



美国英特佩斯控制系统有限公司  
Intrepid Control Systems Inc.

## EEA COM—基于AutoSAR架构的以太网数据库编译器

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# EEA COM

## 一个基于AUTOSAR架构的汽车网络通讯数据库编辑工具



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# 主要内容

1. EEA COM **的功能** – 这个工具能用来做什么?
2. EEA COM **使用场景** – EEA COM 的应用领域?
3. EEA COM **功能查看** – 功能模块查看
4. EEA COM **实际案例** – **SOA** (Service Oriented Architecture)以服务为导向的架构描述



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# EEA COM – 功能

- 用于创建，编辑和查看AUTOSAR ARXML 文件的软件工具
- 用于解析AUTOSAR架构，并且以易读的格式呈现网络架构信息
- 用于创建/设计AUTOSAR 定义的CAN/CAN FD, LIN, FlexRay和以太网网络的数据库/通讯矩阵定义
- 提供同时查看多个总线网络数据的功能



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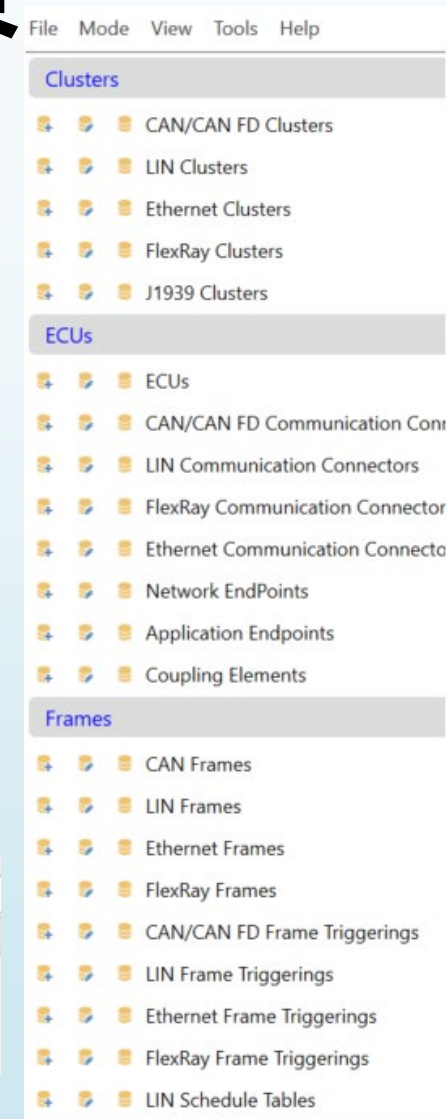
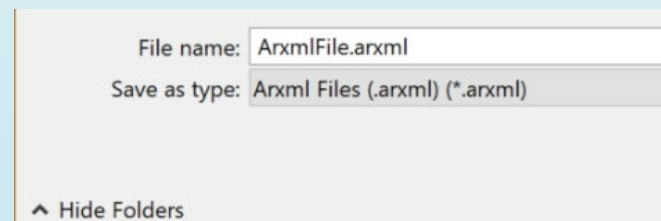
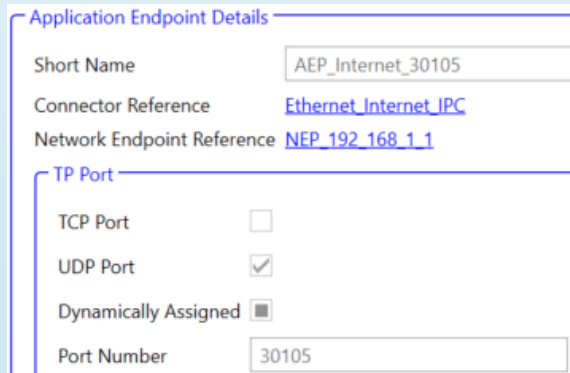
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# EEA COM – 应用场景

- 需要了解AUTOSAR ARXML 文件内容的汽车网络工程师;
- 需要使用Vehicle Spy等网络分析工具进行测试的ECU测试工程师。该工具可以添加, 删除和修改网络报文并且保存为一个新的ARXML 文件。



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# EEA COM – 应用场景

- 需要创建同于系统或台架测试通信矩阵的系统工程师;
- 允许任何专注于汽车网络的工程师出于任何目的来修改通信矩阵-避免因为很小的测试改动都需要网络架构组的同事重新生成通信矩阵。

**事实上，如果你有使用/修改DBC, LDF, FIBEX或ODX/PDX文件的经验，那么EEA COM工具对于ARXML文件的作用也是类似的。**



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# EEA COM – 应用场景

- EEA COM 工具允许使用ARXML 标准在多个团队之间交换车辆网络数据库；
- 将旧版数据库（如DBC, LDF, VSDB）导入 Autosar ARXML
- 将用户的 .xls或.csv数据库转换为ARXML标准的数据库平台



