

Connectivity in MTCA Crates

Tomasz Jezynski
DESY

MTCA Workshop for Industry and Research
11 December 2012

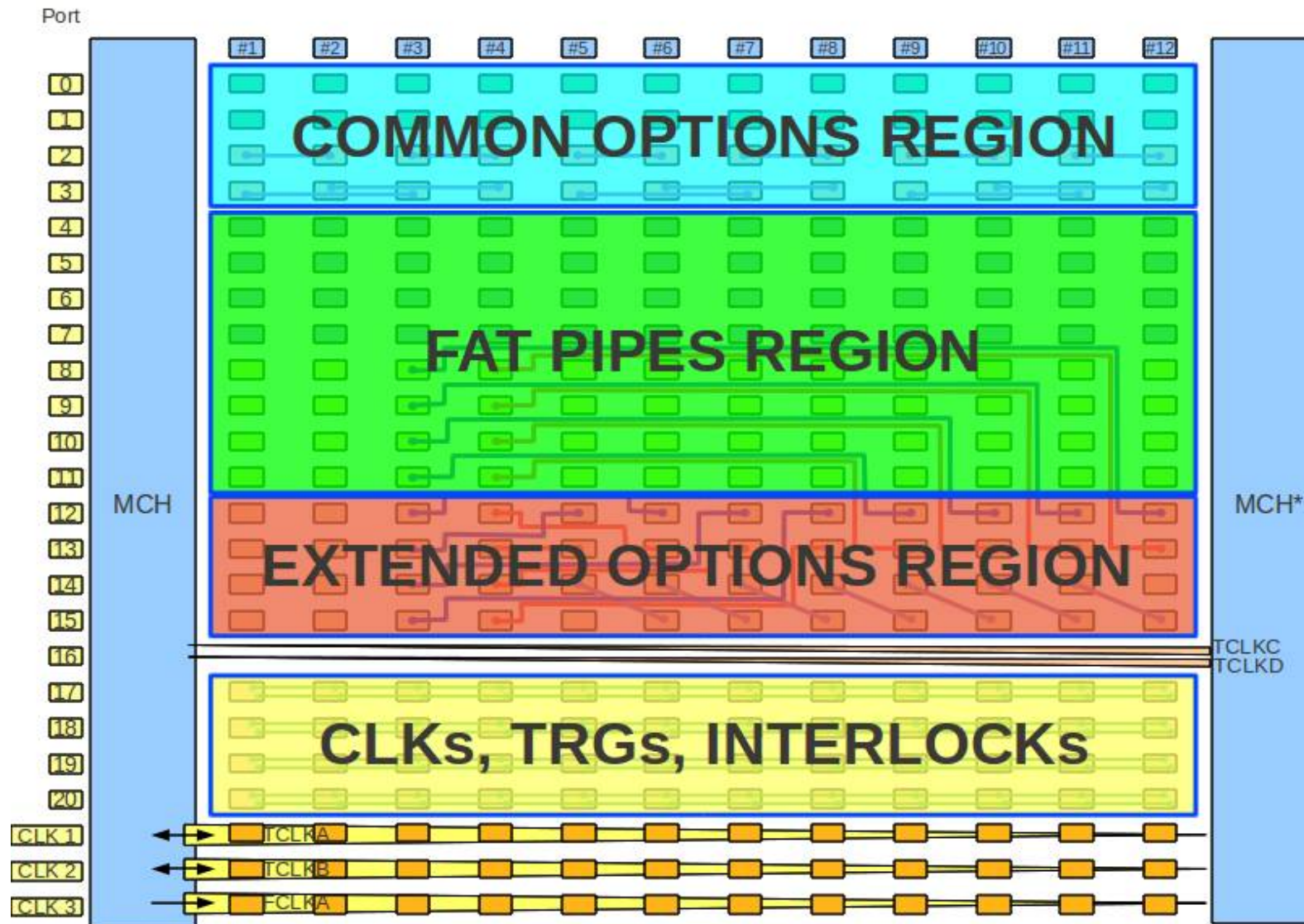


HELMHOLTZ
ASSOCIATION

Outline

- Backplane – basic information
- Connectivity
- MTCA.4 crates available on the market
- How to select right backplane for your application

Backplane : Definitions



Port Definition (1)

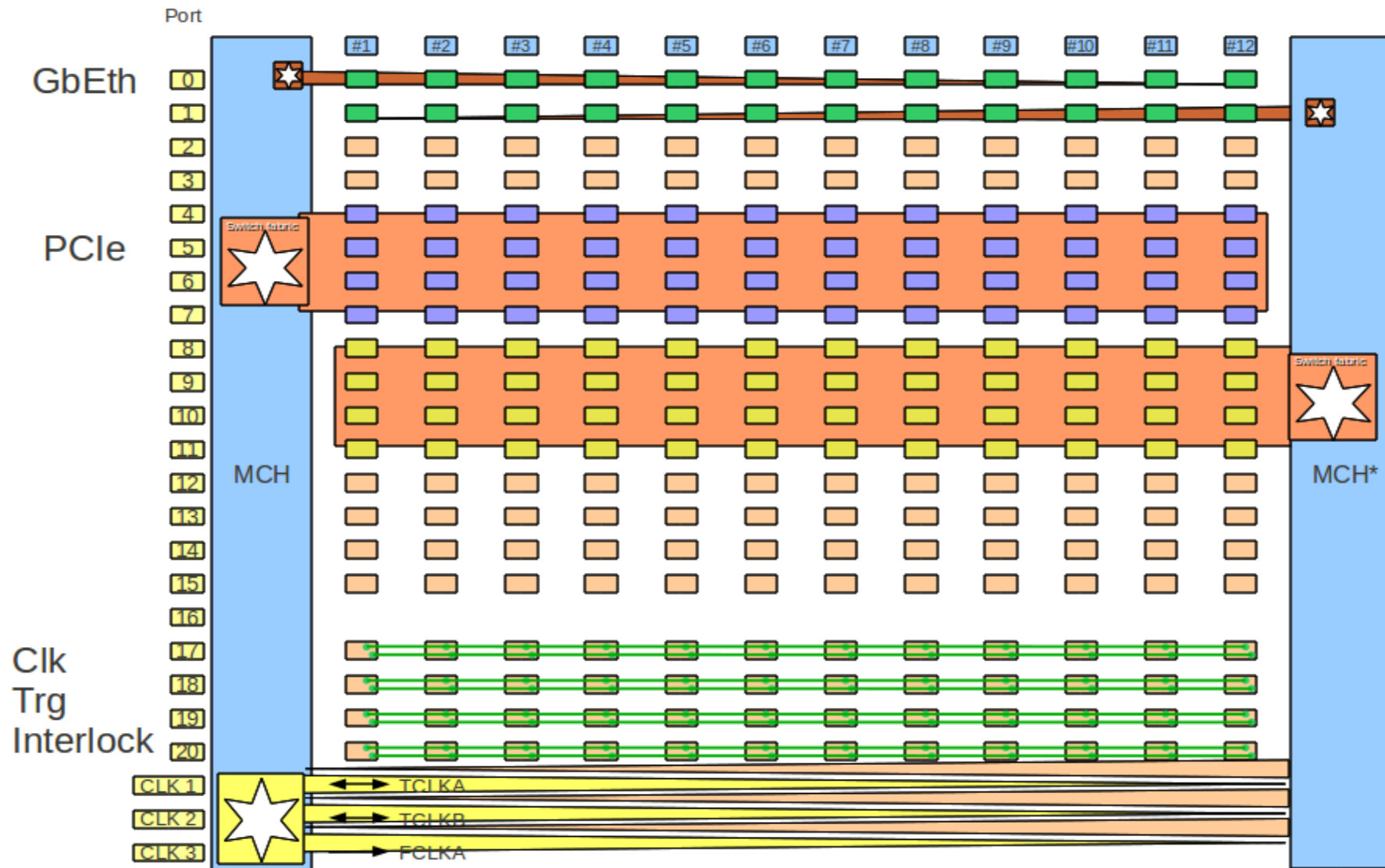
- P0-P1 : Ethernet
 - 10/100/1000BASE-T signals
- P2-P3 : SATA
 - Serial communication
 - Gigabit links (p-p)
- P4-P7 : PCI Express (x1, x2, x4)
 - Gen.1 : up to 250MB/s per lane (PCIe x4 - 1GB/S)
 - Gen.2 : up to 500MB/s per lane (PCIe x4 - 2GB/s)
 - Gen.3 : up to 1GB/s per lane (PCIe x4 - 4GB/s)
- P8-P11 : Redundant PCI Express (p-p)

