RTA Solutions
Comprehensive Support for AUTOSAR-based ECU Development

With its unique recognized expertise in the automotive market, ETAS provides full support for any AUTOSAR-based ECU Development – classic and now also adaptive platform!

**ETAS has a proud legacy of developing high quality, innovative embedded platform software solutions**

- 20 years experience in automotive embedded software development
- As of today, more than 1.5 billion ECUs have been produced containing ETAS basic software with 2 million more being produced each week
- Collaborative development with some of the largest tier 1 automotive suppliers in the world
- Continual collaboration with corporate research and international research institutions to ensure state-of-the-art solutions
RTA Solutions

What do we do?

**RTA Basic Software and Tools**

We enable efficient development and deployment of automotive application software, through the uniquely open and cost-optimized AUTOSAR basic software for both the classic and adaptive AUTOSAR platforms.

**RTA Engineering Services**

We deliver high quality and cost-effective customer-specific embedded software, through a global team of embedded software specialists.

**RTA Consulting Services**

We provide expert support for optimizing the development processes and overcoming the technical challenges of tomorrow’s ECU architectures.
RTA Solutions

Basic Software: RTA-BSW for classic AUTOSAR and RTA-VRTE for adaptive AUTOSAR

RTA Basic Software and Tools

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Classic Platform  GM Global B SUMs

OS  Hypervisors  Adaptive Platform

RTE

BSW  MCALs

Security  Bootloaders
RTA Solutions
RTA Engineering Services

We deliver high quality and cost-effective customer-specific embedded software, through a global team of embedded software specialists.

Safety-relevant SW
- Standards
- Flexibility
- Quality

Application SW
- Development to spec.
- On-site support
- Competitive pricing

Advanced Development
- Tool development
- SW integration and test
RTA Solutions
RTA Consulting

RTA Consulting Services
We provide expert support for optimizing the development processes and overcoming the technical challenges of tomorrow’s ECU architectures

- Expertise
- Flexibility
- Assessments
- Functional Safety
- Concept demonstrators

- Training
- Hypervisor
- Process improvement

- Standardization
- Multi-/Many-Core
- Embedded Security

AUTOSAR
RTA Solutions
AUTOSAR Classic Platform Solutions
AUTOSAR Classic Platform Solutions

ISOLAR-A and ISOLAR-B: Configuration Tools

○ ISOLAR-A
  ○ Full solution for configuration following the AUTOSAR methodology
  ○ Importing legacy formats: DBC, Fibex, LDF, ODX

○ ISOLAR-B
  ○ BSW configuration

○ ISOLAR tools easily integrate with your process
  ○ Speak AUTOSAR XML (.arxml) natively
  ○ Simple to extend thanks to Eclipse & ARTOP basis

○ ISOLAR tools scale to huge projects
AUTOSAR Classic Platform Solutions

RTA-BSW Stacks and Modules

- **RTA-***
  - Code generators for AUTOSAR BSW
  - Packages of AUTOSAR Basic software modules
  - Available today for most all ST microcontrollers combinations with further ports available on request.

- **RTA-SEC**
  - Qualified security stack for HSMs
    - ST SPC58NE84 “Eiger” Cut 1
    - ST Chorus SPC58EC80 Chorus 4M
    - ST Chorus SPC58EG84 Chorus 6M
    - ST SPC58NN84 “Bernina” Cut 1

AUTOSAR Basic Software developed and provided by ETAS and third-parties.
AUTOSAR Classic Platform Solutions

RTA-RTE

- RTA-RTE was the first commercial implementation of the AUTOSAR RTE specification
- PC-based, command-line RTE Generation tool
  - Comprehensive coverage of the AUTOSAR specifications
    - R3.x, R4.0, ...
  - Robust, production quality performance
  - Flexible support for different use cases
- RTA-RTE products are already used in series production projects
  - Passive safety,
  - Powertrain, and,
  - Body Electronics
  - Clusters (HMI)
AUTOSAR Classic Platform Solutions

RTA-OS

- RTA-OS is the world’s smallest and fastest AUTOSAR OS implementation
- Used in series production for over 20 years
- Deployed in over 1.25 Billion ECUs world wide
- Support for multicore ECUs with optimized RTA-IOC implementation
- TÜV-SüD certified for use in ECU developments up to and including ISO26262 ASIL-D

RTA-OS: The smallest AUTOSAR OS in the world, so small it fits here:
AUTOSAR Classic Platform Solutions

Other Solution Components

- **RTA-FBL**
  - Flash Boot Loader
  - Plug-in for ISOLAR-B
  - CAN/UDS support
  - Generates FBL code from FBL specific configuration
    - Reduced effort to create FBL
  - Requires OEM-specific add-ons for custom boot loading needs

- **GMSUM**

  ![Diagram]

