



NETX BMS Client Editor



System Documentation

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BACnet Interest Group Europe



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1. Product description

NETx BMS Client Editor

The NETx BMS Server is more than just a simple data server that integrates datapoints from various fieldbus technologies. In addition to many advanced features like the included database for historical data and mechanisms to add control functionality, it includes an embedded web server. This web server provides a high-performance interface for web-based visualization clients. As client platform, any device with integrated standard web browser can be used. In addition, dedicated apps for iOS, Android, and Windows CE that simplify the integration and configuration are provided.

1.1. Main criteria

- **Reliability** – NETx BMS Clients can be combined with a NETx Main/Backup server solution (e.g. NETx BMS Server). If the main server fails, the visualization is able to switch to the backup server immediately without being noticed by the end user.
- **Versatile** – Datapoints can be integrated within the visualization independently from the underlying automation system. Using this approach, datapoints originating from different technologies (e.g. KNX, BACnet, Modbus, ...) can be represented and controlled within a single visualization.
- **Look & Feel** – Individual layouts can be defined by using a master page and customized components. By reusing the own design, it is possible to create an individual Look & Feel.
- **Drag & Drop** – Using Drag & Drop, the datapoints can be linked to the controls very simply. This approach provides the possibility to create and modify professional visualizations with just a few clicks and in a short amount of time.
- **Multi-language support** – The language of the editor as well as of the visualization itself can be customized. Therefore, it is possible to provide country-specific solutions.
- **Unique editor** – The editor that is used to create NETx BMS Client Editor projects is identical to the one that is used to design other NETx visualizations. The use of this unique tool minimizes the effort for training and learning.
- **Button editor** – The NETx BMS Client Editor includes an integrated button editor. Using this button editor, buttons with a user-specific layout (icons, text, appearance, ...) can be created. To reuse them, these button layouts can be stored as templates.
- **Advanced Controls** – In addition to standard graphical elements like buttons, sliders, and images, enhanced and professional Controls are available (e.g. Graph, Multi-Internet, RGB Control ...).
- **Library** – User-defined control elements can be grouped and stored as components of a library. This approach provides the opportunity to reuse components in other visualization projects.
- **Metering Chart** – The metering chart provides the possibility to integrate smart meters. Using the metering chart, it is possible to visualize the current and historical consumption values of smart meters in an easy and user-friendly way.
- **Historical data chart** – In combination with the NETx BMS Server, the past data values of any datapoint within the building automation system can be shown. This historical data can be visualized using different chart types (lines, bars, areas, ...) or using a table view. Printing and exporting to PDF or Excel is also possible.
- **Server Calender** – In combination with the NETx BMS Server, server based calendar events can be used. These server based calendar events are independent of the visualization since they are defined and running within the NETx BMS Server. Using a Look & Feel that is similar to Microsoft Outlook, server based calendar events can visualized and modified within the visualization – even by the end user at runtime.

1.2. System overview

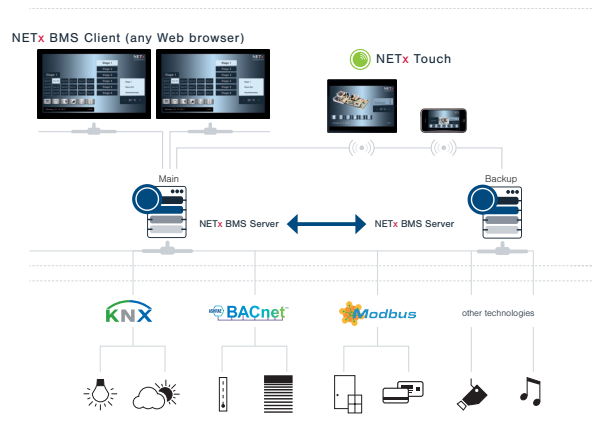


Figure 1.1.: NETx BMS Client Editor within a building automation system

NETx BMS Clients are part of the technical building management. The information that is collected by the NETx BMS Server is represented by NETx BMS Clients in a user-friendly way. The user gets a global view of the whole building automation system and its datapoints.

Due to the use of the NETx BMS Server that supports various different fieldbus and management interfaces, NETx BMS Clients are not limited to a certain application domain. NETx BMS Clients are able to visualize and control datapoints from any system and technology. Thus the user is independent of vendors and can freely choose the field of application.

As it is common for all NETx solutions, NETx BMS Clients provide a lot of benefits when comparing it to other products. In combination with the NETx BMS Server, a NETx BMS Client guarantees a reliable communication to the underlying building automation system. Therefore, NETx BMS Clients are able to handle a large amount of datapoints together with a high data throughput. Thanks to the high reliability and scalability, it is possible to use the NETx BMS Server together with NETx BMS Clients within the largest building automation projects of the world.

1.2.1. NETx BMS Clients

A NETx BMS Client is just the frontend that shows the visualization. This frontend can be a normal web browser or the special apps for iOS, Android, Windows CE called NETx Touch. A NETx BMS Client uses either a HyperText Transfer Protocol (HTTP) connection (for web-based clients) or a VNET connection (e.g. for WinCE clients) to get the data from the NETx BMS Server. Therefore, a NETx BMS Client always needs a connection to the NETx BMS Server. The rendering i.e. the visualization itself is done by the embedded web server of the NETx BMS Server. Additional software is not needed since it is all included within the NETx BMS Server.

Depending on the operating system, the following NETx BMS Clients are available:

- NETx Touch iOS Version: free client App for Apple's iPhone, iPad or iPod touch that can be installed via Apple's App Store.
- NETx Touch Android Version: free client App for Android devices (smart phones, tablets) that can be installed via Google Playstore.
- In fact any arbitrary web browser supporting HTML 5 and JavaScript can be used as NETx BMS Client– the used web engine within the NETx BMS Server does not require any browser plugins and so no additional software needs to be installed at the client side. Supported web browsers are the commonly used ones.

Visualization projects for these clients are created and maintained within the NETx BMS Server Studio using the so called NETx BMS Client Editor. This editor is the same for all three different kinds of NETx BMS Clients – therefore one visualization project can be used for all different client platforms. These clients are advantageous for visualization projects where a large amount of NETx BMS Client devices has to be controlled and maintained centrally.

1.2.2. Visualization structure

NETx BMS Clients are designed for the use in building automation systems of any type and any size – from smart homes up to large enterprise buildings. To be able to fulfill the requirements of large-scale visualization projects, a flexible, modular, and clear visualization structure is of utmost importance.

To provide this scalability, the NETx BMS Client Editor is based on the concepts of visualization pages, controls, and layers. A visualization page is simply a side that is shown to the visualization user. While the visualization user only sees one visualization page at a time, a NETx BMS Client Editor project (also referred to as a NETx BMS Client Editor workspace) can contain multiple different visualization pages. Depending on the design of the visualization, the user can navigate through different visualization pages using dedicated control elements. Using this approach, a (hierarchical) structure can be defined. A typical example would be a start page that is linked to a building page that shows an overview of all floors. This building page is in turn linked to different floor pages where each floor page shows a floor plan. These floor pages can in turn be used to navigate to room pages that show a more detailed view of each room.

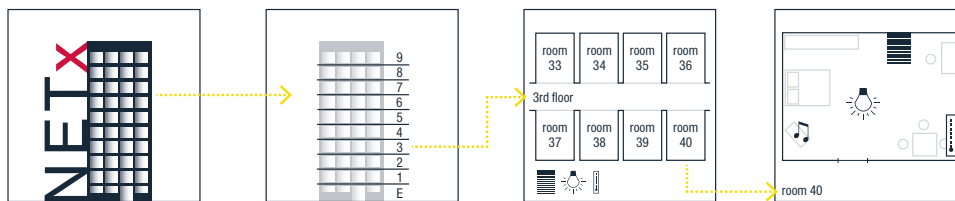


Figure 1.2.: Visualization Example

Each visualization page contains different controls that are placed by the visualization designer. Controls are used for visualization and/or control purposes. Typical examples of simple controls are images, labels, and buttons. Images are used to display pictures. Labels can be used to show static text information or the current value of a datapoint. Buttons can be used to show the current value of a datapoint and to change it. In addition to these simple control elements, more advanced ones are available, too. For example, the Historical Data Chart that can be used to visualize past values of datapoints.

Another key feature of the NETx BMS Client Editor is the concept of layers. This concept is similar to the layer concept of well-known CAD software applications. Control elements can be assigned to a layer independently from the page where they are used. This assignment to layers helps the visualization designer to organize the visualization. Using special controls, layers can be shown or hidden as well as activated or deactivated even at runtime. In combination with the integrated user management, the layer management is an efficient mechanism to define views for different visualization users.

In addition to these concepts, the NETx BMS Client Editor provides so called modules. Modules help to implement advanced visualization and control functionality. In NETx BMS Client Editor, the following modules are supported:

- User Management
- Server Calendar
- Charts

1.2.3. Visualization modes

The NETx BMS Client Editor can be used in two different modes: Editor Mode and Visualization Mode.

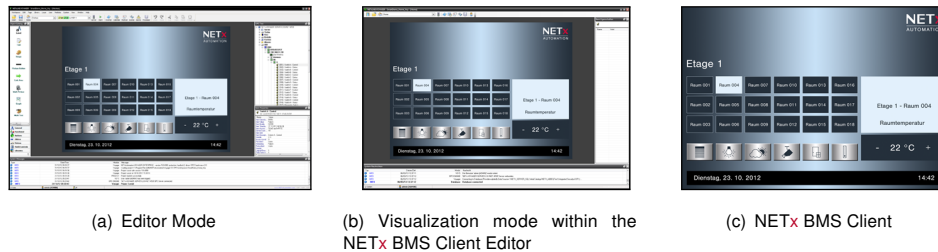


Figure 1.3.: Different modes of NETx BMS Client Editor

The NETx BMS Client Editor has to be started within the NETx BMS Server Studio. This is done by creating a new visualization project or by selecting an existing one. Creating a new one can be done by doing a right-click on “Visualization Projects” within the “Project Tree” of the NETx BMS Server Studio and selecting “New Visualization Project”. In order to modify an existing one, the project has to be selected in the “Visualization Projects” of the “Project Tree” of the NETx BMS Server Studio. Then using a right-click the context menu entry “Edit Visualization Project” has to be chosen.

Afterwards, the NETx BMS Client Editor is started in editor mode. Within the editor mode, the visualization designer is able to create new visualization projects as well as modify existing ones. Within this mode, different visualization pages can be created, control elements can be placed on these pages, the different modules can be configured, and the control elements can be linked to datapoints within the building automation system.

After having finished the design process of the visualization project, the NETx BMS Client Editor can be started in visualization node. In this mode, the visualization is online. This means that the values of the datapoints of the building automation systems are visualized by the different control elements of the visualization. Furthermore, inputs from the visualization user (e.g. pressing a button or clicking on a slider) are processed and the configured actions (e.g. changing a datapoint value) are initiated. In other words, the visualization mode is the mode that is seen by the visualization user i.e. the end customer.

