

A top-down view of a MicroTCA board, showing various components like connectors, capacitors, and a large heat sink. The board is populated with several modules, including what appears to be a power supply and a processor. The background is slightly faded to make the text stand out.

MicroTCA for HEP

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Dual Star, Telecom Clocks

MCH2: LHC-CLK, TTC & TTS and DAQ Concentrator

MCH2 or
AMC13

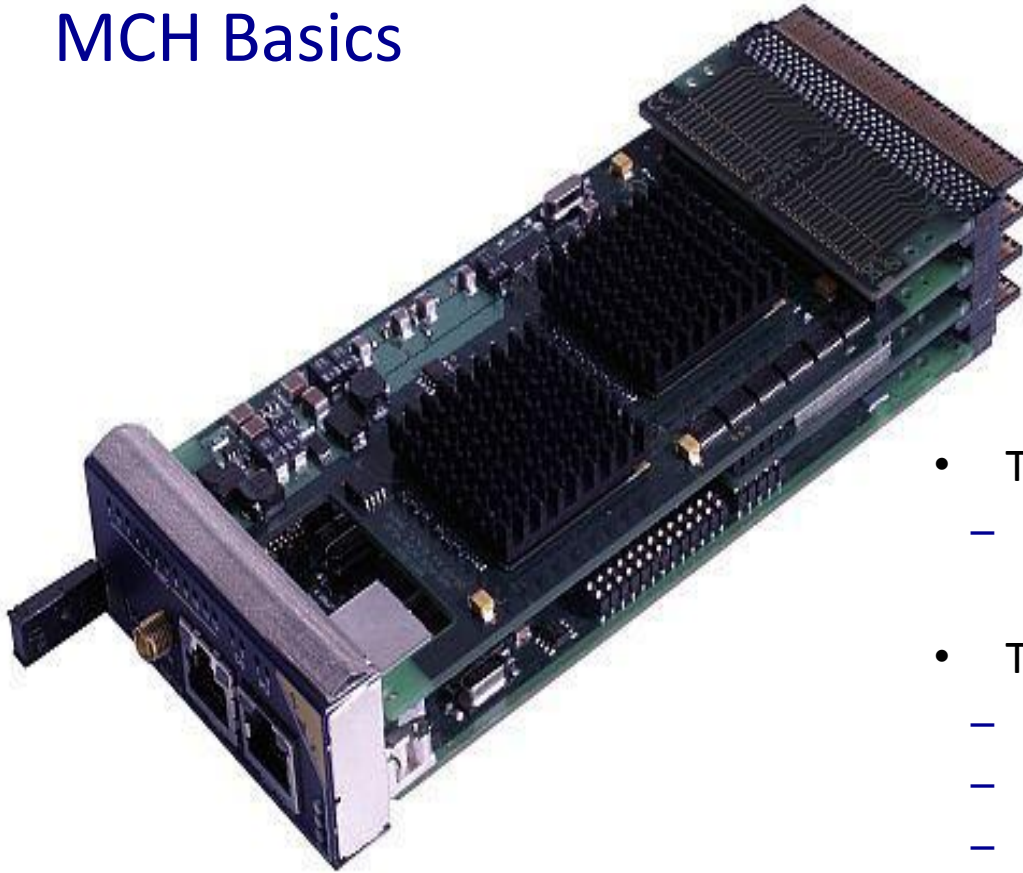
MCH1

12 Full width AMC slots

MCH1 providing GbE and standard functionality

Vadatech VT891

MCH Basics



- Tongue 1
 - Fabric A (GbE) + IPMI
- Tongue 2
 - Multiple options
 - Fabric B (SATA) 12 slots + 2 clocks
 - Fabric B (SATA) 6 slots + 3 clocks
 - 4 clocks
- Tongues 3&4
 - Fabric DEFG (PCIe, SRIO, 10GbE)

