

***TD 15 - EUMETCast - EUMETSAT's Broadcast
System for Environmental Data***

Technical Description

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1 INTRODUCTION

1.1 EUMETCast Overview

EUMETCast - EUMETSAT's Broadcast System for Environmental Data, is a multi-service dissemination system based on standard Digital Video Broadcast (DVB) technology. It uses commercial telecommunication geostationary satellites to multicast files (data and products) to a wide user community. EUMETCast is the EUMETSAT contribution to GEONETCast.

1.2 Scope and Structure of this Document

This Technical Description provides a general description of EUMETCast and the procedure for gaining access to information disseminated via EUMETCast. The document is divided into the following sections:

- EUMETCast system overview - a description of the EUMETCast dissemination mechanism, service overview and availability
- EUMETCast reception station specification – detailed information on the hardware and software required for the basic reception of data
- Process for Receiving EUMETCast - including user station equipment installation procedure
- The registration process for gaining access to the EUMETCast distribution system

1.3 Referenced Documents

- [RD. 1]: MSG Ground Segment LRIT/HRIT Mission Specific Implementation, MSG/SPE/057
- [RD. 2]: EFTS Agents Software Design Document, EUM/OPS-MSG/TEN/04/0575
- [RD. 3]: Rapid Scanning Service, Technical Description, EUM TD 13
- [RD. 4]: OpenMTP Format Guide, EUM FG 1
- [RD. 5]: EUMETSAT Data Policy, EUM BR 12
- [RD. 6]: EUMETSAT Web Site – What We Do – EUMETCast – Reception Station Set-up
- [RD. 7]: EUMETSAT Web Site – Access to Data – Delivery Mechanisms – EUMETCast Dissemination Scheme
- [RD.8]: EUMETSAT Web Site – Access to Data – User Support – Useful Programs & Tools
- [RD.9]: EUMETSAT Web Site – Access to Data – User Support – Equipment Manufacturers
- [RD.10]: EUMETSAT Web Site – Access to Data – User Support – Service News
- [RD.11]: EUMETSAT Web Site – Access to Data – User Support – Service Registration
- [RD.12]: EUMETSAT Advance Retransmission Service, Technical Description, EUM TD 14

2 EUMETCAST OVERVIEW

2.1 System Overview

Within the current EUMETCast configuration, the multicast system provided is based on a client/server system developed by Tellitec Engineering GmbH. The server side is implemented at the EUMETCast uplink site (Usingen, Germany), and the client side installed on the individual EUMETCast reception stations.

The key features of EUMETCast are:

- Secure delivery allows multicasts to be targeted to a specific user or group of users thus supporting any required data policy
- handling of any file format, allowing the dissemination of a broad range of products
- use of DVB turnarounds allows the easy extension of geographical coverage
- one-stop-shop delivery mechanism allows Users to receive many data streams via one reception station
- an installed User base of over 1700 User stations
- use of off-the-shelf, commercially available, DVB reception equipment
- highly scalable system architecture

The telecommunications providers supply the DVB multicast distribution. Encoded data/product files are transferred via a dedicated communications line from EUMETSAT to the uplink facility where they are transmitted to a geostationary communications satellite for broadcast to user receiving stations. Each receiving station decodes the signal and recreates the user data/products according to a defined directory and file name structure.

In its current configuration, EUMETCast operates two turn around systems. The turn around service provider receives the DVB signal from one satellite and retransmits it, without unpacking the DVB packets, to another satellite. Telespazio S.p.a. provides the C-band turnaround service for EUMETCast Africa from its uplink site in Fucino, Italy and Globecast provides the C-band turnaround service for EUMETCast Americas from its uplink facility in Paris, France.

Figure 1 illustrates how EUMETCast fits within the overall EUMETSAT Ground Segment architecture.

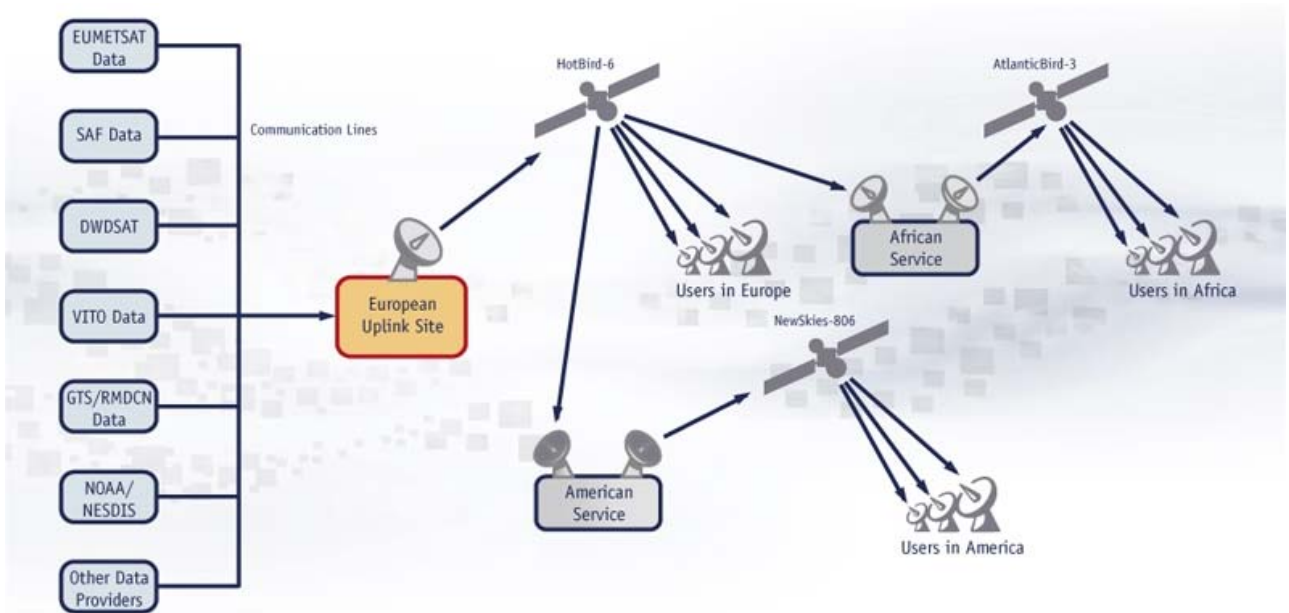


Figure 1 EUMETCast System Overview, C-band

A single reception station can receive any combination of the provided services. Data whose access is controlled will be encrypted using a combination of EUMETCast Key Unit and the EUMETCast Client Software. The decryption at the user station will be carried out by an USB eToken decryption scheme.

2.2 EUMETCast Coverage

EUMETSAT operates three EUMETCast broadcasts: EUMETCast Europe, in Ku-band via Hotbird-6; EUMETCast Africa in C-band via AtlanticBird-3 and EUMETCast Americas in C-band via NewSkies-806. The geographic coverage of a DVB is determined by the characteristics of the spacecraft and its associated antenna beams. The coverage zones of these broadcasts are shown in Figure 2.

