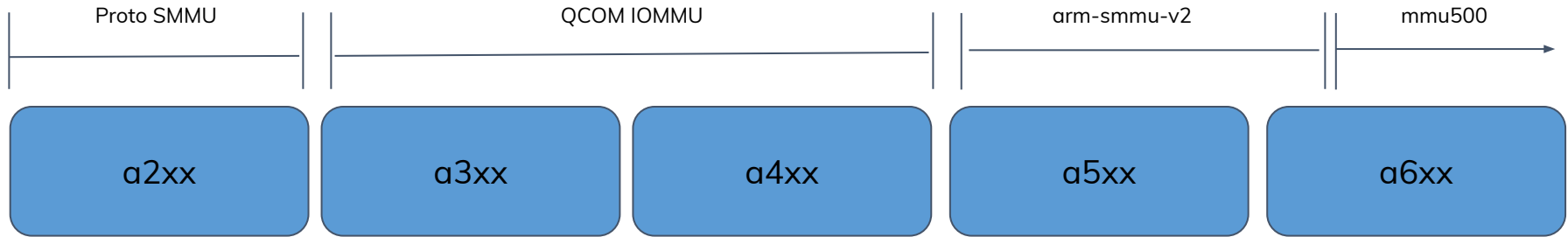


The ARM SMMU and the Adreno GPU

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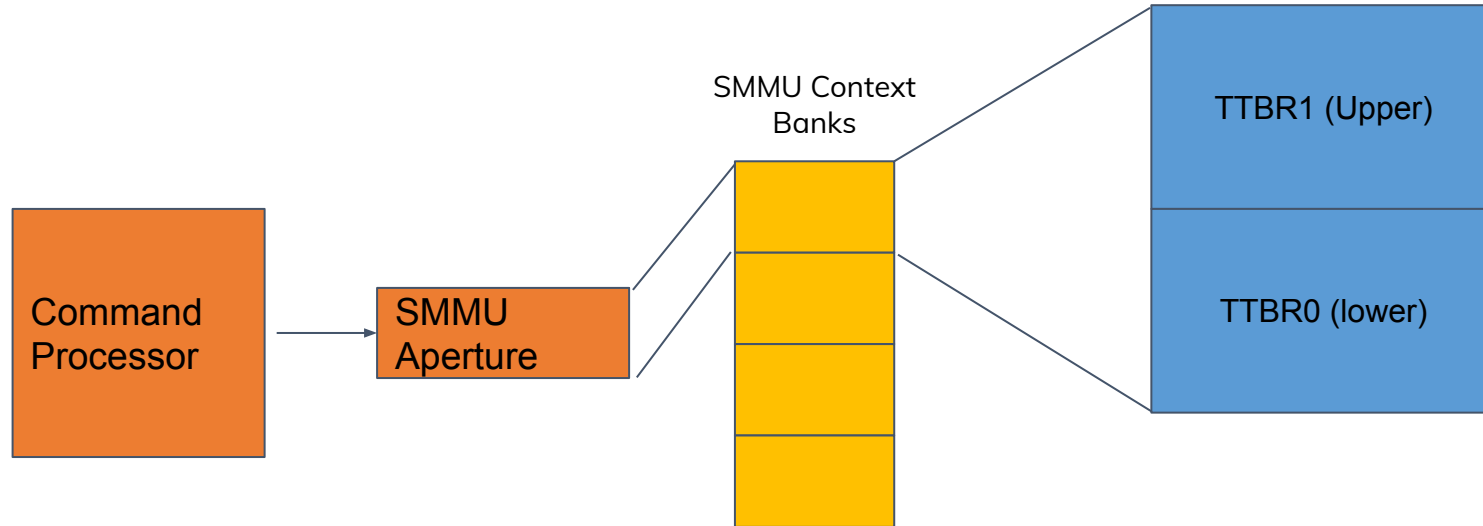
Hardware History



Per-Instance Pagetables

- Individual virtual address spaces
- Could be as granular as a context and as broad as a process
- As a bonus allows for coarse grained SVA (Same Virtual Address)
- Triggered from the command processor stream with the SMMU_TABLE_UPDATE opcode

