



WE DO CONNECTIONS

Consorzio TOP-IX Interconnection Services Service Description

DATE 15.03.2023

REV. 2023.01

Service Description

1. Introduction	4
2. TOP-IX Backbone Architecture	5
2.1 TOP-IX Platform Access Nodes	5
2.2 Interconnection To The Platform	7
2.3 Interface And Physical Access Standards	8
3. Services And Access Port	10
3.1 Peering Service	11
3.1.1 Access Mode	11
3.1.2 Access Requirements	12
Physical Layer: (applicable only to direct access)	12
MAC level and VLAN:	12
IP layer:	12
Routing:	12
3.1.3 Route Servers	13
3.1.4 Peering Agreements	13
3.1.5 Ancillary Services	13
3.2 Marketplace Services	14
3.2.1 Access Mode	14
3.2.2 Access Requirements	14
Physical Layer:	14
MAC level and VLAN:	14
IP layer:	14
Routing:	14
3.2.3 Ancillary Services	15
3.3 Transport Services	15
3.3.1 Service Access Modes	15
3.3.2 Service Access Requirements	15
Physical Layer:	15
MAC level and VLAN:	15
3.3.3 Ancillary Services	16
3.4 Remote Peering To Partner Ixps	16
4. Service Provisioning Process	17
4.1 Provisioning	17
4.2 Management	17
4.3 Maintenance	18
4.4 Operational Communications	18
5. Quality Statements	19
5.1 Provisioning	19
5.2 Management	19
5.3 Maintenance	19

5.3.1 Availability	19
5.3.2 Recovery Time	20
5.4 Performance Monitoring	20
5.5 Access To Traffic Statistics	20

1. INTRODUCTION

Interconnection services offered by Consorzio TOP-IX to consortium Members and Partners are based on the use of a geographically distributed transmission infrastructure (or platform) across North-West of Italy, and designed to allow the following types of connections:

- **Peering** connections using BGP protocol to implement mutual visibility sessions between the Autonomous System of Members and Partners connected to the platform.
- **Marketplace** designed to allow the sale of interconnection services (e.g. IP Transit, Cloud, remote Ethernet, etc.) between Members and Partners connected to the platform.
- **Transit** designed to implement point-to-point or multipoint connections for private services (e.g. backhauling) for Members and Partners connected to the platform.

Any relation between connecting entities is carried out directly between the relevant involved parties without any technical or financial involvement by TOP-IX. TOP-IX is solely responsible for providing the configuration on the platform required by Members.

2. TOP-IX BACKBONE ARCHITECTURE

The interconnection platform managed by TOP-IX operates at Level 2 (Ethernet). It is characterized by a high level of reliability and availability thanks to the redundant architecture of the local physical platforms building the network nodes and their interconnecting backbones.

As shown in Figure 1, the platform currently covers all the main cities in Piedmont and Valle d'Aosta regions, as well as the metropolitan Milan metropolitan area.

