

EPS Data Denial Guide

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1 INTRODUCTION

1.1 Purpose and Scope

The purpose of this document is to provide users of the Metop Direct Readout and near real-time Metop/NOAA global dissemination services with an overview of the principles of data denial. The document also describes the potential impact that data denial may have on these services.

1.2 Document Structure

This document is structured as follows:

Chapter 1 - This chapter

Document purpose and scope, plus reference documentation.

Chapter 2 - What is Data Denial?

This chapter describes the principles and methodology behind data denial.

Chapter 3 - Data Denial and Direct Readout Local Dissemination

This chapter discusses data denial for users of the Metop direct readout service.

Chapter 4 - Data Denial and EUMETCast Global Data Dissemination

This chapter discusses data denial for users of the Metop EUMETCast service.

Chapter 5 - Abbreviations

A list of abbreviations used in this document.

1.3 Applicable Documents

N/A

1.4 Reference Documents

The following documents are referenced:

[RD1]	EUM/LAD/DOC/05/0350	Data Policy for Metop Data and Products
[RD2]	EUM/TSD/MAN/04/0341	EPS Key Dissemination System - User Guide
[RD3]	EPS-ASPI-SP-0266	Metop HRPT/LRPT User Station Requirements Specification
[RD4]	EUM/MSG/ICD/114	Meteosat Second Generation Interface Control Document Station Key Unit
[RD5]	EPS.SYS.SPE.95424	EUMETSAT Polar System (EPS) / Meteorological Operational satellite (METOP) Encryption System Specification
[RD6]	EPS-ASPI-DS-0674	Metop HRPT/LRPT User Station Design Specification
[RD7]	EUM/OPS/DOC/06/0118	TD 15 - EUMETCast - EUMETSAT's Broadcast System for Environmental Data Technical Description

2 WHAT IS DATA DENIAL?

2.1 Introduction

The polar orbiting Metop satellites are equipped with 11 scientific instruments. Seven of the instruments are supplied by EUMETSAT or European partners. Four of the instruments are supplied by the United States' National Oceanic and Atmospheric Administration (NOAA), an operational partner of EUMETSAT.

Data from the scientific instruments are disseminated to the user community through two mechanisms. The first mechanism is called "Direct Readout", which is a real-time broadcast of the current instrument data in an L-band signal from the satellite. This mechanism is also called local dissemination because it is available only whilst the satellite passes within line-of-sight visibility overhead of a suitably configured reception station. The second dissemination mechanism is EUMETCast, which is EUMETSAT's standard data delivery mechanism over Ku-band and C-band broadcasts using DVB technology and commercial communication satellites. In the context of Metop data dissemination, the EUMETCast dissemination mechanism is also referred to as "global" because the data made available on EUMETCast cover entire Metop orbits.

The principle of data denial applies to both the local and global dissemination mechanisms, for data with timeliness under 3 hours. Only data from the US instruments is affected by data denial; European instrument data will remain unaffected. If or to which extent products making use of US instruments data will be impacted is an open question.

2.2 Definition

Data denial means that, upon request from NOAA, data from the US instruments on board the Metop satellites can be denied to users when deemed necessary by the United States of America, see also: http://www.eumetsat.int/Home/Main/Media/Press_Releases/005264?l=en.

The principles underlining the implementation of data denial are contained within an agreement signed by both NOAA and EUMETSAT. This agreement is called the Data Denial Implementation Plan (DDIP). The agreement also provides the necessary steps for data denial if NOAA makes a request to EUMETSAT.

Additionally, EUMETSAT's Data Policy for Metop Data and Products document contains the following reference to data denial [RD1]:

"Data denial means that in case of a crisis or war situation, EUMETSAT may be requested by NOAA to deny access to direct-readout NOAA instrument data or global/regional products derived from the US instruments on the Metop satellites. In these situations, only authorised users will continue to receive these data. During data denial, re-distribution by authorised users of data from NOAA instruments to any unauthorised third party is prohibited. In principle, data denial will not be implemented for more than 120 days, unless explicitly extended".

2.3 Affected Instrument Data

During a period of data denial the following NOAA instruments on Metop may be subject to data denial:

- Advanced Very High Resolution Radiometer (AVHRR);
- Advanced Microwave Sounding Unit-A (AMSU-A);
- High Resolution Infrared Radiation Sounder (HIRS);
- Space Environment Monitor (SEM).

