GENERIC CODE OF PRACTICE ON

TELEVISION TECHNICAL STANDARDS

BROADCASTING AUTHORITY

9 NOVEMBER 2007

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Chapter 1　　　Preamble

1.1　　　This Code of Practice is issued by the Broadcasting Authority (BA), after consulting the Telecommunications Authority (TA), pursuant to section 3 of the Broadcasting Ordinance (Cap.562).

1.2　　　This Code is applicable to television programme services licensed under the Broadcasting Ordinance (Cap.562) except for a service provided to hotel rooms.

1.3　　　Unless otherwise approved by the BA, the signal formats of television programmes delivered on a licensed television programme service should comply with the formats, if any, specified in the statements (including statements of intention) and representations made by, or on behalf, of the licensee in its licence application.　In particular,

> (a)　Chapter 2 applies to a television programme service which employs the I/PAL Colour Television System;

> (b)　Chapter 3 applies to a television programme service which employs the M/NTSC Colour Television System;

> (c)　Chapter 4 applies to a television programme service which employs the Multisound I/PAL System for the audio signals; and

> (d)　Chapter 8 applies to a television programme service which employs the Digital Terrestrial Television System.

1.4　　　A licensee shall comply with the technical standards and directions issued from time to time by the TA which are applicable to it.

1.5　　　The standards set out in this Code should be read in conjunction with relevant legislation and licence conditions currently in force.

Chapter 2 I/PAL Colour Television System

Introduction

2.1 This chapter specifies the I/PAL Colour Television System and technical standards adopted for television programme services in Hong Kong.

The Television Signal

Television System

2.2 The I/PAL television system used in Hong Kong must comply with the latest version of ITU-R Recommendation BT 470: Conventional Television Systems.

Video Characteristic

2.3 All picture signal, number of lines per picture, interlace, aspect ratio, gamma, colour subcarrier frequency, field frequency and video bandwidth broadcast and used by the I/PAL system must comply with the latest version of ITU-R Recommendation BT 470.

Synchronizing and Blanking Waveforms

2.4 The horizontal and vertical synchronizing, blanking and colour burst blanking waveforms used by the I/PAL system must comply with the latest version of ITU-R Recommendation BT 470.

Video Signal

2.5 The video characteristics broadcast and used by the I/PAL system must comply with the latest version of ITU-R Recommendation BT 470.

Colour Picture Signal

2.6 The colour picture signal broadcast and used by the I/PAL system must comply with the latest version of ITU-R Recommendation BT 470.

Chapter 3   M/NTSC Colour Television System

Introduction

3.1   This chapter specifies the M/NTSC Colour Television System and technical standards adopted for television programme services in Hong Kong.

The Television Signal

Television System

3.2   The M/NTSC television system used in Hong Kong must comply with the latest version of ITU-R Recommendation BT 470: Conventional Television Systems.

Video Characteristic

3.3   All picture signal, number of lines per picture, interlace, aspect ratio, gamma, colour subcarrier frequency, field frequency and video bandwidth broadcast and used by the M/NTSC system must comply with the latest version of ITU-R Recommendation BT 470.

Synchronizing and Blanking Waveforms

3.4   The horizontal and vertical synchronizing, blanking and colour burst blanking waveforms used by the M/NTSC system must comply with the latest version of ITU-R Recommendation BT 470.

Video Signal

3.5   The video characteristics broadcast and used by the M/NTSC system must comply with the latest version of ITU-R Recommendation BT 470.

Colour Picture Signal

3.6   The colour picture signal broadcast and used by the M/NTSC system must comply with the latest version of ITU-R Recommendation BT 470.

Chapter 4   Multisound I/PAL System

Introduction

4.1   This chapter specifies the provision of multichannel sound television broadcast service for I/PAL system in Hong Kong.

