



RFTagAware™
Reader Configuration Guide

Version 1.3.1 Patch 2

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RFTagAware™

Reader Configuration Guide

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Supported RFID Readers

You need one or more RFID readers to use RFTagAware. RFTagAware supports the makes and models of readers shown in the table below. The reader models marked with an asterisk (*) have substantially similar command sets and capabilities as others in the same row, but they have not been as extensively tested. Please contact your technical support representative if you encounter any issues with these reader models.

If you do not have a reader, you can use the reader simulator provided with RFTagAware. Out of the box, it runs on any workstation and simulates a ThingMagic Mercury4 reader; with minor editing it can simulate a Printronix reader. The reader simulator is useful for software evaluation, application development, and debugging.

We are committed to providing support for new makes and models of readers as they become available, so check with your sales representative if your selected reader does not appear in this list.

Make	Model	Read/Write ¹	Tag Classes Supported
Accraply	ALX-92X series	WO	EPC Class 1
Alien	ALR-9750 (Nanoscanner) 915 MHz RFID	RW	EPC Class 1
	ALR-9780 915 MHz RFID ALR-8780 866 MHz RFID*	RW	EPC Class 1
	ALR-9780 915 MHz RFID	RO	EPC Class 1 Gen 2
	ALR-9800	RO	EPC Class 0, 1 EPC Class 1 Gen 2
Avery	6405	WO	EPC Class 1
AWID	MPR-2010AN, MPR-2080*	RO	EPC Class 0
		RW	EPC Class 0+, 1
	MPR-2010AN	RW	EPC Class 1 Gen 2
CAEN	A928	RW	ISO 18000-6B
DataLogic	DS6300-105-010	RO	N/A (bar code reader)
Escort Memory Systems	LRP820S, LRP2000	RO	ISO 15693
Identec Solutions	i-CARD 3	RO	ILR i-Q and i-D (active tags)
Intermec	Intellitag IF5	RW	Intellitag G1 ISO 18000-6B EPC Class 1 Gen 2

Make	Model	Read/Write¹	Tag Classes Supported
Paxar	Monarch 9855	WO	EPC Class 1
Printronix	T5000e Smart Label	WO	EPC Class 0+, 1
	T5000r Smart Label	WO	EPC Class 0+, 1
SAMSys	MP9320 2.0 and 2.7	RW	EPC Class 1
		RO	ISO 18000-6B v1.19 EPC
	MP9320 2.8	RW	EPC Class 1 EPC Class 1 Gen 2
		RO	ISO 18000-6B v1.19 EPC
	MP9210	RW	ISO 15693 Philips I-Code
Symbol (Matrics)	RDR-001	RO	EPC Class 0
	AR400, DC400*, XR400	RO	EPC Class 0, 0+, 1
TAGSYS	Medio L100, Medio L200*	RW	ISO 15693 Philips I-Code
ThingMagic	Mercury3, Sensormatic Agile 1*	RW	EPC Class 1
	Mercury4, Sensormatic Agile 2*, Omron V740*	RO	EPC Class 0, 0+
		RW	EPC Class 1
Zebra	R110XiIIIPlus	WO	EPC Class 0+
	R110Xi	WO	EPC Class 0+, 1
	R4MPlus	WO	EPC Class 1

1 - Supported read/write types are Read/Write (RW), Read Only (RO), and Write Only (WO).

Configuring Physical Readers

Some readers may require specific configuration prior to use with RFTagAware. You can configure RFTagAware to communicate with supported readers in one of two ways:

- *(new for RFTagAware 1.3)* Edit the reader configuration information using the RFID Devices pane on the Administration Console (the default for new RFTagAware installations).
- Edit the `edge.props` file directly to configure these devices. (This is the default for RFTagAware installations prior to version 1.3.) This file is a Java properties file used to configure the Edge Server. It is located in the `etc` subdirectory of the RFTagAware installation directory.

Configuration properties consist of a name (shown in the Property Name column of the tables in this document) and a value (described in the Property Value and Description column of those same tables). When written out in the `edge.props` file, they will appear in the following format:

```
com.connecterra.ale.reader.<phys reader name>.<property name>=<property value>
```

If you are using the Administration Console to add and configure readers, the configuration dialog will contain reader-specific fields to enter information into. In this case, no information will be written to the `edge.props` file; instead, the configuration information you enter will be saved in the persistence store kept by the Edge Server. See Chapters 2 and 3 of the *RFTagAware Deployment Guide* for more information on reader configuration procedures.

Accraply

This section describes driver configuration information for the Accraply label printer. This device is capable of connecting to a reader (referred to as a `secondaryLogicalReaderName`) for tag write operations.

The Accraply reader uses the Easy Plug Label Scripting language. For more information on Easy Plug, see *Using the Easy Plug Label Scripting Language* on page 14.

The Accraply driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.AccraplyPhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the printer's LAN adapter.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will target when establishing connections to the printer's LAN adapter. The default value is 4000.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The default value is 15000 milliseconds (15 seconds).
Logical Reader Name	<code>prnLogicalReaderName</code>	Yes	The logical reader name assigned to the Accraply printer's print head.
N/A	<code>rfPowerLevel</code>	No	See <code>rfAttenuation</code> . Used only for backward compatibility with releases prior to RFTagAware 1.3.
RF Attenuation	<code>rfAttenuation</code>	No	Default antenna power attenuation setting to be passed to the <code>secondaryLogicalReaderName</code> . Valid range: 0 (no attenuation, maximum power) to 160 (maximum attenuation, minimum power), in increments of 10 - each increment representing an additional 1 dB of RF attenuation. Default value is 0.
N/A	<code>defaultFormFilename</code>	No	See <code>easyPlugFilename</code> . Used only for backward compatibility with releases prior to RFTagAware 1.3.

Field Label	Property Name	Required?	Property Value and Description
Easy Plug Form	<code>easyPlugFilename</code>	No	<p>Specifies the pathname of a file containing Easy Plug commands defining a smart label's form. Typically, the PCSpec <code>readerParameters</code> attribute specifies Easy Plug-based label design. This property provides a mechanism for specifying a default label design in the event the PCSpec does not contain this parameter.</p> <p>When present, <code>easyPlugFilename</code> refers to a text file containing the set of Easy Plug commands specifying the smart label's layout and dynamic (variable) content.</p> <p>Note: While optional, this property MUST point to a valid Easy Plug label script file if it is present.</p>
Fail Form	<code>failFormFilename</code>	No	The form which will be used instead of the <code>easyPlugFilename</code> if the <code>secondaryLogicalReaderName</code> 's tag write operation fails.
Enable RFID Encoding	<code>programRFID</code>	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying whether the reader driver instructs the printer to program EPC data into an embedded RFID tag. The default value is <code>true</code> .
Logical Reader Name for RFID Encoding	<code>secondaryLogicalReaderName</code>	No	Specifies a logical reader to write the RFID tag in the label. This logical reader must be properly specified and configured.
Retries	<code>retries</code>	No	The number of attempts that the <code>secondaryLogicalReaderName</code> should make to write the RFID tag in the label.

Alien

RFTagAware uses two Alien reader drivers:

- Alien ALR-9750 – Use this driver for the Alien ALR-9750 (Nanoscanner 915 MHz) RFID reader.
- Alien ALR-9780 – Use this driver for the Alien ALR-9780 and ALR-8780 RFID readers.

Alien ALR-9750

This driver is used to interface the RFTagAware Edge Server with an Alien Technology ALR-9750 (Nanoscanner 915 MHz) RFID Reader. The reader driver implements Alien's text-based communications protocol for configuring and operating its RFID readers. This text-based reader/ host protocol is specified in the *Nanoscanner Reader User Guide* (Alien Doc # 8101024-000 Rev B).

The Alien ALR-9750 reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	For backward compatibility with releases prior to RFTagAware 1.1.2, set to: <code>com.connecterra.ale.readertypes. AlienReaderGroup</code> Otherwise, set to: <code>com.connecterra.ale.readertypes. AlienALR9750PhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the Alien reader.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will use when establishing connections to the Alien Reader. The default is 23.
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between the start of one read cycle and the start of the next. Note that if multiple logical readers are simultaneously active, then each logical reader will be read at an interval equal to the <code>defaultRate</code> times the number of logical readers.

Field Label	Property Name	Required?	Property Value and Description
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The integer property value must be greater than or equal to 0. A timeout of 0 is interpreted as an infinite timeout. The default is 15000 milliseconds (15 seconds).
User Name	<code>username</code>	Yes	The username the Edge Server will use for gaining access to the Alien reader. Must be the same as the username you configured when setting up the Alien reader. Note: The username is case sensitive and must be entirely lowercase.
Password	<code>password</code>	Yes	The password the Edge Server will use for gaining access to the Alien reader. Must be the same as the password you configured when setting up the Alien reader. Note: The password is case sensitive and must be entirely lowercase.
Disable Programming Cycle Check	<code>disableProgrammingCycleCheck</code>	No	An optional Boolean property (allowed values are <code>true</code> and <code>false</code>) specifying whether the driver disables the “Check Operation” (verification that there is a single tag in an antenna's field prior to conducting a tag programming operation). The default value is <code>false</code> , meaning the driver conducts the Check Operation.
Antenna 0 Logical Reader Name Antenna 1 Logical Reader Name	<code>uhf1LogicalReaderName</code> <code>uhf2LogicalReaderName</code>	No * (see descr.)	Specifies the logical reader name for each UHF antenna. At least one logical reader name must be specified or the Edge Server will generate an error on startup.

The Alien reader obtains its IP network configuration dynamically via DHCP, or statically through one of the reader's configuration interfaces. Refer to the *Alien Nanoscanner Reader User Guide* for further details.

The Edge Server's Alien reader driver assumes the Alien reader has also been configured, through Alien's web interface or command line interface, with the following configuration settings. These configuration settings must be saved to the reader's flash memory so that reader reboots do not result in their loss.

```

Alien>Set Username=<username>
Alien>Set Password=<password>

```

Alien ALR-9780

This driver is used to interface the RFTagAware Edge Server with two models of Alien Technology readers: the ALR-9780 915 MHz RFID reader and the ALR-8780 866 MHz RFID Reader.

The reader driver implements Alien's text-based communications protocol for configuring and operating its RFID readers. This text-based reader/host protocol is specified in the *ALR-9780 Reader Interface Guide* (Alien Doc # 8101938-000 Rev 01).

The Alien ALR-9780 reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	class	Yes	For backward compatibility with releases prior to RFTagAware 1.1.2, set to: <code>com.connecterra.ale.readertypes.AlienALR9780Group</code> Otherwise, set to: <code>com.connecterra.ale.readertypes.AlienALR9780PhysicalReader</code>
Reader Hostname	hostname	Yes	The DNS name or IP address of the Alien reader.
Reader Port	port	No	The TCP port the Edge Server will use when establishing connections to the Alien Reader. The default is 23.
Default Rate	defaultRate	Yes	The period (in milliseconds) between the start of one read cycle and the start of the next. Note that if multiple logical readers are simultaneously active, then each logical reader will be read at an interval equal to the <code>defaultRate</code> times the number of logical readers.
Socket Timeout	socketTimeout	No	The TCP socket timeout interval (milliseconds). The integer property value must be greater than or equal to 0. A timeout of 0 is interpreted as an infinite timeout. The default is 15000 milliseconds (15 seconds).

