标准化平台构建创新性设计

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日程

- PICMG Introduction
- Status ECT-Market
- COM Express Introduction
- MicroTCA Introduction
- Open Standards in China

PICMG的角色

PCI **I**ndustrial **C**omputer **M**anufacturer **G**roup

– 为基于PCI/PCI Express的嵌入式计算机系统开发公共标准

– 超过 300 个成员的全球组织

PICMG的目标

- 把 PCI /PCI Express标准扩展到工业计算机系统
- 增加产品的可用性，降低成本，提供一种清晰的升级途径
- 开发 *PCI –ISA / SHB Express*标准
- 开发 *CompactPCI* 标准
- 开发 *ATCA/MTCA* 标准
- 开发 *COM Express* 标准
- 具有软件兼容性

Trend towards Outsourcing

- Make vs Buy **è** Make & Buy
- 2006 – 2011: CAGR > 15%

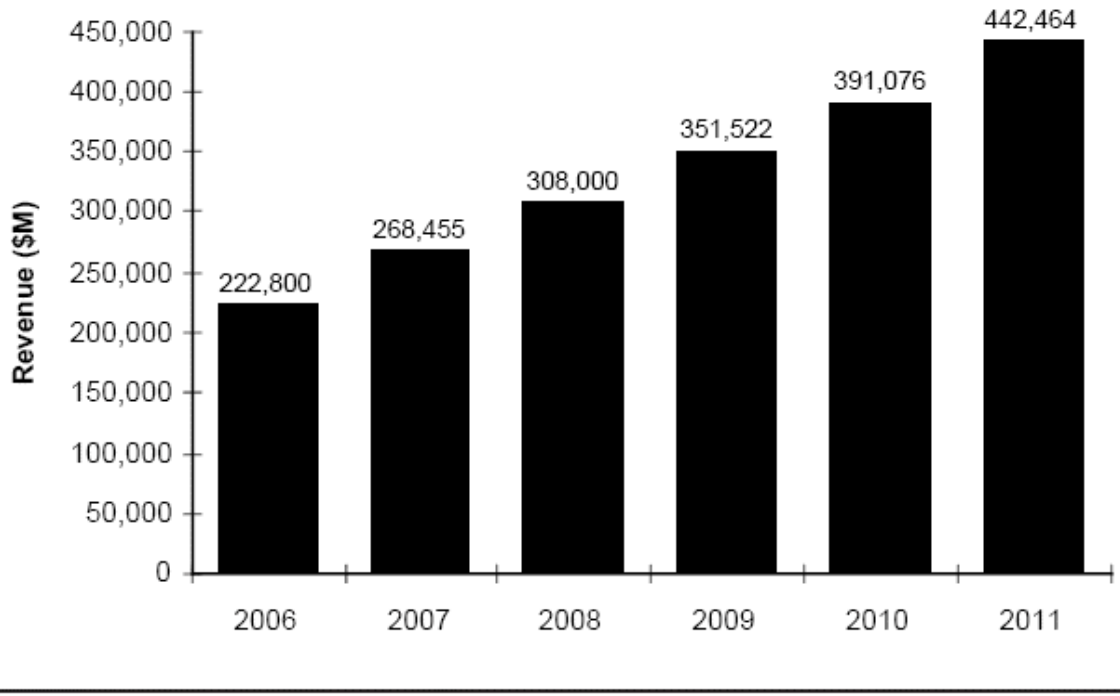


Figure 2-1 The Worldwide EMS Market, 2006–2011

EMS = Electronic Manufacturing Services

Source: Electronic Trend Publications, 2007

ETC - Trends & Drivers

INFOTAINMENT – 3G Graphic replacing mechanical

ENERGY – Optimizing through ECT

AUTOMATION – Continue with Outsourcing

TELECOM (ATCA) – ATCA Standard defined by PICMG

MEDICAL – Cost Savings in Digital Health Care

GOVERNMENT – Cost Savings by Standard ECT (COTS*)

* Commercial Off The Shelf

Market Trends of ECT

Table 2-2 Bus Architecture Summary Forecast, 2007–2012							
	2007	2008	2009	2010	2011	2012	CAGR (%)
Revenue by Architecture ($M)							
PCI	699.2	697.4	695.5	693.7	686.7	679.8	–0.6
cPCI	1,207.0	1,259.9	1,315.8	1,375.1	1,357.2	1,314.5	1.7
ATCA	242.1	306.0	391.5	497.6	637.6	776.0	26.2
VMEbus	872.9	931.0	1,047.6	1,194.6	1,309.2	1,466.6	10.9
PMC	266.9	284.2	302.6	322.2	315.8	309.4	3.0
AMC	46.8	70.4	105.9	159.2	238.8	334.3	48.2
PC/104 & Motherboards	773.7	863.6	965.1	1,079.5	1,207.9	1,352.3	11.8
COM	315.9	387.0	484.7	623.0	773.6	918.1	23.8
Other	551.6	599.6	651.9	708.7	765.4	826.6	8.4
Total	4,976.1	5,399.0	5,960.5	6,653.5	7,292.2	7,977.7	9.9%

- 2007 - 2012: CAGR ~ 10%

Source: Electronic Trend Publications, 2008

Traditional Requirements

- System Stability – 系统稳定性
  - Always be stable for several-year running
- System Reliability – 系统可靠性
  - Always facing rigorous environment
  - Always be a reinforced equipment
- System Thermal solution –系统的散热解决方案
  - Always facing wide range temperature
  - 90% systems need thermal solution without Fan
- Product Life Cycle Management – 产品的长生命周期管理
  - Always needs long life cycle, up to 10 years
  - Critical Life Cycle Management to meet Quality Requirement
- Service and Support – 产品的技术支持和维护
  - Always needs RMA and Technical Support, up to 10 years
  - Even System has been end of life after several years

New technology trends

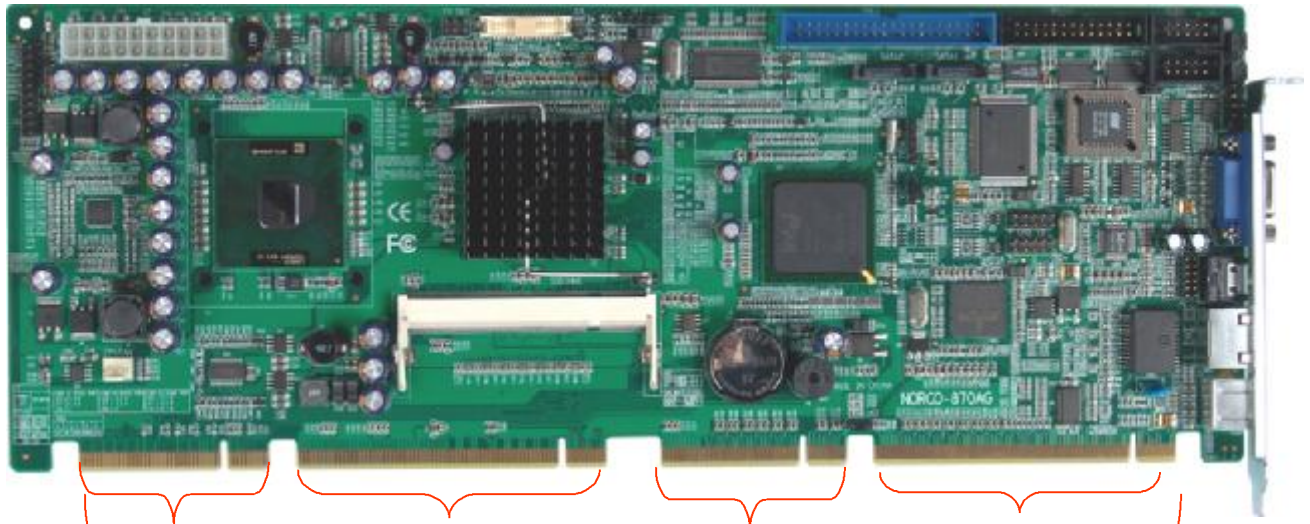
Item	Past Tech	Current Tech	Tech in future
CPU	Single Core	Dual-Core	Multi-Core
Memory	EDO / SDRAM / DDR	DDR2	DDR3
Peripheral	ISA / PCI	PCI-E 1.0	PCI-E 2.0
Network	10/100M	1000M/GE	10GE
Storage	IDE SCSI	SATA / SATA II SAS / FC	-- SAS / FC
Module	PC104/+ ETX	COM-Express Type 1/2/3	COM-Express Type 3/4/5
System	PCI / CPCI	SHB-Express MTCA	MTCA

