



## Instruction

### Z-Wave XML Editor User Guide

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<b>Description:</b>	Description of the Z-Wave XML Editor used to create a XML file containing the Z-Wave devices and command classes which can be used by the Z-Wave Zniffer for interpretation of the above mentioned classes.
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**REVISION RECORD**

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2	20070928	IHM	All	Content and screenshots have been added to chapter 4. Proof-reading.
3	20071004	IHM	All	Most chapters and sections have been revised.
3	20071119	IHM	All	Some abbreviations have been added. Figures and figure captions have been updated. New menu items – “Move Parameter Down” and “Move Parameter Up” have been described. A note for “SPECIFIC_TYPE_NOT_USED” name for Specific Device has been added. Description of the Add Parameter dialog has been enhanced.
3	20090427	DDA	All	Revised and updated in respect of version 1.09
4	20110117	DDA	Appendix	Minor errors fixed, changed fancy quotes to regular quotes.

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## 1 ABBREVIATIONS

Abbreviation	Explanation
CD	Compact Disk – a digital, optical-based computer data storage medium
R&D	Research and Development – all activities related to the evolution of new products and services
XML	Extensible Markup Language ( <a href="http://www.w3.org/XML/">http://www.w3.org/XML/</a> )
XSD	XML Schema Definition – a language for specifying the grammar of the markup allowed in an XML file. XSD file describes the structure of an XML document.

## 2 INTRODUCTION

### 2.1 Purpose

The Z-Wave XML Editor is used to define approved Z-Wave devices and command classes [1] used by the application layer of the Z-Wave protocol in the XML document that can be used by the Z-Wave Sniffer [2] for interpretation of the above mentioned devices and command classes. Beside a XML file containing all the information is it also possible to generate a C# class file and C header file as foundation for application development. The Z-Wave XML Editor enables also the customer to define devices and command classes under development or proprietary command class structures.

### 2.2 Audience and prerequisites

The audience is external R&D software application programmers.

## 3 GETTING STARTED

### 3.1 Check the prerequisites

The following components should be pre-installed on the machine that you need to use Z-Wave XML Editor:

1. [.NET Framework](#), version 2.0 or later

**Important:** Make sure you have the latest service pack and critical updates for the version of Windows that you are running. To find recent security updates, visit [Windows Update](#).

### 3.2 Install the XML Editor application

1. Exit all programs.
2. In Microsoft Windows, click the **Start** button, and then click **Control Panel**.
3. In Classic view, double-click **Add or Remove Programs**.
4. Click **Add New Programs**, and then click **CD or Floppy**.
5. Locate the “setup.exe” that should be placed in the <drive name>\DevKit\_x\_xx\Tools\XMLEditor\ folder on your hard drive in case you installed Z-Wave Developer’s Kit.

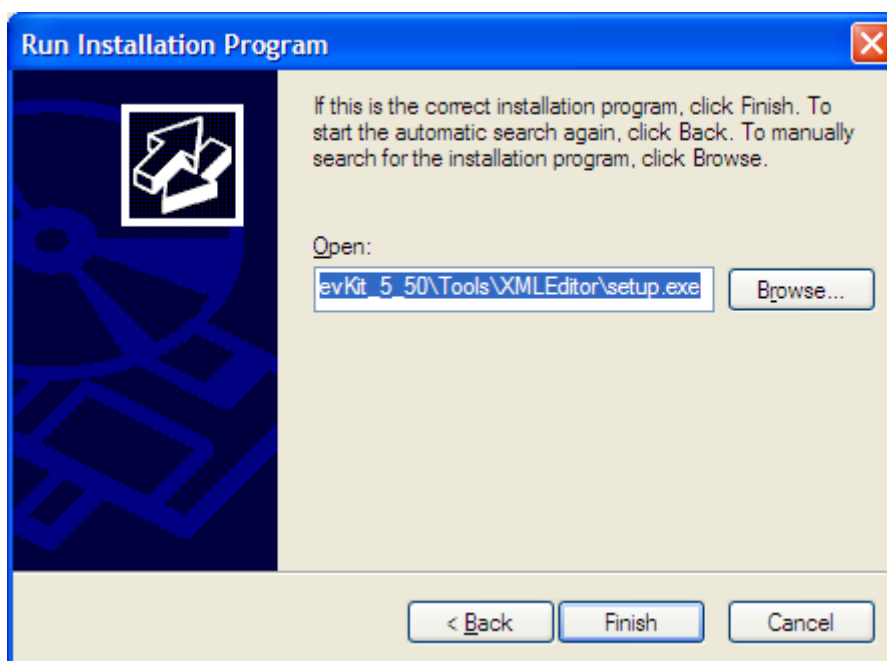
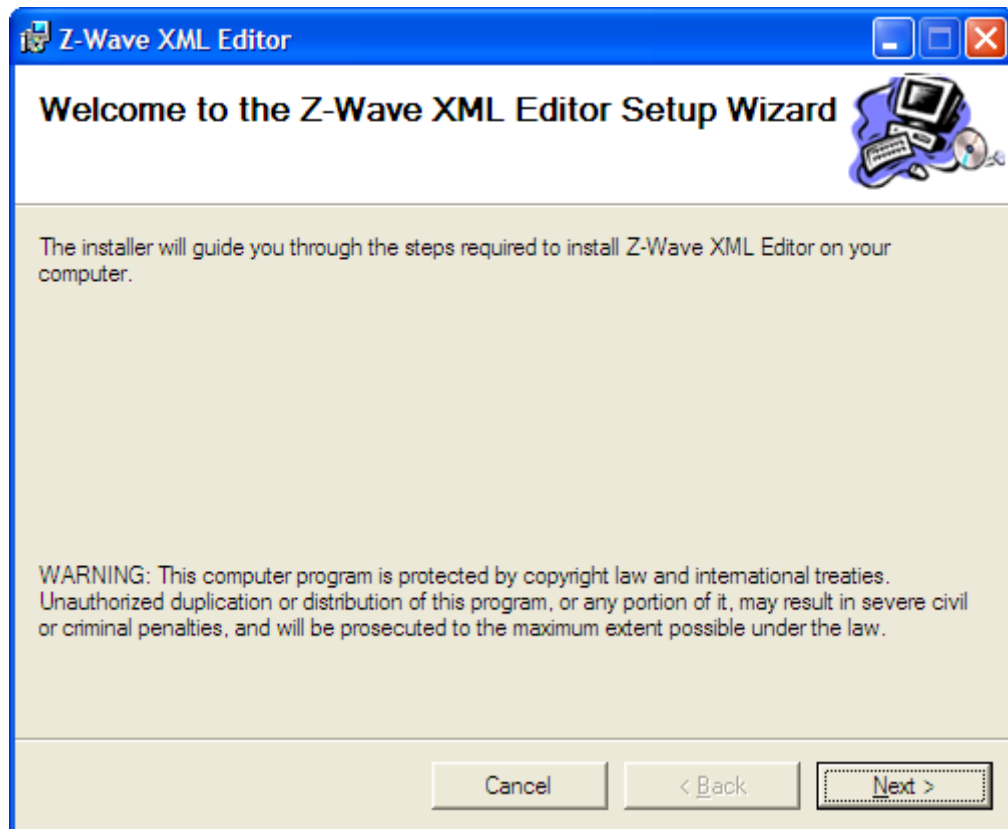


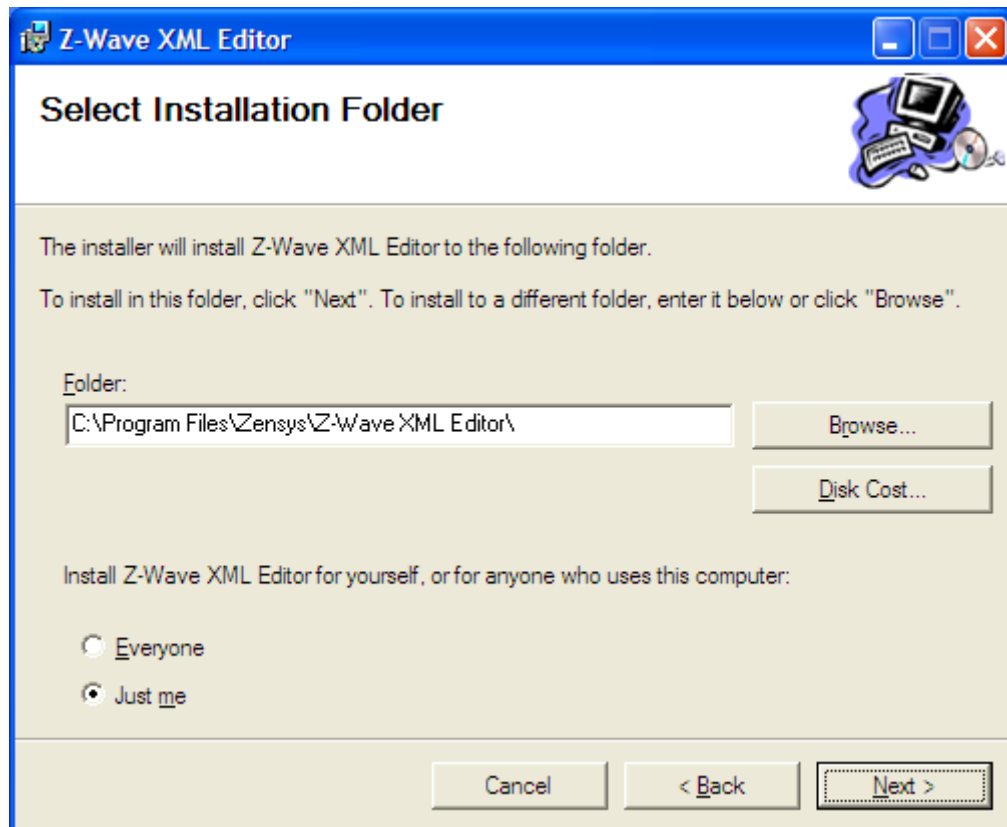
Figure 1. Location of the installation program

6. After double clicking the “Setup.exe” file, the following dialog appears. Please note the copyright notification and click **Next** button.



**Figure 2. Welcome page of the Z-Wave XML Editor installation**

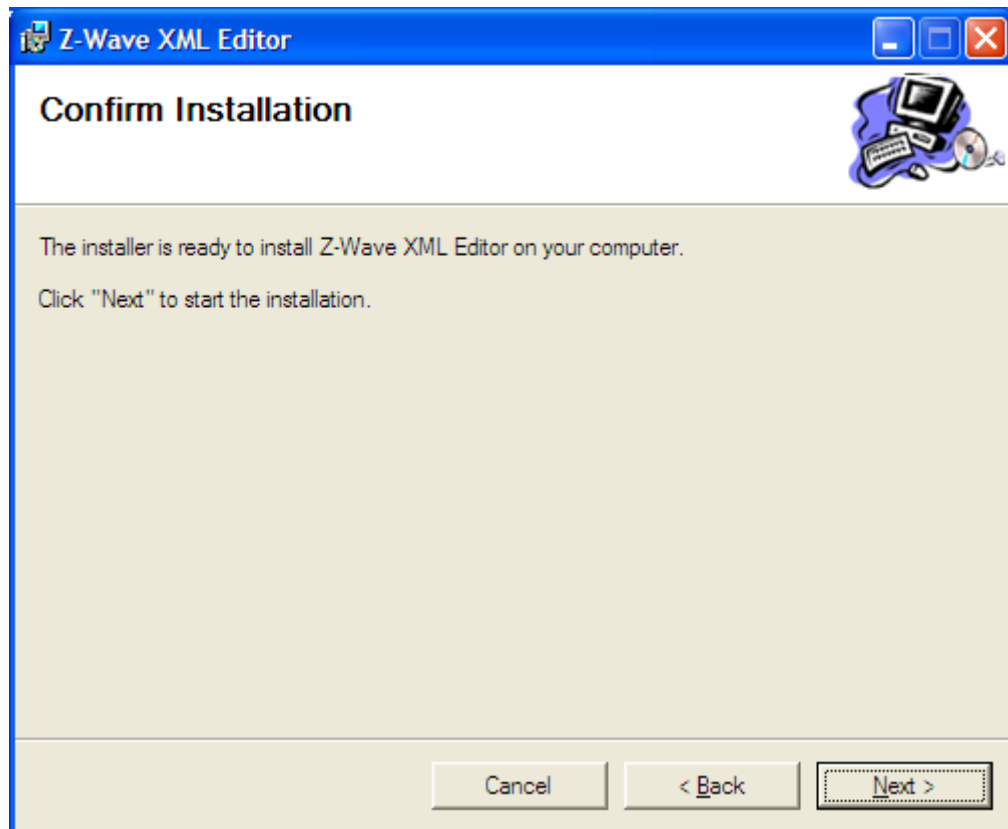
7. Select the installation folder and who should be able to use the XML Editor application. Please note, that it is not recommended to move the XML Editor application manually after it has been installed into the above specified folder. When done, click **Next**.



