



# *ASPIRE Tools and IDE*

**Athens Information Technology**





# ASPIRE Tools

- ASPIRE has developed
  - A number of tools easing the development and configuration of RFID solutions
  - The tools are integrated in a single IDE for RFID solutions that can be added or removed as needed (plug-ins)





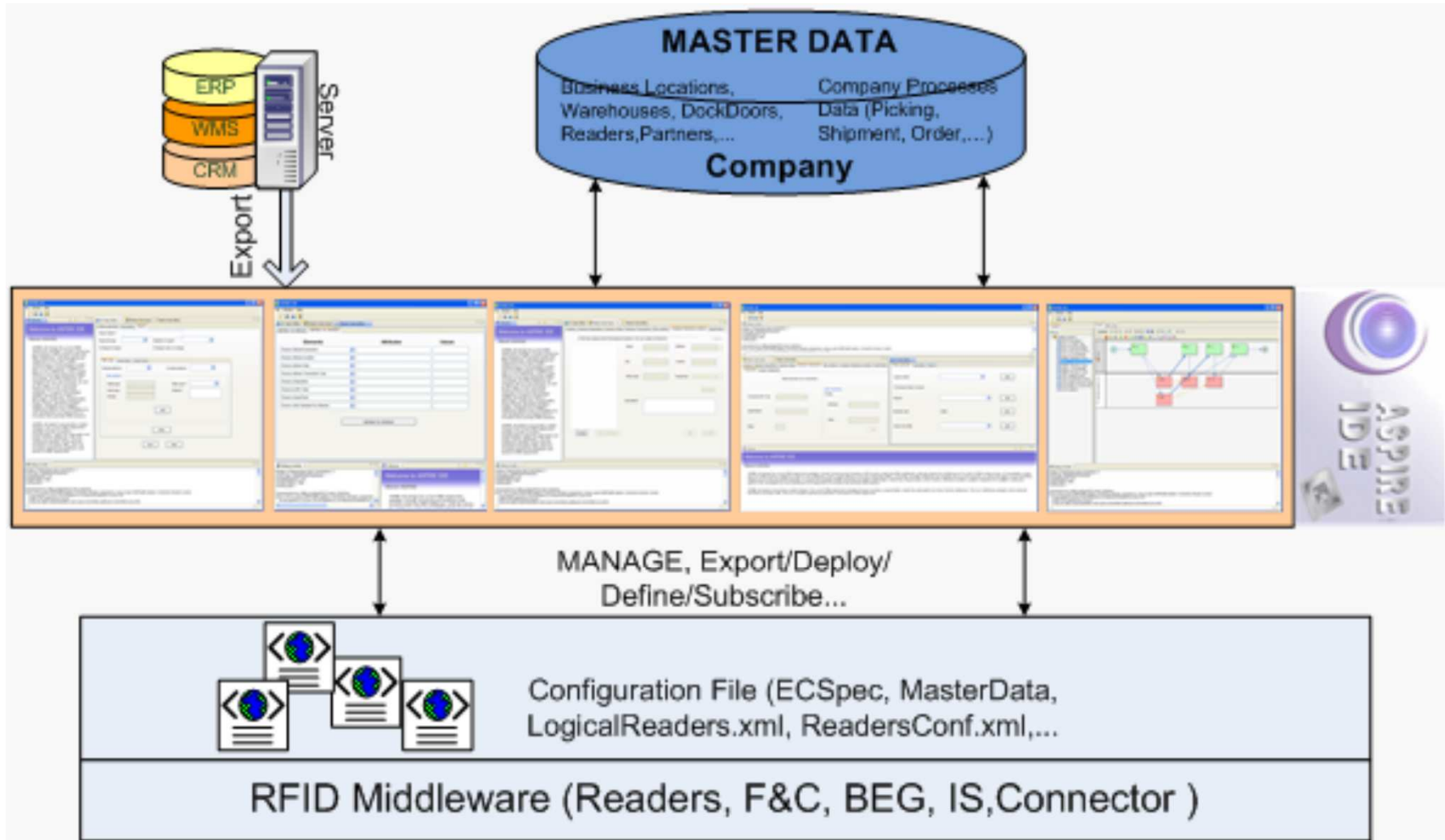
# ASPIRE IDE

- Based on Eclipse RCP architecture
- Open and Extensible
- Versatile/Customizable to different needs and solutions
  - E.g., It can host from one-to-many tools
- The “Housing” for Integrating the various tools (plug-ins)





# ASPIRE IDE Tools







# ASPIRE IDE Tools

- ASPIRE IDE Management/Configuration Console
- Physical Reader Configuration Editor
- LR Spec Configurator
- Logical Reader Editor
- EC Spec Configurator
- EC Spec Editor
- ALE Configurator
- BEG Configurator
- Master Data Editor
- Business Process Workflow Editor
- Connector Editor/Configurator
- Debugging Capabilities





# ASPIRE IDE Management Console (1)

- Based on JMX
  - Displays the current status of the *Reader Core proxy* component
    - DISCONNECTED
    - STOPPED
    - STARTED
-  Refresh status
-  Start / Stop
  - Starts/stops reader proxy operation



## ASPIRE IDE Management Console (2)

- **Reset configuration**
  - Delete changes to the proxy
  - Restore the default configuration file
- **Download configuration file** / **Upload configuration file**
  - Backup/restore configuration as an XML file
- **Save and load updated configuration**
  - Load changes at runtime





# ASPIRE IDE Management Console (3)

The screenshot displays the ASPIRE RFID IDE Management Console. It is divided into two primary functional areas:

- Configuration Console (Left):** This section is used for setting up the reader. It includes:
  - Reader information:** Fields for Reader Name (IntermecIF5), Reader EPC, Reader manufacturer, Reader manufacturer description, Reader model (ReaderModel:IF5), and Reader role (ReaderRole). An "Update selected" button is located below these fields.
  - Main configuration:** A grid of settings including:
    - TCP connection:  Is enabled?, TCP port: 5566
    - HTTP connection:  Is enabled?, HTTP port: 8000
    - Read cycles per trigger: 1
    - Max read duty cycles: 100
    - Max sources: 100
    - Max tag selector: 10
    - Thread pool size: 16
    - Max triggers: 10
    - Glimpsed timeout: 2000
    - Notification timeout: 30000
    - Observed timeout: 1000
    - Lost timeout: 0
    - Read timeout: 0
    - Observed threshold: 0
  - Buttons for "Save" and "Reset" are at the bottom of this section.
- Management Console (Right):** This section is used to control the reader's operation.
  - Buttons for "Start" and "Stop" are at the top.
  - Buttons for "Save and load updated configuration" and "Reset configuration" are below.
  - The "Current status" is displayed as "STOPPED".
  - A "Refresh status" button is present.
  - Buttons for "Download configuration file" and "Upload configuration file" are at the bottom.
- Console (Bottom):** A window titled "Console" is currently empty, displaying "No consoles to display at this time."

