Coexistence between Wi-Fi HaLow and ZigBee in Sub-GHz ISM bands

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Experiment description

CONCEPT AND OBJECTIVES

Objectives of the Methods2Business experiment define in call proposal are:

- Measure maximum achievable throughput of Wi-Fi HaLow network in absence of other wireless networks in the same frequency band

- Measure maximum achievable throughput of Wi-Fi HaLow network in presence of Sub-GHz ZigBee network

- Measure the performance of a Wi-Fi HaLow network with different traffic types (e.g. TCP and UDP) in presence of a Sub-GHz ZigBee network

- Evaluate the coexistence of Wi-Fi HaLow™ and ZigBee in the Sub-GHz ISM band based on the performance impact each of the devices has on the other device when cooperating in the same frequency band.

All objectives of the experiment are met.

Experiment description

BACKGROUND AND MOTIVATION

- Methods2Business aims to bring new wireless technology on the market – Wi-Fi HaLow

- Methods2Business has to show that Wi-Fi HaLow will coexist with existing wireless technologies in Sub-GHz ISM band in order to enable deployment of the technology

- Propose coexistance mechanism to regulators in Europe and worldwide

Experiment description
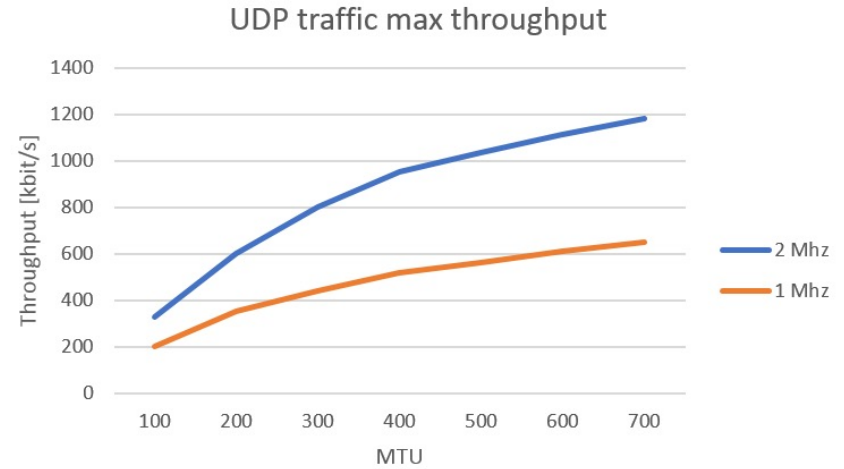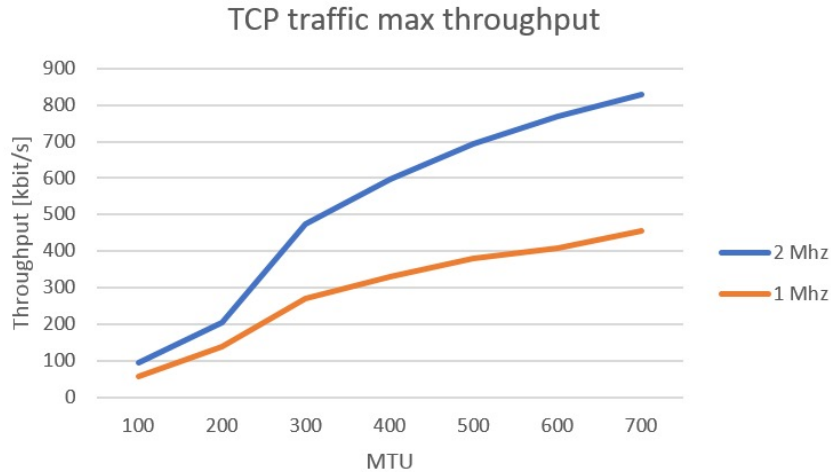
EXPERIMENT SET-UP

Experiment consists of:

- Methods2Business Wi-Fi HaLow Station and Access Point IP solutions mapped on two Xilinx ZC706 Evaluation Kit - Zynq® 7000 SoC + AD FMCOMM radio frontend SDR Hardware platform

- two Zolertia Re-Mote Rev B nodes
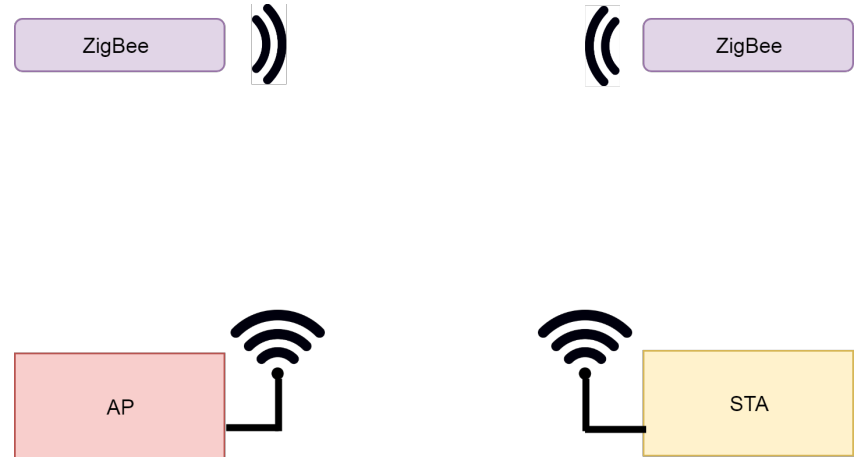
Project results

