RTI Synchronized Time Base Manager Blockset

Reference

For RTI Synchronized Time Base Manager Blockset 1.4.2

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dSPACE

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  Tel.: +49 5251 1638-941 or e-mail: support@dspace.de

You can also use the support request form: http://www.dspace.com/go/supportrequest. If you are logged on to mydSPACE, you are automatically identified and do not need to add your contact details manually.

If possible, always provide the relevant dSPACE License ID or the serial number of the CmContainer in your support request.

Software Updates and Patches

dSPACE strongly recommends that you download and install the most recent patches for your current dSPACE installation. Visit http://www.dspace.com/go/patches for software updates and patches.

Important Notice

Contents

About This Reference

Contents

This RTI Reference provides a full description of the RTI Synchronized Time Base Manager Blockset.

You can use the blockset with the following platforms to implement global time synchronization (GTS):

- SCALEXIO processing hardware
- DS1006 Processor Board
- DS1007 PPC Processor Board
- MicroAutoBox II
- MicroAutoBox III
- MicroLabBox
- VEOS

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

Symbol	Description
🕮	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 Synchronized Time Base Manager Blockset

Where to go from here

Information in this section

Overview of the RTI Synchronized Time Base Manager Blockset

Introduction

The RTI Synchronized Time Base Manager Blockset implements global time synchronization (GTS) on dSPACE systems by using the dSPACE ECU time base manager (DsEcuTbM) contained in the RTLib of SCALEXIO and other supported hardware.

Global time synchronization means providing and distributing synchronized times across all ECUs in a vehicle.

Use cases

The RTI Synchronized Time Base Manager Blockset supports the following use cases:

- Creating and configuring synchronized time base instances.
- Reading the synchronized time information from the synchronized time base instances.
- Simulating global time masters.

- Writing the synchronized time information to the synchronized time base instances, while acting as time slave, global time master or time gateway.
- Analyzing the global time synchronization regarding time precision and correct parameterization.

Supported platforms

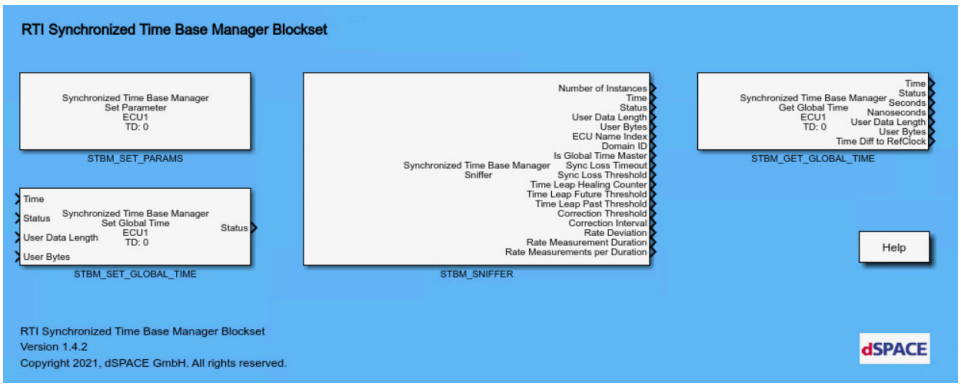
The RTI Synchronized Time Base Manager Blockset supports the following dSPACE platforms:

- SCALEXIO processing hardware
- DS1006 Processor Board
- DS1007 PPC Processor Board
- MicroAutoBox II
- MicroAutoBox III
- MicroLabBox
- VEOS

Library access

You can access the library by entering `rtistbm` in the MATLAB Command Window.

When you open the block library, the blockset is displayed as shown in the following illustration.



You can also access individual blocks via the dSPACE RTI Synchronized Time Base Manager Blockset folder in the Simulink Library Browser tree.

Available blocks

The RTI Synchronized Time Base Manager Blockset consists of the following blocks:

- STBM_SET_PARAMS on page 14
- STBM_SET_GLOBAL_TIME on page 19

- STBM_GET_GLOBAL_TIME on page 23
- STBM_SNIFFER on page 26

Related topics

Basics

Basics on Global Time Synchronization

Introduction

The concept of global time synchronization was introduced and standardized by AUTOSAR as a means of providing and distributing synchronized times across all ECUs in a vehicle.

