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LMEselect

Connectivity & Hosting Guide

1 Preface

1.1 Summary

This guide provides the information for users to connect to the London Metal Exchange LMEselect electronic trading system. Information in this guide covers traditional connectivity and proximity hosting connectivity.

This guide is meant to provide an introduction only; please contact the LME Select Helpdesk for detailed information. Telephone 0207 488 2500 or LMEHelpdesk@lme.com.

1.2 Intended Audience

This guide is intended for user-side technical staff responsible for establishing and maintaining connectivity to the London Metal Exchange Select environment. This guide is suitable for both network support and software/application support.

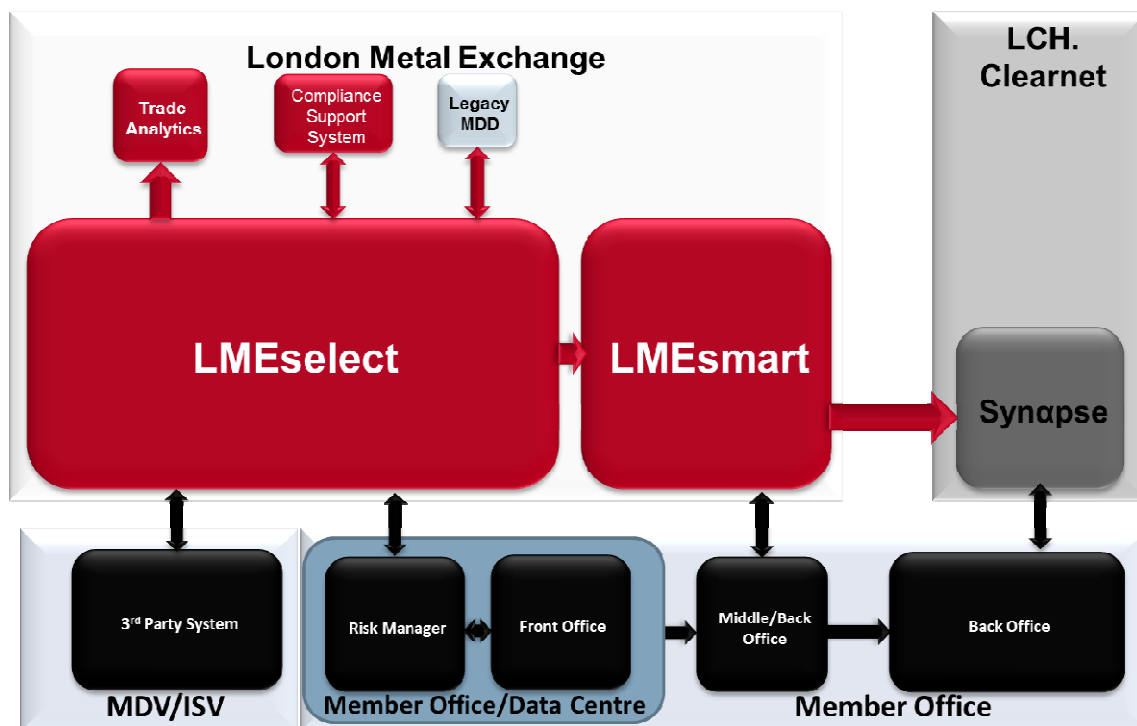
1.3 Change History

Version	Edited by	Date
1.0	Kevin Watson	26 th May, 2011
1.1	Kevin Watson	27 th June, 2011
1.2	Kevin Watson	29 th July, 2011
1.3	David Abrahams	1 st August 2011

Please check the LME Extranet regularly for updated versions.

2 LMEselect Trading Platform Overview

2.1 LMEselect Trading System



2.2 LME Data Centre Environment

The LMEselect platform provides a robust and reliable system with redundancy built across two geographically separated data centres. The system is protected from component failure through the deployment of fully synchronous server, application and network technology; network diversity is provided using diversely routed circuits across multiple carriers. The two trading system data centres are located in east and west London, connected via geographic and carrier diverse circuits.

