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FEATURES OF MULTISERVICE STREAMS TRANSMISSION IN DVB-T2 STANDARD

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This article describes the transmission of multiservice streams in the DVB-T2 system. The multistreaming (M-PLP) of this system is explained and the basic transformations from information streams to building superframes are described.

ОСОБЛИВОСТІ ПЕРЕДАЧІ МУЛЬТИСЕРВІСНИХ ПОТОКІВ В СТАНДАРТІ DVB-T2

В даній статті описується передача мультисервісних потоків в системі DVB-T2. Пояснюється багатопоточність цієї системи (M-PLP) та описуються основні перетворення від інформаційних потоків до побудови суперкадрів.

DVB-T2 is a digital terrestrial transmission system developed by the DVB Project. It is the most advanced system in the world and introduces the latest modulation and coding techniques to enable highly efficient use of terrestrial spectrum for the delivery of audio, video and data services to fixed, portable and mobile devices.

The DVB-T2 system is capable of transmitting several independent multimedia streams, each with its own modulation scheme, coding rate and time slots. The Physical Layer Pipes (PLP) in DVB-T2 as DVB-S2 are logical channels carrying one or more services with modulation scheme and robustness [1].

The M-PLP (Multistreams) feature of DVB-T2 opens a wide range of increasing the transmission efficiency by means of a services number, so the DVB-T2 standard is not a "simple" system for transporting packages of digital video content. This is a powerful multimedia broadcasting tool, which initially has huge opportunities to expand functionality.

Each input PLP may take one of the following formats: Transport Stream (TS), Generic Encapsulated Stream (GSE), Generic Continuous Stream (GCS), Generic Fixed-length Packetized Stream (GFPS).

The packets of each main stream are combine into Baseband frames (BB-frames) - separately for each stream. The distribution of streams by frames is handled by a special dispatcher at the stage of formation of BB-frames. The BB-frame contains the BB header (80 bits), the data field and the alignment field, see figure 1.

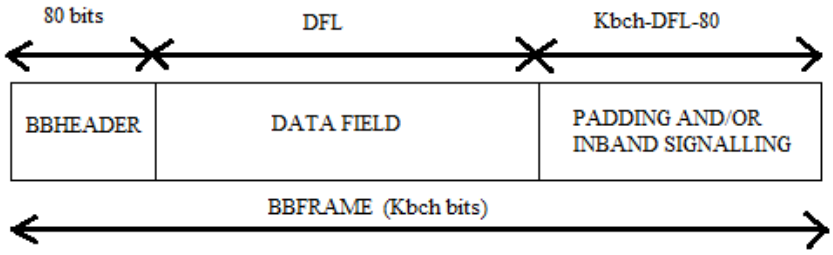

Figure 1: The structure of the Baseband frame

The generated BB-frame is scrambled (randomized by multiplying by a pseudo-random sequence) and subjected to corrective coding. The corrective code is a cascading code. As an external code, the block coder Bose-Chowdhury-Hocquingham (BCH) is used in it. As internal - a low-density code with a parity check (LDPC). Depending on the encoding speed of the LDPC, the size of the input data block for the BCH coder may differ, however the output codeword size after the LDPC is always 64800 bits [2].

Before modulation (except for BPSK and QPSK), codewords are subjected to bit interleaving and distributed by modulation symbols. After the formation of the modulation symbols, they are interleaved within the codeword.

All the processes considered until then are performed at the same time for individual main stream. As a result, a sequence of modulation symbols is formed for each PLP.

In order to enable the reception of PLPs separately, physical layer (L1) signaling indicating how the PLP can be received is necessary. In DVB-T2 the L1 signaling is mainly transmitted in preambles located in the beginning of so called T2 frames. The T2 frame begins with preamble consisting of P1 and P2 symbols followed by data symbols. The structure of the T2 frame is depicted in Fig. 2.

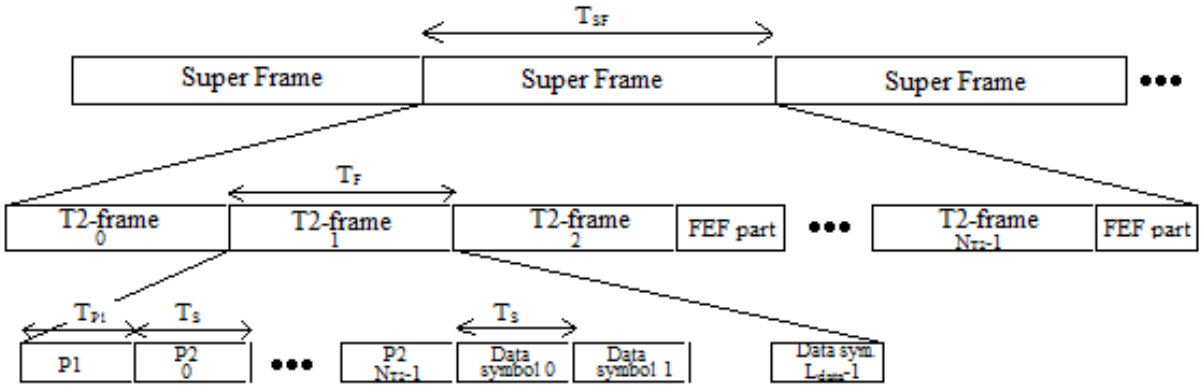

Figure 2: The DVB-T2 frame structure, showing the division into super-frames, T2-frames and OFDM symbols

The physical layer signaling information L1 in DVB-T2 system is transmitted mainly in preamble symbols P1 and P2. The P1 symbol conveys the most important system parameters in a very robust way and enables the reception of P2 symbols that carry the rest of the L1 signaling. With the L1 signaling information the receiver is able to decode the PLPs from the received signal.

The maximum duration T2 frame - 250 ms. The T2-frames are combined in superframe.

The number of T2-frames in a super-frame is a configurable parameter N_{T2} that is signalled in L1-pre signalling, . The T2-frames are numbered from 0 to N_{T2}-1. A super-frame can carry T2-frames and may also have FEF-parts – Future Extension Frame (see figure 2). FEF is used for reserving space for information that may appear in the future and be transmitted in OFDM. There may be several FEF parts in the super-frame [3].

The complexity of the task of transferring many services to many remote users makes it necessary to manage a variety of overhead and security transformations associated with the addition of signals stream and redundant symbols. Hence, the actual transmission speed of symbols in the ether of DVB-T2 standard is substantially greater than the actual data rate. This again provokes the system for redundancy of interference protection devices. This is the price of providing multiservice in the DVB-T2 standard.

In this way, the DVB-T2 standard is an example of the implementation of a modern multiservice multistream system with reliable transmission of information to many users, but in the mode of unidirectional communication. Perspective should consider the task of implementation of the formulated principles during creation of the innovation multiservice systems for double-sided (including duplex) communication.

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