

BEFORE THE
Federal Communications Commission
WASHINGTON, D.C. 20554

JAN 18 1995

JAN 13 1995

Satellite and Mobile Communication Service
Satellite Policy Branch
FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In re Applications of:)	
)	
MOBILE COMMUNICATIONS	)	File Nos. 11-DSS-P-91(6)
HOLDINGS, INC.	)	18-DSS-P-91(18)
	)	11-SAT-LA-95
	)	12-SAT-AMEND-95
)	
CONSTELLATION COMMUNICATIONS,	)	File Nos. 17-DSS-P-91(48)
INC.	)	CSS-91-013
	)	9-SAT-LA-95
	)	10-SAT-AMEND-95
)	
LORAL/QUALCOMM PARTNERSHIP, L.P.	)	File Nos. 19-DSS-P-91(48)
	)	CSS-91-014
	)	13-SAT-LA-95
For Authority to Construct,	)	14-SAT-AMEND-95
Launch, and Operate)	
Low Earth Orbit Satellite)	
Systems in the 1610-1626.5 MHz)	
and 2483.5-2500 MHz Bands)	

CONSOLIDATED REPLY TO OPPOSITIONS

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SUMMARY

On December 22, 1994, TRW Inc. ("TRW") filed petitions to deny the applications of Constellation Communications Inc. ("CCI"), Mobile Communications Holdings, Inc. ("MCHI"), and Loral/Qualcom Partnership, L.P. ("LQP") for the provision of Big LEO service. Each of those parties has opposed the petitions to deny filed by TRW.

In their oppositions, both CCI and MCHI displayed desperate, smoke and mirrors attempts to meet the Commission's strict financial qualifications standard -- supplying the Commission with impermissible supplements to their amended applications and claiming to meet non-existent or irrelevant Commission standards. When the smoke has cleared and the illusion is broken, however, one simple fact remains; neither CCI nor MCHI is financially qualified to construct, launch, and operate their respective proposed Big LEO systems.

In addition, CCI provides the Commission with a long and torturous story of alleged gradual changes in stock ownership and corporate control. Nowhere, however, does CCI adequately explain why the Commission was not notified previously of these unauthorized transfers of control or why its amended application

should not be treated as newly filed. For these reasons, the Commission should deny the amended applications of CCI and MCHI.

In its petition to deny LQP's amended application, TRW alerted the Commission to LQP's gross underestimates of LQP's space segment costs. Instead of providing the Commission with material evidence regarding the accuracy of its projected costs, however, LQP attempted to discredit the calculations of leading industry, analysts and TRW's own experts. LQP's opposition presented no evidence to rebut TRW's substantial allegations regarding LQP's understated cost estimates.

In this Reply, TRW demonstrates that under good engineering practices and nationally -- and internationally -- recognized cost models, LQP's proposed system (with the capabilities claimed by LQP) will conservatively cost between \$2.6 billion and \$3.1 billion. LQP, however, has a commitment worth only \$2.247 billion -- a minimum of \$300 million less than is objectively required from Loral Corporation. Under these circumstances, the Commission should designate LQP's application for an evidentiary hearing to resolve these issues.

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CONSOLIDATED REPLY TO OPPOSITIONS

TRW Inc. ("TRW"), by its attorneys, hereby replies to the following pleadings filed by certain Big LEO applicants in opposition to the petitions to deny filed by TRW on December 22, 1994:^{1/} (1) Opposition ("CCI Opposition") filed by

^{1/} The Commission's Public Notice, Report No. DS-1481 (released November 21, 1994), errata Public Notice, Report No. DS-1482 (released November 30, 1994), announcing the acceptance of
(continued...)

Constellation Communications, Inc. ("CCI"); (2) Consolidated Opposition ("MCHI Opposition") filed by Mobile Communications Holdings, Inc. ("MCHI");^{2/} and (3) Consolidated Response to Petitions and Comments ("LQP Opposition") filed by Loral/Qualcomm Partnership, L.P. ("LQP").

DISCUSSION

I. THE COMMISSION HAS ADOPTED STRICT AND EXPLICIT FINANCIAL QUALIFICATION STANDARDS FOR BIG LEO APPLICANTS.

In its Report and Order in Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz

^{1/}(...continued)

amended applications for authority to construct, launch, and operate satellite systems in the new mobile satellite service at 1.6 and 2.4 GHz (the "Big LEO" service), and establishing deadlines for the filing of petitions to deny and oppositions thereto, did not specifically invite or forbid the filing of replies to oppositions. However, Section 25.154(d) of the Commission's Rules permits a party who has filed an original petition to deny an application the opportunity to reply to opposing pleadings. 47 C.F.R. § 25.154(d).

^{2/} The MCHI Opposition alone was hand-served on TRW. In the interest of efficiency and simplicity, TRW is replying to all oppositions in this consolidated pleading, and respectfully requests that the Commission waive its five-day reply period, to the extent that TRW's reply with respect to MCHI might be considered late-filed. See 47 C.F.R. § 25.154(d).

Frequency Bands, 9 FCC Rcd 5936 (1994) ("Report and Order"), the Commission formally adopted financial standards for the Big LEO service. It decided that an applicant must demonstrate the financial ability to build and launch all satellites for which it has applied, and to operate its system for one year after the launch of the first satellite in its constellation. Report and Order, 9 FCC Rcd at 5952 (¶ 38).^{3/}

This standard can be met in either of two ways (or with a combination of the two). First, applicants can show that they have the requisite financial ability (defined by the Commission as current assets and operating income in excess of the projected costs), along with a commitment from management of the applicant or parent company providing that, absent a material change in circumstances, it is prepared to expend the funds necessary to complete (or enable the applicant to complete) the proposed

^{3/} Section 25.143(b)(3) of the Commission's Rules requires each Big LEO applicant to demonstrate its financial qualification on the basis of the documentation contained in its application. See 47 C.F.R. § 25.143(b)(3).

system. Id. at 5952 (¶ 35).^{4/} In the alternative, applicants may demonstrate their ability to meet the Commission's financial standards with "irrevocably" committed debt or equity financing. Id. at 5949 (¶ 28). "Irrevocably" committed external financing is "financing that has been approved and does not rest on contingencies which require action by either party to the loan or equity investment." Id. at 5950 (¶ 32). Specifically, the "instrument of financing must demonstrate that the lender: (1) has already determined that the applicant is creditworthy; and (2) absent a material change in circumstances, is prepared to make the loan immediately upon grant of a Commission authorization." Id. In addition, the applicant must provide the Commission with the terms of any fully negotiated loan or form of credit intended to be used to finance the proposed system, including: (1) the identity of the creditors; (2) the amount

^{4/} The Report and Order expressly requires management of the company making the financial showing to supply a commitment that, except for "material change in circumstances," it is prepared to expend the necessary funds. Report and Order, 9 FCC Rcd at 5952 (¶ 35). The Commission will not permit any other qualifications to management's commitment to a Big LEO system applicant.

credited; and (3) the detailed terms of the credit arrangement, including any contingencies. 47 C.F.R. § 25.140(d)(2)(i).^{5/}

These standards are reproduced here because, as explained below, CCI and MCHI both have endeavored to distort or ignore essential attributes of the relevant tests in a misguided effort to convince the Commission that they are financially qualified and that others are not.^{6/} In actuality, both CCI and MCHI have made insufficient financial showings, the deficiencies in which are merely highlighted or even exacerbated

^{5/} If an applicant intends to rely on funds from a fully negotiated sale or other placement of any equity or other form of ownership interest, it must submit the terms of the arrangements to the Commission in the same level of detail. 47 C.F.R. § 25.140(d)(2)(ii).