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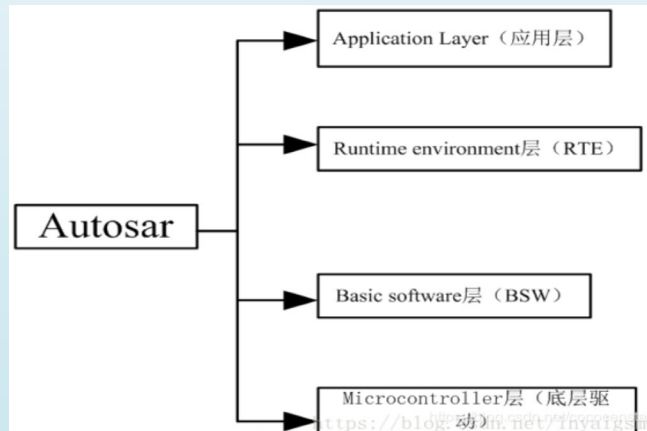
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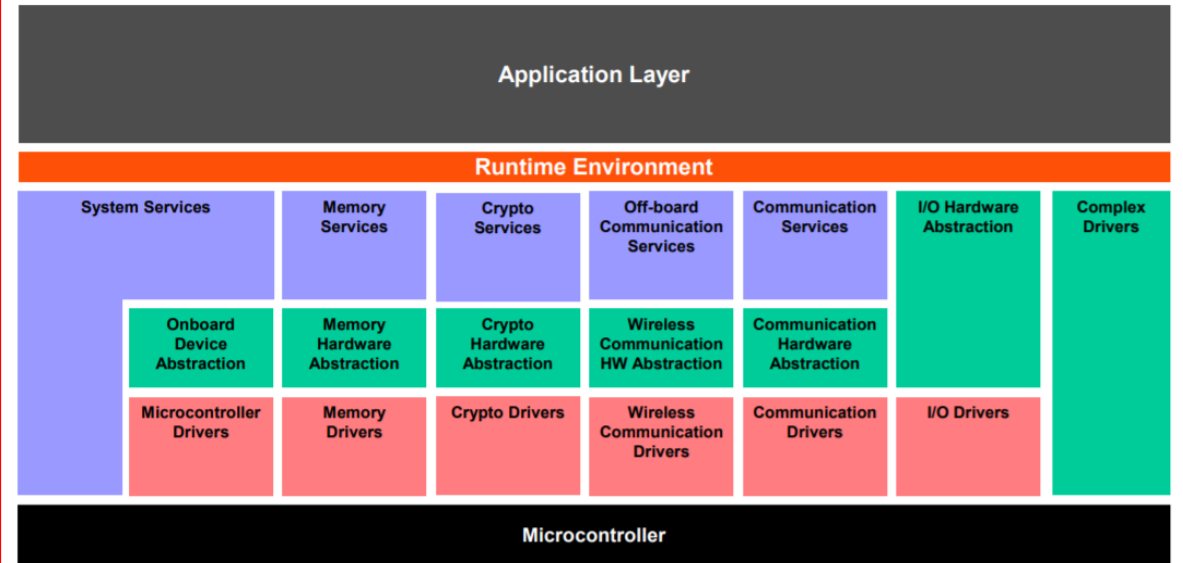
# AUTOSAR 及ARXML 快速回顾

AUTOSAR: Automotive Open System Architecture (汽车开放系统架构)。AUTOSAR是关于汽车电子的，是由全球汽车制造商、部件供应商及其他电子、半导体和软件系统公司联合建立的一个联盟组织。起义，要有起义口号，比如让人民富裕起来，建立AUTOSAR，也是出于某个目的的，这个目的也是为了解决目前存在的问题：

- 1) 建立独立于硬件的分层软件架构；（说明以前软硬件耦合程度高）
- 2) 为实施应用提供方法论，包括制定无缝的软件架构堆叠流程并将应用软件整合至ECU；（说明应用软件开发没有统一框架规范）
- 3) 制定各种车辆应用接口规范，作为应用软件整合标准，以便软件构件在不同汽车平台复用。（说明以前应用软件的复用性差）



The Basic Software Layers are further divided into functional groups. Examples of Services are System, Memory and Communication Services.



- AUTOSAR Confidential -



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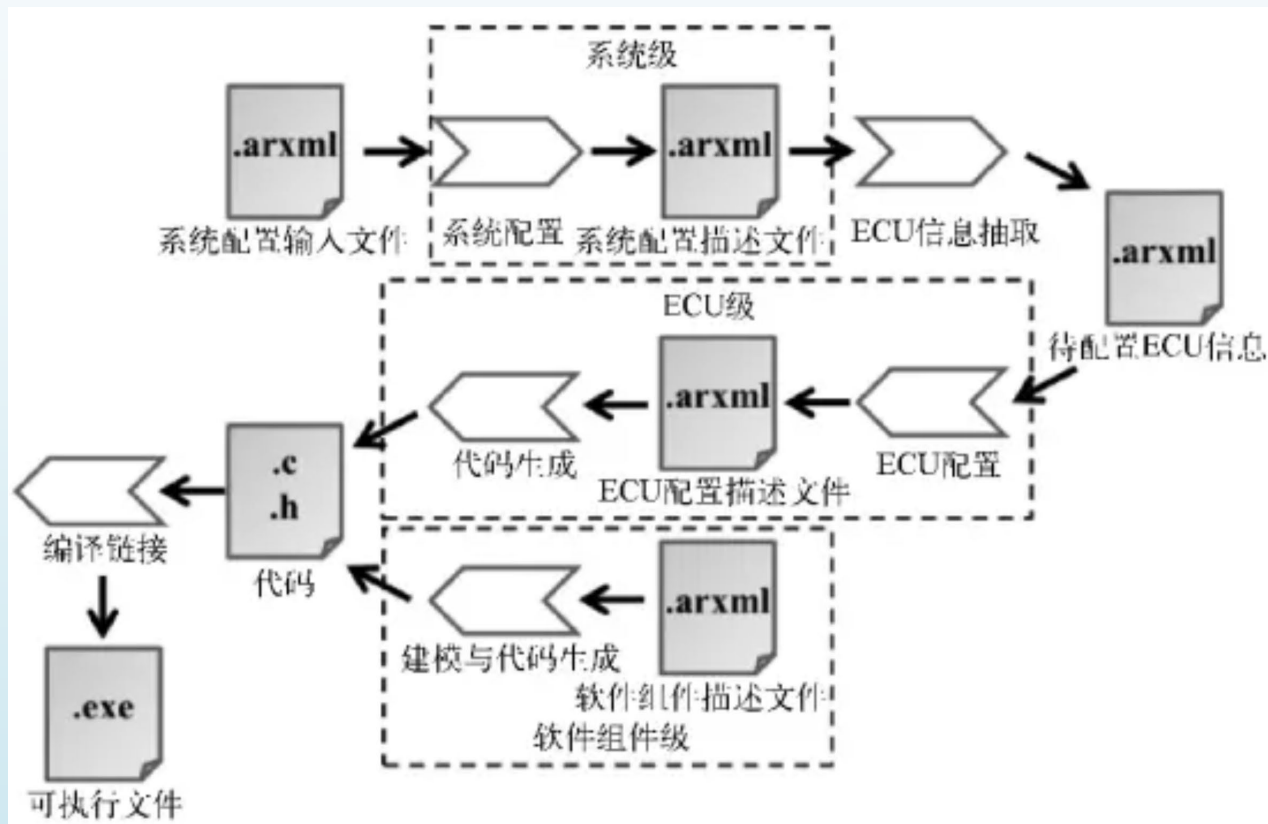
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# AUTOSAR 及ARXML 快速回顾



AUTOSAR方法论 (AUTOSAR Methodology) 的开发涉及系统级、ECU级和软件组件级。系统级主要考虑系统功能需求、硬件资源、系统约束, 然后建立系统架构; ECU级根据抽象后的信息对ECU进行配置; 系统级和ECU级设计的同时, 伴随着软件组件级的开发。上述每个环节都有良好的通信接口, 并使用统一的arxml (AUTOSAR Extensible Markup Language) 描述文件, 以此构建了AUTOSAR方法论。

