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SECURED & HIGH-PERFORMANCE PRODUCT LINES

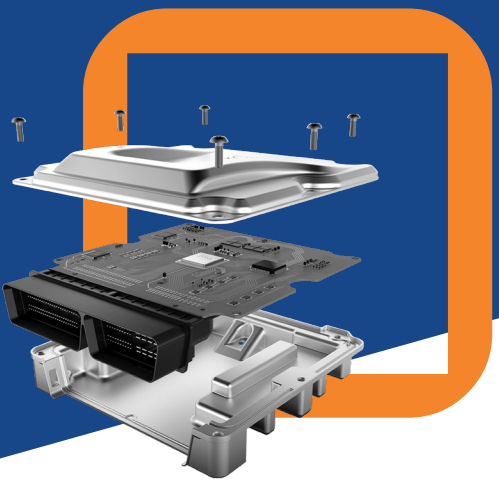
HIGHLIGHTS

GuardKnox's patented hardware and software solutions form secure, high-speed vehicle networks that empower the next generation of smart vehicles to meet the changing needs of mobility users.

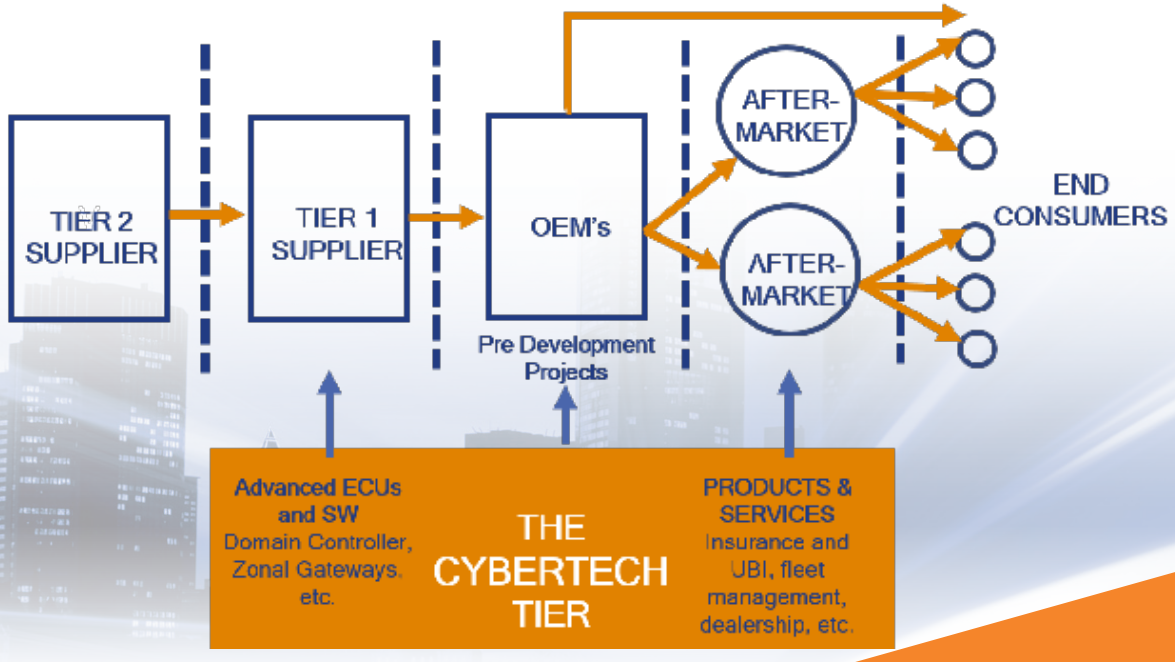
Coming from aviation the GuardKnox team has already experienced 'going to full connectivity' challenge, providing new and ultra fast communication networks to moving platforms, fast data based systems using our patented SOA or Services Oriented Architecture and high-performance computing all secure by design.

