Morningstar Web Services

Specification

Version 5.0

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Revision History

Revision History			
Version	**Date**	**By**	**Description**
1.0	09.03.2009	BW	Initial revision
1.2	20.04.2009	BW	Addition of error messages Change of server address
1.3	16.06.2009	BW	Changed <field id to <fld id in examples
1.4	01.09.2009	BW	New version of XML (ver 1.2) additional features
1.4a	09.09.2009	BW	Note re spaces
1.5	23.09.2009	BW	Clarified HTTP protocol version
1.6	22.09.2009	BW	Changed Addresses updated Field requests
1.7	18.01.2010	BW	Added HTTS, changed support phone numbers
1.8	29.07.2010	BW	Added maintenance window
1.9	29.04.2011	BW	Added additional error messages and new features
2.0	18.07.2011	BW	Additional feature in new version (see marked sections)
2.1	03.10.2011	BW	Added additional error messages
2.2	26.10.2011	BW	More functionality
2.2a	02.12.2011	BW	Clarified Latest of BATS/USCOMP processing
2.2b	15.12.2011	BW	Added information on HTTP page expiry
2.2c	20.12.2011	BW	Added additional error messages
2.3	02.03.2012	BW	New features for next release
2.4	24.04.2012	BW	Added Index requests
3.0	14.05.2012	BW	Added 90 Day T&S requests
3.1	25.07.2012	BW	Additional information on 90 Day T&S requests
3.2	25.09.2012	BW	Minor corrections to 90 Day T&S requests and other new features
3.3	04.10.2012	BW	Updates to Field List functionality and new error messages
3.4	04.01.2013	BW	More 90 Day T&S and other functionality
3.5	22.02.2013	BW	Added phase 1 of the Alerts service (ver.a fixed typo's) (ver b further clarification) (ver c clarification on alert 16) (ver d – addition of BATS enhanced fields)
3.6	08.08.2013	BW	Added Request by sec ID and addition T&S parameter for trading market.

Revision History			
Version	**Date**	**By**	**Description**
3.7	22.10.2013	BW	Added additional Tags and more detail on Alerts appendix
4.0	20.11.2013	BW	Re-write to make clearer
4.1	09.12.2013	BW	Updated Alerts Schema
4.2	11.04.2014	BW	Updated BATS enhanced fields
4.3	27.05.2014	BW	New Release of web services
4.3a	29.05.2014	BW	Fixed typo
4.3b	12.06.2014	BW	Fixed Type with extended alerts
4.4	10.09.2014	BW	Updates for new release of code
4.5	19.01.2015	BW	Updates for new release of code
4.5a	02.03.2015	BW	Typo's and corrections
4.5b	11.03.2015	BW	Typo's and corrections
4.6	10.04.2015	BW	Update for new version of code
4.7	17.08.2015	BW	Update for new version of code
4.71	18.01.2016	BW	Further updates to 4.7
4.8	08.03.2015	BW	Update for version 4.8 of code
4.9	31.01.2017	BW	Updated for version 4.9 of code
4.9a	07.03.2017	BW	Further clarifications and examples for streaming
4.9b	10.04.2017	BW	Further clarifications and corrections
4.9c	14.06.2017	BW	List of streaming tags added to Appendix F
5.0	03.11.2017	BW	Added updated for release of WS V5

Contents

1 Morningstar Web Services

1.1 Overview

Morningstar Web Services allows users to access real-time, delayed or end-of-day pricing data, historical data, and related content. Data is available on-demand, using industry protocols and data formats XML and JSON. Users can also set alerts on a wide variety of criteria and receive real-time notifications when pre-defined criteria are met. The developer at the receiving end requires no special software or hardware to receive and decode the feed. The service is particularly suitable for integrating into any web-style environment.

Note: All examples in this document are given using XML format. Responses can be received in JSON format rather than XML format, by using the following tag in the request: &JSONShort.

1.2 Access

The service is accessed via the internet; for security, a static IP address is required. Access is via either HTTP or HTTPS. Full back-up and redundancy options are available.

1.3 Features

Morningstar Web Services have the following key features:

Morningstar Web Services – Key Features	
Feature	**Description**
Level 1 and Level 2 data access	Access to all Morningstar level 1 and level 2 depth data: all fields, all instruments.
Fast request response	Up to 500 instrument queries per second can be returned.
Server-stored symbol lists	Server-stored symbol lists allow for easy access and mean that watch lists can be managed centrally.
Secure access	For security reasons, only client-specific IP addresses are enabled to use the service. Morningstar assigns a unique username and password to every client and defines the exchanges and data that are available to the client. All requests sent by a client must contain the unique username and password.
Monitoring	Pre- and post-instrument limit monitoring.

Morningstar Web Services – Key Features	
Feature	**Description**
Fixed symbol setups	Fixed symbol setups for easy access to indices, and so on.
Request by identifier	Multiple identifiers are supported: ► Instrument code ► ISIN ► Morningstar Perf ID ► Morningstar Investment ID ► Morningstar Sec ID
Responses formats	Responses can be returned in either XML or JSON format.
Index constituent lists	Users can request the constituents of most of the major indices.
Time and Sales service	Users can request 90-day tick data, 5 years' bar data (min, hour, and user-defined), as well as daily, weekly and monthly data.
Alerts	Real-time and delayed. Users can set alerts on a wide variety of criteria and receive real-time notifications when pre-defined criteria are met

1.4 Conventions

The Morningstar Web Services interface is case insensitive, except for instruments, usernames and passwords.

Spaces are not allowed in the command string.

1.5 Real-Time, Delayed or End-of-Day Services

All services are available as real-time, delayed or end-of-day (EOD).

1.5.1 EOD Data

The release of EOD data is done at the correct time of day to ensure that data can be delivered, in most cases, free of end user exchange fees.

The EOD service takes the closing prices from exchanges and quarantines them until the appropriate time of day when the data can be released to the client. A request for the data can be made at any time during the day, however, the previous day's data will be sent until the appropriate time after market close.

Existing commands and functionality of the web service will be available, as the change is done by client permissioning, except for the following:

- Basic Time & Sales will not work for a user who is enabled for EOD.
  For example, if a user requests 151.1.VOD and 151 is enabled for EOD on 151, then an "Invalid enablement" error will be generated in response XML. For full Time & Sales, only daily data is provided if the service is enabled.
- Responses from the EOD database will not have the instrument status field (D954).
- If a user is enabled for EOD on exchange 126, then this cannot be BATS enhanced.

1.6 Instrument Requests Limits

Instrument requests can be sent in any combination that adds up to 500 instruments per second. For example, 500 single instrument requests, or up to 500 symbols in a single request.

If the number of outstanding requests becomes too large due to excessive incoming request rates, then data will simply be dropped. For efficiency, Morningstar recommends that instruments are requested in groups rather than individually.

1.7 Field Requests Limits

Requesting large numbers of fields with large number of symbols generates substantial responses and it may not be possible to transmit the data over the internet within a second. In this case, you should reduce the number of fields requested.

1.8 Fixed Symbol Lists

Web Services clients can be enabled with fixed symbol lists which allow clients to receive tailored packages, such as index packages. For more information, contact your account manager.

1.9 HTTP Protocol

HTTP protocol 1.1 is supported and Morningstar recommends that it is used.

1.9.1 HTTP Compression

All web servers support HTTP compression. This is automatically enabled by the web server if the header of the incoming request includes the "Accept-Encoding: gzip, deflate" field.

1.9.2 HTTP Expiry

The HTTP expiry date is sent in the HTTP header. This is set per client in seconds to a maximum of 24 hours. It can also be set so there is no page expiry.

Example

```
HTTP/1.1 200 OK
Server: Microsoft-IIS/5.1
Date: Mon, 12 Dec 2011 15:54:02 GMT
X-Powered-By: ASP.NET
X-Powered-By: PHP/5.2.8
Expires: Mon, 12 Dec 2011 16:54:00 GMT
Content-type: text/html

<?xml version="1.0" encoding="ISO-8859-1"?><MS_xml_root soft_ver="1.5.2"
provide
r="Morningstar"  xmlns="http://morningstar.com"
xmlns:xsi="http://www.w3.org/200
1/XMLSchema-instance" xsi:schemaLocation="http://localhost
TenforeXMLSchema.xsd"
><report><error>Unable to connect to realtime US
database</error></report></MS_x
ml_root>
```

If a user has an expiry time set, then all requests will have an expiry time set in headers.

1.10 Web Servers

Multiple web servers are available. The London and US plants are clusters with load balancers to support automatic failover in the event of a system failure. All servers run live, with live data.

Server	Location
Msxml.tenfore.com	London
Msbxml.tenfore.com	Frankfurt
Msuxml.morningstar.com	Points to Dallas and Chicago servers
msSxml.tenfore.com	Shanghai

In addition, there are two UAT plants:

Server	Location
Mstxml.tenfore.com	London
Mshxml.morningstar.com	Chicago

Note: There is a brief maintenance window at 23:15 local time each night during which time the responsiveness of the service may be severely reduced for up to 2 minutes while the system backs up its databases

2 Extended Version History

2.1 New Features from Version 1.9 Onwards

- A fixed rate of 100 instruments/sec has been changed to a per client configurable rate of between 1 and 500 instruments per sec (max). All examples below that use 100 should be equally applicable to a number between 1 and 500.
- Field limits have been applied – the number of fields a client can request can be specified on a per client basis.
- Security type limits have been applied – the security types a user can access can be specified on a per client basis.
- Clients can have a pre-set limit of a unique number of instruments that can be requested in a month – once this limit is reached no more new instruments can be requested however existing instruments already requested can be requested again.
- Clients can have a pre-set limit of a unique number of instruments that can be requested in a month – once this limit is reached new instruments can be requested however these will be counted and charged retrospectively.

2.2 New Features from Version 2.0 Onwards

- Support for JSON format for compressed responses.
- Support for SSO and session keys.

  Note: This feature will be deprecated from Web Services version 6 onwards.

2.3 New Features from Version 2.1 Onwards

- Best US equity price – for users who have this feature enabled and delayed US equity data/Realtime BATS the XML service will automatically give the best (most recent) quote from either the delayed composite feed or the real-time BATS feed. The list of BATS enhanced fields is given in *Appendix C* and the rules are as follows:
  - The requesting instrument is in US composite (126) and enabled for delayed
  - BATS (17) and/or BATS-Y (23) is enabled for real-time.
  - The user must be enabled for BATS enhancement.
- Pre- and post-market trade prices in fields D774-D777

2.4 New Features from Version 2.2 Onwards

- Supplying the delta (Requesting updates for instruments later than a given epoch timestamp).
- Time & Sales requests.

2.5 New Features from Version 2.3 Onwards

- Request by ISIN, Morningstar Performance ID or Morningstar.com symbol as well as existing Morningstar Realtime Instrument code.
- Added H14 % net change.

2.6 New Features from Version 2.4 Onwards

- Index requests

2.7 New Features from Version 3.0 Onwards

- 90 Day T&S requests (ticks, minute bars & hour bars).

2.8 New Features from Version 3.1 Onwards

More 90 Day T&S functionality consisting of:

- 90 Days true time & sales data (with F108 = 0 data)
- 90 Day trade tick data for chart display (without F108 = 0) data
- 5 years 1 min bar data, bar data and hour bar data
- As much daily/weekly/monthly data as we have
- Current days data will contain corrections and cancellations
- Users will be able to request from Start Date/Time to End Date/Time
- Special key words for "today's data" and an end Date/Time of 'Now'
- Ability to request the 'true' open and close of the day in the same message.
- One instrument request per message
- Single threaded operation one request at a time
- XML format data only
- Full exchange enablement and rules aware – able to give both real-time and delayed data
- Variable bar requests of between 1 and 100 minutes created on the fly.

- Futures Data available along with equity data
- Options 1 min bars available for US/Canadian stock options

2.9 New Features from Version 3.3 Onwards

- Improved Multi-user performance.
- Add optional &Exchange tag with ISIN requests. This will return instruments with matching exchanges.
- Add field lists.
- Made the &fields Tag in Lists optional
- Add optional &date tag in conjunction with &timesales to display date in GMT.
- Increase old style T&S from last 50 trades to last 100 trades
- Added new fields H15, H16 net change and net change % with adjusted close price.
- For Bar responses display close price as D2 and not D20
- Changed the limit for &interval for Bar generation on 90 Day T&S from 100 to 1440.

2.10 New Features from Version 3.4 Onwards

The following features have been added to the 90Day T&S service:

- JSON Support
- Support for cross Exchange/Sectype requests for up to the last 10 bars (min or hour)
- Ability to restrict the user to a number of Unique instruments/month
- Ability to restrict the user to a number of requests/hour
- New Error messages

The following other features have been added:

- The ability to request a common timestamp in the basic T&S service
- The ability to have an option F108 field in the basic T&S service
- The option to request exchange 511 (Pink and OTC combined)
- basic T&S increased from 100 to 200 trades.

2.11 New Features from Version 3.5 Onwards

Added the ability to setup and retrieve real-time and delayed alerts.

2.12 New Features from Version 3.6 Onwards

- Added ability to request by Sec ID (instrument ID)
- Added option Tag to allow trading exchange in 90Day Tick data

2.13 New Features from Version 3.7 Onwards

- Added &vwap tag for options VWAP field on minbar and bar request
- Added &Exchangeinfo for exchange based meta data
- Added &Tradingdays to allow quick access to up to 60 trading days of bar data
- Added &Calendardays to allow for quick access to up to 90 calendar days of bar data

2.14 New Features from Version 4.0 Onwards

- Restructured document
- Added additional Alerts

2.15 New Features from Version 4.1 Onwards

- Updated and corrected Alerts Schema

2.16 New Features from Version 4.3 Onwards

- Ability to optionally add Openinterest to bars requests
- Ability to optionally receive the alert creation time in Alert responses
- Ability to optionally receive additional fields in the alert response (fields D2, D18, D19, D16, D20, D4, D5, D6, D7, D2374, D2375, D2376, D2377, S9, H15, H16.)
- Ability to auto reset a number of the alerts (alerts 1, 2, 3, 4, 5, 6, 7, 8, 21, 27 and 28)
- Support for Alerts in JSON format
- Ability to optionally receive pre- and post-trading in bar requests
- Addition of composite OTC data and charts on exchange 125
- In Alerts the unique user ID's can now include ()-_ and the length has been increased to 40 chars

- Trading days and calendar days' requests are now sent in exchange local time
- Added alerts resilience – Alerts are now swapped between pairs of servers and triggers can come from either
- New Alerts Schema

2.17 New Features from Version 4.4 Onwards

- The ability to chart forwards and money market instruments
- A number of alert changes:
    - When a client exchange is moved from real-time to delayed or delayed to real-time, the alerts are also moved appropriately.
    - When a client account is deleted all associated alerts are deleted as well
    - Any alerts which are configured as auto reset can be displayed when requesting a list of un-triggered alerts by the use of the &DisplayAutoResetTrigger tag
- &Exchange now works with &perfidy in the same way it works with &ISIN

2.18 New Features from Version 4.5 Onwards

- Ability to request Corporate Action for Markets/Sectype up to N days ago and as far forward as we have as follows
- Support added for up to 10 levels of depth for level 2 data – these will be displayed using normal depth fields. If order book is supplied by the feed it will be converted to depth
- Added weekly and monthly bar requests. The tags are &Weeklybar, &Monthlybar, and are to be used like other types e.g. &type=Monthlybar
- Added the "&unadjusted" tag to receive unadjusted data from the 90 Day service
- Added a digit to the beginning of Alert ID's
- Exchange 511 and 512 no longer supported.

2.19 New Features from Version 4.6 Onwards

- Ability to support 90day T&S requests by ISIN code
- Added &fields=L2 request for L2 data only
- Clients using Alerts can now login with multiple usernames/passwords over a single TCP connection on port 8999

- Added Search feature

2.20 New Features from Version 4.7 Onwards

- Tick History integration – users are able to request up to 1 month of tick data for any instrument/exchange they are entitles to see. (JSON not supported in this release)
- Additional checks (and hence error messages) added for Alerts
- Wildcards can now be used without having to specify and exchange or MIC code in Symbol Search
- For ISIN Requests an optional &Security tag is now allowed to select a specific security type
- Multiple price adjustments on the same day now supported
- Bug fix – fixed issue with Depth generation from order book on CME
- Bug Fix – various corporate actions clean-up changes
- Name Changes now applied to alerts

2.21 New Features from Version 4.8 Onwards

- Ability to request New and Deleted instruments
- Single command EOD data
- Ability to retrieve historical price edits and deletes
- Increase in number of returned instruments in Symbol search to max 5000
- &security tag now accepts a comma-separated list of security types
- Additional &Exchangeinfo information

2.22 New Features form version 4.9 Onwards

- Added ability to do a single day whole market historical EOD request
- Added ability to download history for 'dead' instruments
- Added Streaming as an add-on service
- Added FIGI codes to symbol search for when FIGI codes become available on the feed
- Added Support for optional VWAP on daily bar requests (data available from 1/1/17)
- Increased input limit for values in alert fields to 1 trillion
- Improved error responses for invalid tags
- Grandfathered support for best US equity price.

2.23 New features from version 5.0 Onwards

- Added &NanoSecs tag to return, where available, data with time in nanoseconds in tick requests from the chart server
- Added &RemoveFields and &Addfields to streaming, to add and remove fields within the set of fields allowed for streaming
- Added optional &VWAP to &EODDownload
- Increased fields stored with price-affecting corporate actions
- Extended &prepost functionality to work with tick charts
- Extended 90day T&S coverage to Sectype 4 which is now covered the same as Sectype 2 (no tick)
- Added &Responses tag for symbol search to limit the number of responses received
- Release of Fan Out Device (FoD) version 3.0
- Various bug fixes:
    - Close value in EOD Download will now contain settle for Sectypes 3,4 13
    - D954 is now available on 1st day of trading. Prior to Web Services version 5.0, it needed a close price to start working.
    - Forex prices now have the correct D954 instrument status value
    - Removed the need for a valid trade to have an incremental volume (D3)
    - Fixed issue where EOD Download in JSON format was not returning H1, H2, H3
    - Stream server – corrected instrument status on Sectype 10
    - Fixed an issue where if the end date of the chart was the day before a corporate action, the data could be returned incorrectly
    - Cleaned up error messages for instances where clients not permissioned for data. Now always says "invalid enablement" rather than in some cases "No Data".

3 Core Web Services

The following core services are available to all clients:

- Basic price requests
- List handling
- Sub users
- Wildcard searches and chains
- Single sign on (SSO)

  Note: SSO will be deprecated from Web Services version 6 onwards.

- Best US equity price
- Supplying the delta
- Basic Time and Sales
- Additional keys for requesting data
- Index constituent requests
- Exchange metadata requests
- New and deleted instruments
- OHLCV for end-of-day (EOD)
- Historical price edits

3.1 Basic Price Requests

There are several basic '&' tags than can be used with the system:

Basic Price Requests Tags	
Tag	**Description**
&username=	Followed by a case-sensitive username. The username and password will be used by the system to work out a client's enablement mask. Only data the client is enabled to see (real-time, delayed etc.) will be returned. If the client asks for data and the client is allowed only part of it, just that part will be returned; if the client is enabled for none of the data requested then an error response will be returned.

Basic Price Requests Tags	
Tag	**Description**
&password=	Followed by a case-sensitive password. See above.
&Instrument=	Followed by one or more of the following, separated by a comma: ► <exchange> ► <sectype> ► <symbol> **Example:** &instrument=151.1.VOD, 240.20,GBPUSDCOMP
&fields=	Can come before or after **&Instrument=** in the line and defines the fields for all the instruments in the line. Only one instance of **&fields=** can be used. Fields are as defined in the *Morningstar Exchange and Field Codes* document. The maximum number of fields that may be requested in either a list or directly is 100. **Example:** &fields=H1,H2,D2,D4,D6,S12 To get all real-time fields, you can use the command: &fields=DA The 'A' is for all fields. This also works with 'HA' (header fields) and 'SA' (static fields). **Note:** This can lead to very large responses which can take an extended period of time. Therefore, using the 'all' character should be used with caution.

