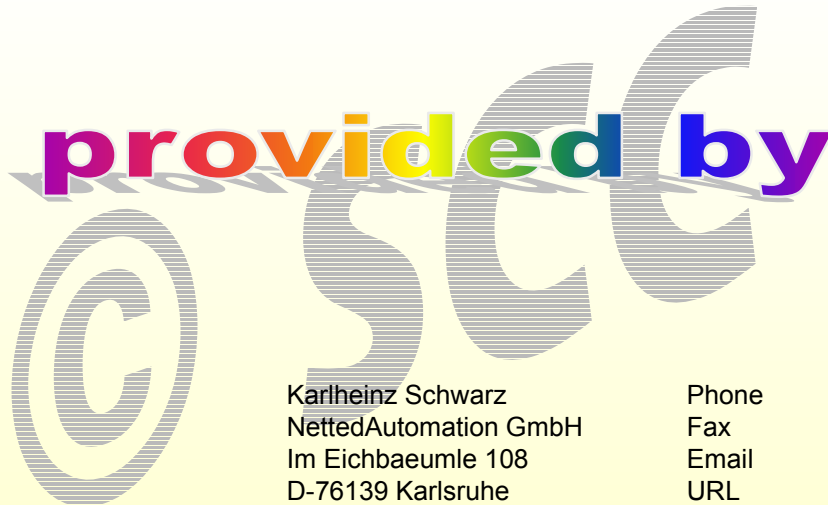


Experience with IEC 61850 compliant communication for Wind Power Plants

IEC 61850 server and client implementations based on DLLs



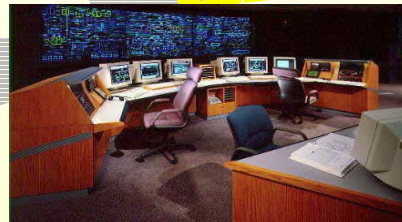
Karlheinz Schwarz
NettedAutomation GmbH
Im Eichbaeumle 108
D-76139 Karlsruhe
Germany

Phone
Fax
Email
URL

+49-721-684844
+49-721-679387
karlheinz.schwarz@nettedautomation.com
www.nettedautomation.com



IEC 61850 compliant communication for Wind Power Plants *



Project by Vattenfall & NettedAutomation

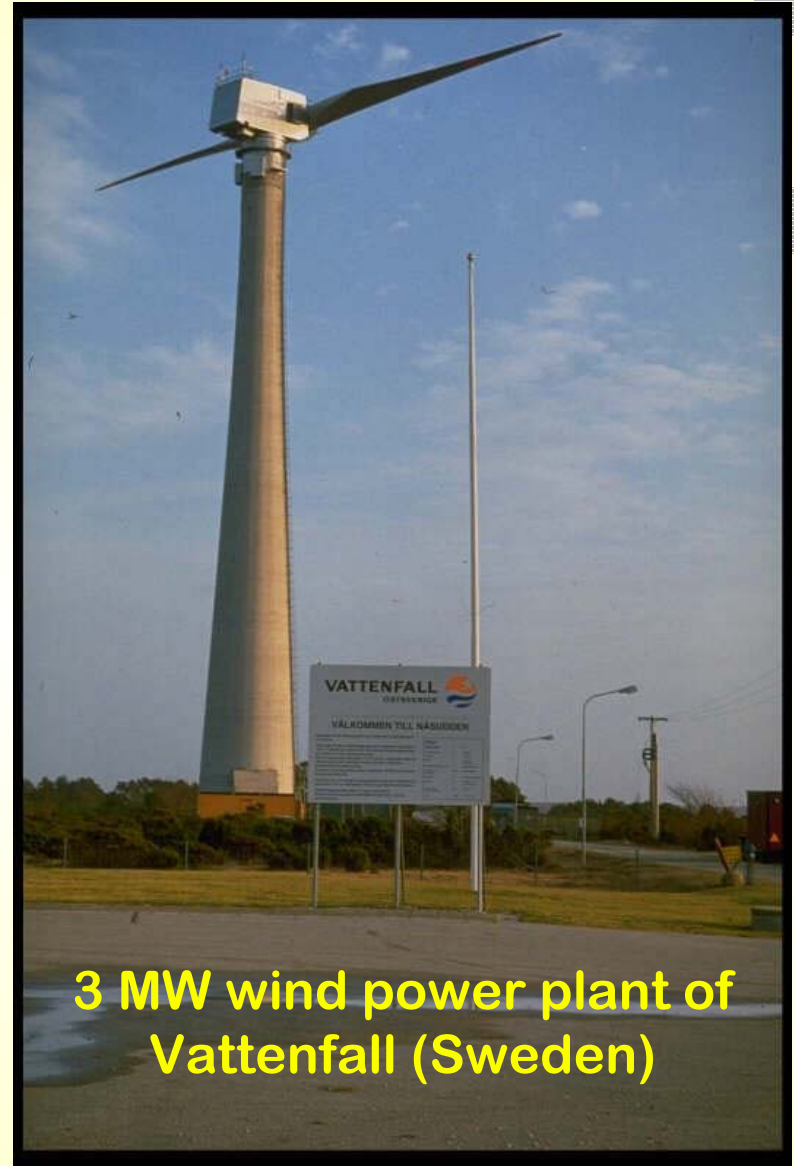
* Standard 61400-25 under preparation

see: <http://www.scc-online.de/std/61400/index.html>

Vattenfall (Sweden)

**Modelled with
IEC 61850
methods**

**Monitored and
Controlled with
IEC 61850
compliant services**



**3 MW wind power plant of
Vattenfall (Sweden)**

Wind power plant standardization

IEC TC 88

Draft IEC 61400-25

WIND TURBINE GENERATOR SYSTEMS

Communications for monitoring and
control of wind power plants

<http://www.scc-online.de/std/61400/index.html>

Wind power plant Logical Node models

Logical Node	Description
WTur	general wind turbine information
WGen	wind generator information
WGrd	wind grid information
WNac	wind nacelle information
WGer	wind gear information
WBrk	wind brake information
WRot	wind rotor information
WYaw	wind yaw information
WEnv	wind turbine information

WTur

Measurands

- Energy G1
- Energy G2
- Energy consumption
- Time with fault status
- Time with grid ok
- Time with wind for prod
- ...