Time bases

A time base is a time entity which is characterized by the progression of time, ownership of the time base, and reference to the physical world. There are two types of time bases:

Synchronized time bases A synchronized time base is a time base which is synchronized with other time bases at different processing entities. These synchronized time bases constitute a global time.

Offset time bases An offset time base is a time base which exists at a processing entity and depends on a particular synchronized time base relative to which it holds an offset value.

Global time domains

All components (e.g., nodes and communication systems) that are linked to a synchronized time base constitute a *global time domain*. There can be multiple global time domains in a vehicle. They are differentiated by time domain identifiers.

Time masters and slaves Global time synchronization is based on a master-slave principle. Each global time domain has a time master which acts as the source for the time base, distributing it cyclically via the Ethernet, FlexRay, and CAN bus systems to a set of time slaves. Each time slave has its own time base instance, i.e., a local instance of the time.

A single ECU can have multiple time base instances that belong to different global time domains.

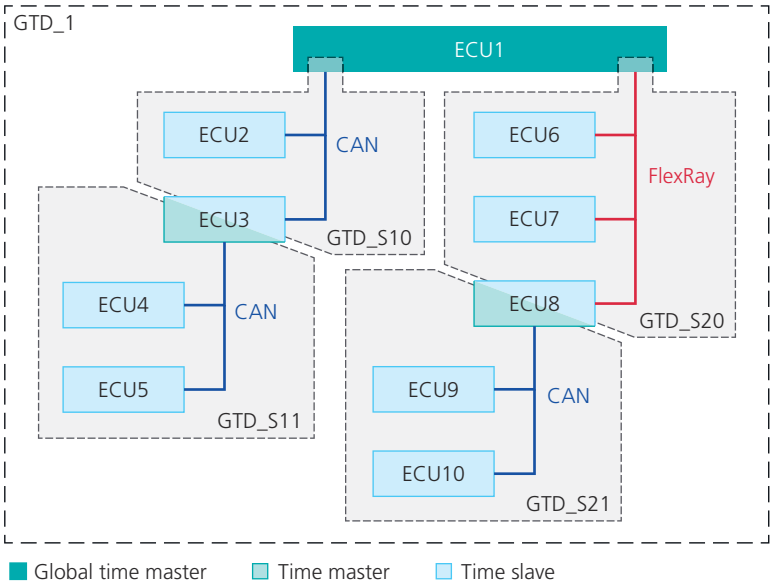
The messages that distribute the time information are called *time synchronization messages*. Whenever a time slave receives a new time from the time master, the time slave extrapolates the time until the next synchronization with the time master.

If a time master is also the origin and global owner of the time base it is called *global time master*

Time gateways A time gateway receives the time base as a slave and distributes it to a set of time slaves as a time master. This set of time slaves and master then constitutes a *time subdomain*.

A time gateway can be connected to different types of bus systems, for example, a FlexRay bus on the slave side and a CAN bus on the master side.

The following schematic illustrates the main concepts explained above: A global time is distributed in a bus network with four communication clusters and five global time domains. *GTD_S10* and *GTD_S20* are subdomains of *GTD_1*. *GTD_S11* and *GTD_S21* are subdomains of *GTD_S10* and *GTD_S20*, respectively, where ECU3 and ECU8 act as time gateways. All global time domains use the same domain identifier.



AUTOSAR documentation

For more information on global time synchronization, refer to the following AUTOSAR documents:

- Specification of Synchronized Time-Base Manager (Document Identification No. 421)
- System Template, Chapter 9 on global time synchronization (Document Identification No. 063)
- Specification of Time Synchronization over CAN (Document Identification No. 674)
- Specification of Time Synchronization over FlexRay (Document Identification No. 675)
- Specification of Time Synchronization over Ethernet (Document Identification No. 676)

Components of the RTI Synchronized Time Base Manager Blockset

Introduction

The RTI Synchronized Time Base Manager Blockset provides RTI blocks that you can use in a Simulink model to create and access synchronized time base manager instances.

