EUMETCast System Component details -Software

Ben Maathuis, 19-02-2021

Dept. of Water Resources, Faculty ITC, University of Twente, Enschede, The Netherlands. Email: <u>b.h.p.maathuis@utwente.nl</u>



© This work is licensed under the Creative Commons Attribution-NonCommercial 4.0 License. To view a copy of this license, visit https://creativecommons.org/licenses/by-nc/4.0/ or send a letter to Creative Commons, 444 Castro Street, Suite 900, Mountain View, California, 94041, USA.



Contents

Intr	roduction	2
Ku-	Band reception	3
2.1	Basic and HVS-1 services	4
2.2	HVS-2 service	5
2.3	EKU and Tellicast Client	5
C-B	and reception	7
3.1	Africa Service	7
3.2	EKU and Tellicast Client	8
Dat	ta Management	10
Cor	ncluding remarks	11
Ref	erences	12
	Int. Ku- 2.1 2.2 2.3 C-E 3.1 3.2 Dat Cor Ref	Introduction Ku-Band reception 2.1 Basic and HVS-1 services 2.2 HVS-2 service 2.3 EKU and Tellicast Client C-Band reception

1 Introduction

This document is describing the EUMETCast reception setup at ITC-University of Twente. Currently the following services are operated:

- On Ku-band:
 - o Basic Service
 - High Volume Service 1
 - High Volume Service 2 (on a separate reception station)
- On C-band:
 - o Africa Service

All data received is transferred to a server, and based on user request the data is stored for different periods of time, some data is deleted immediately, as it is not relevant for the in-house users. Below a picture is shown of the reception room. Some of the systems use scheduled tasks for image visualization and data processing. Attention is given to the installation of the DVB-S2 router / receiver (Novra S300E for Ku Band reception and TBS 5927 for C-band reception), the Eumetsat Key Unit installation and the Tellicast installation and setup. For detailed step by step instructions reference is made to the installation and setup manuals.





2 Ku-Band reception

Some general settings are described in this section which have been encountered while configuring the stations. For Ku-Band reception an offset antenna is used pointed to EUTELSAT 10E, having a reflector dimension of 120 cm (diameter). The coax cable is connected to a splitter situated in the reception room. From there a coaxial cable is connected to a DVB-S2 device (Novra S300E), receiving the Basic Service and the High Volume Service 1 and the other coaxial cable is connected to another DVB-S2 router (also a Novra S300E), receiving the High Volume Service 2. This service is disseminated using another transponder on the same communication satellite. The Ku reception systems have an additional network card to which the DVB-S2 router is connected using a Cat-5 crossover cable.

The ip-address used for the Novra S300E is 192.168.0.11 with default subnet mask (255.255.255.0) and settings can be checked using the MS DOS command from the command prompt window: 'ipconfig /all'. Using multiple network adapters, the interface metric for the Novra router has been set to 1 and the regular network card to connect to the institutes network has been given lower priority (e.g. metric 400). These settings can be applied under the Internet Protocol Version 4 (TCP/IPv4), click Properties and Advanced options. Here also the ip address of the network card has to be specified. When configuring the router, start the system with only the router connected and start the Novra device software. The device should be recognized by the software. If the system is restarted and also the regular network connection to the local network is attached and the Novra device is not recognized, then the Metric has to be adapted, asigning the Novra router the highest priority.

After the DVB-S2 device is installed and the signal from the satellite is received / locked, two other required software utilities are required to be installed, the latest versions of the EKU (eToken) and Tellicast software packages, both using the default installation instructions. Automatic startup of the services can be activated for Tellicast and the Windows Firewall settings should be checked to ensure that Tellicast is allowed through the Firewall.

Step by step configuration is provided in the document: "Novra S300 DVB Receiver EUMETCast Setup Guide". Ensure that the "IP Data" is properly configured and the appropriate PIDs are included, see: https://eumetsatspace.atlassian.net/wiki/spaces/DSEC/pages/700055570/Channels+and+Packet+Identifiers+PIDs.

Basic and HVS-1 services 2.1

The Basic and HVS-1 Services are disseminated by the same transponder on EUTELSAT 10E satellite. When using default installation, various Tellicast client shortcuts are transferred to the desktop, like the EUMETCast Bas, EUMETCast HVS-1, etc. The shortcut is providing access to the respective client services and is providing the necessary information regarding the services received. EUMETSAT is providing a batch routine to activate the Tellicast services automatically during start-up of the reception system. If Tellicast is installed using default settings, within the folder "C:\EUMETSAT\EUMETCast" a file 'startup_config.bat' can be executed and the required services can be selected. Furthermore within this folder the central receiver configuration settings are provided, e.g. the 'cast-client_HVS-1.ini'.

