

Connectivity Guide

LCH SA


LCH The Markets'
Partner



Disclaimer

This document is solely intended as information for clearing Members and others who are involved in the connectivity services provided by LCH SA. It is a presentation for information of one of the services provided by LCH SA and not a binding commercial offer. Although all reasonable care has been taken in the preparation of this document LCH SA disclaims any liability for the information contained in this document and for the uses to which it may be put. All the parts of the booklet may be upgraded from time to time without notice. All the intellectual property rights of the technical presentation and the diagrams included in this booklet are exclusively vested in LCH SA. This work is issued in confidence for the purpose for which it is supplied. It must not be reproduced in whole or in part or used for other purposes except with the prior consent in writing of LCH SA and then only on the condition that this disclaimer notice is included fully in any such reproduction. The information contained in the booklet is solely for educational purposes and is not to be construed as technical specification.

Table of Contents

Table of Contents	3
1. Introduction	4
1.1. Definitions and Acronyms	4
1.2. Service description	5
1.3. The connectivity	6
1.4. The Clearing Access Solutions	7
2. Member Access CMC - Customer Managed Connectivity	11
2.1. Architecture principles	11
2.2. Connectivity principles	11
2.3. General Architecture & Connectivity Synoptic	12
2.4. Connectivity Tiers	13
3. Subscribing to LCH SA's Solutions	17
3.1. Direct Business Model	17
3.2. Subscribe	18
4. Contacting LCH SA	21
4.1. Client Relationship Management	21
4.2. Customer Technical Helpdesk (CTH)	21
4.3. CMC Forms	21
Appendices	22
5. Customer Technical Helpdesk (CTH)	23
On-site Support	24
Supervision	24
Verification Tests	24
Calls Recording	24
Ticket Reference	25
Operating Hours and Conditions of the CTH	25
Members contacts and references	26
6. "Accredited Connectivity Partners" (ACP)	27
7. Clearing Gateways Solution description	28
7.1. LCAP (Logical Certified Access Point)	28
7.2. eCCW SOLUTION 	30
7.3. WebOTC	32
7.4. WebEGCP	33
7.5. PUSH / PULL Solution	34
7.6. Clearlink gateway	36
7.7. LCH Member Portal	37

1. Introduction


1.1. Definitions and Acronyms

Abbreviation / Terms	Explanation / Definition
API	Application Programming Interface.
CAP	Certified Access Point
CCP	Central Counterparty Clearing
CLEARING HUB® (for clearing only)	The message handling interface-managing application flows between the central systems and the access points.
CMC	Customer Managed Connectivity
CMF	Clearing Member Firm
DMZ	Demilitarized zone. Secured zone in a network.
	Access solution to Central Counterparty Web based services. This program provides an access to the LCH SA clearing services
EGCP	€GCPlus service. This program provides an access to the LCH Repoclear services for cash tripartite repo transactions that are secured by collateralising securities belonging to a pre-defined basket of securities
EUA	External User Acceptance (test platform for Users)
FTP	File Transfer Protocol
GMA	Group Member Access
IP	Internet Protocol
ISV	Independent Software Vendor. A provider offering a software and/or facilities management solution to access the LCH SA clearing systems.
LAN	Local-area network
LCAP®	Logical Certified Access Point. A device handling network between a Member's site and the "CLEARING HUB®" or the "Order Flow HUB", including data compressing. A LCAP® handles the communication for one or more Members
MAP	Mutualized Access Point
Members	LCH Clearing Member of LCH SA or LCH Ltd.
MMTP	Market Message Transfer Protocol Standardised communication protocol used by client applications to access the LCAP® solution as an interface between the CAPI® / MAPI® and the "CLEARING HUB®" or the "Order Flow Hub".
OTC	Over The Counter (Bond & Repo market service)
POP	Point of Presence (into CMC network)
Physical server	Computer hardware on which order management server (SLE) and/or broadcast server (SLC) software reside.

Abbreviation / Terms	Explanation / Definition
Router	A network device that performs dynamic routing between the Hub (Order Flow or Clearing) and the access point.
SEF	Swap Execution Facility
SFTP	Secured File Transfer Protocol
SLC	Broadcast Server. A logical server (server software), developed by the Member or ISV ; it receives the market data feed, stores this information in a local database that maintains a picture of the current state of the market, and makes this information available on the workstations. (SLC – “Serveur Local de Consultation” in French means local consultation server.)
SLE	Order Management Server. A logical server (server software) developed by the Member or ISV ; it handles the interactive communication between the Clearing/Trading central systems and Members, including all private messages, i.e. the order feed (orders, acknowledgments, trade notices, cancellations, etc.). (SLE – “Serveur Local d’Emission” in French means local transmission server.)
SPOF	Single Point Of failure
Subscribers	Logical access to a LCAP. A LCAP can support up to 5 subscribers
TMF	Trading Member Firm
VPN	Virtual Private Network
WAN	Wide Area Network
WebEGCP / WebOTC	Web base solution for Bonds & Repo €GCPlus and OTC services

1.2. Service description

Clearing Gateway Solutions (see Appendix for detailed description)

- LCAP (except for CDSClear),
-  ,
- WebOTC,
- WebEGCP ,
- Push/Pull Solution,
- LCH Website,
- Clearlink Gateway,
- LCH Member Portal,

rely on 2 types of Connectivity enabling Members to connect LCH ’s clearing platforms in regards of the market or the product cleared:

- CMC
- Internet

Connectivity and Clearing Gateway Solutions can simultaneously provide access to the same cleared market, product, trading or matching platform.

The Internet connectivity is not provided by LCH , Members have to subscribe an Internet connection by their own means.

The following chart gives Members a synopsis of market/product and related access solutions offered by LCH SA

Product Family	Market/Product/Trading or Matching Platform	Member Access Solution							
		Network CMC	LCAP via CMC	eCCW via Internet	WebOTC via Internet	WebEGCP via Internet	Push/Pull for OTC or €GCPlus	LCH Website via Internet (Portal member)	Clearlink Gateway (reporting SFTP)
Securities	Euronext Cash	Yes*	Yes*	Yes*	n.a.	n.a.	n.a.	Yes	n.a.
	Equiduct	Yes*	Yes*	Yes*	n.a.	n.a.	n.a.	Yes	n.a.
	Bourse de Luxembourg Cash	Yes*	Yes*	Yes*	n.a.	n.a.	n.a.	Yes	n.a.
Exchange Traded Financial and Equity	Euronext Derivatives	Yes*	Yes*	Yes*	n.a.	n.a.	n.a.	Yes	n.a.
	AtomX	Yes*	Yes*	Yes*	n.a.	n.a.	n.a.	Yes	n.a.
Credit Default Swap	CDS (**)	Yes*	n.a.	n.a.	n.a.	n.a.	n.a.	Yes	Yes
Fixed Income	ICAP	n.a.	n.a.	n.a.	Yes	Yes	Yes	Yes	n.a.
	Euroclear Trade Capture and Matching System (ETCMS)	n.a.	n.a.	n.a.	Yes	n.a.	Yes (For OTC Only)	Yes	n.a.
	MTS Group	n.a.	n.a.	n.a.	Yes	Yes	Yes	Yes	n.a.
	Tullett Prebon Trading System	n.a.	n.a.	n.a.	Yes	Yes	Yes	Yes	n.a.
Commodities	Euronext Derivatives	Yes*	Yes*	Yes*	n.a.	n.a.	n.a.	Yes	n.a.

* Not mandatory, Members choose the solution that suits them best.

** In addition to other means, CDSclear has implemented the Clearlink API to provide open access to the system and facilitate connectivity with other middleware platforms and SEFs in the future.

Members' choice is to be made according to their own internal requirements, constraints or policies but Members cannot access LCH SA services otherwise than through one of these solutions.

All solutions provide encrypted data transfers between Members and LCH SA systems in order to guarantee security and confidentiality.


1.3. The connectivity

LCH SA brings to Members different clearing gateways accessible through different paths: private lines **WAN with** the CMC Connectivity or **Internet**.

