



Multicore Virtualization Update

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Review and Agenda

❑ Last Year: intro to multicore virtualization for embedded

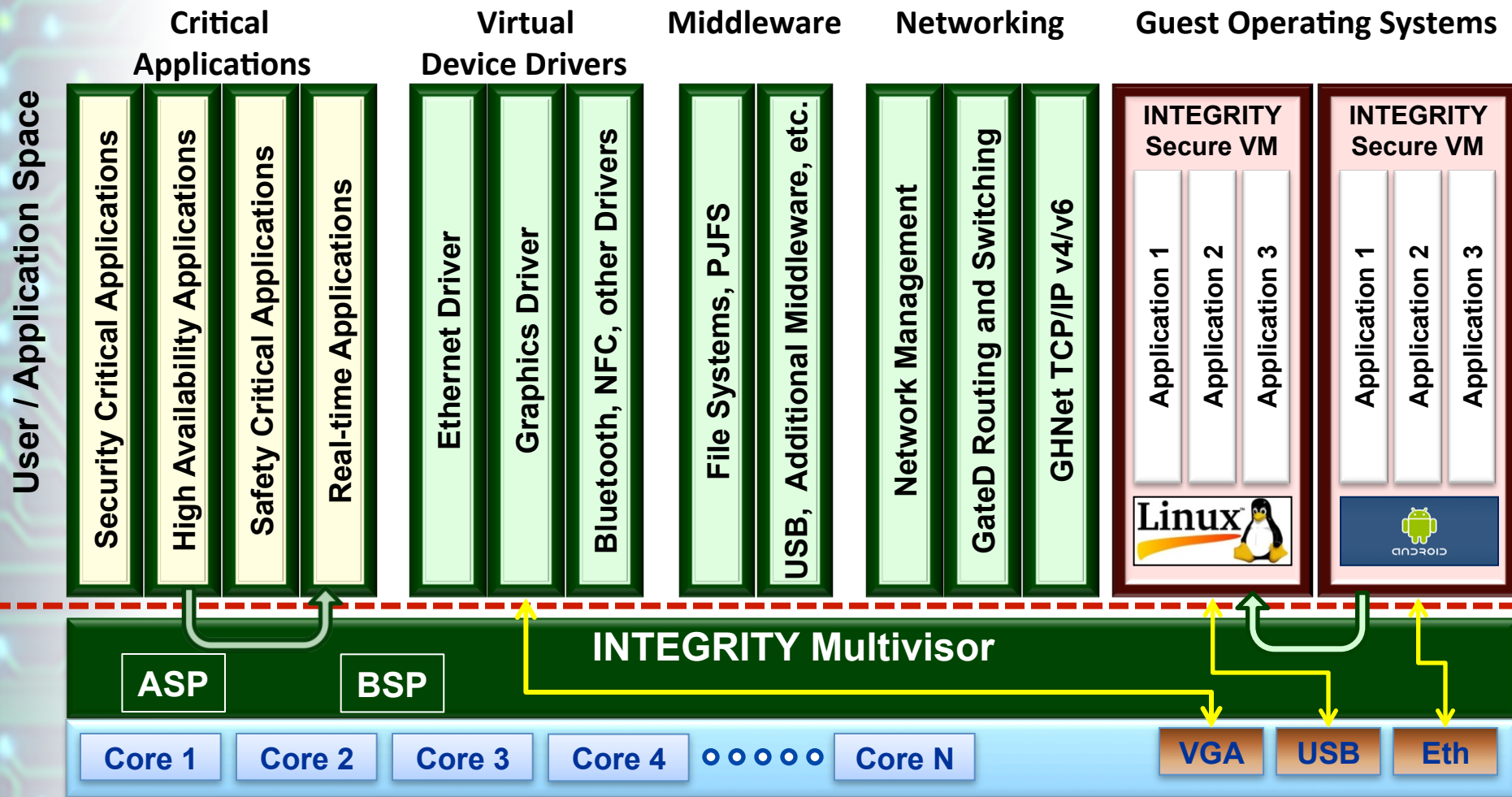
- Use cases – smartphone, SDR, infotainment, medical imaging
- Classification – para/full, Type-1/Type-2, I/O
- Multiple cores – static vs. dynamic partitioning, SMP VMs
- Focus on ARM – TrustZone and a little about ARM VE