Status information

- Free to yaw
- Free to operate
- Free run
- Safety chain
- Status Code
- ...

some 100
process data
points

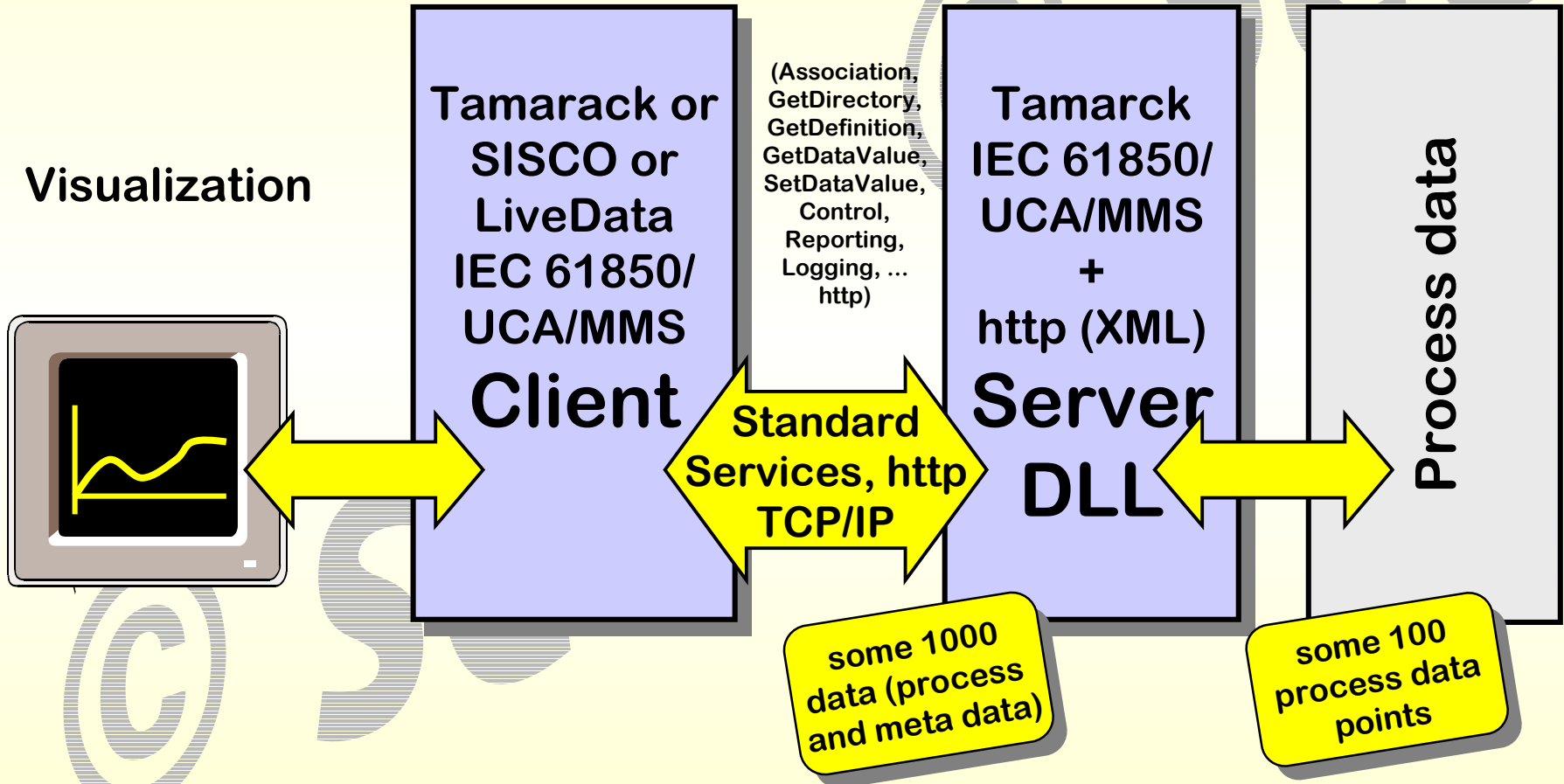
Wind power plant model

Wind generator (WGen)

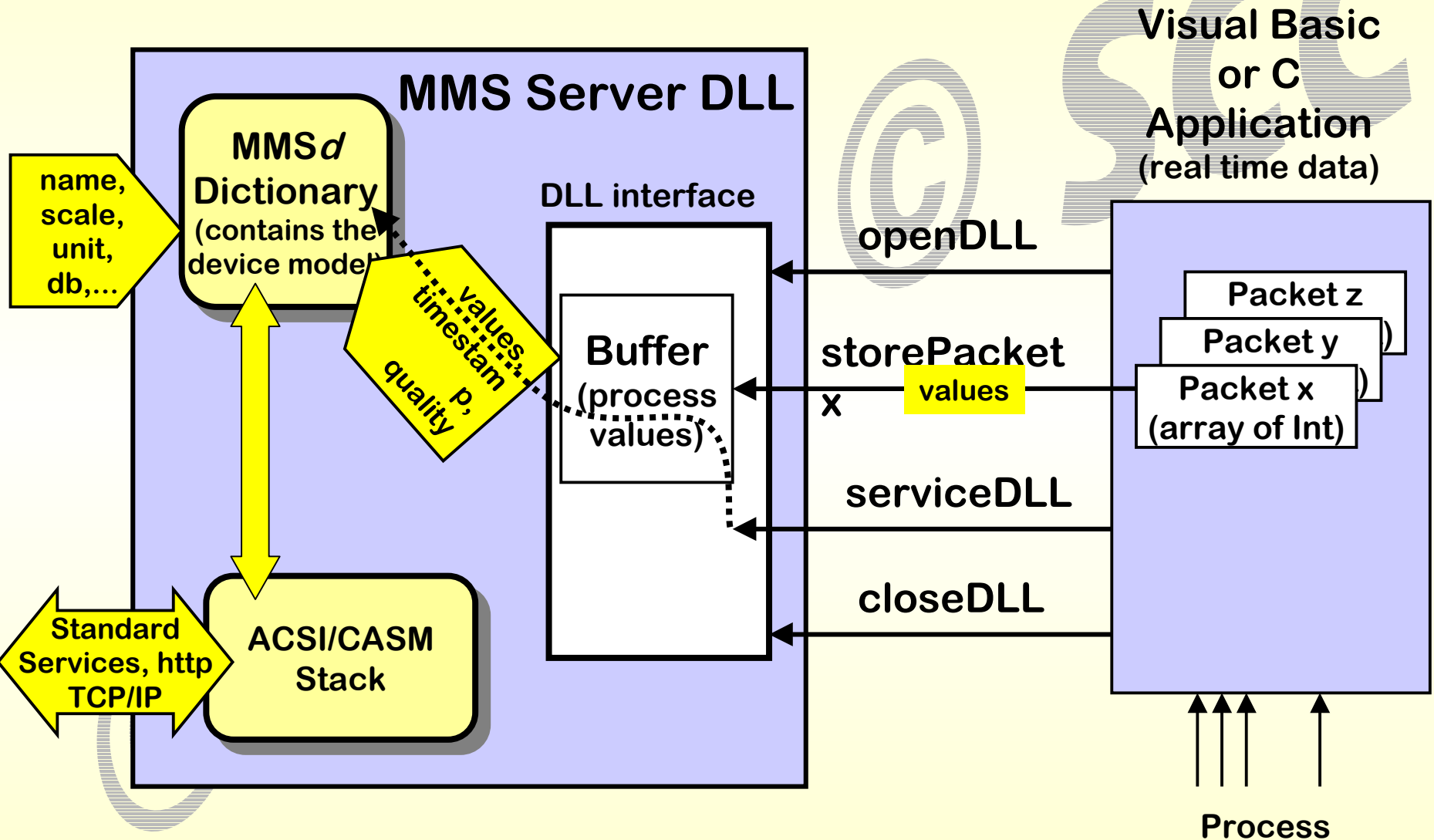
Wind turbine ...
(WTur)

