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Goddard Space Flight Center
Greenbelt, Maryland

Joint Polar Satellite System (JPSS) Field Terminal Support Segment (FTS) to Services Interface Description Document JPSS Review/Approval Page

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Preface

This document is under JPSS Ground Project configuration control. Once this document is approved, JPSS approved changes are handled in accordance with Class I and Class II change control requirements as described in the JPSS Configuration Management Procedures and changes to this document shall be made by complete revision.

Any questions should be addressed to:

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1 Introduction

The Joint Polar Satellite System (JPSS) is the National Oceanic and Atmospheric Administration's (NOAA) next-generation operational Earth observation program that acquires and distributes global environmental data primarily from multiple polar-orbiting satellites. The program plays a critical role in NOAA's mission to understand and predict changes in weather, climate, oceans and coasts, and the space environment, which support the Nation's economy and protect lives and property. The first JPSS satellite mission, the Suomi National Polar-orbiting Partnership (S-NPP) satellite, successfully launched in October 2011. S-NPP, along with the legacy NOAA Polar Operational Environmental Satellites (POES), provides continuous environmental observations. Two JPSS satellites will follow S-NPP: JPSS-1, planned for launch in fiscal year (FY) 2017, with JPSS-2 to follow in FY2022.

In addition to the JPSS Program's own satellites operating in the 1330 (±10) Local Time of the Ascending Node (LTAN) orbit, NOAA also leverages mission partner assets for complete global coverage. These partner assets include the Department of Defense (DoD) Defense Meteorological Satellite Program (DMSP) operational weather satellites (in the 1730 - 1930 LTAN orbit), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) Meteorological Operational (Metop) satellites (in the 2130 LTAN orbit) and the Japanese Aerospace Exploration Agency (JAXA) Global Change Observation Mission-Water (GCOM-W) satellite (in the 1330 LTAN orbit). JPSS routes Metop data from McMurdo Station, Antarctica to the EUMETSAT facility in Darmstadt, Germany and EUMETSAT, in turn, provides Metop data to NOAA. For GCOM, JPSS routes the GCOM-W data from Svalbard, Norway through the NOAA Satellite Operations Facility (NSOF) in Suitland, MD, processes GCOM-W data and delivers GCOM-W products to the JPSS users who have JAXA permissions.

Additionally, the JPSS Program provides data acquisition and routing support to the DMSP and the WindSat Coriolis Program. JPSS routes DMSP data from McMurdo Station to the 557th Weather Wing at Offutt Air Force Base in Omaha, NE. After processing, the 557th releases the DMSP data for public consumption over the Internet via the National Geophysical Data Center in Boulder, CO. The JPSS Program provides data routing support to the National Science Foundation (NSF), as well as the National Aeronautics and Space Administration (NASA) Space Communications and Navigation (SCaN)-supported missions, which include the Earth Observing System (EOS). As part of the agreements for the use of McMurdo Station, JPSS provides communications/network services for the NSF between McMurdo Station, Antarctica and Centennial, Colorado.

As a multi-mission ground infrastructure, the JPSS Ground System supports the heterogeneous constellation of the before-mentioned polar-orbiting satellites both within and outside the JPSS Program through a comprehensive set of services as listed in Table 1-1.

Table: 1-1 JPSS Ground System Services

Service	Description
Enterprise Management and Ground Operations	Provides mission management, mission operations, ground operations, contingency management and system sustainment
Flight Operations	Provides launch support and early orbit operations, telemetry and commanding, orbital operations, mission data playback, payload support, flight software upgrade, flight vehicle simulation, and disposal at the end of mission life
Data Acquisition	Provides space/ground communications for acquiring mission data
Data Routing	Provides routing of telemetry, mission and/or operations data through JPSS' global data network
Data Product Generation	Provides the processing of mission data to generate and distribute raw, sensor, environmental, and ancillary data products
Data Product Calibration and Validation	Provides calibration and validation of the data products
Field Terminal Support	Provides development and operational support to the Field Terminal customers

1.1 JPSS Ground System Block Evolution

The JPSS Ground System is required to support JPSS missions through FY2025. Over this long time span, the system supports the current missions, as well as prepares to support future missions for which the definitions and requirements are still evolving. Therefore it is essential that the Ground System be flexible and adaptable to evolve along with advancing technologies and future missions.

The JPSS Ground Project plans to evolve the Ground System in implementation Blocks. With the release of each Block, the Ground System rolls out new capabilities, security enhancements, technology refreshes, and reliability improvements. Table 1-2 provides a summary of notional JPSS Ground System Implementation Blocks. Missions listed for a particular block are the missions newly added in that timeframe.

Table: 1-2 JPSS Ground System Implementation Blocks

Block	Mission	Transition To Operations (TTO) Date	Contents	Note
0	Coriolis/WindSat, POES, SCaN-supported missions	Ongoing	Coriolis/WindSat, POES, SCaN-supported missions support from Svalbard	
1.0	S-NPP	Ongoing	S-NPP support	
1.1	Metop	04/2011	Metop-A support from McMurdo Station, SCaN-supported missions support from Svalbard	
1.1	DMSP	02/2012	DMSP support from McMurdo Station	
1.2	GCOM-W1	Ongoing	System patches, upgrades and enhancement; Stop-Gap Mission Management Center (MMC) capability; GCOM-W1 support; security updates; 557th Weather Wing will receive products from NESDIS IDPS and decommissioning hardware at 557th Weather Wing; GZIP compression to data consumers implemented.	
TRANSITION TO JPSS TECH BASELINE				
2.0	JPSS-1	01/2016	JPSS-1 mission support, GCOM-W1 full capability, hardware and COTS upgrades, software fixes, separate operation configurations, failover capabilities at Consolidated Backup at Fairmont, WV, and situational awareness. Alternate Common Ground System (ACGS), extended polar station operations, services, data delivery to the Naval Oceanographic Office (NAVOCEANO) and Fleet Numerical Meteorology and Oceanography Center (FNMOC), full security requirement compliance	In time to support JPSS-1 Integration and Test (I&T) In the Block 2.0 timeframe the 557th Weather Wing will receive JPSS data products from NOAA Environmental Satellite Processing Center (ESPC).
2.1	n/a	JPSS-1 Launch + 9 months	Fleet ground management (remote planning); situational awareness (state of service, centralized reporting/monitoring); IDPS modularity (primary vs. non-primary product ordering); phased implementation of IDPS XML management; data quality monitoring	
3.0	JPSS-2	2019	JPSS-2 support, Tech Refresh	In time to support JPSS-2 I&T
	End of Program	2025		

The current deployed operational JPSS Ground System supporting S-NPP, GCOM-W1, Metop, POES, Coriolis/WindSat, DMSP, and NSF, as well as SCaN-supported mission operations, is dubbed Block 1.0 through Block 1.2. The design and development of these JPSS Ground

System capabilities are based on the heritage NPOESS technical baseline with minor evolution to improve robustness, operability, security and performance.

Starting with Block 2.0 the JPSS Ground System development is being fully revised to reflect the JPSS Program requirements flow-down and fundamental changes in mission set, roles and responsibilities, and required capabilities. As a result, Block 2.0 represents a point of departure from the NPOESS technical baseline and the arrival of JPSS Ground System technical baseline.

The deployment and transition to operation of the Block 2.0 JPSS Ground System will directly support the JPSS-1 mission with significant enhancement to meet stringent requirements associated with operational weather missions. It will also re-baseline the current JPSS Ground System with a full complement of refreshed hardware systems, and serve as the foundation for future needs for the JPSS Program mission set. Additional capabilities for remote mission planning, situational awareness, and data processing modularity will be deployed as Block 2.1 approximately nine months after JPSS-1 launch.

1.1.1 JPSS Ground System

The JPSS Ground System is composed of eight functional nodes: the Space/Ground Communications Node, the Ground Network Node, the Management and Operations Node, the Data Processing Node, the Common Ground System (CGS) Support Node, the Simulation Node, the Calibration/Validation Node, and the Field Terminal Support Node.

The CGS consists of the Space/Ground Communications Node, the Ground Network Node, the Management and Operations Node, the Data Processing Node, and the CGS Support Node.

These Nodes are described in the following sections.

1.1.2 Space/Ground Communications Node

The Space/Ground Communications Node (SGCN) is distributed around the globe. The Node provides the Radio Frequency (RF) uplink and downlink communications between the ground and spacecraft to support telemetry and commanding operations as well as mission data operations. Some of the assets used to provide Space/Ground Communications are owned and dedicated to the JPSS Program, while others are provided by other Government agencies or commercial entities.

The primary communications are provided by Kongsberg Satellite Services (KSAT) Svalbard Satellite Station (SvalSat) located in Svalbard, Norway, and the McMurdo Station S/Ka-band receptor site in Antarctica. Alternate communications are provided via the NOAA Fairbanks Command and Data Acquisition Station (FCDAS) in Fairbanks, Alaska, and KSAT Troll Satellite Station (TrollSat) located in Jutulsessen, Antarctica. The JPSS Ground System also leverages ground station assets in McMurdo Station, Antarctica to support Data Acquisition and Data Routing services to missions such as Metop, DMSP and NASA missions supported by SCaN.

