

# SIMATIC PCS 7 TeleControl

## Версия V9.0

АСУ ТП и телемеханика в одной системе

# SIMATIC PCS 7 TeleControl – Компоненты

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## Операторские станции соответствуют структуре предприятия

- Также как “двух канальные” OS например, с параллельным подключением к контроллерам PCS 7 и TeleControl RTU

## Мощная Инженерная система

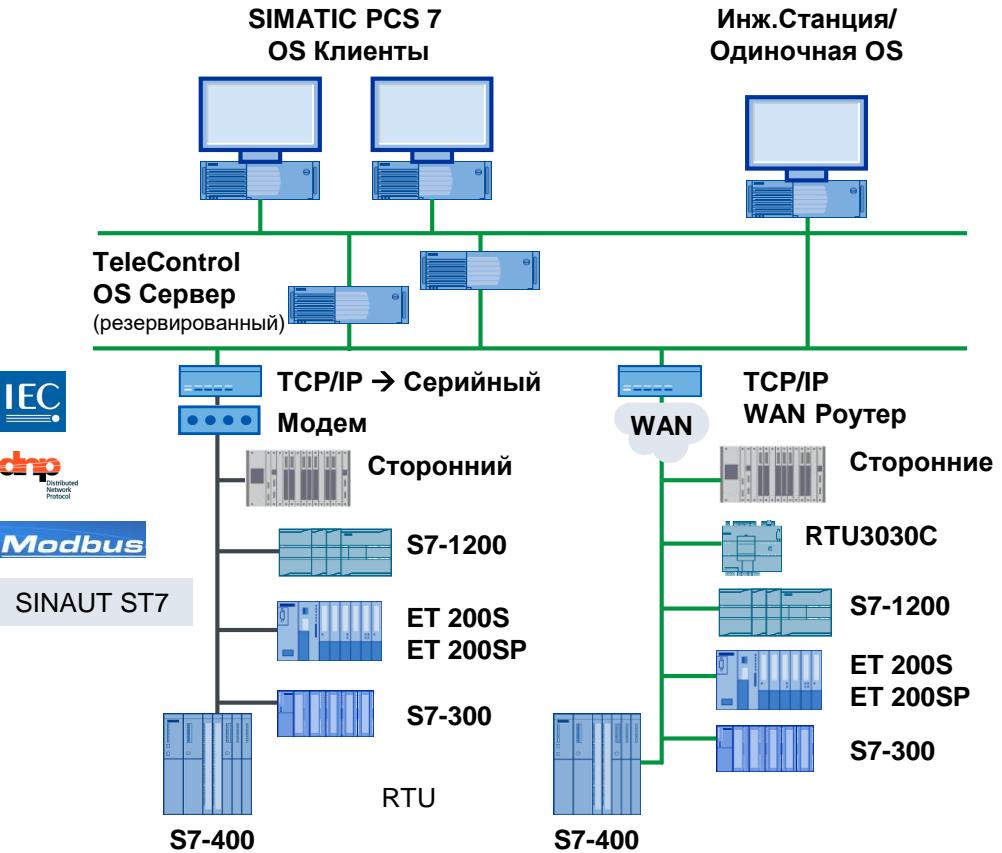
- Библиотека с функциями + панелями TeleControl
- Соответствующий PCS 7 внешний вид в символах+ панелях
- Разработка TeleControl + PCS 7 в **одной** системе

## Оптимальный Remote Terminal Unit (RTU)

- RTU3030C (обычно до 16 I/O)
- S7-1200 (обычно около. 30 ... 150 I/O)
- ET 200S, ET 200SP (обычно около. 30 ... 200 I/O)
- S7-300 (обычно около. 100 ... 2,000 I/O)
- S7-400 (обычно около. 500 ... 5,000 I/O)

## Гибкое подключение RTU к существующей инфраструктуре коммуникации

- Среда передачи: Выделенные линии, dial-up линии (аналог/ISDN), радио системы (GSM, UMTS, LTE), TCP/IP подключения (DSL, GPRS), Спутник
- Протоколы: DNP3, IEC 60870-5-101/-104, SINAUT ST7, Modbus, SIMATIC S7 EDC



## Оптимизированные компоненты, с учетом конкретного применения

# SIMATIC PCS 7 TeleControl – Компоненты Remote Terminal Units (RTU)

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## Малые RTU

### Обычно около 10 ... 200 I/O

- Низкая цена для бюджетных решений
- RTU3030C, DNP3 и IEC 60870-5-104 через UMTS
- ET 200S и ET 200SP интегрированный интерфейс для Modbus, IEC 60870-5-101/104
- S7-1200 модульные ST7, DNP3, IEC 60870-5-104 и Modbus
- SIPLUS версия с диапазоном -25°C ... +70°C



## Средние RTU

### Обычно около 100 ... 2,000 I/O

- Модульные, очень гибкие и универсальные решения
- S7-300, SINAUT и DNP3 с TIM, IEC 60870-5 библиотека или Modbus CP
- Опционально безопасность S7-300F



## Большие RTU

### Обычно около 500 ... 5,000 I/O

- Для приложений, требующих больше производительность или надежность
- S7-400/S7-400H, SINAUT и DNP3 с TIM, IEC 60870-5 библиотекой или Modbus CP
- Опционально безопасность с S7-400F/S7-400HF



Оптимизированные компоненты RTU предназначенные под конкретную задачу

# SIMATIC PCS 7 TeleControl – Операторская станция (OS)

## Система с одной станцией

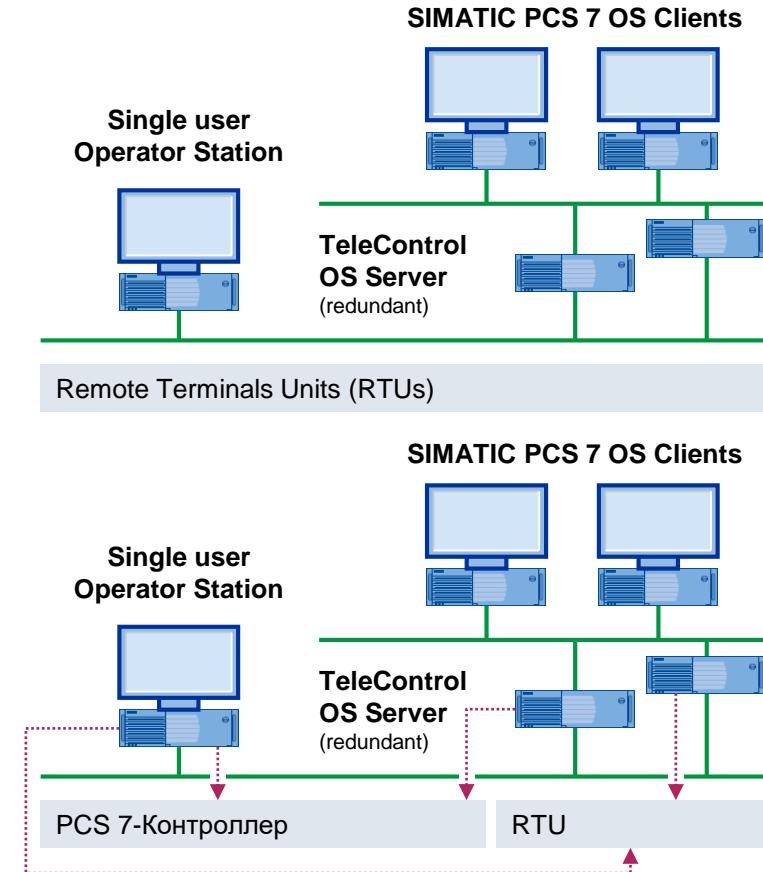
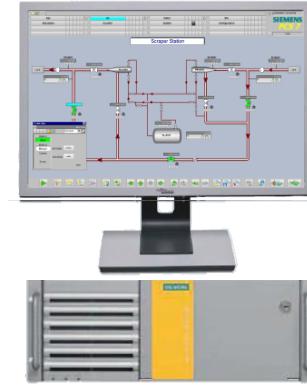
- Для малых структур
- Одна станция оператора

## Клиент-Серверная конфигурация

- Для больших структур
- Множество операторских станций

## “Двух канальные” OS

- Подключение к контроллерам PCS 7 и PCS 7 TeleControl RTU параллельно
- Для одной пользовательской станции и сервера
- Общий OS клиент для серверов PCS 7 и TeleControl



Стация оператора гибко адаптируема к требованиям предприятия

# SIMATIC PCS 7 TeleControl – Инженерная станция

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## PCS 7 TeleControl OS разработки

- PCS 7 ПО Разработки (не включено в TeleControl)
- PCS 7 TeleControl DBA ПО
- Библиотека с панелями и символами TeleControl

## Обновление PCS 7 TeleControl OS разработки

- Обновление существующей PCS 7 TeleControl ES и OS
- PCS 7 TeleControl DBA ПО
- Библиотека с панелями и символами TeleControl

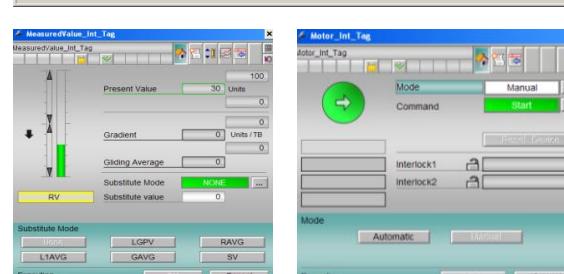
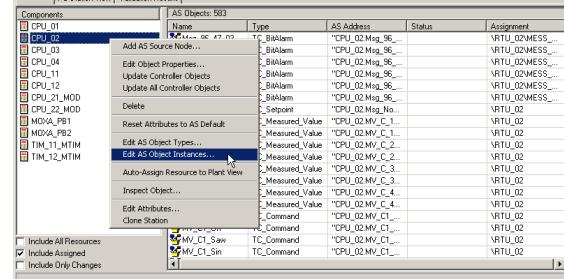
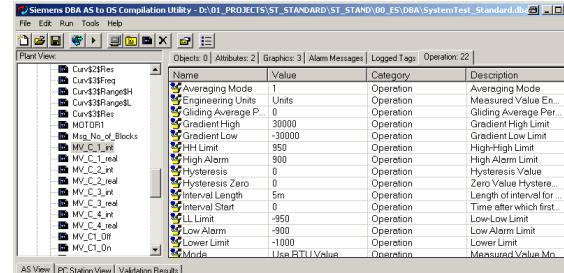
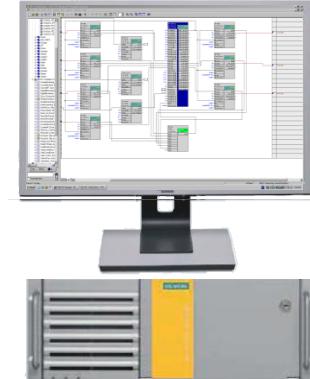
## TeleControl драйвер

- PCS 7 TeleControl SINAUT Драйвер
- PCS 7 TeleControl DNP3 Драйвер
- PCS 7 TeleControl IEC 60870-5-101/-104 Драйвер
- PCS 7 TeleControl Modbus Драйвер

## TeleControl OS библиотека компонентов

- Базовая библиотека со стандартными функциями “Simple-Type”
- Эксплуатация аналогично панелям и символам PCS 7
- Базовая библиотека расширяема под проект

Комфортная разработка с одной (!) системой



# SIMATIC PCS 7 TeleControl – TeleControl Communication – Overview

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## Transmission media

- Public/private communication networks (dedicated lines, dialup networks [analog, ISDN], radio systems [GSM, UMTS, LTE])
- TCP/IP based connections (DSL, GPRS), satellite

## DNP3

- DNP3 serial/DNP3 TCP
- International Standard
- easy integration of own and 3<sup>rd</sup> party RTUs in TeleControl

## SINAUT ST7

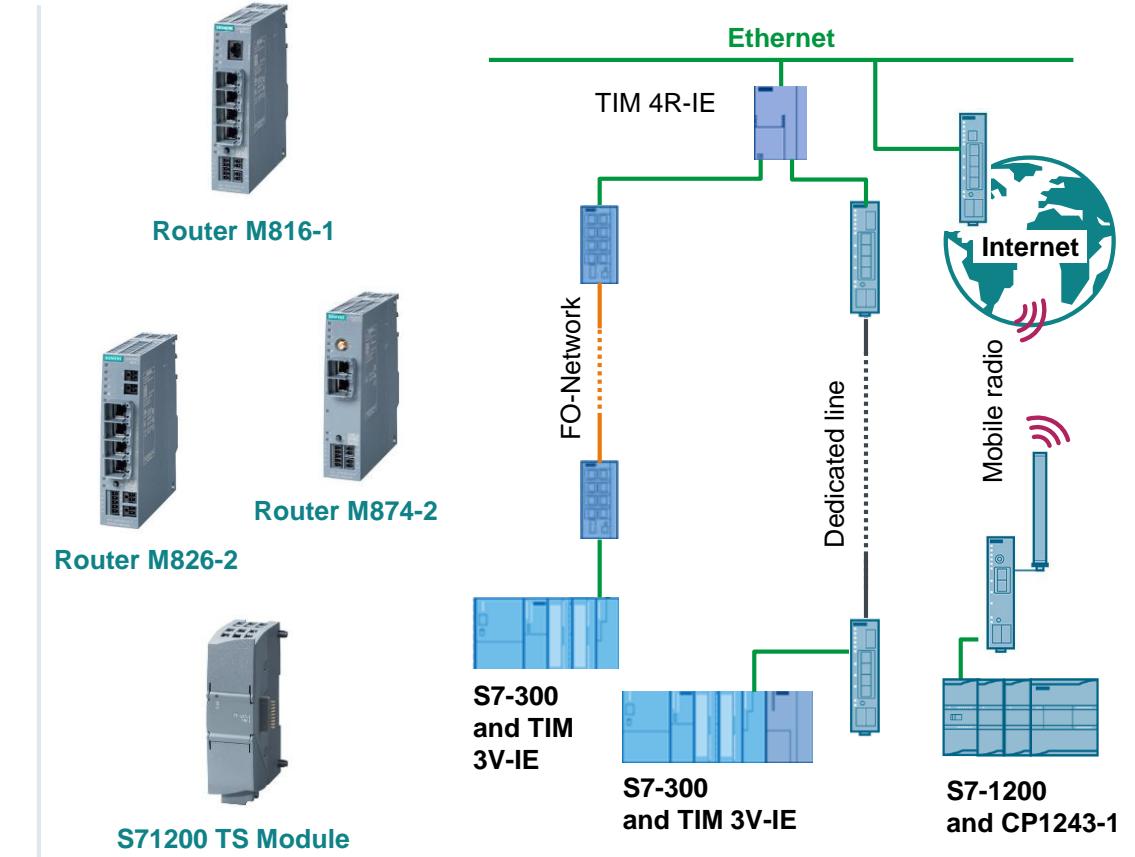
- For SIMATIC RTUs – S7-1200, S7-300, S7-400
- Hardware- and software-components for WAN
- Variety & modularity by choosing/combining exist. networks and transmission routes

## IEC 60870-5-101/-104

- IEC 60870-5-101 (serial)/-104 (TCP/IP)
- International Standard
- easy integration of own and 3<sup>rd</sup> party RTUs in TeleControl

## Modbus

- For integration of existing/3<sup>rd</sup> party RTUs
- TCP/IP based connections as well



**Flexible choice of the communication based on infrastructure/requirements**

# SIMATIC PCS 7 TeleControl – TeleControl Communication – SINAUT ST7

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## TeleControl protocol SINAUT ST7 – Benefits

- Dynamic response for slower transmission lines
- Good time resolution for all data processing due to time stamping locally in the RTUs
- Time synchronization of Remote Terminal Units via TeleControl Server (incl. summer-/winter time)
- Data buffering in outstations (RTUs) to avoid loss of important data in case of communication failure
- Reduction of transmitted data volume due to event-triggered transmission of process values
- Automatic monitoring of all outstations (RTUs) (alarming in case of failure of a station/connection)
- Programming/parameterization of the SIMATIC S7 RTUs (via existing TeleControl communication)
- SINAUT communication module TIM (TeleControl Interface Module) for SIMATIC S7-300/S7-400, CP for S7-1200



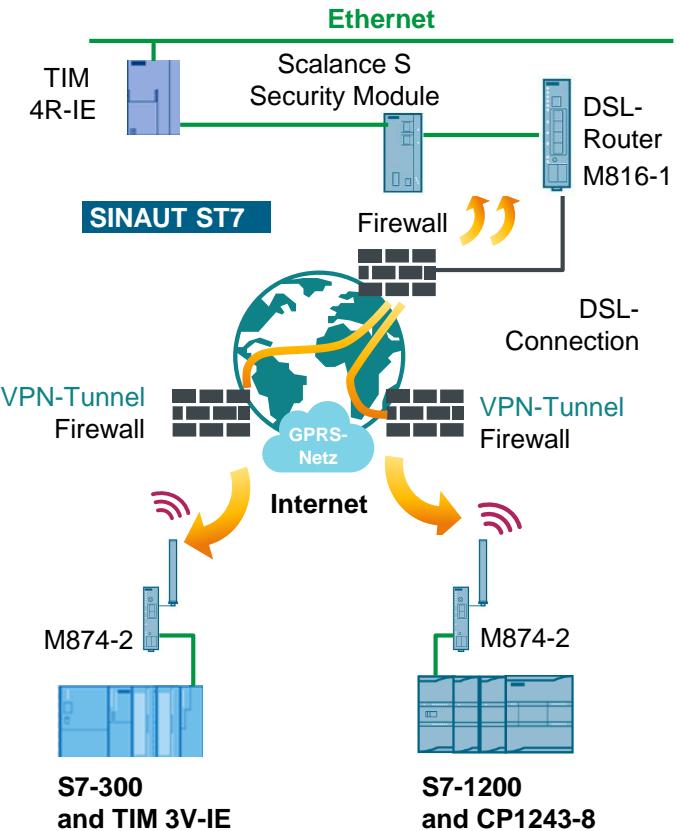
TIM 3V-IE



TIM 4R-IE



CP1243-8 IRC



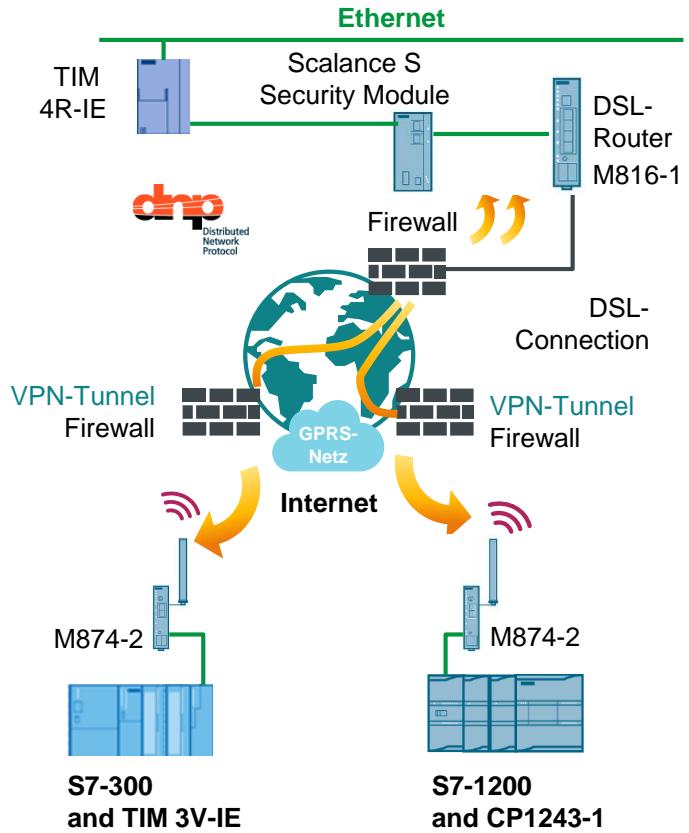
**Powerful TeleControl communication for cost effective integration of outstations (RTUs)**

# SIMATIC PCS 7 TeleControl – TeleControl Communication – DNP3

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## TeleControl protocol DNP3 – Benefits

- Dynamic response for slower transmission lines
- Good time resolution for all data processing due to time stamping locally in the RTUs
- Time synchronization of Remote Terminal Units via TeleControl Server (incl. summer-/winter time)
- Data buffering in outstations (RTUs) to avoid loss of important data in case of communication failure
- Reduction of transmitted data volume due to event-triggered transmission of process values
- Automatic monitoring of all outstations (RTUs) (alarming in case of failure of a station/connection)
- Programming/Configuration of SIMATIC S7 RTUs via TeleControl connection
- SINAUT communication module TIM (TeleControl Interface Module) for SIMATIC S7-300/S7-400, CP for S7-1200
- Multi-master capability



