HITB+CyberWeek
Abu Dhabi, UAE: 12-17 October 2019

Securing your Laptop like you **mean** it: Virtualization Based Security

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https://www.meriac.com
@FoolsDelight

2

ABOUT
ME

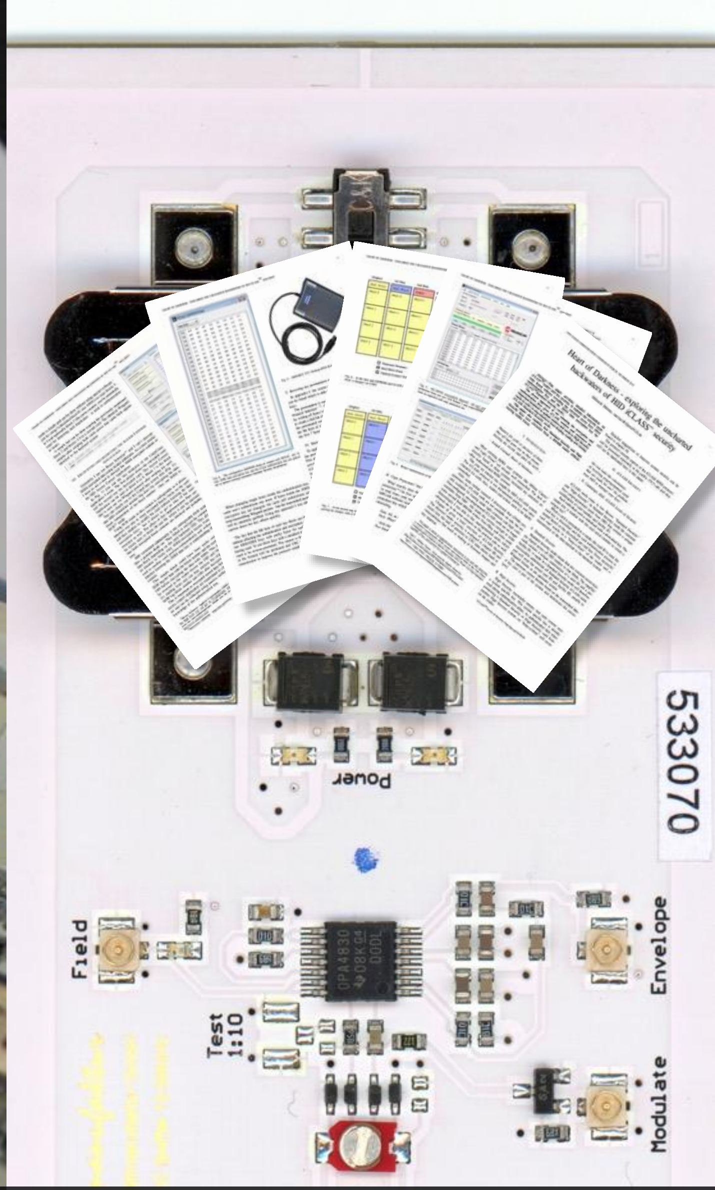
My Open Software & Hardware Projects

SHARED FUN IS TWICE THE FUN

I created a range of open hardware designs and software tools around RF(ID)/BLE security research and electronic art projects. You can find a more information on my work at meriac.com

OpenPCD.org

Open 13.56 MHz
RFID NFC Reader



broke HID iClass

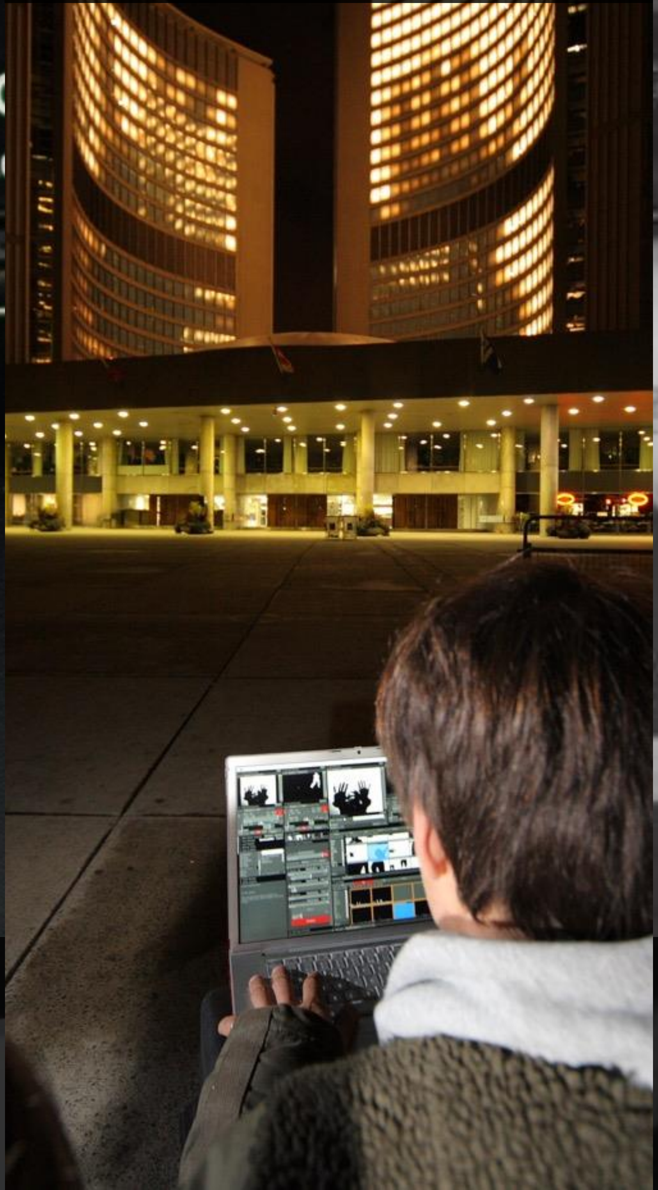
Open 13.56 MHz
RFID Sniffer Design
with HID iClass
Decoder

OpenBeacon.org

Realtime 2.4GHz Localization & Human Interaction Analysis, see also SocioPatterns.org

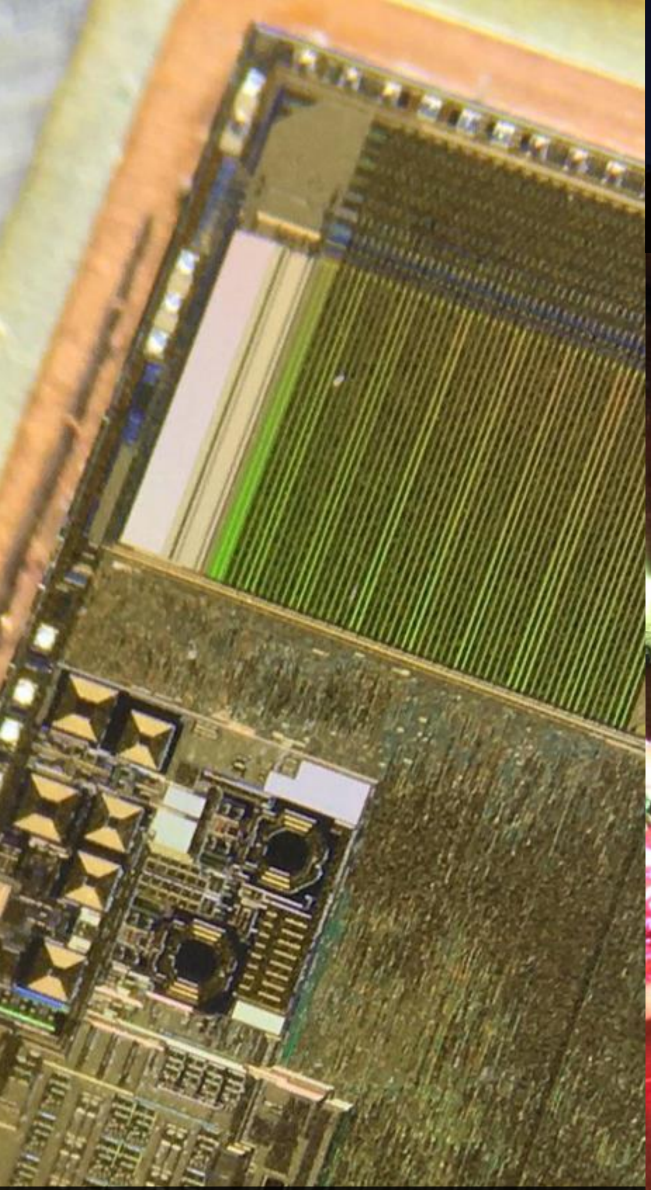
Blinkenlights Stereoscope

960 x Realtime 2.4GHz Wireless Halogen Dimmers for Toronto City Hall



Xbox Linux Core Team

Breaking the first trusted computing platform for consumers



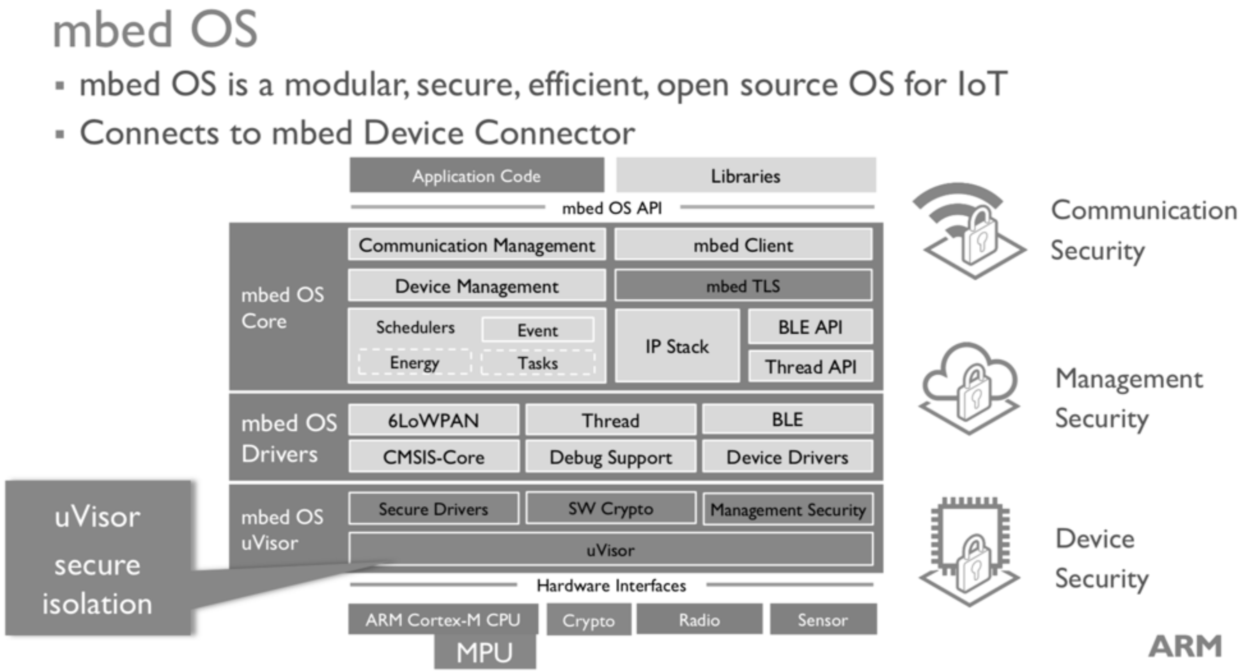
Chip Security

Reverse engineering and researching safer chip de-capping for HW attacks

Blinkenstick.org

Light Painting using LPD8806 based RGB strips

Arm Mbed uVisor Security



Arm Ltd

Led mbed OS uVisor code compartmentalization project for microcontrollers. Uses hardware isolation features of Arm v7M/v8M for isolated execution.

