RTT TECHNOLOGY TOPIC
February 2008

Satellites for Emergency Service Provision

This month's Technology Topic revisits satellites, a subject last addressed by RTT in our July 2007 Technology Topic, Satellites and Terrestrial Hybrid Radio Networks.

This time we review specifically the evolving role of satellites in emergency service provision and look in particular at the past and possible future role of low earth orbit (LEO)satellites in public protection and disaster relief.

We suggest a related need to develop **integrated** satellite, cellular, two way radio and broadcasting specialist service solutions.

Ten years of low earth orbit satellite service
Just over ten years ago two companies , Iridium and Globalstar started providing service from two low earth orbit constellations.

The Iridium project, championed, engineered and financed by Motorola, involved launching sixty six satellites into low earth orbit to provide cellular type services at a time when cellular networks were becoming increasingly ubiquitous and cellular service increasingly competitively priced.

The system was and still is a spectacular engineering success; a tribute to largely US based engineering resource but at the time was a fiscal failure.

The business model was predicated on the existence of a user community who would prefer not to use their cellular phone or two way or short wave radio as a preferred communications device.

This user community would instead choose a system where the phones and phone service were made available at a substantial premium with poor indoor coverage, packaged in a form factor similar to a Motorola World War walkie talkie radio.

Globalstar launched a competing constellation of 48 higher altitude satellites. Like Iridium these were an engineering triumph but at the time a fiscal failure. Both Iridium and Globalstar went into Chapter 11 administration.

But life moves on and moves in mysterious ways. A retrospectively prescient decision was taken not to de orbit the satellites but to maintain both constellations and continue to service and develop a loyal group of specialist users.

And then came 9/11, and the second Gulf War and Afghanistan and Hurricanes Katrina and Rita and the Asian Tsunami, the Madrid bombings and the 7/7 bus and tube bombing in London and more recently the forest fires in California plus earthquakes, famine and floods and other natural and unnatural disasters around the

world.

Satellites and Cellular Networks
Cellular networks were and are not always ideal to provide first responder support in these often hazardous and naturally or unnaturally chaotic unwanted and unpredictable events.

For example towers and or terrestrial telephone links can be blown up or blown down.

Iridium has always had a number of inherent resiliency advantages both over terrestrial only networks and other satellite networks. It was and is the first and only civilian low earth orbit satellite system to implement inter satellite switching, reducing dependency on any single ground facility.

As a LEO (low earth orbit) constellation), round trip latency is 20 milliseconds, substantially lower than the 133 milliseconds of a MEO (medium earth) or the 500 milliseconds of a GEO (geostationary) satellite system. This makes speech and latency sensitive data exchanges easier to support.

Additionally the satellites have proved to be significantly more robust than expected and continue to provide service across the US, Alaska, Hawaii, the Pacific Ocean (as an integral part of the now updated tsunami warning system) and other hard to reach parts of the world.

Iridium therefore has a perhaps unexpected opportunity both politically and financially to justify new investment in a replacement constellation and updated service platforms, to negotiate innovative collaborative deals with other traditional and non traditional service providers and possibly to justify preferential access to new spectral allocations at L band between 1518 and 1675 MHz or S band between 1.97 and 2.69 GHz. Globalstar and a number of other entities have similar plans.

The impact of changing technology and a changed and changing economic and regulatory climate- common interest opportunities
This opportunity has to be seen within the context of a substantially changed and changing economic and regulatory climate.

Satellites are attractive again as investment opportunities.

Partly this shift is technologically driven.

Satellites can now pack more processing power into a much smaller space. Advances in RF and baseband hardware have delivered a steady year on year increase in functionality per kilogram of orbital weight. Solar panel arrays are more efficient and can deliver more on board power to support wider bandwidth two way communication.

Smart antenna technologies have improved over the past ten years so available power can be more accurately and adaptively deployed. Improvements in station keeping efficiency and hardware reliability have helped to increase the life span of satellites. An operational life of 15 years is now a realistic expectation even for the

traditionally shorter lived low earth orbit platforms.

A reasonably broad choice of launch options and some innovative mission insurance solutions have helped trim launch costs. All these factors together have contributed positively to the overall economics of providing or updating and upgrading satellite based services.

Iridium and Globalstar both have the advantage of having existing constellations, an established and loyal user base and a track record of providing emergency service support.

It has to be said that cellular operators have not been as conspicuously successful at nurturing and serving specialist user communities. The lack of service immediately post Hurricane Katrina for example was understandable but resulted in politically costly censure.

Cellular operators would do well to review their service offerings for the public safety sector and ensure that these sectors are at least adequately represented in their overall customer mix.

