

SPACE JAM: Fighting satellite interference from the ground up
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Interference is an occupational hazard in any wireless game, but factors from crowded skies to cheap equipment are making it critical for the satellite industry, especially in Asia. The solution: some serious self-regulation, starting with SUIRG

Vietnam is getting closer to realizing its dream of joining the satellite club. Financing for its Vinasat project has been secured, and several manufacturers have been shortlisted for the \$200 million supply contract. With any luck, Vietnam will name a winner by year-end, and Vinasat will be in orbit with 28 live transponders by early 2006.

That's provided Vietnam can work out frequency coordination issues with Japan and Tonga. Vinasat's orbital slot overlaps with slots registered by both countries. That means Vinasat's transmissions will interfere with Japanese and Tonganese signals unless everyone agrees on how to mitigate this. Under the International Telecommunication Union's allocation rules, newcomer Vinasat has to do most of the mitigating. If it can't make adjustments that Japan and Tonga can live with, its business case for launching the satellite could be shot.

The twist in this story is that Tonga doesn't even have a satellite to be interfered with by Vinasat. But it does have the rights to adjacent slots, and it has the right to protect them, even if it's not using them.

While it's tempting to file the story under Weird Telecoms Tales, it's actually a fairly typical occurrence under current frequency coordination procedures – not just for the ITU, but for the Asia-Pacific, whose satellite regulations are as diverse, bureaucratic and inconsistent as the region itself.

Another contemporary example is Shin Satellite's iPSTAR, due for launch early next year. Its frequency plan clashes with that of AsiaSat-4, which made orbit earlier this year. Shin Sat and AsiaSat have been trying to work out a frequency coordination plan for close to two years. As we went to press it was still unresolved, with just a few months to go before iPSTAR's launch.

That probably won't stop Shin Sat from launching iPSTAR anyway. Many operators launch before coordination is complete, and interference issues persist well after new satellites go into service. Complicating matters is the increasingly limited room for new players and the practice of spacing satellites closer and closer with no consistent regulations to control interference.

Even if coordination can be resolved between the operators, interference is still a daily occurrence from any number of sources, often inadvertent but sometimes not.

That's not to say that interference is reaching epidemic proportions, says Anthony Baker, vice president of capacity and frequency management at New Skies.

"Interference is a daily occurrence, but that's true in any radio business, and satellite operators monitor their systems around the clock and can pinpoint interference and its source fairly easily in most cases," Baker says.

However, interference isn't without its consequences, either, particularly on the commercial side, says AsiaSat CEO Peter Jackson.

"We've seen a lot of new business from customers who are leaving satellites that have experienced problems with coordination," Jackson says. "We call it a 'flight to quality'."

While the industry overall agrees that interference benefits nobody in the end, there's very little effective recourse for resolving interference issues, especially in Asia. If the satellite industry wants to get interference under control, it is ultimately going to have to do it on its own. And that's just what it's starting to do.

A full-time job

Frequency coordination is complicated enough even when everyone plays by the rules. For a start, between satellite uplink channels, downlink channels and terrestrial radios like microwave links that run on similar frequencies, there are six paths of potential interference that have to be coordinated. Also, because it may not be possible to completely eliminate interference, operators have to decide how much interference they're willing to accept.

"Frequency coordination is a full-time occupation for about 5% of our staff, and that's about right for most other satellite companies," says Barry Turner, GM of engineering at AsiaSat.

However, says Baker of New Skies, possibly the most cumbersome part of frequency coordination is the ITU process itself.

"To register a satellite, you have to file a number of pieces of paper, starting with an advance publication document [API], which is just a broad indicator of what you want to do, what orbital slot you want to use and a bunch of frequencies," Baker explains. "Six months later, you need a request for coordination, which is where you provide more detailed information. The ITU looks at all the other filings to determine whether you need to coordinate or not."

With the skies increasingly crowded, he says, the odds are you will, especially if you're planning to use C-band frequencies. Complicating things is the ITU's "first come, first serve" rule, which means that everyone with a filing is going to have priority over you. Adding to the fun is the fact that there are far more filings than there are actual physical satellites – over eight times as many, in fact, which virtually ensures that a satellite operator will have to coordinate with as many as 20 different countries.

"Couple this with the fact that the ITU doesn't have enough staff to work with this, and what we have is a backlog of filings that can take as long as three years for them to deal with," Baker says.