Introduction:
Laptop Threat Model

Follow The White Rabbit

Malicious firmware weakens the operating system security at boot ...

HIT THE ROAD, LOJAX —

First UEFI malware discovered in wild is laptop security software hijacked by Russians

“LoJax” repurposed LoJack anti-theft agent as rootkit that could survive OS re-installs.

SEAN GALLAGHER - 10/2/2018, 4:33 PM

Chatri Attanatwong / Getty Images

Enlarge

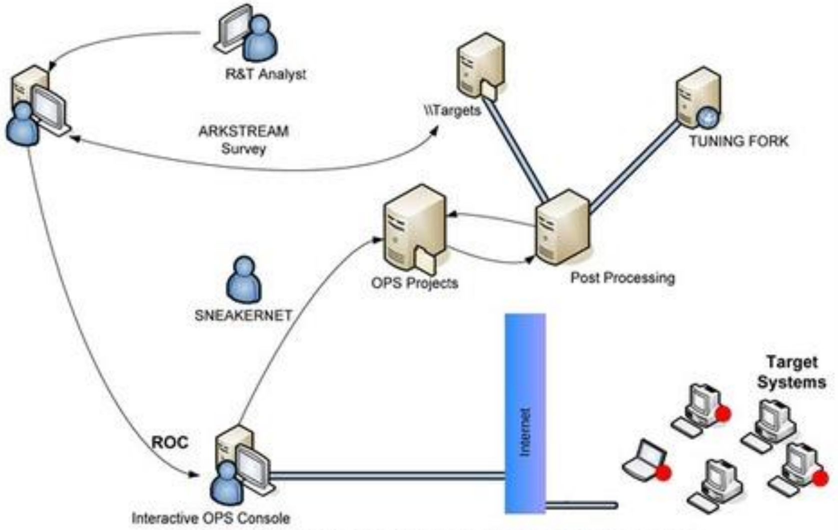
… or runs in the background creating active backdoors – undetectable by the OS and persistent across OS reinstalls

DEITYBOUNCE

ANT Product Data

(TS//SI//REL) DEITYBOUNCE provides software application persistence on Dell PowerEdge servers by exploiting the motherboard BIOS and utilizing System Management Mode (SMM) to gain periodic execution while the Operating System loads.

06/20/08



(TS//SI//REL) DEITYBOUNCE Extended Concept of Operations

(TS//SI//REL) This technique supports multi-processor systems with RAID hardware and Microsoft Windows 2000, 2003, and XP. It currently targets Dell PowerEdge 1850/2850/1950/2950 RAID servers, using BIOS versions A02, A05, A06, 1.1.0, 1.2.0, or 1.3.7.

(TS//SI//REL) Through remote access or interdiction, ARKSTREAM is used to re-flash the BIOS on a target machine to implant DEITYBOUNCE and its payload (the implant installer). Implantation via interdiction may be accomplished by non-technical operator though use of a USB thumb drive. Once implanted, DEITYBOUNCE's frequency of execution (dropping the payload) is configurable and will occur when the target machine powers on.

Status: Released / Deployed. Ready for Immediate Delivery

Unit Cost: $0

POC: [redacted], S32221, [redacted], [redacted]@nsa.ic.gov

Derived From: NSA/CSSM 1-52
Dated: 20070108
Declassify On: 20320108

Attackers physically obtaining **temporary access** to hardware can result in **irrecoverable loss** of control over your hardware

MOTHERBOARD
TECH BY VICE

Watch a Hacker Install a Firmware Backdoor on a Laptop in Less Than 5 Minutes

This demo shows that "evil maid attacks," hacks where an attacker has physical access to a target computer, are not as complicated as you may think.

By Lorenzo Franceschi-Bicchierai

Jul 23 2018, 11:27pm Share Tweet

IMAGE: ECLYPSIUM

Hacker lore is littered with tales of mysterious attackers breaking into hotels—perhaps at a conference—to get their hands on someone's

Supply chain attacks enable pre-installation of backdoors for targeted users – most attacks won’t require installation of physical chips like in this example.

ANDY GREENBERG SECURITY 10.10.2019 11:07 AM

Planting Tiny Spy Chips in Hardware Can Cost as Little as $200

A new proof-of-concept hardware implant shows how easy it may be to hide malicious chips inside IT equipment.

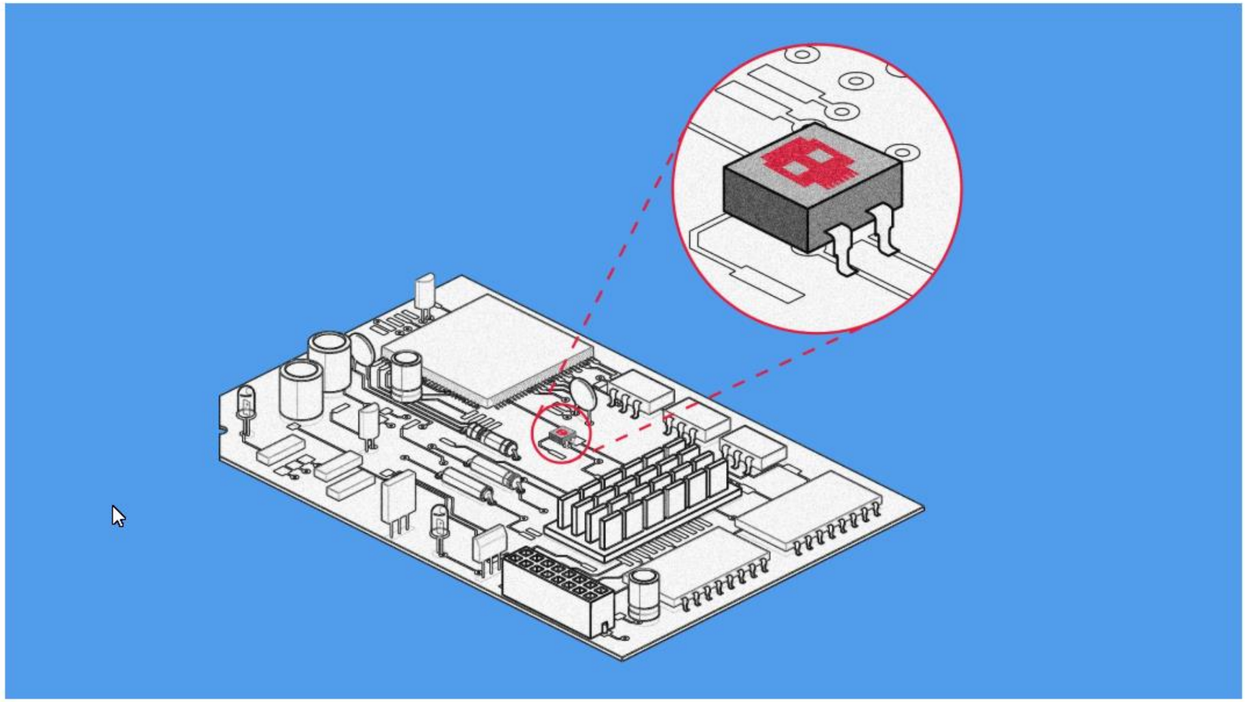
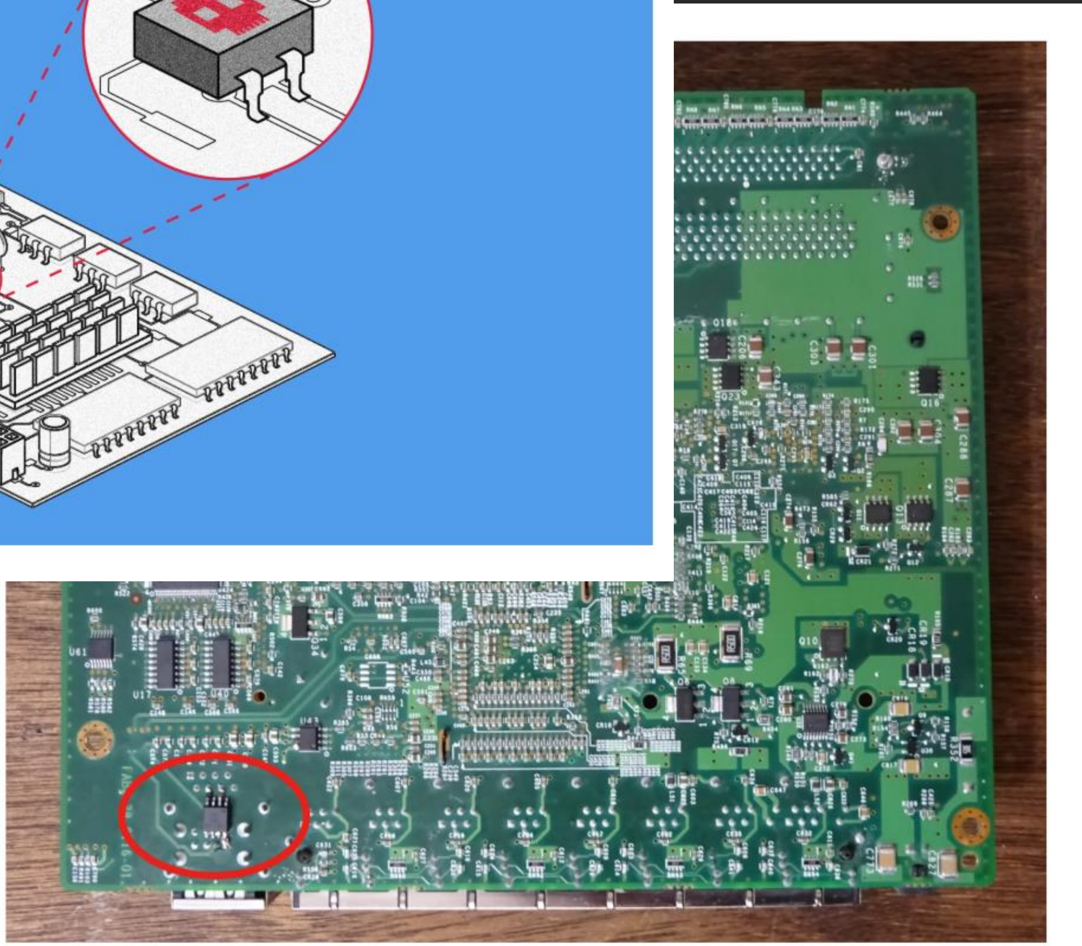


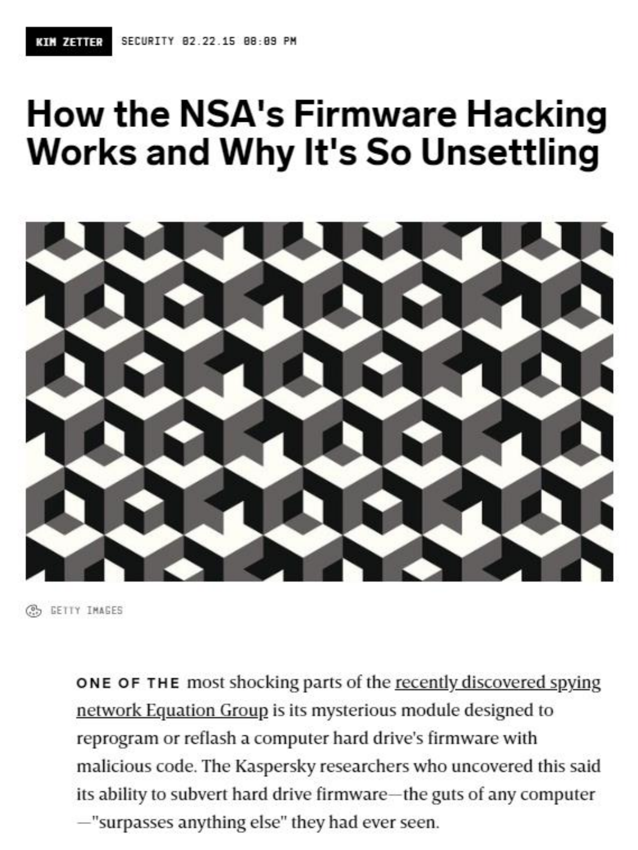
ILLUSTRATION: CASEY CHIN; GETTY IMAGES



The bottom side of a Cisco ASA 5505 firewall motherboard, with the red oval marking the 5-millimeter-squared chip that Elkins added.
PHOTOGRAPH: MONTA ELKINS

Simple malware runs on the main CPU (various system- & PCI BIOS NVM chips) - hidden in SMM/HV.