Management Console


Configuration Console








# JMX Configuration Console (1)

- Inputs a valid, operational URL
- Changes are loaded when  button is hit in the Management Console
- Reader Information
  - Identify the reader
  - Reader name is used by the F&C module to identify proxy



# JMX Configuration Console (2)

- Main configuration
  - General purpose parameters
  - Defined in EPCglobal Reader Protocol v1.1
  - Default values should work in most of the cases
- Sources
  - Access a group of read points
  -  new ones



# JMX Configuration Console (3)

- Readers configuration
  - to the configuration
  - for this reader
  - 
  - To edit a reader, first select it from the *Existing Readers* drop-down list



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# Physical Reader Configuration Editor (1)

- Physical Readers Management/Configuration Plug-In
  - Configure and manage physical readers across different vendors and models
  - For use with the AspireRfid Reader Core module
  - User can define reader metadata
    - Name, EPC, manufacturer, description, role





# Physical Reader Configuration Editor (2)

- Physical Readers Manager/Configurator Plug-In
  - Through the JMX Management/Configuration Console
  - Define Technical Characteristics
    - Http or Tcp connection and port
    - Read Cycles per Trigger
    - ...
    - as defined in the EPCglobal Reader Protocol standard





# Physical Reader Configuration Editor (3)

**ASPIRE RFID IDE**

File Edit Window Help

Configuration

**Reader information**

Reader Name: IntermecIF5  
 Reader EPC: ReaderEPC  
 Reader manufacturer: ReaderManufacturer  
 Reader manufacturer description: ReaderManufacturerDescription  
 Reader model: ReaderModel:IF5  
 Reader role: ReaderRole

Update selected

**Main configuration**

TCP connection <input checked="" type="checkbox"/> Is enabled?	Read cycles per trigger: 1	Glimpsed timeout: 2000
TCP port: 5566	Max read duty cycles: 100	Notification timeout: 30000
HTTP connection <input checked="" type="checkbox"/> Is enabled?	Max sources: 100	Observed timeout: 1000
HTTP port: 8000	Max tag selector: 10	Lost timeout: 0
	Thread pool size: 16	Read timeout: 0
	Max triggers: 10	Observed threshold: 0

Save Reset

**Sources**

**Readers configuration**

**Management**

Reader proxy

Start Stop

Save and load updated configuration Reset configuration

Current status: STOPPED

Refresh status

Download configuration file Upload configuration file

Console

No consoles to display at this time.

Configuration Console





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# LR Spec Configurator (1)

- Logical Reader Specifications Configurator Plug-In
  - Create/edit Logical Readers (static, dynamic and composite)
  - Define, subscribe and manage Logical Readers at the ALE level
  - “Hide” from upstream layers the details of how readers are physically configured





# LR Spec Configurator (2)

- Supports
  - Reader Protocol
  - Low Level Reader Protocol
  - Hardware Abstraction Layer
  - Composite readers
- Provides a graphical interface for the EPC-ALE methods





# LR Spec Configurator (3)

Service Name	Input	Info
Define	name : String spec : LRSpec	Creates a new logical reader named name according to spec.
Update	name : String spec : LRSpec	Changes the definition of the logical reader named name to match the specification in the spec parameter.
Undefine	name : String	Removes the logical reader named name.
AddReaders	name : String readers : List<String>	Adds the specified logical readers to the list of component readers for the composite logical reader named name
SetReaders	name : String readers : List<String>	Changes the list of component readers for the composite logical reader named name to the specified list.
RemoveReaders	name : String readers : List<String>	Removes the specified logical readers from the list of component readers for the composite logical reader named name
SetProperties	name : String properties : List<LRProperty>	Changes properties for the logical reader named name to the specified list





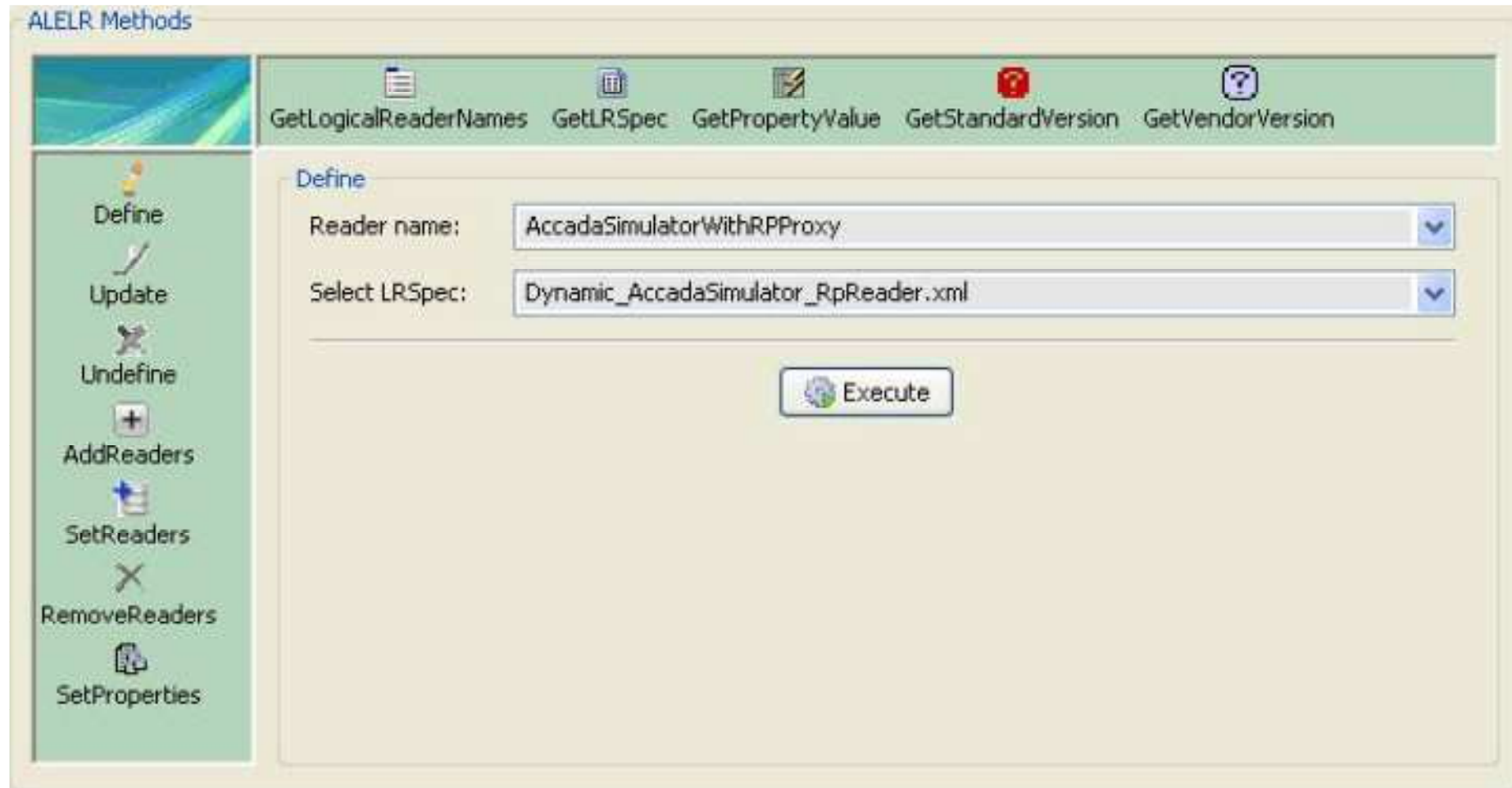
# LR Spec Configurator (4)

