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OS-9 connected to Field Bus & Network

presented by Dipl.-Ing. Ulf Podbielski &
Dipl.-Ing. (FH) Uwe Böttger

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IPP – Ingenieurbuero Podbielski & Partner
Holzhaeuser Str. 120
D-04299 Leipzig
Germany
Tel.:+49(341)8628651
Fax:+49(341)8628653
Email: Ulf.Podbielski@ipp-csc.de
Web: www.ipp-csc.de

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IPP and OS-9

- Work with OS-9 since 1990
- Make OS-9 service for several companies (world-wide)
- Implemented field bus protocols for OS-9
- Different tools for simply service and update from OS-9 systems
- Reengineering and implementation on new hardware platform

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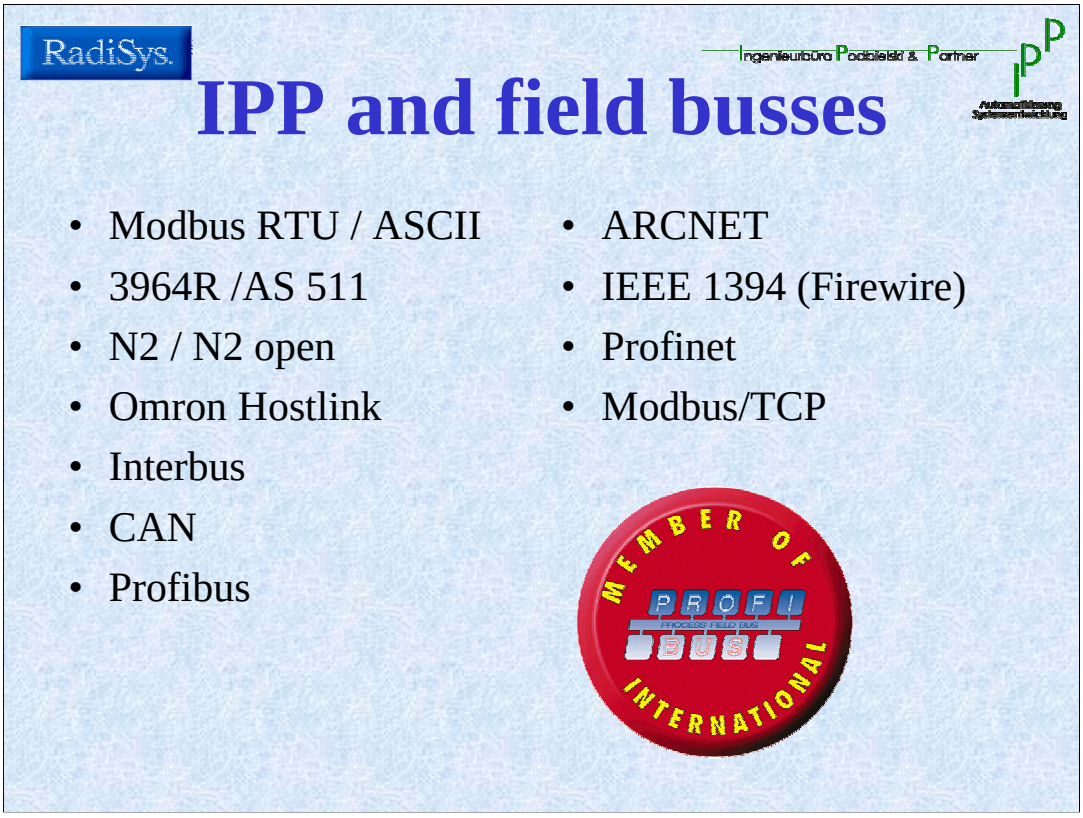
VMEbus stock exchange

www.ipp-csc.de

- Spare parts for older systems / test systems (normally not for new systems)
- Second-hand VMEbus cards and systems
- Customer and manufacturer



IPP have test tools / analyser for same field busses (layer 1 … 7)

IPP supported Profibus since 1990

IPP is a PNO member

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How integrate a field bus in OS-9

- Used a OS-9 standard manager (scf, ...)
- Developed a special manager (profiman, ...)
- Communicate over a Dual Port RAM
- Integrate a special library in the application
- Trap handler (comparable with a Win DLL)

