EUMETCast Africa DVB-S2 Migration Setup Guide

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v1A	3.05.2018		Initial document
v1B	14.05.2018		Updates from user feedback
v1D	28.06.2018		Corrections from user feedback Polarisation corrected in table 2 Specify who should use this migration guide.

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1 INTRODUCTION

NOTE:

1. **MESA/PUMA2015 END-USERS CANNOT USE THIS GUIDE. MESA/PUMA2015 USER PLEASE CONTACT EUMETSAT HELPDESK ops@eumetsat.int**

2. **THIS MIGRATION USER GUIDE IS INTENDED TO BE USED ONLY BY NON PUMA/MESA END-USERS.**

The purpose of this manual is to guide an existing user of EUMETCast Africa provided from EUTELSAT 5W through the migration to the new DVB-S2 based EUMETCast Africa service provided from EUTELSAT 8W.

The new Africa Service (AFR-1) is the continuation of the current EUMETCast Africa DVB-S service, and all users have access to the same data as on the current system. The DVB-S2 AFR-1 downlink started early May 2018 and became operational on 7 May 2018. The DVB-S operation is planned to stop end of July 2018.

The following web page contains general and most recent information, including the schedule:

https://www.eumetsat.int/website/home/TechnicalBulletins/EUMETCast/DAT_3589215.html

The migration involves several activities:

- Preparations and status check
- Update of Tellicast
- Replacement of DVB-S receiver or card with a DVB-S2 device
- Repointing of the reception antenna from EUTELSAT 5W to EUTELSAT 8W
- Update of DVB receiver configuration

It is recommended to perform these steps in the order as shown in the following section.

2 UPGRADE STEPS

2.1 Step 1: Download Upgrade Documentation and Packages

First download all packages necessary for the migration and documentation from the following location:

ftp://ftp.eumetsat.int/pub/OPS/out/user/EUMETCast_Support/Africa_Migration

Operating system specific packages can be found in the related sub-directories.
The linux files must be copied to the /root directory, please read also the Readme.txt file.

2.2 Step 2: Check the Status of the Existing DVB-S System

As a starting point, make a status check of the current system and store the results in a file, in case support by EUMETSAT is needed.

Windows and Linux

Is reception working	Yes/No
Quality of reception	Open the Tellicast "Statistics" page (see Figure 1), reset the counter and make a screenshot 1 hour later
Tellicast version and client information	Open the Tellicast "License" page (see Figure 2), and make a screenshot
Store log files	Save Tellicast logs (recv...log, recv...log.1, etc.) in a temporary folder, for later analysis if needed.
If used: DVB router status, Novra Ayecka SR1	Make screenshots of reception status, see user guides.

