BECKHOFF New Automation Technology

Manual | EN

ADS Monitor

TwinCAT 2 | System

2022-05-30 | Version: 1.0

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1 Foreword

1.1 Notes on the documentation

This description is only intended for the use of trained specialists in control and automation engineering who are familiar with applicable national standards.
It is essential that the documentation and the following notes and explanations are followed when installing and commissioning the components.
It is the duty of the technical personnel to use the documentation published at the respective time of each installation and commissioning.

The responsible staff must ensure that the application or use of the products described satisfy all the requirements for safety, including all the relevant laws, regulations, guidelines and standards.

Disclaimer

The documentation has been prepared with care. The products described are, however, constantly under development.
We reserve the right to revise and change the documentation at any time and without prior announcement.
No claims for the modification of products that have already been supplied may be made on the basis of the data, diagrams and descriptions in this documentation.

Trademarks

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Patent Pending

The EtherCAT Technology is covered, including but not limited to the following patent applications and patents:
EP1590927, EP1789857, EP1456722, EP2137893, DE102015105702
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1.2 Safety instructions

Safety regulations

Please note the following safety instructions and explanations!
Product-specific safety instructions can be found on following pages or in the areas mounting, wiring, commissioning etc.

Exclusion of liability

All the components are supplied in particular hardware and software configurations appropriate for the application. Modifications to hardware or software configurations other than those described in the documentation are not permitted, and nullify the liability of Beckhoff Automation GmbH & Co. KG.

Personnel qualification

This description is only intended for trained specialists in control, automation and drive engineering who are familiar with the applicable national standards.

Description of symbols

In this documentation the following symbols are used with an accompanying safety instruction or note. The safety instructions must be read carefully and followed without fail!

⚠ DANGER

Serious risk of injury!

Failure to follow the safety instructions associated with this symbol directly endangers the life and health of persons.

⚠ WARNING

Risk of injury!

Failure to follow the safety instructions associated with this symbol endangers the life and health of persons.

⚠ CAUTION

Personal injuries!

Failure to follow the safety instructions associated with this symbol can lead to injuries to persons.

NOTE

Damage to the environment or devices

Failure to follow the instructions associated with this symbol can lead to damage to the environment or equipment.

Tip or pointer

This symbol indicates information that contributes to better understanding.

1.3 Notes on information security

The products of Beckhoff Automation GmbH & Co. KG (Beckhoff), insofar as they can be accessed online, are equipped with security functions that support the secure operation of plants, systems, machines and networks. Despite the security functions, the creation, implementation and constant updating of a holistic security concept for the operation are necessary to protect the respective plant, system, machine and networks against cyber threats. The products sold by Beckhoff are only part of the overall security concept. The customer is responsible for preventing unauthorized access by third parties to its equipment, systems, machines and networks. The latter should be connected to the corporate network or the Internet only if appropriate protective measures have been set up.

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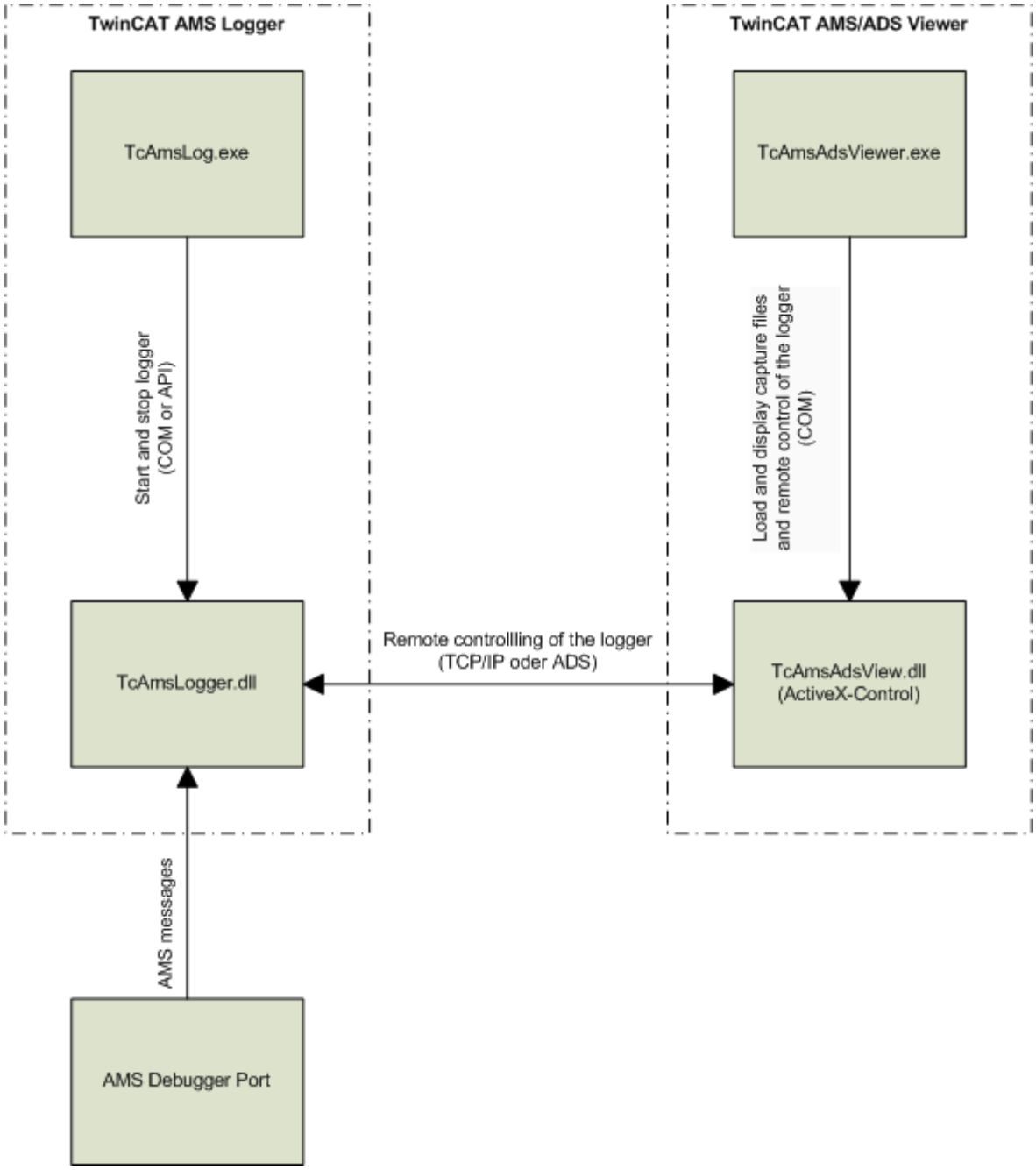
Beckhoff products and solutions undergo continuous further development. This also applies to security functions. In light of this continuous further development, Beckhoff expressly recommends that the products are kept up to date at all times and that updates are installed for the products once they have been made available. Using outdated or unsupported product versions can increase the risk of cyber threats.

To stay informed about information security for Beckhoff products, subscribe to the RSS feed at https://www.beckhoff.com/secinfo.

