



INVESTORS EXCHANGE DEEP+ SNAP SPECIFICATION

Version 1.03

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Table of Contents

OVERVIEW	3
TRANSPORT PROTOCOL OPTIONS	3
ARCHITECTURE	4
DATA TYPES	4
NETWORK DETAILS	5
DEEP+ SNAP TCP/IP	5
Snapshot Configuration	5
DEEP+ SNAP Server Addresses	5
MESSAGE FORMATS	6
SnapshotRequest Message - r (0x72)	6
ErrorResponse Message - e (0x65)	7
Reject Reason Code	7
Snapshot Response	8
SnapshotStart Message - s (0x73)	8
SnapshotData Message - d (0x64)	9
SnapshotEnd Message - x (0x78)	10
DEEP+ Feed messages in Snapshot Response	11
REVISION HISTORY	12



OVERVIEW

Participants of Investors Exchange (“IEX” or the “Exchange”) may use DEEP+ to receive real-time, order-by-order, depth of book quotations and last sale information direct from IEX. DEEP+ also supports several security-related administrative messages and provides event controls, such as start of day and end of day, to participants.

The depth of book quotations received via DEEP+ provide an order-by-order view of resting displayed orders at each price and side. Non-displayed orders and non-displayed portions of reserve orders are not represented in DEEP+. DEEP+ also provides last trade price and size information. Trades resulting from either displayed or non-displayed orders matching on IEX will be reported. Routed executions are not reported.

DEEP+ provides short sale restriction status, trading status, operational halt status, and security event information via security-related administrative messages. Lastly, DEEP+ provides event information about the market and data feed via administrative messages.

DEEP+ cannot be used to enter orders. For order entry, refer to the [IEX FIX Specification](#).

Please refer to [IEX DEEP+ Specification](#) for more specific DEEP+ feed information.

The DEEP+ SNAP service is intended to augment the planned DEEP+ gap-fill retransmission service by adding a separate snapshot protocol to allow consumers to accelerate late-start recovery. The service does not modify the existing DEEP+ feed or retransmission protocols.

For ordering information, contact IEX Market Operations at 646.343.2310 or marketops@iextrading.com or simply submit completed [IEX Data Subscriber Agreement and Forms](#).

TRANSPORT PROTOCOL OPTIONS

DEEP+ SNAP uses a request-response TCP/IP unicast protocol.

Note: Snapshot Responses contain data messages detailed in the [IEX DEEP+ Specification](#) and the [IEX Transport Specification](#).



ARCHITECTURE

DEEP+ SNAP is a request-response protocol with no unsolicited messages (i.e. heartbeats). Applications would start to receive and buffer DEEP+ multicast before connecting to a DEEP+ SNAP server on a well-known port and would issue a SnapshotRequest Message.

In response, the DEEP+ SNAP server will either provide a Snapshot Response or ErrorResponse Message.

A Snapshot Response provides a point-in-time snapshot of the DEEP+ order data and trading status data for all IEX Symbols along with the associated DEEP+ feed Sequence number.

On receipt of a Snapshot Response the applications would initialize their internal Price level books for each Symbol using data from the Snapshot Response, then apply any buffered real-time updates with higher sequence numbers.

Applications would then disconnect from the DEEP+ SNAP server and continue to process the DEEP+ feed real-time multicast as normal.

Connections may be timed-out and disconnected by either client or server if no data has been transmitted for a significant period (10 seconds).

DATA TYPES

These are identical to the planned DEEP+ Specifications:

- String: Fixed-length ASCII byte sequence, left justified and space filled on the right
- Long: 8 bytes, signed integer
- Price: 8 bytes, signed integer containing a fixed-point number with 4 digits to the right of an implied decimal point
- Integer: 4 bytes, unsigned integer
- Byte: 1 byte, unsigned integer
- Timestamp: 8 bytes, signed integer containing a counter of nanoseconds since POSIX (Epoch) time UTC
- Event Time: 4 bytes, unsigned integer containing a counter of seconds since POSIX (Epoch) time UTC

All binary fields are in **little endian** format.

Note that each byte is represented by two hexadecimal digits in the examples within this specification.



NETWORK DETAILS

DEEP+ SNAP TCP/IP

Snapshot Configuration

- Supported Retransmission Protocol(s): TCP
- Maximum Requests: Quota restricted (1000/day)
- Simultaneous Requests: Unlimited
- Supported Request Type(s): SnapshotRequest

DEEP+ SNAP Server Addresses

SITE	XC Type	Server	Port	Credentials
IEX POP (Equinix NY5)	Primary (A)	23.226.155.172	11379	Contact Market Ops
	Secondary (B)	23.226.155.236	11379	Contact Market Ops
Disaster Recovery (Equinix CH4)	Tertiary (C)	23.226.155.253	11379	Contact Market Ops
IEX Testing Facility (Equinix NY5)	ITF (I)	23.226.155.22	33381	Contact Market Ops

Please contact marketops@iextrading.com to procure DEEP+ SNAP credentials.