Opening the client is based on the following addresses for the BAS and the HVS-1 services respectively:

- BAS: http://localhost:8100
- HVS-1: http://localhost:8200

Figure 2: Dasic and 11 v 5-1 INOVIA 550	De reception settings	·······
🖒 S300E Management Console V6.3.15.0 — 🗆 🗙	Satellite ×	LNB Parameters ×
File Control Video Wizard Help	Frequency Calc.	
Interfaces IP Data A /V Data Control Network Satellie IP Data IP Data IP Data Selected Device S300E -> IP: 192 168.0.102 MAC: 00:06:76:05:06:7d Signal Stength PAT Reboot Status Signal Data CAModule LNB Signal Stength 59 dBm DVBS2 Signal Parameters Carrier Freq. [15125 MHz (586 KHz] Signal Quality Uncorrectables 0 Reset Symbol Rate [32:939 Mups MDDCDD CCM-Urknown Carrier to Noise [13:0:dB	RF Freq. III2022 MHz L0. Freq. 9750 MHz LBand Freq. 1512.5 MHz Symbol Rate IV MHz Symbol Rate IV MHz Gold Code 0 IV MODCOD CCM IV Polarization IV NB Power 0n? Band (Tone) C Vertical / Right	L.O. Frequency 2000 Mhz LNB Voltages C 11-15 Volt Polarity Switch C 13-18 Volt Polarity Switch C 21 Volt Fixed WARNING: Choosing the wrong voltage option may damage your LNB. Please check your LNB specifications.
Ethemet Total Ethemet Packets Sent Total Ethemet Packets Received Total Ethemet Packets Received Total Ethemet Packets Received Total Ethemet Packets Received Total Ethemet Packets Processed	Search Mode C DVB-S C DVB-S2 C Both Irou Stream ID Filter F Enable ISI (0.255) 1 Apply Exit	C 22 kHz C 44 kHz ✓ Long Line Compensation OK Cancel

2.2 HVS-2 service

The HVS-2 Service is disseminated by another transponder on the EUTELSAT 10E satellite. When using default installation options, various Tellicast client shortcuts are transferred to the desktop, like the HVS-2. The shortcut is providing access to the respective client services and is providing the necessary information with respect the services received.

Opening the client is based on the following addresses for the HVS-2 service:

• HVS-2: http://localhost:8201

IP Data	A / V Data Control	RF Freq.	11387.5	MHz
		L.O. Freq.	9750	MHz
Network Satellite CAM Content	IP Content PAT Reboot	LBand Freq.	1637.5	MHz
		Symbol Rate		
ected Device S300E -> IP: 192.168.0.102_MAC: 00-06-76-05	16-eb	Automatic or	45	Msp
Status 🔵 Signal 🍈 Data 🍈 CA Module 🍥 LN	-64 dBm	Gold Code	0	
/BS2 Signal Parameters	Signal Quality	MODCOD	CCM 💌	Ĉ.
arrier Freq. 1637.5 MHz (-595 kHz)	Uncorrectables 1286338 Reset	☑ LNB Power On?	LNB Parameters	s
mbol Rate 32.999 Msps	LDPC BER 3.138e+004	Polarization	-	
ODCOD CCM-Unknown	Carrier to Noise 12.7 dB	Horizontal / Left C Vertical / R		
		Band (Tone)	• Low (Off)	
hernet	DVB			
otal Ethernet Packets Sent 1511710886	DVB Packets Accepted 0			
otal Ethernet Packets Received 312590	MPE Packets Processed 1511427080	- Search Mode		
themet Receive Errors 0		C DVB-S	● DVB-S2	Both
		Input Stream ID Filte	a	

Figure 3: HVS-2 Novra S300E reception settings

Note that LNB parameters are identical for this service, see also figure 2.

