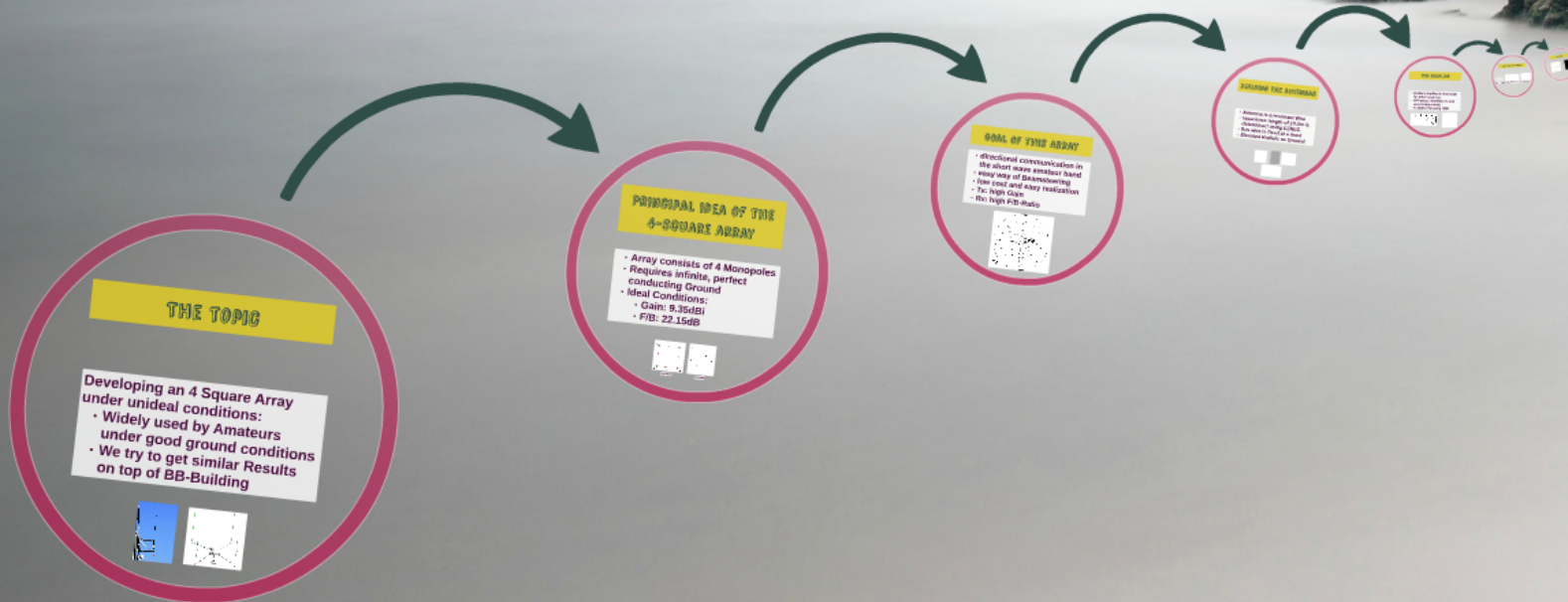


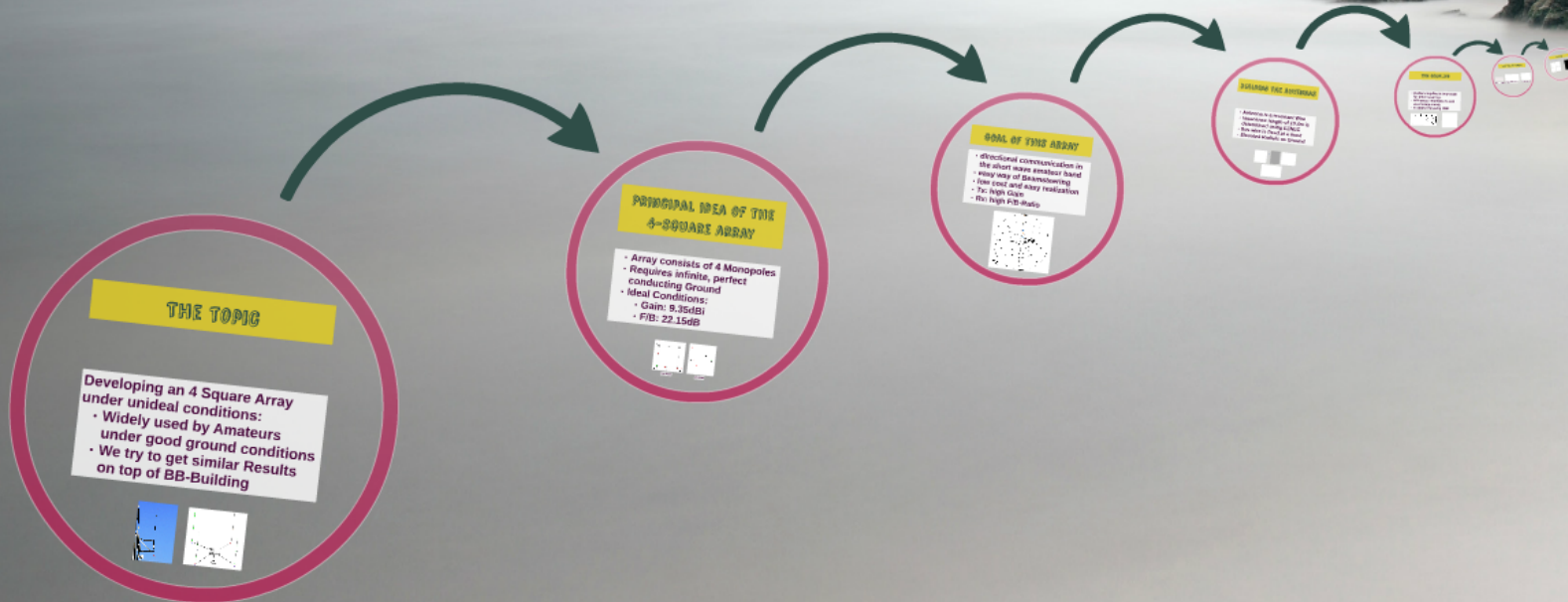
Building an Phased Array Antenna

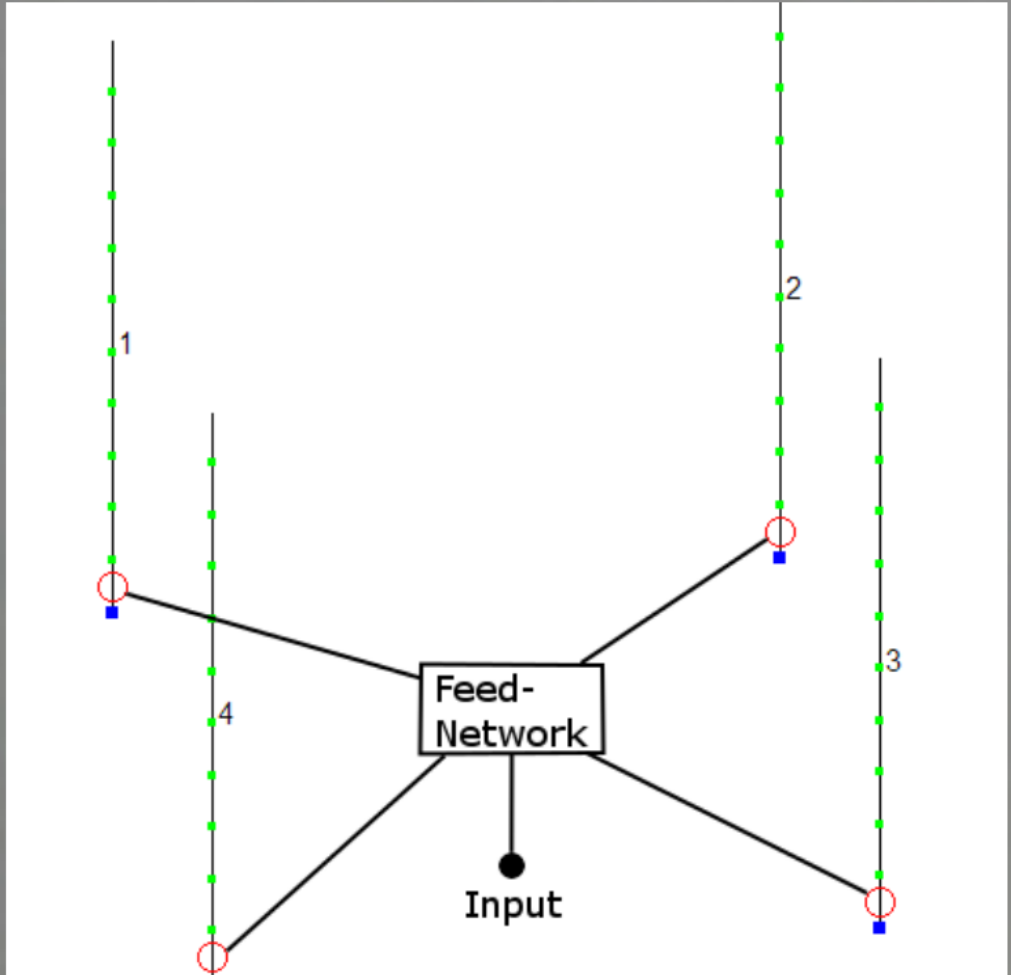
FOR SHORT WAVE COMMUNICATION



Building an Phased Array Antenna

FOR SHORT WAVE COMMUNICATION

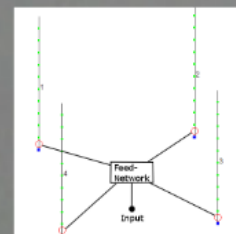




THE TOPIC

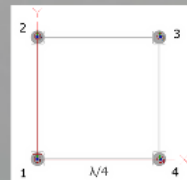
**Developing an 4 Square Array
under unideal conditions:**