PCI-Express Overview

- PCI Express是Intel于2002年正式发布的
- PCI Express: 可理解为串行PCI
  - 互连的基础是虚信道
  - 它以4线方式　每个方向2根差分线　提供2.5Gbits/秒的LVDS连接
  - 可使用的带宽是每方向每虚信道2Gbps
  - 通道可合并成X2　X4　X8　X16和X32速以提供额外的带宽　最大双向带宽为128Gbps
- PCI Express还有一个改进: 连接方式
  - PCI Express采用的是点对点连接方式
  - 每个设备在传输时建立自己的传输通道　对于其他设备这个通道是封闭的
  - 保证传输的质量和速度

符合PICMG 1.3规范 全长CPU卡

SHB Express â

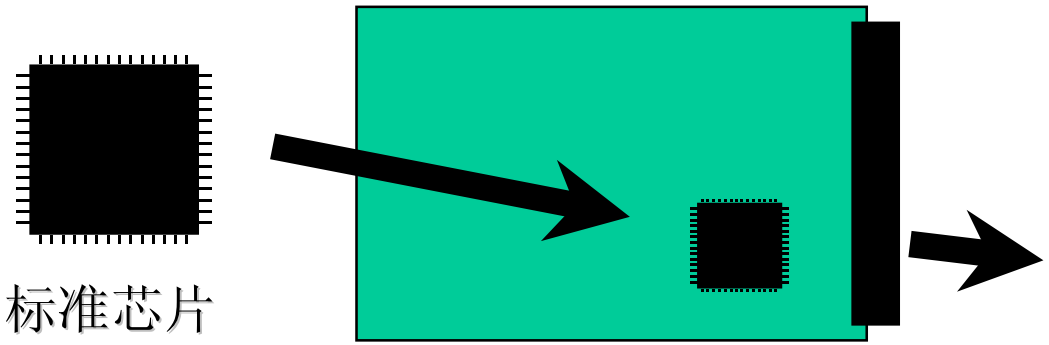


A: PCI　B: I/O(USB,SATA...)　C: PCI-E*　D: PCI-E*

全新的PICMG 1.3总线

基本思想　把PCI bus 应用于工业环境

定义　基于现有的 PCI 总线技术来制造满足工业环境要求的　具有无源背板结构的　计算机系统的一系列标准化的解决方案



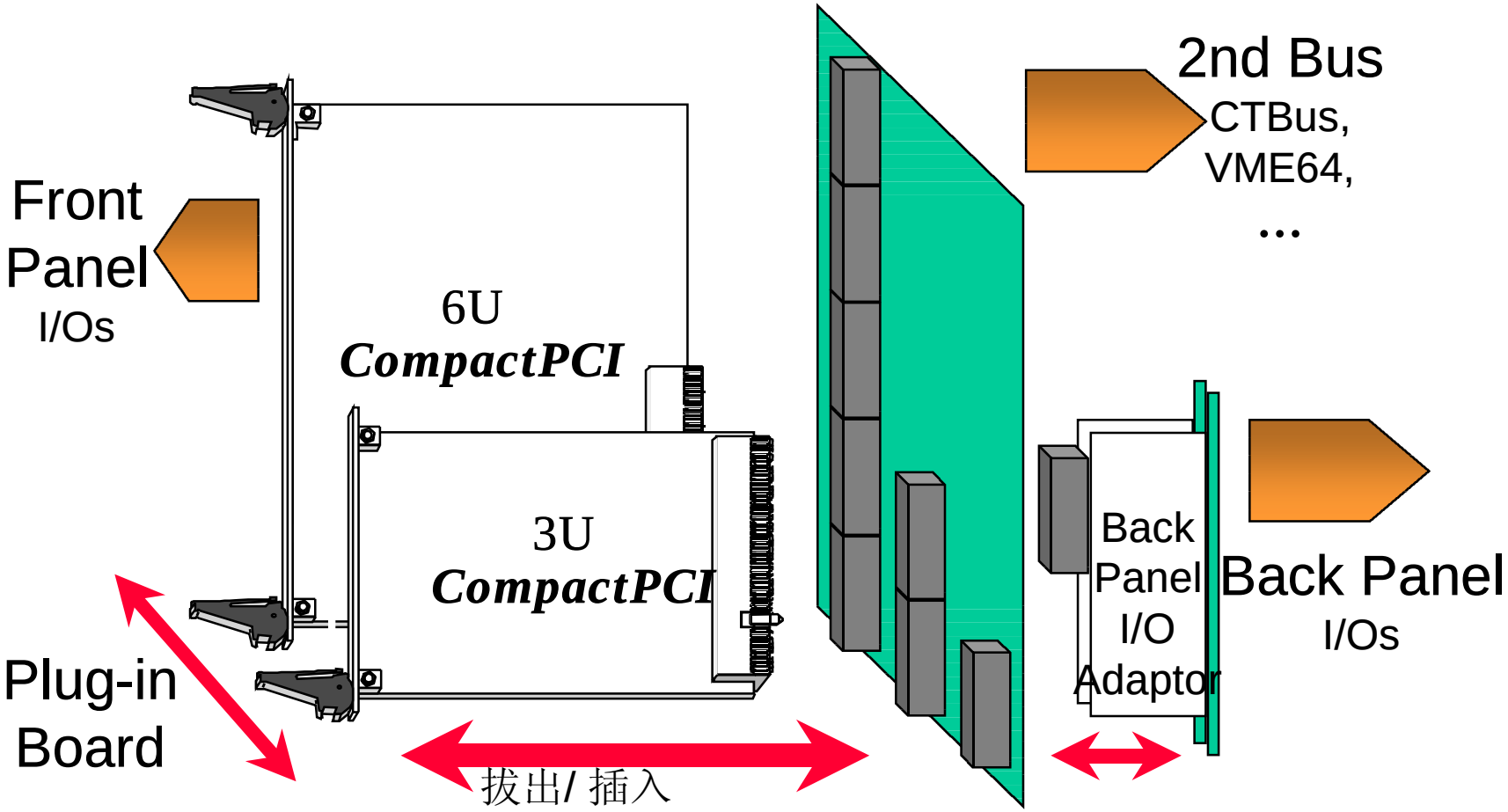
CompactPCI 板

CompactPCI 系统

CompactPCI 的特点

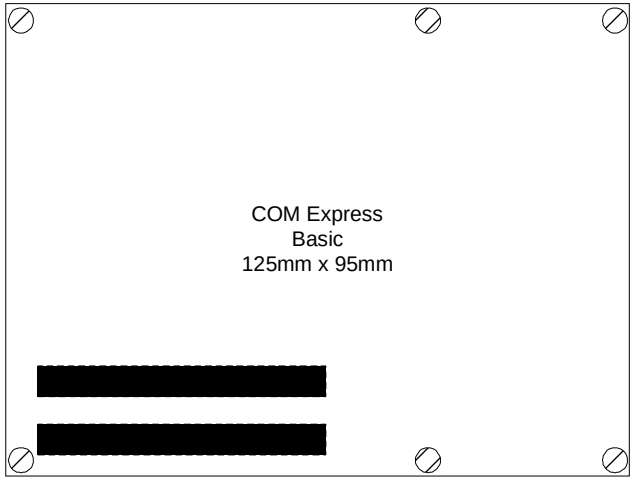
- 33 /66MHz PCI 性能
- 32 / 64-bit 数据传输宽度
- 基于3U (100 mm X 160 mm)或者6U (233.35 m m X 160 mm)的欧洲板卡尺寸
- 每个总线段 8 槽无源背板结构
- 前面板具有易于拔插板子的推入/退出机构
- 采用一种标准的 2mm CPCI 连接器
- 更适合具有冲击和振动的严酷环境
- 提供了扩展系统的大量机会
- 与 PCI 总线完全兼容 – 确保软件兼容性

