National Oceanic and Atmospheric Administration
National Environmental Satellite, Data, and Information Service
Satellite Operations Control Center- Command Data Acquisition (SOCC-CDA)
006-48-01-12-01-3206-00-108-023
Operational Analysis
2006

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Executive Summary

The Satellite Operations Control Center/Command and Data Acquisition (SOCC/CDA) program encompasses all operations conducted by the Office of Satellite Operations (OSO). SOCC/CDA provides uninterrupted availability of critical information and supports NOAA's critical National support functions that are not available commercially, such as real-time hurricane support. The function of the SOCC/CDA is to command and control NOAA, as well as non-NOAA, environmental satellites, track the health and safety of the satellites; acquire and process all data delivered from the satellites; and pass these data to other Offices within NESDIS, primarily Office of Satellite Data Processing and Distribution (OSDPD). The SOCC/CDA provides the vital link between the satellites and every data user.

The SOCC/CDA Operational Analysis (OA) supports the 24x7 operations conducted at the Wallops and Fairbanks Command and Data Acquisition Stations (FCDAS), the Satellite Operations Control Center, and OSO Headquarters. These operations primarily support the Geostationary Operational Environmental Satellites (GOES), Polar -orbiting Operational Environmental Satellites (POES) Ground Systems, and the Defense Meteorological Satellite Program (DMSP). This OA is an annual, in-depth review of the program's performance based on the following:

- Customer Results
- Strategic and Business Results
- Financial Performance
- Innovation

This report focuses on the operational state of the program as of December 31, 2006, and is based on guidance developed by the Department of Commerce. The SOCC/CDA program directly facilitates the NOAA Strategic Goal to "serve society's needs for weather and water information." The current program meets established cost, schedule and performance parameters.

1.0   Customer Results

The SOCC/CDA program is fully meeting the customer's needs and the program is delivering the services that it is intended to deliver as outlined in the NOAA and NESDIS operational plans. The SOCC/CDA program primarily serves internal NESDIS customers, i.e. the Environmental Satellite Processing Center (ESPC) within the Office of Satellite Data Processing and Distribution (OSDPD). The data provided by SOCC/CDA to ESPC is used to generate products which impact all economic sectors of the nation. The impact of these data and products are documented in the Economic Statistics for NOAA. This document is available from the following website: http://www.economics.noaa.gov/library/documents/economic_statistics_and_methodology/NOAAEconomicStatistics-May2006.pdf

1.1   Customer Requirements and Costs
The SOCC/CDA program is fully meeting the customers' needs/requirements and is delivering the data and services as outlined in the NOAA and NESDIS operational plans. The cost to the customer is as low as it could be for the results delivered.

1.2   Performance Measures

There are 3 performance measures which specifically address the customer results for the SOCC/CDA internal customers. These measures are:

Metric	Current Performance Level	Threshold	Comments
Prevent any deterioration in data delivered meeting quality/timeliness requirements (including dropouts)	99.90%	98.5% of GOES data meeting quality/timeliness requirements per quarter	+1.40% as of December 31, 2006

Prevent any deterioration in DCS data that is successfully transmitted to users	100%	98.5% of DCS data that is successfully transmitted to users per quarter	+ 1.50% as of December 31, 2006
Prevent any deterioration in POES data delivered meeting quality requirements (total data recovered)	99.94%	98.5% of POES data delivered meeting quality requirements (total data recovered) per quarter	+1.44% as of December 31, 2006

2.0   Strategic and Business Results

The SOCC/CDA program is meeting its own goals and objectives as well as those of the agency. Program management and controls are in place to ensure the program continues to meet its goals and objectives and monitor how well the SOCC/CDA program performs.

