

EURONEXT CLIENT MANAGED CONNECTIVITY (CMC)

Service and Technical Description

MAY 2022



EURONEXT

PREFACE

PURPOSE

The purpose of this Policy is to provide Clients with a detailed definition of the Euronext Client Managed Connectivity (CMC) service. This document is published by Euronext ("Euronext"). Other relevant documentation is also available from the website at

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

Capitalised terms used in this document 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 Client Managed Connectivity Service which governs the provision of the Client Managed Connectivity Service once executed by a Client and Euronext, or (ii) – in case not defined therein – the Rules.

TARGET AUDIENCE

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

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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 Document History table, see the Appendix.

REVISION NO./ VERSION NO.	DATE	AUTHOR	CHANGE DESCRIPTION
1.0	June 2021	Euronext	First Version
2.0	December 2021	Euronext	Second version
3.0	March 2022	Euronext	Third version
4.0	May 2022	Euronext	Fourth version

This document 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 document or which provide other relevant information for the user:

For all Clients:

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

For Service Providers:

- Service Provider accreditation agreement

CONTENTS

- 1. SERVICE DESCRIPTION 5**
- 2. OPEN CONNECTIVITY MODEL..... 6**
 - 2.1 Client Access Options..... 6
 - 2.1.1 Options for Clients 6
 - 2.1.2 CMC Access 6
 - 2.1.3 CMC Access – Connection via Euronext PoPs..... 7
 - 2.1.4 Connection via Service Providers..... 8
- 3. TECHNICAL DESCRIPTION 9**
 - 3.1 PHYSICAL CONNECTION DETAILS 9
 - 3.1.1 CMC Access 9
 - 3.1.2 CMC Access – Connection via Euronext PoPs.....10
 - 3.1.3 Physical handoff.....10
 - 3.2 SAP (Service Access Point) Requirements.....10
 - 3.2.1 Client side11
 - 3.2.2 Data Centre/PoP and MMRs11
 - 3.3 Security Controls.....12
 - 3.4 Network configuration13
 - 3.4.1 Logical Interfaces.....13
 - 3.4.2 Euronext IP Addressing.....13
 - 3.4.3 Client IP Addressing14
 - 3.4.4 Routing.....14
 - 3.4.5 Network failover15
- 4. TESTING POLICY..... 16**
- 5. INCIDENT AND CHANGE MANAGEMENT (PORTAL)..... 17**
- 6. GLOSSARY 19**



1. SERVICE DESCRIPTION

Client Managed Connectivity (CMC) provides an optimised network infrastructure, offering resiliency and scalability, to allow Clients to access Euronext Markets and Services with additional choice, flexibility and control. Euronext has an open connectivity model allowing Clients to select their preferred Carrier to support their Data and Markets access.

Euronext provides Clients with a choice of scalable physical access ports on which to terminate their chosen Carrier or their Cross-Connect where applicable (and allowed for hereunder), underpinned by a resilient and scalable network infrastructure. Access ports can be provided in the Euronext Production and DR Data Centres directly or at the Euronext PoPs (Points of Presence) connected to the Euronext Production and DR Data Centres via the Euronext network.

2. OPEN CONNECTIVITY MODEL

The Euronext open connectivity model has been established to provide Clients with greater choice and flexibility when connecting directly to Euronext Markets.

In this model, Clients contract directly with their preferred Carrier for physical circuits between the Clients' premises and Euronext Production and DR Data Centres or between the Clients' premises and Euronext PoPs. A list of Carriers connected to the Data Centres and Facilities will be made available by Euronext upon request.

In the case that Clients' sites and Euronext sites are in the same premises, the connections can be realised by Clients via local Cross-Connects, though only after Euronext approval (which may be denied by Euronext at its sole discretion). Please note that such connections in the Production Data Centre are only available for Colocation Clients.

Prior to entering into any contractual arrangements for circuit provision from the Carrier or for provisioning of Cross-Connects within the Euronext PoPs or Euronext Data Centres, Clients should contact their Euronext Sales Representative to make sure that requirements are fully understood and can be met.

