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White Paper

HOW TO COPE WITH CHANGES IN SATELLITE TV BROADCASTING

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Satellite & TV Broadcasting: Intro & Historical Perspective

From the very first transmissions, TV broadcasting has had a major social impact on the collective human memory and psyche. The first recorded instance of the Olympics being broadcast were at the 1936 Summer Games in Berlin when they were televised by means of closed circuit television to various viewing halls located across the city.

The 1950's heralded in the first national live broadcasts of events, such as President Harry Truman's speech at the peace conference to the US in 1951 and the coronation of the UKs Queen Elizabeth II, being the first live multinational TV coverage in 1953, facilitated by the BBC (British Broadcasting Corporation) and the EBU (European Broadcasting Union). Satellite has always been an integral part of these transmissions and by 1969 facilitated worldwide live coverage of the first landing on the moon by Apollo 11 astronauts.

The Olympic games have always been key milestones for the introduction of the latest and greatest technologies; We came a long way to London 2012, being able to choose what we watch and when we watch it, in stunning detail and quality. As we look towards Sochi and Rio, the pace of technological evolution continues unabated.

Of the approximately 7 billion inhabitants of our planet, it's estimated that something like 5 billion watch TV more or less regularly today and more than 2 billion of those watch it thanks to Newtec's satellite technology in the transmission chain. The histories of satellites and TV have always been intertwined and are set to remain so.

TV Business Revolution

The television market is in transition, which is reflected in all the enabler industries, including satellite. TV is not a pure linear technology anymore. While its continuing relevance is demonstrated by live sports (like the aforementioned Olympics), news and events, the Internet has changed the way viewers expect to find and consume content.

The proliferation of consumption devices (tablets, smartphones, laptops, etc) complementing the traditional TV in the living room, has radically changed the business of being a 'broadcaster'. The changing technology and workflows to feed a multi-format, multi-platform operation are immense but the shift in subscription & advertising revenues, together with the changing competitive landscape, drive fundamental challenges to the commercial viability of many established players.

It's not only consumption of content that is changing but the generation of it too. Video of conflict zones, disasters and other news often comes from the general public, captured on their phones and uploaded to YouTube. Newsrooms are now about monitoring events and trends on social media as well as having a correspondent live on the scene for a stand-up.

Some of the changes are broadly welcomed. The evolution from 'state' to 'public service' broadcasters and the growth of commercial broadcasters has expanded the quantity of channels and choice of what to watch. However, the need for trust and independence of media, long championed by truly public service broadcasters, is as vital for us all in the future as it has always been. The rise of well-funded TV networks, part of governmental 'soft power', will see expanded growth over the next few years and continues to divide opinion. Other trends like the explosion in the cost of sports rights, key to the success of many pay TV platforms and increasingly excluding many established broadcasters, are less welcomed by many.

TV Production and Transmission Evolution

The migration of content consumption from pure linear 'broadcast' to 'on-demand unicast' and an interactivity channel (for 'Connected TV', second screen smart apps) are arguably the biggest factors affecting the broadcasters workflows and the distribution platforms like satellite.

But the traditional 'broadcast' technologies still have tremendous scalability (sending content once, received by millions) advantages that 'broadband' infrastructure will never have (even with Fiber to the Home, 4G) to the reliability and availability levels of today's TV. It is by combining the advantages of both broadcast and broadband networks (using 'broadcast' to send 1 to many and 'broadband' for interactivity and connectivity) that a suitable architecture to deliver next-gen TV services will be possible. An example is already here today called HbbTV (Hybrid Broadcast Broadband TV) and there are others.

The 'TV Production' workflows and technologies are changing to meet the evolution in consumption demands. The convergence of broadcast and ICT worlds has had a major impact on systems and solutions for broadcasters with a significant move towards IP. This transition is leading to an increased importance of 'non-linear' file based workflows for news gathering, distributed production/post-production workflows, multicast asset delivery. But these changes also bring their own challenges. Managing the proliferation of multiple file types (often hundreds of different variants of containers, essence codecs, chroma, etc) and associated meta-data is hard to control effectively.
A number of significant technical standards have emerged to manage these interoperability challenges. The AS-11 standard from the DPP (Digital Production Partnership) and AMWA (Advanced Media Workflow Association) is a good example in standardising production asset delivery file formats.

