



Radiocommunications Agency
*Ministry of Economic Affairs
and Climate Policy*

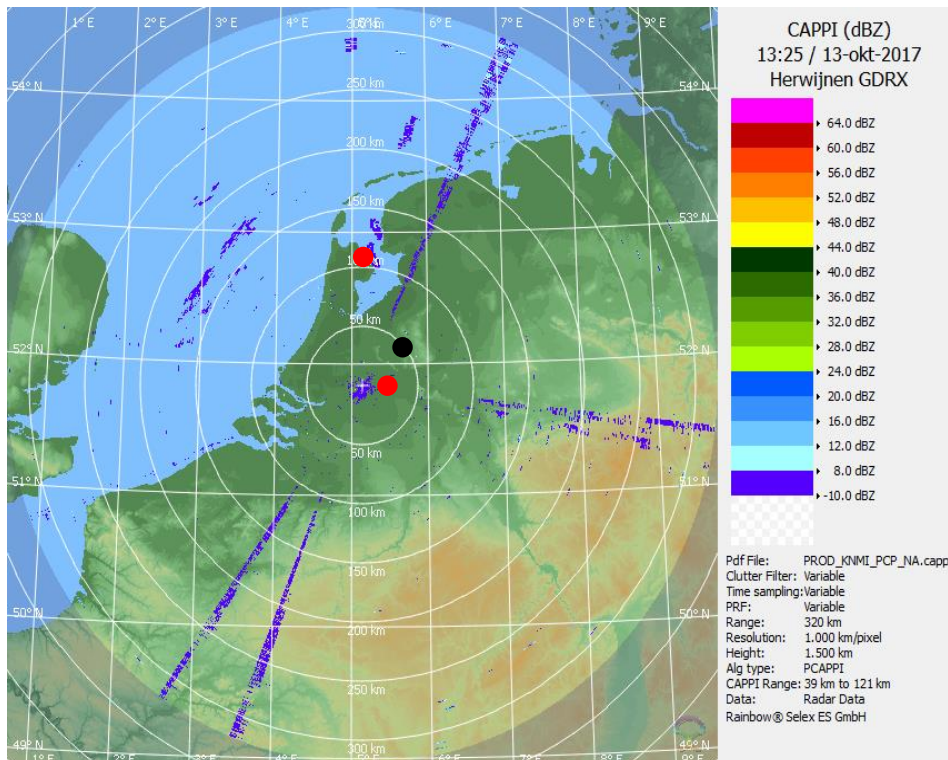
Interference of meteo radar by wireless LAN

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Meteo radar in the Netherlands



Royal Netherlands Meteorological Institute (KNMI)



radar locations:

- de Bilt (1997)
- Herwijnen (2017)
- Den Helder (2017)

radar type:

- Pulse-Doppler, C-band (5633 MHz)
- $\text{prf} = 250/1200 \text{ Hz}$; $\tau = 0.8/2.0 \mu\text{s}$
- $P_{\text{tx}} = 270 \text{ kW}$; $G_{\text{ant}} = 43 \text{ dB}$; $\theta = 1^\circ$



Meteo radar interference cases

History:

- Many cases in 2008 ~ 2010 of de Bilt radar
- RLAN devices and wireless cameras
- DFS often disabled
- Interference sources difficult to find

Resolution:

- Frequency change from 5647 MHz → 5650 MHz
- Merge of radar data de Bilt & Den Helder
- Contact with suppliers/operators of devices

Current status:

- New radar at different operating frequency
- Installed base of RLAN devices
- Attention from ECC/CEPT & ADCO RED



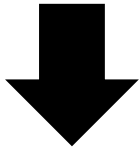


Interference resolving process

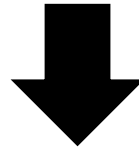
Interference
complaint
information

Desktop inspection
& threat analysis

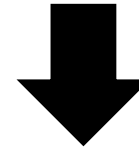
Verification &
enforcement



Accurate directional
interference data
from victim radar.