Clients should ensure that any circuits provided by Carriers can support the transportation of standard Ethernet frames.

2.1 CLIENT ACCESS OPTIONS

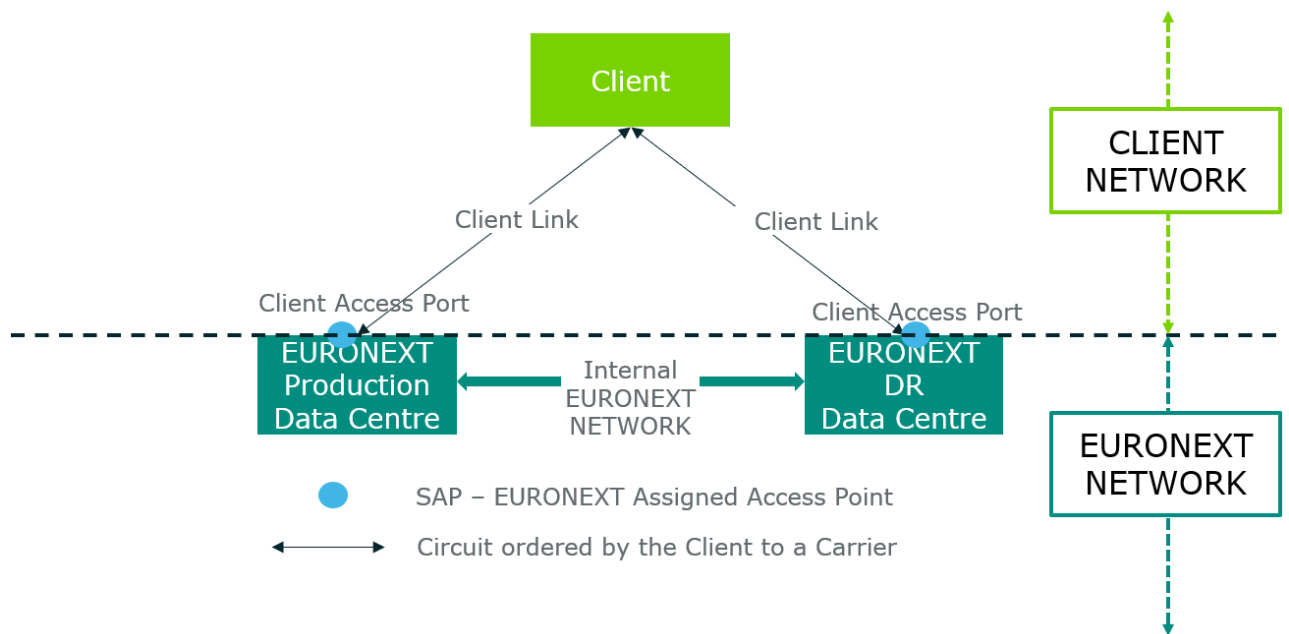
2.1.1 Options for Clients

- Choice of access speeds from 100Mb to 10Gb
- 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