- **Widely used by Amateurs
under good ground conditions**
- **We try to get similar Results
on top of BB-Building**

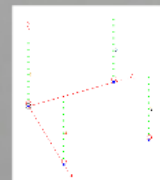


PRINCIPAL IDEA OF THE 4-SQUARE ARRAY

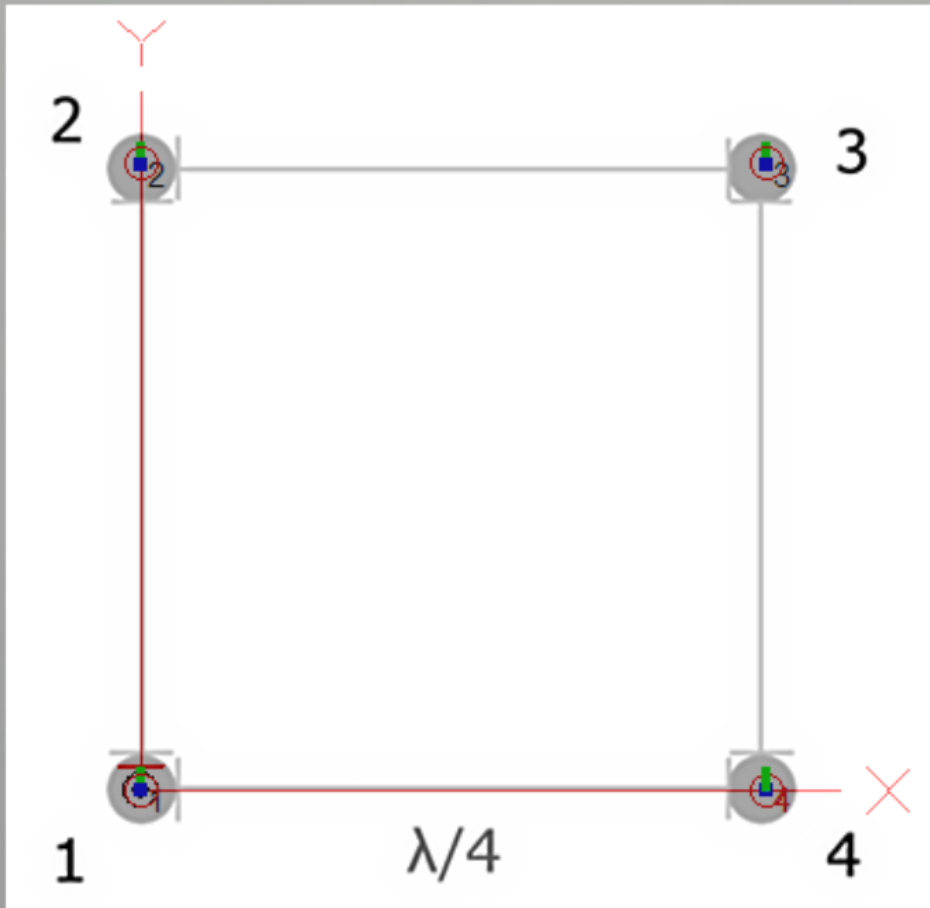
- Array consists of 4 Monopoles
- Requires infinite, perfect conducting Ground
- Ideal Conditions:
 - Gain: 9.35dBi
 - F/B: 22.15dB



