

Elektron Message API C++ Edition V3.0.3

ELEKTRON MESSAGE API CONFIGURATION GUIDE



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Chapter 1 Introduction

1.1 About this Manual

This document is authored by Elektron Message API architects and programmers. Several of its authors have designed, developed, and maintained the Elektron Message API product and other Thomson Reuters products which leverage it. As such, this document is concise and addresses realistic scenarios and use cases.

This guide documents the functionality and capabilities of the Elektron Message API C++ Edition . The Elektron Message API can also connect to and leverage many different Thomson Reuters and customer components. If you want the Elektron Message API to interact with other components, consult that specific component's documentation to determine the best way to configure and interact with these other devices.

This document explains the configuration parameters for the Elektron Messaging API (simply called the Message API). Message API configuration is specified first via compiled-in configuration values, then via an optional user-provided XML configuration file, and finally via programmatic changes introduced via the software.

Configuration works in the same fashion across all platforms.

1.2 Audience

This manual provides information that aids software developers and local site administrators in understanding Elektron Message API configuration parameters. You can obtain further information from the *Elektron Message C++ Edition API Developer's Guide*.

1.3 Definitions

| DEFINITION | DESCRIPTION |
|---------------|--|
| Group | A related set of configuration parameters for a specific EMA component (e.g., ChannelGroup). |
| List | A list of components belonging to a group (e.g., ChannelList). |
| Component | A specific component (e.g., Channel). Because lists can have multiple components, each component must have a 'name' field for identification purposes. |
| Field | A configurable parameter. |
| Default Value | A default value is the value the API uses if a value is not specified by the user. In general, items with default values are required by the API. |
| Allowed value | Specific values or a range of values that the field allows. |

Table 1: Definitions

1.4 Acronyms and Abbreviations

| ACRONYM | MEANING |
|---------|---|
| ADH | Advanced Data Hub is the horizontally scalable service component within Thomson Reuters Enterprise Platform (TREP) providing high availability for publication and contribution messaging, subscription management with optional persistence, conflation and delay capabilities. |
| ADS | Advanced Distribution Server is the horizontally scalable distribution component within Thomson Reuters Enterprise Platform (TREP) providing highly available services for tailored streaming and snapshot data, publication and contribution messaging with optional persistence, conflation and delay capabilities. |
| API | Application Programming Interface |
| ASCII | American Standard Code for Information Interchange |
| EED | Elektron Edge Device |
| EMA | Elektron Message API, referred to simply as the Message API |
| ETA | Elektron Transport API, referred to simply as the Transport API |
| HTTP | Hypertext Transfer Protocol |
| HTTPS | Hypertext Transfer Protocol (Secure) |
| OMM | Open Message Model |
| QoS | Quality of Service |
| RDM | Reuters Domain Model |
| RMTES | Reuters Multi-Lingual Text Encoding Standard |
| RSSL | Reuters Source Sink Library |
| RWF | Reuters Wire Format, a Thomson Reuters proprietary format. |
| TR-DFD | Thomson Reuters Data Feed Direct |
| TREP | Thomson Reuters Enterprise Platform |
| UML | Unified Modeling Language |
| UTF-8 | 8-bit Unicode Transformation Format |

Table 2: Acronyms and Abbreviations

1.5 References

1. Elektron Message API C++ Edition *RDM Usage Guide*
2. *API Concepts Guide*
3. *Elektron Message API C++ Edition Developers Guide*
4. *Transport API C Edition Value Added Components Developers Guide*

5. *Transport API C Edition Developers Guide*
6. The [Thomson Reuters Professional Developer Community](#)

1.6 Documentation Feedback

While we make every effort to ensure the documentation is accurate and up-to-date, if you notice any errors, or would like to see more details on a particular topic, you have the following options:

- Send us your comments via email at apidocumentation@thomsonreuters.com.
- Add your comments to the PDF using Adobe's **Comment** feature. After adding your comments, submit the entire PDF to Thomson Reuters by clicking **Send File** in the **File** menu. Use the apidocumentation@thomsonreuters.com address.

1.7 Document Conventions

This document uses the following types of conventions:

- Typographic
- Data Types
- Field and Text Values

1.7.1 Typographic

- C++ classes, methods, in-line code snippets, and types are shown in **orange, Courier New** font.
- Parameters, filenames, tools, utilities, and directories are shown in **Bold** font.
- Document titles and variable values are shown in *italics*.
- When initially introduced, concepts are shown in ***Bold, Italics***.
- Longer code examples are shown in Courier New font against an orange background. For example:

```
AppClient client;
    OmmConsumer consumer( OmmConsumerConfig().operationModel(
OmmConsumerConfig::UserDispatchEnum ).host( "localhost:14002" ).username( "user" ) );
    consumer.registerClient( ReqMsg().domainType( MMT_MARKET_BY_PRICE ).serviceName(
"DIRECT_FEED" ).name( "BBH. ITC" ).privateStream( true ), client );
    unsigned long long startTime = getCurrentTime();
```

1.7.2 Data Types

Data types within the configuration repository are as follows:

| DATA TYPE | DEFINITION |
|-------------|--|
| EmaString | String |
| Enumeration | Specific text, as indicated in the field description |
| Int64 | Signed long integer |
| UInt64 | Unsigned long integer |

Table 3: Data Type Conventions

1.7.3 Field and Text Values

The value for individual fields in XML files are specified as `<fieldName value="field_value"/>` where:

- **fieldName** is the name of the field and cannot contain white space.
- **field_value** sets the field's value and is always included in double quotes.

Note: Except for examples, double quotes are omitted from the field (parameter) descriptions throughout the remainder of this document.

Though enumerations have text values (i.e., `RSSL_SOCKET`), in the software, text values are represented as numbers (required for programmatic configuration). When introduced, enumerations are listed along with their textual values.

Chapter 2 EMA Configuration General Overview

2.1 About Message API Configuration

You write the Message API configuration using a simple XML schema, some settings of which can be changed via software function calls. The initial configuration compiled into the Message API software defines a minimal set of configuration parameters. Message API users can also supply an XML file (**EmaConfig.xml**) to specify configuration parameters, which must be put in the same directory as the EMA application. Additionally, programmatic interfaces can change parameter settings.

Message API configuration data is divided into the following groups:

- **Consumer:** Consumer configuration data is the highest-level description of the application. Such settings typically select entries from the channel, logger, and dictionary groups.
- **NiProvider:** Non-interactive provider configuration data is the highest-level description of the application. Such settings typically select entries from the channel, logger, and directory groups.
- **Channel:** Channel configuration data describe various connection alternatives and provides configuration alternatives for those connections.
- **Logger:** Logger configuration data specify logging alternatives and associated parameters.
- **Dictionary:** Dictionary configuration data sets the location information for dictionary alternatives.
- **Directory:** Directory configuration data configures source directory refresh information.

The Consumer and NiProvider groups are top-level configuration groups. Specific consumer and non-interactive provider applications select their configurations using the consumer and non-interactive provider names, which are passed in using the `consumerName()` and `providerName()` methods (for details on these methods, refer to Section 4.3.1).

This manual discusses the six configuration groups and the configuration parameters available to each group.

2.2 Parameter Overview

Many default behaviors are hard-coded into the EMA library and globally enforced. However, if you need to change EMA behaviors or configure EMA for your specific deployment, you can use EMA's XML configuration file (**EmaConfig.xml**) and adjust behaviors using the appropriate parameters (discussed in this section). While EMA globally enforces a set of default behaviors, certain other default behaviors are dependent on the use of the XML file and its settings.

For example:

- EMA's globally default behavior is to log its messages at a **LoggerSeverity** level of **Success** to a file named **emaLog_pid.log** (where **pid** is the process ID). You can manually change the **LoggerSeverity** and the log filename by using **EmaConfig.xml**.
- By default (globally), the EMA does not XML trace to file (equivalent to **XmlTraceToFile value="0"**). You need to add this parameter only if you want to turn on XML tracing. If you turn on XML tracing (a non-default behavior), the EMA will trace to a file named **EmaTrace** (equivalent to **XmlTraceFileName value="EmaTrace"**).

For a list of default behaviors (and the parameters that you can use to change these behaviors) refer to Section 2.3.

For details on editing **EmaConfig.xml** and its XML schema, refer to Chapter 2, EMA Configuration General Overview.

2.3 Default Behaviors

When the EMA library needs a parameter, it behaves according to its hard coded configuration. You can change the behavior of EMA by providing a valid alternate value either through the use of **EmaConfig.xml**, function calls, or programmatic methods.

| PARAMETER | TYPE | DEFAULT BEHAVIOR | NOTES |
|----------------------------|-------------|--|--|
| Host | EmaString | localhost | Specifies the host name of the server to which the application connects. The parameter value can be a remote host name or IP address. |
| Port | EmaString | 14002 (for consumers) 14003 (for non-interactive providers) | Specifies the port number on the server to which the application connects. |
| DefaultConsumer | EmaString | EmaConsumer | If consumer components are configured, this parameter is ignored. |
| DefaultNiProvider | EmaString | EmaNiProvider | If non-interactive provider components are configured, this parameter is ignored. |
| LoggerSeverity | Enumeration | Success | Sets the level at which the EMA logs events. For details on logging severity levels and their enumerations, refer to Section 3.4.2. |
| LoggerType | Enumeration | File | Specifies the destination for output messages. The parameter value can be either File or Stdout . For details on selecting a loggerType and its enumerations, refer to Section 3.4.2. |
| FileName | EmaString | "emaLog_ <i>pid</i> .log" | Specifies the base name of log file (used when LoggerType value="File"); the EMA automatically appends _pid.log to the base name, where pid is the logger's process id number. |
| RdmFieldDictionaryFileName | EmaString | ./RDMFieldDictionary | Specifies the path and name of the RdmFieldDictionary file. |
| EnumTypeDefFileName | EmaString | ./enumtype.def | Specifies the path and name of the enumTypeDef dictionary file. |

Table 4: Global Configuration

Chapter 3 Configuration Groups

3.1 ConsumerGroup

A **ConsumerGroup** contains two elements:

- A **DefaultConsumer** element, which you can use to specify a default **Consumer** component. If a default **Consumer** is not specified in the **ConsumerGroup**, EMA uses the first Consumer listed in the **ConsumerList**. For details on configuring a default **Consumer**, refer to Section 3.1.2.
- A **ConsumerList** element, which contains one or more **Consumer** components (each should be uniquely identified by a **<Name .../>** entry). The consumer component is the highest-level abstraction within an application and typically refers to **Channel**, **Logger**, and/or **Dictionary** components which specify consumer capabilities.

For a generic **ConsumerGroup** XML schema, refer to Section 3.1.1.

For details on configuring a **ConsumerGroup**, refer to Section 3.1.3.

For a list of parameters you can use in configuring a **Consumer**, refer to Section 3.1.4.

3.1.1 Generic XML Schema for ConsumerGroup

The generic XML schema for **ConsumerGroup** is as follows:

```
<ConsumerGroup>
  <DefaultConsumer value="VALUE" />
  <ConsumerList>
    <Consumer>
      <Name value="VALUE" />
      ...
    </Consumer>
  </ConsumerList>
</ConsumerGroup>
```

3.1.2 Setting a Default Consumer

If a **DefaultConsumer** is not specified, then the EMA uses the first **Consumer** component in the **ConsumerGroup**. However, you can specify a default consumer by including the following parameter on a unique line inside **ConsumerGroup** but outside **ConsumerList** (for an example, refer to Appendix A).

```
<DefaultConsumer value="VALUE" />
```

3.1.3 Configuring Consumers in a ConsumerGroup

To configure a **Consumer** component, add the appropriate parameters to the target consumer in the XML schema, each on a unique line (for a list of available **Consumer** parameters, refer to Section 3.1.4).

For example, if your configuration includes logger schemas, you specify the desired logger schema by adding the following parameter inside the appropriate **Consumer** section:

```
<Logger value="VALUE" />
```

Consumer components can use different logger schemas if the configuration includes more than one.

3.1.4 Consumer Entry Parameters

Use the following parameters when configuring a **Consumer** in EMA.