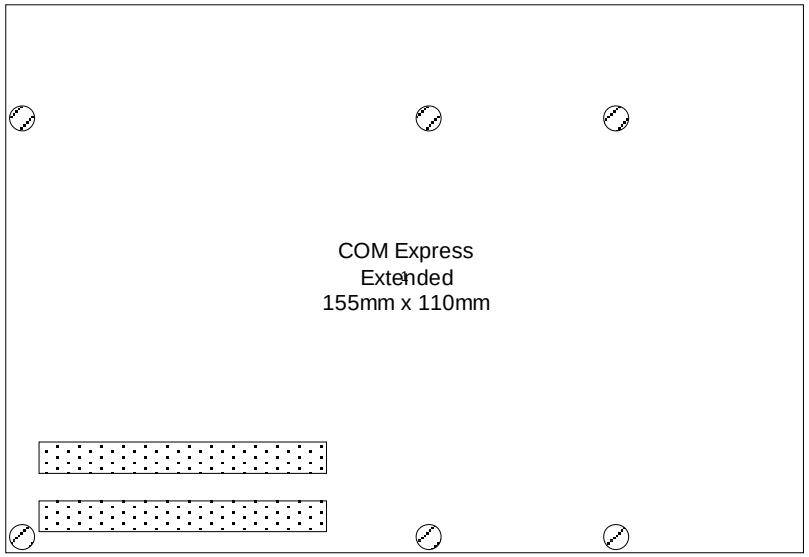
CompactPCI 所有部件一览



COM Express Overview

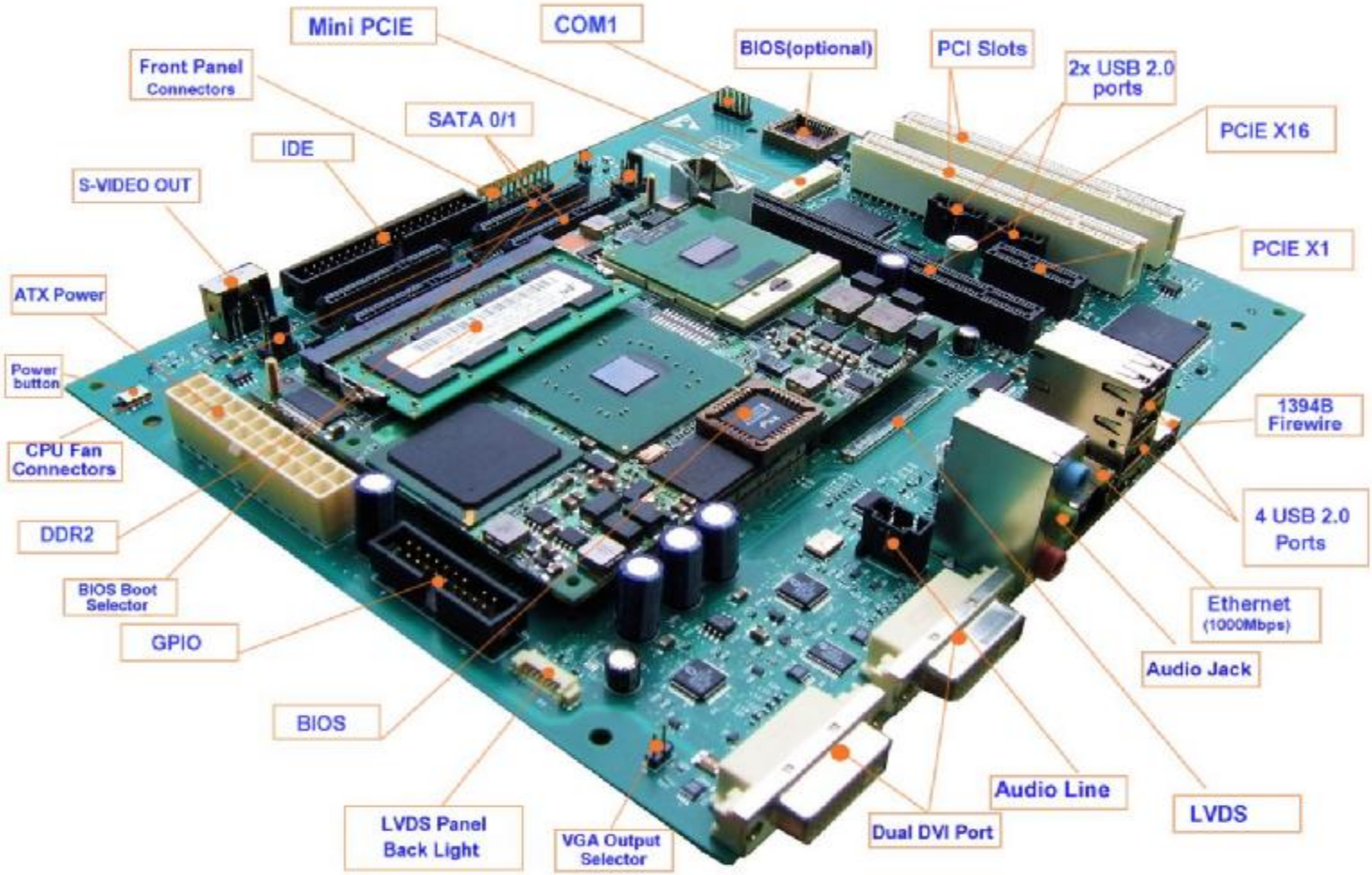
- Released by PICMG
  - First Industrial Standard for Module
  - Compatibility: Module and Carrier
- Key Features
  - Optimized for Modular Processor
    - CPU / North / South Bridge (GMCH / ICH) /Memory / FWH / GE .etc
  - Basic & Extended Sizes
- Target Markets
  - Defense
  - Medical / Test & Measurement
  - Automation / Industrial
  - ……