To try and standardise the interfacing of equipment (often from different incompatible vendors) the EBU (European Broadcasting Union) and AMWA have been standardizing the FIMS Media SOA framework (Framework for Interoperable Media Services, Service Oriented Architecture) framework, which is a leading example of re-using the best ICT technologies (here Service Oriented Architectures and XML) to standardise broadcast workflow services and orchestration. One of the benefits of standardization is cost reduction, which is a necessity in the current business landscape. This recurrent cost factor is driving broadcasters to look at IP alternatives to traditional transmission (e.g. file transfer over Internet) but also optimising the existing transmission channels by mixing live (peak hours) and file (off-peak) contribution transmission workflows to improve the utilisation of links. The efficiency of codecs continues to improve too, as seen by the emergence of HEVC, which targets around half of the bandwidth of MPEG-4 AVC. This is like a repeat of the migration from MPEG-2 to AVC and promises either the same channels in less bandwidth (hence cost savings) or for example a 4K HEVC channel in the same bouquet as HD channels. Another market for HEVC is to enable acceptable TV quality to mobile devices over 3G/4G networks, where the addition of lots of video will clog up the available radio spectrum and backhaul capability.

Satellite is Changing Too

Satellite has a long association with broadcasting and remains a key future transmission technology despite the increased competition from Internet, fiber & 3G/4G networks. Satellite really excels in the multicasting of content to large geographical regions, disaster recovery and remote newsgathering. The multilateral 2012 Olympic feeds were beamed around the world via satellite, as there is no realistic alternative in many cases. Satellite will also be an integral part of seeing the 2014 World Cup and 2016 Olympics from Brazil worldwide.

Improved Satellite Efficiency for Higher Definition

The efficiency of satellite transmission continues to improve beyond the existing DVB-S2 standards. Currently extensions and new standards are being specified and tested. For satellite businesses, the creation and adoption of new DVB-S2 Extensions will translate into better efficiency, higher speed and improved service robustness. These extensions have the potential for 15 to 37 per cent improvements on top of the current standards. They are being planned now in DVB, with the intent to take effect during 2013.

UHDTV 4K and 8K services will use significantly higher bitrates than HD and SD content. With the buzz about such services already growing rapidly and the pool of potential customers massive, broadcasters and satellite service providers will be looking to limit the impact on satellite usage. In the past, during upgrades to HD, standards such as MPEG-4 AVC and DVB-S2 developed in tandem to counteract the increased requirements for space on the satellite with large efficiency savings. The combination of UHDTV, HEVC and next-gen DVB-S2 Extensions may well do the same.

The full new open standard will first be applicable in contribution networks, and later in distribution networks as new silicon becomes available supporting not only the DVB extensions, but also new compression standards like HEVC.

Unfortunately, these different next-gen standards (DVB-S2 Extensions, UHDTV, HEVC) will likely enter the market at different times and integrated receiving devices, either professional IRDs (Integrated Receiver Decoder) or consumer STBs (Set-Top Boxes) will lag behind, until all the standards are available and stable. In the intermediate period, there is a strong case to split the demodulation of the DVB-S2 Extensions from the decoding of the video into separate units, to get the benefits of the evolutions in a timely and flexible way.

IP and Multi Service Networks over Satellite

In broadcast contribution and exchange, satellite capacity was traditionally allocated on a permanent or occasional basis to specific single service applications (sports contribution, news gathering, etc).

Pioneered by the ASBU (Arab States Broadcasting Union) with their award-winning MENOS (Multimedia Exchange Network over Satellite) network, the enabler of IP networks over satellite allows multiple services to be combined onto one service platform. This can be multiple contribution services (like news and sports which have differing quality and delay requirements). Alternatively, a combination of contribution, asset delivery and primary distribution services, mixing live and file based workflows. These multiple services are automated and optimize the satellite resources, to allow them to be offered by service providers at very low cost. This is whilst still providing the QoS (Quality of Service) and service availability required by professional broadcast transmission users.

