

KNX Training Centre Workshop

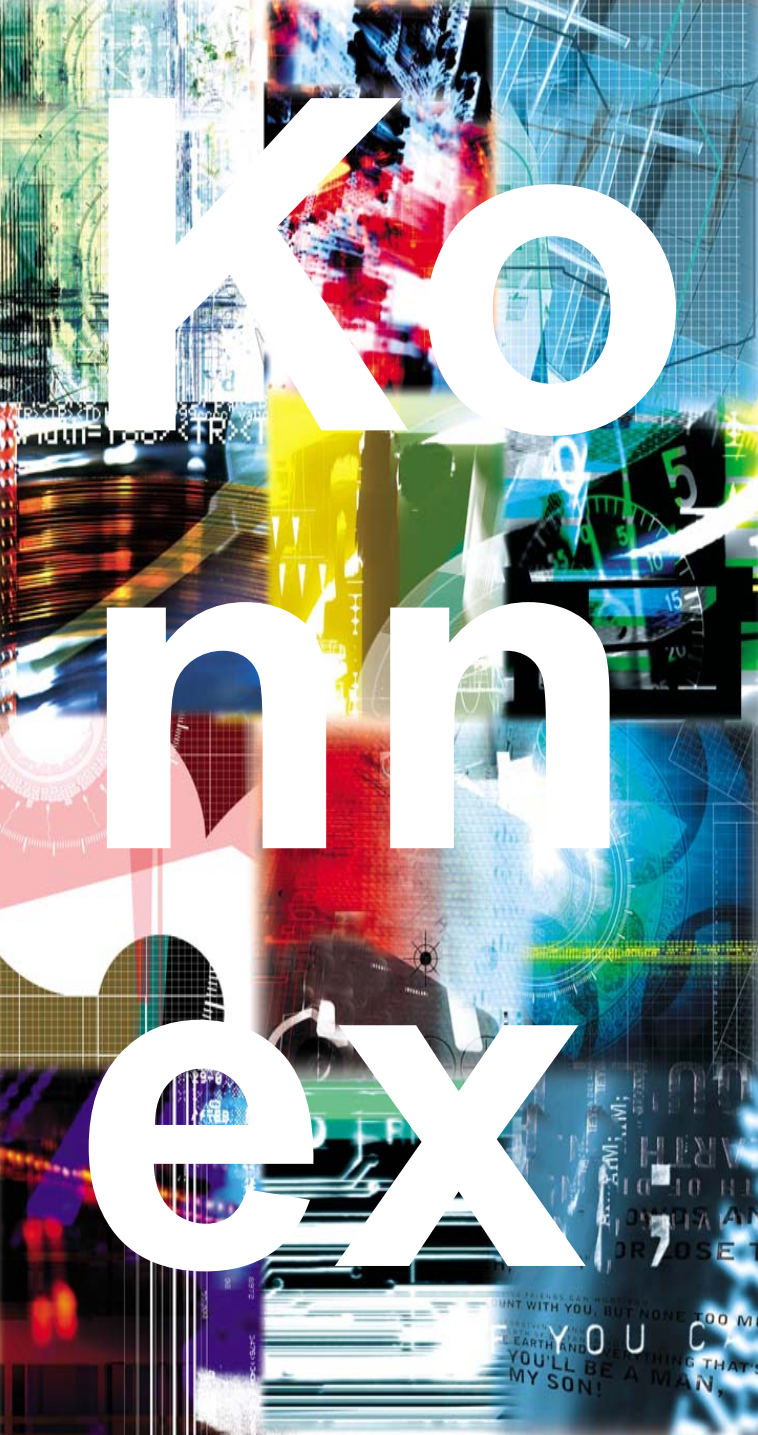
Radevormwald

May 23, 2006

Chantal Degol

Marc Goossens





1. The KNX OPC Server

Marc Goossens

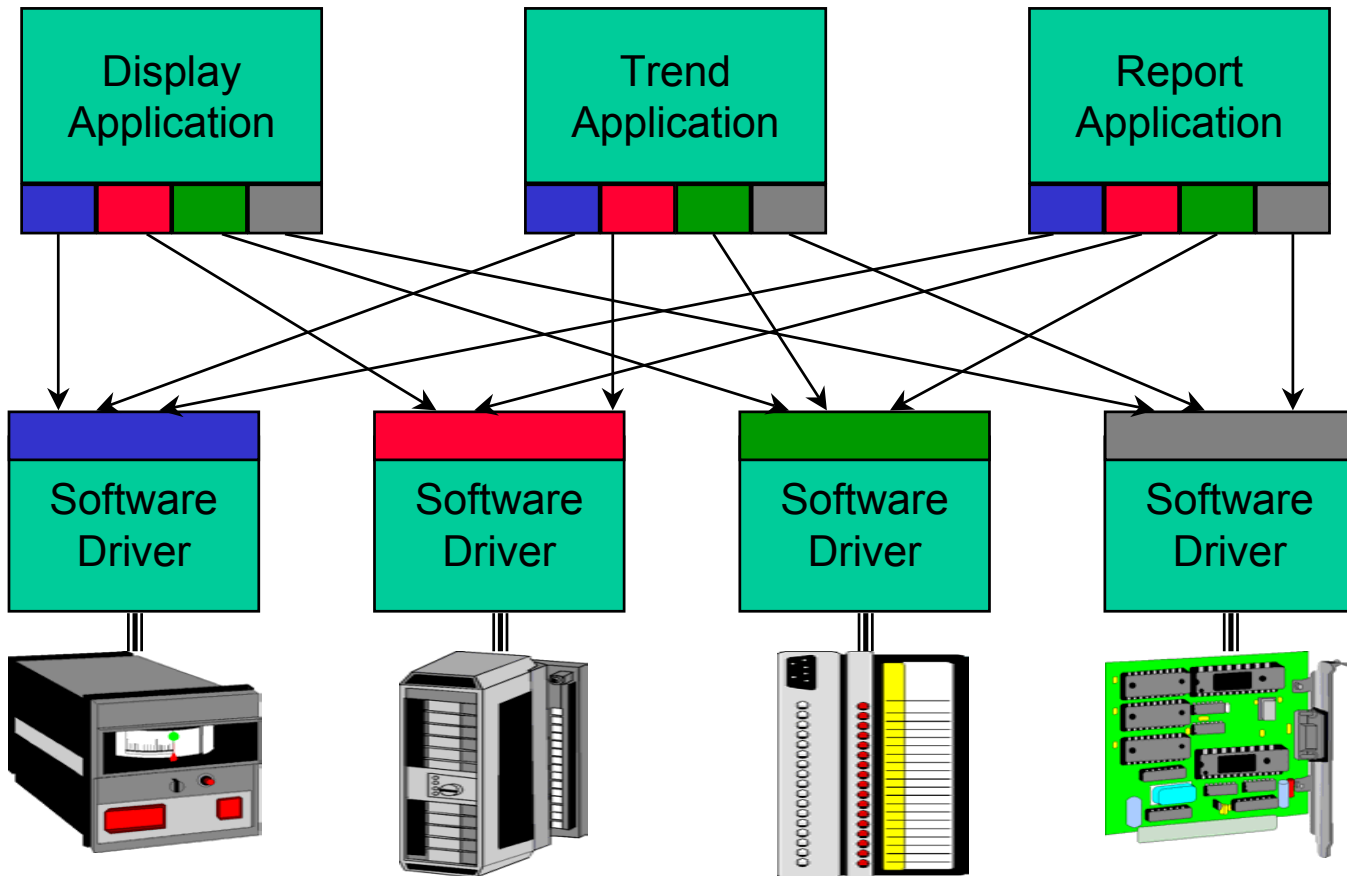


“OPC” ???

- “OLE” stands for “Object Linking and Embedding”
 - this allows dynamic integration of data from different sources in one environment (document)
 - developed for Windows
 - typical example: embed an Excel spreadsheet in a Word document
- “OPC” stands for “OLE for Process Control”
