ERICSSON DVB-S2X SOLUTIONS DELIVER 20% SAVINGS ON BANDWIDTH COSTS

Satellite bandwidth efficiency is a key part of profitability in news gathering, events coverage and content distribution so the introduction of new technology with the ability to reduce OPEX will be of interest to all users and system operators. The vast majority of these professional broadcast satellite applications rely on a combination of DVB-S2 transmission and MPEG-4 AVC video compression. The introduction of the new DVB-S2X standard, and solutions that support the standard, means broadcasters and system operators are now able to reduce OPEX without being locked into expensive proprietary schemes that limit industry growth. DVB-S2X can provide bandwidth efficiency to add extra services or migrate to higher quality services either in HD or 4K UHDTV.

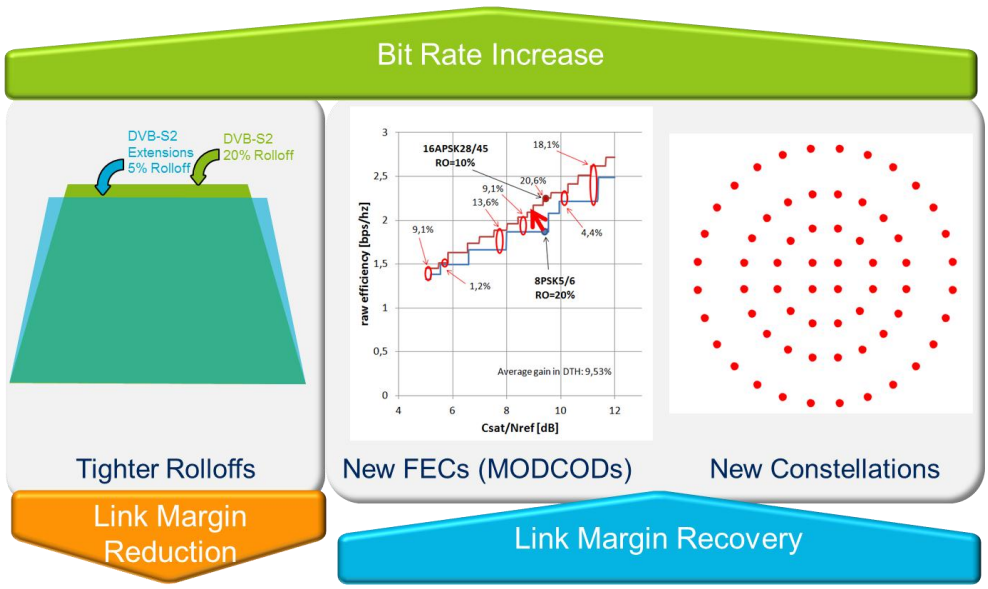

FIGURE 1; The DVB-S2X Model

The DVB-S2X standard introduces a number of new, tighter rolloff's which are key to achieving improvements in bandwidth efficiencies when compared to the older DVB-S2 standard. However this is at the expense of link margin which is reduced as a result of using the tighter rolloffs. To recover this loss in margin the DVB-S2X standard has introduced new Forward Error Correction (FEC) ModCods and constellations that enable operators to achieve desired efficiency gains whilst maintaining their existing link margin. This application note describes what savings can be gained and in what applications those gains can positively impact.

Savings Available from DVB-S2X

Bandwidth savings of between 1% and 50% are quoted as being achievable through use of DVB-S2X across a broad range of applications. For professional broadcast applications such as Fixed Contribution and Distribution and DSNG it is possible to save up to 20% bandwidth and in some cases even more. This additional bandwidth is achieved through the tighter rolloff's - delivering more useable bandwidth that provides more Msymbols which in turn equates to increased bit rates.

There are three new rolloffs introduced namely 5%, 10% & 15% in addition to 20% and 25% and 35% that are used in DVB-S2. However tighter rolloffs are not "free" as using more of the available bandwidth affects the power spectral density of the satellite link – effectively resulting in a small reduction in down-link margin. However, the DVB-S2X standard has introduced new ModCods that enable recovery of lost link margin.

These new ModCods provide a far more granular coverage than DVB-S2 through using operating points closer to the Shannon Limit.

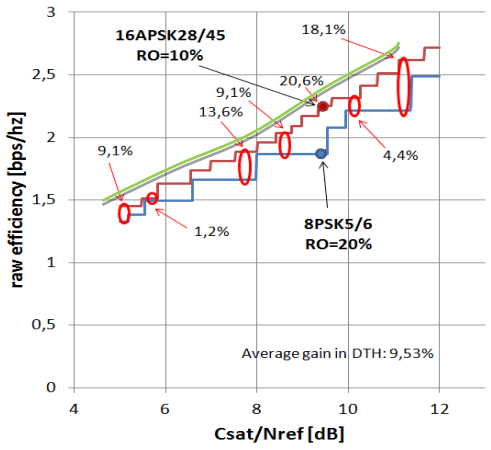

Figure 2; DVB-S2/DVB-S2X ModCods

Figure 2 shows a comparison between the ModCods available between DVB-S2 and DVB-S2X. The green line indicates the "Shannon Limit" that illustrates the theoretical maximum efficiency possible. The blue lines indicate DVB-S2 ModCods whereas the red lines indicate DVB-S2X ModCods. From the diagram it can be seen the deeper level of granularity of the DVB-S2X ModCods and how they are able to achieve an operating point far closer to the theoretical shannon limit. As an example, DVB-S2 8PSK 5/6 FEC operating point is further from the Shannon Curve than the DVB-S2X 16 APSK 28/45 FEC operating point – thus demonstrating why DVB-S2X is more efficient.