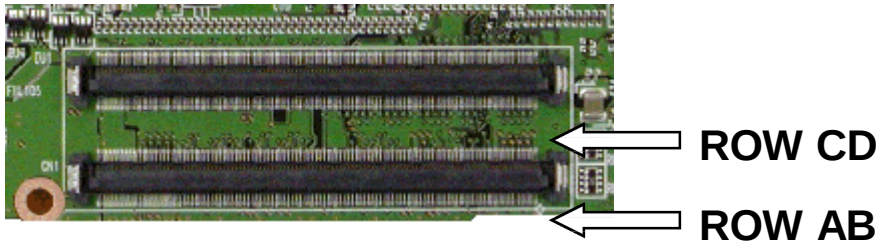
Typical COM-E Module and Carrier

COM Express



Board-to-Board Interface Connectors

COM Express



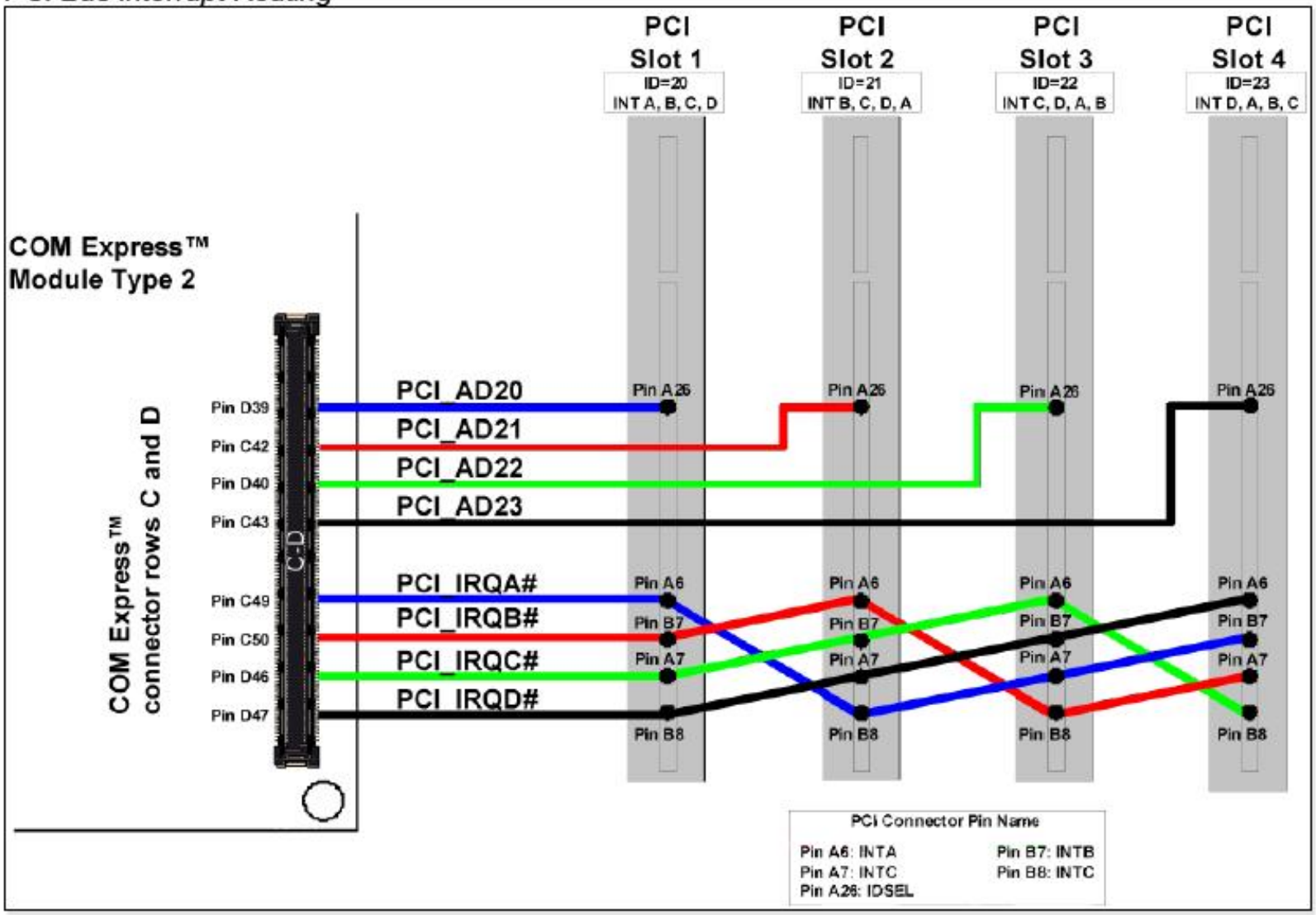
- COM Express
  - Two rows of 220 pins each
  - Row AB is required
    - PCI-E, SATA, LVDS, LPC bus, system & pow er management, VGA & TV_Out, LAN, .etc
  - Row CD is optional
    - Provides PCI, IDE and additional PCI Express, SDVO, LAN, .etc
  - 8mm and 5mm total stack-height options
  - Rated up to 6.25GHz performance

COM Express: 5 Module Types

	Type 1	Type 2	Type 3	Type 4	Type 5
	Same as Type 2 Except		Same As Type 2 Except	Same As Type 2 Except	Same as Type 4 Except
Connector	AB Only	AB CD			
Display		DVI, Dual 24-bit LVDS, Analog VGA, TV Out, SVDO			
Audio		AC'97, Speaker Out			
Storage	No IDE	(1) IDE Port, 4 Serial ATA Lanes	No IDE		No IDE
Networking	(1) 10/100/1000 Ethernet Interface	(1) 10/100/1000 Ethernet Interface	Up to 3 Gig E Ports, 10 GigE Option		Up to 3 Gig E Ports, 10GigE Option
Expansion	Up to 6 PCI-Express Lanes	Up to 22 PCI-Express, 32Bit PCI, Up to 8 USB 2.0, Up to 2 Express Cards		Up to 32 PCI-Express, No PCI	
Other	120W Max Input Power	188W Max Input Power, +12V Supply, +5V Standby, 3,3V RTC Supply			

PCI Bus兼容

PCI Bus Interrupt Routing



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COM Express的应用

工控

成熟的市场, 但仍预期有成长
- 更广范围的工业自动化
- 更有效的操作流程
- 对小尺寸规格的需求不断增长
- 工厂内对局域网的采用
- 工厂联结到互联网

- VDC (2004), Intel

数字监控

"数字安全监控 (DSS)
- 33% 预期增长在 '03 &'07
- >1.3M单位的出货量在2006

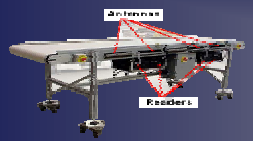
-A&S Buyers Guide 2002, Intel

零售

"高端POS: 15% 的增长率在2006
自助终端: 超过 $1B 的业务会通过自助终端交易在2006
Kiosks: 17% CAGR
- IHL Consutling Group 2004, Intel

医疗

"美国的医疗机构的IT 支出会从2002年的 $15.1B增长到2007年的$17.3B."
- Rotbert Law Group, LLC and ITAA; April 9, 2004



RFID

"沃尔马上个星期宣称计划要求其100大供应商在2005年2越之前　其货物上必须提供RFID标签,这是一项促进更大范围内RFID技术应用的举动　" - Computerworld, June 16, 2003

"先期使用者正在从RFID技术中受益, 并且该技术所带来的好处将使得他们能够在市场中保持一个相对有利的位置　　- RFID Journal, "March 3, 2005

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Summary

COM Express

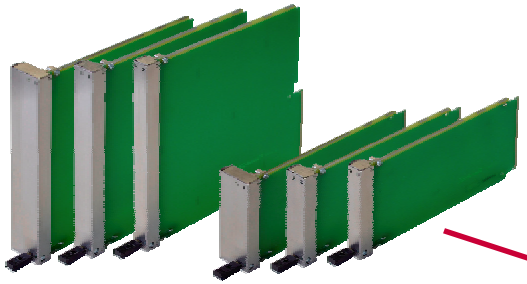
- COM-E: The RIGHT selection for Module
  - COM-Express is the first industrial standard specification fro m PICMG
  - COM-Express provides kinds of Next-Gen technology and g ive up several fatal limitations
  - COM-Express provides 5 types for kinds of apps

什么是 MicroTCA?

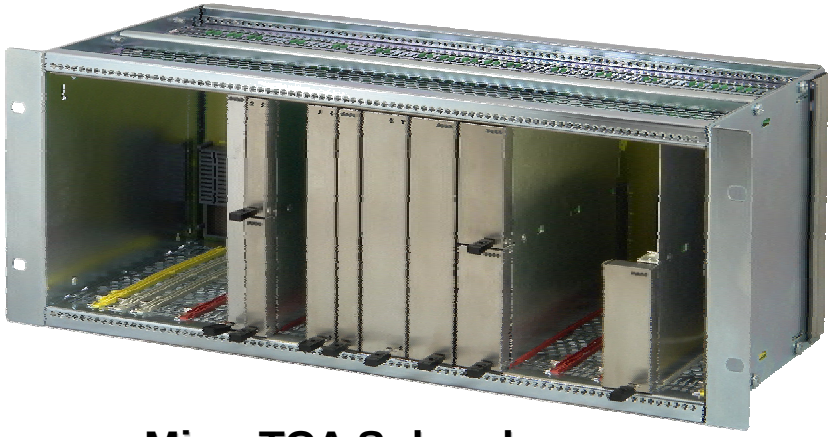
AdvancedTCA标准即先进的电信计算平台,简称ATCA 是为下一代融合通讯及数据网络应用提供一个高性价比的 兼容的 并可扩展的硬件构架 同时以模块化结构的形式呈现 以支持符合现代传输需求的科技或应用 ATCA标准由一个核心规范 PICMG3.0和一系列辅助规范组成

MicroTCA是ATCA的补充 作为一个通用平台服务于电信与企业计算机网络设备 以及其它市场 MicroTCA架构满足了低成本和小尺寸的应用 它们具有较小的容量 性能和可用性要求 MicroTCA保留了许多ATCA的重要设计思想 包括交换互连拓扑与系统管理结构 MicroTCA是一个模块化标准 在机箱中可以配置多种类型AMC夹层卡 以一种高效率 低成本和可管理的方式 轻而易举的实现种类丰富的应用