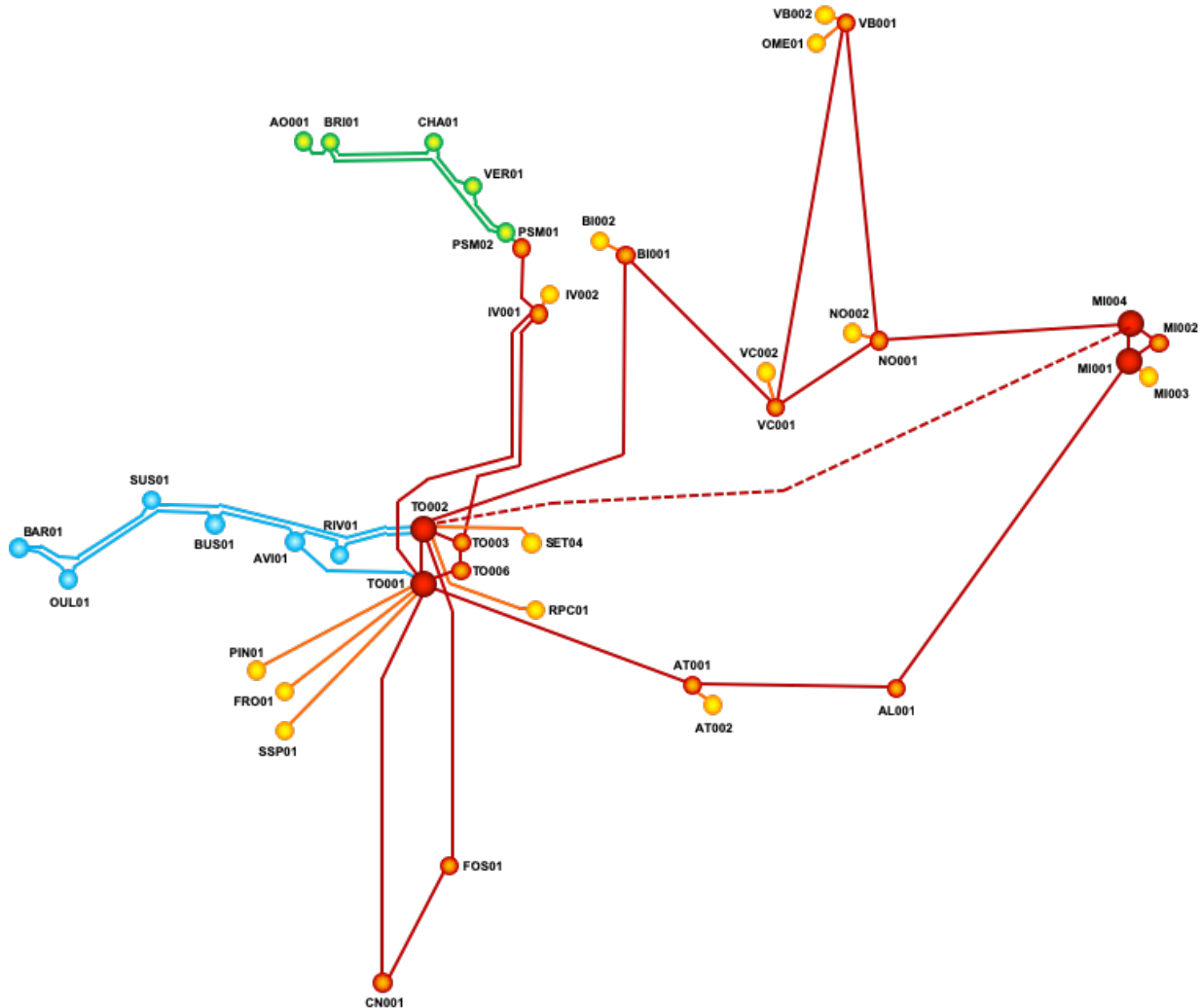


Figure 1 - TOP-IX network platform

2.1 TOP-IX PLATFORM ACCESS NODES

Depending on the specific features of local platforms and interconnecting backbones, four types of node can be identified. Each node differs in terms of its level of reliability, robustness and performance.

CORE: robust, reliable and high-performance platforms nodes comprising composed by redundant equipment. The backbones links connecting the nodes to the rest of the platform have

a meshed topology with physically diverse routes, with a speed of 400 Gbps / N x 100 Gbps (towards other Core) and N x 100 Gbps / N x 10 Gbps (towards other types).

BACKBONE: reliable and high-performance platforms nodes. The backbone links connecting the nodes to the rest of the platform have a meshed topology with physically and/or logically diverse routes, with speed N x 100 Gbps or N x 10 Gbps.

EDGE: reliable and high-performance platforms nodes. The backbone links connecting the nodes to the rest of the platform have a meshed topology with diverse routes on selected nodes, with a speed of N x 10Gbps but not always meshed.

REMOTE ACCESS: access nodes with a passive, single way xWDM interconnection technology. These nodes are designed to house backbone, point-to-point radio devices for traffic backhauling.

CORE NODES

TO001 TORINO Corso Unione Sovietica 216 (CSI Piemonte)

TO002 TORINO Centro Piero della Francesca Corso Svizzera 185 (It.Gate)

MI001 MILANO Via Caldera 21 - Orange Building (Irideos)

MI004 MILANO Via Monzoro, 101-105 Cornaredo (Data4)

BACKBONE NODES

TO003 TORINO Environment Park Via Livorno 60 (Colt Technology Services)

TO006 TORINO C.so Castelfidardo 22 (Officine Grandi Riparazioni)

AL001 ALESSANDRIA Lungo Tanaro Magenta 7/a (Comune di Alessandria)

AT001 ASTI Viale Pilone 103 (Comune di Asti)

BI001 BIELLA Via Quintino Sella, 12 (Provincia di Biella)

CN001 CUNEO Corso Soleri 2 (Provincia di Cuneo)

FOS01 FOSSANO Strada Torino 164/166 (Unione dei Comuni del Fossanese)

