



Continuon™— Beyond High Availability NEBS Blade Server

White Paper

On the Innovations in the Continuon™ Product Family by I-Bus

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Beyond High Availability NEBS Blade Server

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1 What is an ideal Blade Server System?

1.1 Industry Requirements

A high availability system that has the following characteristics:

- **Simplicity:** open architecture and compliance with Federal and Telcordia generic requirements and design quality standards (Telcordia, ITU-T, UL/CSA, NEBS, etc.)
- **Density:** highest density with smallest form factor
- **Performance:** maximize the processor utilization and bus speed
- **Reliability:** lowest MTBF without any single point of failure
- **Serviceability:** lowest MTTR and ease of service and support
- **Maintainability:** ease of use and hardware and software product upgrades
- **Scalability:** support system growth and increasing volumes of traffic
- **Time-to-market:** quicker
- **Total cost of ownership:** lower

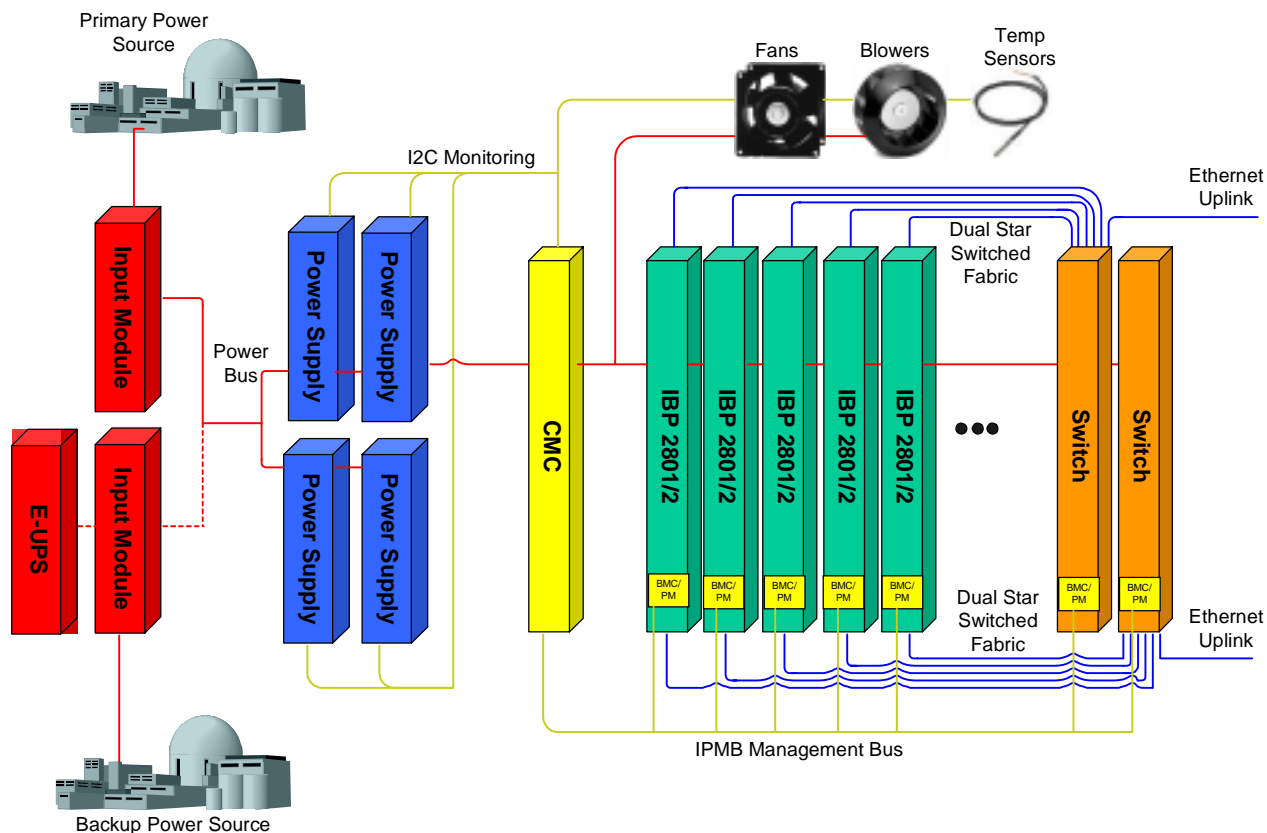


Figure 1. An Ideal HA Blade Server System

1.2 The I-Bus Solutions

A comprehensive design of the overall application ready industrial computing platform through the use of “from-the-ground-up” approach from concept to commercialization is a fundamentally important aspect of creating a robust high performance and high availability computing system capable of operating across a wide dynamic range of harsh and unforgiving environment.

