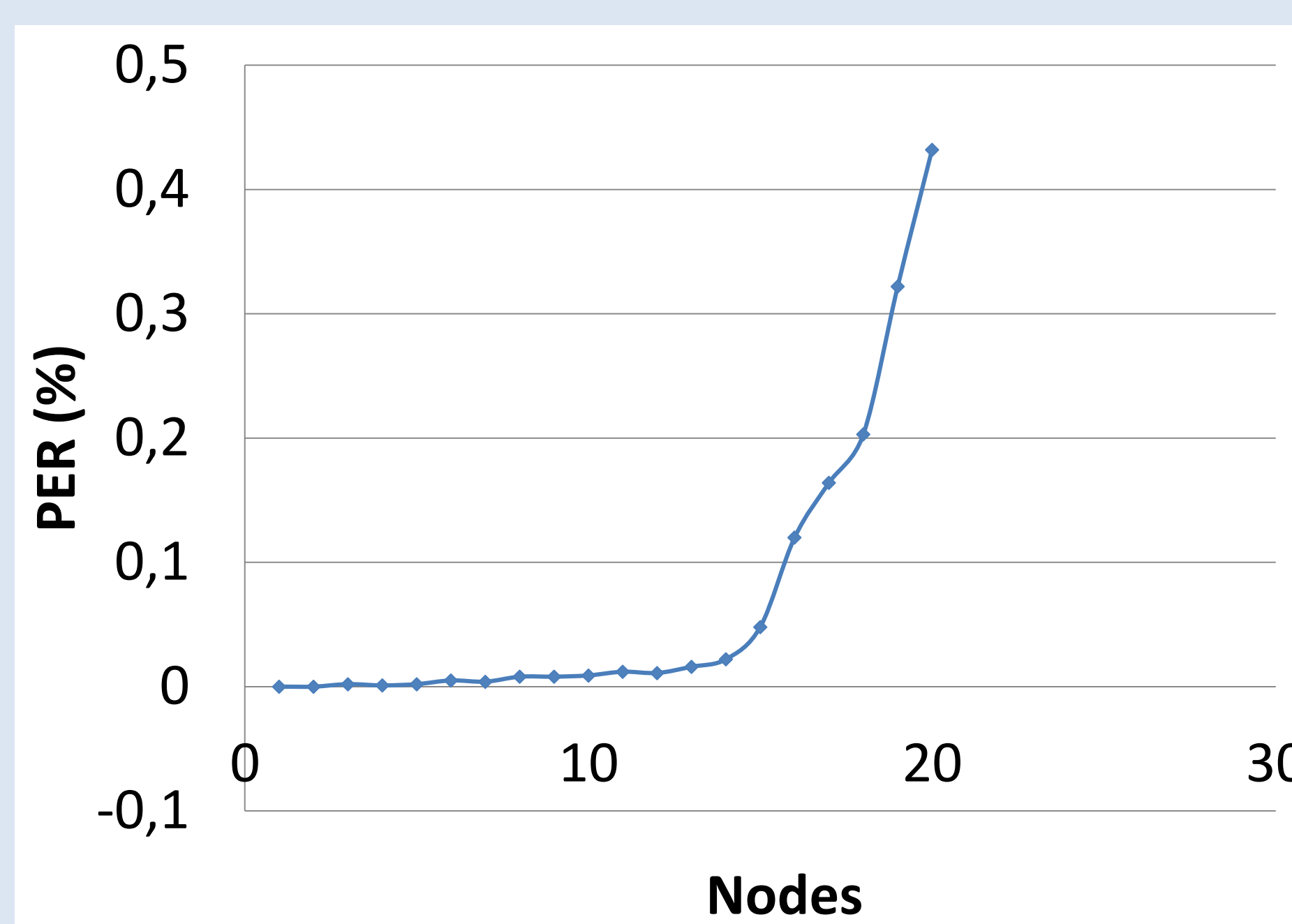
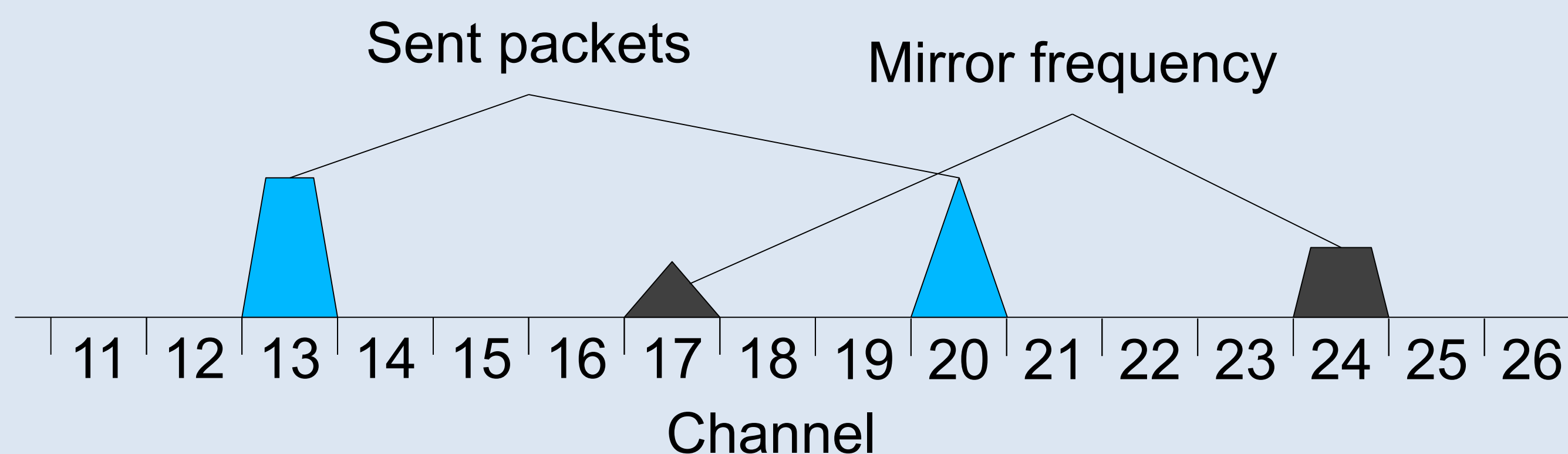
AED coordinator



- Custom hardware deployed in the testbed
- Remote access to:
 - AED Coordinator
 - TWIST testbed

Results

- **Interference on mirror frequencies**
 - Channel content repeated on mirror frequencies
 - Caused by time de-synchronization of FFT-Controller
 - Brakes Multi-channel capabilities
- **Buffer management**
 - Internal buffer on the FPGA was overflowed while receiving on multiple channels at the same time
 - Caused increase of PER
 - Updated FPGA design solved the problem



Conclusions

- Identified the problems with the FPGA PHY implementation
- Fix mirror frequency problems
- Repeat and continue experiments
- Bring product to the market

Testimony

- Problems were not detected during small scale tests
- Large scale experiments help in bringing the platform closer to the commercial product.
- Still more development is needed



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PROJECT DATA

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