ATCA: Order out of Chaos
Why is ATCA important?

Brian Carr, Strategic Marketing Manager
Embedded Communications Computing, Motorola

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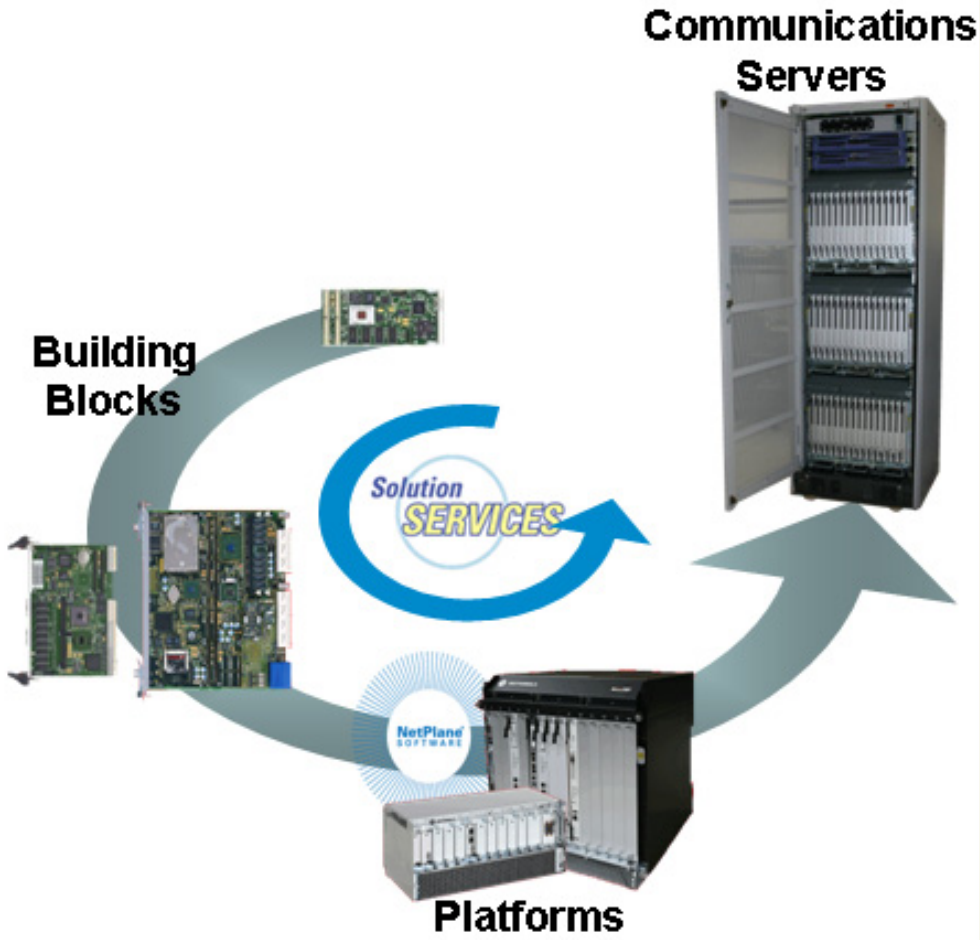
Embedded Communications Computing

- Independent business unit within Motorola's Networks and Enterprise
- Leading provider of embedded computing technology and services for communications infrastructure products
- Targeting telecommunications, defense and aerospace, medical, and industrial automation industries
- Leading the industry in open-standards-based communications servers used as a common platform for wide range of applications
- 25+ year commitment to standards-based computing
- Headquartered in Tempe, AZ.; major facilities worldwide



AdvancedTCA® CompactPCI® SDL

AdvancedMC™ µTCA™ VMEbus Technology SERVICE AVAILABILITY™ FORUM

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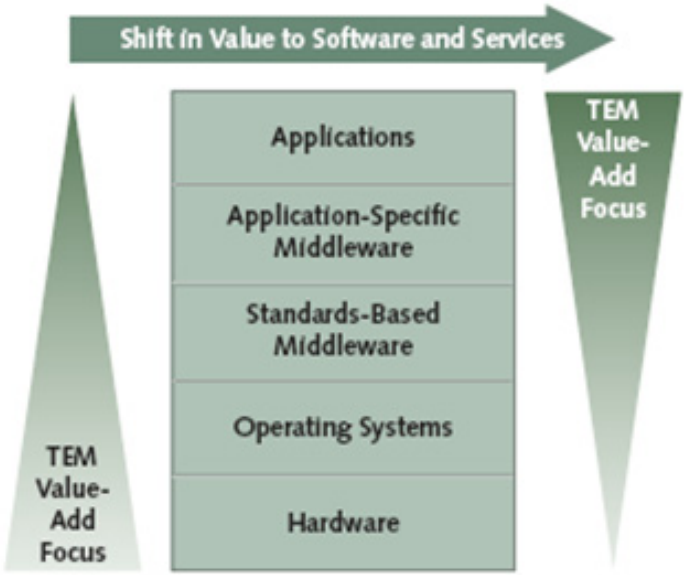
Some of your questions?