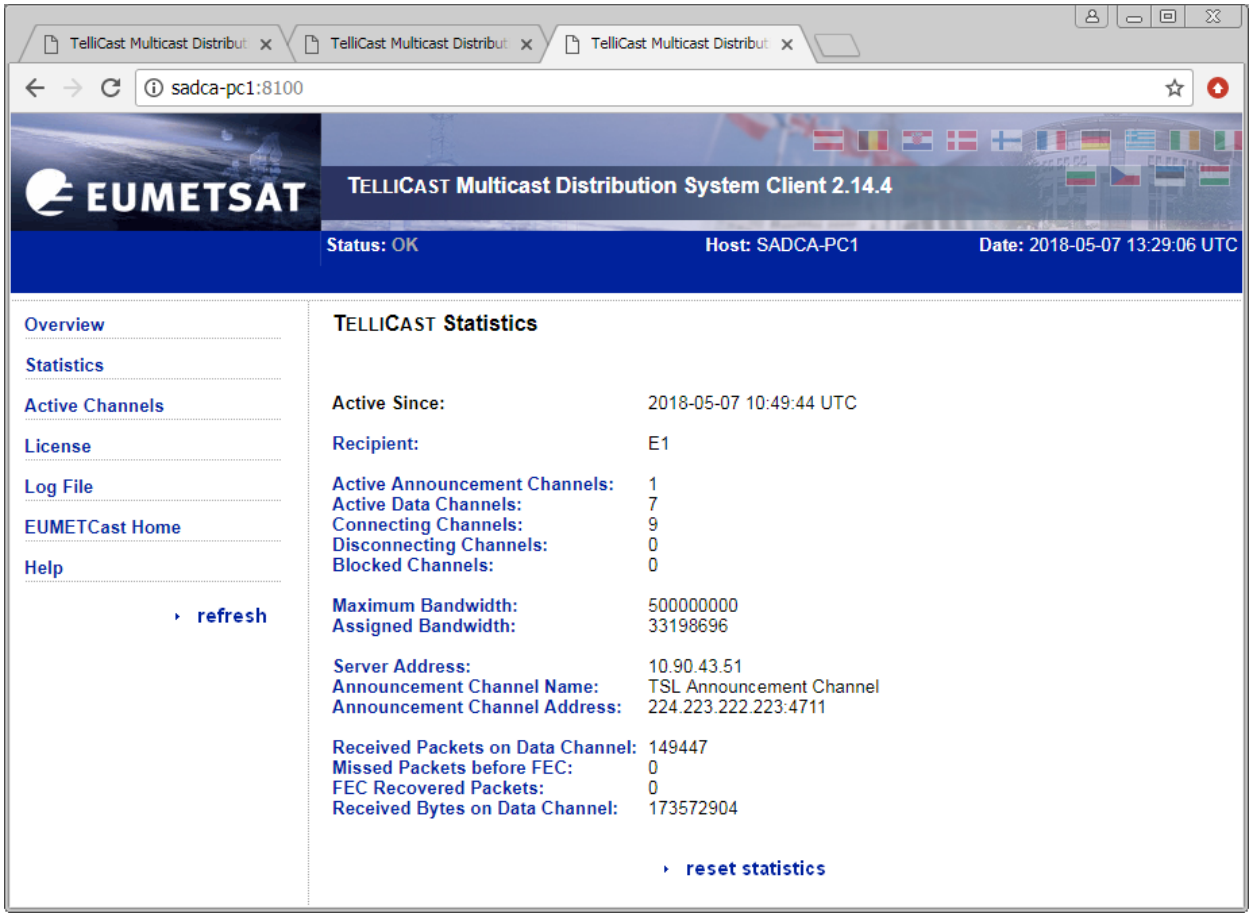

Figure 1: Tellicast Statistics page

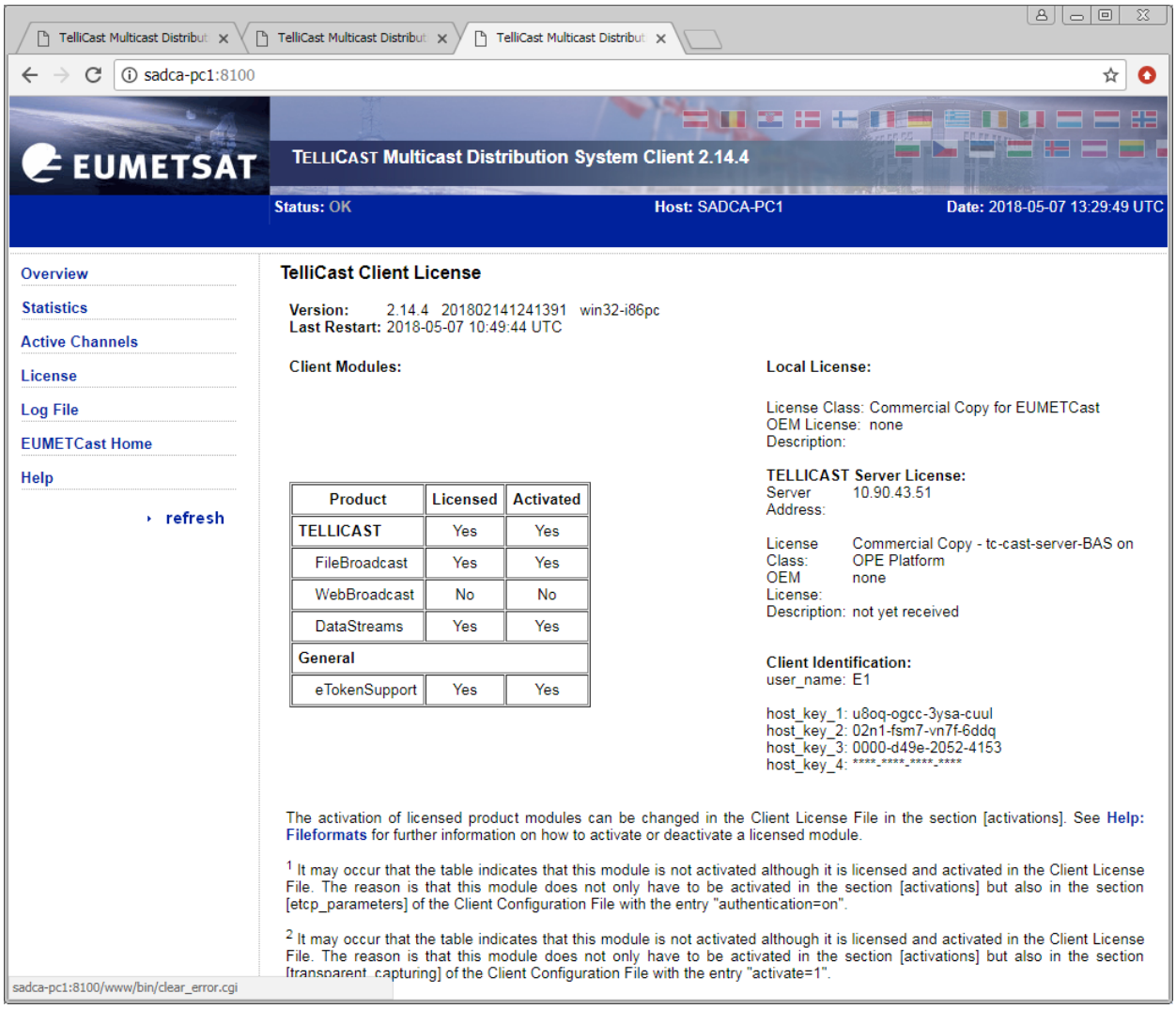

Figure 2: Tellicast Client Identification page

Windows

Reception quality of internal DVB cards, or USB receivers	Make a screenshot of DVB reception quality, SNR, Signal status (e.g. BDADataEx "Status/Tuner" see Figure 3, or same images from other applications, or the DVB router)

