# Clewiston Test Plan
# Phase II Testing
# For MDS America, Inc.

**Prepared By**


March 21, 2003

The Knowledge that Powers the Network

# Table of Contents

LCC
The Knowledge that Powers the Network

## Introduction

MDS America has been granted an experimental license by the Federal Communications Commission (FCC) for the purpose of demonstrating and testing the HyperCable broadband wireless technology developed by MDS International. Pursuant to this license, the following Phase II test plan is proposed in order to determine the ability of the MDS technology to share use of the 12.2-12.7 GHz band with Direct Broadcast Satellite (DBS) systems. These tests will be conducted in a rural environment, near Clewiston, Florida under the designated call sign WC2XPU.

The goal of Phase I testing was to establish compatibility of a low power MDS transmitter, at a low transmitter height, with the DBS system. This type of MDS deployment would have very limited coverage area and consequently would be cost-prohibitive for large-scale deployment. A more realistic deployment would be to use a more powerful transmitter at a higher height. The goal for Phase II testing in Clewiston is to determine the compatibility of this second type of deployment with the DBS system. Thus, the objective of Phase II testing is to measure the HyperCable signal and to monitor the DBS satellite signals (DirecTV and EchoStar) in the presence of an MDS transmitter. Tests will be conducted at various receiving antenna sites and during a variety of atmospheric conditions, including rainy conditions, within the test service area. Test sites will include sites that appear to be worst-case interference conditions.

## Test Methodology

The general test methodology is to measure concurrently the RF characteristics (C/(N+I), Eb/No, BER) of two sets of DBS receivers; one set is subject to possible interference by the MDS America transmitter while the other set is protected against interference by means of shielding. The RF characteristic of the protected set is used as reference to compare the RF characteristic of the interference exposed set. Any decrease in availability of the interference exposed set as compared to reference set will be attributed to the MDS

Transmission. Availability will be defined by means of a certain threshold on the RF characteristic. Such an empirical approach would afford direct measurement of the DBS downlink performance degradation due to MDS transmission.

An important part of such an approach would be to establish empirically the performance comparability of the two sets in the absence of interference. Hence, prior to turning on the MDS transmitter, RF characteristic data would be collected from the two DBS receiver sets to ensure similar performance. Furthermore, periodically the MDS transmitter would be turned off to again collect data for performance comparability.

Phase I testing carried out in July of 2001 established that measuring the performance degradation of DBS downlink due to MDS transmission is difficult and can be observed only very near the MDS transmitter. As it is our goal to capture the full impact of MDS transmission, the Phase II test plan addresses the worst case scenario. It is anticipated that the worst case scenarios occur near the point of ground incident of the first side lobe of the maximum ERP of the antenna and the immediate area surrounding the transmitter. In a realistic deployment scenario, it would be the first side lobe of the antenna that will be a potential source of interference to DBS downlink. As such, a fixed site is proposed at or near the ground incident point of the first side lobe of the MDS transmitter. Data collection will be made for the entire duration of the testing period (over a month). Additional fixed sites (1-2) are proposed again near the first side lobe ground incident point which will be will be brought online as the logistical and FCC license expiration limitation allows. As required by the FCC experimental license grant, the maximum ERP will be directed towards 180 degrees.

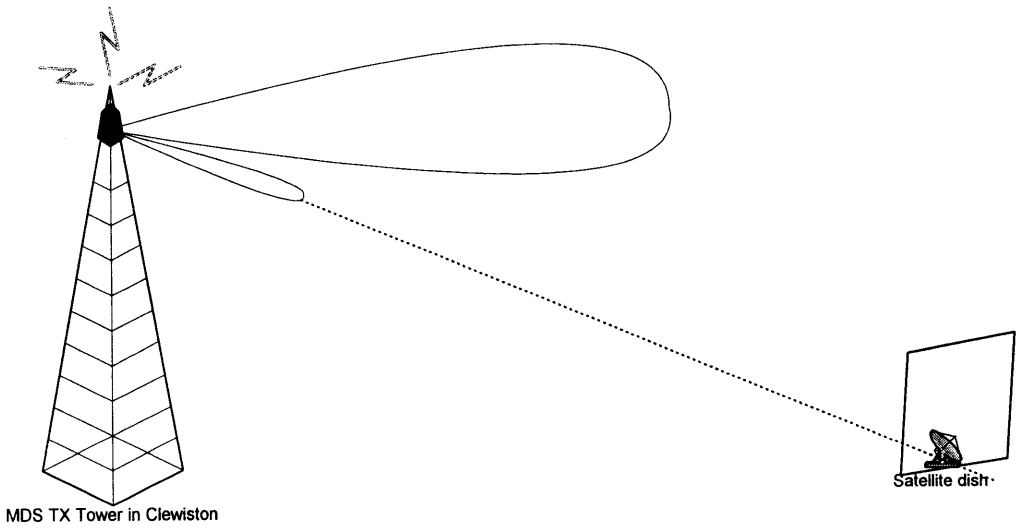


Figure 1 Fixed site test configuration

As the MDS antenna is near omni directional, a number of other measurements will be made over a shorter duration (one week or less) at directions other than the maximum ERP direction. The number of these measurements will depend on the logistical success of DBS shielding transportation and the FCC license.

Phase I testing demonstrated that the MDS transmission will not affect the DBS downlink in non-rainy conditions. The main objective of this round of testing is to determine the reduction in availability (if any) of DBS downlink in the presence of MDS transmission. As the availability is closely linked with the atmospheric conditions, it is proposed that for Phase II testing, measurements be made in a continuous fashion which will include a variety of atmospheric conditions (rainy or otherwise).

