

UK Launch

iSat Tracking Feed Product

Satellite Catapult
April 2017

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iSat is a....

- World class innovator in RF terminals at specialist frequencies, associated feeds and tracking.
 - Oil & Gas - Maersk Oil.
 - Broadcast - Al Jazeera Ka-band 110MHz backhaul.
 - Satellite Operator - Es'hailSat mini hub.

Financial and Technical Partners

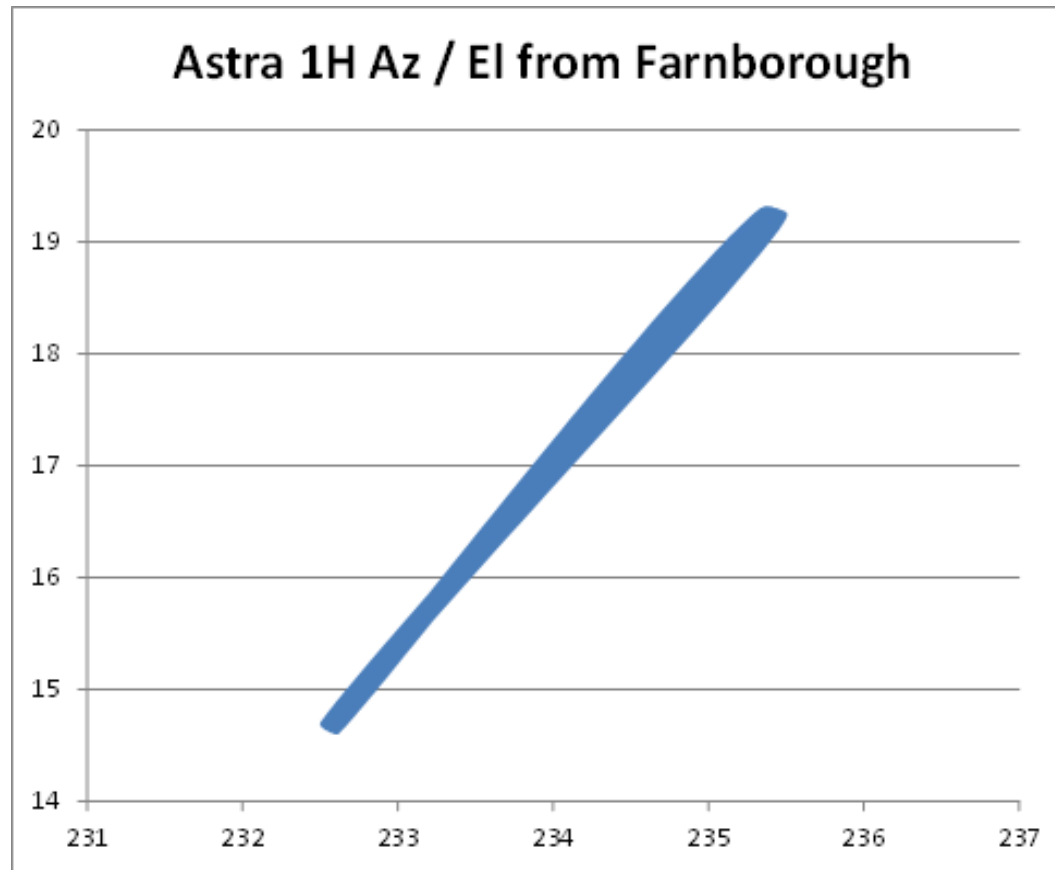
- HSBC – international bonds and working capital facilities combining with
- UKEF bond support scheme.
- ESA Artes 3/4 program.
- Highly experienced sector specialist board of directors

What is 'Inclined Satellite'?

- Rotate on a slightly different axis to Earth.
- Inclined satellites need terminals on the ground to track.
- Lower cost bandwidth versus geostationary satellites.
- iSat's tracking feed 10 times cheaper.

