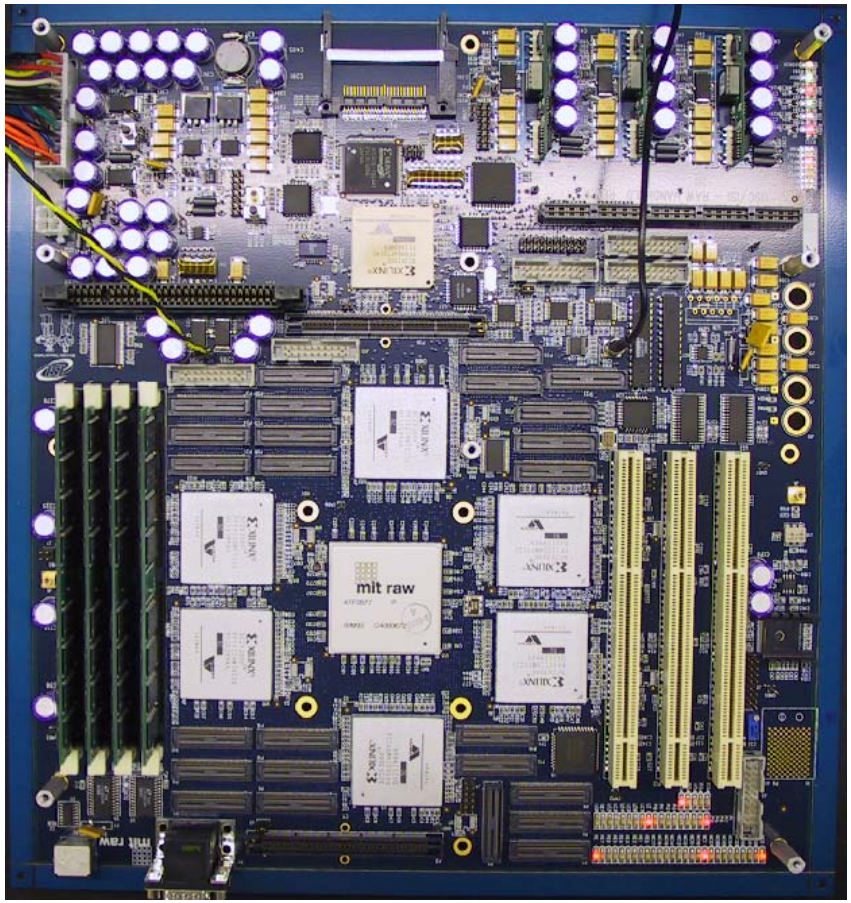
Introduction to the Raw Handheld Board



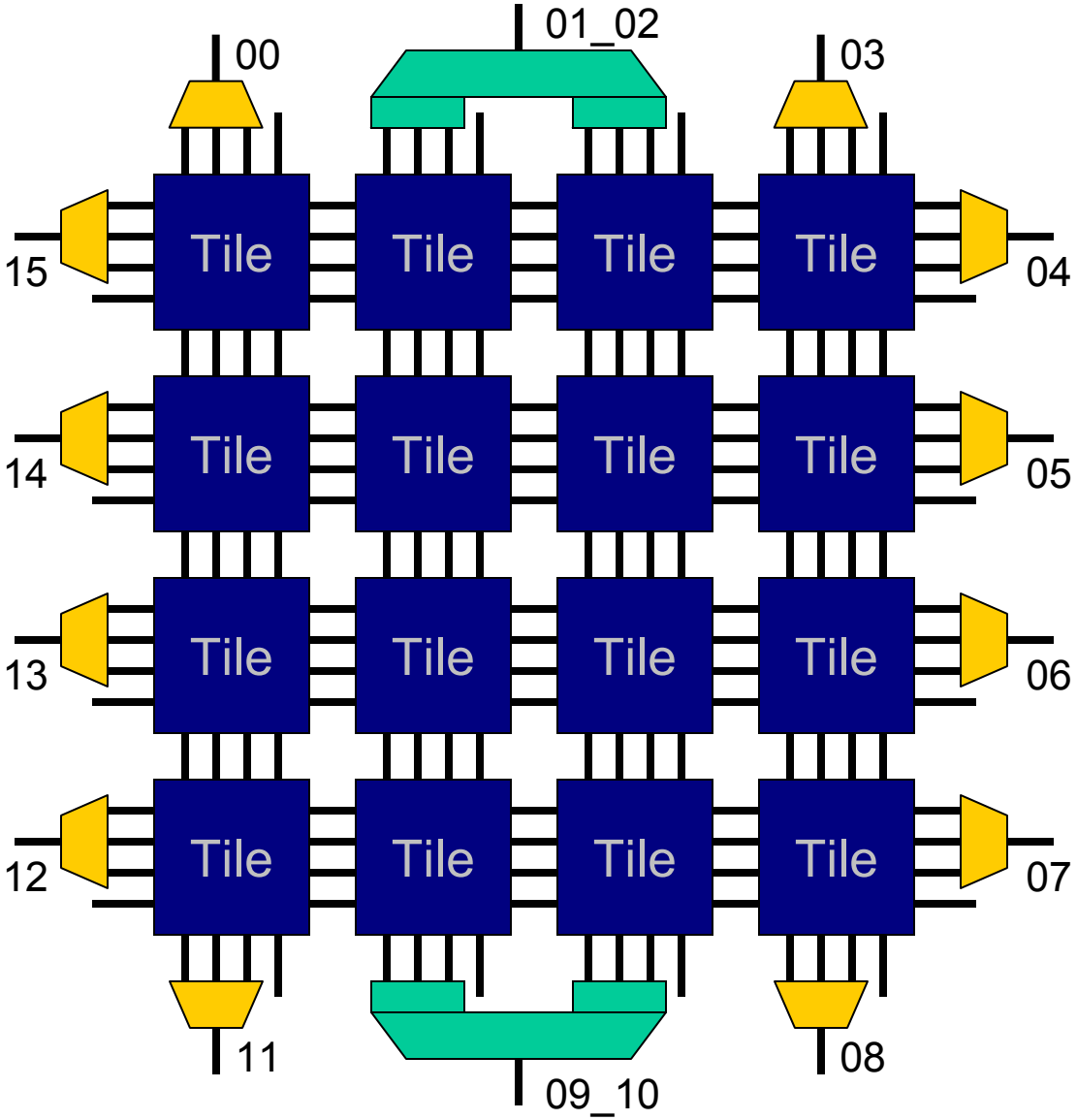
Jason Miller, David Wentzlaff, Nathan Shnidman

