



Protocol Interface Manual

**MPI (netLINK)**

Language: English

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# 1 Introduction

## 1.1 Netlink Default Parameter

By default the Netlink-MPI is configured on the Ethernet interface to auto-detect between 10/100 Mbaud. The Ethernet RJ 45 connector and its pinning can only be used within a Switch or Hub and not for direct operation at a Notebooks Ethernet card for example. This needs a cross link cable.

The Netlink itself does not have a default IP address to suppress address conflicts when you install Netlink the first time in your Ethernet Network. The IP-Address must be set temporarily at this time via the Hilscher specific NetIdent-Protocol or with a program which supports this functionality. If the Netlink is unconfigured it just reacts on this type of Ethernet broadcast messages. The protocol itself supports multiple Netlinks be active in one Ethernet Segment. After having installed the IP address the Netlink is now reachable for either the IP Device Driver Test program or for the configuration software SyCon. If the Netlink is still unconfigured and you repower it, the NetIdent/SetIp procedure must be redone again.

By default the Netlink has the following MPI-Busparameter be active.

Variable name	Value
Address	0
Baud_rate	187,5 Kbaud
Tsl	415 tBit
min Tsdr	60 tBit
max Tsdr	400 tBit
Tqui	1 tBit
Tset	1 tBit
Ttr	10000 tBit
G	20
HSA	31

These MPI-Parameter can be changed also in accordance to the PROFIBUS communication parameter, so that the Netlink for example can be used for a baudrate up to 12Mbaud.

If the IP address shall be set statically or the MPI-parameter have to be changed in any way, the configuration software SyCon must be used. This tool performs a download of these parameter into the Netlinks flash memory. ATTENTION! If the Netlink is statically configured in its IP address, the NetIdent protocol is enable just only 3 minutes after powering it to prevent missuse during runtime.

The Netlink has two LEDs. The yellow LED reflects the Ethernet-Link status and goes to static on when a Ethernet-link to a switch can be found. The second duo-LED informs about the status of the firmware. If it is flashing acyclic green the Netlink is not configured in its IP-Address, neither via the Netident Protocol nor via static configuration. If it is static green the Netlink is ready for message communication. During bootup-phase this LEDs is flashing fast red for a short time. This is the time that is needed to load the firmware from external serial FLASH memory to the Netlink program memory. A firmware update is also possible via the SyCon configuration tool. When the firmware is loaded and the Netlink is repowered the firmware update is performed. During this time the LED flashes fast green.

## 1.2 Netlink Interface

This manual describes the HOST interface of an Netlink-MPI DEVICE. The aim of this manual is to support the integration of these devices into own applications based on the IP device driver functions.

In general only two types of functions need to be called in the Device Driver to send and receive the data to and from the DEVICE. These functions are DevPutMessage() and DevGetMessage(). DevPutMessage() function is used to send a message to the Device while DevGetMessage() is used to receive the corresponding response from it. Normally one DevPutMessage() command call is followed by one DevGetMessage() command call.

## 2 Message Communication

Via the virtual mailbox interface of the Netlink a protocol-oriented interface is provided. Socalled message are transferred trough the send and receive channel.

A message is a common data structure within the HOST transmits acyclic data to or receives data from the DEVICE. The Netlink is a passive DEVICE and will not automatically send a messages without beeing addressed before by a command message.

A message consists of an 8 byte message header, and optional 8 byte telegram header and up to 247 bytes of user data.

Header	
Message Header	Used by the DEVICE operating system for transporting and address the message.
Telegram Header	Defines the action for the protocol task. MPI 0
User data	Send or receive data.

The message structure is defined in the RCS\_USER.H header file.

