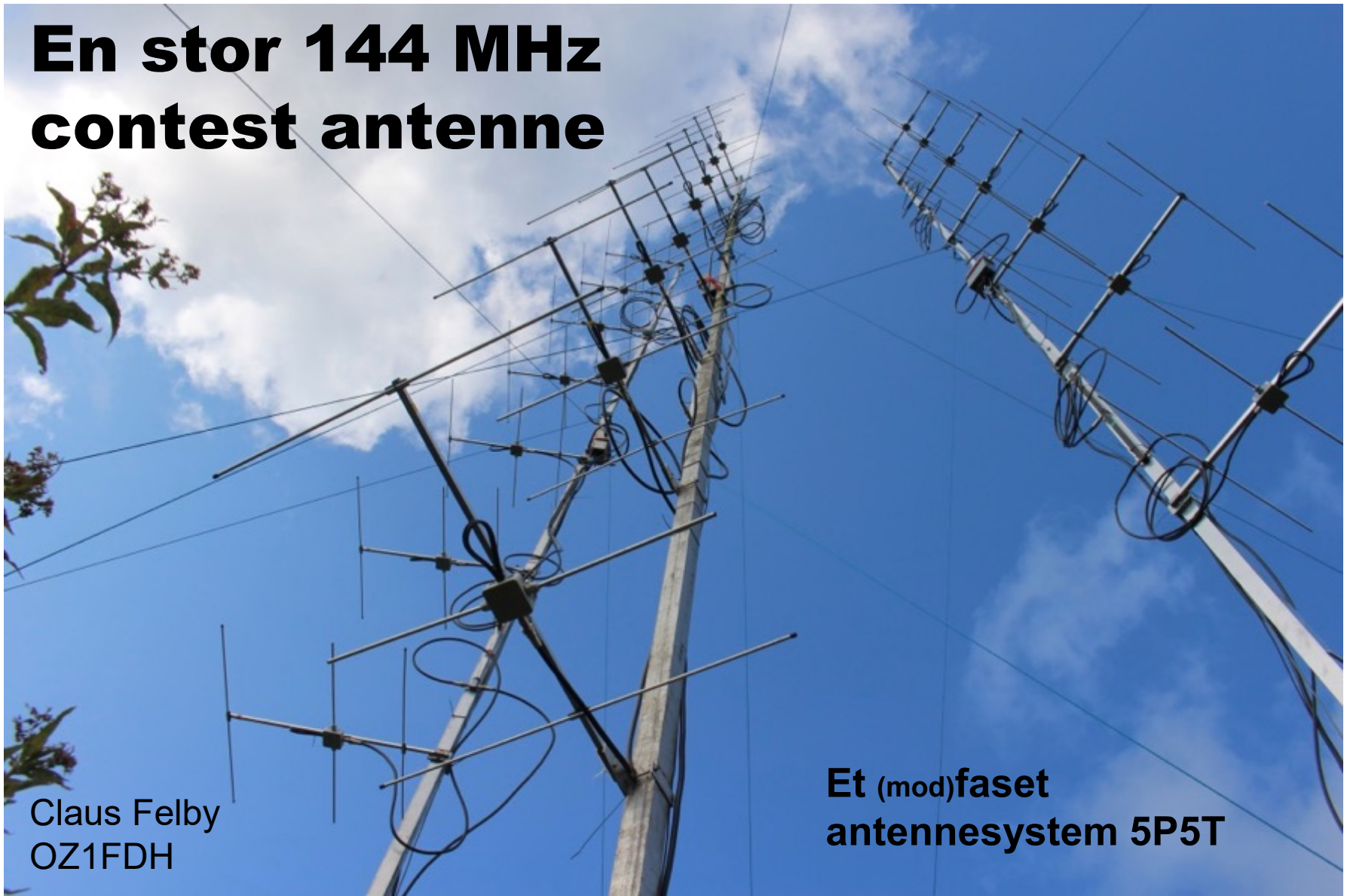


# **En stor 144 MHz contest antennne**

Claus Felby  
OZ1FDH

**Et (mod)faset  
antennesystem 5P5T**



# 5P5T 2018

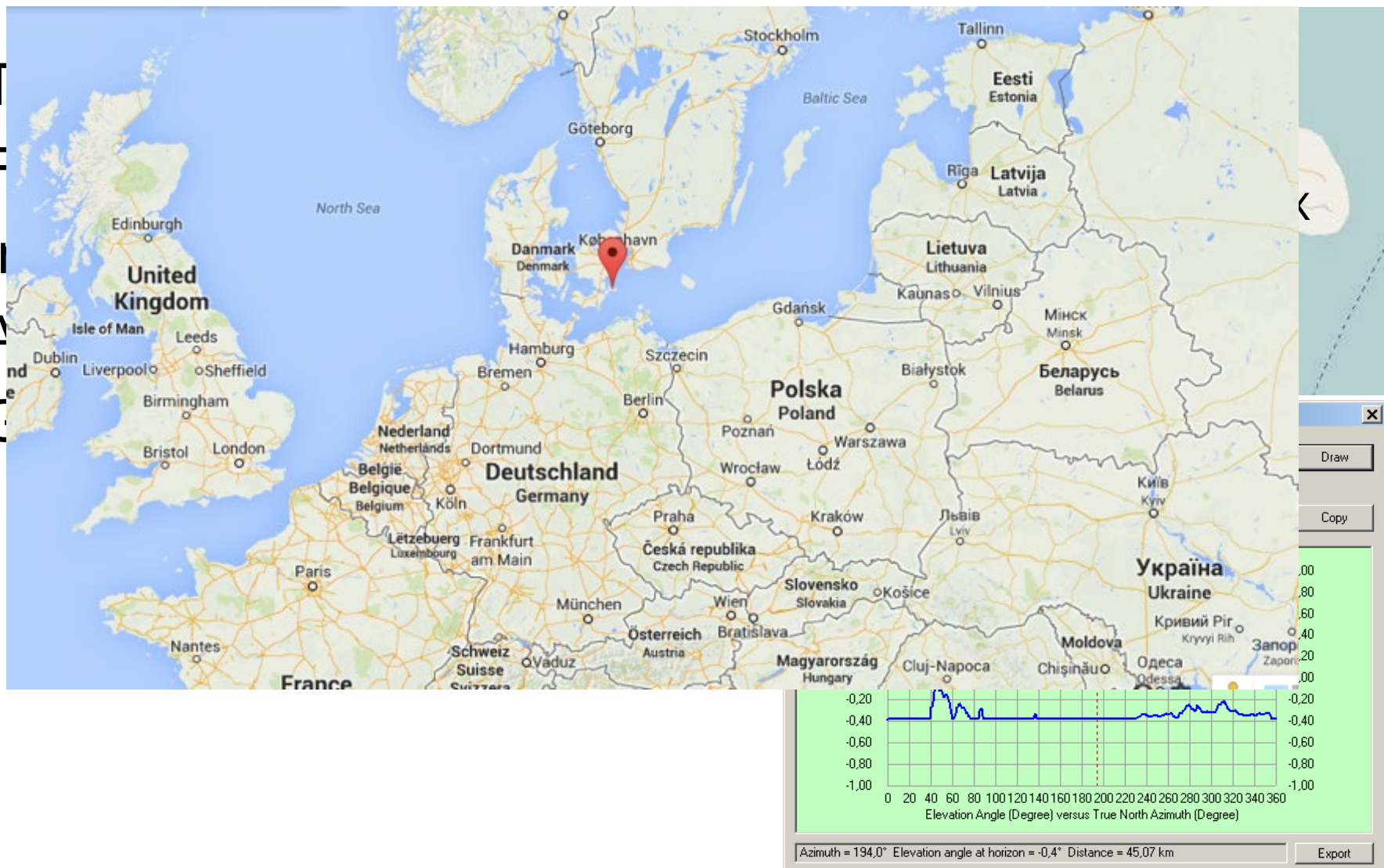


+ AG6QV  
OZ1DJJ, OZ1IKY



# QTH Kongsbjerg, Moen JO64gx

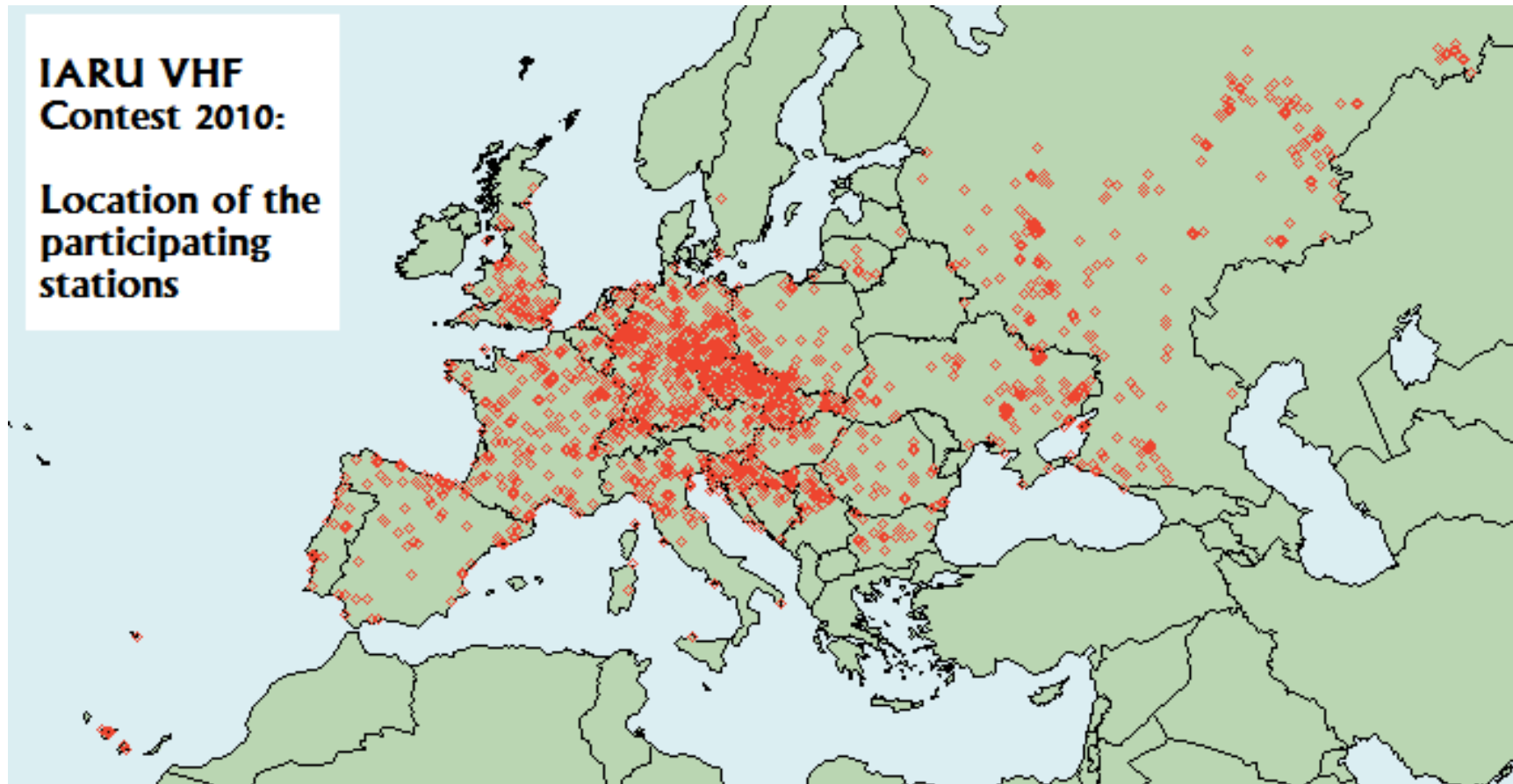
- T
- F
- I
- A
- C



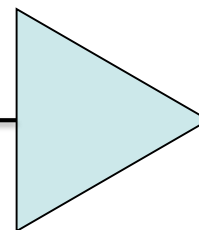
View direction 140-200 deg



# Hovedaktiviteten dækker 180 deg.



# 5P5T station 2013-2017



4x10 el  
rotor  
(default  
235 deg)

8x3 el  
200 deg

8x3 el  
160 deg

4x3 el  
100 deg



Basis ant. 3 el DK7ZB 12,5 ohm  
7,4 dBD 57 deg -3dB Hor.



8x3 el 16,5 dBd 59 grd -3dB Hor.





