

Specifications Document for the RTRS Subscription Service

Version 6.4, May 2018



Revision History

Version	Date	Description of Changes
2.6	January 2008	Original Documentation
2.7	August 2012	Updated to reflect addition of new field “Unable to Verify Dollar Price Indicator” and change to the value disseminated in the “Par Traded” field for trades over \$1 million from “1MM+” to “MM+”. Updated business continuity information.
2.8	November 2012	Changes announced in August 2012 became effective. Updated the “Par Traded” field to reflect that trades with a par amount of \$5 million or greater will show par value as “MM+” until five days after the trade date.
2.9	August 2015	Updated to reflect new file retrieval process for bulk trade data files via MSRB Gateway and the hours for Email Support under the Resources and Support page.
3.0	September 2015	Updated to reflect addition of a new field for an indicator for customer trades involving non-transaction-based compensation arrangements (NTBC), a new field for an indicator for inter-dealer transactions executed with or using the services of an alternative trading system (ATS), and a change to the value disseminated in the “Yield” field for customer trades as described in MSRB Notices 2015-07 and 2016-09.
4.0	June 2016	Draft 1 - General overall restructuring of the content to reflect the RTRS re-engineered system incorporating a new subscription socket service, subscription web service and subscription file retrieval service.
5.0	November 2016	Draft 2 – General overall restructuring of the content to reflect the RTRS re-engineered system.
5.1	March 2017	Draft 3 – Technical corrections to specifications for Real-Time Trade Dissemination Secure Web API and RTRS Subscriber File Retrieval Secure Web API.

Version	Date	Description of Changes
6.0	July 2017	Addition of specifications for Comprehensive Trade File Retrieval to reflect changes to the service that are effective Q2 2018.
6.1	October 2017	Replacing Figure 1,2 and 3 of Message Dissemination Overview.
6.2	November 2017	Summary of differences between the current and new specifications for Comprehensive and Real Time Retrieval services added to Appendix B. Addition of Comprehensive Trade File Header.
6.3	January 2018	Correction of socket service description.
6.4	May 2018	Error message added for Inactive Data Center Updated Replay File posting to exclude User Interface Removed Whitelisting references Removed dissemination max batch size value

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Resources and Support

Online

MSRB Website: msrb.org

EMMA Website: emma.msrb.org

MSRB Support

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Live Support: 7:30 a.m. - 6:30 p.m. ET

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Municipal Securities Rulemaking Board

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Introduction

The Municipal Securities Rulemaking Board (MSRB) protects investors, issuers of municipal securities, entities whose credit stands behind municipal securities and public pension plans by promoting a fair and efficient municipal market. The MSRB fulfills this mission by regulating securities firms, banks and municipal advisors that engage in municipal securities and advisory activities. To further protect market participants, the MSRB promotes disclosure and market transparency through its Electronic Municipal Market Access (EMMA[®]) website, provides education and conducts extensive outreach. The MSRB has operated under Congressional mandate with oversight by the Securities and Exchange Commission since 1975.

The EMMA website is a centralized online database operated by the MSRB that provides free public access to official disclosure documents and trade data associated with municipal bonds issued in the United States. In addition to current credit rating information, the EMMA website also makes available real-time trade prices and primary market and continuing disclosure documents for over one million outstanding municipal bonds, as well as current interest rate information, liquidity documents and other information for most variable rate municipal securities.

The MSRB's Real-Time Transaction Reporting System (RTRS) is designed to increase price transparency and to assist in the inspection for compliance with and the enforcement of MSRB rules through the collection and dissemination of information about transactions occurring in the municipal securities market.

MSRB Rule G-14 requires dealers to report their municipal securities transactions to the MSRB within 15 minutes of the time of trade, with certain exceptions.¹ The reported price data is available by subscription, after subscribers sign an agreement, either in a real-time feed or in files published daily. The purpose of this document is to provide the specifications and requirements to access, retrieve and understand the subscription trade data from RTRS.

¹ See <http://www.msrb.org/Rules-and-Interpretations/MSRB-Rules/General/Rule-G-14.aspx>.

Background

The MSRB offers two types of subscriptions to the RTRS trade data.² The Real-Time Data Subscription Service disseminates price data continuously throughout each RTRS business day, nearly contemporaneously with receipt of the data from dealers. Modifications and cancellations submitted by dealers that apply to earlier trade submissions are also disseminated in real time. The Comprehensive Transaction Data Subscription Service provides reports each morning covering the previous day's trades (T+1 Report), as well as restatements of the T+1 Reports which are published one week later (T+5 Report) and one month later (T+20 Report) which reflect the effect of modifications and cancellations received after trade date.

RTRS subscription services are available to subscribers, subject to a subscription agreement entered with the MSRB. Subscribers must comply with the terms and conditions of that agreement. More information about the subscription agreement and license verification is available on the MSRB's website at www.msrb.org.

The MSRB reserves the right to restrict or remove the access of users to RTRS Subscription Services when their behavior endangers the integrity of RTRS and its systems or inhibits access by other users of those services. If a subscriber's system generates a large volume of request traffic that imposes an unreasonable or disproportionately large load on the service or in any way compromises the speed or functionality of the service, the subscriber's account will be suspended and the subscriber may be required to implement corrective changes to their client before access to the system is permitted again.

Real-Time Transaction Data Subscription Service:

The flow of real-time trade messages includes instruct, modify and cancel messages reflecting dealer reporting activities, as well as MSRB modify messages.³ MSRB modify messages will be published for the following reasons:

- To show exact par values for transactions that were initially disseminated with a par value of "MM+,"⁴
- To fill in or update data elements for trades disseminated before complete security data was available, and
- To correct data where better information was obtained after publication.

The MSRB real-time data feeds disseminate trade messages via a secure socket interface (broadcast or push service) and via a secure web API (pull service).

The real-time data feed services consist of disseminated messages describing transactions

² The MSRB also makes historical data available for purchase.

³ See Appendix A, Transaction Type Indicator = R (MSRB Modify)

⁴ Transactions with a par value exceeding \$5 million will show a par value of "MM+" until five days after trade date.

processed by RTRS that day, including information about trades effected prior to that date.

RTRS also provides real-time subscribers access to a Replay File to facilitate recovery from data loss. The Replay File is accessible for secure retrieval through a secure web API for at least 60 calendar days after the RTRS real-time trade dissemination date. The Replay File includes all trade messages disseminated by RTRS for a specific business day and is normally published by midnight Eastern Time of such business day.

Comprehensive Transaction Data Subscription Service:

Files comprising the Comprehensive Transaction Data Subscription Service are available by 6:00 a.m. Eastern Time on the posting date showing a summary of all the published transactions for a single business day (see below for additional details on the publication timeline.) For each trade date, three files are published: a T+1 Report, T+5 Report and T+20 Report files.

- The T+1 Report file is published on the next business day after trade date and includes only trades which were effected on the date covered by that file.⁵
- The T+5 Report file is published 5 business days after trade date and replaces the T+1 Report file completely. Par amounts that were masked in the T+1 Report will be unmasked in the T+5 Report.
- The T+20 Report file is published 20 business days after trade date and replaces both of the earlier Comprehensive Trade Files.

Trades that are cancelled subsequent to the T+1 Report publication will be omitted from the T+5 and T+20 Reports. Trades that are reported late (after publication of the T+1 Report) will only appear in the T+5 Report or T+20 Report.⁶

Comprehensive Trade Files remain available for secure retrieval through an MSRB user interface for at least 60 calendar days after publication date. For trade data older than 60 calendar days, the MSRB provides the *MSRB Historical Transaction Data Product* for separate purchase.

⁵ Reports for trade dates which immediately follow a weekend or holiday will include trades effected on the non-business days immediately preceding the date covered by the report.

