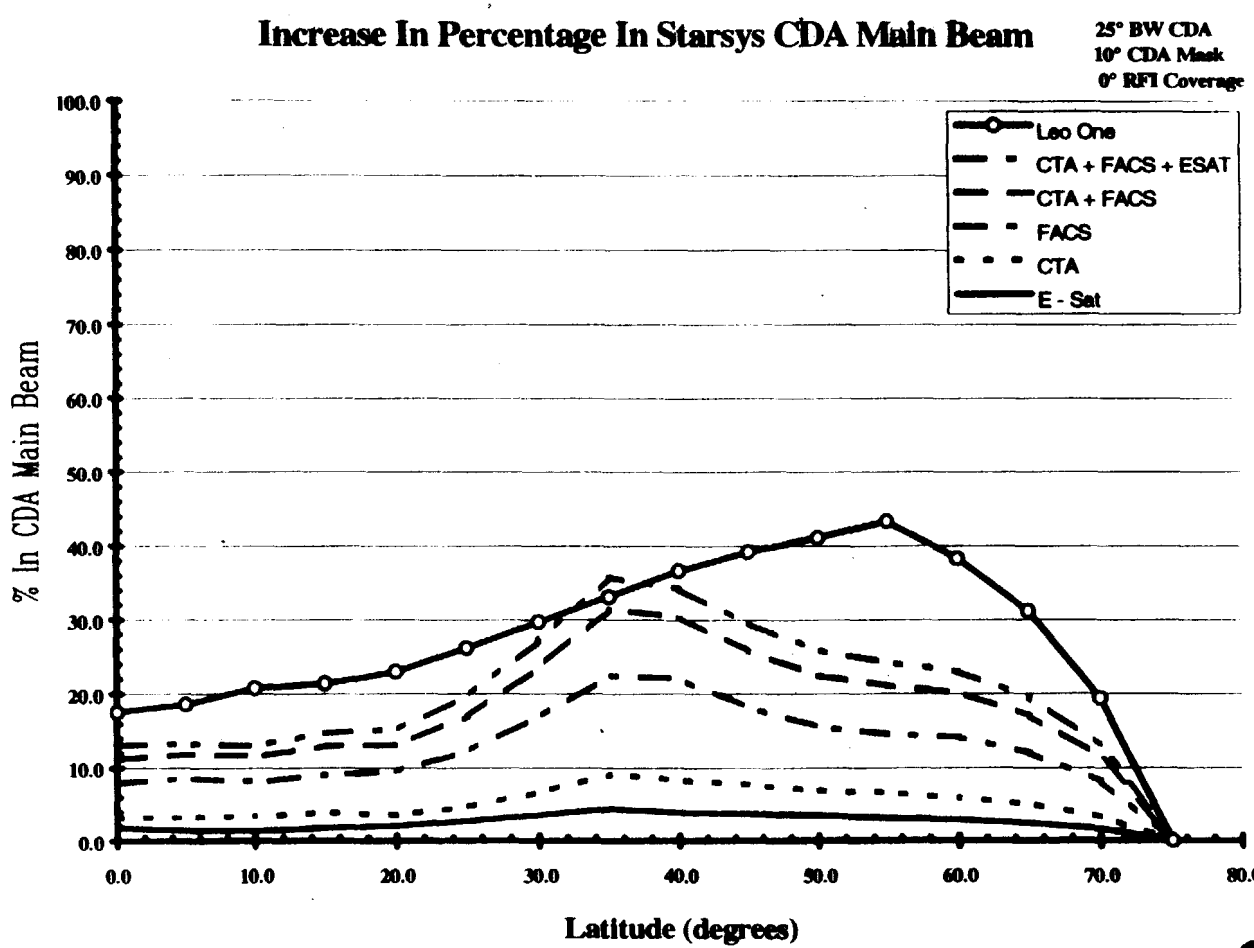
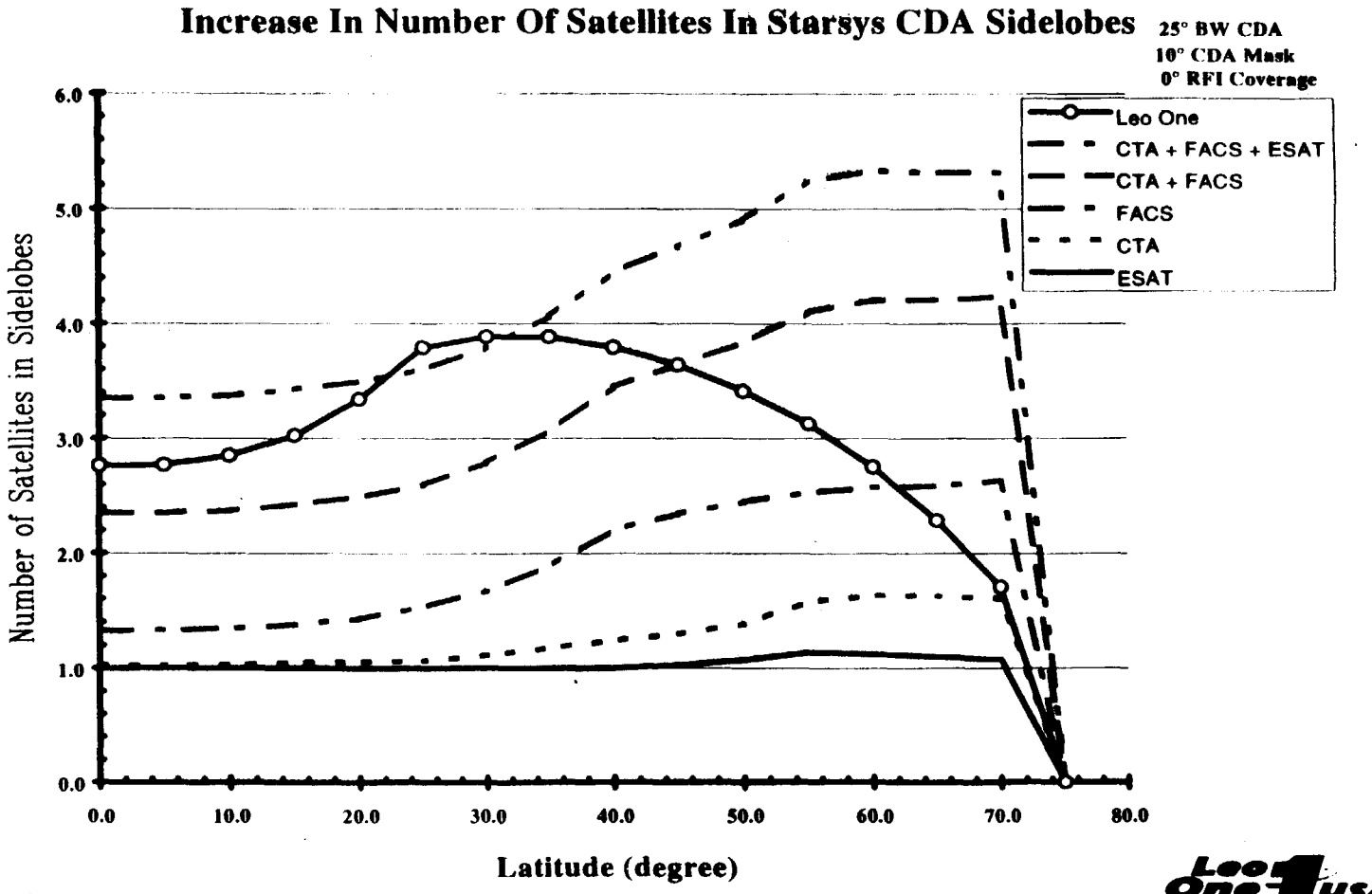
Increase in Percent Of Time At Least One Satellite In Starsys CDA Mainbeam

- **At 40° N. Latitude Sharing With 12 Satellite CTA Constellation Results In Interference 31.3% of Time**
  - An Increase of 8.3% above existing 23% due to Orbcomm



