EBU subtitling data exchange standard

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Subtitling has become one of the "growth areas" of European broadcasting, as television services take in increasing numbers of programmes from outside their own countries. Subtitling offers significant advantages compared to sound dubbing, especially in the case of specialist programmes, where the cost of dubbing would be out of proportion to the potential television audience.

Seizing the opportunities presented by this relatively new market, several companies have independently developed subtitling systems of varying complexities.

Faced with increasing diversity in the data file formats delivered by these systems, the EBU has taken the initiative of establishing a standard for the exchange of subtitle lists. The EBU standard leaves system manufacturers free to offer any operational features which they believe will give them a competitive lead in the market, while ensuring that the subtitle data which is essential for the correct display of the subtitles can be exchanged without ambiguity between broadcasters.

1. Introduction

The importance of subtitling to the European broadcasting organizations has increased very considerably in recent years. This trend has been prompted by a number of factors: an enhanced awareness of the common cultural heritage of the European peoples, the influence of certain Directives of the European Commission, and a number of initiatives aimed specifically at the encouragement of inter-lingual programme exchanges. In many countries, subtitling is the dominant method used to convey the spoken dialogue of foreign-language programmes and it is also being used increasingly as a service to the deaf and hard-of-hearing.

Although subtitling presupposes that the viewer has reading ability (a constraint for young children, the illiterate and those with poor sight), and although subtitling cannot convey all the information in the foreign dialogue, it does have certain advantages compared to sound dubbing. The most important advantages are:

- it is less expensive;
- viewers who are proficient in the original language, or who wish to learn it, are able to enjoy the dialogue without the degradation inherent in a spoken interpretation;

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- it is possible, using teletext, to convey translated dialogue in several languages simultaneously.

In view of these advantages, subtitling is now regarded in some countries as an important component of the overall television programme service. It is to be expected that, with the increasing use of satellites having service areas extending over several countries, if not the whole of Europe, there will be a further demand for subtitles.

Given that subtitling will be an integral part of European television programming in the years ahead, it is then interesting to see how television subititles fit into the wider European media market. Four points are worthy of attention in this respect:

- Many broadcasters use specialist external companies for the supply of subtitles.
- A programme (feature film, television documentary, etc.) may be translated several times into different languages - or into the same language - according to the requirements of the different distribution media (cinema, home video, television broadcast, cable television, etc.). Duplication of effort and incompatibility of technologies may result.
- Languages are people-dependent, rather than country-dependent. Subtitles produced in one country may be equally useful in another country.
- Some television channels broadcast to more than one linguistic group.

In the light of this scope for practical chaos in the subtitling market, it became clear some time ago that it would be of great benefit if all producers and users of subtitles could exchange subtitle information in a common, standardized format. The EBU Technical Committee took the initiative and set up within Sub-group G5 an Ad-hoc Group (G5/STL) with the task of developing such a standard exchange format. The standard was to specify the data file structure as well as the medium for data exchange. The Ad-hoc Group completed its work in 1990 and the resulting publications [1, 2] were issued in Spring 1991.

2. The subtitling process

Two different methods are used to provide subtitles to the television audience. One, known as "in-vision" or "open" subtitling, involves the insertion of the text directly into the displayed picture prior to on-air transmission. In the second, known as "closed" subtitling, the subtitles are transmitted as encoded data carried in a channel (e.g. teletext) accompanying the picture signal (*Fig. 1*).

For both methods the method of subtitle preparation is almost the same. Most of the systems in operation today use a personal computer (PC) with dedicated word-processing software, a video tape-recorder (for example, in S-VHS format), a time-code reader, a subtitle keyer and a character generator. The four main steps in the preparation of subtitles and their delivery with the programme are as follows:

- The dialogue is translated into the target language.
- The translated text is shortened to ensure that the texts are easily legible on the screen.

Figure 1
Examples of closed subtitles (*left*) and open subtitles (*right*).

- The subtitles are tagged to indicate their timing relative to the programme. EBU vertical-interval or longitudinal time-and-control code is often used for this purpose. In general, a two-row subtitle with thirty to forty characters will be displayed for about 5 or 6 seconds.
- The data file containing all the subtitle information (text and time-code data) is stored in the PC. It can then be transferred to a floppy disk for distribution with the video tape, or perhaps recorded as ancillary data on a dedicated line of the vertical blanking interval, on the same tape as the programme.

