Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC 20554

In the Matter of	)	
	)	
CELSAT, INC	)	PP-28
	)	
Request for a Pioneer's Preference	)	
Regarding Its Petition for Rulemaking	)	RM-7927
to Allocate Spectrum and To Establish	)	
Rules and Policies for a New Hybrid	)	
Personal Communications Network	)	
Service	)	

GTE's COMMENTS IN OPPOSITION TO CELSAT'S PIONEER'S PREFERENCE REQUEST

GTE Service Corporation, on behalf of
its affiliated domestic telephone,
equipment, and service companies

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April 8, 1992

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SUMMARY

GTE continues to urge the Commission to reject "claimstaking" applications for Pioneer's Preferences ("PP"). While CELSAT's PP Request is of significantly better quality than many other claim-staking requests filed by other parties, it still does not comply with the FCC's Rules and should be rejected. The Rules require that an Applicant must accompany its Pioneer's Preference Request with either a demonstration of the technical feasibility of the new service or technology or an experimental license application (unless an experimental license application has previously been filed for that service or technology). CELSAT has done neither. While consistently referring to "an application" and promising that "an application" or "experimental applications" will be filed, the fact is, none have been filed. This is a fatal omission to CELSAT's PP Request.

CELSAT has requested a "guarantee" of between 362 and 417 MHz for its proposed Hybrid Personal Communications Network ("HPCN"). However, it has failed to satisfy the criteria that are preconditions to such a determination, to justify why such a determination is in the public interest or to demonstrate why a Nationwide license to such a large block of spectrum should be given to CELSAT.

CELSAT's PP Request should be denied.

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Request for a Pioneer's Preference Regarding Its Petition for Rulemaking to Allocate Spectrum and To Establish Rules and Policies for a New Hybrid Personal Communications Network Service	)	RM-7927

GTE's COMMENTS IN OPPOSITION TO CELSAT'S PIONEER'S PREFERENCE REQUEST

Pursuant to Section 1.402 of the Commission's Rules, 47 C.F.R. Section 1.402, GTE Service Corporation, on behalf of its affiliated domestic telephone, equipment, and service companies ("GTE"), with regard to the Request for Pioneer's Preference ("PP") submitted by CELSAT on February 10, 1992 ("PP Request"), hereby submits the following Comments in opposition. CELSAT's PP Request was placed on Public Notice March 9, 1992.

BACKGROUND

CELSAT has attempted to file its PP Request pursuant to the Rules adopted in the Pioneer's Preference Docket, Establishment of Procedures to Provide Preference to Applicants Proposing an Allocation for New Services, GEN Docket No. 90-217 ("D.90-217"), Report and Order (the "D.90-217 Report & Order"), 6 FCC Rcd 3488 (1991), modified, Memorandum Opinion and Order FCC 92-57 released February 26, 1992 ("the D.90-217 Reconsideration Order");

and in particular Sections 1.402, 1.403 and 5.207 of the Commission's Rules as adopted therein.

The Pioneer's Preference criteria that were adopted by the Commission, and applied in the "LEO" cases[1], are rigorous standards that demonstrate the Commission "do[es] not intend to bestow preferences casually." D.90-217 Report & Order, 6 FCC Rcd at 3494.

DISCUSSION

I. GTE OPPOSES GRANTING A PIONEER'S PREFERENCE TO CELSAT.

For the reasons set out below, GTE opposes grant of a Pioneer's Preference to CELSAT. CELSAT has not satisfied the "significant burden" of persuading the Commission that its proposal has "sufficient merit" to justify grant of a preference. (Id.) CELSAT has not complied with the FCC Rules setting forth the pre-conditions to a Tentative Award of a Pioneer's Preference.