 - exploits these concepts for controlling networked, automated processes from a Windows PC
 - examples may be industrial processes (production, power generation plants, ...) but also building control
 - this usage is often referred to as “SCADA”
 - “SCADA” stands for “Supervision, Control and Automatic Data Acquisition”
- the OPC standard is managed by the OPC Foundation:
 - see www.opcfoundation.org

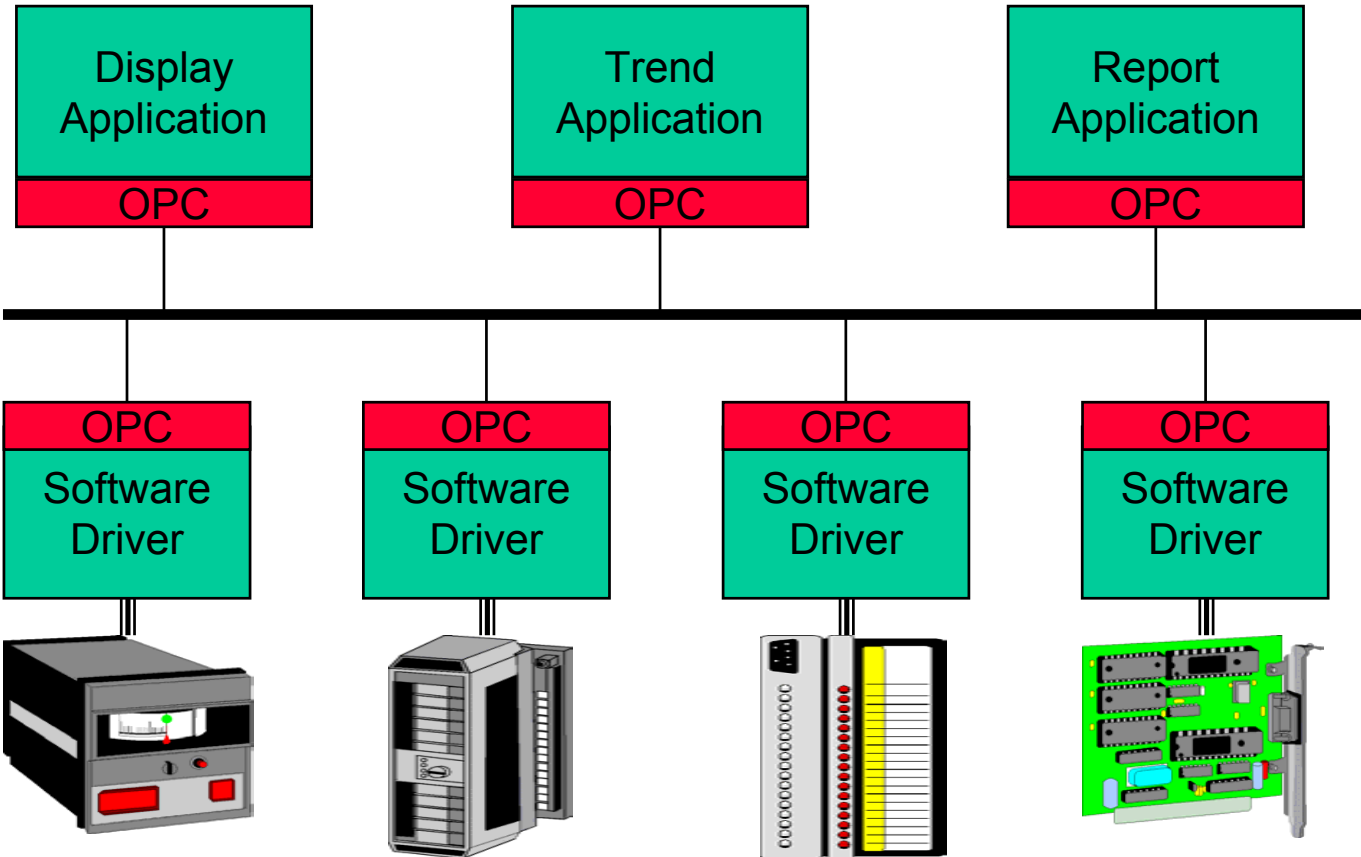
➔ *For this kind of requirements, “OPC” is an integrating technology and an important de facto standard.*

Why OPC? – The problem ...



