Anybus: Embedded Industrial Networking Technology

One universal solution for all embedded networking

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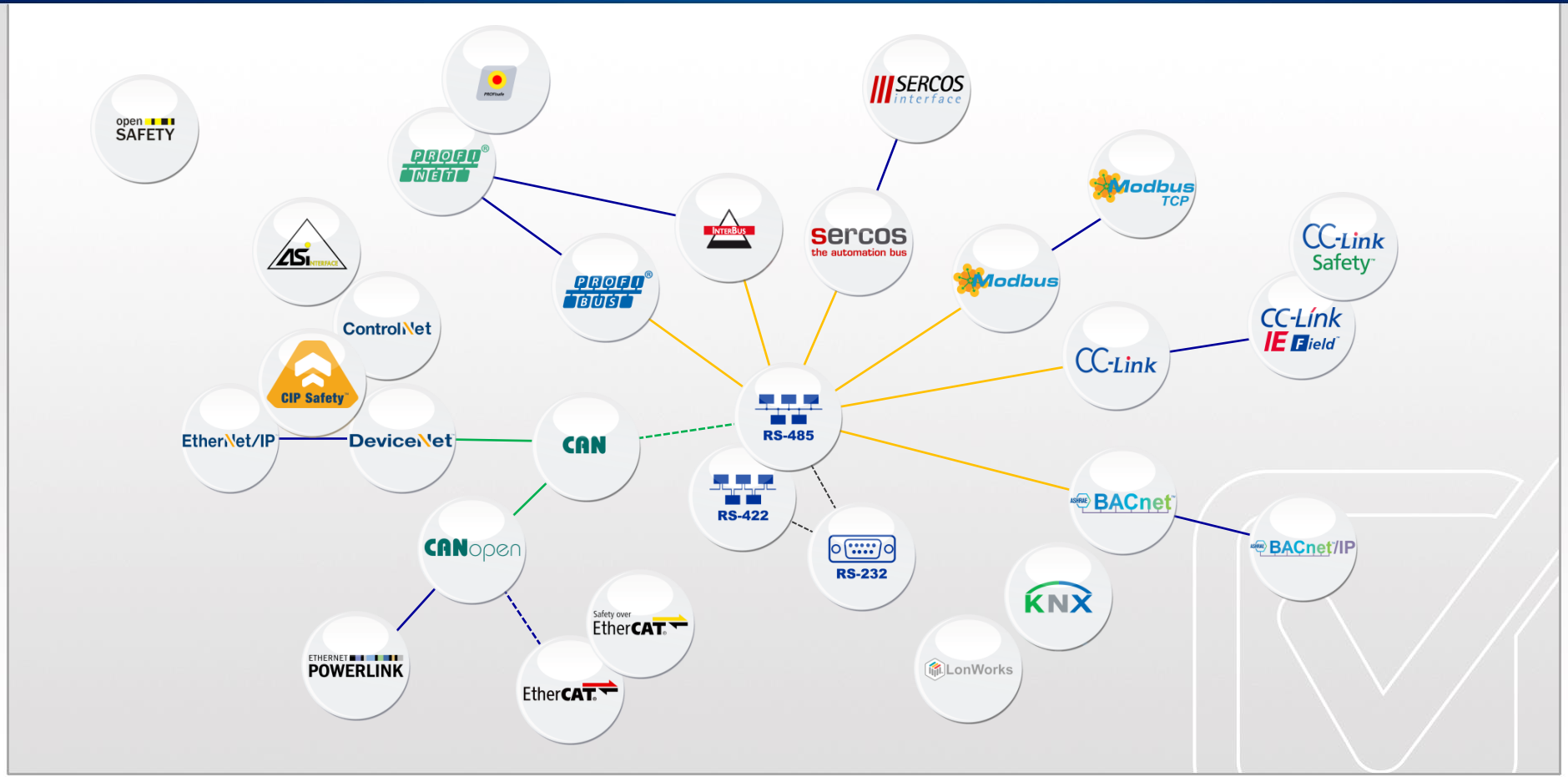
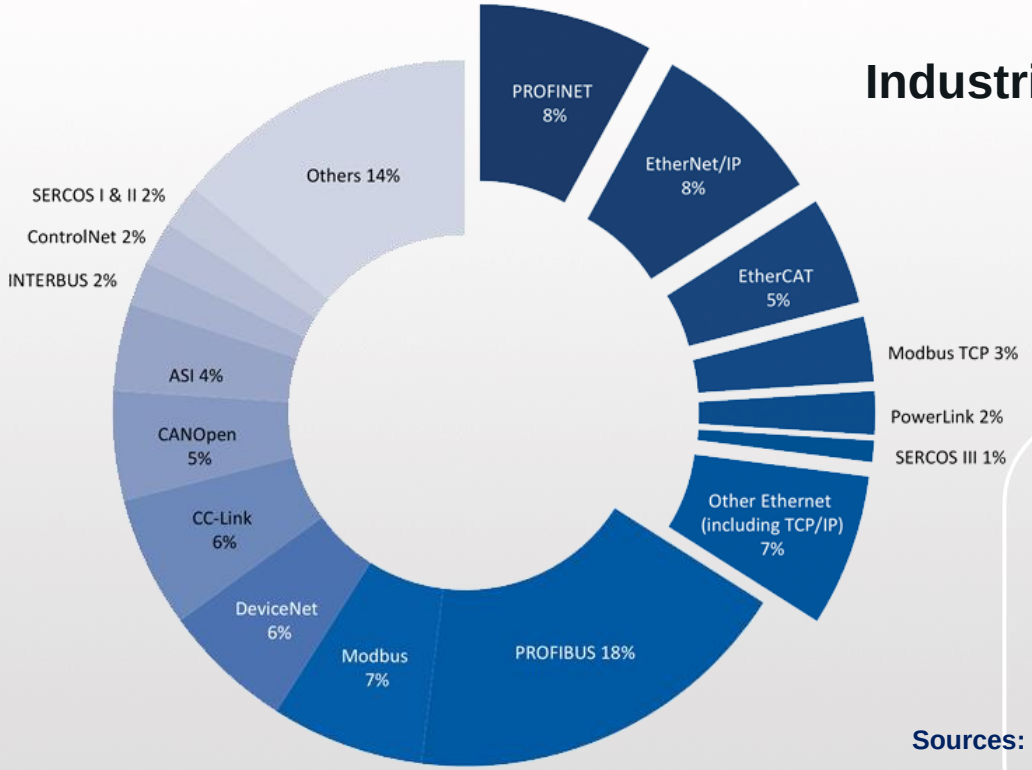
Networking