2.1   SOCC/CDA Helps to Achieve Strategic Goals

In line with the current NOAA Strategic Plan for FY2006-FY2011, the SOCC/CDA program directly supports the mission goal to serve society's needs for weather and water information. Today there are significant demands on virtually all of NOAA's programs to provide information to the Nation and the World community on the health of the environment in real-time. SOCC/CDA provides 24x7 support for each NOAA geostationary and polar orbiting environmental spacecraft and actively prepares for and participates in new spacecraft launch operations. Hence, SOCC/CDA supports the reception and processing of the data which is required to meet the NOAA mission strategy of Monitor and Observe. In addition, the SOCC/CDA supports the Department of Commerce (DOC) theme to Observe, Protect, and Manage the Earth's Resources to Promote Environmental Stewardship

2.2   Business Results

2.2.1   Program Management and Controls

The SOCC/CDA program is managed by the Office of Management and Budget (OMB), DOC, and NOAA guidelines and policies. Oversight is provided by NESDIS, including the NESDIS Information Technology Architecture Team (ITAT) and the NESDIS Chief Information Officer (CIO). A baseline of annual activity is contained in the matrix Annual Operating Plan (AOP) which is approved by NESDIS.

OSO performs extensive, continuous OA on the performance of its SOCC/CDA operational components. This ensures system resources and ancillary supporting infrastructure (security, training, facilities, etc.) as well as labor resources remain optimally functional and configured to suit the NESDIS/NOAA's goals. OSO's OA covers a hybrid of system and non-system components.

OSO conducts an objective measurement of resource and performance metrics of the SOCC/CDA elements on a periodic basis, such as those included in Table 1 and Table 2, to ensure that operations are meeting all business and customer requirements. For all IT components, performance thresholds have been established and performance is measured continuously through mainly automated process, supplemented by a manual process when required. Performance data is gathered at the OSO

functional level and reported to OSO management on a weekly basis. OSO Management reports to NESDIS senior management on a monthly basis. The OSO organization maintains sufficient resources to maintain performance at the required levels. Hardware issues are referred to the maintenance contractor for remediation; and software problems are referred to the in-house software maintenance group for resolution. Key performance issues and risks are identified through these reviews and tracked by OSO management.

Given that the SOCC/CDA operational environment includes a large IT component, OSO must keep abreast of changes in technology that would impact operations. Often, this is done in conjunction with the Office of Systems Development (OSD), which performs system development and identification of new technologies on behalf of OSO. These changes can pose risks such as system incompatibility, to current operations in addition to providing viable alternatives for improving systems and processes within OSO. The results of this analysis are the basis for OSO input to the Ground System Five Year Plan.

2.2.2   Monitoring Cost, Schedule and Performance

Cost – OSO conducts are variety of budget analyses throughout the fiscal year. Obligations and expenditures are tracked on a weekly basis. Labor costs and full time equivalent usage are tracked on a bi-weekly basis. Variances to budget plans are analyzed monthly and reported to OSO Management as well as NESDIS management. A Needs Analysis is conducted annually in conjunction with the Planning, Programming, Budgeting and Execution System (PPBES) and Ground System processes. Key budget issues and risks are identified through these reviews and tracked by OSO management.

Schedule – The matrix annual operating plan is used to track key milestones. The final matrix annual operating plan for FY07 will be finalized when FY07 appropriations are received. Monthly staff meetings allow the program manager to track progress towards key milestones and other operational aspects of the program (e.g., IT security compliance, data availability, etc.).

Performance – Contract performance is monitored to support both budget and performance measurements. Although the majority of OSO operations are conducted utilizing government FTEs, contractors are utilized to support operations at the Fairbanks CDA and also provide support to OSO software maintenance and engineering. For these contracts, OSO receives monthly status reports and meets at least quarterly with contract management to review performance, priorities, lessons learned, and work plan. A more formal review is held at the end of each contract year to assess the performance, come to agreement on ways to maximize the efficiency and productivity, and decide on potential corrective actions and milestones. Hardware maintenance contracts are reviewed on a semi-annual basis for technology advances impacting system maintainability, reliability, and interoperability.

All of these elements are provided to NESDIS senior management via a monthly quad chart summarizing cost, schedule, and performance.

2.3   Reviews

As part of the NOAA program structure, the SOCC/CDA program is reviewed continuously throughout the year. Each data center and program manager is responsible for monitoring their

individual monthly spending and reporting to NESDIS Headquarters Financial Officer unacceptable deviations, along with explanations and a plan to correct.

The SOCC/CDA will undergo a programmatic review at NOAA and DOC in June 2007.

2.4   Security

All SOCC/CDA systems have been through a C&A Process and have been granted Full Authority to Operate. All SOCC/CDA systems have approved System Security Plans, Risk Assessments, and Contingency Plans in place. Management, operational and technical security controls are in place to ensure the confidentiality, integrity, and availability of information.