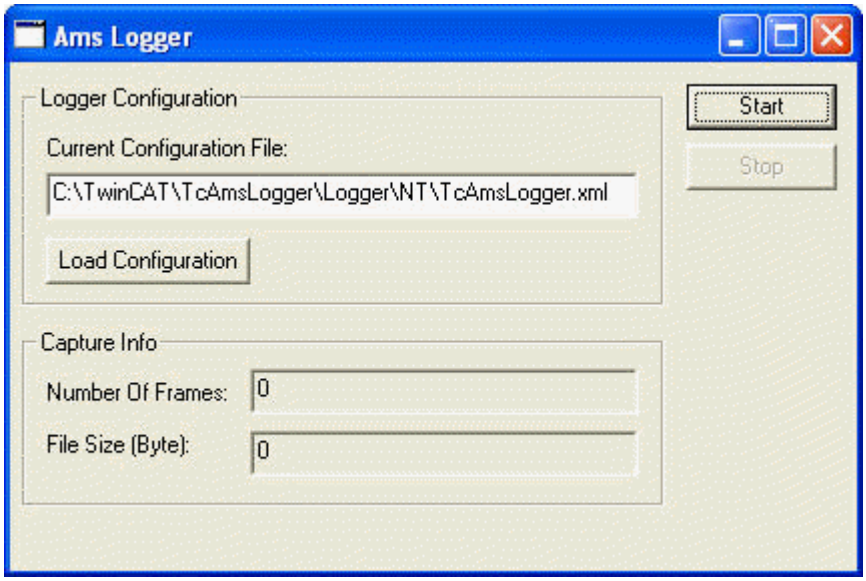
2 Overview

The TwinCAT ADS Monitor is divided into the two applications AMS logger (TcAmsLog.exe) and AMS viewer (TcAmsAdsViewer.exe). The logger is responsible for recording the AMS commands and the AMS/ADS viewer for displaying this data. Furthermore, the logger can be controlled remotely by the viewer via TCP/IP. The following diagram shows the relationship between the individual components.



3 AMS Logger

The AMS logger (TcAmsLog.exe) is responsible for recording AMS messages. The logger is configured with the help of an XML file, that can be loaded with **Load Configuration.** Among other things one can specify the maximal size of the file and if a ring buffer should be used. After starting the application an attempt is made to load a configuration file named TcAmsLogger.xml from the executable path.



As soon as **Start** is clicked, the logger starts to record the AMS messages. The capture process can be stopped with the **Stop** button. By default, the captured AMS commands are saved in the file .. \TwinCAT\Boot\Current.cap. The name of this file can be changed in the XML configuration file. But it is not possible to change the path. The AMS/ADSViewer can load and analyze the AMS commands stored in this file.

Following tags can be use in the XML configuration file:

Tags	Description	Default
<FileSize>	Max size of the capture file.	1MB
<AutoSave>	If <AutoSave> is false, the AMS messages are stored in a temporary file. After the capture is stopped the file is deleted. This configuration only makes sense if the logger is controlled remotely by the viewer. If <AutoSave> is true, the messages are stored in the TwinCAT Boot folder. The name of this file can be set with the Tag <AutoSaveName>	true
<AutoSaveName>	Name of the capture file.	Current.cap
<RingBuffer>	Specifies the behavior when the maximal file size (set with <FileSize>) is reached. If this value is set to false, the capture process is stopped. Otherwise a ring buffer is used. Here the captured messages are stored in two or more files. If all files are full, the oldest file is overwritten. The number of files can be set with <RingBufferFiles>. The size of one file is the maximum file size(<FileSize>) divided by the number of files (<RingBufferFiles>).	true
<RingBufferFiles>	Number of files used for the ring buffer (see <RingBuffer>)	2
<OverwriteExisting>	If <OverwriteExisting> is true, an existing capture file is overwritten. Otherwise, the new messages are appended to the existing file.	true

Controlling the logger remotely with the AMS/ADS Viewer

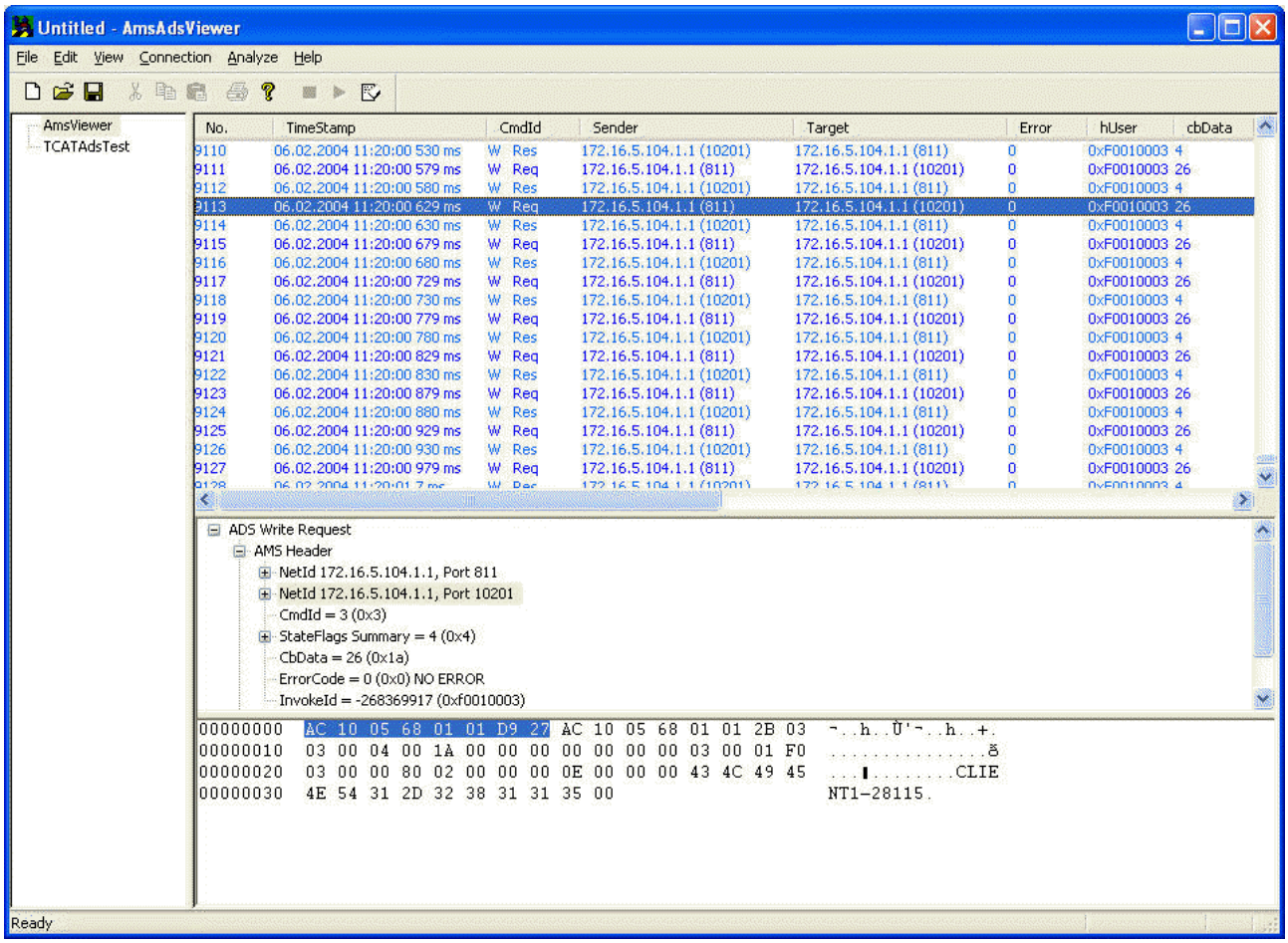
It is also possible to control the logger remotely with the AMS/ADS Viewer. As soon as the Logger application is executed, the logger waits for a connection attempt from the viewer. In this case the text **Viewer Connected** is displayed in the bottom area of the logger window. Now the viewer can start, stop, and configure the logger.

