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Digital Video Broadcasting (DVB); DVB Data Download Specification; Part 1: Simple Profile

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Foreword

This Technical Specification (TS) has been produced by the Joint Technical Committee (JTC) Broadcast of the European Broadcasting Union (EBU), Comité Européen de Normalisation ELECTrotechnique (CENELEC) and the European Telecommunications Standards Institute (ETSI).

NOTE: The EBU/ETSI JTC Broadcast was established in 1990 to co-ordinate the drafting of standards in the specific field of broadcasting and related fields. Since 1995 the JTC Broadcast became a tripartite body by including in the Memorandum of Understanding also CENELEC, which is responsible for the standardization of radio and television receivers. The EBU is a professional association of broadcasting organizations whose work includes the co-ordination of its members' activities in the technical, legal, programme-making and programme-exchange domains. The EBU has active members in about 60 countries in the European broadcasting area; its headquarters is in Geneva.

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Founded in September 1993, the DVB Project is a market-led consortium of public and private sector organizations in the television industry. Its aim is to establish the framework for the introduction of MPEG-2 based digital television services. Now comprising over 200 organizations from more than 25 countries around the world, DVB fosters market-led systems, which meet the real needs, and economic circumstances, of the consumer electronics and the broadcast industry.

The present document is part 1 of a multi-part deliverable covering DVB System Software Update Specification, as identified below:

Part 1: "Simple Profile";

Part 2: "Extended Profile".

Introduction

The present document defines agreements on which to base interoperability for *system software update* services and receivers. These have been selected to minimize interdependencies between the parties involved. In particular:

- It defines the signalling information that can be used to locate the transport stream containing the *system software update service* in a network via the NIT or BAT as appropriate.
- It defines the signalling information used to locate the *system software update service* in a transport stream (via the PMT).
- It defines the options for transmitting the actual *system software update service* in either a proprietary data transfer format, or a standardized 2-layer DVB data carousel (called standard update carousel from here on).

- It defines an Update Notification Table (UNT) that can be used to enhance the system software update functionality in an upward compatible way. The table provides a standard mechanism for carrying additional information, e.g. update scheduling information, extensive selection and targeting information, action notification, filtering descriptors.
- It defines a recommended format for exchanging the *system software update* data from receiver manufacturer to the network (or multiplex) operator for subsequent transmission. In case multiple receiver manufacturers share the same standard update carousel this format allows such a multi-vendor carousel to be composed from individual manufacturers contributions in a simple way.

The present document has to be seen in context with ETR 162 [3] and EN 300 468 [4] because it describes additional descriptors used for *system software update*.

1 Scope

The present document specifies a standard mechanism for signalling a software update service and the means to carry the data for such a software update service. Since receiver software is increasingly complex, such a software update service is required to guarantee the functionality of a receiver as well as to increase its functionality once deployed in the field.

The present document builds on [1], [3] and [4] for signalling and on [2] for data carriage.

The present document does not define the mandatory character of this protocol in a specific context, and it does not exclude the use of proprietary mechanisms for doing a software update. This allows a network to support horizontal market model receivers (e.g. MHP receivers). Equally it allows receivers requiring a software update service to be deployed in a network independent way.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication and/or edition number or version number) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, the latest version applies.

- [1] ISO/IEC 13818-6 (1998): "Information technology - Generic coding of moving pictures and associated audio information - Part 6: Extensions for DSM-CC".
- [2] ETSI EN 301 192 (V1.2.1): "Digital Video Broadcasting (DVB); DVB specification for data broadcasting".
- [3] ETSI ETR 162: "Digital Video Broadcasting (DVB); Allocation of Service Information (SI) codes for DVB systems".
- [4] ETSI EN 300 468: "Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems".
- [5] IEEE 802-1990: "IEEE Standard for Local and Metropolitan Area Networks: Overview and Architecture".