Two additional data centres have been selected for Proximity Hosting services, which will provide high speed direct access to the LMEselect matching engines. These data centre locations are provided by Interxion and Equinix. Order input and market data will be supplied to these two data centres by high speed links to the primary and secondary data centres.

2.3 Production Environment

Access to the production environment is available to all users who meet the relevant criteria. The high-level criteria are as follows:

- All users connected to LMEselect data centres must have completed the connectivity procedures in full, including all contractual agreements.
- All systems connected to the LMEselect Production environment must have completed the LMEselect conformance testing process and been certified for connectivity by the LMEselect Helpdesk (Further information on the LMEselect conformance testing procedures can be found in the LMEselect conformance testing guide)
- All members must adhere to LME electronic trading rules, including the throttling limit and order to trade ratio; details on LME electronic trading rules can be supplied upon request.
- Connectivity to the LMEselect platform is available to LME Cat 1 & Cat 2 members and accredited ISV's only. The LME does not currently allow direct market access for clients.

2.4 Member/User Testing Environment

The LME maintains a separate trading system and data centre network for development, testing, and compliance certification. The same connection models apply to this system, along with the same trading rules.

The current member test environments are designed for functional testing only. Performance testing will be performed on a scheduled basis out of core trading hours.

When connecting to test environments it is important to note that the WAN connection at the user termination point may be subject to contention if a user chooses to run network intensive tests during the working day, the LME recommends that all network intensive testing is performed out of critical hours to avoid production service degradation.

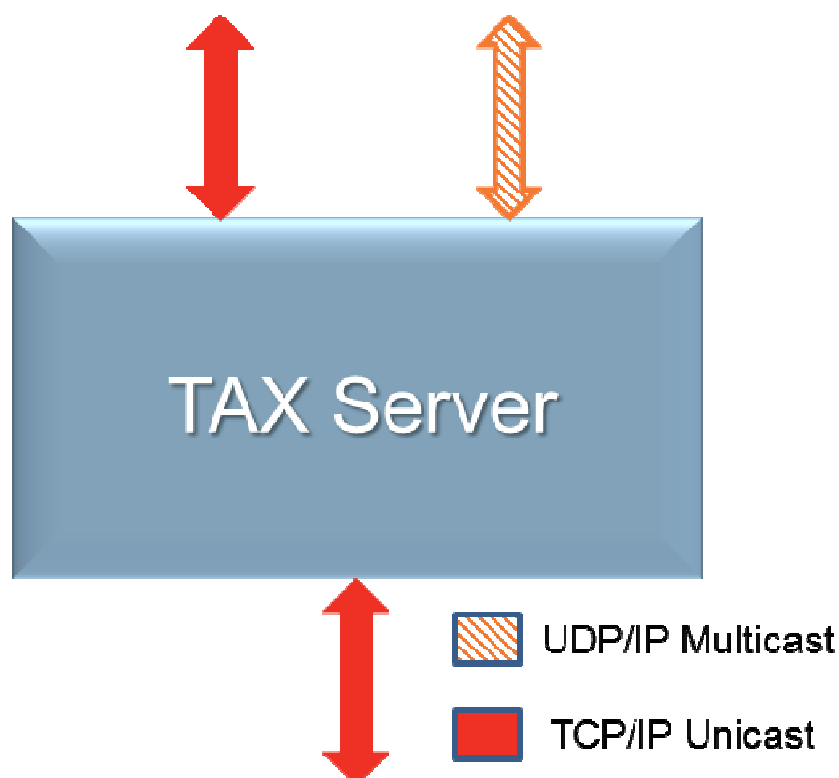
2.5 Network

The internal system components use TCP/IP and UDP/IP (multicast) protocols. External, user-facing, interfaces use TCP/IP unicast only.

Key Details:

- The network infrastructure allows any server component to communicate to any other component using TCP/IP. It also allows any internal system component to send UDP/IP multicast and any other component in the system.

