

# Vcilcu

## 1) Functional Description

This VCI target is a memory mapped peripheral implementing a vectorized interrupt controller. It can concentrate up to 32 independent interrupt lines **p\_irq\_in[i]** to a single **p\_irq** interrupt line.

The active state is high, and the output interrupt is the logical OR of all input interrupts. Each input interrupt can be individually masked through a programmable register.

This component can be addressed to return the index of the highest priority active interrupt **p\_irq[i]**. The priority scheme is fixed : The lower indexes have the highest priority.

This hardware component checks for segmentation violation, and can be used as a default target.

This component contains 5 memory mapped registers:

- **ICU\_INT** Each bit in this register reflects the state of the corresponding interrupt line. This is read-only.
- **ICU\_MASK** Each bit in this register reflects the state of the enable for the corresponding interrupt line. This is read-only.
- **ICU\_MASK\_SET** Each bit set in the written word will be set in the ICU MASK. (**ICU\_MASK = ICU\_MASK | written\_data**). This is write-only.
- **ICU\_MASK\_CLEAR** Each bit set in the written word will be reset in the ICU MASK. (**ICU\_MASK = ICU\_MASK & ~written\_data**). This is write-only.
- **ICU\_IT\_VECTOR** This register gives the number of the highest-priority active interrupt. If no interrupt is active, (-1) is returned. This is read-only.

For extensibility issues, you should access your ICU using globally-defined offsets.

You should include file `soclib/icu.h` from your software, it defines **ICU\_INT**, **ICU\_MASK**, **ICU\_MASK\_SET**, **ICU\_MASK\_CLEAR**, **ICU\_IT\_VECTOR**.

Sample code:

```
#include "soclib/icu.h"

static const volatile void* icu_address = 0xc0000000;

static icu_test()
{
    // Getting / setting interrupt mask
    uint32_t current_interrupt_mask = soclib_io_get( icu_address, ICU_MASK );

    // Enabling IRQ #5
    soclib_io_set( icu_address, ICU_MASK_SET, 1<<5 );
    // Disabling IRQ #0
    soclib_io_set( icu_address, ICU_MASK_CLEAR, 1<<0 );

    // When interrupt is raised, you may do:
```

```

int irq_to_serve = soclib_io_get( icu_address, ICU_IT_VECTOR );
// This should be equivalent to (see man 3 ffs)
int irq_to_serve = ffs( soclib_io_get( icu_address, ICU_IT_VECTOR )
                        & soclib_io_get( icu_address, ICU_MASK ) );
}

```

(add -I/path/to/soclib/include to your compilation command-line)

## 2) Component definition & usage

source:trunk/soclib/module/infrastructure\_component/interrupt\_infrastructure/vci\_icu/caba/metadata/vci\_icu.sd

See [SoclibCc/VciParameters](#)

```
Uses( 'vci_icu', **vci_parameters )
```

## 3) CABA Implementation

### CABA sources

- interface :  
[source:trunk/soclib/soclib/module/infrastructure\\_component/interrupt\\_infrastructure/vci\\_icu/caba/source/include/vci\\_icu.h](#)
- implementation :  
[source:trunk/soclib/soclib/module/infrastructure\\_component/interrupt\\_infrastructure/vci\\_icu/caba/source/src/vci\\_icu.c](#)

### CABA Constructor parameters

```

VciIcu(
    sc_module_name name, // Component Name
    const soclib::common::InTab &index, // Target index
    const soclib::common::MappingTable &mt, // Mapping Table
    size_t nirq); // Number of input interrupts

```

### CABA Ports

- sc\_in<bool> **p\_resetn** : Global system reset
- sc\_in<bool> **p\_clk** : Global system clock
- soclib::caba::VciTarget<vci\_param> **p\_vci** : VCI port
- sc\_out<bool> **p\_irq** : Output interrupt port
- sc\_in<bool> **p\_irq\_in[]** : Input interrupts ports array