⁶ Information reported or modified more than 20 business days after trade date will not be disseminated to Comprehensive Transaction Data Subscription Service subscribers.

RTRS System Hours

The MSRB maintains 7:00 a.m. to 7:00 p.m. Eastern Time as core operational hours on business days, which exclude weekends and holidays identified on the MSRB System Holiday Schedule.

The open message will be the first message sent and it will be published at approximately 6:00 a.m. each business day. Unmasked trades and other MSRB updates to trade messages will be published shortly after the open message is published and no earlier than 6:00 a.m. RTRS begins publishing real-time trade reports each business day no later than 7:00 a.m. or as soon after that time as real-time trade messages are reported by dealers. The real-time feed continues to publish until all inbound messages and MSRB modifications have been processed for the day, which will be no earlier than 9 p.m. (All times are Eastern Time.)

Comprehensive Trade Files and Replay Files are normally available 24 hours a day, seven days a week. However, due to maintenance activities, files may be unavailable outside of core operational hours.

Timeline for Comprehensive File Publication

T+1 Report files are posted on the morning of the first business day following the trade date covered by the report. T+1 Report files do not publish on an MSRB system holiday. For example, the T+1 Report for trades effected on a Monday is published Tuesday unless Tuesday is a holiday, in which case the T+1 Report would be published on Wednesday.

T+5 Report files are posted on the morning of the sixth weekday following the trade date covered by the report, regardless of holidays. No report is generated if the date that would have been covered by the report was a holiday. For example, the T+5 Report file for trades effected on a Monday posts on Tuesday of the following week, even if any day between is a holiday and even if the publication date is a holiday.

T+20 Report files are posted on the morning of the 21st weekday following the trade date covered by the report, regardless of holidays. No report is generated if the date that would have been covered by the report was a holiday. For example, the T+20 Report file for trades effected on a Monday posts on Tuesday of the fourth week following, even if any day between is a holiday and even if the publication date is a holiday.

Subscription Authentication

All subscription connections are authenticated by RTRS against the MSRB Gateway authentication system. Subscribers are provided an MSRB Gateway username and password when the subscription contract is initiated.

Once an MSRB Gateway user account is established, users can manage their passwords through the Gateway user interface. To confirm access, log in at www.msrb.org using the username and password provided to you. MSRB Gateway passwords expire approximately every 12 months for security purposes. Once a password expires, the subscriber's client application will no longer be allowed to access the MSRB subscription services, leading to service disruption.



Subscribers are encouraged to proactively reset passwords before they expire to prevent such disruption.

As a courtesy, the MSRB may send a reminder email to the address provided on the MSRB Gateway account to notify the user when their password is about to expire. Users remain responsible for timely maintenance of their Gateway password and should not rely on receipt of an email to initiate password changes.

Real-Time Feed Business Continuity

The MSRB maintains redundant data centers to ensure the ability to provide real-time subscribers timely dissemination of trade messages. Domain Name Servers (DNS) will be used for failover purposes to direct traffic to the current active data center(s). Relevant DNS records will have a very low TTL to facilitate redirection on failover. Subscribers should honor this TTL to ensure they are redirected to the currently active data center as quickly as possible.

Each redundant data center processes and disseminates semi-autonomously while maintaining common numeric sequencing of messages disseminated upon an MSRB failover between data centers subscribers may notice re-dissemination of messages (dissemination overlap) or gaps in message dissemination. Numeric sequencing of messages disseminated will make both conditions apparent to subscribers. Both the socket interface and web API provide mechanisms for same-day requests for re-dissemination of specific messages or groups of messages to allow subscribers to fill gaps in messages received.

Subscribers that operate multiple data centers for business continuity purposes may establish a connection from each data center. The MSRB reserves the right to limit the total number of connections per subscription contract and may require separate login credentials for each concurrent connection.

Real-Time Transaction Data Subscription Services

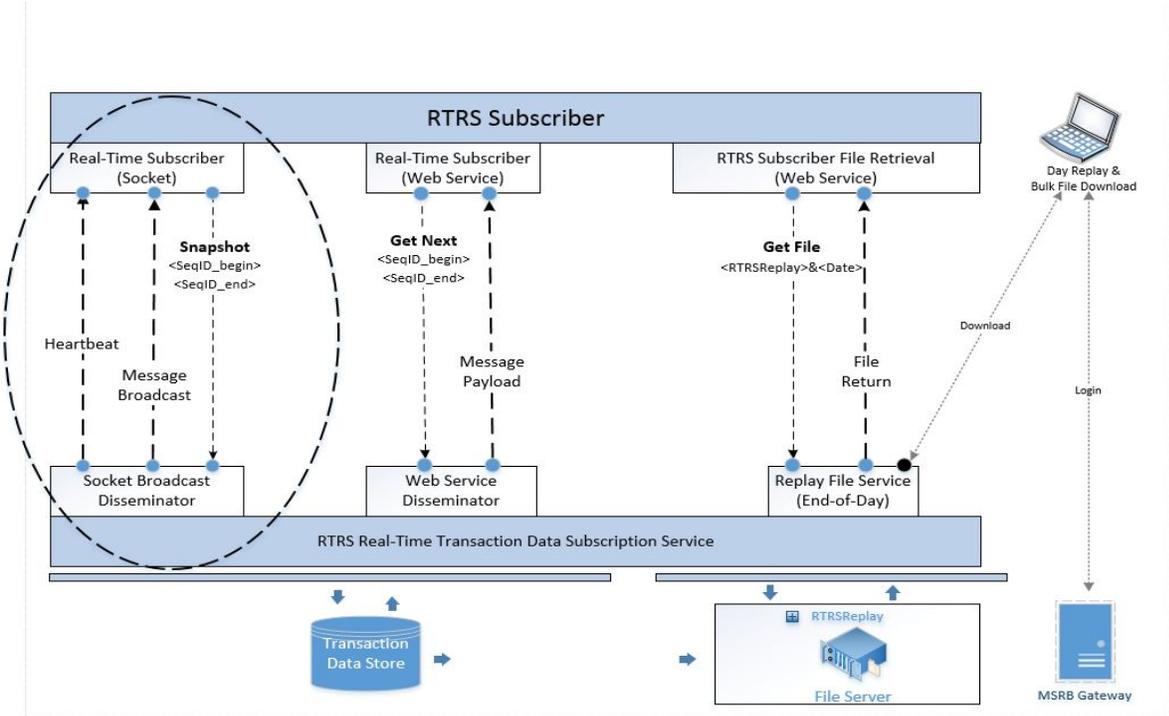
The MSRB provides two interfaces to provide near real-time data feeds. One is a socket interface like the previous socket interface. This interface continues to use the same tagged, comma delimited format as the previous interface. **It is important to note that although this socket service is similar in many ways to its predecessor, all former clients will need to be changed. The new service is implemented with secure sockets and requires all clients connecting with it to use secure sockets. This is different from the previous version.**

A second interface is a web service interface. This new interface wraps the tagged, comma delimited format in a JSON structure.

The former MQ based service has been discontinued. **All subscribers using MQ clients will need to upgrade their client software to use one of the two above interfaces.**

Real-Time Trade Dissemination Secure Socket Service

Figure 1: Message Dissemination Overview - RTRS Secure Socket Subscription Service



Overview

The MSRB will expose a secure socket (broadcast) service interface to allow subscribers to receive tagged, comma delimited dissemination messages. This interface may be consumed by applications written by or for subscribers in a wide variety of programming languages and running on a wide variety of platforms. The MSRB will provide location information for production access to the secure socket (broadcast) service to each subscriber during initiation of the subscription. Subscribers will be provided a domain name and corresponding list of possible IPs from which MSRB will broadcast. Subscribers should make any necessary network modifications to allow this traffic.

