FTF | FREESCALE TECHNOLOGY FORUM POWERING INNOVATION

Freescale Automotive Software

AUTOSAR Is Just the Beginning

FTF-AUT-F0022

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August 2012

Agenda

- **Freescale Automotive Software Mission**
- Automotive Software Products and Solutions
  - AUTOSAR
  - ISO 26262
  - Motor Control
  - Ethernet in the Car
- Summary
- Q&A

Freescale in Automotive

- **Freescale Leadership in Driving Standards**
  推进新标准的领导者
  - First semiconductor supplier to join the AUTOSAR partnership
    第一个加入AUTOSAR的半导体公司
  - Active member of JASPAR
  - Member of GENIVI
  - Co-founded Open Alliance on Ethernet for Automotive
    Automotive Ethernet开放组织的合作建立者
- **Broadest Automotive MCU Product Portfolio**
  最广的汽车微处理器产品线
  - Auto-qualified products (8/16/32-bit MCUs & MPUs) span body electronics, powertrain, chassis and safety and driver information systems.
    汽车级的产品覆盖所有的汽车电子应用：车身电子，动力总成，地盘和安全，驾驶员信息系统
- **Customer Relationships**
  与用户的紧密合作
  - Freescale has solid, long-standing customer relationships with nearly every automotive manufacturer and Tier 1 supplier in the world

    飞思卡尔与我们的客户建立稳固长期的战略合作。我们几乎和世界上所有的主要汽车OEM及一级零部件供应商都有密切的合作.
- **Long-term Global Presence**
  - Freescale has what it takes to meet the stringent requirements of the global automotive market

    在全球的汽车电子市场，飞思卡尔满足最苛刻的技术要求

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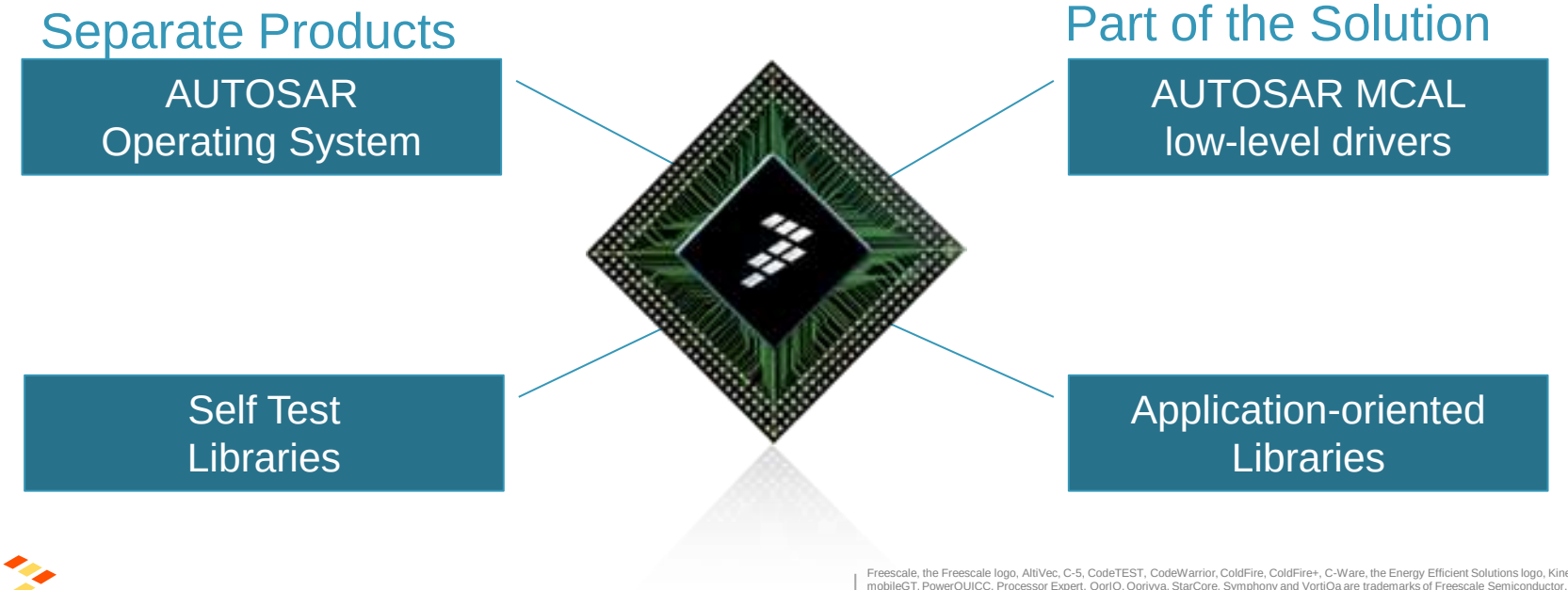
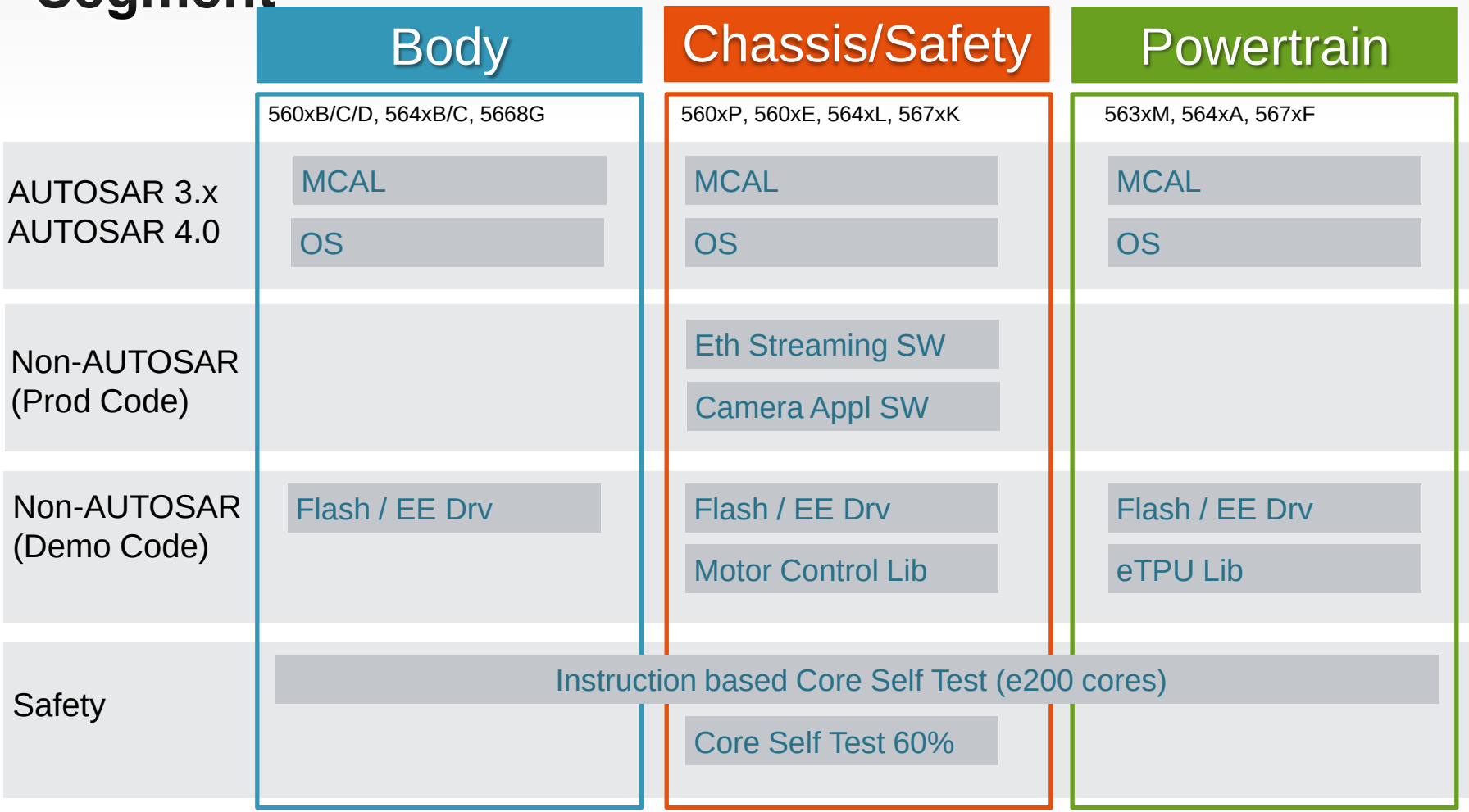
Freescale Automotive Software

- Freescale provides software products where in-depth hardware knowledge is crucial – including AUTOSAR MCAL and OS, Core Self Test, and application-specific libraries to address unique hardware features.

  在很多应用中对某些硬件的深入了解非常重要，飞思卡尔在此方面提供软件产品。这可以帮助用户以更高的效能来使用硬件，或者有效地缩短开发的周期。比如：AUTOSAR的底层驱动和操作系统；内核的自测程序，以及充分利用硬件特有功能的面向应用的库。



32-bit Automotive Software Product Overview by Segment



Not all shown products are available for all MCUs

Automotive semiconductor demand is growing rapidly in emerging markets because, in addition to a similar content growth rate as in the developed markets, vehicle production is also growing rapidly.

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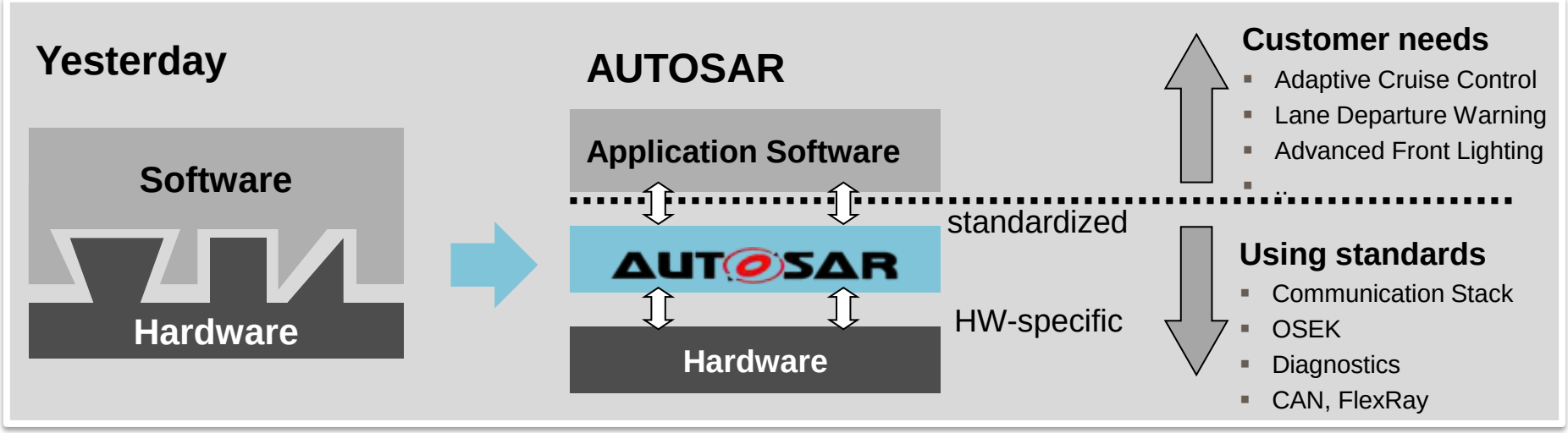
AUTOSAR – Global Automotive Software Standard

AUTOSAR aims to improve complexity management of integrated E/E architectures through increased reuse and exchangeability of SW modules between OEMs and suppliers.
汽车电子系统日益复杂，对此复杂性的管理需要增强；尤其需要增加OEM和供应商之间的软件模块的互换性

