# Ziggo XGS-PON

## Interface specifications

ziggo

# Contents

# 1.  Conventions

Throughout this document, the words that are used to define the significance of particular requirements are capitalized. These words are: "MUST, SHALL" This word means that the item is an absolute requirement of this specification.

| "MUST, SHALL" | This word means that the item is an absolute requirement of this specification. |
|---|---|
| "MUST NOT" | This phrase means that the item is an absolute prohibition of this specification. |
| "SHOULD" | This word means that there MAY exist valid reasons in particular circumstances to ignore this item, but the full implications SHOULD be understood and the case carefully weighed before choosing a different course. |
| "SHOULD NOT" | This phrase means that there MAY exist valid reasons in particular circumstances when the listed behavior is acceptable or even useful, but the full implications SHOULD be understood and the case carefully weighed before implementing any behavior described with this label. |
| "MAY" | This word means that this item is truly optional. |

# 2.  Contact

Queries regarding this specification can be addressed to: [CPE_supplier@vodafoneziggo.com](mailto:CPE_supplier@vodafoneziggo.com)

Please note that this is an address for hardware vendors only. Information for individual customers regarding the use of own devices on the Ziggo network is available here:
[https://www.ziggo.nl/klantenservice/apparaten/wifi-modems/eigen-modem](https://www.ziggo.nl/klantenservice/apparaten/wifi-modems/eigen-modem)

# 3.  Scope

This document describes the XGS-PON protocol requirements for the Internet Service over the Ziggo fibre network at the dedicated data optical Interface and the main characteristics of the dedicated data optical interface in the Ziggofibre network at the user's passive optical network termination point. This document describes the typical limits or values within which the characteristics can be expected to remain for networks that are built according to Ziggo specifications at installation time.

The interface specification does not apply under abnormal operating conditions such as:

- operating conditions arising as a result of operating services other than XGS-PON over the dedicated data optical interface.
- operating conditions arising as a result of a fault, maintenance and construction work or to minimize the extend of interruption of service.
- operating conditions arising as a result of force majeure or third-party interference.
- operating conditions arising as a result of test signal injection governed by regulation.

- In case of non-compliance of a network user's installation or non-compliance of equipment with the relevant standards or non-compliance with the technical requirements for connection, established either by this interface specification or the public authorities including the relevant limits for electromagnetic compatibility.

The characteristics given in this interface specification are intended to be used to derive and specify requirements for equipment such as fibre optic cables and ONTs to connect them to the dedicated data optical interface. The values in this interface specification take precedence over requirements in equipment product standards and installation standards. The given characteristics are not intended to be used as electromagnetic compatibility levels or user emission limits in the Ziggo network.

This interface specification may be changed at any time and may break backward compatibility with previous versions. Manufacturers are therefore asked to provide regular software updates. The user of this interface specification has to check for the newest version available from Ziggo. This interface specification may be superseded in total or in part by the terms of a contract between the individual network user and Ziggo.

# 4. References

In the case of a conflict between specific requirements in this document with requirements in any of the directly or indirectly referenced documents, the specific requirements of this document are applicable.

## 4.1 Normative references

- ANSI/TIA/EIA 568-B Commercial Buildings Telecommunications Cabling Standard
- BBF TR.101 Ethernet Based Broadband Aggregation
- BBF TR.156 Using GPON Access in the context of TR.101
- BBF.247 issue 4 Abstract Test Plan for GPON ONU Conformance – specifically issue 4 (XGS-PON)
- BBF TR.255 GPON Interoperability Test Plan
- CFR Pt. 68 FCC CFR Pt. 68; 1999
- IEC 60068-1:2014 Environmental testing – Part 1: General and guidance
- IEC 61000-4-5:2014 Electromagnetic compatibility (EMC) Part 4-5: Testing and measurement techniques - Surge immunity test
- IEC 61754-4 Fibre optic interconnecting devices and passive components - Fibre optic connector interfaces - Part 4:
- Type SC connector family
- IEEE 802.3 802.3-2022 - IEEE Standard for Ethernet
- IEEE 802.1Q-2014/ Cor 1-2015 IEEE Standard for Local and metropolitan area networks--Bridges and Bridged
- Networks--Corrigendum 1: Technical and editorial corrections
- IETF RFC 2131 Dynamic Host Configuration Protocol
- IETF RFC 2464 Transmission of IPv6 packets over Ethernet networks
- IETF RFC 3376 Internet Group Management Protocol, Version 3
- IETF RFC 4638 Accommodating a Maximum Transit Unit/Maximum Receive Unit (MTU/MRU)
- IETF RFC 4862 IPv6 Stateless Address Autoconfiguration