Meanwhile, the clock is ticking, because operators only have seven years from the time they file with the ITU to set up their system, which isn't nearly as much time as it sounds when considering that the ITU may take up to three years to respond to a filing, after which the operator has to set up bilateral agreements with different governments, many of whom may have their own slow bureaucratic processes.

"Meanwhile, you have to get to a point where you have enough confidence that the plan is commercially workable so you can tell the commercial guys to go ahead and build the satellite, which takes two to three years," says Baker. "So seven years isn't as long as it sounds."

If the coordination process makes it seem as though the odds are stacked against new operators, that's because they are, but that doesn't mean the process is easier for incumbents launching new satellites, Baker says.

"If it's a replacement satellite that's going in the same slot as a retired satellite, in theory you don't need to do much coordination, but in reality, that new satellite is going to be different in some way," he says. "It might have a bigger number of C-band or Ku-band transponders, or maybe even Ka-band, and the beams may be a slightly different shape, or transmit at a higher power level. If any of this is the case, you'll have to do some coordination for that satellite."

Two degrees of separation

Perhaps unsurprisingly, the coordination process is so drawn out and complex that in many cases, conflicts remain unresolved even after the satellite goes up. One reason for this is the adjacent interference caused by spacing satellites closer than 5° apart, says Turner of AsiaSat.

“There’s this myth in the industry that you can separate satellites by 2° – which you can do, but only if you restrict the size of the antenna and the power of the transmission,” Turner explains. “The FCC does this in the US – it has specific rules that say if you design your satellite it has to follow these specs, and the uplink antenna has to be this size, and you can only transmit at these powers, and it works. But the US is only one country. 2° is not enough if you have different operators in different countries using different-sized antennas, which is exactly what you have in Asia, but unfortunately some Asian companies get some stupid consultation from Americans who tell them that 2° is okay.”

Baker of New Skies concurs. “There is no discipline, no regulatory guidelines that apply to every country. All countries with satellites want to provide their own beams to their own people first. You have different beam shapes, different power levels, different applications like DTH, VSAT, or rural communications. It’s a free-for-all.”

Lack of unity

This is only to be expected from a region comprising 63 governments, which means 63 regimes with their own regulations, experience and skillsets for satellite operations, whether on the ground or in the sky. (By comparison, North America only has three regimes to cope with, while Western Europe is ostensibly unified for satellite technologies like VSATs.) Skillsets range from first-class to novice, installation crews aren’t always properly equipped, and language barriers are common, despite the widespread use of English.

Asia is also saturated with satellite operators, which means intense competition and frequently uncooperative inter-operator relationships at the operational level. Complaints to overseas regulators regarding satellite interference generated by an operator under their jurisdiction often plod through bureaucracies that see satellites as a matter of national security and pride as much as anything else.

“There’s a lot of coordination disputes in the region between people who have not really abided by the process and are not sticking by their coordination agreements, particularly where we’ve got 2° C-band spacing,” says David Ball, Asia-Pacific VP for PanAmSat. “Internationally, we don’t see the same level of cooperation between operators as we do in North America. Indeed, in some cases there’s quite a lot of animosity.”

There have even been instances of deliberate, politically motivated jamming between rival countries, though this is a comparatively rare problem. Even without such activities, the nature of the Asian market is already making the tricky process of coordination even trickier, says Simon Twiston Davies, CEO of the Cable and Satellite Broadcast Association of Asia.

“We’ve got a great deal more satellites that have been launched in the last ten years than perhaps some of us would have expected, and the pressures just continue to build, and the spectrum is not infinitely expandable,” he says. “As the Asia-Pacific continues to grow, even if it may be slowly at the moment, these issues are only going to become more pressing, and we do have to tackle them at some point.”

Reform needed

The most logical place to start would seem to be the creation of a mechanism to standardize operational procedures and enforce compliance – things the ITU doesn’t have the power to do. Interestingly, however, few in the industry are keen on giving the ITU that kind of power.

“The ITU can arbitrate negotiations, but it can’t tell countries to stop transmitting, and the countries like it that way,” says Turner of AsiaSat. “Each country is sovereign, so if Burma, for instance, interferes with Pakistan, those governments should resolve it.”

Baker agrees that the ITU shouldn’t have enforcement powers to resolve coordination disputes, but adds that the current process is in need of some kind of reform.

“All countries want autonomy over their own territory, but the ITU rules don’t really respect that,” he says. “They respect ‘first come, first serve’ services. That goes against the grain for some countries.”