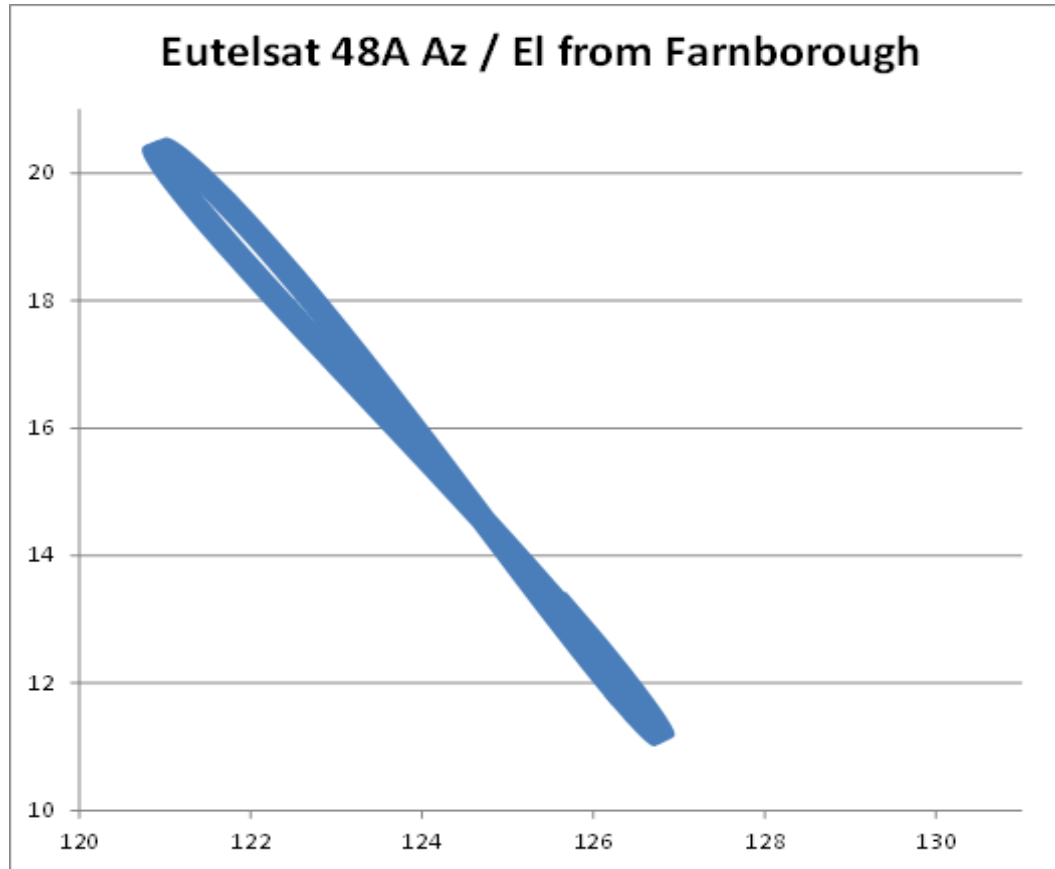
Tracking of inclined satellites

Astra 1H.



