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FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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Federal Communications Commission
Office of the Secretary

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Domestic Facilities Division
Satellite Radio Branch

In the Matter of the Application of)
)
ORBITAL COMMUNICATIONS CORPORATION)
)
For Authority to Construct a)
Low-Orbit Mobile Satellite System)
_____)

File No. 22-DSS-MP-90(20)

REPLY COMMENTS OF ORBITAL COMMUNICATIONS CORPORATION

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SUMMARY

The comments on ORBCOMM's Application overwhelmingly support the Commission's expeditiously proceeding to authorize ORBCOMM to construct its proposed low earth orbit satellite system. The comments confirm that ORBCOMM will provide innovative services, and that the combination of low-cost, low-power, ubiquity and portability will allow ORBCOMM to fulfill market demands that will otherwise go unserved or underserved.

Geostar filed comments disputing the technical advantages of ORBCOMM's proposed LEO satellite operations. ORBCOMM continues to believe that its system is best suited for the mass market it seeks to serve, but the Commission need not resolve this controversy, since the marketplace will do so.

The only party to oppose the Application is Starsys -- an entity that filed a "copycat" request some two months subsequent to ORBCOMM's filing -- and its opposition is based on an unfounded assertion that a different modulation technique should be used; ORBCOMM does not believe that the proposed alternative is a practical solution. Moreover, because ORBCOMM is not seeking to be the only LEO satellite system licensee, the Commission can proceed to license ORBCOMM expeditiously without foreclosing other qualified applicants.

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REPLY COMMENTS OF ORBITAL COMMUNICATIONS CORPORATION

I. Introduction

Orbital Communications Corporation ("ORBCOMM"), by its attorneys, hereby replies to the comments submitted on its application to construct a low-earth orbiting satellite system ("Application").^{1/} In the Application, ORBCOMM requests authority to construct satellites to be used for a new mobile satellite data communications and position determination service provided over a constellation of small satellites placed into low-earth orbit ("LEO"). As detailed in the Application, advances in launch vehicles and small satellite technologies, combined with the relatively low power requirements of satellite

^{1/} Orbital Communications Corporation, File No. 22-DSS-MP-90(20), Public Notice Report No. DS-953, April 11, 1990. Along with the Application, ORBCOMM additionally filed a waiver request under Section 319(d) so that it could immediately begin construction. The Commission has also placed ORBCOMM's petition for rulemaking on public notice, Orbital Communications Corporation, RM No. 7334, Public Notice Report No. 1814, April 4, 1990, and of the eighteen parties who commented on the rulemaking petition, none opposed initiation of a rulemaking.

operations in LEO, make possible the ubiquitous, efficient and economical provision of a variety of services that will meet unserved and underserved needs.

In developing its pioneering LEO satellite system,^{2/} ORBCOMM has made every effort to keep the cost of the receivers as low as possible, in order to be able to provide the "mass market" services that ORBCOMM proposes to offer. ORBCOMM has also been constrained by a need to design the LEO satellite system to use relatively little spectrum (about 1 MHz in total), and to share that spectrum with the currently authorized users. Moreover, as ORBCOMM explained in the Application, expeditious action by the Commission is necessary both to allow the U.S. to secure a leadership role in the global deployment of this innovative communications technology, and to ensure timely provision of these critical services.

Sixteen parties filed comments on the Application.^{3/} Based on these comments and the other information in the record (including the rationale set forth in ORBCOMM's rulemaking reply comments for a "set aside"), the Commission should promptly

^{2/} This system includes several innovations for which ORBCOMM and its parent have filed patent applications.

^{3/} The parties filing comments on the Application were: American Mobile Satellite Corp. ("AMSC"); C. Itoh Aviation, Inc. ("C. Itoh"); Communications Satellite Corporation ("COMSAT"); Ford Motor Company; Geostar Corporation ("Geostar"); L-Tronics; Mitsubishi Corporation ("Mitsubishi"); NEC America, Inc. ("NEC America"); OTC Maritime Limited ("OTC Limited"); Portland Mountain Rescue; Public Service Satellite Consortium; SeaLand Service, Inc. ("SeaLand"); SCI Systems, Inc. ("SCI Systems"); Southern Marine Research; STARSYS, Inc. ("Starsys"); Volunteers in Technical Assistance, Inc. ("VITA").

authorize ORBCOMM to construct its LEO satellite system for the provision of mobile two-way data communications and position determination services.

