

1 Product Overview

All program specific details are described in this data sheet as an extension to the general Product Information MICROSAR 4. This data sheet covers the following aspects:

- > Software architecture and supported specifications
- > Tool support and workflow

1.1 Supported Specifications

The offered software modules are based on AUTOSAR 4.x specifications (we agreed with Ford to use the newest available versions).

They cover the communication requirements based on the Ford specification “HS/MS-CAN CGEA ECU Level Functional Requirements Specification”, version 2014, first issued January 1, 2015.

DCM & DEM are extended to support the Ford specification “Generic Global Diagnostic Specification (GGDS)”, issue index 004, volume 1, document no. 00.06.15.001 dated 2013-05-02.

The Ford security algorithm is based on “EESE Diagnostic Application Security Algorithm” document no. 00.06.15.151.

The offered Ethernet / IP modules are based on AUTOSAR 4.2.1 specifications.

1.2 Software Architecture

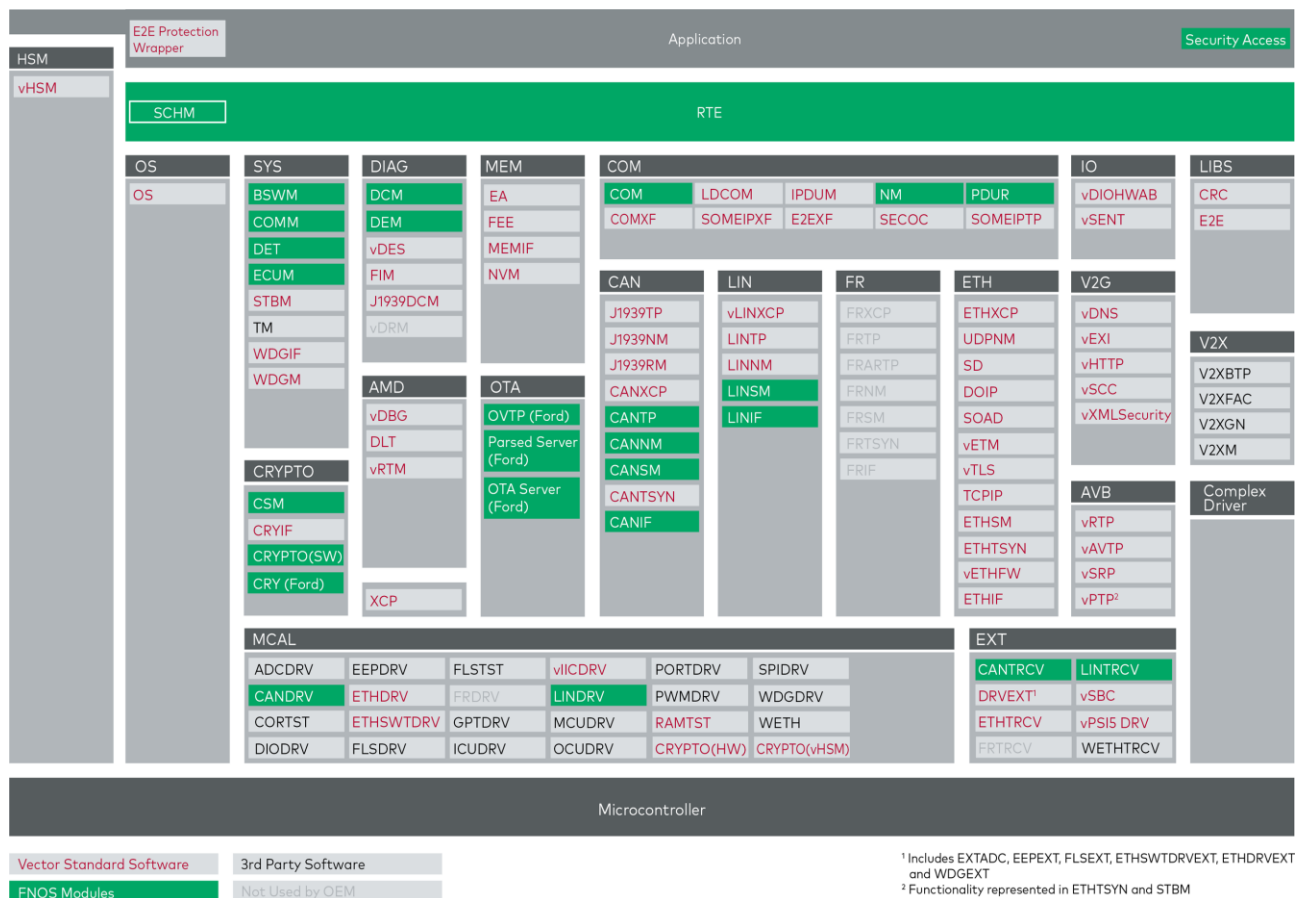


Figure 1-1 Software Architecture

All modules for Ford AUTOSAR are colored green (FNOS Modules). Only the components needed for a specific ECU will be included in the requested package. Additional AUTOSAR components can be requested but are optional for a Ford ECU.

