

TLN WRO Specification type Document

< Requirement specification for AO
interconnection on TLN VHE to enable usage
of TLN ROTV/AIDTV >



Document Housekeeping

Document Category and type

CAT	TYPE	DOC ID	Comment
(i)DTV	SPEC	TLN-WRO-TA-I-S-PAAG	Specification type documents (-SPEC) are documents specifying logical / physical interfaces / protocols, etc., to which AO equipment/systems need to comply

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List of Appendixes

This document may refer to further detailed documents that are added in Appendixes to this document.

A reference to an appendix is in this document highlighted with grey background.

The list with appendixes of this document:

- A. Appendix A, <APP-I-C-PAAG-A> contains :
 - 1) Appendix A1 - : Telenet PSISl v18.pdf
 - 2) Appendix A2 - : Serviceplan idtv.xls
- B. Appendix B, <APP-I-C-PAAG-B> contains :
 - 3) Appendix B1 - Osm_DownloadDescriptorProposal 0 1
- C. Appendix C, <APP-I-C-PAAG-C> contains :
 - 1) Appendix C1 - <CAS to DVB-C interaction TLN specifics>>

The appendix(es) referred to in this section List of Appendixes, contain(s) detailed technical information which is only relevant when a Beneficiary enters in a concrete implementation project to become Beneficiary of the Telenet Reference Offer and/or Annex.

List of References

This document may refer to external documents or information sources.

A reference to an external document or information source is in this document highlighted with grey background.

The list of referred external documents or information sources in this document:

Reference 1 : TLN WRO CAT: (i)DTV : TLN-WRO-TA-I-C-PAAG

Reference 2 : TLN WRO CAT: (i)DTV : TLN-WRO-TA-I-C-PDAA

Restricted information

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1 **Abstract**

This document describes the major DVB-C interconnection building blocks an AO must implement towards the TLN VHE in order to be able to successfully interoperate with the TLN ROTV. Each required building block is briefly described explaining it's expected functional behavior.

This document has a corresponding certification document with reference: **TLN-WRO-TA-I-C-PAAG** which is used to test AO WO equipment compliance against this specification.

The feasibility of the technical designs and methods described in this document are subject to verification by a Proof of Concept (POC) test organized by Telenet and may be changed or updated depending on the outcome of this POC.

2 Glossary and Abbreviations

BER: Bit Error Rate
CA: Conditional Access
CWDM: Coarse Wavelength Division Multiplexing
CAT: Conditional Access Table
CPPS: CAS Proxy Provisioning Server
DEMUX: De-Multiplexer
DRM: Digital Right Managements
EIT: Event Information Table
EMC: Entitlement Management Control
EMM: Entitlement Management Message
EPG: Electronic Program Guide
ETSI: European Telecommunications Standards Institute
HFC: Hybrid Fiber Coax
IPTV: Internet Protocol Television
MHP: Multimedia Home Platform
MPEG: Moving Picture Experts Group
MPTS: Multi-program Transport Stream
MUX: Multiplexer
NCP: Network Control Platform
NIT: Network Information Table
NIU: Network Interface Unit
OAM: Operations and Maintenance
PAT: Program Association Table
PMT: Program Map Table
POI: Point of interconnect
PPV: Pay per view
PSI: Program Specific Information
QAM: Quadrature Amplitude Modulation
RPOI: Regional Point of interconnect
SC: Smartcard
SDI: Serial Digital Interface
SDT: Service Description Table
SI: Service Information
SMS: Subscriber Management System
SPTS: Single Program Transport Stream
VHE: Video Head-end
VoD: Video on Demand
IEC: EPG Ingest Control

