Nodal T7 Network Access Guide

Network Configuration Guide

Version	1.4
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Deutsche Boerse

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Deutsche Boerse AG

Version 1.4

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1. Introduction

This document is intended for participants' network administrators and provides an overview of the network access options to T7 for Nodal. The document contains the required technical background information to gain network access, such as router equipment information and port numbers for the configuration of firewalls.

Please note that this document focuses exclusively on the connectivity options introduced together with Nodal T7. This document does not provide information on legacy concepts such as the previous Nodal infrastructure.

For further information on how to access the legacy Nodal Platform, getting access to the SFTP service or subscribing to the Nodal FIX Gateway please contact Market Operations & Customer Service (MOCS) at techsupport@nodalexchange.com.

The network connectivity concept is designed to reflect the requirements of the differing interface landscapes with the following components:

- High-bandwidth participant lines, based on Ethernet technology to address the higher bandwidth requirements of Nodal T7.
- The Multi Interface Channel (MIC) for trading.

This document focusses on the aspects of establishing general connectivity to the Nodal T7 trading system and is primarily intended for use by the network engineer and system administrator.

For a more detailed description of aspects of latency optimization, please refer to the presentation “Insights into trading system dynamics”, which is updated regularly. The presentation is available on the Nodal website www.nodalexchange.com at:

RESOURCES > TECHNOLOGY > T7 TRADING ARCHITECTURE RELEASE 7.1

1.1 T7 for Nodal - interface landscape

The following graph gives an overview of the supported interfaces for T7 for Nodal.

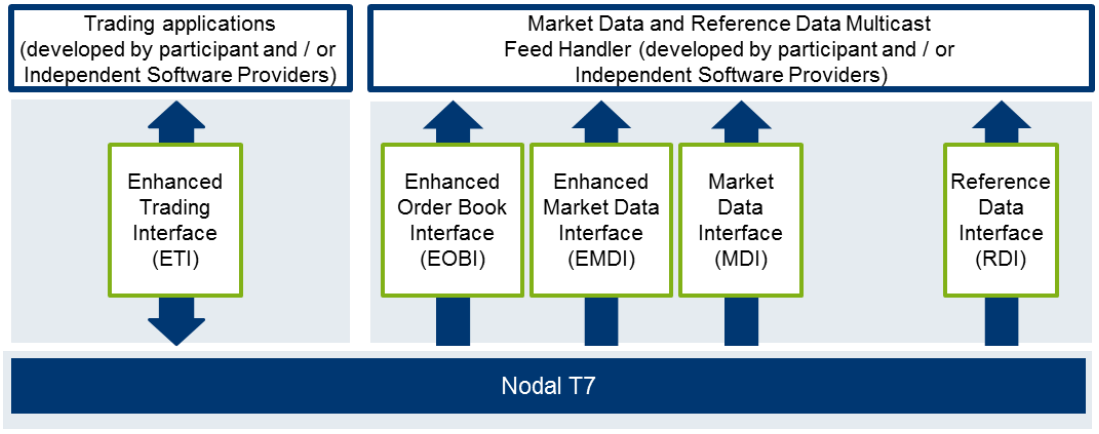

Figure 1: Nodal T7 interface landscape

1.2 Network overview

In order to support the respective T7 services, Deutsche Börse Group has established an efficient infrastructure representing a dedicated global IP network. Access from a participant location to these services must always be established via the Deutsche Börse Group's IP network.

Any participant connection to the back-end systems must be established via Access Points (AP). APs, to which leased lines connect are located throughout the world in major financial centers T7 participants are concentrated.

Alternatively, Nodal offers cross connection services in the Equinix data center in Chicago (primary site) and New Jersey (secondary/failover site).

This concept allows Deutsche Börse Group to extend its private network up to the demarcation point of the carrier at the participant’s site. Each AP is connected to the respective hosts via redundant leased lines. Participants are connected to an AP via dedicated leased lines.

1.2.1 Network security

Security is achieved by executing a number of measures, one of which is the AP, which is the sole gateway between T7 back end hosts and participant installations. Several participant installations are connected to the same AP. The functions and procedures implemented for an AP act as a firewall.

Typical IP services, such as Telnet, FTP, Finger, SMTP and RPC are not available via an AP. Passive and active security mechanisms are designed for all T7 routers to ensure that the individual participants systems cannot communicate with each other across the network. The AP acts as a shield between the participant device and the back-end hosts of T7.

As shown in Figure 2, if Participant A tries to access the network of Participant B, then the AP will prevent any kind of communication in that direction.

In addition, the AP will stop any kind of unauthorized access to the back end.

