Frequently Asked Questions

Top of PHLX Options - TOPO

NASDAQ OMX PHLX^{SM} (PHLX^{SM}) is now offering the Top of PHLX Options (TOPO) market data feed.

This document attempts to answer technical questions that are important to subscribers of the TOPO feed. Additional information will be published as it becomes available.

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 will be available from NASDAQ OMX's New York Area data center.

II. Technical

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

   A: Yes, the spec for TOPO is available on the [NASDAQ OMX Trader® 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 110

Megabits per multicast group. Data compression for TOPO will be done using the Fix Adapted for Streaming (FAST) protocol version.

6. **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.

7. **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.

8. **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 is not guaranteed to be identical. Firms should not synchronize by Mold sequence number between feeds or use data from the "B" feed to fill gaps in the "A" feed.

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

A: A sample data file for TOPO is available by request. Please contact dataproducts@nasdaqomx.com for a copy of the file.

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

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

11. **Q: Why do the broadcast channels and the re-request channels use different protocol versions?**

A: Because the MoldUDP broadcast channel was designed to either re-quote or refresh all options within a certain amount of time, the SoupBinTCP re-request channel was designed primarily to allow firms to request large amounts of data, such as a complete history of all data for the day.

12. **Q: What do I need to do if I miss a quote?**

A: Wait 15 seconds on the broadcast channel. All issues will either be re-quoted or refreshed within 15 seconds. The refresh message is only broadcast on the MoldUDP connections and not the SoupBinTCP connections.

13. **Q: How can I best utilize the re-request channel?**

A: The SoupBinTCP re-request channel is best used for receiving larger amounts of data such as the Options Directory or complete end of day history of all data for that day. Also, firms should use timestamp when requesting retransmission on SoupBinTCP. The MoldUDP sequence number is used for detecting gaps within the stream, not synchronizing between streams.

14. **Q: Can more than one TOPO packet be transported in a single MoldUDP packet?**

A: Yes. The single read of a UDP datagram can contain more than one TOPO packet. The dictionary cache should be reset for each TOPO packet, even though it was received in one I/O operation.

15. **Q: What does "ID" mean in the Message Templates section of the TOPO specification?**

A: The ID column indicates the order in which fields are to be decoded using FAST decompression. For example, the System Event Message has three fields, Message Type (ID=0), Timestamp (ID=1) and Event Code (ID=10). Therefore decoding must be for Message Type first, Timestamp next, and Event Code last.

III. FAST Technical

16. **Q: When do I reset the previous value dictionary cache for TOPO FAST decoding?**

A: FAST decoders need to keep previous values of fields for COPY or DELTA operators (dictionary cache). The dictionary cache should be reset each time a TOPO packet is received. Since all TOPO fields are mandatory (no default value), the first occurrence of each field is present and FAST encoded in the TOPO packet. Subsequent field values may be based on the dictionary cache.

17. **Q: For FAST decoding, what bit positions do the fields occupy in the presence map?**

A: As defined in FAST, COPY CODE fields occupy a bit in the presence map, while DELTA fields do not occupy bits in the presence map. The order of the bits in the presence map correspond to the numerical order of ID (see question above), taking into account that DELTA fields do not occupy bits in the presence map. A given field will always have the same bit position in the presence map regardless of the message type. For example, for the System Event Message: the Message Type field will occupy bit 0 (least significant bits have highest bit position); the Timestamp field is not in the presence map since it is a DELTA field; and the Event Code field occupies the eighth bit of the presence map, since 3 DELTA fields with lower ID are not in the presence map. In this example, the presence map will be 2 bytes, the first byte encoded as 10000000 (from lowest to highest bit position, the only set bit representing the presence of Message Type) and the next byte is 10000001

(the first set bit being the eighth bit representing the presence of Event Code and the last set bit being the stop bit, indicating the end of the presence map).

18. **Q: How is the first occurrence of a DELTA field decoded in FAST?**

A: All TOPO DELTA fields are unsigned integers. Operands for DELTA operators are signed so successive field values can increase or decrease. To obtain the field value of a DELTA field, the field is calculated as previous value + decoded operand value. When the FAST dictionary cache is cleared at the start of every TOPO packet, the encoded value of every DELTA field is a signed integer, relative to an implied value of zero. For example, a Second field value of 2000000 (2 milliseconds) encodes to 00000000 11110100 00010010 00000001. Stripping the last bit from each byte (reserved for the stop bit) leaves 0000000 1111010 0001001 0000000, or 2,000,000 (decimal). Since the implied value is zero when dictionary cache is cleared, the field value decodes to 0+2,000,000 or 2,000,000. Note that the encoded value requires the first byte because the operand is a signed integer; the extra byte was required for the sign bit.

19. **Q: Is sample code for FAST decoding available?**

A: No sample code for decoding is available at this time.

IV. Connectivity

20. **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.

21. **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.

V. Contact Information

22. **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 for additional information.