同时目前ARXML 作为汽车以太网的数据库描述文件, 对汽车以太网的开发起到很重要的作用。

# EEA COM – 工具总览

The screenshot displays the EEA Com software interface with the following components:

- Entity Table View Area:** A left-hand sidebar containing a tree view of project entities such as Clusters, ECUs, Frames, PDU, Signals, Data Types, and SOME/IP.
- AR Packages Tree View:** A right-hand sidebar showing a hierarchical tree of AR Packages, including categories like ComputeMethods, SystemSignals, Signals, PDU, Frames, Clusters, ECUs, DataConstrs, DataTypes, BaseTypes, ServiceInterfaces, and SOADRoutingGroups.
- Details View, Edit and Create area:** The central workspace divided into several panels:
  - LIN Clusters:** Lists LIN\_1\_Cluster and LIN\_2\_Cluster.
  - ECUs:** Lists BCM[LINMASTER] and IPC[LINSLAVE].
  - LIN Cluster Details:** Shows Baudrate (9600), Protocol Name (LIN), Protocol Version (1.3), and Speed.
  - LIN Frames:** A table listing frames with their identifiers and checksums.

Short Name	Identifier	LIN Checksum	Hex Arbid
IBSMeasuredTem...	1	CLASSIC	<input checked="" type="checkbox"/>
SRC_Cmd	1	CLASSIC	<input type="checkbox"/>
IBSOFFmodeData	1	CLASSIC	<input type="checkbox"/>
HAQS_Rsp_MSG	4	CLASSIC	<input type="checkbox"/>
  - Frame Details:** Fields for Long Name, Description, and Short Name (IBSMeasuredTemp\_Frame).
  - Frame Ports:** A table showing ECU (BCM) and Direction (OUT).

ECU	Direction
BCM	OUT

Entity Table View Area

AR Packages Tree View

Details View, Edit and Create area



# Cluster 视图

The screenshot displays the 'EEA Com - Copyright 2018 - Intrepid Control Systems' application. The interface is divided into several panes:

- Left Pane (Clusters):** A tree view showing categories like CAN/CAN FD Clusters, LIN Clusters, Ethernet Clusters, FlexRay Clusters, and J1939 Clusters. Under 'ECUs', 'CAN/CAN FD Communicatic...', 'LIN Communication Connec...', 'FlexRay Communication Cor...', 'Ethernet Communication Co...', 'Network EndPoints', 'Application Endpoints', and 'Coupling Elements' are listed. Under 'Frames', 'CAN Frames', 'LIN Frames', 'Ethernet Frames', 'FlexRay Frames', 'CAN/CAN FD Frame Triggeri...', 'LIN Frame Triggerings', 'Ethernet Frame Triggerings', 'FlexRay Frame Triggerings', and 'LIN Schedule Tables' are listed. 'PDU's and 'Signals' are also visible at the bottom.
- Top Center Pane (CAN Clusters):** Shows 'CAN Clusters' with 'CAN\_HSCAN\_1' and 'CAN\_HSCAN\_2', and 'ECUs' with 'ABS' and 'IPC'.
- Bottom Center Pane (CAN Frames):** A table with columns: Frame Trigger, CAN FD Frame Sup..., Identifier, and CAN. The table lists:

Frame Trigger	CAN FD Frame Sup...	Identifier	CAN
<b>Positioning_System</b>	<input checked="" type="checkbox"/>	<b>7B</b>	
Drive_Mode	<input checked="" type="checkbox"/>	DC	
BrkApplyStatus	<input type="checkbox"/>	420	
EngineOFFTime	<input type="checkbox"/>	241	
GlareFreeHighbeam	<input type="checkbox"/>	210	

Below the table, it states 'Number of Frames : 5'. Below this, 'Frame Details' shows fields for Long Name, Description, and Short Name (set to 'Positioning\_System\_Frame'). 'Frame Ports' shows 'ECU' as 'ABS' and 'Number of I...'.  
Number of Frames : 5

- Right Pane (LIN Schedule Table):** Shows 'LIN Clusters' with 'LIN\_1\_Cluster' and 'LIN\_2\_Cluster'. Below, 'Schedule Tables' has a table:

Schedule Table	Resume Position	Run M
<b>Startup</b>	<b>STARTFROMBEGI...</b>	
Ign ON	CONTINUEATITPOS...	RU
Startup	STARTFROMBEGIN...	
Ign ON	CONTINUEATITPOS...	RU

Below the table, it states 'Number of Schedule Tables : 4'.  
Number of Schedule Tables : 4
- Far Right Pane (Autosar):** A list of packages including 'Ar Package [ Computi...', 'Ar Package [ SystemS...', 'Ar Package [ ISignals ]', 'Ar Package [ PDUs ]', 'Ar Package [ Frames ]', 'Ar Package [ Clusters ]', 'Ar Package [ ECUs ]', 'Ar Package [ DataCon...', 'Ar Package [ DataTyp...', 'Ar Package [ BaseTyp...', 'Ar Package [ ServiceI...', and 'Ar Package [ SOADRo...'. Below this are 'Attributes' and 'Annotations' sections.


# 查看CAN / CAN FD cluster ECU—报文—PDU—信号 界面

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File Mode View Tools Help

**Clusters**

- CAN/CAN FD Clusters
- LIN Clusters
- Ethernet Clusters
- FlexRay Clusters
- J1939 Clusters

**ECUs**

- ECUs
- CAN/CAN FD Commur
- LIN Communication C
- FlexRay Communicatio
- Ethernet Communicati
- Network EndPoints
- Application Endpoints
- Coupling Elements

**Frames**

**PDU**s

**Signals**

- I Signals
- System Signals
- I Signal Triggerings

**Data Types**

SOME/IP

**CAN Frames**

Short Name	Length(Byte)
<b>Positioning_System_Frame</b>	8
Drive_Mode_Frame	8
EngineOFFTime_Frame	3
BrkApplyStatus_Frame	6
GlareFreeHighbeam_Frame	8

Number of Frames : 5

**Frame Details**

Long Name:

Description:

**I Signal I PDU**s

Short Name	Length
<b>Positioning_Syste...</b>	8
Drive_Mode_PDU	8
EngineOFFTime_PDU	7
BrkApplyStatus_PDU	6
GlareFreeHighbea...	8
IBSMeasuredTemp_...	5
SRC_Cmd_PDU	4

Number of I Signal I PDU : 36

**I Signal I PDU De**

Long Name:

Description:

**I Signal In I PDU**s

Short Name	Start Position	Packing Byte Order
<b>Pos_Latitude</b>	5	MOSTSIGNIFICA...
Pos_Latitudenv	38	MOSTSIGNIFICANT...
Pos_Longitude	6	MOSTSIGNIFICANT...

