

**Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554**

In the Matter of)
)
)
DISH OPERATING L.L.C.)
) File No. SAT-AMD-2010_____)
Minor Amendment to Application for) File No. SAT-LOA-20090518-00053
Modification of DBS Authorization and)
Authority to Launch the EchoStar 14)
Satellite and to Operate it at 118.9° W.L.)
)
)

MINOR AMENDMENT

Pursuant to Sections 308, 309 and 319 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 308, 309 and 319, and Part 25 of the Commission’s Rules, 47 C.F.R. Part 25, DISH Operating L.L.C. (“DISH”) hereby files a minor amendment to its application for authority to modify its DBS authorization and to launch and operate the EchoStar 14 satellite on the 21 Direct Broadcast Satellite (“DBS”) channels already licensed to DISH at the 119 ° W.L. nominal orbital location.¹ Specifically, DISH amends the above-captioned application to reflect the results of the actual antenna tests that were recently conducted by DISH’s satellite manufacturer. In most respects, these tests confirm the specifications described in DISH’s original application. The only exceptions are minor and do not increase the potential for harmful interference to any other operational or planned DBS satellite. Nevertheless, out of an abundance of caution and to the extent necessary, DISH requests a waiver of Section 25.215 of the Commission’s rules, 47

¹ See File No. SAT-LOA-20090518-00053 (filed May 18, 2009) (“EchoStar 14 Application”).

C.F.R. § 25.215, to operate a few spot beams on EchoStar 14 with less than 30 dB cross-polarization isolation.

I. INTRODUCTION

On May 18, 2009, DISH filed an application for a minor modification of its DBS authorization, and authority to launch and operate its EchoStar 14 satellite at 118.9° W.L.² As explained in that application, EchoStar 14 will replace EchoStar 7, which currently operates at 118.9° W.L. The “CONUS-plus” capability of EchoStar 14 will increase DISH’s capacity to provide High Definition programming to subscribers, and its advanced spot-beam technology will enhance DISH’s ability to provide local-into-local stations across the country.

DISH now submits a minor amendment to that application for the purpose of providing the Commission with test results of its satellite manufacturer and, to the extent necessary, requesting a waiver of Section 25.215 of the Commission’s Rules, 47 C.F.R. § 25.215, to allow certain of the satellite’s spot beams to operate with less than 30 dB cross-polarization isolation.³ The proposed operations will not increase harmful interference into any other operational or planned DBS satellite. The only operational satellites that may be affected by this change are DISH’s own satellites at the 119° W.L. nominal orbital location, which include both EchoStar 7 and the EchoStar 14 satellite itself, and DISH is able to manage this without any impact on service quality to its customers; therefore, this amendment qualifies as minor. 47 C.F.R. § 25.116.

² *See id.*

³ DISH Network only recently discovered this minor deviation, as explained in the technical annex attached hereto as Attachment 1.

II. TECHNICAL REQUIREMENTS OF PART 25

The technical information for the EchoStar 14 satellite required to be submitted pursuant to Part 25 of the Commission's Rules was set forth in the Technical Narrative, FCC Form 312, and Schedule S of DISH's application to launch and operate EchoStar 14, and is incorporated herein by reference.⁴

The actual antenna tests recently conducted by DISH's satellite manufacturer have confirmed that the EchoStar 14 satellite, as built, is consistent with the technical requirements of Part 25 of the Rules in all but one respect—the cross-polarization isolation of 16 out of 51 transmit spot beams and 1 of 6 receive spot beams are, in the worst case, less than the minimum 30 dB required by Section 25.215 of the Commission's Rules, 47 C.F.R. § 25.215, as explained in detail in the technical annex. Accordingly, DISH hereby requests a waiver of Section 25.215 of the Rules to the extent required.