❑ This Year: update

- ARM, Power, Intel
- More embedded/mobile use cases, challenges, and solutions

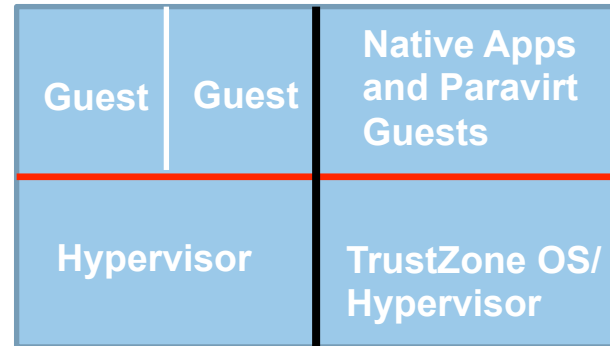
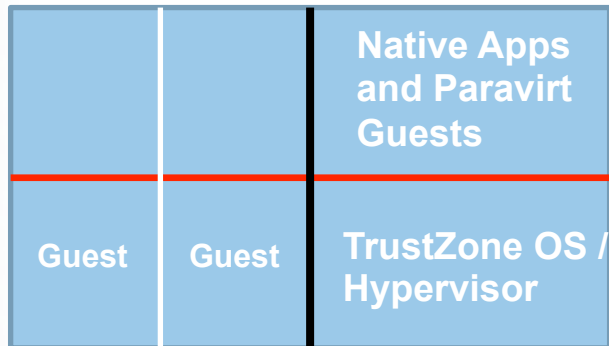
INTEGRITY Multivisor

Microkernel-Type-1 Hypervisor Solution



ARM

- ❑ Cortex A15 SoCs sampling this year, production 2012
 - ARM VE
- ❑ Dual core going to quad and up
- ❑ Smartphone/tablet, networking/data center
- ❑ ARM SystemMMU is additional IP, not always present
 - TrustZone is alternative for IOMMU protection
 - Some SoCs have proprietary IOMMU



Use Case: “Bring Your Own” - Enterprise

□ Enterprise Security

- Data-at-rest encryption
- Secure VPN
- Secure device authentication
- Virtual security appliance – firewall, anti-X
- Remote wipe

□ Enterprise Management

- Field upgrade / guest patching
- VM configuration management
- Inventory / health management



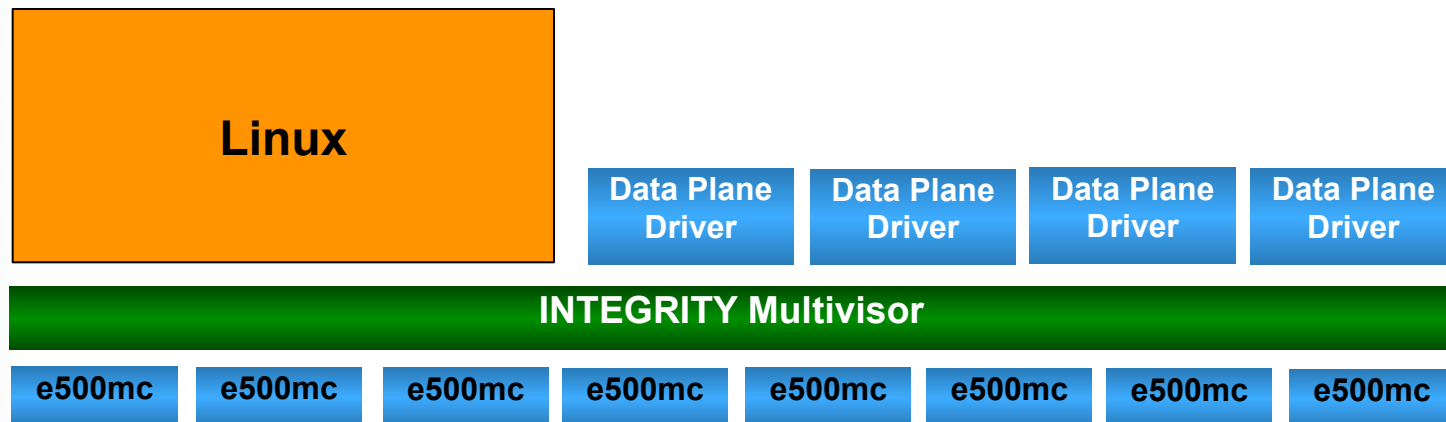
□ Value proposition

- VMaaS (VM as a Service) revenue
 - For OEM, Carrier
- Reduce total cost of ownership (TCO)
 - Managed vs. unmanaged devices
- Multiple service plans in one device

Power

❑ Freescale P3, P4, P5

- ePAPR standardization of VM configuration and management
- PAMU
- Fast inter-core IPC (doorbell)
- Use Case: control/data/security consolidation, availability
- Multicore VMs with one or more SMP Linux
- DPAA optimization and isolation from Linux control plane

