

## **POES IJPS**

# **Polar-orbiting Operational Environmental Satellite (POES)**

## **Interface Requirements between the Initial Joint Polar- orbiting Operational Satellite System (IJPS) Preprocessor, Product Generation and Distribution (PGD) and Data Archive and Access Systems (AAS)**

**October 2002**



**Prepared by:**

**U.S. Department of Commerce  
National Oceanic and Atmospheric Administration (NOAA)  
National Environmental Satellite, Data, and Information Service (NESDIS)**

**NOAA/NESDIS**

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Approved by: Office of System Development <div style="text-align: right; margin-right: 50px;">DATE</div> NAME: Mike Mignogno, POES Program Manager	Approved by: Office of System Development <div style="text-align: right; margin-right: 50px;">DATE</div> NAME: H. James Silva, POES/IJPS Project Manager
Approved by: Office of Satellite Data Processing and Distribution <div style="text-align: right; margin-right: 50px;">DATE</div> NAME: Barbara A. Banks, IPD Chief	Approved by: Office of Satellite Data Processing and Distribution <div style="text-align: right; margin-right: 50px;">DATE</div> NAME: Reginald Lawrence, Satellite Systems Division Chief
Approved by: National Climate Data Center <div style="text-align: right; margin-right: 50px;">DATE</div> NAME: Charles Carpenter, Satellite Systems Branch	Prepared by: Computer Sciences Corporation <div style="text-align: right; margin-right: 50px;">DATE</div> NAME: Dave Morel
<b>CCB RELEASE APPROVAL:</b> <div style="text-align: right; margin-right: 50px;">DATE</div> NAME: Pong Yu	

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## Preface

This document comprises the NOAA/NESDIS baseline publication of the Polar-orbiting Operational Environmental Satellite (POES) Interface Requirements between the Initial Joint Polar-orbiting Operational Satellite System (IJPS) Preprocessor, Product Generation and Distribution (PGD) and Data Archive and Access Systems (AAS). This document is Revision 0, DCN 0 (document number NOAA-POES-IJPS/OSD-2002-0013R0UD0).

This document identifies the IJPS era satellite data flows between the POES Preprocessor and the PGD systems and the AAS in the IJPS time period. The interface requirements stated in this document provide the basis for further analysis and interface implementation and are documented in an Interface Control Document between affected parties. Unless specifically cited in this document, the NOAA IJPS system will continue to meet the baseline performance and quality requirements for the POES system.

Publication of this document closes Document Configuration Change Request (DocCCR) # DocCCR-POES-Other-2002-0004, entitled *Acceptance of IJPS PG&D and Archive IRD*.

Future updates and revisions to this document will be produced and controlled by NOAA/NESDIS/OSD.

## Table of Contents

<b>1.0</b>	<b>Introduction</b> .....	1-1
1.1	Scope of Document .....	1-2
1.2	System Overview .....	1-2
1.3	Structure of the Document .....	1-2
1.4	Applicable Documents .....	1-3
1.5	Reference Documents .....	1-3
<b>2.0</b>	<b>Requirements</b> .....	2-1
2.1	Interface Identification and Diagrams .....	2-1
<b>3.0</b>	<b>Qualification/Test</b> .....	3-1
<b>4.0</b>	<b>Requirements Traceability</b> .....	4-1
<b>5.0</b>	<b>Definitions</b> .....	5-1

## List of Tables

1-1	Applicable Documents .....	1-3
1-2	Reference Documents .....	1-3

## List of Figures

2-1	IJPS Era Ingest and Preprocessing Flow .....	2-2
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## Acronyms

AAS	Data Archive and Access System
AD	Applicable Document
CCSDS	Consultative Committee for Space Data Systems
CDA	Command and Data Acquisition (Station)
CSC	Computer Sciences Corporation
CSDP	Central Satellite Data Processing
EPS	EUMETSAT Polar System
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FRAC	Full Resolution Area Coverage
GAC	Global Area Coverage
GDS	Global Data Stream
GFT	Generic File Transfer
NASA	National Aeronautics and Space Administration
NESDIS	National Environmental Satellite, Data, and Information Service
NOAA	National Oceanic and Atmospheric Administration
OSDPD	Office of Satellite Data Processing and Distribution
PGD	Product Generation and Distribution
POES	Polar-orbiting Operational Environmental Satellite
RD	Reference Document
V&V	Verification and Validation
VCDU	Virtual Channel Data Unit