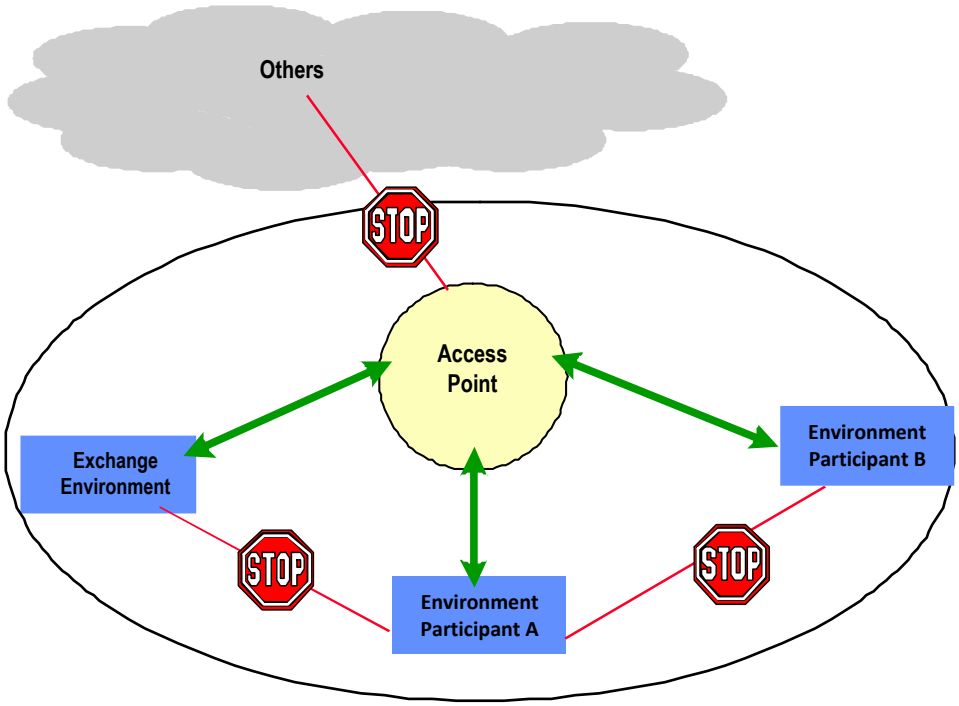

Figure 2: Access Point setup

Two security features are established on all AP routers:

- Accessibility control feature: The IP networks belonging to installations of different participants are not reachable by others through the AP network.
- Transport control feature: The AP network only transports data belonging to the application-specific connection.

1.2.2 Network failover/Last mile redundancy

T7 provides dual line options. Network failover is provided for the Layer 2 cross-site solution for leased line connectivity.

To enhance connectivity further, T7 offers redundant access to both sides for leased line connectivity.

The last mile redundancy enhancement facilitates a network routing failover in case a single circuit fails, while previously the client application was required to manage a failover to the other infrastructure side itself.

As a result of this improved last line redundancy IP prefixes are propagated via both T7 Ethernet WAN MIC/GUI connections in a dual connection setup.

Please find a detailed list of IP prefixes in the Appendix.

This enhancement also enables T7 Participants to additionally increase their redundancy by using two instances of a redundant gateway protocol such as HSRP or VRRP in the T7 member LAN, thus avoiding impact of a member router failure.

Things to consider regarding last mile redundancy setup:

- When using a first hop gateway protocol such as HSRP or VRRP, the following should be considered.
  - Two HSRP/VRRP groups are recommended where each T7 facing router has one active group, so that static routes on servers/firewalls for side 1 prefixes point to the side 1 active group virtual IP, and for side 2 prefixes to the side 2 active group virtual IP.
  - Care should be taken to ensure that the active groups and static routes are aligned with the primary paths for side 1 or 2.
- If only one HSRP/VRRP group is used and the server static routes use this virtual IP address, then the use of the BGP local-preference feature should be considered, to give the A prefixes preference over the A circuit and B over the B circuit.
- If BGP routing filters are used on the routers facing T7 connectivity, the filters will need to be adapted to take advantage of the A/B failover via one circuit.
- If the new A/B failover is not desired, then BGP routing filters can be used to only enable the routes for the relevant side.

2. Procedures and responsibilities

The following chapter deals with the procedures and responsibilities with regard to getting connected to the Nodal T7 back end. Participants who would like to get connected are kindly asked for their cooperation in taking the necessary preparatory steps which are described below. The three major activities which are necessary for the participant to take part in are:

- consulting call
- end-to-end test
- connection test

Please contact the Market Operations & Customer Service (MOCS) team if you have any questions or comments regarding the consulting call, the end-to-end test or the connection test (see Appendix for general contact information).

2.1 Getting connected

The following aspects are essential for participants who would like to get access to Nodal T7. The participant is asked to:

- choose the desired access options and order the connection with T7 trading system by sending the order form to techsupport@nodalexchange.com
- acquire and configure the necessary hardware (router and switches)
- liaise with the dedicated Technology & Operations Customer Service
- ensure that he has received and has access to the respective router configuration

2.2 Consulting call

All participants who wish to connect to Nodal T7 need to arrange a consulting call with MOCS and take part in subsequent testing (end-to-end test and connection test).