**Powerful TeleControl communication for cost effective integration of outstations (RTUs)**

# SIMATIC PCS 7 TeleControl – TeleControl Communication – IEC 60870-5-101/104

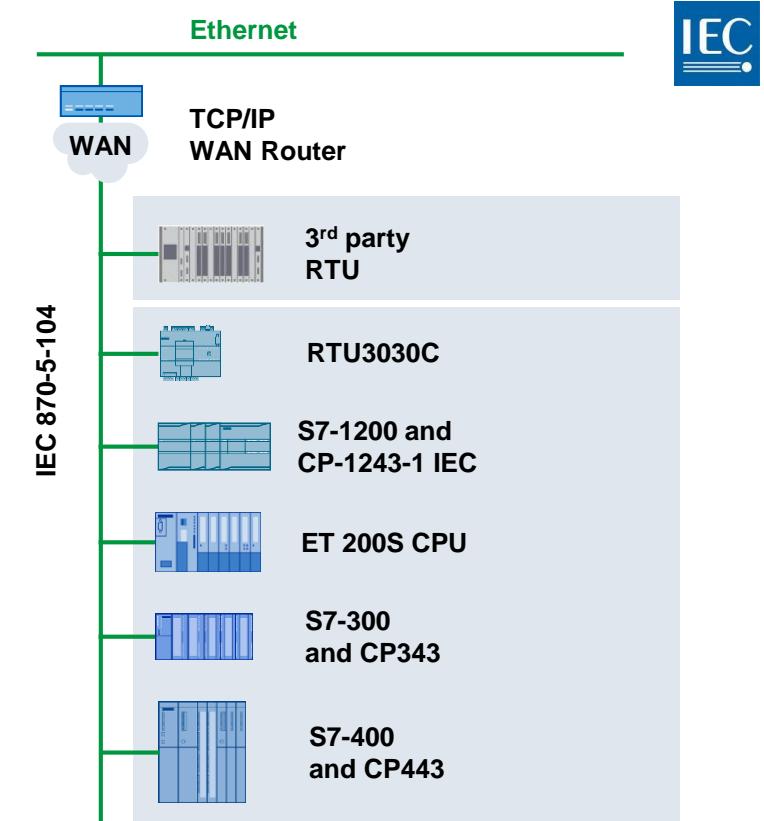
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## Benefits of IEC 60870-5-101/104 – Interface

- Easy integration of an existing RTU infrastructure into a PCS 7 TeleControl solution
- Cost effective direct integration of 3<sup>rd</sup> party RTUs into a PCS 7 TeleControl server
- Conform to an international (widespread) standard
- Available for Siemens RTUs

## Implementation of 60870-5-101/104 – Communication

- Direct connection of TCP based RTUs
- Connection of serial RTUs via 3<sup>rd</sup> party interface converter
- Import of 3<sup>rd</sup> party RTU data via CSV format into Engineering (DBA) supported
- Function block “Diagnose IEC 60870-5 – RTU”



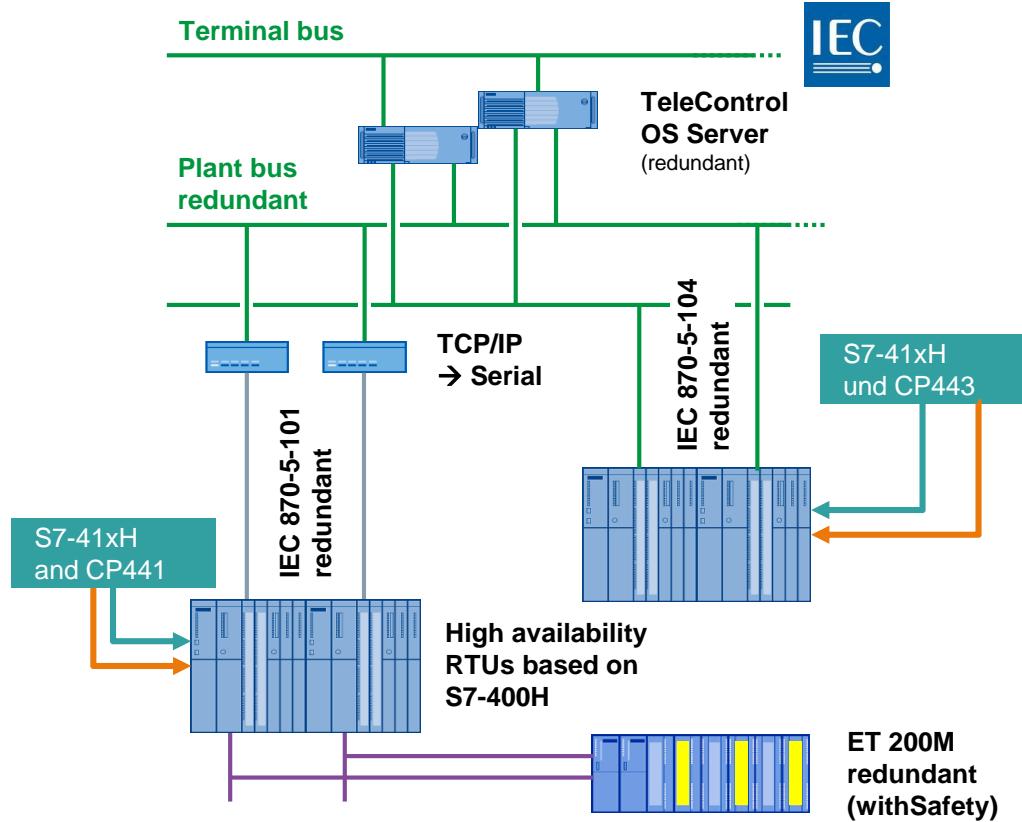
Efficient and cost effective integration of an existing RTU infrastructure into a PCS 7 TeleControl solution

# SIMATIC PCS 7 TeleControl – TeleControl Communication – IEC 60870-5-101/104 with Redundancy

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## Redundancy with IEC 60870-5-101/104

- Redundant PCS 7 TeleControl Server for high availability of operation, archiving, ...
- Redundant communication on plant bus for high availability of system communication
- Redundant telecontrol communication with IEC 60870-5-101/104 to the RTUs
- Redundant RTU based on S7-400H for high availability of local automation
- Redundant PROFIBUS for high availability of connection of decentralized peripherals
- Redundant I/O modules for high availability on I/O level
- Integration of Safety functionality (up to SIL3) into the RTU (S7-41xH + ET 200M)



High availability by redundancy on all levels!

# SIMATIC PCS 7 TeleControl – TeleControl Communication – Modbus

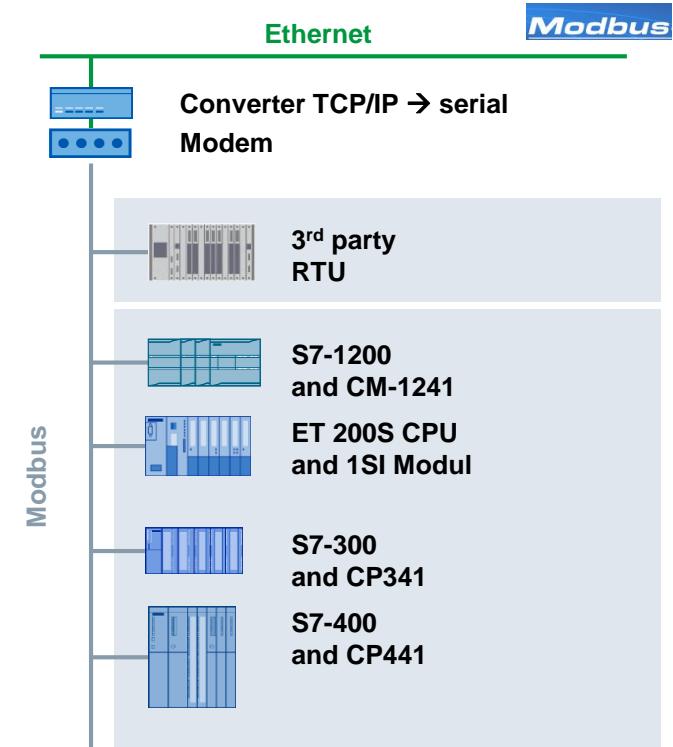
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## Benefits of the Modbus interface

- Integration of an existing RTU infrastructure into a PCS 7 TeleControl solution
- Cost effective direct integration of 3<sup>rd</sup> party RTUs into a PCS 7 TeleControl server
- Widespread standard (also in TCP/IP)
- Available for Siemens RTUs

## Implementation of the Modbus communication

- Direct connection of TCP based RTUs
- Connection of serial RTUs via 3<sup>rd</sup> party interface converter
- Import of 3<sup>rd</sup> party RTU data via CSV format into Engineering (DBA) supported
- Function block “Diagnostic Modbus RTU”



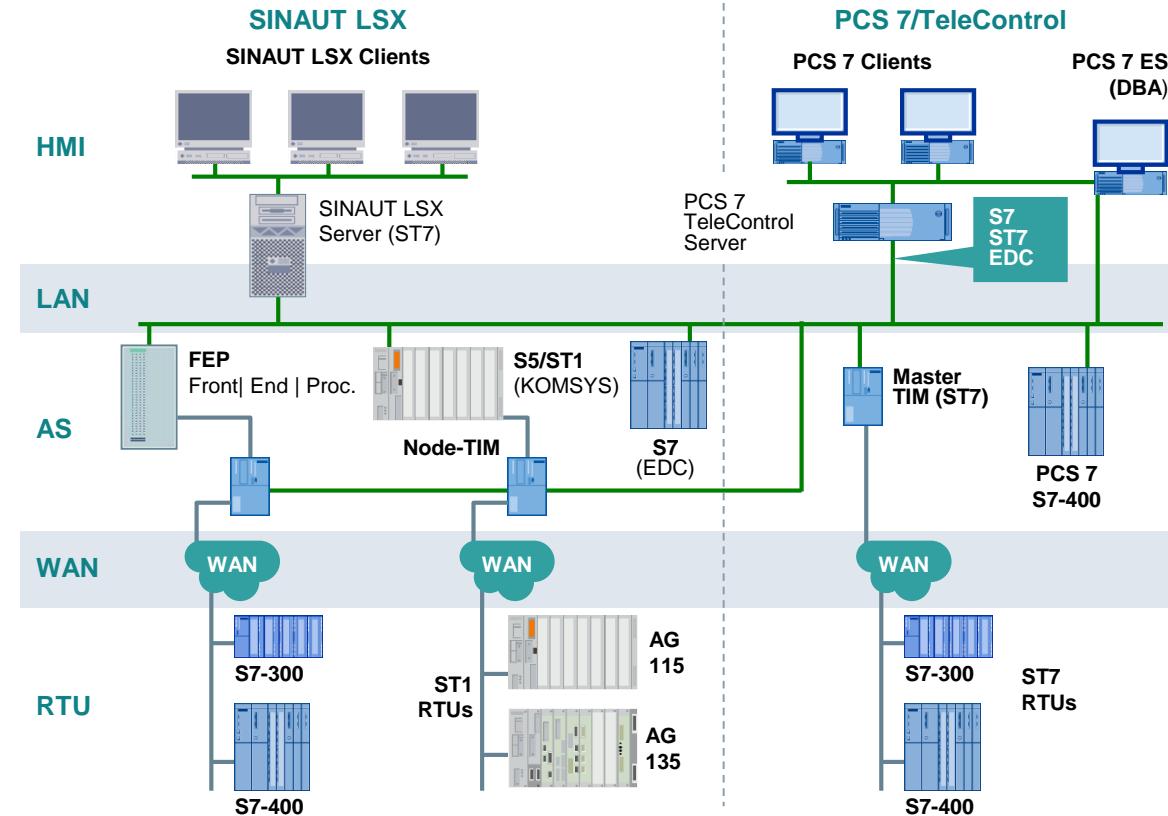
**Effective integration of an existing RTU infrastructure into a PCS 7 TeleControl solution**

# SIMATIC PCS 7 TeleControl – Migration of installed SINAUT LSX base to PCS 7 TeleControl

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## Benefits of SINAUT LSX – Migration

- Existing and new system architecture coexist on all levels (as long as necessary)
- No intermediate solution with restricted lifetime or additional hardware
- S7 (EDC) is moved unchanged into the new world of PCS 7 TeleControl
- Only modernized components need re-engineering and re-testing (e.g. transmitting data → multiple masters)
- “PCS 7 like” engineering based on proven DBA migration architecture



Protection of previous investments by migration support of existing SINAUT LSX/CS7 plants to SIMATIC PCS 7 TeleControl

# SIMATIC PCS 7 TeleControl – Support of additional protocols for different RTUs

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## Benefits

- Cost effective implemented protocols also for smaller RTUs  
**→ cost effective entrance**
- Standard protocols for smaller RTUs  
**→ international standards**
- Powerful protocols for medium and large RTUs  
**→ flexible adaption to the plant**
- Integration of 3<sup>rd</sup> party RTUs via international standard protocols  
**→ international standards**

Protocol	RTU 3030C	ET 200S ET 200SP	S7-1200	S7-300	S7-400	3 <sup>rd</sup> party RTUs
<b>SINAUT ST7 serial</b>	–	–	–	✓ TIM3V-IE	✓ TIM4R-IE	–
<b>SINAUT ST7 TCP</b>	–	–	✓ CP-1243-8 IRC	✓ TIM3V-IE	✓ TIM4R-IE	–
<b>DNP3 serial</b>	–	–	–	✓ TIM3V-IE DNP3	✓ TIM4R-IE DNP3	✓
<b>DNP3 TCP</b>	✓ UMTS integrated	–	✓ CP-1243-1 DNP3	✓ TIM3V-IE DNP3	✓ TIM4R-IE DNP3	✓
<b>IEC 60870-5-101 serial</b>	–	✓ IEConS7	–	✓ IEConS7 and CP341	✓ IEConS7 and CP441	✓
<b>IEC 60870-5-104 TCP</b>	✓ UMTS integrated	✓ IEConS7	✓ CP-1243-1 IEC	✓ IEConS7 and CP343	✓ IEConS7 and CP443	✓
<b>Modbus serial</b>	–	✓ 1SS RSxxx	✓ CM-1241	✓ CP341	✓ CP441	✓
<b>Modbus TCP</b>	–	✓ IT4industry SW Lib	–	✓ IT4industry SW Lib and CP343	✓ IT4industry SW Lib and CP443	✓

# SIMATIC PCS 7 TeleControl – Supported functionalities of different protocols

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Protocol	Dial-up lines	Dedicated lines and radio network	Master-Slave	Peer-to-Peer	Mixed Network Topologies	Time stamp in RTU	Time sync. of RTU	Data buffer in RTU	International standard
<b>SINAUT ST7 serial</b>	✓	✓	✓	✓	✓	✓	✓	✓	–
<b>SINAUT ST7 TCP</b>	–	✓	✓	✓	✓	✓	✓	✓	–
<b>DNP3 serial</b>	✓	✓	✓	–	✓	✓	✓	✓	✓
<b>DNP3 TCP</b>	–	✓	✓	–	✓	✓	✓	✓	✓
<b>IEC 60870-5-101 serial</b>	–	✓	✓	✓ <sup>2</sup>	✓	✓	✓	✓	✓
<b>IEC 60870-5-104 TCP</b>	–	✓	✓	✓ <sup>2</sup>	✓	✓	✓	✓	✓
<b>Modbus serial</b>	–	✓	✓	–	–	–	–	–	✓ <sup>1</sup>
<b>Modbus TCP</b>	–	✓	✓	–	–	–	–	–	✓ <sup>1</sup>

1 Many existing flavors; 2 IEConS7 Master-/Slave library

# SIMATIC PCS 7 TeleControl – Network topologies with SINAUT ST7 communication

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## Basic Topologies

**Point-to-Point**



**Multidrop**



**Star**



**Ring**



## Flavors of Basic Topologies

**Star and multidrop**



**Star via radio**



**Dialup via radio**



**Star via Internet**



...

## Any combination of the Basic Topologies possible

**Different networks and media combined**



**Node**



**Redundant paths FO and radio**



...

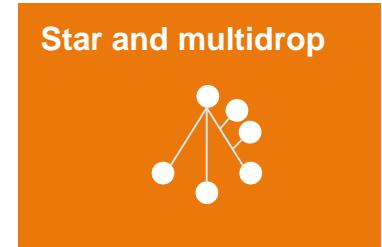
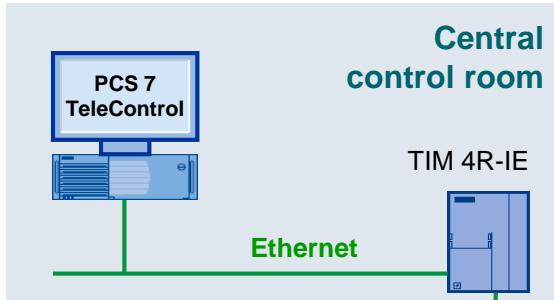
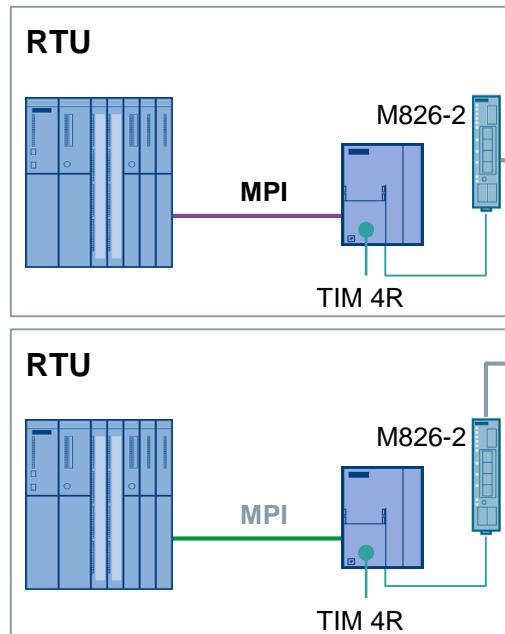
# SIMATIC PCS 7 TeleControl with SINAUT ST7 – Classic WANs Dedicated Line

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Ingenuity for life

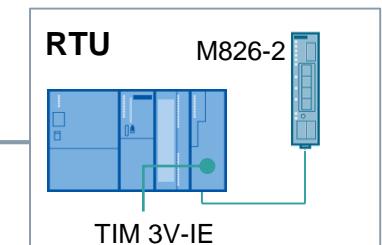
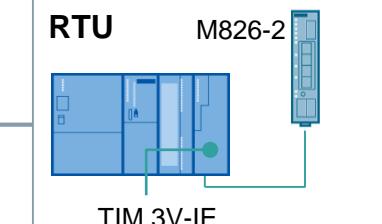
## Range without Repeater (example)

with cable diameter 0.8 mm

- 1,200 Bit/s max. 33 km
- 2,400 Bit/s max. 27 km
- 19,200 Bit/s max. 11 km

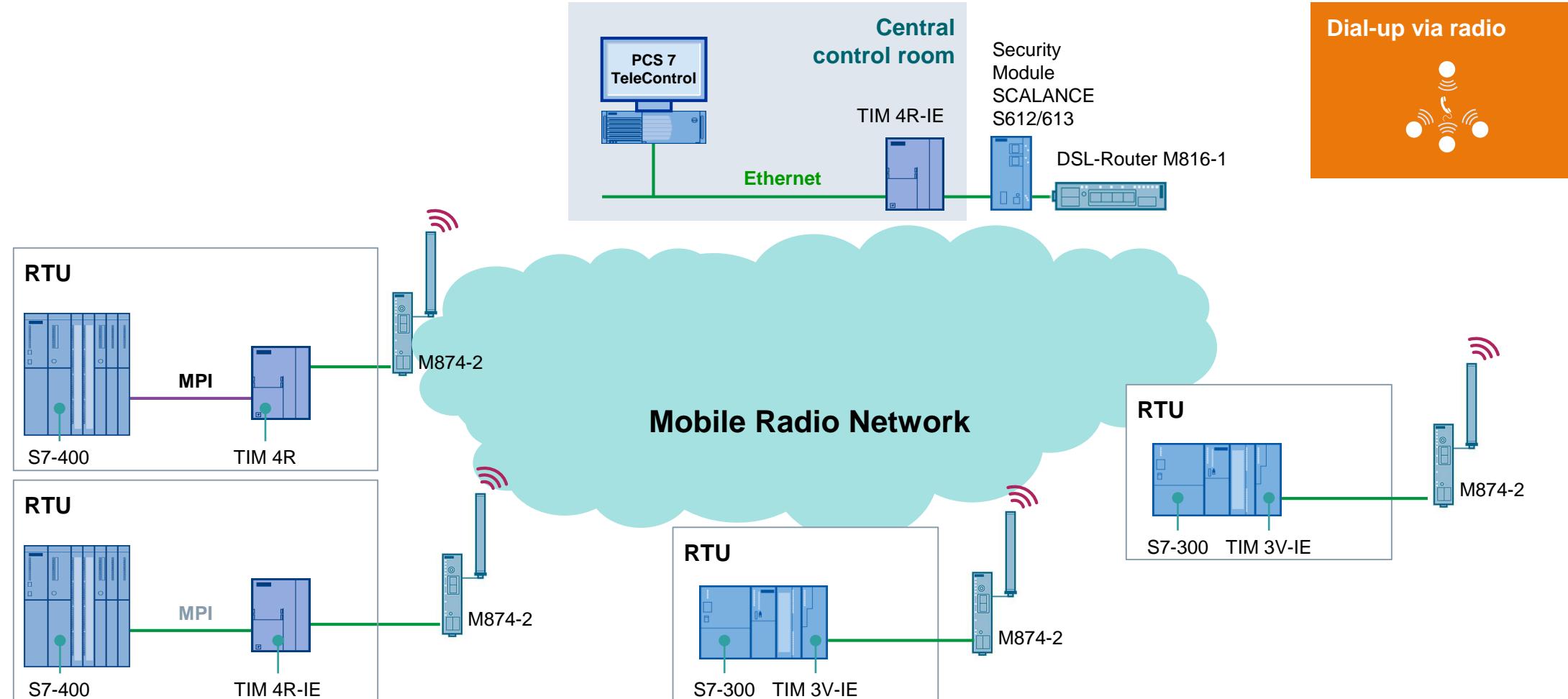


Star-shaped  
dedicated line  
network



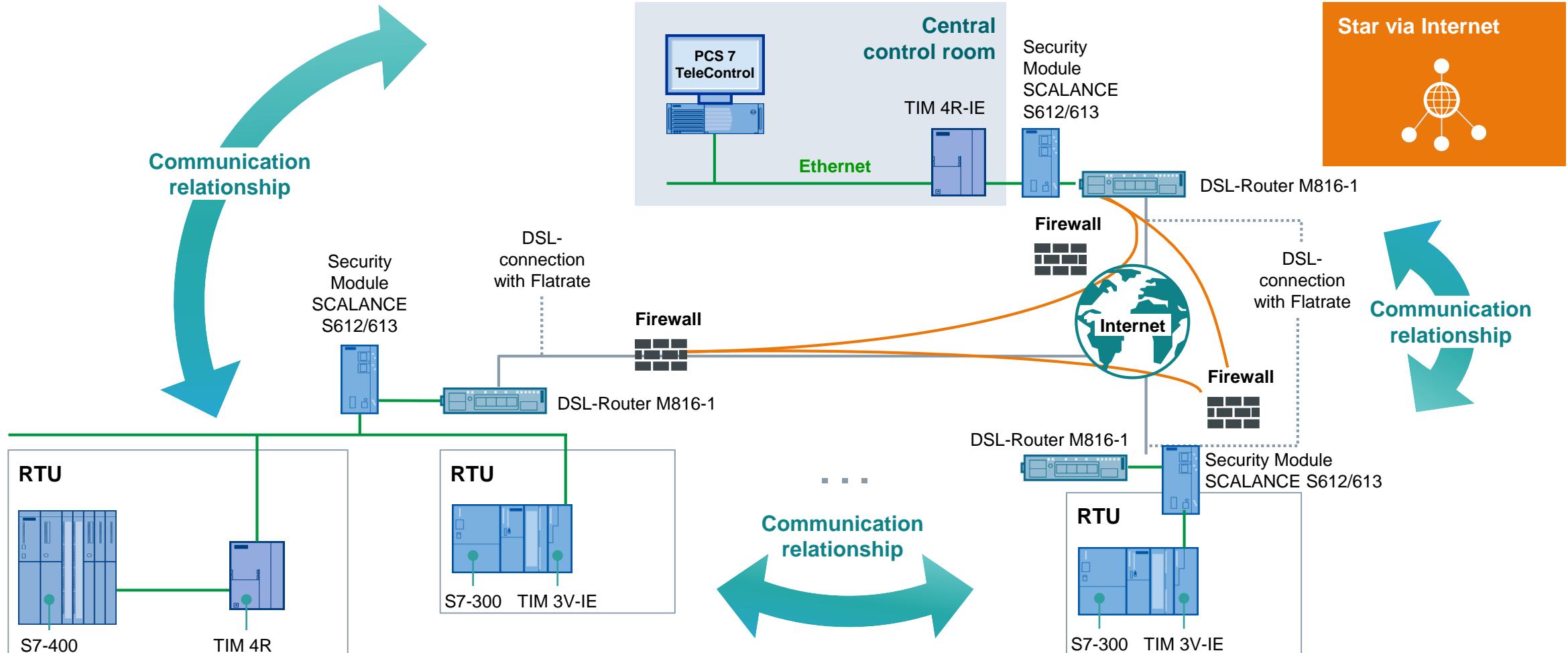
# SIMATIC PCS 7 TeleControl with SINAUT ST7 – Classic WANs mobile radio (GSM) with data service CSD