## 1.0 Introduction

The National Oceanic and Atmospheric Administration (NOAA) has entered into an agreement with the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT) for participation in the Initial Joint Polar-orbiting Operational Satellite System (IJPS) (hereinafter referred to as the "IJPS Agreement.") In the IJPS Agreement, NOAA and EUMETSAT agree to operate their Polar-orbiting satellites in a manner beneficial to both parties and the world's meteorological community.

The IJPS is comprised of two independent yet fully coordinated polar satellite systems. Both independent systems are comprised of two satellites flown consecutively under control of its respective ground segment. In support of the IJPS, NOAA satellites NOAA-N and -N' will be flown consecutively (N' replaces N) in a polar orbit with an afternoon equatorial crossing time. EUMETSAT, working together with the European Space Agency (ESA), will develop the Meteorological Operational (Metop) series of satellites to be flown consecutively in a Polar orbit with a mid-morning equatorial crossing time. The Metop satellites comprise the space segment of the EUMETSAT Polar System (EPS). The mid-morning and afternoon satellites will have a set of jointly provided common instruments, plus additional instruments specific to each orbit, provided by NOAA and EUMETSAT for their satellites. The IJPS Agreement also commits NOAA and EUMETSAT to supporting each other's operational satellite through their respective ground segments for commanding, receiving telemetry and global data, monitoring their respective satellite on-orbit status, and exchanging data between the two polar satellite systems.

NOAA's national and international commitments for providing global environmental data are the responsibility of the National Environmental Satellite, Data, and Information Service (NESDIS). NESDIS is responsible for establishing and operating civil operational environmental satellite systems while acquiring replacement satellites, launch vehicles and launch services through interagency agreements with the National Aeronautics and Space Administration (NASA).

The Office of Satellite Data Processing and Distribution (OSDPD), Information Processing Division (IPD) is responsible for preprocessing data from both the morning and afternoon satellites, now and throughout the IJPS era.

### 1.1 Scope of Document

This document defines the interface requirements between the Preprocessor, the Product Generation and Distribution (PGD) and Data Archive and Access Systems (AAS) resulting from changes that introduce new data streams from the IJPS era satellite instruments. This document identifies the interface requirements and upgrades that need to be made to the current KLM era Preprocessing System.

In the IJPS era, the Preprocessor (several software applications are anticipated, one for each instrument – TBC) will reside on an IBM RS/6000/SP under an AIX operating system. The actual design of the IJPS preprocessor is currently on going.

## 1.2 System Overview

The POES Preprocessor system, within IPD, is responsible for acquiring High Resolution Picture Transmission (HRPT) containing Advanced Very High Resolution Radiometer (AVHRR) 1a data sets (approximately 15 minutes of coverage), Local Area Coverage (LAC) containing AVHRR 1a data sets (approximately 11 minutes of coverage and Global Area Coverage (GAC) containing AVHRR and Advanced Microwave Sounding Unit (AMSU) Instrument Processor (AIP) 1a orbital data sets. All of these data sets produce instrument level 1b\* orbital data sets. The current instruments within the AIP are: Advanced Microwave Sounding Unit – A (AMSU-A), Advanced Microwave Sounding Unit – B (AMSU-B), High-Resolution Infrared Radiation Sounder (HIRS), Data Collection and Location System (DCS), Search and Rescue (SAR), Space Environment Monitor (SEM) and Television Infrared Observation Satellite (TIROS) Information Processor (TIP). From the afternoon satellite, we also derive atmospheric ozone data from the a Solar Backscatter Ultra-Violet (SBUV) instrument as well.