Field Label	Property Name	Required?	Property Value and Description
User Name	username	Yes	The username the Edge Server will use for gaining access to the Alien reader. Must be the same as the username you configured when setting up the Alien reader. Note: The username is case sensitive and must be lowercase.
Password	password	Yes	The password the Edge Server will use for gaining access to the Alien reader. Must be the same as the password you configured when setting up the Alien reader. Note: The password is case sensitive and must be lowercase.
Reader Network Timeout	readerNetworkTimeout	No	The amount of time (in seconds) the reader maintains an idle connection with the RFTagAware Edge Server before closing the connection. The integer property value must be greater than 0. Valid range is 1-65535 seconds; default value is 90 seconds.
Read RF Attenuation	readRfAttenuation	No	Sets antenna power attenuation for tag read operations. Valid range: from 0 (no attenuation, maximum power) to 160 (maximum attenuation, minimum power), in increments of 10 - each increment representing an additional 1 dB of RF attenuation. Default value is 0.
Write RF Attenuation	writeRfAttenuation	No	Sets antenna power attenuation for program tag operations. Valid range: from 0 (no attenuation, maximum power) to 160 (maximum attenuation, minimum power), in increments of 10 - each increment representing an additional 1 dB of RF attenuation. Default value is 0. This property may be overridden at run-time by an application reader parameter <code>rfAttenuation</code> .

Field Label	Property Name	Required?	Property Value and Description
Disable Programming Cycle Check	<code>disableProgrammingCycleCheck</code>	No	An optional Boolean property (allowed values are <code>true</code> and <code>false</code>) specifying whether the driver disables the “Check Operation” (verification that there is a single tag in an antenna's field prior to conducting a tag programming operation). The default value is <code>false</code> , meaning the driver conducts the Check Operation.
Enable Global Scroll Mode	<code>enableGlobalScrollMode</code>	No	An optional Boolean property specifying whether tags are to be acquired in the Global Scroll mode. The default value is <code>false</code> (the driver acquires tags in the Inventory mode).
Antenna 0 Logical Reader Name Antenna 1 Logical Reader Name Antenna 2 Logical Reader Name Antenna 3 Logical Reader Name	<code>uhf1LogicalReaderName</code> <code>uhf2LogicalReaderName</code> <code>uhf3LogicalReaderName</code> <code>uhf4LogicalReaderName</code>	No * (see descr.)	Specifies the logical reader name for each UHF antenna. At least one logical reader name must be specified or the Edge Server will generate an error on startup. If multiple UHF antennas are assigned the <i>same</i> logical reader name, then the driver will treat them as a single combined antenna. The lowest-numbered antenna in the combined antenna grouping is checked to set antenna-specific properties and used for tag programming.
Antenna 0 Acq. Cycles Antenna 1 Acq. Cycles Antenna 2 Acq. Cycles Antenna 3 Acq. Cycles	<code>uhf1AcqCycles</code> <code>uhf2AcqCycles</code> <code>uhf3AcqCycles</code> <code>uhf4AcqCycles</code>	No	The number of acquisition cycles that are performed each time a logical reader conducts a read cycle (is issued a “Get TagList” command). Each logical reader operates with its own value. Integer property values range from 1 to 255. The default value is 1. See chapters 3 and 4 of the <i>ALR-9780 Reader Interface Guide</i> for further information on this Acquire Parameter.

Field Label	Property Name	Required?	Property Value and Description
Antenna 0 Wake Count at Start of Cycle Antenna 1 ... Antenna 2 ... Antenna 3 ...	uhf1AcqEnterWakeCount uhf2AcqEnterWakeCount uhf3AcqEnterWakeCount uhf4AcqEnterWakeCount	No	The number of RF wake commands the Alien reader issues at the start of each acquisition cycle. Each logical reader operates with its own value. Integer property values range from 0 to 255. The default value is 3. See chapters 3 and 4 of the <i>ALR-9780 Reader Interface Guide</i> for further information on this Acquire Parameter.
Antenna 0 Field Reads per Cycle Antenna 1 Field Reads per Cycle Antenna 2 Field Reads per Cycle Antenna 3 Field Reads per Cycle	uhf1AcqCount uhf2AcqCount uhf3AcqCount uhf4AcqCount	No	The number of field reads (anti-collision searches) that are performed in each acquisition cycle. Each logical reader operates with its own value. Integer property values range from 1 to 255. The default value is 3. See chapters 3 and 4 of the <i>ALR-9780 Reader Interface Guide</i> for further information on this Acquire Parameter.
Antenna 0 Sleep Commands per Read Antenna 1 Sleep Commands per Read Antenna 2 Sleep Commands per Read Antenna 3 Sleep Commands per Read	uhf1AcqSleepCount uhf2AcqSleepCount uhf3AcqSleepCount uhf4AcqSleepCount	No	The number of RF sleep commands the Alien reader issues after each field read. Each logical reader operates with its own value. Integer property values range from 0 to 255. The default value is 1. See chapters 3 and 4 of the <i>ALR-9780 Reader Interface Guide</i> for further information on this Acquire Parameter.
Antenna 0 Wake Commands at end of each read Antenna 1 ... Antenna 2 ... Antenna 3 ...	uhf1AcqExitWakeCount uhf2AcqExitWakeCount uhf3AcqExitWakeCount uhf4AcqExitWakeCount	No	The number of RF wake commands the Alien reader issues at the end of each acquisition cycle. Each logical reader operates with its own value. Integer property values range from 0 to 255. The default value imposed by RFTagAware is 1. See chapters 3 and 4 of the <i>ALR-9780 Reader Interface Guide</i> for further information on this Acquire Parameter.

Field Label	Property Name	Required?	Property Value and Description
Antenna 0 Field Inventory Timeout Antenna 1 Field Inventory Timeout Antenna 2 Field Inventory Timeout Antenna 3 Field Inventory Timeout	uhf1GetTagListTimeout uhf2GetTagListTimeout uhf3GetTagListTimeout uhf4GetTagListTimeout	No	The timeouts (in milliseconds) for field inventories (Alien Reader “Get TagList” commands). Each logical reader operates with its own timeout value. This configuration parameter, rather than the <code>socketTimeout</code> property, will serve as the socket timeout value when the Edge Server is awaiting a response to a “Get TagList” command. The integer property value must be greater than or equal to 0. A timeout of 0 is interpreted as an infinite timeout. The default value is the value of the <code>socketTimeout</code> property (or its default).
Stack Light A Logical Reader Name	<code>leftStackLightLogicalReader</code>	No	Specifies a logical reader to control the left stack light. See Appendix A for more information on stack light configuration.
Red Light IO Mask	<code>redLightIOMask</code>	No	Defines GPIO port output lines to control the red light on the stack. The valid range is 0-15; the default value is 0.
Green Light IO Mask	<code>greenLightIOMask</code>	No	Defines GPIO port output lines to control the green part of the stack light. The valid range is 0-15; the default value is 0.
Stack Light B Logical Reader Name	<code>rightStackLightLogicalReader</code>	No	Specifies a logical reader to control the right stack light. See Appendix A for more information on stack light configuration.

Field Label	Property Name	Required?	Property Value and Description
List of Protocols	rfProtocols	No	A blank-separated list of RF protocols. Alien ALR-9780 is a multi-protocol reader. To improve efficiency, the read operation will only attempt to collect tags encoded with the specified protocols. At present, valid values are: All epcClass1 epcClass1Gen2 The default value is All.

The Alien reader obtains its IP network configuration dynamically via DHCP, or statically through one of the reader's configuration interfaces. Refer to the *Alien Reader Interface Guide* for further details.

The Edge Server's Alien reader driver assumes the Alien reader has also been configured, through Alien's web interface or command line interface, with the following configuration settings. These configuration settings must be saved to the reader's flash memory so that reader reboots do not result in their loss.

```
Alien>Set Username=<username>
Alien>Set Password=<password>
```

Alien ALR-9800

This driver is used to interface the RFTagAware Edge Server with the Alien Technology ALR-9800 reader. The Alien ALR-9800 reader driver uses the same properties as the ALR-9780, with the following exceptions:

- The Device Type property value in `edge.props` is set to `com.connecterra.ale.readertypes.AlienALR9800PhysicalReader`
- The List of Protocols values include `epcClass0`.

Avery

This section describes driver configuration information for the Avery 6405 RFID label printer. The printer supports the writing (programming) of Class 1 tags embedded within label stock (“smart labels”) and the printing of those labels.

The Avery 6405 reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.Avery6405PhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the printer's LAN adapter.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will target when establishing connections to the printer's LAN adapter. The default value is 4000.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The default value is 15000 milliseconds (15 seconds).
N/A	<code>defaultFormFilename</code>	No	See <code>easyPlugFilename</code> . Used only for backward compatibility with releases prior to RFTagAware 1.3.
Easy Plug Form	<code>easyPlugFilename</code>	No	Specifies the pathname of a file containing Easy Plug commands defining a smart label's form. Typically, the <code>PCSpec</code> <code>readerParameters</code> attribute specifies Easy Plug-based label design. This property provides a mechanism for specifying a default label design in the event the <code>PCSpec</code> does not contain this parameter. When present, <code>easyPlugFilename</code> refers to a text file containing the set of Easy Plug commands specifying the smart label's layout and dynamic (variable) content. Note: While optional, this property MUST point to a valid Easy Plug label script file if it is present.

Field Label	Property Name	Required?	Property Value and Description
Enable RFID Encoding	<code>programRFID</code>	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying whether the reader driver instructs the printer to program EPC data into an embedded RFID tag. The default value is <code>true</code> .
Logical Reader Name	<code>uhf1LogicalReaderName</code>	Yes	The logical reader name assigned to the Avery printer's single integrated UHF antenna.
Retries	<code>retries</code>	No	Defines the number of labels to retry in case of a failed RFID operation. The valid range is 1 through 10. The default value is 3.

Using the Easy Plug Label Scripting Language

Easy Plug is a scripting language for specifying the layout and contents of printed labels. Easy Plug is described in detail in the Avery document, *Manual Easy Plug, Release 3.00, 11/2003*. Commands specific to the Avery 6405 are described in the document, *How to RFID with Avery 6405*.

The Avery 6405 and Accraply smart label printer drivers send their printers a separate collection of Easy Plug commands with each “smart label” (a printed label with an embedded RFID tag) to be printed and programmed. Users specify a smart label’s Easy Plug commands when defining a `PCSpec` (see the *RFTagAware Programmer Guide*). A `PCSpec`’s `readerParameters` field carries the Easy Plug script as a String object; the corresponding reader parameter name is `easyPlugScript` (or one of `easyPlugScript.accraply` or `easyPlugScript.avery` if your RFTagAware installation supports more than one device that uses EasyPlug).

For backward compatibility with releases prior to RFTagAware 1.3, use the reader parameter names `com.connecterra.ale.readertypes.avery.eplScript` or `com.connecterra.ale.readertypes.accraply.eplScript`.

As an alternative to specifying Easy Plug within a `PCSpec`, the Edge Server administrator may specify a default Easy Plug script using the reader driver’s `easyPlugFilename` property. The `easyPlugFilename` property provides a mechanism for specifying Easy Plug commands that serve as a default label design in the event the `PCSpec`’s `readerParameters` field does not carry a key/value pair containing an Easy Plug script.

