RN00434

Generic Open Abstraction Layer

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Document information

Information	Content
Keywords	RN00434, GOAL, Generic Open Abstraction Layer Tool, Generic Open Abstraction Layer,
Abstract	This document is the release notes for the Generic Open Abstraction Layer (GOAL). Supports: MIMXRT1180-EVK.

1 Features

This chapter lists the features and the architecture of Generic Open Abstraction Layer(GOAL).

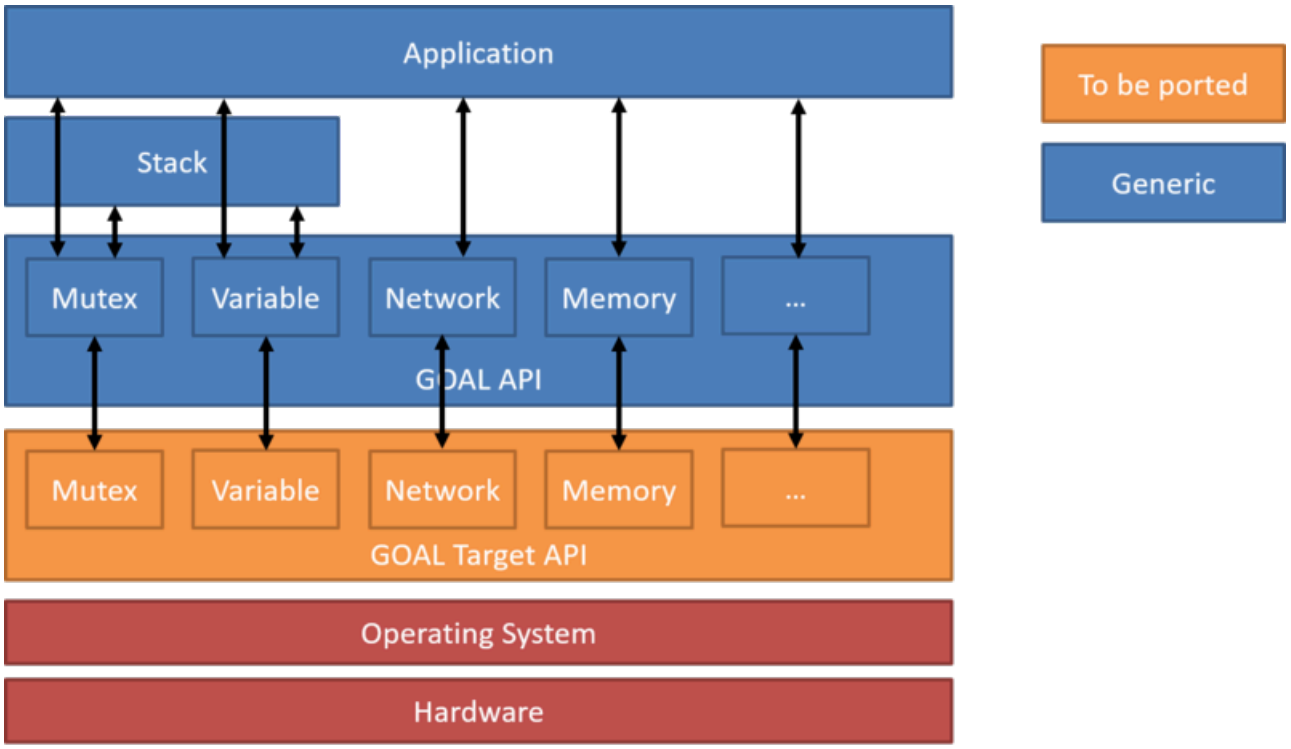

Figure 1. Architecture

1.1 Components

GOAL is configured in its Building Blocks to address:

- MCU/CPU capabilities (PN IRT/RT)
- Switch Management vs. Single Port
- Protocols as needed (Information/Data/Variables Management)
- Connecting to upper Layers via
  - IP
  - OPC-UA and many more

1.2 Basic package

The GOAL basic package includes:

- GOAL – Management
- GOAL – Multiprotocol Solutions
- Engineering - Tools

1.2.1 Network management features

- PHY Management
- Ethernet frame sending/receiving

- Switch management and interface management
- IP Address Management (if supported by the underlying OS/TCP/IP stack)
- HTTP Server
- Command-line interface

1.2.2 Multitasking support

- Locks
- Mutex
- Binary and counting semaphore
- Linked Lists
- Thread creation and control

1.2.3 Network protocol solutions

- PROFINET
- EtherNet/IP
- EtherCAT
- CC-LINK IE Field Basic
- CC-LINK IE TSN
- Modbus/TCP
- Powerlink
- CANopen Library

1.2.4 GOAL engineering tools

Design Tools

- Industrial Communication Creator
  - PROFINET
  - EtherNet/IP
  - CANopen
  - EtherCAT
  - CC-Link IE TSN
  - CC-Link IE Field Basic
- CANopen: CANopen Design tool
- Powerlink: Powerlink Design tool

Configuration Tools

- Industrial Communication Explorer

1.2.5 Extensions and options

- DLR - Device Level Ring (EtherNetIP)
- Media Redundancy protocol (MRP) for PROFINET.
- OPC-UA
- IEEE1588
- 802.1x
- RSTP
- TSN

2 Known restrictions

None

3 Changelog and open issues

This chapter lists the changelog and the open issues.

