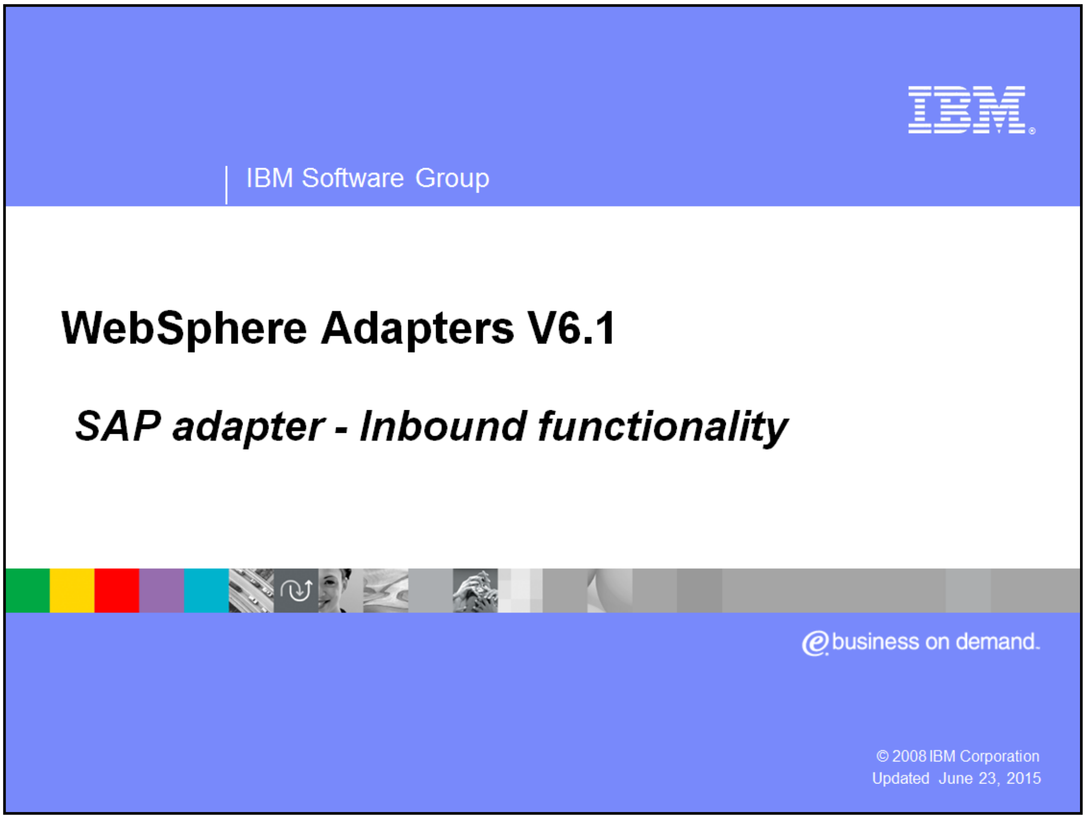

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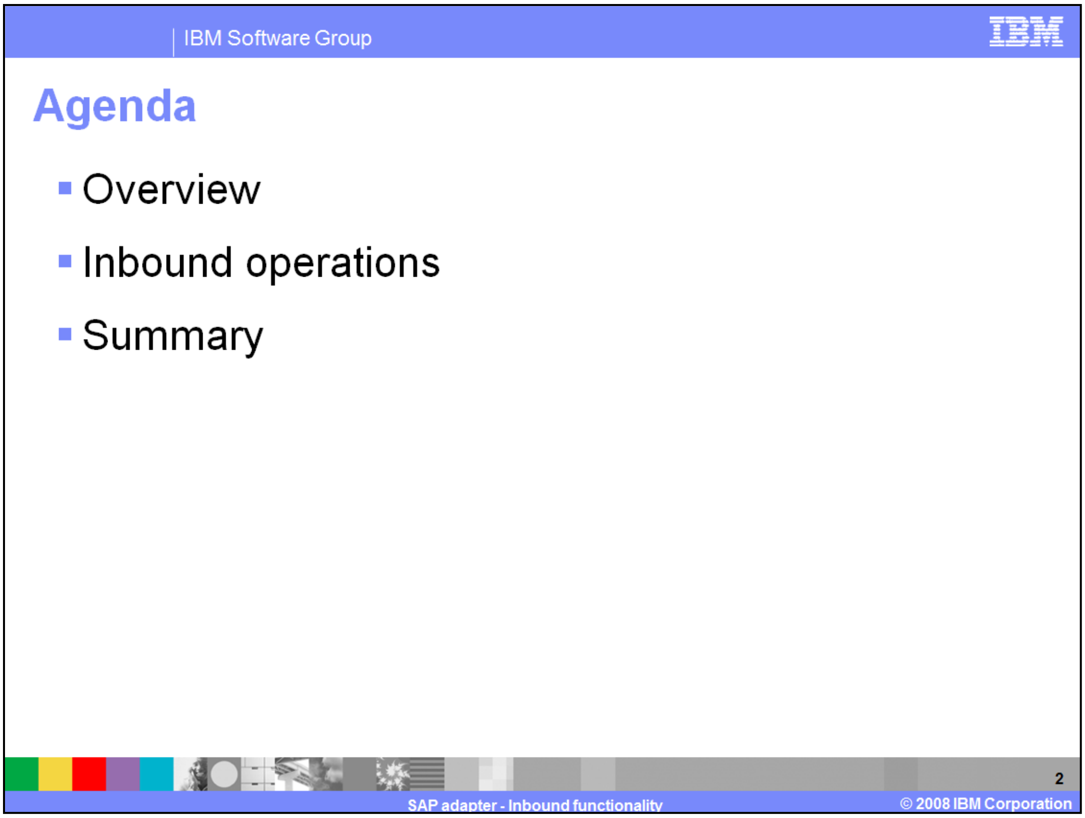
WebSphere Adapters V6.1

SAP adapter - Inbound functionality

business on demand.

Updated June 23, 2015

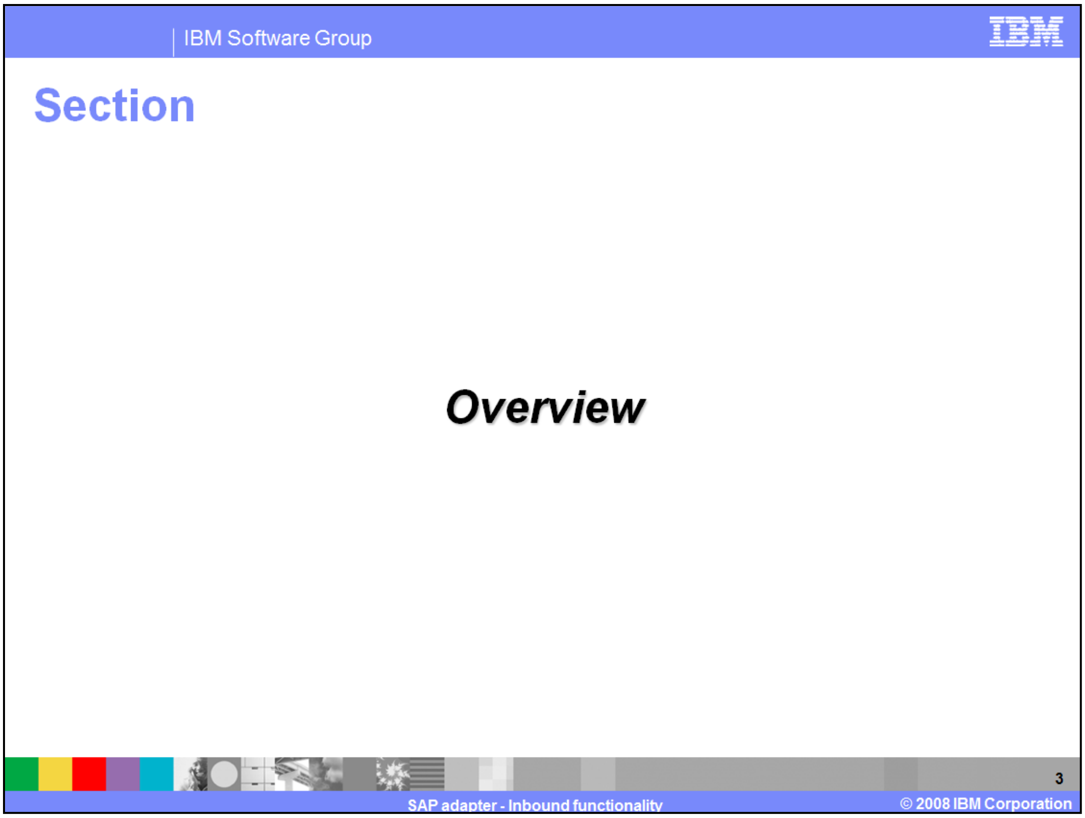
This presentation covers the inbound functionality of the WebSphere® Adapter for SAP.



Agenda

- Overview
- Inbound operations
- Summary

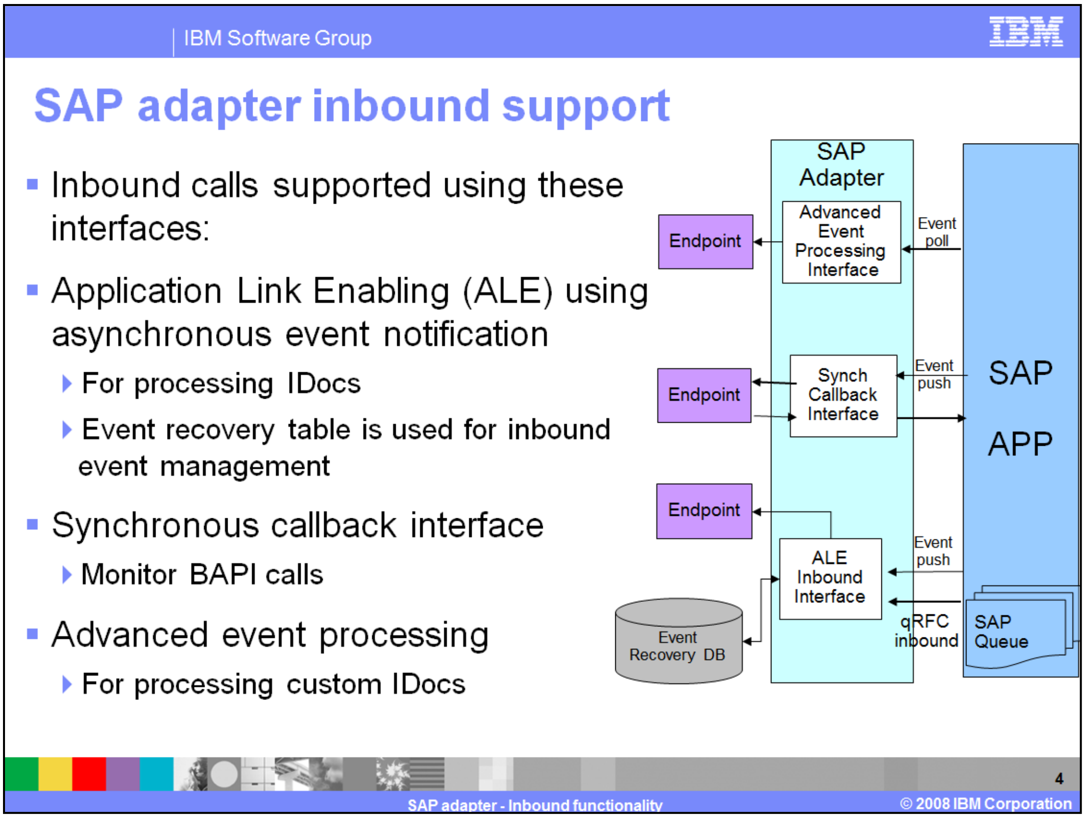
The agenda for this presentation is shown here.



