

EURONEXT MANAGED CONNECTIVITY SERVICES (EMC)

Service and Technical Description

JANUARY 2023

PREFACE

PURPOSE

The purpose of this Policy is to provide Clients with a detailed definition of the Euronext Managed Connectivity Services, or EMC. This policy document (Policy) is published by Euronext. Other relevant documentation is also available from the website at:

connect2.euronext.com/membership/resources/it-documentation

Capitalised terms used in this Policy though not defined herein shall either (i) have the same meaning as ascribed thereto in the legal documentation made available by Euronext in relation to its Euronext Managed Connectivity Service which governs the provision of the Euronext Managed Connectivity Service once executed by a Client and Euronext (Agreement), or (ii) – in case not defined therein – the Rules.

TARGET AUDIENCE

This Policy should be read by all Members and Non-Members interested in connecting to Euronext Markets and Services.

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The development of Euronext products and services is continuous and published information may not be up to date or may change. It is important to check the current position with Euronext.

WHAT'S NEW?

The following lists only the most recent modification made to this revision/version. For the Policy History table, see below.

REVISION NO./ VERSION NO.	DATE	AUTHOR	CHANGE DESCRIPTION
1.0	October	Euronext	First Version

This Policy may be amended at any time in accordance with article 2.5 GTCs

ASSOCIATED DOCUMENTS

The following lists the associated documents, which either should be read in conjunction with this Policy or which provide other relevant information for the user:

For all Clients:

- Euronext Managed Connectivity Services Order Form
- Euronext Managed Connectivity Services Price List
- Euronext Connectivity Application Services Fees Price List
- Euronext Managed Connectivity Services Specific Terms
- Euronext Data Centre Services General Terms and Conditions
- This Policy

For Service Providers:

- Service Provider Accreditation Agreement

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1. SERVICE DESCRIPTION

Euronext Managed Connectivity Services or EMC provide the network infrastructure, fully monitored and managed by Euronext, to allow Clients to access the Euronext Markets and other services offered by Euronext and its Affiliates.

Euronext provides Clients with dedicated circuits, terminated on devices provided and managed by Euronext. Lines can be terminated in the Euronext Production and Disaster Recovery (DR) Data Centres directly, or at the Euronext Points of Presence (PoPs) connected to the Euronext Production and DR Data Centres via the Euronext network.

2. EMC ACCESS OPTIONS

2.1 OPTIONS FOR DIRECT CLIENTS

- Available bandwidths: 2 Mbps, 10 Mbps, 100 Mbps, 1 Gbps and 10Gbps
- Resilient or singular set-up, providing access to Production, EUA and DR facilities
- Support for all existing and future Euronext Services
- Provides a secure environment supporting mission critical and sensitive transactions
- Circuits can be terminated at Production and DR Data Centres or at the Euronext POPs in London or in Milan

2.1.1 Data Centre and PoPs

The Euronext Production Data Centre is located at:

Aruba IT3
Via San Clemente 53
24036 Ponte San Pietro (BG)
Italy

The Euronext DR Data Centre is located at:

Equinix
114 Rue Ambroise Croizat
93200 Saint Denis
France

The Euronext PoPs in London are hosted in the following facilities:

Interxion LON1	Equinix LD4
11 Hanbury Street	2 Buckingham Ave
London E1 6QR	Slough SL1 4NB
UK	UK

The Euronext PoP in Milan is hosted in the following facility:

BT Italia/I.Net
Via Darwin, 85
20019 Settimo Milanese (MI)
Italy

It is understood that such locations may change from time to time in accordance with the GTCs.

2.1.2 Resilient solutions

The EMC resilient solution can be offered within the same Client Site and can be offered in the following set-up:

- 1) two links to Production Data Centre
- 2) one link to Production Data Centre and one link to one of the POPs (London or Milan)
- 3) two links to the POPs (London or Milan)

For each resilient solution option the primary link will carry unicast traffic and multicast Feed A, while the secondary link will carry unicast backup and multicast Feed B.

