

## Frequently Asked Questions

### Top of PHLX Options – TOPO v3

NASDAQ OMX PHLX<sup>SM</sup> (PHLX<sup>SM</sup>) offers a top of market data feed called the Top of PHLX Options (TOPO).

This document attempts to answer technical questions that are important to subscribers of the enhanced TOPO v3 feed. Additional information will be published as it becomes available. This version replaces the previously published version 1.2 for the legacy TOPO data feed.

#### I. Overview

**1. Q: What is Top of PHLX Options?**

A: Top of PHLX Options (TOPO) is a direct, low-latency market data feed that is designed to provide PHLX Best Bid and Offer (BBO) and last sale information directly to subscribers. Although TOPO contains the same information that is currently sent to the Options Price Reporting Authority (OPRA), this proprietary data feed provides firms with an additional tool to compete with those receiving the data from OPRA.

**2. Q: Why would a firm subscribe to TOPO instead of only receiving the data from OPRA?**

A: TOPO is a direct data feed offering minimal latencies to subscribers who are concerned about maintaining a leading edge in a competitive market environment. As speed becomes an increasingly-important issue to conducting a successful trading operation, PHLX expects direct data feeds to become a critical component for options trading.

**3. Q: From where will the TOPO feed be disseminated?**

A: The TOPO feed is available from NASDAQ OMX's New York Area data center.

#### II. Technical

**4. Q: Is the TOPO v3 interface specification available?**

A: Yes, the spec for TOPO v3 is available on the [NASDAQ OMX Trader<sup>®</sup> website](#). As updates and enhancements are made, new versions will be published.

**5. Q: What is the recommended bandwidth to support the new TOPO feed?**

A: The recommended bandwidth for the compressed data feed is 80 Megabits per multicast group.

**6. Q: What is the difference between legacy TOPO and TOPO v3?**

A: The data emitted by TOPO and TOPO v3 are logically identical, the presentation of the data is different:

- TOPO uses FAST compression to reduce bandwidth, TOPO v3 uses a more compact, flat binary approach. A TOPO v3 data stream consumes less bandwidth than a TOPO data stream for the same logical data.
- TOPO identifies options by canonical, TOPO v3 identifies options by an integer option id. The canonical information for an option is found in the Options Directory Message.
- TOPO bundles individual messages into a TOPO packet, TOPO v3 does not bundle information into a packet. One TOPO v3 message is one Mold or Soup message identified by the Mold or Soup sequence number. A particular TOPO2 message will have the same Mold and SoupTCP sequence number.
- TOPO sends Quote Refresh Messages, TOPO v3 does not support this message since the method for filling gaps has been greatly simplified.
- If a quote differs from the previous quote on both sides, TOPO sends a Bid Update followed by an Ask Update, TOPO v3 sends one atomic BidAndAsk update message. To reduce bandwidth, TOPO v3 sends Bid Updates if the Ask side has not changed and Ask Updates if the bid side has not changed.

**7. Q: How closely aligned are the PHLX TOPO v3 and NOM2 BONO protocols?**

A: The messages are identical. Both protocols offer the same message set and the fields and offsets within the messages are exactly the same. Every effort will be made to keep the message set, fields and offsets the same. Field values may differ slightly, for example the version and subversion fields in the System Event Message have different values.

PHLX TOPO v3 currently sends out mitigated quotes, NOM2 BONO does not.

**8. Q: What is quote mitigation on TOPO v3?**

A: TOPO v3 has 10% mitigation on the sizes. This means TOPO will not send out a quote if the price does not change and the new size increases by less than 10%. All decreases are reported and all price changes are always disseminated.

**9. Q: How many multicast groups will be offered?**

A: NASDAQ OMX will support three multicast groups, also called the 'A feed', 'B feed' and 'C feed'. NASDAQ OMX will provide local redundancy in the New York Metro Area data center ('A feed' and 'B feed') while using the Mid-Atlantic Region data center ('C feed') for disaster recovery in the event that order entry is switched from the New York Metro Area.

**10. Q: Why are both the "A feed" and "B feed" being introduced from the New York Metro Area data center?**

A: In order to maximize the low-latency advantages of the TOPO data feed, NASDAQ OMX determined to offer local redundancy for the "A" and "B" feeds. The intent is to offer a high availability, low latency alternative in the event of a single failure. The "C" feed from the Mid-Atlantic Region is meant as a disaster recovery feed in the event of total New York Metro Area failure, and has a higher latency than the "A" and "B" feeds.