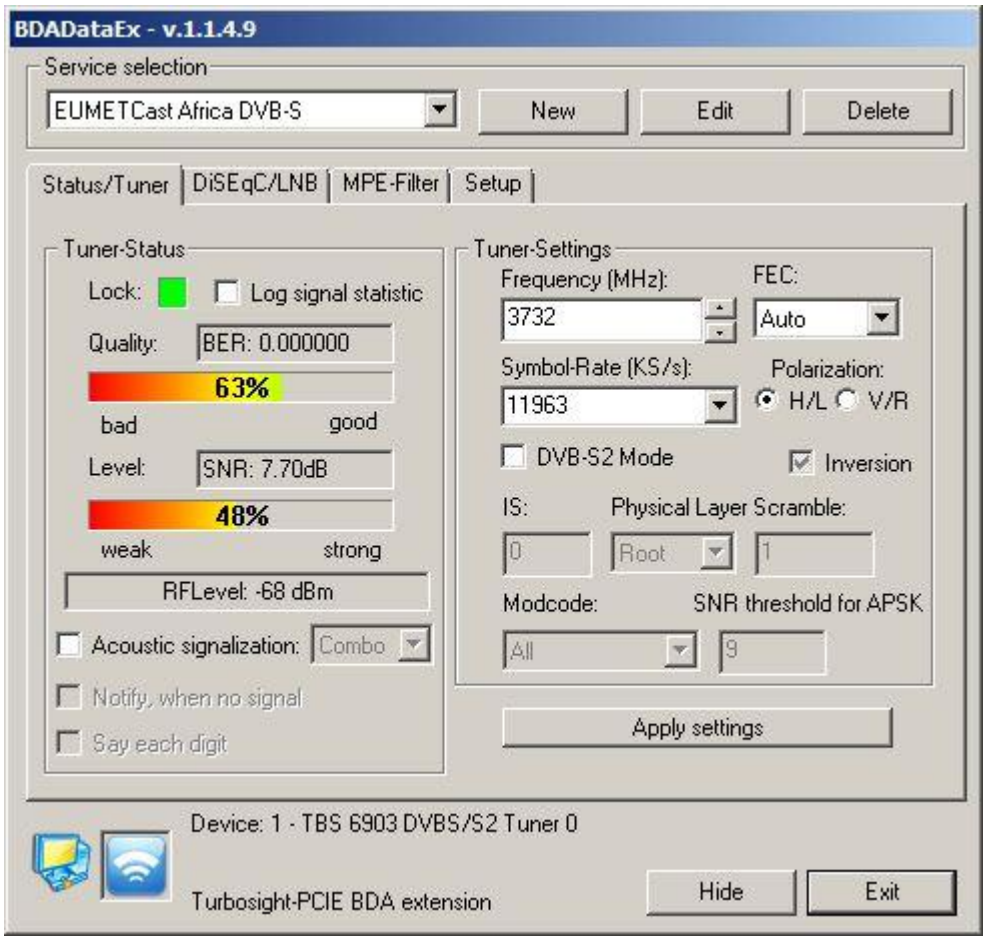

Figure 3: DVB card reception status

Linux

Reception quality of internal DVB cards or USB receivers	Open terminal window and type: femon –H store the output in a file or make a screenshot

DVB Routers

Reception quality of external DVB routers	Make screenshot from Novra DVB interface or Ayecka SR telnet interface

2.3 Step 3: Update Tellicast

The new Service has new Tellicast announcement and data channels. However the same data files are transmitted using an equivalent set of channels (see Appendix A).

The Tellicast configuration files must therefore be updated. This is done differently for Windows and Linux.

Windows

Download all files from

ftp://ftp.eumetsat.int/pub/OPS/out/user/EUMETCast_Support/Africa_Migration/Windows/

1. You must have administrator privileges to install the new version.

2. Start eumetsat-setup-2.14.4_7.msi

3. If a recent version of Tellicast was installed, the username and password are prefilled, and you can continue with the upgrade of the installed version.
    a. Select "Keep currently installed channel configuration files…".
    b. Accept all further windows until the client is upgraded.
    c. Now the old service is unchanged and a new AFR-1 service is added.
    d. The new AFR-1 service can be started in parallel to the old service, however no data will be received until the antenna is repointed and the DVB receiver configured.