1.3 MICROSAR Ford SLP1 Specific Modules

1.3.1 Library Delivery of Security Algorithm

The Ford-specific security algorithm is delivered as a library file. Please note that this file depends on the compiler options used for the delivery.

A change of the compiler or compiler options later in the project might result in incompatibilities.

Parts of the security algorithm are implemented as a SWC, which uses the BSW module CSM (CRY) and an additional module "CRY (SW-based) Ford" with Ford-specific content.

1.3.2 E2E Algorithm

There is no common agreement within Ford which algorithm (profile) is used for end to end protection (calculation of CRC and message counter). It is defined within a project and might even be different within one project from one PDU to the next PDU as it depends on the agreement involving all ECUs sending/receiving the specific PDU.

Vector can only offer AUTOSAR-compliant profiles, they can be mixed within one ECU, please let us know which profile you need. Profile 1 and 2 is suitable for ECUs connected to CAN (CRC is 8 bit) and will be supported by the protection wrapper as well.

If the algorithm doesn't match to the AUTOSAR profiles the application has to do the implementation.

1.3.3 VSG for Diagnostics

For details about VSG support (Vehicle System Group, Ford-internally called dependencies) we provide an Application Note AN-ISC-8-1189_Vehicle_System_Group_Support. This feature can be used to support different diagnostic requirements in one ECU software.

1.3.4 Ford Transparent Gateway

A complex driver is available for ECUs that need to support the transparent gateway according to GGDS004 Annex F.

1.3.5 Limitation DEM

- > No integrated support of ISO 15031-5 / SAE J1979 (OBD services)
- > No support for separate aging counter for testFailedSinceLastClear Bit versus confirmed DTC bit (typically only needed for ECM/TCM)
- > All supported snapshot records must contain the same list of DIDs for a given DTC
- > No integrated support for ISO 14229-1 service function \$19 sub –function \$17, \$18 and \$19
- > There are some additional requirements by Ford to implement OnDemand DTCs. This is not in the scope of the DEM. There is no support in the Ford SLP1 for this so the application has to implement it.

1.3.6 Limitation DCM

Support for the following features is planned

- > SID 0x2F with CEMR and bitmapped signals → R19
- > SID 0x31 "RoutineInfo" and OBD2 routines → R17 (December 2016)

1.3.7 Integration Review

An Integration review is required. It will be offered with the FNOS stack. It is scheduled by Ford.

1.3.8 Priority Inversion Avoidance (PIA)

If PIA is required in your project please note the following (typically external PIA is not of interest to Ford).

AUTOSAR defines Can driver features for implementing PIA:

- > Multiplexed Tx for external PIA (multiple Tx mailboxes are used for BasicCAN transmission).
- > Hardware (Transmit) Cancellation for internal PIA

But not all hardware platforms support this, due to hardware limitations. So if this topic is important for your Ford project, please select a hardware platform without limitations wrt

PIA. Internal PIA can be fulfilled as well by putting all send PDUs into a FullCAN buffer, but this solution depends on the available mailboxes and on the communication description distributed by Ford.

2 Tool Chain

This chapter gives an overview over the available tool chain, which supports the configuration of the Basic Software (BSW), the Runtime Environment (RTE), Software Components (SWC) and, if available, of the boot loader.

Please refer to the Vector Knowledge Base for a list of supported operating systems of each tool.

2.1 Configuration Tools

The basic delivery set includes the following tools:

(mandated by Ford)

> **DaVinci Configurator Pro Version 5:**

- > Recommended editor for MICROSAR BSW, MICROSAR OS
- > Recommended configurator for MICROSAR RTE
- > Generic Configuration editor (GCE) which allows the configuration of any software module which provides an AUTOSAR Basic Software Module Description (BSWMD).
- > Use Case editors and validators

2.2 Additional Tools

> **DaVinci Developer:** SWC editor. Basic features are

- > Creation and configuration of atomic SWC and SWC compositions
- > Support of several AUTOSAR versions when importing SWC descriptions that have been created by AUTOSAR-compliant tools

> **CANdela Studio:** This tool provides easy editing and creation of diagnostic configuration files (CDD) as used by the MICROSAR DCM and DEM.