2.5   Performance Measures

The performance measures in the following table show the SOCC/CDA program's performance with respect to Strategic and Business

Metric	Current Performance Level	Threshold	Comments
Improve POES data delivered meeting timeliness requirements to above 95%	96.20%	95% of POES data delivered which meets timeliness requirements per quarter	+1.20% as of December 31, 2006
Improve GOES data delivered within navigation specification to above 95%	99.89%	95% of GOES data delivered within navigation specification per quarter	+4.89% as of December 31, 2006

Other Alternatives. Currently, there are no other organizations capable of doing this work better, more efficiently, or at lower cost. Details can be found in the SOCC/CDA OMB 300 Alternative Analysis section.

3.0 Financial Performance

3.1   Current Performance vs. Baseline

The current SOCC/CDA financial performance, shown below, compares actual cost of the program compared to a pre-established cost baseline (i.e., annual spend plan). Financial performance information is provided for the 1st quarter of FY2007 (which ended December 31, 2006).

The SOCC/CDA program planned costs vs. actual costs are shown in Figure 1. Program costs consist of contract staff dedicated to SOCC/CDA activities. In addition, these funds support relevant sub-systems and archive/access systems and SOCC/CDA infrastructure components such as both internal and external communications.

The dollars on the Y-axis are in thousands. The financial operational analysis includes only Steady State IT dollars for calendar year 2006. The total Steady State IT planned expenditures for CY2006 were $12,368,000; actual CY2006 expenditures were $12,792,000.
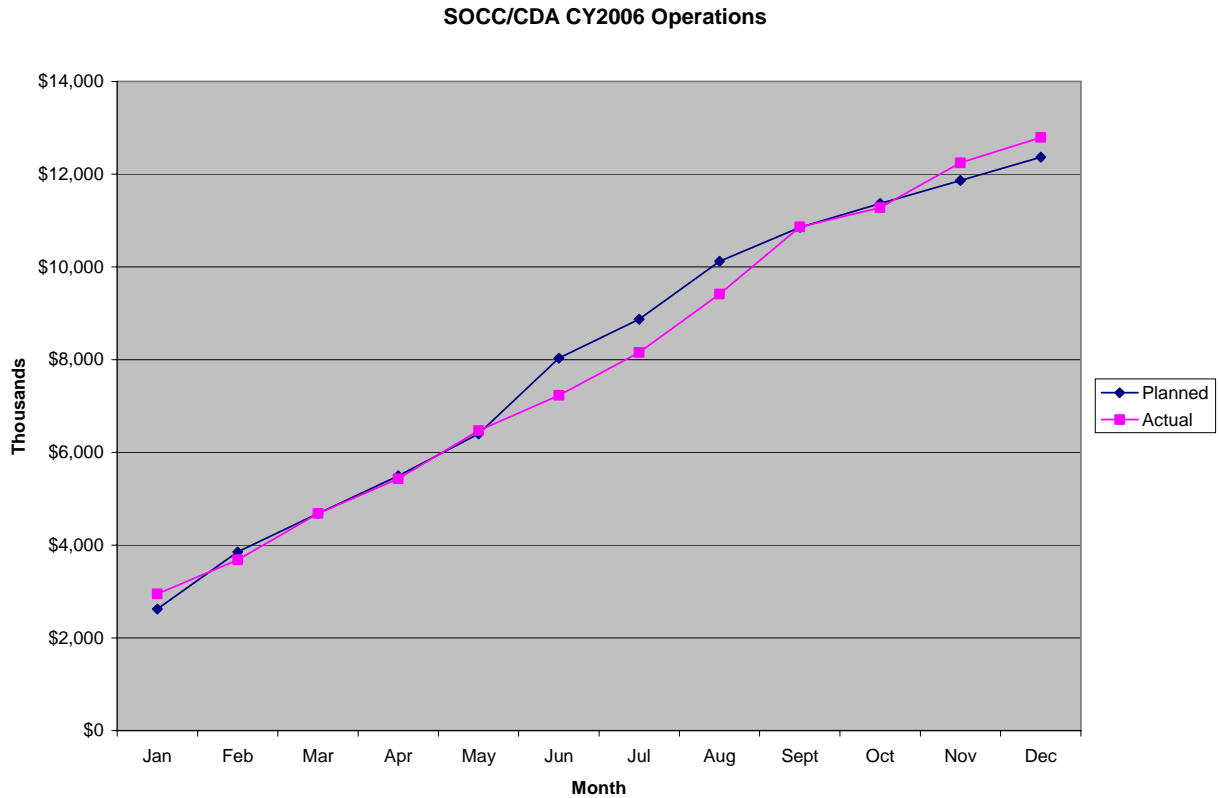
SOCC/CDA CY2006 Operations