- Why are we even talking about ATCA?
- What can I do with ATCA – will it meet my needs?
- Will it all work – what challenges do I face?
- Will there be widespread adoption – will I be backing a winner?

Carrier & NEP Business Models Under Pressure

- Burst bubble left many NEPs struggling to find the correct strategy to achieve success and profitability.
- NEPs face two concurrent challenges
  - The need to deliver new platforms and applications
  - The need to reduce costs and improve engineering productivity
- NEP core competencies must be more focused and supply chain simplified
- Common base platform strategy seen as crucial



The Evolution of the TEM/NEP Value Chain
Source: Yankee Group, 2006

Why ATCA?
What can I do with it?

- An ideal basis for an open standards-based common platform, on which many applications can be built
- Primary focus is carrier grade telecom
- Covers shelves, boards, mezzanines, and management
- Viable, multi-source ecosystem, with many off-the-shelf products

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Typical ATCA shelf

- Chassis / Enclosure
  - 19" and 23"/600mm wide, 12 – 14U (rack units) high, 3 shelves per rack
  - 14 slots in 19", 16 slots in 23"/600mm
- Power / Cooling
  - -48V / -60V DC power (telecom central office) – no AC
  - Nominally 200W per slot
- Backplane
  - Dual-star fabric, separate control and data fabrics
  - Support for telecom features: clocks, update channels
- Fabric (redundant)
  - Many options in standard, but vast majority keep to Gigabit Ethernet
- Shelf management (redundant)
  - Shelf manager controls board states, e-keying and availability functions

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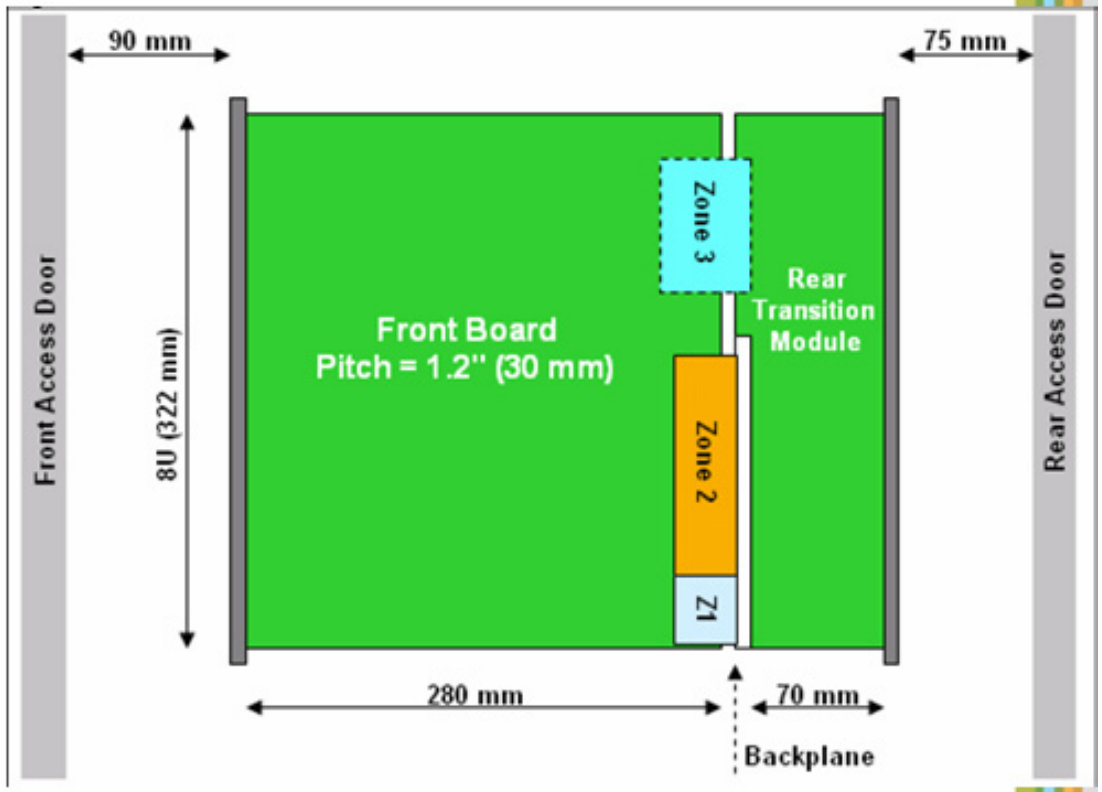
Typical ATCA blade

- Dimensions:
  - Front board size 8U x 280 mm
  - Rear board size 8U x 70 mm
    - Connects directly to front board
- Examples
  - Dual Intel Xeon CPU blades/16G memory
  - General purpose I/O processors
  - 4000+ channel Voice over IP DSP blades
  - In-shelf storage elements
- Restrictions
  - 200W power becoming a challenge to keep to
  - Only use long-lifecycle components so will always lag enterprise servers