4 AMS/ADS Viewer

The TwinCAT AMS/ADS viewer(TcAmsAdsViewer.exe) is responsible for displaying capture file(offline mode) recorded by the TwinCAT AMS logger and for controlling the AMS logger remotely. In the offline mode(no connection to the logger) the capture AMS commands can be loaded and analyzed.

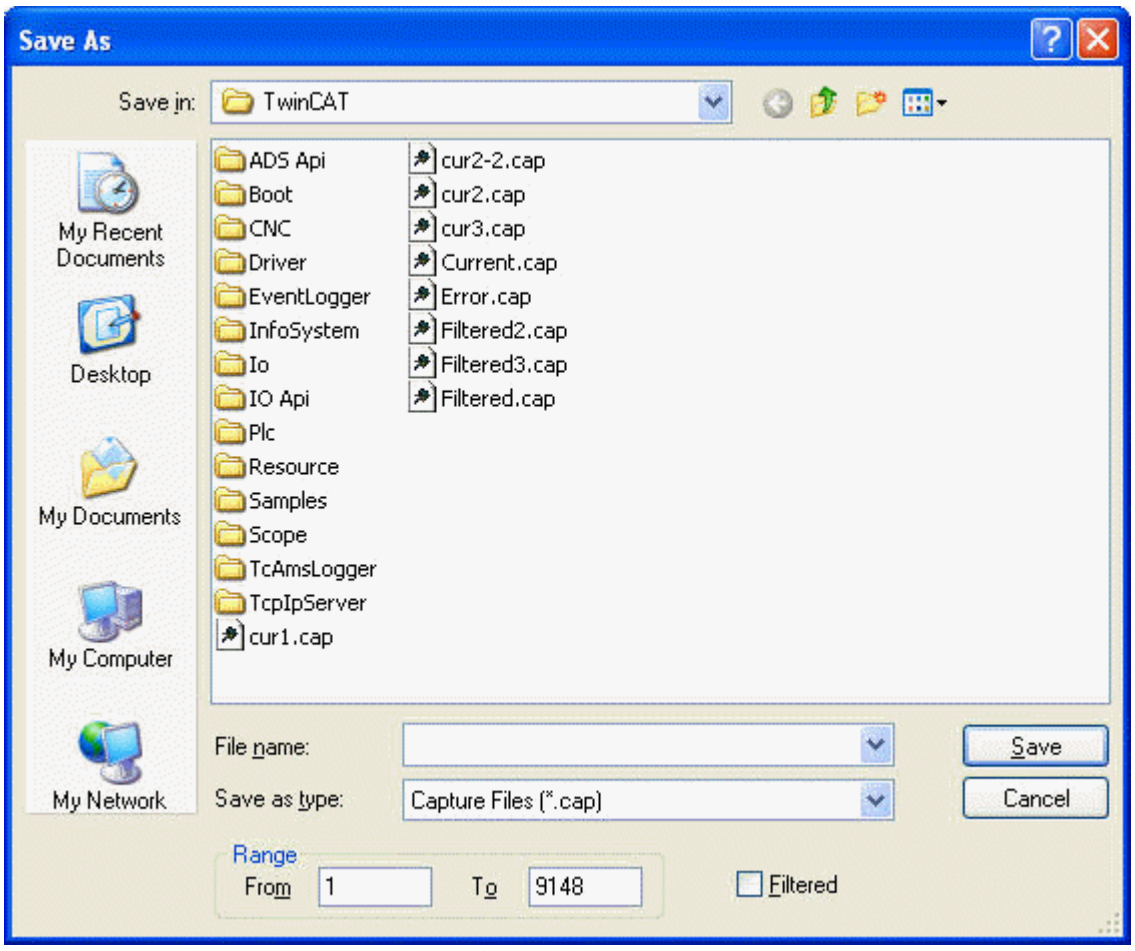
4.1 Loading and analyzing capture files (offline mode)

If the viewer is not connected to the logger, one can load the AMS commands captured by the AMS logger. The display is divided into three windows. The upper window is a list view containing all recorded commands. The parser view in the middle provides additional information about the command selected in the tree view. The bottom view displays a hex dump of the selected command.



Save a capture file

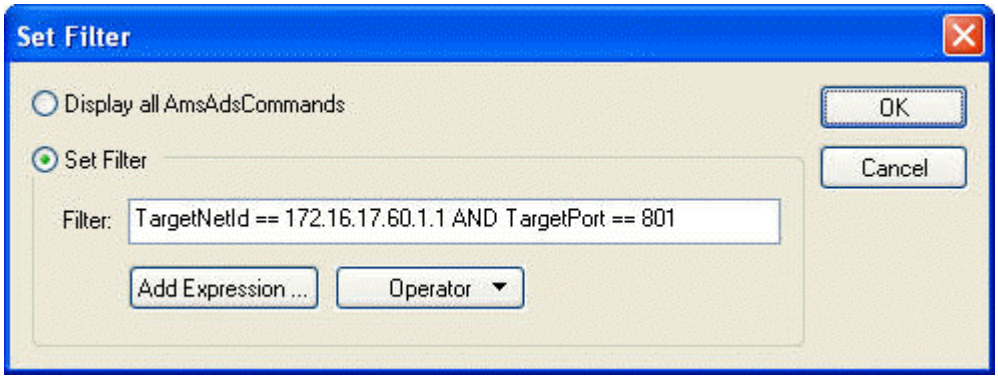
To save a capture file, one must right click the entry **AmsViewer** in the tree view. Then select **Save Capture As...** in the opened context menu. This opens the **Save As** Dialog:



The textboxes **Range From** and **Range To** are used to specify the range that should be saved. If the **Filtered** check box is checked, only the filtered AMS commands are saved. This is extremely useful for minimizing the size of large capture files.

Filter a capture file

In offline mode one can filter the capture AMS/ADS commands. There are more much filter possibilities available than there are for capturing the AMS/ADS commands. To enter a new filter, one has to right click on the entry **AmsViewer** in the tree view. In the opened context menu select **Set Display Filter...** . This opens following dialog:



In the text box **Filter** the filter string can be entered. Expressions can be combined with Boolean operators (AND, OR, NOT) here. An expression is a combination of a property (e.g. TargetNetId) a relation (!=,==,<,>,>=,<) and a value (number, NetId etc.) or a property on its own. If a property is used as expression, the program checks if the property exists AMS command.

Ads_IndexGroup

If this filter string is entered, all commands are displayed, that contain this property. In this case all ADS Write, Read, ReadWrite and AddDeviceNotification requests would be displayed.

