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Analysis of Time Slicing and OFDM Transmission Services of DVB-H

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Abstract— This paper shows the analysis of the Digital Video Broadcasting—Handheld (DVB-H) services. DVB-H is based on the earlier standard Digital Video Broadcasting—Terrestrial (DVB-T), with additional features that make it suitable for delivery of videos to mobile devices such as phones and Personal Digital Assistant (PDAs). It shows that how time slicing technique, OFDM transmission modes, MPE-FEC is helpful for the of DVB-H standard. In time slicing, what will be the size of a burst packet that is useful for the receiver that how much time taken by next burst after receiving the first burst, compression between 2k, 4k and 8k OFDM transmission mode and how the MPE-FEC reduce signal-to-noise ratio (SNR) requirement. Finally by these services use the DVB-H standard show excellent performance to broadcasting for handheld devices.

Keywords— DVB; Digital Video Broadcasting—Handheld (DVB-H); time slicing; handheld terminals; orthogonal frequency division multiplexing (OFDM); multiprotocol encapsulation-forward error correction (MPE-FEC).

I. INTRODUCTION

Digital Video Broadcasting (DVB) standard is design for the mobile television [1]. Satellite is a way to transmit several DVB signal. One of them is Digital Video Broadcasting—Handheld (DVB-H) [1] that is most important for multimedia services like television can be received with mobile devices. It is a challenging opportunity to achieving fast data rates in wireless networks and power-limitation in mobile devices for the purpose of efficient use of bandwidth used single frequency networks (SFN).

The meaning of the mobile television is television watched on a small mobile device. It may be a paid service that broadcast by the 3G cellular network (fixed network) to the mobile devices or mobile handheld devices. A base station handles all the mobile devices that receive signal by base station controller.

Mobile television is one of the features provided by the 3G network services. South Korea in 2005 became the first country in the world to have mobile TV. Today, South Korea and Japan are developing sector for the mobile devices. Mobile Device services were launched by the operator CSL in Hong Kong, March 2006, on the 3G network. Also in 2006 Germany, Italy and US also introduce our 3G network services for mobile television [2].

In 1998 project started for commercial terrestrial digital television services in Europe. After that in 2000, research

motivate for the television in mobile devices is possible by DVB—T sponsored by EU. After that EU-sponsored Multimedia Car Platform (MCP) project in 2002 for the receiver to access DVB-T signals broadcast for fixed receivers. Later in 2007 Singapore and Germany cities see that DVB-T shows sufficient flexibility for the mobile devices [2] [3].

For the high-speed, high data-rate reception of IP (Internet Protocol) services for the mobile devices used Digital Video Broadcast—Handheld (DVB-H), DVB-H have reliability, scalability, unique transmission power, screen size, coverage requirements. DVB-H is a technology, which is a combination of service information, elements of the physical layer and data link layer [2]. This technology also has some advance features at the data link layer level likes time-slicing and forward error correction techniques (FEC). Which is use-full for the mobile devices in terms of energy saving is critical to battery-powered mobile devices, and recent commercial mobile TV chips consume more than 400 mW in continuous mode and continuous receive burst both handle by the time-slicing and forward error correction is to improve the Doppler performance in mobile channels and to improve the tolerance to impulse interference.

II. DVB-H SYSTEM

The relation of on/off depends to achieve maximum power saving. In DVB-H stream if there are approximately

ten or more bursts, up to 90% of energy saving rate from the front end. DVB-H is a technical system which was carefully tested by the DVB-H Validation Task Force [5]. DVB-SH (Satellite services to Handheld) improved radio performances and can be seen as an evolution of DVB-H. For the stationary use initially designed DVB-T, during the field trials in mobile reception it showed an exceptional performance. However, when it use for the mobile devices, there is a series of requirements that have to be satisfied. For the mobile DVB receives limited battery life is a crucial issue, Supported to wireless devices. A mobile device should operate in a network which allows and assists handovers, Processing power, Improve mobile reception, Efficient 4K OFDM transmission mode, 4MHz to 6MHz channel bandwidth, Multiple band's operation; used for the Ultra High Frequency (UHF), Impulse noise, Advance Transmission Parameters Signaling (TPS) check additional bits to measure the presence of DVB-H services and the efficient use of MPE-Forward Error Correction, Time-slicing: use for the mobile devices in terms of energy consumption is critical to battery-powered mobile devices, and recent commercial mobile TV chips consume more than 400 mW in continuous mode and continuous receive burst.

