FetLON Stack

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Agenda

- who is who?
- FetLON Stack Overview
- FetLON Evaluation Kit
- FetLON License Models

Ingenieurgesellschaft mbH

who is who

We are <u>the</u> development partner for customized system solutions!

- Founded 1995 in Lübeck
- Owner managed
- > 5,8 Mio.€ turnover in 2024
- 54 employees
- >> 500 completed projects
- Research projects

TÜV SÜD ISO 9001 – Zertifiziertes Qualitätsmanagementsystem – www.tuev-sued.de/ms-zert

TÜV SÜD ISO/IEC 27001 – Zertifiziertes Informationssicherheits-Managementsystem – www.tuvsud.com/ms-zert

tekom MITGLIED WWW.TEKOM.DE

Competences

Ingenieurgesellschaft mbH

Development and testing under one roof

Development of customized system solutions

Building Automation

Industrial Automation

Medical Technology

Verification

EMC Measurement

Environmental Testing

Your development requirements

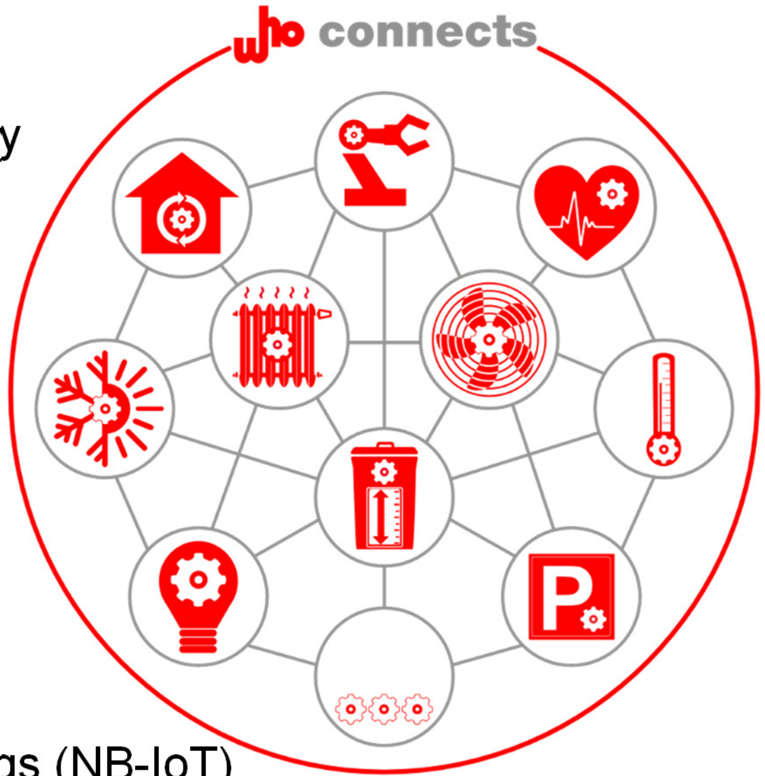
Our services for your demands:

- Planning and Consulting
- Hardware-Development
- Software-Development
- Firmware-Development
- Verification und Validation
- Technical Documentation
- Product delivery
- Product-Lifecycle-Management

who connects - Technologies

Wireless media:

- Bluetooth Mesh / Low Energy
- Zigbee / Thread / Dotdot
- enOcean
- Wirepas
- Matter
- DECT NR+
- LoRa / Sigfox
- 5G / LTE / LTE-M
- Narrowband Internet of Things (NB-IoT)
- RFID (NFC)
- …



Wired media:

- DALI
- KNX
- SMI
- M-Bus
- BACnet
- LON
- SPE
- Modbus
- IO-Link
- CAN
- Ethernet / PoE
- …

