RTI Ethernet (UDP) Blockset

Reference

For RTI Ethernet (UDP) Blockset 1.4.5

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dSPACE

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About This Reference

Content

This RTI Reference is a complete description of the Real-Time Interface (RTI) blocks and their settings provided by the RTI Ethernet (UDP) blockset. You can use this blockset to model communication in a Simulink® model via the Ethernet interface.

The blockset can be used with:

- MicroAutoBox II
- PHS-bus-based systems with a DS1006 processor board

Required knowledge

If you want to implement a network-based communication with this blockset, basic knowledge in IP-based networks and handling Simulink models is assumed.

This reference is primarily for engineers who implement real-time applications by using MATLAB®/Simulink®.

Symbols

dSPACE user documentation uses the following symbols:

Symbol	Description
DANGER	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
CAUTION	Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.
NOTICE	Indicates a hazard that, if not avoided, could result in property damage.
Note	Indicates important information that you should take into account to avoid malfunctions.
Tip	Indicates tips that can make your work easier.

Symbol	Description
	Indicates a link that refers to a definition in the glossary, which you can find at the end of the document unless stated otherwise.
	Precedes the document title in a link that refers to another document.

Naming conventions

dSPACE user documentation uses the following naming conventions:

%name% Names enclosed in percent signs refer to environment variables for file and path names.

< > Angle brackets contain wildcard characters or placeholders for variable file and path names, etc.

Examples:

- Where you find terms such as `rti<XXXX>` replace them by the RTI platform support you are using, for example, `rti1007`.
- Where you find terms such as `<model>` or `<submodel>` in this document, replace them by the actual name of your model or submodel. For example, if the name of your Simulink model is `smd_1007_sl.slx` and you are asked to edit the `<model>_usr.c` file, you actually have to edit the `smd_1007_sl_usr.c` file.

RTI block name conventions All I/O blocks have default names based on dSPACE's board naming conventions:

- Most RTI block names start with the board name.
- A short description of functionality is added.
- Most RTI block names also have a suffix.

Suffix	Meaning
B	Board number (for PHS-bus-based systems)
M	Module number (for MicroAutoBox II)
C	Channel number
G	Group number
CON	Converter number
BL	Block number
P	Port number
I	Interrupt number

A suffix is followed by the appropriate number. For example, DS2201IN_B2_C14 represents a digital input block located on a DS2201 board. The suffix indicates board number 2 and channel number 14 of the block. For more general block naming, the numbers are replaced by variables (for example, DS2201IN_Bx_Cy).

Special folders

Some software products use the following special folders:

Common Program Data folder A standard folder for application-specific configuration data that is used by all users.

```
%PROGRAMDATA%\dSPACE\<InstallationGUID>\<ProductName>
```

or

```
%PROGRAMDATA%\dSPACE\<ProductName>\<VersionNumber>
```

Documents folder A standard folder for user-specific documents.

```
%USERPROFILE%\Documents\dSPACE\<ProductName>\
<VersionNumber>
```

Local Program Data folder A standard folder for application-specific configuration data that is used by the current, non-roaming user.

```
%USERPROFILE%\AppData\Local\dSPACE\<InstallationGUID>\
<ProductName>
```

Accessing dSPACE Help and PDF Files

After you install and decrypt dSPACE software, the documentation for the installed products is available in dSPACE Help and as PDF files.

dSPACE Help (local) You can open your local installation of dSPACE Help:

- On its home page via Windows Start Menu
- On specific content using context-sensitive help via **F1**

dSPACE Help (Web) You can access the Web version of dSPACE Help at www.dspace.com.

To access the Web version, you must have a *mydSPACE* account.

PDF files You can access PDF files via the icon in dSPACE Help. The PDF opens on the first page.

General Information on the RTI Ethernet (UDP) Blockset

Introduction

Provides basic information on the RTI Ethernet (UDP) Blockset.

Where to go from here

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Overview of the RTI Ethernet (UDP) Blockset

Introduction

To provide a short description of the blockset's main features, its components and how to access them.

Main features

The RTI Ethernet (UDP) Blockset is a Simulink® blockset for modeling communication via an Ethernet interface using UDP/IP protocol. With this, you have access to all the external devices that also provide an Ethernet interface, such as another dSPACE board or a calibration device.

The blockset provides RTI blocks for configuring the Ethernet interface by specifying its IP address and port number, and for sending and receiving data via the UDP/IP protocol.

Hardware support The blockset supports the following interfaces which are represented by the board type. The interfaces are also called ETH devices.

- ETH Type 1

  The ETH Type 1 interface is a built-in ETH device of MicroAutoBox II.

  Connect the external device to MicroAutoBox II directly with a network cable via the Ethernet I/O connector. A matching cable with a LEMO-RJ45 adapter is supplied from dSPACE on request. The communication is processed on the I/O Ethernet interface (ETH Type 1 module) of the board.

  Note

  The blockset does not support Ethernet communication with the host PC via the host PC connector.

  If you want to send to or receive data from the application that you have implemented by using the blockset, you must connect the host PC to the Ethernet I/O connector via a separate IP address. For further information, refer to Application Examples on page 13.

  Tip

  MicroAutoBox II with board revision DS1401-25 and higher provides an internal Ethernet switch. You can therefore also access the Ethernet I/O interface via the host PC connector using the IP address and port number configured in the ETHERNET_UDP_SETUP_BLx block.

- ECU Type 1 ETH

  The ECU Type 1 interface can be used with MicroAutoBox II.

