Linaro Connect
MADRID 2024 | MAY 14-17 2024

Looking back on SystemReady IR

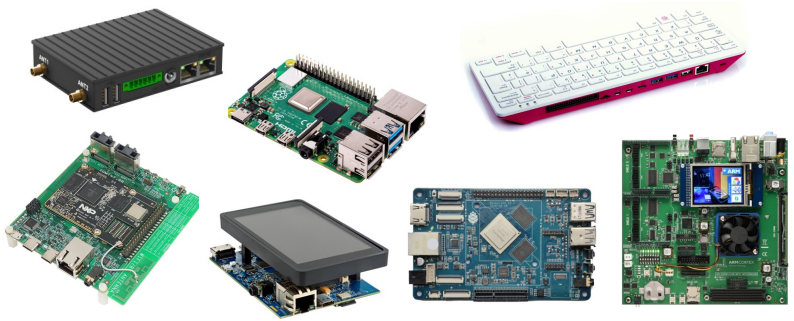
Vincent Stehlé, Arm

Contents

- Brief SystemReady IR recap
- Quick look at the software stack, specifications and standards
- Timelines
- Certifications data analysis
- Lessons learned

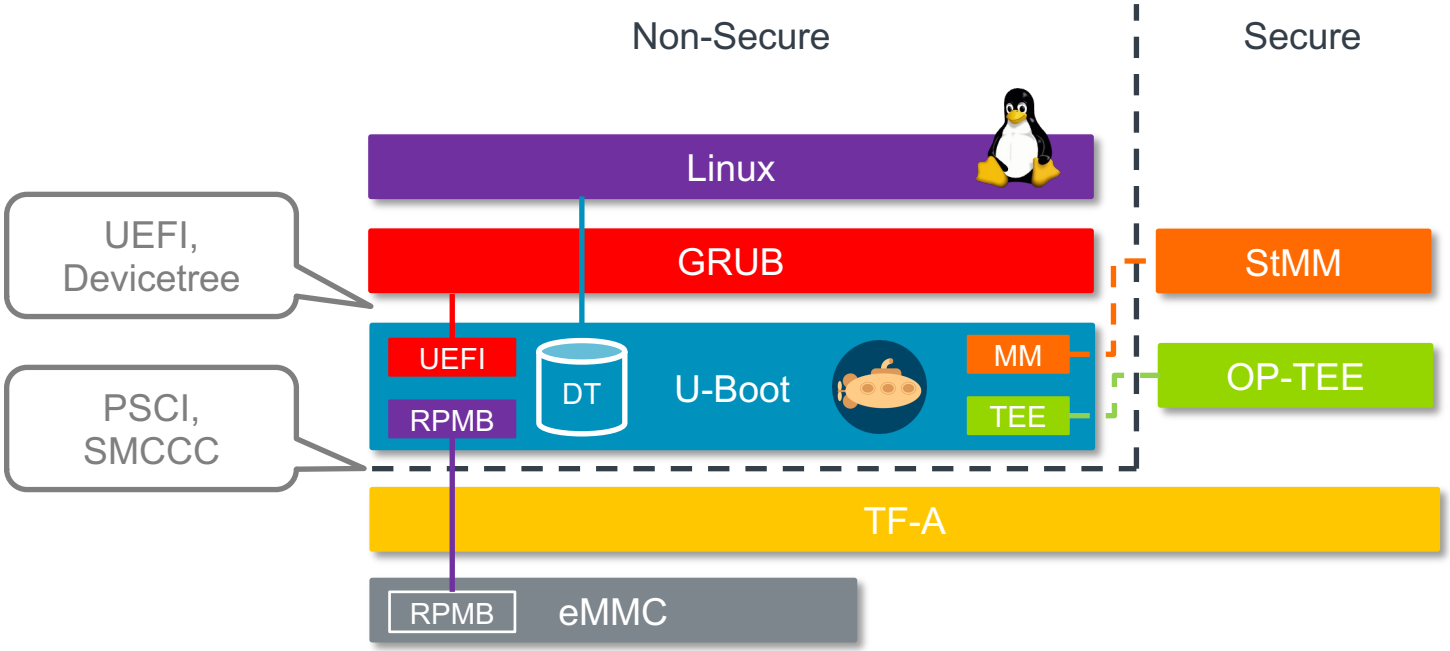
Brief SystemReady IR recap

- “Software just works” for embedded Linux/BSD ecosystem on Arm.
- UEFI (EBBR subset), Devicetree.
- More than 40 systems certified.
- IR 1.x is now deprecated for 64b.

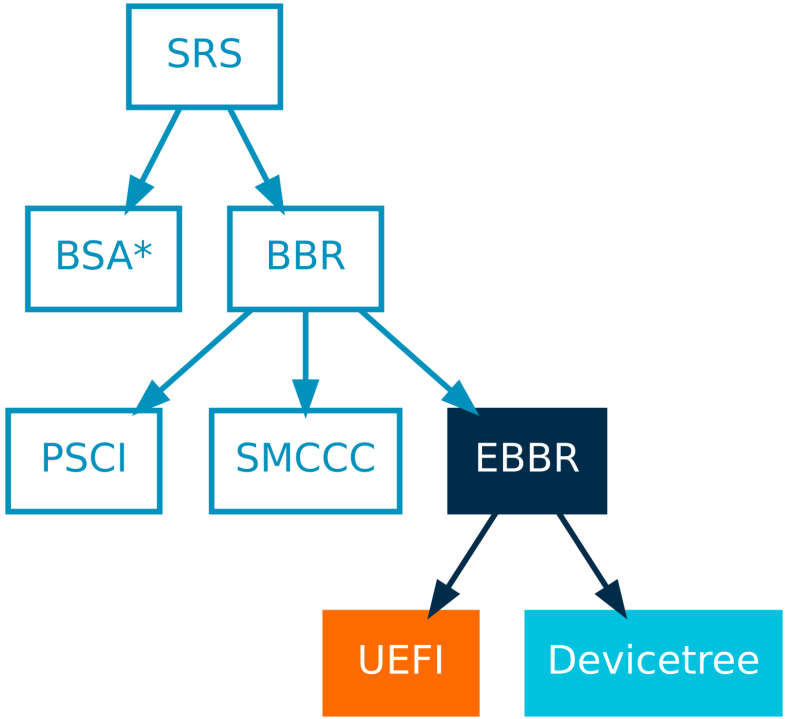


- UEFI SCT
- UEFI Capsule Update
- Linux FWTS
- UEFI BSA, Linux BSA (informative)
- 2x OS installed
- SIE recommended
- ESRT
- Devicetree schemas
- Signed FMP capsules
- Ethernet
- Boot & storage medium
- 3x OS installed