Section

Overview

This section provides an overview of the WebSphere Adapter for SAP inbound support



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SAP adapter inbound support

- Inbound calls supported using these interfaces:
- Application Link Enabling (ALE) using asynchronous event notification
  - For processing IDocs
  - Event recovery table is used for inbound event management
- Synchronous callback interface
  - Monitor BAPI calls
- Advanced event processing
  - For processing custom IDocs

SAP adapter - Inbound functionality

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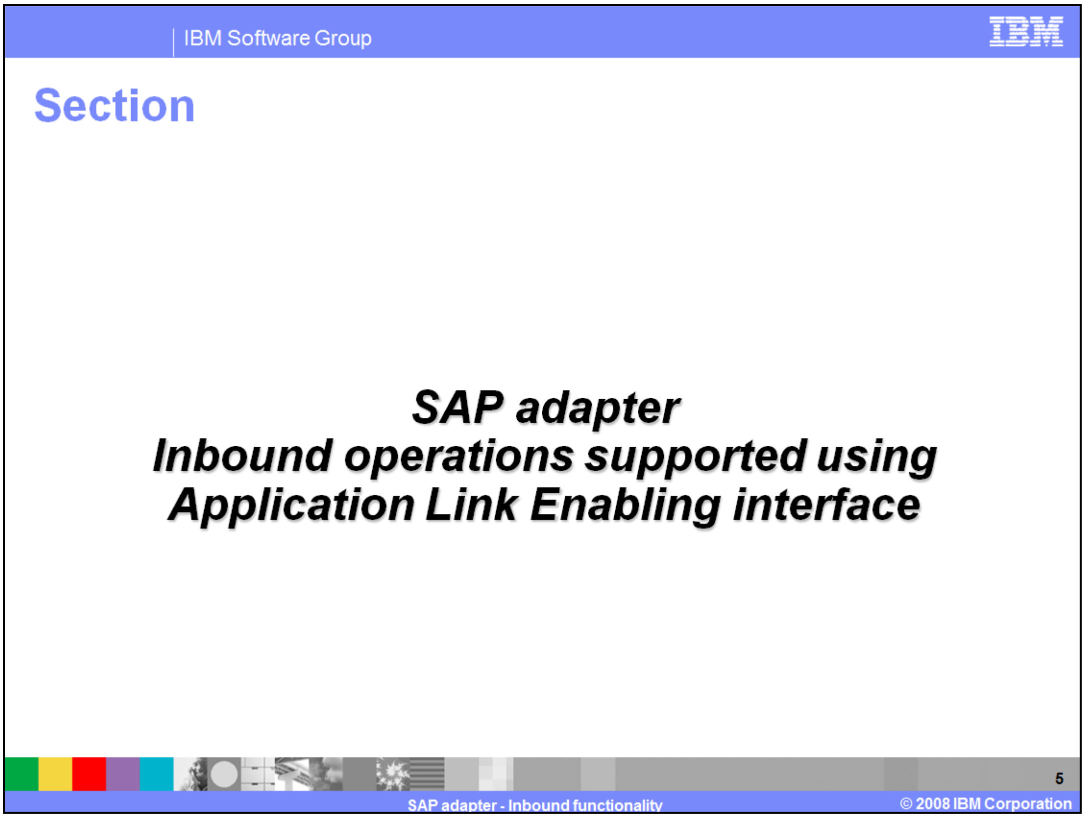
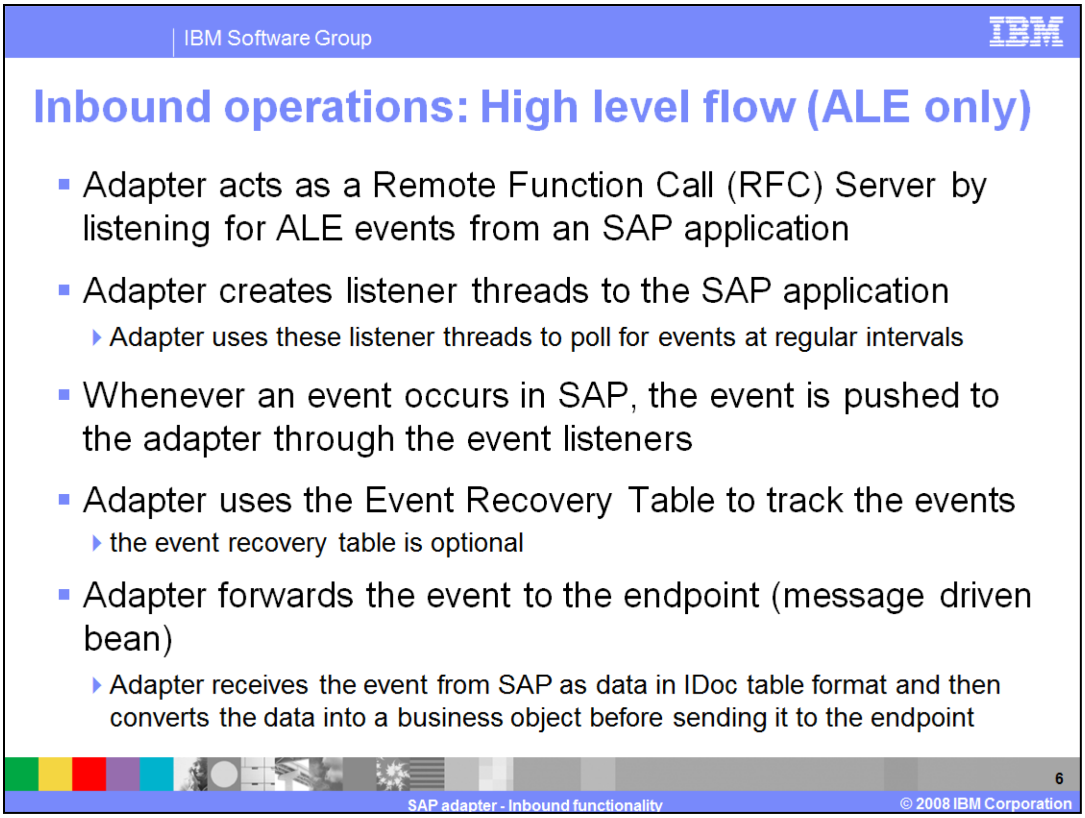
This diagram shows the high level flow and the components for inbound events from SAP. Inbound calls are supported by the ALE interface using asynchronous event notification. For the inbound call, the Adapter acts as an RFC server and listens for ALE events from SAP applications. The adapter uses an event recovery table to manage the inbound events. With Advanced Event Processing interface, the adapter processes events related to custom IDocs. The Synchronous callback interface provides a means to synchronously call RFC-enabled functions (such as BAPI functions) that are registered with the adapter from the SAP server.



Section

SAP adapter
Inbound operations supported using
Application Link Enabling interface

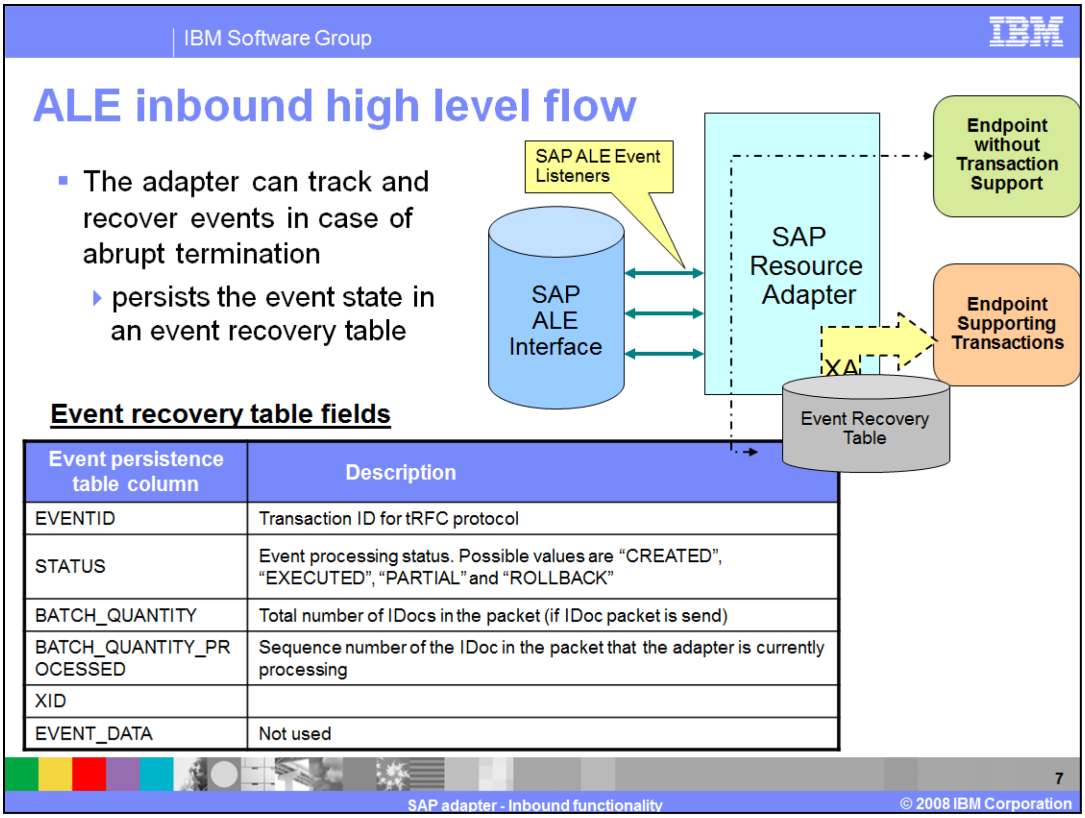
This section covers the inbound operations supported using only the ALE interface.