Port Definition (2)

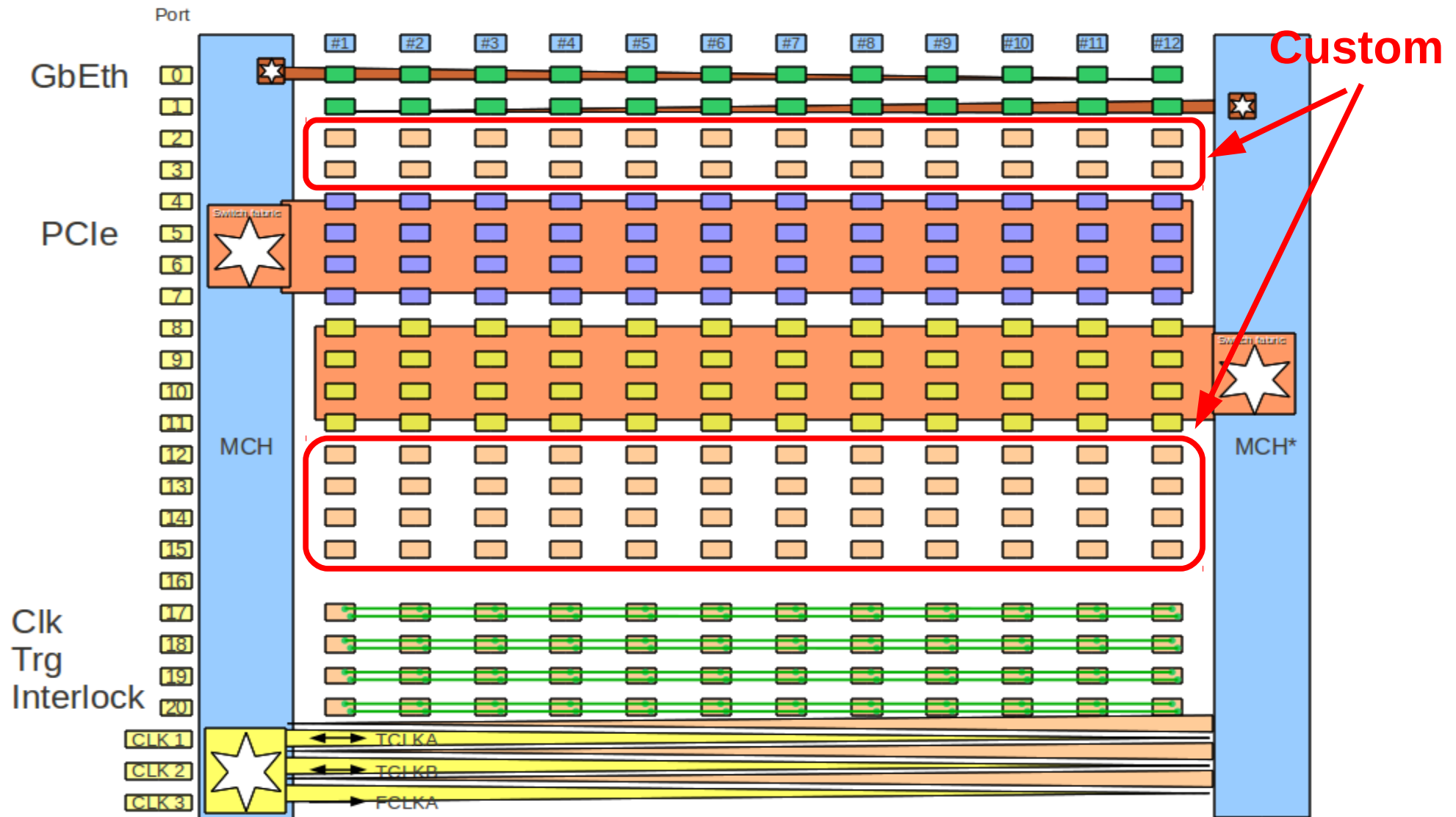
- P8(12)-P15 : Custom
 - Gigabit links (p-p)
 - from Mb/s up to 10 Gbps
- P16 : CLK
- P17-P20 : Clocks, Triggers, Interlocks
 - M-LVDS