The benefits of this multi-service network capability are increasingly being recognised and adopted by broadcasters and service providers around the world. Indeed, this network concept has been extended to 'Any-IP' networks in a hybrid satellite/terrestrial configuration, to provide 'broadcast transmission as a service', irrespective of the physical transmission link, allowing the system to choose the optimal path depending on link availability, ingress/egress locations, congestion, cost, etc. In the end, broadcasters just want to transmit their live feeds or files to the required destinations at an acceptable cost with appropriate service guarantees and quality. How it actually gets there doesn't really interest many of them.

Spectrum and Interference

The competition for spectrum has become fierce, both in frequencies used for terrestrial TV and Radio broadcasting and for satellite communications, with the increasing bandwidth demands from mobile 2G/3G/4G operators and others. The 'digital dividend' (with analog TV/Radio switch off) and mobile auction licenses have been anything but positive for broadcasters. Both the increasing demand for spectrum and the usage of those allocated frequencies have created additional issues for satellite user and operator communities; arguably the victim of its own success.

While a lot of the satellite frequencies for broadcast have migrated from C-band to Ku-band (both for contribution and distribution) the still important C-band frequencies are increasing being subjected to interference from WiMAX deployments.

The new kid on the satellite block is Ka-band. While not exclusive to Ka-band, these satellite payloads are typically built to focus the footprints into multiple smaller 'spot beams'. These smaller beams, with higher power, allow smaller (hence cheaper and more portable) dish sizes to be used and also permit the same frequencies to be re-used in different spot beams, reducing the total required frequency spectrum, while significantly increasing the aggregate throughput of a single satellite. These newer generation satellites are often called High Throughput Satellites (HTS) and enable a significantly reduced cost of bandwidth, keeping transmitting costs competitive with other alternatives like fiber and mobile. While some of these configurations target other markets, like consumer broadband, Internet access and maritime communications, there are also major benefits to broadcast transmission too, for certain applications.

The increased usage and importance of satellite for communications has multiplied the incidents of interference,

both accidental and in some regions deliberate. As well as the previously mentioned WiMAX, the increase in VSAT and other satellite communication networks have raised the frequencies of accidental interference due to mis-pointing, equipment mis-configuration, etc. All the stakeholders (satellite operators, service providers, broadcast users, equipment manufacturers) have joined forces to tackle these issues by including default identification of transmitters. This 'Carrier ID' mechanism is now being standardized within DVB and will become a standard feature of satellite equipment starting 2013.

The deliberate jamming of signals for political or economic reasons is harder to address and will require international diplomatic support as well as existing technical measures to geo-locate the culprits and advances in satellite countermeasures, derived from government communication payloads.

It is a Business After All

Despite the strong competition with cable TV and IPTV operators, satellite DTH (Direct To Home) still represents a strong alternative that enables customers to have direct access to a minimum of 200 to 300 channels. The global DTH business for the period between 2011 and 2015 represents an expected revenue growth of US$15 billion and an increase of 40 million subscribers.

Additionally, DTH has the unique advantage of very large geographical coverage from a single platform, with availability of the signal even in rural and semi-rural areas where cable or ADSL are difficult to install. This is key not only to existing developed regions like Europe and US but also to deploy digital TV services to developing regions like Africa and the so called 'BRICS' (Brazil, Russia, India, China and South Africa) nations.

Conclusions

The TV industry must 'adapt or die'. No-one really knows who the winners and losers will be but there are clear trends that have emerged, with the need to target the growing range of consumers devices, with the viewing experience they demand, always available, whenever, wherever.

Bigger screens with increasing quality will co-exist with adaptive video on mobile devices. Linear live TV will co-exist with non-linear catch-up and on demand. Broadcast will co-exist with broadband and the biggest benefits will accrue by maximising the benefits of both, where 1+1=3.

Satellite will stay as important to the global TV industry as ever, but it too will adapt to stay relevant, incorporating the latest in ICT power to be more efficient, simpler to use, faster and cheaper. It will co-exist with fiber, mobile and the Internet, being used where it is most appropriate. It won't be 'either/or' but rather the best of breed.