- Back end Server components use one NIC device for the TCP/IP communication and one for the UDP/IP multicast traffic. Each NIC device is a “bonded” interface for redundancy purposes i.e. two physical NICs will be bonded into one virtual network interface.
- External gateway servers, known as TAX servers, use one upstream NIC team for the internal TCP/IP communication and another upstream NIC team for the internal UDP/IP multicast traffic to communicate with other components in the system. An additional bonded NIC interface is used for external connections. This ensures LMEselect system security.



2.6 Order-to-Trade Ratio & Throttling

The LME will impose an order-to-trade ratio. This is to ensure no single user can create a disorderly market through flooding the system with unmatched orders; this also ensures that orders in the system are within a reasonable spread of the current market price.

Charges will be administered to members who do not abide by order-to-trade ratio and throttling rules, including potential disconnection from the LMEselect trading system.

These policies apply to all member accounts. Please contact the LMEHelpdesk for current information on the order to trade ratio and the throttling policies.

2.7 Access Control, Security and Business Continuity

2.7.1 Business Continuity

It is the user's responsibility to put a business continuity plan in place. The user is free to purchase additional network connectivity or rack space in order to fulfil BCP plans.

Additionally, LMEselect is licensed for use both at the user's primary site and any BCP/DR sites as well. It is recommended that the Java web-start version of LMEselect is used at BCP/DR sites in order to ensure that the latest version is used if use of the site is invoked.

2.7.2 Member Server Setup – Security

It is recommended that members deploy dedicated server(s) for connectivity to LME systems.

While connecting to the trading system, the user's server should not activate any other connectivity to other public network such as the public Internet.

The user should ensure that the dedicated server is restricted to authorized users only. The user should apply the best and applicable security practice, e.g. Security patch updates according to their relevant internal policy.

2.7.3 Incident Reporting & Handling

Users are required to report to the LMEhelpdesk if they detect any irregular incident in the dedicated servers connecting to LME systems which may affect the performance of the trading system. In some occasions if LME Systems Operations detects an irregular traffic pattern generated by the user's server which may potentially affect the service level of the trading system, the LME may need to, at its own discretion, block the problematic traffic generated by the user in order to maintain an orderly market.

2.7.4 Control of Access to the LMEselect System

Members must ensure that only accredited user's login to LMEselect. Members are responsible for the actions of their employees and anyone acting on their behalf. Members must have controls in place to ensure that non-accredited users do not place orders or execute trades on the LMEselect platform. The LME will treat any failure by members to restrict trading on LMEselect to accredited traders as a serious breach of its rules and regulations. Members are responsible for all orders entered and all trades made on the LMEselect system using an authorised login and password, as such naked or unrestricted access is not permissible.

Members may allow non-accredited users access to view orders and trades.