- Section 3.1 "Changelog"
- Section 3.2 "Open issues"

3.1 Changelog

Table 1. Change log

Issue Type	Summary	Component/s	Description	Fix Version/s	Affects Version/s
Story	Adapting CM33 linker files for larger applications like OPC-UA	Platform i.MX RT1180.	Enlarge GOAL heap to support applications with a large memory requirement.	GOAL 3.0.2	GOAL 3.0.2
Bug	invalid LED behavior on EIP 10_led_ button	GOAL Core	The user LEDs are manipulated by process data. But their behavior are inconsistent to PNIO and ECAT.	GOAL 3.0.1	GOAL 3.0.0
Story	Support multiple Instances of the EtherNet/IP stack	EtherNet/IP	Support multiple instances of the EtherNet/IP stack. Each instance can be assigned to a different Ethernet interface.	GOAL 3.0.0	GOAL 3.0.0
Story	EIP remove obsolete Callback ID GOAL_ EIP_CB_ID_INIT	EtherNet/IP	The callback GOAL_EIP_CB_ ID_INIT is removed. It was called immediately before GOAL_EIP_ CB_ID_READY. Therefore GOAL_ EIP_CB_ID_INIT is merged into GOAL_EIP_CB_ID_READY.	GOAL 3.0.0	GOAL 3.0.0
Story	Rework Ethernet MI for Multihoming	GOAL Core	Reworked the Ethernet Media Interface to support multiple instances for Multihoming.	GOAL 3.0.0	GOAL 3.0.0
Story	setting GOAL Demo timer to 5h	GOAL Core	Increase GOAL Demo time limitation to 5h. Customers will get the possibility to run all conformance tests with binary demo.	GOAL 3.0.0	GOAL 3.0.0
Story	allowing unused-local-typedefs	GOAL Core	GOAL presumes the -Wunused-local-typedefs flag to handle \{color:#242424}GOAL_CASSERT \{color} makro. But using the global flag might cover other issues. So, the GOAL_CASSERT makro will be modified.	GOAL 3.0.0	GOAL 3.0.0

Table 1. Change log*...continued*

Issue Type	Summary	Component/s	Description	Fix Version/s	Affects Version/s
Story	Add Callback Argument to Protocol Receive Handler	GOAL Core	Add an arbitrary Callback Argument to the Rx Handler for Ethernet Frames. This callback can be used by the callback owner to reference private data.	GOAL 3.0.0	GOAL 3.0.0
Story	Support Multihoming	GOAL Core	GOAL is extended to support multiple Network interfaces.	GOAL 3.0.0	GOAL 3.0.0
Story	Extended Configuration Management to support multiple instances of each module	GOAL Core	Multiple instances of each GOAL module can store their own set of CM variables.	GOAL 3.0.0	GOAL 3.0.0
Story	Create new application with buttons and LEDs - Ethernet/IP	Platform i.MX RT1180.	Providing a functionally unified application with buttons and LEDs for Ethernet/ IP.	GOAL 3.0.0	GOAL 3.0.0
Story	Inlcude SDK from outside of GOAL	Platform i.MX RT1180.	GOAL references to an official, local SDK repository instead of an internal copy at bsp/nxp/i.MX RT1180.	GOAL 3.0.0	GOAL 3.0.0
Story	Get unique Mac Address from i.MX RT1180. silicon API	Platform i.MX RT1180., Platforms	Get UID from silicon API for unique MAC address. So multiple i.MX RT1180. can be communicating.	GOAL 3.0.0	GOAL 3.0.0
Story	Create new application with buttons and LEDs - Profinet	Platform i.MX RT1180.	Providing a functionally unified application with buttons and LEDs for Profinet.	GOAL 3.0.0	GOAL 3.0.0
Story	Multi-core support for i.MX RT1180.	Platform i.MX RT1180., Platforms	Support multi-core projects by shared memory between CM33 (Communication Core) and CM7 (Application Core). Multi-core based on GOAL Micro-Core-To-Core enables the platform i.MX RT1180. running multi-core applications for better performance. The Implementation contain example applications for EtherCAT, EtherNet/IP and Profinet.	GOAL 3.0.0	GOAL 3.0.0
Story	supporting new IDE: MCUXpresso for VS Code	Platform i.MX RT1180.	New IDE support for GOAL. Projects are now available for {_ }MCUXpresso for Visual Studio Code{_}{_}.{_}	GOAL 3.0.0	GOAL 3.0.0
Story	Create new application with buttons and LEDs - Ethercat	Platform i.MX RT1180.	Providing a functionally unified application with buttons and LEDs for EtherCAT.	GOAL 3.0.0	GOAL 3.0.0