**I Signals**

Short Name	Length
<b>Pos_Latitude</b>	30
Pos_Latitudenv	1
Pos_Longitude	31
Pos_Longitudelnv	1
DriveMode_Name	5
DriveMode_Pending	1
DriveMode_Unavaila...	1

Number Of I Signals : 98

**Equation**

Linear Equation =

**Unit Details**

Short Name:

Unit:

Autosar

Attributes

Annotations

**Autosar**

Root element

**Admin Data**

This repres

**Introducer**



# 产看FlexRay Clusters ECU –报文–PDU–信号 界面

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File Mode View Tools Help

**Clusters**

- CAN/CAN FD Clusters
- LIN Clusters
- Ethernet Clusters
- FlexRay Clusters
- J1939 Clusters

**ECUs**

**Frames**

- CAN Frames
- LIN Frames
- Ethernet Frames
- FlexRay Frames
- CAN/CAN FD Frame Triggerings
- LIN Frame Triggerings
- Ethernet Frame Triggerings
- FlexRay Frame Triggerings
- LIN Schedule Tables

**PDU**

**Signals**

**Data Types**

**SOME/IP**

**FlexRay Clusters**

FlexRay Clusters

**FlexRay**

**FlexRay Cluster Details**

Baudrate	10000000
Protocol Name	FlexRay
Protocol Version	2.1
Speed	
Action Point OffSet	4
Bit (Nominal Bit Time)	1E-07
CAS Rx Low Max	91
Cold Start Attempts	8
Cycle Count Max	63
Detect NIT Error	False
Dynamic Slot Idle Phase	1
Ignore After Tx (Bitstrobing)	7
Listen Noise	2
Macro Per Cycle	50000
MacroTick Duration	1E-06
Max_Without Clock Correction Fatal	15
Max Without Clock Correction Passive	4
MiniSlot Action Point Offset	

**FlexRay Frames**

Short Name	Length
RedundantParkReq	
GearShiftArbitrator	
FrTrPCM_FR_P_Petrol	
FrTr_FR_S_PHEV	

Number of Frames : 4

**PDU To Frame Mappings**

Short Name	Start Position
RedundantParkRe...	

Number of PDUs : 1

**Autosar**

- Ar Package [ ComputMethods ]
- Ar Package [ SystemSignals ]
- Ar Package [ ISignals ]
- Ar Package [ PDUs ]
- Ar Package [ Frames ]
- Ar Package [ Clusters ]
  - CAN Cluster [ CAN\_HSCAN\_1 ]
  - LIN Cluster [ LIN\_1\_Cluster ]
  - Ethernet Cluster [ Ethernet ]
  - FlexRay Cluster [ FlexRay ]
    - FlexRay Cluster Conditional
      - FlexRay Physical Channel [ Channel\_A ]
        - Communication Connector Ref Cor
        - FlexRay Frame Triggering [ Redund...
        - FlexRay Frame Triggering [ GearShi...
        - FlexRay Frame Triggering [ FR\_P\_Pe...
        - FlexRay Frame Triggering [ FR\_S\_P...
        - FRAME-PORT-REF
        - Frame Ref

**Attributes**

Category:

Short Name Pattern:

Short Name:

**Annotations**

**Atp Blueprint**  
This meta-class represents the ability to act as a Blueprint.

**Blueprint Polycs**  
This role indicates whether the blueprintable element will I

**Short Name Pattern**

C:\Samir\ICS\Training\ICS\_GSM\_Material\2018 USA GSM\Arxml\_Demo\Harsha Files\All\_Cluster\_HJ\_5.arxml



# 查看汽车以太网网络信息 界面

The screenshot displays the 'Ethernet Communication Connectors' configuration window in the EEA Com software. The interface is divided into several sections:

- ECU:** Shows 'ABS' and 'IPC' connected to the Ethernet communication connector.
- Ethernet Comm Connectors:** The selected connector is 'Ethernet\_CGM\_Internet'.
- Communication Connector Details:**
  - Short Name: Ethernet\_CGM\_Internet
  - PNC Gateway Type: [Empty]
  - IPv6 Path MTU Enabled:
  - IPv6 Path MTU Timeout: [Empty]
  - Maximum Transmission Unit: [Empty]
  - PNC Filter Data Mask: [Empty]
- Communication Controller Details:**
  - Wake Up By Controller Supported:
  - Mac Unicast Address: 10:00:00:22:20:00
  - Maximum Receive Buffer Length: [Empty]
  - Maximum Transmission Unit: [Empty]
  - Maximum Transmit Buffer Length: [Empty]
- Coupling Ports:**

Connection Negoti...	Coupling Port Speed	Default VLAN	Physical
AUTO	2000	/Clusters/Etherne...	

Number of Coupling Ports : 1
- MAC Multicast Address:**

MAC Multicast Add...
[Empty]
- VLAN Memberships:**

Default Priority	VLAN
[Empty]	2 /Cl...

The software title bar indicates 'EEA Com - Copyright 2018 - Intrepid Control Systems'. The file path at the bottom is 'C:\Samir\ICS\ICS\_Training\ICS\_GSM\_Material\2018 USA GSM\Arxml\_Demo\Harsha Files\All\_Cluster\_HJ\_5.arxml'.