Presentation Outline

- Raw's I/O ports (basic)
- Memory sub-system
- PCI and host PC connection
- Expansion interface
- Integrated peripherals and connectors

- Raw's I/O ports (detailed)

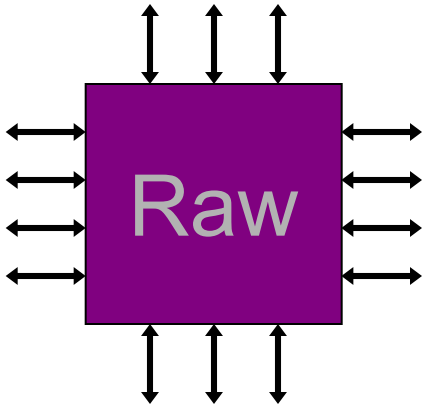
Raw Chip I/O Ports



I/O Multiplexing:

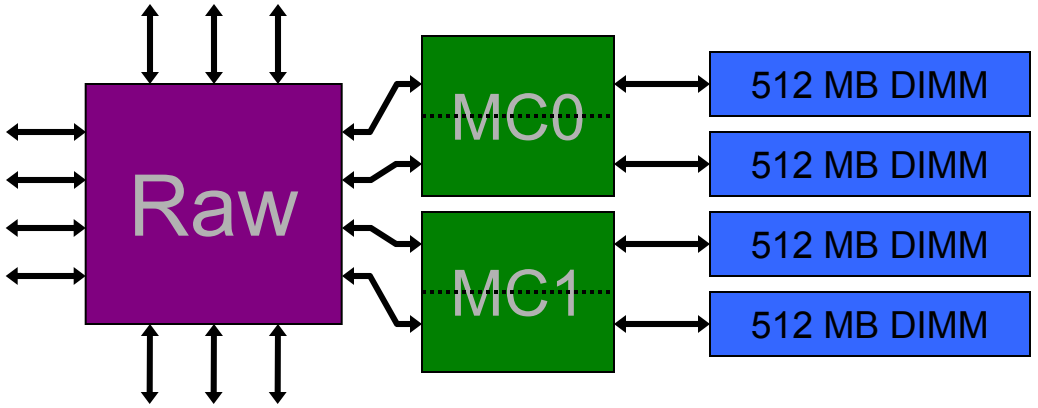
- Drop ST2
- Round-robin arbitration for MDN, GDN and ST1
- Ports 01 & 02 and ports 09 & 10 are merged
- 14 ports total
- May be numbered in hex
- Each port is actually separate input and output busses