MI002 MILANO Via Savona 125 (Equinix ML2)

NO001 NOVARA Viale Manzoni, 26 (Comune di Novara)

VB001 VERBANIA Via dell'Industria, 29/1 (Tecnoparco / Provincia di Verbania)

VC001 VERCELLI Via San Cristoforo, 3 (Provincia di Vercelli)

EDGE NODES

IV001 IVREA Strada Torino 50 (Città Metropolitana di Torino)

MI003 MILANO Via Caldera 21 (Caldera21 – CDLAN)

PSM01 PONT SAINT MARTIN Viale Carlo Viola 76 (Reg. Autonoma Valle d'Aosta / Engineering)

VER01 VERRES Via Luigi Barone (Regione Autonoma Valle d'Aosta / Politecnico di Torino)

CHA01 CHATILLON Via Tornafol (Regione Autonoma Valle d'Aosta / CVA)

BRI01 BRISSOGNE Località Ile Blonde, 5 (Regione Autonoma Valle d'Aosta / INVA)

AO001 AOSTA Via Lavoratori Vittime col Du Mont 24 (Regione Autonoma Valle d'Aosta)

- RIV01 RIVOLI lungo Autostrada A32 Galleria "La Perosa" lato Torino (SITAF)
- AVI01 AVIGLIANA lungo Autostrada A32 Casello lato Torino (SITAF)
- BUS01 BUSSOLENO lungo Autostrada A32 Galleria "Prapontin" (SITAF)
- SUS01 SUSA lungo Autostrada A32 PCC / Autoporto (SITAF)
- OUL01 OULX lungo Autostrada A32 cavalcavia SS335 (SITAF)
- BAR01 BARDONECCHIA lungo Autostrada A32 svincolo accesso A32 direzione Torino (SITAF)

REMOTE ACCESS NODES

- AT002 ASTI Piazza Catena 3 (Comune di Asti)
(location connessa in singola via al nodo AT001)
- BI002 BIELLA Via Fratelli Rosselli 2 (IIS "Sella")
(location connessa in singola via al nodo BI001)
- FRO01 FROSSASCO – Via Rinaldo Asvisio 2 (Comune di Frossasco)
(location connessa in singola via al nodo TO001)
- IV002 IVREA Strada Torino 50 (Città Metropolitana di Torino)
(location connessa in singola via al nodo IV001)
- NO002 NOVARA Via San Bernardino da Siena 10 (IIS "Nervi")
(location connessa in singola via al nodo NO001)
- PIN01 PINASCA – Via Pola 2-6 (Comune di Pinasca)
(location connessa in singola via al nodo TO001)
- PSM02 PONT SAINT MARTIN Viale Carlo Viola 76 (Reg. Autonoma Valle d'Aosta / Pèpinière)
(location connessa in singola via al nodo PSM01)
- RPC01 RIVA PRESSO CHIERI – Via Andriano 12 (Area Industriale ex Embraco)
(location connessa in singola via al nodo TO002)
- SET04 SETTIMO TORINESE – Piazza Freidano (Comune di Settimo Torinese / Traliccio)
(location connessa in singola via al nodo TO002)
- SSP01 S. SECONDO DI PINEROLO Via Repubblica 1 TOP-IX (Scuola Secondaria "F. Brignone")
(location connessa in singola via al nodo TO001)
- VB002 VERBANIA Via dell'Industria, 29/1 (Tecnoparco / Provincia di Verbania)
(location connessa in singola via al nodo VB001)
- VC002 VERCELLI Piazza Risorgimento 12 (CCIAA)
(location connessa in singola via al nodo VC001)

2.2 INTERCONNECTION TO THE PLATFORM

The choice of the access node and the connection speed are at the discretion of the individual user who may also choose whether to:

- implement a direct remote interconnection from its own premises to the TOP-IX node while keeping the network equipment at its own premises;
- exploit the housing location at the TOP-IX node to host the network equipment.

The service demarcation point is located at layer 2 physical port made available to TOP-IX Member on the network node chosen by the Members. The Member is responsible for any physical cross connect needed from the physical access port on the TOP-IX network device to its own network infrastructure or to its equipment hosted in the node.

In selected locations, TOP-IX offers a housing service dedicated exclusively to host network transmission equipment (the installation of equipment such as servers, storage, etc. is not permitted).

The housing services is not included in the interconnection services and are well described in Housing Services - Service Description also available on TOP-IX website.

In-site cross-connect between equipment from different consortium Members must be requested to TOP-IX and are managed directly by TOP-IX staff.