3.1.1 Request

```
http://msxml.tenfore.com/index.php?username=user&password=pass&instrument=151.1.VOD,240.20.GBPUSDCOMP,240.20.GBPPKRCOMP&fields=H1,H2,D16,D108,D4,D6,S12,S19,S565,D785
```

3.2 List Handling

Lists can be stored on the servers using the following commands:

List Handling Tags	
Tag	**Description**
&list=	Used to retrieve data from a stored list which has been created and amended using the commands below. Cannot be used with &instrument, but can be used with &fields. The &fields command overrides the fields in the stored list. **Example:** &list=list1

List Handling Tags	
Tag	**Description**
&addlist=	Used to add instruments and (if required) fields to a list. If the list does not exist, then the first &addlist command will create it. The client must create a default fields set for the list. To do this when creating a new list the first command in the &addlist command after the name of the list must be an &fields command followed by a list of fields. **Example:** &list=list1&fields=D2,D4,D6 The above command can also be used to change the default fields set saved for an existing list. The &addlist and &fields commands can then be followed by one or more &instrument commands. Each &instrument command can be optionally followed by an &fields command to override the default field set for that instrument. **Example:** &addlist=list1&fields=D2,D4,D6&instrument=151.1.VOD,240.20.GBPUSDCOMP&fields=D4,D6 Changes the default field for the list set to D2, D4, D6, adds the instrument 151.1.VOD with the default fields set, and adds the instrument 240.20.GBPUSDCOMP with the fields D4 and D6 only, overriding the default field list To add an instrument to a list that already exists, the &fields command does not need to be included. **Example:** &addlist=list1&instrument=151.1.HSBC Adds 151.1.HSBC to the stored list1 with the default field set. **Example:** &addlist=list1&instrument=151.1.HSBC&fields=D7,D8 Adds 151.1.HSBC to the stored list1 with fields D7 & D8 overriding the default field set. A list can contain a maximum of 100 instruments, and a user may have a maximum of 10 lists. If the user tries to add a new list when the limit has been reached or extend a list which is already full, an error message will be returned. For more information, see the *Error Responses* section.
&dellist=	Used to remove an instrument from a list when followed by &instrument=. The maximum number of instruments is 100, comma-separated. Fields do not need to be listed. If &Dellist is used with no other qualifiers except the name, then it deletes the entire list: **Example:** &dellist=list1 Deletes list 1.

List Handling Tags	
Tag	**Description**
&AddFieldList= &DelFieldList= &FieldList=	Field lists act in a similar was to normal lists. **Example:** &AddFieldList=FieldList1&Fields=D2,D3,D4,D5,D6 **Example:** &DelFieldList=FieldList1 If a client has set up a list, the following is possible: **Example:** &list=List1&fieldlist=FieldList1 FieldList 1 overwrites any fields defined in the list.

Users should note the following in relation to lists:

- Maximum number of fields in a list is 100.
- Maximum number of field lists that a user can have is 10.
- The &AddFieldList tag can only be used with the &fields tag. It will ignore any other tag. If you call the &AddFieldList tag on a field list that already exists, then it will append the fields to that list. (Duplicates will not be added).
- The &DelFieldList tag will delete the field list. If this tag is used with the &fields tag, then it will remove only those fields from that list. For example, &delfieldlist=list10&fields=D4,D6, will only remove D4 and D6 from the field list.
- The &fieldlist tag can be used with the &instrument and &list tags. More than one field list can be added within the tag, but the tag can only have one occurrence. For example:
    - &fieldlist=fieldlist1,fieldlist2&list=list5,list6.
    - &fieldlist= fieldlist1,fieldlist2&instrument=151.1.VOD,151.1.XTA
- If the &fieldlist tag is used, any &field tag will be ignored.

3.3 Sub Users

Note: Before attempting to use this feature, please contact your Morningstar account manager, as not all exchanges allow this.

Sub users allow clients to identify their clients to Morningstar for exchange reporting purposes.

A regular request has the following format:

```
http://msxml.tenfore.com/index.php?username=user&password=pass&instrument=151.1.VOD,240.20.GBPUSDCOMP,240.20.GBPPKRCOMP&fields=H1,H2,D16,D108,D4,D6,S12,S19,S565,D785
```

To identify a sub user, the username will be following be a name in the following format: '`.subuser`', where 'subuser' can be composed of any characters except ampersand or period ('&' or '.'). The maximum length of a sub user identifier is 49 characters.

Examples:

```
http://msxml.tenfore.com/index.php?username=user.0001&password=pass&instrument=151.1.VOD,240.20.GBPUSDCOMP,240.20.GBPPKRCOMP&fields=H1,H2,D16,D108,D4,D6,S12,S19,S565,D785
```

or

```
http://msxml.tenfore.com/index.php?username=user.MrSmith&password=pass&instrument=151.1.VOD,240.20.GBPUSDCOMP,240.20.GBPPKRCOMP&fields=H1,H2,D16,D108,D4,D6,S12,S19,S565,D785
```

Morningstar monitors each sub user's usage during the month and produces a usage report for the exchange at the end of the month. Each sub user inherits the same enablements mask as the main user.

3.4 Wildcards and Chains

Wildcards and chains can be used in instrument requests.

3.4.1 Asterisk (*) – Wildcard Search

Used at the end of the symbol only and is used for the query 'starts with'.

Example

To find all the stocks on the London Stock exchange starting with 'IC' the instrument query would be:

```
&instrument=151.1.IC*
```

The following results would be returned:

```
<message symbol="151.1.ICA">
<message symbol="151.1.ICB">
<message symbol="151.1.ICGC">
<message symbol="151.1.ICH">
<message symbol="151.1.ICMI">
<message symbol="151.1.ICMW">
<message symbol="151.1.ICOV">
<message symbol="151.1.ICP">
<message symbol="151.1.ICTA">
<message symbol="151.1.ICTB">
<message symbol="151.1.ICTU">
<message symbol="151.1.ICV">
<message symbol="151.1.ICX">
```

Example

For futures, to see all months, the instrument query would be:

```
&instrument=201.3.DX*
```

The following results would be returned:

```
<message symbol="201.3.DX0H">
<message symbol="201.3.DX0Y">
<message symbol="201.3.DX9U">
<message symbol="201.3.DX9Z">
<message symbol="201.3.DXBF0F">
<message symbol="201.3.DXBF0G">
<message symbol="201.3.DXBF0H">
<message symbol="201.3.DXBF0J">
<message symbol="201.3.DXBF0K">
<message symbol="201.3.DXBF0M">
<message symbol="201.3.DXBF0N">
<message symbol="201.3.DXBF0Q">
<message symbol="201.3.DXBF0U">
<message symbol="201.3.DXBF0Y">
```

```
<message symbol=”201.3.DXBF0Z”>
<message symbol=”201.3.DXBF1Z”>
<message symbol=”201.3.DXBF9U”>
<message symbol=”201.3.DXBF9V”>
<message symbol=”201.3.DXBF9X”>
<message symbol=”201.3.DXBF9Z”>
```

3.4.2 Question Mark (?) - Chains

‘?’ can be used for specific character substitution. All ‘?’ must be together and only one group of ‘?’ is allowed.

Example

```
&instrument=240.20.???EURCOMP
```

Returns all cross rates against the Euro on the composite market.

3.5 Single Sign On (SSO)

Note: This feature will be deprecated from Web Services version 6 onwards.

The standard log on request for Web Services has the following format:

```
http://msxml.tenfore.com/index.php?username=user&password=pass&instrument=1
51.1.VOD,240.20.GBPUSDCOMP,240.20.GBPPKRCOMP&fields=H1,H2,D16,D108,D4,D6,S1
2,S19,S565,D785
```

While this remains the recommended approach for any user requesting data from the web servers, Morningstar also supports single sign on (SSO) log in, with a callback and session key.

SSO is done in the following form:

```
http://mstxml.tenfore.com/RTQuote/SMLogin?URL=TheCallbackURL
```

Note: This is a HTTP get example. Alternatively, the callback URL can also be submitted as a post value in the SMLogin page.

The XML service will then call back the URL specified in the above URL and once the client server authenticates the call back, the client server needs to send the following to the XML Service:

```
<?xml version="1.0" encoding="UTF-8" ?>
<WSINFO>
      <STATUS>0</STATUS>
      <INSTID>PRODCUCTIDENTIFIER</INSTID>
      <PAYLOAD>
            <TERMINALID>TheTerminalID</TERMINALID>
      </PAYLOAD>
```

```
      <EMAIL>AContactEmailAddress</EMAIL>
</WSINFO>
```

Where the following values apply:

Value	Description
<STATUS>	0 = No errors 1 = An error Example: Unable to authenticate the callback request.
<INSTID>	Name of the client product.
<TERMINALID>	The user-specific terminal ID provided by Morningstar.
<EMAIL>	A valid contact email address for the product/client.

The following will then be sent from the XML service to the client:

```
<?xml version="1.0" encoding="UTF-8" ?>
<WSINFO>
    <SESSIONKEY>XLZT6FCYAQUTGNJGGJ9HML4669056068</SESSIONKEY>
    <TERMINALID>9900001004</TERMINALID>
      <ENABLEMENT>R0=0|R1=0,1,6,7,9,10|R2=0,1,6,7,9,10|R3=1,6,7,9,10|R5=0|R
6=0|R7=0|R8=1,6,7,9,10|R10=1,6,7,9,10|R12=1,6,7,9,10|R13=0,1,6,7,9,10|R14=0
,1,6,7,9,10|R15=0,1,6,7,9,10|R16=1,6,7,9,10|R18=0,1,6,7,9,10|R19=0,1,6,7,9,
10|R20=0,1,6,7,9,10|R22=0,1,6,7,9,10|R23=0,1,6,7,9,10|R24=0,1,6,7,9,10|R25=
0,1,6,7,9,10|R26=0,1,6,7,9,10|R29=0|R35=0|R126=1,6,7,9,10|N90=0
      </ENABLEMENT>
    <TRACKABLE>NO</TRACKABLE>
</WSINFO>
```

Where the following values apply:

Value	Description
<SESSIONID>	A 30-byte alphanumeric key for this SSO instance. The key has a 30-minute timeout for no activity at which point a new session key needs to be requested.
<ENABLEMENT>	A list of the various enablements for the terminal ID. Only needed for debugging purposes if there is an issue with some data not being enabled.

Users can now make an XML request using this session ID and terminal ID. A normal format response will be returned.

Example:

```
http://msxml.tenfore.com/index.php?Skey=TheSessionKey&TerminalID=TheTerminalID&instrument=151.1.VOD,240.20.GBPUSDCOMP,240.20.GBPPKRCOMP&fields=H1,H2,D16,D108,D4,D6,S12,S19,S565,D785
```

3.6 Best US Equity Price

This feature is no longer supported and will be removed in a future version of the Web Services solution.

3.7 Supplying the Delta

Users can add a timestamp in the request and this will return the instrument only if its last update (D782, D783) is greater than the given time. Times are expressed in Epoch time which is the number of milliseconds since 1st Jan 1970 GMT.

Example

```
http://msxml.tenfore.com/index.php?username=user&password=pass&instrument=151.1.VOD&Fields=D2,D4,D6&TS=1319030550000
```

A response will be generated providing the instrument has updated since the Epoch time of 1319030550000. If the instrument has not been updated since the Epoch time of 1319030550000, no response will be sent for that instrument.

3.8 Basic Time and Sales

Note: This feature is separate to the full historical Time&Sales/Chart service which is an add-on to the web service and separately charged.

Users can request the last 200 trades as a Time&Sales request within the basic web service. The request has the following features:

- It is a separate request from normal instrument requests.
- It is not possible to use the &fields command with the request as the format of the response is fixed.
- Options data and security types 7 & 9 are not available via this request.
- Multiple instruments, wildcards and instrument limits are all supported this request.
- There is an additional schema for Time and Sales. For more information, see *Schemas*.

The request has the following format:

```
http://msxml.tenfore.com/index.php?username=xxxxxxx&password=xxxxxx&instrument=151.1.VOD&timesales
```

The returning XML will have 6 fields:

Field	Description
D502	Trade time (HH:MM:SS.ms format) Time and Sales is normally based on field D502. If an instrument does not contain D502, then it uses GMT instead. The GMT time is the feed time (SYSTIME) converted to GMT.
D214	Listing exchange
D3	Size (volume)
D2	Price
D4	The last bid before this trade
D6	The last offer before this trade

3.8.1 Time&Sales Response Header

Previously, a Web Services response had the following header format:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<MS_xml_root soft_ver="1.4.1" provider="Morningstar"
xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
```

For Time&Sales, the response header has the following format:

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<MS_xml_root soft_ver="1.5.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://mstxml.tenfore.com
TenforeXMLSchemaTS.xsd">
```

3.8.2 Web Services Response

The following is an example of a full Web Services response for a Time&Sales request:

```
<?xml version="1.0" encoding="ISO-8859-1" ?>
<MS_xml_root soft_ver="1.5.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://mstxml.tenfore.com
TenforeXMLSchemaTS.xsd">
<report>
      <error>OK</error>
</report>
<message symbol="151.1.VOD">
      - <trade>
            <fld id="D502">10:38:33.135</fld>
            <fld id="D214">151</fld>
            <fld id="D3">955</fld>
            <fld id="D2">171.95</fld>
             <fld id="D4">171.85</fld>
             <fld id="D6">171.9</fld>
      </trade>
      - <trade>
            <fld id="D502">10:38:33.135</fld>
        <fld id="D214">151</fld>
        <fld id="D3">1904</fld>
        <fld id="D2">171.95</fld>
        <fld id="D4">171.85</fld>
        <fld id="D6">171.9</fld>
      </trade>
      - <trade>
             <fld id="D502">10:38:24.177</fld>
            <fld id="D214">151</fld>
            <fld id="D3">100</fld>
            <fld id="D2">171.9</fld>
            <fld id="D4">171.85</fld>
            <fld id="D6">171.9</fld>
      </trade>
  </message>
```

```
</MS_xml_root>
```

3.8.3 Option Tag – &Date

The option tag &Date includes the dates of the trade in each section of the response in GMT.

```
http://msxml.tenfore.com/Index.php?username=XXXXXX&password=XXXXXX&Instrume
nt=151.1.VOD&TimeSales&date
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root soft_ver="1.9.3a" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi
="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchemaTS.xsd">
<report>
      <error> = OK</error>
</report>
<message symbol="151.1.VOD">
<trade>
      <fld id="D502"> 10:17:20.979</fld>
      <fld id="D953">26-09-2012</fld>
      <fld id="D214">151</fld>
      <fld id="D3">5067</fld>
      <fld id="D2">177.9</fld>
      <fld id="D4">177.85</fld>
      <fld id="D6">177.9</fld>
</trade>
<trade>
      <fld id="D502">10:17:20.979</fld>
      <fld id="D953">26-09-2012</fld>
      <fld id="D214">151</fld>
      <fld id="D3">877</fld>
      <fld id="D2">177.9</fld>
      <fld id="D4">177.85</fld>
      <fld id="D6">177.9</fld>
</trade>
.....
```

3.8.4 Option Tag – &Commontime

You can request a common timestamp in addition to the D502 timestamp. The value will appear in field D942 and is given in EST. It always reflects of the data is delayed or real-time.

The request:

```
http://msxml.tenfore.com/Index.php?username=XXXXXX&password=XXXXXX&Instrume
nt=151.1.VOD&TimeSales&date&Commontime
```

The response:

```
<trade>
  <fld id="D502">12:05:14.336</fld>
  <fld id="D942">07:05:14.000</fld>
  <fld id="D953">04-01-2013</fld>
  <fld id="D214">151</fld>
  <fld id="D3">222</fld>
  <fld id="D2">157.85</fld>
  <fld id="D4">157.85</fld>
  <fld id="D6">157.9</fld>
</trade>
```

3.8.5 Option Tag – &tradecont

You can request for the value of D108 to determine if the trade should update the high/low etc.

is given in EST. It always reflects of the data is delayed or real-time.

The request:

```
http://msxml.tenfore.com/Index.php?username=XXXXXX&password=XXXXXX&Instrume
nt=151.1.VOD&TimeSales&date&commontime&tradecond
```

The response:

```
<trade>
  <fld id="D502">12:05:14.336</fld>
  <fld id="D942">07:05:14.000</fld>
  <fld id="D953">04-01-2013</fld>
  <fld id="D214">151</fld>
  <fld id="D3">222</fld>
  <fld id="D2">157.85</fld>
  <fld id="D108">19</fld>
  <fld id="D4">157.85</fld>
  <fld id="D6">157.9</fld>
</trade>
```

3.9 Additional Keys for Requesting Data

As well as the &instrument tag, there are three other tags that can be used to query instruments:

- &ISIN
- &perfID
- &investmentID

Note: When using these tags, a number of behavioural changes need to be considered. A single request can generate multiple instruments in response as (for example) the ISIN is only unique at the company level, not the instrument level.

3.9.1 Considerations

The following considerations should be taken in respect to &ISIN, but equally apply to &perfID and &investmentID.

- All user data restrictions apply to ISIN requests. For example, 1-500 instruments per seconds. Users can also use the fields tag to request specific fields.
- Monthly unique instrument limits also work, but the list is based on Morningstar instrument codes (for example, 151.1.VOD), not the ISIN instrument.
- The response for ISIN requests will be same as normal requests and users must use S19 to match requesting ISIN instrument to Morningstar instrument.
- If a user requests an ISIN, but the returning instrument is an exchange he is not enabled for, then the instrument will not be displayed in the response.
- ISIN requests can be sent as JSON responses with &jsonshort tag. They support the SSO log in with session and terminal keys.
- ISIN requests cannot request Time&Sales data.
- Normal requests cannot be mixed with ISIN requests. For example, the request cannot have the &instrument tag and &ISIN tag in the same request.
- The Restricted user file is not supported for ISIN instrument requests.
- For ISIN requests only, it is possible to add the &Security tag and give a security type for the request.

3.9.2 Example – &isin Instruments Request

```
HTTP://msxml.tenfore.com/index.php?username=xxxx&password=xxxx&ISIN=AEDFXA0
M6V00,AGP8696W1045&fields=D2,D4,D6
```

3.9.3 Example - &perfID Instruments Request

```
HTTP://msxml.tenfore.com/index.php?username=xxxx&password=xxxx&perfid=0P000TMFH
```

3.9.4 Example - &investmentID Instruments Request

```
HTTP://msxml.tenfore.com/index.php?username=XXX&password=YYY&investmentID=E0USA00A05&fields=.....
```

3.9.5 Option Tag - &exchange

An optional &exchange tag has been added to the Web Services for use with &ISIN and &investmentID. The exchanges used are the normal Morningstar Real-Time exchange codes. For a full list of exchange codes, see the *Morningstar Fields and Exchange Codes* document.

Example

```
http://msxml.tenfore.com/Index.php?username=XXXXXX&password=XXXXXX&ISIN=GB00B16GWD56&exchange=151
```

Since there can only be one instance of the &ISIN or &exchange tag in each request, all the ISINs being requested need to be associated with the same exchange.

Example

```
http://msxml.tenfore.com/Index.php?username=XXXXXXX&password=XXXXXX&ISIN=GB00B16GWD56,GB0031348658&exchange=151&fields=D2,S12
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root soft_ver="1.9.3a" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi
="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
<report>
      <error> = OK</error>
</report>
<message symbol="151.1.VOD">
      <fld id="D2"> 177.828</fld>
      <fld id="S12"> Vodafone Group PLC</fld>
</message>
<message symbol="151.1.BARC">
      <fld id="D2"> 217.081</fld>
      <fld id="S12"> Barclays PLC</fld>
</message>
</MS_xml_root>
```

3.10 Index Constituent Requests

Users can request the constituents of most of the major indices. An up-to-date list can be found on the Morningstar FTP servers:

FTP Server Location	IP Address	Password and Usernames
London	83.244.214.45	Username = publicftp (lowercase) Password = publicftp (lowercase)
Frankfurt	195.47.237.83	
The index files and the index of these index files (Indexmap.log) are in the IndexMembers sub-directory.		

3.10.1 &Index tag

The XML tag &Index is used followed by a comma-separated list of the instrument codes for the indices.

Note: The request cannot be used with &instruments, &ISIN, &perfID, &investmentID, or &fields.

The request

```
http://mstxml.tenfore.com/index.php?username=xxxxx&password=xxxx&index=151.10.UKX,33.10.DJI
```

and the response

```
<MS_xml_root soft_ver="1.6.1a"
provider="Morningstar"  xmlns="http://morningstar.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://localhost TenforeXMLSchema.xsd">
            <report>
                        <error>OK</error>
            </report>
            <message
symbol="151.10.UKX">151.1.VOD,151.1.XTA,151.1.ARM,151.1.BP/</message>
<message symbol="33.10.DJI">19.1.MSFT,19.1.IBM,19.1.ICI</message>
</MS_xml_root>
```

3.10.2 XML Responses

For XML index responses, like in the previous example:

- The constituents for that index will be comma-separated within the message entity.
- The tag <fld id=" "> will not exist for index XML responses.

