Re-think MicroTCA

Tailoring to meet industrial requirements and cost points in an open environment

Stockholm, Sweden
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uTCA Key features for Industry Wide Deployment

- Ecosystem – alive & kickin'
  - AMCs / uTCA building blocks available from 30+ vendors
- Serial backplane interconnect
  - Includes most popular such as GbE, PCIe, SATA, …
  - Serial interconnect allows for a wide variety of system architectures
- Modularity
  - AMC based form factor provides almost unlimited scalability and flexibility
- Density
  - highest density among all modular system standards existing today
- Availability & manageability
  - uTCA designed for industrial grade requirements
  - Manageability from remote

uTCA Obstacles for Industry Wide Deployment (1)

- Platform cost is too high for a lot of applications
  - What makes a uTCA Platform ?
    - Power Unit
    - Cooling Unit
    - Backplane
    - Chassis
    - MCH (System Management + Fabric Switches)
    - Application processor
  - Why is it too expensive ?
    - Fully managed architecture
    - Distributed, intelligent management
    - (almost) unlimited flexibility
    - Full redundancy support
      - Even if it is not used, it has been designed into sub-units used
  - => uTCA is not cost optimized for a lot of applications!

uTCA Obstacles for Industry Wide Deployment (2)

- Platform complexity is too high for a lot of applications
  - IPMI management is not required in a lot of applications
    - Adds complexity without clear benefit to the system integrator / end user
    - Even hot swap may not be a requirement
    - On the other side, higher layer management such as HPI increase complexity even more
  - Too many options for the switch fabrics
    - Complicates system integration between Chassis/backplane, MCH and AMC modules
  - Custom hardware integration
    - Knowledge barrier for integration of custom hardware
    - AMC design expertise required
    - System management know how required
      - Hot swap
      - E-keying
      - ….

Introducing Industrial and Network Computing Architecture *(INCA)*

- Simplified version of uTCA
  - Supports key & basic µTCA feature set
  - uTCA style backplane
  - Compliant with off the shelf AMC modules

- Cost down features
  - MCH & integration
    - MCH + application processor integrated on one module = PMCH
  - Simplified infrastructure
    - Supports Off the shelf power supplies (e.g. open frame)
    - Simplified cooling units:
  - Low cost AMC cards with USB connectivity
  - Lower cost ***LeanMC (LMC)*** cards without hot swap and management

- Simplified deployment & integration:
  - Simplified system management by PMCH
  - Simplify custom hardware design task (LMC)
  - Less complex = lower TTM, less NRE

Why use *INCA* ?

- Deploy the huge base of COTS solutions, especially AMCs
- Deploy state of the art serial interconnect technology
  - Get PICMG2.16 connectivity in less space than 3U CPCI….
  - Don’t get disconnected from the technical evolution by sticking to parallel busses….
- Cost down from full blown uTCA
- It is simple to integrate your own hardware
  - LMC design does not require any system management know how, especially on IPMI
  - Use PCIe for PCI based hardware migration
  - Use USB for ISA / LPT / COM based hardware migration
- It’s up to you choose how much system management you want & need
  - Simplify system & application integration
- Reduce time to market

INCA positioning & objectives

- Maintain compatibility with AMC ecosystem
- Cost down platform from full fledged uTCA
- Provide a scalable platform with switch fabric support
- Simplify…
  - integration of proprietary hardware
    - USB
    - LMC
  - system management
    - Some applications do not need any management
- Integrated Graphics support
- Target applications
  - Telco / IT / voice equipment & converged platforms
  - 3U CPCI / VME, PICMG2.16 in compact form factor
  - Industrial computing
  - Migration from parallel bus architectures

Who drives *INCA* ?

- Industry alliance
  - Advantech: PrAMC, AMC and MCH technology
  - Elma: Chassis / Backplane technology
  - Gateware: MCH firmware / software technology

- Important milestones
  - Launch INCA at Electronica 2008 (Europe)
  - Launch INCA at ATCA Summit 2008 (USA)

- Open standard
  - Common objective to release INCA as open standard under PICMG

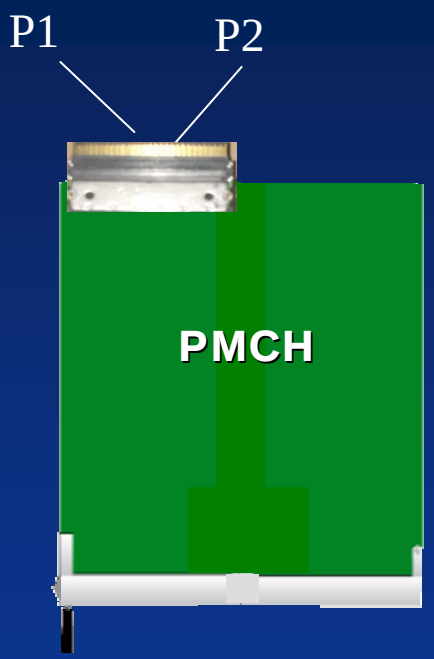
  - This is an Invitation to ecosystem peers to join this activity!

