CONCURRENT TECHNOLOGIES

Embedded TechTrends

Big and Bright - Security

Big and Bright – Security

Does this mean:

- Everything is **Big and Bright** – our security is 100% effective?

or

- There are **Big** security concerns but **Bright** solutions?

or

- Security issues are so **Big and Bright** - there are no solutions?

- We will look at this in the context of our embedded defense customers

Security Risks depend on the Environment

Consumer Use

- Open and connected
- Many Tasks
- Single User

Embedded Use

- Closed, controlled
- Single Task
- Multiple Users

Embedded users can leverage some consumer technologies

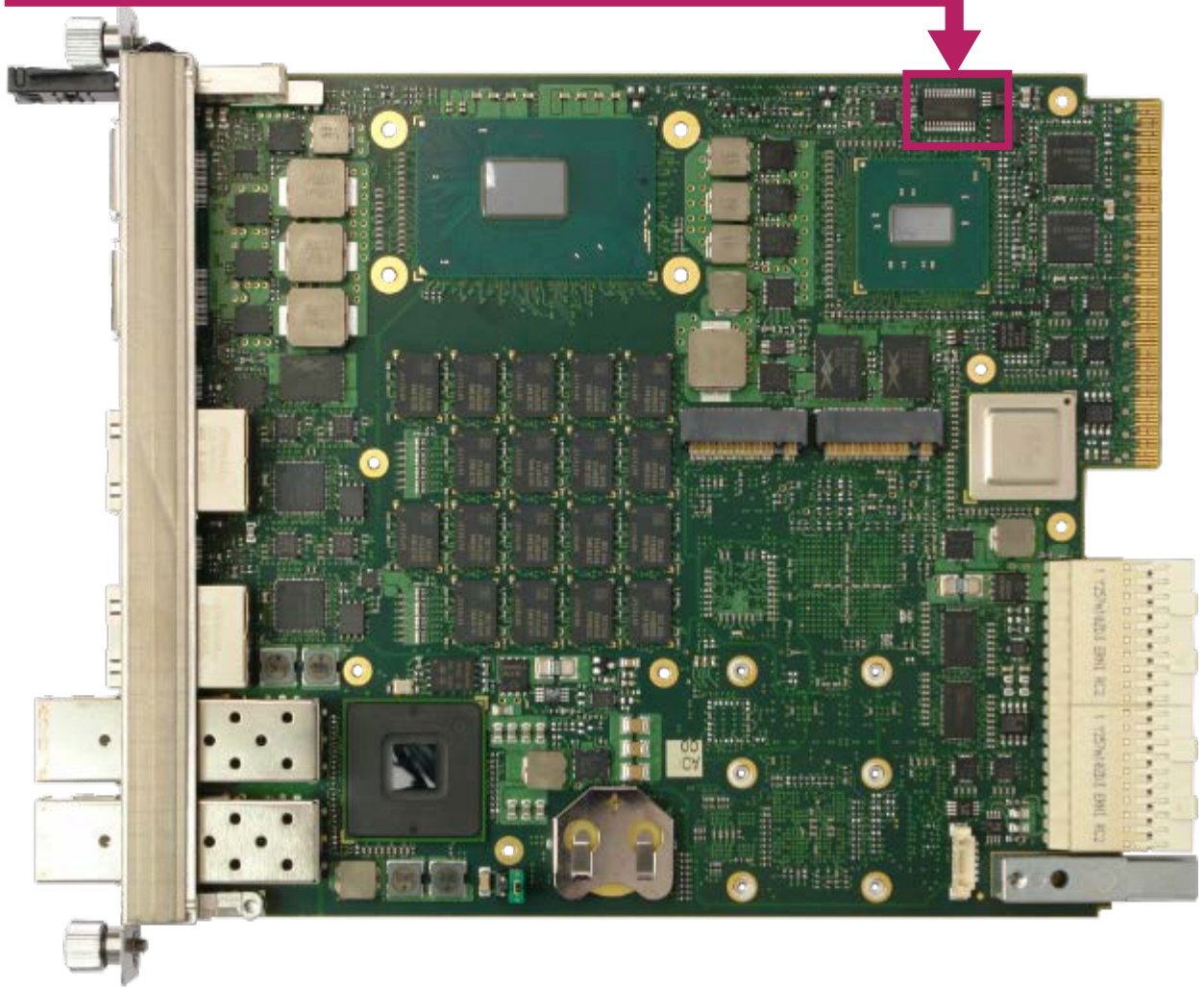
Security Timeline

1993	2002	2009	2012	2015
Microsoft Windows NT	Microsoft Windows xp	Windows 7	Windows 8	Windows 10
User access permissions	IPv6 using IPSec	**TPM 1.2** Bitlocker, User Account Control, Defender	UEFI Secure Boot	**TPM 2.0** Device Guard, Credential Guard, Boot Guard