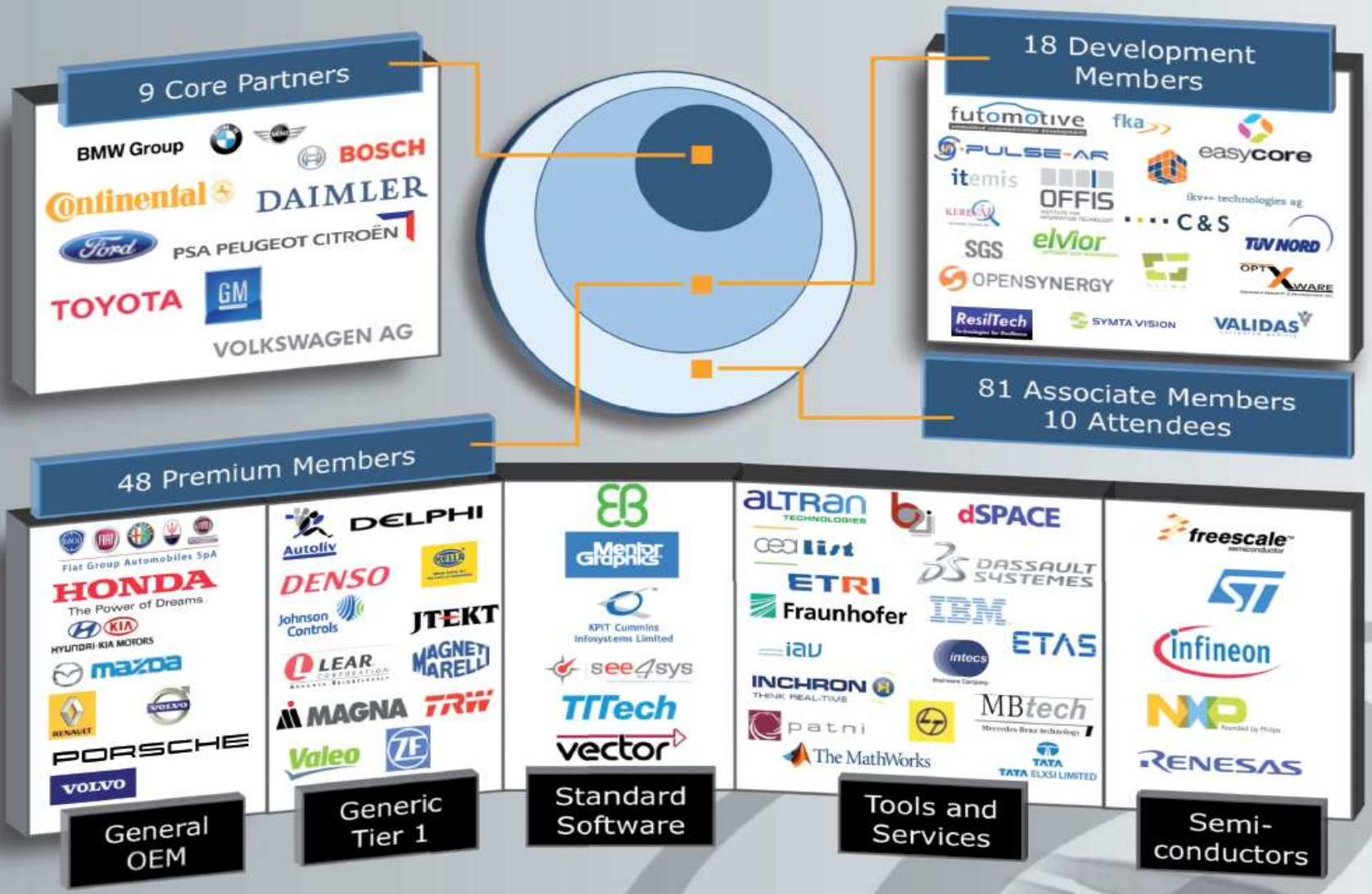
The essential means is the standardization of the software architecture of ECUs.
根本的方法是标准化ECU的软件架构



- Hardware and software is widely independent of each other.
  能够将软件独立于硬件；
- Development can be de-coupled by horizontal layers. Reduces development time and costs.
  开发在水平方向也能够分开，有效降低开发的时间和成本
- Reuse of software enabled at OEM and at suppliers. Enhances quality and efficiency.
  提高软件在OEM和Tier1之间的重用，增强软件的质量和有效性

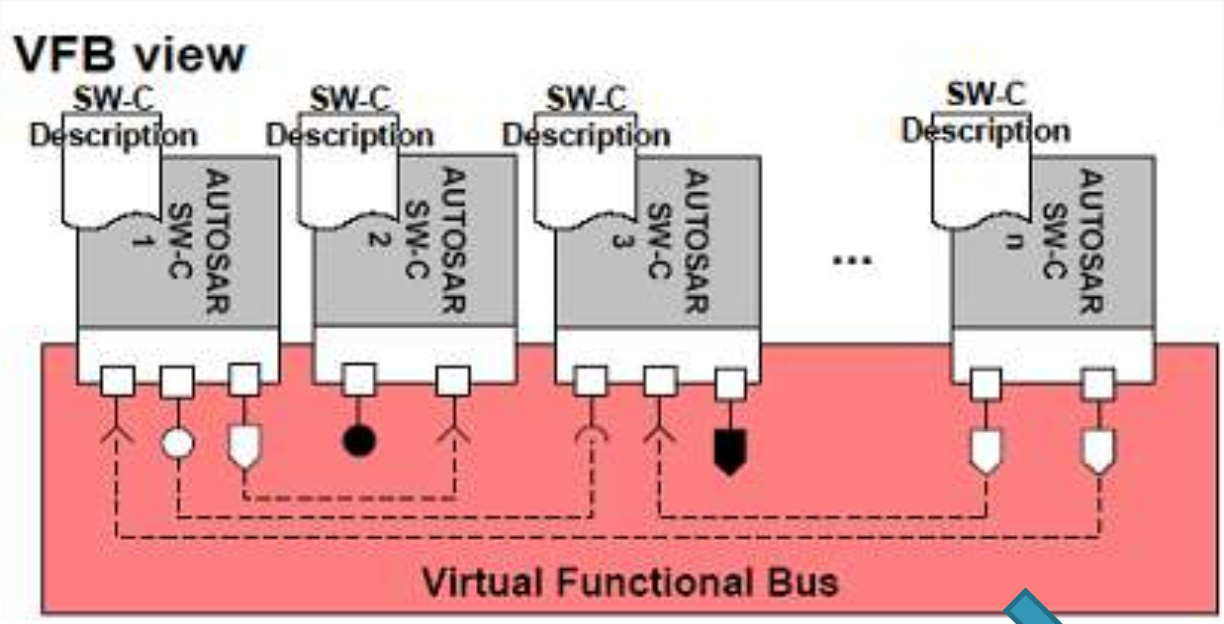
MEMBERS OF THE AUTOSAR DEVELOPMENT PARTNERSHIP

(Status: December 2011)



Source: AUTOSAR Development Partnership

AUTOSAR Application Model

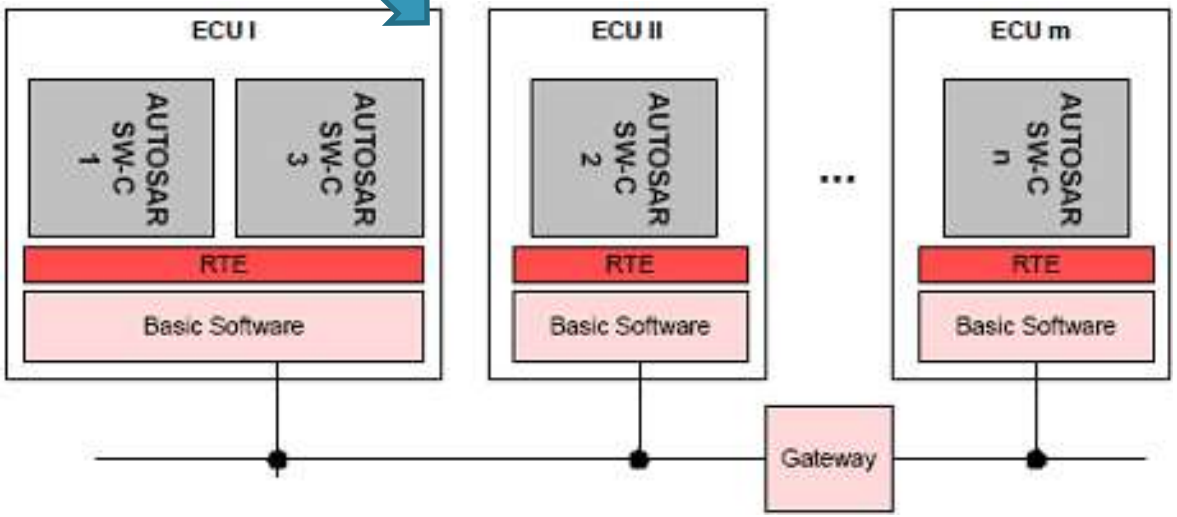


Application Abstraction
Hardware independent,
Component based

OEM专注于应用：
独立于硬件；
建构于**软件组件（SWC）**

MAPPING 映射

RTE 是 VFB 的具体**实现**



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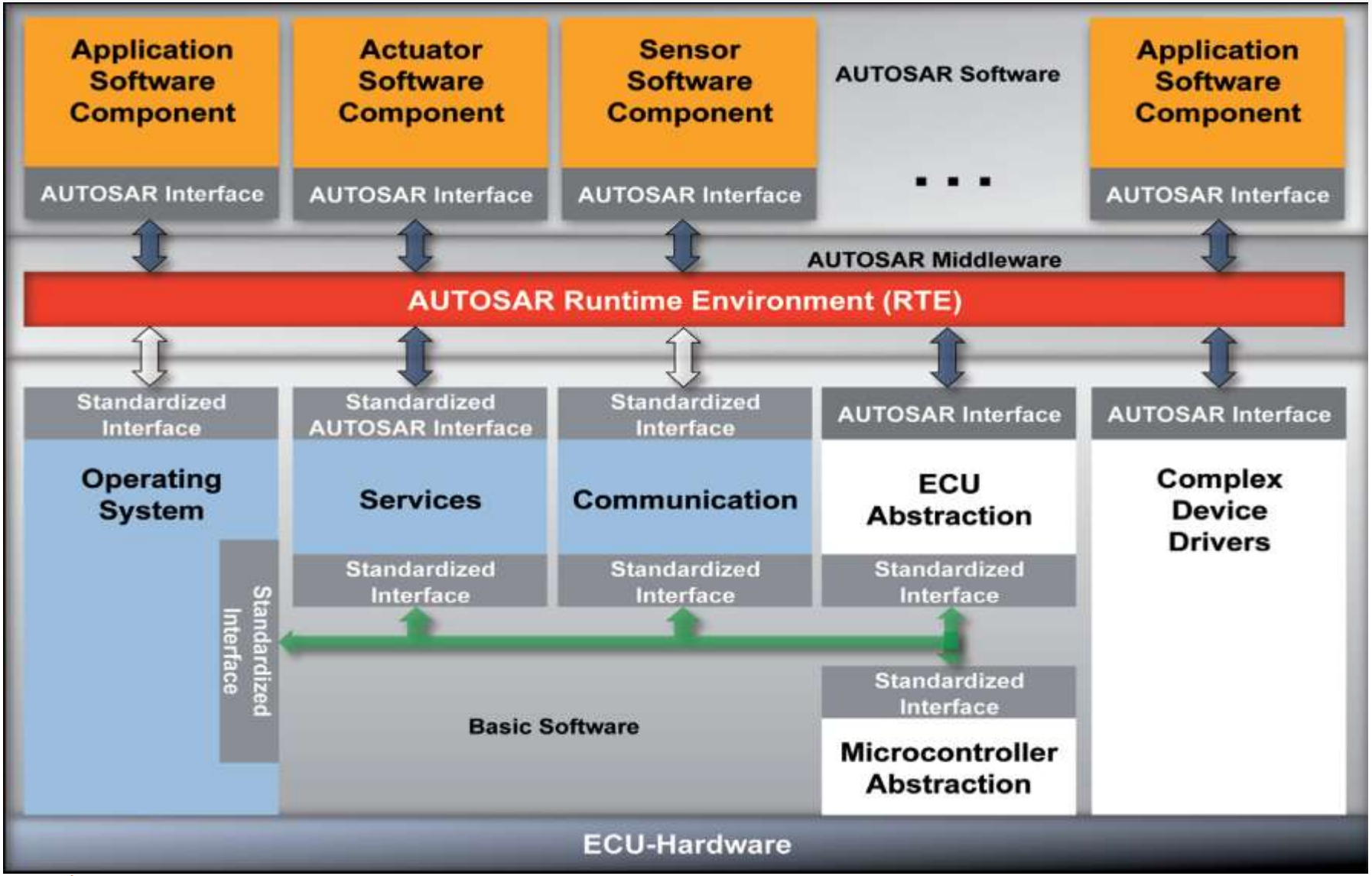
AUTOSAR Architecture