Where to go from here

Information in this section

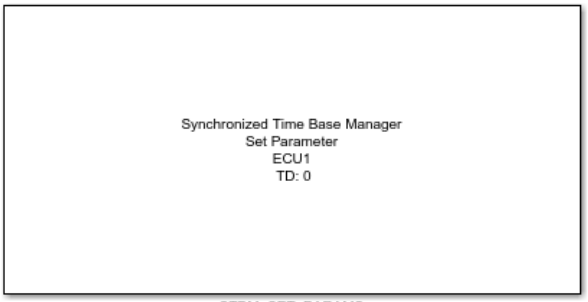
STBM_SET_PARAMS

Where to go from here

Information in this section

Block Description (STBM_SET_PARAMS)

Block



Purpose

To create or access and configure a time base instance.

Description

The STBM_SET_PARAMS block lets you access an existing time base instance or create a new one and set all the parameters that define it and its synchronization.

I/O characteristics

This block has no ports.

Dialog pages

The dialog settings can be specified on the Parameters page. Refer to Parameters Page (STBM_SET_PARAMS) on page 15.

Related topics

Basics

Basics on Global Time Synchronization 11

References

Parameters Page (STBM_SET_PARAMS) 15

Parameters Page (STBM_SET_PARAMS)

Purpose

To specify and configure a time base instance.

Dialog settings

ECU name Lets you provide the name of the ECU for which you specify the time base instance.

Time domain identifier Lets you select an identifier for the time base instance on the ECU in order to specify which time domain the time base instance belongs to. Together, the ECU name and the Time domain identifier uniquely identify the time base instance, because there can be only one time base instance per time domain on an ECU. If the identifier addresses an existing time base instance, this instance is used.

Because the dSPACE ECU time base manager supports a maximum of 16 synchronized time bases per ECU, the identifier must have a value between 0 and 15.

Has connected slave Lets you specify whether the time base instance is assigned to a time slave.

A time base instance that is not assigned to a time slave, but to a global time master does not have to be checked for synchronization loss timeouts (refer to Set synchronization loss timeout on page 15), because it provides the time for the time domain in question and a local timer can be used as its clock.

Set start time Lets you specify whether the block writes a start time to the time base instance when the real-time application is started.

The AUTOSAR System Template does not define a start time. Therefore, the FlexRay Configuration Package and the RTI CAN MultiMessage Blockset do not set this parameter.

Start time Lets you specify the start time in seconds which the block writes to the time base instance. The default value is 0.0.

Set synchronization loss timeout Lets you specify whether the block writes the Synchronization loss timeout parameter to the time base instance.

The parameter is set automatically for time bases that are created by the FlexRay Configuration Package or the RTI CAN MultiMessage Blockset. Therefore, it is recommended that you do not select the checkbox in these cases.

Synchronization loss timeout Lets you specify how many seconds are allowed to pass between two consecutive synchronizations before a timeout occurs.

Set synchronization loss threshold Lets you specify whether the block writes the Synchronization loss threshold parameter.

The parameter is set automatically for time bases that are created by the FlexRay Configuration Package or the RTI CAN MultiMessage Blockset. Therefore, it is recommended that you do not select the checkbox in these cases.

Note

The Synchronization loss threshold parameter is still contained in the AUTOSAR 4.3 specifications. However, the functionality was replaced by the Time leap future threshold (refer to Set time leap future threshold on page 16) and the Time leap past threshold (refer to Set time leap past threshold on page 17) parameters.

Synchronization loss threshold Lets you specify by how many seconds the time that is written to the time base instance is allowed to deviate from the local clock.

Set time leap healing counter Lets you specify whether the block writes the Time leap healing counter parameter to the time base instance.

The parameter is set automatically by time bases that are created by the FlexRay Configuration Package or the RTI CAN MultiMessage Blockset. Therefore, it is recommended that you do not select the checkbox in these cases.