Inbound operations: High level flow (ALE only)

- Adapter acts as a Remote Function Call (RFC) Server by listening for ALE events from an SAP application
- Adapter creates listener threads to the SAP application
  - Adapter uses these listener threads to poll for events at regular intervals
- Whenever an event occurs in SAP, the event is pushed to the adapter through the event listeners
- Adapter uses the Event Recovery Table to track the events
  - the event recovery table is optional
- Adapter forwards the event to the endpoint (message driven bean)
  - Adapter receives the event from SAP as data in IDoc table format and then converts the data into a business object before sending it to the endpoint

The adapter creates listener threads to the SAP system. The listener threads regularly poll for events. So, in a way, the adapter acts as a Remote function call server to the SAP application. Whenever an event occurs in SAP, the event is pushed to the adapter through the event listeners. There is no event store within the SAP application. The adapter uses a persistent event recovery table to track the events. Adapter receives the event from SAP in IDoc table format and which it converts to a business object before sending it to the endpoint.



ALE inbound high level flow

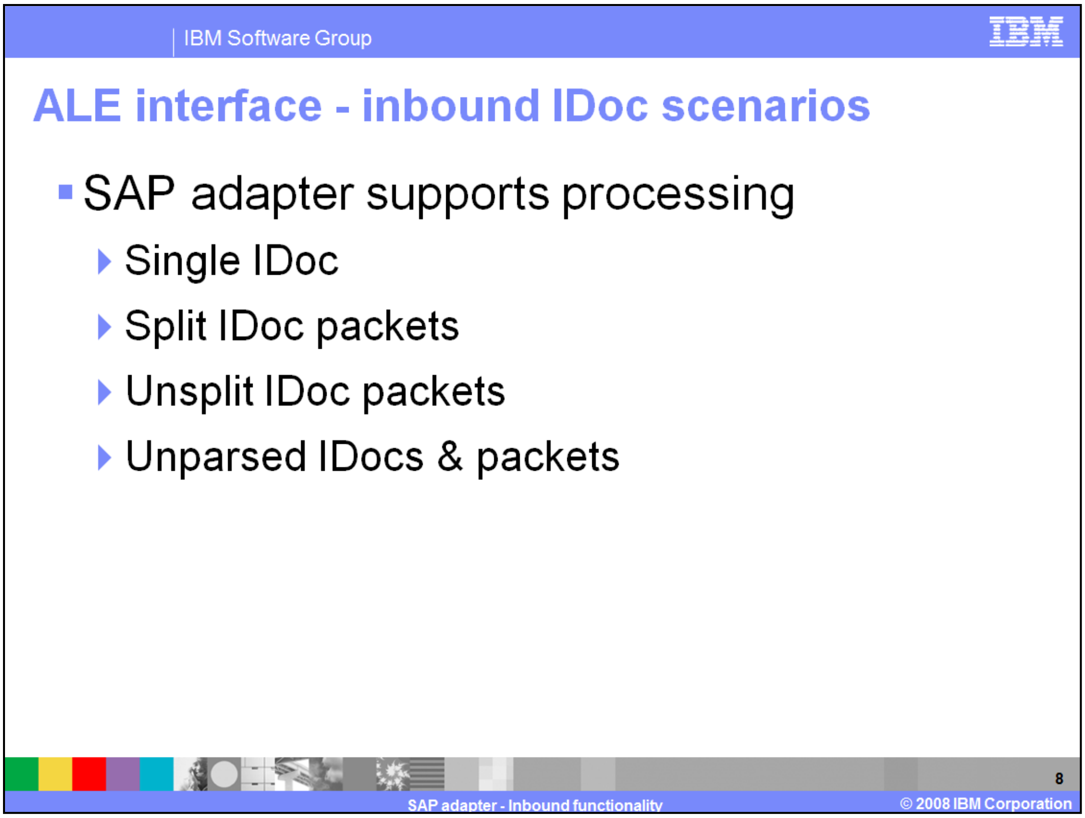
- The adapter can track and recover events in case of abrupt termination
  - persists the event state in an event recovery table

Event recovery table fields

Event persistence table column	Description
EVENTID	Transaction ID for tRFC protocol
STATUS	Event processing status. Possible values are “CREATED”, “EXECUTED”, “PARTIAL” and “ROLLBACK”
BATCH_QUANTITY	Total number of IDocs in the packet (if IDoc packet is send)
BATCH_QUANTITY_PROCESSED	Sequence number of the IDoc in the packet that the adapter is currently processing
XID	
EVENT_DATA	Not used

This diagram shows the components involved in end-to-end handling of the events. The SAP ALE event listeners listen for the events. The new event is pushed to the adapter, and the adapter stores it in the persistent event recovery table. The persistent table provides failure recovery to reprocess the events.

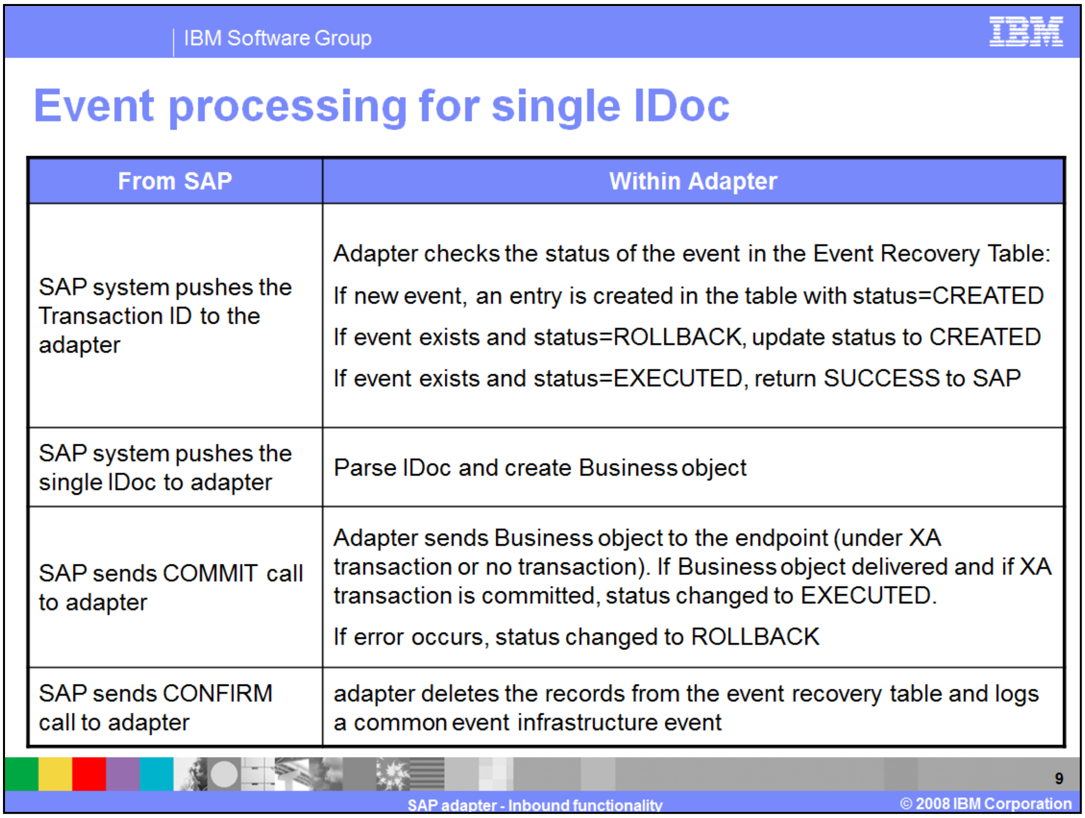
The schema of the event recovery table is shown. The EVENTID field is the unique transaction ID that the SAP application uses for events. SAP will send the same Transaction ID for subsequent processing of the same event. An event can represent an IDoc packet. The table has fields for the total number of IDocs in the packet, the total number of IDocs that are successfully processed and the current IDoc that is being processed.



ALE interface - inbound IDoc scenarios

- SAP adapter supports processing
  - Single IDoc
  - Split IDoc packets
  - Unsplit IDoc packets
  - Unparsed IDocs & packets

SAP adapter supports processing of single IDoc and IDoc packets. By default, the adapter splits IDoc packets into individual IDocs, but the adapter also provides functionality to process the whole IDoc packet without splitting. While processing the IDocs, the adapter parses the incoming IDoc structure and populates the IDoc content into the appropriate business object. In addition, the adapter provides functionality to send the IDoc content without parsing if needed. These topics are covered in more detail in subsequent slides in this presentation.



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Event processing for single IDoc

From SAP	Within Adapter
SAP system pushes the Transaction ID to the adapter	Adapter checks the status of the event in the Event Recovery Table: If new event, an entry is created in the table with status=CREATED If event exists and status=ROLLBACK, update status to CREATED If event exists and status=EXECUTED, return SUCCESS to SAP
SAP system pushes the single IDoc to adapter	Parse IDoc and create Business object
SAP sends COMMIT call to adapter	Adapter sends Business object to the endpoint (under XA transaction or no transaction). If Business object delivered and if XA transaction is committed, status changed to EXECUTED. If error occurs, status changed to ROLLBACK
SAP sends CONFIRM call to adapter	adapter deletes the records from the event recovery table and logs a common event infrastructure event

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SAP adapter - Inbound functionality