The socket interface disseminates RTRS real-time trade data by a streaming real-time message push using transport security. Each trade message has a sequence number and a date/time indicating when that message was published. Sequence numbering resets at the beginning of each trade date. Disseminated trade messages represent the current state of their respective trades as of the date/time of message publication.

During operation, the secure socket dissemination service will accept new connections and will broadcast up to a configurable number of messages (the maximum broadcast batch size) per broadcast push. Broadcast will continue to push data in batches as messages are available for dissemination. Maximum broadcast batch size may be increased or decreased by MSRB depending on system capacity and without prior notification.

Line Endings

Line endings are carriage return line feed (\r\n). This applies to both messages sent by the service and to command sent by the client to service. If you are using a non-Windows system and are experiencing problems connecting or sending other commands such a snapshot requests, check your line endings.

Session Initiation

Secure socket connections persist until disconnected by the subscriber, by MSRB, or by communications failure. To initiate a secure socket session, the subscriber must submit a login request message.

Login Request Message		
Message	Format	Example
Login	1=L,200=username,201=password	1=L,200=jdoe,201=12345678

If authentication is successful, the first message returned by RTRS will be a login success message. If authentication fails, subscribers will receive a login failure error message; the server will then terminate the connection and the subscriber will need to reconnect.

Open/Close System Messages

At the start of each day's broadcast cycle, a connected subscriber's system should expect an open message with a sequence number of zero (0) having a time stamp corresponding to the start of dissemination for that day. The last message of the day will be a close message with a concluding sequence number equal to one (1) greater than that of the last trade message for that day and having a time stamp corresponding to the end of dissemination for the day. If a subscriber connects after the day's broadcasting has begun, it is the subscriber's responsibility to request any missed messages using Snapshot functionality described below. The secure socket dissemination service may be shut down no less than five (5) minutes after the close message is published and will be online approximately five (5) minutes before the open message is published. After receiving the close message client applications should disconnect and sleep until the start of the next business day.

System Open/Close Message Format

Field	Field ID	Always Present?	Values	Format
Message Type	1	Y	O - Open C - Close	One character
Sequential Number	2	Y		Up to 16 digits
Timestamp	3	Y		hhmmss

Example Open/Close Messages	
Type	Example
Open	1=O,2=0,3=060004
Close	1=C,2=40489,3=210000

A two-character Carriage Return (r) Line Feed (n) (CRLF) marks the end of each open/close message.

Trade Messages

Trade messages are sent in comma-delimited format using numerically tagged fields. Trade message field definitions, format and examples are shown in Appendix A. A two-character Carriage Return (r) Line Feed (n) (CRLF) marks the end of each trade message.

Tagged fields having a null value for a particular trade message are omitted from the disseminated message for that trade. This approach helps provide version independence and allows the possibility for new fields to be added as needed in the future. The following is an example of a trade message where tags have been omitted due to null values. Specifically, tagged field ID's 12, 13, 20, 21 and 22 are omitted because they each have a null value. Field ID 3 is omitted because it does not apply to trade messages.

1=T,2=31,4=8338F97ECB951A9A,5=D,6=M,7=411005TB4,
8=SOMEWHERE CNTY REF-SER A,9=20140901,10=5.000,11=20331001,
14=20160407,15=084739,16=20160412,17=6155000.00,18=120.569,19=2.311,
23=20160414,24=060007,25=1.10

If a subscriber detects that a message or a series of messages was missed, the subscriber can request a trade message snapshot. See *Snapshot Requests* below.

Messages will be queued at MSRB for broadcast if the processed trade volume exceeds dissemination capacity. Under normal circumstances dissemination delay due to processed message queueing will be no more than 10 seconds.

Heartbeat System Messages

Heartbeat messages are sent once every 60 seconds in the absence of real-time messages to be broadcast. Heartbeat messages contain a timestamp but do not have a sequence number. These messages indicate that the connection is working properly but there are no trade messages for MSRB to send.

If a subscriber fails to receive trade or heartbeat messages for more than 120 seconds, they should assume that there has been a connection failure, proceed to close their current connection, re-query DNS and attempt to reconnect to the RTRS secure socket dissemination service. Subsequent socket reconnection attempts should be made no more frequently than once every thirty (30) seconds. Reconnection requires session initiation, including authentication, and should begin with a login request message.

Heartbeat Message Format				
Field	Field ID	Always Present?	Values	Format
Message Type	1	Y	H	One character
Timestamp	3	Y		hhmmss

Heartbeat Message Example	
Message	Example
Heartbeat	1=H,3=095325

Since Field ID 3 (Timestamp) is not applicable to a trade message, reference is not included in the listing of Field ID's in Appendix A (Trade Message Fields and Format).

A two-character Carriage Return (r) Line Feed (n) (CRLF) marks the end of each heartbeat message.

Snapshot Requests

If a subscriber detects that they missed a message or series of messages, they can request a trade message snapshot. Requesting a snapshot will prompt the system to resend one or more specified messages in a range by sequence number from a specific point in the real-time feed. When a snapshot is requested, trade messages will be sent in sequential order beginning with the Start sequence number, through to and including the End sequence number in the snapshot request, not to exceed the configured maximum broadcast batch size. If the missed series of messages exceeds the configured maximum broadcast batch size, the subscriber may need to send multiple snapshot requests to complete the missed series.

A snapshot response will include a snapshot response open message, one or more trade messages, and a snapshot response close message to conclude the snapshot transmission. Included in the snapshot request close message is an indicator showing whether more data is available in the system for the snapshot request beyond the last sequential number transmitted in the current snapshot response. A two-character Carriage Return (r) Line Feed (n) (CRLF) marks the end of each snapshot response message.

Snapshot Messages		
Message	Format	Example
Snapshot Request	1=S,300=Start Sequence Number,301=End Sequence Number	1=S,300=7000,301=7010
Snapshot Response Open	1=S,3=hhmmss,600=BEGIN SNAPSHOT	1=S,3=130000,600=BEGIN SNAPSHOT
Snapshot Response Close	1=S,3=hhmmss,600=END SNAPSHOT,601=End Sequence Number,602=MoreDataExists (Yes=1/No=0)	1=S,3=130000,600=END SNAPSHOT,601=7010,602=1

When a snapshot is requested, real-time messages will be paused for that subscriber and then resumed immediately after the current snapshot response transmission is complete. Subscribers should use the message sequence number and date of publication to ensure that older trade messages do not overwrite newer versions of those trades.

Snapshot requests through the secure socket subscription service are available only for the current business day's disseminated messages.

Sample Messages (By Type)

Sample Messages	
Type	Message
Sample System Messages	
System Open	1=O,2=0,3=060000
Trade Message	1=T,2=1976323,3=093001,4=123,5=D
Heartbeat	1=H,3=095325
System Close	1=C,2=43560,3=210000
Sample Request/Response Messages	
Login Request	1=L,200=username,201=password
Login Response Successful	1=L,3=060000,500=AUTHENTICATION SUCCESSFUL
Snapshot Request	1=S,300=7000,301=7010
Snapshot Response Open	1=S,3=130000,600=BEGIN SNAPSHOT
Trade Message	1=T,2=7000,4=79F5C6EE8FCBCA1A,5=D,6=M,7=93974DUH9,8=WASHINGTON ST REF-SER R-2016B,9=20160216,10=5.000,11=20290701,14=20160324,15=074059,16=20160330,17=21495000.00,18=122.630,19=2.385,20=P,23=20160401,24=060003,25=1.10
Snapshot Response Close	1=S,3=130000,600=END SNAPSHOT,601=7010,602=1
Sample Error Messages	
Login Response Failure	1=E,3=073000,500=AUTHENTICATION FAILED
System Error	1=E,3=073000,500=SYSTEM ERROR
Not Authenticated	1=E,3=073000,500=NOT AUTHENTICATED
Connection Request Frequency Violation	1=E,3=073000,500=REQUEST FREQUENCY VIOLATION
Invalid Sequence Number Requested for Snapshot	1=E,3=104232,600=INVALID SEQUENCE NUMBER
Invalid Request	1=E,3=130000,700=INVALID REQUEST
Inactive Data Center	1=X,3=095325,500=DATA CENTER NOT ACTIVE

