Redundant Open User Communication

LComRed Library

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1 Introduction

1.1 Overview

The TCON block is used for programmed connections when establishing a connection via Open User Communication (OUC). However, this does not provide the option of an alternative connection path in the event of a connection fault.

LComRed blocks expand functionality of the TCON blocks with monitoring and automatic connection switchover for up to four lower-level connections.

1.2 Principle of operation

Die LComRed blocks search for an active connection from the available connection parameters. A test connection is additionally established between both communication partners for fast connection diagnostics and monitored by means of test telegrams. If the monitoring determines a connection fault, the test connection and active connection are disconnected and a search is initiated for a new active connection.

1.3 Components used

This application example consists of the following libraries:

Table 1-1

Component	File name	Note
LComRed Library for TIA Portal V15.1	LComRed_Library	
LComRed Classic for STEP 7 ≥ Version 5.5	LComRedClassic	

The LComRed_Library library comprises the following standardized blocks. The specified PLC data types are used internally in the function blocks and copied automatically to the PLC program as required by inserting one of the LComRed blocks.

Table 1-2

Component	Type	Note
LComRed_ISOonTCP	Function block	
LComRed_TCP	Function block	
LComRed_ISOonTCP_Classic	Function block	
LComRed_typeTConHandlingRFC	PLC data type	Internal data type
LComRed_typeTConHandlingV4	PLC data type	Internal data type
LComRed_typeTConRedTestTelegramm	PLC data type	Internal data type
LComRed_typeTDisconHandling	PLC data type	Internal data type
LComRed_typeTRcvHandling	PLC data type	Internal data type
LComRed_typeTSendHandling	PLC data type	Internal data type

The LComRed_Library library can be used in the TIA Portal V15.1 with the following hardware or the following hardware families:

Table 1-3

Component	Article number	Version	Note
S7-1200	6ES7 21.-…..-….	≥ 4.2	
S7-1500	6ES7 51.-…..-….	≥ 2.5	
S7-1517H	6ES7 517-3HP00-0AB0	≥ 2.6	
S7-1515R	6ES7 515-2RM00-0AB0	≥ 2.6	
S7-1513R	6ES7 513-1RL00-0AB0	≥ 2.6	
S7-300	6ES7 31.-…..-0AB0	≥ 3.2	
S7-400	6ES7 41.-…..-0AB0	≥ 6.0	

The STEP 7 Library LComRedClassic contains the following block:

Table 1-4

Component	Type	Note
LComRed_ISOonTCP	Function block	

The STEP 7 Library LComRedClassic can be used on the following hardware or the following hardware families:

Table 1-5

Component	Article number	Version	Note
S7-300	6ES7 31.-…..-0AB0	≥ 3.2	
S7-400	6ES7 41.-…..-0AB0	≥ 6.0	

2 Engineering

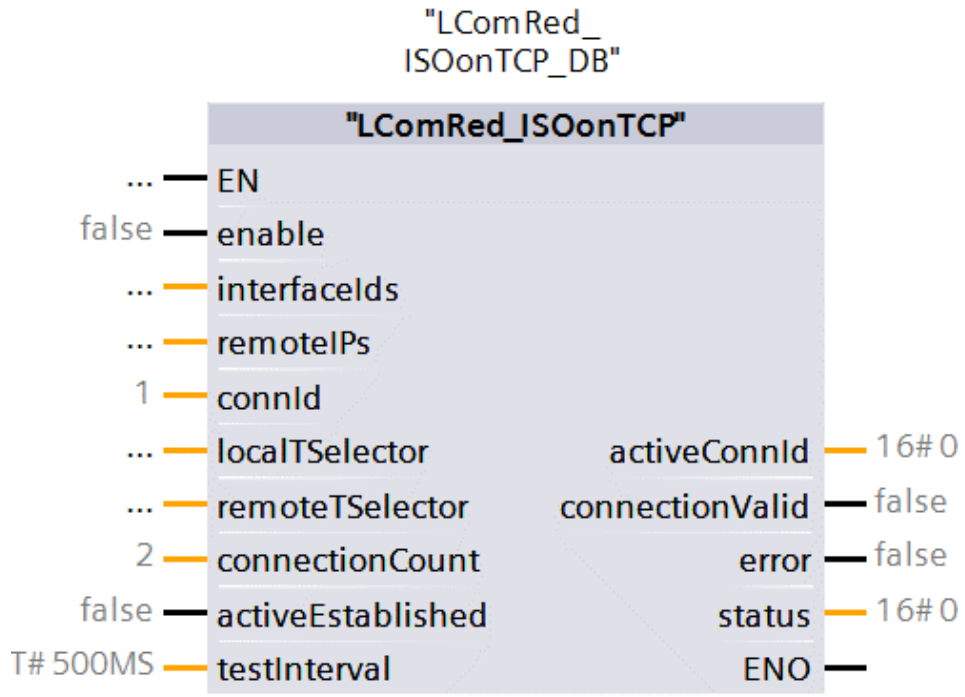
2.1 Interface description

Select parameters of the TCON Connect interface were summarized to reduce the time and effort required for parameterization of the LComRed blocks. Definition of an individual Connect data record for each of the maximum four connections is not necessary. With the exception of the communication partner's IPs and the HW_IDs of the local communication interfaces, the remaining values are based on one start value or are determined on this basis.

This simplified operation, however, cannot be not fully utilized for communication between S7-300/400 and S7-1200/1500 for the LComRed Classic blocks. The Connect data record on the side of the S7-300/400 controller family includes information regarding the interface to be used and its position, thus preventing a generation based on start values.

2.1.1 LComRed_ISOonTCP (S7-1200/1500)

Figure 2-1



Inputs of the LComRed_ISOonTCP

Table 2-1

Input	Type	Start value	Note
enable	Bool	False	Activates the connection establishment and monitoring
interfaceIds	Array[1..4] of HW_ANY	-	Hardware IDs of the local interfaces
remoteIPs	Array[1..4] of IP_V4	-	IP addresses of the partner endpoint

Input	Type	Start value	Note
connId	UInt	1	Start value for connection reference
localTSelector	TSelector	-	TSelector start value of the local connection partner
remoteTSelector	TSelector	-	TSelector start value of the removed connection partner
connectionCount	UInt	2	Number of connection paths (min = 2, max = 4)
activeEstablished	Bool	False	ID for type of connection establishment • FALSE: Passive connection establishment • TRUE: Active connection establishment
testInterval	Time	T#500ms	Test telegram cycle