AMC in MicroTCA Systems



AdvancedMC Modules



MicroTCA Subrack

The Advanced Mezzanine Card is plugged directly into the MicroTCA Subrack or System

A MicroTCA system must provide the same Management, Fabric Switching, Clock Distribution, Power, Cooling, and Mechanical resources that are provided by an AMC Carrier installed into an ATCA shelf…

MicroTCA 的特点

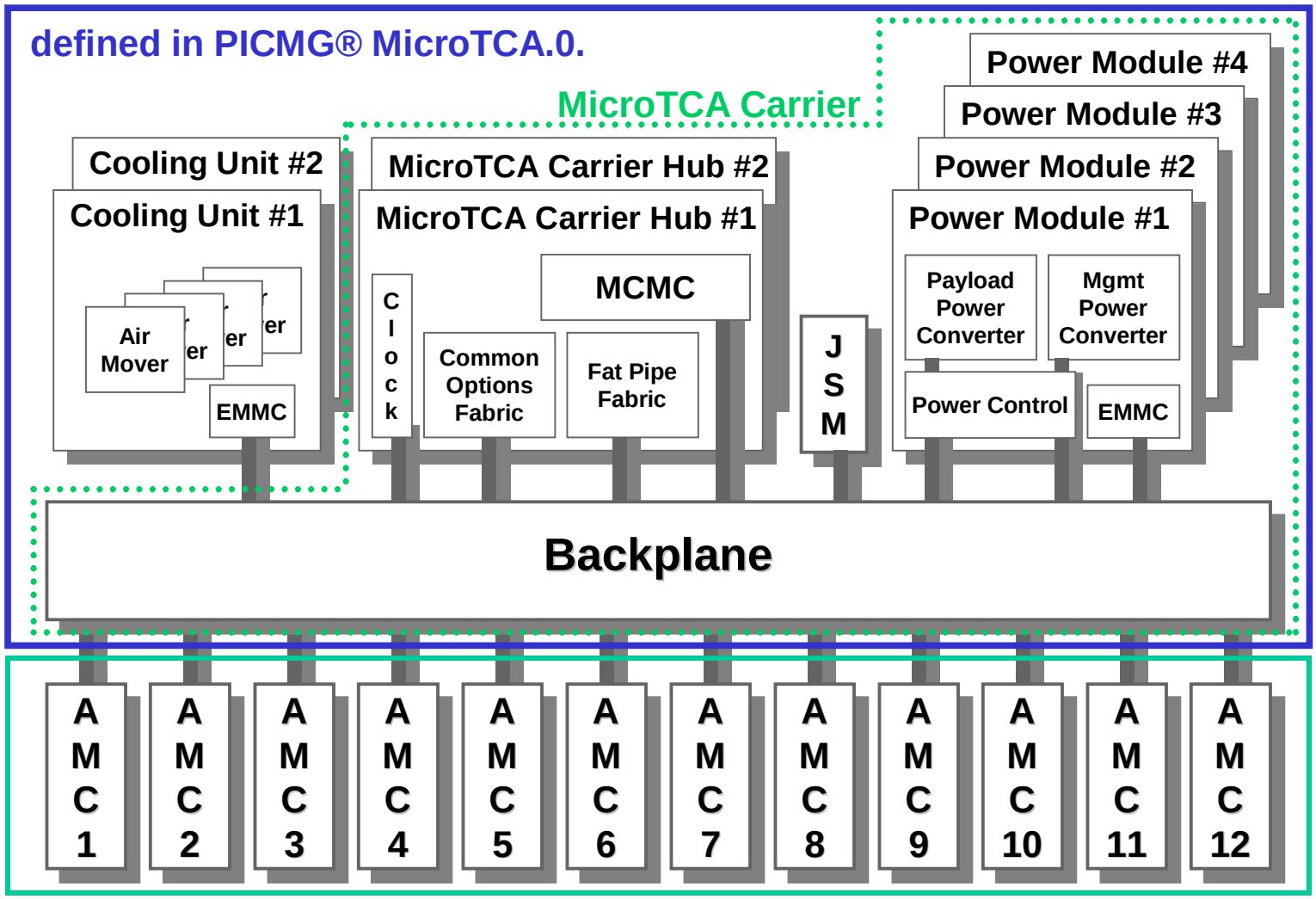
- 支持3.125Gbps LVDS 差分信号，高达 40Gbps 接口，2.5Tb/s 背板带宽
- 单星　双星　全网拓扑形式
- 可靠性能高达99.999%
- 优异的系统可管理性
- 支持所有类型的AMC模块
- 可选支持热插拔的Virtual Carrier
- 可选冗余的配置
- 工业标准的软件支持

MicroTCA 带来的好处

- 缩短开发时间，以便快速部署新服务
- 支持用户自由选择最佳COTS构建模块， 进而促进创新和提高灵活性
- 降低库存和启动成本 – 减少初始资本投资
- 降低开发成本 – 开发系统不再需要专用硬件
- 降低部署成本 – 软件安装
- 降低备件成本 – 硬件可用于执行多种功能
- 降低维护成本 – 系统配置标准化后，维护工作更容易进行，而且还降低了培训成本

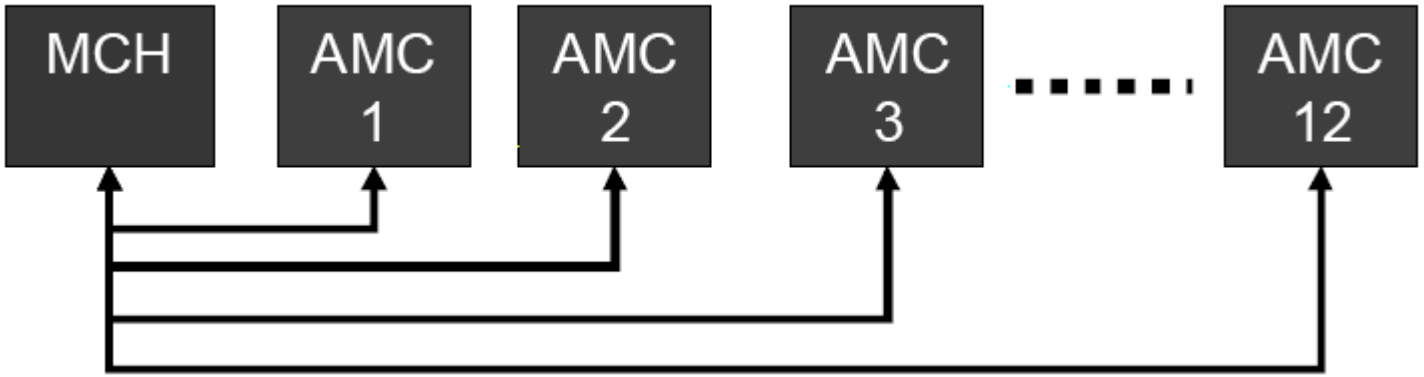
现有的专有解决方案正在向MTCA迁移　以充分利用基础模块解决方案的标准化和不断提高的可用性　MTCA标准旨在使客户能够快速　无缝且低成本转变其应用