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FetLON Stack Overview

Fetron

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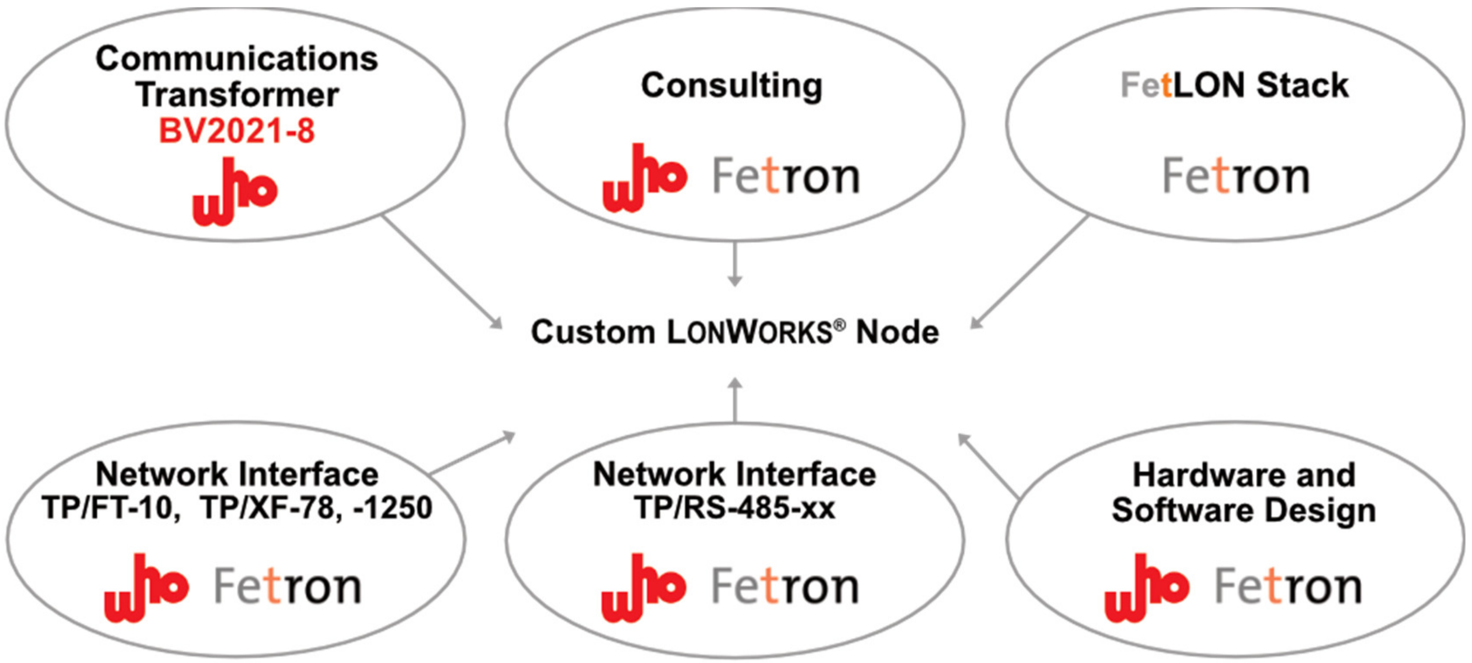
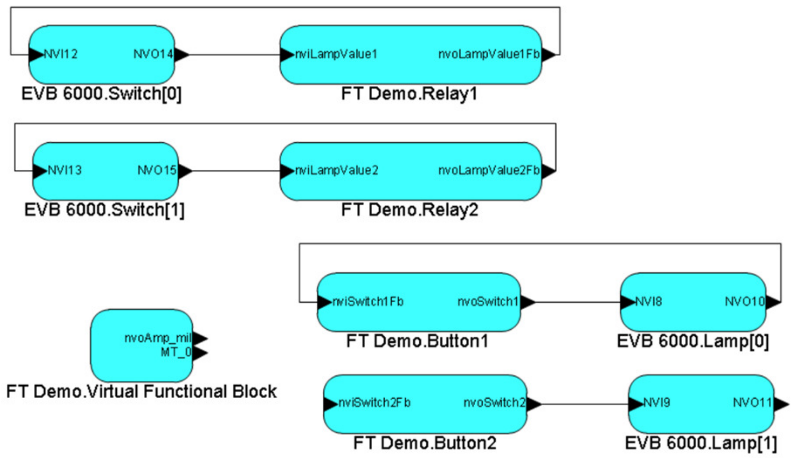
Hard- and Software GmbH