The I-Bus Continuum™ family blade server product introduces a 16 blades system with dual 6U/4HP switch fabric slots. A dual star topology packet, switched backplane compliant to PICMG 2.16 and PICMG 2.9 standards with N+1 redundant –48VDC or 90-250VAC power subsystem together with a patented dual isolated hot-swap input modules clearly provide the best of class HA solution compare to the rest of the product available in the industry today. The I-Bus Continuum™ family product features a FailSafe Opticool™ thermal management using I-Bus’ patented hot-swap redundant “push-mix-pull” cooling architecture which provides sufficient cooling to the smallest form factor system platform in the industry. Continuum™ also has an optional PICMG 2.9 compliant system management module with SNMP agent support, which may be integrated in the rear to maximize the number of available I/O slots.

With 11 patent applications filed and 7 patents pending, this new I-Bus Continuum™ product family overcomes most of the industry toughest problems and is the first blade server platform to guarantee the level of availability that surpasses the rest of the industry.

2 I-Bus ContinuoTM Family Product

2.1 I-Bus ContinuoTM 0818D Server Blade Platform

The I-Bus ContinuoTM 0818D 8U rackmount network grade blade server application ready platform introduces dual star topology packet, switched backplane fully compliant to PICMG 2.16 to support Ethernet switched fabric architectures, PICMG 2.9 full IPMI system management, and PICMG 2.1 full hot-swap standards. The ContinuoTM 0818D supports up to 16 blades with dual switch fabric slots and features a patented Failsafe OpticoolTM with redundant “push-mix-pull” thermal management for the industry’s highest density blade server in the smallest form factor.

The I-Bus ContinuoTM 0818D features a patented dual isolated hot-swap 90-250VAC or – 48VDC power input modules providing system independent over or under voltage protection is the first server blades system in the industry to guarantee the level of availability. ContinuoTM 0818D is also available with a patented optional non-disruptive field upgradeable embedded “Zero U” UPS backup for orderly shutdown or event ride-through, and a patented cable management for ease of use and management.



Figure 2. ContinuoTM 0818D Server Blades System

By combining cPCI technology, packet switch backplane, and IP switch routing into a single platform, ContinuoTM 0818D system platform allows OEMs and end users to reduce cabling, footprint, and power consumption in one common system management interface. Together with the IBC 2801 and IBC 2802 blade servers, the ContinuoTM 0818D server blades system allows ISP and enterprise customers to bring a new level of density, manageability to their data centers.

2.2 Power Subsystem

The Continuum™ 0818D features a patented Dual Redundant Isolated Power Input with N+1 power supplies to support high availability mission critical switching and communication applications. The Continuum™ 0818D is also available with a patented optional non-disruptive field upgradeable embedded “Zero U” UPS backup for orderly shut-down or event ride-through, and a patented cable management for ease of use and management. The chassis accommodates 4 internal 200Watt hot swappable power supplies compliant with PICMG 2.0 with an integrated power backplane as part of the overall platform monolithic CompactPCI packet switched backplane, eliminating all internal power cable/harnessing.

2.3 Chassis Construction and Cooling

The Continuum™ 0818D enclosure is made of steel with EMI/RFI tight removable front panel(s), which can be rack-mounted in a 19” or 23” cabinet. The Continuum™ rack mount chassis is designed to be NEBS compliant with all hot-swappable field replaceable components (FRUs) such as 6U cPCI SBCs and I/O boards, switches, power supplies, fan tray, blowers, air filters, isolated power input modules, and CMC chassis management modules, ... etc.

The Continuum™ 0818D features a patented FailSafe OptiCool™ cooling management utilizing the “push-mix-pull” cooling architecture. Continuum™ 0818D is the platform capable of cooling a high-density platform in the industry in an 8U form factor.

2.4 cPCI Card Cage and Backplane

The Continuum™ 0818D Card Cage is compliant to PICMG standard including height, depth, ejector, keying, card glides with frame grounded ESD clip, EMI gasketing, and all other relevant specifications in IEEE 1101.10. The cPCI card cage allows all 6U cPCI boards to be front accessible with all slots are labeled per PICMG cPCI specification including glyphs. The card cage includes front and rear blank panels that are either non-conductive or with a protective ground as required by IEC 950 and harmonized derivative safety standard.