Increase In Number Of Satellites In Sidelobes Of Starsys CDA Antenna

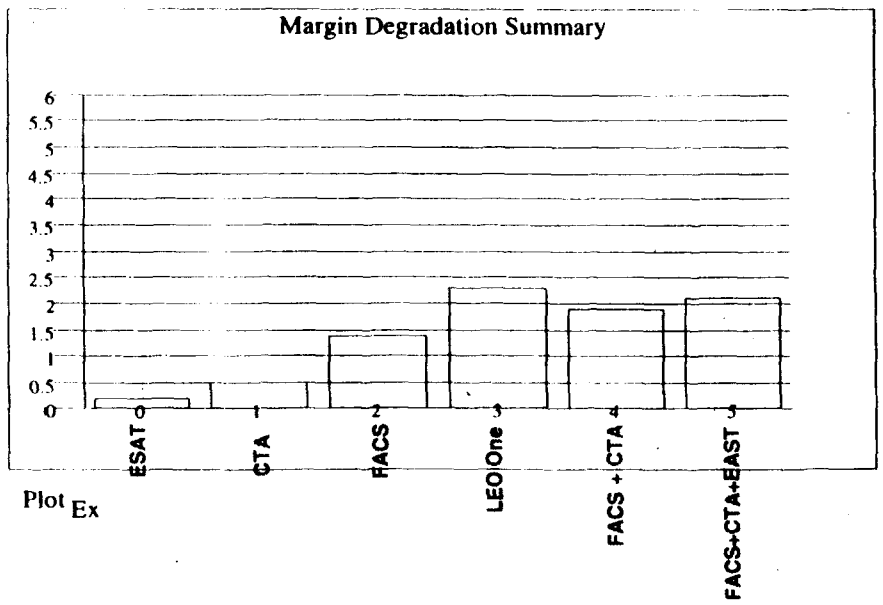
- 12 Satellite CTA Constellation Adds 1.2 Satellites in Sidelobes Of CDA At 40° Latitude While Tracking Starsys Satellites



Leo One USA

Starsys Link Margin Degradation For 137 MHz

- Analysis Shows ESAT Decreases Margin By 0.2 dB
- 12 Satellite CTA Decreases Margin By 0.5 dB
- FACS Decreases Margin By 1.4 dB
- Leo One Decreases Margin By 2.3 dB
- FACS And CTA Combined Decreases Margin By 1.9 dB
- The addition of FACS, CTA and ESAT Decreases Margin By 2.1 dB



VHF Downlink Sharing Analysis Conclusions

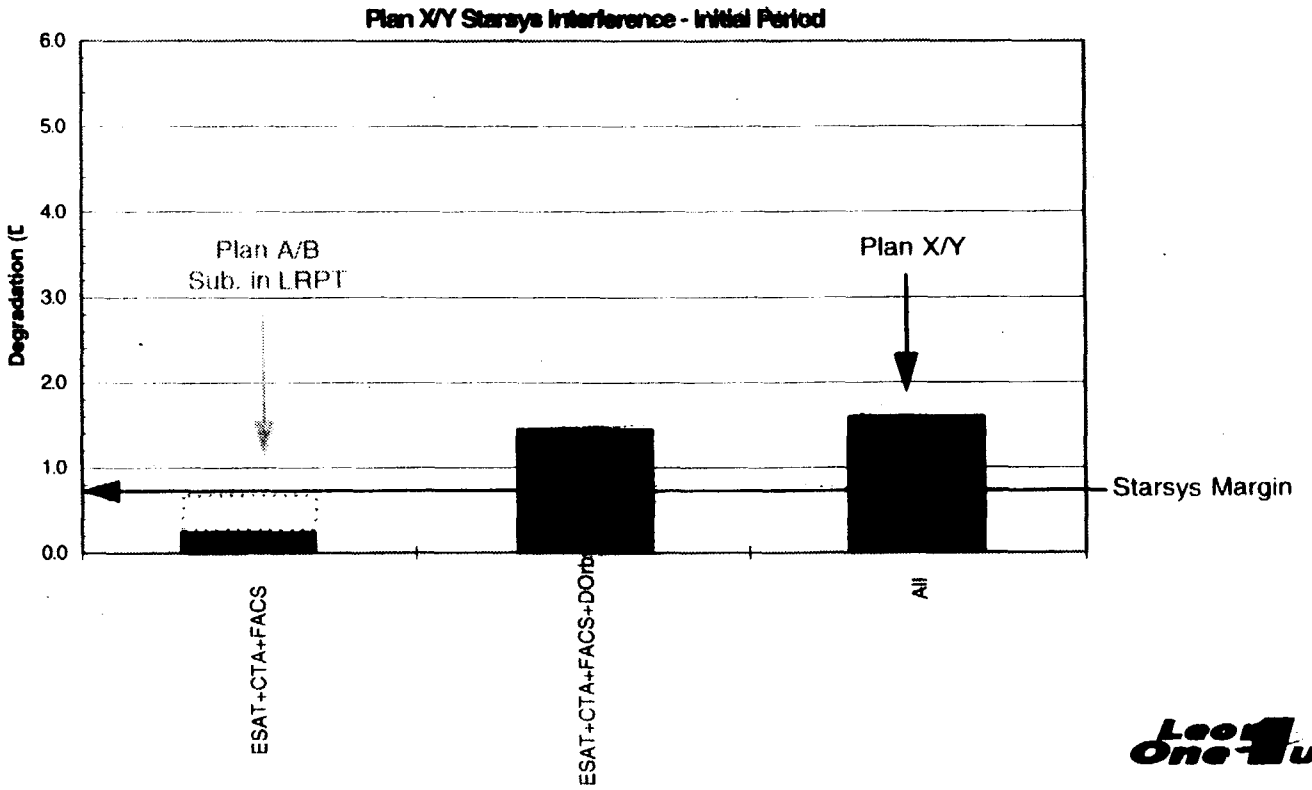
- **Proposed Settlement Plan Leads To A Significant Margin Degradation For Starsys**
  - (And S80)
  - LEO One recommends against this plan in favor of it's System B and System A presented in NPRM Comments
    - Less Potential Interference To Starsys
- **FACS Results In Less Degradation To Starsys Than LEO One**
  - FACS Is the best choice for LEO One's System B
    - CTA can be acommodated with little additional impact
    - ESat can presumable share with Starsys

Plan X/Y of 3/19/97

- **LRPT Channel Divided Among Applicants**
  - CTA has outer 50 kHz in each LRPT Band Segment
  - System X has inner 50 kHz of each LRPT
  - System Y has 50 kHz in each LRPT
- **NOAA Channels Divided Among System X & Y**
- **Gateways Only**
  - Orbcomm Exception Using Upper 25 kHz LRPT Edge
- **Depending Upon Period LRPT Or NOAA Channel Shared With Metsats**

