## FlexRay Configuration Tool

# Reference

For dSPACE FlexRay Configuration Package 4.7

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### About This Reference

#### Contents

This reference provides information on the menu commands, context menu commands, dialogs, and windows of the FlexRay Configuration Tool. The FlexRay Configuration Tool is a graphical user interface that allows you to view FlexRay network information, create configurations, and generate code and Simulink configuration data for modeling and simulating with the RTI FlexRay Configuration Blockset or FlexRay Configuration Blockset.

#### Required knowledge

Knowledge in handling the host PC and the Microsoft Windows operating system is assumed.

#### **Symbols**

dSPACE user documentation uses the following symbols:

Symbol	Description
<b>▲</b> DANGER	Indicates a hazardous situation that, if not avoided, will result in death or serious injury.
<b>▲</b> WARNING	Indicates a hazardous situation that, if not avoided, could result in death or serious injury.
<b>▲</b> 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.
	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.

#### **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.

 $\label{lem:programDATA} $$ \PROGRAMDATA \CE\clinstallation GUID>\CProductName> or $$$ 

%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>\
<Pre><Pre><Pre>ductName>

### 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/go/help.

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.

## **Project Management**

#### Overview

The FlexRay Configuration Tool's Project Management provides the following commands and dialogs:

#### Where to go from here

#### Information in this section

| Exit  |
|---|
| Icons for Communication Cluster Elements and FlexRay Task Types |
| Import Communication Cluster                                    |
| New   |
| Open  |
| Recent Communication Cluster                                    |
| Recent Project Files  |
| Save  |
| Save As   |

#### Update Communication Cluster......17

To update the configuration when the corresponding FIBEX or AUTOSAR system description file was changed.

#### Information in other sections

#### Handling Configuration Projects (FlexRay Configuration Tool Guide 🕮)

Providing information on how you can manage configuration projects, import a communication cluster file and handle its elements.

### Exit

| Access      | You can access this o                  | You can access this command via:   |  |  |
|-------------|--|--|--|--|
|             | Menu bar                               | Project  |  |  |
|             | Context menu of                        | None   |  |  |
|             | Shortcut key                           | None   |  |  |
|             | Toolbar icon                           | None   |  |  |
| Purpose     | To exit the current Fl                 | To exit the current FlexRay Configuration Tool session.                                    |  |  |
| Purpose     | To exit the current Fl                 | To exit the current FlexRay Configuration Tool session.                                    |  |  |
| Result      | The FlexRay Configu                    | The FlexRay Configuration Tool ends the current session.                                   |  |  |
| Description | If you made any cha<br>before exiting. | If you made any changes to the open project, you are prompted to save them before exiting. |  |  |

### Icons for Communication Cluster Elements and FlexRay Task Types

#### **Purpose**

To identify the communication cluster element and task types used in the FlexRay Configuration Tool, all the icons are listed with descriptions of their meanings.

#### Description

The FlexRay Configuration Tool displays the elements of the communication cluster and the FlexRay tasks in different views. For detailed information on the views, refer to Graphical User Interface of the FlexRay Configuration Tool (FlexRay Configuration Tool Guide (1)).

#### **Communication cluster elements**

| Icon             | Communication Cluster Element Type  |
|------------------|---|
| <b>a</b>         | Communication cluster   |
|                  | ECU <sup>1)</sup>   |
|                  | Controller  |
| <b></b>          | Channel   |
| Frames           |   |
|                  | Static receiving frame <sup>2), 3)</sup>  |
|                  | Static transmitting frame <sup>1), 2), 3)</sup>                                     |
|                  | Static receiving sync frame <sup>2), 3)</sup>                                       |
|                  | Static transmitting sync frame <sup>1), 2), 3)</sup>                                |
|                  | Static receiving startup-sync frame <sup>2), 3)</sup>                               |
|                  | Static transmitting startup-sync frame <sup>1), 2), 3)</sup>                        |
|                  | Static receiving subframe   |
| [ <b>•</b> il]   | Static transmitting subframe <sup>1)</sup>  |
|                  | Dynamic receiving frame <sup>3)</sup>   |
|                  | Dynamic transmitting frame <sup>1), 3)</sup>  |
|                  | Dynamic receiving subframe  |
|                  | Dynamic transmitting subframe <sup>1)</sup>   |
| Signals          |   |
| J/v              | Static receiving signal <sup>4)</sup>   |
| 1                | Static transmitting signal <sup>1), 5)</sup>  |
| Jij <sub>∧</sub> | Static receiving signal, which belongs to a sync frame <sup>4)</sup>                |
| Þijγ             | Static transmitting signal, which belongs to a sync frame <sup>1), 5)</sup>         |
| 3ly              | Static receiving signal, which belongs to a startup-sync frame <sup>4)</sup>        |
| MA               | Static transmitting signal, which belongs to a startup-sync frame <sup>1), 5)</sup> |

| Icon | Communication Cluster Element Type            |
|------|---|
| 1/4  | Dynamic receiving signal <sup>4)</sup>        |
| 4    | Dynamic transmitting signal <sup>1), 5)</sup> |

- 1) The icon contains a monitor if the element is monitored.
- <sup>2)</sup> The icon contains a clock if the element is a time synchronization message.
- 3) The icon contains a lock symbol if the element is a secured or cryptographic IPDU.
- <sup>4)</sup> The icon is crossed out if the ECU does not receive the signal, and the signal therefore cannot be configured in the FlexRay Configuration Tool. The communication cluster file defines that the signal is part of the PDU, but it does not instruct the ECU to unpack the signal from the PDU.
- <sup>5)</sup> The icon is crossed out if the ECU does not send the signal, and the signal therefore cannot be configured in the FlexRay Configuration Tool. The communication cluster file defines that the signal is part of the PDU, but it does not instruct the ECU to pack the signal into the PDU. For the signal, the PDU default bit value will be used.

#### Task types

| Icon                 | Task Type            |
|----------------------|----------------------|
| Ê                    | Synchronization Task |
| ₩                    | Static Task          |
| ₩                    | Dynamic Task         |
| $\tilde{f_{\infty}}$ | Application Task     |

#### **Related topics**

#### References



### Import Communication Cluster

#### Access

You can access this command via:

| Menu bar        | Project  |
|-----------------|----------|
| Context menu of | None     |
| Shortcut key    | None     |
| Toolbar icon    | <b>m</b> |

**Purpose** 

To import a FIBEX or AUTOSAR system description file.

#### Result

The FlexRay Configuration Tool imports the FIBEX or AUTOSAR system description file and displays the network information in the Communication Cluster view.

#### Description

The FlexRay Configuration Tool opens the Select a Communication Cluster dialog for you to select an existing FIBEX or AUTOSAR system description file to import.

After the import, the FlexRay Configuration Tool displays the network information included in the file:

- FlexRay cluster and ECUs belonging to it
- Controller and channels belonging to them
- Frames belonging to the channels and the corresponding signals

For further information, refer to Communication Cluster View on page 20.

#### Note

The imported communication cluster file must be valid according to a validation schema.

- When a FIBEX file is imported, the FlexRay Configuration Tool itself does not validate it against a FIBEX schema. Using an invalid FIBEX file can result in faulty configuration.
- For AUTOSAR system description files, the FlexRay Configuration Tool can perform a validation check during the import process. You can enable or disable this validation.

An invalid communication cluster file cannot be imported. A communication cluster file is invalid, for example, if the timing does not fit one of the supported dSPACE platforms.

Unsupported frames and signals are not imported.

### Select a Communication Cluster dialog

To select a FIBEX or AUTOSAR system description file to import.

**Look in** Lets you select the folder to take the FIBEX or AUTOSAR system description file from.

**File name** Displays the name of the FIBEX file or AUTOSAR system description file to be imported.

**Files of type** Only files of the XML and ARXML types can be selected here.

**Schema Validation** (Available only if an AUTOSAR system description file is selected for import) Lets you enable a validation check for the selected AUTOSAR system description file. If the checkbox is selected, the FlexRay Configuration Tool checks whether the file is valid during the import process.

#### **Related topics**

#### **Basics**

Communication Cluster Files Usable for Configuration (FlexRay Configuration Tool Guide 🕮)

#### HowTos

How to Import a Communication Cluster File (FlexRay Configuration Tool Guide 🕮)

#### References

Recent Communication Cluster.....

#### New

#### Access

You can access this command via:

Menu bar Project Context menu of None Shortcut key Ctrl+N Toolbar icon 

#### **Purpose**

To start a new configuration project.

#### Description

No project is currently open In this case, you can import a communication cluster file to start with your configuration. See Import Communication Cluster on page 10.

A project is currently open In this case, the current project is closed. If you made any changes to the open project, you are prompted to save them before exiting.

#### **Related topics**

HowTos

How to Create a New Project (FlexRay Configuration Tool Guide  ${\color{orange} \square}$ )

## Open

| Access              | You can access this command via:  |          |  |
|---------------------|---|----------|--|
|                     | Menu bar  | Project  |  |
|                     | Context menu of   | None     |  |
|                     | Shortcut key  | Ctrl+0   |  |
|                     | Toolbar icon  | <i>≌</i> |  |
| Purpose             | To open a project.  |          |  |
| Result              | The FlexRay Configuration Tool opens the Open Project dialog for you to select an existing project to open.   |          |  |
| Description         | If another project is already open, it is closed. Then the project you selected is opened. If the referenced communication cluster file cannot be located, a dialog opens asking you whether you want to select another path. If you click Yes in the dialog, the FlexRay Configuration Tool opens a standard dialog for you to enter the new path. You cannot import a different FIBEX or AUTOSAR system description file than the referenced one. If a different communication cluster file is specified or if you click No in the dialog, the loading procedure of the project is aborted. |          |  |
| Open Project dialog | To select a project to open.  |          |  |
|                     | <b>Look in</b> Lets you select the folder to take the project from.   |          |  |
|                     | <b>File name</b> Displays the name of the project file (PRJ file) to be opened.   |          |  |
|                     | <b>Files of type</b> Only files of the PRJ type can be selected here.   |          |  |
| Related topics      | References  |          |  |
|                     |   |          |  |

### Recent Communication Cluster

| Access         | You can access this o  | You can access this command via:                  |  |  |
|----------------|--|---|--|--|
|                | Menu bar   | Project   |  |  |
|                | Context menu of  | None  |  |  |
|                | Shortcut key   | None  |  |  |
|                | Toolbar icon   | None  |  |  |
| •              | the FlexRay Configuration Tool.  |   |  |  |
| Purpose        | To import one of the six most recent communication clusters that were used in the FlexRay Configuration Tool.  |   |  |  |
| Description    | The recent communication cluster that you select from the list is imported and its network information is displayed in the Communication Cluster view. |   |  |  |
|                | Hetwork imormation   | is displayed in the Communication Cluster view.   |  |  |
| Related topics | References   | n is displayed in the Communication Cluster view. |  |  |

## Recent Project Files

| Access      | You can access this o           | You can access this command via:   |  |  |
|-------------|---------------------------------|--|--|--|
|             | Menu bar                        | Project  |  |  |
|             | Context menu of                 | None   |  |  |
|             | Shortcut key                    | None   |  |  |
|             | Toolbar icon                    | None   |  |  |
| Purpose     | To open one of the s<br>Tool.   | six most recent projects opened in the FlexRay Configuration                               |  |  |
| Description | If another project is a opened. | If another project is already open, it is closed. Then the project you selected is opened. |  |  |

#### **Related topics**

#### References

### Save

#### Access

You can access this command via:

| Menu bar        | Project |
|-----------------|---------|
| Context menu of | None    |
| Shortcut key    | Ctrl+S  |
| Toolbar icon    |         |

#### **Purpose**

To save the current project.

#### Result

The current project is saved. The location of the imported communication cluster file is referenced to the project file.

#### Tip

If you change the location of a referenced FIBEX or AUTOSAR system description file after saving the project and you open the project again, FlexRay Configuration Tool opens a standard dialog for you to enter the new path. You cannot import a different FIBEX or AUTOSAR system description file than the referenced one.