Ads_IndexGroup == 0x4020

If you enter this string, all ADS Write, Read, ReadWrite and AddDeviceNotification requests with an IndexGroup of 0x4020 would be displayed. There are also properties, that cannot be combined with a relation.

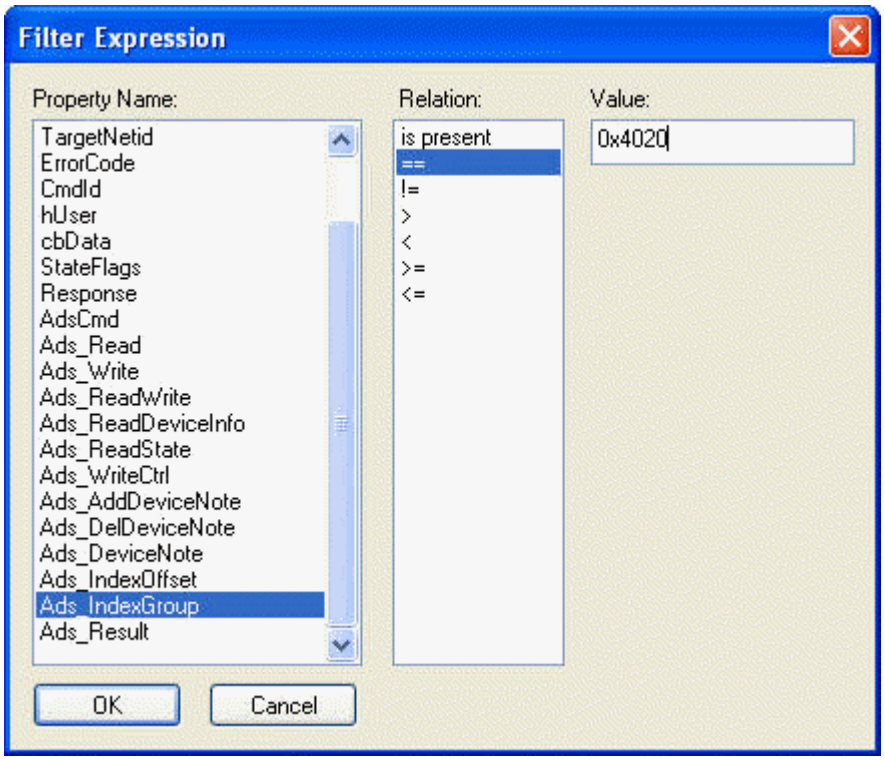
AdsCmd

For instance this filter string displays all ADS commands. The properties starting with Ads_ are ADS specific properties.

Following table list the supported properties:

Property	Description	Example
SenderPort	Port of the sending ADS device.	SenderPort > 800
SenderNetId	AMS-NetId of the sending ADS device.	SenderNetId == 172.16.17.5.1.1
TargetPort	Port of the target ADS device.	TargetPort == 123
TargetNetId	AMS-NetId of the target ADS device.	TargetNetId != 127.12.2.3.1.1
ErrorCode	AMS error code. 0, if no error occurred.	ErrorCode > 0
CmdId	Id of the AMS command.	
hUser	User handle	hUser == 0x12345678
cbData	Length of the data in byte.	cbData > 40
StateFlags	AMS state flags.	
Response	Is true, if the command is a response.	Response
Data	Data of the AMS command	Data == 'MAIN.Variables[10]'
AdsCmd	Is true, if the command is a ADS request or response.	AdsCmd
Ads_Read	Is true, if the command is a ADS read request or response.	Ads_Read
Ads_Write	Is true, if the command is a ADS write request or response.	Ads_Write
Ads_ReadWrite	Is true, if the command is a ADS ReadWrite request or response.	Ads_ReadWrite
Ads_ReadDeviceInfo	Is true, if the command is a ADS ReadDeviceInfo request or response.	Ads_ReadDeviceInfo
Ads_ReadState	Is true, if the command is a ADS ReadState request or response.	Ads_ReadState
Ads_WriteCtrl	Is true, if the command is a ADS WriteCtrl request or response.	Ads_WriteCtrl
Ads_AddDeviceNote	Is true, if the command is a ADS AddDeviceNote request or response.	Ads_AddDeviceNote
Ads_DelDeviceNote	Is true, if the command is a ADS DelDeviceNote request or response.	Ads_DelDeviceNote
Ads_DeviceNote	Is true, if the command is a ADS DeviceNote request or response.	Ads_DeviceNote
Ads_IndexOffset	Index-Offset of the ADS command	Ads_IndexOffset
Ads_IndexGroup	Index-Group of the ADS command.	Ads_IndexGroup
Ads_Result	Result of the command. A value not equal to 0, indicates an error.	Ads_Result
Ads_data	Data of the ADS command	Ads_data

To make the entry of expressions easier the **Filter Expression** Dialog can be opened with **Add Expression ...**. In the left list box, all supported properties are listed. If a property is selected, the **Relation** list box displays all possible relations. The value of the property can be entered in the textbox **Value**.



If the dialog is confirmed with **OK**, the expression is added to the **Filter** text box.

Example 1:

Display all AMS commands sent or received from an ADS device with the AMS-NetId 172.16.7.70.1.1:

sendernetid == 172.16.7.70.1.1 OR targetnetid == 172.16.7.70.1.1

Next we want reduce this set to all ADS write commands:

(sendernetid == 172.16.7.70.1.1 OR targetnetid == 172.16.7.70.1.1) AND ads_write

Example 2:

Find the string 'MAIN.Values' in the ADS data:

ads_data contains 'MAIN.Values'

Example 3:

Find the byte pattern '01 25 a0':

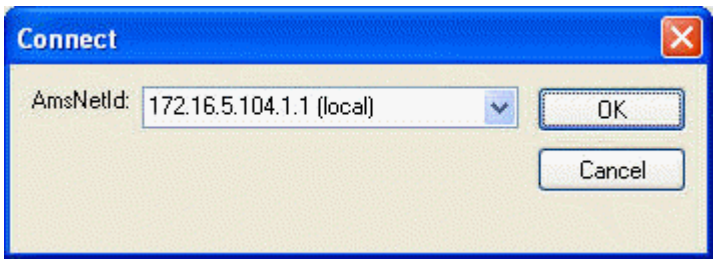
ads_data contains '01 25 a0'

4.2 Remote control of the logger (online mode)

The Viewer can control the AMS Logger remotely. As s consequence the logger can be started, stopped, and configured from a remote computer.