- “SCADA” involves status display, trends, reporting spanning heterogeneous hardware environments
- You need...
 - blue drivers
 - red drivers
 - green drivers
 - grey drivers
 - etc.

Why OPC? – The answer ...



- OPC provides a unified driver / interface concept

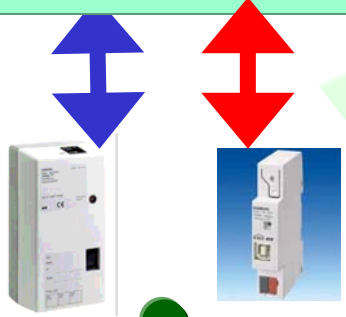
The KNX OPC Server: your freedom of choice



Visualization

KNX OPC Server

“Falcon”
KNX driver library



← KNX Installation →

Get all relevant data directly from the ETS project!

- ... and use any OPC-compliant visualization solution or toolkit to present the KNX building on the PC screen...
- ... you choose!

Access to KNX via **USB**, Ethernet / IP, ...

Novelties with KNX (“EIB”) OPC Server 1.6



KNX OPC
1.6

- is OPC 2.0 (DA) compliant
 - “DA” stands for “Data Access”
 - this is an enhanced client-server integration model, proposed by OPC
- is .net compliant (checked with opcdanet)
 - .net is the powerful “software plumbing” technology for Windows
- supports group addressing read/write
- supports live check of devices (“ping” of physical addresses)
 - automatically (cyclic)
 - manual device check
- comes with OPC Server Configurator 1.6
 - change EIS types,... comfortably
- improved user Help

Novelties with KNX (“EIB”) OPC Server 2.0 (i)

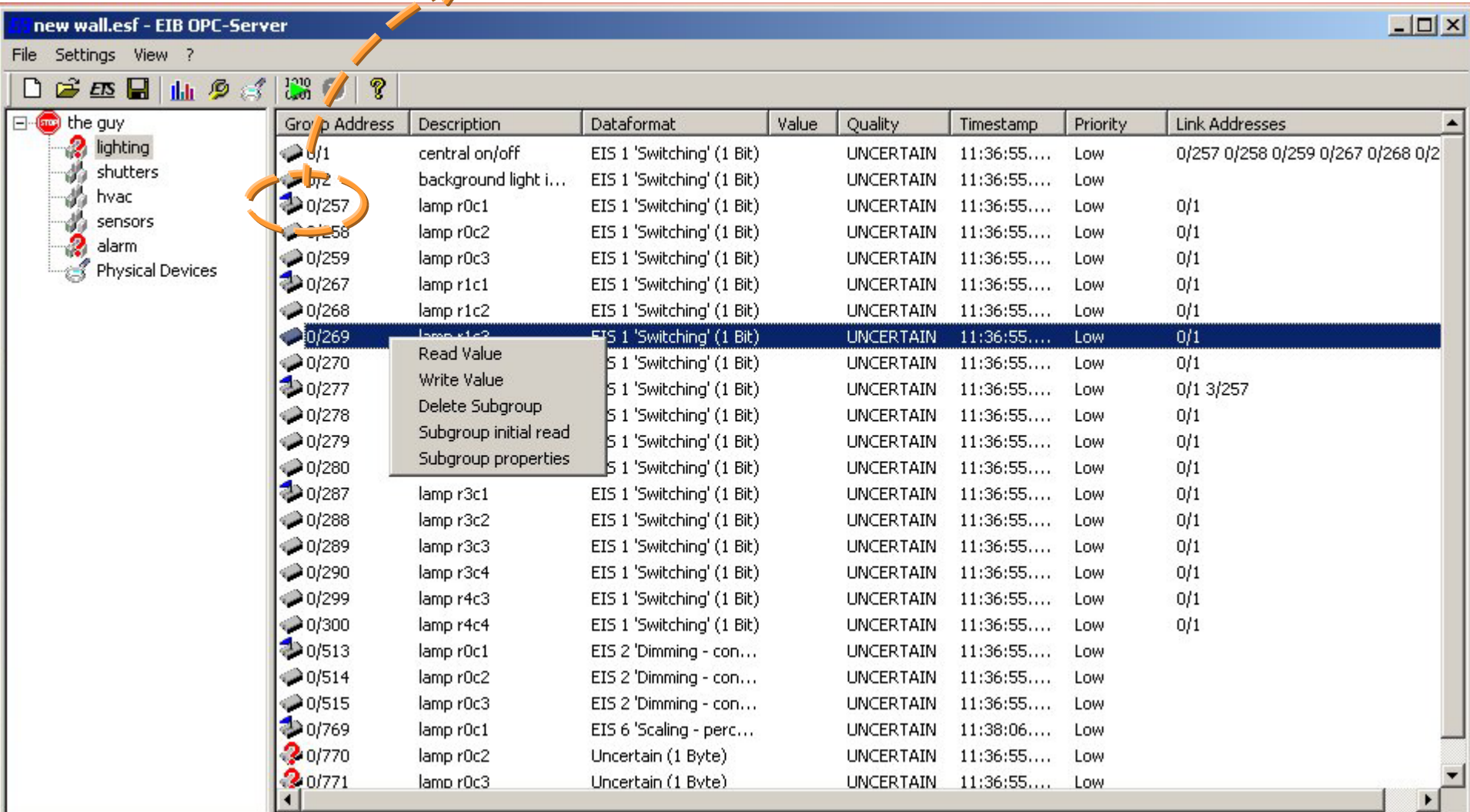


KNX OPC
2.0

- includes some minor bug fixes:
 - corrects properties in “multiple selection” error
 - corrects selecting errors
 - properly checks for dot (".") in Group Addresses
- permits soft active status synchronization
 - startup initialization with KNX/EIB bus overload protection
 - configurable per Group Address
- evades any transient KNX/EIB network overload
 - features buffer to store read / write requests
- uses new version of Falcon library, with
 - integrated KNX/EIB Connection Manager
 - supports the following Server-KNX/EIB Network Interfaces:
 - ✓ RS232 (PEI10 / PEI16)
 - ✓ USB
 - ✓ iETS (IP)