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# SIMATIC PCS 7 TeleControl with SINAUT ST7 – IP based WAN Secure Networking via unsecure Networks

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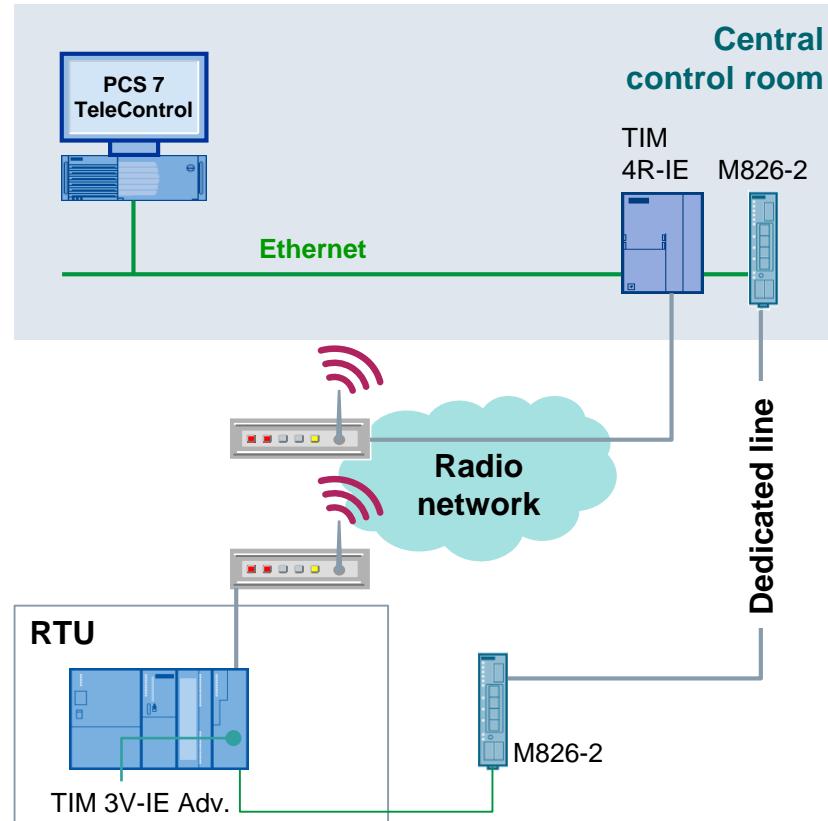


# SIMATIC PCS 7 TeleControl with SINAUT ST7 – Classical and IP based WAN – Redundant communication paths

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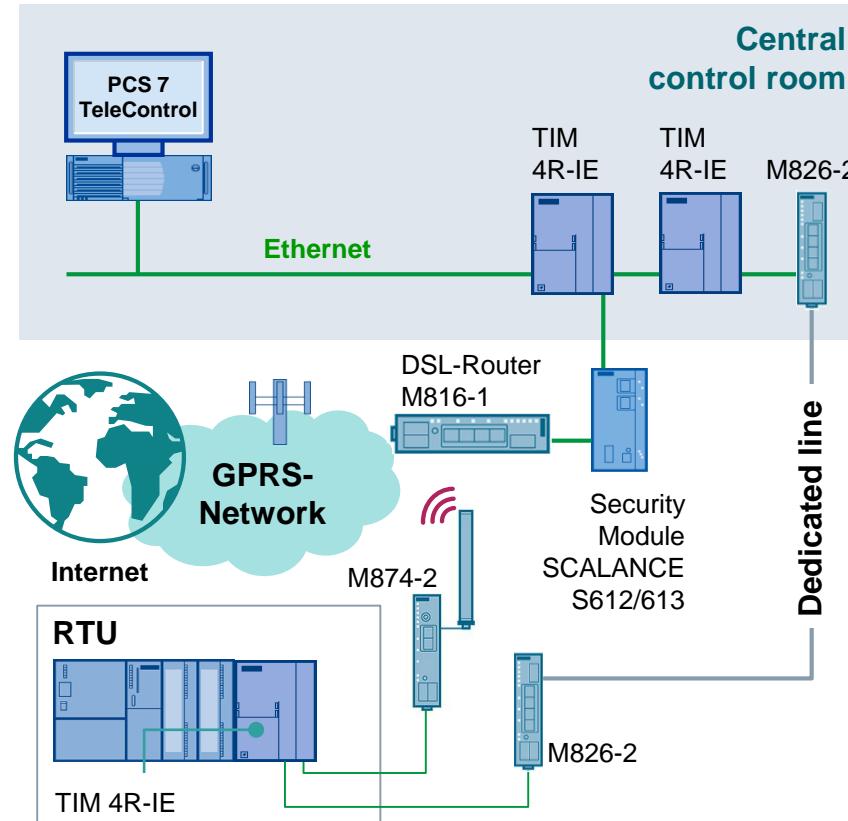
## Redundant communication paths

Classical WAN and classical WAN



## Redundant communication paths

Classical WAN and IP based WAN



Redundant paths  
DL and Radio



# SIMATIC PCS 7 TeleControl – Network Topologies with DNP3 communication

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## Basic Topologies

**Point-to-Point**



**Multidrop**



**Star**



**Ring**



## Flavors of Basic Topologies

**Star and multidrop**



**Star via radio**



**Star via GPRS**



**Star via Internet**



...

## Any combination of the Basic Topologies possible

**Different networks and media combined**



**Node**



**Redundant paths  
FO and radio**



**Station to  
multi-master**



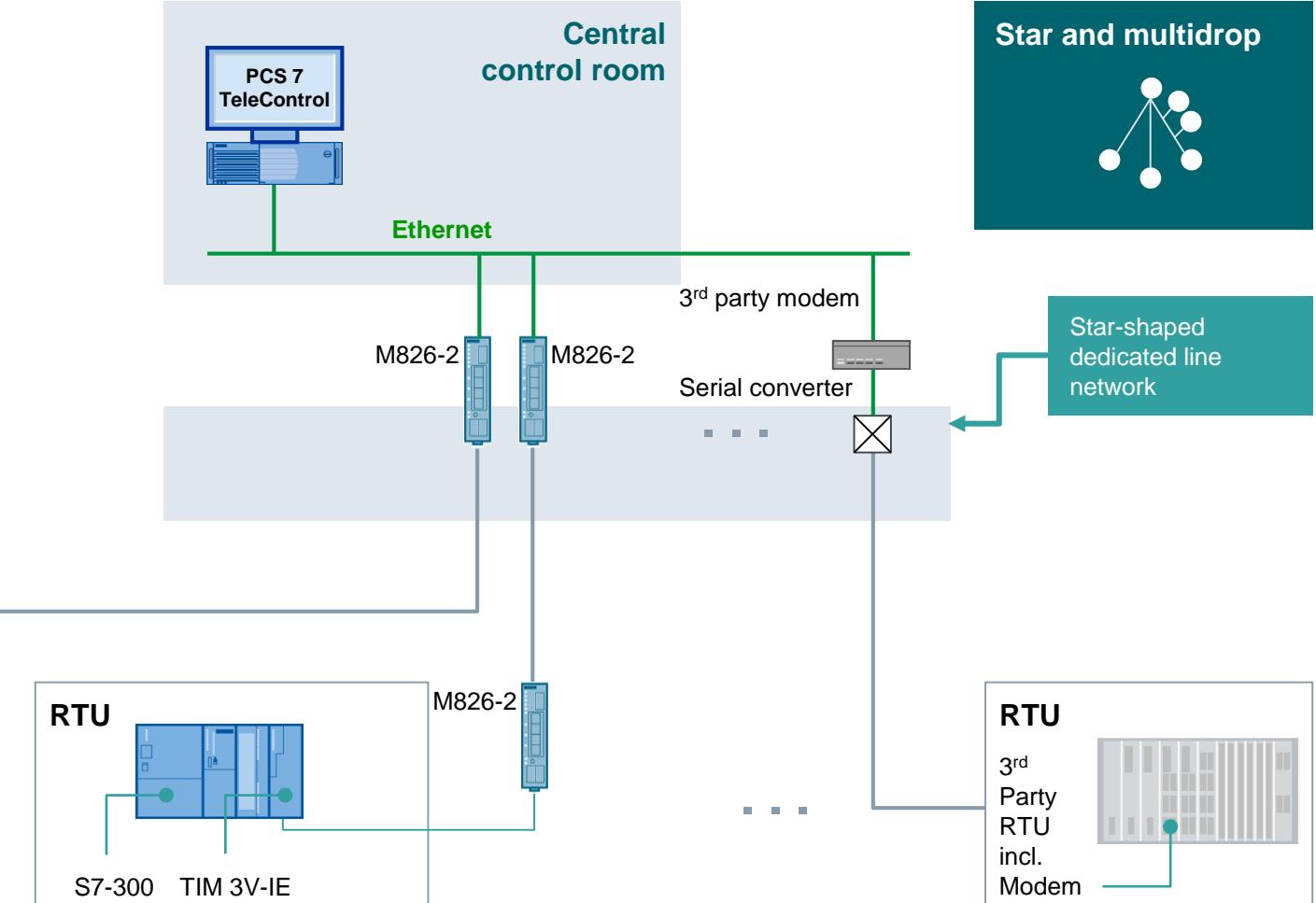
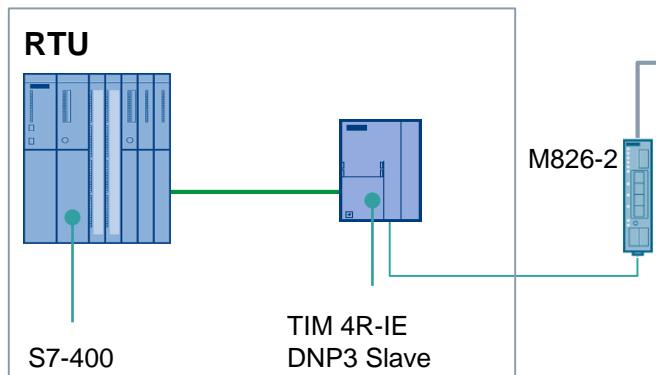
# SIMATIC PCS 7 TeleControl with DNP3 – Classic WANs – Dedicated Line

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## Range without Repeater (example)

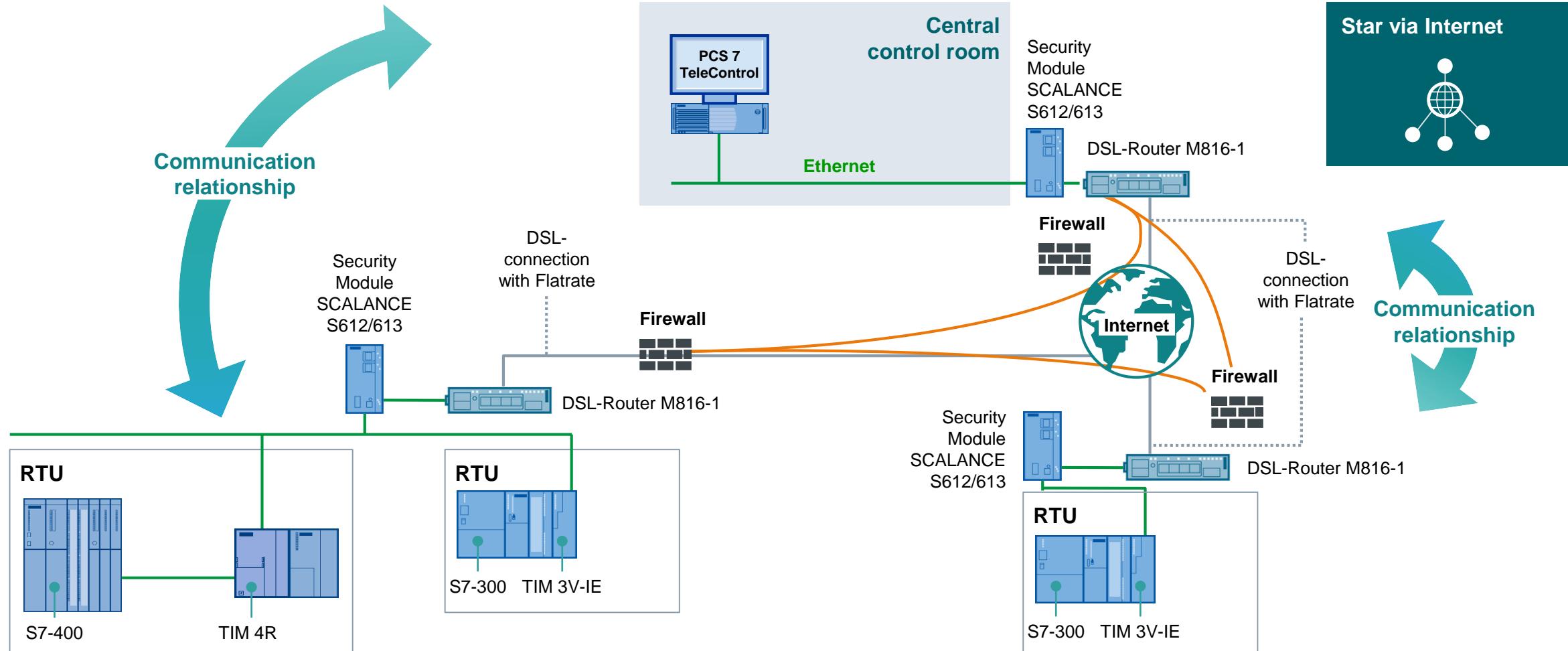
with cable diameter 0.8 mm

- 1,200 Bit/s max. 33 km
- 2,400 Bit/s max. 27 km
- 19,200 Bit/s max. 11 km



# SIMATIC PCS 7 TeleControl with DNP3 – IP based WAN Secure Networking via insecure Networks

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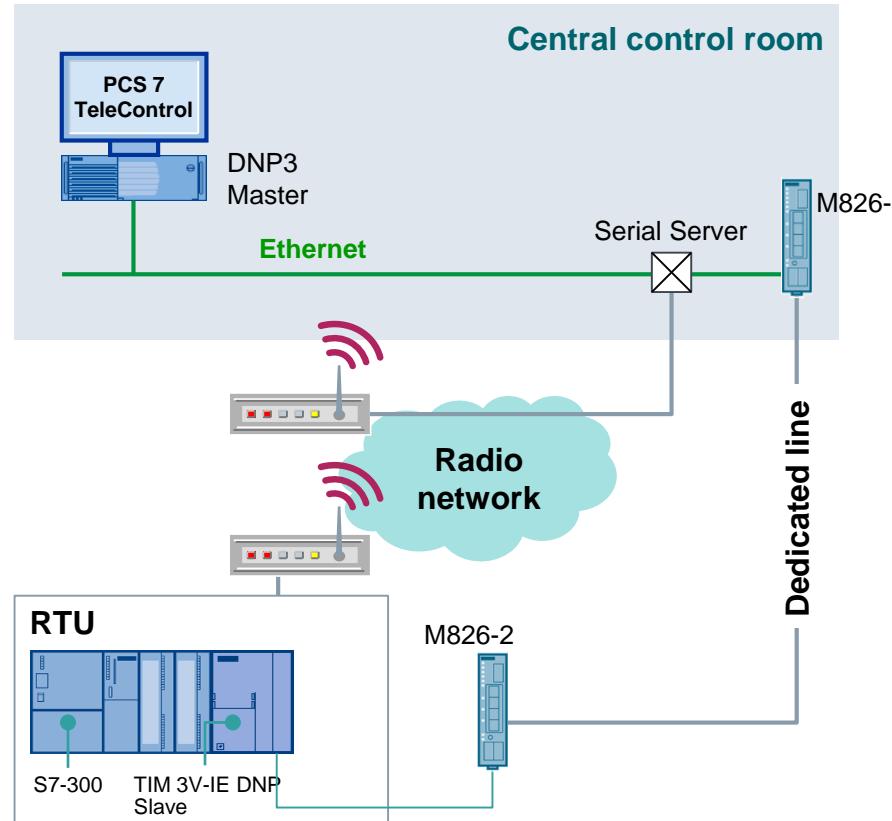


# SIMATIC PCS 7 TeleControl with DNP3 – Classical and IP based WAN – Redundant communication paths

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Ingenuity for life

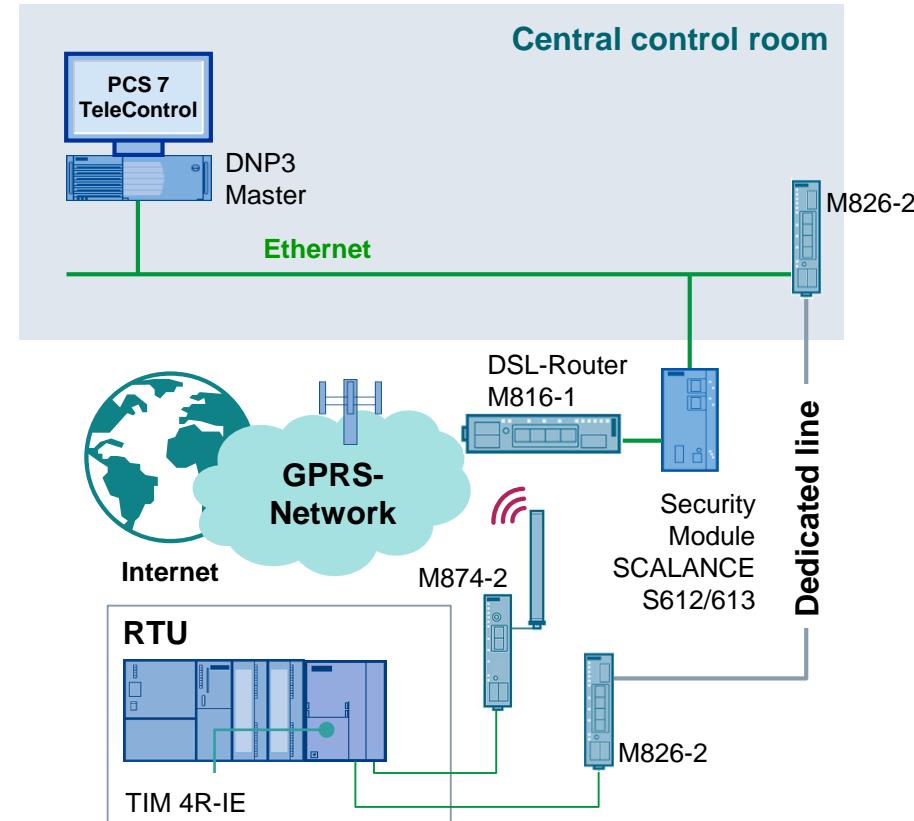
## Redundant communication paths

Classical WAN and classical WAN



## Redundant communication paths

Classical WAN and IP based WAN



Redundant paths  
DL and radio



# SIMATIC PCS 7 TeleControl – Network Topologies with IEC 60870-5 communication

**SIEMENS**  
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## Basic Topologies

Point-to-Point



Multidrop



Star



Ring



## Flavors of Basic Topologies

Star and multidrop



Star via radio



Star via internet



...