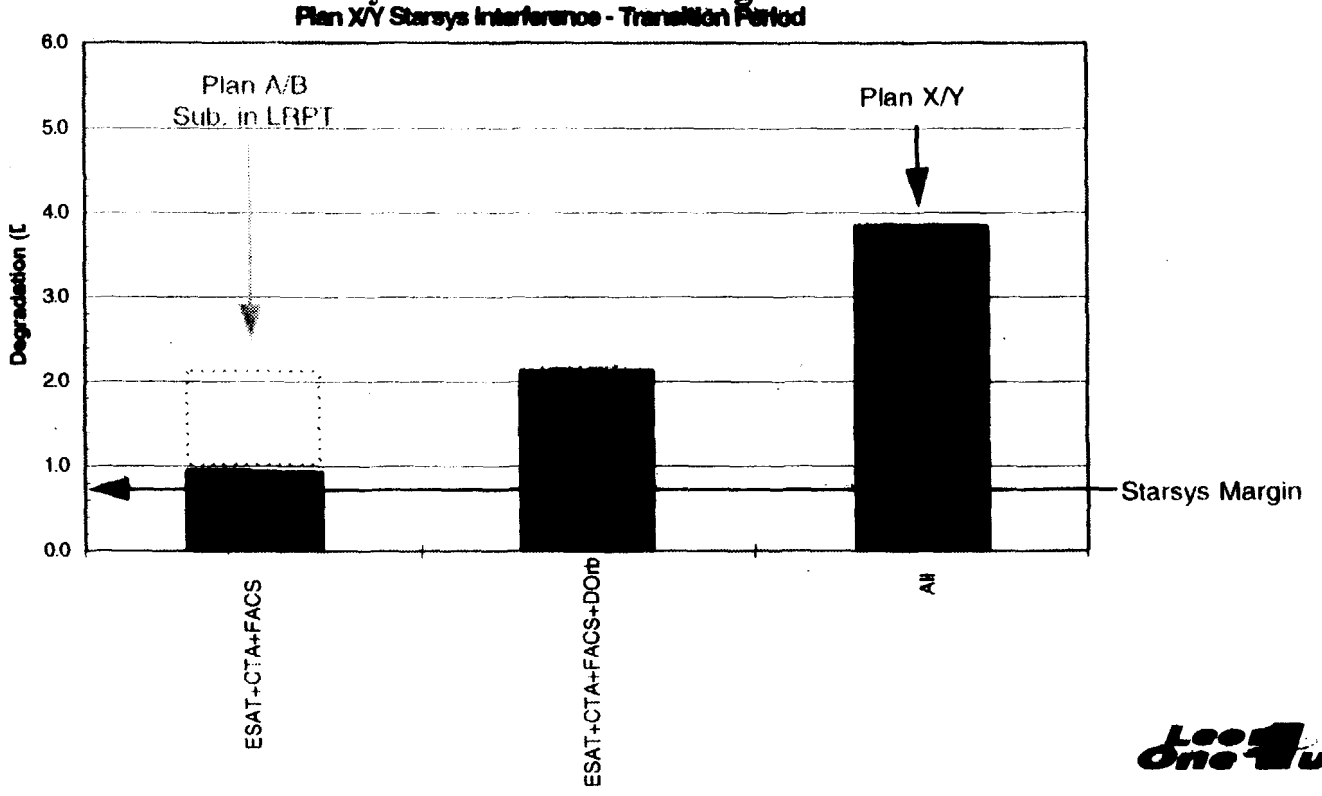
Starsys Downlink Margin Degradation - Plan X/Y Initial LRPT Use Only - Gateways Only

- **Assumes LEO One Is System Y, FACS is System X & CTA is at Outer Band Edge**
  - Delta Orbcomm Uses Upper LRPT Band Edge For Subscriber Channel plus Existing Chnls
- **During Exclusive LRPT Band Useage Interference To Starsys Is Tolerable Without Delta Orbcomm**



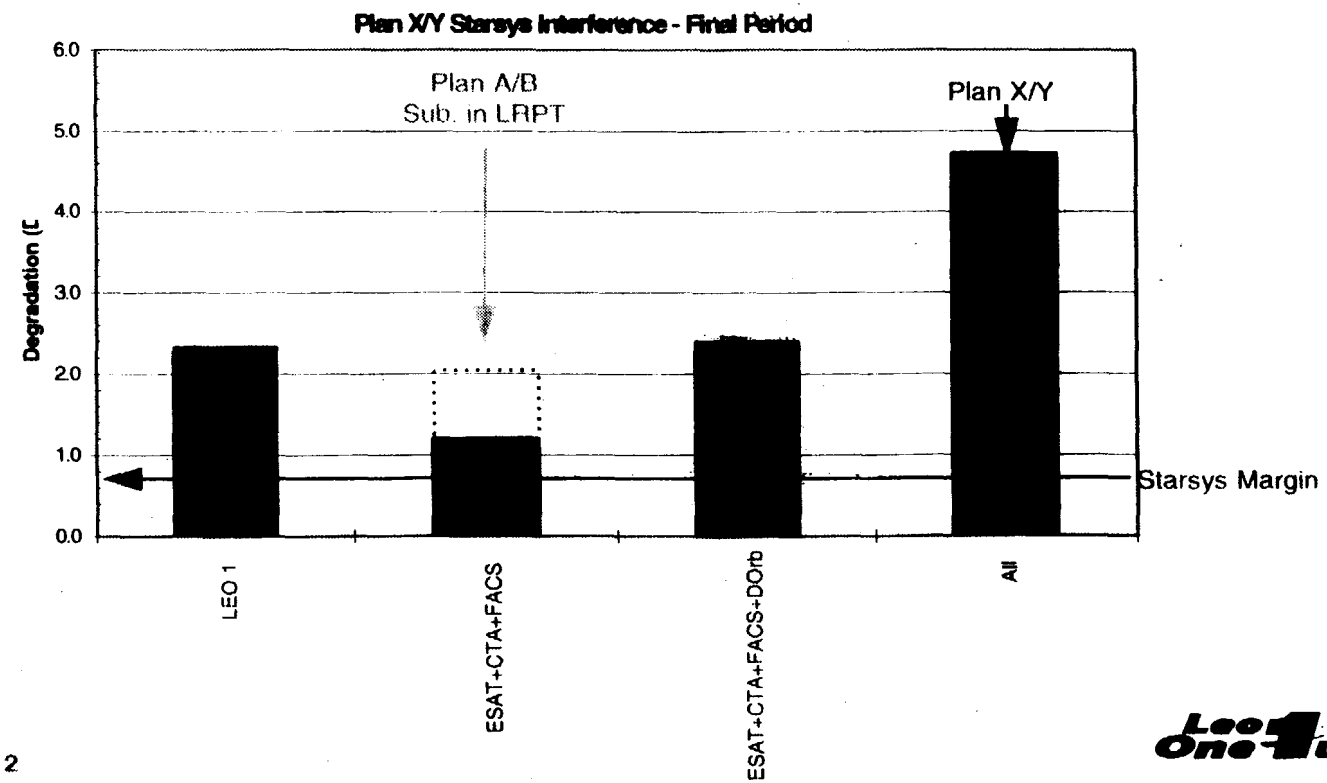
Starsys Downlink Margin Degradation - Plan X/Y Transition Period - Gateways Only

- Assumes Gateways Only except for Delta Orbcomm
  - LEO One uses one set of APT and TIP Channels and FACS uses other
    - Interference averaged over APT, TIP & LRPT bands
  - Delta Orbcomm Uses Upper LRPT Band Edge For Subscriber Channel plus Existing Chnls
  - CTA Continues to Use LRPT (No Other Band Available)
- Transition Interference To Starsys Exceeds 0.7 dB Margin Without LEO One & Delta Orbcomm



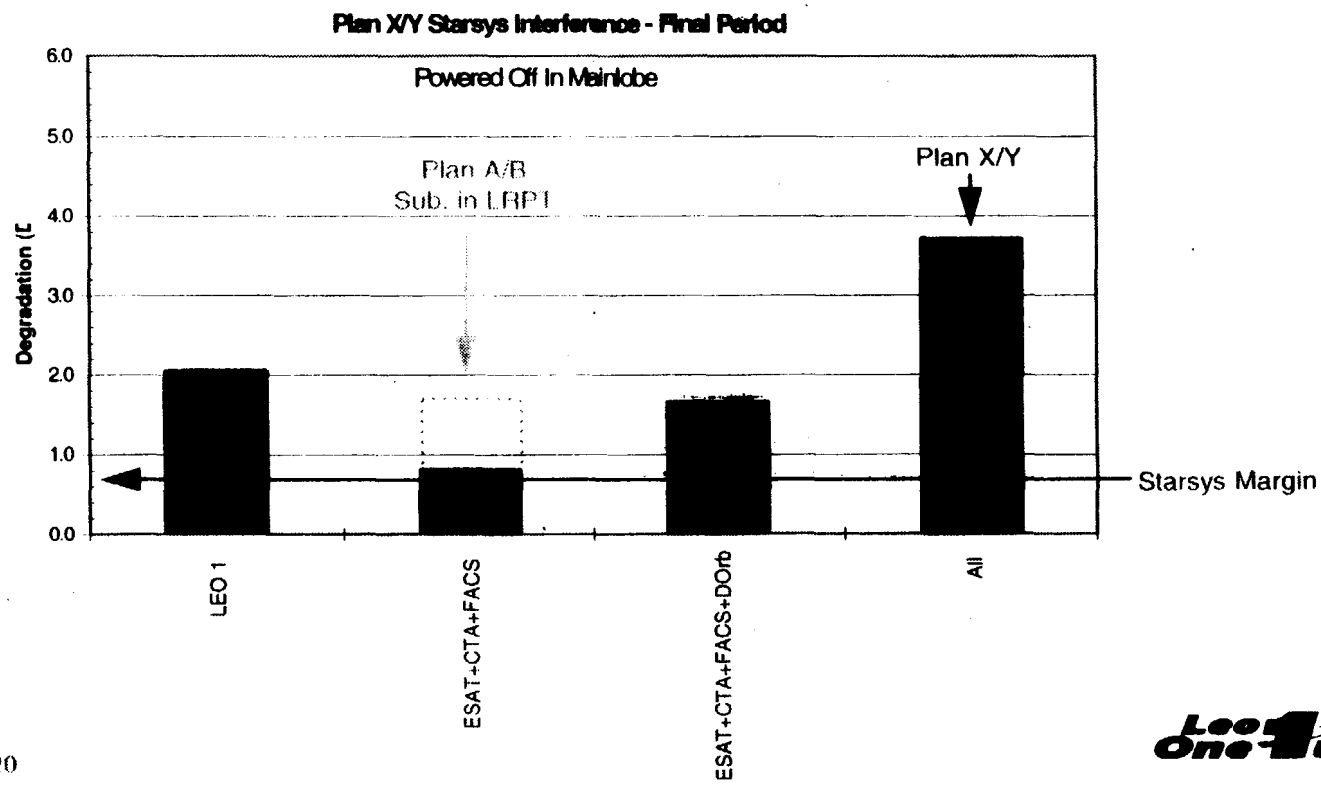
Starsys Downlink Margin Degradation - Plan X/Y Final Configuration - Gateways Only