Additionally, the DVB-S2X standard has introduced three new constellations – 64APSK, 128APSK and 256APSK. Typically only 64APSK will be applicable to the broadcast market. 128 APSK and 256 APSK constellations are largely for non-broadcast applications due to the large receive antennas required.

Ericsson solutions for Fixed Links

For fixed systems that support the DVB-S2X standard Ericsson has introduced the M6100 Broadcast Satellite Modulator, a next generation DVB-S2X platform that is backward compatible with older DVB-S, DVB-S2 and DVB-SNG standards. At the receiver end, the market leading RX8200 Advanced Modular Receiver features an integrated DVB-S2X satellite demodulator. Having an integrated demodulator further reduces OPEX by removing the need for a stand-alone demodulator unit in addition to the decoder. This approach also simplifies system architectures.

Adding an extra High Definition Service in a bouquet; in a distribution type of application a comparison between a traditional DVB-S2, 8PSK feed with a 3/4 FEC and a 20% roll-off angle and using 28 Msym/s is it typically possible to achieve a usable bit rate of 61 Mbit/s. By switching to DVB-S2X and changing FEC to 13/18 FEC and using a 5% roll-off angle combined with a 34 Msym/s the available bandwidth increases to 71.3 Mbit/s - which equates to an increased throughput of around 17%. This is in addition to a 0.2 dB margin.

In this application the increased efficiency should be more than enough to introduce a whole extra service in high definition or add multiple standard definition services or a mixture of additional standard definition services and a more robust downlink.

For the larger primary distribution applications Ericsson full system solution also features AVP 4000 System Encoders andMX8400 Multiplexer in an end to end system all managed by nCompass Director. These systems ensure the solution delivers the maximum number of services at the best picture quality protected by the proven Director CAS. Director also is able to manage all remote distributed Receivers from one central location.

Ericsson Solutions for DSNG

Ericsson is the market leader in DSNG applications; the AVP 3000 Voyager, housed in a compact 1RU chassis, supports all main compression (MPEG-2/MPEG-4 AVC in SD and HD) and transmission technologies for efficient content distribution over fibre or satellite.

The AVP 3000 Voyager is now available with an integrated satellite modulator containing a number of advanced features such as DVB-S2X in addition to DVB-S2/DVB-S and DVB-SNG. In fact existing AVP 3000s and even any Voyager II, can be upgraded to DVB-S2X via a software upgrade. The RX8200 Advanced Modular Receiver is used to compliment the AVP 3000 Voyager and features an integrated DVB-S2X de-modulator.

Fig 3; AVP 3000 Voyager

Reducing Bandwidth Usage; In an DSNG type of application a comparison between a traditional DVB-S2, 8PSK feed with a 5/6 FEC and a 20% roll-off and using 5 Msym/s it is typically possible to achieve a usable bit rate of 12.1 Mbit/s in a 6 Mhz bandwidth. By switching to DVB-S2X at 16 APSK and changing FEC to 135/180 FEC and using a 5% roll-off combined with 4.2 Msym/s the available bandwidth remains at 12.1 Mbit/s but the bandwidth allocation reduces to 4.4 Mhz which equates to a reduction of 25% lower bandwidth usage in addition to a 0.2 dB margin improvement.

The Importance of Standards

Prior to the adoption of the DVB-S2 standard there were a number of proprietary modulation schemes, some based on turbo codes that offered users bandwidth efficiencies over the DVB-S standard. Whilst these savings were attractive to those users, marketing these proprietary codes created uncertainty in the market as equipment was not always interoperable. This meant any user of a particular proprietary scheme was “locked in” to that particular vendor. Early adopters of turbo code based systems quickly found they had made a costly mistake once the DVB-S2 standard became available as their chosen solution was withdrawn from the market.

The success of DVB-S2 and its rapid adoption was largely due to it being an open standard. Operators invested in the standard knowing they would gain from the efficiencies without costly “lock-in” to a single vendor and proof of this is today there are few, if any, turbo codes solutions available on the market.

Summary of Benefits

With the new DVB-S2X modulation standard now fully ratified and solutions becoming available on the market, broadcasters and system operators can take advantage of the benefits of DVB-S2X solutions. The DVB-S2X efficiency gain benefits can be taken in the form of transmitting the same service at the same bit rate in a smaller bandwidth - as in the case of DSNG; or can be used to add an additional service on a primary distribution uplink. Alternately, DVB-S2X could be used to efficiently increase service bandwidth i.e., migrate standard definition services to high definition or even secure a more robust down link.

Being an open standard the deployment of DVB-S2X solutions prevent costly “lock-in” when compared to other proprietary technologies that offer similar efficiencies in a “like for like” comparison. Ericsson solutions, available now for DSNG and Fixed Contribution & Distribution, offer an integrated end-to-end solution that is designed to simplify system architectures saving CAPEX and rack space.

In the near future it will be possible to combine DVB-S2X modulation technology with HEVC compression solutions - delivering even greater transmission efficiencies when compared to MPEG-4 AVC and DVB-S2 solutions. Ericsson solutions for both DSNG and Fixed Contribution & Distribution systems feature the Ericsson RX8200 Advanced Modular Receivers which is HEVC Ready; whilst supporting MPEG-4 AVC today it will be possible to software upgrade to HEVC HD 4:2:0 at a later date.

For more information on the Ericsson DVB-S2X portfolio of Content Acquisition, Content Exchange and Content Distribution solutions visit;

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