CAN Standardization: XL & FD light

ME-IC/PRM-IP | March 14th, 2024

BOSCH

CAN Standardization Status
Agenda

CAN XL

- Who standardizes CAN XL?
- Standardization Activities & Status
- Plugfest

CAN FD light

- Who standardizes CAN FD light?
- Standardization Activities & Status

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Who Standardizes CAN XL?

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CAN XL – Next Step in CAN Evolution
Who standardizes CAN XL?

Most activities are at CAN in Automation in Special Interest Group CAN XL [link]

- Chairman of SIG CAN XL: Arthur Mutter (Bosch ME)
- Editor of Protocol Specification: Florian Hartwich (Bosch ME)

Activities since 1st Meeting (Dec. 2018)

Participating Companies

NXP, Infineon, Renesas, STM, TI, Continental, Denso, Bosch, ...
VW, Jaspar (JOEMs), Nissan, PSA, Mercedes, Vector, ETAS, Kvaser, Murata, ...

CiA: CAN in Automation e.V.
SIG: Special Interest Group

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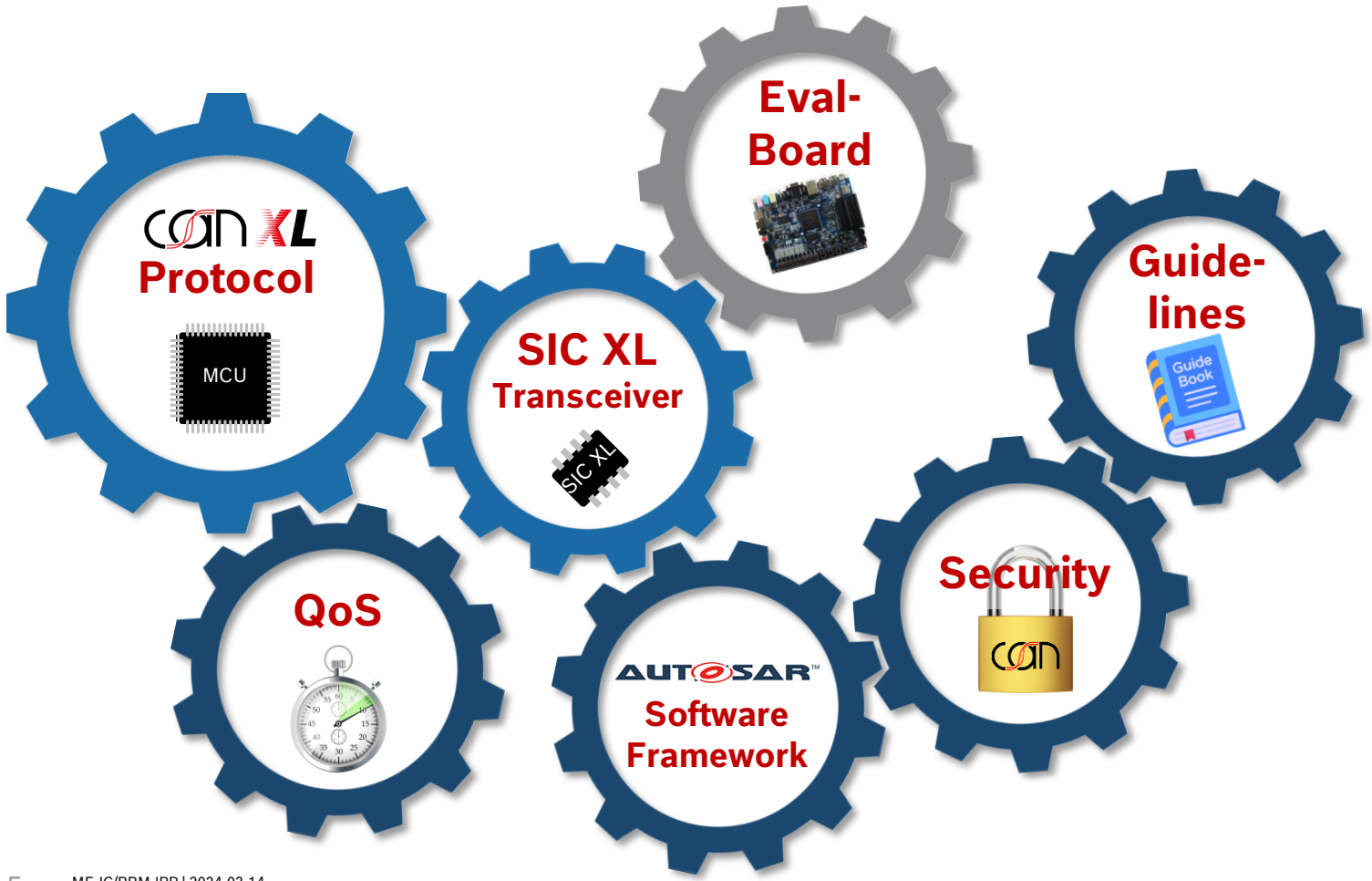
CAN XL – Next Step in CAN Evolution
Standardization Ecosystem



