M E M O R A N D U M

To: Scott Kotler, FCC

Date: November 10, 2005

From: Noel Imitz, C5 Communications

Re: C5 Communications Ku-Band ESV STA Request
File No. SES-STA-20051107-01528

This memo is an electronic supplement to the above-referenced application of C5 Communications, LLC ("C5") for Ku-Band ESV STA and is in response to your request for additional information and clarifications and confirmations, as follows:

1. Call sign for the hub station.

ANSWER.

The Hub Station is located at.
1305 INDUSTRIAL PARK ROAD, SHENANDOAH, MOUNT JACKSON, VA
38 ° 43 ' 42.00 " N LAT, 78 ° 39 ' 25.00 " W LONG.

The call sign for the Hub Station in this instant application is **E980149.**

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2. Confirmation that the vessel for this ESV is a US registered vessel.

ANSWER.

The Vessels prepared for installation in this instant application are Singapore registered Vessels.

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3. Confirmation that the controller can detect and cease emissions within a total of 100 milliseconds if a disturbance causes the antenna to mispoint by more than 0.5 degrees.

ANSWER.

C5 uses stabilized antenna systems for ESVs (Sea Tel 4003) that operate with ±0.2° pointing accuracy of the exact position of the satellite through which the ESV is communicating. There are only a few exceptional conditions, described below, under which the antenna could be mispointed by more than 0.5°. Even under these highly unusual conditions, the ESV antenna controller can detect within 100 milliseconds if the

pointing error should ever exceed 0.5°and cease transmissions in 70 milliseconds. The controller would then suppress transmissions until the pointing accuracy is within±0.2°.

The stabilized antenna systems used by C5 employ closed-loop servo systems and highly accurate sensors to continuously monitor the antenna's position in inertial space. When operating properly, the servo mechanism will keep the antenna pointing within ±0.1° RMS, 0.2° peak. See Figures 4-6 attached hereto.

There always exists the possibility that unforeseen conditions can cause the antenna to be mispointed outside of these specifications. Examples of some of these possible conditions are:

- Unexpected mechanical disturbance from an external source;
- Operation in an unbalanced mechanical configuration;
- Operation subjected to tangential accelerations beyond the pedestal specifications (e.g., extremely heavy sea conditions);
- Failure of one or more sensors; or
- Failure of one or more drive motors.

Even under any of the failure conditions cited above, the antenna controller can detect a pointing error that exceeds 0.5° within 100 ms and cease transmissions immediately. As noted above, the controller will not allow transmissions to resume until the pointing error has diminished to within ± 0.2°.

The sensors mounted on the antenna measure antenna position with a resolution of better than 0.01°. The key to robust systems operation and reliable error reporting is that the antenna position data is processed before being used to drive an error comparator. In addition to antenna position, many sources of data are available to the system to make a robust decision about the accuracy of the antenna pointing. They are:

- Satellite modem synch lock;
- Short-term integrated rate sensor antenna position;
- Long-term accelerometer and heading reference sensors readings;
- AGC level data; and
- Calculated azimuth and elevation positions based on ship latitude, longitude and desired satellite longitude.

If for any reason the satellite modem should lose synch with the satellite down-link, the system will cease transmission immediately, regardless of the pointing accuracy, and not re-transmit until it has re-synchronized with the satellite and the pointing accuracy is within ±0.2°.

At all times the antenna controller compares a running average of the measured azimuth and elevation to the desired azimuth and elevation positions. If the results exceed the 0.5° threshold, then transmissions will cease immediately and not resume until the pointing accuracy is within±0.20.

The threshold detection algorithm has been used successfully for more than 10 years to insure that the stabilized antenna system is operating within the desired limits.

In addition, new software has recently been developed to continuously monitor the instantaneous pedestal pointing error and will trip an error flag whenever an unexpected event occurs that causes the pointing error to exceed 0.5 degrees. This flag will not clear until the pedestal error remains below 0.2 degrees for a period of S seconds. The state of this flag is used as an additional logic input to the existing "Transmit Mute" function of the Sea Tel below decks controller. By connecting the "Transmit Mute Output" of the Sea Tel below decks controller to the "Mute Input" of the satellite modem, the provisions of Section 25.222(a)(7) are satisfied.

This section is additionally confirmed by attachment to this instant application, via letter of confirmation from the Manufacturer (Sea Tel).

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4. The justification for the need of the STA as discussed in Section 25.120 of the Commission's rules.

ANSWER.

Section 25.120 provides for (a)" *In circumstances requiring immediate or temporary use of facilities, request may be made for special temporary authority to install and/or operate new or modified equipment.*", and (b)(3) "*The Commission may grant a temporary authorization for a period not to exceed 60 days, if the STA request has not been placed on public notice, and the applicant plans to file a request for regular authority for the service. " (emphasis added).*

As noted in this instant application, C5 Requests just such a temporary authority, which will be followed by application for regular authority for the service, in order to conduct test installations to prove it's worthiness and compliance. Providing instant and dependable communications to Vessel's plying the waters of the U.S. can only be in the best interests of the public, providing those same instant communications in matters of security and safety in those same waters. Though applicable to a 60-day STA, C5 is seeking only a 30-day STA to prove its operations.

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5. It appears that your off-axis EIRP density plots do not demonstrate that your ESV satisfies the off-axis density limits in Section 25.222(a) of the Commission's rules beginning at 1.25 degrees off-axis and in portions out to 5 degrees off-axis. To resolve this, you may reduce power (please indicate to what input power density at the antenna flange in dBW/4 kHz you intend to operate if this method is chosen) and/or you may seek a waiver request which sets forth the reasons in support of a waiver of (or an exception to), in whole or in part, any specific rule, regulation, or requirement with which the

application is in conflict. The waiver request, however, must comply with Commission rules requiring waivers to be plead with particularity.

ANSWER.

The spectral density plots provided indicate the EIRP spectral density transmitted from the antenna when the input power at the antenna flange is -14 dBW/4KHz. This is the maximum input power allowed for any antenna by the FCC. -14 dBW/4KHz + the antenna gain of 41.8 dBi = + 27.8 dBW/4KHz this is what the plot indicates. The antenna system has 1.5 dB of TX loss so the maximum power available at the feed is 2.5 Watts which is equal to 4 dBW. If you divide 4 dBW by 256 K you get -14.08 dBW/4 KHz. C5 and the SeaTel 4003 and iDirect modems do not need to provide -14dBW/ 4 KHz of power at the flange to support our link. C5's testing has shown that no more than -17dBW/ 4 KHz will be required to operate as planned which supports compliance with the above rules.

EMISSIONS DESIGNATOR CORRECTION.

The Corrected Emission Designator is **1M06G7W** .