2.1.3 Non-Resilient solutions

Non-resilient solutions are accepted for Members.

Non-resilient solutions are accepted for Non-Members only in the following cases:

- Access to EUA
- Access to clearing services only

2.2 CONNECTION VIA SERVICE PROVIDER

Another option for Clients to be connected to Euronext Markets and Services is via a Service Provider that has in place access to Connectivity Services.

3. TECHNICAL DESCRIPTION

This section describes the interface provided by Euronext to Clients who wish to access the Euronext Markets and related services, using the Euronext Managed Connectivity Services.

Clients should make sure they understand and complete any additional obligations required for particular Euronext Services before ordering connectivity.

3.1 PHYSICAL CONNECTION DETAILS

The Euronext Managed Connectivity Services can be delivered by fibre optic or copper cable directly to the Client Site(s). Each circuit can have RJ45 or Single Mode SFP presentation.

3.1.1 Physical handoff

The required physical handoff for the EMC Services within the Client Site is:

- single-mode fibre with LC connectors for 1 Gbps and 10 Gbps bandwidths;
- copper, using the standard RJ45 physical socket, for all other bandwidths.

3.2 SAP (SERVICE ACCESS POINT) REQUIREMENTS

For all EMC Services, Client access to the Markets and Services is made via a Service Access Point (SAP).

The SAP provides both the physical and logical interface to the IP Network.

The devices provisioned at Client Site will be Juniper switches: one Juniper switch (for single set-up) or two Juniper switches (for resilient solution).

Clients should ensure that adequate facilities exist for the installation of the equipment supporting their SAP and the associated communications equipment e.g. the Carrier's circuits or the Cross-Connects. It is suggested that Clients should be vigilant and ensure that power supplies of the correct rating, adequate ventilation and appropriate environmental conditions are in place for their connectivity.

3.2.1 Client Site installation and cabling for bandwidth up to 100 Mbps

Circuits are terminated on port 0/0/0 of each Juniper switch.

Euronext will communicate to the Clients the demarcation points of the circuits at the Client Site. Clients must provide the Cross-Connect between the termination point of the Euronext circuit in the Client Site and the port of the patch panel where the Euronext device is installed in the Client Site.

The two Juniper switches must be connected together using two straight copper cables:

- one between port 0/0/22 of each device
- one between port 0/0/23 of each device

This is the resilient path which is used in case of the failure of one WAN link (this is shown in black on the diagram in section 3.2.3).

The client LAN interconnect is connected to:

- 0/0/1 on both Junipers for the Unicast traffic Prod
- 0/0/2 on both Junipers for the Unicast traffic EUA
- 0/0/3 on both Junipers for the Multicast traffic

Cables must be copper.

3.2.2 Client Site installation and cabling for bandwidth of 1 Gbps and 10 Gbps

Termination of the circuit is SM fibre with LC connectors.

Circuits are terminated on port 0/1/0 of each Juniper switch.

Euronext will communicate to the Clients the demarcation points of the circuits at the Client Site. Clients must provide the Cross-Connect between the termination point of the Euronext circuit in the Client Site and the port of the patch panel where the Euronext device is installed in the Client Site.

The two Juniper switches must be connected together using:

- one between port 0/0/22 of each device
- one between port 0/0/23 of each device

This is the resilient path which is used in case of the failure of one WAN link (this is shown in black on the diagram in section 3.2.3).

