

INTRODUCTION TO THE SNAPSHOT SERVICE



Scope and audience: This technical note intends to provide general information about the Snapshot Service for Optiq MDG. Describing the Snapshot kinematics, this document aims to familiarize developers how to implement this recovery functionality in their feed handler to recover from packet loss, or in case of an intraday/late start.



SUMMARY

The Optiq MDG Snapshot service is a recovery functionality provided by the exchange in order to allow customers to recover from packet loss or in case of an intraday/late start. Providing an image of the market data and the last Market Data Sequence Number used to build the Snapshot image allows customers to synchronize with the real time data and continue/start processing messages in real time.

Snapshot messages will be provided on dedicated Snapshot channels, alongside the real-time channels and the messages will be compressed using LZ4.

A snapshot contains an image of all the market data message types for all instruments that are part of the real-time channel and the messages are sent with the Rebroadcast indicator field set to 1.

The snapshots are sent out periodically and the minimum time interval between 2 snapshots is 2 seconds.

1. THE SNAPSHOT SEQUENCE EXPLAINED

A snapshot sequence contains multiple channels that when combined provide the necessary information for our customers to align with the real time MDG feed. The following snapshot channels are part of a sequence:

- Full Order Book Channel
- BBO Channel
- Reference Data and Full Trade Information Channel
- Reference Data and Index Package Channels

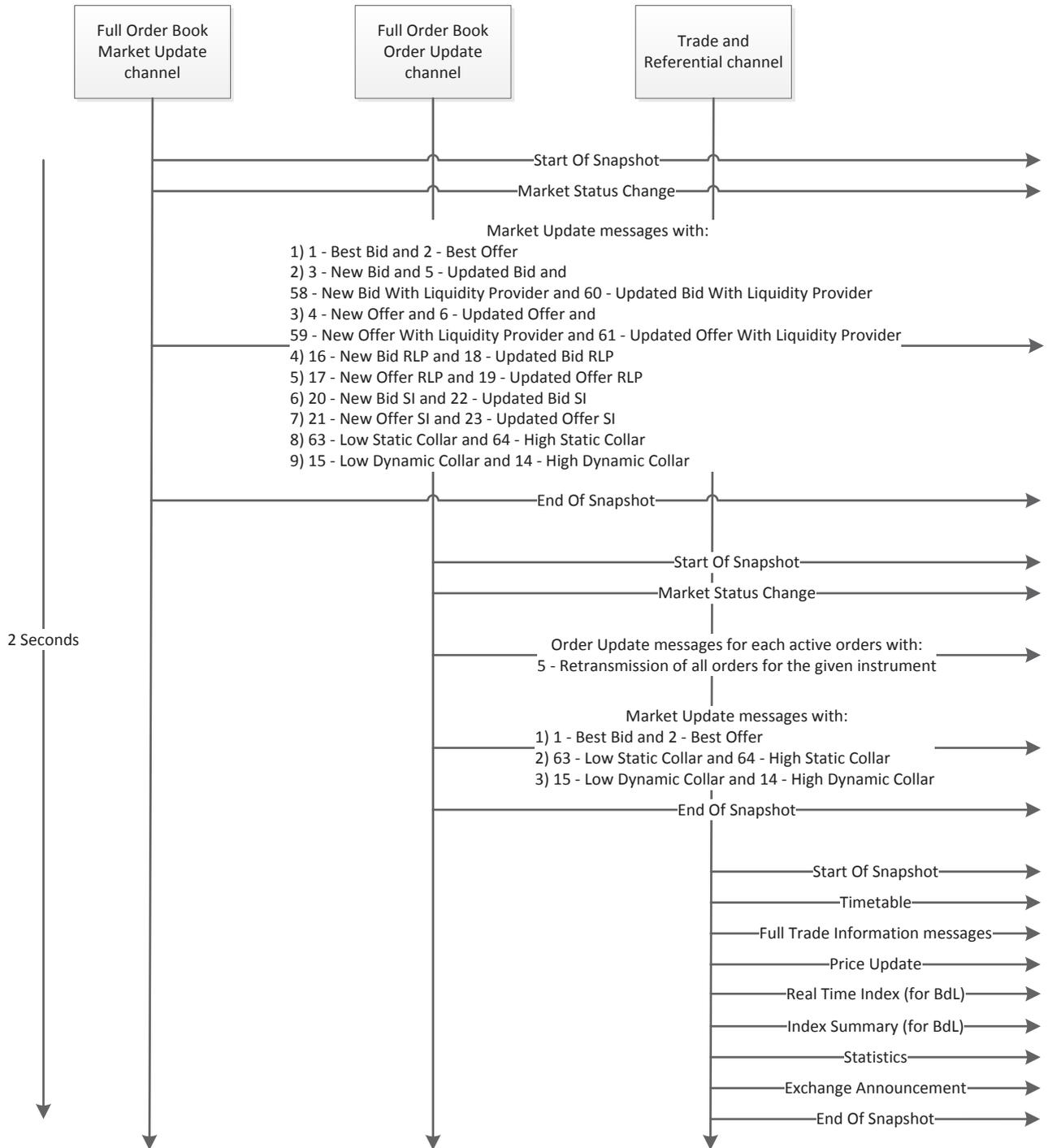
Both "Start Of Snapshot" and "End Of Snapshot" messages contain the last "Market Data Sequence Number" of the last real-time message taken into account by the snapshot. Both these messages are not compressed.