#### Description

If you want to save a project for the first time, the Save Project dialog opens to specify the path and file name.

| Save Project dialog | Save in Lets you select the path and folder to save the project to. |
|---------------------|---|
|                     | File name Lets you specify the project name.                        |
|                     | Save as type Only the type PRJ can be selected here.                |
|                     |   |
| Related topics      | References  |
|                     | Save As   |

### Save As

| Access         | You can access this o  | You can access this command via:       |  |  |  |
|----------------|--|--|--|--|--|
|                | Menu bar   | Project                                |  |  |  |
|                | Context menu of  | None                                   |  |  |  |
|                | Shortcut key   | None                                   |  |  |  |
|                | Toolbar icon   | None                                   |  |  |  |
| Purpose        | To save the current project under a new name.  |  |  |  |  |
| Result         | The current project is saved under the new name.                                     |  |  |  |  |
| Description    | FlexRay Configuration Tool opens the Save As dialog to specify another project name. |  |  |  |  |
| Save As dialog | Save in Lets you select the path and folder to save the project to.                  |  |  |  |  |
|                | File name Lets you change the project name.  |  |  |  |  |
|                | Save as type On  | lly the type PRJ can be selected here. |  |  |  |
| Related topics | References   |  |  |  |  |
|                | Save   | 15                                     |  |  |  |

## Update Communication Cluster

| Access                 | You can access this command via:  |  |  |  |  |
|------------------------|---|--|--|--|--|
|                        | Menu bar  | Project  |  |  |  |
|                        | Context menu of   | None   |  |  |  |
|                        | Shortcut key  | None   |  |  |  |
|                        | Toolbar icon  |  |  |  |  |
| Purpose                | To update the configuration when the corresponding FIBEX or AUTOSAR system description file was changed.  |  |  |  |  |
| Result                 | The FlexRay configuration is updated according to the new FIBEX or AUTOSAR system description file.   |  |  |  |  |
| Description            | The FlexRay Configuration Tool updates the FlexRay configuration automatically. Inconsistencies and configuration changes which occur during the update are reported as log messages. |  |  |  |  |
| Select a Communication | To select a FIBEX or AUTOSAR system description file to import.   |  |  |  |  |
| Cluster dialog         | <b>Look in</b> Lets you select the folder to take the FIBEX or AUTOSAR system description file from.  |  |  |  |  |
|                        | <b>File name</b> Displays the name of the FIBEX file or AUTOSAR system description file to be imported.   |  |  |  |  |
|                        | Files of type Only files of the XML and ARXML types can be selected here.   |  |  |  |  |
|                        | AUTOSAR system de   | (Available only if an AUTOSAR system description file is<br>Lets you enable a validation check for the selected<br>escription file. If the checkbox is selected, the FlexRay<br>hecks whether the file is valid during the update process. |  |  |  |
| Related topics         | HowTos  |  |  |  |  |
|                        | How to Update the Co  | ommunication Cluster File (FlexRay Configuration Tool  |  |  |  |

## Communication Cluster Management

#### Overview

The FlexRay Configuration Tool's Communication Cluster Management provides the following commands and dialogs:

#### Where to go from here

#### Information in this section

| Collapse All  To collapse the items in the selected node of the FlexRay Network shown in the different views.   | 20 |
|---|----|
| Communication Cluster View  To open the Communication Cluster view, which displays the FlexRay content of an imported FIBEX or AUTOSAR system description file. | 20 |
| Expand All  To expand the items in the selected node of the FlexRay network shown in the different views.   | 21 |
| Filter To filter the project items displayed in the views.  | 22 |
| Remove To remove a selected communication cluster element or a task from the configuration.   | 26 |
| Sorting To sort the item lists in the views alphabetically, or according to direction, type, or category.   | 27 |

#### Information in other sections

## Communication Cluster Files Usable for Configuration (FlexRay Configuration Tool Guide (14))

The FlexRay Configuration Tool supports the FIBEX and AUTOSAR standards for describing FlexRay networks.

## Collapse All

| Access            | You can access this                         | You can access this command via:                            |  |  |  |
|-------------------|---|---|--|--|--|
|                   | Menu bar                                    | None  |  |  |  |
|                   | Context menu of                             | <ul> <li>Communication Cluster view</li> </ul>              |  |  |  |
|                   |   | <ul> <li>Configuration view</li> </ul>                      |  |  |  |
|                   |   | <ul><li>Task view</li><li>Monitoring view</li></ul>         |  |  |  |
|                   | Shortcut key                                | -   |  |  |  |
|                   | Toolbar icon                                | None  |  |  |  |
| Purpose           | To collapse the item:                       | s in the selected node of the FlexRay Network shown in one  |  |  |  |
| Purposo           | To collapse the item                        | s in the selected node of the Flav Pay Notwork shown in one |  |  |  |
|                   | of the different view                       | S.  |  |  |  |
| Purpose<br>Result | of the different view                       | he element tree are hidden. To make the child nodes appear  |  |  |  |
|                   | of the different view  The child nodes of t | he element tree are hidden. To make the child nodes appear  |  |  |  |

### Communication Cluster View

| Access      | You can open the Communication Cluster view via:   |                               |  |  |
|-------------|--|-------------------------------|--|--|
|             | Menu bar   | Views - Communication Cluster |  |  |
|             | Context menu of  | None                          |  |  |
|             | Shortcut key   | None                          |  |  |
|             | Toolbar icon   | None                          |  |  |
| Purpose     | To enable or disable the Communication Cluster view.   |                               |  |  |
| Description | In the Communication Cluster view, the FlexRay Configuration Tool displays the content of an imported FIBEX or AUTOSAR system description file hierarchically. |                               |  |  |

The Communication Cluster view lets you sort and filter the elements of the communication cluster. See also Import Communication Cluster on page 10.

**Filtering and sorting the communication cluster elements** In the Communication Cluster view, you can view and manage the elements belonging to the currently imported FIBEX or AUTOSAR system description file. The Communication Cluster view provides a menu, allowing you to filter and/or sort the elements according to your needs (see Filter on page 22 and Sorting on page 27).

**Element type** The Communication Cluster view displays each element with an icon indicating its type. For a complete list of all icons, refer to Icons for Communication Cluster Elements and FlexRay Task Types on page 8.

#### **Related topics**

#### Basics

Handling the Elements of a Communication Cluster File (FlexRay Configuration Tool Guide  $\Omega$ )

#### HowTos

How to Import a Communication Cluster File (FlexRay Configuration Tool Guide 🕮)

### **Expand All**

#### Access

You can access this command via:

| Menu bar    |        | None   |
|-------------|--------|--|
| Context me  | enu of | <ul> <li>Communication Cluster view</li> <li>Configuration view</li> <li>Task view</li> <li>Monitoring view</li> </ul> |
| Shortcut ke |        | *  |
| Toolbar ico |        | None   |

#### **Purpose**

To expand the items in the selected node of the FlexRay network shown in one of the different views.

#### Result

The child nodes of the element tree are shown. To make the child nodes disappear, invoke Collapse AII.

#### **Related topics**

#### References



### Filter

#### Access

You can access the Filter commands via:



#### **Purpose**

To filter the project items displayed in the views.

#### Result

The views show the project items that fulfill the active filter criteria.

#### Description

You can filter the items of the following views:

- Communication Cluster view
- Configuration view
- Monitoring view
- Task view

#### Tip

You can combine the filters according to your needs. See the filter descriptions below.

#### **Element filter**

The FlexRay Configuration Tool provides several element-specific filter types which can be used individually or in combination. An active element filter is indicated by a colored background. You can read the currently active element filter criteria in a tooltip which is displayed when the mouse is placed on the toolbar icon.

The following filter types are available for specifying an element filter. Not all filter types are available in each view.

| Icon       | Filter Type                         |
|------------|-------------------------------------|
| ₽,         | ECU filter                          |
| <b>3</b> ₽ | Redundant frames in logical channel |
| None       | Only the sending frames             |
| h-         | Only the ECUs and the signals       |
| ₩          | Only the tasks and the signals      |

You can deactivate all specified element filter settings at once via the No filter activated option.

**ECU filter** Lets you choose one or all of the ECUs to be displayed with their associated communication cluster elements.

**Redundant frames in logical channel** Lets you summarize the frames under the ECU nodes. If this option is not selected, all the frames which are sent or received by the ECUs are displayed under the used channels (Channel\_A and/or Channel\_B). If this option is selected, the frames which are sent or received via both channels are displayed under Logical\_Channel\_AB nodes. Only the frames which are sent or received via one channel are displayed under the used channel.

Note that even if frames are sent or received using both channels (the frames displayed under Logical\_Channel\_AB nodes), some property values can be different for channel A and channel B. In this case, the property field in the Properties view is empty. However, changes in these properties are valid for both channels.

This filter is useful only if the FlexRay communication uses two channels.

**Only the sending frames** (Available in the Communication Cluster view only) Lets you display only the sending frames with their signals of the current communication cluster file. The frames are also sorted by their slot ID.

**Only the ECUs and the signals** (Not available in the Task view) Lets you display only the signals of the ECUs of the current communication cluster file. Different signal instances of the same signal are displayed only once per ECU.

**Only the tasks and the signals** (Available in the Task view only) Lets you display only the signals of the tasks.

#### Short name filter

Lets you display only frames and signals whose short names contain a specified string. You can specify separate short name filters for the different views (via the buttons in the views) or a global short name filter which applies to all views (via the toolbar button at the top of the FlexRay Configuration Tool). The global short name filter overrides the short name filters specified for the single views. An

active short name filter is indicated by the 🖳 icon.

If you click the 5 button, the (Global) Short Name Filter dialog opens.

**Filter text** Lets you enter a search string. You can use the ? wildcard for one missing letter, or the \* wildcard for an undefined number of missing letters in the filter string.

**Match case** Lets you specify whether the filter differentiates between lowercase and uppercase letters.

**Activate** (Available in the Short Name Filter dialog for a single view only) Activates the filter for the view.

**Deactivate** (Available in the Short Name Filter dialog for a single view only) Deactivates the short name filter for the view.

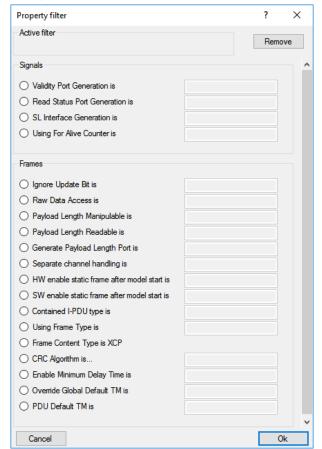
**Apply** (Available in the Global Short Name Filter dialog only) Applies the specified global short name filter to all views.

**Reset** (Available in the Global Short Name Filter dialog only) Clears all the short name filters, regardless of their filter texts and whether they were activated locally or globally.

#### **Property filter**

The property filter is available in the Configuration view and Monitoring view only. It lets you display only elements that fulfill a filter criterion based on a signal

or frame property value. An active property filter is indicated by the vicon. You can read the currently active filter criterion in a tooltip which is displayed when the mouse is placed on the toolbar icon.



If you click the volume button in a view, the Property Filter dialog opens for you to specify the filter.

A filter can consist of one condition only. In a condition, a signal or frame property is compared with a specified value. The conditions are connected with the tunable properties of signals or frames. Refer to Configurable Properties for ECUs, Signals, and Frames (FlexRay Configuration Tool Guide (1)).

**Active filter** Displays the currently selected filter criterion.

**Remove** Lets you clear the Property filter.

**Signals** Lists the possible filter conditions based on signal properties and lets you select and configure a condition.

- Validity Port Generation is 'True' or 'False'.
- Read Status Port Generation is 'True' or 'False'.
- SL Interface Generation is 'True' or 'False'.
- Using for Alive Counter is 'True' or 'False'.

**Frames** Lists the possible filter conditions based on frame properties and lets you select and configure a condition.

- Ignore Update Bit is 'True' or 'False'.
- Raw Data Access is 'True' or 'False'.

- Payload Length Manipulable is 'True' or 'False'.
- Payload Length Readable is 'True' or 'False'.
- Generate Payload Length Port is 'True' or 'False'.
- Separate channel handling is 'True' or 'False'.
- HW enable static frame after model start is 'True' or 'False'.
- SW enable static frame after model start is 'True' or 'False'.
- Contained IPDU type is 'Static Contained IPDU' or 'Dynamic Contained IPDU'.
- Using Frame Type is 'Sync or StartupSync', or 'None'
- Frame Content Type is XCP
- CRC Algorithm is ...
- Enable Minimum Delay Time is 'True' or 'False'.
- Override Global Default Transmission Mode (TM) is 'True' or 'False'.
- PDU Default Transmission Mode (TM) is 'True', 'False', 'User-Defined' or 'LPDU timing triggered'.