The CMC handles:

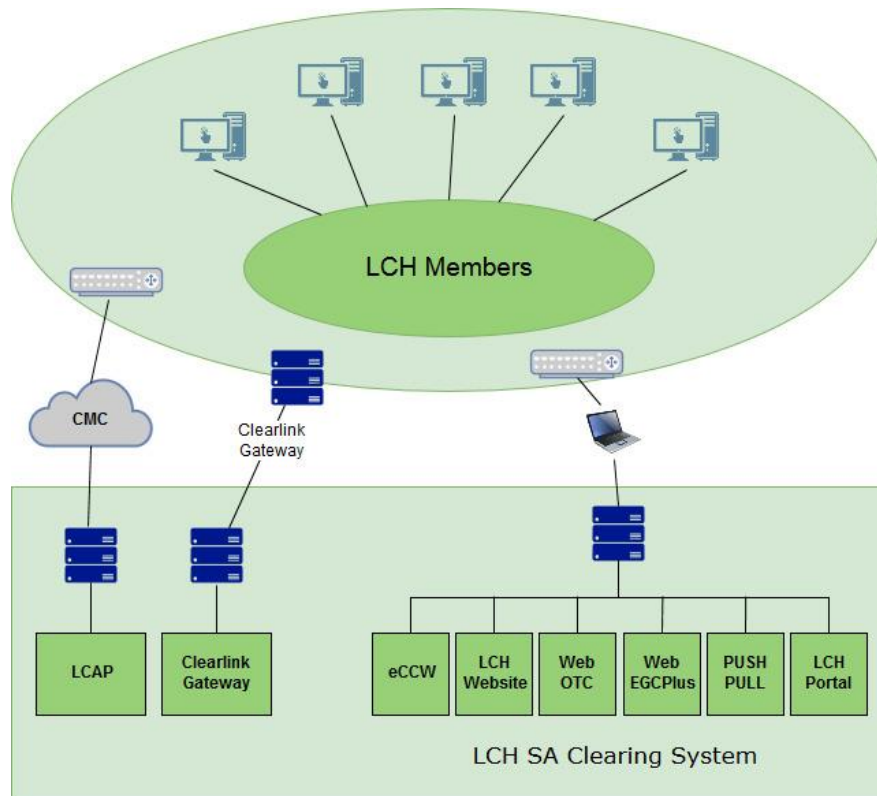
- LCAP solution (Logical Certified Access Point)
- ClearLink API

Internet connectivity handles

-  eCCW solution, (access to Central Counterparty Webservices),
- WebOTC solution, access to web interface,

- WebEGCP solution, access to web interface
- Push/Pull solution, access to FTP interface, including both OTC and €GCPlus services
- LCH website
- LCH Member Portal

The following diagram represents the general architecture to access LCH SA services:



1.4. The Clearing Access Solutions

All clearing gateways share the same background in terms of technical reliability, each offers different possibilities.

1.4.1. LCAP solution

Solution description


- Dedicated network access required
- No hardware in Members premises
- Allows mutualisation of the access point interface for several Members
- The network equipment handles data encryption and compression
- Order flow through the CMC network
- Handles order certification on behalf of the ISV with the Member's agreement
- Member's pricing and connection processes defined and handled by the ISV
- Handles real time messages (MMTP) and file transfer (FTP) or secured file transfer (SFTP available from 2019)

Features

- An open architecture
- Allows re-processing of delivered real-time feeds
- Enables the handling of multiple and large files
- Secured (IPsec encryption) & resilient solution
- End-to-end connectivity, fully managed by LCH SA(LCAP gateway & IP network)
- Group solution CMC
- Inteconnected with Member clearing applications (open API)

1.4.2. eCCW, WebOTC and WebEGCP solutions

Solution description

- Dedicated to LCH SA clearing business
- Certified and secured access point
- One Member code per  access
- One Member code per WebOTC/WebEGCP access
- End-to-end solution
- Can be used virtually from anywhere over the Internet
- Manual file downloading

Features

- Easy to implement
- Web-based solution
- Real time access to general and Member specific clearing data
- Enables TMF to view their trades in the CMF environment when authorized by CMF

1.4.3. Push/Pull solution

Solution description

- FTP file transfer
- Members can choose between two solutions:
 - download their files (Pull) from the LCH SA server
 - LCH SA upload files to Members FTP server (Push)

Features

- Allows automation of files downloading and processing
- Easy to implement (Internet)
- Straight Through Processing solution to your information system
- Security, integrity and confidentiality guaranteed by PGP encryption and external IP address identification
- Possibility to use your own FTP server (Push solution only)

1.4.4. The Clearlink API for CDSClear clearing services

LCH SA has implemented the Clearlink API to provide open access to the system and facilitate connectivity with other middleware platforms and SEFs in the future. Clearlink provides an interface allowing market participants (Trade Providers and Clearing Members) to interact with LCH.

Clearlink API allows trade providers to submit trade for clearing and also to exchange messages with Clearing Members to request acceptance to clear a client trade. Clearlink API also allows feedback to be provided to both trade providers and Clearing Members about the progress of a trade through clearing to registration or rejection.

Only trade processing messages can be managed by Clearlink API. Payment of margins and collateral allocation are out of Clearlink's scope. Request for take-up of a client trade, and feedback on the trade status are example of messages managed by Clearlink Gateway. The messages are received from the Middleware and sent back to the Middleware and the Clearing Members.

This service is available for CDSClear only.

The CDSClear Reporting API is an interface where Users of LCH CDSClear service can use scripts to access and download individual reports.

CDSClear Portfolio Margin Calculation (PMC) API is a programmatic interface where Users of LCH CDSClear service can use scripts to access and download individual margin results.

Features

- Allows automation of margin calculations and processing
- Straight Through Processing solution to your information system
- Security, integrity and confidentiality guaranteed by external IP address identification

1.4.5. The LCH Member Portal

The LCH Member Portal is a single sign-on solution which gives access to various LCH applications.

- Standard authentication and authorisation model for LCH external users in accordance with LCH security guidelines
- A web-based browser presentation layer, aggregating multiple artefacts such as content, reports, documents, applications from multiple business lines
- Consistent standards and framework for the integration and presentation of business applications, document libraries and content
- Standard approach for user-registration and self-service (Super User)
- Single point of access for API interfaces for programmatic interaction with back-end business service

1.4.6. Secure File Transfer Protocol for Member Reporting (CDSClear only)

The CDSClear Reporting sFTP solution is a non-browser based, Secure FTP (File Transfer Protocol) interface used by Users of the LCH CDSClear service for the scripted, bulk retrieval of reports on a scheduled basis.

Features

- Secure FTP
- Allows automation and processing of reports
- Straight Through Processing solution to your information system
- Security, integrity and confidentiality guaranteed by external IP address identification

2. Member Access CMC - Customer Managed Connectivity

2.1. Architecture principles

LCH SA brings to its Members a connectivity solution offering performance, security and resiliency. LCH SA Members clearing connectivity solution is provided by London Stock Exchange (LSEG).

The connectivity solution named CMC (Customer Managed Connectivity) is based on secure IP network between several points of access ("CMC City Pops") and LCH Data Centres.

Members shall connect to these CMC City Pops using a dedicated connection called "Last Mile" that he needs to be ordered from an ACP (Accredited Connectivity Partners). The list of ACPs is provided in the appendice.

The main requirement is that any Members' production clearing applications using LCH SA real time messaging (MMTP SLE clients), File transfers (FTP-clients) always have to be able to access the LCH SA Clearing services even in case of failure of the Clearing House primary network access.

2.2. Connectivity principles

2.2.1. Resilience

The CMC standard access is built using two separate CMC POPs for the connection to LCH SA or LCH Ltd clearing platform.

Members can choose their architecture for standard connectivity:

- Access from one site, with two circuits or
- Access from two sites, one circuit on each site.

Each circuit can be subscribed with a different Telecom carrier.

The circuits are connected to two different CMC POPs (network points of presence) of the solution provider to avoid any SPOF (Single Point Of Failure).

Exception for Test only (Bronze offer see 0): a non-resilient access can connect to LCH SA to the testing environments.

a) Network infrastructures

All LCH network infrastructures are resilient:

- Resilient network equipment implemented with failover mechanisms.
- Resilient Members' access with no SPOF based on dual carriers.
 - Redundant network equipment.
 - Dual circuits
 - Separate CMC POPs
- Secured and fully-meshed network
- Resilient central infrastructures

b) Systems infrastructures

The logical gateway (LCAP) is built on up-to-date technology which guarantees high availability and performances.

c) Capacity

The minimum bandwidth for each circuit connected to LCH SA is 2 Megabits per second (2Mbps). The bandwidth is scalable from a minimum of 2Mbps in steps of 2Mbps depending on Members clearing activity needs.

2.2.2. Security

Security is enforced by Encryption VPN Gateways located in Members' premises. Each circuit of a CMC access has his own attached Encryption VPN Gateway.

a) Network infrastructures

The security aspects (encryption and authentication) are guaranteed by the CMC connectivity solution, with end-to-end VPN tunnelling based on IPSec protocol (VPN gateway fully-managed by the selected Telecom Provider):

- All clearing flows are secured by this VPN layer
- Real-time messaging MMTP
- Secured File transfer FTP

b) Systems infrastructure

On LCH's central infrastructures, each LCAP is isolated on a dedicated DMZ per Member.