Illustration: the OPC Configurator

■ blue flag = "synchronize on startup"



The screenshot shows the OPC Configurator window for 'new wall.esf - EIB OPC-Server'. The interface includes a menu bar (File, Settings, View, ?), a toolbar with various icons, and a tree view on the left showing a project structure with categories like 'lighting', 'shutters', 'hvac', 'sensors', 'alarm', and 'Physical Devices'. The main area is a table of group addresses.

Group Address	Description	Dataformat	Value	Quality	Timestamp	Priority	Link Addresses
0/1	central on/off	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/257 0/258 0/259 0/267 0/268 0/2
0/2	background light i...	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	
0/257	lamp r0c1	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/258	lamp r0c2	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/259	lamp r0c3	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/267	lamp r1c1	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/268	lamp r1c2	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/269	lamp r1c3	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/270		EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/277		EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1 3/257
0/278		EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/279		EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/280		EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/287	lamp r3c1	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/288	lamp r3c2	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/289	lamp r3c3	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/290	lamp r3c4	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/299	lamp r4c3	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/300	lamp r4c4	EIS 1 'Switching' (1 Bit)		UNCERTAIN	11:36:55...	Low	0/1
0/513	lamp r0c1	EIS 2 'Dimming - con...		UNCERTAIN	11:36:55...	Low	
0/514	lamp r0c2	EIS 2 'Dimming - con...		UNCERTAIN	11:36:55...	Low	
0/515	lamp r0c3	EIS 2 'Dimming - con...		UNCERTAIN	11:36:55...	Low	
0/769	lamp r0c1	EIS 6 'Scaling - perc...		UNCERTAIN	11:38:06...	Low	
0/770	lamp r0c2	Uncertain (1 Byte)		UNCERTAIN	11:36:55...	Low	
0/771	lamp r0c3	Uncertain (1 Byte)		UNCERTAIN	11:36:55...	Low	

A context menu is open over the row for group address 0/269, showing options: Read Value, Write Value, Delete Subgroup, Subgroup initial read, and Subgroup properties. A blue flag icon is visible next to the group address 0/269 in the table, indicating 'synchronize on startup'.

Novelties with KNX (“EIB”) OPC Server 2.0 (ii)



KNX OPC
2.0

- features Simulation Mode:
 - performs random setting of different values to check the results of OPC clients.
- directly uses data form native ETS 3 OPC exports
 - no “import” necessary
- improved KNX Interworking datatype support (“EIS”)

→ allows a flexible licensing and pricing model, adapted to project size and requirements.

Example: Quick Results with Visual Basic

```

Microsoft Visual Basic - 2000.02.03 Test 5 OPC Server - Test Case modified.ppt [design] - [Slide56 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
Ln 22, Col 1
Connect_Button Click
Private Sub Connect_Button_Click()
    ' first check if the objOPCServer is not already connected to.
    Set objOPCServer = New OPCAutomation.OPCServer
    If objOPCServer.ServerState = OPCDisconnected Then
        With objOPCServer
            Call .Connect("ICON.EIBOPCServer")

            Set objOPCGroup = .OPCGroups.Add("Testgroup")

            Lamp1Switch = 1
            Lamp2Switch = 2
            Lamp3DimControl = 3
            Lamp3Switch = 4
            Lamp3DimValue = 5

            Set Lamp1SwitchOPCItem = objOPCGroup.OPCItems.AddItem("Hoofdgroep.0/1", Lamp1Switch)
            Set Lamp2SwitchOPCItem = objOPCGroup.OPCItems.AddItem("Hoofdgroep.0/2", Lamp2Switch)
            Set Lamp3DimControlOPCItem = objOPCGroup.OPCItems.AddItem("Hoofdgroep.0/3", Lamp3DimControl)
            Set Lamp3SwitchOPCItem = objOPCGroup.OPCItems.AddItem("Hoofdgroep.0/4", Lamp3Switch)
            Set Lamp3DimValueOPCItem = objOPCGroup.OPCItems.AddItem("Hoofdgroep.0/5", Lamp3DimValue)

        End With
    End If

    ... some further initialisation of the user interface

    ' ----- This only at the very end !!
    objOPCGroup.UpdateRate = 100 ' This is the update rate in milliseconds
    Let objOPCGroup.IsSubscribed = True

End Sub

Private Sub Lamp1Switch_CheckBox_Click()
    If Lamp1Switch_CheckBox.Value = True Then
        Call Lamp1SwitchOPCItem.Write(1)
    Else
        Call Lamp1SwitchOPCItem.Write(0)
    End If

    datWait = Second(Now)
    Do While (Second(Now) - datWait + 60) Mod 60 < 2
        DoEvents
    Loop

End Sub

```

Your computer already knows what an OPC server is.
 Create an object that will represent an OPC server
 Tell your computer that that OPC server will be the KNX OPC server and connect to that server.

The Group Addresses are available as *OPC Items*. Every OPC Server gives such OPC item a unique name, an identifier. It is

Then, you make OPC Items.
 One for each Group Address you are interested in.
 Nice names for easy recognition.