Figure 1. SOCC/CDA Calendar Year 2006 Operational Finances

Current operational expenditures are within the 10% performance constraint. The SOCC/CDA program plans and executes budget based upon a fiscal year calendar. A calendar year view comprises a snapshot of the program, and is likely to depict variance due to factors unrelated to performance. Although a calendar year view may include a variance between actual and planned expenditures, this variance is expected to be remediated in the course of the fiscal year, as indicated by the convergence of the lines in September 2006.

3.2   Performance Measures

The current SOCC/CDA financial performance is based on a pre-established cost baseline (e.g., annual spend plan). Program costs consist of labor and benefits for full time permanent staff dedicated to OSO, travel, communications, supplies and equipment, contracts, and corporate overhead. During 2006 the SOCC/CDA program consistently stayed within a ten percent variance.

3.3   Financial Performance Review

Financial performance is typically subjected to a periodic review for reasonableness and cost efficiency. Monthly budget reviews are held with the program manager, contracting officer technical

representatives (COTR) and contract managers to ensure contracts are within cost and on schedule. Monthly reports from contractors are required to ensure the Government has the information it needs to evaluate cost performance. A detailed review of work and priorities is undertaken if cost is significantly above base lined values. Also, any necessary corrective actions are also identified and implemented.

4.0   Innovation to Meet Future Customer Needs

The following projects/initiatives have been implemented in FY2006, or were identified and initial planning to implement in the future has begun, to address future challenges, better meet customer needs, make better use of technology, and lower operating costs. Many of the CY06 activities included planning for future project which will help to better meet customer needs while also resulting in lower operating costs and providing a more management approach to IT Security.

4.1   Better Use of Technology

In CY06, the SOCC/CDA performed a gap analysis to identify opportunities to better utilize technology to meet operational requirements as well as emerging IT Security mandates. As a result of this planning activity, three future projects have been identified.

Enterprise backup solution: Identification of, and planning for, an Enterprise backup solution began in FY2006. FIPS-200 and NIST 800-53 requires that all mission critical systems have some form of backup and disaster recover system. Currently OSO uses nine different software products to backup the current OSO enterprise and there are seven different individuals trained to perform these backups. An Enterprise backup solution consists of a software agent that is robust enough to allow for multiple operating systems management, as well as, a centralized data storage device that will allow for the safe and reliable storage of the data. In addition, it will reduce the labor cost to four staff members and allow for greater flexibility in exercising all aspects of the backup and restoration process. The CY06 planning activities created the basis for the SOCC/CDA FY08 Ground System budget request.

Centralized Intrusion Detection System: The NIST 800-53 requires that all mission critical systems have some form of Intrusion Detection System. An Intrusion Detection System (IDS) monitors any network traffic and logs/notifications providing instant status of any possible malicious activity. Unlike a standard Firewall, IDS can differentiate between friendly and unfriendly activity. OSO is currently running IDS for each and every critical system and the 2006 study confirmed that a significant cost saving would be realized by implementing one centralized IDS for all missions. The CY06 planning activities created the basis for the SOCC/CDA FY08 Ground System budget request.

Commonly Shared Dual Factor Authentication Method:
Dual factor authentication which is the combination of a user selected password or user name, and a password generated by a specific device such as an USB flash drive or Smart Card mobile card. OSO was informed by the CIO office that dual factor authentication will be required for all newly certified systems, retro fitting of older certified systems is a requirement that is in the near future. Taking into account OSO current enterprise solution, a streamlined architecture can be developed that would allow for a commonly shared dual factor authentication method, sharing several mission needs to one common system. Planning activities in 2006 identified a two stage

approach which will be included in the SOCC/CDA Ground System budget request as required to meet the CIO outlined implementation schedule.