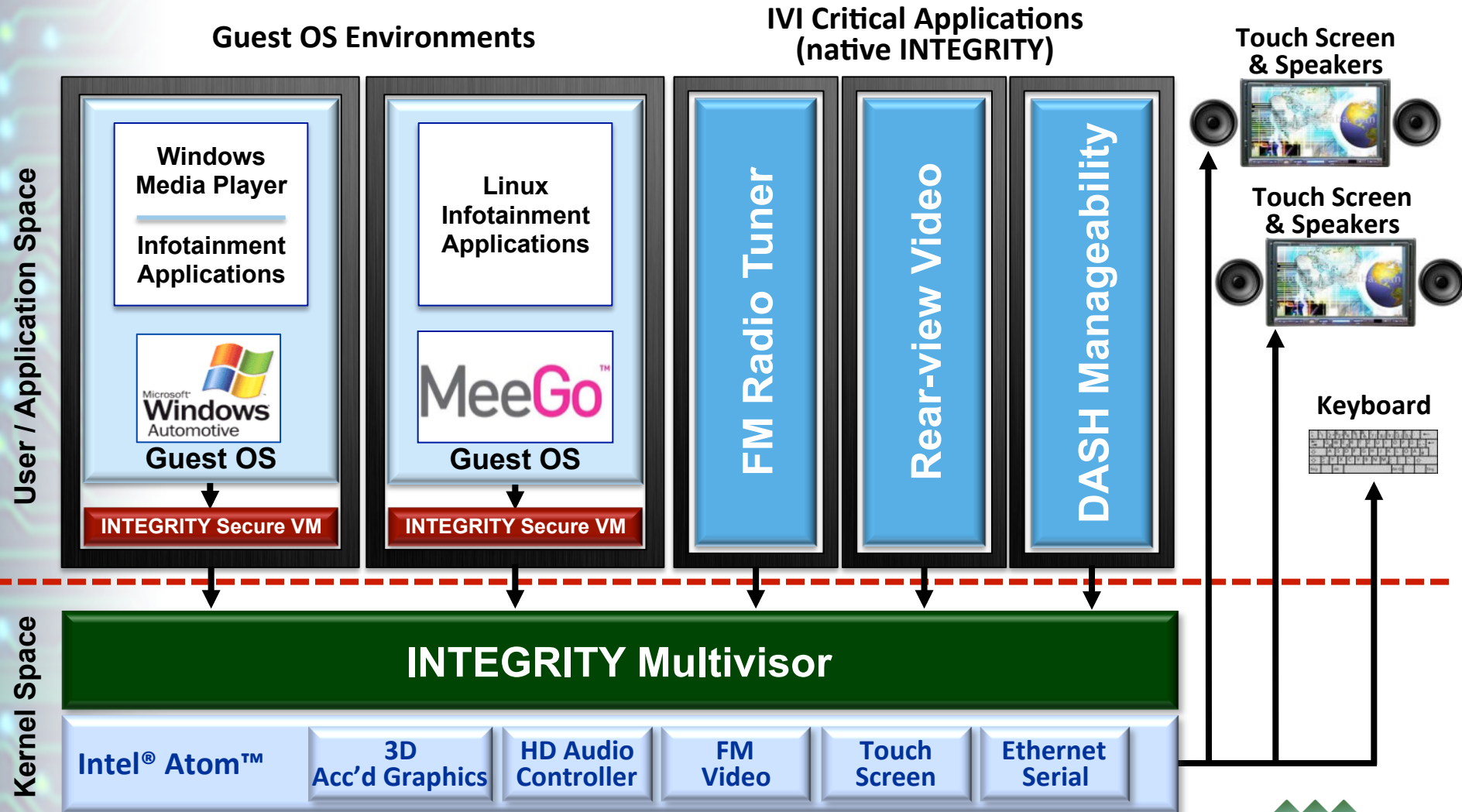


Intel

❑ Differences in VT across Intel processor families

- Current Atom: VT-x, no EPT, no IOMMU, mostly single core
 - Rumors of 16-core version for low-power server
- Want: EPT, VT-d, VT-c

Use Case: Automotive ECU Consolidation



Looking Forward

- ❑ The big challenge is I/O virtualization across cores/VMs
 - Interface/virtualization
 - Safe sharing
 - DMA protection
- ❑ Smartphone Multicore SoC – an incomplete list
 - GPU
 - Video accelerator
 - Bluetooth
 - WiFi
 - 4G
 - Audio
 - Power/battery management
 - HMI (display, keyboard, touchscreen)
 - USB
 - GPS
 - HDMI
 - NFC