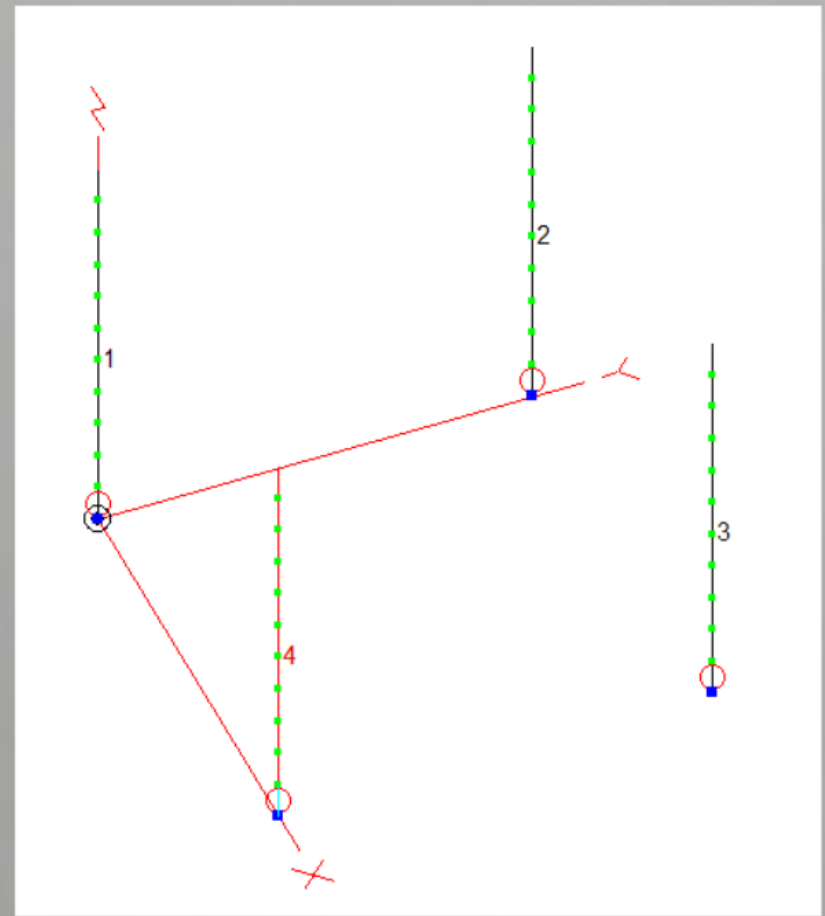
Top View



3D-View



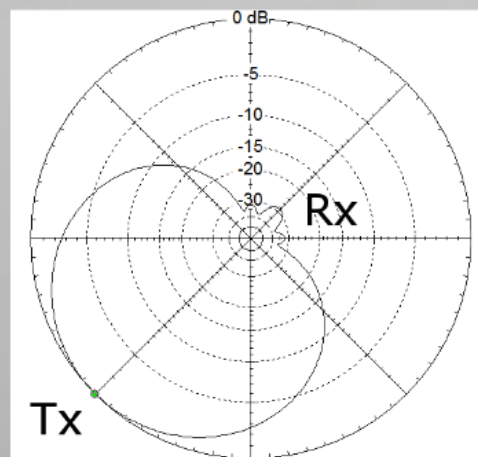
Top View

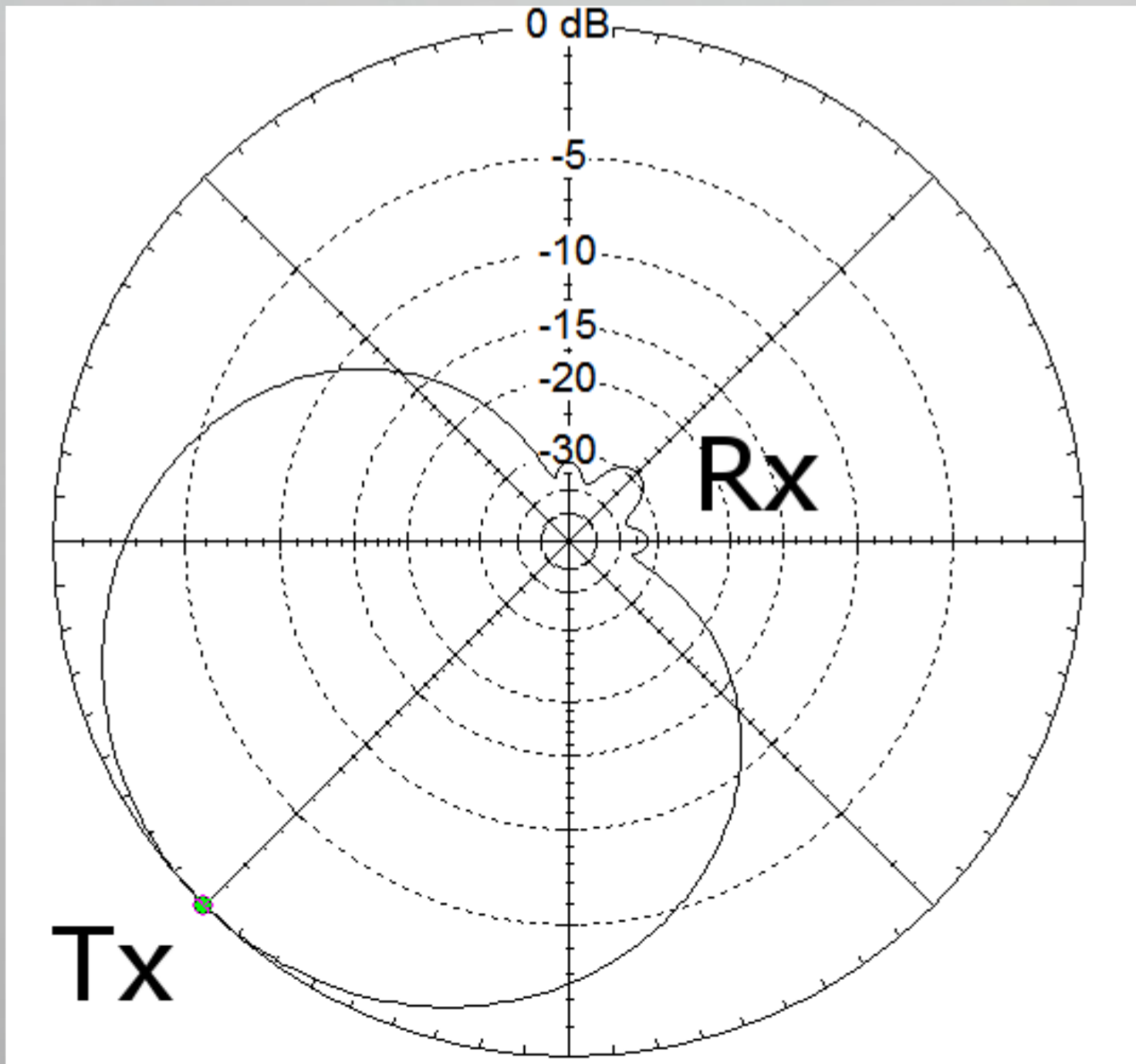


3D-View

GOAL OF THIS ARRAY

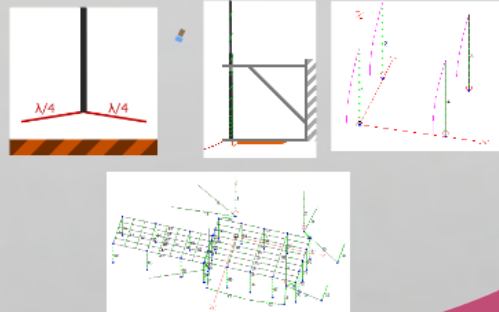
- **directional communication in the short wave amateur band**
