



Cboe Europe Disaster Recovery Guide

31 May 2019

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1 Introduction

Data Centre Modes

The Cboe production environments are provided out of the Equinix Slough (LD4) data centre. Disaster recovery environments are provided out of Equinix Park Royal (LD3). The disaster recovery environment in Park Royal (LD3) operates in one of two modes:

- *Secondary Mode.* In this mode, Slough (LD4) is still the primary production site. Market data, reference data, and FIX Drop copy products are available in Park Royal (LD3) for traffic generated in Slough (LD4). Order entry and ODROP ports in Park Royal (LD3) are available for heartbeating only—orders entered will be rejected.
- *Primary Mode.* In this mode, the data centre has been invoked and will be the primary production site. Once invoked, Slough (LD4) will become unusable for the rest of the trading day.

The BXE, CXE and DXE markets, along with the Trade Reporting Facility (TRF), run as completely separate environments. The decision to failover a market from Slough (LD4) to Park Royal (LD3) *may* be made for only one of the four environments.

Port Requests and Addressing

Any order entry, Drop, or market data ports requested are automatically created in both Slough (LD4) and Park Royal (LD3) environments. TCP ports will be identical across Slough (LD4) and Park Royal (LD3) data centres, but IP addresses will be different. Addressing information will be provided for both data centres for any requested ports, or may be accessed via the Ports Dashboard in the secure member area of the Cboe website.

Failover

Once a market has failed over from Slough (LD4) to Park Royal (LD3), *it will remain in Park Royal (LD3) for the remainder of the trading day.* Cboe will make and communicate information about where trading will occur on the next trading day.

Order and execution identifiers are guaranteed to be unique even after a failover. Market data sequence numbers will continue to monotonically increment after a failover.

Cross Data Centre Connectivity

Cboe maintains high bandwidth, low latency connectivity between the Slough (LD4) and Park Royal (LD3) data centres. This connectivity allows customer connections to ports across data centres (e.g., connecting to a FIX, BOE or ODROP port located in Slough (LD4) via a customer connection terminating in Park Royal (LD3)). Also, Park Royal (LD3) is accessible from the Interxion point of presence (PoP).

User Acceptance Testing

A Certification Disaster Recovery (DR) CXE environment located at the Secondary Datacentre, Equinix Park Royal (LD3) is available for testing purposes. LD3 ports are available for heartbeating and logical connectivity testing on a continuous 24/5 basis. Cboe will periodically use the environment to test failover scenarios. Addressing information for the ports in LD3 may be accessed via the member area of the Cboe Certification website.

2 Park Royal (LD3) Service Summary

This table summarises the products available in Park Royal (LD3) on a daily basis (Secondary Mode) and on the basis of the environment being invoked to become the primary production environment (Primary Mode).

Service	Secondary Mode	Primary Mode
TCP PITCH Feeds	•	•
Multicast PITCH (E Feed)	•	•
Order Entry (FIX/BOE) Ports	Heartbeat Only	•
FIX DROP Ports	•	•
All Order Drop (ODROP) Ports	—	LD3 Input Only

Additional information on each product is available below.

TCP based ports are provided in pairs. For example, ordering a FIX order entry port provides a port in both Slough (LD4) and Park Royal (LD3).

3 Market Data Products

Cross Data Centre Connectivity

Only market data generated from Park Royal (LD3) can be consumed from Park Royal (LD3) connections. Market data feeds generated from Slough (LD4) (including TCP PITCH and Multicast PITCH feeds) are not available from Park Royal (LD3). However, market data feeds generated from Park Royal (LD3) (including TCP PITCH and the Multicast PITCH E feeds) can be taken from LD4.

Sequence Number Considerations

For all market data products, sequence numbers available in Park Royal (LD3) are identical to those generated in Slough (LD4). It is possible to arbitrage at the sequence number level between feeds across both data centres. Whilst data and sequence numbers are identical, data may be framed into packets differently across data centres.

In the event that the Park Royal (LD3) site is invoked, sequence numbers will continue to increase (with no gaps). This applies to both multicast and TCP based feeds.

Park Royal (LD3) Multicast PITCH (E) Feed

A single Multicast PITCH (WAN-shaped) feed is generated in Park Royal (LD3) (BE/BE_n for the BXE book, XE/XE_n for the CXE book, DE for the DXE book, TE/TE_n for the TRF Trade feed and QE/QE_n for the TRF Quote feed). As long as the Park Royal (LD3) site is available, these feeds are available in Park Royal (LD3).

The E feeds (BE_n/XE_n/DE/TE_n/QE_n) are also made available in Slough (LD4).

TCP Based Feeds

As long as the Park Royal (LD3) site is available, all TCP-based market data products are available in Park Royal (LD3).

4 Order Entry Products

The order entry ports in Park Royal (LD3) are considered distinct from the order entry ports in Slough (LD4). Sequence numbering is *not* maintained across data centres.

Whilst in Secondary Mode, order entry ports in Park Royal (LD3) will reject any orders entered. In the event that the Park Royal (LD3) site is invoked, order entry ports will be put into Primary Mode and will begin to accept orders. All open orders will be cancelled. In some cases, it is possible that cancel reports may not be able to be generated for all orders. In that event, cancel reports will be communicated by other means (e.g., verbally or by email). **Outbound order routing to liquidity providers and other venues is not available when trading out of Park Royal (LD3).**

Cboe recommends Participants connect to order entry sessions in Park Royal (LD3) daily and allow them to heartbeat to exercise and test connectivity.

5 Drop Copy Products

FIX DROP ports are always available in Park Royal (LD3) as long as the site is operating and will drop traffic for any orders generated in Slough (LD4) or, if invoked, Park Royal (LD3).

ODROP ports only provide data for orders generated in the data centre where the ODROP port is located. That is, if Slough (LD4) is running as the primary site, ODROP ports in Park Royal (LD3) will generate no traffic.

All sessions between data centres are considered unique. Participants may use sessions from both data centres simultaneously. Note, however, that FIX sequence numbers are likely to differ between the data centres due to the way FIX sequence numbers are incremented by the sessions (e.g., heartbeats increment a sequence number).

6 Web Products

The website for Cboe is served from Slough (LD4). If the Park Royal (LD3) site is invoked, DNS will be updated to point to a web server in Park Royal (LD3). Users may continue to use the same URLs as before. Depending on the reason for failover, most products will be available in the event of a failover. In particular, order lookup and trade data downloads will function. Some products which require previous days' data (such as previous day order lookup) may not function. Some products which used data from earlier in the day (such as real-time latency information) will not function.

There may be a delay where the site is unavailable as DNS propagates; a temporary hostname (or IP address) will be provided.

7 Revision History

31 May 2019	Add DXE environment.
7 May 2019	Addition of new Multicast 'n' feed names.
22 August 2016	Addition of a certification DR CXE environment in the secondary datacentre.
29 April 2016	Updated to reflect changes in various DROP services.
19 February 2016	Updated for new branding.
23 September 2013	Add TRF environment.
1 February 2012	Initial draft version.