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

In the Matter of	)	
ECHOSTAR KUX CORPORATION	)	File No. _____
Application for Authority to Construct, Launch And Operate a Geostationary Satellite Using The Extended Ku-band Frequencies in the Fixed-Satellite Service at the 121° W.L. Orbital Location	)	

APPLICATION

Pursuant to Sections 308, 309 and 319 of the Communications Act of 1934, as amended, 47 U.S.C. §§ 308, 309 and 319, Part 25 of the Commission's rules, 47 C.F.R. Part 25, and the Commission's *First-Come-First-Served Report and Order* ("*FCFS Orde*r"),[1] EchoStar KuX Corporation ("EchoStar") hereby re-files an application for authority to construct, launch and operate a geostationary ("GSO") satellite in the Fixed-Satellite Service ("FSS") using extended Ku-band frequencies (11.45-11.7 GHz downlink; 13.75-14.0 GHz uplink) at the 121° W.L. orbital location.[2] In accordance with the *FCFS Order*, the addition of this application will

[1] *In the Matter of Amendment of the Commission's Space Station Licensing Rules and Policies*, IB Docket No. 02-34, First Report and Order and Further Notice of Proposed Rulemaking, FCC 03-102 (rel. May 19, 2003) ("*FCFS Order*").

[2] By letter dated December 8, 2003, the International Bureau dismissed EchoStar's application for a satellite to be located at the same orbital slot with the same set of extended Ku-band frequencies. *See* Letter from Thomas S. Tycz, FCC to David K. Moskowitz, EchoStar KuX Corporation (Dec. 8, 2003). This application is being re-filed in order to correct the asserted deficiencies with the previously dismissed application.

not cause EchoStar to exceed the five-satellite limit for licensed-but-unbuilt and pending applications in the extended Ku-band frequencies.[3]

As the Commission is well aware, EchoStar is a leading provider of Direct Broadcast Satellite ("DBS") services in the multichannel video programming distribution ("MVPD") market with over 9 million subscribers. EchoStar and its affiliates own and operate eight DBS satellites at the 61.5° W.L., 110° W.L., 119° W.L., 148° W.L. and 157° W.L. orbital locations, as well as a hybrid Ka-/Ku-band FSS satellite at the 121° W.L. orbital location. The proposed satellite will supplement and support EchoStar's existing MVPD offerings with more local-into-local channels and international programming.

This satellite application satisfies the requirements for first-come-first-served processing under the *FCFS Order*, and EchoStar requests that it be placed in the appropriate position in the first-come, first-serve ("FCFS") queue based on its filing date and time.

I. GENERAL DESCRIPTION

The Technical Annex (*see* Exhibit 1) contains a detailed description of the technical specifications of the proposed satellite and is incorporated into this narrative by reference. EchoStar also supplies, as Exhibit 2, all necessary Advance Publication Information for transmittal to the International Telecommunication Union ("ITU").

In summary, the proposed extended Ku-band satellite will operate with 16 transponders each of 27 MHz usable bandwidth. Dual orthogonal polarization will be employed to give full frequency re-use of the uplink and downlink spectrum. All the transponders will use

[3] *See FCFS Order* at ¶¶ 230-231. In this regard, EchoStar notes that three of its pending extended Ku-band FSS applications at these locations were dismissed by the Commission, without prejudice to refiling, on December 8, 2003. This application replaces one of the dismissed applications and, as such, it is not subject to an application filing fee, 47 C.F.R. § 1.1109(d).

a single broad coverage beam on the downlink and a steerable spot beam on the uplink. The steerable uplink beam can be used to receive uplinks from various locations in other countries.

EchoStar will be uplinking transmissions from outside the United States and downlinking programming into the United States as well as possibly other countries, which clearly is international service in compliance with footnote NG104 of the U.S. Table of Allocations, 47 C.F.R. § 2.106 and footnote 2 of 47 C.F.R. § 25.202(a)(1). EchoStar may also be uplinking transmissions from within the United States if permitted to do so by the Commission. In EchoStar's view, a service with uplinks from the United States and downlinks to the United States and other countries should qualify as international service.[4] Because the Bureau has disagreed with this view, however, EchoStar hereby requests a waiver of footnote NG104 of the U.S. Table of Allocations, 47 C.F.R. § 2.106, and footnote 2 of 47 C.F.R. 25.202(a)(1), to allow uplink transmissions from within the United States and downlink programming to locations in the United States and elsewhere. *See* Section VII below. If its waiver request is granted, EchoStar envisions using the steerable beam both to uplink transmissions from EchoStar's earth station located at Cheyenne, Wyoming, and to uplink transmissions (including international programming) directly from other countries (*e.g.* Canada, Mexico and Peru). If the waiver request is denied, EchoStar will conduct uplink transmissions exclusively from other countries, which would indisputably qualify the service as international.

EchoStar plans to locate its TT&C earth station and satellite control facilities for the proposed satellite in the United States. TT&C is not a conventional communications link, and therefore cannot be considered in the context of being "domestic" or "international" in

[4] Among other things, a narrower reading of the term "international" would threaten to undo the Commission's First-Come, First-Served processing system, as the ORBIT Act's prohibition on auctions for "international" systems would not apply in cases of combined domestic and international services.

nature. Inevitably a TT&C link must uplink and downlink from the same earth station. For reliability, cost and other reasons that earth station should preferably be located within the United States. Therefore, EchoStar believes it is not necessary to obtain a waiver of footnote NG104 of the U.S. Table of Allocations, 47 C.F.R. § 2.106, and footnote 2 of 47 C.F.R. 25.202(a)(1), in order to allow a United States TT&C facility to control the proposed satellite. However, to the extent that the Commission believes that a waiver of the Rules is necessary for TT&C operations in the United States using the extended Ku-band frequencies, it hereby requests such a waiver. Should that waiver too be deemed necessary and denied, EchoStar is prepared to conduct TT&C operations from a foreign uplink center.

The proposed satellite will communicate with receive-only earth terminals in the extended Ku-band frequencies in the United States.[5] As the downlink beam will comply with the power flux density limits in 47 C.F.R. § 25.208(b), protection of the co-primary Fixed Service (FS) is assured. As for potential interference from FS terminals, EchoStar expects that its receive terminals can co-exist within this interference environment in most geographic areas of the country while maintaining an acceptable quality of service without any frequency coordination. Buildings, foliage and terrain will naturally block FS signals. In areas where the level of interference from FS transmitting stations into EchoStar receive terminals does reach unacceptable levels, a number of interference mitigation techniques can be employed, including careful placement of the receiver and/or additional shielding of the receive earth station. EchoStar does not envision the need for any frequency coordination with the FS stations for its smaller terminals.

[5] These earth terminals may have transmit capabilities in other frequency bands, but will not be transmitting in the extended Ku-band.

II. SERVICES TO BE PROVIDED

EchoStar will use the proposed satellite to provide primarily three types of services:

- Direct-to-Home services, including bandwidth-intensive "local-into-local" and High Definition ("HD") services, to supplement the services provided today by EchoStar's DBS satellites and alleviate many of the spectrum constraints that have hampered its DBS offerings.
- Transport of programming to EchoStar's DBS uplink centers, to serve its increasing needs for feeding programming to these centers.
- International Direct-to-Home, broadband and programming transport services.

EchoStar proposes to offer Direct-to-Home services, interactive services and HD content to consumers using transactions modeled on the current relationship between EchoStar and its DBS subscribers, which (as the Commission is aware) is a non-common carrier relationship, or other non-common carrier transactions.

III. FINANCIAL QUALIFICATIONS – COST OF CONSTRUCTION, LAUNCH AND OPERATION

The *FCFS Order* abolished the requirement of submitting an estimate of the proposed system's cost, as well as the financial qualification requirements.[6] Nonetheless, EchoStar is amply qualified to finance the construction, launch and operation of the proposed satellite.

[6] *FCFS Order* at ¶ 164, app.B §§ 6 and 13 (deleting §§ 25.114(c)(13), 25.140(b)(3)-(4) and 25.140(c)-(d)).

IV. LEGAL QUALIFICATIONS

EchoStar's legal qualifications are a matter of record and are also set forth in the Form 312 submitted today for this satellite.

V. MILESTONES

EchoStar will submit itself to the milestones contemplated by the Commission's new rules for satellite licensees as set forth in the *FCFS Order*.[7]

VI. PUBLIC INTEREST CONSIDERATIONS

The grant of this application clearly serves the public interest by allowing the provision of additional DTH services (including more local-into-local and High Definition ("HD") channels), programming transport, and international services.