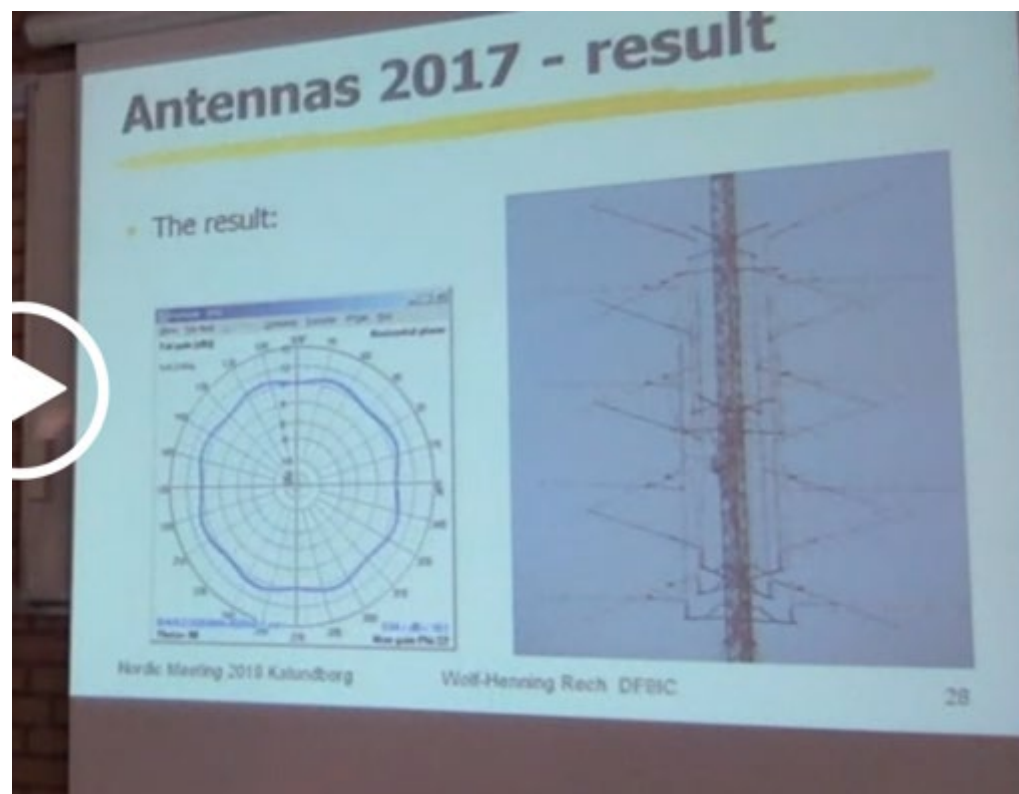
2018: Vi troede udstyret bare lige skulle efterses et par uger før

- Men så var der lige et foredrag...



# DR9A endeligt system

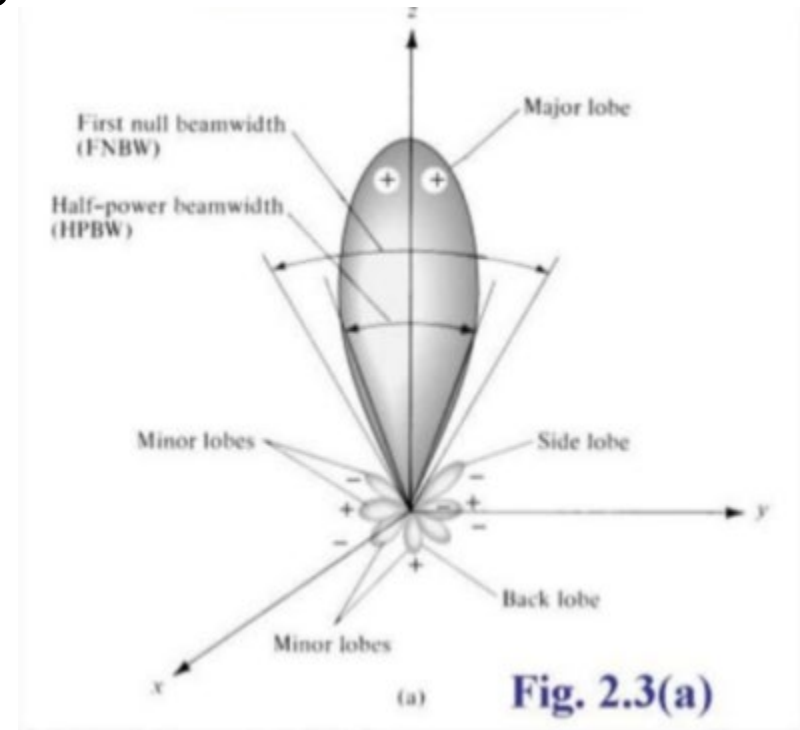
- 8 systemer med 4x6 el yagi
- Placeret i en radius på 1,4 m med 45 grd. imellem
- Meget jævnt udstrålingsdiagram, tilsyneladende ikke noget nævneværdigt tab af gain



# Numerical Electromagnetics Code (NEC)

- Udviklet på Lawrence Livermore lab
- Simulerer det elektromagnetiske felt omkring en tråd
- Modellering af Pyonting vektoren i 3D ved hjælp af EZNEC Pro

