

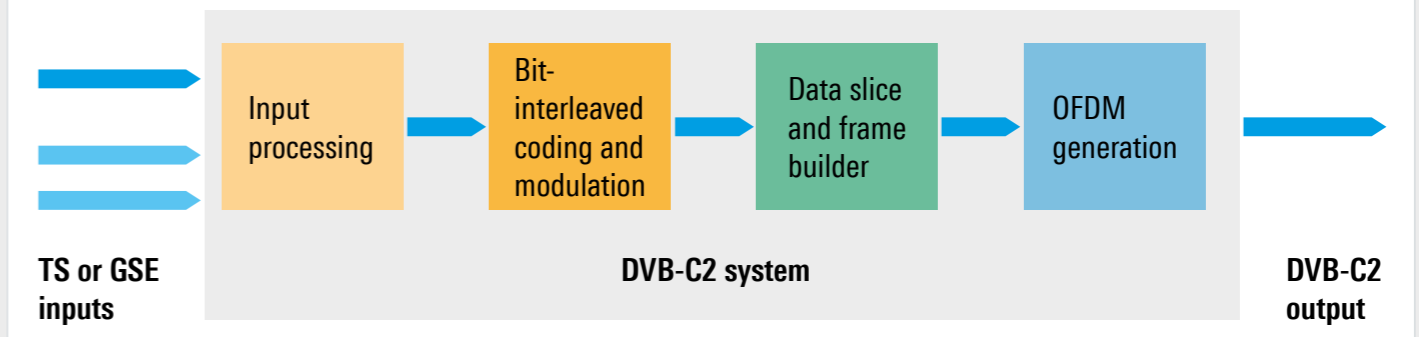
DVB-C2: Technology overview

Second generation for cable systems

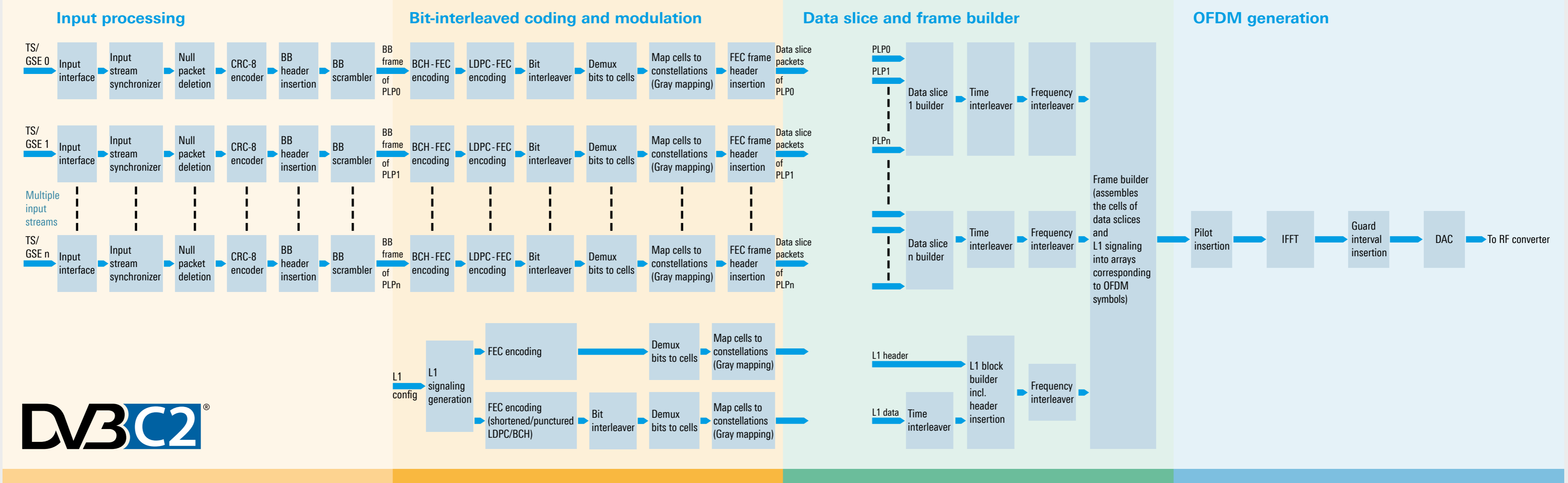
Key performance features of DVB-C2

- 30% more spectrum efficiency
 - 60% higher capacity for optimized HFC networks
 - The flexibility of DVB-C2 allows excellent solutions for all types of signal configurations and network characteristics
 - Easy transition to media boundaries (satellite, terrestrial network to cable) due to high degree of communality with other second-generation DVB transmission systems
- DVB-C2 has adapted the concept of PLPs used in DVB-T2. Consequently, the robustness of each data stream can be adjusted widely independent of other data streams
 - The bandwidth of a DVB-C2 signal is very flexible, too. It can be 8 MHz or several hundred MHz, which means that a DVB-C2 transmission is not bound to a traditional cable structure