Twincomm



Fieldbus & Industrial Ethernet

Industrial network shares



Industrial Ethernet 34%

Fieldbus 66%

Sources: HMS, ARC and IMS Research

Fieldbus & Industrial Ethernet

More and more industrial networks

1975
- Ethernet
- Modbus

1985
- Ethernet
- Remote IO
- Modbus

1995
- Ethernet
- Foundation FB
- ControlNet
- DeviceNet
- Profibus
- Sercos I & II
- AS-Interface
- Interbus
- FIP
- CC-Link
- CANopen
- Remote IO
- Modbus

2015
- Safety Networks
- Sensor Networks
- Wireless Networks
- BACnet IP
- Sercos III
- Profinet IO
- EtherCAT
- Powerlink
- CC-Link/IE
- FF HSE
- Ethernet/IP
- FL-net
- Modbus TCP
- BACnet MSTP
- Foundation FB
- ControlNet
- DeviceNet
- Profibus
- Sercos I & II
- AS-Interface
- Interbus
- CC-Link
- CANopen
- Modbus

Fieldbus & Industrial Ethernet

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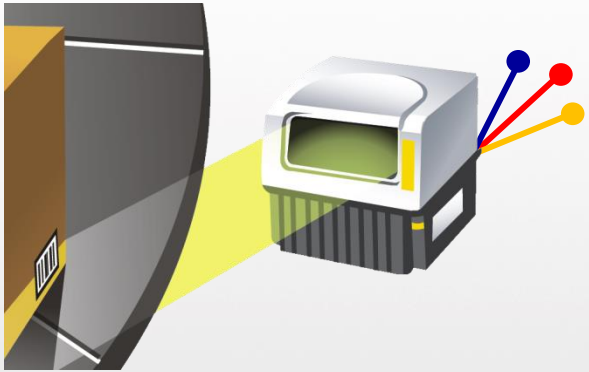
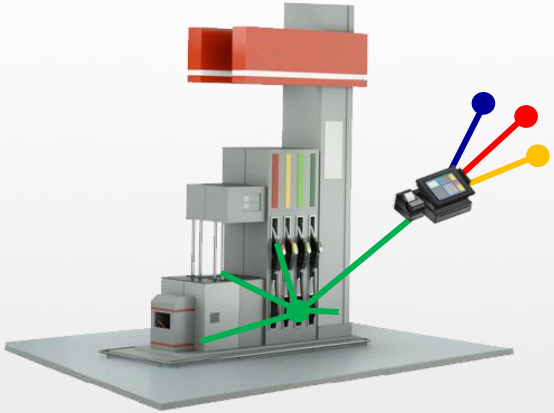
Component