Wind turbine ... (WTur)		Measurands (MX)	Name
		Generator speed Duty factor sent to gen.	<i>GenSpeed</i> <i>DFacSToGen</i>
Measurands (MX)	Name		
Energy G1	<i>MX.WhG1</i>	<i>Slip</i>	
Energy G2	<i>MX.WhG2</i>	<i>GenA</i>	
Energy consumption	<i>MX.WhConspt</i>	<i>GenBeTemp</i>	
Total time	<i>MX.TimeTotal</i>	<i>GenTemp</i>	
Time G1	<i>MX.TimeG1</i>	<i>Gen2Temp</i>	
Time G2	<i>MX.TimeG2</i>		
Time with fault status	<i>MX.TimeFltSt</i>		
Time with grid ok	<i>MX.TimeGridOk</i>		
Time with wind for prod	<i>MX.TimeWndProd</i>		

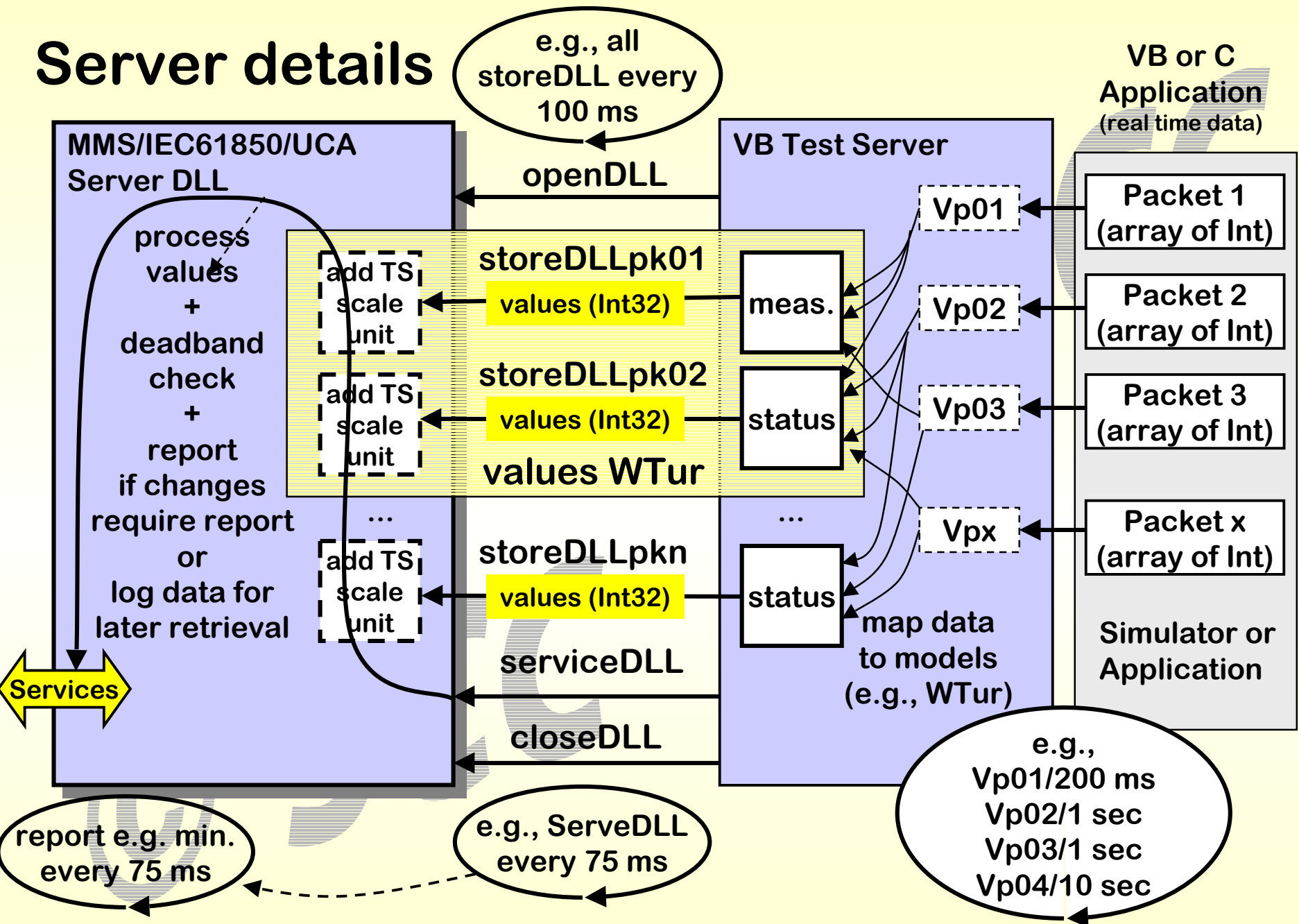
61850 compliant software (overview)



Server implementation (overview)