* all point-to-point connections works over 10 Gbps

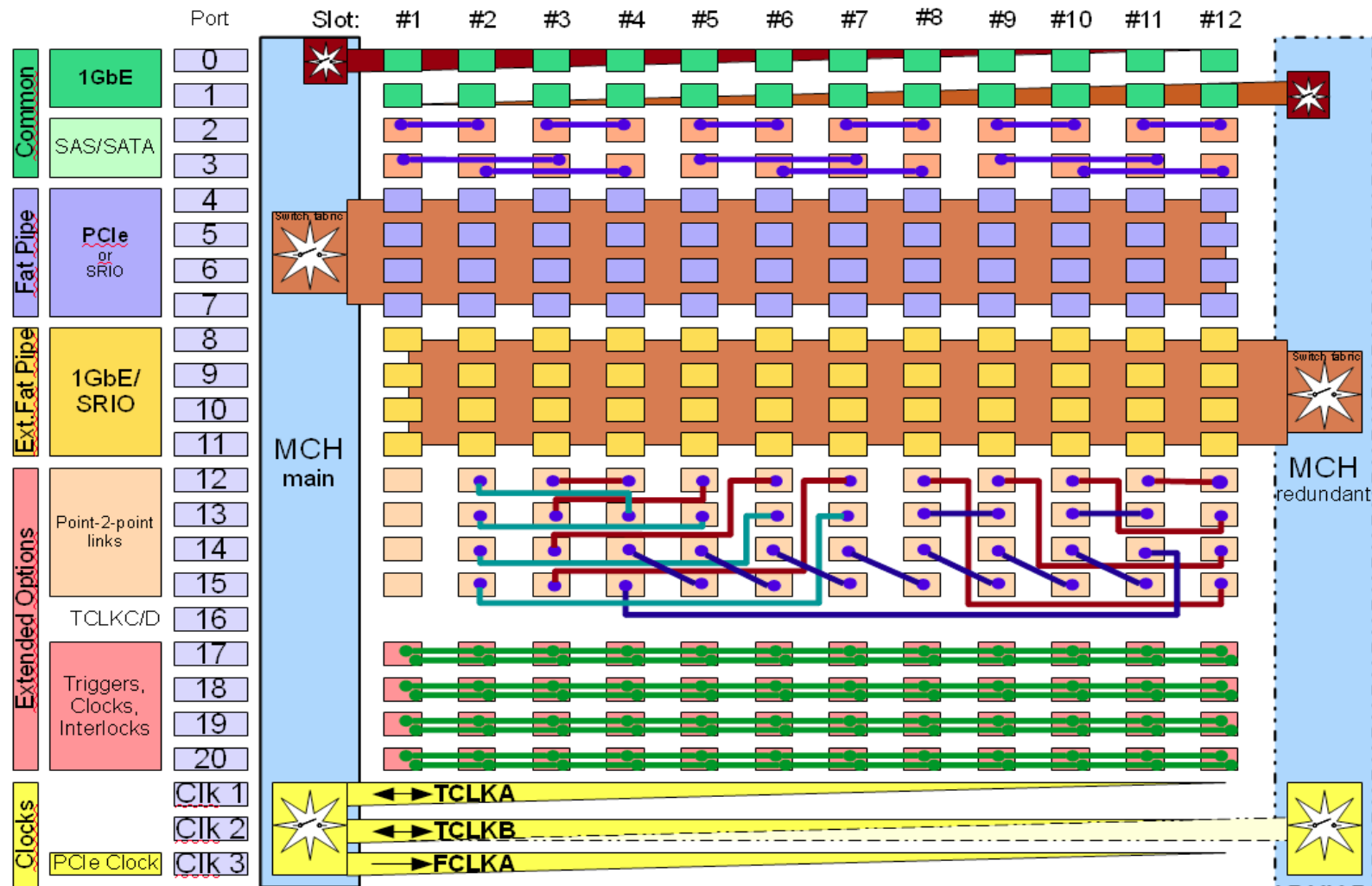
Backplane, 12-slot, 2-MCH



Backplane, 12-slot, 2-MCH

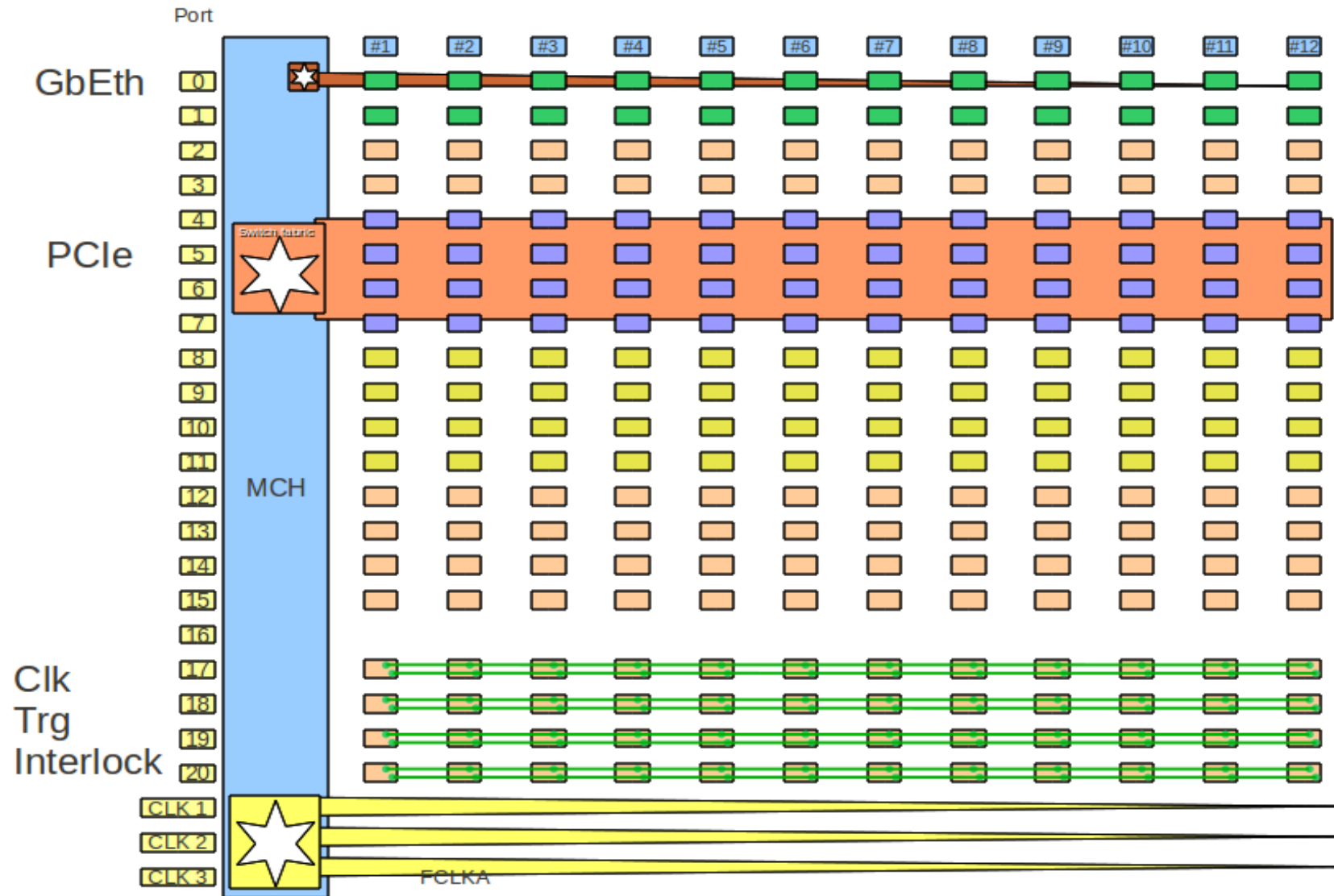