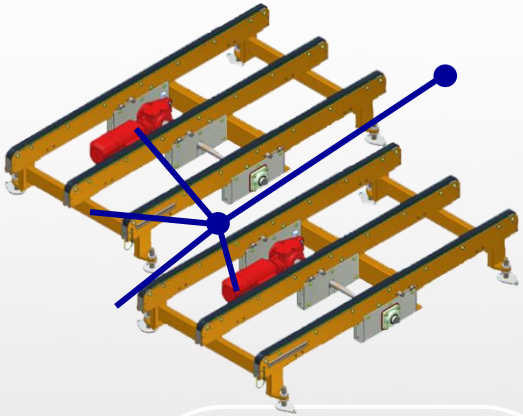
- Standardisation
- Fixed I/O data-set
- Single software variant

System interface



- Flexible
- High-level exchange
- Single driver software

Economical

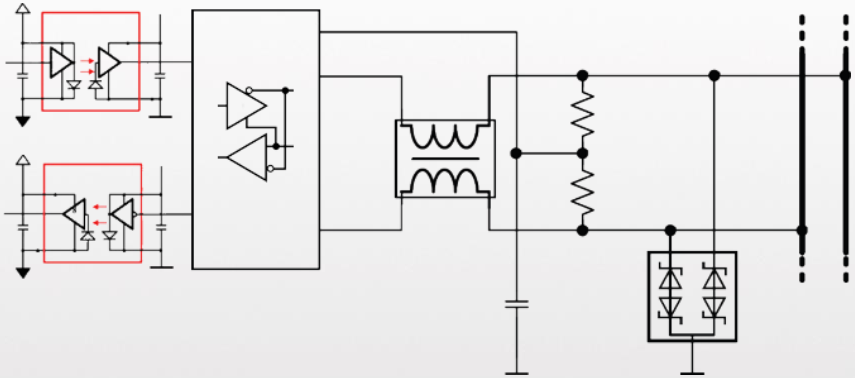


- No-hassle
- Commands / Sensors
- Limited or no software

Fieldbus & Industrial Ethernet

Hardware

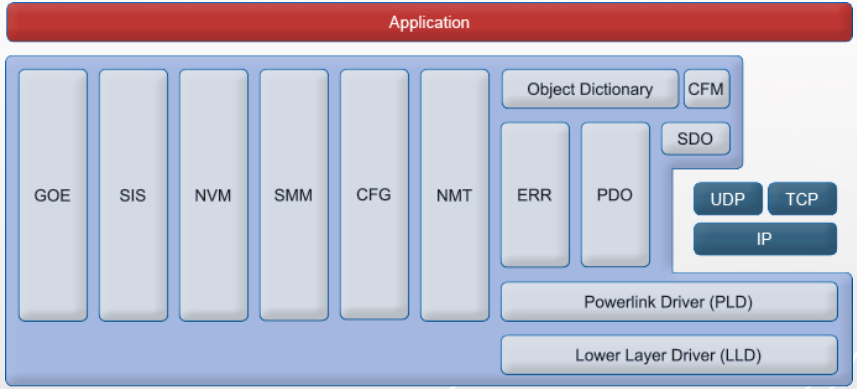
Understanding physical communication



- Every protocol has different physics
- Protection at the right level
- Development time and effort
- Certification

Software

Understanding the protocol



- Protocol Stack + Server, E-mail, FTP, …
- Develop, Buy or Open Source
- Licences
- Certification

Concept of a universal solution

Under the hood – Network processor

Programmable hard- & software

Protocol/IP MAC & API (VHDL code)

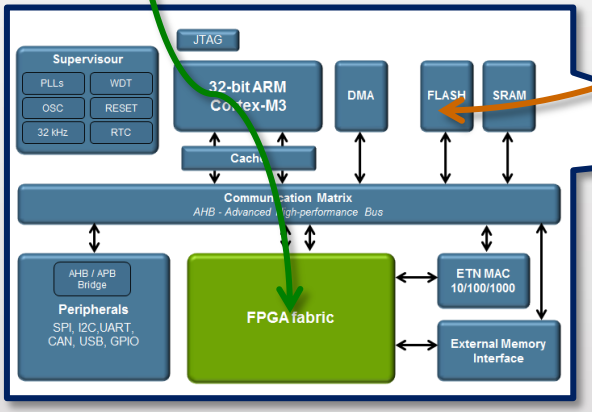
Protocol/IP Software (C code)