- **easy way of Beamsteering**
- **low cost and easy realization**
- **Tx: high Gain**
- **Rx: high F/B-Ratio**

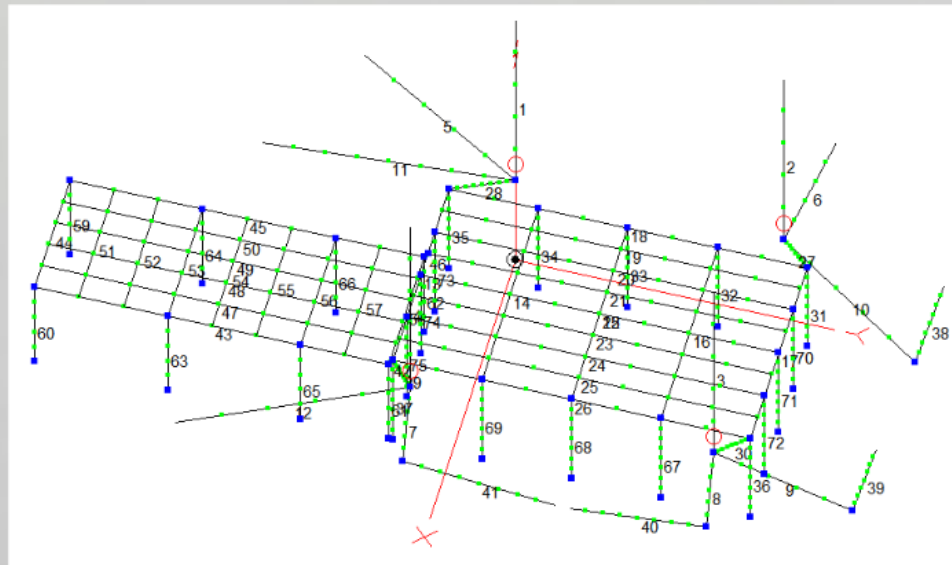
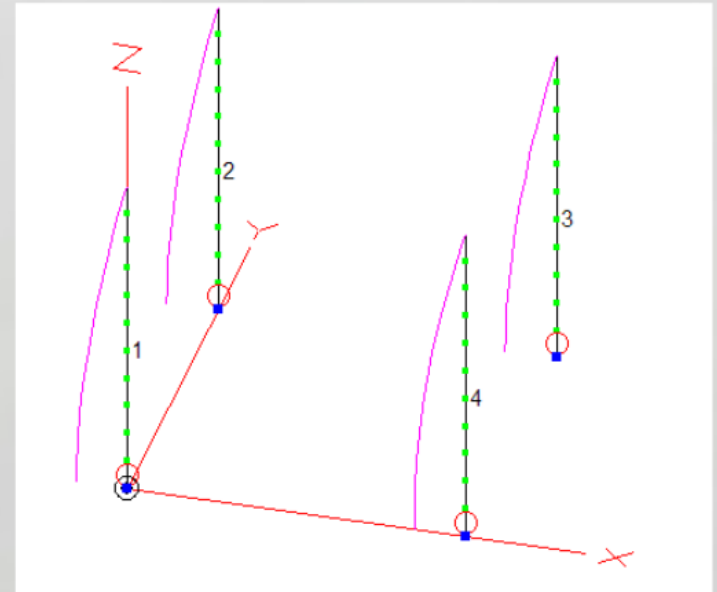
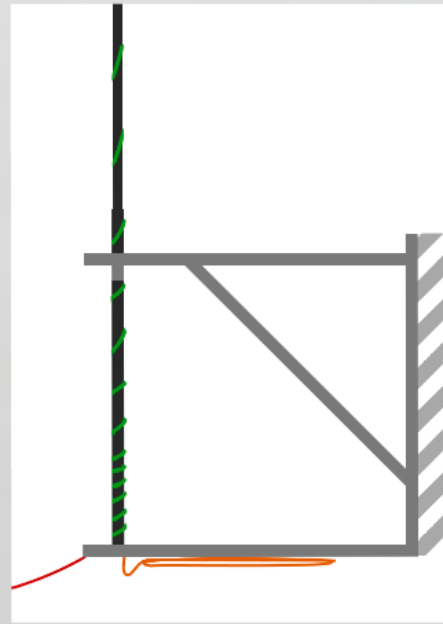
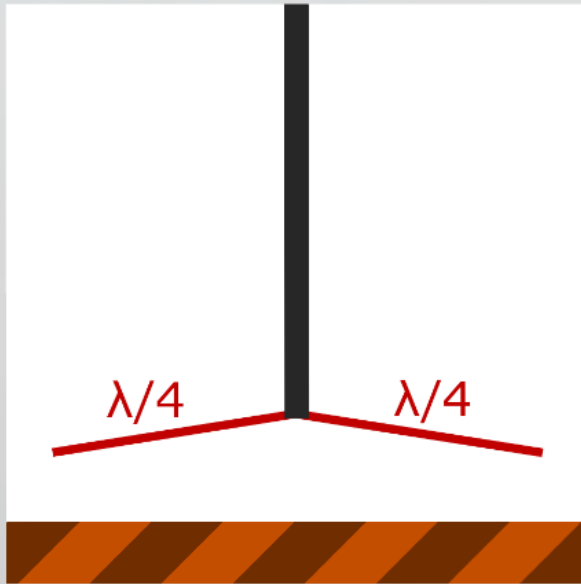