Service Name	Input	Info
getLogicalReaderNames	-	Returns an unordered list of the names of all logical readers that are visible to the caller
getLRSpec	name : String	Returns an LRSpec that describes the logical reader named name
getPropertyValue	name : String propertyName : String	Returns the current value of the specified property for the specified reader, or null if the specified reader does not have a property with the specified name
getStandardVersion	-	Returns a string that identifies what version of the specification this implementation of the ALE Logical Reader API complies with
getVendorVersion	-	Returns a string that identifies what vendor extensions of the ALE Logical Reader API this implementation provides





# LR Spec Configurator (5)





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# Logical Reader Editor (1)

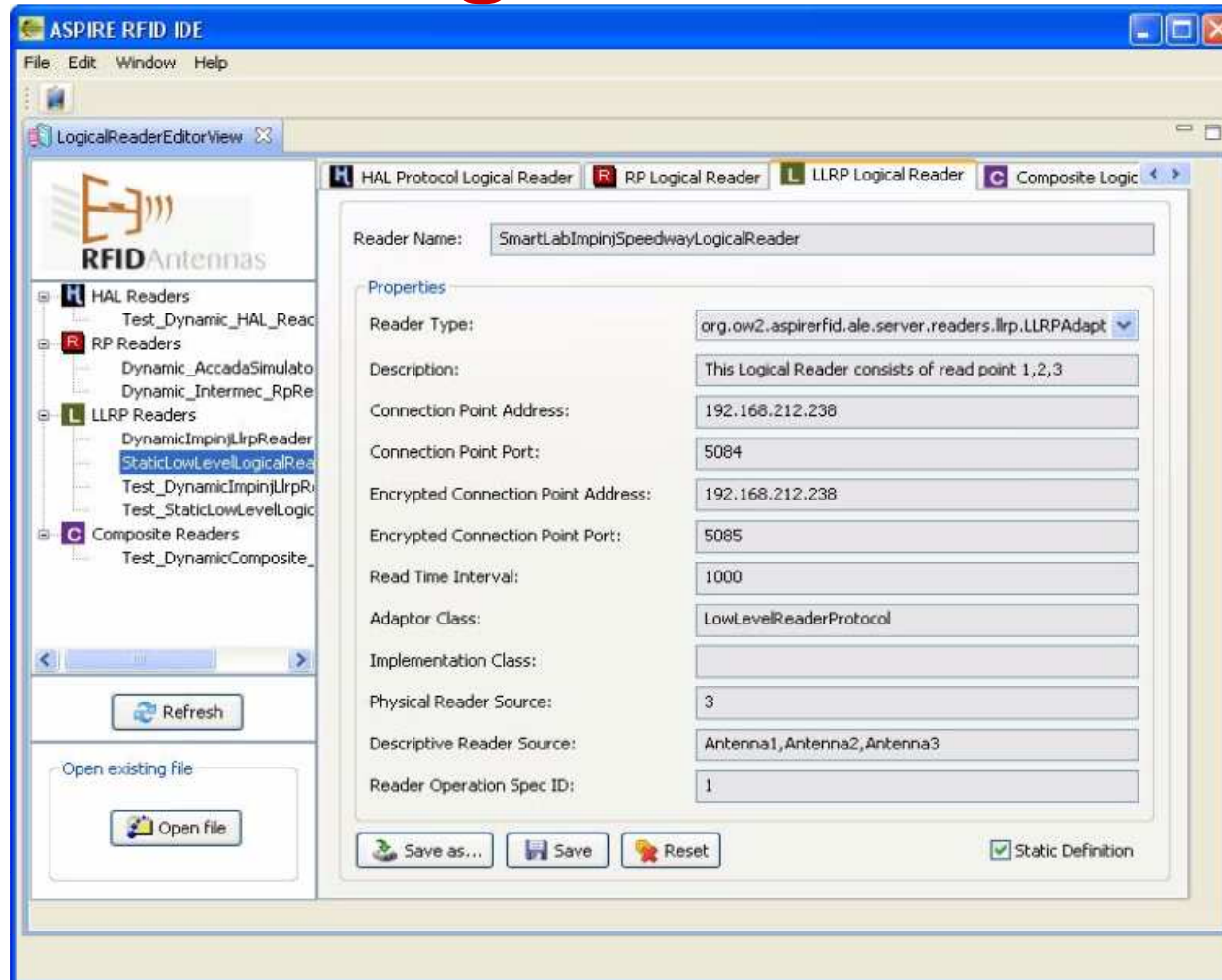
- Configure Logical Readers through
  - Hardware Abstraction Layer (HAL)
  - Reader Protocol (RP)
  - Low Level Reader Protocol (LLRP)
  - Composite





# Logical Reader Editor (2)

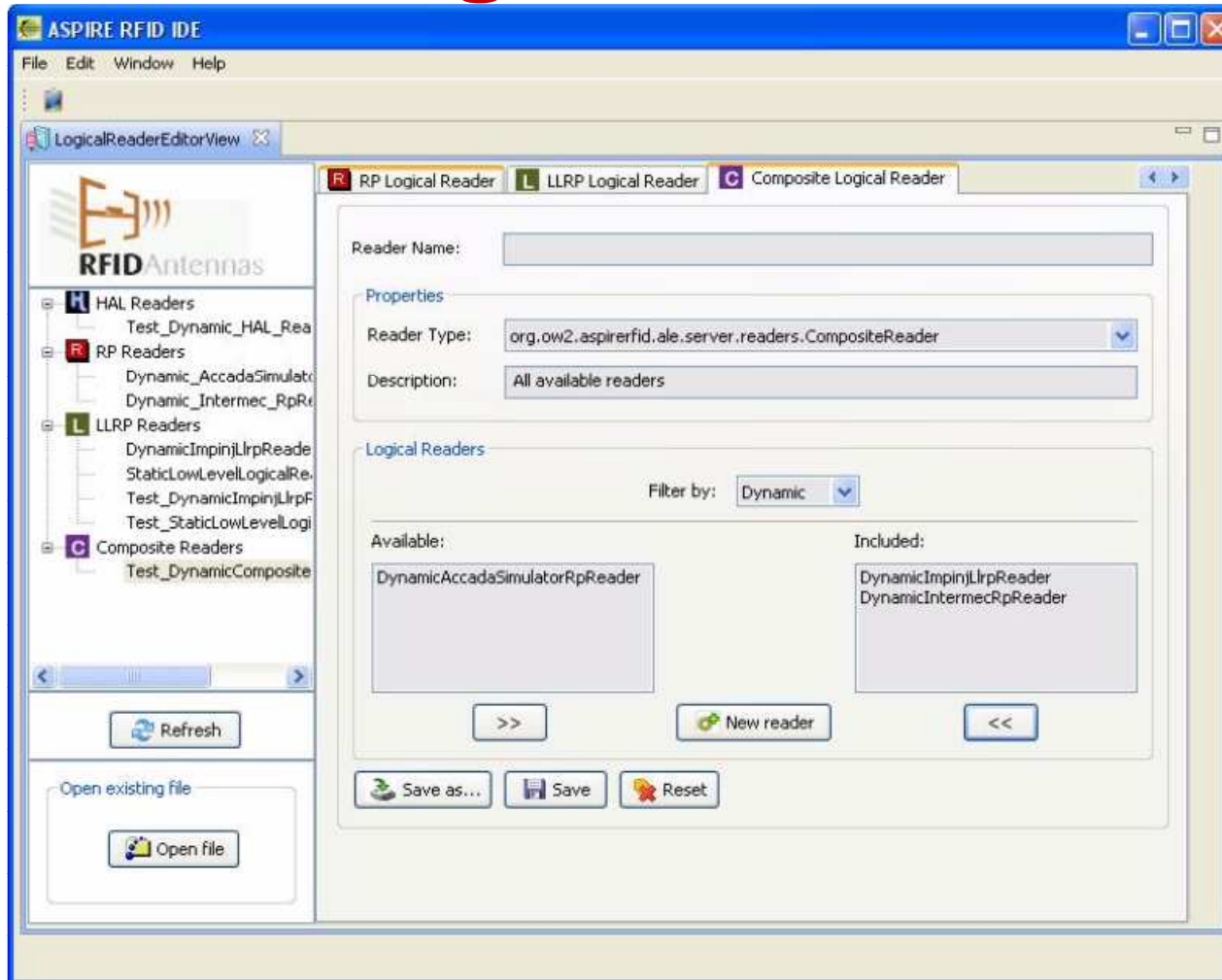
- LLRP-compliant Logical Reader configuration