2.3. General Architecture & Connectivity Synoptic

- Clearing connectivity solutions for Members through GBSL by LSEG
- Resilient access of 2 Mbps minimum, scalable to 10 Mbps

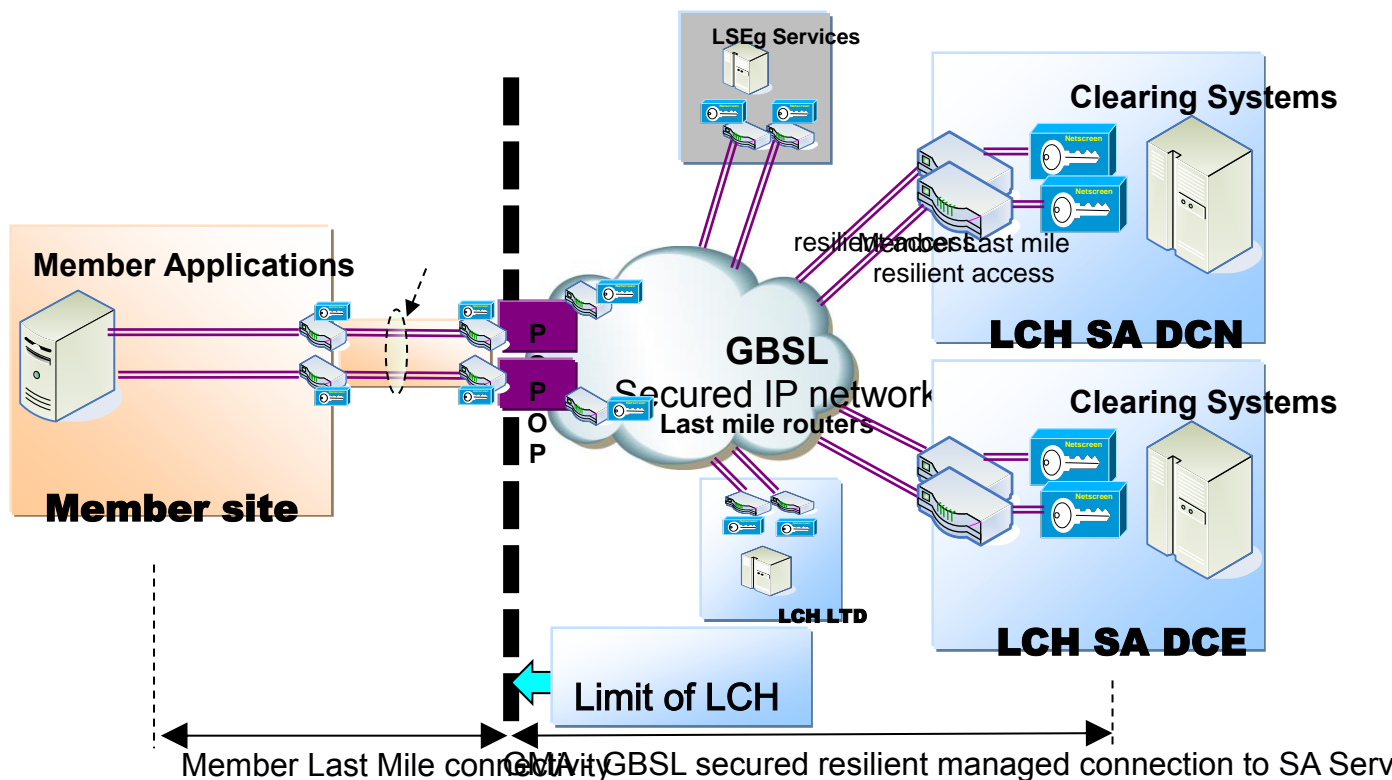
2.4. Connectivity Tiers

LCH SA offers 4 different packages (Tiers) for Members to choose from:

- Platinum
- Gold
- Silver
- Bronze (this offer is not resilient)

Each Tier comes with different possible bandwidths.

Members need to select the Tier and the bandwidth adapted to their needs and requirements.

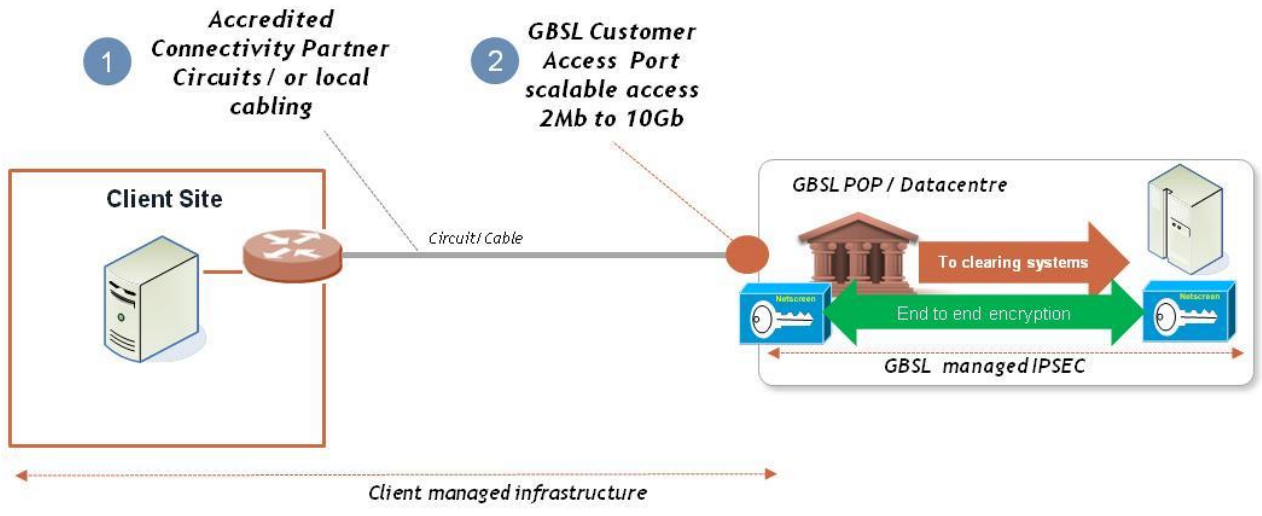


2.4.1. Bronze

- A single non-resilient connection
- One circuit, one carrier
- One Member site

This Tier is mainly dedicated to testing environments or for the use of eCCW® connectivity as backup. Because of its non-resilient characteristic Bronze Tier connectivity can only be used for test.

Bronze Tier examples:

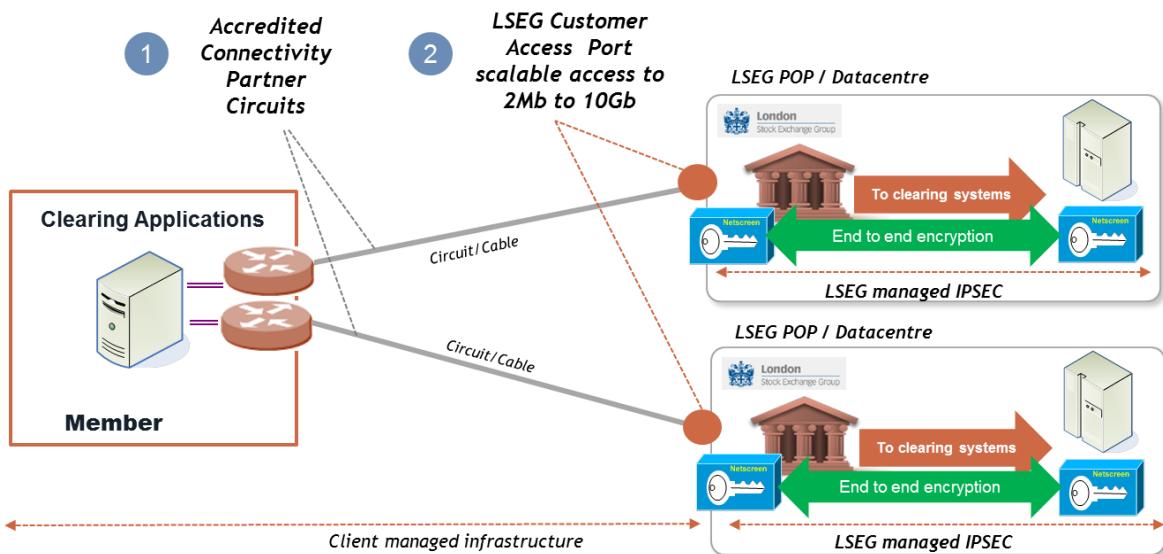


2.4.2. Silver

- A single resilient CMC access
- Two circuits based on 2 different carriers to connect to the CMC POPs
- Circuits can be connected on a single site or can be split on two different interconnected sites as illustrated below

Silver CMC access can be used for both Production and Testing environments.

Silver Tier configuration examples:

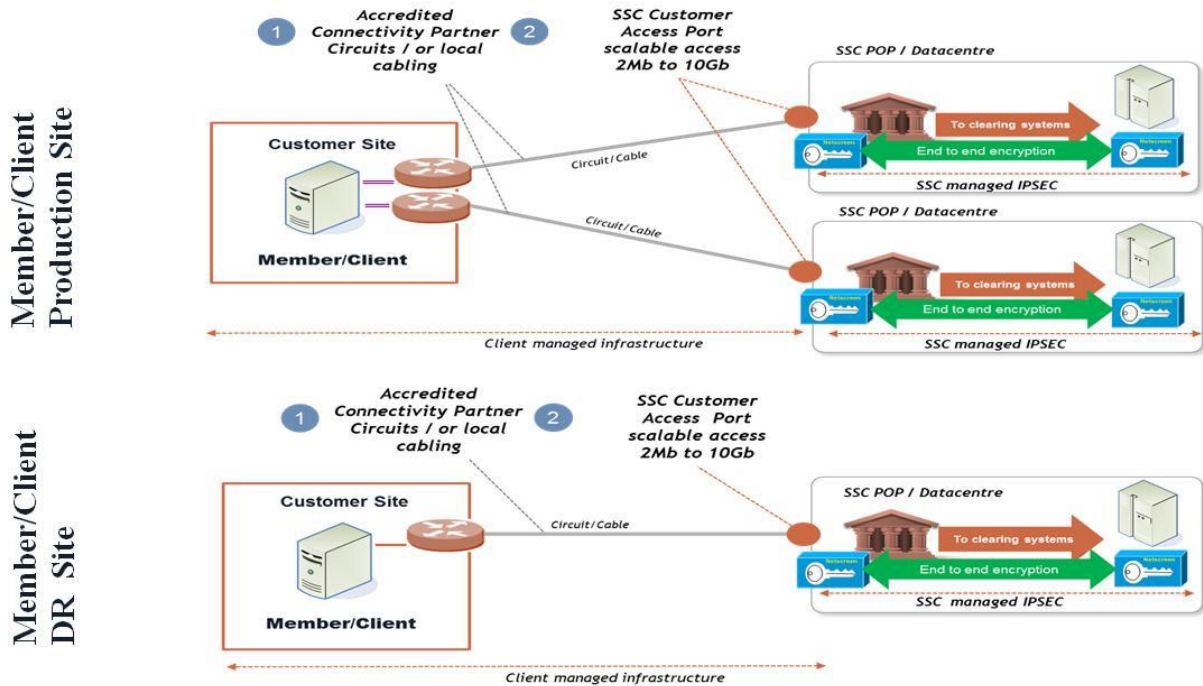


Silver solution for Members wishing to access both LCH SA and LCH Ltd (4 Mbps minimum)

