



Wholesale Market

Fibre to the Office

The flexible 1 Gbps solution for
small offices



1Gbps symmetrical single-fibre connection 100% dedicated to the End Customer with the option to manage traffic peaks thanks to flexible bandwidth availability, both upstream and downstream.

Service features

| | | |
|--|--|---|
| Speed <ul style="list-style-type: none">• DOWNSTREAM UP TO 1 Gbit/s• UPSTREAM UP TO 1 Gbit/s | Delivery SLAs <ul style="list-style-type: none">• CALENDAR DAYS 40 days | Assurance Blocking failure recovery time: <ul style="list-style-type: none">• ACCESS AND BASIC KIT 8 solar hours• COLOCATED OR PLUS KIT 5 solar hours |
|--|--|---|

Who is it for?

The service is for business customers who want to take full advantage of bandwidth of up to 1 Gbps at a very competitive price.

FTTO service description

The Wholesale Fibre To The Office service provides a connection between an Operator's End-Customer sites and the Operator's backbone, providing packet-switched transmission capacity. Concerning the Customer's specific requirements, Telecom Italia shall implement the service to provide Ethernet Point-to-Point geographic connectivity between NTPs (Network Termination Points), coinciding with the Operator PoPs (location Z) and the locations of its end customers (locations A), through Ethernet delivery interfaces and the creation of layer 2 virtual private networks.

In an FTTO connection one of the two Network Termination Points must coincide with the End Customer's premises, and the other NTP must coincide with an Operator PoP.

End-Customer-side access component, hereinafter referred to as FTTO access, consisting of:

Customer-side port on L2 switch equipment on which the single-fibre connection service is configured between the End Customer's premises and Telecom Italia's network and 1Gbps optical interfaces with transmission solutions defined by Telecom Italia on a project basis and transparent to the Customer

To each FTTO access the Customer may associate a service profile, a dedicated bandwidth capacity and a type of port on the Electric or Optical Customer-side as better specified in paragraph 2.



Operator PoP side access component

At the Network Terminal Level, the Operator PoP-side Access Component corresponds to the termination of a connection on a Customer-side port of a special device located in the PoP called KIT FTTO.

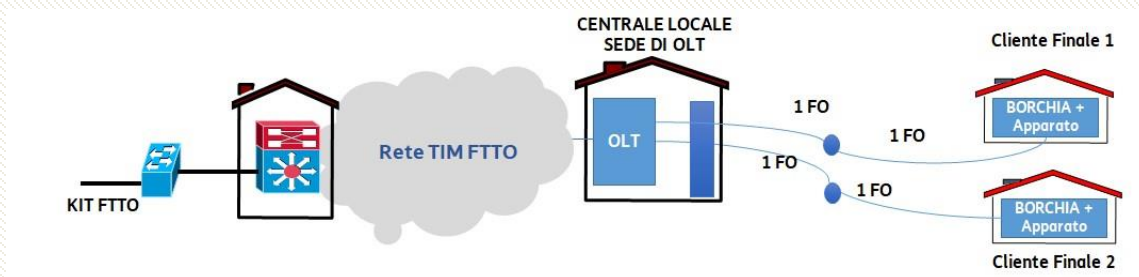
To set up this component, an FTTO KIT is required at the Operator PoP, with a port available, Customer-side, with appropriate characteristics, and the band capacity necessary to support the new Operator PoP-side Access Service Component requested.

An FTTO KIT shall have as many Access Service Components as there are FTTO connections to it; consequently, if several Connections are delivered to an Operator PoP, each will be terminated either on a different Operator-side port or on a common port on which the E-NNI delivery mode has been activated.

Description of the service

The FTTO service consists of three main components:

1. End Customer-side access component, hereinafter referred to as FTTO access;
2. Transport component from the End Customer's premises to the Operator PoP
3. Access component on the Operator PoP-side, that is, the FTTO KIT for the delivery of traffic at the Operator PoP.



The FTTO access component on the end Customer-side consists of:

- End-customer-side port on L2 switch equipment on which the service is configured
- single-fibre one-way connection between the End Customer's premises and Telecom Italia's network and 1Gbps optical interfaces with transmission solutions defined by Telecom Italia on a project basis and transparent to the Customer

The equipment at the End-Customer's premises is connected to the Telecom Italia network using a single-fibre optical fibre carrier, connected to a dedicated 1 Gbps port of the OLT (Optical Line Termination) equipment at the local control centre at the End Customer's premises. The latter is connected via the TIM packet-switched network to the FTTO KIT.

Transport Component

The Operator may configure the FTTO access of its End Customers by assigning a bandwidth capacity as follows

- **FTTO profile up to 1 Gbps** with the following dedicated bandwidth sizes available:

| DEDICATED BAND CAPACITY (Mbit/s) |
|-------------------------------------|
| 10 |
| 100 |

Table 1

It is possible to use the transmission capacity up to the physical speed of the Connection of 1 Gbps in shared mode.

Telecom Italia configures the dedicated bandwidth capacity required by the Customer for the Connection on the traffic transport route from the End Customer's premises to the Operator's network so that each FTTO access comes with its own transmission capacity in line with the contents of Table 1 managed with Class of Service (COS) type 2.