Connect to the AMS logger

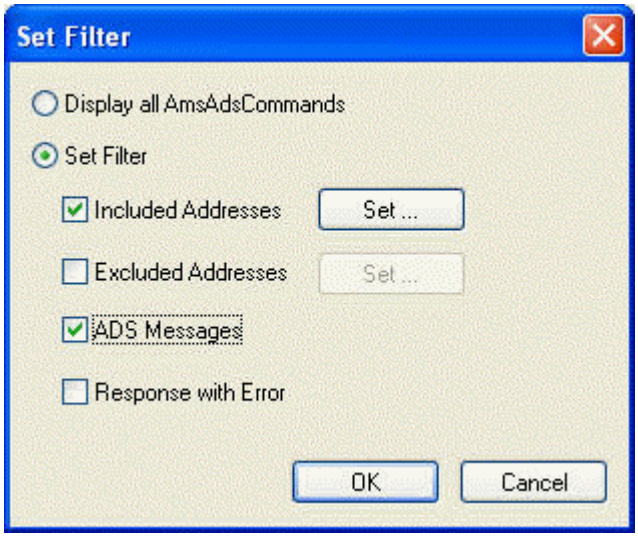
1. Open the menu **Connection** and select the entry **Connect**. This opens the **Connect** dialog:



2. Choose the computer that contains the AMS Logger you want to connect to and confirm the dialog.

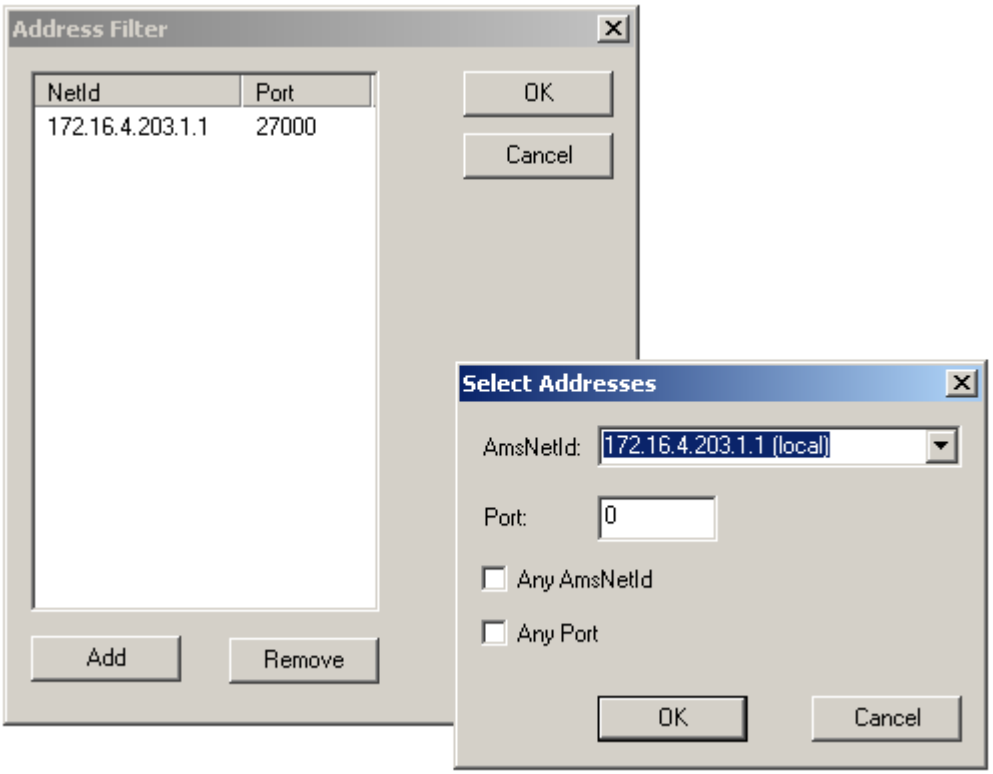
Applying a filter in online mode

In the online mode you can set a filter, to reduce the amount of AMS/ADS commands to be recorded. Therefore you have to select the entry **Set Capture Filter...** in the context menu of the tree view item **AmsViewer**. This opens the **Set Filter** dialog:



If the **ADS Message** button is checked, only ADS commands are captured. If the **Response with Error** button is checked, only the erroneous AMS/ADS commands are captured.

If the **Included Addresse**s button is checked, you can specify a list of ADS devices, whose messages you want to record.



With **Excluded Addresses** you can specify a list of ADS devices, whose messages you do not want to record.

Starting/Stopping the capture

The capture can be started with the **<F5>** key or with the displayed button in the toolbar.

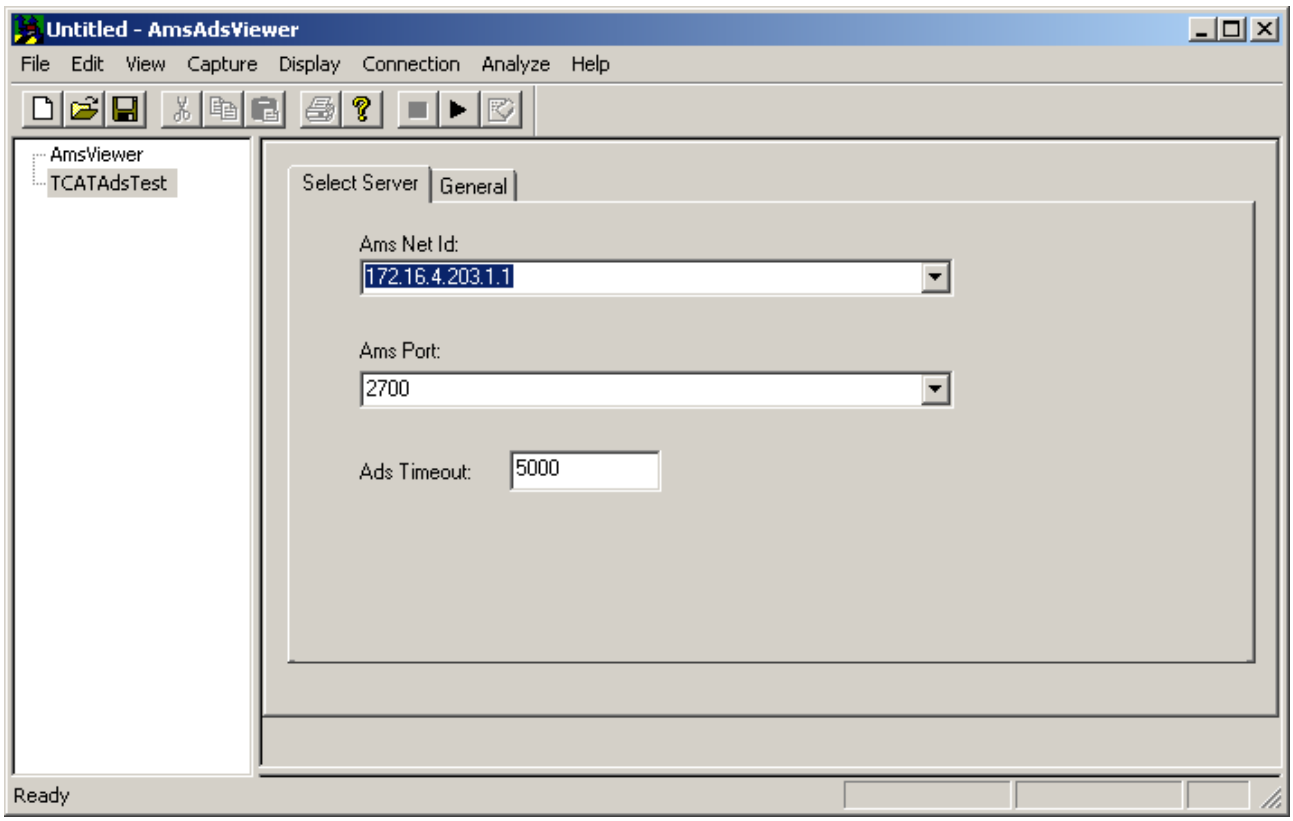
The capture can be stopped with the shortcut **<Shift>** + **<F5>** or by clicking the display button in the toolbar. To view the captured AMS/ADS message, you have to select the entry **Display Captured Packets...**in the context menu of the tree view item **AmsViewer.**

4.3 Create Test signals

The ADS test monitor enables configuration of test signals for testing the functionality of the ADS server.