# Logical Reader Editor (3)

- Composite Logical Reader configuration





# Configure LR Spec Editor (1)

- Full Control over LR Spec Editor parameters
- EC Specs Directory
  - EC Specs configure the server's filtering function
- LR Specs can be static or dynamic





# Configure LR Spec Editor (2)

- HAL LR Specs Directory
  - HAL readers specifications
- RP LR Specs Directory
  - RP LR readers specifications
- LLRP LR Specs Directory
  - LLRP readers specifications





# Configure LR Spec Editor (3)

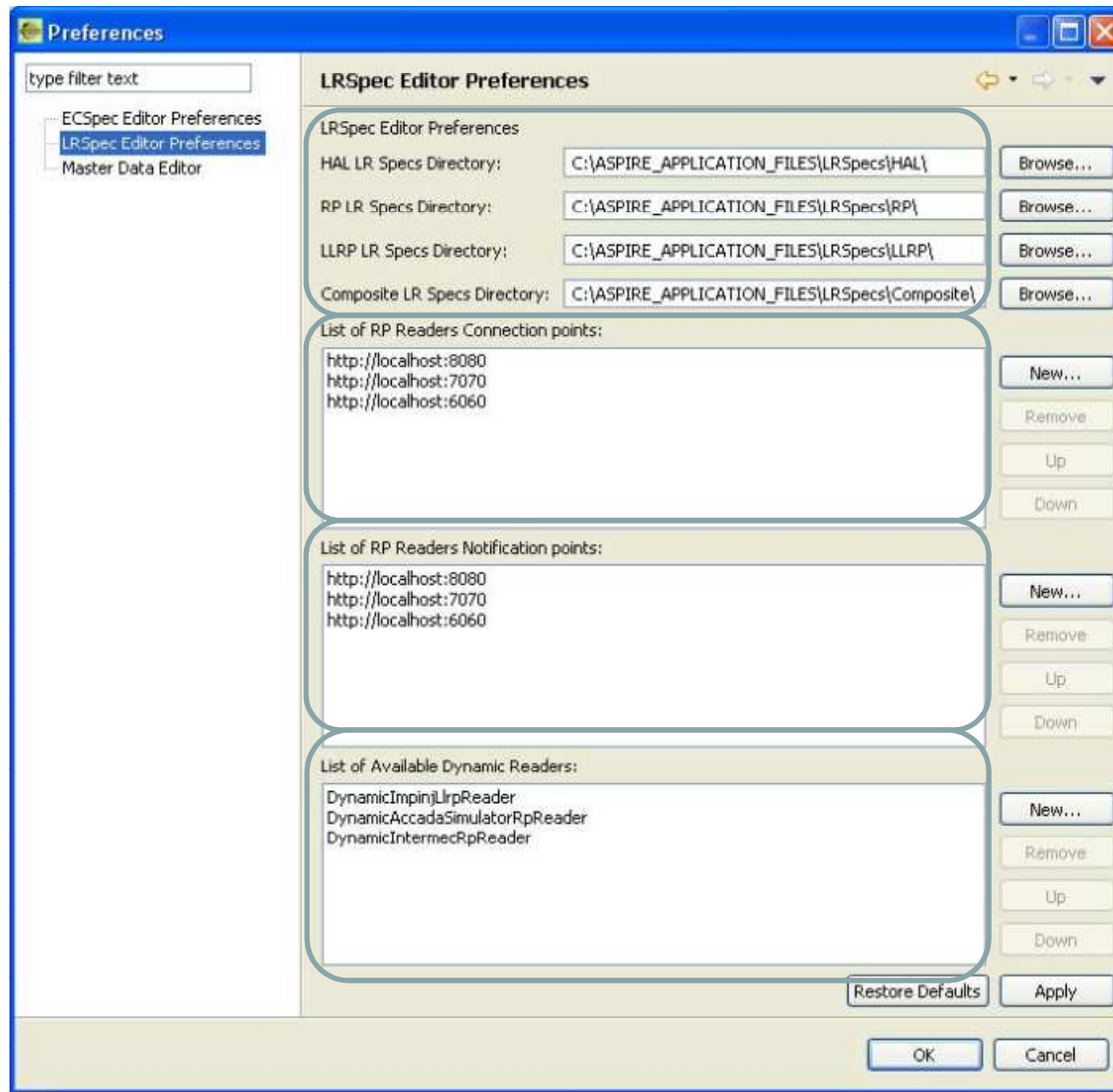
- RP Readers Connection points list
- RP Readers Notification Points list
- Available Dynamic Readers list
  - Easing configuration effort
    - Drop-down Lists available in the LR Spec Editor







# Configure LR Spec Editor (4)



Specs directories

Connection URIs

Notification URIs

Available Readers





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# EC Spec Configurator (1)

- ECSpec Configurator Plug-in
  - Create/edit specifications for collecting and filtering data
    - In a generic fashion (EPC-ALE V1.1 ECSpec compatible)
  - Define, Subscribe and Manage the Filtering specifications at the ALE level





# EC Spec Configurator (2)

Service Name	Input	Info
define	specName : String spec : ECSpec	Creates a new ECSpec having the name specName, according to spec
undefine	specName : String	Removes the ECSpec named specName that was previously created by the define method
subscribe	specName : String notificationURI : String	Adds a subscriber having the specified notificationURI to the set of current subscribers of the ECSpec named specName
unsubscribe	specName : String notificationURI : String	Removes a subscriber having the specified notificationURI from the set of current subscribers of the ECSpec named specName
poll	specName : String	Requests an activation of the ECSpec named specName, returning the results from the next event cycle to complete
immediate	spec : ECSpec	Creates an unnamed ECSpec according to spec, and immediately requests its activation





# EC Spec Configurator (3)

Service Name	Input	Info
getECSpec	specName : String	Returns the ECSpec that was provided when the ECSpec named specName was created by the define method
getECSpecNames	-	Returns an unordered list of the names of all ECSpecs that are visible to the caller
getSubscribers	specName : String	Returns an unordered list of the notification URIs corresponding to each of the current subscribers for the ECSpec named specName
getStandardVersion	-	Returns the version of the specification that this Reading API implementation complies with
getVendorVersion	-	Returns a string that identifies what vendor extensions this implementation of the Reading API provides