^{6/} For example, CCI and MCHI have both attempted to bolster the strength of their financial showings by implying that TRW will ultimately own only 15% of its Odyssey system. CCI Opposition at 14; MCHI Consolidated Opposition at 6, 21 n. 23. This argument is misleading and mischaracterizes the applicable standard. TRW itself is the applicant and, as contemplated by the Commission, relies on its own financial ability in making its financial showing to the Commission. Whether TRW ultimately will seek strategic partners to help fund its operating company is irrelevant. See TRW Opposition to MCHI Petition at 7.

by their respective oppositions.^{7/} Neither applicant is financially qualified.

II. THE COMMISSION SHOULD DENY CCI'S AMENDED APPLICATION FOR FAILURE TO MEET THE COMMISSION'S FINANCIAL STANDARDS AND BECAUSE CCI'S APPLICATION IS A MAJOR AMENDMENT.

CCI, recognizing that it cannot meet the Commission's standards for self-financing or debt or equity financing, attempts to convince the Commission that it made the required financial showing and management commitment for an applicant relying on corporate parents for its financial showing. However, CCI's claim is completely flawed. First, CCI's alleged parents, E-Systems, Inc. ("E-Systems") and Bell Atlantic Corporation ("Bell Atlantic"), are not parents at all, owning only 31% and 8% of CCI, respectively. Furthermore, even if the Commission were to consider E-Systems and Bell Atlantic to be parents of CCI, neither the management commitments originally submitted in CCI's

^{7/} In this regard, TRW notes that both MCHI and CCI are relying on the financial wherewithal of external companies with limited equity interests in the applicants to make their financial showings. TRW does not believe the Commission can rationally accept at face value the notion that companies with limited equity investments in an applicant who are represented as having made financial commitments in percentages greatly in excess of their ultimate equity investments in the actual applicant can be relied upon to do so.

Amended Application nor the additional "evidence" belatedly proffered by CCI in its Opposition meets the Commission's standards. Finally, CCI has failed to provide the Commission with any reason why its Amended Application should not be considered a major amendment due to its unauthorized and unreported transfer of control.

A. CCI Has Failed To Provide The Commission With Adequate Commitments To Demonstrate That CCI And Its Corporate Parents Can Meet The Commission's Financial Qualifications Standard.

CCI attempts to mislead the Commission initially by stating that E-Systems and Bell Atlantic are corporate parents, despite the fact that they own only 31 percent and 8 percent of CCI, respectively. CCI Opposition at 5. Although CCI notes that the Commission has never precisely defined what constitutes a parent (see CCI Opposition at 5), other relevant authorities have provided guidance on this subject.^{8/} "Control" is clearly a

^{8/} For example, the Internal Revenue Service Code section dealing with stock options defines a corporate parent as "any corporation (other than the employer corporation) in an unbroken chain of corporations ending with the employer corporation if, at the time of the granting of the option, each of the corporations other than the employer corporation owns stock possessing 50 percent or more of the total combined voting power of all classes of stock in one of the other corporations in such a chain." 26 U.S.C. § 425(e)
(continued...)

key aspect of the parent/subsidiary relationship; inasmuch as CCI is effectively contending that entities new to its applicant who own only 39 percent of its shares are "parents" (i.e., in control of CCI), CCI's difficulties in the control area (see Section II.B, infra), are compounded by its financial claims.

The fact remains, however, that even if the Commission were to consider CCI's investors, E-Systems and Bell Atlantic, as corporate parents, CCI has failed to make the financial showing required by the Commission. First, CCI states that it will rely on the balance sheets of Bell Atlantic and E-Systems, together with letters from corporate officers of these companies, to demonstrate compliance with Section 25.140(d)(1) of the Commission's rules. CCI Opposition at 9. Although E-Systems and Bell Atlantic together have sufficient current assets and operating income to cover the proposed cost of the system, CCI

8/ (...continued)

(emphasis added). Similarly, in its rules, the United States Court of Appeals for the District of Columbia Circuit defines a "parent" of a company as "an affiliate controlling [the company] directly, or indirectly through intermediaries." U.S. Ct. of App. D.C. Cir. Rule 26.1(a), 28 U.S.C. (1994). The Commission itself has embraced the concept of control as a basis for determining affiliations between business entities. See 47 C.F.R. § 24.720(1) as adopted in Implementation of Section 309(i) of the Communications Act-Competitive Bidding, Fifth Memorandum Opinion and Order, FCC 94-285 (released, November 23, 1994).

cannot rely on this ability to demonstrate that it is financially qualified to build the \$1.72 billion system that CCI describes in its Amended Application. CCI Amended Application at 33.

If E-Systems and Bell Atlantic were to finance the entire cost of CCI's system without violating their fiduciary duty to their shareholders, any amounts in excess of \$700 million would have to be evidenced by some kind of fully-negotiated debt instrument. See 47 C.F.R. § 25.140(d)(2)(i).^{2/} CCI is required to submit evidence of the terms of such a debt instrument to the Commission under Section 25.140(d)(2) of the Commission's rules and must demonstrate that the financing is "irrevocable." Report and Order, 9 FCC Rcd at 5950 (¶ 32). As noted in TRW's Petition to Deny, CCI's Amended Application does not contain any such evidentiary showing. TRW Petition to Deny at 21-23.

In addition, Bell Atlantic and E-Systems have not provided the management commitments expressly required by the Commission of corporate parents. TRW demonstrated in its

^{2/} As TRW pointed out in its Petition to Deny, even if it could be assumed that Bell Atlantic and E-Systems would contribute funds to CCI in proportion to their equity stakes -- an assumption that is not supported by the requisite management commitments in any event -- that would provide CCI with no more than \$700.4 million of the \$1.72 billion CCI requires.

Petition to Deny that the management commitments provided in CCI's Amended Application are not sufficient to meet the Commission's requirements and will not recite these arguments here. See TRW Petition to Deny CCI at 18-21. Furthermore, CCI's extended argument that it has satisfied the management commitment requirements the Commission may, at one time, have imposed on other services (see CCI Opposition at 10-12) is curious, but ultimately inapposite. Here, the Commission has expressly stated the requirements for the management commitment applicable to Big LEO applicants (see Report and Order, 9 FCC Rcd at 5952 (¶ 35), and CCI should have looked no further than this in its search for a "model."

The declarations CCI attaches to its Opposition fail to assist its cause.^{10/} First of all, they are inexcusably tardy. The Commission required each applicant to make its financial showing in an Amended Application by November 16, 1994. Report and Order, 9 FCC Rcd at 5952-53 (¶ 39). This deadline was not an

^{10/} In Exhibit A to its Opposition, CCI provides a Declaration of Thomas R. McKeough, Vice President of Mergers and Acquisitions and Associate General Counsel, Bell Atlantic Corporation ("Bell Atlantic Declaration"), and a Declaration of Peter Marino, Senior Vice President, E-Systems Corporation ("E-Systems Declaration"), in an attempt to legitimize the insufficient "commitment" letters provided by CCI in its Amended Application.

invitation by the Commission for applicants to begin to get their financial statements in order. Second, even if the Commission were to accept these declarations, they are insufficient to aid in CCI's financial showing.

