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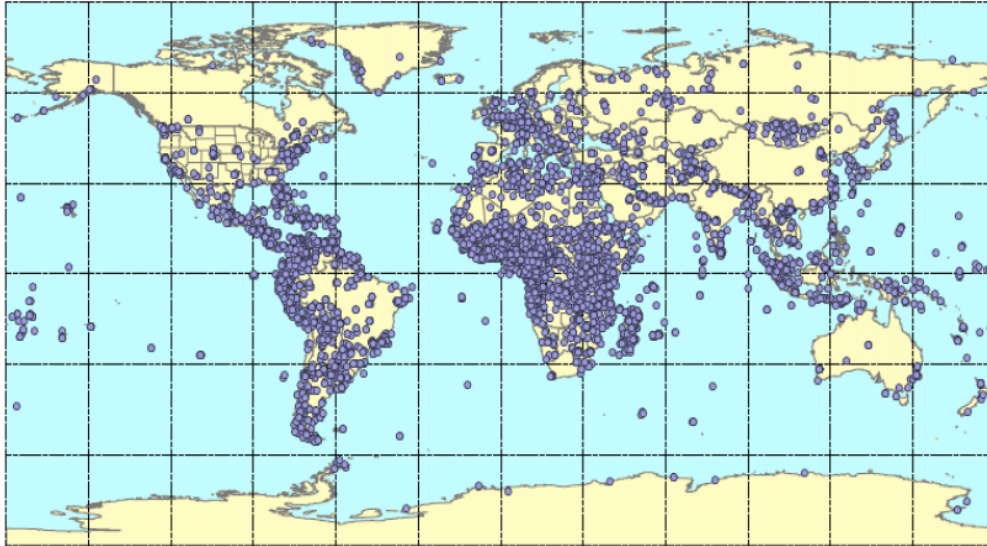
### WiMax and Satellite – Can't we all just get along?

Here at Near Earth, we focus on digital communications, which in its many forms includes satellite broadcasting/telecom as well as broadband wireless access (BWA), such as WiMax and similar technologies. While satellite is the older of these two technologies, both have provided and continue to provide substantial public benefit and financial returns to investors. But in a shrinking world where finite spectrum resources are relentlessly being taxed to carry more and more information, it was probably inevitable that two of our favorite technologies would find themselves in conflict.

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And so, now we find an increasing brouhaha emerging over pending allocation of the 3.5 GHz band (as WiMax proponents like to call this potential source of spectrum for expansion) and the C-band (as satellite proponents like to call it). Depending on how this is resolved, the fortunes of satellite builders (e.g. Loral, Orbital Sciences) and operators (Intelsat, SES, etc.) could be pitted against emerging broadband wireless manufacturers (Motorola, Alvarion, etc.) and operators (e.g. Sprint, ClearWire, Wireless Australia, etc.).

The sources of this conflict lie in the technical approaches used by BWA and satellite users. BWA networks use a combination of base stations and individual fixed and mobile terminals that transmit radiation at strengths that can overwhelm or degrade the much weaker signals from satellites. This interference can come from both the strong in-band (i.e. within the licensed spectrum) emissions from a tower, or the weaker out-of-band (immediately adjacent to the licensed spectrum) emissions. In the case of the former type of interference, where the signals are stronger, satellite receivers as far as tens of miles from the transmitter can be affected. Even in cases where the emissions are unintended (and thus much weaker), interference can extend for over a mile. When roaming users of the 802.16e standards (mobile WiMax) are added to the mix, the potential for interference is substantial. The figure below shows C-band earth stations registered with Intelsat, a large satellite operator – a fraction of the overall total.



Source: Intelsat

This problem is not merely academic – there have been numerous examples of actual interference taking place due to BWA transmissions in Bolivia, Australia, Hong Kong and other locations.

As background to this discussion it should also be noted that, compared to the Ku-band, C-band satellite transmissions are much more resistant to rain fade, which is particularly acute in tropical regions common in the developing world. As such, simply migrating satellite users to Ku-band is problematic from a technical as well as a cost viewpoint. From the perspective of WiMax, routing traffic from the C-Band to other feasible bands (such as S-band) carries its own problems, which vary depending on the demands for S-band spectrum in each jurisdiction.

So, on the one hand, many countries, particularly developing ones, want to speed the rollout of broadband services. On the other hand, there is a substantial and expanding installed infrastructure for satellite operators and users that want to protect their investment. How then to resolve the dilemma?

In the end we expect a mixture of technology, lobbying, and “lawyering” to be brought to bear. In the case of technology, a number of approaches apply: bandpass filtering can protect from out of band transmissions, and the use of directed antennas and shielding can help reduce interference when the locations of transmitters are known. Both approaches are only partially effective, and can be quite costly – the only complete solution is

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to dedicate the band to one type of service or the other, which becomes a regulatory issue.

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In the case of lobbying, the WiMax Forum, Global VSAT Forum, Cable and Satellite Broadcasting Association of Asia, and others have all cranked up their efforts in advance of the upcoming International Telecommunications Union WRC-07 Conference, currently set for October and November of this year. These groups are also mounting efforts with the appropriate national regulatory bodies in affected countries. In this latter instance, the more “local” flavor of WiMax operators vs. the international flavor of the satellite operators could tilt the arguments in favor of WiMax, though it is too early to say this with confidence. On the other hand, the satellite operators have the power of incumbency, with tens of thousands of antennas in service. While this pales with the potential for millions of WiMax users, few or none of these users are yet in service.

We expect the resolution of this issue will ultimately result in some unhappiness on all sides, and will vary by location. At stake is the value of satellite operators installed assets, and their ability to generate the cash flows needed for debt service (see the Deal Side article in this issue) vs. the ability of WiMax to get enough new spectrum to provide the services (and associated revenues) users want, especially for emerging bandwidth hogs like mobile video and data service. It’s likely to get pretty messy out there.

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