System Architecture of MicroTCA

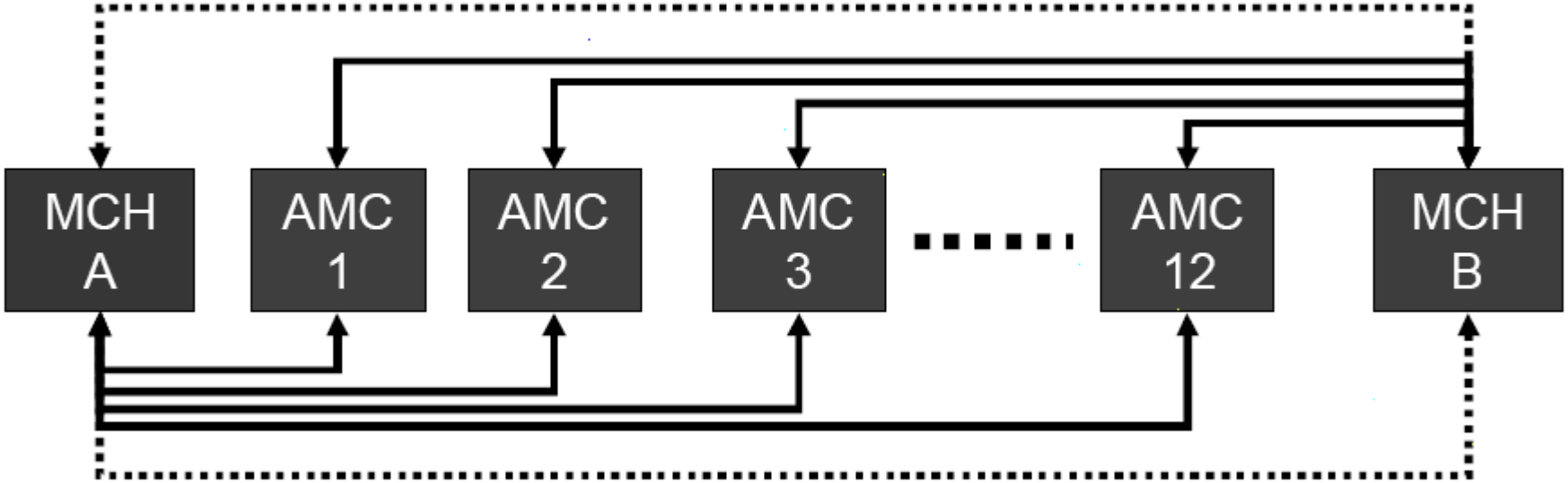


The AdvancedMC Modules are defined in PICMG® AMC.0.

System Architecture of MicroTCA

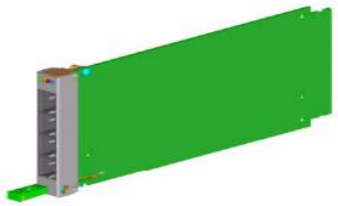
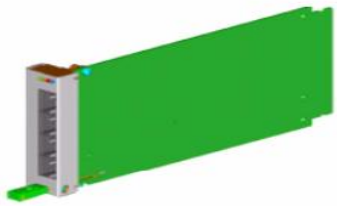
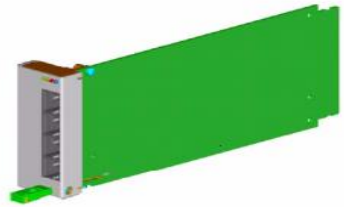
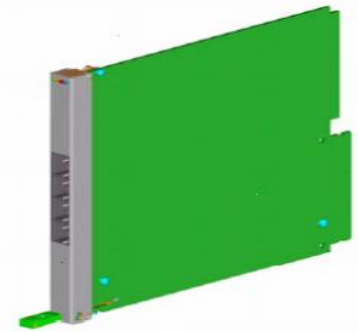
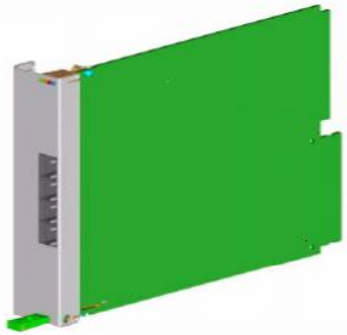


以MCH为中心的单星交换结构



以MCH为中心的双星交换结构

AMC Modules

	Compact-Size (3HP)	Mid-Size (4HP)	Full-Size (6HP)
Single modules	 73.8x13.88x181.5mm	 73.8x18.96x181.5mm	 73.8x28.95x181.5mm
Double modules	 148.8x13.88x181.5mm	 148. 8x18.96x181.5mm	 148. 8x28.95x181.5mm

AMC.0 R2.0 ->

Single Compact = 24 W

Single Mid-size = 30 W

Single Full-size = 48 W

Double Compact = 48 W

Double Mid-size = 60 W

Double Full-size = 80 W

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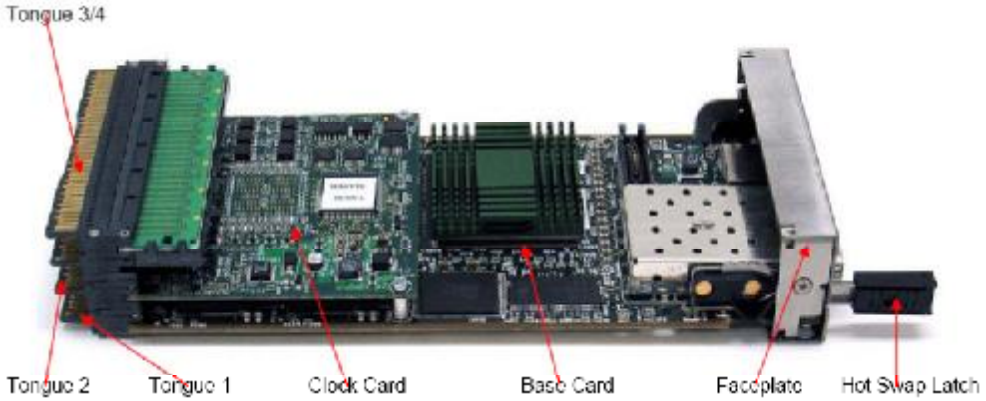
MCH Module

As MicroTCA doesn´t use a Carrier board, the management, clock distribution and switching functionality must be realized onto another device

-> the **MicroTCA Carrier Hub (MCH)**

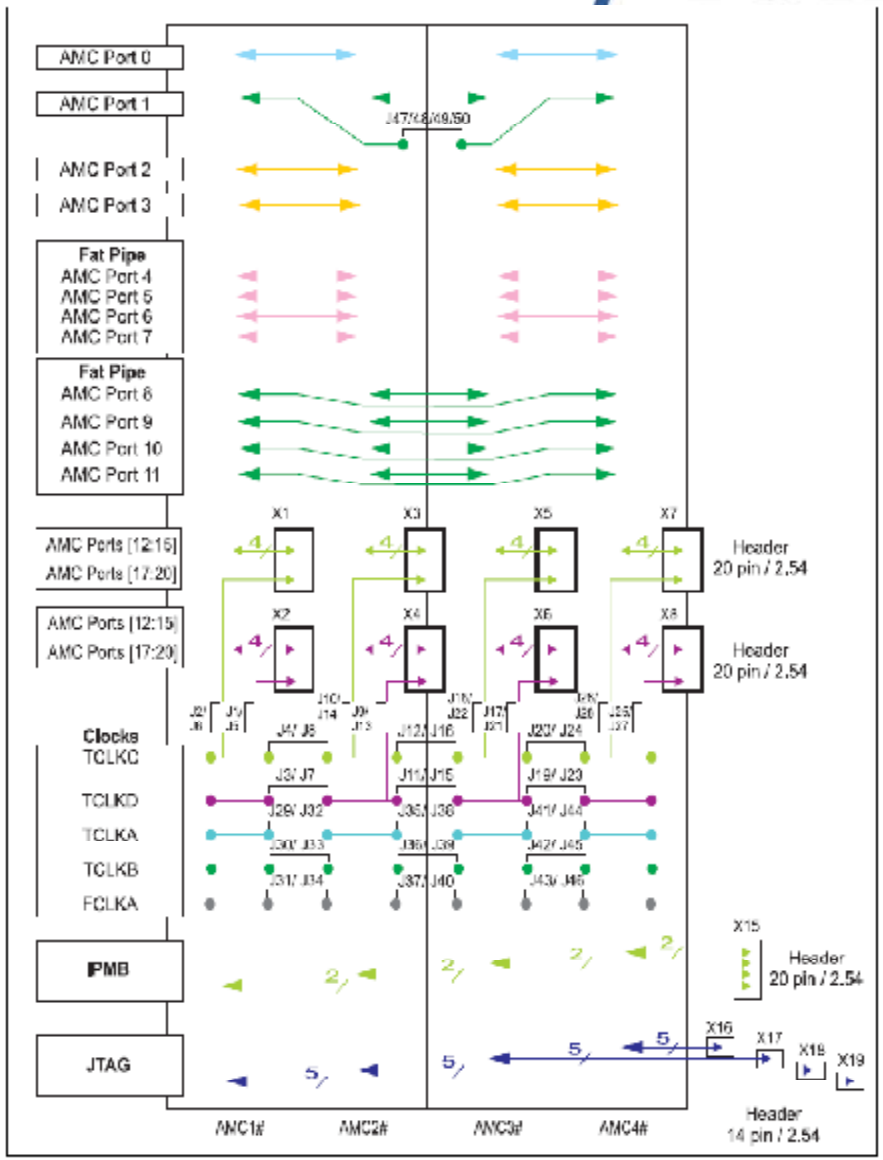
- **Switch functionality** (common options, fat pipe)
- **Management Controller** (Carrier management, optional: Shelf- and Systemmanagement)
- **Clock distribution / generation**
- **JTAG slave / master**