3 Definitions and Abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

(receiver) manufacturer: organization which assumes prime responsibility for updating this software of a receiver once deployed in the field

NOTE: Depending on legal arrangements this can also apply to service providers and other entities.

system software update: update of receiver software transmitted over the DVB systems

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

| | |
|--------|--|
| BAT | Bouquet Association Table |
| bslbf | bit string, left bit first |
| DDB | Download Data Block |
| DII | Download Info Indication |
| DSI | Download Server Initiate |
| DSM-CC | Digital Storage Media - Command and Control |
| DVB | Digital Video Broadcasting |
| EBU | European Broadcasting Union |
| ISO | International Organization for Standardization |
| LSB | Least Significant Bit |
| MHP | Multimedia Home Platform |
| MPEG | Moving Pictures Expert Group |
| MSB | Most Significant Bit |
| NIT | Network Information Table |
| OUI | Organization Unique Identifier |
| PMT | Program Map Table |
| PSI | Program Specific Information |
| SI | Service Information |
| TS | Transport Stream |
| uimsbf | unsigned integer most significant bit first |
| UNT | Update Notification Table |

4 Types of system software update services

The present document allows three different formats of *system software update* services:

- 1) Proprietary format streams.
- 2) Standard update carousel (potentially shared between manufacturers).
- 3) Update Notification Table based system software update services.

The `data_broadcast_id_descriptor` identifies the *system software update* stream. System software update services can contain data of one or multiple receiver manufacturers.

In case of (1) it is the responsibility of the receiver manufacturers potentially sharing the update service to identify their organization's stream, or the stream can be uniquely identified as being specific to a receiver manufacturer through the `data_broadcast_id_descriptor`.

In case of (2) the standard carousel contains the identification of the receiver manufacturer.

In case of (3) selection information is passed in one or more specific UNTs optionally carrying multiple selection and targeting descriptors. This or these tables are referenced in the PMT.

5 Network (SI) Signalling

The linkage descriptor with the linkage type of 0x09 (*system software update* service) conveys the location of the transport stream carrying a *system software update* service within a network or bouquet respectively. This descriptor shall be carried in the first loop of the NIT or in the first loop of a specifically identified BAT (called *system software update* BAT from here on).

The *system software update* BAT is identified by the *system software update* bouquet_id 0xFF00, and if the country_availability_descriptor is used, the country code applicable should be 902 (all countries). This allows a receiver to quickly identify it. If the *system software update* BAT is carried in the transport stream of a network it shall be the same as in any other transport stream of that network carrying the system software update BAT.

NOTE: The preferred positioning of this descriptor is in the NIT. On large networks which operate in a partitioned way (typical for satellite) it may be prohibitive to carry this descriptor in the NIT (e.g. due to size constraints of the NIT), in which case carriage in the *system software update* BAT is appropriate.

If OUIs (plus additional selector bytes) are listed in the linkage_descriptor the list of OUIs shall be complete in that it shall convey information about all software upgrades conveyed on the respective service. This allows a receiver to conclusively detect that it may *not* have to further explore a service. A specific OUI with value 0x00015A has been reserved by DVB. This OUI might be used for other purposes despite the System Software Update described in the present document. Within the scope of the present document it is used to signal that the data_broadcast_id_descriptor does not signal any specific OUI. In that case further selection information shall be carried either in the standard data carousel or the Update Notification Table as referenced in the descriptor. If the DVB OUI is used only this single OUI shall be contained in the loop of the data_broadcast_id descriptor. There can be multiple descriptors in the NIT or system software update BAT to allow multiple system software update services to be identified. It is specifically not the intention to remove this descriptor from the NIT or BAT in case of temporary absence of the service. For this purpose specific organization identification (OUI) shall not be removed from this descriptor in case of temporary absence of a *system software update* service for receivers of identified organization.

5.1 Linkage descriptor for systems software update

Table 1: Syntax for the private data bytes for linkage type 0x09

| Syntax | No. of bits | Identifier |
|--|-------------|------------|
| System_software_update_link_structure(){ | | |
| OUI_data_length | 8 | uimsbf |
| for (i=0; i<N; i++){ | | |
| OUI | 24 | bslbf |
| selector_length | 8 | uimsbf |
| for (j=0; j<N; j++){ | | |
| selector_byte | 8 | uimsbf |
| } | | |
| } | | |
| for (i=0; i<N; i++){ | | |
| private_data_byte | 8 | uimsbf |
| } | | |
| } | | |

Semantics of the private data bytes for linkage type 0x09:

OUI_data_length: This field specifies the total length in bytes of the following OUI-loop.