DTH services. The proposed satellite will help EchoStar become more competitive with cable operators in the MVPD market. Specifically, EchoStar has been laboring under the twin handicap of finite DBS spectrum and the lack of a "return" link that could enable truly interactive satellite services. The DBS spectrum (up to 32 channels at each of a finite number of orbital locations) provides EchoStar with significantly less programming capacity than is available to digital cable systems. This limited spectrum must be used to provide local broadcast channels, national programming, HD content and interactive services across the entire United States. This spectrum constraint is exacerbated by the need to provide local broadcast channels by satellite to as many cities as possible and by the must-carry rules, as well as by consumer demand for more HD channels. In contrast, most cable systems can devote a full 750 MHz or more in each MSA to provide local, national and HD programming, as well as

[7] *See FCFS Order* at ¶ 174 (contract execution within 1 year; Critical Design Review within 2 years; Commence Construction within 3 years; and Launch and Operate within 5 years).

interactive and data services.[8] Even with spot beam satellites, the use of a DBS channel to provide local stations in one city generally reduces the spectrum available for DBS services elsewhere in the nation. Indeed, the need for more spectrum alternatives appears to grow more acute by the day as EchoStar attempts to provide local channels to an increasing number of MSA's and as more HD channels become available.

While the proposed satellite certainly will not be enough to cure this spectrum shortage problem, it is imperative for EchoStar to deploy additional spectrum resources at orbital locations that can "view" the entire United States in order to lessen this widening competitive handicap.

Programming Transport. Grant of this application will help better serve EchoStar's increasing need for the efficient transport of programming to its uplink centers, to the ultimate benefit of DBS consumers.

International Services. EchoStar proposes to use the proposed satellite for various types of international services. In particular, EchoStar's DBS business plan is increasingly focused on international programming.[9] The proposed satellite will help EchoStar provide to its customers many channels of international programming, including Latin American programming that is especially popular to U.S. consumers of Hispanic origin. Subject to the satellite's coverage capabilities and the licensing requirements in other countries, as well as the applicable regulations regarding the size of earth stations in certain frequency bands, EchoStar is also interested in developing business plans for international DTH and broadband services to

[8] *Annual Assessment of the Status of Competition in the Market for the Delivery of Video Programming*, Ninth Annual Report, MB 02-145, FCC 02-338, at ¶ 23 tbl.3 (2002).

[9] *See* EchoStar Communications Corp., Press Release, *EchoStar's Dish Network to Launch up to 100 New International Satellite TV Channels This Summer* (Apr. 4, 2003).

consumers in those countries, starting with countries that have reached DTH/FSS bilateral agreements with the U.S.

VII. REQUESTS FOR WAIVER OF COMMISSION RULES

A. Waiver to Permit Domestic Service – Footnote NG104 of the U.S. Table of Allocations and Footnote 2 of 47 C.F.R. § 25.202(a)(1)

Pursuant to Section 1.3 of the Commission's Rules, EchoStar hereby requests waivers of NG104 of the U.S. Table of Allocations, 47 C.F.R. § 2.106, and footnote 2 of 47 C.F.R. § 25.202(a)(1) *to the extent necessary* to permit it to provide domestic service as well as international service from the proposed satellite.

Both NG104 and footnote 2 limit the use of the 10.95-11.2 GHz and 11.45-11.7 GHz downlink bands to "international systems" only. To the extent that EchoStar is uplinking from outside the United States and downlinking programming into the United States, the proposed satellite is an "international system." EchoStar further submits that its provision of mixed domestic/international services (uplink from the U.S., downlinks serving both the U.S. and other countries) complies with the Commission's Rules for the use of the requested frequency bands. It recognizes, however, that the Bureau has taken a contrary view in dismissing its earlier filed application to construct, launch and operate a similar satellite at the same orbital location. Accordingly, EchoStar is requesting this waiver of the Rules to allow for both domestic and international services using the proposed satellite.

Commission rules may be waived "for good cause shown."[10] In particular, a waiver of the Table of Allocations to permit non-conforming spectrum uses is generally granted "when there is little potential interference into any service authorized under the Table of Frequency Allocations and when the non-conforming operator accepts any interference from

[10] 47 C.F.R. § 1.3; *WAIT Radio v. FCC*, 418 F.2d 1153, 1157 (D.C. Cir. 1969).

authorized services."[11] A waiver is also appropriate where a grant "would not undermine the underlying policy objectives of the rule in question" and would be in the public interest.[12]

In this case, there is good cause for the requested waivers. The placement of receive-only antennas on an uncoordinated basis in the United States will not inhibit or otherwise negatively impact the operations of FS stations in the extended Ku-band. The downlink beam from the proposed satellite will comply with the power flux density limits in the Commission's Rules, thus fully protecting FS operations from interference. With respect to potential interference from FS operations, EchoStar expects that its receive terminals can co-exist with FS stations in most geographic areas of the country while maintaining an acceptable quality of service. Buildings, foliage and terrain will naturally block FS signals. In areas where the level of interference from FS transmitting stations into EchoStar receive terminals is high, a number of interference mitigation techniques can be employed, including careful placement of the receiver and/or additional shielding of the receive earth station. In any event, EchoStar will accept any level of interference from FS stations into its earth stations in the extended Ku-band.

Moreover, the requested waivers of footnote NG104 of the U.S. Table of Allocations and footnote 2 of 47 C.F.R. § 25.202(a)(1) would not undermine the underlying policy objective of those two rules – "namely to minimize the overall number of earth stations in order to limit the areas in which future terrestrial fixed service would be precluded."[13] In this

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[11] *See The Boeing Company*, Order and Authorization, 16 FCC Rcd. 22645, 22651 ¶ 12 (Int'l Bur. 2001); *Fugro-Chance, Inc.*, Order and Authorization, 10 FCC Rcd. 2860, 2860 ¶ 2 (Int'l Bur. 1995) (authorizing non-conforming MSS in the C-band); *see also Motorola Satellite Communications, Inc.*, Order and Authorization 11 FCC Rcd. 13952, 13956 ¶ 11 (Int'l Bur. 1996) (authorizing service to fixed terminals in bands allocated to the mobile-satellite service).

[12] *See GE American Communications, Inc.*, Order and Authorization, 15 FCC Rcd. 3385, 3391 ¶ 14 (Int'l Bur. 1999).

[13] *Id*. at 3392 ¶ 15.

case, FS operations will not be impacted by EchoStar's operations in the United States because of the proposed use of receive-only earth stations that can accept interference from FS stations without any frequency coordination.[14] Accordingly, the Bureau should waive those restrictions here.

The grant of the requested waivers will also serve the public interest as the proposed satellite will supplement and support EchoStar's existing MVPD offerings (*i.e.* more local-into-local channels and international programming). These services will enable EchoStar to compete more effectively with its dominant competitors, the incumbent cable operators.[15]

In any event, even if the Commission were to deny the requested waivers, EchoStar is prepared to conduct uplink transmissions exclusively from other countries. A service consisting of uplinks from outside the U.S. and downlinks into the U.S. indisputably qualifies as international even under a narrow interpretation of the term. Therefore, even if EchoStar's waiver request were to be denied, this application should be granted on the condition that the proposed satellite only be used to provide international service. If this were the case, EchoStar will comply with the requirements of footnote NG104 and footnote 2 of 47 C.F.R. § 25.202(a)(1) by only pointing the steerable uplink beam at points outside the United States.

[14] This is the key difference between EchoStar's proposal in this application and GE's proposal in *GE American*, *id*., namely that EchoStar's receive-only terminals (unlike GE's) will not need to be coordinated with FS stations (or vice versa) in the downlink band. *Compare id.* at 3390 ¶ 12 (noting GE's proposal that "any interference concerns that arise can be dealt with through the coordination process.").

[15] See Section VI., *supra*, for more on the public interest benefits that would be realized from licensing the proposed satellite.

B. Waiver to Permit TT&C Operations in the United States – Footnote NG104 of the U.S. Table of Allocations and Footnote 2 of 47 C.F.R. § 25.202(a)(1)

In addition, to the extent that the Commission believes that waivers of footnote NG104 of the U.S. Table of Allocations and footnote 2 of 47 C.F.R. § 25.202(a)(1) are also necessary for TT&C operations in the United States using the extended Ku-band frequencies, EchoStar hereby requests such waivers.

As previously noted, EchoStar plans to locate its TT&C earth station and satellite control facilities for the proposed satellite in the United States. TT&C is not a conventional communications link, and therefore cannot be considered in the context of being "domestic" or "international" in nature. Consequently, EchoStar believes it is not necessary to obtain a waiver of footnote NG104 of the U.S. Table of Allocations, 47 C.F.R. § 2.106, and footnote 2 of 47 C.F.R. 25.202(a)(1), in order to allow a United States TT&C facility to control the proposed satellite.

However, if the Commission considers that a waiver of these two Rules is necessary for TT&C operations in the United States using the extended Ku-band frequencies, EchoStar hereby requests such a waiver. There is good cause to waive these rules for TT&C purposes. Inevitably, a TT&C link must uplink and downlink from the same earth station. For reliability, cost and other reasons that earth station should preferably be located within the United States. Waiving these rules will also ensure that a U.S.-licensed satellite is controlled from an earth station in the United States. In addition, a waiver of these rules for TT&C purposes would not undermine the policy of the rules because TT&C operations would be conducted from only one (or perhaps only a small number) of earth stations within the United

States.[16] In any event, if the Bureau believes that a waiver of these rules for TT&C is necessary and if it were to deny this waiver request, EchoStar is prepared to conduct TT&C communications too from an uplink center located outside the U.S.