For example, in the Bell Atlantic Declaration, Mr. McKeough explains that by its November 16, 1994 letter, "Bell Atlantic believes it has demonstrated the required intent to provide the necessary financial support for the Constellation LEO system." Bell Atlantic Declaration (emphasis added). Bell Atlantic's beliefs regarding its intentions are irrelevant. The fact is that Bell Atlantic has not supplied the management commitment required by the new Big LEO rules and the Report and Order. Further, the Bell Atlantic Declaration merely restates the qualifying language in its November 16, 1994 letter regarding normal business reviews of market conditions and Bell Atlantic's internal business approval procedures. As noted above, the Commission does not permit such qualifications for the Big-LEO service, and the declaration does nothing to indicate that Bell Atlantic has changed its mind.

Similarly, Mr. Marino of E-Systems declares that he "believes it, along with Bell Atlantic Corporation, has demonstrated the commitment to provide the necessary financial

support for the Constellation LEO system." E-Systems Declaration (emphasis added). Again, E-System's beliefs regarding the management commitment are irrelevant. It is for the Commission, not E-Systems or Bell Atlantic, to decide whether CCI's shareholders have made the required management commitment. Clearly, in TRW's view they have not.

B. CCI Has Not Provided The Commission With Adequate Explanation Why Its Unauthorized And Unreported Transfer Of Control Should Not Result In Its Amended Application Being Treated As A Major Amendment.

In an attempt to demonstrate that CCI has not undergone a change of control that would require its application to be considered a major amendment, CCI provides the Commission with a lengthy and convoluted explanation regarding its alleged gradual transfers of stock and changes in the board of directors. See CCI Opposition at 19-24. All of CCI's double-speak, however, cannot obscure the simple fact that, between 1991 and 1994, control of over 50 percent of CCI's stock changed hands,^{11/} and

^{11/} CCI makes a series of curious assertions that smack of desperation. For example, it claims that the original stockholders all still hold today the same number of shares they held in 1991. CCI Opposition at 21 n. 37. This is absurd. First, as TRW noted, beneficial ownership of at least 50 percent of the stock has changed hands, and the number of shares outstanding has been increased by an untold
(continued...)

that the new owners exercised their de facto control by replacing all but two of CCI's officers and directors. See TRW Petition to Deny at Attachment B; Declaration of Bruce D. Kraselsky, CCI Opposition, Exhibit B.^{12/}

In short, CCI has failed entirely to rebut the showings of TRW and others that it has undergone at least one unauthorized transfer of control. CCI also offers no valid explanation for its failure to notify the Commission (under Section 1.65) of the changes in its legal qualifications. The Commission should, at a minimum, treat CCI's Amended Application as newly filed.

III. MCHI'S AMENDED APPLICATION SHOULD BE DENIED FOR FAILURE TO MEET THE COMMISSION'S FINANCIAL QUALIFICATIONS STANDARD.

MCHI has attempted to augment its November 16, 1994 Amended Application by presenting the Commission with an impermissible supplement to its original financial showing,

^{11/} (...continued)

percent (thereby substantially diluting those initial interests). See Declaration of Bruce D. Kraselsky, CCI Opposition, Exhibit B. There is absolutely no credibility to CCI's assertion that it is not a closely-held corporation -- a claim CCI makes in order to bring itself within a theorized standard that was proposed in a law review article. CCI Opposition at 23-24.

^{12/} CCI's argument about intervening changes in its board is also without merit. The new entities with de jure control have clearly exercised their control.

rather than an opposition to the Petitions to Deny that were filed against it. The Commission's Report and Order, which required Big LEO applicants to submit amended applications on November 16, 1994 demonstrating that they were in compliance with the Commission's financial standards, was not an invitation to applicants to begin to assemble a financial package, but rather a requirement that the applicant be financially qualified on that date. Report and Order, 9 FCC Rcd at 5953 (¶ 40). TRW, in its Petition to Deny MCHI's Amended Application, has already established that MCHI failed to meet the Commission's strict financial standards on November 16, 1994, and accordingly will not repeat its arguments therein. Instead, TRW will address the alleged new evidence that MCHI has proffered in its belated attempt to satisfy the Commission's financial requirements.

First, MCHI submits a letter dated January 3, 1995, to David Castiel from Shmuel Peretz, Chief Financial Officer of Israel Aircraft Industries, Ltd. ("IAI"), stating that IAI is "prepared to expend the necessary funds to support the Ellipso project, subject to normal business reviews of market and business conditions and progress to assure acceptable levels of risk and return." In addition to being submitted well beyond the Commission's November 16, 1994 deadline, this letter is flawed in

a number of ways. First, as noted above, a "commitment" that is qualified subject to normal business reviews and acceptable levels of risk and return is not a permitted condition under the Commission's Big-LEO management commitment standard. See Report and Order, 9 FCC Rcd at 5952 (¶ 35). In addition, the letter does not list current assets or operating income as required by the Commission.^{13/} Without access to IAI's current assets or operating income, the Commission has no basis for determining that IAI is capable of financing even one bolt in MCHI's proposed satellites.^{14/}

In addition, in its Consolidated Opposition, MCHI continues to allege that it will rely on the support of Westinghouse Electric Corporation ("Westinghouse") and Harris Corporation ("Harris"). Westinghouse has not supplied MCHI or

^{13/} In its Opposition at n.18, MCHI states that IAI is a government-owned defense contractor that is precluded from disclosing its current assets and operating income. Instead, MCHI relies on IAI's size and reputation to establish that IAI is financially capable of supporting MCHI's Big LEO project. Ironically, this reliance is exactly what MCHI so vigorously criticizes with respect to the financial showings made by Motorola, TRW, and LQP. See MCHI Consolidated Opposition at 2.

^{14/} In this respect, MCHI's proffer of IAI's sales information is meaningless; Westinghouse, which had sales of \$8.875 billion in 1993, had an operating loss of \$326 million for the same year. MCHI Consolidated Opposition, Exhibit 1; Westinghouse Electric Corporation Form 10-K, 1993.

the Commission with any new letters and, as explained in TRW's Petition to Deny, its November 16, 1994 "commitment" letter^{15/} is wholly inadequate to satisfy the stringent requirements of Section 25.140(d). See TRW Petition to Deny MCHI at 12. Harris, on the other hand, submits a new letter in which it states that it "remains committed to providing the significant financial and technical resources to the Ellipso project consistent with the terms of our present business agreement with MCHI". Letter to David Castiel from Philip W. Farmer, President and Chief Operating Officer, Harris Corporation dated December 21, 1994. This letter contains nothing that was not already stated in the letter from Harris^{16/} that MCHI submitted with its November 16, 1994 Amended Application, nor does it bolster MCHI's financial showing to the Commission.

MCHI also submits a letter to David Castiel from David Archer, Director, Spectrum Network Systems, Ltd. ("Spectrum"), dated December 30, 1994, in which Spectrum states that it "supports the development of the Ellipso satellite system and

^{15/} See letter to David Castiel from M.F. Borkowski, Vice President and General Manager, Westinghouse Electric Corporation, Electronic Systems Group, dated November 16, 1994.

^{16/} See letter from Bill C. Tankersley, Director, Space Systems, Harris Corporation, dated November 16, 1994.