In order to use the Snapshot, the first step is to queue messages on the real-time channel from the moment you start receiving the snapshot data.

Clients can use the **Start Of Snapshot or End Of Snapshot** messages to retrieve the last "Market Data Sequence Number" used to build the snapshot that is being sent out and can use it to synchronize with the real time channel by discarding from the real-time queued data those messages with a "Market Data Sequence Number" equal or smaller than the last "Market Data Sequence Number" received in the Start or End Of Snapshot messages and continue in real time channel processing the next Market Data Sequence Numbers.

It is important to note that since the Market Data Sequence Number does not necessarily increment by 1, within a real time channel, the sequence number in the start or end snapshot messages might belong to another channel, and was in fact not actually lost. As a reminder, the only criteria to determine packet loss is by using the Packet Sequence Number which increments monotonically with 1 and is unique per channel ID.

2. SNAPSHOT SEQUENCE FOR CASH:



Cash is composed of: Bourse de Luxembourg (BdL), Equities, Funds and Fixed Income.

	Compressed and Shaped				
	100 Mbps				
	Full Order Book Order Update	Full Order Book Market Update	Full Order Book BqB	Full Order Book SI	Reference Data ¹ and Full Trade Information
Start Of Day (1101)	X	X	X	X	X
End Of Day (1102)	X	X	X	X	X
Health Status (1103)	X	X	X	X	X
Start Of Snapshot (2101)	X	X			X
End Of Snapshot (2102)	X	X			X
Timetable (1006)					X
Market Status Change (1005)	X	X			
Standing Data (1007)					X
Contract Standing Data (1013)					
Outright Standing Data (1014)					
Strategy Standing Data (1012)					
Exchange Announcement (1010)					X
Market Update (1001)	X ²	X	X ³	X ⁴	
Order Update (1002)	X				
Price Update (1003)					X
Full Trade Information (1004)					X
Real Time Index (1008)					X (only for BdL)
Snapshot Statistics (2009)					X
Index Summary (1011)					X (only for BdL)

