NYSE American Options
Customer Best Execution ("CUBE") Mechanism
Frequently Asked Questions

1. **What is CUBE?**
   CUBE is NYSE American Options' (the "Exchange") electronic crossing price improvement auction mechanism. CUBE is available for single-leg orders ("Single-Leg CUBE") and complex orders ("Complex CUBE") and offers exchange participants ("Participants") the ability to seek price improvement for paired orders of any size.

   Additional information can be found in NYSE American Rules 971.1NY for Single-Leg CUBE and Rule 971.2NY for Complex CUBE.

2. **What is a CUBE 'Paired' order?**
   Paired orders are comprised of an 'Initiating' order -- i.e., the CUBE Order -- and a 'Contra' order. The orders may be made up of principal or solicited interest and are sent to the Exchange in a single CUBE order message; both the Initiating order and Contra order components are required to constitute a valid CUBE order, which is then evaluated for auction eligibility. Except for AON CUBE, where both Initiating and Contra orders may be canceled in certain circumstances where the AON order contingency is not met (see below), the Contra order guarantees execution of the Initiating order within an allowable execution range.

3. **What is AON CUBE?**
   AON CUBE provides All-or-None ("AON") functionality for CUBE orders with a minimum of 500 contracts for Single-Leg AON CUBE, and with a minimum of 500 contracts on the smallest leg for a Complex AON CUBE. For additional information on AON CUBE, please see the 'AON CUBE Supplemental Information' section below.

4. **How does the CUBE auction operate?**
   On receipt of a valid CUBE/Contra order pairing, the Exchange broadcasts the auction via a Request for Quote ("RFQ") message to subscribers of the Exchange's market data ("XDP") feeds. Once a CUBE auction is initiated, the Initiating and Contra order may not be cancelled or modified. A CUBE timer will start, during which time Participants may submit responses to interact with the Initiating order. Upon the conclusion of the auction, responses are evaluated for price improvement and, if eligible, allocated per the Exchange's allocation algorithm; absent eligible auction interest, the Contra order trades with the Initiating CUBE Order or may cancel in AON CUBE, as described in further detail below.

5. **Where are CUBE RFQs published?**
   RFQs for Single-Leg CUBE auctions are published over the Top of Book XDP feed. RFQs for Complex CUBE auctions are published over the Complex XDP feed.

6. What information is included in the CUBE RFQ and what are the various CUBE order types?
RFQ messages include the initiating price, series/complex strategy, side, size/quantity, and CUBE order type (i.e. Price Improvement ('**P**') - minimum size is 1 contract; Facilitation ('**F**') - minimum size 50 contracts; or AON CUBE ('**S**') - minimum size 500 contracts).

Each CUBE order type has corresponding requirements that dictate the price at which an auction may be initiated, as well as a range of permissible executions, as described in further detail below.

7. What is the duration of the CUBE timer?
The timer is randomized with outside time parameters of 500 milliseconds to 750 milliseconds. A qualifying event may cause an early conclusion to the auction irrespective of the timer. Scenarios or "qualifying events" resulting in early termination are described below.

8. Are there any restrictions on clearing capacity for CUBE orders?
Yes. The Contra order may only be submitted on behalf of a non-Customer. The Initiating order may be submitted on behalf of any clearing capacity (Customer, Firm, Market Maker, etc.).

9. Are there restrictions on who can respond to a CUBE order?
No. Any Participant may interact with the CUBE order by submitting a contra-side quote or order - including GTX orders - to the Exchange. Eligible contra-side interest may interact with a CUBE order even if such interest is not specifically designated as an auction response/GTX.

10. What is a GTX order?
A GTX order has a Time-in-Force designation for the duration of, and is submitted as a response to, a CUBE auction. GTX orders may only be submitted on the opposite side of the CUBE Order and may be entered in $0.01 increments. After the CUBE order is fully allocated, any remaining quantity of a GTX order may trade with interest in the Exchange's Consolidated Book. Any unexecuted portion of the GTX order will subsequently be cancelled.

