

attenuation has minimal effect on the service being provided," notes Hartshorn.

There are two main mitigation techniques, one being site diversity, where typically the operator will ensure there are uplinks in geographically diverse locations. This naturally means that if one site is being impacted by heavy rain, they can simply switch to another site. This is not a new approach, and indeed has been applied with good effect for decades. The second technique is adaptive coding modulation operating at the modulator end by working out the whole picture, even where there may be some information missing. Hartshorn insists that these techniques had eliminated significant degradation or signal loss over Ka-band in the event of heavy rain.

Hartshorn also contended that there was no longer any distinction between TV and broadband in any case, with quality of service requirements converging between the two. "Internet or TV - what is the difference? Increasingly internet is the TV," he points out. "There is an expectation that the satellite industry will begin delivering both

consumer and enterprise services through satellite broadband."

### Towards Q- and V-bands

While consumer broadband, TV, and mobility are the obvious applications for Ka-band, there is one other area of huge potential in cellular backhaul for mobile telephony services, given the proliferation of traffic generated by emerging 4G/LTE networks.

Many cell sites around the world, especially emerging markets in Africa and Latin America but also remoter parts of Europe, are beyond the reach of fixed broadband infrastructure. Satellite is therefore an obvious candidate, but with one big hurdle that has to be overcome, according to Doron Elinov, VP Strategic Accounts at Israeli-based VSAT equipment maker Gilat Satellite. This is that many countries require their cellular traffic to be terminated for entry into the global internet within their territory. This would mean that the gateway connecting the satellite's communications with the internet would have to reside in the same

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"There are two distinct markets for satellite broadband, the unserved, and the underserved."

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country, which is often not the case for Ka-band satellites at present. "If this can be solved, then the internet portion of cell backhaul has great potential," said Elinov.

Another emerging area without any such problem is remote video contribution, extending the range of places from which high quality pictures can be obtained, especially valuable for news gathering. "Our NewsSpotter uses professional-grade KA-SAT terminals for video contribution from crews in the field to a broadcaster's master control room," says Eutelsat's Petrie. "Using standard IP routing, the service is capable of transmitting at speeds of up to 20Mbps via KA-SAT and its dedicated ground network fibre infrastructure."

While this ability to support transmission speeds of 20 Mbps is keeping satellite competitive at present, the industry will have to make further advances to meet future demand for ever greater throughput, for example to support ultra HD. As this time approaches Ka-band capacity will become exhausted, and this will also erode one of its present advantages, which is relative immunity from interference. This is largely a function of the relatively low population of Ka-band satellites at present, but this will change. The industry will respond by moving up to even higher frequencies, according to Elinov. "We expect to go to Q- and V-band, and reach 100 Mbps," he says.

This will also involve even smaller spot beams capable of serving yet smaller local markets with high quality of service. So for the foreseeable future the whole HTS movement involving ever higher frequencies and smaller spot beams looks like ensuring satellite communications will retain a major role in broadband and TV Everywhere.

In the longer term though as scope for recruiting ever higher frequencies is exhausted and fibre eventually reaches almost all households, at least in more developed countries, satellite communications may be relegated to more niche markets such as mobility. **CSI**