This is how the KNX OPC Server names the Group Addresses.

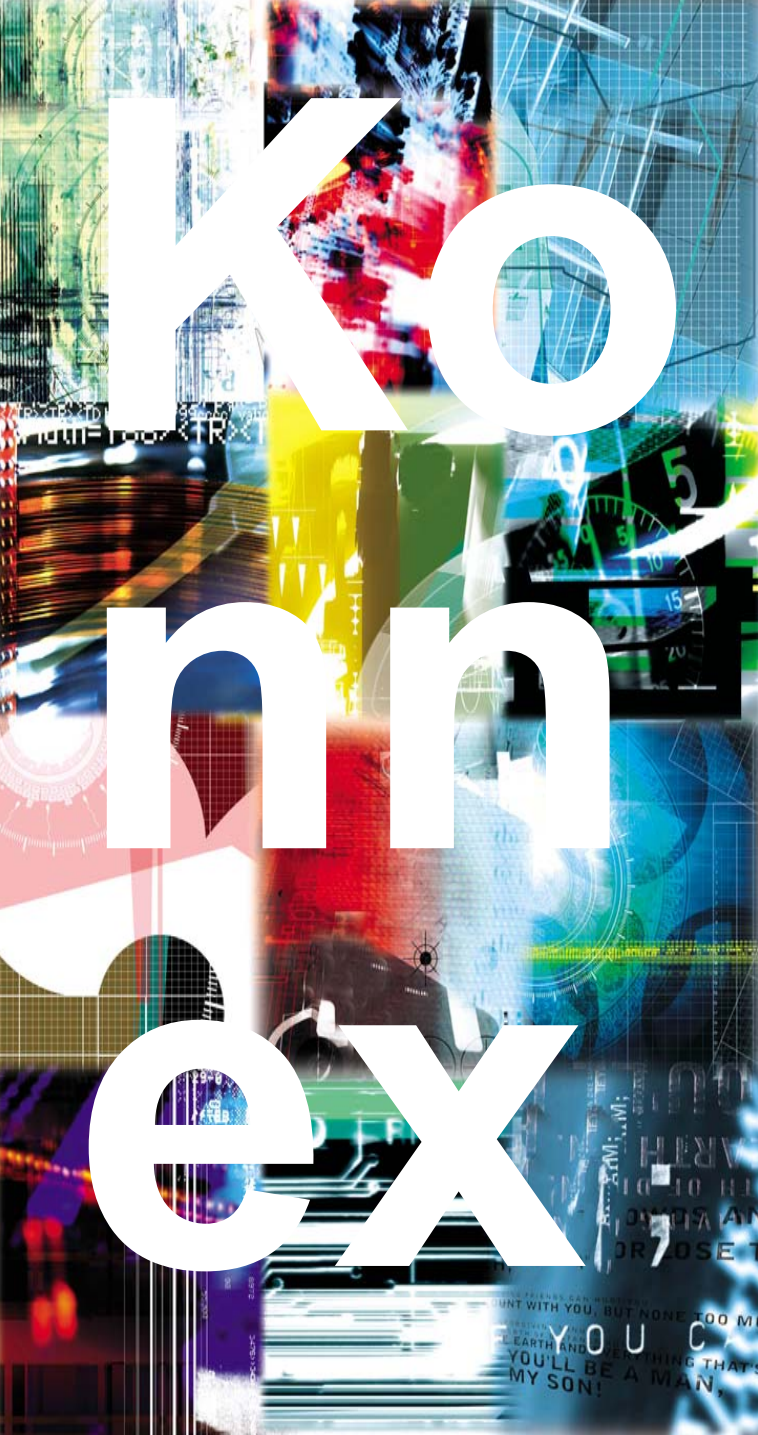
Of course ... we use our human readable names for our identifiers, instead of some numbers.

If the person who uses my software clicks on some checkbox ...

... then switching the light on just means doing the Write operation with a value 1

... or 0 to switch off ...

These values have to be encoded according the EIS or Datapoint Types.



2. ETS Professional 3.0d

Marc Goossens



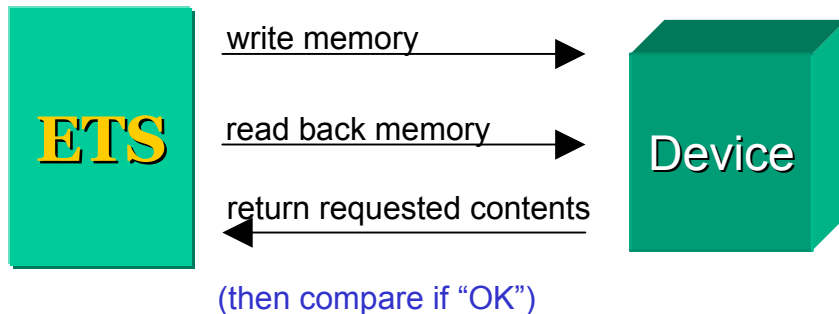
Some highlights from ETS 3.0d (i)

→ ETS Pro 3.0d brings over 100 enhancements, compared to 3.0c.

