



# **GOES-R Series**

## **Ground Segment (GS) to High Rate Information Transmission (HRIT) / Emergency Managers Weather Information Network (EMWIN) Interface Requirements Document (IRD)**

**ATTACHMENT 6**

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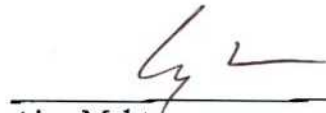
**U.S. Department of Commerce (DOC)  
National Oceanic and Atmospheric Administration (NOAA)  
National Environmental Satellite, Data, and Information Service (NESDIS)  
National Aeronautics and Space Administration (NASA)**

**GOES-R Ground Segment (GS) to  
Emergency Managers Weather Information Network (EMWIN) /  
Low Rate Information Transmission (LRIT)  
Interface Requirements Document (IRD)**

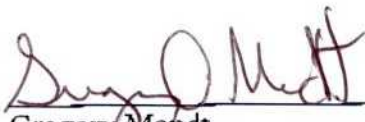
Approved by:

  
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Vanessa Griffin  
GOES-R Ground Segment  
Project Manager

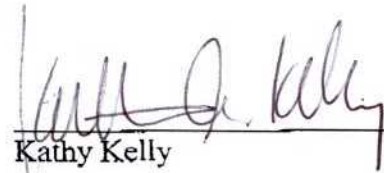
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\_\_\_\_\_  
Ajay Mehta  
OSDPD Deputy Director

6/2/09  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Gregory Mandt  
GOES-R System  
Program Director

\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Kathy Kelly  
Director  
OSDPD/Office of Satellite Operations

10/8/08  
\_\_\_\_\_  
Date

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- **Working copy or Draft:** a document not yet finalized or ready for distribution; sometimes called a draft. Use 0.1A, 0.1B, etc. for unpublished documents.
- **Final:** the first definitive edition of the document. The final is always identified as Version 1.0.
- **Revision:** an edition with minor changes from the previous edition, defined as changes affecting fewer than one-third of the pages in the document. The version numbers for revisions 1.1 through 1.9, 2.1 through 2.9, and so forth. After nine revisions, any other changes to the document are considered an update. A revision in draft, i.e. before being re-baselined, should be numbered as 1.1A, 1.1B, etc.
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# 1. INTRODUCTION

## 1.1 Purpose

The purpose of this document is to describe and specify the functional and performance interface requirements for the communication links between the GOES-R Ground Segment (GS) and the High Rate Information Transmission (HRIT) and the Emergency Managers Weather Information Network (EMWIN) system. Only those parameters which are necessary to specify the interface requirements will be referenced here; specifications for the RF links between the GOES-R Space Segment (SS) and the EMWIN and HRIT Ground Segment must comply with the GOES-R Space Segment (SS) to HRIT/EMWIN IRD.

This document is also intended to provide a basis for the subsequent development of a GS to HRIT/EMWIN Interface Control Document (ICD).

## 1.2 Scope

The interfaces addressed in this document support the exchange of data between the GOES-R GS and the EMWIN and HRIT systems. Only those parameters which are necessary to specify the interface requirements will be referenced here; specifications for the RF links between the GOES-R Space Segment (SS) and the EMWIN and HRIT Ground Segment are contained in the SS to HRIT/EMWIN IRD. This IRD therefore:

- a) Identifies required terrestrial communication links between the GS and the EMWIN and HRIT ground equipment;
- b) Establishes functional and performance requirements related to these links;
- c) Identifies supporting requirements for the GOES-R System for the HRIT/EMWIN service.

## 1.3 Requirement Terminology

The statements in this document are not of equal importance. The following requirements terminology is used in this document:

- a) The term "**shall**" shall be interpreted to mean that the function, service, or capacity described is a mandatory requirement for the GS.
- b) The terms "**shall provide the capability**," "**shall have the capability**," "**shall be capable**," "**shall enable**," "**shall permit**" and "**shall allow**," shall be interpreted to mean that the function, service or capacity described is a mandatory requirement for the GS, but that the capability, service or capacity may not necessarily be exercised continuously (e.g., event driven, operator selected, operator initiated).
- c) The term "should" designates a desired level of performance the Government would like to achieve.

- d) All other declarative statements, including use of the term “will”, only designate statements of fact or intentions of the Government and are not to be interpreted as contractor requirements.
- e) The term “(TBS)” means, “to be supplied”, identifies missing or incomplete information, values, or data needed to fulfill a requirement.
- f) The term “(TBD)” means “to be determined”, identifies a missing requirement.
- g) The term “(TBR)”, means “to be refined/reviewed”, means that the requirement is subject to review for appropriateness and subject to revision.

Refer to the Statement of Work for Government and contractor responsibilities associated with TBSs, TBDs, and TBRs.

## **2. EMWIN AND HRIT INTERFACE DESCRIPTION**

### **2.1 EMWIN Service**

EMWIN is a service that includes watches, warnings, forecasts, graphics, and other hydro-meteorological products. The EMWIN data are produced at the NOAA NWS Headquarters in Silver Spring, MD and are processed from the NWS and other emergency data sources.