Table 1. Change log*...continued*

Issue Type	Summary	Component/s	Description	Fix Version/s	Affects Version/s
Bug	i.MX RT1180. MCTC loses syncronization sporadically	Platform i.MX RT1180., Platforms	During longterm tests the device did not respond anymore after some time sporadically. A powercycle solved the problem. This might be caused by MCTC sync.-losses.	GOAL 3.0.1	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	Invalid LED behavior on EIP 10_led_ button	GOAL Core	The user LEDs are manipulated by process data. But their behavior are inconsistent to PNIO and ECAT.	GOAL 3.0.1	GOAL 3.0.0

3.2 Open issues

Table 2. Open issues

Issue Type	Summary	Component/s	Description	Affects Version/s
Bug	DLR sign-on frames sporadically are not transmitted	DLR, Platform i.MX RT1180., Platforms	Under certain circumstances the sign-on-frame is missing during DLR tests at the i.MX RT1180..	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	ECAT: stack expected PDO mappable attribute for application variables at multicore	EtherCAT, Platform i.MX RT1180., Platforms	Singlecore devies does not require this attribute, but multicore does.	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	ACD does not work for static IP configurations	EtherNet/IP	If DHCP is disabled, the device does not send out the expected pattern of ARP frames to probe its IP address.	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	AutoMDIX Test fails with 1 Gbit/s cable	EtherNet/IP	The DUT cannot establish a connection to the Hub (Half duplex) if a cable with 4 twisted pairs is used. If a 100 Mbit/s cable (2 twisted pairs) is used, no problems occur	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	DHCP client's Tx timer does not reset after link down	EtherNet/IP	The DHCP client increases its Tx timer witch each unanswered Request. After a link down, the timer should reset but it still uses the previous value.	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	ACD Test Case 4.15 fails	EtherNet/IP	The DUT does not respond to normal ARP request after its	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0

Table 2. Open issues*...continued*

Issue Type	Summary	Component/s	Description	Affects Version/s
			IP address has been successfully probed.	
Bug	GOAL LED always returns 0	Platform i.MX RT1180.	goal_targetGetLeds() always return 0 for the i.MX RT1180..	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	i.MX RT1180. MCTC loses syncronization sporadically	Platform i.MX RT1180. , Platforms	During longterm tests the device did not respond anymore after some time sporadically. A powercycle solved the problem. This might be caused by MCTC sync.-losses.	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	PNIO Hardware Test Malfunction	Platform i.MX RT1180. , PROFINET	When both the Device B and the DUT are configured to 100 MBit Full Duplex the DUT responds with the Alarm "no port offers speed duplexity". Which should not be the case.	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	DCP Blink Malfunction	Platform i.MX RT1180. , PROFINET	During the PNIO CT the DCP Blink did not blink at 1Hz for 3s. The current behaviour is, that it just blinks the LED one time.	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	PNIO VLAN PCP wrong for Alarms	Platform i.MX RT1180. , PROFINET	For Alarms the VLAN PCP shall be 5. Refer to Table 403 of PNIO Specification. Current implementations sets 0.	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0
Bug	LLDP TLV shows incorrect port settings during AR	PROFINET, PRO FINET LLDP	The TLV ieee802 shows "Autonegotiation disabled" even though the DUT is configured to use autonegotiation at TIA portal. This can be provoked by executing the hardware test testcase 8.1.3. The DUT shall use autonegotiation (also at LLDP frames) until parameter end is received, then it must send an alarm due to misconfiguration ("PDEV no port...").	GOAL 3.0.2, GOAL 3.0.1, GOAL 3.0.0

4 GOAL - Memory footprint

This appendix provides a brief overview about general topics regarding GOAL and compatible platforms.

4.1 Memory footprint of applications

This chapter gives an overview of the memory needed of several applications based on GOAL version 2.26.0. The footprints are determined using the supported platform i.MX RT1180.

