

EUMETCast Basic Service DVB S2 Migration Setup Guide

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1 INTRODUCTION

The purpose of this manual is to guide a user through the DVB-S2 migration of EUMETCast Europe.

The DVB-S2 migration of EUMETCast Europe will modernise the dissemination system. The highly flexible usage of transponder resources using DVB-S2 ensures the readiness of EUMETCast for the upcoming evolutions addresses the data access needs of diverse user communities and minimises timeliness and data volume uncertainties in future bandwidth increases and is the most cost effective implementation of a satellite based multicast system.

Basic Service (BS) is the continuation of the current EUMETCast Europe DVB-S service. The DVB-S2 BS operation phase started on the 14th of August 2014. The DVB-S operation will continue in parallel until the end of 2014.

2 REQUIREMENTS

For the BS DVB-S2 EUMETCast reception the user should check the compatibility and the functional status of the existing DVB-S reception equipment (satellite dish, LNB, satellite cable, Tellicast PC).

The change of technology to DVB-S2 makes a hardware change mandatory on the reception stations. That means that the user has to buy a new DVB-S2 satellite receiver which replaces the old DVB-S reception card, USB device or router.

The EUMETCast Client Software and ECU are also mandatory for receiving the new service. Existing installations will continue to work on the new system. The only possible configuration change required is to select the network interface for the upgraded DVB-S2 device and the re-pointing of the satellite dish.

2.1 Satellite Dish

The diagrams 1-3 illustrate the general coverage of the DVB-S2 Basic Service. The required antenna sizes depend on reception station location, the Effective Isotropic Radiated Power (EIRP) and the typical weather patterns.

The Basic Service can be received with the currently installed antennas in most areas across the footprint but the antenna needs to be re-pointed to Eutelsat E10A and the reception optimized to achieve the same margin for bad weather.

EUMETCAST – BASIC SERVICE

Eutelsat E10A (10°E); 8PSK3/5

0.9m reception antenna rain fade availability
(G/T at 12.5 GHz = 18.5 dB/K)

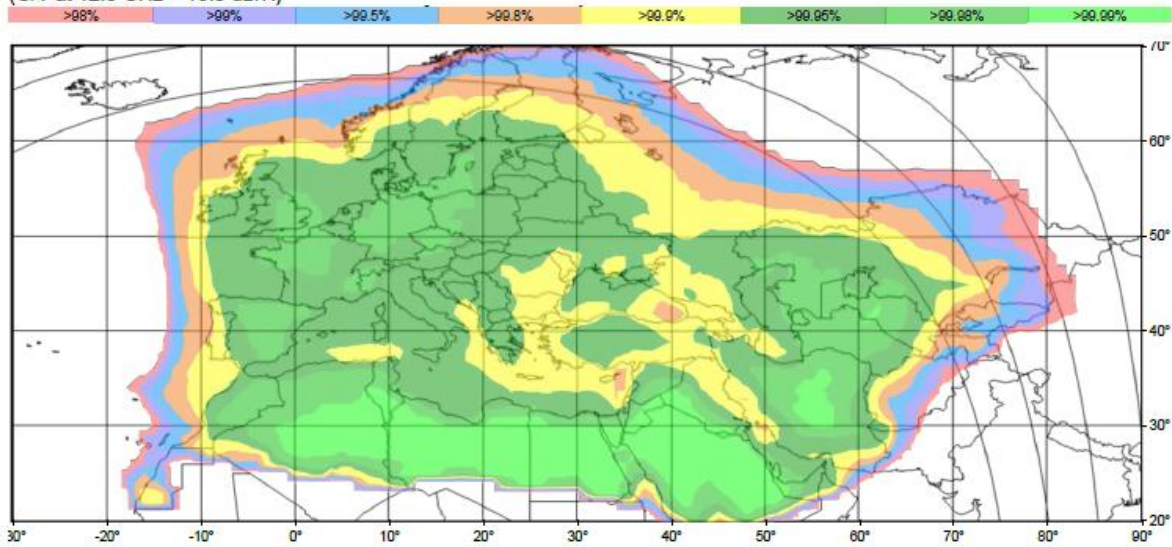


Figure 1 : EUMETCAST Basic Service 0.9m reception antenna

EUMETCAST – BASIC SERVICE

Eutelsat E10A (10°E); 8PSK3/5

1.2m reception antenna rain fade availability
(G/T at 12.5 GHz = 20.5 dB/K)

