

# TLN WRO Architecture type Document

< High level network and service architecture  
overview of the TLN Annex Interactive Services  
(*AIDTV*) Wholesale Reference Offer >



## Document Housekeeping

### Document Category and type

| CAT    | TYPE | DOC ID              | Comment  |
|--------|------|---------------------|--|
| (i)DTV | ARCH | TLN-WRO-TA-I-A-PIAA | Architecture type documents (ARCH) mainly have an informational/explanatory purpose to highlight the overall technical set-up. |

### Document Authorization

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### Document Effective Date

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## **List of Appendixes**

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# 1 **Abstract**

This document provides a high level network and service architecture overview of the Telenet Basic TV Wholesale Reference Offer (ROTV). It describes the main building blocks and interfaces on a conceptual level.

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

AAA: Authentication, Authorization and Accounting  
AOTC: AO Testing and Compliance  
CAS: Conditional Access System  
CDN: Cable Delivery Network  
CMTS: Cable Modem Terminating System  
CPPS: CAS Proxy Provisioning System  
CRM: Content Resource Management  
CSP: Content Service Provider  
iDTV: interactive Digital Television  
ECM: Entitlement Control Message  
EIC: EPG Ingest Control  
EIT: Event Information Table  
EMM: Entitlement Management Message  
EPG: Electronic Program Guide  
HFC: Hybrid Fiber Coax  
IEC: Immediate Event Charging  
IP: Internet Protocol  
IT: Information Technologies  
MPEG: Moving Pictures Experts Group  
MPTS: MPEG Transport Stream  
MUX: Multiplexer  
NCP: Network Control Platform  
NE: Network Element  
NIU: Network Interface Unit  
OAM: Object Administration and Maintenance  
PPV: Pay per view  
SC: Smartcard  
STB: Set-top-box  
VHE: Video Head-end  
VOD: Video on Demand  
VSP: VOD Services Proxy  
WO: Wall Outlet

### 3 TLN WRO Overall Reference Architecture

This section displays in figure 1 below the overall architecture and block diagram of the Telenet Wholesale Reference Offer technical set-up. This figure is repeated in each “service specific” architecture document with as purpose to have a clear common reference and a strict application of naming conventions on building blocks and building blocks which are then further described in “specification” type documents which will allow the beneficiaries to implement the required building blocks on their end-user equipment, network and IT CRM systems.

#### Naming Conventions:

Each Network building block on the overall (General) level has a unique reference naming in the format: NE.G.xy, where xy is the number of the block. (xy <= 50 means TLN Network Element(NE) and xy >= 60 means AO NE

Each Network Building block on the overall (General) level has a unique reference naming in the format: IF.G.xy, where xy is the number of the building block.

#### Four main domains are defined:

- Wholesale Operator (TLN) domain: this is the set of all systems that are/will be present in the Telenet infrastructure to implement the TLN Wholesale reference offer. Per convention they will always be depicted as boxes with yellow borders in all documents.
- Alternative Operator (AO) domain: this is the set of all systems that are/will have to be present in the AO infrastructure to make use of the TLN Wholesale reference offer. Per convention they will always be depicted as boxes with green borders in all documents. Obviously TLN does not impose by any means how the AO should organize its own infrastructure, hence the AO domain components must be mainly seen as an example how the AO could organize its infrastructure to make use of the TLN WRO and for clarity of the TLN WRO by describing clearly the building blocks.
- Household domain: this is the set of all systems that are/will have to be present in the customer home to make use of the TLN Wholesale reference offer. Per convention they will be depicted as boxes with yellow or green borders in all documents, depending if they are TLN owned and/or provided equipments or AO owned and/or provided equipments. Obviously additional equipment may be present in the household, typically owned by the customer and where relevant for the technical explanations these equipments have been depicted as boxes with black borders. The household domain is for clarity reasons always bordered by red dotted lines. Obviously TLN does not impose by any means how the AO should organize its own household equipment, hence the AO elements in this domain components must be mainly seen as an example how the AO could organize this to make use of the TLN WRO and for clarity of the TLN WRO by describing clearly the building blocks.
- Third party domain (3<sup>rd</sup> party): this is the set of all systems that will be provided and operated by third parties on common behalf of the AO's and that require interfacing with TLN systems to enable use of the TLN Wholesale reference offer by AO. Per convention they will always be depicted as boxes with blue borders in all documents. Currently only the AO CAS system belongs to this category.