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|-------------------------|-----------|---------|---|
| CatchUnhandledException | UInt64 | 1 | Specifies whether EMA catches unhandled exceptions thrown from methods executed on the EMA's thread or whether EMA lets the application handle them. Available values include: <ul style="list-style-type: none"> 1 (true): Whenever the EMA catches unhandled exceptions in its thread, the EMA logs an error message and then terminates the thread. 0 (false): the EMA passes unhandled exceptions to the operating system. |
| Channel | EmaString | N/A | Specifies the channel that the Consumer component should use. This channel must match the Name parameter from the appropriate <Channel> entry in the ChannelGroup configuration. If Channel is not specified, the EMA resorts to default channel behavior when needed. For further details on the <Channel> entry and default behaviors, refer to Section 3.3. |
| ChannelSet | EmaString | N/A | Specifies a comma-separated set of channels names. Each listed channel name should have an appropriate <Channel> entry in the ChannelGroup . Channels in the set will be tried with each reconnection attempt until a successful connection is made. For further details refer to Section 3.3.6. Note: If both Channel and ChannelSet are configured, then EMA uses the parameter that is configured last in the file. For example, if <Channel> is configured after <ChannelSet> then EMA uses <Channel> , but if <ChannelSet> is configured after <Channel> then EMA uses <ChannelSet> . |

Table 5: Consumer Group Parameters

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|--------------------------|-----------|---------|---|
| Dictionary | EmaString | N/A | Specifies how the consumer should access its dictionaries (it must match the Name parameter from the appropriate <Dictionary> entry in the DictionaryGroup configuration). If Dictionary is not specified, the EMA uses the channel's dictionary when needed. For further details on this default behavior, refer to Section 3.5. |
| DictionaryRequestTimeout | UInt64 | 45,000 | Specifies the amount of time (in milliseconds) the application has to download dictionaries from a provider before the OmmConsumer throws an exception. If set to 0 , EMA will wait for a response indefinitely. |
| | | | Note: If ChannelSet is configured: <ul style="list-style-type: none"> EMA honors DictionaryRequestTimeout only on its first connection. If the channel supporting the first connection goes down, EMA does not use DictionaryRequestTimeout on subsequent connections. |
| DirectoryRequestTimeout | UInt64 | 45,000 | Specifies the amount of time (in milliseconds) the provider has to respond with a source directory refresh message before the OmmConsumer throws an exception. If set to 0 , EMA will wait for a response indefinitely. |
| | | | Note: If ChannelSet is configured: <ul style="list-style-type: none"> EMA honors DirectoryRequestTimeout only on its first connection. If the channel supporting the first connection goes down, EMA does not use DirectoryRequestTimeout on subsequent connections. |
| DispatchTimeoutApiThread | Int64 | -1 | Specifies the duration (in microseconds) for which the internal EMA thread is inactive before going active to check whether a message was received. If set to less than zero, the EMA internal thread goes active only if it gets notified about a received message. |
| ItemCountHint | UInt64 | 100,000 | Specifies the number of items the application expects to request. If set to 0 , EMA resets it to 513 . For better performance, the application can set this to the approximate number of item requests it expects. |
| Logger | EmaString | N/A | Specifies a set of logging behavior the Consumer should exhibit (it must match the Name parameter from the appropriate <Logger> entry in the LoggerGroup configuration). If Logger is not specified, the EMA uses a set of logger default behaviors. For further details on the <Logger> entry and default settings, refer to Section 3.4. |

Table 5: Consumer Group Parameters (Continued)

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|----------------------------|-----------|---------|---|
| LoginRequestTimeout | UInt64 | 45,000 | <p>Specifies the amount of time (in milliseconds) the provider has to respond with a login refresh message before the OmmConsumer throws an exception.</p> <p>If set to 0, EMA will wait for a response indefinitely.</p> <p>Note: If ChannelSet is configured:</p> <ul style="list-style-type: none"> EMA honors LoginRequestTimeout only on its first connection. If the channel supporting the first connection goes down, EMA does not use LoginRequestTimeout on subsequent connections. |
| MaxDispatchCountApiThread | UInt64 | 100 | Specifies the maximum number of messages the EMA dispatches before taking a real-time break. |
| MaxDispatchCountUserThread | UInt64 | 100 | Specifies the maximum number of messages the EMA can dispatch in a single call to the OmmConsumer::dispatch() . |
| MaxOutstandingPosts | UInt64 | 100,000 | Specifies the maximum allowable number of on-stream posts waiting for an acknowledgment before the OmmConsumer disconnects. |
| Name | EmaString | N/A | <p>Specifies the name of this Consumer component. Name is required when creating a Consumer component.</p> <p>You can use any value for Name.</p> |
| ObeyOpenWindow | UInt64 | 1 | <p>Specifies whether the OmmConsumer obeys the OpenWindow from services advertised in a provider's Source Directory response. Available values include:</p> <ul style="list-style-type: none"> 0 (false) 1 (true) |
| PipePort | Int64 | 9001 | Specifies the internal communication port. You might need to adjust this port if it conflicts with other processes on the machine. |
| PostAckTimeout | UInt64 | 15,000 | <p>Specifies the length of time (in milliseconds) a stream waits to receive an ACK for an outstanding post before forwarding a negative acknowledgment to the application.</p> <p>If set to 0, EMA will wait for a response indefinitely.</p> |
| RequestTimeout | UInt64 | 15,000 | <p>Specifies the amount of time (in milliseconds) the OmmConsumer waits for a response to a request before sending another request.</p> <p>If set to 0, EMA will wait for a response indefinitely.</p> |
| ServiceCountHint | UInt64 | 513 | Sets the size of directory structures for managing services. If the application specifies 0 , EMA resets it to 513 . |

Table 5: Consumer Group Parameters (Continued)

3.2 Non-interactive Provider Group

A **NiProviderGroup** contains two elements:

- A **DefaultNiProvider** element, which you can use to specify a default **NiProvider** component. If a default **NiProvider** is not specified in the **NiProviderGroup**, EMA uses the first non-interactive provider listed in the **NiProviderList**. For details on configuring a default **NiProvider**, refer to Section 3.2.2.
- A **NiProviderList** element, which contains one or more **NiProvider** components (each should be uniquely identified by a **<Name .../>** entry). The non-interactive provider component is the highest-level abstraction within an application and typically refers to **Channel**, **Logger**, and/or **Directory** components which specify non-interactive provider capabilities.

For a generic **NiProviderGroup** XML schema, refer to Section 3.2.1.

For details on configuring a **NiProviderGroup**, refer to Section 3.2.3.

For a list of parameters you can use in configuring a **NiProvider**, refer to Section 3.2.4.

3.2.1 Generic XML Schema for Non-interactive Provider Group

The generic XML schema for **NiProviderGroup** is as follows:

```
<NiProviderGroup>
  <DefaultNiProvider value="VALUE" />
  <NiProviderList>
    <NiProvider>
      <Name value="VALUE" />
      ...
    </NiProvider>
  </NiProviderList>
</NiProviderGroup>
```

3.2.2 Setting a Default Non-interactive Provider

If a **DefaultNiProvider** is not specified, then the EMA uses the first **NiProvider** component in the **NiProviderGroup**. However, you can specify a default non-interactive provider by including the following parameter on a unique line inside **NiProviderGroup** but outside **NiProviderList** (for an example, refer to Appendix A).

```
<DefaultNiProvider value="VALUE" />
```


3.2.3 Configuring a Non-interactive Provider in a NiProviderGroup

To configure a **NiProvider** component, add the appropriate parameters to the target non-interactive provider in the XML schema, each on a unique line (for a list of available **NiProvider** parameters, refer to Section 3.2.4).

For example, if your configuration includes logger schemas, you specify the desired logger schema by adding the following parameter inside the appropriate **NiProvider** section:

```
<Logger value="VALUE" />
```

Non-interactive provider components can use different logger schemas if the configuration includes more than one.

3.2.4 Non-interactive Provider Entry Parameters

Use the following parameters when configuring a **NiProvider** in EMA.

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|--------------------------|-----------|---------|--|
| CatchUnhandledException | UInt64 | 1 | Specifies whether EMA catches unhandled exceptions thrown from methods executed on the EMA's thread or whether EMA lets the application handle them. Available values include: <ul style="list-style-type: none"> 1 (true): Whenever the EMA catches unhandled exceptions in its thread, the EMA logs an error message and then terminates the thread. 0 (false): the EMA passes unhandled exceptions to the operating system. |
| Channel | EmaString | N/A | Specifies the channel that the NiProvider component should use. This channel must match the Name parameter from the appropriate <Channel> entry in the ChannelGroup configuration. If Channel is not specified, the EMA resorts to default channel behavior when needed. For further details on the <Channel> entry and default behaviors, refer to Section 3.3. |
| Directory | EmaString | N/A | Specifies source directory refresh information that the NiProvider sends after establishing a connection (this must match the Name parameter from the appropriate <Directory> entry in the DirectoryGroup configuration). If Directory is not specified, the EMA uses a hard coded configuration. For further details on the <Logger> entry and default settings, refer to Section 3.4. |
| DispatchTimeoutApiThread | Int64 | -1 | Specifies the duration (in microseconds) for which the internal EMA thread is inactive before going active to check whether a message was received. If set to less than zero, the EMA internal thread goes active only if it gets notified about a received message. |
| ItemCountHint | UInt64 | 100,000 | Specifies the number of items the application expects to maintain. If set to 0 , EMA resets it to 513 . For better performance, the application can set this to the approximate number of items it maintains. |

Table 6: NiProviderGroup Parameters

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|----------------------------------|-----------|---------|---|
| Logger | EmaString | N/A | Specifies a set of logging behavior the NiProvider should exhibit (it must match the Name parameter from the appropriate <Logger> entry in the LoggerGroup configuration). If Logger is not specified, the EMA uses a set of logger default behaviors. For further details on the <Logger> entry and default settings, refer to Section 3.4. |
| LoginRequestTimeout | UInt64 | 45,000 | Specifies the amount of time (in milliseconds) the provider has to respond with a login refresh message before the OmmProvider throws an exception. If set to 0 , EMA will wait for a response indefinitely. |
| MaxDispatchCountApiThread | UInt64 | 100 | Specifies the maximum number of messages the EMA dispatches before taking a real-time break. |
| MaxDispatchCountUserThread | UInt64 | 100 | Specifies the maximum number of messages the EMA can dispatch in a single call to the OmmProvider::dispatch() . |
| MergeSourceDirectoryStreams | UInt64 | 1 | Specifies whether EMA merges all source directory streams (configured and user-submitted) into one stream: <ul style="list-style-type: none"> • 1 (true) • 0 (false) |
| Name | EmaString | N/A | Specifies the name of this NiProvider component. Name is required when creating a NiProvider component. You can use any value for Name . |
| PipePort | Int64 | 9001 | Specifies the internal communication port. You might need to adjust this port if it conflicts with other processes on the machine. |
| RecoverUserSubmitSourceDirectory | UInt64 | 1 | Specifies whether EMA recovers user-submitted source directories when recovering from a disconnect: <ul style="list-style-type: none"> • 1 (true) • 0 (false) |
| RefreshFirstRequired | UInt64 | 1 | Specifies whether EMA requires the application to send a refresh message prior to sending update messages. Available values include: <ul style="list-style-type: none"> • 1 (true) • 0 (false) |
| RemoveItemsOnDisconnect | UInt64 | 1 | Specifies whether EMA removes items from its internal hash table whenever it disconnects from the ADH: <ul style="list-style-type: none"> • 1 (true) • 0 (false) |
| ServiceCountHint | UInt64 | 513 | Sets the size of directory structures for managing services. If the application specifies 0 , EMA resets it to 513 . |

Table 6: NiProviderGroup Parameters (Continued)

3.3 Channel Group

The **ChannelGroup** contains a **ChannelList**, which contains one or more **Channel** entries (each uniquely identified by a **<Name .../>** entry). Each channel includes a set of connection parameters for a specific connection or connection type.

There is no default channel. If an EMA application needs a specific channel, you should specify this in the appropriate **Consumer** or **NiProvider** section.

- For details on configuring the **Consumer** component, refer to Section 3.1.4.
- For details on configuring the **NiProvider** component, refer to Section 3.2.4
- For a generic **ChannelGroup** XML schema, refer to Section 3.3.1.
- For a list of universal parameters you can use in configuring any type of **Channel** regardless of the channel type, refer to Section 3.3.2.
- For a list of parameters you can use only when configuring a **Channel** whose channel type is **RSSL_SOCKET**, refer to Section 3.3.3.
- For a list of parameters you can use only when configuring a **Channel** whose channel type is **RSSL_ENCRYPTED**, refer to Section 3.3.4.
- For a list of parameters you can use only when configuring a **Channel** whose channel type is **RSSL_HTTP**, refer to Section 3.3.4.
- For a list of parameters you can use only when configuring a **Channel** whose channel type is **RSSL_RELIABLE_MCAST**, refer to Section 3.3.5.