II. The Comments Support Grant of ORBCOMM's Application

The majority of commenting parties support ORBCOMM's Application to provide mobile satellite services ("MSS") using a LEO satellite system.^{4/} The parties also agree with ORBCOMM's observation in the Application that time is of the essence, and that the Commission must act expeditiously in order to ensure

^{4/} E.g., C. Itoh; Ford Motor Company; Mitsubishi; NEC America; OTC Limited; Public Service Satellite Consortium; SCI Systems; SeaLand; Southern Marine Research. Of the sixteen parties that filed comments, only one -- Starsys -- petitioned to deny the Application. Starsys (which is 95% owned by North American CLS, itself a wholly-owned subsidiary of the French company Collecte Localisation Satellites, which in turn is owned 55% by CNES (the French Space Agency), 15% by INFREMER (the French Institute for Research of the Sea) and 30% by French banks) filed a "copycat" application some two months after the filing of ORBCOMM's Application, differing in one key respect in that it proposes generically to use spread spectrum technology. Starsys objected to the Application solely on the ground that ORBCOMM does not propose to use spread spectrum modulation. Starsys at p. 2. The Starsys petition to deny is addressed in greater detail infra.

VITA requested that the Commission delay acting on the ORBCOMM Application until it has had a chance to review the application VITA plans to file. As discussed in ORBCOMM's reply comments in the related rulemaking proceeding, because ORBCOMM is not seeking an exclusive authorization, the Commission can proceed to act on ORBCOMM's Application without foreclosing consideration of VITA's interests. ORBCOMM Reply Comments in RM-7334 at pp. 6-17. Thus, VITA has not presented a valid basis for the Commission to defer action on the ORBCOMM Application.

that the U.S. remains at the forefront of these innovative services.^{5/}

In addition to generalized support, the comments recognize that ORBCOMM has proposed innovative services using technology not previously available or applied to a commercial service.^{6/} The comments also reinforce ORBCOMM's position that it will be offering services that are largely unique, in view of the combination of low-cost, low-power, ubiquity and portability.^{7/} The comments also confirm that the receivers can be manufactured at the low prices discussed in the Petition.^{8/} Thus, ORBCOMM will be able to fulfill important market demands that will otherwise go unserved or underserved.

5/ E.g., SCI Systems; Southern Marine Research; SeaLand; Mitsubishi; OTC Limited. Indeed, as ORBCOMM anticipated in the Application, the entities that stand to benefit most from any regulatory delay are foreign groups. For example, much activity in developing similar technology is now being undertaken in Europe. There are reliable reports that one or more French companies are developing a rocket with capabilities similar to Orbital Science Corporation's Pegasus™ Air-Launched Space Booster, using components from existing strategic launch vehicles being taken out of service. In addition, there are reports that a German project (OHB Systems) plans to develop a rocket that would be launched from the Concorde and used to place satellites in low earth orbit.

6/ E.g., C. Itoh; Mitsubishi; Public Service Satellite Consortium; SeaLand.

7/ E.g., Ford Motor Company; Mitsubishi. Cf., AMSC (the AMSC space segment will be able to offer any MSS that technology permits). To the extent that there may be in some areas other terrestrial or satellite services that will offer some of the same types of services that ORBCOMM will provide, ORBCOMM is fully prepared to compete with those other offerings in the marketplace.

8/ Ford Motor Company.

Several commenting parties specifically recognize that ORBCOMM will be able economically and rapidly to meet particular needs. For example, several commenting parties indicate that ORBCOMM will be well suited to provide "PELTS-type" services.^{9/} Similarly, other commenting parties observe that ORBCOMM's LEO satellite system proposal is uniquely designed to provide services globally as the satellites circle the earth.^{10/} Likewise, parties indicate that the ORBCOMM system will fulfill requirements not presently being met with respect to automotive applications,^{11/} and maritime uses.^{12/} In sum, the comments fully support ORBCOMM's claim that there is a substantial need for the services to be provided over the ORBCOMM system, and that ORBCOMM can meet those needs.