**Figure 3. Installation folder**

8. An installation confirmation appears. Click **Next** again to confirm and start the installation.





**Figure 4. Confirmation page of the Z-Wave XML Editor installation**

9. An actual installation procedure will pass with progress indicator and final confirmation appears. Click **Close** to complete the installation.

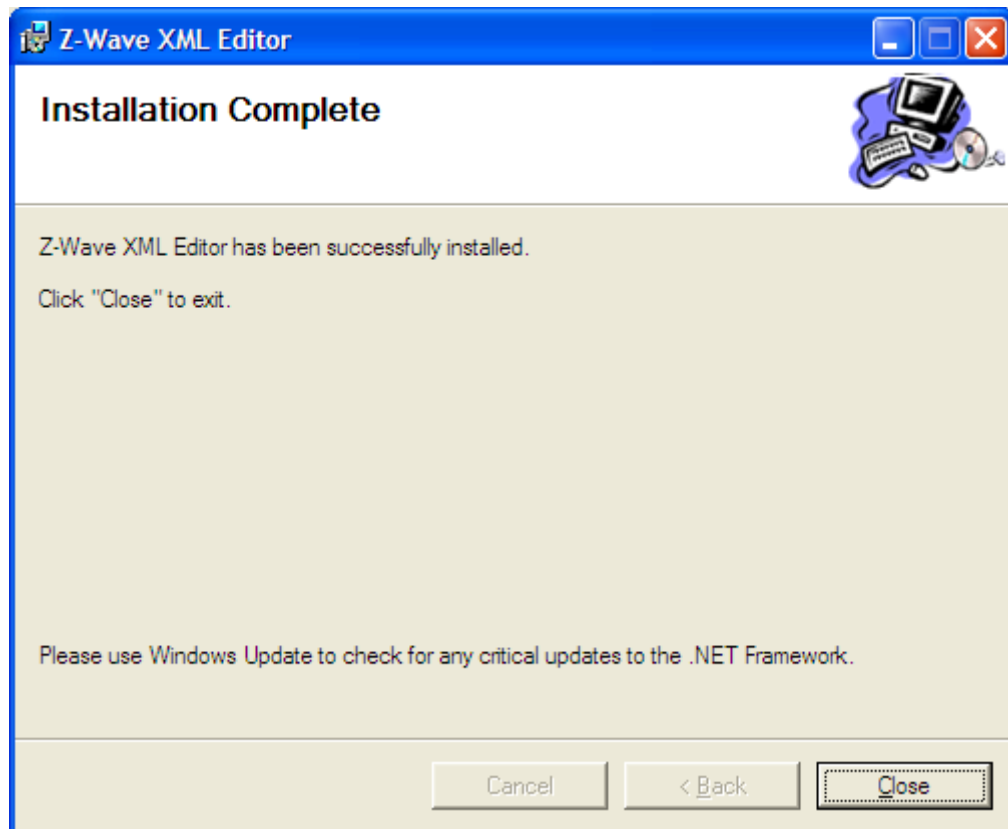


Figure 5. XML Editor Installation complete.

### 3.3 Start the Z-Wave XML Editor

You can start the Z-Wave XML Editor using the Start menu. To open the Start menu, click the **Start** button in the lower-left corner of your screen. Or, press the **Windows logo** key on your keyboard. The Start menu appears.

To open Z-Wave XML Editor, click its icon shown in the left pane of the Start menu that displays the most frequently used programs list. If you don't see its icon there, click **All Programs** at the bottom of the left pane. Instantly, the left pane displays a long list of programs in alphabetical order, followed by a list of folders. Click **Zensys** folder, then **Z-Wave XML Editor** folder and finally click the **Z-Wave XML Editor** item as shown at the next figure.



Figure 6. Start menu with Z-Wave XML Editor group

Each time you start Z-Wave XML Editor, you are actually running the “C:\Program Files\Zensys\Z-Wave XML Editor\ZWaveXMLEditor.exe” executable file, although you do not usually type its name or even see it.

### 3.4 Remove Z-Wave XML Editor

You can uninstall Z-Wave XML Editor from your computer if you no longer use it.

1. Open **Add or Remove Programs** in Control Panel.  
To do it, click **Start**, then click **Control Panel** (in Classical View – click **Start**, then point to **Settings**, and click **Control Panel**), and then double-click **Add or Remove Programs**.
2. Click the program in the list and then click the **Remove** button as shown at the picture below.  
You can sort programs by selecting different options in **Sort by**.

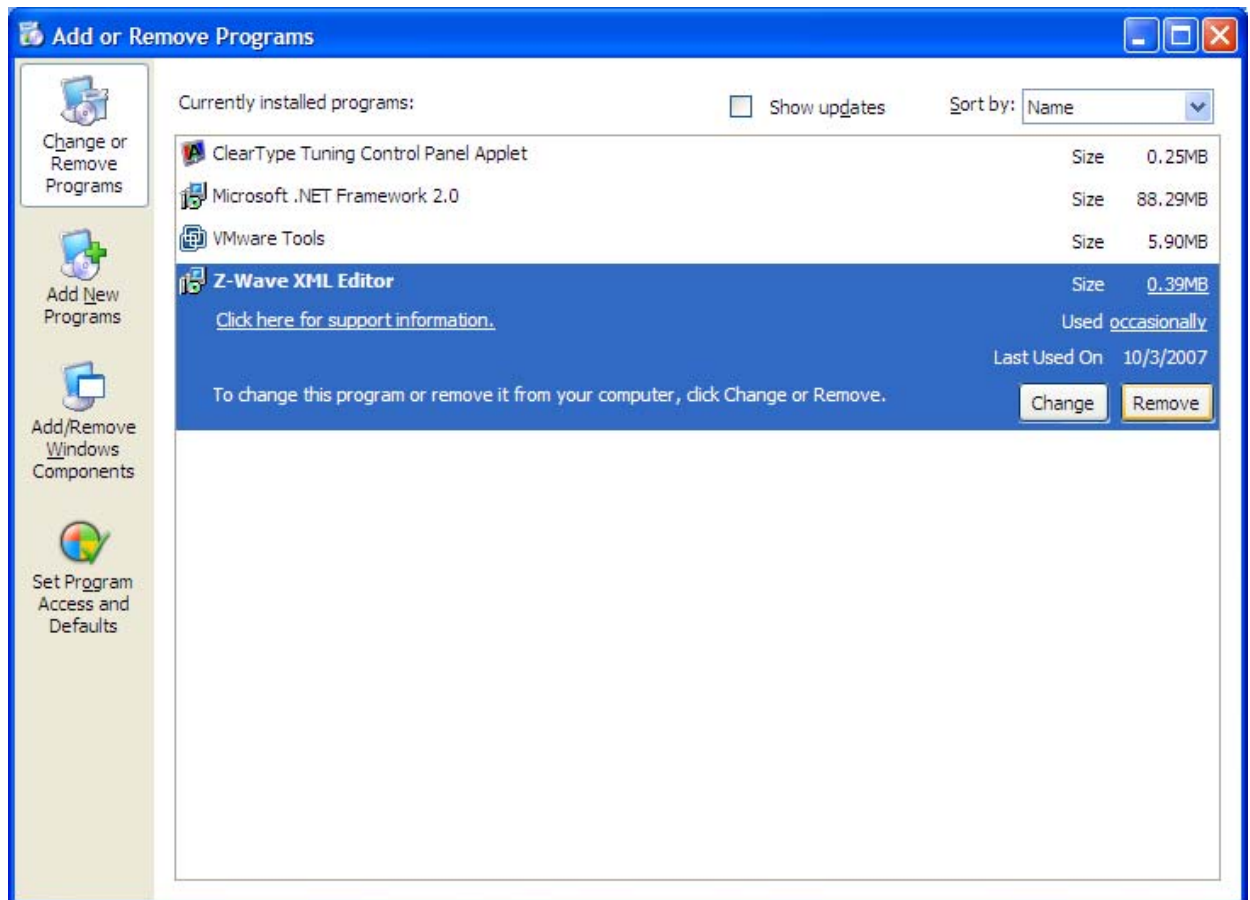


Figure 7. Add or Remove Programs window

3. Standard confirmation dialog appears. Click **Yes** to continue the removal of the XML Editor application.

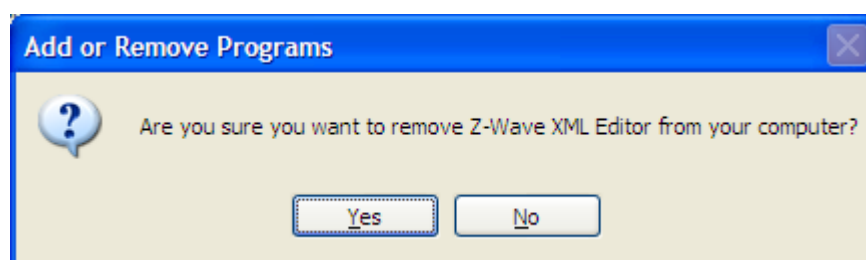


Figure 8. Confirmation message for Z-Wave XML Editor removal

4. Z-Wave XML Editor and its settings will be completely removed without prompting you further.

## 4 USER INTERFACE

### 4.1 Layout of the XML Editor main window

The figure below shows the Z-Wave XML Editor window as it usually looks after opening an appropriate XML file.