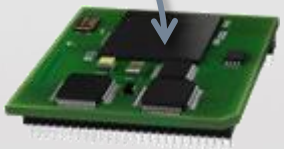
Stack

API

RTOS and drivers

All-in-one

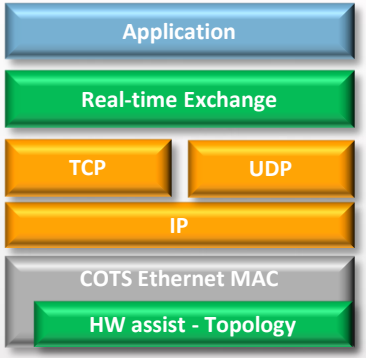




Under the hood – IE handling

Standard TCP/IP

Architecture 1

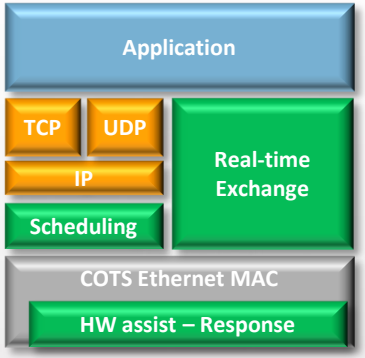


Standard Ethernet TCP/IP

- TCP/IP
- Modbus TCP
- EtherNet/IP
- Etc.

Software by-passing

Architecture 2

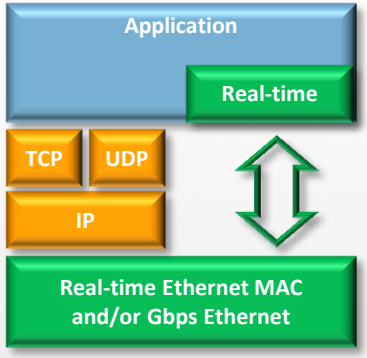


SW by-passing or traffic scheduling

- PowerLink
- PROFINET IO (RT)
- Etc.

Hardware assisted

Architecture 3



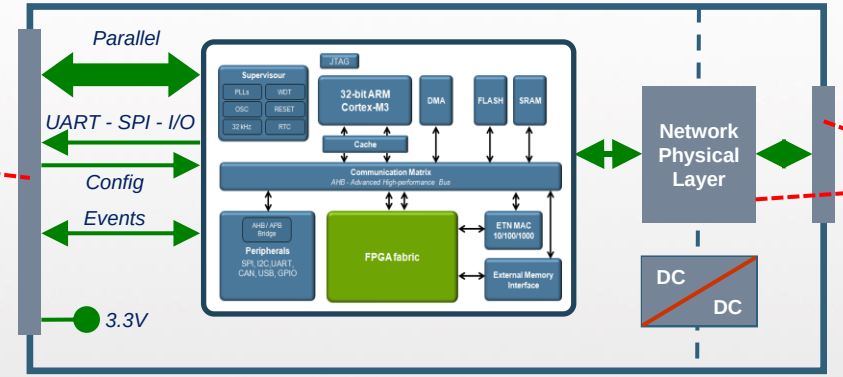
Hardware Assisted Real-time

- PROFINET IO (IRT, DFP)
- EtherCAT
- SERCOS III
- CC-Link IE (Gbps)
- etc.