Let's start building a Raw board



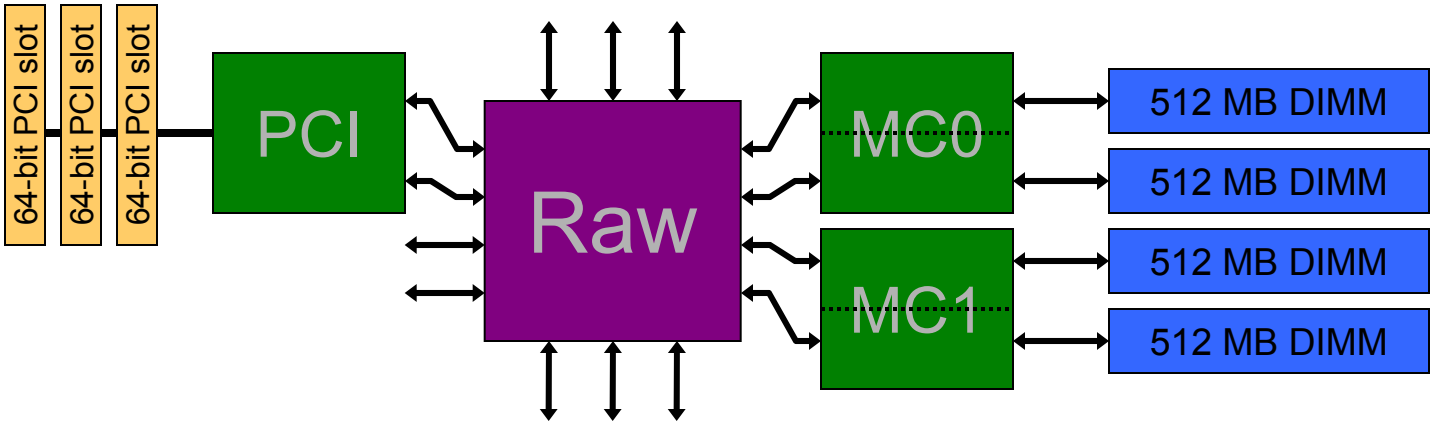
- Single Raw processor
- 14 I/O ports

Add a memory sub-system



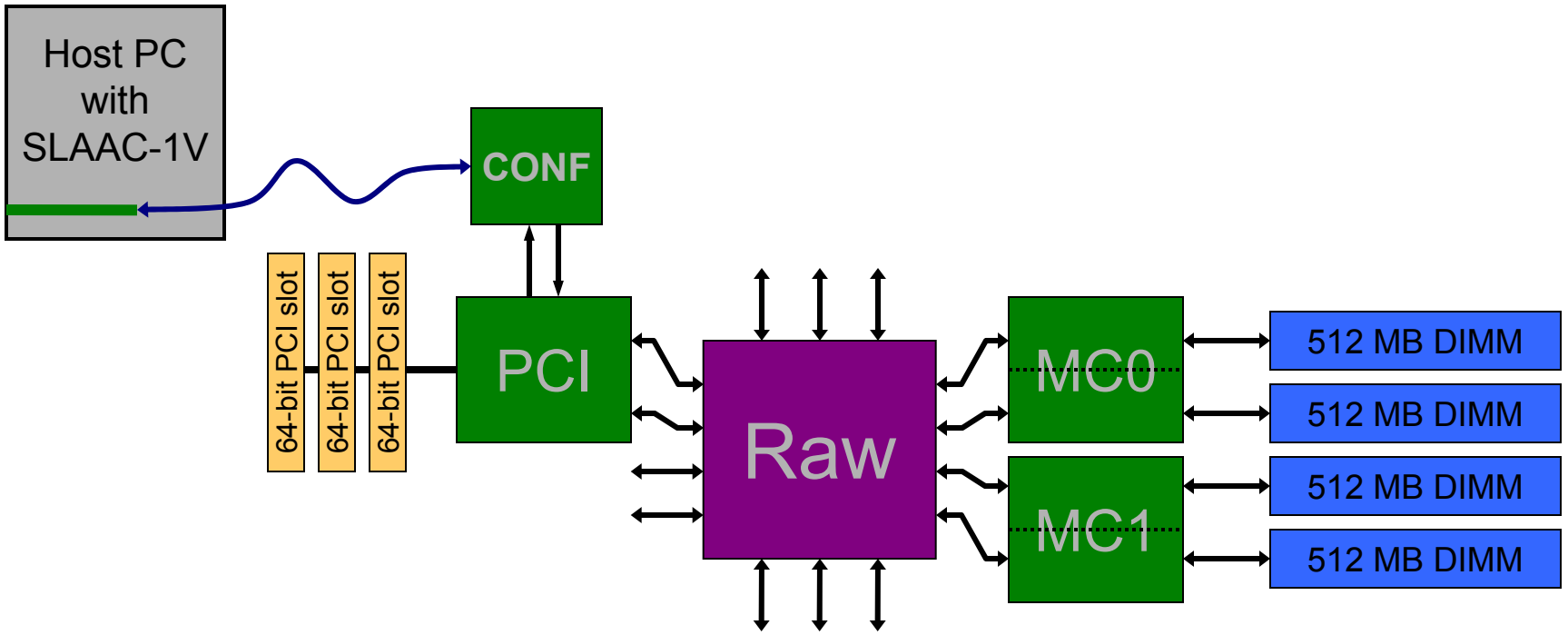
- 2 Xilinx XC2V3000 FPGAs for memory controllers
- Separate memory controller on each port
- 512 MB PC133 SDRAM DIMM for each controller
- 128 MB address space for each tile by default