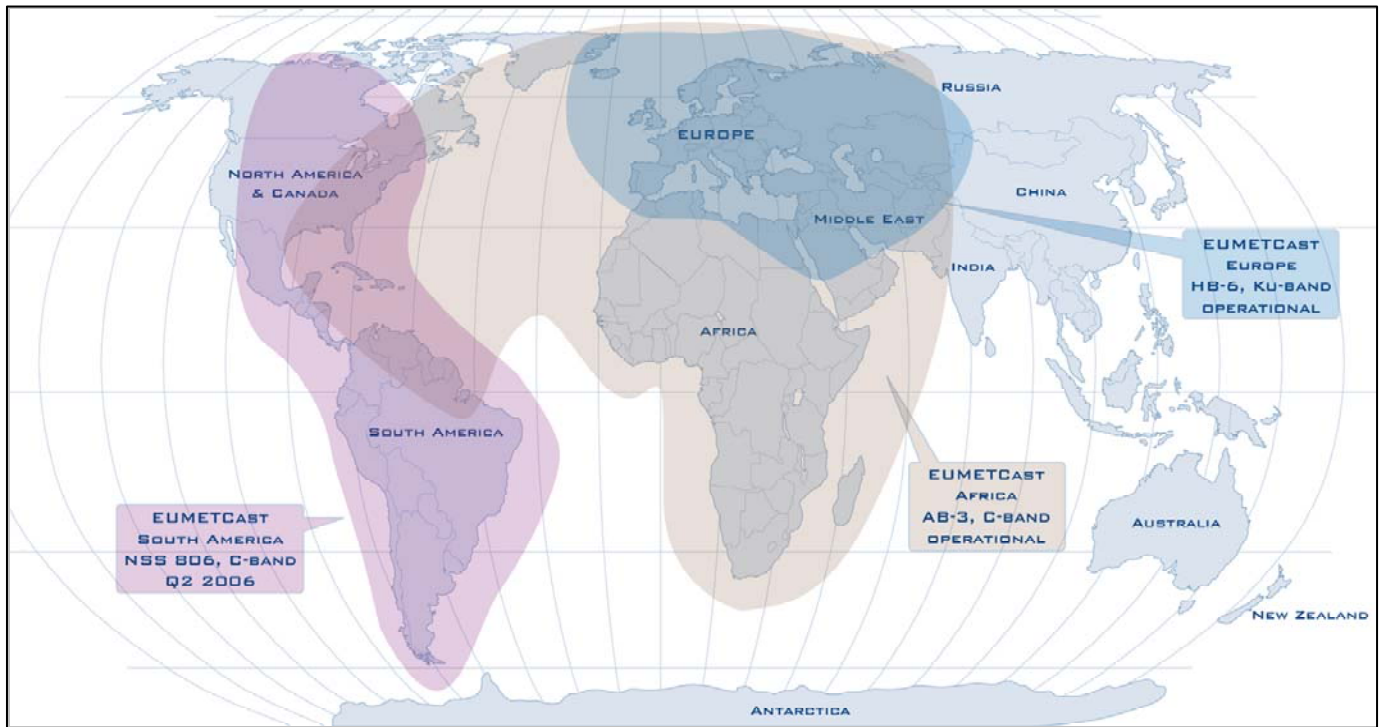


Figure 2 EUMETCast Coverage Footprint

2.2.1 EUMETCast Coverage in Europe Ku-band

For coverage in Ku-band, the spacecraft selected by the telecommunications provider, T-Systems, is the HotBird series operated by EUTELSAT. This has excellent coverage of Europe and the surrounding area, as shown in Figure 3. In the current Ku-band operational configuration, EUMETCast provides good coverage over Europe.

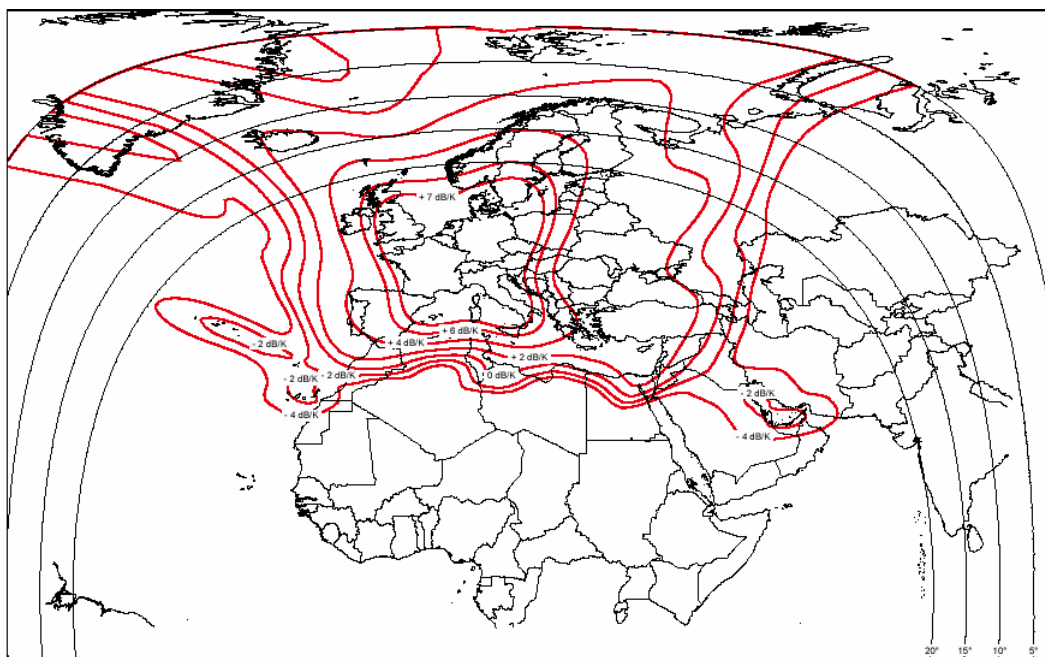


Figure 3 HotBird 6 Satellite Coverage

2.2.2 EUMETCast Coverage in Africa C-band

For coverage in EUMETCast-Africa, the spacecraft selected by the telecommunications provider, Telespazio S.P.A., is the Atlantic Bird 3 operated by EUTELSAT. The core coverage zone of the satellite is mainland Africa, see Figure 4.

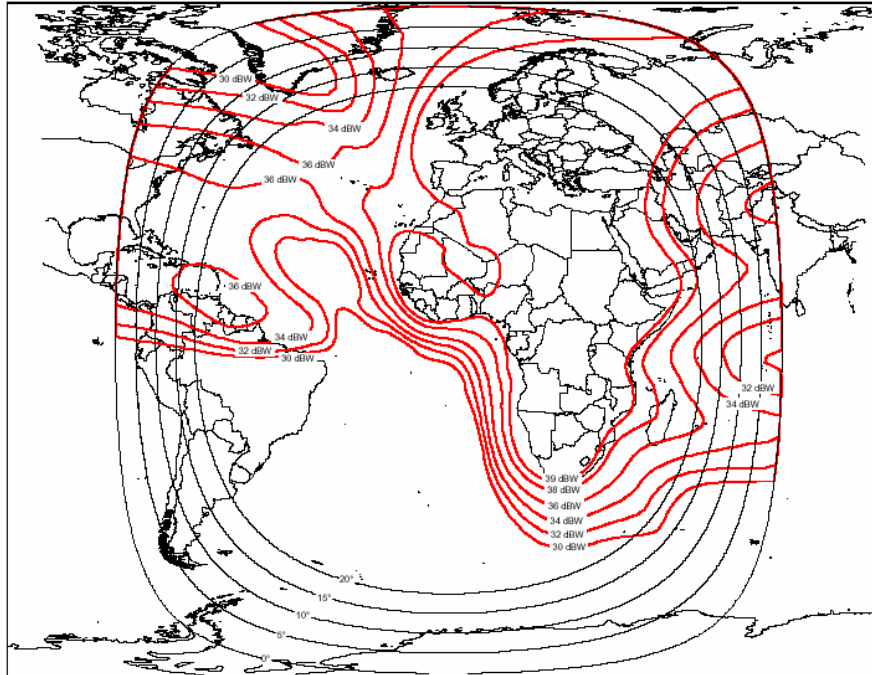


Figure 4 AtlanticBird 3 Coverage

Additional information on EUTELSAT's HotBird and AtlanticBird satellites can be found on their web site at:

<http://www.eutelsat.com>

2.2.3 EUMETCast Coverage Americas C-band

For coverage in EUMETCast-Americas, the spacecraft selected by the telecommunications provider, Globecast, is the NewSkies-806. The core coverage zone of the satellite is South and parts of North America and the Caribbean region, see Figure 5.