Under the hood – Block diagram

General hardware and application-interfacing

Common application Interface



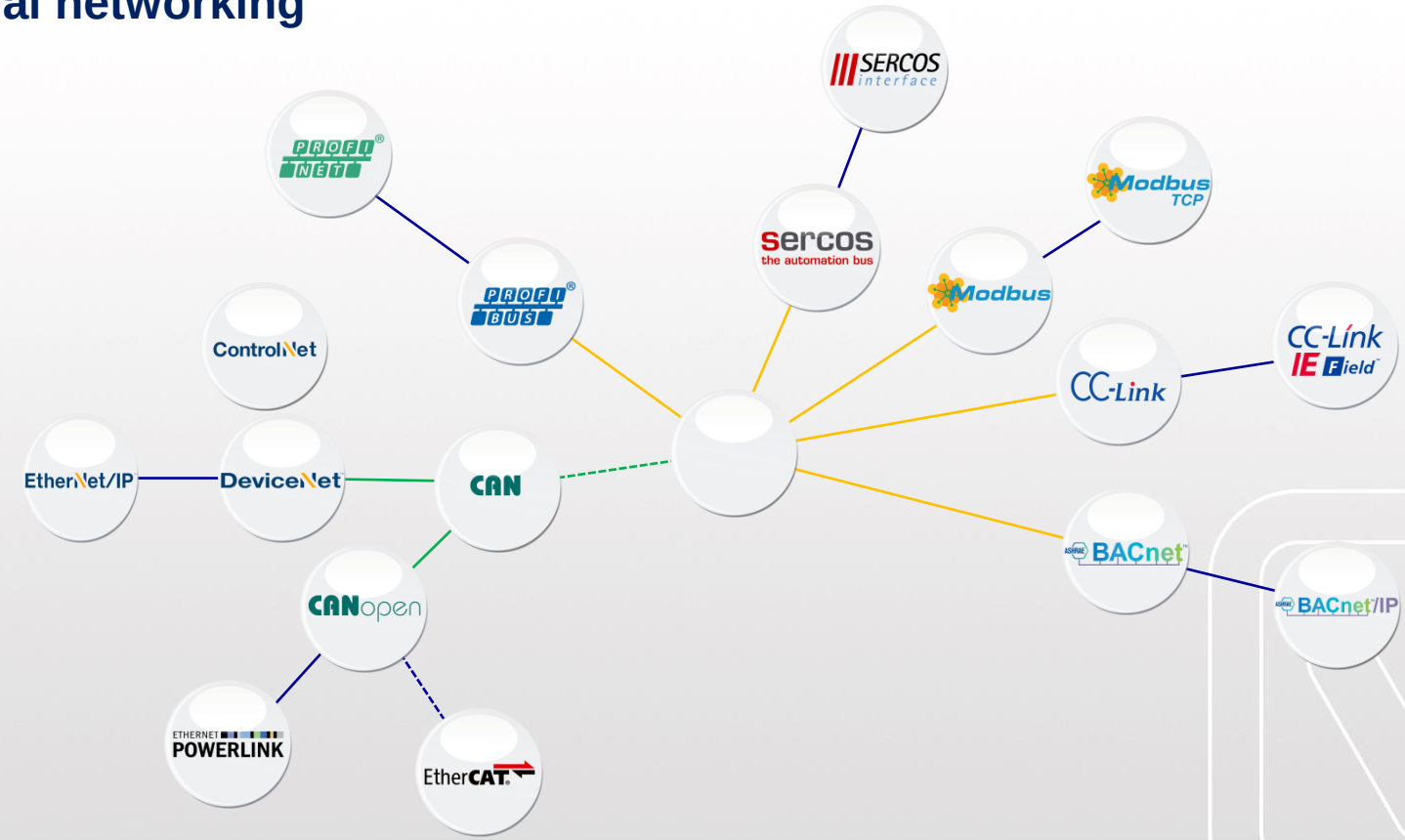
Network specific

Interfacing

- Parallel (8-/16-bit)
- SPI (20 Mhz)
- Asynchrone UART (625 kb/s)
- Stand-alone I/O (12,5 MHz)

Common software

General networking



Common software

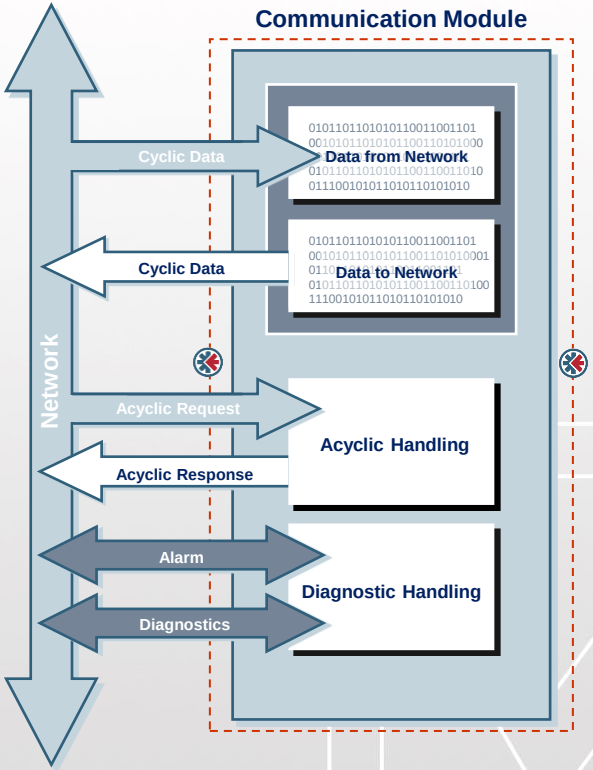
General network communication

Acyclic data handling
- Read or Write Request/Response
- Identification
- Configuration