Add a PCI sub-system



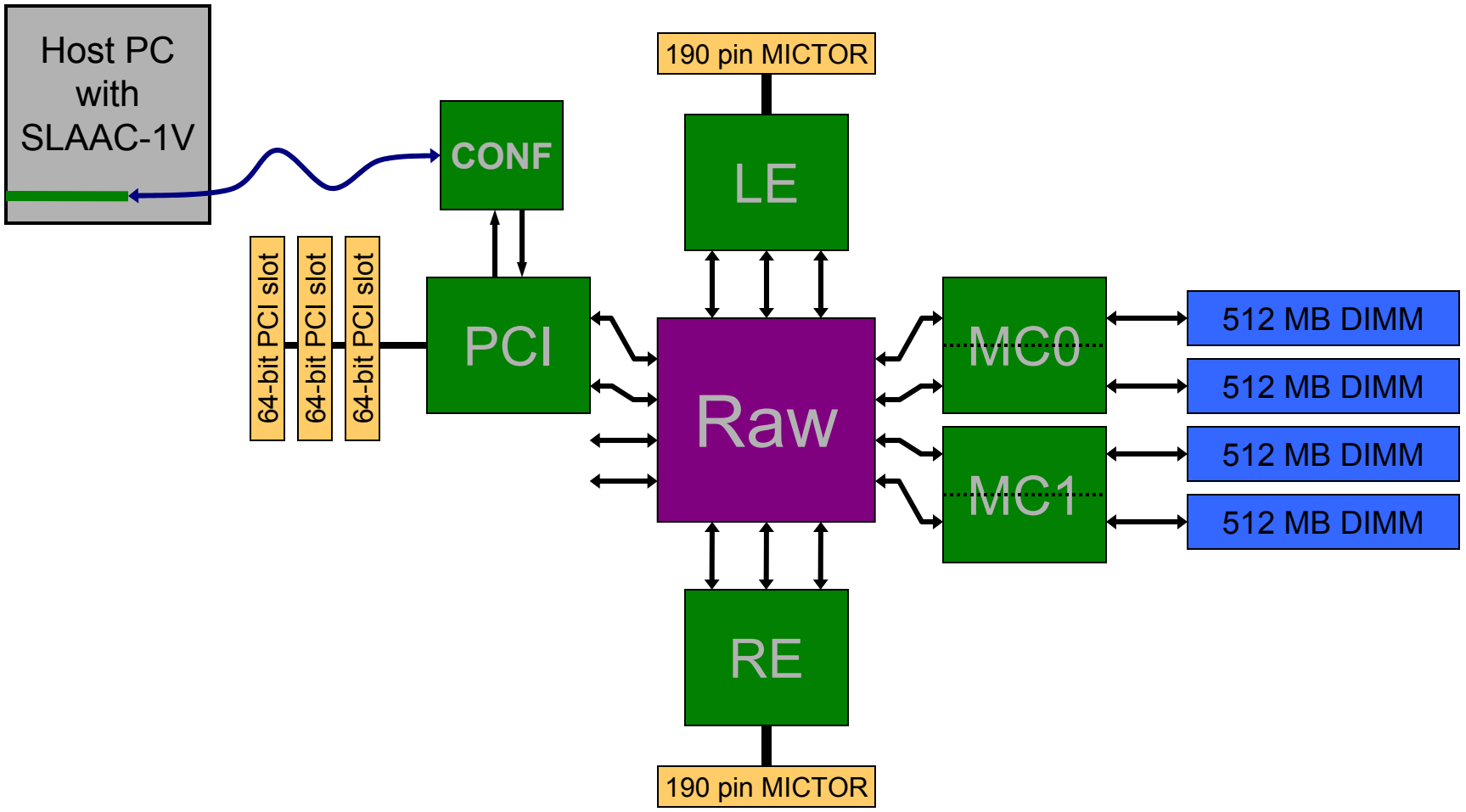
- Xilinx XC2V3000 FPGA for PCI controller
- Three 64-bit / 66 MHz PCI slots

Add a PCI sub-system



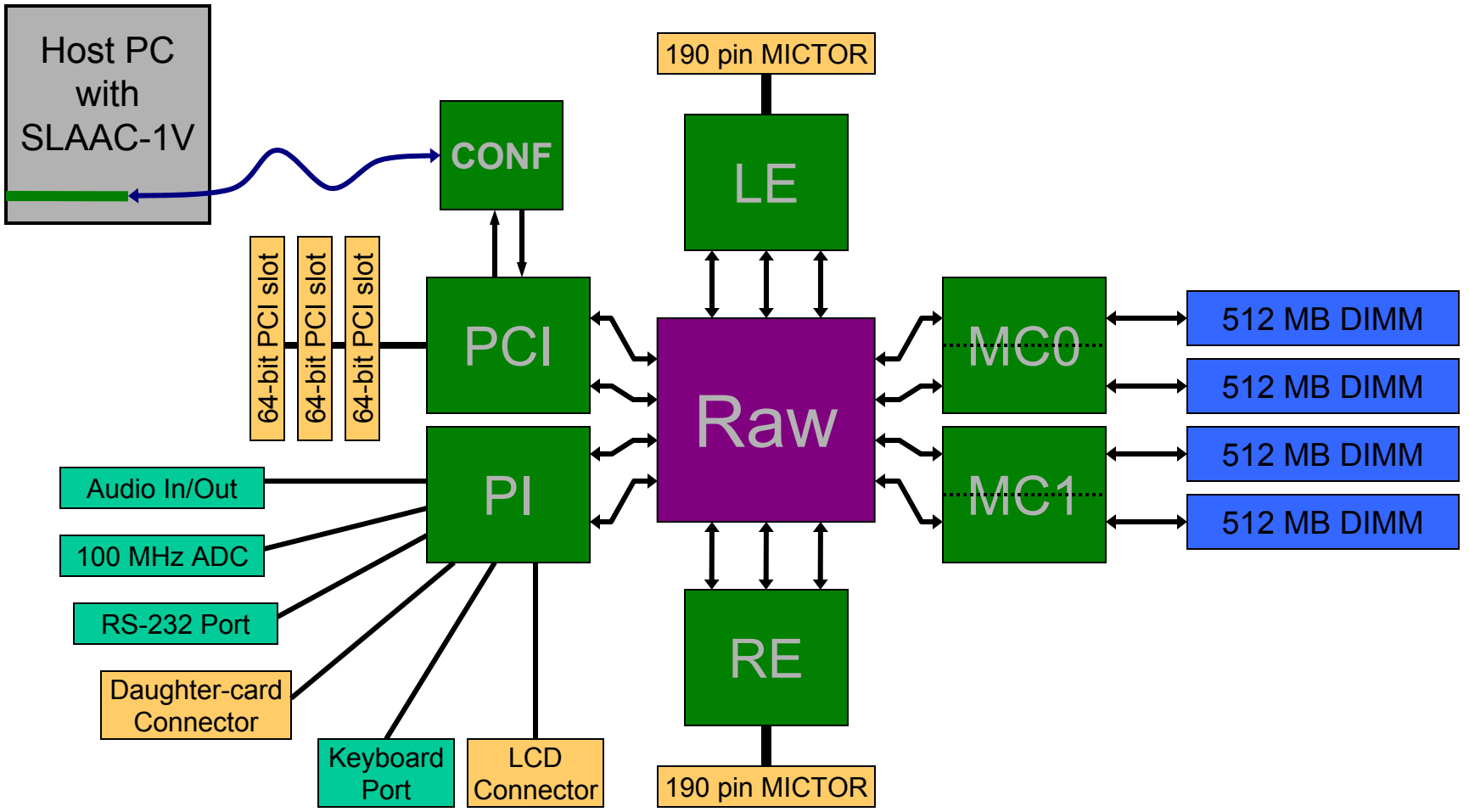
- Xilinx XC2V3000 FPGA for PCI controller
- Three 64-bit / 66 MHz PCI slots
- Xilinx XC2V1000 FPGA for Config
- “Backdoor interface” for connection to host PC