Find any match between
interference data and
spectrum monitoring data.

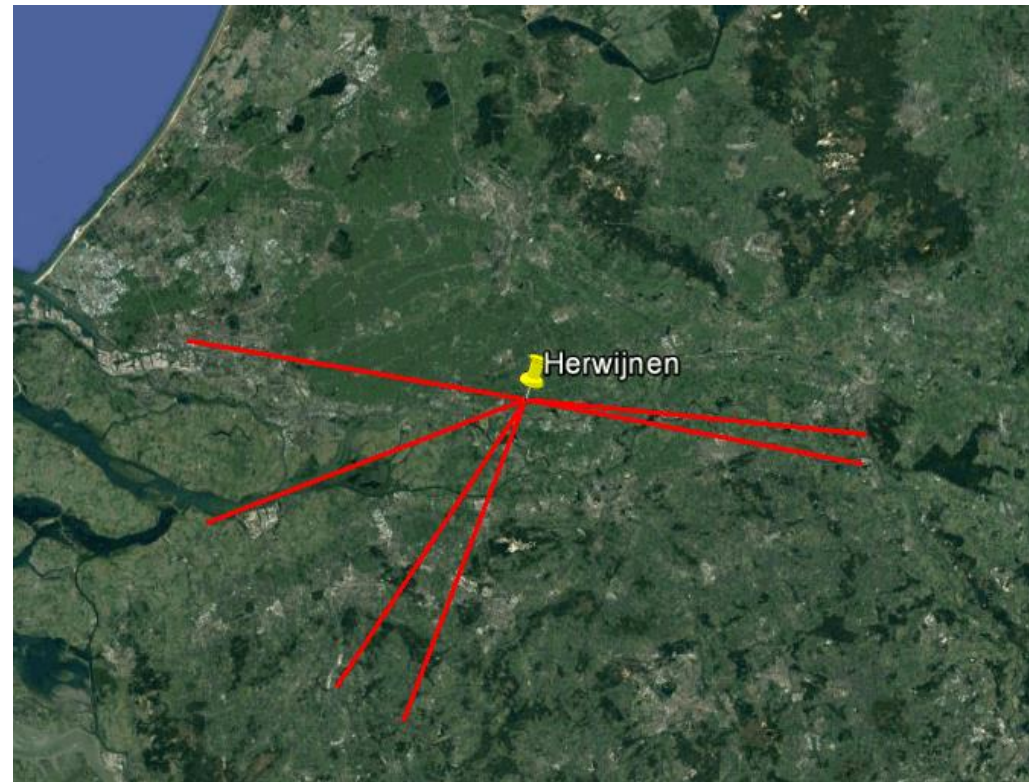
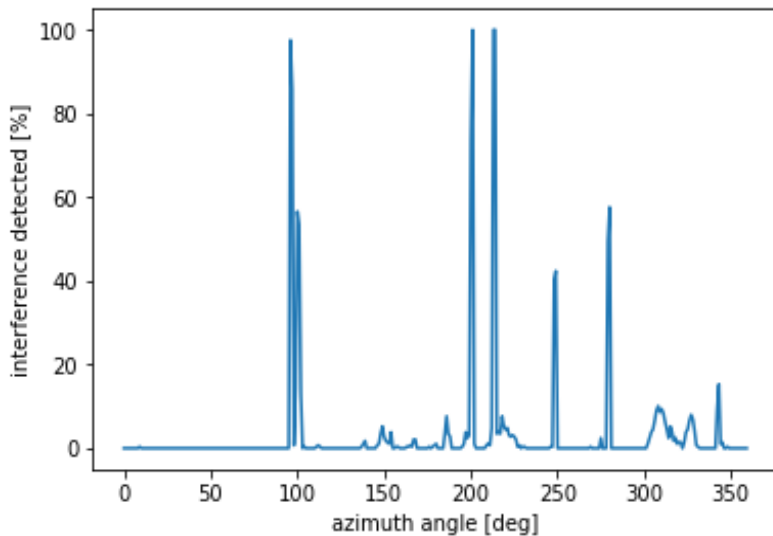


Local RF measurements.
Interview RLAN users.
Engage RLAN operator.