3.3.1 Generic XML Schema for ChannelGroup

The top-level XML schema for the **ChannelGroup** is as follows:

```
<ChannelGroup>
  <ChannelList>
    <Channel>
      <Name value="VALUE" />
      ...
    </Channel>
  </ChannelList>
</ChannelGroup>
```

3.3.2 Universal Channel Entry Parameters

You can use the following parameters in any **<Channel>** entry, regardless of the **ChannelType**.

| PARAMETER NAME | TYPE | DEFAULT | NOTES |
|-------------------------|-------------|-------------|---|
| ChannelType | Enumeration | RSSL_SOCKET | <p>Specifies the type of channel or connection used to connect to the server.</p> <p>Calling the host function can change this field. For details on this event, refer to Section 4.3.2.</p> <p>Use enumeration values with EMA's programmatic configuration (for details, refer to in Section 4.4)</p> <p>Available values include:</p> <ul style="list-style-type: none"> • RSSL_SOCKET (0) • RSSL_ENCRYPTED (1): Supported only on Windows OS. • RSSL_HTTP (2): Supported only on Windows OS • RSSL_RELIABLE_MCAST (4) |
| ConnectionPingTimeout | UInt64 | 30000 | Specifies the duration (in milliseconds) after which the EMA terminates the connection if it does not receive communication or pings from the server. |
| GuaranteedOutputBuffers | UInt64 | 100 | <p>Specifies the number of guaranteed buffers (allocated at initialization time) available for use by each RsslChannel when writing data. Each buffer is created to contain maxFragmentSize bytes.</p> <p>For details on RsslChannel and maxFragmentSize, refer to the <i>Transport API Developers Guide</i>.</p> |
| HighWaterMark | UInt64 | 6144 | Specifies the upper buffer-usage threshold for the channel. |
| InterfaceName | EmaString | "" | <p>Specifies a character representation of the IP address or hostname of the local network interface over which the EMA sends and receives content.</p> <p>InterfaceName is for use in systems that have multiple network interface cards. If unspecified, the default network interface is used.</p> |
| MsgKeyInUpdates | UInt64 | 1 | <p>Sets EMA to fill in message key values on updates using the message key provided with the request. Possible values are:</p> <ul style="list-style-type: none"> • 0 (false): Do not fill in the message's key values (values received from the wire are preserved). • 1 (true): Fill in the message's key values (values received from the wire are overridden). <p>Note: Valid only for consumer configurations.</p> |
| Name | EmaString | | Specifies the Channel's name. |
| NumInputBuffers | UInt64 | 10 | <p>Specifies the number of buffers used to read data. Buffers are sized according to maxFragmentSize.</p> <p>For details on RsslChannel and maxFragmentSize, refer to the <i>Transport API Developers Guide</i>.</p> |

Table 7: Universal <Channel> Parameters

| PARAMETER NAME | TYPE | DEFAULT | NOTES |
|-------------------------|-----------|-----------|--|
| ReconnectAttemptLimit | Int64 | -1 | Specifies the maximum number of times the consumer and non-interactive provider attempt to reconnect to a channel when it fails. If set to -1 , the consumer and non-interactive provider continually attempt to reconnect. |
| ReconnectMaxDelay | Int64 | 5000 | The maximum amount of time the consumer and non-interactive provider wait (in milliseconds) before attempting to reconnect a failed channel. Refer also to the preceding ReconnectMinDelay parameter. |
| ReconnectMinDelay | Int64 | 1000 | Specifies the minimum amount of time the consumer and non-interactive provider wait (in milliseconds) before attempting to reconnect a failed channel. The time consumer and non-interactive provider waits between each connection attempt increases with each attempt, from reconnectMinDelay to reconnectMaxDelay . |
| SysRecvBufSize | UInt64 | 0 | Specifies the size (in KB) of the system's receive buffer for this channel. |
| SysSendBufSize | UInt64 | 0 | Specifies the size (in KB) of the system's send buffer for this channel. |
| XmlTraceFileName | EmaString | EmaTrace | Sets the name of the file to which to write XML trace output if tracing is selected. |
| XmlTraceHex | UInt64 | 0 | Sets whether to print incoming and outgoing messages in hexadecimal format. Possible values are: <ul style="list-style-type: none"> 0 (false): Do not print messages in hexadecimal format. 1 (true): Print messages in hexadecimal format. |
| XmlTraceMaxFileSize | UInt64 | 100000000 | Specifies the maximum size (in bytes) for the trace file. |
| XmlTracePing | UInt64 | 0 | Sets the EMA to trace incoming and outgoing ping messages. Possible values are: <ul style="list-style-type: none"> 0 (false): Do not trace ping messages. 1 (true): Trace ping messages. |
| XmlTraceRead | UInt64 | 1 | Sets the EMA to trace incoming data. Possible values are: <ul style="list-style-type: none"> 0 (false): Do not trace incoming data. 1 (true): Trace incoming data |
| XmlTraceToFile | UInt64 | 0 | Sets whether EMA traces its messages to an XML file whose name is set by XmlTraceFileName . Available values are: <ul style="list-style-type: none"> 0 (false): Turns off tracing. 1 (true): Turns on tracing to an XML file. |
| XmlTraceToMultipleFiles | UInt64 | 0 | Specifies whether to write the XML trace to multiple files. Possible values are: <ul style="list-style-type: none"> 1 (true): EMA writes the XML trace to a new file if the current file size reaches the XmlTraceMaxFileSize. 0 (false): EMA stops writing the XML trace if the current file reaches the XmlTraceMaxFileSize. |

Table 7: Universal <Channel> Parameters (Continued)

| PARAMETER NAME | TYPE | DEFAULT | NOTES |
|------------------|--------|---------|--|
| XmlTraceToStdout | UInt64 | 0 | Specifies whether EMA traces its messages in XML format to stdout. Possible values are: <ul style="list-style-type: none"> • 0 (false): Turns off tracing. • 1 (true): Turns on tracing to stdout. |
| XmlTraceWrite | UInt64 | 1 | Sets the EMA to trace outgoing data. Possible values are: <ul style="list-style-type: none"> • 0 (false): Do not trace outgoing data. • 1 (true): Trace outgoing data. |

Table 7: Universal <Channel> Parameters (Continued)

3.3.3 Parameters for Use with Channel Type: **RSSL_SOCKET**

In addition to the universal parameters listed in Section 3.3.2, you can use the following parameters to configure a channel whose type is **RSSL_SOCKET**.

| PARAMETER NAME | TYPE | DEFAULT | NOTES |
|----------------------|-------------|-----------|--|
| CompressionThreshold | UInt64 | 30 | Sets the message size threshold (in bytes, the allowed value is 30-UInt32 MAX), above which all messages are compressed (thus individual messages might not be compressed). Different compression types have different behaviors and compression efficiency can vary depending on message size. |
| CompressionType | Enumeration | None | Specifies the EMA's preferred type of compression. Compression is negotiated between the client and server: if the server supports the preferred compression type, the server will compress data at that level. Use enumeration values with EMA's programmatic configuration (for details, refer to in Section 4.4) Available values are: <ul style="list-style-type: none"> • None (0) • ZLib (1) • LZ4 (2) |
| | | | Note: A server can be configured to force a particular compression type, regardless of client settings. |
| Host | EmaString | localhost | Specifies the host name of the server to which the EMA connects. The parameter value can be a remote host name or IP address. |
| Port | EmaString | 14002 | Specifies the port on the remote server to which the EMA connects. |
| TcpNodelay | UInt64 | 1 | Specifies whether to use Nagle's algorithm when sending data. Available values are: <ul style="list-style-type: none"> • 0: Send data using Nagle's algorithm. • 1: Send data without delay. |

Table 8: Parameters for Channel Type: **RSSL_SOCKET**

3.3.4 Parameters for Use with Channel Types: **RSSL_HTTP** or **RSSL_ENCRYPTED**

In addition to the universal parameters listed in Section 3.3.2, you can use the following parameters to configure a channel whose type is either **RSSL_HTTP** or **RSSL_ENCRYPTED**.

| PARAMETER NAME | TYPE | DEFAULT | NOTES |
|----------------------|-------------|-----------|---|
| CompressionThreshold | UInt64 | 30 | Sets the message size threshold (in bytes, the allowed value is 30-UInt32 MAX), above which all messages are compressed (thus individual messages might not be compressed). Different compression types have different behaviors and compression efficiency can vary depending on message size. |
| CompressionType | Enumeration | None | <p>Specifies the EMA's preferred type of compression. Compression is negotiated between the client and server: if the server supports the preferred compression type, the server will compress data at that level.</p> <p>Use enumeration values with EMA's programmatic configuration (for details, refer to in Section 4.4)</p> <p>Available values are:</p> <ul style="list-style-type: none"> • None (0) • ZLib (1) • LZ4 (2) <p>Note: A server can be configured to force a particular compression type, regardless of client settings.</p> |
| Host | EmaString | localhost | Specifies the host name of the server to which the EMA connects. The parameter value can be a remote host name or IP address. |
| ObjectName | EmaString | "" | Specifies the object name to pass along with the underlying URL in HTTP connection messages. |
| Port | EmaString | 14002 | Specifies the port on the remote server to which the EMA connects. |
| TcpNodelay | UInt64 | 1 | <p>Specifies whether to use Nagle's algorithm when sending data. Available values are:</p> <ul style="list-style-type: none"> • 0: Send data using Nagle's algorithm. • 1: Send data without delay. |

Table 9: Parameters for Channel Types: **RSSL_HTTP or **RSSL_ENCRYPTED****

3.3.5 Parameters for Use with Channel Type: RSSL_RELIABLE_MCAST

In addition to the universal parameters listed in Section 3.3.2, you can use the following parameters to configure a channel whose type is **RSSL_RELIABLE_MCAST**.

Several of these parameters configure how the channel sends a Host Status Messages on the network, while others configure how the channel manages RRCP packet transmission. For further details on the Host Status Message (HSM) concept, on configuring HSMs, and on RRCP packet transmission, refer to the *ADS* or *AHD Software Installation Manuals*.

Additionally several parameters are designed for use with a TREP infrastructure tool called **rrdump**. **rrdump** is a monitoring utility available in the TREP Infrastructure Tools package. For more information on **rrdump**, refer to either of the *ADS* and *ADH Software Installation Manuals*.

| PARAMETER NAME | TYPE | DEFAULT | NOTES |
|-----------------|-----------|---------|---|
| DisconnectOnGap | UInt64 | 0 | Specifies whether the underlying connection should be closed if a multicast gap situation is detected. <ul style="list-style-type: none"> 0 (false): 0 is the default value which means the underlying connection is not closed if a multicast gap situation occurs. 1 (true): Sets the underlying connection to close if a multicast gap situation occurs. |
| HsmInterface | EmaString | "" | Specifies the Host Status Message (HSM) interface. By default, HsmInterface is set to the host machine's default interface. |
| HsmInterval | UInt64 | | The interval (in seconds) over which HSM packets are sent. You can use rrdump to change the value of hsmInterval . Thus, after starting the application, you can stop and restart HSM publication as needed. The default interval is 0 (disabled) which suspends host status message publication. |
| HsmMultAddress | EmaString | "" | Specifies the multicast address over which this channel sends HSM packets. EMA configuration allows for the use of defined aliases. |
| HsmPort | EmaString | "" | Specifies the multicast port to which this channel sends HSM packets. |
| ndata | UInt64 | 7 | Specifies the maximum number of retransmissions to attempt for an unacknowledged point-to-point packet. |
| nmissing | UInt64 | 128 | Specifies the maximum number of missed consecutive multicast packets, from a particular node, from which RRCP requests retransmits. |
| nrreq | UInt64 | 3 | Specifies the maximum number of retransmit requests that can be sent for a missing packet. |
| PacketTTL | UInt64 | 5 | Sets the lifespan (in hops) of the data packet through the multicast network, which can prevent the packet from circulating indefinitely. It has a range of 0 - 255 . <ul style="list-style-type: none"> 0 means the message can be sent only to other applications on the same machine. A value of 255 sets the message to travel through the network indefinitely. |