  - SUM Modules
    - Secure Bootloader
    - Operating system
    - System Services
    - Memory Management
    - Communication and diagnostics services
    - HW IO Abstraction
    - Complex Drivers

  - Application Layer
    - RTE (Run time environment)
    - Microcontroller Abstraction Layer
    - Microcontroller
RTA Solution

RTA-Safety

ETAS safety package in a nutshell

- Safety manuals for defining all required tasks to **achieve** and **maintain** the desired ASIL
- Safety case demonstrating ETAS software developed according to ISO26262
- TUV Sud certificates for RTA-OS and RTA-RTE

- [Optional] Identification of any **gap** between safety requirements and supported BSW features for achieving full compliance
- [Optional] Consulting support for customer-specific safety requirements
- [Optional] Consulting for safety reviews including BSW configuration
RTA-BSW

RTA-BSW and ISOLAR-A/B Business Model

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- Production licenses:
  - Run-times
  - Project license
  - Platform license
  - Buyout

- Services:
  - Maintenance and support
  - Funct. Safety
  - Consultancy
  - Engineering
  - Frozen version support
**RTA-BSW**

**RTA-BSW Starter Kit for ST**

- Ready-to-use complete AUTOSAR reference application
- Configured for GHS compiler and SPC58NN development board
- Includes:
  - evaluation licenses for:
    - RTA-BSW (incl. OS, RTE, CAN, etc.)
    - ISOLAR-A & BCT (or ISOLAR-B)
    - SPC58NN MCAL
Changes & Challenges in Modern Automotive Software
Motivating the AUTOSAR Adaptive Platform

- “Software eats the world” in automotive too!
- Increased demands for
  - High performance / large data computing
  - High bandwidth (switched / flexible) communication, permanent updates
  - Integrated / Domain ECUs (saving weight / cost)
- Heterogeneous architectures
  - Specialized co-processors
Evolution of E/E architecture

The Solution Space

**Vehicle Centralized E/E Architecture**
- Domain independent vehicle centralized approach with central vehicle computation nodes, neural networks, etc. (zones)
- Logical centralization and physical distribution

**2019-2023 (Cross) Domain Centralized E/E Architecture**
- Address complexity of increasing cross domain and centralized vehicle functions

**VISION**
- Increasing number of vehicle functions in the cloud
- Complexity concentration: “Cross domain ECUs” / “Cross domain Computation”
- Domain specific “Domain ECUs” / “Domain Computer”

**TODAY**
- Mostly encapsulated E/E architecture structure

- Distributed E/E Architecture
  - Mostly encapsulated E/E architecture structure

- Functional integration
- Function specific ECU

**Domain independent “Vehicle Computer”**
- Domain specific zone (ECU)
- Domain independent zone ECUs, e.g. Door ECU
- Optional ECU, e.g. Central Gateway
- Sensors/Actuators
- State of the art Automotive ECU (function specific)
The Adaptive Platform - characteristics

- The **Adaptive AUTOSAR** Platform (AP) is designed to bridge the gap between Classic Platform (CP) and Infotainment.

- Key Adaptive AUTOSAR Characteristics
  - Service oriented architecture (adaptive / dynamic: Ready for ongoing updates)
  - Soft real-time
    - Deadlines in ms range
  - Some safety requirements
    - ASIL-B
  - High resource availability
    - Micro-processor
    - Dynamic OS

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- Real-time (µs)
  - Safety (ASIL-D)
  - Low resource
  - Fixed SW

- Soft real-time (ms)
  - Safety (ASIL-B)
  - High resource
  - Planned Dynamics

- Non real-time (s)
  - QM
  - High resource
  - SW load on demand

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**Adaptive AUTOSAR**

**Classic Platform**

**Adaptive Platform**

**Infotainment ECU**
The Adaptive Platform – spread in the E/E architecture

Coexistence with (deeply embedded) classic Autosar

- Adaptive and Classic AUTOSAR will co-exist within a vehicle
  - Adaptive ECUs support dynamic SW change, highly parallel architectures
  - Classic ECUs for high safety, real-time SW within a severely resource constrained ECUs

- Adaptive ECUs <10% of ECUs within vehicle
  - A high-end vehicle might have ~120 ECUs of which **5-10 might use Adaptive ECUs**
  - But size (8 MB vs 8 GB) and value are in another dimension
VRTE is more than just Adaptive Autosar

RTA-VRTE and Adaptive AUTOSAR

- Adaptive AUTOSAR doesn’t address all issues (yet)
  - Vehicle computation
  - Domain controller ECUs

- ETAS, together with Bosch, is building RTA-VRTE to address these additional challenges
  - Adaptive AUTOSAR
    - Standardized applications
    - Hypervisor for virtualization
    - Multiple safety and functional domains
  - Vehicle computing support
    - Lifecycle management
    - Update management
    - Personalization
Thank you

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