Beta Platform for the Real-Time Trade Dissemination Secure Socket Service

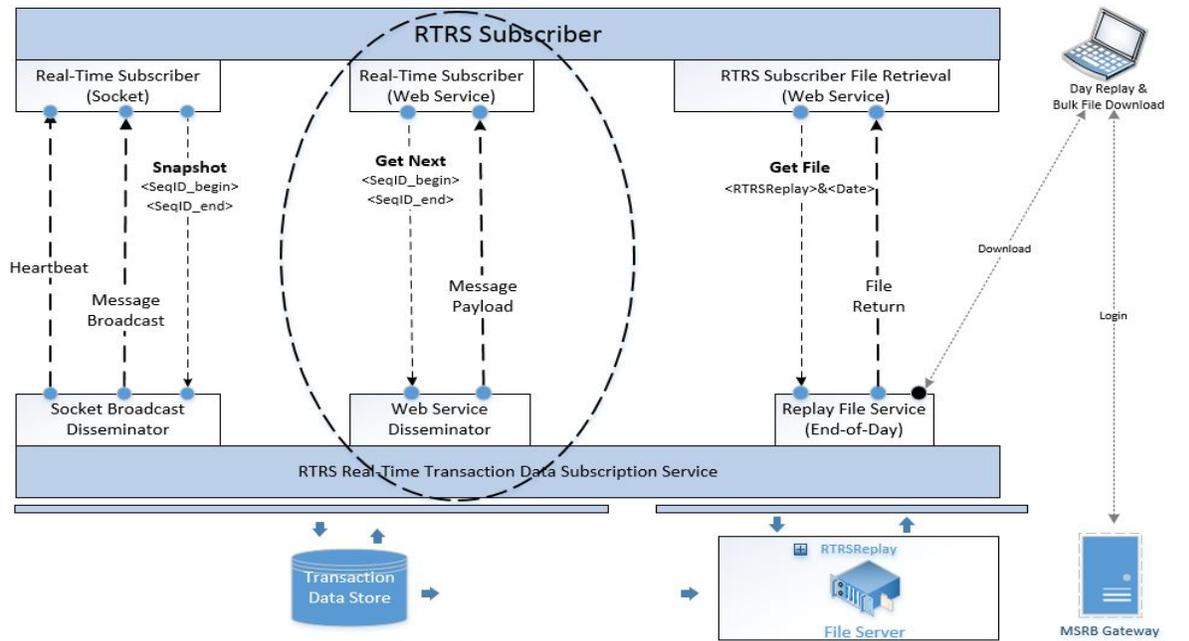
MSRB allows access to a beta instance of its RTRS Secure Socket interface to facilitate testing by new and existing subscribers. **Testing to ensure proper programming and configuration of subscription client applications should be performed against this instance of the secure socket service.**

Trade messages disseminated through the beta platform are for test purposes only. This system may publish test messages and may publish messages with delay. These messages should not be re-disseminated by subscribers, or used for any other purpose than testing the programming and configuration of subscription applications.

Access to the beta platform site may require specific authentication credentials and firewall modifications. **Subscribers will be provided a domain name and corresponding list of possible IPs from which MSRB will broadcast. Subscribers should make any necessary network modifications to allow this traffic.** To inquire about the procedures for accessing the beta platform, contact MSRB Support at 202-838-1330.

Real-Time Trade Dissemination Secure Web API Service

Figure 2: Message Dissemination Overview - RTRS Subscription Service (Web Service)



Overview

The MSRB will expose a secure web API interface to allow subscribers to receive JavaScript Object Notation (JSON) messages. This interface uses transport security and may be consumed by applications written by or for subscribers in a wide variety of programming languages and running on a wide variety of platforms. The MSRB will provide location information for production access to the secure web API to each subscriber during initiation of the subscription.

Each trade message has a sequence number and a date/time indicating when that message was published. Sequence numbering resets at the beginning of each trade date. Disseminated trade messages represent the current state of their respective trades as of the date/time of publication.

Each dissemination request must include authentication credentials, the requested beginning trade message sequence number and, optionally, the requested end trade message sequence number.

During operation, the secure web API dissemination service will accept dissemination requests and will respond with up to a configurable number of messages (the maximum dissemination batch size) per request. To help ensure rapid system response for all subscribers, the web API is configured by MSRB to limit request frequency to a value it feels is reasonable for a single-threaded client under normal operating conditions.

Authentication

To receive real-time trade messages, a subscriber must provide their authorized Gateway username and password with each request using a special credentials http header. The format of this header is “credentials=username,password”. If the username and password are correct, the subscriber will receive trade messages consistent with the request. If authentication fails, subscribers will receive an authentication failed error message (see *System Response Codes* section below).

Open/Close System Messages

MSRB will begin each day’s dissemination with an open message having sequence number of zero (0) and having a time stamp corresponding to the start of dissemination for that day. The last message of the day will be a close message with a concluding sequence number equal to one (1) greater than that of the last trade message for that day and having a time stamp corresponding to the end of dissemination for the day.

System Open/Close Message Format				
Field	Field ID	Always Present?	Values	Format
Message Type	1	Y	O - Open C - Close	One character
Sequential Number	2	Y		Up to 16 digits
Timestamp	3	Y		hhmmss

Example Open/Close Messages	
Type	Example
Open	1=O,2=0,3=060004
Close	1=C,2=40489,3=210000

Trade Messages

Trade messages are sent in comma-delimited format using numerically tagged fields. Trade message field definitions, format and examples are shown in Appendix A. A two-character Carriage Return (r) Line Feed (n) (CRLF) marks the end of each trade message.

Tagged fields having a null value for a particular trade message are omitted from the disseminated message for that trade. This approach provides version independence and allows the possibility for new fields to be added as needed in the future. The following is an example of a trade message where tags have been omitted due to null values. Specifically, tagged field ID's 12, 13, 20, 21 and 22 are omitted because they each have a null value. Field ID 3 is omitted because it does not apply to trade messages.

```
1=T,2=31,4=8338F97ECB951A9A,5=D,6=M,7=411005TB4,  
8=SOMEWHERE CNTY REF-SER A,9=20140901,10=5.000,11=20331001,  
14=20160407,15=084739,16=20160412,17=6155000.00,18=120.569,19=2.311,  
23=20160414,24=060007,25=1.10
```

Real-Time Trade Dissemination Secure Web API Service Requests

If a subscriber sends a Begin sequence number of 0 with no End sequence number, the service will send messages from the start of day up to the maximum dissemination batch size.

Example:

```
https://<web api URL>/  
rtrsubscriptionwebservice/api/Subscription.GetNext?beginSequence=0
```

If a subscriber sends both a Begin sequence number and an End sequence number, the service will respond with messages in sequential order beginning with the Start sequence number, through to and including the End sequence number in the request, not to exceed the configured maximum dissemination batch size.

Example:

```
https://<web api URL>/  
rtrsubscriptionwebservice/api/Subscription.GetNext?beginSequence=0&  
endSequence=2100
```

If the range of sequence values in the request exceeds the configured maximum dissemination batch size, the subscriber may need to send multiple requests to complete the missed series. Included in the request response is an indicator showing whether more data is available in the system beyond the last sequential number transmitted in the current response.

Subscribers should use the message sequence number and date of publication to ensure that older trade messages do not overwrite newer versions of those trades.

Client access to the interface is DNS based. Subscribers will be provided a domain name and corresponding list of possible IPs to which it may resolve. Subscribers should make any necessary network modifications to allow this traffic.