Additional information is available by visiting the NewSkies satellite website:

<http://www.newskies.com>

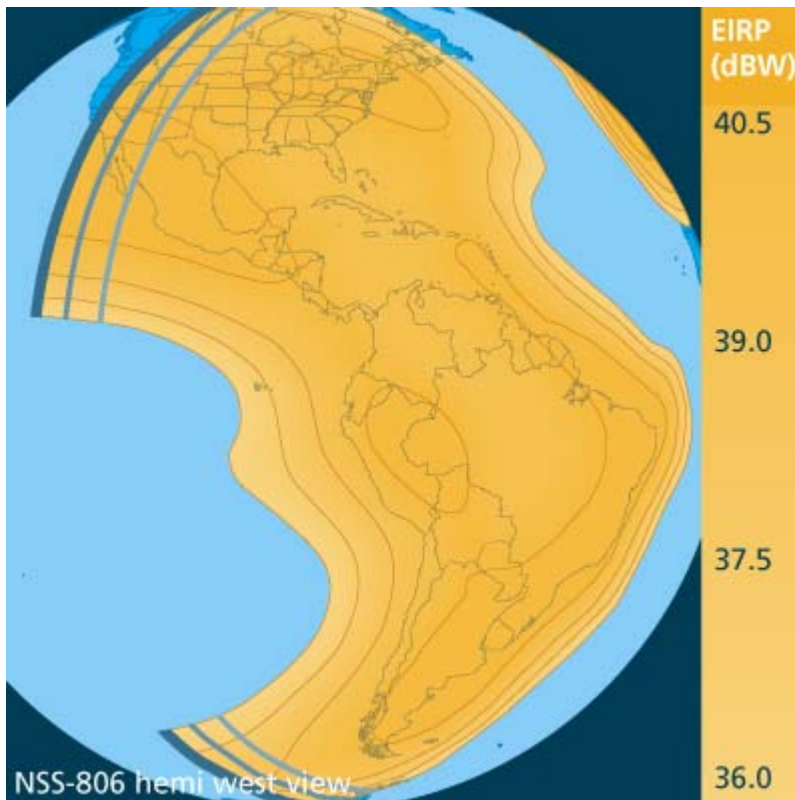


Figure 5 NewSkies 806 Coverage

2.3 EUMETCast Services

EUMETCast supports the dissemination of the following environmental data streams and products:

- Meteosat first generation image data
- Meteosat second generation image data
- GOES East and West image data
- MTSAT image data
- DCP and MDD in-situ forecast data
- EUMETSAT meteorological products
- Land and Ocean Sea Ice SAF products
- NOAA/NESDIS meteorological products
- NOAA/NESIS Ocean colour products
- DWDSAT products from DWD
- SPOT VEGETATION products from VITO
- Basic Meteorological Data (BMD) for WMO RA VI
- ERS SCAT and QuikSCAT products from KNMI

For an up-to-date list and description of the services available on EUMETCast consult the EUMETSAT web site, or contact the User Service Helpdesk (see Section 6.2).

Please note that access to some services is allowed in accordance with EUMETSAT Data Policy, or the data policy of the individual data provider.

2.3.1 Data Formatting and file naming conventions

The data is made available on the reception station as files organised and formatted according to the reception format specification. No changes are performed in the reception station.

The format of data files provided on EUMETCast are according to the specification for each individual service and are determined by the data provider themselves. The following provides an indication of the file names of the EUMETSAT provided services on EUMETCast.

2.3.1.1 Meteosat Second Generation

Meteosat Second Generation (MSG) segment format, compressed with either lossless Wavelet algorithm or lossy JPEG, except for admin files, for further details see: [RD. 1].

2.3.1.2 EPS Regional Data Service - EARS

AAPP file format, compressed with bzip2 algorithm, for file naming conventions see: [RD.12]

2.3.1.3 HRI – Indian Ocean Data Coverage

The HRI data use OpenMTP format within the LRIT data stream, [RD. 1] Lossless Wavelet compression is applied. For further information on OpenMTP format, [RD. 4]

2.3.1.4 Rapid Scanning Service

The RSS data are disseminated in OpenMTP, GIF and JPEG format. The RSS data is compressed with bzip2 algorithm. For file naming conventions see: [RD.3]. For further information on OpenMTP format, see: [RD.4].

2.3.1.5 Other Data Services

Data and products supplied by external data providers, e.g. EUMETSAT Satellite Application Facility (SAF) products, have their individual file naming formats and details on these can be found by visiting the relevant web site of contacting the data provider directly.

2.3.2 Data Volume

The data volume per file varies according to the individual product or data file. For the comprehensive list of a data volumes per EUMETCast channel, consult the EUMETSAT Web site: [RD.6]

2.3.3 Archiving

By default files received are kept in the selected target directory indefinitely. It is recommended to implement an automatic housekeeping mechanism to keep only a configurable amount of time on the local disks.

2.3.4 Reporting

The station, via the TELLICAST client, maintains a full log of the file reception history. This includes the time of reception for each individual file. The level of reporting is configurable.

2.3.5 Timeliness

All files are available and accessible on the reception station within a few seconds of the reception of the last DVB packet. However, partial files are not made available and are deleted after a configurable amount of time.

3 EUMETCAST RECEPTION STATION REQUIREMENTS

3.1 PC Hardware Specification

Minimum requirements are:

- **2.8 GHz Pentium IV CPU**
Although also < 1GHz CPUs work in some environments, it is recommended to use state of the art CPUs, in order to provide margin for system administration and other parallel tasks
- **1 GByte RAM**
This size is mandatory, approximately 512 MB are needed as **RAM Disk** for the TelliCast file database buffer. The configuration of a **RAM Disk** is **strongly recommended** (details of this configuration are provided with the TELLICAST installation package). All tests performed at EUMETSAT at the full (12 Mbps) data rate resulted in significant data losses on EUMETCast Reception Stations **not configured with a RAM Disk**.
- **36 GByte Internal Disk**
The exact requirement depends on the volume of data to be stored. For example, storage of all EPS Level 1 products of one day will require up to 75 GB.
- **Fast and Reliable Disk Interface, e.g. SATA, SCSI**
A **non-blocking I/O** to disk(s) is of utmost importance, to be ensured by use of suitable/reliable drivers.
- **5 Volt PCI Bus (up to PCI 2.2)**
Internal DVB Cards are not yet available for later PCI standards using lower voltages. Alternatives for this case are the use of external DVB reception/routing devices connected to the network interface or via USB.
- **100/10 Base Ethernet Card (or higher data rate)**
This interface is needed if data must be transferred to other computers, or as interface if a DVB Receiver/Router is used.
- **USB Port 2.0**
This interface is **mandatory** for connection of the EUMETCast Key Unit (EKU). Furthermore, additional USB ports might be needed to connect USB DVB reception devices and other peripheral devices.
- **DVB Reception Devices**
 - PCI Cards (5 volts):
 - TechniSat SkyStar2
 - BroadLogic V@box 2030
 - Pentamedia Pent@Value card
 - Hauppauge

Users have informed EUMETSAT about the (successful) use of cards from other manufacturers – the list above represents thus only the selection of models used/tested by EUMETSAT.

- **DVB Router Receiver:**
 - DVB Router Receivers are standalone boxes sending the received DVB multicast data onto a LAN that connects to the PC via a network card. EUMETSAT has (successfully) used/tested the model “IPR-S500” from “IPricot”.
- **USB DVB Receiver:**
 - These boxes are connected to the PC via an USB link with the same functionality as an internal DVB Reception Card. There are, however, some constraints to be noted: Many models on the market are only USB 1.1 compatible and support only data rates of up to 7 Mbps. However, there are USB 2.0 devices available without data rate limitation, e.g. TechnoTrend TT-connect S-2400.

3.2 Operating System Specification

Several Operating Systems have been tested by EUMETSAT, focusing on compatibility/performance with selected DVB PCI cards. The following combinations have been verified as performing satisfactorily:

- Windows 2000 - with all recommended DVB PCI cards
- Windows XP - with all recommended DVB PCI cards
- Linux Redhat 9 (Intel) – with the Pentamedia Pent@value and TechniSat SkyStar2 DVB PCI cards
- Linux kernel 2.6.11 and higher (Fedora core 4, Suse 9.3) with the DVB cards that are supported by the built-in kernel drivers (e.g. Skystar2, Hauppauge)
- All of the above listed operating systems with a DVB Router Receiver (IPR-S500 from IPricot) connected via the network interface
- NTFS file system on Windows OS and ext2 files system on Linux OS – recommended for maximum performance

Other combinations of Operating System and DVB PCI cards may function adequately, but have not been tested by EUMETSAT.

