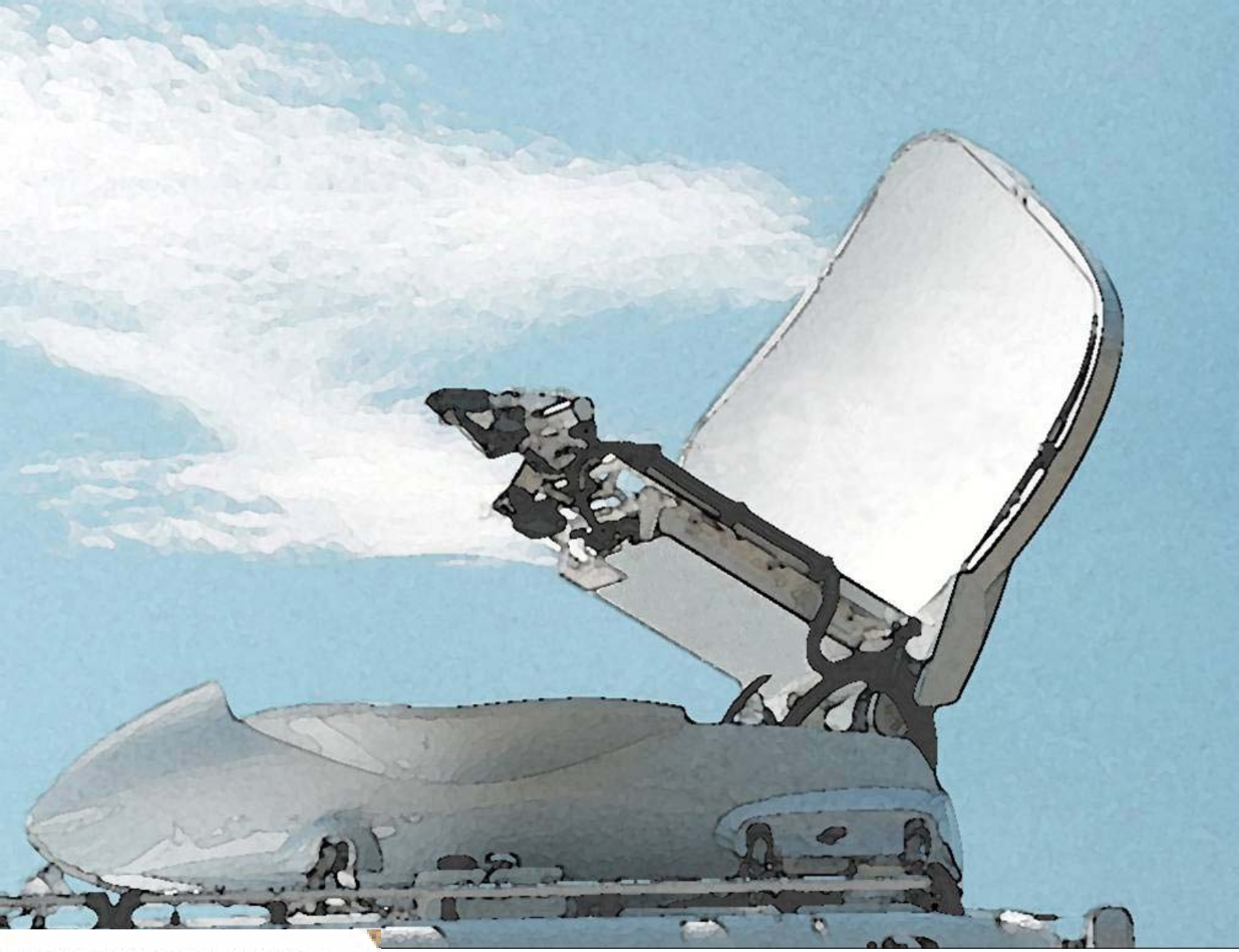

>> INTERACTING WITH YOUR WORLD

AUTOPOINTING ANTENNAS

RF PERFORMANCE AND POINTING CHARACTERISATION BY EUTELSAT

November 2011

eutelsat
communications via satellite

EARTH STATION ANTENNAS
AUTO-POINTING CHARACTERISATION
BY EUTELSAT

This list aims at providing Eutelsat customers with guidance on the selection of the most appropriate earth station equipment capable of automatically point and peak the antenna to Eutelsat Fleet, without need of expert operators.

We underline that the auto-pointing systems which are listed in this document have been characterised in regard of the Eutelsat criteria, but that **the Earth station operations and space segment access remain subject to application of procedures as per ESOG 140.**

Prior an access to the Eutelsat Fleet, each Earth station using one of these systems has to be applied for to the Earth Station Approval Office, as per indicated in the ESOG 110, and individually approved.