Message	Parameter	Type	Explanation
Message Header	msg.rx	byte	Receiver Code
	msg.tx	byte	Transmitter Code
	msg.ln	byte	Data length of the Message
	msg.nr	byte	Identification Code
	msg.a	byte	Response Code
	msg.f	byte	Error Code
	msg.b	byte	Command Code
	msg.e	byte	Extention Code
Telegram Header	msg.device_adr	byte	Remote partner address
	msg.data_area	byte	Data area
	msg.data_adr	word	Data address
	msg.data_idx	byte	Data index
	msg.data_cnt	byte	Data quantity
	msg.data_type	byte	Data type
	msg.function	byte	Function code
Telegram User Data	msg.d[0]	byte	User specific data
	...	...	
	msg.d[x-1]	byte	

*General structure of a message*

## 2.1 The MPI-Interface

The MPI-Interface in the Netlink offers the following functions

MPI function overview		Remark
Connect	See remark for Read/Write	The connection is established automatically when using the first read/write command. The DEVICE remembers the initial parameter until the connection is disconnected.
Read/Write	Read and write Data Block (DB)	The connection is established automatically when using the first read/write command. The DEVICE remembers the initial parameter until the connection is disconnected.
	Read and write Memory (M)	
	Read and write IO (I and Q)	
	Read and write Counter (C)	
	Read and write Timer (T)	
Disconnect	MPI disconnect	-
OP Status	MPI Get OP Status	-

The MPI interface can handle one command (read or write) at a time per remote station only. This means that the HOST can activate one command message to the DEVICE and then has to wait for the answer message from the DEVICE before it is allowed to send the next command to this remote station again.

### 2.1.1 MPI Read and Write Data Block (DB)

Command Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	3	receiver = MPI-Task
	msg.tx	byte	255	transmitter = HOST
	msg.ln	byte		length of message
			8	read access
			9..224	write access
	msg.nr	byte	j	number of the message
	msg.a	byte	0	no answer
	msg.f	byte	0	no error
msg.b	byte	49 (0x31)	command = MPI_Read_Write_DB	
msg.e	byte	0	extension	
Telegram Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte		data area,
			0..255	high byte of offset adress in DB
	msg.data_adr	word		data address,
			0..65535	DB address
	msg.data_idx	byte		data index,
			0..255	low byte of offset address in DB
msg.data_cnt	byte		data count, number of bytes	
		1..216 1..222	to be written or to be read	
msg.data_type	byte		data type bytestring	
		5	TASK_TDT_UINT8	
msg.function	byte		function code	
		1 2	TASK_TFC_READ TASK_TFC_WRITE	
Write Data	msg.d[0]	byte array		in write access data to be written
	... msg.d[x-1]			

This command allows to read or write Data Registers within S7 components which are supporting the MPI protocol. This can be either done via the MPI interface if any is present or the PROFIBUS interface of the remote station. Normally the MPI interface is driven at 187,5kBaud but should be verified with the corresponding configuration tool before calling the command. Via the standard PROFIBUS line the baudrate is relevant which is configured for the whole PROFIBUS network. Ensure that all active (master) station have the same bus parameter settings, especially the Baudrate, the Highest Station Address and the Target Rotation Time.

If the MPI connection to the remote station is not established and the command is called, the DEVICE automatically establishes the connection in the background before accessing the registers.

The access is divided into 4 parameters. First the remote station address must be specified which is addressed during the access. It's either the MPI address of the remote component or its PROFIBUS address. It depends which physical interface is used for the connection. The value must be fixed in `msg.device_adr`. A range from 0 to 126 is possible. As next the DB value must be set in `msg.data_adr`. Allowed values are 0 to 65535. Within the DB there can be an offset specified from where the data is read or where the data is written to. The offset is splitted into 2 values. The offset is caculated by  $\text{offset} = \text{msg.data\_area} * 256 + \text{msg.data\_idx}$ . With that a range of 0 to 65535 is possible. The `msg.data_cnt` is the number of bytes to be read or written. The maximum value here is 222 bytes for read respectively 216 bytes for write. The value in `msg.function` specifies a read or write command.