SOME OF OUR CORE COMPETENCIES ARE:

- Intelligent and high-performance network backbone for fast moving platforms
- GuardKnox patented Services Oriented Architecture (SOA)
- High Performance Communication Processing with Integrated Security with patented Communication Lockdown
- Flexible and modular software stack
- Consolidation of E/E architecture across legacy, present, and future componentes and architectures
- Cost-effective solution based on customer needs & functionalities
- Scalable and flexible solutions- including OTA updates to vehicle capabilities in real-time-- including software & hardware updates



GuardKnox's solutions empower the auto industry with the **FREEDOM TO EVOLVE** to meet the changing needs of connected vehicles safely and securely



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DOMAIN CONTROLLER

The GuardKnox Domain Controller's main function is to act as the network backbone, connecting, segregating and orchestrating all cross-domain communications. The domain controller serves as a uniform hardware and software ECU platform for domain controller E/E architectures.

GuardKnox Domain Controller platform supports high performance processing with integrated micro-processors coupled with realtime processing using micro-controllers. High speed communication is supported using Ethernet (1G, 100Mbps including switching and routing) and realtime communication with CAN-FD, FlexRay and LIN.

The platform is designed to host applications in order to provide extra services, additional functionality and consolidation of otherwise external hardware. This ability for mixing such capabilities is based on the GuardKnox Service-Oriented Architecture (SOA) patented technology.

Lastly, the platform supports multiple safety domains (up to ASIL D) and high cyber security protection based on GuardKnox patented secure SOA stack and Lockdown™ security methodology.

VARIANTS:

- **GATEWAY DOMAIN CONTROLLER**
- **COCKPIT DOMAIN CONTROLLER**
- **BODY DOMAIN CONTROLLER**
- **COMFORT DOMAIN CONTROLLER**
- **INTEGRATEDTELEMATICS,ADAS(+2)EVCHARGINGSUPPORT****

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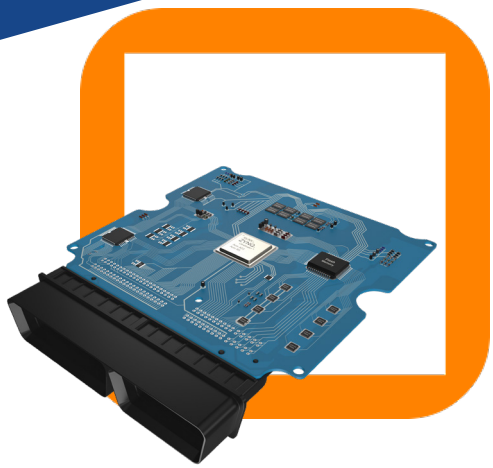
ZONAL GATEWAY ON A CHIP



The GuardKnox Zonal Gateway is a cost-effective hardware solution for high-performance routing on a single chip design.

This high-performance routing solution also contains the GuardKnox proprietary High-Performance Communication Engine.

The Gateway supports all automtoive communication interfaces and can implement full communication matrix in hardware with integrated edge-processing capabilities.
This implementation includes full line-rate security verification of all communication.

GuardKnox has developed tools to convert CANDB and ARXML communication databases into high-performance communication engine compatible databases.

In addition, the Zonal Gateway is able to support the full spectrum of AUTOSAR routing capabilities.

VARIANTS:

- **SEATING**
- **LEGACY ECU INTEGRATIONS**

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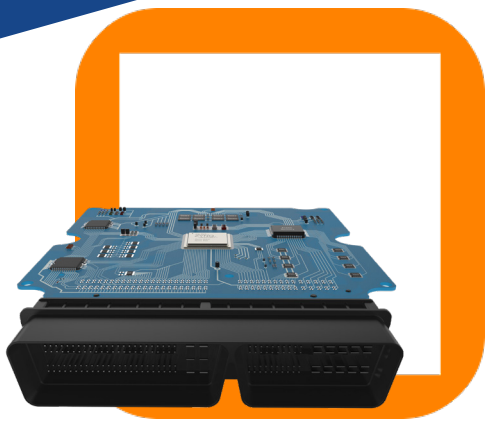
COMPUTE DOMAIN ON A CHIP



The GuardKnox Compute Domain on a Chip is a full domain on a single chip that includes all necessary communication infrastructure and application processing capabilities. The Compute Domain on a Chip leverages a highly integrated SoC which includes both communication routing and processing subsystems.