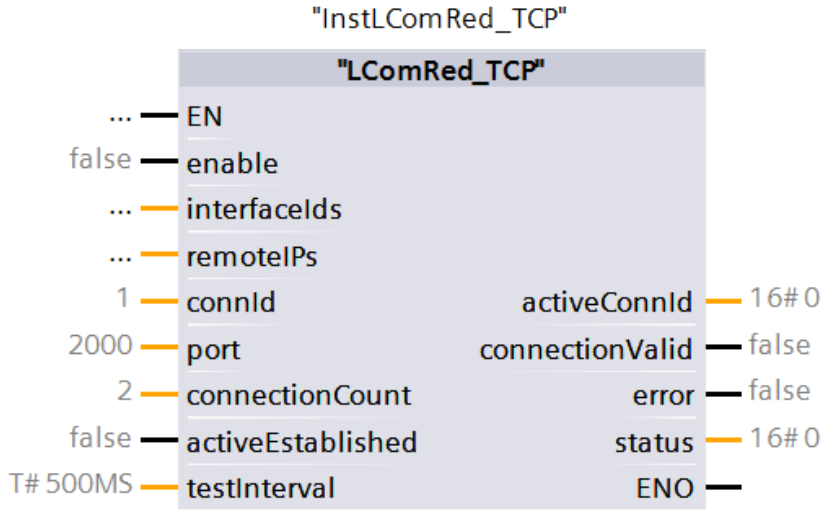
Outputs of the LComRed_ISOonTCP

Table 2-2

Output	Type	Note
activeConnId	CONN_OUC	Reference to the active communication connection
connectionValid	Bool	Status of the active communication connection
status	Word	Status of the instruction
error	Bool	Error status, refer to status for cause

2.1.2 LComRed_TCP

Figure 2-2



Inputs of the LComRed_TCP

Table 2-3

Input	Type	Start value	Note
enable	Bool	False	Activates the connection establishment and monitoring
interfaceIds	Array[1..4] of HW_ANY	-	Hardware IDs of the local interfaces
remoteIPs	Array[1..4] of IP_V4	-	IP addresses of the partner endpoint
connId	UInt	1	Start value for connection reference
port	UInt	2000	Start value port address of the passive connection partner
connectionCount	UInt	2	Number of connection paths (min = 2, max = 4)
activeEstablished	Bool	False	ID for type of connection establishment • FALSE: Passive connection establishment • TRUE: Active connection establishment
testInterval	Time	T#500ms	Test telegram cycle

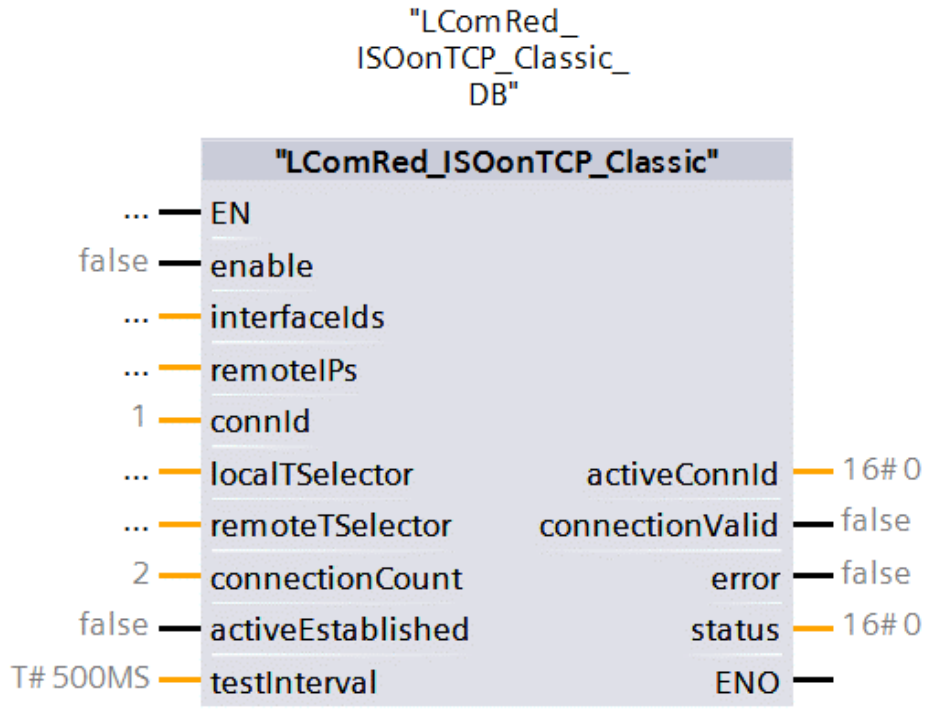
Outputs of the LComRed_TCP

Table 2-4

Output	Type	Note
activeConnId	CONN_OUC	Reference to the active communication connection
connectionValid	Bool	Status of the active communication connection
status	Word	Status of the instruction
error	Bool	Error status, refer to status for cause

2.1.3 LComRed_ISOonTCP_Classic (S7-1200/1500)

Figure 2-3



Inputs of the LComRed_ISOonTCP_Classic

Table 2-5

Input	Type	Start value	Note
enable	Bool	False	Activates the connection establishment and monitoring
interfaceIds	Array[1..4] of HW_ANY	-	Hardware IDs of the local interfaces
remoteIPs	Array[1..4] of IP_V4	-	IP addresses of the partner endpoint
connId	UInt	1	Start value for connection reference
localTSelector	Array[1..4] of TSelector	-	TSelectors of the local connection partner
remoteTSelector	Array[1..4] of TSelector	-	TSelectors of the remote connection partner
connectionCount	UInt	2	Number of connection paths (min = 2, max = 4)
activeEstablished	Bool	False	ID for type of connection establishment • FALSE: Passive connection establishment TRUE: Active connection establishment
testInterval	Time	T#500ms	Test telegram cycle

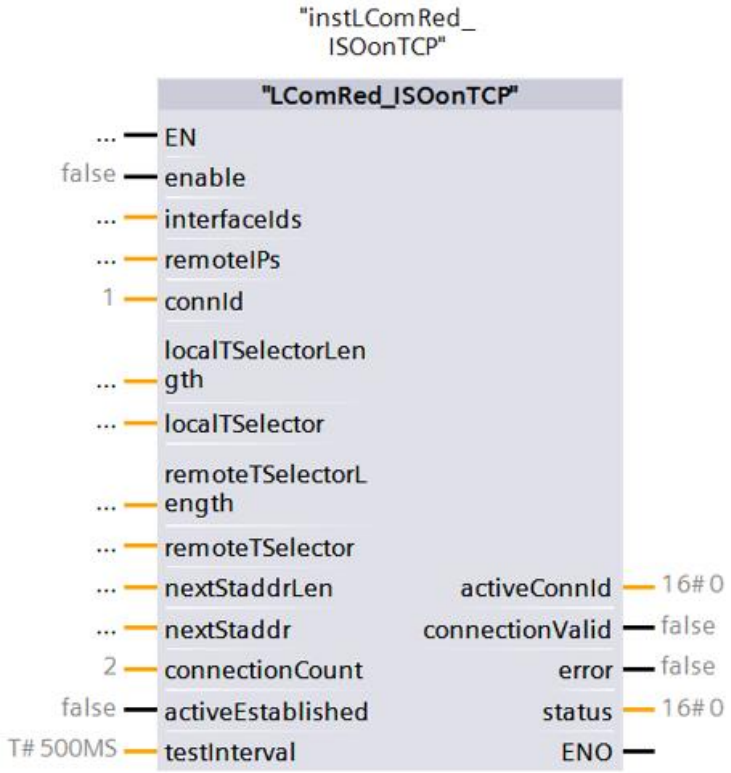
Outputs of the LComRed_ISOonTCP_Classic

Table 2-6

Output	Type	Note
activeConnId	CONN_OUC	Reference to the active communication connection
connectionValid	Bool	Status of the active communication connection
error	Bool	Error status, refer to status for cause
status	Word	Status of the instruction