^{9/} E.g., Mitsubishi; Portland Mountain Rescue. L-Tronics raised operational concerns regarding use of the ORBCOMM system for emergency location and communication in the wilderness. ORBCOMM believes that those issues may be better addressed in the Commission's separate proceeding concerning such services, Amendment of Parts 0, 1, 2 and 95 of the Commission's Rules regarding the Establishment of a Personal Emergency Locator Transmitter Service, PR Docket No. 89-599, FCC 89-342, released December 20, 1989, but ORBCOMM intends to consult with rescue teams and others in designing its services to meet these emergency location and communications needs.

^{10/} E.g., Mitsubishi; SCI Systems; NEC America; OTC Limited.

^{11/} Ford Motor Company; Mitsubishi; C. Itoh.

^{12/} OTC Limited; Southern Marine Research.

III. The Comments of Geostar or Starsys
do not Justify Delay or Denial of
ORBCOMM's Application

Two of the commenting parties have sought to inject extraneous issues into this proceeding. Geostar, while not objecting to Commission grant of ORBCOMM's Application, seeks to demonstrate the technical superiority of its proposed geostationary satellite position determination and messaging system. Starsys is seeking denial of ORBCOMM's Application solely on the ground that the ORBCOMM system will not use spread spectrum modulation. Neither of these arguments provide a valid basis for the Commission's delaying or denying authorization of ORBCOMM to construct its LEO satellite system.^{13/}

^{13/} COMSAT does not oppose the Application, but submitted comments claiming that the U.S. would be required to consult ORBCOMM's system with INTELSAT under Article 14 of the INTELSAT Agreement, and notify INMARSAT under Article 8 of the INMARSAT Convention. COMSAT also asserts that ORBCOMM may be subject to the U.S. separate systems policies and conditions. ORBCOMM fully intends to undertake all necessary technical coordinations. ORBCOMM does not believe, however, that any such coordination should include an economic harm analysis, in light of the specialized, mobile nature of its offerings. See generally, INTELSAT Document BG-84-81E (March 13, 1990) at p. 2: "since INTELSAT has no present intention to provide mobile services, separate systems, or those elements of separate systems offering such services, should not be subject to the economic harm assessment." Likewise, the Commission's separate systems limitations are inapplicable, because ORBCOMM's proposed specialized services are outside of "INTELSAT's 'core' revenues obtained from supplying space segment capacity for international switched message services." Establishment of Satellite Systems Providing International Communications, 101 FCC 2d 1046, 1096 (1985).

A. Response to Geostar

With respect to Geostar's claims of a technically superior system, ORBCOMM believes that the marketplace is the best arbiter of the choices the consumer will face, including service cost, subscriber equipment cost and service features. There will be significant differences between Geostar's proposed geostationary satellite system-based services and ORBCOMM's LEO satellite system-based services, in part due to the somewhat different markets being targeted. As indicated above, ORBCOMM has designed its system to meet the requirements of a "mass market," and the costs and operating characteristics reflect that goal. At any rate, the Commission need not resolve such issues, particularly at the cost of delaying implementation of these important services that can meet unserved and underserved needs. Nonetheless, a rebuttal to some of Geostar's claims is called for, so that the Commission is not misled into a view that ORBCOMM has proposed an impractical system.

First, with respect to the user terminal prices, ORBCOMM's estimates are consistent with high volume cost analyses prepared by Ford Motor Company's Electronics Division, and in view of the design of the ORBCOMM system to meet mass market needs, the projected volumes of subscriber terminals are conservative.^{14/} Second, as to Geostar's service reliability

^{14/} While Geostar could lower its user terminal costs by assuming larger production runs, ORBCOMM terminals are still likely to be much less expensive because of operations in the low-VHF bands, which allows a shared automobile radio antenna and
(continued...)

and availability claims, the ORBCOMM system will provide nearly constant coverage, with any period when there is no satellite in view lasting for one to two minutes or less, and any momentary non-availability at a given position occurring only occasionally.^{15/}

Third, as to the different capabilities for position accuracy, Geostar is "comparing apples to oranges"; the ORBCOMM system is not designed to provide extremely precise accuracy, but the tradeoff is significantly lower costs in line with the mass market intended to be served. Moreover, in many applications where there is a constant power source (e.g., automobiles), the ORBCOMM terminal will be continuously calculating its position, resulting in a rapid, accurate position fix.^{16/} Finally, with

^{14/} (...continued)
less expensive RF components. In addition, ORBCOMM's use of frequency measurement for position determination rather than time measurement (ranging) reduces the need for high speed digital circuitry, ensuring lower cost baseband electronics.