The visualization mode can be started within the NETx BMS Client Editor directly or at the NETx BMS Client i.e. the end device (e.g. a touch panel). Starting the visualization mode within the NETx BMS Client Editor is mainly used for testing (cf. figure 1.3(b)). Here some graphical user interface elements (e.g. the menu bar, the window border, the item property window, the system messages, ...) are still shown.

In order to show the visualization at the NETx BMS Client i.e. the end device, the visualization project has to be transferred to the NETx BMS Server. This is done automatically by the NETx BMS Client Editor. If the visualization project is saved within the NETx BMS Client Editor it stores the visualization project and all its resources on hard disk and transfers the visualization to the NETx BMS Server. Afterwards, the visualization project can be used by any NETx BMS Client (cf. figure 1.3(c)). It is even possible that multiple NETx BMS Clients use the same visualization project.

1.2.4. Main/Backup solution

Reliability is one of the most important requirements within the building automation domain. Therefore, the NETx Touch apps for iOS and Android can be combined with a NETx Main/Backup server solution. The visualization is able to communicate with the main and backup server at the same time. If the network connection to the main server is interrupted, the connection to the backup server becomes active. By communicating with the backup server, the NETx Touch App is still able to retrieve the data from the building automation system. Switching between main and backup server is done automatically – without the need of manual interaction of the end user.

A main/backup solution not only increases the reliability of the system but also eases the maintainability. If the configuration of a building automation system has to be changed during runtime, the main server can simply be turned off in order to adapt the configuration. In meantime, the backup server can remain online and the end user

NETx Touch for iOS and Android

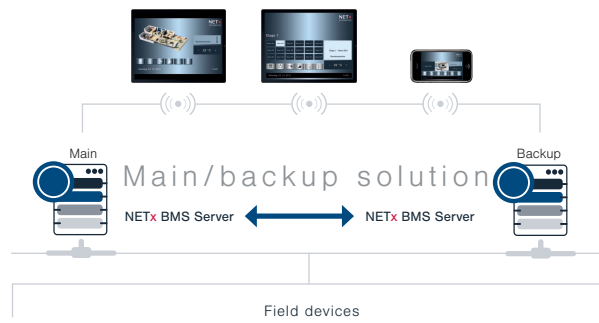


Figure 1.4.: Main/Backup solution

can still use the visualization. Again, the switching between main and backup is done automatically without any user intervention.

1.3. Disambiguation

1.3.1. Project/workspace

A NETX BMS Client Editor project is a collection of visualization pages, Controls (connected to Server Items), and layers to display and manage a building automation system in a user-friendly way. The sum of configuration files and directories containing a project are referred to as workspace.

1.3.2. Page

Pages in a workspace display dedicated areas of the building automation system in different levels of detail (e.g. a single room or a whole floor). While the visualization user sees one visualization page at the same time, the user is able to switch between them.

1.3.3. Layer

In the NETX BMS Client Editor, Controls can be assigned to a layer independently from the page where they are used. This assignment to layers helps the visualization designer to organize the visualization. Using special Controls, layers can be shown or hidden as well as activated or deactivated even at runtime.

1.3.4. Control

A Control is a single object (e.g. a button to display or control a light switch) that can be placed on a page. Controls are used for visualization and/or control purposes. To show or control datapoint values, Controls are connected to one or more Server Items.

1.3.5. Group

Controls can be grouped together. These groups can be named, graphically fixed, or can even represent a pop up control.

1.3.6. Server Item

Server Items represent datapoints (e.g. KNX group addresses, BACnet objects, Modbus registers) of the building automation system. They can be assigned to Controls. The Server Item ID is unique within the server and therefore it is used as a reference when the Server Item is assigned to a Control.

1.3.7. Visualization user

A visualization user is a person (usually the end customer) that uses the visualization when it is online.

1.3.8. Visualization designer

A visualization designer is a person (e.g. a system integrator) who creates, modifies, or configures a visualization project.

2. Getting started

2.1. First steps

First create a new visualization project within the NETx BMS Server Studio. This is done by doing a right-click on "Visualization Projects" within the "Project Tree" of the NETx BMS Server Studio and selecting "New Visualization Project". Then, the name of the visualization project has to be defined. The name shall not include any special characters since it will be used as the name of the directory where all information of the project will be stored in. After having specified a name, the NETx BMS Client Editor is started in editor mode.

! Creating new visualizations project as well as modifying existing ones is only possible as long as the NETx BMS Server is running.

After the NETx BMS Client Editor was started, the wizard will ask for the administrative user of the project. Name, password, and password confirmation are mandatory. Optional you can put in an email address. There is also a check box to declare this user as the default one for the visualization. When the application starts in visualization mode, the default user will be logged in automatically and the login dialog will be suppressed.

! For all demo projects provided by NETxAutomation Software GmbH, the default user name is "admin" and the default password is "aaa".

2.1.1. Adding a new page

This dialog can be reached via the menu item "Page" selecting "New page...". The first text box contains a default name of the page. It can be useful to change this one into something more descriptive (e.g. "First floor" or "Temperature regulation").

By hitting the OK button a new page is successfully created.

2.1.2. Placing a Control

To place a Control onto a page it is simply dragged out of the object catalog and dropped onto the page.

After placing the control onto the page a Server Item can be assigned to it by the same simple method. Every Server Item can be dragged out of the Item Tree and dropped directly onto a Control.

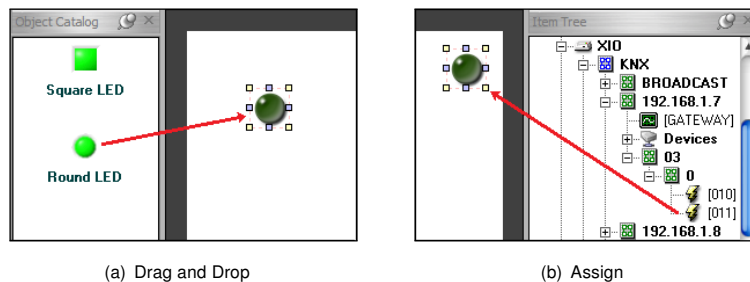


Figure 2.1.: Assigning a 2-state KNX actuator to the switch control

By clicking the green arrow in the toolbar (Run) the application will switch to the visualization mode. Given the fact that the connection to the server is properly established it will be possible to turn the switch on and off already.

In order to show the visualization at a NETx BMS Client, the visualization project has to be saved and the NETx BMS Client Editor has to be closed. After having closed the NETx BMS Client Editor the visualization is transferred to the web server of the NETx BMS Server. Afterwards, the visualization project can be used by any NETx BMS Client. In order to test the newly created project, create a new NETx BMS Client. This is done by doing a right-click on "BMS Clients" within the "Project Tree" of the NETx BMS Server Studio and selecting "Add Client Definition". A dialog appears that allows to create a new NETx BMS Client. Specify a name and a password of the new NETx BMS Client and select the newly created visualization project within the drop down box that lists all available projects. After the "OK" button is pressed, a new NETx BMS Client is created and the new visualization project is assigned to the client. In order to have a look at the visualization, double-click on the new NETx BMS Client. The local web browser opens and the new visualization is shown.

! As an alternative, the newly created visualization project can also be assigned to an existing NETx BMS Client. Right-click on the existing client within the Project Tree” of the NETx BMS Server Studio and select “Edit Client Definition”. In the following dialog, select the newly created visualization project within the drop down box that lists all available projects. After pressing the “OK” button, the new visualization project is assigned to the existing client.

3. Overview of the NETx BMS Client Editor

Figure 3.1 gives an overview of the graphical user interface of the NETx BMS Client Editor after start up. It also shows the different windows in their default position.

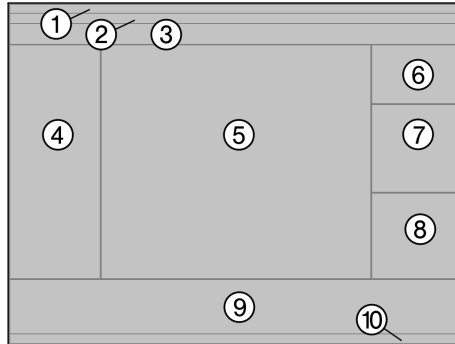


Figure 3.1.: User interface of the NETx BMS Client Editor

1. **Title Bar** – Application name, workspace, and current page are displayed.
2. **Menu bar** – In additions to the common menus like “Edit”, most of the management functionality such as “Page” or “User” can be found.
3. **Toolbar** – There can be found the dropdown to select the page to display. The Eventor, scene management and other features are available as well.
4. **Object Catalog** – All Controls which can be used in a visualization project can be found here.
5. **Page** – The actual selected page will be displayed here.
6. **Item Tree** – Contains all Server Items the server provides.
7. **Search Datapoints** – A search pattern can be put in to reduce the amount of the displayed items to a size which can be handled easier.
8. **Item Properties** – whenever a control is right-clicked which has an Server Item assigned to the option “Show Information” can be chosen. Then the attached Server Item - including its ID and properties - will be displayed in this docking window.
9. **System Messages** – log information will be displayed in this window.
10. **Status Bar** – Statuses of the application can be viewed here (e.g. the actual logged on user).

4. Editor commands

The most important features of the editor are:

- Drag and Drop – Controls as well as Server Items are easily placed or assigned by simply dragging them from the dockable windows onto your working surface
- Right click / context menu – Most of the functions concerning a Control, group, or page can be called by a right click onto the object wished to be manipulated
- Menus / toolbar – Here one can find administrative tools or objects, which do not have an immediate presence on the page itself.

4.1. Selecting Controls

Controls on a page can be selected by just clicking on it.

By holding the [Ctrl] key and clicking other Controls multiple elements can be selected. Clicking a control of the selected collection again while pressing [Ctrl] is deselecting it.

Another possibility to select multiple Controls is to click with the left mouse button into the background and while holding it pressed moving the mouse. This will open a frame, with which Controls can be fetched. It is not necessary to have the frame surround the controls entirely; as long as they are touched by it, they will be selected.

4.2. Edit Controls

In order to get to the properties of a Control you can either double click it or right click the selection and use the context menu entries.

4.3. Moving Controls

To move a Control, click it and, with the mouse button still held down, change its position. Release the mouse button, when the desired position is reached.

An alternative way to use is, to hold the [Alt] key pressed and use the arrow keys to move the controls. This is especially useful, when it is wanted to position a Control very precisely, because of the small steps the Controls move each time an arrow key is hit.