The secure web API service will respond only with the current day's disseminated messages.

System Response Codes

System Response Codes	
Response Code	Description
200	OK
400	Request is not parse-able or bad request
401	Authentication Failed
404	Not Found - the requested resource could not be found
429	Request frequency violation
430	Data center not active
500	System Error

Sample Trade Response: 200 OK

```
{ "ResponseStatusCode":200,
  "ResponseMessage":"OK",
  "Subscription":{"RecordCount":3,
  "MoreRecordsAvailable":false,
  "MaxBatchSize":500,
  "RequestFrequencyIntervalSeconds":5,
  "Records":
  [
    {"SequenceId":0, "Message":"1=O,2=0,3=060004"},
    {"SequenceId":1,"Message":"1=T,2=1,4=D0ACD8508107B190,5=S,6=M,7=658256Z47,8=NORTH
CAROLINA ST REF-SER
A,9=20160309,10=5.000,11=20250601,14=20160407,15=064839,16=20160412,17=10000000.00,18=129
.776,19=1.500,23=20160414,24=060007,25=1.10"},
    {"SequenceId":2,"Message":"1=T,2=2,4=0251B4F9FF7D0FA2,5=S,6=M,7=548351AE5,8=LOWER NECHES
VALLEY AUTH TEX VAR-REF-EXXONMOBIL
PROJ,9=20120517,10=0.220,11=20460501,14=20160407,15=075443,16=20160407,17=6300000.00,18=1
00.000,19=0.000,23=20160414,24=060007,25=1.10"}
  ]
}
```

200 OK - Message Return Metadata	
Key Field (Key/Value Pairs)	Description
ResponseStatusCode	System Response Code
Response Message	Description of System Response Code
Record Count	Number of trade records in the response
More Records Available	True when the number of messages requested exceeds the batch size, else false
MaxBatchSize	The configurable maximum number of trades in a single response
RequestFrequencyIntervalSeconds	The minimum allowed frequency between client requests in seconds

Sample Error Messages

Sample Error Messages	
Example	Message
End Sequence Number is Less Than Begin Sequence Number	{"ResponseStatusCode":400,"ResponseMessage":"Request is not parse-able or bad request.,"Subscription":null}
Authentication Failed	{"ResponseStatusCode":401,"ResponseMessage":"Authentication Failed","Subscription":null}
Service Request is Incorrect	{"Error":"Not Found - StatusCode: 404, ReasonPhrase: 'Not Found', Version: 1.1, Content: System.Net.Http.StreamContent, Headers:\r\n{\r\n Date: Fri, 22 Apr 2016 12:57:23 GMT\r\n Server: Microsoft-IIS/8.5\r\n X-Powered-By: ASP.NET\r\n Content-Length: 1245\r\n Content-Type: text/html\r\n}"}
Request Frequency Violation	{"ResponseStatusCode":429,"ResponseMessage":"Request frequency violation","Subscription":null}

Beta Platform for Real-Time Trade Dissemination Secure Web API Service

MSRB allows access to a beta instance of its RTRS Real-Time Secure Web API Service to facilitate testing by new and existing subscribers. **Testing to ensure proper programming and configuration of subscription client applications should be performed against this instance of the secure web API service.**

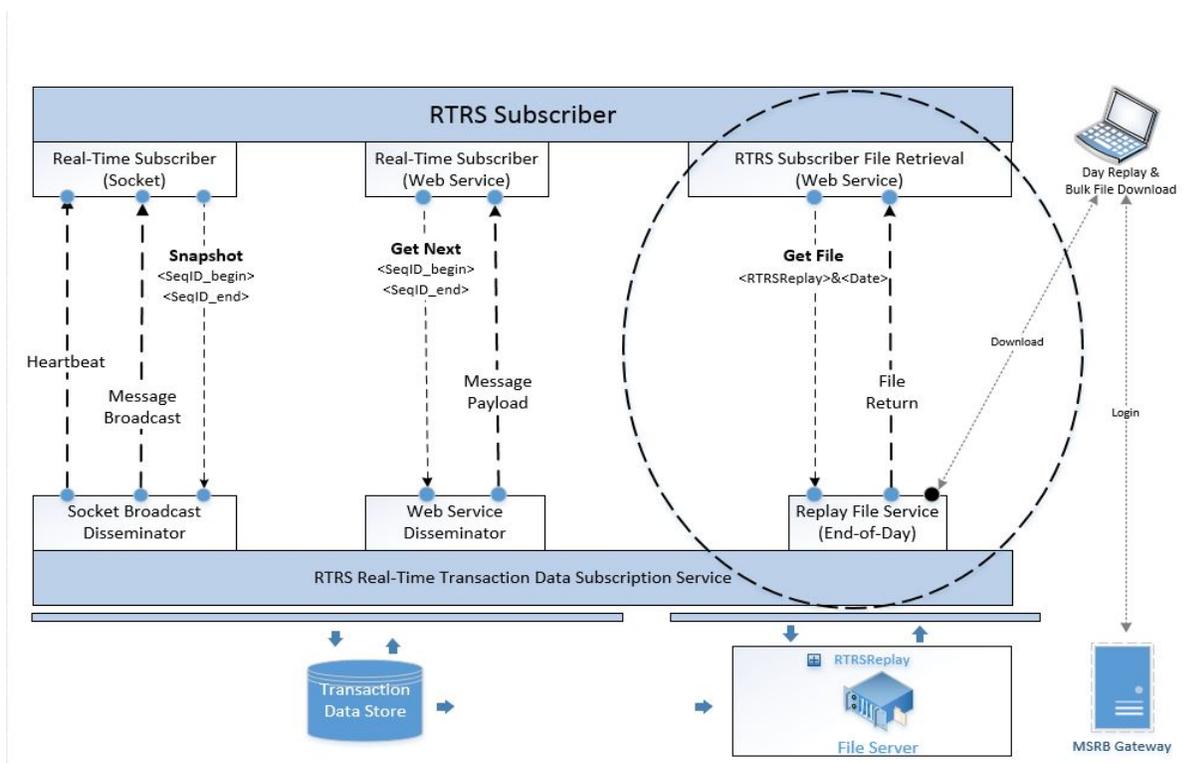
Trade messages disseminated through the beta platform are for test purposes only. This system may publish test messages and may publish messages with delay. These messages should not

be re-disseminated by subscribers, or used for any other purpose than testing the programming and configuration of subscription applications.

Access to the beta platform site may require specific authentication credentials and firewall modifications. Client access to the interface is IP-specific. MSRB must know and trust each IP from which you intend to connect. Subscribers will be provided a list of IPs from which MSRB will host the beta subscription API and they should make necessary firewall modifications to allow this traffic. To inquire about the procedures for accessing the beta platform, contact MSRB Support at 202-838-1330.

RTRS Subscriber File Retrieval Secure Web API Service (Web Service)

Figure 3: Message Dissemination Overview - RTRS Subscriber Secure File Retrieval (Web API Service)



Overview

The MSRB will expose a secure web API interface to allow subscribers to retrieve Replay files. This interface uses transport security and may be consumed by applications written by or for subscribers in a wide variety of programming languages and running on a wide variety of platforms. The MSRB will provide location information for production access to the secure web API to each subscriber during initiation of the subscription.

Files may be retrieved through the secure file retrieval API located at `https:// <web api URL>/rtrssubscriptionfilewebservice/api/Subscription.GetFile`. Requests must include two parameters which identify the file type and date of the file requested. The date indicates the publication date of the messages contained within that file. An additional credentials http header must be included in the request.

Replay File

The Replay File contains all trade, open and close messages disseminated by the real-time feed during a business day. Each trade message has a sequence number and a date/time indicating when that message was published. Sequence numbering resets at the beginning of each trade date. Disseminated trade messages represent the current state of their respective trades as of the date/time of publication.