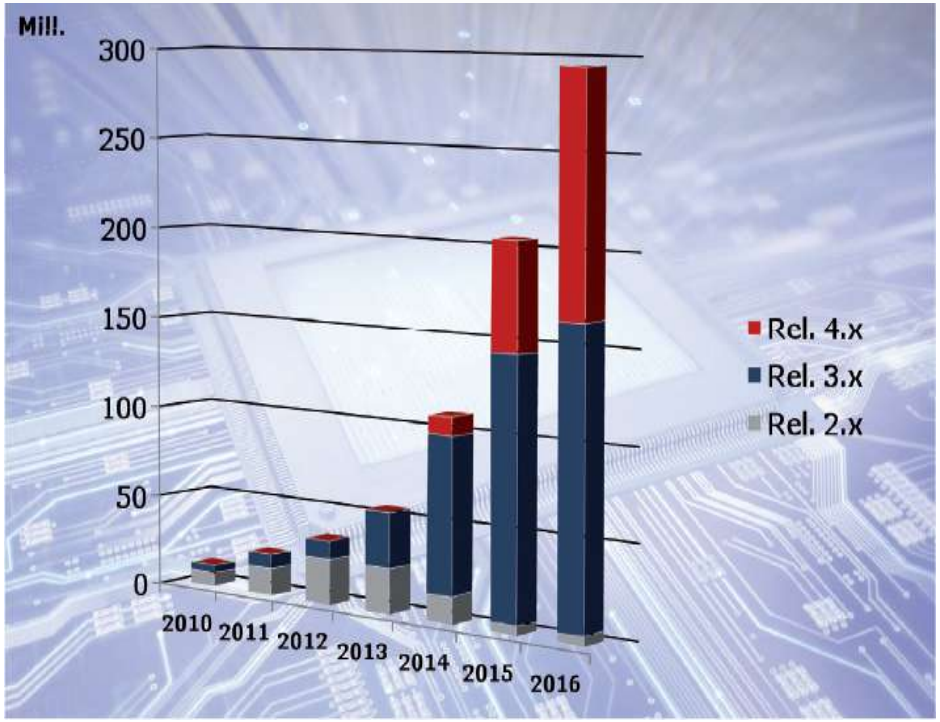
Source: AUTOSAR Development Partnership

AUTOSAR – Global Automotive Software Standard

- **Benefits for car manufacturer**
  - Establish development distribution among suppliers
    建立一个分布于供应商的研发体系
  - Compete on innovative functions with increased design flexibility
    增强的研发灵活性使得竞争专注于在功能创新；
  - Simplify software and system integration
    简化软件和系统的集成
  - Reduce cost of overall software development
    降低整个软件研发的成本

- **Benefits for supplier**
  - Reuse software modules across car manufacturers
    减少在不同CAR OEM之间的软件模块的数量；
  - Increase efficiency of application development
    增强应用开发的有效性；
  - Reduce version proliferation
    使得版本数量的增加减缓

Volume of ECUs with AUTOSAR



- Members represent about 80% of worldwide car production.
- In 2016 approx 25% of ECUs will be based on AUTOSAR.

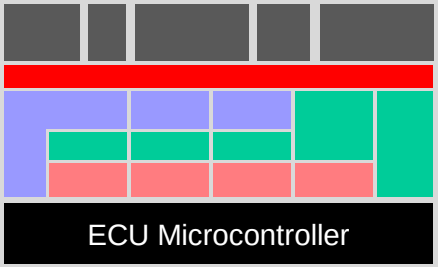
到2016年，大约25%的ECU的软件将基于AUTOSAR

Source: AUTOSAR

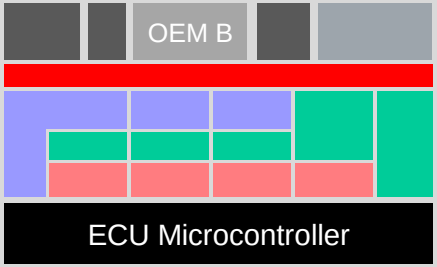
Source: AUTOSAR Development Partnership

Reusability of BSW Modules and SW Components

Fully AUTOSAR compliant ECU



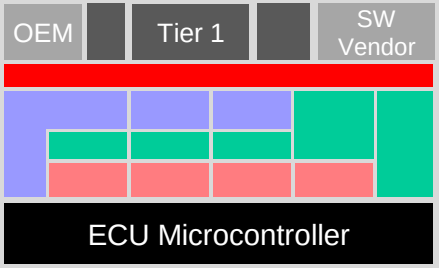
Scenario A



The supplier provides the ECU to a different OEM.

ECU的供应商向多家OEM供货的情形

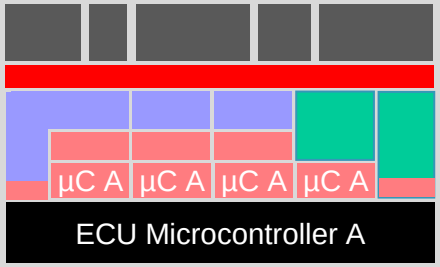
Scenario B



Integration of features, delivered from different sources.

功能的集成，**OEM或Tier1使用多个软件供应商的软件**

Scenario C



The hardware changes.

替换硬件（如 MCU）

Source: AUTOSAR

Freescale AUTOSAR Products

- **Freescale offers cost effective production-ready MCAL and OS**

  Freescale 提供产品级的高性价比的MCAL和OS；

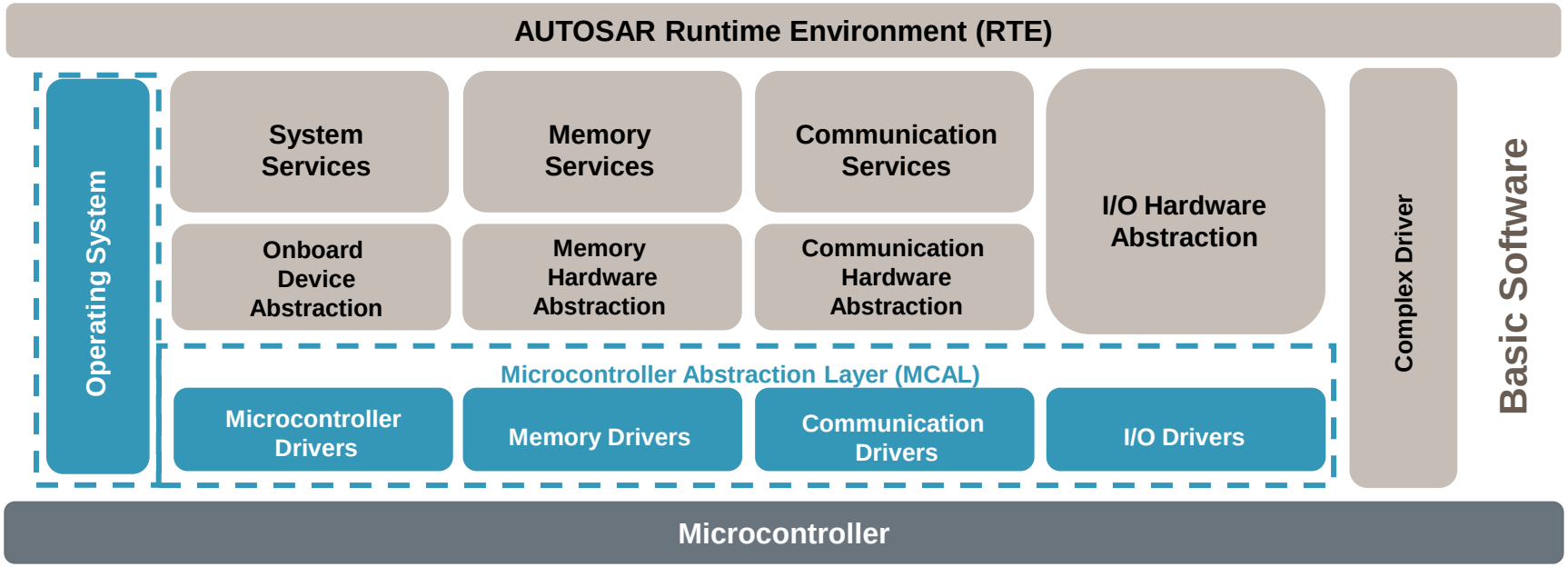
- **What the customer gets:**

  From Freescale (shaded blue below): MCAL (source code), OS (source code) and supporting Configuration Tool (executable).

  Freescale: MCAL和OS的（包括源代码）及所支持的配置工具；

  From Partners (Elektrobit, Vector, KPIT, etc.) – The rest of AUTOSAR basic software as needed. Partner does integration (Freescale IP + Partner IP + Customer IP) 提供

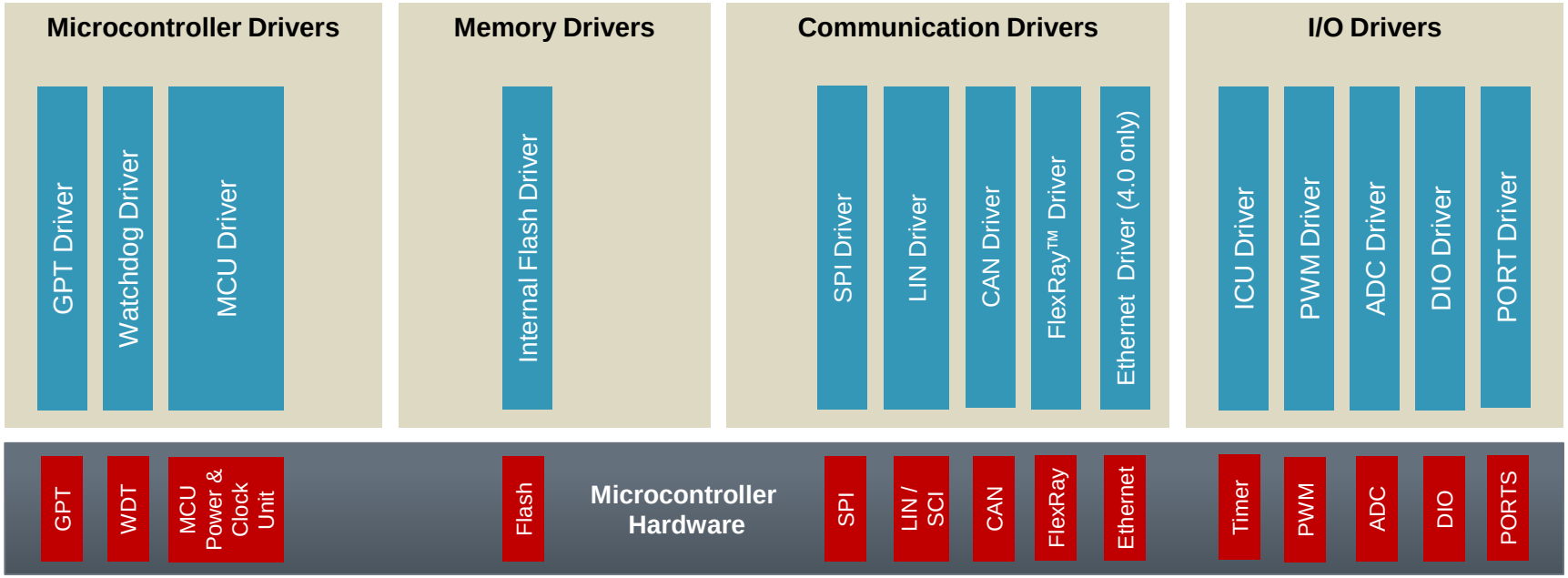
  Partners: 其它AutoSAR的基础软件和工具；Partner同时提供集成业务