Backplane, 12-slot, 2-MCH

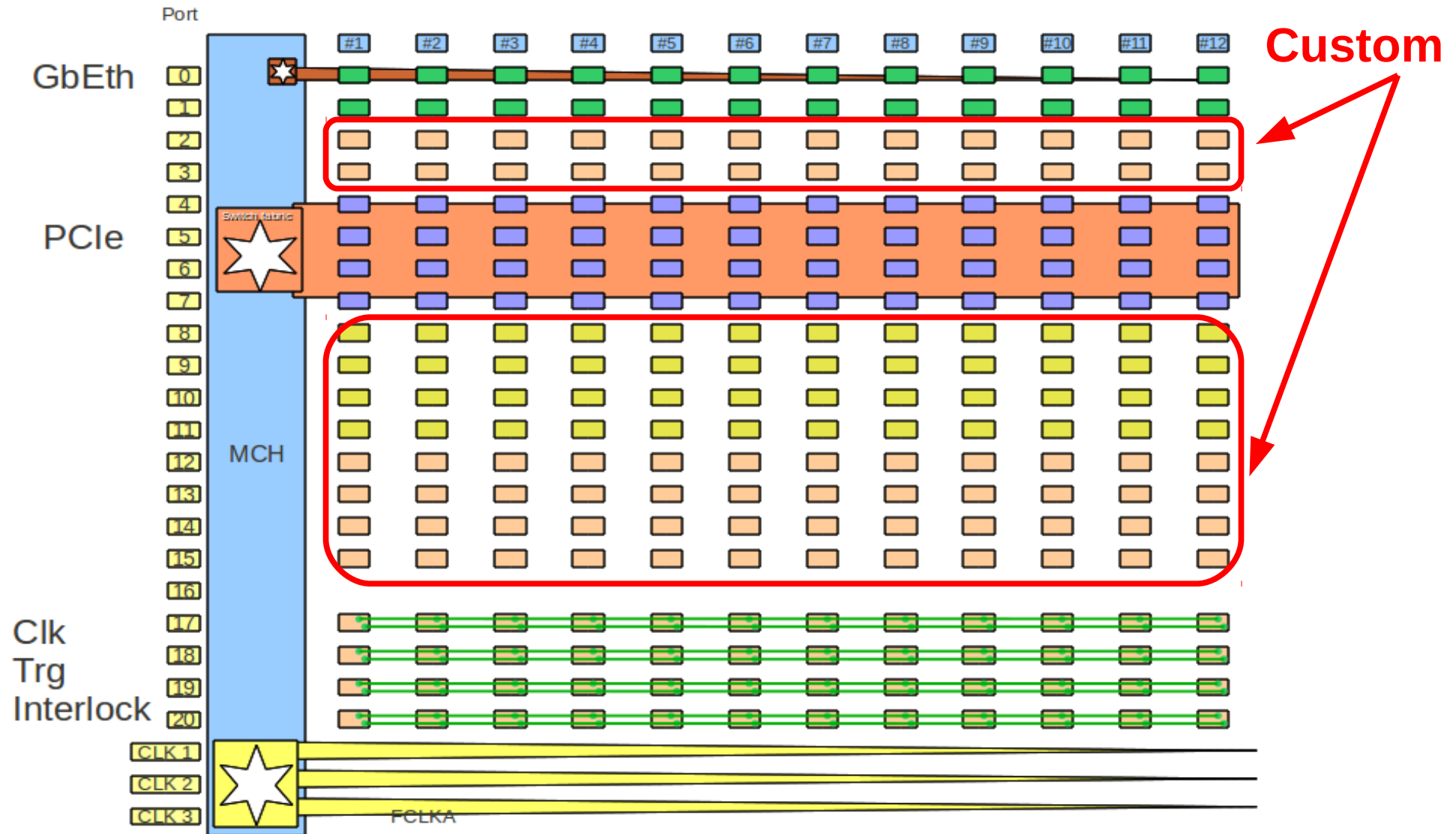


from MTCA.4 specification

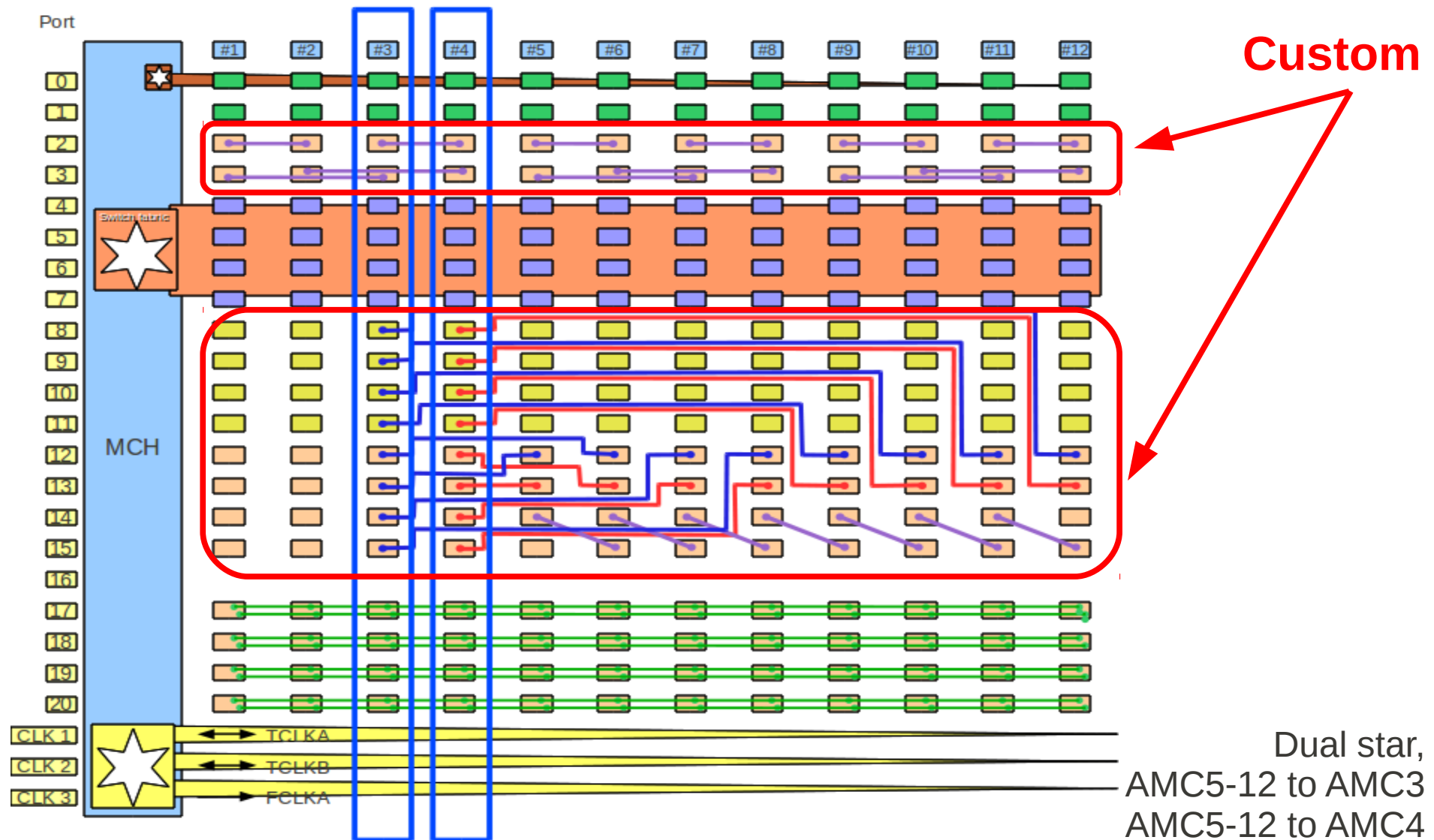
Backplane, 12-slot, 1-MCH



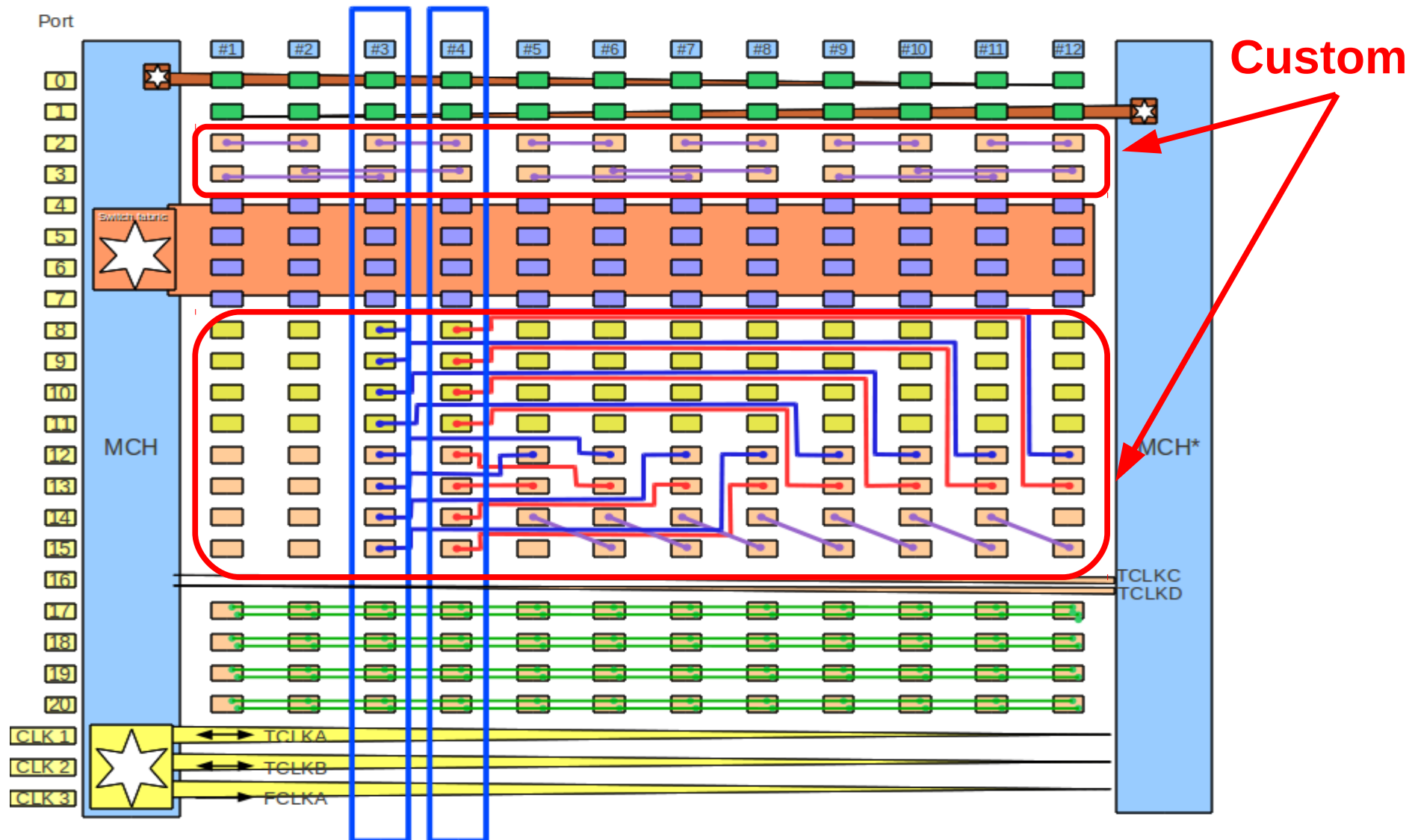