Additionally, the SvalSat location provides monitoring capability for the Direct Broadcast capabilities of the S-NPP and JPSS satellites. In Block 2.0, only X-band HRD broadcast will be supported.

The White Sands Complex (WSC) is used to provide access to the Tracking and Data Relay Satellite System (TDRSS) for T&C communications when Svalbard and Fairbanks are not available or in view. For JPSS-1, and likely JPSS-2, WSC/TDRSS can also be used to provide backup for Stored Mission Data (SMD) downlink.

1.1.3 Ground Network Node

The JPSS Ground Network Node (GNN) is used to support communications among all ground system entities, including the Space/Ground Communications Node, the Management and Operations Node, the Data Processing Node, and the CGS Support Node. It consists of distributed Local Area Networks (LANs) connected together via the AT&T Multi- Protocol Label Switching (MPLS) Wide-Area Network (WAN). For some missions, such as DMSP, Metop, SCaN-supported missions, and Coriolis/WindSat, the Ground Network Node provides data routing from the Space/Ground Communications Node to the non-JPSS Data Processing Node at their respective destinations.

The GNN acquires, manages, and distributes the mission data and the mission support data for the JPSS Ground System. The GNN carries command and telemetry data between the ground stations and mission management centers, and stored mission data from ground stations to data processing centers, including NESDIS, FNMOC and NAVOCEANO. The mission support data service includes acquisition of ancillary data used for data processing and orbit operations, as well as distributing ancillary and auxiliary data to authorized users throughout the JPSS Ground System and external-interfacing partners.

1.1.4 Management and Operations Node

The Management and Operations Node (MON) commands the spacecraft and ensures proper operation of the JPSS spacecraft and ground assets. The MON provides the mission planning and scheduling, flight operations, telemetry and commanding, orbit and attitude management, ground operations, alarms, warnings and events processing, and trending and analysis. The MON also provides the infrastructure for enterprise management as well as monitoring for the security events within the system.

The MON functionality is provided by the MMC. The primary MMC is located in Suitland, MD at the NSOF. The alternate MMC is located at the NOAA Fairmont, WV Consolidated Backup (CBU) facility. A Stop-Gap MMC is provided at the CGS vendor location in Aurora, CO for S-NPP prior to the deployment of the alternate MMC. The primary purpose of this Stop-Gap MMC is to maintain the health and safety of the satellite.

1.1.5 Data Processing Node

The Data Processing Node (DPN) processes mission data into raw, sensor and environmental data products. Currently NOAA has JPSS-provided DPN implementations to minimize WAN communications utilization. The Fleet Numerical Meteorology and Oceanography Center (FNMOC) and Naval Oceanographic Office (NAVOCEANO) will receive technical support to implement their own DPNs. The NOAA DPN distributes data products to the ESPC, the Comprehensive Large Array-Data Stewardship System (CLASS), and the Government Resource for Algorithm Verification, Independent Testing, and Evaluation (GRAVITE).

The primary NOAA DPN is located in Suitland, MD at the NSOF. The alternate NOAA DPN is located at the NOAA Fairmont, WV CBU facility. The alternate NOAA DPN is only responsible for data flows to ESPC and CLASS.

1.1.6 Common Ground System Support Node

The JPSS Ground System is an evolving capability that will be in multiple concurrent lifecycles for the various missions being supported. As such, the ground system needs to be capable of developing capabilities for new missions and capabilities, while integrating, testing and validating releases to support launches and updates to existing missions; all the while supporting mission operations for the on-orbit satellites. The Common Ground System Support Node provides the functionality needed to support these activities.

1.1.7 Simulation Node

The JPSS Ground System's Simulation Node provides satellite and ground system simulators to support mission operations as well as integration, test and verification of new capabilities to be fielded.

The Flight Vehicle Test Suite (FVTS) and Flight Vehicle Simulator (FVS)/S-NPP Spacecraft Command and Telemetry Simulator (CTSIM) (for S-NPP only) perform the functions of the Simulation Node in support of S-NPP, JPSS-1, and beyond. The FVTS system consists of Engineering Development Unit (EDU) and software-based simulators to support operations as well as test and verification for the JPSS Ground System.

1.1.8 Calibration/Validation Node

The JPSS Ground System's Calibration/Validation Node maintains the existing science algorithms, maintains the algorithm calibration and develops new algorithms as needed for the science mission.

The Calibration/Validation Node relies on the GRAVITE system for the JPSS Ground System-embedded computing resources and also on external Local Computing Facilities (LCF) to support the science maintenance role.

1.1.9 Field Terminal Support Node

The S-NPP and JPSS satellites include a High-Rate Data (HRD) antenna that continuously downlinks sensed data as the data are collected. Such a downlink is often referred to as a Direct Broadcast (DB). The JPSS Ground Project has defined, specific support for end user (Direct Broadcast Community) processing of DB data from the JPSS-managed satellites. The Field Terminal Support (FTS) node will support the DB community by providing software, documentation, and periodic updates using a web portal. The FTS web portal will also provide the necessary hardware and software specifications, ancillary and auxiliary data needed for processing the broadcasts, as well as making orbital data available to assist the DB community in locating the satellites of interest. With their own equipment and the above-provided information, the DB community can capture and process the HRD content and generate data products, such as RDRs, SDRs, and a subset of EDRs. In addition, the JPSS Ground System will provide

equipment at the Svalbard Ground Station, which will monitor the quality of the direct broadcast link and make the HRD Monitoring report available on the web portal.

1.1.10 Continuity of Operations

With the launch of JPSS-1, the JPSS Ground System will be compliant with U.S. Government continuity of operations policy, providing diversely located backup capabilities to deal with long-term outages of facilities and equipment. The current plan is to provide backup capabilities to critical Management and Operations Node functions as well as Data Processing Node functions. There will be backup Simulation Node capabilities to support the critical Management and Operations Node functions.

1.1.11 Security

The Federal Information Security Management Act (FISMA) of 2002 mandates that federal information processing systems maintain a security program and control guidelines that are commensurate with the level of risk of which the information system operates. As such, the JPSS Ground System employs a security program aimed at mitigating the risks to which the JPSS Ground System is exposed. In addition, the JPSS Ground System must meet the NOAA Level 1 requirements that the JPSS Ground System will also develop and maintain, to the fullest extent, the controls of the National Institute of Standards and Technology (NIST) Special Publication (SP) 800-53, Recommended Security Controls for Federal Information Systems and Organizations. The JPSS Ground System Security Requirements Document (GSSRD) derives its requirements from the NIST SP 800-53; and enhances the requirements based on Department of Commerce IT SPP, NOAA IT Security Policies, and National Environmental Satellite, Data, and Information Service (NESDIS) policies. The objective of the ground security is to be fully compliant with FISMA 2002 and NOAA IT Security Policies prior to launch of JPSS-1.

1.1.12 Support Nodes Managed by Flight Project

To support JPSS-managed missions such as S-NPP and JPSS-1, there are two support nodes that are managed under the JPSS Flight Project: the Instrument Support Node (ISN) and Spacecraft Support Node (SSN). These support nodes are outside of the JPSS Ground System but interact with the Ground System nodes under various scenarios.

The Instrument Support Node includes the infrastructure utilized by the Instrument Science Team (IST) to perform their tasks. The ISN also includes the Instrument Vendors, the Flight Project Instrument Manager, the Instrument Science Lead as well as relevant system and discipline engineers from the Flight project. The ISN maintains and updates the instrument flight software as needed, as well as managing some of the flight instrument tables. It also provides anomaly investigation support, as needed.

Similarly the Spacecraft Support Node includes the infrastructure to support spacecraft sustainment operations. SSN includes the Flight Project Observatory Manager, spacecraft vendors, as well as relevant system and discipline engineers from the Flight project. The SSN maintains and updates the spacecraft flight software and tables. It also provides anomaly investigation support, as needed.

1.2 Interfacing System Overview

JPSS collects, processes, and delivers global multi-spectral radiometry and specialized meteorological, oceanographic, and solar-geophysical data to operational users, which includes the National Oceanic and Atmospheric Administration/National Environmental Satellite, Data, and Information Service (NOAA/NESDIS), the Air Force Weather Agency (AFWA), the Naval Oceanographic Office (NAVOCEANO, also known as NAVO) and the Fleet Numerical Meteorology and Oceanography Center (FNMOC). The data is also provided to worldwide-deployed field terminal users and the environmental remote sensing scientific community.