4.4. Cut, copy, delete, paste Controls

It is possible to accomplish cutting, copying, deleting, or pasting Controls in three different ways:

1. Select the control or several of them, then go to the menu "Edit" and pick the action to be applied onto the selection from there.
2. Use the context menu and choose here, whether you wish to delete the selection or use a different action on it.
3. The third possibility is to use the shortcuts on the keyboard.
 - [Del] – Erases the selection from the page
 - [Ctrl] + [C] – Copies the selection to the clipboard
 - [Ctrl] + [X] – Cuts the selection off the page and copies it to the clipboard
 - [Ctrl] + [V] – Pastes the content of the clipboard onto the page

4.5. Aligning Controls

You can align multiple controls. To accomplish this, first select the controls. Now right click the item, the others shall align to. The context menu will open and offer you six different possibilities:

- Left

- Center
- Right
- Top
- Middle
- Bottom

For example, the option “Align” + “Left” will line up your controls in a vertical line with their left borders all sitting underneath each other.

4.6. Unifying the size of Controls

To make the size of the Controls equal, it is needed to select them first, and then right click the Control, to which size it is desired all of the items to change. The context menu will open and three options are available:

- Width
- Height
- Width and height

For example, “Make same size” + “Width” will resize all Controls as horizontally wide as the Control which was right clicked.

4.7. Equalizing spaces between Controls

First select the Controls to manipulate. Right click the one at the edge of the line (e.g. the very left one or the one on the bottom). The context menu will open and two options are provided:

- Equal horizontal
- Equal vertical

4.8. Grouping of Controls

In order to group Controls it is necessary to select more than one. Then open the context menu and choose “Grouping” and “Group”. The selected Controls will be put into a group, which can be named in the appearing dialog. These check boxes are found also:

- “Graphically fixed” means that the group’s appearance will remain like it was at the moment it was created. Changing size or position of the single Controls by accident will be prevented. It is still possible to move the group around.

4.9. Changing the drawing order

Sometimes it is necessary, when controls overlap each other, to change their order. Therefore, just select the Control, group, or multiple objects and call the context menu with a right click. Now choose “Order” and it will be possible to select from two options:

- Move to top
- Move to background

4.10. Moving Controls to layers

Controls can be moved to different layers in two ways. First one can edit them and on the “Position / Layer” tab select the layer they should be situated on. Second, one can also select the layer one wants to move the controls to first, then select the controls, and finalize it by choosing “Move to current layer” from the context menu.

4.11. Adding Controls to the library

Already placed Controls can be selected and used to create a library component using the context menu command “Add to library”. When no library was created yet, the user will be asked to type in a library’s name. The dialog to create a component appears:

There are two mandatory properties in this dialog: the name of the component and the destination library.

The option “keep Item” also allows the user to save the assigned Server Items inside the new component. When it is dragged onto a new page from the library now, the Server Items are already assigned to it.

A component can be created out of multiple controls. An example can be component used to control a dimming actuator. It may consist of buttons to increase and decrease the brightness as well as a label that visualizes the current brightness value. This component can be reused in any project without the need of placing, sizing, and adapting every single control again.

5. Controls

5.1. Overview

All Controls the NETx BMS Client Editor provides, can be found in the Object Catalog. The Controls are grouped in the following categories:

- General
- Functional
- Buttons
- Sliders
- Charts
- Libraries

This chapter describes the Controls of the listed categories. Special attention will be paid to the parameter pages of the Controls.

5.1.1. Identical tabs

Some of the pages are identical. In particular the tab "Position / Layer" reoccurs in all Controls in the same way.

5.1.1.1. Tab Position / Layer

The center of origin is at the upper left corner of each page.

Tab:	Position / Layer
Top	The vertical position of the Control in pixel
Left	The horizontal position of the Control in pixel
Width	The horizontal dimension of the Control in pixel
Height	The vertical dimension of the Control in pixel
Layer	The layer the Control is placed on, for setting user rights

5.2. General

5.2.1. Label

Labels are used to display the value of a Server Item or to simply show static text. It can be used also for the input of numeric or string values.

The tab "Appearance" is the same for all four modes of the label. It is structured as follows:

Tab:	Appearance
Text	The text the label will display. It will only remain the way it is when the label is set as indicator. All other modes will alter this field.
Formatted text	A preview of the formatted text. This field cannot be edited. It is a result of the combination of the text and text format.
Text format	A string to format the Control's value (cf. table A.1).
Font	The font the label's content will be displayed in.
Alignment	Position of the text inside the defined area of the label (left, center, right).
Background color	The background color of the label.
Text color	The font color of the label.
False value color	The background color when the value is outside a defined limit.

On the "Object" tab of the Control the following functions can be selected:

5.2.1.1. Static text

A text will be displayed at a predefined place which will not change in its appearance.

Tab:	Object
Function	The mode of the Label can be selected here.

5.2.1.2. Indicator

The label shows the value of the assigned Server Item. In this mode it is read only. The Item on the server cannot be changed by the label.

Tab:	Object
Function	The mode of the Label can be selected here.
Item ID	The Server Item assigned to the label.
Scale factor	The factor, the Server Item's value is multiplied with.
Limit value	Min. value and max. value, to set borders for the false value color.
Send value on click	On click the current value is sent back to the Server Item.

5.2.1.3. Date / time

Here the Control displays the actual date and time depending on the given text format.

Tab:	Object
Function	The mode of the Label can be selected here.

5.2.1.4. Control

The label controls the values of its Server Items. It can send these values back to the server actively.

Tab:	Object
Function	The mode of the label can be selected here.
Item ID	The Server Item assigned to the Label.
Scale factor	The factor, the Server Item's value is multiplied with.
Limit value	Min. value and max. Value, to set borders for the false value color.

5.2.2. Image

The Image Control can display different formats of pictures. It can be used as a background image or you can stack several pictures with transparency. The picture can be stretched, flipped, or scaled.

Tab:	Object
Empty	

Tab:	Appearance
Picture	Defines the picture that shall be shown.
Rotation	The angle which the picture will be turned clockwise.
Flip	If either vertically or horizontally is checked, the picture will be flipped accordingly.
Scale	If set, the picture can be proportioned under perpetuation of the ratio between width and height
Stretch	If set, the picture can be scaled without keeping the ratio between width and height
Opacity	It contains the percentage of how through shining a picture will be displayed. 100% is solid and 5% makes the picture almost invisible.

Tab:	Appearance
Use transparency	When set, one color of the control is made transparent.
Transparent color	This color is the one set to invisible, when the check box above is set. A color can be picked with the pipette tool.

5.2.3. Picture Button

This control is one of the most powerful ones of the visualization software. Not only that it can switch or toggle binary values of boolean Server Items, moreover it can be used to navigate through the NETx BMS Client Editor, call external applications, send NET commands, or simply close the program.

Parts of tab "Object" and the whole tab "Appearance" are the same for all button modes. The following properties all functions of the button have in common:

Tab:	Object
Function	The mode of the button can be selected here.
Code Lock	The drop down list offers three choices: <ul style="list-style-type: none"> • None – no code will be asked for • Numeric code – when the Control is clicked, the user will be asked to enter a number. The code is the one entered in the text field. • Confirmation – a message box will appear in which the user can enter a confirmation text like "Do you really want to quit?". Is the question declined with "No", the button command will not be executed.

Tab:	Appearance
Template name	A button template can be selected or written to the text box. The buttons below give the visualization designer the possibility to create, edit, or load a template. The option "Files..." opens a new dialog to select three different picture files instead of a template; one picture for each, off-, on-, and uncertain-state.
Rotation	The angle which the button will be turned clockwise.
Flip	If either vertically or horizontally is checked, the button will be flipped accordingly. The caption is not affected by this.
Auto size	When it is set, the size of the "Off" state image is used as the button's size otherwise the button can be resized.
Stretch	If this property is set, the pictures of the button are stretched to the size of the button.
Hor. alignment	The horizontal alignment of image can be set here. It is only active when neither "Stretch" nor "Auto size" is set.
Vert. alignment	The vertical alignment of image can be set here. It is only active when neither "Stretch" nor "Auto size" is set.
Use background color	If set, a background color for the button can be selected. This is especially useful if neither "Stretch" nor "Auto size" is active or the Control is rotated at an odd angle. A frame with the selected color will fill the space up to the full size of the Control.
Background color	This color is used to fill the background of the control.
Opacity	It contains the percentage of how through shining the Control will be displayed. 100% is solid and 5% makes the control almost invisible. Only the images of the Control are inflicted by the opacity, background color and caption will remain solid.
Use transparency	When set, one color of the control is made transparent.
Transparent color	This color is the one set to invisible, when the check box above is set. A color can be picked with the pipette tool.
Caption	Contains the text written onto the Control. It is also possible to define a caption in the button editor when creating or editing a template. This one will be merged with the pictures and therefore can be stretched, rotated, and inflicted by transparency. The caption outside the button editor is not influenced by the above mentioned.
Caption color	The font color of the caption can be selected here.

Tab:	Appearance
Hor. alignment	The horizontal alignment of caption can be set here. A positive value (measured in pixel) of X will put an offset to the right onto the caption, a negative one will shift it to the left.
Vert. alignment	The vertical alignment of caption can be set here. A positive value (measured in pixel) of Y will put an offset upwards onto the caption, a negative one will shift it down.

5.2.3.1. Standard button

The Picture Button in the Standard-Button-Mode can be used to change Server Items or display their values.

Tab:	Object
Operation mode	<p>There are several different operation modes for the standard button:</p> <ul style="list-style-type: none"> ● Indicator – The button only displays the value of the Server Item, the control is read only. ● Switch – The button will lock in place in either down or up state. Once any of the two positions has been reached the according value will be sent to the Server Item. ● Toggle – The ON value will be sent when the toggle button is pressed. Once it is released the OFF value will be sent. ● Toggle on/off – sends alternating on- or off-signals when it is pressed. ● Toggle down – sends the value when the button is pressed ● Toggle up – sends the value when the button is released ● +Value – increases a value by a defined amount. The maximum value - when set - will not be exceeded. ● -Value – decreases a value by a defined amount. The minimum value - when set - will not be exceeded. ● Send actual value – just sends the current value back to the server.
Values	For the modes “Switch”, “Toggle”, and “Toggle on/off” the values for the on- and off-state can be set here. For “Toggle up” and “Toggle down” a single value can be set, which will be sent to the server either on pushing or releasing the button.
Step	By this value the Server Item value will be increased or decreased. If a max value or min value is needed, the check box needs to be activated and the limit needs to be entered into the text box.
Confirmation	The time interval that is used to determine whether sent value was received by at least one Server Item. After this timeout, the button switches to the state “Undefined”.
Items	It is possible to assign up to ten items to the button. Depending on the operation mode they can be set to either “receive” or “send” for either getting the value from the server for putting it to the control or sending it to the Server Item for setting it's value. Once a row is selected, the buttons below the table allow the visualization designer to either select a Server Item of the Item Tree or erase a formerly selected off of the table.

5.2.3.2. Go to page

This function allows the user to navigate from one page to another. There are special targets implemented like

navigating to the home page or simply back and forth.