VIII. COMPLIANCE WITH COMMISSION RULES

The proposed satellite is compatible with the Commission's two-degree spacing requirements and will not cause harmful interference to any authorized user of the spectrum. Except where waivers have been requested, it also complies with all technical and non-technical requirements of Part 25 of the Rules, as amended by the *FCFS Order*. Specifically, EchoStar will comply with all applicable power flux density limits[17] and with the Commission's full frequency reuse requirements.[18] Except where waivers have been requested, EchoStar also commits to comply with all of the Commission Rules applicable to GSO FSS satellites operating in the extended Ku-band.

IX. ORBITAL DEBRIS MITIGATION

Pursuant to 47 C.F.R. § 25.217(d), applicants requesting a satellite authorization must submit a narrative statement describing the debris mitigation design and operational strategies, if any, that they will use.

To control orbital debris, EchoStar will use a design for its satellite and launch vehicle that minimizes the amount of debris released during normal operations. To ensure that

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[16] *See*, *e.g.*, *The Boeing Company*, Order and Authorization, 18 FCC Rcd. 12317 at ¶ 15 (Int'l Bur. 2003) (explaining that "it would not disserve the policy objective of NG104" to permit NGSO FSS and GSO MSS systems to use the extended Ku-band frequencies for feeder link operations "because the total number of such gateway stations would be relatively small" and "may [therefore] present fewer constraints for terrestrial systems . . . .").

[17] *See* 47 C.F.R. §§ 25.208(b).

[18] *See* 47 C.F.R. § 25.210(f).

its satellite does not become a source of orbital debris, EchoStar will conduct an analysis to ensure that the probability of collision with any known space borne objects during its normal operational lifetime is minimal. EchoStar will also conduct an analysis that demonstrates that no realistic failure modes exist or can lead to an accidental explosion during normal operations or before completion of post operations disposal. At the end of the operational life of the satellite, EchoStar will maneuver its spacecraft to a storage orbit with a perigee altitude above its normal operational orbit. EchoStar will use a maneuver strategy that reduces the risk of leaving any of its spacecraft near an operational orbit. After the satellite reaches its final disposal orbit, all on-board sources of stored energy will be depleted or safely secured.

X. ITU COST RECOVERY

EchoStar is aware that as a result of the actions taken at the 1998 Plenipotentiary Conference, as modified by the International Telecommunication Union ("ITU") Council in June 2001, processing fees will now be charged by the ITU for satellite network filings. As a consequence, Commission applicants are responsible for any and all fees charged by the ITU. EchoStar hereby states that it is aware of and unconditionally accepts this requirement and its responsibility to pay any ITU cost recovery fees for the ITU filings associated with this application. Invoices for such fees may be sent to the contact representative listed in the accompanying Form 312.

XI. CONCLUSION

For the foregoing reasons, EchoStar respectfully requests that the Commission promptly approve this application as in the public interest, convenience and necessity.

Respectfully submitted,

EchoStar KuX Corporation

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Exhibit 1

TECHNICAL ANNEX

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 pleading, 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 pleading, and that it is complete and accurate to the best of my knowledge and belief.

_____/s/_____

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ECHOSTAR-121W-KuX

ATTACHMENT A
TECHNICAL DESCRIPTION

A.1 GENERAL DESCRIPTION

The ECHOSTAR-121W-KuX satellite will operate at the 121°W.L. orbital location to provide FSS ("Fixed Satellite Service") services to North and Central America. The satellite will use the 13.75-14.0 GHz uplink frequency band and the 11.45-11.7 GHz downlink frequency band.

The satellite will carry sixteen extended Ku-band transponders, each of 27 MHz bandwidth. Dual orthogonal polarization will be employed to give full frequency re-use of the uplink and downlink spectrum. All the transponders will use a single broad coverage beam on the downlink and a steerable spot beam on the uplink.

A.2 ORBITAL LOCATION

EchoStar requests Commission authority to use the 121°W.L. geostationary orbital location for the ECHOSTAR-121W-KuX satellite. This available orbital location provides high elevation angles to all of North and Central America including Hawaii, which is very important for satellite services to large numbers of small and inexpensive consumer earth stations, which will be used at Ku-band. The high elevation minimizes the risk of signal blockage due to buildings and foliage, and also minimizes the atmospheric and rain attenuation.

Figure A.2-1 shows the elevation angles to the 121°W.L. orbital location. Note that the majority of CONUS and Hawaii are above the 30° elevation angle. The only parts of the service area that is below 30° are parts of North East CONUS (where the elevation angle is still greater than approximately 15°).

In addition, EchoStar has an existing hybrid Ku/Ka-band satellite (EchoStar-9) operational at the 121°W.L. orbital position, and the additional Ku-band spectrum that is the subject of this application will open up new service opportunities in the provision of direct-to-home ("DTH") and broadband services to the US public.

Figure A.2-1 – Elevation Angles to the 121°W.L. Orbital Location

A.3 SATELLITE COVERAGE

Sections A.5 and A.6 provide full details of the antenna beams used to provide these satellite coverages.

The ECHOSTAR-121W-KuX satellite will provide one-way direct-to-home ("DTH") satellite and other fixed satellite services at extended Ku-band frequencies to CONUS, Hawaii, Puerto Rico and Mexico, as well as to parts of Canada. The beam coverage consists of a single large downlink beam and a small steerable uplink spot beam used primarily for feeder links.[1]

A.4 FREQUENCY AND POLARIZATION PLANS

The ECHOSTAR-121W-KuX satellite frequency plan is shown in Table A.4-1. This table provides the transponder center, upper and lower frequencies, as well as transponder polarizations.

All the transponders are of nominal 27 MHz usable bandwidth, with a spacing between co-polar transponder center frequencies of 30 MHz. Linear polarization is used throughout. The cross-polar transponders are offset by 10 MHz relative to the co-polar ones in order to achieve additional isolation resulting from the guard bands.

TT&C operations will take place in portions of the main service link frequency ranges of the satellite, as discussed in detail in Section A.19.

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[1] §25.204(f) currently restricts FSS earth station antenna diameters in the 13.75-14.0 GHz band to a minimum size of 4.5 meters. Should the Commission relax this restriction in the future as a result of decisions taken at the 2003 World Radiocommunications Conference, EchoStar reserves the right to make a future modification to the satellite's receive beams in order to allow for the provision of two-way services in the extended Ku-band.

Table A.4-1 – Transponder Frequency Plan

	UPLINK				DOWNLINK			
Txpdr #	Pol'n	Center Freq	F_{low}	F_{high}	Pol'n	Center Freq	F_{low}	F_{high}
KuX - 1	HP	13,765.00	13,751.50	13,778.50	VP	11,465.00	11,451.50	11,478.50
KuX - 2	VP	13,775.00	13,761.50	13,788.50	HP	11,475.00	11,461.50	11,488.50
KuX - 3	HP	13,795.00	13,781.50	13,808.50	VP	11,495.00	11,481.50	11,508.50
KuX - 4	VP	13,805.00	13,791.50	13,818.50	HP	11,505.00	11,491.50	11,518.50
KuX - 5	HP	13,825.00	13,811.50	13,838.50	VP	11,525.00	11,511.50	11,538.50
KuX - 6	VP	13,835.00	13,821.50	13,848.50	HP	11,535.00	11,521.50	11,548.50
KuX - 7	HP	13,855.00	13,841.50	13,868.50	VP	11,555.00	11,541.50	11,568.50
KuX - 8	VP	13,865.00	13,851.50	13,878.50	HP	11,565.00	11,551.50	11,578.50
KuX - 9	HP	13,885.00	13,871.50	13,898.50	VP	11,585.00	11,571.50	11,598.50
KuX - 10	VP	13,895.00	13,881.50	13,908.50	HP	11,595.00	11,581.50	11,608.50
KuX - 11	HP	13,915.00	13,901.50	13,928.50	VP	11,615.00	11,601.50	11,628.50
KuX - 12	VP	13,925.00	13,911.50	13,938.50	HP	11,625.00	11,611.50	11,638.50
KuX - 13	HP	13,945.00	13,931.50	13,958.50	VP	11,645.00	11,631.50	11,658.50
KuX - 14	VP	13,955.00	13,941.50	13,968.50	HP	11,655.00	11,641.50	11,668.50
KuX - 15	HP	13,975.00	13,961.50	13,988.50	VP	11,675.00	11,661.50	11,688.50
KuX - 16	VP	13,985.00	13,971.50	13,998.50	HP	11,685.00	11,671.50	11,698.50