3 Telenet DVB-C VHE Interconnection Functional Description

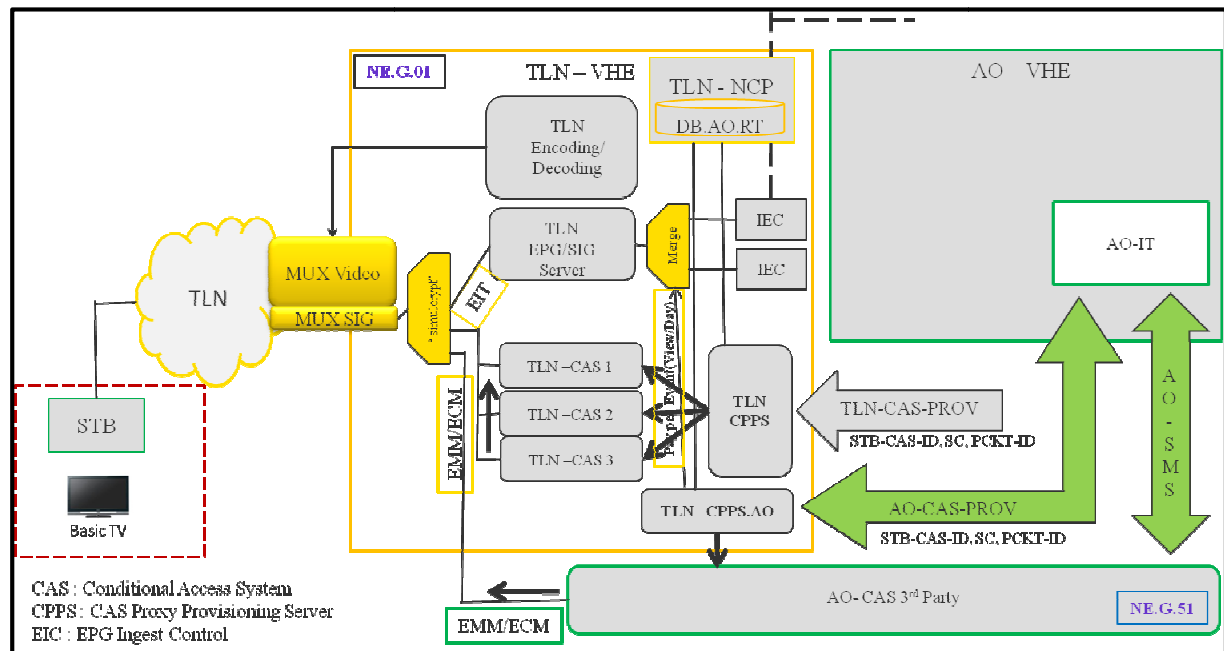


Figure 3-1

- (1) The TLN VHE is the main building block generating DVB-C signaling, providing CA and multiplexing services for STB's to play digital TV streams. It includes the essential parts to realize a complete DVB-C broadcast video streaming solution such as EPG, CA systems, Encoding/Decoding and multiplexing units. The AO VHE will need to be connected to TLN VHE to enable the AO to use the ROTV and to deliver CA services to AO customers by using the TLN VHE infrastructure. The AO 3rd party CA connection towards TLN VHE enables delivery of CA encryption services that will be "simul-crypted" by the TLN VHE.

4 Telenet DVB-C VHE Interconnection Functional Requirements

4.1 General

- (2) The TLN VHE provides encoding, multiplexing, service signalling and CA services for the complete offer of digital TV services on the Telenet Network. Before an AO can make use of the TLN ROTV it needs to implement a number of service interfaces towards the TLN VHE, such as the CA system interface (via 3rd party CA system).

4.2 Injection of CA messages into DVB-C signalling

4.2.1 General

- (3) The AO 3rd party CA system is connected to the TLN VHE via a DVB-C signalling interface carrying EMM/EMC messages as well as to the TLN-CPPS AO unit for STB service provisioning over a secure IP link.