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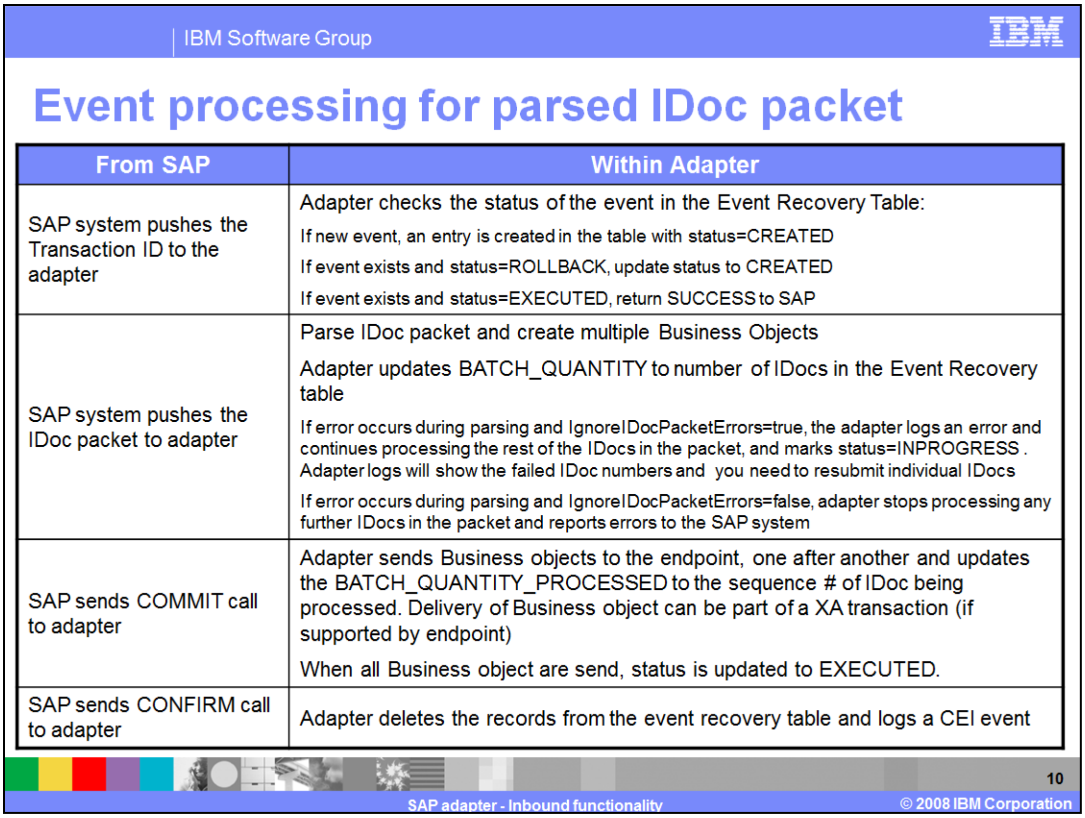
This table shows the actions that occur on the SAP side and within the adapter when processing a Single IDoc. The adapter listens for events occurring on the SAP system and when they occur the resulting IDoc or IDoc packet is sent to the adapter. If the incoming event relates to a single IDoc, the adapter parses the incoming IDoc and populates its contents to the appropriate business object.



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Event processing for parsed IDoc packet

From SAP	Within Adapter
SAP system pushes the Transaction ID to the adapter	Adapter checks the status of the event in the Event Recovery Table: If new event, an entry is created in the table with status=CREATED If event exists and status=ROLLBACK, update status to CREATED If event exists and status=EXECUTED, return SUCCESS to SAP
SAP system pushes the IDoc packet to adapter	Parse IDoc packet and create multiple Business Objects Adapter updates BATCH_QUANTITY to number of IDocs in the Event Recovery table If error occurs during parsing and IgnoreIDocPacketErrors=true, the adapter logs an error and continues processing the rest of the IDocs in the packet, and marks status=INPROGRESS . Adapter logs will show the failed IDoc numbers and you need to resubmit individual IDocs If error occurs during parsing and IgnoreIDocPacketErrors=false, adapter stops processing any further IDocs in the packet and reports errors to the SAP system
SAP sends COMMIT call to adapter	Adapter sends Business objects to the endpoint, one after another and updates the BATCH_QUANTITY_PROCESSED to the sequence # of IDoc being processed. Delivery of Business object can be part of a XA transaction (if supported by endpoint) When all Business object are send, status is updated to EXECUTED.
SAP sends CONFIRM call to adapter	Adapter deletes the records from the event recovery table and logs a CEI event

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SAP adapter - Inbound functionality

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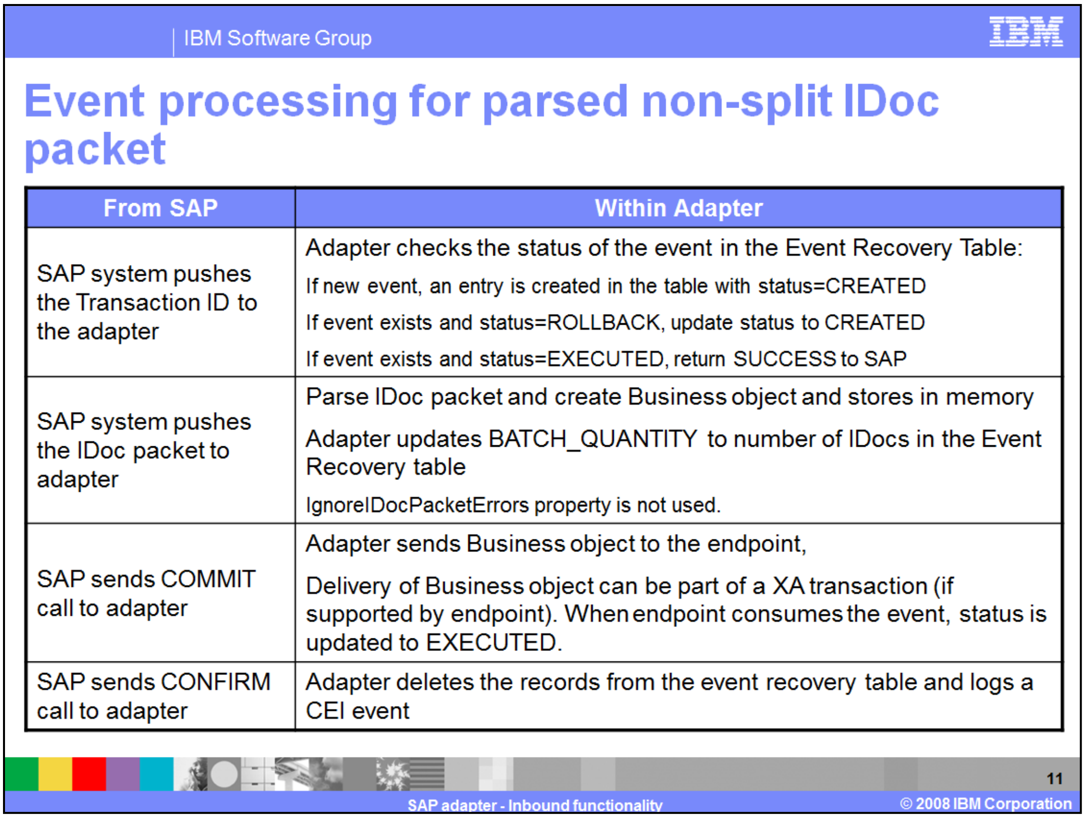
This table shows the actions that occur on the SAP side and within the adapter when processing an IDoc packet. In case of abrupt interruptions during IDoc packet processing, the adapter resumes processing the IDocs from the current sequence number. The adapter continues updating the CurrIDoc property, even if IgnoreIDocPacketErrors is set to true. This is required in case you terminate the adapter manually while processing an IDoc.

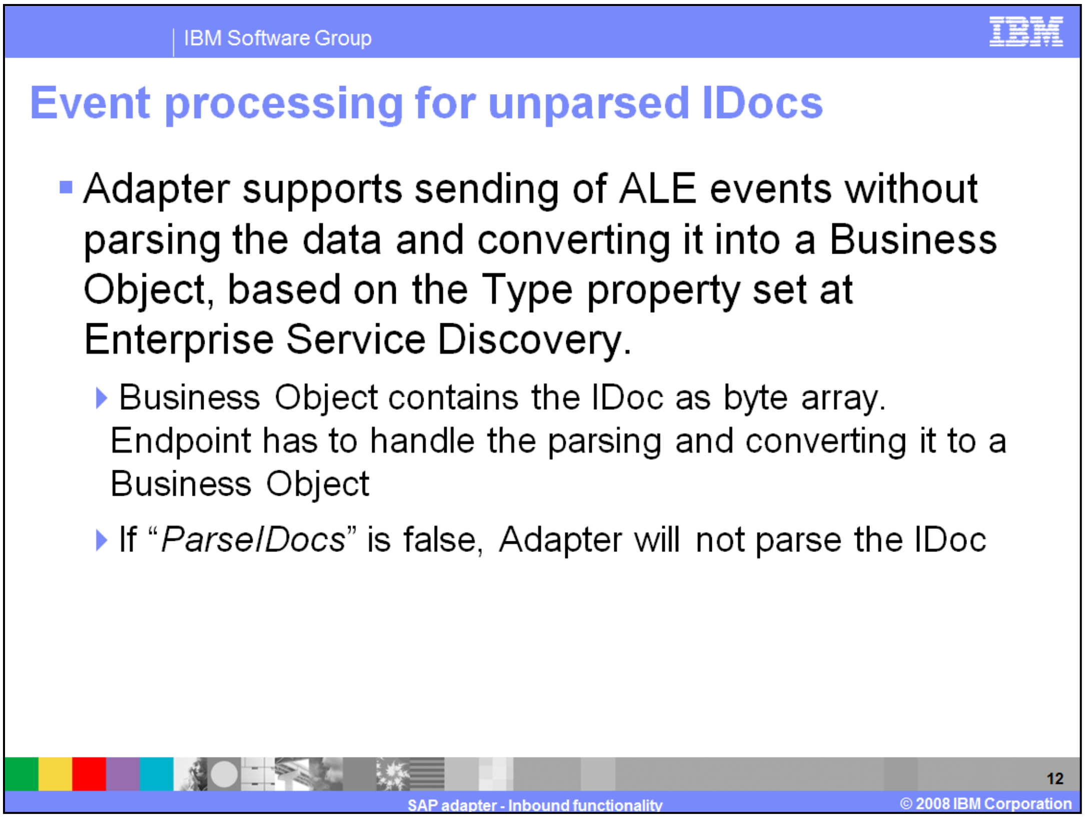


Event processing for parsed non-split IDoc packet

From SAP	Within Adapter
SAP system pushes the Transaction ID to the adapter	Adapter checks the status of the event in the Event Recovery Table: If new event, an entry is created in the table with status=CREATED If event exists and status=ROLLBACK, update status to CREATED If event exists and status=EXECUTED, return SUCCESS to SAP
SAP system pushes the IDoc packet to adapter	Parse IDoc packet and create Business object and stores in memory Adapter updates BATCH_QUANTITY to number of IDocs in the Event Recovery table IgnoreIDocPacketErrors property is not used.
SAP sends COMMIT call to adapter	Adapter sends Business object to the endpoint, Delivery of Business object can be part of a XA transaction (if supported by endpoint). When endpoint consumes the event, status is updated to EXECUTED.
SAP sends CONFIRM call to adapter	Adapter deletes the records from the event recovery table and logs a CEI event

This table shows the actions that occur on the SAP side and within the adapter when processing a non-split IDoc packet. One case scenario for this feature is for maintaining the transaction of data if inventory levels for a set of materials need to be updated at one time. This feature will most likely increase memory usage since the whole IDoc packet is stored in memory. The adapter can handle processing an IDoc packet as one unit of work if all the IDocs in the packet are of the same IDoc type

The event processing is similar to a single IDoc with respect to the event recovery mechanism. The IDoc packet is considered a single unit of work. So, a failure registered by the endpoint for any one IDoc fails the whole packet. A failure requires all the IDocs in the IDoc packet to be sent to the endpoint again.



