Gigaclear®

# Product Specification:

# Wholesale Ethernet

**Version 1.5**

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# 1 Gigaclear Product Overview

Gigaclear provides pure fibre broadband access service to homes and businesses in predominantly rural communities, offering ultrafast connectivity with symmetric speeds from 30Mbps up to 1000Mbps.

The Wholesale Ethernet product has been developed by Gigaclear to provide partners with ultrafast services for the 'last mile' reach into areas of the country where Gigaclear has built networks.

The customer last mile services are delivered as fibre based Point-to-Point or PON (Passive Optical Network) services offering 30Mbps to 1Gbps symmetrically, as a Layer 2 service delivered back to partner networks over Network to Network Interfaces (NNIs) through one of our two Data Centre locations at (Telehouse North2 (THN2) and Equinix Slough LD7).

The Wholesale service provides a tunnelled Layer 2 service between the customer property, across the Gigaclear network to the Partner network, with the Gigaclear network termination at the customer premises being the Gigaclear NTE. The wholesale partner provides the Layer 3 service to the customer (IP address, routing, transit etc.), including the CPE.

Gigaclear has three service families detailed in the Wholesale Pricelist: a set of contended Ethernet services for residential use with a standard SLA, contended Ethernet services for Business use with standard and enhanced SLA options.

Wholesale partners may request other services, and each request will be reviewed against a business plan to assess its commercial viability.

# 2 Network Technical Specification

This section of the document outlines the Technical Specifications with relation to the Networking Infrastructure. It covers the layout of the Gigaclear network, how the Wholesale Ethernet service can be delivered and technical configuration requirements.

## 2.1 Network to Network Interface (NNI) Sizing and Delivery

There are currently two sizes of Network to Network Interface (NNI) available to partner networks: 1Gb and 10Gb. The Gigaclear Core has been developed with much greater capacity in mind and, when needed, we may be able to support bandwidths greater than 10Gb. We may support etherchannel/bonded connections of 10Gb as long as LACP is used to manage the etherchannel.

Please discuss your requirements with the network team if you need bandwidths greater than 10Gb.

NNI connectivity is currently available from the following Gigaclear Data Centre locations:

- Telehouse North 2, London
- Equinix LD7, Slough

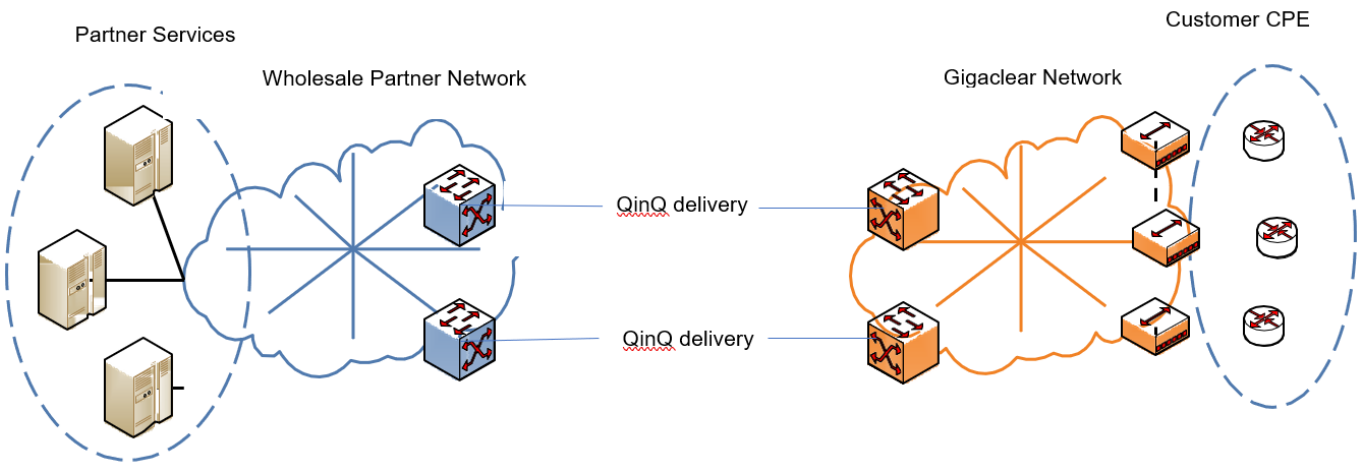
When ordering the active Ethernet circuits, you should ensure that an adequate MTU is available. An MTU of 1600 is a minimum you should configure on your NNI interface and an MTU of 2000 is recommended in order to cater for some of the features offered over a Wholesale Ethernet NNI with Gigaclear.