GbE

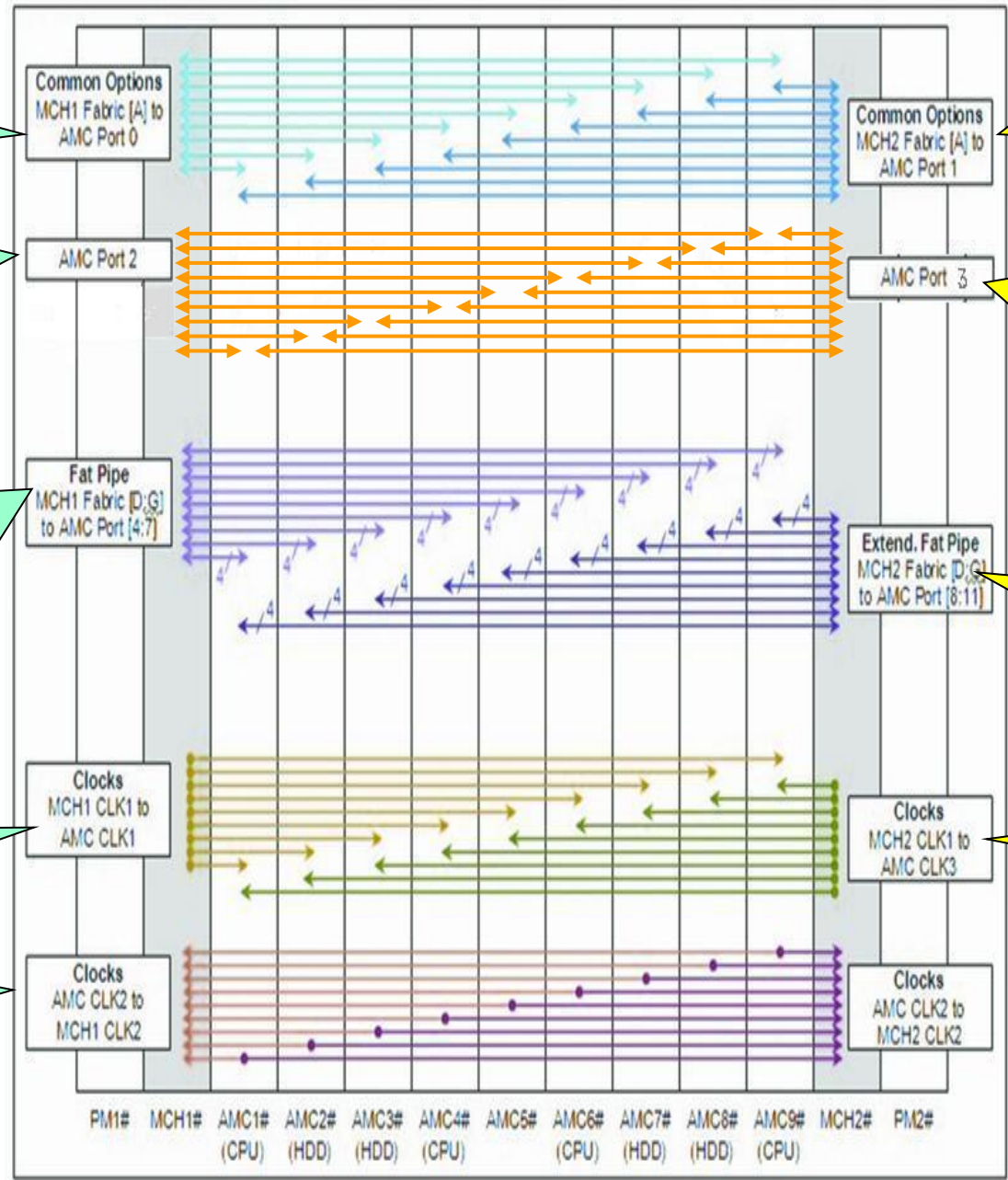
SATA
or SAS

FatPipe
x4 lanes
e.g.
PCIe
SRIO

Clk Out

Clk In

Dual star



Reserved
Alt DAQ?
Alt Comm?