All core competences from a single source



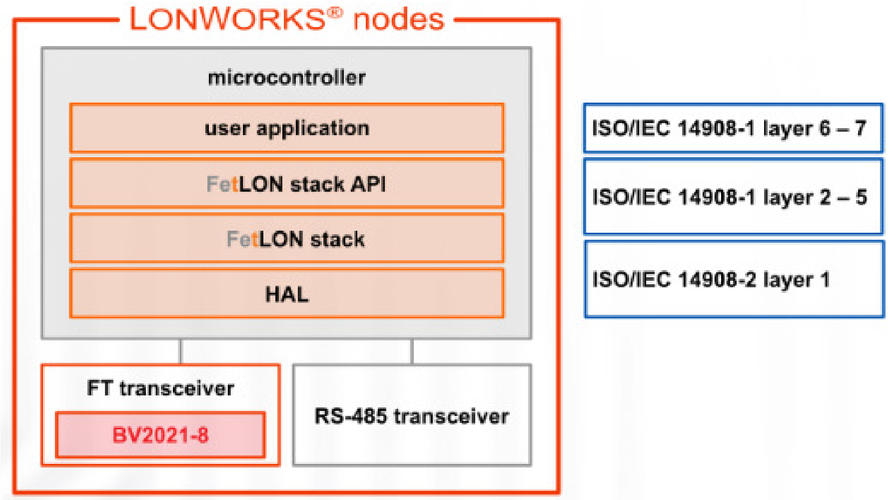
FetLON Stack - Overview

- LonTalk Protocol Stack for Embedded Applications
- Fully ISO/IEC 14908-1 Compliant
  - Network Variables
  - Configuration Properties
  - LonMark Objects
  - Explicit Messages
- Channels
  - TP/FT-10 (ISO/IEC 14908-2)
  - TP/XF-78, -1250
  - TP/RS-485-xx
- Requires a Single Microcontroller only



Single Microcontroller

- Patent-Protected Differential Manchester Code Conversion
  - Executed on Microcontroller
  - Utilizes Standard Microcontroller Peripherals
    - Reduces Computing Time
- Fits For Embedded Applications
  - Runs on any suitable microcontroller
  - Programming language: C
  - Static Memory Allocation
  - Small Memory Footprint
  - Low Performance Demands



Doxygen Documentation

FetLON Stack 1.0

Main Page | Topics | Data Structures ▾ | Files ▾

- FetLON Stack
  - Topics
    - Demo for FetLON stack
    - Layer 2: Data Link
    - Layer 3: Network
    - Layer 4: Transport
      - Authentication Server
      - Transaction Control Sublayer
      - Transport Layer
    - Layer 5: Session
      - Session Layer
    - Layer 6, 7: Application & Presentation Layers
      - Event Handler
      - Message Passing and NV Propagation
        - Msg_Send
        - Poll
        - PollArrayNetVar
        - PollNetVar
        - Propagate
        - PropagateArrayNetVar
        - **PropagateNetVar**
        - Resp_Send
        - SendServicePinMessage
      - Setup Functions for Application Layer
      - Memory Interface to Application Layer
      - Stack Timer
      - Network Management and Diagnostic
    - Utilities
    - Modules for various Tables
    - Pin_mux
    - Debugconsolelite
    - Assert
    - Debugconsole

◆ PropagateNetVar()

ErrorLog PropagateNetVar (**idx_netv** nvIndex)

To send one simple output network variable or one whole array. If nvIndex is the first element of an array, the whole array is propagated, else only the single index. If the node **IsNodeUnConfigured()** no NV update is sent (and no error).

Parameters

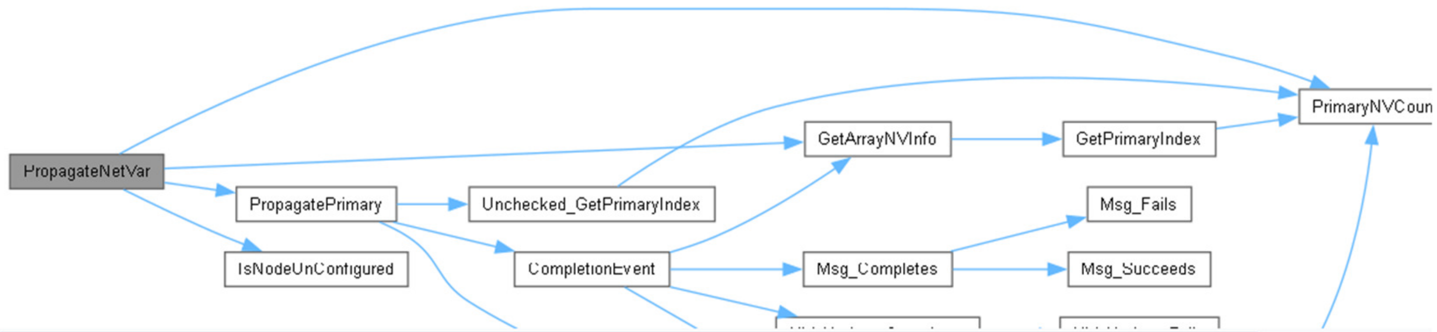
`[in]` **nvIndex** must be a primary index of the nv, and not belong to the alias table Example: Send a network variable

```
// send output NV with new fixed value
SNVT_switch sw_val;
idx_netv    nvo_index0;  // index number returned by CreateNetVar()

sw_val.state = 1;
sw_val.value = 200;

// set value and send
SetNetVar(nvo_index0, &sw_val);
PropagateNetVar(nvo_index0);
```