Backplane, 12-slot, 1-MCH



Backplane, 12-slot, 1-MCH

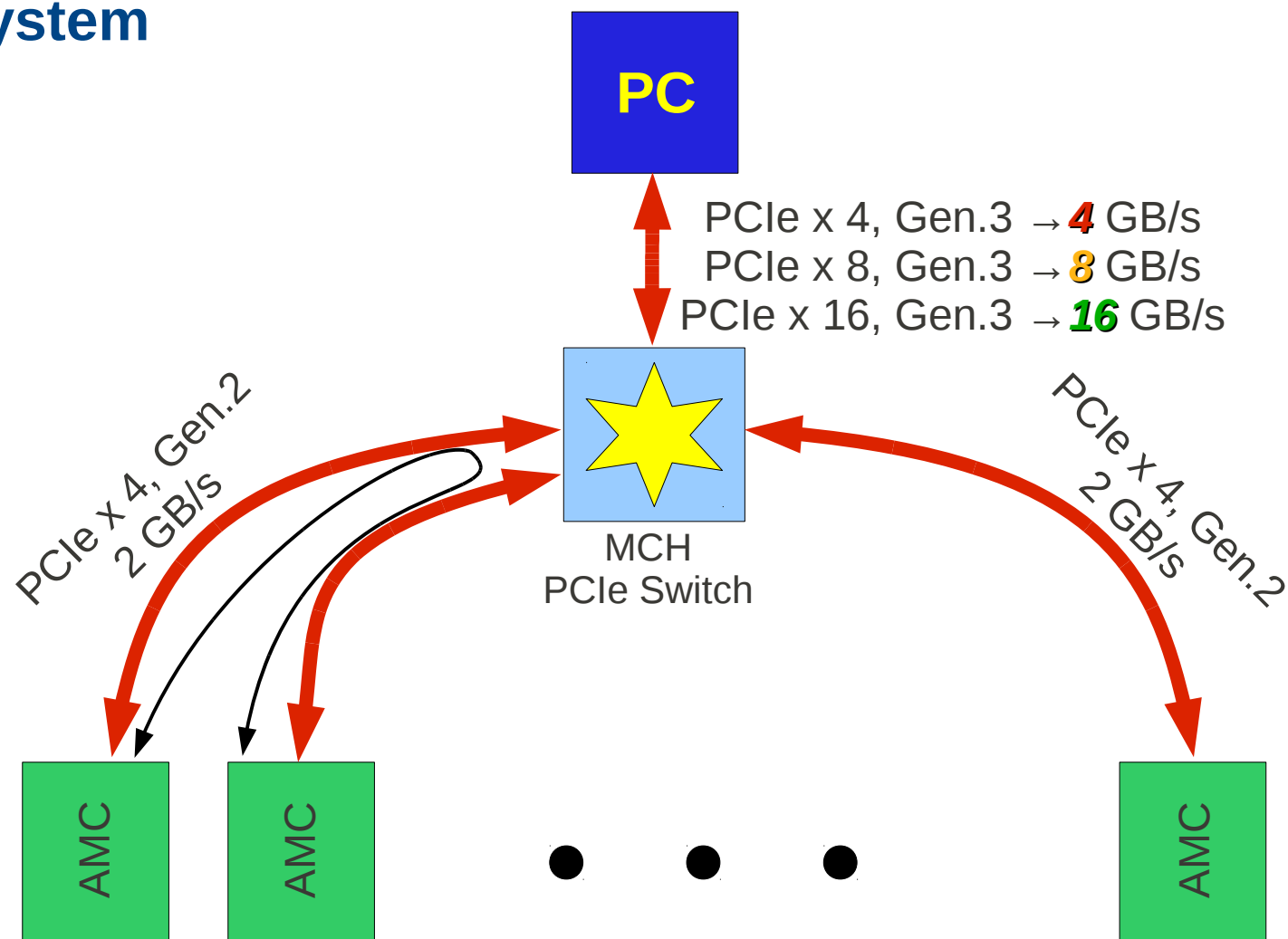


Backplane, 12-slot, 1.5-MCH



Data transport: PCIe

DAQ System



