2.1 MPI bus

Introduction

The following chapter shows successively all possible hardware constellations enabling a data transfer via the MPI bus.

Detailed bus description

You will find a detailed bus description of the bus system discussed here in *Selection criteria for networks and services*. Selection criteria for networks and services

Structure of the chapter

The chapter MPI bus deals with the following 2 hardware constellations:

Table 2-2

Constellation	Description
CPU connection external	The CPU connection between two individual controllers.
CPU connection internal	CPU connection within a rack without using the backplane bus

Overview of the constellations

Each constellation is described by means of the following 4 information units:

- Description of the connection case

- The matrix of the hardware constellations

- The core information of the available protocols

- An overview of the available sample applications / Getting Started for this constellation

Advantages of this consideration

This consideration enables the purposive selection of the hardware constellation and out of this the selection of the applicable protocol.

All possible hardware constellations within the SIMATIC S7 family will be viewed in each constellation. The following overview of protocols enables a direct selection by comparing the functionalities of the applicable protocols.

2.1.1 CPU connection external

Connection case

The task is to exchange data between two stations assigned to the same MPI bus.

Hardware scheme

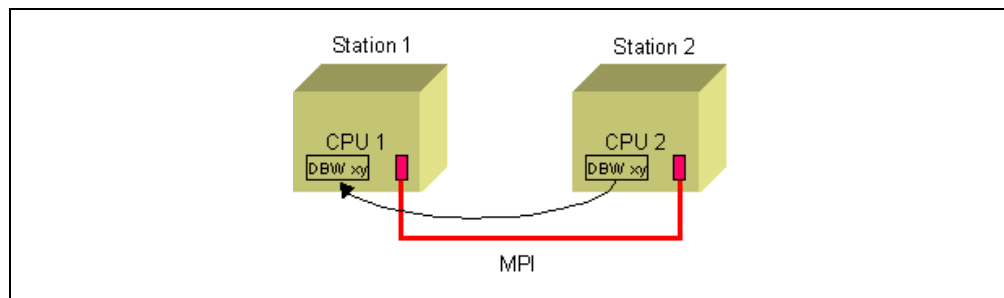This hardware constellation is made up as follows:

Bild 2-1

Both stations, station 1 and station 2, consist of one CPU respectively. They are built up physically separated from each other. And both stations are coupled via the joint MPI bus. The data are to be transferred via this connection.

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Which protocols can I use with this constellation?

The following table shows all applicable protocols for the respective hardware constellations. The following page provides further details of the possible protocols.

Table 2-3

Station 1 / Station 2	S7-200	S7-300	S7-400	WinAC-Slot	WinAC-Basis/RTX (as of V 4.0)
S7-200	**X** (only PPI connection possible)	S7 basis communication (partner 2 as server via XPUT / XGET)	S7 communication (partner 2 as server) S7 basis communication (partner 2 as server via XPUT / XGET)	S7 communication (partner 2 as server) S7 basis communication (partner 2 as server via XPUT / XGET)	S7 communication
S7-300	**X**	S7 basis communication global data	S7 basis communication S7 communication (partner 1 as client partner 2 as server) global data	S7 basis communication S7 communication (partner 1 as client partner 2 as server) global data	S7 communication
S7-400	**X**	S7 basis communication global data	S7 basis communication S7 communication global data	S7 basis communication S7 communication global data	S7 communication
WinAC-Slot	**X**	S7 basis communication global data	S7 basis communication S7 communication global data	S7 basis communication S7 communication global data	S7 communication
WinAC Basis/RTX (ab V 4.0)	**X**	**X**	S7 communication	S7 communication	S7 communication

✕ = not applicable

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Overview of the properties of the MPI bus protocols

With the following overview you can evaluate the properties of the applicable protocols by means of chosen core properties.

Table 2-4

Protocol Service / Criterion	S7 basic communication		S7 communication			Global data
	XPUT / XGET	**XSEND / XRECV**	**BSEND / BRCV**	**USEND / URCV**	**PUT / GET**	
Data range	1 - 84 bytes	1 -76 bytes	1 – 32768 (S7-300) / 65535 (S7-400) bytes	1 – 165 bytes	1 – 165 bytes	1 - 22 bytes (S7-300) / 1 - 64 bytes (S7-400)
Consistency	Only guaranteed when sending	Yes	Throughout the whole length		8 bytes throughout the whole length	Yes
Acknowledgement mechanism	Operating system of the controller		Level 7 implemented	Operating system of the controller		Operating system of the controller
Connected stations	1 – 1 unidirectional	1 – 1 bidirectional	1 – 1 bidirectional		1 – 1 unidirectional	1-1 / 1-n bidirectional
Configuration type	Non-configured connection		Bilaterally configured		Unilaterally configured	Bilaterally configured
Connection type	Dyn. / stat connection Client / Server	Dyn. / stat connection Client / Client	Stat connection Client / Client		Stat. connection Client / Server	Stat connection Client / Client
Performance — Data connection suitable for:	Small data amounts		Medium to large data amounts	Small data amounts		Smallest data amounts
Performance — Evaluation	☞ In case of static connections ☜ In case of dynamic connections		☞			☞
Configuration effort	None		Low			Medium
Pogramming effort	Medium		Medium			Medium
Connection of old systems (S5) / third party systems	No		No			No

Evaluating the performance of the used protocols

The evaluation of the performance statement of the above table is partly made on the basis of the available measurements resulting from the examples of the e-Infoshop and partly on the basis of previous experiences when using protocols.