Data exchange
- Real-time Process Data
- Continuous updating

Alarm
- Warnings & errors

Diagnostics
- Status
- Heart beat



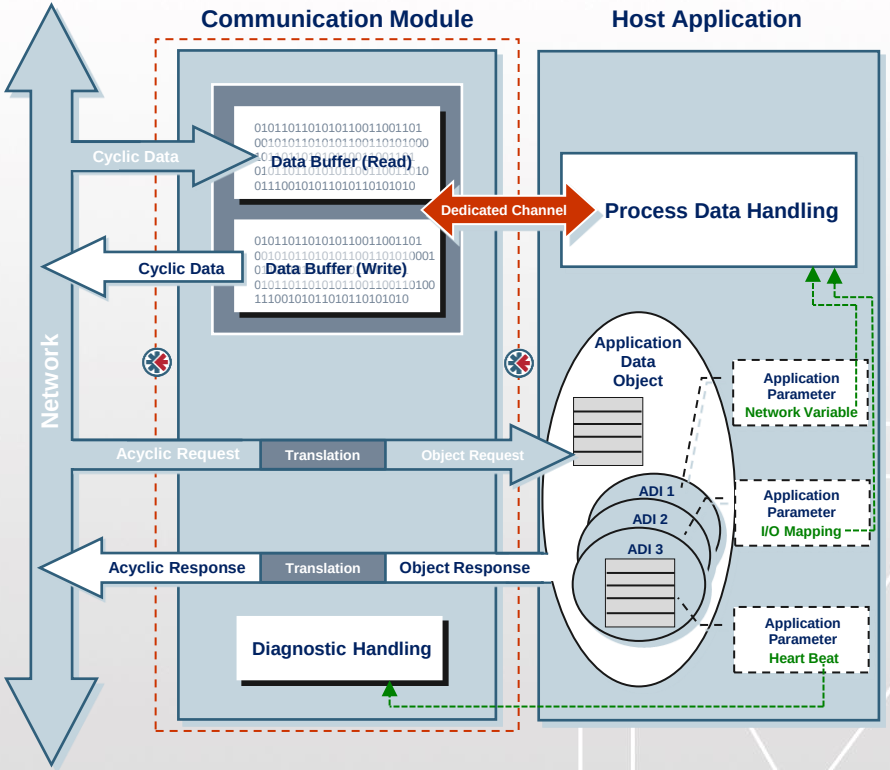
Common software

Software interfacing process

Data objects
- Parameter definitions
- Network variables
- I/O-mapping
- Configuration

Object requests (R/W)
- Passed to application
- Processed
- Response replied

Process data
- Buffered in module
- Continuous updating



Common Software

Software Driver

OS-Independent C-Driver

Application Data Object

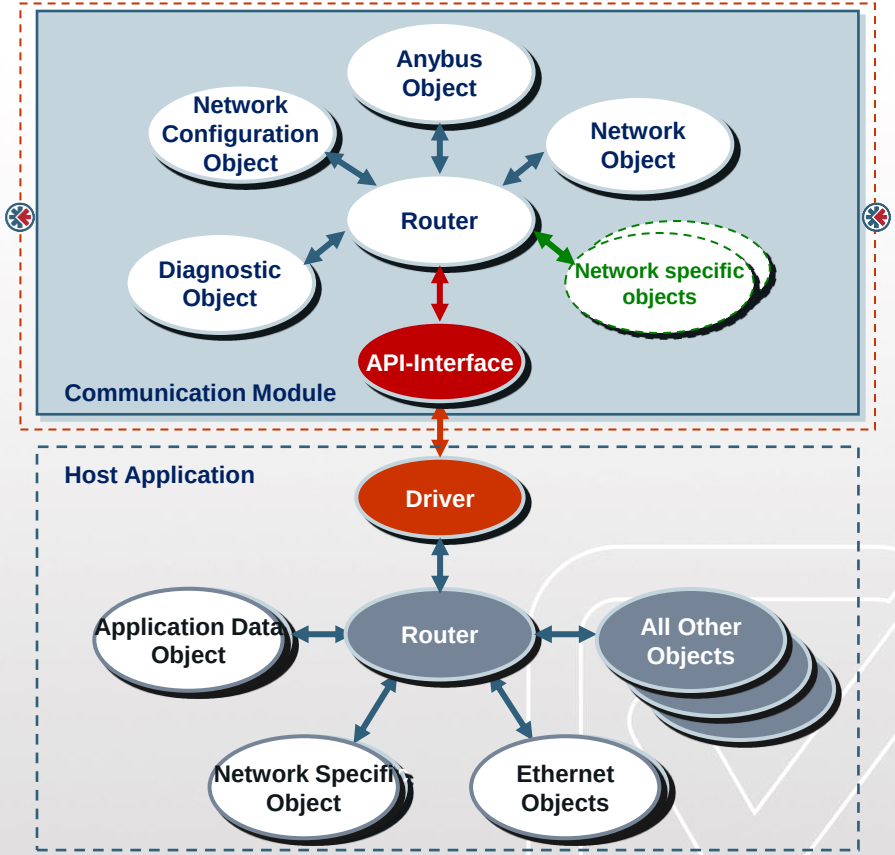
- Name, Data type, Total elements
- Value: Actual, Max, Min & Default

Network Specific Object

- Only when applicable
- Vendor ID, Product ID
- Specific Configuration Data

Ethernet Objects

- File-system & Firmware via FTP
- E-mail client & Web-browser
- Transparent socket interface



Design-in

One solution for all networks?