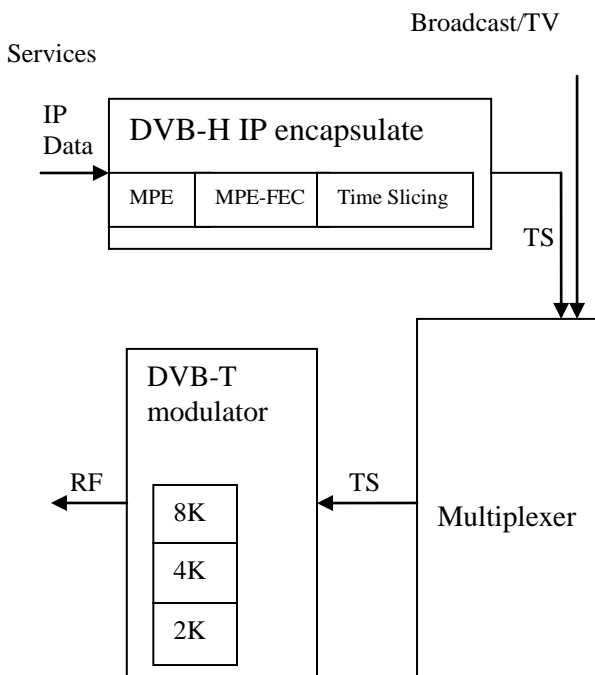


Figure.1. Transmitting scheme for DVB-H

In this figure.1 shows that new DVB-H at the time of IP data encapsulation reduce the signal-to-noise ratio requirement and proceeding into the time slicing and it divide a video into some burst (burst size is decide according to that time taking to the receiver to see the first burst next burst transfer into this seeing time) and broadcasting start into the multiplexer, these packet according to the requirement modulated into radio signal (RF), received by mobile devices.

III. TIME SLICING

The energy saving of mobile devices has been studied for mobile TV networks, where TV channels are coded in non-scalable fashion. Time slicing used for the energy saving. The time slicing enables mobile devices to turn off their radio components for a significant fraction of the time. It only computes the achieved energy saving for pre-determined bursts [7], [8], [9].

Time Slicing principle shows that how the burst comes one by one [1] [2] [8] in order to provide data as a stream to the end user. In this, first we describe that how the burst size is decided. Mainly, the burst duration is decided on the three factors:

- Computation Time (Tc): Time taken by the burst packet to get processed and be placed on the server end of the network.
- Transmission Time (Tt): Time taken by the data packet to reach from the sender (broadcasting) to the receiver.
- Burst Packet Time duration (Td): Total time duration of the video file received in a single burst.

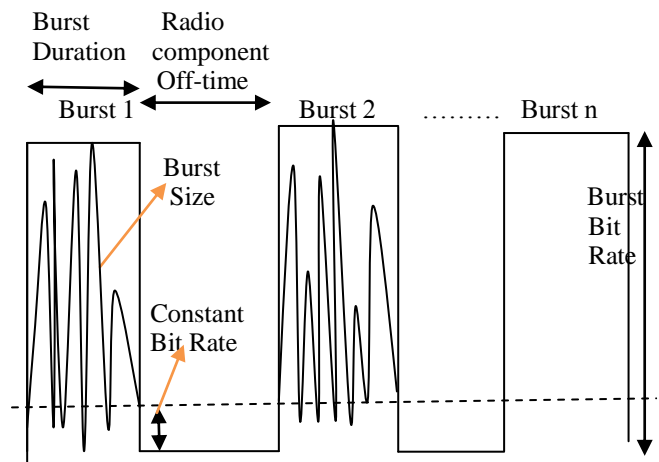


Figure.2. Time Slicing Principle

So the burst packet size must be:

$$B = K * (a * T_c + b * T_t + c * T_d)$$

Where,

- K → Constant Of proportionality
- a → coefficient of Computation Time
- b → coefficient of Transmission Time
- c → coefficient of burst packet Time duration

IV. MPE-FEC

Second main innovation of DVB-H besides the time slicing mechanism is MPE-FEC. In the DVB-T standard the physical layer of FEC completed by MPE-FEC [3]. It is designated for the reception of a handheld device to reduce the signal-to-Noise Ratio (SNR) requirements. It also provides good immunity to impulsive interference. MPE-FEC increases the maximum speed at which the DVB-H service remains available [3] [7].