The Continuum™ 0818D passive backplane, with no permanently mounted active components permitted on either sides, is fully compliant with all relevant industry standards including, but not limited to the following PICMG standards:

- PICMG 2.0 R3.0
- PICMG 2.1 R2.0
- PICMG 2.5
- PICMG 2.10
- PICMG 2.11
- PICMG 2.9
- PICMG 2.16

The Continuum™ 0818D backplane supports up to four front accessible cPCI standard 3U x 6HP AC or DC power supply modules providing load sharing N+1 (N=3) redundancy. This backplane accepts the patented dual redundant isolated power inputs to the power system, and supports the following power input configurations:

- Dual 90-250VAC inputs
- Dual -48VDC inputs
- AC input and embedded UPS backup with battery

The Continuum™ 0818D backplane supports two independent 8-slot cPCI bus segments; segment 1 includes slot 1 through 8, segment 2 includes slot 9 through 16. Two independent H.110 bus segments are also supported; segment 1 includes slot 2 through 8, segment 2 includes slot 10 through 16. The two PICMG 2.16 fabric slots reside in slot 17 and 18 with the two fabric switches connecting to each of the 16 slots of the two cPCI bus segments in a redundant dual star topology configuration.

The monolithic backplane also supports a rear accessible PICMG 2.9 compliant 6U x 4HP x 80mm Chassis Management Controller (CMC) board which monitors the health of each individual input module and power supply module, fans, voltages, and temperature at various critical locations inside the chassis. The backplane includes a PICMG 2.9 compliant system management bus, i.e. IPMB0 that interconnects all 18 slots and the CMC in the card cage. In addition, the backplane provides hot swap connections for three independently removable blower trays for air exhaust at the top and a single fan tray for air intake at the bottom of the chassis. In summary, Continuum™ 0818D monolithic backplane design eliminates all internal cabling except for the I2C cable for temperature sensors inside the chassis to achieve high reliability and serviceability.

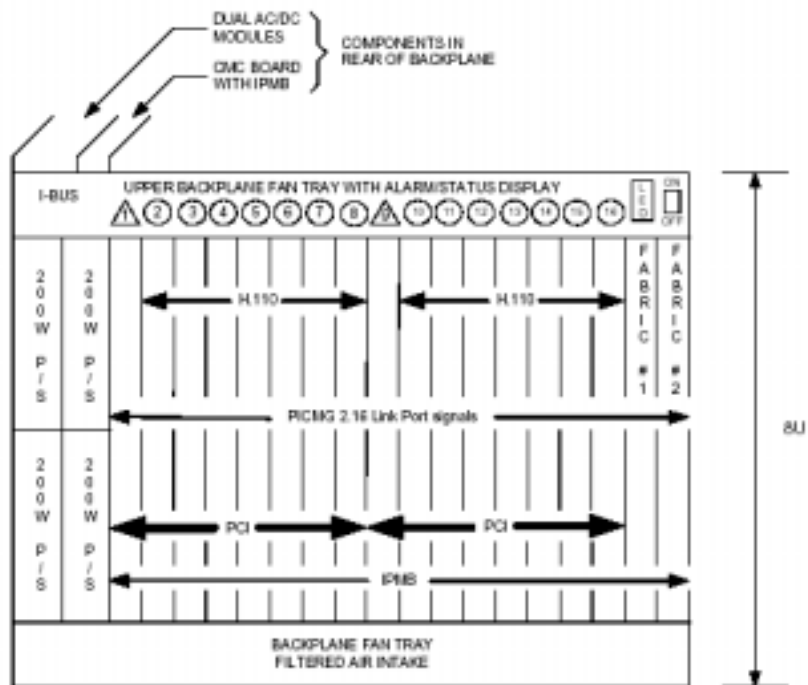


Figure 3. Continuum™ 0818D Backplane

2.5 2801 System Master Blade

The IBC 2801 blade is fully cPSB PICMG 2.16 compatible to support Ethernet switched fabric backplane architectures. In addition to the compatibility of PICMG 2.1 full hot-swap and PICMG 2.9 full IPMI system management, the IBC 2801 blade is a powerful, scalable, open architecture building block in high-reliability and high-availability CompactPCI-based server blade systems from I-Bus. The IBC 2801 supports Dual Low Voltage Intel Pentium III processors, operating at 800MHz/933MHz. Program and data storage needs are met with support for up to 2 Gbytes of DDR SDRAM as well as 256+ Mbytes of CompactFlash or one Gbyte IBM Microdrive and a 20 Gbyte IDE hard drive on board and/or on the IBC 2703 rear I/O transition module. Additional features include Ultra 160 SCSI with rear I/O, dual 10/100BaseTX Ethernet, 32bit/33MHz PMC expansion and on-board AGP Video. Also supported is the full set of standard PC peripherals including Ultra ATA/100, 1.44 Mbyte floppy, USB, RS-232 serial ports and parallel port, mouse and keyboard.

