DVB Fact Sheet - April 2018

Extending DVB-S2

New technology for satellite transmission

What is DVB-S2X?

DVB-S2X is an extension of the DVB-S2 specification that provides additional technologies and features. DVB-S2X has been published as ETSI EN 302 307 part 2, with DVB-S2 being part 1. S2X offers improved performance and features for the core applications of DVB-S2, including Direct to Home (DTH), contribution, VSAT and DSNG. The specification also provides an extended operational range to cover emerging markets such as mobile applications.

Background

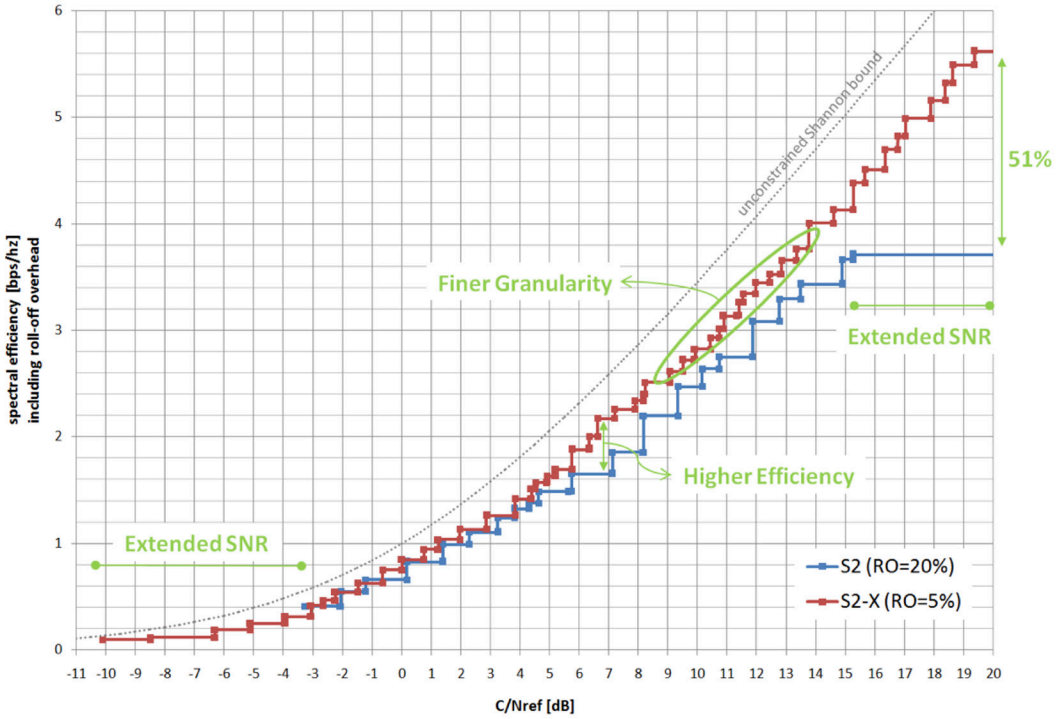
DVB-S2 was specified in the mid-2000s with a strong focus on DTH. In the years that followed, new requirements came up, for which DVB-S2X provides the necessary technical specifications. The work was done by the DVB Technical Module sub-group on satellite chaired by Dr Alberto Morello (RAI), who also led the work on DVB-S2. S2X supports significantly higher spectral efficiency for the carrier to noise ratios (C/N) typical for professional applications such as contribution links or IP-trunking. It also supports very low C/N down to -10 dB for mobile applications (e.g. maritime, aeronautical, trains, etc.).

How does it work?

DVB-S2X is based on the well-established DVB-S2 specification. It uses the proven and powerful LDPC Forward Error Correction (FEC) scheme in combination with BCH FEC as outer code and introduces the following additional elements:

- Smaller roll-off options of 5% and 10% (in addition to 20%, 25% and 35% in DVB-S2)
- A finer gradation and extension of the number of modulation and coding modes
- New constellation options for linear and non-linear channels
- Additional scrambling options for critical co-channel interference situations
- Channel bonding of up to 3 channels
- Very low SNR operation support down to -10 dB SNR
- Super-frame option

This results in the following spectral efficiencies for DVB-S2X compared to DVB-S2:



How does it work? (cont'd)

The usable C/N range is extended for values down to -10 dB with additional framing, coding and modulation options, which will enable satellite services for mobile (sea and air) and very small directive antennas. For VSAT applications the S2X specifications open up the possibility of supporting advanced techniques for future broadband interactive networks, i.e. intra-system interference mitigation, beam-hopping and multi-format transmissions. These may result in significant gains in capacity and flexibility of broadband interactive satellite networks and are made possible thanks to the optional Super-Framing structure.

DVB-S2 already offered excellent spectral efficiency for DTH applications and S2X therefore could not produce physical layer gains comparable to the transition from DVB-S to S2 (i.e. around 30%). Nevertheless, for DTH DVB-S2X fine-tunes both the physical and the upper protocol layers of DVB-S2, producing a highly attractive package (for new generation services, which would require new receivers in any case).

The most relevant features for DTH are channel bonding and finer granularity of modulation and FEC options combined with sharper roll-offs. Channel bonding of up to three satellite channels will support higher aggregate data rates and allow for additional statistical multiplexing gain for high data rate services such as UHD. The mandatory implementation of VCM (Variable Coding and Modulation) in receivers offers the possibility of increasing the spectral efficiency for UHD services, while guaranteeing service continuity during heavy rain by simulcasting highly protected SD components. A finer granularity of modulation and FEC options allows for improved operational flexibility.

For professional and DSNG applications high efficiency modulation schemes allow spectral efficiencies approaching 6 bps/Hz (with 256APSK). C/N values of up to 20 dB are now supported with an achievable gain improvement of up to 50%.

Market Deployment

DVB-S2X was published as ETSI EN 302 307 in February 2015. The new specification was warmly welcomed and swiftly implemented by providers of professional satellite transmit and receive equipment.

Some of the first deployments where the increased efficiency of DVB-S2X has made a marked difference include use cases such as cellular backhaul by mobile operators, primary distribution to DVB-T2 transmission sites, and maritime networks for cruise ships. As of early 2018 DVB-S2X is also used for DTH broadcast transmission.

Next Steps

The trend towards UHD services will drive further development of DTH consumer receivers compliant with DVB-S2X. The first STB system-on-chip (SoC) implementations already exist and from 2018 onwards it is anticipated that there will be more and more CE equipment available.

Links

www.dvb.org/standards