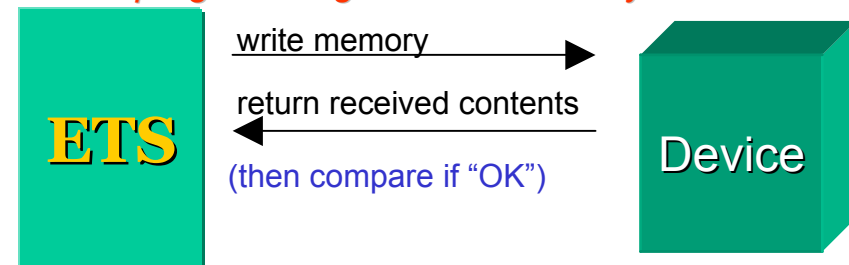
A selection:

- Improved and extended on-line help.
- Faster and more efficient initial programming of devices on the bus.
 - exploiting a special feature, known as “Verify Mode”, available in most devices

device programming “old style”



device programming with active Verify Mode



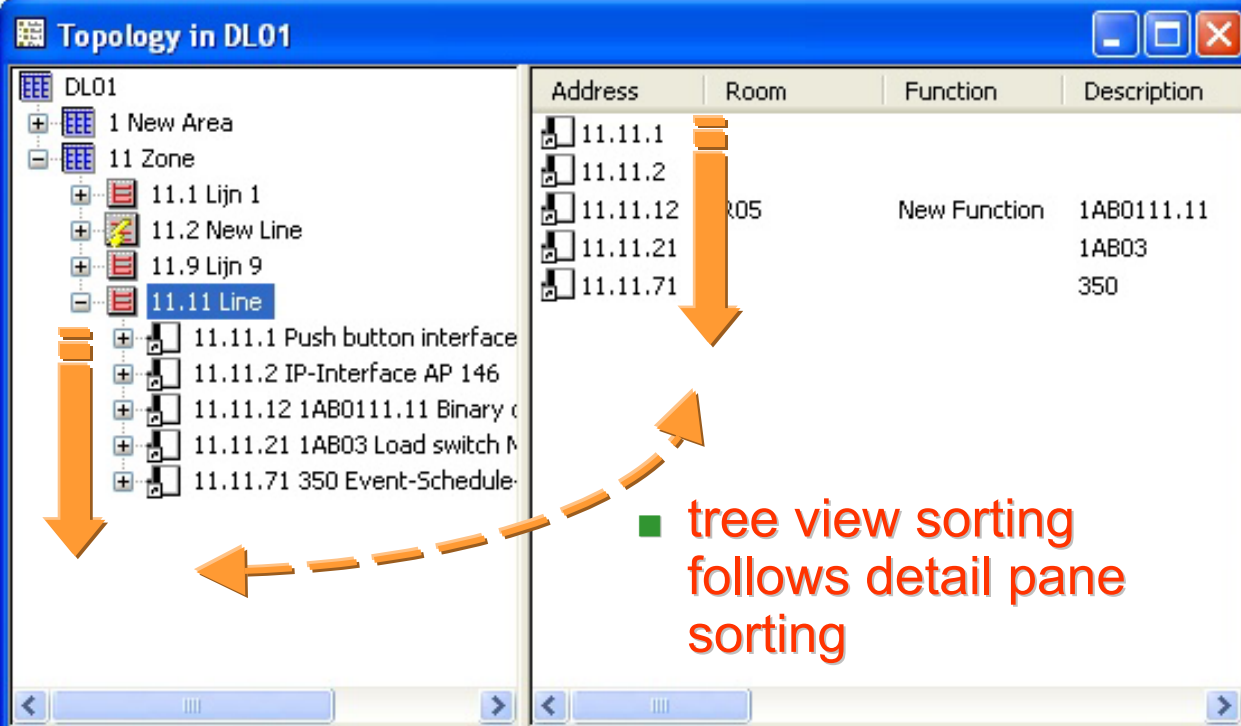
Some highlights from ETS 3.0d (ii)

- Intelligent and hence faster programming of subsequent modifications to devices.
- Support of new high-performance / sophisticated product series
 - based on the “device models” (or “mask versions”):
 - ✓ (hexadecimal) 0705
 - ✓ (hexadecimal) 07B0, known as “System B”

➔ *Among the challenges resulting from the download changes:*

- *do all existing products correctly support the now activated verify Mode feature?*
- *do all existing products tolerate “KNX specification - neutral” modifications resulting from new masks?*
- *.... or will product-specific exception handling be required?*

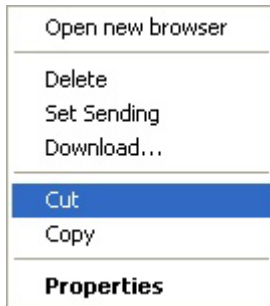
Sort Synchronization



The screenshot shows a software window titled "Topology in DL01". On the left is a tree view showing a hierarchy: DL01, 1 New Area, 11 Zone, 11.1 Lijn 1, 11.2 New Line, 11.9 Lijn 9, and 11.11 Line (selected). Below 11.11 Line are several sub-items including "11.11.1 Push button interface", "11.11.2 IP-Interface AP 146", "11.11.12 1AB0111.11 Binary c...", "11.11.21 1AB03 Load switch M", and "11.11.71 350 Event-Schedule...". On the right is a table with columns: Address, Room, Function, and Description. The table contains five rows of data. An orange arrow points from the table to the tree view, and a dashed orange arrow points from the table back to the table, indicating synchronization.

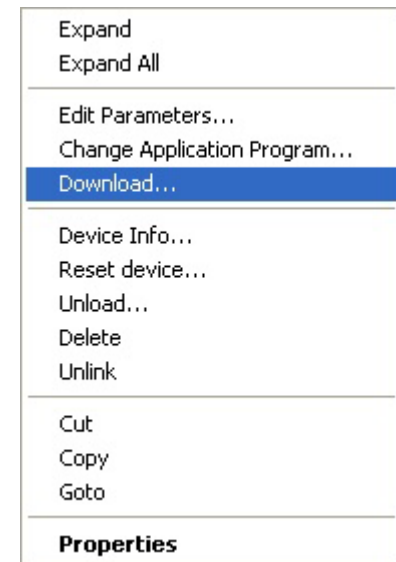
Address	Room	Function	Description
11.11.1			
11.11.2			
11.11.12	105	New Function	1AB0111.11
11.11.21			1AB03
11.11.71			350

