AUTOSAR Statement of Work

Version: 2019.0
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Electrical/Electronic Systems Engineering
Architecture and Software Platform

REVISION HISTORY

Previous Release	Current Release	Revision Description	Author	Date
2018.2	2019.0	Exemption process updated. Minor edits to implementation requirements. Removal of ETAS and Elektrobit from Section 4. Renamed “Central Software” to new name of “Architecture and Software Platform”	Stephen Traicoff	August 27, 2019
2018.1	2018.2	Removed reference to Appendix C. Removed flowcharts in Appendix B and added additional required components. Added general requirement for AUTOSAR usage, updated Table 3.1, Added filling and submitting the AUTOSAR conformance level in Table 3.1 for the TPS/PS milestone	Jim Miloser	September 26, 2018
2017.1	2018.1	Updated Table 1 and Table 2.	Jim Miloser	February 27, 2018
2017.0	2017.1	Added: IPC, SW SOW link, AUTOSAR SOW_AppendixC Updated 2.1 ATTENTION section to highlight items other than communication. Added ETAS and Elektrobit to Section 4. Added reference contact information. Removed Sections: Standard Software, Software Download, Ford-Standard Software Components Updated 2.1.5.1: removed 100 hours requirement, moved timing to appendix, re-worded technical support requirements. Updated 2.2.2: reference SW SOW instead of Netcom SOW Added requirement for secured communication (2.1.4.1)	Jim Miloser	November 27, 2017

Previous Release	Current Release	Revision Description	Author	Date
		Changed Appendix A from Documentation attachment to Integration Guide attachment. Removed “EESE Network Communications Multiplex Technology Statement of Work.” reference in Table 2. Added Vehicle Milestone Table.		
NA	2017.0	FIRST RELEASE FORD MOTOR COMPANY GLOBAL AUTOSAR STATEMENT OF WORK	Eric Winder	February 15, 2017

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Appendix A – AUTOSAR Integration Guide

Appendix B – AUTOSAR Selection Guide

Table 1: Abbreviations and Definitions

Acronym	Term/Definition
AUTOSAR	Automotive Open System Architecture
BSW	AUTOSAR Basic Software
CAN	Controller Area Network
CAN-FD	CAN with Flexible Data-Rate
CMA	CAN Message Authentication
CDD	AUTOSAR Complex Device Driver
CP	AUTOSAR Classic Platform
CRY	Crypto Library/Driver
CRYIF	Crypto Interface
CSM	Crypto Service Manager
D&R	Design & Release
ECU	Electrical Control Unit
EESE	Electrical/Electronic Systems Engineering
EMM	Engineering Matters Meeting
eSOW	Engineering Statement of Work
FDJ	GPDS Final Data Judgment
FMC	Ford Motor Company
GPDS	Global Product Development System
HSM	Hardware Security Module
HW	Hardware
IPC	Inter-process Communication
MRD	GPDS Material Required Date
PA	Program Approval
PO	Purchase Order
PS	GPDS Program Start
PSC	GPDS Program Strategy Confirmed

Acronym	Term/Definition
RFQ	Request For Quote
SecOC	Secure On-board Communication
SW	Software
SHE	Secure Hardware Extension
SOW	Statement of Work
TDJ	GPDS Technology Data Judgment
TPS	GPDS Technology Program Start
TSC	GPDS Technology Strategy Confirmed
UNV0	GPDS Underbody Verification 0
UPV0	GPDS Upperbody Verification 0

Table 2: References

#	Document Name	Version	Document Location
1	Software Statement of Work	Latest	https://pd1.spt.ford.com/sites/CCSW/SWSOW/SitePages/Home.aspx
2	EESE Network Communications Multiplex Technology Statement of Work	Latest	https://pd1.extspt.ford.com/sites/EENETCOM
3	EESE Network Communications Diagnostic Statement of Work	Latest	https://pd1.extspt.ford.com/sites/EENETCOM

1 PURPOSE AND SCOPE

The purpose of this document is to aid the planning, execution, and closure of supplier engineering activities associated with the design, development, and manufacture of production components that must conform to Ford specified in-vehicle software requirements. This document shall be fully applicable to ECUs that are of new design (HW or SW) for this vehicle program. For modified ECUs that have been re-used from another vehicle program, this document shall be fully applicable. This document is not applicable for part number carry-over ECUs from another vehicle program.

Disclaimer: Obtain FMC approval for all changes and implement the approved changes using a robust 'manage the change' process, **(i.e. Concern / Change Request Form). Any non-authorized change cannot be charged to FMC.**

2 GENERAL REQUIREMENTS

All ECU platforms shall be compliant to AUTOSAR Classic Platform 4.3 or later. EESE Architecture and Software Platform must be informed and approve exemptions from this requirement.