# EC Spec Configurator (4)

ALE Methods

GetECSpec GetSubscribers GetECSpecNames GetVendorVersion GetStandardVersion

Define

Spec Name: WarehouseAleDemoEcspec

Select ECSpec: ECSpec\_AccadaSimulator\_WarehouseAleDeliveryCounterDemo.xml

Execute

Define

Unsubscribe

Subscribe

Unsubscribe

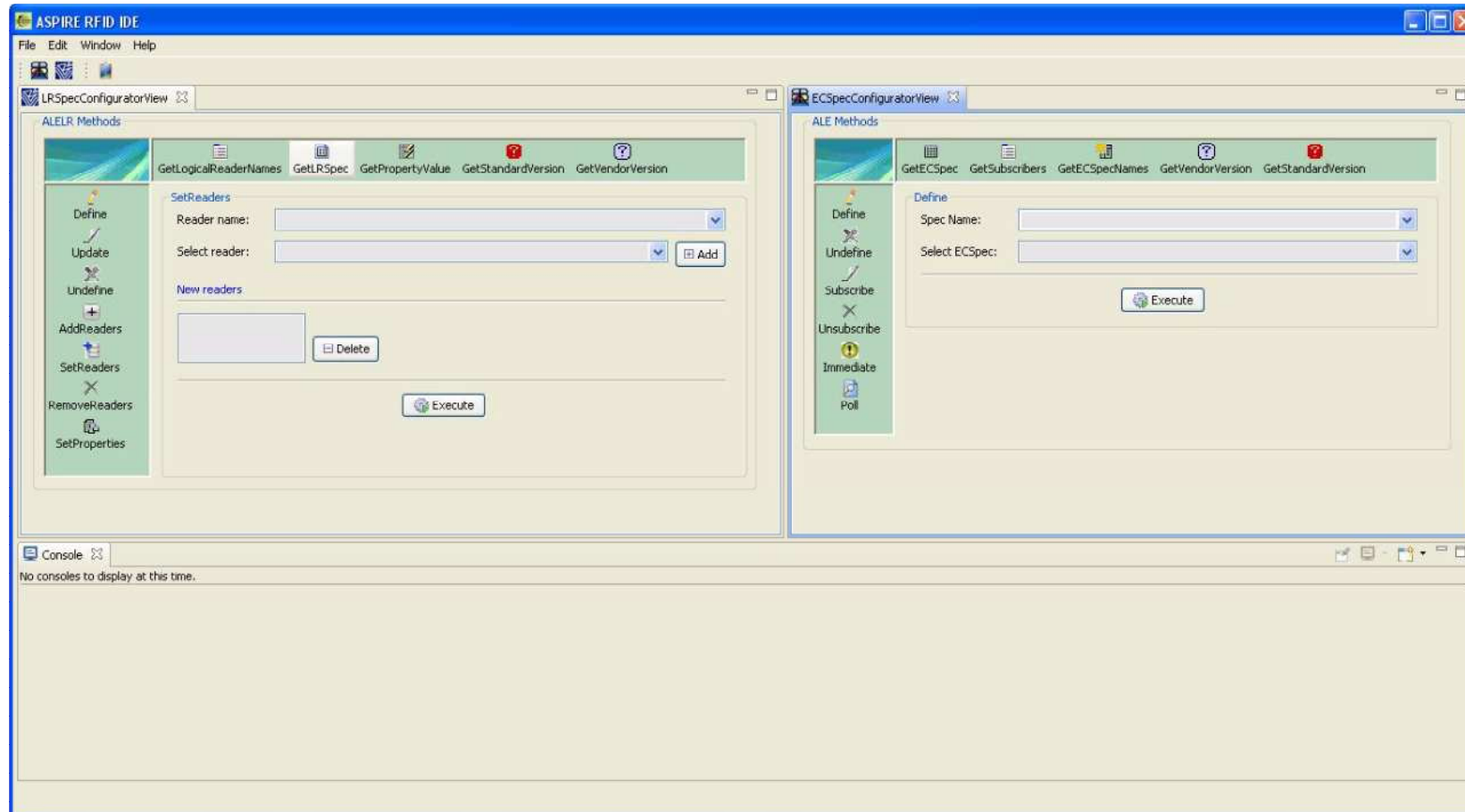
Immediate

Poll

Undefine



# EC Spec Configurator (5)



- In combination with LR Spec Configurator offers full control over the ALE server



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# EC Spec Editor (1)

ASPIRE RFID IDE

File Edit Window Help

Logical Readers included in the EC Spec

EC • spec

ECSpecs

- ECSpec\_AccadaSimulator\_AI
- ECSpec\_AccadaSimulator\_Ac
- ECSpec\_AccadaSimulator\_CI
- ECSpec\_AccadaSimulator\_Dv
- ECSpec\_AccadaSimulator\_Ol
- ECSpec\_Impinj\_ADDITIONS\_
- ECSpec\_Impinj\_Aggregation
- ECSpec\_Impinj\_CURRENT\_F
- ECSpec\_Impinj\_DELETIONS\_
- ECSpec\_Impinj\_ObjectEvent
- ECSpec\_Intermec\_ADDITIO
- ECSpec\_Intermec\_Aggregat
- ECSpec\_Intermec\_CURRENT
- ECSpec\_Intermec\_DELETIO
- ECSpec\_Intermec\_ObjectEv
- Test\_ECSpec\_AccadaSimulat
- Test\_ECSpec\_Impinj\_Aggreg
- Test\_ECSpec\_Intermec\_Agg

Logical readers:

Available:

- Test\_Dynamic\_HAL\_Reader
- AccadaSimulatorWithRFPProxy

Included:

- SmartLabImpinjSpeedwayLogicalReader

>> New reader <<<

boundarySpec reportSpec

Report name: bizTransactionIDs\_1234 Report set: CURRENT

filterSpec groupSpec reportOutputSpec

Include patterns: Add Exclude patterns: Add

Include patterns list Exclude patterns list

- urn:epc:pat:gid-96:145:12:\* Update Delete
- urn:epc:pat:gid-96:239:30,\* Update Delete

Report If Empty  Report Only On Change

Add report Reset report

Reports List

- bizTransactionIDs\_1234 Update Delete
- transactionItems\_1234

Include Spec In Report

Save as... Save Reset

Refresh

Open existing file

Open file

- Edit the event cycle specifications and corresponding reports



# EC Spec Editor (2)

boundarySpec reportSpec

Start trigger:   Stop trigger:

Start trigger list

Stop trigger list

Repeat period

Value (ms):

Duration

Value (ms):

Stable set interval

Value (ms):

