



# SAN Architectures for Real-Time Embedded Applications

SAN architectures employing fabric technology are viable for implementation and use within embedded systems. For military, medical and communication applications, switched Ethernet and Fibre Channel provide network technology that supports the requirements of real-time system implementation. Further, fabric specifications such as PICMG 2.16 and the future VITA 31 provide standards for system designers to build scalable systems that can benefit from high speed interconnect to embedded SANs.

The standards, specifications and references listed below were compiled for a technical paper by Ken Grob, Vice President of ACT/Technico. The company provides system architecture design, development, and implementation of complex solutions for communications, military/aerospace, medical and semiconductor equipment manufacturers. This is a valuable source for technical information. To read the technical paper, please go to <http://www.acttechnico.com/news.html>.

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## **Standards Organizations and Trade Associations**

The following are some of the standard organizations supporting the technologies required to implement SANs.

### **Fibre Channel Standards**

The National Committee for Information Technology Standards, Technical Committee T11, <http://www.T11.org>.

**X.3230-1994-Fibre Channel Physical and Signaling Standard: FC-PH**, Initial core standard

### **Storage Network Models**

The **SNIA Shared Storage Model** of the Storage Networking Industry Association, [www.snia.org](http://www.snia.org). Information can be found on Fibre Channel, IP Storage Networks, and NAS.

## Protocols

**Internet Engineering Task Force (IETF)**, [www.IETF.org](http://www.IETF.org) : Protocols in development under the IPS Work Group; FCIP, Fibre Channel Over IP; iFCP, Internet Fibre Channel Protocol; iSCSI, Internet SCSI

## Ethernet

The latest Ethernet Standard, including Gigabit Ethernet definition:

IEEE std 802.3, 2000 Edition, ISO/IEC 8802-3: 2000 (E)), IEEE Standard for Information technology—Telecommunications and information exchange between systems—Local and metropolitan area networks—Specific requirements—Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications (*includes 802.3ab, 802.3ac and 802.3ad*)

Available for download in pdf format at: <http://standards.ieee.org/getieee802/802.3.html>

## CompactPCI Packet Switch Backplane

Information on **PICMG 2.16 IP Backplane for CompactPCI** can be found at: [http://www.picmg.org/specdirectory.stm#\\_PICMG\\_2.16\\_IP](http://www.picmg.org/specdirectory.stm#_PICMG_2.16_IP)

## SCSI

The National Committee for Information Technology Standards, Technical Committee T10, [www.T10.org](http://www.T10.org).

SCSI, SCSI-2, and SCSI-3 including SPI, Fast-20 (Ultra SCSI), Fast-40 (Ultra2 SCSI), Low Voltage Differential (LVD), SPI-3 (Ultra3 SCSI or Ultra160), SPI-4 (Ultra320), CAM, and much more.

## Suggested Reading

*Designing Storage Area Networks* by Tom Clark, Addison-Wesley

*Fibre Channel for SANS* by Alan F. Benner, McGraw-Hill Telecom

*Ethernet The Definitive Guide*, by Charles E. Spurgeon, O'Reilly

*Fibre Channel: Connection to the Future*, The Fibre Channel Association

*IP Sans A Guide to iSCSI, iFCP, and FCIP Protocols for Storage Area Networks*, by Tom Clark, Addison-Wesley

*IBM Storage Networking, June 2000: Demystifying Storage Networking DAS, SAN, NAS, NAS Gateways, Fibre Channel, and iSCSI*, by David Sacks IBM Storage Consultant