

# Site Preparation for 3.6m X/L Band and 3.7m C-Band Groundstation

Anthony Meadows (Elizabeth City State University), Antonio Guion (Elizabeth City State University)    Mentor: Andrew Brumfield (Elizabeth City State University)

## Abstract

On February 7, 2012 a Memorandum of Understanding (MOU) was signed between Elizabeth City State University (ECSU) and SeaSpace Corporation. The memorandum led to the installation of three direct-broadcast satellite receiving ground stations and a training site at ECSU. The receiving stations included a 3.6m X/L band system, a 3.7m C-band system, and a 5.0m L band system. The MOU defined that once the installation of the various systems completed, ECSU would in turn provide an east-coast training and data center for SeaSpace products. The purpose of this project was to document the installation requirements and internal processes at ECSU for the ground stations, as well as; generate a report of training site physical requirements. Aspects of the MOU including ECSU policy requirements, location engineering findings, location installation requirements, ground station capabilities, and training center needs are addressed.

## Introduction

- Sea Space Corporation Inc. based in Poway, California is a provider of remote sensing ground stations. [1]
  - ❖ Provide an east coast training site / data center and continue to foster established research collaboration
- On February 7th, 2012 entered into a partnership with Elizabeth City State University.
  - ❖ 3.6m X/L band ground station
  - ❖ 3.7m C band ground station



## Proposal

- A proposal will be sent for the approval of the University. The proposals will cover the removal of the trees and the preparation for the site, which should take place within August 2014.
- The preparation contain mending the ground station's located on the roof, and prepping for the arrival of SeaSpace Corporation on September 8th, which plans to begin installation of the ground stations on September 8<sup>th</sup>.
- The removal of tops of trees is mandatory to prevent obscuring of the ground station that receives data from GOES-West satellite which is one of the 2.4m antennas.

## Ground Station Installation

- Dixon-Patterson Hall (located on ECSU campus) was chosen as the most ideal location for the 3.6 meter X/L band and 3.7-meter C-band ground stations.
  - ❖ Flat roof provides clear sky's for the ground station antenna
    - ✧ horizon to horizon data acquisition
  - ❖ Space to position the associated server.



## L Band

- ECSU currently has a 1.5m dish and will receive a 3.6m ground station which also operates in the L band. The L-Band has a frequency range of 1-2 GHz and a throughput of ~2 Mbps [1]. A few of the telemetries that operate on the band are the National Oceanic and Atmospheric Administration (NOAA), the Sea-viewing Wide Field of View Sensor (SeaWiFS) , and Meteorological Operational Satellites (METOP). NOAA provides accurate weather forecasts to protect and manage the nation's coastal and ocean resources. METOP is a series of three polar orbiting satellites which measures the atmospheric humidity and temperature. SeaWiFS develop and operate a research data system to gather, process, archive, and distribute data received from an ocean color sensor.



## X Band

- ECSU will receive a 3.6m ground station which will operate within the X band.
- The frequency range of 8-12 GHz and a throughput of ~15 Mbps [5].
- Provides almost eight times the throughput of L band platforms.
- Allows higher spectral and spatial resolution imagery to transmit to supporting ground stations.

- Increases the variation in products that can be generated using the captured data.
- Allows pixel areas of less than one meter in size to be observed. Telemetries that use the X-band are the National Polar-orbiting Operational Environmental Satellite System Preparatory Project (NPP), the Terra, and the Earth Observation System Aqua (EOS-Aqua). NPP provides critical weather and climate measurements to reduce the risks for the next generation meteorological satellite system. Terra, which is a satellite named for earth, collects data for the planet climate change. EOS-Aqua consists of six Earth Observing instruments collecting a variety of global data sets.



## C Band

- ECSU will be receiving a 3.7m C-band ground station commending to the MOU. The C-band is a portion of the microwave band ranging from 4-8 GHz, with the wavelength of ~5 cm [1]. This band is commonly used for satellite communications with ground stations with high data throughput needs. Some telemetries that transpire the C-band are, the Geostationary Operational Environmental Satellites (GOES) and the Meteorological Satellite Second Generation (MSG).
- Both the MSG and GOES satellite platforms are geostationary. Geostationary is a flight path of an orbiting satellite that circles around the earth once per day so as to appear stationary in relation to the earth's surface [2]. This type of orbit is also called geosynchronous.

## FUTURE WORK

As of now the future work of this project consist of the contractors accepting a proposal to conduct landscaping that may be needed in order to cut down trees blocking the communication pathway between the ground stations and the satellites.

## REFERENCES

- 1 <http://www.seaspace.com/about.php>
- 2 [http://nia.ecsu.edu/ur/1112/rw12/mou\\_seaspace\\_ecsu.pdf](http://nia.ecsu.edu/ur/1112/rw12/mou_seaspace_ecsu.pdf)
- 3 <http://www.seaspace.com/about.php>, Memorandum of Understanding ECSU & SeaSpace Corporation
- 4 <http://www.ospo.noaa.gov/Operations/GOES/index.html>
- 5 <http://www2.jpl.nasa.gov/basics/bsf6-3.php>

Dixon-Patterson Hall