Tab:	Object
Linked page	<p>The visualization designer can select either a page of the project to navigate to or one of the following special options:</p> <ul style="list-style-type: none"> • <Navigate back> – is calling the previously viewed page. If there is no page in the history of the program, the visualization will remain at the current page. • <Navigate forward> – gets the user to a page from which he previously must have navigated back. • <Go to home page> – will bring the user to the page which was declared “Home page”. For information about how to do this see chapter 10.3.

5.2.3.3. Change layer visibility

This function turns layers and their controls visible or invisible.

Tab:	Object
Layer	This layer will be the one whose visibility will be turned on or off.
Mode	The drop down list contains the options for the button to turn the layer visibility on or off.

5.2.3.4. Close Voyager

This function closes the application.

5.2.4. Link Area

The Control Link Area can support the user with its functionality to either link to another page, change a layer visibility, or change a popup visibility. A picture can be set into the control to change its appearance.

Tab:	Appearance
Picture	Determines which picture should be displayed.
Stretch	If this property is set, the picture of the Link Area is stretched to the size of the Link Area.
Border	If set, a solid black border will frame the Link Area.

5.2.4.1. Go to page

This function allows the user to navigate from one page to another. There are special targets implemented like navigating to the home page or simply back and forth.

Tab:	Object
Linked page	<p>The visualization designer can select either a page of the project to navigate to or one of the following special options:</p> <ul style="list-style-type: none"> • <Navigate back> – is calling the previously viewed page. If none is in the history of the program, the visualization will remain at the current page. • <Navigate forward> – gets the user to a page from which he previously must have navigated back. • <Go to home page> – will bring the user to the page which was declared “home page”. For information about how to do this see chapter 10.3.

5.2.4.2. Change layer visibility

This function turns layers and their controls visible or invisible.

Tab:	Object
Layer	This layer will be the one whose visibility will be turned on or off.
Mode	The drop down list contains the options for the area to turn the layer visibility on or off.

5.2.5. Multi Picture

This Control is used as an indicator. Depending on the conditions assigned to an image and the actual value of the Item attached to the Multi Picture different results in the visualization are achieved. A possible example could be a picture of a fireplace with the fire turned on or off depending on the state of the heating system. Another possibility is the use of different background images depending on the time of day.

Tab:	Object
Item ID	The item assigned to this control

Tab:	Appearance
Stretch	If this property is set, the pictures of the control are stretched to the size of it.
Hor. alignment	The images will be aligned according to this. It is only active when "Stretch" is not set.
Vert. alignment	The images will be aligned according to this. It is only active when "Stretch" is not set.
Use background color	If set, a background color for the control can be selected. This is especially useful if "Stretch" is not active or the Control is rotated at an odd angle. A frame with the selected color will fill the space up to the full size of the control.
Background color	This color is used to fill the background of the control.
Use transparency	When set, one color of the control is made transparent.
Transparent color	This color is the one set to invisible, when the check box above is set. A color can be picked with the pipette tool.

Tab:	Pictures / Conditions
Index	This drop down list selects the picture that shall be configured. In the following fields, the symbol "#" is a placeholder for the current selected picture.
Picture #	This field contains the file name of the picture which shall be displayed.
Picture not in use	The picture is kept in the workspace but will not be displayed at all. This option is to quickly take an image off the Multi Picture without losing the given information.
Picture when quality is not GOOD	The picture will be shown, when the quality of the Server Item is not "GOOD", when no valid value is available, or when no server item is assigned to the control.
Use condition (quality is GOOD)	The following condition is applied to the item and the picture will be shown when they are fulfilled.
Condition #	The "#" is the number of the actual picture. Here the conditions can be edited under which the the picture shall be show.
Value =	The value of the assigned Server Item equals the one which is placed in the textbox.
Value >	The value of the assigned Server Item is greater than this set value.
Value <	The value of the assigned Server Item is less than this set value.
Value > & Value <	The value of the assigned Item is between those two set values.
Conditions not met	The picture will be displayed when none of the other pictures' conditions are met.

5.2.6. Multi Text

Depending on the value of the assigned Item this Control can display up to ten different texts under different conditions.

Tab:	Object
Item ID	The Server Item assigned to this control

Tab:	Texts / Conditions
Index	This drop down list selects the text that shall be configured. In the following fields, the symbol “#” is a placeholder for the currently selected text index.
Text#	In this text field, the text for this index can be defined. In addition the font can be selected using the “Font” Button. The following options are available for the selected text:
Text not used	Keeps the actual text in the Control without losing the content
Text when quality is not GOOD	This text will be shown, when the quality of the Server Item is not “GOOD”, when no valid value is available, or when no server item is assigned to the control.
Use condition (quality is GOOD)	This option will make the text appear, when the condition set further down in the dialog is met.
Condition#	Here you can edit the conditions to show the text.
Value =	The value equals the one of the assigned Item.
Value >	The value of the assigned Item is greater than this set value.
Value <	The value of the assigned Item is less than this set value.
Value > & value <	The value of the assigned Item is between those two set values.
Conditions not met	The text will be displayed when none of the other text’s conditions are met.

5.2.7. Multi Internet

This Control shows different URLs depending on the conditions set for each of them.

Tab:	Object
Item ID	The Item assigned to this control

Tab:	Appearance
Show scrollbars	If set, scrollbars will appear in the window when the size of the displayed page exceeds that of the control

Tab:	URLs / conditions
Index	This drop down list selects the URL that shall be configured. In the following fields, the symbol “#” is a placeholder for the currently selected URL.
URL#	In this text field, the URL for the selected index is defined. Dynamic URLs can be implemented using a control sequence of the syntax {nxaitem://<OPC_Item_Path>}, e.g. http://www.{nxaitem://NETx\VAR\String\Item1}.com The following options are available for the selected URL:
URL not used	Keeps the actual URL in the Control without losing the content
URL when quality is not GOOD	This URL will be shown, when the quality of the Server Item is not “GOOD”, when no valid value is available, or when no server item is assigned to the control.
Use condition	This option will make the URL appear, when the condition set further down in the dialog is met.
Condition#	Here you can edit the conditions to show the URL.
Value =	The value equals the one of the assigned Item.

Tab:	URLs / conditions
Value >	The value of the assigned Item is greater than this set value.
Value <	The value of the assigned Item is less than this set value.
Value > & Value <	The value of the assigned Item is between those two set values.
Conditions not met	The URL will be displayed when none of the other URL's conditions are met.

5.2.8. Drop Down List

With the Drop Down List you can select from a list of named items and set the value of the assigned item. The user will see a selection of names and does not need to worry about any numbers.

Tab:	Object
Items	Here the list of items that shall be assigned to the drop down list must be defined.
Use list content item	This option activates the opportunity to change the list content via a Server Item. If activated, the Item ID of the Server Item must be specified in the text field below.

Tab:	Appearance
Text	The text the drop down list will display if no entry matches.
Formatted text	A preview of the formatted text.
Text format	A character row to format the Control's value (cf. table A.1)
Font	The font the label's content will be displayed in.
Alignment	Position of the text inside the drop down list (left, center, right)
Back color	The background color of the label.
Text color	The font color of the label
Outside limit color	The background color when the value is outside a defined limit

Tab:	List Content
List items	Add, edit, or remove your list entries here. For each list entry, a value as well as its appearance (font, size, color) can be defined.
List item definition	The formatted definition string for the list content will be displayed here after you clicked "Apply".

The control can also be administrated by assigning a Server Item to it. This one contains a string variable. The string has to be formatted in a special way, so that the NETx BMS Client Editor can read and interpret it.

The syntax of the definition string is as follows:

- `|#|` – Separator between each of the entries.
- `;` – Separator between the properties of the entry.
- `@` – Separator between name and value of a property

Supported properties are:

- Text – The displayed name in the drop down list (mandatory)
- Value – The respective value of the entry (mandatory)
- TxtColor – A 24 Bit Integer containing the color of the text (optional)
- BGColor – A 24 Bit Integer containing the background color of the text (optional)

Examples:

```
Text@full;Value@100;TxtColor@15744;BGColor@10535167|#|Text@undefined;Value@;TxtColor@0;BGColor@16777215|#|
Text@half full;Value@64;TxtColor@32768;BGColor@13434828|#|Text@overflow;Value@128;TxtColor@8388608;BGColor@16764108
```

! Note that a linebreak must not be in this string. The above two lines are to be read as a single one.

A shorter definition for a single entry could be:

```
Text@empty;Value@0
```

Text color and background color are left empty and will be filled with default values, when the NETx BMS Client Editor interprets the entry.

! Separators cannot be used in names or values of list items.

5.3. Functional

5.3.1. Clock

This Control can be used as a clock that shows the current system time. It is possible to customize its appearance according to the users' needs.

Tab:	Object
Empty	

Tab:	Appearance
Clock face picture	A possible new background image can be placed here.
Hour hand picture	An image for a customized hour hand can be placed here.
Minute hand picture	An image for a customized minute hand can be placed here.
Second hand picture	An image for a customized second hand can be placed here.

5.3.2. Alarm Clock

If turned on, the Alarm Clock will play the selected wave sound when the system time matches the set time. The time is set on a 24 hour display.

Tab:	Object
Empty	

Tab:	Appearance
Button Up picture	An image for the increment button can be placed here
Button Up pressed picture	An image for the increment button in its pressed state can be placed here
Button Down picture	An image for the decrement button can be placed here
Button Down pressed picture	An image for the decrement button in its pressed state can be placed here
Alarm sound wave file	The file played when the alarm goes off can be placed here
Alarm enabled text	The text displayed when the alarm is turned on.
Alarm disabled text	The text displayed when the alarm is turned off.
Font	The font for the Alarm Clock can be selected here

5.3.3. RGB Control

This Control was designed foremost to set up light actors in a specific color and intensity. For example the lighting in a restaurant during daytime could be done in a slight blue tone where it might add to a lighter atmosphere, where in the evening one might want to choose a warmer color.

Tab:	Object
Function	The drop down list contains two modes. It is possible to connect to a 24 bit single item or to three different 8 bit items.

Tab:	Object
Control Item	Depending on the selected function, the following options are available: <ul style="list-style-type: none"> • Single 24 bit item – Select the single Item here. • Three 8 bit items – There is one field for each of the three colors “Red”, “Green”, and “Blue”. The user may connect each to a 8 bit Server Item.
Status Item	Depending on the selected function, the following options are available: <ul style="list-style-type: none"> • Single 24 bit item – When “Status On” is checked, it is possible to select an item for status feedback right below the check box. • Three 8 bit items – when “Status On” is checked, it is possible to select an Item for each of the three color status reports right below the check box.
Tab:	Appearance
Text	Contains the text written on the button to send the colorvalue(s).
Font	Determines which font is used in the text of the send button.