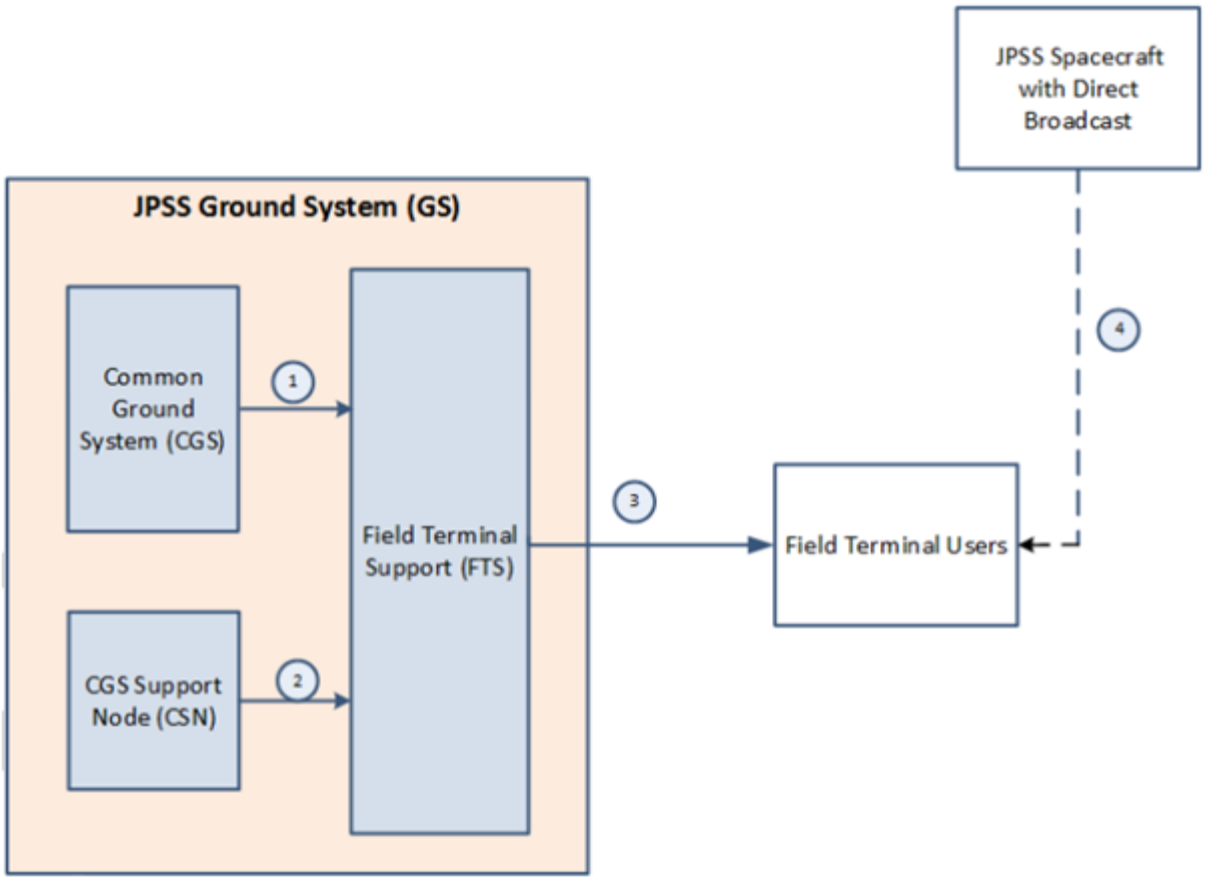
1.3 FTS Overview

The SNPP/JPSS High Rate Data (HRD) link provides Direct Broadcast (DB) data to customers in real-time. The Field Terminal Support (FTS) provides the resources needed to support the Field Terminal customer communities by providing software, documentation, and periodic updates to enable them produce data products from JPSS. The FTS web portal will also provide the necessary ancillary and auxiliary data needed for processing the broadcasts as well as making orbital data available to assist in locating the satellites of interest. The JPSS Program is not responsible for developing, testing, or deploying any JPSS capable field terminals. In addition, the FTS provides development support for the algorithm and software through GSFC Direct Readout Lab (DRL) International Polar Orbiter Processing Package (IPOPP) and University of Wisconsin (UWISC) Community Satellite Processing Package (CSPP) to enable customers to integrate the algorithms into their remote terminals. The support the JPSS Program provides to the institutions developing and maintaining these two software packages will demonstrate the ability to produce ready-to-use products from the HRD link and provide risk reduction effort at a minimal cost.

Customers Key FTS functions include:

- Hardware Specifications
  - Suggested field terminal configurations
- DFCB and RF-ICD
  - Containing specifics on direct broadcast data format
- Software to produce RDRs from packets
  - Provide and maintain RT-STPS
- Algorithms & Software
  - Used to create data products from direct broadcast
- Updated algorithms & software
  - Notification when updates are available
- Mission Support Data
  - Ancillary/auxiliary data
- Maintain list of registered customers

- Mission status
  - Customers are provided status of the JPSS direct broadcast
- HRD Link status
  - Customers are provided post-pass performance information
- On-orbit checkout and special tests
- Promote the use of the JPSS data products from HRD link



1. Mission Support Data (MSD)
2. Software (ADL)
3. Software, MSD, FT Hardware Spec
4. HRD

Figure: 1-1 FTS Overview

1.4 Scope

The FTS Services IDD describes the services available to the Direct Readout (DR) Community in order to receive and process Direct Broadcast (DB) satellite data. This IDD will contain items provided to Field Terminal Customers via the web portal.

1.5 Purpose

This Services Interface Description Document (IDD) defines the services available from the FTS necessary to support the delivery and processing of the DB satellite data.

1.6 Organization

Section 1	Introduction - Provides a brief overview of the FTS services and their functionality, describes the document layout, and defines the services management.
Section 2	Related Documentation - Lists related documents and identifies them as Parent, Applicable, or Information Documents such as, MOAs, MOUs, technical implementation agreements, as well as Interface Control Document (ICD) Data Packages. This section also establishes an order of precedence in the event of conflict between two or more documents.
Section 3	FTS Data Providers and Data Recipients
Section 4	Services Overview – Provides a summary of the interfaces, in terms of the stakeholders, data and purpose, contained in this IDD.
Section 5	FTS Services – Establishes, defines, and characterizes the services covered in this IDD.
Appendix A	Interface to Requirements – Provides a table of all associated system requirements and maps them to the related interfaces defined in this IDD.
Appendix B	FTS Data Acquisition Table – Provides a table mapping data acquisition according to Type, Subtype, Frequency, Source, Size and Retraction Period of data flowing across the interfaces and to the associated physical interfaces.
Appendix C	Data Distribution Table – Maps data distribution.
Appendix D	RSB Data Sources

2 Related Documentation

The latest JPSS documents can be obtained from URL: https://jpssmis.gsfc.nasa.gov/frontmenu_dsp.cfm. JPSS Project documents have a document number starting with 470, 472 or 474 indicating the governing Configuration Control Board (CCB) (Program, Flight, or Ground) that has the control authority of the document.

2.1 Parent Documents

The following reference document(s) is (are) the Parent Document(s) from which this document has been derived. Any modification to a Parent Document will be reviewed to identify the impact upon this document. In the event of a conflict between a Parent Document and the content of this document, the JPSS Program Configuration Change Board has the final authority for conflict resolution.

Document Number	Document Title
474-00262	FTS L3 Requirements Specification

2.2 Applicable Documents

The following document(s) is (are) the Applicable Document(s) from which this document has been derived. Any modification to an Applicable Document will be reviewed to identify the impact upon this document. In the event of conflict between an Applicable Document and the content of this document, the JPSS Program Configuration Change Board has the final authority for conflict resolution.

Document Number	Document Title
474-00001-01	JPSS Common Data Format Control Book - External
474-00001-04	JPSS Common Data Format Control Book - External
474-00562	JPSS CGS Services Interface Definition Document (IDD), Block 2.0
474-00001-01	Common Data Format Control Book - External, Volume I

2.3 Information Documents

The following document(s) is (are) the Applicable Document(s) from which this document has been derived. Any modification to an Applicable Document will be reviewed to identify the impact upon this document. In the event of conflict between an Applicable Document and the content of this document, the JPSS Program Configuration Change Board has the final authority for conflict resolution.

Document Number	Document Title
474-00333	Joint Polar Satellite System (JPSS) Ground System Architecture Description Document (ADD)
470-00041	Joint Polar Satellite System (JPSS) Program Lexicon
N/A	NOAA5042 System Security Plan (SSP)
N/A	NOAA5048 System Security Plan (SSP)
FIPS PUB 199	Standards for Security Categorization of Federal Information and Information Systems
NIST SP 800-47	Security Guide for Interconnecting Information Technology Systems

Document Number	Document Title
NIST SP 800-60	Guide for Mapping Types of Information and Information Systems to Security Categories
474-00262	Joint Polar Satellite System (JPSS) Field Terminal Support Segment (FTS) Requirements Specification
470-00029	Joint Polar Satellite System (JPSS) System Architecture and Concept of Operations (SACO) Document
474-00116	Joint Polar Satellite System (JPSS) Ground System Security Requirements Document (GSSRD)
474-00001-01	Common Data Format Control Book – External, Volume I
NIST SP 800-47	Security Guide for Interconnecting Information Technology Systems
NIST IR 7298	Glossary of Key Information Security Terms

Table: 2-1 Mission Data Format Control Book

Document Number	Document Title
429-05-02-42	Mission Data Format Control Book National Polar-Orbiting Operational Environmental Satellite System (NPOESS) Preparatory Project (NPP) (MDFCB)
472-00163	JPSS-1 Mission Data Format ICD
472-00165	JPSS-1 Spacecraft High Rate Date (HRD) to Direct Broadcast Stations (DBS) Radio Frequency (RF) Interface Control Document (ICD)
472-00340	JPSS-2 Satellite High-Rate Data (HRD) to DBS RF ICD

Table: 2-2 Radio Frequency Interface Control Document

Document Number	Document Title
472-00165	JPSS-1 Spacecraft High Rate Date (HRD) to Direct Broadcast Stations (DBS) Radio Frequency (RF) Interface Control Document (ICD)
472-00340	JPSS-2 Satellite High-Rate Data (HRD) to DBS RF ICD
472-REF-00217	NPP Spacecraft High Rate Data RF ICD to the Direct-Broadcast Stations

Table: 2-3 Algorithm Theoretical Basis Document

STAR Document Number	Document Title
D0001-M01-S01-005	OMPS Nadir Profile Ozone Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-003	VIIRS Radiometric Calibration Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-027	VIIRS Earth Gridding Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-006	OMPS Nadir Total Column Ozone Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-021	VIIRS Active Fires: Fire Mask Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-	VIIRS Imagery Products Algorithm Theoretical Basis Document (**ATBD**)

STAR Document Number	Document Title
008	
D0001-M01-S01-002	Cross Track Infrared Sounder (CrIS) Sensor Data Records (SDR) Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-011	VIIRS Cloud Mask (VCM) Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-026	VIIRS Surface Reflectance Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-009	VIIRS Ocean Color/Chlorophyll Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-028	VIIRS Net Heat Flux (NHF) Environmental Data Record (EDR) and Ocean Surface Albedo Intermediate Product (IP) **ATBD**
D0001-M01-S01-024	VIIRS Surface Type Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-017	VIIRS Snow Cover Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-025	VIIRS Vegetation Index (VVI) Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-023	JPSS VIIRS Surface Albedo Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-012	Cloud Top Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-013	Cloud Effective Particle Size and Cloud Optical Thickness Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-001	Advanced Technology Microwave Sounder (ATMS) SDR Radiometric Calibration Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-014	VIIRS Cloud Cover/Layers Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-015	VIIRS Cloud Base Height Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-019	VIIRS Suspended Matter Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-016	VIIRS Sea Ice Characterization Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-010	VIIRS Sea Surface Temperature Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-020	VIIRS Aerosol Optical Thickness (AOT) and Particle Size Parameter Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-029	VIIRS Atmospheric Correction Over Ocean Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-022	VIIRS Land Surface Temperature Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-018	VIIRS Ice Surface Temperature Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-004	VIIRS Geolocation Algorithm Theoretical Basis Document (**ATBD**)
D0001-M01-S01-	Algorithm Theoretical Basis Document For the Cross Track Infrared Sounder

STAR Document Number	Document Title
007	(CrIS) (**ATBD**), Volume II, Environmental Data Records (EDR)
D0001-M01-S01-003	JPSS Algorithm Support Functions (ASF) VIIRS-047 DNB Zero Offset vs. Response Look-Up Tables Package Version Description Document
D0001-M01-S01-027	JPSS Algorithm Support Functions (ASF) VIIRS H Scale Factor Look Up Table (LUT) Package Version Description Document

Table: 2-4 Common Data Format Control Book

Document Number	Document Title
474-00448-02-01	JPSS Algorithm Specification Volume II: Data Dictionary for the Common Algorithm Software
474-00001-05-B0200	JPSS Common Data Format Control Book - External - Volume V - Metadata - Block 2.0.0
474-00001-06-B0200	JPSS CDFCB - External - Volume VI - Ancillary Data, Auxiliary Data, Messages, and Reports - Block 2.0.0
474-00020-01-B0200	JPSS Internal Data Format Control Book - Volume I - Internal Data Formats - Block 2.0.0
474-00020-02-B0200	JPSS Only Internal Data Format Control Book - Volume II - Uplink and Downlink Data Transport Formats - Block 2.0.0
474-00020-03-B0200	JPSS Internal Data Format Control Book - Volume III - Retained Intermediate Product Formats - Block 2.0.0

Note: The NPP Operational Algorithm Description Documents are listed on SCoRe in the FTS Distributed Documentation.

3 FTS Data Providers and Data Recipients

The FTS system works with five classes of organizations and systems. These interface types are:

- CGS Support Node
- Common Ground System (CGS)
- Integrators (NASA GSFC DRL and UWISC/CIMSS)
- UWISC/CIMSS
- Field Terminal Customers

This section describes each of these FTS Provider / Recipient organizations and systems.

3.1 Data Providers and Data Recipients

The data providers and data recipients are: Common Ground System (CGS), CGS Support Node, NASA GSFC DRL, UWISC / CIMSS.

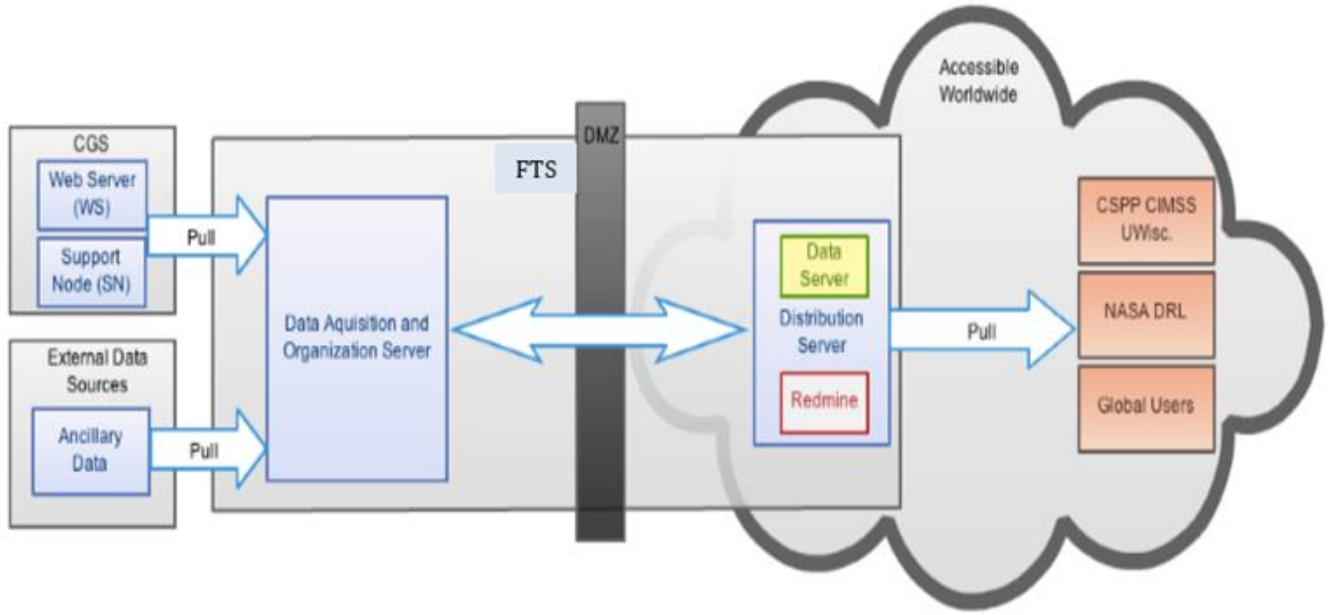


Figure: 3-1 FTS Data Providers and Recipients

3.2 Common Ground System (CGS)

The ground project portion of the Joint Polar Satellite System (JPSS) ground segment is known as the Common Ground System (CGS). It performs the functions of four of the major JPSS Ground System (GS) nodes: Space/Ground Communications Node, Ground Network Node, Management & Operations Node, and Data Processing Node (DPN). This functionality encompasses the control of JPSS-managed satellites, collection of data from satellites, transport of data to the data processing facilities, data processing, and distribution of data products to the science customers. These nodes were formerly described as the Ground Station, Ground Network, Mission Management Center, and Interface Data Processing Segment (IDPS); but have

been renamed for better clarity and to be more consistent across the integrated technical baseline and are based on the concepts of operations, architecture, requirements and interfaces. The JPSS GS encompasses more functionality since it also includes other operations and nodes external to the Common Ground System (CGS). The JPSS GS includes: CGS, Simulation Node, Field Terminal Support Node (FTSN), and Government Resources for Algorithm Verification Independent Testing and Evaluation.

3.3 CGS Support Node

The CGS Support Node provides the CGS capability for maintenance of CGS software, including the ADL framework and algorithm release packages. The FTS System interfaces with the CGS Support Node to receive processing software (ADL and algorithm packages) to be made available to FT Integrators via the FTS Portal.

3.4 NASA GSFC DRL

The Direct Readout Laboratory (DRL) is a technology and information conduit for the Direct Broadcast (DB) community. The DRL acts as an intermediary between missions and DB community members that are not directly involved in the missions. With the support of the Joint Polar Satellite System (JPSS), the Suomi National Polar-orbiting Partnership (SNPP), and NASA Headquarters (HQ), the DRL develops and enables technologies that benefit the entire DB community. To develop these technologies, the DRL ensures bidirectional communication between missions and the entire DB community.

3.5 UWISC/CIMSS

The Cooperative Institute for Metrological Satellite Studies (CIMSS) mission includes these three goals:

Foster collaborative research among NOAA, NASA, and the University in those aspects of atmospheric and earth system sciences that exploit the use of satellite technology, serve as a center at which scientists and engineers working on problems of mutual interest can focus on satellite-related research in atmospheric and earth system science and stimulate the training of scientists and engineers in the disciplines involved in atmospheric and earth science.

3.6 Field Terminal Support Customers

The Field Terminal Support (FTS) provides the resources needed to support the Field Terminal Support customer communities by providing software, documentation and periodic updates to enable them to produce data products from JPSS. The Field Terminal Support will provide the building blocks for customers who wish to obtain the High Rate Data (HRD) signal and the necessary ancillary data to generate meaningful products. Field Terminal Support customers are not limited to government organizations but to Universities and private users too.

3.7 Reflective Solar Band (RSB) Auto Cal

RSB Auto Cal implements automated adjustments to keep each VIIRS band calibrated, replacing an offline human in-the loop process with an on-line, fully automated process. The RSB Auto Cal allows the field terminal to produce properly calibrated VIIRS SDRs. A complete listing of RSB data sources can be found in Appendix D.

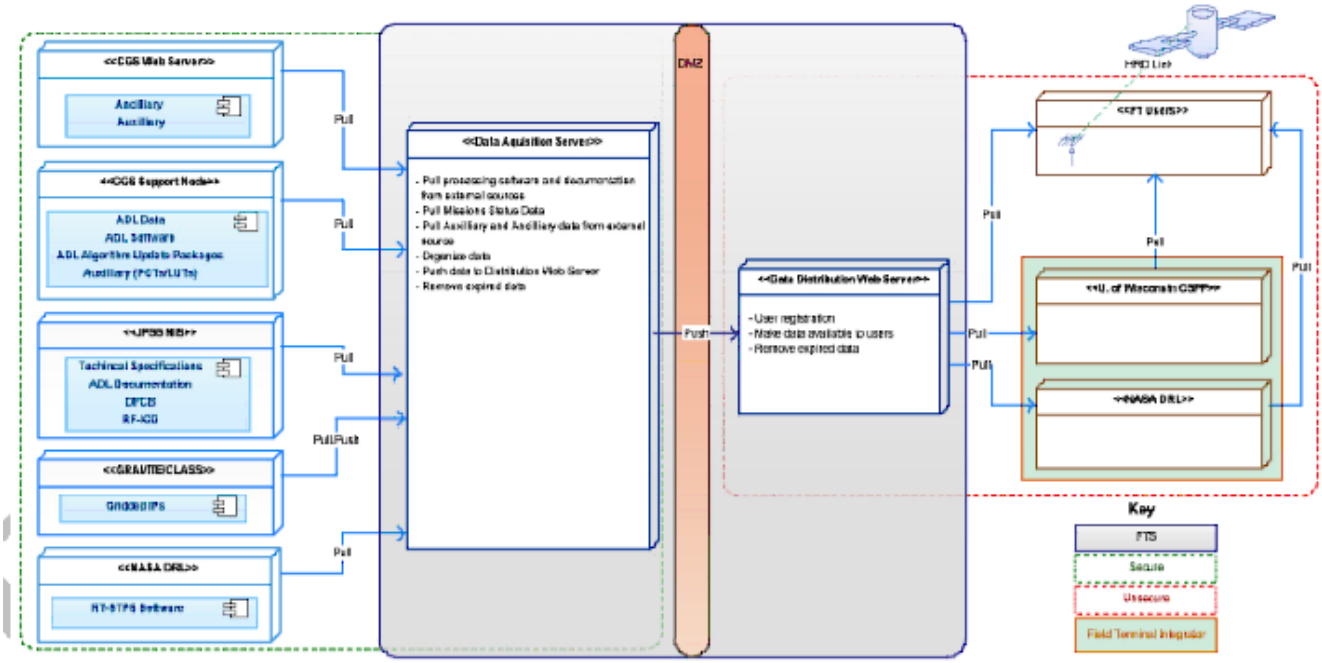


Figure: 3-2 FTS System Architecture

4 Services Overview

4.1 Service Conventions

4.1.1 Service Mnemonic Definition

All services in the FTS are assigned a Service Mnemonic Definition located in the Common Data Format Control Book - External, Volume I, 474-00001-01.

4.2 Service Description

Table: 4-1 GRAVITE Services

Service ID	Service Title	Source	Destination	Document Location
X_FT_FO-L00010	Documentation	FTS	FTS Customers	5.1.1
X_FT_FO-L00020	Auxiliary Data	FTS	FTS Customers	5.1.2
X_FT_FO-L00030	Ancillary Data	FTS	FTS Customers	5.1.3
X_FT_FO-L00040	Software	FTS	FTS Customers	5.1.4
X_FT_FO-L00050	Gridded IPs	FTS	FTS Customers	5.1.5
R_FT_FO-P00010	FTS Web Server	FTS	FTS Customers	5.2.1

5 FTS Services

5.1 Services Listing

5.1.1 Documentation

Service Name	Documentation
Service Mnemonic	X_FT_FO-L00010
Description	**Description:** The FTS acquires public-released technical specifications and other relevant documentation from the JPSS program Management Information System (MIS), stores them on the FTS Acquisition server, and makes them available to FTS customers via the FTS Distribution Server. Relevant documents are found in Appendix D. No ITAR controlled data is stored on the FTS system.

5.1.1.1 Data Transaction and Response

Sender	FTS
Receiver	Authorized Customers
Initialization	Customer enters valid web address and logs in using a valid name and password.
Response	Sender: N/A Receiver: The response to a request is the delivery of requested data.

5.1.1.2 Data Content, Data Format and Data Mnemonic

Data Content and Data Format	PDF
Data Mnemonic(s)	N/A

5.1.1.3 Protocol and Parameters

Protocol	HTTPS: External customer initiates access to Web site.
Parameters	HTTPS: Valid Web address, API: The API uses the JPSS API libraries that encapsulate all the necessary intersystem communication protocols. The API is described in the JPSS Application Programming Interface (API) Customers Guide, 474-00019.

5.1.1.4 Performance Monitoring

Thresholds	FTS monitors the success/failure of all incoming files from our external source servers. If a file transfer fails to the FTS acquisition server then an attempt to retrieve the file will be made. The retrieval attempt will be made two times. The FTS operator will be notified if the file transfer continues to fail.
Logging	The success or failure status off all attempted transmissions to FTS is logged in to a file Contact FTS IT Support services or FTS Help Desk or gravite.service@noaa.gov

5.1.1.5 Security

Client Authentication Required	For HTTPS interfaces (FIPS 140-2 compliant); email address and strong passwords are required for client authentication. Contact FTS for customer account setup.
Encryption Required	The customer authentication and session are encrypted via the HTTPS protocol for access to the FTS Portal. The HTTPS protocol is configured to use TLS version 1.2 encryption in combination with x.509 SSL certificates. The entire communication session is encrypted, providing confidentiality and integrity for authentication information and data transfers. Symmetric Encryption Algorithm: AES-256-CBC Message Authentication Code: SHA256 For HTTPS interfaces, TLS version 1.2 encryption should be utilized with x.509 SSL certificates required on the server side with trusted certification paths to the NOAA PKI or a government agency trusted root certification authority. Utilize FIPS 140-2 validated cryptographic modules for TLS encryption in vendor implementations.
Security Mechanisms	HTTPS replaces HTTP for web based interfaces to ensure customer name and passwords are not passed in clear text. Strong passwords are used within the interfaces in accordance with the password policy requirements in section Authenticator Management (IA-5) of the Office of Satellite and Product Operations (OSPO) Identification and Authentication Policy and Procedures. External systems not managed by the CGS are subject to applicable external agency password policies. The NOAA PKI may issue X.509 certificates or a government agency trusted root certification authority. X.509 certificates are used to verify the identity of the web server. For Data Integrity of all JPSS-CGS delivered data products cryptographic hashing mechanisms should be used with a SHA-256 hashing algorithm for integrity verification. External network interfaces should be routed through the NOAA Trusted Internet Connection where possible.

5.1.1.6 Operational Constraints

Constraints	Priority: There is no prioritization of data or customers for this interface, except as affected by transfer protocol. Constraints: Authorized Customers have read-only privileges to access posted data on the IPS Bandwidth Limitations

5.1.2 FTS Auxiliary Data

Service Name	FTS Auxiliary Data
Service Mnemonic	X_FT_FO-L00020
Description	**Lookup Tables and Processing Coefficient Tables** Auxiliary Data is data other than that included in the sensor application packets, which is produced internally by the JPSS program. One category of auxiliary data includes Lookup tables (LUTs) and processing coefficient tables (PCTs). Algorithm

	LUTs are files that contain tables of pre-computed values that are used in lieu of real-time algorithm computations. These table values are typically the result of RTM executions, and other environmental model simulations, and typically cover a broad, multi-dimensional parameter space that is unique to each algorithm. Similarly, PCTs are files that contain algorithm-specific processing parameters used in the creation of NPP/JPSS data products. These files are maintained by the CGS, and updated at varying frequencies. LUTs are typically rarely updated, while PCTs may be updated on an ad hoc basis or at regular intervals (with some occurring weekly). The FTS acquires these tables from the CGS extranet webserver, stores them on the FTS Acquisition server, and makes them available to FTS customers via the Distribution Server. **Orbital Information** JPSS and S-NPP Auxiliary Data is data other than that included in the sensor application packets, which is produced internally by the JPSS program. This data includes LUT and PCTs, as described in section 6.1.6.2. Other Auxiliary data includes the following orbit-related information: • Two-line Element Sets (TLEs) (see CDFCB-X, Vol. VI, sec 3.5) provide orbital information that can be used to determine the position and velocity of NPP and JPSS satellites. TLEs are wrapped in hdf5 and made available by the CGS. They are nominally produced once per day per spacecraft, and more frequently when maneuvers occur. • The Revolution Number file (see CDFCB-X, Vol. VI, sec 3.13) provides customers with predictions of JPSS revolution numbers. Satellite revolutions are defined as incrementing at each successive ascending node crossing, starting with revolution "one" at the first ascending node crossing after launch. The Revolution Number file will provide predictions for up to 90 days. TLEs and Revolution number files are produced by the CGS daily. The FTS acquires TLE and Revolution number files from the CGS extranet webserver, stores them on the FTS Acquisition Server, and makes them available to FTS customers via the Distribution Server. **Mission Status** JPSS and S-NPP Auxiliary Data is data other than that included in the sensor application packets, which is produced internally by the JPSS program. • Mission Schedules (see CDFCB-X, vol. VI, sec 3.7) are regularly produced by the CGS identifying events and activities relating to the mission. They are produced by the CGS weekly, with additional updates as needed. • Mission Notices (see CDFCB-X, vol. VI, sec 4.15) are human-readable text files that are created and delivered on an ad-hoc basis, and are used to communicate mission-related information such as maneuvers, outages, orbital events and other noteworthy mission information. This data is acquired from the CGS, stored on the FTS Acquisition server, made available to FTS customers via the Distribution Server. **HRD Status Information** The High Rate Data (HRD) Link Monitoring (HLM) Report (see CDFCB-X, vol VI, sec 4.16) contained information about the content and signal quality of the HRD downlink for JPSS and S-NPP spacecraft. The report contains status on the HRD receivers, processors, the Vector Signal Analyzer (VSA) and the Digital to Serial

	interfaces. The report also contains Virtual Channel IDs (VCID) statistics. The report is produced by CGS for each HRD contact at the SvalSat site. The FTS interfaces with the CGS to retrieve the reports, stores them on the FTS Acquisition Server and makes them available to FTS customers via the Distribution Server. **Reflective Solar Band (RSB) Auto Cal** RSB Auto Cal implements automated adjustments to keep each VIIRS band calibrated, replacing an offline human in-the loop process with an on-line, fully automated process. The RSB Auto Cal allows the field terminal to produce properly calibrated VIIRS SDRs. A complete listing of RSB data sources can be found in Appendix D.

5.1.2.1 Data Transaction and Response

Sender	FTS
Receiver	Customers
Initialization	Customer enters a valid web address and logs in using a valid email address and Password.
Response	Sender: N/A Receiver: Status messages and delivery of requested data.

5.1.2.2 Data Content, Data Format and Data Mnemonic

Data Content and Data Format	FTS uses CDFCB-defined IDPS formats of data, primarily *.h5 (HDF Version 5) files.
Data Mnemonic(s)	N/A

5.1.2.3 Protocol and Parameters

Protocol	HTTPS: External customer initiates access to Web site.
Parameters	HTTPS: Valid Web address,

5.1.2.4 Performance Monitoring

Thresholds	FTS monitors the success/failure of all incoming files from our external source servers. If a file transfer fails to the FTS acquisition server then an attempt to retrieve the file will be made. The retrieval attempt will be made two times. The FTS operator will be notified if the file transfer continues to fail.
Logging	The success or failure status of all attempted transmissions to FTS is logged to a file. Contact FTS IT Support services or FTS Help Desk or gravite.service@noaa.gov

5.1.2.5 Security

Client Authentication Required	For HTTPS interfaces (FIPS 140-2 compliant); email address and strong passwords are required for client authentication. Contact FTS for customer account setup.
Encryption Required	The customer authentication and session are encrypted via the HTTPS protocol for access to the FTS Portal. The HTTPS protocol is configured to use TLS version 1.2

	encryption in combination with x.509 SSL certificates. The entire communication session is encrypted, providing confidentiality and integrity for authentication information and data transfers. Symmetric Encryption Algorithm: AES-256-CBC Message Authentication Code: SHA256 For HTTPS interfaces, TLS version 1.2 encryption should be utilized with x.509 SSL certificates required on the server side with trusted certification paths to the NOAA PKI or a government agency trusted root certification authority. Utilize FIPS 140-2 validated cryptographic modules for TLS encryption in vendor implementations.
Security Mechanisms	HTTPS replaces HTTP for web based interfaces to ensure customer name and passwords are not passed in clear text Strong passwords are used within the interfaces in accordance with the password policy requirements in section Authenticator Management (IA-5) of the Office of Satellite and Product Operations (OSPO) Identification and Authentication Policy and Procedures. External systems not managed by the CGS are subject to applicable external agency password policies. The NOAA PKI may issue X.509 certificates or a government agency trusted root certification authority. X.509 certificates are used to verify the identity of the web server. For Data Integrity of all JPSS-CGS delivered data products cryptographic hashing mechanisms should be used with a SHA-256 hashing algorithm for integrity verification. External network interfaces should be routed through the NOAA Trusted Internet Connection where possible.

5.1.2.6 Operational Constraints

Constraints	Priority: There is no automatic prioritization of data or customers for this interface except as affected by transfer protocol. Constraints: IO speed limitations to the storage array.

5.1.3 Ancillary Data

Service Name	Ancillary Data
Service Mnemonic	X_FT_FO-L00030
Description	Ancillary data is defined as any data, which is not produced by JPSS. For a complete definition of ancillary data file-naming conventions, see the JPSS CDFCB-X Vol. I, 474-00001-01. GMASI: Global Automated Multi-sensor Snow/Ice NCEP: The National Centers for Environmental Prediction (NCEP) formulate numerical analyses and weather prediction products. NCEP is a source for ancillary data products used in JPSS data processing. NAVGEM: The Navy Global Environmental Model (NAVGEM) is a global numerical weather prediction computer simulation run by the United States Navy's Fleet Numerical Meteorology and Oceanography Center.

	NAAPS: Navy Aerosol Analysis and Prediction System USNO: The United States Naval Observatory (USNO) provides a wide range of astronomical data and products, and serves as the official source of time for the U.S. Department of Defense and a standard of time for the entire United States. The FTS interfaces with the CGS extranet webserver to retrieve relevant dynamic ancillary data, stores that data on the FTS Acquisition Server and make the data available to customers via the FTS Distribution Server. The static ancillary data is also used in JPSS processing algorithms, but updated infrequently. This data (see CDFCB-X, vol. VI, sec 2.1.3) includes: • Aerosol Optical Thickness Climatology Files • Cloud Top Pressure Files • Nitrate Depletion Temperature Files • Ozone Climatology Files • Surface Reflectivity, Pressure, Temperature, Wind, Precipitable Water, Humidity Climatology Files • IDPS Terrain Database • Isobaric Level Temperature Climatology Files • Geopotential Height Climatology Files • Leap Seconds • Planetary Ephemeris The FTS acquires static ancillary data from the CGS Support Node via standard software release mechanisms, stores that data on the FTS Acquisition Server, makes the data available to FTS customers via the Distribution Server.

5.1.3.1 Data Transaction and Response

Sender	FTS
Receiver	Customer
Initialization	Customer enters a valid web address
Response	Sender: N/A Receiver: Status messages and delivery of requested data.

5.1.3.2 Data Content, Data Format and Data Mnemonic

Data Content and Data Format	Data are in multiple formats used by both command-line processes and GUIs. Data used are in CDFCB-defined formats, as well as binary, ASCII, internal DMS, TAR, and many other formats.
Data Mnemonic(s)	N/A

5.1.3.3 Protocol and Parameters

Protocol	HTTPS: External customer initiates access to Web site SSH: Customer email address and Password
Parameters	HTTPS: Valid Web address SSH: IP address and valid connection port(s)

5.1.3.4 Performance Monitoring

Thresholds	FTS monitors the success/failure of all incoming files from our external source servers. If a file transfer fails to the FTS acquisition server then an attempt to retrieve the file will be made. The retrieval attempt will be made two times. The FTS operator will be notified if the file transfer continues to fail.
Logging	The success or failure status off all attempted transmissions to FTS is logged into a file. Contact DPES IT Support services or FTS Help Desk or gravite.service@noaa.gov

5.1.3.5 Security

Client Authentication Required	For HTTPS interfaces (FIPS 140-2 compliant); email address and strong passwords are required for client authentication. Contact FTS for customer account setup.
Encryption Required	The customer authentication and session are encrypted via the HTTPS protocol for access to the FTS Portal. The HTTPS protocol is configured to use TLS version 1.2 encryption in combination with x.509 SSL certificates. The entire communication session is encrypted, providing confidentiality and integrity for authentication information and data transfers. Symmetric Encryption Algorithm: AES-256-CBC Message Authentication Code: SHA256 For HTTPS interfaces, TLS version 1.2 encryption should be utilized with x.509 SSL certificates required on the server side with trusted certification paths to the NOAA PKI or a government agency trusted root certification authority. Utilize FIPS 140-2 validated cryptographic modules for TLS encryption in vendor implementations.
Security Mechanisms	HTTPS replaces HTTP for web based interfaces to ensure customer name and passwords are not passed in clear text. Strong passwords are used within the interfaces in accordance with the password policy requirements in section Authenticator Management (IA-5) of the Office of Satellite and Product Operations (OSPO) Identification and Authentication Policy and Procedures. External systems not managed by the CGS are subject to applicable external agency password policies. The NOAA PKI may issue X.509 certificates or a government agency trusted root certification authority. X.509 certificates are used to verify the identity of the web server. For Data Integrity of all JPSS-CGS delivered data products cryptographic hashing mechanisms should be used with a SHA-256 hashing algorithm for integrity verification. External network interfaces should be routed through the NOAA Trusted Internet Connection where possible.

5.1.3.6 Operational Constraints

Constraints	Priority: There is no prioritization of data or customers for this interface except as affected by transfer protocol. Constraints: N/A

5.1.4 Software

Service Name	Software
Service Mnemonic	X_FT_FO-L00040
Description	Algorithm Development Library (ADL) is a software package that supports development, integration, maintenance and enhancement of S-NPP and JPSS algorithms. ADL provides a processing framework for offline (i.e., external to IDPS) algorithm execution and a toolkit of utilities to ease algorithm development and integration. The ADL approach accomplishes three things: (1) The initial Science-to-Operations (Sci2Ops) code modification, integration, and testing efforts are greatly reduced, which lowers cost and accelerates operational capability. (2) The processing code of the algorithm remains the same, allowing for one software "science" baseline to be maintained. (3) Use of ADL enables the execution of individual algorithms on relatively inexpensive hardware and software platforms, providing the flexibility for almost any end customer to assess and improve the science of the operational algorithm. ADL was developed to support the goal of a common set of algorithm code that can be integrated into heterogeneous processing frameworks to satisfy differing customer needs. The entire set of IDPS NPP operational algorithms has been made ADL compatible. ADL is currently being used as a key component of the NPP Calibration/Validation process, and has been designated as the mechanism for providing science processing algorithm software to field terminal customers to enable processing of NPP and JPSS HRD. The FTS acquires updated ADL source code, algorithm update packages, and ADL Data packages from the CGS Support Node via standard software build distribution processes. These software packages are stored on the FTS server, and made available to integrators and customers via the FTS Distribution Server. The release cycle for the ADL framework is expected to be roughly twice per year, while the release cycle for algorithm update packages will coincide with IDPS builds (per the IDPS Accelerated Release Cycle (ARC), occurring approximately every 10-12 weeks). ADL Data Packages are also provided with each framework release and algorithm update release. RT-STPS: Real Time Satellite Processing System

5.1.4.1 Data Transaction and Response

Sender	FTS
Receiver	Customers
Initialization	Customers enters a valid web address and logs in.
Response	Sender: N/A Receiver: Status messages and delivery of requested data.

5.1.4.2 Data Content, Data Format and Data Mnemonic

Data Content and Data Format	Data are in multiple formats used by both command-line processes and GUIs. Data used are in CDFCB-defined formats, as well as binary, ASCII, internal DMS, TAR,

	and many other formats.
Data Mnemonic(s)	N/A

5.1.4.3 Protocol and Parameters

Protocol	HTTPS: External customer initiates access.
Parameters	HTTPS: Valid Web address

5.1.4.4 Performance Monitoring

Thresholds	FTS monitors the success/failure of all incoming files from our external source servers. If a file transfer fails to the FTS acquisition server then an attempt to retrieve the file will be made. The retrieval attempt will be made two times. The FTS operator will be notified if the file transfer continues to fail.
Logging	The success or failure status off all attempted transmissions to FTS is logged.

5.1.4.5 Security

Client Authentication Required	For HTTPS interfaces (FIPS 140-2 compliant); email address and strong passwords are required for client authentication. Contact FTS for customer account setup.
Encryption Required	The customer authentication and session are encrypted via the HTTPS protocol for access to the FTS Portal. The HTTPS protocol is configured to use TLS version 1.2 encryption in combination with x.509 SSL certificates. The entire communication session is encrypted, providing confidentiality and integrity for authentication information and data transfers. Symmetric Encryption Algorithm: AES-256-CBC Message Authentication Code: SHA256 For HTTPS interfaces, TLS version 1.2 encryption should be utilized with x.509 SSL certificates required on the server side with trusted certification paths to the NOAA PKI or a government agency trusted root certification authority. Utilize FIPS 140-2 validated cryptographic modules for TLS encryption in vendor implementations.
Security Mechanisms	HTTPS replaces HTTP for web based interfaces to ensure customers name and passwords are not passed in clear text. Strong passwords are used within the interfaces in accordance with the password policy requirements in section Authenticator Management (IA-5) of the Office of Satellite and Product Operations (OSPO) Identification and Authentication Policy and Procedures. External systems not managed by the CGS are subject to applicable external agency password policies. The NOAA PKI may issue X.509 certificates or a government agency trusted root certification authority. X.509 certificates are used to verify the identity of the web server. For Data Integrity of all JPSS-CGS delivered data products cryptographic hashing mechanisms should be used with a SHA-256 hashing algorithm for integrity verification. External network interfaces should be routed through the NOAA Trusted Internet Connection where possible.

5.1.4.6 Operational Constraints

Constraints	Priority: There is no prioritization of data or customers for this interface except as affected by transfer protocol. Constraints: Authorized Customers have read-only privileges.

5.1.5 Gridded IPs

Service Name	Gridded IPs
Service Mnemonic	X_FT_FO-L00050
Description	JPSS Environmental Data Records (EDRs) and Intermediate Products (IPs) are produced operationally by running a variety of retrieval algorithms through the Interface Data Processing Segment (IDPS). To support generation of certain EDRs and IPs from VIIRS data, global Gridded Intermediate Products (GIPs) that are updated dynamically with data from previous swaths of the VIIRS instrument have been included in the operational processing. As IDPS performs global processing, it can both update and use these global GIPs. In a Field Terminal Environment, which does not process globally, and may not process regularly, maintenance of these global GIPs is not feasible. To enable use of the same processing algorithms in both IDPS and Field Terminal systems, the FTS acquires and stores the global GIPs required for VIIRS processing. The GIPs are created in the IDPS, updated per the IDPS schedule, and delivered to IDPS subscribers. The GIPs needed for Field Terminal processing are updated at varying frequencies: • The Snow/Ice Cover Rolling GIP is updated on a granule basis (but output only once daily) • The NBAR/NDVI Rolling GIP and Land Surface Albedo GIP are updated every 17 days • The Quarterly Surface Type (QST), Quarterly Surface Type/Land Water Mask, and Master Land Index (MLI) are updated (offline) on an at most quarterly basis. The FTS acquires the Snow/Ice Cover, NBAR NDVI and LSA GIPs from GRAVITE, stores them in the FTS Acquisition Server, and makes them available to FTS customers via the Distribution Server.

5.1.5.1 Data Transaction and Response

Sender	FTS
Receiver	Customers
Initialization	Customer enters a valid web address and logs in.
Response	Sender: N/A Receiver: Status messages and delivery of requested data.

5.1.5.2 Data Content, Data Format and Data Mnemonic

Data Content and Data Format	Data are in multiple formats used by both command-line processes and GUIs. Data used are in CDFCB-defined formats, as well as binary, ASCII, internal DMS, TAR,

	and many other formats.
Data Mnemonic(s)	N/A

5.1.5.3 Protocol and Parameters

Protocol	HTTPS: External customer initiates access.
Parameters	HTTPS: Valid Web address

5.1.5.4 Performance Monitoring

Thresholds	FTS monitors the success/failure of all incoming files from our external source servers. If a file transfer fails to the FTS acquisition server then an attempt to retrieve the file will be made. The retrieval attempt will be made two times. The FTS operator will be notified if the file transfer continues to fail.
Logging	The success or failure status off all attempted transmissions to FTS is logged.

5.1.5.5 Security

Client Authentication Required	For HTTPS interfaces (FIPS 140-2 compliant); email address and strong passwords are required for client authentication. Contact FTS for customer account setup.
Encryption Required	The customer authentication and session are encrypted via the HTTPS protocol for access to the FTS Portal. The HTTPS protocol is configured to use TLS version 1.2 encryption in combination with x.509 SSL certificates. The entire communication session is encrypted, providing confidentiality and integrity for authentication information and data transfers. Symmetric Encryption Algorithm: AES-256-CBC Message Authentication Code: SHA256 For HTTPS interfaces, TLS version 1.2 encryption should be utilized with x.509 SSL certificates required on the server side with trusted certification paths to the NOAA PKI or a government agency trusted root certification authority. Utilize FIPS 140-2 validated cryptographic modules for TLS encryption in vendor implementations.
Security Mechanisms	HTTPS replaces HTTP for web based interfaces to ensure customer name and passwords are not passed in clear text Strong passwords are used within the interfaces in accordance with the password policy requirements in section Authenticator Management (IA-5) of the Office of Satellite and Product Operations (OSPO) Identification and Authentication Policy and Procedures. External systems not managed by the CGS are subject to applicable external agency password policies. The NOAA PKI may issue X.509 certificates or a government agency trusted root certification authority. X.509 certificates are used to verify the identity of the web server. For Data Integrity of all JPSS-CGS delivered data products cryptographic hashing mechanisms should be used with a SHA-256 hashing algorithm for integrity verification. External network interfaces should be routed through the NOAA Trusted Internet Connection where possible.

5.1.5.6 Operational Constraints

Constraints	Priority: There is no prioritization of data or customers for this interface except as affected by transfer protocol. Constraints: Authorized Customers have read-only privileges.

5.2 Physical Interface Definitions

5.2.1 FTS Web Server

Interface Name	FTS Web Server
Service Mnemonic	R_FT_FO-P00010
Description	This interface is the primary, bi directional connection between the GRAVITE Web Server and the Internet. Sender/Receiver: FTS Web Server Sender/Receiver: FTS core switch

5.2.1.1 Interface Design

Hardware	Dell R710
Hardware Interface Standards	Ethernet 1000 Base-T RJ45
Software	Redmine, Red Hat Linux
Protocol	Ethernet
Failover Mechanism	Parallel Operations

5.2.1.2 Characteristics

IP Domain Name	idmz2.npoess.gov
Connection Type	RJ-45 to RJ-45
Cable Type	Copper CAT-5/6
Link Type	Primary
Test Capability	ICMP and HTTPS
Status Reporting	Firewall Link Status Light
Configuration Parameters	Bidirectional parameters: Access Control Lists

5.2.1.3 Bandwidth

Aggregate	2 Gb/sec
Physical	1 Gb/sec
Margin	1 Gb/sec

5.2.1.4 Security

Security Mechanisms	Encryption Required: NOAA5048 connects to external networks or information systems only through managed interfaces consisting of boundary protection devices.

	Managed interfaces employing boundary protection devices include, for example, proxies, gateways, routers, firewalls, guards, or encrypted tunnels arranged in effective security architecture. External communications will be routed through the Trusted Internet Connection.

Appendix A. Interface To Requirements Mapping

Table: A-1 Segment Interface Requirements

Requirement ID	Mnemonic	Interface Title
FTS-691, FTS-1053	X_FT_FO-L00010	Documentation
FTS-651	X_FT_FO-L00020	Auxiliary Data
FTS-690	X_FT_FO-L00030	Ancillary Data
FTS-688, FTS-1052	X_FT_FO-L00040	Software
FTS-1044	R_FT_FO-P00010	FTS Web Server

Appendix B. FTS Data Acquisition Table

Table: B-1 Data Acquisition

Type	Subtype	Frequency	Source	Size
Ancillary	NCEP GFS	Produced 4 times per day, containing forecasts in 3 hour increments from the synoptic (3, 6, 9, 12, 18, 21 & 24 hour)	CGS WS	13M/forecast file; 400M daily
Ancillary	FNMOC NAVGEM	Produced 4 times per day, containing forecasts in 3 hour increments from the synoptic	CGS WS	11M/ forecast file; 350M daily
Ancillary	GNMOC NAAPS	Produced 4 times per day, containing forecasts in 3 hour increments from the synoptic	CGS WS	50 K/ forecast file; 1 M daily
Ancillary	Polar Wander	Produced Weekly	CGS WS	2 & M
Ancillary	Static (All)	Infrequent	Support Node	TBD
Gridded IPs	Snow/Ice Cover	Updates are made on a granule basis in the IDPS, and are output once a day (TBR)	(CGS WS, GRAVITE or CLASS)	6 G
Gridded IPs	NDVI	Updates are produced on schedule every 17 days	(CGS WS, GRAVITE or CLASS)	80M
Gridded IPs	LSA	Updates are produced on schedule every 17 days	(CGS WS, GRAVITE or CLASS)	52G
Gridded IPs	QST, QST-LWM, and MLI	Updates are produced offline, at most quarterly	(CGS WS, GRAVITE or CLASS)	TBD
Ancillary	PCTs, LUTs	Ad hoc	CGS WS or Support Node	TBD
Ancillary	Mission Notices, Schedules and HLM Reports	Ad hoc or regularly scheduled	CGS WS	<10M
Ancillary	TLSs and Revolution Number file	Daily, or ad hoc	CGS WS	<10M
Software	RT-STPS	Ad hoc	NASA/DRL	3M
Software	ADL	Ad hoc nominally every 6 months	Support Node	7M
Software	ADL dates	Ad hoc, nominally every 10-12 weeks	Support Node	9M

Type	Subtype	Frequency	Source	Size
Software	Algorithm Update Packages	Ad hoc nominally every 6 months	Support Node	TBD (30g?)
Documentation	Public-released Specs, ICDs, etc.	Ad hoc	JPSS MIS	TBD

Appendix C. Data Distribution Table

Type	Subtype	Frequency	Source	Size	Retraction Period
Ancillary	Forecast files (GFS, NAVGEM, NAAPS)	Produced 4 times per day, containing forecasts in 3 hour increments from the synoptic	No	Yes (search based on model run time)	TBD FTS.IDD_02
Ancillary	Polar Wander	Produced Weekly	No	Yes (search based on creation time)	TBD FTS.IDD_02
Ancillary	Static (All)	Infrequent	No	Yes (search based on creation time)	TBD FTS.IDD_02
Gridded IPs	Snow/Ice Cover	Updates are made on a granule basis in the IDPS, and are output once a day (TBR)	No	Yes (search based on creation time)	TBD FTS.IDD_02
Gridded IPs	NDVI, LSA	Updates are produced on schedule every 17 days	No	Yes (search based on creation time)	TBD FTS.IDD_02
Gridded IPs	QST, QST-LWM, and MLI	Updates are produced offline, at most quarterly	No	Yes (search based on creation time)	TBD FTS.IDD_02
Ancillary	PCTs, LUTs	Ad hoc	No	Yes (search based on creation time)	TBD FTS.IDD_02
Ancillary	Mission Notices, Schedules and HLM Reports	Ad hoc or regularly	No	Yes (search based on creation time)	TBD FTS.IDD_02
Ancillary	TLSs and Revolution Number file	Daily, or ad hoc	No	Yes (search based on creation time)	TBD FTS.IDD_02
Software Documentation	All SW & Documentation	Ad hoc	No	Yes (search based on creation time)	TBD FTS.IDD_02

Appendix D. RSB Data Sources

Table: D-1 RSB Data Sources

Directory	Type	Subtype	Source
software/RT-STPS	Software & Documentation	All SW & documentation	NASA DRL
software/Algorithm_update_packages	Software & Documentation	All SW & documentation	CGS Support
software/adl	Software & Documentation	All SW & documentation	CGS Support
software/adl_data	Software & Documentation	All SW & documentation	CGS Support
documentation/mdfcb	Software & Documentation	All SW & documentation	JPSS MIS
documentation/rf_icd	Software & Documentation	All SW & documentation	JPSS MIS
documentation/atbd	Software & Documentation	All SW & documentation	JPSS MIS
documentation/jpss_srs	Software & Documentation	All SW & documentation	JPSS MIS
documentation/cdfcb	Software & Documentation	All SW & documentation	JPSS MIS
documentation/nnp_oad	Software & Documentation	All SW & documentation	JPSS MIS
data/ancillary/static	Ancillary	Static (all)	CGS Support
data/ancillary/polar_wander	Ancillary	Polar Wander (USNO)	CGS Server
data/ancillary/fnmoc_navgem	Ancillary	Forecast Files	CGS Server
data/ancillary/fnmoc_naaps	Ancillary	Forecast Files	CGS Server
data/ancillary/gmasi	Ancillary	GMASI	CGS Server
data/ancillary/ncep_gfs	Ancillary	Forecast Files	CGS Server
data/gridded_IPs/ndvi	Gridded IPs	NDVI, LSA	GRAVITE
data/gridded_IPs/qst	Gridded IPs	QST, QST-LWM, and MLI	GRAVITE
data/gridded_IPs/snow_ice_cover	Gridded IPs	Snow/Ice Cover	GRAVITE
data/gridded_IPs/mli	Gridded IPs	QST, QST-LWM, and MLI	GRAVITE
data/gridded_IPs/gst-Iwm	Gridded IPs	QST, QST-LWM, and MLI	GRAVITE
data/gridded_IPs/Isa	Gridded IPs	NDVI, LSA	GRAVITE
data/auxiliary/pcts	Auxiliary	PCTs, LUTs	CGS Server
data/auxiliary/revnumber	Auxiliary	TLEs, Revolution number file	CGS Server
data/auxiliary/tles	Auxiliary	TLEs, Revolution number file	CGS Server
data/auxiliary/hlm_reports	Auxiliary	Mission Notices, Schedules and HLM Reports	CGS Server
data/auxiliary/mission_notice	Auxiliary	Mission Notices, Schedules and HLM Reports	CGS Server
data/auxiliary/mission_schedule	Auxiliary	Mission Notices, Schedules and HLM Reports	CGS Server
data/auxiliary/luts	Auxiliary	PCTs, LUTs	CGS Server
data/auxiliary/rsb_autocal_history	Auxiliary	RSB Autocal History Files	GRAVITE
data/auxiliary/cris_correction_matrix	Auxiliary	CrIS Correction Matrix	GRAVITE