INCA main element: PMCH

- Integrates several uTCA building blocks:
  - Application processor
    - State of the art, LV x86 processor subsystem (preferred)
    - Fabrics supported:
      - SATA/SAS ports
      - GbE ports
      - PCIe
      - USB2.0
  - Switch
    - Base fabric (GbE) switch
    - Fat pipes fabric root port (PCIe/SATA/USB)
  - System management
    - Shelf/carrier manager
    - Power management unit controller
    - Cooling unit controller
- Power Management and Cooling Unit
  - are distributed system elements controlled by PMCH
  - Non-intelligent FRUs

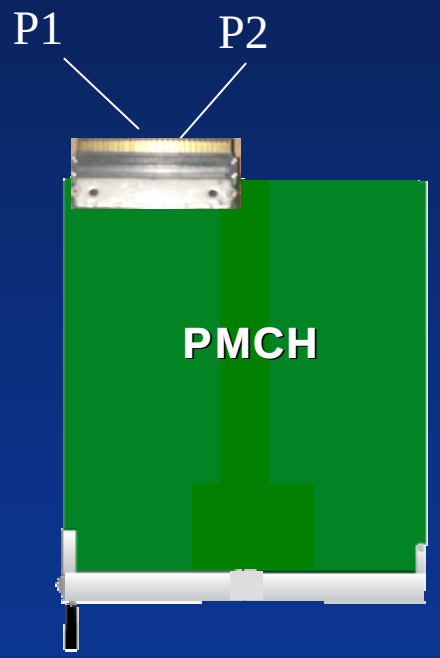
INCA PMCH Connectors

- PMCH may have two connectors:
  - Std. AMC / uTCA card edge
    - Tongue 1 only
  - Std. uTCA MCH plugs
    - Tongue 1 and tongue 2
  - P1: Tongue 1
    - std. AMC pinout style
    - with special port mapping
    - Mandatory
  - P2: Tongue 2
    - INCA specific
    - Optional
- PMCH may be a single width or double width module



INCA PMCH Connectivity

- P1:
  - Power
  - IPMB-L
  - Hot Swap, management IOs
  - I2C incl. ALARM
  - 6 GbE ports
  - 2 SATA ports
  - 4 USB Ports
  - 8 PCIe lanes
    - Incl. 5 clocks
    - 2 PCIex4 or 1 PCIex4 + 4 PCIex1
- P2:
  - 6 GbE Serdes links
  - 2 or 4 SATA ports
  - 4 or 0 USB Ports
  - 16 PCIe lanes
    - Incl. 4 clocks
    - 4 PCIex4 or 2 PCIex8 or 1 PCIex16

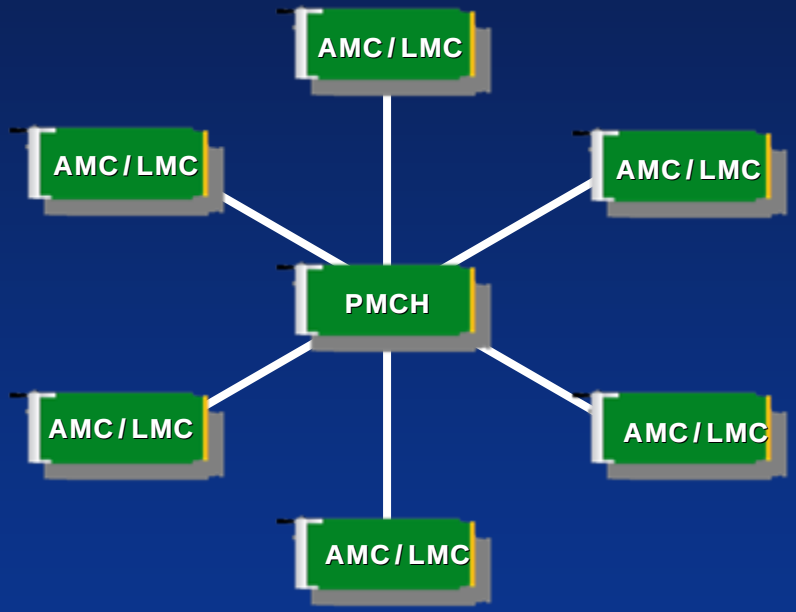


Lean Mezzanine Card (LMC)