Command Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	255	receiver = HOST
	msg.tx	byte	3	transmitter = MPI-Task
	msg.ln	byte	9..230	length of message read access
			8	write access
	msg.nr	byte	j	number of the message
	msg.a	byte	49 (0x31)	answer = MPI_Read_Write_DB
	msg.f	byte	f	error, see chapter error definitions in MPI
	msg.b	byte	0	no command
msg.e	byte	0	extension	
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0..255	data area, high byte of offset adress in DB
			0..65535	data address, DB address
	msg.data_idx	byte	0..255	data index, low byte of offset address in DB
	msg.data_cnt	byte	1..216	data count, number of bytes to be written or
			1..222	to be read
	msg.data_type	byte	5	data type bytestring TASK_TDT_UINT8
msg.function	byte	1	function code TASK_TFC_READ	
		2	TASK_TFC_WRITE	
Read Data	msg.d[0] ... msg.d[x-1]	byte array		in read access data which was read

In case of a read command the answer message contains in msg.d[...] area the data from the DB. In case of a write command just the extended message is delivered back. If an error happened during the access the variable msg.f contains a value unequal 0. The definitions of the error codes can be read in the chapter 'Error code definition in MPI response messages'.

### 2.1.2 MPI Read and Write Memory (M)

Command Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	3	receiver = MPI-Task
	msg.tx	byte	255	transmitter = HOST
	msg.ln	byte		length of message
			8	read access
			9..224	write access
	msg.nr	byte	J	number of the message
	msg.a	byte	0	no answer
	msg.f	byte	0	no error
msg.b	byte	0x33	command = MPI_Read_Write_M	
msg.e	byte	0	Extension	
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word		data address, Memory address
			0..65535	
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte		data count, number of bytes
			1..216 1..222	to be written or to be read
msg.data_type	byte		data type bytestring	
		5	TASK_TDT_UINT8	
msg.function	byte		function code	
		1 2	TASK_TFC_READ TASK_TFC_WRITE	
Write Data	msg.d [0] [0...(x-1)]	byte array		in write access data to be written

This command allows to read or write Merker Registers within S7 components which are supporting the MPI protocol. This can be either done via the MPI interface if any is present or the PROFIBUS interface of the remote station. Normally the MPI interface is driven at 187,5kBaud but should be verified with the corresponding configuration tool before calling the command. Via the standard PROFIBUS line the baudrate is relevant which is configured for the whole PROFIBUS network. Ensure that all active (master) station have the same bus parameter settings, especially the Baudrate, the Highest Station Address and the Target Rotation Time. If the MPI connection to the remote station is not established and the command is called, the DEVICE automatically establishes the connection in the background before accessing the registers. The access is divided into 3 parameter. First the remote station address must be specified which is addressed during the access. It's either the MPI address of the remote component or its PROFIBUS address. It depends which physical interface is used for the connection. The value must be fixed in msg.device\_adr.

A range from 0 to 126 is possible. As next the Merkerbyte offset value must be set in msg.data\_adr. Allowed values are 0 to 65535. The msg.data\_cnt is the number of bytes to be read or written. The maximum value here is 222 bytes for read respectively 216 bytes for write. The value in msg.function specifies a read or write command.

Response Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	255	receiver = HOST
	msg.tx	byte	3	transmitter = MPI-Task
	msg.ln	byte	9..230 8	length of message read access write access
	msg.nr	byte	j	number of the message
	msg.a	byte	0x33	answer = MPI_Read_Write_M
	msg.f	byte	F	error, see chapter error definitions in MPI
	msg.b	byte	0	no command
	msg.e	byte	0	Extension
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0..65534	data address, Merker address
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	1..216 1..222	data count, number of bytes which were written or which are read
	msg.data_type	byte	5	data type bytestring TASK_TDT_UINT8
	msg.function	byte	1 2	function code TASK_TFC_READ TASK_TFC_WRITE
Read Data	msg.d [0] [0...(x-1)]	byte array		in read access data which was read

In case of a read command the answer message contains in msg.d[...] area the data from the Merker area. In case of a write command just the extended message header is delivered back. If an error happened during the access the variable msg.f contains a value unequal 0. The definitions of the error codes can be read in the chapter 'Error code definition in MPI response messages'.