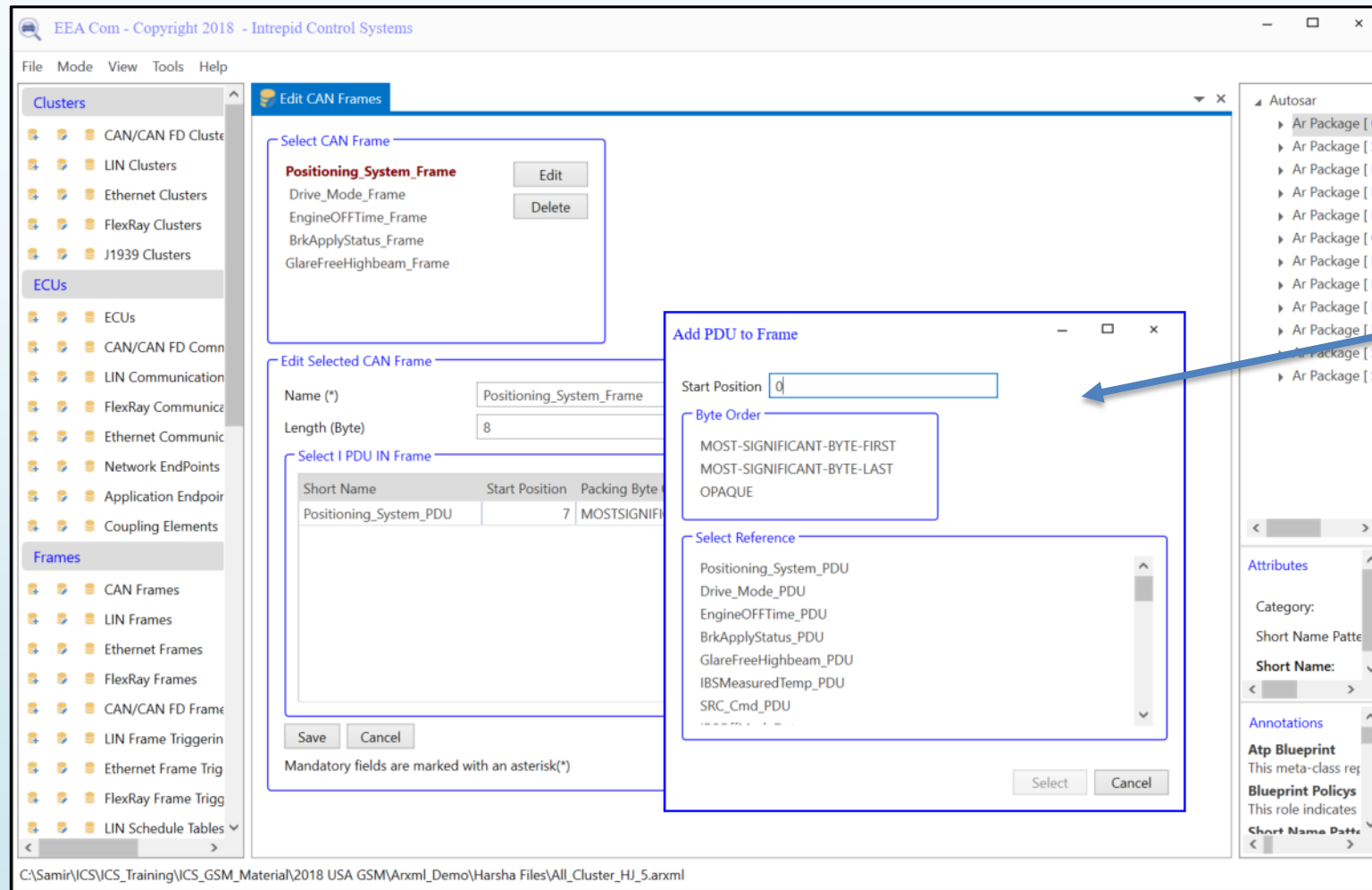
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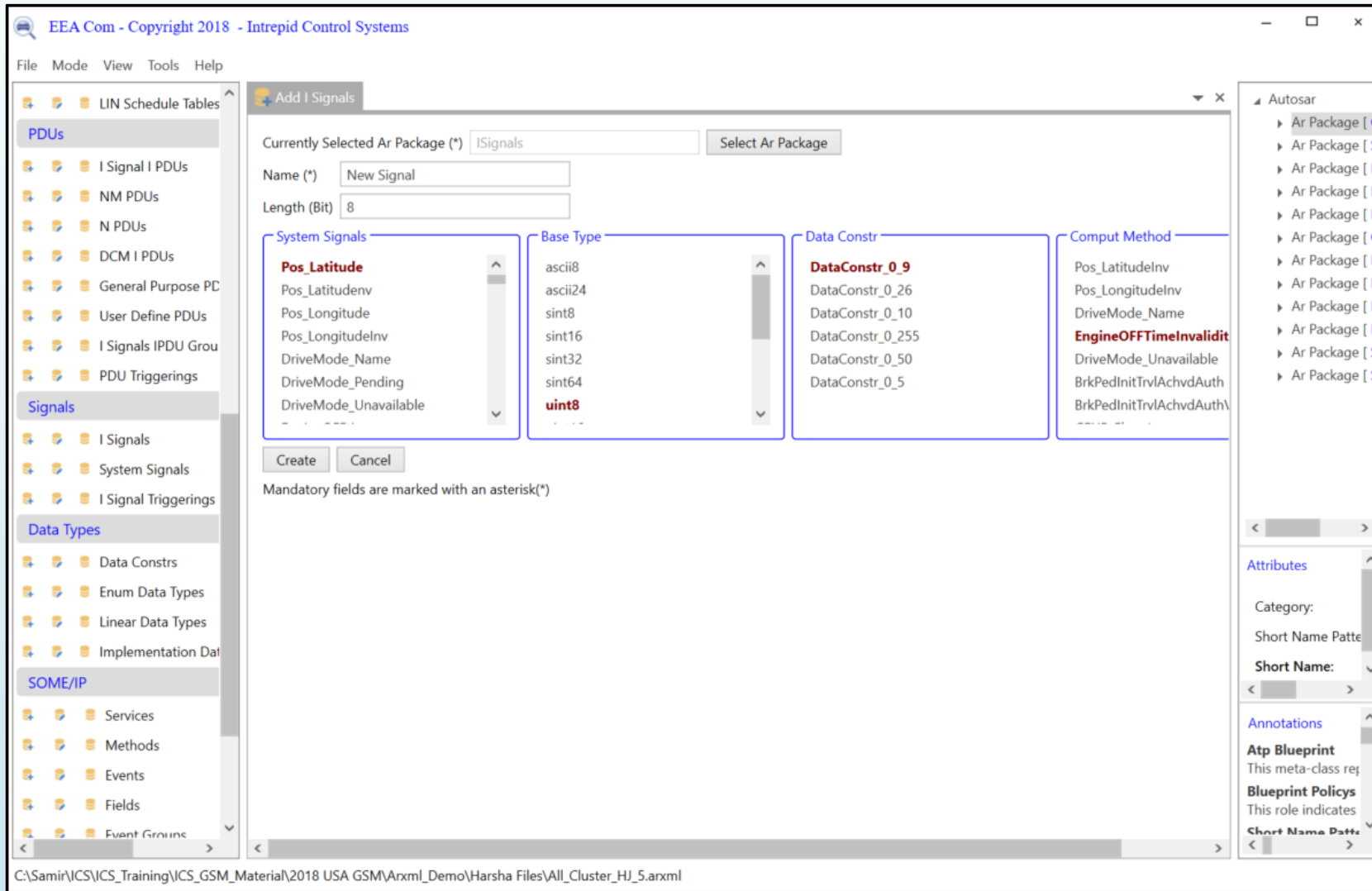
# 编译一个基于CAN 网络的ARXML文件