4.2.2 DVB-C normative reference

- (4) In order to achieve compliance with the TLN ROTV specification, it is necessary to conform to the standards and other works as indicated below, in addition to the other requirements of this specification. Notwithstanding, intellectual property rights may be required to use or implement such normative references.
- (5) The referenced public domain standardization documents can be found at [:http://docbox.etsi.org/Reference](http://docbox.etsi.org/Reference).
- [1] CENELEC EN 50083-9: "Cable networks for television signals, sound signals and interactivitieservices; Part 9: Interfaces for CATV/SMATV headends and similar professional equipment forDVB/MPEG-2 transport streams"; Annex B: "Asynchronous Serial Interface".
 - [2] ETSI TS 103 197 (V1.2.1): "Digital Video Broadcasting (DVB); Head-End Implementation of DVB Simulcrypt".
 - [3] ISO/IEC 13818-2: "Information technology; Generic coding of moving pictures and associated audio information: Video".
 - [4] ISO/IEC 13818-3: "Information technology; Generic coding of moving pictures and associated audio information - Part 3: Audio".
 - [5] ETSI TS 103 197 (V1.4.1): "Digital Video Broadcasting (DVB); Head-end implementation of DVB SimulCrypt".

4.2.3 TLN implementation specifics

- (6) Telenet requires that the 3rd party CA system vendor / operator is a vendor with a proven track record in DVB-C smart card based Conditional Access or alternative smartcard less implementations. Telenet will not impose a particular CA system vendor as long as the chosen one is capable of meeting the specifications.
- (7) The TLN implementation is DVB-C standards based, but nevertheless TLN wants to highlight following specific implementation aspects :
 - Extensive use of the DVB-C SimulCrypt capabilities due to the presence of multiple CA systems on the TLN DVB-C infrastructure
 - Presence of a card-less CA system in parallel with card based CA systems leading to complex signaling schemes
- (8) The detailed specifications of the TLN implementation specifics can be found in appendix C1.

4.3 DTV MPTS Services

4.3.1 General

- (9) The role of this VHE component is to perform packet multiplexing of input data, and to output an MPEG-2 / MPEG 4 transport stream. The input data can be transport packets, MPEG sections or raw data.

4.3.2 DVB-C normative reference

- (10) In order to achieve compliance with the TLN ROTV specification, it is necessary to conform to the standards and other works as indicated below, in addition to the other requirements of this specification. Notwithstanding, intellectual property rights may be required to use or implement such normative references.

- (11) The referenced public domain standardization documents can be found at :

- http://www.dvb.org/technology/standards/a038_DVB-SI_dEN300468v1.12.1.pdf
- http://www.etsi.org/deliver/etsi_en/300400_300499/300468/01.07.01_60/en_300468v010701p.pdf
- [1]“Digital Video Broadcasting (DVB); Specification for Service Information (SI) in DVB systems

4.3.3 TLN implementation specifics

- (12) TLN provides read access to DVB-C signalling information (NIT, DVB-C Mux frequency map, DVB-C MUX service map,) in order to allow AO STB's to “tune” into the correct MUX and select the correct MPTS services for decoding by its STB/SC in function of its end-user channel selections.
- (13) DVB Service information (SI) is an enhancement of MPEG PSI (Program Specific Information). It provides extra information which the receiver (STB) can use. The primary link between DVB SI and MPEG is the PSI in MPEG and is contained primarily in the (PAT, PMT, CAT etc.) set of tables.
- (14) The TLN VHE system generates SI tables which are broadcast towards the STB population. There are two types of PSI/SI descriptors, mandatory and optional. Mandatory means it will always be transmitted; Optional means that it will only be transmitted when applicable. Besides general PSI/SI descriptors, TLN also uses some private descriptors like “Network oriented private descriptor” and “Service oriented private descriptor” etc. All these specification are detailed in **appendix A1**.

4.3.4 TLN DTV MPTS services overview

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4.3.5 TLN statistical multiplexing practices

- (15) In digital audio and video broadcasting, a statistical multiplexer is a content aggregating device that allows broadcasters to provide the greatest number of audio or video services for a given bandwidth by sharing a pool of fixed bandwidth among multiple services or streams of varying bitrates. The multiplexer allocates to each service the bandwidth required for its real-time needs so that services with complex scenes receive more bandwidth than services with less complex ones. This bandwidth sharing technique produces the best video quality at the lowest possible aggregate bandwidth.
- (16) TLN uses the above techniques at its own discretion to optimize the customer experience while also assuring the appropriate level of bandwidth consumption.