■ tree view sorting follows detail pane sorting

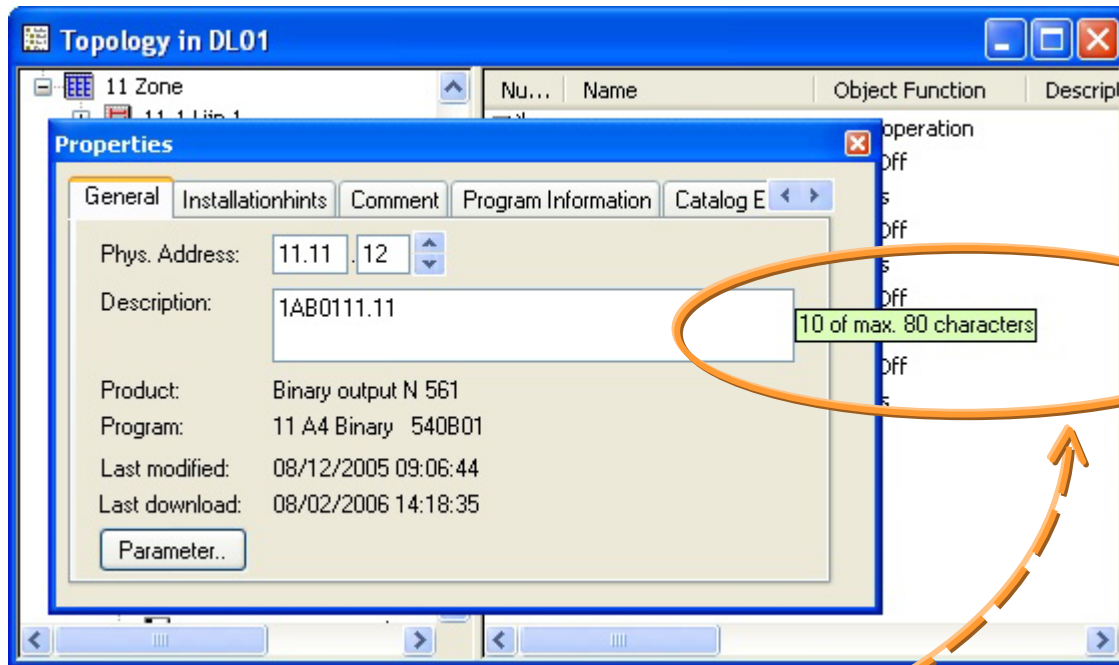


- “Cut” functionality added

- logically structured device context menu



Text field length indication



- tip shows characters used / available

Monitor Report

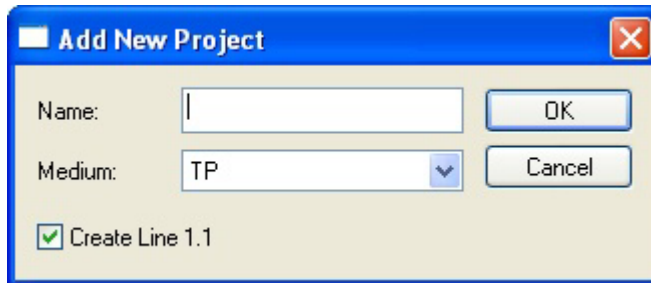
GroupMonitor1 (DL01)

</t

#	Time	Service	Flags	Prio	Src_addr	Source	Dest_addr	Destination	Rout	DPT	Type	Data
1	09:49:00.664	from bus		L	1.1.176	Not Found	1/0/1	Not Found	6	6 Bit	Write	\$00
2	09:49:21.043	from bus		L	1.1.5	Not Found	4/2/0	Not Found	6	2 Byte	Write	05 6E 13.9
3	09:49:35.784	from bus		L	1.1.5	Not Found	2/0/0	Not Found	6	2 Byte	Write	47 C6 5094.4
4	09:50:21.660	from bus		L	1.1.5	Not Found	4/2/0	Not Found	6	2 Byte	Write	05 6E 13.9
5	09:50:35.179	from bus		L	1.1.176	Not Found	1/0/0	Not Found	6	2 Byte	Write	0C 8F 23.34
6	09:50:36.301	from bus		L	1.1.5	Not Found	2/0/0	Not Found	6	2 Byte	Write	4C 02 5253.12
7	09:51:22.488	from bus		L	1.1.5	Not Found	4/2/0	Not Found	6	2 Byte	Write	05 64 13.8
8	09:51:23.409	from bus		L	1.1.85	Not Found	0/1/9	Not Found	6	6 Bit	Write	\$01

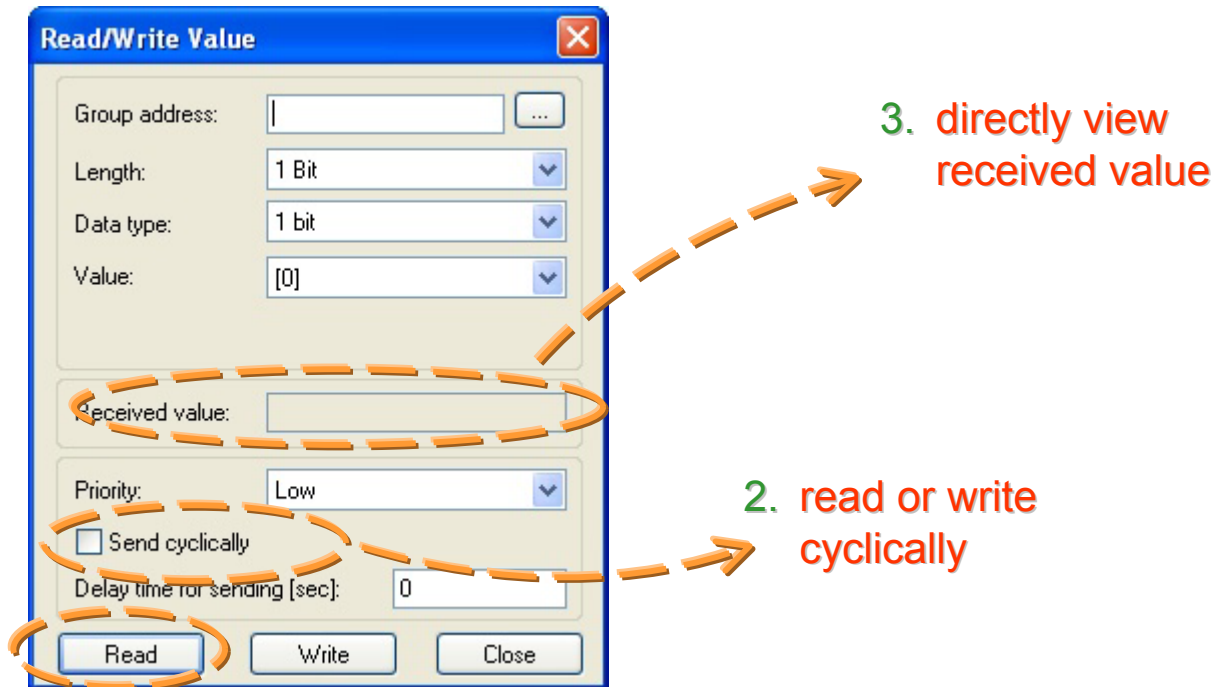
- bus telegram monitoring results now available as standard report for printing