- **Assumes Gateways Only except for Delta Orbcomm**
  - LEO One uses one set of APT and TIP Channels and FACS uses other
  - Delta Orbcomm Uses Upper LRPT Band Edge For Subscriber Channel plus Existing Chnls
  - CTA Continues to Use LRPT (No Other Band Available)
- **Interference To Starsys Exceeds 0.7 dB Margin Without LEO One & Delta Orbcomm**



Plan X/Y Final Configuration - Gateway Only, Only Sidelobe Interference

- **Assumes Gateways Only except for Delta Orbcomm**
  - LEO One uses one set of APT and TIP Channels and FACS uses other
  - Delta Orbcomm Uses Upper LRPT Band Edge For Subscriber Channel plus Existing Chnls
  - CTA Continues to Use LRPT (No Other Band Available)
- **Interference To Starsys Exceeds 0.7 dB Margin - Huge Mainbeam Coordination Issue**



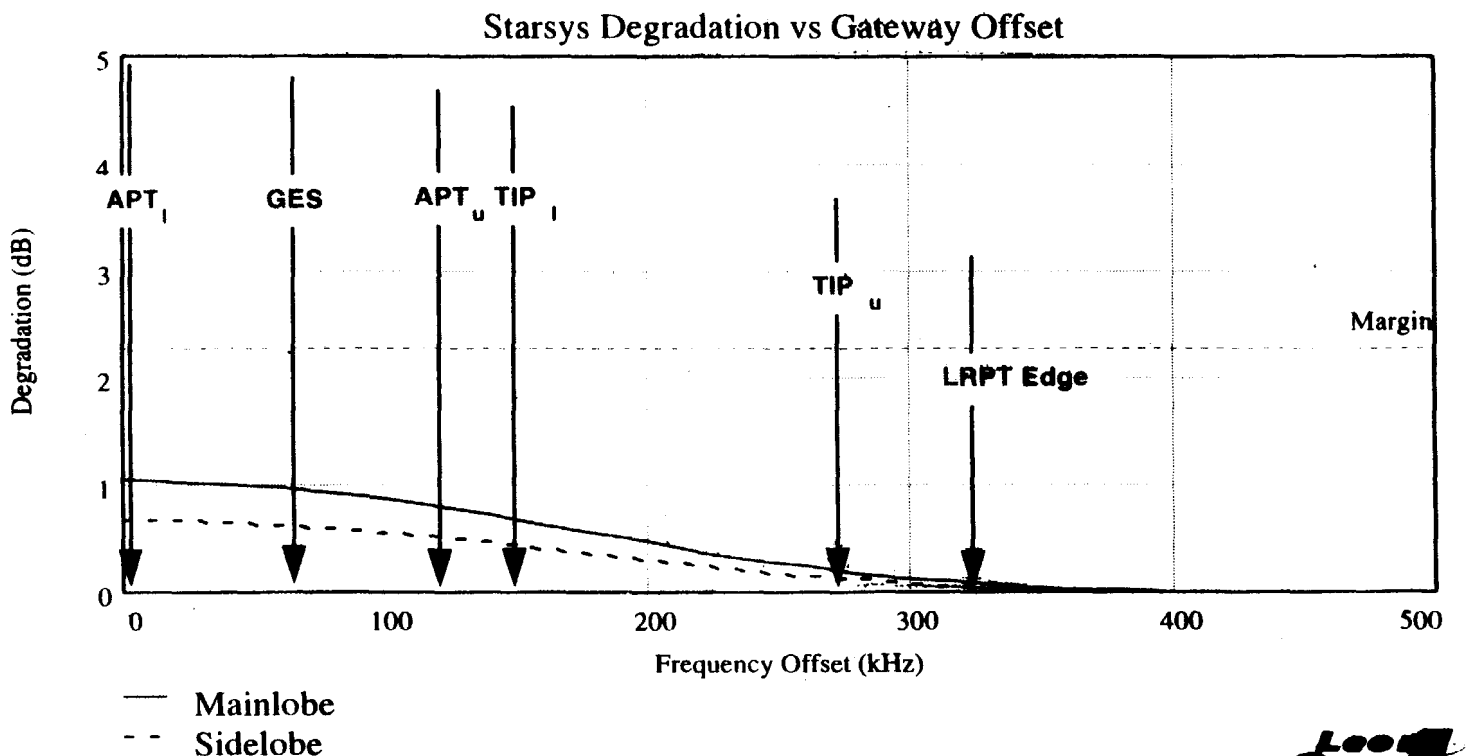
Plan X/Y Degradation Conclusions

- **Conclusions Unchanged**
- **Proposed Settlement Plan Leads To A Significant Margin Degradation For Starsys**
  - And S80
  - LEO One recommends against this plan in favor of it's System B and System A presented in NPRM Comments
    - Less Potential Interference To Starsys
- **FACS Results in Less Degradation To Starsys Than LEO One**
  - FACS is the best choice for System B

