Carrier Identification Business Case

Draft 1 November 2010

Problem/Opportunity Summary: Satellite interference has been a growing problem for many years and is a quality of service issue for everyone from satellite operators through to the user. The end customer is the ultimate victim who accuses everyone involved in providing their satellite service. If satellite operators could quickly identify the source of an interference incident it would lead to significantly reduced service impacts due to satellite interference and improve satellite's perception for quality.

Options Considered:

1. Do nothing as interference is a cost of doing business in this industry

2. Address the problem to provide a capability within satellite communications carriers to quickly identify the owner and uplink location of a satellite carrier that is the source of an interference incident.

Proposed Solution: What is being proposed is a capability called Carrier Identification (CID) which will add contact and location information within each satellite data stream thus allowing a receiving station to decode the embedded information. This capability will provide the source and owner of a satellite carrier that is actively causing interference into a valid satellite carrier. For this to become reality, it will require the development of an industry wide accepted specification defining what information is to be included in the carriers along with an agreed method to implement the inclusion and extraction of said information.

Project Definition: The carrier identification project is broken out into three distinct sub-projects defined by carrier type: video, data modem, and VSAT because each type has its own unique challenge to incorporate contact and location information data within their carriers.

The **Video CID** portion was initiated several years ago; therefore, it is further along in its development as compared to the other types of service in that the specification is developed and accepted by the satellite industry. Currently, implementation options are being explored by the equipment manufacturers involved in the specification development. The plan is to incorporate the CID information into the video Metadata portion of the data stream at the modem interface. The additional CID data bits will use bits that are currently undefined within the Metadata information section of the data stream.

When there is an interference incident, the operator at a station receiving the impacted carrier will be able to decode the Metadata information from the data stream using demodulator equipment currently available from several manufacturers. Using the decoded CID contact information, the source location can be contacted and advised that they are the source of an on-going interference incident and they need to take the appropriate actions to mitigate the problem. The implementation schedule for the video portion of CID is 1 January 2012.

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In the process of developing the video specification it became apparent that Data and VSAT services have unique ways to implement the additional data bits to provide CID information. As a result, each service was broken out into sub-projects each with its own team of developers. Each sub project has broad industry support from satellite operators, users and equipment providers to ensure the final technical specification has industry wide acceptance.

The **Data Modem** CID capability is currently in the definition phase identifying how and where the Carrier ID information bits will be located. The team's developmental requirements are as follows:

1. Carrier ID is to be independent of the external modem interface in use
2. Carrier ID can be decoded by a DSP based system
3. Carrier ID data must be transmit lest 1 per 5 minutes however, 1 per 30 seconds is preferred
4. Compatibility with existing modes is desirable

The CID for Data Modems should be embedded in Dummy PL frames for modems that use ACM and VCM. This method should provide the most compatibility with existing receiving modems. However, this method still needs to validation from decoding companies. A draft specification is being reviewed to determine feasibility of implementation along with effectiveness.

The **VSAT** CID capability is currently in the implementation research portion to identify the best method to implement. This group faces a unique challenge in that VSAT networks sometimes involve tens of thousands of terminals per network. Adding carrier ID would have a major impact, which is why some manufactures are taking a cautious approach. This working group consists of VSAT manufacturers, satellite operators, SUIRG, Geo-Location experts, and others. Currently the group is focusing on evaluating VSAT interference data and solutions, as agreement has recently been reached on the scope of the project and underlying principles. There are also many different VSAT system designs thus increasing the difficulty in developing a common Carrier ID approach. The Carrier ID implementation schedule is January 20l5.

Benefits

Financial: The cost of satellite interference to the industry is very high and broad as it impacts the cost to operate and use satellites thorough: a) additional operations staff and equipment required to support interference mitigation, b) cost to operators and users to reconfigure their systems to back up carriers and c) the overall cost to satellite service reputation due to negative quality image. The typical cost to a major satellite operator is several millions of dollars per year. Impacted service can also be expensive to the end-user who loses a video feed in the middle of a breaking news story or stock market transactions impacted due to corruption of a satellite link caused by satellite interference. With the CID capability embedded in satellite transmissions the loss of service will be significantly less in duration thus returning the service to full operational level in a timely manner.

The cost to implement CID is minimal because the design utilizes unused data bits within the present MetaData portion of the video data stream or similar options for data and VSAT services.

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Implementation will be mostly via software modification with minimal hardware impact such as inclusion of a GPS capability, where not available. The decoding capability is already available within the industry resulting in no additional costs for the CID capability.

A point to remember is that the cost of satellite interference mitigation is an unnecessary operational cost that directly impacts the corporate financial bottom line.

For the satellite operator or service provider the impact can be more than purely financial in that it is a quality of service issue that implies that satellite service is not as reliable as terrestrial services

Strategic: Users of satellite services have and continue to complain to satellite operators that the incidents of interference have reached an unacceptable level and have requested the satellite operators to do something constructive to fix the problem. Considering the level of dissatisfaction amongst the satellite user community it is important to remember that they have the option to use terrestrial services which are not impacted by interference as is satellite. If nothing is done to address the problem identified by the user community, many users could switch their data communications services to terrestrial.

SATCOM users and equipment providers who have implemented CID capability within their systems or services would have a marketing advantage on non CID services or equipment because the quality of service that is provided would be better. CID is providing a platform for equipment uplink providers to distinguish their company within the industry by offering CID capability within their product line.

Operational: Satellite interference ties up multiple operational staff on a daily basis. These staff members could be reassigned to more productive operational assignments or the number of operation staff could be reduced. The addition of the CID technology would provide a valuable tool to satellite operations by quickly identifying the source and location of an interfering satellite carrier.

Technology: Through the use of current technology, Carrier ID can be implemented in a timely manner (i.e.: January 2012 for video). There is minimal development required to fully implement the Carrier ID capability within up-link carriers.

Success Criteria: It is imperative that satellite operators, service providers and the SATCOM user community commit to requiring the implementation of the Carrier ID in any new carrier uplink equipment by including the CID specification within new uplink equipment or service procurement requirements.

Assumptions: It is assumed that the Carrier ID specification will become an industry standard and be included in all new equipment designs plus a follow-on plan to implement Carrier ID in current equipment designs.

Obstacles: Once the specification is developed and mutually agreed upon across the industry including satellite operators, users, decoder companies and equipment manufacturers, there will be several major hurdles to overcome to see this capability come to fruition. Firstly the equipment

manufacturers must agree to include the new Carrier ID specification within their designs along with a method to update preexisting equipment. The second hurtle is to have the companies who purchase this equipment and/or services include the requirement for Carrier ID within their technical specifications.

Risks: If the SATCOM user community or equipment providers fail to implement the CID specification in their service procurements or equipment designs then the capabilities of Carrier ID would not be realized and the incidents and duration of satellite interference will continue to increase. There are no known risks to the industry related to the implementation of Carrier ID.

Conclusion: With satellite interference increasing, resulting in user dissatisfaction with the quality of service provided by the satellite data communications industry, the Carrier ID capability will provide a valuable tool for the SATCOM industry to effectively mitigate the satellite problem. What is needed is to have Carrier ID as an industry standard and have the uplink equipment manufacturers and users agree to include the CID specification in their equipment or services.