2.1.4 LComRed_ISOonTCP (S7-300/400)

Figure 2-4



Inputs of the LComRed_ISOonTCP

Table 2-6

Input	Type	Start value	Note
enable	Bool	False	Activates the connection establishment and monitoring
interfaceIds	Array[1..4] of byte	-	Corresponds to the local_device_id of the TCON
remoteIPs	Array[1..4, 1..4] of byte	-	IP addresses of the partner endpoint
connId	Int	1	Start value for connection reference
localTSelectorLength	Array[1..4] of byte	-	Length of the TSelectors of the local connection partner
localTSelector	Array[1..4, 1..16] of byte		TSelectors of the local connection partner
remoteTSelectorLength	Array[1..4] of byte	-	Length of the TSelectors of the remote connection partner
remoteTSelector	Array[1..4, 1..16] of byte		TSelectors of the remote connection partner
nextStaddrLen	Array[1..4] of byte		Length of the nextStaddrLen parameter
nextStaddr	Array[1..4,		Rack and slot for the

Input	Type	Start value	Note
	1..6] of byte		communications interface
connectionCount	Int	2	Number of connection paths (min = 2, max = 4)
activeEstablished	Bool	False	ID for type of connection establishment • FALSE: Passive connection establishment TRUE: Active connection establishment
testInterval	Time	T#500ms	Test telegram cycle

Outputs of the LComRed_ISOonTCP

Table 2-7

Output	Type	Note
activeConnId	Word	Reference to the active communication connection
connectionValid	Bool	Status of the active communication connection
error	Bool	Error status, refer to status for cause
status	Word	Status of the instruction

2.2 Integration in the user project

2.2.1 LComRed_Library

The LComRed blocks of the LComRed_Library Library are encoded and stored as typified blocks. They can be integrated in the user program via drag and drop. Internally used PLC data types are also adopted automatically.

Ensure that the correct version of the blocks is used accordingly, otherwise you will be prompted to enter the block password for Compile.

The following versions are available in the library:

- S7-1200
- S7-1500 (incl. S7-1500 Standard, 1500T, 1500F, 1500R and 1500H)
- S7-300/400

A functioning connection between active and passive connection partners can only be established if the correct block is used respectively on both sides.

The following block combinations are supported:

Table 2-8

Communication partner 1		Communication partner 2
S7-1200/1500 "LComRed_TCP"	↔	S7-1200/1500 "LComRed_TCP"
S7-1200/1500 "LComRed_ISOonTCP"	↔	S7-1200/1500 "LComRed_ISOonTCP"
S7-1200/1500 "LComRed_ISOonTCP_Classic"	↔	S7-300/400 "LComRed_ISOonTCP"
S7-300/400 "LComRed_ISOonTCP"	↔	S7-300/400 "LComRed_ISOonTCP"

The "Classic" block of the S7-1200/1500 is thus provided for redundant communication with controllers of the S7-300/400 family.

2.2.2 LComRedClassic

The LComRedClassic Library for utilization in STEP 7 as of Version 5.5 includes the encoded block "LComRed_ISOonTCP". This calls the following blocks or UDT internally, which must be available in the program block folder:

- TSEND [FB63]
- TRCV [FB64]
- TCON [FB65]
- TDISCON [FB66]
- TCON_PAR [UDT65]

These blocks can be found in the "Standard Library" in the "Communication Blocks" folder.

Note The LComRed_ISOonTCP block uses "Array" as a data type for some of the inputs. However, this data type is not supported in the Continuous Function Chart (CFC) language. Consequently, the LComRed_ISOonTCP can not be called directly in a CF Chart.

2.3 Operation

An LComRed block can be called either in a cyclic or in a cyclic interrupt OB. Before the "enable" input is activated, you must have provided the following parameters correctly and in their entirety:

- interfaceIds
- remoteIPs
- connID
- remoteTSelector
- remoteTSelectorLength (only for S7-300/400)
- localTSelector
- localTSelectorLength (only for S7-300/400)
- nextStaddr & nextStaddrLen (only for S7-300/400)
- connectionCount
- activeEstablished
- testInterval

With activation of the "enable" input on the active and passive communications side, the currently established connection is provided at the "activeConnId" output for utilization at a corresponding TSEND/TRCV if the parameterization is correct. The connection status is conveyed via the "connectionValid" output.

Details regarding the individual parameters are explained in the following chapter.

2.4 Parameter details

2.4.1 Block input enable

An LComRed block only functions as long as the "enable" input is set to "true". Changes to the other input parameters of the block are ignored with this setting. In order that this can be adopted, a rising edge is required at the "enable" input.

If the "enable" input is set from "true" to "false", all connections are deactivated internally via TDISCON. Should the input become enabled again via the user program in the meantime, this will only be executed following a delay to allow complete deactivation of the connection. The "enable" input, however, does not have to be triggered again in this regard.

2.4.2 Block inputs remoteIPs & interfaceIds

Up to four connection data records are transferred to an LComRed block on the active and the passive communication side. These include for each connection:

- IP address of the communication partner for each connection

  {remoteIPs: Array [1..4] of IP_V4}

  or

  {remoteIPs: Array [1..4, 1..4] of byte}

- The interface identifier of the local communications interface to be used for each connection. For S7-1200/1500, this would entail the HW ID of the interface being used, and for S7-300/400 the local_device_id.

  {interfaceIds : Array [1..4] of HW_ID}

  or

  {interfaceIds : Array [1..4] of byte}

It is recommended that the individual connection paths are recorded and "remoteIPs" and "interfaceIds" entered in order that the correct data for the respective connection can be provided on both sides. Examples of correct parameterization can be obtained in Chapter 3.2 Examples.

The number of data records which must be filled depends on the "connectionCount" input. If this is parameterized to "2", for example, "remoteIPs[1] and [2]", as well as "interfaceIds[1] and [2]" must be filled with valid values on the active and passive side respectively. The remaining elements can be left blank as they are not evaluated by an LComRed block.