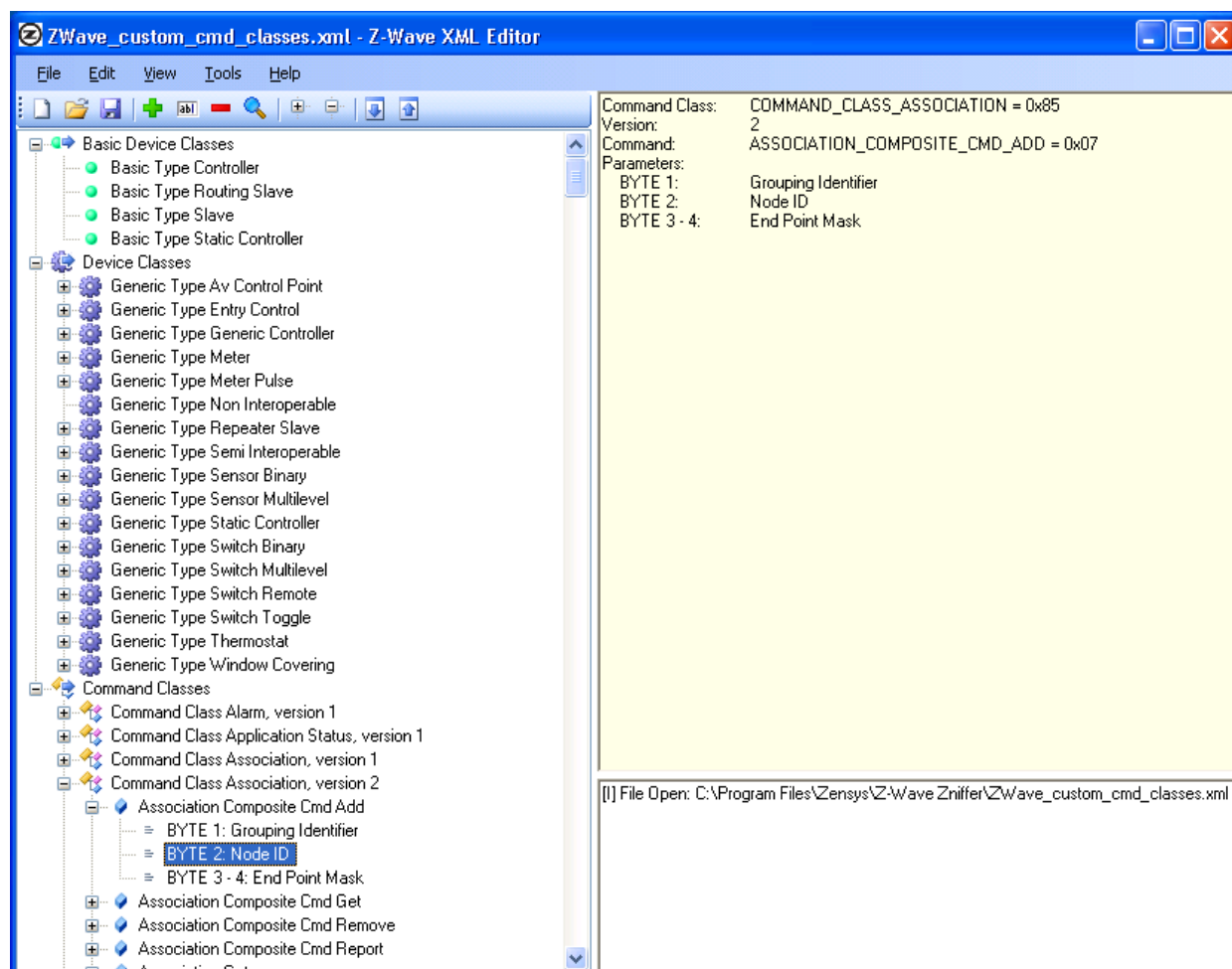


Figure 9. Main window

The main application window has the same basic parts as other Windows applications:

- **Title bar** displays the name of the program. It may display also the name of opened/saved XML file.
- **Menu bar** contains items that you can click to make choice in a program. For more details, see Section 4.2.
- **Toolbar**. The row of buttons which represents tasks that you can do within a program. It provides quick access to common tasks frequently accessed from the menus. For more details, see Section 5.
- **Tree-view pane** displays the structure of the current XML file as expandable tree on the left of the main window.

- **Info pane** displays the details for the current element in the Tree-view pane. It is top-right pane in the main window.
- **Log pane** displays the log of the operations that XML Editor performs. It is bottom-right pane in the main window.

## 4.2 Menu bar

On top of the main window is the application menu bar. It has the following items:

- **File.** This menu contains items to create new, open and save the XML files, and to quit from Z-Wave XML Editor.
- **Edit.** This menu contains items to do the main actions (Add, Edit or Remove) with the definitions of devices, command classes, commands and parameters. It contains also items to operate the versions of the command classes.
- **View.** This menu contains two commands to change the appearance of the nodes in the Tree-view pane.
- **Tools.** This menu contains items to view/edit the application options and run the generation of the C# class file and C header file as foundation for application development.
- **Help.** This menu contains items to help the user – it displays the information about the current application and opens online manual.

### 4.2.1 File menu

This menu contains items to create new, open and save the XML files, and to quit from Z-Wave XML Editor. The File menu has the following items:

Menu item	Keyboard Shortcut	Description
New	Ctrl+N	Clears the current XML file and initiate a new one.
Open...	Ctrl+O	Opens a standard File Open dialog to open the XML file.
Save	Ctrl+S	Saves the current XML to a file.
Save As...	–	Saves the current XML with a new name.
Exit	–	Exits the application.

### 4.2.2 Edit menu

This menu contains items to do the main actions with the nodes in the Tree-view pane (definitions of devices, device classes, command classes, commands and command parameters). The Edit menu has the following items:

Menu item	Keyboard Shortcut	Description
Add...	–	Adds new device, device class, command class, command, or command parameter (depending on the active cursor position in the Tree-view pane).
Edit	–	Edits the current node in the Tree-view pane.
Remove	–	Removes the current node in the Tree-view pane.
Add new version...	–	Add new version of the command class.
Read only	–	Marks the current command class definition as read-only.
Truncate System Commands	–	Removes the definitions of the parameters for all system (protocol) commands.
Move down parameter	–	Moves the selected command parameter down. This menu item is inactive if the parent command has less than two parameters or the active (highlighted) parameter is the last one already.
Move up parameter	–	Moves the selected command parameter up. This menu item is inactive if the parent command has less than two parameters or the active (highlighted) parameter is the first one

		already.
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#### 4.2.3 View menu

This menu contains two commands to change the appearance of the nodes in the Tree-view pane. The View menu has the following items:

Menu item	Keyboard Shortcut	Description
Expand All	–	Shows all the existing child elements in the Tree-view pane.
Collapse All	–	Hides all child elements except the active one in the Tree-view pane so the parent nodes remain visible in it.

#### 4.2.4 Tools menu

This menu contains items to view/edit the application options and run the generation of the C# class file, C header file, and Node Info as foundation for application development. The Tools menu has the following items:

Menu item	Keyboard Shortcut	Description
Options...	–	Opens a dialog with Z-Wave XML Editor options.
Generate C#	–	Generates .CS file with class definitions in C#.
Generate C Header	–	Generates .H file with definitions in C.
Generate Node Info	–	Generates Node Info for the XML file if changes have been done to the Command and Device Classes using the XML Editor.

#### 4.2.5 Help menu

This menu contains items to help the user. The Help menu has the following items:

Menu item	Keyboard Shortcut	Description
About	–	Opens a standard about dialog with the information about the current application.
Help	–	This item is dedicated to opening the online application-specific manual.



## 5 WORKING WITH Z-WAVE XML TAGS AND ATTRIBUTES

### 5.1 Basic Device Handling

The basic device class determines the available functionality of the Z-Wave protocol depending on the library used.

Initially, a new XML file in Z-Wave XML Editor has three empty top-level nodes in the Tree-view pane on the left of the main application window:

- Basic Device Classes
- Device Classes
- Command Classes

As any other XML file element, the Basic Device definitions are presented as elements or nodes in the Tree-view pane. All the Basic Device definitions in the current XML are grouped under the **Basic Device Classes** parent node.

Using Z-Wave XML Editor you can do the standard actions with Basic Device definitions - add, edit and remove.

#### 5.1.1 Add Basic Device

To add a new Basic Device definition, select **Basic Device Classes** top-level node in the Tree-view pane, and then click **Add item** button at the toolbar. Or click **Edit** menu, then click **Add...** item.

**Add Basic Device** dialog appears as shown at the figure below.

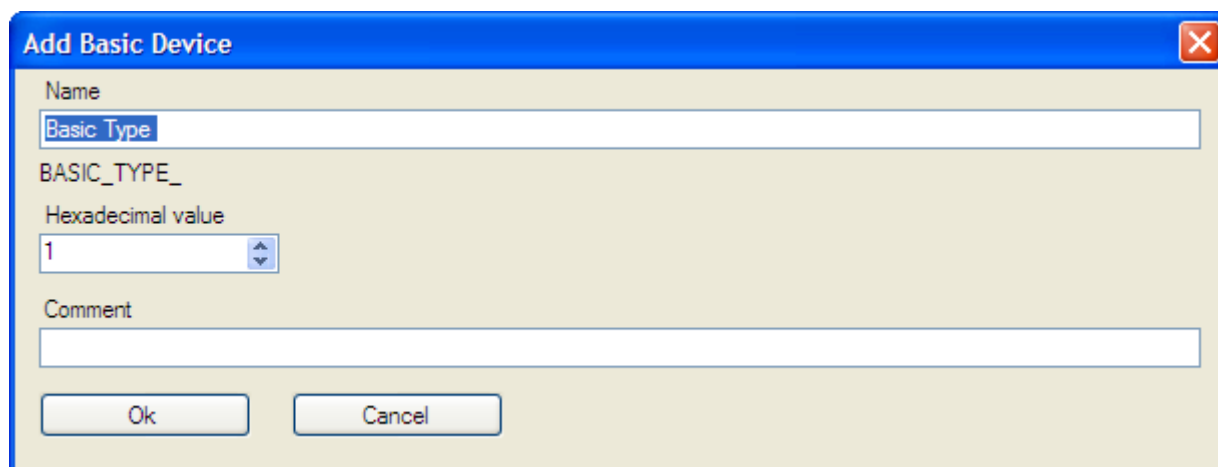


Figure 10. Add Basic Device dialog

**Add Basic Device** dialog provides you with the following entry fields:

- **Name** for the Basic Device that will be automatically translated to the correct format (all caps characters, underscore signs instead of the spaces, etc.). A name for the Basic Device in this generated format is shown dynamically right below the entry field;

- **Hexadecimal value** for hexadecimal identifier (key).  
Please note, that definitions you do in XML file should have precedence over the header file ZW\_classcmd.h distributed as part of the Z-Wave Developer's Kit. However, the assignment of all hex identifiers should be synchronized with the values in the header file ZW\_classcmd.h;
- **Comment** for the text string with any needed extended names, explanations, notes, etc.

To save the entered values and create a new Device Class definition, click **Ok** button. To discard the entered values, click **Cancel**.

### 5.1.2 Edit Basic Device

To edit the existing Basic Device definition, select it in the tree below the **Basic Device Classes** top-level node, and then click **Edit item** button at the toolbar. Or click **Edit** menu, then click **Edit...** item. Or just double-click it in the Tree-view pane.

**Edit Basic Device** dialog appears as shown at the figure below.

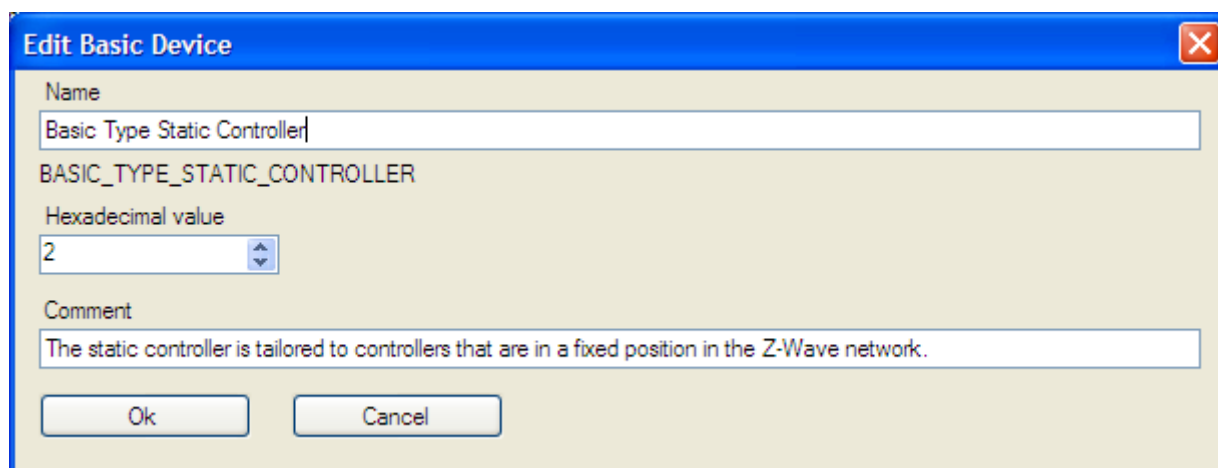


Figure 11. Edit Basic Device dialog

**Edit Basic Device** dialog provides the same entry fields as **Add Basic Device** dialog described above.

To save your changes, click **Ok** button. To discard the changes, click **Cancel**.

### 5.1.3 Remove Basic Device

To remove an existing Basic Device definition, select it in the tree below the **Basic Device Classes** top-level node, and then click **Remove item** button at the toolbar. Or click **Edit** menu, then click **Remove** item.

