



Federal Communications Commission
Washington, DC 20554

International Bureau

2024184437
202-418-2818 (fax)

March 15, 2002

Mr. William T. Hatch
Associate Administrator
Office of Spectrum Management
United States Department of Commerce
National Telecommunications and Information Administration
Washington, DC 20230

Dear Mr. Hatch:

Thank you for your letter of February 5, 2001, regarding the Eagle Eye, Inc. application before the Commission to operate half-duplex mobile earth station terminals in the 1.5/1.6 GHz Mobile-Satellite Service bands through the Mobile Satellite Ventures (MSV) and Canadian Telesat Mobile satellite networks. The Commission has issued a license granting the application to operate in the L-band frequency bands. This license addresses the concerns expressed in your letter. A copy of the license is attached.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Abelson", written over the word "Sincerely,".

Donald Abelson
Bureau Chief

Enclosure



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UNITED STATES DEPARTMENT OF COMMERCE
National Telecommunications and
Information Administration
Washington, D.C. 20230

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FEB 5 2002

Donald Abelson
Chief of the International Bureau
Federal Communications Commission
445 12th Street, SW
Washington, DC 20554

RE: Eagle-Eye Inc. License Application FCC File Number SES-LIC-20001206-02309

Dear Mr. Abelson:

Eagle-Eye Inc. has applied to the Commission for a license to operate half-duplex mobile earth terminals (METs) in the 1.5/1.6 GHz Mobile-Satellite Service (MSS) bands through the Mobile Satellite Ventures (MSV) and Canadian Telesat Mobile satellite networks. As you are aware these are shared government/non-government band 8 and, therefore, NTIA and affected federal agencies routinely review and comment on such applications. Last year after consultation with the Federal Aviation Administration, I informed you that in order to meet the requirements for priority and real-time preemption for MSS systems¹, we had established a requirement that half-duplex METs should be able to terminate their transmissions within 1 second. As is explained in greater detail in the enclosed letter from Eagle-Eye Inc., the initial planned design of the Eagle-Eye Inc. METs would require up to 13 seconds to terminate transmission.

We have examined the Eagle-Eye Inc. application in some detail and requested that Eagle-Eye Inc. determine if there is an approach that they could employ to reduce the total time to clear their channels. Eagle-Eye Inc. has proposed such an approach that is explained in the enclosure. Eagle-Eye Inc. states that there may be a performance penalty in using an alternative to their original design, but the proposed approach appears to be feasible and would reduce the overall response time to around 3 seconds. While even this approach does not fully meet the priority and real-time preemption requirements, NTIA, with the concurrence of the FAA, can agree to the Eagle-Eye application provided that the design of the METs reduce the overall response time to around 3 seconds or less as provided in their alternative proposal.

I thank you for working with us on these matters.

Sincerely,

William T. Hatch
Associate Administrator
Office of Spectrum Management

Enclosure

¹ See letter from William T. Hatch, Associate Administrator, NTIA, to Donald Abelson, Chief, International Bureau, FCC, filed August 25, 2000.

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3 January 2002

James Vorhies
National Telecommunications Information Agency
Room 4076
Department of Commerce
Washington, DC 20230

Subject: Satisfaction of pre-emption requirements contained in 47 CFR 2 footnotes US308 and US315; SkyBitz L-band Mobile Earth Terminal Blanket License Application, FCC File number SES-LIC-2000 1206-023 09

Dear Mr. Vorhies,

Early this year Eagle Eye, Inc applied to the Federal Communications Commission for a blanket license to operate mobile earth terminals in the L-band mobile satellite **allocations** at 1.5 and 1.6 gigahertz'. Among other things we understand from the FCC that we must show we meet the requirements of footnotes US315 and US308 of 47 CFR 2.106, granting GMDSS and AMS(R)S preemptive priority rights respectively, before the FCC will act to grant the license.