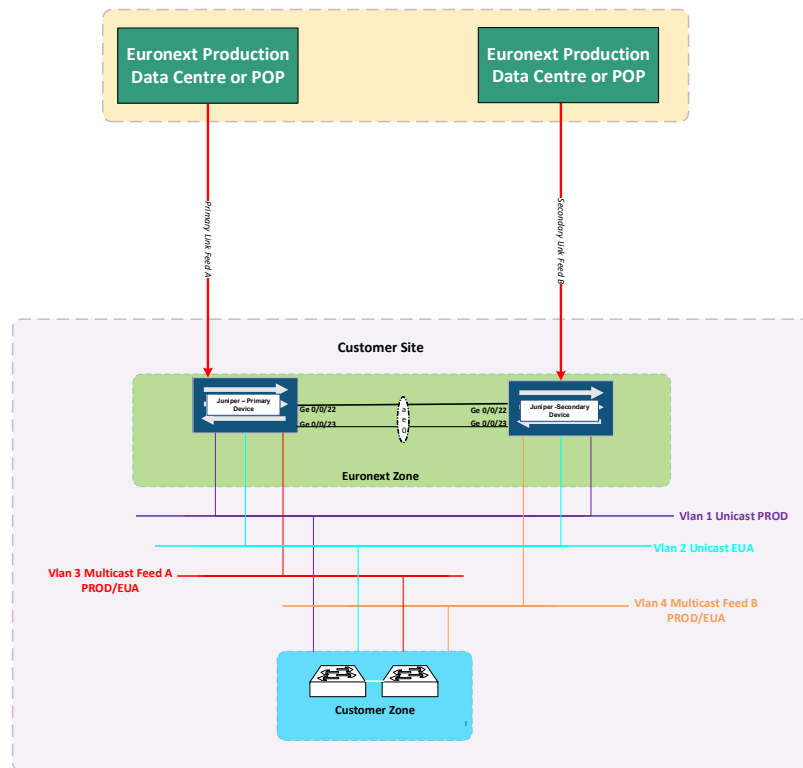
The client LAN interconnect is connected to

- port 0/1/1 on both Junipers for the Unicast traffic PROD
- port 0/1/2 on both Junipers for the Unicast traffic EUA
- port 0/1/3 on both Junipers for the Multicast traffic

Cables must be SM fibre with LC connectors.

3.2.3 Network Diagram

See below a Network Diagram of the EMC solution:



3.3 SECURITY CONTROLS

It is the responsibility of the Client to implement security controls between the Client Equipment and Euronext Equipment at the Client Site.

It is expected that Clients will use firewalls to implement security controls between the Euronext network and their own networks. Any firewall installed between the Client and the Euronext network must be able to allow IP multicast packets to pass through.

Euronext will implement the following security controls to minimise the risk of unauthorised access to its network:

- (a) Incoming and outgoing filters ensure a Client SAP can exchange only pre-defined and agreed-upon routing information.
- (b) Access lists of allowable source IP addresses.

3.4 NETWORK CONFIGURATION

3.4.1 Logical Interfaces and routing

3.4.1.1 Layer 2 interconnection between Euronext and the Client

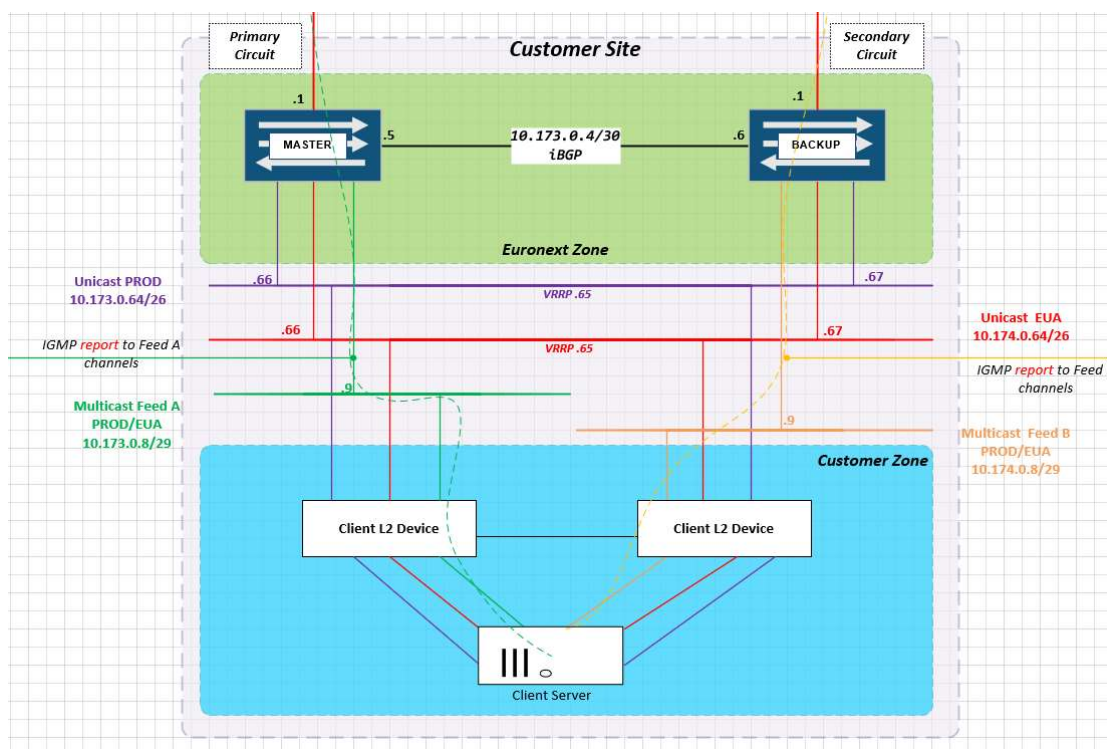
The routing between Euronext and the Client is static and the Client must target a VRRP IP address.