Establishing a connection to the ADS server

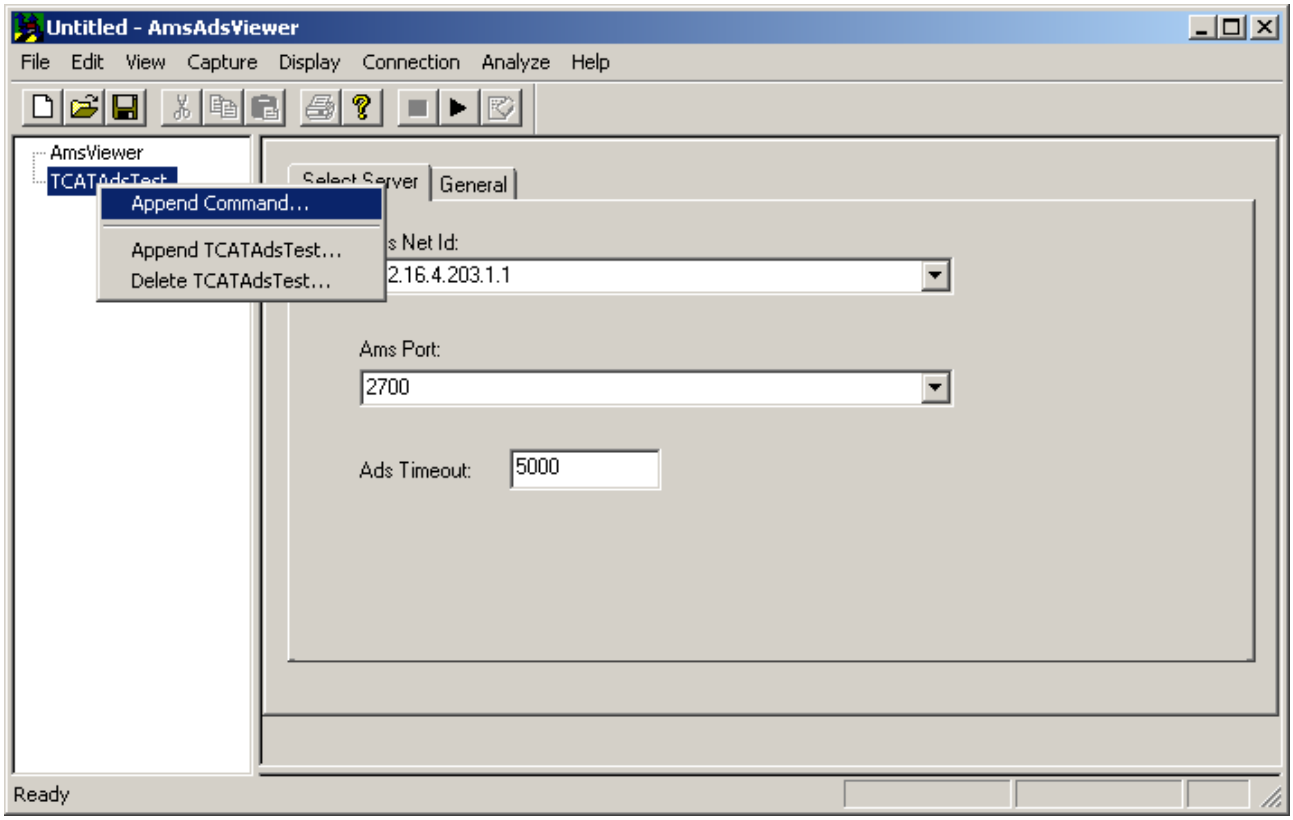
Select **TCATAdsTest** in the main window to specify the **Ams Net Id** and the configured **Ams port**.



Via an existing connection configurable signals can be sent to the ADS server.

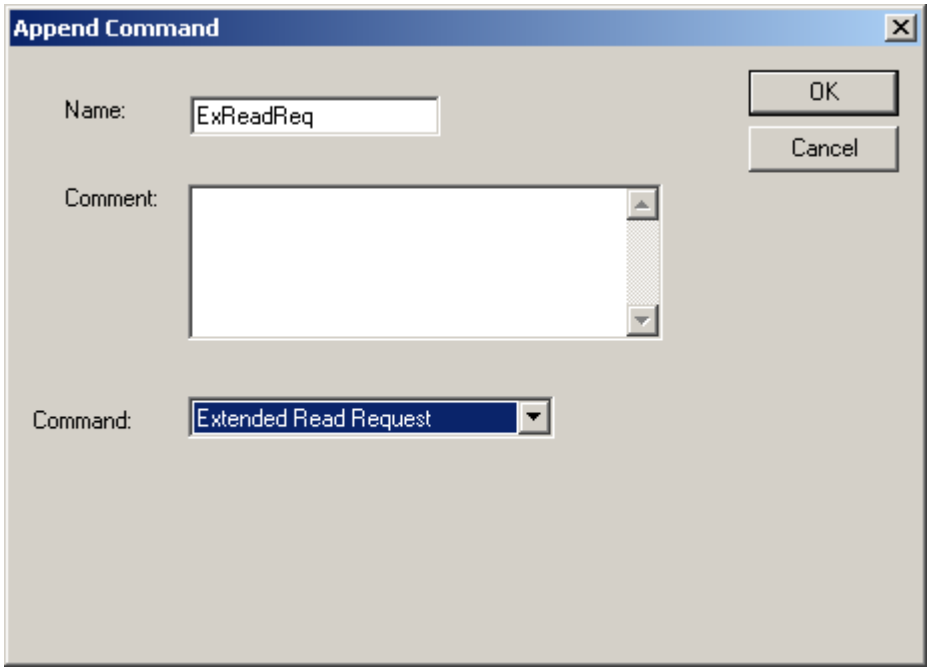
4.3.1 Read command

Right-click on **TCATAdsTest** to generate a test signal via the **Append Command...** context dialog.



