

ORIGINAL



Merrill S. Spiegel  
Vice President  
Government Affairs

**EX PARTE OR LATE FILED**

January 17, 2000

**RECEIVED**

**JAN 18 2000**

FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

Ms. Magalie Roman Salas  
Secretary  
Federal Communications Commission  
445 12<sup>th</sup> Street, S.W.  
TW-A325  
Washington, DC 20554

Re: ET Docket No. 98-206; DA 99-494; Diversified Communication Engineering, Inc.,  
File Nos. 0418-EX-ST-1999, 6001-EX-MR-1998, 0094-EX-ST-1999; Call Sign  
WA2XMY; Ex Parte

Dear Ms. Salas:

This is to advise you that on Thursday, January 13, 2000, James R. Butterworth, Paul R. Anderson, Joseph Santoru, and the undersigned, all of DIRECTV, Inc., met with Jim Burtle, Thomas Derenge, Michael Marcus, Bruno Pattan, Rodney Small and Tom Stanley of OET; and Donald Abelson, Linda Haller, Harry Ng, Peter Pappas and Tom Tycz of the International Bureau. The substance of those meetings is summarized in the attached presentation, which was used during the meeting.

Please contact the undersigned with any questions.

Very truly yours,

A handwritten signature in cursive script that reads 'Merrill S. Spiegel'.

Merrill S. Spiegel

Attachment

No. of Copies rec'd 0/1  
List ABCDE

# Northpoint Sharing Issues

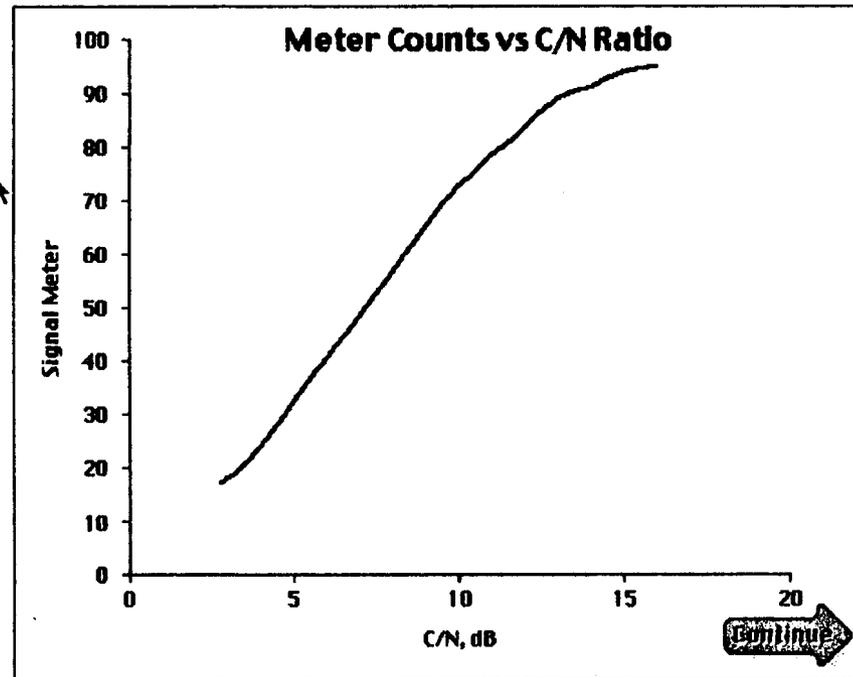
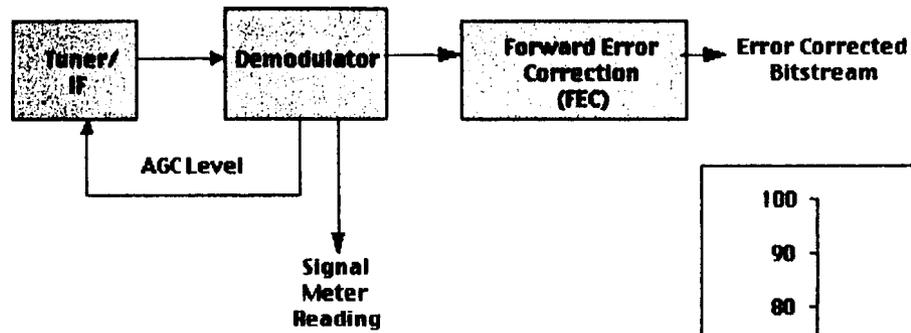
- Northpoint Washington Demonstrations
- DIRECTV New York Rain Testing
- Interference and Coverage Zone Analysis



# Table of Contents

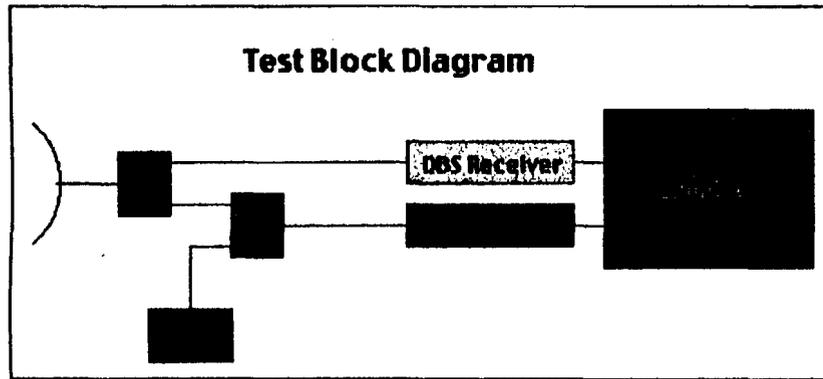
<b>The Signal Meter</b>	C
<b>New York Rain Tests</b>	A
<b>Interference Criteria</b>	B
<b>DBS Antenna Characteristics</b>	D
<b>Washington DC Observations</b>	E
<b>Washington DC Predictions</b>	F
<b>Interference Zone Analysis</b>	G
<b>Simple Propagation Model</b>	G1
<b>Sophisticated Propagation Model</b>	G2
<b>Conclusions</b>	H1

### DBS Receiver Signal Meter



**New York Rain Demonstration:**

**Show interference degrades performance**  
**Controlled conditions**  
**Months of continuous operation**  
**Two C/I levels tested**

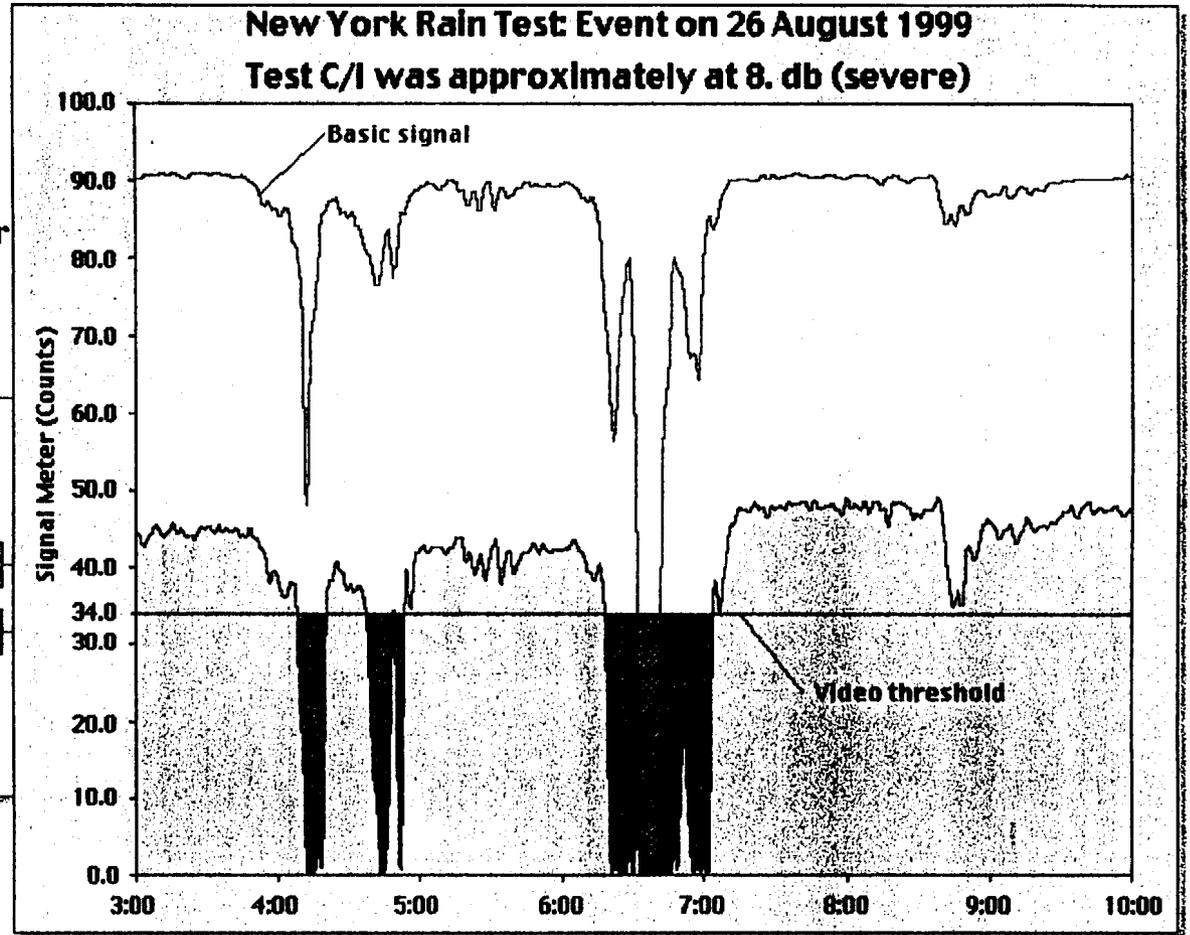
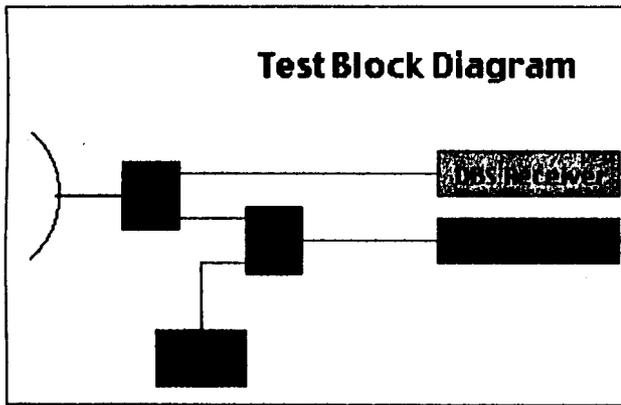