3.10.3 JSON Responses

JSON responses will be a single array with paired values for data; first value is index, second is comma-separated constituents.

```
    "quotes": {
        "results": [
            {
                "151.10.UKX": "151.1.VOD,151.1.XTA,151.1.ARM,151.1.BP/",
                "33.10.DJI": "19.1.IBM,19.1.ICI"
            }
        ]
    }
}
```

3.11 Exchange Metadata Requests

The &ExchangeInfo tag in a request provides metadata about an exchange, for example, timezone, open/close times, and so on.

```
http://msxml.tenfore.com/Index.php?username=XXX&password=YYY&Exchangeinfo
=151
```

The response is:

```
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root soft_ver="3.0.11" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi
="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://mstxml.tenfore.com TenforeXMLSchema.xsd">
<report>
      <error> = OK</error>
</report>
<message symbol="151.1.EXCHANGEINFO">
      <fld id="D2366"> 25-12-2013,26-12-2013</fld>
      <fld id="D2367"> BST</fld>
      <fld id="D2368"> 08:00</fld>
      <fld id="D2369"> 16:30</fld>
      <fld id="D2370"> Saturday,Sunday</fld>
      <fld id="D2371"> -</fld>
      <fld id="D2372"> 24-12-2013||12:30,31-12-2013||12:30</fld>
      <fld id="D2373"> LSE (SEAQ national)</fld>
</message>
<message symbol="151.7.EXCHANGEINFO">
      <fld id="D2366"> 25-12-2013,26-12-2013</fld>
      <fld id="D2367"> BST</fld>
```

```
      <fld id="D2368"> 08:00</fld>
      <fld id="D2369"> 16:30</fld>
      <fld id="D2370"> Saturday,Sunday</fld>
      <fld id="D2371"> -</fld>
      <fld id="D2372"> 24-12-2013||12:30,31-12-2013||12:30</fld>
      <fld id="D2373"> LSE (SEAQ national)</fld>
</message>
<message symbol="151.8.EXCHANGEINFO">
      <fld id="D2366">25-12-2013,26-12-2013</fld>
      <fld id="D2367">BST</fld>
      <fld id="D2368"> -</fld>
      <fld id="D2369"> -</fld>
      <fld id="D2370"> Saturday,Sunday</fld>
      <fld id="D2371"> -</fld>
      <fld id="D2372">24-12-2013||12:30,31-12-2013||12:30</fld>
      <fld id="D2373"> LSE (SEAQ national)</fld>
</message>
<message symbol="151.9.EXCHANGEINFO">
      <fld id="D2366"> 25-12-2013,26-12-2013</fld>
      <fld id="D2367"> BST</fld>
      <fld id="D2368"> 08:00</fld>
      <fld id="D2369"> 16:30</fld>
      <fld id="D2370"> Saturday,Sunday</fld>
      <fld id="D2371"> -</fld>
      <fld id="D2372"> 24-12-2013||12:30,31-12-2013||12:30</fld>
      <fld id="D2373"> LSE (SEAQ national)</fld>
</message>
<message symbol="151.10.EXCHANGEINFO">
      <fld id="D2366">25-12-2013,26-12-2013</fld>
      <fld id="D2367"> N/A</fld>
      <fld id="D2368"> -</fld>
      <fld id="D2369"> -</fld>
      <fld id="D2370"> Saturday</fld>
      <fld id="D2371"> -</fld>
      <fld id="D2372">24-12-2013||12:30,31-12-2013||12:30</fld>
      <fld id="D2373"> LSE (SEAQ national)</fld>
</message>
</MS_xml_root>
```

3.12 New and Deleted Instruments

New and deleted symbols for you to the last 7 days can be requested using the following tags:

- &newsymbols
- &delsymbols

In the request, users must define the following:

- An exchange, using the &exchange tag
- A security type, using the &security tag

If either of the above are missing, then the following default values are used:

- Start time, midnight GMT, using the &stime tag
- Start date, current date (today), using the &sdate tag
- End time, current time, using the &etime tag
- End date, current date (today), using the &edate tag

Example

The following request will return all new symbols on exchange 155 with security type 1.

```
http://msxml.tenfore.com/changes/?username=******&password=******&exchange=155&security=1&newsymbols
```

For a list of deleted symbols, you replace &newsymbols with &delsymbols.

Each new/deleted symbol returned will have the following fields, if available:

Field ID	Description
D2124	Perf ID
S2	Root
S12	Name
S9	Currency
S19:	ISIN code
S7	Strike price
S677	Put or call
S780	Expiry

Example

```
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root xsi:schemaLocation="http://msoxml.tenfore.com
TenforeXMLSchema.xsd" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="http://morningstar.com" provider="Morningstar" soft_ver="7.4.6b">
<report>
      <error>OK</error>
</report>
<message symbol="126.1.PGHD">
      <fld id="S12">PACER FDS TR GLOBAL HIGH DIVID ETF</fld>
      <fld id="S9">USD</fld>
      <fld id="S19">US69374H7098</fld>
</message>
</MS_xml_root>
```

3.13 OHLCV for EOD

You can request OHLCV for EOD symbols that have traded within the last day. The request is from Snapper via XML. The following tag is used to request the data:

- &eoddownload - No value is required in this tag

You must specify an exchange using the &exchange tag. &security is an optional tag. Values are a comma-separated list of security types.

Since Web Services version 5.0, there is also the optional &VWAP tag. It adds the VWAP to the EOD download.

Example

```
http://localhost/index.php/?username=******&password=******&exchange=2&secu
rity=1&eoddownload
```

Each record returned will have the following fields, if available:

Field ID	Description
D2	Last price
D16	Cumulative volume
D17	Open price
D18	High price
D19	Low price
D243	VWAP. Optional. Only added when &VWAP tag is used.
D784	Date of last trade (New York time)

Field ID	Description
S9	Listed currency
S12	Company name
S19	ISIN code

Example

```
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root xsi:schemaLocation="http://msoxml.tenfore.com
TenforeXMLSchema.xsd" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="http://morningstar.com" provider="Morningstar" soft_ver="7.4.6b">
<report>
      <error>OK</error>
</report>
<message symbol="151.7.09GG">
      <fld id="D2">45</fld>
      <fld id="D16">10000</fld>
      <fld id="D17">45</fld>
      <fld id="D18">45</fld>
      <fld id="D19">45</fld>
      <fld id="D784">16-02-2016</fld>
      <fld id="S9">USD</fld>
      <fld id="S12">Barclays Bank PLC</fld>
      <fld id="S19">GB0000779529</fld>
</message>
</MS_xml_root>
```

3.14 Historical Price Edits

You can now request historical price adjustments for a selected exchange by using the following tags:

- &pricechangeadjusted - Historical adjusted price changes
- &pricechangeunadjusted - Historical unadjusted price changes
- &bulkpricedelete - Bulk price deletes

Note: Only one of the above tags can be used at a time.

You must specify an exchange using the &exchange tag.

You can limit the search between two dates using the following tags:

- &sdate - Historical adjusted price changes

  The default value is the earliest available date in the database.

A value of 'today' in this tag returns all messages received so far today.

- &edate - Historical unadjusted price changes

  The default value is today's date.

Example

A &pricechangeunadjusted request:

```
http://mso2xml.tenfore.com/indexTS/?username=******&password=******&pricech
angeadjusted&exchange=126&sdate=01-01-2016
```

and response:

```
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root xsi:schemaLocation="http://mso2xml.tenfore.com
schema90DayTSImm.xsd" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="http://morningstar.com" provider="Morningstar" soft_ver="7.4.7d">
      <report>
            <error>OK</error>
      </report>
      <message Date="05-01-2016">
            <message symbol="126.1.FMC">
                  <fld id="D2003">16022006,A,O,15.31050025,15.3675</fld>
                  <fld id="D2003">16032006,A,O,15.4555,15.525</fld>
                  <fld id="D2003">28042006,A,O,16.42149925,16.125</fld>
            </message>
      </message>
      <message Date="06-01-2016">
            <message symbol="126.1.FMC">
                  <fld id="D2003">03012006,A,O,41.16329217,31.666664</fld>
                  <fld id="D2003">23052012,A,C,35.95996404,35.77996</fld>
            </message>
      </message>
</MS_xml_root>
```

A &bulkpricedelete response:

```
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root xsi:schemaLocation="http://mso2xml.tenfore.com
schema90DayTSImm.xsd" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="http://morningstar.com" provider="Morningstar" soft_ver="7.4.7d">
      <report>
            <error>OK</error>
      </report>
      <message Date="08-01-2016">
            <message symbol="7.1.$">
                  <fld id="D2631">D=30102015,151.1.VOD</fld>
                  <fld id="D2631">D=30102015,151.1</fld>
            </message>
      </message>
      <message Date="13-01-2016">
            <message symbol="7.1.$">
                  <fld id="D2631">D=22122015,151.1.PSON</fld>
            </message>
      </message>
</MS_xml_root>
```

4 Additional Services

In addition to the core services described in section 3, a number of services are separately enabled and are priced individually:

- 90-Day Time and Sales
- Alerts
- Corporate actions
- Search
- Tick history requests
- Streaming web services

4.1 90-Day Time and Sales/Chart Data

90Day Time and Sales – Chart Data	
Tag	**Description**
&Stime	(hh:mm:ss) and sdate (dd-mm-yyyy) are the starting time and date in GMT
&Etime	(hh:mm:ss) and edate (dd-mm-yyyy) are the end time and date in GMT
&type	This has the following possible values minbar, hourbar, dailybar, Weeklybar, Monthlybar, bar, and tick. Please note dailybar currently run midnight to midnight GMT
&tradecond	If present all trades including those with F108=0 will be included, this includes, late trades, overnight trades etc.
&SingleDataPoint	This returns a single data point for charting (the close of the bar) the &type tag will tell what sort of bar, min, hour etc
&etime=now or &eDate=now	This will set the end time/date to current time in GMT. If either of the tags has the 'now' parameter, it will override the other even if it has a valid time or date.
&Today	This will give data from midnight GMT to current time in GMT. This will override the stime/sdate/etime/edate flags
&OpenClose	If present, this will give the true open and close in separate fields in the response. This supereceeds the previous operation of the dayprice field
&Interval=XXX	This allows a bar interval to be specified and can have a value (in minutes) of between 1 and 100 (changed to 1440 in version 3.2). Please note the &type has to have the value bar (see below)
&vwap	VWAP data is optionally supported for minute bars and 'n' minute bar data (&minbar and &bar requests) using the tag &vwap and for daily bars since 01/01/2017.
&tradingdays	Used to specify the number of trading days data being requested for minbar, bar and dailybar requests without using a start and end time – MAX 60 trading days supported. Providing data has been received in the past 30 Days
&calendardays	Used to specify the number of calendar days data being requested for minbar, bar and dailybar requests without using a start and end time – MAX 90 calendar days supported
&listingexch	Adds the trading exchange (D214) to 90day T&S request primarily for US equities.
&openinterest	Optional tag to include open interest data in the response
&prepost	Optional tag to include pre- and post-trading data in the response
&unadjusted	Allows for unadjusted data to be received (new in version 4.5 Q1 2015)
&tradecond	If present all trades including those with F108=0 will be included, this includes, late trades, overnight trades etc.
&SingleDataPoint	This returns a single data point for charting (the close of the bar) the &type tag will tell what sort of bar, min, hour etc.

90Day Time and Sales – Chart Data	
Tag	**Description**
&NanoSecs	Displays a nanosecond value if available.

Here is an example of the tags being used in a request:

```
http://msxml.tenfore.com/indexTS?username=fred&password=fred&instrument=151
.1.VOD&sdate=14-03-2012&stime=09:30:00&edate=25-04-
2012&etime=17:30:00&type=tick
```

The returning XML stream can be sent back to client either immediately or via links to files on the web server. This is calculated from the type of data requested.

A response will be sent immediately if:

- Type is tick and data is today's data only.
- Type is minbar and data is 15 Calendar days or less.
- Type is hourbar.

A response will be sent via file links if:

- Type is tick and data is not today's data (historic data)
- Type is minbar and data is more than a week.

The XML response will contain a message with a number of trades or bars. For each day, there can be an optional <dayprice> element which consists of the open and close price for the whole day. If the exchange has multiple closes this will be the final close when it's available before that it will be the initial close prices. If a close price is not available for the day, then this element will not be returned.

If a field is not available, it will not be present in the XML stream.

The fields for tick response in a trade element:

Fields for Tick Response in a Trade Element	
Field ID	**Description**
D953	trade date in GMT, format (dd-mm-yyyy)
D952	trade time in GMT, format (hh:mm:ss.msec)
D502	(Optional) exchange time, format (hh:mm:ss.nanosec). Displayed if present. If &Nanoseconds tag is used, will be in nanoseconds, else will be milliseconds.
D3	Volume
D2	Price
D4	Last bid
D6	Last offer

The fields for a minbar or hourbar response in a trade element:

Fields for a minbar or hourbar response in a trade element	
Field ID	**Description**
D953	bar start date in GMT, format (dd-mm-yyyy)
D952	bar start time in GMT, format (hh:mm)
D16	cumulative volume
D17	opening price (within the bar)
D18	high price (within the bar)
D19	low price (within the bar)
D2	closing price (within the bar)

The fields in a day price element:

Fields for a minbar or hourbar response in a trade element	
Field ID	**Description**
D953	date in GMT, format (dd-mm-yyyy)
D17	opening price
D2	closing price

JSON responses work with the 90Day T&S service

4.1.1 Cross Exchange Time and Sales Requests

As part of the 90Day T&S service it is possible to request:

- The last 'n' bars for an entire exchange,
- A security type on an exchange, or
- A list of instruments on an exchange.

The following considerations apply:

- 'n' has a value of 1-10.
- The maximum number of instruments in the list is 500.
- 2 new tags have been defined, &security and &numbars.
- The tag &security is to be used with the &exchange tag to give last n minutes across a market. This tag is optional and if not used will give all instruments across all security types.
- The &numbars tag defined the number of min or hours bars required. The value has to be within range of 1-10 otherwise an error is given. If this tag is not present, the software will default to a value of 1.
- To get single data point data use the tag &singledatapoint.

Note: For last n minute requests the start and end date/time tags are not used.

Example 1:

Request format for all instruments across market on a specific security type for minbar data

```
http://msxml.tenfore.com/indexTS/?username=XXXXXX&password=XXXXX&exchange=126&security=2&type=minbar&numbars=10
```

Example 2:

Request format for all instruments for all security types for minbar data

```
http://msxml.tenfore.com/indexTS/?username=XXXXX&password=XXXXX&exchange=126&type=minbar&numbars=10
```

Example 3:

Request format for all instruments on a specific security type for minbar single point data.

http://msxml.tenfore.com/indexTS/?username=XXXXX&password=XXXXX&exchange=126&security=2&type=minbar&singledatapoint

Example 4:

Request format for a list of instruments for minbar

```
http://msxml.tenfore.com/indexTS/?username=XXXXX&password=XXXL&instrument=126.1.MSFT,126.1.AA,126.1.IBM&type=minbar
```

Note: For hour bar requests, replace the type 'minbar' with 'hourbar'.

4.1.2 Considerations

You should consider the following when using this feature and the 90Day Time and Sales service in general:

- Responses can be very large – please consider carefully what is requested. Where possible, always request by Sectype as there can be many Warrants, Funds and ETF's which are not required. For example, Stuttgart has a million instruments of which most are warrants. Whilst few trade and so the response will be small it will take the web service a considerable amount of time and resource to comb through the last 'n' minutes of a million instruments. Please also consider if a 'bar' (OHLCV) is needed or a single data point is enough.
- Bars are only generated for instruments take have traded in that 'n' minute period, so many lesser traded instruments may not be included in the response. It is up to the receiver to deal with this in the chart.
- Multiple responses for different instrument may be included in a single response, it is up to the user to parse them separately:
    - Ability to restrict the user to a number of unique instruments/month -Commercially we can restrict users to a number of unique instruments in the 90 Day T&S Service per month
    - Ability to restrict the user to a number of requests/hour - Commercially we can restrict users to a number of requests from the 90 Day T&S Service per hour
    - New Error messages – See *Appendix D* for a list of error messages.

4.1.3 Requesting Historical Data for an Exchange for a Single Day

This request allows the user to request OHLCV for all instruments on an exchange that traded on a specific day any time in the past that the system has data for.

Example

```
http://mstxml.tenfore.com/IndexTS/?Username=XXXXXX&password=XXXXXX&HisEODExchange&sdate=10-01-2005&exchange=151
```

This will request all instruments that traded on exchange 151 (London Stock Exchange) for the 10-01-2005.

The response will be similar to the following example:

```
<?xml version="1.0" encoding="UTF-8"?><MS_xml_root soft_ver="7.5.7a"
provider="Morningstar"  xmlns="http://morningstar.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://mstxml.tenfore.com schema90DayTSImm.xsd">
<report>
<error>OK</error>
</report>
<message symbol="151.1.0P6O"><trade><fld id="D953">10-01-2005</fld><fld
id="D952">00:00</fld><fld id="D16">0</fld><fld id="D17">26.145</fld><fld
id="D18">26.145</fld><fld id="D19">26.145</fld><fld
id="D2">26.145</fld></trade></message>
<message symbol="151.1.365"><trade><fld id="D953">10-01-2005</fld><fld
id="D952">00:00</fld><fld id="D16">518</fld><fld id="D17">16.5</fld><fld
id="D18">15.37</fld><fld id="D19">15.37</fld><fld
id="D2">16.5</fld></trade></message>
<message symbol="151.1.50IT"><trade><fld id="D953">10-01-2005</fld><fld
id="D952">00:00</fld><fld id="D16">0</fld><fld id="D17">26.145</fld><fld
id="D18">26.145</fld><fld id="D19">26.145</fld><fld
id="D2">26.145</fld></trade></message>
<message symbol="151.1.68HN"><trade><fld id="D953">10-01-2005</fld><fld
id="D952">00:00</fld><fld id="D16">0</fld><fld id="D17">115</fld><fld
id="D18">115</fld><fld id="D19">115</fld><fld
id="D2">115</fld></trade></message>
.
.
.
```

4.1.4 Requesting Data for all Instruments Including Those No Longer Trading

To facilitate fast access to historical data our chart data server keeps an index of currently trading instruments in RAM. An instrument will remain in the RAM index for a year after the last time it trades. Before version 4.9 of the Web Services solution, there was no way to obtain the historical data for an instrument that ceased trading a number of years ago.

Another potential issue is ticker symbol re-use. For example, the instrument 151.1.ABC may have been used for a company from 1989 to 2001. An exchange could currently be re-using the same ticker symbol for a different instrument and/or a different company.

To overcome this, all requests for instruments that are no longer trading must be extracted by first creating an index for instruments for a specific year and then retrieving the data for that year. If multiple years' data is required, then multiple requests need to be made, one for each year.

To create the index, the following request is used:

```
http://mstxml.tenfore.com/IndexTS/?Username=XXXXXX&password=XXXXXX&SymbolList&sdate=10-01-2005&exchange=151
```

This request retrieves a list of all instruments that traded on the LSE in the year 2005.

Note: The request only takes the year from the &sdate parameter the day and the month are ignored.

The following response is returned:

```
<?xml version="1.0" encoding="UTF-8"?><MS_xml_root soft_ver="7.5.7a"
provider="Morningstar"  xmlns="http://morningstar.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://mstxml.tenfore.com schema90DayTSImm.xsd">
<report>
<error>OK</error>
</report>
<message symbol="151.1.01GS"></message>
<message symbol="151.1.01IP"></message>
<message symbol="151.1.02IP"></message>
<message symbol="151.1.03IP"></message>
<message symbol="151.1.04HK"></message>
.
.
.
```

Using the list of instruments returned from this symbol request, the user should request one instrument at a time and add the tag &fullsearch to the daily bar request and make the request from the start of the year to the end of the year or shorter.

Note: To avoid unpredictable results, the request should not go outside of the year the symbol list is for.

```
http://mstxml.tenfore.com/IndexTS/?Username=XXXXXX&password=XXXXXX&Instruments 151.1.01GS&sdate=01-01-2005&edate=31-12-2005&type=dailybar&FullSearch&exchange=151
```

The following response is returned:

```
<?xml version="1.0" encoding="UTF-8"?><MS_xml_root soft_ver="7.5.7a"
provider="Morningstar"  xmlns="http://morningstar.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://mstxml.tenfore.com schema90DayTSImm.xsd">
<report>
<error>OK</error>
</report>
<message symbol="151.1.01GS">
<trade><fld id="D953">29-07-2005</fld><fld id="D952">00:00</fld><fld
id="D16">0</fld><fld id="D17">110</fld><fld id="D18">116.18</fld><fld
id="D19">110</fld><fld id="D2">116.18</fld></trade><trade><fld
id="D953">19-04-2005</fld><fld id="D952">00:00</fld><fld
id="D16">0</fld><fld id="D17">107</fld><fld id="D18">116.18</fld><fld
id="D19">107</fld><fld id="D2">116.18</fld></trade><trade><fld
id="D953">16-03-2005</fld><fld id="D952">00:00</fld><fld
id="D16">0</fld><fld id="D17">112</fld><fld id="D18">116.18</fld><fld
id="D19">112</fld><fld id="D2">116.18</fld></trade><trade><fld
id="D953">14-03-2005</fld><fld id="D952">00:00</fld><fld
id="D16">0</fld><fld id="D17">108.5</fld><fld id="D18">116.18</fld><fld
id="D19">108.5</fld><fld id="D2">116.18</fld></trade><trade><fld
id="D953">11-03-2005</fld><fld id="D952">00:00</fld><fld
id="D16">0</fld><fld id="D17">107.5</fld><fld id="D18">116.18</fld><fld
id="D19">107.5</fld><fld id="D2">116.18</fld></trade><trade><fld
id="D953">20-01-2005</fld><fld id="D952">00:00</fld><fld
id="D16">0</fld><fld id="D17">109</fld><fld id="D18">116.18</fld><fld
id="D19">109</fld><fld id="D2">116.18</fld></trade><trade><fld
id="D953">18-01-2005</fld><fld id="D952">00:00</fld><fld
id="D16">0</fld><fld id="D17">109</fld><fld id="D18">116.18</fld><fld
id="D19">109</fld><fld id="D2">116.18</fld></trade>
</message>
</MS_xml_root>
```


4.1.5 Adding VWAP to a Daily Bar Request

The tag &VWAP can now be used with a daily bar request. VWAP data will be available from the 1/1/17.