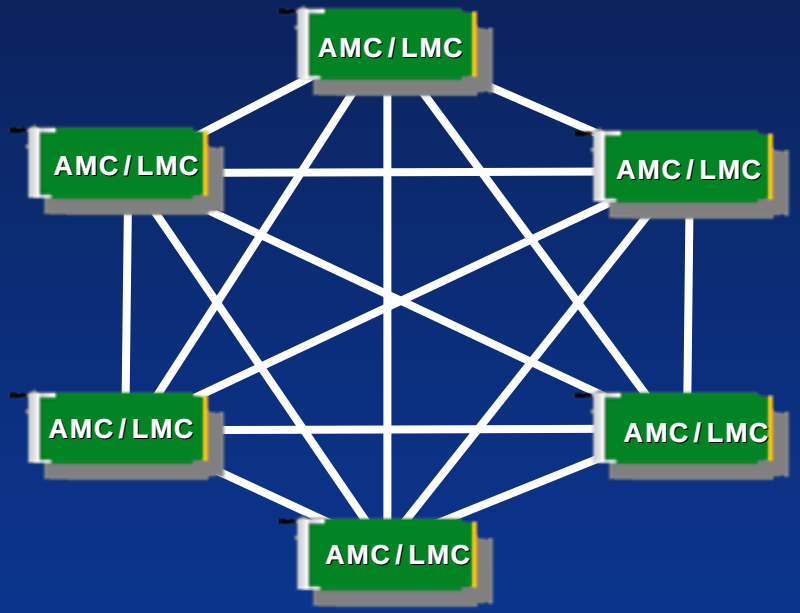
- LMC is a simplified version of AMC
- Same form factor and connector pinout, but
  - No IPMI support
  - No hot swap
  - Uses I2C bus instead
  - No E-keying
  - Simple fabric interface
    - SATA
    - USB based hardware
    - PCIe based hardware
- Cost reduction
  - No MMC, no IPMI license
  - No hot swap hardware
- Complexity reduction
  - No IPMI / hot swap knowledge required to design an LMC
  - Simplifies porting prorietary hardware to INCA