Activities at

- CiA ➔ 11 specifications
- ISO ➔ 2 standards
- AUTOSAR ➔ 1 specification
- China ➔ t.b.d

Main document editors

VECTOR, NXP, C&S, Infineon, BOSCH, RENESAS

CiA: CAN in Automation e.V.
ISO: International Standardization Organization
SIC: Signal Improvement Capability
QoS: Quality of Service
MCU: Micro Controller Unit

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Standardization Activities & Status

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CAN XL – Next Step in CAN Evolution

CiA: Specification Documents

11 specification documents

Hardware relevant: released

IP TechDay
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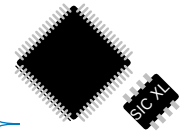
Part	Title	Comment	Status Q1/24	Main Editor/Contrib.	
Series CiA 610: CAN XL specifications and test plans					
CiA 610-1	Data link layer and physical coding sub-layer requirements	XL Protocol + PWME	100%	BOSCH, NXP	Hardware
CiA 610-2	Data link layer and physical coding sub-layer conformance **test plan**	XL Protocol + PWME	80%	C&S, BOSCH	Hardware
CiA 610-3	Physical medium attachment sub-layer requirements	XL Transceiver + PWMD	100%	Infineon, NXP	Hardware
CiA 610-4	Physical medium attachment sub-layer conformance **test plan**	XL Transceiver + PWMD	80%	C&S, Infineon, NXP	Hardware
Series CiA 611: CAN XL higher-layer services					
CiA 611-1	SDU types	SDU Types	100%	VECTOR, BOSCH	Software / AUTOSAR
CiA 611-2	Multi-PDU	Multi-PDU	100%	Schlegel Consulting	Software / AUTOSAR
Series CiA 612: CAN XL guidelines and application notes					
CiA 612-1	System design recommendations	CAN XL usage	100%	BOSCH	Application Notes
CiA 612-2	PWM coding implementation guideline	PWM coding usage	100%	NXP	Application Notes
Series CiA 613: CAN XL add-on services					
CiA 613-1	Simple/extended content (SEC) indication	SEC indication	90%	VECTOR, BOSCH	Additional Functions
CiA 613-2	Security	DLL Security	60%	RENESAS, Infineon	Additional Functions
CiA 613-3	LLC frame fragmentation	Fragmentation for QoS	90%	VECTOR, BOSCH	Additional Functions