AUTOSAR MCAL Product

- MCAL drivers for each MCU peripheral, compliant to AUTOSAR 2.1 / 3.x / 4.0
- AUTOSAR 2.1/3.0 MCAL: excl. RamTst module
- AUTOSAR 4.0 MCAL: excl. RamTst, CoreTst, FlashTst modules
- All components configurable in any AUTOSAR-compliant configuration tool
- Configuration Tool EB tresos Studio™ and plug-ins are part of the product

Freescale对各种MCU的外设提供各种MCAL的各种AutoSAR的版本，符合2.1/3.x/4.0
这些MCAL能够在各种配置工具中使用；且，
EB Tresos 的配置工具是产品的一部分



AUTOSAR Operating System

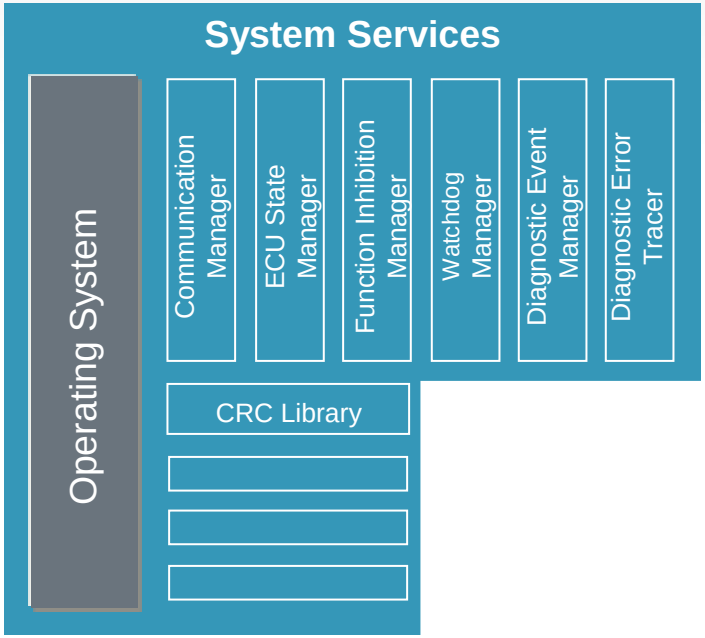
- Configurable in AUTOSAR configuration tool
- Available in Scalability Classes 1, 2, 3, 4 to fit the needs of different applications

针对各种不同的应用需求，提供各种可分级：

  - SC1 – deterministic RTOS baseline (tasks, events, counters, alarms, messages)
  - SC2 – timing based task determinism (low-latency, precise timing for periodic tasks) 基于定时的任务
  - SC3 – protected memory (MMU/MPU) for tasks avoids memory collisions for safety systems适用于安全系统的存贮空间保护
  - SC4 – timing and memory protected tasks, utilizes the full capabilities of the silicon for secure and protected RTOS designed specifically for the automobile.

- Availability of SC2,3,4 depends on MCU family / presence of MPU

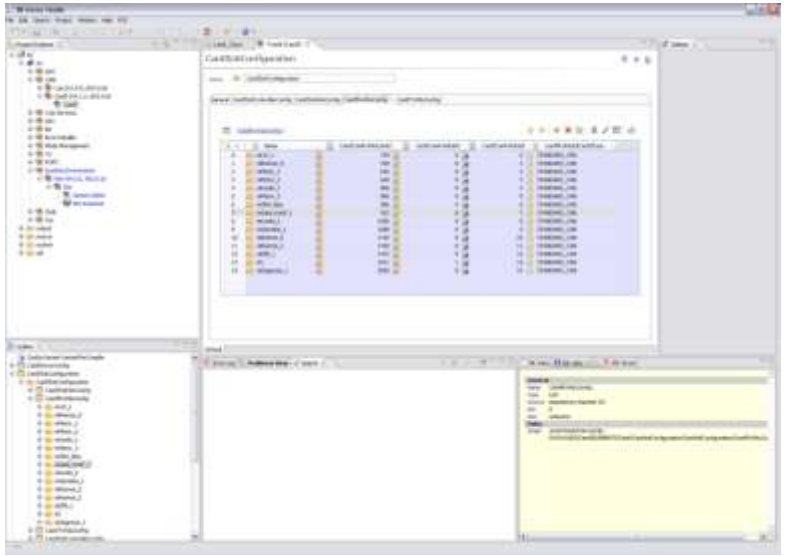
根据各种不同的MCU及是否有MPU（内存保护单元），对SC2, 3, 4的支持也不同



EB tresos Studio

- EB tresos Studio is an easy-to-use tool for ECU standard software configuration, validation and code generation
- Full support for the AUTOSAR standard
- Full support for the Freescale AUTOSAR software and the EB tresos AutoCore

EB Tresos 是基础软件模块或其他定制的模块的配置工具以及配置参数的校验工具。



Source: Elektrobit

- Integrated, graphical user interface
- Based upon Eclipse and open standards
- Online-help and parameter-specific help

EB tresus studio 是完全图形化的应用了Eclipse 框架的工具。

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Freescale AUTOSAR Integration Partners

Freescale AUTOSAR Integration Partners receive Freescale MCAL and OS releases for pre-integration into their proprietary AUTOSAR BSW products

Freescale将MCAL和OS发布给第三方集成伙伴，然后集成到专有的AUTOSAR BSW产品中

All MCAL and OS releases

All MCAL and OS releases

On demand delivery

On demand delivery

On demand delivery

On demand delivery

On demand delivery

AUTOSAR MCAL and OS Availability Matrix

Qorivva MPC56xx MCUs, 90nm

	Body					Chassis & Safety			Powertrain			
	S12X S12P/G	MPC551x	MPC5668	MPC560xB/C/D	MPC564xB/C	MPC560xP	MPC564xL	MPC567xK	MPC563xM	MPC564xA	MPC567xF	MPC567xR
MCAL 2.1		X		X	X							
OS 2.1*		X	X	X	O							
MCAL 3.0/3.1	X		X	X	X	X	X	X	X	X	X	
OS 3.0/3.1*	X		X	X	X	X	X	X	X	X	X	
MCAL 4.0.3				X	X	X	X	X		X		X
OS 4.0.3*				X	X	X	X					

Status: June 2012

X - Available
O - Planned
* OS row shows planning for Freescale internal OS development only, AUTOSAR OS for Freescale MCUs is available from many 3rd party companies

AUTOSAR MCAL and OS Plan – Next Generation

Qorivva MPC57xx MCUs, 55nm (subject to change without notice)

- AUTOSAR 4.0.3 is the lead version for all next generation MCU families.
- Other AUTOSAR versions can be supported on request by Freescale or a Freescale software partner.

对所有下一代的MCU，AUTOSAR 4.0是主打的版本

	Body			Chassis & Safety			Powertrain						
	S12Z Family	MPC574xB	MPC574xC	MPC574xP	MPC574xU	MPC577xN/K	MPC574xM GTM	MPC574xK GTM	MPC577xM GTM	MPC572xL GTM	MPC577xC eTPU	MPC574xR eTPU	MPC574xF eTPU
MCAL 4.0.3	O	O	O	O	O	O	O	O	pr	pr	pr	pr	pr
OS 4.0.3 *	O	O	O										

Status: June 2012

X Available
O Planned
pr Proposed

* OS row shows planning for Freescale internal OS development only, AUTOSAR OS for Freescale MCUs is available from many 3rd party companies

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  - AUTOSAR
  - **ISO 26262**
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ISO 26262 : Automotive Norm on Functional Safety

- ISO 26262 is a Functional Safety standard applicable to automotive systems. This norm is an adaptation of the Functional Safety standard IEC 61508.
  ISO26262是汽车版的IEC61508，适用于重量小于3.5吨以下的乘用车。

- ISO 26262 is applied to ensure that electronic systems in automotive applications are safe. Thus it covers functional safety aspects of the entire development process, including requirements specification, design, implementation, integration, verification, validation, and configuration.
  ISO26262涵盖了功能安全生命周期的所有方面：需求定义，设计，生产运行，支持等。

Figure 1: Functional Safety Standards Details

Standards Defined

IEC 61508	Generic industry standard, applicable to electrical/electronic/programmable electronic safety-related systems	
	Integrity levels	SIL 1, SIL 2, SIL 3, SIL 4
	Publication date	More than 10 years ago
ISO 26262	Automotive industry standard, adaptation of IEC 61508 for electronic systems in road vehicles	
	Integrity levels	ASILA, ASILB, ASILC, ASILD
	Publication date	Target end 2011

Level Comparison

No direct correlation for SIL and ASIL levels

SIL (IEC)	ASIL (ISO)
4	D
3	C
2	B
1	A

Failure Measures

IEC 61508

SIL	Random HWFR target
4	$\geq 10^{-9}$ to $<10^{-8}$
3	$\geq 10^{-8}$ to $<10^{-7}$
2	$\geq 10^{-7}$ to $<10^{-6}$
1	$\geq 10^{-6}$ to $<10^{-4}$

ISO 26262

ASIL	Random HWFR target
D	$<10^{-8}\,h^{-1}$
C	$<10^{-7}\,h^{-1}$
B	$<10^{-7}\,h^{-1}$

New Policy

- **Information** is more structured in IS0 26262
- **Concept of safety culture** exists in IS0 26262
- **Terminology** is well defined in ISO 26262 (safety plan, safety case, work products, confirmation measure, etc.)
- **Roles and responsibilities** are better defined in IS0 26262, (PM, safety manager)

Source: Adressing the Challenges of Functional Safety in Industrial and Automotive Markets, White Paper, 2012, www.freescale.com

Functional Safety. Simplified.
功能安全. 化繁为简.

Simplifies the process of system compliance, with solutions designed to address the requirements of automotive and industrial functional safety standards

简化流程 针对汽车和工业市场功能安全标准设计的解决方案,简化达标的流程

Reduces the time and complexity required to develop safety systems that comply with ISO 26262 and IEC 61508 standards

缩短开发时间和降低复杂性 解决方案可缩短安全系统的开发时间，同时满足国际标准化组织(ISO) 26262和国际电工委员会(IEC) 61508标准的规定

Supports the most stringent Safety Integrity Levels (SILs),enabling designers to build with confidence

支持安全完整性等级(SIL) 最严格的要求 帮助设计人员更自信地开发系统

Zero defect methodology from design to manufacturing to ensure our products meet the stringent demands of safety applications