## Any combination of the Basic Topologies possible

Different networks and media combined



Redundant paths



Redundant paths  
FO and radio



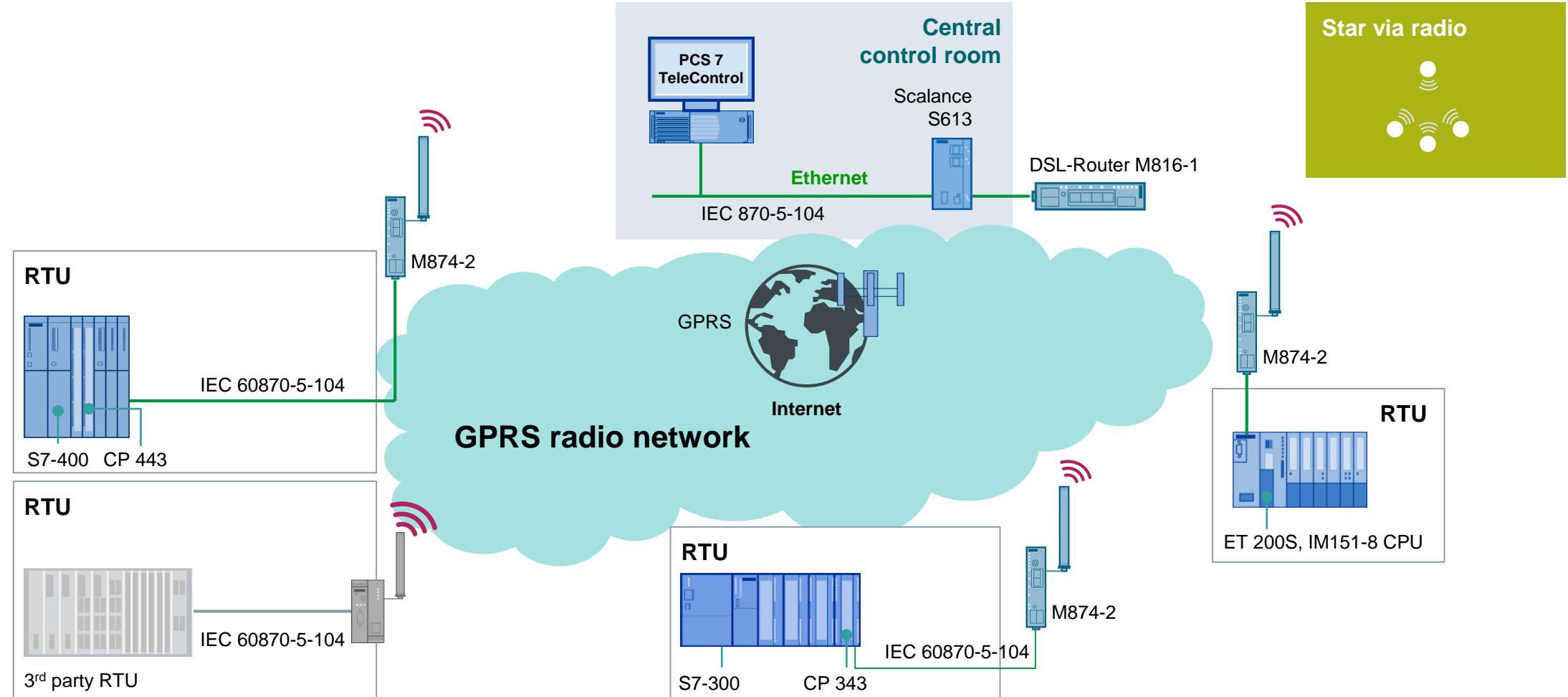
Station to  
Multi-Master



...

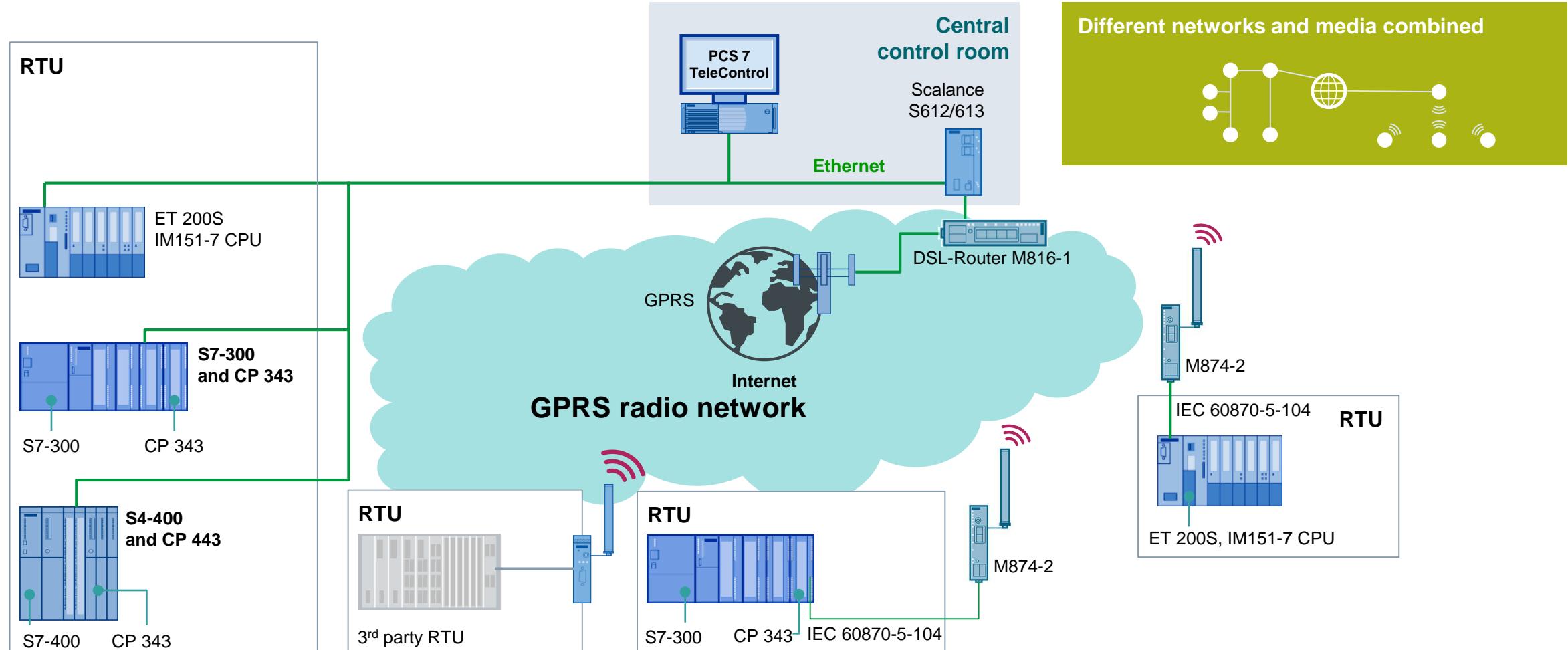
# SIMATIC PCS 7 TeleControl with IEC 60870-5-104 – IP based WAN with GPRS radio network

**SIEMENS**  
Ingenuity for life



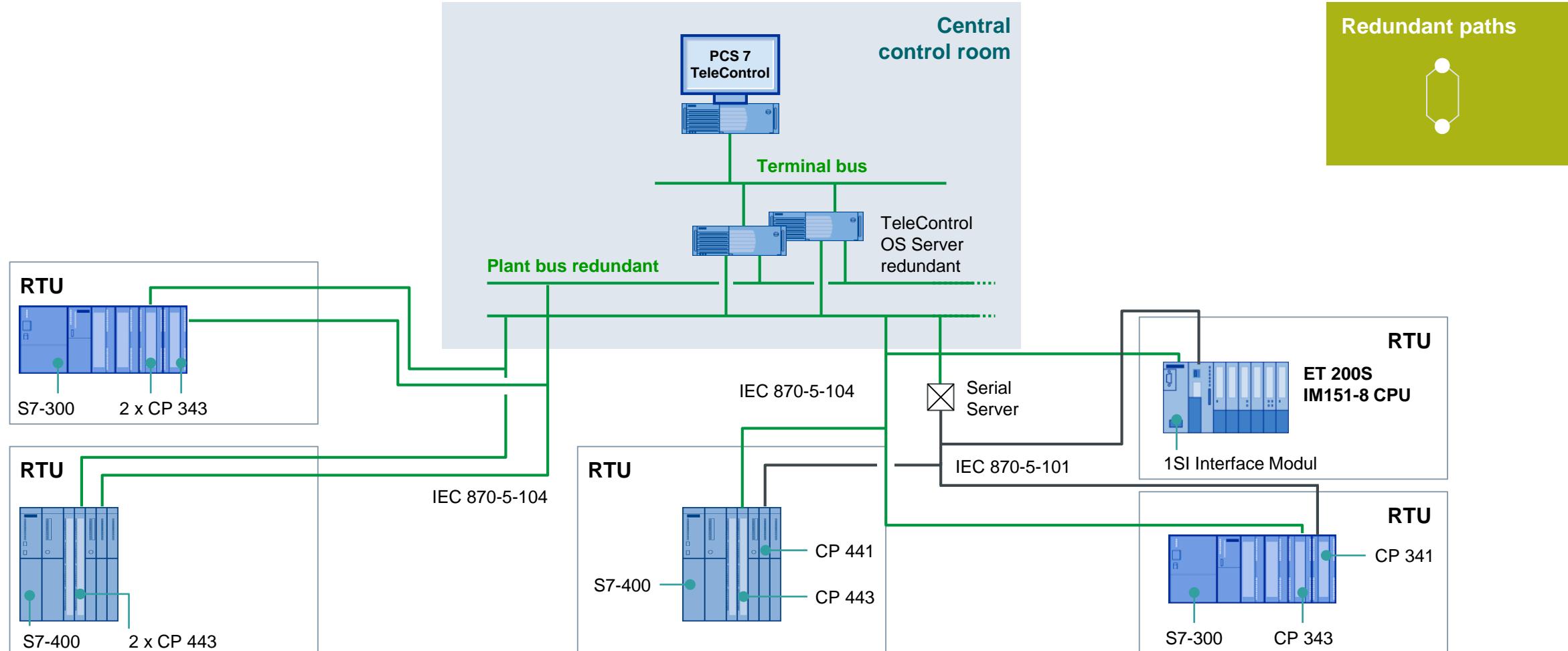
# SIMATIC PCS 7 TeleControl with IEC 60870-5-104 – IP based WAN with wired and GPRS Network

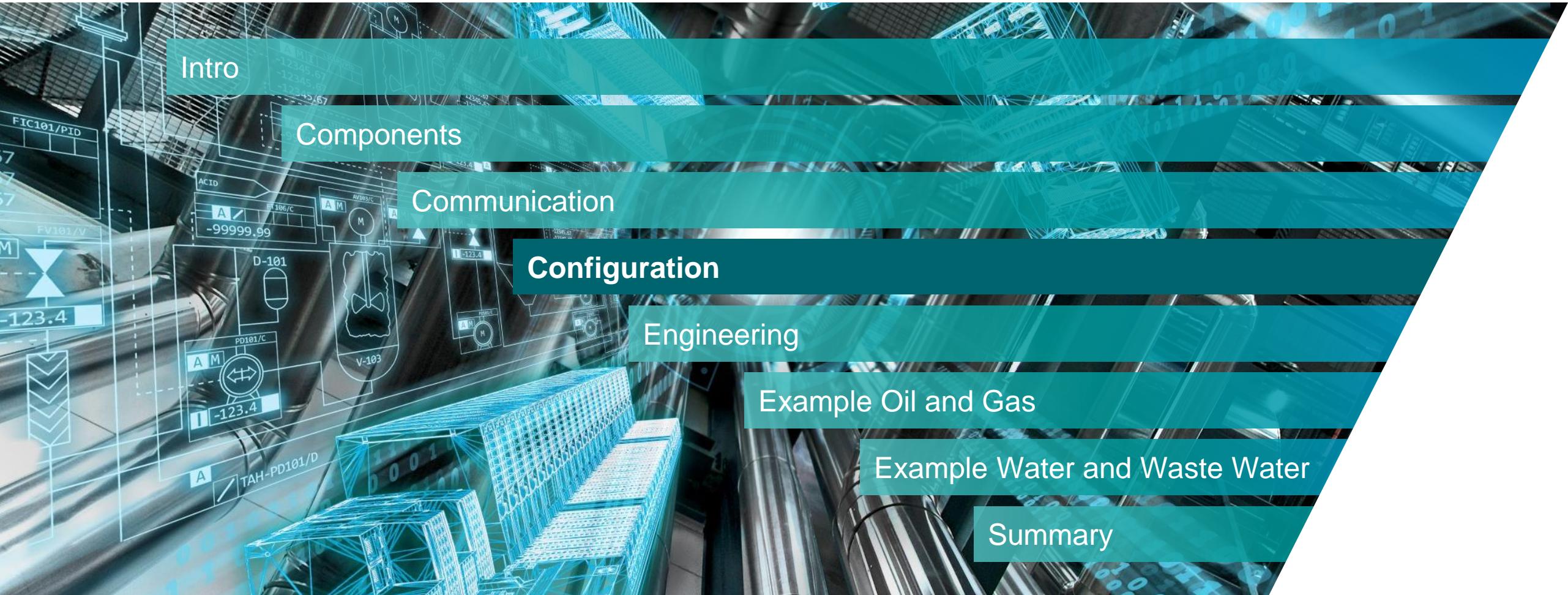
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# SIMATIC PCS 7 TeleControl with IEC 60870-5-101/104 – Redundant paths

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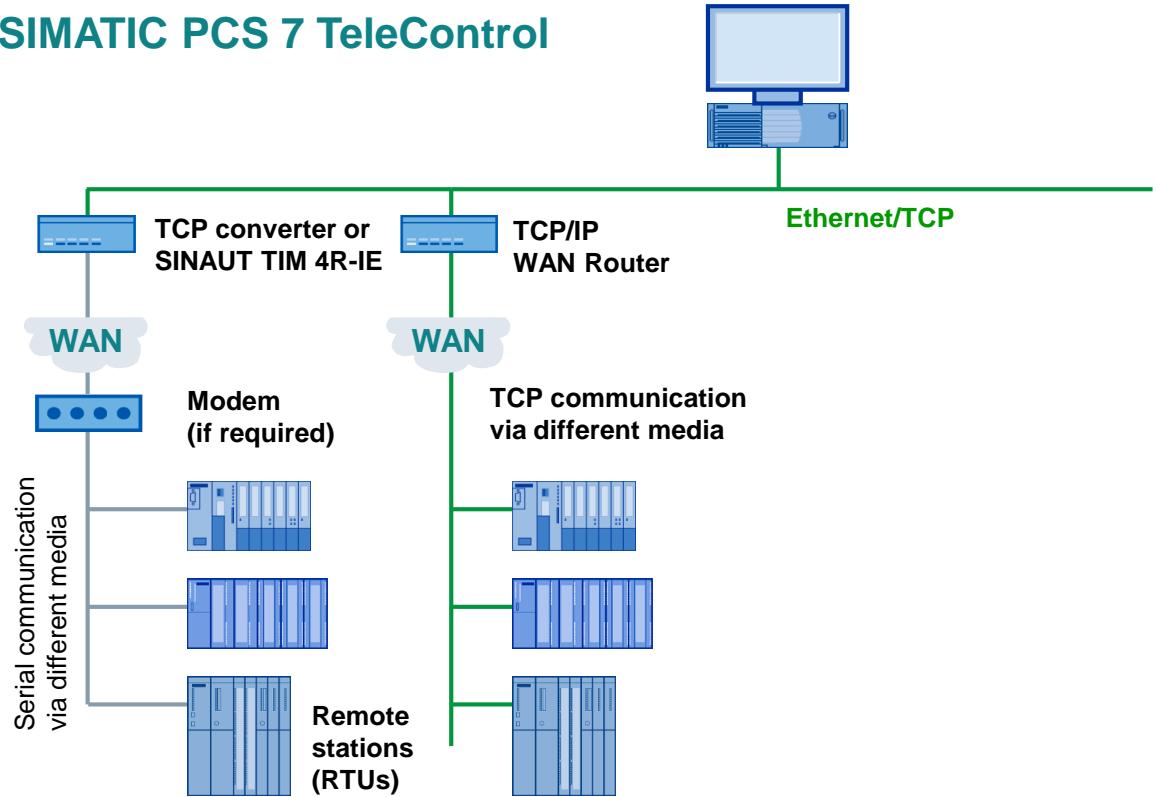




# SIMATIC PCS 7 TeleControl – Dedicated PCS 7 TeleControl – Configuration

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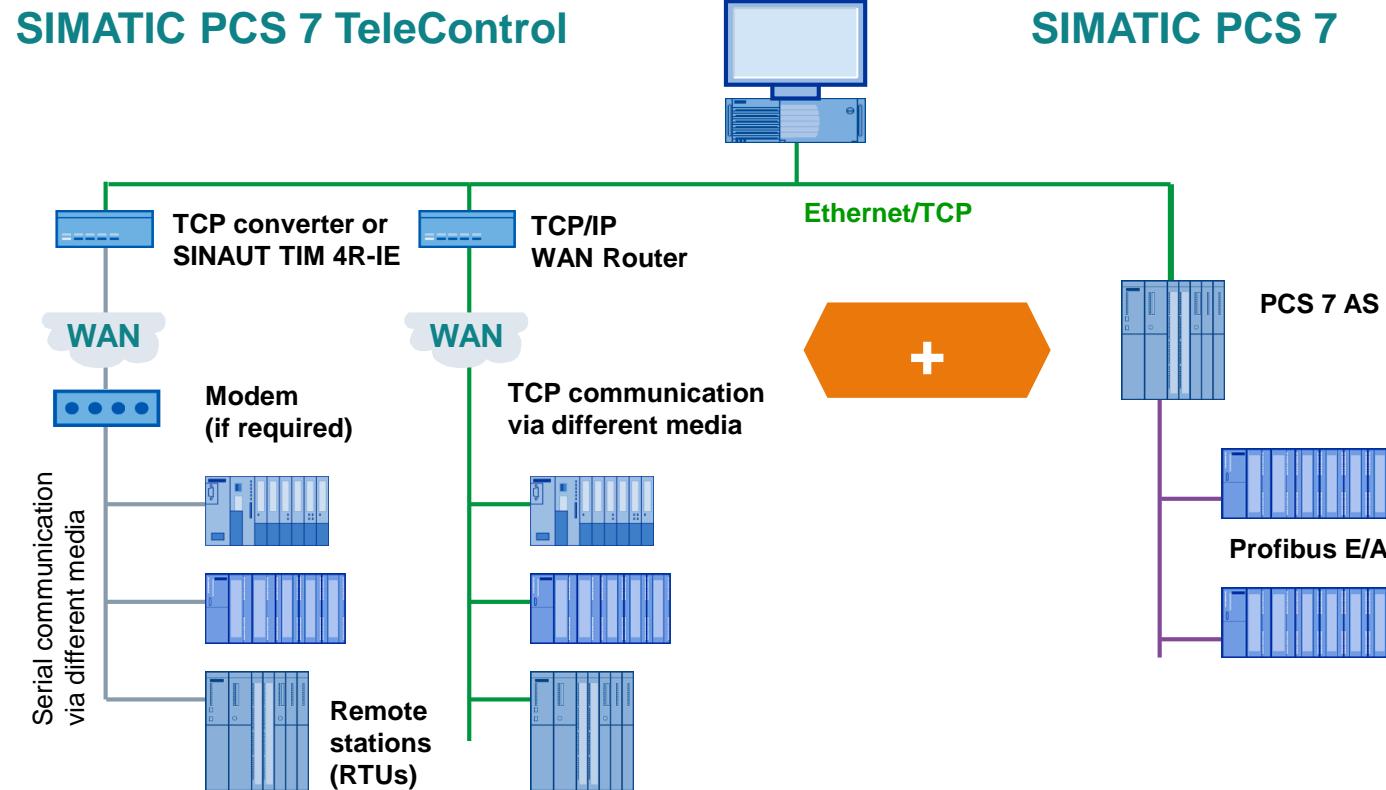
## SIMATIC PCS 7 TeleControl