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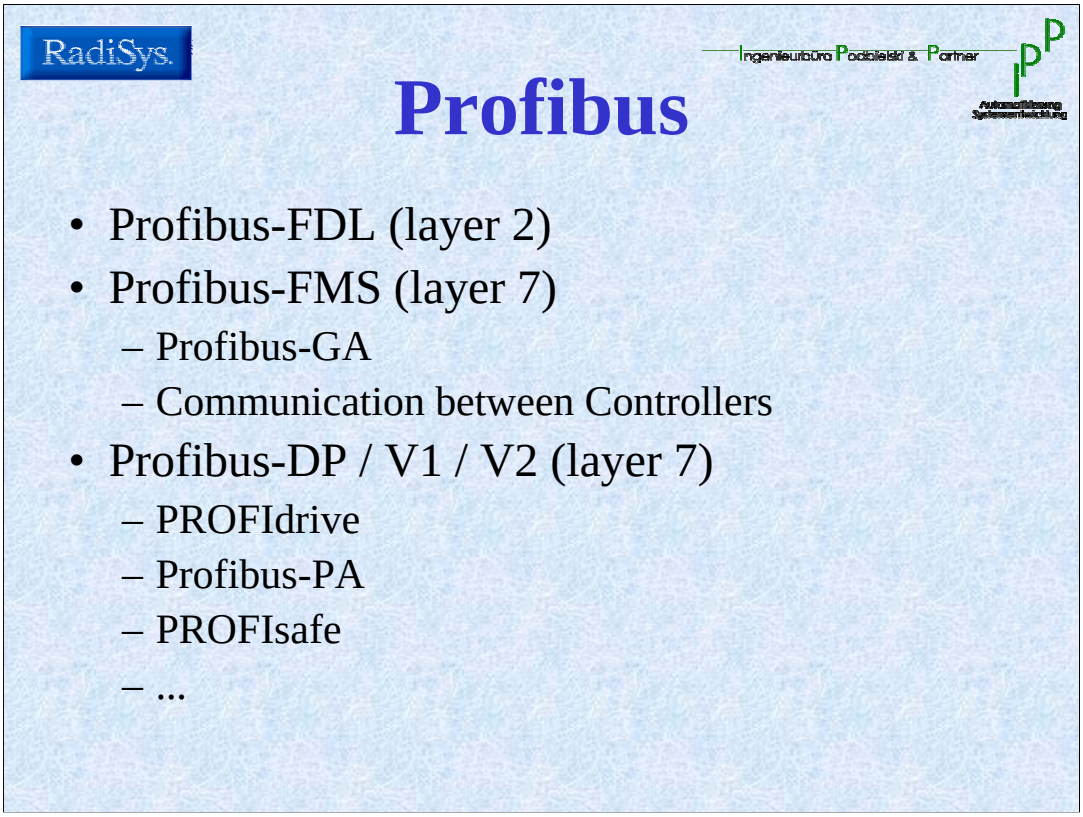
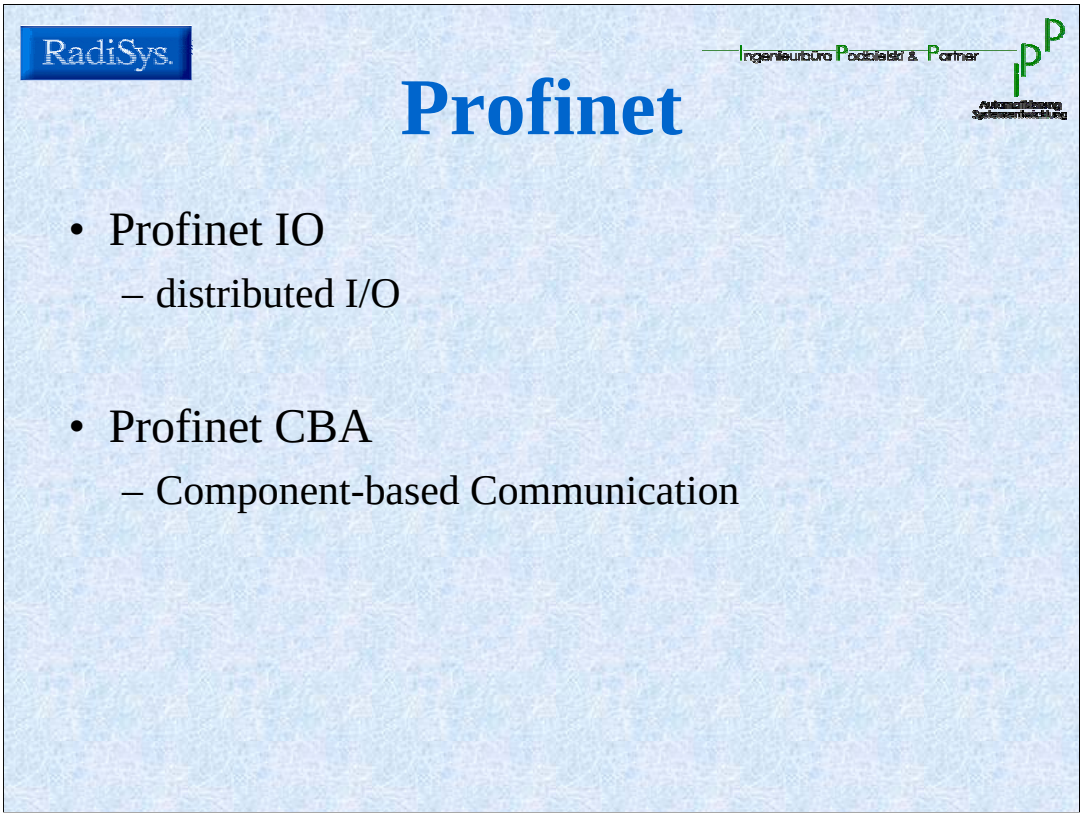
Overview sample Projects