BUILDING THE ANTENNAS

- Antenna is a resonant Wire
- resonance length of 10.4m is determined using EZNEC
- this wire is fixed at a mast
- Elevated Radials as Ground

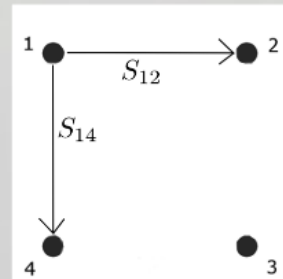




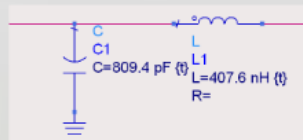
THE COUPLING

- mutual coupling is important for antenna arrays
- influences impedances and used components
- is measured using NWA

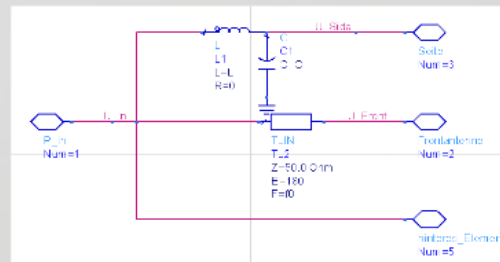
$$\begin{pmatrix} S_{11} & S_{12} & S_{13} & S_{14} \\ & S_{22} & S_{23} & S_{24} \\ & & S_{33} & S_{34} \\ & & & S_{44} \end{pmatrix}$$