### 2.1.3 MPI Read and Write IO (I and Q)

Command Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	3	receiver = MPI-Task
	msg.tx	byte	255	transmitter = HOST
	msg.ln	byte	8	length of message read access
			9..224	write access
	msg.nr	byte	J	number of the message
	msg.a	byte	0	no answer
	msg.f	byte	0	no error
	msg.b	byte	0x34	command = MPI_Read_Write_IO
msg.e	byte	0	Extension	
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, input area
			1	output area
	msg.data_adr	word	0..65535	data address, IO address
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	1..216	data count, number of bytes to be written or
			1..222	to be read
msg.data_type	byte	5	data type bytestring TASK_TDT_UINT8	
msg.function	byte	1	function code TASK_TFC_READ	
		2	TASK_TFC_WRITE	
Write Data	msg.d [0] [0...(x-1)]	byte array		in write access data to be written

This command allows to read or write IO Registers within S7 components which are supporting the MPI protocol. This can be either done via the MPI interface if any is present or the PROFIBUS interface of the remote station. Normally the MPI interface is driven at 187,5kBaud but should be verified with the corresponding configuration tool before calling the command. Via the standard PROFIBUS line the baudrate is relevant which is configured for the whole PROFIBUS network. Ensure that all active (master) station have the same bus parameter settings, especially the Baudrate, the Highest Station Address and the Target Rotation Time.

If the MPI connection to the remote station is not established and the command is called, the DEVICE automatically establishes the connection in the background before accessing the registers.

The access is divided into 4 parameters. First the remote station address must be specified which is addressed during the access. It's either the MPI address of the remote component or its PROFIBUS address. It depends which physical interface is used for the connection. The value must be fixed in msg.device\_adr. A range from 0 to 126 is possible. The parameter msg.data\_area selects the input area = 0 or the output area = 1. As next the IO-Byte offset address must be set in msg.data\_adr. Allowed values are 0 to 65535. The msg.data\_cnt is the number of bytes to be read or written. The maximum value here is 222 bytes for read respectively 216 bytes for write. The value in msg.function specifies a read or write command.

Response Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	255	receiver = HOST
	msg.tx	byte	3	transmitter = MPI-Task
	msg.ln	byte	9..230	read access
			8	write access
	msg.nr	byte	j	number of the message
	msg.a	byte	0x34	answer = MPI_Read_Write_IO
	msg.f	byte	F	error, see chapter error definitions in MPI
	msg.b	byte	0	no command
msg.e	byte	0	Extension	
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	input area
			1	output area
	msg.data_adr	word	0..65535	data address, IO address
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	1..216	data count, number of bytes which were written or
			1..222	which are read
msg.data_type	byte	5	data type bytestring TASK_TDT_UINT8	
msg.function	byte	1	function code TASK_TFC_READ	
		2	TASK_TFC_WRITE	
Read Data	msg.d [0] [0...(x-1)]	byte array		in read access data which was read

In case of a read command the answer message contains in msg.d[...] area the data from the I or O area. In case of a write command just the extended message header is delivered back. If an error happened during the access the variable msg.f contains a value unequal 0. The definitions of the error codes can be read in the chapter 'Error code definition in MPI response messages'.

