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

$$50\times\left(10^4\times10^6\times64\right)^{-1/2}=62.5\mu\text{K}$$
$$=-201\text{ dBm in 10 kHz BW}$$

Array rejection at horizon

The antenna gain of each station will be about 22.5 dBi (12 m^2 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.