



ITC 2011

C-Band Special Session

C-Band Vendor Products

ViaSat

Eddie Payne

October 26, 2010

Bally's

Las Vegas, NV



ViaSat

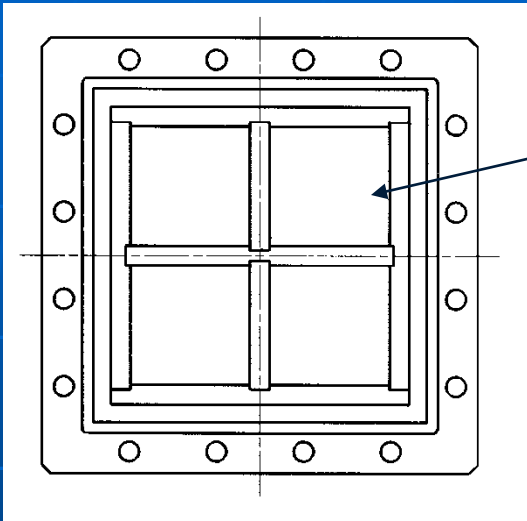
- Wireless communication products, networks, services and systems engineering
 - For military, commercial and consumer markets
- Founded in 1986
 - The three founders are still active at ViaSat
- Over 1,600 employees worldwide
- Headquartered in Carlsbad (San Diego), California
- Antenna Systems Division located in Atlanta Georgia
- **ViaSat successfully launched last week ViaSat -1, communication satellite with 140Gbps capability more than all other satellites over North America combined**



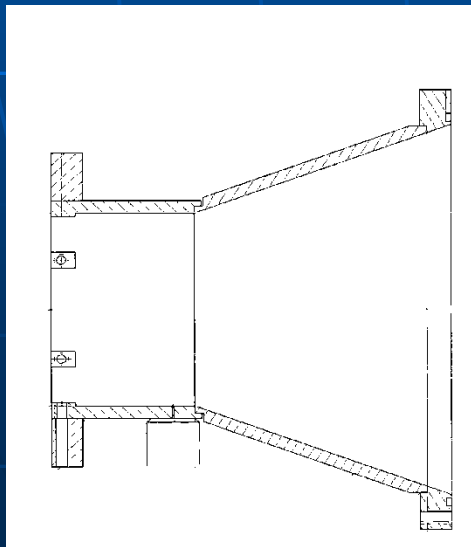
C-Band Tracking Feed Design Objectives

- Add to existing L/S Band tracking system new simultaneous RHC and LHC receive capability over the 4.7-5.1 GHz band
- Provide exceptionally high quality C-band autotracking performance
- Minimize performance impact to current L/S band feed so that antenna can perform in both L/S and C bands.
- Reuse of customer existing hardware to minimize upgrade costs and risks
- Utilize ViaSat existing C-band hardware designed for Radar Systems to minimize project risk
- Minimize integration effort required for upgrade by adding downconverter so same back equipment can be used

C-Band Tracking Feed



Horn Throat uses a four horn array which provides excellent tracking modulation slope but also has high spillover loss and non-uniform E/H plane patterns



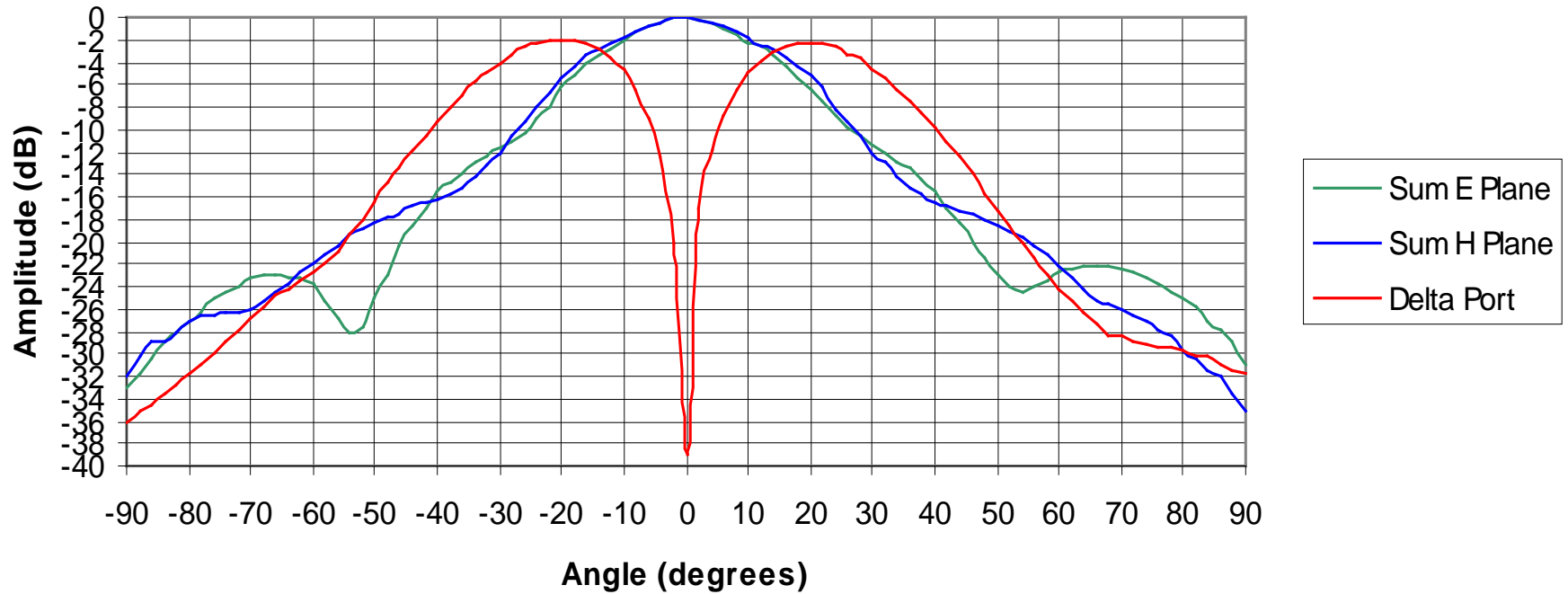
Final horn aperture section generates higher order waveguide modes that combine with the dominate waveguide modes from the four horn array. The result is optimum sum channel primary patterns that maintain the desired error slope for the tracking channel with near equal E/H plane patterns