Time leap healing counter Lets you specify how many times the local clock must be resynchronized with a time whose deviation is smaller than the value defined in the Time leap future threshold (refer to Set time leap future threshold on page 16) and the Time leap past threshold (refer to Set time leap past threshold on page 17) parameters. Once this is achieved, the TIMELEAP_FUTURE/TIMELEAP_PAST bit of the status register is cleared. Refer to Block Description (STBM_SNIFFER) on page 26.

Set time leap future threshold Lets you specify whether the block writes the Time leap future threshold parameter to the time base instance.

The parameter is set automatically for time bases that are created by the FlexRay Configuration Package or the RTI CAN MultiMessage Blockset. Therefore, it is recommended that you do not select the checkbox in these cases.

Time leap future threshold Lets you specify by how many seconds the time that is written to the time base instance is allowed to deviate into the future compared to the local time. If this value is exceeded, the TIMELEAP_FUTURE bit

of the status register is set to 1. Refer to Block Description (STBM_SNIFFER) on page 26.

Set time leap past threshold Lets you specify whether the block writes the Time leap past threshold parameter to the time base instance.

The parameter is set automatically for time bases that are created by the FlexRay Configuration Package or the RTI CAN MultiMessage Blockset. Therefore, it is recommended that you do not select the checkbox in these cases.

Time leap past threshold Lets you specify by how many seconds the time that is written to the time base instance is allowed to deviate into the past compared to the local time. If this value is exceeded, the TIMELEAP_PAST bit of the status register is set to 1. Refer to Block Description (STBM_SNIFFER) on page 26.

Set rate correction measurement duration Lets you specify whether the block writes the Rate correction measurement duration parameter to the time base instance.

The parameter is not described in the AUTOSAR System Template and is therefore not set automatically for time bases that are created by the FlexRay Configuration Package or the RTI CAN MultiMessage Blockset. Therefore, it is recommended that you select the checkbox in these cases.

Rate correction measurement duration Lets you specify the time span in seconds which is used to calculate the rate deviation and set a corresponding rate correction. If you set it to zero, you deactivate the rate correction.

Set rate corrections per measurement duration Lets you specify whether the block writes the Rate corrections per measurement duration parameter to the time base instance.

The parameter is not described in the AUTOSAR System Template and is therefore not automatically set for time bases that are created for the FlexRay Configuration Package or the RTI CAN MultiMessage Blockset. Therefore, it is recommended that you select the checkbox in these cases.

Rate corrections per measurement duration Lets you specify how many parallel rate correction measurements are performed for the duration specified in the Rate correction measurement duration parameter.

Example: If you set Rate correction measurement duration to 4 seconds and Rate corrections per measurement duration to 4, a rate correction measurement that lasts 4 seconds is started every second: The first measurement lasts from 0 to 4 seconds, the second measurement from 1 to 5 seconds, the third measurement from 2 to 6 seconds, and so on.

Set offset correction jump threshold Lets you specify whether the block writes the Offset correction jump threshold parameter to the time base instance.

The parameter is not described in the AUTOSAR System Template and is therefore not automatically set for time bases that are created by the FlexRay

Configuration Package or the RTI CAN MultiMessage Blockset. Therefore, it is recommended that you select the checkbox in these cases.

Offset correction jump threshold Lets you specify the limit in seconds up to which an offset between the local instance of the time base and the received value of the global time base is adjusted via rate adaption. Rate adaption temporarily switches the rate of the local time base instance to a different value so that the offset is eliminated within the Offset correction adaption interval.

If the time offset is larger than specified by the Offset correction jump threshold parameter, the time offset is corrected by an appropriate time jump.

If you set the Offset correction jump threshold parameter to zero, the time offset correction is *always* performed by means of a time jump.

Set offset correction adaptation interval Lets you specify whether the block writes the Offset correction adaption interval parameter to the time base instance.

The parameter is not described in the AUTOSAR System Template and is therefore not automatically set for time bases that are created by the FlexRay Configuration Package or the RTI CAN MultiMessage Blockset. Therefore, it is recommended that you select the checkbox in these cases.