Table 10: Parameters for Channel Type: RSSL_RELIABLE_MCAST

| PARAMETER NAME | TYPE | DEFAULT | NOTES |
|------------------|-----------|---------|---|
| pktPoolLimitHigh | UInt64 | 190000 | Specifies the high-water mark for the RRCP packet pool. If this limit is reached, no further RRCP packets are allocated until usage falls below the low-water mark (as set by pktPoolLimitLow). |
| pktPoolLimitLow | UInt64 | 180000 | Specifies the low-water mark for the RRCP packet pool. If RRCP packet allocation gets frozen (due to pktPoolLimitHigh having been reached), additional RRCP packets are allocated only when usage falls below the pktPoolLimitLow setting. pktPoolLimitLow should be greater than $3 * \text{userQLimit}$. |
| RecvAddress | EmaString | "" | Specifies the multicast address to which this channel connects for receiving data. |
| RecvPort | EmaString | "" | Specifies the multicast port to which this channel connects for receiving data. |
| SendAddress | EmaString | "" | Specifies the multicast address to which this channel connects for sending data. |
| SendPort | EmaString | "" | Specifies the multicast port to which this channel connects for sending data. |
| tbchold | UInt64 | 3 | Specifies the maximum time that RRCP holds a transmitted broadcast packet in case the packet needs to be retransmitted. tbchold is specified in RRCP clock ticks (100 milliseconds), so a value of 2 means 200 milliseconds. |
| tcpControlPort | EmaString | "" | Specifies the port to use for the RRCP tcpControlPort . This port is used when troubleshooting RRCP using the rrdump tool. A setting of -1 disables tcpControlPort . |
| tdata | UInt64 | 1 | Specifies the time that RRCP waits before retransmitting an unacknowledged point-to-point data message. tdata is specified in RRCP clock ticks of 100 milliseconds, thus a value of 2 means 200 milliseconds. |
| tpphold | UInt64 | 3 | Specifies the maximum time that RRCP holds a transmitted point-to-point packet in case the packet needs to be retransmitted. tpphold is specified in RRCP clock ticks (100 milliseconds), so a value of 2 means 200 milliseconds. |
| trreq | UInt64 | 4 | Specifies the amount of time that RRCP waits before "resending" a retransmit request for a missed multicast packet. trreq is specified in RRCP clock ticks (100 milliseconds), so a value of 2 means 200 milliseconds. |
| twait | UInt64 | 3 | Specifies the duration of time for which RRCP ignores additional retransmit requests for a data packet that it has already retransmitted. This time period starts with the receipt of the first request for retransmission. twait is specified in RRCP clock ticks (100 milliseconds), so a value of 2 means 200 milliseconds. |

Table 10: Parameters for Channel Type: RSSL_RELIABLE_MCAST (Continued)

| PARAMETER NAME | TYPE | DEFAULT | NOTES |
|----------------|-----------|---------|---|
| UnicastPort | EmaString | "" | Port to which this connection connects for unicast messages (i.e., ack/nak messages and any retransmit messages). This value also configures a TCP listening port for use with the rrdump tool. |
| userQLimit | UInt64 | 65535 | Specifies the maximum backlog of messages allowed on an application's inbound message queue. If userQLimit is exceeded, the RRCP protocol engine begins to discard messages for that application until the backlog decreases. |

Table 10: Parameters for Channel Type: RSSL_RELIABLE_MCAST (Continued)

3.3.6 Example XML Schema for Configuring ChannelSet

The following is an example **ChannelSet** configuration within the XML schema:

```
<ConsumerGroup>
  <ConsumerList>
    <Consumer>
      <Name value="Consumer_1"/>
      <!-- ChannelSet is optional -->
      <ChannelSet value="Channel_1, Channel_2"/>
      <!-- Logger is optional: defaulted to "File + Success" -->
      <Logger value="Logger_1"/>
      <!-- Dictionary is optional: defaulted to "ChannelDictionary" -->
      <Dictionary value="Dictionary_1"/>
    </Consumer>
  </ConsumerList>
</ConsumerGroup>
<ChannelGroup>
  <ChannelList>
    <Channel>
      <Name value="Channel_1"/>
      <ChannelType value="ChannelType::RSSL_SOCKET"/>
      <Host value="localhost"/>
      <Port value="14002"/>
    </Channel>
    <Channel>
      <Name value="Channel_2"/>
      <ChannelType value="ChannelType::RSSL_SOCKET"/>
      <Host value="122.1.1.100"/>
      <Port value="14008"/>
    </Channel>
  </ChannelList>
</ChannelGroup>
```

3.3.7 Example Programmatic Configuration for ChannelSet

The following is an example programmatic **ChannelSet** configuration. In this example, the consumer uses the **Channel** parameters **ReconnectAttemptLimit**, **ReconnectMinDelay**, **ReconnectMaxDelay**, **XmlTraceFileName**, **XmlTraceMaxFileSize**, **XmlTraceToFile**, **XmlTraceToStdout**, **XmlTraceToMultipleFiles**, **XmlTraceWrite**, **XmlTraceRead** and **MsgKeyInUpdates** of the last channel. Though each channel in the **ChannelSet** can have different values for these parameters, EMA uses parameter values as set for the last channel in the set (even if the consumer successfully connects to a different channel in the **ChannelSet**).

```
Map configMap;
Map innerMap;
ElementList elementList;
elementList.addAscii( "DefaultConsumer", "Consumer_1" );
innerMap.addKeyAscii( "Consumer_1", MapEntry::AddEnum, ElementList()
.addAscii( "ChannelSet", "Channel_1, Channel_2" )
```

```

.addAscii( "Logger", "Logger_1" )
.addAscii( "Dictionary", "Dictionary_1" ).complete() ).complete();
elementList.addMap( "ConsumerList", innerMap );
elementList.complete();
innerMap.clear();
configMap.addKeyAscii( "ConsumerGroup", MapEntry::AddEnum, elementList );
elementList.clear();
innerMap.addKeyAscii( "Channel_1", MapEntry::AddEnum, ElementList()
.addEnum( "ChannelType", 0 )
.addAscii( "InterfaceName", "localhost" )
.addAscii( "Host", "localhost" )
.addAscii( "Port", "14002" ).complete() )
innerMap.addKeyAscii( "Channel_2", MapEntry::AddEnum, ElementList()
.addEnum( "ChannelType", 0 )
.addAscii( "InterfaceName", "localhost" )
.addAscii( "Host", "121.1.1.100" )
.addAscii( "Port", "14008" ).complete() ).complete();
elementList.addMap( "ChannelList", innerMap );
elementList.complete();
innerMap.clear();
configMap.addKeyAscii( "ChannelGroup", MapEntry::AddEnum, elementList );
elementList.clear();

innerMap.addKeyAscii( "Logger_1", MapEntry::AddEnum,
ElementList()
.addEnum( "LoggerType", 0 )
.addAscii( "FileName", "logFile" )
.addEnum( "LoggerSeverity", 1 ).complete() ).complete();
elementList.addMap( "LoggerList", innerMap );
elementList.complete();
innerMap.clear();
configMap.addKeyAscii( "LoggerGroup", MapEntry::AddEnum, elementList );
elementList.clear();
innerMap.addKeyAscii( "Dictionary_1", MapEntry::AddEnum,
ElementList()
.addEnum( "DictionaryType", 1 )
.addAscii( "RdmFieldDictionaryFileName", "./RDMFieldDictionary" )
.addAscii( "EnumTypeDefFileName", "./enumtype.def" ).complete() ).complete();
elementList.addMap( "DictionaryList", innerMap );
elementList.complete();
configMap.addKeyAscii( "DictionaryGroup", MapEntry::AddEnum, elementList );
elementList.clear();
configMap.complete();

```

3.4 Logger Group

LoggerGroup contains a **LoggerList**, which contains one or more **Logger** components (each uniquely identified by a **<Name .../>** entry). A **Logger** component defines the parameters and behaviors for a single logging utility.

3.4.1 Generic XML Schema for LoggerGroup

The top-level XML schema for **LoggerGroup** is as follows:

```
<LoggerGroup>
  <LoggerList>
    <Logger>
      <Name value="..." />
      ...
    </Logger>
  </LoggerList>
</LoggerGroup>
```

3.4.2 Logger Entry Parameters

Use the following parameters when configuring a **Logger** in EMA.

| PARAMETER NAME | TYPE | DEFAULT | NOTES |
|---------------------------|-------------|------------------|--|
| FileName | EmaString | "emaLog_pid.log" | The EMA ignores this parameter if LoggerType is set to Stdout (1). |
| IncludeDateInLoggerOutput | UInt64 | 0 | Sets whether to include the date in EMA's log messages. Possible values are: <ul style="list-style-type: none"> 0 (false): Include only the time, omitting the date. 1 (true): Include both date and time. |
| Name | EmaString | | Sets a unique name for the Logger component in the LoggerList . |
| LoggerSeverity | Enumeration | Success | Severity levels aggregate messages so that a severity level includes all messages from higher levels (e.g., a setting of 1 includes any messages normally printed at levels 2 and 3). Use enumeration values with EMA's programmatic configuration (for details, refer to in Section 4.4). Possible values are: <ul style="list-style-type: none"> Verbose (0) Success (1) Warning (2) Error (3) NoLogMsg (4) |
| LoggerType | Enumeration | File | Specifies the logging mechanism. Use enumeration values with EMA's programmatic configuration (for details, refer to in Section 4.4). Possible values are: <ul style="list-style-type: none"> 0: EMA logs to the file specified in the parameter FileName. 1: EMA logs to stdout. |

Table 11: Logger Group Parameters

3.5 Dictionary Group

The **DictionaryGroup** contains a **DictionaryList**, which contains one or more **Dictionary** components (each uniquely identified by a **<Name .../>** entry). Each **Dictionary** component defines parameters relating to how the dictionary is accessed.

3.5.1 Generic XML Schema for DictionaryGroup

The top-level XML schema for **DictionaryGroup** is as follows:

```
<DictionaryGroup>
  <DictionaryList>
    <Dictionary>
      <Name value="..." />
      ...
    </Dictionary>
  </DictionaryList>
</DictionaryGroup>
```

3.5.2 Dictionary Entry Parameters

Use the following parameters when configuring a **Dictionary** entry in the EMA.

| PARAMETER NAME | TYPE | DEFAULT | NOTES |
|----------------------------|-------------|-------------------|---|
| DictionaryType | Enumeration | ChannelDictionary | Specifies the dictionary loading mode. Use enumeration values with EMA's programmatic configuration (for details, refer to in Section 4.4) Possible values are: <ul style="list-style-type: none"> FileDictionary (0): The EMA loads the dictionaries from the files specified in the parameters RdmFieldDictionaryFileName and EnumTypeDefFileName. ChannelDictionary (1): The EMA downloads dictionaries by requesting the dictionaries from the upstream provider. |
| EnumTypeDefFileName | EmaString | | Sets the location of the EnumTypeDef file. |
| EnumTypeDefItemName | EmaString | RWFEnum | Sets the name of the EnumTypeDef item specified in the source directory InfoFilter.DictionariesProvided , and InfoFilter.DictionariesUsed elements. |
| Name | EmaString | | Sets a unique name for a Dictionary component in the DictionaryList . |
| RdmFieldDictionaryFileName | EmaString | | Sets the location of the RdmFieldDictionary . |
| RdmFieldDictionaryItemName | EmaString | RWFFld | Sets the name of the RdmFieldDictionary item specified in the source directory InfoFilter.DictionariesProvided , and InfoFilter.DictionariesUsed elements. |

Table 12: Dictionary Group Parameters

3.6 Directory Group

The **DirectoryGroup** contains a **DirectoryList**, which contains one or more **Directory** components (each uniquely identified by a **<Name .../>** entry). Each **Directory** component defines a list of **Service** components (which in turn define parameters that relate to the Service **InfoFilter** and **StateFilter**).

3.6.1 Generic XML Schema for Directory Entry

The top-level XML schema for **DirectoryGroup** is as follows:

```
<DirectoryGroup>
  <DefaultDirectory value="..." />
  <DirectoryList>
    <Directory>
      <Name value="..." />
      <Service>
        <Name value="..." />
        <InfoFilter>
          ...
        </InfoFilter>
        <StateFilter>
          ...
        </StateFilter>
      </Service>
    </Directory>
    ...
  </DirectoryList>
</DirectoryGroup>
```

3.6.2 Setting Default Directory

If you do not specify a **DefaultDirectory**, then the EMA uses the first **Directory** component in the **DirectoryGroup**. However, you can specify a default directory by including the following parameter on a unique line inside **DirectoryGroup** but outside **DirectoryList** (for an example, refer to Appendix A).

```
<DefaultDirectory value="VALUE" />
```

3.6.3 Configuring a Directory in a DirectoryGroup

To configure a **Directory** component, add the following parameters (as appropriate) to the target directory in the XML Schema, each on a separate line:

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|-----------|----------------|---------|---|
| Name | EmaString | N/A | Specifies the name of this Directory component. Name is required when creating a Directory component. You can use any value for Name . |
| Service | Component Name | N/A | Specifies InfoFilter and StateFilter values for the given Service . Note: A Directory may contain several Service components. |

Table 13: Directory Entry Parameters

3.6.4 Service Entry Parameters

The Service Entry resembles the RDM's Source Directory Domain payload. For further details, refer to the *EMA C++ Edition RDM Usage Guide*. The EMA supports only the RDM entries **InfoFilter** and **StateFilter**. Use the following parameters when configuring a Service in EMA:

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|-------------|----------------|---------|--|
| Name | EmaString | N/A | Specifies the name of this Service component. You can use any value for Name . |
| InfoFilter | Component Name | N/A | Specifies InfoFilter values for the given Service . InfoFilter values set a filter on the types of information EMA sends out. |
| StateFilter | Component Name | N/A | Specifies StateFilter values for the given Service . EMA sends StateFilter values to describe the service's state. |

Table 14: Service Entry Parameters

3.6.5 InfoFilter Entry Parameters

EMA uses the following **InfoFilter** parameters to set filters on the types of information EMA sends out over its services (as specified in the **EmaConfig.xml**).