LEO One USA

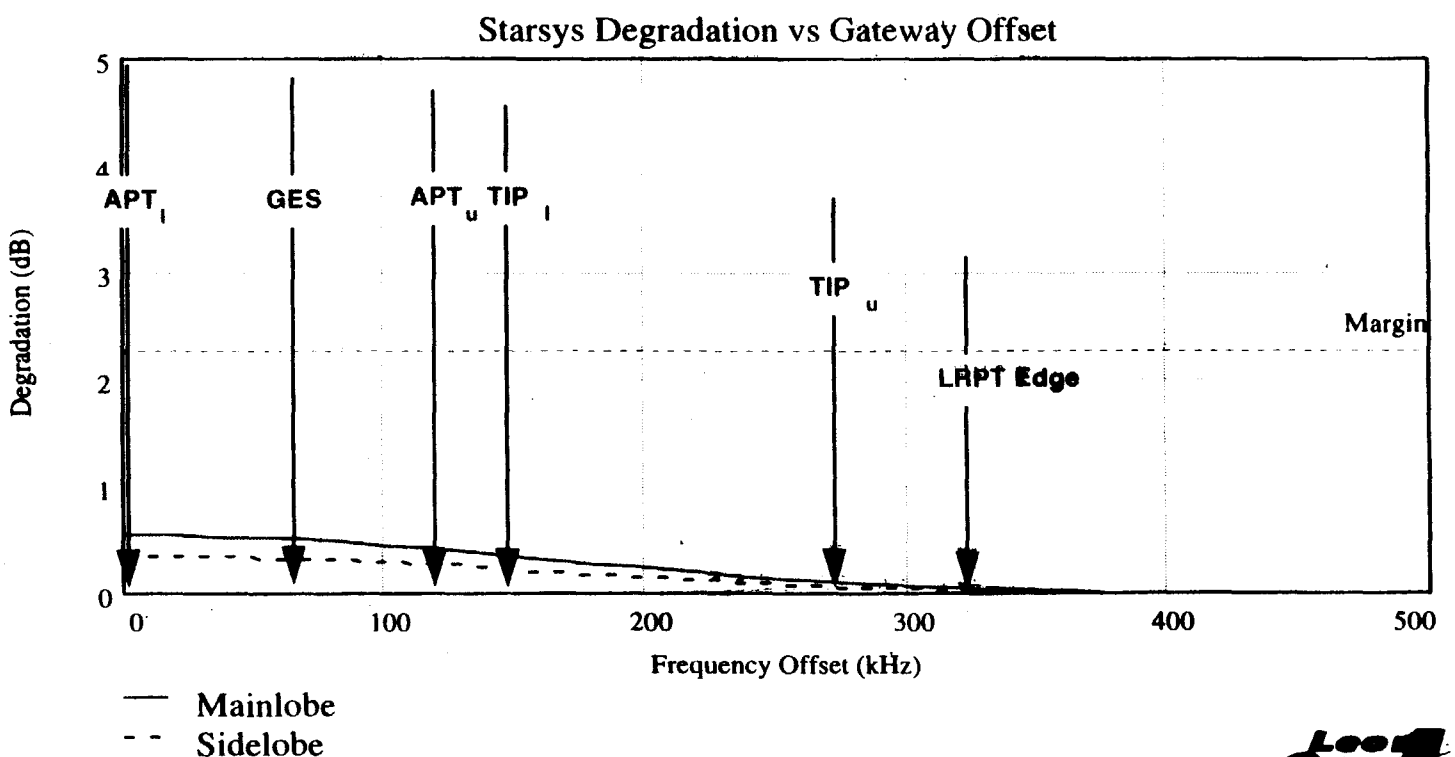
Degradation With Gateway Power Reduced 3 dB

- **For Gateway EIRP of 3.5 dBW**
  - Max PFD Calculation



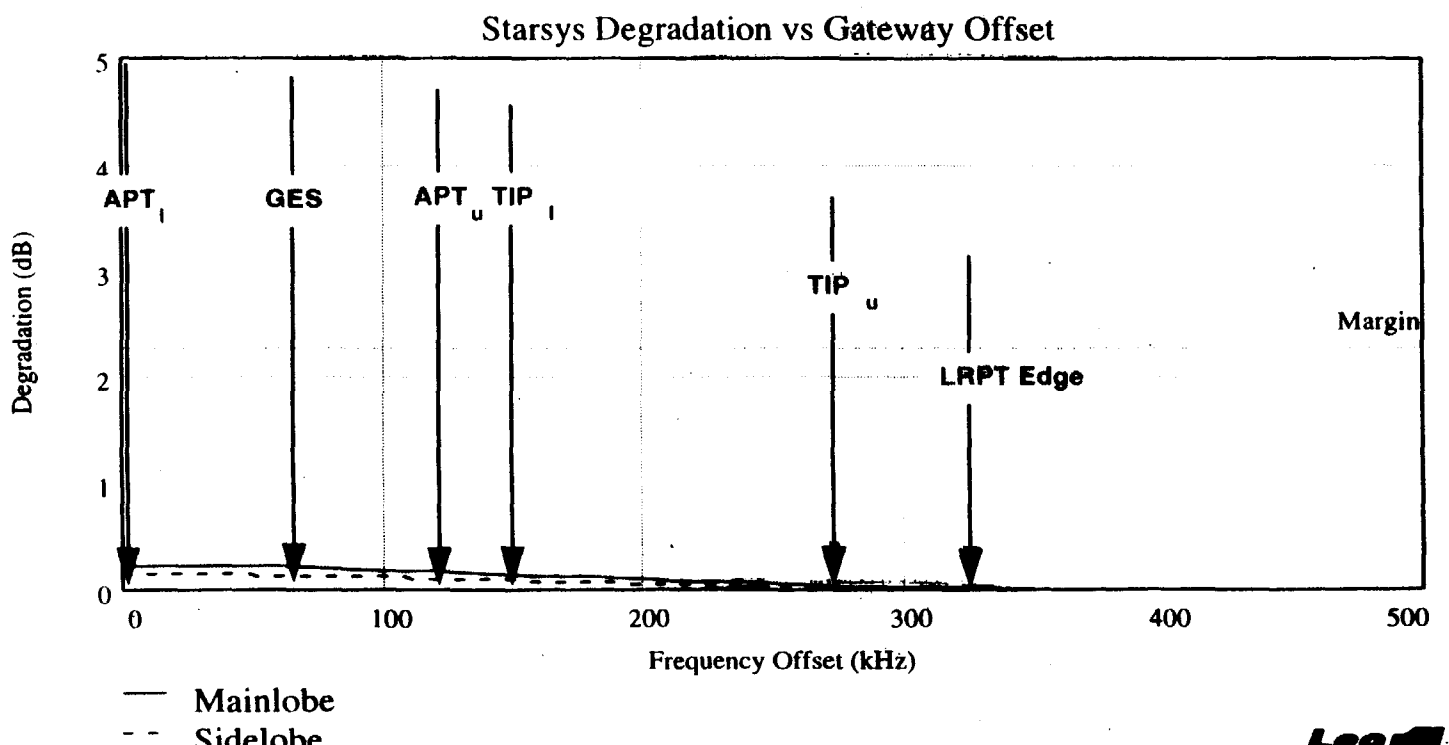
Degradation With Gateway Power Reduced 6 dB

- **For Gateway EIRP of 0.5 dBW**
  - Max PFD Calculation



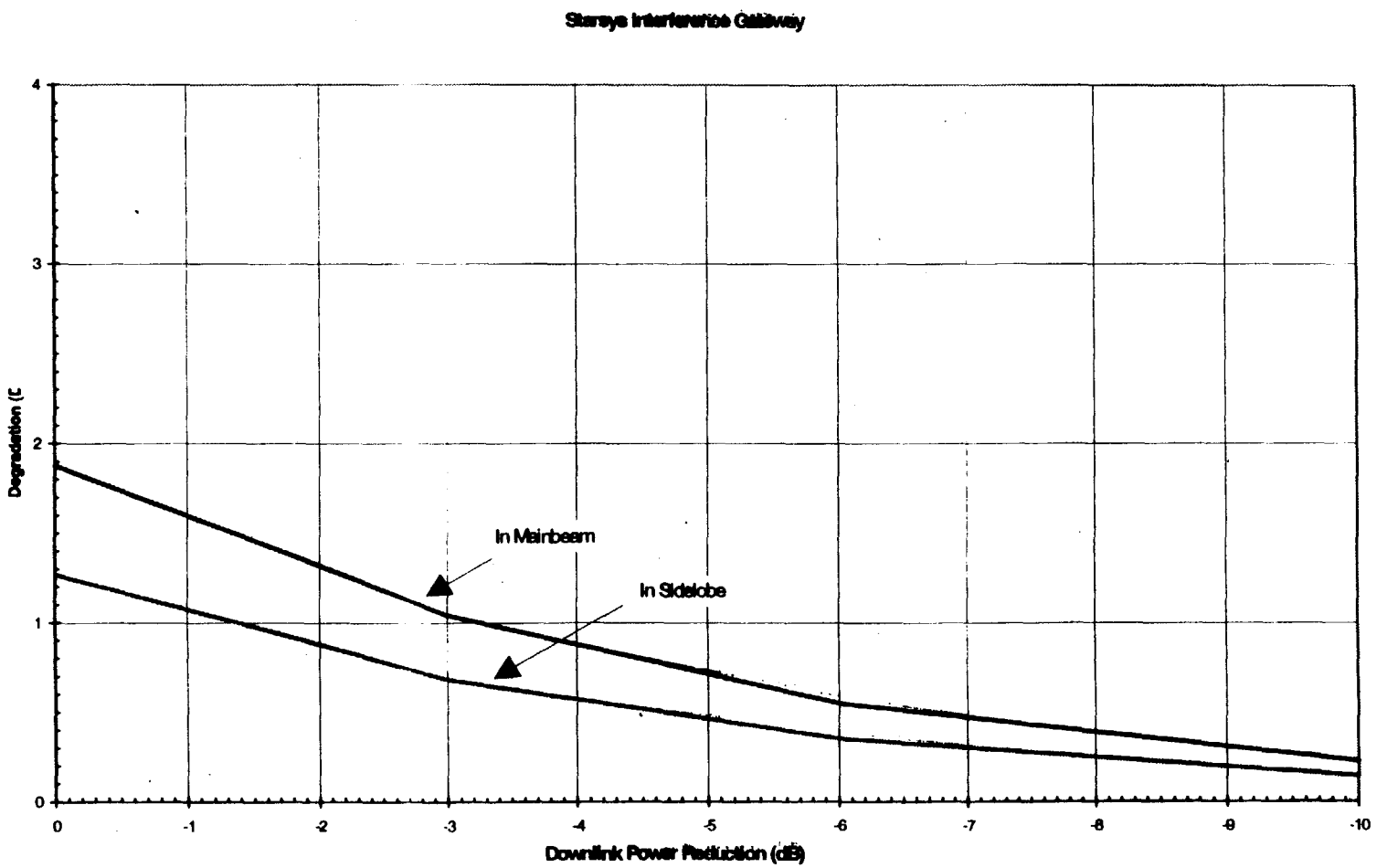
Degradation With Gateway Power Reduced 10 dB