5.3.4. Server Calendar

The Control “Server Calendar” allows the user to add, modify, and delete events of server based calendars. In contrast to client calendars, server calendars do not demand that the NETx BMS Client Editor is running because the event processing is directly done within the NETx BMS Server. The end user needs to start the client software only to create or administrate the events on the server. Once this is done the client connection can be shut down and the scheduled events on the server still will be executed. For more information about the server calendar see section 9.2.

Tab:	Object
Name	The button next to the text box allows the user to select a server calendar group or remotely create a new one inside the server.
Description	Displays the description of the server calendar. It may remain empty when no description was given.
Actions	This drop down list contains all actions defined for this calendar. The selected one may be edited or deleted.
Description	Displays the description of the actually selected action. It may remain empty when no description was entered. <ul style="list-style-type: none"> • Add – will open the editing dialog for a new action. • Edit – will open the editing dialog for the actually selected action. • Delete – will delete the actually selected action off of the list.
Tab:	Appearance
Title	Defines the title of the Server Calendar.
Font	The button on the right will open the font selection dialog. The selected font will be applied to the title of the calendar. The color chosen in the dialog will be taken as title color.
Title color	This determines the actual color of the calendar title.
Background color	This determines the background color of the calendar head.

5.3.4.1. Dialogs in editor mode

Calendars are saved in the server like any other items – in a tree. Starting at the root node the user can structure them in any hierarchy. Only branches (calendars) shall be chosen as associated calendar to the visualization control.

Dialog:	Select calendar group
Context – Add calendar group	Opens the dialog to add a new server calendar group.
Context – Delete calendar group	Deletes the selected server calendar group.

Dialog:	Calendar group parameters
Name	Contains the name of the calendar group.
Description	Contains the description of the server calendar.

Dialog:	Action parameters
Name	Contains the name of the action saved in the calendar group. It is recommended to use well chosen names for actions since the user in visualization mode has no other information but this and the description to know what the action will do. Once the action was added with their new name this parameter will not be allowed to change again. The name of an action has to be unique inside a server calendar.
Description	Contains the description of the action saved in the server calendar. It is recommended to use well chosen descriptions for actions since the user in visualization mode has no other information but this and the name to know what the action will do.
Start command	The visualization designer may want to create the command for the begin of the calendar event in here. "Edit" will open a dialog to put this command together.
Stop command	This command will be run at the end of an event. If - for an example - an event is defined from 10:00 AM to 6:00 PM of the same day this command will be run at exactly 6:00 PM.

Dialog:	Command parameters
Name	Contains the name of the command. This parameter is not editable. It shows which of the action's commands the user is editing.
Items	Shows a table consisting of all Server Items taking part in this command. Entries can be added, edited and deleted. It is possible to place different items for both start and stop of the event's action. So it is possible - for an example - that an actuator A is turned on at the start command of an action where at the stop command a minimum temperature on actuator B is set to 19°C. A pair of Server Item and value is referred to as Command Step.

Dialog:	Command step parameters
Item	It is possible to either add an item by typing the Item ID into the text field or selecting from the appearing dialog when clicking the button next to it.
Value	Enter the value here which shall be written to the Server Item when the command is executed.

5.3.4.2. Dialogs in visualization mode

Like already described in the beginning of this section during runtime (in the visualization mode) the actual events are defined and saved at the server. Once there they will be executed. The creation of an event consists of two

steps; the adjustment of the timer and the selection of an action to that timer. The four buttons in the top left corner of the calendar allow the user to switch between the different views. The button in the right hand side opens a small date-time-picker to navigate back and forth.

Dialog:	Event parameters
Name	Contains the name of the event displayed on the calendar surface.
Description	Contains the description of the server calendar event.
Color	The color is used to display the event on the calendar surface.
Active	This check box activates or deactivates the event.
Start time	This determines when the event first is started. No dates smaller than the 1st of January 1900 shall be entered. The "On start" command will be executed at this time.
Stop time	That time determines when the event shall end. The "On end" command will be executed at this time. The minimum time span between start time and stop time is 30 seconds where the maximum duration is 365 days. The stop time always needs to be after the start time.
Action	The user shall select an action for the event in here. In the drop down list all actions are listed which the visualization designer defined for this server calendar.
Recurrence	<p>It is possible to repeat an event. The available options are the following ones:</p> <ul style="list-style-type: none"> • None – the event will not be repeated • Daily – depending on the period set to 1, 2, or more; the event will be repeated everyday, every other day, or in larger steps. The second option is to repeat the event on workdays only. • Weekly – depending on the period set to 1, 2, or more; the event will be repeated every week, every other week, or in larger steps. The day pattern (check boxes) determines on what days during an active week the event will be repeated. (e.g. the period is set to "2" and Monday and Thursday are activated, then the event will run on all Mondays and Thursdays every other week) • Monthly – depending on the period set to 1, 2, or more; the event will be repeated every month, every other month, or in larger steps. • Yearly – depending on the period set to 1, 2, or more; the event will be repeated every year, every other year, or in larger steps. <p>All options can explicitly include or exclude holidays. Including holidays means, that the event is not only executed on the days defined by the recurrence but also on all holidays in between. Excluding holidays will result in preventing the execution of the event on holidays even if they were defined as event-days by the schedule.</p>
Period	The start is defined by the start time and simply will be taken over. It is not editable directly. For Stop there may be chosen either "none", "after", or "at". "none" defines an infinite recurrence for the event. "after" makes it possible to define a certain amount of recurrences where "at" sets a final date for recurrences.

5.4. Buttons

This section contains an assortment of buttons with different appearances. The general functionality of the buttons is the same. Therefore the tab "Object" and tab "Appearance" of each button style are identical to each other.

The following button styles are available:

- V. Toggle
- H. Toggle
- Square LED
- Round LED

- Push Button
- V. Rocker
- H. Rocker
- V. Slide Switch
- H. Slide Switch
- Toggle OFF/ON
- Command Ok

Tab:	Object
Operation mode	<p>There are several different operation modes for Buttons:</p> <ul style="list-style-type: none"> • Indicator – Button only displays the value of the Item, the Control is read only • Switch – The button will remain in the down or up state • Toggle – As long as it is pressed, the true state is sent
Values	One can set ON- and OFF-value here.
Confirmation	The time interval that is used to determine whether the sent value was received by at least one Server Item. After this timeout, the button switches to the “Undefined” state.
Code lock	<p>The drop down list offers three choices:</p> <ul style="list-style-type: none"> • None – no code will be asked for • Numeric code – when the Control is clicked, the user will be asked to enter a number. The code is the one entered in the text field. • Confirmation – a message box will appear in which the user can enter a confirmation text like “Do you really want to quit?”. Is the question declined with “No”, the button command will not be executed.
Items	It is possible to assign up to ten items to the button. Depending on the operation mode they can be set to either “receive” or “send” for either getting the value from the server for putting it to the Control or sending it to the Server Item for setting it’s value. Once a row is selected, the buttons below the table allow the visualization designer to either select a Server Item of the Item Tree or erase a formerly selected off of the table.

Tab:	Object
Style	It is possible to switch between the above mentioned styles back and forth.
Title	The caption above the actual button.
ON text	The text in the center of the button when it is in the “ON” state.
OFF text	The text in the center of the button when it is in the “OFF” state.
Back color	This color will fill the background of the button solidly in a rectangle.
Title color	The color of the caption on top of the button.
ON color	The base color of the button in its “ON” state.
OFF color	The base color of the button in its “OFF” state.
Undefined state color	The base color of the button in its “Undefined” state.
ON text color	The color of the text in the center of the button in its “ON” state.
OFF text color	The color of the text in the center of the button in its “OFF” state.

5.5. Sliders

This section contains an assortment of sliders with different appearances. The general functionality of the sliders is the same. Therefore the “Object”, tab “Appearance”, and tab “Axis” of each slider style are identical to each other.

The following slider styles are available:

- H. Solid Bar
- H. 3D Bar
- V. Solid Bar
- V. 3D Bar

Tab:	Object
Operation mode	<p>There are two different operation modes for the Slider:</p> <ul style="list-style-type: none"> • Indicator – The slider only displays the value of the Item, the control is read only • Control – The slider will display the value of a Server Item as much as it can send its value to several Server Items.
Scale factor	This is the multiplier the Server Item value will be scaled with before being displayed.
Use as KNX dimmer	The slider is split in half and reacts like a seesaw. On the right hand side it dims down where on the left hand side it dims upwards. The further away from the center it is clicked, the stronger it reacts. The data type the control is based on in this state is a 4 bit value (EIS2).
Confirmation	The time interval that is used to determine whether the sent value was received by at least one Server Item. After this timeout, the button switches to the “Undefined”state.
Items	It is possible to assign up to ten items to the button. Depending on the operation mode they can be set to either “receive” or “send” for either getting the value from the server for putting it to the control or sending it to the Server Item for setting it’s value. Once a row is selected, the buttons below the table allow the visualization designer to either select a Server Item of the Item Tree or erase a formerly selected off of the table.

Tab:	Appearance
Style	It is possible to switch between the above mentioned styles back and forth.
Title	The caption above the actual slider.
Back color	This color will fill the background of the slider solidly in a rectangle.
Title color	The color of the caption on top of the slider.
Pointer color	The base color of the pointer in a slider. This color only is used when the slider style implements a pointer.
Fill color	The color of the filled part of the slider.
Interior color	The color of the empty part of the slider scale.
Undefined state color	The color of the filled part of the slider in its “Undefined” state.

Tab:	Axis
Visible	Determines whether the axis scale and title should be shown or not.
Title	If set this title will be shown along the scale of the slider.
Title color	Changes the color of the axis title.
Format string	The format string for the values of the axis scale.
Label color	The color of the displayed numbers along the axis scale.
Color	Sets the color for the hair lines along the axis scale.
Maximum value	Determines the maximum value of the axis scale.
Minimum value	Sets the minimum value possible to be displayed and set with the slider.

5.6. Charts

5.6.1. Metering Chart

The Metering Chart displays metering data of the metering module of the NETx BMS Server. The data can be viewed in a table as well. The possibility of printing this data is given as well. One is able to browse through different time segments to view any point of interest. Metering data is calculated data off of historical datapoints. It can represent trends of different meters or show the actual counter values.

Tab:	Graphs
Index	The index of the graph that shall be edited has to be selected from this drop down list.
Name	The text box contains the name of the currently chosen graph. This name can freely be chosen.
Resource	This drop down list contains all resources created on the currently connected server. Depending on which resource is selected the selection of the next field is altered.
Meter	This drop down list contains all meters which count the previously selected resource. The graph of the currently selected meter will be displayed in the chart at runtime.
Interpolation	To limit the amount of values that shall be display in one graph view, an interpolation can be selected. The following different interpolation modes can be chosen: "None", "Average", "Minimum", "Maximum", and "Minimum/Maximum". "Average" computes the average of the values within one interpolation interval. "Minimum" takes the smallest value and "Maximum" the largest value. "Minimum/Maximum" is a special mode where the minimum and maximum values is visualized together using a bar. The following text field contains the maximum amount of values that shall be displayed.
Scale factor	The values of the datapoint are multiplied with this factor to exaggerate or flatten their amplitude.
Graph type	It is possible to select a certain type of graph from this field.
Line color	This field defines the color of the graph.
Show values at	This defines whether the values are displayed on the left or the right y-axis of the chart.