Easy to use forms, entry and selection fields

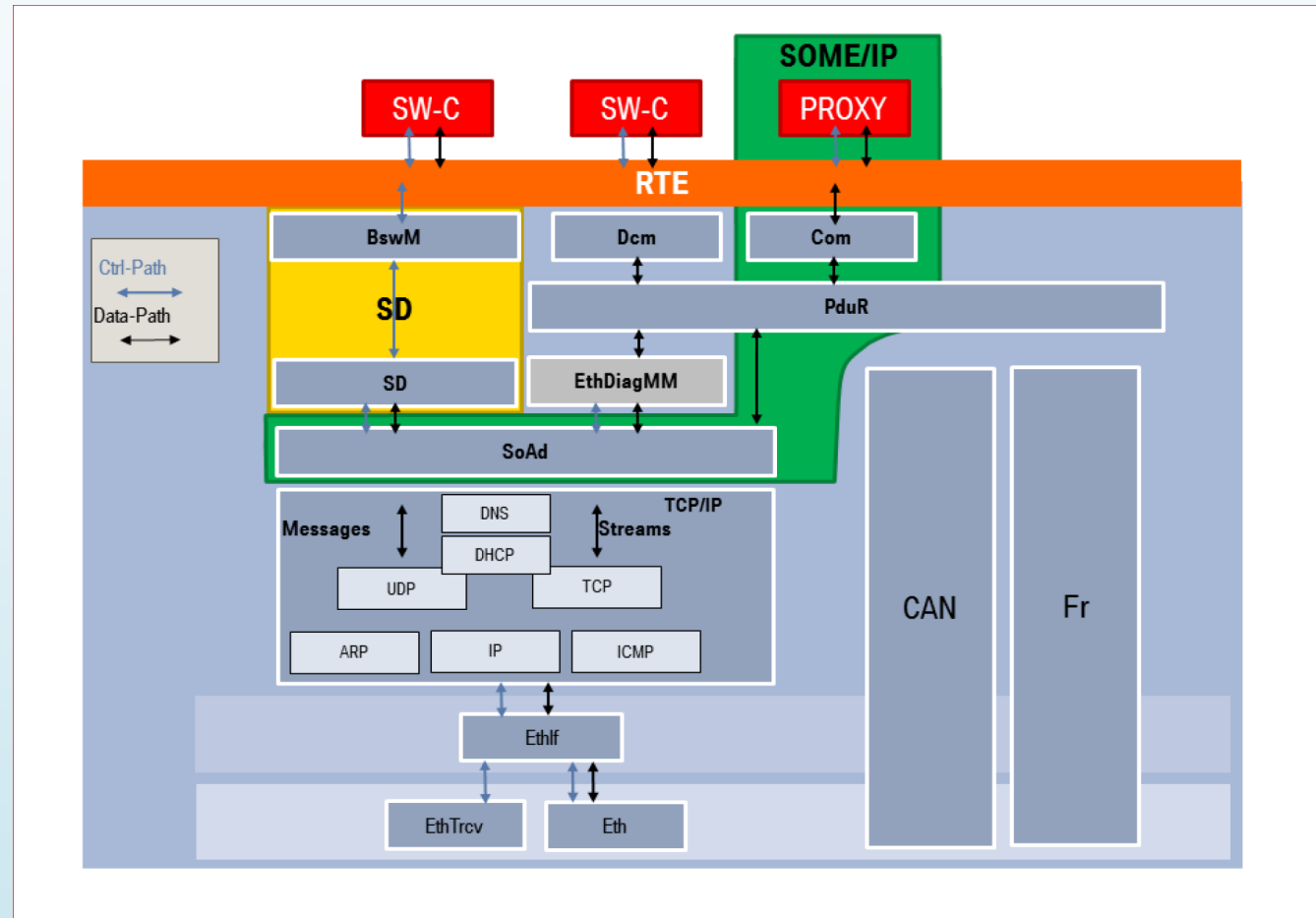


# 创建信号





# EEA COM 使用案例 – 描述 SOA (Service Oriented Architecture)

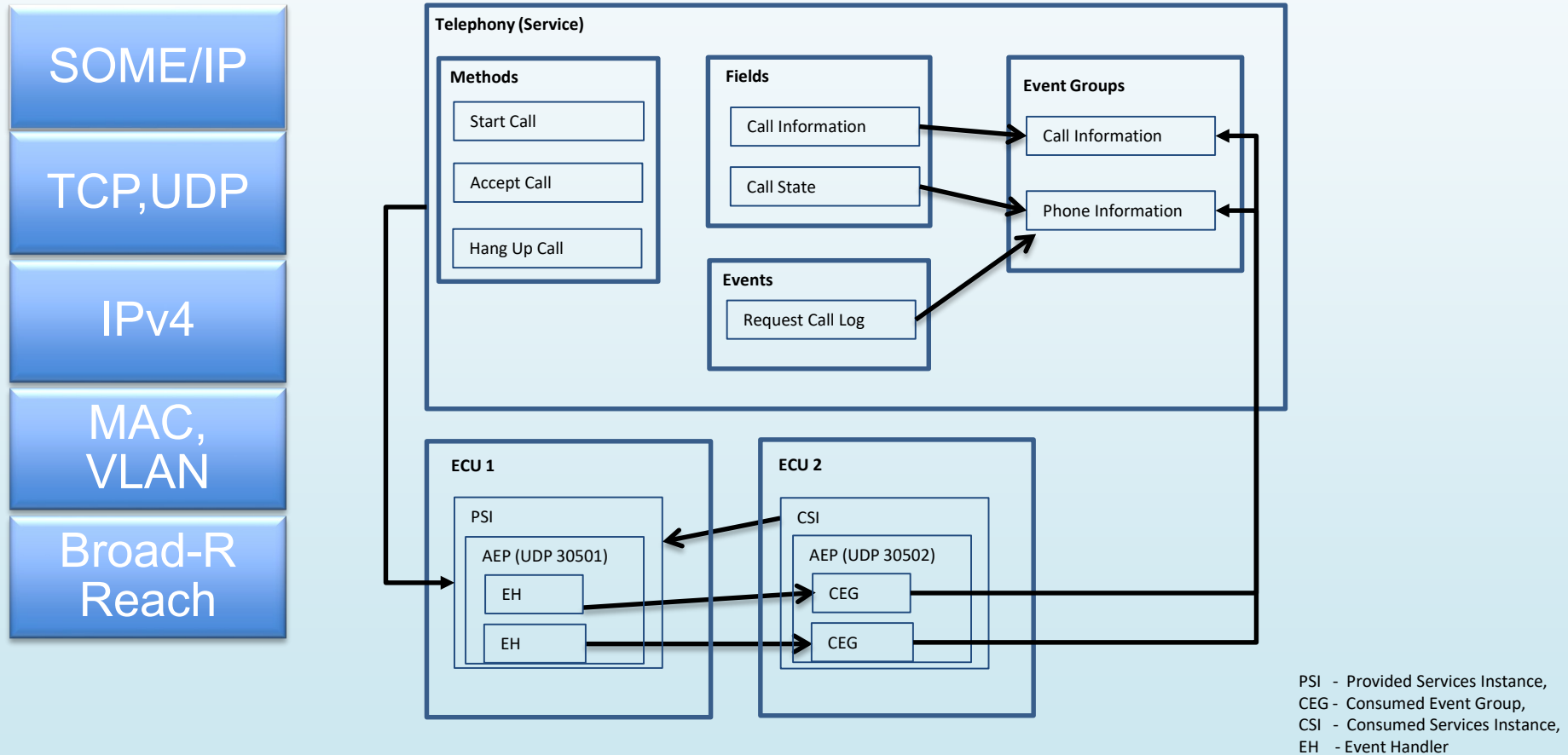


Taken as is from Autosar Specifications

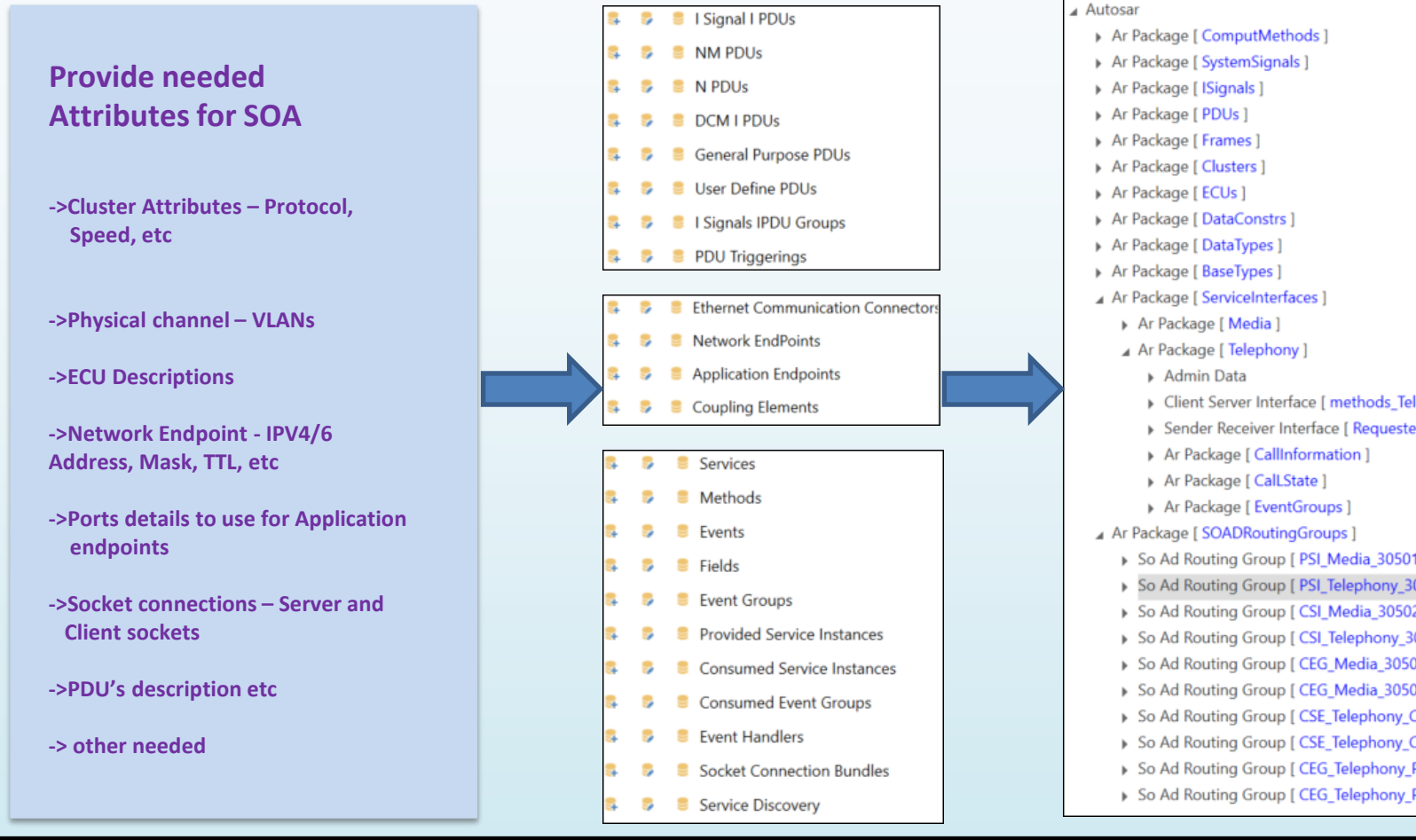


# EEA COM – 所有层都可以被定义为以功能性服务为主的通信矩阵

## Example Service Oriented Communication



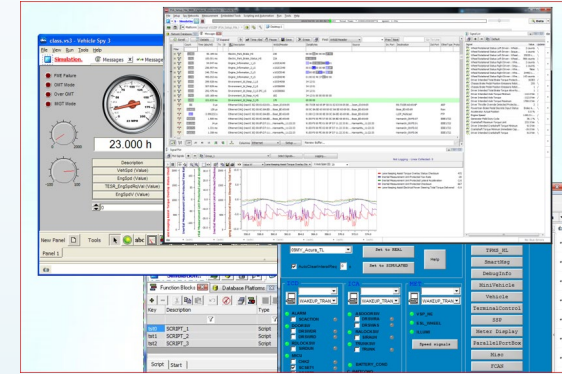
# EEA COM 支持服务为主的架构描述



# VehicleSpy 企业版支持 汽车以太网和 SOME/IP

1.000040 s SomeIP\_SD\_Offer\_Message\_Type\_2\_Ent... 10.50.0.50 30490 239

- Destination MAC Address = 01:00:5E:40:FF:FB [01005E40FFFB]
- Source MAC Address = 3C:CE:15:00:00:32 [3CCE15000032]
- 802.1Q Tag : Tag Protocol Identifier = VLAN-Tagged Frame [8100]
- 802.1Q Tag : Priority Code Point = 1 [1]
- 802.1Q Tag : Drop Eligible Indicator = 0 [0]
- 802.1Q Tag : VLAN Identifier = 50 [32]
- EtherType or Length = IPv4 [800]
- IP Version = 4 [4]
- Internet Header Length = 5 [5]
- Differentiated Services Code Point = 0 [0]
- Explicit Congestion Notification = 0 [0]
- Total Length = 112 [70]
- Identification = 73 [49]
- Flag\_Reserved = False [0]
- Flag\_DF = False [0]
- Flag\_MF = False [0]
- Fragment Offset = 0 [0]
- Time To Live = 64 [40]
- Protocol = UDP [11]
- IPv4 Header Checksum = 16404 [4014]
- Source IP Address = 10.50.0.50 [A320032]
- Destination IP Address = 239.192.255.251 [EFC0FFF8]
- Source Port = 30490 [771A]
- Destination Port = 30490 [771A]
- UDP Header + Data Length = 92 [5C]
- UDP Checksum = 41745 [A311]
- SOME/IP Header Message ID (Service ID) = - Signal Error
- SOME/IP Header Message ID (Method ID) = 33024 [8100]
- SOME/IP Header Length = 76 [4C]