INCA base fabric routing

GbE – STAR

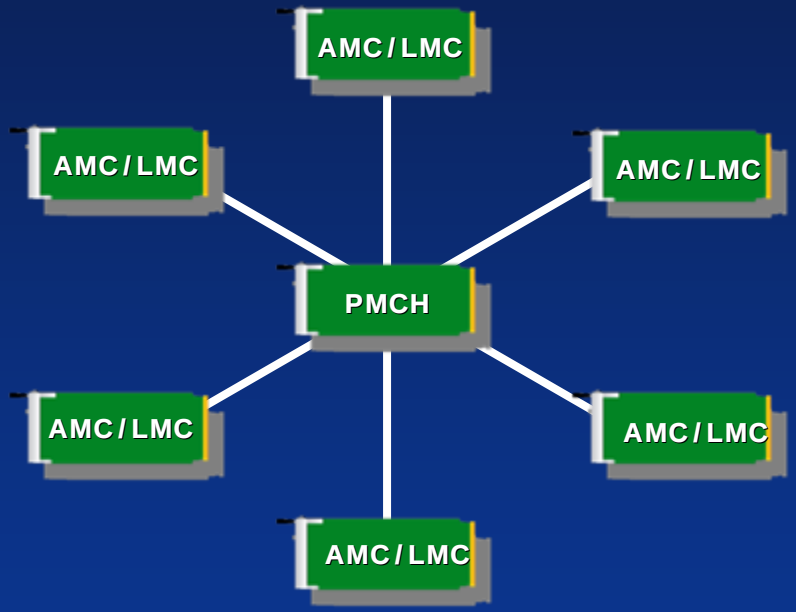


GbE – Full MESH



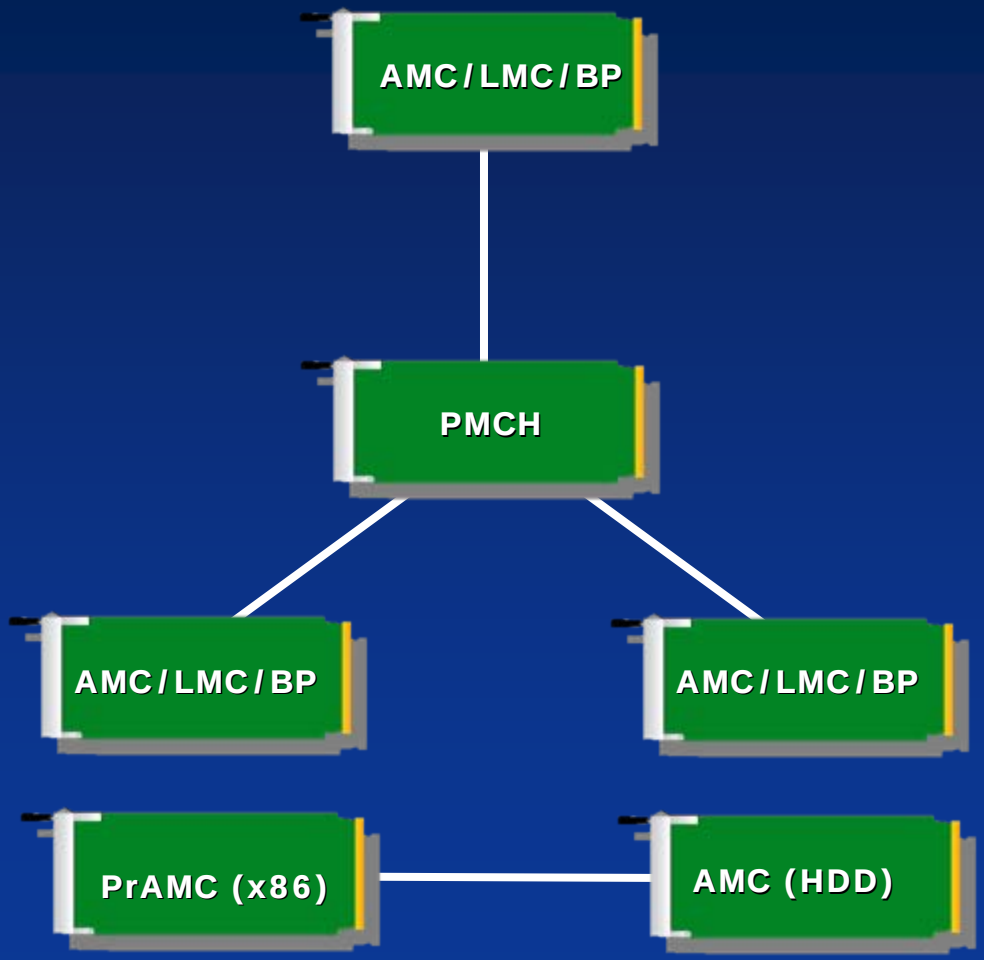
- Backplane may have 6 up to 12 slots with GbE connectivity
  - STAR
  - DUAL STAR (requires 2 PMCH slots on backplane)
  - FULL MESH (limited slot count)

INCA PCIe



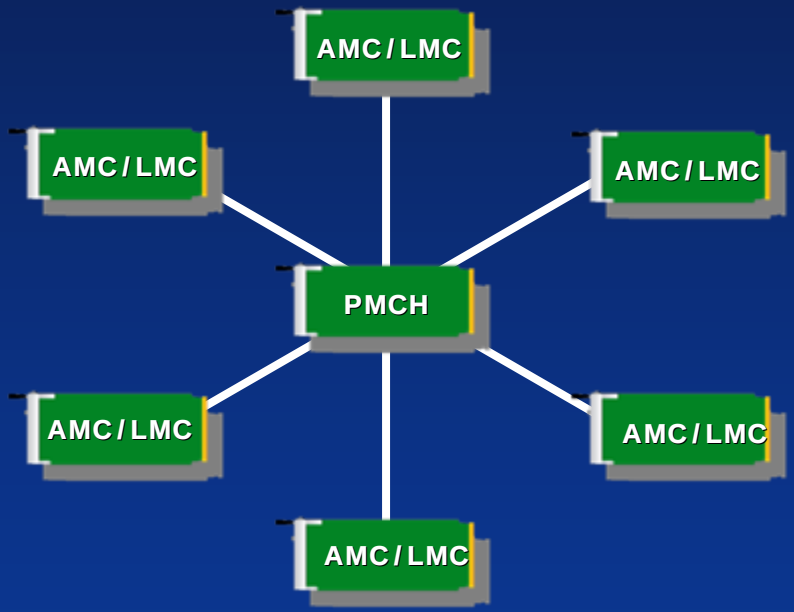
- PMCH contains root – switch
- P1
  - Supported configurations depend on PMCH implementation
  - Examples:
    - **1 x8**
    - **2 x4**
    - **1 x4, 4 x1**
- P2
  - Supported configurations depend on PMCH implementation
  - Examples:
    - **1 x16**
    - **2 x8**
    - **4 x4**