Interference complaint information

- October 30, 2017: no rain
- Elevation: 0.3°
- Interference: >400 range bins
- Magnitude: range bins 600-802





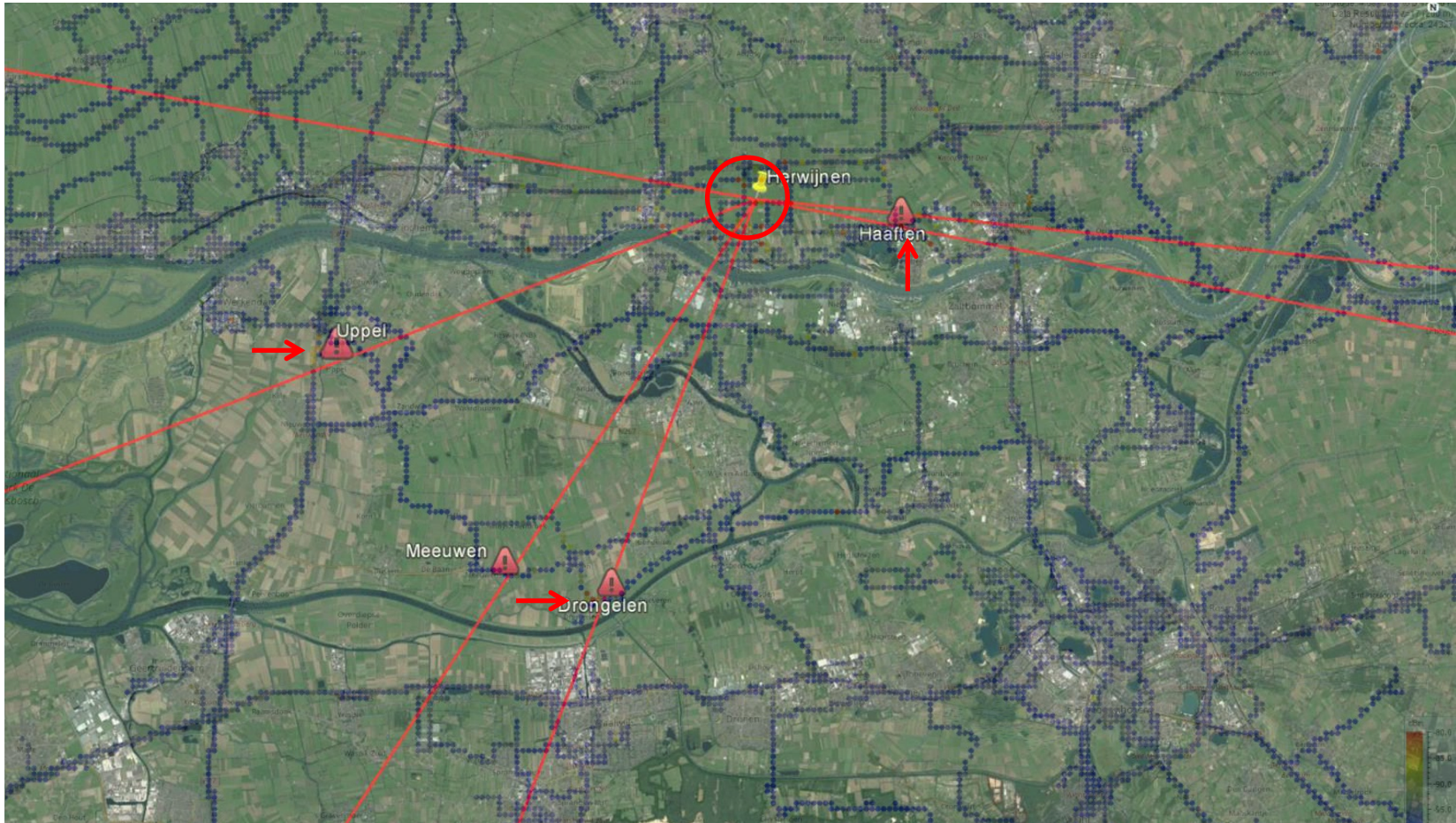
Desktop inspection and threat analysis (1)

