



Unique Safety and Security Software Platform for Automotive Systems

Lynx Software Technologies and ETAS have formed a technology collaboration that brings the automotive safety-critical world together with the highest levels of security to meet the demanding needs of next generation connected and autonomous vehicles. With a combined 50 years of experience in real-time software development, Lynx and ETAS develop precision engineered, innovative products that are deployed in millions of highly reliable systems all over the world, meeting the highest levels of safety-criticality.

Lynx and ETAS have created a complete automotive software technology platform that allows new domain controllers and vehicle computers (DC/VC ECUs) to be introduced into both new and existing electrical/electronic (E/E) architectures required in connected and autonomous vehicles. Joining together the LynxSecure Separation Kernel Hypervisor from Lynx, RTA-BSW AUTOSAR software from ETAS, and Embedded Security solutions from ESCRYPT, the platform is unique in that it provides a secure software foundation for newer, more advanced, powerful microprocessors with richer, more adaptive software environments while addressing the unique safety, security, and real-time challenges inherent in next generation transportation systems.

LynxSecure Separation Kernel Hypervisor

LynxSecure is a real-time separation kernel and development kit that leverages multi-core CPU hardware virtualization features to enhance automotive embedded solutions by both accelerating their performance and providing the highest possible level of assurance that systems are safe. Combining



military-grade security with aviation-grade safety features, the LynxSecure Separation Kernel Hypervisor is uniquely engineered to raise the assurance of automotive systems performing critical computing functions in regulated environments.

Through virtualization and real-time control, LynxSecure isolates and protects fully independent computing environments to support the development of next generation ECUs featuring heterogeneous software defined architectures of mixed application critically. Adhering to the strictest safety standards, LynxSecure can simultaneously host safety critical applications up to ISO 26262 ASIL D and supports an extensive range of feature-rich virtual environments, including non-real-time OSes (such as Android and Linux), proprietary RTOSes, AUTOSAR kernels, and bare-metal applications.

With LynxSecure, automakers are empowered to safely incorporate multicore next generation SOCs (system on a chip) into their advanced and emerging automotive software designs while reducing cost of development and time to market.

RTA-BSW AUTOSAR Platform

AUTOSAR (the AUTomotive Open Systems ARchitecture) is the accepted automotive industry development framework for interoperable, scalable, standards-compliant embedded systems, enabling developers to bring new products to market quickly and cost-effectively while allowing scope to create differentiating features. ETAS provides a full AUTOSAR compliant runtime platform consisting of RTA-OS (operating system for deeply embedded ECUs), RTA-RTE (AUTOSAR Runtime Environment generator), and RTA-BSW (AUTOSAR compliant Basic Software). The platform is capable of supporting safety critical ECUs for both passenger cars (ISO26262) and off-highway (ISO25119) domains. This environment is now running within the lightweight isolated virtual machine containers of LynxSecure, allowing existing AUTOSAR software to be integrated into a powerful DC/VC ECU while providing the necessary safety, security, and freedom from interference features that the most demanding applications require (see figure 1)

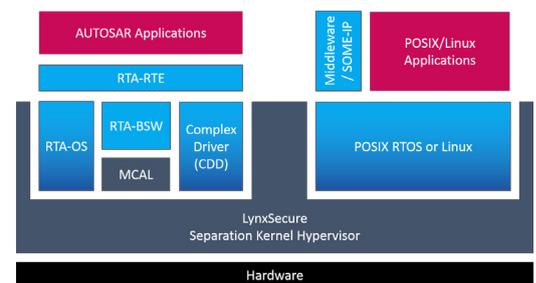


Figure 1: LynxSecure and RTA-BSW provides a unique safety and security platform

Advanced Kernel Technology

The LynxSecure kernel provides automotive systems with the protection they need by reducing the attack surface of exploitable interfaces to an absolute minimum through a tamper proof run-time design and a tiny trusted code-base compared to traditional RTOSes and Microkernels.

Unlike traditional operating systems, microkernels, and hypervisors which include drivers, I/O stacks, and application APIs, the LynxSecure separation kernel exports all system I/O and development APIs in fully autonomous user space runtimes, limiting its kernel space functionality to resource partitioning, controlling data flow between partitions, and mediate access to system state change functions.

LSA.connect bare-metal network encryption

LSA.connect is a LynxSecure development kit component that allows developers to create computing devices with multiple independent cryptographic network channels that can tunnel over a common IP network and create nested encrypted enclaves. The expansion includes cryptographic modules that can be layered in between network interfaces to encrypt data in motion generated by applications before exposing the data to public network interfaces. The LSA.connect components remain transparent to applications and are interoperable with any LynxSecure supported guest operating system and work with any IP supported network interface. LynxSecure protects the crypto modules from exposed

network interfaces or internal application domains and provides an architecture vastly superior to kernel integrated software VPNs that can be bypassed by malware or users. LSA.connect provides robust network integrity between a wide range of devices from IT infrastructure to automotive process controllers running in safety critical environments. In its simplest configuration, LSA.connect can be used to encrypt network traffic without exposing a large attack surface to malicious agents by housing the network encryption algorithms in their own secure domain, away from both the operating system connected to the internet and the encryption keys themselves. When running on a LynxSecure platform, LSA.connect provides a secure foundation for enabling dynamic content from the outside; controlled, unbreakable internal communications networks, and secure firmware-over-the-air (FOTA) software updates (see figure 2).

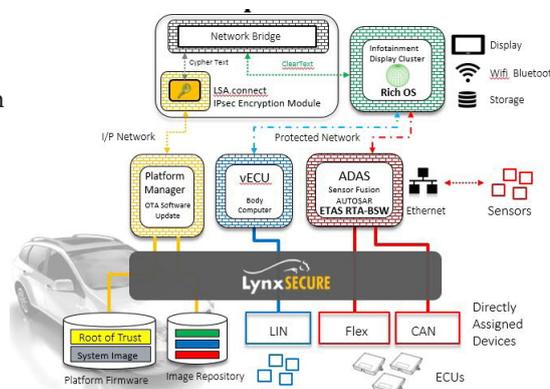


Figure 2 : LynxSecure and LSA.connect offer multi-domain security on a single platform

About Lynx Software Technologies

Through precision engineering, Lynx Software Technologies develops advanced kernel technology that empowers innovative companies to create the safest, most secure systems in the world. Lynx is committed to providing the highest levels of safety and security in its Virtualization and RTOS products. The latest product in the portfolio, the award-winning LynxSecure offers a secure separation kernel and embedded hypervisor that forms a platform for the development of highly secure systems. Since it was established in 1988, Lynx Software Technologies has created technology that has been successfully deployed in thousands of designs and millions of products made by leading automotive, communications, avionics, aerospace, medical, and transportation companies.

About ETAS

ETAS provides innovative solutions for the development of embedded systems for the automotive industry and other sectors of the embedded industry. As a systems provider, ETAS supplies a multifaceted portfolio that covers the range from integrated tools and tool solutions to engineering services, consulting, training, and support. Security solutions for embedded systems are offered by the ETAS subsidiary ESCRYPT. Established in 1994, ETAS GmbH is a 100-percent subsidiary of the Bosch Group, with international subsidiaries and sales offices in Europe, North and South America, and Asia.



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