

# HF-Monitoring overview

function, concept, examples

# Introduction

The aim of the HF-Monitor development is the continuous or alternating metrological monitoring of given frequency ranges.

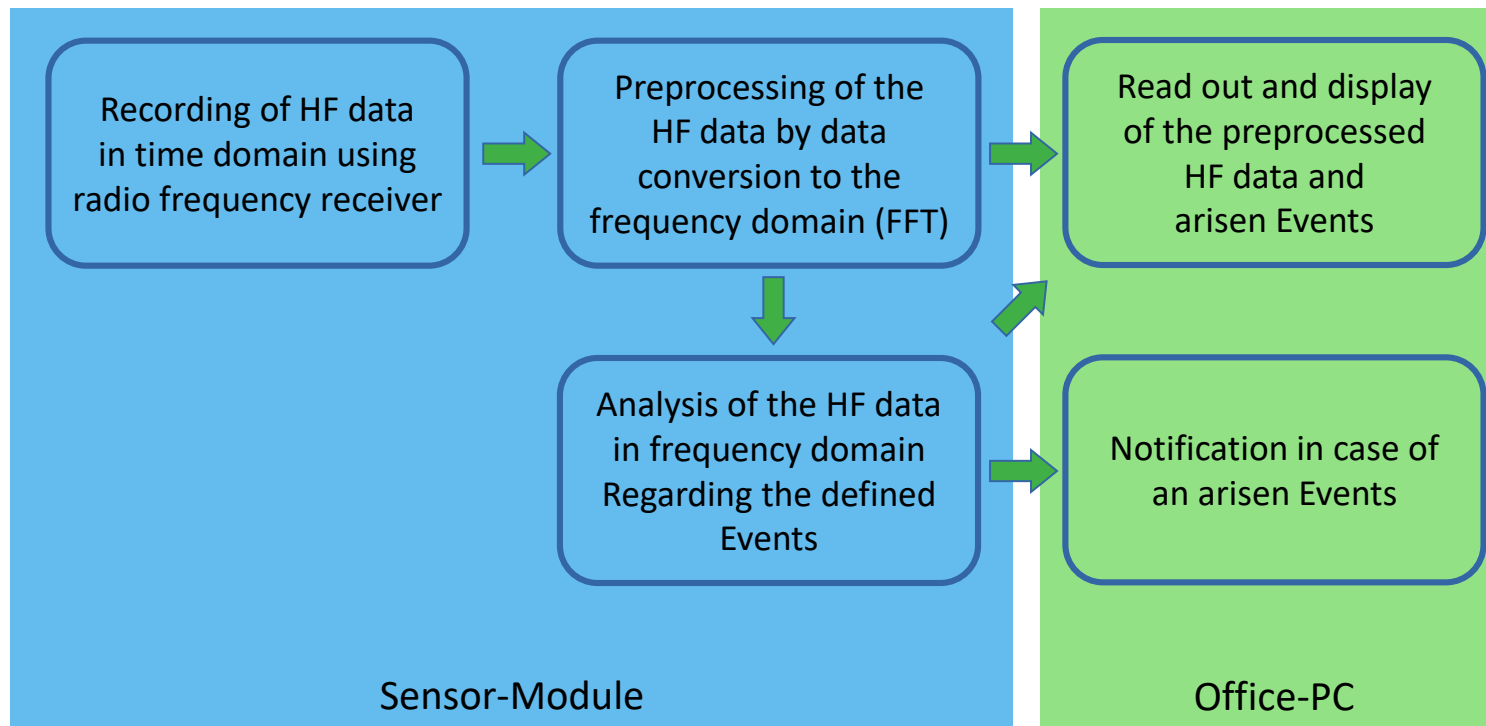
The radio frequency data is captured using detached receiving hardware with pre-processing of the recorded data on a single board computer (SBC).

Different HF receiver can be used as receiving hardware depending on the application and the measurement resolution. One possibility is to use a software defined radio (SDR) as a HF receiver.

A key element is the automatic initiation of configurable Events which can be used as starting point for a detailed analysis. If the configured terms of an Event are met a pre-programmed action is started like the transmission of an email or trigger an SMTP notification.

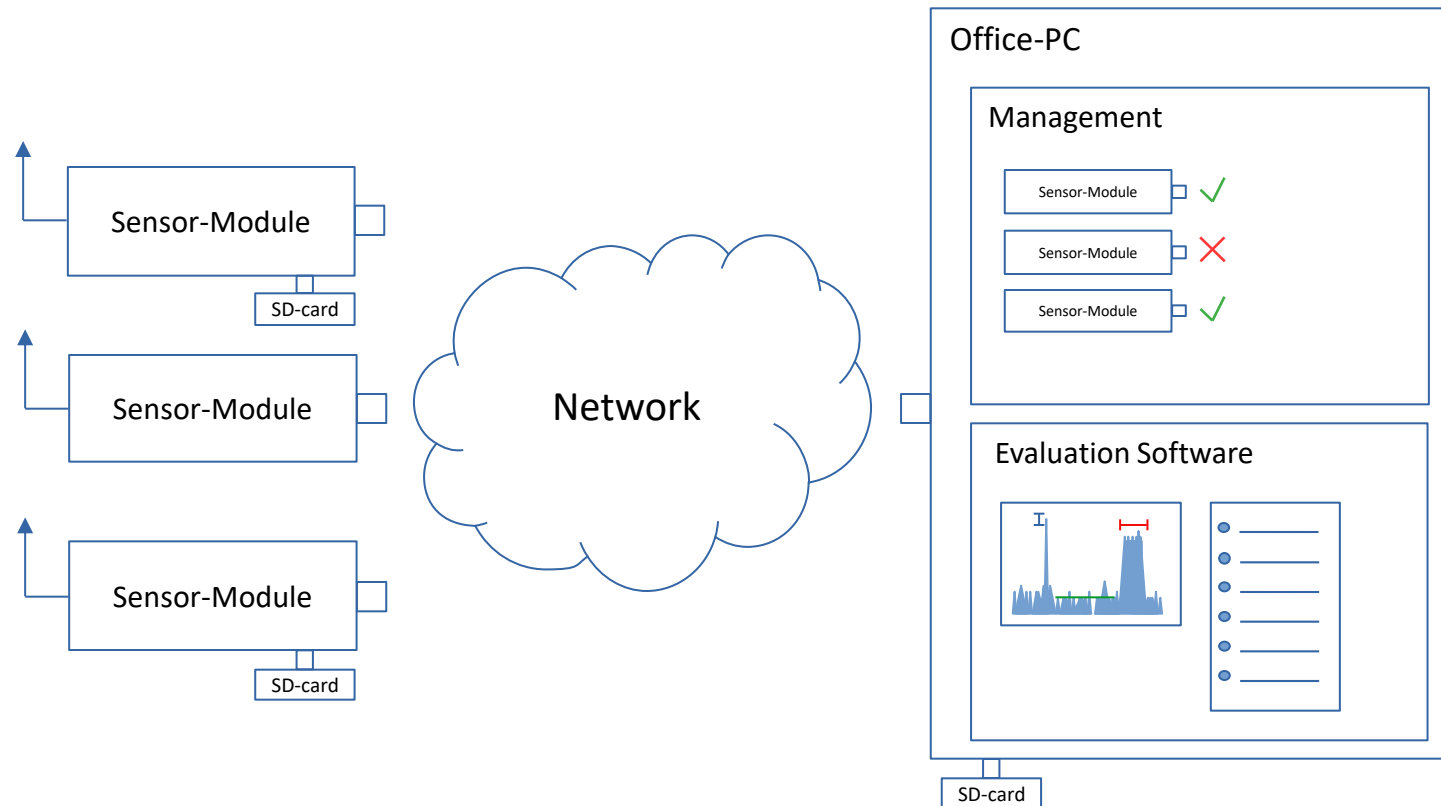
# Concept

Description of the basic construction:



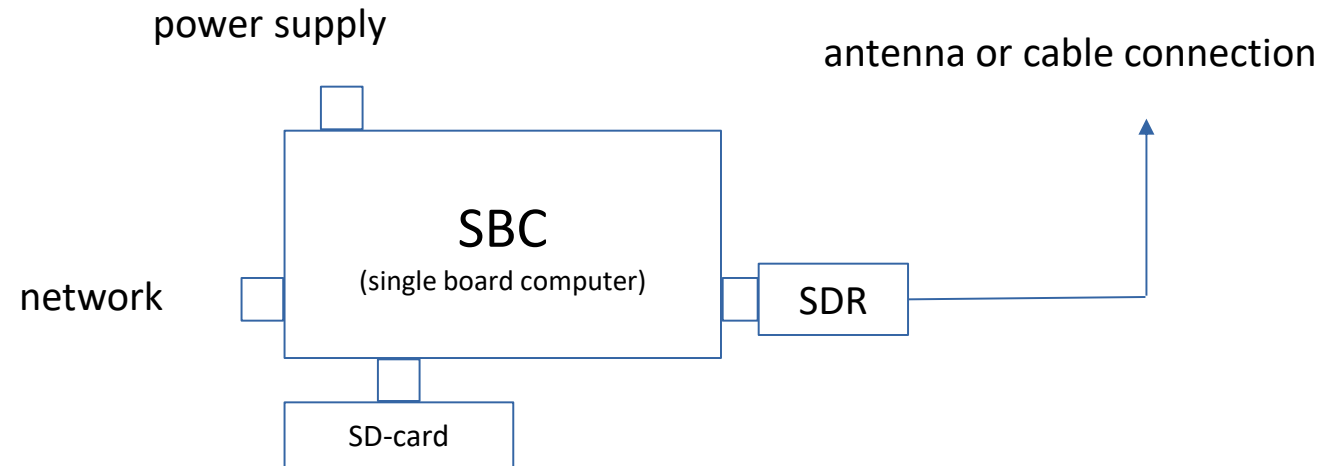
# Concept

The hardware concept of the HF-Monitoring System:



# Concept

The setup of a Sensor-Module:



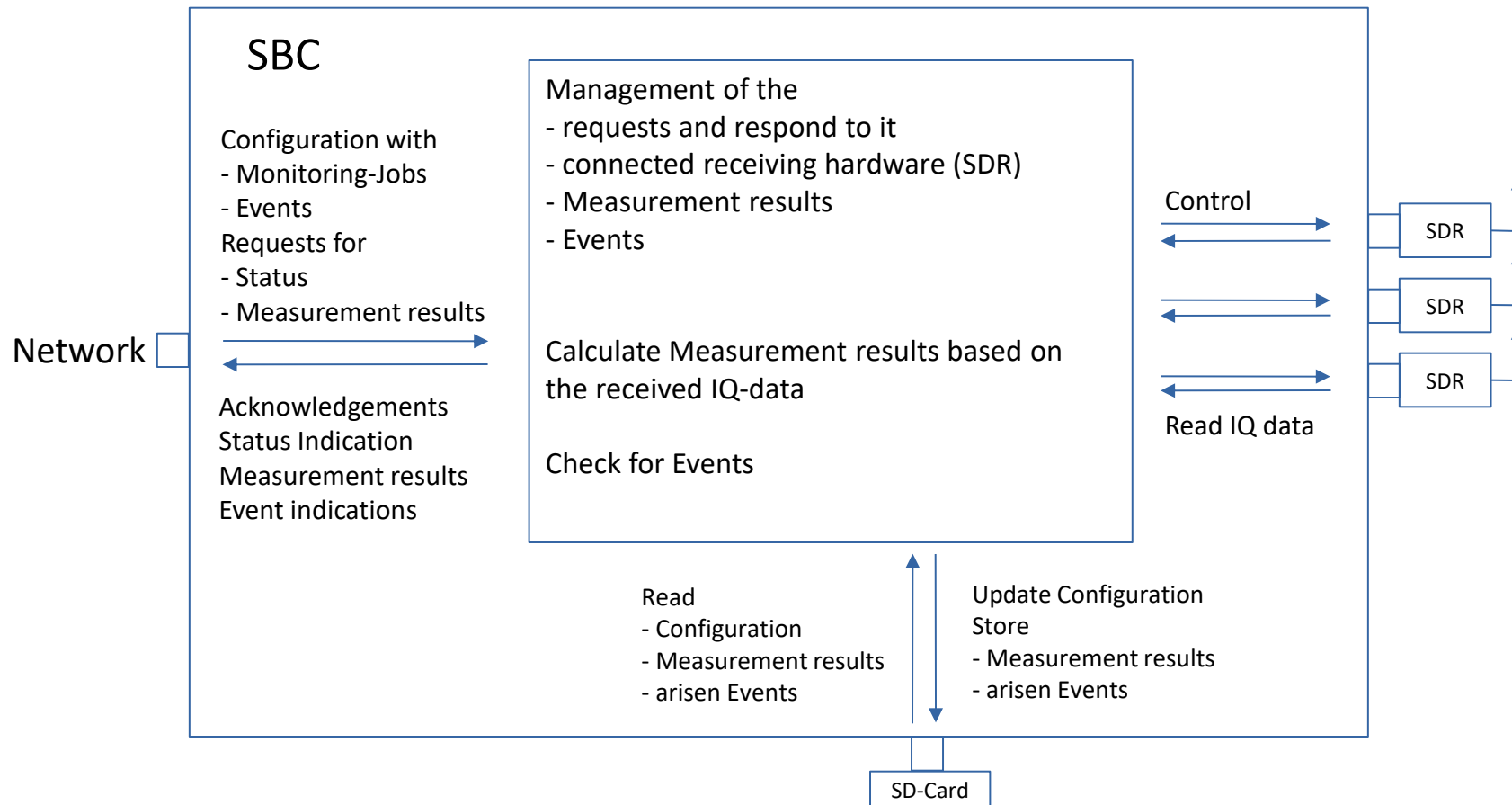
# Function

Configuration of the Sensor-Modules each with:

- Name
- Location
- Monitoring-Jobs
  - Frequency range
  - Time interval
  - Resolution of the measurement
- Events
  - Noise floor surveillance
  - Level surveillance
  - Peak detection
  - SNR surveillance or Carrier surveillance with spectral mask