- Mobile monitoring network
- Spectrum data from 20 MHz to 6 GHz
- Received power versus time & location
- Grafical database for visualization & analysis
- Google-Earth & Street View





Desktop inspection and threat analysis (2)

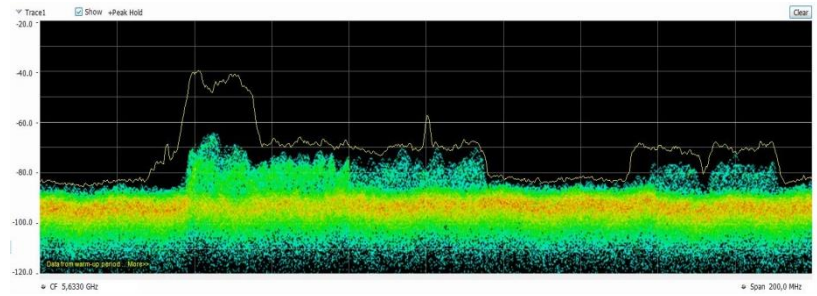
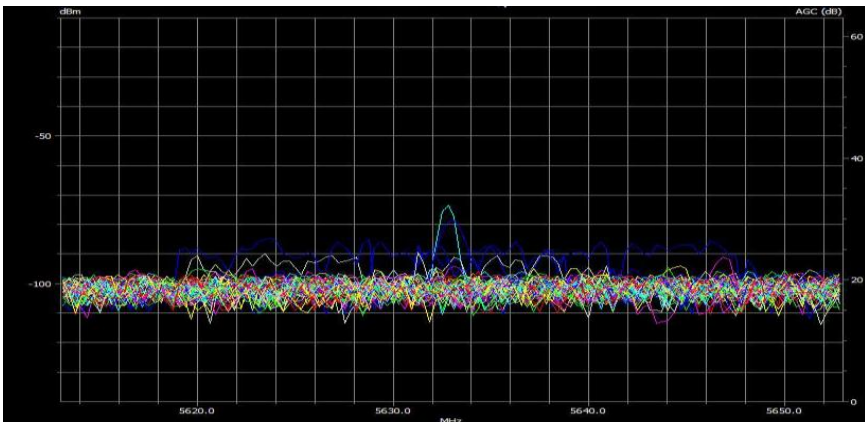




Field data collection & enforcement (1)



Haaften
N 51.8285
E 5,20666
4,8 km

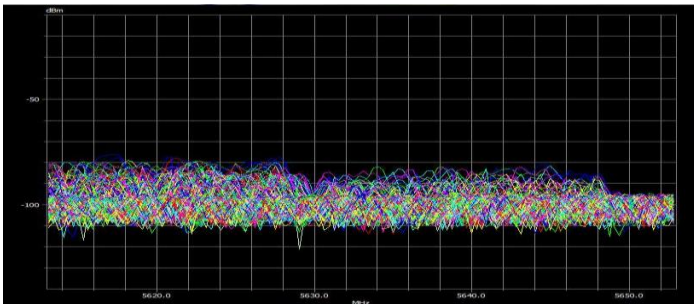




Field data collection & enforcement (2)