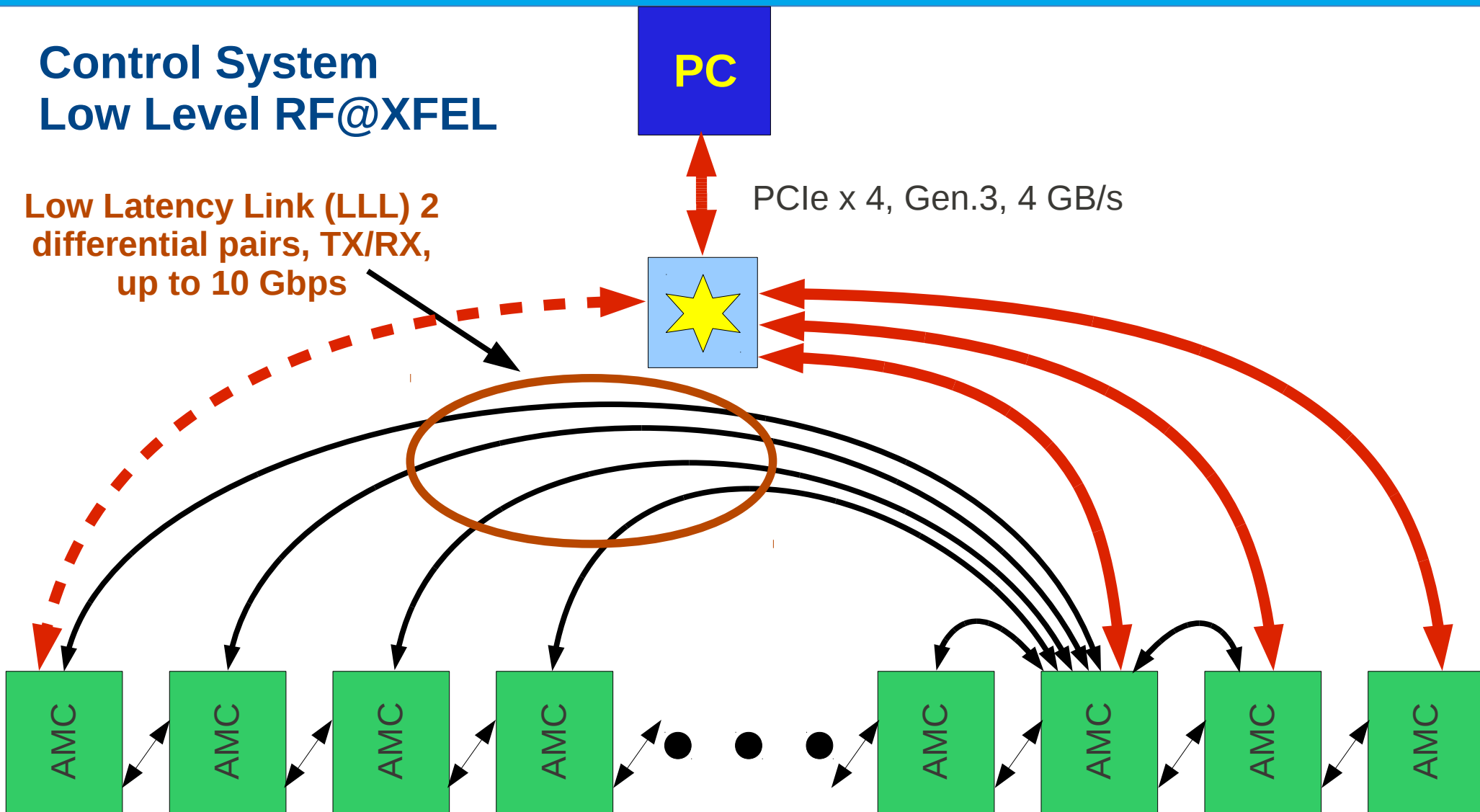
Data transport: PCIe and LLL

Control System
Low Level RF@XFEL

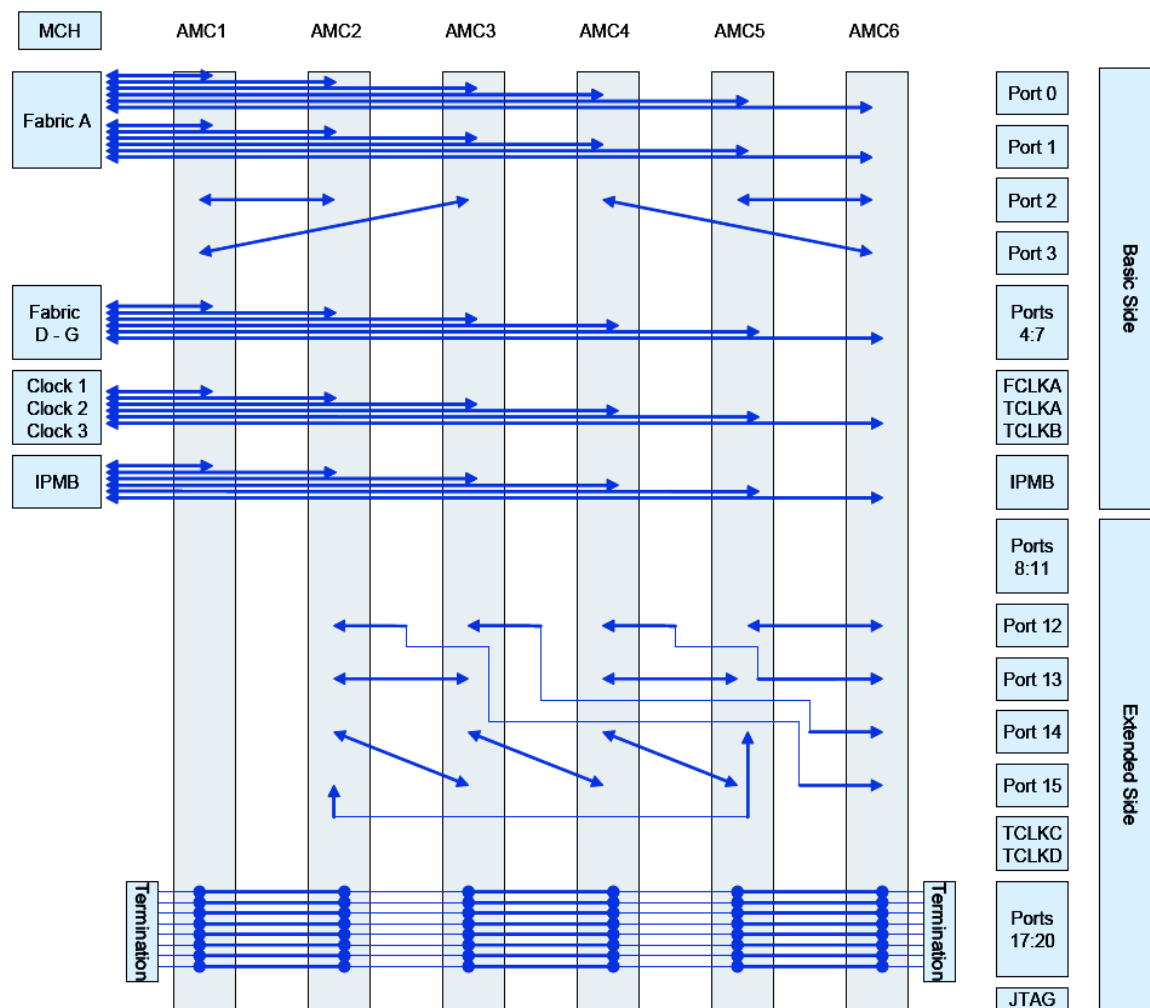
Low Latency Link (LLL) 2
differential pairs, TX/RX,
up to 10 Gbps