In the IJPS era, it is anticipated that the data to be preprocessed from the NOAA POES satellites afternoon mission, will be the same except the Microwave Humidity Sounder (MHS). The MHS replaces the AMSU-B. The data to be preprocessed from the EPS Metop satellites mid-morning mission will also be the same, minus the TIP and SBUV. The Metop satellites also have additional unique instruments, however these are not required to be preprocessed as of the writing of this interface document. The preprocessor will also then input 1a portions of an orbit (granules) and produce 1b\* and 1b granules in pipeline mode.

## 1.3 Structure of the Document

- Section 1.4 – lists the applicable documentation that provides source information to the scope of requirements on the POES system.
- Section 1.5 – lists the reference documentation that provides additional information to the scope of requirements on the POES system.
- Section 2 – provides the interface requirements.
- Section 3 – provides how the section 2 requirements will be qualified or tested.
- Section 4 – provides traceability to Applicable Document AD-2.
- Section 5 – provides definitions to key terms.

## 1.4 Applicable Documents

Table 1-1 presents a list of Applicable Documents (AD-#) that contain information and/or requirements that need to be applied for the successful completion of the IJPS program.

**Table 1-1. Applicable Documents**

Doc. #	Title	Reference Number	Issue	Date
AD-1	Polar-orbiting Operational Environmental Satellite Systems Requirements for the Initial Joint Polar-orbiting Operational Satellite System (IJPS), RDN-4	NOAA-POES-IJPS/OSD-2002-0012R0UD0		21 June 2002
AD-2	IJPS System Requirements for the Ingest and Preprocessing System (IPS)	NOAA-POES/OSD-2001-0009R0UD0		30 Aug 2002
AD-3	Initial Joint Polar-orbiting System (IJPS) Interface Control Document (ICD) for NOAA Level 1a and 1b Data		Final Draft	31 Oct 2000

## 1.5 Reference Documents

Table 1-2 presents a list of Reference Documents (RD-#) that provide additional useful information for program implementation.

**Table 1-2. Reference Documents**

Doc #	Title	Reference Number	Issue	Date
RD-1	Information Processing Division System Requirements Specification, IPD-SRS	IPD-1012	1	01 Oct 2001
RD-2	IPD Operations Concept Document	IPD-1013	1	12 Mar 2002

## 2.0 Requirements

### 2.1 Interface Identification and Diagrams

#### IR-PPP-PGD/AAS-3.1.1-10

The Preprocessor shall input the instrument Level 1a data sets which originated in the EPS Global Data Stream (GDS), as VCDUs in CCSDS format, and output instrument Level 1b\* granules in pipeline mode, for the PGD and 1b orbital data sets for the AAS. The preprocessor shall also make available all auxiliary and ancillary data used to create the 1b orbital data set for the AAS. [The 1a data sets will be coming in at a data rate much slower than the afternoon data sets. Auxiliary data arrives via the Generic File Transfer (GFT)].

#### IR- PPP-PGD/AAS -3.1.1-20

The Preprocessor shall input blind orbit GAC Level 1a granules, in pipeline mode and output instrument Level 1b\* granules for the PGD and 1b orbital data sets for the AAS. The preprocessor shall also make available all auxiliary and ancillary data used to create the 1b orbital data set for the AAS.

#### IR- PPP-PGD/AAS -3.1.1-30

The Preprocessor shall input Metop HRPT (MHRPT) Level 1a granules and output selected instrument Level 1b\* granules for the PGD and 1b orbital data sets for the AAS. The preprocessor shall also make available all auxiliary and ancillary data used to create the 1b orbital data set for the AAS.

#### IR- PPP-PGD/AAS -3.1.1-40

The Preprocessor shall be capable of producing 1b granules and/or 1b\* orbital data sets if desired by the PGD.

#### IR- PPP-PGD/AAS -3.1.1-50

The Preprocessor shall also output data received from nominal NOAA-N & -N' orbits as instrument Level 1b\* granules to reduce the amount of preprocessor code to be maintained. *As mentioned above a granule is defined as a portion of an orbit, the size of that portion is TBD. Therefore a granule could be anything from a scan line to an entire orbit.*

#### IR- PPP-PGD/AAS -3.1.1-60

The Preprocessor shall process 99.8% of data received within any given 30-day period to meet timeliness requirements.