[is] willing to expend the necessary funds to construct, launch and operate the satellite system." Importantly, however, nowhere in MCHI's Amended Application, MCHI's Consolidated Opposition, or Spectrum's December 30, 1994 letter is there a reference to the number of shares of MCHI that Spectrum holds.^{17/} In addition, Spectrum's December 30, 1994 letter is silent with respect to the amount of money that Spectrum is willing to commit to the Ellipso project.

MCHI also relies on Spectrum's alleged affiliation with Savage Resources, whose financial statement it includes as an attachment to Spectrum's December 30, 1994 letter. Importantly, nowhere in either of the Spectrum letters or the Savage financial statement does Savage or Spectrum refer to each other as "affiliated companies." In fact, the Commission has no basis for

^{17/} MCHI's most recent FCC Form 430 indicates that Spectrum holds less than 1% of MCHI's voting stock. See MCHI Amended Application, Exhibit 2, Exhibit VI.

determining that Savage Resources is affiliated with Spectrum except for MCHI's bald, unsupported assertion.^{18/}

In support of its impermissible financial supplement, MCHI engages in slight-of-hand accounting, in an effort to bolster the amount of vendor financing it claims to have lined up. Specifically, in Exhibit 1, MCHI accounts for \$45 million for launch services to be contributed by Arianespace and \$160 million committed by ESKOS, a Russian and Ukrainian space company, for launch services associated with the Ellipso system. MCHI cannot contract with Arianespace to provide for all of MCHI's satellite launch needs, contract again with ESKOS to provide some of the same launch services, and then credit vendor financing from both mutually exclusive contractors towards MCHI's system costs.

In the end, MCHI's alleged Consolidated Opposition is nothing more than a belated and impermissible attempt to satisfy the Commission's financial qualifications for Big LEO service.

^{18/} MCHI reports that Savage Resources has \$125.6 million in current assets and \$59 million in operating revenues. MCHI Consolidated Opposition at 18. However, an examination of the Savage financial statement reveals that MCHI did not bother to convert those sums to United States dollars ("USD"). As of January 12, 1995, Savage's current assets and operating revenues would have been valued at \$96.5 million USD and \$43.8 million USD respectively.

As such, it should be ignored by the Commission. Further, even if the Commission were to credit the contents of MCHI's Consolidated Opposition, MCHI would still be far short of demonstrating that it is financially qualified. Accordingly, the Commission should deny MCHI's Amended Application for failure to comply with the Commission's financial qualifications standards.

IV. TRW HAS RAISED A SUBSTANTIAL AND MATERIAL QUESTION OF FACT REGARDING THE REASONABLENESS AND RELIABILITY OF LQP'S COST PROJECTIONS FOR THE DESIGN, CONSTRUCTION, AND LAUNCH OF THE 56 PROPOSED GLOBALSTAR SATELLITES.

In its Opposition, LQP attacks TRW's reliance on a widely publicized study by industry analyst The MITRE Corporation ("MITRE"). See LQP Opposition at 14-17.^{19/} According to LQP, the MITRE Report is not "factual," but instead is a compilation of data generated from several sources, and is stale because the analysts at MITRE reached their conclusions before LQP filed its November 1994 "minor" amendment. Id. at 15-16. LQP asserts that

^{19/} In its report, entitled "A Reevaluation of Selected Mobile Satellite Communications Systems: Ellipso, GLOBALSTAR, IRIDIUM and Odyssey," May 1994 ("MITRE Report"), MITRE concluded that LQP's estimates of the cost of constructing and launching its satellites are dramatically understated. Notably, MITRE concluded that the cost estimates for the other Big LEO applicants evaluated were all relatively close to the mark. See TRW Petition at 5-6 (citing MITRE Report at 136).

"the speculative estimates in the Mitre Report make the analysis irrelevant to LQP's actual cost estimates." Id. at 17. LQP then falls back on a pair of bald assertions from employees of LQP's affiliate and general contractor that the LQP satellite contract "is a fixed price contract[,]" and that "the costs for design and construction of the satellites, as of October 1994, is [sic] \$894 million." See Declarations of C. Patrick DeWitt, Vice President of Finance and Administrations, Space Systems/Loral, Inc. ("SS/L"), and Terry R. Evans, Vice President of Finance and Administration, Globalstar L.P. ("Globalstar"), both dated December 28, 1994, both at 1. See also LQP Opposition at 19.^{20/}

A. LQP Has Failed To Rebut On Its Merits TRW's Contention That Its Cost Projections for The Globalstar System Are Substantially Understated.

TRW is very troubled by the response of LQP -- a response that is both exceedingly carefully worded, and that is

^{20/} Although LQP asserts that its contract with Space Systems/Loral is a fixed-price contract, TRW notes that the alleged agreement, which is identified as Exhibit 10(h) to the Globalstar Telecommunications Limited ("GTL") SEC Form S-1 that has been brought into this proceeding by others, has yet to be filed with the Securities and Exchange Commission. Amendment No. 1 to the GTL S-1 was filed with the SEC on January 5, 1995, but still does not include Exhibit 10(h).

more enlightening for its omissions than its contents.^{21/}

Despite the assertion in LQP's heading that its satellite system cost estimates are accurate, LQP never actually makes (much less supports) this contention in the text.

In its Opposition, LQP assails the methodology (but not the accuracy) of the MITRE Report, and includes the virtually identically-worded declarations of SS/L and Globalstar principals that attest only to the existence of a broad "prime contract" for SS/L to design, construct, and launch 56 Globalstar satellites. See Declarations of DeWitt and Evans. TRW cannot help but notice that both declarants disassociate the discussion of satellite design and construction costs from the statement that the prime contract between SS/L and "Globalstar" is a fixed-price contract.^{22/} This subtle and orchestrated act begs the

^{21/} For example, Mr. DeWitt does not state that SS/L and Globalstar have a signed contract in hand; he merely states that an "award" has been made. In the vernacular of the aerospace industry, an "award" is nothing more than a contemplation of a contract. As further evidence of this, the GTL SEC Form S-1, the "contract" is identified as still being under negotiation. See GTL Amended Forms S-1 at 56 ("Globalstar and SS/L are currently discussing certain scope-of-work issues, which may increase the amount payable under the SS/L agreement.

^{22/} Specifically, in each case, the declarant states that the \$894 million stated cost for design and construction of the satellites is not based on the fixed price contract; instead, these costs are "[a]s stated in the November 15,
(continued...)

question that if LQP's assertion is that the \$894 million cost stated for the design and construction of 56 Globalstar satellites is truly "fixed" by contract, why do both declarants state that these costs are based on the amendment, and that they are current only "as of October 1994[?]"^{23/}

In short, LQP has not responded directly to TRW's substantive allegation that LQP's costs for Globalstar are dramatically understated. Instead, it has only heightened the urgency that the Commission examine the accuracy of LQP's estimates. As shown below, this is not a question of a few dollars here and there, but of cost estimates that may be as little as half or less of what they should be. Given that LQP is not financially qualified to construct, launch, and operate a system that costs more than \$2.247 billion based on the financial wherewithal of its parent, Loral Corporation,^{24/} expert cost estimates on the order of \$2.6 to \$3.1 billion for the Globalstar

^{22/} (...continued)

1994 amended application filed by Loral/QUALCOMM Partnership, L.P." Declarations of DeWitt and Evans at 1.

^{23/} Id.

^{24/} In its Amended Application, LQP stated that Loral Corporation's current assets and operating income totalled \$2.247 billion. See TRW Petition to Deny LQP at 3.

system raise substantial and material questions of fact as to LQP's basic qualifications, which, at a minimum, requires designation for hearing.

