How-To Guide
SAP Extended Warehouse Management
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Configuration of ABAP Push Channels TCP for Material Flow System in SAP Extended Warehouse Management
Connecting Programmable Logic Controllers to MFS in SAP EWM
## Typographic Conventions

<table>
<thead>
<tr>
<th>Type Style</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Example</em></td>
<td>Words or characters quoted from the screen. These include field names, screen titles, pushbuttons labels, menu names, menu paths, and menu options. Textual cross-references to other documents.</td>
</tr>
<tr>
<td><strong>Example</strong></td>
<td>Emphasized words or expressions.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td>Technical names of system objects. These include report names, program names, transaction codes, table names, and key concepts of a programming language when they are surrounded by body text, for example, SELECT and INCLUDE.</td>
</tr>
<tr>
<td><em>Example</em></td>
<td>Output on the screen. This includes file and directory names and their paths, messages, names of variables and parameters, source text, and names of installation, upgrade and database tools.</td>
</tr>
<tr>
<td><em>Example</em></td>
<td>Exact user entry. These are words or characters that you enter in the system exactly as they appear in the documentation.</td>
</tr>
<tr>
<td><code>&lt;Example&gt;</code></td>
<td>Variable user entry. Angle brackets indicate that you replace these words and characters with appropriate entries to make entries in the system.</td>
</tr>
<tr>
<td><strong>EXAMPLE</strong></td>
<td>Keys on the keyboard, for example, F2 or ENTER.</td>
</tr>
</tbody>
</table>
Document History

<table>
<thead>
<tr>
<th>Document Version</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>First official release of this guide</td>
</tr>
</tbody>
</table>
# Table of Contents

1 Business Scenario .................................................................................................................. 5  
  1.1 Introduction ..................................................................................................................... 5  

2 Background Information ........................................................................................................ 5  
  2.1 SAP ABAP Push Channel ............................................................................................... 5  
  2.1.1 More Information ....................................................................................................... 6  

3 Prerequisites .......................................................................................................................... 6  
  3.1 Logon Information for SAP EWM .................................................................................. 6  

4 Step-by-Step Procedures ....................................................................................................... 6  
  4.1 Creating the Remote Function Call Destination ........................................................... 7  
  4.2 Specifying the Remote Function Call Destination per Programmable Logic Controller ...... 8  
  4.3 Specifying the Host Information of the Programmable Logic Controllers ..................... 8  
  4.4 Troubleshooting ............................................................................................................. 9  

5 Further Information ............................................................................................................... 9
1  Business Scenario

1.1  Introduction

SAP Extended Warehouse Management (SAP EWM) contains functions and features for controlling material flow in your warehouse. This functionality is delivered with the Material Flow System (MFS) component of SAP EWM. An important part of a working MFS is the robust and fast data exchange between MFS in SAP EWM and external data sources such as programmable logic controllers (PLCs) or rack feeders. For this purpose, SAP provides ABAP Push Channel (APC) TCP as an integral part of SAP NetWeaver. This guide describes how you can configure SAP EWM to directly communicate with PLCs.

2  Background Information

2.1  SAP ABAP Push Channel

ABAP Push Channel (APC) is a technology for full-duplex communication with the ABAP server. The “push” in APC emphasizes that you can use this technology to push messages to the client even if the client has not sent a request. APC supports two APC connection types, which refer to the underlying communication protocol:

- WebSockets
  The WebSocket protocol is used for communication according to IETF standard RFC 6455. The WebSocket protocol is supported by the most commonly-used Web browsers.

- TCP sockets
  Native TCP/IP packets are used for communication. This allows communication with embedded systems and programmable logic controllers (PLC) that do not support the WebSocket protocol.

The ABAP server can act as a client or server. The communication partner can be, for example, a Web browser, another ABAP server, or a PLC. The following figure shows an ABAP server and a Web client communicating using the WebSocket protocol:

The figure below shows an ABAP server and a PLC communicating using native TCP/IP:
The ABAP server also supports seamless integration of the ABAP Messaging Channels (AMC) technology in APC scenarios (also referred to as collaboration between APC and AMC). This allows you to realize one-to-many (1:n) communication using APC connections.

2.1.1 More Information

This configuration guide focuses on connecting the Material Flow System (MFS) component of SAP Extended Warehouse Management (SAP EWM) with PLCs. For more information about the various possibilities that ABAP channels offer, see SAP Library for SAP NetWeaver on SAP Help Portal at http://help.sap.com/nw75.

3 Prerequisites

- SAP Extended Warehouse Management (SAP EWM) 9.4 and higher with a properly configured material flow system (MFS)
- SAP EWM running on SAP NetWeaver 7.50 and higher, which is the case for SAP EWM 9.4 and higher

3.1 Logon Information for SAP EWM

For the next steps you need to get the following logon information for the SAP EWM system:

- Address of SAP application server
- SAP EWM system number
- Client
- Name and password of SAP user to use for incoming programmable logic controllers (PLC) requests and execution of follow-on actions based on the requests in SAP EWM
  We recommend that you use a technical communication user.
- System ID, message server, and logon group in case load balancing is needed during the start of the communication with PLCs to map the connection to the application server with the lowest load

4 Step-by-Step Procedures

The following steps are required to configure SAP Extended Warehouse Management (SAP EWM):

1. Creating the Remote Function Call Destination
2. Specifying the Remote Function Call Destination per Programmable Logic Controller
3. Specifying the Host Information of the Programmable Logic Controllers
4.1 Creating the Remote Function Call Destination

A synchronous Remote Function Call (sRFC) that uses ABAP Push Channel (APC) TCP is used during the start of a communication channel in SAP Extended Warehouse Management (SAP EWM) to connect to a programmable logic controller (PLC) acting as a TCP/IP socket server. This sRFC is in place to realize a context and user switch to achieve the following:

- A dedicated technical user/password can be specified who is used for incoming messages. Thus, this user can be equipped with necessary authorizations and can be monitored easily.
- By specifying a target system group with load balancing the system automatically reacts on system load during channel start. Moreover, in case of downtimes the communication can automatically be moved from one application server to another one if multiple application servers are available in the specified logon group.