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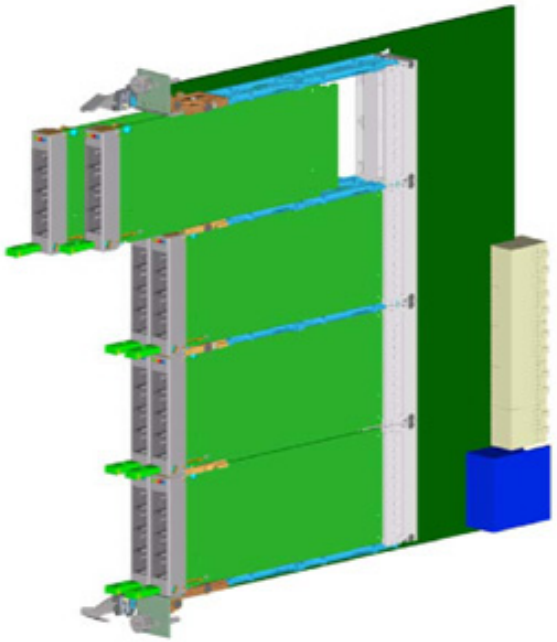
Modular Computing & I/O

- Advanced Mezzanine Cards (AMC) defined as new modular accessory for ATCA
  - Hot swappable
  - Various inter-changeable form factors
- ATCA AMC carriers
  - Maximum 4 bays carrying up to 8 modules
  - Increased flexibility at a more granular level
- AMC ecosystem also growing
  - Processors (PrAMC) – both IA and PowerPC
  - Storage
  - VoIP & DSP
  - Telecom I/O
    - n x T1/E1, STMx etc



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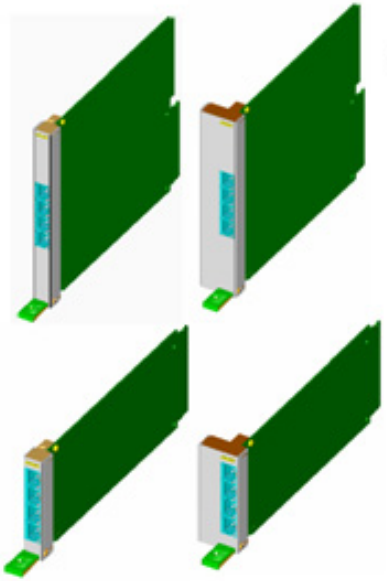
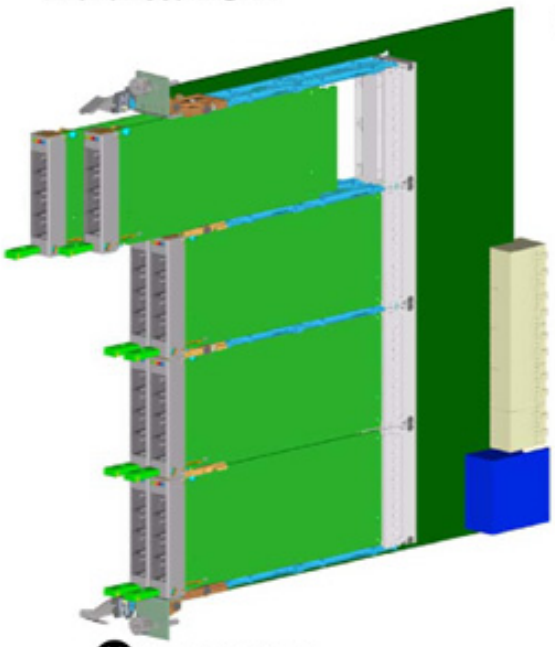
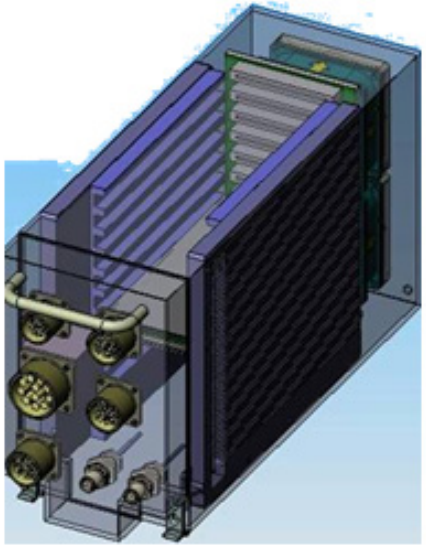
MicroTCA – a natural complement to ATCA



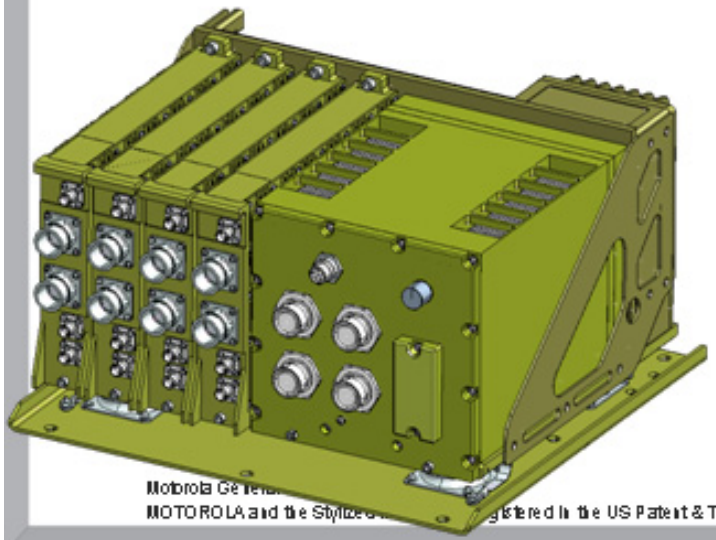


In simple terms, MicroTCA recreates the carrier environment for Advanced Mezzanine Cards in a more flexible package

