Can Embedded and IoT "Just Work"?
Standards, SystemReady and Linux

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A Balance of Standardization for Partner Success

Enabling Innovation

Low Flexibility

High SW Maintenance Cost

Fixed

Custom
Project Cassini for Edge & IoT Infrastructure

Ensuring a cloud-native experience across a diverse and secure edge ecosystem

- Hardware, firmware specifications
- Certification program
- Security Certification program
- Open API for cross-platform security services

Cloud Native Stacks
- Edge Reference Implementations
SystemReady is built on...

Hardware Requirements
(BSA – Base System Architecture & Supplements)
• Hardware requirements for generic off-the-shelf OSes
• Arm architecture and standards-based system architecture

Firmware Requirements
(BBR – Base Boot Requirements)
• Firmware requirements for OSes/Hypervisors such as Microsoft Windows, Red Hat, VMware, etc.
• Focus on interface requirements, not implementation

Architectural Compliance Suites (ACS)
• Testing SiP Reference Boards and OEM/ODM Products for SBSA/SBBR compliance
• The test suites are hosted in GitHub and are open source (Apache v2):
The Embedded Compute Ecosystem has unique characteristics

SystemReady IR must complement existing diverse embedded ecosystem

Platform Diversity
- Healthy ecosystem with many solutions
- Vendor IP blocks
- Low standardization
- Highly configurable

Diverse software ecosystem
- Multiple OS designs
- Custom builds
- Modified distros
- 3rd party supported
- Tailored for application

U-Boot and Devicetree
- Large installed base
- Mature Devicetree support
- Preferred by developer community
- ACPI not practical
SystemReady IR is tailored for Embedded
SystemReady IR Elements

- UEFI subset
- Devicetree provided by platform
- Implemented in U-Boot and TF-A
- UpdateCapsule()
- Compliance Testing
- Works with Yocto Project
- Tested against Top Tier Distros
SystemReady IR Elements: Secure Boot (Optional)

- Security option adds UEFI Secure Boot requirement
- Important part of building secure, connected devices
- Please look at PSA Certified program for securing IoT devices
- [https://www.psacertified.org/](https://www.psacertified.org/)
### SystemReady bands detail

<table>
<thead>
<tr>
<th>Firmware Spec</th>
<th>Platform Hardware</th>
<th>OS/Hypervisor</th>
<th>OS Distro (examples)</th>
<th>Hardware Compliance Levels</th>
<th>BBR Recipe</th>
<th>Certification</th>
</tr>
</thead>
<tbody>
<tr>
<td>IR (IoT)</td>
<td>UEFI + Devicetree</td>
<td>Linux, etc.</td>
<td>Fedora, openSUSE, Ubuntu, Debian, Yocto</td>
<td>BSA + No BSA requirements for 32-bit + waivers for existing HW initially</td>
<td>EBBR</td>
<td>Arm SystemReady IR + System Certification List</td>
</tr>
<tr>
<td></td>
<td>32bit/64bit Arm</td>
<td></td>
<td>Under Investigation: OpenWRT, QNX, VxWorks, Integrity, Wind River, Mentor</td>
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<td></td>
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<tr>
<td>ES (Embedded Server)</td>
<td>UEFI + ACPI + SMBIOS</td>
<td></td>
<td>Windows IoT Enterprise, VMware ESXi, RHEL, SLES, Ubuntu, CentOS, Fedora, openSUSE, Debian, FreeBSD, NetBSD</td>
<td>BSA + waivers for existing HW initially</td>
<td></td>
<td>Arm SystemReady ES + System Certification List</td>
</tr>
<tr>
<td>SR (ServerReady)</td>
<td>UEFI + ACPI + SMBIOS</td>
<td></td>
<td>VMware ESXi, Windows Client/Server, RHEL, SLES, Ubuntu, CentOS, Fedora, openSUSE, Debian, FreeBSD, NetBSD</td>
<td>BSA + SBSA Levels 3 through 6</td>
<td></td>
<td>Arm SystemReady SR + System Certification List</td>
</tr>
</tbody>
</table>

Can support UEFI SecureBoot and Secure Firmware Update via UEFI Capsule Service across (BBSR)

Generic, off-the-shelf (w/ exceptions: virtualization, RAS, etc.)
Arm SystemReady – update CQ1 2021

Certified

- AMPERE
- GIGABYTE
- NXP

In Progress

- wiwynn
- MARVELL
- SolidRun
- ASUS IoT
- BROADCOM
- Lenovo
- Advantech
- MediaTek
- Lanner
- Eurotech
- NEXCOM
- Hongdian
- CyberTan
- Nuvoton
- Rackchip
- Compulab
- Pro
- Lenovo
Current Status of System Ready IR

- **Standards documents**
  - BSA v1.0 (released)
  - BBR v1.0 (released)
  - EBBR v2 (released in April, draft available on Github)

- **Certification requirements**
  - Pass IR ACS test suite (To be released in July). UEFI SCT can be used in mean time
  - Boot two unmodified major Linux distros (Fedora, Debian, Ubuntu or Suse).

- **Firmware support**
  - Required features already in mainline U-Boot, TF-A, Optee and StMM

- **Example platforms**
  - Compulab IOT-GATE-IMX8, RockPro64 (rk3399)
  - Ongoing contractor work to bring up more platforms

- **Support documentation**
  - SystemReady IR "How To" documentation in progress

https://developer.arm.com/arm-systemready
Arm is spinning up certification program now

Expect announcements of certified platforms later this year

Join us on the EBBR community project at https://github.com/arm-software/ebbr

Contact us about getting your platform certified
systemready@arm.com
Additional Sessions at Connect

Tuesday

• SystemReady SR and ES: Standards for Servers and the Edge
  *Samer El-Haj-Mahmoud*

• SystemReady-IR in Practice
  *Vincent Stehlé*

• The Case for UEFI Boot on Arm-powered IoT Devices
  *David Tischler*

Wednesday

• Standard Firmware Updates on Arm
  *Jose Marinho*

• Generic Image Approach and LEDGE Reference Platform
  *Maxim Uvarov*
Thank You
Danke
Gracias
谢谢
ありがとうございます
Asante
Merci
감사합니다
धन्यवाद
Kiitos
شكرًا
ধন্যবাদ
תודה

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Find out more:
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https://developer.arm.com/arm-systemready