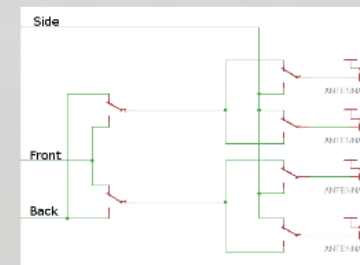
THE FEED NETWORK



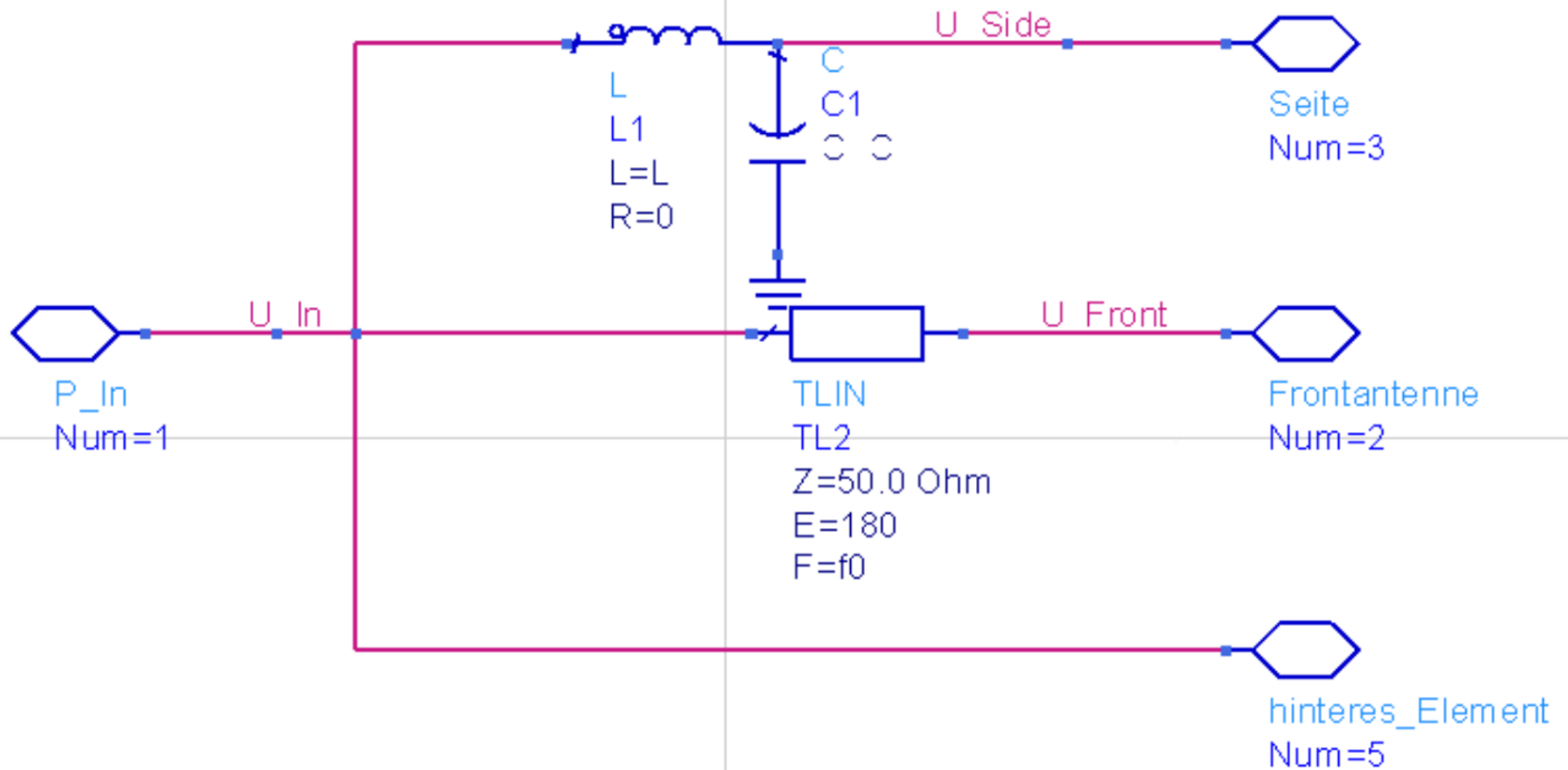
Matching Circuit



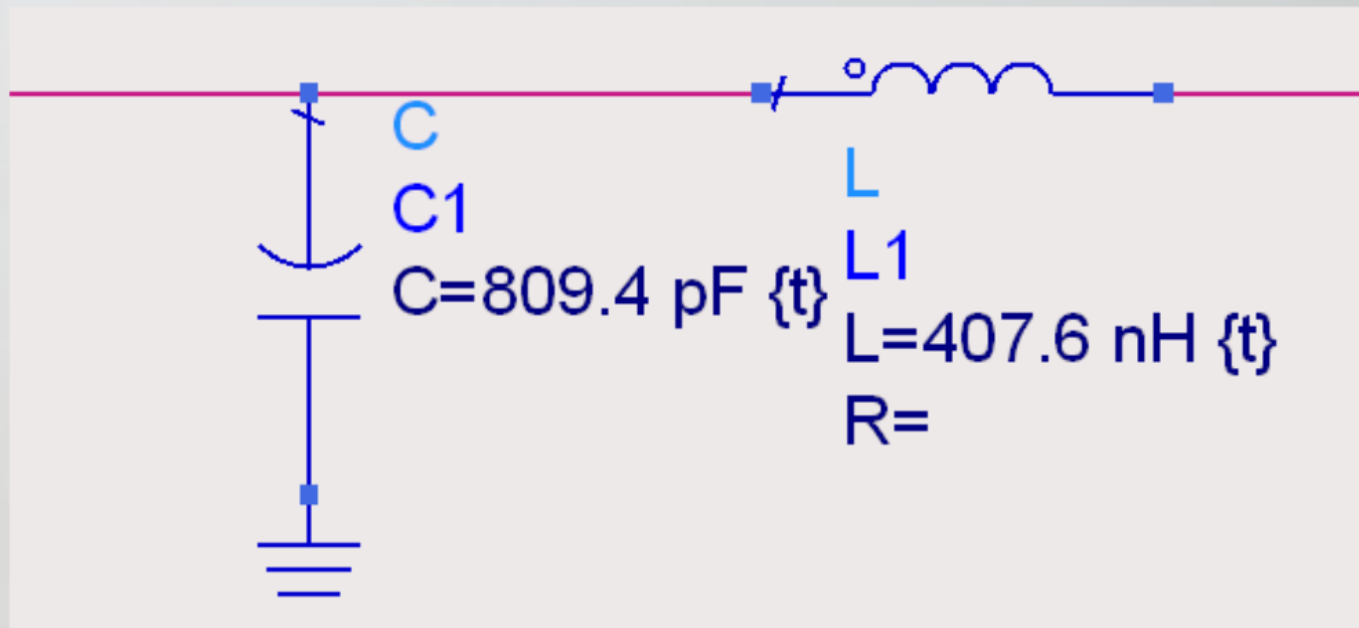
Phase Shifter Network