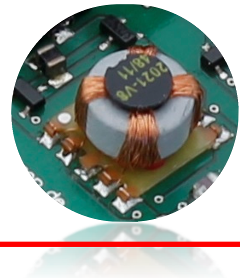
Here is the call graph for this function:



Supported Channels

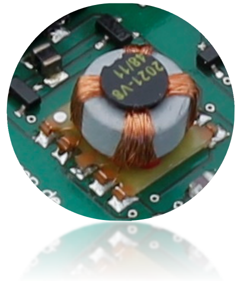
- TP/FT-10

  - Microcontroller peripherals (DAC, DMA, SPI)
  - Simple, Discrete Bus Coupling Circuit
    - 3 op-amps
    - BV2021-8 Coupling Transformer



- TP/XF-78
- TP/XF-1250

  - Microcontroller peripherals (DMA, SPI)
  - Simple, Discrete Bus Coupling Circuit
    - 3 op-amps, 1 line driver
    - TP/XF-78 BV2021-8
    - TP/XF-1250 PE-65848



- TP/RS-485-xx

  - Microcontroller peripherals (UART, DMA, SPI)
  - RS-485 Transceiver

- LonWorks FT/LP Compatible Communications Transformer
  - TP/FT-10 + TP/XF-78
  - Very Small Footprint and Overall Size
  - Alternative to Renesas' FT-X3
  - Fully compatible with FT 5000 and FT 6050
  - Designed and Tested according to Echelon Compatibility Specification
  - Verified by Echelon
- Proven Reliability
  - WAGO 753-648 LON-FTT Interface
- More Info: https://who-ing.de/en/bv2021-8_en/

- Easy Adaption to Different Microcontrollers
  - NXP, ST, Renesas, etc.
  - No Vendor-Lock
- Easy Adaption to Operating Environments like
  - Zephyr
  - FreeRTOS
  - Bare Metal
- Easy Configuration for application-specific requirements

Development Platform

- Compiler
  - GCC
- IDEs
  - MCUXpresso Suite
  - STM32CubeIDE
  - Other Commercial IDEs (Keil, IAR, …)

- Available Ports

Microcontroller	Core	TP/FT-10	TP/XF-78	TP/XF-1250	TP/RS-485-xx
STM32G474RE	ARM® Cortex®-M4F	✓	✓	✓	✓
STM32G0B0	ARM® Cortex® M0+		✓	(✓)	✓
NXP MCXN947	ARM® Cortex®-M33	✓	✓	✓	✓
NXP LPC546xx	ARM® Cortex®-M4		✓	✓	✓

- Coming soon: Renesas

- FRDM Development Board for MCX N94/N54 MCUs
  - MCXN947 - ARM® Cortex®-M33 - Dual Core, 150 MHz
  - powerful MCU with machine learning support
  - Integrated Debugger
- FetLON Arduino-Shield
  - TP/FT-10, RS-485
  - TP/XF-78 and TP/XF-1250
  - User-Interface
    - Service Pin and Service LED (FRDM-Board)
    - 2 Push Buttons (Arduino Shield)
    - 2 User LEDs (Arduino Shield)
    - Pmod, mikroBUS
- Demo project for MCUXpresso IDE

License Models

- Runtime license
  - available for NXP MCXN947
  - preprogrammed controller
  - FetLON stack in protected memory segment
- Source Buy-Out
  - no limitation on number of devices or applications
  - no runtime fee
  - for all available ports
  - ports to additional platforms are possible

who Ingenieurgesellschaft mbH

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Fetron

www.fetlon.com