Tab:	Appearance
Theme	It is possible to a choose predefined appearance using themes. Using a customized theme is also possible.
Title	This defines the caption of the whole chart.
Title color	Set the color of the title in either selecting it from the color selector or use the pipette to select a color from anywhere on the display.
Back color	This color will solidly fill the back of the whole chart.
Border visible	Check this box to turn the border's visibility on.
Diagram fill color 1	The first color to fill the background of the actual diagram with.
Diagram fill color 2	The second color to fill the background of the actual diagram with.
Legend visible	Set to true for displaying the legend.
Alignment	Change the alignment of the legend here. It is possible to display it either inside or outside the graph on all four sides centered or border anchored.

Tab:	X-Axis
Axis visible	Determines whether the x-axis shall be displayed or not.
Axis title color	Change this color to display the axis title differently.
Axis label color	This color defines how the axis values and units are displayed.
Axis color	The color here defines how the axis/ruler is displayed.
Show axis at	Shall the axis be displayed at the bottom or on top of the chart?

Tab:	Left Y-axis
Axis visible	Determines whether this axis shall be displayed or not.
Axis title	This field contains the text which will be displayed at the axis.
Axis title color	Change this color to display the axis title differently.
Axis label color	This color defines how the axis values and units are displayed.
Axis color	This color defines how the axis/ruler is displayed.

Tab:	Right Y-axis
Axis visible	Determines whether this axis shall be displayed or not.
Axis title	This field contains the text which will be displayed at the axis.
Axis title color	Change this color to display the axis title differently.
Axis label color	This color defines how the axis values and units are displayed.
Axis color	This color defines how the axis/ruler is displayed.

5.6.2. Historical Data Chart

The Historical Data Chart displays any historical data of any historical datapoints inside the NETx BMS Server. This data can be viewed in a table. The opportunity of printing the data is possible. One is able to browse through different time segments to view any point of interest. The data of the Historical Data Chart is displayed unaltered (except for scaling) and thus shows only the values of the monitored items in their history.

Tab:	Object
Index	The index of the graph the visualization designer wishes to edit shall be selected from this drop down box.
Name	The text box contains the name of the currently chosen graph. This name can freely be chosen.
Item ID	This field defines which historical item the graph shall display.
Interpolation	To limit the amount of values that shall be display in one graph view, an interpolation can be selected. The following different interpolation modes can be chosen: "None", "Average", "Minimum", "Maximum", and "Minimum/Maximum". "Average" computes the average of the values within one interpolation interval. "Minimum" takes the smallest value and "Maximum" the largest value. "Minimum/Maximum" is a special mode where the minimum and maximum values is visualized together using a bar. The following text field contains the maximum amount of values that shall be displayed.
Scale factor	The values of the datapoint are multiplied with this factor to exaggerate or flatten their amplitude.
Graph type	It is possible to select a certain type of graph from this field.
Line color	This field defines the color of the graph.
Show values at	This defines whether the values are displayed on the left or the right y-axis of the chart.

Tab:	Appearance
Theme	It is possible to choose a predefined appearance using themes. Using a customized theme is also possible.
Title	This defines the caption of the whole chart.
Title color	Set the color of the title by either selecting it from the color selector or use the pipette to select a color from anywhere on the display.
Back color	This color will solidly fill the back of the whole chart.
Border visible	Check this box to turn the border's visibility on.
Diagram fill color 1	The first color to fill the background of the actual diagram with.
Diagram fill color 2	The second color to fill the background of the actual diagram with.
Legend visible	Set to true for displaying the legend.

Tab:	Appearance
Alignment	Change the alignment of the legend here. It is possible to display it either inside or outside the graph on all 4 sides centered or border anchored.

Tab:	X-Axis
Axis visible	Determines whether the x-axis shall be displayed or not.
Axis title color	Change this color to display the axis title differently.
Axis label color	This color defines how the axis values and units are displayed.
Axis color	This color defines how the axis/ruler is displayed.
Show axis at	Shall the axis be displayed at the bottom or on top of the chart?

Tab:	Left Y-Axis
Axis visible	Determines whether this axis shall be displayed or not.
Axis title	This field contains the text which will be displayed at the axis.
Axis title color	Change this color to display the axis title differently.
Axis label color	This color defines how the axis values and units are displayed.
Axis color	The color here defines how the axis/ruler is displayed.

Tab:	Right Y-axis
Axis visible	Determines whether this axis shall be displayed or not.
Axis title	This field contains the text which will be displayed at the axis.
Axis title color	Change this color to display the axis title differently.
Axis label color	This color defines how the axis values and units are displayed.
Axis color	This color defines how the axis/ruler is displayed.

5.7. Libraries

In the "Libraries" section components are stored consisting of Controls or groups of Controls. These components can be created by the user for the purpose of multiple use in reoccurring situations or even different projects. Especially the visualization designer will profit from the predefined appearance and behavior of the Controls which are stored in library components.

The tree view in the "Libraries" section consists of single libraries. The libraries themselves again consist of components. With this structure it is possible to group related components.

6. Menu

In the following section the commands of the menu bar will be explained.

6.1. Workspace

- **Save** – Saves the current workspace.
- **Export ...** – This menu command will open a file dialog. A name can be defined under which the export will be stored. Visualization Export Workspace (VEW) files contain the compressed content of the exported workspace including all files and settings.
- **Import ...** – The upcoming dialog allows the user to reimport an exported workspace. After selecting the VEW file to import it is necessary to define the new workspace name. The imported workspace will be opened immediately.
- **Export to BMS client file ...** – Exports the current workspace as NETx BMS Client project . The workspace is exported as a .vxf file which can be imported into the NETx BMS Server Studio.
- **Export Items to CSV...** – This command exports all used Server Items into a Comma Separated Value (CSV) file. The purpose is to be able to quickly adapt a visualization project to different Server Items. The exported file consists of two columns. The first contains the Server Items to replace. Those MUST NOT be changed. The second column contains the new IDs the old ones will be replaced with.
- **Import Items From CSV...** – This reimports the changed Server Items and overrides the old definitions.
- **Close** – Closes the workspace.
- **Delete...** – Deletes the selected workspace with all of its content and directories irreversibly.
- **Configuration...** – This calls the configuration dialog to change the settings of the workspace. For more detailed information about individual settings please refer to section 10.1.
- **System configuration...** – This calls the configuration dialog to change the settings of the software. For more detailed information about individual settings please refer to section 10.2.
- **Exit** – Ends the application.

6.2. Edit

- **Undo (Ctrl + Z)** – Undoes the last operation.
- **Redo (Ctrl + Y)** – Redoes the last undone operation.
- **Cut (Ctrl + X)** – Cuts the selected Controls and adds them to the clipboard.
- **Copy (Ctrl + C)** – Copies the selected Controls and adds them to the clipboard.
- **Paste (Ctrl + V)** – Pastes the Controls in the clipboard to the current page.
- **Delete (Del)** – Deletes the selected Controls.
- **Select all (Ctrl + A)** – Selects all elements of the current page.
- **Order**
 - **Move to top** – Moves the selected Controls to the foreground.
 - **Move to background** – Moves the selected Controls to the background.
- **Replace (Ctrl + H)** – Can be used for searching and replacing Item IDs.

6.3. Page

- **New...** – This creates a new empty page and opens the page configuration dialog (cf. section 10.3).
- **Delete** – Deletes the opened page.
- **Copy** – Copies the opened page to a new one.
- **Configuration...** – This opens the page configuration dialog (cf. section 10.3).

6.4. Library

- **New** – Creates a new library in the object catalog.
- **Import** – Imports a new library in the object catalog from a file.
- **Export** – Exports a library in the object catalog to a file.
- **Delete** – Deletes a library in the object catalog.

- **Add component** – Adds the selected Control or Control group to a library. Name of the component, library to add to, and whether the Server Items shall be kept or not, needs to be defined in the upcoming dialog.
- **Delete component** – Deletes the selected component from the library.

6.5. Layer

- **Configuration...** – Opens the layer configuration dialog (cf. section 10.4).

6.6. User

- **Login** – Used to login another user, with the current user being logged out.
- **User list...** – Opens the user management dialog (cf. section 9.1.1).

6.7. System

- **Run / Stop** – Changes from editor mode to visualization mode or vice versa.
- **Reconnect server** – Interrupts the connection to the server and creates it a new or retries to establish a new connection to the server.

6.8. View

- **Object Catalog** – Turns the “Object Catalog” sub window on or off.
- **Item Tree** – Turns the “Item Tree” sub window on or off.
- **Search data points** – Turns the “Search data points” sub window on or off.
- **Item Properties** – Turns the “Item Properties” sub window on or off.
- **System messages** – Turns the “System Messages” sub window on or off.
- **Toolbars**
 - **Standard** – Turns the “Standard” toolbar on or off.
- **Status bar** – Turns the status bar on or off.
- **Restore panel position** – Reestablishes the default positions and sizes of the panels.

6.9. Help

- **About** – The dialog coming up when this menu point is selected contains software name, version, license type, license key and other information.
- **Documentation** – This menu point can either be selected directly or called by pressing the [F1] button. It calls this document.

7. Toolbar

- **Save** – Saves the full workspace.
- **Home** – Jump to the homepage.
- **Page drop down** – The page to be displayed can be selected with it.
- **Layer drop down** – The current layer can be selected here. Controls placed by Drag & Drop are put to this Layer.
- **Server** – The icon shows the status of the Server connection. A click on it will open the connection properties dialog.
- **Start / Stop** – This icon switches to run mode or back to editing mode.
- **Undo** – Undoes the last operation.
- **Redo** – Redoes the last undone operation.
- **Cut** – Cuts the selected Controls and adds them to the clipboard.
- **Copy** – Copies the selected Controls and adds them to the clipboard.
- **Paste** – Pastes the controls in the clipboard to the current page.
- **Delete** – Deletes the selected Controls.

8. Window

8.1. Menu bar

This area was already described in section 6. For its exact location when the application windows are in their default position refer to number 2 in figure 3.1.

8.2. Tool bar

This area was already described in section 6. For its exact location when the application windows are in their default position refer to number 3 in figure 3.1.

8.3. Object Catalog

The Object Catalog consists of several areas containing different controls for different purposes (cf. number 4 in figure 3.1). This window can be closed with the small cross in the upper right corner or activated and deactivated by the according point in the menu bar (View → Object Catalog). The pin in the upper right corner fixates the window in its position or allows it to collapse. The double arrow button in the lower right corner allows to enlarge or collapse the button list on top of it step by step.