- August test
- Oct test
- Nov/Dec test



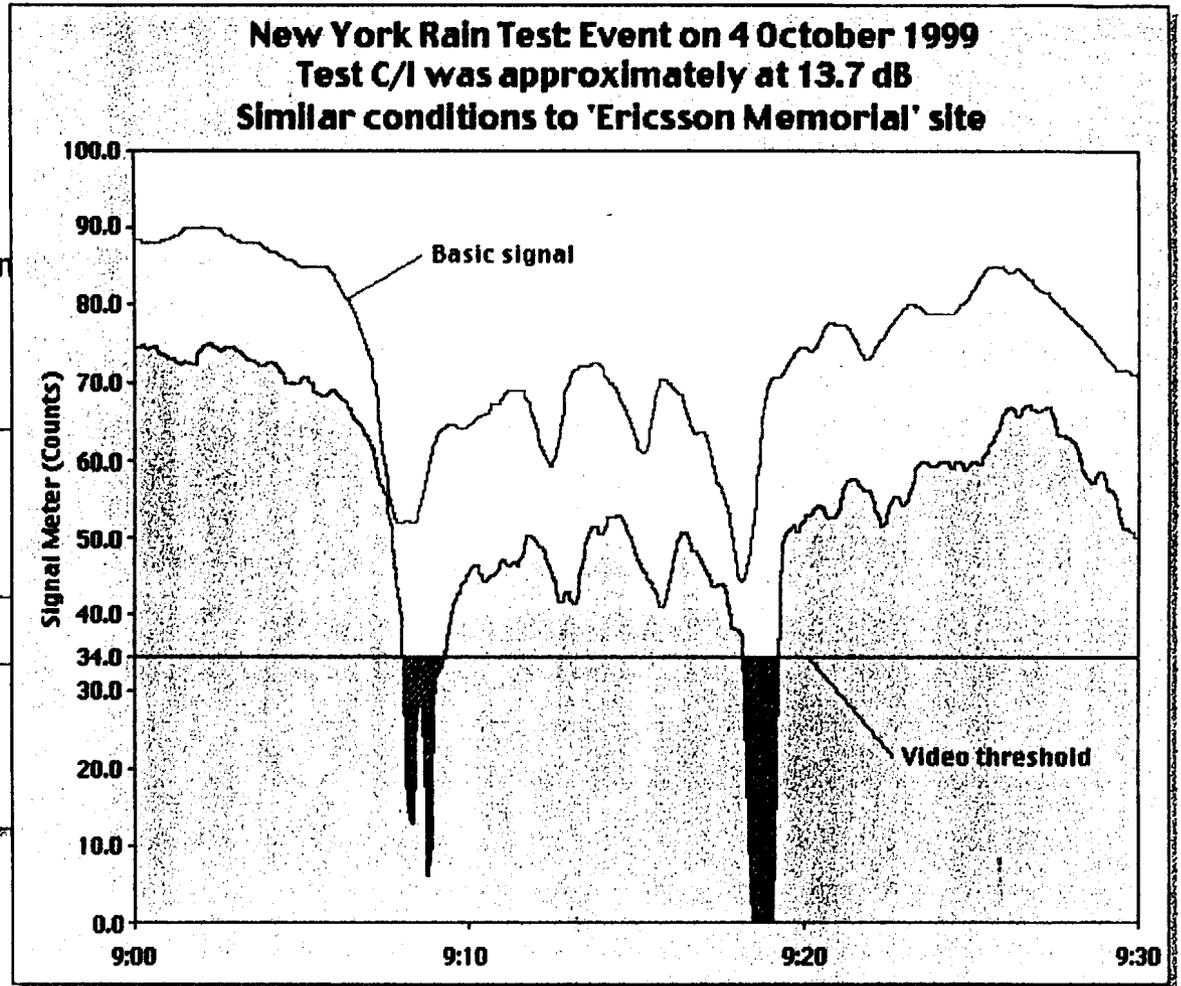
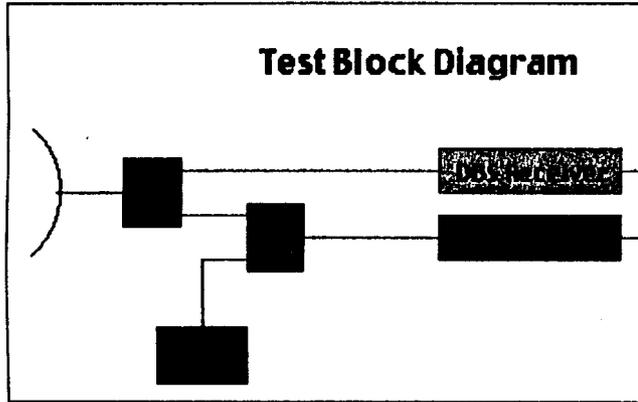
**New York Rain Demonstration:**

**Show interference degrades perfor  
Controlled conditions  
Months of continuous operation  
Two C/I levels tested**



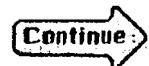
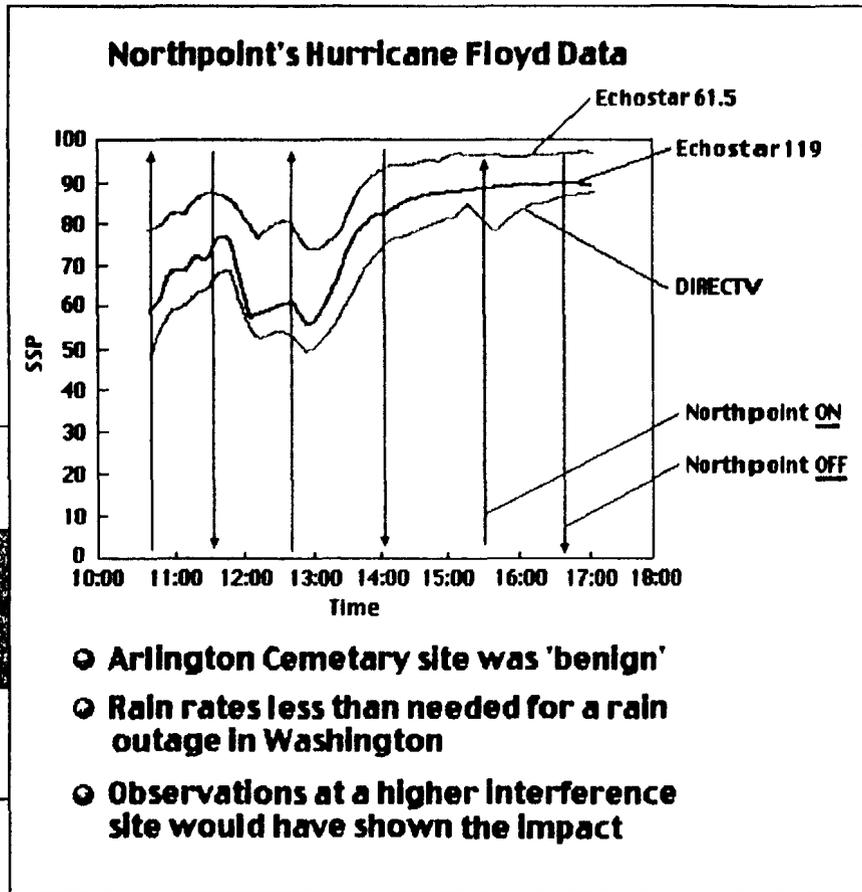
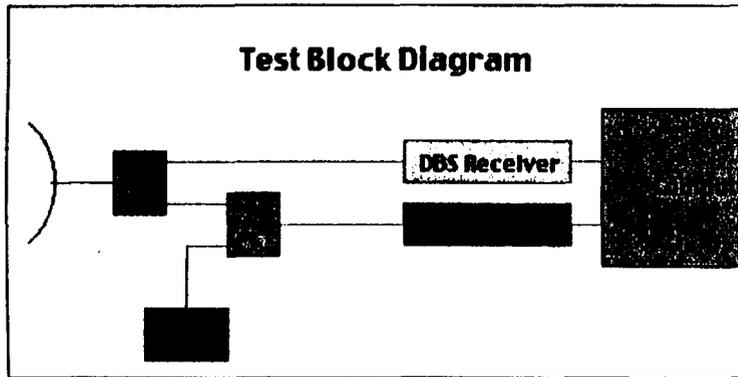
**New York Rain Demonstration:**

Show interference degrades perform  
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**New York Rain Demonstration:**

**Show interference degrades performance**  
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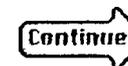
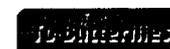
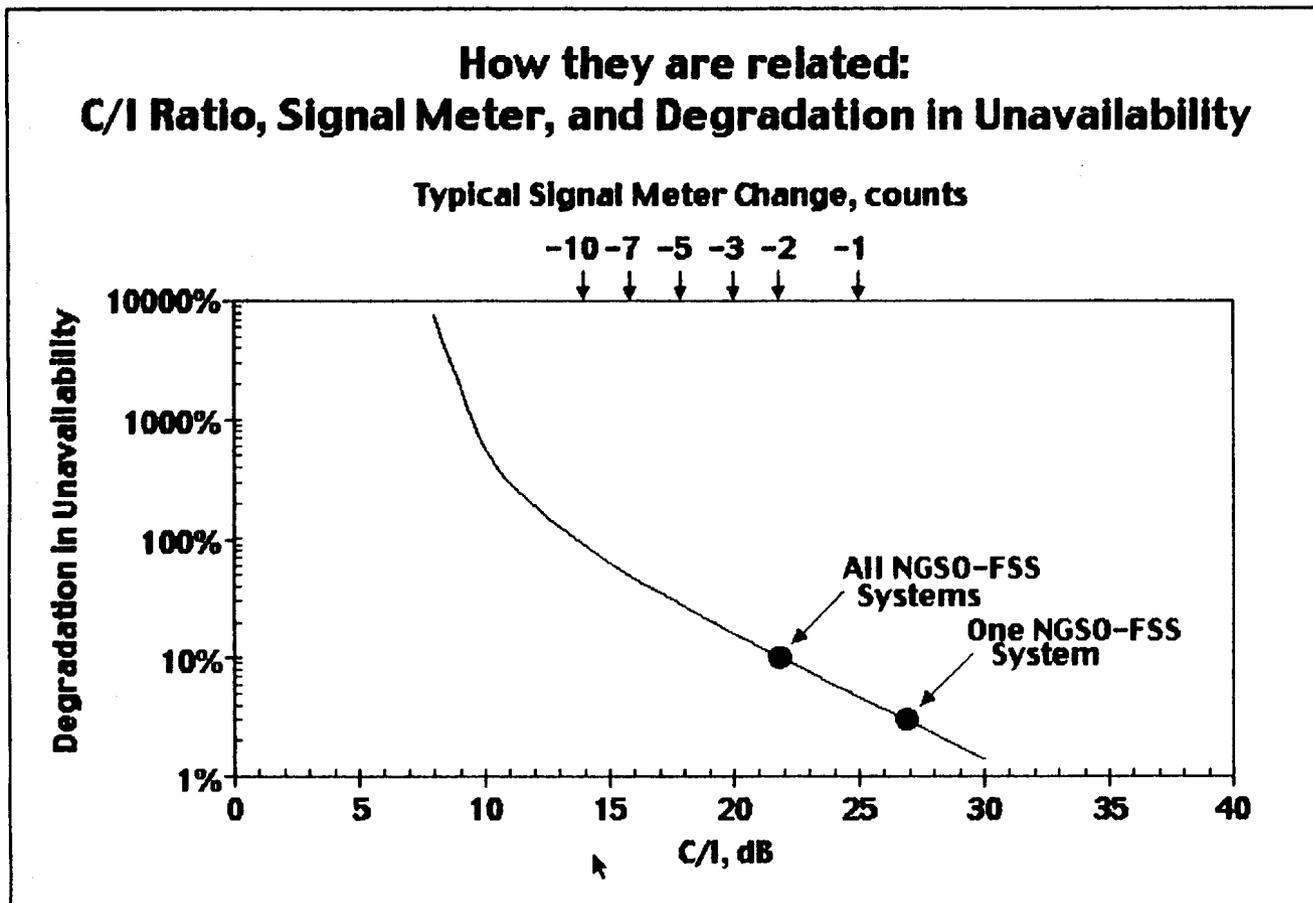
## Protection Criteria