In the absence of an agreed standard, manufacturers of subtitling equipment have all used different data file formats. Although the various formats all, necessarily, carry very similar information (as outlined above), the manufacturers do not publish information about the data structures they use, or their character and control codes. The objective of the EBU Ad-hoc Group was therefore to establish a common exchange format into which, and from which, all manufacturers could transcode their in-house formats. This approach leaves the manufacturers free to retain their existing formats, which may offer specific advantages in the context of their individual product lines. To maximise acceptance of the EBU exchange format, it was seen as an advantage to base the format and coding structures on internationally agreed standards where possible.

3. EBU standard subtitle exchange format

The EBU specification set out in [2] covers three main aspects of the exchange format:

- the medium for exchange;
- the software operating system upon which the data file is based;
- the data file structure.

3.1. Medium for exchange

To ensure maximum take-up of the EBU standard, it was agreed that a widely-used, low cost exchange medium should be adopted. The choice is a 3.5-inch high-density magnetic disk, formatted to 1.44 Mbytes.

It is nevertheless envisaged that exchanges will also be made via other forms of data transmission channel, for example via modem on the public-switched telephone network.

3.2. Operating system

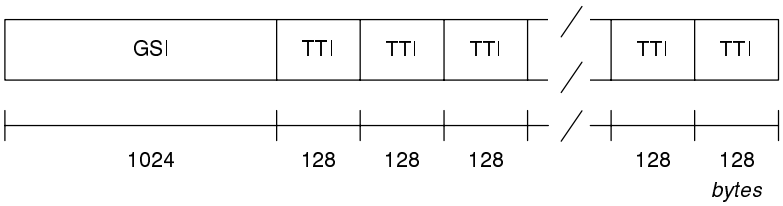
Most subtitling preparation equipment is based on PCs using the MS/PC-DOS operating system. A natural choice was therefore to retain this operating system for the exchange format. If other operating systems are used, the data file must still be readable and writeable with MS/PC-DOS based systems.

3.3. Data file structure

The data file (*Fig. 2*) is divided into two main parts:

- one General Subtitle Information (GSI) block, which includes general information such as the programme title, language, owner of rights and display format;
- a number of Text and Timing Information (TTI) blocks which carry the subtitle texts, time-code data and other information relevant to individual subtitles.

Figure 2
Basic structure of the data file.



3.3.1. General Subtitle Information block

The GSI block contains all the information needed to ensure that the main body of the data file - the texts and timing data in the TTI blocks - is used correctly. The GSI block also has general information about the subtitle list. The following list summarises the GSI block contents:

- Data needed for correct use of the TTI blocks. Examples include the display standard, character code table used, maximum number of displayable rows.
- Data which is calculated from the TTI blocks, after the complete subtitle list has been created. This may include the total number of TTI blocks, total number of subtitles (which may be different), time-code of the start of the first subtitle ("in cue"), maximum number of display-

able characters in any subtitle row, and other information.

- Information provided by translator who has prepared the subtitles. This will normally include the title of the programme (and episode), and may also give the translator's name and contact details, a reference code for the subtitle list and its date of creation.
- Information about ownership of the subtitles, including the publisher, editor's name and contact details, country of origin, etc.

Space is provided in the GSI for additional free-form information, which the user can adapt to specific requirements. Some data capacity is reserved for future extensions.

The information in the GSI block is stored as characters selected from one of the standard MS/PC-DOS code pages. The number of the code page used to prepare the GSI block is given in the first 3 bytes of the GSI block, so it can immediately be applied in any user terminal to permit correct interpretation of the remainder of the GSI block.

3.3.2. *Text and Timing Information blocks*

The GSI block is followed by as many TTI blocks as are necessary to contain all the subtitle texts.

Although each broadcaster may have his own policy regarding the timing, positioning, fonts and other features of the subtitle display, a standard exchange format must be able to convey the information necessary for transmission. In other words, the aim must be to permit the subtitle data to be exploited directly, without requiring too much additioonal preparation between compilation of the data file and final transmission.