With a "connectionCount" of "4", both parameters must be filled with values in their entirety.

CAUTION	**Risk of losing communication completely**
	LComRed blocks do not check whether all connections can be established upon activation. If only one out of four data records is correct, for example, this will only become evident if this particular connection fails and the LComRed block cannot establish any further connection. The connections or the switchovers in between should already be tested during commissioning.

2.4.3 Block input connId

Connection IDs are used as a reference to a connection. The first ID to be used by the LComRed block is transferred to the block via the "connId" parameter. The IDs of the block being used, and consequently disabled for other OUC communication paths, are yielded together with the specification regarding number of connection paths ("connectionCount"). Additionally, a further ID is used for the connection diagnostics to achieve a faster connection switchover.

If the "connId = 10" and a connection number of "2" is transferred for the block, for example, the block disables the IDs "10" and "11", as well as "12" for a test connection. Three connection resources are therefore required.

With a "connId = 112" and four connections, the IDs "112", "113", "114" and "115", as well as "116" for the test connection are disabled, which in turn requires 5 connection resources.

The "connId" does not have to be identical for the active and passive side, as these are only used for PLC-internal referencing of a connection. No adjustment of the IDs is made between the two communication partners.

If the block is active ("enable = true") and has a valid active connection, two connection resources are required, one for the active connection and one for the internal test connection.

Upon activation of the LComRed block and for the connection switchover, the LComRed block briefly requires the full number of resources for the possible connection paths + test connection:

- "connectionCount" = 2 → required resources 3
- "connectionCount" = 3 → required resources 4
- "connectionCount" = 4 → required resources 5

Thus, if you are using multiple LComRed instances for each PLC/system, these must be taken into account with regard to the connection resources available for the system.

2.4.4 Block inputs local & remote TSelector for LComRed_ISOonTCP (S7-1200/1500)

The ISOonTCP communication requires a **T**ransportation **S**ervice **A**ccess **P**oint (TSAP) for Local and Remote respectively for each connection. To ensure that you will not have to specify two TSAPs ("local & remote TSelector") respectively for each data record, only one TSAP (local & remote) is transferred respectively at the LComRed_ISOonTCP. The TSAP must feature a length of at least "3", however, may not exceed "14". The limitation to "14" in contrast to the familiar "16" for the standard TCON is due to the internal processing of the LComRed_ISOonTCP. For each of the four maximum possible connections, the TSAP is extended by "_x" (x = 1..4), or "_T" for the test connection.

For example, the input parameter

- "localTSelector.TSel" = ISOonTCP (49.53.4F.6F.6E.54.43.50)
- "localTSelector.TSelLength" = 8

with a "connectionCount = 4" in the internal processing:

- Connection 1: "localTSelector.TSel" = ISOonTCP_1 (49.53.4F.6F.6E.54.43.50.5F.31)
- Connection 2: "localTSelector.Tsel" = ISOonTCP_2 (49.53.4F.6F.6E.54.43.50.5F.32)

- Connection 3: "localTSelector.TSel" = ISOonTCP_3 (49.53.4F.6F.6E.54.43.50.5F.33)
- Connection 4: "localTSelector.TSel" = ISOonTCP_4 (49.53.4F.6F.6E.54.43.50.5F.34)
- Test connection "localTSelector.TSel" = ISOonTCP_T (49.53.4F.6F.6E.54.43.50.5F.54)
- thus becomes "localTSelector.TSelLength" = 10 for all connections

2.4.5 Block inputs local & remote TSelector for the Classic communication

For communication between S7-1200/1500 (LComRed_ISOonTCP_Classic) and S7-300/400 (LComRed_ISOonTCP), an individual and unambiguous local and remote TSAP must be specified for each of the possible 4 connections.

Each TSAP must feature a length of at least "3", however, may not exceed "14". The limitation to "14" in contrast to the familiar "16" for the standard TCON is due to the internal processing of the blocks. If one of these possible four connections becomes the active connection, the test connection takes its TSAPs as a basis and supplements each with "_T".

2.4.6 Block inputs nextStaddr & nextStaddrLen (S7-300/400)

The LComRed blocks are based on the TCON blocks to establish the connection. The TCON versions of the S7-300/400 revert to the UDT 65 "TCON_PAR" connection description via the "Connect" input for transfer of the connection parameters. The slot and the rack number of the communications processor (CP) being used must be specified in this description in accordance with the "local_device_id" with the "nextStaddr".

Communication via a CP443-1 for an S7-400H, for example, thus requires a "nextStaddr[1]" = 16#24 and "nextStaddrLen" = 16#01 in rack 1 at slot 4.

2.4.7 Block input port for LComRed_TCP

For the "port" input, the port number for the first connection set is transferred to the LComRed_TCP block. The smallest possible value is "2000" and is used for the active partner as "remotePort" for the first connection. Every further connection uses an incremental value internally. The port specifications must correlate on both the active and passive side. The "localPort" of the active partner is selected dynamically from the interface and therefore does not have to be prescribed.

2.4.8 Block input connectionCount

LComRed blocks support two to a maximum four connections, between which switchovers can be performed.

2.4.9 Block input activeEstablished

With the "activeEstablished" input, it is specified whether this involves the active or passive connection partner, as with the Standard TCON.

One side must be the active communication partner, and consequently the other side must be the passive communication partner.

2.4.10 Block input testInterval

With the "testInterval" input, the interval at which the active connection partner is to send test telegrams via the test channel is specified with a time value. In this regard, all other internal monitoring times of the block are LComRed. It should be considered at this point that the smaller the value, the greater the switchover time is reduced in the event of an error, but the network and communications loads of the PLCs are increased by the telegrams.

In addition, it should be considered that the value must be greater than the total cycle time. Factor 5 is recommended. Thus, if the block is called with a cycle of 40 ms, the "testInterval" input should be set to "T#200ms". As the same value must be used on the active and passive side, the cycle time of the communication partner with the higher cycle time applies.

If the time selected is too small, the connection will be unstable. This will be noticeable as the "connectionValid" output repeatedly switches to "false", but the same connection is always established. The connection itself is therefore not disrupted, rather neither of the connection partners manage to successfully exchange a test telegram within the monitoring period prescribed.

For the "1513R" and "1515R" systems in particular, the LComRed block has a major influence on the total cycle time due to the synchronization via PROFINET. This should be monitored by the RT_INFO block with "Mode 25". This mode indicates the actual cycle (cyclic OBs, interrupt OBs, communication, synchronization). The "testInterval" input must be adapted accordingly.