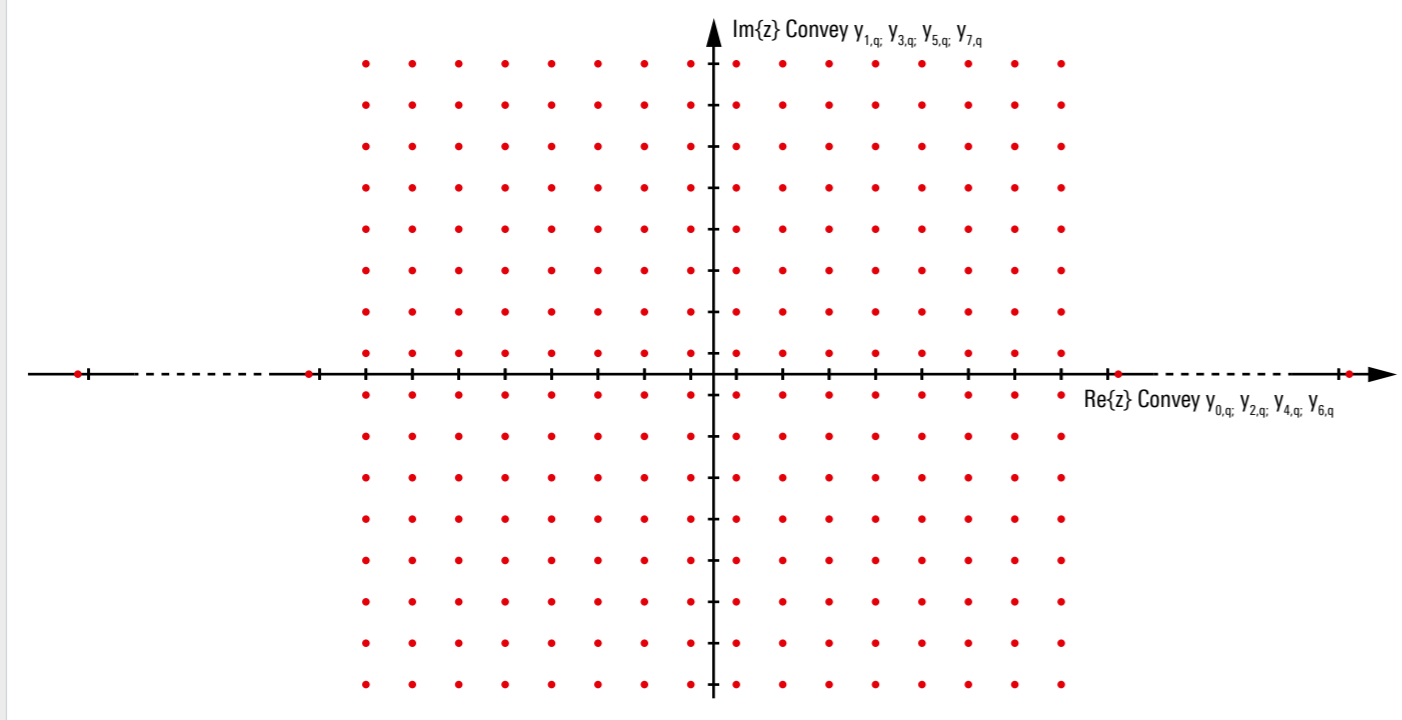
High-level DVB-C2 block diagram



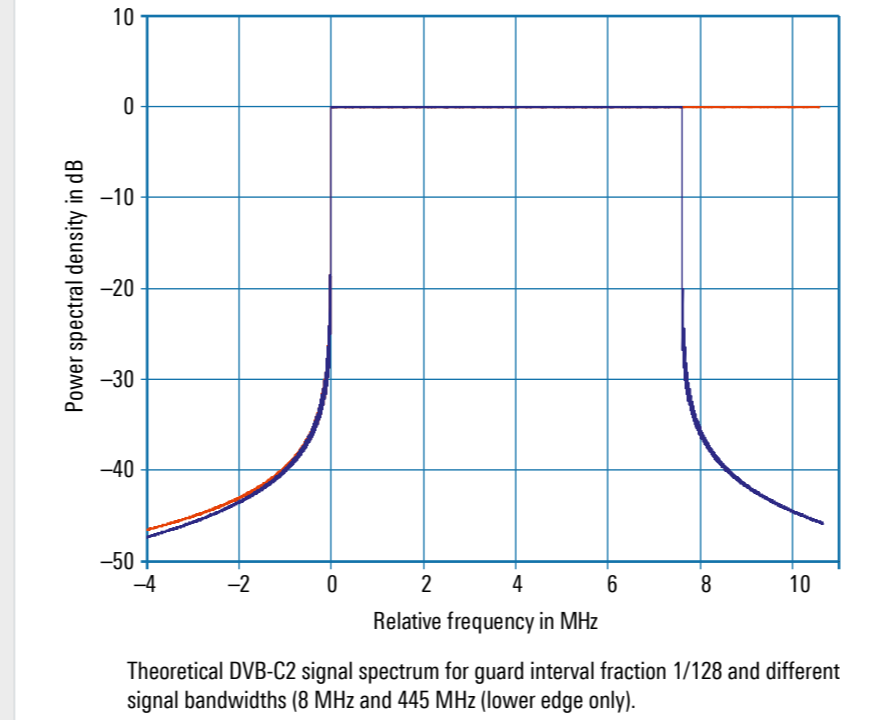
Detailed DVB-C2 block diagram



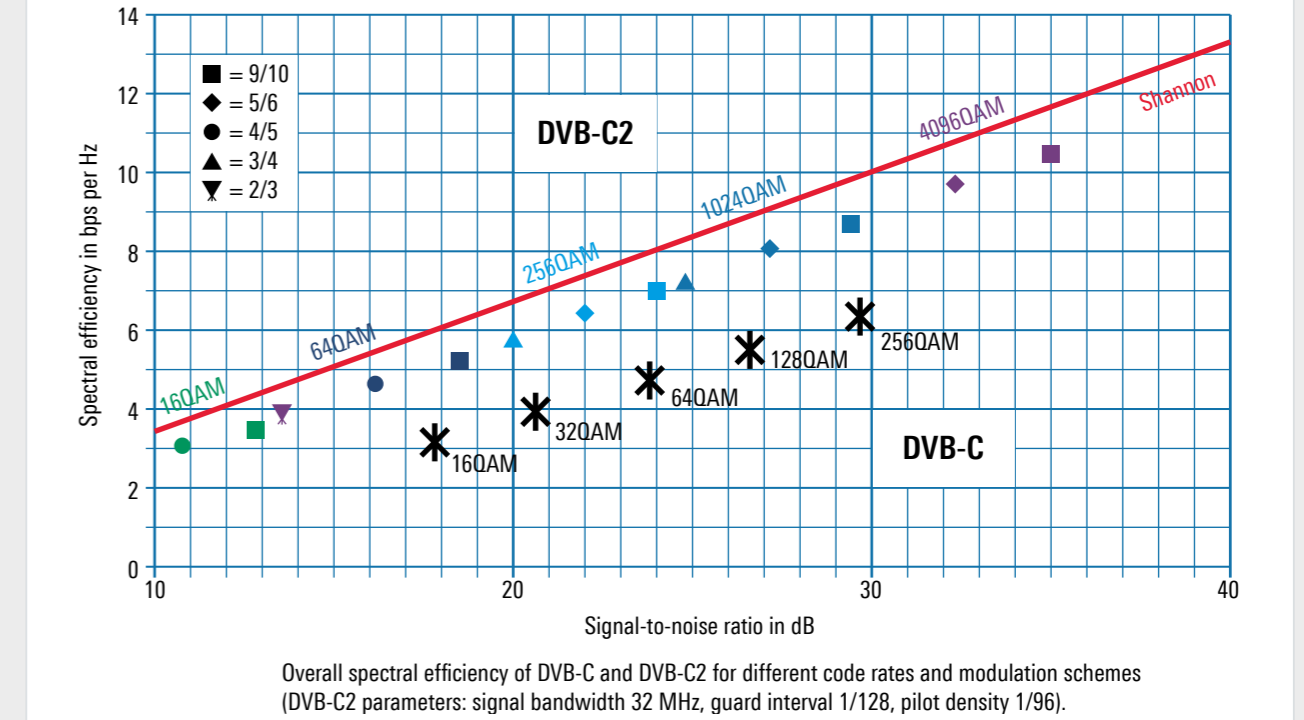
DVB-C2 constellation diagram



Theoretical DVB-C2 spectrum



Overall spectral efficiency



Handling of interference