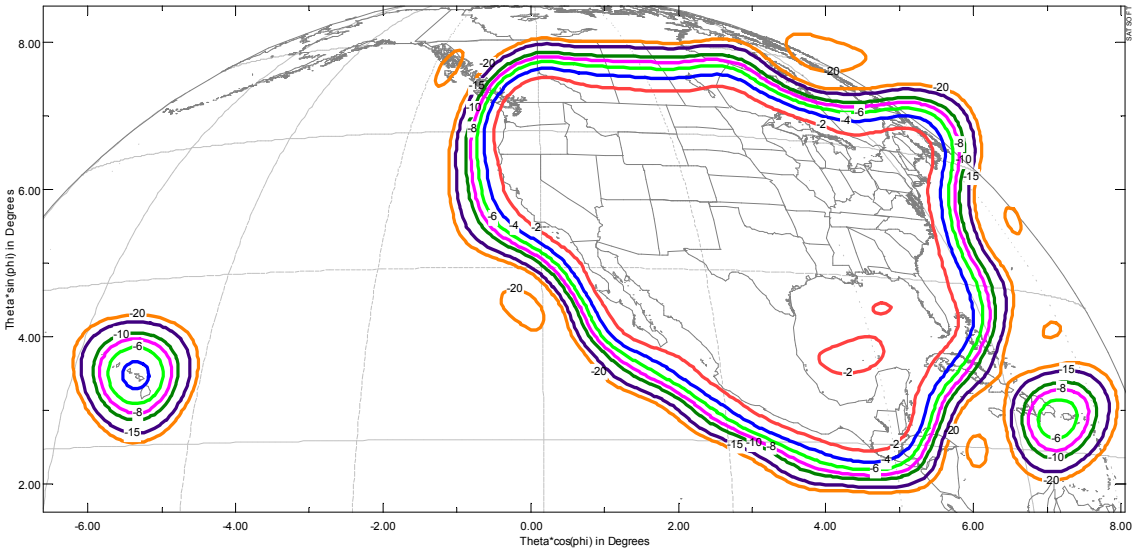
A.5 SATELLITE TRANSMIT CAPABILITY

Figure A.5-1 shows the relative gain contours for the downlink beam. The peak antenna gain is 30.8 dBi.

Each transponder will use a 135 Watt TWTA, providing approximately 21.3 dBW saturated power at the TWTA output. The losses between the TWTA output and the antenna input amount to 1.8 dB. The resulting beam peak saturated EIRP level for these transponders will be 50.3 dBW (i.e., 30.8+21.3-1.8). All of CONUS and Mexico is within the -2 dB relative gain contour and therefore will receive an EIRP of greater than 48.3 dBW. Hawaii will receive an EIRP generally greater than 46.3 dBW and Puerto Rico greater than 44.3 dBW. The cross-polar isolation of the satellite transmit antennas will exceed 30 dB within the -6 dB gain contour at all transmit frequencies.

Figure A.5-1 – Downlink Beam Coverage

(Contours shown are -2, -4, -6, -8, -10, -15, and -20 dB relative to the beam peak)



A.6 SATELLITE RECEIVE CAPABILITY

The satellite will utilize a relatively small receive spot beam that will be used primarily for feeder link transmissions. This spot beam will be fully steerable, by ground telecommand, to any point on the visible Earth, and will be used to receive feeder link transmissions from outside the USA in the baseline configuration. It is expected that this beam will be used for uplink transmissions from Mexico City, but this is tentative. The beam relative gain contours for the example of the beam pointing towards Mexico City are given in Figure A.6-1. Alternatively, subject to the FCC granting any necessary waivers, the uplink beam may be pointed towards Cheyenne, WY, in which case the relative gain contours are shown in Figure A.6-2.

The peak receive antenna gain for these spot beams is 44.4 dBi. However, in order not to make the feeder uplink over-sensitive to interference from transmissions to adjacent satellite networks, an adjustable attenuator with a range of 15 dB in 1 dB steps is employed between the spot beam receive antenna and the first active amplifier in the receiver chain of the satellite. As a result of

this, the effective beam peak G/T as seen by the receiver chain for the extended Ku-band spot receive beams ranges between +14.4 dB/K and -0.4 dB/K within the -1 dB relative gain contour.

The cross-polar isolation of the satellite receive antenna exceeds 30 dB within the -4 dB gain contour at all receive frequencies.

Figure A.6-1 – Example Uplink Beam Coverage for Baseline Configuration (Non-US Uplink – Mexico City Example)

(Contours shown are -2, -4, -6, -8, -10, -15, -20 and -25 dB relative to the beam peak)

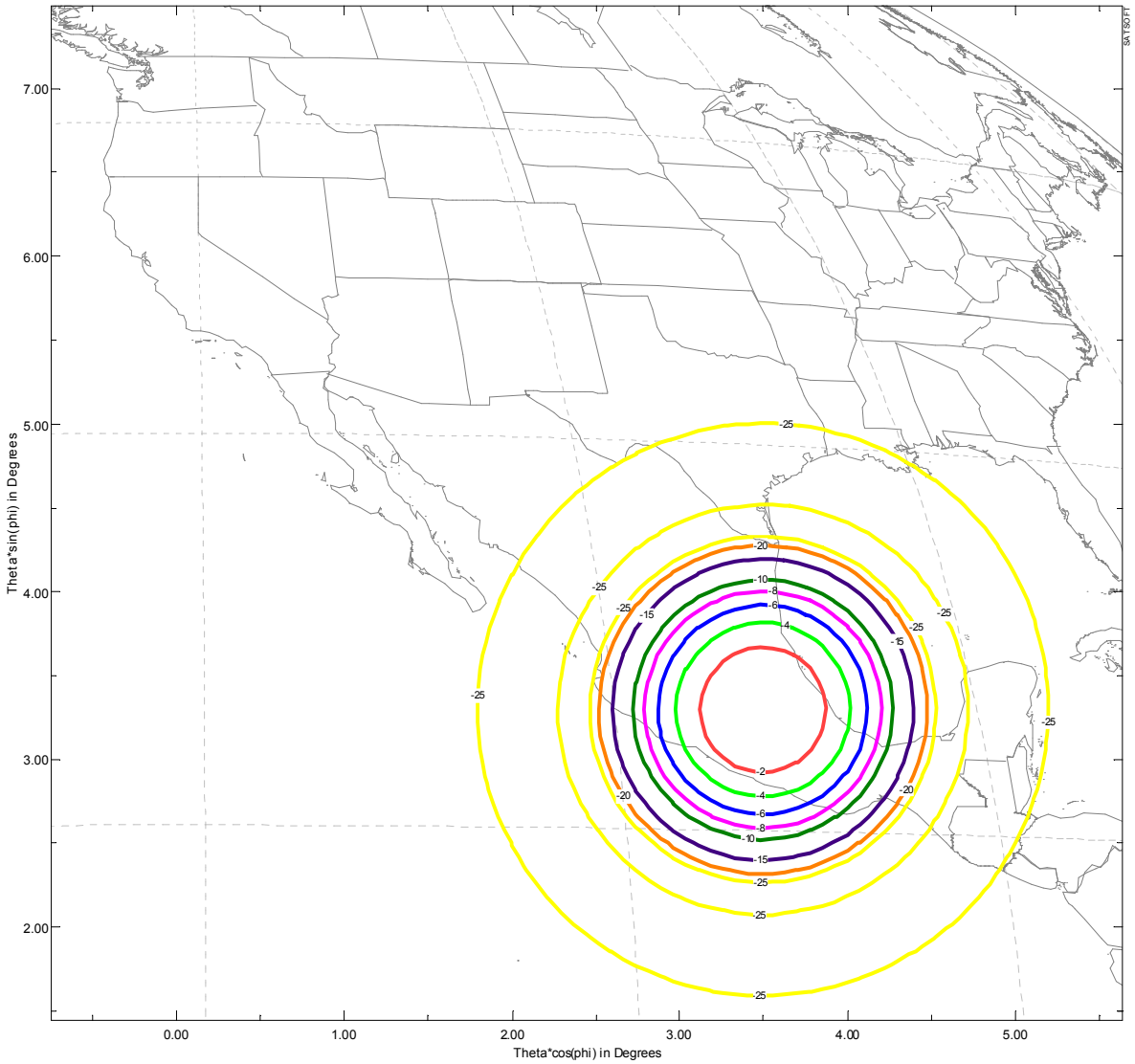
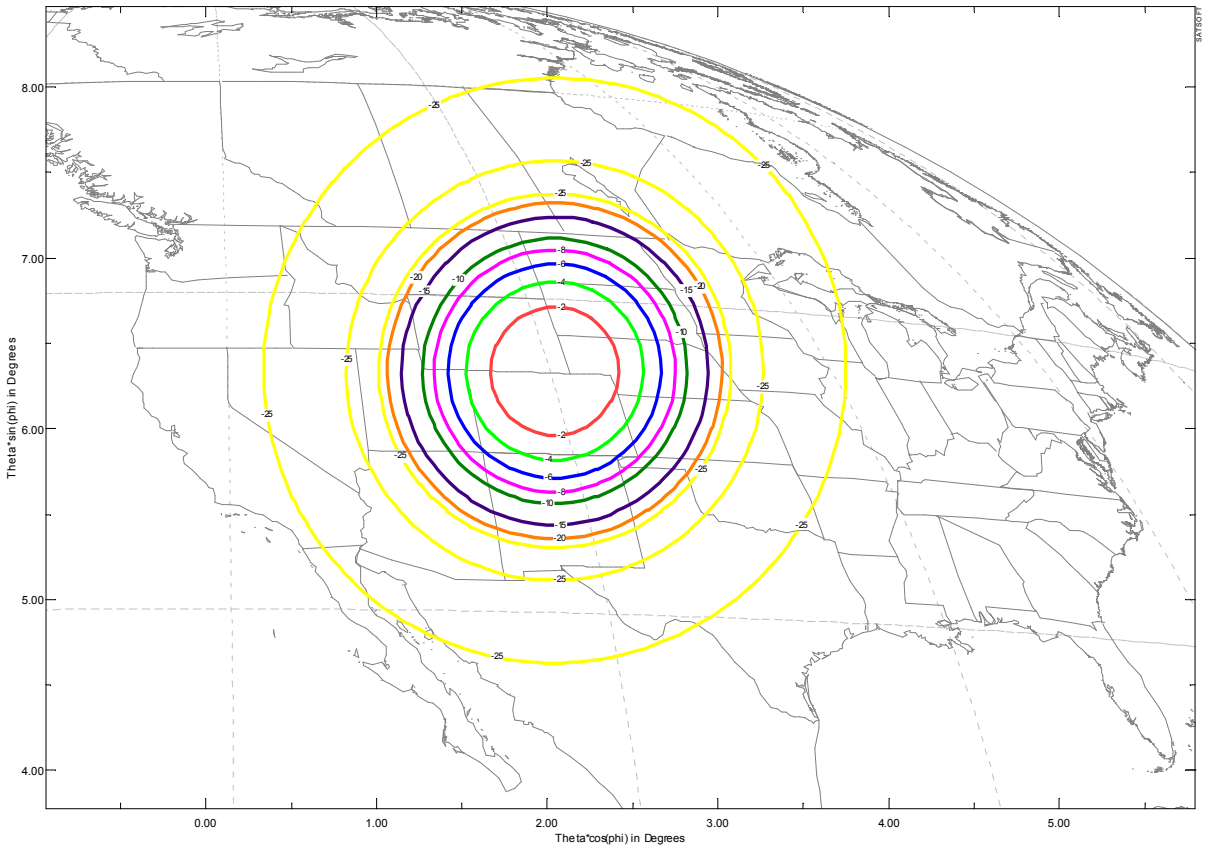