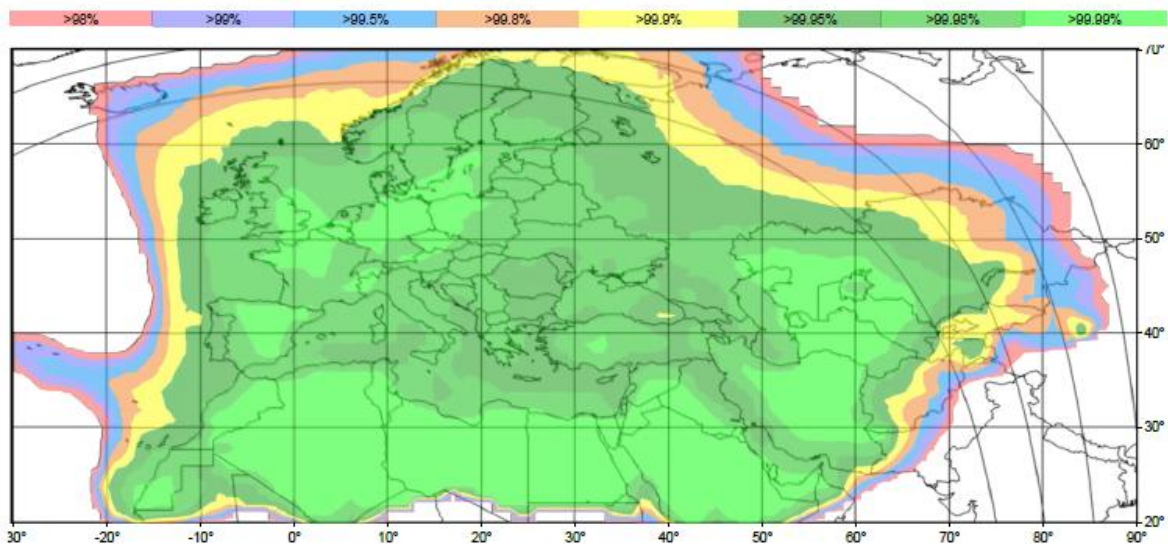


Figure 2 : EUMETCAST Basic Service 1.2m reception antenna

EUMETCAST – BASIC SERVICE

Eutelsat E10A (10°E); 8PSK3/5

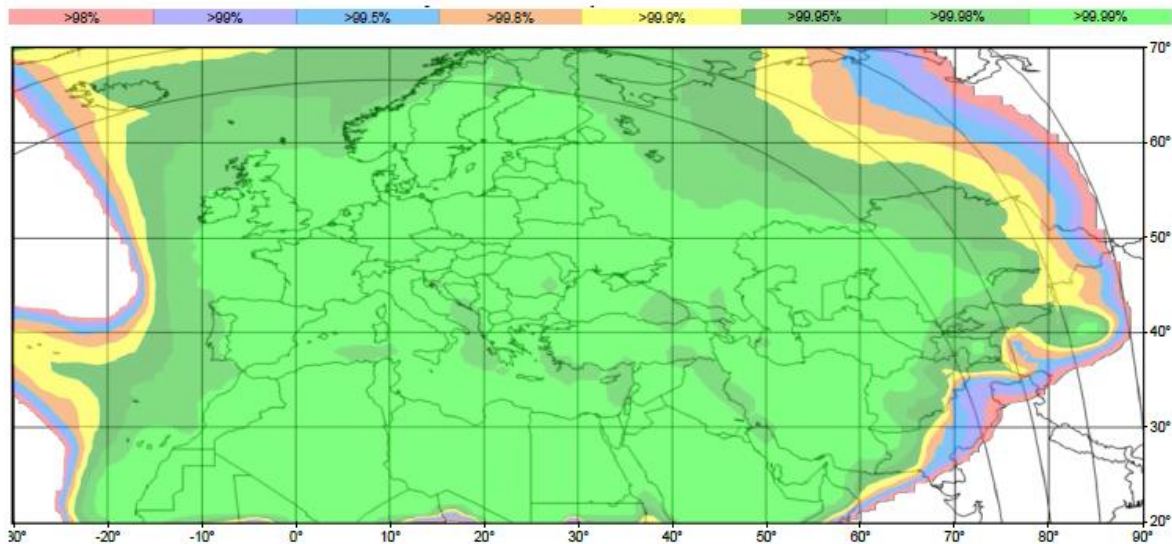
1.8m reception antenna rain fade availability
(G/T at 12.5 GHz = 23.5 dB/K)

Figure 3 : EUMETCAST Basic Service 1.8m reception antenna

2.2 Satellite Dish pointing and LNB alignment

Adjusting the satellite dish for best reception is very important, even for small antennas as over time the pointing will degrade due to wind load.

For new installations you will need to find the exact elevation, azimuth and skew that gives you the optimal reception. In order to get a clear signal, you need a clear path from your dish to the satellite - no trees or buildings in the way.

There are three steps to successfully installing the satellite dish and optimising it for DBV-S2 reception on Eutelsat 10A.

The first step involves finding your “look angle”, the direction in which the dish needs to be pointed to receive the signal. This can be done by utilising the website <http://www.dishpointer.com/> where to find the “look angle” you enter your location and the required satellite (10E EUTELSAT 10A). Alternatively you can call a local technician for assistance.

The second step is aligning the satellite dish/antenna to the satellite using the azimuth and elevation angles. Use a compass or get the direction from Google maps to select the azimuth. Select the elevation by using the elevation angle scale on the mount bracket. Then use a dish pointer tool to optimise the signal. Connect