Advanced malware permanently installs on embedded controllers like Keyboard, Hard disk, SSD, Network, Intel AMT/ISM, WIFI, BT, WAN, Thunderbolt-adapters, SD-Card or USB devices like webcams and disks.

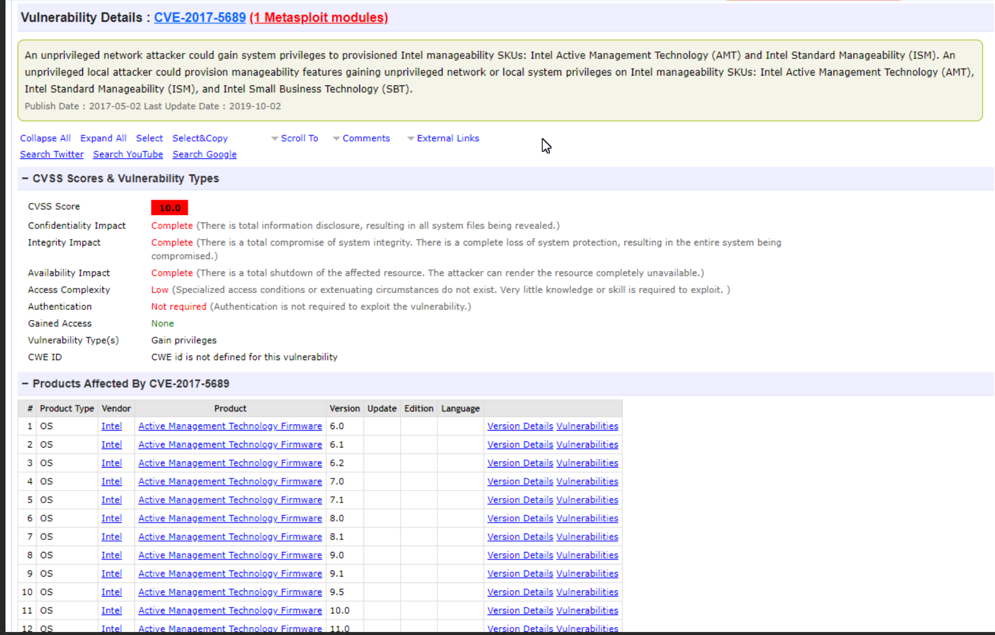


KIM ZETTER SECURITY 02.22.15 08:09 PM

How the NSA's Firmware Hacking Works and Why It's So Unsettling

GETTY IMAGES

ONE OF THE most shocking parts of the recently discovered spying network Equation Group is its mysterious module designed to reprogram or reflash a computer hard drive's firmware with malicious code. The Kaspersky researchers who uncovered this said its ability to subvert hard drive firmware—the guts of any computer—"surpasses anything else" they had ever seen.



Vulnerability Details : CVE-2017-5689 (1 Metasploit modules)

An unprivileged network attacker could gain system privileges to provisioned Intel manageability SKUs: Intel Active Management Technology (AMT) and Intel Standard Manageability (ISM). An unprivileged local attacker could provision manageability features gaining unprivileged network or local system privileges on Intel manageability SKUs: Intel Active Management Technology (AMT), Intel Standard Manageability (ISM), and Intel Small Business Technology (SBT).
Publish Date : 2017-05-02 Last Update Date : 2019-10-02

Collapse All Expand All Select Select&Copy Scroll To Comments External Links
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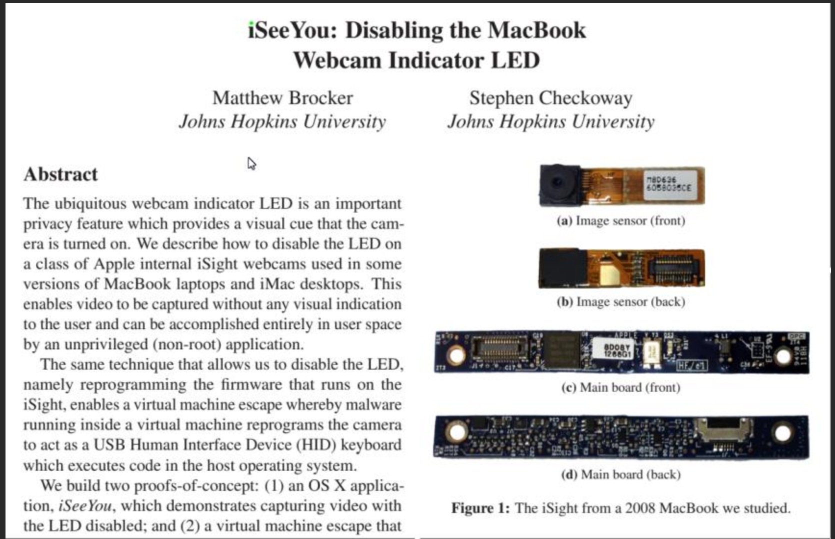
− CVSS Scores & Vulnerability Types

CVSS Score	10.0
Confidentiality Impact	Complete (There is total information disclosure, resulting in all system files being revealed.)
Integrity Impact	Complete (There is a total compromise of system integrity. There is a complete loss of system protection, resulting in the entire system being compromised.)
Availability Impact	Complete (There is a total shutdown of the affected resource. The attacker can render the resource completely unavailable.)
Access Complexity	Low (Specialized access conditions or extenuating circumstances do not exist. Very little knowledge or skill is required to exploit.)
Authentication	Not required (Authentication is not required to exploit the vulnerability.)
Gained Access	None
Vulnerability Type(s)	Gain privileges
CWE ID	CWE id is not defined for this vulnerability

− Products Affected By CVE-2017-5689

#	Product Type	Vendor	Product	Version	Update	Edition	Language	
1	OS	Intel	Active Management Technology Firmware	6.0				Version Details Vulnerabilities
2	OS	Intel	Active Management Technology Firmware	6.1				Version Details Vulnerabilities
3	OS	Intel	Active Management Technology Firmware	6.2				Version Details Vulnerabilities
4	OS	Intel	Active Management Technology Firmware	7.0				Version Details Vulnerabilities
5	OS	Intel	Active Management Technology Firmware	7.1				Version Details Vulnerabilities
6	OS	Intel	Active Management Technology Firmware	8.0				Version Details Vulnerabilities
7	OS	Intel	Active Management Technology Firmware	8.1				Version Details Vulnerabilities
8	OS	Intel	Active Management Technology Firmware	9.0				Version Details Vulnerabilities
9	OS	Intel	Active Management Technology Firmware	9.1				Version Details Vulnerabilities
10	OS	Intel	Active Management Technology Firmware	9.5				Version Details Vulnerabilities
11	OS	Intel	Active Management Technology Firmware	10.0				Version Details Vulnerabilities
12	OS	Intel	Active Management Technology Firmware	11.0				Version Details Vulnerabilities



iSeeYou: Disabling the MacBook Webcam Indicator LED

Matthew Brocker, *Johns Hopkins University* — Stephen Checkoway, *Johns Hopkins University*

Abstract

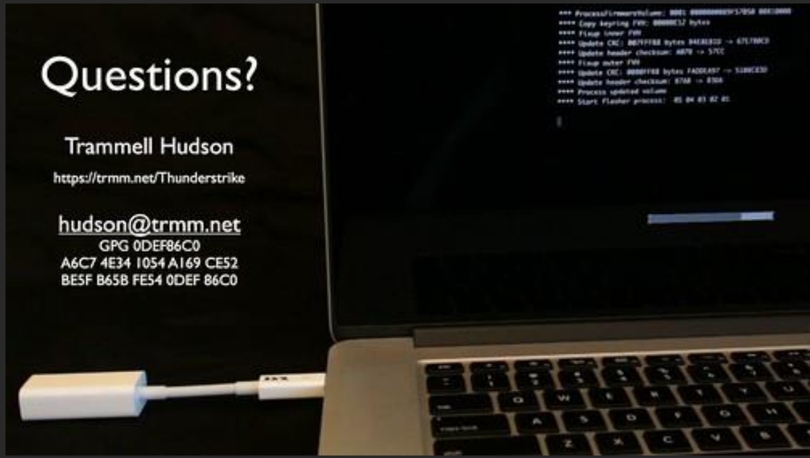
The ubiquitous webcam indicator LED is an important privacy feature which provides a visual cue that the camera is turned on. We describe how to disable the LED on a class of Apple internal iSight webcams used in some versions of MacBook laptops and iMac desktops. This enables video to be captured without any visual indication to the user and can be accomplished entirely in user space by an unprivileged (non-root) application.

The same technique that allows us to disable the LED, namely reprogramming the firmware that runs on the iSight, enables a virtual machine escape whereby malware running inside a virtual machine reprograms the camera to act as a USB Human Interface Device (HID) keyboard which executes code in the host operating system.

We build two proofs-of-concept: (1) an OS X application, *iSeeYou*, which demonstrates capturing video with the LED disabled; and (2) a virtual machine escape that

(a) Image sensor (front)
(b) Image sensor (back)
(c) Main board (front)
(d) Main board (back)

Figure 1: The iSight from a 2008 MacBook we studied.



Modern OSs like Windows and selected Linux distribution detect installed hardware, update device & system firmware, update vendor-specific software and install binary drivers.

POSTED: 25 MAR, 2019 1 MIN READ THREAT INTELLIGENCE

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Symantec Security Response
Security Response Team

ASUS Software Updates Used for Supply Chain Attacks

ASUS update system hijacked to send out malicious updates to as many as half a million computers.

SHARE

What has happened?

News has emerged that tech company ASUS has been delivering malware through its automated software update system. Based on our analysis, this supply chain attack started in June 2018 and continued through to at least late October. It may have affected up to half a million systems.

The Trojanized updates contained a form of backdoor program which attempted to connect to an attacker-controlled domain. The updates were signed with legitimate ASUS digital certificates.

Am I protected?