2.1 Platform Software

The Supplier is required to obtain mandated software platform components (AUTOSAR Classic Platform) from an authorized and accepted source. Adherence to this requirement is to ensure compatibility within the corporate product line from vehicle to vehicle, model year to model year and maintain compatibility with the industry driven standards. Refer to Section 4 of this document for AUTOSAR Provider contact information. All respective ECU suppliers are required to accept the standard licensing terms set forth by the AUTOSAR provider.

ATTENTION:
FORD MOTOR COMPANY RESERVES THE RIGHT TO EXAMINE ALL RELATED SUPPLIER HARDWARE AND SOFTWARE DESIGN INFORMATION FOR CONFORMANCE VERIFICATION. THIS INCLUDES BUT IS NOT LIMITED TO THE CONFIGURATION AND DESIGN OF BSW, OS, MEMORY MANAGEMENT, DISTRIBUTION OF FUNCTIONALITY ACROSS MULTIPLE CORES, IPC METHODS AND ISO 26262 RELATED DESIGN AND IMPLEMENTATION METHODS.

2.1.1 Description of AUTOSAR Classic Platform Embedded Software

AUTOSAR Classic Platform software is composed of a scalable set of components that satisfies a large proportion of the Ford software platform requirements. This includes requirements regarding Operating System, low-level drivers, middleware (including communication stack components), and application abstraction.

"Appendix A - Ford AUTOSAR Integration Guide" and “Appendix B – Ford AUTOSAR Selection Guide” address which components are to be used under what ECU build types and attributes, as well as provide tool settings and integration hints. The Supplier is required to implement all components as described in Appendices A and B unless prior written agreement has been obtained from the Software Architecture and Development Manager.

Refer to the “EESE Network Communications Multiplex Technology Statement of Work” [2], Appendices A, B, and C for a listing of applicable specifications. Diagnostic requirements are covered in the “EESE Network Communications Diagnostic Statement of Work” [3].

Note: In order to prevent late discovery of incomplete implementation and as additional oversight, the Supplier is required to submit a list of the used Basic Software (BSW) and Complex Device Driver (CDD) components, the vendors from which they were obtained, the delivery timing of each of the various software components, and a filled out AUTOSAR Conformance Level document. This information can be sent to the author of this document.

See Table of Deliverables for details.

2.1.2 Acquisition Requirements

2.1.2.1 AUTOSAR Request for Quote

All ECU suppliers are required to submit RFQ's to the AUTOSAR software vendor according to the timing provided in Section 3. The purchaser must ensure the package acquired is appropriate for the ECU being procured by Ford Motor Company.

2.1.2.2 AUTOSAR Purchase Order

All ECU suppliers are required to submit (when necessary) a procurement PO to the AUTOSAR software vendor according to the timing given in Section 3**.**

2.1.2.3 AUTOSAR Package Delivery

Suppliers are required to take delivery of AUTOSAR Classic Platform software according to the timing given in Section 3.

2.1.3 Non-AUTOSAR Implementations

Suppliers may be exempted from the requirements in Section 2.1 if they are in possession of a Non-AUTOSAR CP Software Declaration form that has been reviewed and signed by the Software Architecture and Development Review Board in EESE Architecture and Software Platform. Review Board meetings happen during the weekly Architecture and Software Platform EMM. Exemption certificates shall be granted or denied by Architecture and Software Platform prior to <PA>. All exemptions are provided per ECU and are not transferable to any other products provided by the Supplier.

- **The person requesting exemption should contact the latest author of this document to be added to the EMM agenda.**
- **Requests for exemption must be made before <PSC> for GPDS-based programs.**
- **All exemptions must be approved by the Review Board in the Architecture and Software Platform EMM.**
- **Exemption from AUTOSAR implementation does not imply exemption from Diagnostic or Multiplex requirements**

Example exemptions to AUTOSAR Classic Platform implementation:

- ECU does not communicate on CAN, CAN-FD, or Ethernet
- ECU acts as a LIN Slave
- ECU microprocessor uses a POSIX-compliant operating system, including but not limited to QNX Neutrino, Android OS, or Linux

2.1.4 Implementation Requirements

2.1.4.1 ECUs which must support CAN Message Authentication (CMA) are required to implement SecOC and the Cryptography Stack (CSM, CRYIF, CRY) as defined in AUTOSAR CP 4.3.0 or later. CRY requires SHE or HSM.

2.1.4.2 All ECU suppliers are required to implement the necessary software components for all <MRD> prototype and production intent deliveries.