**Cancel** Lets you close the dialog without saving any of your settings.

**OK** Lets you confirm your filter settings and close the dialog. The specified filter is activated.

#### **Related topics**

#### Basics

Sorting and Filtering Elements in the Views (FlexRay Configuration Tool Guide 🚇)

#### Remove

#### Access

You can access this command via:

| Menu bar        | None |
|-----------------|------|
| Context menu of | None |
| Shortcut key    | Del  |
| Toolbar icon    | Ї    |

#### Purpose

To remove a selected communication cluster element or a task from the configuration.

#### Result

The communication cluster element or task selected in the current view is removed from the hierarchy in the view.

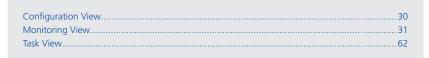
#### Description

You can remove items from the following views:

- Configuration view
- Task view
- Monitoring view

#### **Related topics**

#### References



### Sorting

#### **Access**

You can access the sorting commands via:

| Menu bar        | None       |                                    |
|-----------------|------------|------------------------------------|
| Context menu of | None       |                                    |
| Shortcut key    | None       |                                    |
| Toolbar icon    | A↓         | Alphabetic Sorting                 |
|                 | ₽          | Type Sorting                       |
|                 | ↓ <b>4</b> | Direction Sorting                  |
|                 | •=         | Categorized (Properties view only) |

#### **Purpose**

To sort the item lists in the views alphabetically, or according to direction, type, or category.

#### Result

The items in the views are displayed in the specified orders.

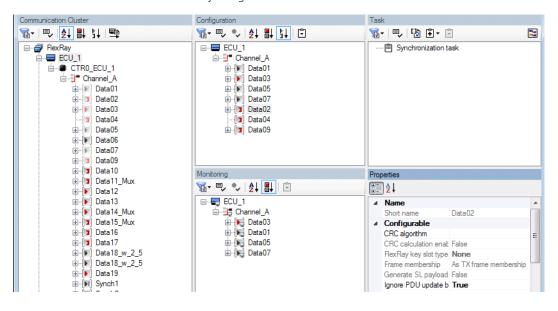
#### Description

You can sort the items of the following views:

- Communication Cluster view
- Configuration view
- Monitoring view
- Properties view

Sorting modes can be specified individually for the different views. Not all sorting modes are available in all views. The currently active sorting mode of a view is marked by a frame around the respective toolbar icon.

The following illustration shows an example with different sorting modes for the views. The items in the Communication Cluster view are sorted alphabetically, the items in the Configuration view are sorted by frame direction, the items in the Monitoring view are sorted by type, and the information in the Properties view is sorted by categories.



#### **Related topics**

#### **Basics**

Sorting and Filtering Elements in the Views (FlexRay Configuration Tool Guide  $\square$ )

## **Configuration Creation**

#### Overview

The FlexRay Configuration Tool's Configuration Creation provides the following commands and dialogs:

#### Where to go from here

#### Information in this section

| Configuration View                                    |  |
|---|--|
| Create Corresponding ECU                              |  |
| Monitoring View                                       |  |
| Properties View                                       |  |
| Configurable Properties for ECUs, Signals, and Frames |  |

#### Information in other sections

#### Creating Configurations (FlexRay Configuration Tool Guide )

When the communication cluster file is imported, you can create a configuration. The configuration is the basis for a blockset which will be generated for your Simulink model afterwards.

### **Configuration View**

You can open the Configuration view via:

| Menu bar        | Views - Configuration |  |  |
|-----------------|-----------------------|--|--|
| Context menu of | None                  |  |  |
| Shortcut key    | None                  |  |  |
| Toolbar icon    | None                  |  |  |

#### **Purpose**

Access

To enable or disable the Configuration view.

#### Description

In the Configuration view, you can add ECUs, frames and signals from the Communication Cluster view via drag & drop. Selected elements are deactivated in the Communication Cluster view, until they are unselected.

**Filtering and sorting** The Configuration view provides a menu, allowing you to filter and/or sort the elements according to your needs (see Filter on page 22 and Sorting on page 27).

#### **Related topics**

**Basics** 

Basics of Simulation (FlexRay Configuration Tool Guide (11))
Basics on Sending and Receiving Signals (FlexRay Configuration Tool Guide (11))

### Create Corresponding ECU

#### Access

You can access this command via:

| Menu bar        | None                              |
|-----------------|-----------------------------------|
| Context menu of | None                              |
| Shortcut key    | None                              |
| Toolbar icon    | (Communication Cluster view only) |

#### **Purpose**

To select contra frames and signals of a real ECU for restbus simulation automatically.

#### Result

The FlexRay Configuration Tool moves the send frames for each frame received by the selected ECU to the Configuration view to be simulated on your dSPACE system.

#### Description

You must first select the ECU you want to simulate the restbus for and then click . If you want to simulate the restbus for several ECUs, select several ECUs at once and click . This generates the corresponding send frames of the other ECUs in the cluster in one single step.

#### **Related topics**

HowTos

How to Configure a Restbus Simulation (FlexRay Configuration Tool Guide  $\mathbf{\Omega}$ )

### Monitoring View

#### Access

You can open the Monitoring view via:

| Menu bar        | Views - Monitoring |  |  |
|-----------------|--------------------|--|--|
| Context menu of | None               |  |  |
| Shortcut key    | None               |  |  |
| Toolbar icon    | None               |  |  |

#### **Purpose**

To enable or disable the Monitoring view.

#### Description

In the Monitoring view, you can add transmitting signals and frames from the Communication Cluster view via drag & drop for monitoring the bus communication.

**Filtering and sorting** The Monitoring view provides a menu, allowing you to filter and/or sort the elements according to your needs (see Filter on page 22 and Sorting on page 27).

#### **Related topics**

#### HowTos

How to Select and Configure Signals for Monitoring (FlexRay Configuration Tool Guide  $\Omega$ )

### Properties View

| Access         | You can open the Pr                       | You can open the Properties view via:   |  |  |  |
|----------------|---|---|--|--|--|
|                | Menu bar                                  | Views - Properties  |  |  |  |
|                | Context menu of                           | None  |  |  |  |
|                | Shortcut key                              | None  |  |  |  |
|                | Toolbar icon                              | None  |  |  |  |
|                | To cookle on Earlie                       | No December 1   |  |  |  |
| Purpose        | to enable of disable                      | To enable or disable the Properties view.   |  |  |  |
| Description    | communication clust information cannot be | The Properties view displays the attributes of a selected element, for example, a communication cluster element or a task. The imported FIBEX or AUTOSAR information cannot be edited. The attributes are displayed in categories, with complex data nesting. You can also sort the properties alphabetically. Refer to Sorting on page 27. |  |  |  |
| Related topics | References                                |   |  |  |  |
|                |   | ss for ECUs, Signals, and Frames  |  |  |  |

### Configurable Properties for ECUs, Signals, and Frames

| Purpose     | The FlexRay Configuration Tool provides some configurable properties for ECUs, signals, and frames.  |
|-------------|--|
| Access      | The configurable properties are accessible in the Properties view, when you select an ECU, signal, or frame in one of the following views:  Configuration view Monitoring view Task view |
| Description | Configurable ECU, signal, and frame properties are available for ECUs, frames and signals in the Properties view.  |

## **Configurable ECU properties** You can configure the following properties for ECUs.

| Configurable<br>Property    | Default                   | Description  |  |
|-----------------------------|---------------------------|--|--|
| ECU disable mode            | Controller                | <ul> <li>Specifies whether disabling/enabling the communication of the simulated ECU is to be done by disabling/enabling the controller(s) or the buffer(s) which transmit the ECU's frames.</li> <li>For ECUs with sync frame or startup-sync frame, only the 'Controller' mode is available.</li> <li>If you want to activate the 'Buffer' mode for these ECUs, you must set the FlexRay key slot type parameter for the sync or startup-sync frame to 'None'. As an alternative, you can specify 'Global RX pool' as the frame membership for the sync or startup-sync frame. In this case, the sync or startup-sync frame will not be disabled.</li> <li>If the ECU disable mode is configured differently for the ECUs belonging to a TX frame membership group (some ECUs use the 'Controller' mode, others use the 'Buffer' mode), the FlexRay Configuration Tool sets the 'Controller' mode for the TX frame membership. This is done for time optimization purposes.</li> </ul> |  |
| Monitoring frame membership | As TX frame membership    | Selects the membership type for frames in the Monitoring view.   |  |
| RX frame membership         | As TX frame<br>membership | Selects the membership type for RX frames in the Configuration view.   |  |
| TX frame membership         | 1                         | Selects a frame membership group <sup>1)</sup> for the TX frames of this ECU.  |  |

<sup>1)</sup> For information on frame membership groups, refer to Building Frame Membership Groups (FlexRay Configuration Tool Guide 🕮).

## **Configurable signal properties** You can configure the following properties for signals.

| Configurable<br>Property          | Signal Type             | Default  | Description   |
|-----------------------------------|-------------------------|--|---|
| Alive counter start <sup>1)</sup> | Send signal             | 0  | Specifies the start value of the alive counter. The start value must be lower than or equal to the stop value.  |
| Alive counter step <sup>1)</sup>  | Send signal             | 1  | Specifies the increment value of the alive counter. The increment value must be greater or equal to 0 and it must be lower than or equal to the difference of stop and start value.             |
| Alive counter stop <sup>1)</sup>  | Send signal             | 1  | Specifies the stop value of the alive counter. The stop value must be greater than or equal to the start value.   |
| Coded default value               | Send signal             | 0 or default value if<br>defined in the<br>communication cluster<br>file | Specifies the usage of default values for send signals if the application task did not yet calculate the values.  If you change the coded default value, the physical default value is adapted. |
| Coded initial value               | Receive signal          | 0 or default value if<br>defined in the<br>communication cluster<br>file | Specifies the usage of default values in the application task for receive signals that were not yet received.  If you change the coded initial value, the physical initial value is adapted.    |
| Generate SL interface             | Send and receive signal | True   | Activates the generation of a Simulink interface. If the value is False, no Simulink interface for writing or reading the signal will be generated at the corresponding PDU RX or               |

| Configurable<br>Property             | Signal Type             | Default  | Description   |
|--------------------------------------|-------------------------|--|---|
|                                      |                         |  | PDU TX block. The default value for monitored signals is False.   |
| Generate SL read status port         | Receive signal          | False  | Activates the read status port. If it is activated, you can read the status from the outport in Simulink in the Signals subsystem of the corresponding PDU block.   |
| Generate SL validity port            | Send and receive signal | False  | Activates the validity port (available only if a value with validity status ≠ 'VALID' is specified in the imported communication cluster file). If it is activated, you can read and write the signal validity status in Simulink in the Signals subsystem of the corresponding PDU RX or PDU TX block. |
| Physical default value               | Send signal             | 0 or default value if<br>defined in the<br>communication cluster<br>file | Specifies the usage of default values for send signals if the application task did not yet calculate the values.  If you change the physical default value, the coded default value is adapted.   |
| Physical initial value               | Receive signal          | 0 or default value if<br>defined in the<br>communication cluster<br>file | Specifies the usage of default values in the application task for receive signals that were not yet received.  If you change the physical initial value, the coded initial value is adapted.  |
| Port data type <sup>2)</sup>         | Send and receive signal | Coded data type  | Specifies whether the coded or physical port data type is used for encoding or decoding the signal.  For signals with the SCALE_LINEAR_TEXTTABLE computation method, the 'Coded and Physical' port data type can be selected. <sup>3)</sup>   |
| Used for alive counter <sup>1)</sup> | Send signal             | False  | Specifies the usage of the signal as alive counter.   |
| Used for CRC calculation             | Send and receive signal | False  | Marks the signal as a CRC signal (available only if the CRC algorithm is defined for the frame (see Configurable frame properties on page 34)).   |

<sup>1)</sup> For details on configuring an alive counter, refer to How to Configure an Alive Counter (FlexRay Configuration Tool Guide  $\square$ ).

#### **Configurable frame properties** You can configure the following properties for frames.

| Configurable<br>Property   | Frame Type                                  | Default                              | Description  |
|----------------------------|---|--------------------------------------|--|
| CRC algorithm              | Static and dynamic frames                   | Empty                                | Specifies which CRC algorithm is used for the frame (see CRC Page on page 39).   |
| CRC calculation<br>enable  | Static and dynamic frames                   | False                                | Specifies whether the checksum calculation is initially enabled or disabled. It is available only if a CRC algorithm is defined for the frame. Checksum calculation can also be controlled under Simulink, refer to How to Handle Checksum Calculation for a PDU (FlexRay Configuration Features 1). |
| Default cyclic switch code | Static and dynamic<br>PDUs with<br>sub-PDUs | Smallest available switch code value | Specifies the switch code for the cyclic sub-PDUs.   |
| Default event switch code  | Dynamic PDUs with sub-PDUs                  | Smallest available switch code value | Specifies the switch code for the event-triggered sub-PDUs.  |

<sup>&</sup>lt;sup>2)</sup> The specified value is used for the configured RTI block. It cannot be changed in the model.