NOTE: The TechniSat software works under Windows 98 SE/ME, Windows NT 4.0 SP6, and Windows 2000 Professional, *but with severe limitations with respect to files systems or USB support*. These Operating Systems have not been tested. It does not work under Windows 2000 Advanced Server.

3.3 Multicast Software

In the EUMETCast up-link system, all processing steps between the reception of the data files for dissemination and the provision of an IP stream to an IP/DVB gateway are performed by the TELLICAST Server software. Consequently, the counterpart of this software, the TELLICAST Client software is mandatory on the EUMETCast Reception Stations, with a

licence required for each station. Hence the following software items (including supporting software) need to be installed and configured:

- The TELLICAST Client Software (for latest version see EUMETSAT's web site: [RD.6]), available for both MS Windows and Linux systems. This software supports mainly the following functionalities:
 - Decryption of the data based on a key code
 - Error correction and management of the received files
- The appropriate driver software for your chosen DVB PCI card
- The EUMETCast Key Unit Run-Time-Environment, available for both MS Windows and Linux systems
- For Linux Systems: PCSC lite, required for the EUMETCast Key Unit (EKU)
- On MS Windows: Microsoft Internet Explorer (Web Browser) version 5.5 or later, required for display of the TelliCast monitoring information
- On LINUX systems: Mozilla or a similar Web Browser, including the JAVA RTE, for display of the TelliCast monitoring information

3.4 Optional Software

The following optional software is available:

- EFTS-Agents Software
- Java RTE (required by the EFTS-Agents Software)
- NTP time synchronisation software, for accurate time stamping by the reception station
- WaveLet decompression software, required to decompress Meteosat-8 High Rate SEVIRI data and Foreign Satellite Data. In most instances this software will have already been pre-installed by your user station software manufacturer.

3.4.1 EFTS PreProcessor Software

The EUMETSAT EFTS-Agent Software allows the set-up of automatic housekeeping of target directories. This software was developed by EUMETSAT to provide secure and reliable transfer of files from a source host to a number of target hosts. It is a Java application and, therefore, platform independent.

For further information on the EFTS see: [RD. 2]. The software is available for free download from the EUMETSAT Web site, see [RD.8]

3.4.2 WaveLet Decompression Software

If not already installed by your manufacturer, the WaveLet decompression software is available free of charge, under licence from EUMETSAT. The software can be compiled with both Windows and Linux. If not provided by your manufacturer, the software is - available from the EUMETSAT Web site, see [RD.8]

3.5 Antenna Requirements

A satellite antenna fitted with a digital universal V/H LNB is required. EUMETCast operates as a multicast system without return channel. To achieve the required level of system performance users should use a slightly larger antenna than would normally be needed for multimedia DVB applications with a return channel. The dish antenna diameter required to receive this broadcast depends upon the location within the footprint of the broadcast satellite, see Figure 3, Figure 4 and Figure 5. Currently recommended antenna sizes are presented in Table 1. For the latest information, see the EUMETSAT Web site: [RD.6].

It should be noted that since there may be improvements in the power available through satellite transponders, it may be possible to operate receiving stations with smaller antenna sizes. For the latest information, please consult the EUMETSAT web site or contact the EUMETSAT User Service.

Band	Location	Antenna size
Europe - Ku-band	within the "core" geographical footprint of the spacecraft, the area bounded by the inner contour depicted in Figure 3 .	85cm or larger
Europe- Ku-band	within the "extended" geographical coverage (remote European islands, Turkey East of Ankara and Eastern European countries)	1.8m or larger
Africa C-band	within the "core" geographical footprint , the area bounded by the inner contour depicted in Figure 4	2.4m or larger
Africa C-band	within the "extended" geographical coverage (e.g. Madagascar, La Reunion, Mauritius and parts of the Americas)	3.7m or larger
Americas C-band	within the area bounded by the 3.9 dBW contour, depicted in Figure 5	2.4m or larger
Americas C-band	smaller antennas may be sufficient, depending up the user location. Contact the User Service for details about your location.	1.8m or larger

Table 1 Recommended Antenna Sizes

A tool to determine azimuth and elevation for the HotBird, Atlantic Bird and NewSkies satellites can be found on the EUMETSAT web page, see [RD.8]

3.6 Application Software

A wide range of application software is commercially available for image viewing and data processing. These are available in the form of freeware, low cost software packages and higher cost advance data/product processing software; see Appendix B for guidelines to some of these software. For detailed information consult reception station manufacturers, see: [RD.9].

3.7 General Note on Reception Equipment

EUMETSAT strongly recommends setting up the EUMETCast PC only as a Reception Station with an optional FTP/File Server functionality, and not to install and run other application software. Peaks in disk or bus usage could interrupt the DVB data reception and thus cause non-recoverable data losses.

Whilst the multicast system includes many features to ensure the reliable delivery of data, the Ku-Band transmission is subject to attenuation by rain. This means that heavy rain in the vicinity of the reception station may cause attenuation of the satellite signal which, in turn, could result in some loss of data.

C-Band transmission is significantly less susceptible to rain fall, but may be affected by local interference from airport radar and television transmitters. In this case installation of a RF band-pass filter between the feed horn and the LNB has proven to reduce or even to eliminate the interference, depending on its signal strength. It shall, however, be noted, that with such a filter installed, it may take longer for the DVB card to lock onto the signal. In some instances, the cable may even have to be disconnected and reconnected several times before successful signal lock is achieved. The locking capability depends on the type of the filter, the LNB and the DVB card in use.

3.8 Purchasing Hardware and Software

The basic hardware equipment for receiving EUMETCast is readily available from many commercial suppliers. For a list of known manufacturers, consult the EUMETSAT Web site: [RD.9].

The EUMETCast Client Software and EUMETCast Key Unit are available from EUMETSAT at a price of €60 and €40 respectively. All requests should be addressed to the EUMETSAT User Service (please see Section 6.2 for details).

4 EUMETCAST RECEIVING EQUIPMENT SET UP

Owing to the multitude of possible hardware/software combinations, EUMETSAT cannot provide individual user support for the receiving equipment set up. Users are advised to set up their stations in line with guidelines provided by EUMETSAT and to contact the individual component vendors should problems arise.

For the procedure for setting up the SkyStar2 DVB card under Windows, see Appendix A.

An up-to-date troubleshooting guide is provided on the EUMETSAT web site: [RD.6], to assist new users in setting up their EUMETCast station.

4.1.1 PC Set up

For general PC set up support, please contact your system administrator or PC vendor.

4.1.2 DVB Card Installation

Install the DVB card and driver according to the instructions in the package and connect it to the antenna, see Appendix A for the procedure for the SkyStar2 DVB card.

4.1.3 EUMETCast Client Software Set up

4.1.3.1 Installing EUMETCast Client Software

The EUMETCast Client Software, TELLICAST, licence package is available from EUMETSAT on CD-ROM. The package includes a Readme file. Execute the installation procedure and when prompted to do so enter the username and user_key/password provided by EUMETSAT.

The default installation directory on Windows is C:\Program Files\T-Systems\Business TV-IP. During the installation process the following files will be copied into the selected installation directory:

- license.ini
- recv.ini
- recv-channels.ini
- tc-recv.exe (version 2.4 and later)

Shortcuts in the startmenu and the startup folder will be automatically created during installation.

After the initial application start up additional files and directories will automatically be created containing log data and cache files.

4.1.3.2 The Initialisation Files

The following initialisation files will appear in the installation directory:

recv.ini

- contains important start-up parameters, such as:

[recipient]

user_name=

user_key= (or user_key_crypt=)

Please enter your assigned username/user-key here

Note: the username/user_key_crypt will be automatically inserted during the installation process, if the new install-shield version of the TELLICAST client software is use, however the line "user_key_cryp=..." can be replaced by the line "user_key=..."

[locations]

file_database_directory=G:\

sets the file database location (see 4.1.3.4)

[announcement_channel]

address=224.223.222.223:4711

name=TSL Announcement Channel

If set incorrectly the announcement channel cannot be read.

[parameters]

interface_address=192.168.238.238

Please assure that the IP address of DVB card matches the interface address.