GTE continues to urge the FCC to reject filings that are merely "claim-staking." In fact, the Commission should not even place such filings on Public Notice unless they are acceptable under the Commission's Rules in the first instance and at least make a prima facia showing of satisfying the criteria for a Pioneer's Preference. In this connection, GTE reminds the Commission of its expressed intention to avoid granting something as important as a Pioneer's Preference to "hastily developed proposals [of] speculators." (Id. at 3490.) While CELSAT's PP Request clearly demonstrates that a lot of effort has gone into its preparation, it does not satisfy the FCC criteria under the Rules.

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[1] Request for Pioneer's Preference/Low-Earth Orbit Satellites, ET Docket No. 91-280, Tentative Decision, 1992 FCC LEXIS 768.

II. IN ADOPTING ITS PIONEER's PREFERENCE RULES, THE FCC REQUIRED AN APPLICANT TO CARRY A SIGNIFICANT BURDEN OF MEETING CHALLENGING STANDARDS AND EMPHASIZED THAT PP REQUESTS WILL BE SUBJECTED TO RIGOROUS REVIEW.

In adopting its Pioneer's Preference Rules, the FCC placed heavy emphasis on the substantial burdens to be carried by an applicant and the rigorous review to which any PP Request would be subjected. Following are the eligibility criteria specifically identified by the Commission, as relevant to the instant matters:

First: THE PROPOSAL MUST BE AN INNOVATION OF SOME SIGNIFICANCE. The FCC "emphasize[d] that preferences will be granted only for innovations of some significance." (Id. at 3500 n.8.) The specified "preference standard," which "must be capable of flexible application in order to account for the different forms that innovation can take," is the development of "an innovative proposal that leads to the establishment of a service not currently provided or a substantial enhancement of an existing service." (Id. at 3494.) Thus, in the LEO cases, the Commission was not impressed by "relatively routine factors" and tentatively denied Pioneer Preference requests where the FCC was "unable to discern any unique or innovative contribution."[2]

Second: THE APPLICATION MUST MAKE A TECHNICAL SHOWING. The D.90-217 Reconsideration Order continues to require a "technical showing." (Id. at paragraph 10.) Believing that "performance of an experiment generally will be extremely beneficial, since in most cases a substantially different technology or service will be proposed," the FCC nonetheless decided the Rule

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2 LEO at paragraph 18. "Many of the technical achievements that ORBCOMM argues are justification for a pioneer's preference are relatively routine design features that most new LEO satellite licensees would be expected to accomplish." (Id. at paragraph 17.)

should continue to be that an experiment will not "be absolutely required as a prerequisite to obtaining a preference." (Id.) The Commission was emphatic in rejecting the notion that "requiring only a technical showing [i.e., without an experiment] means that a preference could be based on mere speculation that a technology might work and result in technically inferior services." (Id.)

Further, the Reconsideration Order says an applicant relying upon an experiment rather than a written technical submission "at least must have commenced its experiment and reported to us preliminary results in order to be eligible for award of a conditional preference," and that "the findings of that experiment will be one of the major components ... in determining whether a tentative preference is warranted." (Id. at paragraph 11.) Thus:

> [W]e find that a tentative preference will not be awarded to an applicant that has not submitted a demonstration of technical feasibility nor commenced an experiment and reported to us at least preliminary results. (Id.)

Third: THE PROPOSAL MUST BRING OUT THE CAPABILITIES OF THE TECHNOLOGY OR BRING THEM TO A MORE ADVANCED OR EFFECTIVE STATE. The "development of an innovative proposal [shall] mean that the petitioner (or its predecessor-in-interest) has brought out the capabilities or possibilities of the technology or service or has brought them to a more advanced or effective state." (D.90-217 Report & Order, 6 FCC Rcd at 3494.)

Fourth: THE PROPOSAL MUST REPRESENT A SUBSTANTIAL CHANGE. "Generally, ... an innovation could be an added functionality, a different use of the spectrum than previously available, or a change in the operating or technical characteristics of a service, any of which involve a substantial change from that which existed prior to the time the preference is requested." (Id.)