Integrating the GuardKnox High-Performance Communication Engine allowes for a flexible, high-performance and secure multi-interface routing as well as components from the patented Secure Service-Oriented Architecture, to allow for application processing support.

The Domain on a Chip provides a cost effective, power efficient and flexible solution for single domain applications with emphasis on a multitude of interfaces and management applications. Ideal for mid-range to high end Zonal Gateway ECUs which require application hosting.

In addition, GuardKnox can provide the core for Domain Controller designs, especially Gateways and Body Domain Controllers.

VARIANTS:

- **HIGH-SPEED ROUTING IN CURRENT VEHICLE ARCHITECTURE**

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VEHICLE SERVER ECU

The GuardKnox Vehicle Server is a multi-domain ECU for Zonal backbone applications with heterogeneous resources (CPU, MCU, GPU, hardware accelerators) in a highly integrated and cost-effective design. Coupled with the GuardKnox Secure SOA stack to provide both hardware and software infrastructure for safe and secure multi-domain and mixed criticality operation (design is engineered to be certifiable to ISO26262 up to ASIL D and upcoming ISO21434).

The Vehicle Server is designed to support all automotive interfaces and is able to accomodate any number of interfaces. Due to the fact that the vehicle server is designed on families of SoCs, GuardKnox is able to provide a seamless transition from low cost mass-market solutions to super premium solutions, all while utilizing the same hardware and software architecture as well as the same tool chain.

The same architecture can be used across backbone ECUs, optimized for different application groups, while still maintaining the same development environment, uniform software deployment infrastructure (including between backbone ECUs) with smarter centralized management, and leveraging cost economy of scale.

When FPGA based designs are employed, unique Hardware OTA (HOTA) capability becomes available, which enables the deployment of hardware processing resources in realtime while the vehicle is already on the road. The GuardKnox Vehicle Server is based on multiple, industry leading SoC architecture, which are selected according to customer requirements.

VARIANTS:

- **GENERAL PURPOSE**
- **CLUSTER COMPUTER**
- **MODULAR UNIT**

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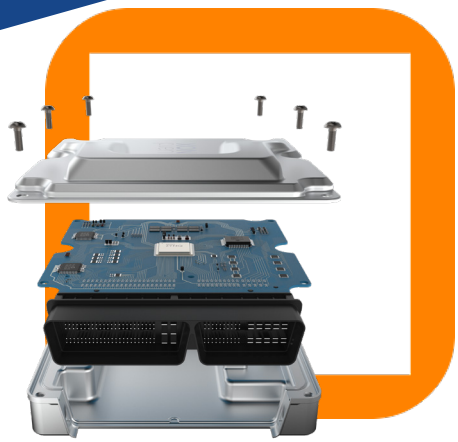
AFTERMARKET ADD-ON



The Aftermarket Add-On is a connectivity Domain Controller which serves as a Gateway to external communication by wireless and wired interfaces. External connectivity allows for advanced connectivity features such as OTA updates, smartphone applications, in-vehicle entertainment, smart city services, OEM app store etc.

The platform features strong separation in both hardware and software between vehicle and external domains using the GuardKnox patented Lockdown™ architecture. Interface support includes high speed Ethernet (currently up to 1GB with 10GB in development) and CAN-FD with external wireless communication using Bluetooth (up to 5), Wi-Fi and Cellular (4G and support for future 5G) connectivity. There are several variants to this platform with high performance, mainstream and costeffective versions.

The Aftermarket Add-On includes GuardKnox's patented SOA design that overcomes the complexity of today's vehicle networks by functioning as a consolidated platform with reusable code components, standardized protocols for interoperability and scalable hardware services.

This product line is available for series production and aftermarket products. Aftermarket use cases include OEM branded connected accessories, and smart mobility solutions.