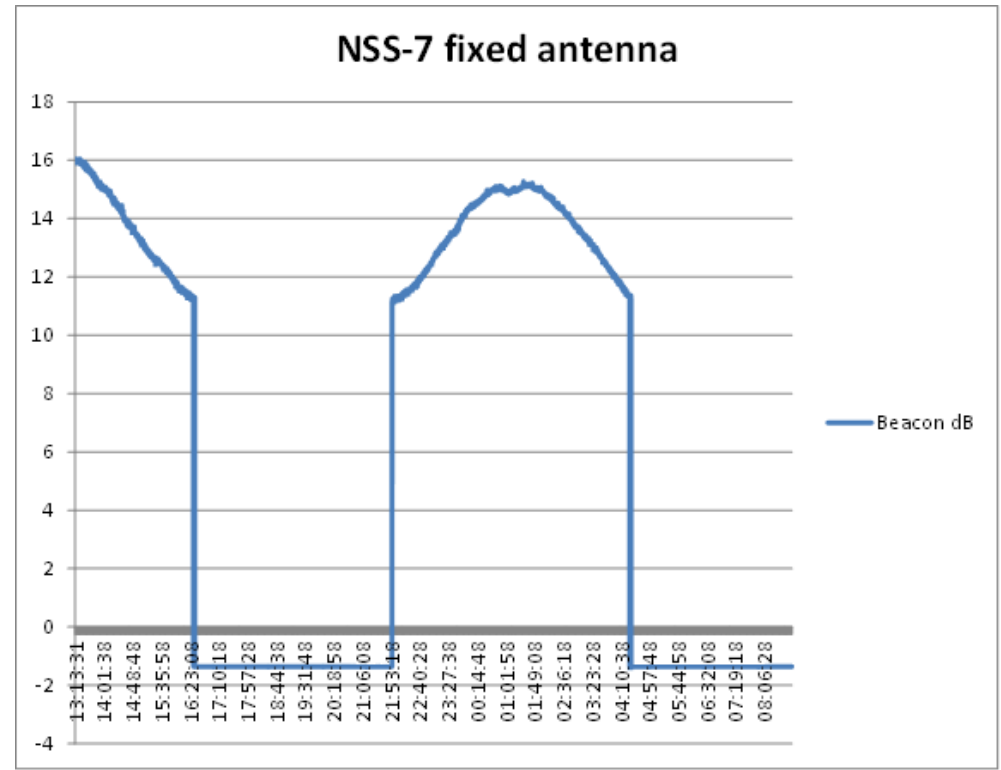
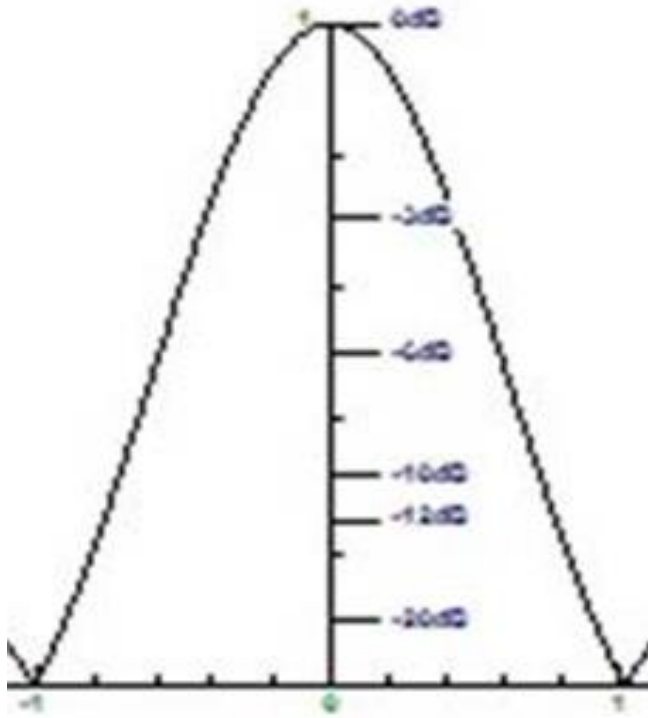
Tracking requirement

Eutelsat 48A



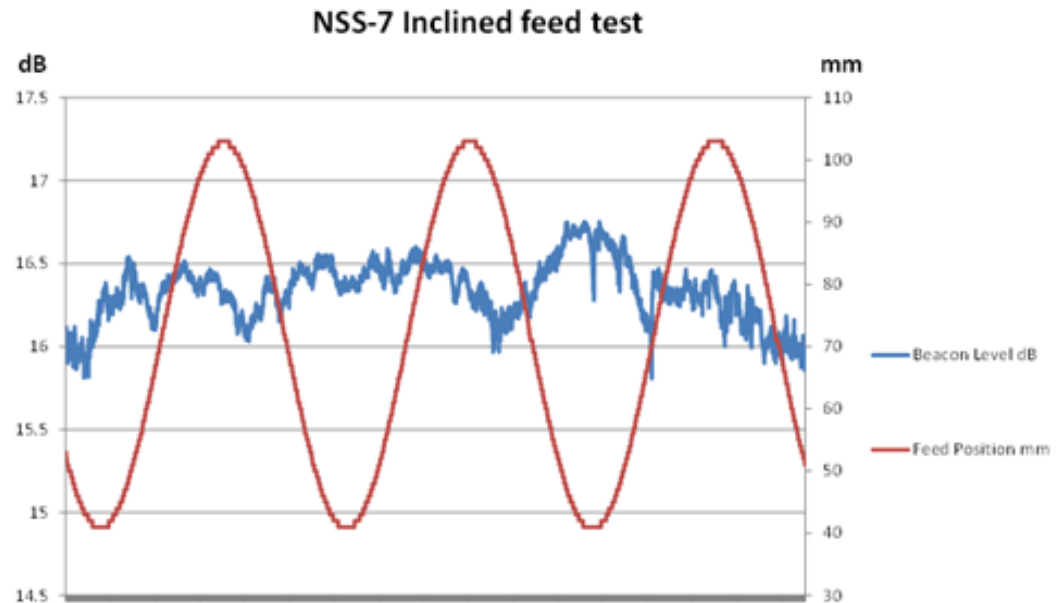
iSat Demo is pointed at NSS7 Ku band

- Without tracking, the signal strength at 1 degree has dropped 20dB
- So the signal is lost by a modem or beacon receiver.



With Feed Tracking – Signal Retained!