Add an expansion interface



- Xilinx XC2V3000 FPGAs for LE and RE
- 190-pin MICTOR connectors for general use

Finally, some I/O interfaces

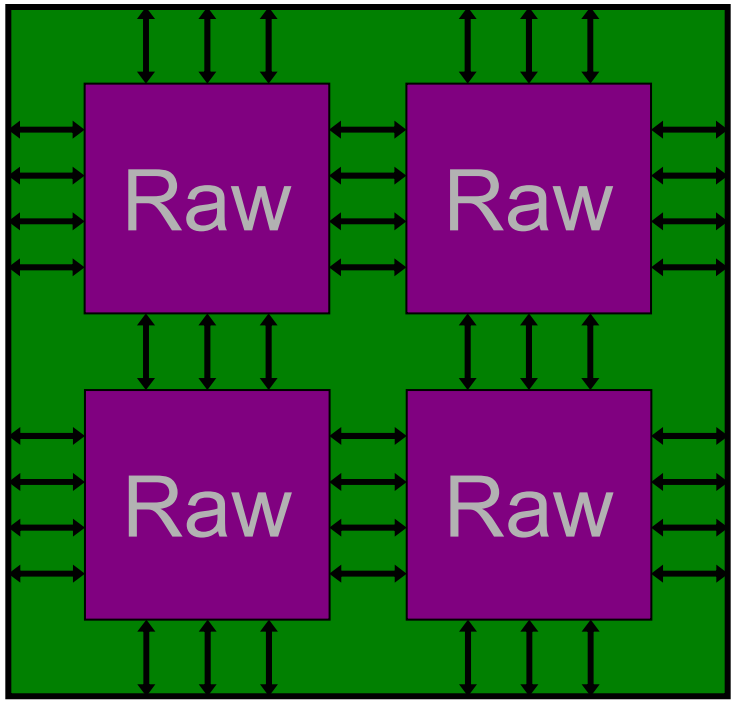


- Xilinx XC2V3000 FPGA for controllers
- Various integrated devices and connectors