Server details



New offer

**free demo
software!**

IEC 61850 server and client implementations based on DLLs

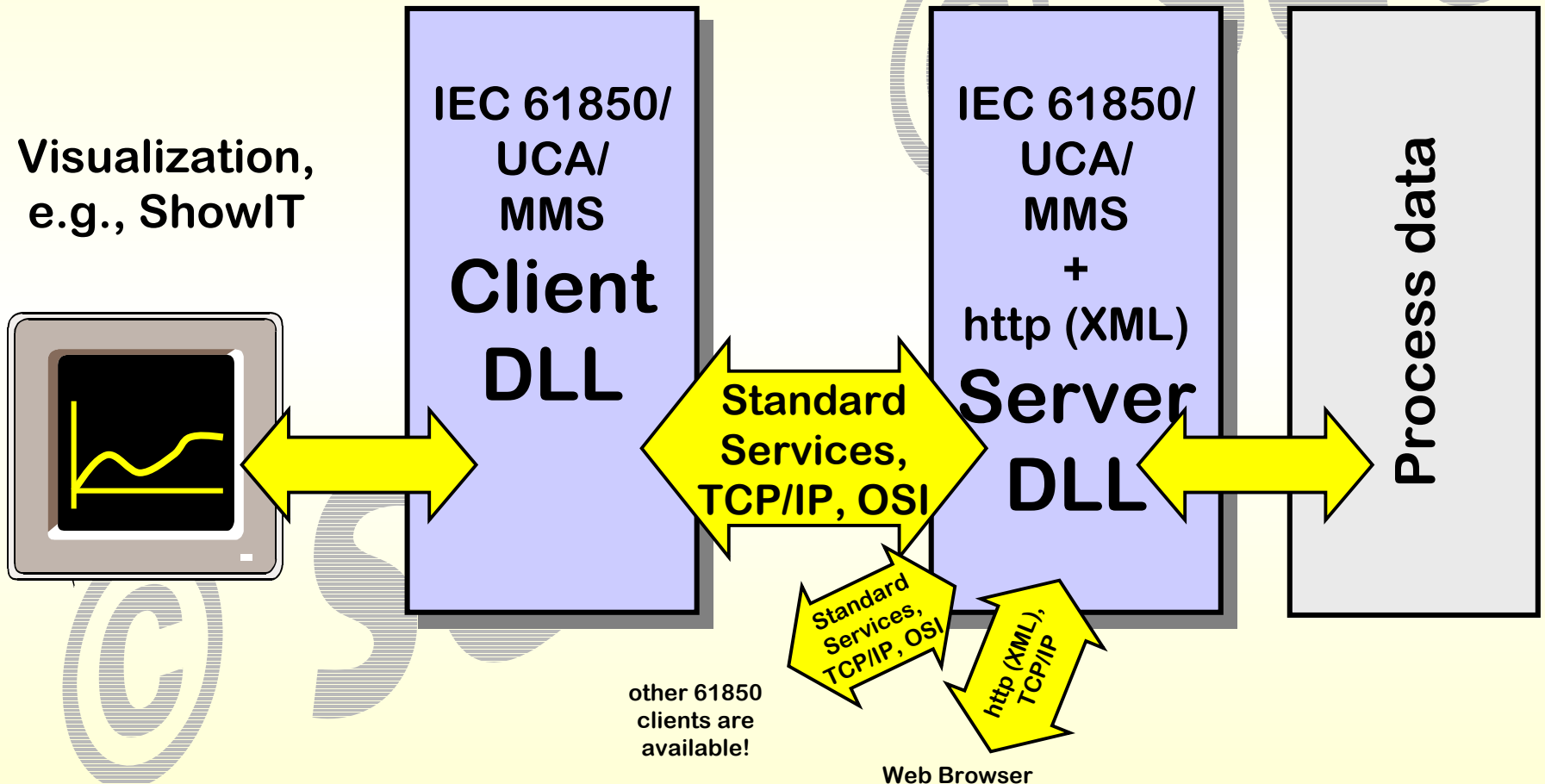
provided by

Netted Automation
GmbH
Information & Communication Systems

Why DLLs

- excellent experiences with the application in the wind power plant
- requirement to easy integrate data into IEC 61850 compliant server (Gateway/Proxy)
- requirement to easy visualize the data at client/master
- market demand to get soon started with the use of IEC 61850
- start with small configuration
- grow while you go
- DLLs and ViewIT provide the right base

Client and server realized as DLLs (principle)



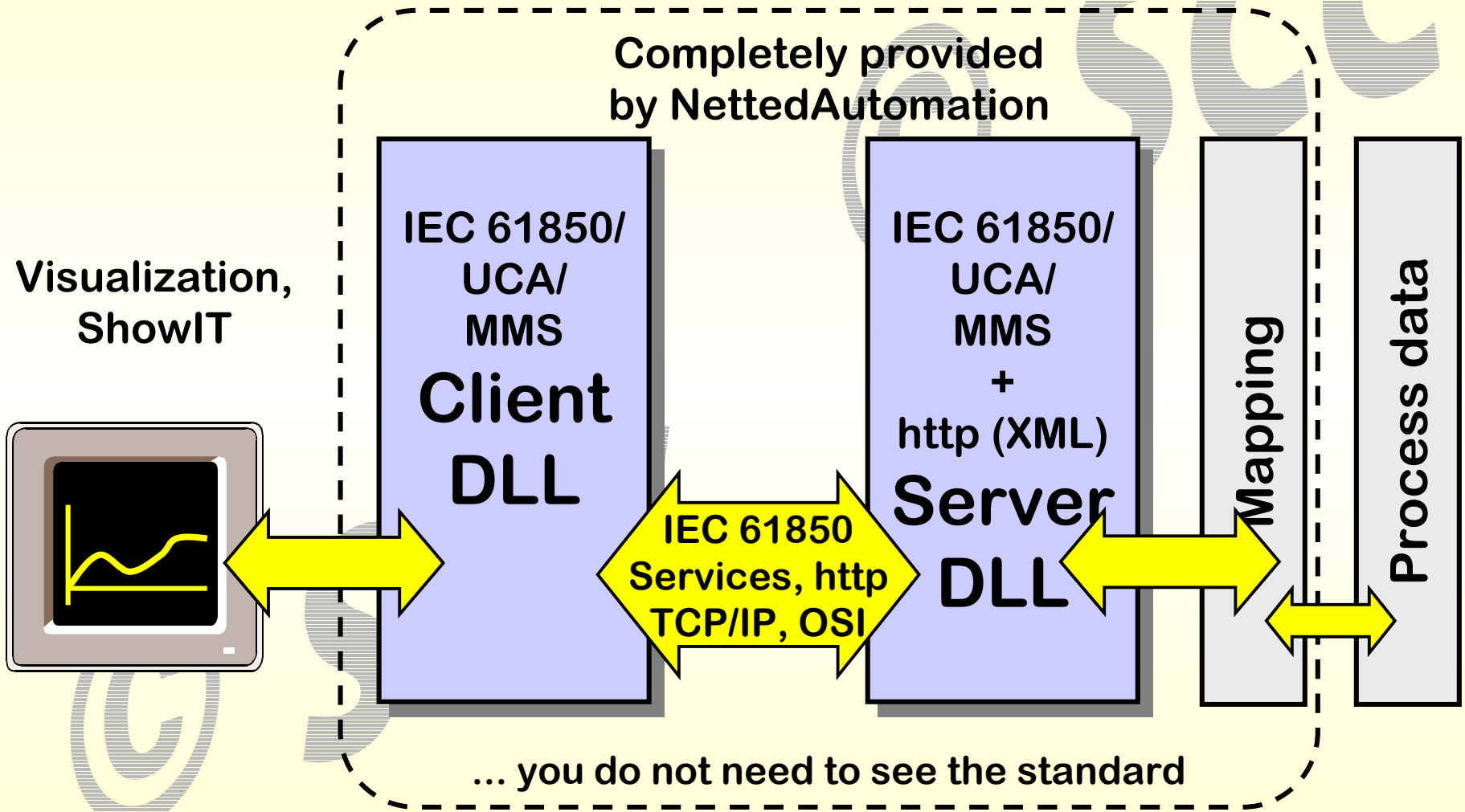
Advantages using DLLs

- easy to implement
- scaleable and flexible(few data to complex models)
- easy to use
- applicable on standard OS
- any Visual Basic and C application can use DLL
- easy to integrate into application
- standard IEC 61850/UCA/MMS hidden
- easy to migrate from any protocol to 61850
- **your data can be communicated in a few days**