  Connect the external device to MicroAutoBox II with a LVDS Ethernet link cable (LVDS_CAB14 is required for an ECU interface connector). The communication is processed on the ECU interface (ECU Type 1 module).

  The MicroAutoBox II variants provide a different number of Ethernet interfaces, see the table below.

MicroAutoBox II Variants	Number of Ethernet Interfaces	
	ETH Type 1	ECU Type 1 ETH
MicroAutoBox II		
1401/1507	1	3 (3xECU interface connector)
1401/1511 1401/1511/1514	1	2 (2xECU interface connector)
1401/1513 1401/1513/1514	1	2 (2xECU interface connector)

- DS4121 ETH

  The DS4121 ETH interface can be used with a DS1006 PHS-bus-based system that contains one or more DS4121 ECU Interface Boards.

  Connect the external device to a DS4121 ECU Interface Board of your DS1006 PHS-bus-based system with a LVDS Ethernet link cable (LVDS_CAB14). The communication is processed on the DS4121 ECU interface (DS4121 ETH) of the board. The DS4121 ECU Interface Board provides 2 interface connectors.

Supported UDP features and limitations For an overview, here is a list of basic features and blockset-specific limitations.

- The blockset supports transferring Ethernet packets by means of the UDP/IP protocol.
- You can define up to 4 sockets per unit.
  - MicroAutoBox II: Unit is equivalent to module
  - DS4121: Unit is equivalent to channel
- Each socket can be used for bidirectional communication.
- Each socket can be configured with a maximum datagram size of 1472 bytes.
- Auto negotiation is supported.
- Data rates of up to 100 MBit/s are supported for ECU Type 1 ETH and DS4121 ETH. Using ETH Type 1 data rates of up to 1 GBit/s are supported.
- Listening to any IP address and port is supported.
- IP fragmentation is not supported. Each UDP message is limited to the maximum Ethernet datagram size.
- DHCP is not supported.
- Multicast is not supported.
- Routing is not supported. All participants of the communication must be available in the same subnet.
- Broadcasts are not supported.
- IPv6 is not supported, only the IPv4 protocol can be used.

Library access

The library can be opened with the following methods:

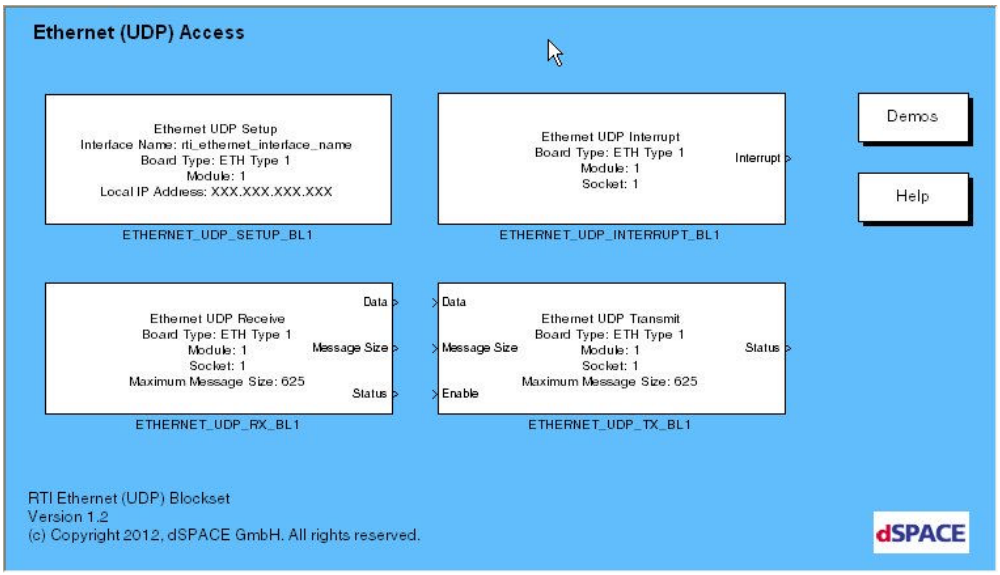
Note

Choose the platform support before you open the RTI Ethernet (UDP) Blockset to get the predefined board-specific settings.

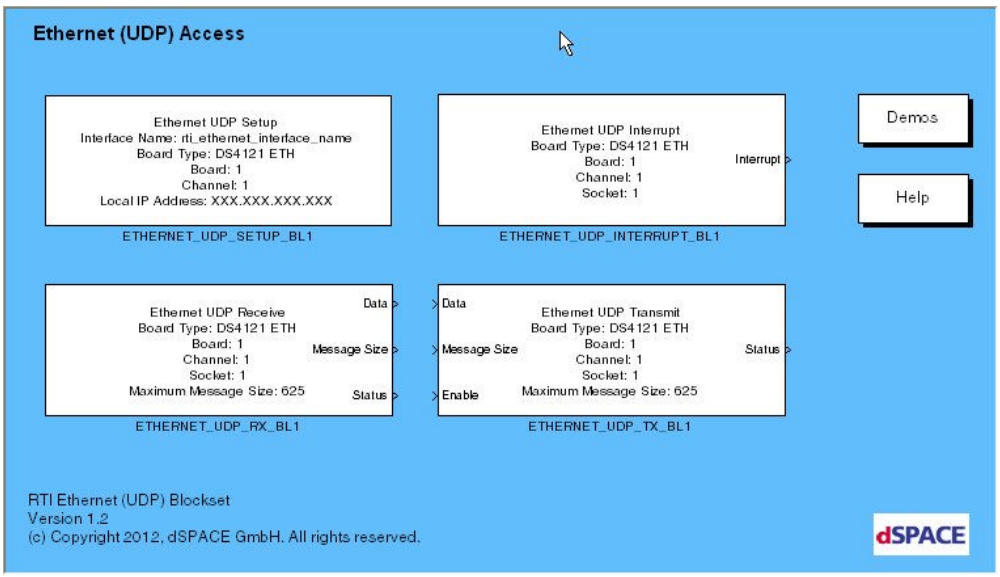
- Enter `rtiethernetudp` in the MATLAB Command Window.
- Click **Blocksets - RTI ETH (UDP) Blockset** in the MicroAutoBox II or DS1006 blockset.
- Click **ETH (UDP)** in one of the MicroAutoBox II **Base Board** libraries.
- Navigate to the **RTI Ethernet (UDP) Blockset** folder in the Simulink Library Browser to access the RTI blocks of the library separately.