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Event processing for unparsed IDocs

- Adapter supports sending of ALE events without parsing the data and converting it into a Business Object, based on the Type property set at Enterprise Service Discovery.
  - Business Object contains the IDoc as byte array. Endpoint has to handle the parsing and converting it to a Business Object
  - If “*ParseIDocs*” is false, Adapter will not parse the IDoc

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SAP adapter - Inbound functionality

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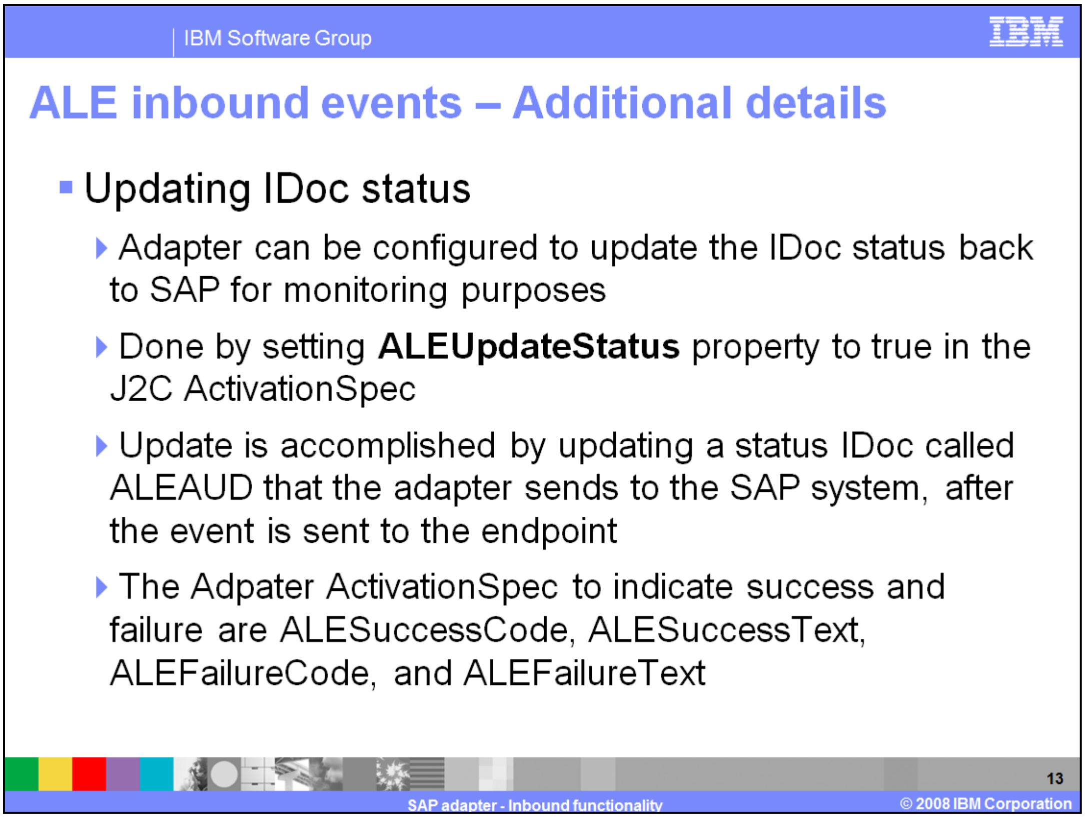
The adapter supports processing unparsed ALE events for Applications or components that have parsing capability.

A value of “UNPARSEDIDOC” is set for the metadata property “Type” at the business object level. The value for this property is set by the Enterprise Service Discovery when it determines the kind of Business Object structure to generate (IDoc or UNPARSEDIDOC) .

If the end point requires the incoming IDoc not to be parsed, you can set the type of IDoc at the Enterprise Service Discovery process to UNPARSED and the Business Object contains the IDoc as byte array.



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ALE inbound events – Additional details

- Updating IDoc status
  - Adapter can be configured to update the IDoc status back to SAP for monitoring purposes
  - Done by setting **ALEUpdateStatus** property to true in the J2C ActivationSpec
  - Update is accomplished by updating a status IDoc called ALEAUD that the adapter sends to the SAP system, after the event is sent to the endpoint
  - The Adpater ActivationSpec to indicate success and failure are ALESuccessCode, ALESuccessText, ALEFailureCode, and ALEFailureText

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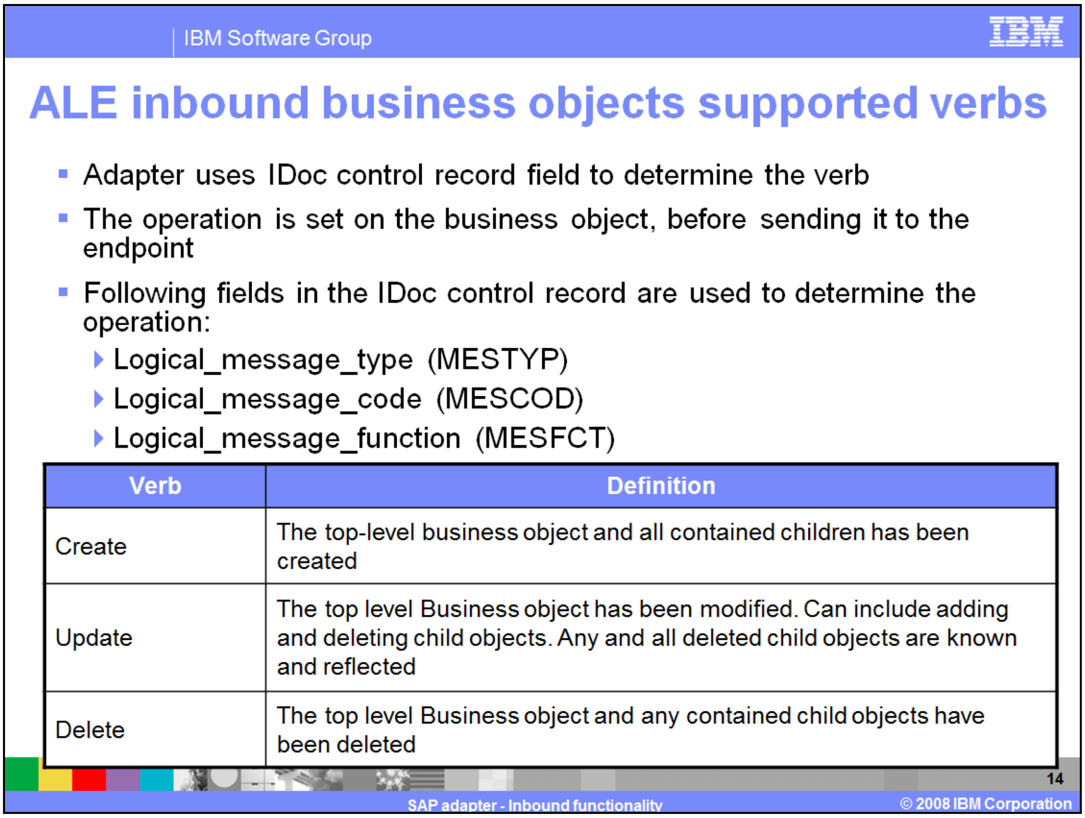
SAP adapter - Inbound functionality

Here are some additional details for ALE Inbound events. Another attribute is **ALEUpdateStatus**. If this is set to true in the ActivationSpec, the adapter will update the IDoc status back to SAP application for monitoring purposes. The update is accomplished by updating a status IDoc that the adapter sends to the SAP system, after the event is sent to the endpoint. The ActivationSpec contains additional attributes to indicate the success code, success text, failure code and failure text to be sent to the SAP application.



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ALE inbound business objects supported verbs

- Adapter uses IDoc control record field to determine the verb
- The operation is set on the business object, before sending it to the endpoint
- Following fields in the IDoc control record are used to determine the operation:
  - Logical_message_type (MESTYP)
  - Logical_message_code (MESCOD)
  - Logical_message_function (MESFCT)

Verb	Definition
Create	The top-level business object and all contained children has been created
Update	The top level Business object has been modified. Can include adding and deleting child objects. Any and all deleted child objects are known and reflected
Delete	The top level Business object and any contained child objects have been deleted

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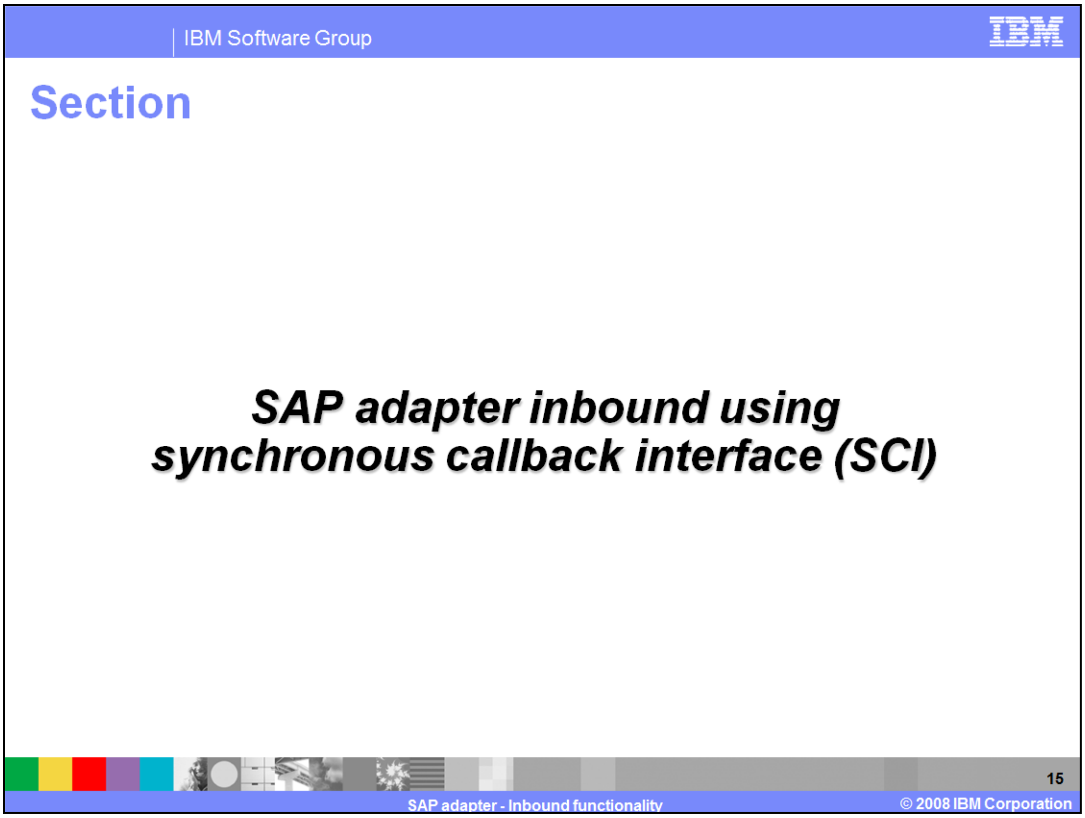
SAP adapter - Inbound functionality

The supported verbs for ALE inbound operations are create, Update and Delete. The adapter uses an IDoc control record field to determine the operation. The operation is then set on the Business Object, before sending it to the Endpoint. The values you set for the message type, code and function in the external service wizard when you configured inbound using ALE should match the values set in the incoming IDoc for successful processing of that IDoc.