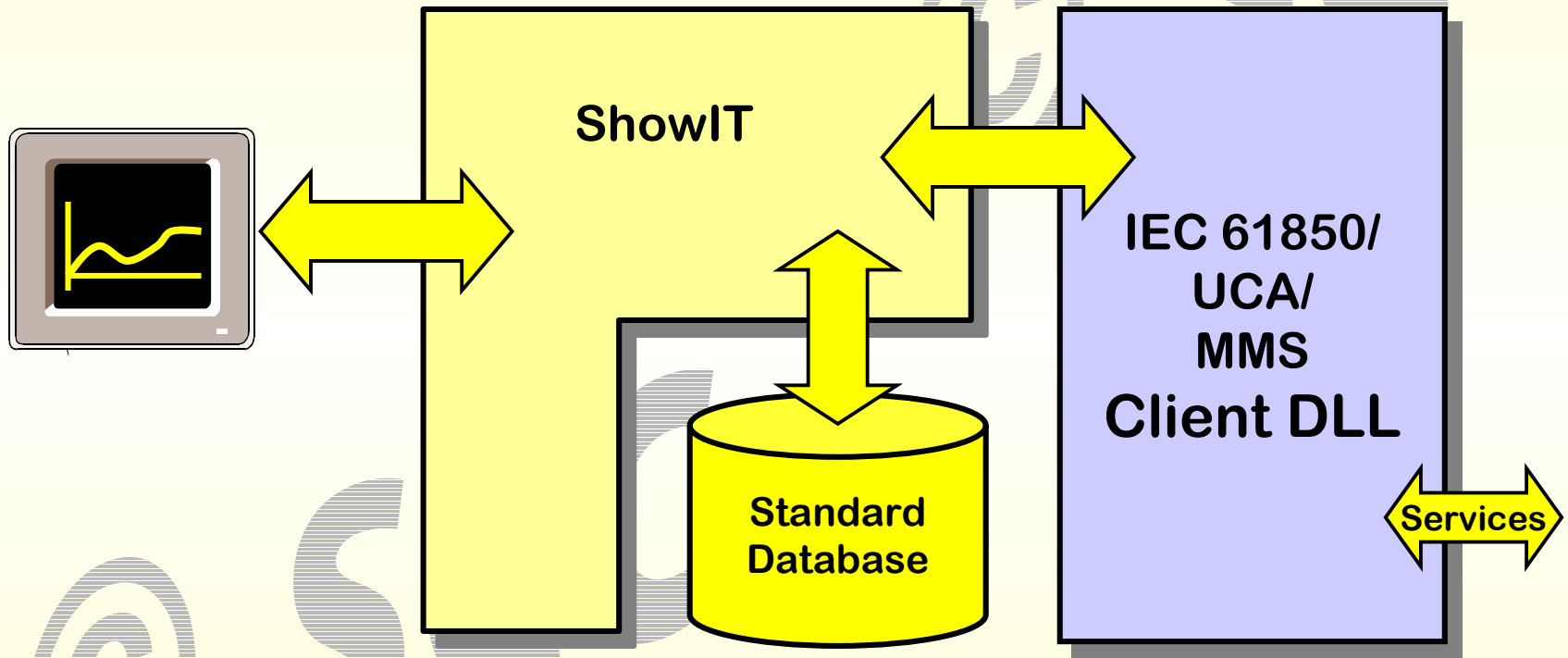
Disadvantages using DLLs

- Performance depends on the request from the application
 - Performance is moderate
 - not for embedded solutions
-
- more powerful integrations are possible with other IPCs (inter process communication) and other platforms.

What you need



Client and visualization



What is ShowIT?

- easy to use visualization software
- communicates with the process preferably over DLLs
- scaleable
- standard data base
- reasonable price:
starts at about 400 EUR for 64 points
- free demo version with 32 points