Please contact itfsupport@iextrading.com for support help related to the ITF.



MESSAGE FORMATS

SnapshotRequest Message - r (0x72)

The SnapshotRequest message is sent from the Client to the DEEP+ SNAP Server to authenticate and request a Snapshot Response.

Field Name	Offset	Length	Type	Description/Notes
Message Length	0	2	Integer	Length of message in bytes not including this field (57)
Message Type	2	1	Byte	'r' (0x72) - SnapshotRequest
Authentication Token	3	40	Byte	Token supplied by IEX Market Ops. Left justified string space padded on right.
ChannelID	43	4	Integer	Channel Identifier.
SessionID	47	4	Integer	Session Identifier.
Minimum Sequence Number	51	8	Long	Minimum Sequence Number useable by client.

Total Message Data length is 59 bytes.

Applications will normally wait until they receive and start buffering DEEP+ Feed Multicast messages before connecting and sending a SnapshotRequest to the DEEP+ SNAP Server. The SnapshotRequest's ChannelID, SessionID and Minimum Sequence Number fields should be populated with values from the DEEP+ FEED IEX TP-Header in the Multicast packet. A value of 0 (zero) in the Minimum Sequence Number field will return the latest Snapshot available.

Example

```
Message Length      39 00                                // 57
Message Type        72                                // r = SnapshotRequest
Authentication Token 41 54 4F 4B 45 4E 31 20 20 ... 20 // ATOKEN1 (Space padded on right)
ChannelID           01 00 00 00                        //
SessionID           F0 81 18 4B                        // 1259897328
Minimum Sequence Number D4 01 00 00 00 00 00 00 // 468
```



ErrorResponse Message - e (0x65)

Sent by the DEEP+ SNAP server to the client when a SnapshotRequest is rejected.

Field Name	Offset	Length	Type	Description/Notes
Message Length	0	2	Integer	Length of message in bytes not including this field (2)
Message Type	2	1	Byte	'e' (0x65) - ErrorResponse
Reject Reason Code	3	1	Byte	Reason the SnapshotRequest was rejected

Total Message Data length is 4 bytes.

Reject Reason Code

'A' (0x41) - Authentication Failure

'C' (0x43) - Incorrect ChannelID in SnapshotRequest

'E' (0x45) - Snapshot Request already active

'Q' (0x51) - Quota Exceeded

'R' (0x52) - Snapshot Not Yet Available (no snapshot >= requested Minimum Sequence Number is available)

'S' (0x53) - Incorrect SessionID in SnapshotRequest

'U' (0x55) - Unknown Message

Example

```
Message Length      02 00          // 2
Message Type        65              // e = ErrorResponse
Reject Reason Code  51              // Q = Quota Exceeded
```



Snapshot Response

A Snapshot Response is sent from the DEEP+ SNAP server to the client when a client [SnapshotRequest](#) is successful. A Snapshot Response consists of a [SnapshotStart](#) message, followed by [SnapshotData](#) messages, and concluded by a [SnapshotEnd](#) message.

SnapshotStart Message - s (0x73)

Field Name	Offset	Length	Type	Description/Notes
Message Length	0	2	Integer	Length of message in bytes not including this field (9)
Message Type	2	1	Byte	's' (0x73) - SnapshotStart
SnapshotLength	3	8	Long	Length in bytes of the complete Snapshot Response . Includes this SnapshotStart message, all SnapshotData messages and the SnapshotEnd message

Example

```
Message Length      09 00          // 9
Message Type        73              // s = SnapshotStart
SnapshotLength      C7 1E 70 00 00 00 00 00 // Variable (7347911)
                                                           // Length of SnapshotStart(9) +
                                                           // SnapshotData (variable) +
                                                           // SnapshotEnd(9)
```



SnapshotData Message - d (0x64)

Field Name	Offset	Length	Type	Description/Notes
Message Length	0	2	Integer	Length of message in bytes not including this field (Message Type Length + IEX-TP Header Length + IEX-TP Message Block Length + Variable IEX-TP Message Data Length)
Message Type	2	1	Byte	'd' (0x64) - SnapshotData
IEX-TP Header	3	40	Byte	see IEX Transport specification
IEX-TP Message Block Length	43	2	Integer	see IEX Transport specification
IEX-TP Message Data	45	Variable	Byte	see IEX Transport specification