11. Are responses to CUBE auctions disseminated on XDP or OPRA?
It depends. CUBE auction responses submitted as GTX orders are not disseminated to XDP or OPRA. Non-GTX orders and quotes that arrive during a CUBE auction and may be eligible to trade with the CUBE order will be broadcast on XDP and OPRA in accordance with standard processing of orders or quotes.

12. Can responses to a CUBE auction be modified or cancelled?
Yes. GTX orders may be cancelled or modified. Similarly, non-GTX interest that arrives during the auction and is eligible to interact with a CUBE order may also be modified or cancelled (consistent with standard processing for orders and quotes).

13. Is there a size limit for CUBE responses?
No. Interest that is eligible to interact with a CUBE order, including GTX orders, will be capped at the size of the CUBE order for the purpose of pro-rata execution allocation.

14. **How is a CUBE order allocated?**
Allocation depends on interest received during the CUBE auction.

Customer responses take priority at each price level and are allocated pro-rata. Customer interest is followed by non-Customer interest which is also allocated pro-rata at each price level, up or down to the price(s) at which the Contra order guarantees the execution of the CUBE Order.

> **Single-Leg and Complex CUBE orders** ('**P**' and '**F**') - The Contra order will trade with 40% of the CUBE Order at the guaranteed price(s) provided there is remaining size to the CUBE Order after executing with price-improved interest. CUBE Orders guaranteed by auto-match prices will be allocated up or down to match the price improved interest.

> **Single Leg and Complex AON CUBE orders** ('**S**') - The Contra order will trade with the CUBE Order quantity in its entirety unless: i) there is Customer interest at the Contra order's guaranteed price, or better, that on its own or in aggregate with non-Customer interest at the guaranteed price or better, can satisfy the size of the AON CUBE Order; ii) there is enough non-Customer interest at prices that improve the guaranteed price to satisfy the size of the AON CUBE Order. In these circumstances, the Contra order will be cancelled, and the AON CUBE Order will trade with the eligible auction responses. In the event that there is Customer interest at the guaranteed price or better but insufficient size on its own or when aggregated with similarly-priced non-Customer interest to satisfy the AON CUBE order contingency both, the AON CUBE Order and the Contra order will be cancelled.

15. **Can multiple CUBE auctions within the same mechanism (i.e., in Single-Leg CUBE or Complex CUBE) take place concurrently for the same series/complex strategy?**
No. If the Exchange receives an order to initiate a Single-Leg CUBE for an option series while another Single-Leg CUBE for the same series is in process, the first CUBE auction will end early allowing the subsequent (second) auction to start. Similarly, if the Exchange receives an order to initiate a Complex CUBE for a complex strategy while a Complex CUBE for that same strategy is already in progress, the first Complex CUBE Auction will end early, allowing the second Complex CUBE Auction to commence.

16. **Can a CUBE auction conclude early and what happens if it does?**
Yes. CUBE auctions may end early (i.e. prior to the conclusion of the random CUBE timer) as a result of certain specified events (described below) that would otherwise disrupt the priority of interest in the Consolidated Book. When a CUBE auction ends early, the Exchange evaluates the interest received during the auction and allocates the CUBE Order (in whole or in part) with price improving interest, and/or, absent sufficient improving interest, with the Contra order (as noted in Q14 above). Allocations of executions are applied in accordance with the CUBE priority rules and the Exchange's allocation algorithm.

17. Are there restrictions on when a CUBE auction can take place?

Yes. CUBE auctions may only occur during the Exchange's Core Trading Hours, provided there is enough time to process the order (i.e., at least one second before the end of Core Trading Hours). CUBE orders submitted outside of Core Trading Hours will be rejected.