4.1.1 Using i.MX RT1180

The platform i.MX RT1180 uses a complex memory layout with fragmented RAM and FLASH areas with different speeds to guarantee the best performances. These areas are defined as the following:

Table 3. Memory areas

Memory Area	Type
• m_data • m_ncache • m_heap • m_data2 • m_data3 • m_qacode	RAM
• m_text • m_flash_config • m_ivt • m_interrupts	FLASH

Note: *The GOAL static heap is at the area m_data3 and allocates memory during startup of the application. It is designed to leave some additional space for further application development. GOAL does not use all of this space now.*

The following sizes are determined by building the application with enabled optimization -O2 and without logging to ensure the best performance. GOAL uses FreeRTOS and the FLASH for this platform. The BSP of the RT1180 is included in these sizes.

Table 4. Applications and memory footprint

Application	Memory Footprint (with BSP)
goal_pnio/24_pnio_snmp_mrp	[LD] Memory region Flash/RAM Used Size Region Size %age Used [LD] m_interrupts_ram: - 0 GB 0 GB [LD] m_flash_config: Flash 0 GB 3 KB 0.00% [LD] m_ivt: Flash 0 GB 4 KB 0.00% [LD] m_interrupts: Flash 1 KB 1 KB 100.00% [LD] m_text: Flash 221736 B 16339 KB 1.33% [LD] m_data: RAM 114744 B 128 KB 87.54% [LD] m_ncache: RAM 0 GB 0 GB [LD] m_heap: RAM 0 GB 0 GB [LD] m_data2: RAM 24604 B 496 KB 4.84% [LD] m_data3: RAM 256 KB 256 KB 100.00% [LD] m_qacode: RAM 22400 B 128 KB 17.09%
goal_ccl_ie_tsn/04_remotestation*	[LD] Memory region Used Size Region Size %age Used [LD] m_interrupts_ram: 0 GB 0 GB [LD] m_flash_config: 0 GB 3 KB 0.00% [LD] m_ivt: 0 GB 4 KB 0.00% [LD] m_interrupts: 1 KB 1 KB 100.00% [LD] m_text: 404380 B 16339 KB 2.42% [LD] m_data: 121256 B 128 KB 92.51% [LD] m_ncache: 0 GB 0 GB [LD] m_heap: 0 GB 0 GB [LD] m_data2: 72520 B 496 KB 14.28%

Table 4. Applications and memory footprint*...continued*

Application	Memory Footprint (with BSP)
	[LD] m_data3: 256 KB 256 KB 100.00% [LD] m_qacode: 33920 B 128 KB 25.88%
goal_mb/01_simple_io*	[LD] Memory region Used Size Region Size %age Used [LD] m_interrupts_ram: 0 GB 0 GB [LD] m_flash_config: 0 GB 3 KB 0.00% [LD] m_ivt: 0 GB 4 KB 0.00% [LD] m_interrupts: 1 KB 1 KB 100.00% [LD] m_text: 197712 B 16339 KB 1.18% [LD] m_data: 95272 B 128 KB 72.69% [LD] m_ncache: 0 GB 0 GB [LD] m_heap: 0 GB 0 GB [LD] m_data2: 66372 B 496 KB 13.07% [LD] m_data3: 256 KB 256 KB 100.00% [LD] m_qacode: 29952 B 128 KB 22.85%
goal_ecat/02_eoe_http	[LD] Memory region Used Size Region Size %age Used [LD] m_interrupts_ram: 0 GB 0 GB [LD] m_flash_config: 0 GB 3 KB 0.00% [LD] m_ivt: 0 GB 4 KB 0.00% [LD] m_interrupts: 1 KB 1 KB 100.00% [LD] m_text: 204080 B 16339 KB 1.22% [LD] m_data: 99488 B 128 KB 75.90% [LD] m_ncache: 0 GB 0 GB [LD] m_heap: 0 GB 0 GB [LD] m_data2: 66372 B 496 KB 13.07% [LD] m_data3: 256 KB 256 KB 100.00% [LD] m_qacode: 22400 B 128 KB 17.09%
goal_eip/08_acd_dhcp_dlr	[LD] Memory region Used Size Region Size %age Used [LD] m_interrupts_ram: 0 GB 0 GB [LD] m_flash_config: 0 GB 3 KB 0.00% [LD] m_ivt: 0 GB 4 KB 0.00% [LD] m_interrupts: 1 KB 1 KB 100.00% [LD] m_text: 164936 B 16339 KB 0.99% [LD] m_data: 95936 B 128 KB 73.19% [LD] m_ncache: 0 GB 0 GB [LD] m_heap: 0 GB 0 GB [LD] m_data2: 66372 B 496 KB 13.07% [LD] m_data3: 256 KB 256 KB 100.00% [LD] m_qacode: 22912 B 128 KB 17.48%

5 Revision history

Table 5 summarizes the revisions to this document.

Table 5. Revision history

Document ID	Release date	Description
RN00434 v.3.0	23 March 2026	Initial public release

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