2.3 INTERFACE AND PHYSICAL ACCESS STANDARDS

TOP-IX platform have Ethernet access interfaces. The access speeds and standards are listed in the following table for each PoP:

ID Nodo - Tipologia	Ethernet 1 Gbps	Ethernet 10 Gbps	Ethernet 100 Gbps
TO001 (CORE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
TO002 (CORE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
MI001 (CORE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
MI004 (CORE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
TO003 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
TO006 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
AL001 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
AT001 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
BI001 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
CN001 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
FOS01 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
MI002 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
NO001 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
VB001 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
VC001 (BACKBONE)	1000BASE-LH	10GBASE-LR	100GBASE-LR4
IV001 (EDGE)	1000BASE-LH	10GBASE-LR	-
MI003 (EDGE)	1000BASE-LH	10GBASE-LR	-
PSM01 (EDGE - Valle d'Aosta)	1000BASE-LH	10GBASE-LR	-

ID Nodo - Tipologia	Ethernet 1 Gbps	Ethernet 10 Gbps	Ethernet 100 Gbps
VER01 (EDGE - Valle d'Aosta)	1000BASE-T	-	-
CHA01 (EDGE - Valle d'Aosta)	1000BASE-T	-	-
BRI01 (EDGE - Valle d'Aosta)	1000BASE-LH	10GBASE-LR	-
AO001 (EDGE - Valle d'Aosta)	1000BASE-T	-	-
RIV01 (EDGE - Valle di Susa)	1000BASE-LH	10GBASE-LR	-
AVI01 (EDGE - Valle di Susa)	1000BASE-LH	10GBASE-LR	-
BUS01 (EDGE - Valle di Susa)	1000BASE-LH	10GBASE-LR	-
SUS01 (EDGE - Valle di Susa)	1000BASE-LH	10GBASE-LR	-
OUL01 (EDGE - Valle di Susa)	1000BASE-LH	10GBASE-LR	-
BAR01 (EDGE - Valle di Susa)	1000BASE-LH	10GBASE-LR	-
AT002 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
Bl002 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
FRO01 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
IV002 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
NO002 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
PIN01 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
PSM02 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
RPC01 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
SET04 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
SSP01 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
VB002 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-
VC002 (REMOTE ACCESS)	CWDM/DWDM	DWDM	-

REMOTE ACCESS nodes don't have switches to exchange traffic. For this it's mandatory having a a DWDM/CWDM channel towards the next CORE / BACKBONE / EDGE node and a port on it. The channel will be used to interconnect this port and customer device: it won't be possible to use it to connect any equipment co-located in the CORE / BACKBONE / EDGE PoP.

In the case of different needs, TOP-IX can evaluate the use of other physical access standards on a project basis. The possibility of adopting a different standard depends on the capability and port availability of the node network equipment.

For multi-port links on the same node, it is possible to implement the link in LACP mode.

In case of Transport service port (therefore excluding Peering or Marketplace services) it is possible to request the setup of QinQ tunnel in order to allow the free use of a single VLAN tag by the end user.

The backbone does not implement any QoS (Quality of Service) management mechanisms.

3. SERVICES AND ACCESS PORT

Based on the services required, the ports are divided into the following categories:

- Porte Peering. Porte riservate esclusivamente al servizio di Peering ed eventualmente ai servizi di remote peering verso infrastrutture di peering di IXP partner.
- Porte Marketplace (SELL). Porte dedicate alla vendita di servizi tramite infrastruttura TOP-IX. Su queste porte possono essere configurati esclusivamente servizi di tipologia "Marketplace" terminati su porte remote di categoria "Marketplace BUY" o "Transport" richieste da altri afferenti. Possono essere richieste dai soli venditori di servizi autorizzati da TOP-IX previa analisi dei requisiti tecnici
- Porte Marketplace (BUY). Porte dedicate all'acquisizione di servizi forniti da altri afferenti ed ai servizi di peering. Su queste porte è possibile configurare solamente servizi "Marketplace" terminati su porte remote di categoria "Marketplace SELL" o "Transport" richieste da altri afferenti. Ogni afferente potrà richiedere al massimo una porta di tale tipologia.
- Porte Transport. Porte su cui è possibile richiedere uno o più servizi tra quelli disponibili, ovvero Peering e/o Marketplace e/o Transport;
- Porte Reselling. Porte che possono essere richieste esclusivamente da partner TOP-IX che abbiano sottoscritto un apposito accordo per la rivendita a terzi del servizio di accesso alla piattaforma di peering pubblico del consorzio. Le porte di Reselling possono essere di tipologia "Standard" (consegna del peering pubblico TOP-IX su singolo TAG di VLAN comune a tutti i remote peer) o "Advanced" (consegna del peering pubblico TOP-IX tramite un differente TAG di VLAN per ognuno dei remote peer).
- Porte IXP Interconnection: Ports that can only be requested by IXP partners who have signed a specific agreement with TOP-IX for the extension of reciprocal public peering infrastructures.