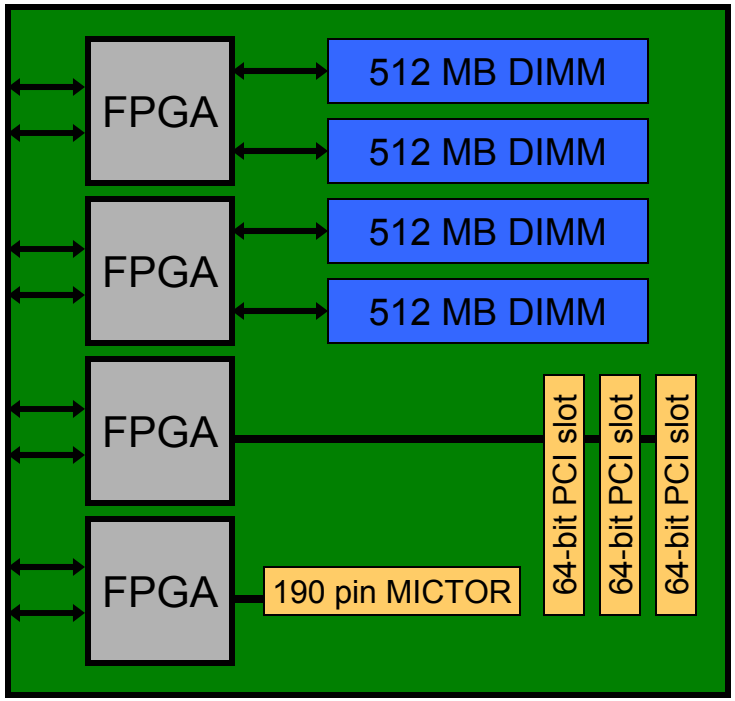
Integrated I/O and Connectors

- Audio frequency ADCs and DACs
  - 2 channels, up to 44.1 kHz, 16-bit samples, RCA jacks
- High-speed analog to digital converter
  - Up to 100 MHz, 12 bit precision, SMB connector
- Serial (RS-232) port w/ 16550 UART
  - 9-pin D-SUB connector
- PS/2 keyboard port (controller in FPGA)
- LCD connector
  - 4x40 character, text-only LCD display: Optrex DMC-40457
- Daughter-card connector
  - Planned: 100 Mbit Ethernet and USB 2.0 controllers
  - 50 signal pins, 66 MHz clock, 5V and 3.3V power