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Section

SAP adapter inbound using synchronous callback interface (SCI)

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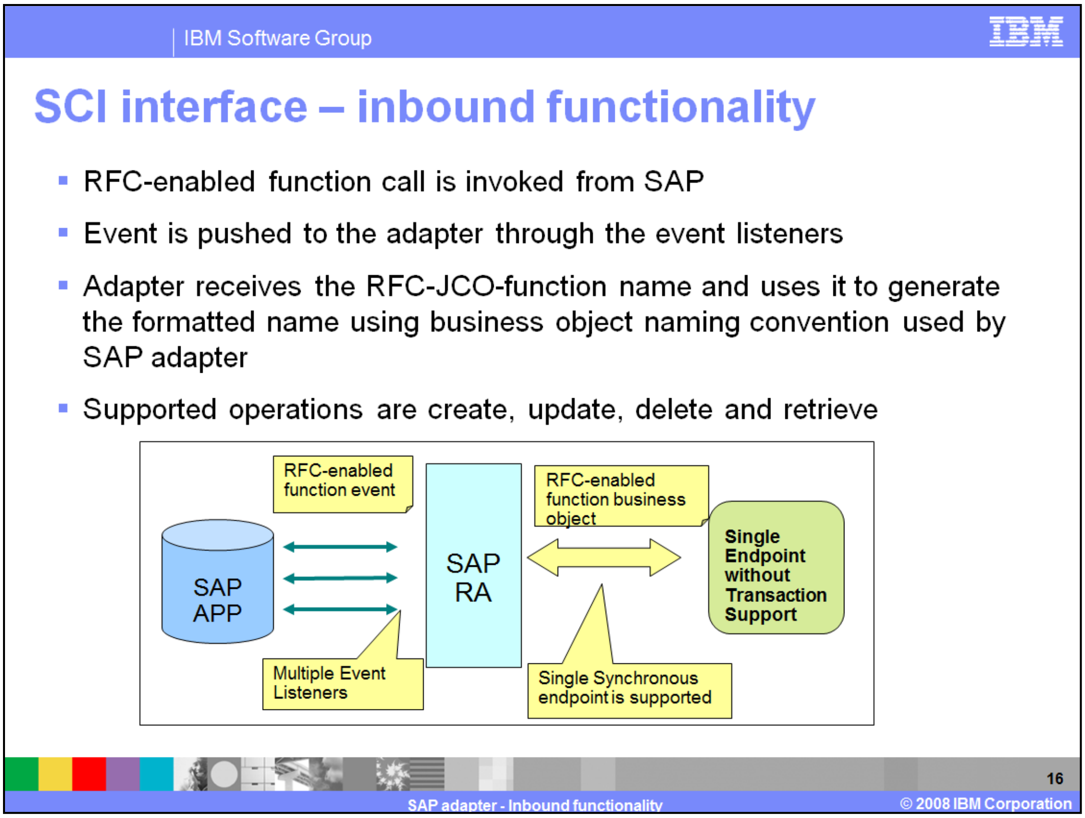
SAP adapter - Inbound functionality

This section covers the inbound operations supported using only the synchronous callback interface.



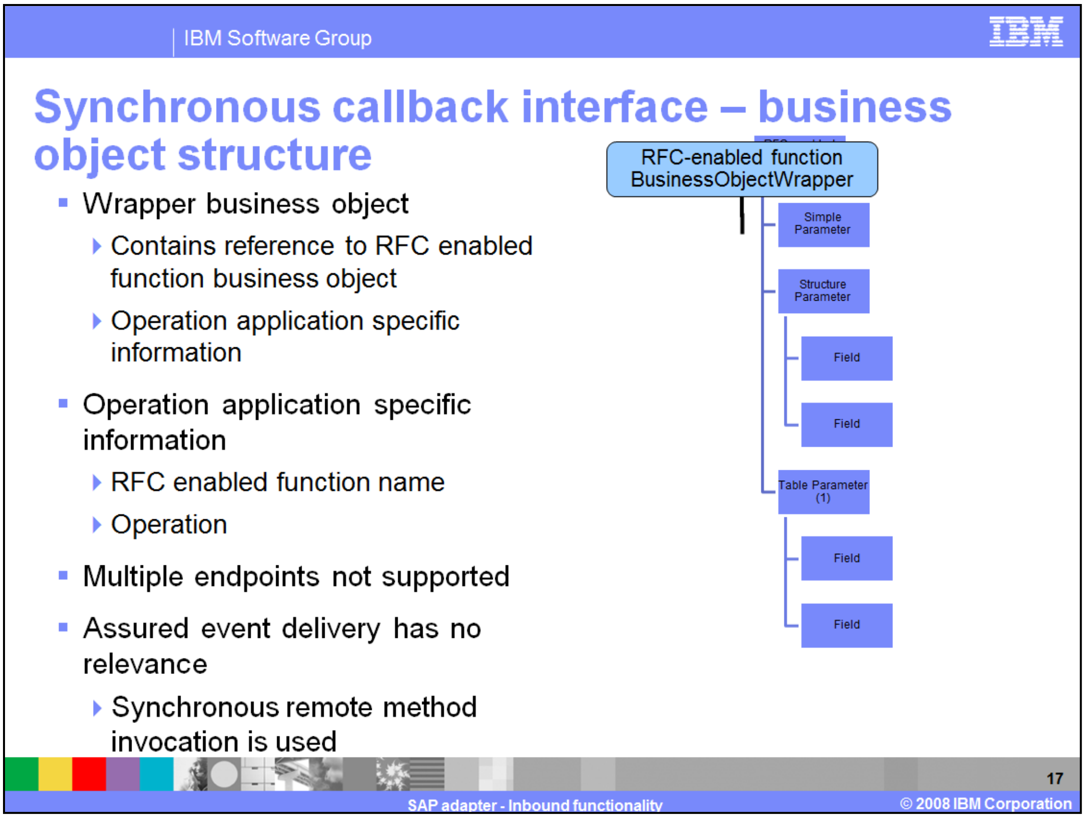
SCI interface – inbound functionality

- RFC-enabled function call is invoked from SAP
- Event is pushed to the adapter through the event listeners
- Adapter receives the RFC-JCO-function name and uses it to generate the formatted name using business object naming convention used by SAP adapter
- Supported operations are create, update, delete and retrieve

RFC-enabled function event
SAP APP
SAP RA
RFC-enabled function business object
Single Endpoint without Transaction Support
Multiple Event Listeners
Single Synchronous endpoint is supported

The adapter supports inbound processing (from the SAP system to the adapter) for the Synchronous callback interface. An RFC-enabled function call is sent to an endpoint by way of the adapter, and the response from the endpoint is returned to the SAP system.

The adapter starts event listeners, which listen to the specified RFCProgramID on the SAP server. When an RFC-enabled function call is invoked from SAP, the RFC-enabled function event is pushed to the adapter by way of the event listeners. The adapter converts the RFC-enabled function event to a business object and sends a business graph that includes the business object to an endpoint in a synchronous manner. Adapter receives the response business object from the endpoint which is mapped to the RFC-enabled function interface and returns it to the SAP system.



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Synchronous callback interface – business object structure

- Wrapper business object
  - Contains reference to RFC enabled function business object
  - Operation application specific information
- Operation application specific information
  - RFC enabled function name
  - Operation
- Multiple endpoints not supported
- Assured event delivery has no relevance
  - Synchronous remote method invocation is used

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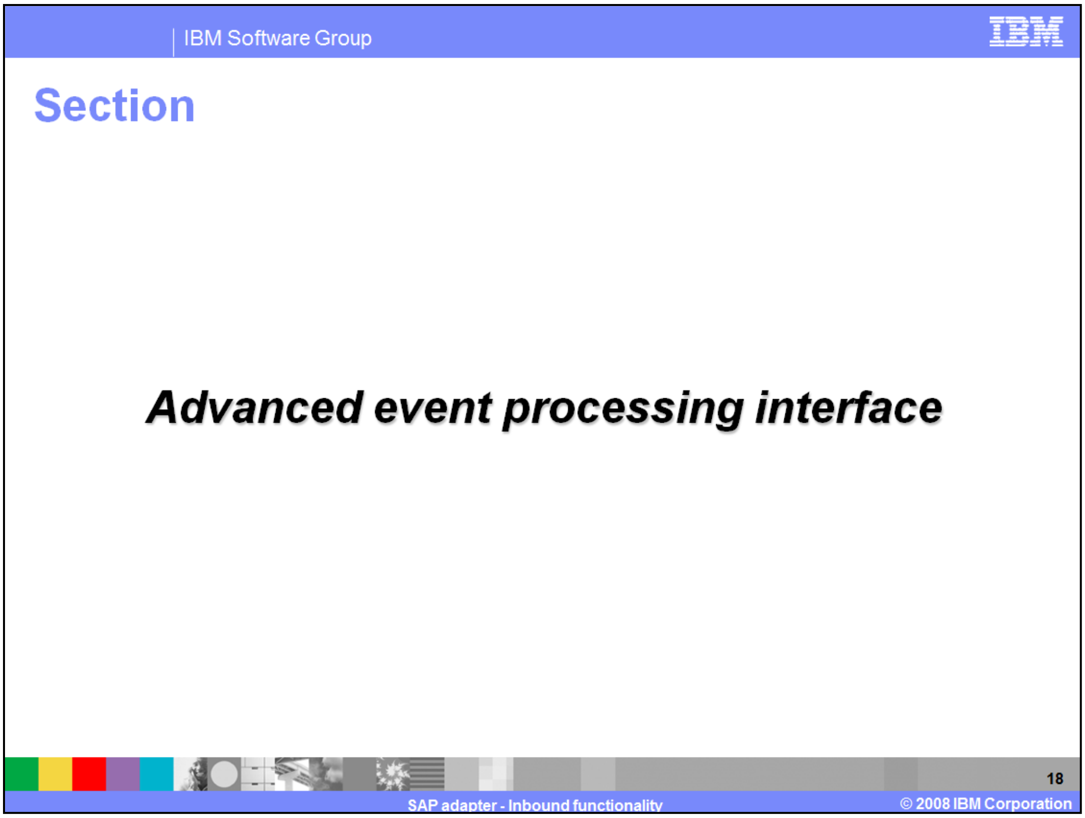
SAP adapter - Inbound functionality