Symantec detects the Trojanized updates as Trojan.Susafone, Trojan.Susafone!gen1, Trojan.Susafone!gen2, and Trojan.Susafone!gen3.

What happens when the Trojanized updates are installed?

The Trojanized updates search for specific machines based on their unique MAC addresses. If specific MAC addresses are found, the installed updates attempt to connect to asushotfix[.]com. This domain is currently offline.

How many victims are there?

Symantec telemetry shows that at least 13,000 computers received the Trojanized updates. 80 percent of victims were consumers and 20 percent were from organizations. Our telemetry shows an even spread of victims across the globe.

Should we just capitulate?

The FBI recommends you cover your laptop's webcam, for good reason

There's a thriving market for illicitly obtained stills and video

Violet Blue, @violetblue
09.23.16 in Security

48 Comments

12644 Shares

Meriel Jane Waissman/Getty

Can I trust my Hardware?

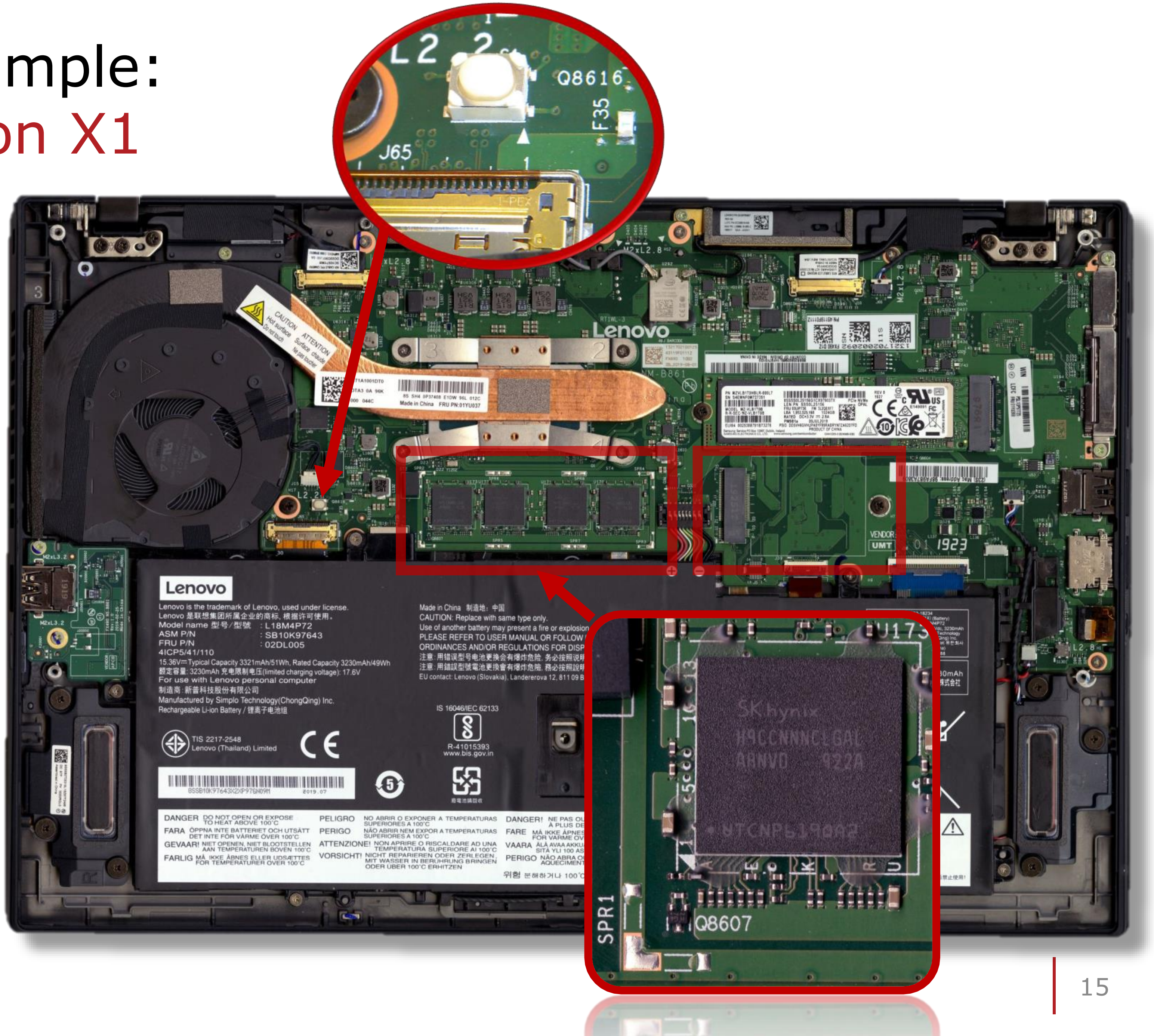
Speedrun:
How bad is hardware complexity?

Hardware Platform Example:
Lenovo ThinkPad Carbon X1

	2019 Lenovo X1 Carbon (7th Gen)
Screen	14.0 inch, FHD matte (400 nits), FHD touch (400 nits), FHD ePrivacy (400 nits), WQHD matte (300 nits), UHD 10-bit with HDR (500 nits)
Processor	up to Intel Whiskey Lake i7-8565U (4 cores, 8 threads @ 1.8-4.6GHz)
Video	UHD Graphics 620 (integrated)
Memory	up to 16GB LPDDR3-2133 (soldered, dual-channel)
Storage	1x M.2 80 mm NVMe OPAL2, up to 2 TB
Connectivity	Intel WiFi 9650 with Bluetooth 5.0 (?), Intel Ethernet Connection, optional WWAN
Ports	2x USB-C Thunderbolt 3, 2x USB-A 3.1, HDMI 1.4(?), SIM/MicroSD, doc-port, headphone/mic, Lock
Battery	51 Wh, 65W power adapter (USB Type-C)
Size	323 ot 12.71"(W) x 217 x 8.54"(D) x 14.95 or 0.58" mm (H)
Weight	from 1.11 kg / 2.46 lbs(+ power supply)
Extras	IR cameras with ThinkShutter, finger-sensor, quad speakers

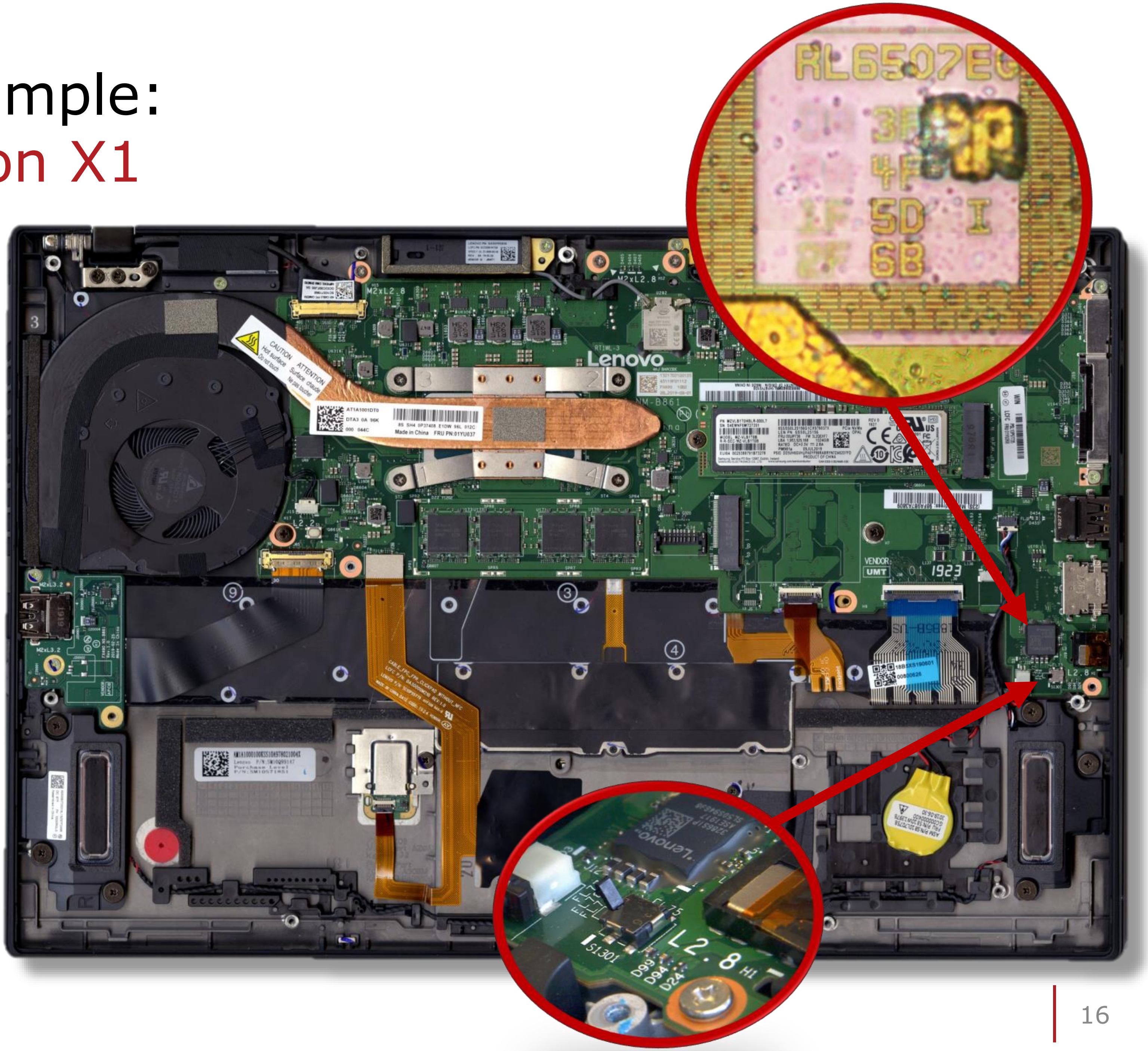
Hardware Platform Example:
Lenovo ThinkPad Carbon X1

- Soldered DDRAM memory complicates cold-boot attacks.
- DDRAM has footprint for adding a metal shield
- Detection of M.2 SSD removal
- Free slot for custom security module (WAN-slot) and SIM-Card slot for secure SIM card
- Hard-Off-Switch, reachable via pinhole in case



Hardware Platform Example:
Lenovo ThinkPad Carbon X1

- Discrete TPM module
- TPM buffered by dedicated CR2032 coin cell
- Anti-Tamper switch protecting the TPM
- Battery-removal detection



