1 Scope

Australian free-to-air (FTA) television broadcasters (Broadcasters) are enhancing their content offerings by implementing IP delivery to Internet Connected Television receivers aligned with open standards that would support the Australian horizontal television market.

This operational practice sets out the requirements for supporting implementation of Hybrid Broadcast Broadband TV (HbbTV) services by broadcast network operators and the reception of such services by suitable consumer electronic equipment.

Within the Australian framework, Broadcasters seek to implement HbbTV Version 2.0.3 in accordance with ETSI TS 102 796 [5] as a system baseline to ensure compatibility & minimal customisation of new products from international markets.

In order to comply with Australian regulatory requirements, Australian television broadcasters' content delivery include some parameters and values that will need to be interpreted differently when compared to other implementations and these are outlined in those clauses specified in the Australian DTTB Transmission Standard, AS4599 [1].

2 Background

Australian television broadcasters implemented HbbTV in Australia in 2013 and currently broadcast applications operating at Versions up to and including 2.0, but with backward capability to Version 1.5. In the foreseeable future, applications up to Version 2.0.3 may be broadcast.

A common application, developed and operated by the free-to-air broadcasters' industry group, Freeview, provides a common electronic programme guide (EPG) with other links to broadcaster's individual applications

3 Definitions

Within this operational practice the following definitions are understood.

Internet TV – Over The Top (OTT) streaming of media over the Internet with no involvement (other than as an access network provider) of Internet Service Providers and includes no guarantee for Quality of Service.

IPTV – delivery of media over networks managed end-to-end, usually with quality of service comparable to Broadcast TV

Hybrid represents devices that include DVB-T receiving capability for live content, as well as IP connectivity for Internet TV or IPTV

Australian Free to Air Television broadcasters (Broadcasters) – this includes national, commercial and community television broadcasters.

4 Delivery Network Requirements

Australian television broadcasters provide linear audio/video (A/V) content which includes all DVB functionalities specified in AS 4599 [1] via the broadcast delivery network.

HbbTV provides mechanisms for the viewer to access applications delivered via both over-the-air broadcast service and bi-directional IP communications over the broadband delivery network. The application, most often initiated from the broadcast service, allows the viewer to navigate between both broadcast and broadband platforms to receive enhanced A/V content and other services. The system architecture is described in Section 4.2.2 of ETSI TS 102 796 [5].

5 HbbTV signalling

5.1 Application Information Table (AIT)

Navigation between the two platforms is initiated for a broadcast service by information carried in the DVB SI in an Application Information Table (AIT) with table_id 0x74.

A receiver finds the AIT from its PID reference listed in the Program Map Table (PMT) for that service.

In accordance with the broadcast signalling requirements specified in Table 5 of ETSI TS 102 796 [5] clause 7.2.3.1 all sections of the HbbTV AIT sub-table shall be transmitted at least once every second. DTV receivers are expected to frequently check for changes in the AIT as signalled by an update of the version number in the AIT sub-table.

The additional elements for HbbTV are primarily an application signalling descriptor to identify the service component carrying the AIT and, if present, one or more DSM-CC object carousels. These are described in detail in ETSI TS 102 809 [6]. Syntax for the AIT is provided in Clause 5.3.4.6 of ETSI TS 102 809 [6].

In order to be uniquely identified, each Application listed within the AIT has an associated application identifier which consists of both the registered mhp_organization_id and an application_id as defined in TS 102 809 [6] Section 5.2.3 and summarised in Table 1 below:

Table 1 Application Identifier Parameters

Parameter	Value
mhp_organisation_id	mhp_organisation_ids are assigned by the DVB Project Office. Refer Table 2.
application_id	0x0001 to 0xffff as per ETSI TS 102 809 [6] Table 1.

Within the “application” (inner) descriptor loop an application is identified by the application_descriptor and an application_name_descriptor. Optionally, there may be additional descriptors in this loop to signal usage or icons in the application.