Enter "ipconfig" on a DOS prompt to list the DVB adapter address

file_database_size=62914560

sets the file database size (see 4.1.3.4)

recv-channels.ini

- Allows selection of target directories for incoming files, e.g. another drive. See comments in the file for more information

[<channel name and / or wildcard>]

Specifies the channel name on which the following setting should be applied.

tmp_directory=

We recommend use of this to guarantee that all files appearing in the target directory are fully written to the file system. The specified directory must be on the same file system as the target directory.

target_directory=

Defines the target directory for the given channel.

license.ini

- Contains the software license and activated modules.

4.1.3.3 Location of Received Files

In the recv-channels.ini file, the user can specify a target directory for the incoming files. The default is the sub-directory ".\received" in the working directory of the TELLICAST software. A wildcard is allowed at the end of the name. Some examples are shown below:

[EUMETSAT Data Channel 1]

```
tmp_directory=/multicast/temp  
target_directory=/multicast/data/channel-1  
# puts EARS and RSS data into the specified directory
```

```
[EUMETSAT Data Channel 2]  
tmp_directory=/multicast/temp  
target_directory=/multicast/data/user selected target directory  
# puts MSG HRIT into the specified directory
```

```
[EUMETSAT Data Channel 3]  
tmp_directory=/multicast/temp  
target_directory=/multicast/data/user selected target directory  
# puts MSG LRIT data into the specified directory
```

```
[EUMETSAT Data Channel*]  
tmp_directory=/multicast/temp  
target_directory=/multicast/data/user selected target directory  
# puts all other data starting with the specified name into the specified directory
```

4.1.3.4 File Database

The file database (0.fsy, 1.fsy, etc) is the temporary store for the received file fragments until a file is completely received. Writing the fragments into the file database is a time critical operation and should not be interrupted.

We recommend to

- create a ramdisk with sufficient size for the subscribed services (e.g. 60 MB MSG1 only, 500 MB all including EPS)
- specify the ramdisk location (e.g. if G:\ is the ramdisk under Windows)
[locations]
file_database_directory=G:\
- specify the maximum size in rcv.ini (should be less than the physical size)
[parameters]
file_database_size=62914560

Should you not be able to use a ram disk, please use the fastest disk on the system. If two disks are used, the location should be different from the target location of the files.

4.1.3.5 Log Files

Tellicast writes logging information into files called rcv.log. This is useful for investigations and monitoring, however it creates additional disk traffic. If logging is not required, you can turn it off by specifying "none".

If required you should at least use the buffered write mode using ">>" in front of the file name. The location can be anywhere on the system, but the file database location should be avoided.

- specify name, logging level and buffered mode for logging in recv.ini

```
[locations]
log_file=>>recv.log
```

```
[logging]
#log_level=none
#log_level=quiet
log_level=normal
#log_level=verbose
```

4.1.3.6 Write-to-disk Performance

The speed used for writing data from the file database to the final files can be adjusted by two parameters, the speed (in bit/s) and the rate in number of files per second.

The following values should be used as default for EUMETCast if all services are selected (in recv.ini):

```
[parameters]
#file_delivery_counter=50          (is default)
file_delivery_speed=20000000      ( default 10 mbit/s)
```

4.1.4 Using the Client Software

This section is focused on Windows systems. Startup of the service on Linux systems is different, the monitoring hints apply accordingly.

If the T icon is not present in the tray bar at the lower right hand side of the screen (see Figure 6 in Appendix A), then the TELLICAST application has to be started up manually via the start menu or by double clicking on the previously installed icon on the desktop.

An additional T icon will be displayed in the tray bar at the lower right hand side of the screen. It will initially be yellow or red and remain so until it has successfully connected to the DVB driver application, when it will turn green.

Right click on the icon to display a popup menu and select the HTML shell item.

A browser screen (see Figure 6) will be displayed which allows access to the TELLICAST program by connecting to port 2517. This screen has various options to display the current state of the multicast reception.

The important pages are the overview page and the Log File page. The overview page provides a graphic display of the received data and provides a clear indication that data file is being received.

The Log File page provides low level information on the files being received. Note that this page does not dynamically update. You have to press the refresh button to update.

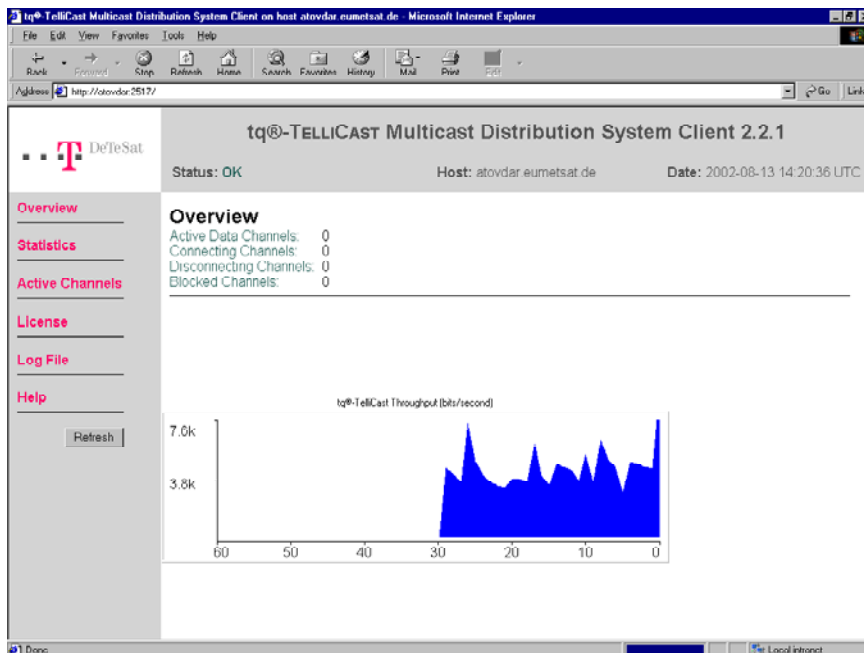


Figure 6 TELLICAST Monitoring Browser

After the PC has been running for 30 minutes, files should have been received. Check that these files can be extracted from the PC via the LAN interface and transferred to another location.

It is not recommended that you leave the Overview page active - remote access via an Internet browser can be established for this purpose.

To ensure correct reception of data the User Station must have a defined directory structure set up. The reception software will deposit the product files in to these directories. Users can define the directory structure in the initialisation files or retain the default setting.

The TELLICAST software will deliver product files to the defined directories and create log files relating to the reception and processing of data. It is the responsibility of the User to ensure that these log files and data files are managed so that they do not fill the available disk space.

4.1.5 EUMETCast Encryption Scheme

A EUMETCast Key Unit (EKU) is required for the reception of those data whose access is controlled in accordance with EUMETSAT Data Policy. The EKU is the USB device used in conjunction with a corresponding username and user_key/password to facilitate the reception of licensed services. Only data described as 'open' are available on EUMETCast without the need to operate an EKU.

A copy of the EKU Software is included in the EUMETCast Client Software licence package CD-ROM and installation instructions are provided in the Readme file. In order to use the EKU this runtime environment must be installed first.

4.2 Configuration Parameters

The following tables provide the configuration parameters at the time of writing for receiving the various services. For the most recent parameters, consult the EUMETSAT Web site: [RD.6]. The procedure for setting up these parameters is explained in earlier sections.