The following table defines the compatibility between service types and port types:

Port	Peering Services	Marketplace Services	Transport Services	Remote Peering Services
Peering	X	-	-	X
Marketplace (SELL)	-	X ¹	-	-
Marketplace (BUY)	X	X ²	-	X
Transport	X	X	X	X
Reselling	X	-	-	-
IXP Interconnection	X	-	-	-

¹ On ports of the Marketplace SELL type, only marketplace services can be configured with termination towards remote ports of other members of the "Marketplace BUY" or "Transport" category.

² On ports of the Marketplace BUY type, only marketplace services can be configured with termination towards remote ports of other members of the "Marketplace SELL" or peering services.

The following table shows the connection speeds available for the different port types:

Port	100 Mbps	1 Gbps	10 Gbps	100 Gbps
Peering	-	-	X	X
Marketplace (SELL)	-	-	X	X
Marketplace (BUY)	-	-	X	-
Transport	-	X	X	X

3.1 PEERING SERVICE

TOP-IX offers its Members and Partners access to the Layer 2 distributed platform of Internet Exchange in order to implement Internet peering agreements towards other Bodies/Organizations/Companies connected directly or indirectly to its platform.

The peering service can only be used to implement BGP sessions of mutual visibility between Consortium Members/Partners. It is prohibited to use TOP-IX public peering platform for other functionalities such as transport, transit sale, etc.

3.1.1 ACCESS MODE

The peering service is available in the following three access modes:

- **Direct access;**
- **Remote access;**
- **Access from Partner IXPs.**

Direct Access

The direct access mode is used when the service user is directly connected to one or more ports active at nodes belonging to the TOP-IX platform.

Remote access

It is possible to access the public peering services offered by TOP-IX through a Partner (Reseller) chosen among those identified by TOP-IX. Resellers are Partners of TOP-IX who have signed a Reselling Agreement in order to provide third parties with remote access (remote peering) to the TOP-IX peering platform.

Any contractual relationship is directly managed by the user of the service and the Reseller. The extension of the peering service (Layer 2) between the platform of TOP-IX and that of the user of the service will be realized by the Reseller through its own network infrastructure.

The updated list of Partners that are offering remote access is available at page <https://www.top-ix.org/en/remote-peering/>

Access from Partner IXPs

The public peering platform of TOP-IX is also available through the Internet Exchanges interconnected to TOP-IX platform (VSIX, Lyon-IX and France-IX).

Members of these IXPs may request access to TOP-IX public peering from their IXP. The Partner IXP extends the TOP-IX Layer2 peering LAN to its Members.

The service is to be considered as Best Effort, and not subjected to the Quality Statements.

3.1.2 ACCESS REQUIREMENTS

Access to the public peering service offered by TOP-IX must be carried out in full respect of the following constraints and requirements.

Physical Layer: (applicable only to direct access)

The physical interfaces of the equipment connected to the TOP-IX platform must respect the interconnection requirements defined in paragraph 2.3 (any exceptions must be agreed with and must be explicitly authorised by TOP-IX).

MAC level and VLAN:

All frames sent to the access ports of TOP-IX public peering platform must have the same source MAC address, associated with the IP assigned by TOP-IX.

Any MAC address change must be reported to the TOP-IX NOC, which will update the ingress filters associated with the access port.

Public peering agreements are carried out on a single public VLAN, they are free of charge and cannot implement transit services.

The protocols allowed are: IPv4 (Ethertype 0x0800), ARP (Ethertype 0x0806) and IPv6 (Ethertype 0x86dd).

ARP, ICMPv6 and unknown-unicast traffic is policed.

All control plane Layer2 protocols (STP, bridging protocols) as well as Router Advertisement/Router Solicitation (RA/RS) will be filtered out.

IP layer:

All Layer 3 interfaces connected to TOP-IX public peering platform have IPv4 and/or IPv6 addresses assigned by TOP-IX (the use of addresses other than those assigned is not permitted).