Quick look at the software stack



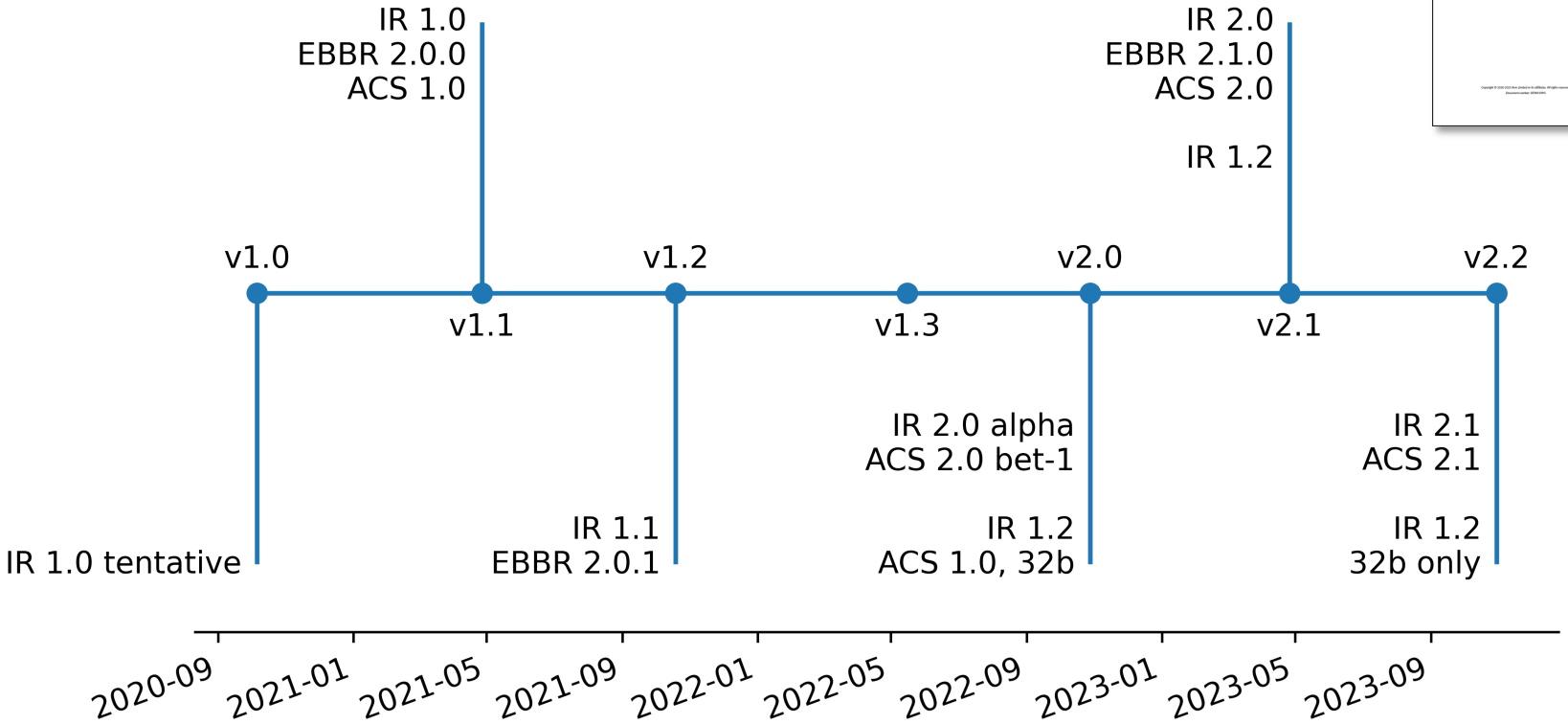
Quick look at the specifications and standards