4. If an older version of Tellicast was installed (T-Systems, BusinessTV-IP), a complete new installation will be made, which can run in parallel to the installed version.
    a. Follow the installation guide "Tellicast_V2.14+_windows_installation.pdf".
    b. The 2.14 version will be running in parallel to the older version.
    c. Change the data processing software to point to the new target directories of the new client under \EUMETCast\received.
    d. Uninstall the old "T-Systems, BusinessTV-IP" client.

Then start the BAS service and open the Tellicast shell from the icon in the tray.
The new AFR-1 service can also be started but it will not yet receive any data.
Both services can be left running.

Linux

Download all files from

ftp://ftp.eumetsat.int/pub/OPS/out/user/EUMETCast_Support/Africa_Migration/Linux

1. You must be logged in as root and all downloaded files must be copied to /root.

2. Extract the scripts by running "tar –zvxf scripts_v2.tar.gz" (or higher version, v3…)

3. Execute the script "upgrade-tellicast-afr.sh" and follow instructions.

   A backup of the old client software and configuration will be made.
   The Tellicast client will be upgraded to 2.14.4.
   A new service AFR-1 will be added.

4. Check if reception of old Africa service is still working. Open a browser and enter
   http://127.0.0.1:8100 for the old service
   http://127.0.0.1:8300 for the new service

   Both services can be left running.

5. In case of problems you can restore the old configuration by running:

   ./restore-tellicast-afr.sh

   Then send the following files to EUMETSAT helpdesk.

   backup-tellicast-afr.tar.gz
   log-upgrade-afr.log

6. Restart (reboot) the computer.

2.4 Step 4: Upgrade of DVB Hardware and Software

The following table described DVB-S2 devices where EUMETCast Guides already exist:

COMPANY NAME	MODEL	TYPE	EUMETCAST SERVICE SUPPORT	OS SUPPORT	FURTHER INFO BY COMPANY	EUMETCAST SETUP INFO	USED BY EUM
Ayecka	Ayecka SR1	Router LAN	EUMETCast Europe Africa (All Services)	All	Ayecka SR1 Satellite Receiver	SR1 Setup Guide (v4A)	Yes
Newtec	MDM6000	Router LAN	EUMETCast Europe Africa (All Services)a	All	Newtec MDM6000 Satellite Modem	MDM6000 Setup Guide(v1F)	Yes
Novra	Novra S300E or S300N	Router LAN	EUMETCast Europe Africa (All Services)	All	Novra S300E Satellite Receiver	S300 Setup Guide (v2D)	Yes
Omicom	Pro Omicom 16/32 PSK	PCI Card	EUMETCast Europe Africa (All Services)	Windows, Linux	Omicom Pro 16/32 APSK PCI	Omicom Windows Setup Guide(v1C) For Linux Guide contact Email	Yes
TBS	TBS 6903 TBS 6908	PCIe	EUMETCast Europe Africa (All Services)	Windows, Linux	TBS-6903 Professional DVB-S2 Dual Tuner Card TBS-6908 Professional DVB-s2 Quad Tuner Card	TBS-6903/6908 Windows Setup Guide(v2) TBS DVB-S2 Receivers EUMETCast LINUX Setup Guide (v2)	Yes
TBS	TBS 5925	USB	EUMETCast Europe Africa (All Services)	Windows, Linux	TBS-5925 Satellite Receiver	TBS-5925 Windows Setup Guide(v1F) TBS DVB-S2 Receivers EUMETCast LINUX Setup Guide (v2)	Yes
TBS	TBS 5927	USB	EUMETCast Europe Africa (All Services)	Windows, Linux	TBS-5927 Satellite Receiver	TBS-5927 Windows Setup Guide(v1) Linux Guide will be available soon	Yes

Table 1: EUMETCast Africa compliant DVB-S2 devices

If the current device supports only DVB-S, it must be replaced by a DVB-S2 device. Please check on the local market if one of the devices in Table 1 is available.

If you have a model not listed in Table 1, please contact EUMETSAT helpdesk. If this model works under DVB-S, it should also work under DVB-S2.

New DVB-S2 devices under Windows

Follow the EUMETSAT guides and manufacturer installation instructions to operate the new DVB-S2 device on the old Africa service before starting the repointing.

DVB Cards and USB Devices under Linux

Making internal DVB-S2 cards and USB devices work under Linux requires some additional work after the DVB kernel drivers have been installed. The dvb-eumetcast service, which manages the tuning of the DVB devices and which makes the data available on the dummy0 network interface, must be upgraded to include the new Africa service. This should be done already on the old Africa service in order to verify its function.

1. Execute script:

   ./upgrade-dvb-eumetcast-afr.sh

   and follow instructions, if any.

2. Check if reception of old Africa service is still working.

3. In case of problems you can restore the old configuration by starting:

   ./restore-dvb-eumetcast-afr.sh

   Then send the following files to EUMETSAT helpdesk.

   backup-dvb-eumetcast-afr.tar.gz
   log-upgrade-afr.log

   Possible problems could be that a non-standard LNB is used, e.g. the LOF (oscillator frequency) is not 5150 MHz. Some LNBs have an LOF of 5750 MHz, and this must be changed in the tuning parameters in the file /etc/dvb-eumetcast.cfg. Please contact EUMETSAT helpdesk in this case and always send the backup and log files, from where we can derive the original settings.