We believe we have designed a system that can meet these requirements, in that our system will guarantee to have cleared the frequency within seconds of receiving an indication of preemption, by building into our system design a feature whereby **all** mobile terminal transmissions are restricted to no more than 1.5 seconds in duration, and the mobile terminal must verify authority to transmit before each transmission. We therefore seek the approval and support of the NTIA and the appropriate U.S., government agencies to operate the SkyBitz Mobile Earth Terminal in the 1525 – 1559 and 1626.5 – 1660.5 megahertz Mobile Satellite L-bands.

Eagle Eye's Service Objectives

In brief, Eagle Eye is planning to introduce a nation-wide service to the logistics and transportation industries providing tracking and optional remote sensor, control, and security services for semi-trailers, rail cars, and shipping containers -- the relatively low-value mobile freight enclosures that actually carry the goods (as distinct from tractor tracking, which already exists). The industry claims substantial savings if it can avoid lost time, lost or misrouted shipments, and inefficient mobile freight enclosure management.

Market history has shown that to have any chance of success in the mobile freight enclosure tracking environment, the Mobile Terminal and the associate service must be inexpensive. Tracking costs must permit a demonstrable net savings in the cost of

¹ FCC Forms 159 and 312 filed in December 2000 and amended by letter and amended FCC Form 312 on 5 June 2001; File number SES-LX-2000 1206-02309.

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operations. Otherwise, operators will not adopt the service, and the benefits that could accrue to the national economy, infrastructure, and security through rapid nationwide tracking will not be realized.

Most companies trying to offer a solution to this market have combined a GPS receiver with either a cellular or satellite radio. But such solutions have proven to be costly and have required very large batteries to support any length of unattended, un-recharged operation. As a consequence there has been very little take-up of tracking solutions so far for low-valued mobile freight enclosures,

Eagle Eye has come up with a technique for obtaining position information from a cold start in a manner that is significantly faster (seconds) and more power-efficient than a GPS receiver on power-up. We have combined this technique with a very efficient but simple custom packet-based software-based satellite radio and protocol to offer a terminal that is small, inexpensive, autonomous, offering years of battery life on a set of AA batteries while providing multiple fixes per day, and rugged enough to make economic and practical sense to the shippers for use on low-valued enclosures. Our prototype field trials have been very encouraging -- we believe we've put together a product that will help shippers finally gain the added efficiencies and savings they seek. SkyBitz production Mobile Terminals will also support local sensor reporting, local device control, local MT activation, and automatic switching between autonomous and local external power sources, features also sought by numerous markets.

Recently Eagle Eye has found increasing interest from the safety and security communities. As an example, the U.S. Senate has just past a port security bill² calling for procurement of surveillance equipment and technology for combating terrorism and criminal activity connected with shipments and trade. We believe we offer a useful answer to a number of safety and security requirements. We plan now on supporting them from our service introduction by providing shipment and asset tracking for high value or high risk items combined with local (sensor or operator-based) or remote emergency rapid alerting and tracking activation and related features. Applications we can support include vehicles, shipping containers, trailers, rail cars, boats, aircraft, heavy equipment, and other high value or high vulnerability assets. We are already designing to several large vehicle manufacturers' requests for such services, and are in discussions now with the United States Government regarding several applications there. Some of the latter are designated urgent.

Eagle Eye is presently pursuing a rapid development schedule targeting the deployment of tracking and emergency reporting terminals in the second quarter of 2002.

²S-1214.ES, "Port and Maritime Security Act of 2001" (Short Title). Title I, Sec 118 of the bill establishes a funding program to develop surveillance technology, while Title II, Sec 207 deals with the development of an ability to track cargo within the United States,

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Technical Features Bearing on Preemption

The SkyBitz System uses bidirectional narrowband frequency assignments on each beam of the AMSC-1 and MSAT-1 L-band satellites. We divide each frequency assignment into many successive timeslots for allocation among a large number (tens of thousands) of MTs in a proprietary, highly flexible manner. Each such time-slotted frequency assignments we term a "Carousel". We presently operate within assignments of a few kilohertz bandwidth each per Carousel given to us by the L-band satellite operator. We expect to begin operations with only one Carousel, but as operations expand we expect within months to expand to a number of parallel Carousels to accommodate growing traffic,

