

NYSE Options Technology FAQs

Scope and Disclaimer

This document published by the NYSE AMEX Options and NYSE ARCA Options exchanges (the “Exchanges” or “NYSE Options”) is intended for informational purposes only in an effort to provide additional transparency on the Exchanges’ technology and recommend best practices. The information contained in this summary document is focused on the technical architecture of the Exchanges so that Members can better understand, effectively integrate and better manage operational risk with the Exchanges. While the information provided is believed to be accurate at the time of publication, this document may become outdated as the Exchanges continuously evaluate new solutions and enhance technology to improve resiliency, performance, and scalability. Members should refer to the Exchanges’ most current rules and product technical specifications for more definitive information, which information ultimately controls in the event of any inadvertent conflict with this document.

General Information

1. What are the trading hours?

Trading on the Exchanges occurs between 9:30am and 4:15pm (ET) daily. Orders may be entered into the system beginning at 3:30am.

Further details are available at: <https://www.nyse.com/markets/hours-calendars>

2. What securities are traded on each exchange?

The Exchanges both trade multiply-listed equity and index options. AMEX Options also trades Binary Return Derivatives (ByRDs).

3. What are Binary Return Derivatives (ByRDs) Options?

ByRDs are “binary” options with a per-contract fixed return amount of \$100.00. More information on ByRDs Options is available here: [Binary Return Derivatives Options](#).

4. What is the allocation algorithm for each exchange?

AMEX Options is a pro-rata, Customer priority model that executes Customer orders, at a price, in time sequence before non-Customer orders (at the same price) and allocates the orders on a pro-rata basis.

ARCA Options is generally a price-time market with certain benefits to Lead Market Makers.

Equipment

5. What type of hardware do the Exchanges use?

NYSE Options employs cutting edge blade servers, switching and messaging technology providing superior throughput and low latency to NYSE Options participants.

Gateways and Messaging

6. How do Members connect to the Exchanges?

Members connect to the Exchanges by establishing TCP/IP sessions with each market's gateway applications. Members can establish connectivity to the Exchanges beginning at 3:30am.

NYSE Options recommends that Members maintain multiple gateway connections for each market so that, in the event of a gateway application failure, they will have the ability to direct order flow to the Exchanges via a connection to an alternate gateway. Specifically, these connections should be maintained in both physical halls within the Mahwah data center from which connections are provided. The NYSE Technology and Connectivity team can help Members establish a presence in each hall.

7. What messaging protocols are supported?

The Exchanges offer two protocols for order entry and a separate protocol for Market Maker quote entry. The protocols are identical for each of the two markets.

Specifications for FIX order entry can be found here: [FIX for Options](#).

Specifications for binary order entry can be found here: [UGW for Options](#).

Specifications for quote entry can be found here: [MMD for Options](#).

8. How many gateways are there? And how do the Exchanges ensure adequate capacity?

On each NYSE Options exchange, multiple instances of each gateway application run in production to allow for load balancing and redundancy. Internally, each gateway application provides access to all matching engines on the exchange.

Gateway capacity (like the Exchanges' system operating capacity discussed below) is periodically reviewed to ensure high availability and consistent throughput across all participants.

The specific number of gateways is not disclosed.

9. Are TCP/IP and UDP both supported?

No. UDP is not supported by the Exchanges. NYSE Options requires TCP/IP connections between the client and the gateway application.

10. How do gateways transmit data to the matching engine?

Data is transmitted from the gateway to the matching engine using TCP connections.

11. Are customer sessions constrained to "one-in-flight" messaging?

No. Additional messages may be sent before prior message acknowledgments have been received.



12. Are customer sessions throttled?

Yes. Order gateways throttle each connection to one thousand messages per second.

13. Are dedicated gateways available to individual clients?

No. Gateways are a shared resource for the Exchanges' participants. Gateway performance is managed as part of the capacity management process.

14. Are gateway reader threads always active?

Yes The gateways maintain "hot" active TCP connections awaiting data arrival.

15. How is the traffic balanced across gateways?

Connection assignments and re-assignments are performed by the Exchanges' System Operations team to maintain appropriate system utilization and balance across market participants.

16. Where in the architecture are messages sequenced?

Messages are sequenced when they arrive at the matching engine.

17. Where in the architecture are timestamps put on acknowledgements of orders and executions?

Order acknowledgement and executions messages have 'Transaction Time' and 'Sending Time' fields that are time stamped in the matching engine and gateway, respectively.

18. Are drop copy messages available?

Yes. FIX trade drop copy is available. More information on drop copy can be found here: [Drop Copy for Options](#).

19. Is testing available?

Yes. The Exchanges provide opportunities for Members to test connectivity and functionality in certification environments and also support test symbols in production environments. Members should contact the Firm Testing group for more information.

Days available: Monday - Friday

Hours available: Firm Testing Phone Support 9am – 5pm

Contact info: Firmtesting@nyse.com or 212-896-2830 (option#2, #2)

Matching Engine

20. How many matching engines are used by the Exchanges?

The Exchanges each use sixteen matching engines.