In case of Direct Access the service includes the assignment of a single IPv4 and a single IPv6 address for each port and a maximum of two ports for direct interconnection can be required.

in case of Remote Access or with Partner IXP, the service includes only one ipv4 address and one IPv6 address for each remote connection.

Maximum MTU allowed is 1500 bytes.

Non-unicast packets are not allowed, with the exception of ARP and ICMPv6 Neighbor Advertisement/Solicitation (IPv4 multicast traffic is not allowed).

Routing:

Peering sessions established through TOP-IX public peering platform must use the BGP-4 protocol.

The AS numbers used in BGP sessions must be public and registered with a RIR (RIPE, etc.) in the name of the Member/Partner (the use of AS belonging to the reserved block for private use is not allowed).

Any IPv4/v6 address assigned by TOP-IX cannot be announced via BGP.

All routes announced in peering sessions must be registered with RIPE or any other public Routing Registry.

3.1.3 ROUTE SERVERS

In order to facilitate and encourage public peering on its platform, TOP-IX provides a redundant Route Server service that automates the management of peering between Members and Partners.

The Route Server does not perform traffic routing, but deals exclusively with the redistribution of routes (learned via BGP protocol) between the Members of the platform. Using a single BGP session with the Route Server is possible to receive the announcements generated by all the Autonomous Systems connected to the Route Server.

All information concerning the use of the Route Server systems are available at the address:

<https://www.TOP-IX.org/it/ix/routeserver/>

Given the importance of the role played by the Route Server function within the Internet Exchange service, the system is redundant; two BGP sessions toward two different and geographically diverse Route Servers must be configured for their correct use.

A Looking Glass service to verify the operation of the Route Server systems is available at the address:

<https://lg.TOP-IX.org>

The use of the TOP-IX Route Server systems is at the discretion of the individual Member, who may decide whether or not to use them.

3.1.4 PEERING AGREEMENTS

The interaction between the Members takes place in peer-to-peer mode using the BGP-4 protocol (Border Gateway Protocol - version 4) or BGP-4+ (for the IPv6 protocol) without any technical or economic interference from TOP-IX.

A public VLAN is made available on which the interested Members can enter into peering agreements of mutual visibility (transit BGP sessions are excluded).

3.1.5 ANCILLARY SERVICES

The service explained in the previous paragraphs also includes:

- One IPv4 and one IPv6 address belonging to the Autonomous System of TOP-IX (depending on the service required), used to implement peering interconnection agreements with other Members.
- Access to statistics related to the volume of traffic exchanged through the Member ports on TOP-IX platform;
- An operational mailing list service;

- Support for configuration updates on ports;
- Support for fault management and troubleshooting on TOP-IX platform affecting the Member service.

The services provided by TOP-IX do NOT include

- housing costs;
- cross connect costs;
- interconnection costs between the Member premises and the TOP-IX platform nodes;
- configuration of the Member equipment.

3.2 MARKETPLACE SERVICES

The Marketplace services are dedicated to allow the sale of services (IP Transit, Dedicated Cloud Access, Ethernet, Security, etc.) between Members directly connected to the TOP-IX platform.

The service exclusively includes Layer 2 interconnection between the requesting party and another Member. The services provided on top of the Marketplace Service are subject to direct agreements between the two Members/Partners involved.

Marketplace services may only be requested between ports of two different Members directly connected to the TOP-IX platform. Marketplace services are not allowed between more than two Members.

3.2.1 ACCESS MODE

Marketplace services are only available in direct access mode to the TOP-IX platform.

3.2.2 ACCESS REQUIREMENTS

Access to the services must be made in full compliance with the following constraints and requirements.

Physical Layer:

The physical interfaces of the equipment connected to the TOP-IX platform shall comply with the interconnection requirements defined in section 2.3 (any exceptions must be agreed with and must be explicitly authorised by TOP-IX).

MAC level and VLAN:

Service agreements (IP Transit, Dedicated Cloud Access, etc.) are negotiated directly between Consortium Members/Partners without any interference from TOP-IX.

IP layer:

All Layer 3 interfaces connected to the platform and dedicated to Marketplace Services that impose the use of BGP sessions must use IPv4/IPv6 addresses assigned by TOP-IX (use of addresses other than those assigned is not permitted).

Maximum MTU allowed is 9008 bytes.

Routing:

Any IPv4/v6 address assigned by TOP-IX cannot be announced via BGP.

