

DEUTERIUM ARRAY MEMO #002
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To: Deuterium Array Group
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Subject: Estimates of the interference susceptibility

The most inciduous interference is likely to be from weak constant narrowband signals rather than transients which can be edited out.

Sensitivity

With a full array of 64 dual polarized stations and 50 K system temperature the sensitivity in a 10 kHz bandwidth and 10^6 seconds integration is

$$50 \times (10^4 \times 10^6 \times 64)^{-1/2} = 62.5 \mu\text{K}$$

= -201 dBm in 10 kHz BW

Array rejection at horizon

The antenna gain of each station will be about 22.5 dBi (12 m² collection area) and we hope to have at least 30 dB rejection at the horizon or -7.5 dBi gain at the horizon.

Level of line of sight (LOS) transmitter

If we assume a LOS transmitter with isotropic antenna then the following levels are acceptable into the -7.5 dBi response at the horizon.

Distance km	Acceptable level dBm
1 km	-111
10 km	-91
100 km	-71
1000 km	-51

Level of non line of sight (NLOS) transmitter

Typical path loss for a NLOS transmitter follows a 35 dB/decade power law out to about 20 km as compared with the 20 dB/decade for LOS. Beyond 20 km the earth's curvature increases the loss more rapidly.

Distance km	Acceptable level dBm
1 km	-111
10 km	-76
100 km	-30
1000 km	+50

Level of moon reflected transmitters

If we assume a transmitter anywhere in the world whose signals are scattered from the moon (assuming at 10% radar cross-section) into the -7.5 dBi response the acceptable transmitter level is less than $+64$ dBm (2500 W).

The advantage of terrain

Terrain, like a range of hills, provides added path loss due to diffraction. Typically each ridge can provide an added 20-30 dB path loss.