To cater for this requirement, the TTI blocks contain the following data:

- a unique numeric identification for each subtitle;
- codes identifying cumulative sets of subtitles (also known as "add-on" subtitles);
- time-code data indicating the start and finish times of a subtitle ("in-cue" and "out-cue");
- a code indicating the vertical position of the first subtitle row;
- a justification code indicating the horizontal alignment of the subtitle (options are: *not used*, *left justified*, *right justified* or *centred*);
- a 112-byte data field for the subtitle text, which may also include special characters used to modify the text display (e.g. use of italics).

The character codes for the subtitle text are taken from one of the character code tables defined by the International Organization for Standardization (ISO). Five such tables are at present available, providing the following alphabets: Latin, Latin/Cyrillic, Latin/Arabic, Latin/Greek and Latin/Hebrew.

The Latin character code table covers all the languages based on the Latin alphabet. With a combination of a diacritical mark and an ordinary Latin character, all accented letters in the different languages can be reproduced. If teletext is used as the subtitle display medium, only a limited number of accented letters can be displayed, according to the national option. The target equipment must therefore identify any locally-invalid letter/accent combinations in the TTI blocks and deliver the appropriate default characters instead.

As noted above, the text field of the TTI blocks can also include certain control characters. If teletext is used to display the subtitles, any of the control

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codes defined in CCIR Teletext System B can be used, giving features such as changes of colour, flashing text, double-size text, etc. These codes are not intended for use when in-vision subtitling is adopted. In this case three basic character control parameters are provided in the EBU exchange format. When applied to an appropriate form of character generator these cause the text to be displayed in italics, underlined or boxed.

The size of the displayed characters for in-vision subtitles depends on the font selected in the character generator at the source. It follows that if a different character generator is used at the target of an exchange, or if the font is different, incorrect subtitle display may result (e.g. too many characters in a row). The GSI block includes a code indicating the length (number of characters) of the longest row in the source subtitle list and this could be used at the target equipment to verify whether it will be able to display all the characters as originally intended.

4. Conclusions

The EBU standard for subtitling data exchange [1] and the accompanying specification [2] were issued over 18 months ago and has already been implemented by a number of manufacturers. Several broadcasters have also adopted the format for the exchange and retreival of subtitles.

To further encourage the adoption of the the format, a new EBU publication is in preparation. This will provide general guidance on the implementation of the EBU standard, including examples and a floppy disk permitting verifications to be made of the conformity of subtitling systems with the EBU standard*.

Bibliography

[1] **Subtitling data exchange format**
EBU Technical Standard N19-1991.

[2] **Specification of the EBU subtitling data exchange format**
EBU document Tech. 3264, 1991.

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Transedit HB, Stockholm, Sweden, 1992.

* An announcement will appear in EBU Technical Review when this new publication is available.

Euro Hi-Def at Expo'92

The European Economic Interest Group Vision 1250 is working in collaboration with the Spanish transmission authority, Retevisión, to promote European HDTV programming and production at the Universal Exhibition Expo'92 in Seville. European HDTV is being presented on three fronts: a showcase of programmes, the provision of production facilities at Expo'92 and regular HDTV broadcasts.

For the showcase, a four-channel fibre-optic network links 40 public viewing sites installed in the pavilions of all the EC member states and in the Community's own pavilion. One channel carries 10 to 12 hours of 1250 HDTV programmes, drawn mostly from recent productions. Another channel carries direct broadcasts in HD-MAC, received live by satellite from major events elsewhere in Europe while Expo'92 is open. Events covered include tennis from Wimbledon and Roland Garros, the European Football Chamionship in Sweden and the Summer Olympic games in Barcelona, with additional material taken from HD-MAC video disc recordings. The other two networks are used for HD programme distribution between individual pavilions.

VISION 1250

To encourage HDTV production, Retevisión has set up a special pavilion where producers can make HDTV programmes throughout the six months of Expo'92. The facilities are centred on a 400 m^2 3-camera studio equipped with HDTV systems from Vision 1250.

The third part of the HDTV promotion package is a regular HDTV broadcast service to be established in Sevilla starting in August 1992. This will broadcast for two hours each day, carrying programmes made during Expo'92 and, in particular, coverage of the Barcelona Olympic Games.