Creating test signals

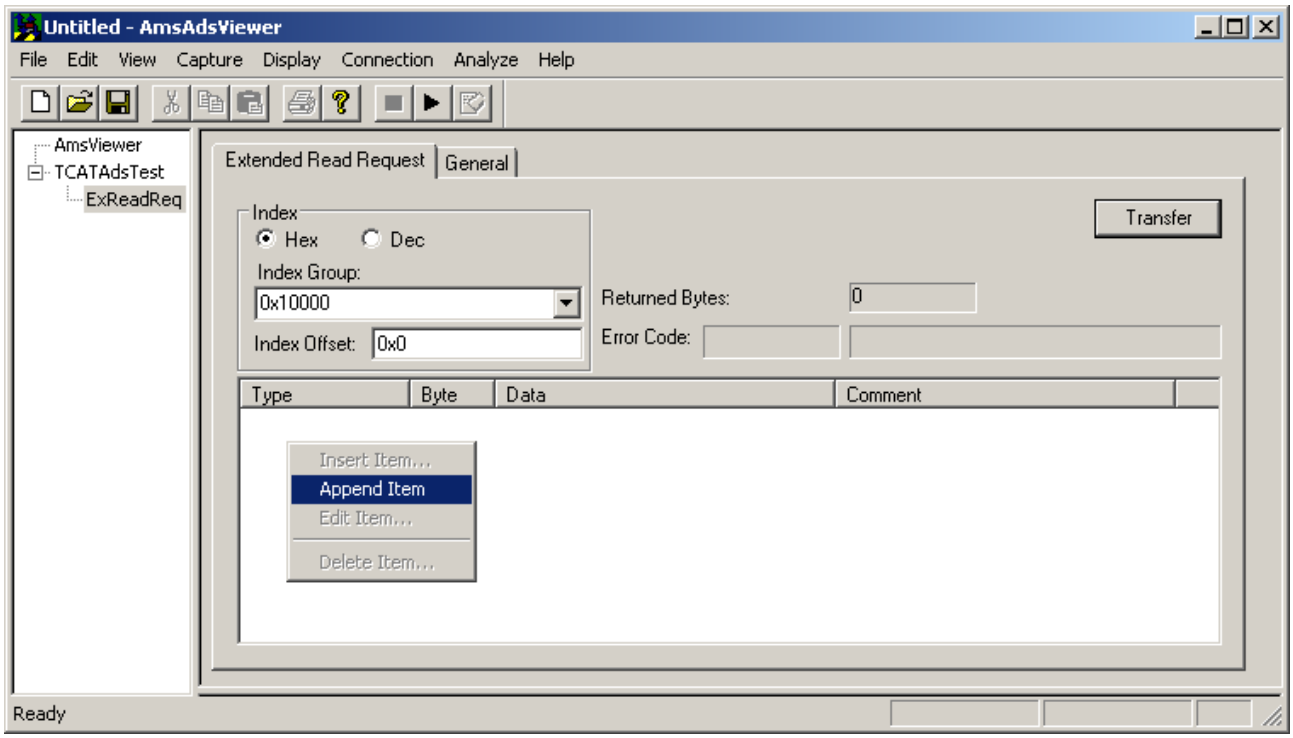
A dialog for configuring the signal opens:



Assign a name, select the command **Extended Read Request** and confirm the entry with **OK**.

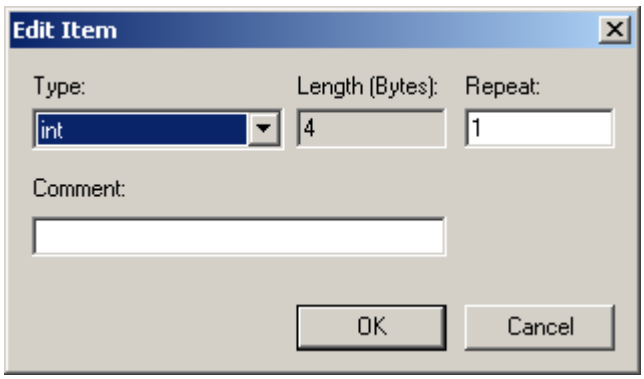
Example configuration for an extended read command

In main window specify the **Index Group** and the **Index Offset** for the ADS server:



The data to be read can be added the context menu **Append Item** (right-click).

In the following dialog the **Type** of the read value can be entered:

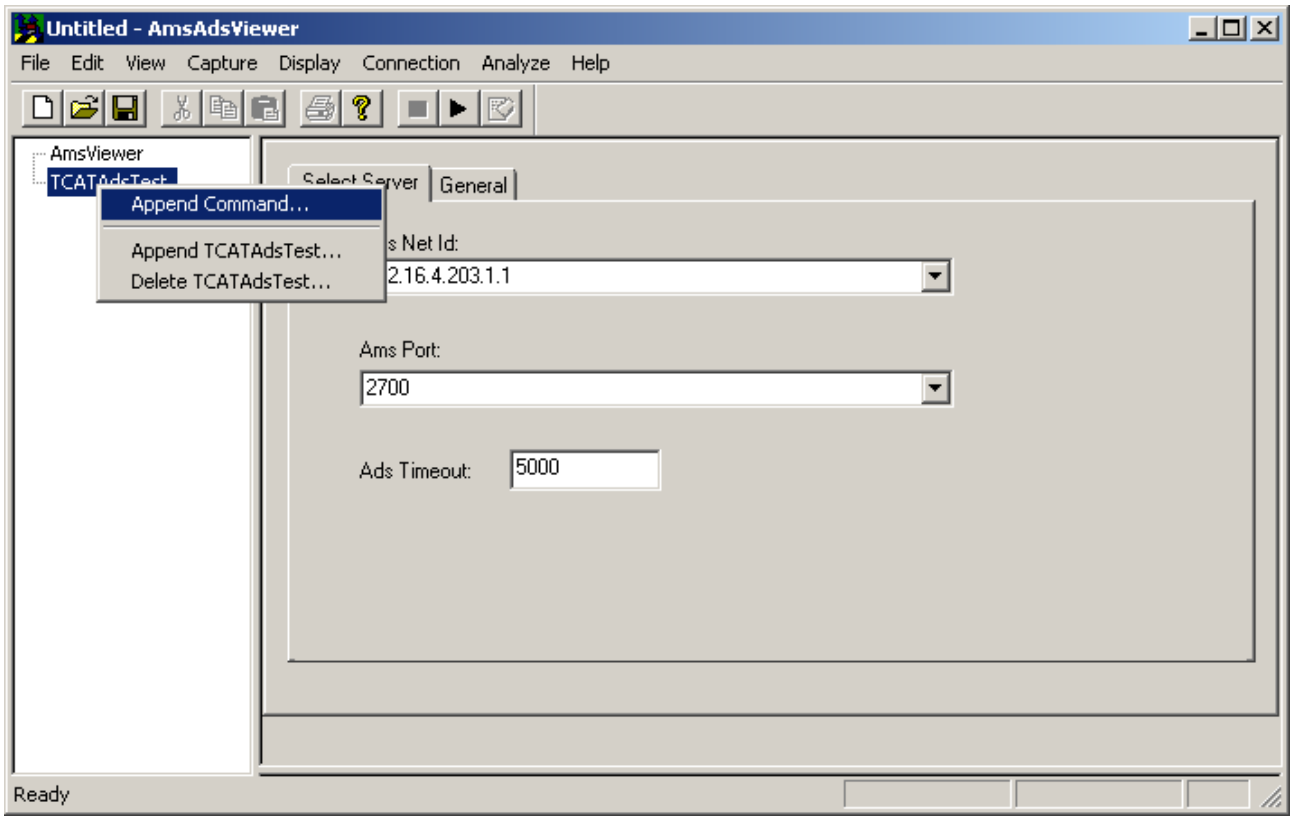


Please note that the data length (**Length**) must match the received data. The **Repeat** parameter defines how often the data are created. Confirm the entry with **OK**.

The signal is sent via the **Transfer** button.