- **NGSO FSS and Northpoint interference affect the demodulator equally.**
- **ITU-R developed interference criteria for NGSO FSS/GSO BSS sharing:**
  - **No clear sky signal interruptions**
  - **No more than 10% degradation in unavailability performance, aggregate of all NGSO FSS systems**
- **DIRECTV position**
  - **Northpoint must meet interference allowed from one NGSO FSS system (2.86%)**
  - **Adding Northpoint to band cannot push aggregate degradation above 10%**
  - **Above limits apply everywhere in the service area**
- **It has been demonstrated that Northpoint does not meet these conditions**

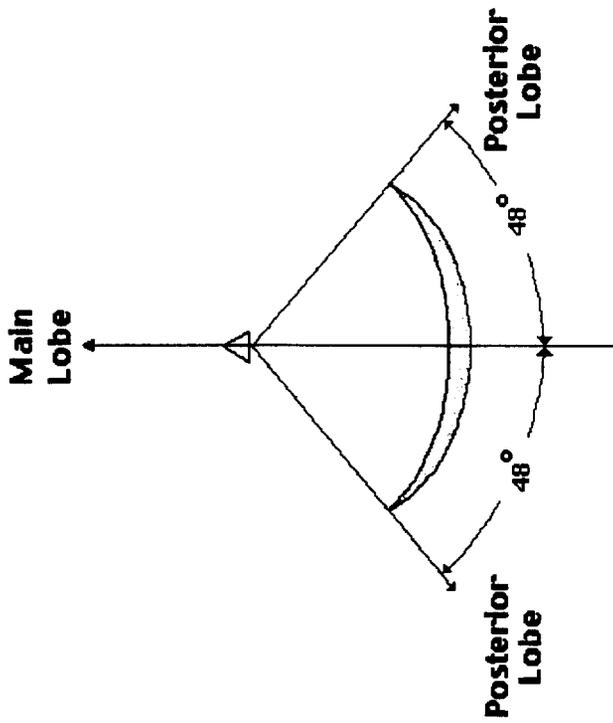
**Details**

**Table of Contents**

**To Summary** **Continue**

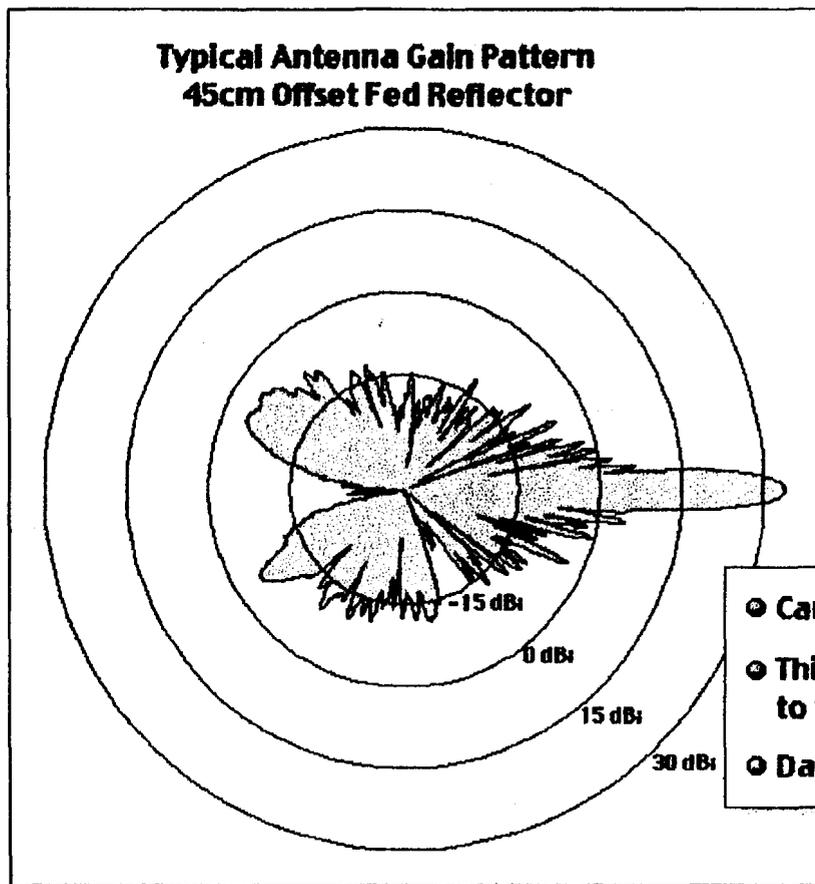


# DBS Receive Antenna



Antenna Geometry



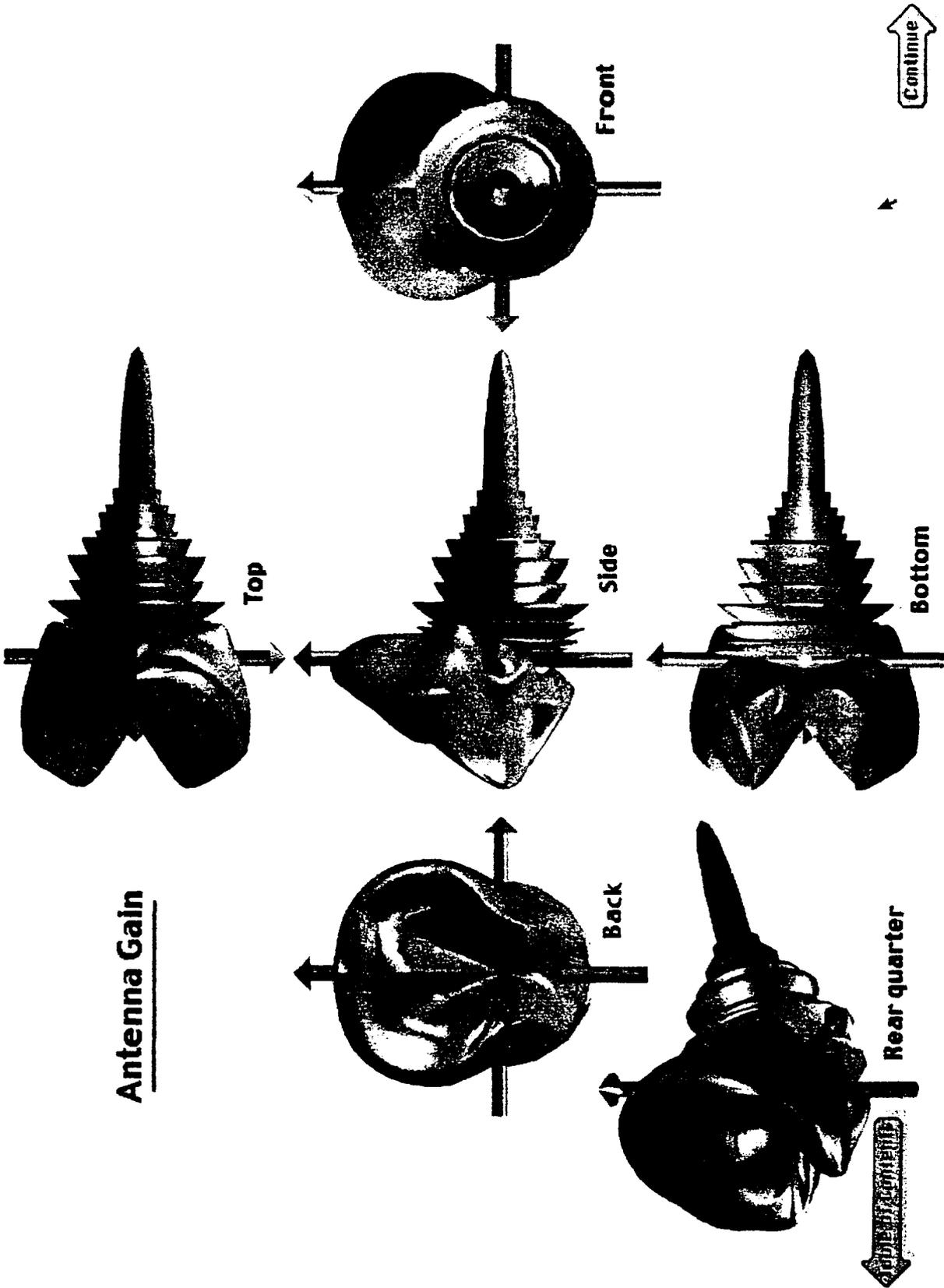


- Canadian Data for ITU
- This cut perpendicular to feed arm
- Data available in 8 planes