2.5 Step 5: Antenna Repointing

Please make sure that all previous steps have been successfully completed.

The assumption is that you have good reception with the current antenna. The reception quality (SNR, EsNo, C/N, etc) should be the same on the new service with sufficient margin. Due to the different downlink frequency it is possible that interference from other sources (radar, WIFI, mobile services, …) is lower of even higher. For most of the users there should be no change.

The new Satellite parameters are the following (Table 2):

PARAMETER	VALUE
Name	EUTELSAT 8WB
Transponder	04C
Down Link Frequency	3848,2525 MHz
Symbol Rate	9892 kS/s
Polarisation	Left hand circular
Roll-Off	5%
Transmission Standard	DVB-S2
MODCOD	QPSK3/4
C-Band Transponder EUTELSAT 8WB	

Table 2: New Satellite parameters

2.5.1 Step 5.1: Mark the Current Antenna Azimuth and Elevation Positions

The repointing instructions start from a perfect pointing to the current satellite EUTELSAT 5W. It is important to mark the current position to come back to the old alignment easily, in case you don't find the new satellite.
The following pictures (Figures 4 and 5) show examples of marking the current azimuth/elevation position with black permanent markers:

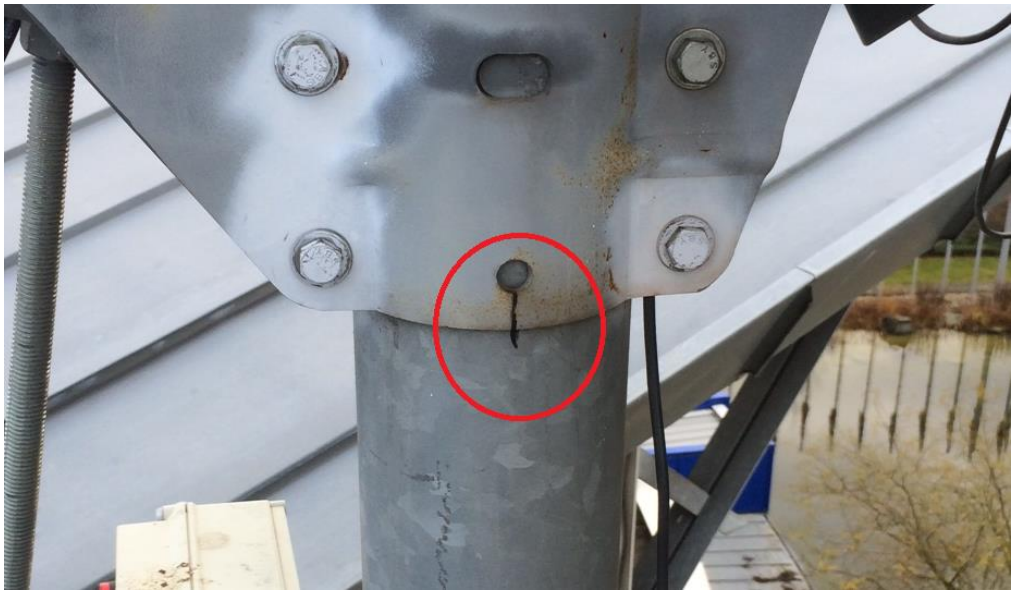

Figure 4: Azimuth Mark

Figure 5: Elevation Mark

2.5.2 Step 5.1: Start Azimuth and Elevation Adjustment

The following tables (Table 3 and 4) show the changes in azimuth and elevation necessary for a set of locations.

The values are derived from http://www.dishpointer.com/.

The highlighted locations (in yellow) show a rapid change in azimuth depending on the location. Therefore in this region a detailed calculation for the accurate location should be made (from http://www.dishpointer.com/).

location		5W EUT 5 W		8W EUT 8 W					
Latitude	Longitude	Elev	Azim	Elev	Azim	elevation change		azimuth change	
deg	deg	deg	deg	deg	deg	deg		deg	
30	-10	54.6	170.1	55	176	0.4	up	5.9	right west
30	-5	55	180	54.9	186	-0.1	down	6	right west
30	0	54.6	189.9	53.9	195.7	-0.7	down	5.8	right west
30	5	53.3	199	52.2	204.8	-1.1	down	5.8	right west
30	10	51.4	208.2	49.9	213	-1.5	down	4.8	right west
20	-15	63.9	152.8	65.2	160.3	1.3	up	7.5	right west
20	-10	65.9	165.6	66.4	174.2	0.5	up	8.6	right west
20	-5	66.5	180	66.3	188.7	-0.2	down	8.7	right west
20	0	65.9	194.3	64.8	202.3	-1.1	down	8	right west
20	10	61	218.1	58.9	223.5	-2.1	down	5.4	right west