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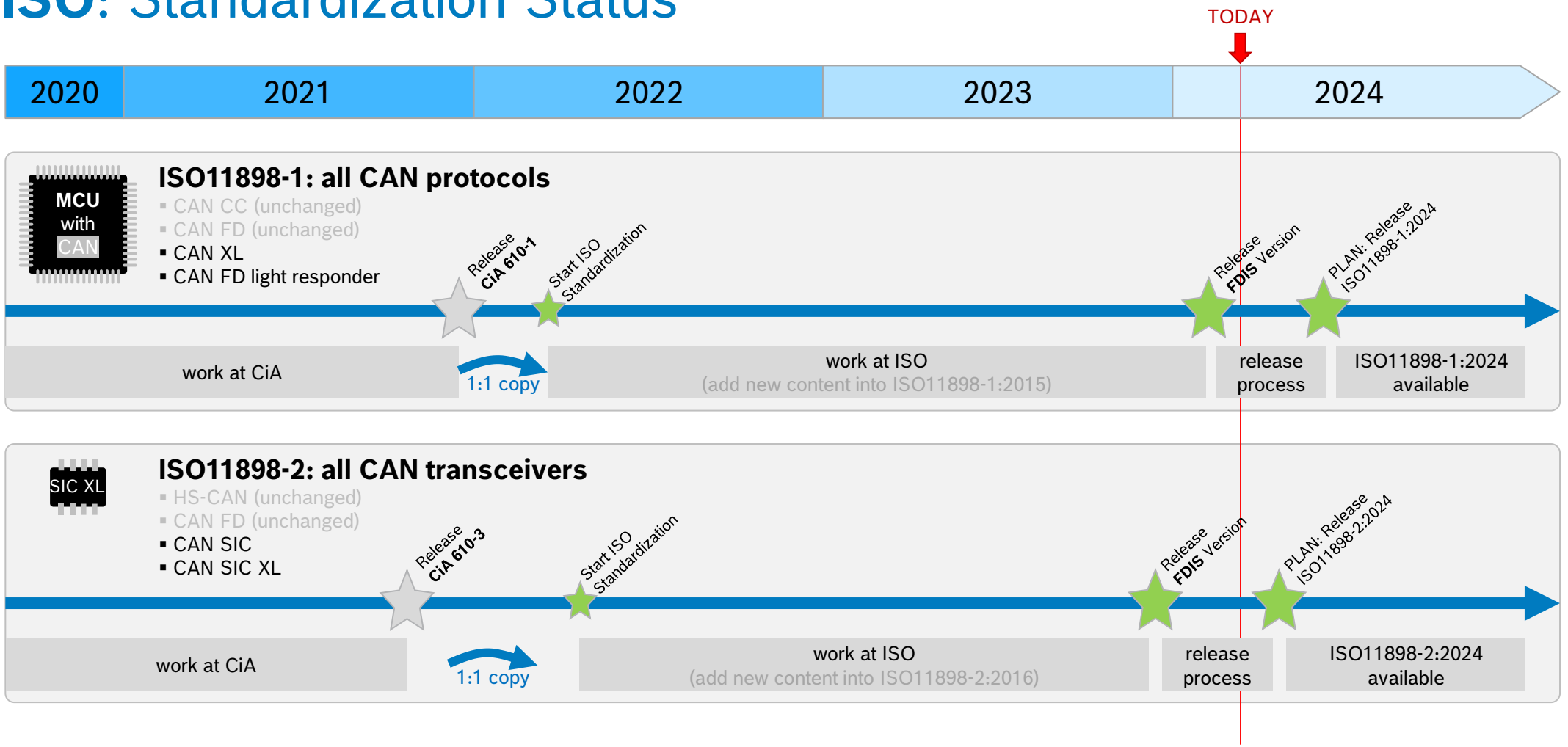
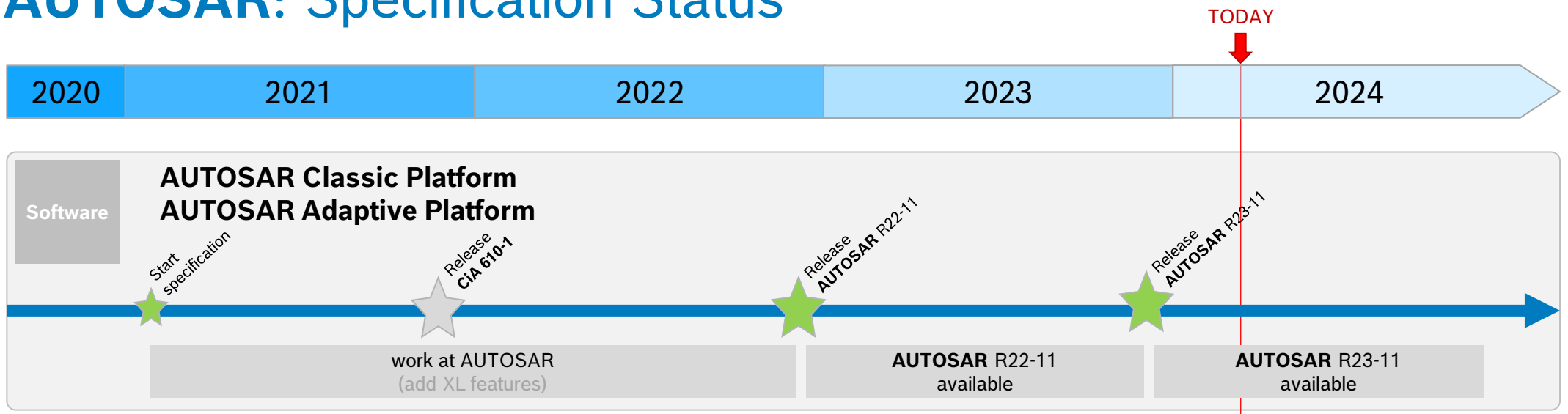
CAN XL – Next Step in CAN Evolution