OUI: This is a 24-bit field containing an IEEE OUI (as described in IEEE 802-1990 [5]) of the organization providing a system software update service on the transport-stream/service. DVB has defined OUI 0x00015A to signal that the stream is from any OUI.

selector_length: This 8-bit field specifies the total length in bytes of the following selector field.

selector_byte: This field provides information additional to the OUI that can be used by a receiver to locate and identify the *system software update* service, e.g. model type or ranges. The syntax and semantics of the selector field are defined by the organization owning the OUI.

private_data_byte: This is an 8-bit field, the value of which is privately defined.

6 PSI signalling

The PMT of the transport stream carrying *system software update* data shall contain the `data_broadcast_id` descriptor with the data broadcast id of 0x000A to indicate the elementary stream used for the *system software update* service.

The descriptor is considered essential for the location of a *system software update* service in all of the following cases:

- The descriptor provides an entry point to a proprietary stream.
- The descriptor provides the entry point to a standard two-layer data carousel without further reference from a table.
- The descriptor provides the reference to an Update Notification Table.

In these cases this descriptor shall be present on a "semi-static" basis: i.e. the identification of the *system software update* service operator shall not be removed from the PMT if there is presently no *system software update* service, but it is expected that there will be in the near future.

The descriptor may contain specific OUIs (plus selector bytes), in which case the list of OUIs (plus selector bytes) shall be complete.

A specific OUI with value 0x00015A has been reserved by DVB. This OUI might be used for other purposes despite the System Software Update described in the present document. Within the scope of the present document it is used to signal that the `data_broadcast_id_descriptor` does not signal any specific OUI. In that case further selection information shall be carried either in the standard data carousel or the Update Notification Table as referenced in the descriptor. If the DVB OUI is used only this single OUI shall be contained in the loop of the `data_broadcast_id` descriptor. There can be multiple descriptors in the NIT or *system software update* BAT to allow multiple *system software update* services to be identified. So it is specifically not the intention to remove this descriptor from the NIT or BAT in case of temporary absence of the service. For the same purpose specific organization identification shall not be removed from this descriptor in case of temporary absence of a *system software update* service for receivers of identified organization.

Where a separate standard update carousel is used for each OUI (plus applicable selector bytes), the `data_broadcast_id_descriptor` in the PMT shall contain the single OUI (plus selector bytes) for each component. This allows vendor unique identification of proprietary format streams and provides for additional convenience for the receiver in the process to identify the appropriate elementary stream in case there is only one applicable option.

It should be noted that the `data_broadcast_id_descriptor` for a *system software update* service is defining a single elementary stream. A single program can encompass multiple elementary streams and thus multiple *system software update* streams (carousels), each of which shall be described by its own `data_broadcast_id_descriptor`. A system software update stream can also be carried as a component of another service, which may simplify network management.

6.1 Data broadcast id descriptor selector byte definition for *system software update*

data_broadcast_id: This field shall be set to 0x000A to indicate a *system software update* service (see ETR 162 [3]).

selector_byte: The selector bytes shall convey the *system_software_update_info* structure which is defined in table 2.

Table 2: Syntax for the *system_software_update_info* structure

| Syntax | No. of bits | Identifier |
|--------------------------------|-------------|------------|
| system_software_update_info(){ | | |
| OUI_data_length | 8 | uimsfb |
| for (i=0; i<N; i++){ | | |
| OUI | 24 | bslbf |
| reserved | 4 | |
| update_type | 4 | |
| reserved | 2 | |
| update_versioning_flag | 1 | |
| update_version | 5 | |
| selector_length | 8 | uimsbf |
| for (j=0; j<N; j++){ | | |
| selector_byte | 8 | uimsbf |
| } | | |
| } | | |
| for (i=0; i<N; i++){ | | |
| private_data_byte | 8 | uimsbf |
| } | | |
| } | | |

Semantics of the id_selector bytes for data_broadcast_id 0x000A:

OUI_data_length: This field specifies the total length in bytes of the following OUI-loop.

OUI: This is a 24-bit field containing an IEEE OUI (as described in IEEE 802-1990 [5]) of the organization providing a system software update service on the transport-stream/service. DVB has defined OUI 0x00015A to signal that the stream is from any OUI.

update_type: This is a two-bit field defining the type of the system software update service as indicated in table 3.