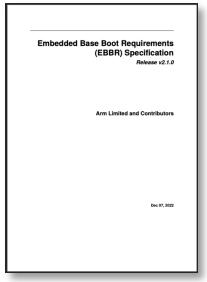
*BSA informative

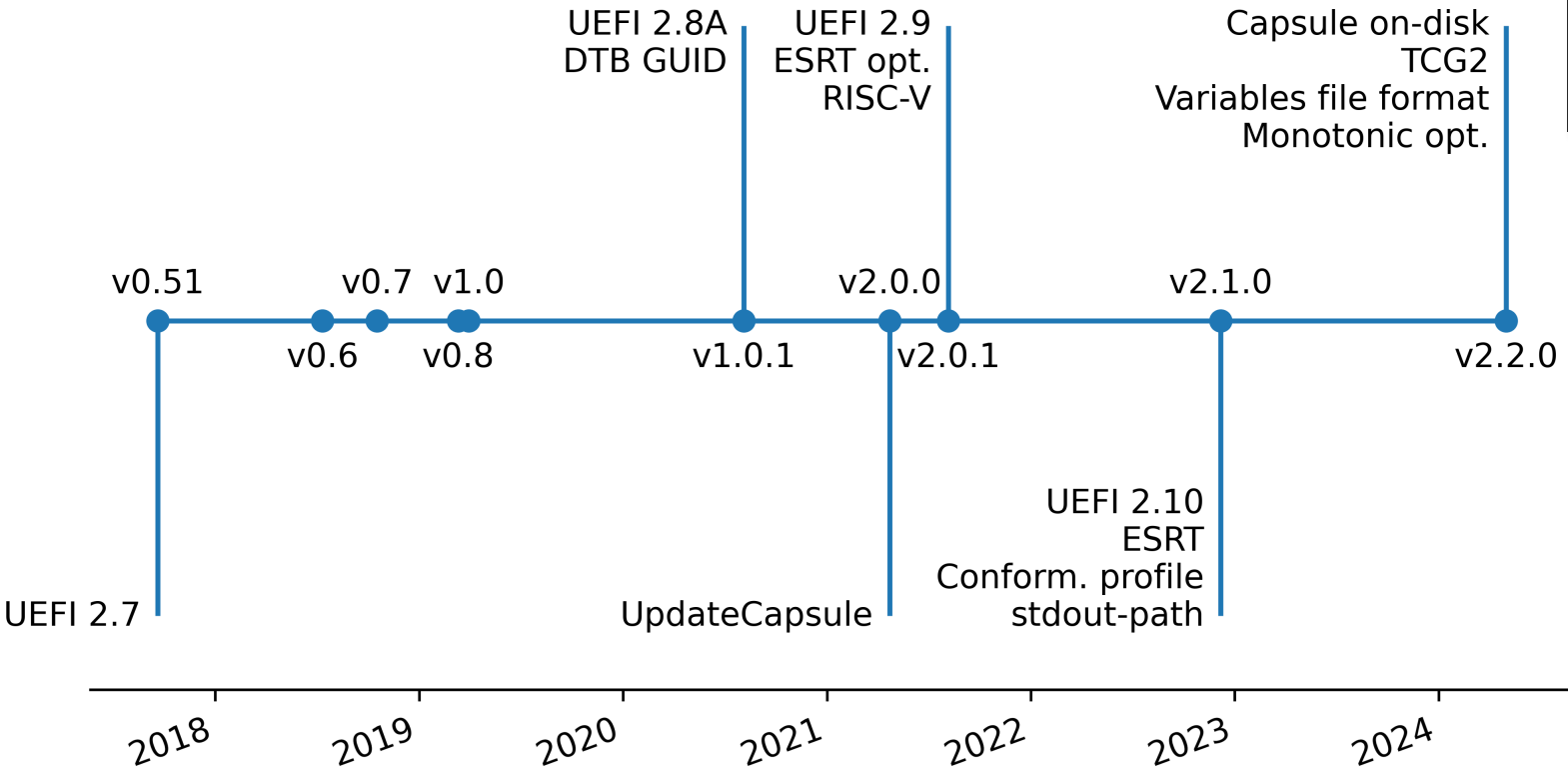
Timelines

SRS timeline

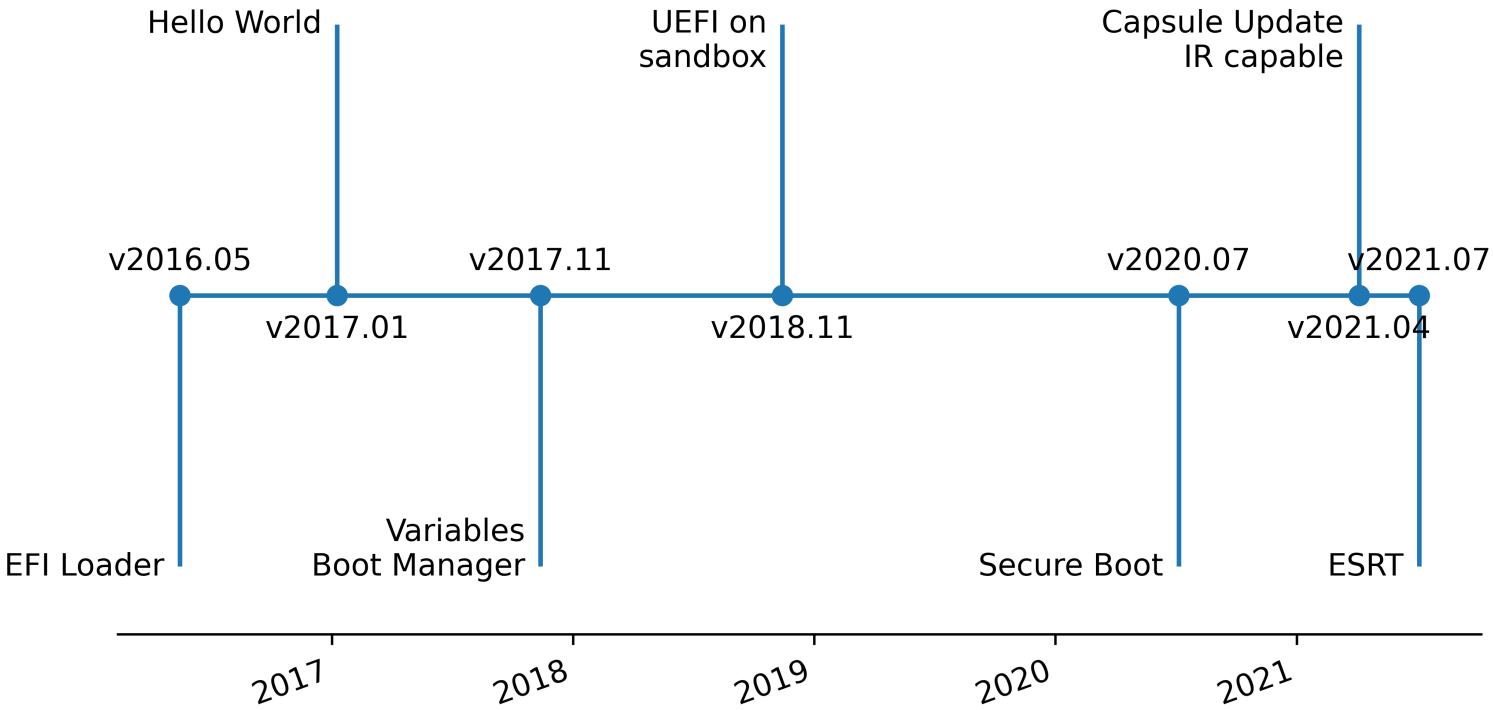


EBBR timeline



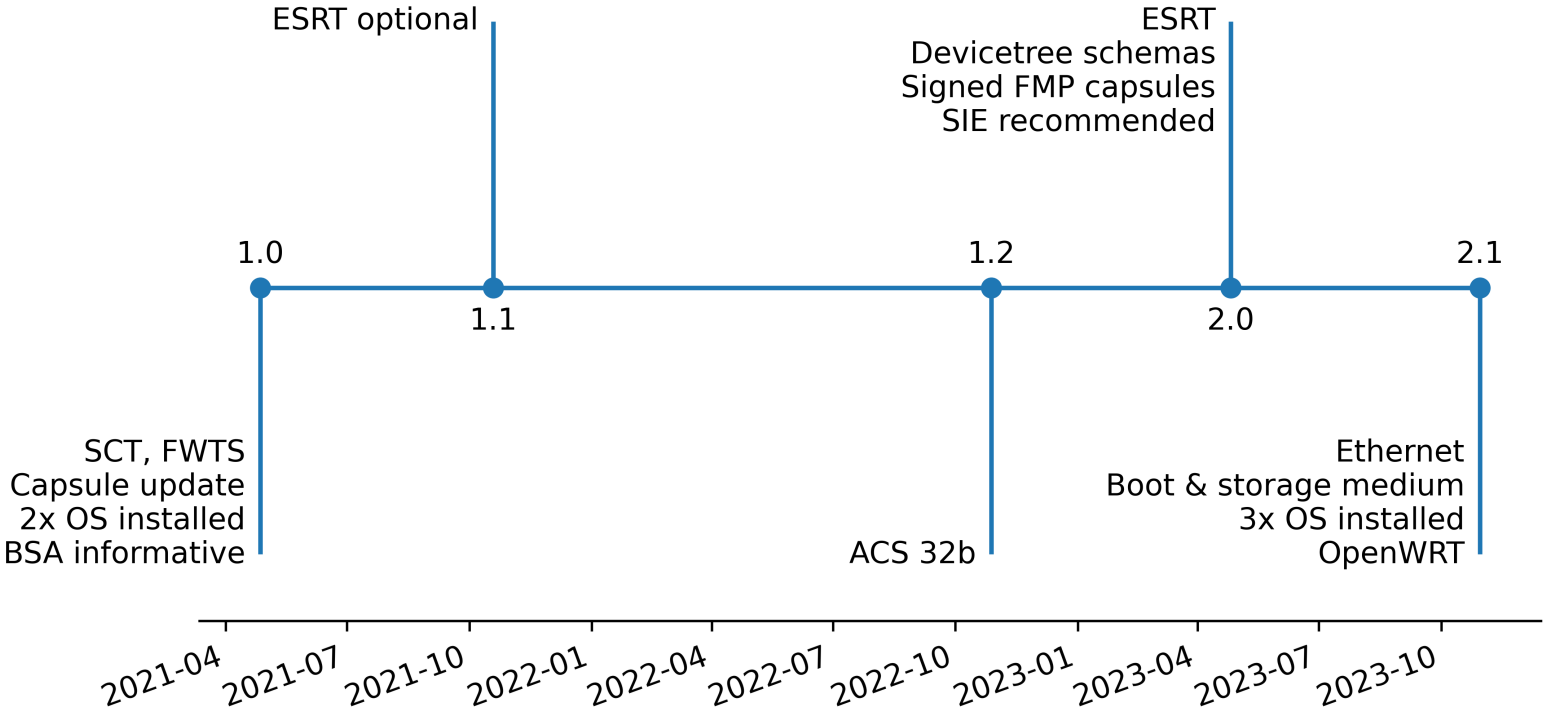


U-Boot timeline



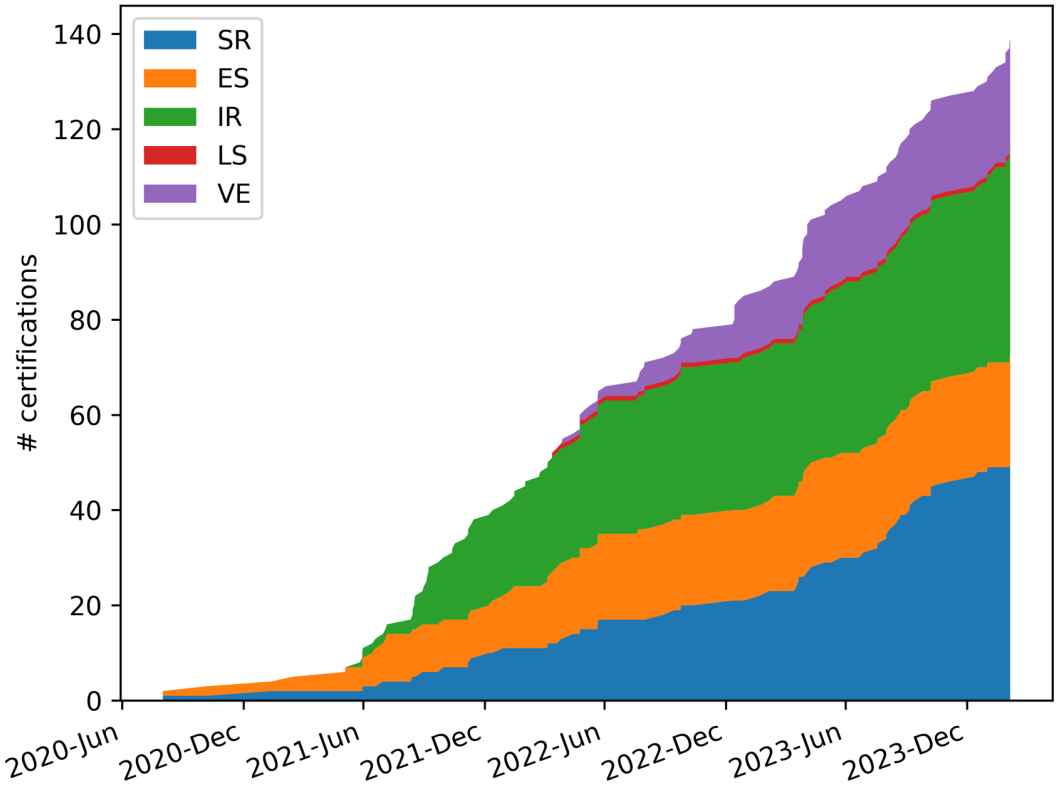
Ilias has more details in the next session *MAD24-215 U-Boot for SystemReady-IR -- Status and struggles*.