2.3 Supported Interchange Formats

> **CAN**

DBC, (AUTOSAR System Description 4.2.1 planned for future)

> **LIN**

LDF 2.1 , (AUTOSAR System Description 4.2.1 planned for future)

> **CDD**

CDD manufacturer type "Ford" required.

3 Workflow

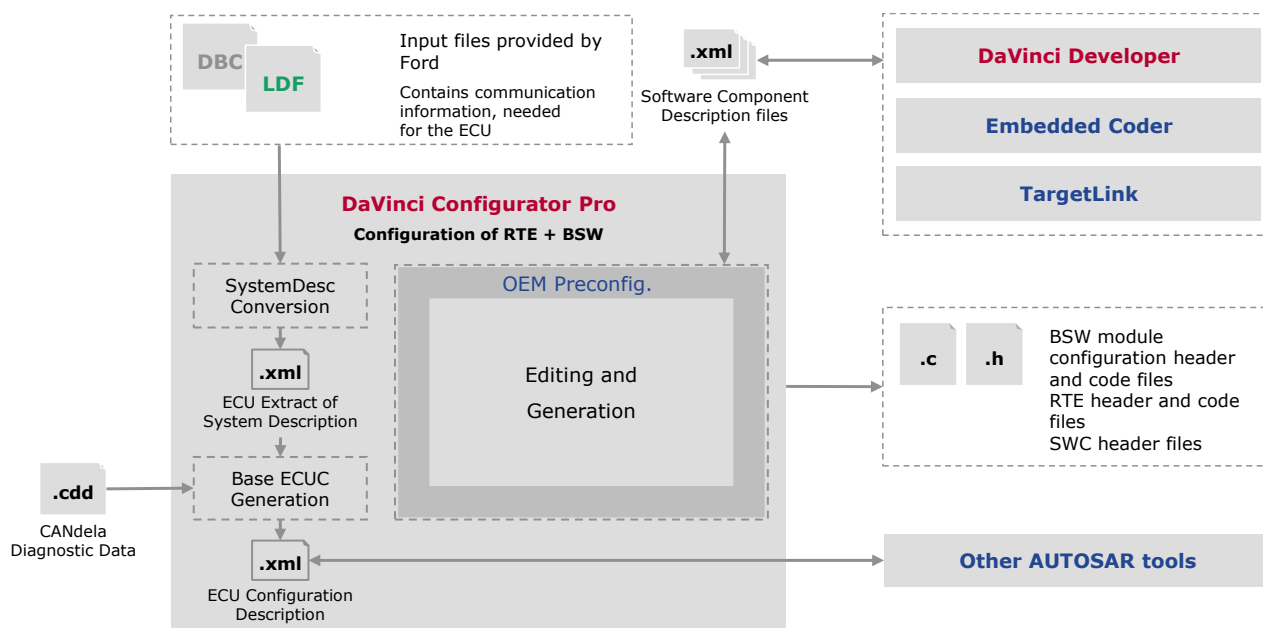


Figure 3-1 Workflow, of BSW configuration

4 Additional Information

> **Legislative On Board Diagnostic (OBD)**

Legislative OBD2 support can be ordered as an optional extension to the MICROSAR DCM module. This add-on supports the OBD diagnostic services \$01 to \$0A according to AUTOSAR and SAE J1979 / ISO 15031.

> **OTA (Over-the-air) Ford**

These modules allow for data collection and/or flashing in the background (while the vehicle is operated) using standard in-vehicle networks (CAN, CAN FD, Ethernet). The name comes from the fact that one ECU in the vehicle sends and receives these data over the air.

> **OTA PARSED Server**

The OVTP PARSED server implements services that allow controlling PARSED data aggregation and transmission by activating/deactivating PARSED channels and by reporting the channel configuration to the backend.

Channels, messages and data structures can be configured flexibly. Standardized data structures (DID push, UINT statistics, UINT histogram) for data aggregation and transmission are provided, additional (custom) data structures may optionally be added. This functionality requires the module OVTP.

> **OTA Server**

The OTA server implements the Ford OTA protocol for software updates over the air from application context.

It provides features such as end-to-end command authentication (cloud-to-ECU), download handling (erase and program flash), software consistency checks ("SWash"), A/B-Swap handling, and rollback handling.

The OTA server requires an ECU-specific extension to facilitate hardware and software architecture-specific parts of the software update process.

This functionality requires the module OVTP.

> **OVTP**

The OVTP protocol handler allows request/response communication (client → server → client) and push messages (server → client) for one OVTP client and multiple OVTP server ECUs with one or more OVTP server applications each.

OVTP provides buffer management, communication timeout supervision, session handling, message header validation and request dispatching.

OVTP supports a CANbedded-type ISO-TP and AUTOSAR 4 PduR interface for communication. All connections and applications must be statically configured at compile time.