With DVB-C2 different frequency bands can be used in cable networks. It is possible to locally switch off (notch) certain frequency bands used, e.g. for radio or terrestrial services interfering cable signals. The DVB-C2 system allows to switch off sets of OFDM carriers where interference scenarios cannot be overcome by other means. The DVB-C2 specification distinguishes between narrowband and broadband notches.

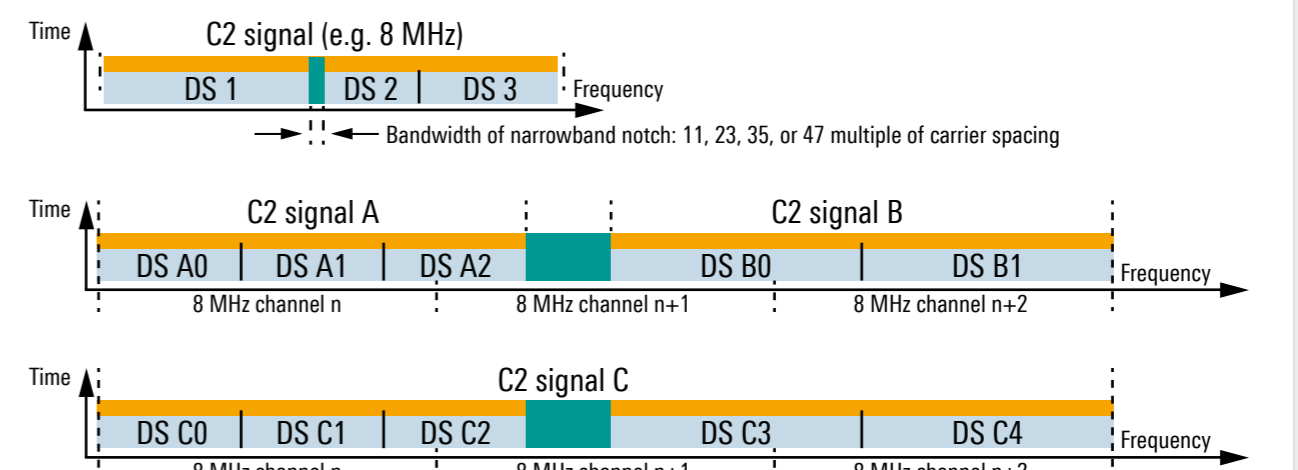
The width of narrowband notches is limited to 47 OFDM subcarriers only. The bandwidth of broadband notches is practically unlimited. Narrowband notches may have up to $47 \times 2.232 \text{ kHz} = 104.9 \text{ kHz}$ within 8 MHz channel bandwidth.