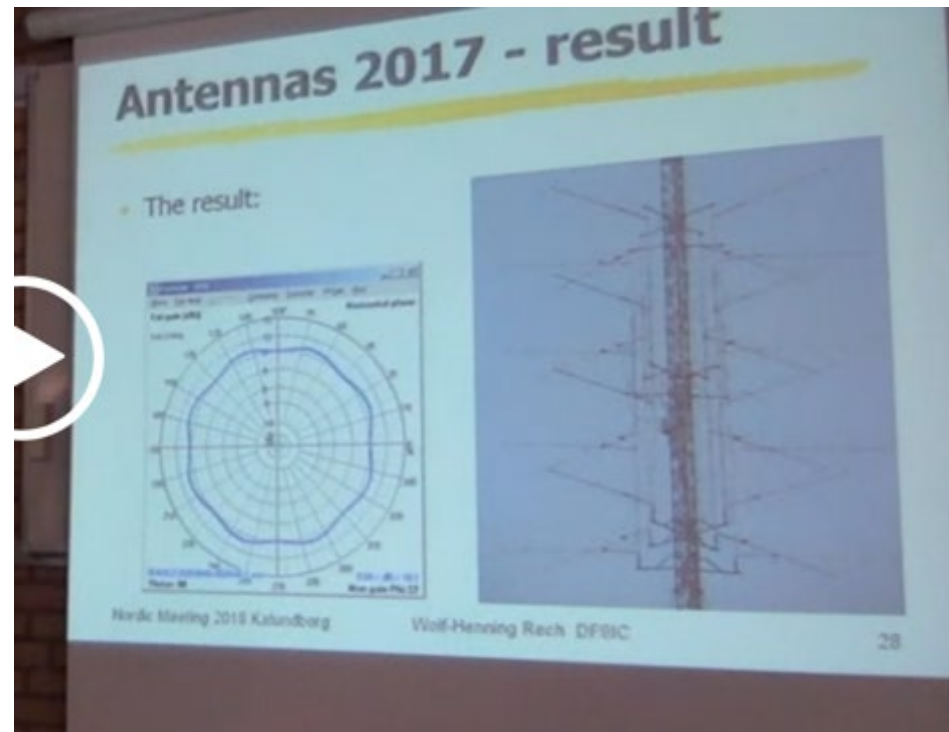
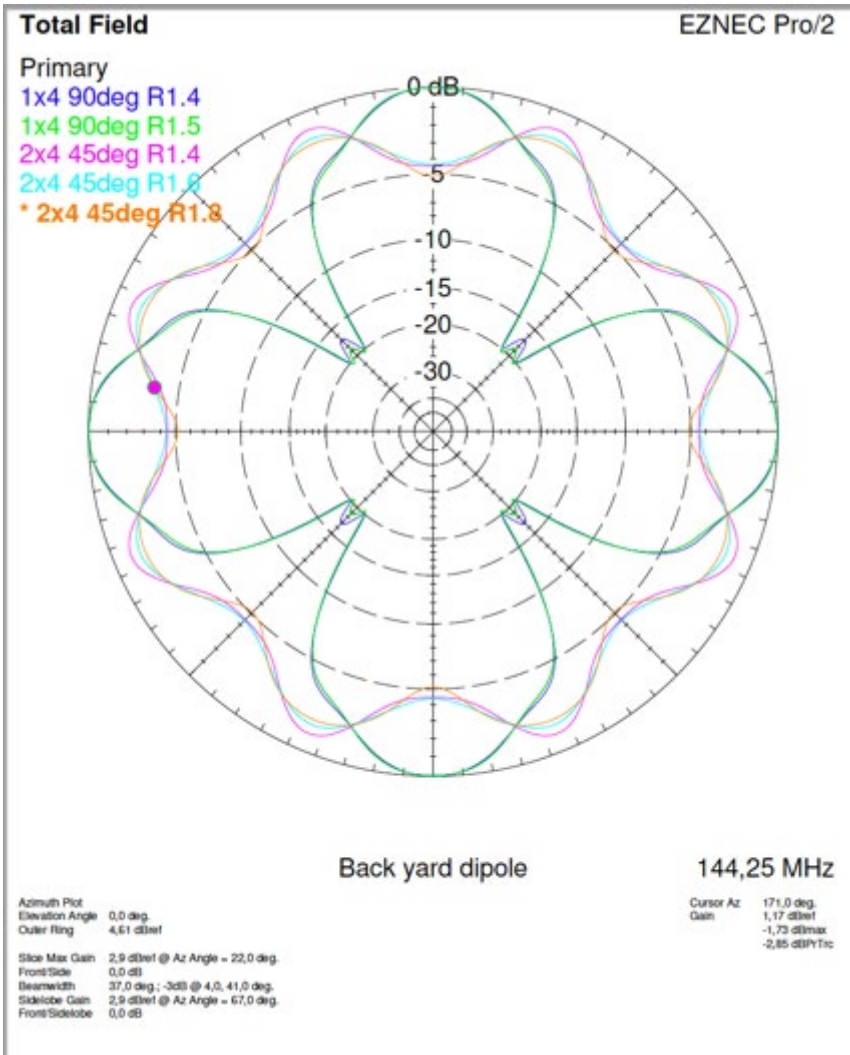
1.  $\nabla \cdot \mathbf{D} = \rho_v$
2.  $\nabla \cdot \mathbf{B} = 0$
3.  $\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$
4.  $\nabla \times \mathbf{H} = \frac{\partial \mathbf{D}}{\partial t} + \mathbf{J}$