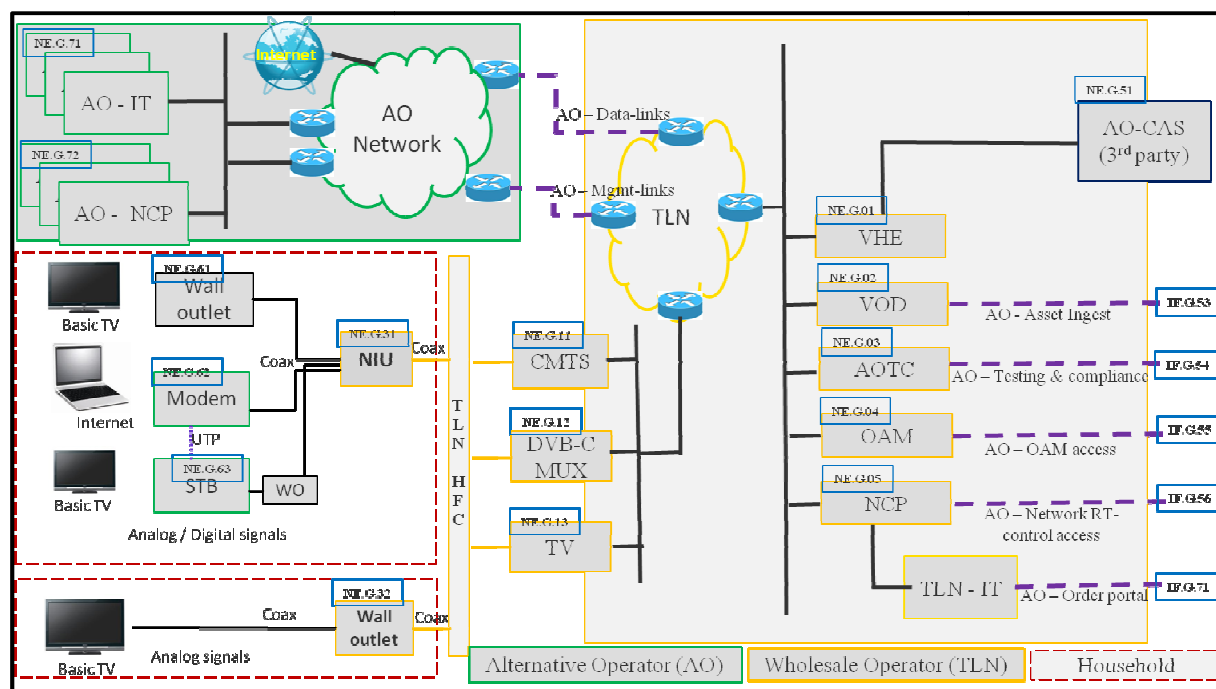


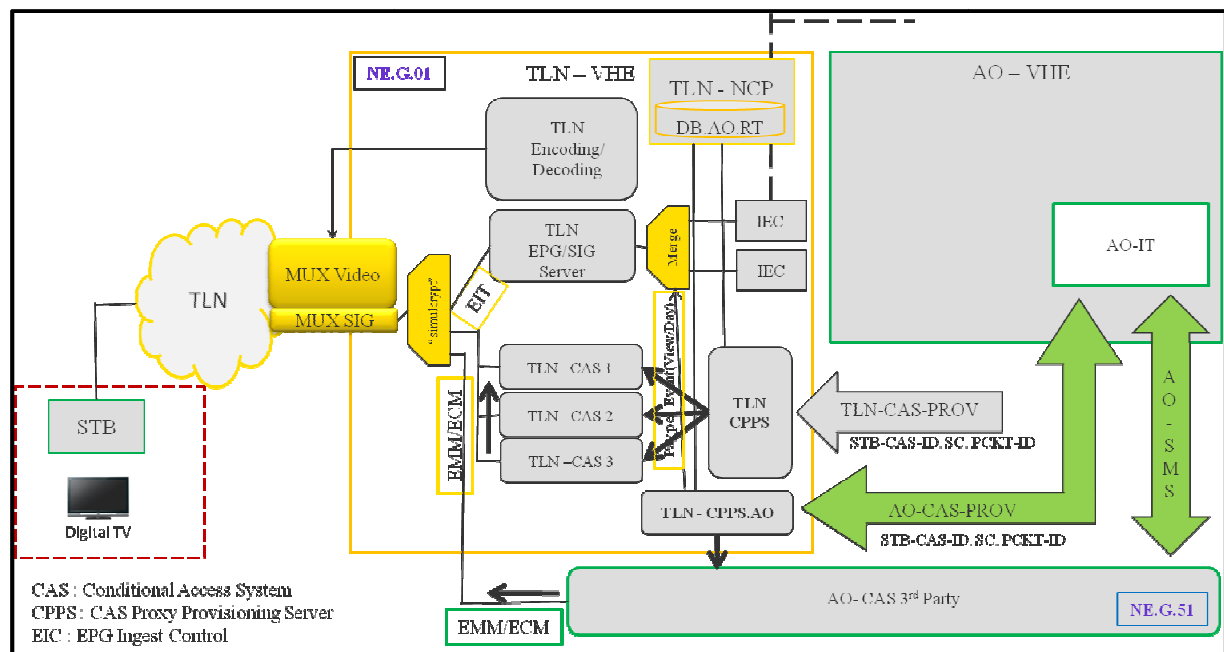
Figure 3-1



#### 4 TLN WRO Annex Interactive Services (AIDTV) Reference Architecture

- (1) This section provides a high level network and service architecture overview of the Telenet Interactive Services Annex part of the ROTV. It shows how the Interactive Digital TV part fits in the overall architecture referenced in section 3 above in this document.
- (2) Note: this document describes the interactive variant (iDTV variant) of the architecture where the AO STB's are two way STB with IP data return path. The non-interactive variant is described in the document with identification **TLN-WRO-TA-I-A-PDAA**

### Figure 4-1



4-1

## 4.1 General Approach

- (3) The generic approach (see figure above) that has been chosen is to create an architecture that enable the AO systems to take control of the business logic for its customers in its own systems and applications. The TLN Video Headend merely supports the basic secure transport and multiplexing of the video signals over the network towards the AO STB in a transparent way as such implementing on the HFC network an architecture that has a lot of similarity with the way Interactive Digital TV wholesale on a Telco DSL network is mostly realized (IP Multicast).
- (4) This approach has the advantage that Telenet interference with AO end-user functionality is minimized, offering maximum “service differentiation” freedom towards the AO’s
- (5) In addition it uses a clean virtualization approach that will allow the “hosting” of multiple AO’s on the TLN network and also limiting interferences between different AO’s.

## 4.2 Key Interactive Digital TV (iDTV) Network Elements

- (6) This section gives a brief overview of the purpose and function of some key building blocks involved in the implementation of the Interactive Services Annex part of the ROTV which have not yet been explained in the overall architecture document