MSRB recommends that real-time data feed subscribers request and process all Replay Files to ensure that the data they received and processed through the real-time feed is complete.⁷ The file naming convention is “replay.<yyyy-mm-dd>.log”, where yyyy-mm-dd represents year, month and day of the day the trade reports were disseminated. Contents are comma delimited and tagged. Open and Close messages follow the format defined under the real-time subscription sections above. See Appendix A for trade message field definitions.

Replay File Retrieval Request Example:

```
https://<web api URL>/rtrssubscriptionfilewebservice/api/Subscription.GetFile?  
filetype=RTRSReplay&dt=yyyy-mm-dd
```



The date “dt” parameter in the sample URL is formatted as: yyyy-mm-dd

Example Replay File Content:

```
1=O,2=0,3=060004  
1=T,2=1,4=2015111600000100,5=S,6=I,7=346136D12,9=20131121,10=5.000,
```

⁷ Subscriber may request Day Replay Files for prior days subject to a configurable look-back window/period maintained by the MSRB initially set to 20 business days.

11=20431101,14=20151116,15=074500,16=20151118,17=10000.00,
18=103.935,19=4.338,23=20161128,24=120937,25=1.1
1=C,2=2,3=210000

File Retrieval API Response Codes

System Response Codes	
Response Code	Description
200	OK - Success
400	Request is not parse-able or bad request
401	Authentication failed
402	The request is outside the look-back window
403	You are not authorized to subscribe to the subscription type requested
404	Not Found - the requested resource could not be found
429	Request frequency violation
500	System Error
550	Not Found – the file requested is not found

File Retrieval API Sample Success (200 OK) Response Message

Sample Success Response Message	
Example	Message
HTTP/1.1 200 OK (Success Message)	<pre> HTTP/1.1 200 OK Cache-Control: no-cache Pragma: no-cache Content-Length: 7474673 Content-Type: application/octet-stream Expires: -1 Server: Microsoft-IIS/8.5 Content-Disposition: attachment; filename=R040116.log X-AspNet-Version: 4.0.30319 X-Powered-By: ASP.NET Date: Fri, 22 Apr 2016 21:00:18 GMT 1=O,2=0,3=060002 1=T,2=1,4=79F5C6EE8FCBCA1A,5=D,6=M,7=93974DUH9, 8=WASHINGTON ST REF-SER R-2016B,9=20160216, 10=5.000,11=20290701,14=20160324,15=074059, 16=20160330,17=21495000.00,18=122.630,19=2.385, 20=P,23=20160422,24=060003,25=1.10 1=T,2=2,4=A66CBFDF0ADB974C,5=D,6=M,7=93974DUH9, 8=WASHINGTON ST REF-SER R-2016B,9=20160216, 10=5.000,11=20290701,14=20160324,15=074840, 16=20160330,17=21495000.00,18=122.680,19=2.380, 20=S,23=20160422,24=060003,25=1.10 ... 1=C,2=41000,3=210000 </pre>

File Retrieval API Sample Error Messages

Sample Error Messages	
Example	Message
Bad Request (i.e., bad date format)	HTTP/1.1 400 Bad Request Cache-Control: no-cache Pragma: no-cache Content-Type: application/json; charset=utf-8 Expires: -1 Server: Microsoft-IIS/8.5 X-AspNet-Version: 4.0.30319 X-Powered-By: ASP.NET Date: Fri, 22 Apr 2016 16:24:22 GMT Content-Length: 37 {"Message":"The request is invalid."}
Authentication Failed	HTTP/1.1 401 Authentication Failed ... Invalid request:
The request is outside the look-back window.	HTTP/1.1 402 The request is outside the look-back window.
You are not authorized to subscribe to the requested subscription type.	HTTP/1.1 403 You are not authorized to subscribe to the subscription type requested.
Current or Future Date, or Invalid File Type	HTTP/1.1 404 The requested resource could not be found. ...
Requested file is not available	HTTP/1.1 550 Not Found - the file requested is not found. ...

Beta Platform for RTRS Subscriber File Retrieval (Web Service)

Interface

The Beta File Retrieval subscription interface is intended to provide a platform for new and existing subscribers to conduct tests to ensure proper programming and configuration of their client applications for accessing subscription files.

Trade messages disseminated through the beta platform are for test purposes only. This system may publish test messages and may publish messages with delay. These messages should not be re-disseminated by subscribers, or used for any other purpose than testing the programming and configuration of subscription applications.

The MSRB will provide location information for beta access to the file retrieval web API to each subscriber during initiation of the subscription. **Access to the beta platform site may require specific authentication credentials and firewall modifications.** Client access to the interface is IP-specific. MSRB must know and trust each IP from which you intend to connect. Subscribers will be provided a list of IPs from which MSRB will host the interface and should make necessary firewall modifications to allow this traffic. To inquire about the procedures for accessing the beta platform, contact MSRB Support at 202-838-1330.

RTRS Comprehensive Trade File Retrieval (User Interface and Scriptable Interface)

Comprehensive Trade Files (T+1, T+5, T+20)

In addition to real-time data, the MSRB provides Comprehensive Trade Files containing the current state of disseminated trades at T+1, T+5 or T+20 business days after trade date. These files are commonly referred to as T-Files or T-Reports.

Trade data is reported in Comprehensive Trade Files in comma-delimited format for easy import into commonly used database and spreadsheet applications. The comma-delimited files do not include the numerical tagging which is present in real-time trade feed messages. Each trade transaction shows the most recent version of that trade in RTRS at the time the file was created (for example, if a trade has been modified, only its modification will appear. Its previous version will not). Cancelled trades are not included in Comprehensive Trade Files.

Accessing Comprehensive Trade Files

To access Comprehensive Trade Files, you must have MSRB Gateway authentication credentials. You may request an MSRB Gateway account from MSRB Support at 202-838-1330.

To confirm your access, log in through MSRB Gateway at <https://gw.msrb.org/Gateway/Login> using the username and password provided. Once an MSRB Gateway account is established, users are required to manage their passwords and contact information using the MSRB Gateway website.

MSRB Gateway subscriber passwords must be changed on an annual basis. MSRB strongly recommends that subscribers change their passwords periodically, without waiting for them to expire. As a courtesy, email reminders are sent to the email address provided on the MSRB Gateway account to notify users when their passwords are about to expire.



It is users' responsibility to proactively maintain their Gateway account, keeping their email address and other contact information current.

Manual File Retrieval Through a Web User Interface

Subscribers can manually retrieve Comprehensive Trade Files by logging into MSRB Gateway through <https://gw.msrb.org/Gateway/Login>. From the Gateway Main Menu, expand the **Subscriptions** menu option and then click on **Subscription File Retrieval**.

MSRB Gateway Main Menu

Welcome to MSRB Gateway! Your User Account has the following access rights:

Subscriptions

- [Subscription File Retrieval](#)

A list of available files will appear on the screen. Click on the file you would like to download and save it to your local system. The most recent files posted appear under the heading **Current**. Older files may appear under the heading **Archive**.

Automated File Retrieval Through a Scriptable Interface

Subscribers may retrieve files programmatically through an MSRB scriptable file retrieval web interface. Subscribers are responsible for writing and maintaining their own subscription file retrieval scripts.



The file naming convention for Comprehensive Trade Files is shown below. (Note: ddmmmyyyy represents day, month and year in all file names)

T+1	T1-ddmmmyyyy.TXT
T+5	T5-ddmmmyyyy.TXT
T+20	T20-ddmmmyyyy.TXT

The MSRB provides resources for developers, including example PowerShell and Linux scripts and related ReadMe files, in a file directory available through MSRB Gateway. To access these developer resources, log in to MSRB Gateway through <https://gw.msrb.org/Gateway/Login>. From the Gateway Main Menu, expand the **Subscriptions** menu option, click on **Subscription File Retrieval** and then click on the “**resources for developers, including sample scripts, are located here**” link. The contents of this directory may be updated from time to time.

