VciMwmrController

1) Functional Description

This VCI component is the hardware part of the MWMR communication middleware. It allows an hardware coprocessor to communicate with one or several MWMR channels. The coprocessor communicates with the MWWR controller through several FIFO interfaces (one FIFO interface per MWMR channel). An internal FSM implements the five steps MWMR communication protocol (5 VCI transactions for one MWMR transaction). This component contains as many hardware FiFOs as the number of supported MWMR channels. An MWMMR transaction starts when a Write FIFO is FULL, or when a Read FIFO is empty. The priority policy between the supported channels is Round Robin.

This component is both a VCI target and a VCI initiator.

- It is addressed as a target to be configured.
- It is acting as an initiator to do the MWMR transfers

Besides the communication channels, this MWMR controller provides a variable number of unidirectionnal 32-bits signals going from/to the coprocessor.

- from the coprocessor, they are *status* registers
- to the coprocessor, they are *configuration* registers

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

As a target this component contains the following memory mapped registers:

- Registers 0 to `MWMR_IOREG_MAX`

When read from, they reflects status registers, when written to, they reflects the control registers.

- `MWMR_RESET`

Writing into this register resets the current state of the controller, flushing all hardware FIFOs and the MWMR controller configuration.

- `MWMR_CONFIG_FIFO_WAY` and `MWMR_CONFIG_FIFO_NO`

Used to designate the currently configured MWMR channel. WAY may be `MWMR_TO_COPROC` or `MWMR_FROM_COPROC`, NO may be any MWMR channel in the selected way.

- `MWMR_CONFIG_STATE_ADDR`

Sets the address of state field for the selected MWMR channel.

- `MWMR_CONFIG_OFFSET_ADDR`

Sets the address of read/write pointer field for the selected MWMR channel.

- `MWMR_CONFIG_LOCK_ADDR`

Sets the address of the lock protecting the selected MWMR channel.

- `MWMR_CONFIG_DEPTH`

Sets the depth of the selected MWMR channel.

- `MWMR_CONFIG_WIDTH`

Sets the width of the selected MWMR channel. This will determine the atomic transfer block size. This must be multiple of 4 bytes.

- `MWMR_CONFIG_BASE_ADDR`

Sets the address of the data buffer for the selected MWMR channel.

- `MWMR_CONFIG_RUNNING`

A boolean enabling the selected MWMR channel.

For extensibility issues, you should access the MwmrController using globally-defined offsets. You should include `soclib/MwmrController.h` from your software, it defines all useful offsets and constants.

Sample code:

Please see source:trunk/soclib/platform/runtime_netlist/mwmr/soft/mwmr.h and source:trunk/soclib/platform/runtime_netlist/mwmr/soft/mwmr.c for reference implementation.

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

2) Component definition & usage

source:trunk/soclib/soclib/module/internal_component/vci_mwmr_controller/caba/metadata/vci_mwmr_controller.sd?
See SoclibCc/VciParameters

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

3) CABA Implementation

CABA sources

- interface : source:trunk/soclib/soclib/module/internal_component/vci_mwmr_controller/caba/source/include/vci_mwmr_control
- implementation : source:trunk/soclib/soclib/module/internal_component/vci_mwmr_controller/caba/source/src/vci_mwmr_controller.c

CABA Constructor

```
VciMwmrController(
        sc_module_name name,  // instance name
        const IntTab &index,  // VCI target index
        const MappingTable &mt,  // mapping table
        const size_t plaps,    // time between two access to a given channel
        const size_t fifo_depth,   // hardware FIFOs depth
        const size_t n_to_coproc,  // number of read MWMR channels
```

```
const size_t n_from_coproc, // number of write MWMR channels
const size_t n_config,     // number of configuration registers
const size_t n_status)   // number of status registers
```

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_target** : The VCI target port
- soclib::caba::VciInitiator<vci_param> **p_vci_initiator** : The VCI initiator port
- soclib::caba::FifoOutput<uint32_t> **p_to_coproc[]** : Fifos to coprocessor
- soclib::caba::FifoInput<uint32_t> **p_from_coproc[]** : Fifos from coprocessor
- sc_out<uint32_t> **p_config[]** : Configuration ports
- sc_in<uint32_t> **p_status[]** : Status ports

4) TLM-T Implementation

The TLM-T implementation is not available yet.