MicroTCA - Customizable

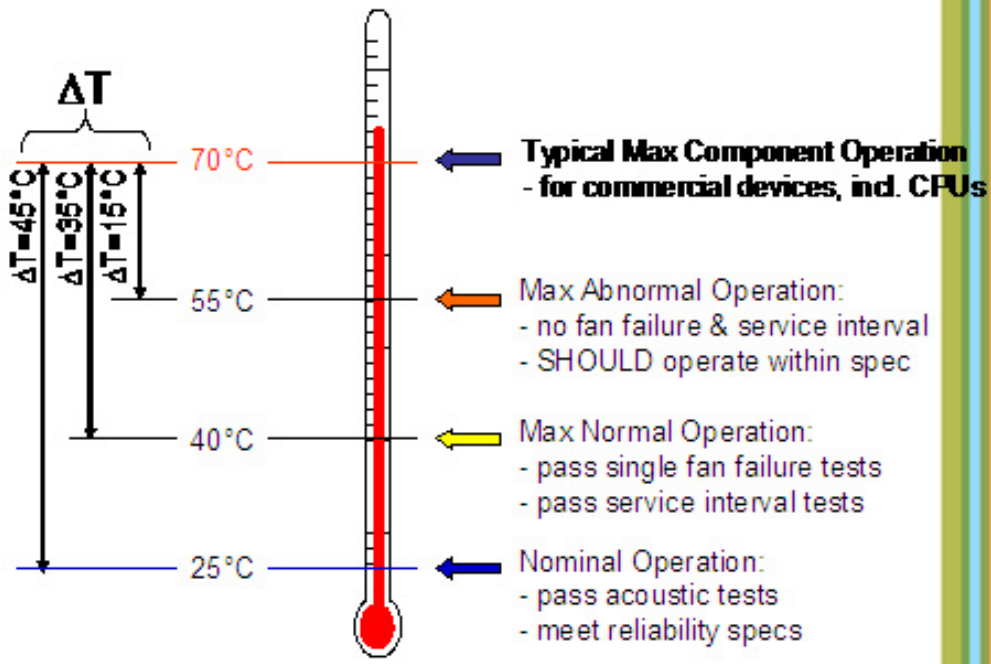


- MicroTCA packaging options widen applicability:
  - Telecom applications: edge, transport, base-station and enterprise segments
    - Supports ETSI 300mm practice
  - Adjacent applications and markets: defense – medical-industrial
  - Simplex and Redundant architectures
  - Different environments and power supply options



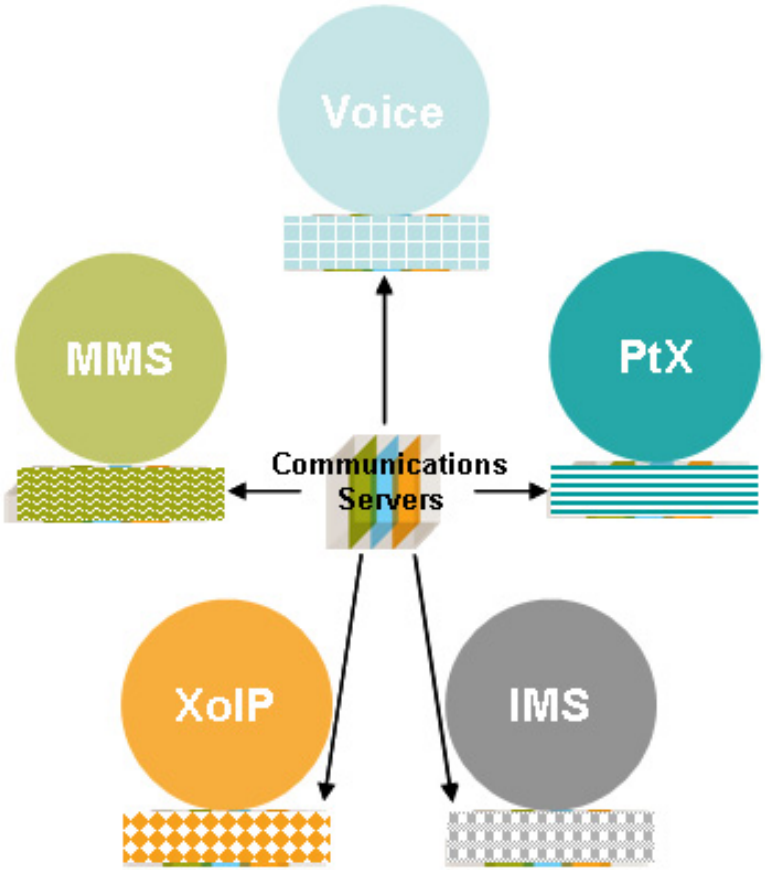
How do I know if this all works?
Ecosystem challenges for ATCA