- General – This panel contains controls for basic functionality like the picture button for switching boolean actors on or of or the label to display numeric values or even strings.
- Functional – In this area advanced controls can be found to solve advanced tasks. It is possible to control RGB actuators or display their values as well as it is possible to configure and play scenes etc.
- Buttons – Predefined buttons for different occasions can be found in this area.
- Sliders – In order to control and display numeric values several different sliders were integrated.
- Charts – Chart Controls can be used to analyze or visualize historical data or consumption values of smart meters.
- Libraries – The visualization designer can customize and group Controls and add them to libraries. It is possible to place them from there into new projects or onto several places in one and the same project. Therewith the development process can be accelerated a lot.

8.4. Item Tree

The Item Tree contains the Server Items of the connected server in a tree view (cf. number 6 in figure 3.1). Activating a Server Item shows, if the window is open, this item's properties in "Item properties".

8.5. Search datapoints

The "Search datapoints" window consists of two areas. The Control elements on the top of it and the visualization area below it. The drop down list in the upper left corner allows the user to choose in which property of the server Item should be searched (Item ID or Description). The text box right next to it is to contain a search expression to search for (the syntax of the Microsoft Like-Operator is used). The button with the magnifying glass on it starts the item search. Displayed Server Items can be dragged onto Controls the same way like those from the Item Tree. Highlighting one of the search results with a mouse click will display this item's properties in the "Item properties" window. For locating the "Search datapoints" window refer to number 7 in figure 3.1. This window can be closed with the small cross in the upper right corner or activated and deactivated by the according point in the menu bar (View → Search datapoints). The pin in the upper right corner fixates the window in its position or allows it to collapse.

8.6. Item properties

It is possible to view the Server Item's properties in this window. Not all items do have the same ones. It is also

possible to determine whether the item can only be read or is writable. For locating this window refer to number 8 in figure 3.1. This window can be closed with the small cross in the upper right corner or activated and deactivated by the according point in the menu bar (View → Item properties). The pin in the upper right corner fixates the window in its position or allows it to collapse.

8.7. System messages

This window contains all relevant messages concerning the running application. For locating the “System messages” window refer to number 9 in figure 3.1. This window can be closed with the small cross in the upper right corner or activated and deactivated by the according point in the menu bar (View → System messages). The pin in the upper right corner fixates the window in its position or allows it to collapse.

9. Modules

9.1. User

Depending on the application, different users shall be able to control a visualization. Based on the access rights of the user, dedicated actions shall be allowed while others shall be denied. A typical example would be a hotel where the hotel staff is allowed to perform a more broad range of actions than a typical hotel guest.

To satisfy these requirements, the NETx BMS Client Editor provides a comprehensive user management. In addition to an administrative user, users with limited access rights can be created. For example, it is possible to specify parts of the visualization as invisible while other parts can be defined as “read only”. In addition, the access rights to dedicated modules (e.g. the calendar module) can also be constrained.

The user management allows the visualization designer to restrict different rights in one and the same project independently for each user. A user declared administrator cannot be restricted. He has always full access rights to all modules and layers. Only administrators can edit the visualization project. Therefore only administrators can set user rights.

The management of the user rights is layer oriented. Each Control can be assigned to one of 1000 layers. For each layer the user gets an access right assigned to. In addition, it is possible to define individual access rights for each module of the NETx BMS Client Editor.

The following access rights are available for each layer and module:

- Invisible – The module or the Controls on this layer can neither be viewed nor used.
- Visible only – The module or the Controls on this layer can be viewed but not touched.
- Full control – The module or the Controls on this layer can be viewed and touched.

! Only administrators have access to the user module.

9.1.1. User management

To open the user management dialog, select the menu item “User list” within the menu “User”. The dialog contains a table which lists all currently defined users and their properties. Each line in the table corresponds to one user.

The following menu elements are available in the tool bar of the dialog:

- New – Adds a new user and opens the user parameters dialog.
- Copy – Creates a new user with exactly the same parameters like the original one.
- Delete – Removes the selected user.
- Edit – Opens the user parameters dialog to edit the dialog which is selected.
- Import – Imports users from a Microsoft Excel file.
- Export – Exports users to a Microsoft Excel file.

9.1.2. New user

Within the user management dialog, click the “New” button. A new dialog opens where the user parameters can be specified:

Dialog:	User Properties
User name	Here the name of the user must be specified. The name of the user is also used as login name for the visualization.
Password/Confirm password	Within these two fields, the password of user that is used for authentication has to be set. If an existing user is edited, the button “Set/Change password” is shown instead of these two fields. If this button is clicked, a new dialog opens that can be used to change or reset the user’s password.
Email	This is the email a user can get signified on when an alarm occurs.
Use as default user for visualization	Only one user can be set as default. If a user is set as default user it will be used to automatically log on onto the visualization when the software is run in any of the two visualization modes.

Dialog:	User Properties
User type	The two types of users are “Administrator” or “User”. Only administrators can set user rights, create new users, delete users, edit a workspace/project or even log on into a workspace in editor mode.
Rights	<p>There are two kinds of rights displayed and editable:</p> <ul style="list-style-type: none"> ● Layer rights – Here it is possible to adjust the different rights for each layer and user. Restricted rights for administrators are ignored. The export button is to create an Excel file which can be used to adjust the layer rights there in a more comfortable way. With “Import” the changed rights can be imported again. ● Module rights – This is the section where the administrator can allow or restrict the access to the modules (i.e. Scenes or Alarms).

9.1.3. Edit user

Select the menu item “User list” within the menu “User”. Double-click on the user that shall be edited. The following dialog is identical with the “New user” dialog (cf. section 9.1.2).

9.2. Server Calendar

The Server Calendar allows the user to schedule server based events. These events consist of the timer and an action. The timer contains the information about “when” the event needs to work. An action defines what work has to be done. It consists of commands. The start command is executed at the beginning of an event while the stop command will be called at the end. The whole event may be set recurring so that it will start and stop over and over at either a daily, weekly, monthly, or even yearly basis. The definition of the actions is done by the visualization designer during the design process of the project. The events with their timers are created by the end user when the project is actually running.

A big advantage of the Server Calendar is that no client connection is necessary to execute any event defined on it. The end user needs to start the client software only to create or administrate the events on the server. Once this is done the client connection can be shut down and the scheduled events on the server still will be executed.

Another positive thing is that multiple clients can manipulate one and the same Server Calendar. Information sent to the server will be distributed immediately to all other connected clients. That way all changes made to the calendar instantly show up at the clients and can be considered for further changes.

To add, modify, and delete events of server based calendars, the dedicated “Server Calendar” control has to be used. More information about this control can be found in section 5.3.4.

10. Dialogs

10.1. Workspace configuration

Tab:	General
Workspace name	Displays the name of the workspace. It cannot be changed.
Server name	This text box determines the name of the server application/service.
Computer	Within the NETx BMS Client Editor, this field is always empty.
Background picture	The picture specifies the background behind the canvas where the controls are placed on. If the text box is empty or filled with "Default" no picture will be displayed.
Background color	The background behind the canvas where the controls are placed on will be colored in the selected color specified here. The pipette tool behind the color can be used to select a color from anywhere on the screen. A click onto the color field calls a color palette to select from directly.
Project type	This defines the type of the project. Within the NETx BMS Client Editor, only "BMS Client" is possible.
Page size	The size of the standard page is defined with width and height. All newly created pages will have this size at start. The size of each page can be altered at any time afterward. This standard size can be defined by selecting a defined size off of the drop down list or by adjusting a user defined format manually. "Use page size for scaling at server" is an option which has effects only to the scaling of pages when displayed via web server. If it is set the standard size will be used to scale the pages. In case the box is not checked the largest page inside the project will be used for scaling. In any case the use of different page sizes is not recommended.

Tab:	System
Import holiday file	This option is not available in NETx BMS Client Editor.
Calendar	This option is not available in NETx BMS Client Editor.
Tool tips	In deactivating "Show tool tips" they are disabled through the entire visualization. "Built in" or "Customized" tool tips can be used. In order to customize the tool tip a format string needs to be put into the text box below. Example for a customized tool: "Item value: 15" can be achieved in putting the leading text in quotation marks followed by the concatenator "+" followed by the keyword "Value". `Item value: "+Value`
Visualization mode	<ul style="list-style-type: none"> Group element borders – Enables displaying the frames around all Controls of a group when the mouse arrow is hovering over one group element and the application is in visualization mode.
Border	<ul style="list-style-type: none"> Show item quality – Displays a red border around the controls that have Server Items with an invalid (e.g. BAD, UNCERTAIN, ...) item quality.

Tab:	License
Controls	Shows the number of actual and maximum possible placed controls in this workspace.
Pages	Shows the number of actual and maximum possible pages in this workspace.

10.2. System configuration

System specific parameters can be changed within this dialog. These parameters do not have just workspace wide

impact but affect the whole NETx BMS Client Editor.

Dialog:	System Parameters
Auto reconnect	If it is enabled a lost connection to the server will be automatically reestablished if possible. No manual action is necessary.
Language	This shows the possible languages available. After selecting a different language, the NETx BMS Client Editor has to be restarted to apply the change.
Auto scale controls	After placing a Control and putting a Server Item onto it by Drag & Drop the scaling of the axis or value will be adjusted according to the properties of the Server Item. If the maximum value is 100 or 360 the scale factor will be set to 1 and the maximum value of the control will be set accordingly. Should the maximum be 255 the value will be scaled by 1/2.55 and the Control's maximum be set to 100. In case the minimum value of the Server Item is -128 and its maximum 127 the scale factor 1/2.54 is applied and the boarders are set to -50 to 50.

10.3. Page configuration

Page specific parameters can be changed in this dialog.

Dialog:	Page parameters
Name	This name will be displayed in the title bar of the application in editor or visualization mode (not full screen). It also is the name under which the page appears in the drop down list in the tool bar.
Homepage	This determines whether this page is declared to be the homepage or not. One page must be homepage at any time. When the waiting time has elapsed without any user interaction the program will switch to the homepage.
Standby page	Standby page is the page the NETx BMS Client Editor will switch to when the virtual standby time has elapsed. Is a waiting time set for the homepage this one will elapse first whereupon the timer for the standby page will run. If 2 minutes are set for the homepage timer and 3 minutes are set for the standby page then the standby page will be reached 5 minutes after the last user interaction. Only one page can be standby page. Homepage and standby page cannot be one and the same. The check box Log off user determines whether the user will be logged off when switching to the standby page or not.
Is master page	If enabled this page functions as a template for all pages deriving from it.
Use master page	Pages where the this option is set derive directly from the master page. Several properties are directly taken over. In addition to the page background and color, controls shown on the master page are displayed and will function exactly like defined on there.
Page color	By clicking onto the pipette the user is able to select a color from anywhere on the screen and use it as color for the page canvas. A click onto the blank area left of it a color of a palette can be chosen.
Page size	The standard drop down list allows the user to select a page size from predefined sizes. Width and height determine the size of the page while switching landscape and portrait also exchanges width and height with each other. The page size applied in the workspace configuration dialog (cf. section 10.1) is applied as the default page size to any new page.