Performance Specification for Multichannel Sound Television Broadcast

Frame Format

4.2   The frame format used by the I/PAL multichannel sound television system used in Hong Kong must comply with the latest version of ITU-R Recommendation BS 707: Transmission of Multisound in Terrestrial Television Systems PAL B, D1, G, H and I, and SECAM D, K, K1 and L.

Coding of Information

4.3   The coding of information used by the I/PAL multichannel sound television system used in Hong Kong must comply with the latest version of ITU-R Recommendation BS 707.

Modulation Parameters

4.4   The modulation parameters used by the I/PAL multichannel sound television system used in Hong Kong must comply with the latest version of ITU-R Recommendation BS 707.

Chapter 5   Technical Quality Standards and Reliability

Introduction

5.1   This chapter specifies the Technical Quality Standards and Reliability required for television programme services in Hong Kong.

Technical Quality Standards

Description of Standards of Technical Quality

5.2   Licensees shall submit to the BA on request, a description of their procedures for ensuring high standards of technical quality.

Monitoring of Technical Quality

5.3   Licensees are required to make their own assessment of the technical quality of their services and to adopt procedures for ensuring high standards of technical quality.

Quality Grading Scale

5.4   Live studio outputs should normally achieve a sound and vision grade of 5 on the ITU-R 5-Point Quality Grading Scale (5-Excellent, 4-Good, 3-Fair, 2-Poor and 1-Bad) as specified in the latest version of ITU-R Recommendation BT 500: Methodology for the Subjective Assessment of the Quality of Television Pictures. Recorded programmes based on electronic production should normally achieve a grade of at least 4 and other programmes should normally achieve a grade of at least 3. However, where the materials include historical materials, news inserts, topical or actuality materials, and it is impracticable for licensees to improve the quality without affecting the integrity of the materials, or where low quality clearly forms part of the editorial intent of the programme, a lower score may be permitted.

5.5   Timing differences between the sound and vision of the transmitted programmes should not be, in the opinion of the BA, annoying to the viewer.

Reliability

Standards of Reliability

5.6   Standards of reliability, measured in terms of service availability to viewers, must be maintained to levels that are as high as reasonably practicable.   The minimum standard of availability is 99.0% averaged over the preceding six months. This standard shall apply on an individual channel basis. Service availability should be measured at the connecting point at the viewers' end.   For video-on-demand service, the reliability standard shall apply when the service is activated and service availability shall count on receipt of the video programme signals at the viewers' end (i.e. television programme signals alone, e.g. on the availability of video programmes, should not be counted as service availability).   This availability figure should take account of a loss of video and sound or control data essential to view the services due to any cause under the control, either directly or through contract arrangements, of the licensees.

Monitoring of Reliability

5.7   Licensees shall submit to the BA, within a reasonable time after being required to do so, a return on transmission performance that should include a summary of reliability performance results for distribution and transmission and an analysis of viewer complaints associated with poor reception quality during such period, and in such form, as the BA may direct.

5.8   A domestic free television programme service licensee and a domestic pay television programme service licensee shall, on or before the first of April of each year, submit a return in the specified form on transmission performance during the calendar year immediately preceding the calendar year to which the return relates.

Chapter 6   Conversion of Widescreen Programmes to 4:3 Programmes

Introduction

6.1   Widescreen television picture commonly adopts an aspect ratio of 16 : 9 or other aspect ratios other than 4:3, and is wider than conventional television picture with an aspect ratio of 4:3. The widescreen television picture showing on conventional (4:3) screen involves some processing of the picture. If no processing takes place, the widescreen picture appears squashed on the 4:3 screen and distorted images may result.

Broadcasting or Processing Widescreen Picture

6.2   In broadcasting or processing a widescreen picture for showing on a conventional screen (with an aspect ratio of 4:3), a licensee shall ensure that the objects in the frame will retain their true shape. It is not acceptable to distort the image to fill the 4:3 frame.