Euronext will assign IPs belonging to the ranges 10.173.x.x and 10.174.x.x. The Client will be given two /25 IP ranges to be assigned to the following VLAN:

- **VLAN for Unicast PROD Traffic:**
 - subnet is 10.173.X.64/26
 - 10.173.X.66 is the physical address of the Euronext primary device (G0/0/1)
 - 10.173.X.67 is the physical address of the Euronext secondary device (G0/0/1)
 - 10.173.X.65 is the Euronext VRRP Virtual IP address (gateway for the Client)
- **VLAN for Unicast EUA Traffic:**
 - subnet is 10.174.X.64/26
 - 10.174.X.66 is the physical address of the Euronext primary device (G0/0/2)
 - 10.174.X.67 is the physical address of the Euronext secondary device (G0/0/2)
 - 10.174.X.65 is the Euronext VRRP Virtual IP address (gateway for the Client)
- **VLAN for A Feed Multicast Traffic:**
 - subnet is 10.173.X.8/29
 - 10.173.X.9 is the physical address of the Euronext primary device (G0/0/3)
- **VLAN for B Feed Multicast Traffic:**
 - subnet is 10.174.X.8/29
 - 10.174.X.9 is the physical address of the Euronext secondary device (G0/0/3)

The customer is free to assign other addresses belonging to the above subnets 10.173.x.64/26 and 10.174.x.64/26, as source IPs for accessing the Production and EUA environments respectively.

Please find below a network diagram of the proposed solution:



3.4.1.2 Layer 3 interconnection between Euronext and the Client

The routing between Euronext and the Client is static and the Client must target a VRRP address.

Euronext will assign IPs belonging to the ranges 10.173.x.x and 10.174.x.x. The Client will be given two /25 IP ranges to be assigned to the following VLAN:

- **Interconnection VLAN for Unicast PROD Services:**

- subnet is 10.173.X.16/29
- 10.173.X.18 is the physical address of the Euronext primary device (G0/0/1)
- 10.173.X.19 is the physical address of the Euronext secondary device (G0/0/1)
- 10.173.X.17 is the Euronext VRRP Virtual IP address (gateway for the Client)
- 10.173.X.20 is the physical address of the Client primary device
- 10.173.X.21 is the physical address of Client secondary device
- 10.173.X.22 is the Client VRRP IP address (gateway for Euronext)