- IETF RFC 7084 Basic Requirement for IPv6 Customer Edge Routers
- IETF RFC 8415 Dynamic Host Configuration Protocol for IPv6 (DHCPv6)
- ITU-T G.988 ONU management and control interface (OMCI)
- ITU-T G.9807:1: 10-Gigabit-capable symmetric passive optical network (XGS-PON)
- NEN 1010:2020 Electrical installations for low-voltage – Dutch implementation of the HD-IEC 60364 series
- NEN-EN 50289-1-6:2002 Communication cables - Specifications for test methods Part 1-6: Electrical test methods
- Electromagnetic performance
- NEN ISO 8601-1:2019 Date and time – Representations for information interchange – Part 1: Basic rules

## 4.2   Informative references

BSI Testkonzept für Breitband-Router, (DSL-, Kabel-, SOHO-, CE-, CPE-Router, IADs); May/2016

## 4.3   Reference acquisition

- BBF: https://www.broadband-forum.org
- BSI Router Testkonzept: https://www.bsi.bund.de/SharedDocs/Downloads/DE/BSI/Cyber-Sicherheit/Themen/Testkonzept Breitbandrouter.pdf
- IEEE: http://www.ieee.org
- IETF RFCs: http://www.ietf.org
- ITU recommendations: http://www.itu.int
- NEN: https://www.nen.nl
- TIA: https://www.tiaonline.org/

# 5.   Definitions And Abbreviations

## 5.1   Definitions

**Customer**: human being or organization that accesses the network in order to communicate via the services provided by the network

**Downstream**: the direction of transmission from the headend to the subscriber, in PON from the OLT to the ONT

**Fibre termination Unit (FTU)**: the passive optical termination point at the customer premises

**Layer**: subdivision of the Open System Interconnection (OSI) architecture, constituted by subsystems of the same rank

**Optical Line Terminal (OLT)**: the operator-facing endpoint of a PON network, connecting multiple ONTs to the access network of the operator using one or more optical ports. It is an active layer 2 device managed using the OMCI protocol

**ONU Management and Control Interface (OMCI)**: management protocol for the (XGS-)PON network, managing both OLT, connected ONTs and the characteristics of their connection

**Optical Network Terminal (ONT)**: the customer-facing endpoint of a PON network, converting its PON protocol to Ethernet. It is an active layer 2 device that connects to the OLT over the PON network. It is managed using the OMCI protocol. A PON ONT has a unique serial number that must be known to operator provisioning systems to enable connectivity

**PHYsical (PHY) layer**: layer 1 in the Open System Interconnection (OSI) architecture; the layer that provides services to transmit bits or groups of bits over a transmission link between open systems and which entails electrical, mechanical and handshaking procedures

**Passive Optical Network (PON)**: a passive optical network with point-to multipoint-topology where a single optical fibre port can service multiple endpoints using passive splitters to distribute the fibre bandwidth over the attached terminals without switches, routers or any other active components requiring power supply.

**Terminal**: equipment connected to a telecommunication network to provide access to one or more specific services

**Ziggo**: Ziggo B.V and/or Ziggo Services B.V.

## 5.2   Abbreviations

| Abbreviation | Definition |
|---|---|
| **AFTR** | Address Family Transition Router |
| **ASCII** | American Standard Code for Information Interchange |
| **BSI** | Bundesamt für Sicherheit in der Informationstechnik |
| **DHCP** | Dynamic Host Configuration Protocol |
| **DS** | Downstream |
| **ERMI** | European Retail Market Information |
| **FQDN** | Fully Qualified Domain Name |
| **IEEE** | Institute of Electrical and Electronics Engineers |
| **IETF** | Internet Engineering Task Force |
| **IP** | Internet Protocol |
| **ITU** | International Telecommunication Union |
| **FTU** | Fibre Termination Unit, the demarcation point between home and network, where the fibre from the street cabinet is terminated. |
| **OSI** | Open Systems Interconnection |
| **MAC** | Media Access Control |
| **MICE** | Mechanical, Ingress, Climatic and Chemical, Electromagnetic |
| **OFDM** | Orthogonal Frequency-Division Multiplexing |
| **ONT** | Optical Network Terminal (ITU term) |
| **ONU** | Optical Network Unit (IEEE term for ONT, considered a synonym) |
| **SI** | Système international d'unités |

| Abbreviation | Definition |
|---|---|
| SNR | Signal to Noise Ratio |
| US | Upstream |
| VAC | Volt Alternating Current |
| VDC | Volt Direct Current |
| XGS-PON | 10 (X) Gigabit (G) Symmetrical (S) Passive Optical Network |