- Profibus & Profinet
- OPC - OLE for Process Control
- MODBUS TCP & MODBUS
- IEEE 1394 (FireWire)



Different protocol standards for Profibus layers

Same profiles for each protocol standard



Integration of distributed I/O through PROFINET IO

PROFINET interfaces distributed I/O to controllers via Industrial Ethernet, which supports flat communication hierarchies in automation. All devices used are connected in a uniform network structure so that they offer unified communication throughout the entire production system. The signals of the field devices are processed directly by the assigned I/O controller. The parameter setting is defined using a device description file (GSD), which is proven technology with PROFIBUS.

Integrating distributed I/O is a perfect addition to distributed automation. A combination of both is always possible in a PROFINET network.

Distributed automation with PROFINET CBA

Machines and systems are divided into technological modules that each consist of mechanical, electrical/electronics and software. The functionality of the technological modules is encapsulated in PROFINET components. Externally, the PROFINET components are accessible via uniformly defined interfaces. They can be interconnected in any way to allow configuration of the production line.

The open engineering interface enables graphical configuration of PROFINET components from different manufacturers using the PROFINET engineering tool.

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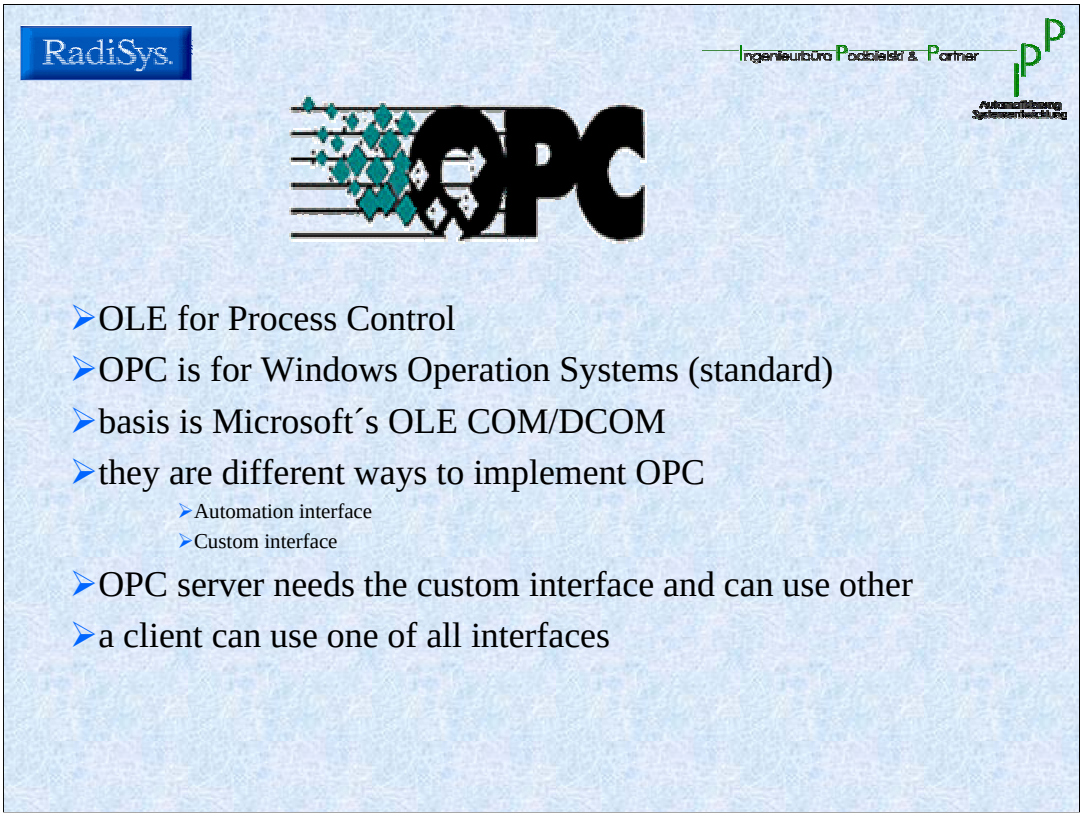
Profinet and RealTime