The scope of data denial may range from a single instrument on one of the dissemination mechanisms to all instrument data on all dissemination mechanisms. The data affected during periods of data denial are subsequently referred to as the “denied data set” in this document. All other instrument data are unaffected by data denial will continue to be made available as per the nominal access and licensing conditions.

2.4 Implementation of Data Denial

At the start of any period of data denial NOAA will inform EUMETSAT of:

- The contents of the denied data set;
- The list of users to be denied data and/or the geographical region(s) which are to be denied access to data.

During any period of data denial, the denied data set will be subject to an added layer of data encryption or access control, which will ensure that only authorised users have access to these data. In practice this will mean:

- The direct readout (A-HRPT/LRPT) denied data set will be encrypted and additionally access to the keys necessary to decrypt these data will be restricted to authorised users only;
- The global Metop/NOAA near real-time denied data set via EUMETCast will be restricted to authorised users by the use of access control.

2.5 The Metop User Community

The activation of data denial affects the various groups of users within the user community in different manners. The user community is defined to consist of the following groups of users.

2.5.1 Priority Users

Priority users are those users entitled to receive the denied data set during periods of data denial. Priority users are thus never denied data. This group consists of EUMETSAT/NOAA approved public duty users, typically National Meteorological Services and national defence authorities. The DDIP contains lists of public duty users in the United States and in EUMETSAT Member and Cooperating States. Nonetheless, priority users must be properly registered with EUMETSAT to ensure that reception continues unimpeded during periods of data denial. Upon completion of the registration process, users in this group will be informed of their priority status.

2.5.2 Normal Users

The normal users are all those who are not defined as priority users. Thus, these users may be denied access to the NOAA instrument data during periods of data denial. Even users in this group who are allowed to receive data during periods of data denial may experience an interruption to the dissemination services for a period of several hours at the start of data denial, before they are re-enabled for data reception/decryption. Normal users must be registered with EUMETSAT to ensure that they may continue receiving data during data denial, should the request from NOAA not exclude them.

2.6 Impact of Data Denial on the Metop User Groups

During data denial, the user community is split into two groups.

2.6.1 Authorised Users

The authorised users are those users who are entitled to continue to receive the denied data set during periods of data denial. This group consists of:

- The priority users;
- The normal users outside of the group or region specified by NOAA in the data denial request.

Correctly registered priority users will not have experienced an interruption to their data reception at the start of data denial. Normal users not covered by the request from NOAA may experience a short outage.

2.6.2 Denied Users

Denied users are those users who during any period of data denial are restricted from receiving the denied data set at the request of NOAA. These may be individual users or users residing within a specific geographic region which NOAA has designated as a region in which the denied data set cannot be disseminated. This group also comprises of un-registered users.

2.7 Notification of Data Denial Periods

Users will be informed of data denial via the usual administrative channels. To ensure the best continuation of service, users are recommended to register with EUMETSAT's User Notification Service (UNS).

3 DATA DENIAL AND DIRECT READOUT LOCAL DISSEMINATION

3.1 Direct Readout Data Denial

Data denial on the direct readout (local) dissemination service is implemented using encryption. The NOAA instrument data are grouped in the following way:

1. AVHRR A-HRPT;
2. AVHRR LRPT;
3. AMSU/HIRS/SEM.

Data denial may be applied to one or more of these three groups. Note that in the case of Metop-A, A-HRPT and LRPT dissemination is not functional.

A user who is expecting to receive NOAA instrument data through the direct readout service in periods of data denial will need to have completed the following tasks:

1. Procurement of a serviceable A-HRPT/LRPT reception station;
2. Registration with EUMETSAT;
3. Integration of the EUMETSAT-supplied Station Key Unit into the reception station;
4. Programme the public encryption keys supplied by EUMETSAT into the Station Key Unit.

The next sections describe these steps and equipment in more detail, beginning with the reception station hardware.

3.2 Reception Station Hardware

3.2.1 A-HRPT/LRPT User Station

Reception stations for the A-HRPT and LRPT broadcasts from the Metop satellites are available commercially. EUMETSAT maintains a list of approved suppliers on its web site. www.eumetsat.int

It is important that the selected user station can be integrated with the EUMETSAT-supplied decryption equipment, the so called Station Key Unit, or SKU.