A confirmation dialog with the name of the selected node appears as shown at the figure below.

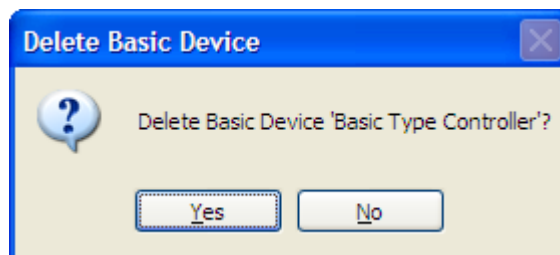


Figure 12. Removal confirmation dialog for Basic Device

To confirm the removal, click **Yes** button. To reject the removal and left the Basic Device definition, click **No**.

## 5.2 Generic and Specific Device Handling

The Generic Device Class definition allows describing the main functionality of a device on a very high level. While Generic Device Class only defines the absolute minimum of functionality of a given type of device, the Generic Device definition is typically extended with a Specific Device Class definition.

As any other XML file element, all the Generic Device and Specific Device definitions are presented as nodes in the Tree-view pane. All the Generic Device definitions in the current XML are grouped under the **Device Classes** top-level node, while all the Specific Device definitions are presented as child nodes for the appropriate Generic Device definition.

Using Z-Wave XML Editor you can do the following standard actions with Generic Device and Specific Device definitions – add, edit and remove.

### 5.2.1 Add Generic and Specific Device

To add a new Generic Device Class definition, select **Device Classes** top-level node in the Tree-view pane, and then click **Add item** button at the toolbar. Or click **Edit** menu, then click **Add...** item.

**Add Generic Device** dialog appears as shown at the figure below.

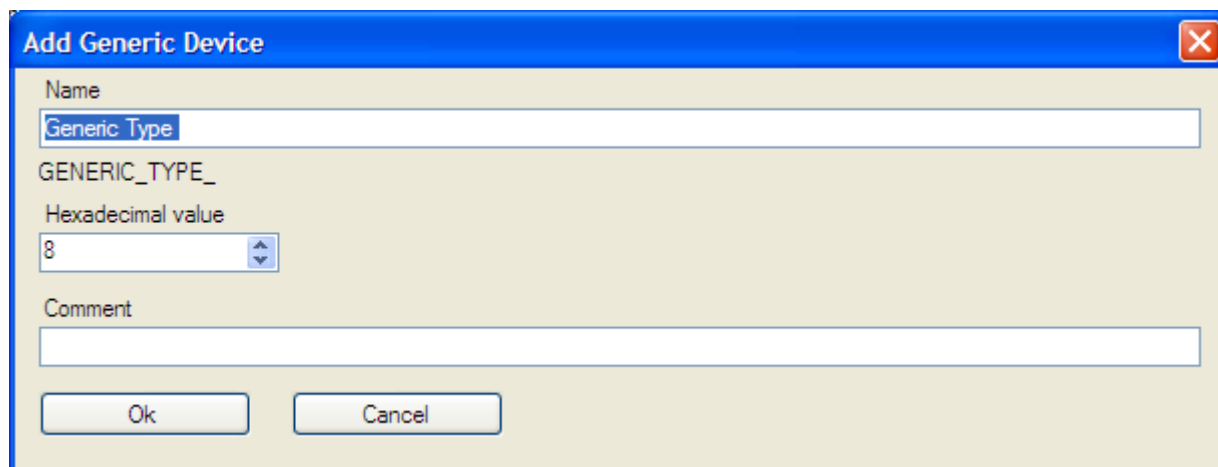


Figure 13. Add Generic Device dialog

**Add Generic Device** dialog provides you with the same entry fields as Add Basic Device dialog which has been described above:

- **Name** for the Generic Device that will be automatically translated to the correct format (all caps characters, underscore signs instead of the spaces, etc.). A name for the Generic Device in this generated format is shown dynamically right below the entry field;
- **Hexadecimal value** for hexadecimal identifier (key).  
Please note, that definitions you do in XML file should have precedence over the header file ZW\_classcmd.h distributed as part of the Z-Wave Developer's Kit. However, the assignment of all hex identifiers should be synchronized with the values in the header file ZW\_classcmd.h;
- **Comment** for the text string with any needed extended names, explanations, notes, etc.

To save the entered values and create a new Generic Device Class definition, click **Ok** button. To discard the entered values, click **Cancel**.

To add a new Specific Device Class definition, select an appropriate Generic Device node in the Tree-view pane first, and then repeat the routine of adding the new Generic Device definition.

**Warning!** Note please that the name for the Specific Device must be unique within all the Specific Devices (not for the current Generic Device only). The only exclusion is "SPECIFIC\_TYPE\_NOT\_USED" name for the Specific Device that could repeat for every Generic Device.

### 5.2.2 Edit Generic and Specific Device

To edit the existing Generic Device or Specific Device definition, select it in the tree below the **Device Classes** top-level node, and then click **Edit item** button at the toolbar. Or click **Edit** menu, then click **Edit...** item. Or just double-click it in the Tree-view pane.

**Edit Generic Device** dialog appears as shown at the figure below.

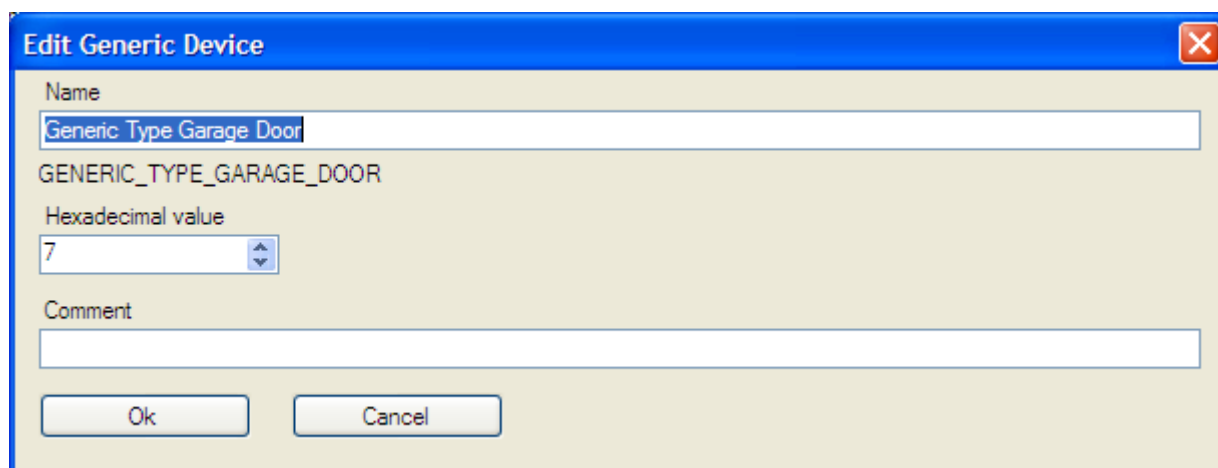


Figure 14. Edit Generic Device dialog

**Edit Generic Device** dialog provides the same entry fields as Add Generic Device dialog which has been described above.

To save your changes, click **Ok** button. To discard the changes, click **Cancel**.

### 5.2.3 Remove Generic and Specific Device

To remove an existing Generic Device or Specific Device definition, select it in the tree below the **Device Classes** top-level node, and then click **Remove item** button at the toolbar. Or click **Edit** menu, then click **Remove** item.

A confirmation dialog with the name of the selected node appears as shown at the figure below.

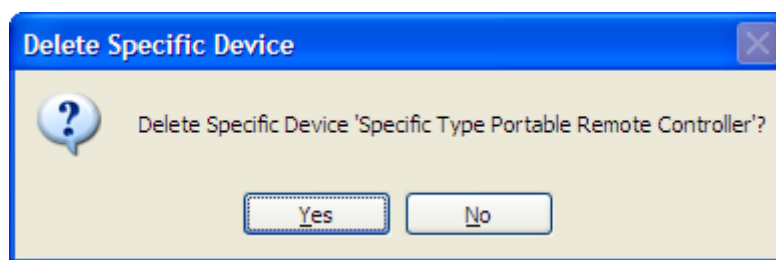


Figure 15. Removal confirmation dialog for Specific Device

To confirm the removal, click **Yes** button. To reject the removal and left the Device definition, click **No**.

**Warning!** Please note, that during the Generic Device removal you also automatically remove all child Specific Device definitions without additional warning or confirmation message.

## 5.3 Command Class and Command Handling

The commands are used by devices when communicating with other devices. These commands are organized into functionally related groups called command classes. Each command class contains the commands associated with a given functionality.

As any other XML file element, all the Command Classes and Commands definitions are presented as nodes in the Tree-view pane. All the Command Classes definitions in the current XML are grouped under the **Command Classes** top-level node, while all the Commands definitions are presented as child nodes for the appropriate Command Class definition.

Using Z-Wave XML Editor you can do the following standard actions with Command Classes and Commands – add, edit and remove.

### 5.3.1 Add Command Class and Command

To add a new Command Class definition, select **Command Classes** top-level node in the Tree-view pane, and then click **Add item** button at the toolbar. Or click **Edit** menu, then click **Add...** item.

**Add Command Class** dialog appears as shown at the figure below.

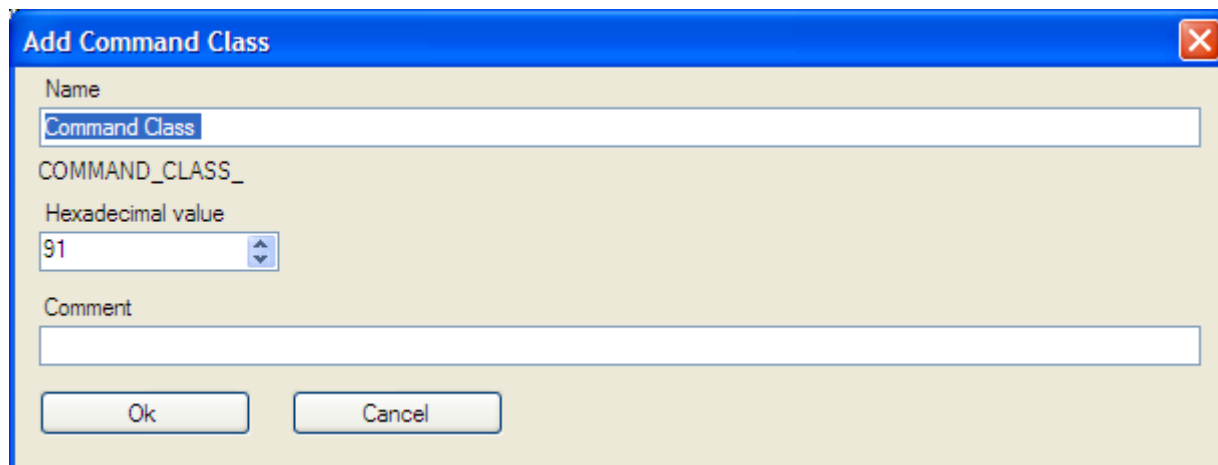
The image shows a Windows-style dialog box titled "Add Command Class". It has a blue title bar with a close button (X) in the top right corner. The dialog contains three input fields: "Name" with the text "Command Class", "Hexadecimal value" with the text "91", and "Comment" which is empty. Below the "Name" field, the text "COMMAND\_CLASS\_" is displayed. At the bottom of the dialog are two buttons: "Ok" and "Cancel".

Figure 16. Add Command Class dialog

**Add Command Class** dialog provides you with the same entry fields as Add Basic Device dialog which has been described above:

- **Name** for the Command Class that will be automatically translated to the correct format (all caps characters, underscore signs instead of the spaces, etc.). A name for the Command Class in this generated format is shown dynamically right below the entry field;
- **Hexadecimal value** for hexadecimal identifier (key). Please note, that definitions you do in XML file should have precedence over the header file ZW\_classcmd.h distributed as part of the Z-Wave Developer's Kit. However, the assignment of all hex identifiers should be synchronized with the values in the header file ZW\_classcmd.h;
- **Comment** for the text string with any needed extended names, explanations, notes, etc.