零失效方法我们确保我们的产品从设计到生产都符合安全应用的严格要求

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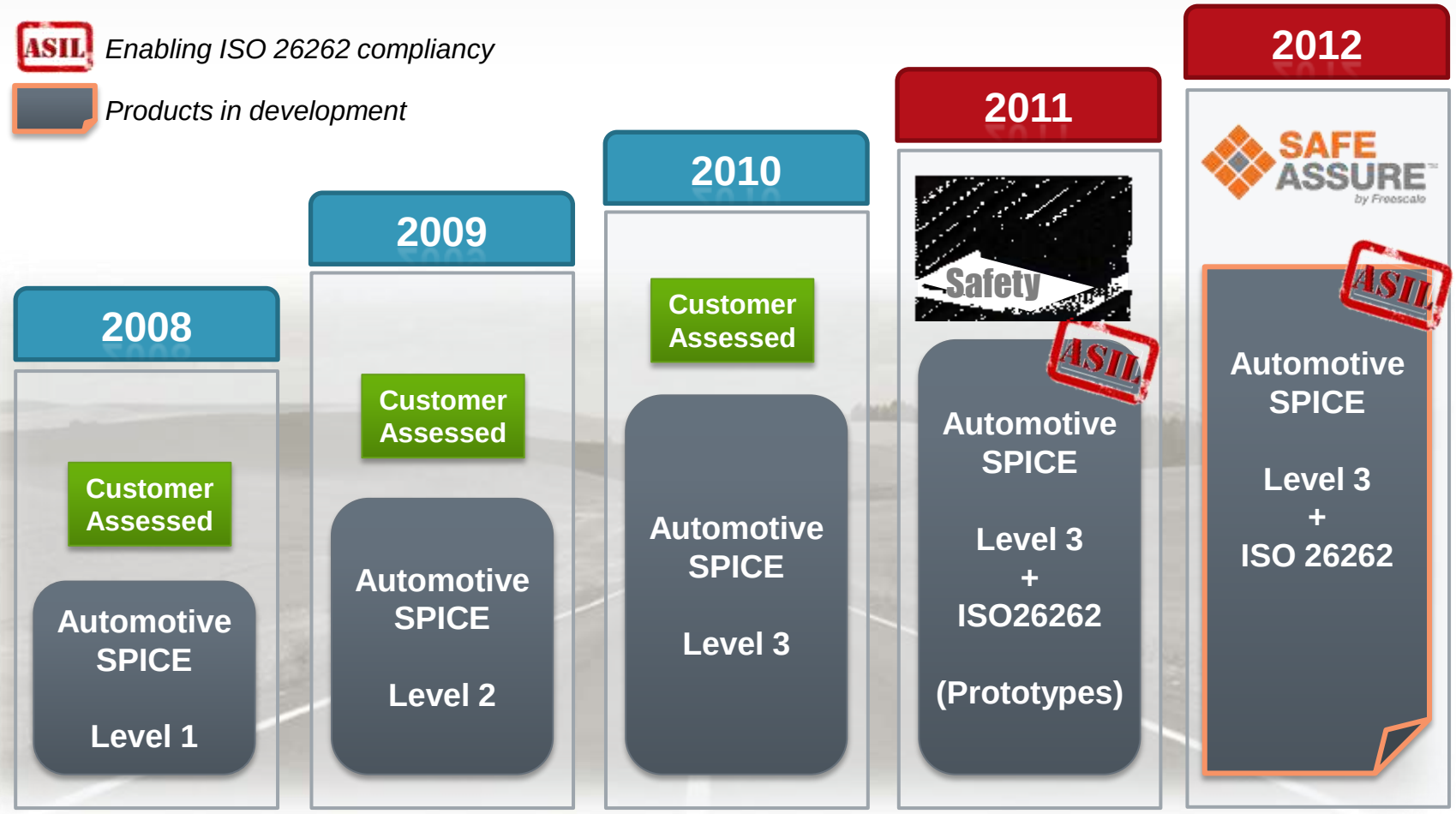
Automotive Software Development Process Evolution



Automotive Software for ISO 26262

- Support efficient achievement of system-level safety goals up to ASIL-D

  有效地支持直到**ASIL-D**的系**统级安全目标**

  – Safety with minimized performance degradation

  – Safety simplified for integrators

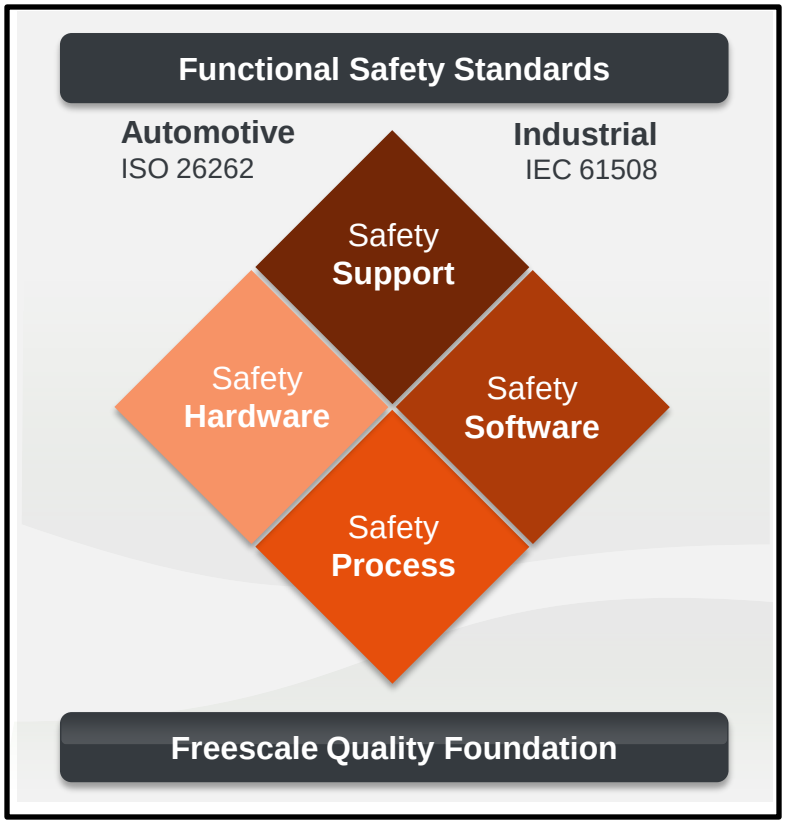
  简化功能安全的系统集成；

  – Cross-platform consistent architecture

  帮助实现跨平台的架构一致性

- Support achievement of hardware architectural metrics up to ASIL-D

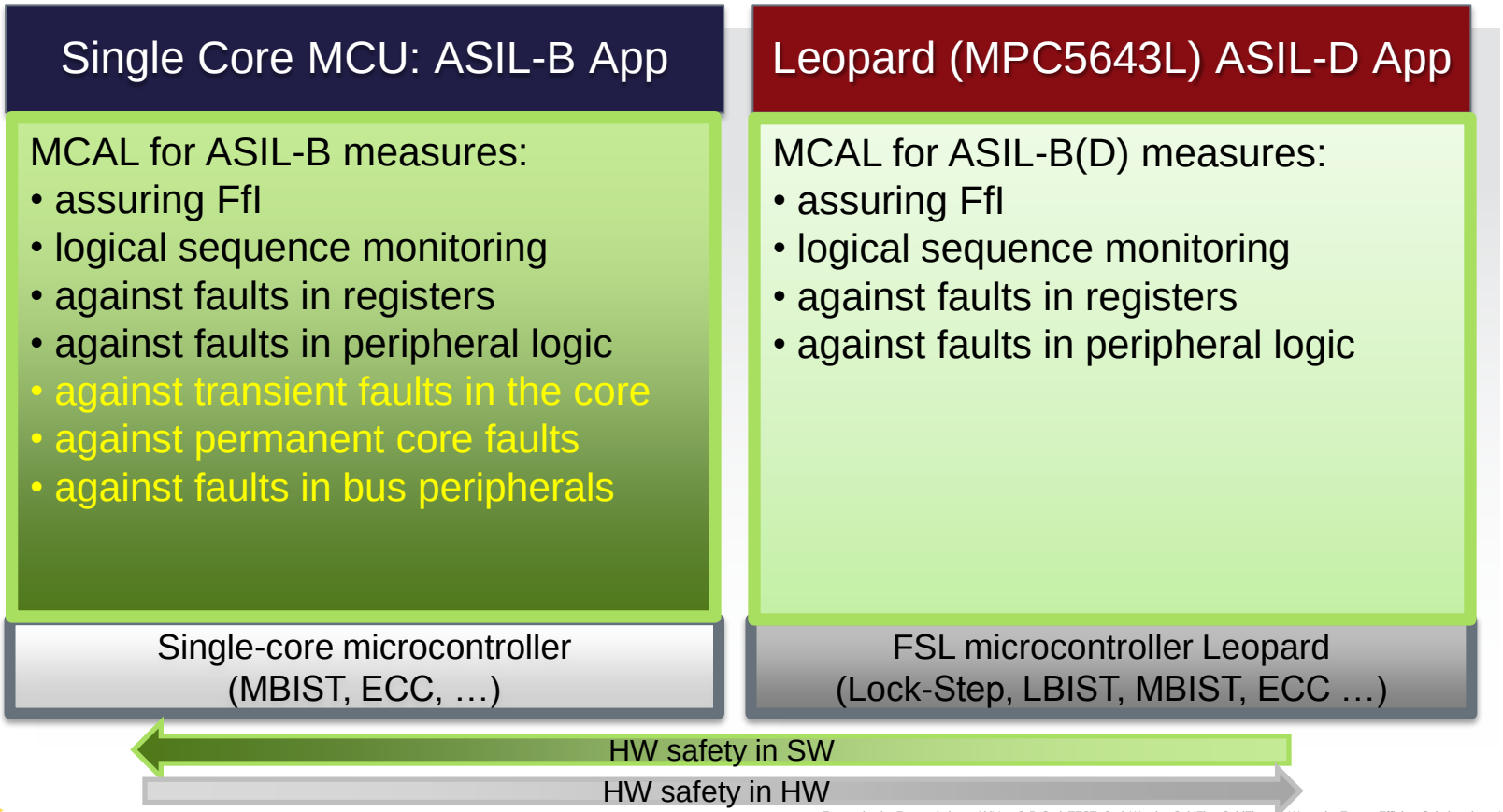
  支持实现硬件架构体系，直到ASIL-D



Functional Safety in Hardware and Software

The paradox of increased software complexity for lower ASILs: Achieving ASIL B with a single-core MCU requires more software safety measures (higher software complexity, performance impact) than achieving ASIL D in a dual-core lock-step MCU.

在单核的系统中达到ASIL B所需要的软件性能和复杂度，有可能超过双核（锁步模式）MCU系统中达到ASIL D的软件要求



Freescale MCAL for ISO 26262

Provides measures for:

- Detecting and reacting to hardware failures
  检测及因应硬件失效
- Detecting latent software faults affecting functional behavior (i.e.: runtime parameter checking, unauthorized invocation detection)
  检测软件（影响功能行为的）潜在的错误；比如运行时参数的检测，非授权的调用检测
- Detecting unauthorized access to hardware resources (i.e: hardware register protection)
  检测非授权的对硬件的访问（如硬件寄存器的保护）

The Freescale MCAL will be developed according to a process lifecycle compliant with the ISO 26262 standard.

飞思卡尔正在开发符合ISO26262开发流程的MCAL

Self Test Software for 32-bit Qorivva MCUs

1. Core Self Test
   - Instruction coverage metric
   - Each instruction is tested at least once for at least one set of input operands
   - Dedicated and special purpose registers, core timers, and exceptions are not covered by the tests
   - No determination of fault coverage

2. Core Self Test – Fault Graded
   - Fault coverage metric ("stuck-at" fault model)
   - Dedicated and special purpose registers, core timers, and exceptions are covered by the tests
   - Tests similar to option 1, but optimized to achieve higher stuck-at fault coverage
   - Extended API, to allow capturing and preprocessing of interrupts during test execution

3. Device Self Test
   - Includes core self test package
   - Includes functional tests of selected peripheral modules (Cache, MMU, etc.)
   - Functional coverage and estimated failure rate contribution can be provided

Self Test Software for 32-bit Qorivva MCUs

1. Core Self Test			
• e200 core self test – VLE	z0, z1, z3, z4, z6, z7		RTM
• e200 core self test – Book E	z1, z3, z4, z6, z7		RTM
• e200 core self test – SPE	z3, z4, z6, z7		RTM
All packages developed in ISO 26262 compliant development process for ASIL C.			