The Easy Plug script, whether defined within the `PCSpec` or contained in a file identified by the `easyPlugFilename` property, must contain only Easy Plug commands. Here is an example script:

```
#!A1
#IMSR100/152.4//6/89/0V
#ER
#R000.00/000.00
#J100#T20.0
#M1/1
#YN100/0/100///THIS IS A TEST
#J50#T25.0
#YN100/0/58///[EPC_TAG_URI]
#Q1/
#!P1
```

Refer to Avery or Accraply documentation for additional information on Easy Plug.

AWID

RFTagAware uses this driver for the AWID MPR-2010AN and MPR-2080 RFID readers.

The AWID MPR-2010AN reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.AWID2010ANPhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the reader.
Reader Port	<code>port</code>	No	Specifies the TCP port the reader driver will target when establishing connections to the reader. The default value is 4000.
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between polls of a logical reader.
Read Timeout	<code>readTimeout</code>	No	The time interval (in milliseconds) allocated to acquiring tags. This interval is a portion of the <code>defaultRate</code> described earlier. The default value is 200 milliseconds.
Write Timeout	<code>writeTimeout</code>	No	The time interval (in milliseconds) allocated to programming tags. The default value is 500 milliseconds.
Sensitivity	<code>sensitivity</code>	No	The sensitivity setting of the MPR-2010AN reader channel. The valid values range from 0 (minimum sensitivity) to 255 (maximum sensitivity). The default setting is 255.
Socket Timeout	<code>socketTimeout</code>	No	The driver's TCP socket timeout interval, expressed in milliseconds. The integer property must be greater than or equal to 0. A timeout of zero is interpreted as an infinite timeout. The default value is 15000 milliseconds.
RF Power Level	<code>rfPowerLevel</code>	No	The RF power setting of the reader. The range of valid values is from 0 (maximum power) to 255 (minimum power). The default value is 0.

Field Label	Property Name	Required?	Property Value and Description
Disable Programming Cycle Check	<code>disableProgrammingCycleCheck</code>	No	Instructs the driver not to perform a program cycle check. Valid values are: <code>true</code> <code>false</code> The default value is <code>false</code> . This property can be specified as <code>true</code> only if one of the writable protocols is listed in the <code>rfProtocols</code> property, otherwise the driver will generate a configuration error.
Antenna 1 Logical Reader Name	<code>uhf1LogicalReaderName</code>	Yes	A logical reader name bound to the reader's UHF antenna. This reader has only one UHF antenna; hence, only one logical reader.
RF Protocol	<code>rfProtocols</code>	Yes	The RF protocol to use in tag acquisition and programming. The MPR-2010AN is a multi-protocol reader. At least one protocol must be specified. Valid values are: <code>epcClass0</code> <code>epcClass1</code> <code>epcClass1Gen2</code> The default value is <code>epcClass1</code> . Support for more protocols may be added at a later time.

CAEN

This section describes driver configuration information for the CAEN Technologies A928 RFID reader.

Note: RFTagAware requires the separate installation of CAEN's Java library to enable interoperability with the CAEN A928 RFID reader. Please contact your CAEN supplier for access to the file `CAENRFIDLibrary.jar`. This file should be copied into the `lib` subdirectory of your RFTagAware installation before starting RFTagAware.

The CAEN reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.CaenA928PhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the reader.
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between the start of one read cycle and the start of the next. Note that if multiple logical readers are simultaneously active, then each logical reader will be read at an interval equal to the <code>defaultRate</code> times the number of logical readers.
RF Protocol	<code>rfProtocols</code>	No	The RF protocol currently being used by the CAEN A928. The read operation will only attempt to collect tags encoded with the protocol specified. At least one protocol must be specified. The only valid value (and the default) is <code>iso18000-6B</code> .
EPC Byte Offset	<code>byteOffset</code>	No	Specifies the byte offset of the EPC within a tag's addressable memory. Values may range from 0 to the amount of available tag memory; the default value is 0.
Byte Length	<code>byteLength</code>	No	Data length in bytes (1-16).

Field Label	Property Name	Required?	Property Value and Description
Antenna 0 Logical Reader Name Antenna 1 Logical Reader Name Antenna 2 Logical Reader Name Antenna 3 Logical Reader Name	uhf1LogicalReaderName uhf2LogicalReaderName uhf3LogicalReaderName uhf4LogicalReaderName	No * (see descr.)	Specifies the logical reader name for each UHF antenna. At least one logical reader name must be specified or the Edge Server will generate an error on startup.
Read RF Power, mW	uhf1ReadRfPower uhf2ReadRfPower uhf3ReadRfPower uhf4ReadRfPower	No	The strength of the RF signal used to read tags, in milliwatts. Valid values are 0-4000; the default value is 500. The maximum value allowable is determined by the reader; see the reader documentation for more information.
Write RF Power, mW	uhf1WriteRfPower uhf2WriteRfPower uhf3WriteRfPower uhf4WriteRfPower	No	The strength of the RF signal used to write tags, in milliwatts. Valid values are 0-4000; the default value is 500. The maximum value allowable is determined by the reader; see the reader documentation for more information.
IO Gate 1 IO Gate 2 IO Gate 3 IO Gate 4	ioGateLine1 ioGateLine2 ioGateLine3 ioGateLine4	No	This field should be left blank.
IO Gate Logical Reader Name	ioGateLine1.logicalReaderName ioGateLine2.logicalReaderName ioGateLine3.logicalReaderName ioGateLine4.logicalReaderName	No	Specifies the logical reader controlled by this IO line. The value for this property must match one of the configured Logical Reader Names.
IO Mask	ioGateLine1.ioMask ioGateLine2.ioMask ioGateLine3.ioMask ioGateLine4.ioMask	No	Specifies the IO mask associated with this IO line. Values range from 0 to 15. A value of 0 means "disable IO gating signal".

DataLogic

This section describes driver configuration information for the DataLogic DS6300-105-010 bar code reader.

The DataLogic reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.DatalogicPhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the DataLogic reader.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will use when establishing connections to the Datalogic reader. The default is 23.
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between the start of one read cycle and the start of the next. Note that if multiple logical readers are simultaneously active, then each logical reader will be read at an interval equal to the <code>defaultRate</code> times the number of logical readers.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The integer property value must be greater than or equal to 0. A timeout of 0 is interpreted as an infinite timeout. The default is 15000 milliseconds (15 seconds).
Logical Reader Name	<code>bcrLogicalReaderName</code>	Yes	A logical reader name specifying the DataLogic bar code reader.

Escort Memory Systems (EMS)

This section describes driver configuration information for the Escort Memory Systems (EMS) LRP820S and LRP2000 readers.

The EMS reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	For backward compatibility with releases prior to RFTagAware 1.1.2, set to: <code>com.connecterra.ale.readertypes.EMSLRPGroup</code> Otherwise, set to: <code>com.connecterra.ale.readertypes.EMSLRPPhysicalReader</code>
N/A	<code>gatewayName</code>	No	See <code>hostname</code> . Used only for backward compatibility with releases prior to RFTagAware 1.3.
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the MOXA serial-to-Ethernet adapter to which the reader is connected.
N/A	<code>gatewayPort</code>	No	See <code>port</code> . Used only for backward compatibility with releases prior to RFTagAware 1.3.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will use when establishing connections to the MOXA serial-to-Ethernet adapter. The default value is 8080
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between the start of one read cycle and the start of the next. Note that if multiple logical readers are simultaneously active, then each logical reader will be read at an interval equal to the <code>defaultRate</code> times the number of logical readers.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The integer property value must be greater than or equal to 0. A timeout of 0 is interpreted as an infinite timeout. The default is 15000 milliseconds (15 seconds).

Field Label	Property Name	Required?	Property Value and Description
EPC Byte Offset	<code>epcByteOffset</code>	No	Specifies the byte offset of the EPC within a tag's addressable memory. The readers supported by this driver read and write ISO 15693 tags that have 48 bytes of reprogrammable memory; thus, the integer property values range from 0 to 47. The default value is 0.
EPC Byte Ordering	<code>epcByteOrdering</code>	No	Specifies the byte ordering of the EPC within a tag's addressable memory. Allowed property values are: <code>bigEndian</code> <code>littleEndian</code> Values are case insensitive.
Reader Model	<code>model</code>	Yes	Specifies the particular model of LRP series reader. Valid values are: <code>LRP820S</code> <code>LRP2000</code>
Logical Reader Name	<code>hf1LogicalReaderName</code>	Yes	Specifies the logical reader name for the single HF antenna attached to the EMS LRP reader (the LRP2000 and LRP820S readers each support a single HF antenna).
Command Timeout	<code>hf1CommandTimeout</code>	No	Specifies the command timeout value (in milliseconds) that the EMS LRP reader is provided in the commands the driver issues. Integer property values range from 50 to 65,534 (0xFFFFE). The default value is 250 milliseconds.

RFTagAware requires the use of a MOXA serial-to-Ethernet adapter for LAN access to EMS LRP readers.

Identec Solutions

This section describes driver configuration information for the Identec Solutions i-CARD 3 reader.

The Identec Solutions i-CARD 3 reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.IdentecICardPhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The hostname or IP address of the host computer where the i-CARD 3 reader has been installed.
Reader Port	<code>port</code>	No	The HTTP port on the host computer targeted by web service clients. The default value is 80.
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between the start of one read cycle and the start of the next. If multiple logical readers are active simultaneously, then each logical reader will be read at an interval equal to the <code>defaultRate</code> times the number of logical readers.
Tx Power	<code>txPower</code>	No	Antenna transmission power in dB. The valid values range from -30 to 6. The default value is 6.
Tag Slots	<code>tagSlots</code>	No	The number of tags the reader expects to respond during a read cycle (for example, setting this field to 32 gives a window of opportunity large enough for exactly 32 tags to respond). In practice, we recommend setting this value to be approximately twice the number of tags you expect to respond. The valid values range from 16 to 4096. The default value is 32.

Field Label	Property Name	Required?	Property Value and Description
Enable Rx Boost	enableRxBoost	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying whether the reader has enabled a feature that allows it to better receive signals from the tags. The reception power is -80dB when this setting is enabled, and -60dB when it is not. The default value is <code>true</code> .
Enable Blink	enableBlink	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying whether the LED on the active tag blinks when it responds to the reader. The default value is <code>true</code> .
Antenna 0 Logical Reader Name Antenna 1 Logical Reader Name Antenna 2 Logical Reader Name Antenna 3 Logical Reader Name	uhf1LogicalReaderName uhf2LogicalReaderName uhf3LogicalReaderName uhf4LogicalReaderName	No * (see descr.)	The logical reader name for the i-CARD 3 reader (PCMCIA card). Each card installed on the same computer should be assigned a unique logical reader name. At least one logical reader name must be specified. Note: Configuring more antennas than there are i-CARD 3 readers will tend to cause errors, and should be avoided.

Intermec

This section describes driver configuration information for the Intermec Intellitag IF5 reader.