2.4.3. Gold

- CMC Access based on three circuits
- Over 2 different Members sites
- On the Member's primary site, resilient access is provided using two circuits based on 2 different carriers to connect to the 2 different CMC POPs
- On the Members secondary site, only one circuit is connected to the solution provider (e.g. for Disaster Recovery or Test dedicated sites)

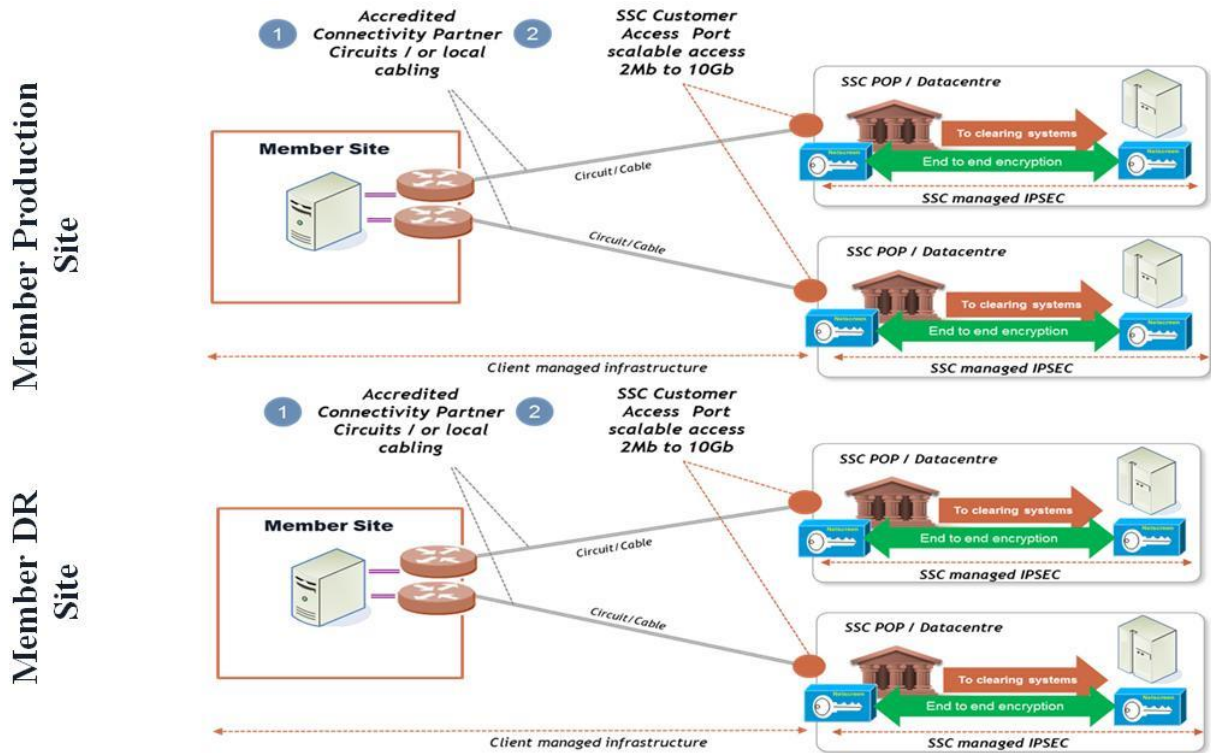
Gold Tier configuration example:



2.4.4. Platinum

- CMC Access is provided on two Members sites
- Using dual resilient connection
- Scalable by steps of 2Mbps
- Two circuits on two different carriers for each site

Platinum Tier configuration example:



2.4.5. Ordering and costs

Costs: the [LCH SA Technical Fees](#).

Last mile connection through the ACP is responsibility of the Member therefore not included in the LCH SA Technical Fees.

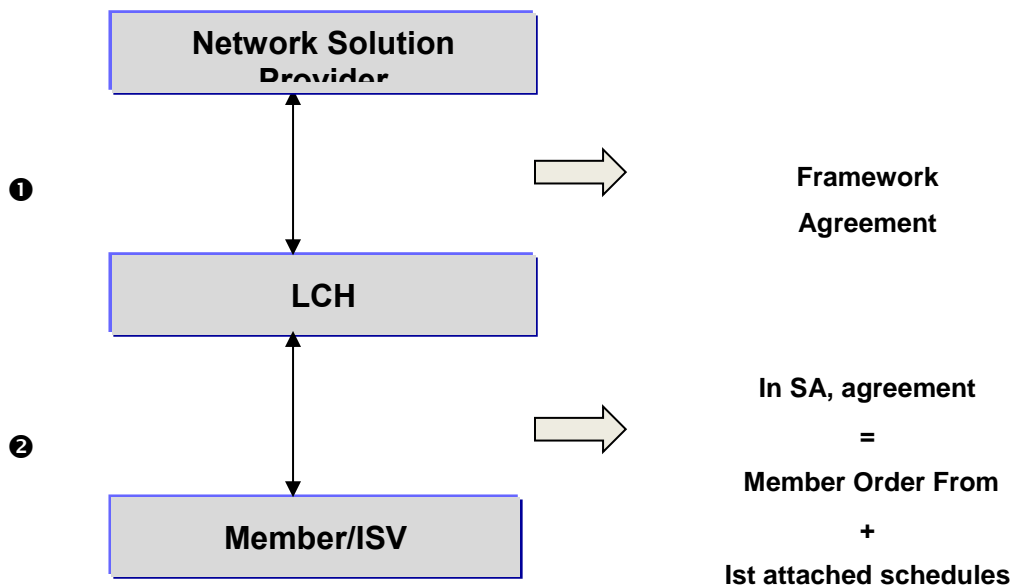
3. Subscribing to LCH SA's Solutions

3.1. Direct Business Model

LCH SA Members order and subscribe their GMA connectivity and clearing gateway solutions directly with LCH SA in reference to the [Member Access Agreement](#) .

The agreement governing technical Access to LCH SA clearing solutions and is notably structured around the integration of the Clearing Access Solution and the Support Services description further to their internalisation within LCH .

3.1.1. Contractual Framework



❶ A Framework Service contract is signed between the network solution provider and LCH SA giving right to LCH SA & Ltd to offer clearing network services to their Members.

❷ An order form is signed between Members and LCH , defining the provision of Clearing access solutions (IP Managed Network connectivity, Clearing Gateway, support services) by LCH SA and/or Ltd.

3.1.2. Direct contract between LCH SA and Members

a) Clearing Member

- The Member agrees to comply with LCH SA access rules by signing the LCH SA's Access Agreement

-
- The Member contracts with LCH SA by signing a CMC Order Form for its connectivity and Gateway Solutions (Order Forms are available by contacting your Customer Relationship Manager)
 - The Member will receive the CMC Service invoice from LCH SA

b) Third Party providers (e.g. ISV providing clearing application services to clearing Members):

- Third Parties agree to comply with LCH SA access rules by signing the LCH SA's Access Agreement
- Third Parties contract with LCH SA by signing a CMC Order Form and the LCAP
- Third Parties provide LCH SA with all the required delegation forms duly completed and signed by the clearing Members
- Third Parties receive the CMC services invoice from LCH SA

c) Members of LCH SA only

LCH SA Members will order their Clearing Connectivity Services and their LCAP Clearing Gateway services to LCH SA.

d) Members of both LCH SA, LCH Ltd and LSEG

i. Connectivity

Members of both LCH SA and LCH LTD can order their common Clearing Connectivity Services for both CCP either to Ltd either to SA either to LSEG through a single order form.

Clearing connectivity subscription and invoicing will be managed either by LCH SA or by LCH Ltd or LSEG following Member's initial subscription.

ii. Clearing Gateway Solutions

Members have to order their clearing gateway solution and associated services with LCH SA.

