Status of AMD platforms in coreboot

FOSDEM 2020 Hardware enablement devroom

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Introduction

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- PC Engines platforms maintainer in coreboot
- Braswell SoC maintainer in coreboot
- one of 36 official coreboot developers
- interested in:
  - advanced hardware and firmware features
  - security solutions

Agenda

- Introduction
- Definitions
- AMD and coreboot - history
  - AGESAv3 (and earlier), CIM-x
  - AGESAv5 open-source
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Definitions

- AGESA - **A**MD **G**eneric **E**ncapsulated **S**oftware **A**rchitecture
  AMD processor initialization source code
- CIM-x - AMD southbridge initialization code
- FCH - **F**usion **C**ontroller **H**ub
  new generation of AMD southbridges/chipsets
- PSP - **P**latform **S**ecurity **P**rocessor
  AMD's equivalent of Intel ME, a coprocessor on the chipset performing similar operations to the ME (security, crypto, CPU bringup, etc.)

For the processor codenames and architecture names please refer to wikipedia

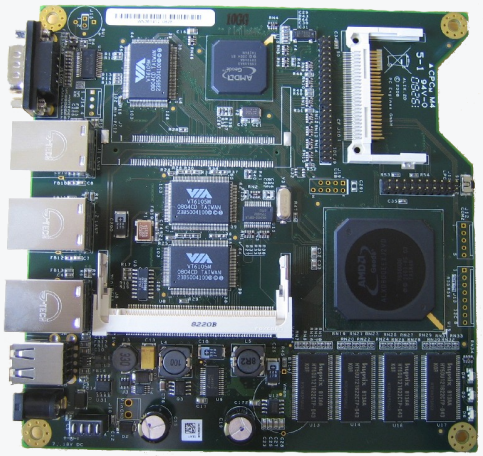
AMD and coreboot - history

AGESAv3 (and earlier), CIM-x, around 2008:

- Family 10 support, Geode processors
- Processor, memory, Hyper Transport initialization
- Southbridge initialization (8111/8131, M690, SB600/SB700)
- 3 chip solutions
- already dropped from master branch due to maintainability problems

Products:

- PC Engines ALIX boards (Geode LX) - maintaining was too troublesome (no MTRRs, no clean CAR setup, many FIXME in the code etc.)



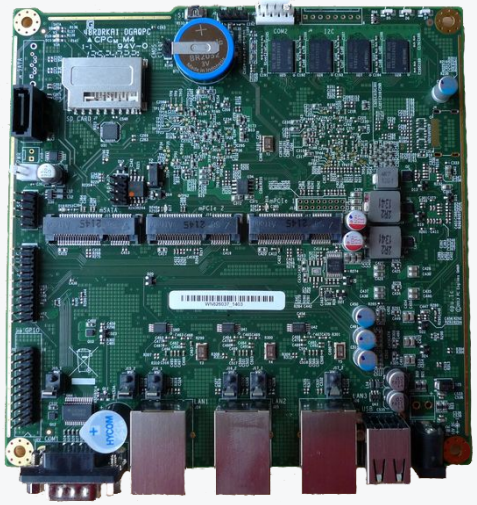
AMD and coreboot - history

AGESAv5 open-source (2011-2013):

- CIM-x only for family 14h
- CIM-x merged into AGESA for newer families
- since family 15h discrete FCHs (many variants)
- open-source up to family 15h (Trinity) and 16h (Kabini)

Products:

- Lenovo G505s (family 15h)
- PC Engines apu1 (family 14h)
- ASRock E350M1 (family 14h), IMB-A180 (family 16h)
- Asus AM1I-A (family 16h), F2A85-M (family 15h)



AMD and coreboot - history

AGESAv5 binaryPI (~2014):

- closed source, binary releases of AGESA
- first appearances of PSP and integrated FCHs
- supported by family 15h processors models 30h-3Fh, 60h-6Fh and 70h-7Fh, family 16h processors models 30h-3Fh
- currently unmaintained by AMD
- broken suspend/resume, issues with CAR teardown

Products:

- PC Engines apu2 (family 16h)
- Chromebooks (family 15h models 70h-7Fh - StoneyRidge)

AMD and coreboot - future

AGESAv9 (2019-now):

- another closed source implementation
- support for family 17h (Ryzen)
- apparently it is designed only for Chromebooks
- work-in-progress, due to AMD's groundbreaking change to their processors architecture it takes a lot of time and effort to make it land into the main tree in usable form
- for more details see Kerry Brown's talk from OSFC 2019:
  `Adaptation of AMD Reference Firmware to coreboot© Using FSP 2.0`
  https://www.youtube.com/watch?v=eyRsk8GU3OE

Products:

- Chromebooks

AMD and coreboot - future

- many platforms are being dropped due to coreboot release requirements
- some developers engaged to implement missing functionalities and requirements (mainly me and Kyösti Mälkki)
- community aligns with the work and push updated board support
- much clean-up and fixes to do, most of the code landed in the repository as copy-paste (MP tables, IRQ tables, ACPI code is also poor)
- thanks to the companies like PC Engines (who support open source development through 3mdeb), the platforms keep living in the coreboot project
- for now the AMD based platforms can move on, but it is unknown when they will face a wall that cannot be jumped over (closed source blobs making it even harder)

Platform maintainership

Native ports:

- Asus KCMA-D8 (dropped from tree)
- Asus KGPE-D16 (dropped from tree)
- Supermicro H8SCM (dropped from tree)

Situation:

- unmaintained and left behind by their port authors
- many bugs unresolved and many new arose in the meantime
- dropped form master branch due to not fulfilling the coreboot release requirements
- one of the last and newest blob-free, fully libre hardware (no PSP, microcode etc.)

Platform maintainership

Hope:

- 3mdeb applied for funding to bring back the Asus KGPE-D16 board back to master branch
- AMD's processors can be better in certain aspects than Intel's (fully open-source D-RTM implementation with Trenchboot developed by 3mdeb with cooperation of Daniel P. Smith (Apertus Solutions), Andrew Cooper (Xen Project))

Future:

- 3mdeb will keep improving the AMD support in coreboot via PC Engines company and their apu products
- possibly bring back other native ports beside Asus KGPE-D16
- family 17h support (Ryzen/Zen) is rather unlikely for other products than Chromebooks in coreboot

References

- Marc Jones at coreboot summit 2008:
  AMD coreboot Development
- Marshall Dawson at Denver coreboot conference 2017:
  AMD and coreboot - History and future
- Own experience

Q&A