566-DAPHNE-MAINPLAN-001

Maintenance Plan for the Data Acquisition Processing and Handling Network Environment (DAPHNE)

Original

**Effective Date: 27 September 2016**

Test Plan for the Data Acquisition Processing and Handling Network Environment (DAPHNE)

**SIGNATURE PAGE**

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Preface

This document is under the configuration control of the Data Acquisition Processing and Handling Network Environment (DAPHNE) Configuration Review Board (CRB). Changes to this document will be made by Documentation Change Notice (DCN) or by complete revision. Proposed changes to this document must be submitted along with supportive material justifying the proposed change. Comments or questions concerning this document and proposed changes will be addressed to:

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Change Information Page

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| **Document History** | | | | | |
| **Document Number** | **Version - Change** | | **Date** | |
| 566-DAPHNE-MAINPLAN-0001 | Original | | 09/27/2016 | |
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# Referenced Document

Table 1 References

|  |  |
| --- | --- |
| Name | Location |
| SCNS-NEN-REQT-0008rev3 | TBD |
| NASA Systems Engineering Processes and Requirements (NPR 7123.1A) | TBD |
| Near Earth Network User’s Guide | TBD |
| NASA Integrated Services Network (NISN) Internet Protocol Operational Network (IONet) Security Policy (700-DOC-029) | TBD |
| IONet Access Protection Policy and Requirements Document (290-004) | TBD |
| Recommended Security Controls and Federal Information Systems (NIST SP 800-53) | TBD |
| Command Telemetry Format Interface Control Document (ICD), IRIS Observatory (A101-RQ-09-0364, Rev C) | TBD |

# Maintenance Plan

## Purpose

The purpose of this document is to provide a plan for the maintenance of the Data Acquisition Processing and Handling Network Environment (DAPHNE) system.

## System Description

DAPHNE is a store and forward computer system located at NASA Ground Stations that takes telemetry data input from a NEN high data rate (HDR) intermediate frequency (IF) receiver buffers and parses it and than distributes it to the mission operations center (MOC) over NISN data networks. Figure 1.

The IF signal contains incoming Consultative Committee for Space Data Standards (CCSDS) Advanced Orbiting Systems (AOS) data stream. The receiver demodulates this signal and output frames of data defined using an “AOS header”. The AOS frame contains virtual channels that DAPHNE writes into separate files. Files are limited in size (e.g. one-minute length) to improve manageability, and to allow for faster turn-around time on the data and smaller transmission cycles in case of any transfer problems. The files are automatically pushed to the customer MOC using file transfer protocol (ftp)/ secure copy protocol (scp).

DAPHNE also provides a “self-service” ftp/sftp interface that allows the MOC to pull specific data files to their site after a satellite pass if there were problems automatically transferring the data.

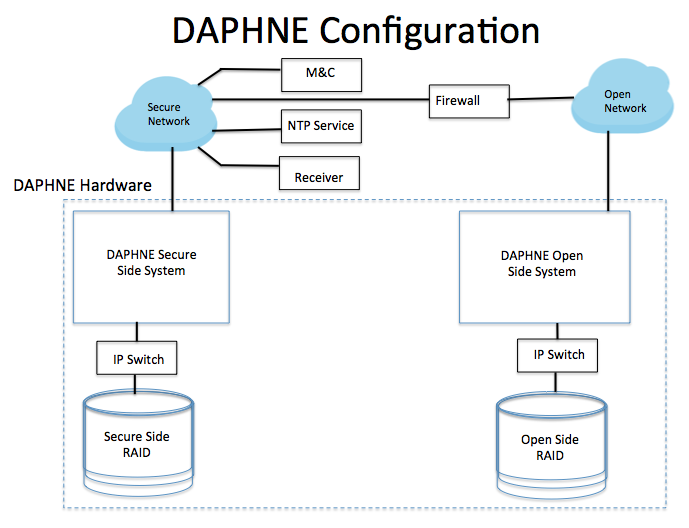


Figure 1 DAPHNE system

## Involved Parties

DAPHNE is developed by Code 566. Code 566 also builds and tests each united needed by the NEN for its operational satellite communication network. NEN will deploy each DAPHNE system to a particular NASA Ground Station where it is operated and maintained under the SCNS contract.

## Maintenance

The DAPHNE system is designed to automatically accommodate a single common failure and remain operational. The system can be brought back to full specification by by referring to the Local Operating Procedures and Maintenance. This process generally will address a software issue with a reboot or replacing a defective piece of hardware.

Any defective units will be returned to the manufacturer for repair or desposed of and replaced whichever is cost effective.

The system is built using Commercial Off-The-Shelf (COTS) units. These units have a limited useable life span. To assure the system meets the availability requirement of 0.99 it must have high reliability. To assure high reliability the various units must be replaced before their end-of-life. This replacement processes minimizes, but does not prevent, failures and so should be maintained seperately from the sparing process mentioned above.

Code 566 will configuration management the software load of the system. They will update the system as necessary. These updates will address not only system functionality but also IT security.