Fifth: THE PROPOSAL MUST REPRESENT A SIGNIFICANT INVESTMENT OF EFFORT. Making clear it will not reward mere "claim-staking", the FCC said it "will grant a preference only to persons who have made a significant investment of effort in developing the innovation, although it is not necessary that every aspect of the innovation be developed by the person seeking the preference." (Id. at 3500 n.10.)

Accordingly: The D.90-217 Report & Order and the D.90-217 Reconsideration Order, and the Rules adopted therein, impose on applicants for Pioneer's Preferences the "significant burden" of meeting certain challenging standards, and emphasize that PP Requests will be subject to rigorous review.

III. THE PP REQUEST OF CELSAT DOES NOT COMPLY WITH THE FCC'S CRITERIA AND SHOULD BE REJECTED.

CELSAT's PP Request fails to meet the Commission's standards. Indeed, GTE urges that applications that fail to meet a minimal prima facie standard, should be rejected without burdening the industry and the Commission with a pointless comment cycle.

CELSAT has offered a technical description of its proposed HPCN system. However, CELSAT is also requesting a Pioneer's Preference and a guarantee to be awarded a National license to between 362 and 417 MHz. (See PP Request, TABLE 2, p. 37 for the total bandwidth requirements of the proposed system.) This is a large amount of spectrum! The FCC has numerous requests for emerging technologies that require spectrum. Since CELSAT is proposing a personal communications service ("PCS"), its request is intertwined with GEN Docket No. 90-314 and ET Docket No. 92-9. To be granted pioneering status in personal communications service, CELSAT must make the

technical feasibility showing required under the Rules and comply before the cut-off date.

CELSAT has failed to make a technical feasibility showing.

In its PP Request and CELSAT's associated Petition for Rulemaking, RM-7927, there are numerous references to other documents or "applications." For example, at PP Request, page 2, it states: "CELSAT also will soon be filing applications for experimental authority to construct a ground segment system and for authority to construct and launch an HPCN satellite ... ." At PP Request, page 16, footnote 14, CELSAT states it "intends to demonstrate" certain technical feasibility "as part of its request for experimental license authority which it will file shortly." At PP Request, page 28, it states: "CELSAT has proposed in its application to offer data speeds up to 144 kbps ...." (Emphasis added) At PP Request, page 32, footnote 32, the reader is referred to CELSAT's "pending application" for a technical description of "clustering." At PP Request, page 41, its states: "CELSAT intends to propose in its application a means whereby some sharing of the requested spectrum will be realized ... ."

The Petition for Rulemaking ("Petition") also makes references to an "application." Petition, page 1, states: "CELSAT's CELSTAR system, for which application is being made contemporaneously ..." (Emphasis added).[3] In Appendix A of the Petition, page A-1, CELSAT states in the first paragraph:

> The following is a brief overview of some of the relevant CELSTAR HPCN technical considerations. These are not intended to be thorough or complete in any respect. For more information one should refer to the

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[3] Also see references to an "application" in the Petition at page 4, footnote 3; page 15, footnote 14; page 27, footnote 27; page 28; page 33; page 35; and page 45, footnote 44.

> Additional Appendices B-E to this Petition for Rulemaking, as well as CELSAT's HPCN application. (Emphasis added).

Petition Appendix A, page A-14 also states the "spacecraft will perform as indicated in CELSAT's application ..." (Also see Appendix E, page E-1 for additional reference to "an application.")

In order for GTE, other parties,[4] or the FCC to evaluate the Petition, the PP Request, or the technical merits of the HPCN system, complete technical data are necessary.[5] GTE contacted CELSAT's attorney to obtain copies of any applications after discovering they were not on file at the Commission. GTE was advised they will exist "shortly." To the best of GTE's knowledge, they have not been filed as of April 8, 1992.