Hardware Platform Example:
Lenovo ThinkPad Carbon X1

- Two serial NVM flash memories

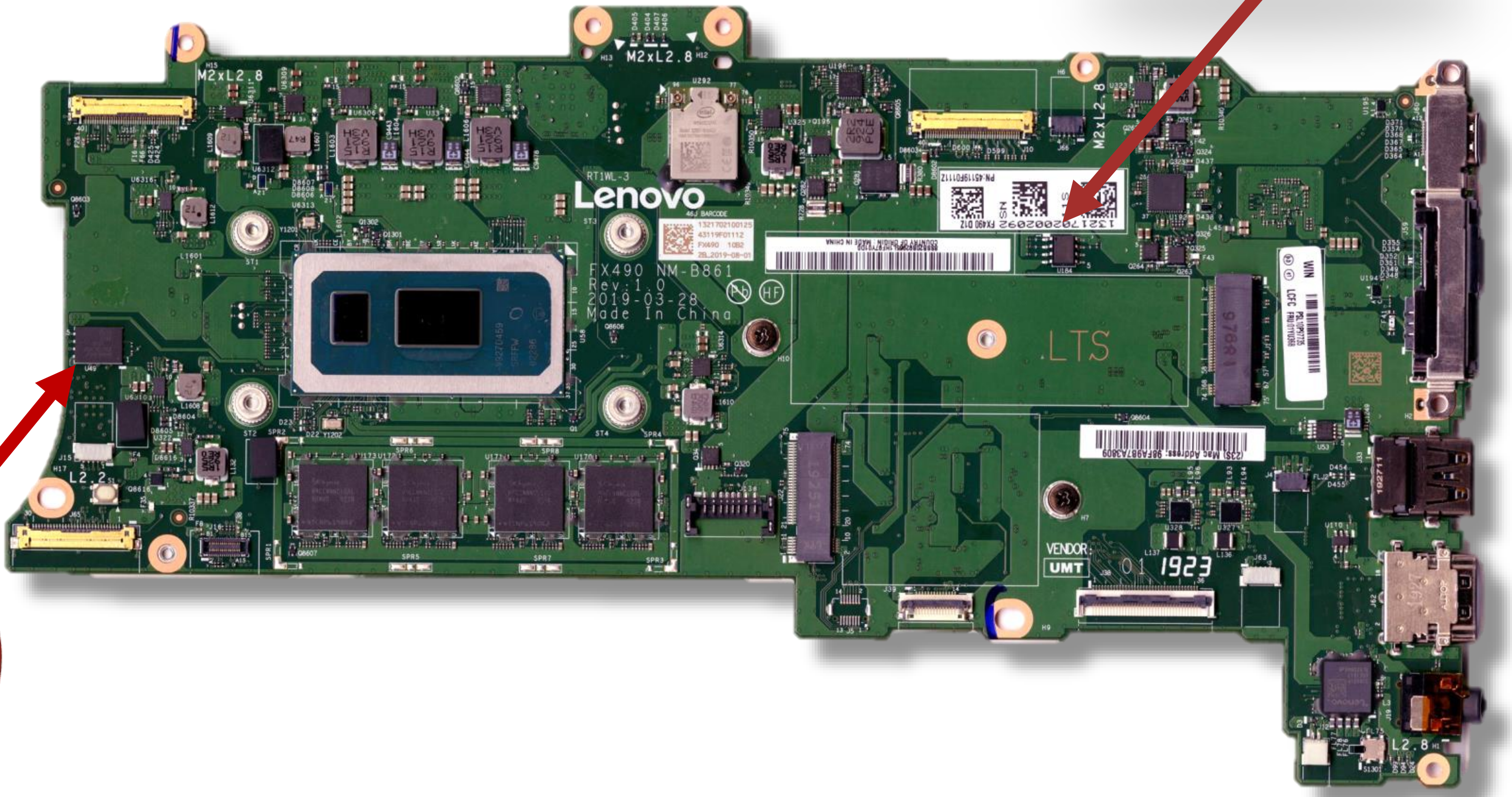
W25Q80DV/DL

winbond

spiflash

2.5V AND 3V 8M-BIT SERIAL FLASH MEMORY WITH DUAL AND QUAD SPI

1MB



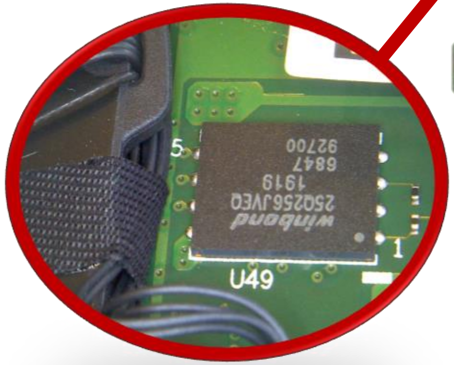
W25Q256JV

winbond

spiflash

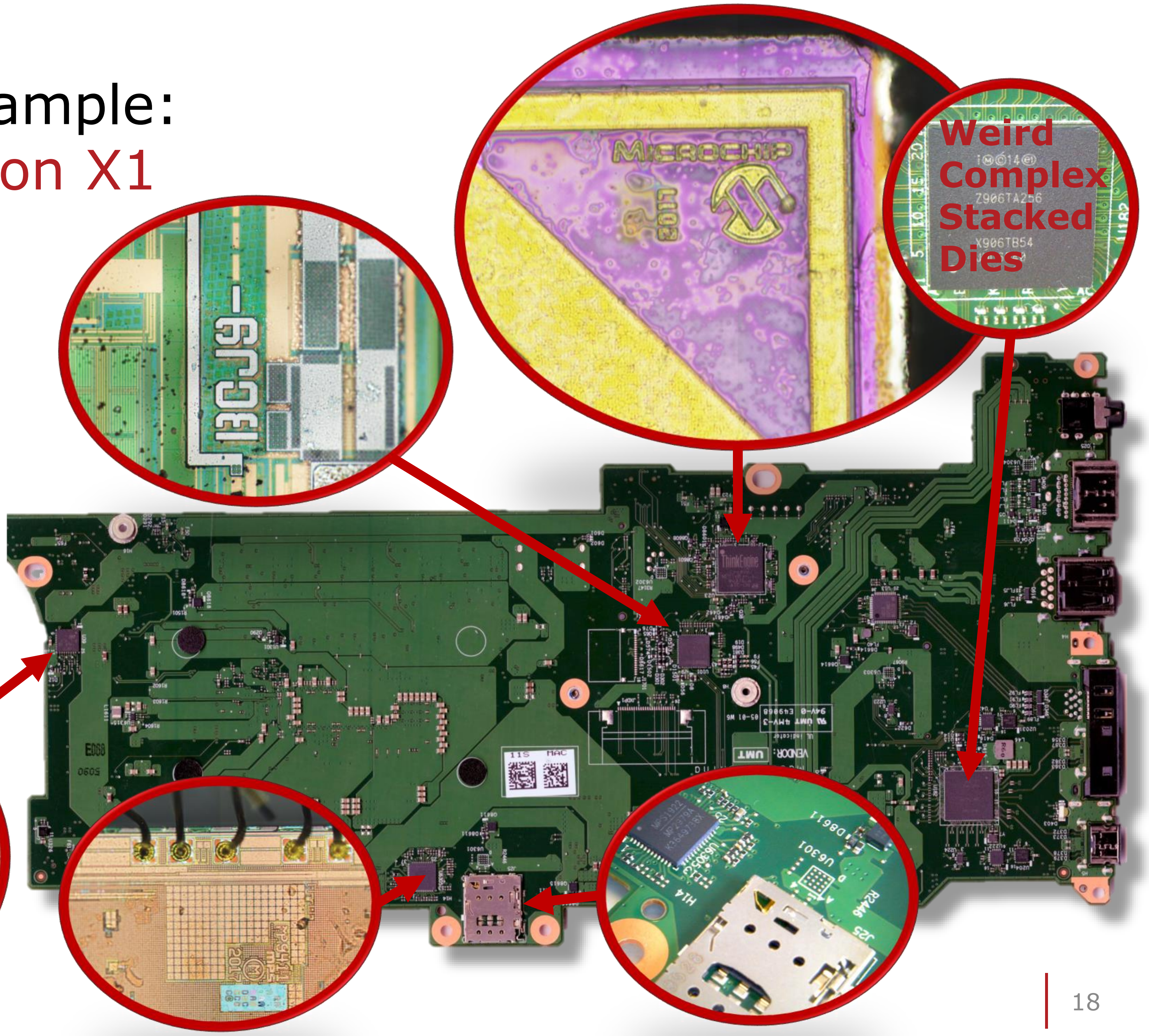
3V 256M-BIT SERIAL FLASH MEMORY WITH DUAL/QUAD SPI

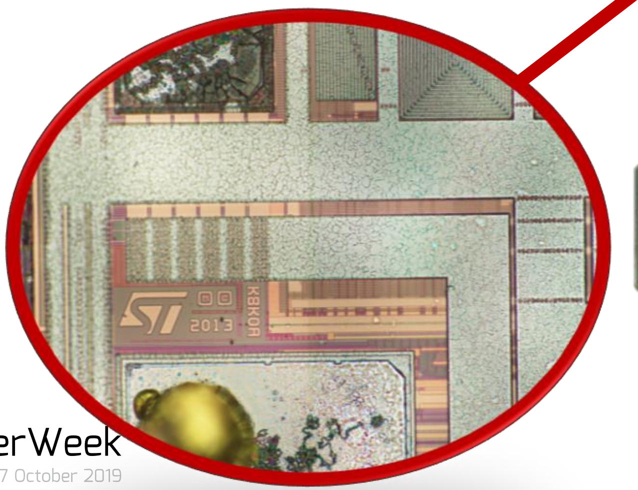
32MB



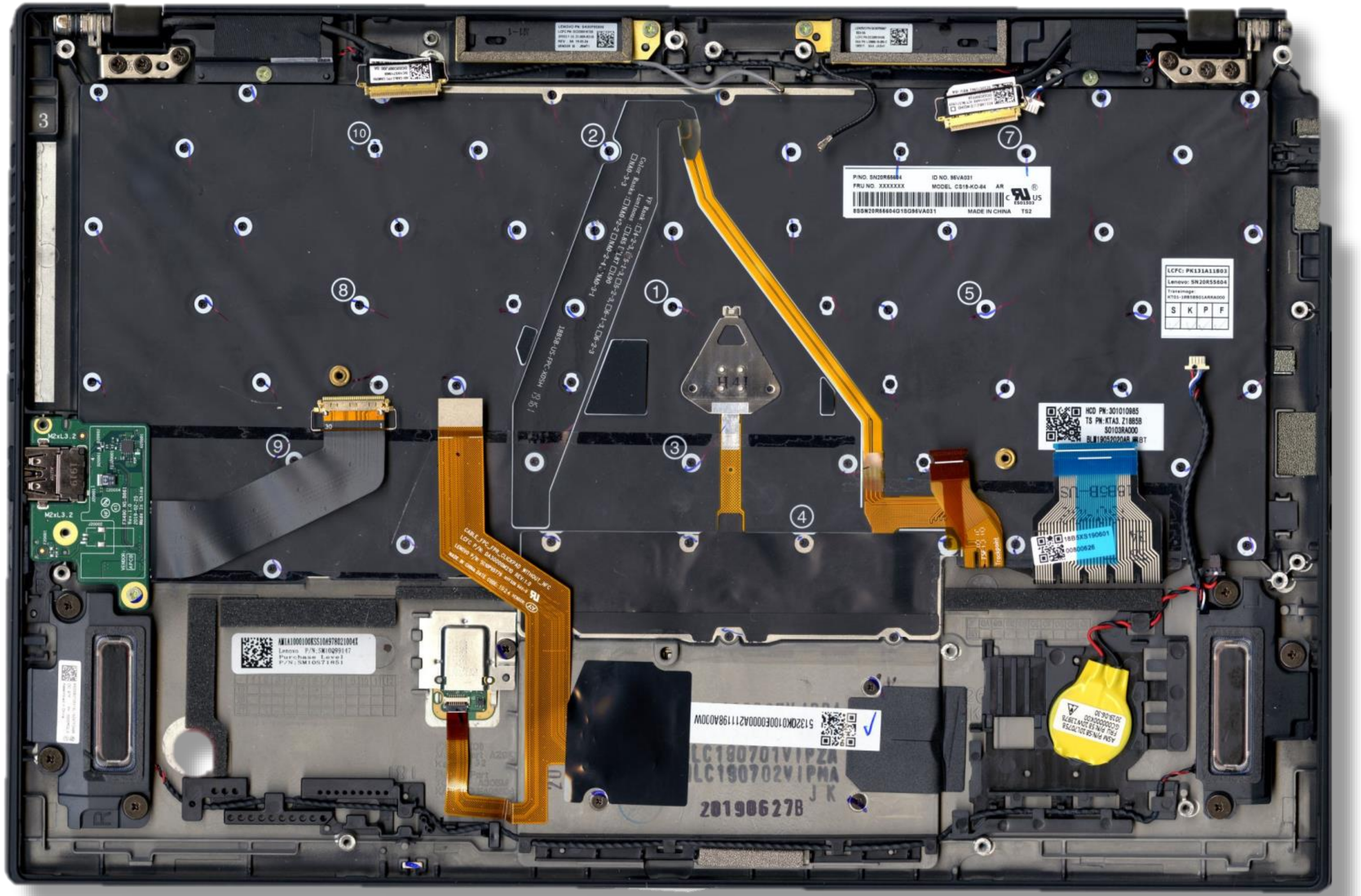
Hardware Platform Example:
Lenovo ThinkPad Carbon X1