<sup>3)</sup> The 'Coded and Physical' port data type can be set individually for each signal via the Properties view, or globally for all relevant signals via the Activate support for text tables setting for the SL Data Generator in the General Properties dialog.

| Configurable<br>Property   | Frame Type   | Default                   | Description  |
|--|--|---------------------------|--|
| Enable Minimum<br>Delay Time                                     | TX frames  | False                     | Specifies whether minimum delay time support is enabled or disabled for the PDU.  The property exists only if minimum delay time support is possible for the PDU. Refer to How to Configure PDUs for Minimum Delay Time Support (FlexRay Configuration Tool Guide 1).  |
| FlexRay key slot type  | Static TX frames   |                           | Specifies the type of a static frame:  StartupSync: startup-sync frame  Sync: sync frame  None: "normal" frame You can change the FlexRay key slot type only for static TX frames.  If you configure a frame/PDU for a dual channel configuration, the value of this property is valid for both channels.  |
| Frame membership   | Static TX frames<br>whose key slot type<br>is StartupSync or<br>Sync | As TX frame<br>membership | Specifies the frame membership of the selected Send-Startup-Sync frame:  As TX frame membership  Global RX pool For detailed information on frame memberships, refer to Building Frame Membership Groups (FlexRay Configuration Tool Guide 1).   |
| Generate SL Interface<br>for Transmission<br>Modes <sup>1)</sup> | Static and dynamic<br>PDUs   | False                     | Specifies whether to add a control element to the PDU mapping subsystem connected to the RTIFLEXRAYCONFIG PDU TX or FLEXRAYCONFIG PDU TX block for you to switch between the transmission modes during run time. For further information on transmission modes, refer to How to Configure PDU Transmission Modes (FlexRay Configuration Tool Guide \(\omega\)).  |
| Generate SL payload<br>length port                               | Dynamic frames   | False                     | Specifies whether to generate a port for raw data access for you to set the payload length of send frames or read the payload length of receive frames.  A payload length port can only be generated for dynamic frames and when raw data access is enabled (see below). For dynamic RX PDUs, the Payload length readable property must also be set to 'True' (see below). Each TX and RX PDU must be assigned to a frame to which no other PDU is assigned. |
| HW enable static<br>frame(s) after model<br>start <sup>2)</sup>  | Static TX frames   | True                      | Specifies whether the static frame is enabled or disabled after model start via hardware. All frames which share the same slot are enabled or disabled together. Some frames cannot be enabled or disabled by hardware, for example, startup or sync frames.   |
| Ignore PDU update<br>bit <sup>2)</sup>                           | RX frames with PDUs  | True                      | Specifies whether the PDU update bit is to be ignored or evaluated when a frame/PDU is received.  The Ignore update bit property can be configured for a PDU only if the PDU update bit functionality is defined for it in the FIBEX or AUTOSAR system description file.   |
| Max number of raw data bytes <sup>2)</sup>                       | RX frames  | Payload length of frame   | Specifies the number of bytes which are read by the configured block. This corresponds to the width of the RxBytes outport in Simulink. The maximum value is limited by the payload length of the RX frame or PDU.   |

| Configurable<br>Property                                      | Frame Type                 | Default             | Description  |
|---|----------------------------|---------------------|--|
| Override Global<br>Default Transmission<br>Mode <sup>1)</sup> | Static and dynamic<br>PDUs | False <sup>3)</sup> | Specifies whether the global default transmission mode specified on the General page of the General Properties dialog must be taken as the default transmission mode for the PDU, or whether another default transmission mode can be specified for it. If allowed, you can select an individual default transmission mode for the PDU via the PDU Default Transmission Mode property.   |
| Payload length readable                                       | Dynamic RX frames          | False               | Specifies whether the payload length of the RX frame shall be actively read during run time each time when the frame is received.  A payload length readable port can only be generated for dynamic RX frames and when raw data access is enabled (see below).   |
| Payload length<br>manipulable                                 | Dynamic TX frames          | False               | Specifies whether the payload length of the TX frame can be manipulated during run time.  A payload length manipulation port can only be generated for dynamic TX frames and when raw data access is enabled (see below).  |
| PDU Default<br>Transmission Mode <sup>1)</sup>                | Static and dynamic<br>PDUs | True <sup>4)</sup>  | Specifies the transmission mode to be used as the default transmission mode for the selected PDU. You can configure this property only if the Override Global Default Transmission Mode property is set to True.   |
| Raw data access   | Static and dynamic frames  | False               | Specifies whether raw data access is enabled in Simulink. The default value for frames without signals is True.  |
| Separate channel handling                                     | TX frames                  | True                | Specifies whether channel handling is separated in dual channel configuration. For details, refer to Dual Channel Configurations (FlexRay Configuration Tool Guide (12)).  |
| SW enable static<br>frame after model<br>start <sup>2)</sup>  | Static frames              | Enabled             | Specifies whether the static frame is enabled or disabled after model start via software. This is also possible for startup-sync frames.  If a static PDU is enabled via software (SWEnable = 1), the data which is sent depends on the setting of the SW Enable Configuration property (see General Page on page 41) and on the settings of the CHI Code Generator (see Generators Page on page 47):  The SW Enable Configuration property in the General Properties dialog is set to Control of L-PDU commit to FlexRay buffer and the Static TX buffer transmission mode property of the CHI Code Generator is set to Event (null frame used):  A null frame is sent if the LPDU to be sent contains exactly one PDU, and this PDU has not been updated and does not have a PDU update bit. |

| Configurable<br>Property | Frame Type | Default | Description   |
|--------------------------|------------|---------|---|
| rroperty                 |            |         | <ul> <li>Payload data is sent for all other LPDUs.</li> <li>Other settings:         <ul> <li>Payload data is sent.</li> </ul> </li> <li>If a static PDU is disabled via software (SWEnable = 0), the data which is sent depends on the database version, on the setting of the SW Enable Configuration property (see General Page on page 41), and on the settings of the CHI Code Generator (see Generators Page on page 47):</li> <li>FIBEX version ≤ 2.0:</li></ul>  |
|                          |            |         | Note  |
|                          |            |         | In some cases, the SW Enable variable is overruled. This can happen if the update bit of a PDU is manipulable (see Update Bit group below). If the Update Bit Enable variable is 1, automatic update bit calculation is disabled. The update bit of the PDU is set to the value specified by the Update Bit Value variable. If SW Enable is 0 and the update bit value is 1, the PDU still sends old data. If the Update Bit Enable variable is not used, SW Enable is used to enable or disable the sending of static TX PDUs. |

| Configurable | Frame Type | Default | Description |
|--------------|------------|---------|-------------|
| Property     |            |         |             |

- <sup>1)</sup> If you create a dual-channel configuration, the specified value is used for both channels. You cannot specify different property values for channel A and channel B.
- <sup>2)</sup> The specified value is used for the configured RTI block and cannot be changed in the model.
- <sup>3)</sup> For PDUs that do not have any timing information specified in the underlying FIBEX or AUTOSAR system description file, the default value is 'True'.
- <sup>4)</sup> For PDUs that do not have any timing information specified in the underlying FIBEX or AUTOSAR system description file, the default transmission mode is 'LPDU timing triggered'.

# 

# **General Properties**

### Overview

The FlexRay Configuration Tool provides the following commands and dialogs to view and change the general properties:

# Where to go from here

# Information in this section

|                 | Page           | 9 |
|-----------------|----------------|---|
| To spe          | ral Page       | 1 |
| The G<br>to spe | ral Properties | 6 |
| To spe          | rators Page    | 7 |
| To sel          | ware Page      | 3 |

# **CRC** Page

### Access

This page is part of the General Properties dialog (see General Properties on page 46).

### **Purpose**

To select a CRC C file and manage access to its CRC algorithm (CRC = cyclic redundancy check). You can select a default CRC algorithm for configured frames in their Properties view.

#### Description

On this page you can select the CRC C file and define IDs for selecting a CRC algorithm for a configured frame. A CRC C file can contain several CRC algorithms which are selected via their IDs. You can select a default CRC algorithm for configured frames in their Properties view. For details on the CRC C file, refer to Implementing Checksum Algorithms (FlexRay Configuration Tool Guide (1)) and Implementing Checksum Algorithms for Signal Groups Protected via End-To-End Communication Protection (FlexRay Configuration Tool Guide (1)).

### **Dialog settings**

**Import** Sets all the dialog elements of the CRC page according to the dialog settings of the imported XML file. If you import the dialog settings, all current dialog settings are overwritten.

**Export** Saves all the dialog settings of the CRC page to an XML file.

**CRC algorithm names** Lists the names, IDs, and states of all the created CRC algorithms.

| Parameter | Description  |
|-----------|--|
| Name      | Name for the CRC algorithm. The name must be unique. It is displayed in the Properties view, where you can select a CRC algorithm.   |
| ID        | ID for the CRC algorithm. This value is given to the checksum function as a parameter to select a CRC algorithm. The ID must correspond to a value in the switch-case section of the CRC C file. The ID cannot be changed. |
| Used      | Displays whether the CRC algorithm is assigned to a frame. If a CRC algorithm is assigned to a frame, it cannot be removed.  |

**Add** Lets you add a new entry to the CRC algorithm list. The algorithm name and ID are set automatically. The algorithm name can be changed using the Rename button. The value of the ID is set to the lowest possible number.

**Remove** Lets your remove the selected CRC algorithm. You can only remove a CRC algorithm which is not assigned to a frame.

**Rename** Lets you rename the selected CRC algorithm.

**CRC C file** Lets you select an existing CRC C file which contains the CRC algorithm via the Browse button, or lets you specify a path and a file name for the CRC file if you want to create it automatically using the Create button.

**Relative to project path** Lets you specify to use a relative path for the CRC file. If the checkbox is selected, the CRC file is saved relative to the configuration project file. Any absolute path specified for the CRC file is ignored.

**Create** Creates the CRC C file from the template automatically. You must have specified the file name before (see CRC C file). After the CRC C file is created, you must adapt it according to your checksum calculations. For details, refer to Implementing Checksum Algorithms (FlexRay Configuration Tool Guide (1)).

**Path to additional included header files** Lets you select a path for including additional header files.

**Relative to project path** Lets you specify to use a relative path for the additional header files. If the checkbox is selected, the path to the files is relative to the configuration project file. If the checkbox is cleared, the path to the additional header files is absolute.

**Path to frame ID file** Lets you select the frame ID file.

**Relative to project path** Lets you specify to use a relative path for the frame ID file. If the checkbox is selected, the path to the file is relative to the configuration project file. If the checkbox is cleared, the path to the file is absolute.

#### **Related topics**

#### Basics

Basics on Implementing Checksum Algorithms (FlexRay Configuration Tool Guide  $\square$ )

### HowTos

How to Assign a Checksum Algorithm to Frames (FlexRay Configuration Tool Guide  $\square$ )

# General Page

| Access          | This page is part of the General Properties dialog (see General Properties on page 46).   |
|-----------------|---|
| Purpose         | To specify general settings and settings for using multiple buses, and select an XCP master.  |
| Dialog settings | <b>Derive physical data types</b> If the value is True, the FlexRay Configuration Tool sets the physical data types of signals and their minimum and maximum values automatically if their physical data types are not defined. Additionally, the minimum and maximum physical values are derived for all signals (not only for signals whose physical data type is not defined). The data type is derived from |

the coded data type. The Physical data type is derived property is set to True. If a physical data type was already defined for a signal, it is not changed.

If Derive physical data types is False, no physical data types are derived for signals without defined physical data types.

**Global Default Transmission Mode** Lets you select the transmission mode used as the default transmission mode for all the PDUs with timing specification in the used communication cluster file, which are selected for the configuration in the current project. You can select one of the following values:

- True
- False
- User-defined

If no transmission modes are defined in the used communication cluster file, the option is disabled.

The FlexRay Configuration Tool allows you to override this setting PDU-specifically. You can specify a different default transmission mode for each single PDU individually in the Properties view. Refer to Configurable frame properties on page 34.