18. Are transaction fees for trading with CUBE orders different than fees for trading with non-CUBE orders?

Yes. Executions in CUBE Auctions are subject to separate fees/credits. Participants should consult the NYSE American Options Fee Schedule, Section I.G, CUBE Auction Fees & Credits, for further information.

19. What system changes are required for Participants to use CUBE?

Participants may use CUBE functionality by following the instructions provided in the Exchange's NYSE Arca FIX Gateway Specification and UGW Binary Gateway Specification documents.

Participants that would like to receive CUBE broadcast messages must subscribe to receive and program their system to read the Exchange's XDP Options Client Specification document.

Participants that would like to respond to CUBE Orders may do so by submitting contra- side interest, including GTX orders, during the auction as described above.

For additional information regarding CUBE, please contact the NYSE Relationship Management Team at rmteam@nyse.com.

20. How can Participants test their ability to utilize CUBE functionality?

CUBE functionality is available for testing on the Exchange's Certification Testing environments. For assistance with the testing, please contact Technology Member Services at tms@nyse.com.

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SINGLE-LEG CUBE SUPPLEMENTAL INFORMATION

21. **What are the Single-Leg CUBE auction Initiating Price Rules?**

    The permissible initiating price for a Single-Leg CUBE auction depends on the order type and size:

    'P' - Single-Leg Orders (Smaller than 50 contracts): Auction can start at the NBBO if the Exchange is not already part of the NBBO. Alternatively, the CUBE order must be $0.01 inside the NBBO if the Exchange is part of the NBBO.

    'F' - Single-Leg Orders (50 contracts or Greater): Auction can start at the NBBO, except if there is Customer interest on the Consolidated Book on the Initiating order side BBO. In such instances, the CUBE order must improve the Exchange's same- side BBO by at least $0.01.

    'S' - AON CUBE Single-Leg Orders (500 contracts Minimum): Auction can start at the NBBO, except if there is Customer interest on the Consolidated Book on the Initiating order-side BBO. In such instances, the Initiating CUBE Order must improve the Exchange's same- side BBO by at least $0.01.

    The accompanying Contra order must be executable with the Initiating/CUBE Order and indicate one of the following three execution limits:

    Single stop price that guarantees the execution at the initiating price or better;
    Auto-match limit* to indicate the Contra Order sender will match auction response volume at every improved price up to a limit price; or
    Auto-match* to indicate the Contra Order sender will match auction response volume at every improved price.
    *Not available for AON Single-Leg CUBE.

22. **What type of interest can interact with Single-Leg CUBE order?**

    Participants may submit GTX orders designed to trade with the CUBE Order. Additionally, orders and/or quotes received during the auction may, if within the permissible range of executions, be treated as responses to (and may interact with) a Single-Leg CUBE auction.

23. **What can cause Single-Leg CUBE auctions to terminate early?**

    CUBE Auctions will conclude early, and the CUBE Order will be filled (with the Contra Order or eligible price-improving responses) if, during the auction, the Exchange receives:

    a) A new Single-Leg CUBE order in the same series arrives;
    b) A BBO update on the same side as the Initiating/CUBE order that improves the initiating price or crosses any responses/Contra Order single-stop or Auto-match limit price;
    c) A market order, marketable quote, or marketable limit order arrives (on either side);
    d) Enough interest to fill a resting AON order. In this scenario, the auction will conclude early, and the CUBE order will execute per priority/allocation rules; the AON order will then fill if enough size remains.

COMPLEX CUBE SUPPLEMENTAL INFORMATION

24. What are the Complex CUBE auction Initiating Price rules?
To initiate a Complex CUBE auction, the price for the Initiating/Complex CUBE Order must improve both the Initiating/CUBE side "derived Complex BBO" by at least $0.01 times the smallest leg ratio and the initiating side "Complex BBO" by at least $0.01. The "derived Complex BBO" and "Complex BBO" are defined in Rule 900.2NY(7)(b),(c)a.