Chapter 7   Loudness Control Limits

Introduction

7.1   This chapter specifies the loudness control limits for television programme services in Hong Kong.

Loudness Control Limits

7.2   The subjective volume should be consistent with the programme material whilst at the same time preventing excessive loudness. Table 1 specifies the permitted normal peaks and full ranges on a peak programme meter for speech, music and advertisements of a television programme. The loudness of the output of a studio television programme should comply with the specified limits in Table 1 at all time.

Table 1: Peak Programme Levels of Studio Output

Programme Type	Normal Peaks	Full Range
Speech		
Talks, news, drama, documentaries, discussions, panel games, quiz shows etc.	5	3 - 6
Music		
Variety shows, dance music	4.5	2 - 6
Brass bands, military bands	4	2 - 5
Orchestral concerts	-	1 - 6
Light music	5.5	2 - 6
'Pop' records (and any recorded programme containing a high degree of compression)	4	2 - 4
Recorded programmes, live 'pop' shows (material not containing a high degree of compression)	5	2 - 6
Advertisements/Promotional Material		
Highly compressed	4.5	2 - 5
Slightly compressed	5	2 - 6

Notes: The levels specified above are related to standard peak programme meter readings with reference to a steady state reading of '4' corresponding to 0 dBu.

Normal peak is the upper limit for the volume of programme, whereas the full range limits the transients within the programme.

Chapter 8 Digital Terrestrial Television System

Introduction

8.1   The Government announced in July 2004[1] that it would adopt a market-led approach to the selection of digital terrestrial television (DTT) technical standard.   In this regard, the two domestic free television programme service licensees indicated their interests in the National Standard[2] and conducted the laboratory tests and field trials to explore its technical performance in the fourth quarter of 2006.   In their proposals submitted to the Office of the Telecommunications Authority (OFTA) in the first quarter of 2007, they suggested unanimously the deployment of DTT services based on the National Standard.   Having assessed the technical performance and garnered the information from the consumer electronic manufacturers, the TA is satisfied that it is technically feasible to deploy the National Standard, with the technical parameters used in the field trial and listed in Table 1, under various propagation situations in Hong Kong and there should be sufficient supply of DTT receivers available on the market at the time of service launch.   This chapter specifies the details of the technical standard adopted for DTT programme services in Hong Kong.

The Television Signal

Modulation and Channel Coding

8.2   The DTT systems used in Hong Kong should be based on the National Standard with the use of the following options :

Table 1: Options of the National Standard

Mode	Multi-Carrier Mode with the number of carriers (C) = 3780
Modulation	64QAM, 16QAM and 4QAM

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[1]   The Government's Statement on the Implementation Framework for Digital Terrestrial Television Broadcasting dated 9 July 2004 refers (http://www.digitaltv.gov.hk/pdf/DTT.pdf).
[2]   The National Standard refers to "GB20600-2006: Framing Structure, Channel Coding and Modulation for Digital Television Terrestrial Broadcasting System" promulgated by the Standardization Administration of the People's Republic of China in August 2007.

Frame Header	PN 945
Code Rate	0.4 and 0.6
Symbol Interleaving	Mode 2 i.e. B = 52 and M = 720 symbols

8.3   The frequency offset applied to the carriers on individual channels is 0, or +/- 1/6 MHz.

8.4   Where a DTT multiplex is co-sited with and operating on a channel adjacent to a I/PAL service, a spectrum mask meeting the specification set out in Figure 19 of the National Standard, the spectrum mask under stringent conditions, must be used for the multiplex.

Multiplexing of Signals

8.5   The multiplexing of baseband signals complied with ISO/IEC 13818-2/3 must conform to ISO/IEC 13818-1.   The multiplexing of baseband signals complied with ISO/IEC 14496-10 must conform to ISO/IEC 13818-1: 2000 / Amendment 3 (2004).   The implementation guidelines stated in ETSI TS 101 154 must be compiled.

Service Information (SI) and Program Specific Information (PSI)

8.6   Transport streams must provide all applicable tables and descriptors of PSI specified in ISO/IEC 13818-1 and ETSI TS 101 154.