**Physical Bus Access Alias** Lets you specify a user-specific alias for the physical FlexRay bus. The specified alias name is used in ControlDesk's Bus Navigator. It is displayed next to the corresponding controller icon in the Bus Navigator tree. Using aliases simplifies working with different FlexRay buses, since they make it easier to distinguish between the buses.

If no alias name is specified, the names of the participating controllers are displayed in the Bus Navigator tree next to the controller icon (for example, "CTR0\_CTR1\_CTR2\_CTR3").

**Physical data type conversion layer** Lets you select where the physical data types are converted to coded data types and vice versa.

| Value         | Description   |
|---------------|---|
| COMMUNICATION | The conversion is executed in the task of the Com layer. The Com task will therefore require more execution time. The FlexRay Configuration Tool takes this additional execution time into account.   |
|               | A Tx inspect group is added for each sending signal in the TRC file. For details, refer to Using the Generated TRC File of PDU-Based Modeling (FlexRay Configuration Features (12)).  |
| APPLICATION   | The conversion is not executed in the task of the Com layer but in the context of an application task.  |
|               | The information required for data type conversion is added to the TRC file if the option Use physical data type is activated for the Trace File Generator on the Generators page of the General Properties dialog in the FlexRay Configuration Tool. Refer to Generators Page on page 47. |

**Save relative communication cluster path** If the value is True, the path to the communication cluster file is saved relative to the project file. This is helpful when you work on PCs with different folder structures.

If Save relative communication cluster path is False, the absolute path to the FIBEX or AUTOSAR system description file is saved.

**SW** Enable Configuration Lets you specify the behavior of the SWEnable functionality: that is, the effects of disabling/enabling the sending of a static PDU via software. You can select one of the following values:

- Control of L-PDU commit to FlexRay buffer: SWEnable controls the packing of the LPDU and the committing to the FlexRay controller, i.e., whether IPDU data is written again to the LPDU cache.
  - If SWEnable is 0 for an IPDU, the LPDU is not packed. Committing new data to the FlexRay controller for the associated LPDU is stopped.
  - If SWEnable is 1 for an IPDU, the data of the IPDU is packed into the LPDU and the data of the LPDU cache is committed to the FlexRay controller.
    There is one exception: If the LPDU to be sent contains exactly one IPDU and if this IPDU has not been updated nor has an PDU update bit, a null frame is sent.

If you work with a FIBEX version  $\leq$  2.0, this setting is fixed and you cannot change it.

- Control of I-PDU payload data update: SWEnable controls the packing of the IPDU, i.e., whether signal values are written to the cache of the IPDU.
  - If SWEnable is 0 for an IPDU, updating payload data of the IPDU is stopped. The PDU update bit is set to 0. No updated data of the IPDU is committed to the LPDU.
  - If SWEnable is 1 for an IPDU, the IPDU is packed. The payload data of the IPDU is updated.

### Note

The SW Enable Configuration setting affects whether a null frame or the regular frame is sent. The data which is sent when a static PDU is disabled or enabled via software also depends on the database version and settings of the CHI Code Generator. Refer to:

- Sending Static PDUs and Sub-PDUs (FlexRay Configuration Features (LL))
- (MicroAutoBox III, SCALEXIO) Sending Static PDUs and Sub-PDUs (Model Interface Package for Simulink Modeling Guide 🕮)

**Update Signal Value** Lets you specify whether RX signal values are updated upon receipt of error values. You can select one of the following values:

- On all validity values: RX signal values are always updated, regardless of the validity status of the received signals.
- On valid values only: RX signal values are updated only if the received values are valid, i.e., if the signal validity status is 'VALID'. For all other validity statuses, the RX signal values remain unchanged.

**Activate** Lets you enable or disable secure onboard communication support for the configuration in the current project.

If the value is False, the support of secure onboard communication is disabled.
 No user code is used, regardless of whether a user code ID is specified. No authentication information is generated and the payload of assigned authentic

IPDUs is not secured, i.e., SecOC authentication and verification are not performed.

Authentic IPDUs, which are assigned to the configuration, are handled as follows: The payload of the authentic IPDUs is directly included in the secured IPDUs. The bits of the secured IPDUs that are reserved for the authentication information are not used. These bits are filled with the related bit pattern for unused bits (bit pattern 0).

• If the value is True, the support of secure onboard communication is enabled. With SecOC enabled, the payload of authentic IPDUs is secured by the related secured IPDUs, i.e, by authentication information that is generated according to an OEM-specific implementation provided by user code. The required user code must be referenced via a user code ID, which you specify in the User code identifier edit field.

**User code identifier** Lets you enter the user code ID that references the user code containing the algorithms used to secure the payload of authentic IPDUs. The identifier must be a valid C identifier. Only letters, numbers and '\_' are allowed, the string must be at least one character long and has to start with a letter. The edit field can only be edited and is only evaluated if Activate is set to True.

In general, user code is C code or C++ code that contains user-specific algorithms. You can use user-specific algorithms to add functionality to the FlexRay Configuration Package, for example, for generating authentication information in SecOC scenarios. A user code implementation consists of at least one source file (C, CPP) and optional include files (H, HPP), such as header files. To use secure onboard communication at run time, you must provide the required OEM-specific implementation for generating authentication information via user code as follows:

- 1. Specify the user code, i.e., the implementation for generating authentication information according to your needs in C code (C, H files) or C++ code (CPP, HPP files).
- 2. Extend the user code by functions for initializing secure onboard communication and for exchanging data with the FlexRay Configuration Package, such as accessing properties of secured IPDUs or writing generated authentication information to secured IPDUs. Use the Bus Custom Code interface for this purpose.

For more information, refer to Bus Custom Code Interface Handling .....

- 3. Add the code files, i.e., the user code implementation.
  - MicroAutoBox III, SCALEXIO: Add the user code implementation to the ConfigurationDesk application via properties of build configuration sets (Bus Custom Code category).

You can add one or more user code implementations. All user code implementations that are added to one build configuration set apply to all application processes that are assigned to this build configuration set. Each application process that is assigned to a build configuration set must use all the modules that are contained in any user code implementation of the build configuration set.

For more information on build configuration sets, refer to Specifying Options for the Build Process (ConfigurationDesk Real-Time Implementation Guide (1)). For more information on the properties of the Bus Custom Code category and the bus custom code options, refer to Build Configuration Table (ConfigurationDesk User Interface Reference (1)).

- Platforms other than MicroAutoBox III and SCALEXIO: Add the user code implementation to the real-time application via the Code Generation's Custom Code page or by adapting the user makefile (USER\_SRCS). Refer to Adding User-Specific Files, Source Files and Libraries (RTI and RTI-MP Implementation Guide □) and Using C++ Code in an RTI Application (RTI and RTI-MP Implementation Guide □)
- 4. Reference the required user code. To do so, type the user code ID as specified in the related user code implementation into the User code identifier edit field. In the user code implementation, the user code ID is specified via the DS\_BUS\_CUSTOM\_FEATURE\_NAME definition of the related source file (C, CPP).

**Allow multiple buses configuration** If the value is False, only one configuration is generated.

If Allow multiple buses configuration is True, several configurations (up to 4, depending on the platform used) can be generated. This is useful if you want to model two FlexRay buses in one Simulink model, for example, to model a gateway. To identify the configuration, the configuration ID must be specified. As the task cannot be executed at the same time, a task offset shift can be specified. The structure of the TRC file is extended by a ConfigID <n> group containing the configuration ID of the buses. Note that, if the setting of Allow multiple buses configuration is changed in projects, the TRC paths of the variables are also changed. Data connections to ControlDesk instruments get lost and must be reconnected.

**Configuration ID** Lets you specify a configuration ID if the multiple bus option is enabled. The configuration ID is used to differentiate and to prioritize the FlexRay buses in the Simulink model. Configuration ID "-" has the highest priority, ID "3" has the lowest priority.

**Task offset shift (µs)** Lets you specify a time offset for executing the task if the multiple bus option is enabled and the configuration ID is 1, 2, or 3.

The Task offset shift property shifts the time-table task start of configuration 1, 2, or 3. Their tasks will be interrupted by the tasks of configuration ID "-", which have the higher priority. You can use the property to fulfill the timing constraints and deadlines of the FlexRay slots for configuration ID 1, 2, 3.

**XCPMaster** Lists the ECUs of a communication cluster file for choosing an ECU for the XCP master. The list contains all the ECUs which receive or send XCP frames. XCP frames are frames of the XCP\_PRE\_CONFIGURED or XCP\_RUNTIME\_CONFIGURED content type.

The XCP frames which you can use for simulating or monitoring depend on the XCP master configuration:

 If no XCP master is chosen, you can use only XCP frames of the XCP\_PRE\_CONFIGURED content type. In this case, the selected XCP\_PRE\_CONFIGURED frames can be used as normal frames, i.e., all the

- relevant Simulink blocks (from the RTI FlexRay Configuration Blockset/FlexRay Configuration Blockset) are generated.
- If an XCP master is chosen, you can use only XCP frames of the XCP master but of all frame content types (i.e., XCP\_PRE\_CONFIGURED and XCP\_RUNTIME\_CONFIGURED). The selected XCP frames can then be used only from the RTI Bypass Blockset. The relevant Simulink blocks from the RTI FlexRay Configuration Blockset/FlexRay Configuration Blockset are not generated for those frames. If an XCP master is chosen, XCP frames cannot be used for monitoring. Furthermore, it is not possible to enable manipulation via ControlDesk for the selected XCP frames, i.e., the selected XCP frames and their signals cannot be selected for the TRC file in the Element Selection dialog.

For detailed information on using an XCP master with the RTI Bypass Blockset, refer to the RTI Bypass Blockset Application Note  $\square$ .

#### Note

You cannot select an XCP master node if a dual-channel communication cluster file is imported.

### **Related topics**

#### Basics

Aspects of Miscellaneous Supported AUTOSAR Features (FlexRay Configuration Tool Guide (12))

Sending Static PDUs and Sub-PDUs (FlexRay Configuration Features (12))

Sending Static PDUs and Sub-PDUs (Model Interface Package for Simulink - Modeling Guide (12))

#### HowTos

How to Configure PDU Transmission Modes (FlexRay Configuration Tool Guide  $\square$ ) How to Create Configurations for Multiple Buses (FlexRay Configuration Tool Guide  $\square$ )

# **General Properties**

#### Access

You can access this command via:

| Menu bar        | Tools  |
|-----------------|--------|
| Context menu of | None   |
| Shortcut key    | Ctrl+P |
| Toolbar icon    | None   |

| Purpose         | To view and change the general properties of the FlexRay Configuration Tool.   |
|-----------------|--|
| Result          | The General Properties dialog contains several pages that you can use to specify settings for your project, including platform selection, checksum calculation, and code generation.                       |
| Dialog settings | <b>Keep changes</b> Lets you confirm your settings and close the General Properties dialog. The last specified configuration settings will be preset the next time you open the General Properties dialog. |
|                 | The button is available as long as all the configuration settings on each page of  |
|                 | the General Properties dialog are valid. Otherwise, a • symbol is displayed beside the disabled Keep changes button. Its tooltip provides information on the pages containing errors.                      |
|                 | <b>Reset changes</b> Lets you restore the current configuration settings at the time of opening the General Properties dialog.   |
|                 | Alternatively, you can press <b>Esc</b> to close the dialog without saving the settings.   |
| Related topics  | References   |
|                 | CRC Page   |

# Generators Page

| Access      | This page is part of the General Properties dialog (see General Properties on page 46).   |
|-------------|---|
| Purpose     | To specify the settings for generating the files needed for modeling and experimenting with the FlexRay configuration.                                    |
| Description | The FlexRay Configuration Tool provides the following generator forms:  Code generation  Report Generator  Exp. Cfg. File Generator  Trace File Generator |

- SL Data Generator
- Com Code Generator
- CHI Code Generator

You can find detailed information on using the generated files in Overview of the Workflow (FlexRay Configuration Features  $\square$ ).