4.2   Meeting A Challenge: Centralized LAN Hosting FIPS and NIST Required Documents

Hardware has been purchased in late CY06 and will be implemented in CY07 to support a centralized server along with a backup server that will house all required NIST and FIPS security documentation. Through better use of technology, this effort will reduce the cost of multiple site document storage while providing a redundant centralized point to fulfill security requirements. An additional cost savings will be generated from centralized organizational approach.

4.3   Meeting Customer Needs:

FCDAS and NWS Alaska Region Collaboration:
In CY06, the FCDAS began support of the Metop satellite. In CY07, the FCDAS plans to expand its support to the NWS Alaska Region in FY07 by supplying real-time Metop High Rate Picture Transmission (HRPT) data received by the FCDAS to the NWS Weather Forecast Office (WFO) Fairbanks Advanced Weather Interactive Processing System (AWIPS) system. The data transfer will use an existing circuit interface to NWS WFO Fairbanks to supply these additional data sets acquired by the FCDAS for forecast use within the State of Alaska. In late CY06, the FCDAS began increasing the volume of POES HRPT data sets being acquired over the high latitude Barrow ground station to assist NWS forecasters in Alaska with acquiring additional polar spacecraft data over Barrow, which is needed for forecast use due to the high latitude location of Alaska's North Slope which limits the use of GOES data.

FCDAS and University of Alaska Geographic Information Network for Alaska:
During the CY06 wild fire season, the FCDAS provided support to emergency responders and management. Through a lessons learned analysis, a new technique was identified for CY07 in which the FCDAS will supply satellite data from the Moderate Resolution Imaging Spectroradiometer (MODIS) instrument on the NASA Earth Observing Satellite. These data sets are not currently available to the University of Alaska at Fairbanks (UAF) or the Bureau of Land Management Alaska Fire Service and State emergency management offices. The existing 13-meter systems will be used to "strip" the real-time MODIS data from the X-band high data rate composite playback stream and will transfer the data in real-time using an existing OC-3 circuit.

In collaboration with the United States Geological Survey and the UAF Geographic Information Network of Alaska (GINA) Program, FCDAS will continue to support the *Landsat-5 for Alaska Program* and is a follow on to successful campaigns during the summer of 2005 and 2006 which contributed 8,669 scenes acquired over Alaska, eastern Siberia, and western Canada to the National Satellite Land Remote Sensing Data Archive.

The FCDAS provides all POES HRPT data collected over Fairbanks and Barrow Stations to the University of Alaska GINA program for use by Alaska Fire Service, Alaska Volcano Observatory (AVO), Alaska Ocean Observing System (AOOS), and International Arctic Research Center (IARC).

4.4   Better Use of Technology

GOES-10 South American support:
A retired GOES-West satellite, GOES-10 was moved from 135 deg West to 60 deg West starting in June 2006 and completed December 4, 2006. The operational schedules developed allowed for a full image of South America every 15 minutes and complete sounder coverage every four hours. The image and sounding data produced was available to all Latin American users starting in November 2006.

POES DOMSAT link upgrade:
POES currently uses 1.33Mbps Domestic Satellite (DOMSAT) links in order to transmit data between the CDAs and users which including the SOCC. On average POES operations performs approximately 54 supports per day. Currently it takes approximately 14 hours per day to transfer this data from the CDAs back to the SOCC. In CY06, a usage and future requirements analysis was completed which identified opportunities to better use this service. The decision was made to increase the bandwidth to 2.66 Mbps in CY07. The increase in DOMSAT bandwidth would reduce the man-hours needed to monitor data transfers between the CDAs and SOCC by 50% and get the data to users faster.

WAN upgrade:
The WAN between the SOCC and CDAs currently consists of T1 lines, routers and multiplexers. Currently, if prime & backup T1 lines are brought up and the same time a "bridge loop" will be created in the WAN and the operational network will get flooded with messages. In CY06, OSO developed a plan to upgrade the WAN to allow both prime and backup lines up simultaneously between the SOCC and CDAs, along with a more automated failover to the backup T1 should the prime T1 have experience problems. This project was presented to OSD during Summer 2006 and funding was approved for FY07.