4.4 CA system to EPG interaction (PPV)

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4.5 Regional Signalling Schemes Variants

4.5.1 General

- (17) Due to historical reasons TLN has a multitude of signalling schemes in effect on different geographical areas on its cable network (ex UPC Belgium region (Brussels), ex Interkabel regions, etc...). This because the actual channel offer can differ substantially both for digital and analogue signals from one geographical area to another as well as due to support for some legacy STB's and the supported spectrum ranges on the different cable plants. This has as a consequence that the DVB-C signalling scheme information is complex and the AO STB will have to be capable of handling this complexity.

4.5.2 Regional signalling scheme variants concepts

- (18) The different regional signalling scheme variants are broadcasted globally over the entire footprint as they share a large common base across all regional areas.
- (19) The regional variants are implemented by broadcasting overlay signalling tables in the relevant areas. As such the AO STB implementation will need to assure that it will "tune" into the correct signalling scheme by implementing a location based link to its AO CRM system that holds the geographical location of the customer.

4.5.3 Regional signalling scheme variants data files

- (20) It should be noted that those signalling schemes are changed on a regular basis and that hence the provided information should only be viewed as the current snapshot at the date that the information is provided.

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4.5.4 Regional broadcast channels

- (21) It is a regulatory requirement that Telenet carries some regional channels (sometimes called the local broadcasters (e.g. ATV, Rob-TV, etc...)) that can only be broadcasted in the region they serve. Since the SI information is generated on a central location special measures are required to assure that only the right regional channels appear on the STB depending on the location of the STB.
- (22) This is done by signalling a `country_code` (in this case interpreted as a `region_id`) along with the regional channels (this is only the case for the regional channels, not for national channels). It is up to the AO STB middleware to only allow regional channels with a `country_code` that matches with the correct `region_id` that the user entered through the scanning menu.
The “`country_availability_descriptor`” is a descriptor which is only available on regional channels.
- (23) If no `country_availability_descriptor` is signalled in the `service_loop` of a `service_id`, it must not be removed from the service list ! (which is the case for all national channels).
- (24) It is the responsibility of the AO to implement the correct behavior of its STB for the regional broadcasters to be compliant with regulatory requirements, based on the signalling information available on the Telenet Network.

4.6 TLN DVB-C software download / upgrade services for AO STB's

4.6.1 General

- (25) TLN provides a DVB-C signalling and transport framework to allow AO's to download software to their STB's over the DVB-C cable network and to trigger software upgrades. This section explains the framework the AO will need to comply with to make use of this service.

4.6.2 Software download/upgrade concepts

- (26) In general an STB should accept a newly broadcasted software load if the software version is higher than the version of the software that currently exists in the STB. Some private descriptors are used to specify the way of STB software downloading and type of download. As STB commands are carried by EMM messages, the set-top box will receive them several times. In order to avoid handling of the same command twice, the sequence number field is changed each time a new command is generated on the head-end side.
- (27) TLN will enable a software download infrastructure for AO STB's according to the specifications that can be found in [appendix B1](#).

4.7 Restrictions

(28) Currently TLN has no bandwidth available to add extra AO DTV channels.

4.8 TLN Operational Procedures

(29) Telenet will execute from time to time operational changes on the VHE infrastructure. An AO making use of the TLN ROTV should be prepared at all time to adapt its infrastructure, devices and systems, as well as its operational procedures to handle those changes. In addition it is strongly recommended by TLN that AO will take this into account in the design of its solution, so that impact of future changes will be limited. Below a non exhaustive list is given, showing some examples of operational changes that TLN has executed in the past and which will be repeated likely in the future :

- Creation of new regional signalling schemes or re-organisation of existing ones
- Redistribution of MPTS services across broadcast QAMs
- Update of MPTS services transmission parameters
- Introduction of additional broadcast QAM's
- Re-allocation of broadcast QAMs in the HFC spectrum
- Changes in time schedules of regularly re-occurring events like (but not limited to) : EPG publishing windows
-

4.9 AO Device Management by TLN Requirements

(30) The applicable requirements are described in [TLN-WRO-TA-I-S-PDAA](#).

5 AO STB - Non Functional Requirements

(31) The applicable requirements are described in [TLN-WRO-TA-I-S-PDAA](#).