- The prototype has been tracking non-stop for nearly 1 year.



How many degrees can a feed track?

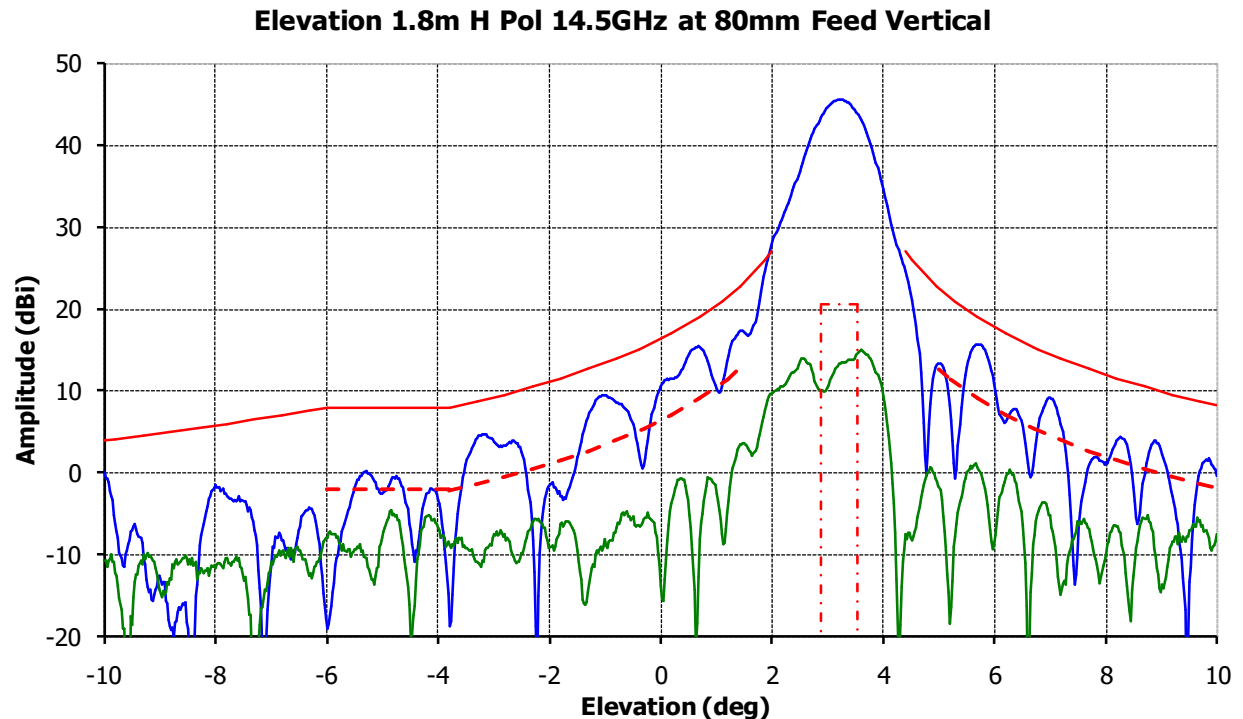
- Signal distortion is relative to wavelength

- About 2λ

Antenna mtrs	Band	Frequency GHz	2λ mm	Inclination degrees
3.8	C	6	98	2.46
2.4	C	6	98	3.37
2.4	X	8	75	2.23
2.4	Ku	14	42	1.25
1.8	C	6	98	3.89
1.8	X	8	75	2.98
1.8	Ku	14.5	40	1.40
1.2	X	8	75	4.47
1.2	Ku	14	42	2.50

