Satellite industry facing critical challenges this year

BY DR ALI R EBADI

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The satellite industry will face critical challenges this year. These challenges include the C-band spectrum protection and additional Ku-band spectrum requirements, Ultra HDTV (UHDTV) ecosystems development and standardisation, the application of new technology in satellite design, as well as accessibility to a more reliable and cost-effective launch vehicle service.

The International Telecommunications Union (ITU) 2015 World Radiocommunication Conference (WRC-15) will decide on additional terrestrial mobile spectrum and identification for International Mobile Telecommunications (IMT). C-band is once again being considered, this time including the uplink spectrum. National and regional preparatory works will be entering a critical phase in 2014-15, and ITU's joint study group will finalise the candidate frequency band by the middle of this year.

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On the other hand, there has been a mismatch of Ku-band spectrum between its uplink and downlink frequency allocation (with shortfalls in the uplink), as well as an unharmonised amount of frequency spectrum between ITU regions. It is critical to develop a viable solution this year that identifies additional frequency bands, as ITU studies show that there is potential interference caused to existing services.

To foster efficient and interference-free use of existing spectrum allocation in an increasingly congested geostationary orbit, it is critical to leverage new advancements in digital technologies, filtering techniques, improved ground antenna sidelobe performance and to incorporate these into best practices concerning regulation and standardisation.

Furthermore, it remains challenging to ensure ITU Master International Frequency Register (MIFR) reflects actual use of orbit resources. While ITU has initiated steps to clean up the MIFR, there remain many ambiguous registries. Nations with satellite manufacturing and launch capabilities could have an unfair advantage in registering satellites, resulting in frequency coordination difficulties to some nations who have been diligently reflecting their actual use in the MIFR.

While high throughput satellites (HTS) will continue to be a hot topic this year, the key challenge remains on how to develop a viable business model for large Ka-band HTS systems for the Asian region. Clearly, there are a number of challenges to develop scale in Asia, compared to North America and Europe, which include: Regulatory (fragmentation of regulatory regimes); technical (rain fade issues); economic (affordability of consumers); and market (products and services that appeal to customers).

UHDTV will be another main theme for discussion this year, with uncertainty on the readiness of the entire UHDTV ecosystem. Key challenges rest on availability of sufficient UHDTV content in linear channel; adoption of standards to support the UHDTV environment, for example, compression (HEVC), transmission (DVB-S2 updates), and so on; and development of devices/equipment to support both the distribution and consumption of UHDTV.

DTH will continue to be the key driver for the growth of transponder demand this year. DTH growth in countries such as Malaysia, India and Indonesia has been constrained recently due to the lack of available capacity. The ability of satellite operators to provide capacity to the markets in a timely manner could be challenging due to the nature of uncertain launch schedules and complex regulatory approval processes in certain markets.

To the end-user, consumption of content over a multi-screen environment is key; there should be availability of a common set of access services across devices and networks through which they are connected. In other words, repeated sign-up/signed-in process to access the media, incompatibility with customer devices in terms of receiver and software/application types, and Internet provider connection speed — for instance, capping on subscriber — versus the need for on-demand content.

For the content provider, there should be migration/synchronisation from existing large wired or wireless networks to an all-IP network architecture, and multiple transport streams with different resolutions and bit-rates to cater for display of the video across a wide range of device types with various screen sizes and formats.

There should also be different compression algorithms used for broadcast TV, Internet video and different mobile device transmissions, and multiple conditional access methods to secure against piracy, which platform operators are unwilling to pay for the extra rights for OTT (over-the-top)-type content.

There is a need to have two-way communications with the end-user — by allowing the user to access his subscribed content from multiple devices, giving users the choice to view content on demand and creating a platform where users can leverage social media while consuming content.

From the launch vehicle point of view the challenge is the availability of reliable launch services options. With Ariane and Proton currently the most viable options, this will change in the medium and long term with the SpaceX Falcon 9 rocket. The success of Falcon 9 may also put pressure on Ariane in securing co-passengers to support its dual-launch philosophy.

2013 was marked by the first launch by SpaceX to GEO, followed by another successful launch last month. Operators have always been keen to develop competition in the launcher industry, both for commercial reasons to keep pressure on prices and technically to ensure there are sufficient alternatives in case of technical failure or problems with launch manifest.

Innovation is a permanent challenge in the industry. Because satellites cannot be repaired in orbit and have to be operational for 15 years or more, most operators are very conservative to adopt new technologies on their own satellites.

Although the first key step in innovation is to develop and qualify new technologies, the main challenge is to get them on the market and in space.

Innovation in the past decade has mainly been focused on platform technologies with the arrival of Li-Ion batteries, extensive use of electric propulsion, new solar cells and star tracker. New areas of improvements should be considered.

Management of a satellite's end-of-life is always an issue. Manufacturers should consider having a dedicated tank carrying enough propellant for de-orbit, thereby resolving the difficulties on gauging accuracy. We also know that solar array produces maximum power at Equinox when the sun ray is directly perpendicular to the solar cell. The solar array should be able to also track North/South in order to maintain this optimum configuration throughout the year.

On the payload side, traditional transparent bent pipe remains the reference. Even new HTS missions largely keep to that basic design. Innovation seems limited to some niche markets. The main example is the development of digital processors for mobile and military applications. Leading companies in space business have made large R&D investments for these units, which open a range of new capabilities: Sub-channelisation, beam forming, Galium Nitride (GaN) chips and GaN high power amplifiers.

Although these new capabilities are of interest to commercial satellite operators, they are not present on common telecommunications missions. One possible explanation is that the current market is driven by video that does not require such new capabilities, and as a consequence operators cannot justify the interest and additional cost. As a result, this new technology was limited to specific applications for mobile operators as they address the core of their business.

The development of broadband missions may change this and open new opportunities for this technology.

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