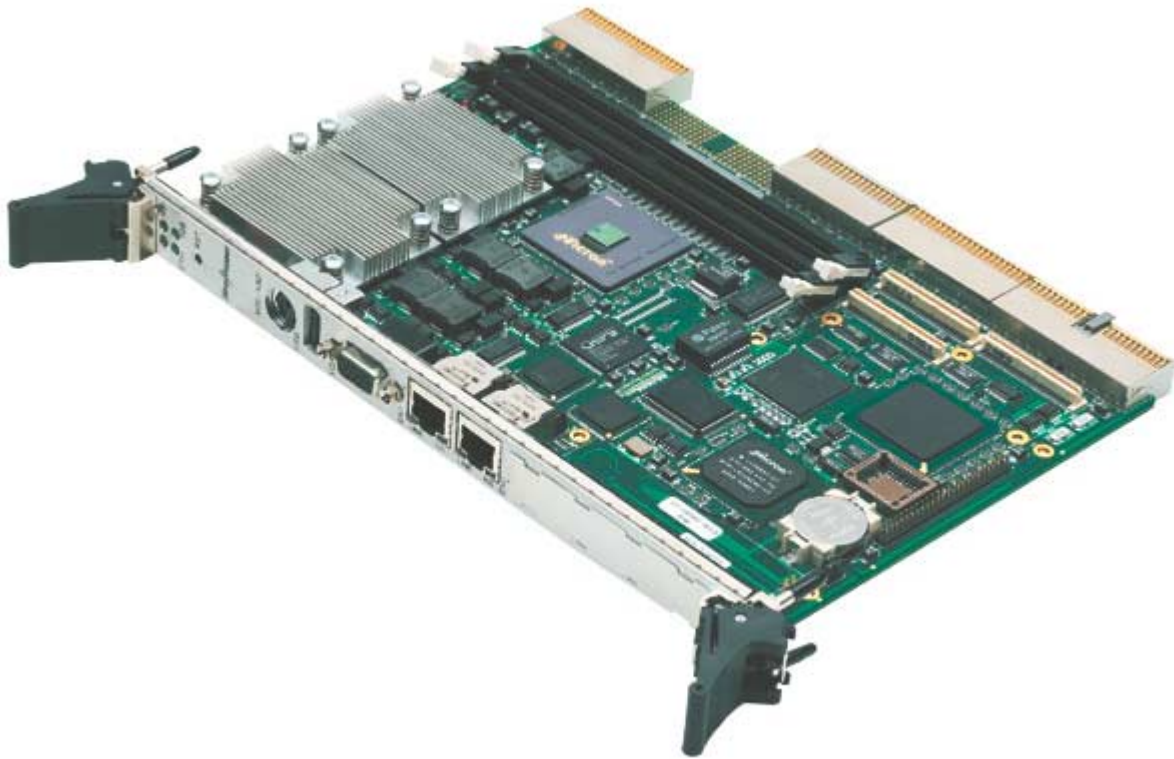


Figure 4. IBC 2801 System Master Blade

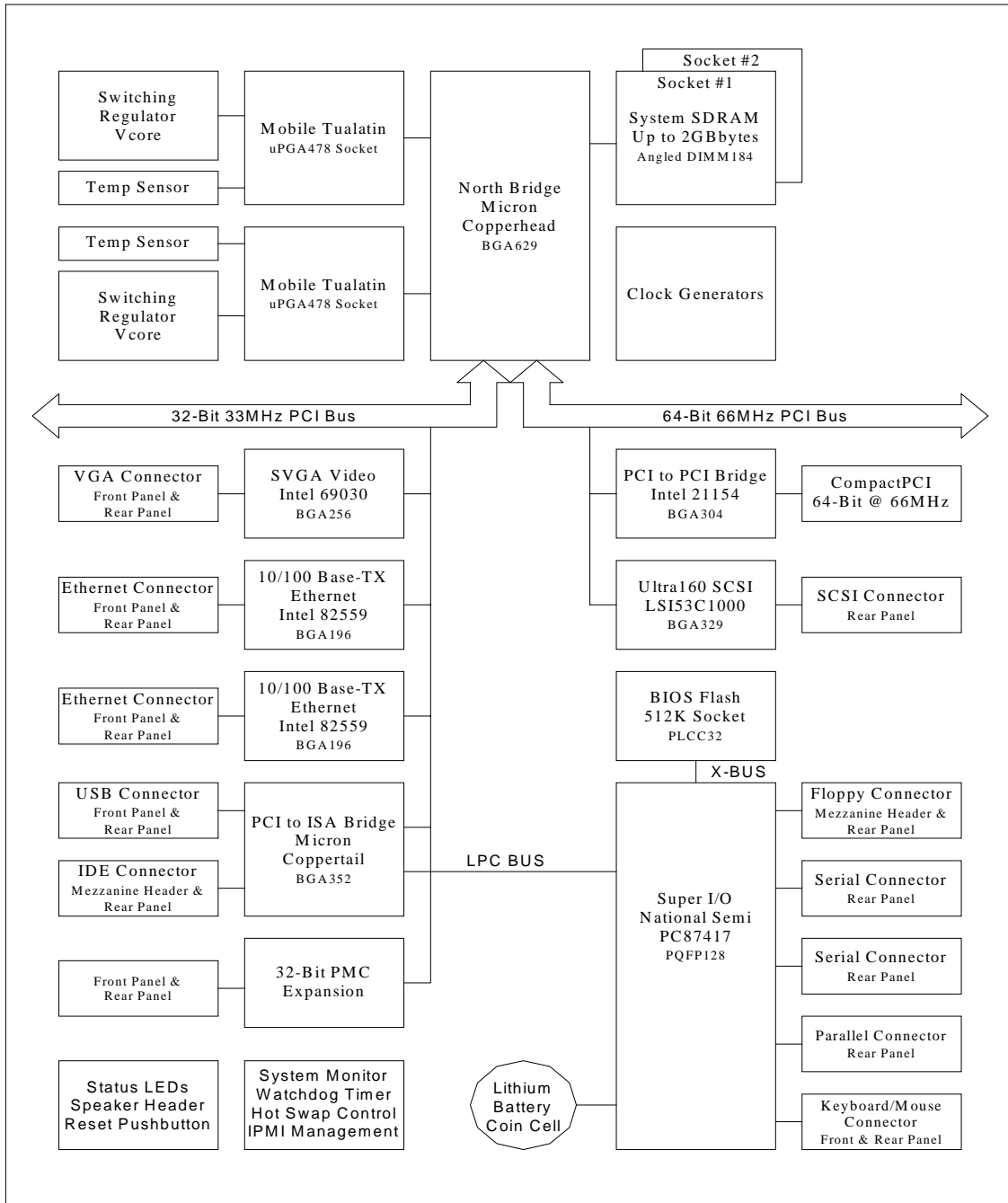


Figure 5. IBC 2801 Block Diagram

2.6 I-Bus 2802 Peripheral Master Blade

The IBC 2802 blade is identical to the IBC 2801 features set except for the additional dual Gigabit Ethernet support instead of SCSI. The 2802 blade server is fully cPSB PICMG 2.16 compatible to support Gigabit Ethernet switched fabric backplane architectures, PICMG 2.1 full hot-swap and PICMG 2.9 full IPMI system management.