Yes, but be aware!

- All networks are different and come with different characteristics

Network architectural characteristics

- Data Speed, Data Size and total bandwidth
- Real-time propagation & synchronisation
- Vendor ID, Product ID & Configuration

Network typical possibilities

- Only available in a typical network

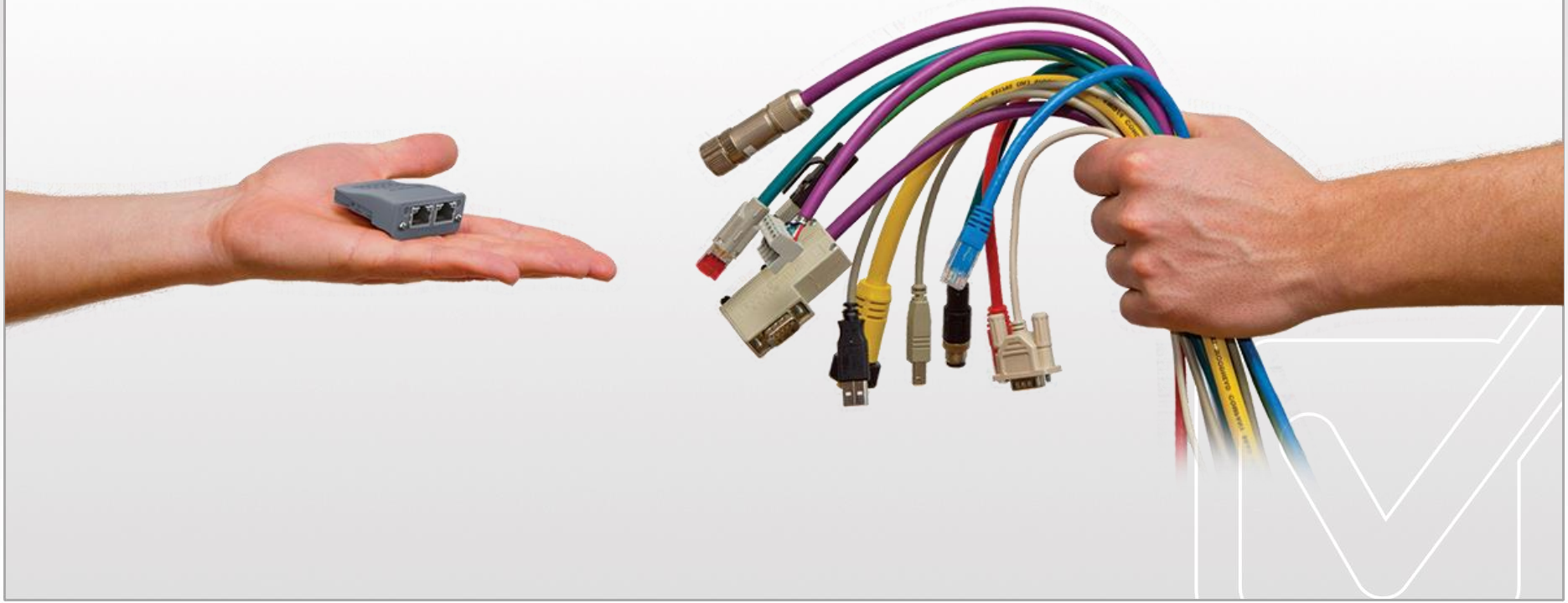
Generic internet protocols

- E-mail, WEB, FTP and Socket-interface
- Only available in TCP/IP-bases networks

