

TLN WRO Architecture type Document

< High level network system and equipment
logical interface description of the TLN WRO >



Document Housekeeping

Document Category and type

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None.

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 : <identification of reference>

Reference 2 : <identification of reference>

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1 **Abstract**

This document provides a high level overview of logical interfaces of network and service systems/equipment to the beneficiaries of the Telenet Wholesale Reference Offer. A logical interface is a virtual interface; it is a logical construct and is not a representation of an instance of any physical hardware. This document describes main interfaces between AO and Telenet in an exhaustive but 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

AOTC: Alternative Operator Testing & Compliance
CAS: Conditional Access System
CAT: Conditional Access Table
CMTS: Cable Modem Termination System
CPE: Customer Precise Equipment
CRM: Customer Relationship Management
DOCSIS: Data over Cable Service Interface Specification
DVB-C: Digital Video Broadcasting - Cable
E2E: End to End
ECM: Entitlement Control Messages
EMM: Entitlement Management Messages
eMTA: Embedded Multimedia Terminal Adapter
EPG: Electronic Program Guide
FM: Frequency Modulation
HDTV: High Definition TV
HFC: Hybrid Fiber Coax
IP: Internet Protocol
LAN: Local Access Network
LDAP: Lightweight Data Access Protocol
MPEG-2: Moving Picture Experts Group
MUX: Multiplex
NCP: Network Control Platform
NE: Network Element
NIU: Network Interface Unit
OAM: Operations and Maintenance
PAL: Phase Alternation Line
PSI: Program Specific Information
RADIUS: Remote Access Dial-In User Server
RF: Radio Frequency
RT: Real Time
SDTV: Standard Definition Television
SI: Service Information
STB: Set top box
UHF: Ultra High Frequency
VHE: Video Head end
VHF: Very High Frequency
VOD: Video on Demand
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 interfaces which are then further described in “specification” type documents which will allow the beneficiaries to implement the required interfaces 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 Interface on the overall (General) level has a unique reference naming in the format: IF.G.xy, where xy is the number of the interface.

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 interfaces.
- 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 (3rd 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.

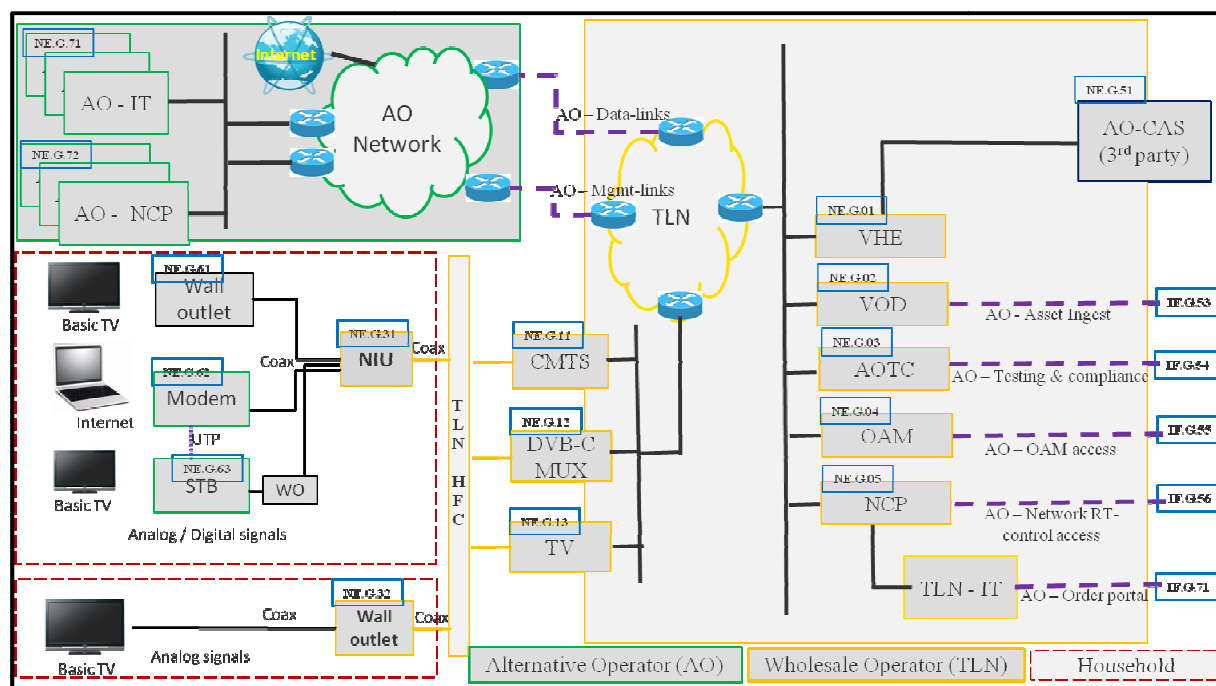


Figure 1

3.1 NE Interfaces described in this document

- (1) This section list all logical interfaces described in this document, together with a cross reference list of the identification tags of the TLN WRO specification type documents in which those interfaces are described in detail.
- (2) **Logical Interface (non-numbered) to CMTS (NE.G11)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (3) **Logical Interface (non-numbered) to DVB-C MUX (NE.G12)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (4) **Logical Interface (non-numbered) to TV (NE.G13)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (5) **Logical Interface AO - Asset Ingest: IF G.53 (on VOD (NE.G02))**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (6) **Logical Interface AO - Testing & Compliance: IF G.54 (on AOTC (NE.G03))**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (7) **Logical Interface AO - OAM Access: IF G.55 (on OAM (NE.G04))**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z