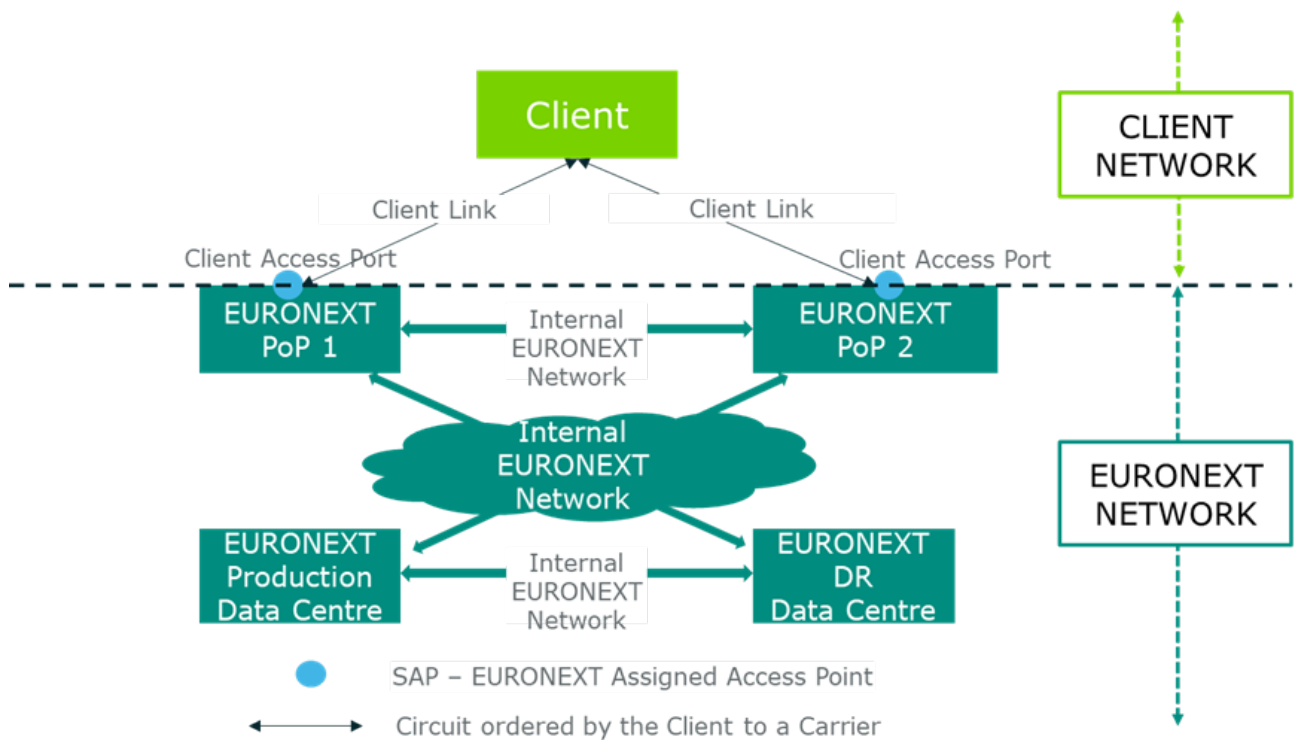
2.1.2 CMC Access

In this case, Clients' links will be connected directly to Client Access Ports in the Euronext Production and DR Data Centres.

Below an example of a Client configuration for CMC Access.



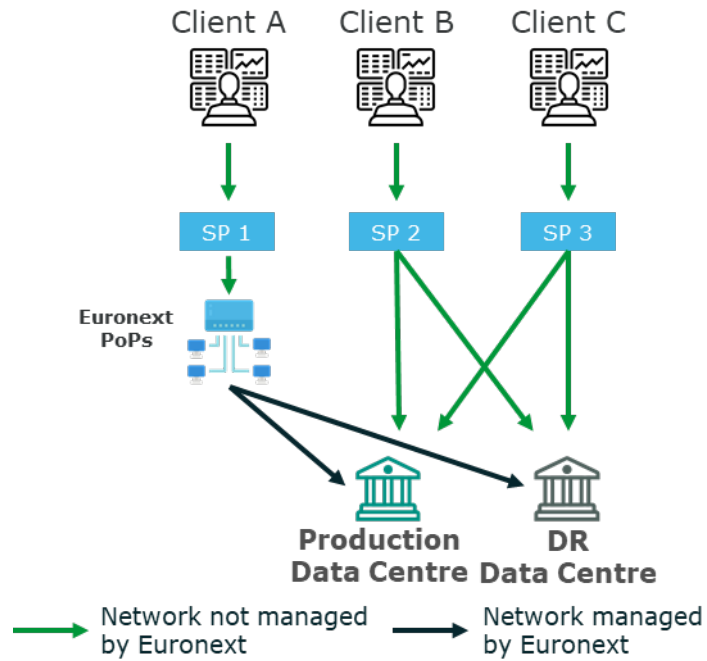
Markets and Services available across Euronext suite of products can be reached via the Euronext network, connecting to the Client Access Ports at the Euronext PoPs. Below an example of a Client configuration for CMC Access – Connection via Euronext PoPs.