The Intermec Intellitag IF5 reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.IntermecIF5PhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the printer.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will target when establishing connections to the reader. The default value is 2189.
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between the start of one read cycle and the start of the next. If multiple logical readers are active simultaneously, then each logical reader will be read at an interval equal to the <code>defaultRate</code> times the number of logical readers.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The default value is 15000 milliseconds (15 seconds). This value must be greater than 0.
RF Protocol	<code>rfProtocols</code>	No	The RF protocol currently being used by the Intermec reader. The Intellitag IF5 is a multi-protocol reader. To improve efficiency, the read operation will only attempt to collect tags encoded with the specified protocols. At least one protocol must be specified. The valid values are: <code>epcClass1Gen2</code> <code>iso18000-6B</code> <code>MIXED</code> The default value is <code>MIXED</code> .

Field Label	Property Name	Required?	Property Value and Description
ID Tries	<code>idTries</code>	No	Maximum number of identify attempts on a given tag. Values range from 1-255; the default value is 3.
Read Tries	<code>readTries</code>	No	Maximum number of read attempts on a given tag. Values range from 1-255; the default value is 3.
Write Tries	<code>writeTries</code>	No	Maximum number of write attempts on a given tag. Values range from 1-255; the default value is 3.
EPC Byte Offset	<code>byteOffset</code>	No	Specifies the byte offset of the EPC within a tag's addressable memory. Values may range from 0 to the amount of available tag memory, minus the amount specified in <code>byteLength</code> (below); the default value is 0. When writing ISO18000-6B tags, this value should be equal to or greater than 8. When reading Class 1 Gen 2 tags this value should be left blank during reader configuration.
Byte Length	<code>byteLength</code>	No	Data length in bytes (0-16). The default value is 8. When reading Class 1 Gen 2 tags this value should be left blank during reader configuration.
Enable V1.19 mode	<code>enableEPCv1.19</code>	No	Enables reading of EPC 1.19 tags. The default value is <code>false</code> . If this property is set to <code>true</code> , the <i>RF Protocol</i> property should be set to <code>iso18000-6B</code> .

Field Label	Property Name	Required?	Property Value and Description
Disable Programming Cycle Check	<code>disableProgrammingCycleCheck</code>	No	<p>An optional Boolean property (allowed values are <code>true</code> and <code>false</code>) specifying whether the driver disables the “Check Operation” (verification that there is a single tag in an antenna's field prior to conducting a tag programming operation). The default value is <code>false</code>, meaning the driver conducts the Check Operation.</p> <p>Note that if the check operation is disabled (this property value is set to <code>true</code>) and multiple tags are present in the antenna's field when conducting a tag programming operation, then all tags in the field will be programmed with the same EPC.</p>
Antenna 0 Logical Reader Name Antenna 1 Logical Reader Name Antenna 2 Logical Reader Name Antenna 3 Logical Reader Name	<code>uhf1LogicalReaderName</code> <code>uhf2LogicalReaderName</code> <code>uhf3LogicalReaderName</code> <code>uhf4LogicalReaderName</code>	No * (see descr.)	<p>Specifies the logical reader name for each antenna. At least one logical reader name must be specified.</p> <p>If one of these properties is left undefined, there will be no logical reader associated with the corresponding antenna, and that antenna will not be accessible via the ALE API.</p>

Paxar

This section describes driver configuration information for the Paxar Monarch 9855 smart label printer. You will need to consult the *Monarch® 9855™ RFID Printer Operator's Handbook* and enable status polling to allow the printer to respond to status requests from RFTagAware.

The Paxar Monarch 9855 reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.Monarch9855PhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the printer.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will target when establishing connections to the printer. The printer default value is 9100.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The default value is 15000 milliseconds (15 seconds). This value must be greater than 0.
Logical Reader Name	<code>uhf1LogicalReaderName</code>	Yes	The logical reader name assigned to the device's single integrated UHF antenna.
Enable RFID Encoding	<code>programRFID</code>	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying whether the reader driver instructs the printer to program EPC data into an embedded RFID tag. The default value is <code>true</code> .
MPCL Form	<code>mpclFilename</code>	No	Specifies the pathname of a file containing MPCL commands defining a smart label's form. Typically the MPCL-based label design will be specified within the PCSpec's <code>readerParameters</code> attribute. This property provides a mechanism for specifying a default label design in the event the PCSpec does not contain Monarch 9855 reader parameters. When present, the Monarch reader parameters are a string containing the set of MPCL commands specifying a smart label's layout.

Printronix

This section describes driver configuration information for the Printronix T5000e and T5000r series of label printers with integrated RFID UHF encoders. Although the Printronix device has a “reader driver,” it does not support tag reading. Instead, it supports the writing (programming) of Class 1 and Class 0+ tags embedded within label stock (“smart labels”) and the printing of those labels.

The Printronix T5000e and T5000r reader drivers use the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	For backward compatibility with releases prior to RFTagAware 1.1.2, set to: <code>com.connecterra.ale.readertypes.PrintronixT5000eGroup</code> Otherwise, set to: <code>com.connecterra.ale.readertypes.PrintronixT5000ePhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the printer’s LAN adapter.
Logical Reader Name	<code>uhf1LogicalReaderName</code>	Yes	The logical reader name assigned to the Printronix device’s single integrated UHF antenna.
Enable Direct Connection for Label Printing	<code>enablePrint</code>	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying whether a direct connection to printer for label printing and RFID programming is enabled. The default value is <code>true</code> .
Reader Port	<code>port</code>	No	The TCP port the Edge Server will target when establishing connections to the printer’s LAN adapter. The default value is 9100, the Printronix device’s factory default.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The default value is 15000 milliseconds (15 seconds).
Enable RFID Encoding	<code>programRFID</code>	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying whether the reader driver instructs the printer to program EPC data into an embedded RFID tag. The default value is <code>true</code> .

Field Label	Property Name	Required?	Property Value and Description
PGL Form	<code>pglFilename</code>	No	<p>Specifies the pathname of a file containing Printronix PGL commands defining a smart label's form. Typically, the <code>PCSpec readerParameters</code> attribute specifies PGL-based label design. This property provides a mechanism for specifying a default label design in the event the <code>PCSpec</code> does not contain Printronix reader parameters.</p> <p>When present, <code>pglFilename</code> refers to a text file (<code>label.pgl</code>) containing the set of PGL create-mode commands specifying the smart label's layout and non-EPC content.</p> <p>See <i>Using the Printronix Graphics Language</i> (below) for more information.</p>
Enable GPIO Port Connection for Printer Status Monitoring	<code>enableGPIO</code>	No	<p>An optional Boolean property (allowed values are <code>true</code> and <code>false</code>), specifying whether the GPIO port for printer status monitoring is enabled. The default value is <code>false</code>. If it is set to <code>true</code>, enter values for the next three properties to properly configure communications via the GPIO port.</p>
GPIO Port	<code>gpioPort</code>	No	<p>The general-purpose I/O (GPIO) port used by the Edge Server to obtain printer status via the printer's Ethernet adapter. The default value is 3002.</p> <p>Note: The GPIO properties are only available for use after installing and configuring the GPIO Accessory Module, available from the manufacturer.</p>
GPIO Port Heart Beat Timeout (ms)	<code>gpioHeartBeatTimeout</code>	No	<p>The printer regularly sends "heartbeat" messages to the Edge Server to confirm connectivity. (Consult the manufacturer or printer documentation for information on how often these messages are sent.) This value defines how long, in milliseconds, the Edge Server will wait for a message before attempting to re-establish a connection with the printer. The default value is 10050. This property must be set to a value greater than the interval between heartbeat messages.</p>
GPIO Message Content File	<code>gpioMessageFile</code>	No	<p>The path and name of the file that defines Printronix GPIO messages and their associated message IDs. The contents of this file can be edited, but the file should always contain entries for <code>Heart_Beat_Normal</code> and <code>Heart_Beat_Error</code> messages. This file is based on Printronix's GPIO message definition.</p>

Using the Printronix Graphics Language (PGL)

The Printronix Graphics Language (PGL) is a scripting language for specifying the layout and contents of printed labels. PGL is described in detail in the Printronix document, *IGP/PGL Emulation for T5000e series Printers: Printronix Graphics Language Programmer's Reference Manual* (Printronix document 750929-001E).

The Printronix T5000e/T5000r smart label printer drivers send the printer a separate collection of PGL commands with each “smart label” (a printed label with an embedded RFID tag) to be printed and programmed. Users specify a smart label’s PGL commands when defining a `PCSpec` (see the *RFTagAware Programmer Guide*). A `PCSpec`’s `readerParameters` field carries the PGL script as a String object; the reader parameter name is `pglScript`. (For backward compatibility with releases prior to *RFTagAware* 1.3, use the reader parameter name `com.connecterra.ale.readertypes.PrintronixT5000eGroup.pglScript`.)

As an alternative to specifying PGL within a `PCSpec`, the Edge Server administrator may specify a default PGL script using the Printronix reader driver’s `pglFilename` property. The `pglFilename` property provides a mechanism for specifying PGL commands that serve as a default label design in the event the `PCSpec`’s `readerParameters` field does not carry a key/value pair containing a PGL script.

The PGL script, whether defined within the `PCSpec` or contained in a file identified by the `pglFilename` property, must only contain IGP/PGL Create Form mode commands. Below is an example PGL script:

```
SCALE;DOT;200;200
FONT;FACE 92250
ALPHA
POINT;60;50;8;8;*SHIP FROM:*
POINT;90;50;10;10;*ACME*
POINT;120;50;10;10;*Corporation*
POINT;150;50;10;10;*P.O. Box 1000*
POINT;180;50;10;10;*Dallas, TX75261*

POINT;60;365;8;8;*SHIP TO:*
POINT;90;365;10;10;*Retailer Distribution Center*
POINT;120;365;10;10;*200 Main Street*
POINT;150;365;10;10;*Springfield, MA01103*
STOP

HORZ
4;200;40;790
STOP
```

VERT
3;343;60;200
STOP

ALPHA
POINT;235;50;8;8;*(420)SHIP TO POSTAL CODE:*
POINT;285;100;12;12;*(420) 01103*
POINT;235;385;8;8;*CARRIER:*
POINT;285;400;12;12;*Acme Freightways*
POINT;330;400;10;10;*PRO: 1234*
POINT;370;400;10;10;*B/L: 5678*
STOP

BARCODE
C128C;XRD3:3:6:6:9:9:12:12;H7;283;75
01103
STOP

HORZ
4;425;40;790
STOP

VERT
3;374;200;425
STOP

ALPHA
POINT;465;50;12;12;*EPC:*
AF512;25;POINT;550;70;14;14
STOP

HORZ
4;625;40;779
STOP

ALPHA
POINT;665;50;12;12;*SKU:*
POINT;705;70;14;14;*ABC21270*
STOP

```
HORZ
4;750;40;779
STOP
```

```
ALPHA
POINT;790;50;12;12;*GTIN:*
POINT;840;270;12;12;*(01) 10036000212706*
STOP
```

```
BARCODE
C128C;XRD3:3:6:6:9:9:12:12;H7;850;250
*10036000212706*
STOP
```

The user-defined PGL script must not contain an `RFWRITE` Create Form mode command; the reader driver will insert the necessary `RFWRITE` command if it is called on to program a smart label's embedded RFID tag.

If the user wishes to print a specified EPC value on the smart label, the user-supplied PGL must use special substitution strings, indicating in what representation the tag values are to be printed. `RFTagAware` recognizes the following substitution string values:

[EPC_HEX]	Will be replaced by the hexadecimal representation of the tag value.
[EPC_ID_URI]	Will be replaced by the pure identity URN representation of the tag value.
[EPC_TAG_URI]	Will be replaced by the tag URN representation of the tag value.