- Interoperability
  - Inconsistent interpretation
  - Too many optional clauses
  - Ecosystem needs guidance on how to interpret standards and options
- Thermal design
  - NEBS compliance is required by carriers
  - Balance cooling performance vs size and noise
  - Again, ecosystem needs guidance and appropriate testing regime



Communications Servers
The Open Foundation for Common Base Platforms

- Communications servers are carrier-grade platforms
  - Standards-based (ATCA, MicroTCA)
  - Meet carrier-grade requirements
    - high availability
    - extended product lifecycle
    - longevity of supply requirements
  - Support real-time and "communications I/O"
  - Provide development support for value-added communications applications
  - Flexible and scalable
- Supported by a robust ecosystem
  - PICMG®, OSDL, Service Availability™ Forum, SCOPE, CP-TA
  - Vendors committed to standards-based, COTS products



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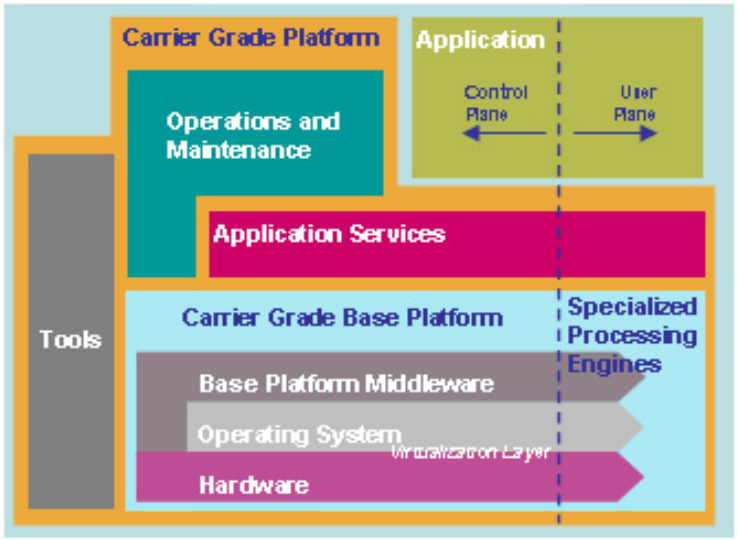
Communications Server Architecture as Defined by SCOPE Alliance

- SCOPE Alliance
  - Founded by leading network equipment providers (NEPs)
  - Encourage and promote open specifications based carrier grade base platforms (CGBPs).
  - Identifies applicable subsets of existing CGBP component standards
  - Publishes profiles defining key content/characteristics of the identified subset standards

SCOPE Alliance Overview
Promoting Open Carrier Grade Base Platforms

SCOPE
Promoting Open Carrier Grade Base Platforms



Scope Alliance Reference Architecture
www.scope-alliance.org
Source: Scope Alliance, redrawn by Motorola

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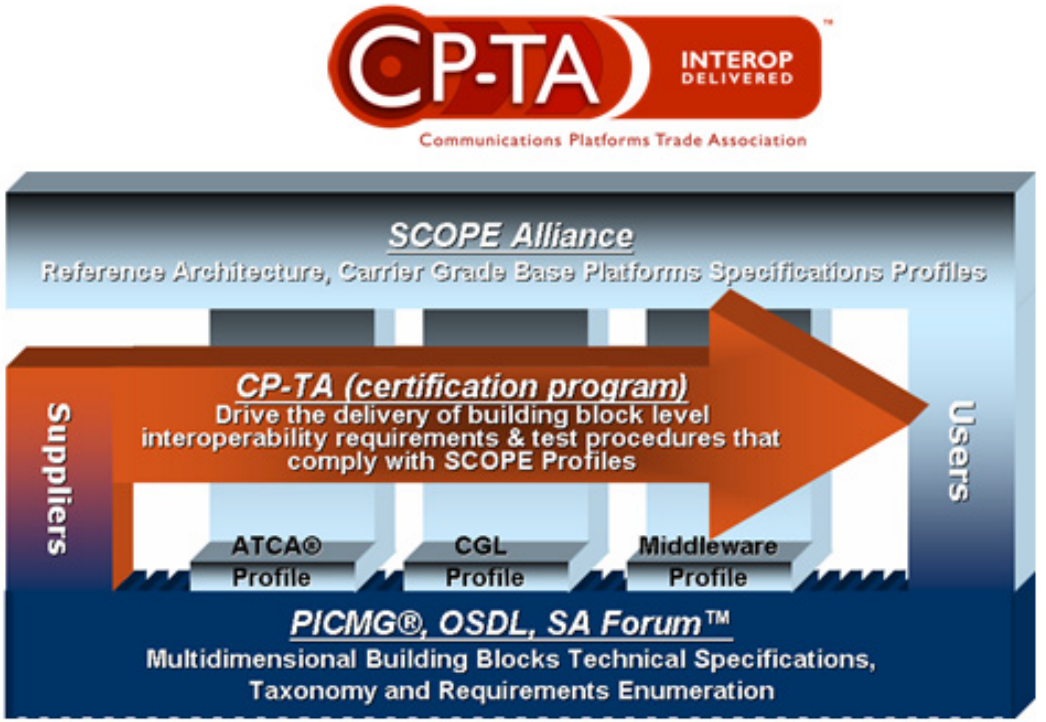
CP-TA – Driving Mainstream Market for Interoperable Communications Platforms