2. Core Self Test – Fault Graded			
• e200 core self test, 80% fault coverage	z6e (MPC5563)		Beta
• e200 core self test, 85% fault coverage	z6ep (MPC5567)		Beta
• e200 core self test, 60% fault coverage	z0h (MPC560xx)		EAR
• e200 core self test, 80% fault coverage	z0h (MPC560xx)		EAR

3. Device Self Test			
• MPC5567 device self test	MPC5567		Beta

EB tresos Safety OS for ISO 26262

- AUTOSAR OS with protected Microkernel
- AUTOSAR 3 and 4 compatible
- Up to ASIL-D
- Already in project use

AUTOSAR

Safety Features

Data Protection
- Write protection between OS applications

Stack Protection
- Only corresponding context (Task, ISR, kernel,…) has write access
- Stack overflow/underflow prevention

Context Protection
- Interrupted context is stored in protected memory area

OS Protection
- System Call interface separates application and kernel
- Private stack for the OS kernel

Hardware Error Protection
- OS provides exception handling including reporting to application

Source: Elektrobit, 2012

Agenda

- Automotive Software Mission
- Automotive Software Products and Solutions
  - AUTOSAR
  - ISO 26262
  - **Motor Control**
  - Ethernet in the Car
- Summary
- Q&A

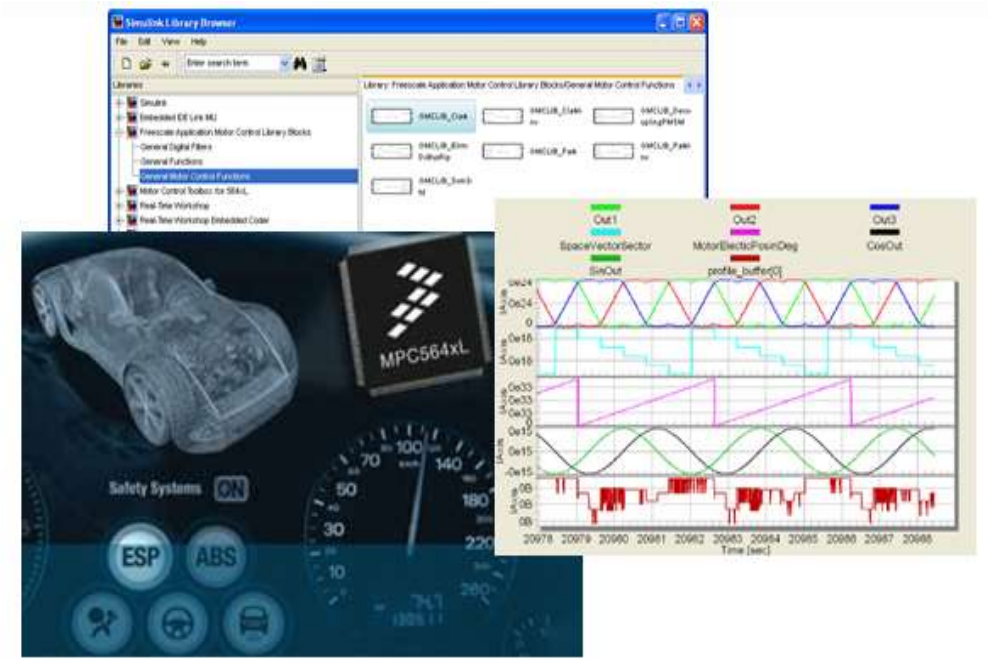
Motor Control Toolbox

- **Mathworks products required for MC Toolbox:**

  Freescale与Mathworks合作提供电机控制工具箱

  MC 工具箱所需要的Mathworks的产品：

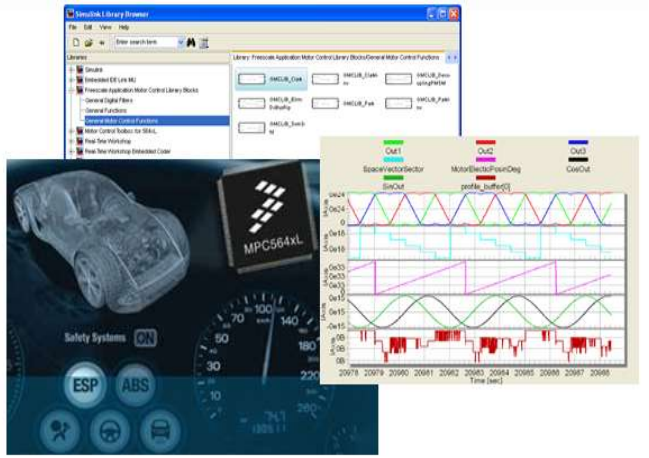
  - MATLAB
  - Simulink
  - MATLAB Coder
  - Simulink Coder
  - Embedded Coder



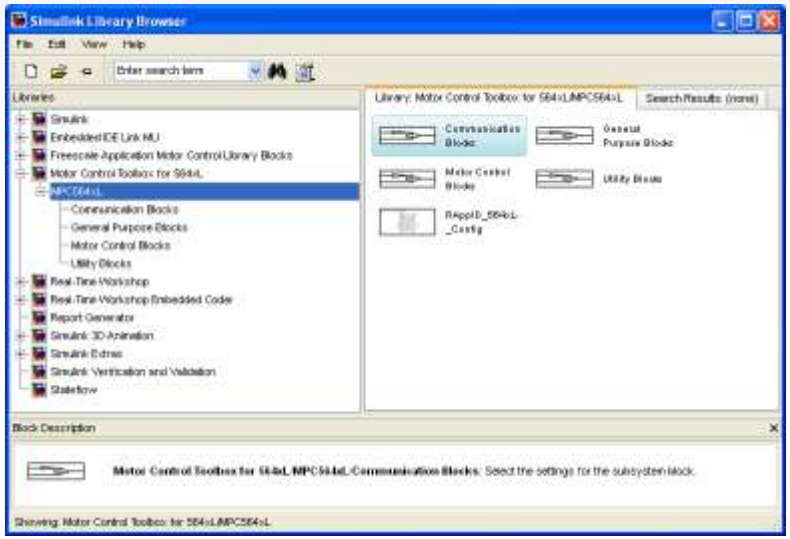
Motor Control Toolbox

- Mathworks Simulink plug-in libraries
- Integrated environment for configuring and generating motor control software including initialization routines, device drivers, and a real-time scheduler
- Includes an extensive library of math and motor control functions developed by Freescale's Motor Control Center of Excellence
- Includes Simulink blocks optimized for fast execution on Freescale MCUs - bit accurate results compared to Simulink simulation using single precision math
- Built-in support for Software- and Processor-in-the-Loop (SIL and PIL)
- Enables automated comparison and plotting of numerical results (FreeMaster)

- 提供关于电机控制的Mathworks plug in lib;
- 提供配置及产生电机控制软件的集成环境，初始化，驱动，及实时任务调度；
- 在Freescale的MCU上能够快速执行 SIL和PIL
- 自动比较和图示数值结果



Motor Control Toolbox Blocks

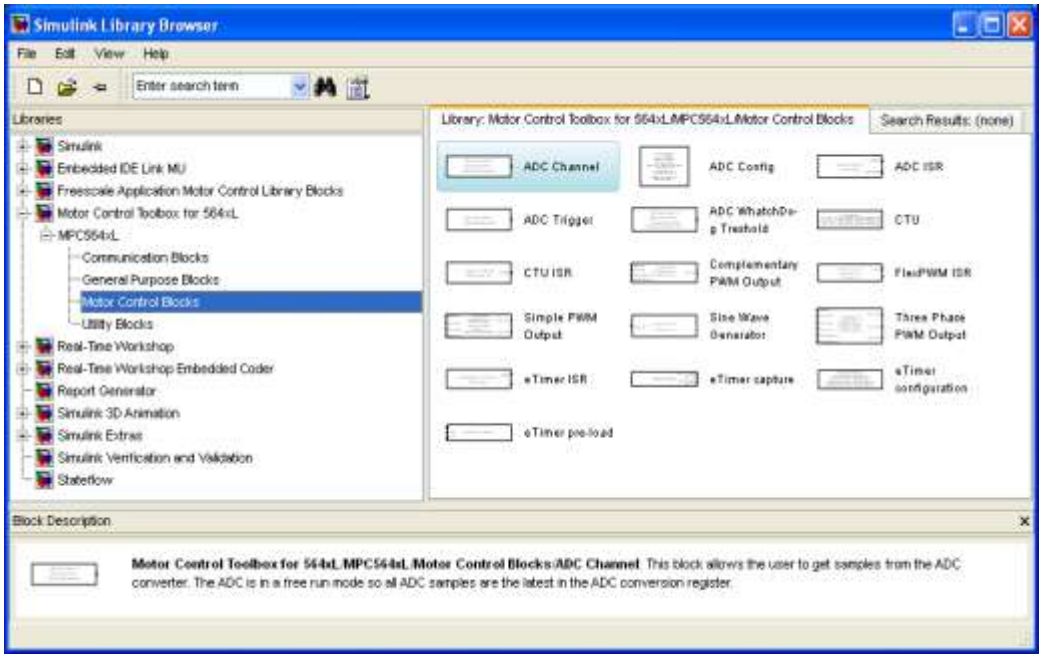


The Blocks inside toolbox will provide the code necessary for Initialization (Reset, Low Level Setup), Interrupt/Exception setup, Device Initialization, and Peripheral Driver Code specifically to support Motor Control Application development.

电机控制工具箱中的组件
提供底层的代码：复位后底层的初始化，中断/异常的初始化，外设的初始化，以及与电机控制密切相关的外设驱动代码。

- Supports integration of Data Acquisition and Calibration tool FreeMaster
- Incorporates Boot Loader utility for easy programming of application in Flash or RAM
- Also supported is the profiler function to measure execution of application code

- 通过FreeMaster来支持数据测量和参数标定；
- Bootloader，加载代码可以方便地在RAM中运行，亦可编程Flash。
- 同时提供profile功能来测量应用程序的运行情况



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Motor Control Toolbox - Contents

I/O Peripherals

- ~~ADC Conversion~~
- *Digital I/O*
- *PIT Timer*
- *ISR*

- *Communication Interface*
  - *CAN Driver*
  - *SPI Driver*

- *Motor Control Interface*
  - *Cross Triggering Unit*
  - *PWM*
  - *eTimer Block(s)*
  - *Sine Wave Generation*

- *MCU Option*
  - *Multiple Packages*
  - *Multiple Clocks Freq.*

Configuration/Modes

- *Compiler Options Available*
  - *Code Warrior*
  - *Wind River DIAB*
  - *Green Hills*

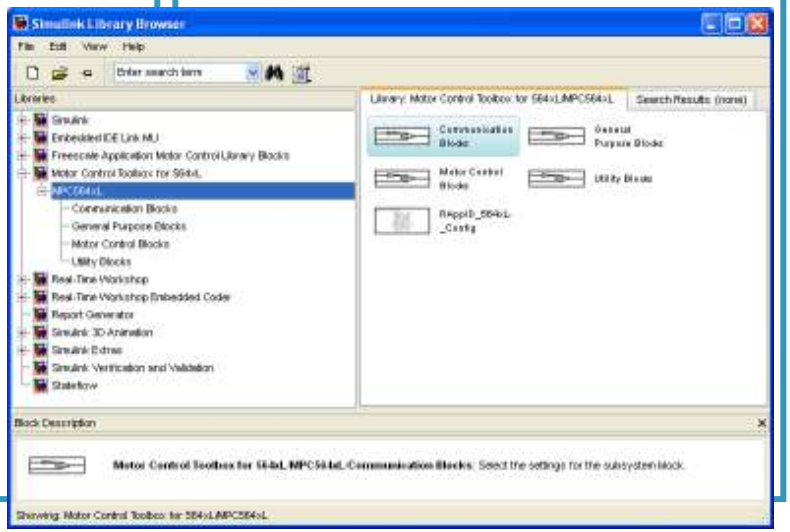
- *Simulation Modes*
  - *Accelerator*
  - *Software in the Loop*
  - *Processor in the Loop*