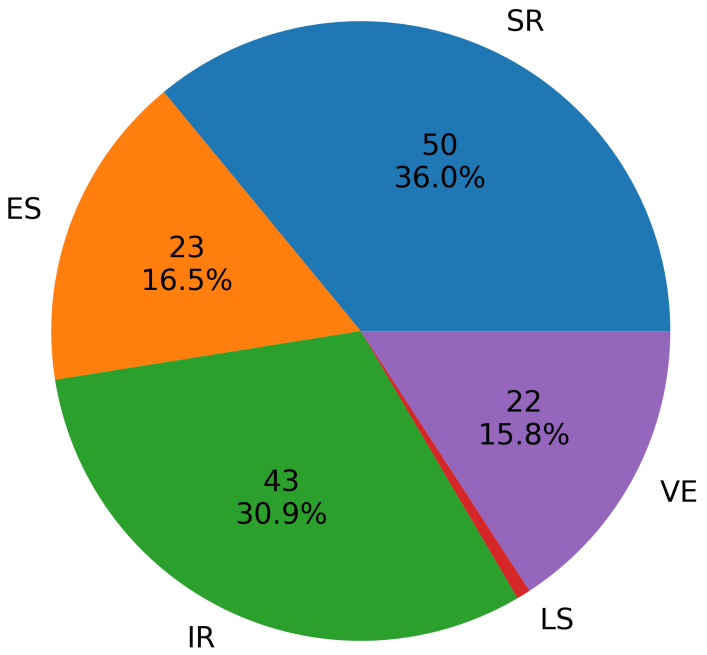
IR timeline


ESRT optional
ESRT
Devicetree schemas
Signed FMP capsules
SIE recommended
1.0
1.1
1.2
2.0
2.1
SCT, FWTS
Capsule update
2x OS installed
BSA informative
ACS 32b
Ethernet
Boot & storage medium
3x OS installed
OpenWRT
2021-04
2021-07
2021-10
2022-01
2022-04
2022-07
2022-10
2023-01
2023-04
2023-07
2023-10