Raw Fabric System

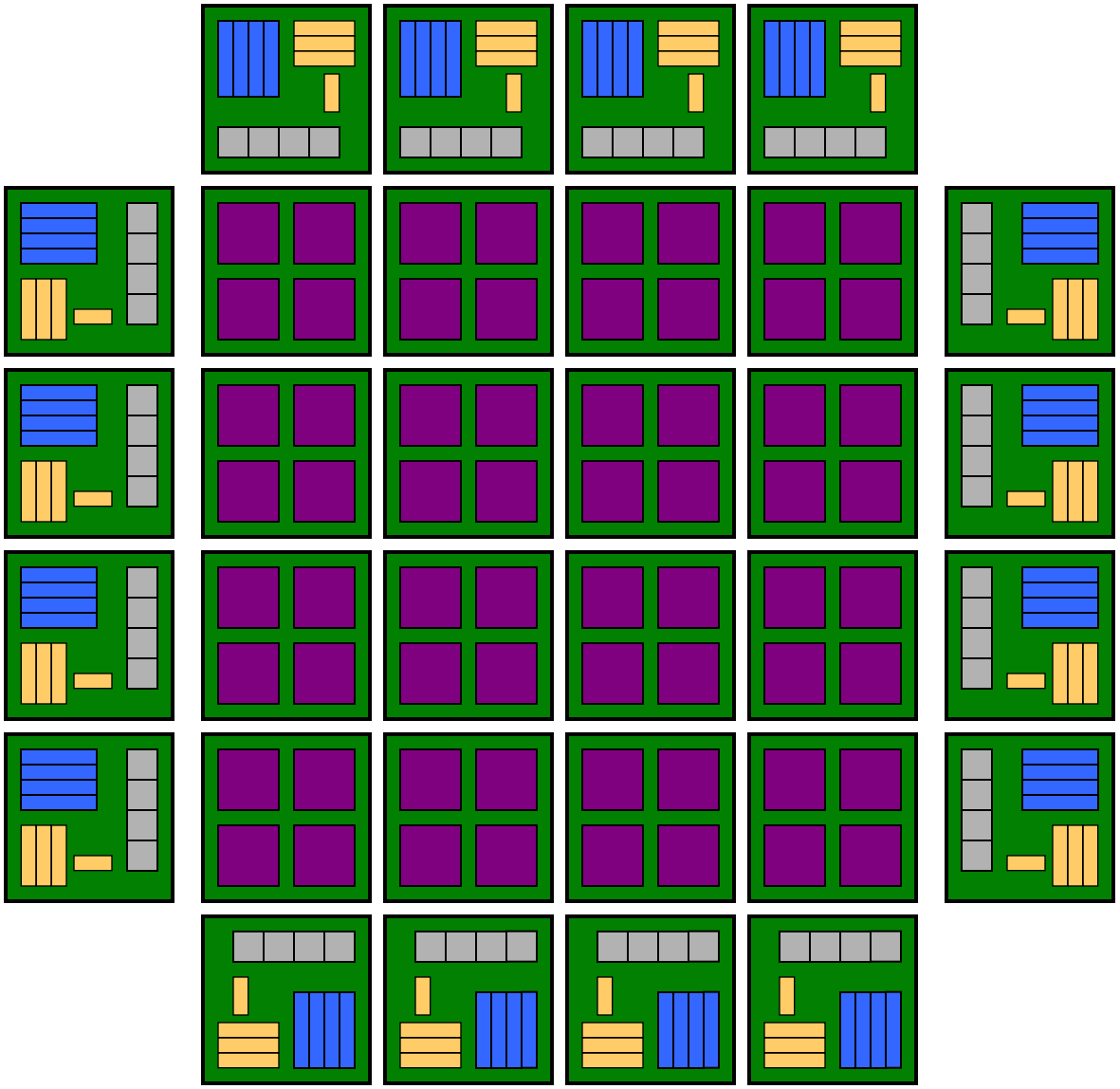


2x2 Raw Board

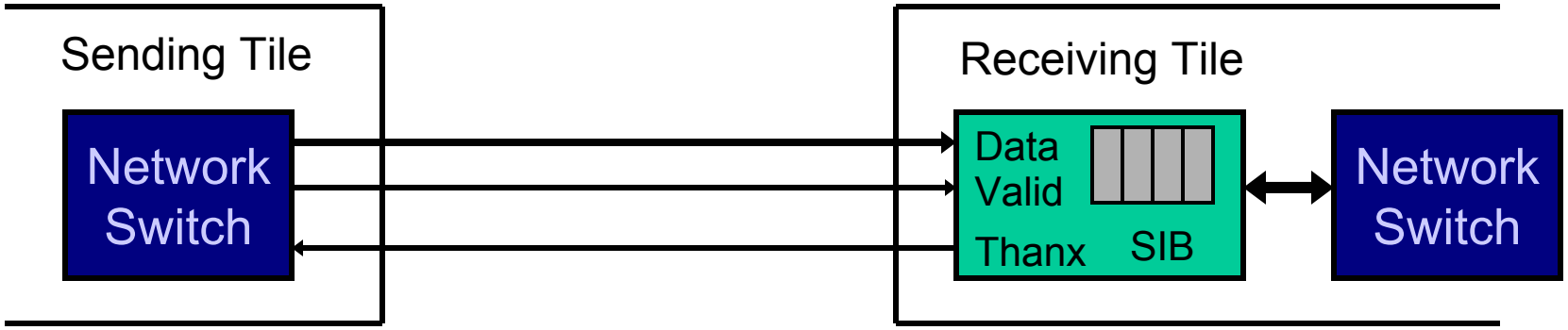


Peripheral Board

Raw Fabric System (cont)



Raw I/O Ports (detailed)



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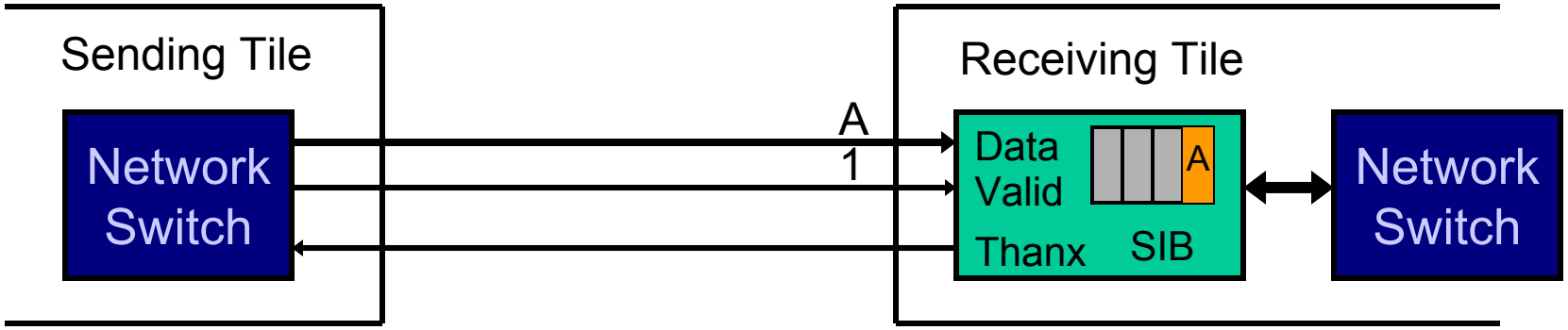

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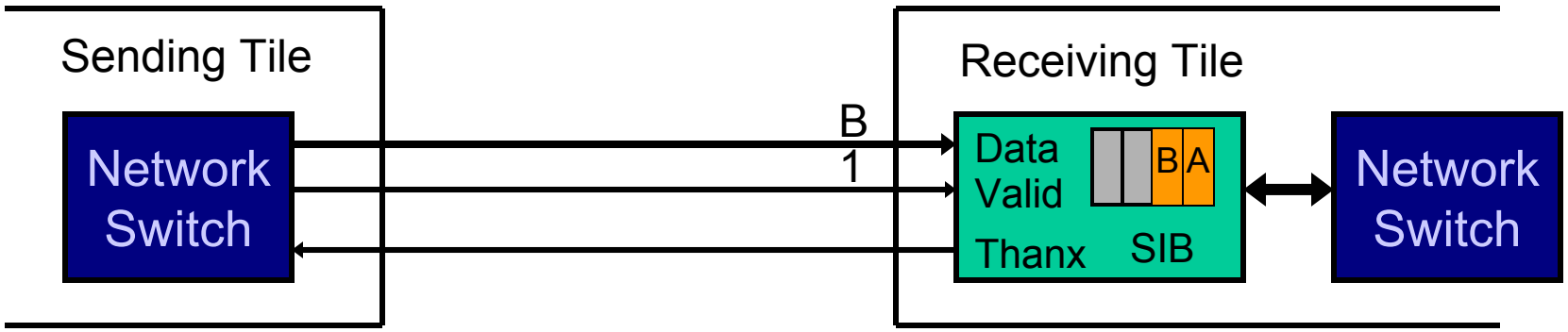