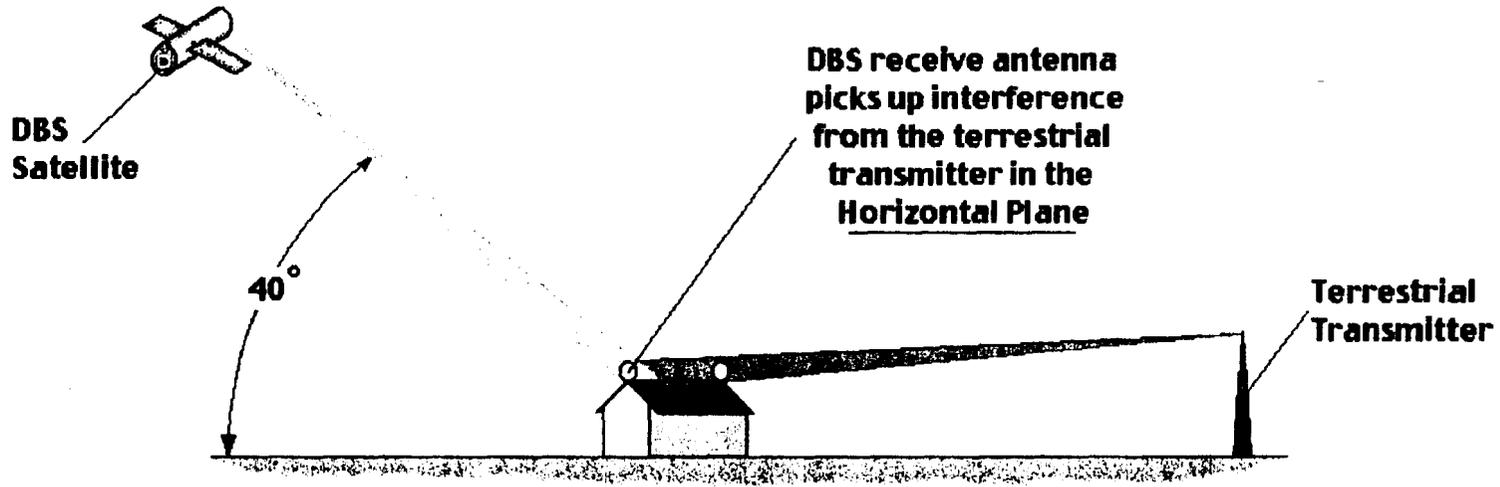
← [Index of Contents](#)

[Continue](#) →

# Antenna Gain

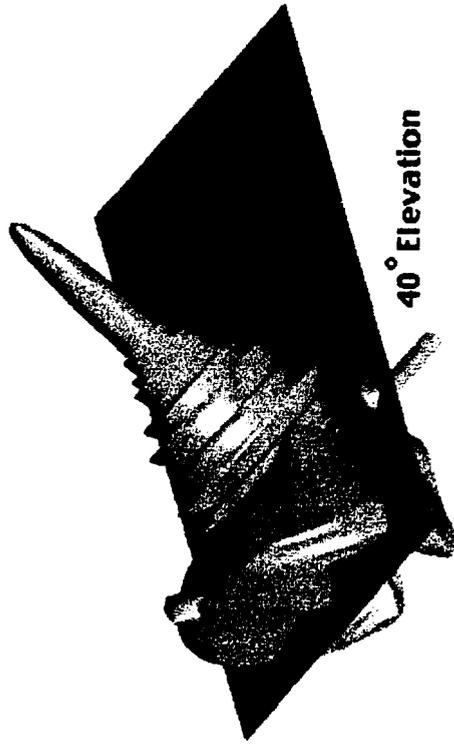


### Plane of Interest

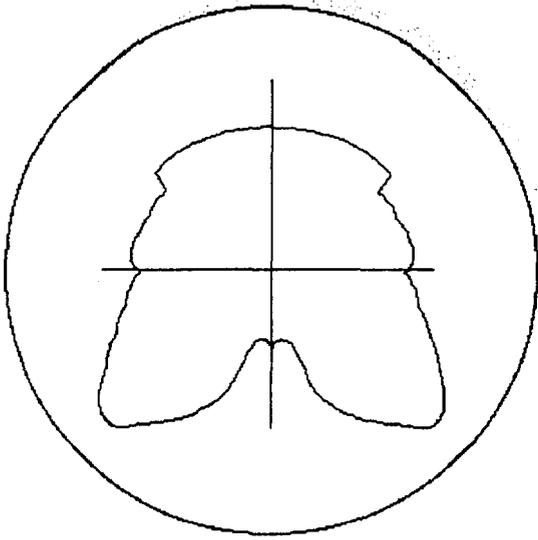


← Plane of Interest

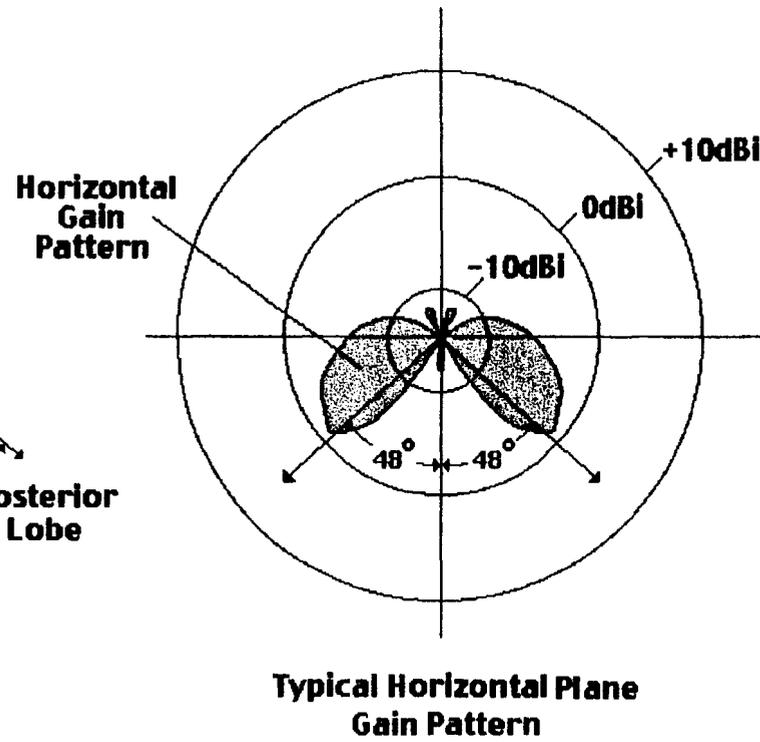
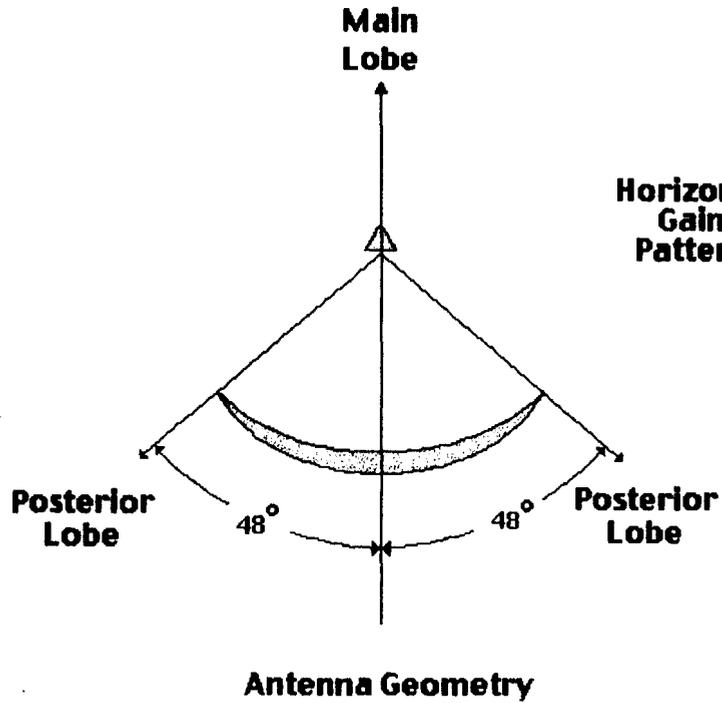
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40° Elevation



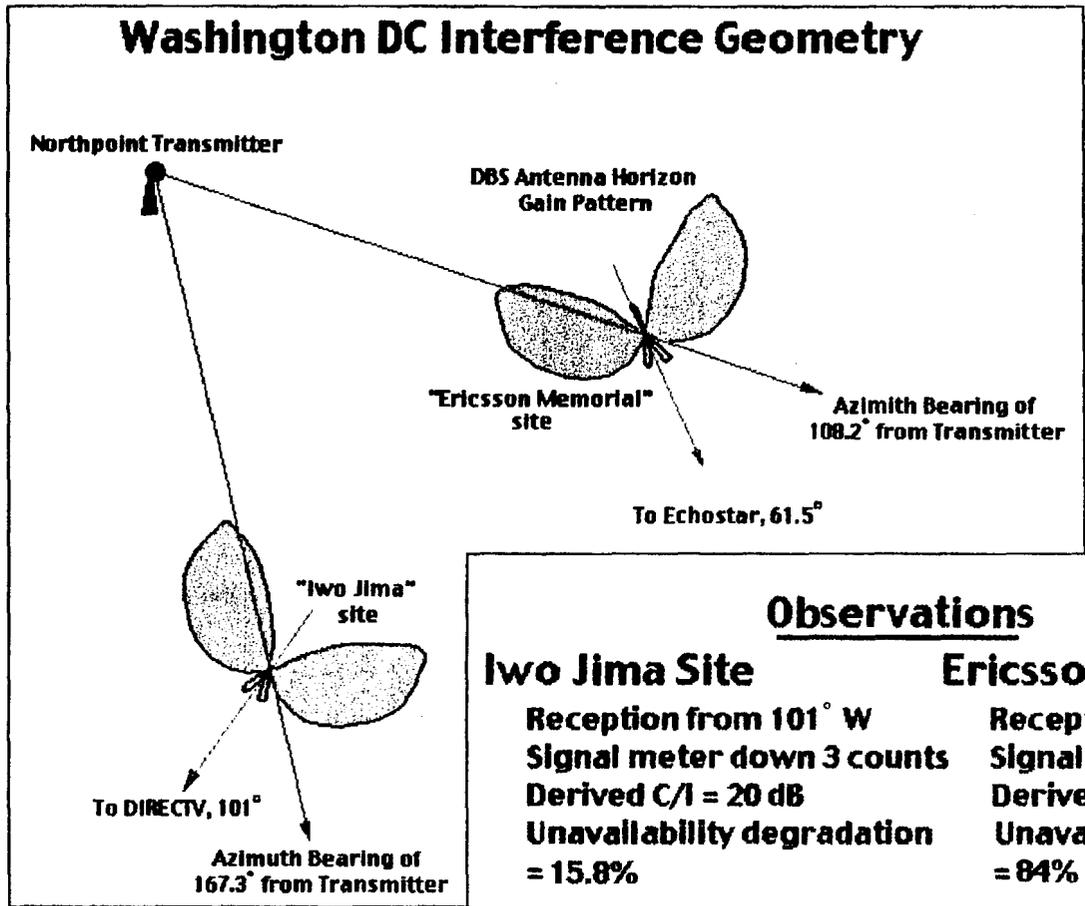
# Horizontal Gain Characteristics DBS Receive Antenna