Example:

```
ALPHA
POINT;465;50;12;12;*EPC:*
POINT;550;70;14;14;*[ EPC_ID_URI ]*
STOP
```

Note: For backward compatibility, RFTagAware also supports the use of the alphanumeric dynamic data field AF512 to print out a hexadecimal representation of the tag value. This method was supported in RFTagAware Release 1.1 and RFTagAware Release 1.1.1. You should use the substitution strings above for new applications.

AF512 example:

```
ALPHA  
POINT;465;50;12;12;*EPC:*  
AF512;25;POINT;550;70;14;14  
STOP
```

Please refer to Printronix documentation for additional information on IGP/PGL.

SAMSys

RFTagAware uses two SAMSys reader drivers:

- MP9320 – Use this driver for the SAMSys MP9230 reader, versions 2.0, 2.7, and 2.8.
- MP9210 – Use this driver for the SAMSys MP9210 reader.

MP9320

This section describes driver configuration information for the SAMSys MP9320 RFID reader. SAMSys MP9320 2.8 readers feature a single-color stack light, which requires no configuration. SAMSys MP9320 2.0 readers are serial devices and do not provide for Ethernet connectivity. To be used with RFTagAware, they require a serial to Ethernet adapter (such as the Digi Connect ME Module). The adapter serial port must be configured to 57600/8/1/N.

The SAMSys MP9320 reader drivers use the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.SAMSysMP9320PhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the reader.
Reader Port	<code>port</code>	No	The TCP port the SAMSys MP9320 reader driver will target when establishing connections to the SAMSys reader. The default value is 2101. For MP9320 2.0, set port to match your gateway device (such as MOXA).
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between polls of a logical reader. The same <code>defaultRate</code> value applies to all logical readers provisioned on a single physical reader.

Field Label	Property Name	Required?	Property Value and Description
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). Must be greater than or equal to zero. A timeout of zero is interpreted as an infinite timeout. The default value is 15000 milliseconds (15 seconds).
Disable Programming Cycle Check	<code>disableProgrammingCycleCheck</code>	No	A Boolean property (allowed values are <code>true</code> and <code>false</code>) specifying whether the driver disables the Program Cycle Check (verification that there is exactly one programmable tag in an antenna's field prior to conducting a tag programming operation). The default value is <code>false</code> , meaning the driver conducts the Check Operation. Note that if the check operation is disabled (this property value is set to <code>true</code>) and multiple tags are present in the antenna's field when conducting a tag programming operation, then all tags in the field will be programmed with the same EPC.
List of Protocols	<code>rfProtocols</code>	No	A blank-separated list of RF protocols. SAMSys MP9320 is a multi-protocol reader. To improve efficiency, the read operation will only attempt to collect tags encoded with the specified protocols. At present, valid values are: <code>iso18000-6B-64</code> <code>iso18000-6B-96</code> <code>epcClass1</code> <code>epcClass1Gen2</code> (MP9320 2.8 only) The default value is <code>epcClass1</code> . Note: Only one of the ISO18000-6B protocols at a time can be specified. The Edge Server will generate an error if both protocols are listed.
Enable Reader Beep	<code>enableReaderBeep</code>	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying whether the reader driver instructs the reader to beep when reading an RFID tag. The default value is <code>false</code> .

Field Label	Property Name	Required?	Property Value and Description
Reader Operation Mode	operationMode	No	Indicates the behavior of the SAMSys reader in response to a request for data from an application such as RFTagAware. A value of poll means that the reader is idle between requests, but performs a tag read when it receives a request for data. A value of autopoll means that the reader continuously reads tags and stores the data in memory between requests, and forwards all stored tag information when it receives a request from the application. Valid values are: poll autopoll The default value is poll.
Antenna 1 Logical Reader Name Antenna 2 Logical Reader Name Antenna 3 Logical Reader Name Antenna 4 Logical Reader Name	uhf1LogicalReaderName uhf2LogicalReaderName uhf3LogicalReaderName uhf4LogicalReaderName	No * (see descr.)	A set of properties specifying a logical reader name bound to each of the SAMSys MP9320 reader's UHF antennas. At least one logical reader name must be specified. The SAMSys MP9320 reader supports up to four logical readers. If a property within this set is left undefined, there will be no logical reader associated with the corresponding antenna.

Setting the Baud Rate

To attain the maximum output from the SAMSys MP9320 2.7 and 2.8 readers, we recommend setting the reader to 57600 bps. If you change the baud rate of the reader in RFTagAware, you will need to perform these steps again to keep the baud rate settings the same throughout the hardware and software.

Use the instructions below to do this:

1. Use a serial cable to connect the reader's RS232 port to your computer's serial port.
2. Run the SAMSys reader's RF Command Suite software. Select the **Reader Connection | Connect via Serial Port** menu option.

3. The software should detect the reader connected to your computer's serial port. If you cannot establish a connection, select the menu item **Reader Connection | Serial Port Settings**, and use the *Maximum Speed* field to set the correct baud rate to connect to the reader.
4. Open a web browser and navigate to <http://<IP.address.of.reader>/> . This URL will launch a Java applet. You will need to enable Java in your web browser to see the applet. If you would prefer to perform this configuration via telnet, skip step 5 and follow the instructions in Appendix C of the *MP9320 2.7 User's Guide*.
5. On the applet that displays, click **Serial Ports** on the left side of the page, change the Baud Rate to 57600, then click **Save**.
6. In the RF Command Suite software, click the Command tab, and type the command `}Cw,d:scw,b:00161616,f:1!` to set the reader's baud rate to 57600.
7. Close the RF Command Suite and the web browser window.
8. Power-cycle the reader. Afterward, the reader's external RS232 port and the external serial port on the Digi Connect ME Module are set to a baud rate of 57600.

Notes: If the reader stops responding, use HyperTerminal to connect to the reader, power-cycle it, and press the [Enter] key three times. This will set the reader to the factory default.

MP9210

The SAMSys MP9210 reader driver requires the use of a MOXA serial-to-Ethernet adapter. This reader uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.SAMSysMP9210PhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the MOXA serial-to-Ethernet adapter to which the reader is connected.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will use when establishing connections to the MOXA serial-to-Ethernet adapter. The default value is 4001.

Field Label	Property Name	Required?	Property Value and Description
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between polls of a logical reader. The same <code>defaultRate</code> value applies to all logical readers provisioned on a single physical reader.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). Must be greater than or equal to zero. A timeout of zero is interpreted as an infinite timeout. The default value is 15000 milliseconds (15 seconds).
List of Protocols	<code>rfProtocols</code>	No	A blank-separated list of RF protocols. SAMSys MP9210 is a multi-protocol reader. To improve efficiency, the read operation will only attempt to collect tags encoded with the specified protocols. The valid values are: <code>iso15693</code> <code>Philips_I_Code</code> The default value is <code>iso15693</code> .
Antenna 1 Logical Reader Name	<code>hf1LogicalReaderName</code>	Yes	A set of properties specifying a logical reader name bound to the SAMSys MP9210 reader's HF antenna.
Memory Block Offset	<code>memBlockOffset</code>	Yes	The memory block location where EPC data written to the tag begins. For example, an offset of 3 means that the first three memory blocks in the user memory area are skipped and the EPC data begins at the third memory block. Valid values may range from 0 to 255, depending on the amount of tag memory available for the tag being used.
Number of Memory Blocks	<code>memBlockLength</code>	No	The number of memory blocks used in storing EPC data. For example, a 96-bit tag uses three 32-bit blocks. The default value is 3.
Enable littleEndian?	<code>memByteOrder</code>	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying the byte ordering of the EPC within a tag's addressable memory. The default value is <code>false</code> .

MP9210 Notes:

1. The reader will be connected to an IP network with MOXA serial server.
2. The serial configuration is shown below. If the reader's serial configuration is changed, these settings should be adjusted accordingly.

<i>Baud rate:</i>	9600
<i>Parity:</i>	None
<i>Data bits:</i>	8
<i>Stop bit:</i>	1
<i>Flow control:</i>	None
<i>UART FIFO:</i>	Disable
<i>Interface:</i>	RS-232

3. A null modem is required if using a straight serial cable (DB9, female-to-male).

Symbol (Metrics)

RFTagAware uses two Symbol (Metrics) reader drivers:

- AR400 – Use this driver for the Symbol Metrics AR400 and XR400 readers.
- RDR-001 – Use this driver for the Symbol Metrics RDR-001 reader.

Note: Symbol Technologies acquired Metrics (an RFID reader manufacturer) in July of 2004. As a result, there may be naming discrepancies between class names and reader names for the readers in this section.

AR400

The Symbol Metrics AR400 and XR400 readers use the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.MetricsAR400PhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the reader.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will target when establishing connections to the reader. The default value is 3000.
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between polls of a logical reader. The same <code>defaultRate</code> value applies to all logical readers provisioned on a single physical reader.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The default value is 15000 milliseconds (15 seconds).

Field Label	Property Name	Required?	Property Value and Description
Frequency Channel	frequencyChannel	No	The frequency channel the AR400 reader will use to read tags. This property MUST ONLY be used with Symbol/Matrices FCC part 90 readers. Integer property values range from 0 to 13, corresponding to 914.25 MHz to 917.25 MHz, in 500 kHz steps. There is no default value. When not specified, the Set Frequency Channel command is not issued.
Disable Programming Cycle Check	disableProgrammingCycleCheck	No	A Boolean property (allowed values are <code>true</code> and <code>false</code>) specifying whether the driver disables the Program Cycle Check (verification that there is exactly one programmable tag in an antenna's field prior to conducting a tag programming operation). The default value is <code>false</code> , meaning the driver conducts the Check Operation. Note that if the check operation is disabled (this property value is set to <code>true</code>) and multiple tags are present in the antenna's field when conducting a tag programming operation, then all tags in the field will be programmed with the same EPC.
Antenna 0 Logical Reader Name Antenna 1 Logical Reader Name Antenna 2 Logical Reader Name Antenna 3 Logical Reader Name	uhf1LogicalReaderName uhf2LogicalReaderName uhf3LogicalReaderName uhf4LogicalReaderName	No * (see descr.)	A set of properties specifying a logical reader name bound to each of the reader's UHF antennas. At least one logical reader name must be specified. (The AR400 reader supports up to four logical readers.) If a property within this set is left undefined, there will be no logical reader associated with the corresponding antenna. If multiple UHF antennas are assigned the same logical reader name, then the driver will treat them as a single combined antenna. The lowest-numbered antenna in the combined antenna grouping is checked to set antenna-specific properties and used for tag programming. If running in this combined antenna mode, see the note below this table for more information.