the DVB-S2 device and check if you have selected the correct transponder and that EUMETCast can be received. Typically the antenna will now be pointed to Eutelsat 9A because the overall transmitted signal level is higher. But Eutelsat 10A can generally already be received with a low link margin.

The third step is optimizing your reception. We suggest a laptop is used in close proximity to the dish and your already configured DVB-S2 receiver, or alternatively remote control software, to enable you to see and optimise the reception via the instantaneous changes in levels.

Follow the DVB-S2 receiver setup guide (see section 2.5) to configure the receiver for the DVB-S2 downlink. Make sure you already receive EUMETCast data and read the link margin or EsNo or C/N (or other quality parameter) while moving the dish.

Note : If the user's DVB-S2 device is the AYECKA SR1, the following information indicates pointing to the wrong satellite, probably Eutelsat 13 deg:

This line indicates the incorrect MODCOD

B. Modulation Order and Code Rate DVB-S2 8PSK 3/4

It should read:

B. Modulation Order and Code Rate DVB-S2 8PSK 3/5

Please change the pointing just a little bit more West until the SR1 shows lock again (first red, then green LED).

Try moving the dish slightly towards the East or West to find the maximum link margin and fix the azimuth. Then move it fractionally up or down to get the best link margin value. Repeat both steps several times. Then tighten the screws. Sometimes tightening the screws will de-point the dish again. You may have to try several times.