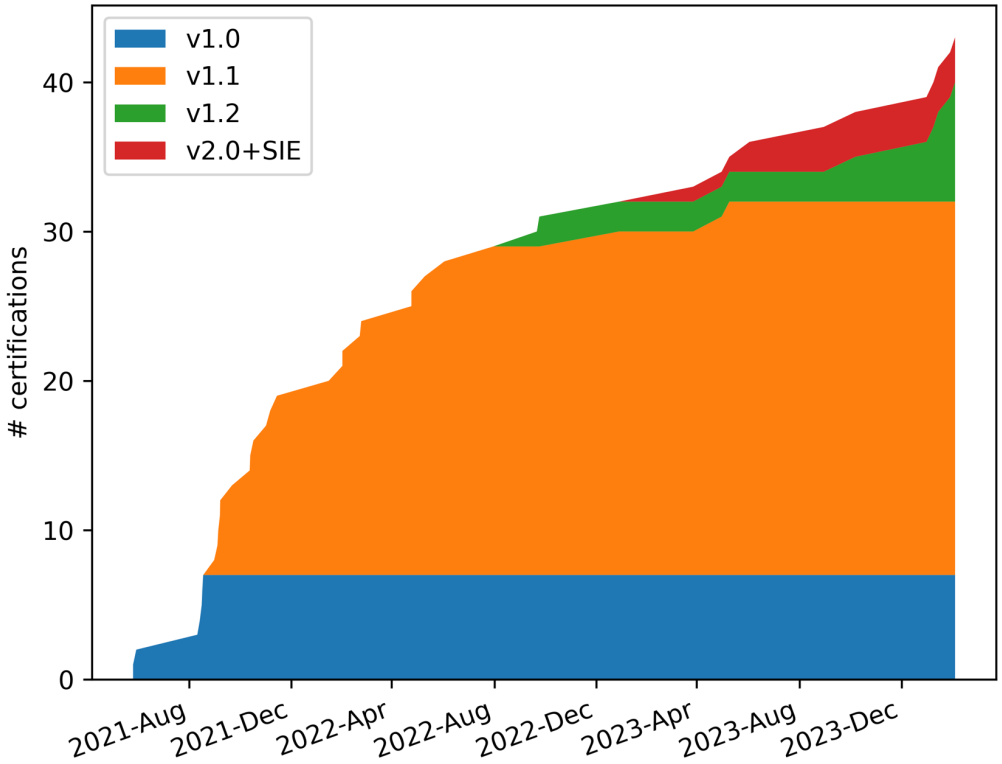
Certifications data analysis

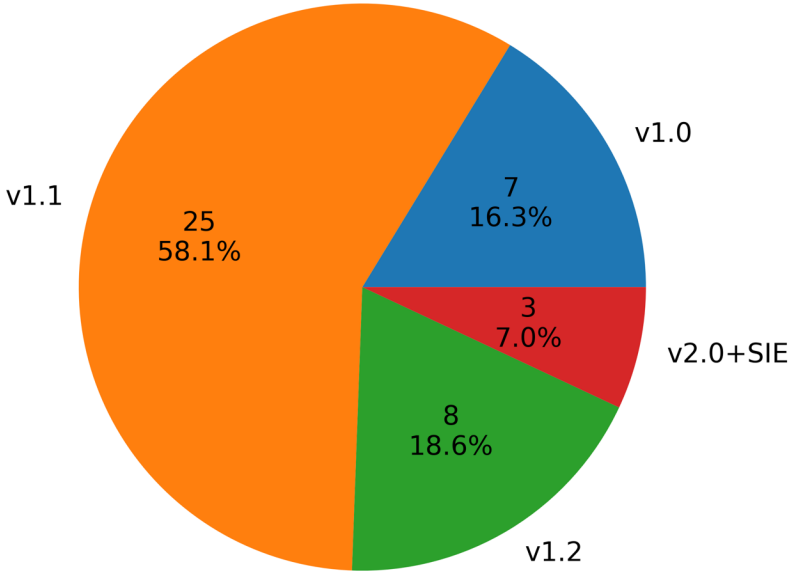
SystemReady certifications per band



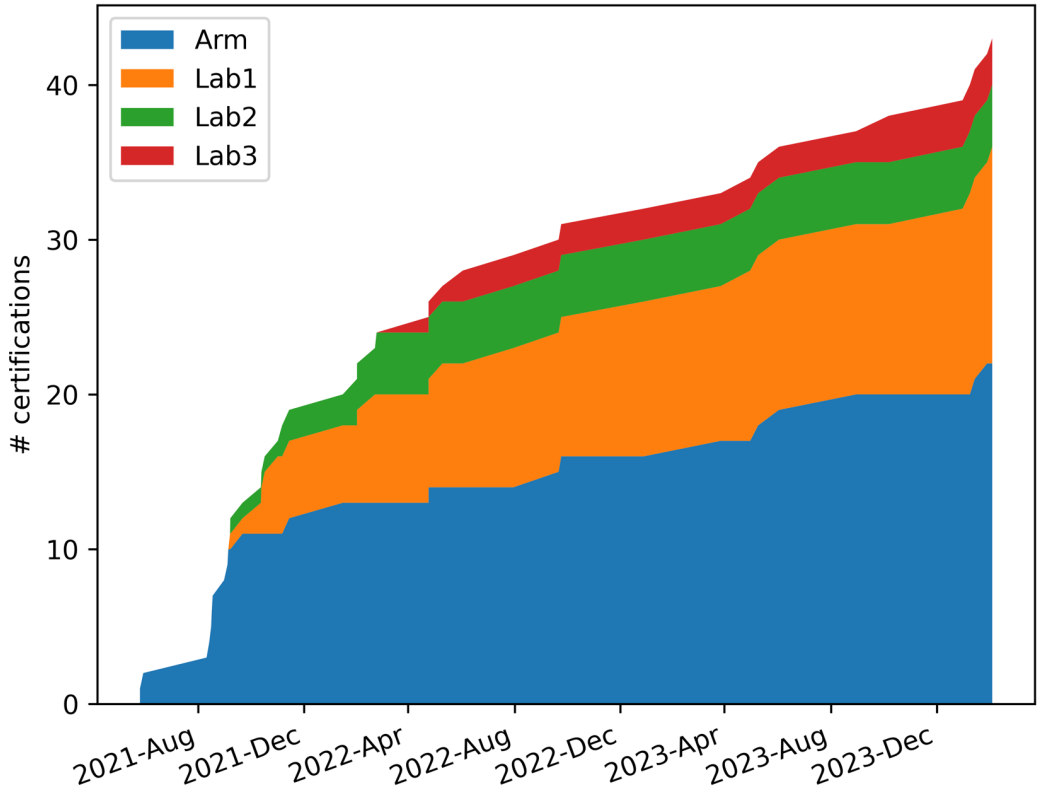


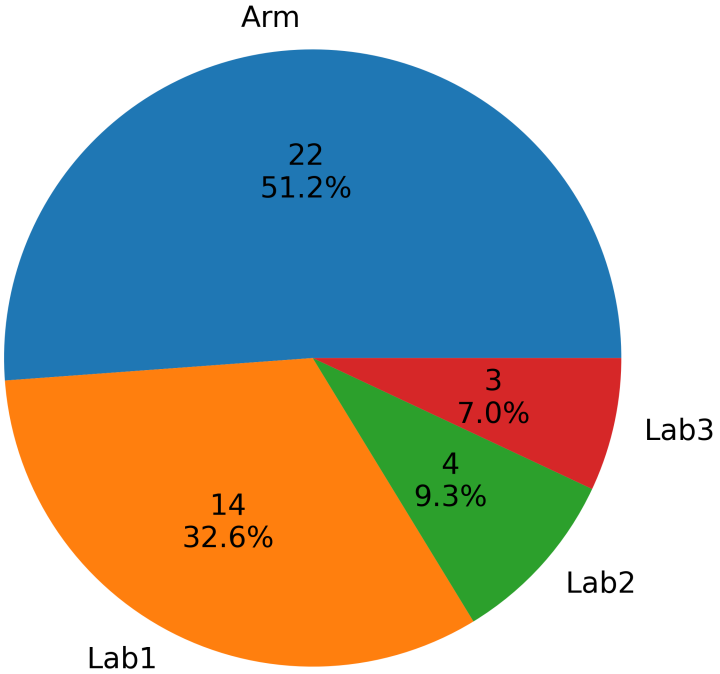
SystemReady IR certifications versions