3.2. Subscribe

3.2.1. Actors and respective tasks

a) The Member

- Fills out and signs order forms (Order Forms are available by contacting your Customer Relationship Manager).
- Controls technical installations.
- Tests the environment and prepares to production.

b) LCH

Customer Technical Helpdesk (CTH)

CTH is in charge of the connection between Members and LCH SA Clearing systems:

- Manages LCAP® implementation
- Maintaining up-to-date ACP list
- Manages connectivity installation with GBSL
- Manages the systems' technical parameters
- Provides the technical support to Members and ISV
- Checks the Order Forms and follow up the installation process with Members and subcontractors

LCH SA Customer Relationship Management

- Checks orders and follows up the process with Members and CTH
- Sets up Members' training
- Provides Member's training on eCCW®
- Organizes individual and general testing

c) GBSL

GBSL on behalf of LCH :

- Operates and integrates technical installation process of the CMC connectivity service
- Provides and manages the CMC POPs
- Maintains technical installation (entry point: LCH)

3.2.2. Connectivity roll-out overview

1. STEP 1: Select a relevant solution
2. STEP 2: Implementation
3. STEP 3: Tests and training
4. STEP 4: Go live

3.2.3. Connectivity Detailed roll-out

a) STEP 1: Select a relevant solution

TASK	ORGANIZATION	OBJECTIVES AND EXPECTED RESULTS
Contact with Member or ISV	LCH SA Customer Relationship Manager per Business Line exchange.ams@lch.com	A detailed presentation on Membership and technical solution is given to the Member for the clearing issues
Send the API and message specifications to Member if requested	LCH SA Customer Relationship Manager per Business Line exchange.ams@lch.com	Member or ISV develops its server and workstation software
Send to Member the appropriate Order Forms	LCH SA Customer Relationship Manager per Business Line exchange.ams@lch.com	Members are able to order the adequate solution for their connectivity to LCH SA
Sign and send to LCH SA the order form	Member or ISV	Beginning of the connection process. Order of the solution (CMC, LCAP®, eCCW®, ...)
Check order form's compliance	CTH Contact: Tel: +33 1 70 37 66 00 or mailto:CTH.SA@lch.com	Initiation of implementation step

b) STEP 2: Implementation

TASK	ORGANIZATION	OBJECTIVES AND EXPECTED RESULTS
Order LCH /Technical supplier	CTH Contact: Tel: +33 1 70 37 66 00 or mailto:CTH.SA@lch.com :	Start deployment actions
Technical visit	Technical supplier	Design the Member's network configuration
Installation of Network hardware and software components	Technical supplier	Member's connection is operational
Central system and network configuration	Member	Member's connection is operational Member is registered within the Clearing System
Define and set up technical parameters and send them to Members	CTH Contact: Tel: +33 1 70 37 66 00 or mailto:CTH.SA@lch.com	Start deployment actions

c) STEP 3: Tests and training

TASK	ORGANIZATION	OBJECTIVES AND EXPECTED RESULTS
Technical and functional testing	Customer Technical Helpdesk Member or ISV	Member's solution operational in the simulation environment
LCH SAClearing Workstation® training	LCH SA Member	Members to become operational

d) Go live in Production

TASK	ORGANIZATION	OBJECTIVES AND EXPECTED RESULTS
Connection to live platform	CTH Contact: Tel: +33 1 70 37 66 00 or mailto:CTH.SA@lch.com	Member's solution operational in production environment
Start up date	LCH	Green Light from corresponding entities (LCH SA/ CMF / TMF / ISV)

4. Contacting LCH SA

4.1. Client Relationship Management

Commodities and Listed Derivatives / Equities

exchange.ams@lch.com

Repoclear

repocleargroupsales@lch.com

CDSClear

CDSClearBusinessDevRM@lch.com

4.2. Customer Technical Helpdesk (CTH)

LCH SA operates a technical helpdesk to which Members can submit queries as to the use of the Clearing Access Solutions.

The Customer Technical Helpdesk can be contacted on:

Telephone: +33 (0)1. 70. 37. 66. 00

Facsimile: +33 (0)1. 70. 37. 65. 05

Email: CTH.SA@lch.com

For further details please refer to the Appendix 0 of this document

4.3. CMC Forms

The latest versions of the CMC Forms (Order Forms, Change of connectivity , Ceasing of connectivity, etc) are available by contacting your Customer Technical Helpdesk.

Appendices

Customer Technical Helpdesk (CTH)

LCH SA operates a technical help desk to which Members can submit queries as to the use of the Clearing Access Solutions.

Any anomaly on Clearing Access Solutions must be identified by the Members and communicated to LCH, by telephone, facsimile or electronic mail to the Customer Technical Helpdesk during the service hours and at the phone numbers and addresses as set out in section 0.

The Members shall refer to the relevant documentation relating to the Clearing Access Solutions prior to contacting the Customer Technical Helpdesk and shall describe precisely and thoroughly the symptoms of the problem encountered.

Anomalies, change requests or queries will be attributed a reference number (ticket reference) by the CTH. This reference number, to be construed as an acknowledgment of receipt, will be communicated by the CTH to the Members.

Upon notification of an anomaly, the CTH shall perform a first analysis, in collaboration with the Members, and may be able to provide assistance, and/or correction and/or a workaround solution by telephone and/or by remote access if feasible.

Workaround solutions are solely temporary and must be followed up with a definitive corrective solution unless otherwise decided by LCH. The Members shall, where necessary, send to the CTH any items that the CTH may request.

The CTH is entitled, unless otherwise requested by the Members, to transfer the anomaly to any Authorised Third Party Provider and/or to another LCH internal department to establish a diagnosis, for assistance and/or corrective action; such Authorised Third Party Provider and/or internal department being, for the sake of clarity, entitled to contact directly the Members to perform the above tasks.

The CTH will supervise the correction of the anomaly by its Authorised Third Party Provider and/or internal department, until it has been remedied.

The CTH shall make its best endeavours to provide the Support Services to the Members. However LCH acting directly or through an Authorised Third Party Provider does not undertake any commitment to effectively correct the anomaly and/or implement the change and/or provide the Members with any workaround solutions in any timeframe whatsoever.

The CTH shall, at the end of the Support Services process as detailed above, issue by e-mail to the Members a proposal to close the anomaly or change request, which at the expiry of a 48 hours period, will be construed as a formal acceptance by the Members unless the Clearing Member requests otherwise.

On-site Support

Where the telephone assistance and remote Support Services are insufficient to remedy the reported Anomaly, on-site support action may be necessary.

In this case, the CTH is entitled to assign the anomaly to an Authorised Third Party Provider with the ability to provide on site support to the Members.

The CTH will provide the Authorised Third Party Provider with the detailed list of the actions already performed by the CTH in the attempt of resolving the anomaly. The Authorised Third Party Provider will contact directly the Members to organise the on-site support, if need be. The Members shall ensure free access to its premises.

Each on-site support intervention will generate additional fees to be invoiced by LCH SA to the Members.

The Authorised Third Party Provider will request, prior to planning any on-site support intervention, the Members prior consent. If a Member requires an on-site support during normal service hours, it might be requested to the Member to interrupt its activities for the duration of the on-site support services.

Supervision

The CTH provides a supervision service of the Members connectivity and access. Therefore, the CTH can detect rapidly whether a Clearing Access solution experiences some connections anomalies. In this case, the CTH may be entitled to contact directly the Member in order to conduct a root cause analysis of such connections problems.

This supervision service does not substitute to the fact that the Members shall raise any encountered anomaly to the CTH.

Verification Tests

Whenever a Clearing Access Solution is installed or a change request is issued or an anomaly is reported on the Members' Clearing Access Solution, the CTH is entitled to perform a series of verification test in direct collaboration with the Members in order to check that the Clearing Access Solution is satisfactorily operating. For that purpose, the Member undertakes to comply with all instructions given by LCH SA and to dedicate any appropriate resource to perform the necessary verification tests.

Calls Recording

The CTH will record and track every incoming anomalies and/or changes requests and/or queries, reported by the Members in LCH SAcalls management system.

The Members shall record all change requests and/or anomalies raised to the CTH on an appropriate media.

The Members are informed that LCH SA may use voice recording procedure in connection with any anomaly and/or change requests issued by the Members.

CTH will record the following information in its call management system that will be updated and safeguarded:

Ticket Reference

Anomaly and/or changes requests descriptions (effects, symptoms detected and all other information provided by the Members) provided by the Members via telephone calls, faxes and emails:

- diagnosis performed;
- solutions proposed;
- major actions taken to resolve the anomaly or implement the change request;
- dates and times of the aforementioned actions or events.

In the event of any conflict, the information recorded into LCH SA call management system shall be construed as “prima facie evidence” unless the Members are able to evidence that LCH SA database is lacking one or several pieces of information duly exchanged between the Parties.

Operating Hours and Conditions of the CTH

Contact details

The Members are responsible for making direct contact with the Customer Technical Helpdesk to report any anomaly they encounter or change request they require during normal use of the Services.

The Customer Technical Helpdesk can be contacted at:

Telephone: **+33 (0)1. 70. 37. 66. 00**
Facsimile: **+33 (0)1. 70. 37. 65. 05**
Email: CTH.SA@lch.com

Service Hours

The Members can contact the Customer Technical Helpdesk at the following hours:

Service Hours	Monday to Friday (excluding public holidays specified in the LCH clearing calendar).	7 a.m. - 11 p.m CET.
----------------------	--	----------------------

LCH SA may decide to extend the service hours under certain circumstances and at its sole discretion. The Members may be informed in due time through a general information communicated via e-mail.