- **For Gateway EIRP of -3.5 dBW**
  - Max PFD Calculation



Degradation Vs Gateway Downlink Power Reduction

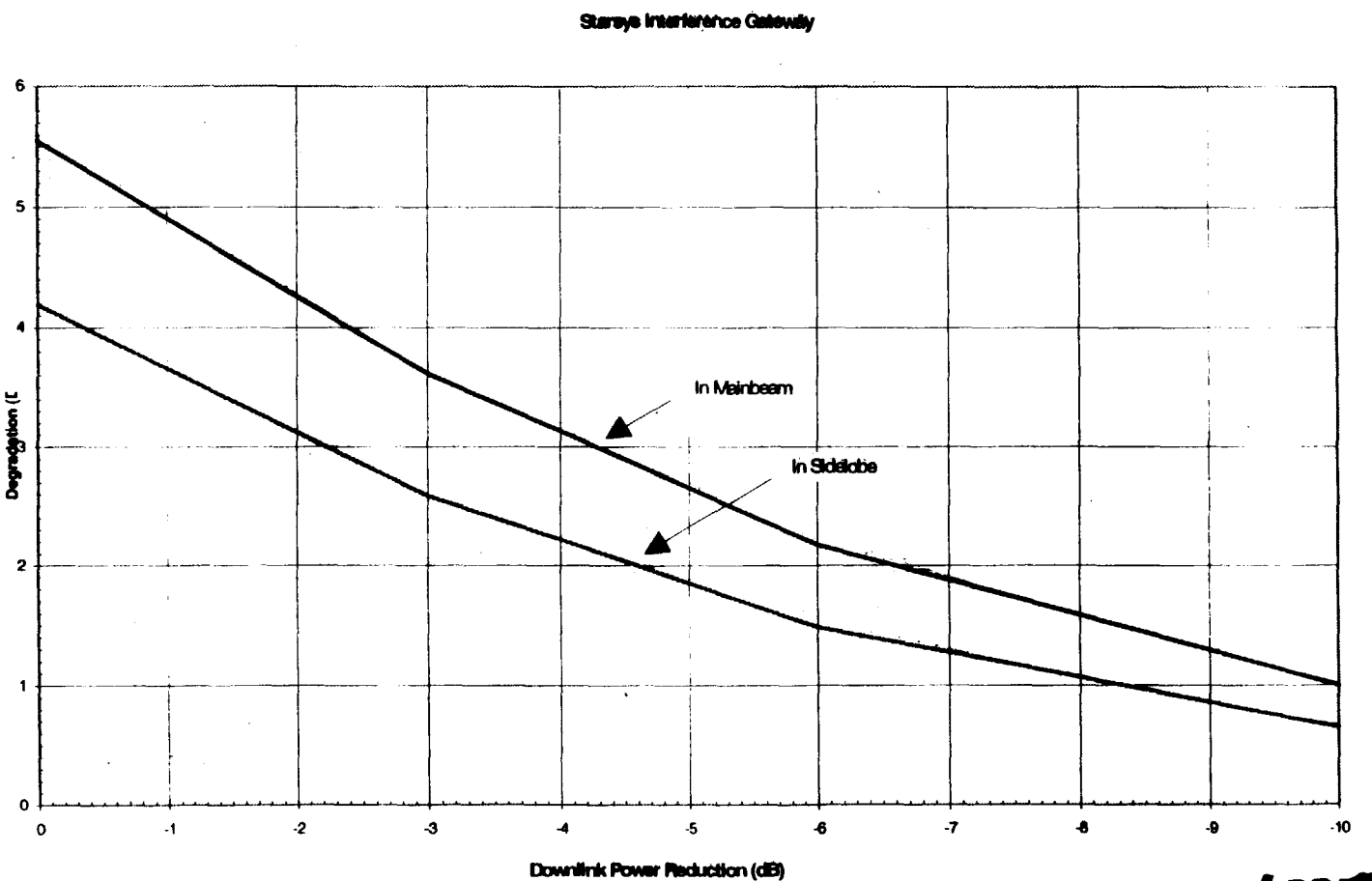
- Maximum Margin Degradation For Single Gateway Downlink



Loral One USA

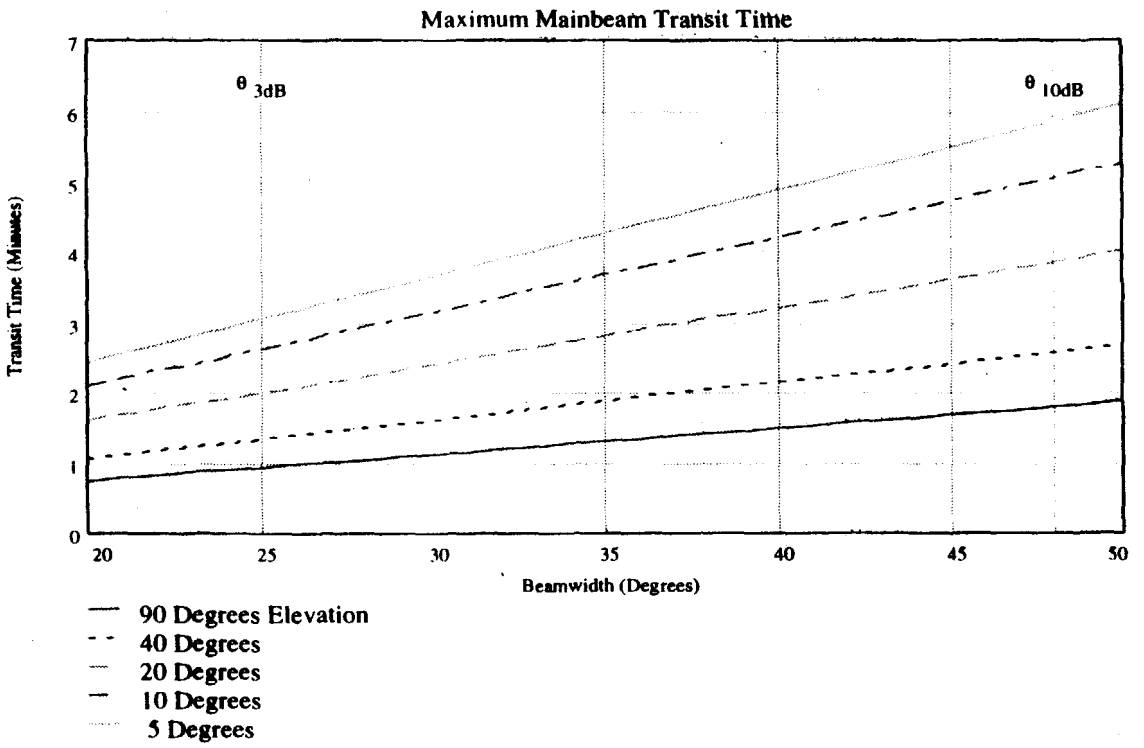
Degradation Vs Subscriber Downlink Power Reduction