### 2.1.4 MPI Read and Write Counter (C)

Command Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	3	receiver = MPI-Task
	msg.tx	byte	255	transmitter = HOST
	msg.ln	byte		length of message
			8	read access
			10..224	write access
	msg.nr	byte	J	number of the message
	msg.a	byte	0	no response
	msg.f	byte	0	no error
msg.b	byte	0x35	command = MPI_Read_Write_Cnt	
msg.e	byte	0	Extension	
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word		data address, counter address
			0..65535	
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte		data count, number of counters
			1..108 1..111	to be written or to be read
msg.data_type	byte		data type word	
		6	TASK_TDT_UINT16	
msg.function	byte		function code	
		1 2	TASK_TFC_READ TASK_TFC_WRITE	
Write Data	msg.d [0] [0...(x-1)]	byte array		in write access data to be written

This command allows to read or write Counter Registers within S7 components which are supporting the MPI protocol. This can be either done via the MPI interface if any is present or the PROFIBUS interface of the remote station. Normally the MPI interface is driven at 187,5kBaud but should be verified with the corresponding configuration tool before calling the command. Via the standard PROFIBUS line the baudrate is relevant which is configured for the whole PROFIBUS network. Ensure that all active (master) station have the same bus parameter settings, especially the Baudrate, the Highest Station Address and the Target Rotation Time.

If the MPI connection to the remote station is not established and the command is called, the DEVICE automatically establishes the connection in the background before accessing the registers.

The access is divided into 3 parameters. First the remote station address must be

specified which is addressed during the access. It's either the MPI address of the remote component or its PROFIBUS address. It depends which physical interface is used for the connection. The value must be fixed in msg.device\_adr. A range from 0 to 126 is possible. As next the Counter start offset address must be set in msg.data\_adr. Allowed values are 0 to 65535. The msg.data\_cnt is the number of counters to be read or written. The maximum value here is 111 counters for read respectively 108 counters for write. The value in msg.function specifies a read or write command.

Response Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	255	receiver = HOST
	msg.tx	byte	3	transmitter = MPI-Task
	msg.ln	byte	9..230	read access
			8	write access
	msg.nr	byte	j	number of the message
	msg.a	byte	0x35	answer = MPI_Read_Write_Cnt
	msg.f	byte	F	error, see chapter error definitions in MPI
	msg.b	byte	0	no command
msg.e	byte	0	Extension	
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0..65535	data address, Counter address
			0	data index, unused
	msg.data_cnt	byte	1..108	data count, number of counter which were written or
			1..111	which are read
	msg.data_type	byte	6	data type bytestring TASK_TDT_UINT16
msg.function	byte	1	function code TASK_TFC_READ	
		2	TASK_TFC_WRITE	
Read Data	msg.d [0] [0...(x-1)]	byte array		in read access data which was read

In case of a read command the answer message contains in msg.d[...] area the data from the counter(s). In case of a write command just the extended message header is delivered back. If an error happened during the access the variable msg.f contains a value unequal 0. The definitions of the error codes can be read in the chapter 'Error code definition in MPI response messages'.

### 2.1.5 MPI Read and Write Timer (T)

Command Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	3	receiver = MPI-Task
	msg.tx	byte	255	transmitter = HOST
	msg.ln	byte		length of message
			8	read access
			10..224	write access
	msg.nr	byte	J	number of the message
	msg.a	byte	0	no answer
	msg.f	byte	0	no error
msg.b	byte	0x36	command = MPI_Read_Write_Tim	
msg.e	byte	0	Extension	
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word		data address, timer address
			0..65535	
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte		data count, number of timers
			1..108 1..111	to be written or to be read
msg.data_type	byte		data type word	
		6	TASK_TDT_UINT16	
msg.function	byte		function code	
		1 2	TASK_TFC_READ TASK_TFC_WRITE	
Write Data	msg.d [0] [0...(x-1)]	byte array		in write access data to be written

This command allows to read or write Timer Registers within S7 components which are supporting the MPI protocol. This can be either done via the MPI interface if any is present or the PROFIBUS interface of the remote station. Normally the MPI interface is driven at 187,5kBaud but should be verified with the corresponding configuration tool before calling the command. Via the standard PROFIBUS line the baudrate is relevant which is configured for the whole PROFIBUS network. Ensure that all active (master) station have the same bus parameter settings, especially the Baudrate, the Highest Station Address and the Target Rotation Time. If the MPI connection to the remote station is not established and the command is called, the DEVICE automatically establishes the connection in the background before accessing the registers. The access is divided into 3 parameters. First the remote station address must be specified which is addressed during the access. It's either the MPI address of the remote component or its PROFIBUS address. It depends which physical interface is used for the connection. The value must be fixed in msg.device\_adr.