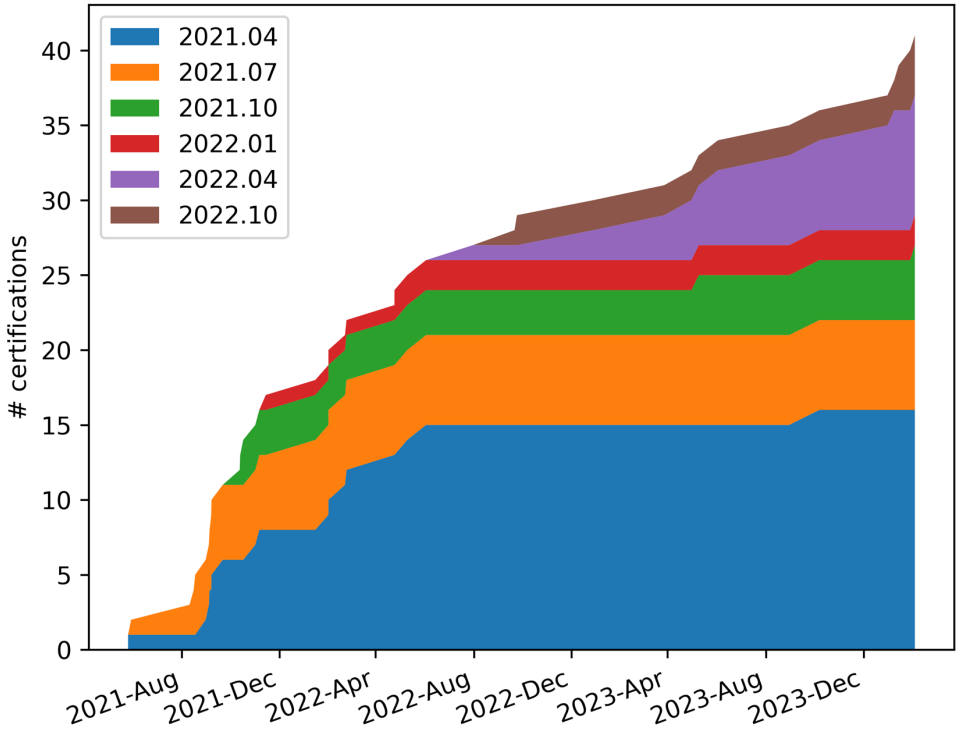


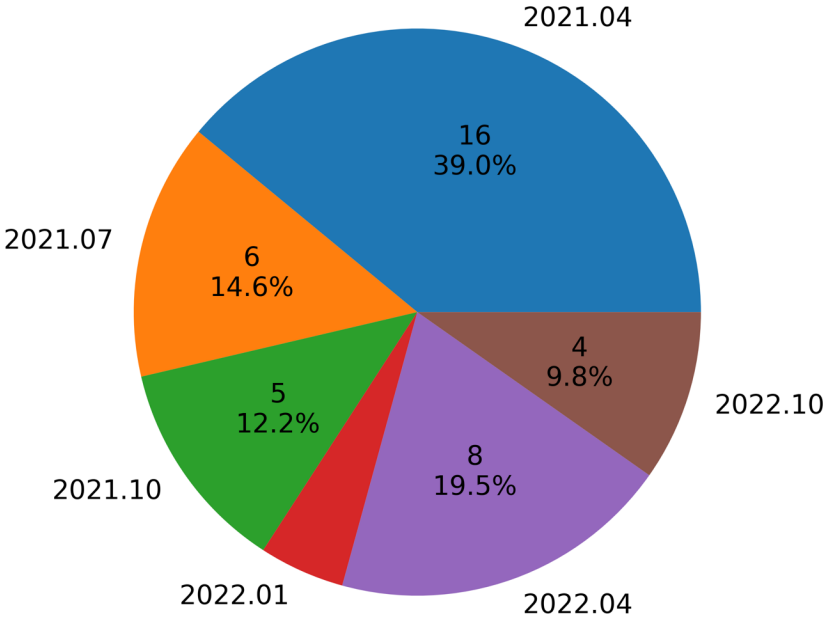
IR certifications labs





IR certifications U-Boot versions

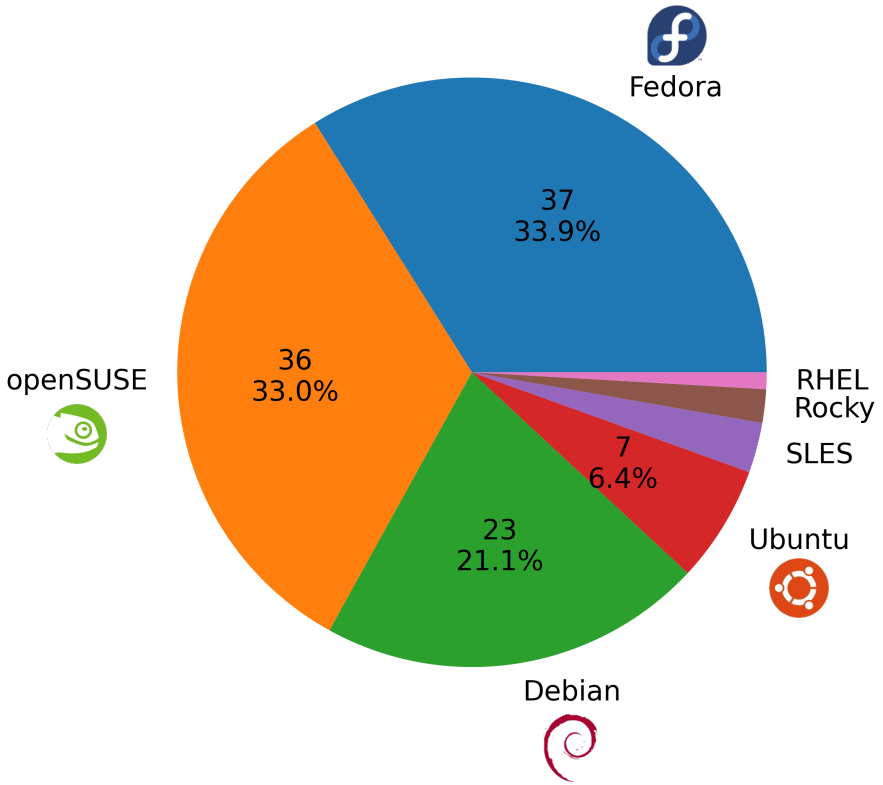




-rc versions are grouped with the released ones for the sake of simplicity.