2.1.2 CPU connection internal

Connection case

The task is to exchange data between two stations which are arranged in the same rack and assigned to the same MPI bus.

Hardware scheme

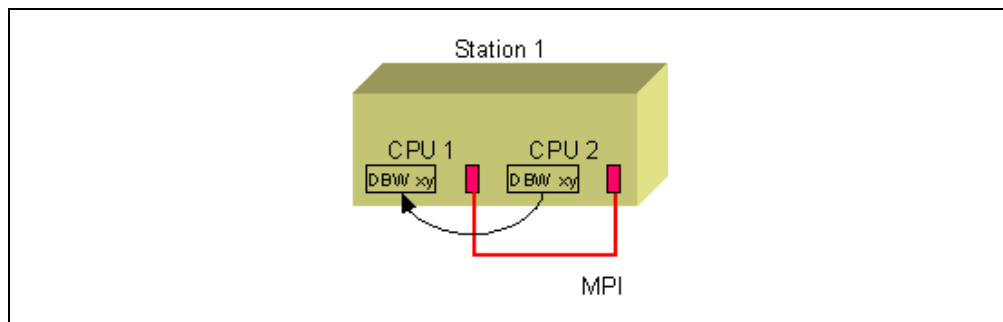This hardware constellation is made up as follows:

Figure 2-2

The stations consist of two CPUs with the respective I/O modules. They are both set up in the same rack. Both stations are additionally coupled via the joint MPI bus, apart from the mutually used communication bus. The data are to be transferred via the MPI bus connection.

Note

The configuration on hand is a special case. The described configuration is usually carried out via the backplane bus connection which can be used, too.

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Which protocols can I use with this constellation?

The following table shows all applicable protocols for the respective hardware constellations. The following page provides further details of the possible protocols.

Table 2-6

Station 1 / Station 2	S7-200	S7-300	S7-400	WinAC-Slot	WinAC-Basis/RTX (ab V 4.0)
S7-200	✕	✕	✕	✕	✕
S7-300	✕	✕	✕	✕	✕
S7-400	✕	✕	S7 basis communication S7 communication global data	✕	✕
WinAC-Slot	✕	✕	✕	✕	✕
WinAC Basis/RTX (ab V 4.0)	✕	✕	✕	✕	✕

✕ = not applicable

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Overview of the properties of the MPI bus protocols

With the following overview you can evaluate the properties of the applicable protocols by means of chosen core properties.

Table 2-7

Protocol Service / Criterion	S7 basic communication		S7 communication			Global data
	XPUT / XGET	**XSEND / XRECV**	**BSEND / BRCV**	**USEND / URCV**	**PUT / GET**	
Data range	1 - 84 bytes	1 -76 bytes	1 – 32768 (S7-300) / 65535 (S7-400) bytes	1 – 165 bytes	1 – 165 bytes	1 - 22 bytes (S7-300) / 1 - 64 bytes (S7-400)
Consistency	Only guaranteed when sending	Yes	Throughout the whole length		8 bytes throughout the whole length	Yes
Acknowledgement mechanism	Operating system of the controller		Level 7 Implemented	Operating system of the controller		Operating system of the controller
Connected stations	1 – 1 unidirectional	1 – 1 bidirectional	1 – 1 bidirectional		1 – 1 unidirectional	1-1 / 1-n bidirectional
Configuration type	Non-configured connection		Bilaterally configured		Unilaterally configured	Bilaterally configured
Connection type	Dyn. / stat connection Client / Server	Dyn. / stat connection Client / Client	Stat connection Client / Client		Stat. connection Client / Server	Stat connection Client / Client
Performance — **Data connection suitable for:**	Small data amounts		Medium to large data amounts	Small data amounts		Smallest data amounts
Performance — **Evaluation**	☞ In case of static connection ♡ In case of dynamic connection		☞			☞
Configuration effort	None		Low			Medium
Pogramming effort	Medium		Medium			Medium
Connection of old systems (S5) / third party systems	No		No			No

Evaluating the performance of the used protocols

The evaluation of the performance statement of the above table is partly made on the basis of the available measurements resulting from the examples of the e-Infoshop and partly on the basis of previous experiences when using protocols.