2.1.4.3 All ECU suppliers are required to implement AUTOSAR software components as directed in the following:

- Appendix A: Ford AUTOSAR Integration Guide: provides integration rules to achieve Ford specification compliance
- User Manuals from the AUTOSAR vendor: provide vendor-specific API descriptions for interfacing with and configuring AUTOSAR components.

2.1.4.4 All ECU suppliers are required to implement AUTOSAR Classic Platform software "as-is" supplied by Ford Motor Company and the AUTOSAR software vendor. No changes or modifications are permitted to the interface or embedded SW without the expressed written consent of Ford Motor Company.

If shortcomings are discovered, the ECU supplier must provide written notification to Ford immediately. If changes/modifications are necessary, Ford may mediate the changes into subsequent deliveries to the ECU Supplier and shall negotiate the timely integration of necessary updates in good faith with said ECU Supplier.

2.1.5 Support Requirements

2.1.5.1 All ECU Suppliers required to implement AUTOSAR CP software shall evaluate technical support needs from the AUTOSAR software vendor. The support plan needs to be reviewed and approved by Architecture and Software Platform. If and when AUTOSAR integration issues and/or support problems shall inhibit the timely delivery of an ECU to the Ford vehicle program MRD build, it is the responsibility of the Tier I supplier to notify the Ford D&R and EESE Architecture and Software Platform for resolution.

2.1.5.2 All ECU Suppliers that are required to implement AUTOSAR CP software shall participate in a software integration review directed by the Software Architecture and Software Quality Assurance sections in Architecture and Software Platform. For this review, the software and configuration files must be provided for inspection, without undue burden or cost to Ford Motor Company.

2.1.5.3 All ECU Suppliers required to implement AUTOSAR software shall purchase and participate in training offered by the AUTOSAR software vendor, targeted at the successful integration of AUTOSAR embedded software elements. Exceptions may be made in the case that the responsible ECU supplier teams can demonstrate a successful history of delivery of AUTOSAR-based ECUs to Ford or other OEMs.

2.2 Base Technology Software deliveries and content

For delivery requirements, please refer to “Base Technology Software deliveries and content” section within the “EESE Network Communications Multiplex Technology Statement of Work” [2] and “Appendix B - AUTOSAR Selection Guide.”

2.2.1 Conformance Testing

Please refer to “Conformance Testing” section within the “EESE Network Communications Multiplex Technology Statement of Work” [2]. Software shall also conform to the “ECU SW Testing Requirements” document contained as an Attachment within the Software SOW [1].

2.2.2 EESE Software Release Schedule

For schedule requirements related to software releases, please reference the Software Attachment within the Software SOW [1].

3 UNIVERSAL TASKS AND DELIVERABLES

3.1 Table of Deliverables

The following table identifies AUTOSAR related tasks and deliverables in addition to “EESE Network Communications Multiplex Technology Statement of Work” and “Software Statement of Work”.

Table 3: Table of Deliverables

GPDS Milestone	Program Task	Supplier	
		Responsibilities	Deliverables

TPS/PS	• If seeking an exemption to this document
	  ○ Submit exemptions regarding AUTOSAR usage to Architecture and Software Platform
	• If not seeking an exemption to this document
	  ○ Submit itemized list of AUTOSAR components and get approval by Architecture and Software Platform
	  ○ Submit AUTOSAR conformance level
	  ○ Select AUTOSAR software vendor and submit RFQ
		Provide the appropriate personnel to participate in evaluation criteria and rationale.	• RFI and RFQ submitted
			• Completed AUTOSAR Conformance Level submitted

GPDS Milestone	Program Task	Supplier	
		Responsibilities	Deliverables
TSC/PSC	• Determine technical support needs from the AUTOSAR software vendor • Decision of one BSW vendor • Submit (if necessary) a procurement PO to the AUTOSAR software vendor	Ensure the package acquired is appropriate for the ECU being procured by Ford Motor Company	• AUTOSAR support plan • AUTOSAR stack and module selections • Itemized list of AUTOSAR related components and services.
Six weeks prior UNV0/UPV0	• Receive AUTOSAR BSW and Tooling	Support review meetings	• Appropriate source code access (electronic format)
UNV0/UPV0 – TDJ/FDJ	• Integration and build with application layer	Support review meetings	• Software architecture and designs • Integration methodology

4 AUTOSAR BSW PROVIDERS

All Suppliers must choose from the list of BSW providers contained in the table below. Additional BSW provider requests must be reviewed with EESE Architecture and Software Platform, and their AUTOSAR Classic Platform stacks must pass FMC qualification.

Table 4: AUTOSAR BSW Provider Information

Company Name	Contact Information
Vector	https://vector.com/vi_contact_en.html
Additional providers expected for programs sourced during CY 2020.	