PC

PCIe x 4, Gen.3, 4 GB/s

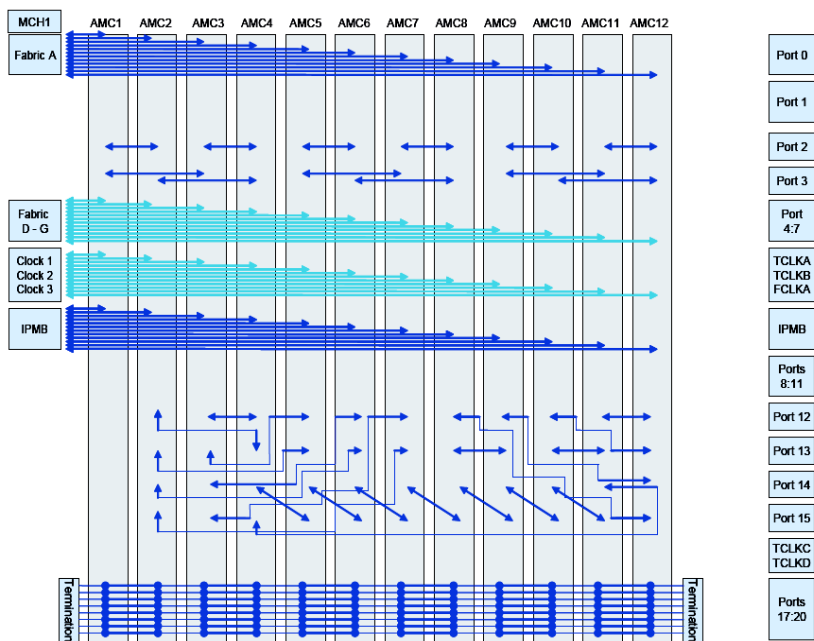


ELMA, 6-slot

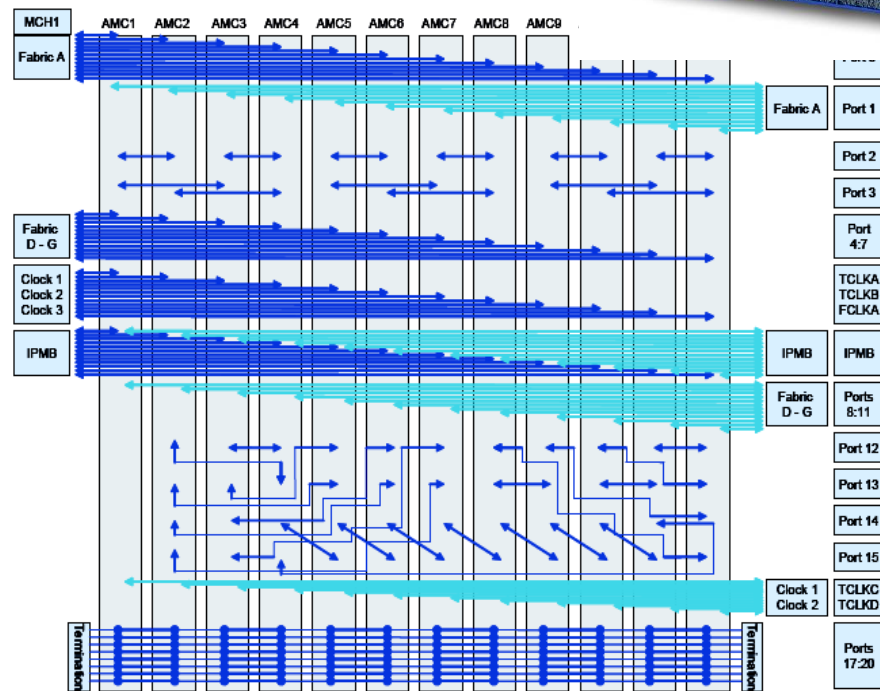
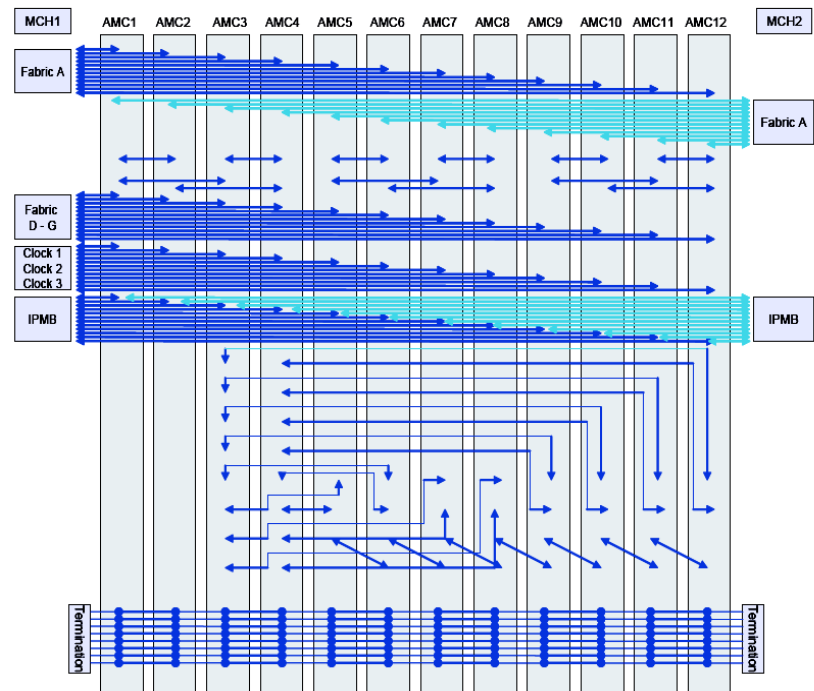


Source: www.elma.de

ELMA, 12-slot



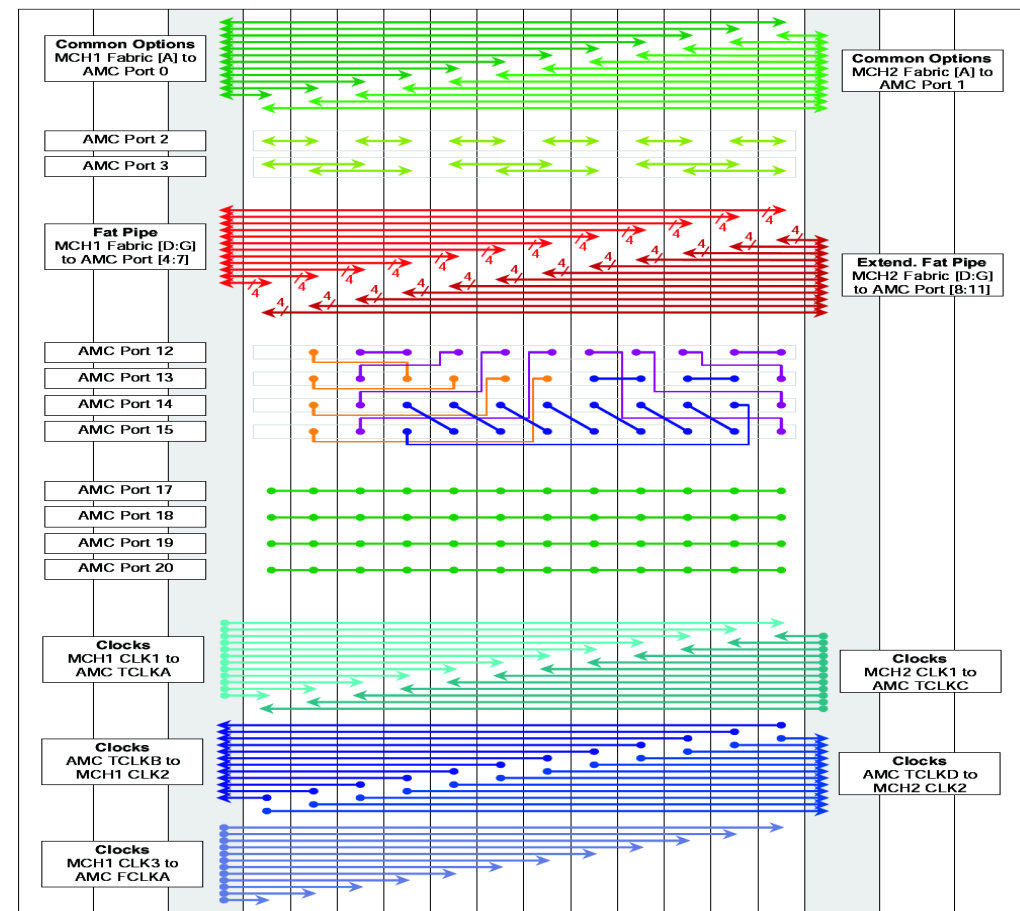
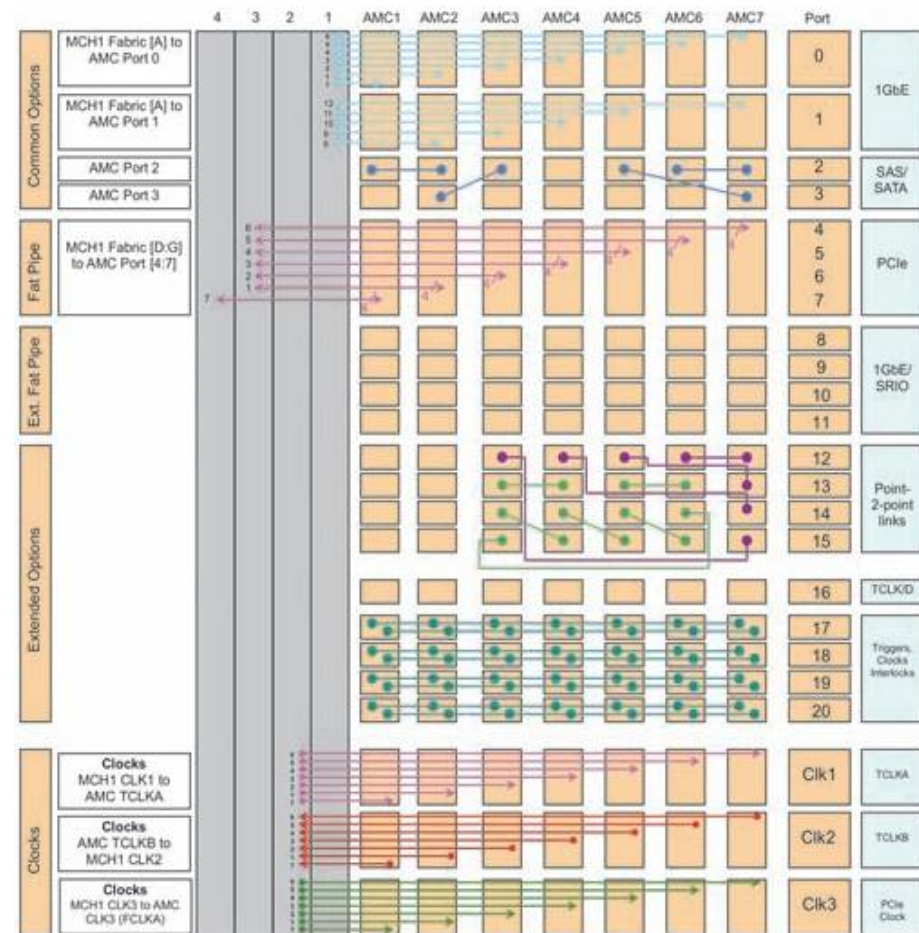
Source: www.elma.de