A range from 0 to 126 is possible. As next the Timer start offset address must be set in msg.data\_adr. Allowed values are 0 to 65535. The msg.data\_cnt is the number of timers to be read or written. The maximum value here is 111 timers for read respectively 108 timers for write. The value in msg.function specifies a read or write command.

Response Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	255	receiver = HOST
	msg.tx	byte	3	transmitter = MPI-Task
	msg.ln	byte	9..230 8	length of message read access write access
	msg.nr	byte	j	number of the message
	msg.a	byte	0x36	answer = MPI_Read_Write_Tim
	msg.f	byte	F	error, see chapter error definitions in MPI
	msg.b	byte	0	no command
	msg.e	byte	0	Extension
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0..65535	data address, Counter address
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	1..108 1..111	data count, number of timers which were written or which are read
	msg.data_type	byte	6	data type word TASK_TDT_UINT16
	msg.function	byte	1 2	function code TASK_TFC_READ TASK_TFC_WRITE
Read Data	msg.d [0] [0...(x-1)]	byte array		in read access data which was read

In case of a read command the answer message contains in msg.d[...] area the data from the timer(s). In case of a write command just the extended message header is delivered back. If an error happened during the access the variable msg.f contains a value unequal 0. The definitions of the error codes can be read in the chapter 'Error code definition in MPI response messages'.

### 2.1.6 MPI Disconnect

Command Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	3	receiver = MPI-Task
	msg.tx	byte	255	transmitter = HOST
	msg.ln	byte	8	length of message
	msg.nr	byte	J	number of the message
	msg.a	byte	0	no answer
	msg.f	byte	0	no error
	msg.b	byte	0x3F	command = MPI_Disconnect
	msg.e	byte	0	Extension
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0	data address, unused
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	0	data count, unused
	msg.data_type	byte	0	data type unused
	msg.function	byte	0	function code unused

While the DEVICE automatically establishes the connection to the remote station if not connected previously to it, the disconnect command must be executed by the HOST application. This service should be executed after having finished the access to the station to close the connection properly and the reserved communication channels (SAPs) are freed again.

Response Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	255	receiver = HOST
	msg.tx	byte	3	transmitter = MPI-Task
	msg.ln	byte	8	length of message
	msg.nr	byte	j	number of the message
	msg.a	byte	0x3F	Response = MPI_Disconnect
	msg.f	byte	F	error, see chapter error definitions in MPI
	msg.b	byte	0	no command
	msg.e	byte	0	Extension
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0	data address, unused
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	0	data count unused
	msg.data_type	byte	0	data type unused
	msg.function	byte	0	function code unused

### 2.1.7 MPI Get OP Status

Command Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	3	receiver = MPI-Task
	msg.tx	byte	255	transmitter = HOST
	msg.ln	byte	8	length of message
	msg.nr	byte	J	number of the message
	msg.a	byte	0	no answer
	msg.f	byte	0	no error
	msg.b	byte	0x32	command = MPI_Get_OP_Status
	msg.e	byte	0	Extension
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0	data address, unused
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	0	data count, unused
	msg.data_type	byte	0	data type unused
	msg.function	byte	0	function code unused

This service provides the possibility to read out the current operational status of the remote station. The remote address must be set in msg.device\_adr. If an error happened during the access the variable msg.f contains a value unequal 0. The definitions of the error codes can be read in the chapter 'Error code definition in MPI response messages'.