3.2.2 SKU Decryption Hardware

During periods of data denial the incoming METOP A-HRPT/LRPT data streams are encrypted (using the 3DES algorithm). Before further processing may take place, the streams must be decrypted. The 3DES decryption implementation is a COTS subsystem, which was originally developed for the MSG satellite programme. The Station Key Unit is also used for the MSG direct dissemination decryption. The interface to the SKU is RS-422. The SKU stores the public keys (PBK) that are distributed by EUMETSAT.

The PBK will be used by the user station decryption software. The output of this will be un-encrypted, clear data. This document does not describe the encryption/decryption process. This information can be found in the following reference documents [RD6] and [RD4].

The following figure shows the SKU.



Figure 1 – Station Key Unit front and rear view

3.3 Registration with EUMETSAT and the Public Key System

A-HRPT and LRPT users should register with EUMETSAT user services. During registration EUMETSAT will create an account for the user on the METOP Direct Readout Service Key Dissemination System (KDS). KDS account information will be sent to the user; access is controlled by individual and unique usernames and passwords. EUMETSAT will also programme and deliver an SKU for user-integration into the user-procured reception station.

The Key Dissemination System is designed to provide registered users in possession of METOP Station Key Units (SKU) access to their Public Keys (PBK). Valid Public Keys are necessary for the operation of the SKU during periods of METOP data encryption.

The PBKs are made available for download in the user account on KDS as a single, compressed (ZIP) file. Contained within this file are the PBKs in two formats: XML marked-up and plain-text ASCII.

Whenever the Public Keys (PBK) are changed, for example at the start of any period of data encryption, an email notification will be sent to the registered users informing them that new Public Keys are available. Upon receipt of this email the user is requested to download their new public keys and to load them into their reception station following the instructions provided by their user station manufacturer. All users are requested to inform the User Service Helpdesk on ops@eumetsat.int of any change to their email address to ensure that the

KDS is kept up-to-date, ensuring that new key notifications are sent to the correct address. Users are also invited to register with the UNS, which will be used to notify the user community about the start of data denial periods.

[RD2] describes how to use the KDS.

PBKs will be changed under these conditions:

- At the start of a data denial period;
- During a long data denial period;
- At the end of data denial.

3.4 User Actions

3.4.1 Priority Users

After registration there are no special steps for the priority users. No break in service should be experienced. Monitor the email account supplied to KDS for updated PBKs. When updated PBKs are made available they should be downloaded and programmed into the SKU.

3.4.2 Normal Users

These users could be denied data during periods of data denial. They could also find at the beginning of a data denial period that they may have several hours of interruption before they are re-enabled. During the initial phase of data denial the A-HRPT/LRPT users will be notified of the availability of new SKU keys (PBKs). The installation of these new keys should re-enable their HRPT/LRPT reception.

3.4.3 Un-registered Users

Un-registered users will experience a complete loss of the denied data set during periods of data denial. Instrument data will return once the period of data denial is finished. To avoid such an interruption, all users are encouraged to register with EUMETSAT.

3.5 Trouble-shooting Steps During Periods of Data Denial

The following steps should be followed if reception of data ceases during a period of data denial:

1. If you are a Priority User you should not experience any break in service. If you do, you should check that you have downloaded and installed the latest PBKs for your SKU.
2. If you are not a Priority Users you may experience a break in service. You will most likely need new PBKs for your SKU. If you are not in the group of users to be denied you should receive the new keys within 36 hours. You will be informed of the availability of new keys automatically via the KDS. The notification will be in the form of an email.
3. After loading the new keys the reception system should start to receive the Direct Readout Data. If this is not the case please carefully review the update of the new keys, especially if you have more than 1 SKU. If the data is still not received please in the first instance contact your reception station manufacturer. If the problems cannot

be solved through this interaction, then please contact User Services and provide the answers to the following questions:

- a) Is your reception station still receiving products from Metop for the European (non-US) instrument products?
 - b) Was your reception station receiving all products before the data denial period?
 - c) Has the decryption process on your reception station ever been tested?
 - d) Has the key upload process ever been tested?
4. Be prepared for additional PBK notifications from KDS.