- Maximum Margin Degradation For Single Subscriber Downlink



Mainbeam Transit Time For Fixed CDA Beam Pointing

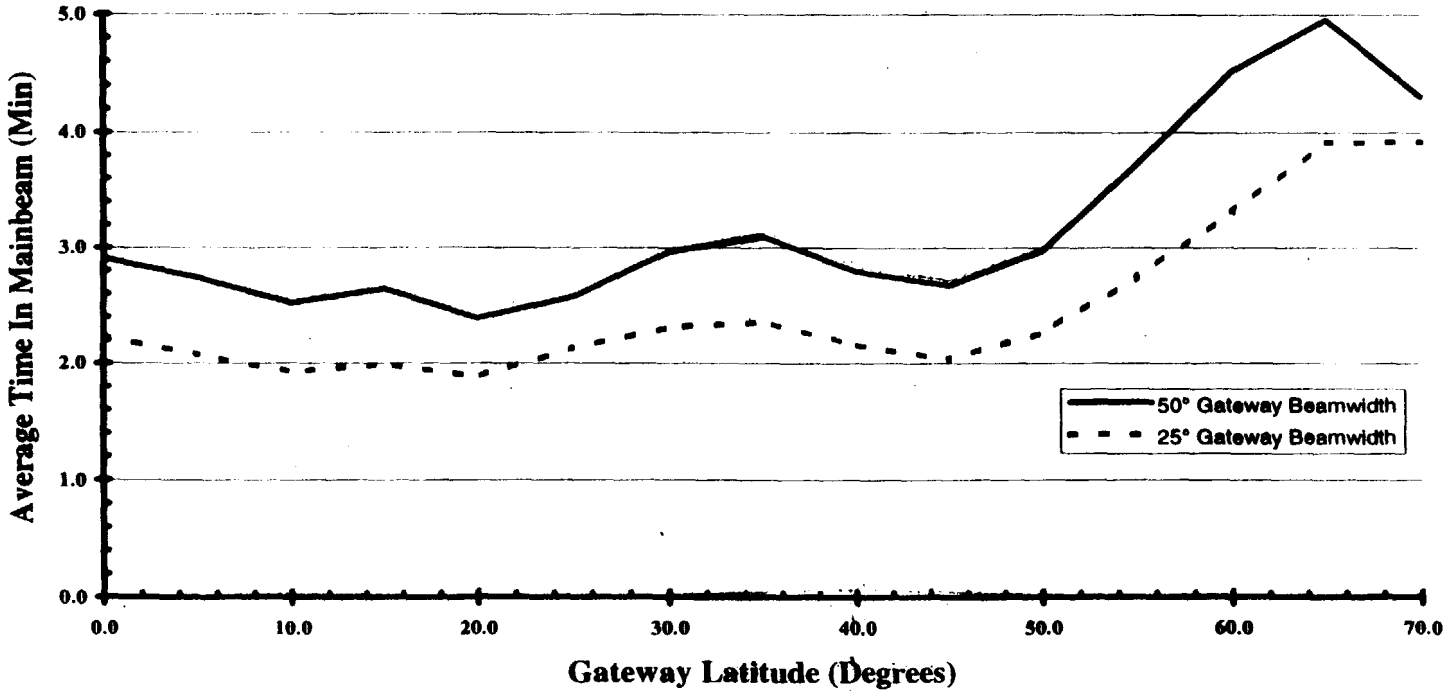
- **Potentially Long Mainbeam Transit Times Even Assuming Satellites Do Not Travel Together**



CDA Mainbeam Transit Time Statistics For LEO One

- **Transit Times For LEO One Constellation With CDA at 40° Latitude and 25° Mainbeam -**
  - Maximum Time is 13 Minutes, Average Time is 2.2 minutes
  - Sidelobe Maximum Time is 17 Minutes, Average Time in Sidelobes is 8.8 minutes

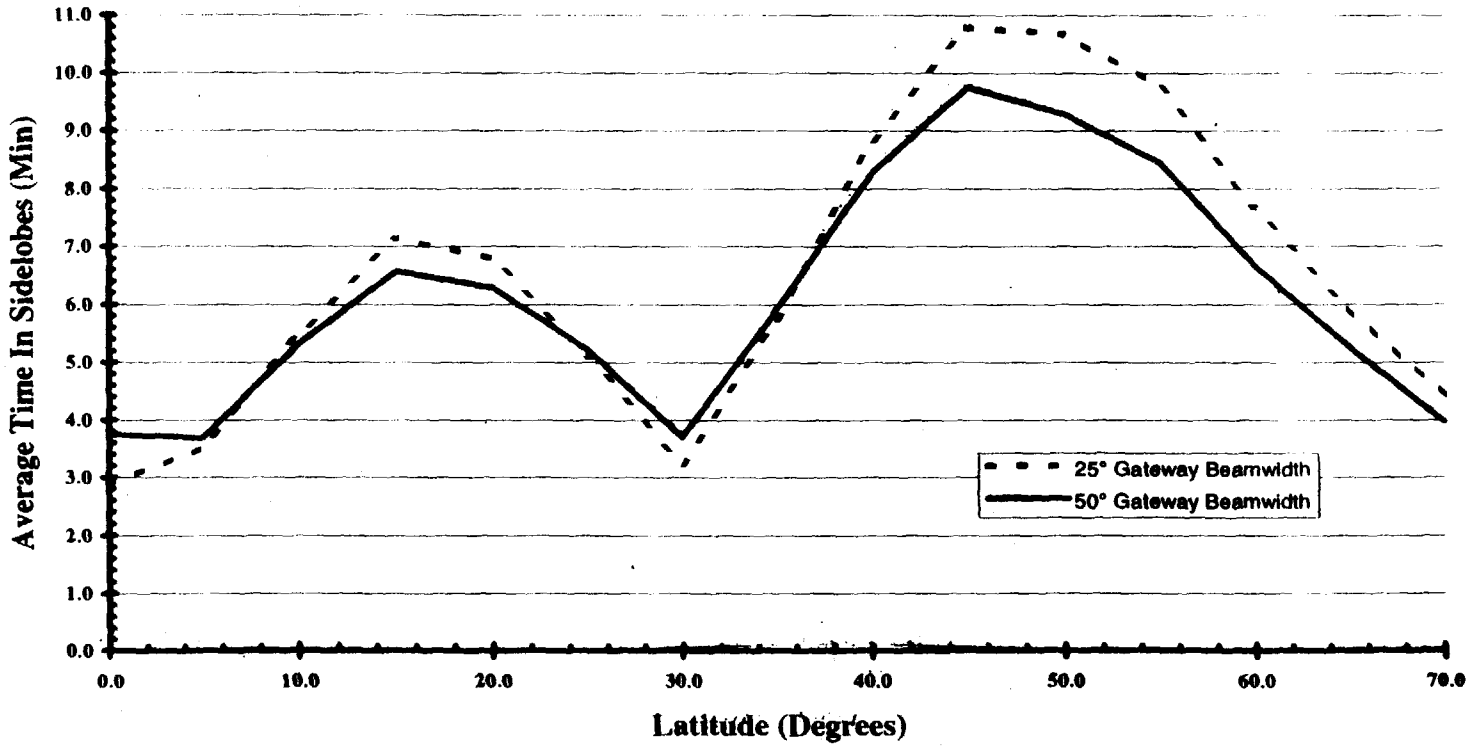
Leo One Satellite's Average Duration In Starsys CDA Mainbeam



CDA Sidelobe Transit Time Statistics For LEO One

- **Transit Times For LEO One Constellation With CDA at 40° Latitude And 25° Mainbeam -**
  - Sidelobe Maximum Time is 17 Minutes, Average Time in Sidelobes is 8.8 minutes