The aim of a consulting call is to make ensure the following points:

- the participant is made aware of the relevant documentation
- the connection test is being properly prepared
- firewall and other restrictions and rules on the participant side are known and observed
- open questions from the participant are answered by MOCS or a Deutsche Börse Network Operations (NetOps) staff member
- a final safety and sanity check before any changes are made

A consulting call is attended by:

- the respective MOCS team member in charge
- a Deutsche Börse Group NetOps staff member
- a participant’s network engineer having access to hardware and configurations to be tested
- a project manager or assistant on the participant side (optional)

The MOCS team member will get in touch with his or her participant contact person to set up the date and time for the consulting call to take place.

2.3 End-to-end test

The goal of an end-to-end test is to make sure that:

- the participant line has been physically cabled
- data from one end can get through to the other end
- avoidable incidents or problems arising from malfunctioning physical connections can be prevented

The prerequisites for performing an end-to-end test are as follows:

- The participant line must have already been delivered
- The participant must have the line terminating on a device for which he may use temporary equipment, e.g. laptops
- The participant must take care of all necessary on-site planning for the end-to-end connection test, e.g. presence of remote hands in data centers
- Routers and trading services are excluded from the test

An end-to-end test is attended by:

- a Deutsche Börse Group NetOps staff member and
- a participant's network engineer who is on-site.

The MOCS team member will get in touch with his or her participant contact person to set up the date and time for the end-to-end test to take place.

2.4 Connection test

The prerequisites for running a connection test are as follows:

- The consulting call must have been scheduled and must have taken place
- The end-to-end test must have been run

The goals of performing a connection test are:

- to check connectivity with regard to the new or changed infrastructure between the participant and the exchange
- to activate line monitoring

A connection test is attended by:

- a Deutsche Börse Group NetOps staff member
- a participant's network engineer who is on-site

The MOCS team will get in touch with his or her participant contact person to agree upon the date and hour for the connection test to take place.

2.5 Network administration and responsibilities

The following table provides an overview of the respective responsibilities.

Role owner	Responsibilities	Definition
Nodal / Deutsche Boerse	Network administration and operation	Applies to network from back end to boundary of the carrier demarcation point at the participant's site
	All leased line connections (currently not offered)	Procurement, installation and maintenance up to the demarcation point (includes cross connects in the datacenters used by Nodal)
Participant	External hardware	Administration and operation of equipment beyond the connection to T7 (e.g. routers, workstations and other participant devices at participant sites)

3. Network connectivity

This chapter provides an overview of the connectivity options enabling participants to gain access to T7 applications. In addition, it also provides technical background information regarding the available connection types and connection.

3.1 Connection types

3.1.1 Cross Connects / Leased lines[1]

Connections with a service-specific dedicated bandwidth based on physical leased lines are provided. The type and the bandwidth of the underlying network connection is determined at the discretion of the Deutsche Boerse deciding whether line sharing is to be applied.

Please note:

- 1 Gbit/s Ethernet cross connections within datacenters are provided with an RJ45 presentation. These copper connections shall terminate on a layer 3 device.

3.1.2 Internet

Except for T7 gateways, Nodal interfaces (Nodal Platform, Nodal file service, and Nodal FIX drop copy) and the new CQG interfaces (GUIs) can all be accessed over the internet. Firms connecting over the internet are responsible for the quality and reliability of their internet connections.

3.1.3 VPN over internet

Nodal can support clients that wish to connect over the internet but prefer to secure their traffic via a VPN tunnel. These VPN endpoints are managed by Nodal Exchange and can be provided for a small monthly fee. Please reach out to MOCS for further information.

3.2 Connection options

Connection types are combined into connection options offered by Nodal / Deutsche Boerse and include the following combinations:

- Two leased lines as standard connection

3.2.1 Two cross connects / leased lines as standard connection

The following setup of two leased lines offers the highest availability of all connection options the participant can choose from.

[1] Leased lines not offered with initial production start

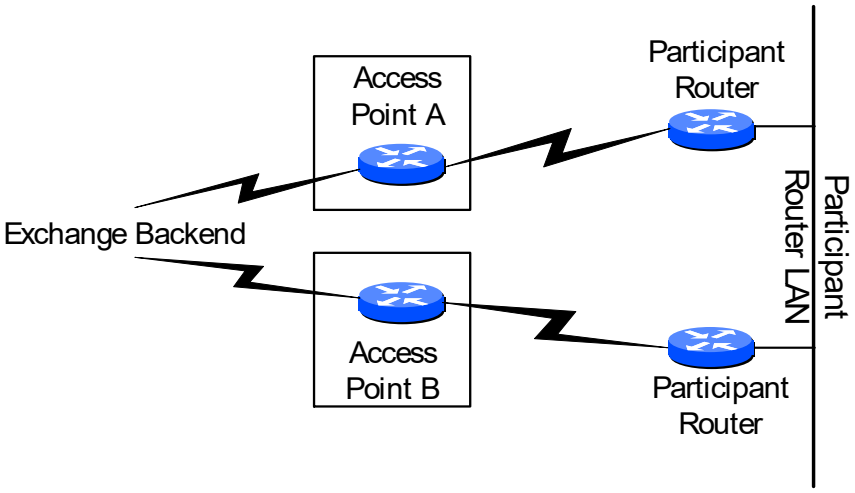

Figure 3: Connection via two leased lines

Technical implementation:

Deutsche Boerse provides bandwidth on a leased line.