TPM – Trusted Platform Module

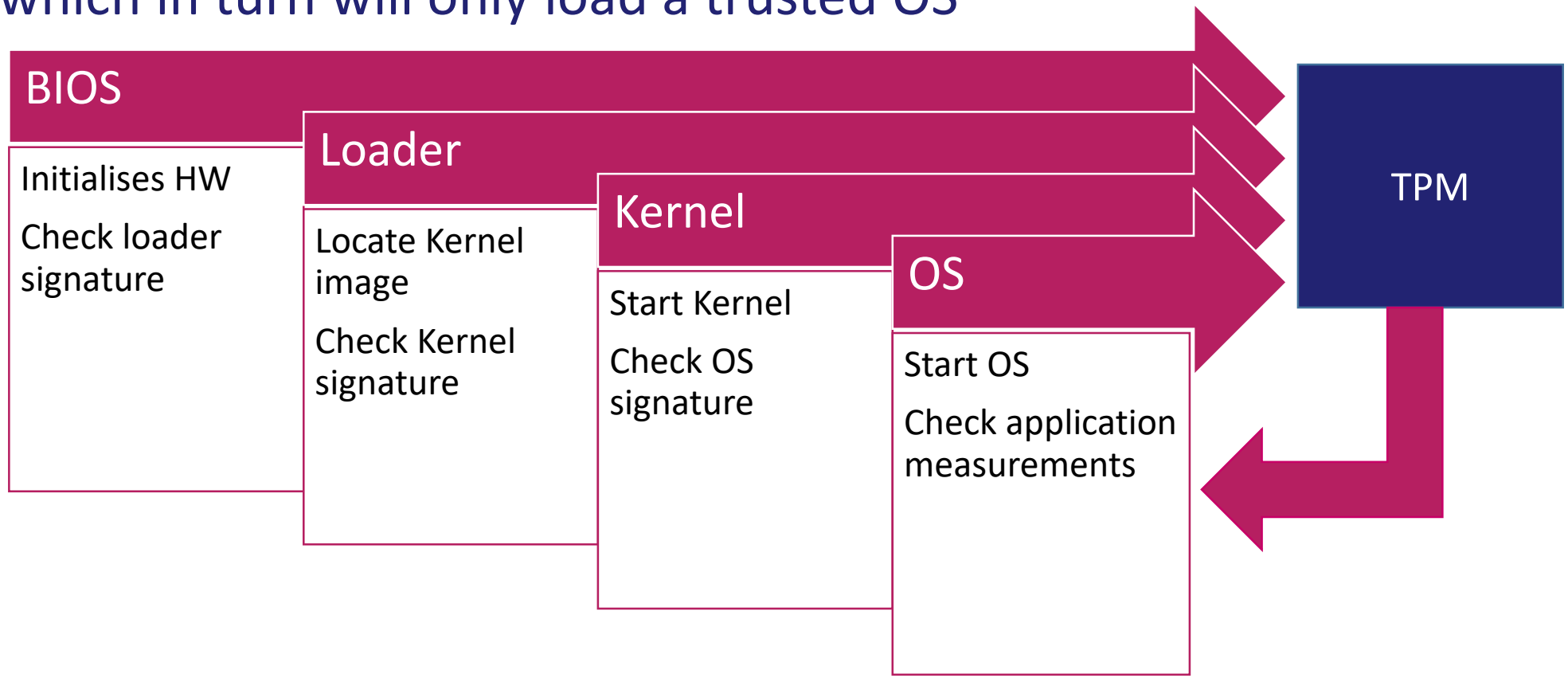
What is a TPM?

