March 16, 1992

Reference: RM7927

Ms. Donna R. Searcy
Secretary, Federal Communications Commission
1919 M. Street, N.W.
Washington, D.C., 20554

Dear Ms. Searcy:

Prior to my recent retirement from the U.S. Army, I was assigned to the United States Space Command. In that capacity, I was responsible for the evaluation of Celsat Corporation's Celstar system. We evaluated the concept from two primary perspectives: technical feasibility and utility to the United States military forces. Cost was considered but was beyond our capability to analyze, through Celsat's estimates appeared reasonable. This letter will address each of these elements.

First, we found all elements of the concept technically feasible and well within today's state of the art. We see no unusual difficulty in implementing the system at approximately the cost indicated by Celsat.

We see tremendous potential benefits to the military from Celsat's unique capability as an Integrated Communications Navigation and Identification (ICNI) system. One of the most important elements of command and control of military forces is tracking the location of maneuver forces in real time. Celsat could provide this service to 100m accuracy as a "no impact" by product of the basic communication process. Since the system knows location of all units for routing purposes, it also assures that any element can contact any other element regardless of the tactical situation. It's network controller would also allow the commander to tailor and enforce networks of his choosing to maintain appropriate communication discipline and chains of command. Knowing the position of all friendly units, and assuring their communication connectivity has tremendous potential to reduce casualties due to friendly fire that has plagued military forces since the Civil War.

The Celsat use of code division multiple access (CDMA) provides an important level of anti-jam and communication security that will become increasingly important on the modern battlefield. During Operation Desert Storm much of the "jamming" of comm links was inadvertent co-channel interference by friendly forces. Celsat would make this a thing of the past. Enemy broad spectrum jamming would be transparent to the CDMA processing and high power narrow band jammer could only jam a small portion of the message content. I am convinced that digital signal correction algorithms currently being developed could recover virtually all of the signal degraded by enemy interference or natural phenomena. Communication security is inherent in the unique codes assigned to user equipment. This may be enough protection in most cases, however simple cryptological circuitry could be added as required using off the shelf technology.

For military forces operating clandestinely behind enemy lines, as our special operations forces are designed to do, a low probability of detection is paramount. These forces require reliable communication to both assure their operational ability (i.e., resupply, insertion, extraction, etc.) and to relay the information they may have collected on enemy capabilities. One of the things that may reveal the location of these forces is communication intercept by direction finding equipment. Celsats low power user equipment greatly decreases the likelihood of intercept and thus would make our special operations forces much less vulnerable. The ability of Celsat handle variable data rates (up to 144k bits/sec) not only lets it interface with existing military modems, but will also increase the possible data forms (i.e., voice, fax text, fax photographs, maps, etc.) available to units operating light and deep in hostile territory. For the first time a commander's reconnaissance elements could transmit real time compressed video, thus truly becoming his eyes and ears.

Celstar's tremendous frequency efficiency will be of great value to both U.S. military and civil users. A system designed to serve the public can be used by the military without the tremendous cost of duplicating capability. This is fully in keeping with an initiative I sponsored while at US Space Command to increase military use of contracted civil or commercial services. For the military this provides quality state of the art services without the large cost of ownership for selected systems, important in today's shrinking defense budget environment. For the civil benefit, partial military funding will allow U.S. industry to remain competitive in a world market where many foreign corporations are protected and subsidized by their governments.

With regard to cost we found that Celsat's estimates were reasonable, but more importantly, had huge margins for error. Whether we were looking as system capacity or costs, this technology provides "order of magnitude" advantages. We believe that the system margins far outweigh any reasonable errors in cost estimations at this stage of development.

Another important advantage of the commercial venture, using both ground and space based networks, is that the system can be evaluated and assimilated into the military incrementally. An early demonstration could be conducted over limited maneuver areas, using a ground net, long before the satellites are flown. Based on the success of these trials, the military could begin incremental phase-in of Celsat equipment to take advantage of the global comm afforded by space based segments. Ultimately the military may wish to purchase a dedicated satellite for operation in areas that may not be cost effective for commercial operations. Even here the military would save R&D costs by buying proven hardware.

Although I am now a civilian and no longer speak for the US Space Command, I have relayed my judgements based on 28 years as a soldier which includes operational (armed helicopter pilot - Viet Nam) R&D (experimental test pilot, SDIO technology development) and space craft (NASA Astronaut) experience. I urge you to allocate a Pioneer's Preference to Celsat and to implement the rules that they request. I have seldom found a proposal that has such tremendous potential for civil and military benefit.

Sincerely,

Robert Stewart
Brigadier General, U.S. Army (Ret.)

RLS/jw