4 DATA DENIAL AND EUMETCAST GLOBAL DATA DISSEMINATION

4.1 EUMETCast Data Denial

Data denial on EUMETCast (global) disseminated dissemination is implemented using the access control functions of the EUMETCast software, Tellicast [RD7]. The NOAA instrument data are grouped in the following way:

1. AVHRR;
2. AMSU;
3. HIRS;
4. SEM.

Data denial may be applied to one or more groups.

Any user wishing to receive data through EUMETCast must have completed the following tasks:

1. Procurement of a serviceable EUMETCast reception station;
2. Registration with EUMETSAT for access to the relevant data;
3. Integration of the EUMETSAT-supplied EKU into the reception station.

The next sections describe these steps and equipment in more detail, beginning with the reception station hardware.

4.2 Reception Station Hardware

4.2.1 EUMETCast User Station

Reception stations for the EUMETCast are available commercially. EUMETSAT maintains a list of approved suppliers on its web site www.eumetsat.int

Access control is implemented on EUMETCast by the use of Encryption Key Units (EKU), which are supplied by EUMETSAT upon completion of registration.

4.2.2 EKU Equipment

The EKU is required for access to all EUMETCast services [RD7]. It is a USB dongle that is used by the Tellicast client software in conjunction with a username/password combination to authorise reception of data. The EKU is programmed by EUMETSAT and supplied to the user as part of the registration process.

During periods of data denial the access control lists of EUMETCast will be updated in accordance with the request from NOAA. Priority users should not be affected.

The following figure shows an EKU.



Figure 2 – Encryption key unit (EKU)

4.3 Registration with EUMETSAT

After the initial registration, reception of the EKU and its integration into the reception station, no further actions are required of the user. Unlike the direct readout service, there are no keys to download. Nonetheless all EUMETCast users are requested to inform the User Service Helpdesk on ops@eumetsat.int of any change to their email address to ensure that their registration information is kept up-to-date. Users are also invited to register with the UNS, which will be used to notify the user community about the start of data denial periods.

4.4 User Actions

4.4.1 Priority Users

After registration there are no special steps for the priority users. No break in service should be experienced when data denial is activated. No user action is required.

4.4.2 Normal Users

After registration there are no special steps for the priority users. Normal users may be denied data during periods of data denial. They could also find at the beginning of a data denial period that they may have several hours of interruption before they are re-enabled. No user action is required.

4.5 Trouble-shooting Steps During Periods of Data Denial

The following steps should be followed if reception of data ceases during a period of data denial:

1. If you are a priority user you should not experience any break in service. If you stop receiving data during a period of data denial please perform the normal check that you would perform for a data loss during nominal reception. If problems persist, contact EUMETSAT;
2. If you are not a priority user it is likely that you have been denied data, i.e. you are on the list of users to be denied data and/or reside with the geographical region(s) which are to be denied access to data. Check the EUMETSAT announcements via the UNS or Web pages for information on the current status of Data Denial. If you are selected for data denial, you will have to wait until the end of the period before the nominal service resumes. When the period of Data Denial comes to an end, further announcements will be made confirming the return of service.

5 FURTHER INFORMATION

The EUMETSAT Web pages provide operational information and news concerning all available data, products and services.

www.eumetsat.int

5.1 User Service Helpdesk

For further information, please contact the EUMETSAT User Service Helpdesk:

Mail:

EUMETSAT User Service
Am Kavalleriesand 31
D - 64295 Darmstadt
Germany

Telephone: +49 (0) 6151 807 366 / 377

Fax: +49 (0) 6151 807379

E-mail: ops@eumetsat.int

Web Site: <http://www.eumetsat.int>

6 ABBREVIATIONS

The following abbreviations are used in this document

AMSU-A	Advanced Microwave Sounding Unit-A
AVHRR	Advanced Very High Resolution Radiometer
COTS	Commercial Off The Shelf
DDIP	Data Denial Implementation Plan
EKU	EUMETCast Key Unit
EPS	EUMETSAT Polar Service
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
HIRS	High Resolution Infrared Radiation Sounder
A-HRPT	Advanced High Resolution Picture Transfer
KDS	Key Distribution System
LRPT	Low Resolution Picture Transfer
METOP	Polar orbiting satellites in the EPS programme
NOAA	National Oceanic and Atmospheric Administration
PBK	Public Key
RD	Reference Document
RUS	Reference User Station
SEM	Space Environment Monitor
SKU	Station Key Unit
TD	Technical Document
US	User Station