When you open the block library, the blockset is displayed. The inscription of the blocks depends on the previously selected platform support.

If you are working with MicroAutoBox II (rti1401), the RTI Ethernet (UDP) blockset's board type is predefined as ETH Type 1.



If you are working with DS1006 (rti1006, rtilibm), the RTI Ethernet (UDP) blockset's board type is predefined as DS4121 ETH.



Library components

The library provides the following RTI blocks:

- Setup
  - ETHERNET_UDP_SETUP_BLx on page 18

  Your model can contain one setup block per interface.

- Send and receive
  - ETHERNET_UDP_TX_BLx on page 27 to send messages to the specified destination.
  - ETHERNET_UDP_RX_BLx on page 23 to receive messages from the specified source.
- Interrupt generation
  - ETHERNET_UDP_INTERRUPT_BLx on page 32 to make interrupts that are generated on data receipt available as trigger sources.

Demo model

For a Simulink model that shows how to use the RTI Ethernet (UDP) Blockset, refer to the blockset's **Demo** library. This model also contains preconfigured blocks for encoding and decoding the signals.

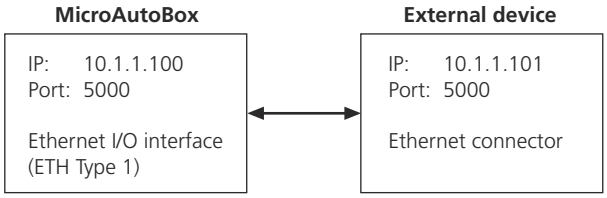
Application Examples

Introduction

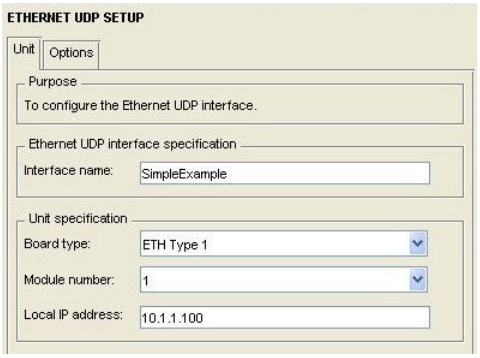
The RTI Ethernet (UDP) Blockset can be used for various use cases. Some examples are described here. As board type, the ETH Type 1 interface from MicroAutoBox II is used, for the other board types, the shown configurations are the same.

Point-to-point communication

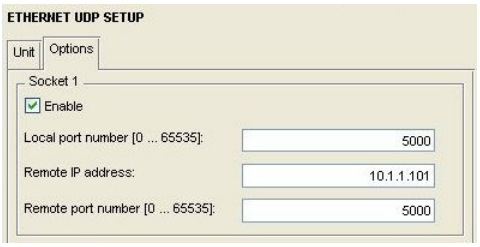
The standard configuration for a point-to-point communication consists of two devices that send and receive data on clearly specified communication channels. In the following case, one socket is specified to be used with the same port number on the local and the remote device.



The related settings in the **Unit** page of the ETHERNET_UDP_SETUP_BLx block are as follows:



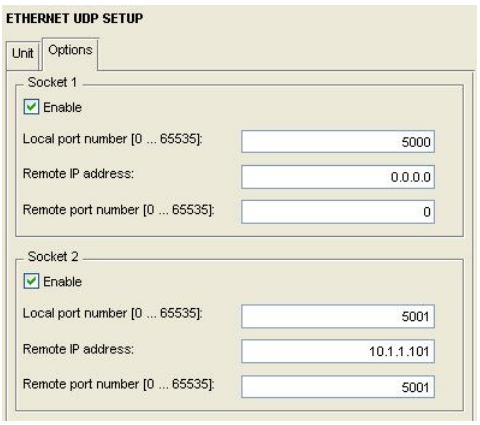
The related settings in the **Options** page of the ETHERNET_UDP_SETUP_BLx block are as follows:



The RX and TX blocks in the model have to be configured accordingly, using the same board type, module number and socket number.

Listening to any IP address and port

For example, if you connect a PC to MicroAutoBox II via the Ethernet I/O interface, the PC's operating system automatically chooses a port for communication. The port number can change every time the PC initializes its UDP port. To access the UDP data from the connected hardware, you have to adapt the configuration of the ETHERNET_UDP_SETUP_BLx block in your model. To avoid these modifications in your model, you can specify the following configuration to allow that an ETHERNET_UDP_RX_BLx block is listening to any IP address and port.