[Table of Contents](#)

[DBS Outline](#)

[Continue](#)



### Observations

<b>Iwo Jima Site</b>	<b>Ericsson Memorial</b>
Reception from 101° W	Reception from 61.5°
Signal meter down 3 counts	Signal meter down 8 counts
Derived C/I = 20 dB	Derived C/I = 16.8 dB
Unavailability degradation = 15.8%	Unavailability degradation = 84%

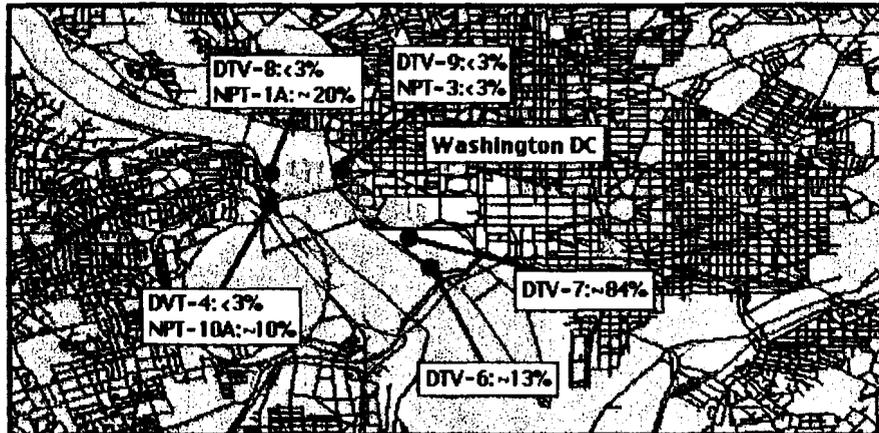
← Table of Contents

TO Home

TO DC

Continue →

### Predicted vs Measured Impact of Interference Reception from 61.5° W (Echostar)



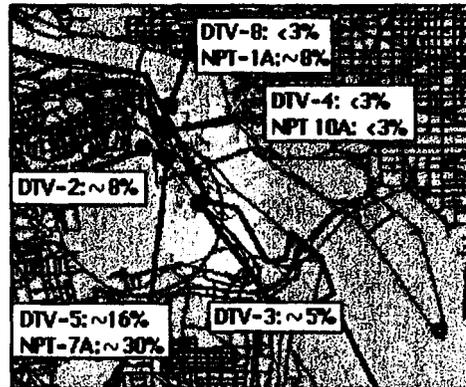
Site Number	Name	Measured by	Signal Meter Change	Calculated C/I, dB	Estimated Unavailability Degradation
DTV-4	110Freeway/Construction Site	DTV	0	—	—
NPT-10A	Same name	NPT	-2.6	22	~10%
DVT-6	Ericsson Memorial (shoreline)	DTV	-3	21	13%
DVT-7	Ericsson Memorial (polo field)	DTV	-8	16	84%
DTV-8	Theodore Roosevelt Island	DTV	0	—	—
NPT-1A	Same name	NPT	-4.4	19	~20%
DTV-9	Kennedy Center	DTV	0	—	—
Npt-3	Same name	NPT	-.7	—	—

← Table of Contents

to the table

Continue →

### Predicted vs Measured Impact of Interference Reception from 101°W (DIRECTV)



Site Number	Name	Measurement by	Signal Meter Change	Calculated C/I,dB	Estimated Unavailable Degradation
DTV-2	Iwo Jima 'A'	DTV	-2	22	8%
DTV-3	110 Freeway/Railroad	DTV	-1	25	5%
DTV-4	110 Freeway/ Construction Site	DTV	+1	—	—
NPT-10A	Same name	NPT	+0.8	—	—
DTV-5	Iwo Jima 'B'	DTV	-3	20	16%
NPT-7A	Rt. Marshal and Marshall (median)	NPT	-5	18	30%
DTV-8	Theodore Roosevelt Island	DTV	0	—	—
NPT-1A	Same name	NPT	-1.9	22	8%

← Table of Contents

DU 05A 0017

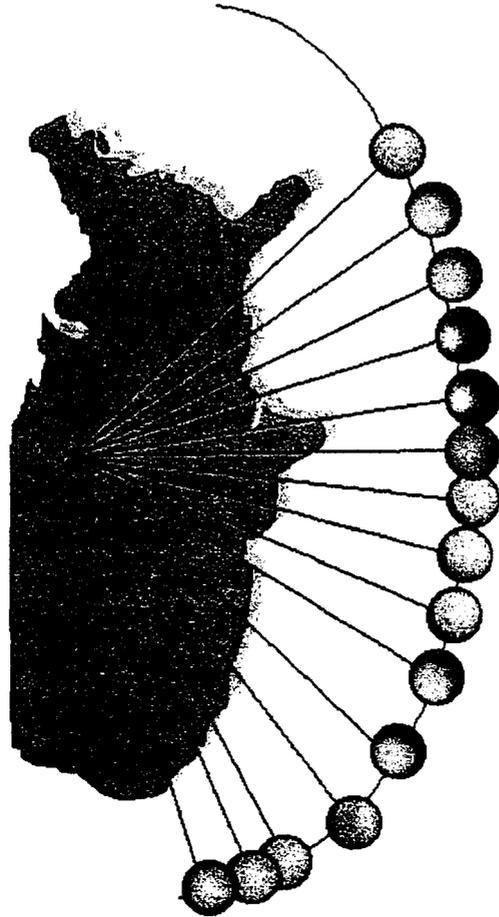
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## Generalize: Protect Reception from All DBS Slots

- What do generalized interference zones look like?
- Two methods of analysis were used:
  - Method 1
    - Simple, flat earth propagation model and  $1/(4\pi R^2)$  for losses;
    - Protect all points on geostationary arc (above  $10^\circ$  elevation angle);
    - Account for changes in DBS antenna horizon gain with elevation.
  - Method 2
    - Sophisticated OH Loss propagation model;
    - Protect (current) specific assignments on geostationary arc;
    - Simplified DBS antenna horizon gain.



# All Geostationary Orbit Locations

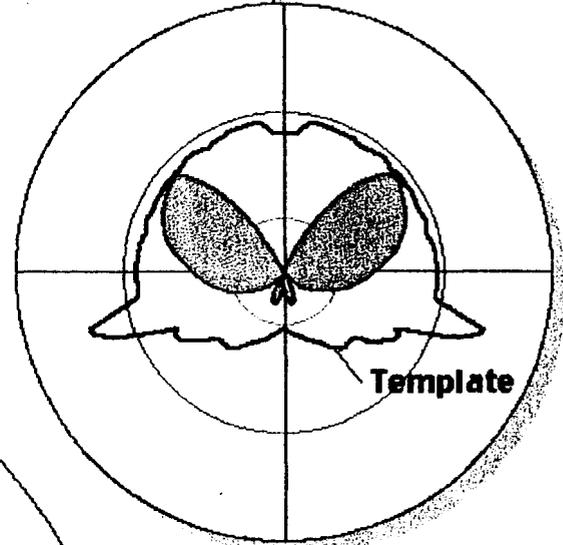
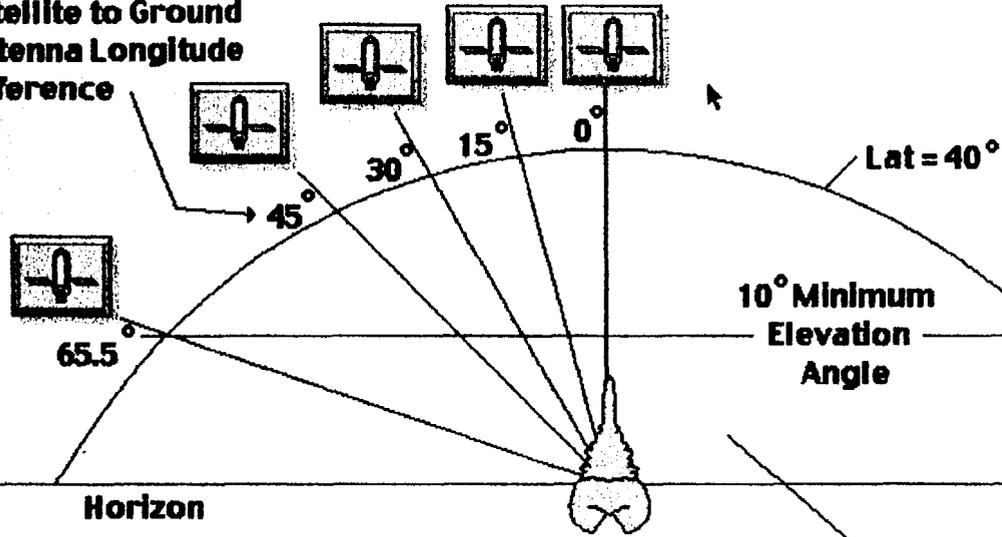


U.S.	61.5	101.0	110.0	119.0	148.0	157.8	166.0	175.0
Canada	82.0	91.0						
Argentina								
Mexico								