Parameter	Value	Remark
Name	HotBird	DVB card setup
Transponder	TP117	DVB card setup
Down Link Frequency	10853.44 MHz	DVB card setup
Symbol Rate	27500 kS/s	DVB card setup
FEC	Auto	DVB card setup
Polarisation	horizontal	DVB card setup
Proxy IP	0.0.0.0	DVB card setup
Proxy Port	0	DVB card setup

Table 2 Configuration Parameters for Europe Ku-band

Parameter	Value	Remark
Name	Atlantic Bird	DVB card setup
Transponder	C02	DVB card setup
Down Link Frequency	3731.7570 MHz	DVB card setup
Symbol Rate	11.963 Msym/sec	DVB card setup
FEC	Auto	DVB card setup
Polarisation	Circular Left Hand	DVB card setup
Proxy IP	0.0.0.0	DVB card setup
Proxy Port	0	DVB card setup

Table 3 Configuration Parameters for Africa C-band

Parameter	Value	Remark
Name	NSS806	DVB card setup
Transponder	22A	DVB card setup
Down Link Frequency	3.803 GHz	DVB card setup
Symbol Rate	27.500 Msym/sec	DVB card setup
FEC	3.4	DVB card setup
Polarisation	Circular Left Hand	DVB card setup
Proxy IP	0.0.0.0	DVB card setup
Proxy Port	0	DVB card setup

Table 4 Configuration Parameters for America C-band

Channel name	PID (decimal)			Multicast address	Data rate(kbps)	Remark
	Hotbird 6	Atlantic Bird 3	NSS806			
TSL Announcement Channel	100	100	1921	224.223.222.223:4711	300	Announcement channel
EUMETSAT Data Channel 1	500			224.223.222.1:4811	512	EARS & RSS data
EUMETSAT Data Channel 2	300	300	1922	224.223.222.21:2511	1420	High Rate SEVIRI Image Data
EUMETSAT Data Channel 3	301	301		224.223.222.23:2611	338	Multi-service Channel ¹
DWDSAT	302			224.223.222.25:2711	1536	DWDSAT service
BMD-RA-VI	500			224.223.222.22:2911	64	BMD RA-VI Data
SAF-Europe	500			224.223.222.28:3011	max 80	Land-SAF products
EUMETSAT Data Channel 7	509		1923	224.223.222.248:2480	max 80	Multi service Americas ²
NOAA-CH1	509		1923	224.223.222.250:2500	max 400	NOAA products

Table 5 Reception Channel Set-up

Key:

¹ **Multi-Service Channel includes the following services:**

- Low Rate SEVIRI Image Data
- Indian Ocean Data Coverage (IODC)
- Data Collection and Retransmission (DCP)
- Meteorological Data Dissemination (MDD)
- EUMETSAT Meteorological Products
- Ocean Sea Ice Satellite Application Facility (OSI-SAF) Products
- GOES & MTSAT image data

² **EUMETCast Americas Multi-Service Channel includes the following services:**

- A sub-set of EUMETSAT Meteorological Products (e.g. AMV, CLM, CLA, GII)
- GOES image data

5 EUMETCAST REGISTRATION

To register for EUMETCast delivered services consult the EUMETSAT Web Site under Access to Data – User Support – Service Registration.

5.1 Access Controlled Service via EUMETCast

A number of services provided on EUMETCast are access controlled at the request of the Data Provider. In addition, some service may require that a licence agreement is concluded before access can be granted.

The following services on EUMETCast provided directly by EUMETSAT are licensed. Access to these services is subject to a licensing procedure:

- Meteosat High Rate SEVIRI - ¼-hourly, ½-hourly, 1-hourly, 3-hourly
- Meteosat Low Rate SEVIRI - ½-hourly, 1-hourly, 3-hourly
- Meteosat Indian Ocean Data Coverage - ½-hourly, 1-hourly, 3-hourly
- Meteosat Rapid Scanning Data - 10mins
- EPS Global Data Service (Level 1) – data derived from the European instruments (ASCAT, IASI, GRAS & GOME)
- EPS Regional Data Service – EARS-ASCAT

In some circumstances an annual licence fee may be charged for access to these data. For further information on EUMETSAT's Data Policy, please consult the EUMETSAT Data Policy on the EUMETSAT Web site: [RD.5].

Access controlled services require that the user operates a station fitted with a EUMETCast Key Unit (EKU). For a detailed list of the access controlled services, consult the EUMETSAT Web site: [RD.7].

5.1.1 Open Access Services

Essential or open services are those services available to all Users and are not subject to any licensing procedure. Users who only need access to open access services do not require an EKU. An example of open access services includes:

- 6-hourly Meteosat image data (SEVIRI and HRI)
- GOES and MTSAT image data
- Meteorological and SAF products

5.1.2 Data Collect and Retransmission

Access to DCP retransmissions is restricted to the DCP operators and their approved recipients of these retransmissions. To receive DCP retransmissions a station must be fitted with an EKU.

5.2 Registration

Access to all EUMETCast services requires that users register with the EUMETSAT User Service. The registration process comprises the following steps:

1. Complete the Online Registration Form, indicating the service you wish to receive and number of EUMETCast Client Software and ECU you require.
2. If you have requested access to one of the 'licensed' services, you will be requested to complete a licensing procedure.
3. The User Service Helpdesk will contact you regarding the purchase of the EUMETCast Client Software and ECU (if an ECU is required).
4. Once the licensing procedure (if required) is complete and you have paid for the EUMETCast Client Software and any ECU, access to the services on EUMETCast will be granted.
5. You will sent a copy of the EUMETCast Client Software, an ECU (if an ECU is required) and a username and user_key/password required for the installation process.

Note: DWDSAT data is available under licence from Deutscher Wetterdienst (DWD). If you are interested in this service, you should contact DWD directly to acquire the necessary licence before requesting the EUMETCast Client Software and ECU. For further information on DWDSAT see:

<http://www.dwd.de>

The point of contact for DWDSAT registration is Mr. Reinhold Horn, email: reinhold.horn@dwd.de and the point of contact for all technical matters is Mr. Christoph Mueller, christoph.mueller@dwd.de.

5.3 Note to EUMETCast Data Providers

If you produce environmental data and products and would like to explore the potential for using EUMETCast to distribute these to your user community, please contact the EUMETSAT User Service in the first instance and our EUMETCast team will be happy to discuss your requirements.

6 FURTHER INFORMATION

The EUMETSAT Web pages provide operational information and news concerning all available data, products and services. Information on the individual services provided by EUMETSAT can be found by navigating from the Access to Data web pages.

6.1 Notification of EUMETCast System Outages

Information concerning scheduled and unscheduled interruptions to services is distributed via EUMETCast and displayed on the EUMETSAT web site under the User Notification Service (UNS) web pages, see: [RD10]. In addition, EUMETSAT offers an email alert service, for details consult the UNS web pages.

6.2 User Service Helpdesk

Requests for further information and all enquiries regarding EUMETCast should be addressed to the EUMETSAT User Service:

Mail:

User Service Helpdesk
EUMETSAT
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>

7 GLOSSARY

AMV	Atmospheric Motion Winds
CLA	Cloud Analysis
CLM	Cloud Mask
DCP	Data Collection Platform
DVB	Digital Video Broadcast
DWDSAT	Deutscher Wetterdienst forecast information
EARS	EUMETSAT ATOVS Retransmission Service
EFTS	Extended File Transfer Software
EUMETCast	EUMETSAT's Broadcast System for Environmental Data
FTP	File Transfer Protocol
GII	Global Instability Index
HRIT	High Rate Information Transmission
IODC	Indian Ocean Data Coverage
IP	Internet Protocol
LRIT	Low Rate Information Transmission
MDD	Meteorological Data Dissemination
MSG	Meteosat Second Generation
MTP	Meteosat Transitional Programme
NOAA	National Oceanic and Atmospheric Administration
NTP	Network Time Protocol
PCI	Personal Computer Interface
PID	Packet Identifier
RAM	Random Access Memory
RSS	Rapid Scanning Service
SAF	Satellite Application Facility
tm	Trade Mark
USB	Universal Serial Bus

APPENDIX A SKYSTAR2 DVB CARD SET UP

A.1 DVB Software Start up

This Section is only relevant for the software installation associated with the SkyStar 2 card. If an alternative DVB PCI card has been purchased then please contact the vendor for installation instructions. Some configuration settings in this section will also apply for other cards. Use the setup program to install the software.

On powering up the PC, the driver software for the DVB card is automatically started and an icon for this software will be displayed in the tray bar at the lower right hand side of the screen (see Figure 7). Right click on this icon to get a popup menu and select the Setup4PC item.

The set up application will be invoked, allowing the configuration of the transponder and service details to be changed. The menu allows access to the status page (by clicking on the status button). The field "Signal Strength" will show the current signal strength of the received signal. This can be used to assist alignment of the antenna.