For an example of structuring sections (e.g., **InfoFilter**) and components (e.g., **Capabilities** or **DictionariesProvided**) in **EmaConfig.xml** refer to Appendix A.

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|-----------|-----------|---------|---|
| ServiceId | UInt64 | N/A | Specifies the Service 's unique identifier. Available values include 0 - 65535. |
| Vendor | EmaString | N/A | Specifies the name of the vendor that provides the service. |
| IsSource | UInt64 | 0 | Specifies whether the source of data sent on this service is its original publisher: <ul style="list-style-type: none"> 1: The service's data is provided directly by an original publisher 0: The service's data is a consolidation of multiple sources into a single service. |

Table 15: Source Directory Info Parameters

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|----------------------------|----------------|---------------------------------|--|
| Capabilities | Component Name | N/A | A component that includes CapabilitiesEntry parameters, which define the message domain types that can be requested from the service. For details on the parameter used in this section, refer to Section 3.6.5.1. |
| ItemList | EmaString | N/A | Specifies the name of the SymbolList that includes all items provided by this service. |
| DictionariesProvided | Component Name | N/A | A component that includes DictionariesProvidedEntry parameters, which define the dictionaries that the provider makes available. When specifying a dictionary, use the Dictionary 's component name whose *ItemName entries are used in this Service's RDM DictionariesProvided entry. For details on the parameter used in this section, refer to Section 3.6.5.2. |
| AcceptingConsumerStatus | UInt64 | 1 | Indicates whether a service can accept and process messages related to Source Mirroring. <ul style="list-style-type: none"> 0: The provider does not accept consumer status 1: The provider accept consumer status |
| DictionariesUsed | Component Name | N/A | A component that includes DictionariesUsedEntry parameters, which define the dictionaries that the provider uses. When specifying a dictionary, use the Dictionary 's component name whose *ItemName entries are used in this Service's RDM DictionariesUsed entry. For details on the parameter used in this section, refer to Section 3.6.5.3. |
| QoS | Component Name | Includes a single QoSEntry | A component that includes QoSEntry sections, with each QoSEntry section defining a QoS Timeliness and Rate supported by this Service. For details on the parameter used in this section, refer to Section 3.6.5.4. |
| SupportsQoSRange | UInt64 | 0 | Indicates whether the provider supports a QoS range when requesting an item. <ul style="list-style-type: none"> 0: The provider does not support a QoS Range. 1: The provider supports a QoS Range. For further details on using QoS ranges, refer to the <i>RDM C++ Edition Usage Guide</i> . |
| SupportsOutOfBandSnapshots | UInt64 | For non-interactive provider: 0 | Indicates whether the provider supports Snapshot requests after the OpenLimit has been reached: <ul style="list-style-type: none"> 0: The provider does not support snapshot requests. 1: The providers supports snapshot requests. For details on OpenLimit , refer to the <i>RDM C++ Edition Usage Guide</i> . |

Table 15: Source Directory Info Parameters (Continued)

3.6.5.1 CapabilitiesEntry Parameter

Use the **CapabilitiesEntry** parameter to configure the message domain type supported by the **Service** component:

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|-------------------|---------------------|---------|--|
| CapabilitiesEntry | UInt64 or EmaString | N/A | Specifies the message domain type supported by the Service component. Accepted names are listed in the emaRdm.h file. Note: You can set CapabilitiesEntry to be an RDM domain number or name (e.g. 6 or MMT_MARKET_PRICE). |

Table 16: CapabilitiesEntry Parameter

3.6.5.2 DictionariesProvided Entry Parameter

Use the **DictionariesProvidedEntry** parameter to configure the dictionaries provided for the **Service's InfoFilter**:

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|---------------------------|-----------|---|---|
| DictionariesProvidedEntry | EmaString | RWFFId for RdmFieldDictionaryItemName RWFEEnum for enumTypeDefItemName | Specifies the name of a Dictionary component from the DictionaryGroup section whose RdmFieldDictionaryItemName and enumTypeDefItemName parameters are used in this Service's RDM DictionariesProvided entry. |

Table 17: DictionariesProvided Parameter

3.6.5.3 DictionariesUsed Entry Parameter

Use the **DictionariesUsedEntry** parameter to configure the types of dictionaries used by the **Service's InfoFilter**:

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|-----------------------|-----------|---|--|
| DictionariesUsedEntry | EmaString | RWFFId for RdmFieldDictionaryItemName RWFEEnum for enumTypeDefItemName | Specifies the name of a Dictionary component from the DictionaryGroup section whose RdmFieldDictionaryItemName and enumTypeDefItemName are used in this Service's RDM DictionariesUsed entry. |

Table 18: DictionariesUsedEntry Parameter

3.6.5.4 QoSEntry Section and Associated Parameters

Use a **QoSEntry** section to configure a specific QoS supported by the **Service's InfoFilter**. You can include multiple **QoSEntry** sections in a parent **QoS** section. For an example of how to structure QoS entries in the **EmaConfig.xml**, refer to Appendix A.

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|-----------|------|---------|--|
| QoSEntry | | N/A | QoSEntry is the name of a section that contains parameters specifying the Timeliness and Rate parameters for a given QoS. You can use multiple QoSEntry sections for a Service's InfoFilter . |

Table 19: QoSEntry Section and Associated Parameters

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|------------|---------------------|----------------------|---|
| Timeliness | UInt64 or EmaString | Timeliness::Realtime | Specifies the QoS timeliness, which describes the age of the data (e.g., real time). |
| | | | Note: You can use numbers or names. Accepted names are listed in the OmmQos.h file. |
| Rate | UInt64 or EmaString | Rate::tickByTick | Specifies the QoS rate, which is the rate of change for data sent over the Service . |
| | | | Note: You can use numbers or names. Accepted names are listed in the OmmQos.h file. |

Table 19: QoSEntry Section and Associated Parameters (Continued)

3.6.6 StateFilter Entry Parameters

Use the following parameters to configure the **Service's StateFilter** (as specified in the **EmaConfig.xml**), which communicates the service's state.

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|-------------------|--------|---------------------------------|--|
| ServiceState | UInt64 | N/A | Specifies whether the service is up or down: <ul style="list-style-type: none"> 0: Service is down 1: Service is up |
| AcceptingRequests | UInt64 | For non-interactive provider: 0 | Specifies whether the service accepts request messages: <ul style="list-style-type: none"> 0: The provider does not accept request messages. 1: The provider accepts request messages. |
| Status | | Open / Ok / None / "" | Specifies a change in status to apply to all items provided by this service. The status only applies to items that received an OPEN/OK in a refresh or status message. |

Table 20: StateFilter Parameters

3.6.7 Status Entry Parameters

Use the following parameters when configuring the **Service's StateFilter**:

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|-------------|-----------|-------------------|---|
| StreamState | EmaString | StreamState::Open | Specifies the state of the item stream. |
| | | | Note: Acceptable StreamState values are listed in the OmmState.h file. |
| DataState | EmaString | DataState::Ok | Specifies the state of the item data. |
| | | | Note: Acceptable DataState values are listed in the OmmState.h file. |

Table 21: Service Entry Parameters

| PARAMETER | TYPE | DEFAULT | DESCRIPTION |
|------------|-----------|------------------|--|
| StatusCode | EmaString | StatusCode::None | Specifies the item status code. |
| | | | Note: Codes and their meanings are listed in the OmmState.h file. |
| StatusText | EmaString | "" | Specific StatusText regarding the current data and stream state. Typically used for informational purposes. StatusText has an encoded text with a maximum allowed length of 32,767 bytes. |

Table 21: Service Entry Parameters (Continued)

Chapter 4 EMA Configuration Processing

4.1 Default Configuration

The EMA configuration is determined by hard-coded behaviors, any customized behaviors specified in **EmaConfig.xml**, programmatic changes, and other internal processing. All of these items affect the configuration used by application components. This chapter discusses how the application configuration is derived.

4.1.1 Default Consumer Configuration

Each EMA consumer-type application must eventually instantiate an **OmmConsumer** object. Constructors for **OmmConsumer** require a **OmmConsumerConfig** object. The **OmmConsumerConfig** constructor takes no arguments, but it does read and process an optional XML file (**EmaConfig.xml**), which applications can use to modify EMA's default consumer behavior.

EMA provides a hard-coded configuration for use whenever an **OmmConsumerConfig** object is instantiated without an **EmaConfig.xml** file in the run-time environment. The resulting EMA configuration is created by taking the defaults from the various configuration groups. For example, the default (hard-coded) behavior for a **Channel** adheres to the following configuration:

- **ChannelType** value="RSSL_SOCKET"
- **CompressionType** value="None"
- **TcpNoDelay** value="1"
- **Host** value="localhost"
- **Port** value="14002"
- **XmlTraceToFile** value="0"

Note that unlike EMA's default behavior of choosing the first **Consumer** component in the **ConsumerList**, EMA applications will not choose the first **Logger**, **Channel**, or **Dictionary** in their respective lists. Instead, if an application wants to use a specific channel, logger, or dictionary configuration, the application must explicitly configure it in the appropriate **Consumer** section of the XML file.

For specifics on EMA's default configuration, refer to Section 2.3.

4.1.2 Default NiProvider Configuration

Each EMA provider-type application must eventually instantiate an **OmmProvider** object. Constructors for **OmmProvider** require a **OmmNiProviderConfig** object. The **OmmNiProviderConfig** constructor takes no arguments, but it does read and process an optional XML file (**EmaConfig.xml**), which applications can use to modify EMA's default non-interactive provider behavior.

EMA provides a hard-coded configuration for use whenever an **OmmNiProviderConfig** object is instantiated without an **EmaConfig.xml** file in the run-time environment. The resulting EMA configuration is created by taking the defaults from the various configuration groups. For example, the default (hard-coded) behavior for a **Channel** adheres to the following configuration:

- **ChannelType** value="RSSL_SOCKET"
- **CompressionType** value="None"
- **TcpNoDelay** value="1"

- **Host** value="localhost"
- **Port** value= "14003"
- **XmlTraceToFile** value="0"

Note that unlike EMA's default behavior of choosing the first **NiProvider** component in the **NiProviderList**, EMA applications will not choose the first **Logger** or **Channel** in their respective lists. Instead, if an application wants to use a specific channel, logger, or dictionary configuration, the application must explicitly configure it in the appropriate **NiProvider** section of the XML file.

4.2 Processing EmaConfig.xml

Except for the parameters **DefaultConsumer** and **DefaultNiProvider**, all configuration elements defined in the **EmaConfig.xml** file must be wrapped within a component definition (i.e., **Consumer**, **NiProvider**, **Logger**, **Channel**, **Directory**, or **Dictionary**) or they will be ignored. This section includes some examples that illustrate this requirement. Appendix A illustrates the proper placement of **DefaultConsumer** and **DefaultNiProvider** within **EmaConfig.xml**.

4.2.1 Use of the Correct Order in the XML Schema

Consider the following snippet from an **EmaConfig.xml** (only those parts needed for the example are included). In this snippet, the application creates a consumer with a **Name** of **Consumer_1** which logs to a file named **emaLogfile**.

```
<ConsumerGroup>
  <ConsumerList>
    <Consumer>
      <Name value="Consumer_1" />
      <Logger value="Logger_2" />
    </Consumer>
  </ConsumerList>
</ConsumerGroup>
<LoggerGroup>
  <LoggerList>
    <Logger>
      <Name value="Logger_2" />
      <LoggerType value="LoggerType::File" />
      <FileName value="emaLogfile" />
    </Logger>
  </LoggerList>
</LoggerGroup>
```

Now assume that the following was not included in **EmaConfig.xml**:

```
<FileName value="emaLogfile" />
```

In this case, the EMA application relies on its hard-coded behavior and uses the filename **emaLog_pid.log**.