The provision, operation and administration of the interconnection between both participant locations (routers) are within the participant's responsibility.

4. Nodal T7 Service Availability and Connectivity

In order to separate services and to support Quality of Service (QoS) concepts for services running on a leased line, Nodal T7 uses a concept based on traffic shaping. This includes the configuration of a Multi Interface Channel.

4.1 Multi Interface Channel

The Nodal Multi Interface Channel (MIC) as a separation of bandwidth using traffic shaping mechanisms combines Nodal interfaces. To avoid any interference of multicast based market/reference data and transactional data within a MIC, a traffic shaping mechanism is used to separate market/reference data from the transactional interfaces.

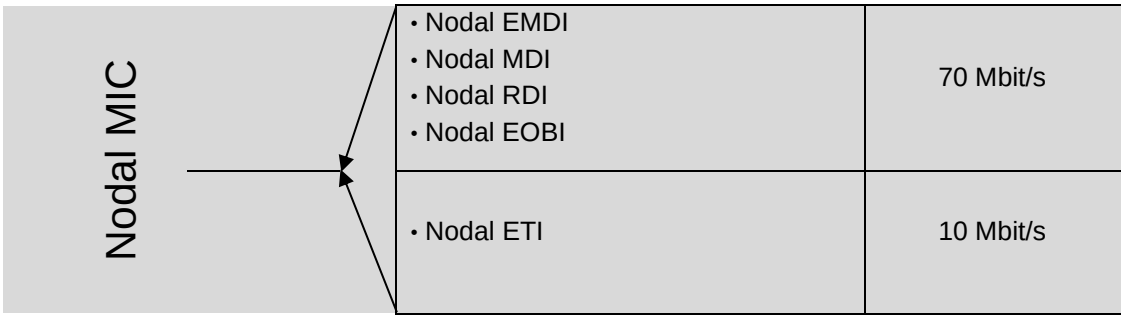

Figure 4: Nodal MIC

4.1.1 Nodal Interfaces on a Nodal MIC

Within a Nodal MIC access to the following Nodal T7 interfaces is possible:

- EMDI (Enhanced Market Data Interface)
- RDI (Reference Data Interface)
- MDI (Market Data Interface)
- EOBI (Full orderbook information)
- ETI (Enhanced Trading Interface)

4.1.2 Bandwidth

The availability of the Nodal market data interface for un-netted market data (Nodal EMDI) and reference data (Nodal RDI) within a Nodal MIC depends on the bandwidth of the leased line the Nodal MIC is configured on.

Nodal MICs are currently offered within Equinix datacenters as dual cross connects with the following market data bandwidths:

- 70 Mbit/s for all market data, netted and un-netted via MDI, EMDI, EOBI, and for reference data via RDI
- 10 Mbit/s for ETI transactional interface

5. Nodal T7 interfaces

Access to Nodal T7 trading and clearing interfaces is only possible using the connection options as described in chapter 3.2 with the configuration of a Multi Interface.

To gain access to the Nodal T7 interfaces, connections to certain servers/gateways identified by certain IP addresses and ports and/or multicast IP addresses must be allowed from the participant's network. This chapter describes the Nodal Exchange's T7 trading interfaces and lists IP addresses and ports necessary for access via these interfaces.

The following table contains an overview of the available interfaces of Nodal Exchange's T7.

Nodal Exchange's T7 interfaces
Enhanced Trading Interface
Enhanced Market Data Interface
Enhanced Order Book Interface
Market Data Interface
Reference Data Interface

5.1 Nodal Exchange's T7 transaction interfaces

5.1.1 Enhanced Trading Interface (ETI)

The ETI is an asynchronous message-based interface. A connection between participants and Nodal is established via a TCP/IP connection. The interface is session-oriented. A session is established between the participants' machine and a Nodal T7 ETI gateway. The gateways types available are low frequency (LF) only.

Low frequency gateways allow routing to all partitions. To ensure an optimal load balancing of the LF sessions to the LF trading gateways, recommended primary and backup trading gateways are assigned to LF sessions during the ordering process. The recommended LF trading gateways for a session can be found in the "ETI Session Details" window or the configuration printout which are available in the respective member section under the "Technical Connection > Current configuration" option.

This connection process is described on a high level in the diagram below.

