EDUCATION SERVICES

EMBEDDED SECURITY ESSENTIALS

COURSE DESCRIPTION

The Embedded Security Fundamentals course covers a wide range of software security topics in the specific context of embedded systems. Attendees will learn how security practices and protocols apply to the embedded industry, and how they impact requirements and design.

After this course, participants will be able to perform the following:

- Identify the key challenges in creating a secure device
- Describe the basics of encryption and keys
- Contrast secure boot on different architectures
- Describe significant elements of network security, including SSH, SSL, IPsec, and IKE

PRODUCTS SUPPORTED

- VxWorks® 7.0
- The following targets are available:
  - Wind River® Simics® simulated targets

COURSE FORMAT

- This two-day expert-led course consists of lectures and lab sessions.
- Attendees use VxWorks 7.0 and Wind River Workbench 4.0 to gain experience with the topics presented.
- Participants receive individual guidance from an expert engineer who has extensive experience with Wind River technologies.

AUDIENCE

- Application developers
- Platform developers
- System architects
- Testers

PREREQUISITE SKILLS

- Understanding of embedded programming concepts
- One year of C or C++ programming experience on Linux/UNIX

Course title:	**Embedded Security Essentials**
Duration:	Two days
Format:	Instructor-led lectures and hands-on lab sessions; instructor-led Live Remote delivery available
Content:	**Day 1:** Introduction to Embedded Security; Privacy Implementations; Integrity Implementations; Availability Implementations; Security Building Blocks—Keys and Hardware; Boot Process; Intel Architecture Security Features **Day 2:** Firewall Overview; SSL; SSH; IPsec/IKE; Security Profile for VxWorks 7

PREREQUISITE COURSES

- VxWorks 7 and Workbench Essentials

RELATED COURSES

- none

SYLLABUS

Day 1

INTRODUCTION TO EMBEDDED SECURITY

- Definitions
- What is security?
- Regulation, standards, and references
- Lifecycle management
- Designing for security
- **LAB: Exploring Network Security Threats**

PRIVACY IMPLEMENTATIONS

- Confidentiality and privacy
- Categories of ciphers
- Symmetric ciphers

- Asymmetric ciphers
- Cryptanalysis
- Sources of information
- **LAB: Working with Ciphers**

INTEGRITY IMPLEMENTATIONS

- Integrity decompositions
- Hash functions
- Keyed-hash message authentication code
- Digital signatures
- Sources of information

AVAILABILITY IMPLEMENTATIONS

- Availability decompositions
- Whitelisting
- Intrusion protection
- Management
- Countermeasures

SECURITY BUILDING BLOCKS—KEYS AND HARDWARE

- What is a key?
- Public vs. private keys
- Diffie-Hellman and RSA
- Managing keys and certificates
- How random is your hardware?
- Is the hardware up to the challenge?
- **LAB: Creating an X.509 Certificate**

BOOT PROCESS

- Secure boot
- **LAB: Using a VxWorks Secure Boot with UEFI**

(OPTIONAL) INTEL ARCHITECTURE SECURITY FEATURES

- Trusted Platform Module 2.0
- Unified Extensible Firmware Interface
- Measured launch environment
- Launch control policy

Day 2

FIREWALL OVERVIEW

- Introduction
- Stateful firewall example
- Firewall concepts
- Firewall implementations
- Linux iptables
- **LAB: Configuring a Firewall**

SSL

- Overview
- SSL architecture
- SSL and security
- Handshake process
- SSL session
- VPN using SSL
- **LAB: Building a Secure Connection with SSL**

SSH

- Overview
- SSH architecture
- Security in SSH
- SSH features
- OpenSSH
- Competing protocols

IPSEC/IKE

- Overview
- IPsec architecture
- Security association and SPD
- AH and ESP
- Key management in IPsec
- IKEv1
- IKEv2
- **LAB: Building Secure Sessions with IPsec and IKE**

SECURITY PROFILE FOR VXWORKS 7

- Security Profile for VxWorks 7
- User management
- Encryption
- Secure networking
- Secure boot
- Encrypting the file system
- **LAB: Managing User Authentication**

GLOBAL REACH OF WIND RIVER EDUCATION SERVICES

With more than 30 years of experience delivering software for intelligent systems, Wind River provides education services in every region of the world. Our private classes can be tailored to your needs by adding or removing topics from multiple courses. If you have more specific project challenges, Wind River Mentoring provides coaching by experienced engineers to help you integrate Wind River solutions into your environment. And when you're too busy to attend a whole class, our On-Demand Learning options provide around-the-clock access to advanced and specialized topics. All of our education services are led by expert engineers who are closely connected to the Wind River technical community for access to specific expertise.

CONTACT US

For more information about Wind River Education Services, visit www.windriver.com/education/.

Wind River World Headquarters

500 Wind River Way
Alameda, CA 94501
USA
Toll-free: 800-545-9463
Tel.: 510-748-4100
Fax: 510-749-2454

training@windriver.com

Wind River EMEA

Steinheilstrasse 10
85737 Ismaning
Germany
Tel.: +49 89 962 445 0
Fax: +49 89 962 445 999

emea-training@windriver.com

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