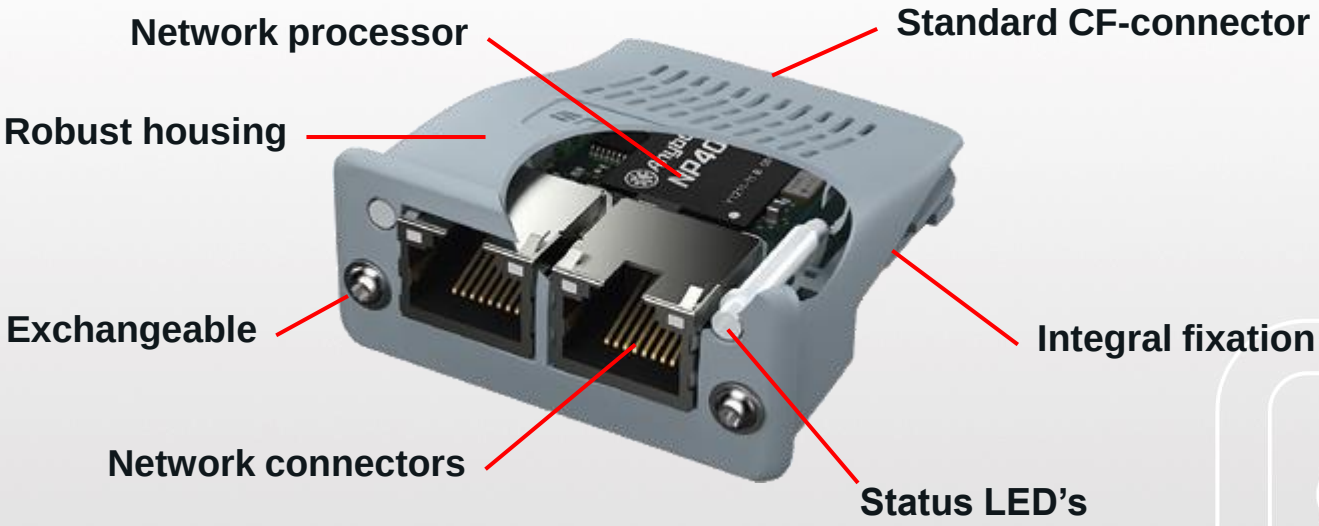
Plan on forehand to cover these differences!

Anybus CompactCom

CompactCom - one solution for all networks

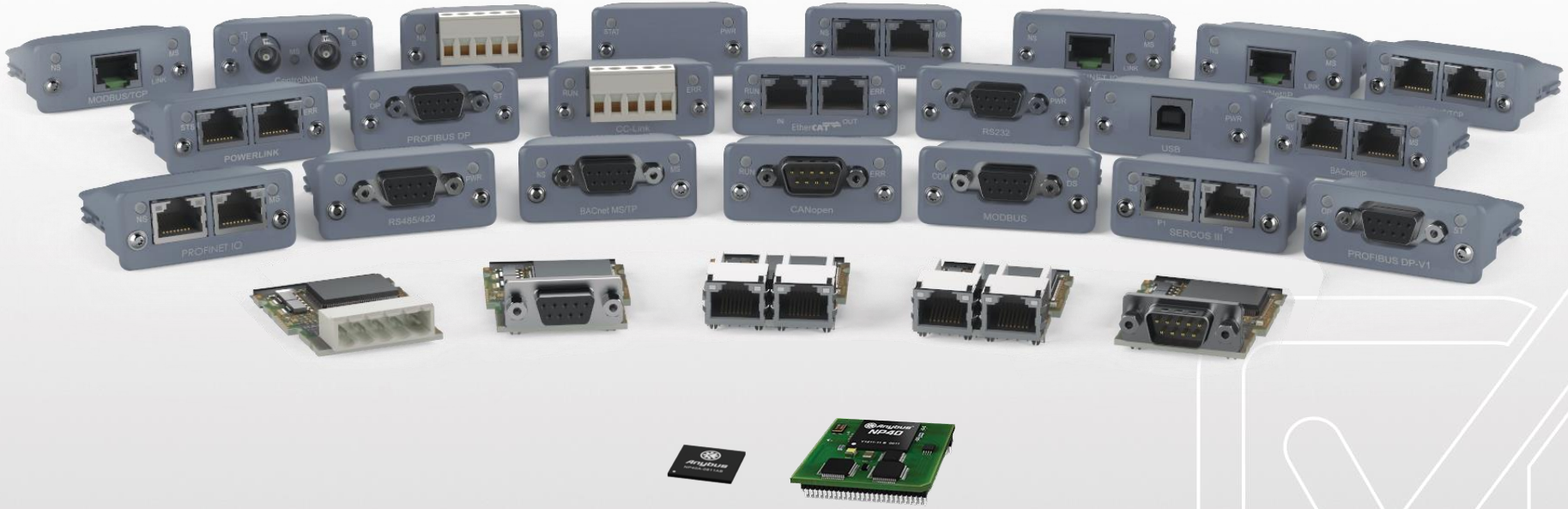


Universal network interface – Standardized hard- & software



Anybus CompactCom

Over 20 Fieldbus & Industrial Ethernet protocols covered



Anybus CompactCom - Design-in

Benefits

Multi-network connectivity with a single development project

- Limiting your development efforts to an absolute minimum
- Reducing your development costs up to 70%
- Fast time-to-market

Proven solution

- All modules and open frames are pre-certified
- Already millions of devices used across the world

Including all design resources

- Ready to use Hard- and Software designs, notes and applications
- Complete support team

Thanks for your attention!

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