“New Project” dialog



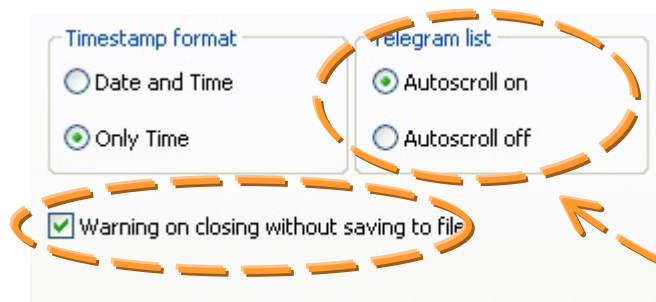
- quickly set medium and create “standard departure” line when creating a new project

Diagnostics: enhanced group value access



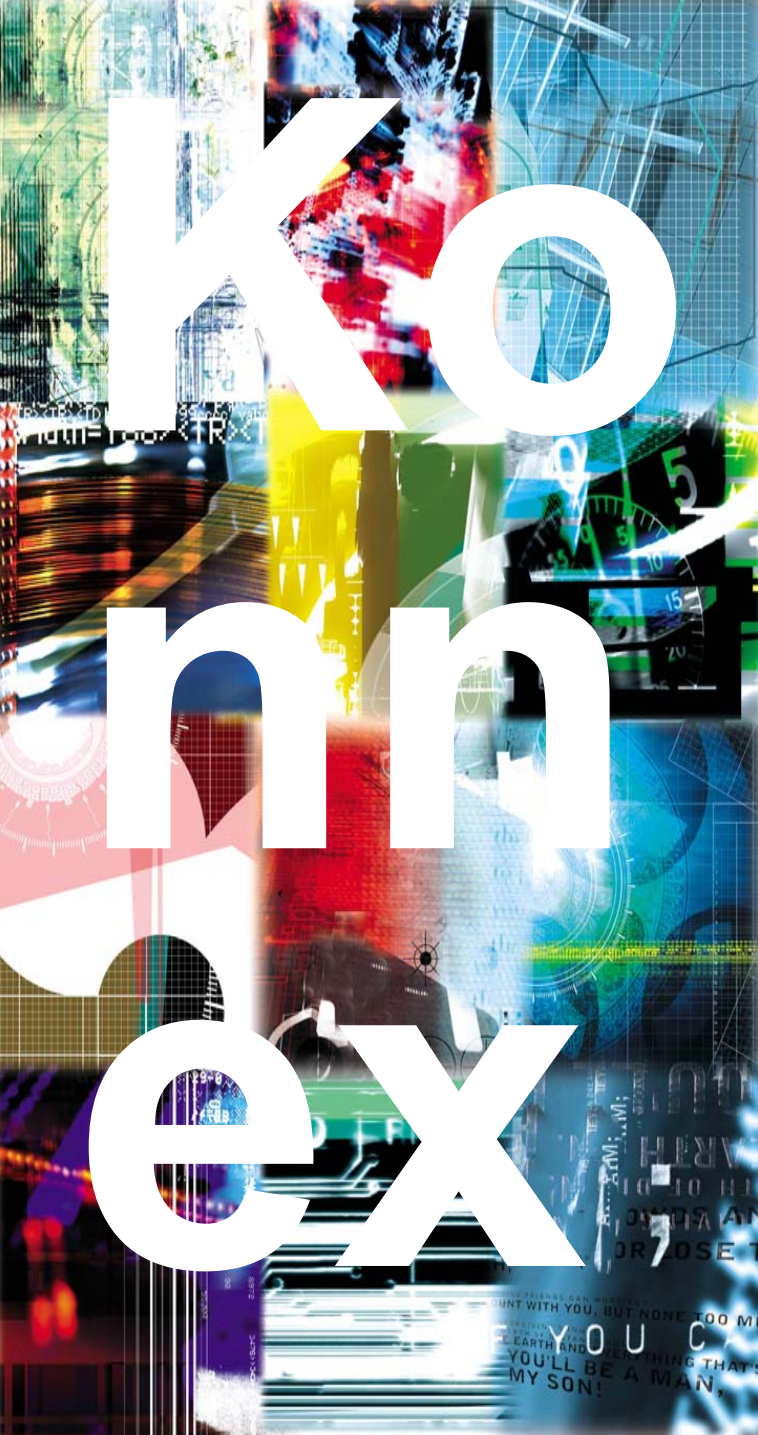
1. read or write
from same dialog

Diagnostics: more comfortable monitoring



- control “close monitoring” warning

- “autoscroll” keeps last recorded telegrams in view



**Thank you
for your attention**