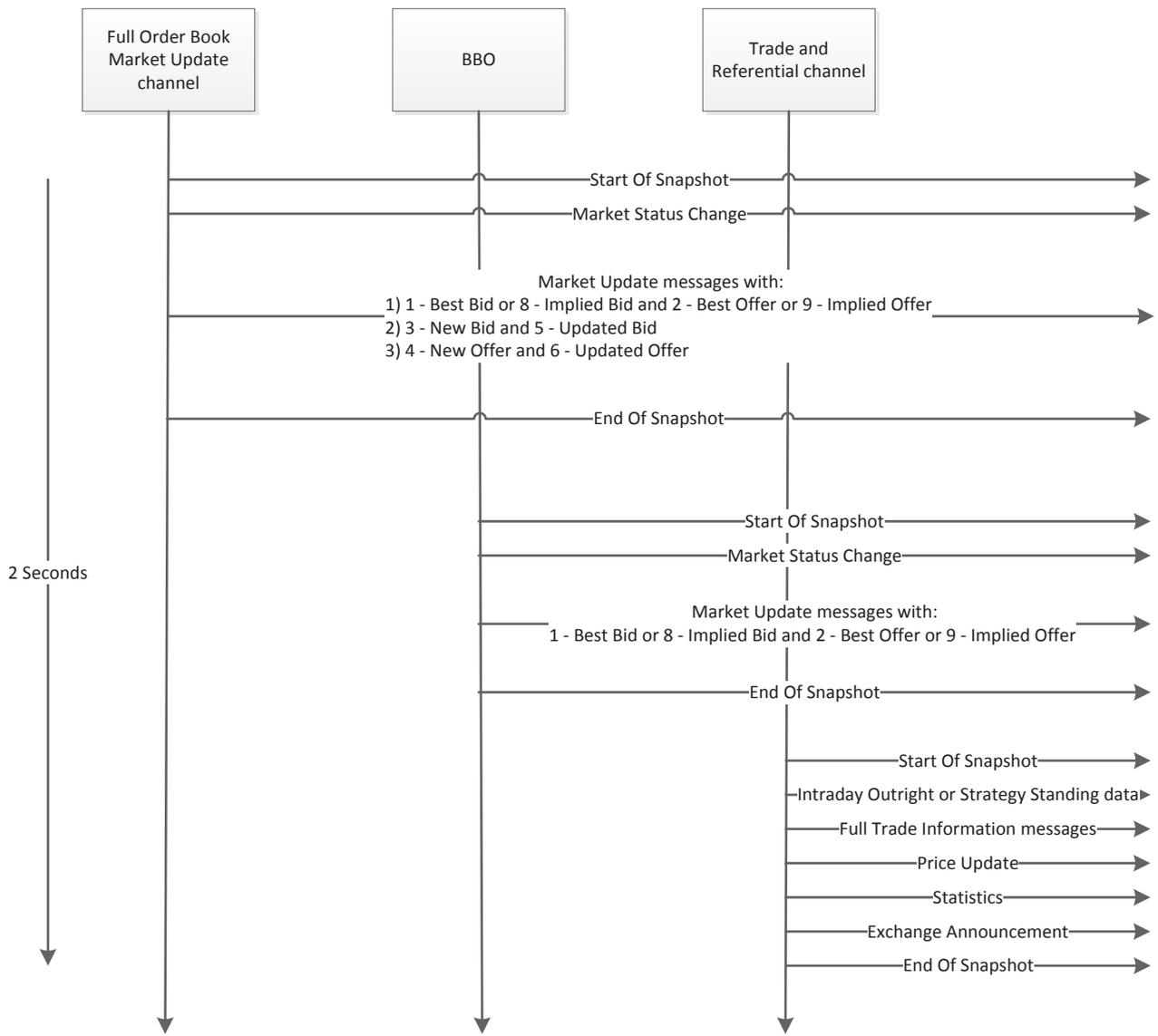
1 Reference Data represents: all instruments characteristics, scheduled phases and market administration messages.

2 This message will not provide: New Bid (3)/New Offer (4), Updated Bid (5) /Updated Offer (6), New Bid With Liquidity Provider (58)/New Offer With Liquidity Provider (59), Updated Bid With Liquidity Provider(60)/ Updated Offer With Liquidity Provider (61), New Bid RLP (Retail Liquidity Provider) (16)/ New Offer RLP (Retail Liquidity Provider) (17), Updated Bid RLP Retail Liquidity Provider) (18)/ Updated Offer RLP (Retail Liquidity Provider) (19), New Bid SI (20)/ New Offer SI (21) and Updated Bid SI (22)/ Updated Offer SI (23).

3 This message will provide only: New Bid RLP (Retail Liquidity Provider) (16)/ New Offer RLP (Retail Liquidity Provider) (17), Updated Bid RLP Retail Liquidity Provider) (18)/ Updated Offer RLP (Retail Liquidity Provider) (19) or Clear-Book (254).