- SOME/IP Header Request ID (Client ID) (Client ID Prefix + Client ID) = 0 [0]
- SOME/IP Header Request ID (Session ID) = 50 [32]
- SOME/IP Header Protocol Version = 1 [1]
- SOME/IP Header Interface Version = 1 [1]
- SOME/IP Header Message Type = NOTIFICATION [2]
- SOME/IP Header Return Code = REQUEST / REQUEST\_NO\_RETURN / NOTIFICATION / RESPONSE\_E\_OK [0]
- SOME/IP Payload - SD Flags - Reboot Flag = 1 [1]
- SOME/IP Payload - SD Flags - Unicast Flag = 1 [1]
- SOME/IP Payload - SD Flags - Undefined Flags = 0 [0]
- SOME/IP Payload - SD Reserved = 0 [0]
- SOME/IP Payload - SD Entries Array Length = 32 [20]
- SOME/IP Payload - SD Entries Array - Type 1 - Type = OfferService / StopOfferService [1]
- SOME/IP Payload - SD Index 1st Option (of First Option Run) = 0 [0]
- SOME/IP Payload - SD Index 2nd Option (of Second Option Run) = 0 [0]
- SOME/IP Payload - SD Number of Option 1 (which First Option Run uses) = 1 [1]
- SOME/IP Payload - SD Number of Option 2 (which Second Option Run uses) = Option Run Is Empty [0]
- SOME/IP Payload - SD Service ID = 776 [308]
- SOME/IP Payload - SD Instance ID = 0 [0]
- SOME/IP Payload - SD Major Version = 1 [1]
- SOME/IP Payload - SD TTL = 3 Seconds [3]
- SOME/IP Payload - SD Reserved = 0 [0]
- SOME/IP Payload - SD Counter = 0 [0]



on network Ethernet

Key	Description	EtherType	VLAN	Protocol	Source	Port	Destination	Port
n0	SomeIP_SubscribeEventGroup_Message	IPv4	0,50	UDP	10.50.0.20	30490	10.50.0.50	
n2	SomeIP_Data_Message	IPv4	2,50	UDP	10.50.0.50	1009	10.50.0.20	
n4	SomeIP_SD_Offer_Message_Type_1_Entry_Format (Services)	IPv4	1,50	UDP	10.50.0.50	30490	239.192.255.251	