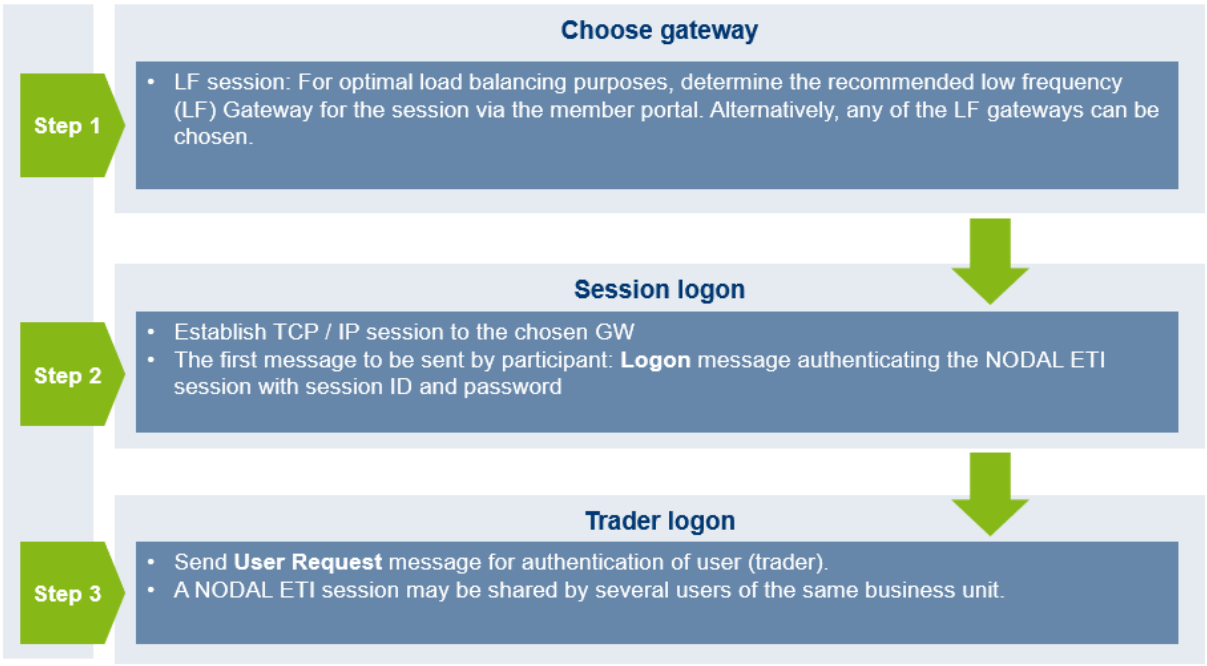

Figure 5: Nodal ETI session logon process

The T7 gateway infrastructure is built redundantly, as indicated in the figure below. A set of low frequency trading gateways are primarily attached to a one line connection of a participant.

A redundancy link between side A and side B exists to ensure network failover for redundant two leased line installations and guarantees that all gateways are reachable via a single line in case of a failure. The redundancy link introduces additional latency and should therefore be actively used in emergencies only.

For this reason, participants are advised to order a redundant leased line setup (connection option with two leased lines). If one leased line connection fails, the corresponding LF gateway can still be accessed.