Just focusing on consumer and corporate users and or consumer and corporate applications is probably not wise either financially or politically in the present unstable world climate. This suggests an opportunity for cellular operators to work with satellite service providers on integrated services for specialist users

Conversely Iridium and Globalstar have to manage their user base across a transitional period where the existing constellations are past their nominal end of life expectancy. Globalstar has had a number of RF hardware failures that have reduced availability of their S band voice services and both Globalstar and Iridium will have to finance and launch new satellites over the next five years.

This suggests a need to work with rather than against cellular operators. Each party has something the other party needs, always a good basis for a collaborative venture. There may be additional opportunities to work with other satellite operators with medium earth or geostationary satellite systems, two way radio service providers and the broadcasting community. Most broadcasters for example have a public service remit which extends to providing emergency broadcasting services in response to local, national or international emergencies.

Satellites have always been a politically sensitive sector and so has satellite spectrum particularly the allocations in L band and S band. Some of that spectrum has been acquired or allocated on advantageous terms and can potentially be repurposed beyond an original remit to provide specialist broadcasting and/or emergency service provision. For example spectrum originally intended for broadcast TV could be extended to embrace a much broader multiplex of essential and non essential service propositions.

There is substantial scope here for special pleading on the basis of social need, for example the provisioning of broadcasting and or emergency service communications in emerging countries. Special pleading can however sometimes be a smoke screen

for more prosaic economic ambition.

Cellular operators are right to be wary of new competitors who could be potentially successful at leveraging political influence into preferred access to new or existing spectrum. To an extent the very specific public service obligations imposed on the public safety bands in the upper band UHF US auction are an early indication of similar battles that will be fought internationally over the next three to five years in the ongoing L band and S band allocation and auction process.

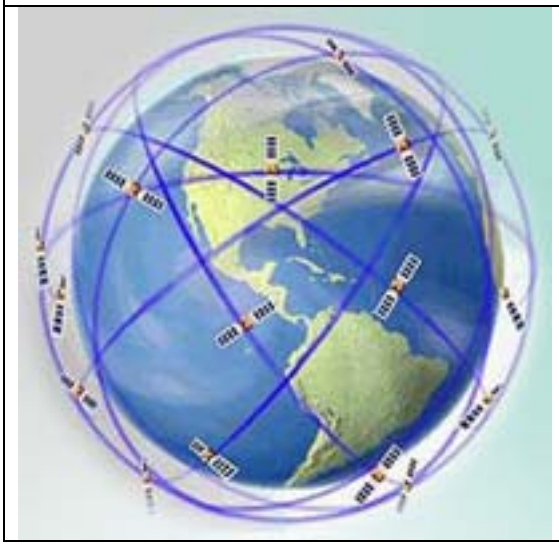
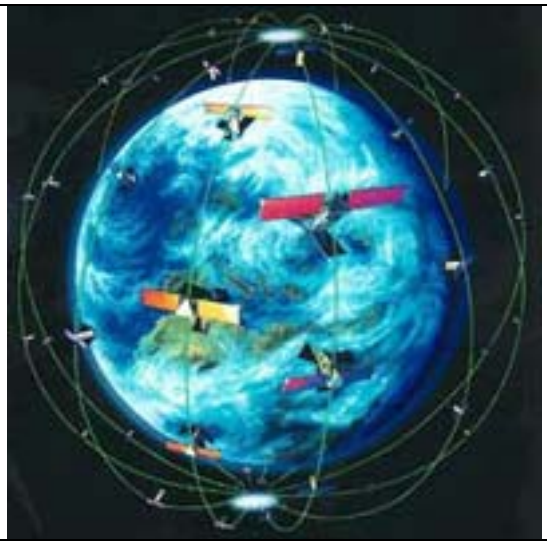
Such an adversarial approach to spectral allocation is inappropriate in a world where radio communications, particularly integrated radio communications, have an increasingly important role to play in emergency service provision.

Iridium will be presenting a paper on the role of satellites in emergency service provision at the forthcoming Specialist Radio Conference 'May Day May Day' being held on Thursday May 1st at the Imperial War Museum at Duxford near Cambridge. Additional information on this event is available from Cambridge Wireless.

Some of the more technical aspects of this subject will be addressed in the 'Looking At' section of the March edition of Land Mobile Magazine, the media partner for the May Day May Day event.

The business positioning of Iridium and Globalstar is discussed in the most recent issue of Insights, the bi monthly strategic briefing from the Shosteck Group.

More information on Globalstar and Iridium is available by following the links below.

Globalstar	Iridium
	

RTT, the Shosteck Group and The Mobile World are presently working on a number of research projects in the cellular, two way radio, satellite and broadcasting industry focusing in particular on present opportunities for collaborative rather than competitive 'balanced business' models.

If you would like more information on this work then please contact

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