Example

```

Message Length          4C 00          // Variable (76)
Message Type            64             // d = SnapshotData
IEX-TP Header
  Version               01             // 1
  (Reserved)            00             // 0
  ProtocolID            05 80          // DEEP+ Protocol ID
  ChannelID             01 00 00 00    // 1
  SessionID             F0 81 18 4B    // 1259897328
  Payload Length        23 00          // Variable (35)
  Message Count         01 00          // ALWAYS = 1
  Stream Offset         04 4F 0E 00 00 00 00 00 // 937732
  First Message Sequence Number
                        62 AC 00 00 00 00 00 00 // 44130
  Send Time             C1 8F 8B D9 4F 1E 0C 17 // 2022-08-17 07:28:10.893922241
IEX-TP Message Block Length 21 00      // 33
IEX-TP Message Data
  Message Length        1F 00          // 31
IEX-TP Message Data*
  Message Type          44             // DEEP+
  Flags                 80             // D = Security Directory
                               // Test Security, not an ETP,
                               // Not a When Issued security
  Timestamp             51 B8 08 8F 4F 1E 0C 17 // 2022-08-17 07:28:09.643833425
  Symbol                5a 49 45 58 54 20 20 20 // ZIEXT
  Round Lot Size        64 00 00 00    // 100 shares
  Adjusted POC Price    24 1d 0f 00 00 00 00 00 // $99.05
  LULD Tier             01             // Tier 1 NMS Stock

```

*The IEX-TP Message Block contains a complete [IEX DEEP+](#) formatted message and may include any DEEP+ message type.



SnapshotEnd Message - x (0x78)

Field Name	Offset	Length	Type	Description/Notes
Message Length	0	2	Integer	Length of message in bytes not including this field (9)
Message Type	2	1	Byte	'x' (0x78) - SnapshotEnd
Snapshot Sequence Number	3	8	Long	Sequence at which the Snapshot was created

Example

```
Message Length           09 00                // 9
Message Type             78                    // x = SnapshotEnd
Snapshot Sequence Number 62 AC 00 00 00 00 00 // 44130
```



DEEP+ Feed messages in Snapshot Response

The IEX-TP Message Data returned in the SnapshotData messages will contain DEEP+ Feed messages required to rebuild the current state of the DEEP+ Feed books for each symbol at the SequenceNumber the Snapshot was created.

Snapshot Content:

1. [SnapshotStart](#) message
2. For each IEX Listed symbol (at time of snapshot)
 - Latest **SecurityDirectory** Message
3. Latest **SystemEvent** message (if exists at time of snapshot)
4. For each symbol (at time of snapshot)
 - Latest **TradingStatus** Message (if exists at time of snapshot)
 - Latest **SecurityEvent** Message (if exists at time of snapshot)
 - Latest **OperationalHaltStatus** Message (if exists at time of snapshot)
 - Latest **ShortSalePriceTestStatus** Message (if exists at time of snapshot)
 - All **AddOrder** Messages necessary to build the book (that are active at time of snapshot)*
 - Latest **RetailLiquidityIndicatorMessage** (if exists at time of snapshot)
5. [SnapshotEnd](#) Message (includes [SnapshotSequenceNumber](#))

Note: All DEEP+ Feed messages (shown in **bold**) are wrapped within a DEEP+ SNAP [SnapshotData](#) Message that includes an IEX-TP Header providing DEEP+ Feed sequencing and timing information.

* **AddOrder** Messages will not be in the original DEEP+ Feed Sequence or SendTime order. **AddOrder** Messages will be net of any order modifications.

As an illustrative example, for the following sequence:

```
Add Order:      Time=0, OrderSide=Buy, OrderID=1, Size=200, Price=10.10
Add Order:      Time=1, OrderSide=Buy, OrderID=2, Size=200, Price=10.10
Order Executed: Time=2, OrderID=1, Size=100, Price=10.10, TradeID=1
Order Modify:   Time=3, OrderID=1, Flag=ResetPriority
```

The snapshot would contain:

```
Add Order:      Time=1, OrderSide=Buy, OrderID=2, Size=200, Price=10.10
Add Order:      Time=3, OrderSide=Buy, OrderID=1, Size=100, Price=10.10
```



REVISION HISTORY

Version	Date	Change
1.00	September 3, 2024	Document created.
1.01	January 14, 2025	<ul style="list-style-type: none">• Removed OfficialPrice Message from “Snapshot Content” example.• Updated overview to reflect feed launch.
1.02	March 26, 2025	<ul style="list-style-type: none">• Updated network details for DEEP+ SNAP in the IEX Testing Facility
1.03	June 11, 2025	<ul style="list-style-type: none">• Updated ErrorResponse Message Reject Reason Code definitions.