### Development of Worst Case Template

Satellite to Ground  
Antenna Longitude  
Difference



Horizontal  
Antenna  
Gain

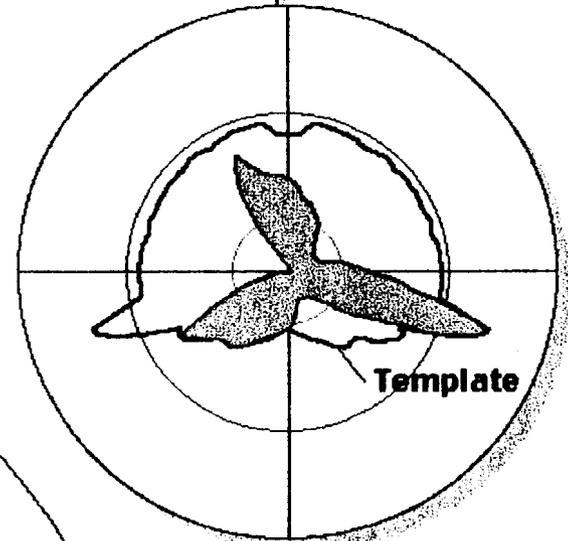
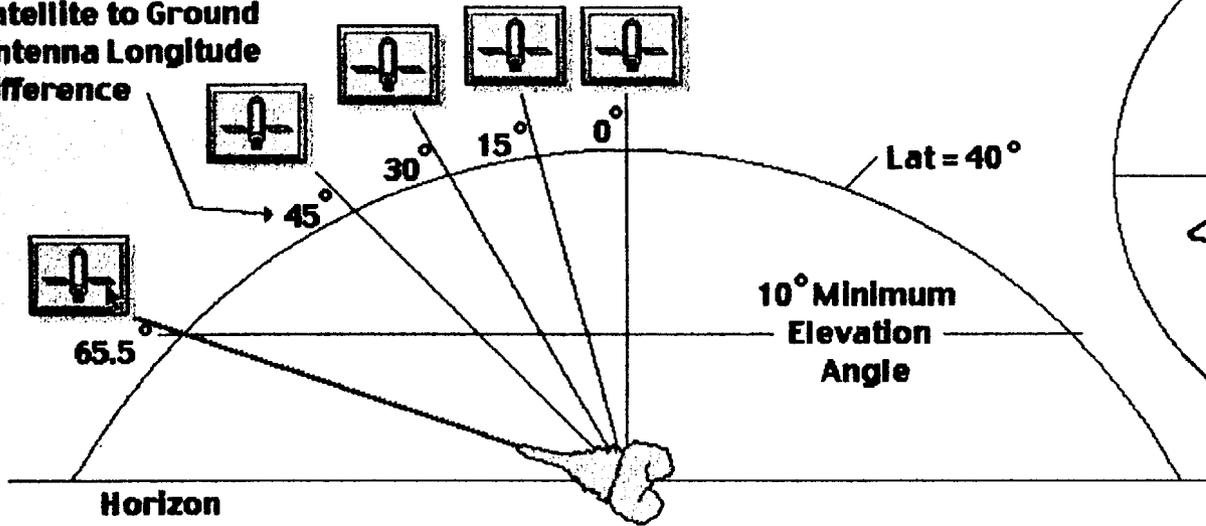
← Table of Contents

Continue →

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### Development of Worst Case Template

Satellite to Ground  
Antenna Longitude  
Difference

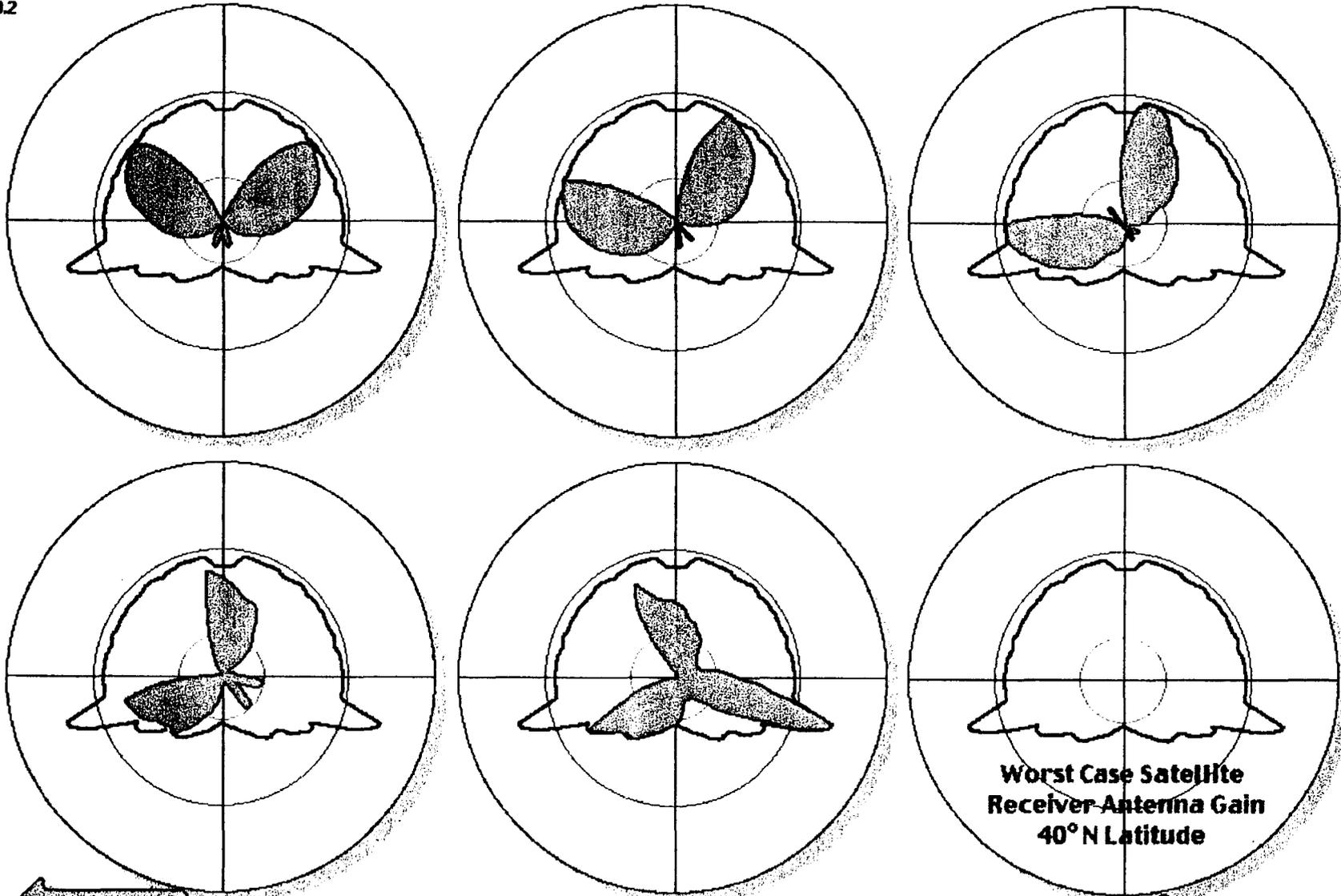


Horizontal  
Antenna  
Gain

← [Table of Contents](#)

[Continue](#) →

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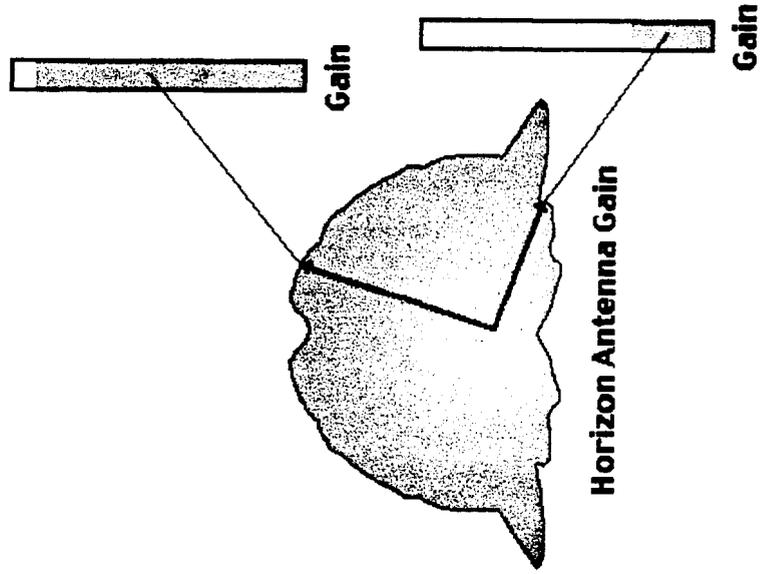
[Table of Contents](#)

**Polar Plot Satellite Receiver Antenna Sensitivity**

[Go Back](#)

[Continue](#)