**11. Q: Is the TOPO data exactly the same from the "A feed" and "B feed"?**

A: The "A" and "B" feeds are independent, logically identical feeds that contain the same content. However, the bundling of the data will be different. In other words, the sequence of the TOPO messages will be exactly the same between the two feeds, but the packaging of TOPO messages in a Mold packet is not guaranteed to be identical.

Firms should synchronize by Mold sequence number between feeds. If a sequence number gap is detected in one of the feeds, the gap can be filled with the missing sequence numbers from the other feed, or by requesting the missing sequence numbers in the Mold re-request channel.

Soup TCP connections are also available as a means of filling large amounts of missing data.

**12. Q: Are sample data files available that can be used for test purposes?**

A: A sample data file for TOPO v3 will be available in the future. Please contact [dataproductions@nasdaqomx.com](mailto:dataproductions@nasdaqomx.com) for more information.

**13. Q: Is the same Administrative data send over both the "Q" and "T" groups?**

A: Yes. System Event, Options Directory, Trading Action and Security Open/Closed messages are sent on both "Q" and "T" groups. The information is identical in fields, timestamps and option id's.

**14. Q: Will TOPO have pre-market/opening rotation data?**

A: No. TOPO updates do not begin until the market is open.

**15. Q: Can both quotes and orders make up the top of market?**

A: Yes.

**16. Q: Are all order types included in the top of market?**

A: All or None orders are not included in the top of market.

### 17. Q: What do I need to do if I miss a quote?

Missing data in the multicast feed implies that quotes have most likely been lost. The missing data can be filled by requesting the missing data with the multicast rerequest channel, or by listening to both feeds in parallel (missing data in one feed can be filled by the received data in the other feed), or by connecting to the SoupTCP connection and logging in with the first sequence number that is missing.

### 18. Q: How can I best utilize the re-request channel?

A: Recovering data from TOPO can be done in different ways. The best way depends on how much information you are missing and your own particular implementation. The different ways of recovering data are outlined below:

1. Gap in the feed: If the issue of recovery is that there was a gap in the Mold MultiCast stream, then use the Mold rerequestor to fill the gap. For example one Multicast datagram containing TOPO Feed sequence x to y is missing, you can ask Mold rerequestor to send messages x to y. If this will fit in one datagram, your gap is filled. If your request does not fit in one datagram, you can ask again for the remaining missing messages. This is the best and quickest way to fill small gaps, details are in the Mold specification (referred to in TOPO spec). Also see the first Note item below
2. Data missed for a period of time: If your system went down and missed data for a period of time (seconds to minutes), then you can connect to the Soup rerequestor and login with the last sequence number your system received and processed (see second note below). You will get all messages that you missed in sequence. You can remain connected to Soup for the rest of the day if you like (there is no latency difference in Mold or Soup at the application level, Mold is Multicast, Soup is TCP however, there may be (small) latency due to the different (TCP, MultiCast) transport methods).
3. Catastrophic failure with need to fill in a significant portion of a day of data: Different ways to deal with this, the method you choose is implementation-specific
  - You can use method (2) above, it may take time to process
  - You can Connect to Multicast to get live data (recording sequence number of the data) while connecting to Soup to get historical data. Record sequence number of each side of quote in the Multicast stream. During the Soup rewind, discard quotes with lower sequence number (older) than multicast, otherwise process the data and store the sequence number. In this way you will get the live quote data for the active options, and fill in the quiet, no so active quotes with Soup rewind
  - You can get a snapshot of Top of Book from Glimpse. The Top of Book needs to be computed. You will have to record the timestamp of the newest order or quote in the top of book when comparing it to live Mold Top of book messages.

### III. Connectivity

**19. Q: What are the available connectivity options?**

A: Firms will be able to co-locate in the New York Metro Area data center, access the feed through a direct connection or utilize an extranet provider.

**20. Q: Is there a list of NASDAQ OMX connectivity providers?**

A: Review the list of Extranets and Direct Connect Providers on the [NASDAQ OMX Trader website](#).

### IV. Contact Information

**21. Q: If I have questions, whom should I contact?**

A: Contact the NASDAQ OMX Global Data Product Sales team at +1 301 978 5307, Option #2 or [DataSales@nasdaqomx.com](mailto:DataSales@nasdaqomx.com) for additional information.