Leo One Satellite's Average Minutes In Starsys CDA Sidelobes

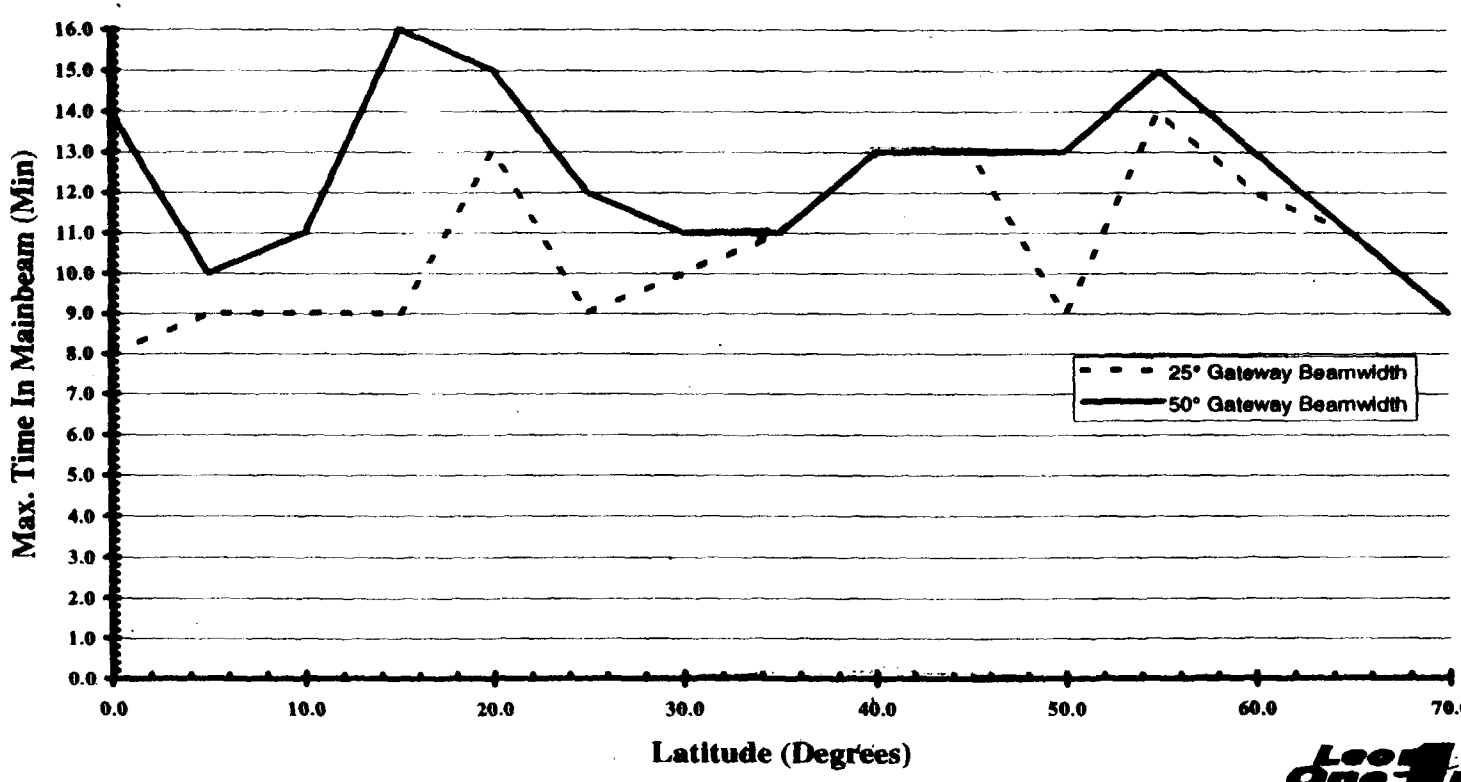


Leo One USA

Maximum CDA Mainbeam Transit Time Statistics For LEO One

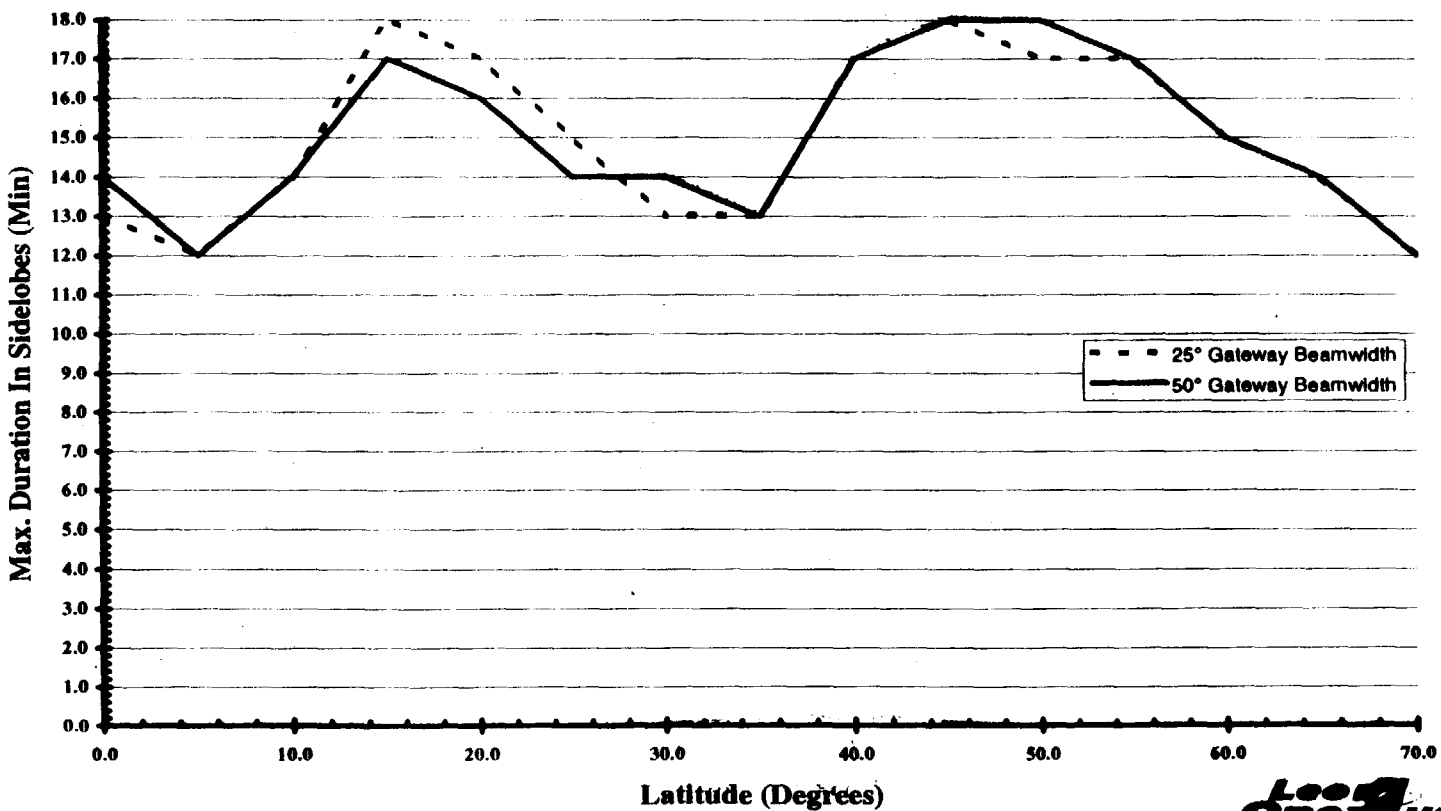
- **Maximum Transit Times For LEO One Constellation With CDA at 40° Latitude and 25° Mainbeam -**
  - Maximum Transit Time is 13 Minutes, Average Time is 2.2 minutes

Leo One Satellite's Maximum Time In Starsys CDA Mainbeam



Leo One USA

Maximum CDA Sidelobe Transit Time Statistics For LEO One

- **Maximum Transit Times For LEO One Constellation With CDA at 40° Latitude And 25° Mainbeam -**
  - Sidelobe Maximum Time is 17 Minutes

Leo One Satellite's Maximum Duration In Starsys CDA Sidelobes