INCA SATA/SAS



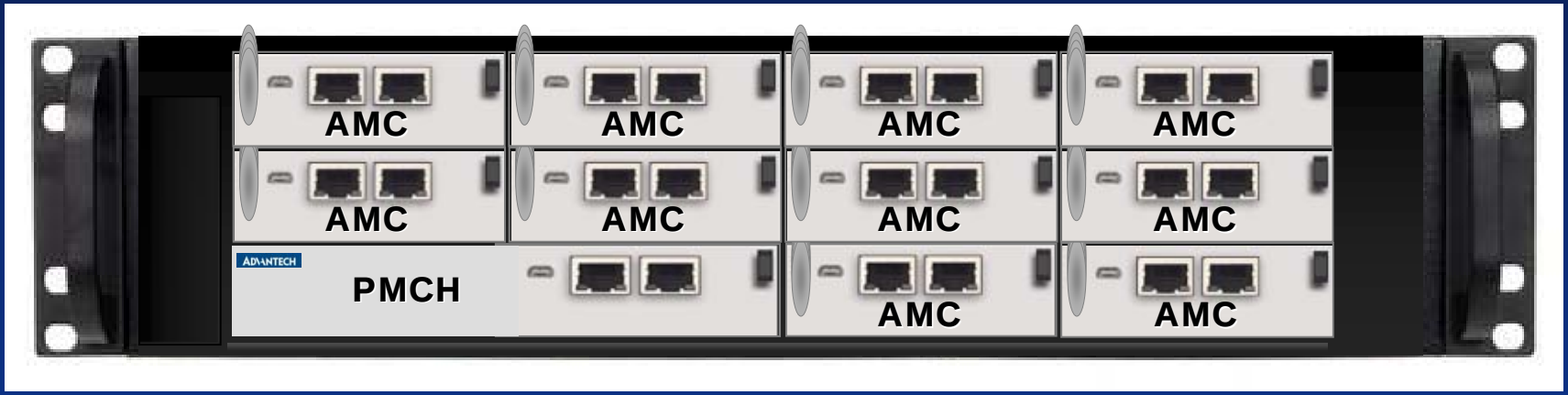
- Mass storage interface for PMCH
- 2 ports provided on P1
- 2 or 4 ports provided on P2
- May connect to
  - AMC/LMC slot
  - Backplane rear IO
    - Fixed HDD installation
- Local peer connectivity between AMCs also supported on backplane
  - E.g. PrAMC + SATA HDD AMC slots

INCA USB



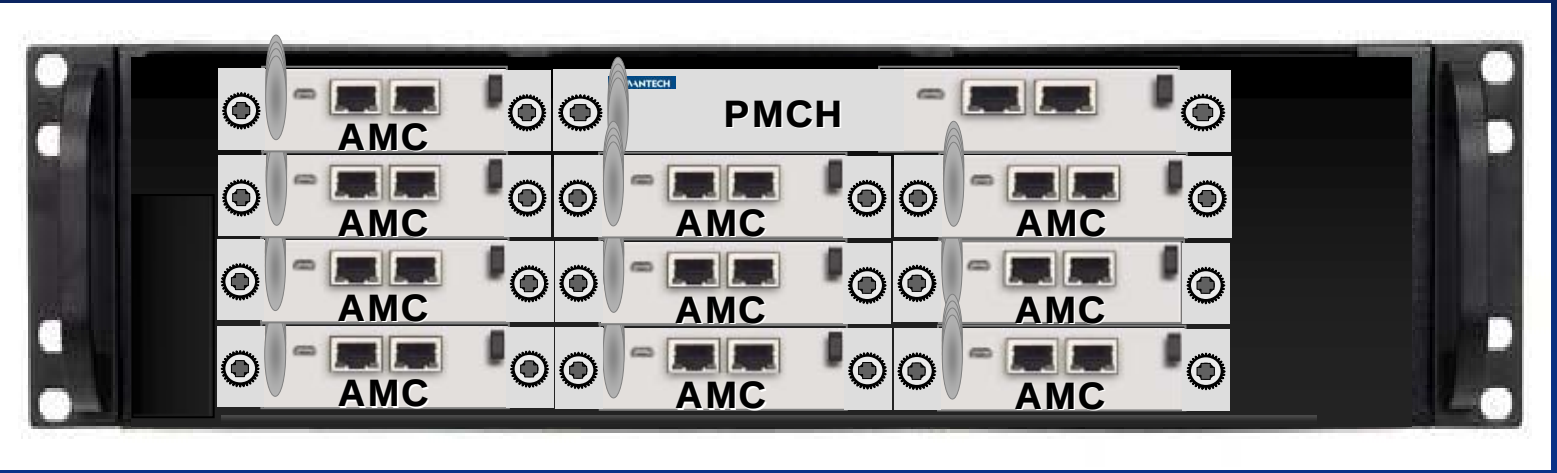
- ***INCA*** supports low cost, USB based IO Expansion
- „Simple & cheap“
- USB Hot Swap Capability + PnP
- Examples:
  - Serial port expansion
  - Flash disk/ card reader
  - Modem/ WLAN
  - KB/ MS
  - Video
  - DAQ
  - Digital IOs
  - Proprietary hardware