3.2.3 ANCILLARY SERVICES

The service explained in the previous paragraphs also includes:

- One or more IPv4/IPv6 address and an IPv6 address belonging to the Autonomous System of TOP-IX (depending on the service required), used to implement peering interconnection agreements with other Members.
- One or more VLANs towards other Members/Partners of TOP-IX (each single VLAN may be propagated exclusively between two Members/Partners).
- Access to statistics related to the volume of traffic exchanged through the Member ports on TOP-IX platform;
- An operational mailing list service;
- Support for configuration updates on ports;
- Support for fault management and troubleshooting on TOP-IX platform affecting the Member service.

The services provided by TOP-IX do NOT include

- housing costs;
- cross connect costs;
- interconnection costs between the Member premises and the TOP-IX platform nodes;
- configuration of the Member equipment.

3.3 TRANSPORT SERVICES

The Transport services allow the implementation of a Layer 2 transport between ports assigned to a single Member.

3.3.1 SERVICE ACCESS MODES

Transport services are available exclusively in direct access mode to the TOP-IX platform and can be provided only on "Transport" type ports.

3.3.2 SERVICE ACCESS REQUIREMENTS

Access to the services must be performed in full compliance with the following constraints and requirements.

Physical Layer:

The physical interfaces of the equipment connected to the TOP-IX platform must comply with the interconnection requirements defined in paragraph 2.3 (any exceptions must be agreed with TOP-IX and must be explicitly authorised by the latter).

MAC level and VLAN:

The service is intended to allow connectivity between Layer 3 equipment of the requesting Consortium Member.

Maximum MTU allowed is 9008 bytes

3.3.3 ANCILLARY SERVICES

The service explained in the previous paragraphs also includes:

- One or more VLANs to other ports of the Member/Partner using the transport service (VLANs used for the transport service may not be propagated to other Members/Partners).
- Access to statistics related to the volume of traffic exchanged through the Member ports on TOP-IX platform;
- An operational mailing list service;
- Support for configuration updates on ports;
- Support for fault management and troubleshooting on TOP-IX platform affecting the Member service.

The services provided by TOP-IX do NOT include

- housing costs;
- cross connect costs;
- interconnection costs between the Member premises and the TOP-IX platform nodes;
- configuration of the Member equipment.

3.4 REMOTE PEERING TO PARTNER IXPS

Through the TOP-IX platform it is possible to access the public peering platforms of Partner IXPs interconnected to TOP-IX platform.

It is possible to request access to the public peering services of the following IXPs:

- VSIX (Padua);
- LYON-IX (Lyon);
- FRANCE-IX (Paris).

The service offered by TOP-IX provides for the extension of the public peering VLAN of the Partner IXP to the requesting port.

4. SERVICE PROVISIONING PROCESS

The following sections describe the operational procedures and contact points for provisioning (port and service activation/capacity expansion/termination), management (changes in configurations) and maintenance processes (fault management and troubleshooting).

4.1 PROVISIONING

Requests related to activating/deactivating/modifying ports and/or services by Consortium Members/Partners should be made by filling in the form available from TOP-IX website

<https://www.TOP-IX>

under the Internet Exchange/Subscription and Fees section.

Request forms should be sent by e-mail to the following address:

amministrazione@TOP-IX.org

During the request phase, the Member/Partner is required to indicate the technical person responsible for coordinating activities on behalf of the Member/Partner.

Requests will be carried out in the manner and timing foreseen in the "Quality Statements" section of this document.

In the case of requests involving contractual changes, please refer to TOP-IX website at <https://www.TOP-IX> (Internet Exchange/Subscription and Fees section) for current financial terms and conditions.

Requests for service activation and/or upgrade will not be carried out in case of pending or outstanding administrative case.

4.2 MANAGEMENT

The operations management service offered by TOP-IX includes the implementation of any configuration modifications requested by the Members/Partners that do not affect the service contract agreement, or require hardware/software updates to TOP-IX backbone platform.

Operations do not include actions involving activation of new ports, capacity changes, discontinuation of existing services – activities to be carried as described in the "Provisioning" section.

Requests to modify the configurations may be requested:

- by email to networking@TOP-IX.org (available only during normal business hours, from Monday to Friday, 9:00-13:00 and 14:00-18:00, public holidays excluded).

Requests involving this type of activity must be submitted with all the necessary technical information in order to implement changes correctly.

The minimum amount of information required in order to deal with the request is as follows:

- details of the technical staff in charge of coordinating the activity;
- detailed technical description of the request;

- any potential impact on other Members/Partners on the TOP-IX platform, and the staff contact of the latter.

This service is active Mondays to Fridays, 09:00-13:00 and 14:00-18:00 (public holidays excluded).