However, if the snippet were configured in either of the following configurations, the EMA application would revert to its default behaviors because its parameters are not in the correct order (i.e., the **FileName** parameter needs to be contained in a **Logger** component entry):

- Configuration 1:

```
<LoggerGroup>
  <FileName value="..." />
  <LoggerList>
    ...
```

- Configuration 2:

```
<LoggerGroup>
  <LoggerList>
    <FileName value="..." />
    ...
```

4.2.2 Processing the Consumer “Name”

The EMA is hard-coded to use a default consumer of **EmaConsumer**. However, you can change this by using **EmaConfig.xml**. When you use the XML file, the default **Consumer Name** is either specified by the **DefaultConsumer** element, or if this parameter is not set, then the EMA application will default to the name of the first Consumer component.

- If **DefaultConsumer** uses an invalid name (i.e., no **Consumer** components in the XML file use that name), the EMA throws an exception indicating that **DefaultConsumer** is invalid.
- If the **EmaConfig.xml** has no **Consumer** components, the EMA application uses **EmaConsumer**.

4.2.3 Processing the NiProvider “Name”

The EMA is hard-coded to use a default non-interactive provider of **EmaNiProvider**. However, you can change this by using **EmaConfig.xml**. When you use the XML file, the default **NiProvider Name** is either specified by the **DefaultNiProvider** element, or if this parameter is not set, then the EMA application will default to the name of the first non-interactive provider component.

- If **DefaultNiProvider** uses an invalid name (i.e., no **NiProvider** components in the XML file use that name), the EMA throws an exception indicating that **DefaultNiProvider** is invalid.
- If the **EmaConfig.xml** has no **NiProvider** components, the EMA application uses **EmaNiProvider**.

4.3 Configuring EMA Using Function Calls

From an application standpoint, instantiating **OmmConsumerConfig** and **OmmNiProviderConfig** objects creates the initial configuration from the **DefaultXML.h** and **EmaConfig.xml** files. Certain variables can then be altered via function calls on the **OmmConsumerConfig** and **OmmNiProviderConfig** objects.

Note: Function calls override any settings in the **EmaConfig.xml** file.

4.3.1 EMA Configuration Function Calls

4.3.1.1 OmmConsumerConfig Class Function Calls

You can use the following function calls in an EMA consumer application:

| FUNCTION | DESCRIPTION |
|---|--|
| <code>addAdminMsg(const ReqMsg&)</code> | Populates part of or all of the login request message, directory request message, or dictionary request message according to the specification discussed in the <i>EMA Reuters Domain Models (RDM) Usage Guide</i> specific to the programming language you use. |
| <code>applicationId(const EmaString &)</code> | Sets the applicationId variable. applicationId has no default value. |
| <code>clear()</code> | Clears existing content from the OmmConsumerConfig object. |
| <code>config(const Data&)</code> | Passes in the consumer's programmatic configuration. |
| <code>consumerName(const EmaString &)</code> | Sets the consumer name, which is used to select a specific consumer as defined in EMA's configuration. If a consumer does not exist with that name, the application throws an exception. |
| <code>host(const EmaString &)</code> | Sets the host and port parameters. For details, refer to Section 4.3.2. |
| <code>operationModel(OperationModel)</code> | Sets the operation model to either OmmConsumerConfig::ApiDispatchEnum (which is the default) or OmmConsumerConfig::UserDispatchEnum . |
| <code>password(const EmaString &)</code> | Sets the password variable. password has no default value. |
| <code>position(const EmaString &)</code> | Sets the position variable. position has no default value. |
| <code>username(const EmaString &)</code> | Sets the username variable. If username is not set, the application extracts a username from the run-time environment. |

Table 22: **OmmConsumerConfig** Class Function Calls

4.3.1.2 OmmNiProviderConfig Class Function Calls

You can use the following function calls in an EMA non-interactive provider application. For further details on variables, refer to the *EMA C++ RDM Usage Guide*.

| FUNCTION | DESCRIPTION |
|--|---|
| <code>addAdminMsg(const ReqMsg&)</code> | Populates part of or all of the login request message according to the specification discussed in the <i>EMA C++ RDM Usage Guide</i> . |
| <code>addAdminMsg(const RefreshMsg&)</code> | Populates part of or all of the initial directory refresh message according to the specification discussed in the <i>EMA C++ RDM Usage Guide</i> . |
| <code>adminControlDirectory(AdminControl)</code> | Specifies whether the API or the user controls the sending of Directory refresh messages. Available values include: <ul style="list-style-type: none"> OmmNiProviderConfig::ApiControlEnum (which is the default) OmmNiProviderConfig::UserControlEnum For details on control models, refer to OmmNiProviderConfig.h . |

Table 23: **OmmNiProviderConfig** Class Function Calls

| FUNCTION | DESCRIPTION |
|---|---|
| <code>applicationId(const EmaString &)</code> | Sets the <i>applicationId</i> variable. <i>applicationId</i> has no default value. |
| <code>clear()</code> | Clears existing content from the <i>OmmNiProviderConfig</i> object. |
| <code>config(const Data&)</code> | Passes in the provider's programmatic configuration. |
| <code>host(const EmaString &)</code> | Sets the <i>host</i> and <i>port</i> parameters. For details, refer to Section 4.3.2. |
| <code>instanceId(const EmaString&)</code> | Sets the <i>instanceId</i> variable. <i>instanceId</i> has no default value. |
| <code>operationModel(OperationModel)</code> | Specifies whether the API or the user controls the thread (i.e., the operation model). Available values include: <ul style="list-style-type: none"> <i>OmmNiProviderConfig::ApiDispatchEnum</i> (which is the default) <i>OmmNiProviderConfig::UserDispatchEnum</i> For details on operation models, refer to <i>OmmNiProviderConfig.h</i> . |
| <code>password(const EmaString &)</code> | Sets the <i>password</i> variable. <i>password</i> has no default value. |
| <code>position(const EmaString &)</code> | Sets the <i>position</i> variable. <i>position</i> has no default value. |
| <code>providerName(const EmaString &)</code> | Sets the provider's name, which is used to select a specific provider as defined in EMA's configuration. If a provider does not exist with that name, the application throws an exception. |
| <code>username(const EmaString &)</code> | Sets the <i>username</i> variable. If <i>username</i> is not set, the application extracts a username from the run-time environment. |

Table 23: ***OmmNi ProviderConfig*** Class Function Calls (Continued)

4.3.2 Using the `host()` Function: How “Host” and “Port” are Processed

Host and **Port** parameters both have global default values. Thus, if either an ***OmmConsumerConfig*** or ***OmmNiProviderConfig*** object exists, its **Host** and **Port** will always have values (either the default value or some other value as specified in ***EmaConfig.xml***).

- The default ***Host:Port*** value for ***OmmConsumerConfig*** is ***localhost:14002***.
- The default ***Host:Port*** value for ***OmmNiProviderConfig*** is ***localhost:14003***.

If needed, you can have the application reset both host and port values by calling the `host(const EmaString&)` method on the object using the syntax: ***HostValue:PortValue***.

Note: Calling the `host()` function results in the ***channelType*** (refer to Section 3.3.2) being set to ***RSSL_SOCKET***, regardless of any previous setting for that configuration element.

Host and **Port** values observe the following rules when updating due to the `host(const EmaString&)` method:

- If the host parameter is missing or empty, then host and port reset to their global default values.
- If the host parameter is set to the string “:”, then host and port reset to their global default values.
- If the host parameter is a string (not containing a :), then host is set to that string and port resets to its default value.
- If the parameter begins with a : and is followed by some text, then host is set to its global default value and port is set to that text.
- If the parameter is ***HostValue:PortValue***, where both ***HostValue*** and ***PortValue*** have values, then host is set to ***HostValue*** and port is set to ***PortValue***.

4.4 Programmatic Configuration

In addition to changing EMA's configuration via **EmaConfig.xml** or function calls, you can do so programmatically via an OMM data structure.

4.4.1 OMM Data Structure

Programmatic configuration of EMA provides a way of configuring all parameters and overriding parameters configured in **EmaConfig.xml** using an OMM data structure, which is divided into four tiers:

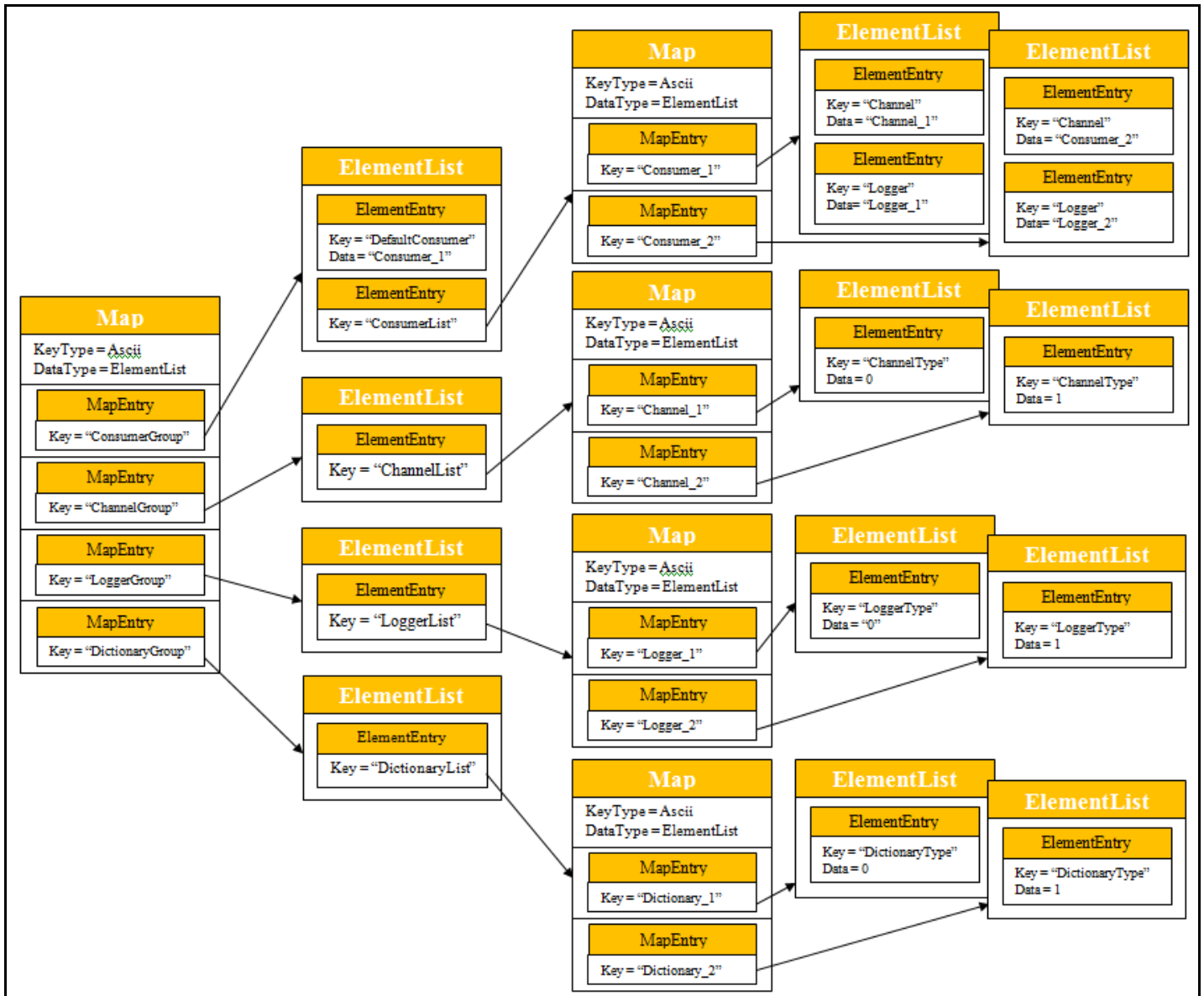
- The 1st tier lists EMA's Consumer, NiProvider, Channel, Logger, Directory, and Dictionary components; each of which has its own list in the 2nd tier.
- The 2nd tier includes each component's list and the default consumer and non-interactive providers to use when loading configuration parameters.
- The 3rd tier defines individual names for these components, which then have their own configuration parameters in 4th tier.
- The 4th tier defines configuration parameters that are assigned to specific components.