2.7.5 Connections through the FIX API

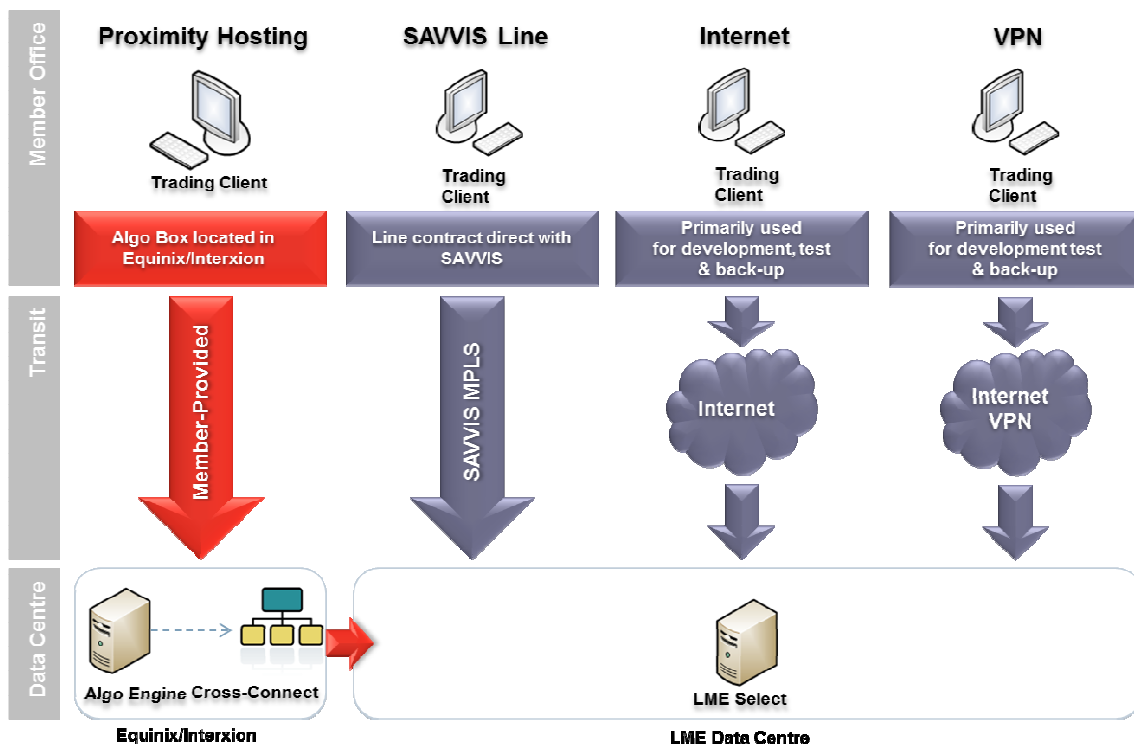
Through the LME FIX Application Programming Interface ('API') members may allow clients to order route into the LMEselect platform. Members should be aware that:

- All login details belong to the member
- Prices from LMEselect are sent via the API and members are required to sign an amendment to the sub-license agreement.
- The client of the member firm can see what is in LMEselect via the API.
- Member firms must stand behind any order placed in their name.
- Member firms also retain responsibility for how they allow their clients to connect the LMEselect platform.

3 Network Connectivity Options

Options:

- Proximity Hosting
- SAVVIS ATS - LMEnet
- Internet
- VPN

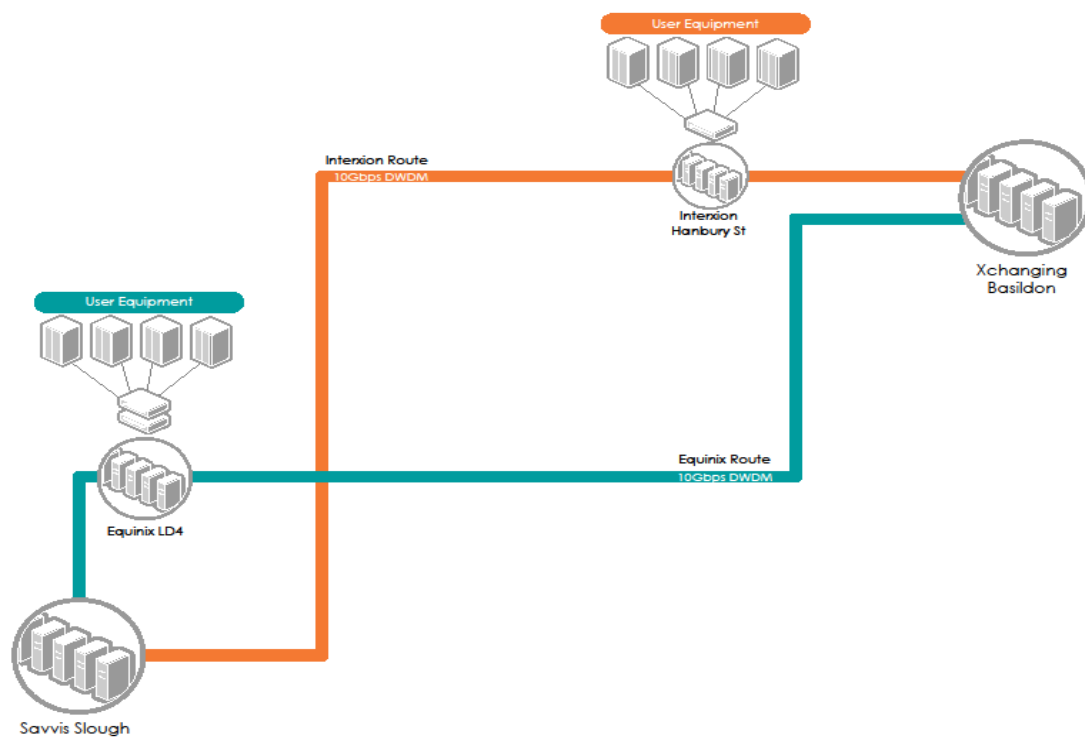


* It should be noted that if a user maintains a direct connection to the Production system they must also always maintain a connection to the Development system for the purpose of testing and participating in test sessions.

3.1 Proximity Hosting Connectivity

Proximity hosting is offered as the fastest access model for trading on the LMEselect platform. The proximity hosting solution will facilitate the lowest latency solution for algorithmic trading strategies. It enables the user to place their trading application order management system (OMS) and associated network equipment in an LME-approved data centre which is connected to the LMEselect matching engine via a high speed link. This solution offers the lowest external latency possible to the LMEselect matching engine gateway.

External network latency is defined as the time it takes a data packet to reach its destination and return an acknowledgement to the originating source, in this case being the LMEselect gateway. Latency is very much dependant on the distance between the source and destination and the network routing in between. In trading terms this can be measured by the round trip time taken by an order execution. The LME manages latency to the point that network traffic exits the LME network (i.e. the proximity hosting cross-connect port, or the LMEselect TAX gateway for traditional connectivity) Decreasing the distance between the source and destination will always reduce the RTT (round trip time) for order entry.



3.1.1 Connection Specifications

- 100Mbps physical port with 100Mbps Bandwidth Throughput
- Fibre

3.1.2 Redundancy

- Both physical and logical network diversity for 2 x Ethernet circuits (test/production)
- A single fibre link exists between each proximity hosting data centre and LMEselect; for this reason a separate connection to LMEselect must be maintained.

3.1.3 Requirements

- All IP Packets destined for LMEselect must be sourced from the LME approved network provider-assigned private address space (RFC1918).
- Users will be responsible for any network address translation
- LME will not share a routing protocol with customers.
- Users are responsible for all connectivity and hosting provision external to the LME proximity switches, LME will provide assistance to interface with Datacentre provider if needed.

3.1.4 Restrictions

- Users should deploy switch hardware connection to the LME network so that no server attaches directly to the Proximity Hosted connectivity zone.
- LME will not accept traffic sourced from any user's RFC1918 IP space or any registered space which is publicly routed.

3.2 Proximity Hosting Rules

3.2.1 Member Test System Access

Users will be connected to the member test system during their development and testing phases and will not be permitted to connect to LME production systems until LMEselect conformance testing is completed successfully.

The user will be required to maintain a connection to the development system at all times for the purposes of testing new software releases and resolving any production issues with their application. Connection to the development system does not need to be co-located and the member is free to choose their method of connectivity, including Internet VPN, however conformance testing will be required to take place from the proximity hosting environment.

3.2.2 Transit Network requirements

It will be the user's responsibility to provide WAN network to the user's proximity hosting rack. The user can choose any bandwidth connection.