Schroff, 7 and 12-slot

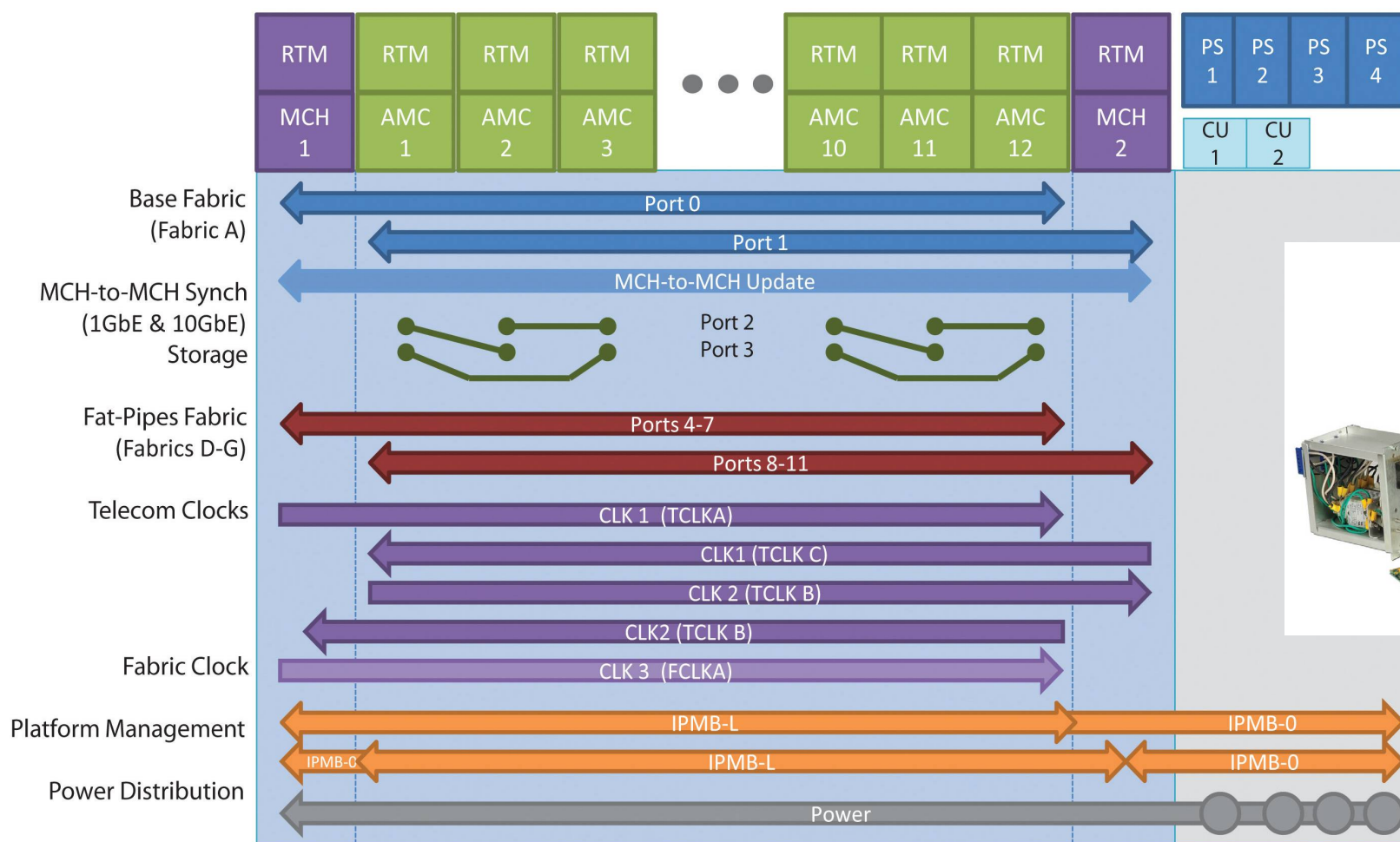


Source: www.schroff.de



PT, MONTEREY 8000

Source: www.pt.com



Criteria for Backplane Selection

- Number of slots (1..12)
- Redundancy model
- Connectivity

Redundancy

- 99.999% availability BUT only for fully redundant system: (12) 6-slot+6-slot+2-MCH+2(4)PS
- Power Modules
 - Power Supplies - 1,2,4
- Management MCH
 - 1 (1.5)
 - 2

Connectivity

- P0-P1 : Ethernet
- P4-P7 : PCI Express
- P8-11 : PCI Express (redundant)
- P8-P15 :
 - Point-to-point, TX/RX
 - Star configuration (low latency)
 - Dual star configuration (low latency)
 - Daisy chain (higher latency, flexible)

Final remarks and summary

- Ports P8-15 allow to implement low latency connections between slots
- Several crates, different size and different backplanes available
- High throughput
- Backplane suitable for control and DAQ systems
- JTAG pins available, but no standard for interconnection

Thank you for your attention