B. TRW's Own Analysis Of The LQP November 1994 Filing Reveals That LQP Has Understated The Relevant Costs For Globalstar By At Least \$1 Billion.

Recognizing that the MITRE Report suffers from certain limitations merely by virtue of the fact that it did not consider the modest technical changes LQP made in its November 1994 "minor" amendment, and intrigued with the apparent evasion LQP has woven into the fabric of its otherwise direct Opposition, TRW felt compelled to take the current LQP technical proposal, as embodied in the November 1994 amendment, back to the drawing board. A team of TRW employees expert in satellite design and costing matters analyzed the capabilities of the Globalstar satellites. Their conclusions, which are sworn to herein, raise very substantial questions about the reasonableness of LQP's cost estimates, and ultimately as to LQP's financial qualifications to be a Commission licensee in this service.

As explained in the attached declarations, TRW has carefully analyzed the weight estimates LQP included in its application (see LQP Amended Application at 14, Table 4-1,

Estimated Mass & Power Budgets), and arrived at some startling conclusions.^{25/} Specifically, TRW evaluated each component of the LQP mass budget for the Globalstar satellites, based on information obtained from LQP's Amended Applications and other published documents. Making only the most conservative estimates and assumptions where required,^{26/} TRW's expert team concluded that, for the capabilities LQP describes for its Globalstar satellites, the "separation" mass of the LQP satellites must necessarily be 916 kilograms (rather than the 426 kilogram figure stated in LQP's Amended Application).^{27/}

Once the appropriate weight of a satellite with the capabilities LQP claims for Globalstar was determined, the figures were plugged into three separate nationally and internationally accepted satellite costing models. In his Declaration, Mr. Fitzgerald states that when judgments were

^{25/} See Declaration of Roger Rusch (Attachment A hereto) and Declaration of James D. Fitzgerald (Attachment B hereto).

^{26/} TRW's credentials to conduct evaluations of the type undertaken here or to make informed assumptions and estimates cannot seriously be questioned.

^{27/} See Rusch Declaration at 2 and Attachment. The primary areas of disagreement TRW had with LQP's assessment are with the payload (239 kg for TRW vs. 141 kg for LQP), electrical power (358 kg for TRW vs. 33 kg for LQP), and propellant (174 kg for TRW vs. 77 kg for LQP). Compare Id. at Attachment with LQP Amended Application at 14.

required for operation of the various cost models, "every effort [was made] to provide the benefit of the doubt as to the lowest reasonable program cost." Fitzgerald Declaration at 1.^{28/}

Under each of the three models employed, LQP was found to have understated its costs for designing, constructing, launching, and operating the 56 Globalstar satellites for one year after initial launch by between \$1.0 billion and \$1.5 billion -- an average cost understatement of \$1.2 billion. Id. at Attachment, Table.^{29/}

As noted above, LQP relies exclusively on the commitment letter provided by its parent, Loral Corporation, and

^{28/} In this respect, TRW notes that the 87 percent "learning curve" it applied to the LQP program to account for the mass production of satellites is the most aggressive number reasonably available (i.e., the number most beneficial to LQP's cause). Mr. Fitzgerald states that if an industry-standard cumulative average cost improvement curve of 95 percent were applied, LQP's satellite recurring construction costs would have increased by 60 percent. Fitzgerald Declaration at 1-2.

^{29/} Because of the conclusion that LQP's satellite mass is understated in the LQP Amended Application by 490 kg, TRW was required to reevaluate LQP's stated plans to conduct multiple launches of the Globalstar satellites. It made the most commercially reasonable estimates of launch vehicle numbers and associated costs based on the revised satellite separation mass of 916 kg. See Rusch Declaration at Attachment.

Loral's financial wherewithal.^{30/} Under the Commission's financial standard, Loral, even if sufficiently committed, is able to support a projected system cost for LQP of \$2.247 billion (based on LQP's current assets of \$1.845 billion and its operating income of \$401 million). With only \$2.247 billion available, and in the face of contemporaneous and substantiated cost projections that show that LQP's proposed Globalstar system will cost a minimum of \$2.562 billion through the construction, launch, and relevant initial operation phase -- and possibly in excess of \$3 billion -- the Commission cannot simply accept LQP's cost projections as reliable.

On the basis of the information TRW has supplied both in its Petition and particularly in this Reply to LQP's obfuscatory Opposition,^{31/} there is now a substantial and

^{30/} TRW, like several others, questioned the reliability of the commitment letter LQP submitted with its Amended Application. In TRW's view, LQP has failed to demonstrate that the letter was not impermissibly contingent, and LQP's attempt to bolster that commitment with a post-November 16, 1994 submission is impermissibly untimely. At best, LQP should be relegated to the January 31, 1996 sub-round of Big LEO applicants; arguably, its application should be dismissed outright, since LQP did not elect to pursue the deferral option even as an alternative.

^{31/} TRW notes, in this regard, that despite the relative staleness of the MITRE study, the ratio of LQP's then-stated costs to MITRE's projections is roughly the same as the ratio in the comparison of LQP's Amended Application to TRW's analysis thereof.

material question of fact as to whether LQP has understated its projected costs for Globalstar, and thus as to whether it is financially qualified. Under these circumstances, Section 309 of the Communications Act of 1934, as amended, requires the Commission to designate LQP's application for an evidentiary hearing.^{32/}

V. IF THE COMMISSION IS TO WAIVE THE PFD LIMITS AT 2483.5-2500 MHZ AS REQUESTED BY LQP, IT MUST WAIVE THE LIMIT FOR ALL BIG LEO APPLICANTS THAT SEEK TO USE THAT BAND.

In its Amended Application, LQP requested a waiver of the power flux density limits imposed globally on the 2483.5-2500 MHz band by Section 2.106 of the Commission's Rules and International Telecommunication Union Radio Regulation 753F. See LQP Amended Application at 31-32. Several commenters, including MCHI, opposed the waiver request made by LQP, unless all Big LEO systems using the 2483.5-2500 MHz band were granted the same waiver.

TRW agrees that the LQP waiver request cannot be granted for LQP alone; that would constitute a relative increase in interference to other protected systems (including TRW's), and

^{32/} See 47 U.S.C. §§ 309(d) and (e); Astroline Communications Co. v. FCC, 857 F.2d 1556 (D.C. Cir. 1988).

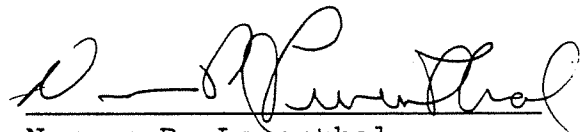
thereby be a major amendment under Section 25.116 of the Commission's rules. However, if the Commission were to waive the provisions for all affected systems, the relative position of each system would remain the same, while each would be able to take advantage of the greater flexibility that the higher threshold limit represents. LQP makes just such an egalitarian suggestion in its Opposition (see LQP Opposition at 25-26), and TRW urges the Commission to implement that suggestion for all affected applicants (including TRW).

CONCLUSION

For all of the reasons expressed herein, the Commission should deny CCI's and MCHI's Amended Applications, and designate LQP's application for hearing.

Respectfully submitted,

TRW Inc.