Using the Transaction Data

Overview

Individual field formats and data definitions are the same for both the Real-Time Service and the Comprehensive Trade Files. The field definitions provided below may be used for understanding the data contained in either service.

However, some differences exist. While the Real-Time Service uses tags to identify fields, and will omit fields when the field is not populated, the comprehensive files are comma delimited and empty fields are indicated by consecutive commas. The columns in the comma-delimited file are in the order listed in Appendix A.

The Real-Time Service makes use of modify and cancel messages to provide updates to transaction data, while the Comprehensive Trade Files do not. The Comprehensive Files always display the current state of the transaction as of publication. For this reason, certain columns shown in Appendix A, (*Message Type, Sequence Number, and Transaction Type Indicator*), do not appear in the Comprehensive Trade Files.

Dissemination of the par values for transactions that were initially disseminated with a par value of “MM+” is treated as an update to transaction data. Therefore the Real-Time Service will disseminate the actual par amount as a modification. In the Comprehensive Trade Files, the T+5 and T+20 Reports will contain exact par values for those transactions without any indication that the information has been updated.

Because the T+5 Report file replaces the T+1 Report file completely, and the T+20 Report file entirely replaces both the T+1 and T+5 data, subscribers should exercise care in loading the data contained in these files. The MSRB recommends that when loading either the T+1 or T+20 files all earlier transaction data for the same trade date should first be deleted, physically or logically.

Appendix A

Trade Message Field Definitions

Trade Message Field Definition		
Field Name	Field ID	Definition
Message Type	1	Type of message sent in the real-time broadcast or web service pull; a trade message, a heartbeat message or a system message. <u>Only used in Real-Time Service, not in Comprehensive Trade Files.</u>
Sequence Number	2	Unique Sequence Number of the trade message. If more than one message has been published for a trade due to modification or cancellation, the trade is uniquely identified by the RTRS ID described below. <u>Only used in Real-Time Service, not in Comprehensive Trade Files.</u>
RTRS Control Number	4	The RTRS ID for the transaction. This may be used to apply subsequent modifications and cancellations to an initial transaction. While this field is provided in the Comprehensive Trade Files to allow unique identification of transactions, it is not required for processing.
Trade Type Indicator	5	Type of trade: an inter-dealer trade, a purchase from a customer by a dealer, or a sale to a customer by a dealer.
Transaction Type Indicator	6	An indicator showing that the message is a new transaction, or modifies or cancels a previously disseminated transaction. <u>Only used in Real-Time Service, not in Comprehensive Trade Files.</u>
CUSIP	7	The CUSIP number of the security traded.
Security Description	8	Text description of the security.
Dated Date	9	Dated date of the security traded.
Coupon	10	The coupon of the security traded.
Maturity Date	11	Maturity date of the security traded.
When-Issued Indicator	12	Indicates whether the transaction occurred on or before the initial settlement date of the offering.
Assumed Settlement Date	13	For new issues where the initial settlement date is not known at the time of execution, this field is a date 15 business days after

Trade Message Field Definition		
Field Name	Field ID	Definition
		trade date. If this field is populated there will be no data in settlement date.
Trade Date	14	The date the trade was executed.
Time of Trade	15	The time of trade execution reported by the dealer.
Settlement Date	16	The settlement date of the trade, if known. If this field is populated there will be no data in assumed settlement date.
Par Traded	17	The par value of the trade. Trades with a par amount over \$5 million will show par value as "MM+" until five days after the trade date.
Dollar Price	18	A quoted price of a security, expressed in terms of dollars per \$100 par value. The dollar price is the transaction price which may be derived from the yield (basis price) of the transaction.
Yield	19	The yield of the trade. For customer and inter-dealer trades, yield-to-worst is calculated by RTRS when it can be computed from dollar price. ⁸
Broker's Broker Indicator	20	An indicator on transactions that were executed by a broker's broker, including whether it was a purchase or sale by the broker's broker.
Weighted Price Indicator	21	An indicator that the transaction price was a "weighted average price" based on multiple transactions done at different prices earlier in the day to accumulate the par amount needed to make this transaction.
List Offering Price/ Takedown Indicator	22	An indicator on a primary market sale to a customer executed on the first day of trading of a new issue at the published list offering price for the security ("List Offering Price Transaction"); or in the case of inter-dealer transactions by a sole underwriter or syndicate manager to a syndicate member, selling group member, or distribution participant ("RTRS Takedown Transaction").
RTRS Publish Date	23	For real-time data, the date the message was published to subscribers. For Comprehensive Trade Files, the date the data was produced for the report.

⁸ For a given dollar price on a municipal security, yield-to-worst is the lowest of several possible yields calculated based on a pricing call, a par call, redemption at maturity, or any combination thereof.

Trade Message Field Definition		
Field Name	Field ID	Definition
RTRS Publish Time	24	The time the message was published to subscribers. For Comprehensive Trade Files, the time the data was produced for the report.
Version Number	25	Version number of the message or file format used in the message or file.
Unable to Verify Dollar Price Indicator	26	An indicator that the dollar price calculated by the MSRB does not match the dollar price submitted by the dealer, but falls within a one-dollar tolerance for dissemination.
Alternative Trading System (ATS) Indicator	27	An indicator that an inter-dealer transaction was executed with or using the services of an alternative trading system (ATS) with Form ATS on file with the SEC.
Non-Transaction-Based Compensation Arrangement (NTBC) Indicator	28	An indicator that a customer transaction did not include a mark-up, mark-down or commission.

Sample Comprehensive Trade File Header

The Comprehensive Trade Files are not published with a header row. Subscribers that wish to add a header row to the file prior to import can use the following sample as a guide.

RTRS Control Number, Trade Type, CUSIP, Security Description, Dated Date, Coupon, Maturity Date, When Issued, Assumed Settlement Date, Trade Date, Time of Trade, Settlement Date, Par Traded, Dollar Price, Yield, Brokers Broker, Weighted Price, LOP or Takedown, Publish Date, Publish Time, Version, Unable to Verify Dollar Price, Alternative Trading System, Non-Transaction-Based Compensation

Trade Message Fields and Format

Trade Messages Fields and Format				
Field Name	Field ID	Always Present?	Values	Format/Length
Message Type	1	Y (only used in trade messages)	T - Trade	One character
Sequence Number	2	Y (applies to open message, trade messages and close message)		Up to 16 digits
RTRS Control Number	4	Y		Up to 16 characters
Trade Type Indicator	5	Y	D - Inter-dealer P - Purchase from Customer S - Sale to Customer	One character
Transaction Type Indicator	6	Y (only used in trade messages)	I - Instruct M - Modify C - Cancel R - MSRB Modify ⁹	One character
CUSIP	7	Y		Nine characters including the checksum digit
Security Description	8	N		Up to 120 characters of free format text
Dated Date	9	N		<i>yyyymmdd</i>
Coupon	10	N		Fixed decimal, up to 6 digits <i>nnn.nnn</i>
Maturity Date	11	N		<i>yyyymmdd</i>

⁹ Includes trades showing exact par values for transactions that were initially disseminated with a par value of "MM+", trades initially disseminated awaiting specific security data, reconsideration of trade messages because of information received subsequent to initial processing, and any other MSRB initiated reconsideration and/or re-dissemination of a trade.