### **2.2 HRIT Service**

HRIT data originates from the Environmental Satellite Processing Center (ESPC) within NOAA Satellite Operations Facility (NSOF) at Suitland, MD. The HRIT data stream is comprised of satellite imagery, DCS products, EMWIN data, derived products from GOES and Polar programs, and weather analysis and forecast maps from the NWS.

### **2.3 Combined EMWIN and HRIT**

The process of combining the EMWIN data into the HRIT data stream will occur in the OSDPD Domain 4 facility at NSOF in Suitland, MD.

HRIT/EMWIN (hereafter referred to as HRIT) is transmitted through the GOES-East and GOES-West satellites. The contents of the HRIT information are specific to the region of broadcast, which means that the HRIT data uplinked by GOES East antenna to the GOES East Satellite is different than the HRIT data uplinked by the GOES West antenna to the GOES West Satellite.

HRIT will be transmitted from the NOAA CDAS at Wallops, Virginia (WCDAS) and/or the RBU to the spacecraft for distribution to a large data user community. This system provides unidirectional broadcast link connectivity between the originating uplink from the CDAS and a large number of outlying ground combined HRIT Terminals.

## 2.4 GOES-R Ground Segment

The next generation Geostationary Operational Environmental Satellites, designated the GOES-R Series, are required to provide continuity and improvement of remotely sensed environmental data from a geosynchronous orbit, launching no earlier than 2015 with an expected operational lifetime of 15 years. GOES-R satellites will nominally operate at two orbital locations: GOES-East at 75° W. longitude and GOES-West at 137° W. longitude (which represents a departure from the 135° W. longitude location of the current GOES-West satellite). Both satellites will fly payloads that provide a set of Unique Payload Services, including transponders that will relay data for HRIT and DCS. (*CCR01519*)

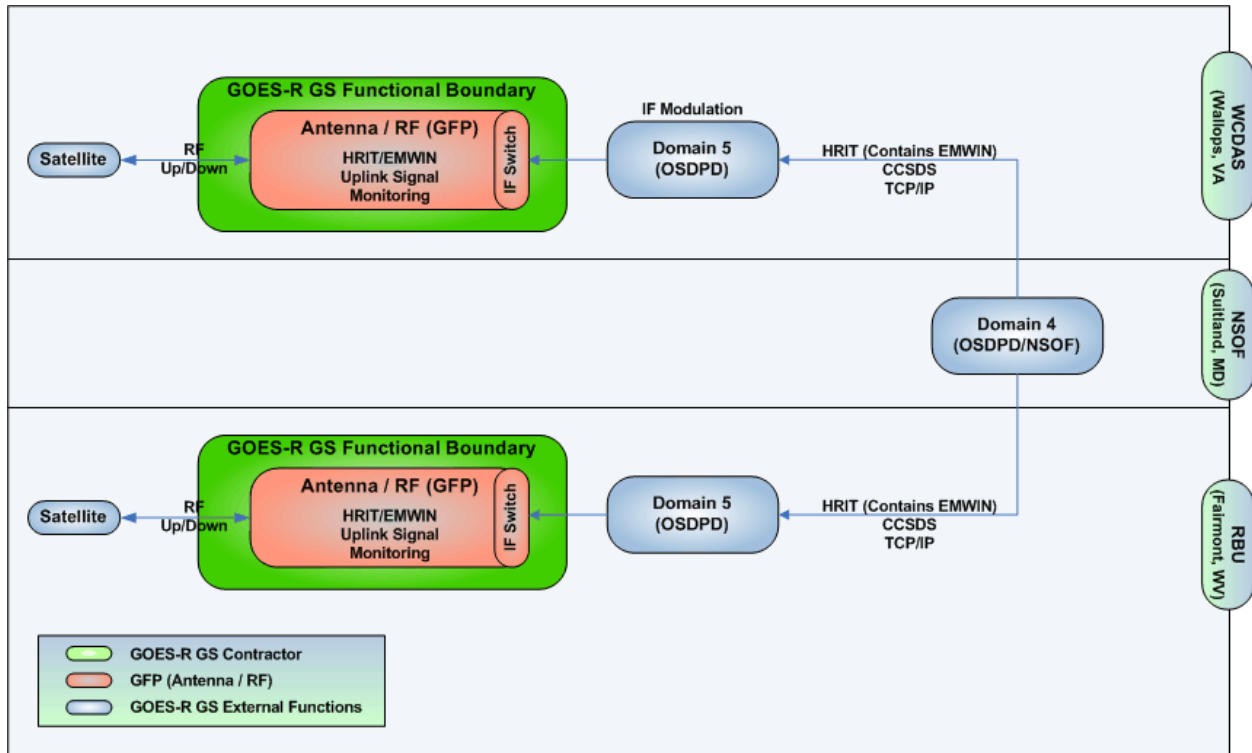
The GOES-R Ground Segment will be a distributed system of systems at three operational sites. Current operational facilities include the NOAA Satellite Operations Facility (NSOF) in Suitland, MD and the Wallops Control and Data Acquisition Station (WCDAS) at Wallops, VA. A new GOES-R, geographically diverse Remote Backup (RBU) facility will be located at Fairmont, WV (TBR). Ground Segment functions will be distributed across the prime sites. The NSOF will house primary Mission Management and Enterprise Management functions, Level 2 and higher (L2+) Product Generation, and prime Product Distribution functions. The WCDAS will provide primary space communications services and primary product generation through Level 1b (L1b). The RBU will function as an independent backup to maintain satellite health and safety and to provide the production and delivery of, at a minimum, key performance and legacy products.