- A tamper-resistant integrated circuit
- Enables:
  - Cryptographic key generation
  - Safe storage of small amounts of sensitive information, such as passwords and cryptographic keys
  - Generation of random numbers



TPM can help ensure image security

- The TPM can record hashes that measure the images for later validation
- Secure Boot only loads trusted (signed) operating system bootloaders, which in turn will only load a trusted OS



Guards utilizing TPMs

- Microsoft® Credential Guard prevents against 'credential creep' in large organizations:
  - User credentials are isolated from the operating system kernel using virtualization and TPM measurements
- Intel® Boot Guard is a hardware based scheme that prevents boot block takeover

TPM 2.0 Improvements

- Support for additional cryptographic algorithms, i.e. SHA256, SHA384, SHA512, and SM3_256
- Enhancements to the availability of the TPM to applications
- Enhanced authorization mechanisms
- Simplified TPM management

- All new boards from Concurrent Technologies come with TPM 2.0 and it is now an option on boards announced since 2014

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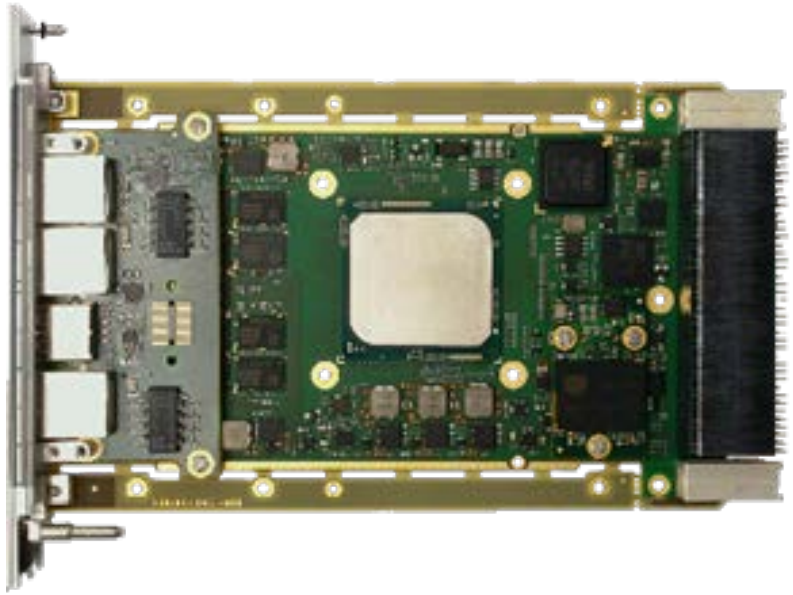
What if you can’t use the latest OS?

Use a Hypervisor

- Run a legacy OS and application in a Virtual Machine
- Can utilize native hypervisor or OS based
- Has an impact on real time performance
- Boot method more secure but legacy OS and application concerns

Virtual Machine

Hypervisor



Use a Board based Security Solution

Guardian Security Package

- Available since 2012
- Processor boards are available with the option of additional hardware, firmware and software components for holistic security

Three Key Goals of Guardian

- Preventing unauthorized use:
  - To prevent an unauthorized person from interfering with or operating the equipment
- Preventing unauthorized access:
  - To prevent an unauthorized person from gaining access to sensitive data when they have access to the equipment
  - To prevent a person with legitimate access to the hardware from gaining access to sensitive data
- Allowing sensitive data to be purged on-demand:
  - To ensure that all sensitive data can be deleted rendering the hardware inoperable or returning it to the original factory configuration

Guardian protects against:

- Physical intrusion
- Booting from non-secure sources
- Accessing classified data
- Retrieving sensitive Intellectual Property
- Modifying non-volatile memory
- Executing non-trusted software
- Unauthorized modification of system configuration
- Bypassing low level firmware
- Reverse engineering

Testing and Deployment

- Board is configured:
  - Enables extensive testing without lock activating
- Security Lock enabled:
  - A breach of any selected measure will lock a board permanently
  - Boards are suitable for deployment
- Remove from Service:
  - Sanitization option to scrub and securely erase devices

Conclusions

- Improved security has now (finally) become more important to some defense customers than backwards compatibility:
  - TPM 2.0 and Windows 10
  - Secure Boot
  - Boot Guard
- Even tightly controlled, closed solutions need security options
- Be flexible - one solution doesn't fit every customer
- Nothing is 100% secure

- There are **Big** security concerns but **Bright** solutions

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Thanks for listening