4 This message will provide only: New Bid SI (20)/ New Offer SI (21), Updated Bid SI (22)/ Updated Offer SI (23), SI Trade (47) or Clear-Book (254).

SNAPSHOT SEQUENCE FOR DERIVATIVES:

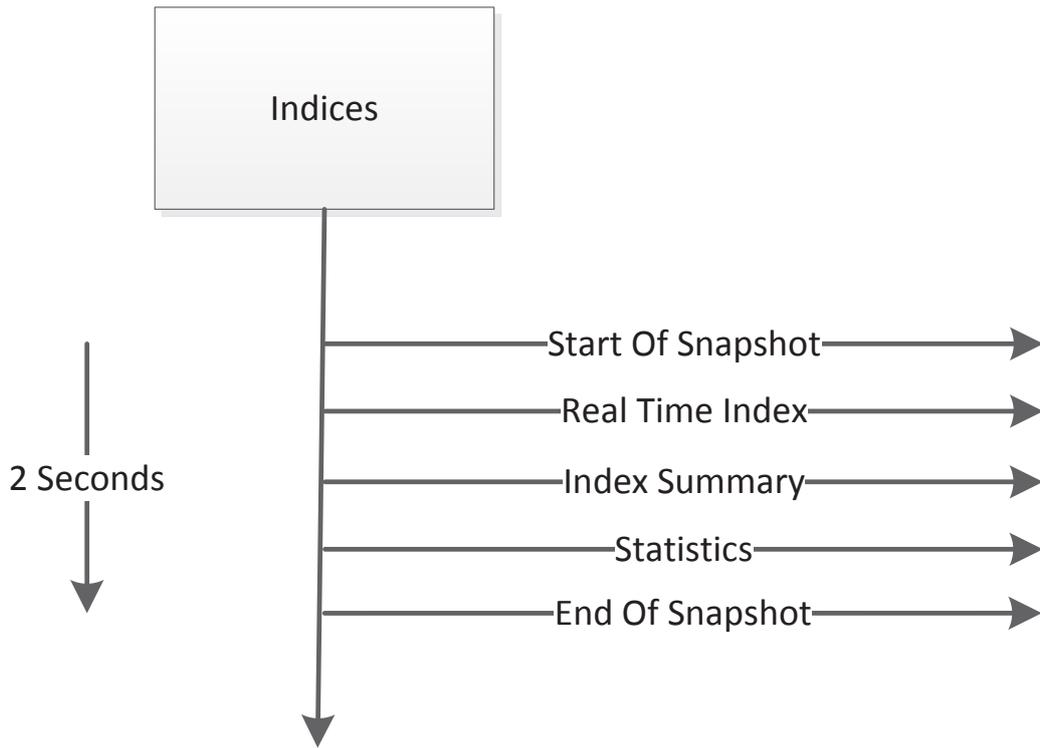


Derivatives is composed of: Options, Futures, Warrants & Certificates.

	Compressed and Shaped		
	100 Mbps		
	Full Order Book Market Update	Best Bid and Offer	Reference Data ¹ and Full Trade Information
Start Of Day (1101)	X	X	X
End Of Day (1102)	X	X	X
Health Status (1103)	X	X	X
Start Of Snapshot (2101)	X	X	X
End Of Snapshot (2102)	X	X	X
Timetable (1006)			X
Market Status Change (1005)	X	X	
Standing Data (1007)			
Contract Standing Data (1013)			X
Outright Standing Data (1014)			X
Strategy Standing Data (1012)			X
Exchange Announcement (1010)			X
Market Update (1001)	X	X ²	
Order Update (1002)			
Price Update (1003)			X
Full Trade Information (1004)			X
Real Time Index (1008)			
Snapshot Statistics (2009)			X
Index Summary (1011)			

- 1 Reference Data represents: all instruments characteristics, scheduled phases and market administration messages.
- 2 This message will not provide: New Bid (3)/New Offer (4), Updated Bid (5) /Updated Offer (6), New Bid With Liquidity Provider (58)/New Offer With Liquidity Provider (59), Updated Bid With Liquidity Provider(60)/ Updated Offer With Liquidity Provider (61), New Bid RLP (Retail Liquidity Provider) (16)/ New Offer RLP (Retail Liquidity Provider) (17), Updated Bid RLP Retail Liquidity Provider) (18)/ Updated Offer RLP (Retail Liquidity Provider) (19), New Bid SI (20)/ New Offer SI (21) and Updated Bid SI (22)/ Updated Offer SI (23).