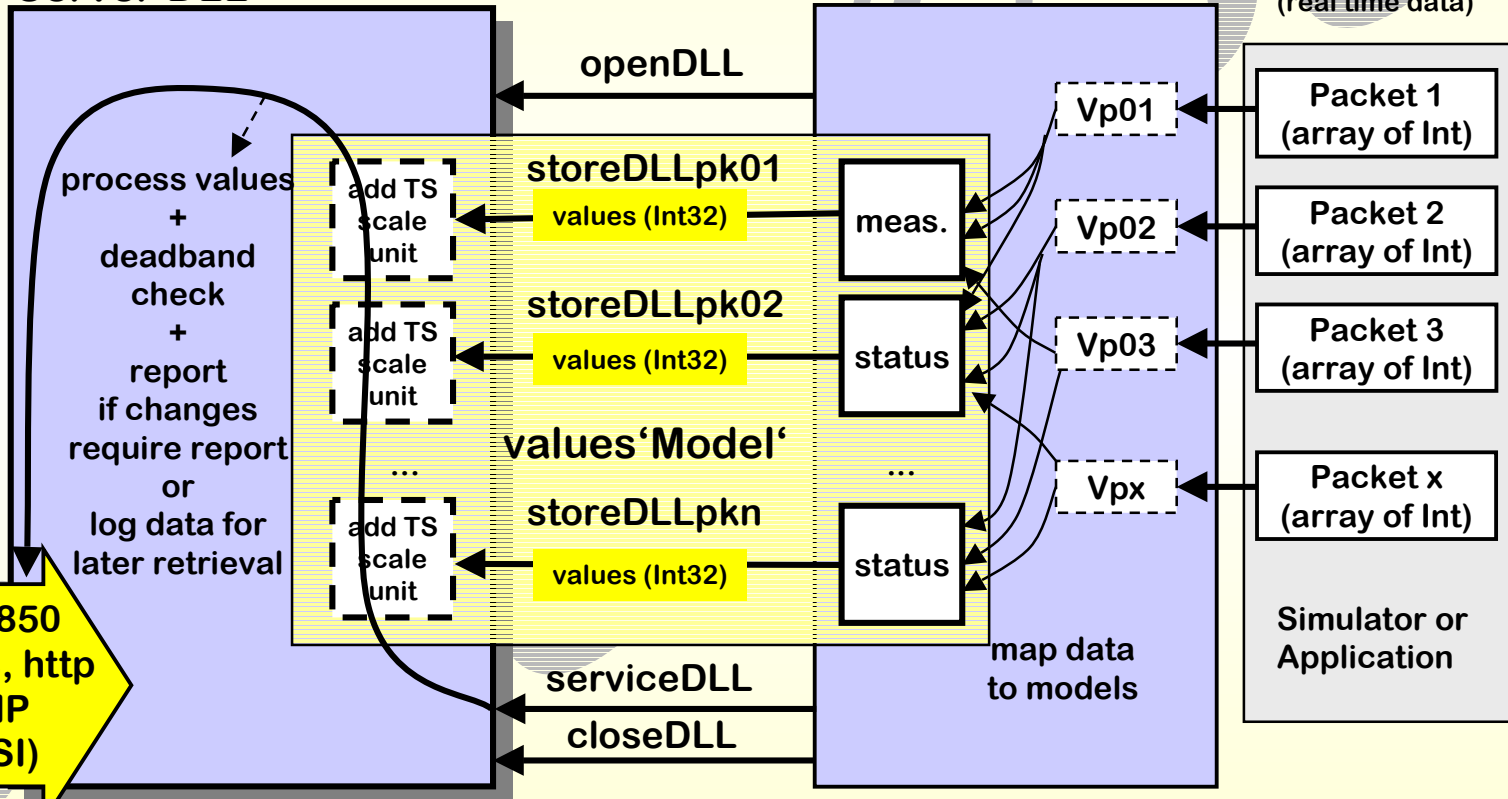
www.showit.de

Server and process data

MMS/IEC61850/UCA
Server DLL

VB Test Server

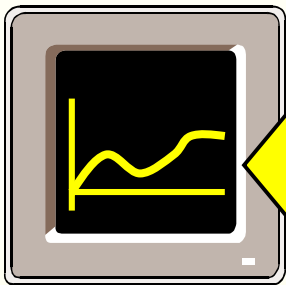
VB or C
Application
(real time data)



Configuration of free demo package

free!

Visualization:
ShowIT



Tamarack
IEC 61850/
UCA/
MMS
**Client
DLL**

(Association,
GetDirectory,
GetDefinition,
GetDataValue,
SetDataValue,
Control,
Reporting,
Logging, ...,
http)

IEC 61850
Services, http
TCP/IP
(or OSI)

Tamarack
IEC 61850/
UCA/
MMS
+
http (XML)
**Server
DLL**

Mapping

calls
Process data

RS 232, RS 485,
IEC 60870-5-101 (103, 104), ...

Demo version:
8 Data points

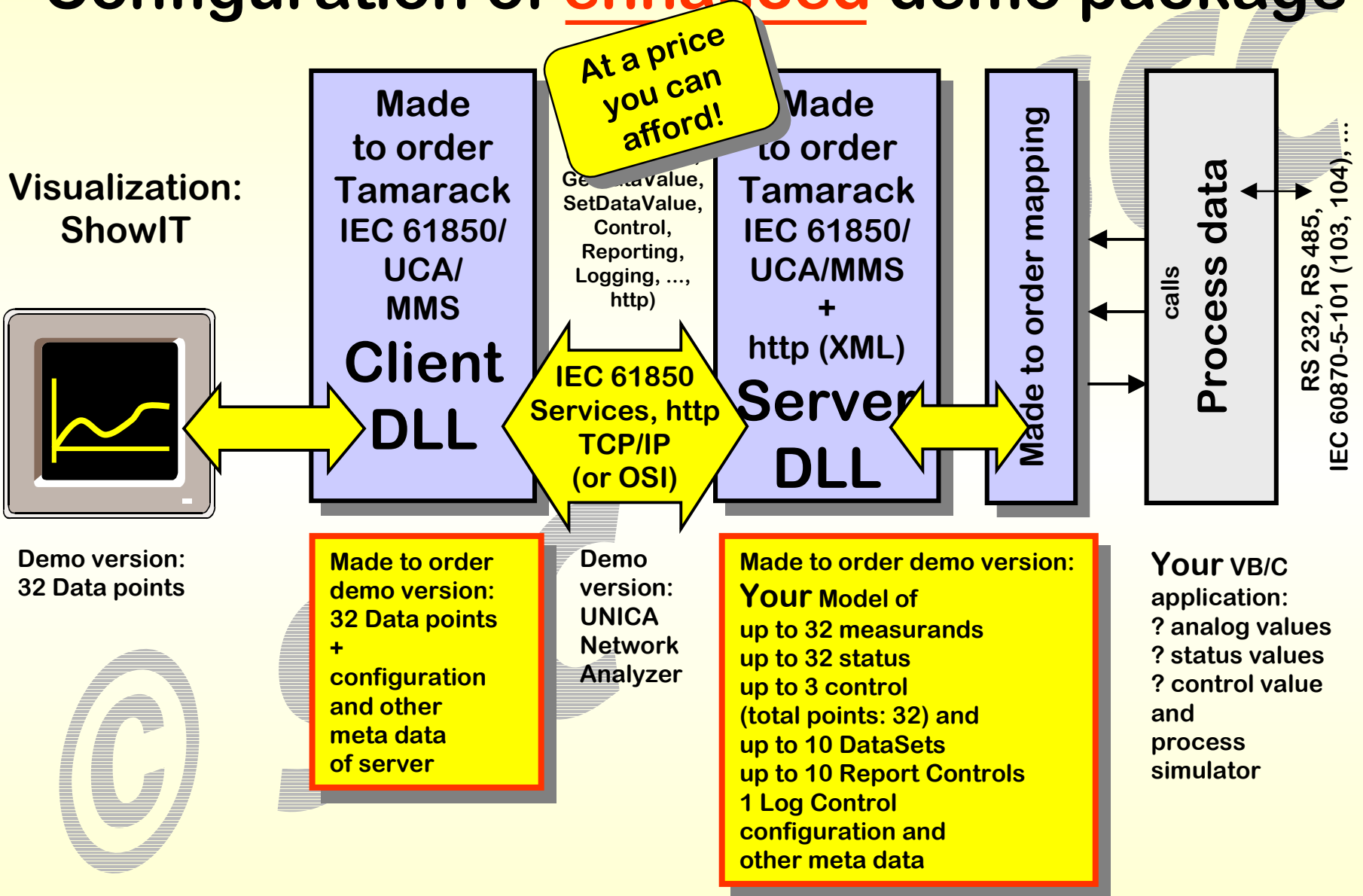
Demo version:
8 Data points
+
configuration
and other
meta data
of server