# Simulering af DR9A system

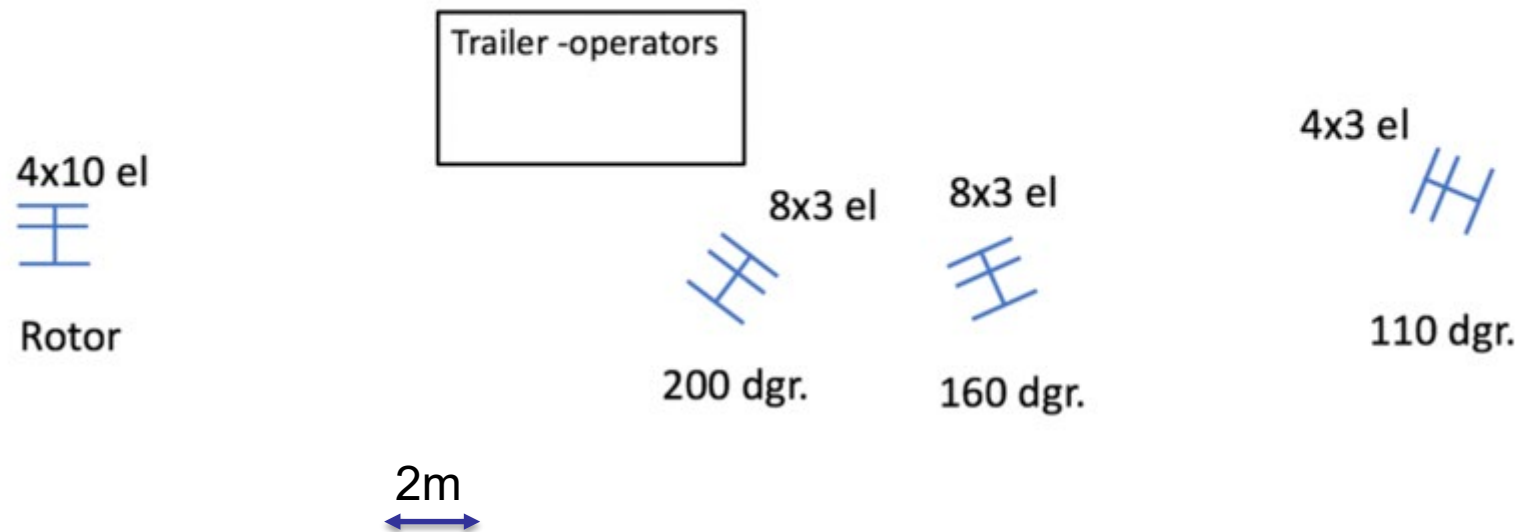
## 8 stk 4x6 el



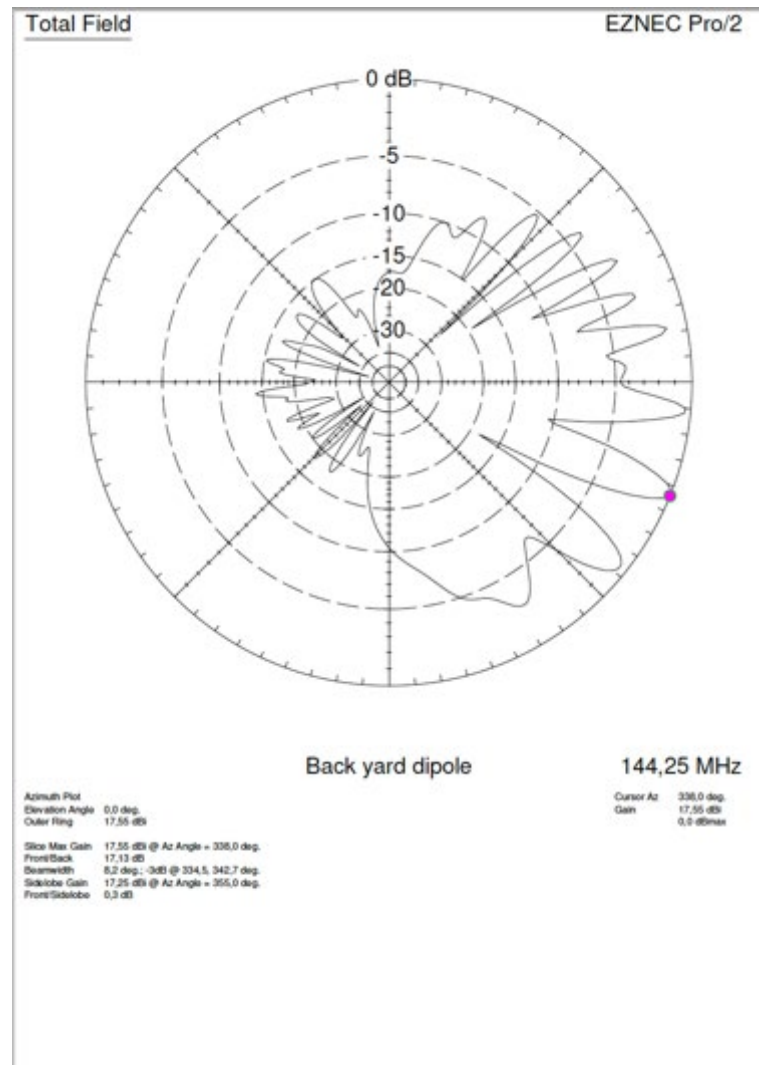
# Antenne placering



5P5T pre-2018



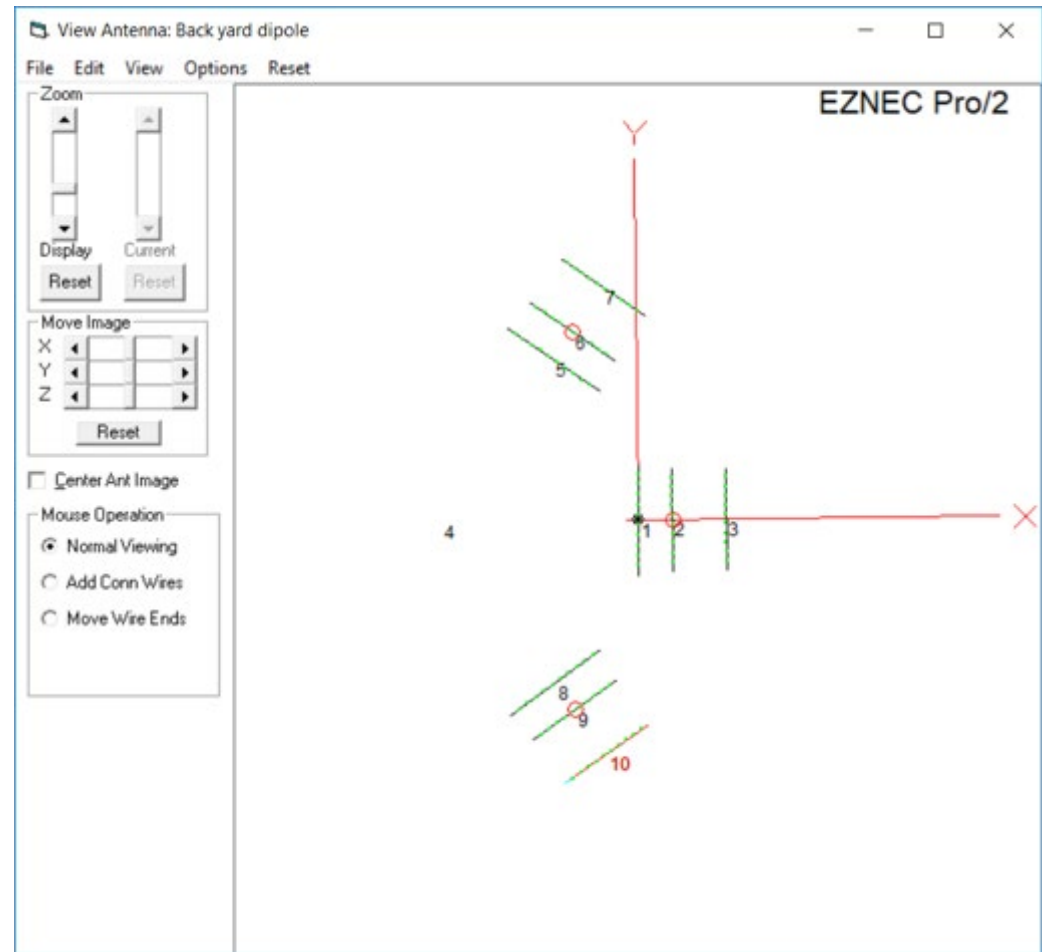
# Udstråling fra samlet system pre-2018



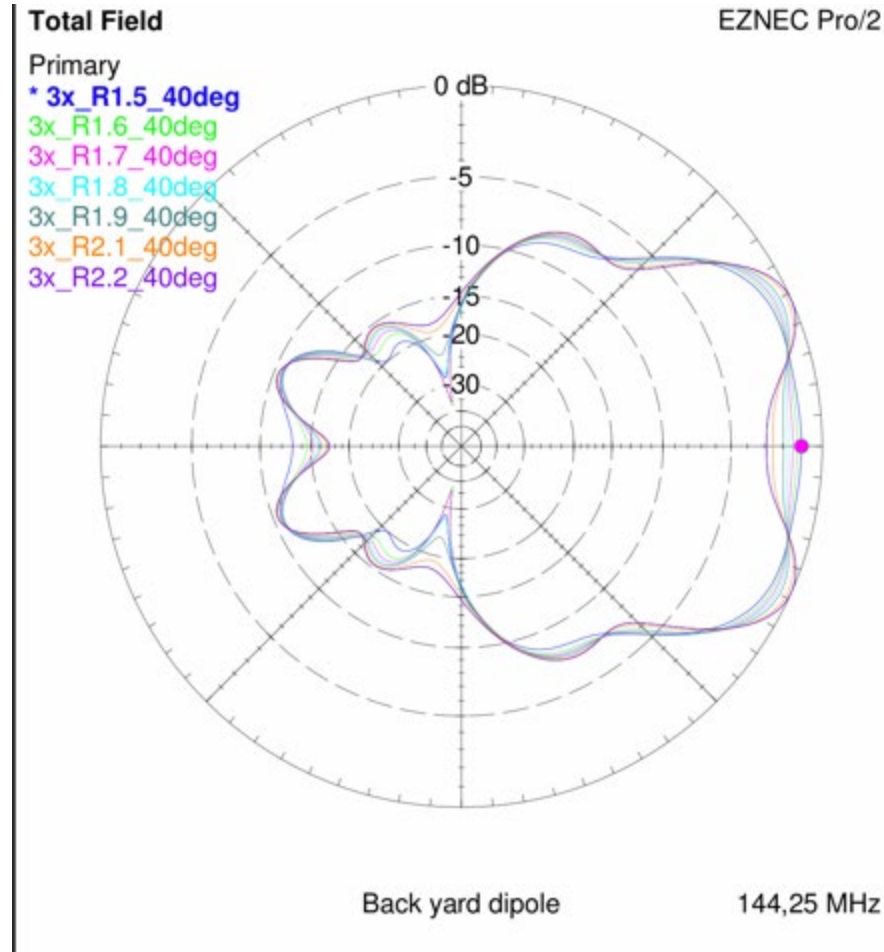


# Optimering af 3 systemer med 8x3 el yagi

- Antennerne placeret på en cirkelbue
- Variation af radius og vinkel mellem antennerne