3. SNAPSHOT SEQUENCE FOR INDICES:



Snapshot for Indices

	Compressed and Shaped
	100 Mbps
	Reference Data and Index Package
Start Of Day (1101)	X
End Of Day (1102)	X
Health Status (1103)	X
Start Of Snapshot (2101)	X
End Of Snapshot (2102)	X
Timetable (1006)	
Market Status Change (1005)	
Standing Data (1007)	X
Contract Standing Data (1013)	
Outright Standing Data (1014)	
Strategy Standing Data (1012)	
Exchange Announcement (1010)	
Market Update (1001)	
Order Update (1002)	
Price Update (1003)	
Full Trade Information (1004)	
Real Time Index (1008)	X
Snapshot Statistics (2009)	X
Index Summary (1011)	X

4. SEQUENCE NUMBERS

The MDG feed contains two sequence numbers:

- The Packet Sequence Number (PSN)

The Packet Sequence Number (PSN) is part of the packet header and should be used for UDP gap detection and packet ordering. Each channel has its own PSN sequence.

- The Market Data Sequence Number

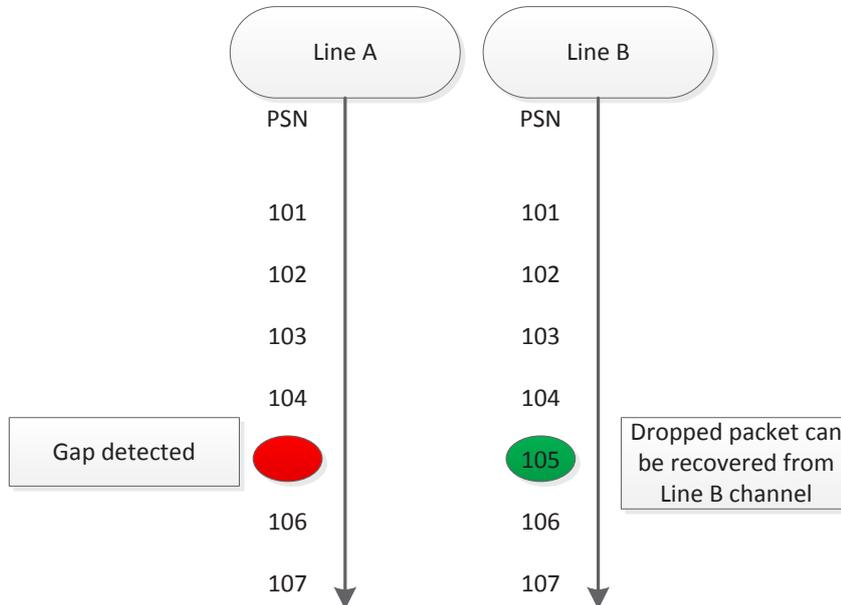
Aggregators are MDG internal components that are dealing with a set of channels. The Market Data Sequence Numbers are managed at the aggregator level. Each one of them has its own sequence, starting from 0 and incrementing by step of 1 along the day. Since clients may listen to only a subset of the channels managed by one aggregator, they won't see all the Market Data Sequence Numbers in the messages they get from the channels they listen to. Therefore on one channel the Market Data Sequence Numbers will increment all along the day but not necessarily by step of 1.

Packet Sequence Numbers are used for detecting packet loss. The Snapshot Channels have their own PSNs that are not the same as the PSNs on the Real Time Channels.

The same applies for the Market data Sequence Numbers.

5. GAP DETECTION AND LINE ARBITRATION

The Packet Sequence Number (please see Market Data Packet Header) should be used to detect gaps in the transmission of packets.