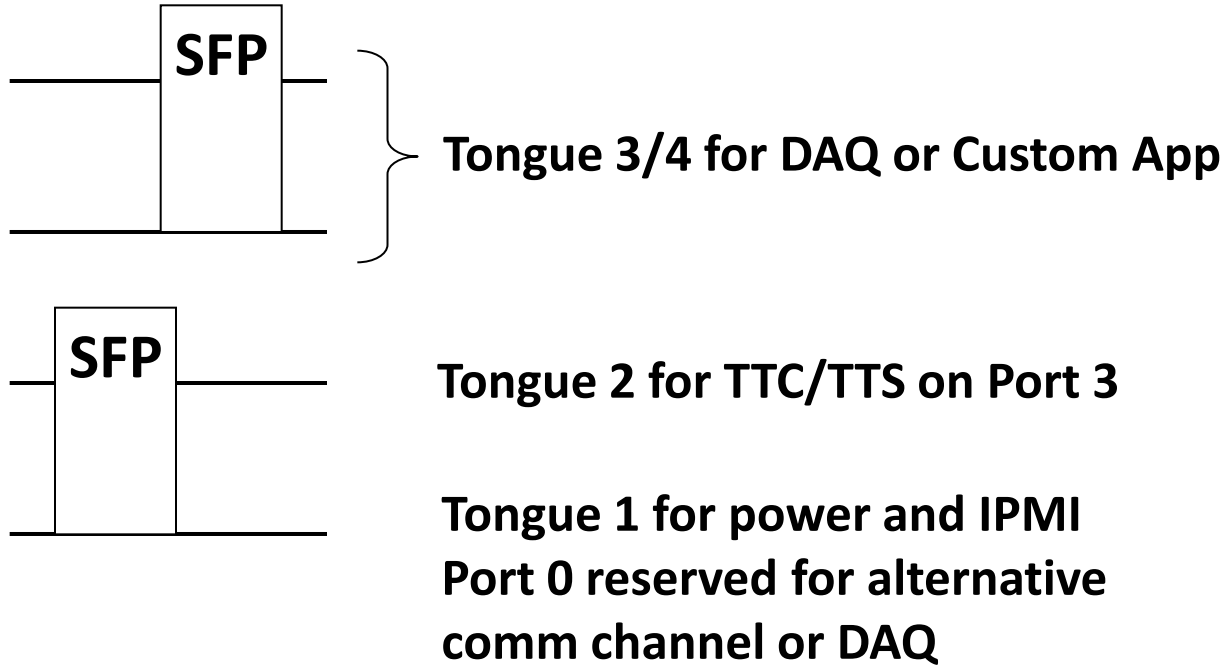
Fast Control
(Not SerDes)
TTC-Out
TTS-In

DAQ-In
or
Switch

LHC 40MHz
Clk

Not shown:
8 spare ports
2 spare clks

Current vision



Decisions

- Decided to use MCH2 as AMC13
 - i.e. Crate **NOT** used in redundant mode
 - Redundant system could be built, but it would lock experiments into a particular MCH vendor that would supply Tongue 1
 - Also rules out using standard uTCA capability (e.g. SATA, SRIO, etc)
- Route TTC/TTS on port 3
 - Decided to use LVDS, but CML would have allowed cards more flexibility.
 - Do we want to change to CML while we still have the chance?
- Route DAQ on port 8
 - Could also route on port 1.
 - Would make base board expensive.
 - Would rule out a redundant systems

MicroTCA Quirks Part 1

Telecom Crate versus PCIe crate

On **Telecom** crates Tongue 2 provides

- Fabric B routed to all slots + 2 clks (TCLK-A + TCLK-B) on MCH1
- MCH2 the same but routes to (FCLK-A + TCLK-B)