Hardware Implementation



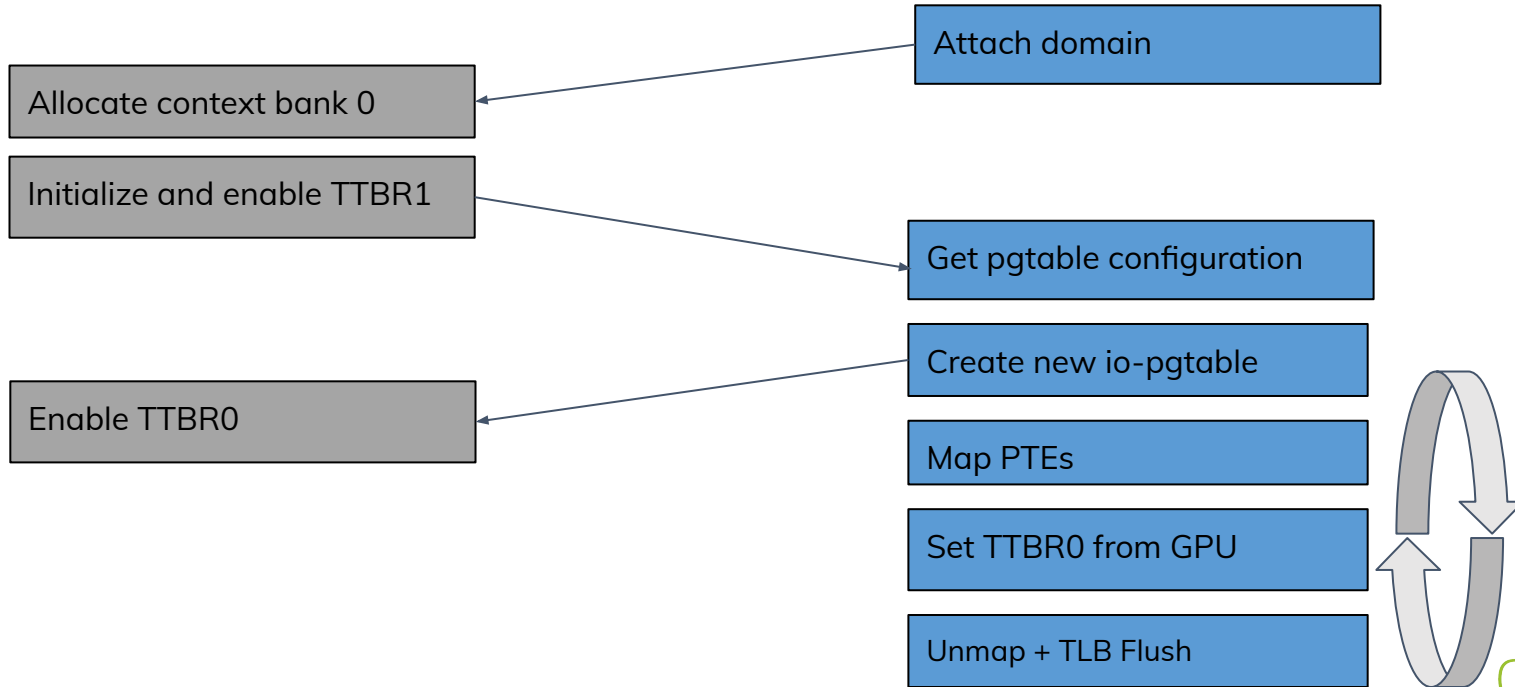
Requirements for GPU Page Table Switch

- Fixed context bank (ideally CB0)
- Split pagetable support
- Shared pagetable configuration between GPU driver and SMMU driver

Programming Sequence

arm-smmu

drm/msm



Code Implementation

- Add a compatible string for qcom,adreno-smmu
 - <https://patchwork.freedesktop.org/patch/385033/?series=79679&rev=3>
- New implementation hook for alloc_context_bank
 - <https://patchwork.kernel.org/patch/11719337/>
- Private interface for GPU <-> arm-smmu
 - Get TTBR1 config / set TTBR0 config
 - <https://patchwork.kernel.org/patch/11719419/>
 - <https://patchwork.kernel.org/patch/11719419/>
- Split pagetables
 - <https://patchwork.kernel.org/patch/11719327/>
- Adreno SMMU implementation
 - <https://patchwork.kernel.org/patch/11719361/>
- drm/msm support for a6xx
 - <https://patchwork.kernel.org/patch/11719409/>

Full series: <https://patchwork.kernel.org/project/linux-arm-msm/list/?series=334093>

Stretch Goals

- Retry on fault (HUPCF)
- Expanded fault debugging
- Stall on fault to force a devcoredump

Thanks

- Jeremy Gebben
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- Vivek Gautam
- Bjorn Andersson
- And many others

Thank you