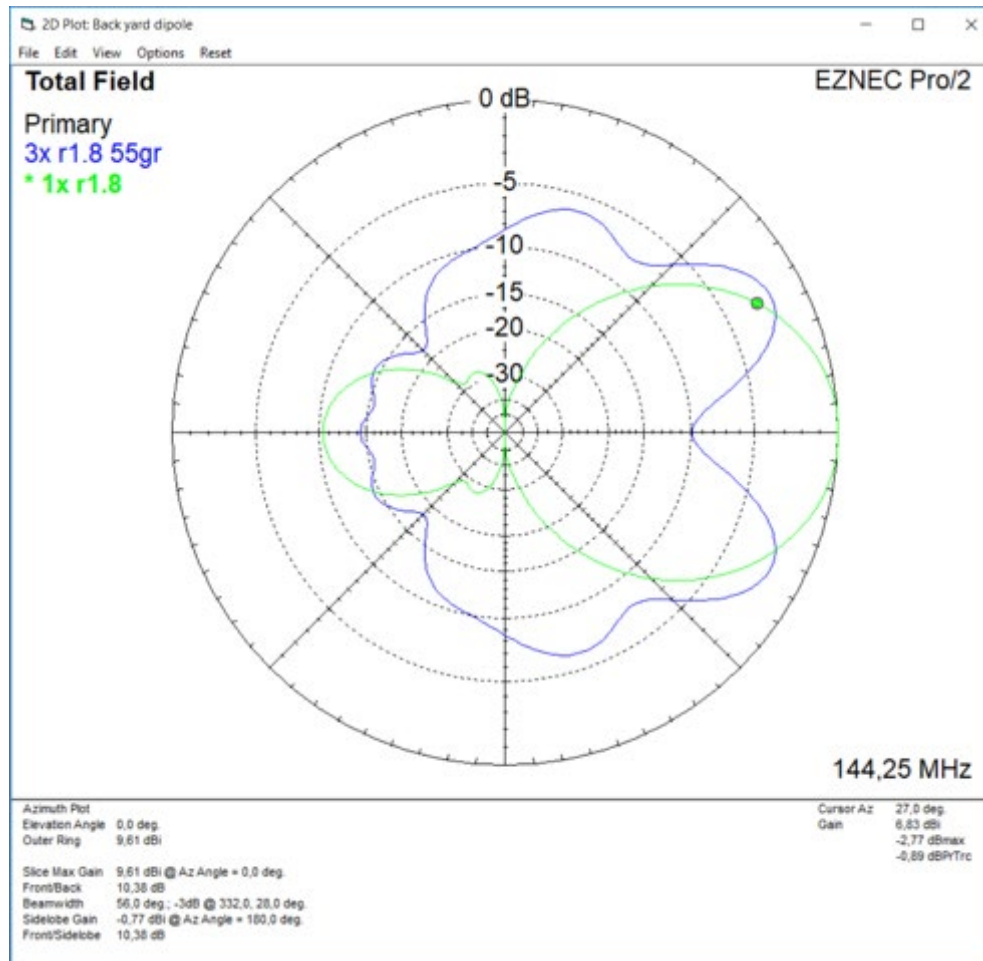


# Variation af radius



Desto mindre radius desto jævner udstrålingsdiagram

# 55 grd. imellem antenner





# 3 og 4 systemer 8x3 el

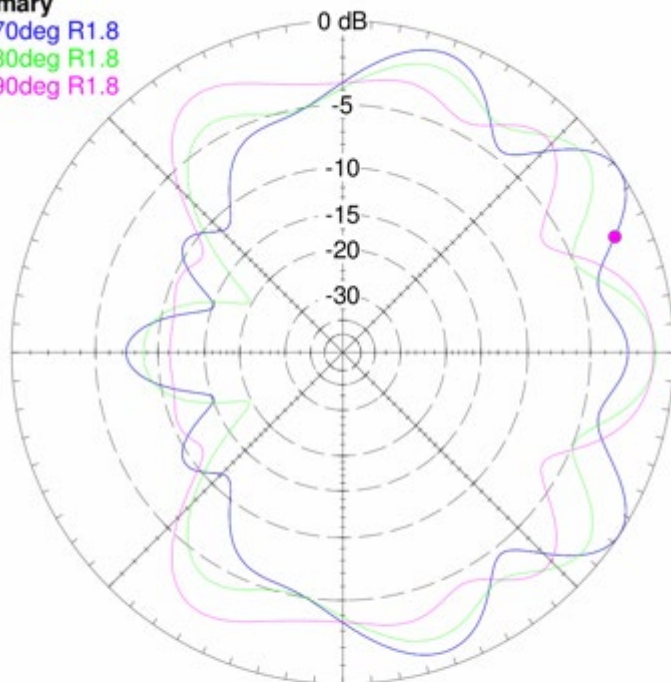
Total Field

\* Primary

3x8 70deg R1.8

3x8 80deg R1.8

3x8 90deg R1.8



Back yard dipole

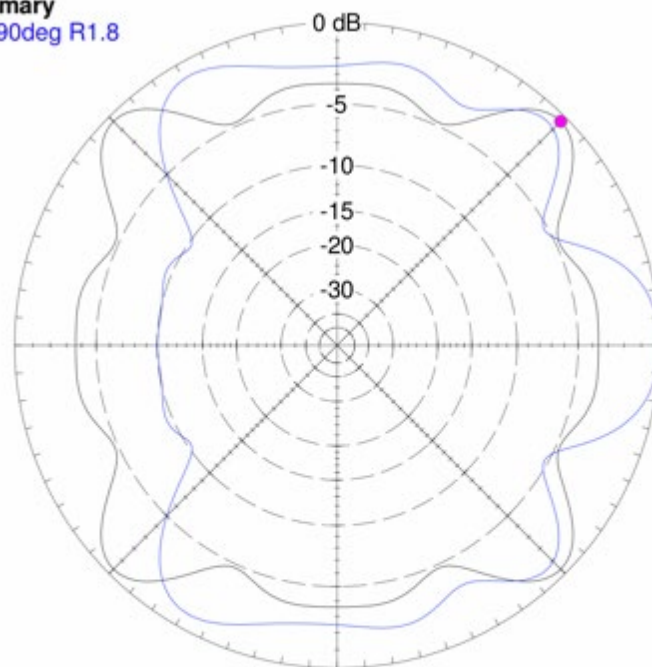
EZNEC Pro/2

otal Field

Primary

x8 90deg R1.8

EZNEC Pro/2



Back yard dipole

144,25 MHz

Cursor Az 23.0 deg.  
Gain 13.14 dB  
-1.95 dBmax

Azimuth Plot  
Elevation Angle 0.0 deg.  
Outer Ring 15.09 dB  
  
Slice Max Gain 15.09 dB @ Az Angle = 33.0 deg.  
Front Back 9.43 dB  
Beamwidth 26.3 deg.: -3dB @ 19.6, 45.9 deg.  
Sidelobe Gain 15.09 dB @ Az Angle = 326.0 deg.  
Front/Sidelobe 0.2 dB

imuth Plot  
vation Angle 0.0 deg.  
ter Ring 14.01 dB  
  
e Max Gain 13.67 dB @ Az Angle = 45.0 deg.  
ntSide 0.0 dB  
amwidth 26.6 deg.: -3dB @ 31.7, 58.3 deg.  
lobe Gain 13.67 dB @ Az Angle = 135.0 deg.  
nt/Sidelobe 0.0 dB

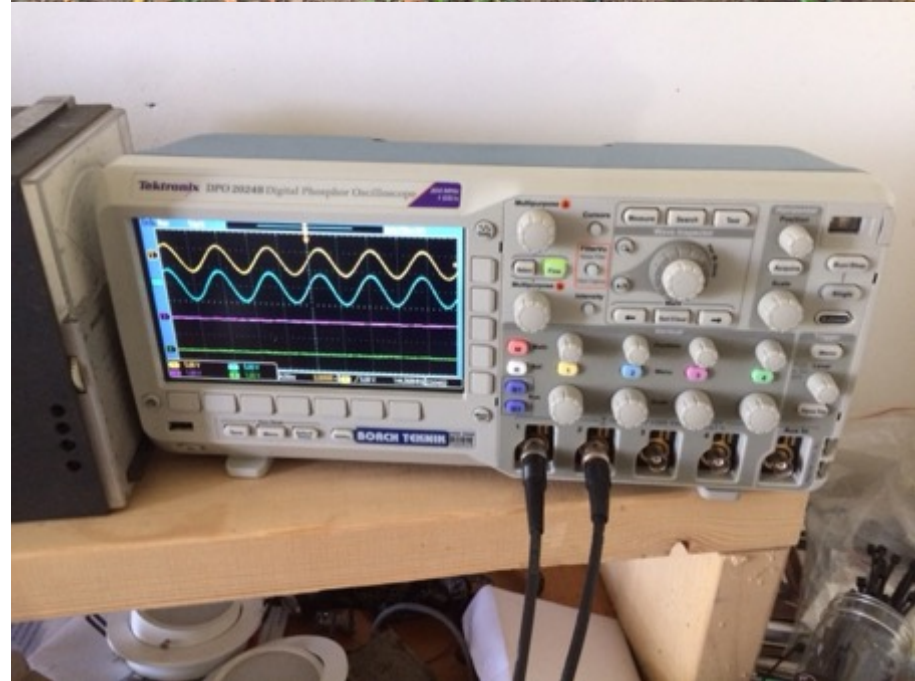
144,25 MHz

Cursor Az 45.0 deg.  