- Profinet (100ms bus cycle)
  - TCP/IP and DCOM
- Profinet RT (10ms bus cycle)
  - Real-Time channel
  - Ethernet Frame EtherType 0x8892
- Profinet IRT (<1ms bus cycle, <1µs jitter)
  - Isochronous Real-Time
  - Special hardware



OPC is one example to bring I/O values from the field to the process management system.

Any implementation for OS-9 available

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OPC

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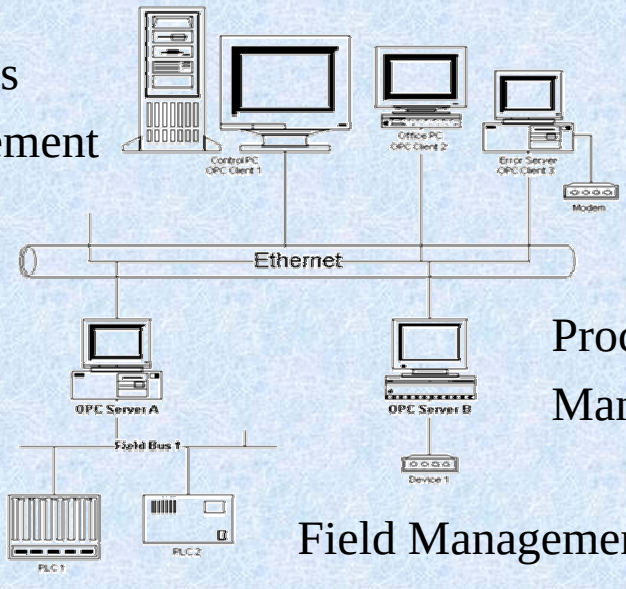
Management Layers

Business Management



Process Management

Field Management

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OPC Specifications

- OPC Data Access
- OPC Alarms and Events
- OPC Batch
- OPC Data eXchange
- OPC Historical Data Access
- OPC Security
- OPC XML-DA
- OPC Complex Data
- OPC Commands

- **OPC UA (Unified Architecture)**

OPC Data Access: Start of OPC nearly 10 years ago

OPC Alarms and Events: 1. extension

OPC Batch: running procedures

OPC Data eXchange: server ⇔ server communication

OPC Historical Data Access: administration and access to historical data

OPC Security

OPC XML-DA: opening for non Microsoft (DCOM) SOAP web-services

OPC Complex Data

OPC Commands

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OPC UA (Unified Architecture)

- next generation of OPC
- platform, hardware and location independent
- scalable system
- includes all existing OPC technologies
- no longer based on Microsoft COM/DCOM
- based on: TCP/IP, HTTP, SOPA and XML

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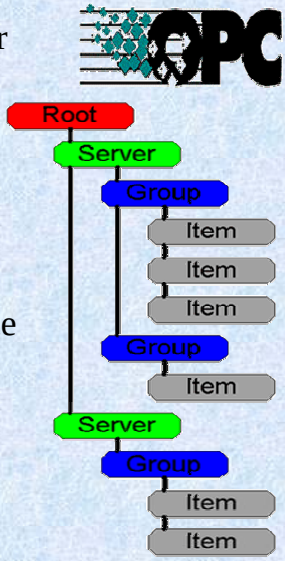
OPC Structure