4.3 MAINTENANCE

Maintenance services offered by TOP-IX allow services to be restored in the event of TOP-IX platform malfunction.

Any faults or malfunction that interfere with the correct running of platform operations and, consequently the supply of services to Members/Partners, can be reported using the following methods:

- by email to networking@TOP-IX.org (available only during normal business hours, from Monday to Friday, 9:00-13:00 and 14:00-18:00, public holidays excluded);
- by telephone +39 011 0883150 (available 24/7/365).

The point of contact reported above are in use solely to report anomalies involving the TOP-IX platform. The contact numbers do not respond to issues regarding management activities (configuration modification, capacity expansion, etc.) or the Members/Partners network devices beyond the TOP-IX service demarcation point (Layer 2 port on TOP-IX node).

It is also necessary to supply all relevant information in order to facilitate initial remote fault troubleshooting:

- name of the Member/Partner affected by the fault or malfunction;
- details of the technical staff in charge of coordinating the activity;
- number of service demarcation points on the TOP-IX platform and related configuration;
- detailed description of the technical problem reported;
- any impact of the fault on other platform Members/Partners (if known).

Maintenance service coverage as described above is active 24/7 and 365 days/year.

4.4 OPERATIONAL COMMUNICATIONS

In addition to the above, the mailing list

operations@TOP-IX.org

is available to:

- communicate planned maintenance to the platform carried out by TOP-IX;
- report any malfunction or unexpected events that may impact on the services provided by TOP-IX.

The same mailing moderated by TOP-IX staff can be used by Members and Partners to:

- report activities and changes that can affect the public peering service on the platform (BGP update, changes, maintenance, etc).

5. QUALITY STATEMENTS

The Quality Statements described below - concerning the implementation, maintenance and management components of the services - are intended as TOP-IX objective to guarantee an adequate level of quality to the user of the platform.

TOP-IX will monitor the actual compliance with the defined target parameters, and in case of deviations from the defined target performance values will take the necessary action to ensure compliance.

5.1 PROVISIONING

Service activation time is subject to whether the type of port required is available on the platform and on the interested physical node device.

The following list describes the implementation times required following a request for the activities:

- port activation/capacity expansion requiring no hardware update: within 5 working days.
- port activation/capacity expansion requiring hardware update: to be defined (TOP-IX shall assess the actions required for platform expansion and will provide an estimated time of activation).
- port activation/capacity expansion on a custom project design: subjected to the project design and constraints.
- Access port discontinuation: within 3 working days.

5.2 MANAGEMENT

Configuration management is carried within 3 working days from the reception of the management request, providing that all details are correctly reported in the request.

5.3 MAINTENANCE

5.3.1 AVAILABILITY

TOP-IX has set an annual minimum service availability target for each individual service port of 99.95%.

Actual availability for each individual port is calculated as follows:

$$Availability = \frac{Reference.period - \sum Downtime}{Reference.period}$$

Where:

Availability: The availability of the relative port, measured during the reference period.

Reference period: The reference period during which any downtime is measured, i.e. one year.

\sum Downtime: The sum of all port downtime measured during the reference period.

Analysis does not include scheduled maintenance and platform update activities, which are carried out to improve performance and reliability.

These activities are managed on a per-project basis and planned in order to minimize any impact on services. Service users are notified in the following way:

- by e-mail with 10 working days' notice for activities with a significant impact on the services provided;
- by e-mail with 5 working days' notice for activities with a limited impact on the services provided.

5.3.2 RECOVERY TIME

The target times set for service restoration in the event of a failure on the platform are:

- 10 hours from reporting the malfunction in 95% of cases;
- 24 hours from reporting the malfunction in 100% of cases.

5.4 PERFORMANCE MONITORING

TOP-IX monitors traffic levels on its network platform in order to guarantee the network service levels and expand capacity when needed.

Platform monitoring is mainly focused on:

- backbone links, in order to ensure adequate capacity between service nodes;
- user service ports, in order to identify and notify user of possible access bottleneck and capacity upgrade.

The monitoring system provides the following web-based information:

- analysis of aggregated total traffic level on the TOP-IX platform (publicly available on TOP-IX website);
- analysis of traffic for each individual user port (privately available on the Members Area).

5.5 ACCESS TO TRAFFIC STATISTICS

Access to information regarding allocated resources, active services, and traffic on the single ports is available to Members and Partners through the Members Area of the TOP-IX website, available at:

<https://membersarea.TOP-IX.org>