CIP usage at Cybertrust

Launching CIP-based Distribution

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Who we are?

Cybertrust is a company who offers the largest Japanese Digital Authentication Infrastructure and Embedded Linux Technology.
Our customers in embedded areas

Factory Automation

Communication

Transportation

Automotive

PLC: 15 Years

PLC: 15 Years

PLC: 15 Years

PLC: 20 Years

PLC: 20 Years

PLC: Product Life Cycle

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EMLinux highlights

• **EMLinux is CIP-based Linux distribution offered by Cybertrust**
  • Source Distribution: Poky (Yocto) as build system + meta-debian
  • The 1ˢᵗ release was on October 29ᵗʰ

• **Features from CIP**
  • CIP OSBL (CIP SLTS4.19 kernel + CIP core packages)
  • SoC: Renesas RZ/G2
  • IEC 62443-4 Readiness (Coming)

• **Other Features**
  • Additional packages from Debian Buster for HMI and Network
  • Additional SoC support: Xilinx Ultrascale+ MPSoC, qemuarm, qemuarm64, raspberrypi3-64
  • Vulnerability Information Notification & patches for 10 years
  • OTA + Trust Service for Authenticity (Coming)
Practices to develop the distribution

Adding Packages

Adding SoC Support

EMLinux

Packages

OSBL

CIP Core Packages

CIP Kernel

SoC Support

Renesas
RZ/G2

Xilinx
MPSoC

Others

HMI

Network

Trust Services

Others
Adding packages

EMLinux Source Distribution

Base Layer
- poky (meta)
- meta-debian
- meta-debian-extended
- meta-emlinux
- meta-emlinux-private

Extension Layer

EMLinux Image for Target Device

- User-land packages (CIP Core, Debian, etc)
- CIP SLTS Kernel

EMLinux SDK

- Cross-Build Tool Chain
- Sysroots
Ten years support

- CIP Core Packages (tens)
- CIP kernel
- Additional Packages (hundreds)
- Customer Applications/Middleware

Support Term:
- 5 yrs
- 10 yrs

Support:
- Supported by CIP
- Supported by Cybertrust

EMLinux Scope

supported by CIP

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## EMLinux supported hardware

<table>
<thead>
<tr>
<th>CIP Reference Hardware</th>
<th>EMLinux Supported Hardware</th>
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<tbody>
<tr>
<td>• AM335x Beaglebone Black (Armv7)</td>
<td>• QEMU (ARMv7-A)</td>
</tr>
<tr>
<td>• QEMU x86_64</td>
<td>• QEMU (ARMv8-A)</td>
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<tr>
<td>• RZ/G1M iWave Qseven Development Kit (Armv7)</td>
<td>• Raspberry Pi3 64bit (ARMv8-A)</td>
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<tr>
<td>• RZ/G2M HopeRun HiHope (Armv8)</td>
<td>• RZ/G2E Silicon Linux ek874 (Armv8)</td>
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<tr>
<td>• SIMATIC IPC227E (x86-64)</td>
<td>• RZ/G2M HopeRun HiHope (Armv8)</td>
</tr>
<tr>
<td>• OpenBlocks IoT VX2 (x86-64)</td>
<td>• Xilinx Zinq Ultrascale+ MPSoC zcu102 (Armv8)</td>
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EMLinux sources

- EMLinux
  - Debian Buster
  - CIP OSBL: 5 years support
  - Linux Mainline
  - LTS: 10 years support
  - SoC BSP: 1-2 years support

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Approach to support non-CIP SoCs

• Two alternatives to support non-CIP SoCs with EMLinux
  • Alt1) Add SoC board support packages locally
  • Alt2) Contribute missing patches to CIP from BSP

• Would like to take Alt2 for Xilinx Zinq Ultrascale+ MPSoC
  • Conducted gap analysis between CIP SLTS4.19 and MPSoC BSP kernel
    • Identified missing patches from its BSP for our use cases (HMI and Network)
      • Neary 500 patches required to add to CIP SLTS4.19
    • Proposed the code contribution to the CIP community
Adding SoC support

• The contribution proposal was granted under the following conditions, and we are now preparing for it.

To follow "Upstream-First" principle, only patches in Linux Mainline are accepted

Add the target board to CIP test environment for CI

Contribute code of the target board and maintain it
Adding SoC support

• Next Steps (suggested by Pavel-san)

1. Identify minimum usable subset of the patches. That would likely be "whatever is necessary to get some kind of output on serial console", probably clock, pinctrl, serial, dts.
2. Verify that support is already in mainline, submit necessary patches if not.
3. Add this point it may be useful to start running tests of mainline on your LAVA board.
4. Send a list of patches that will be needed for initial boot.
5. Start submitting patches for review & merge.
Adding SoC support from upstreams

Contribute SoC code to the Linux community

- Debian Buster
- Linux Mainline
- LTS
- CIP OSBL
- EMLinux
- SoC BSP

- 5 years support
- 10 years support
- 1 - 2 years support

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What’s next

• In CIP Community:
  • Proceed to contribute MPSoC code to CIP
    • Consider to contribute code to Linux Mainline where necessary
  • Discuss with SoC vendors for cooperation
  • Refine the guideline to add SoC support in CIP

• For EMLinux:
  • Expand target SoCs
    • Investigate an appropriate way to support the SoCs code
  • Add packages for IEC 62443-4 readiness and OTA support
Thanks you!