The criteria for inclusion are:

- Eutelsat is in possession of a full set of measured RF electrical characteristics,
- The antenna's RF performance fully meets the minimum Eutelsat requirements (EESS 502) at the characterisation's date.
- There is no known record of operational problems or interference issues related to this antenna,
- Auto-pointing performance has been validated repeatedly on at least three different satellites of the Eutelsat fleet.
- Use of VSAT reflectors is not encouraged, unless proven demonstration of manufacturing high quality processes and performance repeatability

Inclusion in the list is a decision which pertains uniquely and ultimately to Eutelsat alone.
At any moment a given antenna may be removed from the list, should Eutelsat deem necessary to do so, for operational reasons.

Notes:

- The characterisation's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standard at the inspection date.
- Any change to the characterized configuration need to be notified to Eutelsat and may be subject to further tests.
- The information which is provided in this book is relative to the dynamic antenna systems performance. Their static performance are shown on the following links:
  http://www.eutelsat.com/satellites/pdf/typeapproval.pdf
  http://www.eutelsat.com/satellites/pdf/RF_Characterisation.pdf

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Eutelsat S.A. Auto-Pointing Summary Sheet

Applicant:

ND SatCom GmbH
P.O. Box
88039 Friedrichshafen
GERMANY
Tel : +49 7545 939 8725
Fax : +49 7545 939 8866

Website **: www.ndsatcom.com**
Email : **christian.hauff@ndsatcom.com**

Antenna model:
SkyRAY Compact 1500
SkyRAY Compact 1500 Plus
SkyRAY MAS 1500

Diameter:
1.2 m
(See Remark 4)

Standard:
M

Characterisation date:
01-06-2011
Validity period:
See Remark 6

System Description:
Auto-pointing system based on the ERA type approved EA-A017 one piece 1.2 m Ku diamond shape offset antenna with mode generator, vehicle mounted, working with ND SatCom antenna controller ACU 4100 or ACU 5020 series and either a ND SatCom SkyWAN modem or a commercial IRD Tandberg TT1260 or equivalent as pointing device.

Maximum Allowed EIRP:

35.2 dBW / 4 kHz for digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 § 6.1 refers)

Tx Frequency:
13.75 - 14.50 GHz

Rx Frequency:
10.95 - 12.75 GHz

Pointing error:
Azimuth and Elevation $\leq$ 0.1°
Polarisation $\leq$2.1°

Tx XPD:
>27 dB within -1 dB contour

Rx XPD:
>27 dB within -1 dB contour

Remarks:

1 Tests have been performed via satellite with the ERS of Aflenz on the 23rd August 2010.
2 The system has been validated with two different Eutelsat satellites, both with an angle of the polarisation plane equal to 3.5°.
3 Transmission cannot be authorised until the peaking process is completed.
4 The dimensions of the Ku Diamond antennas are 1.5mx1.5m, the equivalent circular diameter is 1.2m
5 SkyRAY MAS/Compact 1500 is equipped with one HPA (400 Watt maximum), SkyRAY Compact 1500 Plus is equipped with two HPAs (400 Watt maximum for each).
6 The characterisation's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standard at the inspection date.
7 Any change to the characterised configuration need to be notified to Eutelsat and may be subject to further tests.

Eutelsat S.A. Auto-Pointing Summary Sheet

Applicant:

ND SatCom GmbH
P.O. Box
88039 Friedrichshafen
GERMANY
Tel : +49 7545 939 8725
Fax : +49 7545 939 8866

Website **: www.ndsatcom.com**
Email : **christian.hauff@ndsatcom.com**

Antenna model:

SkyRAY MAS 1900

Diameter:
1.5 m
(See Remark 4)

Standard:
M

Characterisation date:
01-08-2011
Validity period:
See Remark 6

System Description:
Auto-pointing system based on the ERA type approved EA-A004 one piece 1.5 m Ku diamond shape offset antenna with mode generator, vehicle mounted, working with ND SatCom antenna controller ACU 5020 series and either a ND SatCom SkyWAN modem or a commercial IRD Tandberg Rx1290 or equivalent as pointing device.

Maximum Allowed EIRP:

35.7 dBW / 4 kHz for digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 § 6.1 refers)

Tx Frequency:
13.75 - 14.50 GHz

Rx Frequency:
10.95 - 12.75 GHz

Pointing error:
Azimuth and Elevation $\leq$ 0.16°
Polarisation $\leq$2.0°

G/T:
23.9 dB/K @12.661 GHz for 35° Elevation

Tx XPD:
>27.8 dB within -1 dB contour
>30.0 dB within the de-pointing angle

Rx XPD:
Not measured

Remarks:

1 Tests have been performed via satellite with the ERS of Aflenz on the 30th June and 1st July 2011.
2 The system has been validated with three different Eutelsat satellites, with angles of the polarisation plane equal to either 0° or 3.5°.
3 Transmission cannot be authorized until the peaking process is completed.
4 The dimensions of the Ku Diamond antennas are 1.9mx1.9m; the equivalent circular diameter is 1.5m
5 SkyRAY MAS1900 can be equipped with one HPA (750 Watt maximum) or with two HPA's (750 Watt maximum for each). The tests were performed on a configuration with two HPAs of 400 W mounted on the back frame of the antenna.
6 The characterisation's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standard at the inspection date.
7 Any change to the characterised configuration need to be notified to Eutelsat and may be subject to further tests.