- SIM-Card slot for secure SIM card - connected to WAN modem
- Various microcontrollers, including (Microchip, STM)





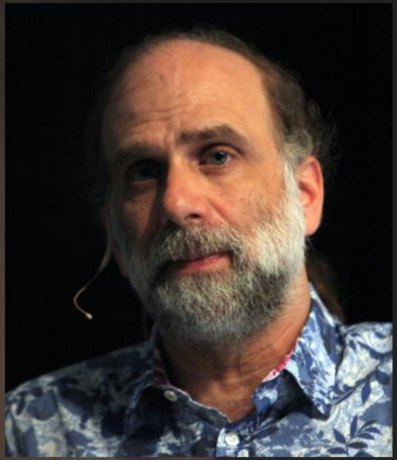
Hardware Platform Example:
Lenovo ThinkPad Carbon X1



- Metal housing for added electromagnetic fault injection & side channel attack resilience
- Fingerprint Sensor

Getting Trust Back*

* Decent security
with reasonable compromises

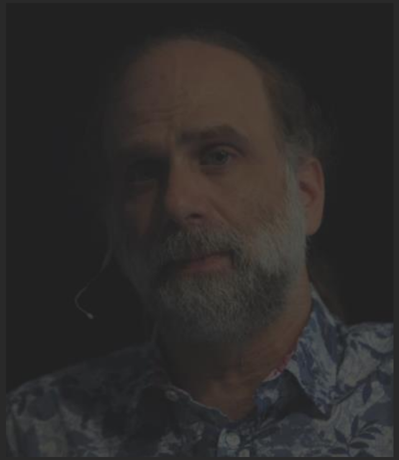


“Anyone can create a security system that they themselves can’t break”

Schneier’s Law

… so let’s try designing a secure laptop anyways!

What Do We Want?



“Anyone can create a security system that they themselves can’t break”
Schneier’s Law

- Unsuspicious look & UX
- Ultra-portable
- Secure & Trusted connectivity (USB & Net)
- Create user trust & security through virtualization
- Flexible sourcing & trusted repair
- Minimized attack surface
- Physical Crypto-Token to lock laptop: User friendly security & Multifactor Authentication

How to get decent security with reasonable compromises

1 Supply-Chain

- Buy hardware in brick & mortar store to avoid targeted attacks
- Depending on threat model – buy in a different city or country.
- Pay cash to hide knowledge about obtained hardware
- Physical Hardening

2 Secure Boot

- If available for your platform – use CoreBoot BIOS replacement
- For most modern platforms though UEFI with secure boot enabled and hardened BIOS settings is fine.
- Settings, System and Data protected by boot process

3 Hardened OS

- Secure booting of minimal headless Linux OS
- Tiny: Minimal executables, modules and boot process in immutable & encrypted filesystem
- Launches IOMMU-protected hypervisor

4 Untrusted OS

- Untrusted virtualized OS receives direct access to the GPU (IOMMU protected)
- All other devices are handled by the hardened OS, virtualized for the untrusted OS
- Disk-encryption, network & power handled by Linux OS

Laptop Security: Implementation Comments

- Protect user by making laptop look normal – don't encourage theft by making it look "special".
- Ensure low weight to make Laptop as portable as possible to ensure that user doesn't leave laptop unattended
- Use strong multifactor authentication for unlocking laptop: protecting against password leaks/guessing.
- Use hardened Linux to protect the Windows instance running in a hypervisor
  - Allows trusted enforcement of policies (USB camera, network, WIFI, Bluetooth) outside of Windows by Linux.
  - Filter/authenticate/protect network traffic in Linux before passing it to Windows instance.
  - For high security systems we suggest to force all network traffic through a VPN – allowing centralized services, network security and malware detection.
- Remove dependency on single supplier (software and hardware) to enable scalable security
  - security model and policies must be transferrable to later devices
  - suppliers and must not create a single point of failure
- Configure security-related settings like anti-tamper, secure boot, boot order, DMA security and Execution Prevention – and set Supervisor and User passwords.
- Remove dependency on untrusted 3rd party repair centers
  - Benefit from availability of spare parts by choosing a well-known vendor of business laptops.
  - This requirement allows the user's IT department to replace common parts without relying on external services
  - Results in simplified supply chain security
- Establish trust by patching/configuring internal BIOS to minimum attack surface – utilizing TPM features and secure boot process to bring up encrypted & hardened Linux system.
- Store root of trust and crypto keys to external USB Hardware Security Module (HSM) that is removed by user whenever laptop is unattended – internal disk can't be decrypted by an attacker without controlling external USB key and PIN for unlocking the stored keys.
- Enable integrated LTE communication to avoid WIFI access points whenever needed (VPN blocking on WIFI etc).
- Disable external interfaces with DMA bus-master access or DisplayPort as IOMMU security might be bypassed through source spoofing on Thunderbolt or similar interfaces: Prevents use of docking stations – but increases security substantially.

Use nail polish with glitter or other microstructures to discourage & detect attacks: Use “blink test” image comparison

Trammell Hudson's Projects Navigation Search Trammell Hudson Search

Actions

Tamper Evident Glitter Nail Polish

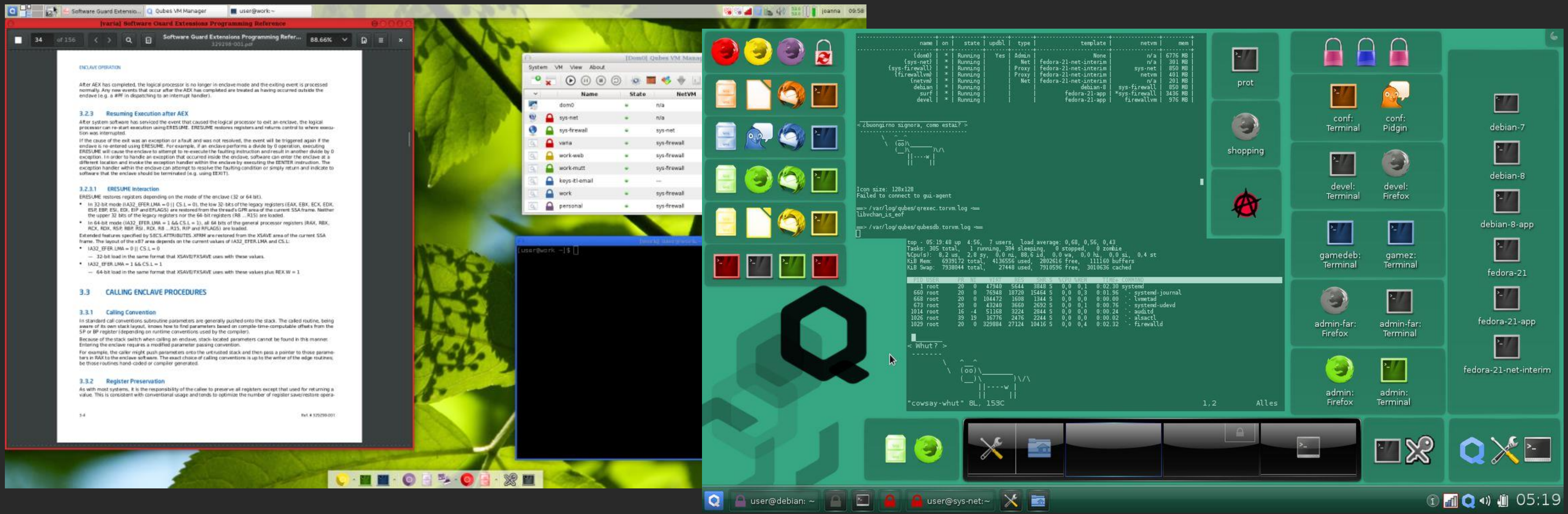
One way to detect physical intrusion attempts on your mobile device is to use nail polish like Fuzzy Coat as a tamper-evident marker on the screws. This was suggested by Eric Michaud and Ryan Lackey at 30C3 and my laptops have had this cheap protection applied prior to going to 31C3. Be sure to take good closeup photos once it has dried so that you can do "blink tests" to verify if the random pattern has changed.

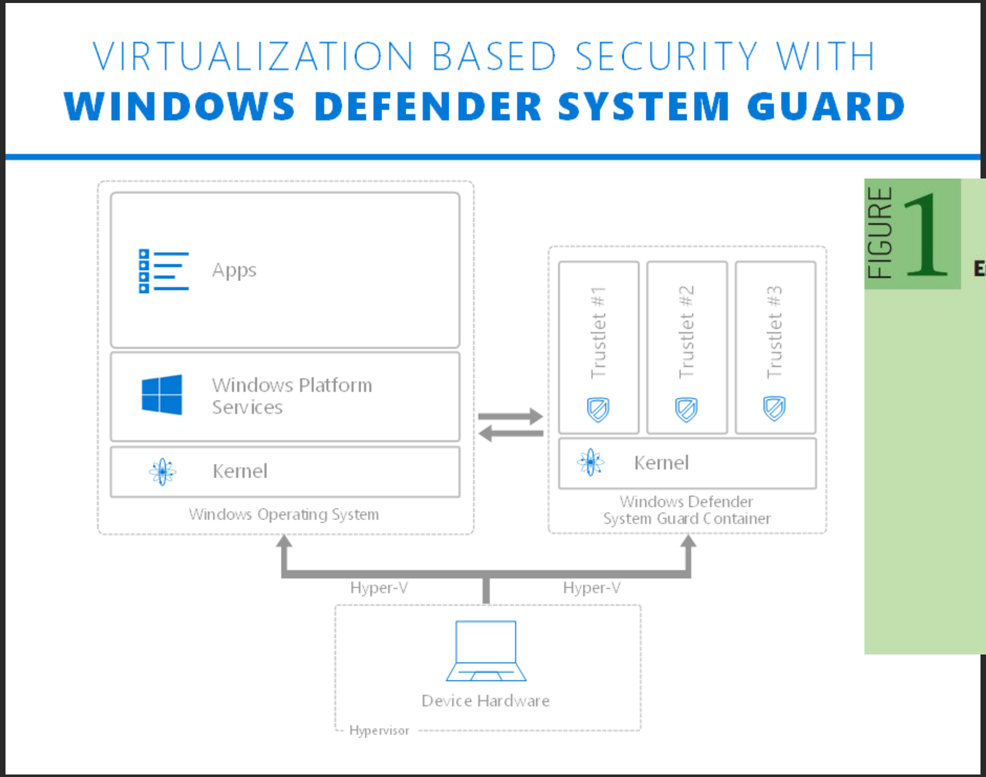
Normal glitter polish works as well, although the features are smaller and have lower contrast than the Fuzzy Coat shown above. You can do your nails with it, too, and look fabulous while you're coding.