Using this method, a lost packet can be recovered from the second line. In case of packet loss on both lines, then the snapshot mechanism should be used.

UDP packets can potentially arrive unordered and potentially sent twice. As such, systems should be able to reorder the packets and detect duplicate packets.

Please be noted that the real-time is carried over line A and B.

The snapshot feed is also carried over line A and B, therefore line arbitrage is also possible on the snapshot multicast feeds.

6. SNAPSHOT APPLIED

Customers that connect intraday (late start) have only one viable way to use the snapshot:

“Hop On” (connect) to the Snapshot Channel corresponding with the Real Time Channel the Packet loss occurred, while starting to queue the Real Time messages.

The customer clears the order books for all instruments on that channel.

The Start Of Snapshot (2101) message indicates the start of a Snapshot Sequence.

The image provided in this sequence contains everything to rebuild the order book up to the last Market Data Sequence Number that is in the end snapshot messages.

End Of Snapshot (2102) indicates the end of a Snapshot Sequence.

Clients then discard the real-time queued messages with a “Market Data Sequence Number” less than or equal to the last “Market Data Sequence Number” of the snapshot.

The customer is in sync with MDG

“Hop Off” (disconnect) from the Snapshot Channel.

Customers that experience packet loss (however unlikely (on both A and B feed) can use the same preferred method:

“Hop On” (connect) to the Snapshot Channel corresponding with the Real Time Channel the Packet loss occurred, while starting to queue the Real Time messages.

The customer clears the order books for all instruments on that channel.

The Start Of Snapshot (2101) message indicates the start of a Snapshot Sequence.

The image provided in this sequence contains everything to rebuild the order book up to the last Market Data Sequence Number that is in the end snapshot messages.

End Of Snapshot (2102) indicates the end of a Snapshot Sequence.

Clients then discard the real-time queued messages with a “Market Data Sequence Number” less than or equal to the last “Market Data Sequence Number” of the snapshot.

The customer is in sync with MDG

“Hop Off” (disconnect) from the Snapshot Channel.

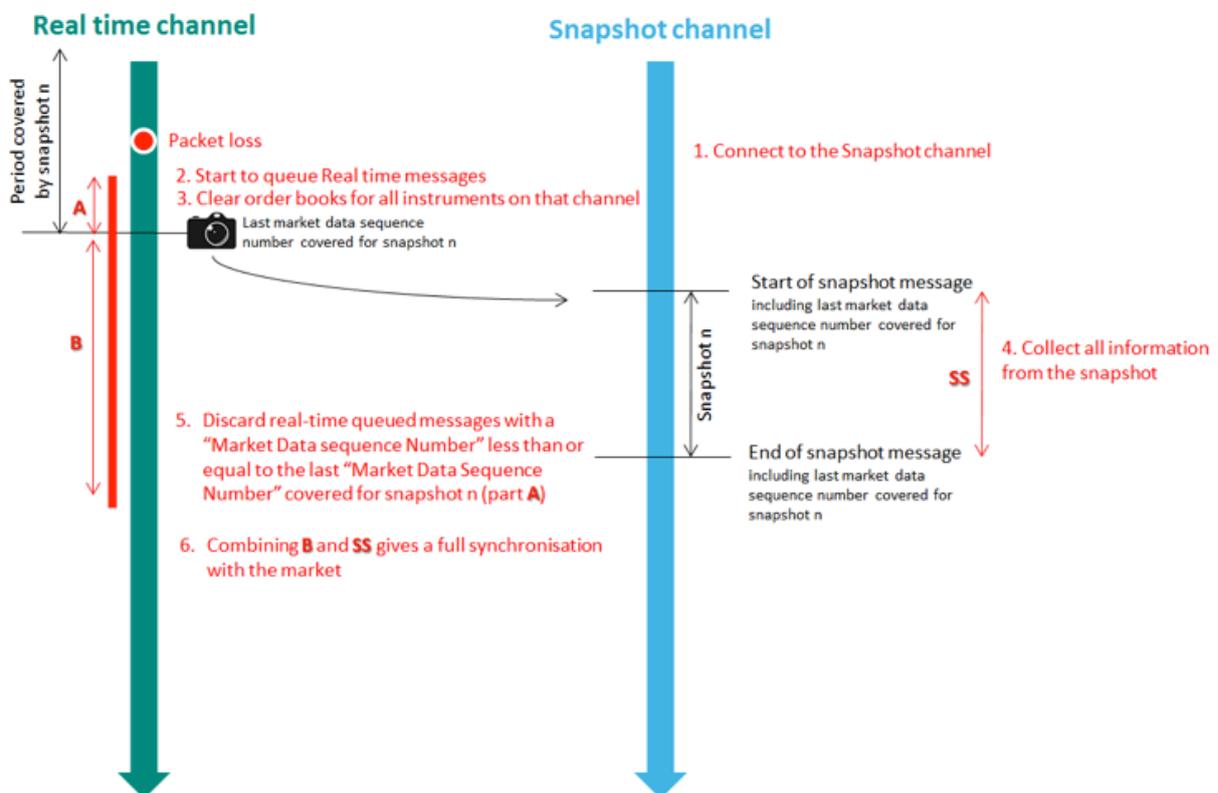
OR:

Use the snapshot to correct those instruments impacted - message type by message type. This method is **not** supported by Euronext and there is no documentation available on this topic. The reason behind this is that the snapshot provides an image and does not provide all messages sent within a certain frame. Please note, this follows not the same logic as the XDP's Refresh Service. This is why members are discouraged to build a solution that only correct the impacted parts.

Regardless if one has a 10 Gb, 1Gb or 100Mb connection clients use the same dedicated Snapshot data.

Summarized:

SNAPSHOT



7. Q&A ON THE SNAPSHOT SERVICE

Q: What is the Snapshot Service?

Snapshot is a service provided by the exchange in order to provide at a given time of the day an image of the market data. The Snapshot Service allows to resynchronize with the real-time data and provides key market data depending on the nature and content of the corresponding real-time feed.

Q: When do I use it?

In case of packet loss in real-time feed that can't be resolved by line arbitration.

Q: Is it similar to the Refresh Service on XDP?

No, on XDP a RFS is initiated by the customer, with MDG dedicated Snapshot Channels provide Snapshot Sequences continuously in cycles. XDP required setting up a TCP/IP connection to request a RFS. MDG only requires clients to "listen" to the snapshot multicast.

Q: What are the bandwidth needs for subscribing to the Snapshot Channel?

Everyone connects to the same snapshot channel (for a subset of realtimes channels) regardless their connection bandwidth, the service is developed in such a way all connection types are supported and use the same data broadcast.

Q: Are Snapshot broadcasts compressed?

Yes they are, but the Begin and End Of Snapshot messages only when they can be.

Q: Compared to RFS on XDP what is the impact on performance.

The expectation is a significant improvement.

Q: Will every snapshot contain all the data since start of the day ?

No. The snapshot will only provide an image of all the messages needed to build the book as it is at the time of the snapshot sending.

Q: Why do I use the Packet Sequence Numbers for detecting potential data gaps? Can't I just look at the Market Data Sequence Numbers?

No, you can't as the logic behind the MDSNs is such that missing MDSN are not per definition identifying a gap. PSN gaps, however is an indicator of potential missing data and an action is required.

Q: Does a Snapshot image contain all needed referential data to rebuild the order book?

Snapshot provides only Intraday standing data, for the full list of instruments (full standing data) you should use the File Service.

Q: Does a member need a single snapshot channel for the entire Cash market for example or one snapshot channel per Cash Asset Class?

The repartition is as following: Per Asset Class – Per Sub Asset – Per Partition – Per channel Type.

Q: When will the Snapshot Service be available?

Snapshot is not available for testing yet. It should be in Bundle 3 (early February 17).

Customer focus

The migration onto the new Optiq platform has been designed with customers in mind. Technical relationship managers from the Euronext Client Readiness team will be available to meet with clients to review the technical specifications, facilitate impact assessment, hold development workshops, and provide regular updates on the migration timeline and status.

CONTACT DETAILS

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