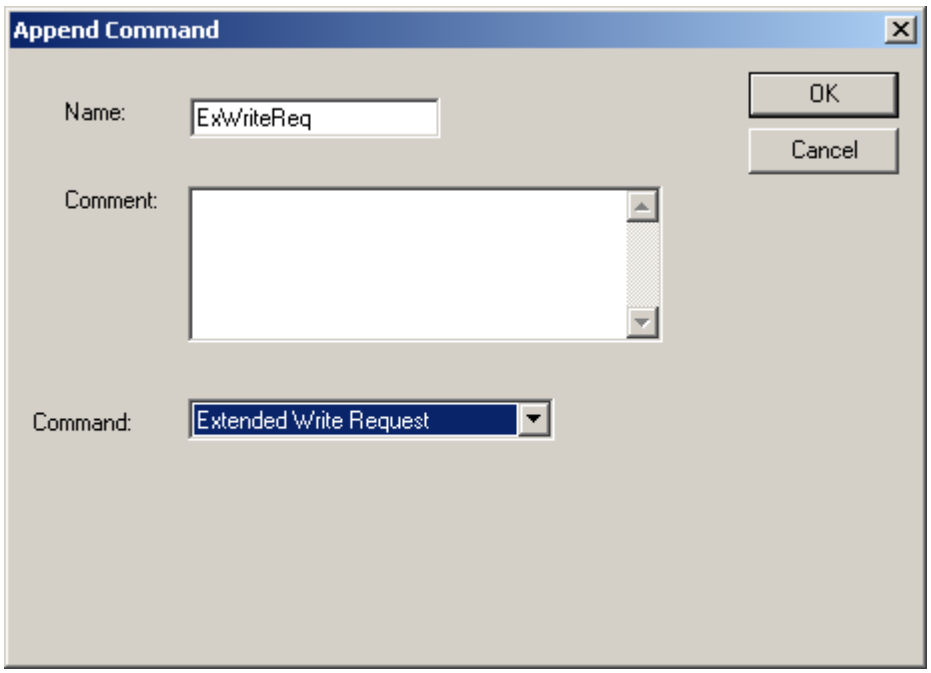
4.3.2 Write command

Right-click on **TCATAdsTest** to generate a test signal via the **Append Command...** context dialog.



Creating a test signal

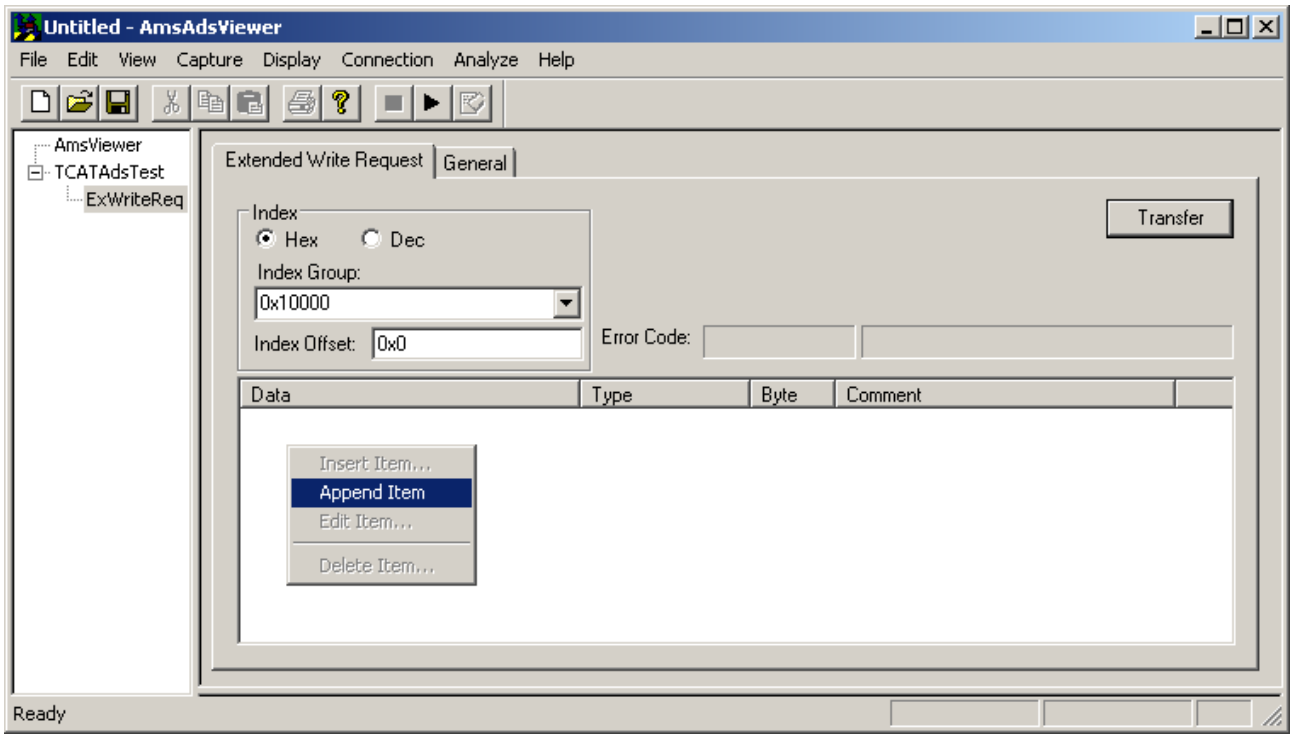
A dialog for configuring the signal opens:



Assign a name, select the command **Extended Write Request** and confirm the entry with **OK**.

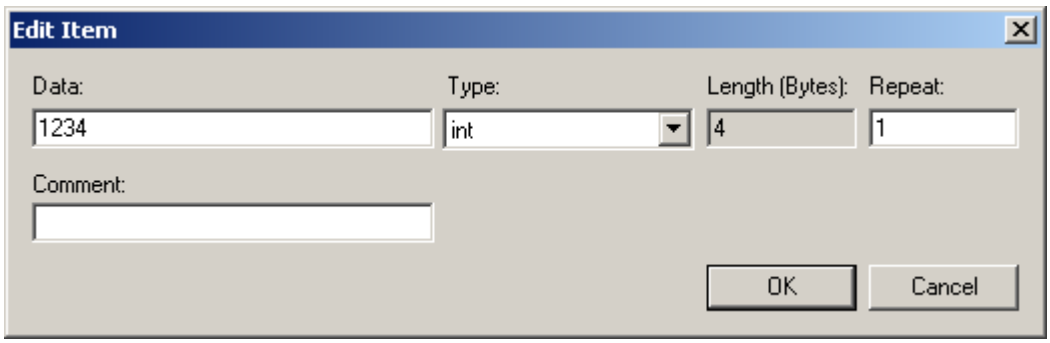
Example configuration for an extended write command

In main window specify the **Index Group** and the **Index Offset** for the ADS server:



The data to be written can be added the context menu **Append Item** (right-click).

In the following dialog the **Type** and content (**Data**) of the data can be specified:



Please note that your ADS server supports the data length (**Length**). The **Repeat** parameter defines how often the data are created. Confirm the entry with **OK**.

The signal is sent via the **Transfer** button.

More Information:
www.beckhoff.com/automation

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