Scalable System Control & Power Management via ARM SCMI

Evolution & Roadmap
Agenda

- What is SCMI
- Evolution & Roadmap
  - High Level Overview
  - New Features
- The Full Picture
- Status & Next Steps
What is SCMI
System Control & Management Interface v1.0

- System Controller Management Framework
- Comprises of
  - Protocols
  - Transports
- System Controller may be
  - Microcontroller
  - Fixed Function Hardware
  - Logical Partition
SCMI Roadmap - New Features
Hardware Assisted Virtualization

- Resource Manager manages Shared Resources.
  - System Controller allows discovery of only those commands and ID’s that are configured for agent.
  - Dedicated device assignment to VMs – passthrough mode
  - Automotive Software Stacks
SCMI Roadmap - New Features

The Device View

Device advertises
- Power State*
- Performance levels
- Reset States

System Controller
- Abstracts and Manages platform specific details
- Creates device attributes from constituent domains
- Manages/Resolves Domain Dependencies for SCMI Device Management calls

*CPU Power Management is still over PSCI
SCMI Roadmap - New Features

Secure Partition Client Interface based Transport

**SCMI transport over SPCI**
- Secure World resident SCMI Server
- Normal world resident sand-boxed SCMI server
- Fixed-Function hardware or microcontroller based design

**SPCI overview**
- A Secure Partition (SP) is a Secure world sandbox
  - Can host a Trusted OS or a driver stack
  - Exports services to Normal world clients and other partitions
- SPCI generalizes communication with SPs
  - Describes ABIs to access services in a SP
  - Uses a manifest to describe SP’s resources
    - Memory regions, Devices, Interrupts etc
  - Enables resource sharing with SPs
    - Memory, Devices, CPU Cycles

**Client Partition**
- Operating System
- SCMI Driver
- SPCI

**Sandboxed Power Management & Control Partition**
- SCMI & Support Infrastructure
- Control & PM Logic
- Alternate Path
- System & Power Control Mailbox
- SPCI
- Physical Channel
The Full Picture
System Control & Management Interface v2.0

- Reset Domains
- Device based isolation & permission Management
- Device-centric Control & Power Management
- Pre-Notifications
- Dedicated Fast Channels
Status & Next Steps

• Tentative SCMI V2.0 Specification release date: Q3 2019
• Performance Domain Fast Channel Support:
  • Prototyping on ARM JUNO yields 1-2us avg. turnaround time for posting kernel cpufreq requests on Cortex A-class cores.
  • Low-cost lightweight system controller (CortexM3 @50Mhz) can service 6+ independent CPU frequency domains without bottlenecks.
• Device/Resource Isolation
  • Proof of Concept under planning
• Device Management
  • Migration Path (Short Term) and Long Term kernel framework under analysis.
  • Proof of Concept tentatively targeted at ARM JUNO board.
Useful Links

- SCP Reference Firmware: https://github.com/ARM-software/SCP-firmware
- ARM Trusted Firmware: https://github.com/ARM-software/arm-trusted-firmware
- SPCI Specification: https://connect.arm.com/dropzone/systemarch/DEN0077A%5FSecure%5FPartition%5FInterface%5FSpecification%5F1.0%5FAAlpha%5F2.pdf
Thank You
Danke
Merci
谢谢
ありがとう
Gracias
Kiitos
감사합니다
धन्यवाद
شكرًا
תודה
The Arm trademarks featured in this presentation are registered trademarks or trademarks of Arm Limited (or its subsidiaries) in the US and/or elsewhere. All rights reserved. All other marks featured may be trademarks of their respective owners.

www.arm.com/company/policies/trademarks