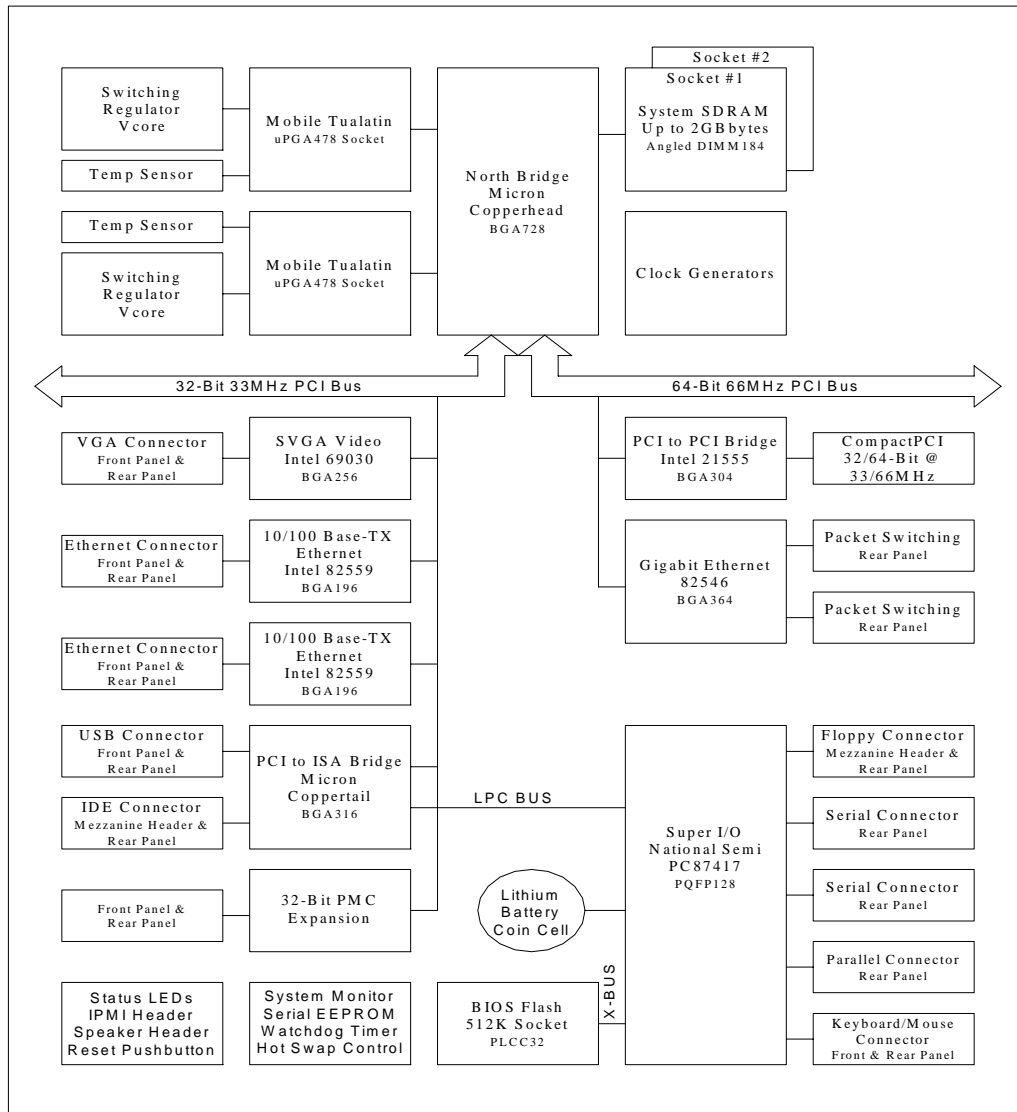


Figure 6. IBC 2802 Block Diagram

2.7 I-Bus 2703 Rear I/O

The IBC 2703 is 6U CompactPCI Rear I/O transition module designed to support the rear panel I/O for the IBC 2801 and IBC 2802 CompactPCI server blades. The IBC 2703 occupies a single 6U x 4HP x 80mm rear I/O slot and is designed to support the most common rear panel functions.