A dedicated system for TeleControl only

# SIMATIC PCS 7 TeleControl – “Dual leg” configuration with SIMATIC PCS 7

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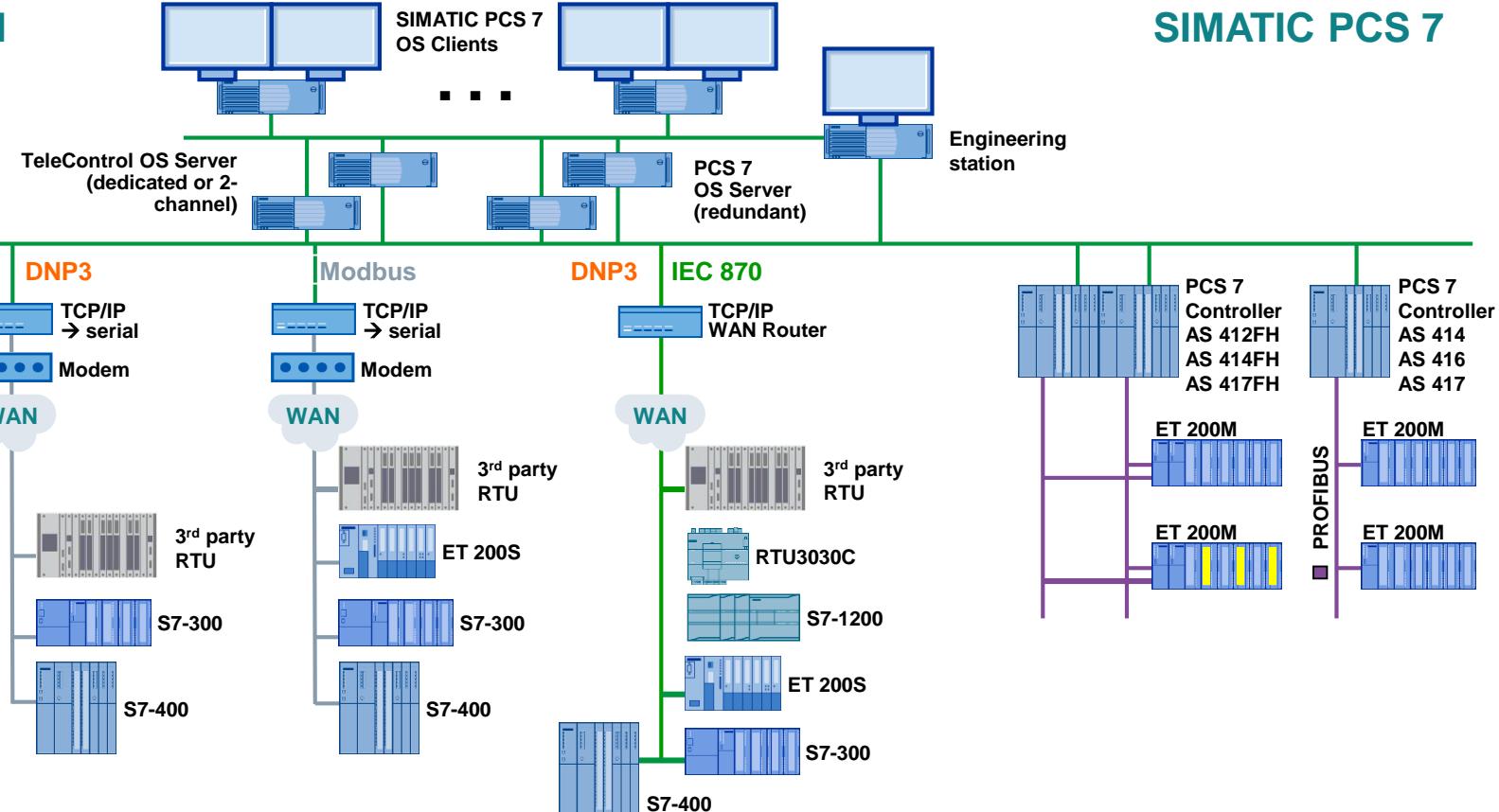


**Plant Automation and TeleControl in one system!**

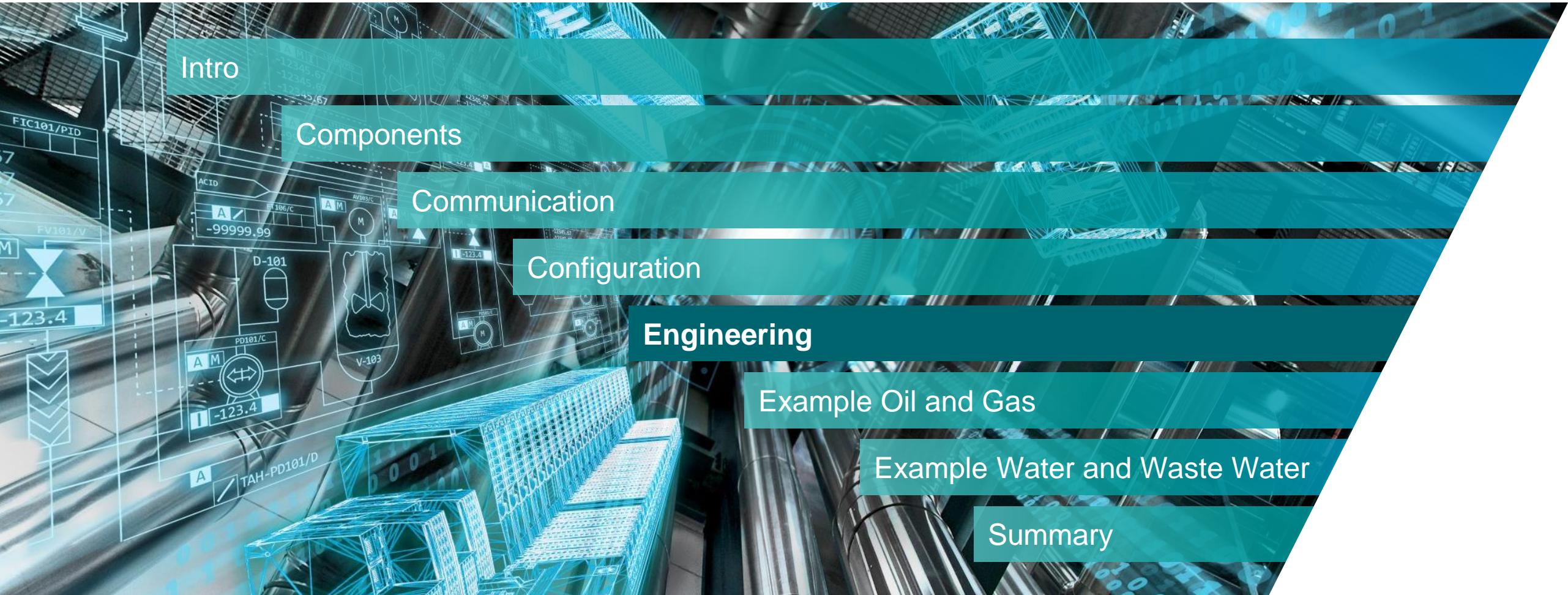
# SIMATIC PCS 7 TeleControl – High availability configuration with SIMATIC PCS 7

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## SIMATIC PCS 7 TeleControl

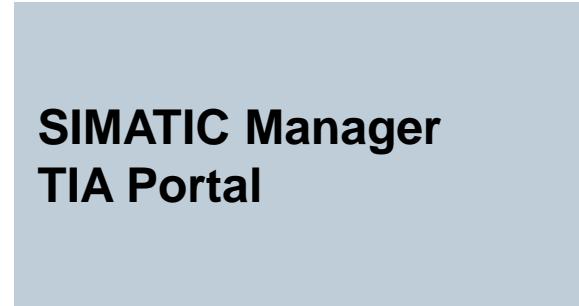


Plant Automation and TeleControl in one system!



# SIMATIC PCS 7 TeleControl – Engineering Workflow – Overview

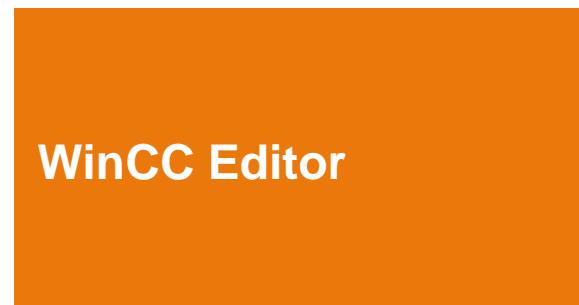
**SIEMENS**  
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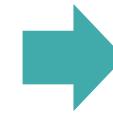
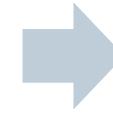
- Configure Hardware
- Configure Network
- Configure S7 Program



- Configure RTU
- Configure Alarms
- Configure TAGs
- Configure Technological Hierarchy



- Configure Pictures
- Configure Time Synchronization
- Configure Archive
- Configure User-Administration



**STEP 7 DB**



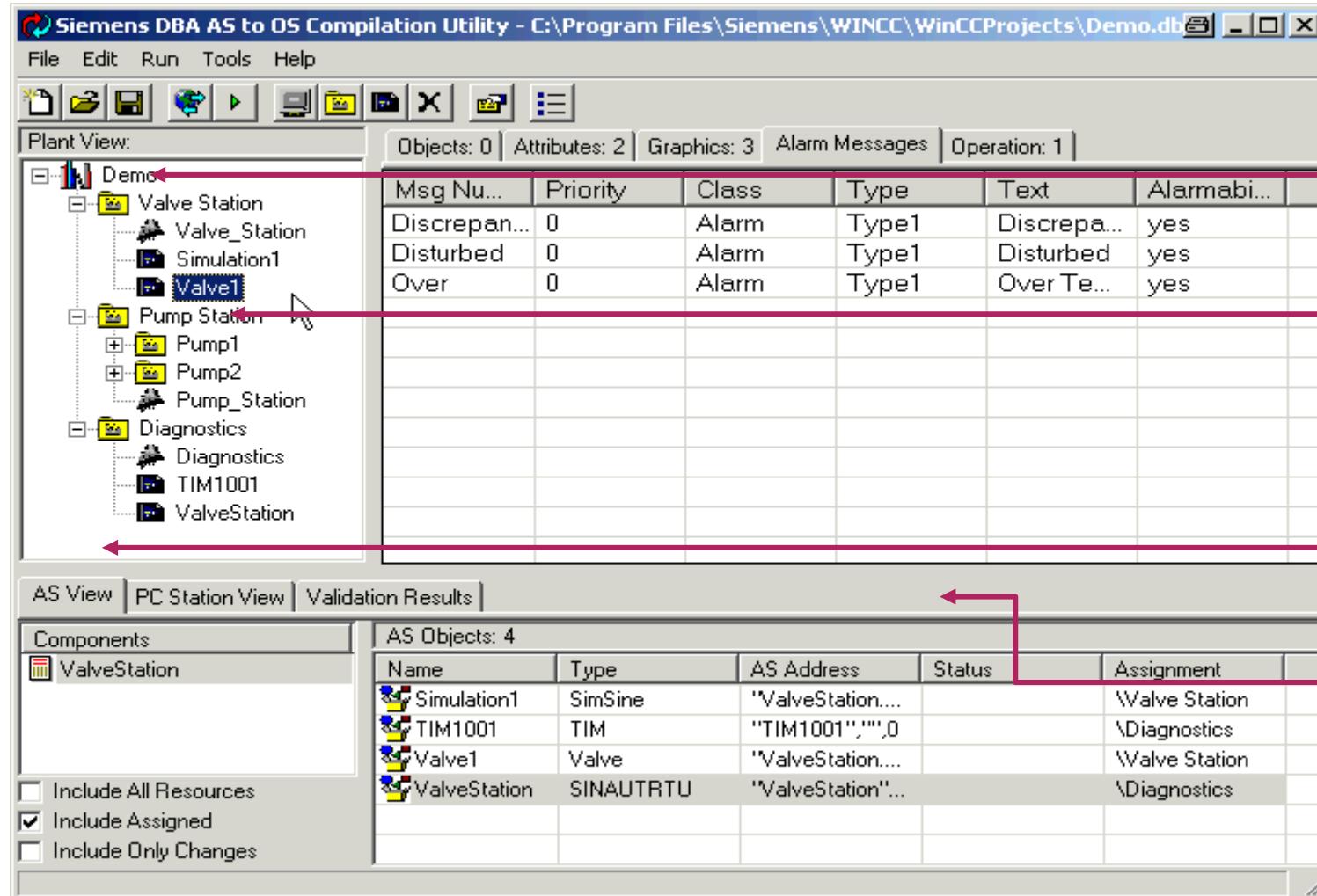
**DBA XML**

**Compile**



**WinCC DB**

# SIMATIC PCS 7 TeleControl – Engineering Workflow – Data Base Automation (DBA) – Tool



PCS 7 Plant Hierarchy

RTU objects assigned  
to the Plant Hierarchy

RTU list

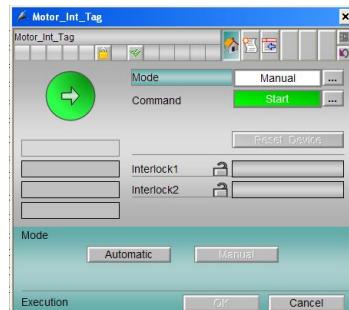
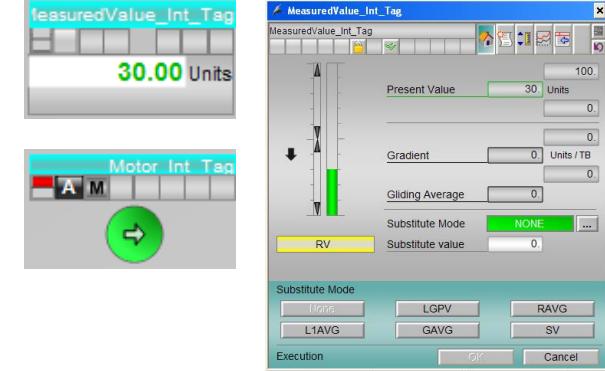
List of RTU objects  
or data points

# SIMATIC PCS 7 TeleControl – Engineering Workflow – OS library (overview)

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## TeleControl OS Object Library

- Basic Library with standard functions
  - MeasuredValue, Counter, BitAlarm, SetPoint, Command, Valve, Motor, Pump
- Technological objects for diagnostic/control of communication
  - TIM, SINAUT-/IEC-/DNP3-/Modbus RTU
- Operation guidance conform to PCS 7 via Symbols, Faceplates as well as PCS 7 Alarming Hierarchy
- Basic Library expandable on project base via new OS Object types with corresponding script processing



**Homogeneous integration into the SIMATIC PCS 7 Operator Station**  
**Same Look & Feel for local and remote processes**  
→ Avoid operation errors  
→ Comprehensive plant overview

# SIMATIC PCS 7 TeleControl – Engineering Workflow – Technological object – Measured Value Processing

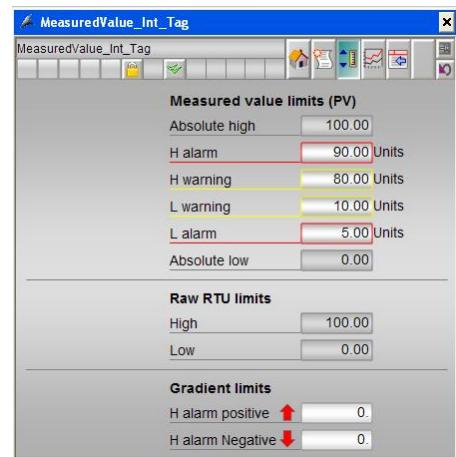
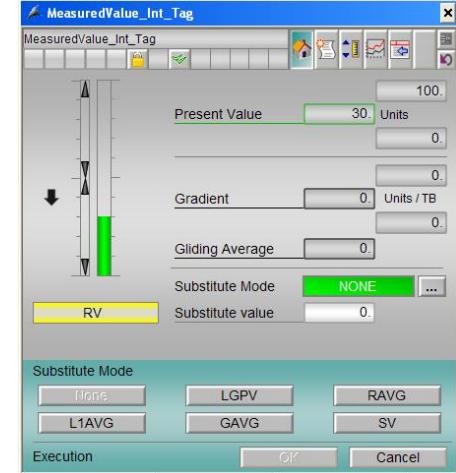
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## Application

Measuring of pressure, temperature, flow, ...

## Functions

- **Linear scaling of measured value (if not already done in RTU)**
- **Formation of Quality Code based on**
  - RTU connection status
  - Diagnostic information
- **Limit checking (HH, H, L, LL) (if not already done in RTU)**
  - Warning and alarm limits
  - Zero and alarm hysteresis
  - Gradient checking
- **Time stamping**
  - Time stamping of all data
  - Correct processing of data arriving with time delay
- **Averaging procedures for event driven data**
  - Time weighted averaging
  - No value during transmission period  
→ Split next value proportionally over 2 intervals



# SIMATIC PCS 7 TeleControl – Engineering Workflow – Technological object – Counter Processing

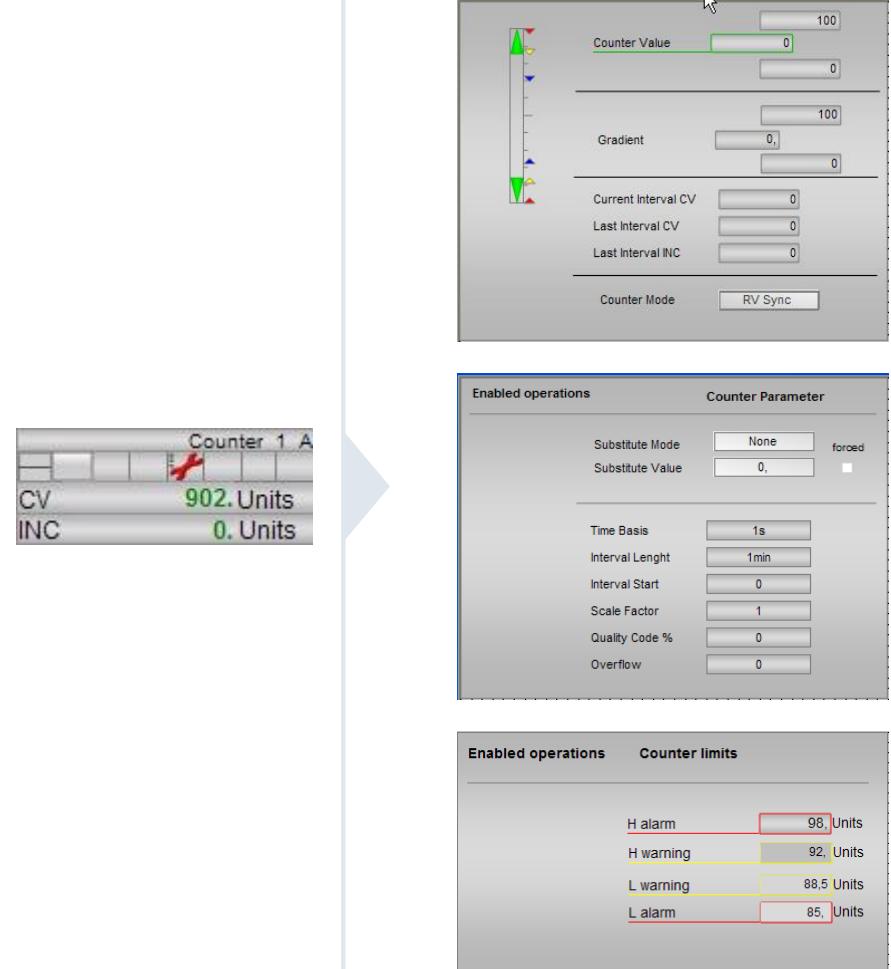
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## Application

Record volumes, energy transferred

## Functions

- **Scaling of counter values  
(if not done in RTU)**
- **Processing counter increments**
  - Transmitted spontaneously by RTU
  - Cyclic freeze and fetch TeleControl commands
- **Flexible substitute value processing**
- **Creation of intervallic values from totalized values**
  - Correct totalized rollover processing
  - Filling of empty periods with interpolated values
- **Derivate flows based on counter values (gradient)**
- **Processing of counter exchange or counter reset**
  - Needs RTU support for counter flags
- **Plausibility check**
  - H and HH limit checking
  - Gradient check

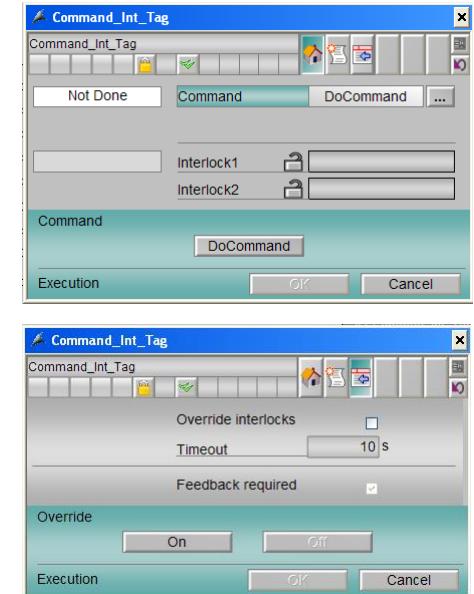


## Application

Execution of a Command

## Functions

- **Command Interlock**
  - Command may be interlocked by one or more conditions
  - Operator is notified when trying to issue a locked command
  - Privileged operator may bypass the interlock
- **Command monitoring**
  - Monitoring the command execution by evaluating status of feedback signals
  - Time monitoring of command execution with discrepancy alarm in case of timeout
- **Scaling of setpoint values (If not supported by RTU)**



# SIMATIC PCS 7 TeleControl – Engineering Workflow – Technological object – Motor, Valve, Pump

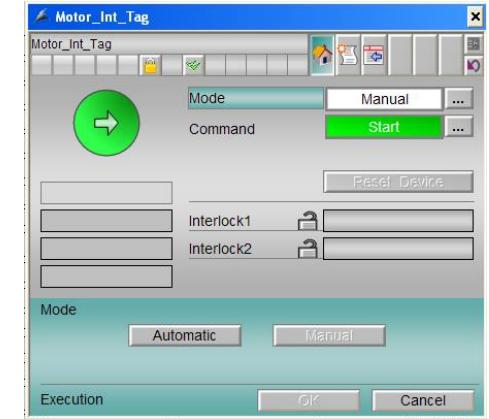
**SIEMENS**  
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## Application

Automation of standard process elements, e.g. Motor, Valve, Pump

## Functions

- **Command interlock**
  - Command may be interlocked by one or more conditions
  - Operator is notified when trying to issue a locked command
  - Privileged operator may bypass the interlock
- **Command monitoring**
  - Monitoring the command execution by evaluating status of feedback signals
  - Time monitoring of command execution with discrepancy alarm in case of timeout



# SIMATIC PCS 7 TeleControl – Engineering Workflow – Technological object – Diagnostics

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## Application

RTU diagnostics

## Functions

- **Available diagnostic information for each RTU**
  - Main and backup connection state
  - State of dial-up connection
  - General request state
  - Station time sync state
  - Message counter for transmissions, retries
- **Commands can be triggered for each RTU**
  - Issue General Request
  - Establish dial-up connection
  - Open/close permanent connection (“online”/“offline”)
- **Detection of connection failure**
  - After x failed dial-up attempts (dialup connection)
  - After abort message from underlaying layer (TCP)
  - After missing life beat monitoring telegrams
- **In case of connection failure**
  - Related process objects are marked as invalid
  - Commands to the affected RTU are locked