Offset correction adaptation interval Lets you specify the length of the time interval in seconds during which a time offset is corrected via rate adaption instead of a time jump.

Related topics

References

Block Description (STBM_SET_PARAMS)..... 14

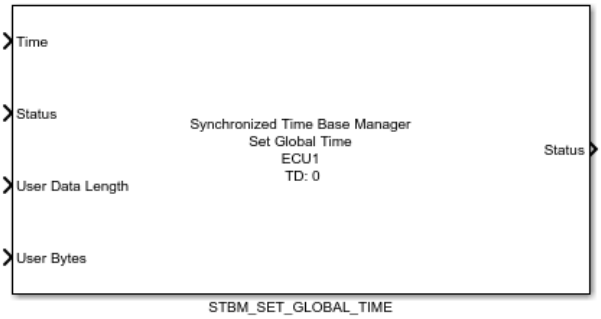
STBM_SET_GLOBAL_TIME

Where to go from here

Information in this section

Block Description (STBM_SET_GLOBAL_TIME)

Block



Purpose

To set the time for a specified time base instance and check its synchronization status.

Description

The STBM_SET_GLOBAL_TIME block sets the time and analyzes the synchronization status of the time base instance, depending on its role as specified on the block's Parameters page.

I/O characteristics

The block has the following inports:

Simulink Inport	Simulink Data Type	Description
Time	Double	Sets the time for the time base instance in seconds.
Status	UInt32	Transfers the synchronization status of the time base instance via the SYNC_TO_GATEWAY bit. Only the SYNC_TO_GATEWAY bit is used to set the status. However, to set/reset the SYNC_TO_GATEWAY bit, the complete status must be provided[1)].

Simulink Inport	Simulink Data Type	Description
		If the **Time base manager role**[2] is **Time Slave** or **MP Communication**, the information is transferred to the time base status register to indicate which of the following cases applies: ▪ SYNC_TO_GATEWAY = 0: The time is synchronized to the (system-wide) global time master. There was no interruption on the way from the global time master to the time base instance. ▪ SYNC_TO_GATEWAY = 1: The forwarding of the global time was interrupted and the time base is synchronized with an ECU subordinate to the global time master.
User Data Length	UInt32	Specifies how many user bytes (0-3) are to be transferred to the time base instance.
User Bytes	UInt8	Transfers up to 3 user bytes to the time base instance.

[1] Refer to Block Description (STBM_GET_GLOBAL_TIME) on page 23.
[2] Refer to Parameters Page (STBM_SET_GLOBAL_TIME) on page 21.

The block has the following outport:

Simulink Outport	Simulink Data Type	Description
Status	UInt32	Provides the status of the time base instance. The status contains the following information: ▪ Bit 0 - TIMEOUT. 0: No synchronization timeout. 1: Synchronization timeout. The time base has not been synchronized for a longer period than specified in the **Synchronization loss timeout** parameter[1]. ▪ Bit 1 - Reserved. Always 0. ▪ Bit 2 - SYNC_TO_GATEWAY. 0: The time is synchronized to the (system-wide) global time master. There was no interruption on the way from the global time master to the time base instance. 1: The forwarding of the global time was interrupted and the time base is synchronized with an ECU subordinate to the global time master. ▪ Bit 3 - GLOBAL_TIME_BASE. 0: The time base has never been synchronized with the global time master and relies on a local clock. 1: The time base has been synchronized with the global time master at least once since the start of the real-time application. ▪ Bit 4 - TIMELEAP_FUTURE. 0: The time has not leaped further into the future than specified in the **Time leap future threshold** parameter[1].

Simulink Outport	Simulink Data Type	Description
		1: The time has leaped further into the future than specified by the **Time leap future threshold** parameter. ▪ Bit 5 - TIMELEAP_PAST. 0: The time has not leaped further into the past than specified in the **Time leap past threshold** parameter[1)]. 1: The time has leaped further into the past than specified by the **Time leap past threshold** parameter. ▪ Bit 6-31 - Reserved. Always 0.