4.2 Alerts

This section outlines the functionality of the alerts system. The following terminology will be used:

Term	Definition
client terminal	Terminal of a 3rd party. Connects to the 3rd party server not the Morningstar Web Services.
client server	Server of the 3rd party system which supports the client terminals, which connects to the Morningstar Web Services API.

4.2.1 Setting Up an Alert

1. A client sets up an alert on a client terminal.
2. The alert details are sent from the client terminal to the client server.
3. The client server sends the alert to the Morningstar Web Services, including a unique user ID (20 characters, alphanumeric) which the client server uses to identify the client terminal.
4. The client server does not need to store any data about the alert.
5. When the alert is breached, Morningstar Web Services sends a message to the client server, giving the details of the alert breach including the unique user ID.
6. Using the unique user ID, the client server passes the details of the alert that was breached back to the client terminal.

4.2.2 Functional Details

- The alert service is a push service; once an alert has been breached it will be sent and then archived on the Morningstar Web Service.
- The client server needs to open a TCP Port 8999 connection to the Morningstar Web Service. The same credentials used for normal web service requests should be used to log on. For example:

  <STX>username=fred&password=123446<ETX>

  Multiple user ID's and password can be sent in a comma separated list. For example:

  <STX>username=fred&password=123446, username=bill&password=111111<ETX>

  Note: If a single username/password combination is incorrect, the logon request will be rejected.

- A POLL should be sent every 10 seconds as a keep alive, this poll message will consist of <STX>POLL<ETX> and the Morningstar Web Service will respond with the same. If no poll is received for 1 minute, the connection will be dropped by the Morningstar Web Service and will need to be re-established by the client server.
- Any alerts that are triggered while the client server is not logged on will be stored and sent upon logon.
- Un-triggered alerts will remain on the Morningstar Web Service for 5 years.
- A user can ask for a list of triggered or active alerts.
- A user can modify or delete an active alert.
- The user must provide a static IP address they will connect to port 8999 on the Web Service from, this will be configured in the Morningstar Web Service.
- Users can have real-time, delayed or EOD alerts based on their enablement. If a user switches from one enablement level to another, the alerts will also be changed as well. For example, if a user sets up an alert when they are enabled for delayed NYSE data and they are then changed some time later to real-time NYSE data, the alert will move to trigger on real-time data rather than delayed.
- If a user is deleted from Web Services, all outstanding alerts for that username are deleted as well. This is at the Web Services username (for example, TeMr05358) level, not the unique user ID level.
- There are potentially many UniqueUserIDs for one Web Services username.

4.2.3 Request Format

Two tags support this service:

- &alert - A comma-separated alert ID and value.
- &UniqueUserID- A unique user ID for the user only one allowed per request.

Example

```
http://msxml.tenfore.com/AlertService/?username=XXXXXXX&password=XXXXXX&instrument=151.1.VOD&alert=11,55&UniqueUserID=TestUser
```

You should take the following into consideration:

- Multiple different alerts can be setup up on different instruments for the same UniqueUserID at one time.
- http://msxml.tenfore.com should be replaced with the URL of the web service you are connecting to. For more information, see section 3.1.

- All Alert requests are sent using http/https via the standard web service interface, the alert triggers will be sent via the port 8999 connection. All messages on the port 8999 connection have an <STX><ETX> envelope around them.

Not all alerts need a value and some require two values. For those that require two values, the following rules apply:

- If alert ID is 27 or 28 then tag must only have one value (the ID), for example, &alert=27
- If alert ID is (16-20) or (94-103) then tag must have three values, first ID, second % value and third user target value, for example, &alert=16,5,97.50
- For all other alert ID's use 2 values first is ID and second being the value (as defined above).

Optionally, for alerts which could alert on multiple fields an &field= tag will be needed. For example, &field=D4 for bid price

4.2.4 Responses Format

Each alert message will be acknowledged and a 13-character unique alert ID assigned per alert that has been setup. It will consist of a system ID (SS), the date (DDMMYY) and a 5-digit number (XXXXX) which will start at 1 each day. This unique alert ID can be used later to modify or delete individual alerts if required.

Example

```
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root soft_ver="1.9.0a" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://msxml.tenfore.com AlertXMLSchema.xsd">
<message symbol="151.1.VOD">
      <alert id=”11” UniqueUserID=”1234567”>
<UniqueAlertID>0111061200001</UniqueAlertID>
<AlertValue>10.2</AlertValue>
      </alert>
      <alert id=”11” UniqueUserID=”1234567”>
<UniqueAlertID>0111061200002</UniqueAlertID>
<AlertValue>10.4</AlertValue>
      </alert>
</message>
<message symbol="213.10.DAX">
      <alert id=”11” UniqueUserID=”1234567”>
<UniqueAlertID>0111061200003</UniqueAlertID>
<AlertValue>10.2</AlertValue>
      </alert>
      <alert id=”11” UniqueUserID=”1234567”>
<UniqueAlertID>0111061200004</UniqueAlertID>
<AlertValue>10.4</AlertValue>
      </alert>
</message>
```

```
</MS_xml_root>
```

4.2.5 Modify an Alert

The trigger value of an alert can be modified. The alert ID cannot be modified, the alert would need to be deleted and re-added in this case. The tag &Value is used in this case to contain the new alert value, the unique alertID is needed as the same client may have multiple alerts of the same type for the same instrument.

Example

```
/AlertService/?username=TeMrXXXX&password=123XXXX&instrument=151.1.VOD&Uniq
ueUserID=1234567&UniqueAlertID=0111061200001&Value=10.3
```

The Web service will respond with the:

```
 <?xml version="1.0" encoding="UTF-8" ?>
<MS_xml_root soft_ver="1.7.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://mstxml.tenfore.com
TenforeXMLSchema.xsd ">
<report>
      <error>OK</error>
</report>
</MS_xml_root>
```

Or, if not successful, an appropriate error message:

```
<?xml version="1.0" encoding="UTF-8" ?>
<MS_xml_root soft_ver="1.7.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://mstxml.tenfore.com
TenforeXMLSchema.xsd ">
<report>
      <error>UniqueAlertID not found</error>
</report>
</MS_xml_root>
```

4.2.6 Delete an Alert

An Alert can be deleted using the &DeleteAlert tag. To delete an alert the user must pass in his UniqueUserID and the UniqueAlertID to make sure he owns that alert. If not, an appropriate error must be sent back to user.

Example

```
/AlertService/?username=TeMrXXXX&password=123XXXX&UniqueAlertID=01110612000
01&UniqueUserID=1234567&DeleteAlert
```

The Web service responds with:

```
<?xml version="1.0" encoding="UTF-8" ?>
<MS_xml_root soft_ver="1.7.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://mstxml.tenfore.com
TenforeXMLSchema.xsd ">
<report>
      <error>OK</error>
</report>
</MS_xml_root>
 Or an appropriate error message if not successful such as
 <?xml version="1.0" encoding="UTF-8" ?>
<MS_xml_root soft_ver="1.7.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://mstxml.tenfore.com
TenforeXMLSchema.xsd ">
<report>
      <error>UniqueAlertID not found</error>
</report>
</MS_xml_root>
```

4.2.7 Request a List of Active Alerts

This will allow the client to retrieve all active alerts set for them (UniqueUserID). The &ActiveAlerts tag will be used.

```
/AlertService/?username=TeMrXXXX&password=123XXXX&UniqueUserID=1234567&Acti
veAlerts
```

The Web service responds with:

```
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root soft_ver="1.9.0a" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://msxml.tenfore.com AlertXMLSchema.xsd">
<message symbol="151.1.VOD">
      <alert id=”11” UniqueUserID=”1234567”>
<UniqueAlertID>1106201200001</UniqueAlertID>
<AlertValue>10.2</AlertValue>
      </alert>
      <alert id=”11” UniqueUserID=”1234567”>
<UniqueAlertID>1106201200002</UniqueAlertID>
<AlertValue>10.4</AlertValue>
      </alert>
</message>
<message symbol="213.10.DAX">
      <alert id=”11” UniqueUserID=”1234567”>
<UniqueAlertID>1106201200003</UniqueAlertID>
<AlertValue>10.2</AlertValue>
      </alert>
      <alert id=”11” UniqueUserID=”1234567”>
<UniqueAlertID>1106201200004</UniqueAlertID>
<AlertValue>10.4</AlertValue>
      </alert>
      .
      .
      .
      .
      .
</message>
</ MS_xml_root>
```

Or, if not successful, an appropriate error message:

```
<?xml version="1.0" encoding="UTF-8" ?>
<MS_xml_root soft_ver="1.7.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://mstxml.tenfore.com
TenforeXMLSchema.xsd ">
<report>
      <error>UniqueUserID not found</error>
</report>
</ MS_xml_root>
```

4.2.8 Request a List of Triggered Alerts

This request and response will be in the same format as the request for ActiveAlerts except the tag will be &TriggeredAlerts.

4.2.9 Alert Trigger Format

The response will have following format when an alert or alerts are breached. There is a new schema for alert XML. These alert breaches will be sent on the port 8999 connection and will have an <STX><EXT> Envelope around them

```
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root soft_ver="1.9.0a" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://msxml.tenfore.com AlertXMLSchema.xsd">
<message symbol="151.1.VOD">
      <alert id=”11” UniqueUserID=’1234567”>
<UniqueAlertID>0111061200001</UniqueAlertID>
            <fld id="D953">20-08-2012</fld>
            <fld id="D952">11:38:34:456</fld>
            <fld id="D2">15.23</fld>
<AlertValue>15.22</AlertValue>
      </alert>
<alert id=”84 UniqueUserID=’1234567”>
<UniqueAlertID>0111061200002</UniqueAlertID>
            <fld id="D953">20-08-2012</fld>
<fld id="D952">11:38:34:456</fld>
<fld id="D4">15.23</fld>
<AlertValue>15.21</AlertValue>
</alert>
</message>
</ MS_xml_root>
```

If an alert is breached that was triggered by two fields they will both be present in the triggered alert. For example:

```
<alert id=”50” UniqueUserID=”testUser”>
      <fld id=”D953”>1-03-2013</fld>
      <fld id=”D952”>14:30:65.000</fld>
      <fld id=”D2”>67.7</fld>                          // price breached
      <fld id=”D20”>67.9</fld>                        // price breached
      <alertValue>3</alertValue>                   // original value
</alert>
```

Similarly, if three fields then three will be in the response

```
<message symbol="151.1.VOD.">
      <alert id="16" UniqueUserID="testUser">
            <UniqueAlertID>0108031300001</UniqueAlertID>
            <fld id="D953">08-03-13</fld>
            <fld id="D952">09:54:56.004</fld>
            <fld id="D2">52.6</fld>
            <AlertValue>50</AlertValue>
            <AlertValue>5%</AlertValue>
      </alert>
```

The fields for response are:

- D953 - Alert breach date in GMT, format (dd-mm-yyyy)
- D952 - Alert breach time in GMT, format (hh:mm:ss.msec)
- DX - Where X is the field ID of the alert that was breached. Its value in tags is the breached value. (in the example above this is D2)
- AlertValue - The original value that was setup as the threshold.

4.2.10 Alert Creation Time

Alert creation time can be added to the alert response using the optional &AlertCreateTime tag

When triggered the response will also contain the created tag.

Example

```
<message symbol="126.1.MSFT">
      <alert id="11" UniqueUserID="testacc">
            <UniqueAlertID>122051400006</UniqueAlertID>
            <AlertValue>234</AlertValue>
            <Created>12:07:26 22-05-2014</Created>
      </alert>
</message>
```

4.2.11 Addition of Additional Fields in the Alert Response

Additional fields can be added in the alert response using the optional &extendedalertresponse tag. Additional fields returned are fields: D2, D18, D19, D16, D20, D4, D5, D6, D7, D2374, D2375, D2376, D2377, S9, H15, H16.

Request

```
http://msxml.tenfore.com/alertService? username=XXXXXXX&password=XXXXX
&alert=11,2&instrument=160.1.ALU&uniqueUserID=TestUser&extendedalertrespons
e
```

Response

```
<message symbol="151.1.VOD">
<alert id="11" UniqueUserID="TestUserID">
      <UniqueAlertID>327051400050</UniqueAlertID>
      <fld id="D953">27-05-2014</fld>
      <fld id="D952">08:42:32.686</fld>
      <fld id="D2">207.1459</fld>
      <AlertValue>20</AlertValue>
      <ExtendedResponse>
            <fld id="D2">207.145900</fld>
            <fld id="D4">207.100000</fld>
            <fld id="D5">58166</fld>
            <fld id="D6">207.250000</fld>
            <fld id="D7">32236</fld>
            <fld id="D16">11544511</fld>
            <fld id="D18">208.400000</fld>
            <fld id="D19">206.256000</fld>
            <fld id="D20">206.200000</fld>
            <fld id="D2374">442.061217</fld>
            <fld id="D2375">202.185300</fld>
            <fld id="D2376">0.000000</fld>
            <fld id="D2377">202.185300</fld>
            <fld id="S9">GBX</fld>
            <fld id="H15">270483300</fld>
            <fld id="H16">54140</fld>
      </ExtendedResponse>
</alert>
</message>
```

4.2.12 Auto Reset for Alerts

Some alerts can be reset using the optional &autoreset tag.

Note: Alerts become relative, not absolute, when the &autoreset tag is used.

When requesting a list of active alerts the tag &DisplayAutoResetTrigger can be used to show any alerts set as auto reset.

The alerts that can be reset using the tag are:

- 00001
- 00002
- 00003
- 00004
- 00005
- 00006
- 00007
- 00008
- 00021
- 00027
- 00028

For detailed information about each of these alerts, see *Appendix B.*

If this tag is added on and any other alert is requested then an "Invalid Request" will be given,

4.2.13 Alerts in JSON Format

Alerts can be sent in JSON format.

Example


```
{
    "quotes": {
        "results": [
            {
                "symbol": "MSFT",
                "exchangeid": "126",
                "type": "Stock",
                "data": [
                    {
                        "alert id": "1",
                        "UniqueUserID": "testacc",
                        "UniqueAlertID": "122051400033",
                        "AlertValue": "234",
                        "Created": "15:17:41 22-05-2014"
                    }
                ]
            }
        ]
    }
}
```

4.2.14 Alert ID Format

Since version 4.5 of the Web service release (Q1 2015), there has been a minor change to the format of the Alert IDs which now have added a digit to the beginning.

Previously the format was: SSDDMMYYXXXXX. Where:

- SS = System ID
- DDMMYY = Date
- XXXXX = 5-digit Sequence number, starts at 1 each day

The current format is: WSSDDMMYYXXXXX. Where

- SS = System ID
- DDMMYY = Date
- WXXXXX = 6-digit Sequence number, starts at 1 each day
- W is the most significant digit of the sequence number

Example

Alert ID = 00223121499999. Where:

- 02 = System ID
- 231214 = Date = 23rd December 2014
- 099999 = Sequence number

The next alert would be 10223121400000. Where:

- 02 = System ID
- 231214 = Date = 23rd December 2014
- 100000 = Sequence number

4.3 Corporate Actions

Corporate actions and name changes can be requested by:

- Exchange/sectype
- Instrument(s)

4.3.1 Exchange/Sectype

To request corporate actions for up to 'n' days ago, and as far forward as available, the request has the following format:

```
http://msxml.tenfore.com/indexTS/?username=USER&password=PASS&exchange=151&
security=1&sdate=01-01-2011&corpactions
```

Where the &exchange, &security and &sdate are compulsory.

To retrieve symbol changes, use &namechanges instead of &corpactions.

4.3.2 Instrument

To request all corporate actions for an instrument the request has the following format:

```
http://msxml.tenfore.com/indexTS/?username=USER&password=PASS&instrument=15
1.1.VOD&corpactions
```

For multiple instruments, use a comma-separated list.

To retrieve symbol changes, use &namechanges instead of &corpactions.

4.4 Search

The search functionality has been designed to support a broad range of searching capabilities combining multiple fields and field values.

The following assumptions have been made:

- All normal enablements will be applied and users will only have access to the data they are contracted and licensed for
- The new functionality will only apply to current values and will not look back historically.
- The functionality will only be available within web services
- For wholesale assimilation of the symbology lists users will continue to use the existing FTP site.

4.4.1 Use

Requests can be made using XML or JSON.

Request

The basic request format is as follows:

```
http://msxml.tenfore.com/search?username=******&password=******&exchange=151&name=Brit*
```

Valid filter requests are:

Field Name	Field Code	Tag
Ticker /Symbol	H1	&symbol
Exchange	H2	&exchange
Security Type	H3	&security
Root Symbol	S2	&rootsymbol
Listed Currency	S9	&currency
Company Name	S12	&name
ISIN	S19	&isin
Primary MIC	S676	&mic
Morningstar Performance ID	S1000	&perfid
CUSIP	S1012	&cusip
SEDOL	S1013	&sedol
Morningstar ID	S1766	&investmentID
Venue FIGI code	S2995	&VenueFigi
Country FIGI code	S1405	&CountryFigi
Share Class FIGI code	S1407	&ShareClassFigi
Global ID Investment Type	S1735	&GIDInvestmentType

Text files such as name are not case sensitive, fields such as symbol or MIC are case sensitive

Response

The response will contain as many of the following fields that are available and that the requestor is enabled for:

Field Name	Field Code
Ticker /Symbol	H1
Exchange	H2
Security Type	H3
Root Symbol	S2
Listed Currency	S9
Company Name	S12
Additional Company Name	S13
ISIN	S19
Contract Name	S31
Country	S34
Local Instrument Code	S33
Primary MIC	S676
WKN	S722
Morningstar Performance ID	D2124
CUSIP	S1012
SEDOL	S1013
Morningstar Industry	S1041
Morningstar Group	S1042
Morningstar Sector	S1043
Morningstar ID	S3059
Venue FIGI code	S2995
Country FIGI code	S1405
Share Class FIGI code	S1407
Global ID Investment Type	S1735

The user has the option of overriding the default set of fields by providing their own list of fields using the &fields tag. In this case only those fields specified by the user will be returned. The fields can only be a subset of those stated in the table above.

Symbology search requests are counted towards the number of requests/second that a client account is enabled for.

Multiple values for a filter condition are supported, separated by a comma, and treated as 'OR' up to a limit of 5. For example:

```
http://msxml.tenfore.com/search?username=******&password=******&exchange=151&name=Land*,Brit*
```

Combinations of different filters are treated as 'AND' with the values within the filters treated as 'OR.

Wildcards are supported using either single character substitution (?) or multiple character substitution (*).

Note: The '*' can only be present at the end of the value so Land* is allowed but L*D is not allowed.

The number of responses generated can be limited with the &Responses= tag with the number indicating the number of responses required.

For example, &Responses=10 will limit the number of responses to a search request to 10 (if there are 10 or more matches).

4.5 Tick History Requests

4.5.1 Features

- Ability to use Web Services to programmatically request tick history.
- Any one month period is allowed per extract (subject to contract). No repeated setups are allowed.
- Clients can only have a maximum of 3 concurrent on-going requests
- The 90Day T&S service giving 90days of Trade, Volume, Bid/Ask and time is still available.
- When a TIX is ready, an SMTP email is sent to the email address included in the request string, giving the client the FTP location string for the file to be downloaded.