VARIANTS:

- Dealership asset manager
- Fleet ransomware protection
- Wireless connectivity
- Logistics fleet management
- Telematics
- Insurance and UBI
- Mobile device integration
- Ride sharing etc.

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SECURE SERVICE-ORIENTED ARCHITECTURE (SOA) STACK

The GuardKnox Secure SOA stack is a fully secure, modular, and patented software solution which is able to meet customer hardware architecture requirements and OS requirements (e.g. Linux, Android, AUTOSAR etc.).

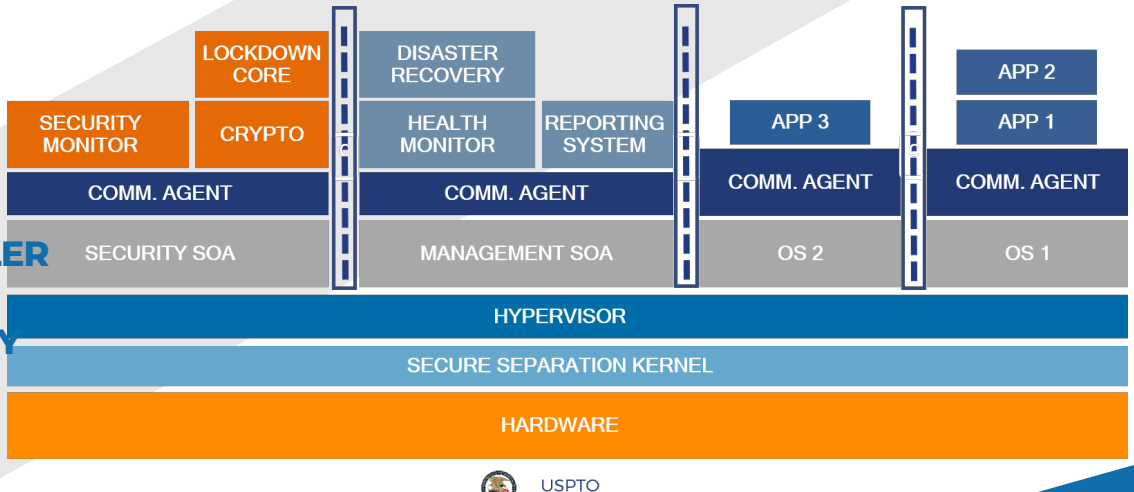
The SOA stack includes a board support package (BSP) with a separation kernel and a hypervisor, optimized and secure partition and kernel configuration, host OS's management infrastructure, software deployment infrastructure including OTA, network level service discovery, security infrastructure and container engine support.

The SOA stack includes the GuardKnox patented Lockdown™ core. GuardKnox's SOA patented technology creates the secure environment which enables added services and applications by hosting downloads or upgrades on the GuardKnox platform. This enables mission critical and non-mission critical applications to run simultaneously without interference even if one application is compromised.

SOA has a secure separation (both hardware and software) between all resources, application groups, and operating systems, simplifying edge computing capabilities by providing ample processing resources with maximal flexibility both in interface support and provision for future software extensions/additional service being added - enabling additional connectivity & customization through access control and service level partitioning.

VARIANTS:

- **GATEWAY**
- **DOMAINCONTROLLER**
- **MIXED CRITICALITY ENVIRONMENT**



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CUSTOMIZABLE BUILT-TO-SPEC

GuardKnox's technological capabilities and services are able to be adapted to meet each customer's individual requirements and needs.

We are able to provide:

- High performance communication processing, especially with integrated security
- Modular software stack solutions
- Hypervisor based and application rich compute environments
- Integration with extra-vehicle devices
- Cybersecurity applications
- Ethernet communication

VARIANTS:

- **CUSTOMERDEFINES-TAILER-MADE**
- **WIRELESS GATEWAY**
- **EV CHARGING**

  The EV Charging Gateway provides a secure endpoint for high performance data processing and storage while also supporting secure cloud communication, data analytics and AI. The patented software core and hardware architecture enables compliance with not only safety and security standards, but also EV specific protocols - ISO 15118 and DIN SPEC. The platform support flexible application management and services.