Create the RFC destination as follows:

1. Start transaction SM59 in the SAP system.
2. Choose the ABAP Connections folder and create a new entry.
3. Choose the Technical Settings tab page.
4. In the Target System Settings screen area, select Yes for the Load Balancing radio button.
5. For the following steps use the logon information listed in chapter 3.1:
   a. In the Target System field, enter the current SAP EWM system. You must not use a different target system than your SAP EWM system.
   b. Enter details in the Msg. Server and Group fields.
      In the Group field, you can use a dedicated logon group for material flow system (MFS) processes. We recommend that you enter a logon group containing multiple application server instances.

The steps above are shown in the following figure:

<table>
<thead>
<tr>
<th>RFC Destination EWMCLNT001_MFS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RFC Destination</td>
</tr>
<tr>
<td>Connection Type</td>
</tr>
<tr>
<td>Description</td>
</tr>
<tr>
<td>Description 2</td>
</tr>
<tr>
<td>Description 3</td>
</tr>
</tbody>
</table>

Target System Settings

<table>
<thead>
<tr>
<th>Load Balancing Status</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
</table>

Target System

| EWM |

Msg. Server

| EWM |

Group

| MFS |

Save to Database as

| Host | IP Address | EWM |

Gateway Options

<table>
<thead>
<tr>
<th>Gateway Host</th>
<th>Delete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gateway service</td>
<td></td>
</tr>
</tbody>
</table>

6. Choose the Logon & Security tab page and specify the language, client, user, and password of the user mentioned in chapter 3.1.
4.2 Specifying the Remote Function Call Destination per Programmable Logic Controller

After creating the RFC destination, for each PLC you must specify which communication layer and which RFC destination should be used, as follows:

1. Start transaction /SCWM/MFS_PLLC in the SAP system.
2. Choose your PLC and switch to details.
3. In the Communication Layer field, enter SAP ABAP Push Channel TCP Socket Communication Layer.
4. In the Destination field, specify the RFC destination of step 4.1.
5. For monitoring and analysis we recommend that you select the Logging checkbox. However, in high throughput processes consider selecting Logging checkbox to save runtime.

The steps above are shown in the following figure:

![Change View "Maintain PLC": Details](image)

4.3 Specifying the Host Information of the Programmable Logic Controllers

For each communication channel defined for your PLCs, you must specify the corresponding host address (usually its IP address) and port. SAP EWM connects as a socket client to the socket server at the specified address.

Maintain the communication channel settings as follows:

1. Start transaction /SCWM/MFS_CCH in the SAP system.
2. Choose your PLC and communication channel and enter the host and port information.

The steps above are shown in the following figure:

![Change View "Maintain Communication Channel": Overview](image)

Usually, SAP EWM directly connects to PLCs using APC TCP. If you need intermediate middleware, for example, for network topology reasons, you can use SAProuter. You can use SAProuter, for example, to cross network borders in your system landscape. To achieve this, you must set up SAProuter and specify a SAProuter string as the host for your communication channel. The port must also be part of the SAProuter string. Accordingly, the Port field must remain empty.

This example SAProuter string contains the SAProuter’s IP address followed by its port, which is 3299 by default. The second IP address belongs to the PLC followed by the port it uses to communicate with the MFS channel. For more information on SAProuter, see SAP Library for SAP NetWeaver on SAP Help Portal at http://help.sap.com/nw. In SAP Library, choose Function-Oriented View → Application Server → Application Server Infrastructure → Components of SAP NetWeaver Application Server → SAProuter.

4.4 Troubleshooting

- RFC destination defined in step 4.1 is not functional
  a. Start transaction SM59 in the SAP system.
  b. Choose your RFC destination and select the Connection Test button.
  c. Check the details in the Msg.Server and Group field.
  d. Select the Remote Logon button to check user credentials.
     If logon fails, verify the user and password.
- Connection to PLC cannot be established
  a. Start transaction /SCWM/MON for your warehouse number and monitor.
  b. Choose Material Flow System → Communication Channel to query your communication channels.
  c. Select a communication channel and choose the Start Channel method under the More Methods button.
     If there are issues, an application log similar to the one below is displayed:

<table>
<thead>
<tr>
<th>Ty</th>
<th>Message Text</th>
<th>LTxt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Start date/time 15.09.2015 15:21:18,8010190</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Process ID 125562 of server idcElkM</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transaction ID 9BEC890BB43A7CBE100000000000000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Triggering start of communication channel PLC 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Host ID 18.165.118 and port 35000 are used</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Connection refused by server (CONNECTION_REFUSED)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Data transfer to communication layer of PLC failed (Connection refused by server (CONNECTION_REFUSED)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>End date/time 15.09.2015 15:21:19,2308850 (Duration 89,572 ms)</td>
<td></td>
</tr>
</tbody>
</table>

d. If the PLC cannot be reached, verify that the host address maintained in step 4.3 can be reached with operating system means such as ping.

e. If there are other error messages, check the Customizing for communication channels, for example, telegram length and end character, in Customizing for Extended Warehouse Management under Material Flow System (MFS) → Master Data → Communication Channel → Define Communication Channel.

5 Further Information


We recommend that you check SAP Note 1914127 to deal with MFS performance.