2.1.4 Connection via Service Providers

Another option for Clients to be connected to Euronext Markets and Services is via Service Providers, who have CMC Accesses in place.

Below some examples of possible connections via Service Providers:



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 Client Managed Connectivity Service.

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

3.1 PHYSICAL CONNECTION DETAILS

In order to access Euronext Services, a physical connection must be made between Clients' Equipment and Euronext Equipment.

3.1.1 CMC Access

The physical connection between Clients' Equipment and Euronext Equipment must be delivered to the Production and/or DR Data Centres from a Carrier's Point of Presence within the Meet Me Rooms (MMRs) in premises where the Production and DR Data Centres are located. In the case that Clients' sites and Euronext sites are in the same premises, the connections can be realised by Clients via Cross-Connects established by the respective Operator, though only after the Client has received specific written approval for such from Euronext (which may be denied by Euronext at its sole discretion).

Please note that Cross-Connects in the Production Data Centre are only available for Colocation Clients.

Colocation Clients wishing to be connected via CMC in the Production Data Centre need to order a Cross-Connect to the MMR for each Client Access Port required.

Clients with a point of presence in the Production Data Centre outside of the Colocation Room and wishing to be connected via CMC in the Production Data Centre need to order from their preferred Carrier a circuit, which must reach at least the Carrier's first available node (outside the Production Data Centre), existing as per the date of this Policy, before terminating in the Production Data Centre's MMRs. In the DR Data Centre, Clients need to terminate their circuits or Cross-Connect on the Euronext patch panel, as per details provided by Euronext, at the DR Data Centre.

Within the Production Data Centre, Clients can choose one or more Client Access Ports, through which Clients can receive unicast services and multicast services (Feed A, Feed B or Feed A+B on each port). Within the DR Data Centre, Clients can receive unicast services and multicast services on a Client Access Port only in case of activation of the Euronext DR.

Although Euronext strongly recommends choosing resilient solutions, according to Service Providers' minimum requirements and/or Clients' needs, several options are available, from the fully redundant solution to the non-resilient solution.

3.1.2 CMC Access – Connection via Euronext PoPs

The physical connection between Clients' and Euronext Equipment must be delivered to the Euronext PoPs from Carrier's Points of Presence, which are located in the MMRs within the same Facility.

In the case that Clients' sites and Euronext sites are in the same Facility, the connections can be realised by Clients via Cross-Connects subject to prior written consent from Euronext (which may be denied by Euronext at its sole discretion).

In both cases, Clients need to terminate their circuit or Cross-Connect on the Euronext patch panel at the Euronext PoPs.

For each Euronext PoP, Clients can choose one or more Client Access Ports, through which Clients can receive unicast services and multicast services (Feed A, Feed B or Feed A+B on each port).

Although Euronext strongly recommends choosing resilient solutions, according to Service Providers' minimum requirements and/or Clients' needs, several options are available, from the fully redundant solution to the non-resilient solution.

3.1.3 Physical handoff

For all CMC Services, either in the Data Centres or in the Euronext PoPs, the required physical handoff at the relevant Data Centres or Euronext PoPs are single-mode fibre with LC connectors.

Bandwidth options for Client Access Ports are:

- 100 Mbps
- 1 Gbps
- 10 Gbps.

3.2 SAP (SERVICE ACCESS POINT) REQUIREMENTS

For all CMC Services, Client access to the Markets and Services is made via a Service Access Point (SAP). Clients are responsible for providing their own switching/routing Client Equipment at their site. For physical access circuits between the Client site and Euronext sites, Clients are responsible for direct contractual relationship with the Carriers. Within the Production Data Centre, Euronext will provide the Cross-Connect from the Carrier's demarcation point or, for Colocation Clients only, from the Client's demarcation point in the Meet Me Room (MMR) to the Client Access Port provided on the Euronext Equipment.