# Function

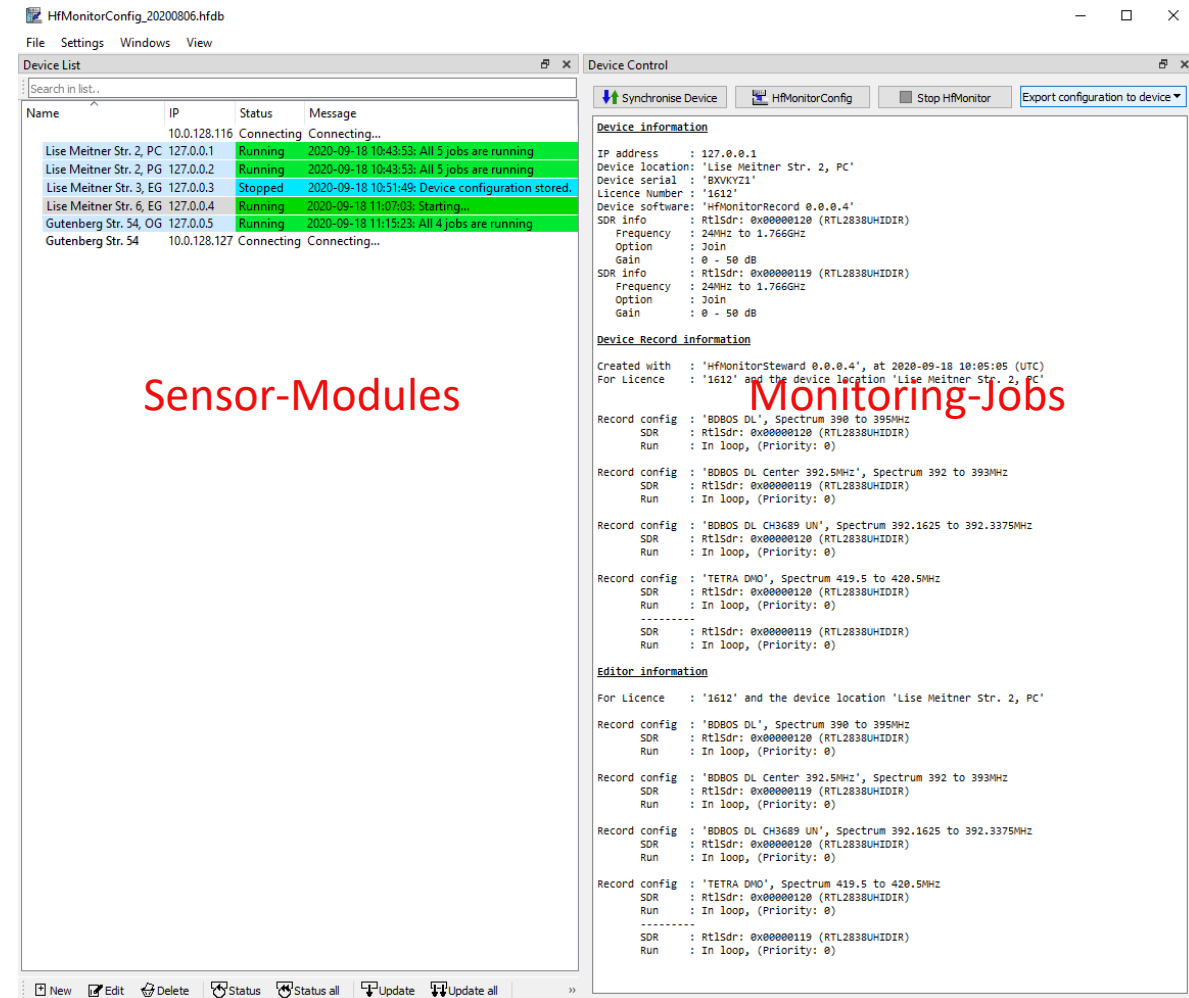
Control of the Sensor-Modules over the network:



# Function

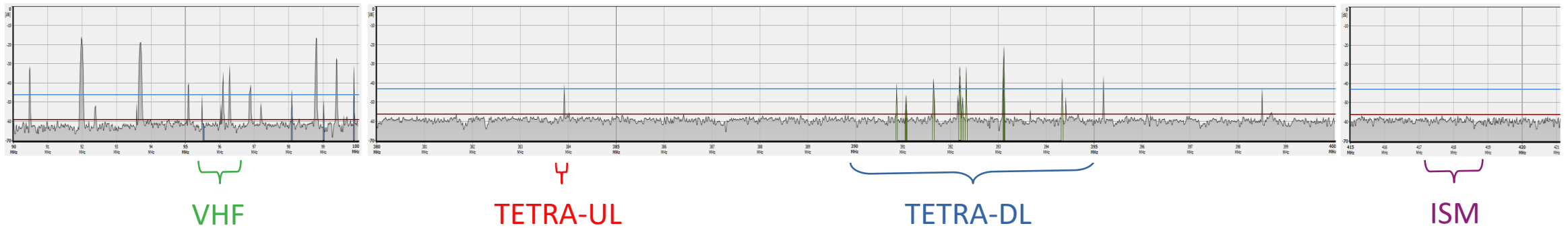
Control of the Sensor-Modules by one program:

- List of configured Sensor-Modules with
  - Name
  - IP-Address
  - Status
  - Time and Date of last received message
  - Last received message
- Connected HF-Receiver and Monitoring-Jobs of the selected Sensor-Module



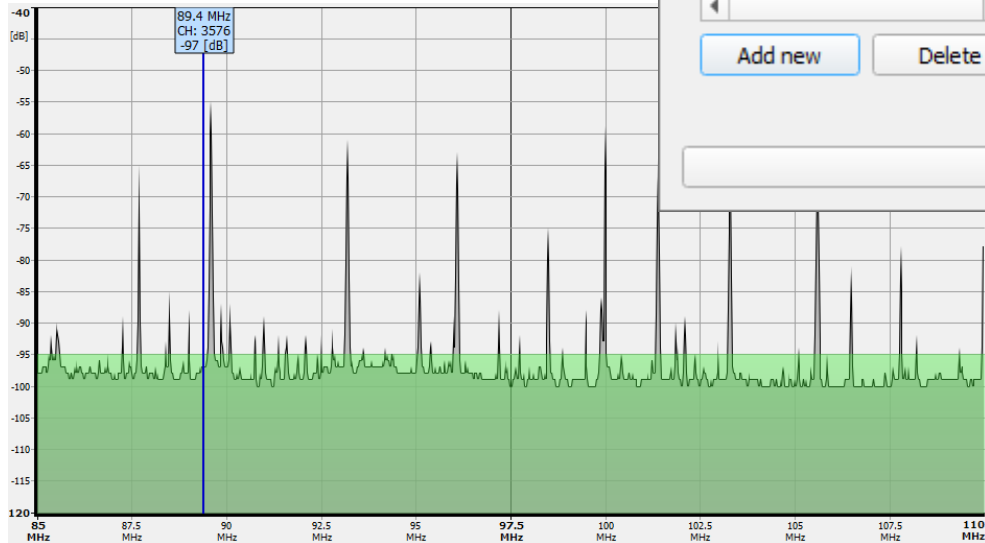
# Monitoring-Jobs

are programmed for several frequency ranges with different time intervals and observation times:



# Events

Noisefloor surveillance of frequency range over time:



Local Event configuration

Events

Please enter name < noise level

Event type: Background noise Event name: Please enter name

☐ Use frequency range defined by record ☒ Use frequency range defined by user

Start frequency 85000000 Stop frequency 110000000 8 kHz Record range Selected

Power level start in dB -127 Power level end in dB -95

Duration time in ms 100 100

Add new Delete

Ok Cancel

Restore

# Events

Power detection of a certain frequency or frequency range:

Local Event configuration

Events

Please enter name <Power level

Add new Delete

Event type: Power level Event name: Please enter name

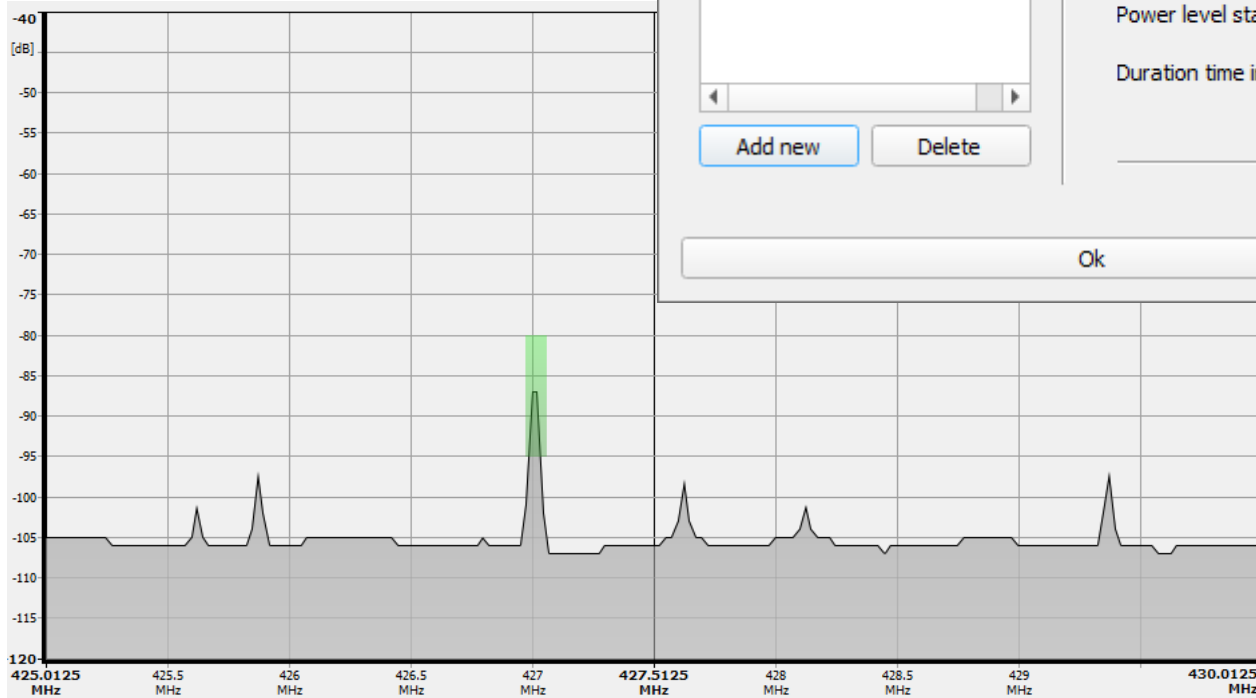
Start frequency 426987500 Stop frequency 427062500 12.5 kHz Record range Selected

Power level start in dB -80 Power level end in dB -95

Duration time in ms 200 100

Restore

Ok Cancel



# Events

Peak detection over frequency range:

Local Event configuration

Events

Please enter name <Detect pea

Add new
Delete

Event type: Peak detection

Event name: Please enter name

☐ Use frequency range defined by record
☒ Use frequency range defined by user

Start frequency 425000000

Stop frequency 430000000

3.125 kHz

Record range

Selected

Power level offset to noise level in dB

9

Minimum bandwidth in Hz

12500

Duration time in ms

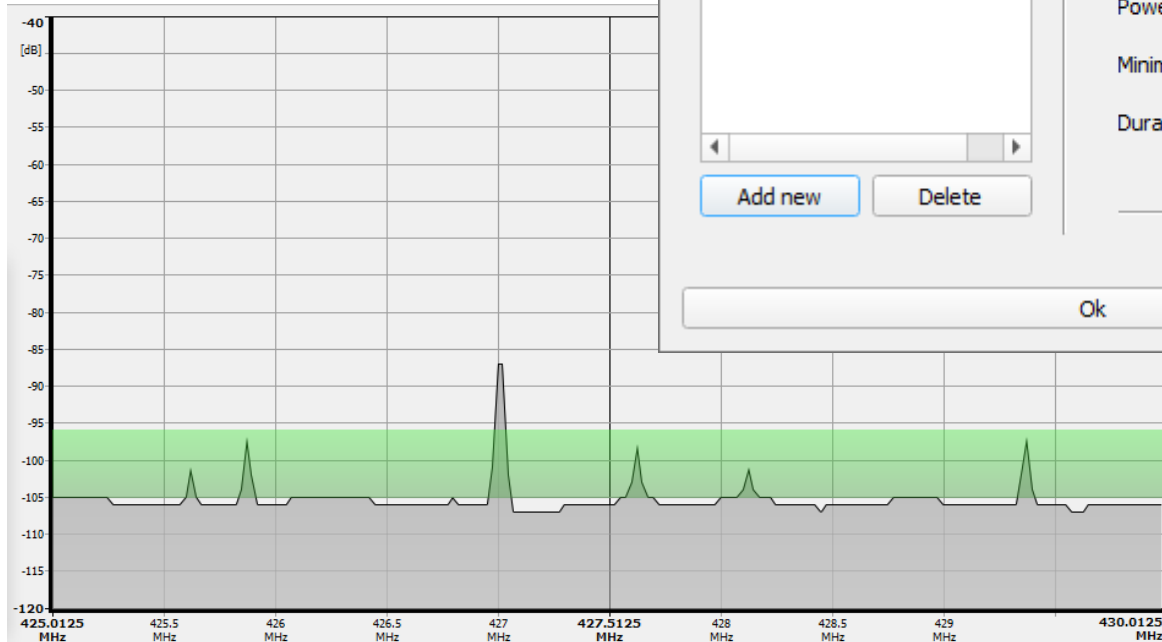
100

100

Restore

Ok

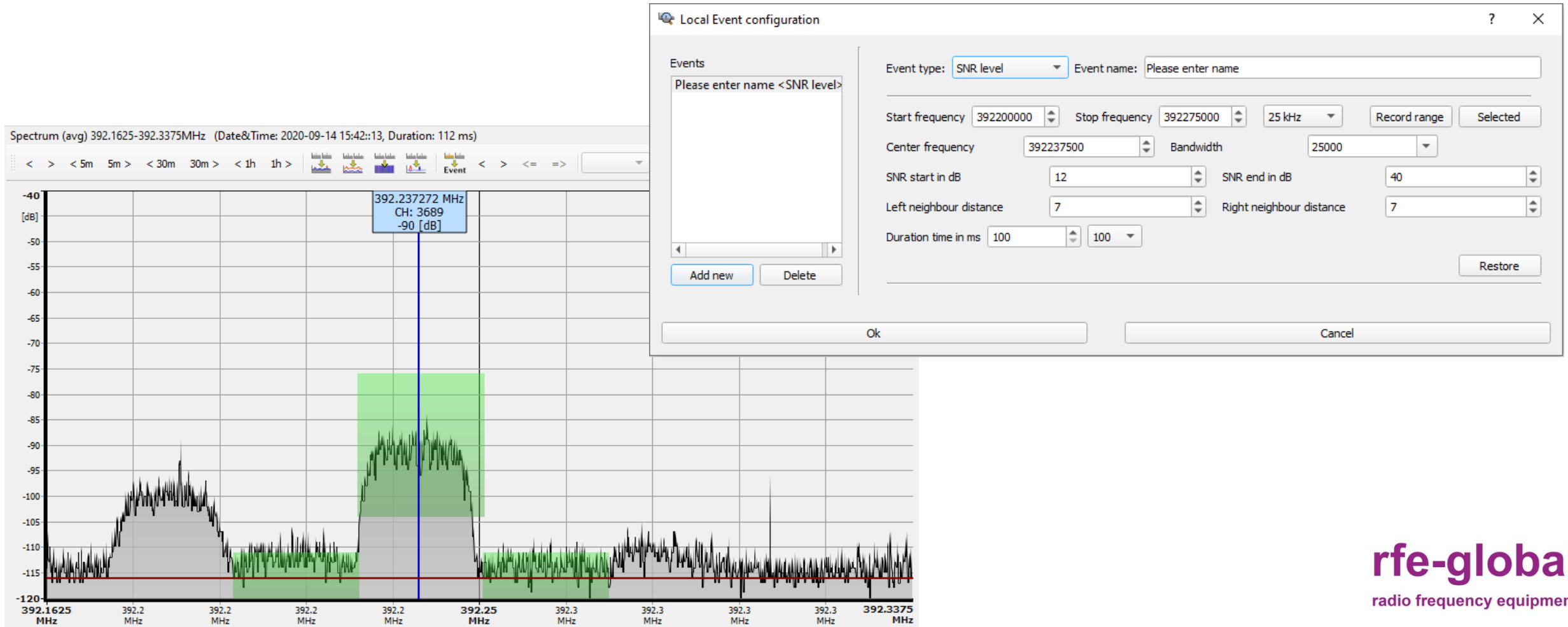
Cancel



**rfe-global**
  
radio frequency equipment

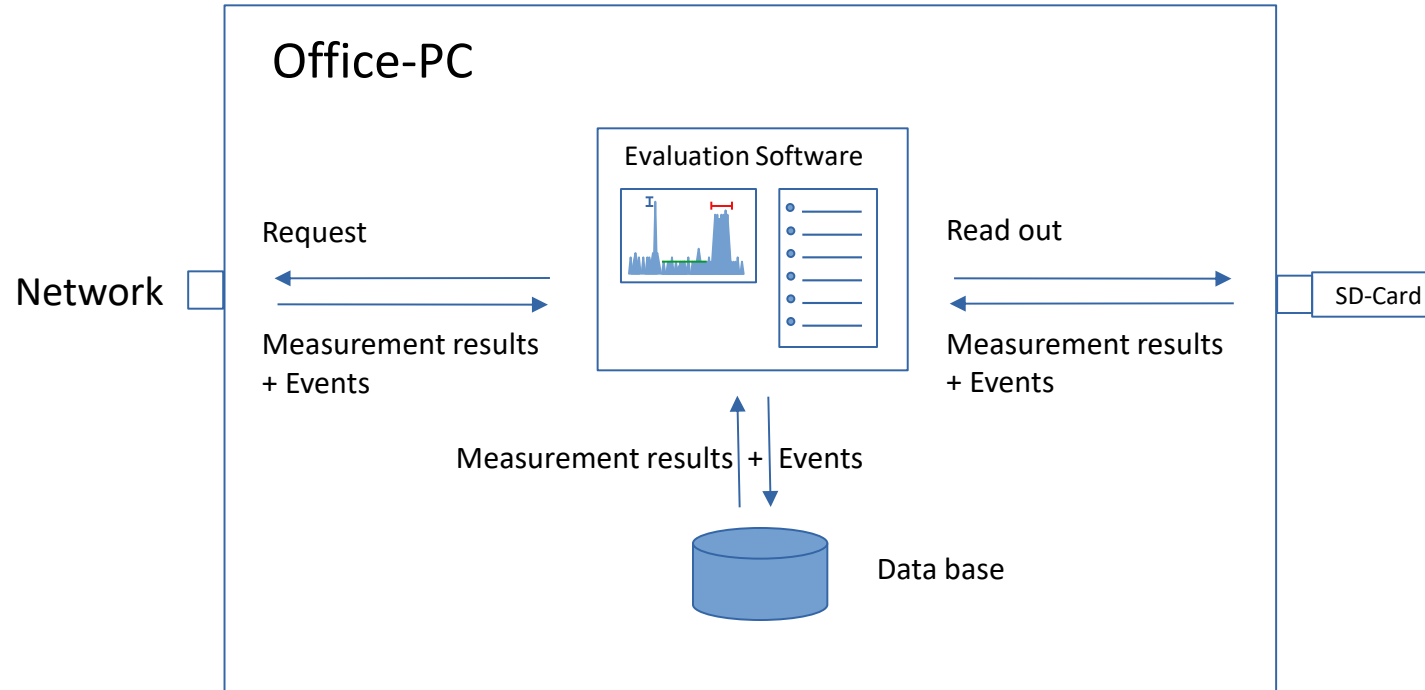
# Events

SNR surveillance and Carrier surveillance with spectral mask:

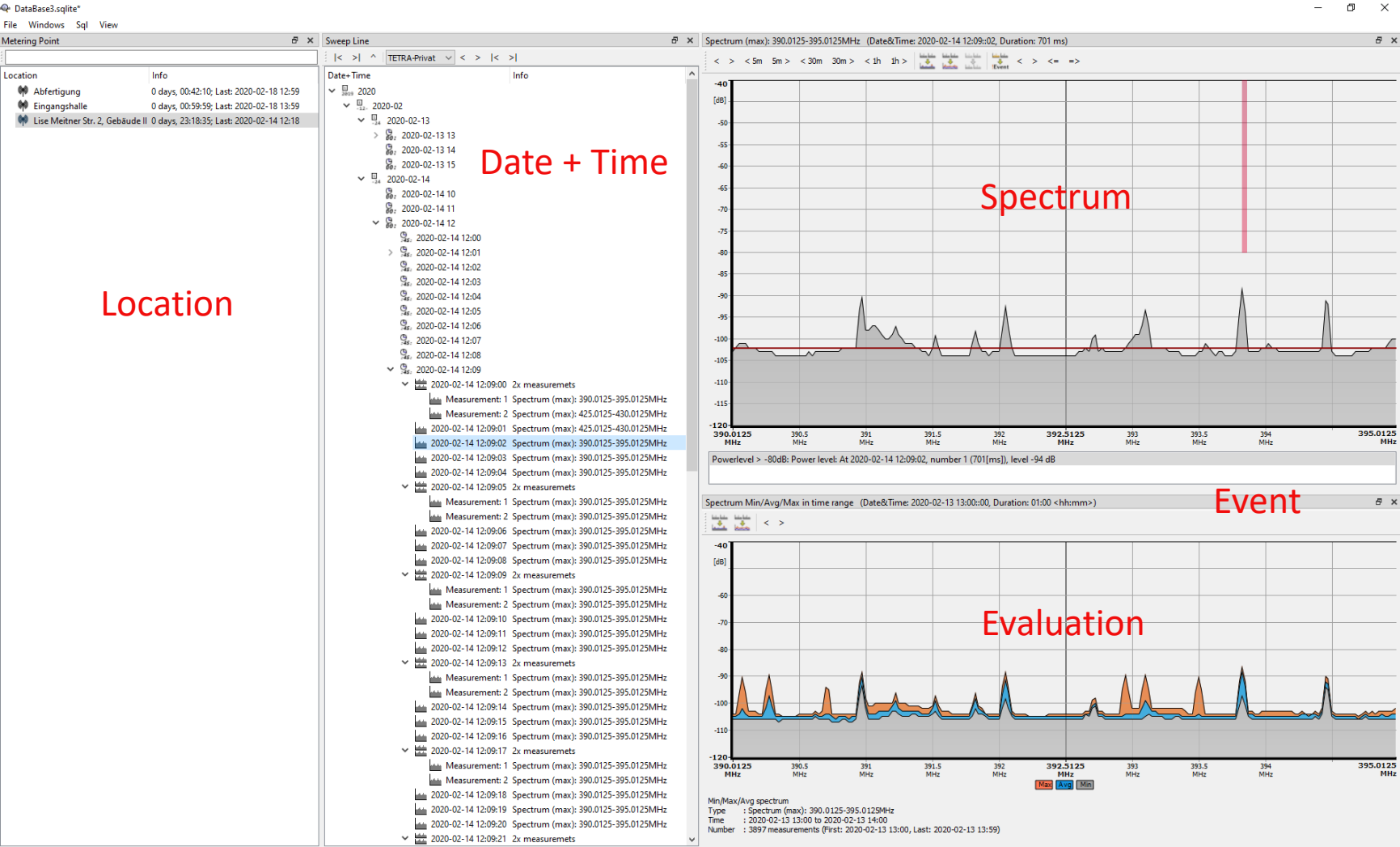


# Function

transfer of the Measurement results to the Evaluation Software:



# Evaluation



# Evaluation

- selection of frequency range

Min/Max/Avg over time

Make coloured spectrum with min, max and average values

Start frequency: 391018750 End frequency: 392012500 1000 Record range: Selected

1m 5m 10m 30m 1h 6h 12h 24h

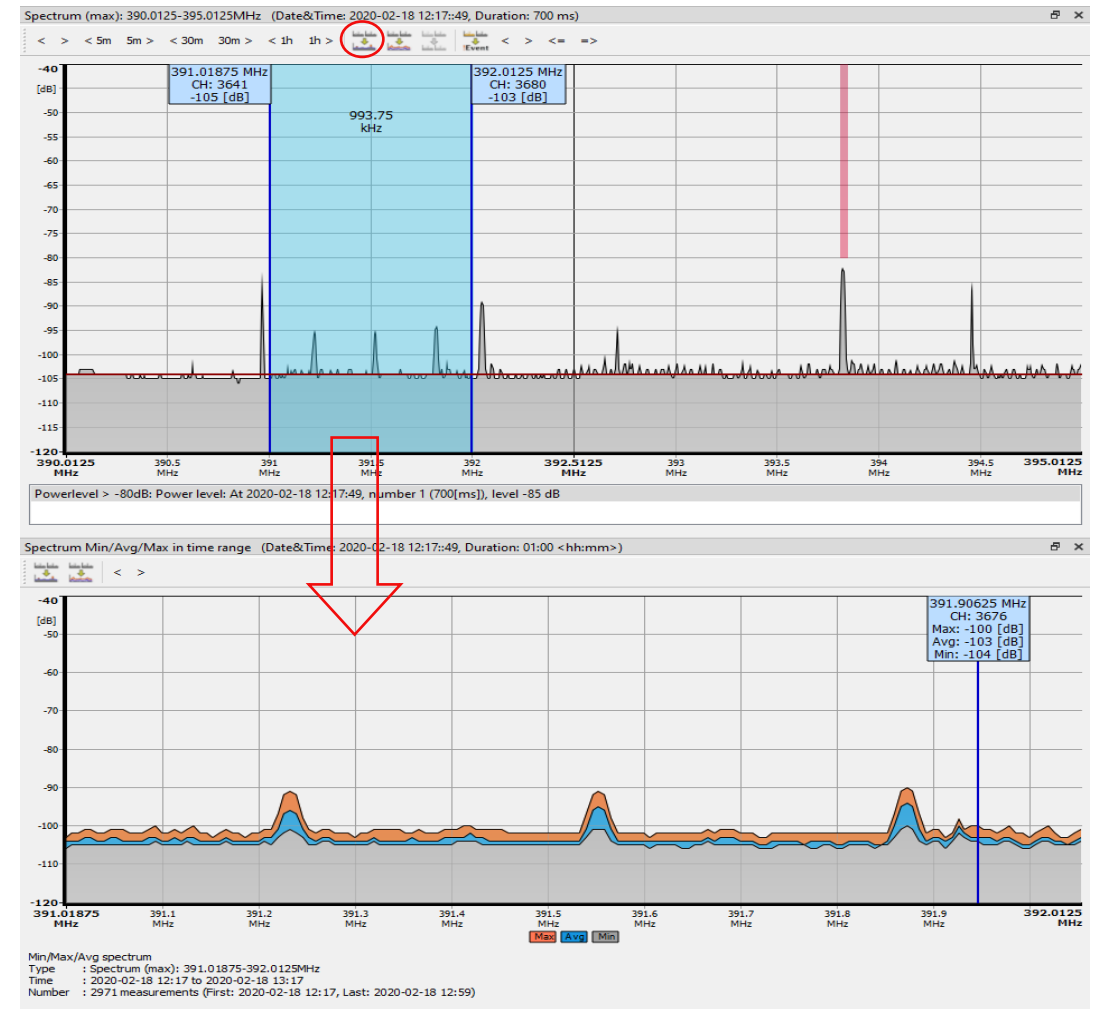
Time range hh:mm:ss: 00:05:00

Start data & time yyyy-MM-dd hh:mm:ss: 2020-02-18 12:17:49

<-1d <-1h <-30m <-10m <-1m 1m-> 10m-> 30m-> 1h-> 1d->

Start Cancel

- Min/Max/Average in frequency range



# Evaluation

- From frequency domain ...