2.3 EKU and Tellicast Client

Next the EKU is configured and the Tellicast software is installed. See step by step instructions in the following documents:

- EKU_driver_installation_windows.pdf
- Tellicast_V2.14+_windows_installation.pdf

After having installed the Tellicast Software, e.g. using default installation instructions, 2 directories are created on the root of the system:

- EUMETCAST: with the folder\received\BAS\default and \HVS-1\default, here the incoming data is stored
- EUMETSAT: with the folder \EUMETCast. Here the Tellicast *.ini file is situated which contains the Tellicast configuration settings. Within the \www\eumetsat folder the "Product Navigator" is located.

When all is installed and configured the Tellicast client can be opened using the appropriate localhost address. Here for each of the services the reception of the data can be monitored using various menu items, like 'Overview', 'Statistics', etc.



Figure 4: Example of the Tellicast Client, HVS-2

🖷 🖅 TelliCast Multicast Dist	ri × + ∨				-		×
\leftarrow \rightarrow \bigcirc \bigcirc	localhost:8201/		□ ☆	r∕≡	l~	Ŀ	
	Ĩ						
EUMETSAT	TELLICAST Multicast Distribu	tion System Client 2.14.4		= +=			HIM
	Status: OK	Host: UTWKS61123.ad.utwente.nl		Date: 20	19-12-20	08:42:0	4 UTC
Overview	TELLICAST Statistics						
Statistics							
Active Channels	Active Since:	2019-12-16 11:03:05 UTC					
License	Recipient:	BVanLeeuwenITC					
Log File	Active Announcement Channels:	1					
EUMETCast Home	Connecting Channels:	0					
Help	Blocked Channels:	0					
 refresh 	Maximum Bandwidth: Assigned Bandwidth:	20000000 49300000					
	Server Address: Announcement Channel Name: Announcement Channel Address:	10.90.43.54 TSL-HVS-2 224.223.224.223:4711					
	Received Packets on Data Channel: Missed Packets before FEC: FEC Recovered Packets: Received Bytes on Data Channel:	4584190 0 0 5371360883					
		 reset statistics 					

It is important to check the 'Statistics' on a regular basis to ensure that there are not too many "Missed Packets on Data Channel".

3 C-Band reception

At ITC – University of Twente for C-Band reception use is made of a prime focus parabolic antenna, pointed to EUTELSAT at 8 degree West. The reflector has a diameter of 2.4 meter and a C-Band LNB is used.

3.1 Africa Service

The coaxial cable from the C-Band LNB is connected to a TBS 5927 receiver. This receiver is connected to a computer by a USB connection and does therefore not require an additional network card. It is important that the most recent software version of TBS is used, here 'tbs-iptool_v3.0.5.0'. Older versions might cause unexpected compatibility issues, resulting in system failure. Setup of the TBS device is performed through the following steps:

- Installation of the driver, using the TBS tuner driver setup tool (TBS_5927_setup.exe)
- After installation of driver, check the system device manager to see if the device is added under "sound, video and game controller"
- Install the IP-Tool (TBS_IP_TOOL_V3.0.5.3.exe)
- Start 'TBS-IPdata' using the shortcut on your desktop, select the DVB-S2 tuner and press "OK"
- Configure the settings of the DVB-S2 tuner, The following settings should be entered, see also the figure below:
 - From the menu item "Tuner Settings":
 - Select Satellite: 3520 Atlantic Bird 2 (8.0W)
 - LOF1, LOF2: 5150 MHz
 - Switch: 0
 - Diseqc: Diseqc NUL
 - Frequency: 3848 MHz
 - Polarity: Horizontal or Vertical, depending on LNB configuration
 - Symbol rate: 9892 KSps
 - press "Add"
 - press: "Save"
 - Code : 0, Code Type : Root Code and then press "Set"
 - Set MODCODES: 4PSK (QPSK) ¾
 - Now press "Lock TP" to lock the signal
 - From the menu item "IP Over DVB":
 - Add the selected PIDs :
 - Ensure the Hex box is unchecked, and enter a PID value of 100 in the PID value box, and press the Insert PID button.