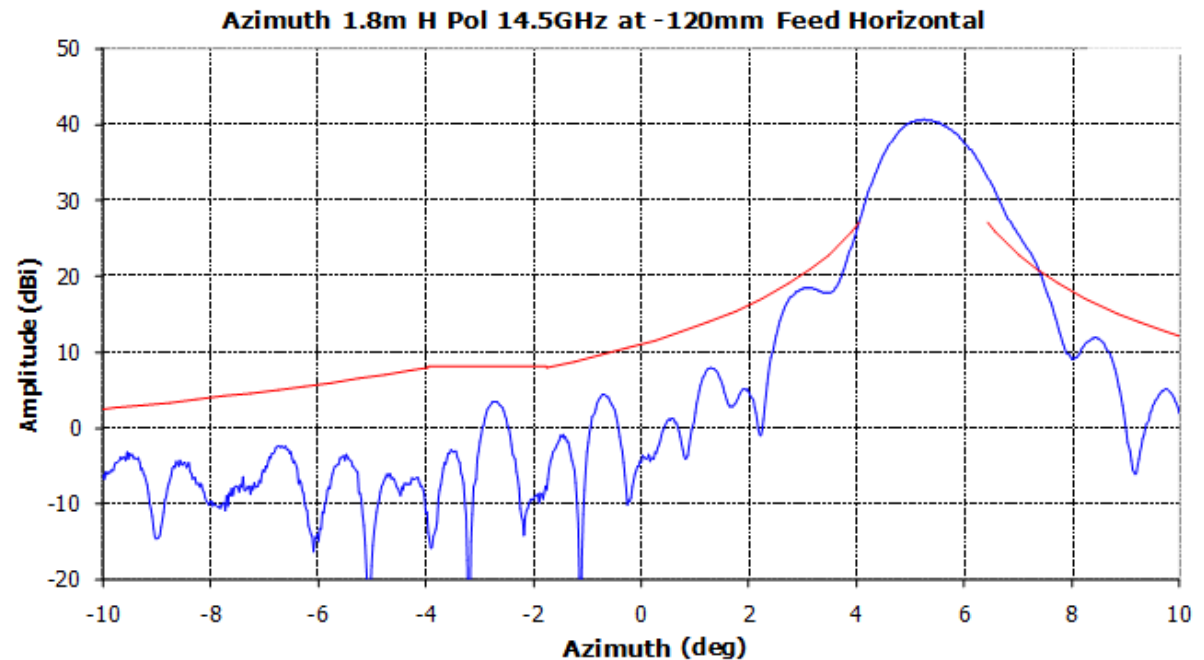
Signal distortion test result

- At 80mm (over 3 degrees) moving the feed vertically up, elevation within spec



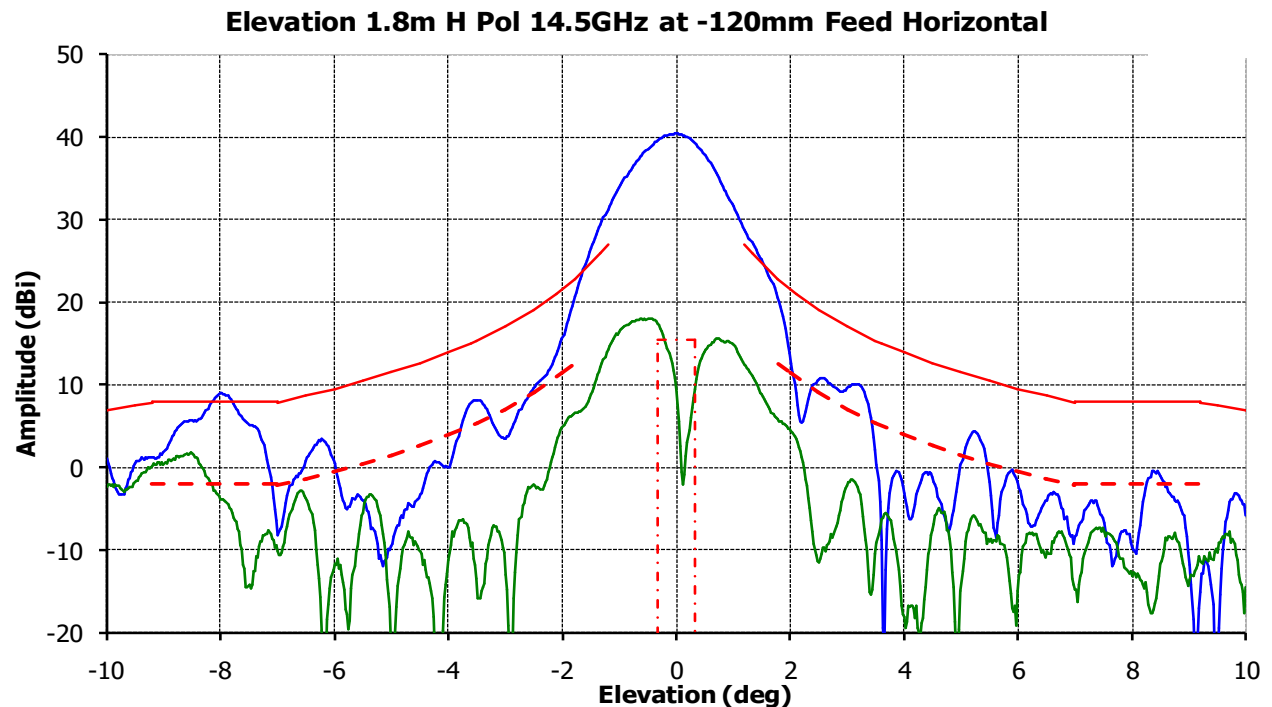
Actual 1.8mtr Ku band range test

- Sidelobe pattern at 120mm horizontal is OK.
- Greater than 5 degrees



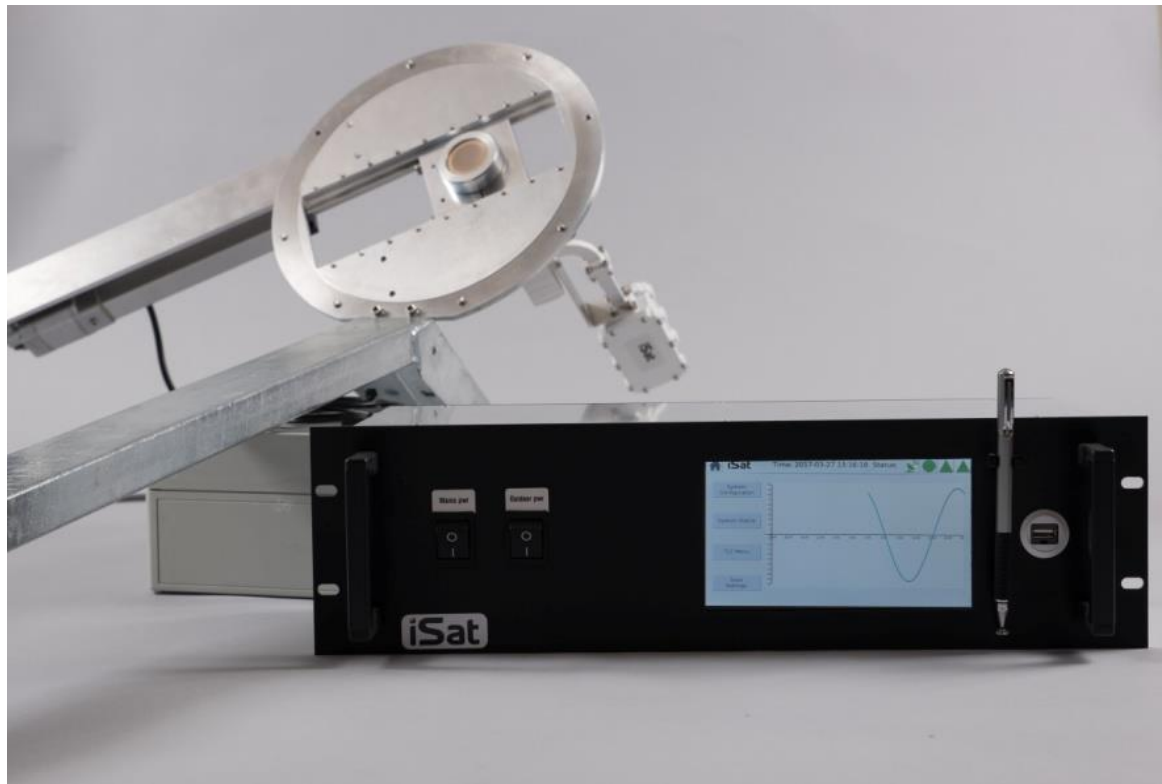
Actual 1.8mtr Ku band range test

- Cross polarisation check at 120mm –OK
- 5 degrees



Innovative Touchscreen GUI

- Configuration
- Status
- Licence
- Alarms



Applications

- Satellite life extension:- alternative to re-fuel or replacement.
- Cost reduction of satellite bandwidth.

Satellite Life Extension worked example

- Re-fuel costs \$60M
- Satellite replacement \$200M
- Verus \$10M for feed tracking retrofit 1000 sites
 - \$4M hardware costs
 - Freight and bolting on allow \$4m
 - 3 years program subscription cost \$1.8M
 - Budget \$10M
- 20% greater revenue over initial 15 investment

Cost reduction worked example

- 2MHz bandwidth used on each site
- Cost of certain GEO = 2000/mth/MHz
- Cost of inclined = 1000/mth/MHz
- Saving per month = 2000/mth
- Time for payback investment = 2 mths
- Benefit on one year contract, 50 sites = \$1M

The tracking feed is...

- Convergence of RF and Coding skills.
- Lowers access to satellite services.
- Demo at Cody Technology Park in Farnborough