ISO: Standardization Status



CAN XL – Next Step in CAN Evolution

AUTOSAR: Specification Status



AUTOSAR Classic Platform supports

- CAN XL (all features)
- CiA611-1: Ethernet Tunneling via CAN XL
- CiA611-1: CC and FD tunneling via CAN XL
- CiA611-1: content-based addressing (via AF field)

AUTOSAR Adaptive Platform [pure Ethernet based] supports

- CiA611-1: Ethernet Tunneling via CAN XL

  ➔ supports CAN XL as alternative Physical Layer for Ethernet

CAN XL – Next Step in CAN Evolution
Chinese Standardization Body: Status

Bosch and NXP reached out to Chinese Standardization Body in October 2023.

“CAN XL core eco-system Cooperation” Project Proposal reviewed preliminarily

- establish CAN technology core eco-system
- ISO11898-1:2024 (CAN XL Protocol): adopt as is
- ISO11898-2:2024 (SIC and SIC XL Transceivers): adopt as is
- carry out CAN XL application specification research in China
- jointly promote the application of CAN XL technology with industry representatives and standardization development organizations

“CAN XL core eco-system" is an **ideal opportunity for all parties interested in CAN XL in China**

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Plugfest

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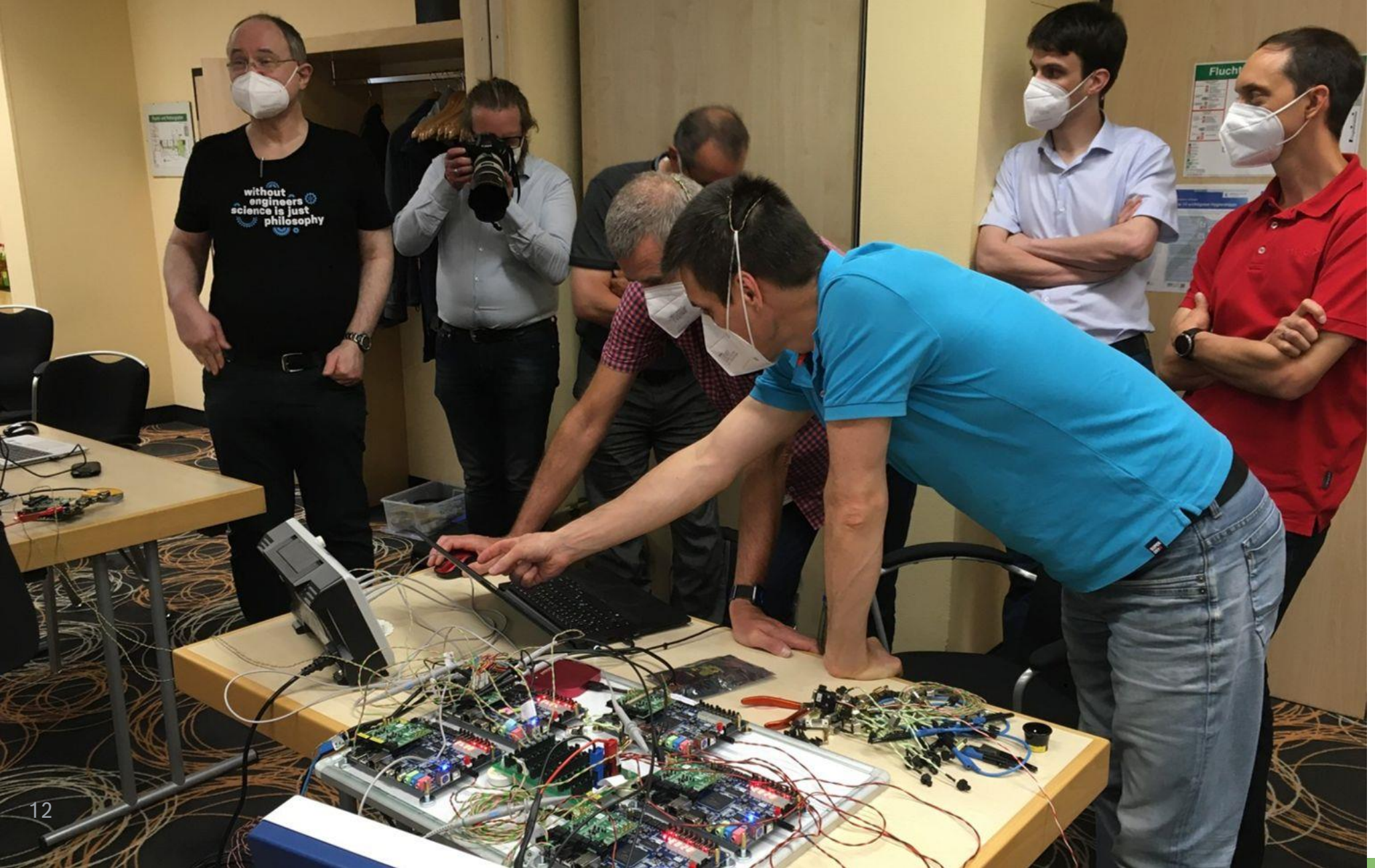