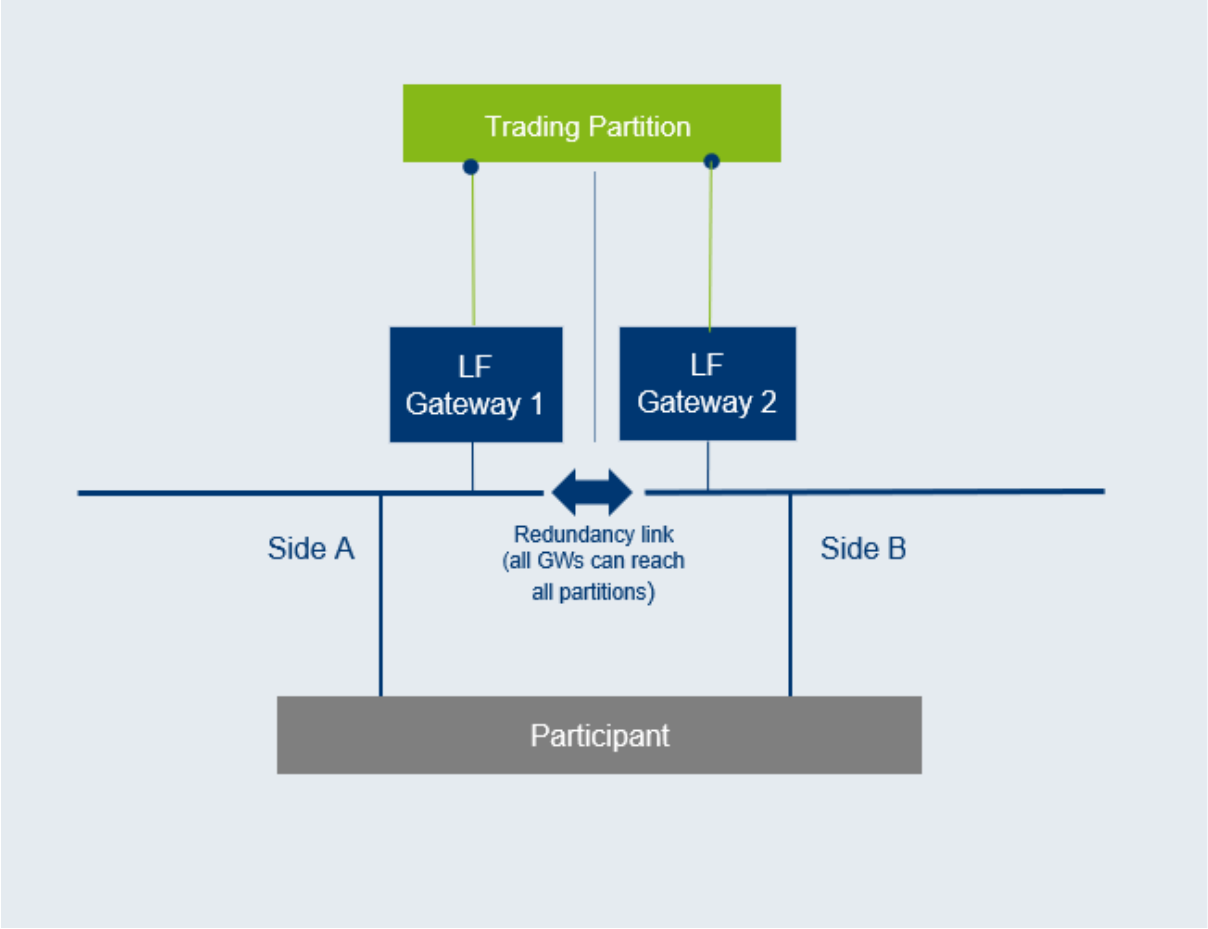

Figure 6: Nodal ETI gateway infrastructure

The IP addresses of the trading gateways are to be obtained as follows:

- The IP addresses, subnets and TCP/IP ports for accessing the Low Frequency gateways are listed in the tables below.

5.1.1.1 ETI Details for Nodal T7

Environ-ment	Gateway type	IP subnets		Ports	Protocol
		Side A	Side B		
Production	LF trading gateways	185.102.252.128/28	185.102.252.144/28	17406	TCP/IP
Simulation	LF trading gateways	185.102.253.208/29	185.102.253.216/29	17906	TCP/IP

IP addresses of the ETI gateways in production are listed in the table below:

Env.	Gateway #	Gateway type	Participant connection	IP address
Production	L02	LF trading gateway	Side A	185.102.252.129
	L01	LF trading gateway	Side B	185.102.252.145

IP addresses of the ETI gateways in simulation are listed in the table below:

Env.	Gateway #	Gateway type	Participant connection	IP address
Simulation	L01	LF trading gateway	Side A	185.102.253.209
	L02	LF trading gateway	Side B	185.102.253.217

5.2 Nodal Exchange's T7 broadcast interfaces

Due to the use of PIM Sparse Mode and any source multicast using IGMPv2 a rendezvous point for each multicast feed is required. The rendezvous points are as follows:

Environment	Rendezvous point Service A	Rendezvous point Service B
Production	185.102.253.248	185.102.253.249
Simulation	185.102.253.250	185.102.253.251

In addition to messages containing functional content, technical heartbeat messages (also called technical beacon messages) are sent out periodically on every multicast address. The purpose of the technical heartbeat message is to keep routing trees alive, i.e. this message prevents routers from dropping multicast packages. MDI sends the technical heartbeat messages on specific ports. The ports are listed in the table below.

Environment	Service A - technical heartbeat		Service B - technical heartbeat	
Production	Nodal T7	57486	Nodal T7	57487
Simulation	Nodal T7	57986	Nodal T7	57987

5.2.1 Market Data Interface (MDI) Nodal T7

The Nodal MDI provides netted price-level aggregated market data. It is a flexible, transparent, UDP based interface that disseminates market data from Nodal Exchange's T7 to participants over a multicast network. The messaging protocol used by MDI is fully compliant to the FIX protocol version 5.0 SP2 and the interface conforms to the FAST (FIX Adapted for Streaming) protocol version 1.2 principles for efficient bandwidth utilization.

The interface provides participants with the information in form of data feeds. The data feeds match to multicast groups, participants can join to receive market data for certain product groups.

MDI data feeds are distributed in a "live-live" concept by disseminating two services, A and B. Both services are identical in terms of the information provided, but utilize different multicast groups. Only one service (A or B) is transmitted per leased line connection. Each service (A or B) is linked to the transmitting leased line. Service A is available on side A and service B is available on side B. An automatic failover of the respective service in case of a line failure is not possible.

Due to the inherent unreliable nature of the delivery mechanism of the UDP protocol, packets may be lost in transmission, arrive out of order or may be duplicated. Participants are advised to subscribe to both services simultaneously on different leased lines to reduce the possibility of data loss.

