Doc. A/68
11 July 2001

ATSC Standard:
Use of ATSC A/65A PSIP Standard in Taiwan

Advanced Television Systems Committee
1750 K Street, N.W.
Suite 1200
Washington, D.C. 20006
www.atsc.org

The Advanced Television Systems Committee (ATSC), is an international, non-profit membership organization developing voluntary standards for the entire spectrum of advanced television systems.

Specifically, ATSC is working to coordinate television standards among different communications media focusing on digital television, interactive systems, and broadband multimedia communications. ATSC is also developing digital television implementation strategies and presenting educational seminars on the ATSC standards.

ATSC was formed in 1982 by the member organizations of the Joint Committee on InterSociety Coordination (JCIC): the Electronic Industries Association (EIA), the Institute of Electrical and Electronic Engineers (IEEE), the National Association of Broadcasters (NAB), the National Cable Television Association (NCTA), and the Society of Motion Picture and Television Engineers (SMPTE). Currently, there are approximately 190 members representing the broadcast, broadcast equipment, motion picture, consumer electronics, computer, cable, satellite, and semiconductor industries.

ATSC Digital TV Standards include digital high definition television (HDTV), standard definition television (SDTV), data broadcasting, multichannel surround-sound audio, and satellite direct-to-home broadcasting.

Table of Contents

Index of Tables and Figures

Use of ATSC A/65A PSIP Standard in Taiwan

1. PURPOSE AND SCOPE

This standard specifies the use of character sets, rating regions, and major channel numbers for the implementation of ATSC A/65A *Program and System Information Protocol* (PSIP) in Taiwan. This standard satisfies the following requirements:

1) It covers all of the fields defined in the syntax of ATSC standard A65/A in which a non-alphabetical character may occur.
2) It gives receiver manufacturers some degree of freedom in implementing decoders.
3) It has the capability to transmit a character code word as well as a character bitmap.

2. REFERENCES

The following documents are Normative References.

1) ISO/IEC 10646-1:2000, Information Technology—Universal Multiple-Octet Coded Character Set (UCS)—Part 1: *Architecture and Basic Multilingual Plane*.
2) *The Unicode Standard*, Version 3.0, The Unicode Consortium, Addison-Wesley Pub., ISBN 0201616335, April 2000.
3) ATSC Standard A/65A (2000), *Program and System Information Protocol for Terrestrial Broadcast and Cable*.
4) III (Institute for Information Industry) Technical Report C-26, *The Code Mapping Table of Chinese Character Glyphs for Computer Applications* (The Big 5 Code Table), May 1984.

3. SPECIFICATIONS FOR THE USE OF A/65A IN TAIWAN

This section describes specific bit stream syntax and semantics that apply to the use of A/65A in Taiwan.

3.1 Use of Multiple String Structures (Section 6.8 of A/65A)

Section 6.8 of A/65A describes the data structure used to convey text messages. Table 6.26 in section 6.8 of A/65A defines the text modes that are to be used to interpret the transmitted characters. Table 3.1 of this standard describes the interpretation of mode assignments in Taiwan. The shaded entries of Table 3.1 specify the additional modes used in Taiwan. When the value of the mode field is 0x3F, the characters represented in multiple string structure instances shall be the Big 5 subset of Unicode characters. This Big 5 subset can be round-trip transcoded to the Big 5 character standard [4] without loss of information. When the value of the mode field is 0x40, characters are transmitted in bitmap form. The use of this mode indicates that the transmitted character is not a member of the Big 5 code set. When the value of the mode field is 0x41, characters are transmitted as Unicode code words followed by the corresponding bitmap. The use of this mode indicates that the transmitted character is not a member of the Big 5 code set, but is within the Unicode character set. When the desired character is not in the Big 5 code set but is within the Unicode character set, the character may be transmitted in either mode 0x40 or 0x41.