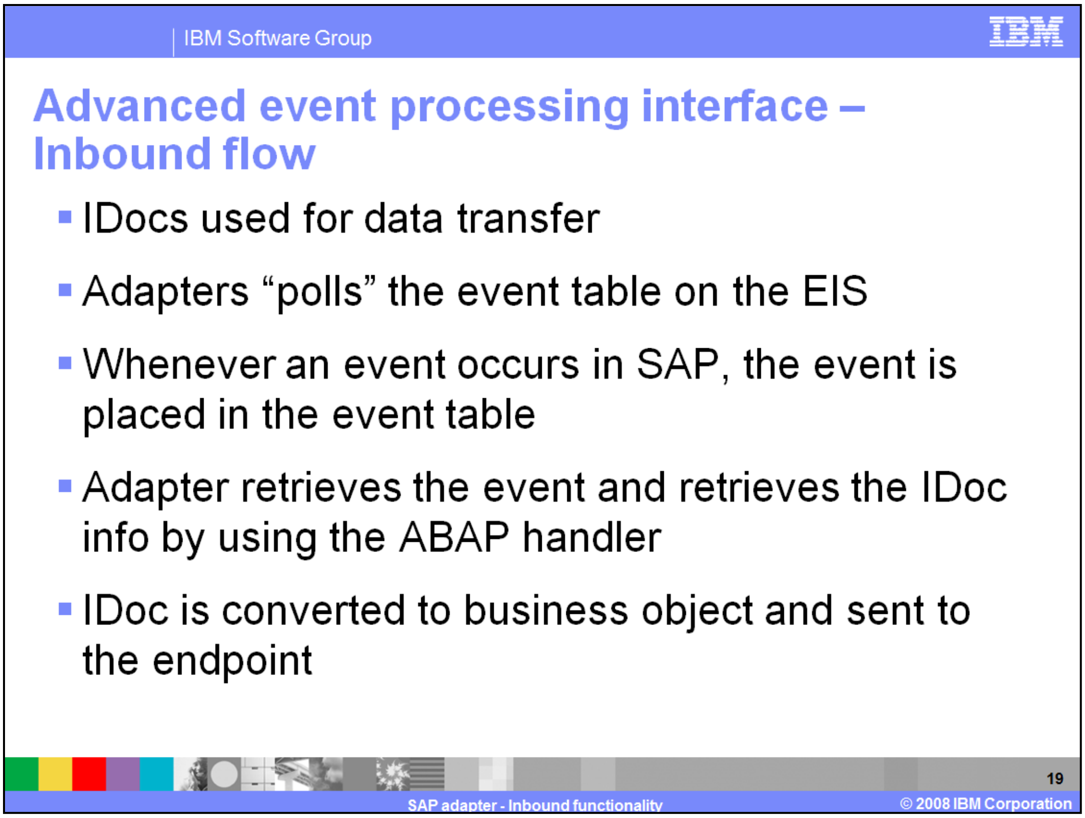
Adapter uses the wrapper business object application specific information to find the operation associated with received RFC-enabled function name .Once the operation is determined it is set as operation on business object before sending it to endpoint. Synchronous callback interface uses a synchronous remote method invocation. So, multiple endpoint support cannot be supported because each endpoint delivery requires synchronous response from endpoint.



Section

Advanced event processing interface

This section covers the operations supported using the Advanced Event Processing Interface.



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Advanced event processing interface – Inbound flow

- IDocs used for data transfer
- Adapters “polls” the event table on the EIS
- Whenever an event occurs in SAP, the event is placed in the event table
- Adapter retrieves the event and retrieves the IDoc info by using the ABAP handler
- IDoc is converted to business object and sent to the endpoint

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SAP adapter - Inbound functionality

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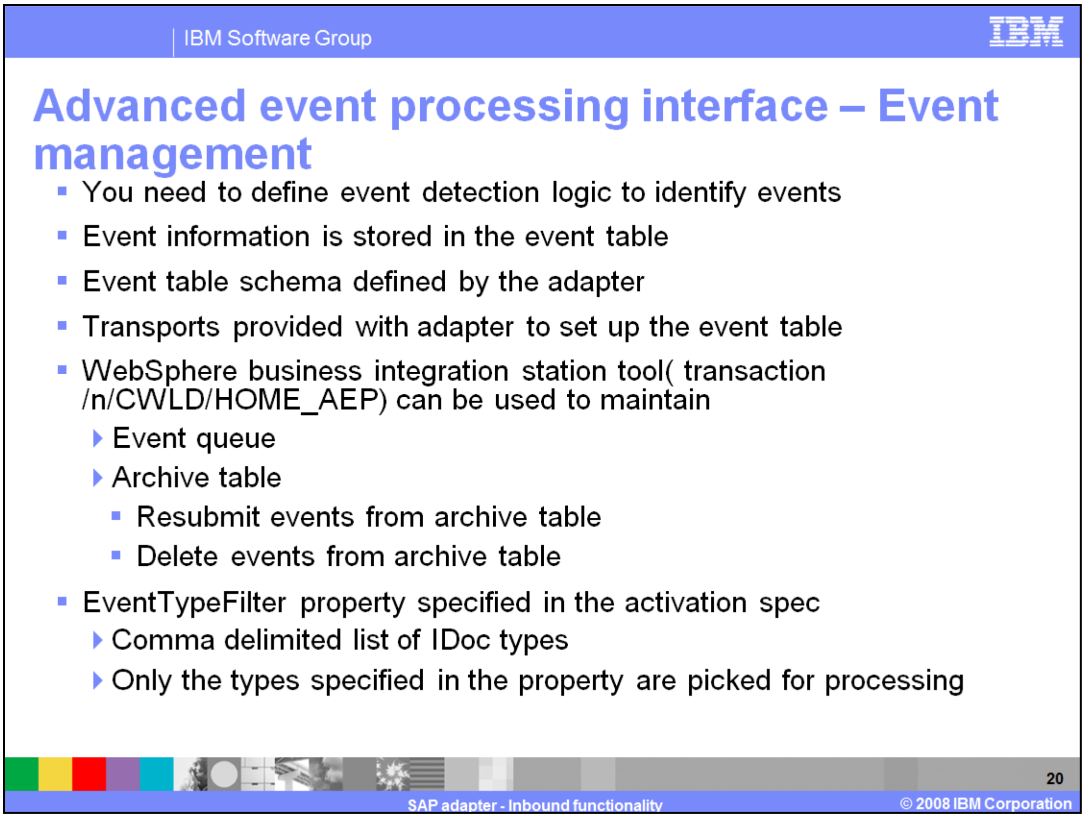
As with the ALE interface, the Advanced Event Processing (AEP) Interface also uses IDocs for data transfer, but the AEP interface is generally used for processing custom IDocs. The adapter polls on the event table on the SAP system, where new events are captured. This differs from the ALE interface event management where the event recovery store is external to the SAP system and events are pushed to the adapter. The adapter retrieves the information from these custom IDocs using the appropriate handler provided, and the retrieved IDoc information is populated into a business object and returned to the endpoint.

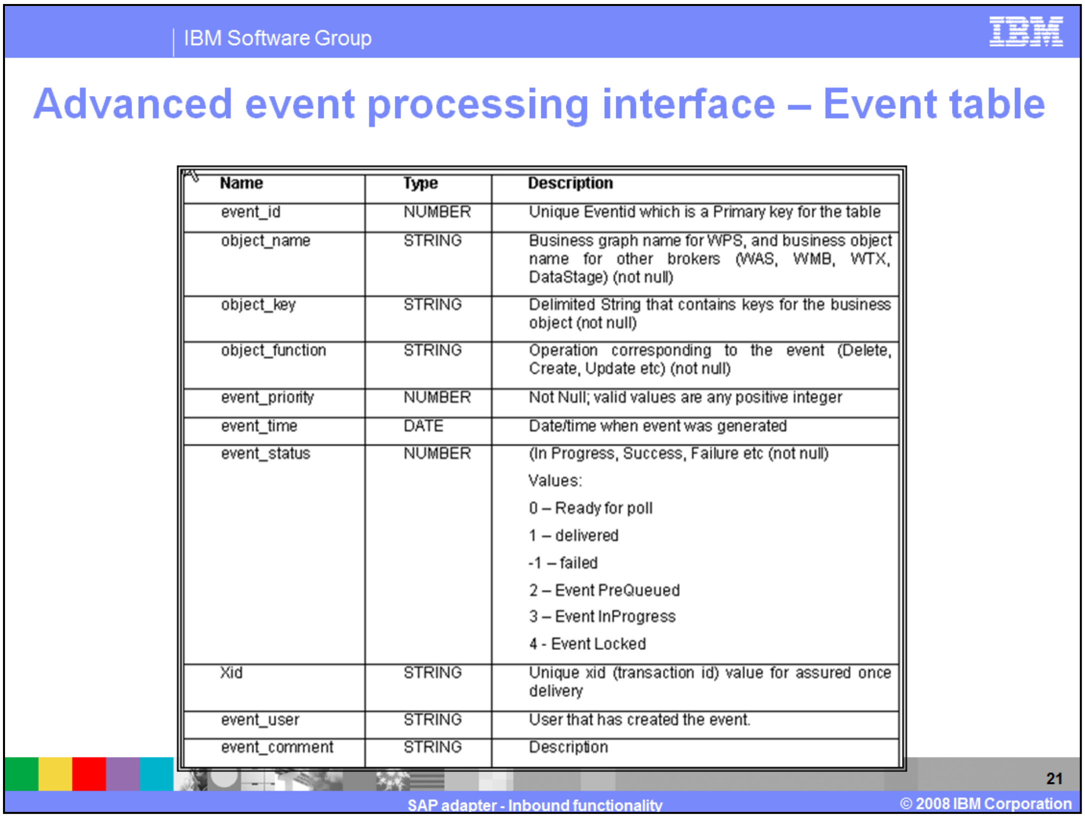


Advanced event processing interface – Event management

- You need to define event detection logic to identify events
- Event information is stored in the event table
- Event table schema defined by the adapter
- Transports provided with adapter to set up the event table
- WebSphere business integration station tool(transaction /n/CWLD/HOME_AEP) can be used to maintain
  - Event queue
  - Archive table
    - Resubmit events from archive table
    - Delete events from archive table
- EventTypeFilter property specified in the activation spec
  - Comma delimited list of IDoc types
  - Only the types specified in the property are picked for processing

Shown here are the event management details for Advanced Event Processing (AEP) interface. You must provide the event detection logic on the SAP side to detect any events, which are then captured in the event table. The scripts for creating the event table and other infrastructure required for supporting AEP interface are provided as transports with the SAP adapter in the WebSphere Integration Developer. You can also make use of the WebSphere Business Integration Station tool to maintain both event and archive queues.