4.4.2 Creating the Configuration

Note: When encoding OMM types, you must follow the OMM data structure and configuration parameter types listed in this document.

► To programmatically configure EMA:

1. Create a map with the following hierarchy to configure EMA configuration parameters:



2. Call the `config` method on an `OmmConsumerConfig` object, and pass the Map (which represents the programmatic OMM structure) as a parameter to the `config` method.

You can pass in multiple maps, each programmatic configuration being applied to create the application's active configuration during instantiation of the `OmmConsumer` or `OmmProvider`.

4.4.3 Example: Programmatic Configuration

```

Map configMap;
Map innerMap;
ElementList elementList;

elementList.addAscii( "DefaultConsumer", "Consumer_1" );

innerMap.addKeyAscii( "Consumer_1", MapEntry::AddEnum, ElementList()
    .addAscii( "Channel", "Channel_1" )
    .addAscii( "Logger", "Logger_1" )
    .addAscii( "Dictionary", "Dictionary_1" )
    .addUInt( "ItemCountHint", 5000 )
    .addUInt( "ServiceCountHint", 5000 )
    .addUInt( "ObeyOpenWindow", 0 )
    .addUInt( "PostAckTimeout", 5000 )
    .addUInt( "RequestTimeout", 5000 )
    .addUInt( "MaxOutstandingPosts", 5000 )
    .addInt( "DispatchTimeoutApiThread", 1 )
    .addUInt( "HandleException", 0 )
    .addUInt( "MaxDispatchCountApiThread", 500 )
    .addUInt( "MaxDispatchCountUserThread", 500 )
    .addInt( "ReactorEventFdPort", 45000 )
    .addInt( "PipePort", 4001 ).complete() ).complete();

elementList.addMap( "ConsumerList", innerMap );

elementList.complete();
innerMap.clear();

configMap.addKeyAscii( "ConsumerGroup", MapEntry::AddEnum, elementList );
elementList.clear();

innerMap.addKeyAscii( "Channel_1", MapEntry::AddEnum, ElementList()
    .addEnum( "ChannelType", 0 )
    .addAscii( "InterfaceName", "localhost" )
    .addEnum( "CompressionType", 1 )
    .addUInt( "GuaranteedOutputBuffers", 5000 )
    .addUInt( "ConnectionPingTimeout", 50000 )
    .addInt( "ReconnectAttemptLimit", 10 )
    .addInt( "ReconnectMinDelay", 2000 )
    .addInt( "ReconnectMaxDelay", 6000 )
    .addAscii( "Host", "localhost" )
    .addAscii( "Port", "14002" )
    .addUInt( "TcpNodelay", 0 )
    .addAscii( "XmlTraceFileName", "MyXMLTrace" )
    .addInt( "XmlTraceMaxFileSize", 50000000 )
    .addUInt( "XmlTraceToFile", 1 )

```

```

        .addUInt( "XmlTraceToStdout", 0 )
        .addUInt( "XmlTraceToMultipleFiles", 1 )
        .addUInt( "XmlTraceWrite", 1 )
        .addUInt( "XmlTraceRead", 1 )
        .addUInt( "XmlTracePing", 1 )
        .addUInt( "MsgKeyInUpdates", 1 ).complete() ).complete();

elementList.addMap( "ChannelList", innerMap );

elementList.complete();
innerMap.clear();
configMap.addKeyAscii( "ChannelGroup", MapEntry::AddEnum, elementList );
elementList.clear();

innerMap.addKeyAscii( "Logger_1", MapEntry::AddEnum,
    ElementList()
        .addEnum( "LoggerType", 0 )
        .addAscii( "FileName", "logFile" )
        .addEnum( "LoggerSeverity", 1 ).complete() ).complete();

elementList.addMap( "LoggerList", innerMap );

elementList.complete();
innerMap.clear();

configMap.addKeyAscii( "LoggerGroup", MapEntry::AddEnum, elementList );
elementList.clear();

innerMap.addKeyAscii( "Dictionary_1", MapEntry::AddEnum,
    ElementList()
        .addEnum( "DictionaryType", 1 )
        .addAscii( "RdmFieldDictionaryFileName", "./RDMFieldDictionary" )
        .addAscii( "EnumTypeDefFileName", "./enumtype.def" ).complete() ).complete();

elementList.addMap( "DictionaryList", innerMap );

elementList.complete();

configMap.addKeyAscii( "DictionaryGroup", MapEntry::AddEnum, elementList );
elementList.clear();

configMap.complete();

```

Appendix A EmaConfig.xml Configuration File

This is the current version of the **EmaConfig.xml** file distributed with the training examples:

```
<?xml version="1.0" encoding="UTF-8"?>
<EmaConfig>

  <ConsumerGroup>
    <!-- DefaultConsumer parameter defines which consumer configuration is used by OmmConsumer -->
    <!-- if application does not specify it through OmmConsumerConfig::consumerName() -->
    <!-- first consumer on the ConsumerList is a default consumer if this parameter is not specified -->
    <DefaultConsumer value="Consumer_1"/>
    <ConsumerList>
      <Consumer>
        <Name value="Consumer_1"/>

        <!-- Channel is optional: defaulted to "RSSL_SOCKET + localhost + 14002" -->
        <Channel value="Channel_1"/>
        <!-- Logger is optional: defaulted to "File + Success" -->
        <Logger value="Logger_1"/>

        <!-- Dictionary is optional: defaulted to "ChannelDictionary" -->
        <Dictionary value="Dictionary_1"/>
      </Consumer>
      <Consumer>
        <Name value="Consumer_2"/>
        <Channel value="Channel_2"/>
        <Logger value="Logger_2"/>
        <Dictionary value="Dictionary_2"/>
      </Consumer>
    </ConsumerList>
  </ConsumerGroup>
  <!-- NiProviderGroup provides set of detailed configurations to be used by named providers -->
  <!-- Application specifies which configuration to use by setting OmmNiProviderConfig::providerName() -->
  <NiProviderGroup>
    <!-- DefaultNiProvider parameter defines which provider configuration is used by OmmProvider -->
    <!-- if application does not specify it through OmmNiProviderConfig::providerName() -->
    <!-- first provider on the NiProviderList is a DefaultNiProvider if this parameter is not specified -->
    <DefaultNiProvider value="Provider_1"/>
    <NiProviderList>
      <NiProvider>
        <!-- Name is mandatory -->
        <Name value="Provider_1"/>
        <!-- Channel is optional: defaulted to "RSSL_SOCKET + localhost + 14003" -->
        <Channel value="Channel_10"/>

        <!-- Directory is optional. -->
```



```

<!-- EMA provides hardcoded directory containing a single service named "NI_PUB". -->
<!-- EMA defaults the OmmNiProviderConfig::adminControlDirectory() to ApiControlEnum. -->
<!-- applications can use the hardcoded "NI_PUB" service to publish all items. -->
<!-- if desired, a custom directory can be configured, named, and used instead of the -->
<!-- hardcoded one. Refer to the examples in the DirectoryGroup. -->
<!-- the directory may also be specified using OmmNiProviderConfig::addAdminMsg(). -->
<!-- if desired the OmmNiProviderConfig::adminControlDirectory() to UserControlEnum -->
<!-- which allows applications to specify and control the directory. -->
<Directory value="Directory_1"/>

<Logger value="Logger_1"/>
</NiProvider

<NiProvider>
  <Name value="Provider_2"/>
  <Channel value="Channel_4"/>
  <Directory value="Directory_2"/>
  <Logger value="Logger_1"/>
</NiProvider>
</NiProviderList>
</NiProviderGroup>
<ChannelGroup>
  <ChannelList>
    <Channel>
      <Name value="Channel_1"/>

      <!-- ChannelType possible values are: -->
      <!-- ChannelType::RSSL_SOCKET      - TCP IP connection type -->
      <!-- ChannelType::RSSL_HTTP        - Http tunnel connection type -->
      <!-- ChannelType::RSSL_ENCRYPTED    - Https tunnel connection type -->
      <ChannelType value="ChannelType::RSSL_SOCKET"/>

      <!-- CompressionType is optional: defaulted to None -->
      <!-- possible values: None, ZLib, LZ4 -->
      <CompressionType value="CompressionType::None"/>
      <GuaranteedOutputBuffers value="5000"/>

      <!-- ConnectionPingTimeout is optional: defaulted to 30000 -->
      <ConnectionPingTimeout value="30000"/>

      <!-- TcpNodelay is optional: defaulted to 1 -->
      <!-- possible values: 1 (tcp_nodelay option set), 0 (tcp_nodelay not set) -->
      <TcpNodelay value="1"/>
      <Host value="localhost"/>
      <Port value="14002"/>
    </Channel>
    <Channel>
      <Name value="Channel_2"/>
      <ChannelType value="ChannelType::RSSL_SOCKET"/>
      <CompressionType value="CompressionType::None"/>
      <GuaranteedOutputBuffers value="5000"/>
      <Host value="122.1.1.100"/>
    </Channel>
  </ChannelList>
</ChannelGroup>

```

```

        <Port value="14002"/>
    </Channel>
    <Channel>
        <Name value="Channel_3"/>
        <ChannelType value="ChannelType::RSSL_ENCRYPTED"/>
        <CompressionType value="CompressionType::None"/>
        <GuaranteedOutputBuffers value="5000"/>
        <Host value="122.1.1.100"/>
        <Port value="14002"/>
    </Channel>
    <Channel>
        <Name value="Channel_4"/>
        <ChannelType value="ChannelType::RSSL_HTTP"/>
        <CompressionType value="CompressionType::None"/>
        <GuaranteedOutputBuffers value="5000"/>
        <Host value="122.1.1.100"/>
        <Port value="14003"/>
    </Channel>
</ChannelList>
</ChannelGroup>
<LoggerGroup>
    <LoggerList>
        <Logger>
            <Name value="Logger_1"/>

            <!-- LoggerType is optional: defaulted to "File" -->
            <!-- possible values: Stdout, File -->
            <LoggerType value="LoggerType::Stdout"/>

            <!-- LoggerSeverity is optional: defaulted to "Success" -->
            <!-- possible values: Verbose, Success, Warning, Error, NoLogMsg -->
            <LoggerSeverity value="LoggerSeverity::Success"/>
        </Logger>
        <Logger>
            <Name value="Logger_2"/>
            <LoggerType value="LoggerType::File"/>
            <!-- FileName is optional: defaulted to "emaLog_ProcessId.log" -->
            <FileName value="emaLog"/>
            <LoggerSeverity value="LoggerSeverity::Success"/>
        </Logger>
    </LoggerList>
</LoggerGroup>
<!-- source directory refresh configuration used by provider -->
<DirectoryGroup>
    <!-- DefaultDirectory specifies Directory used as default if providers do not specify Directory name
    -->
    <DefaultDirectory value="Directory_1"/>
    <DirectoryList>
        <!-- providers refer to the Directory by name -->
        <!-- Directory is a set of Services (one or more) on which a provider will provide item data -->

```

```

<Directory>
  <Name value="Directory_1"/>
  <Service>
    <Name value="TEST_NI_PUB"/>
    <InfoFilter>
      <!-- optional value; if not specified EMA will assign it -->
      <ServiceId value="0"/>
      <!-- optional value -->
      <Vendor value="company name"/>
      <!-- possible values: 0 - means consolidation service, 1 - means original provider -->
      <IsSource value="0"/>
      <!-- an array of market domains supported by this service -->
      <!-- domains defined in the RDM Usage Guide may be referred by name -->
      <!-- names of the RDM defined domains are listed in the EmaRdm.h file -->
      <!-- e.g. MMT_MARKET_PRICE, MMT_MARKET_BY_ORDER -->
      <!-- note that the capabilities may be specified with names and or numbers -->
      <Capabilities>
        <CapabilitiesEntry value="MMT_MARKET_PRICE"/>
        <CapabilitiesEntry value="MMT_MARKET_BY_ORDER"/>
      </Capabilities>
      <!-- list of dictionary names specified in the DictionaryGroup -->
      <!-- EMA will populate the Service::InfoFilter::DictionariesProvided element -->
      <!-- with the respective <>ItemName values -->
      <DictionariesProvided>
        <DictionariesProvidedEntry value="Dictionary_1"/>
        <DictionariesProvidedEntry value="Dictionary_3"/>
      </DictionariesProvided>

      <!-- list of dictionary names specified in the DictionaryGroup -->
      <!-- EMA will populate the Service::InfoFilter::DictionariesUsed element -->
      <!-- with the respective <>ItemName values -->
      <DictionariesUsed>
        <DictionariesUsedEntry value="Dictionary_1"/>
      </DictionariesUsed>
      <!-- list of QoS values supported by this service -->
      <!-- possible values are listed in the OmmQos.h file of the EMA -->
      <QoS>
        <QoSEntry>
          <Timeliness value="Timeliness::RealTime"/>
          <Rate value="Rate::TickByTick"/>
        </QoSEntry>
        <QoSEntry>
          <Timeliness value="Timeliness::InexactDelayed"/>
          <Rate value="Rate::JustInTimeConflated"/>
        </QoSEntry>
      </QoS>

      <!-- 0 means does not support, 1 - means supports QoS range -->
      <SupportsQoSRange value="0"/>
    </InfoFilter>
  </Service>
</Directory>