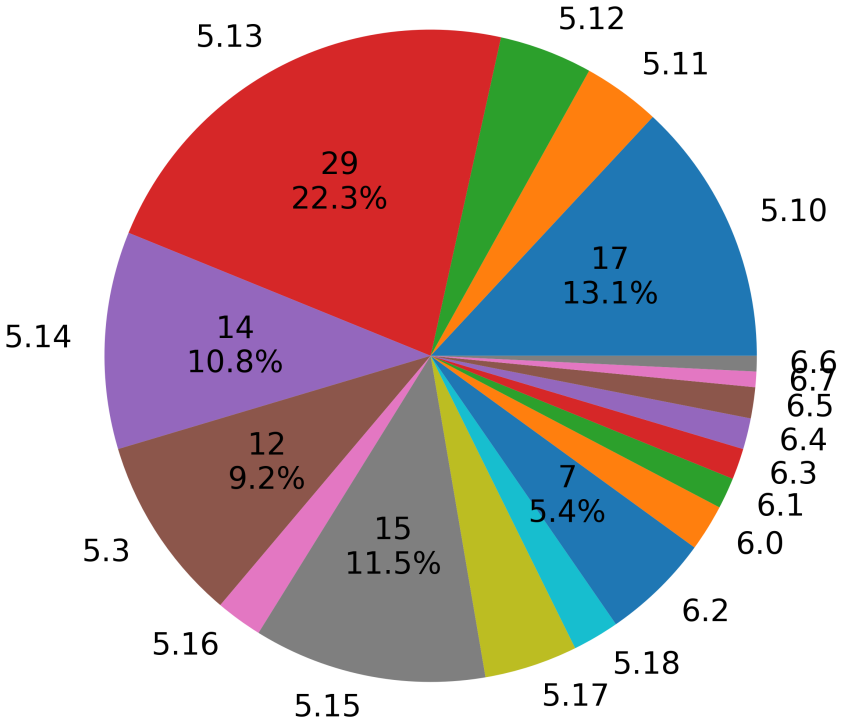
IR certifications OS families

- OS families installed during IR certifications.
- While the OS is not part of the certified system, system support must be present in the OS for certification.

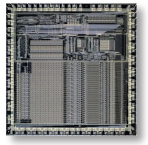


IR certifications Linux versions

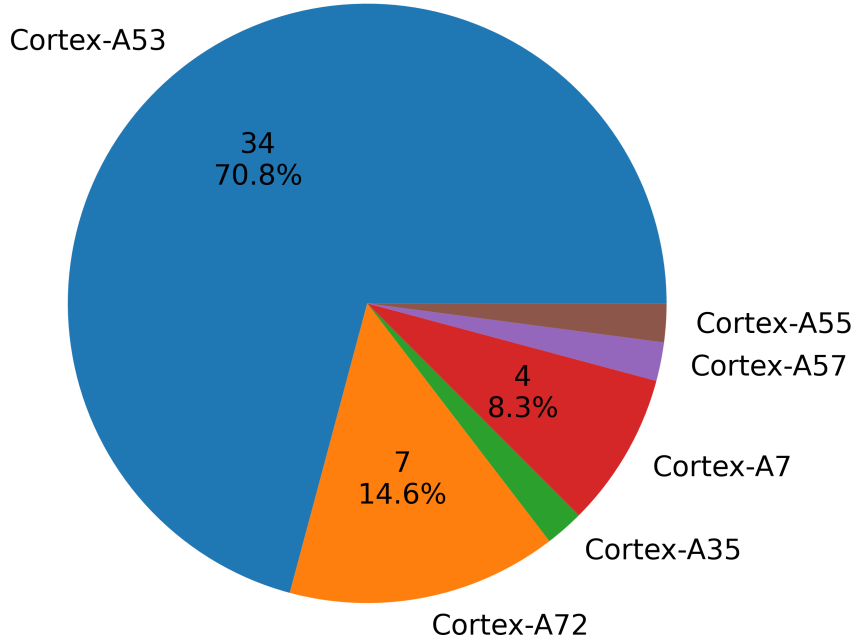
- Linux kernel versions used during IR certifications in:
  - ACS
  - 2x OS installed
- While the Linux kernel is not part of the certified system, system support must be present in the kernel for certification.



IR certifications processors

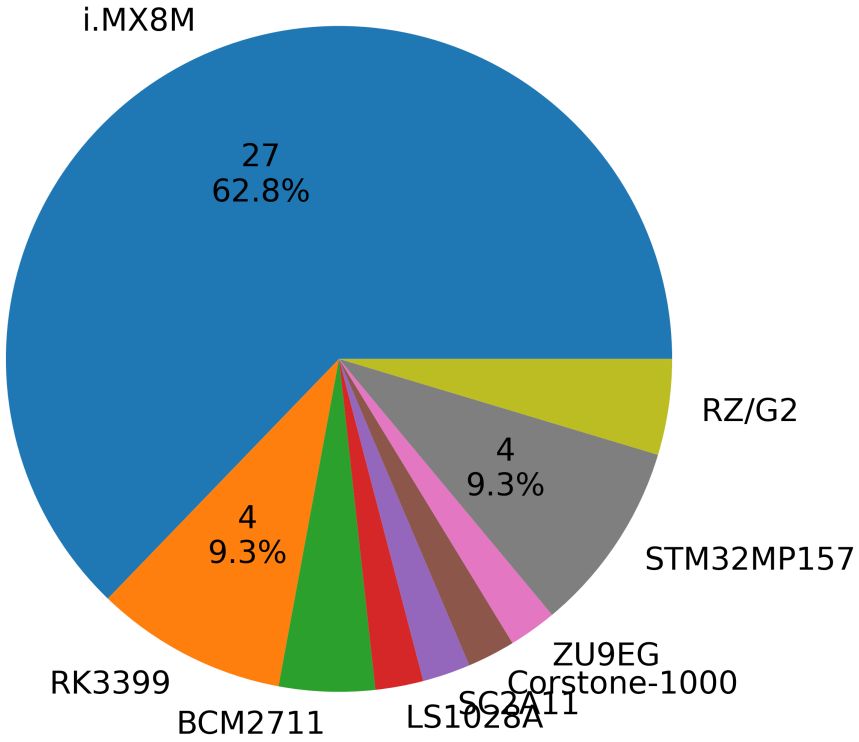


- big.LITTLE systems have two processor types.
  - For example, the RK3399 has Cortex-A53 and Cortex-A72.



IR certifications SoCs families

- Different silicon dies are grouped into families for the sake of simplicity.
- An SoC can be certified for IR only as part of a system.



Lessons learned

Lessons learned

- IR certification is easier when the SoC has already been certified, as part of the silicon vendor's reference design for example.
  - Linux support
  - Distros support
  - Devicetree schemas
- The upstreaming process can be time-consuming.
  - Using daily distros, Devicetree schemas from Linux next can reduce the turnaround time.
- OS-specific certifications are easier when the system has already been certified for IR.
- Firmware necessitating a protective partition makes the OS install more difficult.
  - SPI NOR or eMMC boot partition solve this.
  - In fact, an eMMC is better as it gives us the UEFI Authenticated Variables as well.
- It is tempting to have a "one off" custom firmware to pass certification or to remove nodes from the Devicetree.
  - This is not the spirit.
- It is tempting to run certification tests "piecewise" and to fix the firmware in the middle or change configuration.
  - This is not the spirit.

Lessons learned (Continued)

- Reproducibility issues in the past.
  - Firmware must now be published.
- Capsule on-disk is more challenging than the direct method.
  - Two storage medium (one for the ESP).
- Ethernet working in the OS is key to automation and CI.
  - Now in IR 2.1.
  - We are going toward “continuous compliance”.
- Getting all OS/medium combinations to work is hard.
  - With IR 2.1, we are encouraging the ecosystem to do a step in that direction.
- The “same” systems with different RAM sizes are in fact not the same systems.
  - One might boot an OS when the other might not.
  - We need to test them all for certification.
- The checker scripts find many problems.
  - They need to be run, though ☺
  - We are going toward more automation.

