

2nd Generation Cable

The World's Most Advanced Digital Cable TV System



What is DVB-C2?

DVB-C2 is a digital cable transmission system developed by the DVB Project. It uses the latest modulation and coding techniques to enable highly efficient use of cable networks where, up to now, in many cases downstream transmission capacity is already being used to its limit. DVB-C2 will initially be used for the delivery of innovative new services, such as video-on-demand (VOD) and high definition television (HDTV), helping digital operators to remain competitive and also to meet retransmission requirements; in the longer term the migration of current DVB-C services to DVB-C2 is also foreseen.

April 2010 saw the publication of the DVB-C2 specification (EN302769. An updated version is already available as DVB BlueBook A138) and the Implementation Guidelines Document (DVB BlueBook A147). In the same month, the Technical University of Braunschweig performed the first live DVB-C2 transmission, which validated the strong expected performance boost of the new system. A successful Plugfest was held in February 2012 and there are silicon and TV solutions in mass production.

Background

DVB-C was first published by ETSI in December 1994, subsequently becoming the most widely used transmission system for digital cable television. The standard is deployed worldwide in systems ranging from the larger cable television networks (CATV) down to smaller satellite master antenna TV (SMATV) systems. DVB-C is also integrated as the physical layer for the European version of DOCSIS, Data Over Cable Service Interface Specification (EuroDOCSIS: ITU J.222.1).

A range of factors have combined to create the demand for DVB to create a second generation cable transmission standard, as has been the case with DVB-S2 and DVB-T2 for satellite and terrestrial transmission.

- Many CATV networks are already full to capacity
- Operators with high digital penetration need the flexibility to keep their offering competitive
- CATV networks retransmitting content from other networks, e.g. satellite, must keep pace with their evolution
- New tools are needed to address both private and business customers, particularly with IP-based content
- Performance improvements, e.g. zapping time, are needed to increase digital penetration in some markets

As with all DVB standards, the specification is based on a set of Commercial Requirements. Key requirements include an increase in capacity (at least 30%), support of different input protocols, and improved error performance. DVB-C2 reuses some of the building blocks of other second generation DVB transmission systems - the "DVB Family" approach. The new standard was not required to be backwards compatible with DVB-C, although DVB-C2 receivers will be able to also handle DVB-C services.

How does it work?

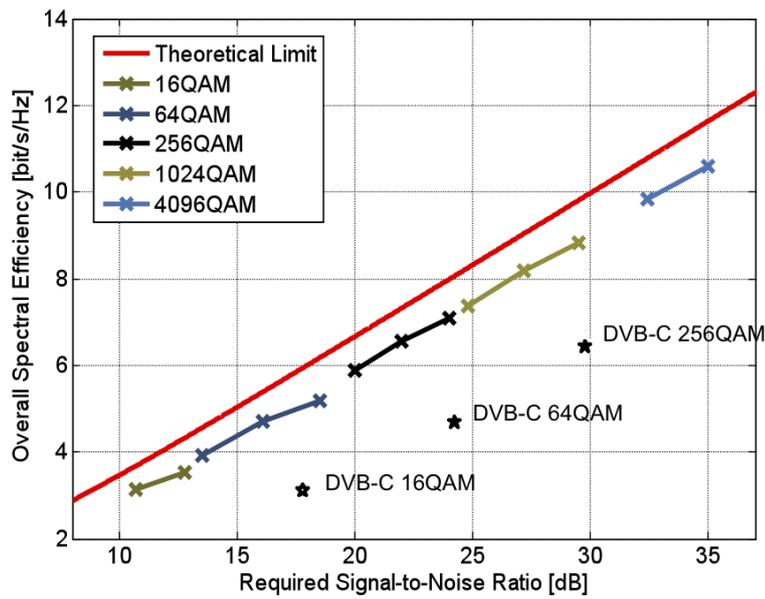
As with its predecessor, DVB-C2 offers a range of modes and options that can be optimised for the different network characteristics and the requirements of the different services planned for delivery to cable customers. (Figure 1. compares the modes and features available in DVB-C and DVB-C2.) By using state of the art coding and modulation techniques it offers greater than 30% higher spectrum efficiency under the same conditions as today's DVB-C deployments. After analogue switch-off the gains in downstream capacity will be greater than 60% for optimized HFC.

| | DVB-C | DVB-C2 |
|---------------------------|------------------------------|--|
| Input Interface | Single Transport Stream (TS) | Multiple Transport Stream and Generic Stream Encapsulation (GSE) |
| Modes | Constant Coding & Modulation | Variable Coding & Modulation and Adaptive Coding & Modulation |
| FEC | Reed Solomon (RS) | LDPC + BCH |
| Interleaving | Bit-Interleaving | Bit- Time- and Frequency-Interleaving |
| Modulation | Single Carrier QAM | COFDM |
| Pilots | Not Applicable | Scattered and Continual Pilots |
| Guard Interval | Not Applicable | 1/64 or 1/128 |
| Modulation Schemes | 16- to 256-QAM | 16- to 4096-QAM |

Figure 1. Table comparing available modes and features in DVB-C and DVB-C2

How Does it Work? (cont'd)

The noise performance of DVB-C2 is excellent, coming close to the Shannon limit, the theoretical maximum information transfer rate in a channel for a given noise level. Figure 2 shows the wide range and fine granularity of solutions possible. The chosen COFDM modulation scheme is insensitive to echoes caused by typical in-house coaxial networks and very robust in relation to impulsive noise interference. Notches, both narrowband and broadband, can be used to cope with different interference scenarios. Flexibility in terms of bandwidth is a further important feature of DVB-C2. In the future, cable networks deployed with DVB-C2 will allow very broad signals (e.g. 32 MHz and more) to be transmitted, meeting the operators' requirements for larger pipes allowing a very efficient sharing of the available resources between individual customers and services.



Verification and Validation

Since the finalization of the technical DVB-C2 specification, the technical team in DVB continuously worked on verification and validation of the different features of the system. The latest important milestone of this work stream was the first DVB-C2 Plug-Fest in February 2012, where the functionalities and interoperability of 4 modulator and 9 tuner/demodulator prototype implementations of DVB-C2 have been successfully evaluated.

Market Deployment

After the commercial availability of a first DVB-C2 demodulator chip in January 2012, already in April 2012 the first iDTVs with DVB-C2 were present in the shops. Professional DVB-C2 modulators are commercially available as well. First operators are planning now to take advantage of the new DVB-C2 standard and to launch first commercial services in 2012, using the extra capacity it offers to enable the delivery of innovative new services including multi-channel HDTV, VOD, and other interactive services.

Over time more and more operators will extend the deployment of new DVB-C2 services and will begin migrating services currently delivered using DVB-C to the new system, by replacing the existing receiver population. However, DVB-C2 will coexist alongside DVB-C in many markets for many years. Timetables for analogue switch-off, as well as other regulatory factors, will have an impact on the pace with which operators can conduct such a migration.

Links

www.dvb.org

The main website of the DVB Project