By: 

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January 13, 1995

Its Attorneys

Attachment A

DECLARATION OF ROGER J. RUSCH

I, Roger J. Rusch, hereby certify under penalty of perjury that the following statements are true and correct to the best of my knowledge and belief:

1. I am employed by the Space & Electronics Group of TRW Inc. as the Deputy Managing Director, Odyssey Services Organization. In this capacity, I am familiar with the current and previous system proposals of all the applicants for FCC authority to establish low Earth orbit mobile satellite systems in the so-called "Big LEO" service, including the GLOBALSTAR program proposal of Loral/Qualcomm Partnership, L.P. ("LQP").

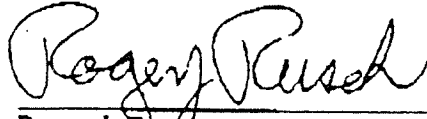
2. In my capacity as Deputy Managing Director, Odyssey Services Organization, I have directed that employees of TRW Inc. perform an analysis of the GLOBALSTAR spacecraft design specified in the November 15, 1994 Big LEO application amendment filed by LQP. The objective of this exercise, which involved personnel with substantial engineering and/or cost analysis experience, was to evaluate whether the satellite construction and design cost projections LQP stated in its November 15, 1994 Amendment are objectively reasonable in light of the capabilities and service objectives identified by LQP.

3. Participating personnel were instructed to use only low-end reasonable cost estimates and assumptions where such estimates and assumptions were required.

4. The results of the engineering analysis of the GLOBALSTAR satellites, which was performed by Eric Wiswell, Christopher J. Spitzer, and Hau Ho, all of whom are technically qualified and competent to perform the requisite analysis, are both accurate and based on good engineering practice. The relevant results are included as the Attachment to this declaration, and made incorporated by reference herein.

5. The determination of the engineering team was that the GLOBALSTAR satellites, in order to possess the capabilities described by LQP in its Amended

Application, would be expected to have a "separation mass" of 916 kilograms (2,015 pounds), and not the 426 kilograms (937 pounds) posited by LQP.



Roger J. Rusch
Deputy Managing Director
Odyssey™ Services Organization
TRW Inc.

Dated: January 12, 1995

GlobalStar Spacecraft Analysis

The GlobalStar satellite configuration was estimated based on information derived from the FCC GlobalStar filing. In particular the payload power and architecture shown in the filing was used to derive required power loads, solar array sizing, and battery sizing. With this as a basis, estimates for the remaining subsystems on the satellite were calculated. These estimates were based on previous TRW experience developing satellites with similar payloads. The mass and power budgets were then totaled to calculate the required propellant to keep the satellite in its desired orbit for the stated lifetime of the satellite. The number of satellites which can be launch on an Atlas II (A/AS) and Delta II were calculate based on the total launch weight, adding allowances for launch adapters, deployment mechanisms, and multi-satellite support structure.

GlobalStar Payload Analysis

The payload was analyzed using information obtained from the GlobalStar FCC filing and other published documents. The payload configuration derived did not overly burden the system with redundancy assumptions so that the weight and power estimates represent a viable value.

Frequency Plan and Polarization

In the mobile link, the GlobalStar system uses 1.610 to 1.6265 GHz for the mobile return link from the user to satellite, and 2.4835 to 2.5 GHz for the forward link from the satellite to user. Left hand circular polarization is used for the mobile link.

In the feeder link, the reverse band 6.875 to 7.075 GHz and 5.025 to 5.225 GHz are used for the return link from the satellite to earth station and the forward link from the earth station to satellite. GlobalStar uses dual circular polarization for the feeder link.

Antenna subsystem

- **Mobile link:** Each satellite has two phased array antennas. One antenna operates at S-band and one operates at L-band. Each antenna uses 61 elements to provide 16 contiguous beams.

- **Feeder link:** Each satellite uses one C-band antenna for the transmitting and the receiving to and from the earth stations.

- **TT&C:** C-band is used for both transfer and on orbit. During the transfer orbit, omnidirectional coverage antenna is used and C-band communication antenna is used for the on orbit.

Communication Payload subsystem:

Each mobile link antenna provides 16 contiguous beams and each beam carries 16.5 MHz, which is fully reused in each beam. The satellite payload functions as a simple bent pipe frequency-translating transponders on the forward and the return link.

In the return link, signals are received in 16.5 MHz band (13×1.25 MHz) by 16 beams over the frequency band of 1.610 to 1.6265 GHz by 61 (61 element phased array) L-band low noise amplifiers (LNAs). Each output of LNA is divided by 16 ways, then each output of 61 LNAs are combined by 61 ways. 61 of 1:16 power dividers and 16 of 61:1 power combiners are needed. The output of power combiner is upconverted, filtered, and frequency displaced to its appropriate FDMA slot. Seventeen (16/traffic + 1 TT&C) FDMA slots divide into two groups, one is LHCP and the other is RHCP. The output of 8 or 9 upconverters are summed, filtered, and amplified by a 5 Watt SSPA for transmission to the earth station.

In the forward link, signals are received at C-band from dual polarization C-band antenna. The signal is bandpass filtered, fed to LNA and down converted to S-band frequency.

The output of downconverters are 8 and 9 ways power divided to the total of 16 separate FDMA's. The output of each FDMA signal are 61 ways power divided, then the output of each 16 way power divider are combined by 16 way power combined. The output of 61 power combiners are amplified by 61 S-band SSPAs, fed to 61 S-band elements. The detailed payload block diagram is shown in Figure 1.

Estimated GlobalStar payload weight/power is based on the following (major components)

- Return link
 - 61 L-band LNAs (61:61 / No redundancy)
 - 16 L to C-band upconverters (6 : 4 / 4 sets of 6:4)
 - 2 : 1 C-band Dr. Amp/ Attn (2 for each polarization)
 - 2 : 1 C-band SSPA (2 for each polarization)
- Forward link
 - 2 : 1 C-band receiver with downconvert to S-band (2 for each polarization)
 - 61: 61 S-band SSPAs (No redundancy)

From the payload design of Figure 1, an estimate of the payload size weight and power was made as shown in Table 1. This information was then used to derive cost estimates from several different widely used cost modeling algorithms.