To save the entered values and create a new Command Class definition, click **Ok** button. To discard the entered values, click **Cancel**.

To add a new Command definition, select an appropriate Command Class node in the Tree-view pane first, and then repeat the routine of adding the new Command Class definition.

**Warning!** Please note, that you cannot enter the hexadecimal identifier for the Command because it is automatically generated.

Please note also, that command name should be unique. Saving the Command with the name that already has been used for any other Command in the current XML file is prohibited.

### 5.3.2 Edit Command Class and Command

To edit the existing Command Class or Command definition, select it in the tree below the **Command Classes** top-level node, and then click **Edit item** button at the toolbar. Or click **Edit** menu, then click **Edit...** item. Or just double-click the appropriate node in the Tree-view pane.

**Edit Command** dialog appears as shown at the figure below.

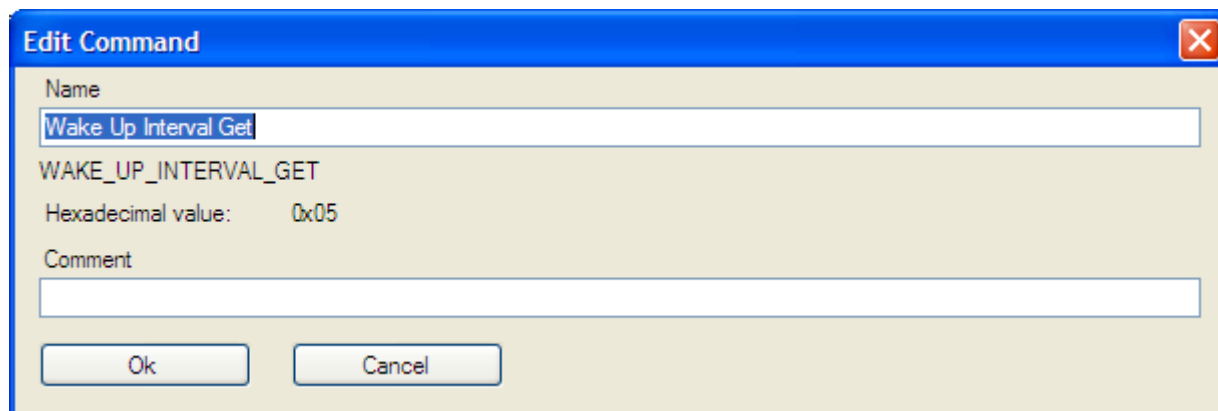


Figure 17. Edit Command dialog

**Edit Command** dialog provides the same entry fields as other similar dialog described above.

**Warning!** Please note that you cannot edit the hexadecimal identifier for the Command because it is automatically generated.

To save your changes, click **Ok** button. To discard the changes, click **Cancel**.

### 5.3.3 Remove Command Class and Command

To remove an existing Command Class or Command definition, select it in the tree below the **Command Classes** top-level node, and then click **Remove item** button at the toolbar. Or click **Edit** menu, then click **Remove** item.

A confirmation dialog with the name of the selected node appears as shown at the figure below.

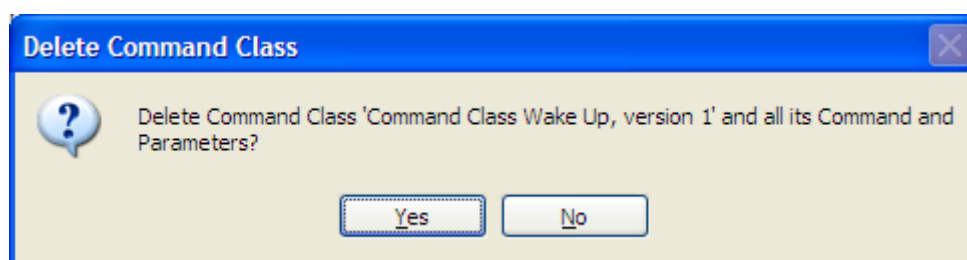


Figure 18. Removal confirmation dialog for Command Class

To confirm the removal, click **Yes** button. To reject the removal to keep the Command Class definition, click **No**.

**Warning!** Please note, that during the Command Class removal you also automatically remove all child Command and Parameter definitions without additional warning or confirmation message.

### 5.3.4 Add Command Parameters

To add a new Parameter for the Command, select an appropriate element for that Command in the Tree-view pane, and then click **Add item** button at the toolbar. Or click **Edit** menu, then click **Add...** item.

**Attention!** Note please that the position for new parameter depends on the active (highlighted) element in the main tree-view pane. Select the command itself to insert the new parameter as the first one with

shifting the existing parameters down (if any). Select any existing parameter to add the new parameter right the next after the selected one.

Short **Create Parameter** dialog appears as shown at the figure below.



Figure 19. Create Parameter dialog

Click **Yes** to create VARIANT\_GROUP parameter or **No** to create the usual parameter.

**Add Parameter** dialog then appears as shown at the figure below.

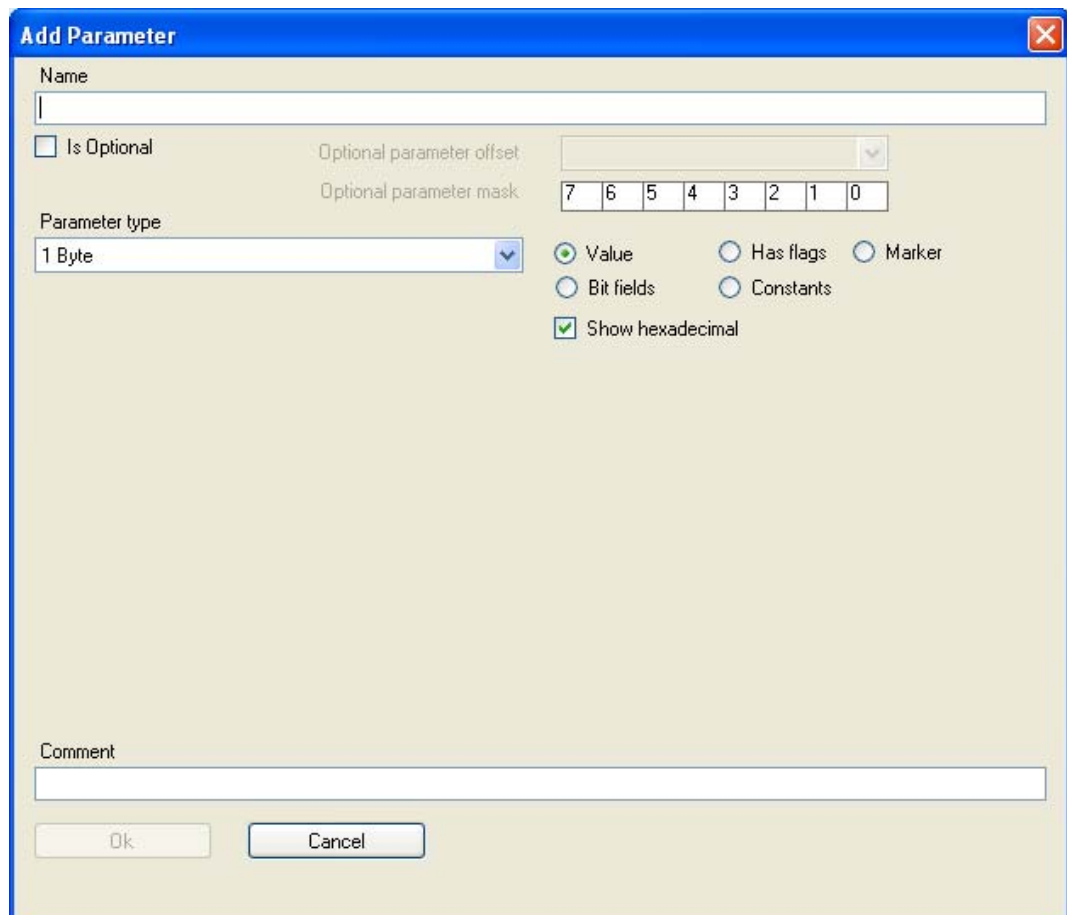


Figure 20. Add Parameter dialog with Value parameter type

Every **Add Parameter** dialog provides you with the following entry fields:

- **Name** for the Parameter;



- **Is Optional** indicates whether the parameter is optional for this command. If this is checked, **Optional parameter offset** and **Optional parameter mask** parameters become active.
- **Optional parameter offset** indicates the command byte where activation of the optional parameter is specified.
- **Optional parameter mask** indicates the bit of the offset byte which enables the optional parameter.
- **Parameter Type** that consists of the drop-down list on the left to select the width of the parameter (with "1 Byte", "2 Bytes", "3Bytes", "4Bytes", "Array" and "Bitmask" as the possible values) and radio buttons on the right to define the possible values within selected type;
- **Comment** for the text string with any needed extended names, explanations, notes, etc.

**Add Parameter** dialog also provides other entry fields that are dynamically added to the dialog and removed from the dialog depending on the selection of the Parameter Type. Available Parameter Types are described in more details in Appendix A.2.

For the Byte parameters radio buttons on the right provides the following options: "Value", "Bit Fields", "Has Flags", "Constants" and "Marker".

"Bit Fields" option provides the controls to enter several fields that are sent within one byte as shown at the figure below.

The screenshot shows the 'Add Parameter' dialog box. The 'Name' field contains 'Parameter1'. The 'Is Optional' checkbox is unchecked. The 'Optional parameter offset' field is empty. The 'Optional parameter mask' field shows a byte mask with bits 7 through 0, where bit 0 is highlighted. The 'Parameter type' dropdown is set to '1 Byte'. The 'Value' radio button is selected. The 'Bit fields' radio button is also selected. The 'Has flags', 'Marker', and 'Constants' radio buttons are unselected. Below the radio buttons, there is a table with 8 columns labeled 7, 6, 5, 4, 3, 2, 1, 0. The first two columns (7 and 6) are highlighted. Below the table, there is a text field containing 'Reserved'. Below the text field is an 'Add' button. Below the 'Add' button is a text area containing 'Bit 0-2: Char. presentation'. Below the text area is a 'Delete' button. At the bottom of the dialog is a 'Comment' text field and 'Ok' and 'Cancel' buttons.

Figure 21. Add Parameter dialog with Bit fields controls

Use the drag-and-drop selection control to define the bits (from 0 to 7). Note please that the bits are displayed with the different background color:

- dark grey color is used for the bits you already entered into the list of the bit fields;
- white color is used for the available bits
- light grey color is used for the selected bits (you are going to enter with the name entered in the text box below).