# Method 1 Interference Zone Calculation

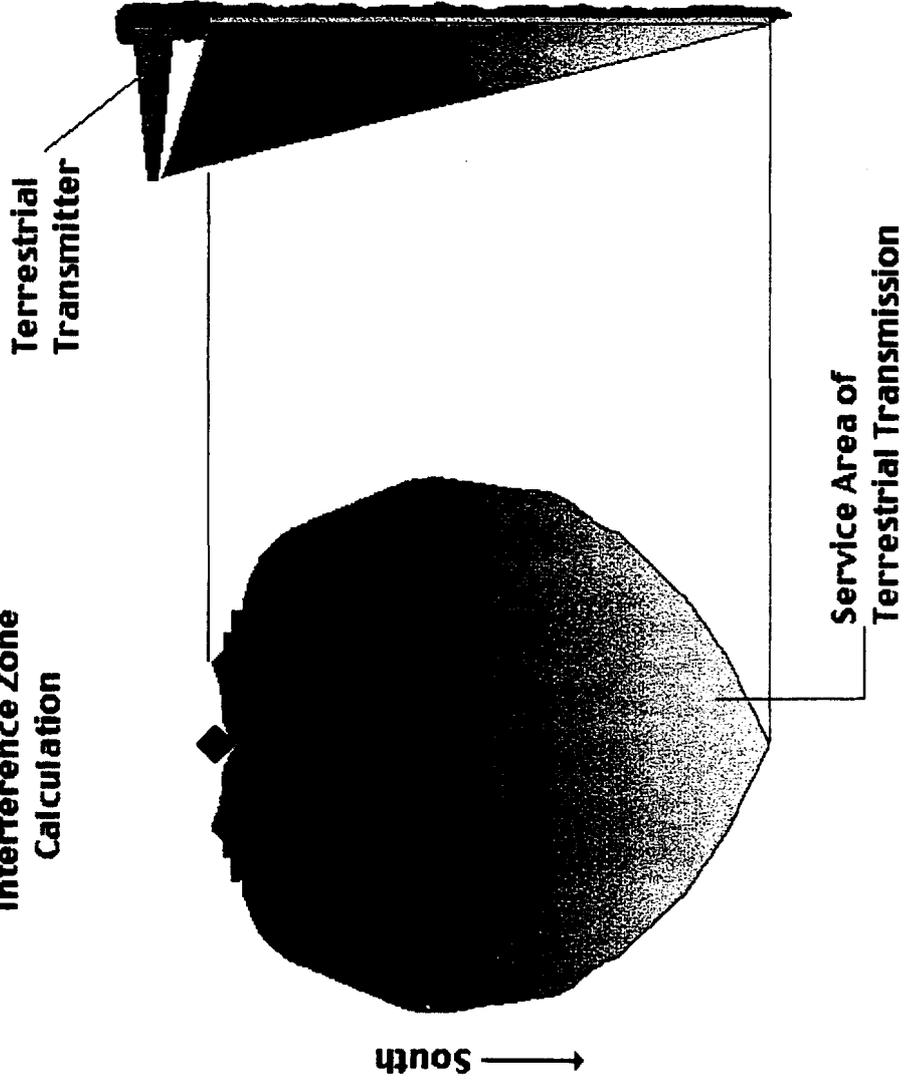


**Method 1**  
**Interference Zone**  
**Calculation**



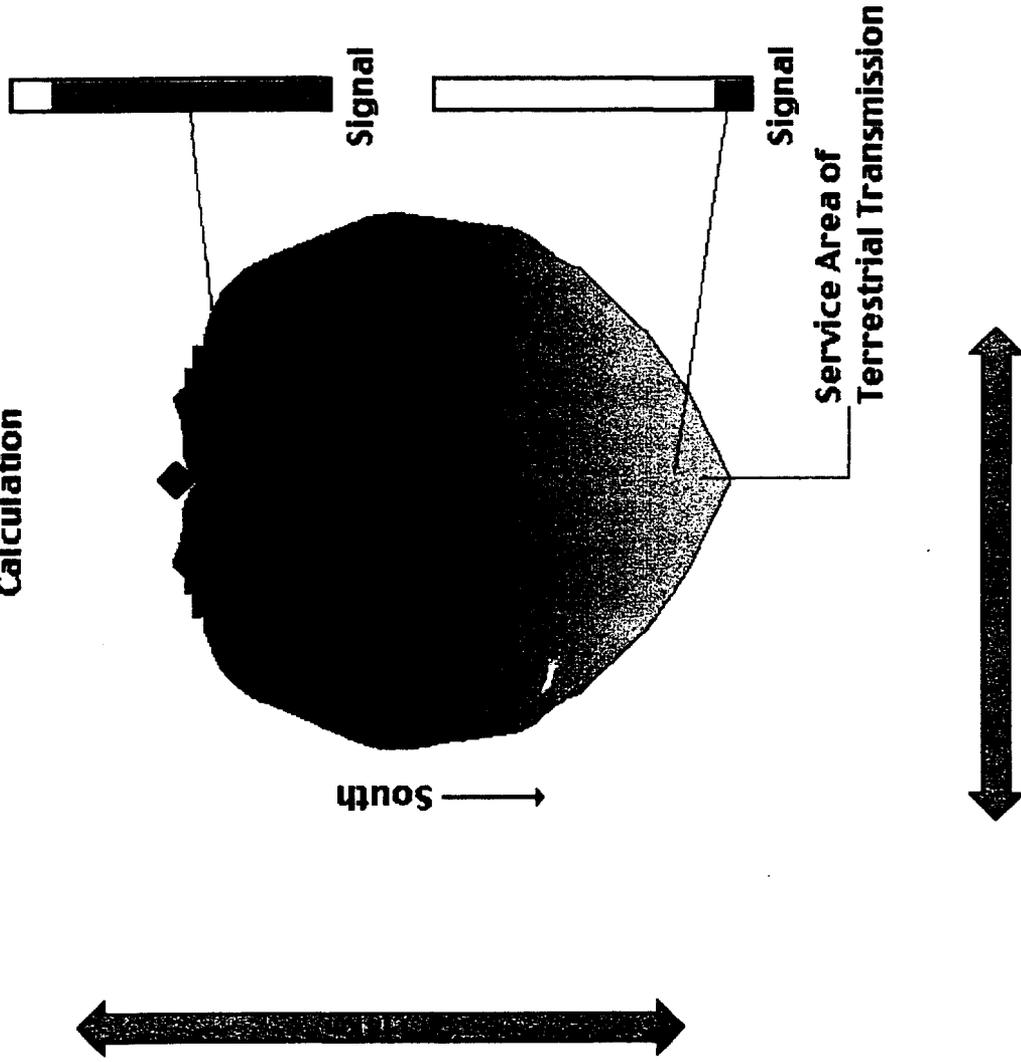
# Method 1

Interference Zone  
Calculation



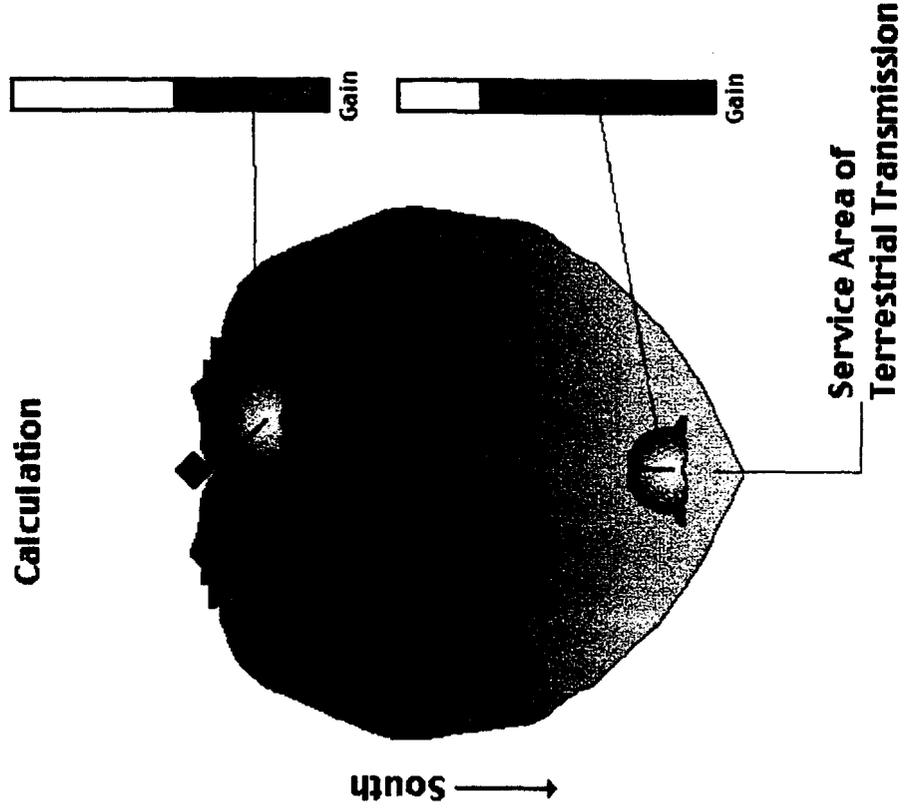
# Method 1

## Interference Zone Calculation



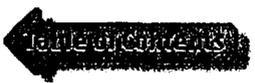
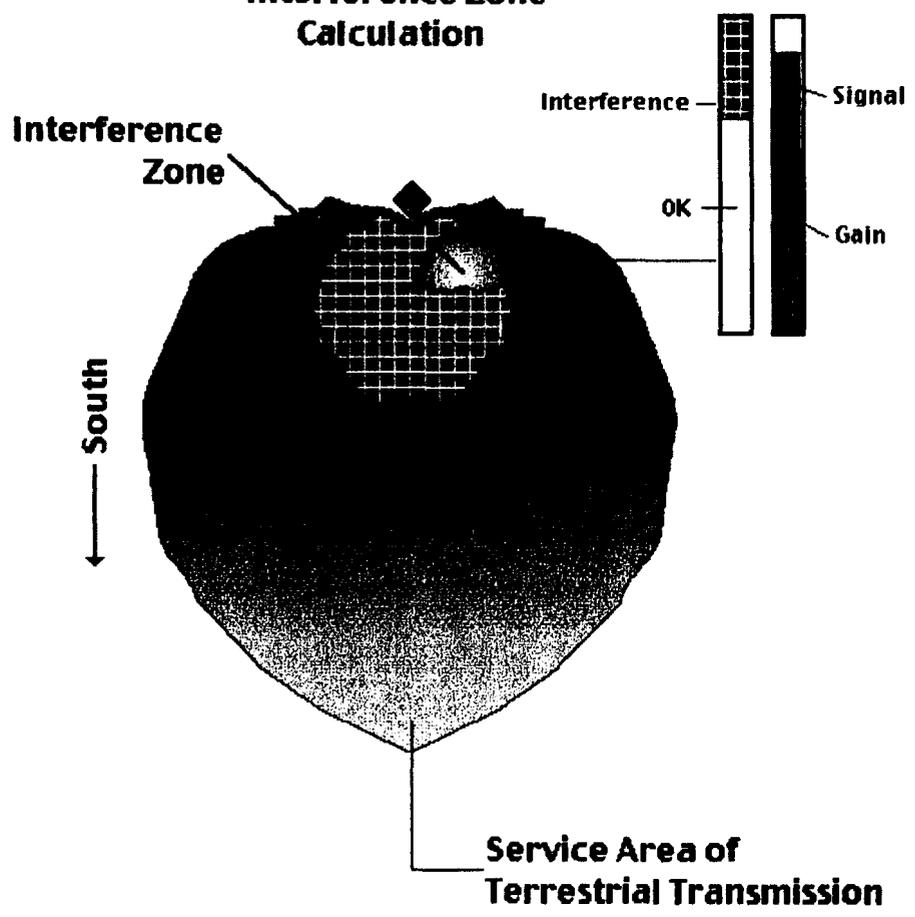
# Method 1

## Interference Zone Calculation

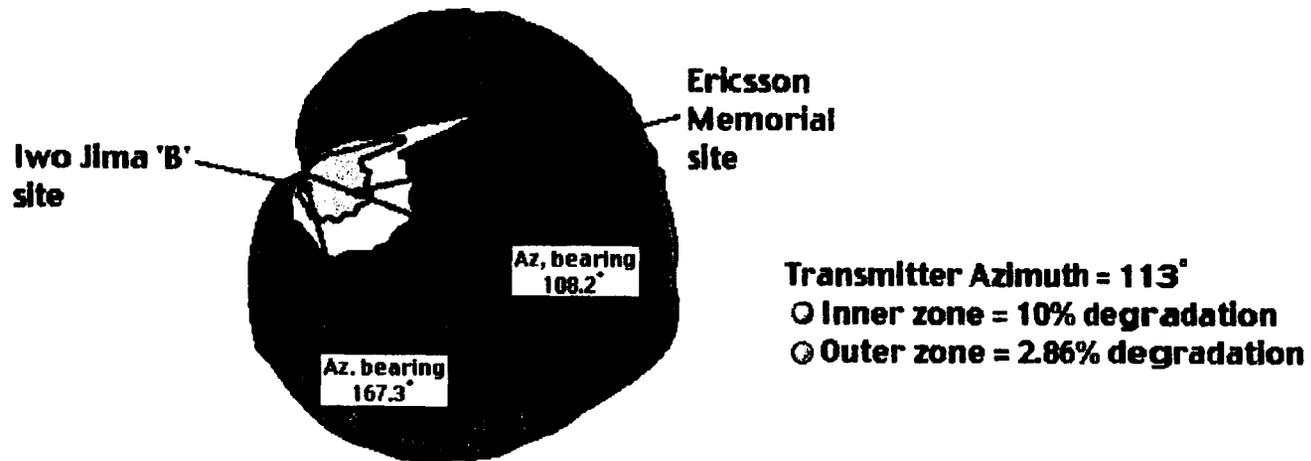


# Method 1

## Interference Zone Calculation



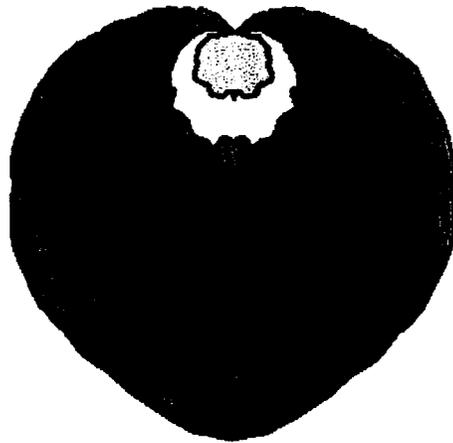
### Washington DC Interference Zone (Generalized, all orbit slots)