[1)] Refer to Parameters Page (STBM_SET_PARAMS) on page 15.

Dialog pages

The dialog settings can be specified on the **Parameters** page. Refer to Parameters Page (STBM_SET_GLOBAL_TIME) on page 21.

Related topics

Basics

Basics on Global Time Synchronization 11

References

Parameters Page (STBM_SET_GLOBAL_TIME) 21

Parameters Page (STBM_SET_GLOBAL_TIME)

Purpose

To specify the time base instance and how the time base manager writes the time to it.

Dialog settings

ECU name Lets you provide the name of the ECU for which you specify the time base instance.

Time domain identifier Lets you select the time domain the time base instance belongs to. The **ECU name** and the **Time domain identifier** together

uniquely identify the time base instance. If there is no time base instance with this identification, a new time base instance is created.

Time base manager role Lets you select the role in which the time base manager sets the time for the time base instance. The following settings are possible:

Time Base Manager Role	Functionality
Global Time Master	The time base manager sets the time in the role of global time master.
MP Communication	The current hardware reference time (DsTimeStamp for non-SCALEXIO platforms and IOCNET time for SCALEXIO platforms) is added before the time is set. This functionality is useful if you want to transfer a time from one core or processor to another. If the hardware reference time is subtracted before the transfer between the cores or processors and is added again at a later stage, this process compensates for the delay caused by reading, transferring, and setting the time.
Time Slave	The time base manager sets the time in the role of time slave.

Related topics

References

Block Description (STBM_SET_GLOBAL_TIME)..... 19

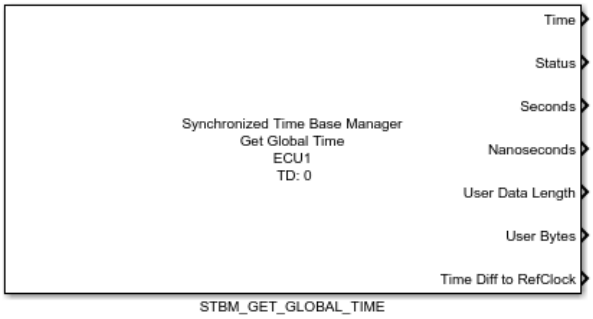
STBM_GET_GLOBAL_TIME

Where to go from here

Information in this section

Block Description (STBM_GET_GLOBAL_TIME)

Block



Purpose

To provide the time and status of a time base instance.

Description

The STBM_GET_GLOBAL_TIME block provides information on the time and synchronization status of a time base instance.

I/O characteristics

This block has no inports.

It has the following outports:

Simulink Outport	Simulink Data Type	Description
Time	Double	Provides the synchronized time of the time base instance in seconds.
Status	UInt32	Provides the status of the time base instance. The status contains the following information: ▪ Bit 0 - TIMEOUT. 0: No synchronization timeout.

Simulink Outport	Simulink Data Type	Description
		1: Synchronization timeout. The time base has not been synchronized for a longer period than specified in the **Synchronization loss timeout** parameter[1)]. ▪ Bit 1 - Reserved. Always 0. ▪ Bit 2 - SYNC_TO_GATEWAY. 0: The time is synchronized to the (system-wide) global time master. There was no interruption on the way from the global time master to the time base instance. 1: The forwarding of the global time was interrupted and the time base is synchronized with an ECU subordinate to the global time master. ▪ Bit 3 - GLOBAL_TIME_BASE. 0: The time base has never been synchronized with the global time master and relies on a local clock. 1: The time base has been synchronized with the global time master at least once since the start of the real-time application. ▪ Bit 4 - TIMELEAP_FUTURE. 0: The time has not leaped further into the future than specified in the **Time leap future threshold** parameter[1)]. 1: The time has leaped further into the future than specified by the **Time leap future threshold** parameter. ▪ Bit 5 - TIMELEAP_PAST. 0: The time has not leaped further into the past than specified in the **Time leap past threshold** parameter[1)]. 1: The time has leaped further into the past than specified by the **Time leap past threshold** parameter. ▪ Bit 6-31 - Reserved. Always 0.
Seconds	Double	Provides the number of integral seconds of the time read from the time base instance.
Nanoseconds	UInt32	Provides the number of nanoseconds read from the time base instance after the subtraction of the integral seconds.
User Data Length	UInt32	Specifies how many user bytes (0-3) are to be read from the time base instance.
User Bytes	UInt8	Provides up to 3 user bytes from the time base instance.
Time Diff to RefClock	Double	Forwards the synchronized time to another core or processor via multiprocessor communication. To compensate for the delay caused by the communication, the current hardware reference time (DsTimeStamp for non-SCALEXIO platforms and IOCNET time for SCALEXIO platforms) is subtracted. When writing to the other core or processor, the current hardware reference time is added again. For this, the **Time base manager role** of the STBM_SET_GLOBAL_TIME block must be set to **MP communication**[2)].