INCA 2U Sample system



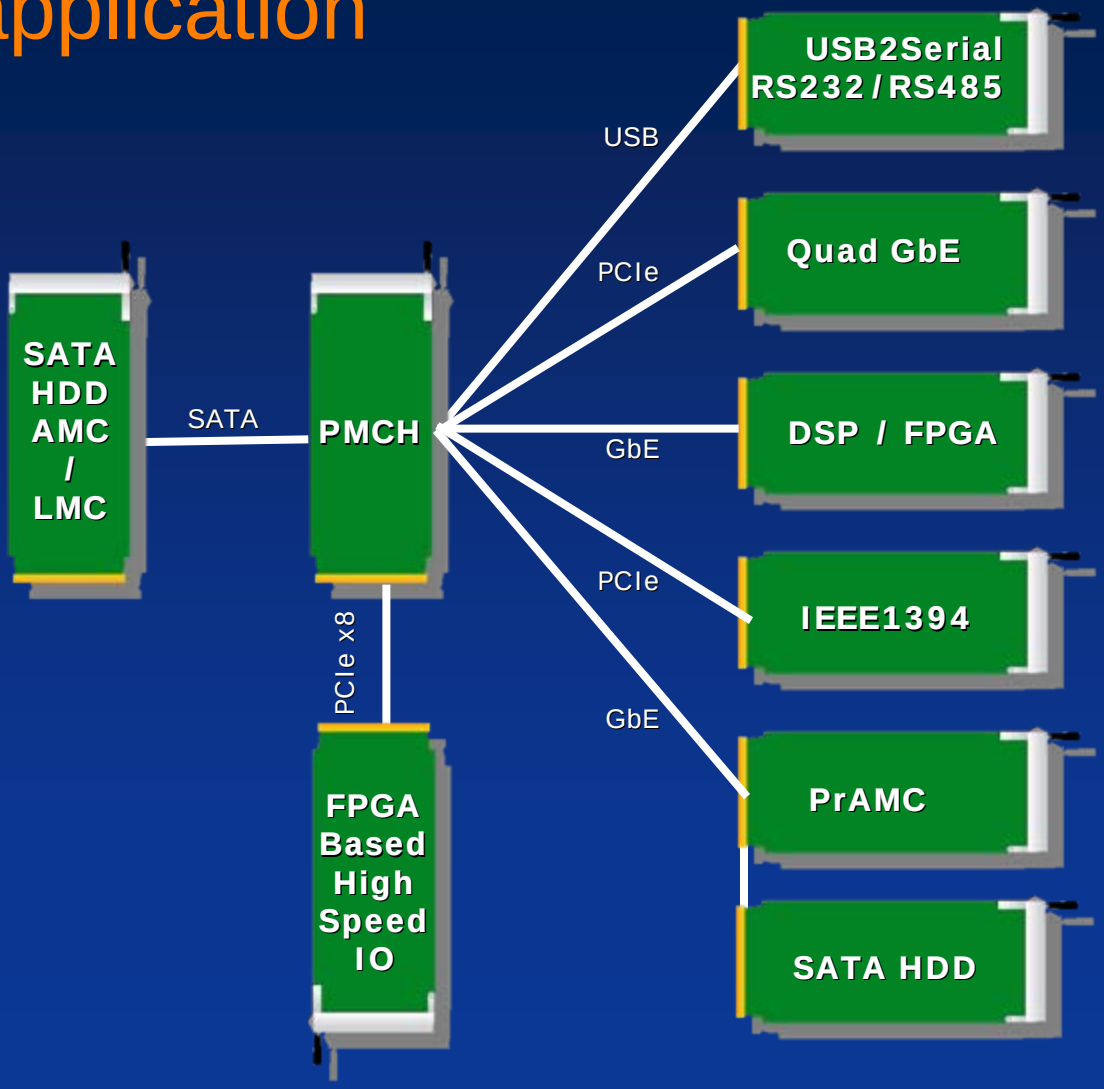
- PMCH + 10 full size AMCs / LMCs in 2U
- PSU + HDD may be installed in the rear!