1st CAN XL Plugfest
Nürnberg, July 6th, 2021

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CAN XL – Next Step in CAN Evolution

Plugfests

Next Plugfest: May 16th, 2024

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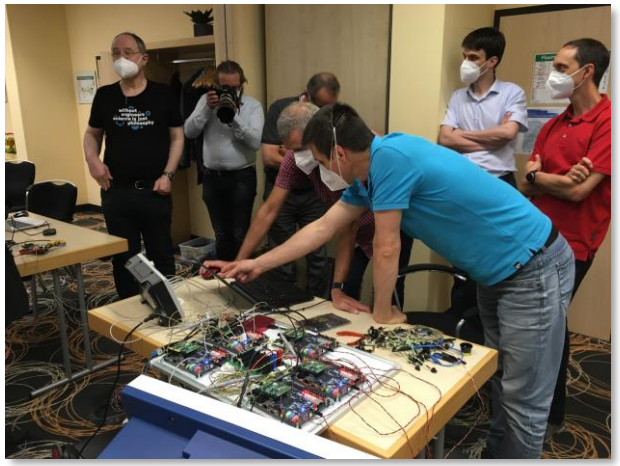
1st
Nuremberg (GER)
July 6th, 2021



2nd
Nuremberg (GER)
May 4th, 2022

3rd
Nuremberg (GER)
January 12-13th, 2023

4th
Detroit (USA)
April 25th, 2023

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Who Standardizes CAN FD light?

CAN FD light
Who standardizes CAN FD light?

Most activities are at CAN in Automation in Special Interest Group CAN FD light [link]

- Chairman of SIG CAN FD light: Fred Rennig, (ST Microelectronics)
- Editor of Protocol Specification: Fred Rennig, (ST Microelectronics)

Activities since 1st Meeting (May 2020)

Participating Companies

STM, TI, NXP, Infineon, Denso, Continental, Bosch, ...
VW, Jaspar (JOEMs), Mercedes, Vector, PEAK, Kvaser, Melexis, Murata, ...

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SIG: Special Interest Group

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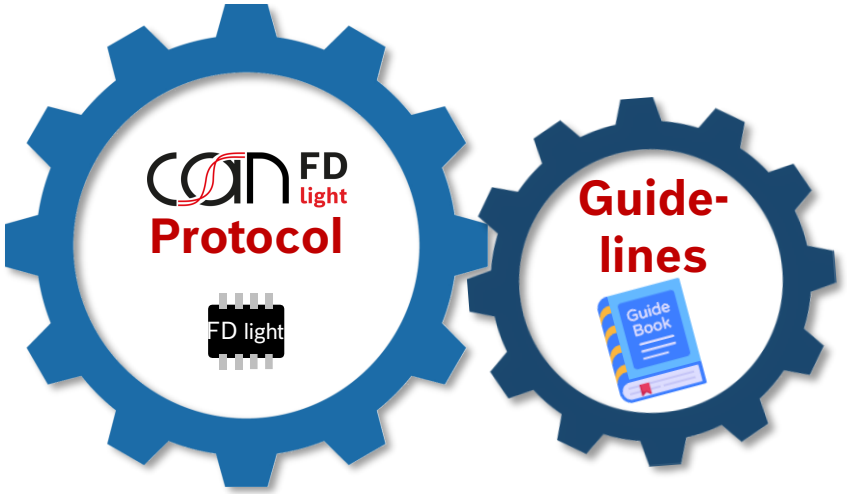
CAN FD light Responder
Standardization Ecosystem