Note

The socket for which you specified listening to any IP address and port, must not be used by an ETHERNET_UDP_TX_BLx block.

The UDP data that is received from a specific IP address and port is not available at the unspecifically configured socket. That means in the above example, that UDP data that has been sent to the socket 2 will not be received from socket 1.

Switching Platforms

Introduction

If you want to use a model created with the RTI Ethernet (UDP) Blockset on different platforms, you have to adapt it.

Differences between the platforms

Usually, you can use a model created with the RTI Ethernet (UDP) Blockset with MMicroAutoBox II (RTI1401) and a DS1006 PHS-bus-based system (RTI1006) without modifications. According to the specified values, there are two settings in the ETHERNET_UDP_SETUP_BLx block, which might lead to warning messages.

Board type With RTI1401, two different board types can be selected (ETH Type 1 or ECU Type 1 ETH). With RTI1006, there is only one board type available (DS4121 ETH). If you have specified with RTI1401 the second board type (ECU Type 1 ETH) as interface, this will be detected as an invalid setting when you open the model with RTI1006.

ECU interface channel number With RTI1006, the ECU interface channel number setting is enabled to specify one of the two available channels of the DS4121 ETH interface to be used. With RTI1401, this dialog setting is disabled, because there is only one channel available. If you have specified the second channel to be used with RTI1006, this will be detected as an invalid setting when you open the model with RTI1401.

Adapting the settings

If the described settings were detected as invalid when you opened a model, you can reconfigure the model to be used with the other platform.

- Open the ETHERNET_UDP_SETUP_BLx block and make the changes manually.

  or

- Enter `rtiethernetudp_boardtypeset` in the MATLAB Command Window and run the command to automatically adapt the settings to the current platform.

Components of the RTI Ethernet (UDP) Blockset

Introduction

The RTI Ethernet (UDP) library provides RTI blocks that you use in the Simulink model to implement access to external devices via the Ethernet interface using UDP/IP protocol.

Where to go from here

Information in this section

ETHERNET_UDP_SETUP_BLx..... 18
To initialize the Ethernet interface.

ETHERNET_UDP_RX_BLx..... 23
To receive messages from the Ethernet interface.

ETHERNET_UDP_TX_BLx..... 27
To send messages via the Ethernet interface.

ETHERNET_UDP_INTERRUPT_BLx..... 32
To make the interrupts that are generated on data receipt available as trigger sources.

ETHERNET_UDP_SETUP_BLx

Purpose

To initialize the Ethernet interface.

Where to go from here

Information in this section

Block Description (ETHERNET_UDP_SETUP_BLx)..... 18
To give information on the appearance and purpose of the block.

Unit Page (ETHERNET_UDP_SETUP_BLx)..... 20
To specify the interface and board properties.

Options Page (ETHERNET_UDP_SETUP_BLx)..... 21
To specify up to four sockets for Ethernet UDP communication.

Information in other sections

Overview of the RTI Ethernet (UDP) Blockset..... 9
To provide a short description of the blockset's main features, its components and how to access them.

Application Examples..... 13
The RTI Ethernet (UDP) Blockset can be used for various use cases. Some examples are described here.

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To receive messages from the Ethernet interface.

ETHERNET_UDP_TX_BLx..... 27
To send messages via the Ethernet interface.

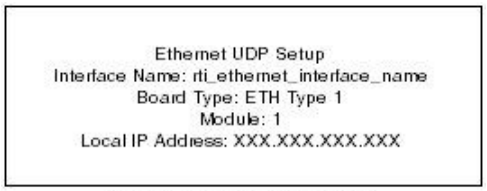
ETHERNET_UDP_INTERRUPT_BLx..... 32
To make the interrupts that are generated on data receipt available as trigger sources.

Block Description (ETHERNET_UDP_SETUP_BLx)

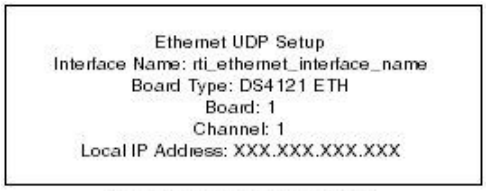
Block

The block appearance depends on the previously selected platform support.

MicroAutoBox II (rti1401)



PHS-bus-based system (rti1006)



Purpose

To initialize the Ethernet interface.

Description

Your model can contain one setup block per interface.

For the number of available interfaces, refer to *Hardware Support* in Overview of the RTI Ethernet (UDP) Blockset on page 9.

You can use several interfaces in the same model at the same time. To avoid conflicts between these interfaces, they must have different settings concerning the specified ports and interface names.

Note

If you are using a firewall, you must allow the specified IP addresses and ports to communicate with an external network participant.

Dialog pages

The dialog settings can be specified on the following pages:

- Unit page (refer to Unit Page (ETHERNET_UDP_SETUP_BLx) on page 20)
- Options page (refer to Options Page (ETHERNET_UDP_SETUP_BLx) on page 21)

Related RTLib functions

This RTI block is implemented by using the following RTLib functions, which are described in the DSETH RTLib Reference 🕮.

- dsEthObjInit
- dsEthSocketObjInit
- dsEthCstmEthTp1

- dsEthCstmDS867
- dsEthSocketObjDelete

Unit Page (ETHERNET_UDP_SETUP_BLx)

Purpose

To specify the interface and board properties.