MAXIMUM ACHIEVABLE THROUGHPUT OF WI-FI HALOW NETWORKS

Project results

COLLISION TESTS

- Methods2Business has performed three different collision tests:

  - Wi-Fi HaLow and Zigbee frames are transmitted at same time with the same output power

  - Wi-Fi HaLow and Zigbee frames are transmitted at same time with the different output powers

  - ZigBee packet is transmitted during transmission of Wi-Fi HaLow frame with same output power

- Results show that both packets (Wi-Fi HaLow and ZigBee) are equally vulnerable to collisions

Business impact

VALUE PERCEIVED

- During this experiment Methods2Business gained valuable knowledge and experience

- Results from this experiment are used for further experimentation on coexistence between Wi-Fi HaLow and other wireless technologies that operate in the same frequency bands.

- Based on the results Methods2Business can develop coexistence mechanisms which will be implemented in their Wi-Fi HaLow chips for clients and access points. Methods2Business aims to bring first Wi-Fi HaLow chips in second half of 2021.

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Business impact

VALUE PERCEIVED

- If testbed infrastructure was not available, Methods2Business would still have to execute this experiment by developing similar environment in their office.

  - This would probably result in higher cost of the experiment.

  - Methods2Business sees that these types of experiments are required when accessing a market with a new technology.

- Methods2Business plans in future to address coexistence of Wi-Fi HaLow devices with other wireless technologies like LoRaWAN, Sigfox, … We see potential collaboration with University of Ghent in this field.

- Methods2Business would like to continue using Fed4FIRE+ facilities in the future.

Business impact

FUNDING

- Allocated budget was high enough to conduct an experiment

- Methods2Business has not receive other funding for executing this experiment

- Methods2Business would execute this project without receiving any external funding

- Methods2Business would consider paying for such experiment. Most valuable components are resources and expert consultancy services.

Feedback

RESOURCES AND TOOLS USED

- Resources used at imec w-iLab.t 2:
    - 2x Xilinx ZC706 Evaluation Kit - Zynq® 7000 SoC + AD FMCOMM radio frontend
    - 1x ZedBoard Xilinx Zynq®-7000 SoC + AD FMCOMM radio frontend
    - 2x Zolertia Re-Mote Rev B
- Methods2Business has used all requested resources
- Reserved resources were used most of the time
- Methods2Business has used jFed tool:
    - Experience with the jFed tool was excellent.
    - Easy to setup
    - It is well documented.

Feedback

DESIGN/SET-UP/RUNNING EXPERIMENT

Procedure:

- Project proposal and final report template are clear and well defined, it was not big overhead providing required feedback

Set-up experiment:

- Process obtaining access to the testbed, including generation of the certificate, making reservation of devices and initial setup of experiment went very smoothly.

Fed4FIRE+ portfolio:

- Resources provided by FED4FIRE+ testbeds were sufficient for execution of this experiment

- Methods2Business suggests FED4FIRE+ consortium to install more Xilinx ZC706 Evaluation Kit - Zynq® 7000 SoC + AD FMCOMM radio frontend

- Technical offering was fully in line with our expectations

Feedback

DESIGN/SET-UP/RUNNING EXPERIMENT

Documentation and support:

- Documentation was helpful and complete, especially for use of Zolertia modules
- Methods2Business didn't use first level support dashboard

Experiment environment:

- Environment was trustworthy
- We have enough control of the environment to repeat the experiment in an easy manner

Experiment execution and results:

- We could use to more time to conduct more experiment in order to gain more data for analysis
- Results were in line with initial goals and expectations
- Main problem in execution of the experiment was porting of Methods2Business Wi-Fi HaLow IP on Xilinx ZC706 boards

Feedback

WHY FED4FIRE+ WAS USEFUL

Execution of the experiment:

- Main reasons for choosing Fed4FIRE+ were:
    - Easy procedure for applying
    - Access to resources that were not available in Methods2Business office
    - Availability of the budget

Added value of Fed4FIRE+:

- Methods2Business finds following as added values of Fed4FIRE+:
    - Diversity of available resources
    - Support and documentation
    - Easy setup of experiment

What is missing:

- We encourage Fed4FIRE+ federation to offer consultancy services

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