Figure A.6-2 – Example Uplink Beam Coverage for Alternative Configuration (US Uplink - Cheyenne, Wyoming)
(Contours shown are -2, -4, -6, -8, -10, -15, -20 and -25 dB relative to the beam peak)



A.7 TRANSMISSION SCHEMES

The transponders in the ECHOSTAR-121W-KuX satellite are of the conventional bent-pipe type, with channel filtering consistent with the transponder bandwidths. The same transmission scheme will therefore be used on both uplink and downlink for the same transponder. Digital modulation will be used throughout.

The main operating mode will be to support a one-way broadcast DTH application, where the feeder uplink consists of a wideband digital multiplex modulated onto a single carrier, operating close to saturation of the transponder. The digital multiplex will be received by large numbers of

small ground receive terminals, each capable of being programmed to receive certain information from the multiplex.

A.8 TRANSPONDER GAIN CONTROL AND SATURATION FLUX DENSITY

The gain of each transponder between the output of the receiving antenna and the input to the transmitting antenna is approximately 120 dB. All transponders will operate in a programmable Automatic Level Control (ALC) mode. This will maintain the transponders operating at or very close to TWTA saturation, even in the presence of feeder uplink signal fades due to rain attenuation effects. At receive beam peak the ALC has the effect of adjusting the SFD from -80 to -98 dBW/m^2. To maintain correct operation over the range of foreseen conditions the ALC will have a dynamic range of 18 dB.

A.9 SATELLITE TRANSPONDER FILTER RESPONSE

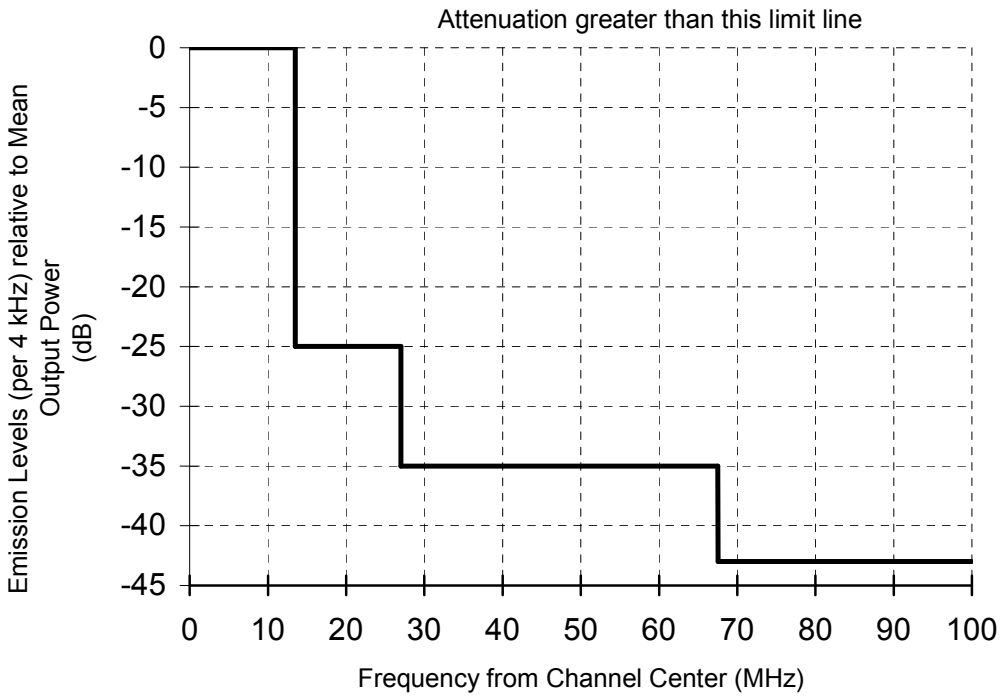
The specification for the overall transponder in-band filter response and out-of-band attenuation will be similar to that used on existing Ku-band FSS satellites. The performance in these respects is dictated by the following considerations:

1. The in-band gain and group delay response must be flat enough so as not to degrade significantly the bit error rate performance of the digital carrier in the transponder;
2. The out-of-band attenuation must be high enough, in the adjacent transponder frequency band, to suppress adequately the multi-path transmission through adjacent transponders.
3. The out-of-band attenuation must also be sufficient to suppress any unwanted signals in frequency bands adjacent to the transponder frequency band, which could otherwise cause overload of the active amplifiers in the communications payload, or waste the available power of the TWTAs.

A.10 UNWANTED EMISSIONS

The out-of-band emissions will not exceed the mask given in Figure A.10-1 below.

Figure A.10-1 – Unwanted Emission Mask



A.11 EMISSION DESIGNATORS AND ALLOCATED BANDWIDTH OF EMISSION

The emission designator for the communications transmissions is 27M0G7W. This has an allocated bandwidth of 27 MHz.

For TT&C the emission designators will be as follows:

Telecommand (including ranging): 1M00F2D
Telemetry (including ranging): 1M00F2D

A.12 EARTH STATIONS

The primary subscriber earth stations to be used with the ECHOSTAR-121W-KuX satellite will use a 90 cm antenna. Such terminals are expected to be deployed in large numbers across the service areas (several millions). In some areas and for certain applications, where higher clear-sky

performance is required, larger antennas may be used (typically 100 cm, 120 cm, 150 cm or 180 cm). The feeder uplink earth stations (main and back-up) will use an 11 meter or larger antenna.

A.13 LINK BUDGETS

Table A.13-1 provides a representative link budget for the DTH link from the feeder link earth station to the subscriber receive earth stations. In this case the feeder uplink earth station is assumed to be located at Mexico City. Both clear sky and rain faded link budgets are shown – the latter for both New York (rain region K) and Los Angeles (rain region E). Availability in excess of 99.9% is achieved. Table A.13-2 provides a similar link budget but for the alternative configuration where the uplink earth station is located at Cheyenne, WY.