- (8) **Logical Interface AO - Network RT - Control Access: IF G.56 (on NCP (NE.G05))**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (9) **Logical Interface AO - Order Portal: IF G.71 (on TLN-IT)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (10) **Logical Interfaces: TLN Network**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (11) **Logical Interface (non-numbered) AO-IT (NE.G71)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (12) **Logical Interface (non-numbered) AO-NCP (NE.G72)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (13) **Logical Interface (non-numbered) NIU (NE.G31)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (14) **Logical Interface (non-numbered) Wall Outlet (NE.G32)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (15) **Logical Interface (non-numbered) Wall Outlet (NE.G61)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (16) **Logical Interface (non-numbered) from modem (NE.G62)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (17) **Logical Interface (non-numbered) from STB (NE.G63)**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z
- (18) **Logical Interface (non-numbered) from AO-CAS(3rd party) (NE.G51) to TLN VHE**; This interface is described in documents : <fill in specification type document reference list (if applicable)>doc x, doc y, doc z

4 TLN WRO Overall Reference Architecture

- (19) This document provides a high level network and service architecture overview of the main interfaces on a logical level that need to be build between the Telenet network and systems and the AO network, systems and CPE in order to allow the beneficiary to make use of the Telenet Wholesale Reference Offer. It describes the main logical interfaces on a conceptual level.

4.1 Architecture Wholesale Operator (TLN) domain sub blocks

- (20) This section gives a brief overview of the logical interfaces on equipment/systems in the TLN domain.

4.1.1 *Logical Interface (non-numbered) to CMTS (NE.G11)*

- (21) The CMTS communicates with Docsis type CPE (Cable modems, eMTA, Home Gateways) over the TLN HFC network. The logical connection between CMTS and CPE is IP over EuroDOCSIS (Data over Cable Interface Specification) connection.

4.1.2 *Logical Interface (non-numbered) to DVB-C MUX (NE.G12)*

- (22) The DVB-C Multiplexers provide transport for digital TV broadcast and VOD signals using MPEG-2/MPEG-4 Transport Stream protocols. A program stream is made of audio, video, service and program specific data (SI/PSI). SI/PSI data contains necessary information such as network, conditional access and program association and mapping information tables as well as Teletext and EPG data. Multiple program streams are joined together to form an MPEG Transport Stream.

4.1.3 *Logical Interface (non-numbered) to TV (NE.G13)*

- (23) Telenet encodes analog signals using PAL (Phase Alternating Line) encoding system. Using RF modulation techniques analog TV signals are made available on VHF and UHF carriers on the coax network.

4.1.4 *Logical Interface AO - Asset Ingest: IF G.53 (on VOD (NE.G02))*

- (24) The VOD system content management system uses XML based metadata structures for content management.
- (25) Play-out of VOD asset uses MPEG-2/MPEG-4 Program Stream with a VOD specific SD/HD video and audio format.
- (26) The AO - Asset Ingest interface (IF G.53) gives the AO the possibility to ingest its own VOD media files and their related asset meta data to build up an AO VOD offering library and catalogue on the TLN VOD platform.

4.1.5 *Logical Interface AO - Testing & Compliance: IF.G.54 (on AOTC (NE.G03))*

- (27) Broadband AOTC environment testing facilities will use logical interfaces as defined in **section 4.1.1** to validate AO broadband equipment (HGW, cable modem, eMTA) and profiles for compliance with EuroDOCSIS standards, Telenet CPE requirements and broadband profile rules for certification prior to deployment approval.
- (28) Digital TV AOTV environment testing facilities will use logical interfaces as defined in **sections 4.1.2-4.1.4** to validate AO digital TV equipment (STB, signaling, return path, VOD assets) for compliance with DVB-C standards, Telenet Digital Head end and VOD system requirements for certification prior to deployment approval.

4.1.6 Logical Interface AO - OAM Access: IF G.55 (on OAM (NE.G04))

- (29) AO will connect to the OAM environment to operate and maintain its end-user equipment (excluding the “modem” or “Docsis” part) over secure IP tunnel.
- (30) Status information about health of interfaces between TLN network and AO equipment and about TLN network components will be available over the same links.