Table 3: Update-type

| Value | Description |
|---------|--|
| 0x0 | proprietary update solution |
| 0x1 | standard update carousel (i.e. without notification table) via broadcast |
| 0x2 | system software update with notification table (UNT) via broadcast |
| 0x3 | system software update using return channel with UNT |
| 0x4-0xF | reserved for future use |

update_versioning_flag: If it is 0 no relevant versioning information is carried in the version field. If it is 1 the version field **shall** reflect changes in the system software update service component.

update_version: The version shall be incremented on each change of the update. If the update_versioning_flag is set to 1 and the update_type is 01 (UNT) then the update_version field shall be the same as the version_number in the UNT section header.

selector_length: This 8-bit field specifies the total length in bytes of the following selector field.

selector_byte: This is an 8-bit field. The sequence of selector_byte fields specifies the selector field. This field provides information additional to the OUI that can be used by a receiver to locate and identify the *system software update* service, e.g. model type or ranges. The syntax and semantics of the selector field are defined by the organization identified by the OUI.

7 Standard data carousel layout for *system software update* services

7.1 Structure of the standard update carousel

The proposed protocol is based on the DSM-CC data carousel specification (ISO/IEC 13818-6 [1]) and the specification of DVB data carousels (EN 301 192 [2]).

Multiple *system software updates* of multiple manufacturers are transmitted as groups in a two-layered Data Carousel. The DownloadServerInitiate message (DSI) is used as the entry point in the carousel and is shared by multiple manufactures. One manufacturer can have multiple updates, each update in a separate group.

It is assumed that all groups and modules can be transmitted on a shared elementary stream.

The DownloadServerInitiate message describes the downloads (groups) with the GroupInfoByte (gi) field. The GroupInfoByte field consists also of a loop of descriptors that may contain miscellaneous information. The compatibilityDescriptor of the DSI message is located in the GroupInfoIndication field and allows the identification of the manufacturer (using the IEEE OUI).

Only the DSI is shared by multiple manufacturers, all data in a group will typically belong to one manufacturer.

Figure 1 illustrates the proposed protocol. In the figure, manufacturer A has one active update and one non-active (i.e. scheduled / announced) update (empty group).

Manufacturer B has one active update.