Min/Max/Avg over time

Make coloured spectrum with min, max and average values

Start frequency: 393112500 End frequency: 393112500 1000 Record range Selected

1m 5m 10m 30m 1h 6h 12h 24h

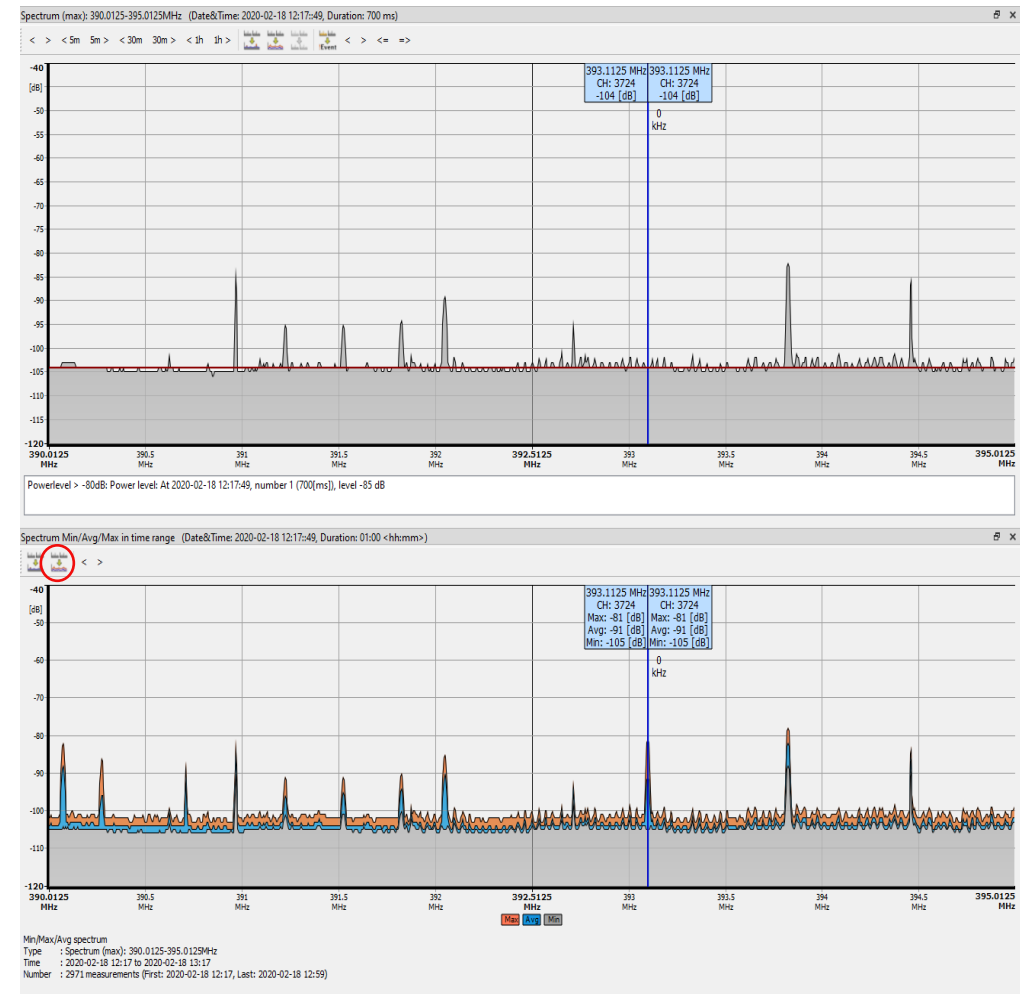
Time range hh:mm:ss 01:00:00

Start data & time yyyy-MM-dd hh:mm:ss 2020-02-18 12:17:49

<-1d <-1h <-30m <-10m <-1m 1m-> 10m-> 30m-> 1h-> 1d->

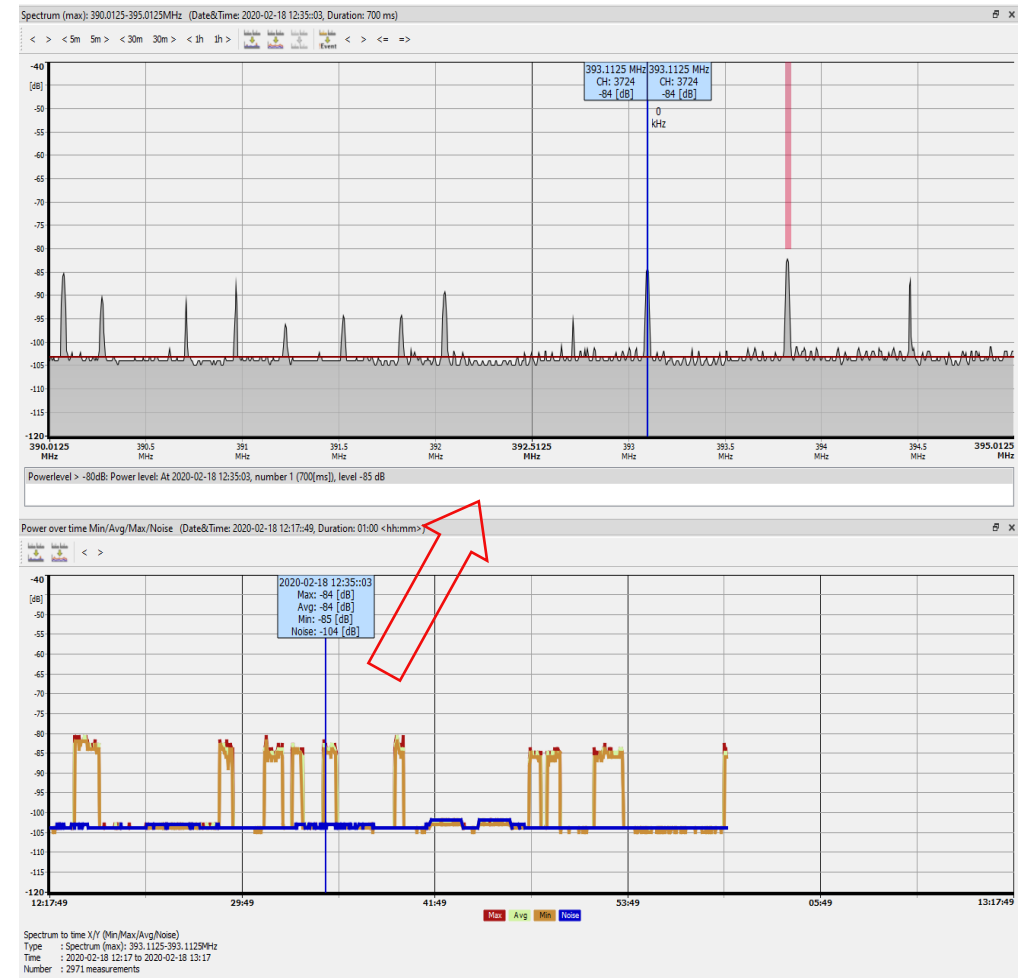
Start Cancel

- to the time domain

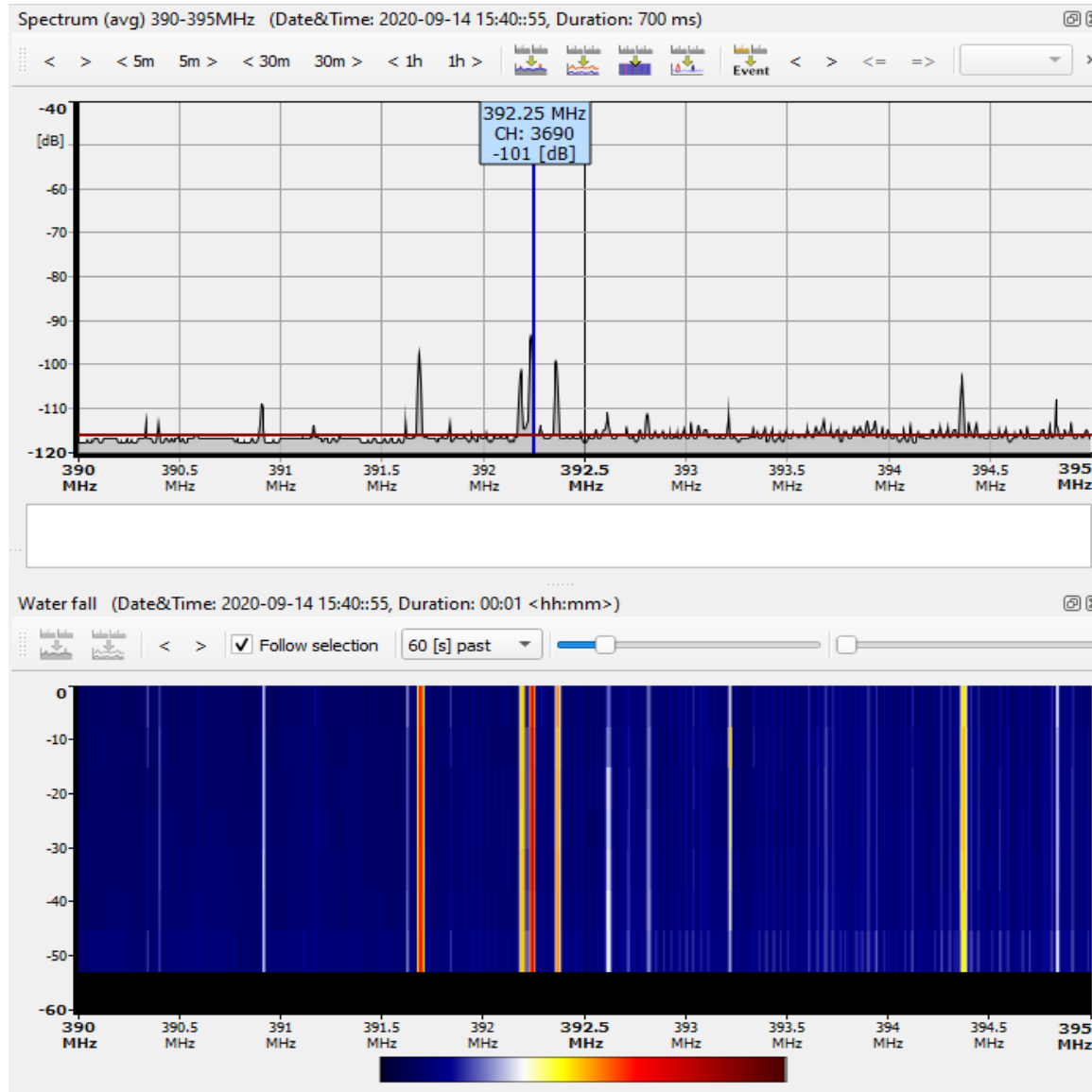


# Evaluation

- spectrum display of the lower window selected point of time
- Display of the signal power over time in the lower window