- *MCUs Supported*
  - *MPC564xL*
  - *MPC567xK*
  - *PXS20xx*
  - *PXS30xx*

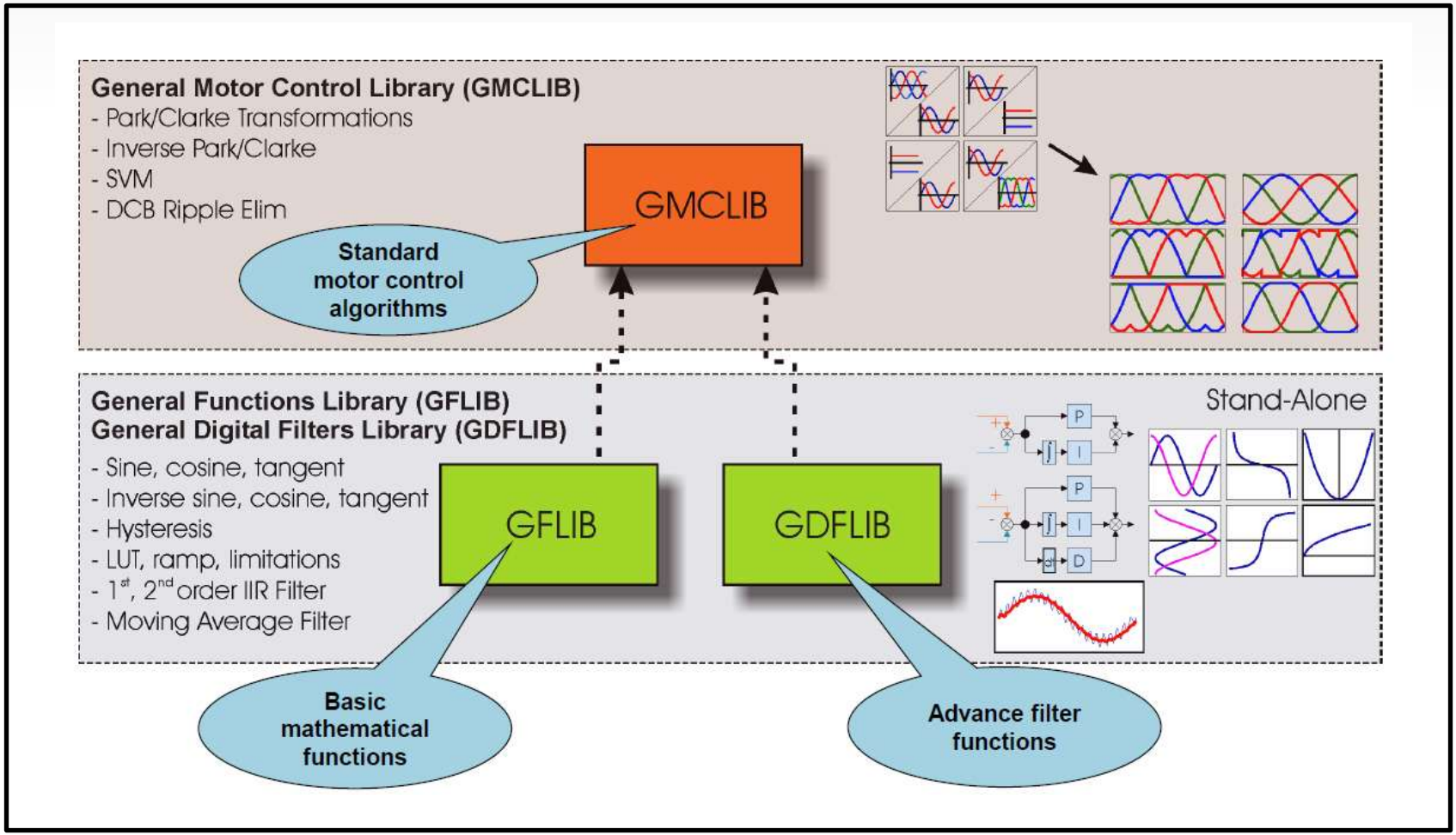
Utility

- *FreeMaster Interface*
  - *Data acquisition*
  - *Calibration*
  - *Customize GUI*

- *Profiler Function*
  - *Exec. time measurement*
  - *Available in PIL*
  - *Available in Standalone*



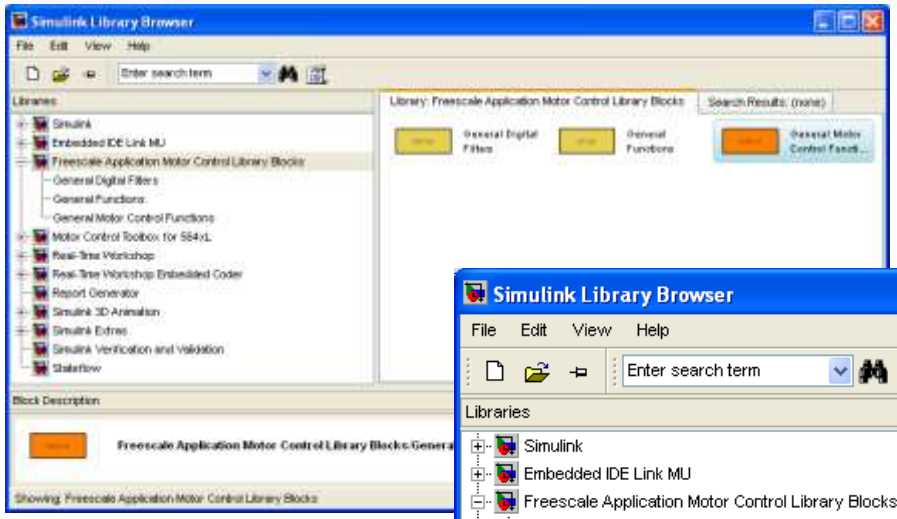
Motor Control Libraries



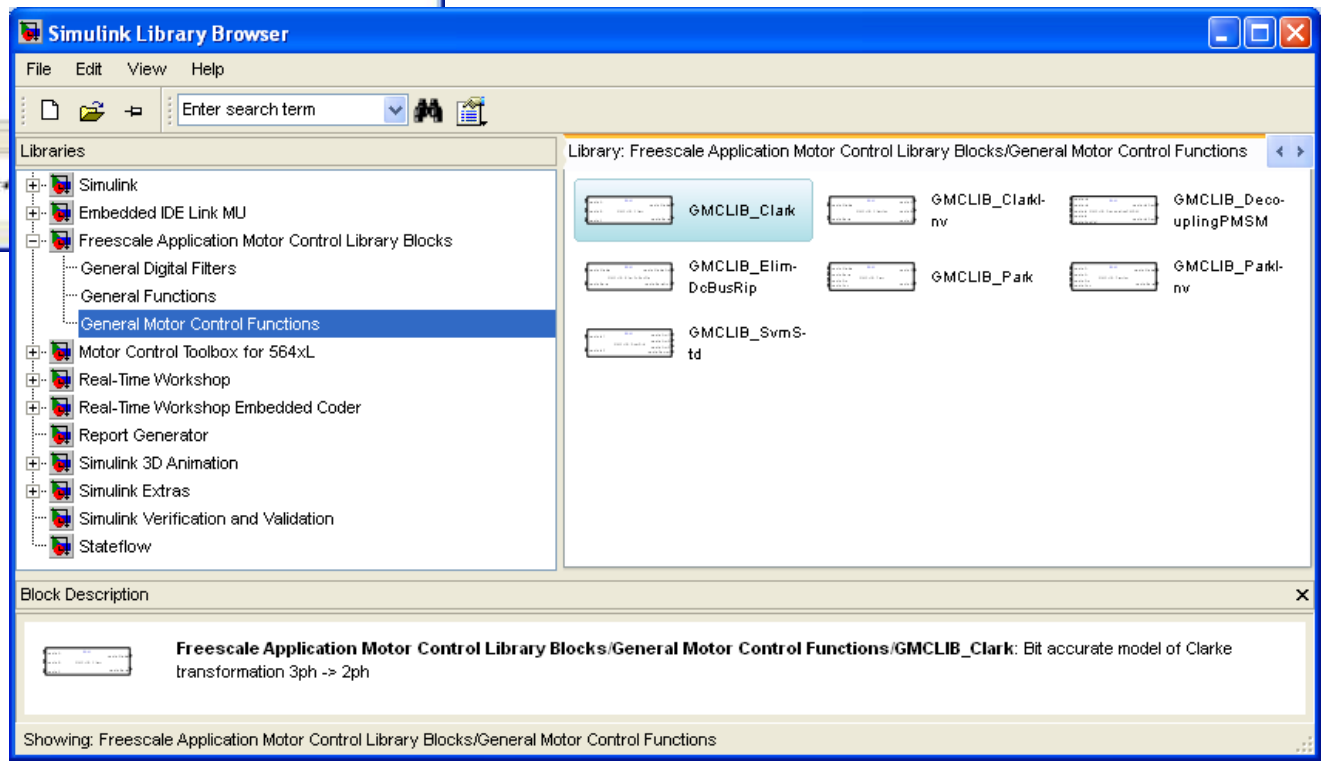
Controls Algorithm development of PI, PID controllers or more advanced controls including functions like Park and Clarke transforms, filters… integration of Motor Control Functions with Motor Control Toolbox.

Developed by Freescale's Motor Control Center of Excellence

Motor Control Library Blocks



This library helps quickly create Single Precision floating point models for simulation in Matlab for accurate verification and prototyping of Motor Control algorithms.



- Developed in ANSI-C, MISRA compliant
- Single precision floating point implementation optimized for MCU
- Theory and performance results summarized in documentation

Motor Control Library - Contents

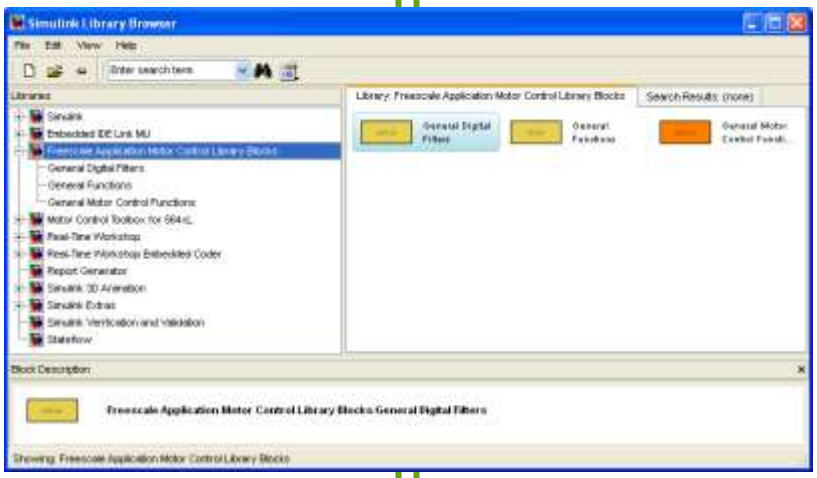
GFLIB

GDFLIB

- Finite Impulse Filter
  - GDFLIB_FilterFIR
- Moving Average Filter
  - GDFLIB_FilterMA
- 1st Order Infinite Impulse Filter
  - GDFLIB_FilterIIR1init
  - GDFLIB_FilterIIR1
- 2nd Order Infinite Impulse Filter
  - GDFLIB_FilterIIR2init
  - GDFLIB_FilterIIR2

GMCLIB

- Clark Transformation
  - GMCLIB_Clark
  - GMCLIB_ClarkInv
- Park Transformation
  - GMCLIB_Park
  - GMCLIB_ParkInv
- Duty Cycle Calculation
  - GMCLIB_SvmStd
- Elimination of DC Ripples
  - GMCLIB_ElimDcBusRip
- Decoupling of PMSM Motors
  - GMCLIB_DecouplingPMSM



Agenda

- Automotive Software Mission
- Automotive Software Products and Solutions
  - AUTOSAR
  - ISO 26262
  - Motor Control
  - **Ethernet in the Car**
- Summary
- Q&A

One Pair Ethernet : Emerging Auto Standard

- OPEN Alliance is designed to encourage wide scale adoption of **Ethernet-based, unshielded single pair networks** as the standard in automotive applications. The jointly developed OPEN Alliance SIG will address industry requirements for improving in-vehicle safety, comfort, and infotainment, while significantly reducing network complexity and cabling costs.

研究车内的安全、舒适和信息系统对网络的要求，致力于显著降低网络的复杂性及网络线缆的成本。

EE Time europ

Technology News

Broadcom, Freescale, Omnivision bring Ethernet to parking assistance system

October 11, 2011 | Christoph Hammerschmidt | 222901836

In an environment where an increasing amount of data needs to be processed, automotive data bus systems such as FlexRay and even MOST are hitting their limits. High-speed point-to-point connections are not flexible enough for many applications. Despite its non-deterministic nature, Ethernet is becoming the technology of choice for some automotive applications.