	Figure 3: AFR	2 – <i>IBS 5927 rec</i>	reption setting	rS	
TBS 5927 USB DVB-S2 Tune	er - Version: 3.0.5.3 — 🗆 🔀	Select Mode Code	e		>
BS Data Servic	es	C QPSK_1/4	QPSK_4/5	8PSK_5/6	16APSK_8/9
Funer Setting MAC Filter IP (Over DVB Motor/Positioner	C QPSK_1/3	QPSK_5/6	8PSK_8/9	16APSK_9/10
Satellite: 3520 Atlantic	Bird 2 (8.0W)	C QPSK_2/5	QPSK_8/9	BPSK_9/10	32APSK_3/4
LOF 1: 5150	Transponder: 3848,V,9892	C QPSK_1/2	QPSK_9/10	16APSK_2/3	32APSK_4/5
Switch: 0	Polarity: Vertical 💌	QPSK_3/5	8PSK_3/5	16APSK_3/4	32APSK_5/6
liseqc: Diseqc NUL	SymbolRate: 9892 KSps	C QPSK_2/3	8PSK_2/3	16APSK_4/5	32APSK_8/9
	Add Save Delete	QPSK_3/4	8PSK_3/4	16APSK_5/6	32APSK_9/10
aoldCode need to be set.P	lease input it here. Code Tune: Root Code ▼ Set			ALL	
Lode. It	Set MODCODES Lock TP		ОК	Can	icel
Strength 59					
Quality 49					
SNR: 9.900000 dB BER: 0.000000 bp	s Option LockStatus LOCKED				
Input Stream Identify:	Apply	1			

Finally you have to configure the "Virtual MPE Decoder Adapter". We now need to define the network address of the virtual network card presented by the software so that TelliCast knows where to find its data. Open "Network & sharing Center". Go to "Change adapter Settings". Double Click on the "Virtual MPE Decoder Adapter" and select properties, under the Internet Protocol Version 4 (TCP/IPv4), click Properties, for IP address specify '192.168.238.238' and for subnet mask use the default settings, *'*255.255.255.0*'*.

3.2 EKU and Tellicast Client

Next the EKU is configured and the Tellicast software is installed. See step by step instructions in the following documents:

- EKU driver installation windows.pdf •
- Tellicast_V2.14+_windows_installation.pdf

After having installed the Tellicast Software, e.g. using default installation instructions, 2 directories are created on the root of the system:

- EUMETCAST: with the folder/received/AFR/default, here the incoming data is stored
- EUMETSAT: with the folder \EUMETCast. Here the Tellicast *.ini file is situated which contains the tellicast configuration settings. Within the \www\eumetsat folder the "Product Navigator" is located.

When all is installed and configured the Tellicast client can be opened using the appropriate localhost address (http://localhost:8300). Here for each of the services the reception of the data can be monitored using various menu items, like 'Overview', 'Statistics', etc.



EUMETSA	TELLICAST Multicast Distribution System Client 2.14.4					
	Status: OK	Host: UT158410.ad.utwente.nl	Date: 2019-12-20 09:03:52 UTC			
Overview	TELLICAST Statistics					
Statistics						
Active Channels	Active Since:	2019-12-17 08:20:07 UTC				
License	Recipient:	52DegN				
Log File	Active Announcement Channels:	1				
EUMETCast Home	Active Data Channels: Connecting Channels:	3				
Help	Disconnecting Channels: Blocked Channels:	0				
→ refresh	Maximum Bandwidth: Assigned Bandwidth:	50000000 7152200				
	Server Address: Announcement Channel Name: Announcement Channel Address:	10.90.43.55 TSL-AFR-1 224.223.225.223:4711				
	Received Packets on Data Channel: Missed Packets before FEC: FEC Recovered Packets: Received Bytes on Data Channel:	191470 0 0 206716146				
		 reset statistics 				

It is important to check the 'Statistics' on a regular basis to ensure that there are not too many "Missed Packets on Data Channel".

4 Data Management

Once the system is operational, a high volume of newly arrived data will be received on a continuous basis. It is of utmost importance that this is a job well done. As the system operates 24 / 7 an automated data management application is required. At ITC – University of Twente we a are using our own developed "EUMETCast Data Manager". The primary purpose for developing this application is to organize the large amount of data files received. The data that is received on the EUMETCast receiving station must be transferred to computer storage that is independent of the receiving station's disk storage before users can access it. Users are not allowed to work directly with the data on the receiving station, because it should perform its primary task undisturbed, which is to be available all the time for storing the files captured by the (DVB-S2) card.