GlobalStar Payload Communication Block Diagram

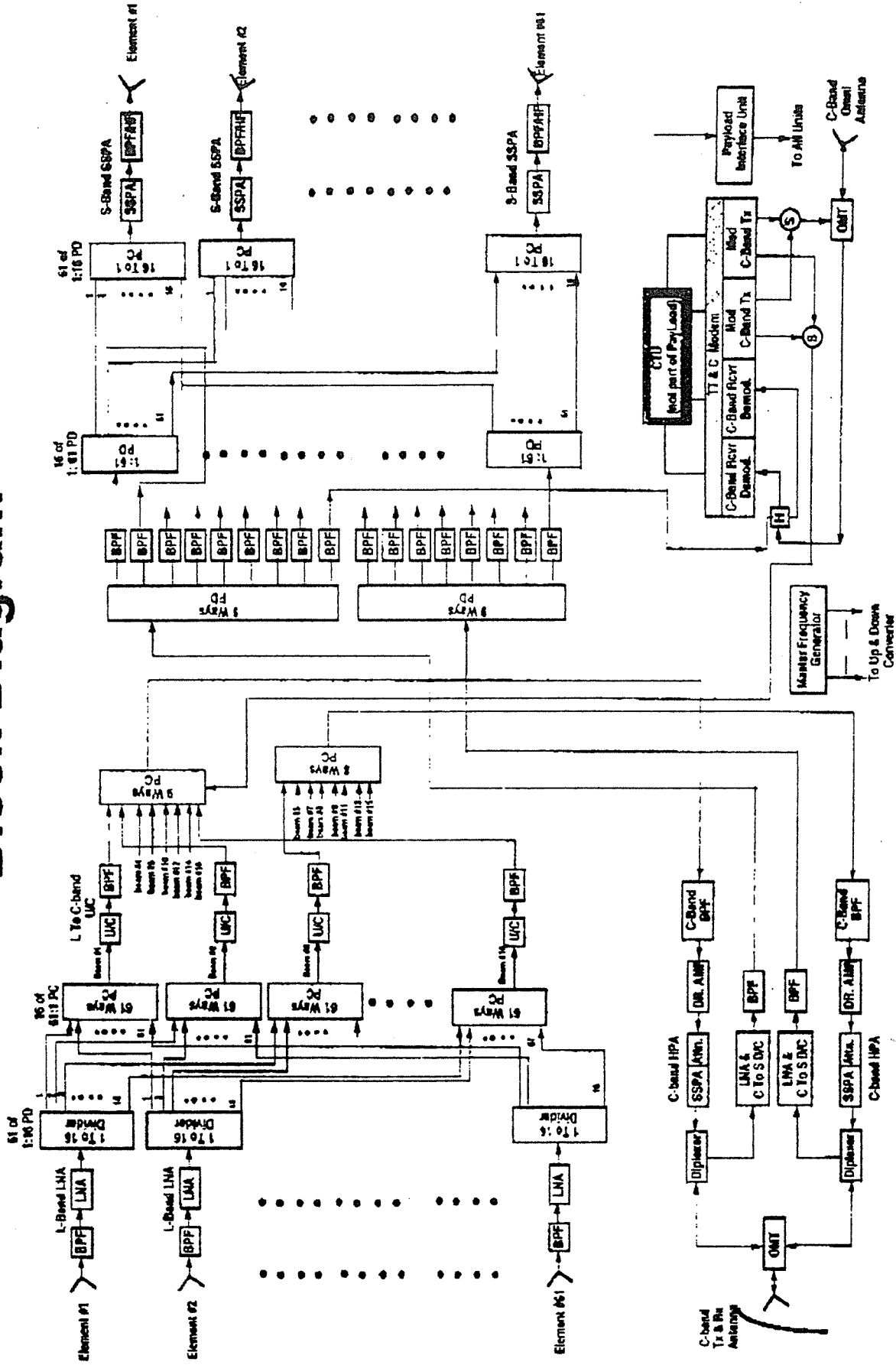


Figure 1

GlobalStar Weight/Power Estimate

GlobalStar SIZE, WT, POWER ESTIMATE FOR 18 BEAMS											
	Qty.	Act. Qty.	Weight Each (lb)	Weight Total (lb)	Weight Total (kg)	DC Power Each (W)	DC Power Total (W)	Thermal Total (W)			
1	1	0	2.0	20.0	9.1	0.0	0.0	0.0			
2	61	0	0.15	9.2	4.2	0.0	0.0	0.0			
3	61	0	0.3	18.3	8.3	0.0	0.0	0.0			
4	61	0	0.35	21.4	9.7	1.0	61.0	61.0			
5	1	1	7.5	75.0	34.1	0.0	0.0	0.0			
6	4	4	5	20.0	9.1	7.0	28.0	28.0			
7	16	0	0.3	4.8	2.2	0.5	0.0	0.0			
8	2	2	1.2	2.4	1.1	5.0	10.0	5.0			
9	2	1	1.0	20.0	9.1	20.0	20.0	20.0			
10	2	0	0.3	0.6	0.3	0.0	0.0	0.0			
11	4	2	1.5	6.0	2.7	5.0	10.0	16.0			
12	4	2	2.2	8.8	4.0	8.6	17.1	11.1			
13	2	0	0.4	0.8	0.4	0.0	0.0	0.1			
14	2	0	0.25	0.5	0.2	0.0	0.0	0.3			
15	2	0	0.4	0.8	0.4	0.0	0.0	0.3			
16	Lot	0		28.3	12.9	0.0	0.0	0.3			
				236.8	107.6		146.1	141.0			
C-BAND UPLINK, S-BAND DOWNLINK											
1	1	0	0.4	0.4	0.2	0.0	0.0	0.0			
2	2	0	0.3	0.6	0.3	0.0	0.0	0.0			
3	2	0	0.1	0.2	0.1	0.0	0.0	0.0			
4	2	0	0.35	0.7	0.3	0.0	0.0	0.0			
5	2	0	0.2	0.4	0.2	0.0	0.0	0.0			
6	4	2	1.65	6.6	3.0	5.6	11.2	11.2			
7	2	0	0.2	0.4	0.2	0.0	0.0	0.0			
8	2	0	1	2.0	0.9	0.0	0.0	0.0			
9	2	0	8	12.0	5.6	0.0	0.0	0.0			
10	1	1	7.6	76.0	34.1	12.0	12.0	12.0			
11	61	61	2.1	128.1	58.2	12.6	785.7	810.7			
12	61	61	0.19	11.6	5.3	0.0	0.0	16.4			
13	Lot	0		35.5	16.2	0.0	0.0	22.6			
14	61	0	0.15	9.2	4.2	0.0	0.0	0.0			
1	1	0	16	15.0	6.8	0.0	0.0	0.0			
				282.3	128.3		808.9	874.9			
C-Band TT&C RF Items											
1	1	0	0.4	0.4	0.2	0.0	0.0	0.0			
2	1	0	0.1	0.1	0.0	0.0	0.0	0.0			
3	1	1	1	1.0	0.6	1.5	1.5	1.5			
4	1	1	1.5	1.5	0.7	2.0	2.0	2.0			
5	2	1	1.1	2.2	1.0	0.0	0.0	0.0			
6	1	1	1.2	1.2	0.6	1.6	1.6	1.6			
7	2	0	0.3	0.6	0.3	0.0	0.0	0.0			
8	LOT	0		1.1	0.6	0.0	0.0	0.0			
1	1	0	0.7	0.7	0.3	0.0	0.0	0.0			
				8.8	4.0		8.0	8.0			
				627.8	239.9		960.1	720.9			
Grand Totals											

Table 1



Launch Mass Budget for Globalstar Satellite - Jan 09, 1995

Subsystem	lbs	kg
Payload	527.8	239.4
Attitude Control	99.0	44.9
Data Management	15.0	6.8
Electric Power	788.3	357.6
Propulsion	31.5	14.3
Thermal Control	57.5	26.1
Structures / Mechanisms	72.8	33.0
On-Orbit Dry Mass	1592.0	722.1
On-orbit Propellant	382.6	173.6
Apogee Injection Prop.	0.0	0.0
Launch Vehicle Adapter	100.0	45.4
	1400 FT/SEC REQUIREMENT ESTIMATE	
	DIRECT INSERTION ASSUMED	

2074.6 941.0

EACH ADDITIONAL SATELLITE 2014.6 915.7



Power Budget for Globalstar Satellite - Jan 09, 1995

FUNCTION	Power
Payload	947
Attitude Control	30
Data Management	48
Electric Power	45
Propulsion	5
Thermal Control	25
Structures / Mech.	10
TOTAL POWER LOAD	1110

Total S-Band RF = 275 watts
EOL Solar Array design power = 2119 watts (including string failures margin)
Battery Size = 118 amp-hours with 20 % DOD

Attachment B

DECLARATION OF JAMES D. FITZGERALD

I, James D. Fitzgerald, hereby certify under penalty of perjury that the following statements are true and correct to the best of my knowledge and belief:

1. I am employed as Major Program Pricing Manager in the Civil & International Systems Division of the Space & Electronics Group of TRW Inc. I am a Certified Cost Analyst (CCA No. 49, Institute of Cost Analysis (ICA)), a Certified Professional Estimator (CPE No. 261, National Estimating Society (NES)), and a Certified Cost Estimator/Analyst (CCEA No. 1029, Society of Cost Estimating and Analysis (SCEA)).