Activities at

- CiA ➔ 3 specifications
- ISO ➔ 1 standard

Main document editors

life.augmented

C&S

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Remarks

- **CAN FD light Responder uses a subset of the CAN FD features**
- **CAN FD light reuses the CAN FD Ecosystem (Transceiver, Tooling, …)**
- CAN FD light Commander up to 1 Mbit/s ➔ ISO11898-1 CAN FD node
- CAN FD light Commander >1 to 8 Mbit/s ➔ ISO11898-1 change required

CiA: CAN in Automation e.V.
ISO: International Standardization Organization
MCU: Micro Controller Unit

CAN XL – Next Step in CAN Evolution

CiA: Specification Documents

3 specification documents

Hardware relevant: released

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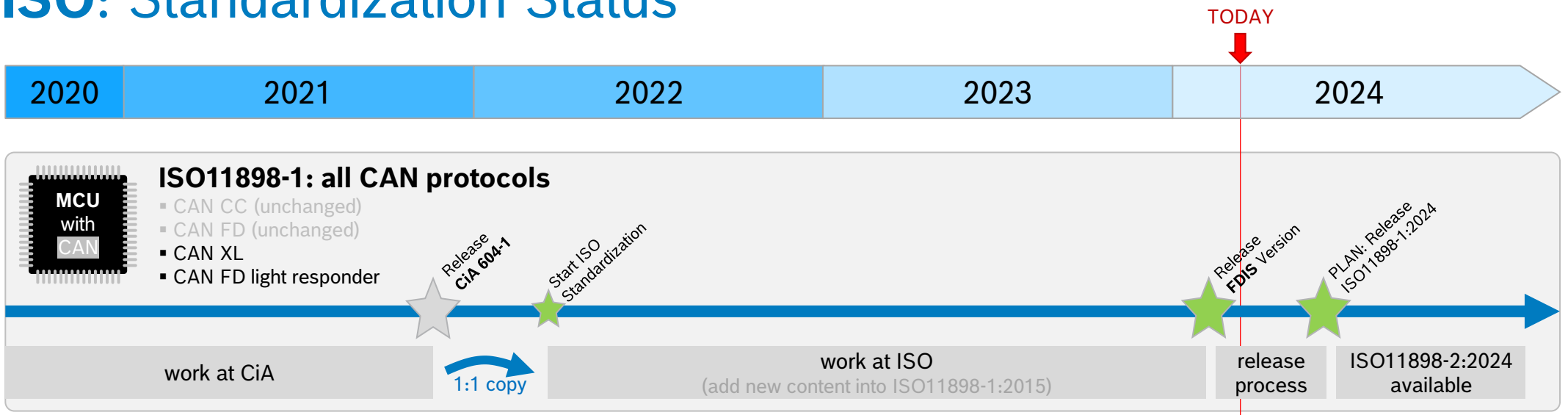
Part	Title	Comment	Status Q1/24	Main Editor/Contrib.	
Series CiA 604: CAN FD light					
CiA 604-1	Data link layer and physical coding sub-layer requirements of **responder nodes**	FD light	100%	ST, BOSCH	Hardware FD light
CiA 604-2	Data link layer and physical coding sub-layer conformance of **responder nodes test plan**		starts soon	ST, C & S	Test
CiA 604-3	System design recommendation	FD light usage	90%	ST, BOSCH	Guideline

CAN FD light – Next Step in CAN Evolution

ISO: Standardization Status



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Summary

CAN XL & CAN FD light Standardization Status

Summary

CAN XL

- **ISO Release soon. Hardware related parts are frozen. Industry Standard.**
- Technology is proven in Plugfests and by evolution
- Collaboration with Chinese standard. body in preparation

CAN FD light responder

- **ISO Release soon. Hardware related parts are frozen. Industry Standard.**
- CAN FD Ecosystem can be reused: Transceivers, Tooling, Knowledge, etc.