20	20	53.2	233.8	50.6	237.3	-2.6	down	3.5	right west
20	30	44.1	244	41.2	246.4	-2.9	down	2.4	right west
20	40	34.5	251.1	31.6	252.9	-2.9	down	1.8	right west
20	50	24.7	256.5	21.8	257.9	-2.9	down	1.4	right west
20	60	15	260.9	12.1	262.1	-2.9	down	1.2	right west
10	-20	68.9	123	71.7	129.3	2.8	up	6.3	right west
10	-10	76.9	153.3	78	168.6	1.1	up	15.3	right west
10	0	76.9	206.7	75	219	-1.9	down	12.3	right west
10	10	68.9	237	66	241.9	-2.9	down	4.9	right west
10	20	58.7	249.6	55.5	251.9	-3.2	down	2.3	right west
10	30	48	256.1	44.7	257.5	-3.3	down	1.4	right west
10	40	37.2	260.1	34	261.1	-3.2	down	1	right west
10	50	26.6	263	23.5	263.8	-3.1	down	0.8	right west

Table 3: Antenna pointing changes for various locations in the northern hemisphere

location		E 5 W		E 8 W					
Latitude	Longitude	Elev	Azim	Elev	Azim	elevation change		azimuth change	
deg	deg	deg	deg	deg	deg	deg		deg	
0	10	72.4	90	68.9	90	-3.5	down	0	
0	20	60.8	90	57.3	90	-3.5	down	0	
0	30	49.3	90	46	90	-3.3	down	0	
0	40	38.2	90	34.9	90	-3.3	down	0	
0	50	27.3	90	24.1	90	-3.2	down	0	
-10	-20	68.9	417	71.7	410.7	2.8	up	-6.3	left west
-10	-10	76.9	386.7	78	371.4	1.1	up	-15.3	left west
-10	0	76.9	333.3	75	321	-1.9	down	-12.3	left west
-10	10	68.9	303	66	298.1	-2.9	down	-4.9	left west
-10	20	58.7	290.4	55.5	288.1	-3.2	down	-2.3	left west
-10	30	48	283.9	44.7	282.5	-3.3	down	-1.4	left west
-10	40	37.2	279.9	34	278.9	-3.2	down	-1	left west
-10	50	26.6	277	23.5	276.2	-3.1	down	-0.8	left west
-20	0	65.9	345.7	64.8	337.7	-1.1	down	-8	left west
-20	10	61	321.9	58.9	316.5	-2.1	down	-5.4	left west
-20	20	53.2	306.2	50.6	302.7	-2.6	down	-3.5	left west
-20	30	44.1	296	41.2	293.6	-2.9	down	-2.4	left west
-20	40	34.5	288.9	31.6	287.1	-2.9	down	-1.8	left west
-20	50	24.7	283.5	21.8	282.1	-2.9	down	-1.4	left west
-20	60	15	279.1	12.1	277.9	-2.9	down	-1.2	left west

Table 4: Antenna pointing changes for various locations in the southern hemisphere

If you are not familiar with antenna pointing, please call a professional or satellite dish installer.

If you can do it yourself, have following tools ready:

- DVB signal analyser or satfinder, to find the new satellite, and perform the course pointing.
- Your DVB-S2 device for the fine pointing.
- An inclinometer to measure the elevation change.
- A compass to measure the azimuth change.

Due to the size and weight of the antenna use proper protection and scaffolding to reach the adjustment bolts and nuts.

1. Connect the DVB analyser to the LNB and check to identify the current satellite. If the DVB-S2 device is used, confirm good signal before you start on the old downlink frequency 3732 MHz, or 1418 MHz on the SR1 (2018 MHz if LOF = 5750)

2. First adjust the elevation, by going down (or up) in the direction indicated in the table, use the inclinometer, and adjust only to 80% of the proposed elevation change value.

2.5.3 Step 5.3: Tuning to new service and fine pointing

1. Set the new downlink frequency 3848,2525 MHz, on the Ayecka SR1 set 1302 MHz (1902 MHz if LOF = 5750).

   On a Windows DVB-S2 card set the new reception parameters, frequency and symbol rate according to Figure 6. It may be possible that reception is already starting.

   On DVB routers set the new frequency and DVB-S2 mode, leave symbolrate automatic if possible.