Tables A.13-1 and A.13-2 show the uplink EIRP is 75.3 dBW for the 27 MHz carrier. §25.204(f) states that the uplink EIRP in the 13.77-13.78 GHz band shall not exceed 71 dBW in any 6 MHz. The uplink EIRP of 75.3 dBW across 27 MHz is equivalent to 68.8 dBW in any 6 MHz, thereby complying with §25.204(f). In other parts of the 13.75-14.0 GHz band, the attenuation setting may be changed such that the uplink EIRP exceeds 71 dBW in any 6 MHz, however this level will not be exceeded within the 13.77-13.78 GHz band.

Table A.13-1 – Representative Link Budget

(Baseline Configuration - Mexico City Uplink Example)

EchoStar Ku-Band Link Budget
(DTH Link)

Link Parameters		Clear Sky (New York)	Faded D/L (New York)	Faded D/L (Los Angeles)
Link Geometry:				
Tx E/S Range to Satellite (Mexico City)	(km)	36,710	36,710	36,710
Rx E/S Range to Satellite	(km)	39,251	39,251	37,056
Uplink (per carrier):				
Carrier Frequency	(MHz)	14,000	14,000	14,000
Tx E/S Antenna Diameter	(m)	11.0	11.0	11.0
Tx E/S Power to Antenna	(W)	20	20	20
Tx E/S Antenna Gain	(dB)	62.3	62.3	62.3
Tx E/S EIRP per Carrier	(dBW)	75.3	75.3	75.3
Atmospheric and Other Losses	(dB)	0.3	0.3	0.3
Free Space Loss	(dB)	206.7	206.7	206.7
Satellite:				
Gain Attenuation	(dB)	10.0	10.0	10.0
Equivalent G/T towards Tx E/S	(dB/K)	6.4	6.4	6.4
Sat'd EIRP at beam peak	(dBW)	50.3	50.3	50.3
EIRP towards Rx E/S	(dBW)	48.3	48.3	48.3
Downlink (per carrier):				
Carrier Frequency	(MHz)	11,700	11,700	11,700
Atmospheric and Other Losses	(dB)	0.2	3.6	1.3
Free Space Loss	(dB)	205.7	205.7	205.2
Rx E/S Antenna Diameter	(m)	0.90	0.90	0.90
Antenna Mis-pointing Loss	(dB)	0.50	0.50	0.50
Rx E/S Antenna Gain	(dB)	39.0	39.0	39.0
Rx E/S G/T	(dB/K)	18.6	14.6	16.4
System (LNA+Sky) Noise Temp.	(K)	110	271	179
Total Link:				
Carrier Noise Bandwidth	(kHz)	27,000	27,000	27,000
(C/N) - Thermal Uplink	(dB)	29.0	29.0	29.0
(C/N) - Thermal Downlink	(dB)	14.8	7.5	12.1
(C/I) - Other Link Degradations	(dB)	15.0	15.0	15.0
(C/N) - Total Actual	(dB)	11.8	6.7	10.2
(C/N) - Total Required	(dB)	6.0	6.0	6.0
Excess Margin	(dB)	5.8	0.7	4.2

Note: The uplink power level shown in this link budget is that used under clear-sky conditions. Uplink power control will be used to increase the transmit power to partly compensate for uplink rain fades.

Table A.13-2 – Representative Link Budget

(Alternative Configuration – Cheyenne Uplink Example)

EchoStar Ku-Band Link Budget
(DTH Link)

Link Parameters		Clear Sky (New York)	Faded D/L (New York)	Faded D/L (Los Angeles)
Link Geometry:				
Tx E/S Range to Satellite (Cheyenne)	(km)	37,810	37,810	37,810
Rx E/S Range to Satellite	(km)	39,251	39,251	37,056
Uplink (per carrier):				
Carrier Frequency	(MHz)	14,000	14,000	14,000
Tx E/S Antenna Diameter	(m)	11.0	11.0	11.0
Tx E/S Power to Antenna	(W)	20	20	20
Tx E/S Antenna Gain	(dB)	62.3	62.3	62.3
Tx E/S EIRP per Carrier	(dBW)	75.3	75.3	75.3
Atmospheric and Other Losses	(dB)	0.3	0.3	0.3
Free Space Loss	(dB)	206.9	206.9	206.9
Satellite:				
Gain Attenuation	(dB)	10.0	10.0	10.0
Equivalent G/T towards Tx E/S	(dB/K)	6.4	6.4	6.4
Sat'd EIRP at beam peak	(dBW)	50.3	50.3	50.3
EIRP towards Rx E/S	(dBW)	48.3	48.3	48.3
Downlink (per carrier):				
Carrier Frequency	(MHz)	11,700	11,700	11,700
Atmospheric and Other Losses	(dB)	0.2	3.6	1.3
Free Space Loss	(dB)	205.7	205.7	205.2
Rx E/S Antenna Diameter	(m)	0.90	0.90	0.90
Antenna Mis-pointing Loss	(dB)	0.50	0.50	0.50
Rx E/S Antenna Gain	(dB)	39.0	39.0	39.0
Rx E/S G/T	(dB/K)	18.6	14.6	16.4
System (LNA+Sky) Noise Temp.	(K)	110	271	179
Total Link:				
Carrier Noise Bandwidth	(kHz)	27,000	27,000	27,000
(C/N) - Thermal Uplink	(dB)	28.8	28.8	28.8
(C/N) - Thermal Downlink	(dB)	14.8	7.5	12.1
(C/I) - Other Link Degradations	(dB)	15.0	15.0	15.0
(C/N) - Total Actual	(dB)	11.8	6.7	10.2
(C/N) - Total Required	(dB)	6.0	6.0	6.0
Excess Margin	(dB)	5.8	0.7	4.2

Note: The uplink power level shown in this link budget is that used under clear-sky conditions. Uplink power control will be used to increase the transmit power to partly compensate for uplink rain fades.

A.14 STATION-KEEPING AND ANTENNA POINTING ACCURACY

The satellite orbital inclination and longitudinal drift will be maintained within ±0.05° of nominal. The antenna axis attitude will be maintained within ±0.12° of nominal during normal mode and ±0.15° of nominal during orbit maneuvers (i.e., station-keeping).

A.15 POWER FLUX DENSITY AT THE EARTH'S SURFACE

In the extended Ku-band downlink frequency ranges there are PFD limits in §25.208(b), as follows:

- -150 dB(W/m^2) in any 4 kHz band for angles of arrival between 0 and 5 degrees above the horizontal plane;
- -150+(δ-5)/2 dB(W/m^2) in any 4 kHz band for angles of arrival δ (in degrees) between 5 and 25 degrees above the horizontal plane; and
- -140 dB(W/m^2) in any 4 kHz band for angles of arrival between 25 and 90 degrees above the horizontal plane.

Compliance with these limits is demonstrated below for both high and low elevation angles.

The maximum saturated EIRP per transponder is 50.3 dBW. The shortest distance from the satellite to the Earth is 35,786 km, corresponding to a spreading loss of 162.06 dB. Therefore the maximum possible PFD at the Earth's surface could not exceed –111.7 dBW/m^2 in the 27 MHz transponder bandwidth (i.e., 50.3-162.06). Allowing for the use of digital modulation with an almost flat spectrum, the corresponding maximum PFD at the Earth's surface measured in a 4 kHz band would not exceed –150.1 dBW/m^2, which is 10.1 dB lower than the PFD limit applicable for angles of arrival greater than 25 degrees, and equal to the PFD limit applicable for angles of arrival less than 5 degrees. Therefore, compliance with the PFD limits at both high and low angles of arrival is assured.

A.16 FREQUENCY TOLERANCE

The satellite local oscillator frequency stability will determine the accuracy of the frequency conversion between uplink and downlink transmissions. This frequency conversion error will not exceed ±5 in 10^6 under all circumstances.

A.17 CESSATION OF EMISSIONS

Each satellite transponder can be individually turned on and off by ground telecommand, thereby causing cessation of emissions from the satellite, as required.

A.18 LAUNCH VEHICLES

The spacecraft are compatible with several commercially available launch vehicles. A decision on the actual launcher to be used has not yet been made.

A.19 TT&C

The TT&C frequencies will be at the edges of the Ku-frequency bands. These frequencies, which will be used both during transfer orbit and on-station, are expected to be as follows:

Telecommand:	13.752 GHz (VP)
Telemetry:	11.452 (HP) and 11.698 GHz (VP)

The TT&C functions will be performed through omni-directional spacecraft antennas during the Launch and Early Operation Phase ("LEOP"), as well as in the event of a spacecraft emergency where attitude control might be disturbed. When operating correctly on-station the TT&C function will be switched to a high gain satellite antenna to permit lower power TT&C transmissions on both uplink and downlink.

Once the satellites are on-station EchoStar will use its existing Spacecraft Operations Center and TT&C earth station facilities located in the USA to control the satellites.

Details of the TT&C transmissions are given in Table A.19-1 below.