When Data Available

Include Spec In Report

- Define Event Cycle boundaries
  - Period
  - Duration
  - Interval



# EC Spec Editor (3)

- Define ECReport-related information
  - Filter specific EPCs



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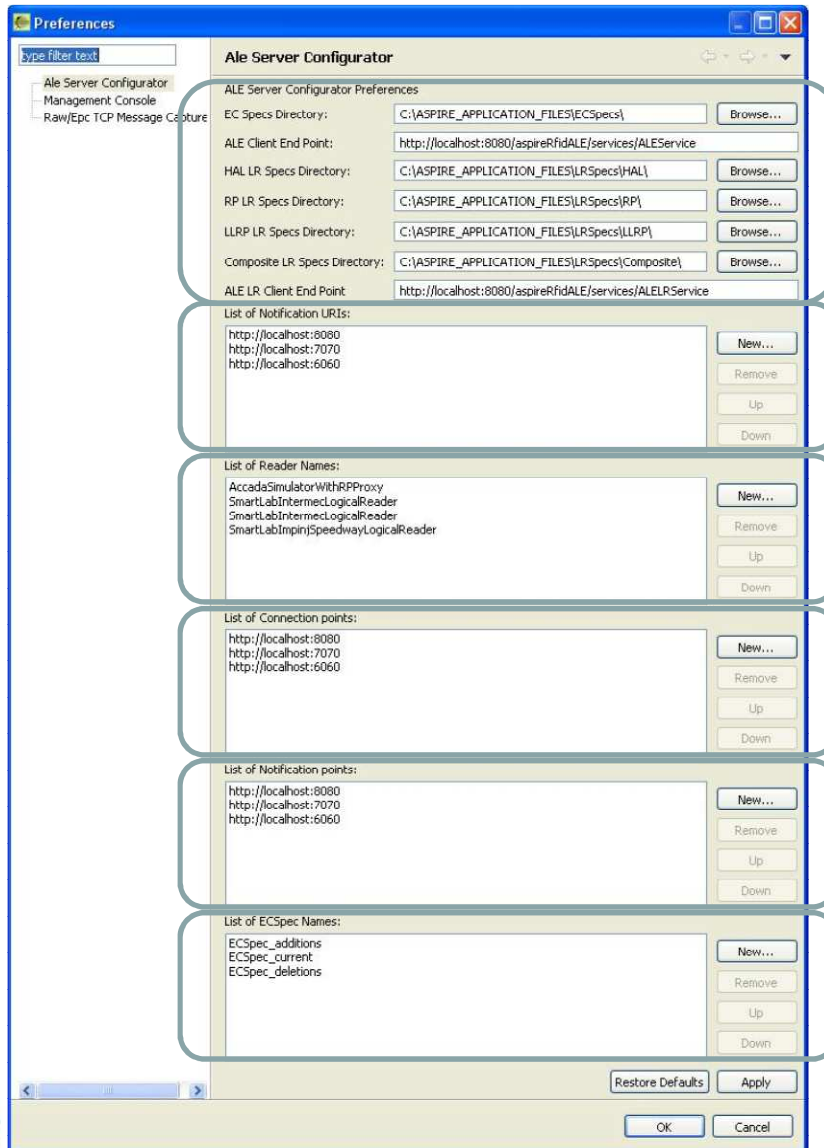
# ALE Server Configurator (1)

- You can configure
  - EC Specs Directory
  - ALE Client EndPoint
  - LR Specs Directory
  - ALE LR Client EndPoint





# ALE Server Configurator (2)



Specifications directories,  
client end points

Notification URIs

Reader names

Connector points

Notification points

EC Spec names







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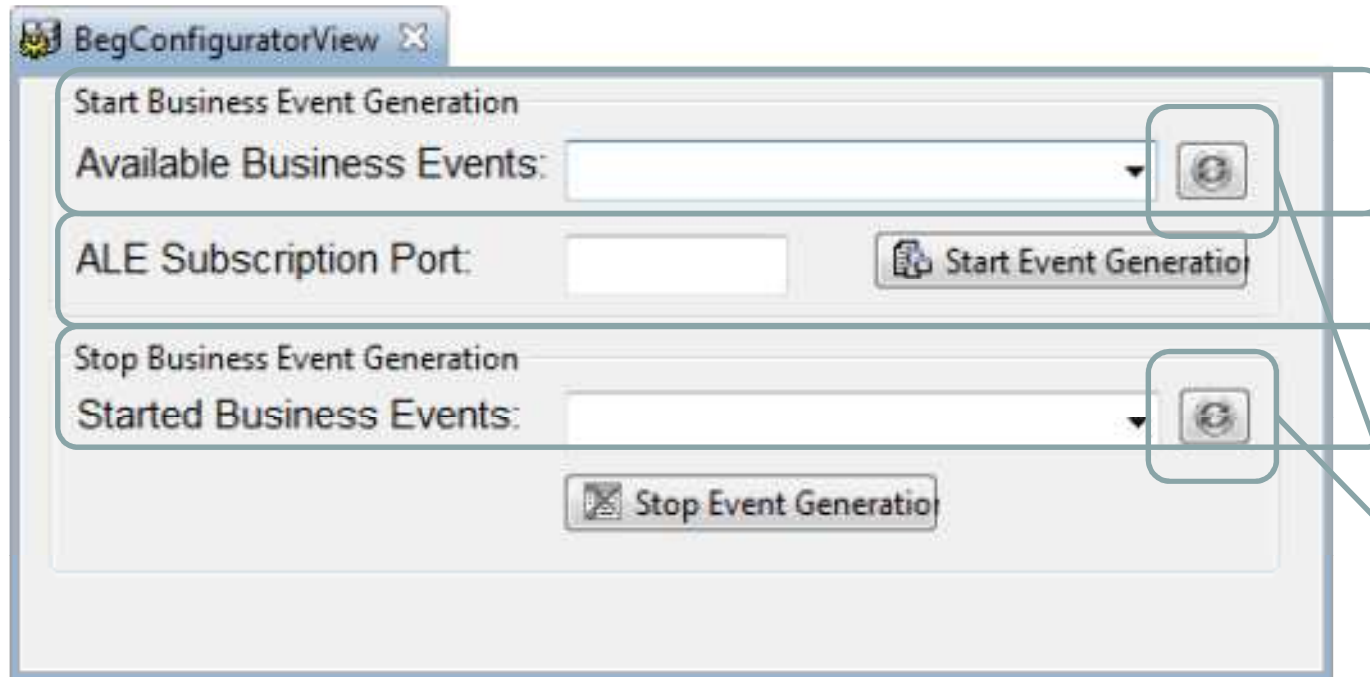
# BEG Configurator (1)

- Business Event Generator Observation and Configurator Plug-In
  - Associate ALE reports with Business Events
  - Translate ECReports to EPCIS events
  - Trigger mechanisms for transforming tag streams using business semantics





# BEG Configurator (2)



Events Defined in the ALE Server

ALE Server's port

Events being monitored

Refresh buttons



# BEG Observation View

Refresh button

Event Observed  
Choose Event to Observe: urn:epcglobal:fmcg:bte:acmewarehouse [dropdown] [refresh]

Business Step Observation Events currently being served

Transaction ID: [input]