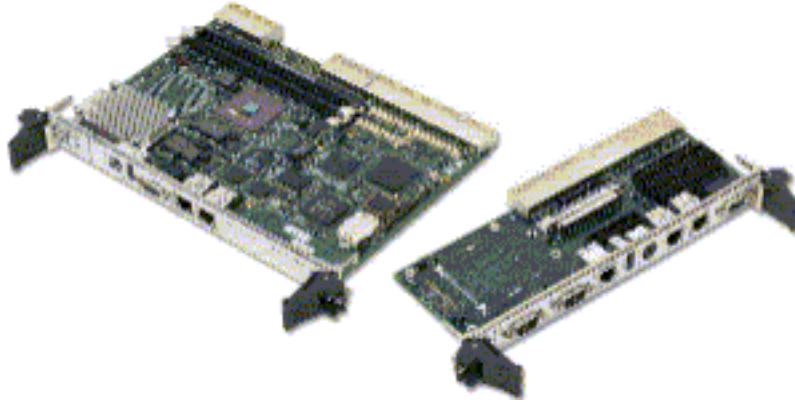


Figure 7. IBC 2802 with Rear I/O 2703

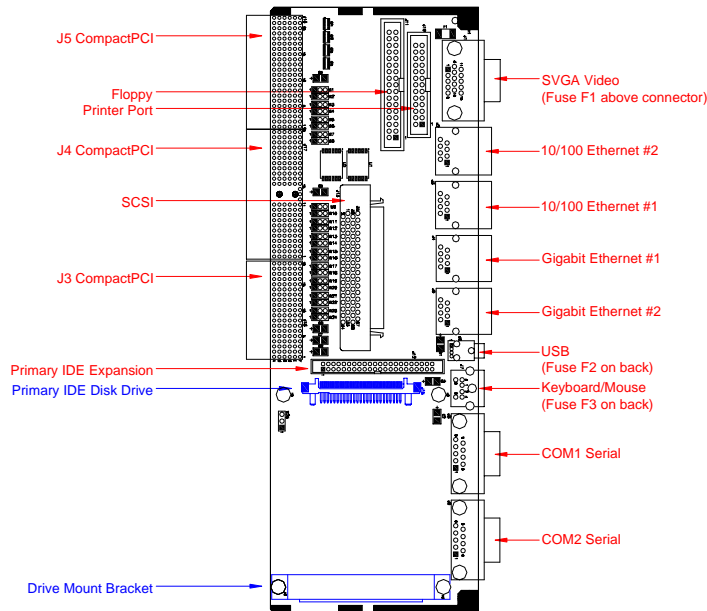


Figure 8. IBC 2703 Rear I/O Transition Module

2.8 I-Bus CMC Chassis Management Controller & Redundant Dual Power Input

The I-Bus Chassis Management Controller (CMC) is a rear accessible 6U x 4HP x 80mm cPCI rear I/O board which allows the chassis to be managed remotely with SNMP agent by system management software application. The CMC monitors and/or manages the chassis power, temperature, fans, and blower speed. The I-Bus CMC features 6x I2C channels and dry contact relay outputs, it communicates with the I-Bus Baseboard Management Controller/Peripheral Management (BMC/PM) mezzanine module on each IBC 2801 or IBC 2802 server blade. The I-Bus CMC option can be mounted on the rear of Continuum™ 0818D platform to maximize the number of available I/O slots.