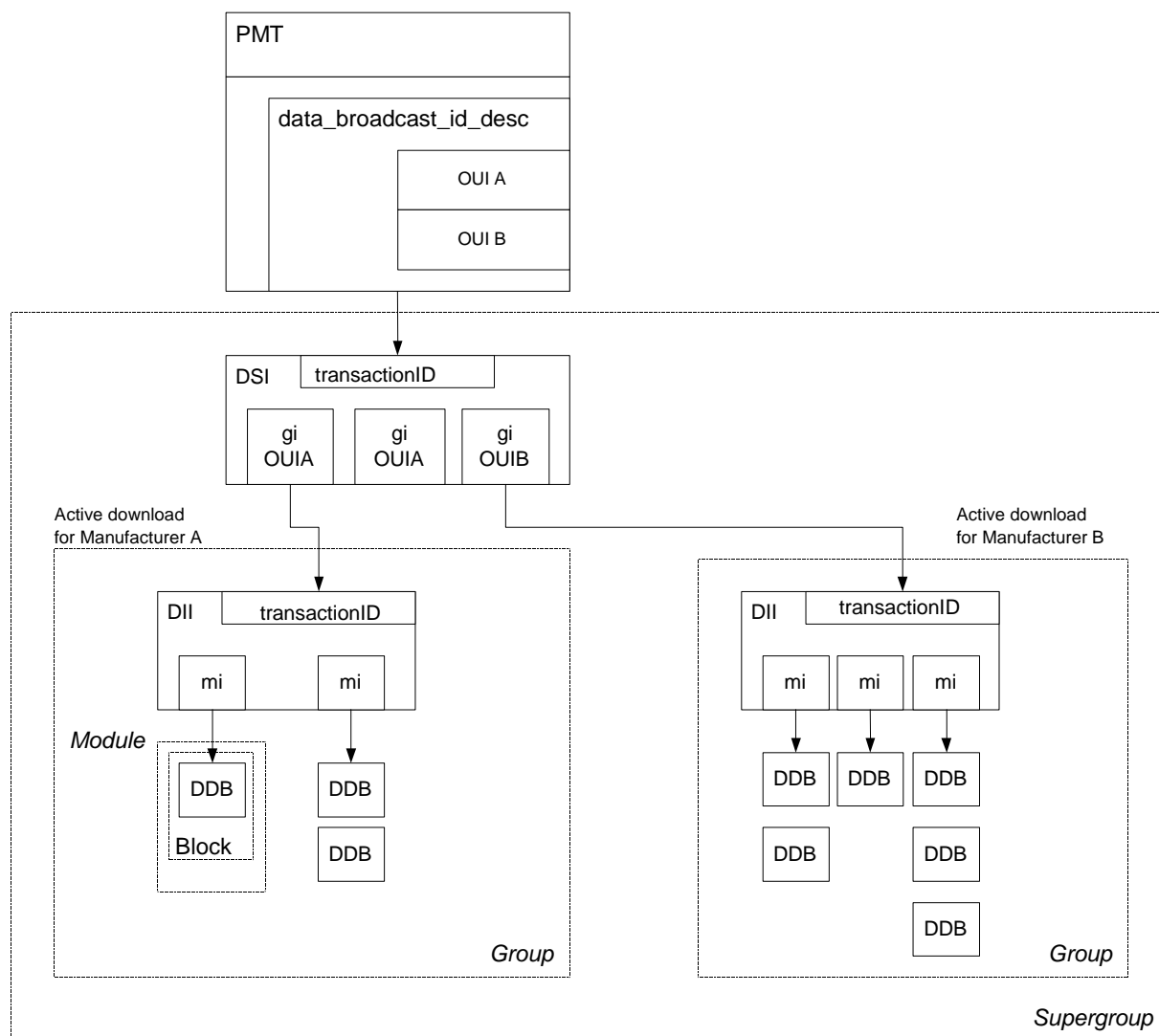


Figure 1: Multiple updates in a two-layered Data Carousel all sharing the same elementary stream

A data_broadcast_id_descriptor in the PMT is used to signal the presence of one or more *system software updates*, of one or more manufacturers.

7.1.1 DownloadServerInitiate message (DSI)

The DownloadServerInitiate message (DSI) is used as the entry point in the carousel and can be shared by multiple manufacturers. One manufacturer can have multiple updates, each update in a separate group.

It is assumed that all groups and modules can be transmitted on a single elementary stream.

The DownloadServerInitiate (DSI) message carries the compatibilityDescriptor in the GroupCompatibility field of the GroupInfoIndication structure to allow the identification of the manufacturers group (download) using the IEEE OUI. The GroupInfoByte (gi) field of the GroupInfoIndication structure can consist of a loop of descriptors that contain miscellaneous information for each group.

In order to allow for multiple updates to be generated independent from each other and transmitted on the same carousel, specific assignment rules for some particular fields are given in annex C.

transactionId: The two least significant bytes of a DSI's transactionId shall be in the range 0x0000-0x0001. The least significant bit of actual transaction ID changes every time there is a change to the underlying carousel structure (i.e. a group is added, changed or removed) as specified in [2].

The two most significant bytes (bits 31..16) contain a number which identifies the carousel version and can be used to detect version changes.

serverId: This field shall be set to 20 bytes with the value of 0xFF.

compatibilityDescriptor(): This structure shall only contain the compatibilityDescriptorLength field of the CompatibilityDescriptor() as defined in DSM-CC (see ISO/IEC 13818-6 [1]). It shall be set to the value of 0x0000.

The privateDataByte fields shall contain the GroupInfoIndication structure as defined below:

privateDataLength: This field defines the length in bytes of the following GroupInfoIndication structure.

privateDataByte: These fields shall convey the GroupInfoIndication structure as defined in table 4.

Table 4: GroupInfoIndication structure

| Syntax | Num. of Bytes | Remarks |
|---|---------------------------------|---|
| GroupInfoIndication() { NumberOfGroups for (i = 0; i < NumberOfGroups; i++) { GroupId GroupSize GroupCompatibility GroupInfoLength for (i=0; i<N; i++) { GroupInfoByte } PrivateDataLength for(i=0;i< privateDataLength;l++) { PrivateDataByte } } } | 2 4 4 2 1 2 1 | number of updates (maximum 150) not used |

Table 5: CompatibilityDescriptor

| Syntax | Num. of Bytes | Remarks |
|--|---|---|
| CompatibilityDescriptor() { CompatibilityDescriptorLength DescriptorCount for (i = 0; i < descriptorCount; i++) { descriptorType descriptorLength specifierType SpecifierData model version subDescriptorCount for (j = 0; j < subDescriptorCount; j++) { subDescriptor() } } } | 2 2 1 1 1 3 2 2 1 | 0x01 (IEEE OUI) IEEE OUI as described in IEEE 802-1990 [5] is equal to 0 if the model is transmitted in a manufacturer private location is equal to 0 if the version is transmitted in a manufacturer private location not used |