# **Code generation**

Lets you specify the general code generation properties.

| Property                      | Description   |  |
|-------------------------------|---|--|
| Absolute path                 | Lets you specify the absolute code generation path. All the code generation files are stored relative to the specified absolute code generation path.                                     |  |
| Relative generation path mode | Lets you specify to use a code generation path that is relative to the project file. If enabled, all the code generation files are stored in paths relative to the configuration project. |  |
|                               | Note  |  |
|                               | You can enable this option only if your project has been saved.   |  |
|                               |   |  |

# **Report Generator**

The Report Generator generates an HTML file containing data on the current configuration. You can include messages from the log view, information on the frame-buffer assignment, and your own notes.

| Property                 | Description   |
|--------------------------|---|
| Generate report          | Lets you activate the report generation. The default is False.                                |
| Relative path            | Displays the relative path the report is stored in.   |
| Generate log<br>messages | Lets you activate the inclusion of the log messages. The default is False.                    |
| Notes                    | Lets you enter comments on the configuration.   |
| Report name              | Displays the project name which is used as the name of the HTML file the report is stored in. |
| View controller buffers  | Lets you activate the inclusion of the frame-buffer assignment. The default is False.         |

# Exp. Cfg. File Generator

The Exp. Cfg. File Generator generates a configuration file for ControlDesk's Bus Navigator. The file is automatically generated when code generation is started. For details on the Bus Navigator, refer to Introduction to the Bus Navigator (ControlDesk Bus Navigator (Lamber 1997)).

| Property      | Description   |
|---------------|---|
| Relative path | Displays the relative path the configuration file for the Bus Navigator is stored in. |

### **Trace File Generator**

The Trace File Generator generates a TRC file for ControlDesk. A TRC file is a variable description file that provides information on the available variables and how they are grouped. By default, it contains all the signals which are selected for monitoring and are assigned to a task. You can also add the receiving and sending signals and PDUs which are selected in the configuration and are assigned to a task.

| Property                         | Description  |  |
|----------------------------------|--|--|
| Relative path                    | Displays the relative path the TRC file is stored in.  |  |
| Use physical<br>data type        | <ul> <li>Lets you access the physical data type. When ControlDesk converts coded data types to physical data types, it always provides a float64 type.</li> <li>True: For all the signals that have a physical data type, the corresponding variables will be included in the TRC file.</li> <li>False: No variables for physical values will be generated for the signals.</li> </ul>   |  |
| Activate support for text tables | Lets you specify to generate TRC variables to access text table elements (relevant for signals with the TEXTTABLE or SCALE_LINEAR_TEXTTABLE computation method).  Signals with TEXTTABLE computation method:  True: The TRC variables to access the coded values (and the physical values) are extended by a description containing information on the text table scalings. The possible text table values are displayed as pairs of a numerical value and a corresponding text table string.  False: No information on the possible text table values is generated into the TRC file.  Signals with SCALE_LINEAR_TEXTTABLE computation method:  True: If Use physical data type is True, all the signals that have the 'Coded and Physical' port data type will have the corresponding variables to access the coded values and the physical values included in the TRC file. For sending signals, a TRC variable for switching between the coded and physical value is also generated (only if the Physical data type conversion layer option is set to COMMUNICATION on the General page of the General Properties dialog). For receiving signals with at least one text table scaling, a variable to access the text table status (indicating whether a text table element is received) is also generated. If Use physical data type is False, no variables for physical value access are available. Thus, no additional switch and text table status variables are generated. However, text table information is available for signals with text table scaling via the TRC variables for coded values.  False: No variables to access text table elements are generated for signals with the 'Coded and Physical' data type. This means that neither a variable to switch between coded and physical data (TX) nor a variable to get the text table status (RX) are included in the TRC file. |  |

#### **SL Data Generator**

The SL Data Generator generates Simulink configuration data. Data is stored in an M file, whose data you can read in MATLAB to automatically parameterize blocks of the RTI FlexRay Configuration Blockset/FlexRay Configuration Blockset and generate a configuration model.

| Property                               | Description   |  |  |
|--|---|--|--|
| Relative<br>path                       | Displays the relative path the M file is stored in.   |  |  |
| Info Text                              | Lets you enter an information text.   |  |  |
| Model name                             | Displays the name for the M file the configuration data is stored in. The default is <pre><projectname>_Data</projectname></pre> . The configuration model name corresponds also to <pre><projectname></projectname></pre> .  |  |  |
| Use physical data type if possible     | Lets you specify a default port data type for the signal encoding/decoding (physical or coded). The selection cannot be changed in the blocks of the RTI FlexRay Configuration Blockset or FlexRay Configuration Blockset. The displayed value of the Use physical data type if possible option also gives information on the actual state of all the signals concerned.  The following values are possible:  All possible: The 'Physical' port data type is set for all the signals in the FlexRay configuration that  |  |  |
|  | <ul> <li>have a physical data type. This setting applies only to the signals that are currently in the configuration. It does not apply to signals that will be added to the configuration later.</li> <li>User defined: Only a part of the signals in the current FlexRay configuration that could be configured for the physical data type is actually configured for the physical port data type (Port data type property). The 'User-defined' status is set automatically by the FlexRay Configuration Tool. You cannot select it manually. For example, the tool switches the value from 'All possible' to 'User-defined' if signals that have a physical data type are subsequently added to the configuration, or if you change a signal's Port data type property setting from 'Physical' to 'Coded'.</li> <li>None: The coded data type is used for all the signals in the current configuration.</li> </ul> |  |  |
| Activate<br>support for<br>text tables | Lets you set the 'Coded and Physical' port data type simultaneously for all the signals with the SCALE_LINEAR_TEXTTABLE computation method. The SCALE_LINEAR_TEXTTABLE computation method is a combination of one linear scaling and one or more text table scalings for signal encoding/decoding. The following illustration shows an example:  Physical value   |  |  |
|  | Linear scaling Text table scalings  The displayed value of the Activate support for text tables option also gives information on the actual state of all the signals concerned.  The following values are possible:  All possible: For all the signals in the FlexRay configuration with the SCALE_LINEAR_TEXTTABLE computation method whose current port data type is 'Physical', text table support is enabled and the 'Coded and Physical' port data type is set (Port data type property). This setting applies to the signals that are currently in the configuration. It does not apply to signals that will be added later to the configuration.   |  |  |

Property	Description	
	You can set this option only if Use physical data type if possible has a value unequal to 'None'.	
	<ul> <li>User-defined: Only a part of the signals with the SCALE_LINEAR_TEXTTABLE computation method that could be configured for 'Coded and Physical' port data type is actually configured for 'Coded and Physical' port data type (Port data type property). This status is set automatically by the FlexRay Configuration Tool. You cannot select it manually.</li> <li>None: None of the signals in the current FlexRay configuration with the SCALE_LINEAR_TEXTTABLE computation method is configured for the 'Coded and Physical' port data type. When you select None, all the signals in the current configuration that have the 'Coded and Physical' port data type set will have the port data type switched to 'Physical'.</li> </ul>	
Enable Minimum Delay Time	<ul> <li>Lets you specify the minimum delay time support setting simultaneously for all the PDUs in the current FlexRay configuration, where possible.</li> <li>The following values are possible:</li> <li>All possible: Minimum delay time support is enabled (Enable Minimum Delay Time property is True) for all the PDUs in the FlexRay configuration for which minimum delay time support is possible. This setting applies only to the PDUs that are currently in the configuration. It does not apply to PDUs that will be added to the configuration later.</li> <li>User-defined: Only a part of the PDUs in the FlexRay configuration that could be configured for enabled minimum delay time support is actually configured for enabled minimum delay time support (Enable Minimum Delay Time property). This status is set automatically by the FlexRay Configuration Tool. You cannot select it manually.</li> <li>None: Minimum delay time support is disabled (Enable Minimum Delay Time property is False) for all the PDUs in the current FlexRay configuration.</li> </ul>	

# **Com Code Generator**

The Com Code Generator generates code files for the communication layer, called Com code. For real-time simulation, the Com code is used in the build process and can be downloaded to the real-time system.

Property	Description
Consistency check	Lets you activate the consistency check, which detects if the transmit buffer with an assigned dynamic frame is empty (previous data has been transmitted) before new data is written. The default is False.
Integrity check	Lets you activate the integrity check, which detects RAM faults. The default is False.
Reset manipulation layer after bus	Lets you specify the reset behavior of TRC variables when the controller is restarted or a frame membership group is activated.
resynchronization	<ul> <li>True: The Source Switch variables and the TRC variables are reset to their initial values after the bus has been resynchronized. This means that all manually specified TRC values are lost.</li> </ul>
	• False: The Source Switch variables and the TRC variables remain unchanged when the bus is resynchronized.  The default is True.

Property	Description
Value used for initialization of unused bits in frame	Lets you specify a value (0, 1) for the bits that are not used in a send frame. The specified value is used both as the initial data and for the parameterization of unused bits of multiplexed PDUs, i.e., of the bits of a subframe that are not used for the new data.
Relative path	Displays the relative path the Com files are stored in.

# **CHI Code Generator**

The CHI Code Generator generates code files for the controller host interface (CHI), called CHI code. For real-time simulation, the CHI code is used in the build process and can be downloaded to the real-time system.

Property	Description	
Static TX buffer transmission mode	Lets you specify the values for the frames which are transmitted when the frame transmission was not transferred, for example, when the TX commands for all cyclic frames are disabled or the task is switched off.  • Event (null frame used): Null frames are transmitted.  • State (old value used): Data of the buffer is transmitted.  Note	
	The Static TX buffer transmission mode setting affects whether a null frame or the regular frame is sent. The data which is sent when a static PDU is disabled or enabled via software also depends on the database version and on the setting of the SW Enable Configuration property. Refer to  Sending Static PDUs and Sub-PDUs (FlexRay Configuration Features (III))  (MicroAutoBox III, SCALEXIO) Sending Static PDUs and Sub-PDUs (Model Interface Package for Simulink - Modeling Guide (III))	
Relative path	Displays the relative path the CHI code file is stored in.	

# **Related topics**

### Basics

Basics of Code Generation (FlexRay Configuration Tool Guide 

)

### HowTos

How to Configure PDUs for Minimum Delay Time Support (FlexRay Configuration Tool Guide 🕮)

How to Generate Code (FlexRay Configuration Tool Guide 🕮)

#### References

# Hardware Page

# Access This page is part of the General Properties dialog (see General Properties on page 46).

# **Purpose**To select the processor board type, I/O board type, and controller module your real-time system is based on.

# **Result** The hardware is specified.

### Description

The FlexRay Configuration Package supports several real-time systems and FlexRay controller modules (see Supported Platforms (FlexRay Configuration Tool Guide (1))). The FlexRay Configuration Tool checks the compatibility of your hardware configuration with the task timing. If your task timing is not compatible with a platform, I/O board, and controller module, the current task configuration is lost. A warning appears and you can decide whether to continue changing the hardware and lose the configuration.

#### Note

An update of the hardware configuration takes effect immediately, i. e., without confirmation via the Keep changes button. As soon as you select a processor board, an I/O board, or a controller module which is suitable for the rest of the current hardware configuration, it is set as simulation hardware. The Log View displays the currently set hardware configuration. If you select an unsuitable board or module, the FlexRay Configuration Tool displays symbols indicating that further configuration settings are required. The tool tips of the symbols provide further information.

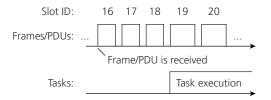
# Hardware Configuration dialog

**Processor Board Type** Displays the available platform types and lets you select one.

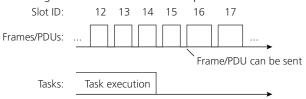
**I/O Board Type** Displays the available I/O board types and lets you select one. The availability depends on the selected platform type.

**Controller Module** Displays the available controller modules and lets you select one. The availability depends on the selected platform and I/O board type.

**RX slot safety margin** Lets you specify a safety margin for RX frames/PDUs. This is the number of time slots between the time slot in which an RX frame/PDU is received and the time slot in which the task which receives the frame/PDU is started. For example, if a frame/PDU is received in time slot 16 and the safety margin is 2, the task receiving the frame/PDU can be started in time slot 19 at the earliest. The following illustration shows the example:



**TX slot safety margin** Lets you specify a safety margin for TX frames/PDUs. This is the number of time slots between the time slot in which a task that calculates the frame/PDU ends and the time slot in which the frame/PDU is sent. For example, if a frame/PDU must be sent in time slot 16 and the safety margin is 1, the task which calculates the frame/PDU must end before time slot 14. The following illustration shows the example:



**Reset safety margins** Lets you reset the safety margins to their default values.

# **Related topics**

### HowTos

How to Configure Hardware (FlexRay Configuration Tool Guide 🕮)

# Task Creation

### Overview

The FlexRay Configuration Tool's Task Creation feature provides the following commands and dialogs:

# Where to go from here

# Information in this section

Automatic Task Creation	
Create Task	
Show Task Schedule View	
Task View	
Configurable Properties for Tasks	

# Information in other sections

Basics of Task Creation (FlexRay Configuration Tool Guide (21))
Task configuration allows you to create tasks for simulation.

