The costly business of satellite interference

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PUNTA GORDA, FLORIDA – With thousands of incidents of interference reported each year and hundreds or even thousands more going unreported, most geostationary satellites will experience an interference incident at one point or another.

Interference can be categorised into five main groups: Interference caused by system users; interference caused by adjacent satellites; interference caused by terrestrial services; deliberate interference; and interference caused by modulation types in cross-polarised transponders. While approximately 85%-90% of incidents are accidental, the result — regardless of source — is always costly.

Calculating the cost of interference

The Satellite Users Interference Reduction Group (SUIRG) estimates that international satellite operators with small-to-large fleets of geostationary satellites in the Atlantic Ocean, Pacific Ocean and Indian Ocean regions incur hundreds of thousands to millions of dollars per year in cost due to interference.

The loss is two-fold. One is the lost revenue from the actual outage time in some cases. But a significant financial punch results from the cost of manpower spent locating the source of the interference and mediating a resolution.

SUIRG estimates that most large satellite operators lose the equivalent of three-quarters to one full "person year" annually on interference-related issues. Many of the large operators retain dedicated personnel working solely on identifying and resolving interference issues.

The financial strain of interference incidents on satellite operators can run into several million dollars when the loss of capacity and personnel time is added up.

What is being done

It is not just the satellite operators, however, who suffer. Broadcast networks, transmission equipment operators and even advertisers have a stake in the integrity of satellite transmission links. Initiatives such as SUIRG's Carrier Identification Working Group are making great strides working directly with equipment vendors and users in implementing — and requiring — state-of-the-art tools for interference detection, analysis and location.

The idea is straight-forward — embed sender identification (ID) data within the encoder so that when the transmission is received and decoded, the source can be easily tracked. In late 2006, SUIRG initiated the first live global rapid interference source ID demonstration.

A SISLink satellite news-gathering (SNG) truck was used during that test. An ID string containing the contact and location information for the SNG truck was added into the data stream via firmware provided by Link Research. A pioneering monitoring and control system furnished by Colem Communications was used to track the validity of the process. *(Note: Read more about the test in the March 2007 issue of Asia-Pacific Broadcasting.)*

Since that test, SISLink has upgraded approximately 90 of its SNG trucks and fixed stations in Europe with carrier ID capability

SISLink provided the SNG truck used to implement a recent test done by SUIRG's Carrier Identification Working Group.

Link Research has been an instrumental player in advancing the concept of carrier ID. The company has been working with Advent Communications on development of the software required for the carrier ID in Advent's DVE5000 encoders. Together, the two companies have taken the lead in incorporating SUIRG's Interference Source Location Specifications into MPEG encoders.

SAT Corporation's Monics systems use digital signal-processing technology to automatically monitor all uplink and downlink carriers as well as the beacon in each satellite. This automatic process provides immediate alerts when a carrier problem arises. The open architecture has plug-and-play interfaces with planning tools and geolocation products such as QinetiQ's SatID system.

The geolocation service is intended to deter malicious or accidental disruption of satellite communications services while allowing customers to identify and locate the source of interference.

What more can be done

Efforts to build broad support for inserting carrier ID directly into signals being transmitted via satellite have gained significant momentum. However, much work remains to be done. While Link Research is "giving" the underlying open architecture software to other vendors, there still needs to be broader adoption of carrier ID.

SUIRG, for example, is strongly encouraging satellite operators to demand carrier ID capability when writing the technical specifications for new equipment being acquired or when equipment is being refurbished. Broad adoption of the carrier ID has the potential to reduce the costly effects of satellite interference.

The frequency of unintentional interference incidents could be reduced with proper training. Early in its development, SUIRG developed a standard operating procedures checklist for uplinkers. Developed in conjunction with the ITU (International Telecommunication Union), the checklist provides a sanity check that can be especially helpful for SNG operators working under tight time constraints.

In addition, SUIRG coordinates closely with a number of companies in ensuring that their training courses address how interference is caused and how to prevent and resolve issues. To date, there are three SUIRG-certified trainers.

Another key effort under way is the development of a database that will provide operators with interference characteristics and case studies of incidents and resolutions. Through "fingerprinting" and cataloguing interference incidents, satellite operators can compare the waveform of the incident they are experiencing to prior incidents; when there is a match, they will know what is causing the interference. This resource could resolve a significant percentage of interference problems relatively quickly and at far less cost. Operators, however, must log their incidents through SUIRG in order to make this a viable tool.

What is ahead in the battle against satellite interference

Two causes of interference that are receiving increased attention come from adjacent satellites and broadband wireless access systems.

While still accidental, interference caused by adjacent satellites is becoming more prevalent as 2° spacing between satellites in the geostationary arc becomes more common. As each affected satellite operator is looking to maximise the full use of their allocated spectrum, we are seeing more incidents of "stepping on each other's toes". The resolution lies in better coordination, which will also help reduce disproportional loss of personnel hours.

As more countries look to open the lower portion of the C-band for WiMAX, interference potential from terrestrial systems could increase. The World Radiocommunication Conference 2007 (WRC-07) ruling created a sound regulatory framework for minimising this potential for interference into fixed satellite service (FSS) operations. However, it is critical that FSS and WiMAX stake holders adequately implement the WRC-07 decisions to ensure a globally acceptable interference environment in the C-band frequencies. For example, failure to appropriately register C-band earth station operations that are in frequencies also identified for WiMAX-type operations, or operation of WiMAX devices in frequencies beyond those identified by WRC-07 would substantially increase the potential for interference events in the C-band.

SUIRG is an international not-for-profit assembly of parties with representation from both the private and public sectors, organised to combat the increasing and costly problem of satellite RF interference. The group's membership comprises satellite operators, users, uplinkers, service providers, equipment vendors and other organisations with a stake in combating radio frequency interference. SUIRG also collects interference incident data from satellite operators on its website to clearly define the specific areas that need focus to reduce the number of incidents.

www.suirg.org.

The Satellite Users Interference Reduction Group (SUIRG) will alternate with the Asia-Pacific Broadcasting Union (ABU) and the Japan Electronics and Information Technology Industries Association (JEITA) to appear in every other issue of APB*, highlighting various association news to the industry.*