Table 3.1 User Private Options for the Mode Field in a Multiple String Structure

Mode	Meaning in A/65A	Interpretation in Taiwan
0x00 ~ 0x3E	Select 8-bit coding of Unicode	Refer to A/65A Standard Table 6.26
0x3F	Select 16-bit coding of Unicode	Using Big 5 subset of Unicode
0x40	Reserved	Transmission of character bitmap only
0x41	Reserved	Transmission of character code word followed by the corresponding character bitmap
0x42 ~ 0xDF	Reserved	Refer to A/65A Standard Table 6.26
0xE0 ~ 0xFE	User private	Refer to A/65A Standard Table 6.26
0xFF	Not applicable	Refer to A/65A Standard Table 6.26
Note: Shaded entries represent differences from Table 6.26 of A/65A.		

Table 6.24 in section 6.8 of A/65A defines the bit-stream syntax of a multiple string structure. The contents of compressed_string_bytes for the additional modes used in Taiwan are summarized in Table 3.2.

Table 3.2 Contents of compressed_string_byte Fields in Table 6.24 of A/65A

Mode	Compressed_string_byte
0x3F	A sequence of *N* 16-bit code words (length = 2*N* bytes)
0x40	Character bitmap for a single character (length = 72 bytes)
0x41	2-byte code word + corresponding character bitmap (length = 74 bytes)

The bitmap is transmitted in 72 bytes [= (24x24)/8] representing a 24 by 24 binary bitmap of the character starting form the upper-lefthand corner and proceeding in raster-scan order. Examples of the transmitted character bitmap in modes 0x40 and 0x41are given in Annex A.

3.2 Use of short_name in Virtual Channel Tables (Section 6.3 of A/65A)

The terrestrial and cable Virtual Channel Tables defined in Section 6.3 of A/65A contain a short_name field which conveys seven Unicode characters. When unified Han characters are used in this field, only those characters that can be encoded in the Big 5 subset of Unicode shall be used.

3.3 Use of rating_region in Rating Region Table (Section 6.4 of A/65A)

The Rating Region Table (RRT) defined in Section 6.4 of A/65A contains a rating_region field that defines the geographical region in which the RRT applies. The rating_region value of 0x03 shall be used within the Taiwan region.

3.4 Assignment of Major Channel Numbers

Major channel numbers may be assigned to individual terrestrial broadcast transmitters without regard to the actual RF channel on which the transmitter operates. More than one major channel number may be assigned to a single transmitter if desired. The only normative requirement that applies is that major channel numbers shall be assigned to transmitters that are carrying different programming such that the same major channel number is never assigned to two transmitters that

have overlapping coverage areas. This will allow receivers to unambiguously tune to the correct transmitter in response to a viewer-entered major channel number.

In the case where two or more transmitters are carrying identical programming, the same channel numbers may be assigned to all such transmitters irrespective of whether their coverage areas overlap. This will allow the identical Transport Stream to be used to modulate all such transmitters. See Annex B for further details.

Annex A:
Examples of Transmitted Character Bitmap in Modes 0x40 and 0x41

The bitmap shall not be compressed for transmission. The coding of the character bitmap follows the general convention shown in Figures A1 and A2. Figure A1 is an example of the use of mode 0x40. Figure A2 is an example of the use of mode 0x41. The bitmap data are conveyed by the compressed_string_byte in the multiple string structure.

The character shown in Figure A1 can not be found in either the Big 5 character set or the Unicode 3.0 CJK character set. The bitmap is transmitted in 72 bytes [= (24x24)/8] representing a 24 by 24 binary bitmap of the character starting form the upper-left corner and proceeding in raster-scan order.

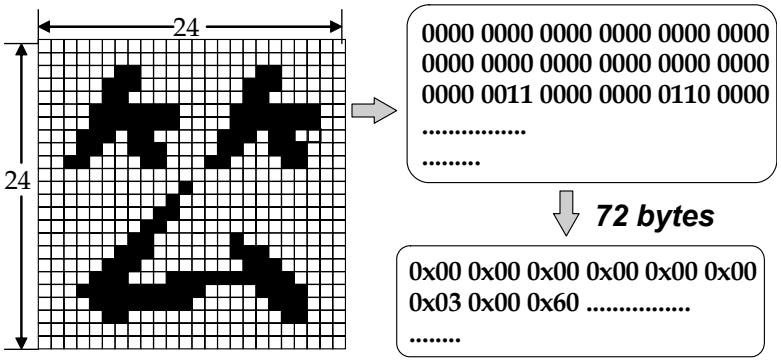

Figure A1 The coding of the bitmap for a character that is neither in the Big 5 character set nor in the Unicode 3.0 character set.