MCH-less MicroTCA

无MCH单元
装配通用ATX电源
背板点到点Fabric通道
时钟分配通过跳线选择
支持标准AMC模块

- AMC test system, Schroff



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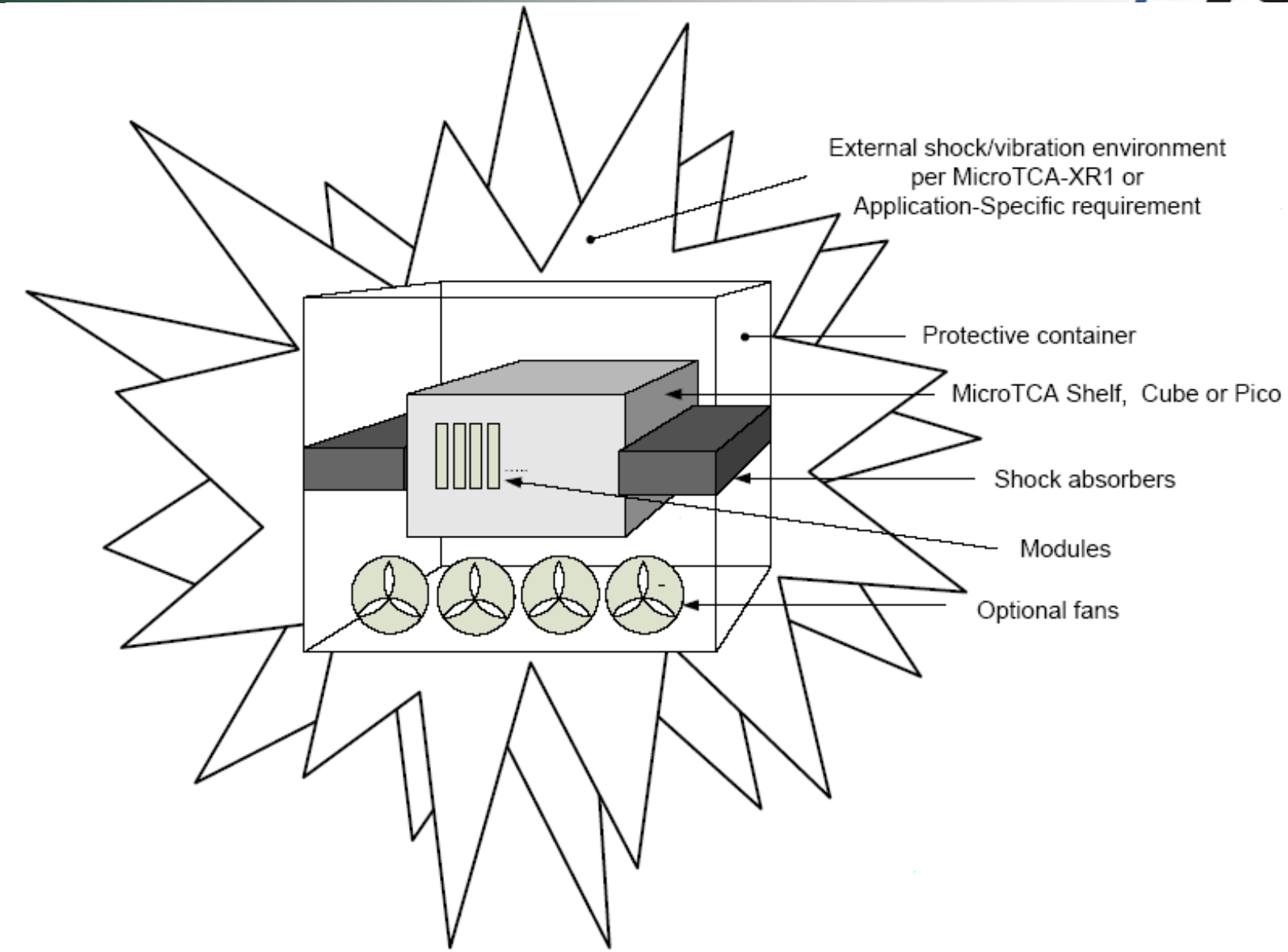
Rugged MicroTCA Overview

Intended Applications		Reference	Class	Description
0	**MicroTCA.0** Commercial Telco-centric	IEC 61587-1	DL1	Low level of shock and vibration. Fixed applications at power stations and general industrial applications (class 3M3 per IEC 60721-3-3).
			A1 (E)	Industrial Atmosphere. Moderate concentration of harmful substances, general industrial use with low chemical emissions (enclosed spaces) and concentrations per IEC 60654-4.
			C1	Climatic. Enclosed spaces without particular stresses (office, lab) with temps. between -10°C and 55°C at 20%-80%RH, non-condensing.
		IEC 61587-2	Seismic	Test requirements per IEC 61587-2 Waveform A (Zone 4).Test set up in a rack per ANSI T1.329.
		GR-63 and ETSI	Altitude	NEBS and ETSI differ. Range to be defined by application.
XR1	**MicroTCA.1** Commercial	IEC 61587-1	DL3	High level of shock and sinusoidal vibration. Mobile applications subject to high stress, heavy rotating machinery, ships (class 3M7 per IEC 60721-3-3).
XR2	**MicroTCA.1** Commercial	ANSI/VITA 47	V2	Higher level of random vibration.
XT1L	**MicroTCA.1** Commercial	IEC 61587-1	C3 (Limited range)	Extended MicroTCA.1 Shelf, Cube, Pico System operating between -40°C and 55°C.
			Altitude	Range to be defined by application.
XT1	**MicroTCA.1** Commercial	IEC 61587-1	C3	Extreme MicroTCA.1 Shelf, Cube, Pico System operating between -40°C and 70°C.
			Altitude	Range to be defined by application.

Mechanical


External shock/vibration environment
per MicroTCA-XR1 or
Application-Specific requirement
Protective container
MicroTCA Shelf, Cube or Pico
Shock absorbers
Modules
Optional fans