- OPC client make a connection to a OPC server
  - computer name
  - server name
  - class ID
  - locale ID
- OPC client create a group
  - group name
  - group or public group
  - synchronous or asynchronous
  - update rate
- OPC client can browse in the server namespace
- OPC client choose a tag and create a item
  - item name
  - request data type
  - access path



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Modbus

- Modbus ASCII
  - RS-232/422/485
  - Single master
  - Max. 255 slaves
  - LCR (Longitudinal Redundancy Check)
- Modbus RTU
  - RS-232/422/485
  - Single master
  - Max. 255 slaves
  - CRC-16 (Cycling Redundancy Check)
- Modbus Plus
  - LAN
  - Multi master
  - Token passing
  - HDLC Level CRC
  - MAC adr. + slave adr.
- Modbus TCP
  - Ethernet
  - Multi master
  - Client server communication
  - TCP adr.

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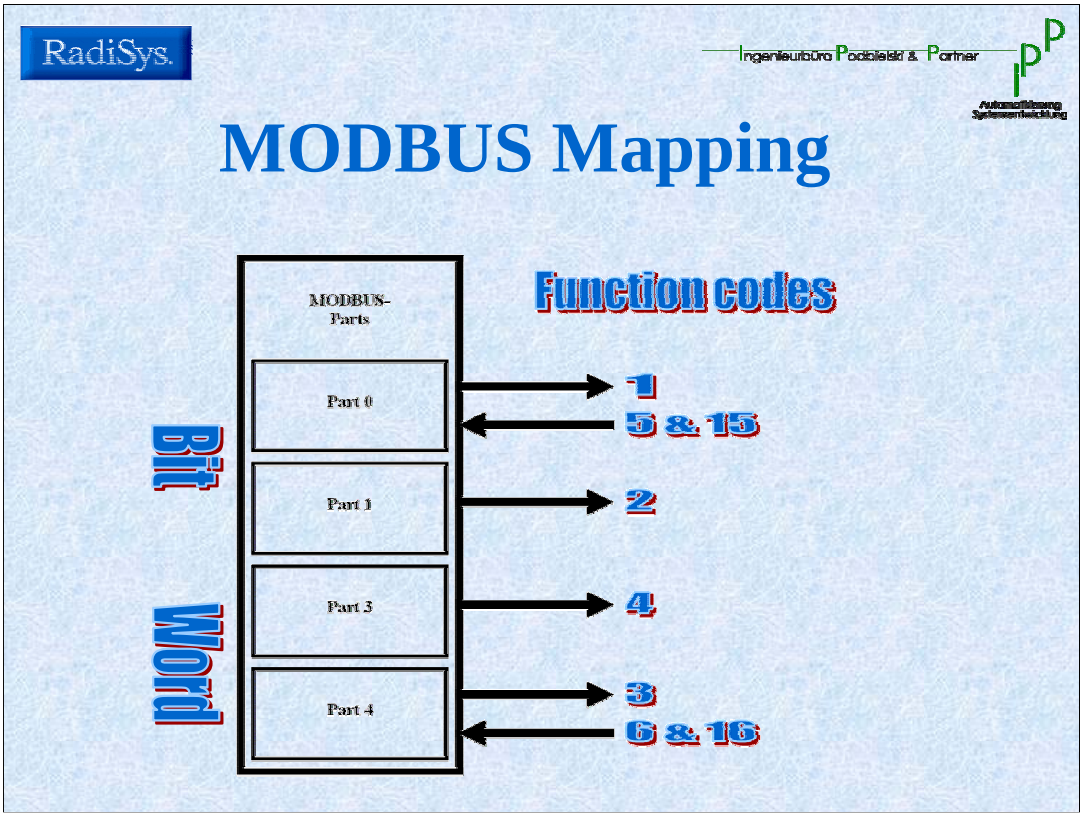
MODBUS TCP

- simple, open, low cost, minimum hardware demands
- standard MODBUS protocol without CRC-Check in TCP/IP frame

- port 502
- de facto industry standard
- a lot of MODBUS TCP devices are available on the market
- Modbus-IDA is the MODBUS organization in the world



