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Using ABR-based high quality video delivery over satellite

Damien Sterkers, Product Manager at Broadpeak explains how satellite operators can utilize adaptive bit rate (ABR) streaming formats such as HLS and MPEG DASH as an addition, and even a possible alternative in future, to traditional transport stream broadcasts without facing any of the QoE issues, including latency, buffering, bitrate and video quality limitations, which typically are associated with OTT services.

Video consumption on second screens, such as smartphones, tablets and PCs, is increasing dramatically, and satellite pay-TV operators must respond to this market demand. Offering live over-the-top (OTT) video services to their subscribers by leveraging the broadband connection is an obvious but costly option, so in order to stay competitive, it's imperative that they find a more cost-effective way to deliver such video streaming services, addressing the broadest audience with the highest quality of service, which in most cases OTT streaming does not permit.

A key focus of this paper is how a transition to a full ABR distribution workflow that delivers the same video quality as



Damien Sterkers, Product Manager at Broadpeak

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broadcast is possible. Additionally, we examine how, by carrying ABR rather than traditional MPEG2-TS, satellite operators can easily and cost-effectively extend their offering, beyond live TV, to all other types of streaming services, including pause and time-shift, catch-up, start-over TV and VOD, delivered to connected devices for increased monetization, outlining the benefits of an hybrid satellite/OTT distribution and the new business opportunities this approach enables.

Challenges facing satellite operators

Today, competition is fierce in the pay-TV market and churn is a significant concern. According to Leichtman Research Group, the number of cord cutters in 2018 reached 2.9 million video subscribers, nearly double the 1.5 million in 2017.

In emerging countries, consumers prefer streaming services as opposed to free-to-air TV. A recent study by research firm Hub found that 56 percent of consumers say they use streaming platforms over pay-TV services to watch their favourite content. Since streaming services are typically available at a lower monthly subscription rate than traditional pay-TV offerings, they are driving advertising and subscription revenues down for satellite operators.

All these challenges mean satellite operators now need to find additional ways to make their most popular live content available on all their subscriber devices, not just the main room TV.

How satellite operators have addressed the multiscreen challenge to date

Two different approaches have been so far explored by several satellite operators who wanted to deliver a true multiscreen live TV experience.

The first one leverages the main room satellite set-top box which behaves as a video hub implementing a complex processing of multiple stream content decryption (Conditional Access termination) for all selected live channels, re-encryption (link encryption such as DTCP-IP or some form of DRM), stream re-packaging, a content description server and a streaming protocol so that the content is delivered to

the companion devices over the consumer local network. The client application includes a content discovery process and a bespoke player tailored to the characteristics of the packaged stream.

The second and more recent approach leverages the consumer's broadband connection to deliver the most popular live TV channels using OTT unicast ABR streaming, whereby the content is protected using a commercial DRM solution. This is usually deployed as a completely separate workflow which overlays the existing satellite head-ends.

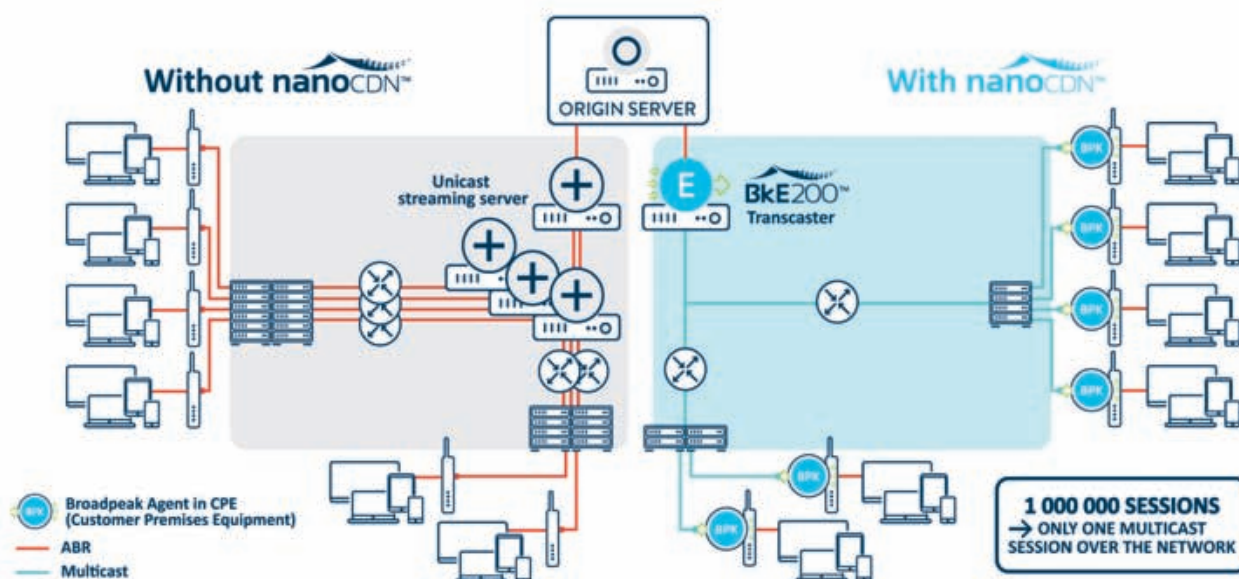
But both approaches have shown their own limitations. The former is costly and complex to develop and maintain, both on the satellite video hub side and the client applications side. It may support added value features such as time shifting, recording or catch-up on the conditions that the hub also features local recording, thus further increasing cost and complexity. The latter has limited reach since it requires a live video capable broadband connection, provides a lower quality video experience, and results in very high content delivery costs for the most popular live TV events, such as sports, because of the unicast transmission, a cost borne by the operator.