CASE STUDY:

FIRST OLYMPICS BROADCAST IN HD

First HD Olympics: Behind the Scenes

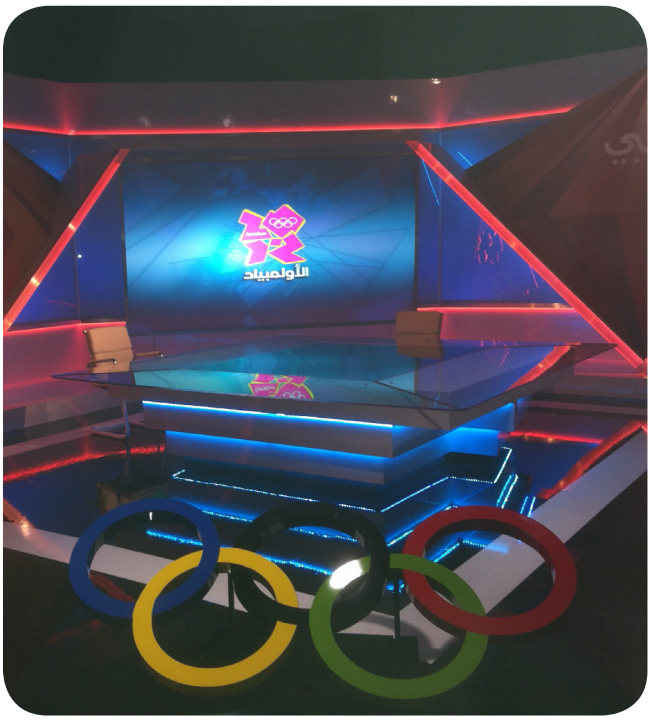
London 2012 was the first time the Olympics were available to watch in full High Definition (HD) in the Middle East and North Africa (MENA). Newtec's partnership with the Arab States Broadcasting Union (ASBU) enabled an upgrade to the member's infrastructure.

MENOS is the world's most advanced Multimedia Exchange Network over Satellite launched by ASBU in January 2009. The platform supports multiple simultaneous managed exchange services for use by broadcasting organisations throughout the MENA region.

How the Olympics is Broadcast to Television Sets in the Middle East

A cameraman captures Bolt crossing the finish line, just beating his fellow countryman Blake, a competitor to his title. The tears and joys of winning the Gold medal for his country are broadcast to his hometown within seconds ...

The cameramen were ready to capture moments, like this, at each London Olympic event, from Athletics to Weightlifting. Once the images are captured it is instantly sent to the Olympic Broadcasting Service (OBS) broadcast center, which beams it around the world.



Special built studio at the London 2012 Olympic Games from Abu Dhabi Media.

From here, television channels in MENA can access the footage directly and edit in the different graphics, subtitles and commentary, unique to their TV and Radio networks. For example: Adding the specific channel logo's (Aljazeera Sport, Abu Dhabi Media, Iraq Media Networks Sultanate of Oman Television, Algerian TV, Middle East Broadcasting Centre etc.) or incorporating a commentator view from temporarily built studios at London within the video image received through OBS of the competition event.

MENOS is set up in a star network, where all video, audio and edits to footage are transmitted through the central site. It is a completely integrated network solution that makes a full range of communication, collaboration and media service available at all times.

MENOS Multilateral Feed - the HD Upgrade

ASBU's central and member infrastructure upgrades allowed the television networks that are members, of ASBU, to receive the live Olympic multilateral feeds and news channels in HD and also to turnaround the HD signals to provide SD simultaneous broadcast (simulcast).

The Olympic content was injected into the central archive of the ASBU MENOS, allowing members to access the content at a later time and eliminating the need for each member to individually archive all feeds. This results in significant cost reductions and operational streamlining. Alternatively, the members can also immediately re-transmit the live content.