- Enables cost efficient communications infrastructure solutions based on open industry standards
- Complements Standards Development Organizations and SCOPE with profile and certification testing
- Provides objective and consistent interoperability criteria and methodology
- Motorola a Founding Sponsor



Source: Communications Platforms Trade Association

Will ATCA be successful?

- Industry Analysts are positive
- Early adopters are now in volume deployment
  - Early majority phase of technology adoption underway
- Next generation applications provide another potential acceleration point
  - 4G and IPTV are key focus

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Some industry analyst views

- About half of network equipment providers will adopt advanced telecommunications computer architecture (ATCA) in parts of their product lines by 2007.
  - *ATCA Opportunity: Adoption of Computing Architectures in Network Equipment* IDC
- Alcatel, Huawei, Motorola, NEC, Nortel, and Siemens are all committed to port various applications to the new platform, and it wouldn't be a surprise to see Lucent follow suit.
  - — Graham Finnie, Senior Analyst, *Heavy Reading*, and Gabriel Brown, Chief Analyst, *Unstrung Insider*
- Substantial market predictions for ATCA and MicroTCA communications servers and blades
  - IDC: market growing to $8.6B in 2011
    - *IDC: May 2006*

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Early Adopters

- NEC
  - SGSN and GGSN were first applications
  - Over 150 commercial installations already
- Nortel
  - Versatile Service Engine common base platform
  - 5 platforms across IMS and wireless use VSE in 2007 with additional deployment planned
- Alcatel
  - Various SGSN and softswitch wireless applications on common base platform
- Siemens
  - RNC and Media Gateway products available
  - Looking now to extend this Next Generation Telecom Architecture to other applications

NORTEL

Nortel Products Using the Versatile Service Engine

- Nortel Call Session Controller
- Nortel Home Subscriber Server
- Nortel Mobile Switching Center
- Nortel Home Location Register
- Nortel Packet Mobile Switching Center

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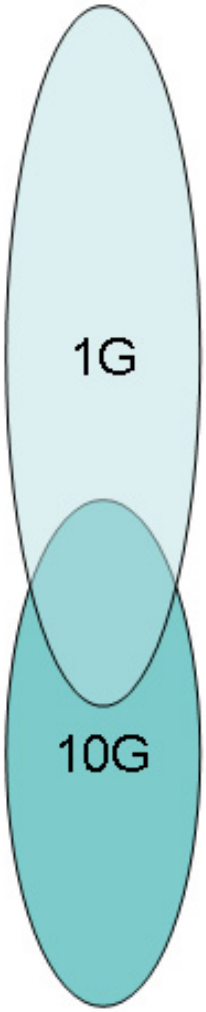
Next generation of applications drive new base platform requirements …



- Wireless infrastructure
  - Radio Network Controller (RNC)
  - Packet core - SGSN, GGSN
- IP Multimedia Subsystem (IMS)
  - x-CSCF, HSS – control plane applications
  - Media gateway (MG), Media Resource Function (MRF)
  - Application Server (AS)
- IPTV
  - Content processing, edge distribution
- 4G Wireless infrastructure
  - All-IP