For the DVB-S2 reception, the 'skew' angle of the LNB is very important. The 'skew' angle represents the horizontal/vertical plane of the LNB. When a satellite dish is facing towards a satellite at due South, the plane of the LNB will be vertical (straight down). As the dish is moved around either East or West to receive other Satellites the LNB will need to be tilted (rotated), clockwise for West and counter clockwise for East (as viewed from the rear of the dish). The best way to adjust the LNB skew is to set it at zero degree and then to rotate it in very small steps both ways while keeping an eye on the link margin. Adjust for optimal link margin.

If the user's LNB supports focussing, the user should try to find the best focus point to get the higher possible link margin, moving the LNB towards the dish or away from it.

Note: If the user satellite dish is within the specification figures 1-3 the expected link margin value should be more than 4 dB which is sufficient to give the target availability of 99.98%.

2.3 LNB

The LNB is a crucial analogue component for reception of the weak satellite signals in Ku band and for delivering the down-converted L-band signal to the DVB-S2 receiver. That's why the user should check the existing LNB and decide if there is a need for it to be replaced. The LNB should also match the antenna geometry.

The noise figure of the LNB is a measurement of how much noise the LNB will add to the signal you may be intending to receive. The gain is a measure of the amplification factor. The lower the noise figure of the LNB and the higher the gain the better the LNB will be able to receive weaker signals. Although high gain LNBs might be useful to compensate losses from long antenna cables, it is more efficient to use low loss cables in this case. The cross-polar isolation is a measure of how much the signals from neighbouring transponders on the different polarisation are suppressed.

Some companies advertise the "0.1dB" noise figure specification. This is utterly meaningless. Once the noise figure is below 0.6dB right across both bands (Hi and Lo), then lowering it further would make no discernible difference to reception. With low price consumer LNBs a quality selection by specification cannot be made. It is better to just test different LNBs if the result is not satisfactory. High priced quality LNBs can give an improvement in link margin of 0.5 dB compared to the average consumer device.

In order to increase the link margin it is more cost effective to invest in a larger dish compared to a high priced LNB.

EUMETSAT suggests a Universal LNB (HD Reception) which can feed the DVB-S2 receiver in the full Ku band range (10.7 to 12.75 GHz).

Where a user has two or more receivers, EUMETSAT suggests the use of a multi output LNB (eg quad LNB). EUMETSAT does not recommend a satellite signal splitter as these attenuate the signal and may impact DVB-S2 EUMETCast reception.

2.4 Cabling - Connectors

It is recommended that the user checks the existing wiring and F connectors. Be sure that the cable is in a good condition showing no signs of damage or kinking. Ensure that the inner core and braiding are not shorted and that both have electrical continuity. If the user finds that the wiring needs replacing EUMETSAT suggests using only high-quality cable with proper insulation. It is recommended that the cable length be less than 20 meters to prevent signal loss.

The user should also check that the F-connectors are fitted correctly. If the copper insulation touches the inner copper wire, or if the F-connector doesn't touch the outer braid, strong interference can occur resulting in degradation in signal quality.

2.5 DVB-S2 Receivers

The new Satellite parameters are the following:

| PARAMETER | VALUE |
|--|---|
| Name | EUTELSAT 10A |
| Transponder | C4 |
| Down Link Frequency | 11263 MHz |
| Symbol Rate | 33000 kS/s |
| Polarisation | Horizontal |
| Roll-Off | 5% |
| Transmission Standard | DVB-S2 |
| MODCOD 1 — Basic Service | 8PSK3/5 MPE transport stream (TS) ISI=1 max 55 Mbps info bit rate (at TS level) max 50 Mbps IP data rate |
| Ku-band Transponder EUTELSAT 10A (10° E), Europe | |

Table 1: New Satellite parameters

Details about setting up the DVB-S2 reception devices are available on the EUMETSAT WEB site.