## DBA workflow

- Automatic generation of the OS database (display hierarchy, variables, alarm-messages and -priorities, function block symbols and faceplates)
- Automatic placing of type specific function block symbols (e.g. for measuring monitoring) and automatic assignment of faceplate

**Manual engineering is basically reduced to the design and positioning of the static graphical elements (e.g. pipes, tanks, ...)**

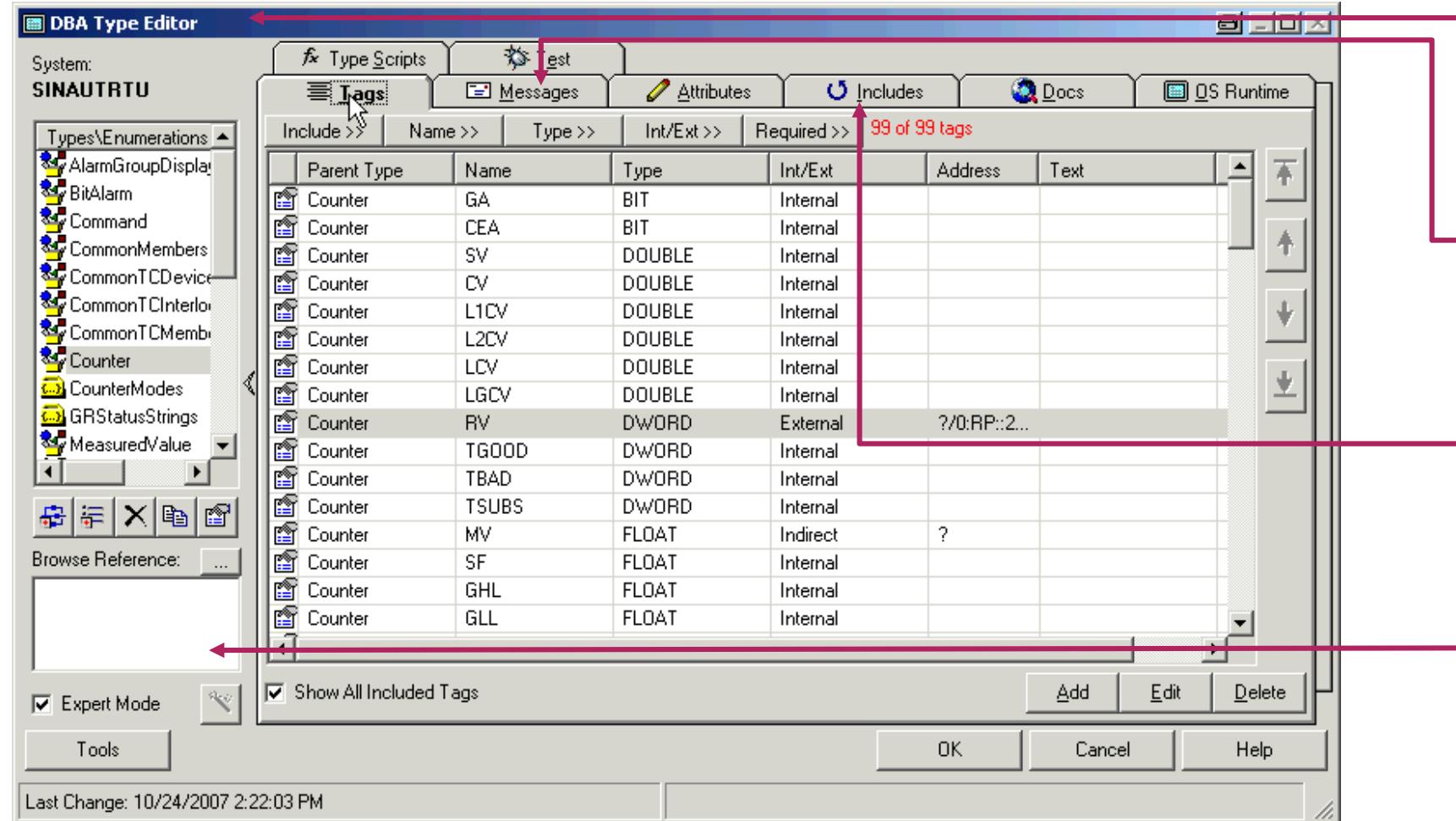
## DBA Type Editor

- Definition of new user specific objects (additional to basic library)
- User function blocks → arrangement of information in variable structure  
→ generation of derived values via VB scripts
- Creation of user specific symbols and faceplates with PCS 7 standard tools
- Same DBA tool handling of the user defined objects as the standard objects

**Flexible adaptation and extension of functionality as per customer requirements**

# SIMATIC PCS 7 TeleControl – DBA Engineering – Type Editor

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Individual type set  
for each RTU type

The definition of a type  
includes tags, messages,  
attributes and runtime scripts

Types may include/inherit  
definitions from other types

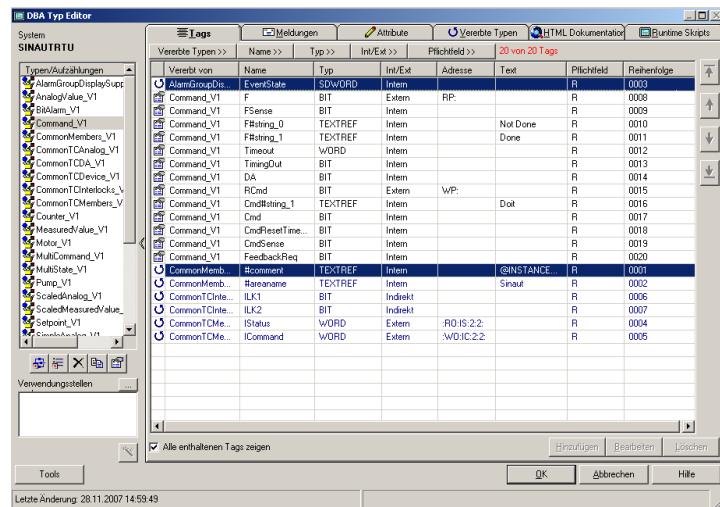
The Type Editor is used to  
add, modify, delete, duplicate  
types

# SIMATIC PCS 7 TeleControl – Mass data (bulk) engineering in “Import Export Assistant” style

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## DBA Type Editor

Measured value type definition



## Excel sheet

Measured Value instance parameters

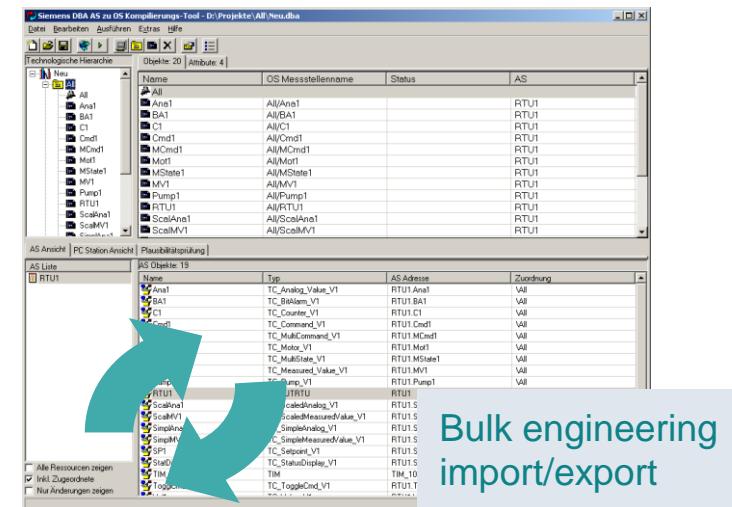
Attribute name	Attribute type	Default value	Instance editable
Instance Name	String		yes
unit	String		yes
Lower limit	Float	0	yes
Upper limit	Float	100	yes



Hierarchy Path	Instance name	Unit	Lower limit	Upper limit
/Plant/Pump1	Pressure_1	mBar	0	3,000
/Plant/Motor1	Temp_1	°C	-20	70
/Plant/Pump1	Flow_1	l/h	0	10,000

## DBA

Measured Value instances in plant hierarchy



## Benefits

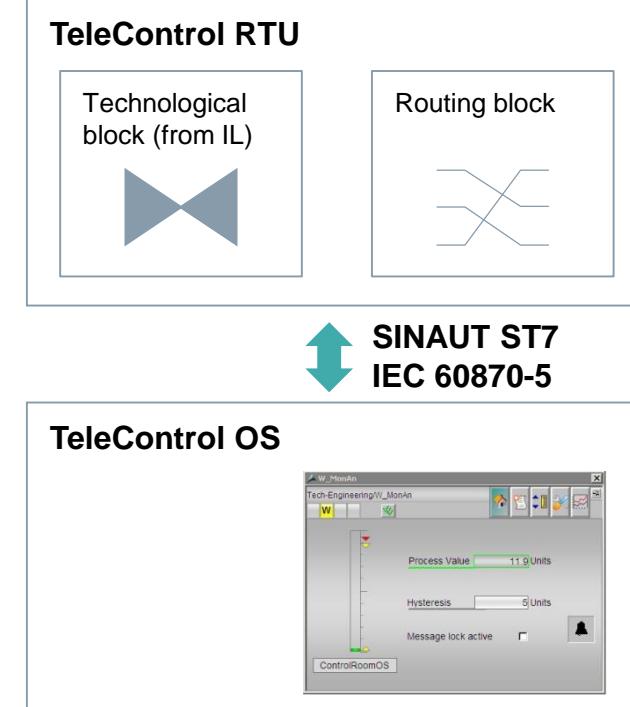
- Reduces engineering overhead – especially in larger projects (many tags)
- Increases engineering efficiency by avoiding double engineering
- 3<sup>rd</sup> party RTUs → eases integration into PCS 7 TeleControl

# SIMATIC PCS 7 TeleControl – Technological engineering based on PCS 7 Industry Library (IL)

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## Technological engineering using routing blocks

- Use of tailored technological function blocks from the PCS 7 Industry Library (Motor, Valve, Measured value, ...)
- IL function blocks support in the standard visualization by symbols and faceplates (in PCS 7 APL style)
- TeleControl routing blocks for connection of technological function blocks with SINAUT ST7 and IEC 60870-5 communication
- Information of function block is sent via a SINAUT or IEC object to PCS 7 → in TeleControl engineering only an object address has to be entered
- Comfortable graphical engineering of technological blocks → routing blocks in CFC-Editor (same as PCS 7)

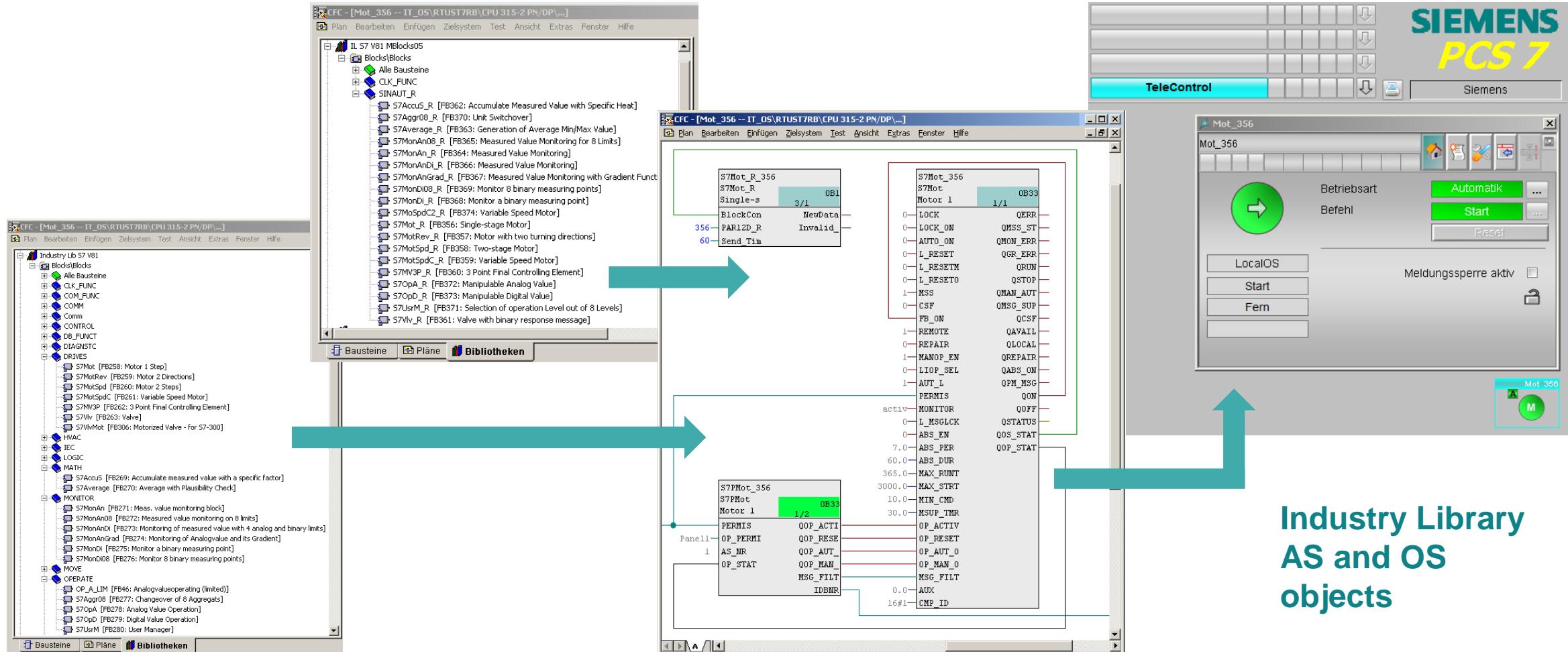


## Reduction of Engineering effort by re-use of ready-made, standardized functions

- Reduced testing effort by use of pre-tested functions
- Reduced maintenance & support effort by higher level of standardization in the plant
- Comfortable engineering as with SIMATIC PCS 7

# SIMATIC PCS 7 TeleControl – Technological engineering using CFC

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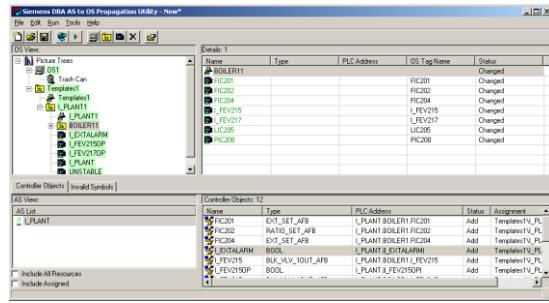


**Industry Library  
AS and OS  
objects**

# SIMATIC PCS 7 TeleControl – Engineering Workflow – Automatic OS-data generation

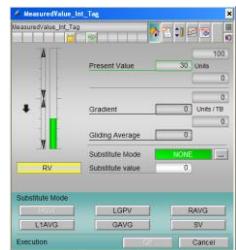
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DBA

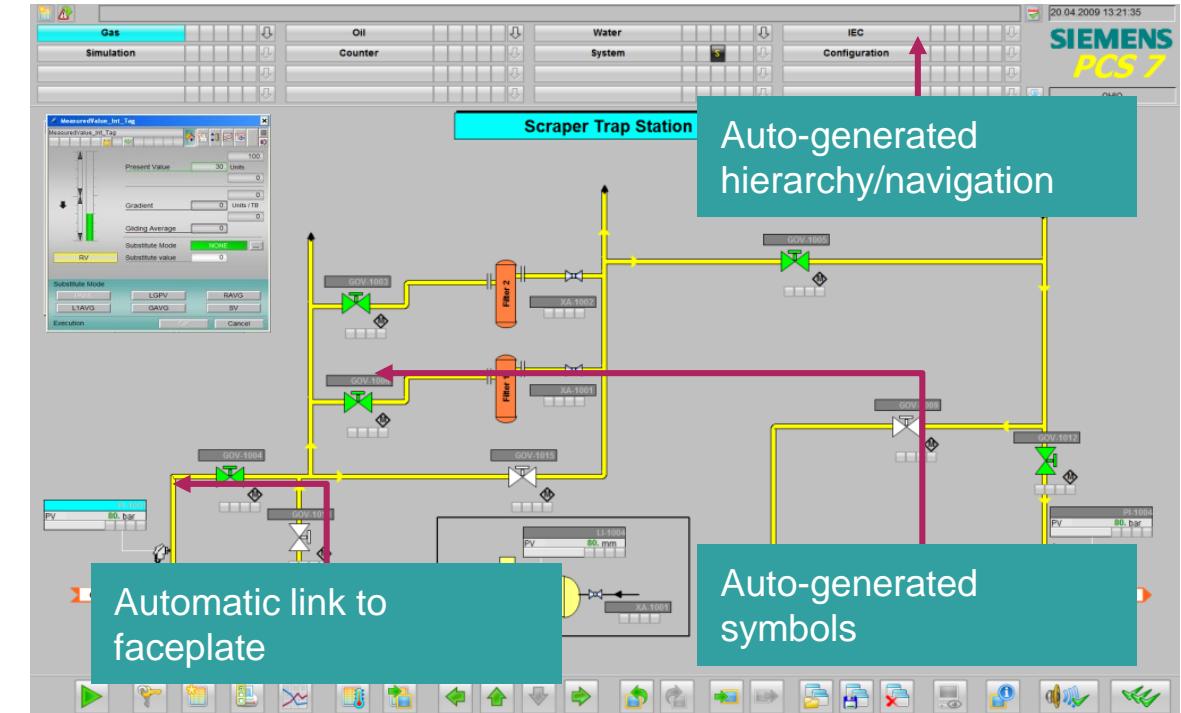


Compile

Faceplate



Process screen



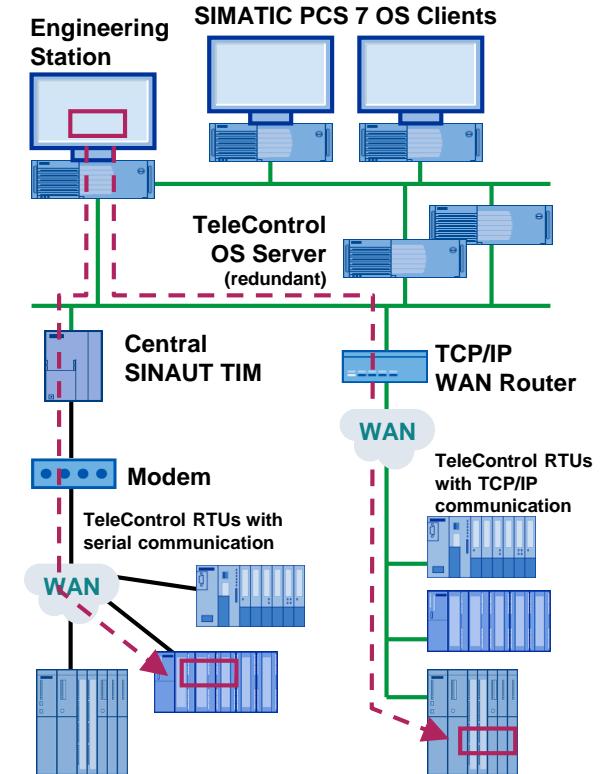
Manual engineering is basically reduced to the design and positioning of the static graphical elements (e.g. pipes, tanks, ...)