2.4.11 Block output activeConnId

At the output, the block with the "activeConnId" supplies the value of the OUC connection currently established which can be used for TSEND/TRCV. The ID remains unstable throughout the process, i.e. it switches following connection errors to a range between

"connId" and "connId + connectionCount – 1"

For example "connId = 200", "connectionCount = 3" → possible "activeConnIds = 200, 201 or 202".

If data loss is also to be prevented during a switchover, buffering of the data must be additionally implemented in the user program.

2.4.12 Block output connectionValid

The "connectionValid" output specifies whether the connection is successfully tested. This value specifies whether a test telegram was transferred once completely from the active to the passive communication partner and back after establishing the test connection. If the block cannot find a connection, the "activeConnId" retains the "connId" input parameter value and the "connectionValid" output remains "false".

As long as the "enable" input is "true" and the "Error" is "false", the LComRed block will continuously try to find an active connection.

2.4.13 Block outputs error & status

The "error" output specifies whether an error has occurred. The "status" output provides the necessary details.

As long as an error is active at the LComRed block, no connection is established.

2.5 Error handling

Table 2-9

Error	Status (W#16#...)	Explanation
0	0000	Connection successfully established
0	7000	No job active – enable = false
0	7001	Connection is being established
0	7003	Active connection down
0	7004	Test connection is being established
0	7005	Test connection established
1	8200	connId outside the valid range
1	8201	connectionCount outside of the valid range (min = 2, max = 4)
1	8202	port outside the valid range
1	8203	testInterval must be at least 50 ms
1	8204	Length of the localTSelector is too short (min = 3) or too long (max = 14)
1	8205	Length of the remoteTSelector is too short (min = 3) or too long (max = 14)
1	82x4	Classic communication only - Length of the localTSelector too short (min = 3) or too long (max = 14) – x identifies the connection
1	82x5	Classic communication only - Length of the remoteTSelector too short (min = 3) or too long (max = 14) – x identifies the connection

3 Useful Information

3.1 Details of principle of operation

Familiarity with the internal functioning is not necessary for utilization of the LComRed blocks. This chapter therefore concentrates on interested parties or developers of communication drivers, e.g. for utilization on PCs or external PLCs.

Internally, the LComRed blocks function essentially in two phases:

Phase 1: Searching for a connection

Phase 2: Validating the active connection

3.1.1 Phase 1

With activation of an LComRed block via rising edge at the "enable" input, following a successful parameter check one TCON instance respectively is activated in accordance with the number of connections. With four connections, for example, four TCON instances accordingly are initiated on the active and passive side. An LComRed waits until one of the instances confirms that a connection has been successfully established. If this concerns more than one connection within a cycle, the connection with the lower number is preferred.

This connection becomes the active connection and the "activeConnId" output is updated accordingly. This OUC ID can be used for the communication via TSEND/TRCV.

3.1.2 Phase 2

Upon conclusion of Phase 1, the "connectionValid" output is still "false", however; the connection is established but has not yet been validated.

Instead, an additional TCON establishes a test connection on the active and passive side. The data of the active connection ("HW_ID" or "local_device_id", "remoteIPs", …) is used as a basis for the Connect parameters. Only the "connId" and "ports" or TSAPs are determined individually.

Test telegrams are exchanged between active and passive communication partners via the test connection. This is initiated from the active side in the cycle of the "testInterval" input.

If a test telegram is not received by the partner within the "testInterval" or is received with incorrect values, the test connection and the active connection are disconnected and the "connectionValid" output is set to "false". The LComRed block switches immediately to Phase 1 once again and searches for a new connection.

Structure of the test telegram

Table 3-1

Element	Type	Note
key	DWORD	Key code for the respective connection
telegramNumber	INT	Numerical value of telegram
telegramConfirmed	INT	Copy of numerical value as confirmation
watchdog	TIME	Set testInterval on active side

The "key" element of the test telegram

This key value is calculated on the active side as follows:

$$key = a - b - c$$

With the following elements:

1. A constant (a) depending on the connection type
   - ISOonTCP → a = 16#FFFB_BF3C
   - TCP → a = 16#FFFA_A56C
2. A connection-specific value (b)
   - ISOonTCP → b = checksum of the "localTSelector" input of the active communication partner
   - TCP → b = the value of the input "port"
3. Number of connections (c) in the range from 1 to the value at the "connectionCount" input

The value of the "key" element is checked on the passive side and is copied in the confirmation telegram decremented by 1.

Upon receipt, the active side checks whether the value of the "key" element which it sent is greater than that received in the confirmation by precisely 1.

The elements "telegramNumber" and "telegramConfirmed" of the test telegram

The active side sends a value between "1" and "32767" in the "telegramNumber". Upon reaching "32767", or each time the test connection is established, i.e. when the LComRed block is activated or a connection switchover occurs, this numerical value is reset to "1".

The value of the "telegramConfirmed" remains "0".

The passive communication partner copies the value of the "telegramNumber" to "telegramNumber" and "telegramConfirmed" in the confirmation telegram.

The active side checks whether "telegramNumber" and "telegramConfirmed" are identical in the confirmation telegram and whether the "telegramNumber" sent correlates with that received in the confirmation telegram.

The "testInterval" element of the test telegram

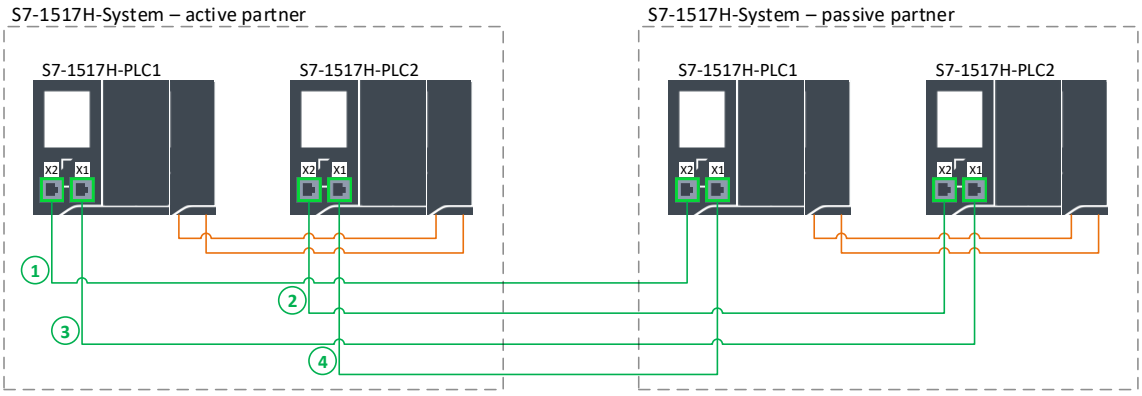
The active communication partner copies the value of the "testInterval" input for the LComRed block at this point.

The passive side updates the internally applied "testInterval" to this value after receiving the first test telegram once the test connection has been established.