Event filters can be specified during configuration in the external service wizard. The IDoc names that you are interested in monitoring for events can be provided for the filter property. Only the types specified in the property are selected for processing



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Advanced event processing interface – Event table

Name	Type	Description
event_id	NUMBER	Unique Eventid which is a Primary key for the table
object_name	STRING	Business graph name for WPS, and business object name for other brokers (WAS, WMB, WTX, DataStage) (not null)
object_key	STRING	Delimited String that contains keys for the business object (not null)
object_function	STRING	Operation corresponding to the event (Delete, Create, Update etc) (not null)
event_priority	NUMBER	Not Null; valid values are any positive integer
event_time	DATE	Date/time when event was generated
event_status	NUMBER	(In Progress, Success, Failure etc (not null) Values: 0 – Ready for poll 1 – delivered -1 – failed 2 – Event PreQueued 3 – Event InProgress 4 - Event Locked
Xid	STRING	Unique xid (transaction id) value for assured once delivery
event_user	STRING	User that has created the event.
event_comment	STRING	Description

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SAP adapter - Inbound functionality

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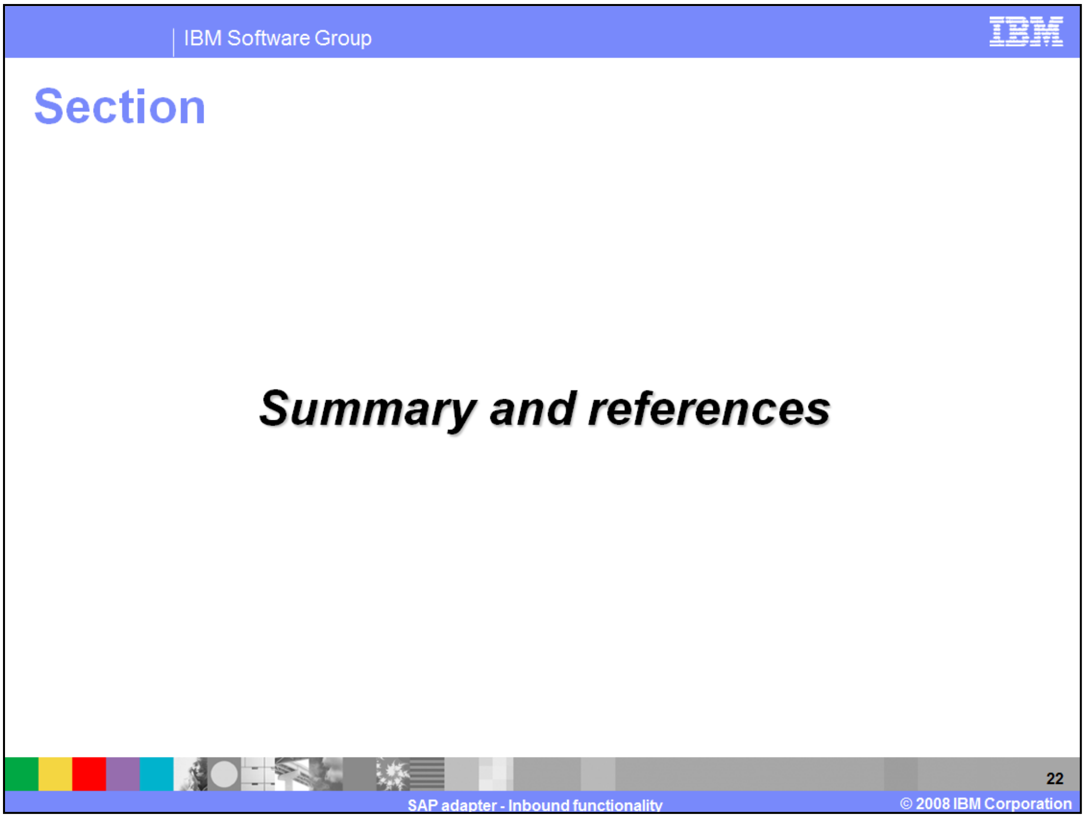
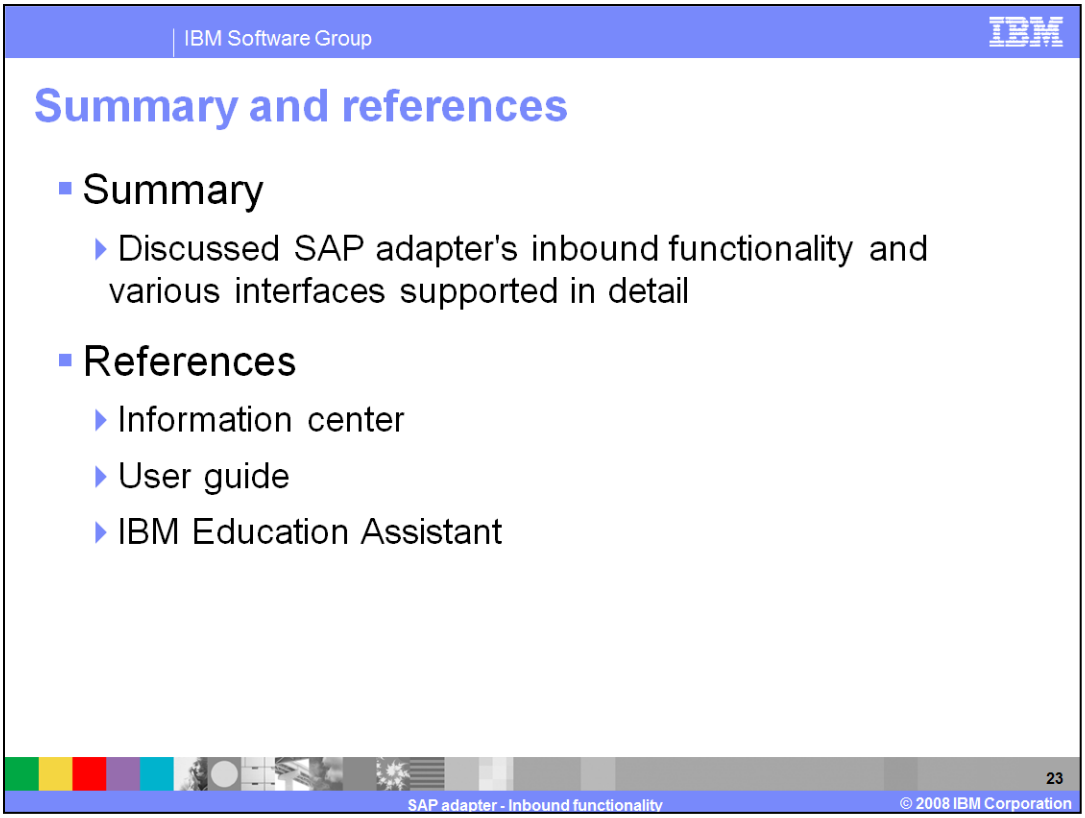
Shown here is the schema of the event table that is created on the SAP system. Any events occurring on the IDocs that you are interested in should be detected and populated in this event table. The adapter then uses the information in this table to extract the corresponding IDoc using the handler.



Section

Summary and references

This section provides a summary and references.



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Summary and references

- Summary
  - Discussed SAP adapter's inbound functionality and various interfaces supported in detail
- References
  - Information center
  - User guide
  - IBM Education Assistant

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SAP adapter - Inbound functionality

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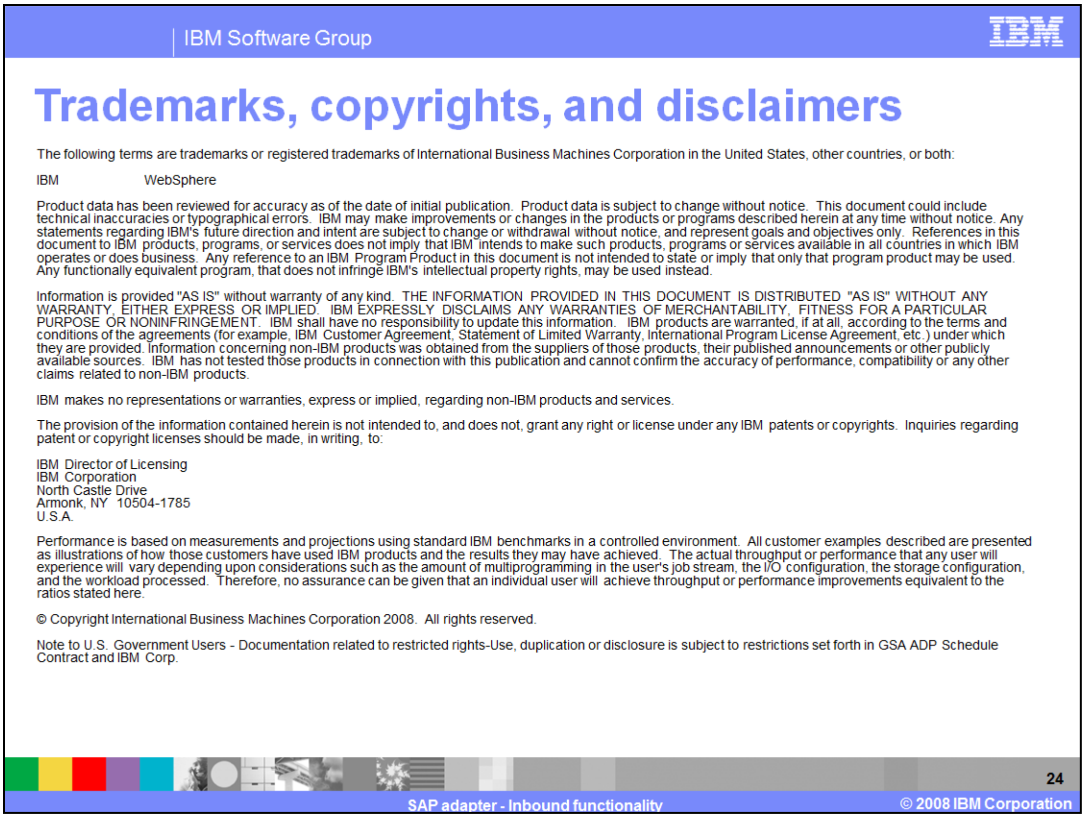
This presentation covered SAP adapter inbound functionality and the various interfaces supported in detail. More information can be found in the user guide and the information center.



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