Access

# **Automatic Task Creation**

You can access this command via:

Menu bar	None
Context menu of	None
Shortcut key	None
Toolbar icon	(Task view only)

Purpose

To create default communication tasks.

Result

The FlexRay Configuration Tool creates communication tasks and assigns the signals and frames listed in the Configuration and Monitoring view automatically to the tasks.

# Description

**Communication tasks** The FlexRay Configuration Tool creates the following four tasks per communication cycle:

- ComTaskDynamicDeliver
- ComTaskDynamicFetch
- ComTaskStaticDeliver
- ComTaskStaticFetch

Sometimes the FlexRay Configuration Tool creates less than four communication tasks. The number depends on the types of the signals and frames to assign.

**Synchronization task** The FlexRay Configuration Tool creates a default synchronization task directly after the communication cluster import.

# Tip

You can open the Task Schedule View, which visualizes all the created tasks in their time sequence within an application cycle. It tells you at a glance which task is executed in which communication cycle and where tasks depend on each other, and helps you plan communication and application tasks exactly. Refer to Show Task Schedule View on page 59.

# **Related topics**

#### HowTos

How to Create Tasks (FlexRay Configuration Tool Guide 

)

#### References

Create Task	57
Show Task Schedule View	59

# Create Task

# Access

You can access this command via:

Menu bar	None
Context menu of	None
Shortcut key	None
Toolbar icon	(Task view only)

# **Purpose**

To create communication or application tasks.

### Result

Opens a submenu showing all task types available in the FlexRay Configuration Tool.

# Description

You can choose one of the following task types via the submenu's command buttons:



# Task types

From the submenu, you can choose one of the following task types to create:

Task Type	Description
Com Task Static	To create a new communication task for static frames.
Com Task Dynamic	To create a new communication task for dynamic
	frames.

Task Type	Description
Application Task	To create a new application task. You can add only static signals to an application task.

The FlexRay Configuration Tool creates a new task of the chosen type, and adds the corresponding icon to the Task view. You can add signals and frames to the task from the list in the Configuration view via drag & drop. You can change the default task settings in the Properties view (see below).

**Synchronization task** The FlexRay Configuration Tool automatically creates a time-triggered synchronization task. The possible start time is calculated. You can change the default start-up sync mode settings in the **Properties** view (see below).

# **Task settings**

On the properties pages in the Properties view, you can configure the following settings for the task. You must first click the task icon in the Task view to activate it. Properties of tasks which are created automatically cannot be changed (except WCET adjustment factor). See also Configurable Properties for Tasks on page 63.

**Short name** Lets you enter a unique short name.

**Base cycle** Lets you enter the first communication cycle where the task is activated.

**Cycle repetition** Lets you enter the number of communication cycles (after the base cycle) whenever the task is activated again.

**Offset (us)** Lets you enter the start time in microseconds.

**WCET adjustment factor** Lets you enter the worst-case execution time (WCET) adjustment factor. The factor lets you change the calculated WCET manually if this is necessary.

**Startup sync mode** (Available only for synchronization tasks) Lets you choose a synchronization mode.

Synchronization Mode	Description
HARD	Synchronization is performed after the first communication cycle. The SyncLimit parameter is ignored (default).
SMOOTH	The synchronization algorithm does not use more µs macroticks for correction than specified by the SyncLimit parameter.

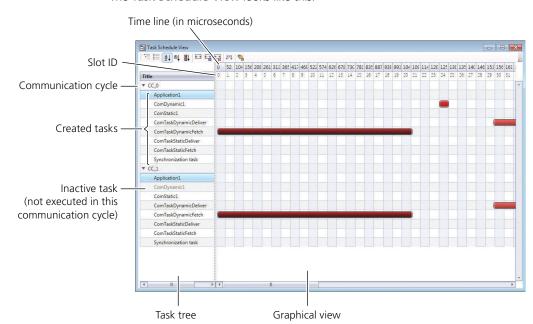
### Tip

You can open the Task Schedule View, which visualizes all the created tasks in their time sequence within an application cycle. It tells you at a glance which task is executed in which communication cycle and where tasks depend on each other, and helps you plan communication and application tasks exactly. Refer to Show Task Schedule View on page 59.

# 

# Show Task Schedule View

Access	You can access this command via:		
	Menu bar	None	
	Context menu of	None	
	Shortcut key	None	
	Toolbar icon	(Task view only)	
Purpose	To display all the configured tasks in their time sequence.		
Result	The Task Schedule View opens.		
Description	Configuration Tool in	View displays the tasks configured in the FlexRay a their time sequence within an application cycle. It helps tion and application tasks exactly.	



The Task Schedule View looks like this:

**Task tree** The task tree contains all the communication cycles belonging to an application cycle. It displays all the communication, application and synchronization tasks created in the FlexRay Configuration Tool for each communication cycle.

Tasks that are executed in a communication cycle are displayed in black, tasks that are not executed are grayed out.

**Graphical view** The graphical view visualizes the task schedule of the communication cycles within an application cycle. The horizontal axis represents the time axis. Each task instance is displayed as a horizontal bar. A bar is placed according to the specified offset value (which specifies the time between the communication cycle starting and the task executing) of the related task. The length of a bar matches the task's worst-case execution time (WCET).

At the top of the graphical view, you will find the time line. It displays the time (in microseconds) elapsed since the start of the communication cycle. The graphical view is divided into regular time intervals for easier orientation. Below the time line, the slots of the communication cycle are visualized. Different background colors are used in the time line and for the slot IDs to indicate the static and the dynamic part of a communication cycle.

If the mouse is placed on a bar, a tooltip displays the name of the related task and information on its task timing properties (base cycle, cycle repetition, offset, WCET).

# Tip

You can zoom in and out of the graphical view by turning the mouse wheel when the mouse is placed on the time line or a slot ID, or dragging a slot ID.

Color coding helps you to distinguish the different task types.

**Changing the task position** For application tasks and user-defined communication tasks, you can change the task position in the **Task Schedule** View by moving the task on the time axis via drag & drop. While you drag the task, you can read the current offset value and the current end value in the tooltip which is displayed.



**Synchronization of Task Schedule View and Task view** The Task Schedule View and the Task view are always synchronized. Here are some examples:

- If you select one or more tasks in the Task view, the tasks are also selected in the task tree and the graphical view of the Task Schedule View, and vice versa
- If you add, modify or remove a task in the Task view, the Task Schedule View is updated accordingly.
- If you move a task in the graphical view of the Task Schedule View, the task's Offset value in the Properties view is changed, and vice versa.

**Function buttons** The Task Schedule View offers several sorting and zooming options. The following function buttons are available below the Task Schedule View header:

Function Button	Description
<b>-</b>	Expands all communication cycles.
<b>=</b>	Collapses all communication cycles.
₽ţ	Sorts the tasks within a communication cycle alphabetically.
<b>⊕</b> ↓	Sorts the tasks within a communication cycle chronologically.
<b>-</b>	Sorts the tasks within a communication cycle according to task type.
€→	Fits the complete communication cycle to the current graphical view size.
<b>€-3</b>	Fits the static part of the communication cycle to the current graphical view size. Nonvisible areas can be reached by using the scroll bar or dragging the time line.

Function Button	Description
<del>€ →</del>	Fits the dynamic part of the communication cycle to the current graphical view size. Nonvisible areas can be reached by using the scroll bar or dragging the time line.
123 ← →	Zooms the communication cycle so that the time line entries (microseconds) and slot ID values are not truncated on the display. Nonvisible areas can be reached by using the scroll bar or dragging the time line.
<u>-</u>	Lets you specify to display the Task Schedule View always on top.

# **Related topics**

#### **Basics**

Basics of Task Creation (FlexRay Configuration Tool Guide 🕮)

### HowTos

How to Create Tasks (FlexRay Configuration Tool Guide 🕮)

# Task View

### Access

You can open the Task view via:

Menu bar	Views - Task
Context menu of	None
Shortcut key	None
Toolbar icon	None

# **Purpose**

To enable or disable the Task view.

### Description

In the Task view, you can create tasks. Refer to Create Task on page 57.

**Task type** After a task is created, the Task view displays it with an icon indicating its type. For a description, refer to Icons for Communication Cluster Elements and FlexRay Task Types on page 8.

Filtering and sorting 
The Task view provides a menu, allowing you to filter and/or sort the elements according to your needs (see Filter on page 22 and Sorting on page 27).

Related topics	HowTos	
	How to Create Tasks (FlexRay Configuration Tool Guide 🕮)	
	References	
	Show Task Schedule View	

# Configurable Properties for Tasks

Purpose	The FlexRay Configuration Tool provides some configurable properties for tasks.
Access	The configurable properties are accessible in the Properties view, when you select a task in the Task view.
Description	Configurable task properties are available for manually created communication and application tasks, and for the automatically generated synchronization task in the Properties view. Properties of communication tasks which are created automatically cannot be changed (except WCET adjustment factor).
	<b>Communication and application tasks</b> You can configure the following properties for communication and application tasks.

Configurable Property	Default	Description
Short name	String	Specifies a unique short name. The property is not configurable for automatically created tasks.
Base cycle	0	Specifies the first communication cycle in which the task is executed. The valid values are in the range 0 63. The base cycle must match the base cycle of the added frames. The property is not configurable for automatically created tasks.
Cycle repetition	1	Specifies a constant repetition. The length of the cycle and the cycle repetition determine the period of the task. The cycle repetition must match the cycle repetition of the added frames. The valid values are 1, 2, 4, 8, 16, 32 and 64. The property is not configurable for automatically created tasks.
Offset Offsets (application tasks only)	Numerical value	Specifies a time offset in the communication cycle. This is the time between the communication cycle starting and the task executing. The maximum range of the offset is 0 65535. Additionally, the range is restricted by the length of the specific communication cycle. For application tasks, you can specify several semicolon separated offsets. The property is not configurable for automatically created tasks.

Configurable Property	Default	Description
Function WCET (application tasks only)	0	Specifies the function WCET.
WCET adjustment factor	1	Specifies an adjustment factor of the worst-case execution time (WCET). The factor lets you change the calculated WCET manually if this is necessary.
Used for real-time test triggering (application tasks	False	Specifies whether the application task is to be used to replay data. If the Real-Time Testing option is enabled, the task is used to execute the corresponding RTT replay script.
only)		If you work with a MicroAutoBox III or SCALEXIO system, this property is not available. You must enable the Real-Time Testing option for the replay task in ConfigurationDesk instead. Refer to Configuring Tasks in ConfigurationDesk (ConfigurationDesk Real-Time Implementation Guide (LD)).  Real-Time Testing does not support the DS1007, which means that data replay is not possible for the DS1007. For this reason, the Real-Time Testing option is always disabled if you work with a DS1007. You cannot
Data capture block	Empty	change this setting.  Specifies a unique ID for the task. If an ID is specified, you can use the
ID (application tasks only)	psy	application task to log data in ControlDesk.  If you work with a MicroAutoBox III or SCALEXIO system, this property is not available. You must specify the DAQ raster name to be used for the logging task in ConfigurationDesk instead. Refer to Configuring Tasks in ConfigurationDesk (ConfigurationDesk Real-Time Implementation Guide (1)).

Synchronization task You can configure the following properties for the synchronization task.

Configurable Property	Default	Description
WCET adjustment factor	1	Specifies an adjustment factor of the worst-case execution time (WCET). The factor lets you change the calculated WCET manually if this is necessary.
Startup sync mode	HARD	<ul> <li>Selects the hard or smooth start-up synchronization mode.</li> <li>In the smooth mode, the synchronization algorithm does not use more macroticks for correction than specified by the SyncLimit parameter.</li> <li>In the hard mode, synchronization is performed after the first communication cycle. The SyncLimit parameter is ignored.</li> <li>For details on the SyncLimit parameter, refer to Unit Page (RTIFLEXRAYCONFIG SYNC SERVICE) (RTI FlexRay Configuration Blockset Reference (1)).</li> </ul>

# **Related topics**

### Basics

Creating Tasks (FlexRay Configuration Tool Guide 🕮)

# References

Configurable Properties for ECUs, Signals, and Frames	32
Show Task Schedule View	59

# **Controller Configuration**

Overview

The FlexRay Configuration Tool's Controller Configuration feature provides the following command and dialog:

# **Controller Configuration**

Access	You can access this	You can access this command via:			
	Menu bar	Tools			
	Context menu of	None			
	Shortcut key	Ctrl+H			
	Toolbar icon	None			
Purpose	To display the contro	oller settings and the required controller and buffer count.			