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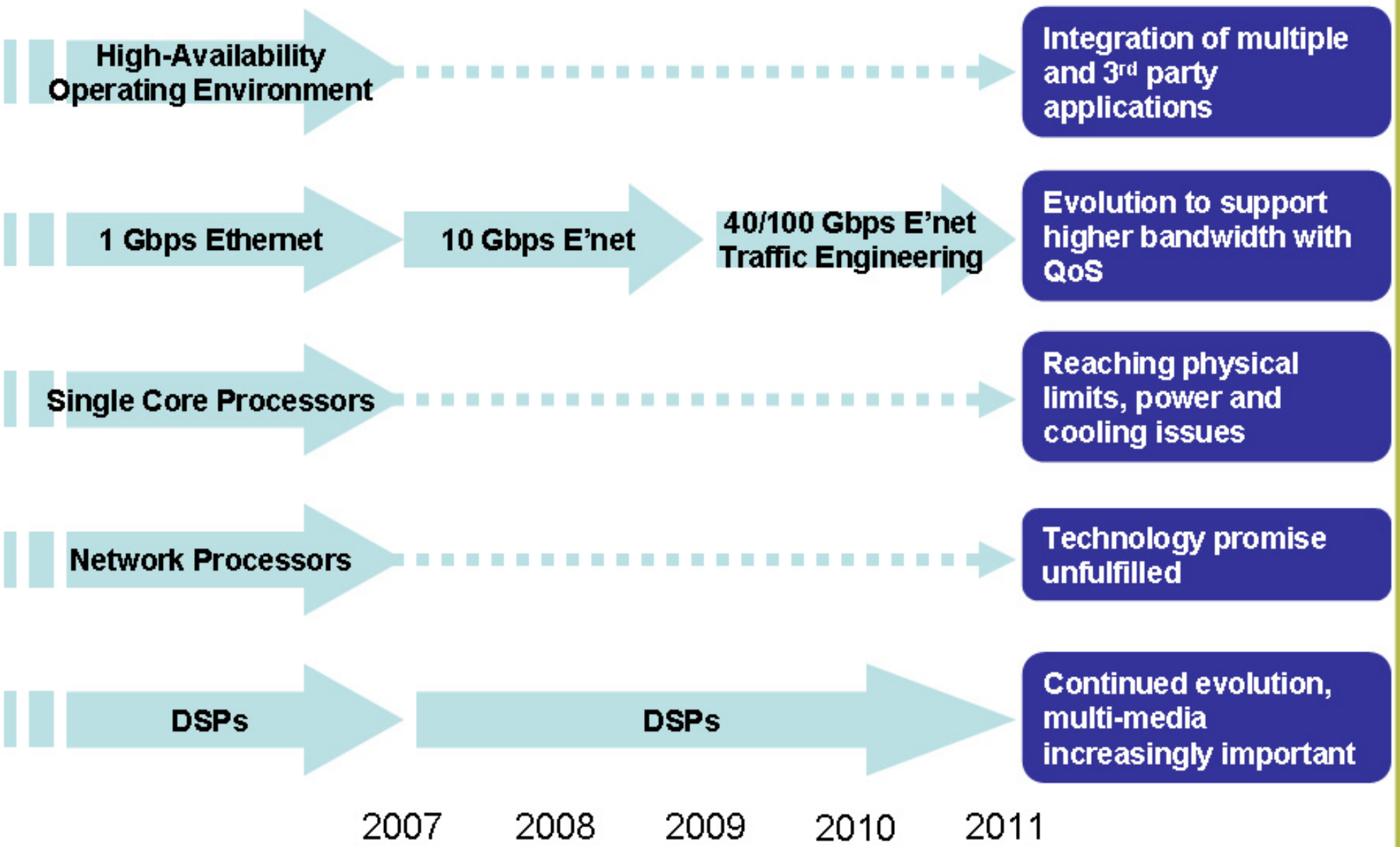
Technology Evolution And Challenges



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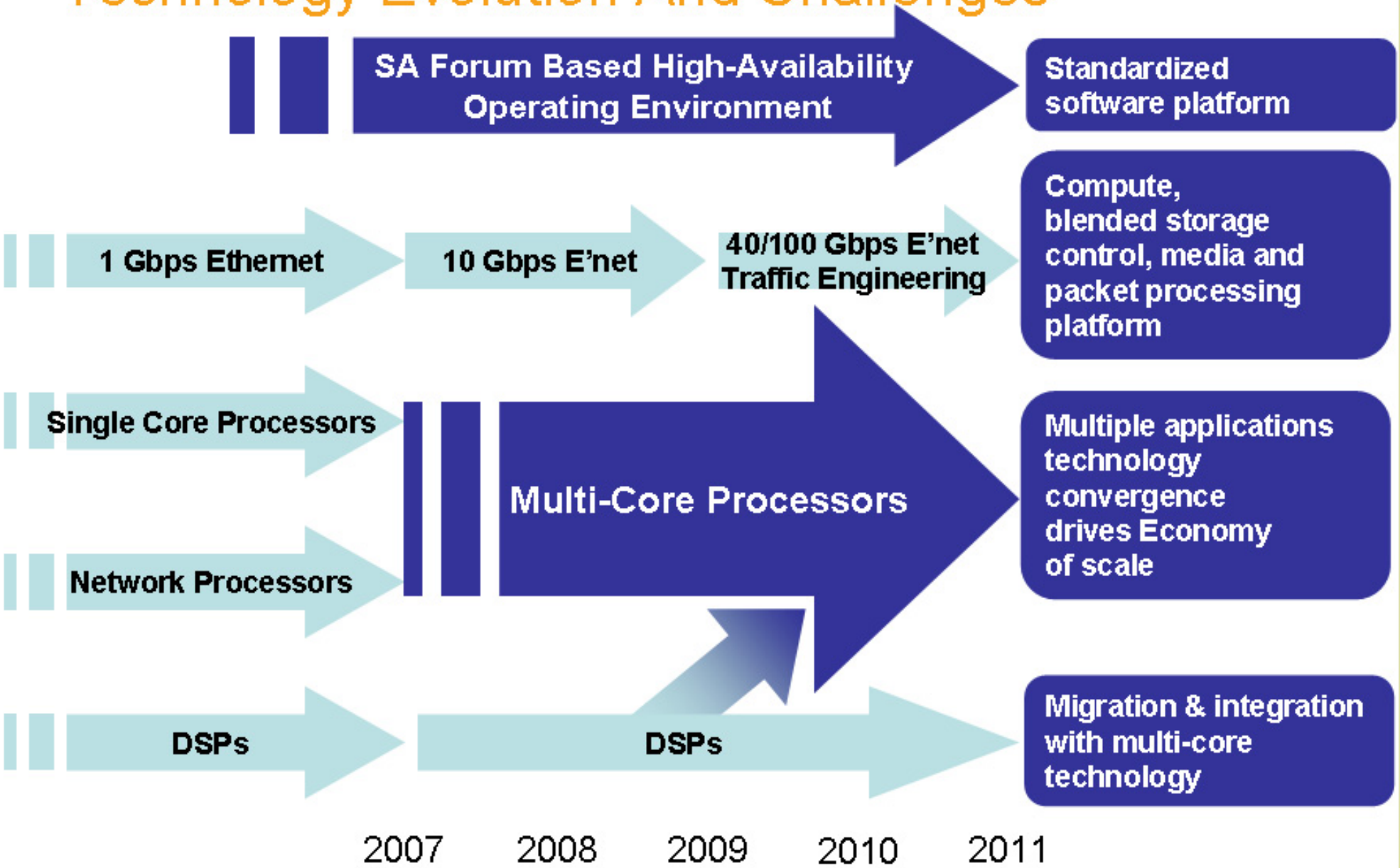
Technology Evolution And Challenges