Another problem is that the ITU system, in essence, deals with satellites on paper rather than real life, as illustrated by the example of Vietnam having to coordinate with Tonga despite the latter having no satellites.

“Some operators are warehousing orbital slots, which means they’re negotiating coordination for satellites that aren’t even there,” Baker says. “They might want to address real usage rather than registered protected spectrum.”

Even so, reforming the process is almost as complex a task as the coordination process itself. Reform proposals at WRC gatherings have generated little support. The problem, of course, is consensus – that’s how the ITU does things, and changing the rules means finding a way to stop over-filing and make it fair and acceptable to all administrations, without penalizing the networks in the backlog.

The bigger problem

If that wasn’t plenty to deal with, CASBAA points out that frequency coordination isn’t even Asia’s biggest interference problem. In fact, two-thirds of reported interference problems in Asia stem from operational and inadvertent causes such “undisciplined uplink power control, FM radio pick-up, and SNG (satellite news gathering) units uplinking to the wrong channel”.

“A typical example is where you have an SNG team who sets up an arrangement with an operator to transmit at a set time,” says Turner of AsiaSat. “But you’re dealing with the stress of a deadline, possibly with the additional stress of personal danger if you’re broadcasting from Iraq, for example, so you may not set up your satellite equipment exactly right, or you may not get the frequency exactly right, or the polarization, or even the broadcast time, and the result may be interference for another SNG team or another user.”

Other problems range from improperly installed VSAT dishes to cheap, poor-quality equipment.

While this type of interference is a definite problem, Turner is quick to point out that it’s not an epidemic either. “AsiaSat has 70 or 80 transponders in use now, and we probably get one instance every few days,” he says. “We usually log less than 100 incidents a year. Most of the time, it’s from some SNG unit – it’s there, and ten minutes later it’s gone.”

Rick Abassi, global manager of satellite services for Reach, which runs teleports in Hong Kong and Australia, agrees. “Often, it’s users overbooking their time slot. There’s always direct communication between us and the customer, so if they need more time, we can usually arrange it and the problem is resolved. We also work to ensure that [satellite users] comply with the guidelines set by our customers, such as equipment quality.”

Even so, as mentioned earlier, guidelines vary across the Asia-Pacific, as do procedures for uplinks and equipment installation, compliance and skillsets. (Some administrations, CASBAA says, don’t even have a current copy of the ITU’s Radio Regulations). There’s also no single certification process for equipment or operators.

However, several regional and global industry initiatives have been created to deal with these day-to-day issues, including CASBAA's Technical Committee, the Rogue Carriers Working Group (RCWG) of the World Broadcasting Unions' Inter-Union Satellite Operations Group (ISOG), and the Satellite Users Interference Reduction Group (SUIRG). SUIRG has been focused on building better awareness of the interference problem by distributing information on problem equipment, providing training materials and developing appropriate skills training for satellite uplink operators. Most recently, the SUIRG and RCWG co-developed the industry's first Universal Access Procedure for satellite uplinking.

The new SUIRG, Inc

What has been lacking from all this has been a single, formal organized body dedicated to the interference problem. Entities like the RCWG and SUIRG were informal initiatives that met once a year and communicated by email between meetings, which ran the risk of duplicative work and lacked a unified front for working with the ITU as well as national regulators.

That changed in mid-September with the formal incorporation of the SUIRG (now known as SUIRG, Inc), which just wrapped up its first general meeting as a non-profit corporation last month. SUIRG president and CEO Bob Ames described the meeting as "very successful", with about 30 delegates representing 18 companies and 12 countries in attendance. Among the accomplishments was the creation of eight working groups to take proactive steps towards the fight against satellite interference.

The charter of the new SUIRG remains focused on operational and inadvertent interference issues, but the hope is that if the industry can pull together to resolve day-to-day interference issues, it may be able to do the same for frequency coordination. If the ITU's rules can't be changed, it may be up to industry players to take matters into their own hands and plot ways to streamline the process.

With satellite programs being highly politicized in most countries, it won't be easy. But most players agree that the current process of frequency coordination is simply not going to cut it for much longer – not at a time when orbital slots are filling up, competition is fierce and demand is already flat and expected to stay that way for some time. Interference doesn't just hurt individual customers, says PanAmSat's David Ball, it hurts the satellite industry's reputation.

"For the industry's protection and for our customers' protection, we need to be able to provide quality service so our industry is sustainable," Ball says. "We don't want to have customers who get that bad experience on satellite, otherwise it's bad for our industry, and it's not a good long-term position to be in."