The processing of MPE-FEC is located on the link layer level of the IP input streams before they are encapsulated by means of the MPE. All the IP encapsulation technique (MPE-FEC, MPE, and time slicing) contains the essential

DVB-H functionality. Bursts formed according to the time slicing method. The error protection is calculated separately for each individual elementary stream by the MPE-FEC. This is followed by MPE encapsulation of IP packets and FEC data, multiplexing and embedding into the transport stream. MPE-FEC is directly related to time slicing. All the techniques of IP encapsulation are applied on elementary stream level, and one time slicing burst includes the content of exactly one MPE-FEC frame. This allows the re-use of memory in the receiver chips.

However, describing the processing of a Reed-solomon (RS) code in conjunction with a block interleaver can see into new MPE-FEC scheme. The encoder of the MPE-FEC creates a frame structure, the Forward Error Correction (FEC) frame, incorporating the data coming from the DVB-H codec. Maximum of 1024 rows and number of 255 columns that is constant consists into the FEC frame [2].

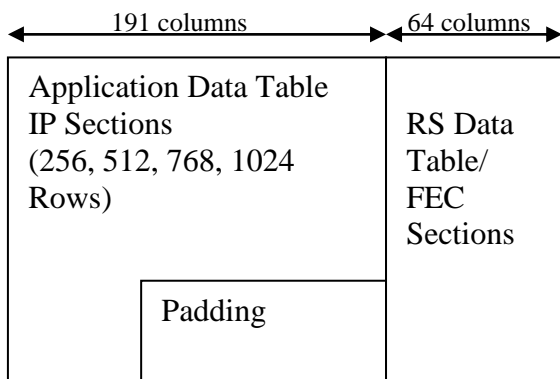


Figure.3. MPE-FEC frame structure

Figure.3. shows the structure of an MPE-FEC frame [7], divided into two parts: one is application data table (ADT) for carries the IP packets and another R-S (Reed-Solomon) data table (RDT) for carries the parity bytes. Received IP packets are sequentially column-by-column from left to right placed in the ADT. Zeros are padded in the remaining space of the ADT. At the ADT is full (by data and/or zeros), row-by-row arrange all the parity bytes, and stored in the RDT. After computing the parity bytes, the whole MPE-FEC frame is sent, column-by-column, as a burst.

V. 4K OFDM TRANSMISSION MODE

It aims to offer flexibility of network planning by trading off mobility and single frequency network is a single objective of 4K OFDM transmission mode. Basically there are three type of DVB-T OFDM used 2K, 4K and 8K [2] [3].

Performance of OFDM mode in mobile reception term's, [2] [9]:

- 2k mode uses for the Doppler tolerance that allowing extremely high speed reception;
- 4k mode uses for the Doppler tolerance that allowing very high speed reception;
- 8k mode uses for the Doppler tolerance that allowing high speed reception.

2K mode	4K mode	8K mode
2K symbol interleaver	4K symbol interleaver	8K symbol interleaver
12*126 words	24*126 words	48*126 words
Number of active data carries 1512-bit words (Permutation function length)	Number of active data carries 3024-bit words (Permutation function length)	Number of active data carries 6048-bit words (Permutation function length)

Figure.4. Overview of DVB-T/DVB-H Native Symbol Interleaver

VI. CONCLUSIONS

DVB-T transmission is a widely used technology having terrestrial transmissions in digital mode. DVB-T services are not suitable to mobile devices, it's for fixed receivers. The DVB-H standard (developed by the ETSI), which enhancements, becomes an ideal medium for mobile TV delivery. This paper shows that important services of the DVB-H and design a formula to calculate the packet burst size in time slicing technique.

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