# SIMATIC PCS 7 TeleControl – Engineering Workflow – Access to outstations

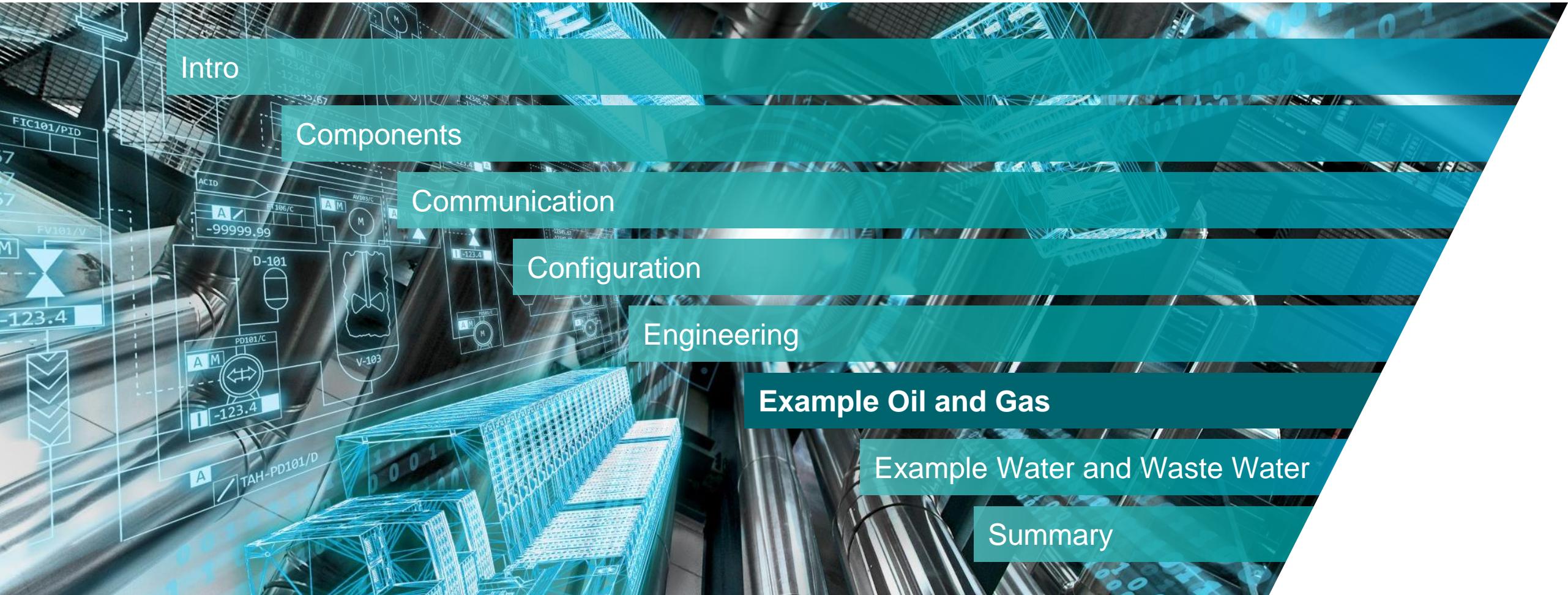
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## Tele-Engineering with access from PCS 7 Engineering Station

- Programming of SINAUT ST7 outstations (RTUs)
- Parameterization of SINAUT ST7 outstations (RTUs)
- Engineering via TCP/IP connection with all protocols
- Engineering via serial connection with SINAUT ST7
- Routing of field devices via SINAUT ST7



**Same communication connection for programming, parameterization as well as process control!  
Savings in the infrastructure!**



# SIMATIC PCS 7 TeleControl in Oil and Gas – Typical applications

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## Remote Terminal Units in Oil & Gas

- Metering-stations in pipelines and gas networks
- Valve stations in pipelines
- Wellhead monitoring and automation, incl.  
Emergency Shut Down (ESD)
  - Gas wells
  - Oil wells
  - Gas injection wells
  - Water injection wells



These applications require integration of both local automation and distributed automation stations

# SIMATIC PCS 7 TeleControl in Oil and Gas – Wellhead monitoring automation

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## Typical requirements for wellhead monitoring RTU

### Monitoring

- 0 – 16 DI for block valve positions
- 8 – 16 AI for pressures, temperatures, flows
- Local storage for well test data

### Control

- Few automation functions
- Max. 2 control loops (production flow, lift injection flow)
- 0 – 16 DO for block valves

### ESD

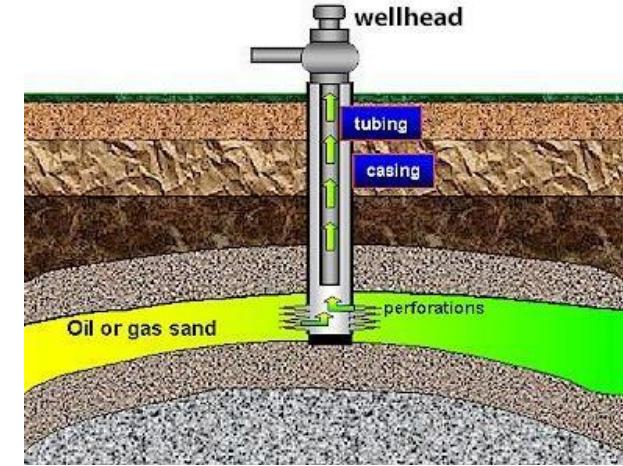
- Close subsurface safety valve (in case of tubing or casing overpressure)
- Not always necessary/not always SIL rated

### Communication options

- Protocols: Modbus (ASCII, TCP), SINAUT ST7, IEC 60870-5 (serial/TCP), DNP3 (serial/TCP)
- Transmission media: radio (GPRS, ...), fiber optic cable, satellite, dial-up lines
- Communication properties: data buffering, time stamping, time synchronization

**Extended temperature range -25° C ... +70° C**

**Low power consumption**



## TeleControl and more ... Typical extensions for Oil and Gas

Leak Detection and Location

Hydraulic Profiles

Batch and Pig Tracking

Load Management  
Load Scheduling

AGA Calculations  
(AGA3, AGA7, AGA8)

Condition Monitoring  
(Corrosion Detection, Vibration Monitoring, ...)

Security Functions  
(Intrusion Detection, Fire & Gas detection, ...)

Remote Operation Control

Offline Training Simulation

Predictive Simulation

Scenario (What-If)  
Simulation

Optimization of Efficiency

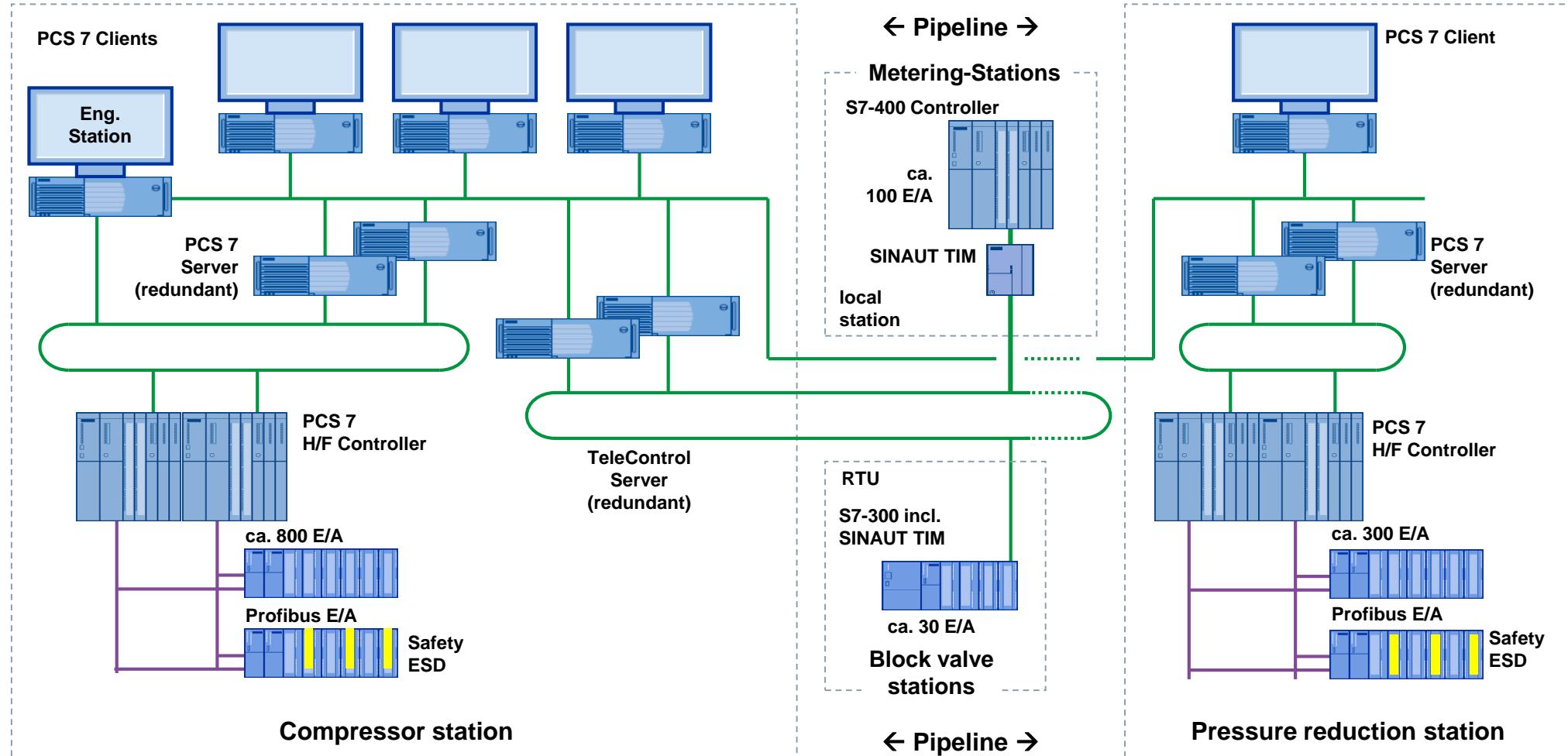
Active Flow Path Coloring  
(for tank farms)

Gas Network Management



# SIMATIC PCS 7 TeleControl in Oil and Gas – Example – Gas-Pipeline with Block Valve- and Metering-Stations

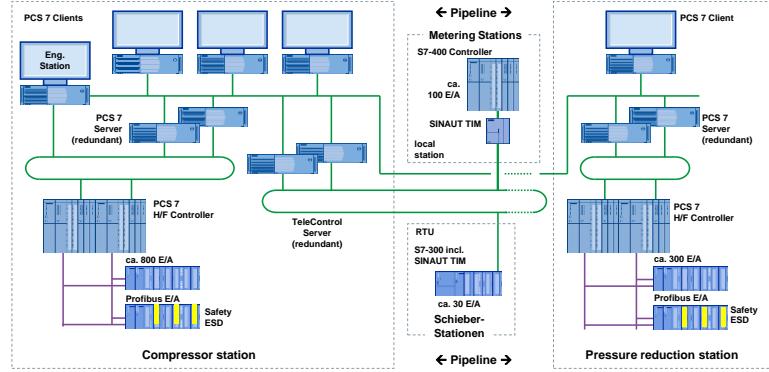
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# SIMATIC PCS 7 TeleControl in Oil and Gas

## Example – Gas-Pipeline with Block Valve and Metering-Stations

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### Uniform automation of all stations of the gas network

- SIMATIC PCS 7 for **Compressor- and Pressure Reducing Station** and PCS 7 **TeleControl** for **Block Valve and Metering Station**
- Consolidation in **one (!) OS Single Station** PCS 7 server and TeleControl (dual channel mode)
- Uniform process control: Same faceplates, alarming, trend displays, ...

### High availability due to redundant configuration

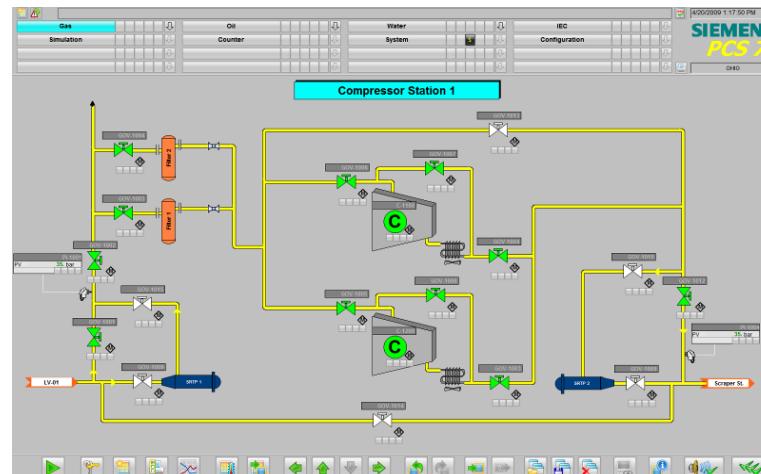
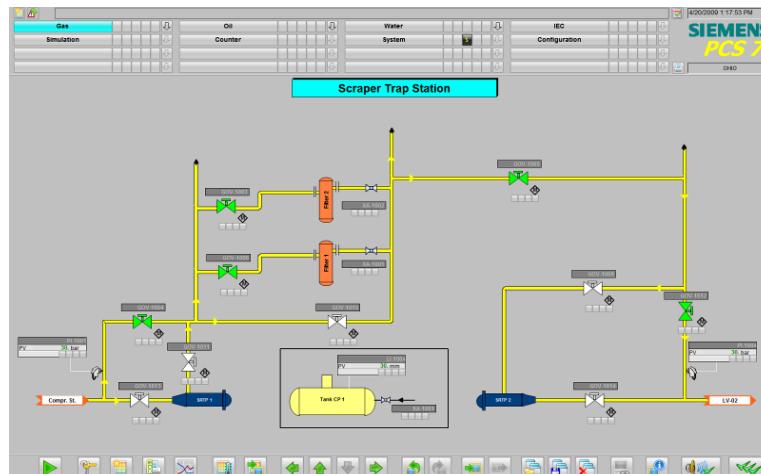
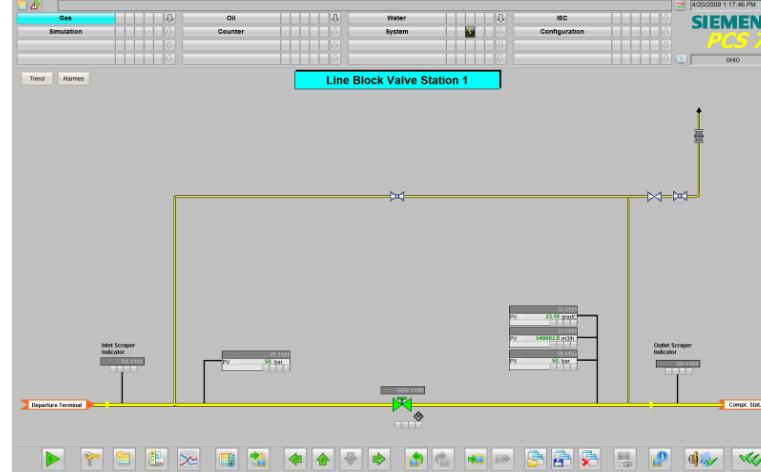
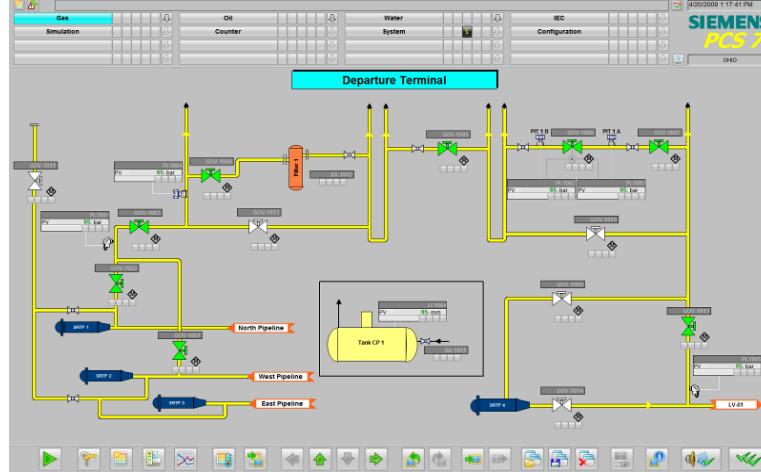
- PCS 7 OS server
- TeleControl OS server
- Media-redundant ring topology

### Safety Integrated for ESD

- **Emergency Shut Down (ESD)** fully integrated into automation solution (Compressor/Pressure Reducing Station)

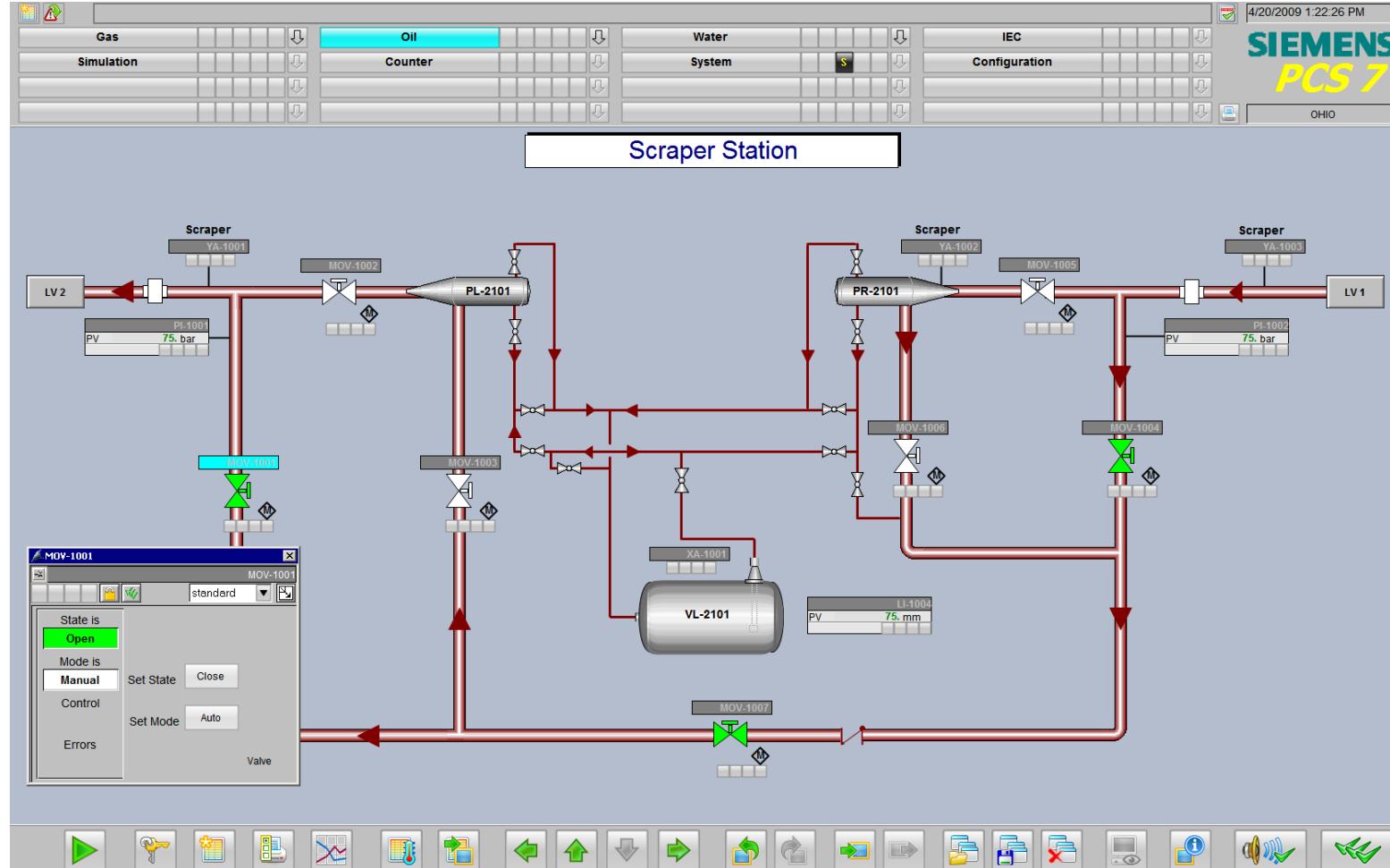
# SIMATIC PCS 7 TeleControl in Oil and Gas – Examples of OS screens Departure/Block Valve/Scraper/Compressor

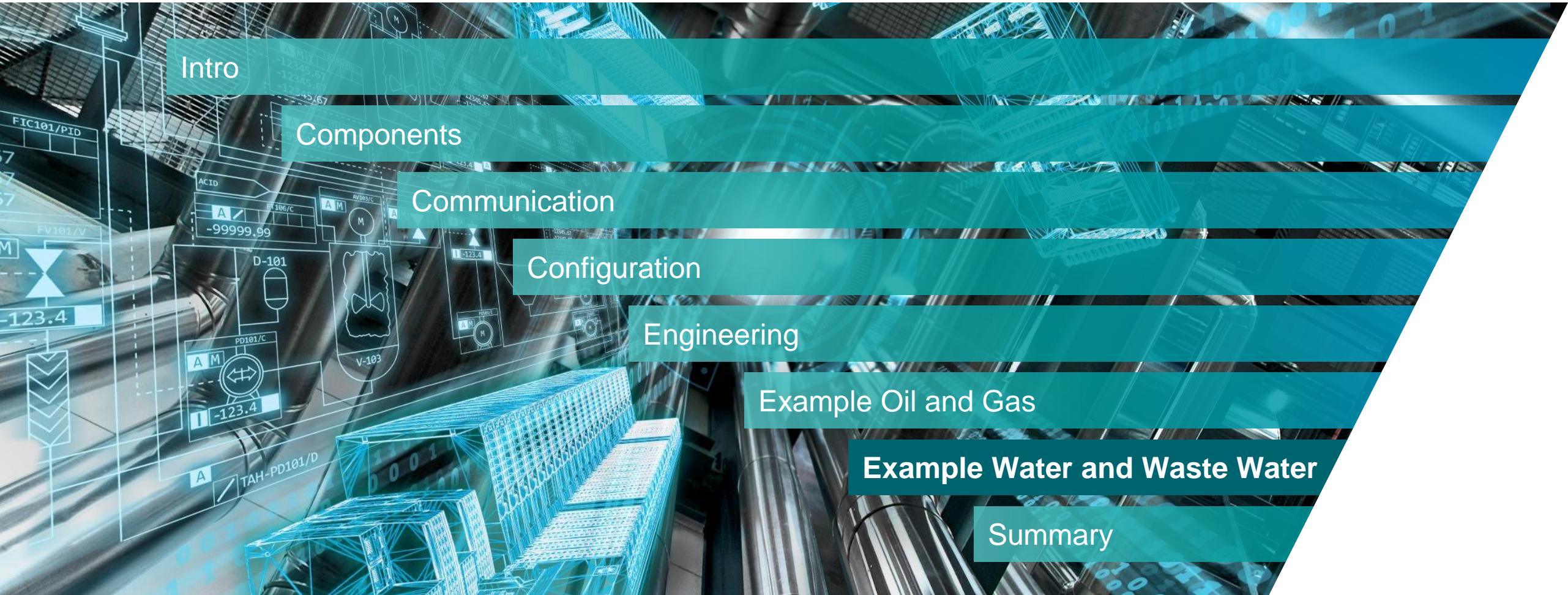
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# SIMATIC PCS 7 TeleControl in Oil and Gas – Example of OS screen → Oil Pipeline Scraper Station

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# SIMATIC PCS 7 TeleControl in Water and Waste Water – Typical applications

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## Remote Terminal Units in Water and Waste Water

- Pump stations
- Rain Water Buildings
- Reservoir Buildings (elevated tank)
- Valve stations in Pipelines



These applications require integration of both local automation and distributed automation stations

# SIMATIC PCS 7 TeleControl in Water and Waste Water – Automation at Rain Water Buildings

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## Communication options

- Protocols
  - Modbus (ASCII, TCP)
  - IEC 60870-5 (serial/TCP)
  - DNP3 (serial/TCP)
- Transmission media
  - Radio (GPRS, ...)
  - Dialup lines
  - Dedicated lines