1) Refer to Parameters Page (STBM_SET_PARAMS) on page 15.
2) Refer to Parameters Page (STBM_SET_GLOBAL_TIME) on page 21.

Dialog pages

The dialog settings can be specified on the **Parameters** page. Refer to Parameters Page (STBM_GET_GLOBAL_TIME) on page 25.

Related topics

Basics

Basics on Global Time Synchronization 11

References

Parameters Page (STBM_GET_GLOBAL_TIME) 25

Parameters Page (STBM_GET_GLOBAL_TIME)

Purpose

To specify the time base instance from which time and status are to be read.

Dialog settings

ECU name Lets you provide the name of the ECU for which you specify the time base instance.

Time domain identifier Lets you specify the time domain the time base instance belongs to. The **ECU name** and the **Time domain identifier** together uniquely identify the time base instance.

Related topics

References

Block Description (STBM_GET_GLOBAL_TIME) 23

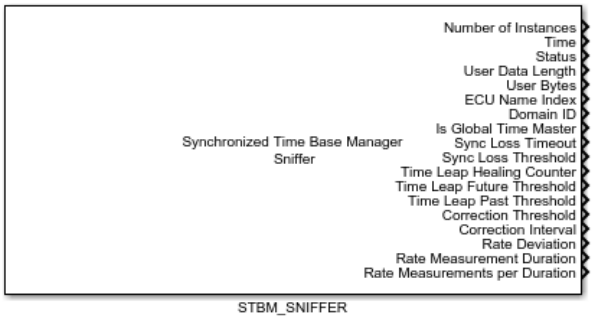
STBM_SNIFFER

Where to go from here

Information in this section

Block Description (STBM_SNIFFER)

Block



Purpose

To find time base instances and provide information about their status.

Description

The STBM_SNIFFER block can be configured to find up to 256 time base instances and provide information on their status.

I/O characteristics

This block has no inports.

It has the following outports:

Simulink Outport	Simulink Data Type	Description
Number of Instances	UInt32	Provides the number of time base instances found.
Time	Double	Provides the synchronized time in seconds for each of the time base instances found. The outport is a vector whose width is determined by the Maximum number of time base manager instances parameter[1)].