Mobile Terminals transmit for a duration of 1.47 seconds per packet timeslot on the Carousel return link. All Mobile Terminals are programmed never to transmit at all in any packet timeslot unless they first receive a valid packet in the same numbered timeslot in the forward direction having a "Return-Enable" bit set for that timeslot. The forward and return timeslots are offset by no more than 12 seconds, so that there is a fixed maximum time interval between receipt of authority to transmit and mobile terminal transmission time. Transmission durations are fixed and limited to less than 1.5 seconds. This is true for each packet. Given this packet duration, the total possible elapsed time between the transmission of a notification of preemption and the cessation of all MT emissions will not exceed 13.5 seconds.

In our service, the mobile terminal must extract commands from the forward packet from the gateway, then information from received GPS signals, process the GPS signals in the receiver to extract information to return to the gateway, and transmit resulting information along with identity, sensor, and housekeeping information within one packet. These steps account for the 12-second interval between MT reception and transmission.

The 1.5 second packet duration is driven by link margin considerations. As mentioned, in order to make sense as a product for the asset tracking market, the mobile terminals we are using must be quite small and rugged, install easily, and use low-gain antennas. They must operate for years from one set of batteries, and must operate reliably to and from the geosynchronous communications satellite in the presence of path impairments over which we have no control. These constraints limited us to a relatively low transmission data rate in order to obtain adequate margin over the satellites we use. The lower data rate combined with the (less than 200-bit) packet length yielded a 1.5-second packet duration, to yield in turn a good overall balance in margin (reliability) and throughput.

In response to your inquiry regarding shortening the offset time between forward (enabling) and return (responding) timeslots, we have, on examining our processing, found that it may be possible to program the mobile terminal to re-activate its receiver again after processing but before transmission in order to check for continued authority to transmit, at the cost of some additional processing overhead. This would reduce preemption reaction times somewhat, should that be necessary.

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In examining alternatives for accomplishing this, we found that an approach that reads a second later forward packet carrying another control indication would not work well. The additional power consumption to support the time and processing penalty to decode and read another packet would cause us to fail to meet our power consumption constraints, which are tough, and essential for market acceptance as a long-term unattended device meeting industry packaging constraints.

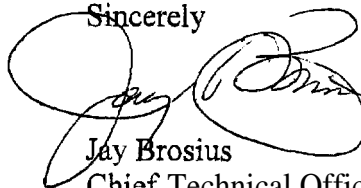
A different approach appears to permit a more rapid reaction time while protecting overall power budgets and cost targets essential to designing an acceptably efficient and inexpensive mobile terminal. In this case, just before transmission, the MT re-activates its receiver to detect the forward beam pilot, whose presence would indicate a continuing permission to operate. This simpler processing is substantially less burdensome in time and consumption, and appears workable. With such an approach, we believe we could reduce the total preemption reaction time to around 3 seconds, including the time from reception of the pilot to the end of a packet transmission, assuming worst case offsets.

However, we note that an MT reply would then depend on successful reception of both the forward packet and the later pilot. Having to detect both signals introduces an added likelihood of missed joint detection (assuming the actual presence of the packet and pilot) compared to the performance of the unit as now designed. Since operational reliability is an important feature of our service, we urge recognition of the present 12 second offset time, combined with a 1.5 second limitation on MT emission time, as adequate to meet the preemption needs of the GMDSS and AMS(R)S services.

In summary, we are keenly interested in assuring that we meet the requirements for protecting safety and emergency operations in the L-band, and indeed hope to contribute to the availability of such services in a cost-effective and efficient manner within these bands on a continent-wide basis. We believe we offer a service that offers an opportunity for significant improvements in logistics and fleet management, and in the safety and security of mobile and remote assets and activities, fulfilling an urgently needed national capability while providing a timely response to existing preemption requirements,

I look forward to working with you further in meeting these requirements. Along these lines I would be pleased to meet with you and others as necessary to discuss SkyBitz System features and solutions further.

Sincerely



Jay Brosius
Chief Technical Officer
Eagle Eye Incorporated

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