Response Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	255	receiver = HOST
	msg.tx	byte	3	transmitter = MPI-Task
	msg.ln	byte	10	length of message
	msg.nr	byte	j	number of the message
	msg.a	byte	0x32	Response = MPI_MPI_Get_OP_Status
	msg.f	byte	F	error, see chapter error definitions in MPI
	msg.b	byte	0	no command
	msg.e	byte	0	Extension
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0	data address, unused
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	0	data count unused
	msg.data_type	byte	0	data type unused
	msg.function	byte	0	function code unused
OP_STATUS	Msg.d[0-1]	Word	0 1 2 3	Operational status STOP START RUN UNKNOWN

### 2.1.8 MPI Transparent (Experts use only)

Command Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	3	receiver = MPI-Task
	msg.tx	byte	255	transmitter = HOST
	msg.ln	byte	12	length of message
	msg.nr	byte	J	number of the message
	msg.a	byte	0	no answer
	msg.f	byte	0	no error
	msg.b	byte	0x30	command = MPI_Transparent
	msg.e	byte	0	Extension
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0	data address, unused
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	0	data count, unused
	msg.data_type	byte	0	data type unused
	msg.function	byte	0	function code unused
Message Data	Msg.d[0]	byte	A	MPI Function Code Octet 1
	Msg.d[1]	byte	B	MPI Function Code Octet 2
	Msg.d[2]	byte	C	MPI Function Code Octet 3
	Msg.d[3]	byte	D	MPI Function Code Octet 4

This service provides the possibility to read out different types of information from the MPI remote station transparently. ATTENTION! You have to be a MPI-Protocol Expert to use this function.

The remote address must be set in msg.device\_adr. If an error happened during the access the variable msg.f contains a value unequal 0. The definitions of the error codes can be read in the chapter 'Error code definition in MPI response messages'. The MPI function code that is intend to use is coded in a 4 bytes character stream within the MPI-Protocol itself. This data must be set up in the 4 byte msg.d[0-3] code octets of the request message and is placed into the physical request message on MPI. The function codes themselves are not defined here in this manual and are Siemens confidential. But MPI-Protocol familiar HOSTs who knows these codes, are able to get information from the MPI remote station transparently with this kind of message.

Response Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	255	receiver = HOST
	msg.tx	byte	3	transmitter = MPI-Task
	msg.ln	byte	8+x	length of message
	msg.nr	byte	j	number of the message
	msg.a	byte	0x30	Response = MPI_Transparent
	msg.f	byte	F	error, see chapter error definitions in MPI
	msg.b	byte	0	no command
	msg.e	byte	0	Extension
Extended Message Header	msg.device_adr	byte	0..126	remote station address
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0	data address, unused
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	0	data count unused
	msg.data_type	byte	0	data type unused
	msg.function	byte	0	function code unused
OP_STATUS	Msg.d[...]	Byte array		returned MPI Data package based on the given function code octects in the request message

### 2.1.9 MPI Disconnect List

If FDL Messages are used with the netLINK or NT 40-MPI to build up a MPI communication, this is transparent for both devices. In case of a TCP connection timeout, the devices can send a MPI disconnect command. Therefore the following messages are to configure this behaviour.

The DEVICE provides one disconnect list for each TCP/IP-connection. With this command, the list of the TCP/IP-connection, on which this command is sent, can be set, cleared and read back.

For each disconnect list, up to 4 commands for the netLINK and up to 32 commands for the NT 40-MPI can be configured by sending this command with parameter `msg.function = 2`. Parameter `msg.data_cnt` gives the number of MPI-close commands, which will be sent by the DEVICE if the TCP/IP-connection is lost. If parameter `msg.data_cnt` is zero, the disconnect list will be cleared. With parameter `msg.function = 1`, the actual disconnect list of the TCP/IP-connection can be read.

After the disconnect list has been processed, the disconnect list will also be cleared.