Gain 13.67 dB  
0.0 dBmax

Valgt system 3 stk. 8x3 el i 70 grd. vinkel

# Fase –afstemning af kabellængder

- 4-kanals 200 MHz oscilloskop
- Alle PA, kabler, relæbokse og kombinere forbundet.
- Åbne porte afsluttet med 50 ohm
- TX –tilpasning af kabellængde fra driver
- RX –tilpasning af kabellængde fra preamp til RX combiner



# Nyt antenne setup



5P5T 2018

4x10 el



Rotor

Trailer -operators

3 systems of 8x3 el.  
Reflectors placed on a  
circle radius 1,8 m

240 dgr.



120 dgr.

180 dgr.





# RX switch

- 4x10 -rotor
- 8x3 250 grd W
- 8x3 180 grd S
- 8x3 110 grd E
  - Individuelt
  - 8x3 samlet
  - S+E
  - S+W

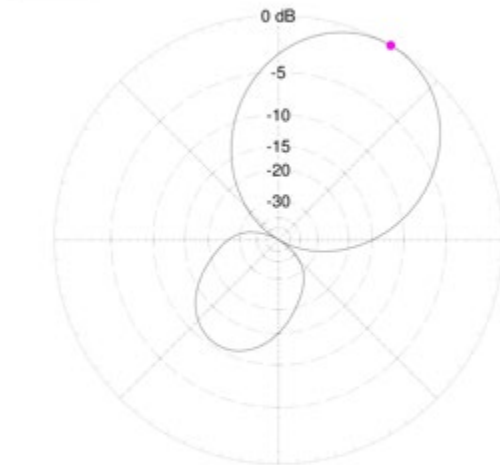


# Max. Gain??

1 system

Total Field

EZNEC Pro/2



Back yard dipole

144,25 MHz

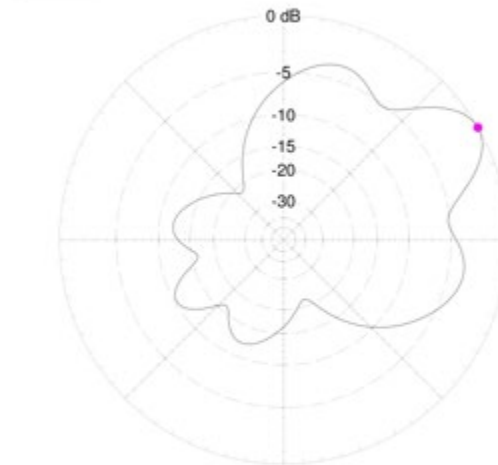
Current Az Gain 16.3 dB  
Elevation Angle 5.0 deg  
Outer Ring 18.0 dB  
Side Max Gain 18.0 dB @ Az Angle = 30.0 deg  
Front Back 10.0 dB  
Beamwidth 17.0 deg @ 10.0 dB  
Stability Gain 10.0 dB @ Az Angle = 300.0 deg  
Power/Distance 10.0 dB