Table 6: DescriptorType

| DescriptorType | Description |
|----------------|-------------------------------|
| 0x00 | Pad descriptor |
| 0x01 | System Hardware descriptor. |
| 0x02 | System Software descriptor. |
| 0x03- 0x3F | ISO/IEC 13818-6 [1] reserved. |
| 0x40- 0xFF | Private use. |

Semantics of the GroupInfoIndication structure:

numberOfGroups: This is a 16-bit field that indicates the number of groups described in the loop following this field.

Applying the procedure described in annex C, with the LSB of the counter position of the groupInfo within the groupInfo loop (the download number) is copied to the MSB of the moduleId, the maximum number of downloads is limited to 255, which is more than sufficient for a MPEG-2 transport format.

groupId: This is a 32-bit field which shall be equal to the transactionId of the DownloadInfoIndication message that describes the group.

Applying the procedure described in annex C, the id part is the same as the counter position of the groupInfo within the groupInfo loop (the download number). The download number is in the range 1 to NumberOfGroups. The range starts at 1 to meet the requirement that at least one bit in the least significant bits 1 to 15 of the DII transactionId has to be 1.

groupSize: This is a 32-bit field that shall indicate the cumulative size in bytes of all the modules in the group.

groupCompatibility: The GroupCompatibility structure is equal to the CompatibilityDescriptor structure of DSM-CC. The CompatibilityDescriptor should contain a system hardware descriptor containing the OUI that is equal to the OUI present in the system_software_update_info structure of the data_broadcast_id_descriptor in the PMT. If multiple updates of the same manufacturer are present, the model and version fields in the system hardware descriptor and the system software descriptor can be used by the receiver to select the correct stream. Only descriptors of descriptorType System Hardware descriptor and System Software descriptor are used.

groupInfoLength: This is a 16-bit field indicating the length in bytes of the descriptor loop to follow.

groupInfoByte: Not defined in the present document.

privateDataLength: This field defines the length in bytes of the following privateDataByte fields.

privateDataByte: These fields are not used.

7.1.2 DownloadInfoIndication Message (DII)

The DII message provides information about all the modules that are part of the download scenario. The DII message shall follow the syntax as specified in [1], table 7-6.

In order to allow for multiple updates to be generated independent from each other and transmitted on the same carousel, specific assignment rules for some particular fields are given in annex C.

transactionId: For DownloadInfoIndication messages the id part of the transactionId shall be in the range 0x0002-0xFFFF to differentiate it from a DownloadServerInitiate messages.

The transactionId is equal to the groupId (group number) in the corresponding groupInfo structure in the DSI.

downloadId: is equal to the transactionId.

Semantics of the moduleInfo structure:

moduleId: field is an identifier for the module that is described here further.

Applying the procedure described in annex C,

Bits 15..8 - has the same value as the LSB of groupId in the corresponding groupInfo structure in the DSI referencing this particular download.

Bits 7..0 - is the moduleId of a particular download, supporting 256 modules.

The maximum number of modules in this case is limited to 256, which can be considered as sufficient for system software update.

moduleVersion: field is the version of the described module.

Applying the procedure described in annex C, this value is also reflected in the LSB of the transaction id in the corresponding groupInfo structure in the DSI referencing this particular download.

7.1.3 DownloadDataBlock Message (DDB)

The DDB message is used to convey module payloads. The message syntax shall be as specified in [1], table 7-7. The DSM-CC section syntax shall follow that defined in [1], table 9-2 and clause 9.2.2.1.

moduleId: is equal to the moduleId of the module to which this block belongs.

moduleVersion: is equal to the moduleVersion in the DII moduleInfo structure of the module to which this block belongs.

blockNumber: identifies the position of the block within the module. Block number 0 shall be the first block of a module.

7.2 Standard data carousel descriptors

7.2.1 SSU module type descriptor

The SSU_type_descriptor contains the type of the SSU module.