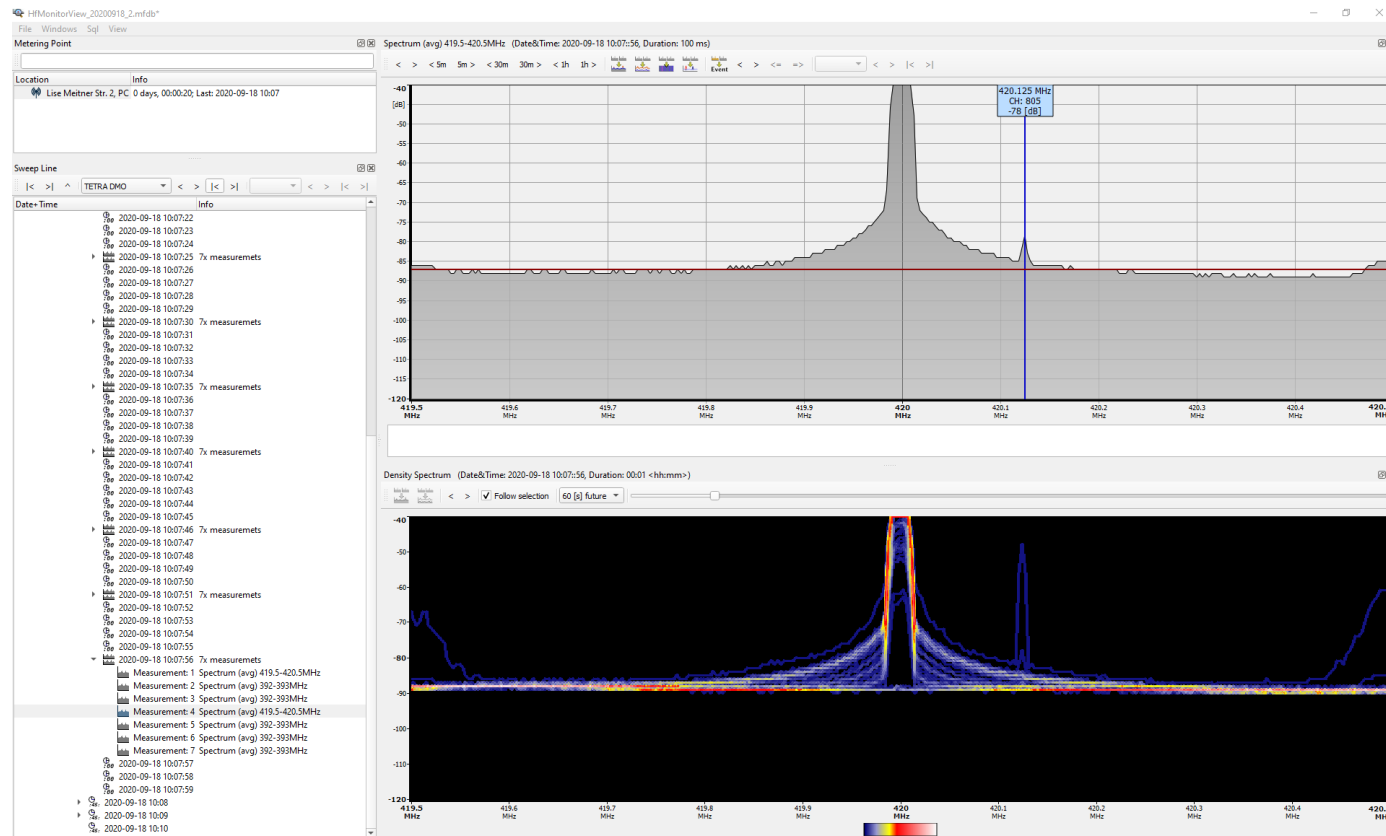
# Evaluation



- Spectrum Waterfall diagram of the past or future based on the actual selected point of time

# Evaluation

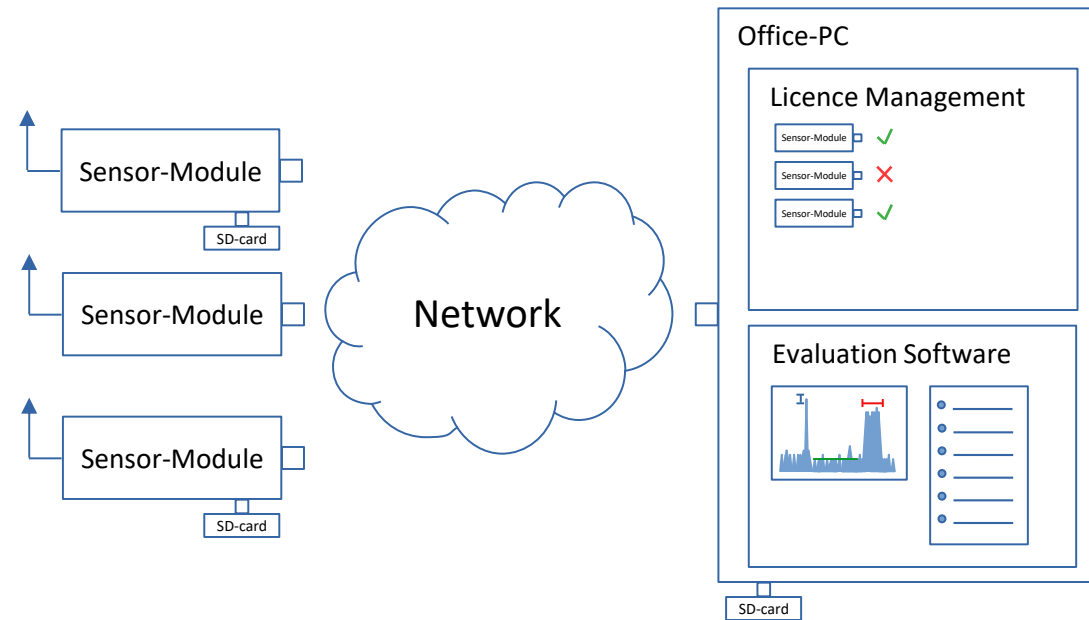
- Density Spectrum diagram of a adjustable time period displaying the data of the past or future based on the actual selected point of time



# For the benefit of the customer

- HF-Monitoring designed for 24/7 monitoring of frequency ranges
- with automatic and configurable signal processing and Event generation
- with low hardware cost
- Flexible, adjustable, scalable
- And so on...

# You have questions?



... or suggestions? Don't hesitate to contact us!

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