## 2.2 NNI Services

There is currently a single NNI service offered over the Gigaclear Wholesale Ethernet product, which is an E-Line.

### 2.2.1 Layer 2 – E-Line

Single E-Line services presenting a Layer 2 connection from the customer site or point in the Gigaclear Core can be delivered to the partner via either of the NNI connections. These circuits will be delivered as a QinQ packet (VLAN definitions are in section 2.4) and partners will need to handle this type of frame.




## 2.3 NNI Partner Control

Gigaclear is passionate about giving our partners as much control as possible within the network to ensure that connections are able to run through a chosen NNI without Gigaclear getting involved. To support this, we have developed a method for NNI and product identification.

## 2.4 VLAN Identification

In order to segregate the services offered by Gigaclear and to ensure that partners have control over the circuits delivered, we have developed a method for both service specification and NNI selection.

This method is based on an “S” (or outer) VLAN with a “C” (or inner) VLAN behind it in the frames sent to the partner network over the NNI circuits.

- The S/outer VLAN will be used to define the service family and the NNI over which a circuit is built (e.g. Residential, Business, Enterprise)
- The C/inner VLAN will be used to identify an individual customer link.

A range of 3 “S” VLANs will be automatically assigned by Gigaclear to identify service families over a specific NNI with a customer. The “C” VLANs will then be automatically assigned per order by our internal systems, from the range 2 to 4088.

The following tables are *examples* of full “S” and “C” VLAN definitions for a partner taking the three NNI connection types from Gigaclear: -

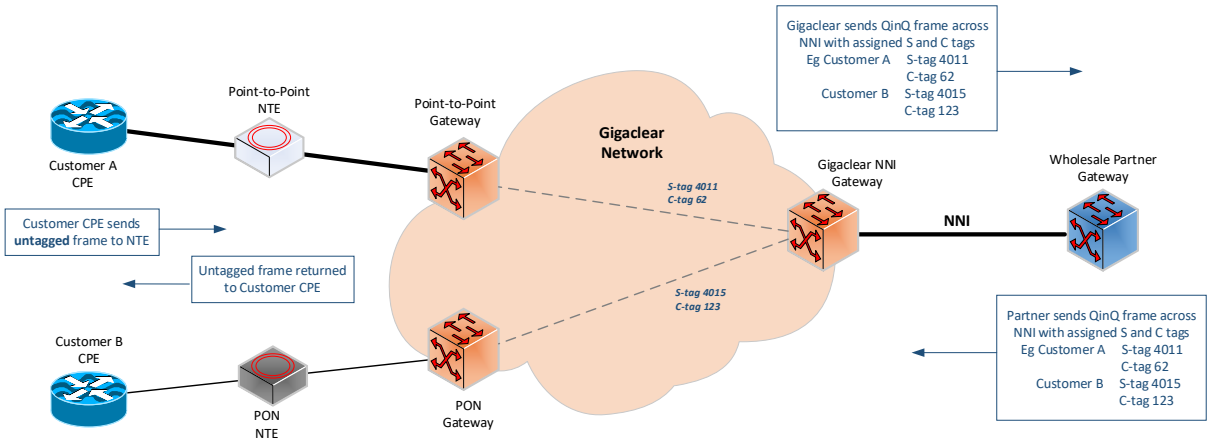
| Code | Service Family | NNI | S-VLAN | C-VLAN |
|---|---|---|---|---|
| **WR** | **Wholesale Residential** | GIGA-LD7-CUST-01 | 4011 | 62 |
| **WB** | **Wholesale Business** | GIGA-LD7-CUST-01 | 4012 | 62 |
| **WE** | **Wholesale Enterprise** | GIGA-LD7-CUST-01 | 4013 | 62 |

| Code | Service Family | NNI | S-VLAN | C-VLAN |
|---|---|---|---|---|
| **WR** | **Wholesale Residential** | GIGA-LD7-CUST-02 | 4014 | 62 |
| **WB** | **Wholesale Business** | GIGA-LD7-CUST-02 | 4015 | 62 |
| **WE** | **Wholesale Enterprise** | GIGA-LD7-CUST-02 | 4016 | 62 |

| Code | Service Family | NNI | S-VLAN | C-VLAN |
|---|---|---|---|---|
| **WR** | **Wholesale Residential** | GIGA-THN2-CUST-01 | 4017 | 62 |
| **WB** | **Wholesale Business** | GIGA-THN2-CUST-01 | 4018 | 62 |
| **WE** | **Wholesale Enterprise** | GIGA-THN2-CUST-01 | 4019 | 62 |

Thus, when an order is placed over a certain NNI, we will assign the “S” and “C” VLANs automatically within our system based on the service family ordered, ensuring that the E-Line circuit is delivered where the partner requires it.