3.2 Examples

3.2.1 LComRed_TCP - Redundant connection between two S7-1517H systems

Figure 3-1



Note

Neither of the two 1517H systems may be connected directly with the same MRP ring. Both MRP rings of the H systems must be separated from one another by way of appropriate switches.

One of the two PLCs in a 1517H system must be the MRP Manager, and this is not possible if more than one 1517H system is connected with the same MRP ring.

Device properties active connection partner

Table 3-2

Parameters	Value	Note
PLC	S7-1517H-3 PN	6ES7 517-3HP00-0AB0
IP address interface X1	PLC1: 192.168.0.20 PLC2: 192.168.0.21	
IP address interface X2	PLC1: 192.168.1.20 PLC2: 192.168.1.21	
Minimum cycle time	1 ms	
Calling organization block	OB30	Cycle clock: 10 ms
LComRed block	LComRed_TCP	From LComRed_Library

Device properties passive connection partner

Table 3-3

Parameters	Value	Note
PLC	S7-1517H-3 PN	6ES7 517-3HP00-0AB0
IP address interface X1	PLC1: 192.168.0.30 PLC2: 192.168.0.31	
IP address interface X2	PLC1: 192.168.1.30 PLC2: 192.168.1.31	
Minimum cycle time	1 ms	
Calling organization block	OB30	Cycle clock: 10 ms

Parameters	Value	Note
LComRed block	LComRed_TCP	From LComRed_Library

LComRed_TCP input parameter active connection partner

Table 3-4

Parameters	Value	Note
interfaceIds	interfaceIds[1] := Local1~PROFINET-interface_2 interfaceIds[2] := Local2~PROFINET-interface_2 interfaceIds[3] := Local1~PROFINET-interface_1 interfaceIds[4] := Local2~PROFINET-interface_1	PLC1.X2 PLC2.X2 PLC1.X1 PLC2.X1
remoteIPs	remoteIPs[1].ADDR[1] := 192 remoteIPs[1].ADDR[2] := 168 remoteIPs[1].ADDR[3] := 1 remoteIPs[1].ADDR[4] := 30 Corresponding to remoteIPs[2] := 192.168.1.31 remoteIPs[3] := 192.168.0.31 remoteIPs[4] := 192.168.0.30	
connId	1	
port	2000	
connectionCount	4	
activeEstablished	True	
testInterval	T#50ms	

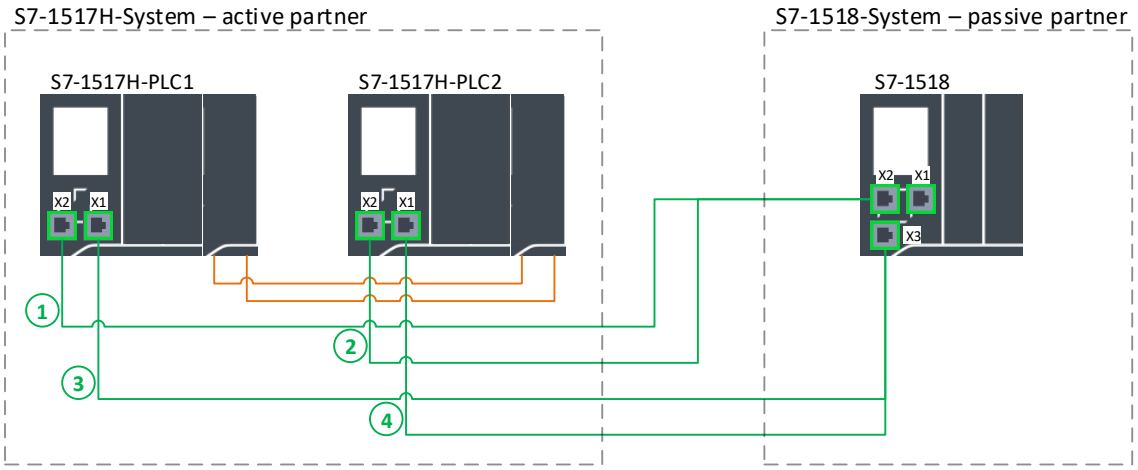
LComRed_TCP input parameter passive connection partner

Table 3-5

Parameters	Value	Note
interfaceIds	interfaceIds[1] := Local1~PROFINET-interface_2 interfaceIds[2] := Local2~PROFINET-interface_2 interfaceIds[3] := Local2~PROFINET-interface_1 interfaceIds[4] := Local1~PROFINET-interface_1	PLC1.X2 PLC2.X2 PLC2.X1 PLC1.X1
remoteIPs	remoteIPs[1].ADDR[1] := 192 remoteIPs[1].ADDR[2] := 168 remoteIPs[1].ADDR[3] := 1 remoteIPs[1].ADDR[4] := 20 Corresponding to remoteIPs[2] := 192.168.1.21 remoteIPs[3] := 192.168.0.20 remoteIPs[4] := 192.168.0.21	
connId	1	
port	2000	
connectionCount	4	
activeEstablished	False	
testInterval	T#50ms	

3.2.2 LComRed_ISOonTCP - Redundant connection between S7-1517H system and S7-1518

Figure 3-2



Device properties active connection partner

Table 3-6

Parameters	Value	Note
PLC	S7-1517H-3 PN	6ES7 517-3HP00-0AB0
IP address interface X1	PLC1: 192.168.0.20 PLC2: 192.168.0.21	
IP address interface X2	PLC1: 192.168.1.20 PLC2: 192.168.1.21	
Minimum cycle time	1 ms	
Calling organization block	OB30	Cycle clock: 10 ms
LComRed block	LComRed_ISOonTCP	From LComRed_Library

Device properties passive connection partner

Table 3-7

Parameters	Value	Note
PLC	S7-1518-4 PN/DP	6ES7 518-4AP00-0AB0
IP address interface X2	PLC1: 192.168.1.80	
IP address interface X3	PLC1: 192.168.0.80	
Minimum cycle time	1 ms	
Calling organization block	OB30	Cycle clock: 10 ms
LComRed block	LComRed_ISOonTCP	From LComRed_Library

LComRed_TCP input parameter active connection partner

Table 3-8

Parameters	Value	Note
interfaceIds	interfaceIds[1] := Local1~PROFINET-interface_2 interfaceIds[2] := Local2~PROFINET-interface_2 interfaceIds[3] := Local1~PROFINET-interface_1 interfaceIds[4] := Local2~PROFINET-interface_1	PLC1.X2 PLC2.X2 PLC1.X1 PLC2.X1
remoteIPs	remoteIPs[1].ADDR[1] := 192 remoteIPs[1].ADDR[2] := 168 remoteIPs[1].ADDR[3] := 1 remoteIPs[1].ADDR[4] := 80 Corresponding to remoteIPs[2] := 192.168.1.80 remoteIPs[3] := 192.168.0.80 remoteIPs[4] := 192.168.0.80	
connId	80	
localTSelector	TSelLength := 8 TSel[1..8] := 48.74.56.53.74.64.5F.41	
remoteTSelector	TSelLength := 8 TSel[1..8] := 48.74.56.53.74.64.5F.50	
connectionCount	4	
activeEstablished	True	
testInterval	T#50ms	