Within the DR Data Centre or Euronext PoPs, Euronext will provide only the cabling from the Euronext port on the Euronext patch panel in the Meet Me Room (MMR) or anywhere else in the DR Data Centres or Euronext PoPs to the Client Access Ports

provided on the Euronext Equipment. Clients are responsible for terminating their circuit or Cross-Connects on the demarcation point assigned by Euronext.

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

The following requirements are valid for all CMC Services (either in the Data Centres or in the Euronext PoPs).

3.2.1 Client side

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.

3.2.2 Data Centre/PoP and MMRs

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 are hosted in the following Facilities: Interxion LON1 (11, Hanbury Street, London E1 6QR, UK) and at Equinix LD4 (2, Buckingham Ave, Slough SL1 4NB, UK).

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

Euronext will communicate to the Clients the demarcation points in the MMRs to be provided to the Carrier or used by the Client itself for the Cross-Connect in the DR Data Centre as well as in the Euronext PoPs.

Clients with a CMC access in the Production Data Centre must communicate to Euronext as soon as practical, their demarcation points in the MMR (for Colocations Clients only) or the circuit termination details provided by the Carrier.

Below the list of MMRs to be used at each Data Centre and Euronext PoPs:

Production Data Centre:

Blue Room (primary)

Yellow Room (secondary)

DR Data Centre:

S130-2

Interxion LON1 PoP:

205G (primary)

214C (secondary)

Equinix LD4 PoP:

MER North LD4.2 (primary)

MER South LD4.2 (secondary)

The port on the Euronext patch panel at which to terminate the Client's circuits or Cross-Connect within the DR Data Centre or within the Euronext PoPs, will be provided by Euronext after the signature of the Connectivity Order Form (unless explicitly determined otherwise by Euronext at its sole discretion).

For Clients having two circuits/Cross-Connects connected to the same Data Centre or Euronext PoP, the Clients have to deliver the primary circuit/Cross-Connect to the MMR classified as "primary" within the corresponding Data Centre or Euronext PoP and the secondary one to the MMR classified as "secondary".

For Clients having only one circuit/Cross-Connect per Data Centre or Euronext PoP, the MMR in which to deliver the circuit has to be agreed with Euronext.

3.3 SECURITY CONTROLS

It is the responsibility of the Client to implement security controls between the Client Equipment at the Client site and Euronext Equipment at the Data Centres or Euronext PoPs.

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 the network:

- (a) Incoming and outgoing filters ensure a Client SAP can exchange only pre-defined and agreed-upon routing information.
- (b) Each Client Access Port will maintain an access list of allowable IP addresses and only packets from addresses in that list will be permitted through the Client Access Port.

3.4 NETWORK CONFIGURATION

Euronext uses TCP/IP (Transmission Control Protocol/Internet Protocol) for network connectivity. Euronext currently only supports IPv4.

A full explanation of IP is beyond the scope of this document. Clients are advised to refer to the Internet Engineering Task Force website for more detailed technical information about the Internet Protocol: www.ietf.org

3.4.1 Logical Interfaces

Euronext will provide a L3 router port over each Client Access Port. Euronext uses L3 point-to-point logical connections.

Clients should configure the relevant local L3 interfaces on their devices for valid connectivity.

To enable Clients to confirm connectivity between their own Client Equipment and Euronext Equipment, Euronext supports ICMP 'ping' messages to the Euronext Interface IP address.

3.4.2 Euronext IP Addressing

Euronext will assign IP addressing for the network links between Client Equipment and Euronext Equipment as follows.

For each network link between the Client Equipment and the assigned Client Access Port on the Euronext Equipment, Euronext will provide a /30 RFC1918 address range. The highest usable IP address within each range will always be reserved for the Euronext Client Access Port of the point to point network link.

IP Ranges are the following:

- 10.52.0.0/16
- 10.54.0.0/16
- 10.55.0.0/16
- 10.56.0.0/16
- 10.57.0.0/16
- 10.205.0.0/16

All IP addressing relating to Euronext Markets and Services will be made available to Clients as part of the onboarding process.