Interference conflicts can be solved by applying narrowband or broadband notches as well as by signal level adjustment in critical bands. DVB-C2 provides powerful means to overcome interference conflicts. In general, the notching features available in C2 should only be used to mitigate the effects of possible interference scenarios and maximize the C2 payload.

Narrowband notch with a maximum bandwidth of 104.9 kHz

Broadband notch placed between two adjacent DVB-C2 signal spectra. Extension of the frequency bands of the adjacent channels up to the lower and upper border of the broadband notch.

Broadband notch placed within a single DVB-C2 signal spectrum, with overall bandwidth of the C2 system and with at least a complete preamble in both the lower and upper adjacent band.



Comparison of available modes in DVB-C and DVB-C2

	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 and BCH
Interleaving	Byte interleaving	Bit, time and frequency interleaving
Modulation	Single carrier QAM	OFDM
Pilots	Not applicable	Scattered and continual pilots
Guard interval	Not applicable	1/64 or 1/128
Modulation schemes	16QAM to 256QAM	16QAM to 4096QAM

OFDM parameters for 6 MHz and 8 MHz

Parameter	"6 MHz" 1/64	"6 MHz" 1/128	"8 MHz" 1/64	"8 MHz" 1/128
Number of OFDM carriers per L1 block K_{L1}	3408	3408	3408	3408
Bandwidth of L1 signaling block (see note)	5.71 MHz	5.71 MHz	7.61 MHz	7.61 MHz
Duration T_{01}	4096 T	4096 T	4096 T	4096 T
Duration T_{02} (μs) (see note)	597.3	597.3	448	448
Carrier spacing $1/T_0$ (Hz) (see note)	1674	1674	2232	2232
Guard interval duration ΔT_0	64T	32T	64T	32T
Guard interval duration ΔT_0 (μs) (see note)	9.33	4.66	7	3.5

Note: Numerical values in italics are approximate values.

Rohde & Schwarz solutions for DVB-C2



R&S SFU
broadcast test system



R&S SFE
broadcast tester



R&S SFE100
test transmitter



R&S SFC
compact modulator

Glossary:
BB = Baseband; **BCH** = Bose-Chaudhuri-Hocquenghem Code; **CRC** = Cyclic Redundancy Check; **DS** = Data Slice;
DTV = Digital Television; **DVB-C2** = Digital Video Broadcasting-Cable Second Generation; **FEC** = Forward Error Correction;
GPS = Global Positioning System; **GSE** = Generic Stream Encapsulation; **HDTV** = High Definition (HD) Television;
HFC = Hybrid Fiber Coax; **IFFT** = Inverse Fast Fourier Transformation; **IP** = Internet Protocol; **LDPC** = Low-Density Parity Check (Codes); **OFDM** = Orthogonal Frequency Division Multiplex; **PLP** = Physical Layer Pipe; **QAM** = Quadrature Amplitude Modulation; **QPSK** = Quadrature Phase Shift Keying; **SDTV** = Standard Definition Television; **TS** = Transport Stream

Sources: ETSI TS 102 991, ETSI EN 302 769

www.rohde-schwarz.com/technology/dvb-c2