Dialog settings

Interface name Lets you specify the name for the Ethernet interface that is configured by this block. The name must be unique and comply with the MATLAB naming conventions.

Board type Lets you specify the hardware-specific interfaces you want to use for Ethernet connection.

Board Type	Description
ETH Type 1	The Ethernet interface is used with MicroAutoBox II by using the I/O Ethernet interface of the board.
ECU Type 1 ETH	The Ethernet interface is used with MicroAutoBox II using the ECU interface of the board. The connectivity must be established via an LVDS Ethernet link cable (LVDS_CAB14). MicroAutoBox II provides two ECU interfaces on its base board. Some of MicroAutoBox II's I/O boards provide additional ECU interfaces, refer to Overview of the RTI Ethernet (UDP) Blockset on page 9.
DS4121 ETH	The Ethernet interface is used in a DS1006 PHS-bus-based system including a DS4121 ECU Interface Board. The connectivity must be established via an LVDS Ethernet link cable (LVDS_CAB14).

Board number/Module number Lets you specify the number of the board in the DS1006 PHS-bus-based system, or the number of the module when using MicroAutoBox II. You can select a value in the range 1 … 16. If your system contains several boards/modules of the same type, RTI uses the number to distinguish between them.

ECU interface channel number This setting is enabled, if you specified the DS4121 ETH board type. It lets you specify a channel number in the range 1 … 2.

Local IP address Lets you specify the IP address of the board providing the Ethernet interface. Each number of the IP address must be in the range 0 … 255, for example, *192.168.1.1*.

Note

Do not use the same IP address for the **Local IP address** setting and the host interface of MicroAutoBox II.

The board's host interface is internally switched with the I/O Ethernet interface (ETH Type 1). The same IP address is then used twice on your network. This might result in unpredictable communication results.

Related topics

References

Block Description (ETHERNET_UDP_SETUP_BLx)..... 18
Options Page (ETHERNET_UDP_SETUP_BLx)..... 21

Options Page (ETHERNET_UDP_SETUP_BLx)

Purpose

To specify up to four sockets for Ethernet UDP communication.

Description

You can enable up to 4 sockets of the Ethernet interface. Each enabled socket must be configured with a local port number and the IP address and the port number of the remote device. If you communicate with different tasks or applications using the same Ethernet interface (same remote IP address) using different sockets, the remote port numbers should differ from each other. If the remote IP addresses are different for each socket, you can specify the same remote port numbers. The remote sockets must be uniquely configured.

Dialog settings

Each of the socket can be separately configured.

Enable Lets you enable a socket for Ethernet communication.

Local port number If the socket is enabled, you can specify its port number on your local board in the range 0 … 65535.

Remote IP address If the socket is enabled, you can specify the IP address of the connected remote device.

Remote port number If the socket is enabled, you can specify the port number of the connected remote device in the range 0 … 65535.

Tip

If you specify **Remote IP address = 0.0.0.0** and **Remote port number = 0**, the socket is used to listen to any IP address and port. For further information, refer to Application Examples on page 13.

Related topics

References

Block Description (ETHERNET_UDP_SETUP_BLx) 18
Unit Page (ETHERNET_UDP_SETUP_BLx) 20

ETHERNET_UDP_RX_BLx

Purpose

To receive messages from the Ethernet interface.

Where to go from here

Information in this section

Block Description (ETHERNET_UDP_RX_BLx)..... 23
To give information on the appearance and purpose of the block.

Parameters Page (ETHERNET_UDP_RX_BLx)..... 25
To configure the interface for receiving messages.

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ETHERNET_UDP_TX_BLx..... 27
To send messages via the Ethernet interface.

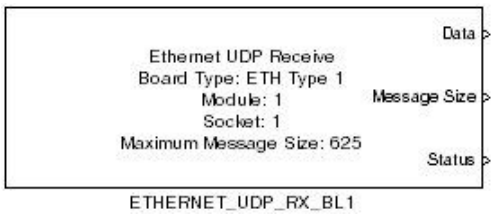
ETHERNET_UDP_INTERRUPT_BLx..... 32
To make the interrupts that are generated on data receipt available as trigger sources.

Block Description (ETHERNET_UDP_RX_BLx)

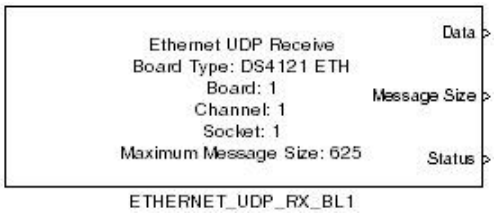
Block

The block appearance depends on the previously selected platform support.

MicroAutoBox II (rti1401)



PHS-bus-based system (rti1006)



Purpose

To receive messages from the Ethernet interface.

Description

This block receives a message from the selected socket. The socket configuration in the related setup block contains the configuration of the remote socket that sends the message, and the local socket that receives the message via this block.

The received bitstream is encoded to 32-bit words and written to the Data outport of the block.

Note

- There must be an ETHERNET_UDP_SETUP_BLx block in the model providing the same main configuration as this block. The following settings must be identical to the related setup block:
  - Board type
  - Board/Module number
  - Channel number
- The specified socket must be enabled in the related ETHERNET_UDP_SETUP_BLx block.

I/O mapping

For information on the I/O mapping, refer to the *data sheet* of the hardware used:

- For MicroAutoBox II, refer to MicroAutoBox II Hardware Reference 🕮.
- For a PHS-bus-based system, refer to DS4121 ECU Interface Board (PHS Bus System Hardware Reference 🕮).