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What is the future for ATCA-based communications servers?

- Continued technology innovation
  - Increased performance
  - Focused application ecosystems
- Deployment acceleration
  - Breadth of application base
  - Improved price/performance
- Cohesive ecosystem
  - SCOPE Alliance – requirements
  - CP-TA – compliance
- Transition to SA Forum based HA operating environment
  - Application and software vendor coalescence

Delivering:

- **Competitive Advantages**
- **Cost Efficiencies**
- **Investment Protection**

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Conclusion

- AdvancedTCA is already making order out of chaos!
- Technology is established and evolving
- Second generation systems are being deployed
- Challenges are being addressed by the industry
- Next generation applications will further expand rate of adoption

Thanks for listening

Visit www.motorola.com/computing for more information

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Backup Material

Industry Challenges

"The telecom equipment market is changing rapidly, as operators move to introduce new services and suppliers fight to win potentially lucrative contracts, while attempting to limit their investment in research and development."

"The old model … is no longer valid"

"ATCA, AMC, & MicroTCA: The Next Generation"
Heavy Reading, August 2006
Simon Stanley

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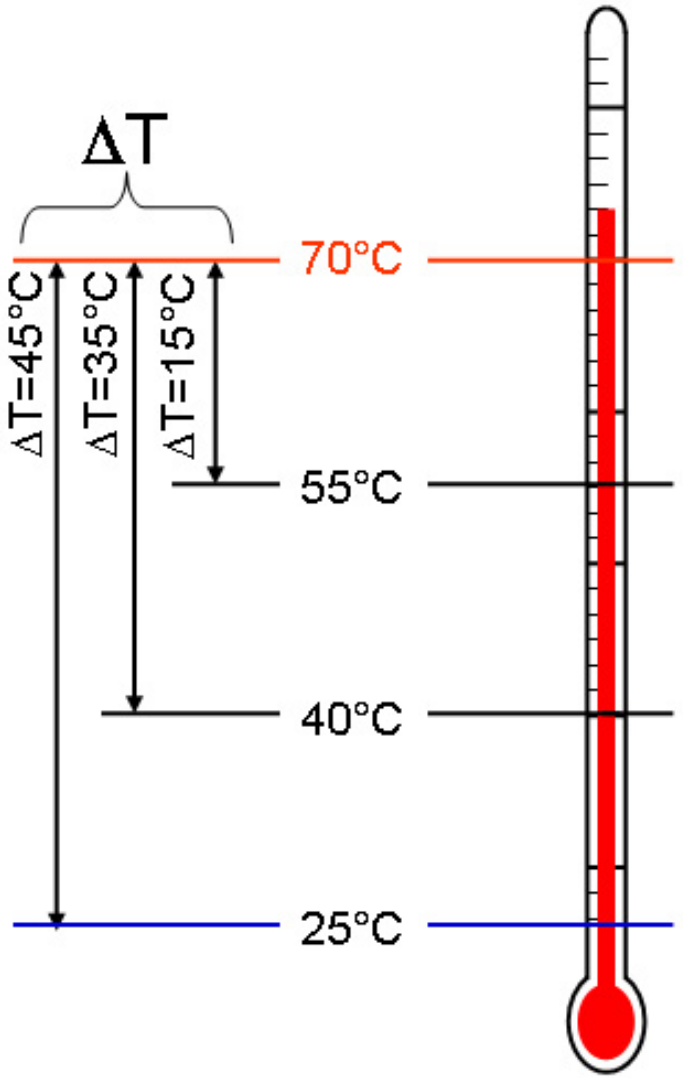
Thermal design challenge



Typical Max Component Operation
- for commercial devices, incl. CPUs

Max Abnormal Operation:
- no fan failure & service interval
- SHOULD operate within spec

Max Normal Operation:
- pass single fan failure tests
- pass service interval tests

Nominal Operation:
- pass acoustic tests
- meet reliability specs