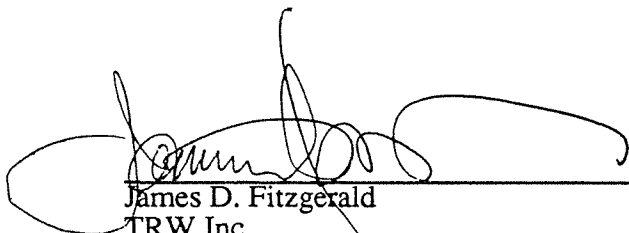
2. I am familiar with and have regularly utilized in the course of my work several nationally and internationally-accepted cost models, including the Unmanned Spacecraft Cost Model (7th and earlier editions); the National Aeronautics and Space Administrations' Unmanned Spacecraft Model (NASCOM-DB), and the Martin Marietta PRICEH Cost Model.

3. I was provided with certain information regarding separation mass estimates and other pertinent characteristics of the proposed 56-satellite GLOBALSTAR program, and conducted a cost analysis of the GLOBALSTAR system using the cost models identified above. The results of my cost analysis of the GLOBALSTAR system, including the estimated costs of constructing, launching, and operating for one year the entire 56-satellite constellation, are presented in the Attachment hereto (which is hereby incorporated by reference and made a part hereof).

4. In the course of my analysis, I made every effort to provide the benefit of the doubt as to the lowest reasonable program cost. An example is that recurring satellite construction costs for the 56 satellites were developed using an 87 percent cumulative average cost (CAC) improvement curve. This composite curve was used to represent the lowest possible cost. It was demonstrated on complex small missile programs with large production quantities. The industry standard for satellite production (based on a study of

prime contractors conducted by the U.S. Air Force) is 95 percent cumulative average cost improvement curve. If a 95 percent CAC improvement curve were applied to the GLOBALSTAR program it would add more than 60 percent to the satellite recurring construction costs stated in the Attachment.

5. Using an average of the results of the three cost models shows that the expected cost for the GLOBALSTAR program construction, launch, and one year of operations is \$2.8 billion, and not the \$1.6 billion stated by the GLOBALSTAR applicant in its November 1994 amended application. Executives of the applicant have stated that the average GLOBALSTAR satellite costs will be \$16 million; TRW cost estimate for the average GLOBALSTAR satellite cost is \$25 million.



James D. Fitzgerald
TRW Inc.

Dated: January 12, 1995

GLOBALSTAR SATELLITE COST COMPARISONS

- Three cost estimates were performed using TRW derived satellite physical characteristics (weight and power) for the satellite performance capabilities described by Loral in their FCC filing 16 Nov 1994.
- The estimates used the following industry standard cost models:
 - Unmanned Spacecraft Cost Model (USCM7)
 - NASA Unmanned Spacecraft Model (NASCOM-DB)
 - Martin Marietta PRICEH Cost Model
- Selection of cost models were made on the basis of the historical programs which underlie the cost model. Each of the selected models estimate at both the subsystem and box level. Each model is a generally accepted government and industry standard and widely used throughout industry and government. The model results were escalated to constant 1994 \$ using 4% compounded yearly.
- USCM7 is primarily a communication satellite cost model developed by the U.S. Air Force. The model data base contains actual costs from over 30 satellite programs. USCM7 is a recently released seventh edition of the USAF communications satellite cost model which has been in use for about 20 years in the aerospace industry.
- The NASA cost model is the second version of the NASA Cost Model Data Base (NASCOM-DB) released in late 1993.

- Martin Marietta PRICEH is a commercially available model used by government and industry for over 20 years.
- Physical parameters/characteristics derived by TRW engineering analysis of the Globalstar satellite performance capabilities described in the Loral 16 Nov 1994 filing formed the basis for the modeling independent variable inputs.

	<u>Loral Filing 16 Nov 1994</u>	<u>TRW Engineering Analysis *</u>
Satellite dry weight	768 lbs 349 Kg	1,592 lbs 724 Kg
Payload dry weight	310 lbs 141Kg	528 lbs 240 Kg
Satellite Launch weight	937 lbs 426Kg	2,015 lbs 916 Kg **
Qty Satellites	48	48
On-Orbit Satellite Spares	8	8
Satellite/Launch Vehicle	6	5
Launch Vehicles	9	14

- Basis for estimates
 - Spacecraft weights are those developed by the TRW engineering staff.
 - Launch consists of 14 launch vehicles. A cost-effective mix of Atlas II and Delta vehicles was chosen to minimize launch rate. Costs are slightly higher but more realistic in terms of utilizing existing launch facilities.

* Detailed weight and power estimates are at Attachment to R. Rusch declaration.
 ** TRW analysis of satellite weight does not include launch adapter.

- Cost model recurring costs were developed using 87% cumulative average cost improvement curves for satellites and 92% for launch vehicles. The steep curve for satellites is based upon those found on high volume (lot sizes of several hundred) complex missile production lines. For smaller quantity satellite production, the U.S. Air Force has stated that a 95% cumulative average cost improvement curve is appropriate (based on industry survey of satellite prime contractors). The use of a 87% cumulative average cost improvement curve is extremely aggressive and should represent the lowest possible cost. Cumulative average cost improvement curve assumptions of 90%-92% are typically viewed as aggressive for satellites of the Globalstar size and class.

GLOBALSTAR 1994 \$M

<u>Cost</u>	<u>Qty</u>	<u>USCM7 ED</u>	<u>NASA NASCOM-DB</u>	<u>Martin Marietta PRICEH</u>	<u>Model Average</u>	<u>Loral FCC Filing Nov 1994</u>
Satellite	56	\$1,642	\$1,356	\$1,211	\$1,403	\$894
Launch Vehicle ¹	14	1,155	1,031	1,085	1,090	394
Ground ²		41	41	41	41	41
1 Yr Ops ²		225	225	225	225	225
Total Construc. + 1 Yr Ops		\$3,063	\$2,653	\$2,562	\$2,759	\$1,554

¹ Eight Atlas IIA and six Delta plus launch vehicle reflight and satellite replacement insurance.

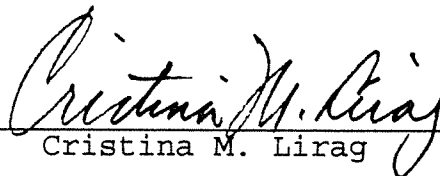
² Assumed costs as stated by Loral in Nov 1994 FCC Filing.

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CERTIFICATE OF SERVICE

I, Cristina M. Lirag, hereby certify that a true and correct copy of the foregoing "Consolidated Reply to Oppositions" was mailed, first-class postage prepaid, this 13th day of January, 1995, to the following:

- *Chairman Reed Hundt
Federal Communications Commission
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- *Commissioner James H. Quello
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