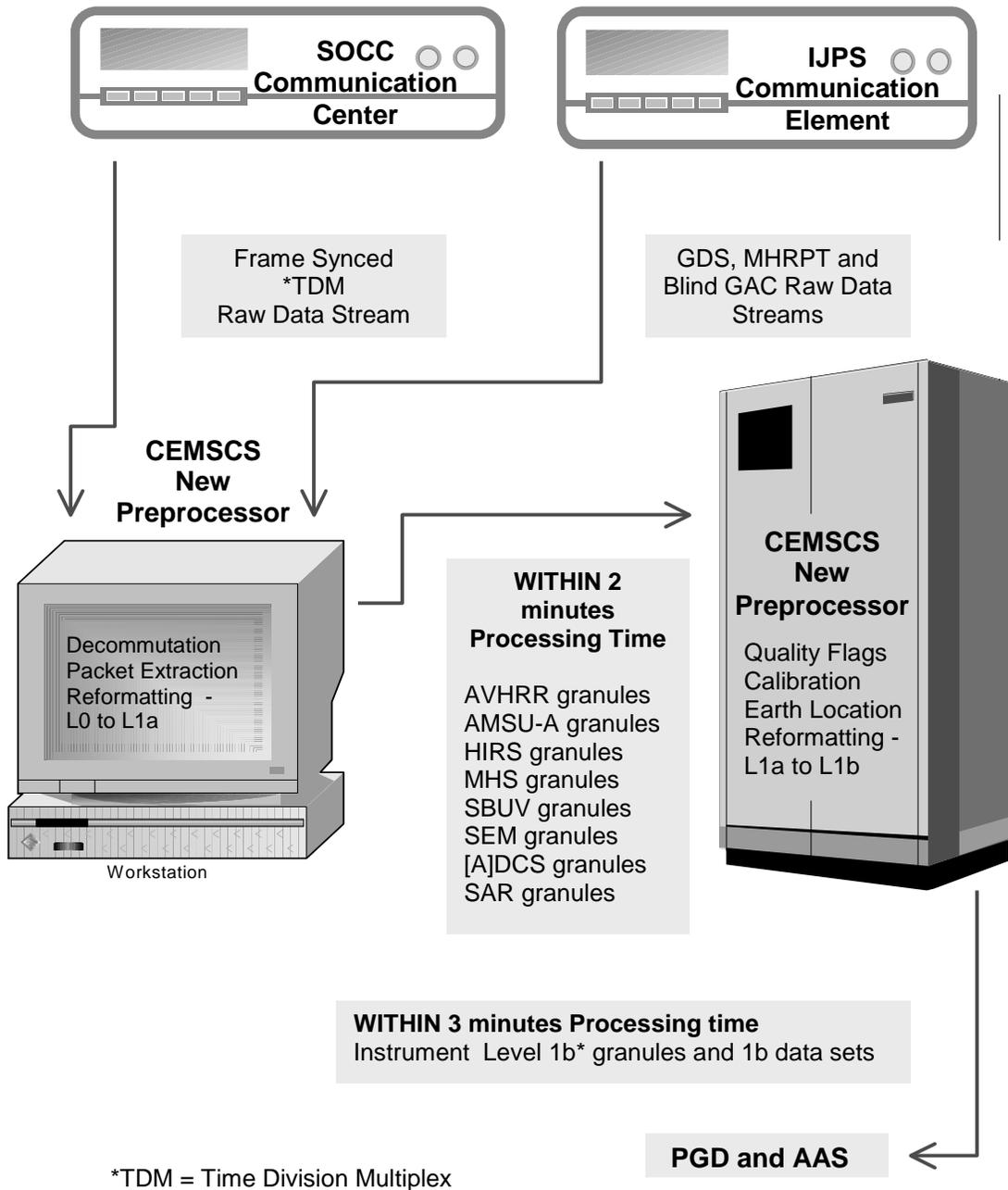


Figure 2-1. IJPS Era Ingest and Preprocessing Flow

### 3.0 Qualification/Test

The qualification test for requirement IR- PPP-PGD/AAS -3.1.1-10 will be done by Demonstration. The output instrument Level 1b\* and 1b data sets will be compared to operational data (simulated into a GDS data stream for the new Ingestor) for accuracy.