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[4] In its request for an extension of time filed March 13, 1992, Loral Qualcomm Satellite Services, Inc. ("LQSS") states (p. 2): "[T]hat it is the position of LQSS that CELSAT's filings should be dismissed out of hand for numerous reasons, including the failure of CELSAT to file an application providing the additional information referred to in its petition.

[5] This evaluation is frustrated by references to documents that apparently do not exist or which have not been filed, and by incorrect or misleading information in what has been filed. For example, CELSAT at Petition page 18, claims an amortized capital cost of each Voice Grade ("VG") satellite circuit over the life of one HPCN satellite "will come to less than one cent/VG channel/year -- low enough to ensure comparably low end user rates." If true, GTE would have to agree. However, one must read another document, the PP Request, at page 24 and footnote 25, to discover what is purported to be the correct information. The Petition at page 29 refers the reader to Figure 3 for an illustration of a "metropolitan bus." Figure 3 is titled: "Annual Cost/Voice Circuit." GTE assumes the reference should have been Figure 5. Petition, Appendix E, page E-4, refers the reader to Figure ???. Figure ??? does not exist in the Petition or its Appendices. Given the amount of numerical data in the filings, GTE is not sure whether it is evaluating CELSAT's technical proposal or some system designed by typographical errors. It would be helpful to the FCC and other parties if an Errata correcting the errors were submitted.

What CELSAT apparently fails to realize is that the Pioneer's Preference Rules require "either a demonstration of the technical feasibility of the new service or technology or an experimental license application ... ." (See Section 1.402) If the Applicant intends to satisfy this criteria by filing an experimental application, then Rule Section 5.207 requires it be for "a limited geographical area, generally including no more than one Metropolitan Statistical Area" and that in order to be eligible for a tentative preference "the experimental applicant must have commenced its experiment and reported to the Commission at least preliminary results, unless it has also submitted an acceptable showing of technical feasibility." CELSAT has only provided a partial technical description of its system, has not filed an experimental application, and has not demonstrated that its described system is "technically feasible."[6]

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[6] The FCC has been critical of other "claims" of technical feasibility for other proposals. For example, PCN America claimed that it could share spectrum for PCS with point-to-point microwave users without causing interference. It sought and was granted experimental authority to demonstrate its "claims" and "prove the technical feasibility." After submitting its experimental results to public scrutiny, the FCC's Chief Engineer concluded that "the test program conducted to date does not provide sufficient information to support a determination at this time that sharing between PCS spread spectrum systems and microwave users is feasible." (See Thomas P. Stanley, Chief Engineer, letter dated August 12, 1991 to PCN America.)

The FCC had numerous concerns, but included among them were concerns over adaptive power control, antenna heights, and interference potential at various cell site loading levels. (Id.) These same concerns would apply to CELSAT's proposed system.

Some of CELSAT's innovation and capacity claims must be challenged.

CELSAT also claims that its proposal is "innovative" and that its system architecture is "unique" and "never been previously proposed." (PP Request, p. 9) GTE is not sure who first proposed integrating mobile satellites with terrestrial-based mobile systems, but it was not CELSAT. The idea of integrated satellite/terrestrial-based mobile systems has been around for a while. For example, the paper "Cellular Access Digital Network (CADN): Wireless Access to Networks of the Future," by E. S. K. Chien, D. J. Goodman, and J. E. Russell, Sr., IEEE Communications Magazine, Vol 25, No. 6., pp. 22-31, June 1987, specifically mentions the possibility of handing off calls between a terrestrial cellular system, and a satellite-based system in order to provide seamless nationwide coverage. Specifically, at page 25:

> While early CADN user terminals will be specialized to specific physical conditions, such as satellite transmission, mobile telephony, or indoor wireless communications, it is desirable in the long run to have one terminal that could be adapted to all environments. Figure 9 is an example of an adaptable terminal. ... The terminal will automatically select the link-specific signal processor, in response to messages received from the cell site. This capability would allow the cellular system to provide handoff from one type of system to another; for example, from a mobile satellite to a terrestrial cellular system as a vehicle moves from a rural to an urban area. (Emphasis added)