I/O characteristics

The following table describes the ports of the block:

Port	Description
Output	
Data	Outputs the data of the next received message. The width of the port depends on the Maximum message size parameter. The number of 32-bit words that corresponds to the message size can be calculated by: `(MaxMessageSize + 3) / 4`

Port	Description
	The integer of the result is the port width. The width is therefore in the range of 1 … 368. Data type: UInt32 Range: 0 … 2^{32}-1
Byte Size	Outputs the size (number of 8-bit words) of the received message. If the number of words to be received exceeds the specified maximum message size, the exceeded data is ignored. Data Type: Int32 Range: 1 … 1472
Status	Outputs the status of the message. Data type: Boolean ▪ 0: There is no new message available ▪ 1: A new message is available

Dialog pages

The dialog settings can be specified on the following pages:

- Parameters page (refer to Parameters Page (ETHERNET_UDP_RX_BLx) on page 25)

Related RTLib functions

This RTI block is implemented by using the following RTLib functions, which are described in the DSETH RTLib Reference 🕮.

- dsEthDataBufferTXObjGet
- dsEthDataBufferTXObjSend
- dsEthCstmEthTp1
- dsEthSocketObjDelete

Parameters Page (ETHERNET_UDP_RX_BLx)

Purpose

To configure the interface for receiving messages.

Dialog settings

Interface name Displays the name of the Ethernet UDP interface specified in the ETHERNET_UDP_SETUP_BLx block if the settings for board type and board/module number in this block dialog match the settings in the related setup block. Otherwise, NOT SPECIFIED is displayed.

Board type Lets you specify the hardware-specific interfaces you want to use for Ethernet connection. This setting must match the configuration in the related ETHERNET_UDP_SETUP_BLx block.

You can select:

- ETH Type 1
- ECU Type 1 ETH
- DS4121 ETH

For further information, refer to Unit Page (ETHERNET_UDP_SETUP_BLx) on page 20.

Board number/Module number Lets you specify the board number/module number in the range 1 … 16. This setting must match the configuration in the related ETHERNET_UDP_SETUP_BLx block.

Channel number Lets you specify the channel number to be used by the DS4121 ETH interface. This setting must match the configuration in the related ETHERNET_UDP_SETUP_BLx block.

Socket number Lets you specify the socket to be used for receiving data in the range 1 … 4.

Note

The specified socket must be enabled in the related ETHERNET_UDP_SETUP_BLx block.

Maximum message size Lets you specify the maximum message size in the range 1 … 1472 bytes.

Local socket (received by) Displays the local IP address and port number used by the related remote device as the destination to send data to in the format `<IP>:<Port>`. The local socket is configured in the related ETHERNET_UDP_SETUP_BLx block. If the specified **Socket number** does not match the setup configuration or the socket is disabled, XXX.XXX.XXX.XXX:5000 is displayed.

Remote socket (received from) Displays the local IP address and port number of the related remote device that sends data to the dSPACE real-time system in the format `<IP>:<Port>`. The remote socket is configured in the related ETHERNET_UDP_SETUP_BLx block. If the specified **Socket number** does not match the setup configuration or the socket is disabled, XXX.XXX.XXX.XXX:5000 is displayed.

Related topics

References

Block Description (ETHERNET_UDP_RX_BLx) 23

ETHERNET_UDP_TX_BLx

Purpose

To send messages via the Ethernet interface.

Where to go from here

Information in this section

Block Description (ETHERNET_UDP_TX_BLx)..... 27
To give information on the appearance and purpose of the block.

Parameters Page (ETHERNET_UDP_TX_BLx)..... 30
To configure the interface for sending messages.

Information in other sections

Overview of the RTI Ethernet (UDP) Blockset..... 9
To provide a short description of the blockset's main features, its components and how to access them.

Application Examples..... 13
The RTI Ethernet (UDP) Blockset can be used for various use cases. Some examples are described here.

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To initialize the Ethernet interface.

ETHERNET_UDP_RX_BLx..... 23
To receive messages from the Ethernet interface.

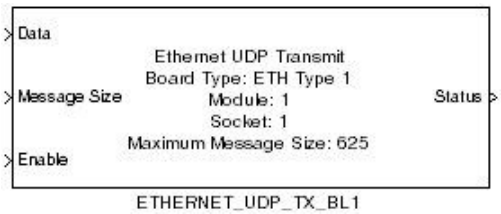
ETHERNET_UDP_INTERRUPT_BLx..... 32
To make the interrupts that are generated on data receipt available as trigger sources.

Block Description (ETHERNET_UDP_TX_BLx)

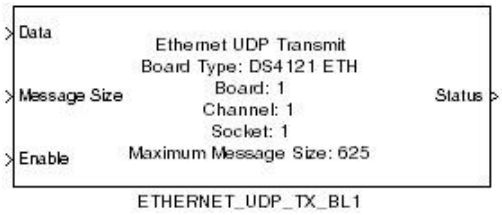
Block

The block appearance depends on the previously selected platform support.

MicroAutoBox II (rti1401)



PHS-bus-based system (rti1006)



Purpose

To send messages via the Ethernet interface.

Description

This block sends a message via the selected socket. The socket configuration in the related setup block contains the configuration of the local socket that sends the message via this block, and the remote socket that receives the message.

To avoid blocking the communication in case of an error, like when the remote device is not connected, you can specify a time after which the block stops trying to send the message.