Table A.19-1 – TT&C Transmission Parameters

(a) Telemetry

Parameter	Performance
Carrier Frequencies	11,452.0 MHz and 11,698.0 MHz
Antenna Configuration	
Orbit-raising operations	+Z elements two wide-beam antennas -Z elements two narrow-beam antennas
On-orbit operations	+Z elements two wide-beam antennas Communication transmit antenna
EIRP	
Wide-angle antenna	0 dBW
Communication antenna	> 10 dBW over CONUS
Carrier stability	< 10 ppm
Subcarrier frequency	48 kHz and 72 kHz
Subcarrier stability	<30 ppm
Data modulation	BPSK
Data rate	4800 bps
Output data	
Normal telemetry	Bi-Phase-L PCM/BPSK on 48 kHz subcarrier
Dwell telemetry	Bi-Phase-L PCM/BPSK on 72 kHz subcarrier
Downlink modulation	PM (telemetry transmitters)
Downlink modulation index	
Ranging only	1 radian
Ranging +1 telemetry	0.7 radian
Ranging +2 telemetry	0.6 radian

(b) Telecommand

Parameter	Performance
Carrier Frequency	13,752.0 MHz
Isolation	>40 dB rejection to signals ±2 MHz away
Flux density	
Transfer orbit	>/= –80 dBW/m^2
On-station	>/= –90 dBW/m^2
Modulation	
Type	FM
Carrier deviation	+/- 400 kHz
Command format	
Subcarrier frequency	16 kHz $\pm$ 10 ppm
Bit rate	250 bps $\pm$ 10 ppm
Modulation	PCM/PSK on 16 kHz subcarrier
Format	Two-step sequence 1. Command Load 2. Command Execute
Message Length	48 bit clear mode 63 bits secure mode

A.20 SPACECRAFT CHARACTERISTICS

The spacecraft manufacturer for the ECHOSTAR-121W-KuX satellite has not yet been selected, and EchoStar does not wish to show preference by providing any data specific to any one manufacturer in this application. The design of the satellite has been based around the expected characteristics of the 3-axis stabilized spacecraft available from the three major U.S. suppliers (Boeing, Lockheed Martin and Loral) in the time frame necessary for these satellites.

The communications payload of the ECHOSTAR-121W-KuX satellite requires approximately 4.6 kW d.c. power. Total spacecraft power requirements are approximately 6 kW d.c. power which necessitates beginning of life solar array power production capability of approximately 6.5 kW. The communications payload mass (including antennas) will be approximately 200 kg which results in a total spacecraft dry mass of approximately 1725 kg. The total spacecraft launch mass is

in the range 4200 to 4600 kg depending on launch vehicle selected. The satellite operational lifetime will be between 12 and 15 years.

The spacecraft reliability will be consistent with current manufacturing standards in place for the major suppliers of space hardware. Bus reliability will be greater than 0.8 with an overall spacecraft reliability of greater than 0.7. Transponder sparing will be consistent with documented failure rates which allow attaining the overall spacecraft reliability numbers listed above.

EchoStar will provide the Commission with full and precise spacecraft physical characteristics when the final supplier and product has been selected.

A.21 COMMUNICATIONS PAYLOAD

The communications payload will be conventional in architecture and very similar to EchoStar's existing Ku-band satellites. The main difference will be the frequency ranges over which the payload equipment operates.

The uplink signals in both vertical and horizontal polarization will be received and separated into the two polarizations by the satellite antenna. Limited filtering and adjustable attenuation is then applied before amplification by the LNAs (Low Noise Amplifiers), and then further amplification and down-conversion to the 11 GHz downlink frequencies takes place in the receivers. The outputs of the receivers (one active receiver for each polarization) will be channelized by the IMUXs (Input Multiplexers) before further amplification and ALC/gain control in the CAMPs (Channel Amplifiers) followed by final amplification in the high power TWTAs (Traveling Wave Tube Amplifiers). The individual RF channels in the same polarization are then combined in the OMUXs (Output Multiplexers) and fed to the satellite transmit antenna. Appropriate redundancy switching is provided for all active payload equipment.

A.22 INTERFERENCE ANALYSIS (ADJACENT GSO SATELLITES)

Tables A.13-1 and A.13-2 show the link noise budget and overall performance for the EchoStar wideband carrier. The carrier is modulated using 4-phase PSK.

Currently there are no satellites at locations adjacent to the 121°W.L. location licensed to use the extended Ku-bands within the U.S. Therefore, in order to comply with §25.140(b)(2), it is necessary to make certain assumptions regarding the transmission parameters of a future adjacent satellite using the extended Ku-bands. In the interference analysis below, it is assumed that the adjacent satellite will transmit with the same uplink EIRP as for the ECHOSTAR-121W-KuX satellite, albeit with a smaller transmitting earth station antenna of 4.5 meters, and with no beam isolation on uplink or downlink.[2] It is also assumed that the adjacent satellite's downlink EIRP is 1 dB less than that of the ECHOSTAR-121W-KuX satellite in order to be conservative.

Table A.22-1 provides a summary of the transmission parameters used in the interference analysis.

Table A.22-1 – Summary of R.F. parameters of the carriers used in the interference analysis

	ECHOSTAR-121W-KuX	**Adjacent Satellite**
RF Bandwidth (MHz)	27 MHz	27 MHz
Modulation	QPSK	QPSK
Uplink Earth Station Diameter (m)	11	4.5
Uplink Earth Station Gain (dBi)	62.2	54.5
Uplink Input Power (dBW)	13	20.7
Uplink EIRP (dBW)	75.2	75.2
Downlink EIRP (dBW)	50.3	49.3
Downlink Earth Station Diameter (m)	0.9	0.9
Downlink Earth Station Gain (dBi)	38.6	38.6
Single Entry C/I Criterion (dB)	19.2	19.2

[2] The assumption of no beam isolation on the uplink is particularly conservative given the use of a small steerable spot beam in the ECHOSTAR-121W-KuX satellite.

The interference analysis assumes a geocentric orbital separation of 2 degrees and a topocentric angular separation of 2.2 degrees. It is assumed that all earth station antennas meet the off-axis gain requirement of 29-25log(θ) in the direction of the adjacent interfering satellite.[3]

Table A.22.2 provides a summary of the interference analysis between the two satellite networks.

Table A.22-2 – Summary of interference calculations

	Interference into ECHOSTAR-121W-KuX from the adjacent satellite	**Interference from ECHOSTAR-121W-KuX into the adjacent satellite**
Uplink C/I (dB)	34.1	41.8
Downlink C/I (dB)	19.2	17.2
Overall C/I (dB)	19.1	17.2
C/I Criterion (dB)	19.2	19.2
C/I Margin (dB)	-0.1	-2.0

Table A.22-2 shows a slightly negative overall interference margin into the ECHOSTAR-121W-KuX satellite. There is a deficit of 2.0 dB into the assumed carrier of the future adjacent satellite. This small deficit can probably be absorbed by the adjacent operator or, alternatively, the adjacent operator can increase its downlink EIRP somewhat to improve the situation. In any event, it is expected that the two operators will be able to coordinate their respective operations.

A.23 SHARING ANALYSIS WITH OTHER SERVICES AND ALLOCATIONS

The 11.45-11.7 GHz band is shared on a co-primary basis with the Fixed Service ("FS"). The GSO FSS space station PFD limits of §25.208(b) have been developed for the protection of the FS in these frequency bands. Section A.15.1 demonstrates that the ECHOSTAR-121W-KuX satellite will not exceed the PFD limits of §25.208(b) and therefore FS stations are adequately protected

[3] The EchoStar 90 cm receive antenna meets the 29-25log(θ) gain mask for off-axis angles greater than approximately 1.7°.

from interference. There also exists the potential for interference from FS stations into receive earth station terminals. EchoStar expects that its receive terminals can co-exist within this interference environment in most geographic areas of the country, while maintaining an acceptable quality of service. In areas where interference from FS transmitting stations into ECHOSTAR-121W-KuX receiving earth stations might exceed an acceptable level, interference mitigation techniques will be employed. These include the careful selection of the installation location of the receive terminal in order to exploit natural and man-made blockage of the interfering signal to the maximum extent possible. Blockage of the FS signals will occur due to buildings and foliage, as well as the natural terrain. Additional receive earth station shielding can be employed if necessary by the addition of interference absorbing structures appended to the receive antennas.

The 13.75-14.0 GHz band is allocated domestically and internationally to the FSS, subject to certain restrictions contained in footnotes RRs 5.502 and 5.503 to the ITU Radio Regulations. These restrictions are largely reflected domestically in §25.204(f) and §2.106.

As discussed in section A.12.1, and in conformance with §25.204(f), uplink transmissions to the ECHOSTAR-121W-KuX satellite will not exceed an uplink EIRP of 71 MHz in any 6 MHz in the 13.77-13.78 GHz band. Further, uplink transmissions using the 13.75-14.0 GHz band will use an 11 m antenna, which is significantly larger than the smallest antenna (4.5 m) allowed under §25.204(f).