# **Controller Configuration** dialog

To view the controller settings.

**Required buffer** Displays the buffer count required for your configuration.

**Available buffer** Displays the total available buffers of the currently added

controllers.

Name Lists the names of the controllers.

**Type** Lists the controller types.

**Buffer Count** Displays the available buffer count for the controller.

**Used Buffer** Displays the buffer count of the controller used for the current configuration.

**Sync** Displays whether the controller sends a synchronization frame or not.

**Startup** Displays whether the controller sends a start-up frame or not.

**Membership** Lists the frame membership groups the controller belongs to.

**Update** Lets you update the Controller Configuration view.

**Close** Closes the dialog. Alternatively, you can press the **Esc** key.

# **Related topics**

### HowTos

How to View the Controller Configuration (FlexRay Configuration Tool Guide  ${\color{orange} \square}$ )

# **Code Generation**

# Overview

The FlexRay Configuration Tool's Code Generation feature provides the following command and dialog:

# Where to go from here

### Information in this section

# Information in other sections

# Generating Code (FlexRay Configuration Tool Guide )

After you have finished your configuration and task creation, you can generate Simulink configuration data, Com code, and CHI code to use for building your real-time application.

# **Element Selection**

#### Access

You can access this command via:

Menu bar	Tools
Context menu of	None
Shortcut key	Ctrl+E
Toolbar icon	None

Purpose	To select elements that are included in the variable description (TRC) file.
Result	During code generation, variables that correspond to the selected elements are included in the TRC file to control the feature.
Description	The Element Selection dialog opens for you to specify the features of elements

(frames/PDUs or signals) to be controlled via ControlDesk. The following features must have been previously configured for a particular element in the Properties view.

Feature	Configuration
Signal alive counter control	The Used for alive counter property must be enabled.
Raw data access	The Raw data access property must be enabled.
Frame CRC control	A CRC algorithm must be assigned to the frame in the CRC Algorithm property.

When a feature is selected for an element, corresponding variables are included in the TRC file during code generation. The variables can be connected to instruments in ControlDesk. The following features can be selected:

Feature	Possible Elements	Purpose
Frame Dynamic Control	Dynamic TX frames	To trigger or activate dynamic TX frames.
Frame Static Control	Static TX frames	To enable the sending of static frames via software.
Frame CRC Control	Frames with CRC calculation	To manipulate the CRC calculation.
Frame Update Bit Control	Frames (PDUs) with update bit	To manipulate the update bit of a frame or PDU.
Frame Receive Status Access	RX frames	To get several status information of an RX frame.
Frame Raw Data Access	Frames with raw data access	To send and receive raw data of a frame.
Frame Minimum Delay Time Control	TX frames with enabled minimum delay time support	To enable or disable minimum delay time support of a PDU and get minimum delay time information.
Frame Container Control	Frames that are contained in a container IPDU	To get access to contained IPDUs.
Frame Global Time Sync Access	Frames that are connected to a global time domain.	To access information of time synchronization messages to manipulate parts of them (TX direction) or receive status information on them (RX direction).
Frame Authentication Control	Authentic IPDUs	To access the authentication information included in a secured IPDU and get verification status information.
Signal Value Access	Signals	To manipulate or read a signal value.
Signal Validity Control	Signals with validity ≠ 'VALID' (e.g., 'NOT VALID' or 'NOT DEFINED')	To manipulate or read the validity of a signal.

Feature	Possible Elements	Purpose
Signal Alive Counter Control	Send signals with alive counter	To manipulate the alive counter of a signal.
Signal RX Status Access	Receive signals	To get the status of a receive signal.

For information on the generated TRC file variables, refer to:

- Using the Generated TRC File of PDU-Based Modeling (FlexRay Configuration Features (1))
- (MicroAutoBox III, SCALEXIO) Using the Generated TRC File of PDU-Based Modeling in ControlDesk (Model Interface Package for Simulink - Modeling Guide (1))

# **Element Selection dialog**

**List of features** Displays all the features and lets you select a feature whose elements you want to control via ControlDesk.

After you select a feature, the Available Elements and Selected Elements lists show the elements that support it.

A colored state icon next to a feature indicates whether elements are configured for the feature and, if they are, whether they are already selected for the TRC file. The following state icons are available:

State Icon	Description
•	A gray state icon indicates that no elements are configured for the selected feature.
•	A red state icon indicates that elements are configured for the selected feature, but no elements are selected for the TRC file yet.
•	A green state icon indicates that all available elements that are configured for the selected feature are already selected for the TRC file.
•	A yellow state icon indicates that elements are configured for the selected feature, and a subset of them is already selected for the TRC file.

You can find some buttons for quick selection/deselection of elements above the features list:

Button	Description
<b>»</b>	All available elements of all features are selected for control via TRC file. 1)
>	All available elements of the selected feature are selected for control via TRC file.
<	All selected elements of the selected feature are deselected from control via TRC file.
«	All selected elements of all features are deselected from control via TRC file. <sup>2)</sup>

<sup>&</sup>lt;sup>1)</sup> The selection includes all the possible receiving signals and frames and sending signals and frames which are located in the Configuration view. In earlier tool versions, the

#### **Button**

#### Description

Generators page offered the Include receiving signals and frames and Include sending signals and frames properties for you to include them in the TRC file. As of FlexRay Configuration Tool 3.4, the properties are removed.

The deselection includes the receiving signals and frames and sending signals and frames which are located in the Configuration view. In earlier tool versions, the Generators page offered the Include receiving signals and frames and Include sending signals and frames properties for you to exclude them from control via TRC file. As of FlexRay Configuration Tool 3.4, the properties are removed.

**Available Elements** Displays all the elements that are configured for the selected feature and not yet selected for the TRC file.

#### Note

Only elements that are assigned to a task are displayed in the Element Selection dialog.

The Available Elements list provides a menu, allowing you to filter and/or sort the elements according to your needs (see Filter on page 22 and Sorting on page 27).

**Selected Elements** Displays all the elements that are configured for the selected feature and selected for the TRC file.

The Selected Elements list provides a menu allowing you to filter and/or sort the elements according to your needs (see Filter on page 22 and Sorting on page 27).

**Cancel** Closes the dialog without saving your settings. Alternatively, you can press the **Esc** key.

**OK** Confirms your settings and closes the dialog.

#### **Related topics**

#### Basics

Using the Generated TRC File of PDU-Based Modeling (FlexRay Configuration Features (12))

Using the Generated TRC File of PDU-Based Modeling in ControlDesk (Model Interface Package for Simulink - Modeling Guide (11)

#### HowTos

How to Prepare the Manipulation or Monitoring of Frames/PDUs and Signals via TRC File (FlexRay Configuration Tool Guide  $\Omega$ )

# Generate Code

Access	You can access this command via:		
	Menu bar	None	
	Context menu of	None	
	Shortcut key	None	
	Toolbar icon		
Purpose	To generate the code for the automatically generated FlexRay model.		
Description	The command generates all the files which are required to model the FlexRay communication in Simulink and finally to experiment with the FlexRay communication. You can specify the properties for code generation on the <b>Generators Page</b> on page 47.		
Result	The code files are generated.		
Related topics	ted topics Basics		
	Basics of Code Generation (FlexRay Configuration Tool Guide ☐)		
	HowTos		
	110W103		

# **Basic Interface**

### Overview

The FlexRay Configuration Tool's basic interface provides various commands and dialogs, which are accessible via the menu bar:

# Where to go from here

# Information in this section

About FlexRay Configuration Tool
dSPACE Help
Find
Log View
Open Log-File Folder
Using dSPACE Help
Views

# Information in other sections

# Graphical User Interface of the FlexRay Configuration Tool (FlexRay Configuration Tool Guide $\square$ )

The graphical user interface offers the basic environment for all other elements and tool windows provided by the FlexRay Configuration Tool.

# About FlexRay Configuration Tool

Access	Menu bar	Help
	Context menu of	None
	Shortcut key	None
	Toolbar icon	None
Purpose	To display information on which FlexRay Configuration Tool version and license are currently installed on your system.	
	•	a on your system.
About FlexRay Configuration Tool dialog	<b>Versions</b> Display Configuration Tool.	s the versions of the components of your current FlexRay

# dSPACE Help

Access	You can access this command via:		
	Menu bar	Help	
	Context menu of	None	
	Shortcut key	None	
	Toolbar icon	<b>@</b>	
Purpose	To view the contents Help.	To view the contents of the FlexRay Configuration Tool's online help in dSPACE Help.	
Result	The online help for the FlexRay Configuration Tool opens.		
Related topics	References		
	Using dSPACE Help	79	

# Find

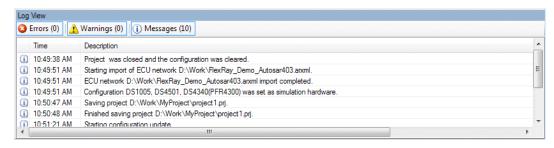
Access	You can access this command via:		
	Menu bar	None	
	Context menu of	None	
	Shortcut key	None	
	Toolbar icon	番	
Purpose	To find a certain elements.	To find a certain element of the communication cluster file shown in the different views.	
Result	Once the FlexRay Configuration Tool finds the element you are looking for, it marks the element in the view you have searched in.		
Description	The FlexRay Configu	The FlexRay Configuration Tool searches in the view you have currently activated	
Dialog settings	<b>Find</b> The drop-down field lets you specify the name of the element you wish to find in the activated view. Wildcards are supported. The FlexRay Configuration Tool stores search strings already entered in the current session for you to reuse. <b>Start Search</b> Click this button to start the search.		
Related topics	Basics		
	Handling the Elements of a Communication Cluster File (FlexRay Configuration Tool Guide $\mathbf{\Omega}$ )		

# Log View

Access	You can access this command via:	
	Menu bar	Views - Log View
	Context menu of	None
	Shortcut key	None
	Toolbar icon	None

Purpose	To show or hide the Log view.
Result	The Log view opens.
Description	The Log view provides a history of all error and warning messages that occur when you work with the FlexRay Configuration Tool. This helps you check the system state.

The Log view looks like this:



Severity, time and text of a message The Log view provides the following information for each message:

Part	Description
Severity	There are three types of messages according to severity level. Each message has a symbol that indicates the message type:
	■ <b>S</b> Errors
	To display/hide errors, click  above the message list.  • • Warnings
	To display/hide warnings, click Marnings above the message list.  • ① Infos
	To display/hide infos, click  above the message list.
Time	The time when the message occurred.
Description	The content of the message.

Each tool button provides a counter. You can see how many messages of the message type appeared.

# Commands of the Log view

The Log view provides several commands to clear entries via its context menu.

Clear All Lets you clear all the entries in the Log view.

**Clear Errors** Lets you clear all the error messages in the Log view.

**Clear Messages** Lets you clear all the messages in the Log view.

Lets you clear all the warnings in the Log view. **Clear Warnings** 

# **Related topics**

#### **Basics**

Graphical User Interface of the FlexRay Configuration Tool (FlexRay Configuration Tool Guide  $\mathbf{\Omega}$ )

# Open Log-File Folder

#### Access

You can access this command via:

Menu bar	Help
Context menu of	None
Shortcut key	None
Toolbar icon	None

### **Purpose**

To open the folder of the LOG file in File Explorer.

### Result

An Explorer window opens with the folder of the FlexRay Configuration Tool's LOG file.

### Note

Some editors (for example, Microsoft Word) open the FlexRay Configuration Tool's LOG file with exclusive access. This means that the FlexRay Configuration Tool cannot store any warnings, error messages, etc., in the LOG file unless you close the file.

# Using dSPACE Help

## Access

You can access this command via:

Menu bar	Help
Context menu of	None
Shortcut key	None
Icon	None

Purpose	To get information on working with dSPACE Help.			
Result		dSPACE Help opens. It provides information on general handling and instructions on using dSPACE Help.		
Views				
Access	You can access this o	You can access this command via:		
	Menu bar	Views		
	Context menu of	None		
	Shortcut key	None		
	Toolbar icon	None		
	To show or hide the views of the FlexRay Configuration Tool.			

The views are either shown or hidden.

# Description

Result

Opens a submenu showing all views available in the FlexRay Configuration Tool. Views that have a checkmark are shown in the main window. Views without checkmarks are hidden.

# **Related topics**

#### Basics

Graphical User Interface of the FlexRay Configuration Tool (FlexRay Configuration Tool Guide  $\mathbf{\Omega}$ )

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