10.4. Layer configuration

Layers are the administrative tools to make controls visible and enabled to the actual logged on user. There are 1000 layers available in the NETx BMS Client Editor which each can be adjusted to be visible or not. Controls placed onto a layer a user has no right to access will not be shown on the page.

The dialog to change the layer configuration contains a table which lists all layers and their properties. Furthermore, it is possible to define user rights for individual layers. Each line corresponds to one layer.

Dialog:	Layer parameters
Name	The name and with it the appearance of the layer how it is displayed in the drop down list of the layer parameters dialog and the tool bar. It is very much recommended to use speaking names for the layers.
Enabled in editor	The Controls can be marked, moved and edited on this layer in editor mode of the NETx BMS Client Editor. If this option is disabled but the visibility turned on the controls can be seen but not touched by accident. This can make things a lot easier while editing.
Visible in editor	The Controls can be seen in the editor mode of the NETx BMS Client Editor.
Enabled in visualization	The Controls can be touched and executed on this layer in visualization mode of the NETx BMS Client Editor (except for those user which do not have the necessary rights to execute this layer's content). If this option is disabled, the control cannot be executed. However, the actual state of the assigned items are visualized by the controls.
Visible in visualization	The Controls can be seen in visualization mode of the NETx BMS Client Editor (except for those user which do not have the necessary rights to view this layer's content).

A. Appendix

A.1. Tables

Table A.1.: String Format

Key	Encoding
{General Number}	Displays the number as entered, with no rounding and no commas.
{Currency}	Displays the number with a currency symbol in front of the comma (if appropriate), and two digits to the right of the decimal point. Negative numbers are displayed according to the local settings (with leading minus or set in parentheses).
{Fixed}	Displays the number with at least one digit to the left of the decimal separator and two digits to the right.
{Standard}	Displays the number with at least one digit to the left of the decimal separator and two digits to the right and commas (if appropriate).
{Percent}	Multiplies the value by 100 and displays the result with two digits to the right of the decimal point and a percent sign at the end.
{Scientific}	Uses standard scientific notation.
{Yes/No}	Any nonzero numeric value is Yes. Zero is No.
{True/False}	Any nonzero numeric value is True. Zero is False.
{On/Off}	Any nonzero numeric value is On. Zero is Off.
{General Date}	Shows date and time if expression contains both. If expression is only a date or a time, the missing information is not displayed.
{Long Date}	Uses the Long Date format specified in the Regional Settings dialog box of the Microsoft Windows Control Panel.
{Medium Date}	Uses the "dd-mmm-yy" format to display a date according to the local settings.
{Short Date}	Uses the Short Date format specified in the Regional Settings dialog box of the Windows Control Panel.
{Long Time}	Shows the hour, minute, second, and "AM" or "PM" using the "hh:mm:ss" format.
{Medium Time}	Shows the hour, minute, and "AM" or "PM" using the "h:mm AM/PM" format.
{Short Time}	Shows the hour and minute using the "hh:mm format".
{0}	Mandatory digit placeholder – Display a digit or a zero. If the expression has a digit in the position where the 0 appears in the format string, display it; otherwise, display a zero in that position. If the number has fewer digits than there are zeros (on either side of the decimal) in the format expression, display leading or trailing zeros. If the number has more digits to the right of the decimal separator than there are zeros to the right of the decimal separator in the format expression, round the number to as many decimal places as there are zeros. If the number has more digits to the left of the decimal separator than there are zeros to the left of the decimal separator in the format expression, display the extra digits without modification.
{#}	Optional digit placeholder – Display a digit or nothing. If the expression has a digit in the position where the # appears in the format string, display it; otherwise, display nothing in that position. This symbol works like the 0 digit placeholder, except that leading and trailing zeros are not displayed if the number has the same or fewer digits than there are # characters on either side of the decimal separator in the format expression.
{.}	In some locales, a comma is used as the decimal separator. The decimal placeholder determines how many digits are displayed to the left and right of the decimal separator. If the format expression contains only number signs to the left of this symbol, numbers smaller than 1 begin with a decimal separator. If always a leading zero has to be displayed with fractional numbers, use 0 as the first digit placeholder to the left of the decimal separator instead. The actual character used as a decimal placeholder in the formatted output depends on the number format recognized by the system.
{%}	The expression is multiplied by 100. The percent character (%) is inserted in the position where it appears in the format string.
{,}	In some locales, a period is used as a thousand separator. The thousand separator separates thousands from hundreds within a number that has four or more places to the left of the decimal separator. Standard use of the thousand separator is specified if the format contains a thousand separator surrounded by digit placeholders (0 or #). Two adjacent thousand separators or a thousand separator immediately to the left of the decimal separator (whether or not a decimal is specified) means "scale the number by dividing it by 1000, rounding as needed." Large numbers can be scaled using this technique. For example, this format string can be used "##0,." to represent 100 million as 100. Numbers smaller than one million are displayed as 0. Two adjacent thousand separators in any position other than immediately to the left of the decimal separator are treated simply as specifying the use of a thousand separator. The actual character used as the thousand separator in the formatted output depends on the Number Format recognized by the system.
{-, {+}, {\$}, {()}, {[]}, {[space]}	Displays the character as is, in the position specified by the format string. To display a character other than one of those listed, precede it with a backslash (\).
{E-}, {E+}, {e-}, {e+}	If the format expression contains at least one digit placeholder (0 or #) to the right of E-, E+, e-, or e+, the number is displayed in scientific format and E or e is inserted between the number and its exponent. The number of digit placeholders to the right determines the number of digits in the exponent. Use E- or e- to place a minus sign next to negative exponents. Use E+ or e+ to place a plus sign next to positive exponents.
{:}	Time separator. In some locales, other characters may be used to represent the time separator. The time separator separates hours, minutes, and seconds when time values are formatted. The actual character used as the time separator in formatted output is determined by the system settings.
{/}	Date separator. In some locales, other characters may be used to represent the date separator. The date separator separates the day, month, and year when date values are formatted. The actual character used as the date separator in formatted output is determined by the system settings.
{C}	Display the date as dddd and display the time as tttt, in that order. Display only date information if there is no fractional part to the date serial number; display only time information if there is no integer portion.
{d}	Display the day as a number without a leading zero (1 - 31).
{dd}	Display the day as a number with a leading zero (01 - 31).

Continued on next page . . .

Table A.1.: String Format

Key	Encoding
{ddd}	Display the day as an abbreviation (Sun - Sat).
{dddd}	Display the day as a full name (Sunday - Saturday).
{ddddd}	Display the date as a complete date (including day, month, and year), formatted according to the system's short date format setting. The default short date format is m/d/yy.
{ddddd}	Display the date as a complete date (including day, month, and year) formatted according to the long date setting recognized by the system. The default long date format is mmmm dd, yyyy.
{w}	Display the day of the week as a number (1 for Sunday through 7 for Saturday).
{ww}	Display the week of the year as a number (1 - 53).
{m}	Display the month as a number without a leading zero (1 - 12). If "m" immediately follows "h" or "hh", the minute rather than the month is displayed.
{mm}	Display the month as a number with a leading zero (01 - 12). If "mm" immediately follows "h" or "hh", the minute rather than the month is displayed.
{mmm}	Display the month as an abbreviation (Jan - Dec).
{mmmm}	Display the month as a full month name (January - December).
{q}	Display the quarter of the year as a number (1 - 4).
{y}	Display the day of the year as a number (1 - 366).
{yy}	Display the year as a 2-digit number (00 - 99).
{yyyy}	Display the year as a 4-digit number (100 - 9999).
{h}	Displays hours in 24hour format numeric without leading zeros (0 - 23). When any Ante/Post Meridian formatting is involved it is switched to 12hour format.
{hh}	Displays hours in 24hour format numeric with leading zeros (00 - 23). When any Ante/Post Meridian formatting is involved it is switched to 12hour format.
{n}	Display the minute as a number without leading zeros (0 - 59).
{nn}	Display the minute as a number with leading zeros (00 - 59).
{s}	Display the second as a number without leading zeros (0 - 59).
{ss}	Display the second as a number with leading zeros (00 - 59).
{tttt}	Display a time as a complete time (including hour, minute, and second), formatted using the time separator defined by the time format recognized by the system. A leading zero is displayed if the leading zero option is selected and the time is before 10:00 A.M. or P.M. The default time format is h:mm:ss.
{AM/PM}	Use the 12-hour clock and display an uppercase AM with any hour before noon; display an uppercase PM with any hour between noon and 11:59 P.M.
{am/pm}	Use the 12-hour clock and display a lowercase AM with any hour before noon; display a lowercase PM with any hour between noon and 11:59 P.M.
{A/P}	Use the 12-hour clock and display an uppercase A with any hour before noon; display an uppercase P with any hour between noon and 11:59 P.M.
{a/p}	Use the 12-hour clock and display a lowercase A with any hour before noon; display a lowercase P with any hour between noon and 11:59 P.M.
{AMPM}	Use the 12-hour clock and display the AM string literal as defined by the system with any hour before noon; display the PM string literal as defined by the system with any hour between noon and 11:59 P.M. AMPM can be either uppercase or lowercase, but the case of the string displayed matches the string as defined by the system settings. The default format is AM/PM.

A.2. Acronyms

CSV Comma Separated Value

HTTP HyperText Transfer Protocol

VEW Visualization Export Workspace

A.3. Support and contact

Please send all your support questions to:

support@NETxAutomation.com

If you have general questions regarding the product and service please send your email to:

office@NETxAutomation.com

A.4. System Requirements

A.4.1. Hardware

- Processor: Intel or AMD 1.6GHz (Multicore recommended)
- System Memory: 2048MB
- Harddisk Space: 4GB (8GB recommended)
- Network Adapter: 100 MBit/s
- Screen Resolution: 1280 x 1024 Pixel (for Editor)

A.4.2. Supported Operating Systems

- Microsoft Windows 7 32bit Servicepack 1
- Microsoft Windows 7 64bit Servicepack 1
- Microsoft Windows 8 64bit
- Microsoft Windows 8.1 64bit
- Microsoft Windows Server 2008 32bit Servicepack 2
- Microsoft Windows Server 2008 64bit Servicepack 2
- Microsoft Windows Server 2008 Release 2 64bit Servicepack 1
- Microsoft Windows Server 2012 64bit
- Microsoft Windows Server 2012 R2 64bit

A.4.3. Other

- .NET Framework: 3.5 or higher