1 … Read Coil Status
2 … Read Input Status
3 … Read Holding Register
4 … Read Input Register
5 … Force Single Coil
6 … Preset Single Register

15 … Force Multiple Coil
16 … Preset Multiple Register

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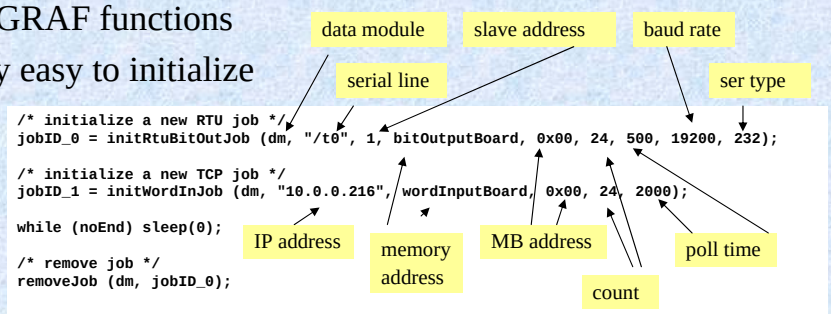
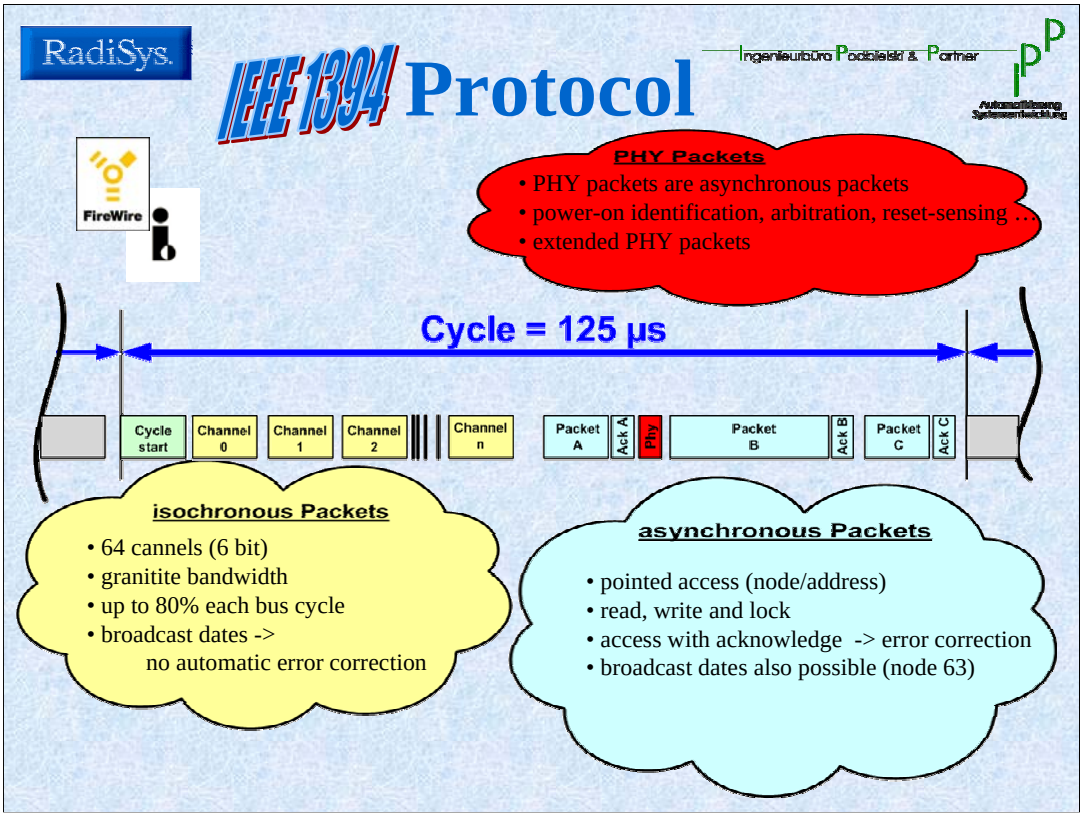
IPP MODBUS Driver

- MODBUS TCP / MODBUS RTU
- Master / Slave / Client / Server
- OS-9 C-Lib (ISP- and SPF version)
- ISaGRAF functions
- very easy to initialize