MicroTCA的应用

Communications

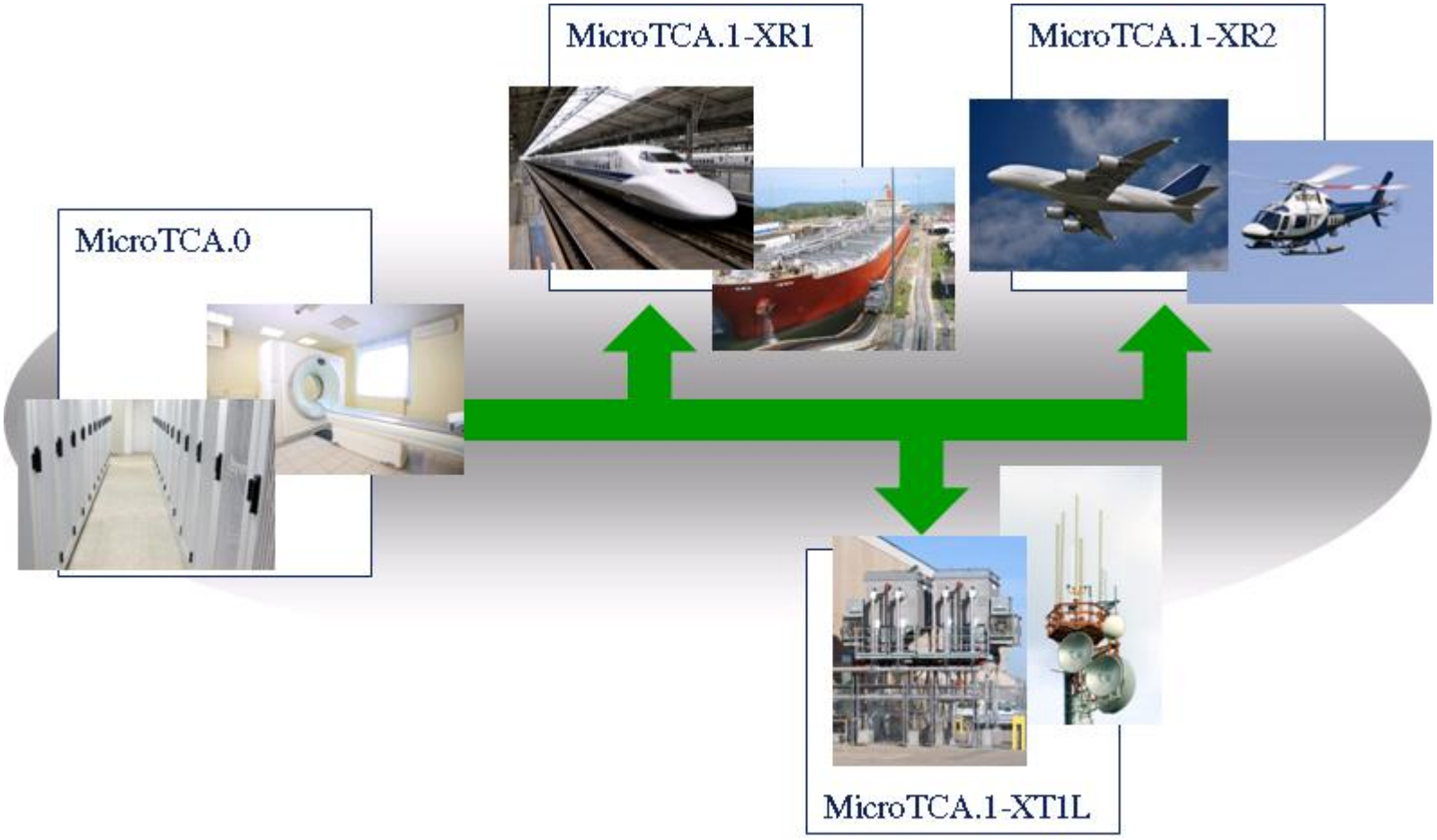
incl. government, professional radio, avionics and military

Industry

Medical

First projects starting (multiprocessor systems for motion control and image processing)

Rugged MicroTCA 的应用



Images from www.dreamstime.com, used with permission.

Summary

- PICMG specifications are amongst the best in the EC T industry
- CompactPCI has still a long life to come
- ATCA has reached stabilization
- MicroTCA is the next ‘super’-standard
- *“**AdvancedTCA and MicroTCA** are far more than just the most exciting things to h appen in the board business since VME. They are, in fact, **the most important devel opments ever**. For the first time, we have a complete ecosystem of customers and ve ndors working together to specify, implement, and apply the new technologies.”*

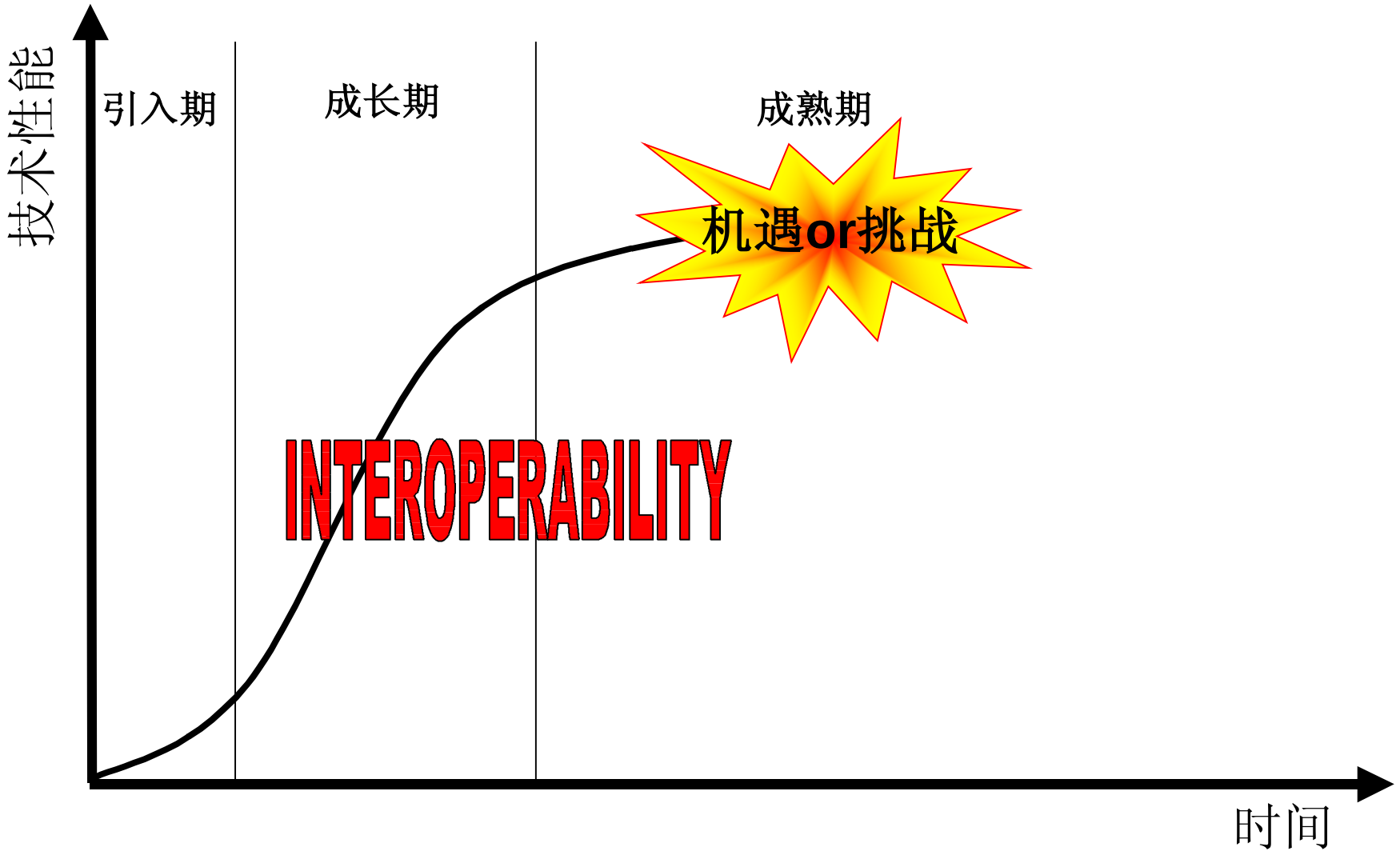
  -- Lars Johan Larsson, MODT AB

开放标准的技术特点

	专用体系	开放标准
所期望的需求	已知的	逐渐出现
变化范围	窄	宽
生态系统演进	慢	快
知识产权	技术所有者自身	所有创新者
商业模式	稳定	渐进
参与者	很少	很多
竞争力	短期	长期
使用情况	量身定制	通用

在技术发展一日千里的今天　开放标准已是大势所趋　唯有开放标准才能成为新的行业主导技术为业内所有利益关系人带来最大利益

开放标准对中国企业的影响



开放标准对中国企业的影响

- 增加兼容性和互联性
- 使更多的成员分享信息
- 吸引更多的用户使用
- 减少用户面临的技术风险
- 加速技术的普及
- 改变竞争的性质:

  竞争的焦点从争夺市场统治地位转向争夺市场份额

  从功能转向价格

  从系统转向组件

开放标准对中国企业的影响

面对开放标准的可行策略

- 不改动　**You may ignore specifications and standards unless they are regulatory**

- 新设计延续老产品的技术参数　在产品更新换代的规划中注意连续性　**You may not participate in a specification or standardization process, yet decide to offer compliant product once the specification or standard is published**

- 战略转移　抓住突破性技术机会实施超越　**You may participate in the specification or standardization process and gain invaluable inside knowledge of the compromises reached**

谢谢