Data Manager v5	GIVE KU Reception Station						-		×
Input folders				Activity				1	
Source folder:	\\ut158537.ad.utwente.nl\default		Browse			Abort	View I	00	
Unmatched files folder:	\\csyn009.utsp.utwente.nl\other		Browse					- y	
EUROCLIMA Sout SOUND Other ME LSA SAF ET LSA SJ MPEF_DayDek_DATA NOAA NPP Active Fire MSG HRIT MSG8 HF	h and Central America Messages TOPB + IASI L2 SOUND METOPC- AF LSA SAF - EDLST LSA SAF - MET MPEF-PRO IODC MPEF-Data IODC MI NOAA JPSS Active Fire JASON OGDR RIT IODC MSG HRIT RSS MSG RSS M	Non processed HASI L2 REF NWC SAF PEF-PRO IODC Day[SARAL OGDR SJ PEF FENGYUN	AEMET WW Copernicus SWI Glo - CMa NWC SAI Dek MPEF-Data IC ARAL SSHA Meteo MODIS EARS I	3 EAMNET AVIS bal-Afri-SoAm CT NWC SAF - C DC DayDek CM SAF r-M PROBA-V Africa dectro-L N2 METOP	SO AMESD-SADC SOUND Other L2 CTTH OSI SAF SO H SAF 038 H SAF 058 PROBA-V Latin America NOAA-18/19/20 NO	MESA-SADC M DevCoCast_A UND SSM METOP 8 0000_24 H SAF 0 MPEF_PRO MPE IAA-20 VIIRS M SVM	MESA-JRC TAMSAT ASCAT L2 58 rest H S F-Data MF IC GPM-C	MESA-M NOAA S SMAP SAF H02B PEF_DayDe core Suo	Marine SMIS SMOS H SAF ek_PRO omi-NPP
Meteosat Second Ger	neration (Meteosat 11 at 0 degree East)								1
Destination folder:	\\csyn009.utsp.utwente.nl\Rawdata		Browse	Dated folders: yes	Current auder 20101	2200920			
Missing data log:	\\csyn009.utsp.utwente.nl\Other\missing\	nissing-hrit.log	Browse	Open	Current cycle: 20191	97%			
Duration of storage:	FOREVER 🗸					37.10			
Items									
PRO		I EPI			HRV				111
Process		Process			Process	1			_111
Times to store:	all	Times to store:	al		Times to store:	al			
-					Segments to store	e: al			
VIS006		VIS008			IR016				-111
Process		Process			Process				_111
Times to store:	all	Times to store:	al		Times to store:	all			_111
Segments to store	all	Segments to st	tore: all		Segments to store	e: al			
IR039		WV062			WV073				111
Process		Process			Process				
Times to store:	all	Times to store:	all		Times to store:	al			
Segments to store	all 🛛	Segments to st	tore: all		Segments to store	e: all			
IR087		IR097			IR 108				
Process		Process			Process				
Times to store:	al	Times to store:	al		Times to store:	all			
Segments to store	all	Segments to st	tore: all		Segments to store	e: all			
IR 120		IR 134							-11
Process		Process							
Times to store:	all	Times to store:	all						
Segmente to store	al	Segments to st	tore: all						

Figure 5: Example of the Data Manager, Basic Service

5 Concluding remarks

Creating your own reception station can be done using off the shelf components. In Africa it is a challenge to acquire the DVB-S2 devices. These can be obtained from web shops though. Pointing the antenna is mostly not a problem as all TV programs are satellite dish based and local vendors can be of assistance. EUMETCast is a system which is continuously evolving. It is important to check if there are new services and the data received are well transferred to a storage server. As the service is continuous, uninterrupted power supply can be an issue!

6 References

Various EUMETSAT resources have been used, like:

EUMETSAT: eToken Driver SAC (9.0) Installation (EKU_driver_installation_windows.pdf)

EUMETSAT: EUMETCast Africa DVB-S2 Migration Setup Guide (v1D Draft - 28 June 2018) (EUMETCast Africa DVB-S2 Migration Setup Guide.pdf)

EUMETSAT: Trouble shooting tips for anyone using the EUMETCast system https://eumetsatspace.atlassian.net/wiki/spaces/DSEC/pages/697630751/Troubleshooting+articles

EUMETSAT: Tellicast v2.14+ installation guide for Windows (Tellicast_V2.14+_windows_installation.pdf)

EUM TD 15 (2021): TD15 - EUMETCast, EUMETSAT's Broadcast System for Environmental Data. Technical description, Issue v8F, 28 January, 2021. EUMETSAT, Darmstadt, Germany. <u>https://www.eumetsat.int/media/44096</u>

https://eumetsatspace.atlassian.net/wiki/spaces/DSEC/overview