← Table of Contents

Continue →

### 'Due South' Interference Zone (Generalized, all orbit slots)



Transmitter Azimuth = 180°  
○ Inner zone = 10% degradation  
○ Outer zone = 2.86% degradation

← Table of Contents

Back

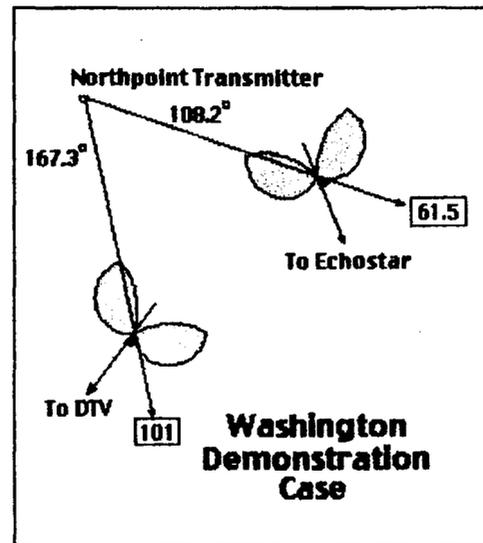
Continue →

## Method 2: Use NSMA OHLOSS Propagation Model

Use simplified DBS antenna horizon gain

◦ Always uses 40 degree elevation angle pattern

Protect discrete orbit slots



**Interference Zones, Protect All Orbit Slots  
USA Today Transmitter Site, 113° Transmitter Azimuth Angle**

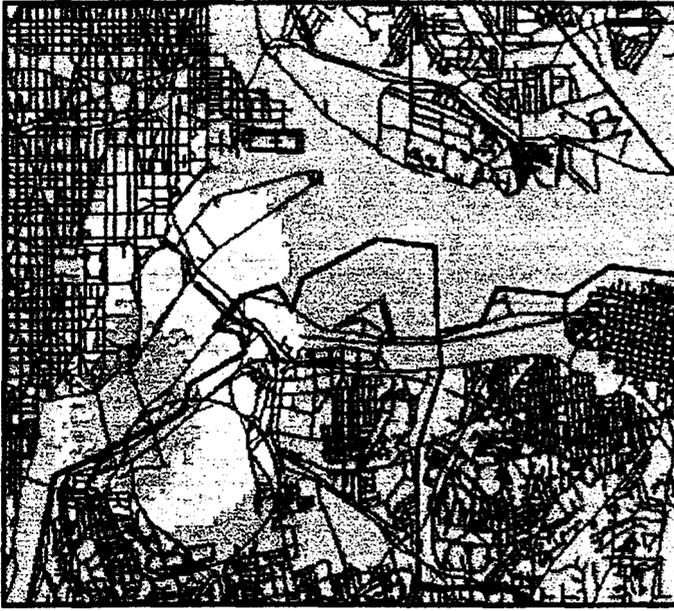
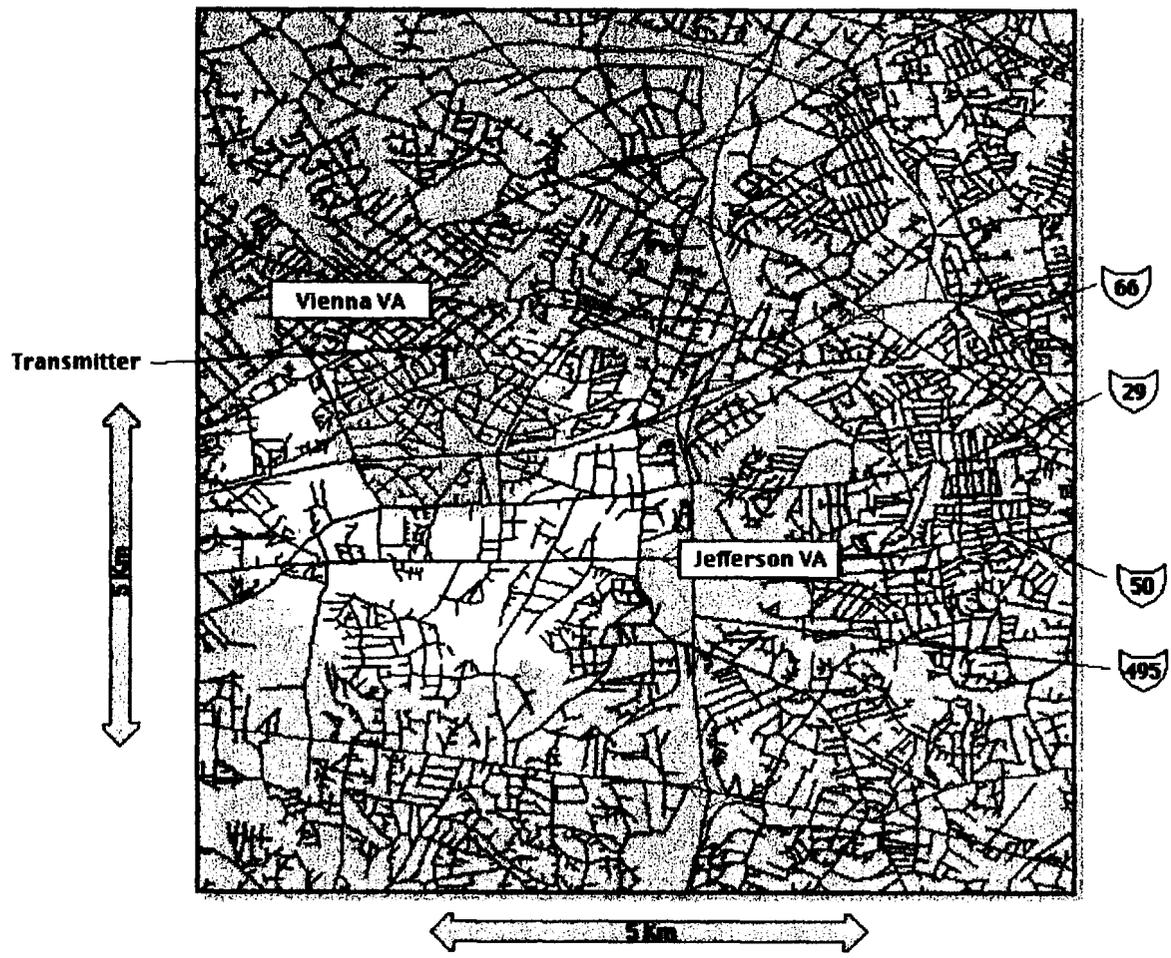


Table of Contents

Continue

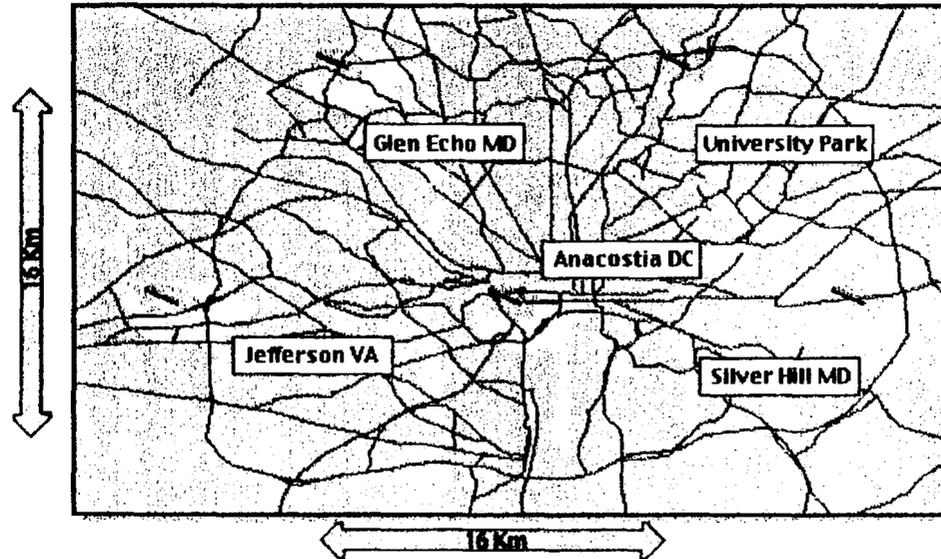
### Interference Zones, Protect All Orbit Slots Vienna, VA Transmitter Site, 180° Transmitter Azimuth Angle



← Table of Contents

→ Continue

### Interference From An Array Of Transmitters



- Each NGS0-FSS System must stay below yellow over this entire area.
- Northpoint clearly exceeds NGS0-FSS sharing criteria over a considerable area.

← Table of Contents

→ Continue

## Conclusions

- **New York rain testing clearly demonstrated the effect of interference on availability**

- **Harmful interference clearly seen at many sites in the Washington demonstration**

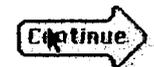
**Interference levels were above those allowed for single and aggregate NGS0-FSS systems despite inadequate test protocol**

- **Observations supported existence of predicted interference zones**

**Some observed levels of interference were higher than predicted  
Observations support the general size and shape of these zones**

- **Multiple interference zones in a metropolitan area created by an array of Northpoint transmitters show a dramatic and completely unacceptable impact to quality of service delivered to DBS subscribers**

- **DIRECTV now knows how and where to look for harmful interference sources. It is predictable.**



## Open Issues

- **The Washington DC demonstration was not a typical installation**

  - Transmission height was unrealistically high for a typical urban or suburban installation

  - The availability of a river and parkland to act as a buffer zone cannot be characterized as typical

  - Further testing is needed to properly characterize the impact of a typical installation

- **DIRECTV had no independent confirmation of various transmission parameters during the demonstration**

  - Power levels, actual transmit antenna pointing angle, beam tilt and measured beam shape

- **Rain testing must be done in a scientific manner**

  - Use of two receivers for a direct comparison of availability impact

  - Long term observations to investigate a range of rain fade conditions

  - Obtain observations in areas with measurable interference levels