The Layer 2 frames handed over to the partner over the NNI connection will still have these two VLAN tags on them and the partner should work with them or strip them off, as required; that is, the frames will arrive at the partner equipment double tagged.
During the on-boarding process for the partner the VLAN allocations will be defined and presented to the wholesaler.




**IMPORTANT:** The wholesale partner is responsible for adhering to the NNI specification in this document. The only device to connect to the NNI must be the Partner QinQ termination device. Loop testing must NOT be performed on the Gigaclear Network, as this will disrupt services for other customers. Breaking these rules will result in Gigaclear shutting down the NNI termination point facing the individual NNI partner.

## 2.5 NNI Interface Specifications

The NNI specification used by Gigaclear is shown below for the physical and logical connectivity required over the NNI connections.

| NNI Interface Specification | | |
|---|---|---|
| **Description** | **Network Parameters** | |
| **Connectivity Type** | Gigabit Ethernet | Single-Mode fibre |
| | Ten Gigabit Ethernet | Single-Mode fibre |
| **Encapsulation** | Gigabit Ethernet | |
| | Ten Gigabit Ethernet | |
| **Sub-Interface for NNI** | Gigabit Ethernet | |
| | Ten Gigabit Ethernet | |
| **MTU Size** | 2000 Bytes | |

## 2.6 Cross-connect specifications & Ordering of NNI Port

The cross-connect should be ordered by the Wholesale Partner at the appropriate Data Centre using the following details to locate the Gigaclear cabinets.

***Please email network-team@gigaclear.com to tell us when your NNI will be installed. A member of the Networks team will then contact you to arrange the commissioning and configuration of the NNI, including providing port/cabinet/ODF references and a Letter of Authority (LOA) permitting the cross connect installation.***

| Data Centre | Address | Port Termination |
|---|---|---|
| Telehouse North 2 | Coriander Avenue,<br>London E14 2AA | Single Mode LR 1310nm 10km |
| LD7 Slough | 1 Banbury Avenue,<br>Slough Trading Estate<br>Slough, Berkshire SL1 4LH | Single Mode LR 1310nm 10km |

**Note: Gigaclear will provide details of the patch panel and port to use in the LOA document.**

# 3 Gigaclear NTE Specifications

The NTE installed by Gigaclear terminates the fibre from the Gigaclear cabinet and presents the customer with a single copper RJ45 Gigabit Ethernet port.
The Wholesale customer receives all network addressing and routing from the wholesale Partner. The Gigaclear service is a pure layer-2 service only.

The type of NTE deployed depends on the technology used by Gigaclear to deliver the service. The technologies currently in use are Point-to-Point and PON (Passive Optical Network).

## 3.1 NTE Interface Specifications

Alongside the NNI standards, there is a separate interface standard for the NTE. This is the same for both the Point-to-Point and PON NTE.
The interface specification for the current NTE is shown below.

| NTE Interface Specification | | |
|---|---|---|
| **Description** | **Network Parameters** | |
| **Connectivity Type** | Gigabit Ethernet | Copper (RJ45) |
| **Negotiation** | Auto | |
| **Encapsulation** | Gigabit Ethernet | Untagged |
| **MTU Size** | 1500 Bytes | |

## 3.2 Point-to-Point

### 3.2.1 Point-to-Point NTE Physical Specification

The Gigaclear NTE (currently a DKT unit) terminates the fibre from the Gigaclear cabinet and presents the customer with a single copper RJ45 Gigabit Ethernet port (LAN1 on the DKT unit). The Gigabit Ethernet port is set to auto-negotiate. Whilst the unit has multiple RJ45 ports, only LAN1 will be enabled.

***Please note: The Wholesale Partner is responsible for providing and installing a separate CPE which must be connected to the Gigaclear NTE.***

| Gigaclear NTE | Specification |
|---|---|
| Model | DKT 79741 |
| Type | NTE (Network Terminating Equipment |
| Input | Fibre G657.A1/SC-UPC |
| Output | Ethernet 10/100/1000 Mbps (CAT5e compliant) |
| Dimensions (inc. mounting plate) | 88x88x65mm |
| Weight | 300g |
| Power Supply | 5V DC via UK 240V adapter |
| Power Dissipation | <4W |
| Operating Temperature | 0 - 40C |
| Storage Temperature | 0 - 70C |

### 3.2.2 Connection

The NTE will be powered up on installation, via its power adapter.
Connect the wholesale service CPE to the LAN1 socket of the NTE, with at least CAT5e compliant Ethernet cable. **Only LAN1 is currently in use/enabled**. The Wholesale customer receives all network addressing and routing from the wholesale Partner.