4.5.2 Request Format

Request Formats	
Parameter	**Description**
&exchange	The exchange the tick history request is for. This is not needed if instruments are used. Only one exchange is allowed per request. **Example** &exchange =151
&instrument	Comma-separated list of instruments, not required if &exchange is used **Example** &instrument =151.1.VOD,126.1.MSFT
&Security	Applicable for exchange based requests and is a comma separated list of security types required **Example** &Security =1,2
&fields	Comma separated list of fields as per the existing service. Short codes for fields are not allowed except for L2 which means Level 2 fields only and L1 which means all fields except Level 2 fields. Short codes cannot be used alongside individual fields. **Example** &fields =H1,H2,H3,D2,D4,D6,S12,S9
&MessageTypes	Comma separated list of the message types required, options are T, Q, C, R, S, A (where A is all) if this is not included then the default value is 'A' **Example** &MessageTypes =T,C
&sDate	Start date the request format is dd-mm-yyyy **Example** &sDate =14-02-2014

Request Formats	
Parameter	**Description**
&sTime	Start time for the request format is hh:mm:ss – please note this field is optional and since tick data requests are only granular to the nearest hour the mm & ss will be ignored. Hh will default to 00 if not present **Example** &sTime =12:00
&eDate	End date for the request format is dd-mm-yyyy. &eDate is optional and if not included will default to one month after the start date **Example** &edate=18-03-2014
&eTime	End time for the request format is hh:mm:ss – please note this field is optional and since tick data requests are only granular to the nearest hour the mm & ss will be ignored. Hh will default to 00 if not present **Example** &etime=00:00
&timezone	Timezone used for the above timestamps. Can be any of: EST (New York Time) CET (European Time) GMT (Greenwich Mean Time) BST (UK Time) HKT (Hong Kong Time) EDT (Sydney Time) This field is optional and the default is GMT **Example** &timezone=EST
&email	Notification email address – email will be sent to this address, with a link, once the data is available for download. This field is mandatory **Example** &email =barry.woodward@morningstar.com

Request Formats	
Parameter	**Description**
&Separator	The field separator to be used. Optional field default is '|', for <TAB> please use <TAB> **Example** &Separator =,
&format	Fixed, variable or FixedWithStandardHeaderFields format. Please note fixed format can only be used with a defined list of up to 100 fields. Default is variable format and this field is optional **Example** &format=fixed or &format=variable or &format=fixedwithstandardheaderfields
&Emptyfieldformat	This is only relevant for fixed format and is optional – default is nothing. Options are Nothing, Space or Zero **Example** &Emptyfieldformat =Space
&IncludeTrailingSeparators	Optional field only applicable for fixed format. Default is for them to be removed. **Example** &IncludeTrailingSeparators
&DateFormat	This is the format of the date response and can be any of DDMMYY, MMDDYY, YYMMDD with either 2 or 4 digit Years. Default is DDMMYYYY and the field is optional, please note when the date is returned in the response it will have a '-' between the day, month and year **Example** &DateFormat =MMDDYYYY
&SplitMonthly	By default all the data is returned in one FTP File, if the data spans several months and the client would like the data to be split into files per month then this tag is to be used. **Example** &SplitMonthly

All FTP data will be delivered compressed and field ID's (H1/S12/D46) will be used rather than field names.

Example:

Request for quote history on the GBPUSD rate since 1st Jan 2012

```
http://servername/TickHist?username=********&password=********&instrument=240.20.GBPUSDCOMP&MessageTypes=Q&timezone=GMT&fields=D2,D4&sDate=01-01-2012&email=firtsname.lastname@morningstar.com
```

The Web services system will respond with a unique ID (uID) for the Tick data request which can later be used to request a progress update or cancel a request.

If a 4th or subsequent concurrent request is made, the system will respond with an error message.

4.5.3 Status Requests

A client can request a list of the current running jobs by user ID using the tag &CurrentTickRequests. The client will get back a list of the unique user IDs of the jobs currently running and the status of each job giving the following times:

- Request start date/time
- Request end date/time
- Request current date/time

4.5.4 Cancel a Running Request

If a client wishes to cancel a request in progress, they can do this using the tag &TickHistCancel= followed by the unique ID returned when the request was setup.

4.5.5 Error Messages

Four new error messages have been added – please see the section on error messages

4.5.6 Response Email

The response email will contain the same text in the subject and the body and this will simply be a link to the file of data. The email format will be SMTP plain text and will come from the following address: RealtimeHelpdesk@Morningstar.com

Clients should ensure that this email address is allowed through any SPAM filters.

The FTP folder will be created using the username and password of the Web Service account. These credentials should be used to login. A user will need an FTP account before using this service.

Note: Files are deleted from the FTP server after 7 calendar days

Note: Only tick history can be requested using this service and that does not include the current day's data.

4.6 Streaming Web Services

Web Services streaming is an add-on service to Web Services that allows streaming (push) services to be delivered via WebSockets to a client's site.

The service allows users to add instruments (with or without snapshot) and delete instruments from a watchlist. The size of the watchlist is the same size as the number of instrument/sec for the account.

4.6.1 Features

The service has the following features:

- Data is time-based, netted to 500 ms conflation. Updates are 'smoothed' over the 500 ms netting period. This prevents excessive bursts of data on the data stream.
- Clients can add 100…500 instruments on watch per account, matching the existing client band entitlement. For example, if a client has a 100 instrument/sec Web Services account and is enabled for streaming, they can add 100 instruments to watch.
- Three messages types are supported over the stream:
  - Trade
  - Quote
  - Close

  The fields covered by the message types are documented in *Appendix E*.
- Clients can:
  - Add instruments to their watchlist.
  - Add with 'snap'; the 1st message will contain all relevant fields that have data.
  - Delete instruments from their watchlist.
- Streaming messages only contain fields which have changed since the last update, except for D954, which is always present.
- Clients can make normal Web Service snapshot requests in parallel with the streaming service (if enabled) and the instruments on the streaming watchlist will not impact the per second request limits on the account.
- The stream server buffers up to 10,000 lines of output. If this limit is reached, the socket is closed and the buffer flushed.
- When a WebSocket is closed either by the client or the server, the buffer is flushed of any remaining messages and the watchlist deleted.

4.6.2 Setting Up a Streaming Web Services Session

To setup a Web Streaming connection, a user makes a request to the normal web server:

```
http://mstxml.tenfore.com/streaming/?username=XXXXXX&password=XXXXXX&Sta
rtstream
```

If the user is enabled for streaming, then a response similar to the following is received:

```
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root soft_ver="7.5.7a" provider="Morningstar"
xmlns="http://morningstar.com"
xmlns:xsi=http://www.w3.org/2001/XMLSchema-instance
xsi:schemaLocation="http://msoxml.tenfore.com StreamXMLSchema.xsd">
<report>
      <error> = OK</error>
</report>
<stream1>
      10.44.75.44</stream1>
<stream2>
      10.44.75.45</stream2>
<token>1231231231231231</token>
</MS_xml_root>
```

The response contains the external IP addresses of 2 valid stream servers. The user can connect to one of these per account. If the user has 2 accounts, Morningstar recommends that the first IP address is connected to from the first account, and the second IP address from the second account. A token is also present in the response and must be used to authenticate the streaming session.

On receipt of this response, the user has 60 seconds to connect to one of the returned stream server IP addresses via WebSockets. If the user attempts to connect to both, then the second connection will receive an error message (`"User already has a streaming session"`) and that connection will be closed. If the user does not connect to one of the stream servers within 60 seconds, then the initial request above to the normal web servers needs to be made again.

Before a WebSocket connection is made, the protocol should be set to `v1.Morningstar.com`.

This will allow clients to maintain backwards compatibility for any future changes. Next, the WebSocket should be connected.

Using the token given in the initial web service request, the following should then be sent:

```
&authenticateSession&token=1231231231231231
```

If authentication is successful, the user receives the following response:

```
<info>Successfully Authenticated with serve</Info>
```

If authentication has failed, the user receives the following response:

```
<info>Failed to Authenticate with serve</Info>
```

At this point, no instruments are on watch, so the user will only receive heartbeats:

```
<Heartbeat>7.1.HEARTBEAT|H|17:49:19</Heartbeat>
```

These are sent every 10 seconds while there is no data to be sent.

4.6.3 Adding Instruments to Watch

To add an instrument to watch, the user uses the following command format:

```
&AddToWatchWithSnap&StreamType=T&Instrument=151.1.VOD
```

In the above example, the comment has added, with snap, a trade message type to watch for the FX instrument 151.1.VOD. To add without snapshot the tag would be: `&AddToWatch`

The initial response will be:

```
<Snap>151.1.VOD|T|11:09:43|H15=0.25|H16=0.1299|D2=192.7|D3=40|D16=14738382|
D17=192.7|D18=200|D19=191.25|D108=19|D138=NT|D243=192.1|D770=06:08:48|D948=
698001|D949=0|D954=O|D1978=192.45</Snap>
```

Followed by a series of:

```
<Update>151.1.VOD|T|11:09:57|D3=617|D16=14741409|D138=AT|D770=06:09:56|D954
=Open</Update>
```

As can be seen, the records are of various lengths as only the fields that have changed in the last 500ms will be updated.

4.6.4 Deleting Instruments from Watch

To delete an instrument from watch, a message similar to the following should be sent:

```
&DeleteFromWatch&StreamType=T&instrument=151.1.VOD
```

4.6.5 Adding and removing fields from watch

Fields can be removed (and then re-added) from the stream. This is a global setting per account and fields can only be removed and then re-added within the superset of stream fields in *Appendix F*

Example:

- To remove fields: &removefields=D3,D4
- To add D3 back: &addfields=D3

4.6.6 Ending a Stream Session

Remove all instruments from watch and close the WebSocket connection.

4.6.7 Stream Session Error Messages

Error messages have the following format:

```
<Error>[Error string]</Error>
```

Where the supported error strings are:

```
"Unable to connect to Realtime DB"
"Unable to connect to Delayed DB"
"Invalid Request - Invalid Tag"
"Invalid Request - Command Tag not specified"
"Invalid Request - Multiple Command Tags used"
"Invalid Request - No Instrument(s) specified"
"Invalid Request - No Field Set Specified"
"Duplicate Instruments=Instr1"
"Too Many Instruments"
```

4.6.8 Adding and Removing from Watch – Examples and Notes

Adding a stream type of 'A' is the equivalent of adding stream types of T+Q+C. If a client request is made for the same instrument with these three stream types, the request will be converted to Stream Type A.

If a user asks for information before the data is available, (for example, adding an IPO instrument to watch before it starts trading), the enablement cannot be checked. In such cases, so an info message is sent:

```
<Info>"Pending enablements StreamType=T=XXX.YY.SYMBOL"</Info>
```

When the data becomes available, a snapshot is sent before the stream starts.

Examples

Example 1: Field not yet available. User is enabled when it is available.

```
&AddToWatchWithSnap&StreamType=T,Q&Instrument=240.20.GBPUSDCOMP
<Snap>240.20.GBPUSDCOMP|Q|00:00:01|D4=34|D5=6|D6=35|D7=7|D954=OPEN</Snap>
<Info>"Pending enablements StreamType=T=240.20.GBPUSDCOMP"</Info>
<Snap>240.20.GBPUSDCOMP|T|00:00:41|D2=34|D3=6|….</Snap>
```

Example 2: Field not yet available. User is NOT enabled when it is enabled.

```
&AddToWatchWithSnap&StreamType=T,Q&Instrument=240.20.GBPUSDCOMP
<Snap>240.20.GBPUSDCOMP|Q|00:00:01|D4=34|D5=6|D6=35|D7=7|D954=OPEN</Snap>
<Error>"Invalid enablements StreamType=T=240.20.GBPUSDCOMP"</Error>
```

Example 3: StreamType=T,Q response.

```
&AddToWatchWithSnap&StreamType=T,Q&Instrument=126.1.MSFT
<Snap>126.1.MSFT|T|00:00:01|D2=123|D3=22|...</Snap>
<Snap>126.1.MSFT|Q|00:00:01|D4=34|D5=6|D6=35|D7=7|D954=OPEN</Snap>
```

Example 4: StreamType=A response.

```
&AddToWatchWithSnap&StreamType=A&Instrument=126.1.MSFT
<Snap>126.1.MSFT|A|00:00:01|D2=123|D3=22|D4=34|D5=6|D6=35|D7=7|D954=OPEN|D1
978=123|…</Snap>
```

Example 5: Adding StreamType=T,Q + (After delay) adding StreamType=C response.

```
&AddToWatchWithSnap&StreamType=T,Q&Instrument=126.1.MSFT
<Snap>126.1.MSFT|T|00:00:01|D2=123|D3=22|...</Snap>
<Snap>126.1.MSFT|Q|00:00:01|D4=34|D5=6|D6=35|D7=7|D954=OPEN</Snap>
<Update>126.1.MSFT|T|00:00:02|D2=123.45|D3=30|…</Update>
&AddToWatchWithSnap&StreamType=C&Instrument=126.1.MSFT
<Snap>126.1.MSFT|C|00:00:04|D2=123.45|D3=30|D1978=123|…</Snap>
<Update>126.1.MSFT|A|00:00:05|D2=123|D3=22|D4=34|D5=6|D6=35|D7=7|D954=OPEN…
..</Update>
```

Example 6: Adding StreamType=A and removing StreamType=Q response.

```
&AddToWatchWithSnap&StreamType=A&Instrument=126.1.MSFT
<Snap>126.1.MSFT|A|00:00:02|D2=123|D3=22|D4=34|D5=6|D6=35|D7=7|D954=OPEN|D1
978=123|...</Snap>
<Update>126.1.MSFT|A|00:00:02|D2=123|D3=22|D4=34|D5=6|D6=35|D7=7|D954=OPEN|
...</Update>
&DeleteFromWatch&StreamType=Q&Instrument=126.1.MSFT
<Update>126.1.MSFT|T|00:00:04|D2=123|D3=22|…</Update>
<Update>126.1.MSFT|C|00:00:10|D2=456|D3=33|D1978=123|…</Update>
```

5 HTTP Schemas

5.1 Standard Response Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
targetNamespace="http://morningstar.com" attributeFormDefault="unqualified"
elementFormDefault="qualified">
<xs:element name="MS_xml_root">
      <xs:complexType>
      <xs:sequence>
            <xs:element name="subuser" minOccurs="0" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="1" name="user"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element name="report" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="unbounded" name="error"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element minOccurs="0" maxOccurs="500" name="message">
                  <xs:complexType mixed="true">
                  <xs:sequence>
                        <xs:element minOccurs="0" maxOccurs="unbounded"
name="fld">
                              <xs:complexType>
                                    <xs:simpleContent>
                                          <xs:extension base="xs:string">
                                                <xs:attribute name="id"
type="xs:string" use="required" />
                                          </xs:extension>
                                    </xs:simpleContent>
                              </xs:complexType>
                        </xs:element>
                  </xs:sequence>
                  <xs:attribute name="symbol" type="xs:string"
use="required" />
                  </xs:complexType>
            </xs:element>
      </xs:sequence>
      <xs:attribute name="soft_ver" type="xs:string" use="required" />
      <xs:attribute name="provider" type="xs:string" use="required" />
      </xs:complexType>
</xs:element>
</xs:schema>
```

5.2 Time and Sales XML Schema

```
<?xml version="1.0" encoding="ISO-8859-1"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
attributeFormDefault="unqualified" elementFormDefault="qualified"
targetNamespace="http://morningstar.com">
<xs:element name="MS_xml_root">
      <xs:complexType>
      <xs:sequence>
            <xs:element name="subuser" minOccurs="0" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="1" name="user"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element name="report" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="unbounded" name="error"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element minOccurs="0" maxOccurs="500" name="message">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element minOccurs="0" maxOccurs="50"
name="trade">
                              <xs:complexType>
                              <xs:sequence>
                                    <xs:element minOccurs="0"
maxOccurs="unbounded" name="fld">
                                          <xs:complexType>
                                                <xs:simpleContent>
                                                      <xs:extension
base="xs:string">
                                                            <xs:attribute
name="id" type="xs:string" use="required" />
                                                      </xs:extension>
                                                </xs:simpleContent>
                                          </xs:complexType>
                                    </xs:element>
                              </xs:sequence>
                              </xs:complexType>
                        </xs:element>
                  </xs:sequence>
                  <xs:attribute name="symbol" type="xs:string"
use="required"/>
                  </xs:complexType>
            </xs:element>
      </xs:sequence>
      <xs:attribute name="soft_ver" type="xs:string" use="required"/>
      <xs:attribute name="provider" type="xs:string" use="required"/>
      </xs:complexType>
</xs:element>
</xs:schema>
```

5.3 90-Day Schema – Response via File (Notification XML)

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
targetNamespace="http://morningstar.com" attributeFormDefault="unqualified"
elementFormDefault="qualified">
<xs:element name="MS_xml_root">
      <xs:complexType>
      <xs:sequence>
            <xs:element name="subuser" minOccurs="0" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="1" name="user"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element name="report" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="unbounded" name="error"
type="xs:string" />
                        <xs:element maxOccurs="1" name="ts_path"
type="xs:string" />
                        <xs:element maxOccurs="1" name="ts_moredata"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
      </xs:sequence>
      <xs:attribute name="soft_ver" type="xs:string" />
      <xs:attribute name="provider" type="xs:string" />
      </xs:complexType>
</xs:element>
</xs:schema>
```

5.4 90-Day Schema – Response via File (XML Data in File)

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
attributeFormDefault="unqualified" elementFormDefault="qualified">
<xs:element name="MS_xml_root">
      <xs:complexType>
      <xs:sequence>
            <xs:element minOccurs="0" maxOccurs="10" name="message">
                  <xs:complexType>
                  <xs:choice minOccurs="0" maxOccurs="unbounded">
                        <xs:element minOccurs="0" maxOccurs="unbounded"
name="trade">
                              <xs:complexType>
                              <xs:sequence>
                                    <xs:element minOccurs="1" maxOccurs="8"
name="fld">
                                          <xs:complexType>
                                                <xs:simpleContent>
                                                      <xs:extension
base="xs:string">
                                                            <xs:attribute
name="id" type="xs:string" use="required" />
                                                      </xs:extension>
                                                </xs:simpleContent>
                                          </xs:complexType>
                                    </xs:element>
                              </xs:sequence>
                              </xs:complexType>
                        </xs:element>
                        <xs:element minOccurs="0" maxOccurs="unbounded"
name="dayprice">
                              <xs:complexType>
                              <xs:sequence>
                                    <xs:element minOccurs="1" maxOccurs="3"
name="fld">
                                          <xs:complexType>
                                                <xs:simpleContent>
                                                      <xs:extension
base="xs:string">
                                                            <xs:attribute
name="id" type="xs:string" use="required" />
                                                      </xs:extension>
                                                </xs:simpleContent>
                                          </xs:complexType>
                                    </xs:element>
                              </xs:sequence>
                              </xs:complexType>
                        </xs:element>
                  </xs:choice>
                  <xs:attribute name="symbol" type="xs:string"
use="required"/>
                  </xs:complexType>
            </xs:element>
      </xs:sequence>
      </xs:complexType>
</xs:element>
</xs:schema>
```

5.5 90-Day Schema – Immediate Response

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
targetNamespace="http://morningstar.com" attributeFormDefault="unqualified"
elementFormDefault="qualified">
<xs:element name="MS_xml_root">
      <xs:complexType>
      <xs:sequence>
            <xs:element name="subuser" minOccurs="0" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="1" name="user"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element name="report" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="unbounded" name="error"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element minOccurs="0" maxOccurs="10" name="message">
                  <xs:complexType>
                  <xs:choice minOccurs="0" maxOccurs="unbounded">
                        <xs:element minOccurs="0" maxOccurs="unbounded"
name="trade">
                              <xs:complexType>
                              <xs:sequence>
                                    <xs:element minOccurs="1" maxOccurs="8"
name="fld">
                                          <xs:complexType>
                                                <xs:simpleContent>
                                                      <xs:extension
base="xs:string">
                                                            <xs:attribute
name="id" type="xs:string" use="required" />
                                                      </xs:extension>
                                                </xs:simpleContent>
                                          </xs:complexType>
                                    </xs:element>
                              </xs:sequence>
                              </xs:complexType>
                        </xs:element>
                        <xs:element minOccurs="0" maxOccurs="unbounded"
name="dayprice">
                              <xs:complexType>
                              <xs:sequence>
                                    <xs:element minOccurs="1" maxOccurs="3"
name="fld">
                                          <xs:complexType>
                                                <xs:simpleContent>
                                                      <xs:extension
base="xs:string">
```

```
                                                                    <xs:attribute
name="id" type="xs:string" use="required" />
                                                                </xs:extension>
                                                            </xs:simpleContent>
                                                        </xs:complexType>
                                                    </xs:element>
                                                </xs:sequence>
                                                </xs:complexType>
                                            </xs:element>
                                        </xs:choice>
                                        <xs:attribute name="symbol" type="xs:string"
use="required"/>
                                        </xs:complexType>
                                    </xs:element>
                            </xs:sequence>
                            <xs:attribute name="soft_ver" type="xs:string" />
                            <xs:attribute name="provider" type="xs:string" />
                            </xs:complexType>
</xs:element>
</xs:schema>
```