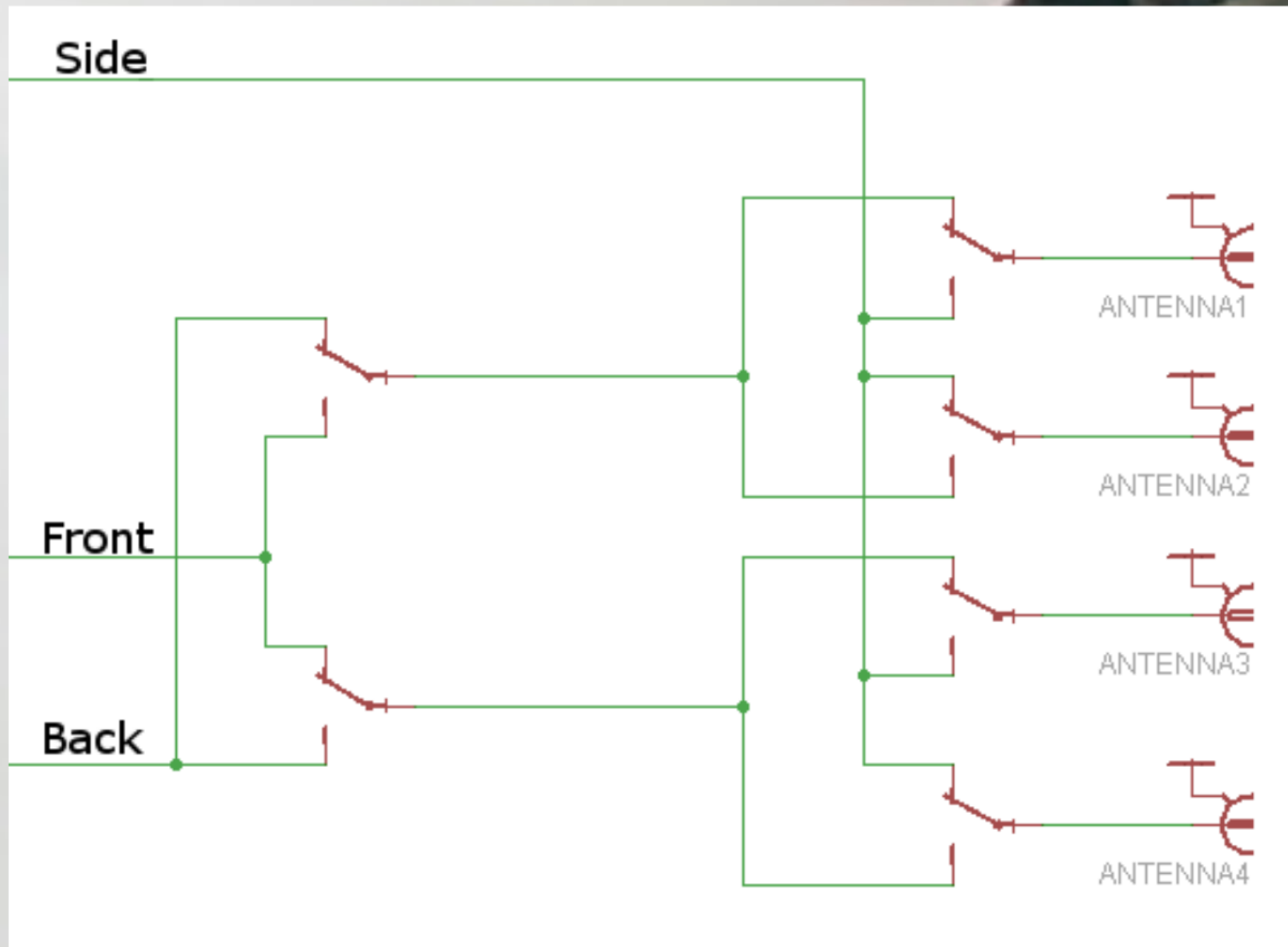
Relay Network



Phase Shifter Network

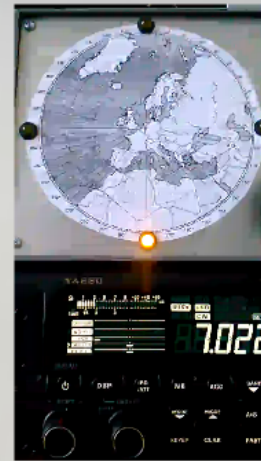
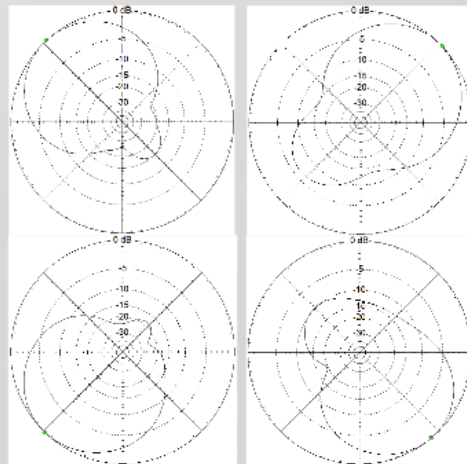