Field Label	Property Name	Required?	Property Value and Description
Antenna 0 Environment Variable Antenna 1 Environment Variable Antenna 2 Environment Variable Antenna 3 Environment Variable	uhf1EnvironmentVariable uhf2EnvironmentVariable uhf3EnvironmentVariable uhf4EnvironmentVariable	No	A property controlling the length of time the AR400 reader gives itself when reading tags within a single antenna's field in response to a single "Read Full Field" Command. Integer property values range from 0 to 8, with full field read times lengthening with increasing environment variable property value. The default environment variable value is 3.
Antenna 0 Power Level Antenna 1 Power Level Antenna 2 Power Level Antenna 3 Power Level	uhf1PowerLevel uhf2PowerLevel uhf3PowerLevel uhf4PowerLevel	No	A set of properties specifying UHF antenna (n=1..4) power levels. Integer property values range from 1 to 255. Power level is logarithmic; hence, 192 is about 50% of and 128 is about 25% of an antenna's maximum power. The default power level is 192.
Left Stack Light Logical Reader Name	leftStackLightLogicalReader	No	Specifies a logical reader to control the left stack light. See Appendix A for more information on stack light configuration.
Right Stack Light Logical Reader Name	rightStackLightLogicalReader	No	Specifies a logical reader to control the right stack light. See Appendix A for more information on stack light configuration.
Stack Light Control Protocol	stackLightProtocol	No	Specifies the protocol to use for stack light control. The default value is <code>Bytestream</code> ; valid values are: <code>Bytestream</code> <code>http</code> Note: Use the <code>http</code> protocol for the XR400 reader, and <code>Bytestream</code> protocol for the AR400 reader.

Note: The AR400 reader driver in `RFTagAware` runs a `bytestream` protocol. The `bytestream` protocol driver now supports combined antenna operations. To enable combined antenna operations, assign the same logical reader name to multiple physical antenna ports (`uhf1`-`uhf4`). All antennas combined within a single logical group must operate with the same set of antenna-specific configuration options (`PowerLevel`, `EnvironmentVariable`). The driver will use the configuration properties assigned to the lowest numbered antenna port in a group for all antennas in that group. So, if `uhf1` and `uhf2` are combined into the same group, then the power level and environment variable properties specified for `uhf1` will also apply to `uhf2`.

RDR-001

The Symbol Matrics RDR-001 reader driver requires the use of a MOXA serial-to-Ethernet adapter, available from Symbol Technologies. This reader uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	For backward compatibility with releases prior to RFTagAware 1.1.2, set to: <code>com.connecterra.ale.readertypes.MatricsReaderGroup</code> Otherwise, set to: <code>com.connecterra.ale.readertypes.MatricsRDR001PhysicalReader</code>
N/A	<code>gatewayName</code>	No	See <code>hostname</code> . Used only for backward compatibility with releases prior to RFTagAware 1.3.
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the MOXA serial-to-Ethernet adapter to which the reader is connected.
N/A	<code>gatewayPort</code>	No	See <code>port</code> . Used only for backward compatibility with releases prior to RFTagAware 1.3.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will use when establishing connections to the MOXA serial-to-Ethernet adapter. The default value is 8080
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between the start of one read cycle and the start of the next. Note that if multiple logical readers are simultaneously active, then each logical reader will be read at an interval equal to the <code>defaultRate</code> times the number of logical readers.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The default is 15000 milliseconds (15 seconds).
Frequency Channel	<code>frequencyChannel</code>	No	The frequency channel the RDR-001 reader will use to read tags. This property MUST ONLY be used with RDR-001 readers running FCC Part 90 Firmware. Integer property values range from 0 to 13, corresponding to 914.25 MHz to 917.25 MHz, in 500 kHz steps. There is no default value.

Field Label	Property Name	Required?	Property Value and Description
Node Address	nodeAddress	No	The reader's RS-485 protocol node address. Integer property values range from 0 (00 hex) to 31 (1F hex). The default value is 4.
Antenna 0 Logical Reader Name Antenna 1 Logical Reader Name Antenna 2 Logical Reader Name Antenna 3 Logical Reader Name	uhf1LogicalReaderName uhf2LogicalReaderName uhf3LogicalReaderName uhf4LogicalReaderName	No * (see descr.)	Specifies the logical reader name for each UHF antenna. At least one logical reader name must be specified or the Edge Server will generate an error on startup.
Antenna 0 Environment Variable Antenna 1 Environment Variable Antenna 2 Environment Variable Antenna 3 Environment Variable	uhf1EnvironmentVariable uhf2EnvironmentVariable uhf3EnvironmentVariable uhf4EnvironmentVariable	No	Controls the length of time the RDR-001 reader gives itself when reading tags within a single antenna's field. The value of this property must be an integer in the range 0 to 8, where greater numbers indicate longer time. The default is 3.
Antenna 0 Power Level Antenna 1 Power Level Antenna 2 Power Level Antenna 3 Power Level	uhf1PowerLevel uhf2PowerLevel uhf3PowerLevel uhf4PowerLevel	No	The power level for each UHF antenna. The value of this property must be an integer in the range 1 to 255. Power level is logarithmic; hence, 192 is about 50% of and 128 is about 25% of an antenna's maximum power. The default power level is 192.

TAGSYS

This section describes driver configuration information for the TAGSYS Medio L100 and L200 RFID readers.

The TAGSYS Medio L100 and L200 reader drivers require the use of a MOXA serial-to-Ethernet adapter, available from Symbol Technologies. These readers use the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	Must be set to: <code>com.connecterra.ale.readertypes.TagsysLX00PhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the MOXA serial-to-Ethernet adapter to which the reader is connected.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will use when establishing connections to the MOXA serial-to-Ethernet adapter. The default value is 4001.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The default value is 15000 milliseconds (15 seconds).
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between polls of a logical reader. The same <code>defaultRate</code> value applies to all logical readers provisioned on a single physical reader.
RF Protocol	<code>rfProtocols</code>	No	The RF protocol to use in tag acquisition. The TAGSYS is a multi-protocol reader. At least one protocol must be specified. Valid values are: <code>Philips_I_Code</code> <code>iso15693</code> The default value is <code>iso15693</code> .
Memory Block Offset	<code>memBlockOffset</code>	Yes	The memory block location where EPC data written to the tag begins. For example, an offset of 3 means that the first three memory blocks in the user memory area are skipped and the EPC data begins at the third memory block.

Field Label	Property Name	Required?	Property Value and Description
Number of Memory Blocks	memBlockLength	No	The number of memory blocks used in storing EPC data. For example, a 96-bit tag uses three 32-bit blocks. The default value is 3.
Enable littleEndian?	memByteOrder	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying the byte ordering of the EPC within a tag's addressable memory. The default value is <code>false</code> .
RF Power in mW	rfPowerLevel	No	The RF power setting of the TAGSYS reader. The range of valid values is from 0 (minimum power) to 4000 (maximum power). The default value is 2000.
Ch. 1 Logical Reader Name Ch. 2 Logical Reader Name Ch. 3 Logical Reader Name Ch. 4 Logical Reader Name	hf1LogicalReaderName hf2LogicalReaderName hf3LogicalReaderName hf4LogicalReaderName	No	Specifies the logical reader name for each HF antenna. At least one logical reader name must be specified or the Edge Server will generate an error on startup. Please note that the L100 reader has two antennas and the L200 reader has four antennas.

Notes:

1. The reader will be connected to an IP network with MOXA serial server.
2. The serial configuration is shown below. If the reader's serial configuration is changed, adjust these settings accordingly.

<i>Baud rate:</i>	38400
<i>Parity:</i>	None
<i>Data bits:</i>	8
<i>Stop bit:</i>	1
<i>Flow control:</i>	None
<i>UART FIFO:</i>	Disable
<i>Interface:</i>	RS-232

3. A null modem is required if using a cross serial cable (DB9, female-to-female).

ThingMagic

RFTagAware uses two ThingMagic reader drivers:

- ThingMagic Mercury3 – Use this driver for the ThingMagic Mercury3 reader.
- ThingMagic Mercury4 – Use this driver for the ThingMagic Mercury4 reader.

Mercury3

The ThingMagic Mercury3 reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	For backward compatibility with releases prior to RFTagAware 1.1.2, set to: <code>com.connecterra.ale.readertypes.ThingMagicReaderGroup</code> Otherwise, set to: <code>com.connecterra.ale.readertypes.ThingMagicMercury3PhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the ThingMagic reader
Reader Port	<code>port</code>	No	The TCP port the Edge Server will use when establishing connections to the ThingMagic Reader. The default is 8080.
Default Rate	<code>defaultRate</code>	Yes	The period (in milliseconds) between the start of one read cycle and the start of the next. Note that if multiple logical readers are simultaneously active, then each logical reader will be read at an interval equal to the <code>defaultRate</code> times the number of logical readers.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The default is 15000 milliseconds (15 seconds).

Field Label	Property Name	Required?	Property Value and Description
Read Timeout	<code>readTimeout</code>	No	Specifies the maximum amount of time (in milliseconds) the reader may spend when servicing a request to read tags in a single antenna's field. The default value is 250 milliseconds.
Write Timeout	<code>writeTimeout</code>	No	Specifies the maximum amount of time (in milliseconds) the reader may spend when servicing a request to program a tag across a single antenna. The default value is 250 milliseconds.
Disable Programming Cycle Check	<code>disableProgrammingCycleCheck</code>	No	<p>An optional Boolean property (allowed values are <code>true</code> and <code>false</code>) specifying whether the driver disables the “Check Operation” (verification that there is a single tag in an antenna's field prior to conducting a tag programming operation). The default value is <code>false</code>, meaning the driver conducts the Check Operation.</p> <p>Note that if the check operation is disabled (this property value is set to <code>true</code>) and multiple tags are present in the antenna's field when conducting a tag programming operation, then all tags in the field will be programmed with the same EPC.</p>
UHF Antenna 1 Logical Reader Name UHF Antenna 2 Logical Reader Name	<code>uhf1LogicalReaderName</code> <code>uhf2LogicalReaderName</code>	No * (see descr.)	<p>Specifies the logical reader name for each UHF (915 MHz) antenna. At least one logical reader name must be specified.</p> <p>If one of these properties is left undefined, there will be no logical reader associated with the corresponding antenna, and that antenna will not be accessible via the ALE API.</p> <p>If multiple UHF antennas are assigned the <i>same</i> logical reader name, then the driver will treat them as a single combined antenna. The lowest-numbered antenna in the combined antenna grouping is checked to set antenna-specific properties and used for tag programming.</p>

Field Label	Property Name	Required?	Property Value and Description
HF Antenna 1 Logical Reader Name HF Antenna 2 Logical Reader Name	hf1LogicalReaderName hf2LogicalReaderName	No * (see descr.)	Specifies the logical reader name for each HF (13.56 MHz) antenna. At least one logical reader name must be specified. If one of these properties is left undefined, there will be no logical reader associated with the corresponding antenna, and that antenna will not be accessible via the ALE API.

The ThingMagic reader obtains its IP network configuration dynamically via DHCP, or statically through one of the reader's configuration interfaces. Refer to the *ThingMagic User Guide* for further details.

Mercury4

The ThingMagic Mercury4 reader driver uses the following properties:

Field Label	Property Name	Required?	Property Value and Description
Device Type	class	Yes	Must be set to: <code>com.connecterra.ale.readertypes.ThingMagicMercury4PhysicalReader</code>
Reader Hostname	hostname	Yes	The DNS name or IP address of the ThingMagic reader
Reader Port	port	No	The TCP port the Edge Server will use when establishing connections to the ThingMagic Reader. The default is 8080.
Default Rate	defaultRate	Yes	The period (in milliseconds) between the start of one read cycle and the start of the next. Note that if multiple logical readers are simultaneously active, then each logical reader will be read at an interval equal to the <code>defaultRate</code> times the number of logical readers.
Socket Timeout	socketTimeout	No	The TCP socket timeout interval (milliseconds). The default is 15000 milliseconds (15 seconds).