   On Linux internal DVB cards or USB devices, tune to the new frequency by typing from the command line as root:

   ./tune_to_new_E8W.sh

   then run

   femon –H

   to show continuous reading of the dvb reception

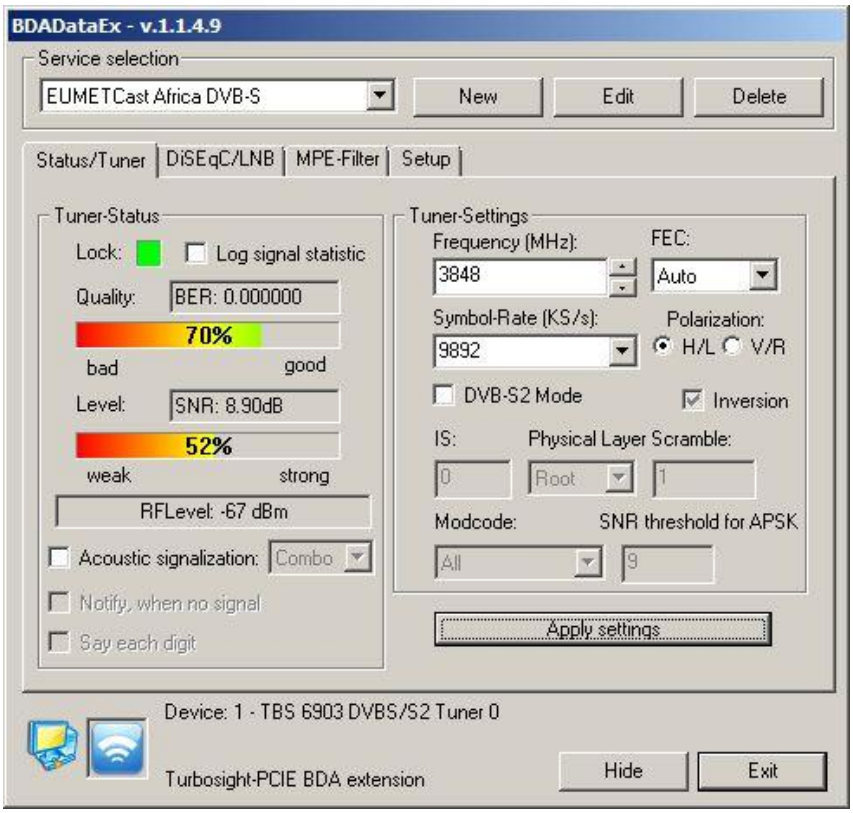

Figure 6: New Africa reception parameters

2. Then untighten the azimuth bolts, but just enough that the antenna can be moved in azimuth. Hold a compass to the antenna at any non-metallic part, far away from iron and steel. Then slowly turn the antenna in azimuth towards west, millimetre by millimetre. At approximately half of the required distance reception should already start.

3. Then connect the normal DVB-S2 receiver through the normal cable and try to optimise the SNR, or quality or C/N or link margin, depending what value is available. Communication between the observer at the receiver and outdoor people can be done via mobile phone.

4. Take time to find the optimum reception values.

5. Then slowly tighten the nuts and bolts, and observe the reception status. Just tightening might change the pointing again.

2.6 Step 6: Verify correct Tellicast reception

Is reception working	Yes/No
Quality of reception http://127.0.0.1:8300	Open the Tellicast "Statistics" page (see Figure 1), reset the counter and make a screenshot 1 hour later
Tellicast version and client information http://127.0.0.1:8300	Open the Tellicast "License" page (see Figure 2), and make a screenshot
Store log files	Save Tellicast logs (recv...log, recv...log.1, etc.) in a temporary folder, for later analysis if needed.
If used: DVB router status, Novra Ayecka SR1	Make screenshots of reception status, see user guides.

Windows

Reception quality of internal DVB cards, or USB receivers	Make a screenshot of DVB reception quality, SNR, Signal status (e.g. BDADataEx "Status/Tuner" see Figure 3, or same images from other applications, or the DVB router)

Linux

Reception quality of internal DVB cards or USB receivers	Open terminal window an type: femon –H store the output in a file of make a screenshot

3 ACRONYMS

DVB-S, DVB-S2	Digital Video Broadcast, a broadcast standard
EUMETCast	EUMETSAT multicast based broadcast system
EUMETSAT	European Meteorological Satellite Organisation
LNB	low-noise block downconverter
PID	Packet IDentification
CCM	Constant Coding and Modulation