Eutelsat S.A. Auto-Pointing Summary Sheet

Applicant:

VISLINK Communications Ltd
27 Maylands Avenue
Hemel Hempstead
Hertfordshire, HP2 7DE
United Kingdom
Tel :+ 44 (0) 1442 431 300
Fax :+44 (0) 1442 431 301

Website **: www.vislink.com**
Email : **Dave.melville@vislink.com**

Antenna model:

FlyDrive 120

Diameter:
1.2 m

Standard:
M

Characterization date:
23-11-2011

Validity period:
See remark 5

System Description:
Auto-pointing system based on the Advent four segments 1.2 m Ku antenna with mode generator, for Fly away and Drive Away applications, working with Advent antenna controller ACU 5000 series and Advent Lynx 5100 Video Exciter/IRD.

Maximum Allowed EIRP:

45 dBW/40 kHz for digital carriers transmitted at the satellite receive contour of 0 dB/K (EESS 502 § 6.1 refers)

Tx Frequency:
13.75 - 14.50 GHz

Rx Frequency:
10.70 - 12.75 GHz

Pointing error:
Azimuth and Elevation $\leq$ 0.3°
Polarisation $\leq$1.1°

G/T:
17.7 dB/K @11.121 GHz for 30° Elevation

Tx XPD:
>33.8 dB at boresight
>32.0 dB within -1 dB contour

Rx XPD:
>23.4 dB within -1 dB contour

Remarks:

1 Tests have been performed via satellite with the ERS of Aflenz on the 22 and 23 August 2011.

2 The system has been validated with three different Eutelsat satellites, with angles of the polarisation plane equal to 3.5°.

3 Transmission cannot be authorized until the peaking process is completed.

4 FlyDrive 120 can be equipped with one HPA (400 Watt maximum).

5 The characterisation's validity is subject to regular submission of patterns to confirm that the system remains compliant with the Eutelsat standard at the inspection date.

6 Any change to the characterised configuration need to be notified to Eutelsat and may be subject to further tests.

ANNEX 1

THE POLARISATION SKEW OF THE EUTELSAT SATELLITES USING DUAL LINEAR POLARISATION

GENERAL

The linear polarisation planes (defined as X and Y and orthogonal to each other) of most of the Eutelsat satellites are not parallel/orthogonal to the equatorial plane.

For historical reasons, the polarisation planes are inclined by an angle with respect to the equatorial plane. This angle is referenced as the polarisation skew.

This value is of fundamental importance for the following types of antennas, whenever the polarisation alignment is performed in open loop (calculated):

- Earth Stations on Vessels (ESVs)
- Satcom-On -The Move (SOTM)
- Auto-pointing antennas

If the pointing and polarisation alignment software of an antenna falling in the categories above did not take duly into account this value of skew, the polarisation discrimination achieved at the end of the alignment would suffer a major degradation with respect to the value which the antenna optics could theoretically yield, with a consequent high risk of interference to other services on the opposite polarisation and the achievable performance would not be met.

VALUE OF THE SKEW OF THE EUTELSAT SATELLITES

The reference X-polarisation is defined as that polarisation whose plane makes an angle of 93.535° in an anti-clockwise direction, looking towards the earth, about a reference vector with respect to a plane containing this vector and the pitch axis. The reference vector is defined as the vector from the satellite in the direction 0.21° towards west and 6.07° towards north in satellite coordinates.

The reference Y-polarisation is defined as that polarisation whose plane is orthogonal to the X-polarisation plane and the reference vector defined above.

In other words the skew of the Eutelsat satellites is **+3.535°, clock-wise** when looking at the satellite from the earth, from anywhere on the meridian (**in the northern hemisphere**) corresponding to the orbital location of the satellite.

In the southern hemisphere the skew of the Eutelsat satellites is **+183.535°, clock-wise**, from anywhere on the meridian corresponding to the orbital location of the satellite.

There are six satellites of the Eutelsat fleet using linear polarisation which make exception.

These are:

Sesat2,
AB3,
Express A3,
Telstar 12.

for which the skew is 0.0 °

and

Telecom 2 C and Telecom 2 D

for which the skew is -22°, when looking at the satellite from the earth.

EUTELSAT SATELLITES USING DUAL CIRCULAR POLARISATION

To provide additional guidance to the development of automatic pointing and polarization alignment systems of antennas, it must be noted that Eutelsat operates part of the payload capacity of the following satellites:

AB3

W4

in dual circular polarisation

and part of the payload capacity of:

Telstar-12

in left hand circular polarisation