INCA 2U rugged sample system

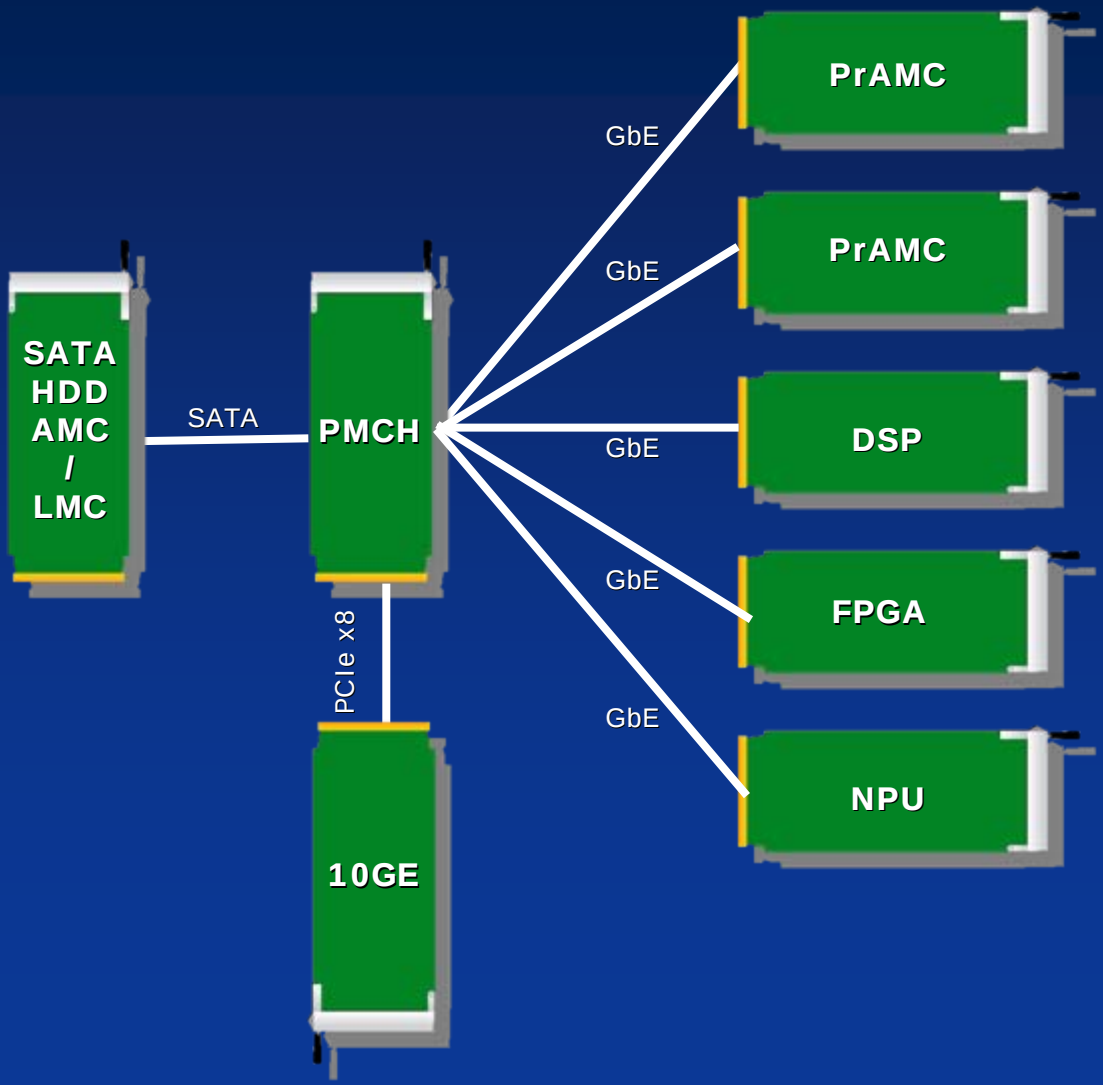


- PMCH + 10 mid size AMCs in 2U
- Support for rugged uTCA front panels
- PSU + HDD may be installed in the rear!