The example character shown in Figure A2 cannot be found in the Big 5 character set but can be found in the Unicode 3.0 character set. The character is transmitted in 74 bytes. The first two bytes represent the Unicode character code and the remaining 72 bytes represent the 24 by 24 binary bitmap of the character starting form the upper-left corner and proceeding in raster-scan order.

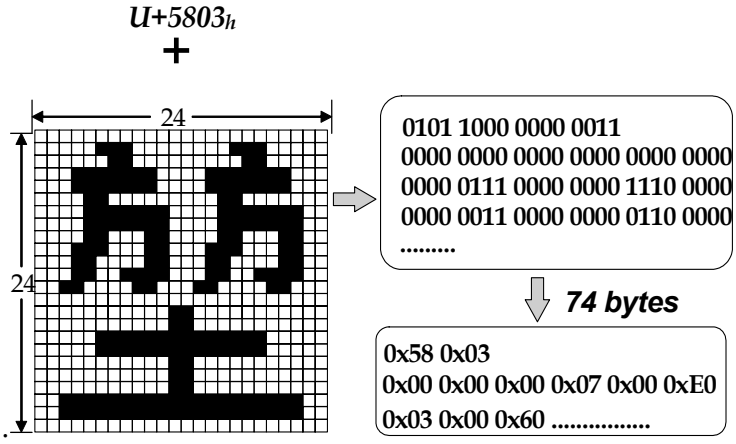

Figure A2 The character in this example is transmitted as a Unicode character code word followed by 72 bytes of bitmap data.

Annex B:
Use of Major Channel Number and Auto-Scan (Informative)

The RF channel, and therefore the channel number, assigned to TV networks for NTSC broadcasting varies from one region to another in Taiwan. For example, even though the program content and baseband signals are identical, the CTV network uses RF channel 9 to broadcast in the northern and southern parts of Taiwan and RF channel 10 in the central part of the country. In order to prevent interference, a similar RF channel assignment plan will be followed for DTV. Unless the carrier_frequency field in the PSIP VCT is corrected when a network broadcast is retransmitted on a transmitter operating on a different carrier frequency than the originating transmitter, the carrier_frequency field cannot be used by the receiver for tuning. However, the cost of changing information carried in PSIP at a retransmission point is high and the process is complicated. As a result of these concerns, DTV receivers should not rely on information in the carrier_frequency field for tuning.

A unique virtual major channel number is assigned to each TV network regardless of the location of its various transmitters. This virtual major channel number serves to identify the TV network and may not match the actual physical RF channel number of the particular transmitter used to broadcast the network programming in a given region of Taiwan. In the VCT table of PSIP this virtual major channel number is kept in the major_channel_number field and is the same throughout Taiwan for a each network broadcaster. The receiver may decode this major channel number and present it to the viewer on an EPG. Users can then use the major channel number for each network to access that network's programs, either through the EPG, if available, or by direct entry.

In order for the receiver to tune to the correct RF frequency for each network a mapping of the virtual major channel numbers to the physical major channel numbers is necessary. This mapping is performed by means of an auto-scan procedure, which at the startup or reset of a receiver, scans all frequencies and decodes the VCT tables for all of the DTV signals it finds on RF channels. The number found in the major_channel_number field is extracted and paired up with the corresponding physical channel number. The results are tabulated and stored in a memory for tuning. Each time a viewer requests a channel through the EPG or by entering a virtual major channel number the stored table is consulted to obtain the correct frequency to tune. When the receiver is moved from one area to another the user will only have to reset the receiver to renew the mapping. With this auto scan procedure the existing transmitting network in Taiwan can be preserved and users can also be spared the efforts in remembering different channel numbers for each of their favorite TV networks.