Tag ID

- Ability to monitor/capture specific business events in real-time





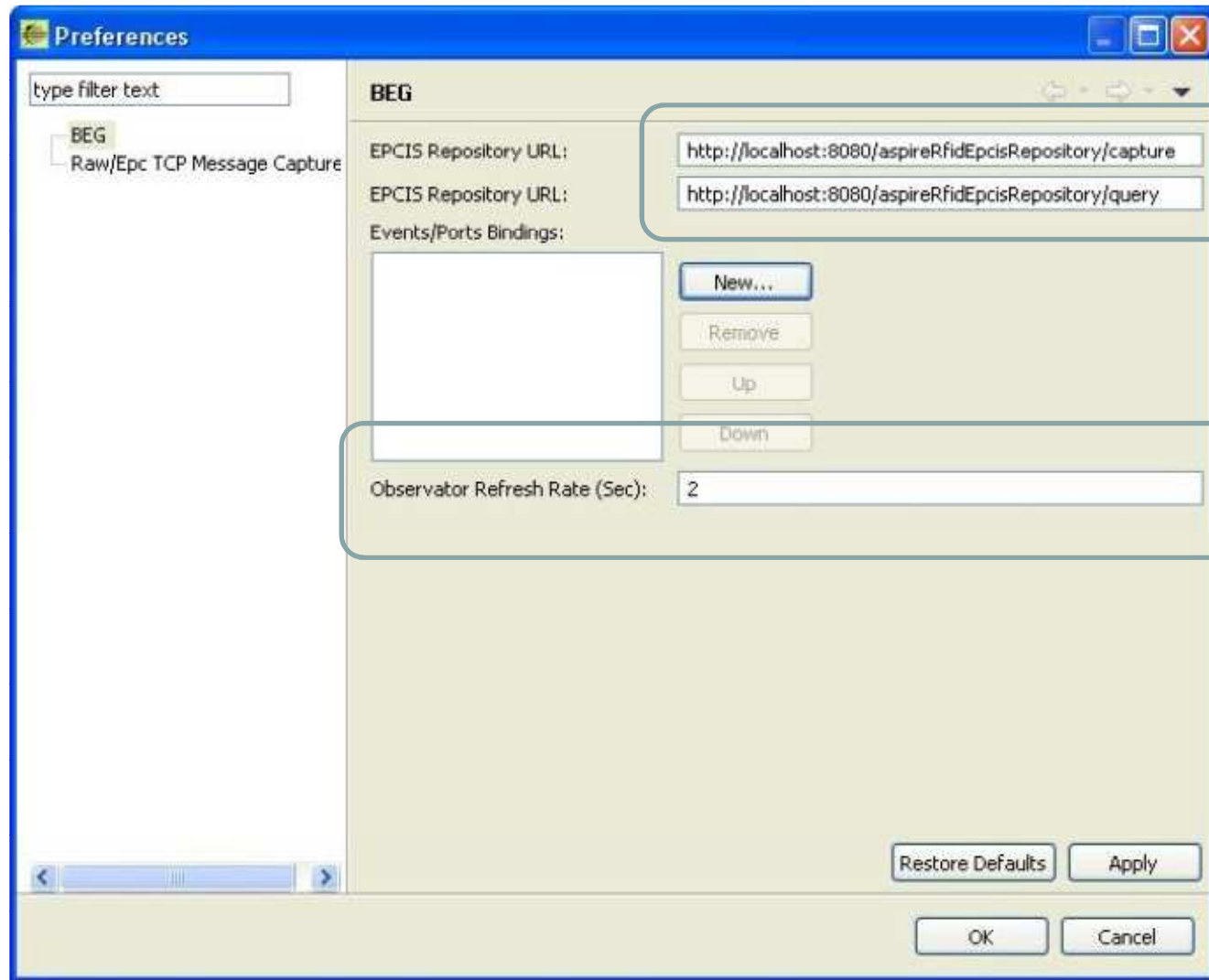
# BEG Preferences (1)

- EPCIS Repository Capture End Point
  - End Point accepting connections for the Capture interface
- EPCIS Repository Query End Point
  - End Point accepting connections for the Query interface
- Observation View Refresh Rate
  - In seconds





# BEG Preferences (2)



EPCIS  
Capture/Query  
Interfaces

Refresh rate



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# Master Data Editor (1)

- Master Data Editor Plug-In
  - Allows editing of
    - Company warehouses and Containers
    - Locations
    - Readpoints
  - Also, data associated with business transactions
    - Business steps
    - Disposition states
    - Transaction types







# Master Data Editor (2)

Business Dispositions Transactions Locations Business Steps Read Points Business Transaction Type

Enter all the possible states that the products can enter after a business transaction

Element Data (URI/Alias)

Business Disposition Tag:

Name:

Attributes-Values

Attribute:  Value:

Attribute	Value

Existing Element List

Search

Search functionality

- Define
  - Tag names
  - Associated key-value pairs



# Master Data Editor (3)

Business Dispositions Transactions Locations Business Steps Read Points Business Transaction Type

**Processes**

Transactions

Element Data (URI/Alias)

Uri:  Name:

Attribute-Values

Attribute:  Value:

Attribute	Value

Save Cancel Attribute

Refresh Process List

- Define
  - Transaction names
  - Corresponding URIs
  - Associated Key-Value pairs



# Master Data Editor (4)

- Define
  - Location specific information
    - Active
    - Inactive

Add new attributes

Refresh  
Location List

And new read points





# Master Data Editor (5)

Business Dispositions Transactions Locations Business Steps Read Points Business Transaction Type

Please enter the various business steps

Element Data(URI/Alias)

Business Step Tag:

Name:

Attributes-Values

Attribute  Value

Attribute	Value

Existing Element List

Search

- Define
  - Business Steps information



# Master Data Editor (6)

Business Dispositions Transactions Locations Business Steps Read Points Business Transaction Type

Please insert the information for your readers (tags, attributes)

Element Data (URI/Alias)

Reader Tag:

Logical Name:

Attribute-Values

Attribute  Value:

Attribute	Value

Existing Element List

Search

- Define
  - Read Points information



# Master Data Editor (7)

Business Dispositions Transactions Locations Business Steps Read Points Business Transaction Type

**Please enter the business transaction types**

Element Data (URI/Alias)

Business Type Tag:

Name:

Attribute-Values:

Attribute:  Value:

Attribute	Value

Existing Element List

Search

- Define
  - Business Transaction Types information



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# Business Process Workflow Editor (1)

- Idea
  - Encode system's behavior through a graphical representation
  - Provide a graphical interface for the ASPIRE Programmable Engine\*
  - On-going process (under development)