OPEN ALLIANCE

OPEN Alliance
Promoting Members

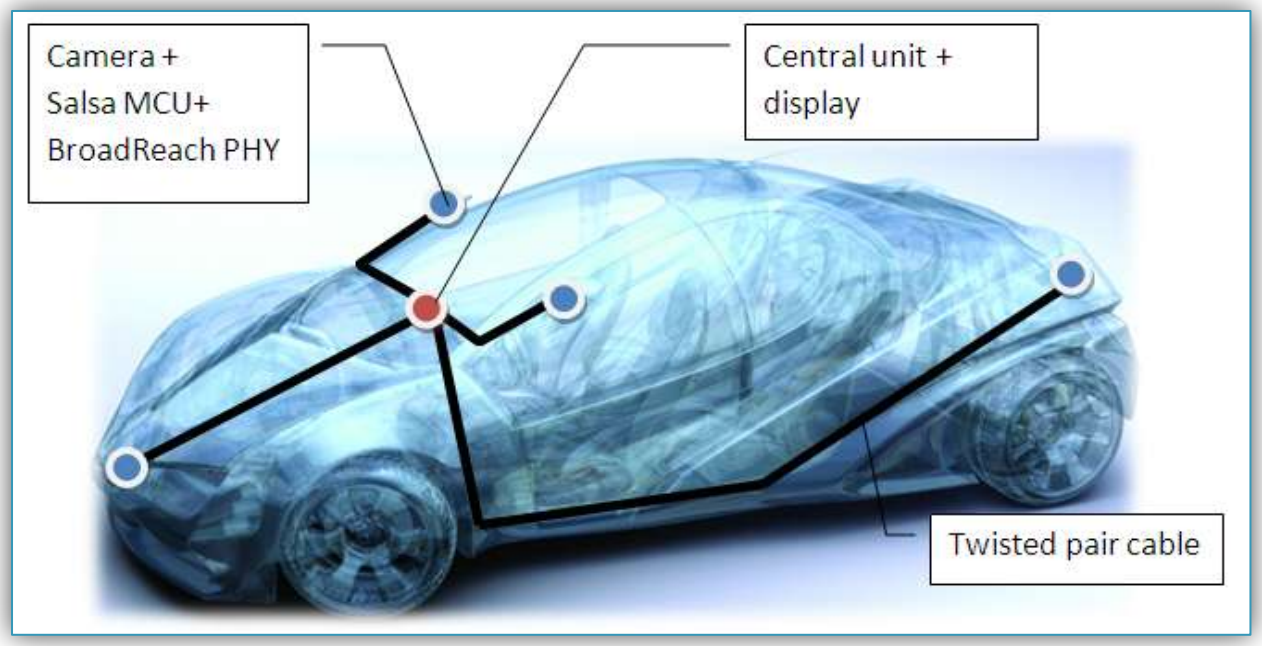
- Broadcom (founding member)
- BMW (founding member)
- Bosch
- Continental
- **Freescale (founding member)**
- Harman
- Hyundai
- Jaguar-Landrover
- NXP (founding member)
- Renault
- Renesas

+ >30 registered Adopters

Qorivva MPC5604E 32-bit Microcontroller

Enabling Video Over Ethernet

- Existing applications broadcast uncompressed video data over expensive screened LVDS cabling现在的方案：未压缩的视频通过昂贵的屏蔽LVDS线缆进行广播
- Strong motivation to cost reduce by using twisted pair cable running Ethernet protocol OEM非常期望通过低成本的以太网双绞线
- MPC5604E compresses video data and packages for Ethernet broadcast



MPC5604E压缩视频数据并打包数据到以太网

MPC5604E for camera nodes in Surround Camera Parking Aid systems

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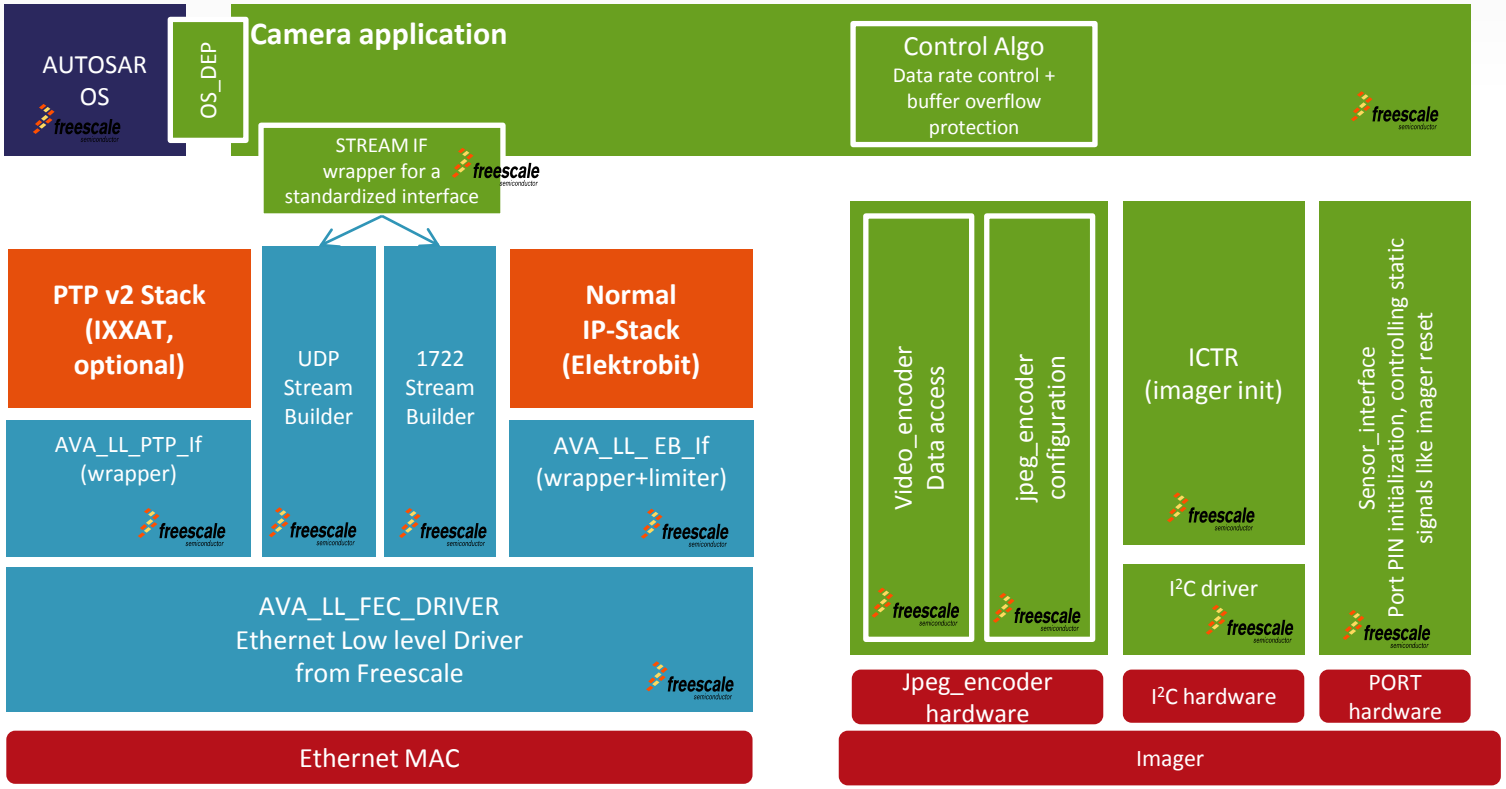
Freescale Software Solution for Ethernet Surround Camera Nodes using MPC5604E



- **Purple** : AUTOSAR OS 3.0, licensable from Freescale
- **Green** : Camera Application Software, licensable from Freescale
- **Blue**: Ethernet Streaming Software, licensable from Freescale
- **Orange**: Off the shelf Software, licensable from 3rd party (Elektrobit, IXXAT)
- **Red**: Hardware

Freescale Software Solution for Ethernet Surround Camera Nodes using MPC5604E

Ethernet Streaming Software	Camera Application Software	AUTOSAR OS
• FEC Low Level Driver IEEE802.3 (Ethernet) IEEE802.1Q (VLAN) • 1722 Stream Builder IEEE1722 (AVB) • UDP Stream Builder RFC791(IP),RFC768(UDP) RFC826 (ARP), required parts only • Interface to TCP/IP Stack from Elektrobit • Interface to PTP Stack from IXXAT IEEE1588 / IEEE802.1AS (PTP) as supported by the IXXAT PTP stack	• Camera Application Data rate control Buffer overflow protection • Stream Builder Interface support for UDP support for IEEE1722 (AVB) • AUTOSAR OS Interface • Video Encoder Driver • I^2C Driver • Imager Configuration Interface • Imager Control Driver	• Operating System (OS) compliant to AUTOSAR 3.0 scalability class 1 • EB tresos Studio™ Configuration tool

Agenda

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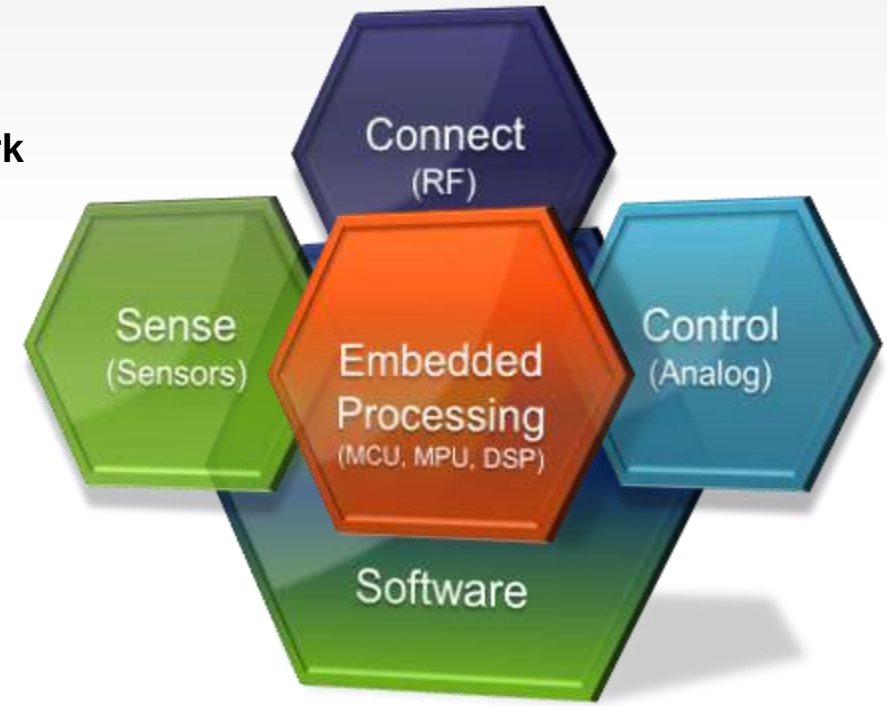
Summary

- Freescale's mission is to be the **benchmark provider for silicon and software** that enables our customers to build scalable platforms for automotive body, powertrain, safety and chassis, and driver information systems.

  不仅提供芯片，同时也提供强大的软件支持 – 飞思卡尔致力于在此方面成为业界的 Benchmark

- Since several years Freescale successfully delivers production ready AUTOSAR MCAL and OS software. Freescale now expands its software roadmap to support our SafeAssure program, as well as Automotive Ethernet, Motor Control, and Radio solutions.



在过去，我们成功地发布了产品级的AUTOSAR MCAL和OS。现在我们把软件的路线图扩展到功能安全、车用以太网、电机控制和车载收音机。

Silicon + Software + Services + Support

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Learn More about Freescale Software

- AUTOSAR - driver suites and operating system
  (See also: www.freescale.com/autosar)
- ISO 26262 – software to enable ASIL D systems
  (Visit sessions ***FTF-AUT-F0189 & FTF-AUT-F0552*** to learn more about SafeAssure Software)
- Motor Control : from function libraries to full-flavor Matlab/Simulink toolbox
  (Visit session ***FTF_IND_F0145 & FTF_IND_F0036*** to learn more about Freescale's Motor Control Development Toolbox)
- Ethernet Surround Camera : complete hardware/software solution for the camera node
  (Visit session ***FTF-AUT-F0551*** to learn more about Freescale's Ethernet Camera Software Solution)
- Connected Radio : Complete hardware/software solution
  (Visit Demo ***A4 & A7*** to learn more about Freescale's Connected Radio Solution)

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Q&A

Freescale on Kaixin
Tag yourself in photos
and upload your own!

Weibo?
Please use hashtag
#FTF2012#

Session materials will be posted @ www.freescale.com/FTF

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