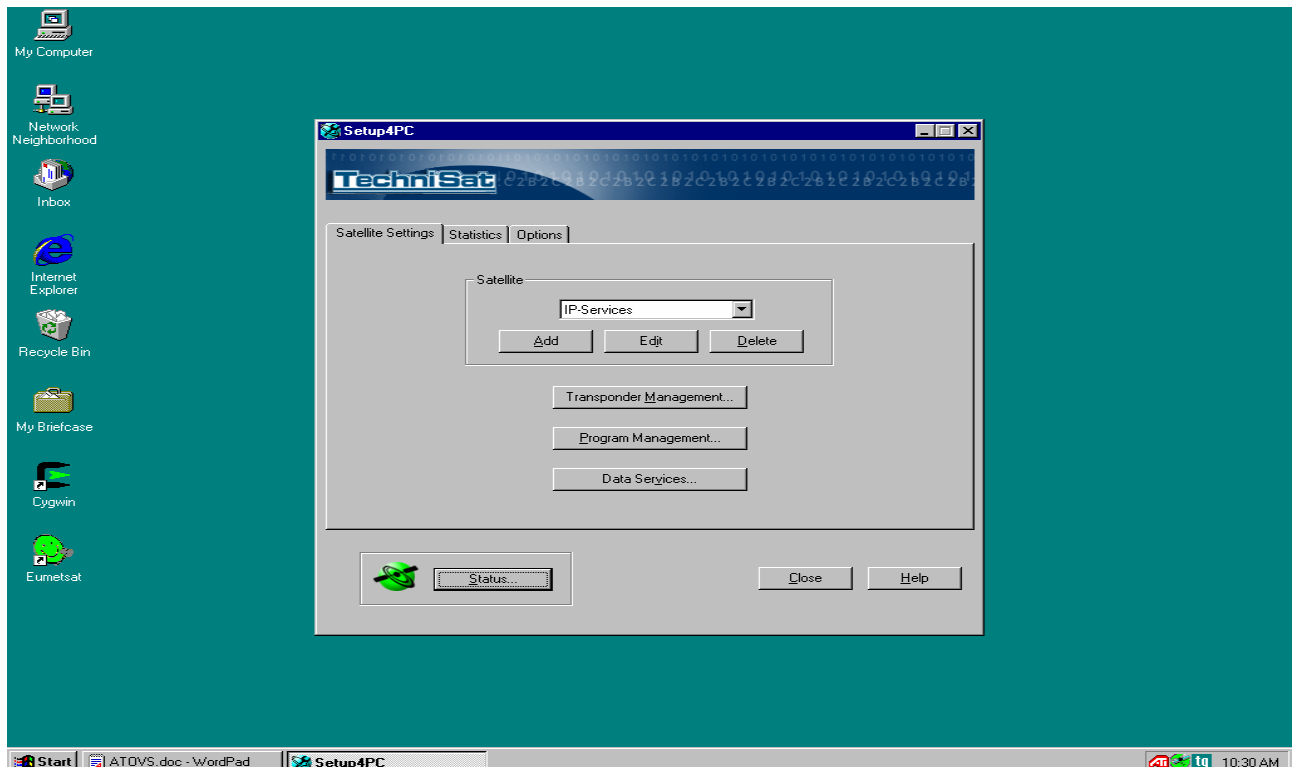


Figure 7 DVB PC Screenshot

A.2 Manual set up of Receiver Parameters

- Invoke the Server4PC program by right clicking on the green circular icon in the system tray bar and then left clicking on the Setup4PC menu entry.
- If a satellite is not yet configured, click "Add" in the satellite box and enter the LNB parameters (LOF1) in the new window. DiseqC is only required for multi-LNB systems.
- Click the "Transponder Management" button

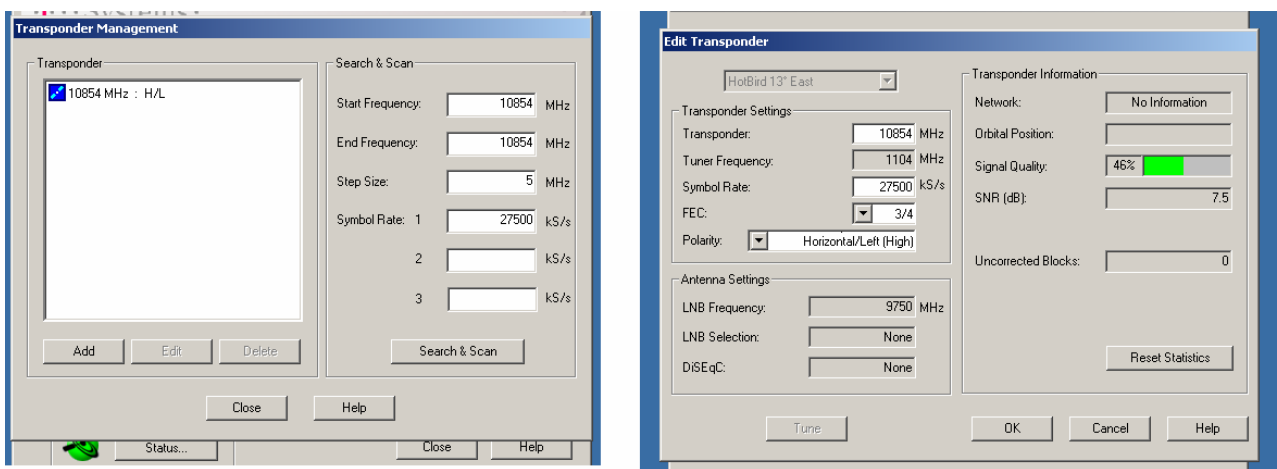


Figure 8 Transponder Configuration

- In the Transponder section, click the "add" button"
- Enter the relevant values in the parameters fields, see configuration of parameters (Section 4.2). Check the latest parameters on the EUMETSAT Web site.
- Click on the tune button
- Exit from "Transponder Management" by clicking the "OK" button"
- Close "Transponder Management" by clicking the "Close" button"
- Move the antenna to the azimuth and elevation relevant to your site. A tool to determine azimuth and elevation for the HotBird satellite can be found on the EUMETSAT web page, see: [RD8].
- Select the status page of the Setup4PC program ("status" button shown in Figure 7) and adjust the antenna position to maximise the signal strength shown in the bar.

A.3 Set-up of the IP data services

- Click on "Data Services" button
- If a Provider Name is not yet configured, select Add and enter the name "EUMETCast"

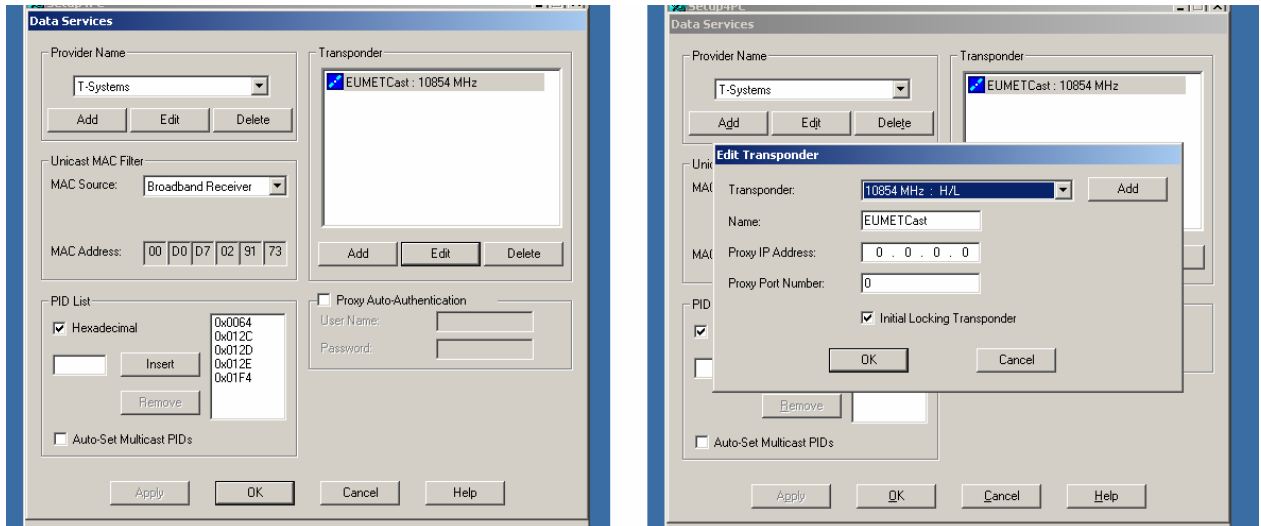


Figure 9 Data Services Configuration

Enter the required PIDs in the PID list section, enter numbers in input window and press the Insert button. Please refer to Section 4.2 and

- Table 5 for the available PIDs. **The announcement channel PID must be selected in order to receive any of the services offered.** If a PID for a data channel is not selected, this channel cannot be received.
- In the transponder section click on the "ADD" button
- Select the transponder, which you configured in section A.2.
- Enter a meaningful name, e.g. again "EUMETCast"
- mark the option "initial locking transponder"
- click on OK and exit the program
- Right click on the Setup4PC icon
- select the data service EUMETCast by left clicking on it

A.4 Check reception of the system

- Check the assigned IP address of the DVB card by typing “ipconfig” in a DOS window
IP address: 192.168.238.238

(If this is not the case, change the setting for the DVB card in the TCPIP network configuration).