5.6 Alerts Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<!--  AS v1.0.5    -->
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
attributeFormDefault="unqualified" elementFormDefault="qualified"
targetNamespace="http://morningstar.com">
<xs:element name="MS_xml_root">
      <xs:complexType>
      <xs:sequence>
            <xs:element name="subuser" minOccurs="0" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="1" name="user"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element name="report" minOccurs="0" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="unbounded" name="error"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element minOccurs="0" maxOccurs="500" name="message">
                  <xs:complexType mixed="true">
                  <xs:sequence>
                        <xs:element minOccurs="0" maxOccurs="unbounded"
name="alert">
                              <xs:complexType>
                              <xs:sequence>
                                    <xs:element type="xs:long"
name="UniqueAlertID"/>
                                    <xs:element minOccurs="0"
maxOccurs="unbounded" name="fld">
                                          <xs:complexType>
                                                <xs:simpleContent>
                                                      <xs:extension
base="xs:string">
                                                            <xs:attribute
name="id" type="xs:string" use="required"/>
                                                      </xs:extension>
                                                </xs:simpleContent>
                                          </xs:complexType>
                                    </xs:element>
                                    <xs:element minOccurs="1" maxOccurs="2"
type="xs:string" name="AlertValue"/>
                                    <xs:element minOccurs="0" maxOccurs="1"
type="xs:string" name="Created"/>
                                    <xs:element minOccurs="0" maxOccurs="1"
type="xs:string" name="AutoReset"/>
                                    <xs:element minOccurs="0"
maxOccurs="unbounded" name="ExtendedResponse">
                                          <xs:complexType mixed="true">
                                          <xs:sequence>
```

```
                                        <xs:element minOccurs="0"
maxOccurs="unbounded" name="fld">
                                              <xs:complexType>
                                                    <xs:simpleContent>
                                                          <xs:extension
base="xs:string">

      <xs:attribute name="id" type="xs:string" use="required"/>
                                                                </xs:extension>
                                                    </xs:simpleContent>
                                              </xs:complexType>
                                        </xs:element>

                                        </xs:sequence>
                                        </xs:complexType>
                                  </xs:element>
                                  </xs:sequence>
                            <xs:attribute type="xs:long" name="id"/>
                            <xs:attribute type="xs:string"
name="UniqueUserID"/>
                            </xs:complexType>
                      </xs:element>
                </xs:sequence>
                <xs:attribute name="symbol" type="xs:string"
use="required"/>
                </xs:complexType>
           </xs:element>
      </xs:sequence>
      <xs:attribute name="soft_ver" type="xs:string" use="required"/>
      <xs:attribute name="provider" type="xs:string" use="required"/>
      </xs:complexType>
</xs:element>
</xs:schema>
```

5.7 Search Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<!--    Schema v1.0.0   08-Apr-2015     -->
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
targetNamespace="http://morningstar.com" attributeFormDefault="unqualified"
elementFormDefault="qualified">
<xs:element name="MS_xml_root">
      <xs:complexType>
      <xs:sequence>
            <xs:element name="subuser" minOccurs="0" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="1" name="user"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element name="report" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="unbounded" name="error"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element minOccurs="0" maxOccurs="500" name="message">
                  <xs:complexType mixed="true">
                  <xs:sequence>
                        <xs:element minOccurs="0" maxOccurs="unbounded"
name="fld">
                              <xs:complexType>
                                    <xs:simpleContent>
                                          <xs:extension base="xs:string">
                                                <xs:attribute name="id"
type="xs:string" use="required" />
                                          </xs:extension>
                                    </xs:simpleContent>
                              </xs:complexType>
                        </xs:element>
                  </xs:sequence>
                  <xs:attribute name="symbol" type="xs:string"
use="required" />
                  </xs:complexType>
            </xs:element>
      </xs:sequence>
      <xs:attribute name="soft_ver" type="xs:string" use="required" />
      <xs:attribute name="provider" type="xs:string" use="required" />
      </xs:complexType>
</xs:element>
</xs:schema>
```

5.8 Tick History Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<!--  TickHistSchema v1.0.0   17-Aug-2015  -->
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
attributeFormDefault="unqualified" elementFormDefault="qualified"
targetNamespace="http://morningstar.com">
<xs:element name="MS_xml_root">
      <xs:complexType>
      <xs:sequence>
            <xs:element name="subuser" minOccurs="0" maxOccurs="3">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="1" name="user"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element name="report" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="unbounded" name="error"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element name="Extraction" minOccurs="0" maxOccurs="1">
          <xs:complexType>
            <xs:sequence>
              <xs:element type="xs:string" name="Start" minOccurs="0"
maxOccurs="1"/>
              <xs:element type="xs:string" name="End" minOccurs="0"
maxOccurs="1"/>
              <xs:element type="xs:string" name="Current"minOccurs="0"
maxOccurs="1"/>
            </xs:sequence>
            <xs:attribute type="xs:long" name="UID"/>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
      <xs:attribute name="soft_ver" type="xs:string" use="required" />
      <xs:attribute name="provider" type="xs:string" use="required" />
      </xs:complexType>
</xs:element>
</xs:schema>
```

5.9 Historical Price Edits Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<!--  Schema v1.0.4     24-Apr-2012  -->
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
targetNamespace="http://morningstar.com" attributeFormDefault="unqualified"
elementFormDefault="qualified">
<xs:element name="MS_xml_root">
      <xs:complexType>
      <xs:sequence>
            <xs:element name="subuser" minOccurs="0" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="1" name="user"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
            <xs:element name="report" maxOccurs="1">
                  <xs:complexType>
                  <xs:sequence>
                        <xs:element maxOccurs="unbounded" name="error"
type="xs:string" />
                  </xs:sequence>
                  </xs:complexType>
            </xs:element>
    <xs:element minOccurs="0" maxOccurs="unbounded" name="message">
      <xs:complexType mixed="true">
        <xs:sequence>
                <xs:element minOccurs="0" maxOccurs="500" name="message">
                      <xs:complexType mixed="true">
                      <xs:sequence>
                            <xs:element minOccurs="0" maxOccurs="unbounded"
name="fld">
                                  <xs:complexType>
                                        <xs:simpleContent>
                                              <xs:extension
base="xs:string">
                                                    <xs:attribute name="id"
type="xs:string" use="required" />
                                              </xs:extension>
                                        </xs:simpleContent>
                                  </xs:complexType>
                            </xs:element>
                      </xs:sequence>
                      <xs:attribute name="symbol" type="xs:string"
use="required" />
                      </xs:complexType>
                </xs:element>
        </xs:sequence>
        <xs:attribute name="Date" type="xs:string" use="required" />
      </xs:complexType>
    </xs:element>
      </xs:sequence>
      <xs:attribute name="soft_ver" type="xs:string" use="required" />
      <xs:attribute name="provider" type="xs:string" use="required" />
      </xs:complexType>
</xs:element>
```

```
</xs:schema>
```

5.10 Streaming Schema

```
<?xml version="1.0" encoding="UTF-8"?>
<!--  Schema v1.0.2     08-02-2017   -->
<xs:schema xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
targetNamespace="http://morningstar.com" attributeFormDefault="unqualified"
elementFormDefault="qualified">
<xs:element name="MS_xml_root">
      <xs:complexType>
            <xs:sequence>
                  <xs:element name="subuser" minOccurs="0" maxOccurs="1">
                        <xs:complexType>
                        <xs:sequence>
                              <xs:element maxOccurs="1" name="user"
type="xs:string" />
                        </xs:sequence>
                        </xs:complexType>
                  </xs:element>
                  <xs:element name="report" maxOccurs="1">
                        <xs:complexType>
                        <xs:sequence>
                              <xs:element maxOccurs="unbounded"
name="error" type="xs:string" />
                        </xs:sequence>
                        </xs:complexType>
                  </xs:element>
                  <xs:element name="stream1" type="xs:string" maxOccurs="1"
/>
                  <xs:element name="stream2" type="xs:string" maxOccurs="1"
/>
                  <xs:element name="token" maxOccurs="1">
                        <xs:simpleType>
                              <xs:restriction base="xs:integer">
                                    <xs:totalDigits value="16"/>
                              </xs:restriction>
                        </xs:simpleType>
                  </xs:element>
            </xs:sequence>
            <xs:attribute name="soft_ver" type="xs:string" use="required"
/>
            <xs:attribute name="provider" type="xs:string" use="required"
/>
      </xs:complexType>
</xs:element>
</xs:schema>
```

6 Sample Requests and Responses

6.1 XML – Response, No Errors

This response can be from either of the following requests:

- &list
- &instrument

6.1.1 Request

```
/index.php?username=user&password=pass&instrument=151.1.VOD,240.20.GBPUSDCO
MP,240.20.GBPPKRCOMP&fields=H1,H2,D16,D108,D4,D6,S12,S19,S565,D785
```

6.1.2 Response

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Ok</error>
      </report>
<message symbol="151.1.VOD">
            <fld id="H1">VOD</field>
            <fld id="H2">151</field>
            <fld id="D16">124998726</field>
            <fld id="D108">19</field>
            <fld id="D4">135.1</field>
            <fld id="D6">135.15</field>
            <fld id="S12">VODAFONE GROUP PLC</field>
            <fld id="S19">GB00B16GWD56</field>
            <fld id="S565">XD</field>
            <fld id="D785">2009-01-16</field>
      </message>
      <message symbol="240.20.GBPPKRCOMP">
            <fld id="H1">GBPPKRCOMP</field>
            <fld id="H2">240</field>
            <fld id="D108">23</field>
            <fld id="D4">117.3</field>
            <fld id="D6">118.5</field>
            <fld id="S12">UNITED KINGDOM POUND - PAKISTAN RUPEE</field>
            <fld id="D785">2009-01-16</field>
      </message>
      <message symbol="240.20.GBPUSDCOMP">
            <fld id="H1">GBPUSDCOMP</field>
            <fld id="H2">240</field>
            <fld id="D108">23</field>
            <fld id="D4">1.4885</field>
            <fld id="D6">1.4889</field>
            <fld id="S12">UNITED KINGDOM POUND - UNITED STATES
DOLLAR</field>
            <fld id="D785">2009-01-16</field>
      </message>
</MS_xml_root>
```

6.2 XML response with an invalid symbol and invalid field in response

6.2.1 Request

```
/index.php?username=user&password=pass&instrument=151.100.VOD,240.20.GBPUSD
COMP,240.20.GBPPKRCOMP&fields=H1,H2,D16,D108,D4,D6,S12,S19,S565,D785,D5999
```

6.2.2 Response

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid instrument=151.100.VOD</error>
<error>Invalid field=D5999</error>
      </report>
      <message symbol="240.20.GBPPKRCOMP">
            <fld id="H1">GBPPKRCOMP</field>
            <fld id="H2">240</field>
            <fld id="D108">23</field>
            <fld id="D4">117.3</field>
            <fld id="D6">118.5</field>
            <fld id="S12">UNITED KINGDOM POUND - PAKISTAN RUPEE</field>
            <fld id="D785">2009-01-16</field>
      </message>
      <message symbol="240.20.GBPUSDCOMP">
            <fld id="H1">GBPUSDCOMP</field>
            <fld id="H2">240</field>
            <fld id="D108">23</field>
            <fld id="D4">1.4885</field>
            <fld id="D6">1.4889</field>
            <fld id="S12">UNITED KINGDOM POUND - UNITED STATES
DOLLAR</field>
            <fld id="D785">2009-01-16</field>
      </message>
</MS_xml_root>
```

6.3 Simple &addlist with no error

6.3.1 Request

```
/index.php?username=user&password=pass&addlist=list1&fields=D2,D4,D6&instru
ment=151.1.VOD,240.20.GBPUSDCOMP&fields=D4,D6&instrument=126.1.IBM,64.3.ZN8
Z
```

6.3.2 Response

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>OK</error>
      </report>
</MS_xml_root>
```

6.4 Simple &addlist error

6.4.1 Request

```
/index.php?username=user&password=pass&addlist=list1&fields=D2,D4,D6&instru
ment=151.1.VOD,240.20.GBPUSDCOMP&fields=D4,D6&fields=D401,D401
```

6.4.2 Response

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid request</error>
      </report>
</MS_xml_root>
```

6.5 Simple &Delist error

6.5.1 Request

```
/index.php?username=user&password=pass&dellist=List10
```

6.5.2 Response

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid list name=List10</error>
      </report>
```

```
</MS_xml_root>
```

6.6 Requesting a Response in JSON Format

Using the &JSONShort tag will allow a user to receive a JSON format response with field numbers, Morningstar provide files on the FTP servers to allow users to map field number to names in their application. The FTP server details are as follows:

- London FTP Server: 83.244.214.45
- Frankfurt FTP Server 195.47.237.83

Username and password are publicftp (lowercase), the files are in a sub directory called XML files.

6.6.1 Request

```
http://msxml.tenfore.com/index.php?username=user&password=pass&instrument=1
51.1.VOD,240.20.GBPUSDCOMP,240.20.GBPPKRCOMP&fields=H1,H2,D16,D108,D4,D6,S1
2,S19,S565,D785&JSONShort
```

or

```
http://msxml.tenfore.com/index.php?Skey=TheSessionKey&TerminalID=TheTermina
lID&instrument=151.1.VOD,240.20.GBPUSDCOMP,240.20.GBPPKRCOMP&fields=H1,H2,D
16,D108,D4,D6,S12,S19,S565,D785&JSONShort
```

6.6.2 Response

```
{"quotes":{"results":[{
"H1":"MSFT","H2":"126","D16":"49134401","D108":"23","D4":"26.65","D6":"26.6
7","S12":"MICROSOFT CORPRATION","S19":"US5949181045","D785":"18-07-2011"}
,{"H1":"VOD","H2":"151","D16":"23730978","D108":"19","D4":"158.3","D6":"158
.35","S12":"VODAFONE GROUP
PLC","S19":"GB00B16GWD56","S565":"XD","D785":"18-07-2011"}]}}
```

6.7 90-Day T&S Response via File

With file delivery the user will receive a notification XML stating the path of the XML file and a flag to mention whether there is more date to come or not. This will have only a value of YES or NO. If the value is Yes, the XML declaration will be repeated, until ts_moredata=NO.

6.7.1 Response

```
<?xml version="1.0" encoding="UTF-8"?>
<MS_xml_root soft_ver="1.7.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http:// http://mstxml.tenfore.com
schema90Day.xsd">
      <report>
            <error>OK</error>

      <ts_path>http://mstxml.tenfore.com/TSHistory/21/TeMr5359/6547894.xml<
/ts_ path>
            <ts_moredata>YES</ts_moredata >
      </report>
</MS_xml_root>
```

6.8 90-Day T&S Tick Response Format via File

```
<MS_xml_root>
<message symbol="151.1.VOD">
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:12:45.804</fld>
  <fld id="D502">16:12:45.804</fld>
  <fld id="D3">8092</fld>
  <fld id="D2">171.5</fld>
  <fld id="D4">171.5</fld>
  <fld id="D6">171.65</fld>
</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:13:45.804</fld>
  <fld id="D502">16:13:45.766</fld>
  <fld id="D3">8091</fld>
  <fld id="D2">171.4</fld>
  <fld id="D4">171.6</fld>
  <fld id="D6">171.75</fld>
</trade>
<trade>
        <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:14:45.804</fld>
  <fld id="D3">8092</fld>
  <fld id="D2">171.35</fld>
  <fld id="D4">171.85</fld>
  <fld id="D6">172.65</fld>
</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:15:45.804</fld>
  <fld id="D3">8292</fld>
  <fld id="D2">171.5</fld>
  <fld id="D4">171.5</fld>
  <fld id="D6">172.65</fld>
</trade>
<dayprice>
  <fld id="D953">12-04-2012</fld>
  <fld id="D17">171.5</fld>
  <fld id="D2">171.5</fld>
</dayprice>
<trade>
        <fld id="D953">13-04-2012</fld>
  <fld id="D952">16:12:45.804</fld>
  <fld id="D502">16:12:45.766</fld>
  <fld id="D3">4092</fld>
  <fld id="D2">171.15</fld>
  <fld id="D4">171.25</fld>
  <fld id="D6">172.65</fld>
</trade>
…
…
…
</message>
</MS_xml_root>
```

6.9 90-Day T&S Hourbar Response Format via File

```
<MS_xml_root>
<message symbol="151.1.VOD">
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">09:00</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">10:00</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">11:00</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>

</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">12:00</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
<dayprice>
  <fld id="D953">12-04-2012</fld>
  <fld id="D17">171.5</fld>
  <fld id="D2">171.5</fld>
</ dayprice >
<trade>
  <fld id="D953">13-04-2012</fld>
  <fld id="D952">09:00</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
…
…
</message>
</MS_xml_root>
```

6.10 90-Day T&S Tick Immediate Response Format

```
<?xml version="1.0" encoding="UTF-8" ?>
<MS_xml_root soft_ver="1.7.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://mstxml.tenfore.com
schema90DayTSImm.xsd">
<report>
      <error>OK</error>
</report>
<message symbol="151.1.VOD">
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:12:45.804</fld>
  <fld id="D502">16:12:45.804</fld>
  <fld id="D3">8092</fld>
  <fld id="D2">171.5</fld>
  <fld id="D4">171.5</fld>
  <fld id="D6">171.65</fld>
</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:13:45.804</fld>
  <fld id="D3">8091</fld>
  <fld id="D2">171.4</fld>
  <fld id="D4">171.6</fld>
  <fld id="D6">171.75</fld>
</trade>
<trade>
        <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:14:45.804</fld>
  <fld id="D3">8092</fld>
  <fld id="D2">171.35</fld>
  <fld id="D4">171.85</fld>
  <fld id="D6">172.65</fld>
</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:15:45.804</fld>
  <fld id="D502">16:15:45.766</fld>
  <fld id="D3">8292</fld>
  <fld id="D2">171.5</fld>
  <fld id="D4">171.5</fld>
  <fld id="D6">172.65</fld>
</trade>
<dayprice>
  <fld id="D953">12-04-2012</fld>
  <fld id="D17">171.5</fld>
  <fld id="D2">171.5</fld>
</dayprice>
<trade>
        <fld id="D953">13-04-2012</fld>
  <fld id="D952">16:12:45.804</fld>
  <fld id="D502">16:12:45.766</fld>
  <fld id="D3">4092</fld>
  <fld id="D2">171.15</fld>
  <fld id="D4">171.25</fld>
  <fld id="D6">172.65</fld>
</trade>
```

```
…
…
…
</message>
</MS_xml_root>
```

6.11 90-Day T&S Min Bar Immediate Response Format

```
<?xml version="1.0" encoding="UTF-8" ?>
<MS_xml_root soft_ver="1.7.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://mstxml.tenfore.com
schema90DayTSImm.xsd ">
<report>
      <error>OK</error>
</report>
<message symbol="151.1.VOD">
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:12</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
<trade>
  <fld id="D953">12-04-2012</fld>

  <fld id="D952">16:13</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:14</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>

</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">16:15</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
<dayprice>
  <fld id="D953">12-04-2012</fld>
  <fld id="D17">171.5</fld>
  <fld id="D2">171.5</fld>
```

```
</ dayprice >
<trade>
  <fld id="D953">13-04-2012</fld>
  <fld id="D952">09:30</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
…
…
…
</message>
</MS_xml_root>
```

6.12 90-Day T&S Hour Bar Immediate Response Format

```
<?xml version="1.0" encoding="UTF-8" ?>
<MS_xml_root soft_ver="1.7.0" provider="Morningstar"
xmlns="http://morningstar.com" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xsi:schemaLocation="http://mstxml.tenfore.com
schema90DayTSImm.xsd ">
<report>
      <error>OK</error>
</report>
<message symbol="151.1.VOD">
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">09:00</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">10:00</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">11:00</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>

</trade>
<trade>
  <fld id="D953">12-04-2012</fld>
  <fld id="D952">12:00</fld>
  <fld id="D16">8092</fld>
```

