CGMS-XXIX USA-WP-26
Prepared by USA
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To be discussed in WG I

STATUS ON THE DEVELOPMENT AND IMPLEMENTATION OF THE INTERFERENCE LOCATION SYSTEM FOR THE DCS

This document provides a status of the USA activities in developing a transmitter location system for the IDCS/DCS.
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1 Introduction

The International GOES Data Collection System (IDCS) is a communications relay system that uses the transponders carried on geostationary satellites to relay atmospheric and environmental data from Earth-based sensors within view of the spacecraft. Data from these sensors are received at a data acquisition for processing and distribution. The data are processed and transmitted to the users via various means. The GOES DCS is critical to the operations of the U.S. Geological Survey, the Army Corp of Engineers, the Bureau of Land Management, the Interior Department, the Energy Department, the Fish and Wildlife Service, the Navy Department, the National Park Service, NASA and the National Weather Service. The initial and primary use of hydrological and meteorological data collected via the GOES DCS is the real-time operation and forecasting for management of multipurpose reservoir systems, water quality, and river and stream flows. These agencies require real-time data for forecasting, management of dams, irrigation, and regulatory missions. These data are critical for the balanced management of the public lands and resources. NASA space shuttle launches require realtime observations from all emergency-landing sites to determine launch status. Data collected via the GOES DCS are used for fire weather prediction, resource management, as well as for managing water projects for flood control, and navigation.

Real-time data such as river stages, precipitation and temperature are needed to judicially operate projects for their authorized purposes. The GOES DCS system is mainly used in connection with meteorological analysis and forecasting efforts by the NWS, with some applications made at the National Ocean Service (NOS), as well as research efforts of the Office of Atmospheric Research (OAR).

In addition to DCS, NOAA manages the Search and Rescue Satellite-Aided Tracking (SARSAT) system. SARSAT utilizes both NOAA POES and GOES to relay signals from emergency locator beacons to SARSAT earth stations. These beacons transmit signals in the 406 MHz band.

2.0 Need to Identify Interference

NOAA recognizes the need to locate and identify interference by illegal users and is developing a technical means to do so. At the Coordinating Group for Meteorological Satellites (CGMS) meeting in Nikko, Japan, the USA stated that interference in the DCS bands creates depreciation in the services for relay meteorological data via geostationary satellites. This development effort will allow the USA and other CGMS members to locate and identify interfering transmitters in the IDCS radio frequency band. Currently, this capability does not exist. Our present mode of operation allows CGMS members to limited

ability to monitor interference. Without more effective monitoring intruders will continue to use our valuable resources without authority and with some degradation in the IDCS service. To provide the IDCS communities with the highest quality data acquisition and dissemination service and reduction in loss of data, USA has embarked on a mission ensure that illegal transmitters and sources of interference are eliminated from our frequency spectrum.

Over the past decade, the GOES DCS and SARSAT have suffered dramatically from interruptions due to unknown and unidentified interference. Disruptions in these services have cost the users valuable time, resources and in some cases, loss of life. In the GOES DCS, the USA began to lose more and more time slots and eventually an entire channel to the pirate transmitters. The reassignment of time slots and the availability of manpower to update the platforms equate to an immense lost of data and a monumental budgetary expense. Interference reduces the reliability of the GOES communications system and denies the USA the full use of their frequency assets. The USA has proven that 'just' monitoring interference does not reclaim the frequencies allocations used by an unknown source. Unless these unauthorized and unknown intruders to the IDCS and DCS systems are expelled, the USA and other CGMS operators will continue to lose a valuable resource, radio-frequency bands. The only solution is to locate and identify the source of the interference when it occurs and report it to the appropriate authorities.

3.0 Expected Improvements

With the development and implementation of a transmitter location system, CGMS satellite operators will be able to effectively manage the frequency resources that are critical to the IDCS and SARSAT operations. The development of a transmitter location system (TLS) will allow satellite operators to locate and identify sources of interference in the DCS and SARSAT frequency bands and provide their environmental users with a safe reliable system for monitoring the Earth's atmosphere, ocean and land resources without interruptions. Service degradations encountered throughout the system can be quickly identified to improve the quality of the DCS and SARSAT services.

4.0 Background

The USA has been investigating techniques for locating and identifying interferes in the DCS frequency band in near-realtime. Interferometrics, Inc has been working to provide NOAA with a TLS for use with the GOES Data Collection System (DCS). The TLS is designed to geographically localize sources of interference to geosynchronous communications satellites. It is commonly used at C-band and Ku-band to locate signals with modulation bandwidths ranging from CW to over 1 MHz, but can be applied to other communications bands, including the UHF/S-band system used with the DCS.

The proposed effort to develop a TLS for the GOES consists of three Phases, each separately funded. The objectives of the three phases are to:

- Explore the potential to adapt the TLS system to the GOES/DCS communications network and define the system hardware and software modifications needed to accomplish this adaptation;
- Implement the necessary hardware and software modifications and perform a proof of concept demonstration on the GOES DCS system; and
- Construct and deliver to NOAA/NESDIS a TLS system modified for use with the GOES DCS.

5.0 Current Activities

On July 2, 2001, NOAA awarded a development contract to Interferometrics, Inc to explore the potential for adapting a TLS system to the GOES DCS system. As proposed, each phase could be separately funded, with the decision to proceed with subsequent phases contingent upon satisfactory results from the preceding phase(s). This approach would provide the most cost effective means to evaluate the ability of the TLS to successfully resolve interference within the DCS network prior to committing to a major system investment.

A nine (9) month period of performance is anticipated for phase 1 and 2. A proof of concept demonstration for locating interference in the GOES DCS system is scheduled for January 2002. Successful completion of this task will result in a TLS in the USA DCS system.