On **PCIe** crates Tongue 2 provides

- Fabric B routed to 6 slots + 3 clks (TCLK-A + TCLK-B + FCLK-A) on MCH1
- MCH2 just has TCLK-B normally, although could have TCLK-C and TCLK-D
 - Made a mess of the standard here to accomodate PCIe clk
 - FCLK-A stolen from redundant MCH to create non-redundant PCIe crate
 - PCIe can optionally run without central clk

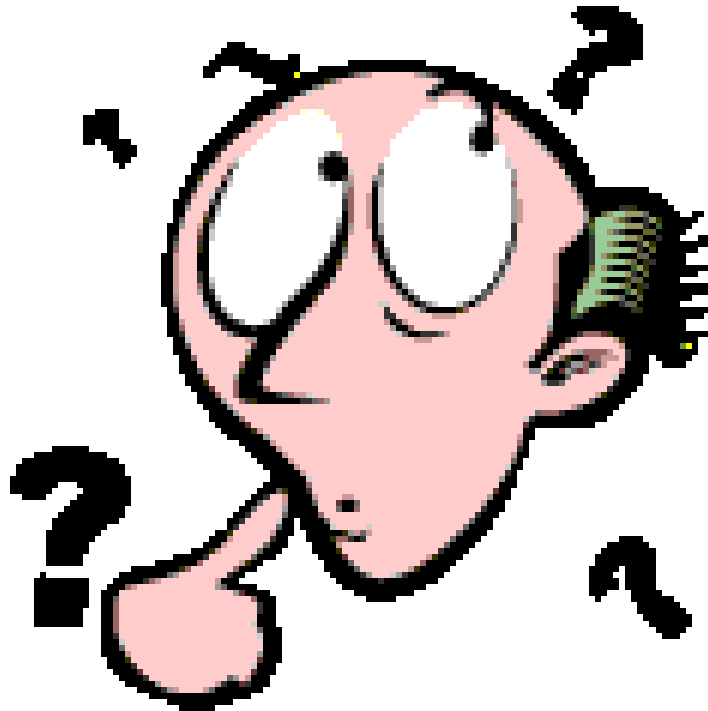
Alternatively we could have

4 clks (TCLK-A + TCLK-B + TCLK-C + ?)

MicroTCA Quirks Part 2

- Board thickness = 1.6mm (limited by edge connector)
 - Provides 14 layers, 16 layers is pushed to the limit
 - New Harting connector = 2.0mm
- Limited number of backplane I/O for custom inter card communication)
 - 8 bidirectional I/O spare (i.e. 12-15 and 17-20)
 - Depending on application may be able to increase to 16 (i.e. 12-15 and 17-20)
 - Not suitable for Full mesh backplane, but very few apps need this
 - Go to ATCA if you need full mesh. Note sure if 12 slot full mesh available, although theoretically possible
- No Rear Transition module
 - Not convinced this is an issue for us

Questions ?



DRAFT document on MicroTCA in physics:

http://giles.web.cern.ch/giles/projects/slhc/The_CMS_uTCA_Crate_v0.6.pdf

Connector Region		AMC Port #	Signal Conventions			Non-redundant MCH Fabric #	Redundant MCH # / Fabric #	
Basic Side	Common Options	0	AMC.2 1000BASE-BX			A	1/A	
		1	AMC.2 1000BASE-BX				2/A	
		2	AMC.3 SATA/SAS			B	1/B	
		3	AMC.3 SATA/SAS			C	2/B	
	Fat Pipe	4	AMC.1 x4 PCI Express	AMC.4 x4 SRIO	AMC.2 10GBase-BX4	D	1/D	
		5				E	1/E	
		6				F	1/F	
		7				G	1/G	
	Extended Side	Extended Fat Pipe	8		AMC.4 x4 SRIO	AMC.2 10GBase-BX4		2/D
			9					2/E
10							2/F	
11							2/G	
Extended Options			12					
			13					
			14					
			15					
			16					
			17					
	18							
	19							
	20							

Physics Profile for comparison