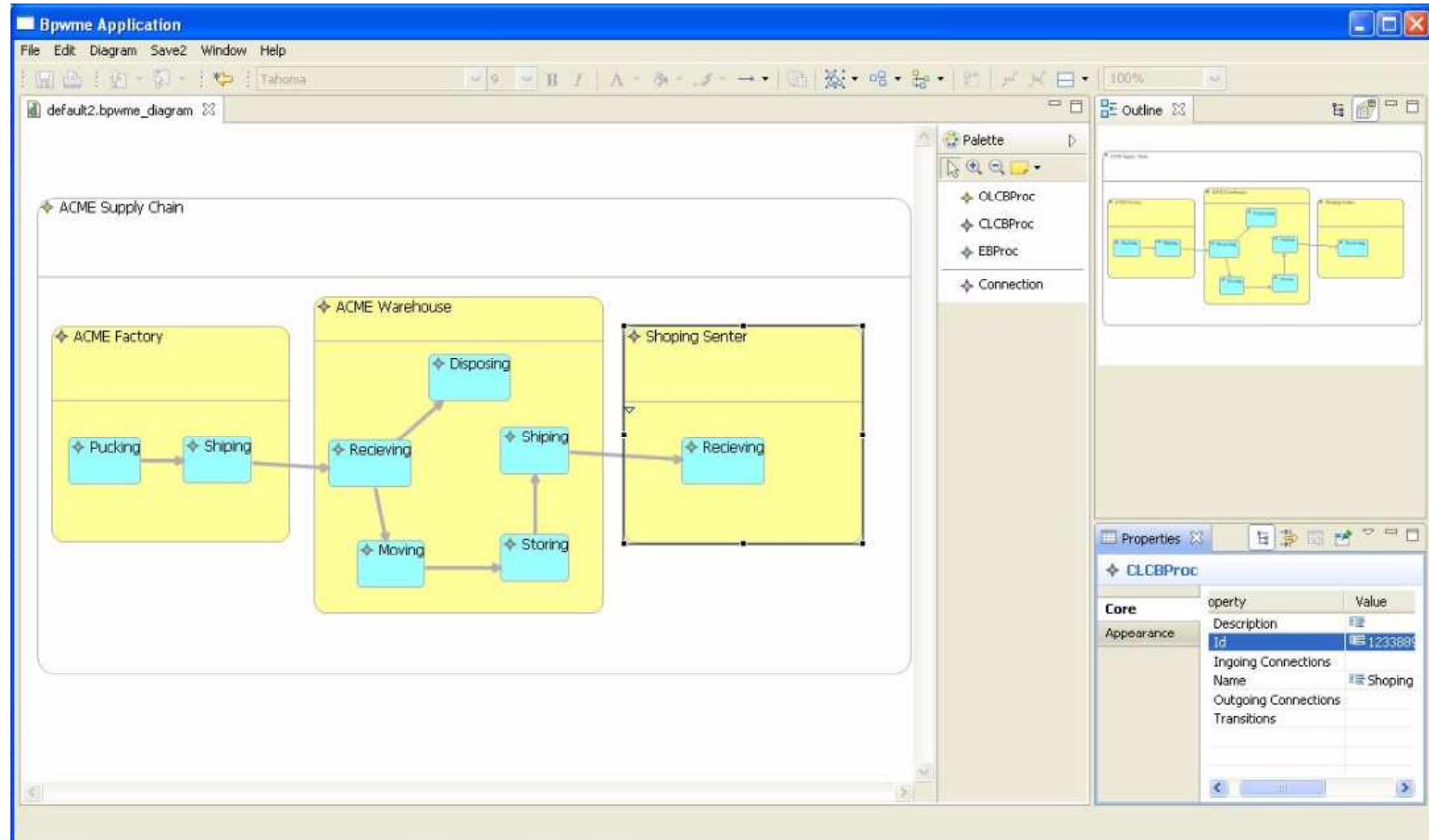


\*see lecture 7: ASPIRE Programmable Language and Engine





# Business Process Workflow Editor (2)





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# Connector Editor/Configurator (1)

- Provides
  - Support for services and events
  - Service abstraction
  - Functionality abstraction
  - Process management





# Connector Editor/Configurator (2)

- Plugin (in-progress) provides
  - Edits/configures adaptors to corporate ICT business systems (e.g., ERP, WMS, corporate databases)





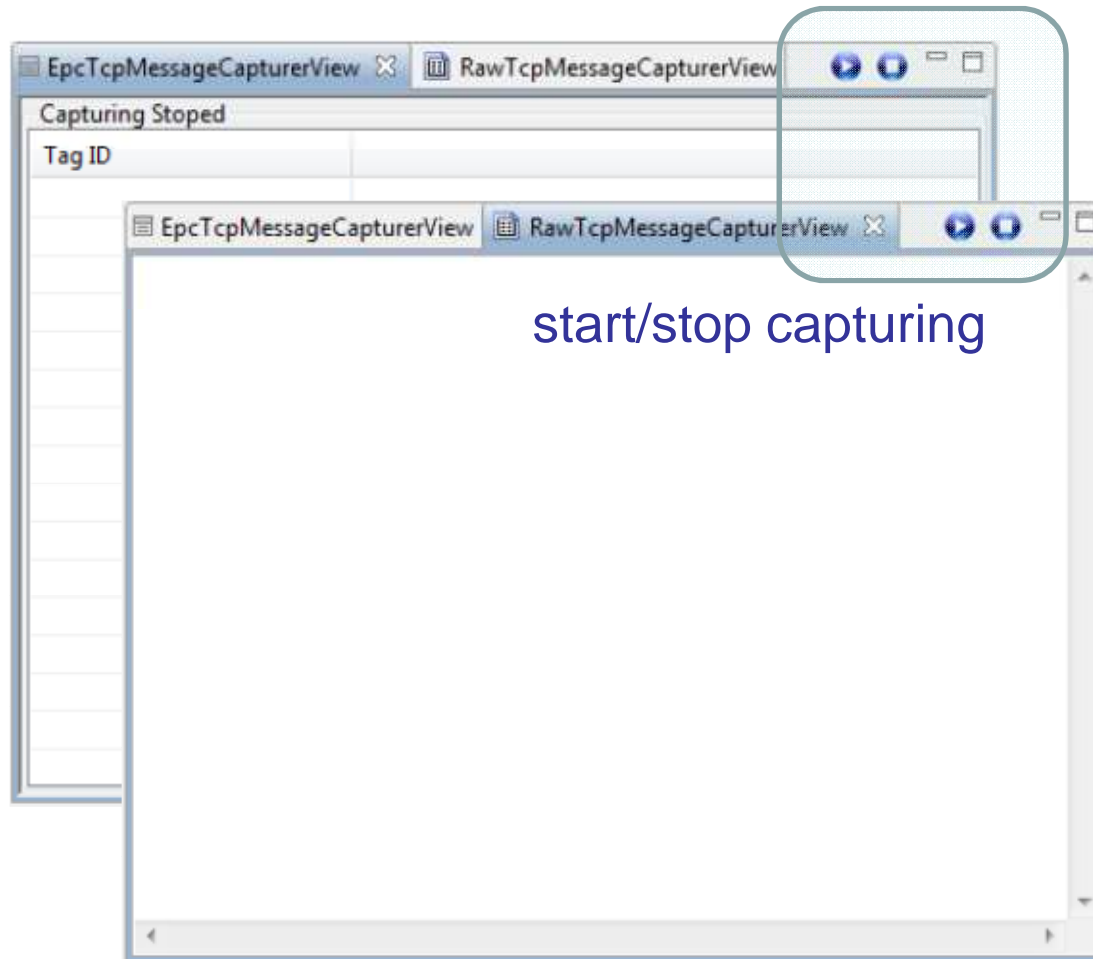
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# Debugging Capabilities



- Capture plain EPC messages exchanged
- Or even TCP





# References – Additional Reading

- Documentation on the ASPIRE Wiki site
  - <http://wiki.aspire.ow2.org/xwiki/bin/view/Main/Documentation>
- ASPIRE Public Deliverable D3.3
- EPCglobal Reader Protocol Standard, Version 1.1
  - [http://www.epcglobalinc.org/standards/rp/rp\\_1\\_1-standard-20060621.pdf](http://www.epcglobalinc.org/standards/rp/rp_1_1-standard-20060621.pdf)