What might be a unique aspect of CELSAT's proposal is to serve both the satellite and terrestrial segments of its network in the same spectrum using the same radio access method.[7] Whether CELSAT can demonstrate that this

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[7] One measure of innovation is the amount of intellectual property involved from the Applicant. CELSAT cites to a single patent in its PP Request.

will eliminate the need for dual-mode or multi-mode mobile terminals, or whether CELSAT terminals would be more inexpensive than other terminals remains to be proven.

The approach used for radio access is proposed to be Code Division Multiple Access ("CDMA"). To the extent that CELSAT describes the form of CDMA to be used, it appears to be very similar to the CDMA technology under development by Qualcomm for terrestrial cellular systems. CELSAT proposes to use a lower bit rate speech coder than that used by Qualcomm, and justifies this on the grounds that CELSAT's system will not be deployed for several years, and by the time it is, there will be high quality speech coders available at this lower bit rate (i.e., 5 kbps). GTE believes this is speculative, and CELSAT should describe and demonstrate what it "can do" and not what it "might be able" to do. From GTE's perspective, these devices are currently non-existent commercially, and CELSAT should be required to re-state its capacity calculations with technology that exists. If new technology becomes available, many parties may use it, and this will impact the comparisons that CELSAT uses to justify its system design.

In the materials that have been filed the details of CELSAT's operation of its CDMA scheme are not described, so it is difficult to assess the validity or technical feasibility of its approach. Possibly this additional technical information will be a part of re-submission of the Pioneer's Preference Request with the required technical feasibility showing or experimental application.

In the Qualcomm system, specific details such as waveform design, error-correcting coding, and power control have a big impact on system

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(PP Request, p. 5, footnote 5.) It would have been helpful for the FCC's review if this patent had been attached to the PP Request.

performance and capacity. The mobile satellite environment is quite different from the terrestrial cellular environment, so a design tuned for performance in one environment may not do so well in the other. Particularly critical are the power control algorithms. Qualcomm's system relies on very fast feedback power control, with a loop delay of one or two milliseconds. In a satellite system, with a round trip delay approaching half a second, this will not work very well.

While it appears CELSAT provided an extra 3 dB in its link budget to provide for this, it remains to be demonstrated as part of the technical feasibility showing whether this is adequate or not. CELSAT does provide a detailed link budget, however, it appears it is based on free-space propagation loss and, therefore, may overstate capacity claims. There will be many instances where a mobile terminal does not have a direct line of sight to the satellite, in which case shadowing losses of on the order of 20 dB will be common. The 10-12 dB peaking factor for transmit powers allowed by CELSAT will be inadequate to handle these cases, which will result in reduced capacity and/or an increased incidence of dropped calls. In fact, any excess losses due to local propagation conditions will severly impact the performance of the system and possibly lead to the inability to close the link at all.

Capacity calculations are based on an extensive list of criteria. In Appendix E of the Petition several critical items are not included in the explanations Specifically, the receiver performance characteristics such as the low inherent noise figure and variable selectivity as shown in Appendix E Table entries 49, 50, 51 and 52 have no supporting explanation included against which GTE can consider these claims.

Again in Appendix E, Table entries 31, 32, and 33 for transmitter performance characteristics, which are also critical items, have no supporting explanation included in this document. Many of the critical characteristics in

CELSAT's capacity calculations of Appendix E have been computed to mid Continental U.S. ("CONUS") -- the center of the country. These characteristics are then utilized as if they exist across the country with no degradation in performance even though CELSAT's coverage maps demonstrate the fact that performance degradation does occur away from the center of the U.S.

Most of the capacity entries are best-case values which may be achievable under a specific set of conditions and in a specific location, but they should not be taken as representative of Nationwide performance. The FCC should be critical of such claims and require a detailed showing that such claims are technically feasible if they are offered to form the basis for a Pioneer's Preference.