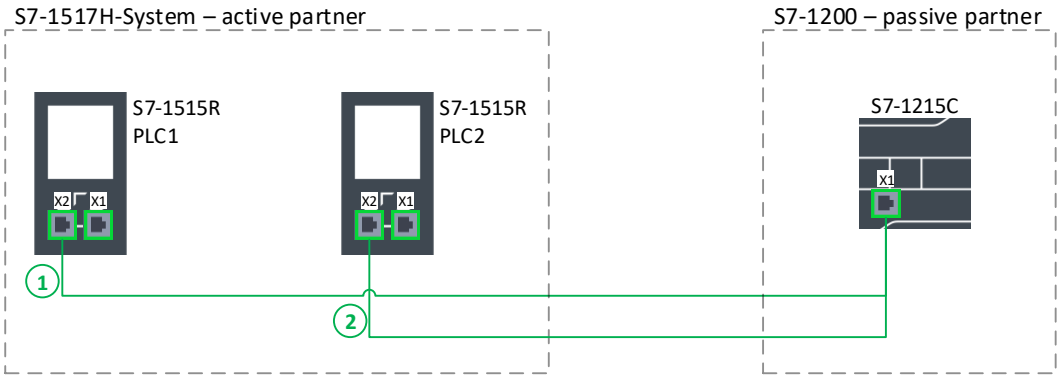
LComRed_TCP input parameter passive connection partner

Table 3-9

Parameters	Value	Note
interfaceIds	interfaceIds[1] := Local~PROFINET-interface_2 interfaceIds[2] := Local~PROFINET-interface_2 interfaceIds[3] := Local~PROFINET-interface_GBIT_3 interfaceIds[4] := Local~PROFINET-interface_GBIT_3	PLC.X2 PLC.X2 PLC.X3 PLC.X3
remoteIPs	remoteIPs[1].ADDR[1] := 192 remoteIPs[1].ADDR[2] := 168 remoteIPs[1].ADDR[3] := 1 remoteIPs[1].ADDR[4] := 20 Corresponding to remoteIPs[2] := 192.168.1.21 remoteIPs[3] := 192.168.0.20 remoteIPs[4] := 192.168.0.21	
connId	80	
localTSelector	TSelLength := 8 TSel[1..8] := 48.74.56.53.74.64.5F.50	
remoteTSelector	TSelLength := 8 TSel[1..8] := 48.74.56.53.74.64.5F.41	
connectionCount	4	
activeEstablished	False	
testInterval	T#50ms	

3.2.3 LComRed_TCP - Redundant connection between 1515R system and S7-1215C

Figure 3-3



Device properties active connection partner

Table 3-10

Parameters	Value	Note
PLC	S7-1515R-2 PN	6ES7 515-2RM00-0AB0
IP address interface X2	PLC1: 192.168.1.120 PLC2: 192.168.1.121	
Minimum cycle time	5 ms	
Calling organization block	OB1	
LComRed block	LComRed_TCP	From LComRed_Library

Device properties passive connection partner

Table 3-11

Parameters	Value	Note
PLC	S7-1215C	6ES7 215-1HG40-0XB0
IP address interface X1	PLC1: 192.168.1.130	
Minimum cycle time	Disabled	
Calling organization block	OB30	Cycle clock: 20 ms
LComRed block	LComRed_TCP	From LComRed_Library

LComRed_TCP input parameter active connection partner

Table 3-12

Parameters	Value	Note
interfaceIds	interfaceIds[1] := Local1~PROFINET-interface_2 interfaceIds[2] := Local2~PROFINET-interface_2	PLC1.X2 PLC2.X2
remoteIPs	remoteIPs[1].ADDR[1] := 192 remoteIPs[1].ADDR[2] := 168 remoteIPs[1].ADDR[3] := 1 remoteIPs[1].ADDR[4] := 130 Corresponding to remoteIPs[2] := 192.168.1.130	
connId	1 300	

Parameters	Value	Note
port	2130	
connectionCount	2	
activeEstablished	True	
testInterval	T#250ms	

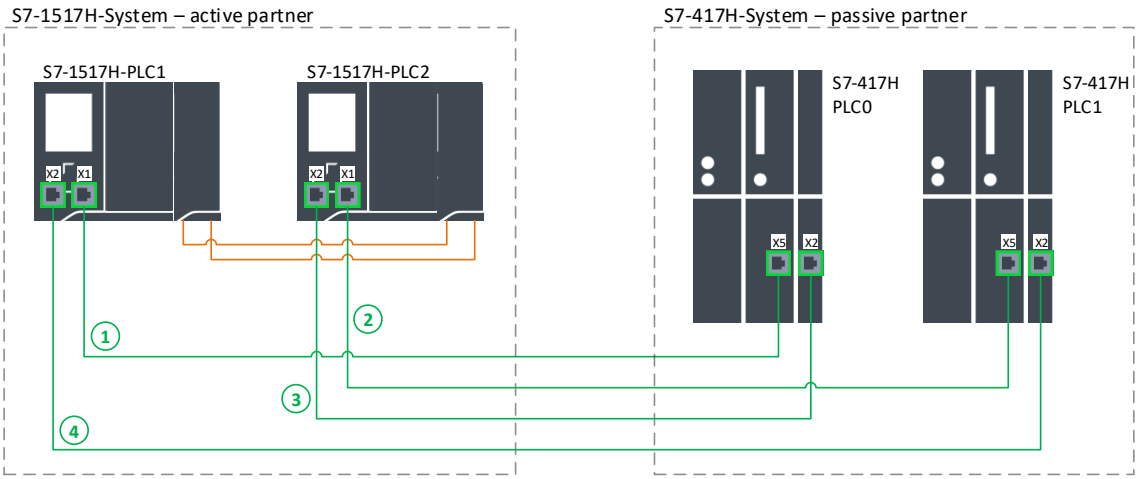
LComRed_TCP input parameter passive connection partner

Table 3-13

Parameters	Value	Note
interfaceIds	interfaceIds[1] := Local~PROFINET-interface_1 interfaceIds[2] := Local~PROFINET-interface_1	PLC.X1 PLC.X1
remoteIPs	remoteIPs[1].ADDR[1] := 192 remoteIPs[1].ADDR[2] := 168 remoteIPs[1].ADDR[3] := 1 remoteIPs[1].ADDR[4] := 120 Corresponding to remoteIPs[2] := 192.168.1.121	
id	1 300	
port	2130	
connectionCount	2	
activeEstablished	False	
testInterval	T#250ms	