8.7   Transport streams must provide all applicable tables and descriptors of SI required by ETSI EN 300 468 and ETSI TR 101 211 and the special variants in Hong Kong (e.g. character encoding) specified in this chapter.

8.8   The Packet Identifiers of all of the transport stream packets relating to the transmission of television programme services must comply with ISO/IEC 13818-1 or ETSI EN 300 468.

8.9   SI information must be carried by all frequency multiplexes within a network through Network Information Table (NIT) other network, Service Description Table (SDT) other transport stream, Event Information Table (EIT) other transport stream.

8.10   Each service must be uniquely identified by original_network_id / transport_stream_id / service_id.

8.11   SI codes to be used are given in Table 2.

Table 2: SI Codes

SI Code	Status
original_network_id	0x7FFD, 0x7FFE and 0x7FFF
network_id	0x7FFD, 0x7FFE and 0x7FFF
transport_stream_id	For unique identification of a transport stream and to be determined by individual licensee.
service_id	To be assigned by individual licensee.
bouquet_id	0xFFF0 – 0xFFFF
country_code	0100 1000 0100 1011 0100 0111
private_data_specifier	0xFFFFFFFF

The assignments of original_network_id and network_id to the multiple frequency network (MFN) multiplex and single frequency network (SFN) multiplexes are given in Attachment to Chapter 8.

Logical Channel Number (LCN)

8.12   The syntax of logical channel number must comply with IEC 62216-1.   The descriptor_tag for logical_channel_descriptor shall be 0x83.

Video Signals

8.13   Table 3 which shows the configuration which must be compiled by all standard definition television (SDTV) and high definition television (HDTV) programme services in MFN and SFN multiplexes.

Table 3: Video Parameters

Parameter	SDTV in MFN multiplex	SDTV in SFN multiplexes	HDTV in SFN multiplexes
Profile / Level	ISO/IEC 13818-2 Main Profile at Main Level	ISO/IEC 13818-2 Main Profile at Main Level or ISO/IEC 14496-10 (or H.264) Main Profile at Level 3.0	ISO/IEC 13818-2 Main Profile at High Level or ISO/IEC 14496-10 High Profile at Level 4.0
Full-screen luminance resolution (horizontal x vertical)	720 x 576 pixels interlaced	720 x 576 pixels interlaced	1920 x 1080 pixels interlaced or 1280 x 720 pixels progressive
Frame rate	25 Hz	25 Hz	25 Hz for 1920 x 1080 pixels interlaced and 50 Hz for 1280 x 720 pixels progressive
Aspect ratio	4:3 or 16:9	4:3 or 16:9	16:9
Chroma subsampling	4:2:0	4:2:0	4:2:0

8.14   Appropriate Active Format Description (AFD) must be included in the user data of the video elementary stream.   The syntax and semantics of AFD defined in ISO/IEC 13818-2 and ETSI TS 101 154 must be compiled.   The use of values of the active format in the range between 0000_2 and 0111_2 are prohibited.

Audio Signals

8.15   Audio encoding must conform to either MPEG-1 Layer II defined in ISO/IEC 13818-3 or AC-3 specified in ETSI TS 102 366.   The implementation guidelines contained in ETSI TS 101 154 must be compiled.

8.16   The bit rate used for MPEG-1 Layer II audio streams must be in the range between 64 kbit/s and 256 kbit/s.   For AC-3 audio streams, the bit rates between 32 kbit/s and 384 bit/s must be used.

8.17   The test signals and metering defined in ITU-R Recommendation BS.645 must be compiled.

Electronic Programme Guide (EPG)

8.18   The EPG data stream must comply with ISO/IEC 13818-1, ETSI EN 300 468 and ETSI TR 101 211.

Subtitle

8.19   Carriage of subtitling data must comply with ETSI EN 300 743.   Subtitle objects must be coded in pixel format.

Character Encoding

8.20   The following character sets: (i) ISO/IEC 10646 : 2003 with CJK full set, Latin subset and encoded control characters and (ii) Hong Kong Supplementary Character Set – 2004 (HKSCS-2004) must be used.   Character encoding must confirm to UTF-8 and UTF-16 BE (Big-endian, high-byte first).