- current setting is stored in a common data module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IEEE 1394 Protocol
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FireWire
PHY Packets
• PHY packets are asynchronous packets
• power-on identification, arbitration, reset-sensing …
• extended PHY packets
Cycle = 125 µs
Cycle start
Channel 0
Channel 1
Channel 2
Channel n
Packet A
Ack A
Phy
Packet B
Ack B
Packet C
Ack C
isochronous Packets
• 64 cannels (6 bit)
• granitite bandwidth
• up to 80% each bus cycle
• broadcast dates ->
no automatic error correction
asynchronous Packets
• pointed access (node/address)
• read, write and lock
• access with acknowledge -> error correction
• broadcast dates also possible (node 63)

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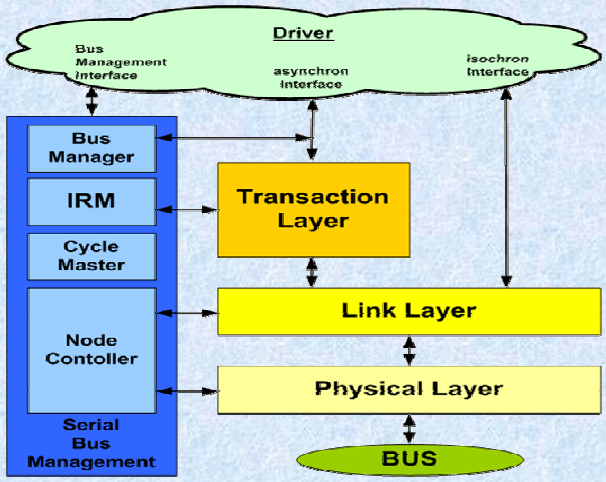
IEEE 1394 ISO/OSI - Layers

FireWire



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IEEE 1394

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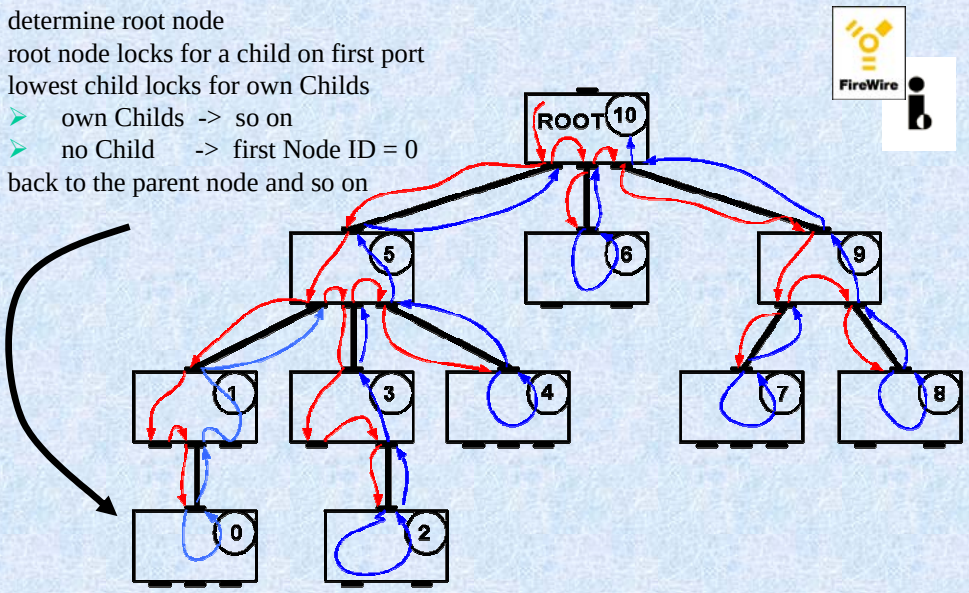
Addressing

- determine root node
- root node locks for a child on first port
- lowest child locks for own Childs
  - own Childs -> so on
  - no Child -> first Node ID = 0
- back to the parent node and so on



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IEEE 1394 .a Improvement

- fast bus reset
- faster arbitration
- PHY-Pinging
- asynchronous streams
- Suspend/Resume for single ports
- four pin plug
- priority arbitration

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IEEE 1394 .b Improvement

- higher speed up to 3,2 GBit/s
- longer distances (up to 100m between two nodes with copper)
- new method of arbitration
  -> short time for arbitration – short gaps
- full downward-compatibly
- better plugs
- no change in application / software necessary


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IPP