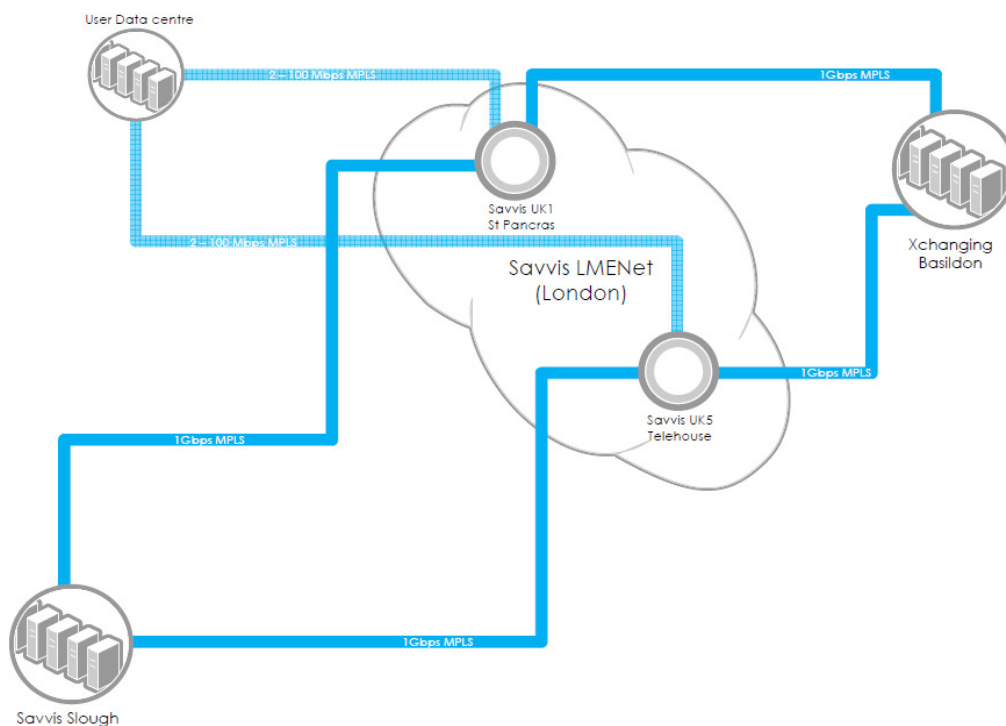
If the user application is being used for algorithmic trading then it is feasible that a fully resilient network connection will not be required. This would be determined on a case basis.

3.2.3 Business Continuity

It is the user's responsibility to put a business continuity plan in place. The user is free to purchase additional racks for this purpose in either data centre or the member could plan to access the standard LMEselect client application from their remote site if their proximity hosted application is rendered unusable.

3.3 LMEnet Information

The LME has partnered with SAVVIS network services to provide connectivity to the LME network. LME standard practice is to require network diversity by installing primary and secondary lines to the SAVVIS network. The following diagram outlines the LMEnet connection model:



3.3.1 Target Customers

UK and Global LME members, vendors and ISVs.

3.3.2 Capacity & Bandwidth

Circuits can be provided at various throughput levels from 1mbps to 10gbps dependant on geographic location and circuit type availability.

2Mb bandwidth Ethernet access is the minimum requirement. Bandwidth expansion based on usage, trade/market data volume, or other factors may be required.

3.3.3 Redundancy

LME requires the user to implement carrier diversity using dual access circuits. This configuration can be a combination of leased line circuits and VPN connections.,

3.3.4 Requirements

- All IP Packets destined for LME must be sourced from the SAVVIS-assigned private address space or non routable registered space.
- User will be responsible for the network address translation.
- SAVVIS will supply customer edge routers and out of band access circuits as required.
- It is the user's responsibility to provide resiliency and redundancy within their internal network.

3.4 Internet/VPN Connections

VPN connections can be made available for API development and Production backup purposes. The LME discourages the use of VPN and internet connections in Production due to inherent reliability issues across the internet.

Requests for Production internet (non-VPN) connectivity will be evaluated on a case by case basis. Users should note that access to FIX API or any other protocol which is not natively encrypted will not be permitted over the public internet and must therefore traverse a VPN or LMENet.

3.5 Network Access Pricing

All pricing is agreed directly with the network provider (i.e. SAVVIS or the data centre for proximity hosting). Please contact the LMEHelpdesk for details of the LME approved community data centres.

LME does not levy any additional charges for transit network connectivity to the matching engines; only the standard LMEselect access charges apply.