As we explain below, ABR streaming is poised to address these challenges and limitations.

What is ABR live video delivery over satellite?

Multicast ABR streaming has recently gained in popularity as it dramatically reduces the data traffic needed to deliver live OTT TV channels across the broadband delivery networks. But interestingly, because of its broadcast nature, a Multicast ABR stream can also be conveniently encapsulated and distributed over a one-way broadcast network, typically a satellite link. Using multicast ABR technology, satellite operators can now mix together IP streaming with regular satellite broadcast.

To achieve this, a transcaster server located in the headend retrieves existing OTT live TV streams and encapsulates them before they are sent via the satellite link to the target reception devices, i.e., satellite gateways or set-top-boxes. The satellite reception equipment at the consumer



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premises embeds a software agent, which simply performs the de-encapsulation of the live stream and its conversion to unicast before the chosen live TV service is delivered to any companion device attached to the home network. This delivery method is totally secure, as the content encryption is done before the multicast encapsulation step.

Advantages of using ABR on satellite

Satellite operators can reap several benefits from the combined use of multicast ABR and satellite broadcast.

Firstly, ABR live video delivery over satellite dramatically increases the satellite operator reach, addressing at once all the companion devices of their entire customer base, making the popular live TV channels ubiquitous.

Secondly, thanks to the use of a standardized ABR solution, the operators can also take advantage of certain aspects of ABR technology, such as offering to the consumer the ability to seamlessly switch to non-linear (i.e., timeshift, catch-up) and personalized (i.e., targeted ads, regional programming) content which is then delivered as a regular OTT service.

Thirdly, adopting an ABR protocol for delivering live content to companion devices over satellite paves the way for a technology convergence, encompassing content protection and a unified transport layer. As mentioned before, for the time being satellite operators have to setup a separate OTT workflow for live video streaming services, thus supporting the cost of two different transport layers and two different content protection solutions, or alternatively implement a complex and costly processing in their set-top boxes. In future, once the multicast ABR technology is adopted, the entire ABR workflow can be used for addressing the companion devices as well as become the reference implementation of the set-top box internal decryption and video decoding processes.

Compared with unicast, the delivery scheme traditionally used in the OTT world, multicast ABR offers better scalability and quality. It also offers a unified delivery mode via the internet. Furthermore, with multicast ABR, satellite operators stand to gain all of these benefits without compromising on the quality of service.

Monetization opportunities

Multicast ABR technology opens up new monetization opportunities for satellite operators by enabling them to reach new customers, provide a higher quality service and reduce churn. By adopting an IP streaming paradigm, satellite operators can cost-effectively appeal to consumers who like to watch news, entertainment, and live sports on their mobile devices.

Beyond linear TV, operators can implement VOD and catch-up pre-caching through satellite, the most popular content from a specific content provider can then be stored on the receiving device. Viewers can instantly access popular UHD and 4K content, which is pre-cached locally, even when streaming bandwidth resources are limited. Offering UHD and 4K premium content on connected devices is a great way for operators to differentiate themselves in a crowded marketplace and address the demand for higher quality content.

Advertising is a prime revenue generator for operators, and multicast ABR enables targeted advertising on the same model as OTT, giving operators an extra monetization boost. For local ad insertion, ads are either streamed directly from

the network, in a seamless transition from satellite to IP network, or pushed via satellite to local devices in advance, whenever they have the relevant tag related to the user profile, to be seamlessly inserted when the ad insertion trigger comes.

Conclusion

Traditional satellite broadcast has distinct advantages; its reach is unparalleled compared with any other technology, and it's generally reliable. But more and more satellite operators are starting to capitalize on the power of multicast ABR technology as a natural extension of their advances in the field of OTT. With multicast ABR, operators can smartly address the scalability issues of OTT unicast delivery while reaping its benefits.

Creating a multicast ABR network over satellite is perfect solution for today's operators that are looking for growth, as it enables them to continue serving their traditional pay-TV customers and offer OTT services to today's mobile-driven consumers while preserving the exceptional quality, low latency, and superior QoE provided by satellite, even better than what ISPs can offer. ■



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