spacecraft receiver will receive at least a portion, if not the full power, of every active NII/SUPERNet device. If the power of these devices is not limited, these devices will cause significant interference to MSS Feeder Uplinks.

More Powerful NII/SUPERNet Devices

Certain parties including Motorola, Nortel, Apple and WINFORUM, suggested in their Comments that the maximum transmitter output power from an NII/SUPERNet device should be greater than - 10dBW (100 milliwatts) proposed by the Commission. With respect to the proposed Globalstar interference criterion, any increase in power will lead to a proportionate decrease in the permitted number of simultaneous users that are within range of the MSS spacecraft receiver. Reiterating from the L/Q Licensee's Comments, the allowable number of simultaneous users is:

$$N = \log^{-1} -\{((DENS - PL + Gs/c) - INT)/10\}$$

where: N is the number of simultaneous NII/SUPERNet users

DENS is NII/SUPERNet device power density

PL is the path loss to the spacecraft = 169.7 dB

Gs/c is spacecraft receive antenna gain = 1 dB

INT is the proposed allowable interference density based on a Globalstar spacecraft system noise temperature of 1000K = -193.7 dBW/3 kHz.

The following Table summarizes the effects of using power greater than the - 10dBW suggested in the NPRM. The numbers in the Table were computed using the formula given above with the NII/SUPERNet power density derived from the Commenters.

NII/SUPERNet Device Output Power mW	NII/SUPERNet Device Power Density mW/3kHz	Allowable Number of Simultaneous NII/ SUPERNet Device Users in CONUS
100 mW	0.03 mW/3 kHz	1070
200 mW	0.06 mW/3 kHz	535
250 mW	0.075 mW/3 kHz	428
316 mW	0.095 mW/3 kHz	338

The allowable number of users in the Table above assumes that the NII/SUPERNet devices are transmitting a uniform power spectrum at the power density given over a 10 MHz bandwidth and that there are ten 10 Mhz bandwidth channels over the 5150-5250 MHz band.

As stated in L/Q Licensee's Comments, this number could be larger based on the percentage of indoor versus outdoor users and the amount of attenuation that an NII/SUPERNet user would encounter due to a building housing the device. Further there is no reliable way to predict the amount of attenuation that NII/SUPERNet users would encounter nor is there a way to predict how many of the users would be located indoors. Given that minimal regulation of NII/SUPERNet devices is proposed, conservative criteria are necessary.

Directional Antennas for NII/SUPERNet Devices

Several parties suggested that the Commission should authorize use of directional antennas. The use of directional antennas may aid in sharing among NII/SUPERNet users but directional antennas will not aid sharing with MSS. Directional antennas focus the power emitted by an NII/SUPERNet device over a smaller area than an omni-directional antenna. It is assumed that the NII/SUPERNet directional antennas will be aimed at the horizon. This means that the power emanating from the device will be directed at the horizon rather than upwards. The NII/Supernet device power that is aimed at the horizon would be aimed at the antenna of a spacecraft that is coming over the horizon. An example of this would be a Globalstar spacecraft that is serving the eastern part of the USA could be interfered with by an NII/SUPERNet device located on the west coast of the USA using a directional antenna pointing east. In this case the NII/SUPERNet user could cause more interference than a user without a directional antenna since the Equivalent Isotropic Radiated Power (EIRP) would be greater than that coming from an omni-directional NII/SUPERNet device. Using an antenna with 6 dB gain the power would be four times greater than that of an omni-directional antenna. Thus, directional antennas do not aid frequency sharing with the MSS.

Differences Between HIPERLANs and NII/SUPERNet Systems

Many of the Commenters have made reference to studies conducted in Europe on the sharing between High Performance Radio Local Area Networks (HIPERLANs) and other services. The Commission mentions these studies as a justification for the possibility of frequency sharing between NII/SUPERNet devices and other services. The HIPERLAN studies are still continuing in Europe and do not support the unstructured and unspecified proposals made for NII/SUPERNet devices.