Demo version:
UNICA
Network
Analyzer

Demo version:
Demo Model of
4 measurands
3 status
1 control
2 DataSets
2 Report Controls
1 Log Control
configuration and
other meta data

**Your VB/C
application:**
4 analog values
3 status values
1 control value
and
process
simulator

Configuration of enhanced demo package



Demo version:
32 Data points

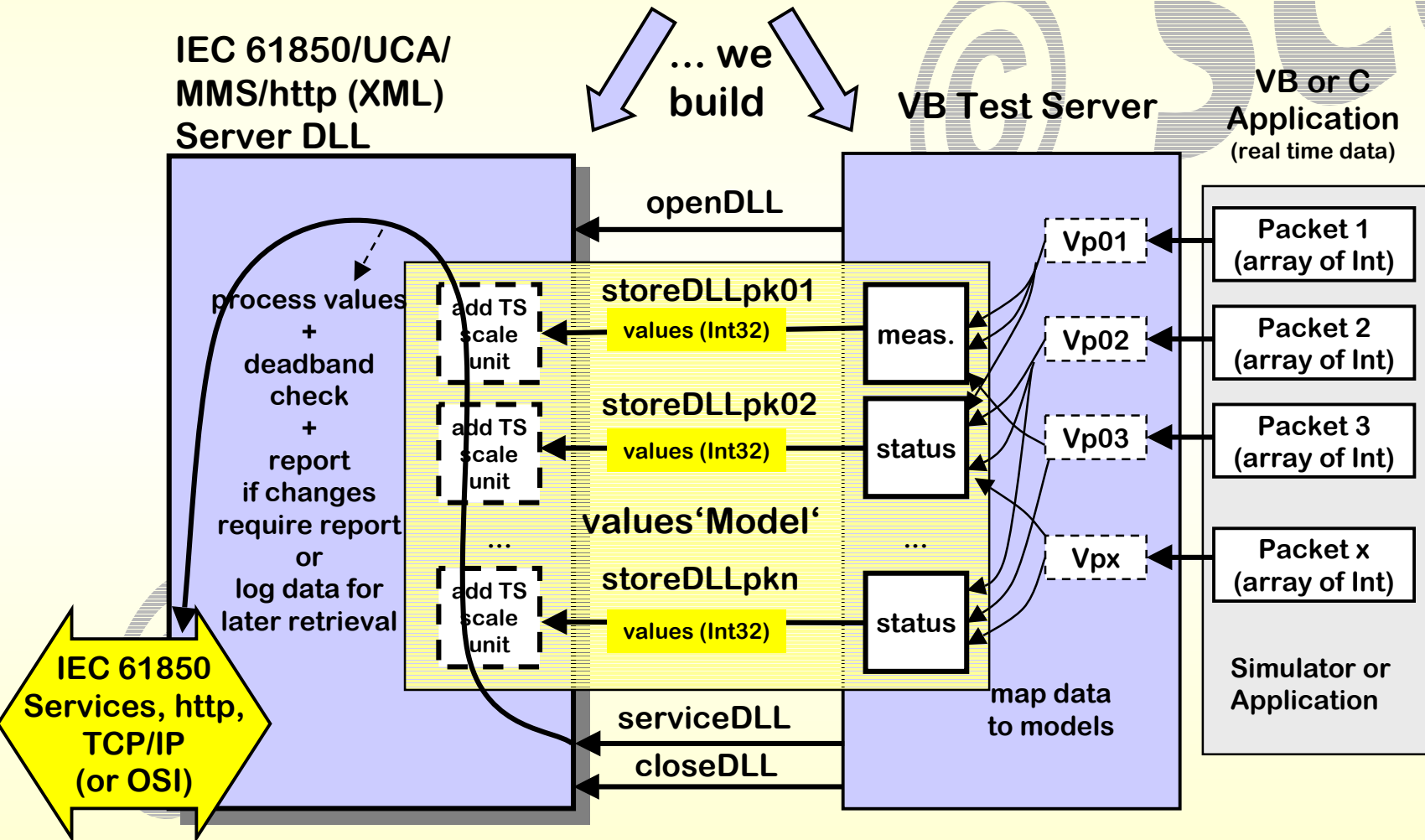
Made to order demo version:
32 Data points +
configuration and other meta data of server

Demo version:
UNICA Network Analyzer

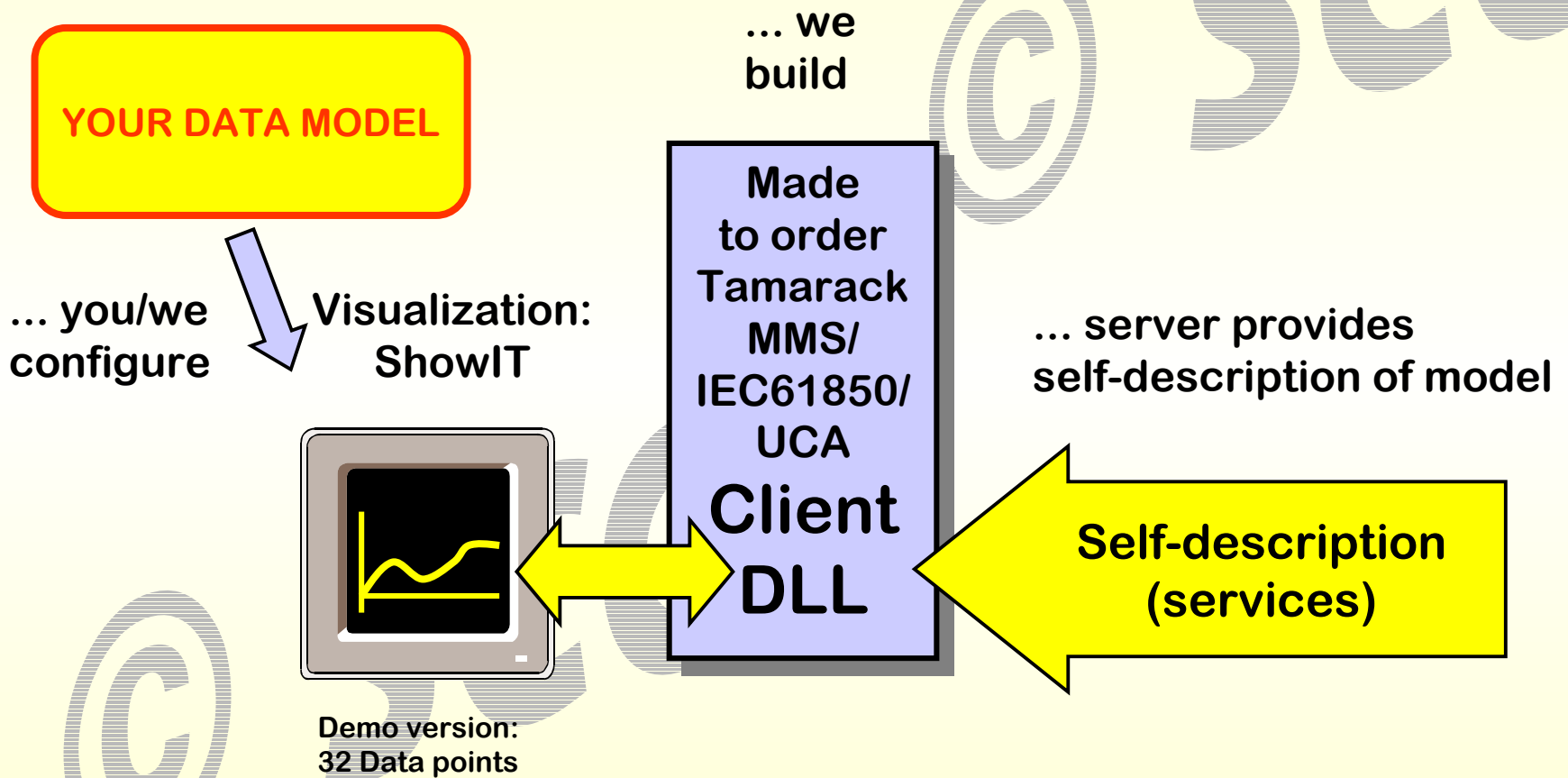
Made to order demo version:
Your Model of
up to 32 measurands
up to 32 status
up to 3 control (total points: 32) and
up to 10 DataSets
up to 10 Report Controls
1 Log Control
configuration and other meta data