By far the largest portion of CELSAT's network is its terrestrial network.[8] Cell sizes in a terrestrial system at 2.4 GHz will be smaller than in the 900 MHz band currently occupied by terrestrial cellular systems, due to the greater attenuation at the higher frequency. This will require CELSAT (or anyone else wishing to build a PCN system in this band) to build a much denser network of cells to get terrestrial coverage for start-up than an operator at 900 MHz. It is not clear whether CELSAT proposes to start its system by providing Nationwide coverage on a satellite-only basis, and then add capacity by installing a terrestrial system. Or, whether it is proposing to begin with terrestrial coverage in some markets and then go to satellite coverage. Much of CELSAT's proposal

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[8] In this respect its PP Request is competitive with the numerous other requests that have been filed related to GEN Docket No. 90-314. Similarly, CELSAT should be required to perfect its filing before the FCC-announced cut-off for Pioneer's Preference Requests in the PCS Docket. See FCC Public Notice dated April 3, 1992 announcing May 4, 1992 as the last date for Pioneer's Preference Requests related to PCN networks.

looks like a Nationwide overlay of a today's cellular systems, except CELSAT wants a monopoly on all the spectrum for such an overlay network.

However, the transition from 110 or so satellite cells to a large enough terrestrial network to provide meaningful coverage will be a major and expensive undertaking. Such a design would have to provide "locally seamless" terrestrial coverage, i.e., coverage which is seamless over the local service area, so that a call does not get constantly handed off between the terrestrial and the satellite systems, otherwise, switching between the satellite delay and the terrestrial delay could get very annoying. CELSAT acknowledges that ground cells are "key" to meeting high volume demand for personal/mobile communications and states that ground cells will be the "preferred mode" for predominately voice transactions. (PP Request, p. 15)

The Public Interest may not be served by a system with excessive voice communications delay.

Delay may be a critical element in CELSAT's proposed system. Since CELSAT bases its capacity claims on low bit rate coders, the FCC should recognize that low rate speech coders typically involve delays of 100 milliseconds or more for the coding/decoding process. Add this to the satellite round trip delay of 500 milliseconds, and you have a proposed system that may not be accepted by the public for voice communications. Experimental or market tests of such public interest questions should be required. Minimization of satellite delay is one of the arguments made by the Low Earth Orbit Satellite advocates for their systems. By going to low earth orbit they eliminate the large delays associated with geosynchronous satellites, and GTE believes that this is a significant problem in CELSAT's design.

It has not been demonstrated that CELSAT has made a "significant" investment of effort.

While CELSAT's Petition and PP Request are substantial filings, it is not clear that CELSAT has made the "significant" investment of effort the FCC referred to in the D.90-217 Report & Order at 3500, n.10. Without the details of its CDMA protocol, it is not clear whether there has been significant innovation in this area. Industry trade press describe CELSAT as a one-year old company with six employees.[9] It is unclear what level of innovation this small staff has made in advancing the service or technology versus merely putting together a technical description of a "paper system." No showing of financial resources directed to proving capacity claims or technical feasibility is included.

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9 See Advanced Wireless Communications, February 19, 1992, pp. 5-6.

CONCLUSION

CELSAT's Pioneer Preference Request should be dismissed for failure to comply with FCC's Rules. To the extent that what CELSAT is proposing is a PCS capability, any resubmission of its PP Request with all required technical feasibility showings or experimental applications must be before the PCS PP cut-off date. If CELSAT's Request is re-submitted, there should be another opportunity for Comments and Replies.

Respectfully submitted,

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Certificate of Service

I, Jennifer R. McCain, hereby certify that copies of the foregoing "GTE"s Comments in Opposition to Celsat's Pioneer's Preference Request" have been mailed by first class United States mail, postage prepaid, on the 8th day of April to the following parties:

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