

Versioning of CV* cores

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Agreed feature set

- Agreed feature set at the start of a specific core project
- Example: CV32E40P has agreed features as M and C extensions as well as the PULP extension
- At a specific RTL freeze not all features might have been implemented or verified
- Example: At initial RTL freeze of the CV32E40P non-0 settings of PULP_XPULP, PULP_CLUSTER, and FPU parameters were not yet supported/verified, which does not mean that support for initially not supported parameter configurations can/will not get added after RTL freeze

What happens after RTL freeze when ...?

- There is a bug fix
- There is a power optimization to the RTL
- There is a change in pinout
- Not-yet-supported (but initially agreed) features are implemented
- Not initially agreed software visible features are added
- The performance of the core is optimized impacting the cycle count
- ...

Project name, *marchid* CSR and *mimpid* CSR

- Project name, e.g.
 - CV32E40P
 - CV32E40
- Machine Architecture ID (*marchid* CSR)
 - Governed by RISC-V organization, see <https://github.com/riscv/riscv-isa-manual/blob/master/marchid.md>
 - CV32E40P has *marchid* 4
 - CV32E40 *marchid* needs to be requested (but will not be 4)
 - *marchid* and project name are 'equivalent'
- Machine Implementation ID (*mimpid* CSR)
 - At initial RTL freeze CV32E40P will have *mimpid* 0
 - Each *mimpid* will correspond to a specific (series of) git tag(s)

Changes after RTL freeze

- Minor updates
 - Logically equivalent RTL
 - Comments
 - Power, performance, area improvements
 - Testbench updates
 - -> **New git tag**
- Bug fixes
 - -> **New git tag**
 - -> **Incremented mimpid**
 - Not LEC equivalent only due to bug fix and *mimpid* increase
- Completion of parameter options
 - E.g. PULP_XPULP
 - -> **New git tag**
 - -> **Incremented mimpid**
 - LEC equivalent (excluding *mimpid* update) for frozen parameter set
- Minor new features
 - E.g bus error support
 - -> **Not allowed (new project needed)**
- Major new features
 - E.g. User mode, PMP
 - New project, e.g. CV32E4**1P**
 - -> **New project**
 - -> **New marchid**

Further explanation and examples

- For the scenario where there are no bugs found with the default parameter settings, then all future feature updates shall result in the new design being “logical equivalent” with the original released version given the default parameter settings, except that *mimpid* can have a logical non-equivalence as this value will be incremented.
- For the scenario where there are bugs found with the default parameter settings, then the new design updates shall only be logically non-equivalent with the original released version for these bugs and *mimpid* value update, and shall be logically equivalent for all other existing features of the original released version given the default parameter settings.
- For example, if there are no bugs using the default parameter setting and if you add a debug trigger feature such as exception trigger, then this feature would not be accessible with the default parameter settings. Moreover, if for some reason the design requires a state machine modification or additional cycle insertions to handle this new feature, then the new design shall still be logically equivalent with the original released version given the default parameter settings. Hence the legacy instruction address match debug trigger feature would not change behavior nor incur additional cycles. This is just an example and may (probably will not) be a concern with the new exception trigger feature.
- Let’s extend this example. After you added the exception trigger feature and we find a bug that is present with the default parameter settings (For example, let’s say non-compressed *ebreak* is not decoded properly.... again this is an example and I’m not aware of a real bug today). In this case the change will be applied and there will be a logical non-equivalence only for this bug fix (and the *mimpid* change) when running LEC with the default parameter settings. The newly added exception trigger feature shall still not be accessible nor cause additional cycles with the default parameter settings.