```

```

    <!-- name of item list -->
    <ItemList value="#.itemlist"/>
    <!-- 0 means does not accept, 1 - means accepts consumer status -->
    <AcceptingConsumerStatus value="0"/>
    <!-- 0 means does not support, 1 - means supports out of band snapshots -->
    <SupportsOutOfBandSnapshots value="0"/>
</InfoFilter>
<!-- StateFilter is optional -->
<!-- EMA will default the values as follows: -->
<!-- for interactive provider: ServiceState is "up" and AcceptingRequests is "Yes" -->
<!-- for non interactive provider: ServiceState is "up" and AcceptingRequests is "No" -->
<StateFilter>
    <!-- 0 means service is down, 1 - means service is up (default; 1) -->
    <ServiceState value="1"/>
    <!-- 0 means service does not accept, 1 - means service accepts (default; 1) -->
    <AcceptingRequests value="1"/>
    <!-- optional; specifies status change to apply to all items provided by this service
        -->
    <!-- possible values are listed in the OmmState.h file of the EMA -->
    <Status>
        <!-- possible values are: Open, Close, CloseRecover -->
        <StreamState value="StreamState::Open"/>,
        <!-- possible values are: NoChange, Ok, Suspect -->
        <DataState value="DataState::Ok"/>
        <!-- possible values are: None, DacsDown, etc -->
        <StatusCode value="StatusCode::None"/>
        <!-- a text field -->
        <StatusText value=""/>
    </Status>
</StateFilter>
</Service>
<Service>
    <Name value="NI_PUB"/>
    <InfoFilter>
        <DictionariesProvided>
            <DictionariesProvidedEntry value="Dictionary_1"/>
        </DictionariesProvided>
        <DictionariesUsed>
            <DictionariesUsedEntry value="Dictionary_2"/>
        </DictionariesUsed>

        <Vendor value="company name"/>
        <IsSource value="0"/>
        <Capabilities>
            <CapabilitiesEntry value="6"/>
            <CapabilitiesEntry value="MMT_MARKET_BY_ORDER"/>
        </Capabilities>
        <QoS>
            <QoSEntry>
                <Timeliness value="Timeliness::RealTime"/>
            </QoSEntry>
        </QoS>
    </InfoFilter>
</Service>

```

```

        <Rate value="Rate::TickByTick"/>
    </QoSEntry>
</QoS>
    <SupportsQoSRange value="0"/>
</InfoFilter>
</Service>
</Directory>
</DirectoryList>
</DirectoryGroup>
<DictionaryGroup>
    <DictionaryList>
        <Dictionary>
            <Name value="Dictionary_1"/>
            <!-- DictionaryType is optional: defaulted to ChannelDictionary -->
            <!-- possible values: FileDictionary, ChannelDictionary -->
            <!-- if DictionaryType is set to ChannelDictionary, file names are ignored -->
            <DictionaryType value="DictionaryType::ChannelDictionary"/>
        </Dictionary>
        <Dictionary>
            <Name value="Dictionary_2"/>
            <DictionaryType value="DictionaryType::FileDictionary"/>

            <!-- dictionary names are optional: defaulted to RDMFieldDictionary and enumtype.def -->
            <RdmFieldDictionaryFileName value="./RDMFieldDictionary"/>
            <EnumTypeDefFileName value="./enumtype.def"/>
        </Dictionary>
        <Dictionary>
            <Name value="Dictionary_3"/>
            <!-- providers always assume DictionaryType = DictionaryType::FileDictionary -->
            <DictionaryType value="DictionaryType::FileDictionary"/>

            <!-- dictionary file names are optional: defaulted to ./RDMFieldDictionary and ./enumtype.def -->
            <RdmFieldDictionaryFileName value="./RDMFieldDictionary_ID3"/>
            <EnumTypeDefFileName value="./enumtype_ID3.def"/>

            <!-- <dictionary>ItemName represents the names shown in DictionariesProvided and
                DictionariesUsed elements of the Directory InfoFilter -->
            <!-- <dictionary>ItemName is optional; default values are "RWFFld" for the RdmFieldDictionary
                and "RWFFenum" for the enumtype.def -->
            <RdmFieldDictionaryItemName value="RWFFld_ID3"/>
            <EnumTypeDefItemName value="RWFFenum_ID3"/>
        </Dictionary>
        <Dictionary>
            <Name value="Dictionary_4"/>
            <DictionaryType value="DictionaryType::FileDictionary"/>
            <RdmFieldDictionaryFileName value="./RDMFieldDictionary_ID4"/>
            <EnumTypeDefFileName value="./enumtype_ID4.def"/>
            <RdmFieldDictionaryItemName value="RWFFld_ID4"/>
            <EnumTypeDefItemName value="RWFFenum_ID4"/>
        </Dictionary>
    </DictionaryList>
</DictionaryGroup>

```

```

        </Dictionary>
    </DictionaryList>
</DictionaryGroup>
<DirectoryGroup>
    <!-- DefaultDirectory specifies Directory used as default if providers do not specify Directory name
        -->
    <DefaultDirectory value="Directory_1"/>
    <DirectoryList>
        <!-- providers refer to the Directory by name -->
        <!-- Directory is a set of Services (one or more) on which a provider will provide item data -->
        <Directory>
            <Name value="Directory_1"/>

            <Service>
                <Name value="TEST_NI_PUB"/>

                <InfoFilter>
                    <!-- optional value; if not specified EMA will assign it -->
                    <ServiceId value="0"/>

                    <!-- optional value -->
                    <Vendor value="company name"/>

                    <!-- possible values: 0 - means consolidation service, 1 - means original provider
                        -->
                    <IsSource value="0"/>

                    <!-- an array of market domains supported by this service -->
                    <!-- domains defined in the RDM Usage Guide may be referred by name -->
                    <!-- names of the RDM defined domains are listed in the EmaRdm.h file -->
                    <!-- e.g. MMT_MARKET_PRICE, MMT_MARKET_BY_ORDER -->
                    <!-- note that the capabilities may be specified with names and or numbers -->
                    <Capabilities>
                        <CapabilitiesEntry value="MMT_MARKET_PRICE"/>
                        <CapabilitiesEntry value="MMT_MARKET_BY_ORDER"/>
                    </Capabilities>

                    <!-- list of dictionary names specified in the DictionaryGroup -->
                    <!-- EMA will populate the Service::InfoFilter::DictionariesProvided element -->
                    <!-- with the respective <>ItemName values -->
                    <DictionariesProvided>
                        <DictionariesProvidedEntry value="Dictionary_1"/>
                        <DictionariesProvidedEntry value="Dictionary_3"/>
                    </DictionariesProvided>

                    <!-- list of dictionary names specified in the DictionaryGroup -->
                    <!-- EMA will populate the Service::InfoFilter::DictionariesUsed element -->
                    <!-- with the respective <>ItemName values -->
                    <DictionariesUsed>
                        <DictionariesUsedEntry value="Dictionary_1"/>

```

```

</DictionariesUsed>

<!-- list of QoS values supported by this service -->
<!-- possible values are listed in the OmmQos.h file of the EMA -->
<QoS>
    <QoSEntry>
        <Timeliness value="Timeliness::RealTime"/>
        <Rate value="Rate::TickByTick"/>
    </QoSEntry>
    <QoSEntry>
        <Timeliness value="Timeliness::InexactDelayed"/>
        <Rate value="Rate::JustInTimeConflated"/>
    </QoSEntry>
</QoS>

<!-- 0 means does not support, 1 - means supports QoS range -->
<SupportsQoSRange value="0"/>

<!-- name of item list -->
<ItemList value="#.itemlist"/>

<!-- 0 means does not accept, 1 - means accepts consumer status -->
<AcceptingConsumerStatus value="0"/>

<!-- 0 means does not support, 1 - means supports out of band snapshots -->
<SupportsOutOfBandSnapshots value="0"/>
</InfoFilter>

<!-- StateFilter is optional -->
<!-- EMA will default the values as follows: -->
<!-- for interactive provider -->
<!-- ServiceState is "up" and AcceptingRequests is "Yes" -->
<!-- for non interactive provider -->
<!-- ServiceState is "up" and AcceptingRequests is "No" -->
<StateFilter>
    <!-- 0 means service is down, 1 - means service is up (default; 1) -->
    <ServiceState value="1"/>

    <!-- 0 means service does not accept, 1 - means service accepts (default; 1) -->
    <AcceptingRequests value="1"/>

    <!-- optional; specifies status change to apply to all items provided by this service -->
    <!-- possible values are listed in the OmmState.h file of the EMA -->
    <Status>
        <!-- possible values are: Open, Close, CloseRecover -->
        <StreamState value="StreamState::Open"/>
        <!-- possible values are: NoChange, Ok, Suspect -->
        <DataState value="DataState::Ok"/>
        <!-- possible values are: None, DacsDown, etc -->
    </Status>
</StateFilter>

```

```

        <StatusCode value="StatusCode::None"/>
        <!-- a text field -->
        <StatusText value=""/>
    </Status>
</StateFilter>
</Service>

<Service>
    <Name value="NI_PUB"/>
    <InfoFilter>
        <DictionariesProvided>
            <DictionariesProvidedEntry value="Dictionary_1"/>
        </DictionariesProvided>
        <DictionariesUsed>
            <DictionariesUsedEntry value="Dictionary_2"/>
        </DictionariesUsed>

        <Vendor value="company name"/>
        <IsSource value="0"/>
        <Capabilities>
            <CapabilitiesEntry value="6"/>
            <CapabilitiesEntry value="MMT_MARKET_BY_ORDER"/>
        </Capabilities>
        <QoS>
            <QoSEntry>
                <Timeliness value="Timeliness::RealTime"/>
                <Rate value="Rate::TickByTick"/>
            </QoSEntry>
        </QoS>
        <SupportsQoSRange value="0"/>
        <ItemList value="#.itemlist"/>
        <AcceptingConsumerStatus value="0"/>
        <SupportsOutOfBandSnapshots value="0"/>
    </InfoFilter>
    <StateFilter>
        <ServiceState value="1"/>
        <AcceptingRequests value="1"/>
        <Status>
            <StreamState value="StreamState::Open"/>
            <DataState value="DataState::Ok"/>
            <StatusCode value="StatusCode::None"/>
            <StatusText value=""/>
        </Status>
    </StateFilter>
</Service>
</Directory>
<Directory>
    <Name value="Directory_2"/>
    <Service>
        <Name value="DF_1"/>

```



```

    <InfoFilter>
        <DictionariesProvided>
            <DictionariesProvidedEntry value="Dictionary_3"/>
            <DictionariesProvidedEntry value="Dictionary_4"/>
        </DictionariesProvided>

        <DictionariesUsed>
            <DictionariesUsedEntry value="Dictionary_3"/>
            <DictionariesUsedEntry value="Dictionary_4"/>
        </DictionariesUsed>

        <Vendor value="company name"/>
        <IsSource value="0"/>
        <Capabilities>
            <CapabilitiesEntry value="6"/>
            <CapabilitiesEntry value="MMT_MARKET_BY_ORDER"/>
        </Capabilities>

        <QoS>
            <QoSEntry>
                <Timeliness value="Timeliness::RealTime"/>
                <Rate value="Rate::TickByTick"/>
            </QoSEntry>
            <QoSEntry>
                <Timeliness value="100"/>
                <Rate value="100"/>
            </QoSEntry>
        </QoS>
        <SupportsQoSRange value="0"/>
        <ItemList value="#.itemlist"/>
        <AcceptingConsumerStatus value="0"/>
        <SupportsOutOfBandSnapshots value="0"/>
    </InfoFilter>
    <StateFilter>
        <ServiceState value="1"/>
        <AcceptingRequests value="1"/>
    </StateFilter>
</Service>
</Directory>
</DirectoryList>
</DirectoryGroup>
</EmaConfig>

```

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