```
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
<dayprice>
  <fld id="D953">12-04-2012</fld>
  <fld id="D17">171.5</fld>
  <fld id="D2">171.5</fld>
</ dayprice >
<trade>
  <fld id="D953">13-04-2012</fld>
  <fld id="D952">09:00</fld>
  <fld id="D16">8092</fld>
  <fld id="D17">171.5</fld>
  <fld id="D18">171.65</fld>
  <fld id="D19">171.65</fld>
  <fld id="D2">171.5</fld>
</trade>
…
…
…
</message>
</MS_xml_root>
```

Appendix A Index Files

Please note the list of supported indices is correct at the time of creation of this specification but is subject to frequent change and the latest list is always available on the MRTD FTP server.

Index Files			
Exchange	**Security**	**Symbol**	**Name**
383	10	AR-MERVAL25	Merval25
146	10	XJO	ASX200
146	10	XTO	ASX100
146	10	XFL	ASX50
146	10	XTL	ASX20
146	10	XKO	ASX300
146	10	XAT	SPASX200
146	10	XAF	ASXAA50
146	10	XMD	ASXMID50
146	10	XSO	ASXSmOrd
146	10	XAO	ASXALL
194	10	ATX	ATX
56	10	IBXX	IBrX
137	10	399106	SZSEComp
127	10	TX60	TSX60
300	10	AE-DUAE	UAE20
290	10	EG-EGX30/INDEX	CASE30
202	10	AEX	AEX
207	10	BEL20	BEL20
160	10	PX1	CAC40
195	10	PSI20	PSI20
160	10	PX4	SBF120
213	10	DAX	DAX30
213	10	HDAX	HDAX
212	10	GD	GD

Index Files			
Exchange	**Security**	**Symbol**	**Name**
134	10	HSI	HSI
139	10	4	BSE500
139	10	1	Sensex
190	10	IEOP	ISE
223	10	FTSEMIB	FTSEMIB
223	10	!FTSEMIB	!FTSEMIB
132	10	100000018	Nikkei
141	10	D4_036	KOSPI50
50	10	ME	IPC
50	10	IM	Inmex
147	10	NZ50	NZX50
42	10	WIG20	WIG20
425	10	PL-WIG20	WSE20
174	10	OBX	OBX
172	10	OMXC20	OMXC20
176	10	OMXH25	OMXH25
170	10	OMXS30	OMXS30
231	10	MICEXINDEXCF	MICEX
193	10	J200	JSE40
193	10	!J200	!JSE40
299	10	SA-TASI	TASI
143	10	IDX019	STI
151	10	FTSTI	FTSTI
199	10	!IBEX	IBEX35
185	10	SMI	SWX
144	10	TW50	TW50
145	10	!SET50_IND	SET50
30	10	!TR20	DJTurk20

Index Files			
Exchange	**Security**	**Symbol**	**Name**
151	10	UKX	FTSE100
151	10	MCX	FTSE250
151	10	AXX	FTSEAIM
151	10	NSX	FTSEFldg
151	10	SMX	FTSESmCp
30	10	!DJI	DJI
30	10	!DJI126	DJI126
29	10	NDX	NDX
29	10	NDX126	NDX126
29	10	NBI	NBI
33	10	!SPX	SPX
33	10	!SPX126	SPX126
33	10	!OEX	OEX
223	10	ITLMS	FTSEItal
223	10	!ITLMS	!FTSEItal
213	10	TDXP	TECDAX
136	10	1	SSEComp
145	10	!SET_IND	SET
134	10	HSCI	HSCI
211	10	CN20	CACN20
211	10	BVLGR	PSIGen
141	10	D4_035	KOSPI100
144	10	!WTIND	TAIEX
230	10	RTSI	RTS
171	10	OMXN40	Nordic40
127	10	0	TSXComp
127	10	JX	TSXVent
198	10	!TDIV	IBEXTD

Index Files			
Exchange	**Security**	**Symbol**	**Name**
138	10	NIFTY	NIFTY50
146	10	XFL	ASX50
233	10	IPSA	IPSA
135	10	IDX0200	KLCI
135	10	!FBMKLCI	!KLCI
142	10	PSEI	PSEI
228	10	BET	BET
29	10	@CCO	NASComp
29	10	@CCO	NComp126
76	10	!TOMX	Russ2000
76	10	!TOMX126	R2000126
329	10	VA-VN30	VN30
292	10	IS-142	TA25
294	10	KU-KSX/15	KSX15
325	10	PK-KSE/100	KSE100
390	10	CO-COLCAP	COLCAP
320	10	BN-DS30	DSE30
423	10	LI-OMXVGI	OMXViln
151	10	TASX	FTSETMAS
151	10	T1X	FTSETMF
212	10	FTSE	LC
133	10	TOPIX30	TOPIX30
223	10	ITSTAR	FTSEISta
223	10	!ITSTAR	!FTSEISta
151	10	ASX	FTSEAll
133	10	1000000JC	Jasdaq
202	10	AMX	AMX
160	10	CACMS	CACMC

Index Files			
Exchange	**Security**	**Symbol**	**Name**
160	10	CACS	CACSC
160	10	PAX	CACAll
133	10	TSEMCI	TSEMoth
127	10	TX20	TSXSmall
127	10	TX40	TSXMid
221	10	SX5E	ESTOXX50
383	10	AR-MERVAL25	Mer25
319	10	ID-LQ45	LQ45
28	10	XIUSA0010W	MSLC
28	10	XIUSA0010X	MSMC
28	10	XIUSA0010Y	MSSC
28	10	XIUSA0010V	MSUS
151	10	E1X	FTSEETop
141	10	D0_001	KOSPI
56	10	IBOV	IBOV
213	10	MDAX	MDAX
146	10	XAO	ASXALL
427	10	SK-SAX	SAX
151	10	AIM5	FTSEAIM50
151	10	NMX	FTSE350
151	10	E3X	FTSEEF300
181	10	SMIM	SMIM
135	10	IDX0861	FTBM100
135	10	!FBM100	!FTBM100
211	10	ASCX	ASCX
211	10	BELM	BELM
211	10	BELS	BELS
211	10	CACMD	CACMID60

Index Files			
Exchange	**Security**	**Symbol**	**Name**
133	10	TOPIX	TOPIXAll
147	10	ALL	NZXALL
172	10	OMXSCAPPI	OMXSALL
151	10	FSTAS	FSTAS
151	10	FSTF	FSTF
151	10	FSTC	FSTC
151	10	FSTM	FSTM
151	10	FSTAM	FSTAM
151	10	FSTS	FSTS
211	10	BELAll	BELAll
202	10	AEXAll	AEXAll
211	10	ENPME	PME150
211	10	N100	ENEXT100
211	10	N150	ENEXT150

Appendix B Alerts Supported

Alerts Supported			
ID	**Name**	**Condition**	**Formulae**
00001	Price > x% Up.	Last Price > x% of previous last close price	
00002	Price > x% Up on High Volume	"Last Price > x% of previous last price && Volume >= 2*(30-day Average Volume)"	((D2 – D20) / D20) * 100 > x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00003	Price < x% Down	Last Price < x% of previous last price	((D20 – D2) / D20) * 100 > x%
00004	Price < x% Down on High Volume	Last Price < x% of previous last price && Volume >= 2*(30-day Average Volume)	((D20 – D2) / D20) * 100 > x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00005	Price >= x% Up	Last Price >= x% of previous last price	
00006	Price >= x% Up on High Volume	Last Price >= x% of previous last price && Volume >= 2*(30-day Average Volume)	((D2 – D20) / D20) * 100 >= x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00007	Price <= x% Down	Last Price <= x% of previous last price	((D20 – D2) / D20) * 100 >= x%
00008	Price <= x% Down on High Volume	Last Price <= x% of previous last price && Volume >= 2*(90-day Average Volume)	((D20 – D2) / D20) * 100 >= x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00009	Price = x%	Last Price = x% of previous last price	
00010	Price = x% on High Volume	Last Price = x% of previous last price && Volume >= 2*(30- day Average Volume)	"((D2 – D20) / D20) * 100 = x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00011	Price > User Target Price	Price > User Target Price	
00012	Price >= User Target Price	Price >= User Target Price	
00013	Price < User Target Price	Price < User Target Price	

Alerts Supported			
ID	**Name**	**Condition**	**Formulae**
00014	Price <= User Target Price	Price <= User Target Price	
00015	Price = User Target Price	Price = User Target Price	
00016	Price > x% of user Target price	Price > x% of user Target price	D2 > (x / 100) * target price
00017	Price >= x% of user Target price	Price >= x% of user Target price	D2 >= (x / 100) * target price
00018	Price < x% of user Target price	Price < x% of user Target price	D2 < (x / 100) * target price
00019	Price <= x% of user Target price	Price <= x% of user Target price	D2 <= (x / 100) * target price
00020	Price = x% of user Target price	Price = x% of user Target price	D2 == (x / 100) * target price
00021	High Volume	Volume >= 2*(30 day Average Volume	D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00022	Volume > User Input Volume	Cumulative Volume > User Input Volume	
00023	Volume >= User Input Volume	Cumulative Volume >= User Input Volume	
00024	Volume < User Input Volume	Cumulative Volume < User Input Volume	
00025	Volume <= User Input Volume	Cumulative Volume <= User Input Volume	
00026	Volume = User Input Volume	Cumulative Volume = User Input Volume	

Alerts Supported			
ID	**Name**	**Condition**	**Formulae**
00027	52 week high alert	Last price > previous 52-week high value	D2 > D2374
00028	52 week low alert	Last price < previous 52-week low value	D2 < D2375
00029	52 week high > user input value	52 week high > user input value	D2374> user input value
00030	52 week high >= user input value	52 week high >= user input value	D2374>= user input value
00031	52 week high < user input value	52 week high < user input value	D2374< user input value
00032	52 week high <= user input value	52 week high <= user input value	D2374<= user input value
00033	52 week high = user input value	52 week high = user input value	D2374== user input value
00034	52 week low > user input value	52 week low > user input value	D2375> user input value
00035	52 week low >= user input value	52 week low >= user input value	D2375>= user input value
00036	52 week low < user input value	52 week low < user input value	D2375< user input value
00037	52 week low <= user input value	52 week low <= user input value	D2375<= user input value

Alerts Supported			
ID	**Name**	**Condition**	**Formulae**
00038	52 week low = user input value	52 week low = user input value	D2375== user input value
00039	Change% 52 Week high > User Input value	((Last price – 52 week high)/ 52 week High * 100) > User input value	((D2374 – D2376) / D2376) * 100 > User input value %
00040	Change% 52 Week high >= User Input value	((Last price – 52 week high)/ 52 week High * 100) >= User input value	((D2374 - D2376) / D2376) * 100 >= User input value %
00041	Change% 52 Week high < User Input value	((Last price – 52 week high)/ 52 week High * 100) < User input value	((D2374 - D2376) / D2376) * 100 < User input value %
00042	Change% 52 Week high <= User Input value	((Last price – 52 week high)/ 52 week High * 100) <= User input value	((D2374 - D2376) / D2376) * 100 <= User input value %
00043	Change% 52 Week high = User Input value	((Last price – 52 week high)/ 52 week High * 100) = User input value	((D2374 - D2376) / D2376) * 100 == User input value %
00044	Change% 52 Week Low > User Input value	((Last price – 52 week Low)/ 52 week Low * 100) > User input value	((D2377 - D2375) / D2377) * 100 > User input value %
00045	Change% 52 Week Low >= User Input value	((Last price – 52 week Low)/ 52 week Low * 100) >= User input value	((D2377 - D2375) / D2377) * 100 >= User input value %
00046	Change% 52 Week Low < User Input value	((Last price – 52 week Low)/ 52 week Low * 100) < User input value	((D2377 - D2375) / D2377) * 100 < User input value %
00047	Change% 52 Week Low <= User Input value	((Last price – 52 week Low)/ 52 week Low * 100) <= User input value	((D2377 - D2375) / D2377) * 100 <= User input value %

Alerts Supported			
ID	**Name**	**Condition**	**Formulae**
00048	Change% 52 Week Low = User Input value	((Last price – 52 week Low)/ 52 week Low * 100) = User input value	((D2377 - D2375) / D2377) * 100 == User input value %
00049	Price > x of previous close price	Last Price > $x + last close price	
00050	Price >= x of previous close price	Last Price >= $x + last close price	
00051	Price < x of previous close price	Last Price < $x + last close price	D20 - D2 > x
00052	Price <= x of previous close price	Last Price <= $x + last close price	D20 - D2 >= x
00053	Price = x of previous close price	Last Price = $x + last close price	Do not use
00054	Ask Price > x of previous close price	Ask Price > $x + last close price	
00055	Ask Price >= x of previous close price	Ask Price >= $x + last close price	
00056	Ask Price < x of previous close price	Ask Price < $x + last close price	D20 - D6 > x
00057	Ask Price <= x of previous close price	Ask Price <= $x + last close price	D20 - D6 >= x

Alerts Supported			
ID	**Name**	**Condition**	**Formulae**
00058	Ask Price = x of previous close price	Ask Price = $x + last close price	Do not use
00059	Bid Price > x of previous close price	Bid Price > $x + last close price	
00060	Bid Price >= x of previous close price	Bid Price >= $x + last close price	
00061	Bid Price < x of previous close price	Bid Price < $x + last close price	D20 - D4 > x
00062	Bid Price <= x of previous close price	Bid Price <= $x + last close price	D20 - D4 >= x
00063	Bid Price = x of previous close price	Bid Price = $x + last close price	Do not use
00064	Ask Price > x% previous close price	Ask Price > (1+x%) * previous close price	((D6 – D20) / D20) * 100 > x%
00065	Ask Price >= x% previous close price	Ask Price >= (1+x%) * previous close price	((D6 – D20) / D20) * 100 >= x%
00066	Ask Price < x% previous close price	Ask Price < (1+x%) * previous close price	((D20 – D6) / D20) * 100 > x%
00067	Ask Price <= x% previous close price	Ask Price <= (1+x%) * previous close price	((D20 – D6) / D20) * 100 >= x%

Alerts Supported			
ID	**Name**	**Condition**	**Formulae**
00068	Ask Price = x% previous close price	Ask Price = (1+x%) * previous close price	((D6 – D20) / D20) * 100 == x%
00069	Bid Price > x% previous close price	Bid Price > (1+x%) * previous close price	((D4 – D20) / D20) * 100 > x%
00070	Bid Price >= x% previous close price	Bid Price >= (1+x%) * previous close price	((D4 – D20) / D20) * 100 >= x%
00071	Bid Price < x% previous close price	Bid Price < (1+x%) * previous close price	((D20 – D4) / D20) * 100 > x%
00072	Bid Price <= x% previous close price	Bid Price <= (1+x%) * previous close price	((D20 – D4) / D20) * 100 >= x%
00073	Bid Price = x% previous close price	Bid Price = (1+x%) * previous close price	((D4 – D20) / D20) * 100 == x%
00074	Ask Price > x% previous close price on High Volume	Ask Price > (1+x%) * previous close price && Volume >= 2*(30 day Average Volume)	((D6 – D20) / D20) * 100 > x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00075	Ask Price >= x% previous close price on High Volume	Ask Price >= (1+x%) * previous close price && Volume >= 2*(30 day Average Volume)	((D6 – D20) / D20) * 100 >= x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00076	Ask Price < x% previous close price on High Volume	Ask Price < (1+x%) * previous close price && Volume >= 2*(30 day Average Volume)	((D20 – D6) / D20) * 100 > x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00077	Ask Price <= x% previous close price on High Volume	Ask Price <= (1+x%) * previous close price && Volume >= 2*(30 day Average Volume)	"((D20 – D6) / D20) * 100 >= x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)

Alerts Supported			
ID	**Name**	**Condition**	**Formulae**
00078	Ask Price = x% previous close price on High Volume	Ask Price = (1+x%) * previous close price && Volume >= 2*(30 day Average Volume)	((D6 – D20) / D20) * 100 == x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00079	Bid Price > x% previous close price on High Volume	Bid Price > (1+x%) * previous close price && Volume >= 2*(30 day Average Volume)	((D4 – D20) / D20) * 100 > x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00080	Bid Price >= x% previous close price on High Volume	Bid Price >= (1+x%) * previous close price && Volume >= 2*(30 day Average Volume)	((D4 – D20) / D20) * 100 >= x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00081	Bid Price < x% previous close price on High Volume	Bid Price < (1+x%) * previous close price && Volume >= 2*(30 day Average Volume)	((D20 – D4) / D20) * 100 > x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00082	Bid Price <= x% previous close price on High Volume	Bid Price <= (1+x%) * previous close price && Volume >= 2*(30 day Average Volume)	((D20 – D4) / D20) * 100 >= x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00083	Bid Price = x% previous close price on High Volume	Bid Price = (1+x%) * previous close price && Volume >= 2*(30 day Average Volume)	((D4 – D20) / D20) * 100 == x% && D16 >= 2 * S658 (Note: S658 is 90 day avg vol)
00084	Ask Price > User Target Price	Ask Price > User Target Price	
00085	Ask Price >= User Target Price	Ask Price >= User Target Price	
00086	Ask Price < User Target Price	Ask Price < User Target Price	
00087	Ask Price <= User Target Price	Ask Price <= User Target Price	
00088	Ask Price = User Target Price	Ask Price = User Target Price	
00089	Bid Price > User Target Price	Bid Price > User Target Price	

Alerts Supported			
ID	**Name**	**Condition**	**Formulae**
00090	Bid Price >= User Target Price	Bid Price >= User Target Price	
00091	Bid Price < User Target Price	Bid Price < User Target Price	
00092	Bid Price <= User Target Price	Bid Price <= User Target Price	
00093	Bid Price = User Target Price	Bid Price = User Target Price	
00094	Ask Price > x% of user Target Price	Ask Price > (1+x%) * user Target Price	D6 > (x / 100) * target price
00095	Ask Price >= x% of user Target Price	Ask Price >= (1+x%) * user Target Price	D6 >= (x / 100) * target price
00096	Ask Price < x% of user Target Price	Ask Price < (1+x%) * user Target Price	D6 < (x / 100) * target price
00097	Ask Price <= x% of user Target Price	Ask Price <= (1+x%) * user Target Price	D6 <= (x / 100) * target price
00098	Ask Price = x% of user Target Price	Ask Price = (1+x%) * user Target Price	D6 == (x / 100) * target price
00099	Bid Price > x% of user Target Price	Bid Price > (1+x%) * user Target Price	D4 > (x / 100) * target price
000100	Bid Price >= x% of user Target Price	Bid Price >= (1+x%) * user Target Price	D4 >= (x / 100) * target price

Alerts Supported			
ID	**Name**	**Condition**	**Formulae**
00101	Bid Price < x% of user Target Price	Bid Price < (1+x%) * user Target Price	D4 < (x / 100) * target price
00102	Bid Price <= x% of user Target Price	Bid Price <= (1+x%) * user Target Price	D4 <= (x / 100) * target price
00103	Bid Price = x% of user Target Price	Bid Price = (1+x%) * user Target Price	D4 == (x / 100) * target price
00104	Ask Size > User Target size	Ask Size > User Target size	D7 > User Target size
00105	Ask Size >= User Target size	Ask Size >= User Target size	
00106	Ask Size < User Target size	Ask Size < User Target size	D7 <User Target size
00107	Ask Size <= User Target size	Ask Size <= User Target size	D7 <= User Target size
00108	Ask Size = User Target size	Ask Size = User Target size	D7 == User Target size
00109	Bid Size > User Target size	Bid Size > User Target size	D5 > User Target size
00110	Bid Size >= User Target size	Bid Size >= User Target size	
00111	Bid Size < User Target size	Bid Size < User Target size	D5 <User Target size
00112	Bid Size <= User Target size	Bid Size <= User Target size	D5<= User Target size
113	Bid Size = User Target size	Bid Size = User Target size	D5 == User Target size

Appendix C BATS Enhanced Fields

Important: The BATS enhanced feature is no longer supported and must not be used. It will be removed in the next version of Web Services.

A delayed US composite instrument can be enhanced with real-time BATS or BATS-Y data if the following conditions are met:

1. The requesting instrument is US composite (126) and enabled for delayed.
2. BATS (17) or BATS-Y (23) is enabled for real-time.
3. The user must be enabled for BATS enhancement and the instrument is requested within the specified times. By default, the times are from 8:30 to 17:00 EST.

The fields taken from BATS depend on whether they are related to trade, bid or ask fields. If the fields D942, D966 (real-time trade updates time and date) are latest, then the trade fields will be updated. Similarly, for bid fields D940, D964 and ask fields D941, D965.

Field D1892 (source of enhanced data) indicates which fields have been updated.

In the following table source indicates where field is enhanced/generated from:

- T = Trade fields,
- B = Bid fields,
- A = Ask fields,
- G = Generated within XML Service
- ANY = Enhanced if at least one of the trade, bid or ask are enhanced.

BATS Enhanced Fields		
Field ID	**Source**	**Description**
H8		Net Change (D2 – D20) where D2 and D20 is taken from BATS/BATS-Y. (If D20 not present it searches for D35)
H14		Net change %
H15		Adjusted net change (D2 – D1978), where D2 and D1978 is taken from BATS/BATS-Y.
H16		Adjusted net change %
D1	T	Time in minutes of the day
D2	T	Last Price
D3	T	Last Volume
D4	B	Bid Price

BATS Enhanced Fields		
Field ID	**Source**	**Description**
D5	B	Bid Size
D6	A	Ask Price
D7	A	Ask Size
D8	B	Bid Market
D10	B	Best Bid Price
D11	B	Best Bid Size
D12	A	Ask Market
D14	A	Best Ask Price
D15	A	Best Ask Size
D20	T	Close price
D30	T	# of Trades since Market Open
D114	B	Bid Indicator flag
D115	A	Ask Indicator flag
D138	T	Trade Indicator flag
D214	G	Origination market of last trade (17 for BATS, 23 for BATS-Y)
D242	T	VWAP volume
D243	T	VWAP price
D502	T	Original Trade Time - ms since midnight
D768	B	Bid, Time of last update inc seconds
D769	A	Ask, Time of last update inc seconds
D770	T	Time of last update to last inc seconds
D778	B	Best bid time in seconds
D779	A	Best ask time in seconds
D782	ANY	Last Update Date of real-time field
D783	ANY	Last Update Time of real-time field
D784	T	Date of Last Trade
D791	B	Bid Date
D792	A	Ask Date

BATS Enhanced Fields		
Field ID	**Source**	**Description**
D793	B	Non-zero Bid
D794	A	Non-zero Ask
D940	B	Real time of last bid
D941	A	Real time of last ask
D942	T	Real time of last trade
D964	B	Date of last real-time bid update
D965	A	Date of last real-time ask update
D966	T	Date of last real-time trade update
D1892	G	Generated Within XMLService. Source of enhanced data.
D1978	T	Adjusted close price

Appendix D XML System Error Responses

The XML system will respond with one or more of the error messages described in this section.

Note: If more than one error is returned, they will be returned in the following format:

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid request </error>
            <error>List Limit Exceeded</error>
      </report>
</MS_xml_root>
```

