



## 868 MHz RF TRAFFIC DETECTIVE

### A SOFTWARE-BASED TOOL FOR RADIO TRAFFIC MONITORING AND TRANSMISSION ERROR DIAGNOSIS

#### Motivation and Context

Numerous applications like smart metering, home automation, building automation, demand side management, ambient assisted living and industrial automation require reliable and cost effective technologies for wireless data transmission. For this purpose the license-free European 868 MHz Short Range Device (SRD) frequency band is prevalently used. Many different and incompatible communication standards and RF-protocols simultaneously occupy this part of the frequency spectrum. Possible negative effects could be interferences, over-occupancy, data collisions and as a result data loss. Special attention must be paid whenever wireless sensor networks are planned or operated. Therefore, network specialists need powerful and flexible tools that provide insights into the wireless data traffic for network planning, operation, fault detection and error diagnosis.

The Traffic Detective is such a tool which is easy to use and does not need any knowledge of the different network protocols.

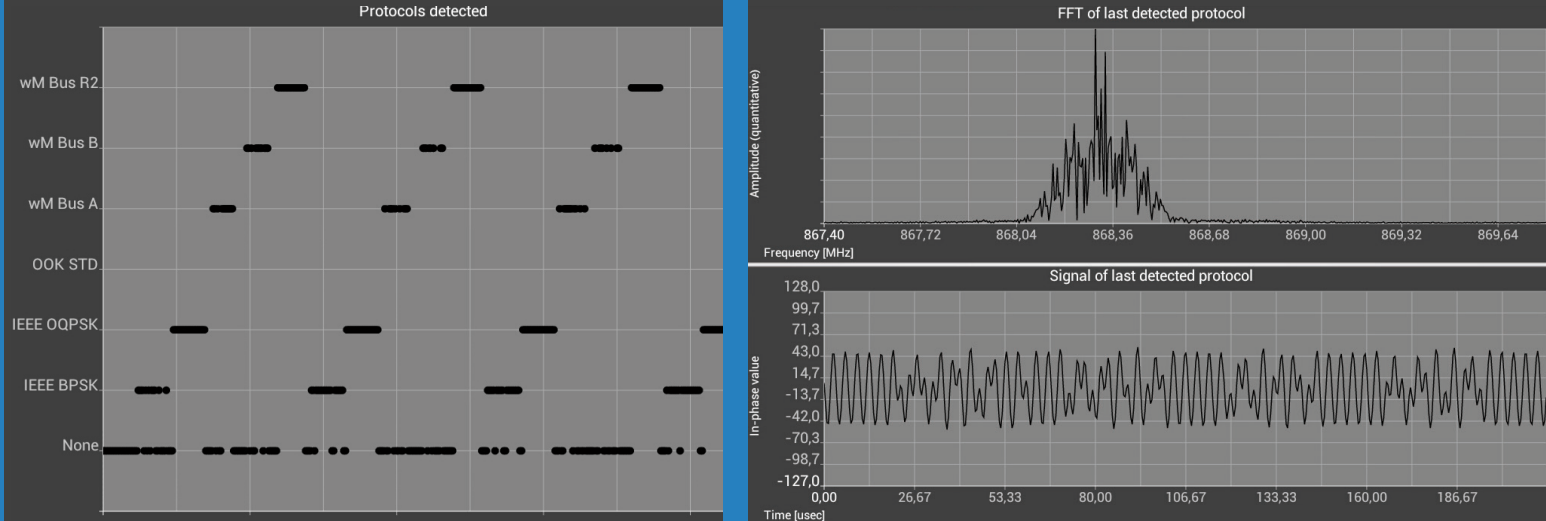
#### Traffic Monitoring

The 868 MHz Traffic Detective is a software-based solution with a user-friendly graphical user interface for monitoring wireless data traffic. A cost-effective and commercially available DVBT USB stick based on a Realtek RTL2832U receiver chip can be used as an analog frontend. In addition to a PC-based implementation, the monitoring software is also available as an app for Android-based mobile devices.

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## Key Features

Supporting network planning and monitoring, the Traffic Detective can detect and observe the occupation of all frequency channels within the 868 MHz band. The solution is able to automatically classify the communication standard used by evaluating properties of the detected RF signal. State of the art digital signal processing algorithms are used to automatically classify the protocol of a received RF-signal. Therefore, the application offers a powerful, cost-effective and easy to use solution for monitoring, analyzing and visualization of RF data traffic.

## Currently Detectable Standards

- ZigBee/IEEE 802.15.4: Industrial standard for wireless sensor networks.
- Wireless M-Bus/IDIN EN 13757-4: Wireless standard for smart metering.
- KNX RF/IDIN EN 13757-4: Wireless implementation of the KNX fieldbus for home and building automation.
- EnOcean Radio Protocol/ISO/IEC 14543-3-10: RF-protocol prevalently used energy-harvested RF data transmission.

## Possible Fields of Application

- Network planning and installation: Whenever a new wireless network has to be installed into an existing environment, it is necessary to know about the occupation of different frequency channels.
- Network monitoring: Traffic of a single wireless 868 MHz network can be monitored as well as the complete wireless traffic in an environment.
- Error diagnosis and intrusion detection.
- Detection of interferers and additional unknown transmitters within the range of the receiver is possible.

## Technical Details

- Java Implementation for PCs and Android-App for mobile devices (additional features are possible)
- Graphical user interface
- Low-cost DVB-T USB Stick used as front-end (based on Realtek RTL2832U receiver)
- State of the art digital signal processing algorithms for automatic classification of RF standards
- RSSI-based field-strength measurement

## Planned Features for the Future

- Statistical analysis (frequency occupation, data collisions, etc.)
- Implementation of further wireless standards
- Optimization of the design of the RF-front end
- Adaption to customer needs

## Funding

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