Members contacts and references

The Members shall fill in the following information:

- a nominative contact -
- a telephone number; -
- a fax number; and -
- an email address.

COMPANY:		
ADDRESS:		
CTH GENERAL CONTACT		
LAST NAME:	FIRST NAME:	POSITION:
TELEPHONE:	FAX:	EMAIL:
CTH TECHNICAL CONTACT (to be completed if different from above)		
LAST NAME:	FIRST NAME:	POSITION:
TELEPHONE:	FAX:	EMAIL:

The Members shall inform without delay LCH SA of any change in the information indicated above.

5. “Accredited Connectivity Partners” (ACP)

The “Accredited Connectivity Partners” that you can use for the last mile connection to the CMC City Pops are the following :

-Colt

-EU Networks

-Hibernia

-Level 3

-SSE

-Zayo

6. Clearing Gateways Solution description

7.1. LCAP (Logical Certified Access Point)

a) Who is the LCAP solution for?

This solution is addressed to Members seeking independent control over message flows, with full responsibility for incoming and outgoing messages. Members opting for this solution may use their own resources or commission access services from subcontractors or publishers.

LCAP provides clearing data for the following Markets

Product Family	Market/Product/Trading or Matching Platform
<i>Securities</i>	Euronext Cash
	Equiduct
	Bourse de Luxembourg Cash
<i>Exchange Traded Financial & Equity derivatives</i>	Euronext Derivatives AtomX
<i>Commodities</i>	Euronext Derivatives

b) LCAP Solution Overview

The Logical Certified Access Points (LCAP) provides Members or ISVs message flows, data transfer standards and optional protocol development tools.

The LCAP is an access server which supports the API's, compresses and stores data transiting between the Member and LCH 's systems.

The LCAP is dedicated to clearing business environment and to production or testing platform.

The LCAP enables Members to set up their own server and workstation configuration with:

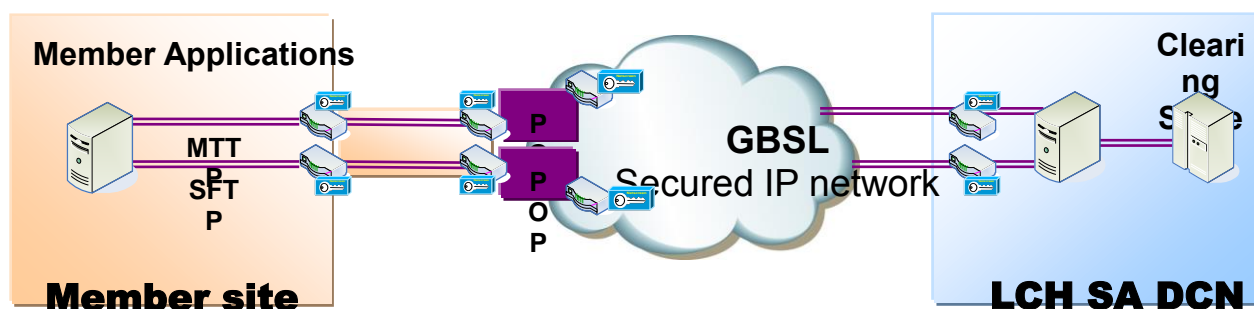
- the API and the messages specifications provided by LCH ,
- or with an independent software provider (ISV).

The LCAP is located in LCH SA premises. It supports the **MMTP** protocol (real time messages), the **FTP** protocol (file server) and **SFTP** protocol (from 2019).

To handle incoming and outgoing message flows, Members must develop (or outsource the development) their own applications (SLEs and SLCs), compliant with the LCAP specifications.

LCAPs are accessible only through the LCH 's CMC Connectivity.

Localisation of the LCAP in LCH 's architecture:



c) Equipment provided

No hardware is provided.

LCAPs are based on full redundant and resilient Virtual Machines located in LCH SA Data Centres and Disaster Recovery Data Centres.

d) Costs

Costs apply per LCAP.

One shot cost installation and monthly fees apply.

For further details please refer to the [LCH SA Technical Fees](#).

e) Features

- Each LCAP can accommodate five subscribers (SLEs).
- Members requiring more subscribers (or backup solutions) will have to order additional LCAPs.
- Open architecture
- Capabilities for integration in existing middle-office and back-office systems.
- The LCAP solution gives Members full control over their information systems, computer equipment, and relations with other suppliers.

7.2. eCCW SOLUTION 

a) Who is the eCCW® solution for?

This solution addresses Members willing to have a light clearing infrastructure or for Members who want to give a remote location access to their clearing data.

An eCCW® provides clearing data for the following Markets/Products:

Product Family	Market/Product/Trading or Matching Platform
Securities	Euronext Cash
	Equiduct
	Bourse de Luxembourg Cash
Exchange Traded Financial and Equity derivatives	Euronext Derivatives AtomX
Commodities	Euronext Derivatives

b) eCCW® Solution Overview

The eCCW® solution is a web based application developed by LCH Members can access their eCCW® through Internet.


This solution is dedicated to LCH SA clearing business as a single-Member solution and multi-platform (test and production). The eCCW® servers are located in LCH SA operation center, on the web servers.

The eCCW® can be used irrespective of the location via Internet connection.

The eCCW® handles basic functions of the clearing business.

Members must be aware that no real time external system can be connected to an eCCW®.

Installation and connection advises can be given at the LCH SA's Customer Technical Helpdesk (see Appendix 0).

Localisation of the  solution in LCH 's architecture:



 **access**

- The flows between the eCCW® client and the server will transit through the Internet network.
- The internet provider is the internet provider of the Member.
- The eCCW® service can be accessed from any Member's workstation located in the company LAN or from any other location with internet access.
- Authentication takes place using the SecureID® process.

c) eCCW® Members Architecture Overview

In order to enforce system resilience, LCH SA recommends Members to set up a resilient network infrastructure, compliant with their business continuity needs.

The recommended workstation configuration is a PC capable of running properly Windows 7 (or above) or Linux as operating system, with an internet browser.

The system should be configured to allow HTTPS connections and local execution of JavaScript programs by the web browser.

d) Equipment provided

SecureID card allowing the access to the eCCW®.

e) Costs

Costs apply per eCCW® access.

- One shot cost installation and
- monthly fees apply

For further details please refer to the [LCH SA Technical Fees](#).

f) Features

- Mono Member
- Not suitable for automated processing of files
- Web based application, accessible from almost anywhere over the Internet
- Easy and quick setup
- Testing and production platform

7.3. WebOTC

a) Who is the WebOTC Gateway for ?

This solution addresses LCH SA Members of Repoclear on the Government markets traded of the following platforms:

Product Family	Market/Product/ Trading or Matching Platform
<i>Repoclear</i>	ICAP
	Euroclear Trade Capture and matching system (ETCMS)
	MTS Group
	Tullett Prebon Trading System

b) WebOTC Solution Overview

The WebOTC solution is dedicated to Repoclear Government markets cleared by LCH SA. The solution allows file upload and real-time messages download.

The WebOTC solution is a web-based application located in LCH SA and only available via Internet.

The WebOTC is a single-Member solution, multi-platform (testing and production) that can be used irrespective of the location via Internet connection.

Installation and connection advises can be given at the LCH SA's Customer Technical Helpdesk (see Appendix 5).

c) Equipment provided

SecurID card allowing the access to the WebOTC.

d) Costs

Costs apply per WebOTC access.

One shot cost installation and monthly fees apply.

For further details please refer to the [LCH SA Technical Fees](#).

7.4. WebEGCP

a) Who is the WebEGCP Gateway for ?

This solution addresses LCH SA Members of Repoclear on the triparty markets traded of the following platforms as cash tripartite repo transactions that are secured by collatealising securities belonging to a pre-defined basket of securities.

Product Family	Market/Product/ Trading or Matching Platform
<i>Repoclear</i>	ICAP
	MTS Group
	Tullett Prebon Trading System

b) WebEGCP Solution Overview

The WebEGCP solution is dedicated to Repoclear triparty market of LCH SA. The solution allows file upload and real-time messages download.

The WebEGCP solution is a web-based application located in LCH SA and only available via Internet.

The WebEGCP is a single-Member solution, multi-platform (testing and production) that can be used irrespective of the location via Internet connection.

Installation and connection advises can be given at the LCH SA's Customer Technical Helpdesk (see Appendix 5).

c) Equipment provided

SecurID card allowing the access to the WebOTC.

A WebEGCP solution is a web based application located on LCH SA web-servers.

d) Costs

Costs apply per WebEGCP access.

One shot cost installation and monthly fees apply.

For further details please refer to the [LCH SA Technical Fees](#).

7.5. PUSH / PULL Solution

a) Who is the Push/Pull solution for ?

