Introduction

MTCA Workshop
IEEE Real Time 2018
Williamsburg VA June 9, 2018

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SLAC National Accelerator Laboratory
for the xTCA for Physics Collaboration
History of xTCA Physics Workshops

• Physics MTCA Workshops
  – 2007 – RT FermiLab USA, PICMG expert tutorials
  – 2008
  – 2009 – RT IHEP Beijing CN, xTCA Committees Formed
  – 2010 – RT Lisbon Portugal
  – 2011 –
  – 2012 – RT Berkeley USA
  – 2013 –
  – 2014 –RT Nara Japan
  – 2015 –
  – 2016 – RT Padua Italy
  – 2017 -
  – 2018 – RT 2018 Williamsburg USA

DESY MTCAWS
DEC. 2012-2017
2018=7th Annual
CERN Interest Group
Physics Standards History

• Standards driven by new innovations for economic, performance advantages

• Timeline
  – 50 Years ago, ~1965, NIM, Nuclear Instrument Module
  – 40 Years ago, ~1975, CAMAC Data bus modules
  – 30 Years ago, ~1985, FASTBUS 10X BW bidirectional
  – 14 Years ago, ~2004, ATCA, MTCA announced by PICMG
    • Multi-GHz serial technology backplane
    • Redundancy for 0.99999 Availability at Shelf (Crate) level
    • Intelligent Platform Management Interface (IPMI)
Physics Standards Timeline

- 1950
- 1960
- 1970
- 1980
- 1990
- 2000
- 2010
- 2020

- NIM '65
- CAMAC '75
- FASTBUS '85
- ATCA '04
- ATCA 3.8, MTCA.4 '10, 11
- MTCA.4.1, SW HP, SHAPI '16
- MTCA.4.1, SW SDM, SPM '17

xTCA WG
New Standards & SW Guidelines 2009-17

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PICMG xTCA for Physics 2002-16

- 2002 ATCA Announced by PICMG for Telcom
- 2004-06 ATCA with μTCA announced
- 2004-11 NSS-MIC paper advocating ATCA for ILC Controls
- 2005-07 Snowmass Physics controls papers DESY, SLAC
- 2005-11 Gromitz controls presentations DESY, SLAC
- 2007-06 First xTCA workshop FNAL
- 2009-06 xTCA for Physics WG’s Announced IHEP IEEE Real Time
- 2011-07 MTCA.4 with RTM Released
- 2016-11 MTCA.4.1 Released; submitted Hot Plug, SHAPI Guidelines
- 2017 -03 Last of 4 SW Guidelines completed
MTCA.4 released July 2011

- MTCA.0 Extensions => MTCA.4 for Physics

**Extension Features:**
- AMC-RTM connector standardized with E-Keying, JTAG, IPMI Management & Power from AMC to RTM
- Low-jitter clock lines, point-to-point connections for vector, interlock summing
- RTM added hot-swap feature same as AMC
Enhancements MTCA.4 => MTCA.4.1

- 1. Auxiliary Backplane
- 2. Rear Power Modules (RPMs)
- 3. MCH-RTM
- 4. Boards & Protective Covers
- 5. Applications Classes of RTMs
MTCA.4.1 Final Released 2016

- **Name MTCA.4.1 Enhancements suggested by PICMG**
- **Approved, adopted, in printing November 2016**
Software Guidelines Completed

- **Standard Device Model (SDM)**: Dec. 2014
- **Standard Hot Plug Procedure (SHPP)**: Nov. 2014
- **Standard Hardware API (SHAPI)**: Mar. 2016
- **Standard Process Model (SPM)**: Dec. 2017

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Final Steps

• PICMG HW, SW Committees
  – PICMG Policy: Dissolve after Statement of Work complete; renew if new standards work needed; Physics Coordinating Committee can continue to correct, update or renew in future.
  – HWG has to be reformed if undertakes new SOW (re-open to all PICMG Members to participate)
  – SWG will remain active to oversee maintenance issues only until new SOW undertaken (same as HW)
  – Finished Guidelines reside in DESY GitHub repository for community-wide use (contact DESYLab)

• Special thanks to all WG Members and their supporting lab-industry institutions
  – To the entire team; see list of key contributors on following page.
# Key Contributors

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