### 4.2.1 VHE: Statistical Multiplexers (MUX)

- (7) The statistical multiplexers combine digital video streams with variable bit rate characteristics, received from the encoders with signaling information and CAS information into a combined MPTS streams that fits into a fixed bandwidth stream that can be transported over the HFC network towards the STB's

### 4.2.2 CAS servers and AO 3<sup>rd</sup> party CAS system

- (8) The CAS servers generate the security control messages (ENM, ECM) that allow the multiplexers to encrypt the video content streams before transmission on the network, as well as the messages that individual STB's need to decrypt these parts of the video content streams to which they are entitled, based upon their subscriptions stored in the AO CRM systems
- (9) The 3<sup>rd</sup> party CAS system performs identical functions as the TLN own CAS systems. Only one distinct 3<sup>rd</sup> party CAS system can be present that operates on behalf of all different AO's together.
- (10) The signaling output of all CAS servers is "merged" into a "simul-crypt" approach and injected into the transport streams by the multiplexers, enabling an architecture where different STB's can use different CAS system while still sharing the same content streams.
- (11) The provisioning interface to make the link between the AO CRM and the CAS systems is realized on the CPPS server. Just like towards the TLN CRM, Telenet also offers this same interface with the same capabilities to the AO CRM's enabling an efficient wholesale architecture.

### 4.2.3 EPG/Signaling server

- (12) This server generates the DVB-C signalling streams to be inserted into the multiplexers, containing information on the location of the MUX in the spectrum, the MPTS services present in a MUX and the related EPG information. The IEC also perform quality control on incoming EPG content data feeds that are typically provided by 3<sup>rd</sup> party providers.