Commission Rules may be waived if there is good cause to do so.⁵ Here, there is good cause, and the International Bureau has already granted a similar waiver to DIRECTV.⁶ The Bureau explained in that case: “[I]icensees may use cross-polarization isolation different from that specified for the Region 2 BSS Plan if they demonstrate that such a difference does not result in interference to other operational or planned systems, including U.S. licensed systems.”⁷ As reflected in the attached technical annex, the lower cross-polarization isolation of the

⁴ See EchoStar 14 Application.

⁵ See 47 C.F.R. § 1.3; *WAIT Radio v. FCC*, 418 F.2d 1153 (D.C. Cir. 1969).

⁶ *DIRECTV, Inc.*, Order and Authorization, DA 05-2654, 20 FCC Rcd. DA 05-2654, (Int'l Bur. Oct. 5, 2005) (waiving Section 25.215 when the cross-polarization isolation of DIRECTV 5's DBS antennas was typically 27 dB over the satellite's primary coverage area). See also Stamp Grant, File No. SAT-LOA-20051221-00267 (granted Mar. 27, 2006).

⁷ *Id.* at ¶ 7.

ATTACHMENT 1
TECHNICAL ANNEX
EHOSTAR-14

Cross-Polarization Isolation of Certain Spot Beam Antennas

A.1 INTRODUCTION

This technical annex reports on the measurements of the cross-polarization isolation (“XPI”) performance of certain antenna beams on the EHOSTAR-14 satellite, which were taken recently when the satellite was tested as built by DISH Network’s satellite manufacturer. Also included here is an explanation as to why the resulting cross-polar isolation performance will not affect any other licensee or satellite operator.

A.2 COMPACT ANTENNA TEST RANGE (“CATR”) MEASUREMENTS

Measurements of the overall satellite antenna performance are routinely carried out late in the stage of the manufacture of a communications satellite. These measurements are performed using a Compact Antenna Test Range (“CATR”). DISH Network recently received the EHOSTAR-14 satellite’s CATR measurements after testing was completed. From these measurements, DISH Network identified the XPI deficiencies described below and determined there were no physical means to improve them in a reasonable time prior to the planned February 12th, 2010 shipment of the spacecraft.

Prior to the CATR measurements the antenna performance is predicted using computer models of the antenna. Those predictions were the basis of the data provided to the Commission in the application for the EHOSTAR-14 satellite filed on May 18, 2009.¹

A.3 NON-CONFORMING XPI RESULTS

DBS spot beams are usually required to serve areas further down the gain slope than might be required for a larger regional beam, such as a CONUS beam. Typically, because of the odd geographic shape of the DMAs (Designated Market Areas) that the spot beams must serve, it may be necessary to operate down to the -5 to -6 dB relative gain contour to reach all the DMAs,

¹ Furthermore, the XPOL specification in DISH Network’s contract with the satellite manufacturer was in fact 30 dB or better.

allowing for spacecraft mispointing effects. This reduces the achievable XPI performance because good XPI performance is most readily achieved relatively close to beam peak.

Table A-1 lists the worst-case XPI performance of those spot beams on ECHOSTAR-14 whose XPI within their service area was measured at below 30 dB, based on the CATR measurements. This is very much worst case in the sense that it gives the lowest XPI towards the furthest extreme of the worst DMA that might possibly be covered by that beam.

Table A-1: ECHOSTAR-14 Spot Beams with XPI less than 30 dB

Beam #	Channel # used by this beam	Pol.	Lowest XPI (dB)
A01	5	R	27
A02	4	L	29
A03	2	L	28
A04	5	R	24
A07	1	R	27
A13	1	R	28
A20	5	R	26
A22	5	R	26
A23	1	R	29
A24	1	R	23
	3	R	23
	5	R	22
A25	2	L	24
	4	L	25
A26	1	R	27
	5	R	28
B07	3	R	28
B08	2	L	28
B10	3	R	29
	5	R	26
B22	1	R	25
	5	R	27
R1	Receive beam operates on all channels	R & L	28

The following should be noted from these results:

- (a) All of the beams listed in Table A-1 are transmit beams with the exception of the last row of the table which identifies the Cheyenne receive beam. Only a minority of the total transmit spot beams (16 of the 51) have XPI below 30 dB.
- (b) There is some frequency dependence to the measurements for some beams. For example, beam B22 has XPI values 2 dB different for channels 1 and 5.
- (c) Eight of the 16 transmit spot beams never drop below 27 dB XPI in any channels used. A further five of those that fall below 27 dB do not fall below 25 dB XPI in any channel. That leaves three beams with XPI values lower than 25 dB XPI in at least one channel.
- (d) The worst case beam is beam A24 which is directed towards major DMAs in Alaska.