Trade Messages Fields and Format				
Field Name	Field ID	Always Present?	Values	Format/Length
When-Issued Indicator	12	N	Y - When Issued	One character
Assumed Settlement Date	13	N		<i>yyyymmdd</i>
Trade Date	14	Y		<i>yyyymmdd</i>
Time of Trade	15	Y		hhmmss (24 hour time)
Settlement Date	16	N		<i>yyyymmdd</i>
Par Traded	17	Y		<i>Fixed decimal, up to 12 digits nnnnnnnnnn.nn or "MM+"</i>
Dollar Price	18	N		<i>Fixed decimal, up to seven digits nnnn.nnn</i>
Yield	19	N		<i>Fixed decimal, up to six digits, may be negative [-]nnn.nnn</i>
Broker's Broker Indicator	20	N	S - Broker's Broker sale P - Broker's Broker purchase	<i>One character</i>
Weighted Price Indicator	21	N	Y - Weighted Price	<i>One character</i>
List Offering Price/Takedown Indicator	22	N	Y – List Offering Price/Takedown	<i>One character</i>
RTRS Publish Date	23	Y		<i>yyyymmdd</i>
RTRS Publish Time	24	Y		<i>hhmmss</i>

Trade Messages Fields and Format				
Field Name	Field ID	Always Present?	Values	Format/Length
Version Number	25	Y		<i>Up to four digits, fixed decimal nn.nn</i>
Unable to Verify Dollar Price Indicator	26	N	Y – Unable to Verify Dollar Price	<i>One character</i>
Alternative Trading System (ATS) Indicator	27	N	Y - Alternative Trading System	<i>One character</i>
Non-Transaction-Based Compensation Arrangement (NTBC) Indicator	28	N	Y - Non-Transaction-Based Compensation Arrangements	<i>One character</i>

RTRS Subscription Products – Overview

RTRS Subscription Products				
	Trades Included	Modifications	Cancellations	Par Shown
Real-time feeds	All processed by RTRS that day regardless of trade date	All sent to RTRS and all previously submitted trades where par now can be disseminated	All sent to RTRS	“MM+” for trades over \$5 million par and less than T+5
Replay File (a restatement of all messages disseminated by the Real-time feeds for a specific dissemination date)	All processed by RTRS that day regardless of trade date	All sent to RTRS and all previously submitted trades where par now can be disseminated	All sent to RTRS	“MM+” for trades over \$5 million par and less than T+5 on day originally disseminated
T+1 Report	T+1 trade dates only	Latest version of trade only	No	“MM+” for trades over \$5 million par
T+5 Report (includes a separate T+20 report)	T+5 trade dates only	Latest version of trade only	No	All

Appendix B

Summary of Changes to the MSRB RTRS- Comprehensive Trade File Retrieval Specifications Document for the RTRS Subscription Service

Current Specifications – Effective July 2016 New Specifications – Effective Q2 2018		
NOTE: The below summary of differences between the current and new specifications is intended to be a high-level overview of changes. Subscribers making changes to their applications should carefully read the entire specifications document for a comprehensive description of the new dissemination service features.		
Feature	Version	Description of Change
Tagged Files	Current	Files are available in two formats: tagged and delimited
	New	Only the delimited format will continue to be produced.
Automated File Retrieval	Current	Subscribers, in their automated applications, can specify what format(s) of file they wish to download. Subscribers are permitted three parameter options, “Comprehensive-Fixed”, “Comprehensive-TGD”, or <nothing>, indicating if their application is retrieving the delimited format, the tagged format, or both formats respectively.
	New	Specifying the format is no longer necessary. The “Comprehensive-TGD” parameter will no longer be valid. The parameter may be omitted.
Line Breaks	Current	All lines terminate with a Line Feed (LF)
	New	All lines terminate with a Carriage Return and a Line Feed (CR+LF)

Summary of Changes to the MSRB RTRS- Real-Time Dissemination Secure Socket Service Specifications Document for the RTRS Subscription Service

Current Specifications – Effective July 2016

New Specifications – Effective Q2 2018

NOTE: The below summary of differences between the current and new specifications is intended to be a high-level overview of changes. Subscribers making changes to their applications should carefully read the entire specifications document for a comprehensive description of the new dissemination service features.

Feature	Version	Description of Change
Connection Design	Current	<p>Live data is provided using either TCP Sockets or IBM Websphere MQ. Users have the option of utilizing those methods over the internet or by providing a Leased Circuit for dedicated connectivity. The TCP Sockets service is unencrypted.</p> <p>Replay logs are posted nightly and accessible via the Subscription File Retrieval service.</p>
	New	<p>Support has been discontinued for both IBM Websphere MQ and Leased Circuit connectivity.</p> <p>The TCP Socket service has been reengineered as the Real-Time Trade Dissemination Secure Socket Service. This service uses encrypted SSL sockets. Users may establish and maintain a single persistent connection throughout the day and are still required to have their source IPs whitelisted prior to accessing the service. Key changes to the product are as follows:</p> <ul style="list-style-type: none"> • All connectivity must be established using a Secure Socket • Replay requests are no longer permitted. Users may request missed message sequences by submitting a snapshot request to the service or by utilizing the new Real-Time Trade Dissemination Secure Web API Service.

		<p>The new Real-Time Trade Dissemination Secure Web API Service allows users to request message batches throughout the day without maintaining a persistent connection. The service uses a RESTful API and communicates via JSON messaging.</p> <p>Replay logs are posted nightly and made accessible via the new RTRS Subscriber File Retrieval Secure Web API Service.</p>
Sequence Numbers	Current	Each trade message has a unique non-repeating Sequential Number
	New	Sequence numbers reset to '0' at the beginning of each trading day.
Replay Logs	Current	Naming convention: 'Rmmdyy.log'
	New	Naming convention changed to 'replay.yyyy-mm-dd.log'
Open Message	Current	Open Messages are not assigned a sequence number.
	New	Open Messages are now assigned a sequence value of '0' on each new trade date (field 2). They no longer contain field 100.
Close Message	Current	Close Messages are not assigned a sequence number.
	New	Close Messages are now assigned the final sequence number of the day (field 2). They no longer contain fields 100-102.
Error Messages	Current	Error messaging are limited to basic Login and Invalid Request failures
	New	Expanded error messaging will allow for an actionable user response.
Trade Messages	Current	See New for changes.
	New	The following fields are currently mandatory, but have become optional in the new system to expedite message

		<p>publishing when applicable security information is not yet available:</p> <ul style="list-style-type: none"> • Security Description (field 8) • Dated Date (field 9) • Maturity Date (field 11) • Dollar Price (field 18) <p>A new Transaction Type Indicator (field 6) has been created to denote MSRB modifications.</p>
Other System Messages	Current	System Interrupted and System Resumed messages detailed in the specification, but never used.
	New	These message types have been removed.
Business Continuity	Current	The MSRB operates from a primary data center with a secondary data center serving as a relay for message publishing. Failover between the data centers could be significantly disruptive and therefore rarely occurred outside of Business Continuity exercises or major system failures.
	New	<p>The MSRB will operate multiple data centers to provide improved Business Continuity and to reduce the impact from major system failures. Each data center processes and disseminates semi-autonomously while maintaining common numeric sequencing of the messages disseminated. Users will be directed to the Active data center via DNS. Subscribers will need to honor the TTL on the DNS records to ensure that redirection occurs as quickly as possible in the event of a failover.</p> <p>Real-Time Trade Dissemination Secure Socket Service users will be disconnected in the event of a failover. Upon completion of the failover, users honoring the TTL of the DNS record will be able to reconnect into the new Active data center. Depending upon the nature of the failover and the elapsed time to reconnection, users may notice message re-dissemination or sequence gaps. Missing messages can be retrieved live using the Snapshot mechanism or the Real-Time Trade Dissemination Secure Web API Service. Gaps from previous trade days can be corrected using the Replay log.</p>

		Users of the Real-Time Trade Dissemination Secure Web API Service and the RTRS Subscriber File Retrieval Secure Web API Service that adhere to the TTL of the DNS record will be minimally or not impacted in the event of a system failover.
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