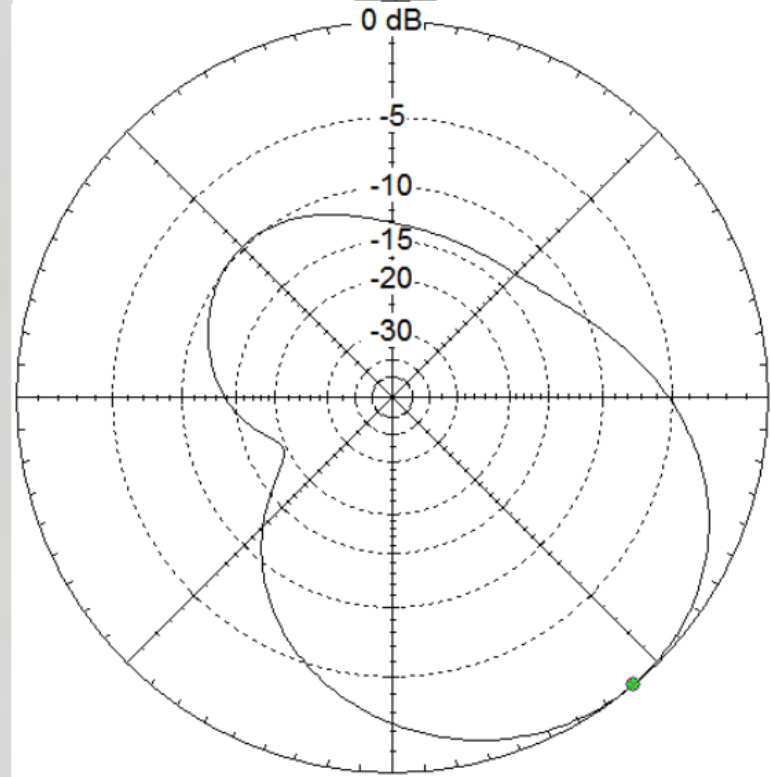
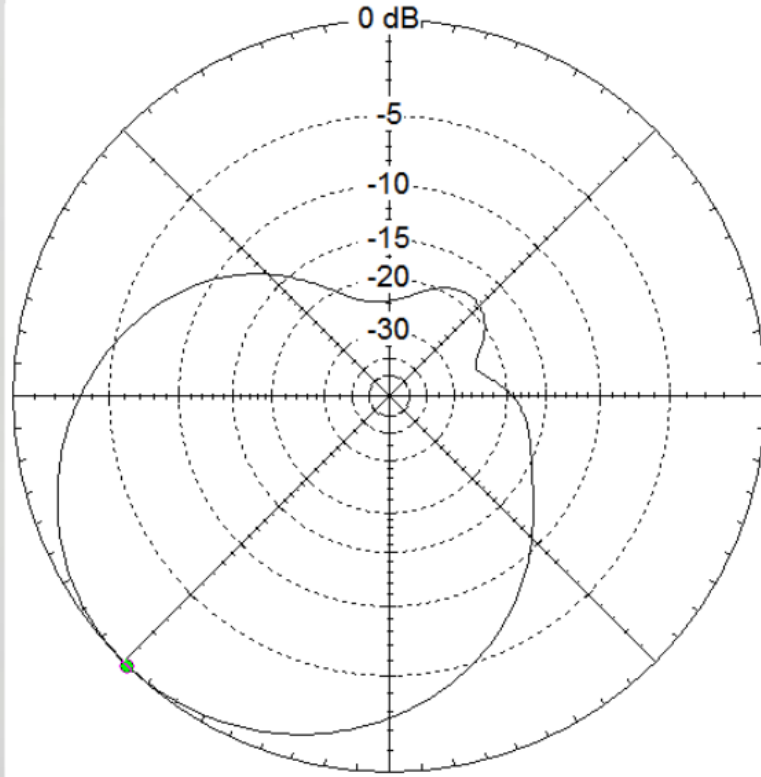
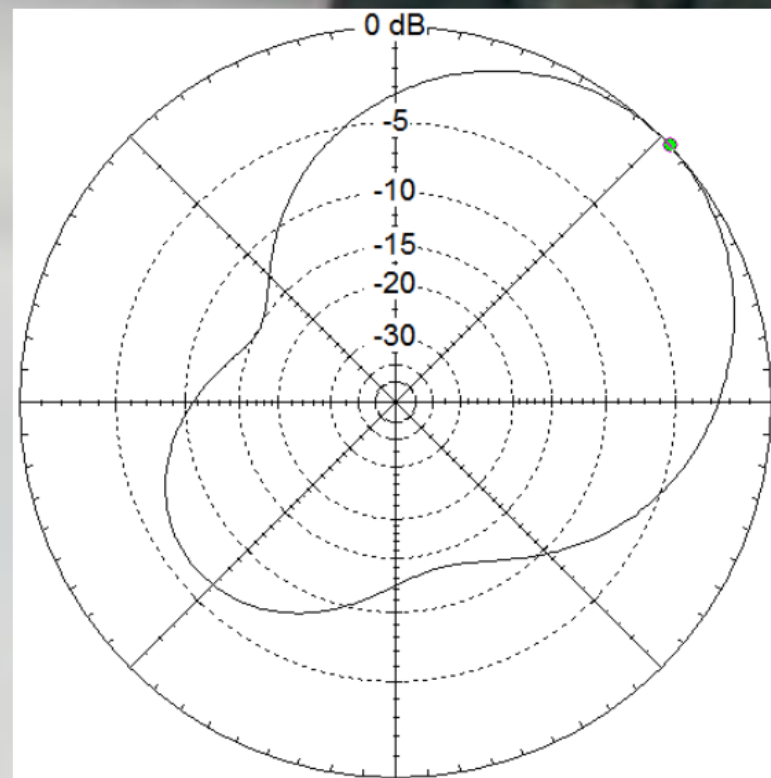
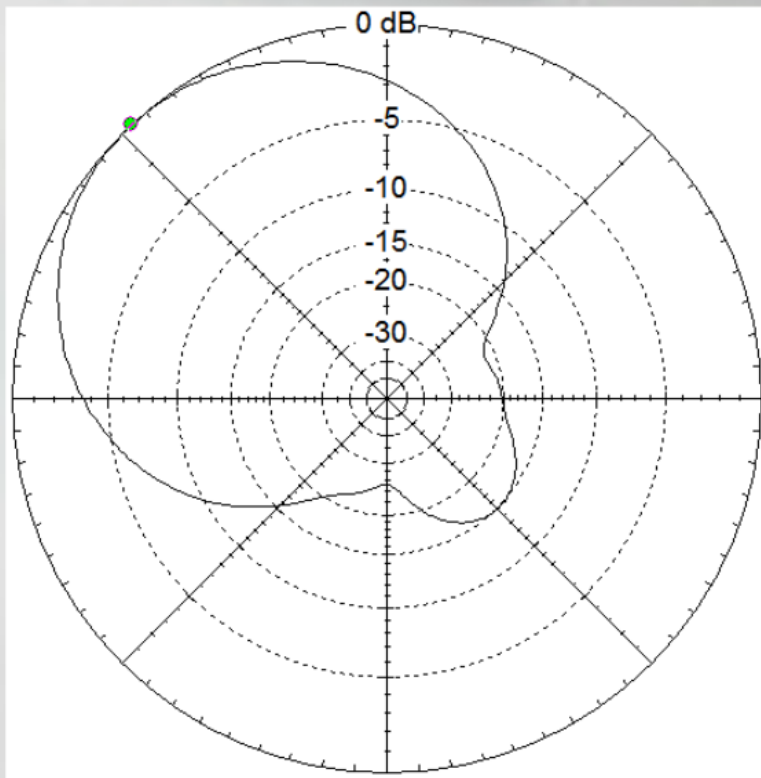
Matching Circuit



Relay Network

RESULTS







Building an Phased Array Antenna

FOR SHORT WAVE COMMUNICATION