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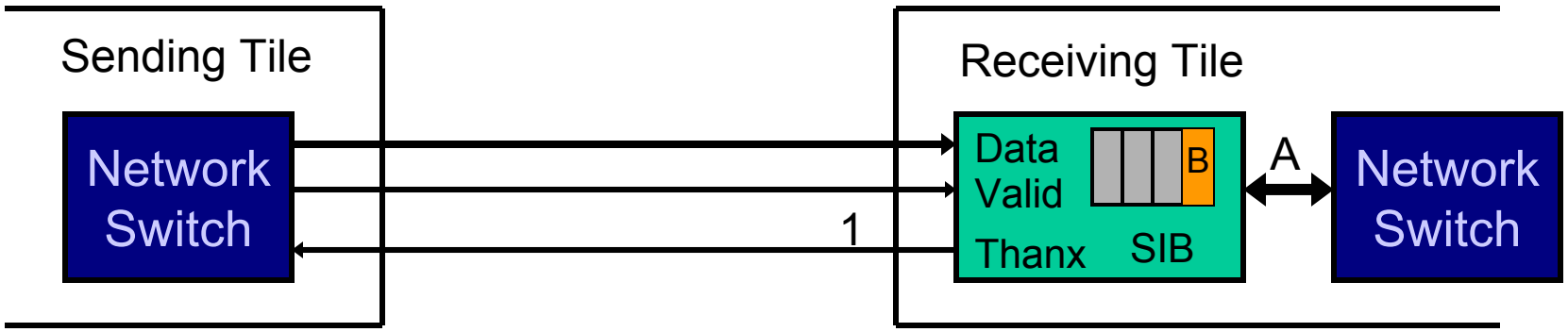

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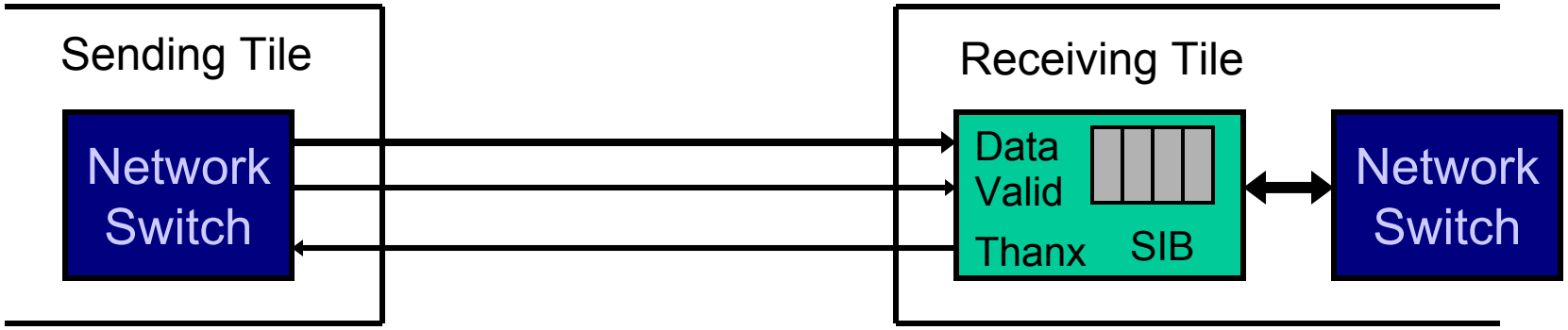

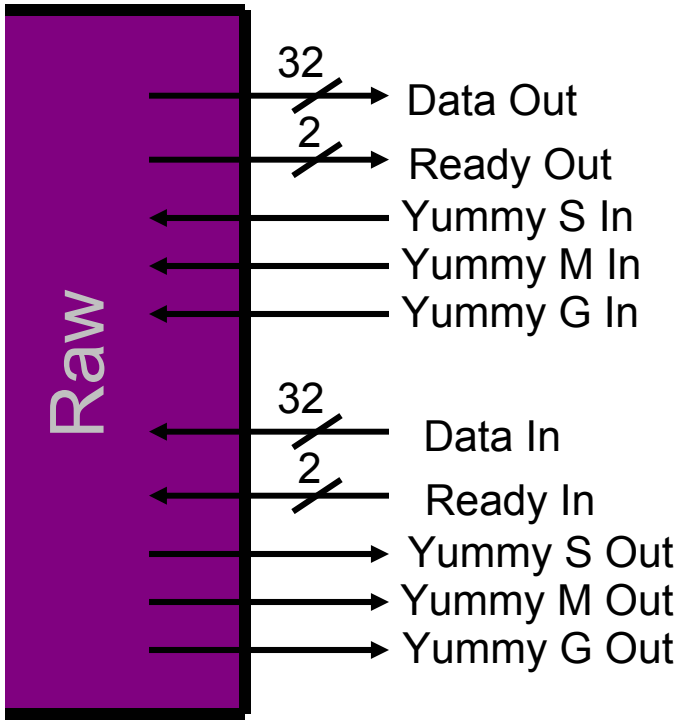

Normal Port:
2 Ready bits
3 Yummy bits

Ready Encodings
00 = None
01 = Static
10 = Memory
11 = General

Double Port:
3 Ready bits
6 Yummy bits

Ready Encodings
000 = None
001 = Static Port 1
010 = Memory Port 1
011 = General Port 1
100 = None
101 = Static Port 2
110 = Memory Port 2
111 = General Port 2