Field Label	Property Name	Required?	Property Value and Description
Read Timeout	<code>readTimeout</code>	No	Specifies the maximum amount of time (in milliseconds) the reader may spend when servicing a request to read tags in a single antenna's field. The default value is 250 milliseconds.
Write Timeout	<code>writeTimeout</code>	No	Specifies the maximum amount of time (in milliseconds) the reader may spend when servicing a request to program a tag across a single antenna. The default value is 250 milliseconds.
Disable Programming Cycle Check	<code>disableProgrammingCycleCheck</code>	No	<p>An optional Boolean property (allowed values are <code>true</code> and <code>false</code>) specifying whether the driver disables the “Check Operation” (verification that there is a single tag in an antenna's field prior to conducting a tag programming operation). The default value is <code>false</code>, meaning the driver conducts the Check Operation.</p> <p>Note that if the check operation is disabled (this property value is set to <code>true</code>) and multiple tags are present in the antenna's field when conducting a tag programming operation, then all tags in the field will be programmed with the same EPC.</p>
UHF Antenna 1 Logical Reader Name UHF Antenna 2 Logical Reader Name UHF Antenna 3 Logical Reader Name ... UHF Antenna 16 Logical Reader Name	<code>uhf1LogicalReaderName</code> <code>uhf2LogicalReaderName</code> <code>uhf3LogicalReaderName</code> ... <code>uhf16LogicalReaderName</code>	No * (see descr.)	<p>Specifies the logical reader name for each UHF (915 MHz) antenna. At least one logical reader name must be specified. If one of these properties is left undefined, there will be no logical reader associated with that antenna, and that antenna will not be accessible via the ALE API.</p> <p>If multiple UHF antennas are assigned the <i>same</i> logical reader name, then the driver will treat them as a single combined antenna. The lowest-numbered antenna in the combined antenna grouping is checked to set antenna-specific properties and used for tag programming.</p>

Field Label	Property Name	Required?	Property Value and Description
HF Antenna 1 Logical Reader Name HF Antenna 2 Logical Reader Name HF Antenna 3 Logical Reader Name HF Antenna 4 Logical Reader Name	hf1LogicalReaderName hf2LogicalReaderName hf3LogicalReaderName hf4LogicalReaderName	No * (see descr.)	Specifies the logical reader name for each HF (13.56 MHz) antenna. At least one logical reader name must be specified. If one of these properties is left undefined, there will be no logical reader associated with that antenna, and that antenna will not be accessible via the ALE API.
N/A	rfProtocol	No	See <code>rfProtocols</code> . Used only for backward compatibility with releases prior to RFTagAware 1.3.
List of Protocols	<code>rfProtocols</code>	No	A blank-separated list of RF protocols. Mercury4 is a multi-protocol reader and can operate in read-only or read-write mode. At least one protocol must be specified. At present, the valid values are: <code>epcClass0</code> (read-only, reads EPC Class 0 and Class 0+ tags) <code>epcClass1</code> (read-write, reads/writes EPC Class 1 tags only) <code>ALL</code> (read-write, reads EPC Class 0, Class 0+, and Class 1 tags, writes Class 1 tags) The default value is <code>epcClass1</code> .

The ThingMagic reader obtains its IP network configuration dynamically via DHCP, or statically through one of the reader's configuration interfaces. Refer to the *ThingMagic User Guide* for further details.

Zebra

This section describes driver configuration information for the Zebra R110XiIIIPlus, R110Xi and R4MPlus label printers.

- The R110XiIIIPlus printer supports the writing (programming) of Class 0+ and Class 1 tags embedded within label stock (“smart labels”) and the printing of those labels.
- The R110Xi printer supports the writing and printing of Class 0+ and Class 1 tags embedded within label stock (“smart labels”).
- The R4MPlus printer does the same for Class 1 tags.

The Zebra R110XiIIIPlus, R110Xi and R4MPlus printer drivers share all the same properties except `class`, as shown in the following table.

Field Label	Property Name	Required?	Property Value and Description
Device Type	<code>class</code>	Yes	R110XiIIIPlus: <code>com.connecterra.ale.readertypes.ZebraR110XiIIIPlusPhysicalReader</code> R110Xi: <code>com.connecterra.ale.readertypes.ZebraR110XiIIIPlusPhysicalReader</code> R4MPlus: <code>com.connecterra.ale.readertypes.ZebraR4MPlusPhysicalReader</code>
Reader Hostname	<code>hostname</code>	Yes	The DNS name or IP address of the printer’s LAN adapter.
Reader Port	<code>port</code>	No	The TCP port the Edge Server will target when establishing connections to the printer’s LAN adapter. The default value is 9100, the Zebra R110XiIIIPlus device’s factory default.
Socket Timeout	<code>socketTimeout</code>	No	The TCP socket timeout interval (milliseconds). The default value is 15000 milliseconds (15 seconds).
Logical Reader Name	<code>uhflLogicalReaderName</code>	Yes	The logical reader name assigned to the Zebra device’s single integrated UHF antenna.

Field Label	Property Name	Required?	Property Value and Description
Enable RFID Encoding	programRFID	No	A Boolean (allowed values are <code>true</code> and <code>false</code>) specifying whether the reader driver instructs the printer to program EPC data into an embedded RFID tag. The default value is <code>true</code> .
ZPL Form	zplFilename	No	Specifies the pathname of a file containing Zebra ZPL commands defining a smart label's form. Typically, the <code>PCSpec readerParameters</code> attribute specifies ZPL-based label design. This property provides a mechanism for specifying a default label design in the event the <code>PCSpec</code> does not contain ZPL reader parameters. When present, <code>zplFilename</code> refers to a text file (<code>label.zpl</code>) containing the set of ZPL commands specifying the smart label's layout and dynamic (variable) content. See <i>Using the Zebra Printing Language</i> , below, for more information. Note: If specified, this property MUST point to a valid ZPL file.
Retries	retries	No	Defines the number of labels to retry in case of a failed RFID operation. The valid range is 1 through 10, the default value is 3.
Error Handling	errorHandling	No	Specifies an error handling operation, if an RFID operation fails after the number of retries (specified in the <code>retries</code> property). The valid values are: <code>NO_ACTION</code> <code>PAUSE_MODE</code> <code>ERROR_MODE</code> The default value is <code>NO_ACTION</code> .
Transponder Position	transponderDisplacement	No	Applies only to R4MPlus printer. Specifies the value of parameter in the <code>^RS</code> command issued to the printer. Use this property only if necessary. Refer to <i>Zebra R4MPlus User Guide</i> for explanation and usage guidelines
Verify Pre-encoded A5A5	verifyValidData	No	Applies only to R4MPlus printer. A Boolean (allowed values are <code>true</code> and <code>false</code>). The default value is <code>false</code> . When <code>true</code> , the printer fails the tag programming operation if the first two bytes of the tag are not <code>0xA5A5</code> .

Using the Zebra Printing Language (ZPL II)

ZPL is a scripting language for specifying the layout and contents of printed labels. ZPL is described in detail in the Zebra document, *ZPLII Programming Guide (Zebra Document 45541LB-R3)*.

The Zebra printer driver sends its printer a separate collection of ZPL commands with each “smart label” (a printed label with an embedded RFID tag) to be printed and programmed. Users specify a smart label’s ZPL commands when defining a `PCSpec` (see the *RFTagAware Programmer Guide*). A `PCSpec`’s `readerParameters` field carries the ZPL script as a String object; the corresponding reader parameter name is `zplScript`.

(For backward compatibility with releases prior to RFTagAware 1.3, use the reader parameter name `com.connecterra.ale.readertypes.ZebraR110XiIIIPPlus.zplScript`. This parameter name applies when using the Zebra R4MPlus printer as well as the R110XiIIIPPlus.)

As an alternative to specifying ZPL within a `PCSpec`, the Edge Server administrator may specify a default ZPL script using the Zebra reader driver’s `zplFilename` property. The `zplFilename` property provides a mechanism for specifying ZPL commands that serve as a default label design in the event the `PCSpec`’s `readerParameters` field does not carry a key/value pair containing a ZPL script.

Below is a sample ZPL script (blank lines have been inserted for readability):

```
^XA
^FX *** NOTE: Lines, beginning with ^FX are comments ***^FS
^FX Set home position ^FS
^LH30,35

^FX Write EPC HEX ^FS
^WT,, , ,1^FD[EPC_HEX]^FS

^FX "Ship From" text ^FS
^FO20,15^A0N,18,,^FDSHIP FROM:^FS
^FO20,40^A0N,26,,^FDacme^FS
^FO20,65^A0N,26,,^FDCorporation^FS
^FO20,90^A0N,26,,^FDP.O. Box 61900^FS
^FO20,115^A0N,26,,^FDDallas, TX 75261^FS

^FX Draw vertical line ^FS
^FO300,0^GB0,180,2^FS
```

^FX "Ship to" text ^FS
^FO320,15^A0N,18,,^FDSHIP TO:^FS
^FO320,40^A0N,26,,^FDRetailer Distribution Center^FS
^FO320,65^A0N,26,,^FD200 Main Street^FS
^FO320,90^A0N,26,,^FDSpringfield, MA01103^FS

^FX Draw horizontal line ^FS
^FO0,180^GB720,0,4^FS

^FX Postal code text ^FS
^FO20,195^A0N,18,,^FDSHIP TO POSTAL CODE:^FS
^FO30,275^A0N,32,,^BC,90,,Y,^FD(420) 01103^FS

^FX Draw vertical line ^FS
^FO340,180^GB0,270,2^FS

^FX Carrier text ^FS
^FO360,195^A0N,18,,^FDCARRIER:^FS
^FO360,245^A0N,36,,^FDAcme Freightways^FS
^FO360,295^A0N,30,,^FDPRO: 1234^FS
^FO360,345^A0N,30,,^FDB/L: 5678^FS

^FX Draw horizontal line ^FS
^FO0,450^GB720,0,4^FS

^FX EPC text ^FS
^FO0,465^A0N,32,,^FDEPC:^FS
^FO20,575^A0N,32,,^FD[EPC_TAG_URI]^FS

^FX Draw horizontal line ^FS
^FO0,670^GB720,0,4^FS

```

^FX SKU text ^FS
^FO0,685^A0N,32,,^FDSKU:^FS
^FO15,724^A0N,36,,^FDABC21270^FS

```

```

^FX Draw hoarizontal line ^FS
^FO0,785^GB720,0,4^FS

```

```

^FX GTIN text ^FS
^FO0,800^A0N,32,,^FDGTIN^FS
^FO100,890^A0N,32,,^BC,90,,Y,^FD>; (01) 10036000212706 ^FS
^XZ

```

If the user wishes to print a specified EPC value on the smart label, the user-supplied ZPL must include special substitution strings, indicating in what representation the tag values are to be printed.

RFTagAware recognizes the following substitution string values:

[EPC_HEX]	Will be replaced by the hexadecimal representation of the tag value.
[EPC_ID_URI]	Will be replaced by the pure identity URN representation of the tag value.
[EPC_TAG_URI]	Will be replaced by the tag URN representation of the tag value.