For each FTTO connection, a virtual private network (hereinafter referred to as 'VLAN') is configured between the two End Points (End Customer site and Operator PoP) in a way that is transparent to the Operator, meaning its configuration does not influence in any way the configurations of the

Operator PoP-side FTTO KIT access component

A FTTO KIT is distinguished by the following features:

- **Type of interfaces** Customer-side made available by the L2 Switch device
- **FTTO KIT Speed** It can be implemented on ports with speeds of 1 Gbps or 10 Gbps
- **How to create the FTTO KIT** It can be made from scratch or created on a dedicated Customer-side port, if available, of an existing GEA MEF KIT
- **Types of delivery:** E-NNI or UNI
- **Operator PoP Location:** colocated at a Telecom Italia Exchange, which is an OPM Feeder Node site or at the Customer's premises external to Telecom Italia

Type of Operator side interfaces made available by the L2 Switch device:

1. TYPE 1: Optical or electrical 100/1000 Mbit/s GigaBit Ethernet Interfaces.
2. TYPE 2: Interfacce 10 GigaBitEthernet



Methods of implementing the FTTO KIT if the FTTO KIT is installed on a dedicated port of an existing GEA MEF KIT, please note that:

- KIT FTTO at 1 Gbps: it can be implemented on a dedicated 1 Gbps port available on any GEA MEF KIT (1 Gbps or 10 Gbps);
- KIT FTTO at 10Gbps: it must necessarily be implemented on a 10 Gbps port if available, and therefore only 10 Gbps GEA MEF kits can be used.

Traffic delivery mode

Two traffic delivery modes are possible on the FTTO Delivery Kit:

E-NNI mode (Network to Network Interface)

- Several S-VLANs can be delivered on the same FTTO KIT port
- The L2 Switch boundary device also delivers the S-VLAN label to the Operator Network
- Delivery protocol QinQ or 802.1ad

UNI mode (User Network Interface) :

- only one S-VLAN is delivered on each port of the GEA KIT.
- it is the port itself on which the handover takes place that identifies the S-VLAN of that specific Connection;
- The L2 Switch boundary device extracts the S-VLAN label, which is not passed to the Operator's Network.

Customer PoP location: in case of request for a new FTTO KIT

- **PoP colocated at a Telecom Italia Exchange, which is an OPM Feeder Node site:** the boundary device is connected to the Feeder Node located within the same Telecom Italia exchange via two pairs of optical fibres on two GigaBitEthernet ports of the Feeder Node, one of which is redundant to the other.
- **PoP situated at the OAO site:** an access configuration corresponding to the PLUS implementation option is used, which envisages the connection of the boundary device to two ports of the same Feeder Node, accessing Telecom Italia's network through two pairs of optical fibres on two network side ports of the device itself. If one of the two network side ports fails, the traffic is automatically re-routed to the other port; As an optional service, the Operator may request diversification of the optical fibre access path.

Although it is not recommended, it is left up to the Operator to implement the KIT with a Basic option whereby the boundary device is connected to a single port of the Feeder Node with a fibre pair. In this case the access is not redundant.



The Customer authorises TIM to use, free of charge, the premises and technical infrastructure (including underground) of the building in which the equipment required to provide the service is installed. Electricity and air conditioning for the above premises must also be provided free of charge under the terms set out herein.

Technical details

Protocols

VLAN tunnels and L2 protocols are delivered to both endpoints of the connection via Ethernet L2 Switches to ensure the same transparency for customer traffic: Customer VLAN tags including CoS and DSCP, full transparency to L3 traffic and higher, transparency to L2 protocols such as CDP, LLDP, VTP, STP, LACP, PAGP, UDLD, CFM/Y.1731. Transparency is guaranteed for single-tagged or untagged customer traffic and, in the case of bpdu of L2 protocols, if they are not altered (single tag with ethertype 8100 for PVST, untagged for all other protocols). In case of E-NNI delivery on FTTO KIT, the Operator's equipment downstream of the KIT, in addition to terminating the VLAN tunnel according to QinQ or 802.1ad, must also terminate the L2 protocol tunnels by implementing the 'l2protocoltunnel' feature (proprietary to Cisco but implemented by many vendors). This modifies the mac destination of the L2 control protocol bpdu using a multicast MAC address (0100 0CCD CDD0). Maximum MTU sendable on end Customer-side 2000Bytes

COS 3.2

The minimum expected performances (End to End from the L2 Switch at the Customer's premises to the Delivery Port on the FTTO KIT) are as follows:

| Parameters | COS 2 |
|---------------------------|-------|
| Max. average latency (ms) | 30 ms |
| Max Jitter (ms) | 42 ms |
| Max Frame Loss Ratio | 0.02% |

Table 1: Minimum expected performance

Note: these performances are to be understood as the minimum expected level. They refer to a 1,200-km connection, over an observation period of one month and are also valid in the case of a congested network in one way mode.

Boundary devices

The boundary devices used for access from the end-customer premises and the Operator PoPs are of the Switch L2 category; the specific equipment model and equipment is decided on a case-by-case basis, depending on the bandwidth capacity required for the Connection.



PRICES

The price of the FTTO service on the end Customer-side is divided into a one-off fee and a monthly fee based on the dedicated bandwidth capacity. The delivery kit's development is based on a specific feasibility study that considers the kit's location and the type of interfaces required.

Regulatory Conditions

The services described above are aimed exclusively at: • Operators with an individual license or a general authorisation for telephone networks and services for public use which existed before the entry into force of Italian Legislative Decree no. 259 of 1 August 2003, containing the 'Electronic Communications Code' (referred to in Article 38 of the Code), as last amended by Italian Legislative Decree no. 70 of 28 May 2012. • Companies with a general authorisation for electronic communications networks and services pursuant to Art. 25 of the above-mentioned Italian Legislative Decree no. 259/2003, as last amended by Italian Legislative Decree no. 70 of 28 May 2012.





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