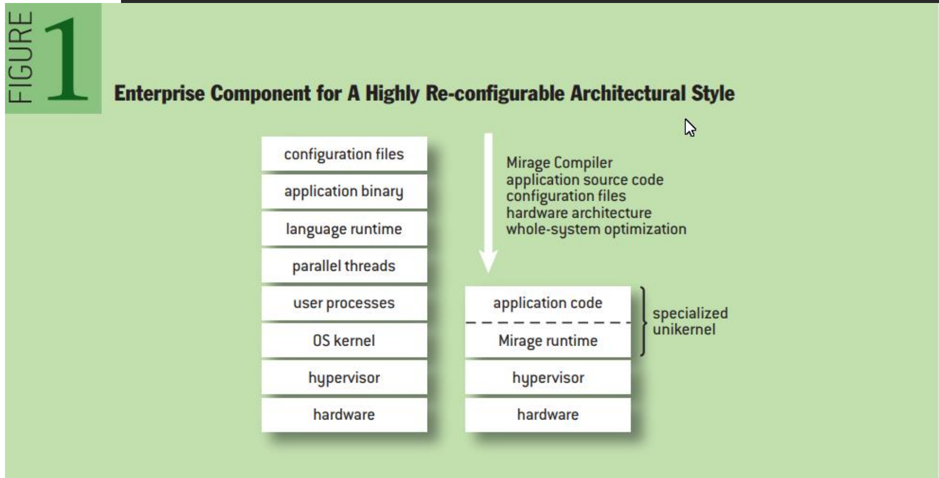
Categories: Security 2014

This page was last edited on 21 December 2014, at 16:40.

Reducing attack surface by using hypervisor virtualization for system integrity is a well-established security mechanism for increasing software security and system trust: see [Cubes OS](), [Windows Defender System Guard]() and [MirageOS]()







Virtualization Based Security with Linux for greater control

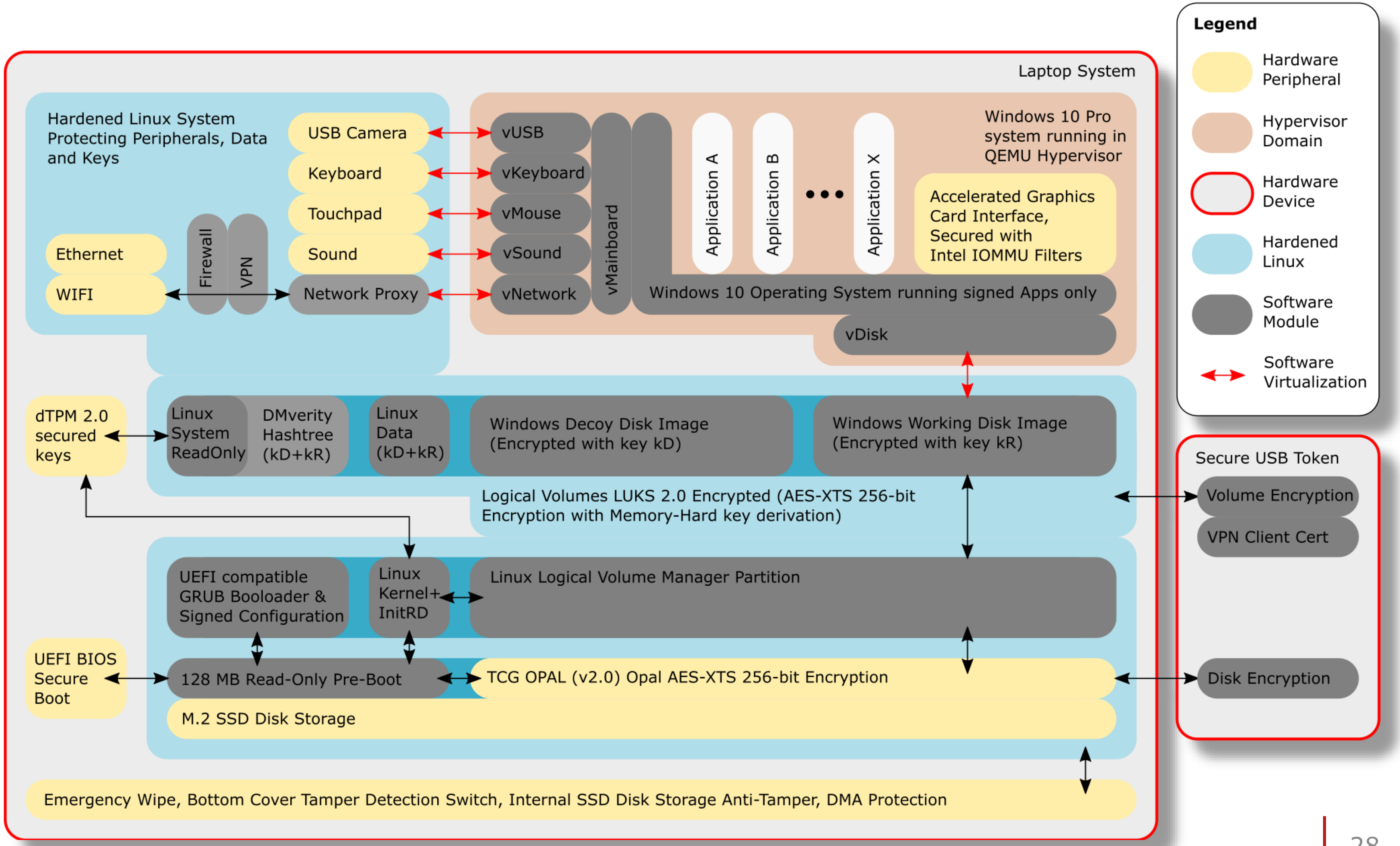
- Run Windows in Hypervisor Compartment, protecting Laptop from Windows-Malware becoming persistent in hardware
  - Windows 10 runs in a hardware-secured hypervisor domain (Intel VT-d, IOMMU)
- External USB Crypto Token used as a 2nd factor for decrypting disk partitions
  - when unplugged, Laptop locks down.
- External Interfaces like LTE, WIFI, USB and Ethernet are protected and controlled by hardened Linux
  - Network traffic tightly controlled by Linux, option to enforce VPN tunnel for all traffic.
  - Policies for communication interfaces controlled outside Windows in Linux

- Internal Windows disks and Linux partitions are encrypted and authenticated by hardened Linux
  - dm_crypt/dm_verity for Linux system partition
  - dm_crypt for data partitions
  - dm_crypt for hypervisor volumes containing Windows disk images
- User password used to decrypt partitions as the 1st factor
- Internal dTPM Security Modules used as 3rd factor to decrypt system partitions, tying encryption into built-in anti-tamper feature of the laptop
- Passive and active tamper countermeasures added to Laptop where required.

How to get decent security with reasonable compromises

"Invisible" Linux controls:

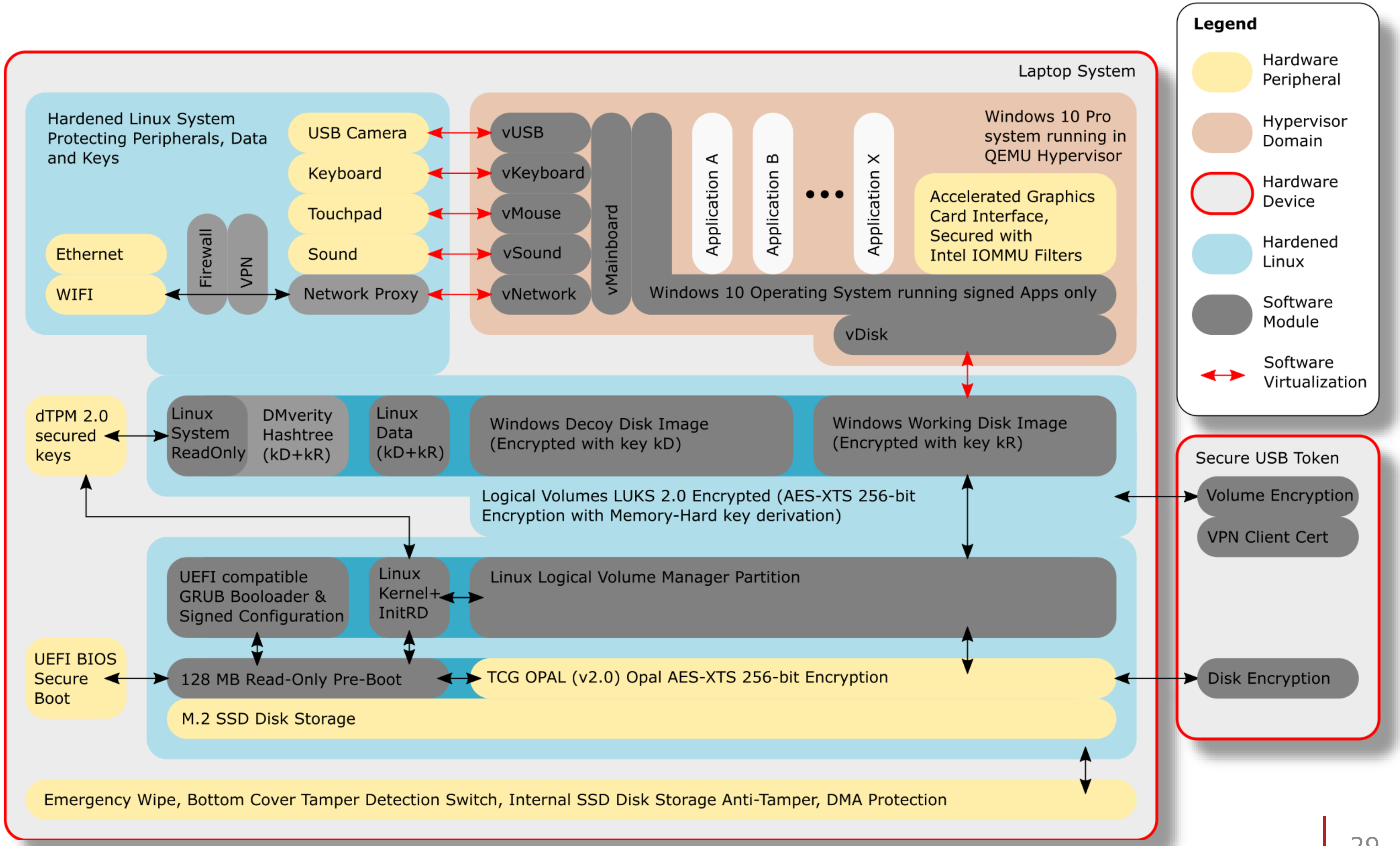
- IOMMU configuration against DMA busmaster attacks
- USB device access
  - Webcam
  - Fingerprint
  - WAN Modem
  - Touchpad
- Keyboard & Trackpoint
- Microphones & Speakers
- Network Traffic
  - VPN
  - Firewall
  - WIFI
- LUKS Disk Encryption and TCG OPAL v2.0
- External Crypto Modules
- All hardware, but the GPU
- Integrity of System Partition
- Power States
- Secure Token & Boot
- dTPM Measurements