Over-the-Air Download

8.21   Receiver software release in any transmitted multiplexes must be carried by transport streams complied with ISO/IEC 13818-1 in accordance with ETSI TS 101 154.

Service Replacement Service

8.22   The linkage descriptor with the linkage type 0x05 (Service Replacement Service) defined in ETSI EN 300 468 and ETSI TR 101 211 must be used to identify the path to the replacement service.

Attachment to Chapter 8

Assignment of original_network_id and network_id

Domestic Free Television Programme Service Licensee	original_network_id	network_id
MFN	0x7FFD	0x7FFD
SFN transmitted on Ch 35	0x7FFE	0x7FFE
SFN transmitted on Ch 37	0x7FFF	0x7FFF

Annex

List of References

1	**GB 20600-2006** "Framing Structure, Channel Coding and Modulation for Digital Television Terrestrial Broadcasting System" published by SAC - Standardization Administration of China
2	**ETSI EN 300 468** "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems" published by ETSI - European Telecommunications Standards Institute
3	**ETSI EN 300 743** "Digital Video Broadcasting (DVB); Subtitling systems" published by ETSI - European Telecommunications Standards Institute
4	**ETSI TR 101 211** "Digital Video Broadcasting (DVB); Guidelines on implementation and usage of Service Information (SI)" published by ETSI - European Telecommunications Standards Institute
5	**ETSI TS 101 154** "Digital Video Broadcasting (DVB); Implementation guidelines for the use of Video and Audio in Broadcasting Applications based on the MPEG-2 Transport Systems" published by ETSI - European Telecommunications Standards Institute
6	**ETSI TS 102 366** "Digital Audio Compression (AC-3, Enhanced AC-3) Standard" published by ETSI - European Telecommunications Standards Institute
7	**HKSCS-2004** "Hong Kong Supplementary Character Set - 2004 (HKSCS-2004)" published by HKSAR - Hong Kong Special Administrative Region
8	**IEC 62216-1** "Digital terrestrial television receivers for the DVB-T system – Part 1: Baseline receiver specification" published by IEC (International Electrotechnical Commission)
9	**ISO/IEC13818-1** "Information technology - Generic coding of moving pictures and associated audio information: Systems" published by ISO - International Organization for Standardization
10	**ISO/IEC 13818-1:2000 / Amd3:2004** "Transport of AVC video over ITU-T Rec H.222.0	ISO/IEC 13818-1 streams" published by ISO – International Organization for Standardization
11	**ISO/IEC 13818-2** "Information technology - Generic coding of moving pictures and associated audio information: Video" published by ISO - International Organization for Standardization

12	**ISO/IEC 13818-3 "**Information technology - Generic coding of moving pictures and associated audio information - Part 3: Audio" published by ISO - International Organization for Standardization
13	**ISO/IEC 14496-10 "**Information technology - Coding of audio-visual objects - Part 10: Advanced Video Coding" published by ISO - International Organization for Standardization
14	**ISO/IEC 10646 : 2003 "**Information technology - Universal Multiple-Octet Coded Character Set (UCS)" published by ISO - International Organization for Standardization
15	**ITU-R Recommendation BT.470** "Conventional Analogue Television Systems" published by ITU – International Telecommunication Union
16	**ITU-R Recommendation BS.707** "Transmission of multisound in terrestrial television systems PAL B, B1, D1, G, H and I, and SECAM D, K, K1 and L" published by ITU – International Telecommunication Union
17	**ITU-R Recommendation BT.500** "Methodology for the Subjective Assessment of the Quality of Television Pictures" published by ITU – International Telecommunication Union
18	**ITU-R Recommendation BS.645 "**Test signals and metering to be used on international sound programme connections" published by ITU – International Telecommunication Union