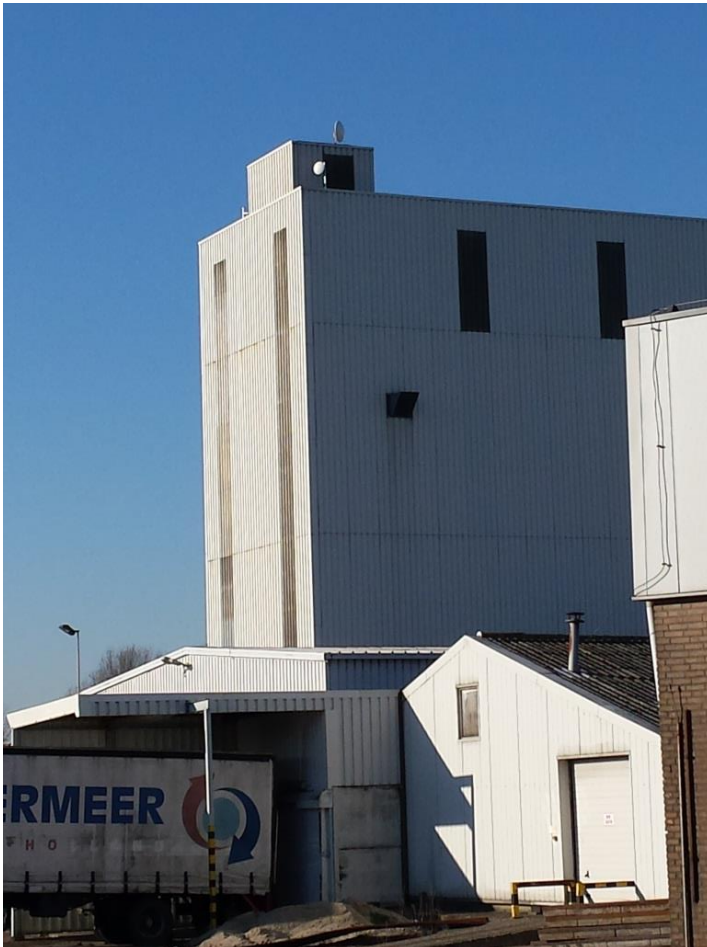


Uppel
N 51.7897
E 4.9401
14,6 km

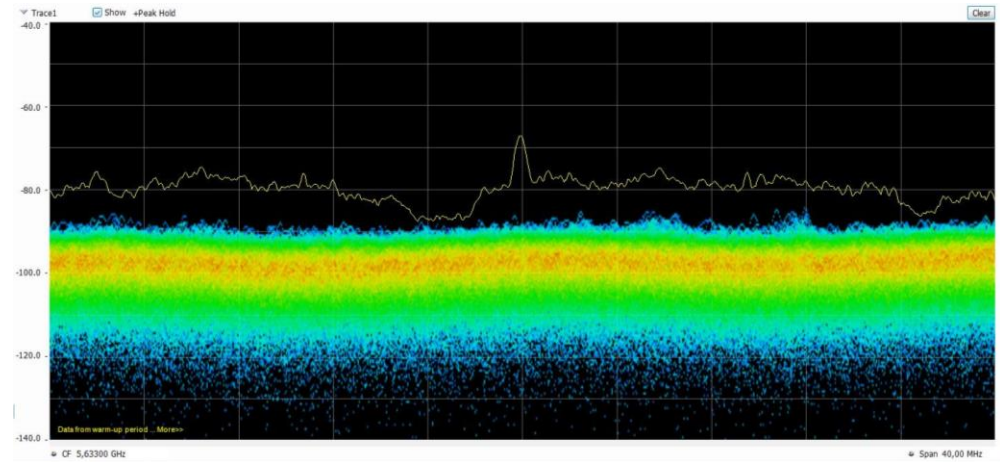




Field data collection & enforcement (3)



Meeuwen
N 51.7274
E 5.0194
14,7 km





Conclusion

- Interference resolving process succesful
- Information from victim radar essential
- Mobile spectrum monitoring: *first blow is half the battle*
- Sources of interference less than ~ 20 km from radar
- Only focus on sources directed towards the radar
- DFS enabled!

- Radar operator is pleased.
- How to find cause of DFS failure?
- Radar operating frequency change to RLAN channel boundary?