4.1.7 Logical Interface AO - Network RT- Control Access: IF G.56 (on NCP (NE.G05))

- (31) The network control platform (NCP) is involved in the real-time session set-up and tear-down interactions between AO CPE and the network components. As such it handles the control plane message flows originated from AO CPE that wants to initialize and build-up (or tear down) and transport connection (or session) with the network. The TLN NCP will contact its counterpart at the AO side (AO-NCP) to pass those parts of the control flows that require AO interaction. In addition to the real-time flows the TLN NCP will also interact with the AO NCP via non real-time transactions such as pre-loading of AO Docsis modem configuration files. In practice the NCP is a collection of platforms, using different IP based protocols (RADIUS, LDAP,) that are together addressed as NCP for clarity and simplicity of the reference offer.
- (32) The AO - Network RT Control Access interface (IF G.56) gives the AO the possibility to receive in a controlled way the session set-up messages involved in initiating and closing of network connections by AO CPE devices and in this way participate in this process allowing the AO to build its own value added services.

4.1.8 Logical Interface AO - Order Portal: IF G.71 (on TLN-IT)

- (33) TLN-IT is used as an umbrella name for the set of systems that together implement the Telenet OSS/BSS system modules involved in supporting the TLN WRO in the broad sense of the definition
- (34) The AO - Order Portal interface (IF G.71) gives the AO the possibility to order TLN WRO services management on behalf of its customers

4.1.9 Logical Interfaces: TLN Converged Network

- (1) The TLN converged network means the complete set of converged backbone and access network infrastructure that transports and routes data, video and voice to its destination and provides interconnection to the Internet. It is in the technical annexes of the TLN WRO often referred to with the generic term “network”.
- (35) Its logical interfaces allow general data exchange for all services and all types of traffic between the TLN domains and the AO domains.

4.2 Architecture Alternative Operator (AO) domain sub blocks

This section gives a brief overview of the purpose and function of the logical interfaces in the AO domain.

4.2.1 *Logical Interface (non-numbered) AO-IT (NE.G71)*

(36) The relevant interfaces are described above already as seen from the TLN domain.

4.2.2 *Logical Interface (non-numbered) AO-NCP (NE.G72)*

(37) The relevant interfaces are described above already as seen from the TLN domain.

4.3 Architecture Household domain sub blocks

This section gives a brief overview of the purpose and function of the logical interfaces in the household domain.

4.3.1 *Logical Interface (non-numbered) NIU (NE.G31)*

- (38) NIU data and TV ports acts as signal transfer point between TLN and the beneficiary and provide DOCSIS, DVB-C (broadcast, VOD) and analog TV connectivity to the AO provided and/or owned broadband CPE and/or AO set top box for signaling, management and monitoring purposes.

4.3.2 *Logical Interface (non-numbered) Wall Outlet (NE.G32)*

- (39) This Wall outlet acts as signal transfer point between TLN and the beneficiary. This wall outlet provides analog/digital TV signal connectivity for AO STB's, customer TV sets and/or FM radio's

4.3.3 *Logical Interface (non-numbered) Wall Outlet (NE.G61)*

- (40) This Wall outlet acts as a connectivity point between for the beneficiary STB's and/or customer TV sets and/or FM radio's. This wall outlet provides analog and digital TV signal connectivity.

4.3.4 *Logical Interface (non-numbered) from Modem (NE.G62)*

- (41) Docsis compliant modem, eMTA or Home gateway to enable communication between the customer in home LAN side network and interactive DTV (iDTV) return path and the TLN CMTS.
- (42) The Docsis modem has multiple logical interfaces towards TLN and AO network components, such as CMTS, NCP, etc., involved in the E2E service delivery.

4.3.5 *Logical Interface (non-numbered) from STB (NE.G63)*

- (43) Digital TV STB to enable AO (i)DTV service delivery
- (44) The STB has multiple logical interfaces towards TLN and AO network components, such as DVB-C MUX, TLN VOD, TLN VHE, NCP, etc., involved in the E2E service delivery.

4.4 Architecture Third Party (3rd party) domain sub blocks

This section gives a brief overview of the purpose and function of the logical interfaces in the 3rd party domain.

4.4.1 *Logical Interface (non-numbered) from AO-CAS (3rd party)(NE.G51) to TLN VHE*

- (45) The AO-CAS (3rd party) is a Single Common Conditional Access System (CAS) operated by a third party CAS provider in joint interest of multiple beneficiaries of the TLN ROTV/IADTV. CAS signaling is part of DVB-C Service Information (SI) conditional access table (CAT). It is used for management of subscriber entitlement control and management messages (ECM/EMM) to descramble encrypted DTV content.
- (46) The 3rd party CAS main logical interfaces allow it to perform CAS provisioning and injection of CAS security messages in the DVB-C transport MUX.
- (47) Only one unique 3rd party CAS system can be presented, operating on behalf of all AO's.