

# VirtualDspinRouter

## 1) Functional Description

This is the elementary node of a VirtualDspinArray .

The Virtual Dspin Router is a component which connects up to five inputs (one local, four for the adjacent Virtual Dspin Router) to five outputs (idem) for each virtual channel.

Both channels share the same bus for routing. Thus, each input has a time multiplexing register, to decide which channel writes on the bus.

It implements the X-First algorithm for multicast, and X-First or Y-First for broadcast, depending on the sender's coordinates' parity.

During broadcast, order of outputs is determined by their priority : in case of X-First routing, EAST and WEST Output are chosen first (NORTH and SOUTH for Y-routing).

### Input INFSM States

FSM_REQ	Waiting for paquet or sending first flit
FSM_DTN	Allocated to correct output for multicast
FSM_DT_11	Sending second flit to first output in multicast
FSM_REQ_12	Sending first flit to second output in multicast
FSM_DT_12	Sending second flit to second output in multicast
FSM_REQ_21	Sending first flit to third output in multicast
FSM_DT_21	Sending second flit to third output in multicast
FSM_REQ_22	Sending first flit to fourth output in multicast
FSM_DT_22	Sending second flit to fourth output in multicast
FSM_REQ_LOCAL	Sending first flit to fifth (LOCAL) output in multicast
FSM_DT_LOCAL	Sending second flit to fifth (LOCAL) output in multicast

### Output INFSM States

LOCAL	Allocated to LOCAL input
NORTH	Allocated to NORTH input
SOUTH	Allocated to SOUTH input
EAST	Allocated to EAST input
WEST	Allocated to WEST input
NOP_LOCAL	Not allocated, and last allocated was LOCAL
NOP_NORTH	Not allocated, and last allocated was NORTH
NOP_SOUTH	Not allocated, and last allocated was SOUTH
NOP_EAST	Not allocated, and last allocated was EAST
NOP_WEST	Not allocated, and last allocated was WEST
NOP	Not allocated, and last allocated is unkwnow (equivalent of NOP_LOCAL)

## 2) Component definition & usage

[source:trunk/soclib/soclib/module/network\\_component/virtual\\_dspin\\_router/caba/metadata/virtual\\_dspin\\_router.sd?](source:trunk/soclib/soclib/module/network_component/virtual_dspin_router/caba/metadata/virtual_dspin_router.sd?)

## 3) CABA implementation

### CABA sources

interface [source:trunk/soclib/soclib/module/network\\_component/virtual\\_dspin\\_router/caba/source/include/virtual\\_dspin\\_router\\_caba.h](source:trunk/soclib/soclib/module/network_component/virtual_dspin_router/caba/source/include/virtual_dspin_router_caba.h)

implementation [source:trunk/soclib/soclib/module/network\\_component/virtual\\_dspin\\_router/caba/source/src/virtual\\_dspin\\_router\\_caba.c](source:trunk/soclib/soclib/module/network_component/virtual_dspin_router/caba/source/src/virtual_dspin_router_caba.c)

### CABA Internal registers

sc_signal<int>	r_output_index	for each channel & each output, input index (INFSM)
sc_signal<bool>	r_tdm	for each input, Time Multiplexing
sc_signal<sc_uint<data_size>>	r_buf	for each channel & each input, fifo extension
sc_signal<int>	r_infsm	for each channel & each input FSM state

### CABA Template parameters

int data_size	Size of flit
int io_mask_offset	Emplacement of IO checking
int io_mask_size	Size of IO checking
int io_number_offset	Emplacement of IO index in IO table
int io_number_size	Size of IO index
int x_addressing_offset	Emplacement of target x in first flit
int x_addressing_size	Size of target x
int y_addressing_offset	Emplacement of target y in first flit
int y_addressing_size	Size of target y
int eop_offset	Emplacement of eop checking
int broadcast_offset	Emplacement of broadcast checking
int in_fifo_size	Size of input fifos
int out_fifo_size	Size of output fifos
int x_min_offset	Emplacement of x_min for broadcast confinement
int x_max_offset	Emplacement of x_max for broadcast confinement
int y_min_offset	Emplacement of y_min for broadcast confinement
int y_max_offset	Emplacement of y_max for broadcast confinement

### CABA Constructor parameters

sc_module_name insname	instance name
int x	x position in the network
int y	y position in the network
bool n	North connexion enabled
bool s	South connexion enabled
bool e	East connexion enabled
bool w	West connexion enabled

bool broadcast0	Broadcast activated for channel 0
bool broadcast1	Broadcast activated for channel 1
bool io0	IO enable for channel 0
bool io1	IO enable for channel 1
clusterCoordinates<x_addressing_size, y_addressing_size> * aIO_table	list of IO Clusters

## CABA ports

sc_in<bool>	p_clk	Global system clock
sc_in<bool>	p_resetrn	Global system reset
DspinOutput<cmd_data_size>	<b>p_out</b>	For each output and each virtual channel
DspinInput<cmd_data_size>	p_in	For each input and each virtual channel

## 4) TLMT implementation

The TLM-T implementation is not available yet.