3.2.4 LComRed_ISOonTCP Classic - Redundant connection between 1517H system and 417H system

Figure 3-14



Device properties active connection partner

Table 3-15

Parameters	Value	Note
PLC	S7-1517H-3 PN	6ES7 517-3HP00-0AB0
IP address interface X1	PLC1: 192.168.0.20 PLC2: 192.168.0.21	
IP address interface X2	PLC1: 192.168.1.20 PLC2: 192.168.1.21	
Minimum cycle time	1 ms	
Calling organization block	OB30	Cycle clock: 10 ms
LComRed block	LComRed_ISOonTCP_Classic	From LComRed_Library

Device properties passive connection partner

Table 3-16

Parameters	Value	Note
PLC	S7-417H-5H PN/DP	6ES7 417-5HT06-0AB0
IP address interface X5	PLC1: 192.168.0.50 PLC2: 192.168.0.51	
IP address interface X2 of the CP443-1	CP1: 192.168.1.50 CP2: 192.168.1.51	
Minimum cycle time	2 ms	
Calling organization block	OB1	
LComRed block	LComRed_ISOonTCP	From LComRedClassic library

LComRed_ISOonTCP_Classic input parameter passive connection partner

Table 3-17

Parameters	Value	Note
interfaceIds	interfaceIds[1] := Local1~PROFINET-Schnittstelle_1 interfaceIds[2] := Local2~PROFINET-Schnittstelle_1 interfaceIds[3] := Local2~PROFINET-Schnittstelle_2 interfaceIds[4] := Local1~PROFINET-Schnittstelle_2	PLC1.X1 PLC2.X1 PLC2.X2 PLC1.X2
remoteIPs	remoteIPs[1].ADDR[1] := 192 remoteIPs[1].ADDR[2] := 168 remoteIPs[1].ADDR[3] := 0 remoteIPs[1].ADDR[4] := 50 Entsprechend remoteIPs[2] := 192.168.0.51 remoteIPs[3] := 192.168.1.50 remoteIPs[4] := 192.168.1.51	
connId	1240	
localTSelector	TSelLength[1] := 8 TSel[1, 1..8] := 35.34.49.53.4F.41.5F.31 TSelLength[2] := 8 TSel[2, 1..8] := 35.34.49.53.4F.41.5F.32 TSelLength[3] := 8 TSel[3, 1..8] := 35.34.49.53.4F.41.5F.33 TSelLength[4] := 8 TSel[4, 1..8] := 35.34.49.53.4F.41.5F.34	"54ISOA_1" "54ISOA_2" "54ISOA_3" "54ISOA_4"
remoteTSelector	TSelLength[1] := 8 TSel[1, 1..8] := 34.35.49.53.4F.50.5F.31 TSelLength[2] := 8 TSel[2, 1..8] := 34.35.49.53.4F.50.5F.32 TSelLength[3] := 10 TSel[3, 1..10] := E0.02.34.35.49.53.4F.50.5F.33 TSelLength[4] := 10 TSel[4, 1..10] := E0.22.34.35.49.53.4F.50.5F.34	"45ISOP_1" "45ISOP_2"
connectionCount	4	
activeEstablished	true	
testInterval	T#50ms	

LComRed_ISOonTCP input parameter passive connection partner

Table 3-18

Parameters	Value	Note
interfaceIds	interfaceIds[1] := 16#05 interfaceIds[2] := 16#15 interfaceIds[1] := 16#00 interfaceIds[2] := 16#10	PLC0.X5 PLC1.X5 PLC0.CP.X2 PLC1.CP.X2
remoteIPs	remoteIPs[1,1] := 16#C0 remoteIPs[1,2] := 16#A8 remoteIPs[1,3] := 16#00 remoteIPs[1,4] := 16#14 Entsprechend remoteIPs[2] := C0.A8.00.15 remoteIPs[3] := C0.A8.01.15 remoteIPs[4] := C0.A8.01.14	192 168 0 20 192.168.0.21 192.168.1.21 192.168.1.20
connId	1240	
localTSelectorLength	localTSelectorLength[1] := 16#08 localTSelectorLength[2] := 16#08 localTSelectorLength[3] := 16#0A localTSelectorLength[4] := 16#0A	
localTSelector	localTSelector[1, 1..8] := 34.35.49.53.4F.50.5F.31 localTSelector[2, 1..8] := 34.35.49.53.4F.50.5F.32 localTSelector[3, 1..10] := E0.02.34.35.49.53.4F.50.5F.33 localTSelector[4, 1..10] := E0.22.34.35.49.53.4F.50.5F.34	
remoteTSelectorLength	remoteTSelectorLength[1] := 16#08 remoteTSelectorLength[2] := 16#08 remoteTSelectorLength[3] := 16#08 remoteTSelectorLength[4] := 16#08	
remoteTSelector	remoteTSelector[1, 1..8] := 35.34.49.53.4F.41.5F.31 remoteTSelector[2, 1..8] := 35.34.49.53.4F.41.5F.32 remoteTSelector[3, 1..8] := 35.34.49.53.4F.41.5F.33 remoteTSelector[4, 1..8] := 35.34.49.53.4F.41.5F.34	
nextStaddr	nextStaddr[1] := 16#00 nextStaddr[2] := 16#00 nextStaddr[3] := 16#04 nextStaddr[4] := 16#24	 Rack 0, Slot 4 Rack 1, Slot 4
nextStaddrLen	nextStaddrLen[1] := 16#00 nextStaddrLen[2] := 16#00 nextStaddrLen[3] := 16#01 nextStaddrLen[4] := 16#01	
connectionCount	4	
activeEstablished	false	
testInterval	T#50ms	

4 Appendix

4.1 Service and support

Industry Online Support

Do you have any questions or need assistance?

Siemens Industry Online Support offers round the clock access to our entire service and support know-how and portfolio.

The Industry Online Support is the central address for information about our products, solutions and services.

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support.industry.siemens.com

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support.industry.siemens.com/cs/ww/en/sc/2067

4.2 Links and literature

Table 4-1

No.	Topic
\1\	Siemens Industry Online Support https://support.industry.siemens.com
\2\	Link to the entry page of the application example https://support.industry.siemens.com/cs/ww/en/view/109763719
\3\	

4.3 Change documentation

Table 4-2

Version	Date	Change
V1.0	02/2019	First version
V1.1	08/2019	Expansion with the Classic communication • LComRedClassic library for STEP 7 as of V5.5 with LComRed_ISOonTCP block • Expansion of the LComRed-V15.1_LIB with LComRed_ISOonTCP block in S7-300/400 • Expansion of the LComRed-V15.1_LIB with LComRed_ISOonTCP_Classic block in S7-1200 & S7-1500