Example:

```

^XA
^FO20,575^A0N,32,,^FD[EPC_TAG_URI]^FS
^XZ

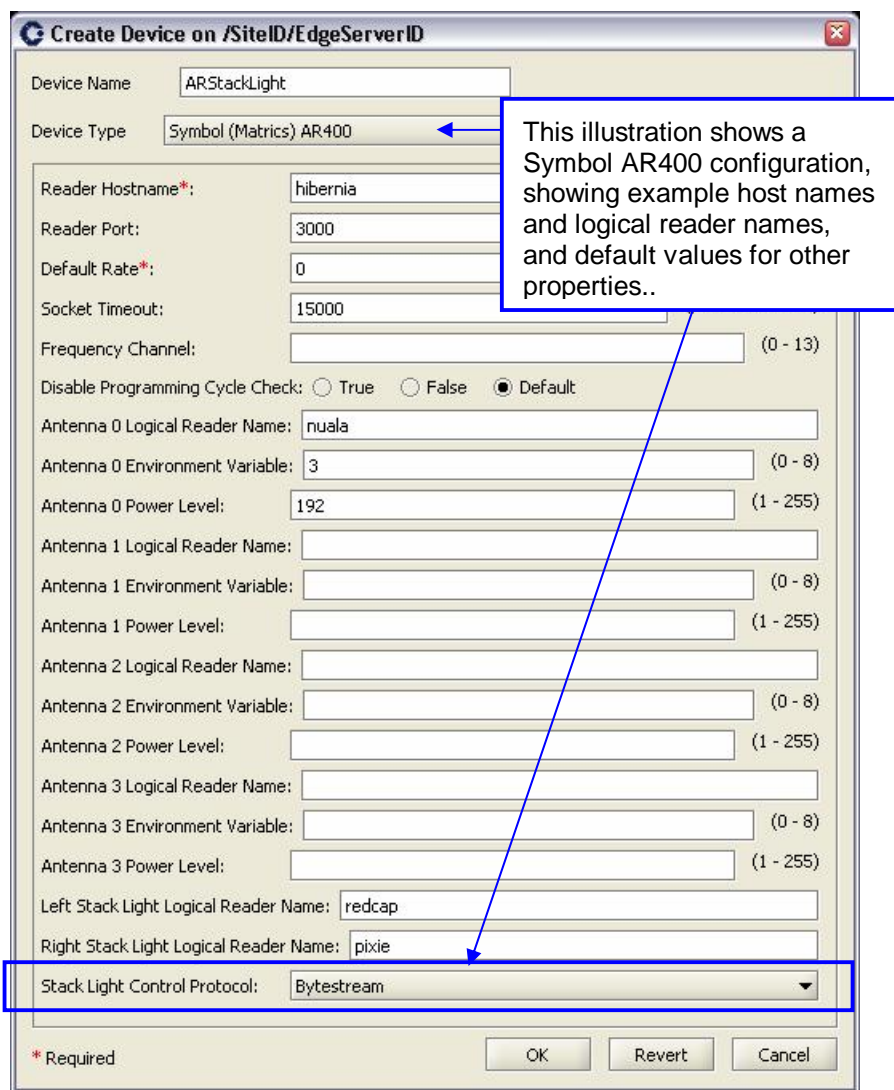
```

Appendix A: Using the ALEPC API for Stack Light Control

A stack light is a device containing up to five signaling lights that can be attached to an RFID device. RFTagAware supports multi-color stack light configuration for the following devices: Symbol AR400, Symbol XR400, and Alien ALR-9780.

Stack Light Configuration

Each stack light to be used is assigned a Logical Reader Name during reader configuration (much like an antenna). Other properties may be filled in as needed.



Stack Light Control

Stack light control is accomplished by writing a special EPC value to the logical reader representing a stack light. The EPC is represented by the URI:

```
urn:connecterra:stacklight:update=<update value>
```

The *update value* consists of five hexadecimal digits. Each digit sets the display on one of the five supported colors (from most significant to least significant): White, Blue, Green, Amber, and Red. Each digit can be one of the following values:

- 0 = turns the color off
- 1-8 = turns the color on for 5 seconds times the value shown
- 9 = turns the color on indefinitely, until a different value is written
- F = does not change the current state

Values of A-E are reserved for future use.

If the update value written to the logical reader has more than five digits, the rightmost five digits are read to set the stack light colors (*e.g.*, 88880000 is read as 80000). If the update value has less than five digits, the number is padded with zeroes on the left before the value is sent to the logical reader (*e.g.*, FF0 is read as 00FF0).

Example Value: A URI of `urn:connecterra:stacklight:update=092F0` written to a stack light configured as described above will perform the following actions on the stack light:

- 0 – turns off the White light
- 9 – turns on the Blue light indefinitely, until next update
- 2 – turns on the Green light for 10 seconds
- F – leaves the Amber light unchanged
- 0 – turns off the Red light

Example API call: An example of an API call would look like this:

```
// This is a code fragment
ALEPC alePCClient = new AxisALEPCClient(<ALEPC Service URL>);
ALEPCFactory alePCFactory = AxisALEPCFactory.getInstance();
PCSpec pcSpec = alePCFactory.createPCSpec();
pcSpec.addLogicalReaderName("LSL");
alePCClient.immediate(
    pcSpec, new URI("urn:connecterra:stacklight:update=092F0"));
```

Appendix B: Controlling RFID Devices Using PLCs

RFTagAware allows you to receive information about other devices and control them, by communicating with a programmable logic controller (PLC), which is a specialized industrial computer used for automation of real-world processes. A programmable logic controller has a number of registers, which are used to hold information. Registers are sometimes referred to as items or tags (not to be confused with EPC tags). Applications interacting with the PLC can either:

- read the contents of one or more registers (referred to as *inbound messages*) and take action based on the value(s) read, or
- write information to one or more registers to make it available to other applications (referred to as *outbound messages*).

Configuring RFTagAware to enable PLC communications requires adding the following items to `RFTA-HOME\etc\edge.props`:

- One or more *transports*, which specify the underlying mechanism used to send messages and the location to which messages should be sent. There may be other configuration options specific to the transport chosen. The available implementations are `OPC_XML`, `StarThis`, and `ModBus`.
- One or more *message conventions*, which must correspond to the conventions expected by the PLC that RFTagAware communicates with. The conventions supported are `Simple` and `CounterPair`. Multiple messages can use the same message convention.
- One or more *messages*, which specify the tag(s) or item(s) on the PLC to read from or write to, and the value(s) to be written. The same message can be sent for multiple events. The messages supported are `inboundMessage` and `outboundMessage`.

In general, customers that would like to enable their installation of RFTagAware to control RFID devices using programmable logic controllers will need some custom development effort. The instructions provided below illustrate one possible configuration of RFTagAware after custom development work has been completed. Please contact your account representative if you would like more information on customization options.

Note: All property names shown in this section should be prefixed with `com.connecterra.ale.plc`, which is abbreviated [`CCAP`] in the properties below.

1. Create a backup copy of `RFTA-HOME\etc\edge.props` and open the original for editing.
2. Define a transport to be used for PLC communications. The supported implementations are `OPC_XML`, `StarThis`, and `ModBus`.

```
# ModBus configuration
[CCAP].plcTransport.modbus1.metaName = ModBus
[CCAP].plcTransport.modbus1.hostname = 10.40.10.157
[CCAP].plcTransport.modbus1.socketTimeout = 10000
[CCAP].plcTransport.modbus1.pollInterval = 500
```



```

# OPC_XML configuration
[CCAP].plcTransport.opcABC.metaName = OPC_XML
[CCAP].plcTransport.opcABC.hostname = http://plchost/path

# StarThis configuration
[CCAP].plcTransport.ab1756.metaName = StarThis
[CCAP].plcTransport.ab1756.licenseDir = ..\licenses
[CCAP].plcTransport.ab1756.storageDir = ..\var\plc-storage
[CCAP].plcTransport.ab1756.hostname = ab1756
[CCAP].plcTransport.ab1756.backplanePort = 0
[CCAP].plcTransport.ab1756.pollInterval = 50

```

3. Choose a message convention. The types supported are Simple and CounterPair. The notations <var1> and <var2> should be replaced by property names that you choose.

```

# SimpleTransaction configuration
[CCAP].plcMessageConvention.<var1>.metaName = Simple
# The plcTransport name shown below should be a hostname from step 2.
[CCAP].plcMessageConvention.<var1>.plcTransport = ab1756

# CounterPairTransaction configuration
[CCAP].plcMessageConvention.<var2>.metaName = CounterPair
# The plcTransport name shown below should be a hostname from step 2.
[CCAP].plcMessageConvention.<var2>.plcTransport = ab1756
[CCAP].plcMessageConvention.<var2>.restart.receiveCounterItem = PLCRestart[2]
[CCAP].plcMessageConvention.<var2>.restart.ackCounterItem = PLCRestartAck[2]
[CCAP].plcMessageConvention.<var2>.restart.dataItems = PLCRestart[0]
[CCAP].plcMessageConvention.<var2>.restart.prefetch = true
# Configure the next two properties on ONE client only
[CCAP].plcMessageConvention.<var2>.restartAckStatusItem = PLCRestartAck[0]
[CCAP].plcMessageConvention.<var2>.restartDelay = 100

```

Note: The array elements shown above and in step 4 refer to PLC registers on the PLCs in use at your organization. Both the register names and element numbers may differ from the sample information shown.

4. Define the inbound and outbound messages for the message convention chosen in the prior step. The notations <var1> and <var2> should be replaced by the property names you chose in step 3.

```

# Simple inboundMessage configuration
[CCAP].inboundMessage.doorOpen.plcMessageConvention = <var1>
[CCAP].inboundMessage.doorOpen.receiveItem = D2052
[CCAP].inboundMessage.doorOpen.matchValues = true

# CounterPair inboundMessage configuration
[CCAP].inboundMessage.BCRArrival.plcMessageConvention = <var2>
[CCAP].inboundMessage.BCRArrival.sendCounterItem = BCRArrival[19]

```

```
[CCAP].inboundMessage.BCRArrival.ackCounterItem = BCRArrivalAck[0]
[CCAP].inboundMessage.BCRArrival.dataItems = BCRArrival

# CounterPair outboundMessage configuration
[CCAP].outboundMessage.SgtinAssign.plcMessageConvention = <var2>
[CCAP].outboundMessage.SgtinAssign.sendCounterItem = SgtinAssign[59]
[CCAP].outboundMessage.SgtinAssign.ackCounterItem = SGTINAssignAck[0]
[CCAP].outboundMessage.SgtinAssign.dataItems = SgtinAssign
```

5. Save the changes to `edge.props`, and restart the Edge Server.
6. Configure your RFID devices to communicate with the PLC by defining devices as shown below using the RFID Devices node on the Administration Console:
 - **Device Type:** PLC-Connected Barcode Reader
 - Logical Reader Name:** <a reader name you choose>
 - Inbound PLC Message Name:** <the name of the `inboundMessage` carrying the bar code, e.g., `BCRArrival` in step 4>
 - **Device Type:** PLC-Connected Label Print & Apply
 - Logical Reader Name:** <a reader name you choose>
 - Outbound PLC Message Name:** <the name of the `outboundMessage`, e.g., `SgtinAssign` in step 4>