In preparation for WRC '95, ETSI undertook studies to examine the compatibility between HIPERLAN devices and MSS Feeder Links. These studies focused on interference from Feeder Link earth stations to HIPERLAN devices and interference from multiple HIPERLAN devices to MSS spacecraft. Based upon specific information on HIPERLAN Type 1 systems which included peak EIRP, transmission duty cycle, indoor-to-outdoor use ratios, channel bandwidths and projected number of users, it was concluded that under certain conditions frequency sharing would be possible.

It must be noted that ETSI HIPERLAN Type 1 standards are defined and provide a reasonable basis for conducting spectrum compatibility analyses. This is not the case with NII/SUPERNet devices. There are no frequency plans nor are there consistent definitions of system operation and terminal characteristics.

Globalstar and ICO Analyses Lead to Similar Conclusions

The technical analysis of ICO and COMSAT submitted with their comments suggests that it is possible for ICO's proposed system to share the 5150-5250 MHz band with more NII/SUPERNet devices than was indicated in the L/Q Licensee Comments. In fact the interference criteria used by both comments are similar.

It is important to note at the outset that the ICO/COMSAT Comments do not address the number of simultaneous users that can be tolerated by the MSS system. Rather, the ICO/COMSAT Comments talk in terms of the number of subscribers to the NII/SUPERNet system, which can greatly exceed the number of simultaneous users.

There are significant differences between the ICO and Globalstar systems. The ICO system operates in an intermediate circular orbit at 10350 kilometers altitude as opposed to the 1414 kilometer altitude of the Globalstar system. The proposed ICO system also utilizes Time Division Multiple Access (TDMA) as opposed to the Code Division Multiple Access (CDMA) technique used in the L/Q Licensee system. The ICO system thus has narrower bandwidth channels than the Globalstar system.

As stated in the ICO/COMSAT Comments, the interference criterion, appropriate for NII/SUPERNet devices, for ICO is 1% delta-T/T which corresponds to a C/I of 24 dB. The interference criterion, appropriate for NII/SUPERNet devices, for the Globalstar system is 0.1% delta-T/T which corresponds to a C/I of 26 dB. These values reflect an estimate of the appropriate amount of interference from NII/SUPERNet devices into the systems, and are relatively close to each other.

The 24 dB C/I quoted by ICO will result from approximately 1.25 million simultaneous users of NII/SUPERNet devices. This is approximately 1100 times the 1070 users that will produce the limit for the Globalstar system. The characteristics of the proposed ICO system and the assumption of a 3 dB lower NII/SUPERNet device power density lead to this difference in interference limits.

Due to factors including the altitude differential between the ICO and Globalstar orbits, ICO transmits about 18 dB more power per active channel in the Feeder Uplink.

ICO further assumes that the power density due to an NII/SUPERNet device will be -10 dBW spread over 20 MHz as opposed to the -10 dBW over 10 MHz that is assumed by Globalstar. This implies that ICO expects a power density 3 dB lower than that expected by Globalstar.

Finally, ICO allows the delta-T/T due to NII/SUPERNet interference to be 1% as opposed to the 0.1% allowed by the Globalstar. This is a 10 dB difference.

Summing these three factors yields 31 dB which is an arithmetic factor of approximately 1200. This value is close to the factor of 1100 for the ratio between the numbers of simultaneous users allowed for the proposed ICO system and the Globalstar system.

DECLARATION

1. I, David E. Weinreich, am a Technical Consultant to Globalstar.

2. I am familiar with the original Globalstar™ application filed with the Federal Communications Commission on June 3, 1991, and the amendments to this application filed on November 16, 1994, and March 8, 1996. I am also familiar with Parts 2, 15 and 25 of the Commission's Rules and the rules and policies proposed for the NII/SUPERNet service in the Notice of Proposed Rule Making released May 6, 1996.

3. I have prepared the foregoing "Further Technical Statement" and the information presented therein is accurate.

I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge and belief.

Signed this 13th day of August 1996 in Washington, D.C..

David E. Weinreich
Technical Consultant
Globalstar, L.P.

CERTIFICATE OF SERVICE

I, William D. Wallace, hereby certify that I have on this 14th day of August 1996, caused copies of the foregoing Reply Comments of L/Q Licensee, Inc. to be delivered via hand delivery (indicated with *) or by U.S. mail, postage prepaid, to the following:

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