^{15/} In the mid-latitudes, the coverage will be even greater. Moreover, in the event of an ORBCOMM satellite failure, there will only be an incremental (roughly 5%) degradation in service for a temporary period while a spare satellite is placed into orbit -- a process that can occur relatively rapidly in light of the capabilities of Orbital Science Corporation's Pegasus™ Air-Launched Space Booster. Geostar's proposed deployment of in-orbit spares is a more expensive approach for providing system backup in the event of a failure, necessitated by the fact that a satellite failure in its geostationary system would not lead to merely an incremental degradation of service.

^{16/} In the ORBCOMM system, the terminals themselves will perform the position determination, using signals broadcast from the satellites to all the terminals; thus, there is no limit on the number of ORBCOMM terminals that can obtain continuous position fixes (although there are limits on the capacity for the terminals to transmit that location information to third parties via the ORBCOMM gateways). In contrast, with the proposed
(continued...)

respect to the technical comparisons, Geostar is able to lessen the power and link margin differences only through assuming the use of very sophisticated, complex and expensive antennae for both its satellites and its user terminals. ORBCOMM will be able to benefit from the technical advantages of low-earth orbit operations to provide a low-cost service targeted to the mass market. In sum, ORBCOMM believes that its LEO satellite system is best suited for the markets it intends to serve. However, ORBCOMM also believes that this disagreement with Geostar on the relative merits of the systems and services is best resolved by consumers, and need not delay Commission action here.

B. Response to Starsys

Starsys' petition to deny the ORBCOMM Application is based on two fundamental misconceptions -- that ORBCOMM is seeking exclusive authority to provide service using LEO satellites, and that Starsys' generic proposal of using spread spectrum technology is a superior technical approach. Neither claim is supported in the record.

First, there is no basis for Starsys' assertion that grant of the ORBCOMM Application would foreclose other LEO satellite systems and create a monopoly. As ORBCOMM made clear in the Application, ORBCOMM's services will be subject to competition from a range of terrestrial and geostationary

16/ (...continued)

Geostar system, position determination will occur at the central earth station and require use of the communications channels for both determining and transmitting the position information.

satellite providers. In addition, others remain free to propose alternative LEO systems, and indeed, some two months after the filing of ORBCOMM's application, Starsys filed an application so that it could provide a nearly identical service.^{17/} ORBCOMM fully supports the development of competition in LEO services, and is prepared to compete with other entities in the marketplace.

ORBCOMM does not object to the Commission granting other qualified applicants authority to provide service using LEO satellites, if those applications will not interfere with ORBCOMM's system, or if the applications seek alternative frequencies (which should be available in light of the relatively small amount of spectrum required by the proposed LEO satellite systems). Moreover, as set forth in greater detail in ORBCOMM's reply comments in the related rulemaking proceeding,^{18/} the Commission can proceed to act on ORBCOMM's Application without foreclosing consideration of additional qualified LEO satellite system applicants. Thus, there is no merit to Starsys' claim

^{17/} ORBCOMM recognizes that this is not the appropriate time to address the myriad defects in the Starsys application (including, inter alia, foreign ownership and control; technical deficiencies; the absence of any financial information, and plans to finance the system through pre-selling of capacity; the absence of any interference analysis; the absence of any technical information on its "spread spectrum" operation; and the impracticality of its proposal to provide continuous service with a constellation of satellites distributed randomly). ORBCOMM will address the significant problems with the Starsys proposal if and when it becomes necessary.

^{18/} ORBCOMM Reply Comments in RM-7334 at pp. 6-17.

that the Commission should deny the ORBCOMM application in the interest of competition.