Advantages of Using MENOS to ASBU Members

- Real time television and radio content exchange including other multimedia services like data and telephony
- Added capability of archiving the recorded content in a central location for easy, instant access
- Central monitoring of the exchange network
- Optimum use of satellite capacity
- Low bit-rate Fast News Gathering (FNG)
- Uses existing structures and equipment so can receive transmission without further investment

The Results

- There were 11 HD channels (220 hours per day) with Arabic commentary (provided by ASBU in London)
- In addition to the multilaterals ASBU also fully managed 8 HD + 2 SD unilateral feeds on behalf of their members on Eutelsat capacity
- ASBU followed all Arabic sport participants and stories
- There was over 3000 hours of live TV coverage, an additional 2000 hours of English (news, interviews, stand-ups, background stories, etc) sent by OBS vans

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Shaping the Future of Satellite Communications

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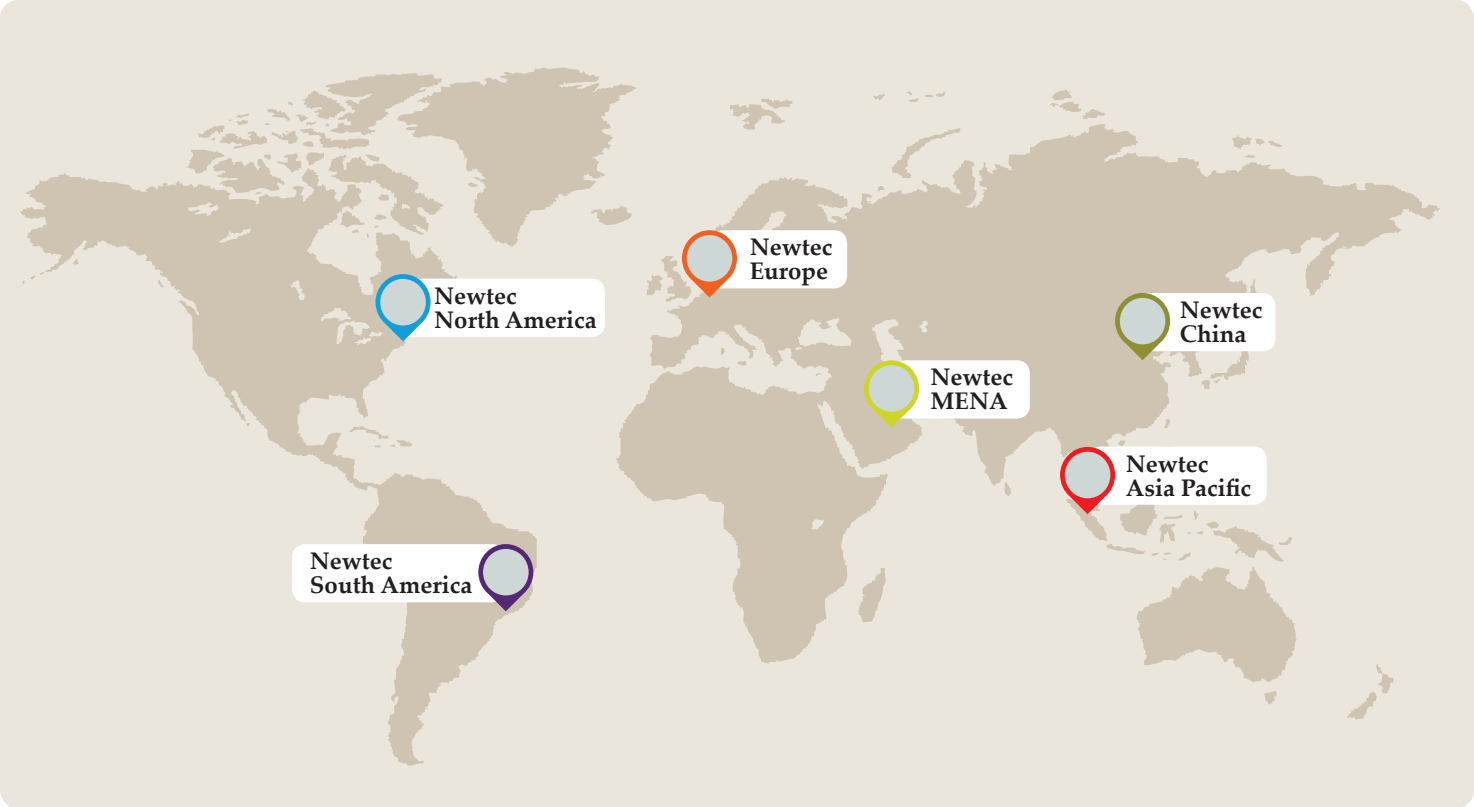

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