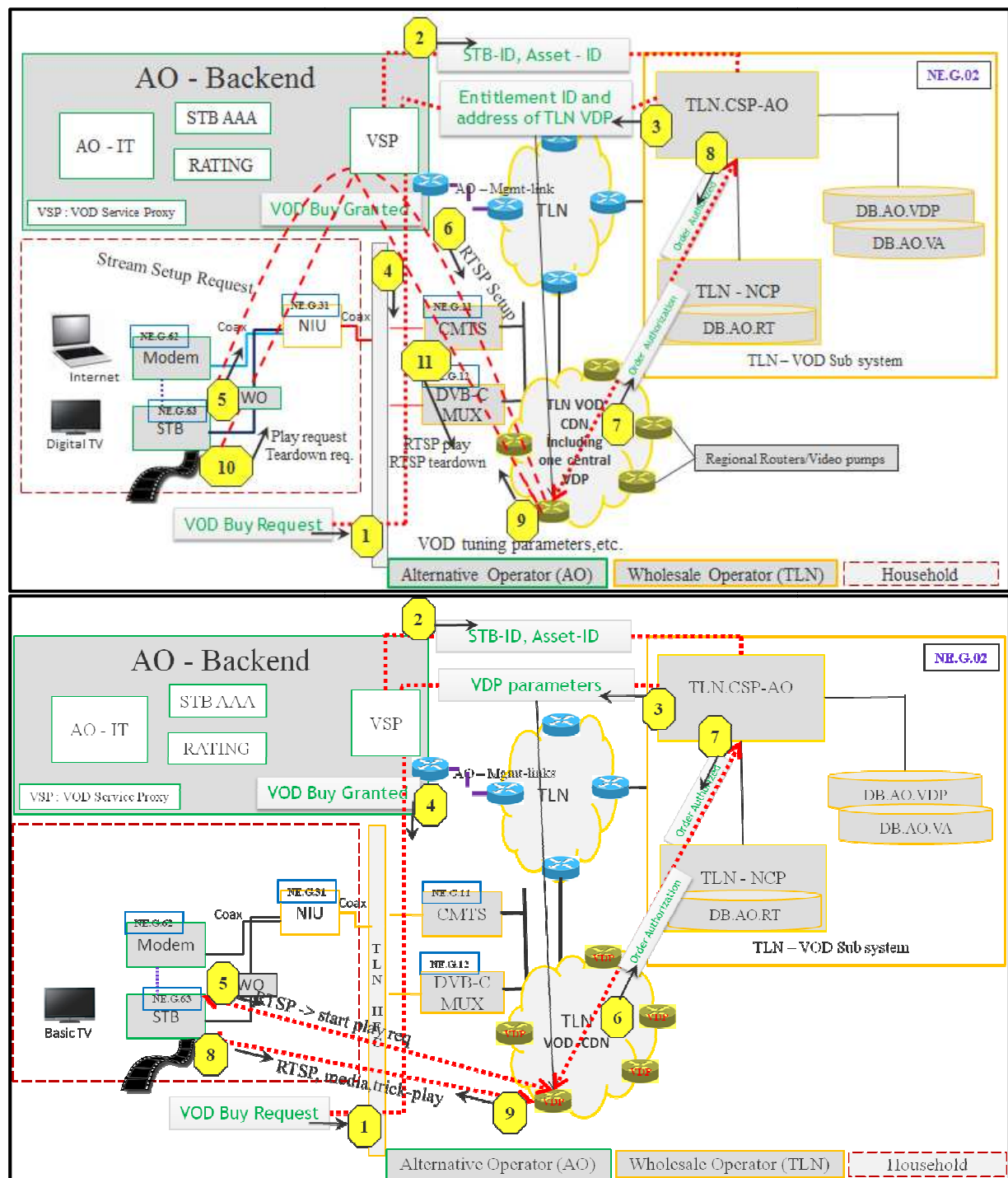
### 4.2.4 IP Data return path

- (13) The function of the iDTV interactive Data Return Path is to allow IP communication between the AO STB, the AO iDTV back-end systems and the TLN IP network components involved in delivering service (e.g. TLN Video Data pumps in TLN CDN) to the AO STB.
- (14) It can be implemented over the TLN cable network, using a modem or the AO can provide this connection by other means.

- (15) In case the IP Data return path is implemented over the TLN cable network, Telenet will deliver the aggregated return path traffic of AO STB customers towards AO via TLN to AO interconnect links, distributed over 5 RPOI's based on geographic origin of traffic.
- (16) Traffic management rules and policies, as well as bandwidth restrictions will apply on the IP Data return path over the Telenet cable network and its use is strictly limited to providing TV related interactivity services in the framework of the ROTV.