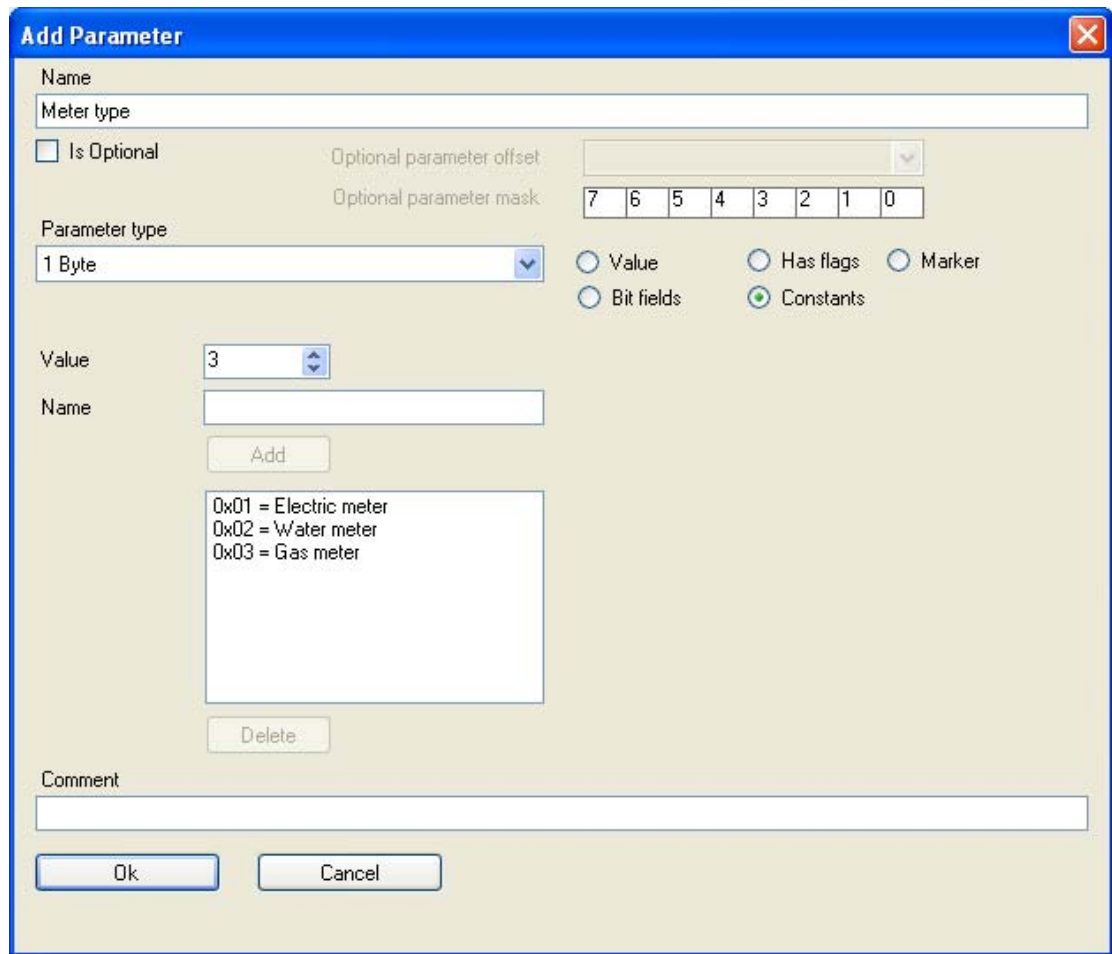
“Has Flags” option provides controls to enter the list of the named values as shown at the figure below. If the parameter value of incoming command is equal to some value in the list then the name for this value will be displayed; otherwise the value itself will be displayed.

The screenshot shows the 'Add Parameter' dialog box with the following fields and controls:

- Name:** A text box containing 'value'.
- Is Optional:** A checkbox that is currently unchecked.
- Optional parameter offset:** A dropdown menu.
- Optional parameter mask:** A row of eight checkboxes labeled 7, 6, 5, 4, 3, 2, 1, 0.
- Parameter type:** A dropdown menu showing '1 Byte'.
- Value:** A text box containing 'FF'.
- Name:** A text box for naming the value.
- Buttons:** 'Add' and 'Delete' buttons.
- Radio buttons:** 'Value', 'Has flags' (selected), and 'Marker'.
- Radio buttons:** 'Bit fields' and 'Constants'.
- Checkboxes:** 'Show hexadecimal' (checked).
- List:** A list box containing '0x00 = close' and '0xFF = open'.
- Comment:** A text box at the bottom.
- Buttons:** 'Ok' and 'Cancel' buttons at the bottom.

**Figure 22. Add Parameter dialog with Flag controls**

“Constants” option provides the controls to enter the strictly defined list of the values as shown at the figure below. The parameter value of incoming command should be one of the values from the list.



The "Add Parameter" dialog box is shown with a blue title bar and a close button. It contains the following fields and controls:

- Name:** A text box containing "Meter type".
- Is Optional:** An unchecked checkbox.
- Optional parameter offset:** A dropdown menu.
- Optional parameter mask:** A row of eight checkboxes labeled 7, 6, 5, 4, 3, 2, 1, 0.
- Parameter type:** A dropdown menu showing "1 Byte".
- Value:** A spin box set to "3".
- Name:** A text box for naming the parameter's value.
- Add:** A button to add the parameter's value to the list.
- Value List:** A list box containing:
  - 0x01 = Electric meter
  - 0x02 = Water meter
  - 0x03 = Gas meter
- Delete:** A button to remove a parameter from the list.
- Comment:** A text box for a description.
- Buttons:** "Ok" and "Cancel" buttons at the bottom.
- Radio Buttons:** Four radio buttons for parameter type: "Value", "Has flags", "Marker", and "Constants". The "Constants" radio button is selected.

**Figure 23. Add Parameter dialog with controls to enter Constant values**

"Marker" option is alike the "Constant" option. Markers are used in the XML file to separate certain parts of an array. The flagmask of the "Marker" parameter has EF value.

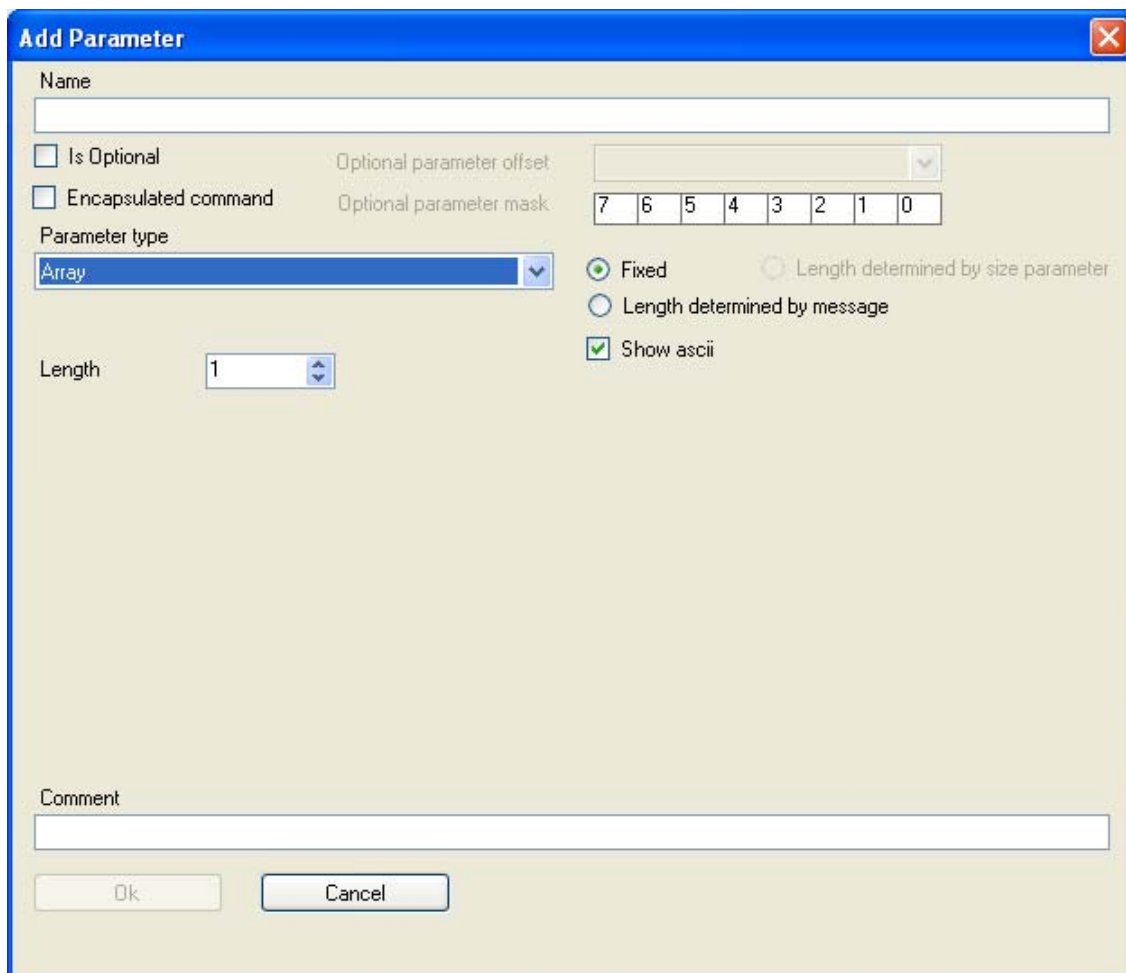
The "Add Parameter" dialog box is shown with the following controls:

- Name:** A text field containing "Marker".
- Is Optional:** An unchecked checkbox.
- Optional parameter offset:** A dropdown menu.
- Optional parameter mask:** A row of eight checkboxes labeled 7, 6, 5, 4, 3, 2, 1, 0.
- Parameter type:** A dropdown menu set to "1 Byte".
- Radio buttons:** Four options: "Value", "Has flags", "Marker" (which is selected), and "Constants".
- Value:** A spinner control set to 0.
- Name:** A text field for the parameter's internal name.
- Add:** A button to add the parameter.
- Delete:** A button to delete the parameter.
- Comment:** A text area containing the text "0x00 = Marker".
- Comment:** A text field with the text "This marker identifier is used to separate between nodes without and with end points attached. This field can be omitted in ca".
- Buttons:** "Ok" and "Cancel" buttons at the bottom.

**Figure 24. Add Parameter dialog with Marker controls**

"Array" parameter provides the controls to select the array type (with "Fixed", "Length determined by message", and "Length determined by size parameter" as possible values) and up-down numeric control (spinner) to enter the array length as shown at the figure below.

The Array-type parameter can define if the command is encapsulated. The appropriate checkbox is available.



The 'Add Parameter' dialog box has a blue title bar with a close button. It contains the following fields and controls:

- Name:** A text input field.
- Is Optional:** A checkbox.
- Optional parameter offset:** A dropdown menu.
- Encapsulated command:** A checkbox.
- Optional parameter mask:** A row of eight checkboxes labeled 7, 6, 5, 4, 3, 2, 1, 0.
- Parameter type:** A dropdown menu with 'Array' selected.
- Length:** A numeric input field with the value '1'.
- Fixed:** A radio button (selected).
- Length determined by size parameter:** A radio button.
- Length determined by message:** A radio button.
- Show ascii:** A checked checkbox.
- Comment:** A text input field.
- Buttons:** 'Ok' and 'Cancel' buttons at the bottom.

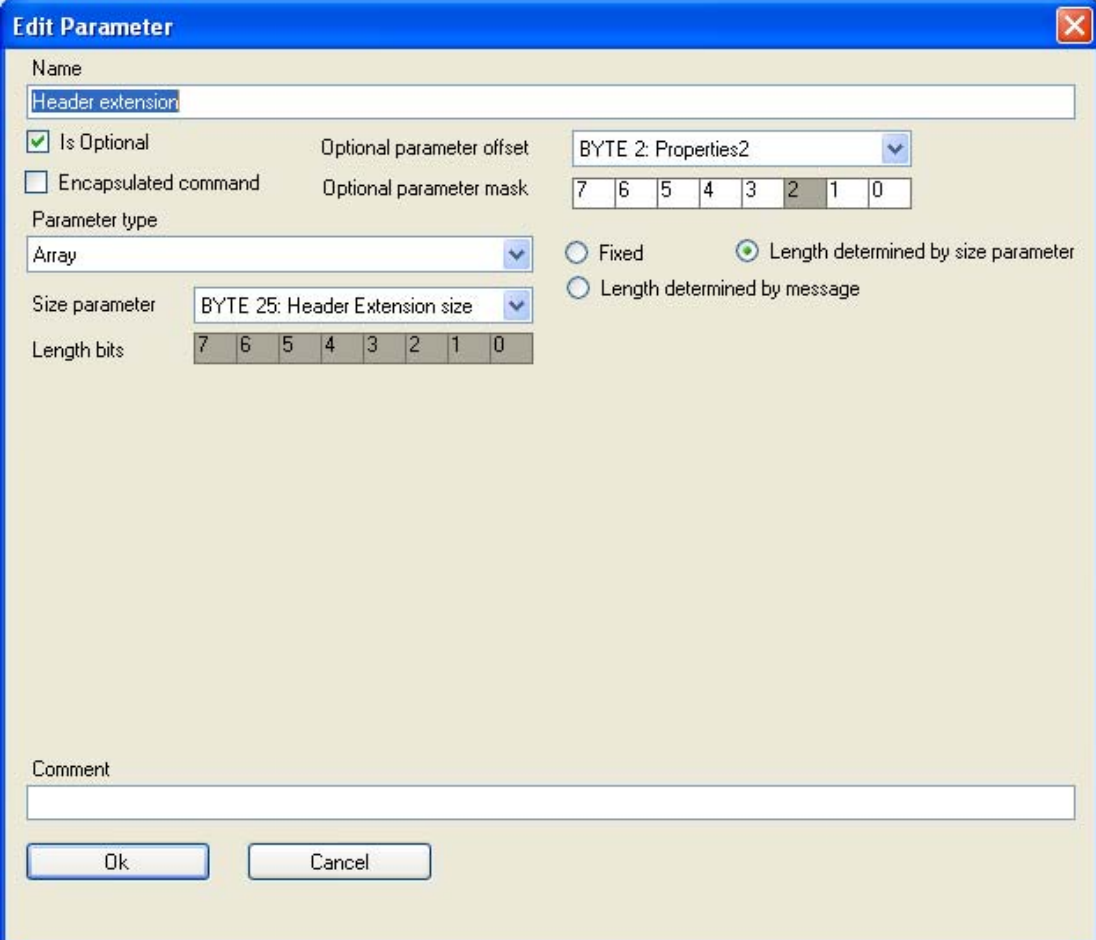
**Figure 25. Add Parameter dialog for Array parameter**

To save the entered values and create a new Parameter definition, click **Ok** button. To discard the entered values, click **Cancel**.