- **Source IP range for Unicast PROD Services:**

- subnet is 10.173.X.64/26

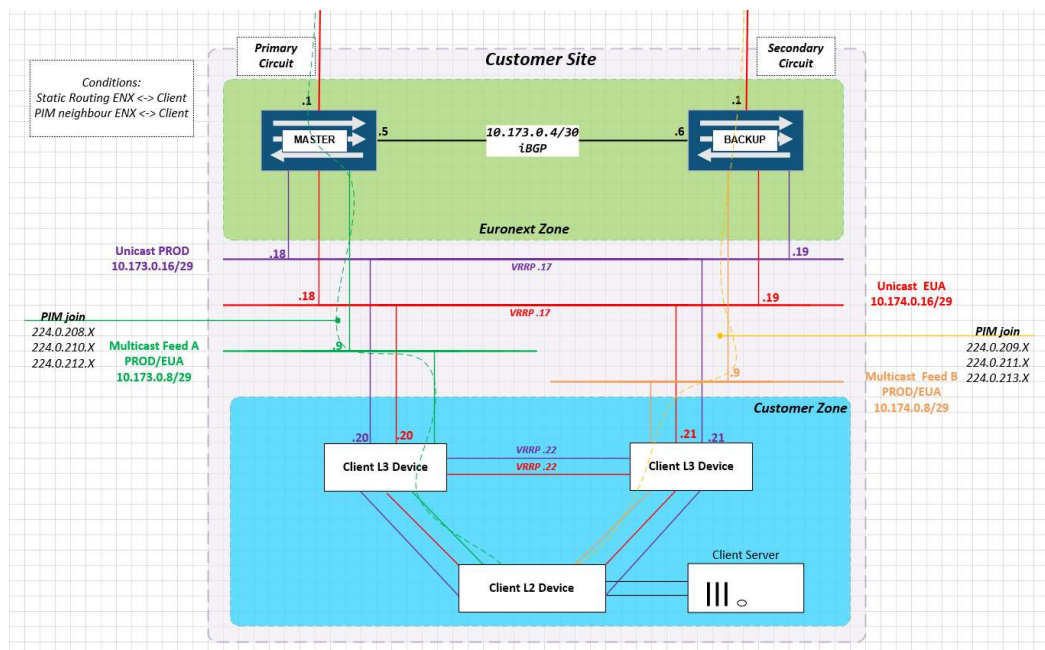
- **Interconnection VLAN for Unicast EUA Traffic:**

- subnet is 10.174.X.16/29
- 10.174.X.18 is the physical address of the Euronext primary device (G0/0/2)

- 10.174.X.19 is the physical address of the Euronext secondary device (G0/0/2)
 - 10.174.X.16 is the Euronext VRRP Virtual IP address (gateway for the Client)
 - 10.174.X.20 is the physical address of the Client primary device
 - 10.174.X.21 is the physical address of Client secondary device
 - 10.174.X.22 is the Client VRRP Virtual IP address (gateway for Euronext)
- **Source IP range for Unicast EUA Services:**
 - subnet is 10.174.X.64/26
 - **VLAN for A Feed Multicast Traffic:**
 - subnet is 10.173.X.8/29
 - 10.173.X.9 is the physical address of the Euronext primary device (G0/0/3)
 - **VLAN for B Feed Multicast Traffic:**
 - subnet is 10.174.X.8/29
 - 10.174.X.9 is the physical address of the Euronext secondary device (G0/0/3)

The customer is free to assign other addresses belonging to the above subnets 10.173.x.64/26 and 10.174.x.64/26, as source IPs for accessing the Production and EUA environments respectively.

Please find below a network schema of the proposed solution:



3.4.2 Multicast services

The Multicast Exchange Services will feature active/active primary (A Stream) and secondary (B Stream) market data being delivered at the same time.

Both streams will contain identical market data. However, the source and group IP Multicast addresses will be different.

Each feed will have its own source IP address with different multicast destination addresses; all of these addresses will be registered.

3.4.2.1 Layer 2 interconnection between Euronext and the Client

The multicast will be static with IGMP protocol.

3.4.2.2 Layer 3 interconnection between Euronext and the Client

The multicast will be dynamic with PIM protocol.