Table 7: Syntax of SSU_type_descriptor

| Syntax | No. of bytes | Remarks |
|--------------------|--------------|---------|
| Type_descriptor(){ | | |
| Descriptor_tag | 1 | 0x0A |
| Descriptor_length | 1 | |
| SSU_module_type | 1 | |
| } | | |

Semantics of the type_descriptor:

descriptor_tag: This 8-bit field identifies the descriptor. For the SSU type descriptor it is set to 0x0A.

descriptor_length: This 8-bit field specifies the number of bytes of the descriptor immediately following this field.

SSU_module_type: This is an 8-bit field, types are describes as following:

- 0x00 : executable module type;
- 0x01 : memory mapped code module type;
- 0x02 : data module type;
- 0x03 to 0xFF reserved for future use.

Annex A (normative): Repetition rates for DSI and DII messages

The DSI and each DII shall be repeated at least every 5 seconds.

Annex B (informative): Locating the appropriate system software update service

The NIT/BAT, PMT, and the standard update carousel or Update Notification Table define a hierarchy of selection mechanisms so as to allow a receiver to locate and identify the appropriate system software update service.

First a receiver should attempt to locate the appropriate transport stream in a network by examining the NIT and (if available) the system software update BAT. The NIT or BAT may contain OUI unspecific linkage descriptors or multiple instances of descriptors identifying the receivers OUI. Further exploration of each of the remaining candidate services will be required.

The PMT of each system software update service may contain specific OUIs, in which case the receiver can conclude if the service is relevant, i.e. system software update data for it is currently and/or will in the near future be broadcasted. It is possible that the relevant signalling in the PMT did not identify any specific OUI(s) relating to a system software update service and refers to a standard update carousel. If this is the case then the group compatibility descriptor contained in the DSI shall contain OUIs for all organizations for which this system software update service is relevant. It may be the case that at this point in time system software update data for some (or even all) OUIs listed is not actually available. However, the rule is still valid as it allows a receiver to determine if this system software update service is relevant. This allows a receiver to constrain scanning for available system software updates to a single service after initial scan.

NOTE 1: In any case there may be multiple locations for the receivers system software update if the selector bytes do not provide additional identification for the receiver to distinguish between multiple system software update services addressing its OUI. Also the location of a system software update service for a receiver may move or may be cancelled. The receiver should be robust against this.

NOTE 2: Only in case a standard update carousel is identified with a single OUI a receiver may be able to identify its system software update service component as exclusive (i.e. no sharing with other manufacturers).

Annex C (informative): Recommendations for transferring *system software update* service data from receiver manufacturer to network operator

In order to allow for multiple downloads to be transmitted on the same elementary stream, specific assignment needs to be applied for particular fields, proposed in the following clauses. Main purpose is to avoid overlap between Groups (=downloads) without any need for pre-agreement, i.e. one-layer carousels can be created independently and assembled into a two-layer carousel at some later point. Just to be clear, this is additional profiling proposed for DVB System Software Update and not interpretation of the existing DVB Data Carousel specification. When the transport format in use is MPEG-2, the DSI is encapsulated in a single MPEG-2 section. Thus the number of Groups is limited by the size of this and allows approximately 150 Groups to be described depending upon the level of detail for the description of each Group.

Using 8 bits of the `moduleId` field (MSB) to map to 8-bits in the identification sub-field (LSB) of the `transactionId` would then allow 255 groups, which fits nicely with the ≈ 150 maximum described above. This leaves 8-bits of the `moduleId` (LSB) for discriminating between Modules related to each Group - as linked by the other 8-bits of the `moduleId` as described above.

The `moduleVersion` could also be used to link changes in the download by mapping to 8-bits in the version sub-field of the `transactionId` (LSB).

The file delivered from the manufacturer to the broadcaster should preferably be in transport stream format (i.e. a sequence of 188 bytes long MPEG-2 TS packets). The manufacturer takes care of generating the file with a full continuity counter run through or the broadcaster has to ensure proper remultiplexing in this respect, which means some further arrangement is necessary between manufacturer and broadcaster. All other fields in the transport packet can be considered as uncritical and can be easily replaced by remultiplexing. Normative repetition rates of the DSI and DIIs are defined in annex A.

Annex D (informative): Bibliography

- ETSI ETR 289: "Digital Video Broadcasting (DVB); Support for use of scrambling and Conditional Access (CA) within digital broadcasting systems".
- Implementation guidelines for use of telecommunications interfaces in the Digital Broadcasting systems (DVB Project Office).

History

| Document history | | |
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