A.4 ASSESSMENT OF THE IMPACT OF NON-COMPLIANT XPI PERFORMANCE

In this section we will assess the impact, if any, that the below 30 dB performance on a few spot beams has on other users of the spectrum, as well as the impact on DISH Network itself. We conclude that the below 30 dB performance will not result in an increase in interference.

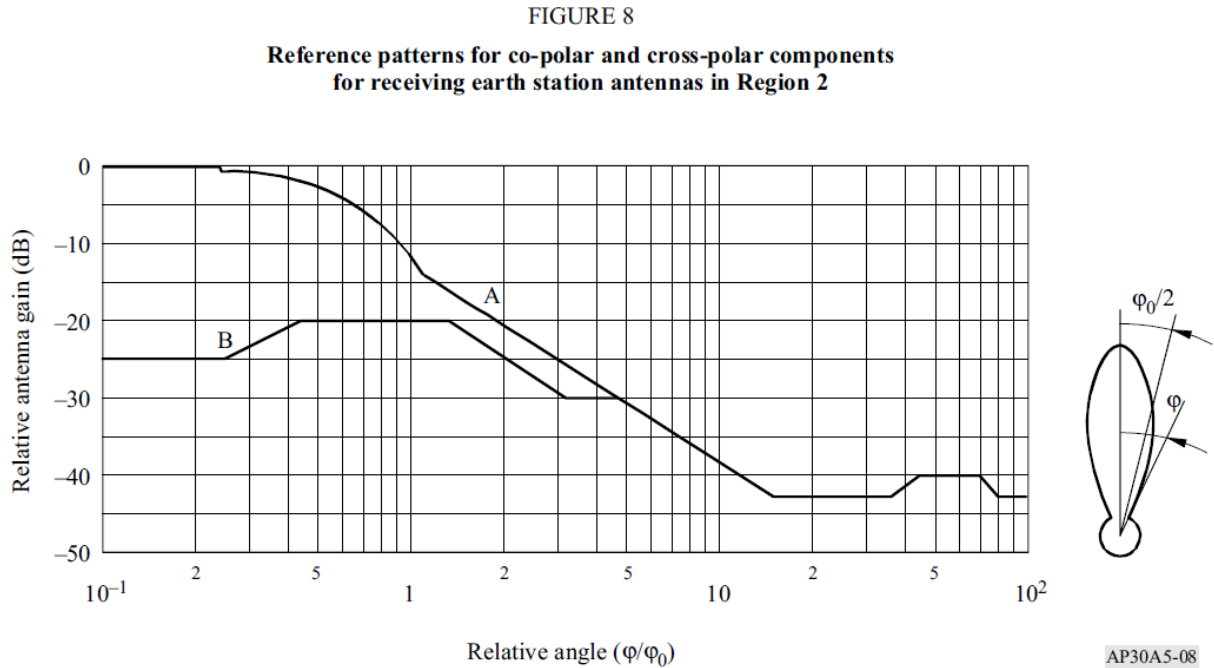
A.4.1 Impact on Collocated, Co-Coverage Satellite Networks

An example network in this category would be DIRECTV's satellite at the 119°W nominal cluster location. At this orbital location DISH Network is licensed by the Commission for channels 1 to 21 inclusive, and DIRECTV is licensed for channels 22 to 32 inclusive. Therefore the only channels where DIRECTV is operating cross-polar to DISH Network are channels 21 (DISH Network) and 22 (DIRECTV). The ECHOSTAR-14 satellite does not use channel 21 for spot beams and therefore there is no impact at all on DIRECTV's collocated network arising from any below 30 dB XPI performance in some of the ECHOSTAR-14 spot beams. In fact, ECHOSTAR-14 only uses channels 1 to 5 inclusive for spot beams – channels far removed from DIRECTV's channel 22.