The application_descriptor (descriptor_tag 0x00) includes a profile defined by the application_profile, version.major, version.minor and version.micro integers (limited to between 0 to 255 each), a service_bound_flag to indicate if the application is only associated with the current service and a visibility flag to indicate if the application is visible to other applications. The application_name_descriptor (descriptor_tag 0x01) includes the ISO639 language code of the application name and a string of characters to identify the name of the application.

A transport_protocol_label is signalled to identify to the transport protocol associated with a service component. These are described within a transport_protocol_descriptor (descriptor_tag 0x02) which may be located in either the “common” (outer) descriptor loop or the “application” descriptor loop. When in the “common” loop it applies to all of the applications in the sub-table.

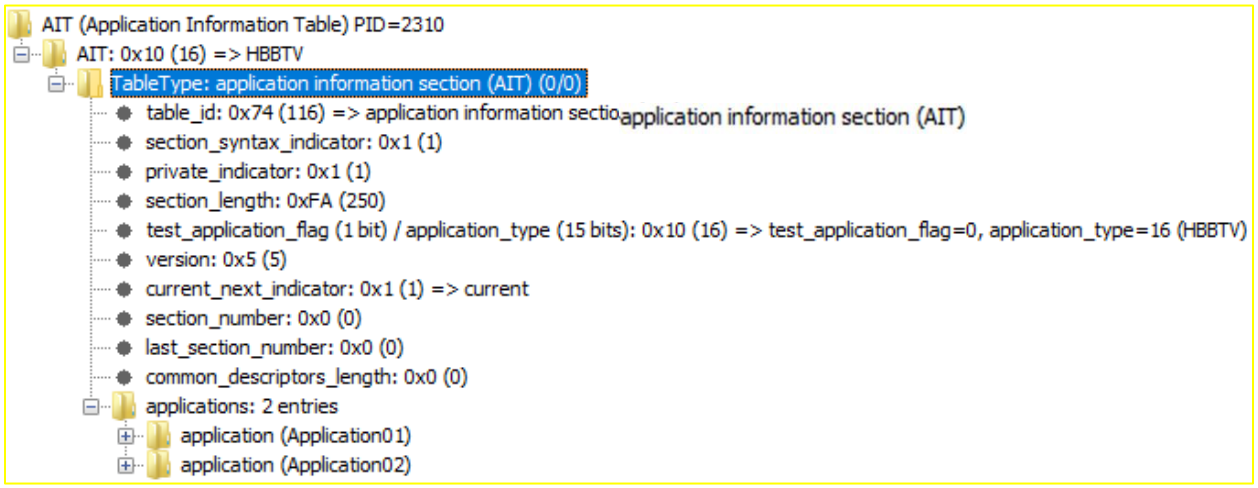

Figure 1 application_information_section

Whilst the scope of the transport_protocol_descriptor may be limited to the single application when carried in the “application” (inner) loop, the transport_protocol_label values assigned must be unique within the current AIT Section as per **Figure 2** below.