Simulink Outport	Simulink Data Type	Description
Status	UInt8	Provides the status for each of the time base instances found. The outport is a vector whose width is determined by the **Maximum number of time base manager instances** parameter[1]. The status encompasses the following information: ▪ Bit 0 - TIMEOUT. 0: No synchronization timeout. 1: Synchronization timeout. The time base has not been synchronized for a longer period than specified in the **Synchronization loss timeout** parameter[2]. ▪ Bit 1 - Reserved. Always 0. ▪ Bit 2 - SYNC_TO_GATEWAY. 0: The time is synchronized to the (system-wide) global time master. There was no interruption on the way from the global time master to the time base instance. 1: The forwarding of the global time was interrupted and the time base is synchronized with an ECU subordinate to the global time master. ▪ Bit 3 - GLOBAL_TIME_BASE. 0: The time base has never been synchronized with the global time master and relies on a local clock. 1: The time base has been synchronized with the global time master at least once since the start of the real-time application. ▪ Bit 4 - TIMELEAP_FUTURE. 0: The time has not leaped further into the future than specified in the **Time leap future threshold** parameter[2]. 1: The time has leaped further into the future than specified by the **Time leap future threshold** parameter. ▪ Bit 5 - TIMELEAP_PAST. 0: The time has not leaped further into the past than specified in the **Time leap past threshold** parameter[2]. 1: The time has leaped further into the past than specified by the **Time leap past threshold** parameter. ▪ Bit 6-31 - Reserved. Always 0.
User Data Length	UInt32	Specifies how many user bytes (0-3) are to be read from each of the time base instances found. The outport is a vector whose width is determined by the **Maximum number of time base manager instances** parameter[1].
User Bytes	UInt8	Provides the user bytes that are read from each of the time base instances found. The outport is a vector of width 3 x **Maximum number of time base manager instances**.
ECU Name Index	UInt32	Provides the ECU name index for each of the time base instances found. This index can be used to access the ECU name in a C program, for example, `printf('ECU Name of index %d is %s', DsEcuTbMEcuNames[index], index);`.
Domain ID	UInt32	Provides the time domain identifier for each of the time base instances found.
Is Global Time Master	UInt32	Provides information on whether the time base instances found are assigned to a global time master.
Sync Loss Timeout	Double	Provides the **Synchronization loss timeout** parameter[2] for each of the time base instances found.
Sync Loss Threshold	Double	Provides the **Synchronization loss threshold** parameter[2] for each of the time base instances found.
Time Leap Healing Counter	UInt32	Provides the **Time leap healing counter** parameter[2] for each of the time base instances found.
Time Leap Future Threshold	Double	Provides the **Time leap future threshold** parameter[2] for each of the time base instances found.

Simulink Outport	Simulink Data Type	Description
Time Leap Past Threshold	Double	Provides the **Time leap past threshold** parameter[2] for each of the time base instances found.
Correction Threshold	Double	Provides the **Offset correction jump threshold** parameter[2] for each of the time base instances found.
Correction Interval	Double	Provides the **Offset correction jump interval** parameter[2] for each of the time base instances found.
Rate Deviation	Double	Provides the rate deviation between time slave and time master for each of the time base instances found.
Rate Measurement Duration	Double	Provides the **Rate correction measurement duration** parameter[2] for each of the time base instances found.
Rate Measurement per Duration	UInt32	Provides the **Rate corrections per measurement duration** parameter[2] for each of the time base instances found.

[1] Refer to Parameters Page (STBM_SNIFFER) on page 28.
[2] Refer to Parameters Page (STBM_SET_PARAMS) on page 15.

Dialog pages

The dialog settings can be specified on the **Parameters** page (refer to Parameters Page (STBM_SNIFFER) on page 28).

Related topics

Basics

Basics on Global Time Synchronization 11

References

Parameters Page (STBM_SNIFFER) 28

Parameters Page (STBM_SNIFFER)

Purpose

To specify the maximum number of time base instances for which the block provides information.

Dialog settings

Maximum number of time base manager instances Lets you specify the maximum number of time base instances for which you want the block to provide information. It can only have values of the form 2^x, where x is an integer between 0 and 8.

If the number of time base instances exceeds the number specified in **Maximum number of time base manager instances**, the **STBM_SNIFFER** block only provides information on the time base instances found up to that number. The

selection of the time base instances in this case follows their sorting, i.e., the **Time domain identifier** followed by the **ECU name**.

Related topics

References

Block Description (STBM_SNIFFER)..... 26

Limitations

Limitations

Limitations of global time synchronization on dSPACE hardware

The RTI Synchronized Time Base Manager is not supported by the DS1104 R&D Controller Board.

Limitations of the synchronized time base manager

The following limitations apply to the synchronized time base manager:

- Triggered customers are not supported: dSPACE tasks are not triggered with respect to a global time base and CAN communication time stamps are not displayed with regard to a global time base.
- Offset time bases and pure local time bases are not supported.
- Global time precision measurement is not supported.
- Immediate time synchronization is not supported.

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