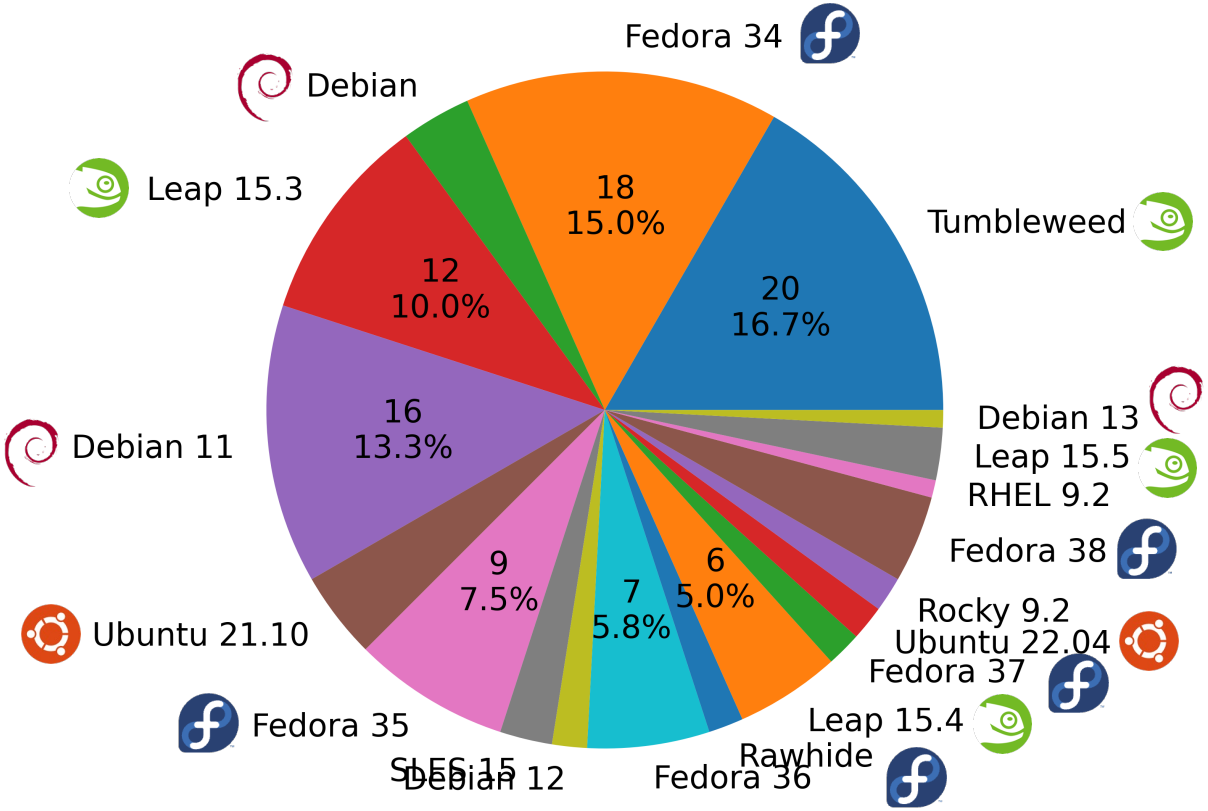
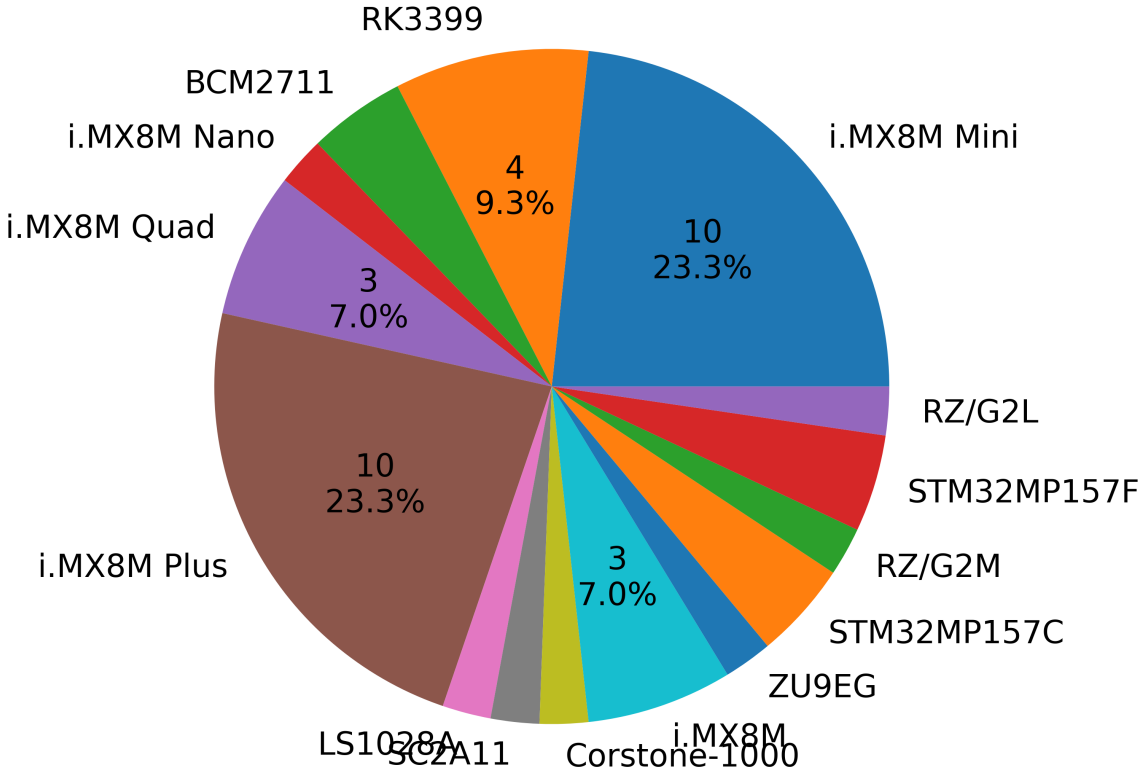
Thanks! Questions?

- Stay here for Ilias' session: *MAD24-215 U-Boot for SystemReady-IR -- Status and struggles*, with more U-Boot specific tips.
- Attend Ilias, Pere & Peter's BoF on Thursday: *MAD24-319 SystemReady as the default option for BSPs - Findings from the last SystemReady IoT workshop*.
- Have a look at the *SystemReady IR IoT Integration, Test, and Certification Guide*, which has some more tips: https://developer.arm.com/documentation/DUI1101/latest/
- Join the EBBR meetings and help advance the specification: https://github.com/ARM-software/ebbr/wiki/EBBR- Meetings.

Linaro Connect
MADRID 2024 | MAY 12-17 2024

Thank you

IR certifications OS versions details



IR certifications SoCs details