How to get decent security with reasonable compromises

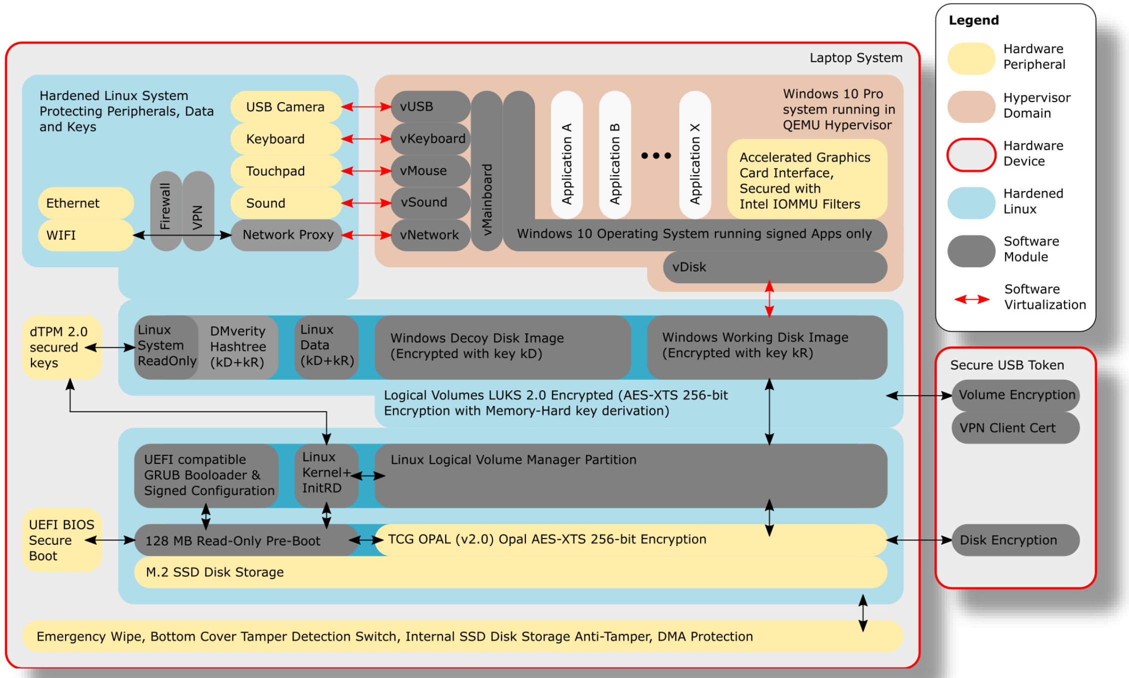
Virtualized Windows installation controls:

- Direct access to graphics card and GPU, but no access to card BIOS – which is only emulated statically from a file.
- All other PCI peripherals are either simulated as part of a virtualized PC mainboard …
- … or use signed VirtIO windows drivers for accelerated access
  - Network
  - Disk IO
- Virtualization enables cool features like snapshots of the VM
  - Reverting to previous named VM snapshots possible
- Enables "Plausible deniability System"



Virtualization Security: Implementation Details - I

1. Windows 10 Pro Installation protected by Linux Hypervisor Hardware Virtualization (QEMU, XEN)
2. No access to real hardware except graphics card - virtualized hardware for all other peripherals: resulting in accelerated 3D-graphics in Windows with native vendor graphics drivers in Windows (nVidia, Intel Graphics)
3. Busmaster-DMA access of graphics card to hardened Linux is prevented by IOMMU
4. Dynamic control of access to critical peripherals like USB camera and built-in microphones handled by Linux-based policies - dynamically hiding them from Windows when inactive.
5. Full control over all external communication (network, user interaction and USB) of the Windows installation by hardened Linux system
6. Protect all hardware peripherals and system BIOS against windows-based malware becoming resident by compromising their firmware through malicious updates
7. Linux power state control and disk encryption allow full control of system security at rest –complemented by external secure USB token
8. Virtualization enables national crypto algorithms of the Windows disk in underlying hardened Linux - protected against leakage by a potentially compromised Windows…



Virtualization Security: Implementation Details - II

1. Laptop boots into 128MB read-only SSD partition (TCG OPAL v2.0)
   a) Secured by UEFI secure boot & PKI signatures
   b) Early-boot DMA attacks prevented by BIOS settings
   c) Linux Kernel and Initial Ramdisk (InitRD) boot protected by PKI based public key signatures
2. Double-encrypted disk to prevent storage hot-swap attacks:
   a) TCG Opal (v2.0) AES-XTS 256 bit SSD hardware encryption as baseline for baseline tamper-protection
   b) LUKS 2.0 Disk Encryption with Argon2i key derivation for security
3. Password-entry dialog allows entry of two passwords, which are derived into two keys:
   a) kD: Access to plausible-deniability windows system without confidential documents (password used on border controls and hardware-seizure of laptop).
      Upon reboot, this system discards all user changes and data.
   b) kR: Access to work system with confidential documents, only used when user is in a safe environment.
      This system keeps user changes/data across reboots.
   c) Knowledge of the decoy-password doesn't lead to disclosure of work system data.
4. Memory-hard Argon2i key-derivation used to combine dTPM2.0 secret and user-passwords used to decrypt disk secret token slots (kD or kR) to unlock Opal Disk Encryption
5. Additional key-derivation steps used for generating LUKS2 password for decrypting Linux partitions – involving the secure USB token (required for kR, optional for kD).
6. Forensic analysis of system will not reveal that two Windows System alternatives exist or that the USB key is required for one of them
7. Without access to the secure USB token, no access to the work system is possible while the system is suspended
8. For Windows, the Linux disk encryption is invisible: Windows malware can't access the disk encryption keys even by compromising the Windows Kernel.

Plugging things together

Implementation:
Here's the working virtualization configuration Makefile for running Windows 10 virtualized, but with full 3D acceleration on the Lenovo Carbon X1 7th gen:

```
# Input files
ISO_WINDOWS10=images/iso/Win10_1903_V1_English_x64.iso
ISO_VIRTIO=images/iso/virtio-win-0.1.171.iso
VIDEO_ROM=images/rom/intel-uhd620.rom
BIOS_ROM=/usr/share/seabios/bios.bin

# Output files
DISK_IMG_SIZE=128G
DISK_IMG_FILE=images/disk/windows.qcow2

.PHONY: prepare run clean

all: ${DISK_IMG_FILE}

run:
	sudo qemu-system-x86_64 \
		-enable-kvm -M pc -m 8G -cpu host,kvm=off,hv_vendor_id=null,-hypervisor \
		-device vfio-pci,host=00:02.0,bus=pci.0,addr=02.0,multifunction=on,x-vga=on,x-igd-gms=4,x-igd-opregion=on,rombar=1,romfile=${VIDEO_ROM} \
		-chardev stdio,id=seabios -device isa-debugcon,iobase=0x402,chardev=seabios \
		-bios ${BIOS_ROM} \
		-drive file=${DISK_IMG_FILE},cache=none,if=virtio,format=qcow2 \
		-object input-linux,id=mouse,evdev=/dev/input/by-path/platform-i8042-serio-1-event-mouse \
		-object input-linux,id=keyb,evdev=/dev/input/by-path/platform-i8042-serio-0-event-kbd \
		-device virtio-net-pci,netdev=eth0 -netdev user,id=eth0 \
		-device virtio-rng-pci \
		-rtc base=localtime \
		-device nec-usb-xhci \
			-device usb-host,vendorid=0x04f2,productid=0xb67c \
		-vga none -display none \
		-snapshot

${DISK_IMG_FILE}:
	qemu-img create -f qcow2 $@ ${DISK_IMG_SIZE}
```

Preparation:
Here's the virtualization configuration Makefile for running Windows 10 installer – using non-accelerated VGA for the installation & connecting the Windows 10 Setup Disk & the virtual IO drivers for virtual network and virtual disks

```
${DISK_IMG_FILE}:
	qemu-img create -f qcow2 $@ ${DISK_IMG_SIZE}

prepare: ${ISO_WINDOWS10} ${ISO_VIRTIO} ${BIOS_ROM} ${VIDEO_ROM} ${DISK_IMG_FILE}
	sudo qemu-system-x86_64 \
		-enable-kvm -M pc -m 8G -cpu host \
		-device vfio-pci,host=00:02.0,bus=pci.0,addr=04.0,multifunction=on,x-igd-gms=4,x-igd-opregion=on,rombar=0 \
		-chardev stdio,id=seabios -device isa-debugcon,iobase=0x402,chardev=seabios \
		-bios ${BIOS_ROM} \
		-drive file=${DISK_IMG_FILE},cache=none,if=virtio,format=qcow2 \
		-object input-linux,id=mouse,evdev=/dev/input/by-path/platform-i8042-serio-1-event-mouse \
		-object input-linux,id=keyb,evdev=/dev/input/by-path/platform-i8042-serio-0-event-kbd \
		-device virtio-net-pci,netdev=eth0 -netdev user,id=eth0 \
		-device virtio-rng-pci \
		-rtc base=localtime \
		-drive file=${ISO_VIRTIO},media=cdrom \
		-drive file=${ISO_WINDOWS10},media=cdrom \
		-device nec-usb-xhci -device usb-host,vendorid=0x04f2,productid=0xb67c \
		-vga std -display gtk

snap-list:
	ls -lh ${DISK_IMG_FILE}
	qemu-img snapshot -l ${DISK_IMG_FILE}

clean:

clean_all: clean
	rm -f ${DISK_IMG_FILE}
```

Summary: Progress so far

What do we have?

- Successfully running Fedora 30 headless on Lenovo Carbon X1 7th gen
- Virtualized Windows 10 Pro boots in 3-4 seconds after starting QEMU: Snappy Operation!
- Extraction of VGA Bios from UEFI BIOS image and usage in QEMU virtualized Windows 10 Pro boot for initializing the graphics chip set
  - Virtualized Windows OS uses native hardware accelerated Intel Graphics Drivers: fast as hell!
- TrackPoint and Keyboard Support
- Hardening of BIOS Security Settings
- Scan of Mainboard PCB
- Decapping & chip-die-imaging of critical/suspicious chips – and initial threat modelling

What are we working on?

- Implement secure & measured boot process with static file system (dm_verity)
- Implement signed atomic updates for hardened Linux
- Implement Secure Crypto Token with JAVA JCOP3 card: YubiKey is unfortunately out due to lack of Secure Messaging support.
- Integrate LUKS2 Disk Encryption with Clevis / Dracut to support the Secure Token, Password and dTPM2 at the same time
- Add graphical interface to password entry (currently blind password entry)
- Plausible-deniability OS: Two windows OS alternatives: One secure and the other n
- Add hotkeys for snapshots and reverting to previous versions
- Touchpad support
- Power Management & Suspend-to-Disk
- USBGuard security for USB Webcam
- Network filtering & VPN
- WIFI Configuration from Windows

Questions?

Please ask!

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Slides @ www.meriac.com/hitb2019

… and of course, we're hiring:

xen1thLabs

www.darkmatter.ae/xen1thlabs/ … please contact me!