# 6.  Interface connectors

## 6.1    General

The physical demarcation point between the Ziggo network and the customer's network in fibre optic XGS-PON installations is the Fiber Termination Unit (FTU). In new-build installations, the Ziggo FTU is wall-mounted in the meter cupboard of the customer's house. It has an SC/APC simplex adapter, pointing downwards from the unit. In the Edam–Volendam municipality Ziggo offers services via the Glasdraad fiber network. Glasdraad uses a different FTU version, but with identical functionality.

Two examples of such FTUs:



Fig.1 Ziggo FTU



Fig.2 Glasdraad FTU

## 6.2    Environmental and safety

The technical requirements of the present document apply under the environmental profiles in ETSI ETS 300 019-1-3 assuming accordance with NEN NTA 5175:2016. If not stated otherwise Class 3.1 typically applies for FTU inside customer homes.

## 6.3    Mechanical interface description

- SC/APC, conform IEC 61754-4
- The XGS-PON ONT MUST have an optical interface and cable that can connect to the SC/APC adapter.

# 7. Network physical layer characteristics

## 7.1 Downstream

| | |
|---|---|
| Wavelength | 1575nm to 1580nm |
| Transmit power | +4dBm to +9dBm |
| 10G downstream receiver | |

## 7.2 Upstream

| | |
|---|---|
| Wavelength | 1260nm to 1280nm |
| Receive power: | -28dBm to -9dBm |
| 10G burst mode upstream transmitter | |

# 8. XGS-PON protocol requirements

## 8.1 Compliance

- The ONT MUST comply with ITU-T G.9807.1 XGS-PON
- The ONT MUST comply with TR-156 issue 3 and strictly use TR-247 elements compliant to G.988
- The ONT MUST be certified according to BBF.247
- The ONT MUST support ITU-T G.988 OMCI
    - Proprietary 3rd party OMCI extensions for L3 functions are not supported

## 8.2 Security, registration and provisioning

- Flexible mapping between XGEM ports and T-CONT
- Forward Error Correction (FEC)

| Encryption | |
|---|---|
| DS | AES (128b) |
| US | AES (128b) |
| **Interface Identification** | |
| Card | 1 |
| Port | 1 |
| Speed | 10G |
| UNI | LAN1 |
| Protocol | EoIP |

# 9. Configuration for devices behind the ont (informative)

## 9.1 VLAN

Ziggo uses a single VLAN configuration:

| Internet | |
|---|---|
| VLAN ID | 100 |
| MTU | 1500 |
| IP protocol version | IPv4 and IPv6 |
| QoS marking | 0 |

## 9.2 DHCPV4

The following information MUST be requested by the DHCP client and will then be provided by DHCP server:

- IP-address
- Subnet mask
- Gateway address
- DNS server

## 9.3 DHCPV6

The following information MUST be requested by the DHCP client and thus will be provided by DHCPv6:

- IPv6-address
- DNS-server
- Delegated prefix

To avoid a configuration conflict, the configuration of the router device WAN behind/in the cable modem MUST be done via respective DHCP and other procedures such as static configuration MUST NOT be used.

In line with RFC7984, the UE for Ziggo Residential telephony service MUST prefer IPv6 however if the voice service is unavailable via IPvs the UE SHOULD attempt IPv4 connectivity.

## 9.4 Prefix delegation

IPv6 Prefix delegation according to RFC3633 MUST be supported.

## 9.5    Multicast

Furthermore it is recommended that any router deployed behind the ONT also support IGMP proxy and IPv4 multicast as described by RFC 3376.

## 9.6    Security recommendations

It is strongly recommended that router/gateway devices should conform to BSI "Testkonzept für Breitbandrouter" recommendations, in particular the exclusion criteria listed in table 33.

# 10. History

| Document history | | |
|---|---|---|
| V0.1 | 18-12-2024 | First draft |
| V0.9 | 05-02-2025 | All technical feedback processed, document to be forwarded to product, legal & communications. |
| V1.0 | 24-3-2025 | Final version |