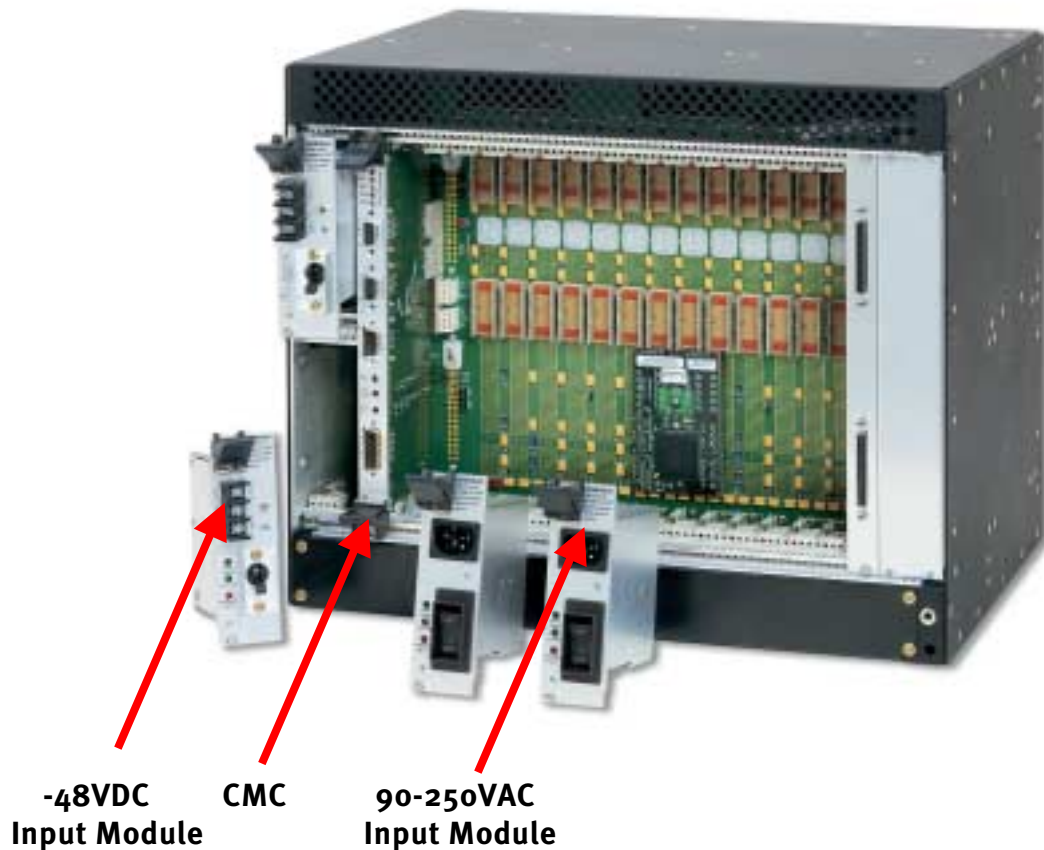


Figure 8. I-Bus Chassis Management Controller & Power Input Modules

The I-Bus Continuum™ Blade Server platform features a patented Redundant Isolated Power Input Architecture. It is available with redundant dual –48VDC input modules or redundant dual 90-250 VAC input modules. Continuum™ 0818D is also available with a patented optional non-disruptive field upgradeable embedded “Zero U” UPS backup in the industry for orderly shut-down or event ride-through, and a patented cable management for ease of use and management

3 Continuon™ Over Coming Industry Most Common Problems

3.1 Performance

The I-Bus Server Blades, IBC 2801 and IBC 2802, features dual 933 MHz Tualatin Pentium III processors, up to 2GB DDR memory, up to 40 GB on-board disk storage and a dual Gigabit Ethernet network connection. This is the highest performance single slot cPCI server blade available in the market today. Performance data and independent benchmark test reports are available upon request.

3.2 Density

The Continuon™ 0818D with the dual star topology packet switch backplane compliant to PICMG 2.16 and PICMG 2.9 standards can support up to 16 server blades plus dual fabric switches and a Chassis Management Controller (CMC) in a 8U network carrier grade cPCI chassis including a 600W N+1 redundant power subsystem with patented dual redundant isolated power input modules and an optional “Zero U” embedded UPS is the highest density blade server system platform available in the market with at least one year ahead of the industry.

3.3 Availability

The full hot-swap PICMG2.1 compliant Continuon™ 0818D with a dual redundant isolated power input is a stepping stone for I-Bus next generation Infini-Availability™ blade server platform that guarantee the level of availability in any given configuration. Continuon™ 0818D is designed to support the most common third party HA software including but not limited to Windows 2000 Advanced Server Cluster option, GoAhead SelfReliant 7500, Continuous Computing UpSuite for Solaris & Linux, Sun Cluster, Veritas Cluster Server, ... etc.

3.4 Maintainability

Both IBC 2801, IBC 2802 blade servers with BMC/PM mezzanine board are PICMG 2.9 compliant. With the I-Bus patented cable management option, the Continuon™ 0818D provide an additional manageability in term of ease of use and serviceability. The Continuon™ 0818D with a hot-swap Chassis Management Controller (CMC) which monitors all chassis functions including the health of each individual blade, backplane voltages, cooling system, power supplies, and power input modules...etc. All of the chassis management data can be reported to management utilities or to network managers such as HP open View, using SNMP.

4 Conclusions

The critical industry wide issues of density, performance, power, availability, maintainability, serviceability, scalability, and the total cost of ownership have been addressed in the I-Bus Continuum™ family products. As a result of advanced modular design techniques, simulation and analysis, the entire Continuum™ product family successfully passed all rigorous tests and qualifications. The I-Bus Continuum™ product family is officially released on February 14, 2003 with EAUs available now and production quantities available in March to meet the industry toughest MARS requirements for use in the most demanding business critical 24x7 operating environment.

There are 11 patent applications filed with 7 patents pending in this new I-Bus Continuum™ product family. Not only providing the ease of management and service of a system consisting of heterogeneous types of blades, the I-Bus Continuum™ is the stepping stone to Infini-Availability™ blade server platform. I-Bus is the first in the industry to guarantee the level of availability for server blade system.

About I-Bus:

Founded in 1982, I-Bus is a leading provider of innovative high availability embedded computing solutions, a global supplier of open-standard architecture boards and systems for communications, industrial, enterprise, and military markets. I-Bus is an OEM focused provider of HA computing platforms for use in mission critical applications and is committed to significant R&D in High Availability solutions

Please visit www.ibus.com for more information.

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