### 3.2.3 Service Check

NTE unit side - POWER and WAN lights should be lit solid green for active Gigaclear connection, WAN flashes on activity.

**Note**: The NTE may take circa 5 minutes to initialise and update firmware on first connection


| Side Panel LEDs | | |
|---|---|---|
| **LED** | **Status** | **Indication** |
| POWER | Solid Green | ON |
| WAN | Solid Green | Link Up |
| | Flashing Green | Link UP, Activity |


| Ethernet Interface LEDs | | |
|---|---|---|
| **LED** | **Status** | **Indication** |
| LEFT | Solid Green | 1000Mbps |
| | Off | 10/100Mbps |
| RIGHT | Solid Yellow | Link UP, Activity |
| | Flashing Yellow | Link Up, Activity |
| | Off | No Link |

## 3.3 PON

### 3.3.1 PON NTE Physical Specification

The Gigaclear ONT (currently an Adtran unit) terminates the fibre from the Gigaclear cabinet and presents the customer with a copper RJ45 Gigabit Ethernet port (The 10GE Port on the Adtran unit) for connection of the Wholesale partner CPE.

The 10GE port is set to auto-negotiate, and while it is capable of negotiating at 10000Mbps the data rate will be limited to the service provided.

**Note**: although the unit has a number of RJ45 and RJ11 ports, **only the 10GE port will be enabled** for connection of the CPE, the VoIP/POTs Ports are not used on the Gigaclear network.

The Wholesale customer receives all network addressing and routing from the wholesale Partner.


| Gigaclear NTE | Specification |
|---|---|
| Model | Adtran 622v |
| Type | XGS-PON ONT (TenGigabit Passive Optical Network Terminal) |
| Input | Fibre G657.A1/SC-UPC |
| Output | Ethernet 10/100/1000/10000 Mbps (CAT5e compliant) |
| Dimensions (incl. mounting plate) | 88x88x65mm |
| Weight | 300g |
| Power Supply | 12V DC via UK 240V adapter |
| Power Dissipation | <18W |
| Operating Temperature | 0 - 40C |
| Storage Temperature | -40 - 70C |

### 3.3.2 Connection

***Please note: The Wholesale Partner is responsible for providing and installing a separate CPE which must be connected to the Gigaclear ONT.***

The Gigaclear engineer will install the ONT onto a wall mounted fibre tray unit. The fibre and power cables connect to the ONT through the cable entry point at the base of the fibre tray

To connect the wholesale partner CPE to the ONT, you will need to remove the cover of the fibre tray.
Unscrew the two screws either side of the fibre tray, and lift the cover away from the unit.

At the base of the ONT you will see the ethernet ports.
Feed a cat6 ethernet cable through the fibre tray and connect it to the 10GE port on the ONT.

**Note**: Only the 10GE port is enabled on the ONT and must be used for connection to the CPE

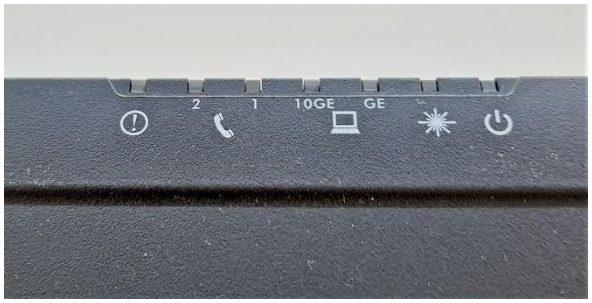
Take care not to press the ON/OFF button on the ONT, and refit the fibre tray cover.

### 3.3.3 Service Check

On the ONT, the Power and PON lights should be lit solid green for an active Gigaclear connection. The **10GE** light flashes on activity.

LEDs 1 and 2 ( ) are not applicable.

**Note**: The ONT may take circa 5 minutes to initialise and update firmware on first connection.




| LED | Status | Indication |
|---|---|---|
| POWER | OFF | No Power |
| | Solid Green | ON, Normal Operation |
| | Flashing Green | Unit powering up |
| PON | Solid Green | ONT ranged and in service |
| | Flashing Green (fast) | ONT synchronizing |
| | Flashing Green (slow) | ONT ranged but no service |
| | Red | DOWN - Loss of fibre/Loss of Service |
| 10GE | OFF | No ethernet connectivity |
| | Solid Green | Ethernet Up, no activity |
| | Flashing Green | Ethernet Up, activity |
| Alarm/ Update | Solid Green | Software upgrade in progress |
| | Flashing Green | Software download in progress |
| | Red | ONT UP and operational - software Upgrade failed |