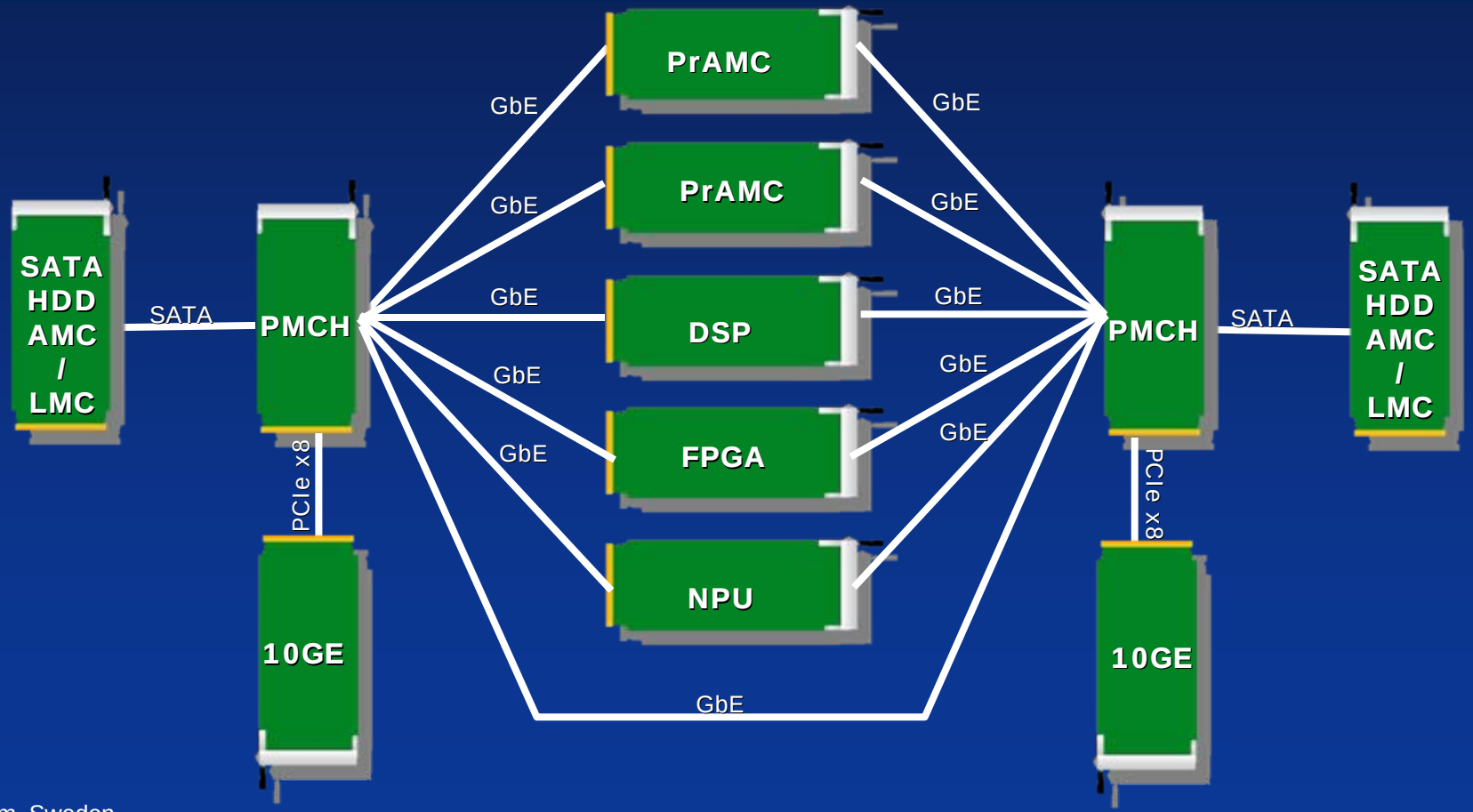
INCA Sample industrial application



INCA PICMG2.16 migration



INCA PICMG2.16 dual star migration



Contact information

Peter Marek
peter.marek@advantech.eu
+49-9621-9732-110

Paul Stevens
paul.stevens@advantech.eu
+33 1 4119 7575