APPENDIX A NEW VERSUS OLD CHANNEL LISTING

ProductTitle	Old Channel Name	New AFR Channel Name
High Rate SEVIRI Level 1.5 Image Data - MSG - 0 degree	EUMETSAT Data Channel 2	A1C-GEO-3
Meteorological Products - MSG - 0 degree	EUMETSAT Data Channel 3	A1C-GEO-4
Image data (3-hourly) - GOES West	EUMETSAT Data Channel 3	A1C-GEO-4
Meteorological Products - MSG - 0 degree	EUMETSAT Data Channel 8	A1C-GEO-4
High Rate SEVIRI Level 1.5 Image Data - MSG - Indian Ocean 41.5 degrees E	E1B-GEO-1	A1C-GEO-1
Meteorological Product - MSG - Indian Ocean 41.5 degrees E	E1B-GEO-2	A1C-GEO-2
Long-Wave Sea Surface Temperature - MODIS	EUMETSAT Data Channel 8	A1C-TPC-6
Photosynthetically Available Radiation - MODIS	EUMETSAT Data Channel 8	A1C-TPC-6
Diffuse attenuation coefficient for downwelling irradiance at 490 nm - MODIS	EUMETSAT Data Channel 8	A1C-TPC-6
Chlorophyll Alpha (MODIS, Mapped 4km) - Aqua	EUMETSAT Data Channel 8	A1C-TPC-6
Data Collection and Retransmission	EUMETSAT Data Channel 9	A1C-DCP-1
Jason-2, Saral data	EUMETSAT Data Channel 10	A1C-TPL-2
Third party GEO data - Feng-Yun - 2	EUMETSAT Data Channel 12	A1C-TPG-1
VIIRS Fire Product	EUMETSAT Data Channel 12	A1C-TPL-1
Absolute Sea Level Anomaly - Multimission	EUMETSAT Data Channel 12	A1C-TPC-1
Absolute Sea Level Anomaly - SARAL - Mozambique	EUMETSAT Data Channel 12	A1C-TPC-1
Absolute Sea Level Anomaly - Jason 2 - Mozambique	EUMETSAT Data Channel 12	A1C-TPC-1
Corrected Sea Surface Height - Multimission	EUMETSAT Data Channel 12	A1C-TPC-1
Global Map of Sea Level Anomalies - Multimission	EUMETSAT Data Channel 12	A1C-TPC-1
Gridded Wind Products - Multimission	EUMETSAT Data Channel 12	A1C-TPC-1
Gridded Wave Products - Multimission	EUMETSAT Data Channel 12	A1C-TPC-1

Global Map of Sea Level Anomalies - Multimission - Mozambique	EUMETSAT Data Channel 12	A1C-TPC-1
Ocean Products (AMESD)	TPC-1	A1C-TPC-1
Ocean Colour Products - MODIS - Aqua	TPC-1	A1C-TPC-1
all other data on channel 12	EUMETSAT Data Channel 12	A1C-TPC-6
Image data - Landsat	EUMETSAT Data Channel 14	A1C-TPC-6
Sea Surface Salinity Forecast - West Africa	EUMETSAT Data Channel 14	A1C-TPC-6
Sea Surface Heights Forecast - West Africa	EUMETSAT Data Channel 14	A1C-TPC-6
UG-MESA Potential Fishing Zone Maps	EUMETSAT Data Channel 14	A1C-TPC-6
Sea Surface Temperature Forecast - West Africa	EUMETSAT Data Channel 14	A1C-TPC-6
Wave Height Forecast - West Africa	EUMETSAT Data Channel 14	A1C-TPC-6
Long Term statistics of VGT-NDVI - Multimission	EUMETSAT Data Channel 14	A1C-TPC-6
Long Term statistics of CHIRPS-RFE - TRMM	EUMETSAT Data Channel 14	A1C-TPC-6
Sea Surface Currents forecast - West Africa	EUMETSAT Data Channel 14	A1C-TPC-6
OSI-SAF data	SAF-Global	A1C-SAF-1
Land SAF Data	SAF-Africa	A1C-SAF-2
Land SAF Data	SAF-Global	A1C-SAF-2
AC SAF Data	SAF-Africa	A1C-SAF-3
CM SAF Data	SAF-Africa	A1C-SAF-4
Copernicus Global Land data	TPC-5	A1C-TPC-5
WMO RA I data	WMO-RA-I	A1C-WMO-RA-I
misc data	Info-Channel-1	A1C-Info-Channel-1
OLCI Ocean Colour Reduced Resolution in NRT - Sentinel-3	E1H-S3A-03	A1C-S3A-03
SLSTR Sea Surface Temperatures (SST) in NRT - Sentinel-3	E1H-S3A-04	A1C-S3A-04
SRAL Altimetry Global in NRT - Sentinel-3	E1H-S3A-06	A1C-S3A-06
SRAL Altimetry Global in STC - Sentinel-3	E1H-S3A-08	A1C-S3A-08
ASCAT soil moisture at 12.5 km swath grid - Metop	EPS-Africa	A1C-EPS-G
ASCAT soil moisture at 25 km swath grid - Metop	EPS-Africa	A1C-EPS-G
IASI Atmospheric Temperature Water Vapour and Surface Skin Temperature - Metop	EPS-Africa	A1C-EPS-G
IASI Cloud Parameters - Metop	EPS-Africa	A1C-EPS-G
IASI Ozone - Metop	EPS-Africa	A1C-EPS-G
IASI Carbon Monoxide Profiles FORLI-CO - Metop	EPS-Africa	A1C-EPS-G

IASI Trace Gases - Metop	EPS-Africa	A1C-EPS-G
IASI Sulphur dioxide - Metop	EPS-Africa	A1C-EPS-G
IASI Surface Emissivity - Metop	EPS-Africa	A1C-EPS-G
ATOVS Sounding Products - Metop	EPS-Global	A1C-EPS-G
ATOVS Sounding Products - NOAA	EPS-Global	A1C-EPS-G
ASCAT regional ocean surface winds at 25 km node grid - Metop	EPS-Africa	A1C-RDS-1
ASCAT Regional Coastal Winds at 12.5 km - Metop	EPS-Africa	A1C-RDS-1