Euronext reserves the right to assign different ranges to Clients. Upon client request and on a non-discriminatory basis, Euronext may evaluate and accept exceptions to the aforementioned ranges.

3.4.3 Client IP Addressing

The Client subnets that will directly interface with Euronext Services will be provided by Euronext.

As standard, the following subnets are offered to the Clients for each SAP:

- 1x subnet /26, split as follows:
 - The lowest /27 subnet for access Production environment
 - The highest /27 subnet for access EUA Environment
- In the case of Service Providers ordering direct Client Access Ports, when technically applicable, a specific /26 subnet for each End User will be allocated.

IP ranges for the Clients' subnets will be as follows:

- 10.52.0.0/16
- 10.54.0.0/16
- 10.55.0.0/16
- 10.56.0.0/16
- 10.57.0.0/16
- 10.205.0.0/16

For all CMC Services, Clients must present themselves to the Production and EUA environments with addresses that belong to the given subnet.

Where Clients use a different private addressing scheme or there is conflict between the IP addresses allocated by Euronext and the Client's network, then Network Address Translation (NAT) must be performed. Any NAT device should employ static address translation. Responsibility for NAT is with the Client.

The subnet is dedicated to a single Client SAP and cannot be used elsewhere on the Euronext network or via another Client SAP.

Upon client request and on a non-discriminatory basis Euronext may evaluate and accept exceptions to the above network configurations.

3.4.4 Routing

Client routing from the Client Access Port until the Client's Equipment is the responsibility of the Client.

BGPv4 is the routing protocol to be used between Euronext Equipment and Client Equipment, for the dynamic propagation of routing information, and is available on all Client Access Ports.

Euronext will use a public registered AS number and assign to each Client a private AS number.

The /30 address range assigned to the L3 point-to-point connection determines the BGP peers on the subnet.

The highest usable IP address in the subnet will always be the Euronext BGP peer, whilst Clients should assign the next usable IP address to their BGP peer.

3.4.5 Network failover

For rapid failover detection, Euronext supports BFD (Bi-directional Forwarding Detection) between the Client Access Port on the Euronext Equipment and the Client Equipment.

The Euronext network has been designed to be resilient through the use of its optimised network infrastructure.

Euronext is able to provide Client Access Ports at both Production and DR Data Centre, as well as at the Euronext PoPs in the Facilities.

If the primary Client Access Port, which should be the prioritised connection for traffic with Euronext under normal market conditions, fails, then network connectivity with Euronext will automatically be maintained via the secondary Client Access Port (if any). Any physical investigation work related to a Client Access Port will be performed outside of market hours.

The initial failover configuration must be agreed between the Client and Euronext, as well as to any change to the initial configuration.

It is recommended that Clients with resilient connections undertake regular failover testing to verify that all functionality behaves as expected on both primary and secondary connections.

4. TESTING POLICY

Before asking for the enablement to Euronext Markets, Clients have to test their CMC accesses by performing an ICMP ping test to each BGP Peer.

After the enablement of the Production and/or Test Environment, Clients with resilient solutions are required to perform a fail over test over the links.

So as 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. In deviation from the aforementioned, in the event that the Service Start Date is on or before the Go-Live Date, Euronext shall charge the Client for such Services as from the Go-Live Date.

5. INCIDENT AND CHANGE MANAGEMENT (PORTAL)

In the case of any issue on connectivity (including security), Clients must contact the Operational Client Services Desk by email at DCmigration@euronext.com or by calling the telephone numbers below.

In the case of new CMC services 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 (respective) 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 the 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 a Client (i) does not want to use the Web Portal, or (ii) is not authorized to do so, or (iii) in respect of contract management functions not available through the Web Portal at any time (including the engagement of Smart Hands Services), a Client should contact Euronext through the following numbers or email address:

email DCmigration@euronext.com.

Operational Client Services Desk:

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	

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.

6. GLOSSARY

AS: Autonomous System

BFD: Bi-directional Forwarding Detection

BGP: Border Gateway Protocol

CMC: Client Managed Connectivity

ICMP: Internet Control Message Protocol

SAP: Service Access Point