21. How are symbols mapped to matching engines?

The Exchanges monitor performance daily and periodically redistribute symbols across matching engines as needed. The symbol to matching engine mapping is not disclosed. Market Makers who use the block quoting interface can send quotes in a block for symbols within a symbol group.

22. What price sources are used for away markets?

OPRA is used for away market quote data.

23. How do the Exchanges ensure adequate trading systems operating capacity?

The trading system capacity (like the Exchanges' gateway capacity discussed above) is constantly reviewed to ensure high availability and consistent throughput across all participants.

24. How are inbound messages sequenced?

Inbound messages are processed in time sequence as received by the matching engine. The matching engine receives messages from multiple gateway applications.

25. How do orders enter the book?

The matching engine processes one message at a time. All requisite actions from the instruction (e.g. update the order book, execute trade, publish quote updates) are completed before processing the next message.

26. Are risk management features available?

Yes. The Exchanges offer a full suite of risk management features. Please refer to this document for a comprehensive list of these features: [Options Risk Controls](#).

Additional Features and Functions

27. Do the Exchanges support a price improvement auction?

AMEX Options supports a price improvement auction called CUBE (Customer Best Execution). Details on CUBE can be found here: [AMEX CUBE](#).

ARCA Options does not support a price improvement auction.

28. Do the Exchanges support Complex Order functionality?

Yes. The Exchanges offer complex order functionality.

29. Do the Exchanges support a “step-up” functionality?

AMEX Options supports a “step-up” functionality called BOLD (Broadcast Order Liquidity Delivery Mechanism). Details on BOLD can be found here: [BOLD FAQs](#).

ARCA Options does not support a “step-up” functionality.

Market Data

30. What market data is available for NYSE Options?

The Exchanges publish their quote and trade data to OPRA and via proprietary data feeds. The proprietary data feeds also include a symbol download, a complex order feed, depth of book messages, BOLD mechanism messages (AMEX only) and CUBE auction messages (AMEX only).

Additional information on Options market data feeds is available at: [XDP for Options](#).

31. When are timestamps generated?

On the Exchanges' proprietary market data feeds, the 'SourceTime' field is generated by the matching engine's trade process and the 'SendTime' field is generated by the XDP Publisher just before sending the packet.

32. How do firms receive proprietary market data?

All proprietary market data feeds publish identical multicast data over an A and a B multicast line for redundancy. These redundant lines can be received via the Secure Financial Transaction Infrastructure (SFTI) IP network by remote customers. Customers co-located in the Mahwah data center may receive proprietary market data feeds over either the IP network or, in resilient form, the LCN network. Customers should automatically arbitrate between the A and the B line so that if one line drops a packet, data normally can still be received over the other line.

In case of doubly-dropped multicast packets, customers can connect to a Request Server via TCP/IP to request retransmissions of missed messages. In case of customer late start or intraday failure, customers can connect to the Request Server and request snapshot refreshes of the state of the market.

In addition, the Exchanges recommend that firms utilizing proprietary market data feeds maintain a connection to the Security Information Processors ("SIPs"), and have the ability to switch between the proprietary market data feeds and the SIPs in the event that one or the other fails.

NYSE Options can also provide data to customers in the Secaucus and Carteret data centers via SFTI Wireless and SFTI LLN, a low latency fiber route. Note that SFTI Wireless is a fair weather service and that neither SFTI Wireless nor SFTI LLN is a redundant service; backup connectivity should be established.

Resiliency Best Practices

33. What do the Exchanges recommend for resiliency best practices?

NYSE Options recommends that Members maintain connectivity to SFTI from multiple geographically diverse SFTI Access Centers. In the event of an Access Center failure, Members should be able to route via another Access Center.

Additionally, Members located in the Mahwah, NJ data center, including for colocation, should be able to access SFTI from an external Access Center.

34. What does NYSE Options recommend for Disaster Recovery (DR) and Business Continuity Planning (BCP)?

NYSE Options recommends all Members establish DR and BCP plans that anticipate potential outages or inaccessibility of its data centers and/or trading floors. Members that depend on physical trading floor presence for order entry are advised to establish electronic order entry capabilities as a backup should the floor be unavailable.



Members are advised to maintain connectivity to the NYSE Group disaster recovery facility in Chicago, IL (350 E Cermak). In the case of a DR event that impacts the Mahwah data center, the Exchanges will operate from Cermak per Exchange rules and previously disseminated DR plans. The NYSE Technology and Connectivity team can help Members establish access to the DR facility.

Additional Information

Additional information on trading options on the AMEX Options market can be found here: [AMEX Options](#)

Additional information on trading options on the ARCA Options market can be found here: [ARCA Options](#)

Members of NYSE, NYSE MKT, NYSE Arca, NYSE Amex Options and NYSE Arca Options may contact their Relationship Manager or send an email to rmteam@nyse.com to meet with exchange technology and business staff to discuss trading infrastructure, connectivity protocols and system functionality.