## Extended temperature range

-25° C ... +70° C

## Low power consumption

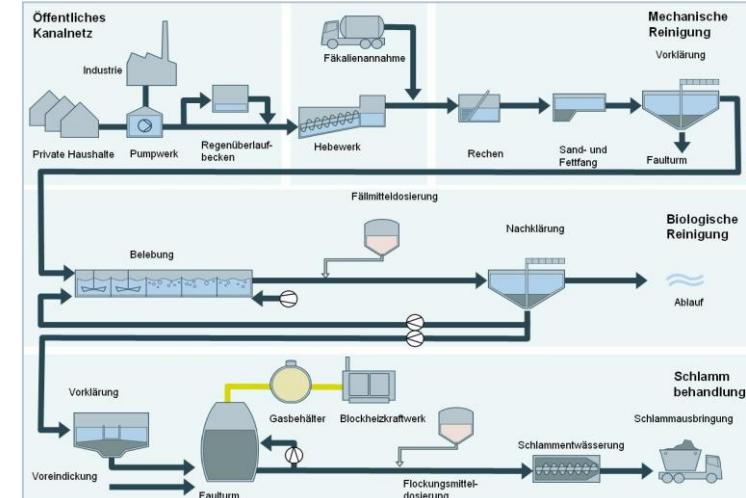
## Flexible choice of I/O modules

## Typical quantity framework

16 DI, 8 DO, 4 AI, 4 AO

## Automation functions

- 2 draining pumps
- 1 valve
- 2 level measurements
- Flow measurements
- Power meters  
(for Energy Management)



# SIMATIC PCS 7 TeleControl in Water and Waste Water – TeleControl and more ...

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## TeleControl and more ... typical functional extensions for Water

ATV M260 Protocol

Alarm Control Center  
(ACC)

Training simulator  
for Pipelines

GIS  
(Geographical Information System)

Water Consultant DVD  
(Planner & System Integrator support)

Leak Detection

Maintenance &  
Service Packages

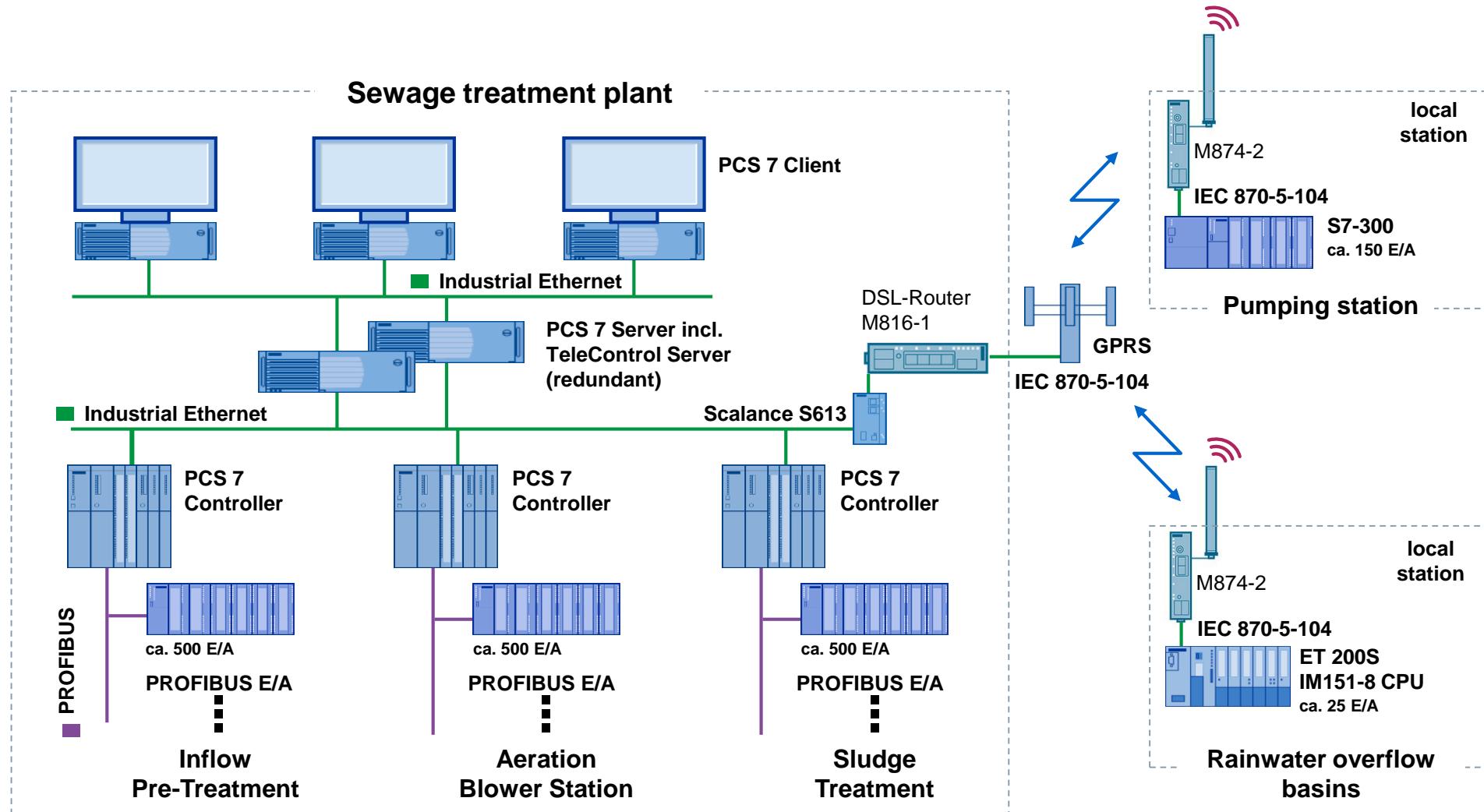
Sewage Network Control

PCS 7 Industry Library (IL)  
(optimized for water requirements)



# SIMATIC PCS 7 TeleControl in Water and Waste Water – Example – Sewage plant with Pump station / Rainwater Overflow Basin

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# SIMATIC PCS 7 TeleControl in Water and Waste Water – Example – Sewage plant with Pump station/Rainwater Overflow Basin

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## Uniform control of the whole wastewater system

- SIMATIC PCS 7 sewage plant and PCS 7 TeleControl for Pump Station and Rain Spilling Basins
- Consolidation in one (!) OS Single Station PCS 7 server and TeleControl (dual channel mode)
- Uniform process control: same faceplates, alarming, trend displays, ...

## Cost effective application due to exactly tailored RTUs

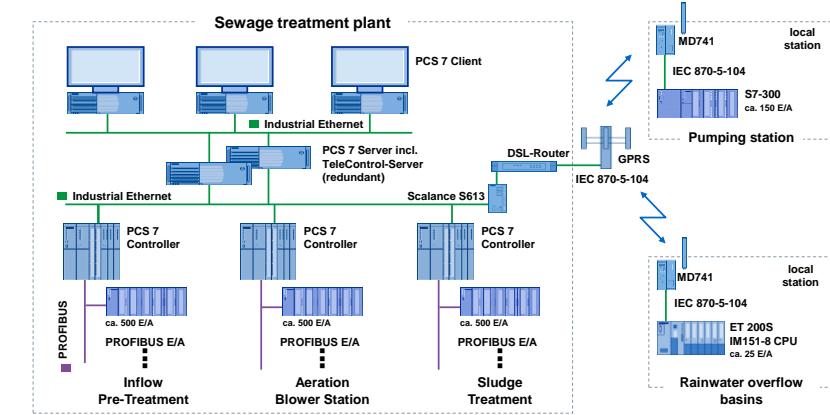
- S7-300 for pump station
- ET 200S for Rainwater Overflow B. (temperature range)

## High security and availability of the communication

- IT-Security Module (Scalance S)
- Use of GPRS Technology

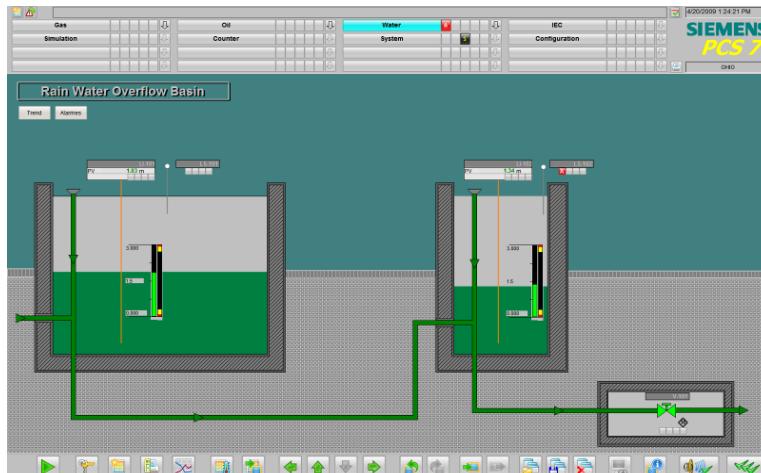
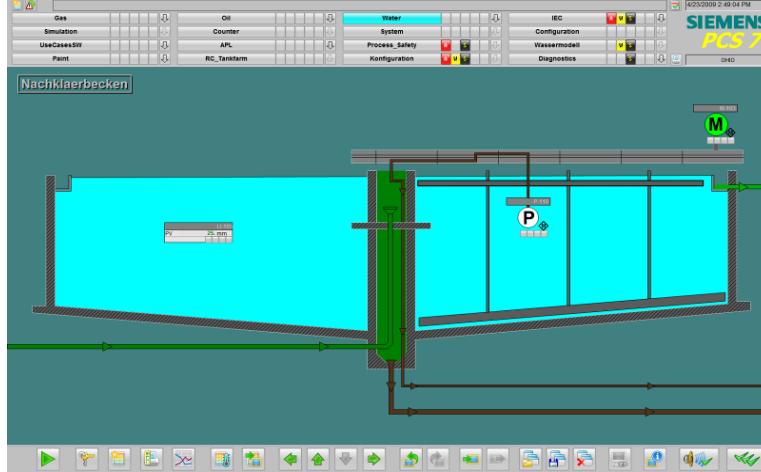
## ATV M260 reports

- provided by Add-On product ACRON



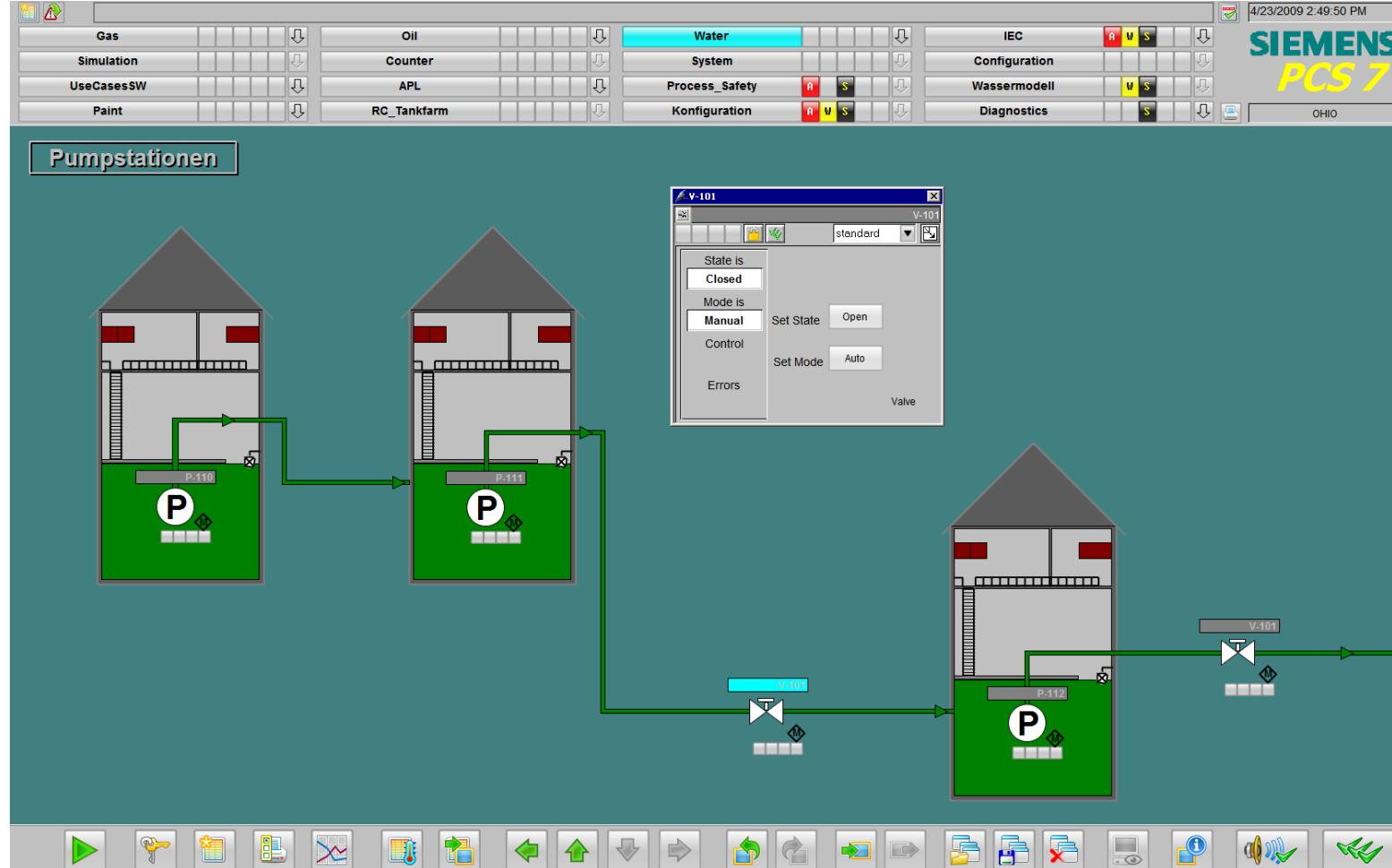
# SIMATIC PCS 7 TeleControl in Water and Waste Water – Example – Sewage plant with Pump station/Rain Spillway Basin

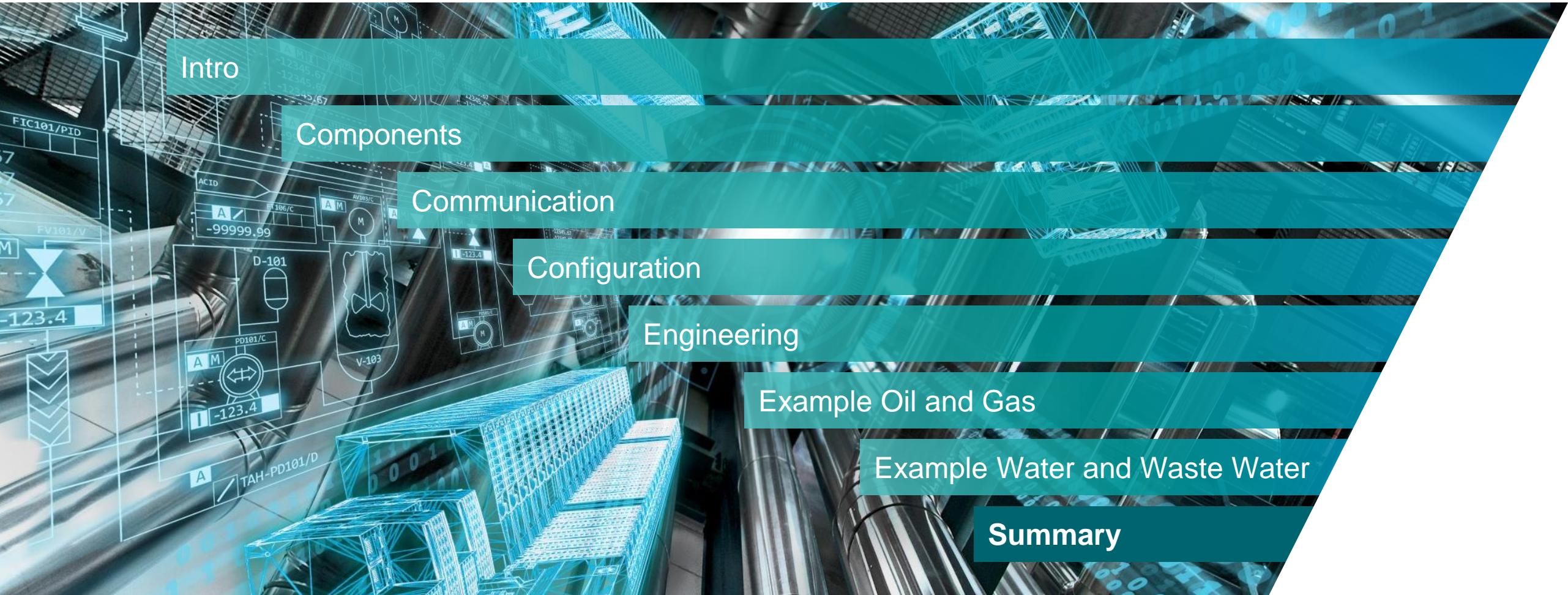
**SIEMENS**  
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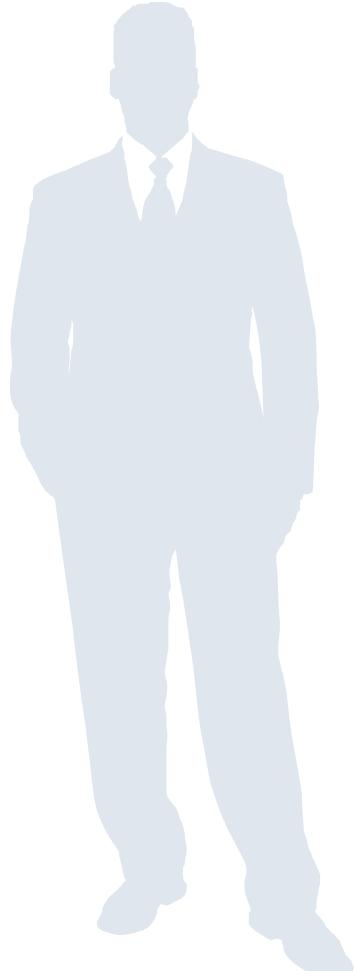


# SIMATIC PCS 7 TeleControl in Water and Waste Water – Example – Sewage plant – Pump station

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## Higher level of integration of the complete plant automation

- Same hardware platform
- Local time stamping in the RTUs

## Reduced risk of operation failures

- Uniform user interface (same visualization and operation)

## Less Engineering- and Maintenance effort

- Uniform software platform
- Powerful BULK Engineering (for 3<sup>rd</sup> party RTUs as well)
- Minimum hardware requirements

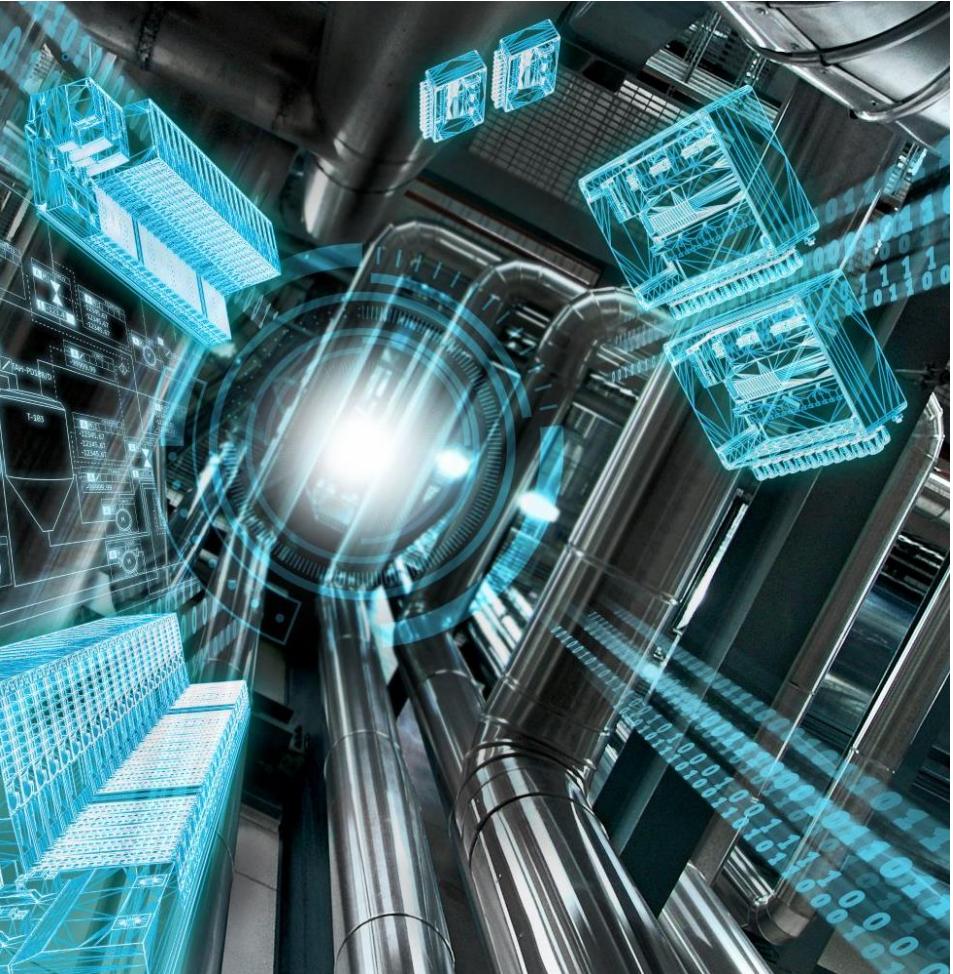
## Flexible selection of communication media

- Protocols: SINAUT ST7, DNP3, IEC 60870-5-101/104, Modbus, S7 EDC
- Media: Radio, WLAN, LAN, telephone, satellite, ...

## Integration of existing (also 3<sup>rd</sup> party) RTUs → Investment protection

- Support of standardized protocols
- Inclusion into Engineering

**Thank you for your attention!**



**Erik Swager**

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