The 32-bit words you want to send are read from the Data inport of the block and encoded to a bitstream.

Note

- There must be an ETHERNET_UDP_SETUP_BLx block in the model providing the same main configuration as this block. The following settings must be identical to the related setup block:
  - Board type
  - Board/Module number
  - Channel number
- The specified socket must be enabled in the related ETHERNET_UDP_SETUP_BLx block.

I/O mapping

For information on the I/O mapping, refer to the *data sheet* of the hardware used:

- For MicroAutoBox II, refer to MicroAutoBox II Hardware Reference 🕮.
- For a PHS-bus-based system, refer to DS4121 ECU Interface Board (PHS Bus System Hardware Reference 🕮).

I/O characteristics

The following table describes the ports of the block:

Port	Description
Input	
Data	Provides the data to be send. The width of the port depends on the specified value of the **Maximum message size** parameter. The number of 32-bit words that corresponds to the message size can be calculated by: `(MaxMessageSize + 3) / 4` The integer of the result is the port width. The width is therefore in the range of 1 … 368. Data type: UInt32 Range: 0 … 2^{32}-1
Message Size	Provides the size (number of 8-bit words) of the message to be send. Data type: Int32 The value range depends on the specified value of the **Maximum message size** parameter. It can be specified in the range of 0 … 1472. If the number of words to be sent exceeds the specified maximum message size, the exceeded data is ignored.
Enable	Controls sending the next message. Data type: Boolean ▪ 0: Sending the message is disabled ▪ 1: Sending the message is enabled
Output	
Status	Outputs the status of the transmission. Data type: UInt16 ▪ DSETH_ERR_SUCCESS (0x00): No error occurred during the operation. ▪ DSETH_ERR_COM_ERROR (0x01): Communication error with the DSETH device.[1)] ▪ DSETH_ERR_COM_ERROR_TIMEOUT (0x02): Timeout in communication with the DSETH device.[1)] ▪ DSETH_ERR_COM_DISCONNECTED (0x03): Communication is not possible because the ETH device is currently not connected.[1)] ▪ DSETH_ERR_UNINITIALIZED (0x04): Communication is not possible because the ETH device is currently not initialized. ▪ DSETH_ERR_ILLEGAL (0x05): Some function parameters are illegal. ▪ DSETH_ERR_FULL (0x10): There is no free space in the corresponding FIFO. Data cannot be stored. ▪ DSETH_ERR_DEVICE_NOT_SUPPORTED (0x13): The identified ETH device is not supported by the driver.

[1)] Note: Not relevant for the ETH Type 1 device.

Dialog pages

The dialog settings can be specified on the following pages:

- Parameters page (refer to Parameters Page (ETHERNET_UDP_TX_BLx) on page 30)

Related RTLib functions

This RTI block is implemented by using the following RTLib functions, which are described in the DSETH RTLib Reference 🕮.

- dsEthDataBufferTXObjGet
- dsEthDataBufferTXObjSend
- dsEthCstmEthTp1
- dsEthSocketObjDelete

Parameters Page (ETHERNET_UDP_TX_BLx)

Purpose

To configure the interface for sending messages.

Dialog settings

Interface name Displays the name of the Ethernet UDP interface specified in the ETHERNET_UDP_SETUP_BLx block if the settings for board type and board/module number in this block dialog match the settings in the related setup block. Otherwise, NOT SPECIFIED is displayed.

Board type Lets you specify the hardware-specific interfaces you want to use for Ethernet connection. This setting must match the configuration in the related ETHERNET_UDP_SETUP_BLx block.

You can select:

- ETH Type 1
- ECU Type 1 ETH
- DS4121 ETH

For further information, refer to Unit Page (ETHERNET_UDP_SETUP_BLx) on page 20.

Board number/Module number Lets you specify the board number/module number in the range 1 … 16. This setting must match the configuration in the related ETHERNET_UDP_SETUP_BLx block.

Channel number Lets you specify the channel number to be used by the DS4121 ETH interface. This setting must match the configuration in the related ETHERNET_UDP_SETUP_BLx block.

Socket number Lets you specify the socket to be used for receiving data in the range 1 … 4.

Note

The specified socket must be enabled in the related ETHERNET_UDP_SETUP_BLx block.

Maximum message size Lets you specify the maximum message size in the range 1 … 1472 bytes.

Send timeout Lets you specify the time for trying to send a message in the range 0.00001 … 2.0 seconds.

Local socket (send by) Displays the IP address and port number of the local device that sends the data in the format `<IP>:<Port>`. The local socket is configured in the related ETHERNET_UDP_SETUP_BLx block. If the specified Socket number does not match the setup configuration or the socket is disabled, XXX.XXX.XXX.XXX:5000 is displayed.

Remote socket (send to) Displays the IP address and port number to which the local device sends the data in the format `<IP>:<Port>`. The remote socket is configured in the related ETHERNET_UDP_SETUP_BLx block. If the specified Socket number does not match the setup configuration or the socket is disabled, XXX.XXX.XXX.XXX:5000 is displayed.

Related topics

References

Block Description (ETHERNET_UDP_TX_BLx)..... 27

ETHERNET_UDP_INTERRUPT_BLx

Purpose

To make the interrupts that are generated on data receipt available as trigger sources.

Where to go from here

Information in this section

Block Description (ETHERNET_UDP_INTERRUPT_BLx)..... 32
To give information on the appearance and purpose of the block.