n5	SomeIP_SD_Offer_Message_Type_2_Entry_Format (Eventgroups Options Array - Config)	IPv4	1,50	UDP	10.50.0.50	30490	239.192.255.251	
n7	SomeIP_SD_Offer_Message_Type_3_Entry_Format (Eventgroups Options Array - IPv4 Endpoint Option)	IPv4	1,50	UDP	10.50.0.50	30490	239.192.255.251	

Setup for SomeIP\_SubscribeEventGroup\_Message

Message Filter Specification

EtherType: IPv4, VLAN: Single, Protocol: UDP, Source IP: 10.50.0.20, Port: 30490, Destination IP: 10.50.0.50, Port: -

Signals in Message

Signal in Message	Type	Equation	Service Discovery Message@0xFFFF8100
SomeIP_SubscribeEventGroup_Message	State Encoded		
SomeIP Header Length	Analog		
SomeIP Header Request ID (ClientID/Session ID)	Analog		
SomeIP Header Protocol Version	Analog		
SomeIP Header Interface Version	Analog		
SomeIP Header Message Type	State Encoded		
SomeIP Header Return Code	Analog		
SomeIP-SD Header Flags	Analog		
SomeIP-SD Header Reserved	Analog		
SomeIP-SD Length Of Entries Array	Analog		
SomeIP-SD Entries Array - Offer Service - Type	Analog		
SomeIP-SD Entries Array - Offer Service - Index First Option Run	Analog		
SomeIP-SD Entries Array - Offer Service - Index Second Option Run	Analog		
SomeIP-SD Entries Array - Offer Service - Number of Options 1	Analog		
SomeIP-SD Entries Array - Offer Service - Number of Options 2	Analog		
SomeIP-SD Entries Array - Offer Service - Service ID	Analog		
SomeIP-SD Entries Array - Offer Service - Instance ID	Analog		
SomeIP-SD Entries Array - Offer Service - Major Version	Analog		
SomeIP-SD Entries Array - Offer Service - TTL	Analog		
SomeIP-SD Entries Array - Offer Service - Minor Version	Analog		



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