Table 2 gives a short summary of the compatible devices. Please visit the EUMETSAT WEB page regularly for any updates.

| COMPANY NAME | MODEL | TYPE | OS SUPPORT | FURTHER INFORMATION BY COMPANY | EUMETCAST SETUP INFORMATION | USED BY EUMETSAT |
|--------------|--|------------|----------------|---------------------------------------|-----------------------------|------------------|
| Ayecka | Ayecka SR1 | Router/LAN | All | Ayecka SR1 Satellite Receiver | SR1 Setup Guide | yes |
| Newtec | EL940 IP Satellite Receiver is not available any more, replaced by MDM6000 | Router/LAN | All | - | EL940 Setup Guide | yes |
| Newtec | MDM6000 (successor of EL940) | Router/LAN | All | Newtec MDM6000 Satellite Modem | under construction | planned |
| Novra | Novra S300E or S300N | Router/LAN | All | Novra S300E Satellite Receiver | S300 Setup Guide | yes |
| TBS | TBS 6925 | PCIe | Windows, Linux | under construction | under construction | planned |
| TBS | TBS 5925 | USB | Windows, Linux | under construction | under construction | planned |

Table 2: EUMETCAST compliant DVB-S2 devices

Links to the setup guides are provided in the online table on the WEB page and are repeated in table 3:

| | |
|---------------|---|
| AYECKA SR1 | http://www.EUMETSAT.int/website/wcm/idc/idcplg?IdcService=GET_FILE&dDocName=PDF_DVB_SR1_GUIDE&RevisionSelectionMethod=LatestReleased&Rendition=Web |
| NEWTEC EL940 | http://www.EUMETSAT.int/website/wcm/idc/idcplg?IdcService=GET_FILE&dDocName=PDF_DVB_NEWTEC_GUIDE&RevisionSelectionMethod=LatestReleased&Rendition=Web |
| NOVRA S300E/N | http://www.EUMETSAT.int/website/wcm/idc/idcplg?IdcService=GET_FILE&dDocName=PDF_DVB_S300_SETUP_GUIDE&RevisionSelectionMethod=LatestReleased&Rendition=Web |
| OMICOM | http://www.eumetsat.int/website/wcm/idc/idcplg?IdcService=GET_FILE&dDocName=PDF_DVB_PRO_16_32_APSK_PCI&RevisionSelectionMethod=LatestReleased&Rendition=Web |
| TBS-5925 | http://www.eumetsat.int/website/wcm/idc/idcplg?IdcService=GET_FILE&dDocName=PDF_DVB_TBS_GUIDE&RevisionSelectionMethod=LatestReleased&Rendition=Web |

Table 3: DVB-S2 Devices Setup Guides

Further setup guides are in work and will be made available when completed.

2.6 High Volume Service

The High Volume service is not operational at the time of writing. A test stream will be made available for users in Q4 2014. The High Volume Service link margin is about 4 dB lower compared to the Basic Service, therefore larger antennas are required. If the antenna size cannot be increased or the HVS is not required, in order to avoid any bad impact on the low link margin of the High Volume Service the recommendation is to disable the High Volume Service reception in the DVB devices according to the guides.

2.7 Basic Service Reception Station

Apart from updating the DVB device there may be a few changes needed in the EUMETCast client configuration.

The necessary steps are provided in the guides of table 3 for each of the devices and are briefly summarised here:

DVB routers

- the network interface address in the Tellicast client config file (recv.ini) must be updated
- on linux stations certain multicast system parameters must be set

Internal DVB cards or USB boxes

- under linux the dvb-eumetcast channel configuration file must be updated

For the details please read the setup guide for your DVB device.

3 ACRONYMS

| | |
|---------------|--|
| BS | Basic Service |
| DVB-S, DVB-S2 | Digital Video Broadcast, a broadcast standard |
| EIRP | Effective Isotropic Radiated Power |
| EUMETCast | EUMETSAT multicast based broadcast system |
| EUMETSAT | European Meteorological Satellite Organisation |
| HVS | High Volume Service |
| ISI | Input Stream Identifier |
| LNB | low-noise block downconverter |
| PID | Packet IDentification |
| VCM | Variable Coding and Modulation |