5.2.1.1 MDI Details Nodal T7

The following multicast group ranges and ports are used:

Environ-ment	Description	Multicast groups Service A	Multicast groups Service B	Ports:
Production	Multicast groups	224.0.168.2 to 15	224.0.168.66 to 79	57400
	Source networks	185.102.252.160/29	185.102.252.168/29	-
Simulation	Multicast groups	224.0.168.130 to 143	224.0.168.194 to 207	57900
	Source networks	185.102.253.224/29	185.102.253.232/29	-

5.2.2 Enhanced Market Data Interface (EMDI) Nodal T7

The Enhanced Market Data Interface provides un-netted price-level aggregated market data. Similar to the MDI, it is UDP based and disseminates market data from Nodal's T7 to participants over a multicast network.

As the un-netted market data consumes considerably more bandwidth, the bandwidth requirements for the EMDI are much higher than for the MDI. The required bandwidth depends primarily on the products market data must be delivered for.

Similar to the MDI, EMDI provides data feeds in a "live-live" concept by disseminating two services, A and B. Therefore, the same rules apply, as for MDI. Please note that in contrast to the MDI, the EMDI disseminates market data via service A for products configured on even partitions first and market data via service B for products on odd partitions first.

5.2.2.1 EMDI Details Nodal T7

The following multicast group ranges and ports are used:

Environ-ment	Description	Multicast groups Service A	Multicast groups Service B	Ports:
Production	Multicast groups	224.0.168.16 to 39	224.0.168.80 to 103	Snapshot: 57400 Incremental: 57401
	Source networks	185.102.252.160/29	185.102.252.168/29	-
Simulation	Multicast groups	224.0.168.144 to 167	224.0.168.208 to 231	Snapshot: 57900 Incremental: 57901
	Source networks	185.102.253.224/29	185.102.253.232/29	-

5.2.3 Enhanced Order Book Interface (EOBI) Nodal T7

The Enhanced Order Book Interface (EOBI) provides the entire visible order book, by publishing information on each individual order and quote side, along with executions and state information in real-time and in an un-netted manner and provides an additional alternative to recipients of the Enhanced Market Data Interface (EMDI).

Similar to the MDI, EOBI provides data feeds in a “live-live” concept by disseminating two services, A and B. Therefore, the same rules apply, as for MDI.

5.2.3.1 EOBI Details Nodal T7

The following multicast group ranges and ports are used for the EOBI:

Environment	Description	Multicast groups Service A	Multicast groups Service B	Ports:
Production	Multicast groups	224.0.168.40 to 63	224.0.168.104 to 127	Snapshot: 57400 Incremental: 57401
	Source networks	185.102.252.160/29	185.102.252.168/29	
Simulation	Multicast groups	224.0.168.168 to 191	224.0.168.232 to 255	Snapshot: 57900 Incremental: 57901
	Source networks	185.102.253.224/29	185.102.253.232/29	

For the highest degree of flexibility in subscribing market data and to enable an optimal bandwidth utilization, snapshot and incremental data is disseminated via different multicast groups.

EOBI sends out technical heartbeat messages periodically on every multicast address to keep routing trees alive, similar to MDI. For details, see chapter 5.2.

Due to the internal configuration of EOBI, market data can originate from one of two source networks. The dissemination of EOBI market data for a particular product will only originate from one of the source networks and will remain constant throughout the trading day

Please note that the rendezvous points for the EOBI multicast feeds are identical to those for the MDI, as listed there.

5.2.4 Reference Data Interface (RDI) Nodal T7

Nodal’s T7 offers an interface dedicated to reference data, the Nodal RDI. The RDI provides reference data for instruments that are available for trading on T7 and delivers data on a product and instrument level. A unique identifier references every tradable object. In addition, the data delivered contains the technical configuration, e.g. multicast group and port combinations for both market data interfaces for all products and instruments.

Please note: The multicast group (address) and port combinations per product must be processed every day, as this assignment is subject to change on a daily basis.

RDI delivers reference data in message format. Similar to the EMDI, the interface is multicast based. As the MDI and EMDI, the RDI provides data feeds in a “live-live” concept by disseminating two services, A and B. Therefore, the same rules apply, as for MDI and EMDI.

Multicast groups and ports for the reference data feeds do not change during trading hours.

RDI sends out technical heartbeat messages periodically on every multicast address to keep routing trees alive, similar to MDI. For details see there.

Please note that the rendezvous points for the RDI multicast feeds are identical to those for the MDI, as listed in there.