#### **4.2.5 VOD ordering and VOD stream delivery**

- (17) Implementation of a VOD delivery system is one of the more complicated parts of the overall iDTV architecture involving many systems and components. A conceptual block diagram showing the major interaction flows is shown in the figure below.



4-2

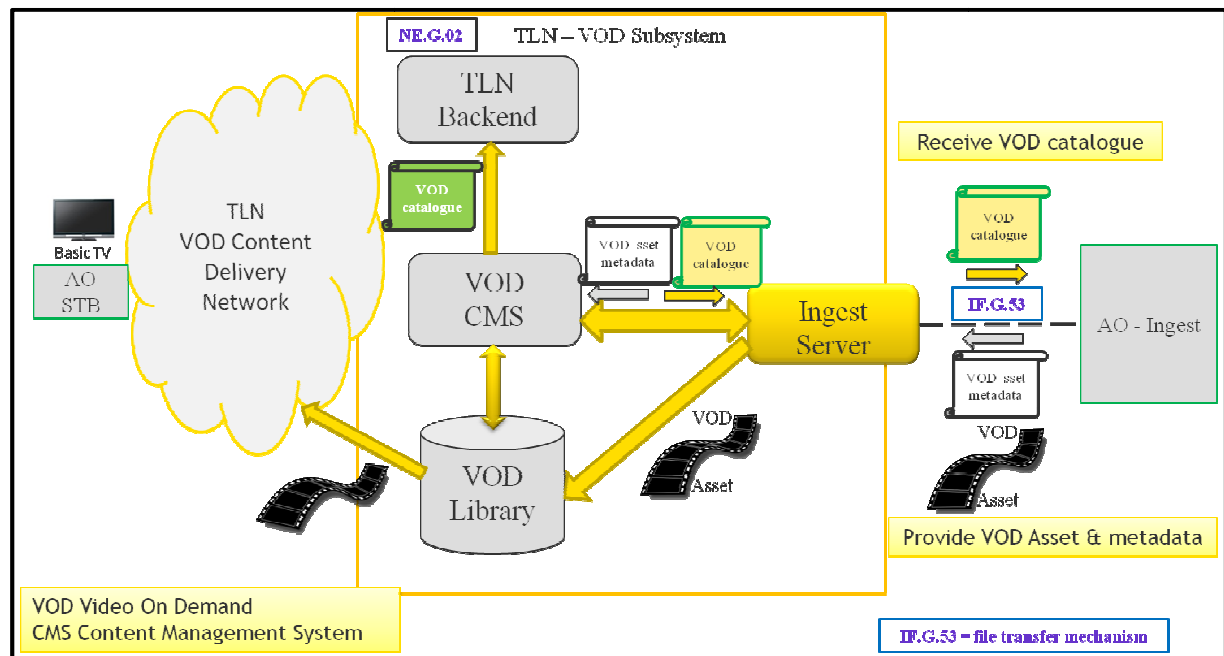
(18) The AO will be in control of the VOD order flow by implementation of a VSP (VOD Services Proxy) that acts as an intermediate between the AO STB's and the TLN VOD delivery platform and network. It will also allow the AO CRM to stay in control of sessions and do essential functions like subscriber authentication, accounting and billing.

(19) The TLN CSP-AO platform is the main interface towards the AO VSP. It acts as a proxy allowing the AO application to have control over the TLN network resources involved in the delivery of VOD and to allow to make resource reservations for playing streams and get the connection parameters of the particular streaming server that will perform the play out to the STB.

(20)The TLN VOD-CDN is organized on a regional basis and divided in VOD serving areas.

### 4.2.6 VOD Content Management

(21) A conceptual block diagram showing the major building blocks of the Content Management System (CMS) and the interaction flows is shown in the figure below.



4-3

(22) The AO ingest server is a platform that allows an AO to upload VOD media and metadata files in a pre-defined format and to trigger ingest of those files via a well defined schedule towards the TLN ingest server. It also allows the AO to receive technical catalogue files that contain the necessary technical reference data in order to allow AO STB's and systems to use those assets in their network locations.

(23) The VOD CMS system contains all necessary information on the VOD assets to allow to build catalogues, create technical streaming parameters. It will push the content to the VOD central library from where distribution is triggered into and over the TLN CDN so that the content comes available in the regional play-out points on the VDP's in each VOD serving area.

### 4.2.7 Rest of network element

(24) The rest of the network elements functions have already been discussed in the overall architecture document.