How to build the server?

You provide us **YOUR DATA MODEL**:
 Name of Model (e.g., „RTU“)
 Name of instance, e.g., „Atlanta5_110“
 Name and type of analogs, status, and controls



How to build the client/master?

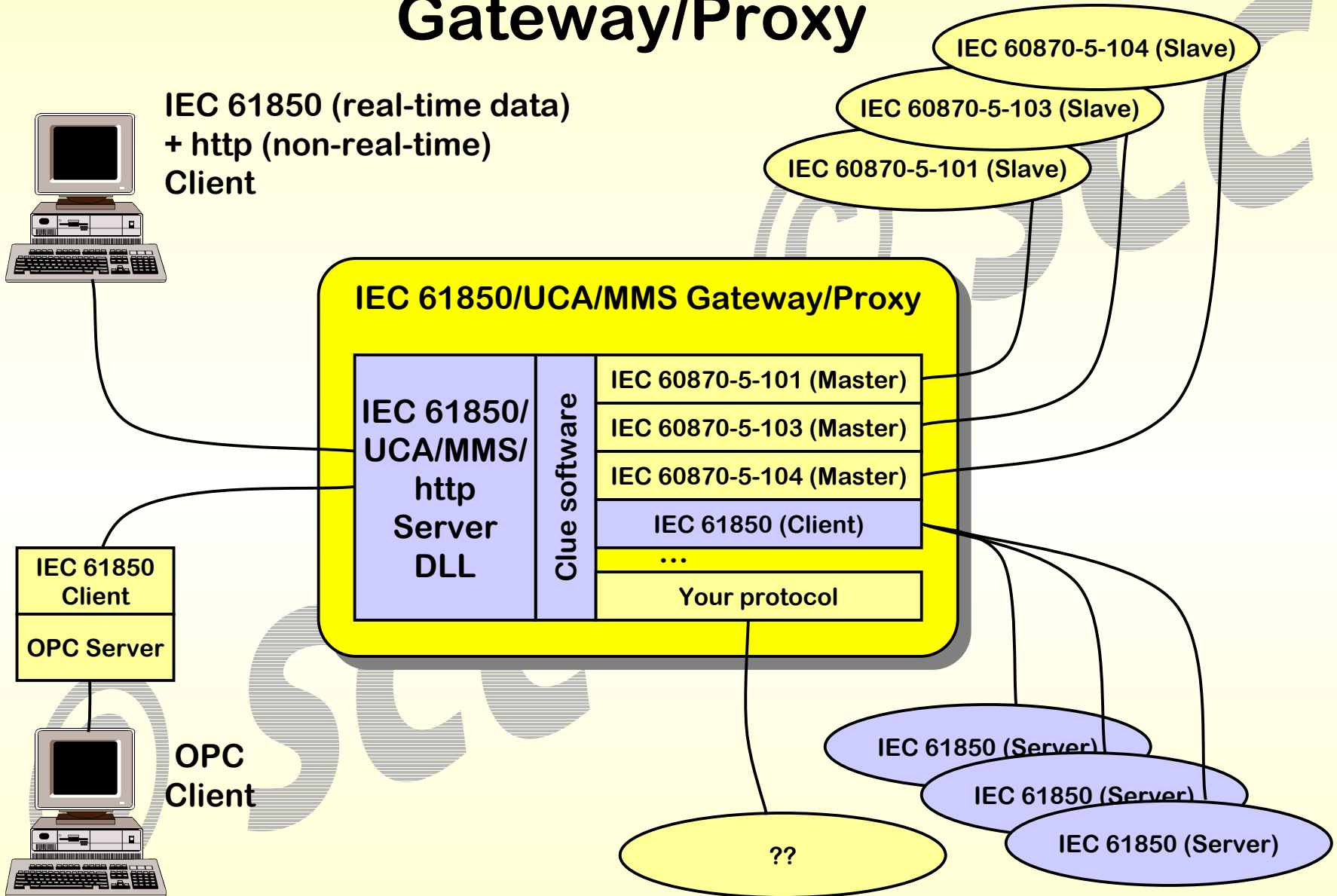


© SCC

Possible applications

© SCC

Gateway/Proxy



**Performance measurements
for other (non-DLL) integration
approach**

PC - Pentium 400 MHz - NT

PC - Pentium 500 MHz
- Windows 2000

Tamarack
MMS/
IEC61850/
UCA
Client



single client:
200 status reports / s OR
100 meas. reports / s

both clients:
200 status reports / s
AND
40 meas. reports / s

Tamarack
MMS/
IEC61850/
UCA
Client



single client:
100 status reports / s OR
40 meas. reports / s

Tamarack
IEC 61850/
UCA/MMS/
http
Server

Process data
simulated

PC - Pentium 166 MHz - Windows 98