5.2.4.1 RDI Details Nodal T7

The following multicast groups and ports are used:

Environ-ment	Description	Multicast groups Service A	Multicast groups Service B	Ports
Production	Multicast groups	224.0.168.0	224.0.168.64	57498 (Snapshot)
		224.0.168.1	224.0.168.65	57499 (Incremental)
	Source networks	185.102.252.160/29	185.102.252.168/29	-
Simulation	Multicast groups	224.0.168.128	224.0.168.192	57998 (Snapshot)
		224.0.168.129	224.0.168.193	57999 (Incremental)
	Source networks	185.102.253.224/29	185.102.253.232/29	-

6. Nodal Platform, FIX Gateway & SFTP Service Access

Nodal runs an SFTP service that authenticates against a common user management service that also governs both the Nodal FIX Gateway and the Nodal Trading Platform. In addition to the Production Environment, Nodal Exchange provides participants with access to a Simulation environment. This environment generally runs the same version of the trading platform as Production and is available for participants to test a complete environment, including a live, rolling schedule, full user interface, full FIX interface, and full file interface:

Environment	Hostname	IP[2]	Port
Production[3]	files.nodalexchange.com (Data files)	216.230.24.15 / 216.230.26.15	22
	apps.nodalexchange.com (Nodal Trading)	216.230.24.15 / 216.230.26.15	443
	gateway.nodalexchange.com (FIX)[4]	216.230.24.16 / 216.230.26.16	9883
FIXPS (Test Environment)	rtv11.nodalexchange.com (Data files)	216.230.27.31	22
	fixps.nodalexchange.com (Nodal Trading)	216.230.27.31	443
	fixps-gw.nodalexchange.com (FIX)[4]	216.230.27.32	9883

These services are provided by Nodal via Internet connectivity. Customers will not be able to access the addresses mentioned above via leased line/cross connect provided by Deutsche Boerse.

[2] Nodal encourages participants to use hostnames rather than IP addresses in their set up as during possible failover hostnames will automatically connect to the backup site

[3] Second set IP addresses denote disaster recovery (DR) environment

[4] SSL required

7. Appendix

7.1 List of abbreviations

The following list is limited to terminology and abbreviations, which are specific to Nodal T7. Basic IT terminology, such as FTP, TCP etc., is not explained in this document, which is aimed at technical roles (administrators) at participant sites.

Abbreviation or term	Description
AP	Access Point: One of its functions is to route data transactions to and from the back ends of the Deutsche Boerse Group's systems.
Cross-connect	Cross connects are direct Ethernet connections between the T7 infrastructure and participants in the same data center. Participants can rent rack space from Equinix in the data centers used for the back ends of the Exchange.
EMDI	T7 Enhanced Market Data Interface
EOBI	T7 Enhanced Order Book Interface
ETI	T7 Enhanced Trading Interface
MDI	T7 Market Data Interface
RDI	T7 Reference Data Interface
ISP	Internet Service Provider
Participant	A participant is a clearing member or a non-clearing member that is connected to the one of the trading markets.
MIC	Multi Interface Channel: A network configuration bundling T7 interfaces.
User	A user is a trader that logs into a trading system. e.g. into T7.

7.2 Contact information

Overview of contact information	
Website for Nodal T7	www.nodalexchange.com

7.3 Sources of information

For further information concerning the T7 please visit the Nodal website (*www.nodalexchange.com*).

The websites provide documents, such as circulars, functional and technical descriptions with additional pieces of information regarding participant-specific system configuration details.

The following table contains a list of references in regard to functional and technical documents.

Chapter reference or topic	What it is about	Link
Documentation for Nodal T7	Multiple topics	www.nodalexchange.com > RESSOURCES > TECHNOLOGY

7.4 List of IP prefixes

IP prefixes (source IP networks, rendezvous points, etc.) are described in this document within the chapters of the respective interfaces. The following list merges all the IP prefixes relevant for leased line connections and advertised over both sides.

IP prefix	Description
Nodal ETI	
185.102.252.128/28	IP subnet of Nodal ETI trading gateways, production, side A
185.102.252.144/28	IP subnet of Nodal ETI trading gateways, production, side B
185.102.253.208/29	IP subnet of Nodal ETI trading gateways, simulation, side A
185.102.253.216/29	IP subnet of Nodal ETI trading gateways, simulation, side B
Rendezvous points for Nodal MDI, Nodal EMDI, Nodal EOBI and Nodal RDI	
185.102.253.248	Rendezvous point for service A, production
185.102.253.249	Rendezvous point for service B, production
185.102.253.250	Rendezvous point for service A, simulation
185.102.253.251	Rendezvous point for service B, simulation
Nodal MDI, EMDI, EOBI and Nodal RDI	
185.102.252.160/29	IP source network for service A, production
185.102.252.168/29	IP source network for service B, production
185.102.253.224/29	IP source network for service A, simulation
185.102.253.232/29	IP source network for service B, simulation

8. Change log

The change log serves as a record of the latest major changes.

No	Date	Chapter, page	Change
1.0	08 June 2018	-	Initial document for Nodal T7
1.1	26 June 2018	5.2	Updated all multicast addresses for broadcast interfaces
1.2	12 September 2018	5.2.4.1	Optimized address tables for easier reading
1.3	25 June 2019	5.1.1 5.1.1.1	Removal of the Connection Gateway
1.4	20 February 2020	6.0	Change of hostname and Ips for the Test Environment.