The qualification test for requirement IR- PPP-PGD/AAS -3.1.1-20 will be done by Demonstration. The output instrument Level 1b\* and 1b data sets will be compared to operational data for accuracy.

The qualification test for requirement IR- PPP-PGD/AAS -3.1.1-30 will be done by Demonstration. The output instrument Level 1b\* and 1b data sets will be compared to operational data (simulated into a MHRPT data stream for the new Ingestor) for accuracy.

The qualification test for requirement IR- PPP-PGD/AAS -3.1.1-40 will be done by Demonstration. The output instrument Level 1b\* and 1b data sets will be compared to operational data for accuracy.

The qualification test for requirement IR- PPP-PGD/AAS -3.1.1-50 will be done by Demonstration. The output instrument Level 1b\* and 1b data sets will be compared to operational data for accuracy.

The qualification test for requirement IR- PPP-PGD/AAS -3.1.1-60 will be done by analysis. All Level 1a granules will be compared with the Level 1b\* output data sets for completeness.

## 4.0 Requirements Traceability

Requirement ID	Requirement Statement (From Section 3.0 above)	Source Requirement (from AD-2)	Verification Method	Comments
IR- PPP-PGD/AAS- 3.1.1-10	The Preprocessor shall input the instrument Level 1a data sets which originated in the EPS Global Data Stream (GDS), as VCDUs in CCSDS format and output instrument Level 1b* granules in pipeline mode, for the PGD and 1b orbital data sets for the AAS. The preprocessor shall also make available all auxiliary and ancillary data used to create the 1b orbital data set for the AAS.	IPS-3.1.3-10 IPS-3.1.4-10 IPS-3.1.4-20	Demo	
IR- PPP-PGD/AAS - 3.1.1-20	The Preprocessor shall input blind orbit GAC Level 1a granules, in pipeline mode and output instrument Level 1b* granules for the PGD and 1b orbital data sets for the AAS. The preprocessor shall also make available all auxiliary and ancillary data used to create the 1b orbital data set for the AAS.	IPS-3.1.3-30 IPS-3.1.4-10 IPS-3.1.4-20	Demo	
IR- PPP-PGD/AAS - 3.1.1-30	The Preprocessor shall input Metop HRPT (MHRPT) Level 1a granules and output selected instrument Level 1b* granules for the PGD and 1b orbital data sets for the AAS. The preprocessor shall also make available all auxiliary and ancillary data used to create the 1b orbital data set for the AAS.	IPS-3.1.3-20 IPS-3.1.4-10 IPS-3.1.4-20	Demo	
IR- PPP-PGD/AAS - 3.1.1-40	The Preprocessor shall be capable of producing 1b granules and/or 1b* orbital data sets if desired by the PGD.	IPS-3.1.4-10 IPS-3.1.4-20	Demo	
IR- PPP-PGD/AAS - 3.1.1-50	The Preprocessor shall also output data received from nominal NOAA-N & -N' orbits as instrument Level 1b* granules to reduce the amount of preprocessor code to be maintained.	Derived	Demo	
IR- PPP-PGD/AAS - 3.1.1-60	The Preprocessor shall process 99.8% of data received within any given 30-day period to meet timeliness requirements.	IPS-3.2.2-10 IPS-3.2.2-20	Analysis	

## 5.0 Definitions

**Granule** – Up until now, even though we define an IJPS Granule as a portion of an orbit, it has been thought of as a small “file”. This may not necessarily be true. A granule can be a portion of an orbit that is passed on in memory, like “message passing” or via a client-server type of data transfer. Until prototyping and the design is finished a granule is just a portion of an orbit, what size portion and how it will appear is still TBD.

**Pipeline mode** – a processing mode that compensates for limited communication bandwidth. It pertains to a chain of processors that are applied in sequence to orbital data. In pipeline mode, at any given moment, each of the processors works on a different piece (referred to as a granule) of the orbital data set, typically on the granule that was just completed by the preceding processor in the sequence.

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