## 2.5 Data Flow Description

The National Weather Service (NWS) in Silver Spring, MD creates EMWIN and sends it to NSOF. OSDPD Domain 4 at NSOF creates the HRIT service by combining GOES East & West imagery, EMWIN data, and DCS data to form a merged HRIT data stream. The HRIT data stream is sent to Domain 5 at both WCDAS and the RBU over a telecommunication line. Domain 5 will encode and modulate the HRIT data stream and send it to the GS Intermediate Frequency (IF) Switch. The GS IF switch will receive the HRIT data stream as a 67.4 Mhz / 915 kbps data stream. This data stream will be sent to the GOES East and GOES West antennas for transmission to the GOES East and GOES West satellites.

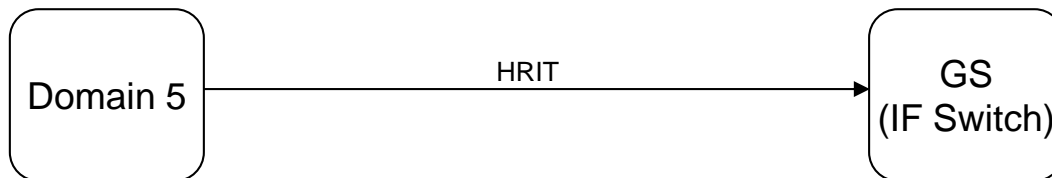
Note that the imagery portion of the HRIT data is specific to the region/users it is being sent to; only the imagery data in the HRIT service uplinked by the GOES East antenna will be different, in terms of HRIT data content, than the HRIT data stream being uplinked by the GOES West antenna.

The demarcation point for the HRIT Systems interfaces will be the GS IF Switch at the WCDAS and RBU.



**Figure 1: Schematic HRIT Interface Context Diagram**

An optional OSDPD/Domain 4 at location TBD location will be capable of serving as a back-up to the OSDPD/Domain 4 located at NSOF. This back up scheme is depicted in the HRIT interface diagram, Figure 1. Figure 2 depicts the data flow between the HRIT systems and the GS.



**Figure 2: HRIT Data Flow**

### 3. INTERFACE REQUIREMENTS

#### 3.1 Ground Segment Requirement

HRIT-IRD-001: The GS (IF switch) at WCDAS **shall** receive HRIT data stream as a 67.4 MHz / 915 kbps data stream from the HRIT System (OSDPD Domain 5) for transmission to the GOES-R series satellite.

Check the VSDE at <https://vsde.nasa.gov/vsde/portal> to verify correct version prior to use.

HRIT-IRD-002: The GS (IF switch) at RBU **shall** receive the HRIT data stream as a 67.4 MHz / 915 kbps data stream from the HRIT System (OSDPD Domain 5) for transmission to the GOES-R satellite.

### 3.2 HRIT System Requirement

HRIT-IRD-015: The HRIT System (OSDPD Domain 5) at WCDAS **shall** send HRIT data stream as a 67.4 MHz / 915 kbps data stream to the GS (IF switch) for transmission to the GOES-R satellite.

HRIT-IRD-016: The HRIT System (OSDPD Domain 5) at RBU **shall** send the HRIT data stream as a 67.4 MHz / 915 kbps data stream to the GS (IF switch) for transmission to the GOES-R satellite.

HRIT-IRD-017: The HRIT System at NSOF **shall** ensure that the mandated security mechanisms and safeguards are in place prior to the transmission and/or processing of all data between the HRIT system and the GOES-R GS in accordance with the federal and departmental regulations prescribed in the GOES-R GS Applicable and Reference Document List.

## 4. ACRONYM LIST

DCS	Data Collection System
DOC	Department of Commerce
DQM	Data Quality Monitoring
EMWIN	Emergency Managers Weather Information Network
ESPC	Environmental Satellite Processing Center
GOES	Geostationary Operational Environmental Satellite
GS	Ground Segment
HRIT	High Rate Information Transmission
ICD	Interface Control Document
IF	Intermediate Frequency
IRD	Interface Requirements Document
L2+	Level 2 and higher products
NESDIS	National Environmental Satellite, Data, and Information Service
NOAA	National Oceanic and Atmospheric Administration
NSOF	NOAA Satellite Operation Facility
OSDPD	Office of Satellite Data Processing Distribution
RBU	Remote Backup
RF	Radio Frequency
SS	Space Segment
WCDAS	Wallops Command and Data Acquisition Station