Parameters Page (ETHERNET_UDP_INTERRUPT_BLx)..... 34
To configure the interface to be detected for providing interrupts.

Information in other sections

Overview of the RTI Ethernet (UDP) Blockset..... 9
To provide a short description of the blockset's main features, its components and how to access them.

Application Examples..... 13
The RTI Ethernet (UDP) Blockset can be used for various use cases. Some examples are described here.

ETHERNET_UDP_SETUP_BLx..... 18
To initialize the Ethernet interface.

ETHERNET_UDP_RX_BLx..... 23
To receive messages from the Ethernet interface.

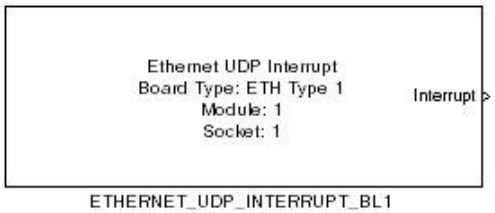
ETHERNET_UDP_TX_BLx..... 27
To send messages via the Ethernet interface.

Block Description (ETHERNET_UDP_INTERRUPT_BLx)

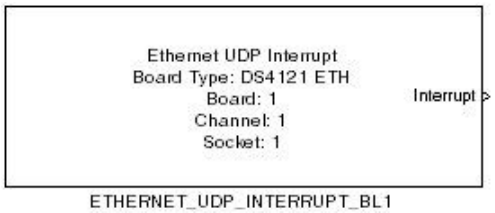
Block

The block's appearance depends on the previously selected platform support.

MicroAutoBox II (rti1401)



PHS-bus-based system (rti1006)



Purpose

To make the interrupts that are generated on data receipt available as trigger sources.

Description

With this block, you can start the execution of a triggered subsystem, when data has been received on the specified socket.

In the Model Task Configuration dialog, the related tasks can be identified by the task names consisting of the specified interface name enlarged by ' Interrupt [RX Socket]' and the socket number. The first task in the dialog that provides the interface name is the main task initialized by the ETHERNET_UDP_SETUP_BLx block.

You can add up to four ETHERNET_UDP_INTERRUPT_BLx blocks to your model with the same main configuration. Interrupt generation is handled separately for each available socket.

Note

- There must be an ETHERNET_UDP_SETUP_BLx block in the model providing the same main configuration as this block. The following settings must be identical to the related setup block:
  - Board type
  - Board/Module number
  - Channel number
- The specified socket must be enabled in the related ETHERNET_UDP_SETUP_BLx block.

Note

For each ETHERNET_UDP_INTERRUPT_BLx block in your model, there must be an ETHERNET_UDP_RX_BLx block with the same configuration. Otherwise the received data might lead to a buffer overflow with data loss.

I/O mapping

For information on the I/O mapping, refer to the *data sheet* of the hardware used:

- For MicroAutoBox II, refer to MicroAutoBox II Hardware Reference 🕮.
- For a PHS-bus-based system, refer to DS4121 ECU Interface Board (PHS Bus System Hardware Reference 🕮).

I/O characteristics

The following table describes the ports of the block:

Port	Description
Output	
Interrupt	Trigger output. Data type: Function call

Dialog pages

The dialog settings can be specified on the following pages:

- Parameters page (refer to Parameters Page (ETHERNET_UDP_INTERRUPT_BLx) on page 34)

Related RTLib functions

This RTI block is implemented by using the following RTLib functions, which are described in the DSETH RTLib Reference 🕮.

- dsEthInterruptProcess

Parameters Page (ETHERNET_UDP_INTERRUPT_BLx)

Purpose

To configure the interface to be detected for providing interrupts.

Dialog settings

Interface name Displays the name of the Ethernet UDP interface specified in the ETHERNET_UDP_SETUP_BLx block if the settings for board type and board/module number in this block dialog match the settings in the related setup block. Otherwise, NOT SPECIFIED is displayed.

Board type Lets you specify the hardware-specific interfaces you want to use for Ethernet connection. This setting must match the configuration in the related ETHERNET_UDP_SETUP_BLx block.

You can select:

- ETH Type 1
- ECU Type 1 ETH
- DS4121 ETH

For further information, refer to Unit Page (ETHERNET_UDP_SETUP_BLx) on page 20.

Board number/Module number Lets you specify the board number/module number in the range 1 … 16. This setting must match the configuration in the related ETHERNET_UDP_SETUP_BLx block.

Channel number Lets you specify the channel number to be used by the DS4121 ETH interface. This setting must match the configuration in the related ETHERNET_UDP_SETUP_BLx block.

Socket number Lets you specify the socket to be detected for providing interrupts in the range 1 … 4.

Note

The specified socket must be enabled in the related ETHERNET_UDP_SETUP_BLx block.

Local socket (received by) Displays the local IP address and port number used by the related remote device as the destination to send data to in the format `<IP>:<Port>`. The local socket is configured in the related ETHERNET_UDP_SETUP_BLx block. If the specified Socket number does not match the setup configuration or the socket is disabled, XXX.XXX.XXX.XXX:5000 is displayed.

Remote socket (received from) Displays the local IP address and port number of the related remote device that sends data to the dSPACE real-time system in the format `<IP>:<Port>`. The remote socket is configured in the related ETHERNET_UDP_SETUP_BLx block. If the specified Socket number does not match the setup configuration or the socket is disabled, XXX.XXX.XXX.XXX:5000 is displayed.

Related topics

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