Command message:

Command Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	3	receiver = MPI-Task
	msg.tx	byte	255	transmitter = HOST
	msg.ln	byte	8 8..104	length of message for reading list length of message for writing list
	msg.nr	byte	J	number of the message
	msg.a	byte	0	no answer
	msg.f	byte	0	no error
	msg.b	byte	0x3E	command = MPI_Disconnect_List
	msg.e	byte	0	Extension
Extended Message Header	msg.device_adr	byte	0	Device address unused
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0	data address, unused
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	0..32	data count, number of commands in disconnect list
	msg.data_type	byte	0	data type unused
	msg function.	byte	1 2	function Read List Write List
Message Data	Msg.d[0]	byte		Local SAP, command 1
	Msg.d[1]	byte		Remote SAP, command 1
	Msg.d[2]	byte		Remote address, command 1
	Msg.d[3]	byte		Local SAP, command 2
	..	..	..	..
	Msg.d[103]	byte		Remote address, command 32

Response message:

Response Message	Variable	Type	Value	Explanation
Message Header	msg.rx	byte	255	receiver = HOST
	msg.tx	byte	3	transmitter = MPI-Task
	msg.ln	byte	8..104	length of message
	msg.nr	byte	j	number of the message
	msg.a	byte	0x3E	Response = MPI_Disconnect_List
	msg.f	byte	0	No error / success
			151	Invalid message size
			158	Message already running
			161	Invalid device address
165			Invalid data count	
167			Invalid function	
msg.b	byte	0	no command	
msg.e	byte	0	Extension	
Extended Message Header	msg.device_adr	byte	0	Device address unused
	msg.data_area	byte	0	data area, unused
	msg.data_adr	word	0	data address, unused
	msg.data_idx	byte	0	data index, unused
	msg.data_cnt	byte	0..32	data count, number of commands in disconnect list
	msg.data_type	byte	0	data type unused
	msg.function	byte		function
1 2			Read List Write List	
Message Data	Msg.d[0]	byte		Local SAP, command 1
	Msg.d[1]	byte		Remote SAP, command 1
	Msg.d[2]	byte		Remote address, command 1
	Msg.d[3]	byte		Local SAP, command 2
	..	..	..	..
	Msg.d[103]	byte		Remote address, command 32

### 2.1.10 Error Codes Definitions in MPI Response Messages

error code	signification	error source	help
0 = CON_OK	service could be executed without an error		
1 = CON_UE	timeout from remote station	remote station	remote station has not responded within 1 sec. timeout
2 = CON_RR	resource unavailable	remote station	remote station has no left buffer space for the requested service
3 = CON_RS	requested function of master is not activated within the remote station.	remote station	the connection seems to be closed in the remote station. try to send command again.
17 = CON_NA	no response of the remote station	remote station	check network wiring, check remote address, check baud rate
18 = CON_DS	master not into the logical token ring	Network in general	check master DP-Address or highest-station-Address of other masters. Examine bus wiring to bus short circuits.
20 = CON_LR	Resource of the local FDL controller not available or not sufficient.	HOST	too many messages. no more segments in DEVICE free
21 = CON_IV	the specified msg.data_cnt parameter invalid	HOST	check the limit of 222 bytes (read) respectively 216 bytes (write) in msg.data_cnt
48 = CON_TO	timeout, the request message was accepted but no indication is sent back by the remote station	remote station	MPI protocol error, or station not presenter
57 = CON_SE	Sequence fault, internal state machine error. Remote station does not react like awaited or a reconnection was retried while connection is already open or device has no SAPs left to open connection channel	remote station	in case of sequence fault consult support center else retry request service again
0x85 = REJ_IV	specified offset address out of limits or not known in the remote station	HOST	please check msg.data_adr if present or offset parameter in request message
0x86 = REJ_PDU	wrong PDU coding in the MPI response of the remote station	DEVICE	contact hotline
0x87 = REJ_OP	specified length to write or to read results in an access outside the limits	HOST	please check msg.data_cnt length in request message
0x88 = REJ_HW	specified address not defined in the remote station	HOST	please check msg.data_adr in the request message
0x89 = REJ_MODE	MPI remote station not in the right operational mode	remote station	bring S7 into RUN-P Mode

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