16,3 dBd

2 systems

Total Field

EZNEC Pro/2



Back yard dipole

144,25 MHz

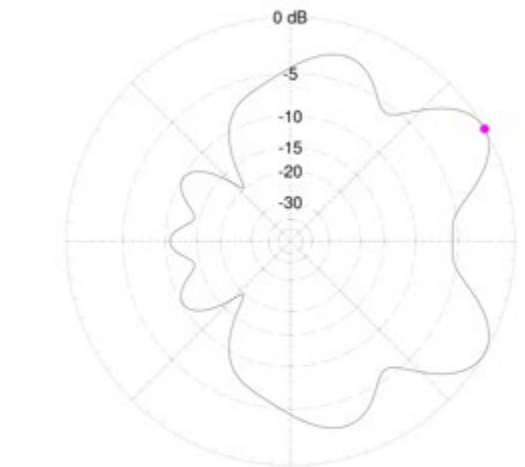
Current Az Gain 15.6 dB  
Elevation Angle 5.0 deg  
Outer Ring 18.0 dB  
Side Max Gain 18.0 dB @ Az Angle = 30.0 deg  
Front Back 10.0 dB  
Beamwidth 17.0 deg @ 10.0 dB  
Stability Gain 10.0 dB @ Az Angle = 300.0 deg  
Power/Distance 10.0 dB

15,6 dBd

3 systems

Total Field

EZNEC Pro/2



Back yard dipole

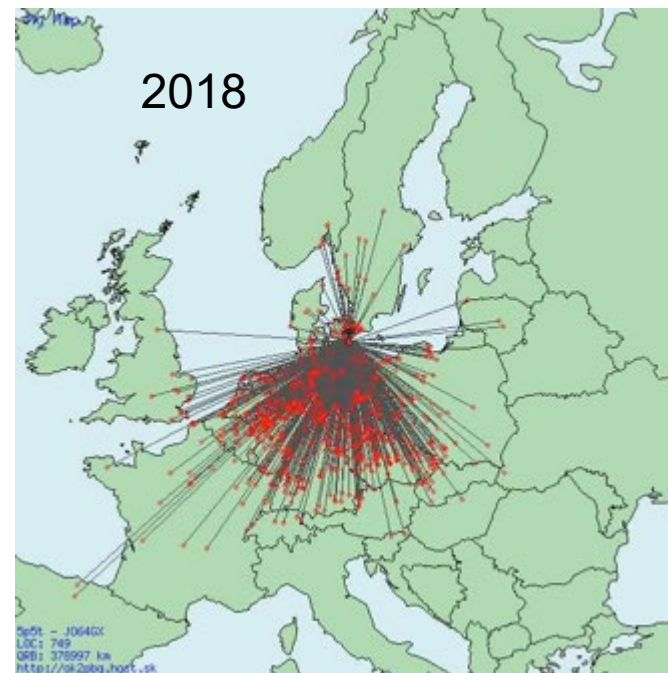
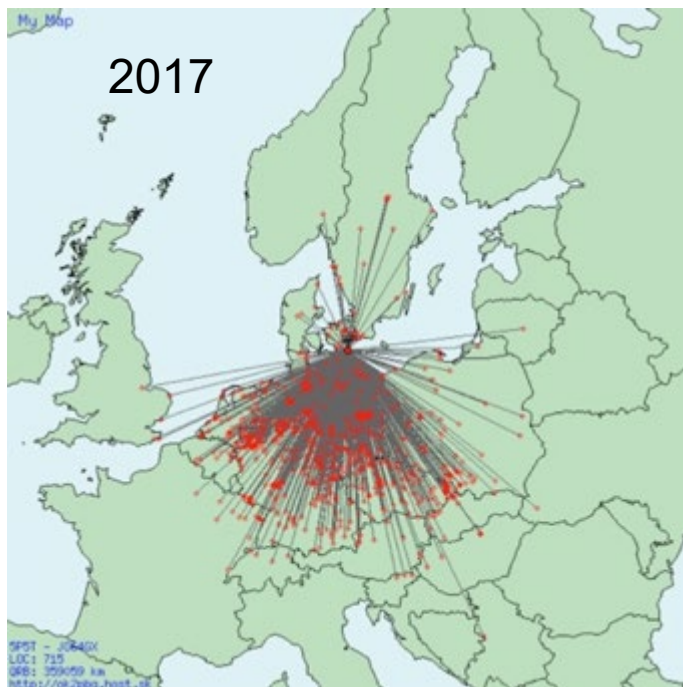
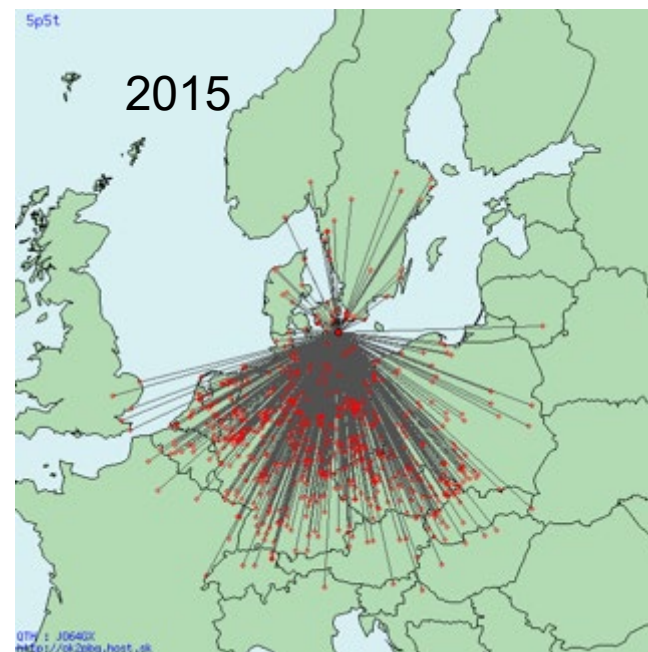
144,25 MHz

Current Az Gain 14.4 dB  
Elevation Angle 5.0 deg  
Outer Ring 18.0 dB  
Side Max Gain 18.0 dB @ Az Angle = 30.0 deg  
Front Back 10.0 dB  
Beamwidth 17.0 deg @ 10.0 dB  
Stability Gain 10.0 dB @ Az Angle = 300.0 deg  
Power/Distance 10.0 dB

14,4 dBd

# Virkede det?

- Design kun baseret på modellering
- Resultater er ikke helt logiske (simuleringer viser uforholdsmæssig stor indvirkning fra 4x10 el)
- Der var noget helt galt mod øst....
- Der var byttet om på 4 af dipolernes faser, så systemet var i perfekt modfase...
- *Man kan sagtens idiotsikre et system, det straks sværere med KRAFTIDIOT-sikring*
- Men det var tydeligt at S og W antennerne spillede sammen som de skulle.
- Vi bliver klogere i 2019...





Der gik lidt ged i fasen –men ideen holder



Flere forsøg og erfaringer venter...

# Fixing the high voltage cables.....