- Use the TELLICAST browser log file display to check if data files are being received.

APPENDIX B GUIDELINES ON APPLICATION SOFTWARE

B.1 Purpose and Scope

The purpose of these guidelines is to provide a limited overview of Application Software for use with EUMETCast Reception Stations. The term “Application Software” is used in distinction to:

- Software described and specified in this document (covering Operating Systems, EUMETCast Client Software, specific driver software etc.;
- Additional software provided by EUMETSAT in support of EUMETCast reception e.g. decompression modules, push agents or housekeeping software.

Application Software as described in this document covers: the software required for the further processing of data files once the initial reception, storage, decompression and other housekeeping processes performed by the reception station have been completed. The origin of these data may be geostationary satellites, polar orbiting satellites, in situ data, and products derived from these sources – basically all kinds of data distributed via EUMETCast.

These guidelines provide an overview of the functionality of Application Software known to EUMETSAT. The Application Software are recorded in two tables: Table 1 lists the software in a functionality matrix. This table records which satellites/instruments/products are supported, or which functionalities out of a defined set are covered.

Table 2 provides a secondary list of companies supplying Application Software. This list is based upon information provided from User Station/Software manufacturers to EUMETSAT, complemented by product names retrieved from their Web sites, but no further analysis of the software has been performed by EUMETSAT and as such this list shall only serve as an indication of the extend of Application Software available.

B.2 Limitations

The software packages listed have either been used at EUMETSAT, and/or could be categorised to some extent through available information (company brochures, Web pages, etc.). It should be noted that, such a condensed presentation has **inherently strong limitations**:

- **It cannot be complete**
- **It cannot be detailed**
- **It cannot present the scope, power and complexity of a functionality implemented**

For example, all software support some kind of animation, but this may range from a very basic loop of a few predefined images to most complex movies combining multiple images and products and formats.

Hence, this list can and shall only give a first impression, to be followed by attainment of further information by the interested party (e.g. close examination of company brochures, and Web pages and contact with manufacturing company).

In the last row of this table, a “price range” for the products is recorded – also indicative only, using only the categories “freeware”, “low”, and “no information”. The latter means, that product price lists could not be identified on the web. Furthermore, the actual price for a specific User may depend significantly of parameters like number of licenses required, or special discounts, and thus the identification of a final price is left to the customer.

Finally, it should be noted that the choice of Application Software is really a decision of the end-user, or customer, and should be based upon their data processing requirements and IT infrastructure constraints.

B.3 List of Products and Functionalities

Functionality & Other Attributes	Companies & Product(s)						
	Rob Alblas (Netherlands)	PRAPRO (Spain)	SatSignal Software (UK)	VCS (Germany)	Kongsberg Spacetek (Norway)	COROBOR Systèmes (France)	GEPARD (Austria)
	XRIT2PIC	NUBES	MSG Data Manager MSG Animator GeoSatSignal HRPT Toolset	2met!® PROCESSING VISION+	MEOS® Geostationary Polar	MESSIR- VISION	CineSat
Satellites & Instruments	MSG MTP GOES	MSG MTP NOAA-AVHRR	MSG MTP GOES MTSAT NOAA-AVHRR	MSG MTP GOES MTSAT NOAA-AVHRR MODIS METOP-AVHRR	MSG GOES MTSAT NOAA - AVHRR NOAA - ATOVS Metop - AVHRR Metop - ATOVS	MSG GOES MTSAT NOAA	MSG MTP GOES MTSAT METOP
Handling of Other Products		Met Products GRIB1 and 2 BUFR and HDF5		Some Met Products	Some Met Products	Many Met Products	Met Products GRIB1 and 2 BUFR and HDF5
Formats (Input)	XRIT	XRIT NOAA L1B	XRIT AAPP NOAA L1B LAC NOAA L1B GAC	XRIT AAPP BUFR GRIB2 HDF	XRIT AAPP HDF	XRIT AAPP GRIB BUFR WMO Formats	XRIT Image Formats (PNG, GIF, PBM, PGM, PPM, XPIF) GRIB & BUFR

Functionality & Other Attributes	Companies & Product(s)						
	Rob Alblas (Netherlands)	PRAPRO (Spain)	SatSignal Software (UK)	VCS (Germany)	Kongsberg Spacetek (Norway)	COROBOR Systèmes (France)	GEPARD (Austria)
	XRIT2PIC	NUBES	MSG Data Manager MSG Animator GeoSatSignal HRPT Toolset	2met!® PROCESSING VISION+	MEOS® Geostationary Polar	MESSIR- VISION	CineSat
Formats (Output)	PGM PPM JPEG	JPEG BMP	JPEG PNG	XPIF HDF HMF TIFF JPEG	HDF JPEG PPM PNG TIFF	BUFR Charts JPEG Media formats	Multi Image Formats Media formats
Processing:							
Projection		X	X	X	X	X	X
Landmark Proc.		X		X			
Calibration		X		X	X	X	X
Logs & Reports		X	X	X	X		
Display Function:							
Quick-Look	X		X	X	X	X	X
Zoom & Pan	X	X	X	X	X	X	X
Animation	X	X	X	X	X	X	X
Overlays	X	X	X	X	X	X	X
Histogram		X		X	X	X	X
Pixel Anal.		X		X	X	X	X
Colour Tab		X	X	X	X	X	X
RGB Comparison		X	X	X	X	X	X
Meteorological Display		X		X	X	X	X
Meteorological Analysis		X		X	X	X	X
Meteorological Forecast						X	X

Functionality & Other Attributes	Companies & Product(s)						
	Rob Alblas (Netherlands)	PRAPRO (Spain)	SatSignal Software (UK)	VCS (Germany)	Kongsberg Spacetek (Norway)	COROBOR Systèmes (France)	GEPARD (Austria)
	XRIT2PIC	NUBES	MSG Data Manager MSG Animator GeoSatSignal HRPT Toolset	2met!® PROCESSING VISION+	MEOS® Geostationary Polar	MESSIR- VISION	CineSat
Image Prediction							X
Cloud Development							X
Cloud Meteorological Forecast.							X
Operating System	LINUX Windows XP	Windows XP	Windows XP	Windows XP LINUX	LINUX Unix	Windows XP	Unix
Price Range	Freeware	Low-Medium	Low	No information	No information	No information	No information

B.4 Summary List of other Companies and Products

COMPANY (Country)	PRODUCT
Norwegian Met Service (Norway)	Diana (⁻¹)
IBL Software Engineering (Germany)	Satellite Weather
UKW-Technik (Germany)	MSG HRIT
CCE (Italy)	Image Workshop
Fontana Roberto Software (Italy)	SYS MSG DVB
TECNAVIA (Switzerland)	Skyceiver MSG
TIMESTEP (UK)	MSG Systems
SeaSpace Corporation (USA)	TeraScan Software

Contact addresses for these companies can be found on the EUMETSAT Web site under:
Access to Data > User Support > Equipment Manufacturers

⁻¹ **Diana** from the Norwegian Meteorological Institute is a meteorological visualisation and software, for combined visualisation of fields, satellite and radar images, surface observations, and weather charts. It is available under the GPL license.