3.4.3 Unicast services

The Unicast Services are routed as follows:

- the standard path is the primary link
- in case of failure of the primary link, connections are routed via the secondary link.

4. BITNET BRONZE OVER EMC

Until the completion of the Borsa Italiana migration to Optiq®, Euronext will support the BItNet Bronze service over the EMC through the internal backbone between the Production Data Centre and the Milan POP.

In this case, the connectivity is realised through the internet access of the Client and is terminated to a firewall provided by Euronext and installed in the Client Site.

5. VPN LAN TO LAN

Until the completion of the Borsa Italiana migration to Optiq®, Euronext will support the VPN LAN to LAN over the EMC through the internal backbone between the Production Data Centre and the Milan POP.

In this case, the connectivity is realised through the internet access of the Client and is terminated to a Client firewall.

6. TESTING POLICY

Before being granted access to Euronext Markets, Clients must test their EMC accesses by performing (among others) telnet to the unicast destinations (if applicable) and confirming multicast groups are received (if applicable).

After the enablement of the production and/or test environment, Clients with resilient solutions are required to perform a failover test over the links.

To allow Clients to test their connectivity to the Markets, Euronext will charge Clients for the Services as from the seventh (7th) calendar day following the respective Service Start Date.

7. INCIDENT AND CHANGE MANAGEMENT (PORTAL)

7.1 INCIDENT MANAGEMENT

In the case of any issue regarding (any part of) the Euronext Managed Connectivity Services (including security), Clients must contact the **Operational Client Services Desk** by email or by telephone using the contact details listed in section 7 of this Policy.

The communication must include at least:

- Names of impacted End Users (for Service Providers only)
- Source IPs, Destination IPs, TCP ports and logical access/user experiencing the issue, if the incident is related to the unicast services
- Multicast Groups experiencing the issue, if the incident is related to the multicast services
- The chosen service provider in the case of indirect connectivity.

7.2 CHANGE MANAGEMENT

In the case of new EMC Services being required, any other required change to the current configuration (i.e. change request), any claim against Euronext, or any other event or situation, Clients can contact Euronext via the appropriate Portal:

Web Portal:

The Web Portal is accessible via the Connect page on Euronext's corporate website. The Web Portal can be used by Clients for contract management functions as notified by Euronext to Clients from time to time. The Client's '*Business Contact*', as appointed by the Client through its Order Form, will act as the Client's Portal Administrator unless the Clients objects to such in accordance with Article 21.4 GTCs or appoints other Portal Administrators by submitting to Euronext (through the Manual Portal) a Web Portal Administrator notification form (the format of which shall be determined by Euronext).

Manual Portal:

In the event that (i) a Client does not want to use the Web Portal, or (ii) is not authorised to do so, or (iii) in respect of contract management functions not available through the Web Portal at any time, the Client should contact Euronext by email or by telephone using the contact details listed in section 7 of this Policy.

Euronext may require Clients to provide certain information in respect of any notifications required hereunder (including determining the format in which such is to be reported to Euronext), and Clients are obliged to adhere to such requirements and to provide such information where reasonably possible.

Changes in the network configuration set-up as per paragraph Network configuration do not normally require the execution of a new Order Form or amendment to the existing one, but Euronext will confirm the case to the Client for each change requested.

8. EURONEXT CONTACTS

Email communications must be sent to both clientsupport@euronext.com and connectivityteam@euronext.com

Operational Client Services Desk numbers:

Belgium: +32 2 620 0585	France: +33 1 8514 8585	Ireland: +353 1 617 4289	Netherlands: +31 20 721 9585
Norway: +31 20 721 9585	Portugal: +351 2 1060 8585	UK: +44 20 7660 8585	Italy: +39 02 4541 1399

9. GLOSSARY

AS: Autonomous System

BGP: Border Gateway Protocol

CMC: Client-Managed Connectivity Services

EMC: Euronext Managed Connectivity Services

ICMP: Internet Control Message Protocol

SAP: Service Access Point

VRRP: Virtual Router Redundancy Protocol