This solution is aimed at LCH SA Members of Repoclear, on the following markets or matching platforms:

Product Family	Market/Product/ Trading or Matching Platform
<i>Repoclear</i>	ICAP
	Euroclear Trade Capture and matching system (ETCMS) (for OTC service only)
	MTS Group
	Tullet Prebon Trading System

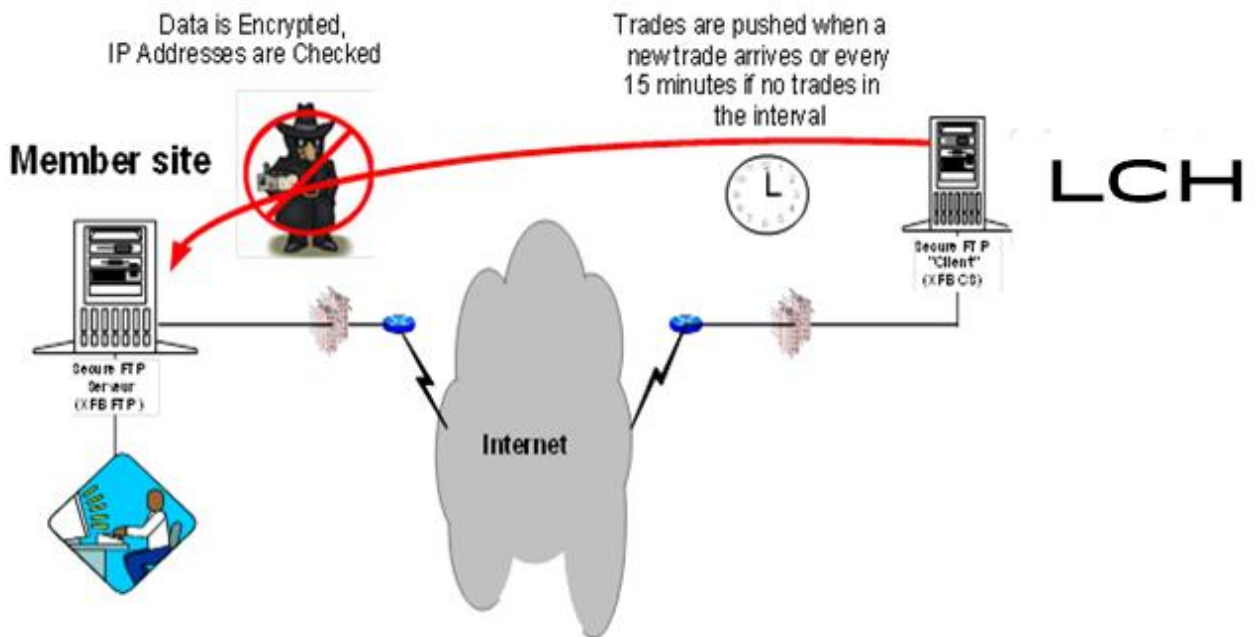
Members may choose between two automatic straight-through processes to download files from LCH SA Information System to Members Information Systems:

- The **push solution**: LCH SA delivers the files to Members' server.
- The **pull solution**: Members download files from LCH SA's server..

Security, Integrity and confidentiality of Member's files are guaranteed by a Public PGP key.

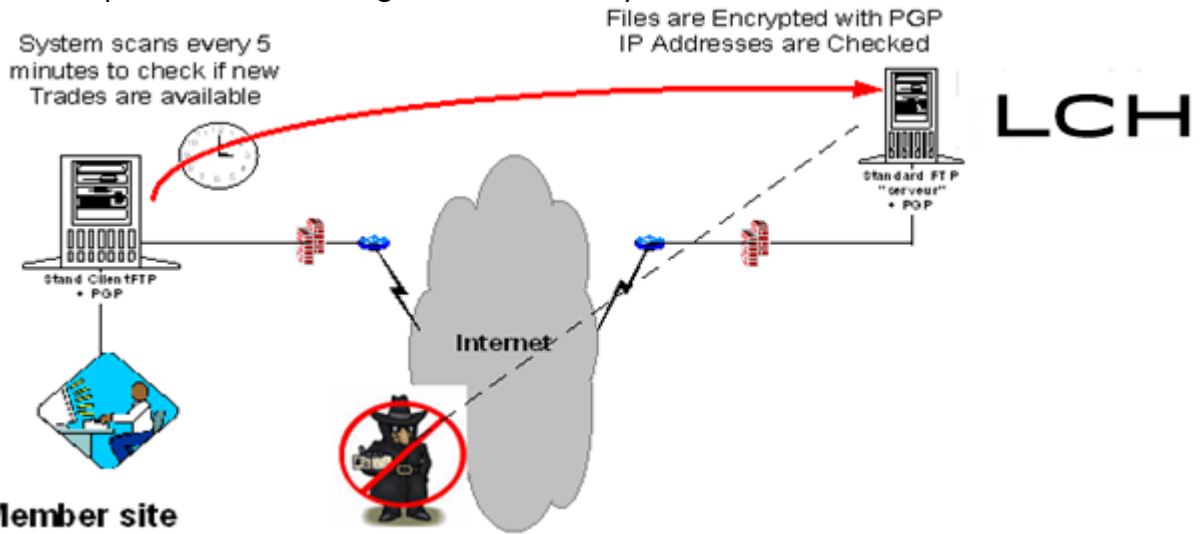
b) Push solution overview

LCH SA is responsible for sending Member's files automatically via the Internet



c) Pull solution overview

You are responsible for retrieving files automatically over the Internet



d) Costs

No fee apply for the Push-Pull solution. One off charge for configuration only.

e) Push/Pull solution for Repoclear

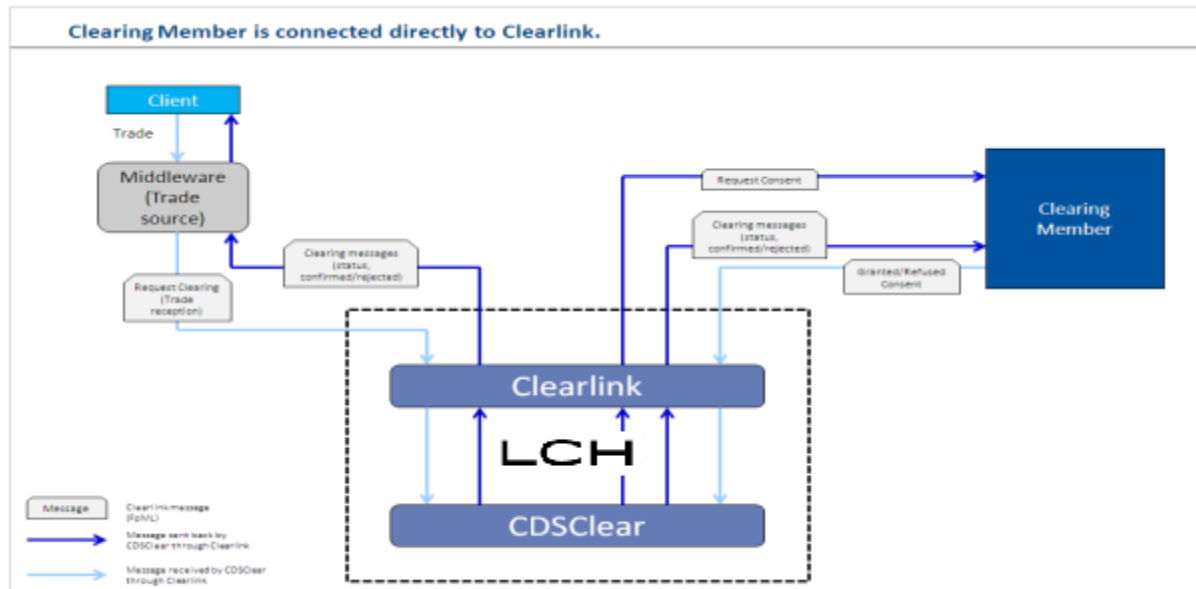
LCH SA bills a one-off charge for the following events: configuration, change and termination.

Configuration/change/termination charge	€ 200 per order form
--	-----------------------------

7.6. Clearlink gateway

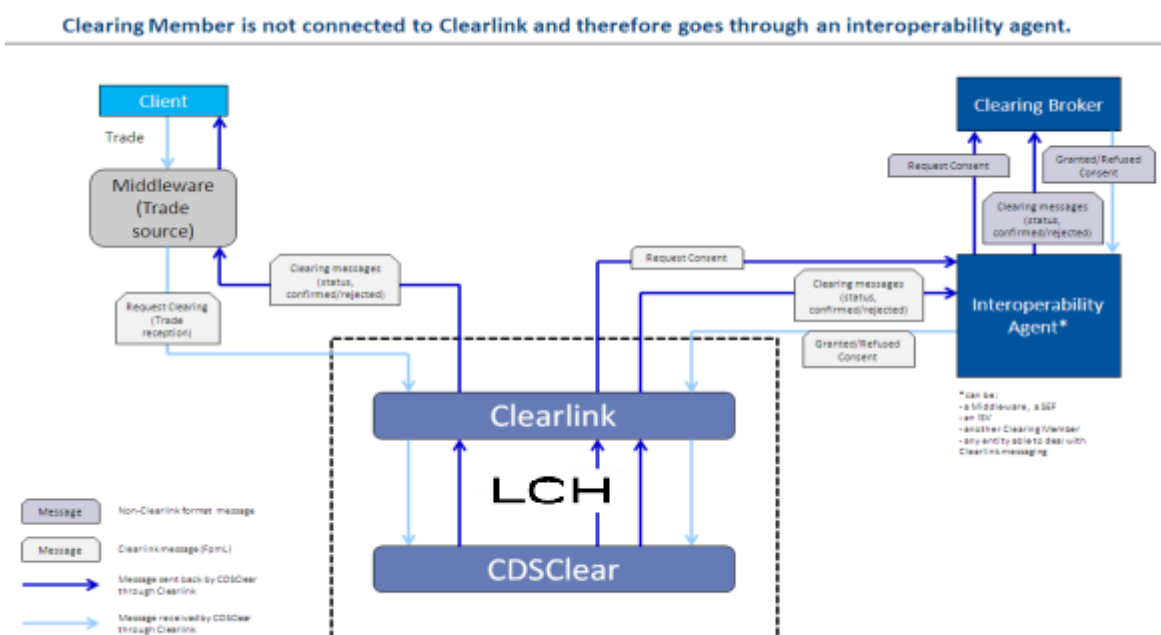
Clearing Members have the following possibilities:

a) Build a direct connection to Clearlink API in order to process messaging

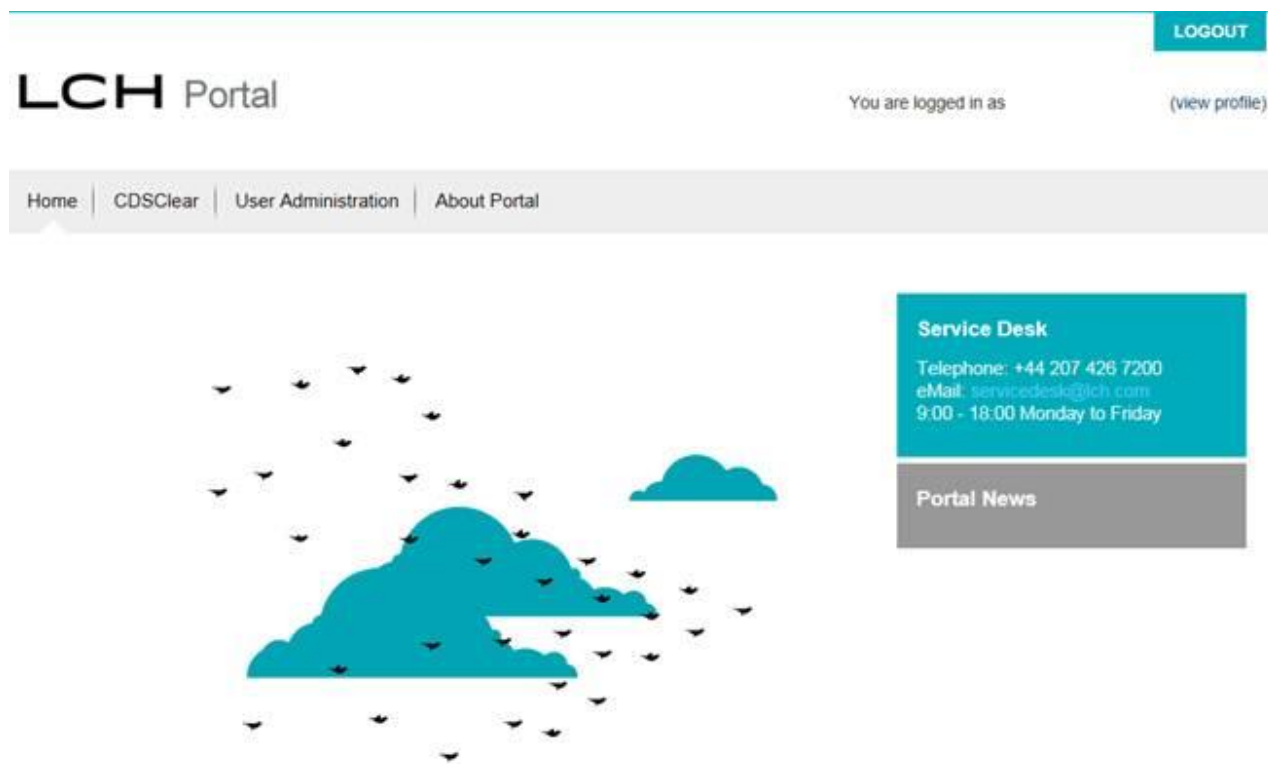


b) Interoperability Agent

Use the services of an interoperability agent that has built a direct connection to Clearlink API. In this case, the interoperability agent communicates with the Clearing Member in a non Clearlink format messaging while the interoperability agent communicates with Clearlink in a Clearlink format messaging.



7.7. LCH Member Portal



LCH's Portal delivers a secure, single point of access to a comprehensive range of tools and resources to support members and clients with their clearing requirements.

Multiple LCH services are currently supported, with additions planned for inclusion in future releases.

a) General Principles

The LCH Member Portal is a single sign-on solution for various LCH applications. Once logged onto the LCH Portal, users will have access to a set of parameterised applications without logging in again.

The available set of applications is defined at user level - based on permissions applied to that user.

b) Managing Principles

In order to be granted access to the LCH Portal, the users shall request LCH to provide the appropriate Request Form. Once this form is duly completed and signed by the Users, LCH takes the necessary actions to give the users access in coordination with the Portal team.

Granting access to the Portal is typically done via the Super User facility, which is done via an online request form directly available to Members upon accessing the LCH Portal Link.

For all applications, users gain access to portal via the Super User facility, which is a delegated responsibility given to 1 or 2 people within that User institution for each line of business and possibly for each application.

In order for a Clearing Member to have access as a Super User, such Clearing Member needs to request the appropriate form from LCH, have it signed by an authorised signatory for that bank and then return it to LCH. Once returned, LCH creates this User as a Super User with delegated authority to create access for others within their own institution.

The Users shall comply with the instructions provided by LCH in the relevant documentation in order to activate their login.

There is no equipment provided for this solution and there is no cost associated.

The following applications are available on the LCH Member Portal

- **CMS – Collateral Management System** is a tool provided by LCH that allows Members to deposit and withdraw their collateral and to check their balance online.
- **CDSClear Reporting application** is a User Interface which allows Users of LCH CDSClear service to gain access to a full suite of downloadable report files.
- **CDSClear Trade Management application** is a User Interface which allows Users of LCH CDSClear service to gain access to real time information on their trade portfolios (bilateral and cleared trades).
- **CDSClear Backloading application** is a User Interface which allows Users of LCH CDSClear service to have the ability to select and upload trades for clearing for the Weekly Backloading cycle.
- **CDSClear Compression application** is a User Interface which allows Users of LCH CDSClear service to configure their compression settings on their portfolios. Users have several options of compression frequency (daily or weekly) and they have the possibility to compress their trades at deskID level.
- **CDSClear Portfolio Margin Calculation (PMC)** is a tool which allows Users of LCH CDSClear service to compute the margin requirements for their portfolios.

For more information please refer to the LCH Portal User Guide.

7.7.1. sFTP solution for CDSClear Member Reporting

a) General Principles

The CDSClear Reporting sFTP solution is a non-browser based, Secure FTP (File Transfer Protocol) interface used by Users of the LCH CDSClear service for the scripted, bulk retrieval of reports on a scheduled basis. Users connect on a frequent, automatic schedule and retrieve reports, often across multiple business line, in bulk - for later processing.

This is a non-user interactive interface. Access to the CDSClear Reporting sFTP solution is made through Internet or CMC connection.

The CDSClear Reporting SFTP solution supplies the Users of the LCH CDSClear service with a Secure FTP service by restricting accounts by IP addresses enabling the management of incoming and outgoing files flows.

The CDSClear Reporting SFTP solution handles the certification and storage of data interchanged between Users and LCH.

b) Managing Principles

The CDSClear Reporting sFTP solution has been built using the LCH Portal security model. Whenever Users require to be given access to the CDSClear Reporting sFTP Solution, the appropriate Request Form, available from the LCH Portal, shall be duly completed and signed by the Users and sent by registered letter to the appropriate LCH interlocutor as set out on the Request Form.

There are no equipment provided for this solution and no cost regarding the provision of this Service.

7.7.2. API for Margin Calculation or Reporting

a) General Principle

The CDSClear PMC API and Reporting API both provide a programmatic interface where Users of the LCH CDSClear service can use scripts to access and download individual margin results or reports. Access to the CDSClear API solutions is made through Internet.

The CDSClear PMC API solution supplies the Users with the ability to run a script in order to calculate margin on an ad-hoc or small-scale basis – the API interface provides a secure mechanism in which to do so.

The CDSClear Reporting API solution supplies the Users with the ability to run a script in order to retrieve reports on an ad-hoc or small-scale basis – the new API interface provides a secure mechanism in which to do so.

Members need to register for a new Portal API account and password.

The CDSClear PMC and Reporting API solutions handle the certification and storage of data interchanged between the Users and LCH.

b) Managing Principles

The PMC and Reporting API solutions were built using the LCH Portal security model. Whenever Users require to be given access to the API, the appropriate Request Form, available from the LCH Portal, shall be duly completed and signed by the Users and sent by registered letter to the appropriate LCH interlocutor as set out on the Request Form.

There are no equipment provided for these solutions and no cost regarding the provision of these Services.