### 5.3.5 Edit Command Parameters

To edit the existing Parameter for the Command, select the node that represents this Parameter in the tree, and then click **Edit item** button at the toolbar. Or click **Edit** menu, then click **Edit...** item. Or just double-click the appropriate node in the Tree-view pane.

**Edit Parameter** dialog appears as shown at the figure below.



**Edit Parameter**

Name:

☒ Is Optional      Optional parameter offset:

☐ Encapsulated command      Optional parameter mask: 

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

Parameter type:

Size parameter:

Length bits: 

7	6	5	4	3	2	1	0
---	---	---	---	---	---	---	---

☐ Fixed      ☒ Length determined by size parameter

☐ Length determined by message

Comment:

Figure 26. Edit Parameter dialog

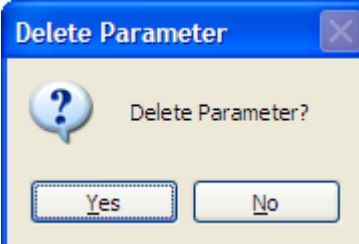
**Edit Parameter** dialog provides the same entry fields as Add Parameter dialog described above.

To save your changes, click **Ok** button. To discard the changes, click **Cancel**.

### 5.3.6 Remove Command Parameters

To remove an existing Command Parameter, select the node that represents this Parameter in the tree, and then click **Remove item** button at the toolbar. Or click **Edit** menu, then click **Remove** item.

A confirmation dialog with the name of the selected node appears as shown at the figure below.



**Delete Parameter**


 Delete Parameter?

Figure 27. Removal confirmation dialog for Command Parameter

To confirm the removal, click **Yes** button. To reject the removal and keep the Command Parameter, click **No**.

## 5.4 File generation from the existing XML file

All the Basic Devices, Generic Devices, Specific Devices, Command Classes, Commands and Command Parameters definitions that have been entered into the XML file could be used to automatically generate a C# class file and C header file with the same definitions as foundation for application development.

### 5.4.1 Generate C# class file

To generate C# class file for all the definitions in the current XML file, click **Tools** menu and then click **Generate C sharp** item. It will generate a C# file, a default path is "C:\Program Files\Zensys\Z-Wave XML Editor\", default file name for the output file is "generated.cs".

To modify the elements that generation program includes into the output filke, edit the template file By default, Z-Wave XML Editor uses "C:\Program Files\Zensys\Z-Wave XML Editor\zw\_classtemplate.cs" file.

To edit the filename for the generated C# file, location for that output file, and full file path (filename and location) for the template file, use Options dialog that is described below.

### 5.4.2 Generate C header file

To generate C header file.for all the definitions in the current XML file, click **Tools** menu and then click **Generate C header** item. It will generate a C header file, a default path is "C:\Program Files\Zensys\Z-Wave XML Editor\", default file name for the output file is "generated.h".

To modify the elements that generation program includes into the output filke, edit the template file By default, Z-Wave XML Editor uses "C:\Program Files\Zensys\Z-Wave XML Editor\zw\_theadertemplate.h" file.

To edit the filename for the generated C header file, location for that output file, and full file path (filename and location) for the template file, use Options dialog that is described below.

### 5.4.3 Generate Node info

To generate Node Info for all definitions in the current XML file, click **Tools** menu and then click **Generate Node Info** item. It will generate Node Info based on the latest changes done to the XML file using the XML Editor.

The output is shown in a modal window, and the user can copy the appropriate lines into the XML file as required.

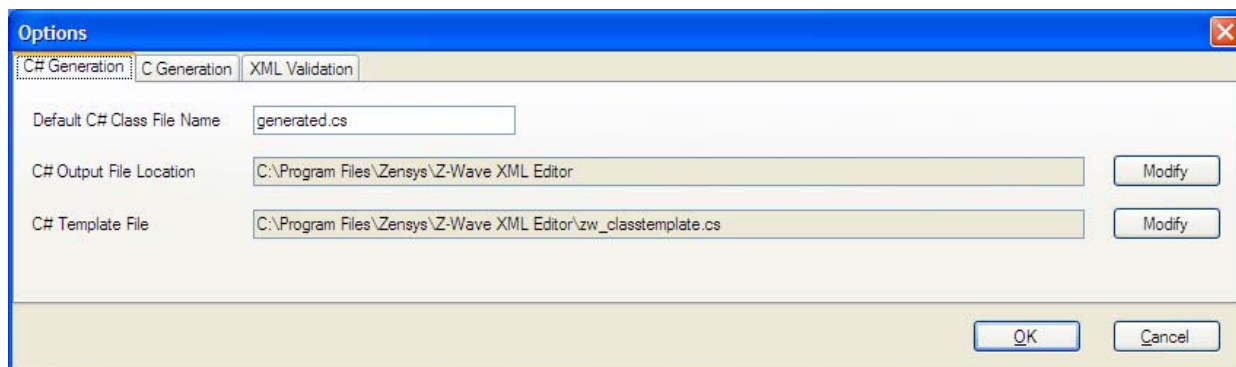
### 5.4.4 Edit XML Editor options

To edit the Z-Wave XML Editor options, click **Tools** menu and then click **Options...** item.

**Options** dialog appears. It contains three tabs:

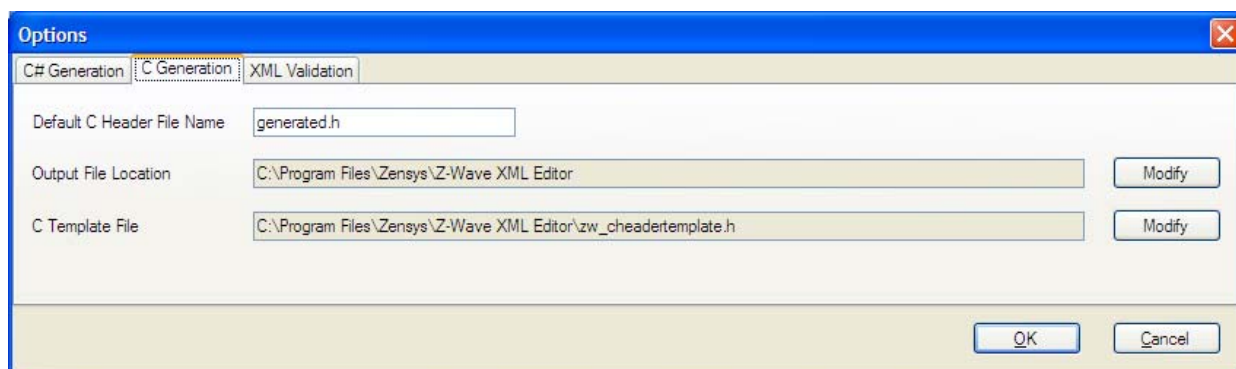
- C# Generation;
- C Generation;
- XML Validation.

C# Generation tab is shown at the figure below. It provides with the controls to edit the filename for the generated C# file, location for that output file, and full file path (filename and location) for the template file.



**Figure 28. Options dialog with C# Generation tab**

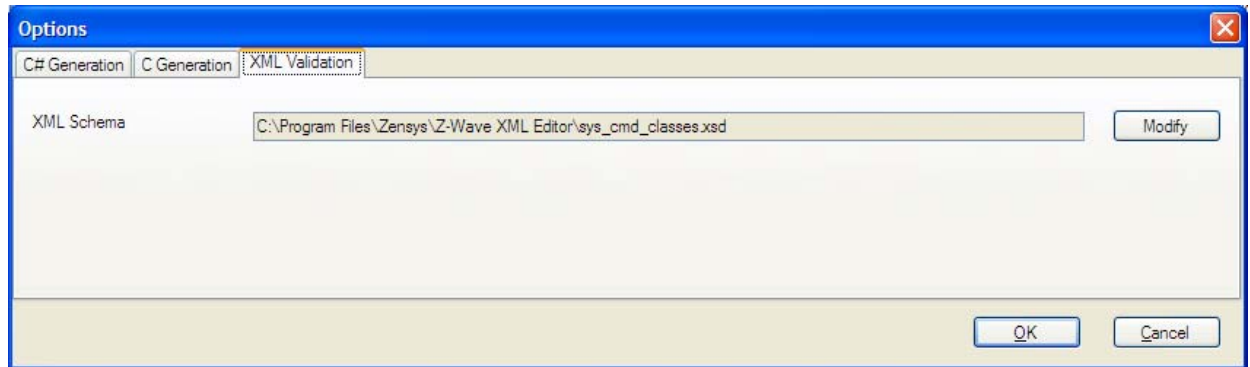
C Generation tab is shown at the figure below. It provides with the controls to edit the filename for the generated C header file, location for that output file, and full file path (filename and location) for the template file.



**Figure 29. Options dialog with C Generation tab**

XML Validation tab is shown at the figure below. It provides with the single control to edit the filename for the XSD file that is used for the XML validation. XSD file contains all the definitions for the possible tags and attributes as described in Appendix A.2.





**Figure 30. Options dialog with XML Validation tab**



## APPENDIX A Z-WAVE XML FORMAT

This Appendix describes the XML format used with respect to Z-Wave XML tags and attributes. All tags are listed which are known by the Editor, how the tags are handled (read/write or only read) and a short explanation of each tag. For a description of the Z-Wave device and command class hierarchy refer to [1].