A simplified view of the test configuration for the inference exposed set is shown in Figure 2. The protected set will be configured in similar fashion, however, the satellite dish antenna will be shielded from the MDS transmitter.

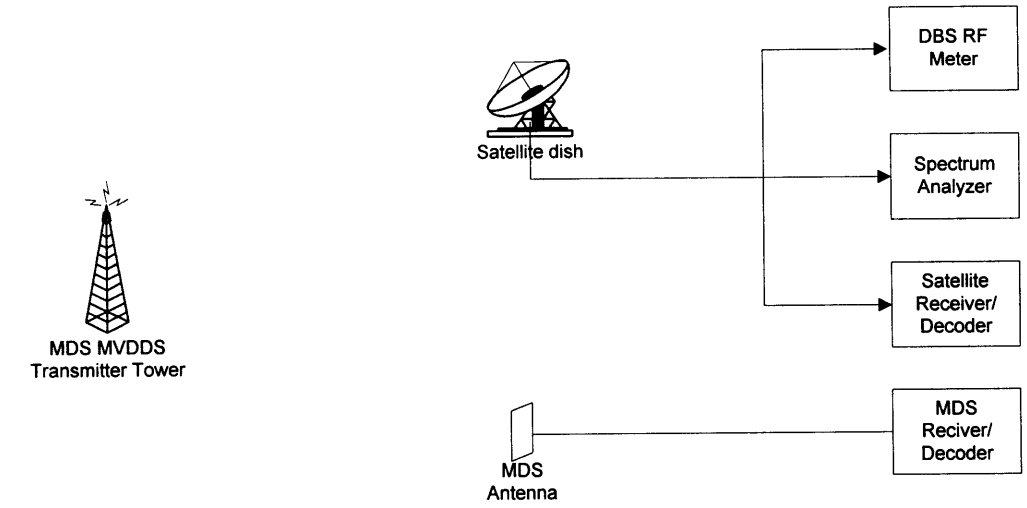


Figure 2

Each test site will include:

- DBS Meter
- DBS systems purchased on the general market
- Spectrum analyzer model E4407B
- Television monitor
- Multi-media Equipment Van
- Laptop Computer
- GPS receiver

## MDS Transmitter Configuration

The MDS transmitter will be installed on an existing telecommunications tower at a height of 181 meters (AGL). The transmitter output power will initially be set to 46 dBm Effective Isotropic Radiated Power (EIRP) with the maximum possible bandwidth of 500 MHz centered at 12.450 GHz. The transmit antenna will be pointed in a Southerly direction (180 Degrees), and with horizontal polarization.

The transmitter and related equipments are as follows:

LCC
The Knowledge that Powers the Network

- Custom Antenna, H pol, 12 dB gain
- One Block ODU, Transmitter power 34 dBm max
- One L band amplifier with variable attenuator
- One IDU, 10 MHz Clock reference, 210 meters of cable

To facilitate the evaluation process, the MDS transmitter will be periodically turned ON during the field tests as shown in the timetable below. Short term variations of schedule will be reported to the Experimental Licensing Branch. The MDS transmitter site will be manned so that any transmitter adjustments can be made as required by the tests. Power, bandwidth and center frequency adjustments may be made during initial stages of the field operations. Beam tilt will initially be set at 0°, but some beam tilt adjustment may be made as the tests proceed.

## Field Measurements

Prior to commencement of testing, the MDS transmitter will be calibrated for the maximum output power. Thereafter regular field strength tests will be made using a calibrated EIRP test set. The calibrated EIRP test set will also be used for maintaining the DBS receiver set calibration. At each site, measurements will be made using both the DBS receiver set and the calibrated EIRP test set.

Each test site will include a protected test set and interference exposed set. A benchmark test will be performed to establish performance comparability between the two sets. The data collection procedure for each test site is as follows:

1. The interference exposed DBS receiver antenna, the protected DBS receiver antenna, and the MDS receive antenna will be positioned at a height of approximately 1 - 2 meters and a GPS reading will be taken.
2. The DBS satellite receivers will be set to receive the satellite signal. Carrier power will be measured using the Agilent ESA-E Spectrum Analyzer. The signal strength count, (C/N) and BER will be read from the DBS meter and recorded. The audiovisual signal quality will be monitored using a

television.

3. The MDS Transmitter will be turned ON and the MDS receiver will be set to receive its signal, which will be monitored using a television.
4. With the MDS transmission system ON, the satellite carrier power will be measured for both sets using the Agilent ESA-E Spectrum Analyzer. The signal strength count and BER will be observed and recorded. The audiovisual signal quality will also be monitored.
5. A site log will be maintained with all the comments and notations about the sites and conditions.

## Data Analysis and Report

During testing and following the completion of Phase II testing, test results will be processed and analyzed by LCC International. Recommendations for further testing, if any, will be made by LCC during or after the Phase II testing.

## Timetable for Transmission

| Date | Start Time | End Time | Transmitter Status | Transmission Type |
|---|---|---|---|---|
| April 15, 2003 – May 31 2003 | 12:00 AM | 11:59:59 PM | ON | Continuous |

## Conclusions

This new round of testing is designed to determine compatibility of MDS Hypercable technology with the DBS system in an actual deployment scenario. The testing examines the performance of the DBS downlink for a continuous and extended period, exposed to MDS transmission. It is expected that DBS downlink will be observed under various atmospheric conditions. Thus, the testing will provide bases for an over all DBS downlink empirical availability with and without MDS transmission.