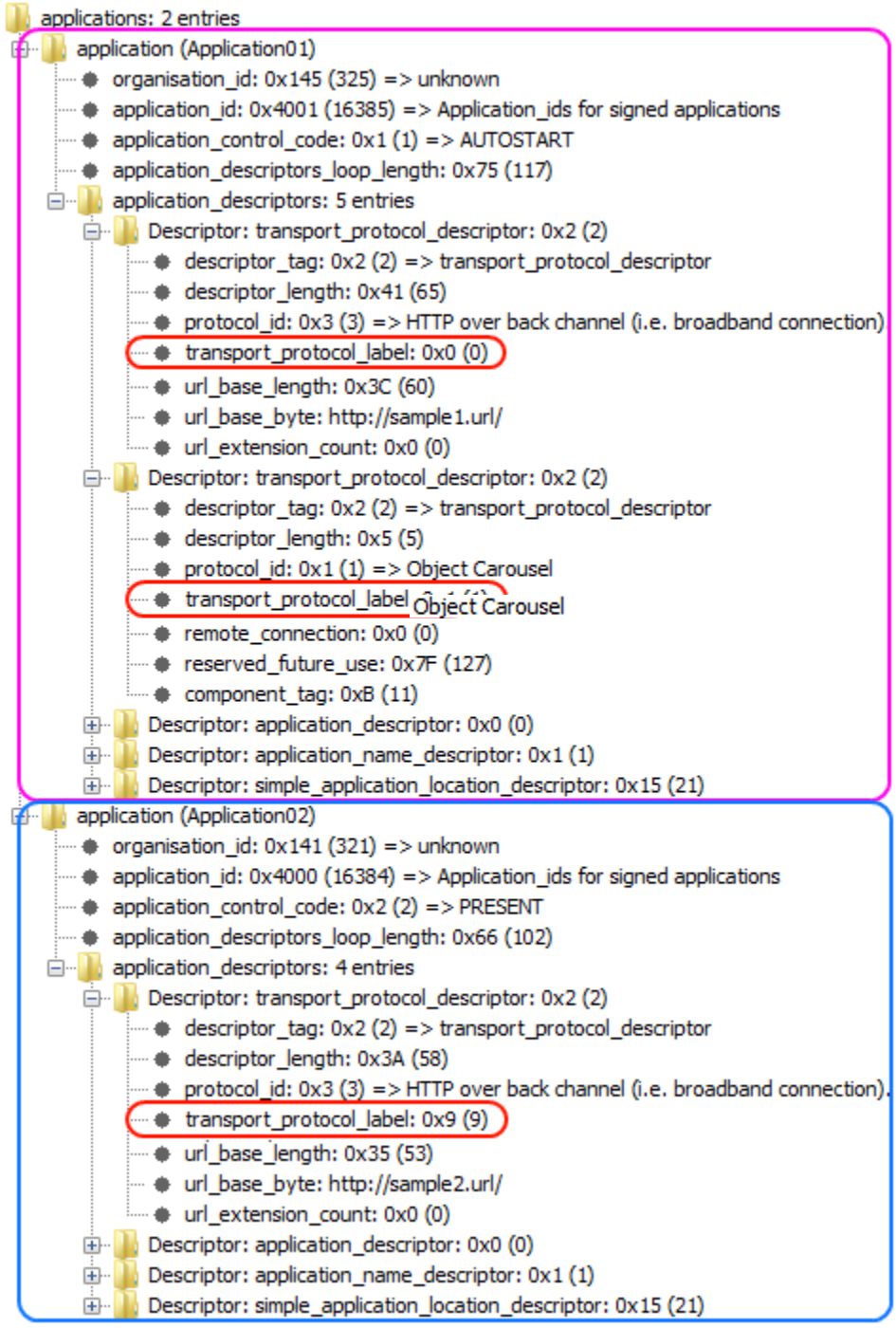

Figure 2 Application Loops

The re-use of a transport_protocol_label within an AIT where it would result in more than one application path being identified is not permitted.

The protocol_id labels are listed in ETSI TS 102 809 [6] Table 29. Protocol_id 0x0001 points to an object carousel which may be used to provide an application with features such as warnings that the receiver needs an internet connection to proceed. Protocol_id 0x0003 points to transport over HTTP and the following selector bytes in the transport_protocol_descriptor provide the web address where the application may be found. This is the core of the link between the broadcast and the broadband platforms.

For the purpose of ensuring the delivery of HbbTV signalling from all Australian television broadcasters is uniform, the following three applications follow agreed specifications which may include both HTTP and Carousel transport:

- AUTOSTART
- GREEN button functionality on a DTV receiver remote control for the common industry EPG
- RED button functionality for specific Australian television broadcaster's applications

In addition, other colour button bindings are used in the following consistent manner:

- BLUE button functionality for specific Australian television broadcaster's additional applications or functions
- YELLOW button functionality for viewer to search and discover programs

5.2 MHP Organisation ID

The mhp_organisation_id is a globally unique value identifying the organization that is responsible for the application. The values are registered with DVB. Values for mhp_organisation_id are assigned to Australian television broadcasters in accordance with Table 2:

Table 2 mhp_organisation_id assignments to Australian television broadcasters

mhp_organisation_id	Organisation
0x00000140	Australian DTTB Reference Transport Stream (/ Free TV)
0x00000141	Freeview Australia
0x00000142	ABC
0x00000143	SBS
0x00000144	Seven Network Australia
0x00000145	Nine Network Australia
0x00000146	Network TEN Australia
0x00000147	Seven Network Regional Australia
0x00000148	WIN Television Australia
0x00000149	Southern Cross Broadcasting Australia
0x0000014A	NBN Television Australia
0x0000014B	Imparja Television Australia
0x0000014C - 0x0000014F	Reserved

5.3 Signalling of HbbTV

If Australian television broadcasters broadcast an HbbTV related DSM-CC Object carousel (ISO/IEC 13818-6 type B), it shall be signalled with a data_broadcast_id_descriptor (descriptor_tag 0x66) including a data_broadcast_id value of 0x0123 in accordance with the specification within ETSI TS 102 796 [5] – Clauses 7.2.3 and 7.2.6 to identify it as an HbbTV carousel.

In addition to the DSM-CC Object carousel Australian television broadcasters may also choose to include a separate DSM-CC event stream (ISO/IEC 13818-6 [2] type C) to convey DSM-CC "do it now" stream events. These events are required to be posted to the application as soon as they are received by the DTV receiver.

All stream events required to be monitored simultaneously by an application shall be transmitted in the same DSM-CC component.

Each carousel present and signalled shall include an association tag which is to be implemented by providing a stream_identifier_descriptor within the PMT descriptor loop for that service component. This value may be used by a HbbTV application to reference the DSM-CC component as for example is required in the definition of a Stream Event Object.

6 Australian implementation of DVB Service Information

Within the linear broadcast platform, to meet local regulatory requirements Australian television broadcasters have been required to alter the required interpretation of items described within the DVB Service Information specifications in ETSI EN 300 468 [3] but not the syntax, including:

- The addition of a logical_channel_descriptor within the NIT
- Clause 6.2.20 Local time offset descriptor, country_region_id values in Table 70
- Clause 6.2.9 Content descriptor content_nibble_level_1 and content_nibble_level_2 values in Table 28
- Clause 6.2.28 Parental rating descriptor, rating values in Table 83

These regulatory requirements include those within the principles published by the Australian Communications and Media Authority (the ACMA) to improve the completeness and accuracy of EPG services provided by Australian free-to-air (FTA) broadcasters. Refer to https://www.acma.gov.au/electronic-program-guides parental lock functionality is legislated under the following technical standard https://www.legislation.gov.au/Series/F2020L01182.

A more detailed reference to the necessary information for a correct implementation may be found in the Australian DTTB Transmission Standard, AS4599 [1]. In particular, from a system perspective, elements within the broadband platform will need to align with the elements of the service information. All implementations of DVB Service Information should be in accordance with Section 4 of AS4599 [1].

6.1 DVB triplets

HbbTV applications will require access to the DVB Triplets (original_network_id/transport_stream_id/service_id) contained in the Service Information. This is so that Electronic Program Guide applications can associate internet delivered EPG information with the broadcast program services from each of the Australian television broadcaster network's transmissions as found by the DTV receiver.

This functionality is included in Open IPTV Forum Release 2 Specification Volume 5 (V2.3) – Declarative Application Environment, as referenced in ETSI TS 102 796 [5].

6.2 Conveyance of a channel list

The logical channel list for Australian television broadcaster's services shall align to the logical_channel_descriptor in Section 4 of AS 4599 [1]. Refer also to Free TV OP-41 [7].

6.3 Parental rating

In accordance with and compliant to DVB specifications the parental_rating_descriptor shall follow Clause 4.2.12 as specified in AS 4599 [1].

6.4 Access to DVB-SI EIT p/f

The present and following implementation of the event_information_table shall align to Section 4 of AS4599 [1]. Refer Free TV OP-44 [8].

6.5 Carriage of CRIDs in EIT actual schedule

It is required that Australian television broadcasters carry content reference information (CRIDs) for all content referenced in the broadcaster's schedule (8 day) event information table. This information shall align with Section 4 of AS4599 [1]. Refer also to Free TV OP-72 [9].