Message OK

Included in any response where there are no errors in the request string.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>OK</error>
      </report>
</MS_xml_root>
```

Invalid Username

No other response will be sent.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid Username</error>
      </report>
</MS_xml_root>
```

Invalid Password

No other response will be sent.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid Password</error>
      </report>
```

```
</MS_xml_root>
```

Invalid List Name

Sent in response to a /delist command when the list does not exist on the server. No other response is sent.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid List Name</error>
      </report>
</MS_xml_root>
```

List Limit Exceeded

Sent when the number of instruments attempting to be added to a list exceeds 100. All instruments up to 100 will be placed in the list with the associated fields. However, any instruments beyond 100 will not be added to the list.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>List Limit Exceeded</error>
      </report>
</MS_xml_root>
```

Data Rate Exceeded

Sent when excessive requests are sent above 100 instruments/sec and the system is unable to buffer responses any longer. At this point, data will be being dropped. The client application needs to stop sending requests for 10 seconds to allow the existing buffered data queued to be sent to the client.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Data Rate Exceeded</error>
      </report>
</MS_xml_root>
```

Invalid Instrument

Followed by one of more triplets of <Exchange><SecType><Symbol> separated by comma for each invalid symbol, then the data for any valid Instruments and fields in the request.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid instrument=151.100.VOD</error>
      </report>
</MS_xml_root>
```

Too Many Fields

Sent when there are too many fields requested. The first 100 fields will be returned; others will be ignored.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Too Many Fields</error>
      </report>
</MS_xml_root>
```

Too Many Instruments

Sent when there are too many instruments requested. The first 100 instruments will be returned; others will be ignored.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Too Many Instruments</error>
      </report>
</MS_xml_root>
```

Invalid Fields

Followed by a comma-separated list of the invalid fields, then the data for any valid instruments and fields in the request.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid field=H34,D9874</error>
      </report>
</MS_xml_root>
```

Invalid Request

Sent when the XML system is unable to understand the request sent by the client. No other response is sent.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid request </error>
      </report>
</MS_xml_root>
```

Invalid Enablement Request

Sent when the client application has requested data their account is not enabled for. It will be followed by one or more triplets of <Exchange><SecType><Symbol> separated by comma for each invalid symbol, then the data for any valid instruments and fields in the request.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
<error>Invalid enablement request=151.1.VOD,240.20.GBPUSDCOMP</error>
      </report>
</MS_xml_root>
```

Too Many Lists

Sent when the client attempts to add more than 10 lists.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
<error>Too Many Lists</error>
      </report>
</MS_xml_root>
```

No Default Fields for Lists

Sent when the client does not include an initial set of fields in the creation of a new list with the &addlist command.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>No Default Fields for List</error>
      </report>
</MS_xml_root>
```

Duplicate Field

Followed by a comma-separated list of duplicated fields, then the data for any valid instruments and fields in the request.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Duplicate field=D4,D6</error>
      </report>
</MS_xml_root>
```

Duplicate Instrument

Followed by one or more triplets of <exchange><SecType><symbol> separated by commas for each duplicated instrument, then the data for any valid instruments and fields in the request

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Duplicate instrument=151.1.AAL,151.1.XTA</error>
      </report>
</MS_xml_root>
```

Too Many Sub Users (v1.1)

Sent when the number of sub users exceeds the number allowed.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Too many sub users </error>
      </report>
</MS_xml_root>
```

Unique Number of Instruments/Month Exceeded (v1.9)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Too many sub users </error>
      </report>
</MS_xml_root>
```

Too Many Fields Requested (v1.9)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Too many fields requested </error>
      </report>
</MS_xml_root>
```

Invalid Terminal ID Requested (v2.0)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Invalid Terminal ID </error>
      </report>
</MS_xml_root>
```

Invalid Session Key Being Requested (v2.0)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Invalid session key </error>
      </report>
</MS_xml_root>
```

Issue Pulling Data from Real-Time US Database (v2.1)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Unable to connect to realtime US database </error>
      </report>
</MS_xml_root>
```

Issue Pulling Data from Real-Time Non-US Database (v2.)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Unable to connect to realtime non-US database </error>
      </report>
</MS_xml_root>
```

Issue Pulling Data from Delayed US Database (v2.1)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Unable to connect to Delayed US database</error>
      </report>
</MS_xml_root>
```

Issue Pulling Data from Delayed Non-US Database (v2.1)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Unable to connect to Delayed non-US database</error>
      </report>
</MS_xml_root>
```

Issue Pulling Data from Real-Time Time & Sales Database (v2.2c)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Unable to connect to realtime TimeSales
      database</error>
      </report>
</MS_xml_root>
```

Issue Pulling Data from Delayed Time & Sales Database (v2.2c)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Unable to connect to delayed TimeSales database</error>
      </report>
</MS_xml_root>
```

Users Not Enabkled for 90-Day Time & Sales Data (v3.1)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> User not enabled for 90 Day T&S Service</error>
      </report>
</MS_xml_root>
```

Invalid Bar Interval (v3.1)

Bar interval not within 1-1440 range.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Invalid Interval</error>
      </report>
</MS_xml_root>
```

Invalid Field List Name (v3.2)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid Fieldlist name</error>
      </report>
</MS_xml_root>
```

Too Many Field Lists (V3.2)

Field lists sent in request are >10.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Too Many Field Lists</error>
      </report>
</MS_xml_root>
```

Invalid Security Type in 90Days Time & Sales (v3.3)

Value in &security is out of range.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid Security Type</error>
      </report>
</MS_xml_root>
```

Invalid Number of Bars in 90Days Time & Sales (v3.3)

Value in &numbars is out of range.

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid Number of Bars</error>
      </report>
</MS_xml_root>
```

No Data Available in 90Days Time and Sales (v3.3)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>No Data</error>
      </report>
</MS_xml_root>
```

Number of Requests Per Hour Limit Exceeded in 90Days Time & Sales (v3.3)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Requests per Instrument Limit Exceeded</error>
      </report>
</MS_xml_root>
```

XML Unable to Understand the Alert (v3.5)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid Alert</error>
      </report>
</MS_xml_root>
```

Search Error Responses

A number of new search error responses have been added all of the above format and are as follows

```
<error>Invalid Symbol=xxx<\error>
<error>Invalid RootSymbol=xxx<\error>
<error>Invalid Currency=xxx<\error>
<error>Invalid Name=xxx<\error>
<error>Invalid ISIN=xxx<\error>
<error>Invalid MIC=xxx<\error>
<error>Invalid PerfID=xxx<\error>
<error>Invalid CUSIP=xxx<\error>
<error>Invalid SEDOL=xxx<\error>
<error>Invalid Investment ID=xxx<\error>
```

TIX Data Error Responses

A number of new error responses have been added for tic data all of the above format and are as follows:

Trying to make a fourth concurrent request

```
<error>Too Many Concurrent Tickdata Requests - Max 3 Permitted<\error>
```

Request exceeds one month's history

```
<error>Request exceeds maximum of one month of history per request</error>
```

Request exceeds amount of data client is enabled for

```
<error>Request exceeds enablement</error>
```

Invalid values for a parameter

```
<error>Invalid value &parameter=123456</error>
```

Alerts - Price and PerFactor Ranges (v4.7)

For alerts, price and per factor must be in the followinging range: -9999 <= value <= 9999. If not, the following error message is returned:

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Alert Parameters Out of Range</error>
      </report>
</MS_xml_root>
```

Alerts If the instrument in the alert request does not exist the error message is returned: "Instrument doesn't exist

Alerts – Instrument in Request Does Not Exisit (v4.7)

If the instrument in the alert request does not exist, the following error message is returned:

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Instrument Doesn't Exist=Instrument</error>
      </report>
</MS_xml_root>
```

User Not Enabled for Tick History Service (v4.7)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>User mot enabled for Tick History Service</error>
      </report>
</MS_xml_root>
```

User Tries to Request More Than 1 Month of Tick History (v4.7)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Date range exceeds user enablment</error>
      </report>
</MS_xml_root>
```

Tick History Parameter is Incorrect (v4.7)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid value &ParameterName=Value</error>
      </report>
</MS_xml_root>
```

User Tries to Delete Incorrect User ID (v4.7)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Extraction [UID] not found</error>
      </report>
</MS_xml_root>
```

TIX Extraction Request Received with Duration > 1 Month (v4.8)

```
If a TIX extraction request is received with a duration > 1 month, the
following message is returned:
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>extraction request received with duration over 31 days.
      Start: DD-MM-YYYY end: DD-MM-YYYY</error>
      </report>
</MS_xml_root>
Extraction Request Receveived Without Email (v4.8)
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Extraction request received with no email</error>
      </report>
</MS_xml_root>
```

More than 100 Fields Requested for a Fixed Format Request (v4.8)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
<report>
      <error>Extraction request received with fixed format but this is only
 allowed witha defined list of up to 100 fields. X fields defined
      </error>
      </report>
```

```
</MS_xml_root>
```

User Makes Invalid Request for L2 Data from TIX (v4.8)

When a user requests L2 data form TIX, but is not permissioned for it, the following response is returned:

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
      <error> Extraction requested for L2 data without permissions
set for L2 data</error>
      </report>
</MS_xml_root>
```

User Mixes Up an Exchange and Instrument request in TIX (v4.8)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
<report>
<error>Extraction request received with both Instrument and Exchange fields
 present </error>
      </report>
</MS_xml_root>
```

Invalid Empty Field Format for TIX Request (v4.8)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid value in EmptyFieldFormat field for extraction r
      equest, format value: X</error>
      </report>
</MS_xml_root>
```

Invalid Format Value in TIX Request (v4.8)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Invalid value in format field for extraction request, fo
      rmat value: X</error>
      </report>
</MS_xml_root>
```

Unknown Timezone in a TIX Request

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
<report>
      <error> Unknown timezone specified in Extraction request: XYZ
</error>
      </report>
</MS_xml_root>
```

TIX Request Made With No Message Types Requested (v4.8)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
<report>
      <error>Extraction request received with no message types set, Message
Types value: X</error>
      </report>
</MS_xml_root>
```

TIX Extraction Request Received with Empty Field Lists (v4.8)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error> Extraction request received with empty field table
      </error>
      </report>
</MS_xml_root>
```

TIX Instrument Request Received with No Instrument Present (v4.8)

```
<?xml version="1.0" encoding="utf-8"?><MS_xml_root soft_ver="1.2.0"
provider="Morningstar" xmlns="http://msxml.tenfore.com"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://msxml.tenfore.com TenforeXMLSchema.xsd">
      <report>
            <error>Extraction request received with empty instrument parame
      ter</error>
      </report>
</MS_xml_root>
```

Appendix E Message Types

E.1 Trade Messages

A trade message is sent with the following fields:

Trade Messages		
Field ID	**Field Name**	**Comments**
D2	Last Trade	Pre/post/normal market
D3	Last Trade Volume	Pre/post/normal market
D16	Cumulative volume	Normal market only
D17	Open	Normal market only
D18	High	Normal market only
D19	Low	Normal market only
D1978	Yesterday's Adjusted Close	All Sectypes except 3 & 4
D34	Settle	Sectypes 3 and 4 only
D35	Yesterday's Settle	Sectypes 3 and 4 only
D423	VWAP	
D954	Instrument status	Always present **Note:** D954 is not be capable of triggering an update. D954 is only generated when an update is sent.
D948	Pre trade cum vol	Only present when status is pre-open
D949	Post Trade cum vol	Only present in post trading
H15	Adjusted Net change (day)_	Normal market only
H16	Adjusted % net change (day)	Normal market only
D770	Time of update to last trade	Pre/Post/normal market
D138	Trade indicator flag	Pre/Post/normal market
D108	Trade Condition	Pre/Post/normal market
Example: 126.1.MSFT|T|HH:MM:SS|D2=123|D3=22|…..		

E.2 Quote Messages

A quote message is sent with the following fields:

Quote Messages		
Field ID	**Field Name**	**Comments**
D4	Best Bid	
D5	Best Bid Size	
D6	Best Ask	
D7	Best Ask Size	
D954	Instrument status	
Example: 126.1.IBM|Q|HH:MM:SS|D4=34|D5=6|D6=35|D7=7|D954=OPEN		

E.3 Close Messages

A close message is sent with the following fields:

Close Messages		
Field ID	**Field Name**	**Comments**
D2	Today's close price	
D16	Cumulative volume	
D17	Open	
D18	High	
D19	Low	
D20	Yesterdays Close	
D34	Settle	
D35	Yesterday's Settle	
D423	VWAP	
D954	Instrument status	
D948	Pre trade cum vol	
D949	Post Trade cum vol	
H15	Adjusted Net change (day)_	
H16	Adjusted % net change (day)	
D772	Time of update to today's close	

Example:

126.1.MSFT|C|HH:MM:SS|D2=123|D16=222000|…..

Note:

If a close message is received on the feed with a changed D2, then this will only send a close message out, not a trade message.

Appendix F Web Service Tags

Note: All tags are case insensitive.

F.1 Single Tags

Single Tags – No User Input Needed		
Tag	**Description**	**Supported in FoD v3.0**
&JSONShort	Request responses in JSON format	Yes
&JSON	No longer supported	Yes
&TimeSales	Request Basic time and sales	No
&Date	Option Date for basic time and sales	No
&CommonTime	Optional common time for basic time and sales	No
&TradeCond	Optional Trade condition for basic time and sales	No
&FTP	For future use	No
&SingleDataPoint	Use in Time and sales to specify a single data point rather than a bar is required	No
&OpenClose	Gives the true day open/close in a time and sales bar request. **Note:** Recommended to use daily bar rather than this tag	Yes
&Today	Can be used for end Date=today in time and sales requests	Yes
&ListingExch	Adds the trading exchange (D214) to 90day T&S request primarily for US equities.	No
&BigFiles	Enables the file responses for Time and sales to be 10Meg rather than the default of 2Meg	No
&Vwap	Used to request the vwap on bar requests for Time and Sales	Yes
&CorpActions	Used to retrieve Corporate actions	Yes
&NameChanges	Used to retrieve name changes	Yes
&DeleteAlert	Used to delete alerts	No
&TriggeredAlerts	Used to view Triggered alerts	No
&ActiveAlerts	Used to view Active (non-triggered) alerts	No
&ExtraDebugInfo	For internal use only – do not use	No

Single Tags – No User Input Needed		
Tag	**Description**	**Supported in FoD v3.0**
&Openinterest	Optional tag to add open interest to a bar request	Yes
&AlertCreateTime	Optional tag to add the alert creations time to an alert response	No
&ExtendedAlertResponse	Adds additional fields to the alerts response	No
&AutoReset	Optional tag to auto reset alerts 1, 2, 3, 4, 5, 6, 7, 8, 21, 27 and 28.	No
&PrePost	Optional tag to add pre- and post-trading data to bar responses	Yes
&DisplayAutoResetAlerts	Optional tag when requesting active alerts to show any alerts set as Auto Reset.	No
&unadjusted	Allows daily chart data to be returned unadjusted	Yes
&newsymbols	Used to request newly introduced symbols	No
&delsymbols	Used to request deleted instruments	No
&eoddownload	Used to request an EOD download of an exchange	No
&pricechangeadjusted	Used to request historical adjusted price change messages	No
&pricechangeunadjusted	Used to request historical unadjusted price changes	No
&bulkpricedelete	Used to request a list of bulk price deletes	No
&FullSearch	Used to request data with a trading gap of > 1 year	No
&SymbolList	Used to create a list of instruments that traded on an exchange in a given year	No
&HisEODExchange	Used to request all instruments that traded on a specific exchange on a specific day	No
&NanoSecs	If available in tick request, nanoseconds will be returned in D502.	No

F.2 Tags Requiring Additional Inputs

Tags Requiring Additional Inputs		
Tag	**Description**	**Supported in FoD v3.0**
&Username	Used to specify the username for requests	Yes
&Password	Used to specify the password for requests	Yes
&Skey	Used to specify the Session key for SSO	No
&TID	Used to specify the Terminal ID for SSO	No
&AddList	Used to add (store) a list on the server	No
&DelList	Used to delete (remove) a list from the server	No
&List	Used to give a list a name	No
&AddFieldList	Used to add (store) a field list on the server	No
&DelFieldList	Used to delete (remove) a field list form the server	No
&FieldList	Used to give a field list a name	No
&Instrument	Used to specify the instrument(s) requested	Yes
&MSLegacy	Obsolete	No
&PerfID	Used to specify the Performance ID(s) required	Yes
&ISIN	Used to specify the ISIN(s) required	Yes
&InvestmentID	Used to specify the Investment/SecID(s) required	Yes
&Index	Used for index constituent requests	Yes
&ExchangeInfo	Used for exchange meta data requests	No
&Fields	Used to specify the fields requested	Yes
&Alert	Alerts	No
&TS	Time and Sales	No
&Exchange	Optional Exchange Tag for ISIN and SecID requests	No
&UniqueUserID	Unique User ID for Alerts	No
&UniqueAlertID	Unique Alert ID for Alerts	No
&Value	Allows the user to enter value(s) for alerts	No
&sDate	Start date for Time and Sales requests	Yes
&sTime	Start time for Time and Sales requests	Yes

Tags Requiring Additional Inputs		
Tag	**Description**	**Supported in FoD v3.0**
&eDate	End date for Time and Sales requests	Yes
&eTime	End time for Time and Sales requests	Yes
&Type	Used to specify the type of bar for Time and Sales requests	Yes (file responses not supported)
&Interval	Used to specify the bar interval for Time and Sales requests	Yes
&Security	Used to set the Security type for cross exchange Time and Sales requests and corporate action requests	No
&Numbars	Used to set the number of bars (1-10) for from exchange Time and Sales requests	No
&CalendarDays	Used to set the number of Calendar days required for Time and Sales requests (max 90)	Yes
&TradingDays	Used to set the number of Trading days required for Time and Sales requests (max 60)	Yes

F.3 Tags Used in Search

Tags Used in Search			
Field Name	**Field Code**	**Tags**	**Tags supported in FoD v3.0**
Ticker /Symbol	H1	&symbol	Yes
Exchange	H2	&exchange	Yes
Security Type	H3	&security	Yes
Root Symbol	S2	&rootsymbol	Yes
Listed Currency	S9	&currency	Yes
Company Name	S12	&name	Yes
ISIN	S19	&isin	Yes
Primary MIC	S676	&mic	Yes
Morningstar Performance ID	S1000	&perfid	Yes
CUSIP	S1012	&cusip	Yes
SEDOL	S1013	&sedol	Yes
Morningstar ID	S1766	&investmentID	Yes

F.4 Tags Used in Streaming

Tag	Description	Tags supported in FoD v3.0
&StartStream	Starts a streaming session	Yes
&AuthenticateSession	Authenticate streaming session	Yes
&Token	Parameter tag	Yes
&AddToWatch	Add instrument to watch list	Yes
&AddToWatchWithSnap	Add instrument to watch list and see current snapshot	Yes
&DeleteFromWatch	Delete instrument from watch list	Yes
&MillisecondTimestamp	Streaming updates will include milliseconds in <update> timestamp with the inclusion of the tag	Yes
&Addfields	Used to add fields back to the stream	Yes
&RemoveFields	Used to remove fields from the stream	Yes