A.4.2 Impact on Neighboring Co-Coverage Satellite Networks

Example networks in this category would be other DBS satellites that actually serve the USA (or are licensed to serve the USA but not implemented yet) from locations spaced typically between 4.5 and 10 degrees away from 119°W. For such networks to be co-coverage with ECHOSTAR-14 there must be sufficient orbital separation that the neighboring satellite appears well down from the main beam of the receive dishes in each network, and probably into the sidelobes. This inevitably means that the cross-polar isolation of the receive dish towards the neighboring satellite will be very poor as it is well outside of the main beam of the dish antenna. A relevant

reference for this performance characteristic can be found in Figure 8 of Annex 5 of Appendix 30 of the Radio Regulations which gives the reference co-polar and cross-polar radiation patterns for the receiving earth station in Region 2, and this has been reproduced below:



Note that the XPI (also referred to as XPD – Cross-Polar Discrimination) is between zero and 5 dB for off-axis angles (approximately the same as the orbital separation) greater than around 1.5°.

With this in mind, consider the situation where a neighboring satellite uses a channel that is cross-polar to one of the channels in ECHOSTAR-14. In this case there are two components to the cross-polar interference power received, I_X , as follows:

$$I_X \propto OAG_X + OAG_{CO} \cdot XPI_{Echo-14}$$

where:

OAG_X is the off-axis cross-polar gain of the receiving earth station in the neighboring network towards the ECHOSTAR-14 satellite (expressed as a linear quantity);

OAG_{CO} is the off-axis co-polar gain of the receiving earth station in the neighboring network towards the ECHOSTAR-14 satellite (expressed as a linear quantity);

$XPI_{Echo-14}$ is the XPI performance of the ECHOSTAR-14 satellite towards the earth station in the neighboring network (converted from dB into linear).

Note that $OAG_{CO} \div OAG_X$ is the XPD (expressed as a linear quantity) of the receiving earth station in the off-axis direction towards the ECHOSTAR-14 satellite, which we will optimistically assume to be 5 dB (3.16x in linear domain). With this assumption we can compute the right hand side of the above expression for the two cases of (a) when the XPI of ECHOSTAR-14 is 30 dB, and (b) when the XPI of ECHOSTAR-14 is reduced to 22 dB (the lowest value in Table A-1 above). The resulting increase in the cross-polar interference for case (b) relative to case (a) is 0.0721 dB, which is negligible.

Furthermore, in all likelihood, there will be co-polar interference from the neighboring satellite in addition to the cross-polar interference. With the above assumption that the XPD for the receiving earth station is 5 dB, this would result in the increase in interference being reduced by a factor of 3.16 (i.e., 5 dB) compared to the above computed value of 0.072 dB, making it only 0.023 dB impact due to the reduction in XPI for the worst-case beams of the ECHOSTAR-14 satellite.

A.4.3 Impact on DISH Network

Adjacent channels on DISH Network's own satellite(s) at the 119°W may experience slightly increased interference resulting from the reduced XPI performance, but this is marginal and can be managed by various operational techniques, such that the service quality to DISH Network's customers can be maintained at the required levels.

A.5 CONCLUSIONS

The impact of the reduction in XPI performance of certain spot beams on the ECHOSTAR-14 satellite will have no actual interference impact on any other users of the spectrum, as demonstrated above.

**CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING
ENGINEERING INFORMATION**

I hereby certify that I am the technically qualified person responsible for preparation of the engineering information contained in this application, that I am familiar with Part 25 of the Commission's rules, that I have either prepared or reviewed the engineering information submitted in this application and that it is complete and accurate to the best of my knowledge and belief.

_____/s/_____

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