7 Minimum Audio requirements

While IP delivery of video and audio may be delivered using adaptive bitrate technologies, Australian television broadcasters seek to ensure that appropriate quality is delivered to the end user and provides the following as minimum requirements for audio signals delivered within HbbTV services:

a. Stereo content should be mono compatible.
b. For downmixes of multi-channel surround sound content, included downmix metadata parameters should be used (when available) rather than using default downmix parameters.
c. DTV receivers should be able to down-mix multi-channel audio content from any source to 2.0 channel stereo.
d. AC-3 metadata should be preserved where possible in AAC encoded audio bitstreams.
e. Where multi-channel AAC encoding is used, it is desirable that the DTV receiver should either preserve the decoded audio as multi-channel PCM (via HDMI) or re-encode it (into any common audio codec used in consumer A/V receivers).
f. Any metadata in the AAC bitstream (such as DialNorm) should be preserved in any re-encoding.
g. where required, a secondary audio track for Audio Description

8 Minimum Display requirements

While IP delivery of video and audio may be delivered using adaptive bitrate technologies, Australian television broadcasters seek to ensure that appropriate quality is delivered to the end user and recommends that at least one representation should meet the following minimum requirements for video content delivered within HbbTV services:

Table 3 Minimum Video Requirements

Vertical Resolution	Horizontal Resolution	Aspect Ratio	Frame Rate	Progressive / Interlace
576	720	16:9	25	I

The minimum HbbTV application graphic plane resolution is 1280 pixels horizontally by 720 pixels vertically.

9 Streaming Implementation

9.1 MPEG DASH

Australian television broadcasters intend to implement adaptive bit rate streaming using MPEG DASH as specified in Annex E of ETSI TS 102 796 [5]. It is expected that progressive download content will also be implemented within applications for some advertising or interstitial television broadcasting content.

9.2 Advertising in broadcast applications

Australian television broadcasters have implemented insertion of advertising or interstitial content into HbbTV video assets. Advertising insertion is driven by third party advertising content management systems, and may be implemented using client-side or server-side Ad insertion.

10 Security Requirements

Australian television broadcasters ONLY provide applications which are trusted from a particular program service/channel.

Applications from Australian Broadcasters shall be signalled with application_id values assigned in the range identified as “Application_ids for signed applications” from ETSI TS 102 809 [6] § 5.2.3.1 where they require a “Trusted” level of security access in the OIPF DAE in accordance with Table A1 of ETSI TS 102 796 [5].

Content that is delivered without DRM will require best practice security mechanisms to minimise unauthorised access.

10.1 Choice of DRM

Australian television broadcasters have agreed on a common implementation of Digital Rights Management within the HbbTV environment.

Australian television broadcasters wish to minimise the number of DRM systems required to be supported. Additionally Australian television broadcasters have agreed that Common Encryption “CENC” to allow different DRM systems to decrypt the same content, therefore minimising versions of assets.

Note: Currently the only DRM protocol implemented by Australian broadcasters is Microsoft PlayReady.

11 References

Reference	Title	Designation
[1]	Digital television – Terrestrial broadcasting – Characteristics of digital terrestrial television transmissions	AS 4599.1-2015
[2]	Information Technology—Generic coding of moving pictures and associated audio information, Part 6: Extensions for DSM-CC.	AS/NZS 13818-6
[3]	Specification for Service Information (SI) in DVB systems	ETSI EN 300 468 V1.17.1 (2022-10)
[4]	Implementation and usage of Service Information (SI)	ETSI TS 101 211 V1.13.1 (2021-05)
[5]	Hybrid Broadcast Broadband TV	ETSI TS 102 796 V1.6.1 (2021-04)
[6]	DVB Signalling and carriage of interactive applications and services in Hybrid broadcast/broadband environments	ETSI TS 102 809 V1.3.1 (2017-06)
[7]	Free TV Operational Practice OP-41	Issue 8 July 2016
[8]	Free TV Operational Practice OP-44, Implementation Guide for DVB EIT Present/Following Information ($EIT_{p/f}$)	Issue 6 December 2014
[9]	Free TV Operational Practice OP-72, Implementation of Content Reference IDs by Australian Television Broadcasters	Issue 1 December 2014