## Responsibilities

The following lists the maintenance responsibility by party:

* Code 566
  + Provide a recommended spare parts list to NEN.
  + Provide a recommended replacement schedule to assure high reliability.
  + Provide software support as required.
  + Provide Local Operating Procedures (LOP).
  + Provide a maintenance manual.
  + Provide software updates if necessary.
* NEN
  + Assure SCNS contractor has LOP and maintenance manual, spares list, and replacement schedule.
  + Monitor SCNS implementation of maintence procedures.
  + Coordinate IT security scans with Code 700.
  + Coordinate network maintenance with NISN.
* SCNS contractor:
  + Maintain the spares depot.
  + Monitor the DAPHNE system for failures and determine the needed follow-on action based on symptons using the LOP and maintenance manual.
  + Restore DAPHNE system to full operation by
    - Restoring software functionality using local operating procedures (rebooting or similar)
    - If system continues to have software issues coordinate assistance from Code 566.
    - If a unit is defective,
      * replace the failed unit with a spare.
      * replace the spare unit by returning unit to vendor for repair or purchasing a new unit.
  + Maintain local network.
  + Coordinate with NISN for external network issues.
  + Other action























































Abbreviations and Acronyms

| **Acronym** | **Definition** |
| --- | --- |
| ADC  AOS | Analog to Digital Converter  Advanced Orbiting Systems |
| APID | Application ID |
| ASF | Alaska Satellite Facility, Fairbanks, AK |
| ASM | Attached Synch Marker |
| CADU | Channel Access Data Unit |
| CCB  CCSDS | Controlled Configuration Board  Consultative Committee for Space Data Standards |
| CLK | Clock |
| CMD | Command |
| CRB | Configuration Review Board |
| CRC | Cyclic Redundancy Check |
| CSO | Communications Service Office (aka NISN) |
| DAPHNE  DCN | Data Acquisition Processing and Handling Network Environment  Documentation Change Notice |
| DMD | Demodulator |
| ECL | Emitter Coupled Logic |
| ftp | file transfer protocol |
| HDR  ICD | High Data Reciever  Interface Control Document |
| IF | Intermediate Frequency |
| IP | Internet Protocol |
| IRIS | Interface Region Imaging Spectrograph |
| ISP | Internet service Provider |
| IT | Information Technology |
| LDF | Log Data File |
| LDPC | Low Density Parity Check |
| M&C | Monitor and Control |
| Mbps | Megabits per second |
| MOC | Mission Operations Center |
| MOD | Modulator |
| NASA | National Aeronautics and Space Administration |
| NEN | Near Earth Network |
| NENG | Near Earth Network Gateway |
| NIC | Network Interface Controllers / Network Interface Cards |
| NISN  NTP | NASA Integrated Services Network  Network Time Protocol |
| PN | Pseudorandom Noise |
| POP | Point-of-Presence |
| RAID | Redundant Array of Independent Disks |
| RF | Radio Frequency |
| RFICD | Interface Control Document |
| SCID | Space Craft Identification |
| SCNS | Space Communications Network Services |
| scp | secure copy protocol |
| SFEP | SoftFEP (software program) |
| sftp | secure file transfer protocol |
| sNTP | Secure Network Time Protocol |
| SSD | Secure Side Disk |
| SOC  SPEC | Science Operation Centers  Specification |
| SSS | Secure Side System |
| STDN | Spaceflight Tracking and Data Network |
| TCP/IP  TDR | Transmission Control Protocol (TCP) and the Internet Protocol (IP)  Test Discrepancy Reports |
| USB | Universal Serial Bus |
| UTC | Universal Time Code |
| VCDU | Virtual Channel Data Unit |
| VCID | Virtual Channel Identifier |
| WGS | Wallops Ground Station, Wallops Island, VA |

Appendix DAPHNE Receivers

Cortex XXL Receiver Features

For current information visit <http://censintechnology.com/Cortex-HDR-XXL/>

Features

* 720 MHz and 1.2 GHz IF
* Dual 720 MHz IF baseline H/W (2 independent demodulation units)
* QPSK, 8PSK, 16APSK and 16QAM demodulator
* Up to 2 Gbps transmission rate
* Digital filtering and signal equalization
* Automatic real-time cross-polarization cancellation
* Convolutional and post-processing decoding
* Variable Coding & Modulation
* Telemetry data server
* Very high speed recording
* Real time output
* Store and forward
* Built-in constellation viewer & spectrum analyser
* Test modulation capabilities
* PRN generation
* Recorded data playback

ViaSat High Rate Receiver 3200

For current information visit www.viasat.com/antenna-systems

For Remote Sensing and Earth Observation, The ViaSat High Rate Receiver 3200 provides up to 6.4 Gbps transfer rates. These unprecedented data rates offer a substantial increase in data density for next generation Ka-band Earth Observation satellite applications.

HIGH RATE RECEIVER 3200 AT-A- GLANCE

High Rate Receiver 3200

* Designed for high-rate Ka-band and other high-rate satellite to ground links
* Total throughput of 6400 Mbps in dual channel mode
* Extremely high-rate single channel downlinks
* Single modulator channel to support full loopback testing
* Internal loop-back and BERT capabilities
* Digital Cross-Pol Cancellation
* Remote lights-out operation

Optional Front End Processor

* Optional equipment that adds data capture, archiving, sorting and playback capability to the High Rate Receiver 3200
* Data capture, processing and archive for up to 4 Gbps transfer rates
* RAW bitstream archiving
* VCID sorting and storage of TM and AOS framed data