- » Feed origin is based on a four horn multimode aperture array
- » High accuracy tracking demands that the tracking error signal gradient be large (high tracking error signals close to bore sight)
- » Tracking error slope is proportional to the difference element offset distance and reflector F/D
- » A four horn feed provides the excellent error slope gradient performance since the tracking elements are located near the reflector focal point (compare to 5 element array)
- » Disadvantage of a four horn array is excessive spillover losses and non-symmetrical illuminations for vertical and horizontal polarizations (unequal E-H plane beam widths)
- » Four Horn disadvantages are compensated by the generation of higher-order waveguide modes in a ViaSat designed aperture section that generates higher order waveguide modes that add to the fundamental modes to shape the final feed patterns.
- » The resultant pattern is a super-position of the dominant waveguide modes and the higher order waveguide modes



C-Band Feed Pattern

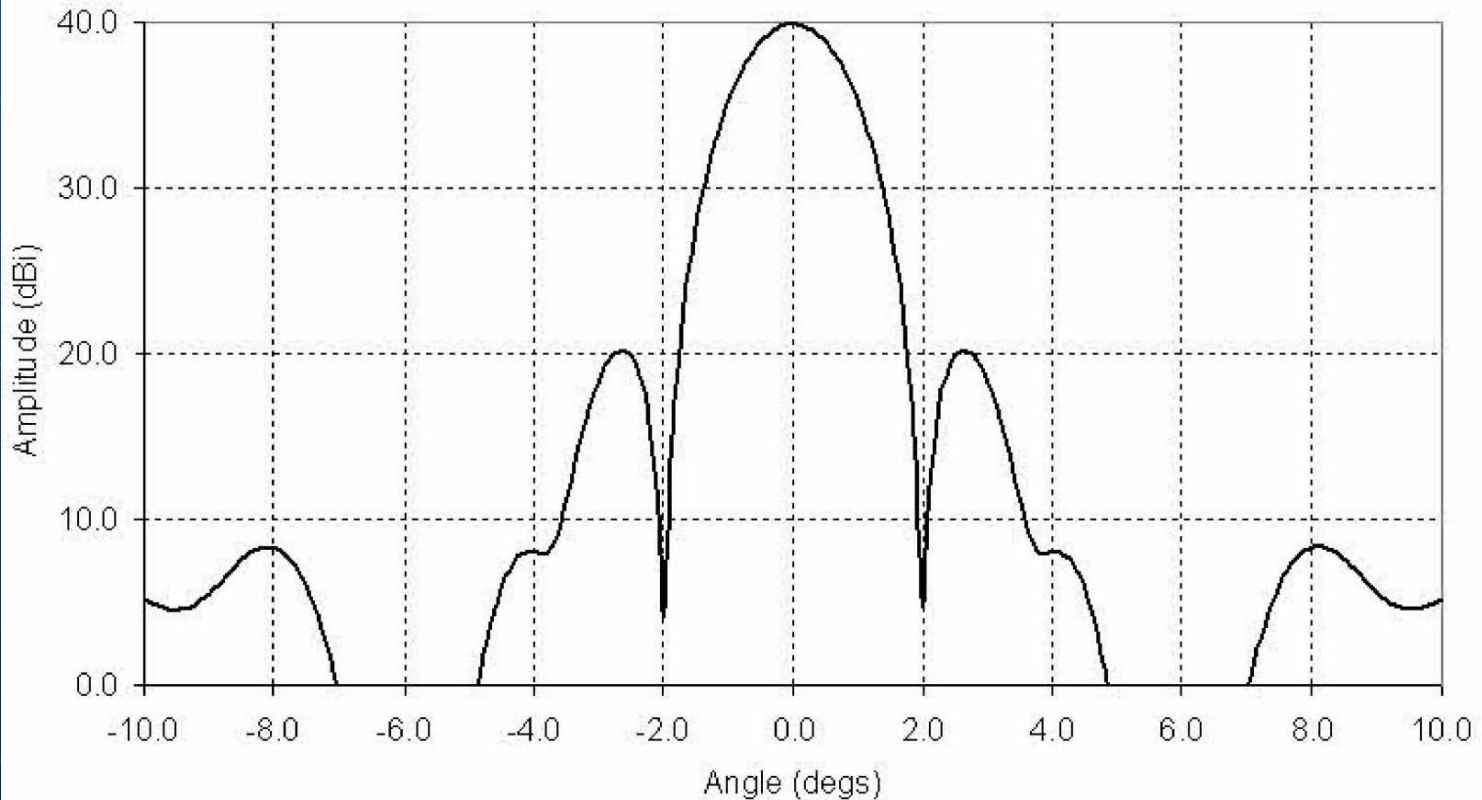
ViaSat C Band MultiMode Tracking Feed PN 443418
Measured Primary Pattern 5.4 GHz





C-Band Feed Pattern

2.44-meter Antenna Sum Channel CP Pattern - 5.10 GHz
HPBW= 1.62 degs.





C-Band Products

ViaSat

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