Second, there is no basis for Starsys' assertion that its proposal presents a viable alternative. ORBCOMM is unable to analyze fully Starsys' claims for its spread spectrum technology, because despite the volume of paper submitted in its application, Starsys merely makes conclusory statements about its spread spectrum approach.^{19/} However, ORBCOMM previously had considered and rejected such a spread spectrum-based approach as economically impractical and technically unworkable. The circuitry necessary for demodulation of the spread spectrum signal would become the most costly and complex element of the user terminal, and would likely drive the cost of the terminal out of the "mass market" range. Also, a spread spectrum approach is not consistent with the characteristics of the equipment and usage of the current government users.^{20/} Neither ORBCOMM nor

^{19/} Starsys has repeatedly invoked "spread spectrum" as some sort of talisman throughout its pleadings, including its petition for rulemaking, application, comments on ORBCOMM's rulemaking petition, reply comments in the rulemaking proceeding and its petition to deny the Application. However, Starsys nowhere presents any technical details on its "spread spectrum technique"; indeed, its technical analysis in its application is based on its "solution B", which does not use spread spectrum. Starsys application at pp. VII-6 - VII-12.

^{20/} Indeed, since the filing of the Application, ORBCOMM has obtained more detailed information on the government usage in these shared bands. In light of that information, ORBCOMM has developed (and will shortly be filing a patent for) an innovative method for eliminating interference from the government users, which it terms Dynamic Channel Activity Assignment System ("DCAAS"). ORBCOMM discussed the DCAAS with the government users (under the auspices of IRAC at its April 24th meeting), and they believe it is a viable sharing solution. ORBCOMM will amend its
(continued...)

the Commission can know how Starsys intends to deal with these problems, because Starsys has provided insufficient technical information on which to evaluate its spread spectrum approach. Thus, Starsys' claim to have developed a superior alternative is mere puffery, at best.

Finally, ORBCOMM objects to Starsys' attempts to characterize ORBCOMM's system as based on "old" or "outdated" technology. In fact, ORBCOMM's system is based on state-of-the-art technology and numerous innovations developed by ORBCOMM and its parent, including orbit selection algorithms, the DCAAS channel assignment technique, and spacecraft and launch vehicle design. At the same time, ORBCOMM objects to Starsys' attempts to overstate its own experience and the "innovativeness" of its proposal. ORBCOMM will detail these objections when and if it becomes necessary to establish the legitimacy of ORBCOMM's claims to "pioneer" status. At any rate, the Commission should reject Starsys' attempt to derail the ORBCOMM Application based on the Starsys claim that it has proposed the only viable, competitive approach.

20/ (...continued)

Application in the near future to specify the DCAAS technique, and to make certain other minor technical changes to reflect refinement of the ORBCOMM proposal based on continuing systems engineering efforts.

IV. Conclusion

The comments filed in this proceeding provide overwhelming support for prompt Commission authorization to begin constructing the ORBCOMM LEO satellite system. The comments reinforce ORBCOMM's claim that there is a substantial need for the services to be provided over the ORBCOMM system, and that ORBCOMM can meet those needs. The only party to oppose the Application is an entity that filed a "copycat" request some two months subsequent to ORBCOMM's filing. Its opposition is based on an assertion that a different modulation technique should be used; ORBCOMM does not believe that the proposed alternative is a practical solution. Moreover, because ORBCOMM is not seeking to be the only LEO satellite system licensee, the Commission can proceed to license ORBCOMM expeditiously without foreclosing other qualified applicants.

Respectfully submitted,



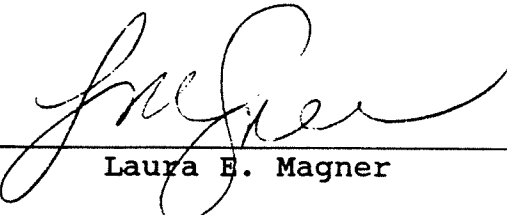
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May 29, 1990

CERTIFICATE OF SERVICE

I, Laura E. Magner hereby certify that on the 29th day of May, 1990, a true copy of the foregoing Reply Comments of Orbital Communications Corporation was mailed, postage prepaid, to the parties on the attached service list.



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