The accompanying Complex Contra order must improve both the contra side Derived BBO by at least $0.01 times the smallest leg ratio and the contra side Complex BBO by at least $0.01 and indicate an execution limit:

> ***Single stop price*** that guarantees the execution at the initiating price or better; or
> ***Auto-match limit**** to indicate the Contra Order sender will match auction response volume at every improved price up to a limit price;
> **Not available for AON Complex CUBE.*

25. What type of Interest can interact with a Complex CUBE order?
Any Complex Orders that arrive during a Complex CUBE Auction (including GTX orders) that are within the range of permissible executions are eligible to trade with the CUBE order. Single-Leg orders and/or quotes are not eligible to interact in a Complex CUBE Auction.

26. What can cause Complex CUBE auctions to terminate early?
Complex CUBE auctions will conclude early, and the Initiating order will be filled (with the Contra Order or eligible price-improving responses) if during the auction:

a) The Exchange receives a new Complex CUBE order in the same complex order strategy arrives;
b) The Initiating CUBE Order-side boundary updates to a price better than the initiating price;
c) Interest arrives that adjusts the Initiating CUBE Order side boundary to cross any RFQ Responses;
d) Interest arrives that adjusts the Initiating CUBE Order-side boundary to cross the single stop price, that guarantees the execution of the CUBE Order. (This early end scenario does not apply where if the CUBE Order is guaranteed by an auto-match limit price);
e) Interest arrives that crosses the Initiating CUBE Order side boundary;
f) Interest in the leg market arrives that causes the contra-side boundary to be better than the stop price or auto-match limit price.

27. How does the Complex Order Auction ("COA") differ from the CUBE Auction?
Like CUBE, COA is a mechanism on the Exchange designed to offer price improvement to Complex Orders, however COA is not a paired order mechanism and does not guarantee an execution to orders submitted to COA. Because the Exchange allows only one auction per complex strategy at a time, a COA in progress will end upon arrival of a better-priced Complex CUBE order.

AON CUBE SUPPLEMENTAL INFORMATION

28. **How does AON functionality work in AON CUBE?**
    For Single-Leg and Complex CUBE orders, AON functionality applies to the Contra order of the CUBE. As such:
    (i)   If there is not enough interest received during the auction to price improve the entire quantity of the CUBE order, and there is no contra-side marketable Customer interest, the **Contra** order will receive *All* of the execution allocation; or
    (ii) If there is enough interest in aggregate to replace the entire quantity of the CUBE order at the stop price - if Customer interest is present - or at improved prices - when no Customer interest exists - the **Contra** order will be replaced and receive **None** of the execution allocation
        a. If eligible Customer interest arrives during an AON CUBE auction, non-Customer interest may join Customer interest at the stop price, or better, to replace the Contra order and execute with the AON CUBE order. If there is not enough interest to fulfil the entire quantity of the AON CUBE order, both the Initiating and the Contra orders of the AON CUBE will be cancelled.

29. **How do AON CUBE orders differ from non-AON CUBE orders?**
    Unlike standard Single-Leg and Complex CUBE orders, which are guaranteed an execution by the Contra order, AON CUBE orders may be cancelled with no execution in certain circumstances. These scenarios are limited to auctions where contra-side marketable Customer interest is present and there is insufficient equally or better priced interest (both Customer and non-Customer) in aggregate to satisfy the size of the AON CUBE order; in such circumstance, the auction will be cancelled on priority grounds as there is not enough interest to allow for Customer interest to trade.

30. **Are there any additional requirements for using AON CUBE?**
    Prior to entering an agency order on behalf of a Customer into the CUBE Auction as an AON Single-Leg CUBE or AON Complex CUBE order, Initiating Participants must deliver to the Customer a written notification informing the Customer that such order may be executed using the AON CUBE Auction. Such written notification must be in a form approved by the Exchange and must disclose the terms and conditions contained in Commentary .04 of NYSE American Rules 971.1NY for Single-Leg CUBE and Rule 971.2NY for Complex CUBE.