### Appendix A.1 Hierarchy

The hierarchy of the XML format is as follows:

```
<zwclasses>
  <bas_dev key=" " name=" " help=" " comment=" " read_only=" " />
  <gen_dev key=" " name=" " help=" " comment=" " read_only=" " >
    <spec_dev key=" " name=" " help=" " comment=" " read_only=" " />
  </gen_dev>
  <cmd_class key=" " version=" " name=" " help=" " comment=" " read_only=" " >
    <cmd key=" " name=" " help=" " comment=" " >
      <param key=" " name=" " type="BYTE" typehashcode="0x01" comment=" " >
        <valueattrib key=" " hasdefines=" " showhex=" " />
        <bitflag key=" " flagname=" " flagmask=" " />
      </param>
      <param key=" " name=" " type="WORD" typehashcode="0x02" comment=" " >
        <word key=" " hasdefines=" " showhex=" " />
      </param>
      <param key=" " name=" " type="DWORD" typehashcode="0x03" comment=" " >
        <dword key=" " hasdefines=" " showhex=" " />
      </param>
      <param key=" " name=" " type="BIT_24" typehashcode="0x04" comment=" " >
        <bit_24 key=" " hasdefines=" " showhex=" " />
      </param>
      <param key=" " name=" " type="ARRAY" typehashcode="0x05" comment=" " >
        <arrayattrib key=" " is_ascii=" " len=" " />
        <arraylen key=" " paramoffs=" " lenmask=" " lenoffs=" " />
      </param>
      <param key=" " name=" " type="BITMASK" typehashcode="0x06" comment=" " >
        <bitmask key=" " paramoffs=" " lenmask=" " lenoffs=" " />
      </param>
      <param key=" " name=" " type="STRUCT_BYTE" typehashcode="0x07" comment=" " >
        <bitfield key=" " fieldname=" " fieldmask=" " shifter=" " />
        <bitflag key=" " flagname=" " flagmask=" " />
        <fieldenum key=" " fieldname=" " fieldmask=" " shifter=" " >
          <fieldenum value=" " />
        </fieldenum>
      </param>
      <param key=" " name=" " type="ENUM" typehashcode="0x08" comment=" " >
        <enum key=" " name=" " />
      </param>
      <param key=" " name=" " type="ENUM_ARRAY" typehashcode="0x09" comment=" " >
        <enum key=" " name=" " />
      </param>
      <param key=" " name=" " type="MULTI_ARRAY" typehashcode="0x0A" comment=" " >
        <multi_array>
          <paramdescloc key=" " param=" " paramdesc=" " paramstart=" " />
        </multi_array>
        <multi_array>
          <bitflag key=" " flagname=" " flagmask=" " />
        </multi_array>
      </param>
    </cmd>
  </cmd_class>
</zwclasses>
```

```

    </multi_array>
  </param>
  <param key=" " name=" " type="CONST" typehashcode="0x0B" comment=" " >
    <const key=" " flagname=" " flagmask=" " />
  </param>
  <param key=" " name=" " type="VARIANT" typehashcode="0x0C" comment=" " >
    <variant key=" " paramoffs=" " sizemask=" " sizeoffs=" " showhex=" " signed=" " />
  </param>
</cmd>
</cmd_class>
</zwclasses>

```

## Appendix A.2 XML Tags

The tags and attributes used in the Z-Wave XML format is listed in the following

### (a) Basic Devices

#### Tag

<bas\_gen> Basic Device. The Editor can read and edit Basic Devices.

#### Attributes

key	Unique value of Basic Device
name	Unique name of Basic Device for code generation
help	Name of Basic Device in plain text. Help and name will always be equal after editing.
	Ex.:
	name="BASIC_TYPE_CONTROLLER"
	help="Basic Type Controller"
comment	Comment for this Basic Device entered in the Editor. Used in code generation.
read_only	true or false set in the Editor.

**(b) Generic and Specific Devices***Tag*

<gen\_dev>                      Generic Device. The Editor can read and edit Generic Devices.

*Attributes*

key	Unique value of Generic Device
name	Unique name of Generic Device for code generation
help	Name of Generic Device in plain text. help and name will always be equal after editing.  Ex.:  name="GENERIC_TYPE_STATIC_CONTROLLER"  help="Generic Type Static Controller"
comment	Comment for this Generic Device entered in the Editor. Used in code generation.
read_only	true or false set in the Editor. Applies to the Generic Device as well as all Specific Devices contained.

A Generic Device can contain one or more Specific Devices:

*Tag*

<spec\_dev>                      Specific Device. The Editor can read and edit Specific Devices.

*Attributes*

key	Unique value of Specific Device
name	Unique name of Specific Device for code generation
help	Name of Specific Device in plain text. help and name will always be equal after editing.  Ex.:  name="SPECIFIC_TYPE_PC_CONTROLLER"  help=" Specific Type PC Controller"
comment	Comment for this Specific Device entered in the Editor. Used in code generation.

**(c) Command Classes, Commands, and Parameters***Tag*

<cmd\_class>            Command Class. The Editor can read and edit Command Classes.

*Attributes*

key	Value of Command Class. This must be unique with the exception that different versions of a Command Class can exist.
version	The version of this Command Class. More versions of Command Classes can exist with same value and name.
name	Name of Command Class for code generation. This must be unique with the exception that different versions of a Command Class can exist.
help	Name of Command Class in plain text. help and name will always be equal after editing.  Ex.:  name="COMMAND_CLASS_ALARM"  help=" Command Class Alarm"
comment	Comment for this Command Class entered in the Editor. Used in code generation.
read_only	true or false set in the Editor. Applies to the Command Class as well as all Command and Parameters contained.

A Command Class can contain one or more Commands:

#### *Tag*

<cmd>	Command. The Editor can read and edit Commands.
-------	---

#### *Attributes*

key	Value of Command
name	Name of Command for code generation. The Command name must be unique for all Commands, except that Commands with the same name and key value can exist in different versions of a Command Class.
help	Name of Command Class in plain text. help and name will always be equal after editing.

Ex.:

name="ALARM\_GET"

help=" Alarm Get"

comment	Comment for this Command Class entered in the Editor. Used in code generation.
---------	--

A Command can contain one or more Parameters.

#### *Tag*

<param>	Parameter for Command. For some Parameter types the Editor can read and edit – for some only read.
---------	--

#### *Attributes*

key	Value of Parameter. Within a Command, Parameters must be numbered from 0 and up. The editor will make sure that Parameters are numbered correctly.
name	Name of Parameter.
type	Type of Parameter – see next section.
typehashcode	Type number of Parameter – see next section.
comment	Comment for this Command Class entered in the Editor. Used in code generation.

### (i) Parameter Types

The possible Parameter types will be listed in the following with their possible Parameter Fields.

*type="BYTE" typehashcode="0x01"*

1 byte parameter. Can contain a 0-255 value or can contain a number of discretely defined values. BYTE can be read and edited by the Editor (select 1 byte as value or as has defines).

#### *Possible Parameter Fields*

<valueattrib>	Tag must exist.
key	Should be 0
hasdefines	true if this BYTE uses discrete value – has defines values (declared in <bitflag>).
showhex	Flag used by Z-Wave protocol Zniffer application. Can be set in the Editor.
<bitflag>	Optional. Used if BYTE has discretely defined values.
key	Count from 1.
flagname	Name of defined value.
flagmask	Value of define.

*type="WORD" typehashcode="0x02"*

2 bytes parameter. Can contain a 0-65535 value. WORD can be read and edited by the Editor (select 2 bytes).

#### *Possible Parameter Fields*

<word>	Tag must exist.
key	Should be 0
hasdefines	Not used. Should be false.
showhex	Flag used by Z-Wave protocol Zniffer application. Can be set in the Editor.



*type="DWORD" typehashcode="0x03"*

4 bytes parameter. Can contain a 0-4294967295 value. DWORD can be read and edited by the Editor (select 4 bytes).

*Possible Parameter Fields*

<dword>	Tag must exist.
key	Should be 0
hasdefines	Not used. Should be false.
showhex	Flag used by Z-Wave protocol Zniffer application. Can be set in the Editor.

*type="BIT\_24" typehashcode="0x04"*

2 bytes parameter. Can contain a 0- 16777216 value. BIT\_24 can be read and edited by the Editor (select 3 bytes).

*Possible Parameter Fields*

<bit_24>	Tag must exist.
key	Should be 0
hasdefines	Not used. Should be false.
showhex	Flag used by Z-Wave protocol Zniffer application. Can be set in the Editor.

*type="ARRAY" typehashcode="0x05"*

Array of bytes parameter. ARRAY can be read and edited by the Editor for fixed length arrays. ARRAY with variable length can be read, but will be saved as VARIANT if changed.

*Possible Parameter Fields*

<arrayattrib>	Tag must exist.
key	Should be 0
is_ascii	Flag used by Z-Wave protocol Zniffer application. Can be set in the Editor.
len	0-254. Fixed length of array. 255: <arraylen> field is used for length definition.
<arraylen>	Optional. Can be read by the Editor.
key	Should be 1
paramoffs	Key value of Parameter holding size information for this array.
lenmask	Bit mask for size information in above size Parameter.
lenoffs	Shift result right this number of times when masked out of size Parameter using lenmask.

*type="BITMASK" typehashcode="0x06"*

Array of bytes parameter used for masking. BITMASK can be read and edited by the Editor. BITMASK has always a variable length determined by size parameter or by message length.

*Possible Parameter Fields*

<bitmask>	Tag must exist.
key	Should be 0.
paramoffs	0-254: key value of Parameter holding size information for this array. 255: Length is determined by message length.
lenmask	Bit mask for size information in above size Parameter.
lenoffs	Shift result right this number of times when masked out of size Parameter using lenmask.

*type="STRUCT\_BYTE" typehashcode="0x07"*

1 byte parameter. Contains bit fields. STRUCT\_BYTE can be read and edited by the Editor (select 1 byte as bit fields).

*Possible Parameter Fields*

<bitfield>	Optional. Used when more than one bit in this STRUCT_BYTE contains a value.
key	Numbered from 0 and up.
fieldname	Name of bit field.
fieldmask	Mask for bit field. Gives the bits used in this field.
shifter	Number of times to shift the masked value to the right to get the value of the bit field.
<bitflag>	Optional. Used when one bit contains a value (eg. on/off or true/false).
key	Numbered from 0 and up.
flagname	Name of bit value.
flagmask	Value of bit.
<fieldenum>	Optional. Used when more than one bit in this STRUCT_BYTE contains defined values from 0 and up.
key	Numbered from 0 and up.
fieldname	Name of fieldenum.
fieldmask	Mask for bits. Gives the bits used in this field.
shifter	Number of times to shift the masked value to the right to get the value of the fieldenum.
<fieldenum>	Contains one or more fieldenum tags to give the names of the defined values. The defined values are always from 0 and up.
value	Name of defined value.

*type="ENUM" typehashcode="0x08"*

1 byte with discretely defined values. ENUM can be read by the Editor but will be changed to CONST if edited.

*Possible Parameter Fields*

<enum>	One or more.
key	Gives the value of the define.
name	Name of the define.

*type="ENUM\_ARRAY" typehashcode="0x09"*

byte array with discretely defined values. The length of the array is defined by the number of defined values. ENUM\_ARRAY can be read by the Editor but not changed.

*Possible Parameter Fields*

<enum>	One or more.
key	Gives the value of the define.
name	Name of the define.

*type="MULTI\_ARRAY" typehashcode="0x0A"*

byte array with index selected in different (ENUM) parameter. The length of the array is defined by the number of <multi\_array> tag containing <bitflag>. MULTI\_ARRAY can be read by the Editor but not changed.

#### *Possible Parameter Fields*

<multi_array>	One or more exist. Contains <paramdescloc> or <bitflag> tags
<paramdescloc>	Information of (ENUM) parameter containing possible indexes
key	Must be 0.
param	Key of Parameter containing possible indexes.
paramdesc	255
paramstart	= param
<bitflag>	One for each possible selection for each possible index in parameter containing possible indexes.
key	Equals values of possible indexes in parameter containing possible indexes.
flagname	Name of defined value.
flagmask	Value

*type="CONST" typehashcode="0x0B"*

1 byte with discretely defined values. CONST can be read and edited by the Editor.

#### *Possible Parameter Fields*

<const>	One or more.
key	Numbered from 0 and up.
flagname	Name of the define.
flagmask	Value.

*type="VARIANT" typehashcode="0x0C"*

Array of bytes. VARIANT can be read and edited by the Editor. VARIANT has always a variable length determined by size parameter or by message length.

*Possible Parameter Fields*

<variant>	Tag must exist.
key	Should be 0.
paramoffs	0-254: key value of Parameter holding size information for this array. 255: Length is determined by message length.
sizemask	Bit mask for size information in above size Parameter.
sizeoffs	Shift result right this number of times when masked out of size Parameter using sizemask.
showhex	Not used.
signed	Not used.



## REFERENCES

- [1] Sigma Designs, SDS10242, Software Design Specification, Z-Wave Device Class Specification.
- [2] Sigma Designs, INS10249, Instruction, Z-Wave Ziffer User Guide.