Status of the CERN ATCA specification

and tender

ATCA shelf specification

Status:

- Specification draft submitted to the experiments electronics coordinators (June and Oct. 2016).

- Feedback received from the experiments.

  - Specification adapted where appropriate and of common interest.

- Informal market survey carried out with selected manufacturers

  - MS Outcome:

    - All contacted suppliers propose compliant COTS equipment for horizontal airflow.

    - Most of them require development (NRE) for vertical airflow and/or backplane bandwidth (100G) and/or topology (full-mesh).

- Cross-check of the specification draft with the latest generation of shelves from Pentair and Comtel

- Indications that Atlas (and CMS) favour vertical cooling.

  - ❖ This lead to some minor changes in the technical specification mostly related to cooling and power distribution.

- Tender is ready and will be launched in the coming days

ATCA shelf specification proposal

Technical specification key points (1/3)

Physical shelf baseline:

- 19" rack system compatible card cage
- 14 ATCA blade slots with RTM
- 2 shelf manager slots
- 2 redundant power entry module (PEM) slots (-48Vdc input)
- Removable cable management trays (front and rear)
- Hot-swappable cooling units
- Cooling :
  - ❖ Baseline: Shelf compatible with in-rack vertical air flow
  - ❖ Option: Shelf compatible with PICMG standard front to back air flow
- Shelf maximum height: 14U baseline; 16U for horizontal option

Backplane requirements:

- Topology 1: Dual star
- Topology 2: Full mesh
- Fabric lane bit rate: 40Gbase-KR4
- Option: 100Gbase-KR4 (for phase 2)

Module location and accessibility:

- Front access:
  - 14 ATCA blades
  - 2 shelf managers
  - Air filter
- Rear access:
  - 14 RTM
  - 2 PEM

Full technical specification available here

ATCA shelf specification proposal

Technical specification key points (2/3)

Electrical

- Shelf power distribution for minimum: 400W (front blade) + 50W (RTM) to each slot
- Power distribution sub-divided in a minimum of four power groups. Each PEM consequently has four power inlets.

Cooling:

- *Cooling capacity of 450W /slot:*
  - ❖ *The shelf cooling capability shall comply with chapter 5 of PICMG-3.7 R1.0 for Data Centre environmental conditions.*
  - ❖ *An airflow of minimum 65 CFM per slot shall be guaranteed in all slot at maximum fan speed for a supply voltage of 48Vdc.*
- *Minimum fan MTBF: 65'000 hours at 40°C, 85'000 hours at 25°C.*

Shelf manager

- Based on Pigeon Point Systems ShMM700 or newer
- Support the following protocols and interfaces: RMCP, SNMP, SSH
- Support for HPM.1 and HPM.3

Full technical specification available here

ATCA shelf specification proposal

Technical specification key points (3/3)

Standards, Rules and Regulations:

- PICMG standard:
    - AdvancedTCA base specification PICMG-3.0 Revision-3.0
    - AdvancedTCA base extensions specification PICMG-3.7 Revision-1.0 section 5 for cooling aspects
- Intel specification: IPMI v2.0
- EMC compliance: CISPR22 and CISPR24 Class A and IEC/EN 61000-6-3
- Safety standard: IEC/EN 60950-1 and CERN IS-23 and IS-41
- Ethernet standard: IEEE standard 802.3
- ROHS compliance: WEEE Directive 2012/19/EU
- CE compliance and related regulations

Full technical specification available here

-48 Vdc rectifier specification proposal

Technical specification key points (1/2)

Rectifier system baseline:

- 19" rack compatible system of maximum 3U high (maximum depth of 500mm)
- Modular rectifier system with N+1 redundancy capability
- Minimum output power: 11kW (with N+1 redundancy)
- Default output voltage: -48 Vdc +/- 500 mV
- Output voltage SW adjustable between -46 and -55 V.
- Maximum ripple: 250 mVpp (with 20MHz BW)
- Minimum efficiency: 95% (for loads above 30% of max. output power)
- Supply output: Minimum 12 individual dc circuit breakers of 32A each

Physical baseline:

- The system frame must accommodate:
  - Minimum 4 slots for hot swappable power rectifier modules
  - 1 control module slot
  - Space for minimum 12 DC circuit breakers
  - Input and output connection terminals in the rear
  - Space for input/output cabling for minimum 1 cable of Ø 19mm and 24 cables of Ø 6mm
- Cooling:
  - Front to back horizontal cooling ensured by the rectifier module

Full technical specification available here

-48 Vdc rectifier specification proposal

Technical specification key points (2/2)

Control module and interfaces:

- System monitoring capabilities including at least:
  - DC output voltage
  - Rectifier module current and internal temperature
  - Rectifier fan speeds and alarms
  - Output DC circuit breaker status
- System control capabilities:
  - Output voltage On/Off commands
  - Output voltage setting (within the range specified in chapter 2.2)
- Autonomous control of the N+1 redundancy policy
- The following interfaces:
  - USB for CLI and/or specific GUI
  - 100 Mbps Ethernet with support for SNMP v3 (and optionally a web interface)

Standards, Rules and Regulations:

- Safety standards: IEC/EN 60950-1 and CERN safety regulations IS-23 and IS-41
- Inrush current: ETSI ETS 300 132-1.
- Fast transient and surge immunity: EN61000-4-4 and EN61000-4-5
- Harmonic current emission: EN61000-3-2
- EMC compliance: EN61000-6-1, EN61000-6-2, EN61000-6-3, EN61000-6-4, CISPR22 (EN55022) Class B and CISPR24 (EN55024)
- Ethernet standard: IEEE standard 802.3, SNMP v3: RFCs 3413 to 3415
- ROHS compliance: WEEE Directive 2012/19/EU
- CE European marking and related regulations

Full technical specification available here

ATCA shelf and -48V rectifier: towards procurement

Next steps:

- Finalize the technical specification with the latest feedback received from the experiments   Q4 2016 ✓
- Perform technical evaluation of proposed COTS ATCA chassis from the suppliers   Q1 2017 ✓
- Launch an official CERN price enquiry   Q2 2017 ✓

	Horizontal	*Vertical*
Qualification of 3 pre-series units (vertical)	Q3 2017	Q3 2017
Once approved, setup procurement contract	Q4 2017	Q4 2017

- *Follow the same path for the -48Vdc rectifier system*

Questions / Comments