Regarding §2.106, EchoStar will coordinate its earth stations operating in the 13.75-13.80 GHz band with the National Telecommunications and Information Administration (NTIA) Interdepartment Radio Advisory Committee's Frequency Assignment Subcommittee, as required.

Exhibit 2

INTERNATIONAL COORDINATION

UNION INTERNATIONALE DES TELECOMMUNICATIONS
BUREAU DES RADIOCOMMUNICATIONS

INTERNATIONAL TELECOMMUNICATION UNION
RADIOCOMMUNICATION BUREAU

UNIÓN INTERNACIONAL DE TELECOMUNICACIONES
OFICINA DE RADIOCOMUNICACIONES

IFIC / DATE **IFIC / DATE** **IFIC / FECHA**	**SECTION SPECIALE N°** **SPECIAL SECTION No.** **SECCIÓN ESPECIAL N.°**
RESEAU(X) A SATELLITE **SATELLITE NETWORK(S)** **RED(ES) DE SATÉLITE** **USASAT-43N**	**ADMINISTRATION RESPONSABLE** **RESPONSIBLE ADMINISTRATION** **ADMINISTRACIÓN RESPONSABLE** **USA**

RENSEIGNEMENTS REÇUS PAR LE BUREAU LE
INFORMATION RECEIVED BY THE BUREAU ON
INFORMACIÓN RECIBIDA POR LA OFICINA EL
15.12.2003

Ces renseignements sont publiés par le Bureau des radiocommunications en application du No. 9.2B. Ils font l'objet de la (les) procédure(s) suivante(s), indiquée(s) ci-dessous par un X dans la case pertinente.

This information is published by the Radiocommunication Bureau in accordance with No. 9.2B. It is subject to the procedure(s) indicated below by an X in the relevant box.

Esta información se publica por la Oficina de Radiocomunicaciones en virtud del No. 9.2B. Está sujeta al (a los) procedimiento(s) siguiente(s), señalado(s) con una X en la casilla apropriada.

	Les renseignements ont été reçus conformément à **l'Article 9, sous-section IA** Toute administration estimant que des brouillages inacceptables peuvent être causés à ses réseaux ou à ses systèmes à satellites existants ou en projet devra communiquer ses commentaires à l'administration qui a demandé la publication, avec copie au Bureau des radiocommunications, dans le delai de quatre mois qui suit la date de la présente publication.	The information has been received pursuant to **Article 9, Sub-Section IA** Any administration which believes that unacceptable interference may be caused to its existing or planned satellite networks or systems shall communicate its comments to the publishing administration, with a copy to the Radiocommunication Bureau, within four months after the date of this publication.	La información ha sido recibida de conformidad con **el artículo 9, sub-sección IA** Toda administración que estime que pueden causarse interferencias inaceptables a sus redes o sistemas de satélites existentes o previstos comunicará sus commentarios a la administración que haya publicado la información, con copia a la Oficina de Radiocomunicaciones, en un plazo de cuatro meses contados a partir de la fecha de esta publicación.
	DATE LIMITE POUR LA RECEPTION DES COMMENTAIRES **EXPIRY DATE FOR THE RECEIPT OF COMMENTS** **FECHA LÍMITE PARA LA RECEPTIÓN DE LOS COMENTARIOS**		
X	Les renseignements ont été reçus conformément à **l'Article 9, sous-section IB** Toute administration estimant que ses réseaux à satellite, ses systèmes à satellites ou ses stations de terre, selon le cas, existants ou en projet, sont affectés, peut envoyer ses observations à l'administration qui a demandé la publication des renseignements, avec copie au Bureau des radiocommunications.	The information has been received pursuant to **Article 9, Sub-Section IB** Any administration which considers that its existing or planned satellite systems or networks or terrestrial stations, as appropriate, are affected, may send its comments to the administration which has requested publication of the information, with a copy of such comments to the Radiocommunication Bureau.	La información ha sido recibida de conformidad con **el artículo 9, sub-sección IB** Cualquier administración que considere que sus sistemas o redes des satélites o estaciones terrenales, según el caso, existentes o planificados se verán afectados, podrá comunicar sus comentarios a la administración que haya solicitado la publicación de la información, enviando una copia de dichos comentarios a la Oficina de Radiocommunicaciones.

Information aussi disponible sur le / Information also available on the / Información también disponible en: Space Network Systems Online Service : http://www-br/sns/advpub.html

Items	Description	Description	Descripción
A1a	Identité du réseau à satellite	Identity of the satellite network	Identidad de la red de satélite
A1f1	Administration notificatrice (voir le Tableau 1 de la Préface)	Notifying administration (Refer to Table 1 of the Preface)	Administración notificante (véase el cuadro 1 del Prefacio)
A1f2	Organisation Intergouvernementale de Satellite	Intergovernmental Satellite Organization	Organización Intergubernamental de Satélite
A2a	Date de mise en service	Date of bringing into use	Fecha de puesta en servicio
A2b	Période de validité (année)	Period of validity (year)	Periodo de validez (año)
A4a1	Longitude nominale d'une station spatiale géostationnaire (degré)	Nominal longitude of a geostationary space station (degree)	Longitud nominal de una estación espacial geoestacionaria (grado)
A4b1	Inclinaison de l'orbite (degré)	Angle of inclination of the orbit (degree)	Ángulo de inclinación de la órbita (grado)
A4b2	Période (jjj/hh/mm)	Period (ddd/hh/mm)	Periodo (ddd/hh/mm)
A4b3a	Altitude de l'apogée (km)	Altitude of the apogee (km)	Altitud del apogeo (km)
A4b3b	Altitude du périgée (km)	Altitude of the perigee (km)	Altitud del perigeo (km)
A4b4a	Nombre de satellites	Number of satellites	Número de satélites
A4b4b	Corps de référence	Reference body	Cuerpo de referencia
A4b5a	Nombre de plans orbitaux	Number of orbital planes	Número de planos orbitales
A13	Référence aux Sections Spéciales	Reference to Special Sections	Referencia a las Secciones Especiales
C1	Gamme de fréquences	Frequency Range	Gama de frecuencias
C4a	Classe de station (voir le Tableau 3 de la Préface)	Class of station (Refer to Table 3 of the Preface)	Clase de estación (véase el cuadro 3 del Prefacio)
C4b	Nature du service (voir le Tableau 4 de la Préface)	Nature of service (Refer to Table 4 of the Preface)	Naturaleza del servicio (véase el cuadro 4 del Prefacio)
C11a4	Description détaillée de la zone de service	Narrative description of the service area	Descripción detallada de la zona de servicio
BR1	Date de réception	Date of receipt	Fecha de recepción
BR3a	Code de référence de la disposition	Provision reference code	Código de referencia de la disposición
BR6a	Numéro d'identification du réseau à satellite	Identification number of the network	Número de identificación de la red
BR6b	Ancien numéro d'identification du réseau à satellite	Old identification number of the network	Número anterior de la identificación de la red
BR7a	Numéro d'identification du groupe	Identification number of the group	Número de la identificación del grupo
BR7b	Ancien numéro d'identification du groupe	Old identification number of the group	Número anterior de la identificación del grupo
BR9	Code indiquant l'action effectuée sur l'entité (groupe)	Code indicating the action to be taken on the entity (group)	Código que indica la acción efectuada en la entidad (grupo)
BR14	Symbole et numéro de la Section Spéciale	Symbol and number of the Special Section	Símbolo y número de la Sección Especial
BR20	Numéro de la IFIC	IFIC number	Número de la IFIC
BR22	Remarques de l'Administration	Administration remarks	Observaciones de la Administración
BR23	Observations du Bureau des radiocommunications	Radiocommunication Bureau comments	Comentarios de la Oficina de Radiocomunicaciones

SECTION SPECIALE / SPECIAL SECTION / SECCION ESPECIAL

A | *A1a* Sat. Network: USASAT-43N | *A1f1* Notifying adm.: USA | *A1f2* Inter. sat. org.: | *BR1* Date of receipt: 15.12.2003 | *BR20* IFIC no.:

BR6a/BR6b Id. no.: 1 | *BR3a* Provision reference: 9.1/IB

A4a1 Orbital long.: 121 W

[ ] *BR7a/BR7b* Group id.: 1 | *BR14* Special Section:

A2a Date of bringing into use: 15.12.2010 | *A2b* Period of valid.: 20

C1 Frequency Range: From 11.45 GHz To 11.7 GHz

C4a Class of station	EC	ED	EK
C4b Nature of service	CP	OT	OT

C11a4 Service area: REGION 2

[ ] *BR7a/BR7b* Group id.: 2 | *BR14* Special Section:

A2a Date of bringing into use: 15.12.2010 | *A2b* Period of valid.: 20

C1 Frequency Range: From 13.75 GHz To 14 GHz

C4a Class of station	EC	ER	EK
C4b Nature of service	CP	OT	OT

C11a4 Service area: REGION 2

BR22 Administration remarks:

BR23 Radiocommunication Bureau comments: