PCI, PCI-X & PCIe Products

Pericom Product Overview

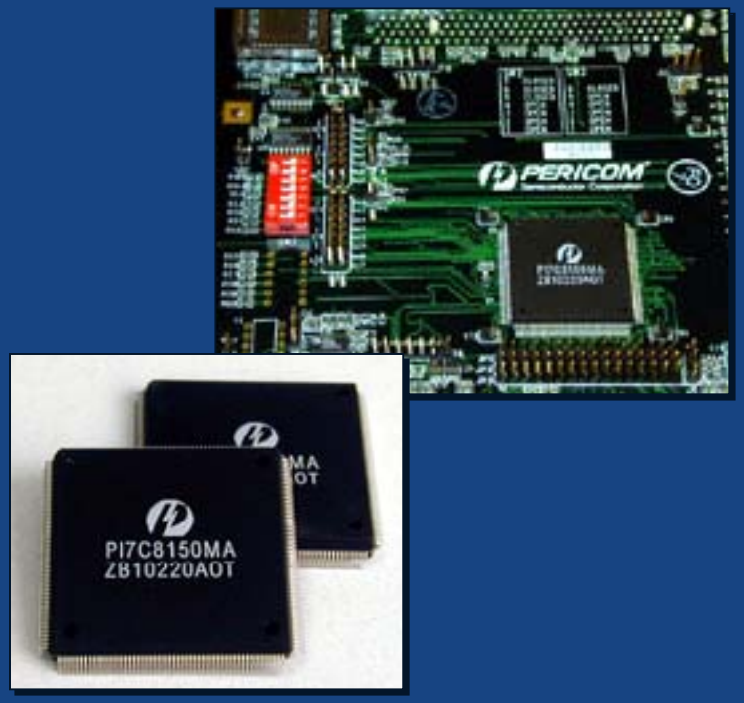
PERICOM Semiconductor Corporation

Experience

- → **Pericom has:**
  - Been in the PCI and PCI-X Bridge business for over 5 years
  - Enjoys significant market share
  - Top-tier customer designs world wide.
    - PCI and PCI-X Bridge Product Family
    - PCI Express Products
  - Product line has doubled in market share for the past 3 years
    - Direct result of our
      - superior product performance,
      - technical support,
      - and customer service.
    - All our products are designed, qualified, and supported by our own in house design team.

Pericom PCI Bridge Overview

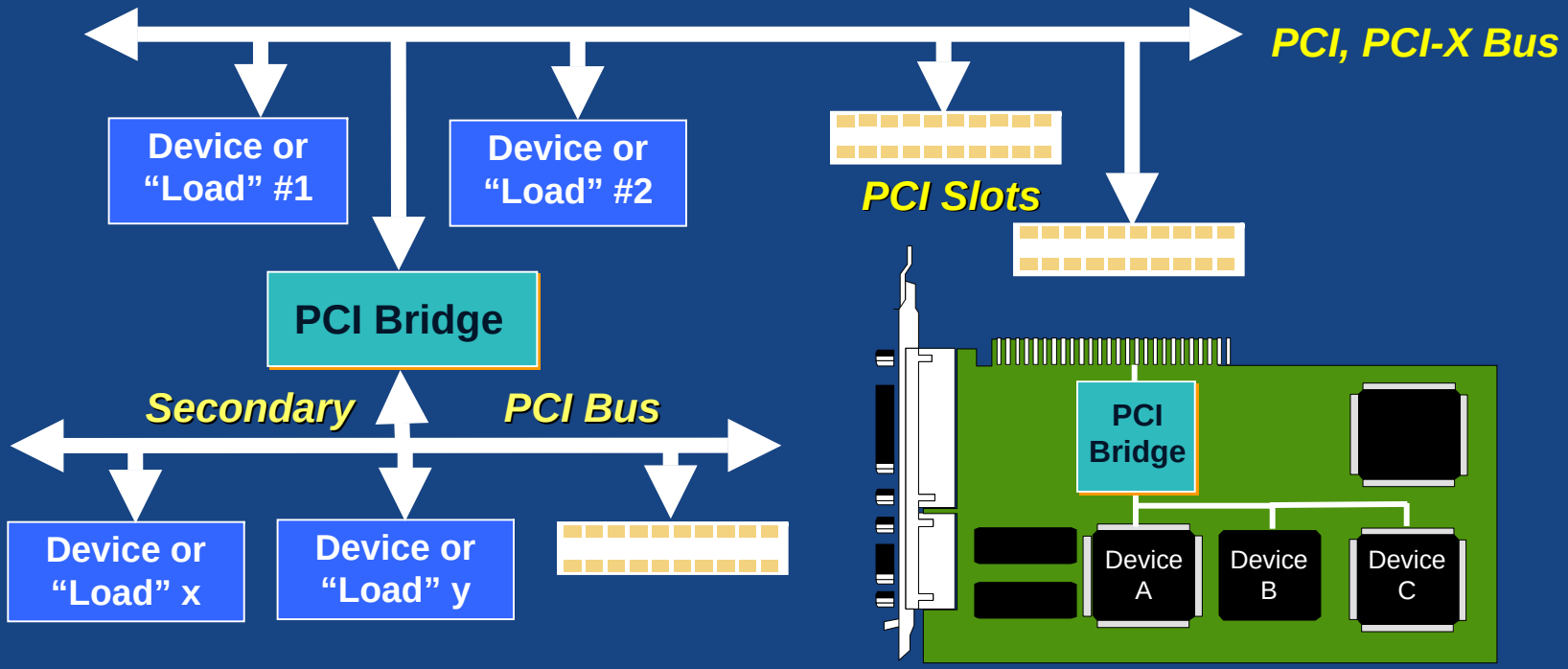
- → **Fully committed to our PCI & PCI-X Bridge Product Line**
  - Focus area for company – long term future commitment
  - Over 5 years experience and success in PCI Bridge Market
  - Dedicated In House Design Team
- → **PCI & PCI-X Bridges Today**
  - Enhanced & Asynchronous
  - Industry unique features
- → **New Focus Area:**
  - PCI Express
    - PCIe to PCI/PCI-X Reversible Bridges
    - PCIe Packet Switches



Introduction to PCI Bridges

A PCI-to-PCI Bridge allows a system to add more "loads" to the bus by creating a separate secondary bus

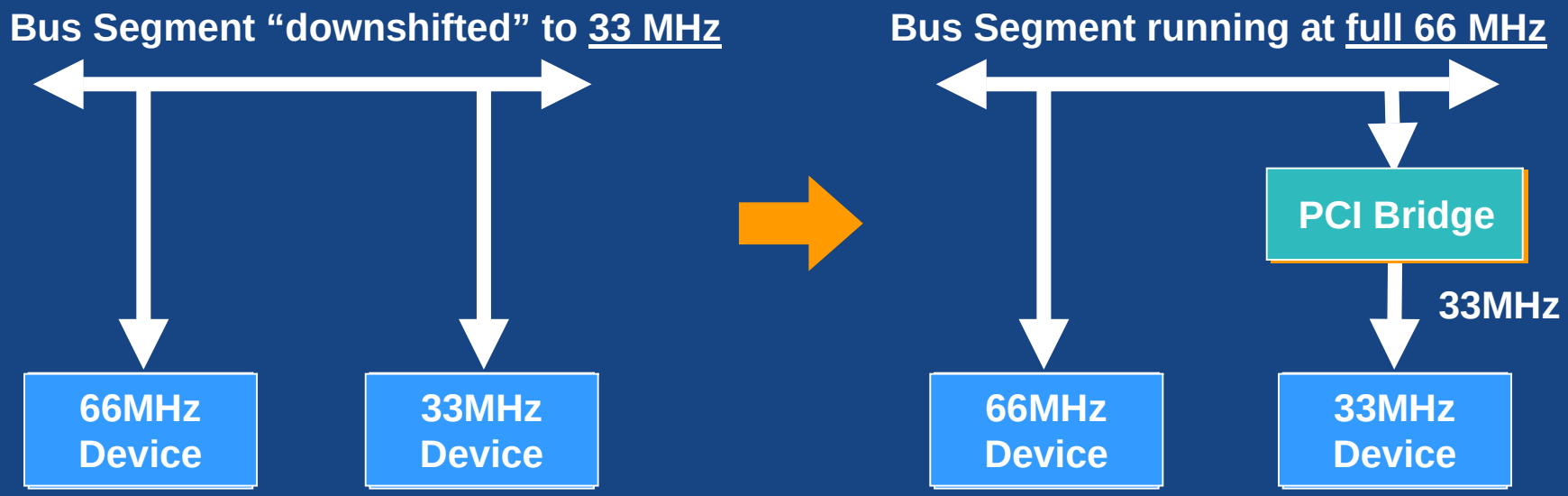
- More Devices or "Loads" on Motherboard
- More Slots for Adapter Cards
- Multiple Devices on Card Needing Access to PCI/PCI-X Bus



Introduction to PCI Bridges (continued)

→ **PCI Bridges may also be used for "isolation"**

- A PCI bus segment will always "downshift" to the lowest speed device residing on the bus. A PCI Bridge can be used to isolate the slower device so that it doesn't slow down the other faster devices

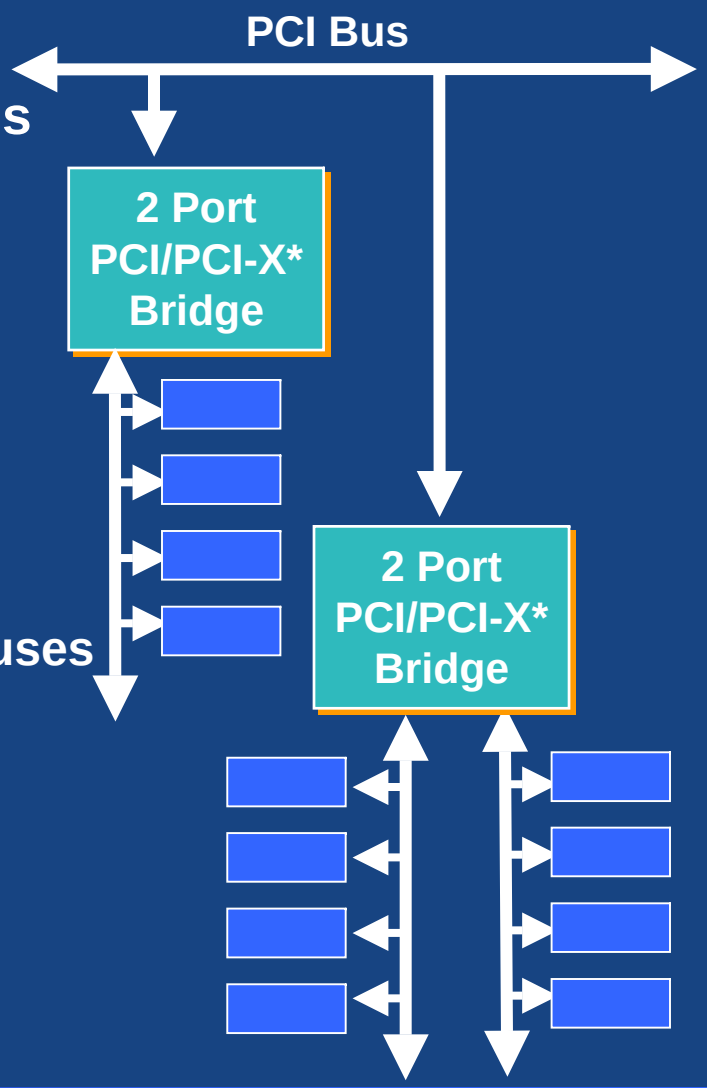


PCI/PCI-X Bridge Family

→ **2-Port PCI-to-PCI Bridges**
- One Primary & One Secondary Bus
- Higher Performance

→ **Enhanced PCI-to-PCI Bridges**
- Asynchronous mode support
- Dynamic Prefetching Control
- 3-Port Bridge
  - One Primary & Two Secondary Buses

→ **2-Port PCI-X to PCI-X Bridge**
- 64-bit/133MHz
- 5V tolerance



2-Port Bridges

- → **PI7C8152A & 8152B**
  - 32-bit / 66 MHz or 33 MHz
  - Enhanced Performance: PI7C8152A
  - Asynchronous mode: PI7C8152B
- → **PI7C8150A & 8150B**
  - 32-bit / 66 MHz & 33 MHz
  - Enhanced Performance: PI7C8150A
  - Asynchronous mode: PI7C8150B
- → **PI7C8154, 8154A* & 8154B***
  - 64-bit / 66 MHz & 33 MHz
  - Enhanced Performance: PI7C8154A
  - Asynchronous mode: PI7C8154B

*** Reference Change Notification #102658-00. Product Discontinuance**

2-Port Bridges, Cont.

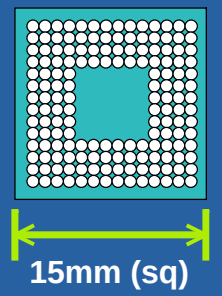
→ **PI7C8148A & 8148B**

- 32-bit / 66 MHz
- Asynchronous mode on PI7C8148B
- Clockrun support
- EEPROM support
- Packaging
  - 160-pin LFBGA
    - 15x15mm
    - 12x12mm - Smallest Bridge Package in Industry

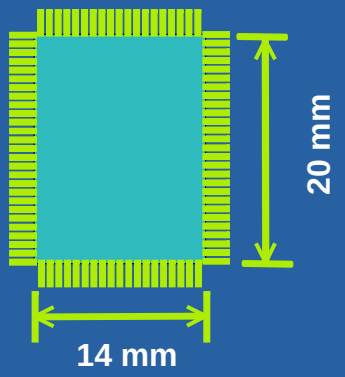
→ **PI7C8140A**

- 32-bit / 66 MHz
- Clockrun support
- Packaging
  - 128-pin QFP

160-pin BGA



128-pin QFP



Superior Performance

→ Dynamic Prefetching Control

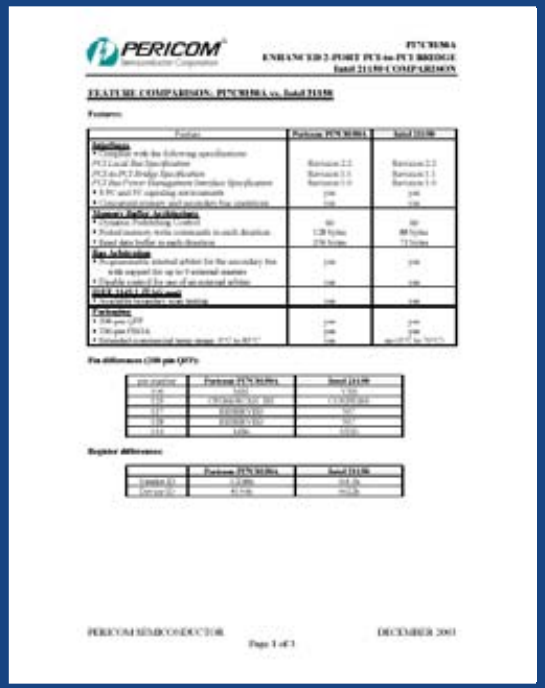
- Patented algorithm for speeding up memory read transactions.
- The memory read transaction cache is adjusted to optimal size to match the incoming transactions, and then dumped.
  - The competition uses fixed size cache and must wait for it to fill up all the way before being dumped. This takes extra time.
- Transaction time is reduced and overall bridge bandwidth is increased – in some cases substantially. Only Pericom uses this exclusive, patented feature.

Bottom Line – Lower Latency – Higher Performance!

Superior Performance

→ Pericom Bridges Outperform the Competition

- Enhanced & Asynchronous support on the following:
  - PI7C815xA, PI7C815xB, PI7C8140A, PI7C8148x, & PI7C21P100
- Unique “Dynamic Prefetching Control” feature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PI7C8150A
ENHANCED 2-PORT PCI-to-PCI BRIDGE
Intel 21150 COMPARISON

FEATURE COMPARISON: PI7C8150A vs. Intel 21150

DECEMBER 2001

Card Number	PI7C8150A	Intel 21150
LAN Card 1	91 Mb/s	78 Mb/s
LAN Card 2	65 Mb/s	34 Mb/s
LAN Card 3	92 Mb/s	65 Mb/s
LAN Card 4	90 Mb/s	66 Mb/s

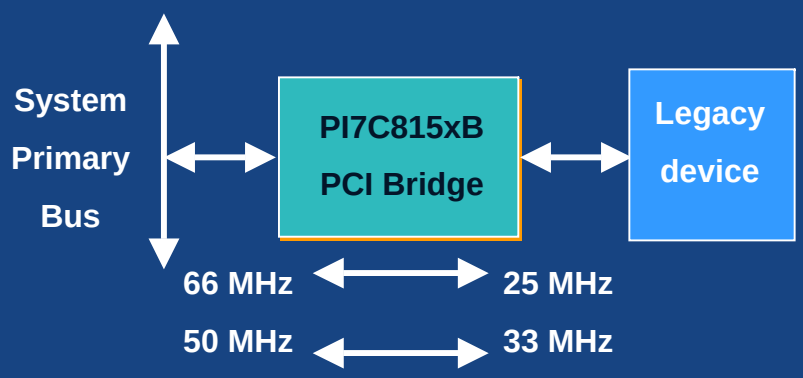
Card Number	PI7C8152A	Intel 21152
LAN Card 1	75 Mb/s	31 Mb/s
LAN Card 2	93 Mb/s	51 Mb/s
LAN Card 3	94 Mb/s	54 Mb/s
LAN Card 4	95 Mb/s	60 Mb/s

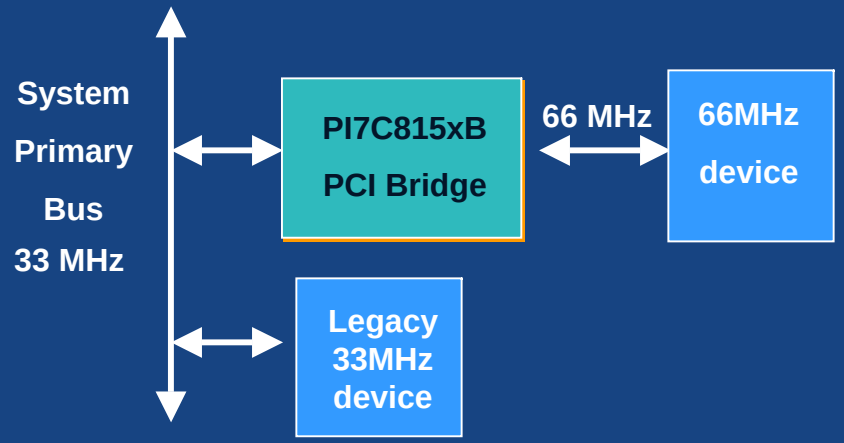
Card Number	PI7C8150A	Intel 21150
LAN Card 1	52 Mb/s	25 Mb/s
LAN Card 2	93 Mb/s	58 Mb/s
LAN Card 3	46 Mb/s	26 Mb/s
LAN Card 4	90 Mb/s	58 Mb/s

** See Web Site for More Comparisons*

Superior Performance

- **Asynchronous Mode**
  - Allows the secondary bus to run at a frequency “asynchronous” from the primary
    - Synchronous bridges limit the secondary bus frequency to either the same frequency or half the frequency of the primary bus
  - Secondary bus frequency may run faster than the primary bus frequency
  - Interface/upgrade for slower legacy products





PI7C8152x Overview

→ **Specifications**

- 32-bit / 66 MHz or 33 MHz
- Dynamic Prefetching Control
- Support for 4 Secondary Bus Masters
- 5V and 3.3V signaling
- 160-pin MQFP
- Extended Commercial Temperature Range (0°C to 85°C)
- Industrial Temperature Range (-40°C to 85°C) on PI7C8152BI
- Enhanced performance on PI7C8152A
- Enhanced performance & Asynchronous support on PI7C8152B

PI7C8150x Overview

→ **Specifications**

- 32-bit / 33 MHZ & 66 MHz
- Dynamic Prefetching Control
- Support for 9 Secondary Bus Masters
- 5V and 3.3V signaling
- 208-pin FQFP and 256-pin PBGA
- Extended Commercial Temperature Range (0°C to 85°C)
- Industrial Temperature Range (-40°C to 85°C) on PI7C8150BI
- Enhanced performance on the PI7C8150A
- Enhanced performance & Asynchronous support on PI7C8150B

PI7C8154x Overview

→ **Specifications**

- 64-bit / 66 MHz & 33 MHz
- Dynamic Prefetching Control
- Support for 9 Secondary Bus Masters
- 5V and 3.3V signaling
- 304-ball PBGA
- Extended Commercial Temperature Range (0°C to 85°C)
- Industrial Temperature Range (-40°C to 85°C) on PI7C8154BI
- Enhanced performance on the PI7C8154A
- Enhanced performance & Asynchronous support on PI7C8154B
- 80MHz secondary support on PI7C8154B-80
  - Only Bridge available in the market to specify 80MHz support in conventional PCI mode

PI7C8148x Overview

→ **Specifications**

- 32-bit / 66 MHz or 33 MHz
- Dynamic Prefetching Control
- Support for 4 Secondary Bus Masters
- Clockrun support
- 5V and 3.3V signaling
- 160-pin PBGA
  - 15x15mm
  - 12x12mm (smallest package PCI Bridge available in the market)
- Extended Commercial Temperature Range (0°C to 85°C)
- Enhanced performance on PI7C8148A
- Enhanced performance & Asynchronous support on PI7C8148B

PI7C8140A Overview

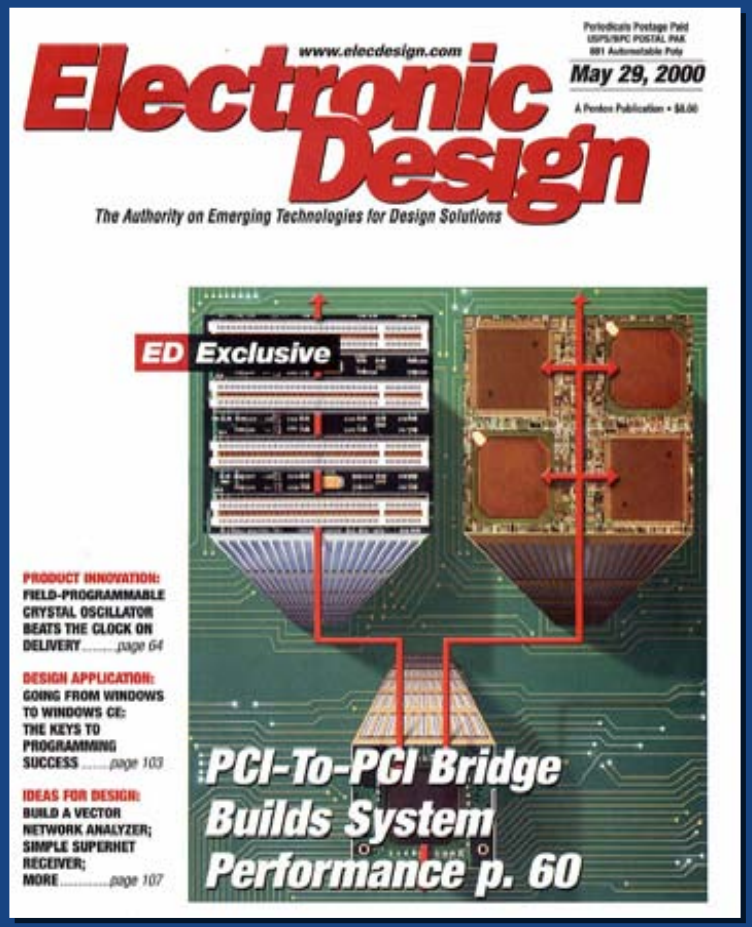
→ **Specifications**

- 32-bit / 66 MHz or 33 MHz
- Dynamic Prefetching Control
- Support for 4 Secondary Bus Masters
- Clockrun support
- 5V and 3.3V signaling
- 128-pin QFP
- Extended Commercial Temperature Range (0°C to 85°C)
- Enhanced performance on PI7C8140A

3 Port Enhanced PCI Bridge

→ **PI7C7300D**

- 32-Bit
- 66 MHz on all 3 ports
- One Primary Bus
- Two Secondary Buses
- Hot-Swap (PICMG 2.1 R1.0)
- 272-Ball PBGA package
- Dual Addressing Cycle
- Load Balancing
- Industrial Temperature Range



PI7C7300D: 3 Port Bridge

- **Traditional Approach**
  - 2 PCI bridges=2x the cost
  - 2x primary bus loading
- **Evolutionary Approach**
  - Integrated dual bridge architecture
  - Single load on primary bus
  - Peer-to-Peer communication capable reduces traffic on primary PCI bus
  - Three regions of data activity increases overall system performance
  - Tri-stated secondary bus for custom “hot-swap”

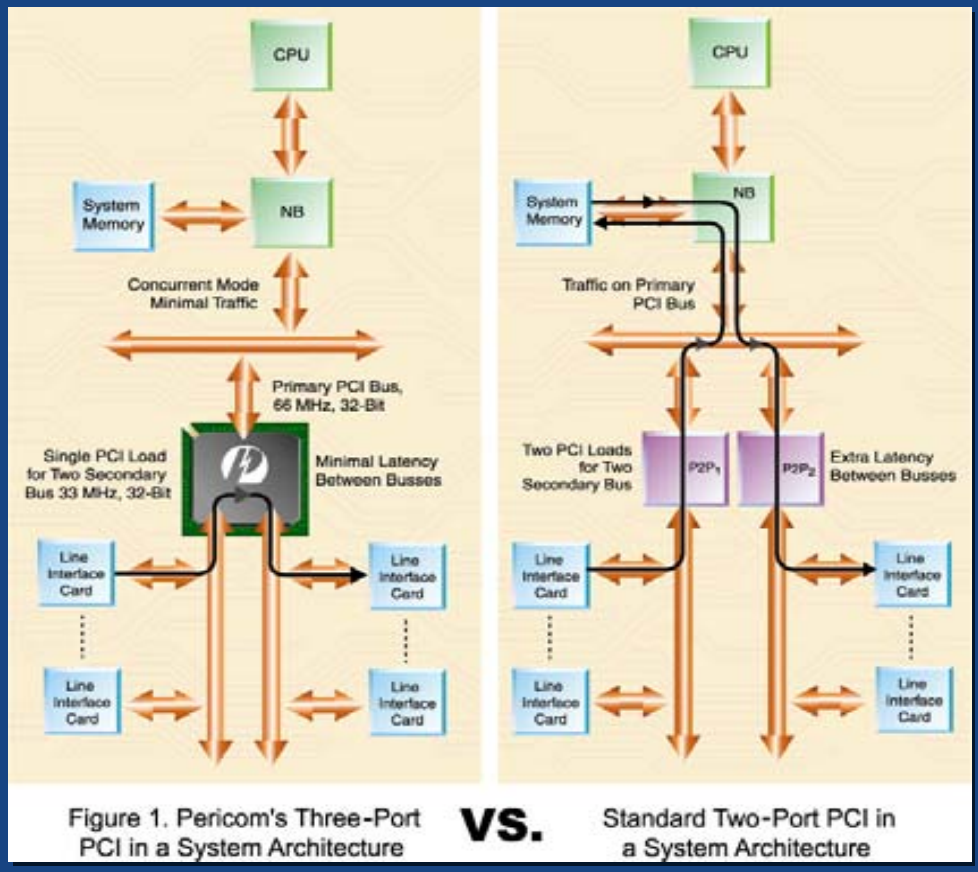


Figure 1. Pericom's Three-Port PCI in a System Architecture **VS.** Standard Two-Port PCI in a System Architecture

PCI-X 2-Port Bridge

- **PI7C21P100 & PI7C21P100B**
  - 64-bit / 133MHz
  - Supports PCI-X Specification
- **Replaces Tundra TSI310a PCI-X bridge**
  - Superior performance replacement
- **Enhanced Features**
  - Higher Performance
  - 5V tolerance support on PI7C21P100
    - Tundra TSI310 does not support 5V tolerance
  - Lower Power Consumption
  - Dynamic Prefetching Control
  - Configurable free space in memory data FIFO

PCI Bridge Cross-Reference

→ 32-bit Bridges

Description	Package	Pericom	Intel	TI	PLX
32-bit/66MHz, 3-Port	272-pin PBGA	PI7C7300ANA			
32-bit/66MHz	160-pin MQFP	PI7C8152AMA			
32-bit/33MHz	160-pin MQFP	PI7C8152AMA	S21152BB	PCI2250PCM	PCI6152-CC33PC
32-bit/66MHz, asynchronous	160-pin MQFP	PI7C8152BMA			
32-bit/33MHz	128-pin PQFP	PI7C8140AMA			PCI6140-AA33PC
32-bit/33MHz	160-pin PBGA	PI7C8148ANJ			PCI6152-CC33BC
32-bit/66MHz	160-pin PBGA	PI7C8148ANJ			PCI6152-CC66BC
32-bit/66MHz, asynchronous	160-pin PBGA	PI7C8148BNJ			
32-bit/66MHz	160-pin PBGA (12 x 12mm)	PI7C8148ANB			
32-bit/66MHz, asynchronous	160-pin PBGA (12 x 12mm)	PI7C8148BNB			
32-bit / 66MHz	208-pin FQFP	PI7C8150AMA	SB21150BC	PCI2050BPPM	PCI6150-BB66PC
32-bit / 66MHz	256-pin PBGA	PI7C8150AND	GD21150BC		
32-bit / 33MHz	208-pin FQFP	PI7C8150AMA-33	SB21150AC	PCI2050PDV PIC2050APDV PCI2050BPDV	PCI6150-BB66PC
32-bit / 33MHz	256-pin PBGA	PI7C8150AND-33	GD21150AC		
32-bit / 66MHz, asynchronous	208-pin FQFP	PI7C8150BMA			PCI6150-BB66PC
32-bit / 66MHz, asynchronous	256-pin PBGA	PI7C8150BND			
32-bit / 66MHz, asynchronous, I-Temp	256-pin PBGA	PI7C8150BNDI			
32-bit / 66MHz, asynchronous, I-Temp	208-pin FQFP	PI7C8150BMAI		PCI2050IPDV	

PCI/PCI-X Bridge Cross-Reference

→ 64-bit Bridges

Description	Package	Pericom	Intel	PLX	Tundra / IBM
64-bit / 66MHz	304-pin PBGA	PI7C8154ANA	21154BC FW21154BE	PCI6154-BB66BC	
64-bit / 33MHz	304-pin PBGA	PI7C8154ANA-33	21154AC FW21154AE		
64-bit / 66MHz, asynchronous	304-pin PBGA	PI7C8154BNA		PCI6154-BB66BC	
64-bit / 66MHz, asynchronous, 80MHz	304-pin PBGA	PI7C8154BNA-80			
64-bit / 66MHz, non-transparent	304-pin PBGA		21555-BA		
64-bit / 33MHz, non-transparent	304-pin PBGA		21555-AA		
64-bit / 66MHz, trans / non-trans	365-pin PBGA			PCI6254-BB66BC	
64-bit / 133MHz	304-pin HPBGA	PI7C21P100B			TSI310A / IBM21P100
64-bit / 133MHz, 5V tolerance	304-pin HPBGA	PI7C21P100			
64-bit / 133MHz	421-pin PBGA		BW31154		
64-bit / 133MHz	380-pin PBGA			PCI6520-BB13BC	
64-bit / 133MHz, trans / non-trans	380-pin PBGA			PCI6540-BB13BC	

PCI Bridge Feature Comparison

→ 32-bit Bridge Features

32-bit Bridges	PI7C8140A	PI7C8148A	PI7C8148B	PI7C8152A	PI7C8152B
FEATURE					
Frequency	66MHz	66MHz	66MHz	66MHz	66MHz
Asynchronous Mode			**X**		**X**
Number of Secondary Masters	4	4	4	4	4
Dynamic Prefetching Control	**X**	**X**	**X**	**X**	**X**
Configurable Memory Data FIFO					
EEPROM support		**X**	**X**		
Clockrun support	**X**	**X**	**X**		
Internal arbiter	**X**	**X**	**X**	**X**	**X**
External arbiter support	**X**	**X**	**X**	**X**	**X**
Compact PCI Hot Swap	**X**	**X**	**X**		
JTAG interface					
GPIO		**X**	**X**		
5V tolerance	**X**	**X**	**X**	**X**	**X**
Temperature Support	0°C to 85°C	0°C to 85°C	0°C to 85°C	0°C to 85°C	0°C to 85°C
Package	128-pin QFP	160-pin PBGA	160-pin PBGA	160-pin QFP	160-pin QFP
dimensions	14 x 20mm	15 x 15mm 12 x 12mm	15 x 15mm 12 x 12mm	28 x 28mm	28 x 28mm

*** New Designs Should Use A or B device**

PCI Bridge Feature Comparison

→ 32-bit Bridge Features (cont.)

32-bit Bridges	PI7C8150A	PI7C8150A-33	PI7C8150B	PI7C8150BI	PI7C8150B-33	PI7C7300D
FEATURE						
Frequency	66MHz	33MHz	66MHz	66MHz	33MHz	66MHz
Asynchronous Mode			X	X	X	
Number of Secondary Masters	9	9	9	9	9	16
Dynamic Prefetching Control	X	X	X	X	X	X
Configurable Memory Data FIFO						
EEPROM support						
Clockrun support						
Internal arbiter	X	X	X	X	X	X
External arbiter support	X	X	X	X	X	X
Compact PCI Hot Swap						X
JTAG interface	X	X	X	X	X	X
GPIO	X	X	X	X	X	X
5V tolerance	X	X	X	X	X	X
Temperature Support	0°C to 85°C	0°C to 85°C	0°C to 85°C	-40°C to 85°C	0°C to 85°C	-40°C to 85°C
Package	208-pin QFP 256-pin PBGA	208-pin QFP 256-pin PBGA	208-pin QFP 256-pin PBGA	208-pin QFP 256-pin PBGA	208-pin QFP 256-pin PBGA	272-pin PBGA
dimensions	28 x 28mm 17 x 17mm	28 x 28mm 17 x 17mm	28 x 28mm 17 x 17mm	28 x 28mm 17 x 17mm	28 x 28mm 17 x 17mm	27 x 27mm

*** New Designs Should Use A or B device**

PCI/PCI-X Bridge Feature Comparison

→ 64-bit Bridge Features

64-bit Bridges	PI78154A	PI7C8154A-33	PI7C8154B	PI7C8154B-33	PI7C8154BI	PI7C8154B-80	PI7C21P100	PI7C21P100B
FEATURE								
Frequency	66MHz	33MHz	66MHz	33MHz	66MHz	66MHz	133MHz	133MHz
Asynchronous Mode			X	X	X	X	X	X
Number of Secondary Masters	9	9	9	9	9	9	6	6
Dynamic Prefetching Control	X	X	X	X	X	X	X	X
Configurable Memory Data FIFO							X	X
PCI 80MHz secondary support			X		X			
EEPROM support	X	X	X	X	X	X		
Clockrun support								
Internal arbiter	X	X	X	X	X	X	X	X
External arbiter support	X	X	X	X	X	X	X	X
Compact PCI Hot Swap								
JTAG interface	X	X	X	X	X	X	X	X
GPIO	X	X	X	X	X	X	X	X
5V tolerance	X	X	X	X	X	X	X	
Temperature Support	0°C to 85°C	0°C to 85°C	0°C to 85°C	0°C to 85°C	-40°C to 85°C	0°C to 85°C	0°C to 85°C	0°C to 85°C
Package	PBGA	PBGA	PBGA	PBGA	PBGA	PBGA	HPBGA	HPBGA
dimensions	31 x 31mm	31 x 31mm	31 x 31mm	31 x 31mm	31 x 31mm	31 x 31mm	31 x 31mm	31 x 31mm

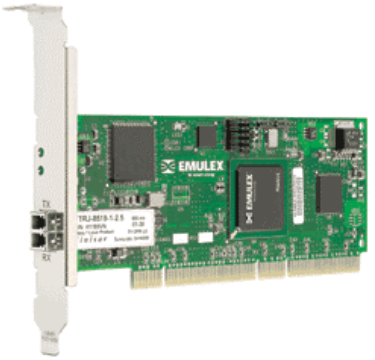
PCI Bridge Applications

Various applications for PCI Bridges

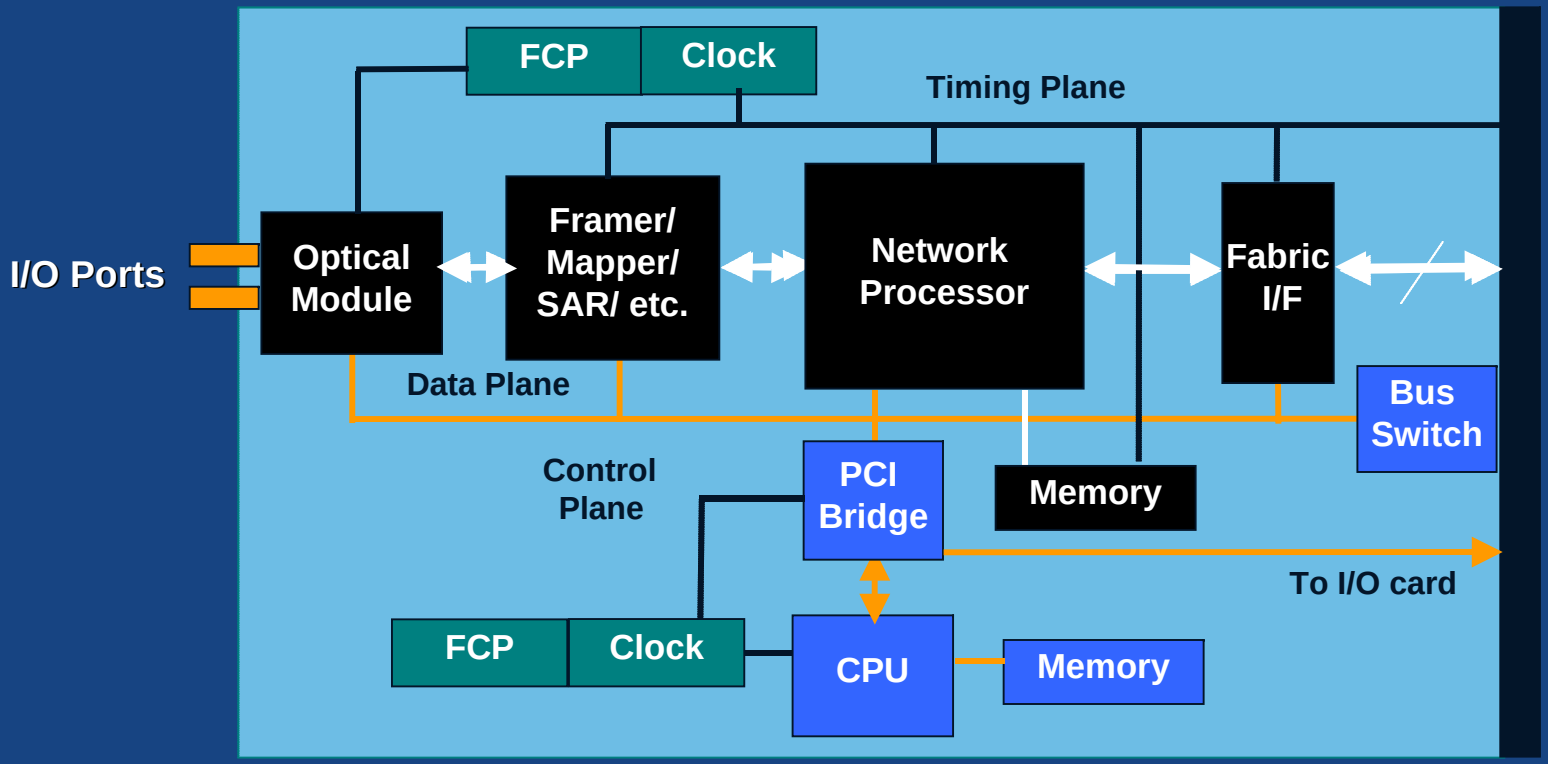
PERICOM Semiconductor Corporation

PCI Bridge Applications

- → Routers & Switches - #1 Application
- → HBA and NIC Cards - #2 Application
  - Fibre Channel Adapter Cards-Servers
  - GbE NIC cards-Servers
  - RAID Controller Cards
- → PC Add in Cards – #3 Application
  - Graphics Cards
  - Video Encoder/Decoder Cards
- → Industrial PC
- → Video Surveillance
- → Multi Function Printers
- → And Many More!



PCI in Control Plane



PCI Bridges used for:

- Bridge to data plane processors and elements
- Bridge to daughter or I/O card across midplane

Bus Switches used for:

- Switching data or control plane signals across back/midplane

Multiservice Access Router

→ **Overview:**

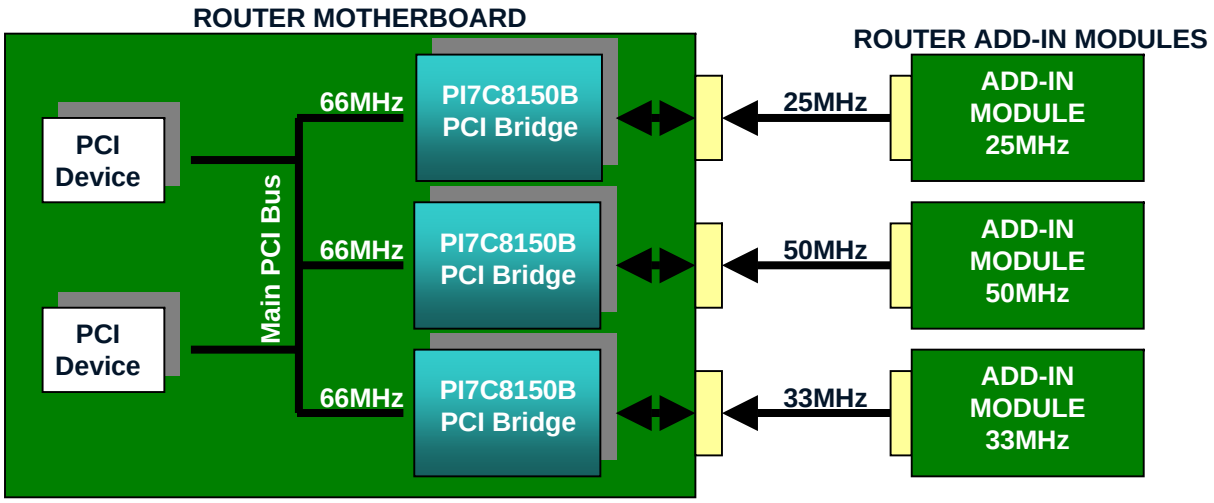
- Access routers help direct packets of information to their proper destination across different networks around the world.

→ **Pericom Solution:**

- The PI7C8150B helps these routers incorporate legacy add-in modules as well as newer faster modules.

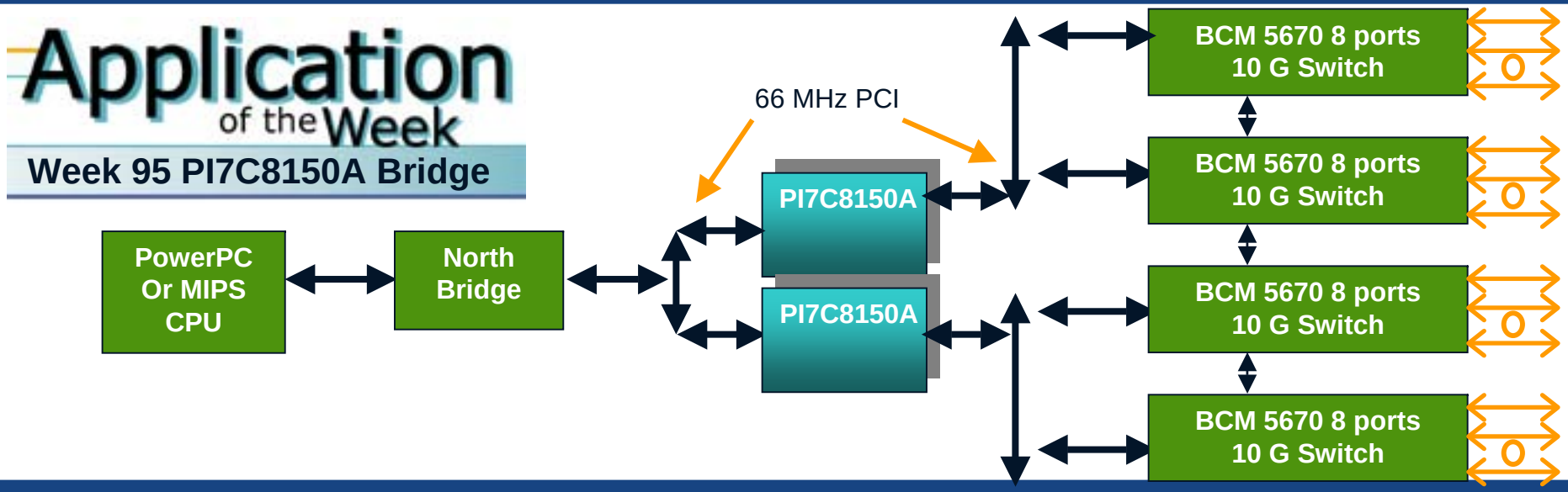
Application of the Week

Week 79 PI7C8150B Bridge



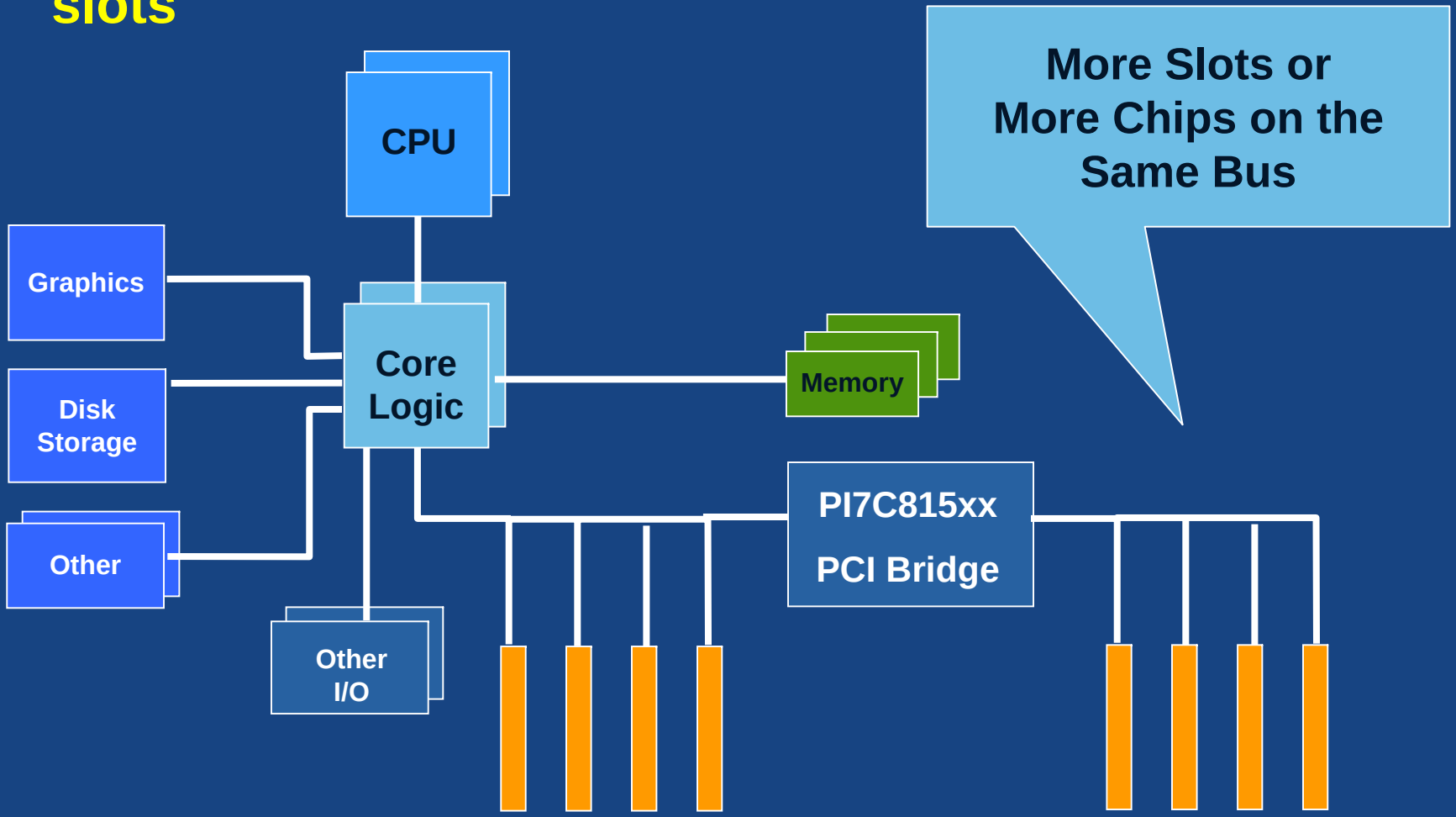
Ethernet Switch for Blade Server

- **Ethenet is:**
  - widely used to connect the workplace and home to the Internet
  - switches help channel the incoming data from any multiple input ports to a specific output port that takes the data to its intended destination.
- **Pericom Solution:**
  - The PI7C8150A allows multiple Ethernet Switch devices to reside on one board



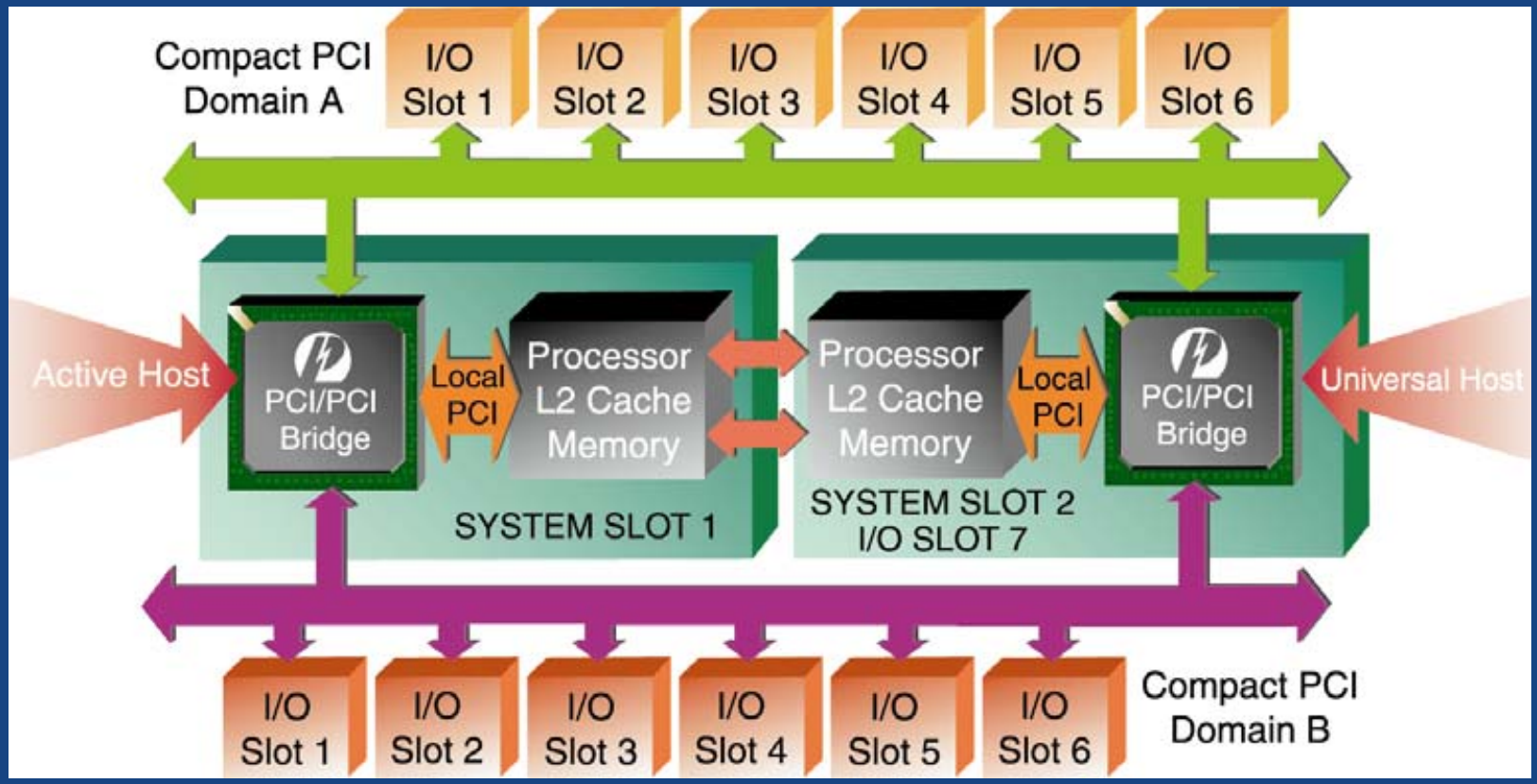
PCI Bus Expansion

→ **Expand a system's loading capability or number of slots**



Provide Redundancy

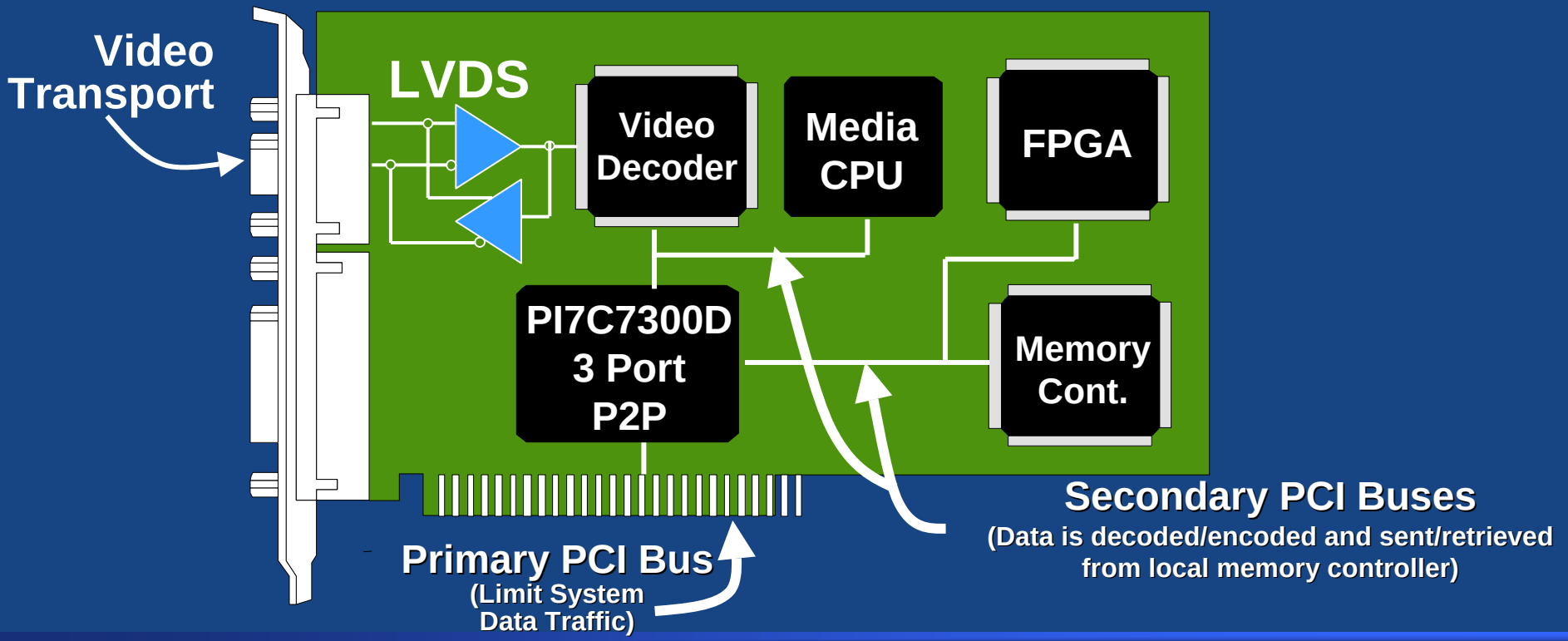
→ **PI7C7300D may be used for redundant applications**



Traffic Isolation

→ **PI7C7300D: Ideal for Multimedia Card**

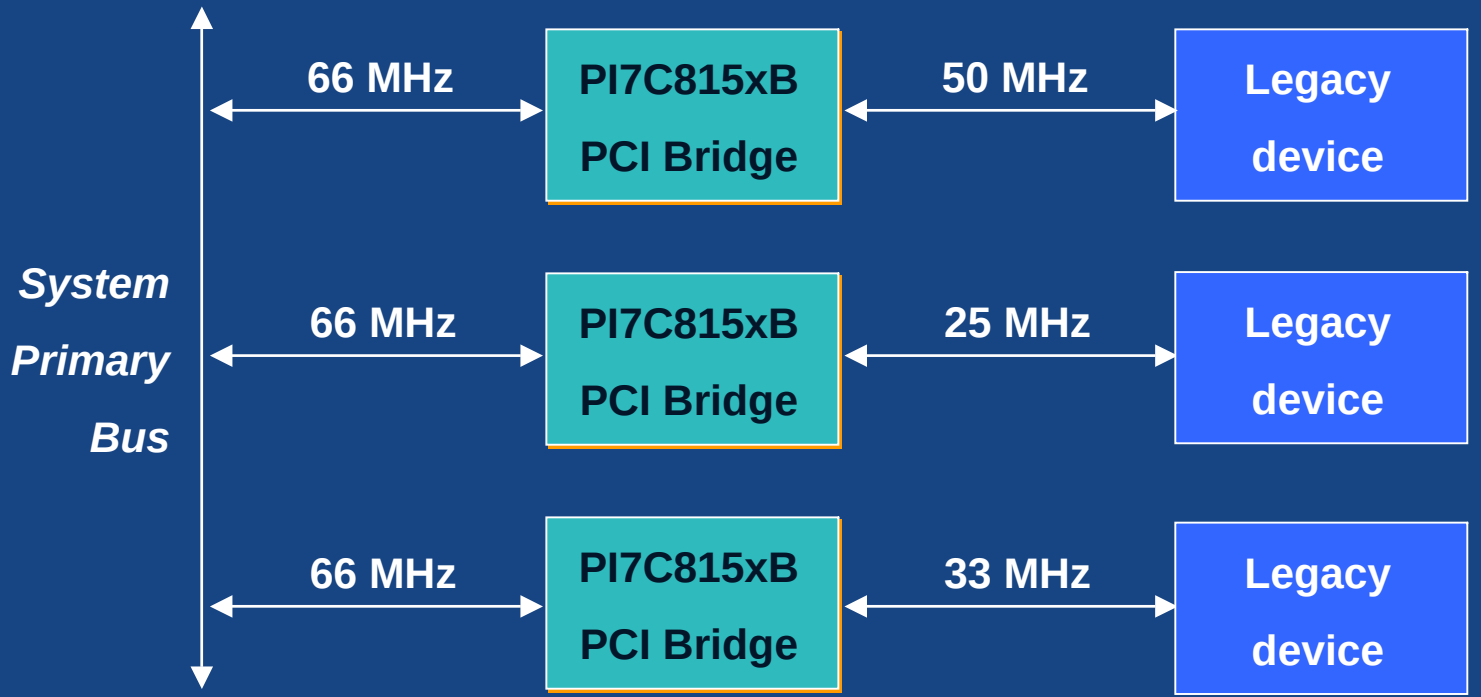
- Isolate traffic from Primary bus
- Increase overall system performance by isolating video data traffic on the secondary buses



Asynchronous Mode

→ **PI7C815xB - Asynchronous support**

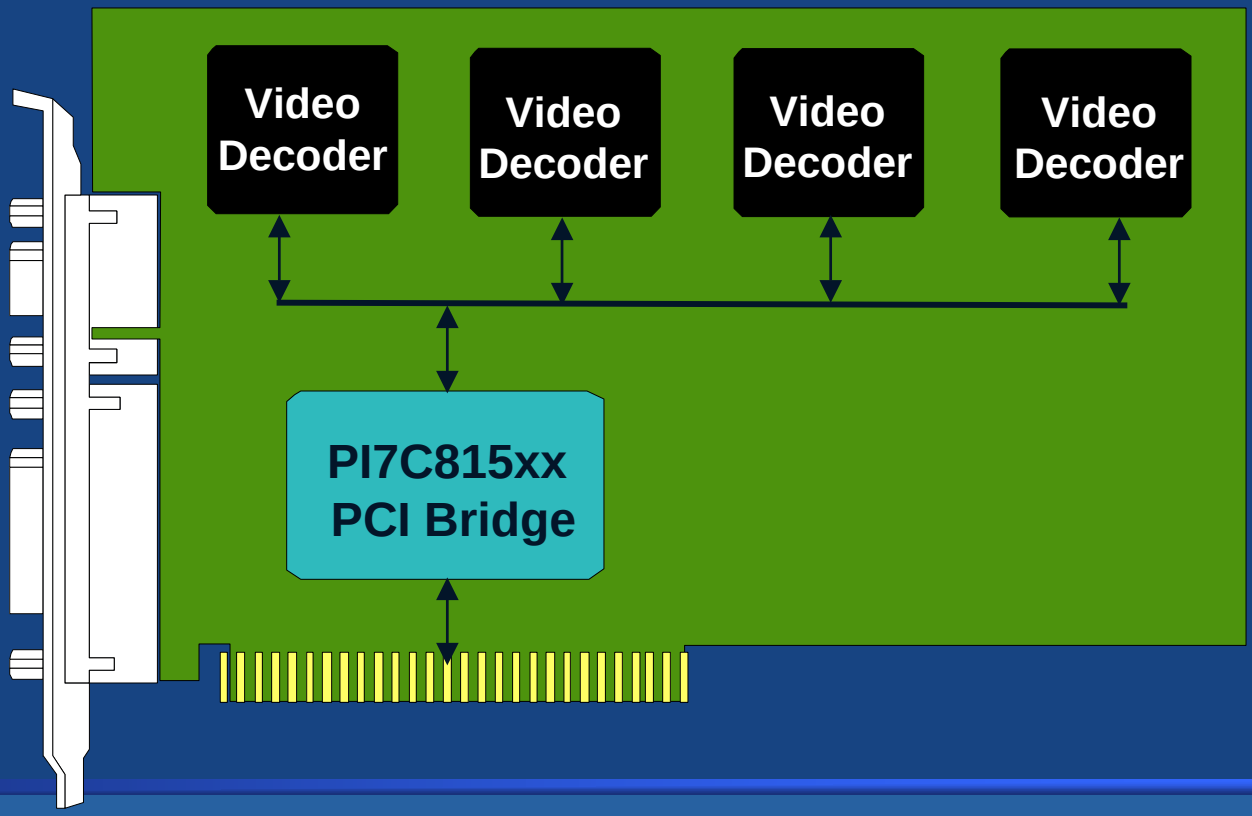
- **Support for legacy products at 25MHz or 50MHz**



Multi-Port PCI Add-In Cards

→ **Allow multiple devices on add-in cards**

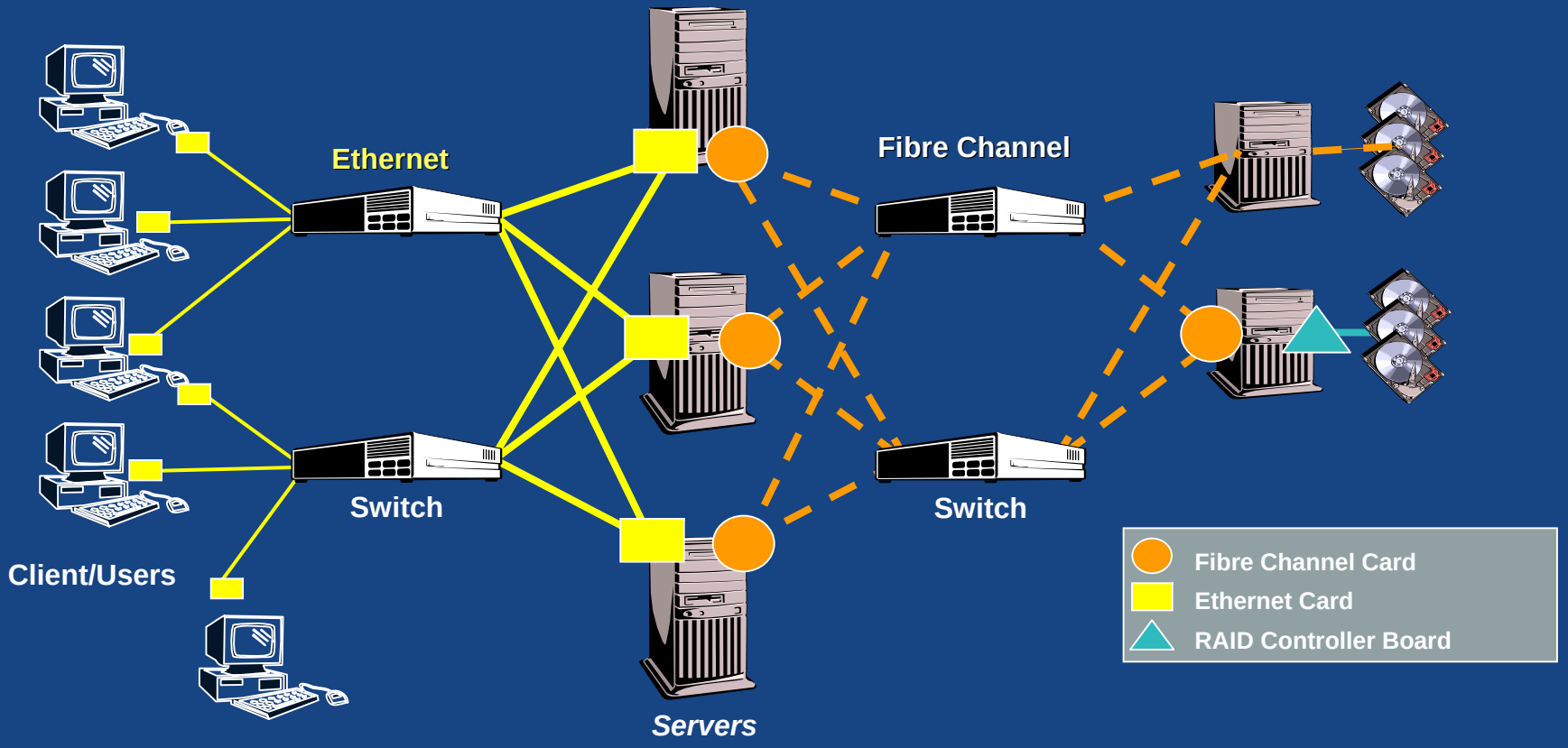
- **Only one device is allowed per PCI slot**
- **The PCI Bridge allows multiple devices per slot**



Storage Area Networks

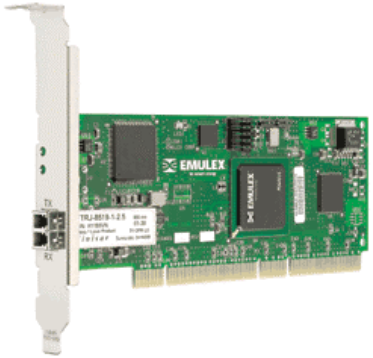
→ SAN (Storage Area Network)

- Bridges are used on interface cards in a SAN application
  - Multi-port Fibre Channel, Ethernet, and RAID Controller Cards



General PCI Bridge Applications

- Routers & Switches
- Fibre Channel Adapter Cards*
- Ethernet (10, 100, 1000, 10000) NICs*
- RAID Controllers*
- Industrial PCs
- Graphics Cards*
- MPEG Encoder/Decoder Cards*
- Video Encoder/Decoder Cards*
- Video Surveillance
- And Many More!



** Multiport/Channel Applications*

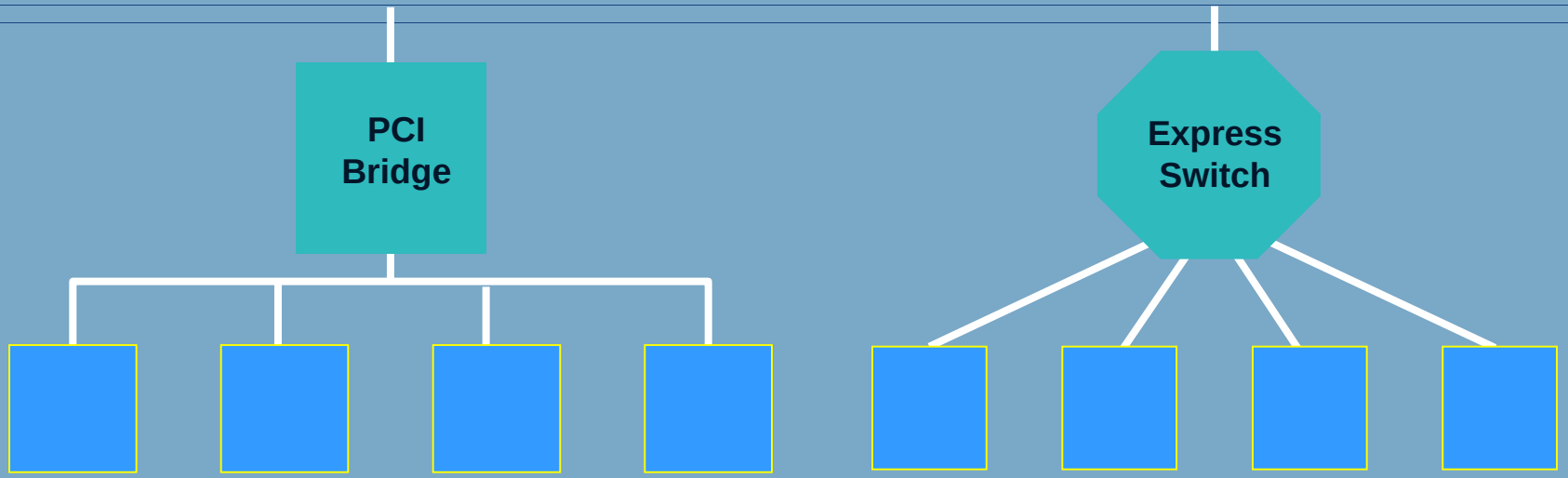
PCI Express Products & Applications

Bridges & Switches

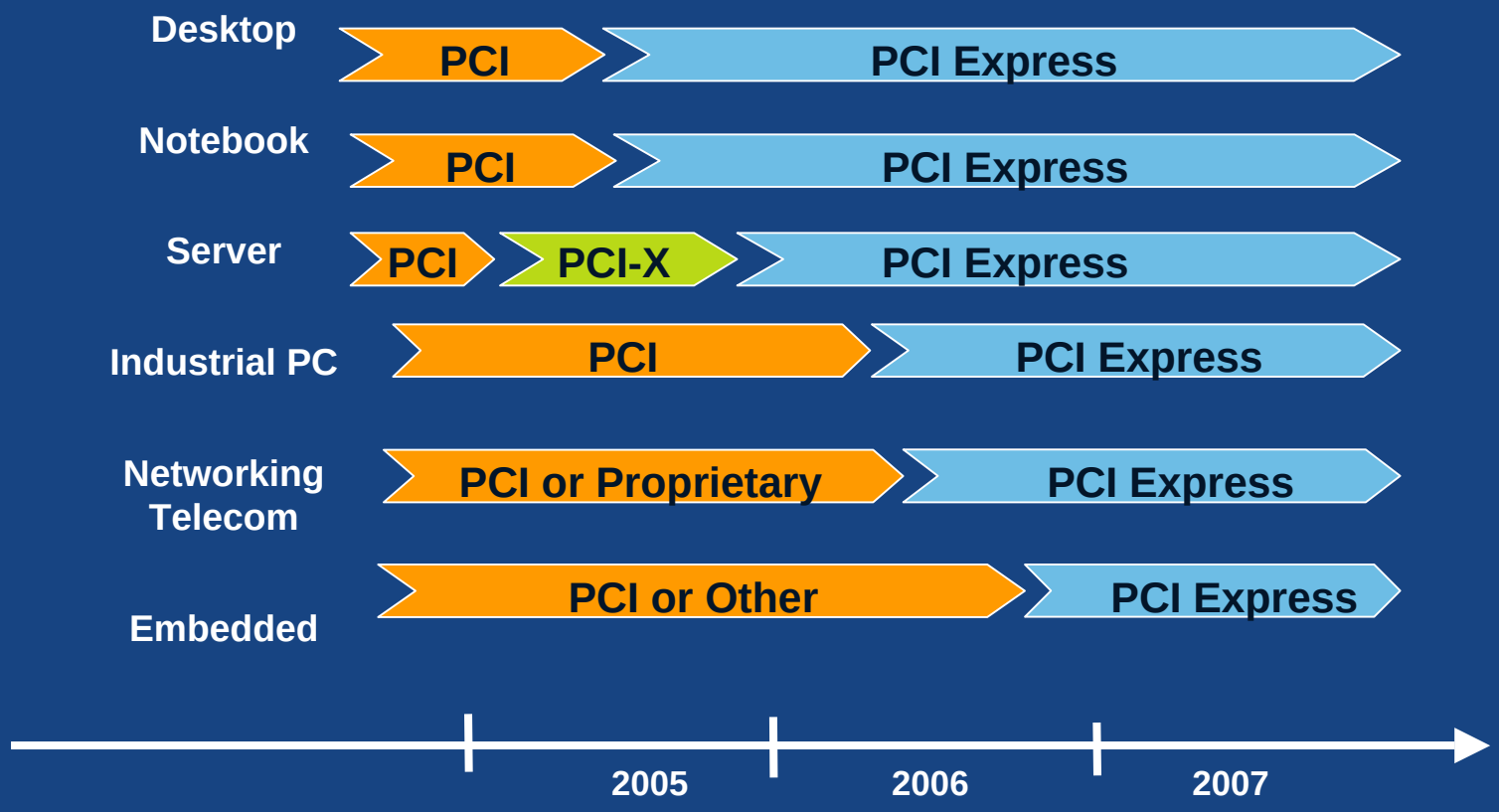
PERICOM Semiconductor Corporation

Technology Shift to PCI Express

- **PCI Express is the next generation I/O protocol, introduced by Intel in 2004 as the PCI replacement**
  - **PCIe is a high speed (2.5Gb/lane) point to point connection.**
  - **Devices are switched - not shared on a bus.**
  - **Up to 32 lanes can be grouped together for a huge 80Gb Link.**
  - **Intel has driven the early need with PCIe chipset introduction**



Technology Shift to PCI Express



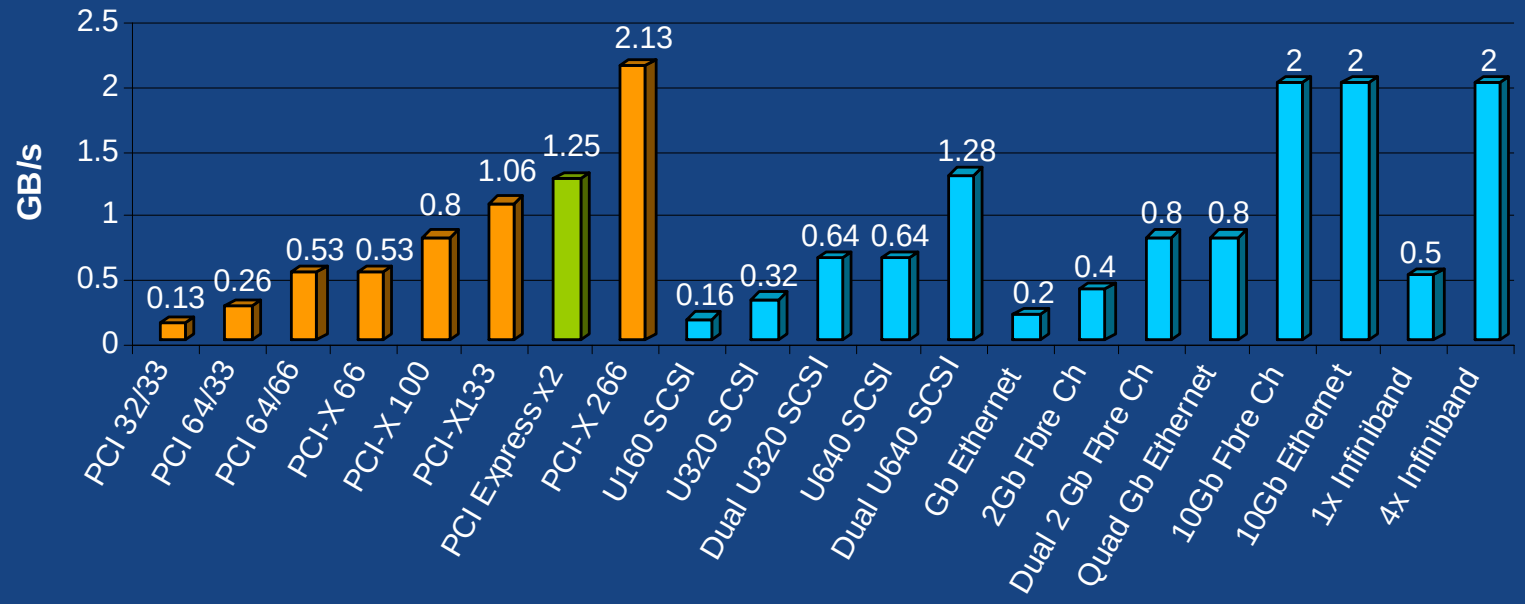
→ **All major markets are transitioning to PCI Express**

- Driven by Intel and other CPU chipsets, PCIe is rolling out.
- Pericom is leveraging its PCI leadership into PCIe.

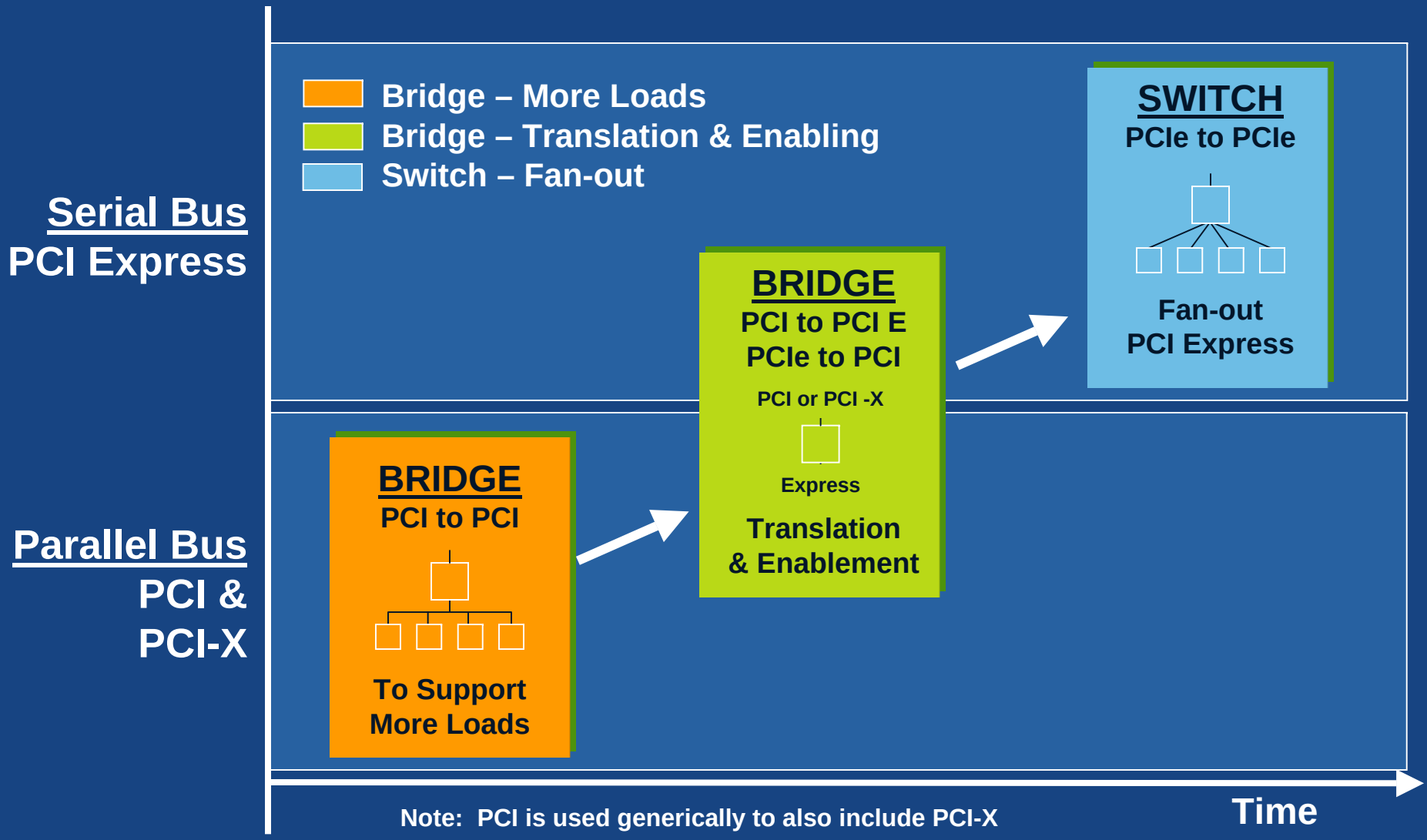
Bandwidth Driving New Bus Standard

→ **PCI Bus Performance:**

▪ PCI	32-Bit/ 33MHz	0.13GB/s	1Gb/s
▪ PCI	64-Bit/ 66MHz	0.53GB/s	4Gb/s
▪ PCI-X	64-Bit/133MHz	1.06GB/s	8Gb/S
▪ PCI Express	4 Lanes	2.50GB/s	20Gb/s



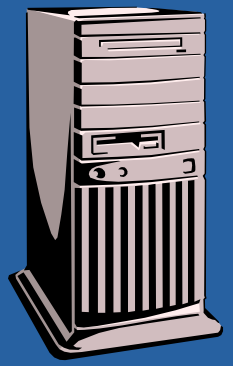
Market Requirements



System Level Translation Needs

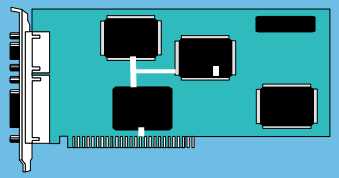
New & Future Systems

PCI Express Based System



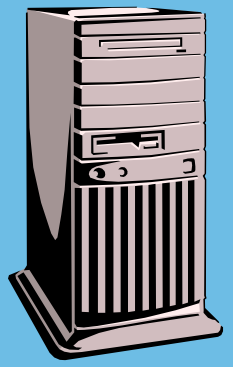
Legacy Cards & Systems

PCI or PCI-X Based



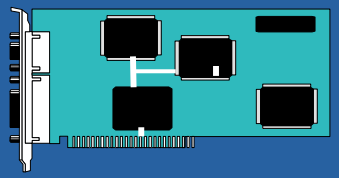
Legacy Systems

PCI or PCI-X Based System



New & Future Cards & Systems

PCI Express Based



PCIe Bridge & Switch Products

→ **Pericom has new PCIe products for introduction in 2005:**

- **PCI Express to PCI/PCI-X Bridge - PI7C9X110**
- **PCI Express Packet Switch – PI7C9X20404**

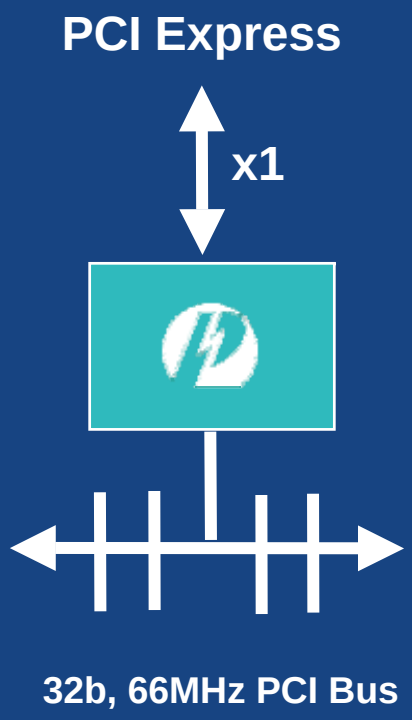
Additional PCIe products are following soon

- **Contact Pericom sales for more information on the complete Pericom PCIe roadmap.**

PCIe Express to PCI Bridge

→ **PI7C9X110**

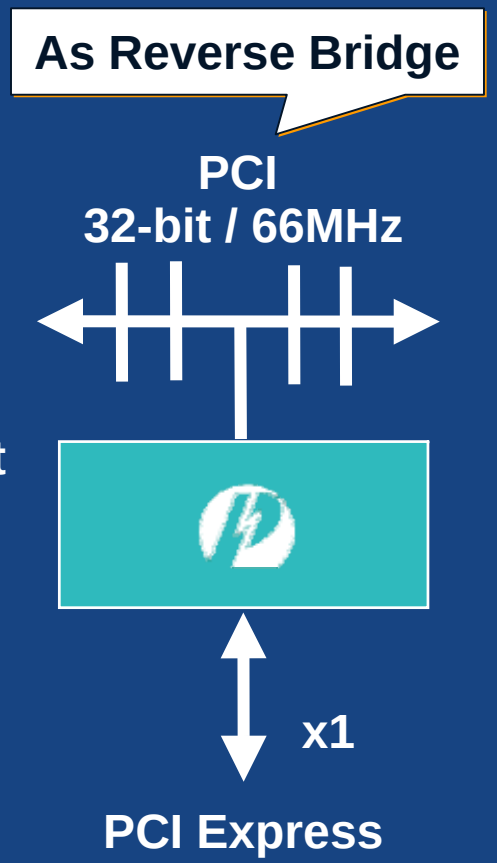
- Single x1 reversible PCIe to PCI bridge
- Application:
  - Basic Building Block for Legacy Translation and Bridge
- Target Application:
  - PC, NB, WS, and Peripherals
  - Add in cards
  - Embedded CPU
  - Control Plane for Switch/Router
  - Printer / Copier
  - Bridge to Legacy PCI



PCI Express to PCI Bridge

→ PI7C9X110 Features

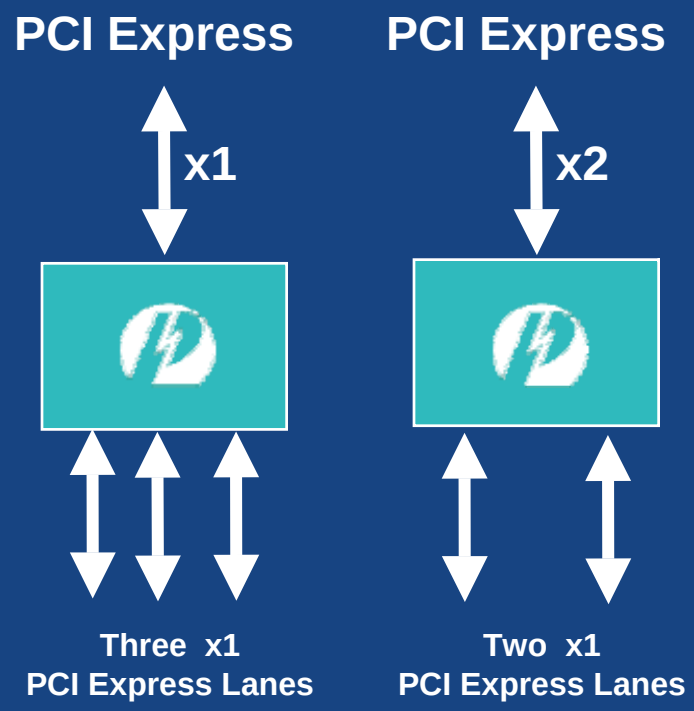
- Reversible - PCIe configurable as Primary or Secondary
- PCI port - 32-bit/66MHz
  - 3.3V signaling w/5V I/O tolerance
  - Support for up to 8 PCI devices
  - Configurable Transparent/Non-transparent
  - Internal arbitration for 8 PCI bus masters
  - Programmable 2-level priority arbiter
- PCI Express Port x1 Lane
  - PCI Express Hot Plug
  - Programmable 2-level priority arbiter
- GPIO Support
- Isochronous support



4-Lane PCI Express Switch

→ **PI7C9X20404**

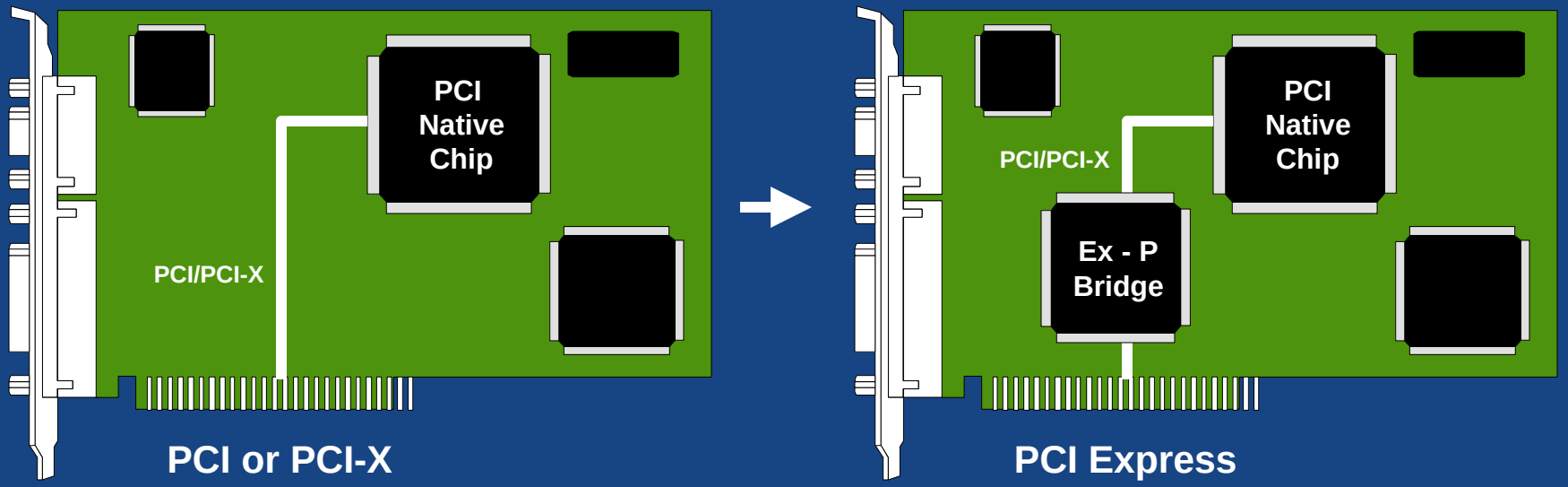
- Single x1 lane to three x1 lanes
  - Or x2 lane to two x1 lanes
- Application:
  - Basic Building Block for Simple Switch requirements
- Target Application:
  - Servers including Blade
  - Embedded CPU applications
  - PCIe Native Multiple Channel
    - GigE, Fibre Channel, RAID
  - Control Plane for Switch/Router
  - PC Cards & Docking Stations



PCIe to PCI/PCI-X Bridge

→ **Enables**

- **Legacy Systems to Work in New PCI Express Based Systems**
- **Time to Market: *Don't wait for Native PCI E Silicon***
- **Risk Management: *Allow faster target market development***

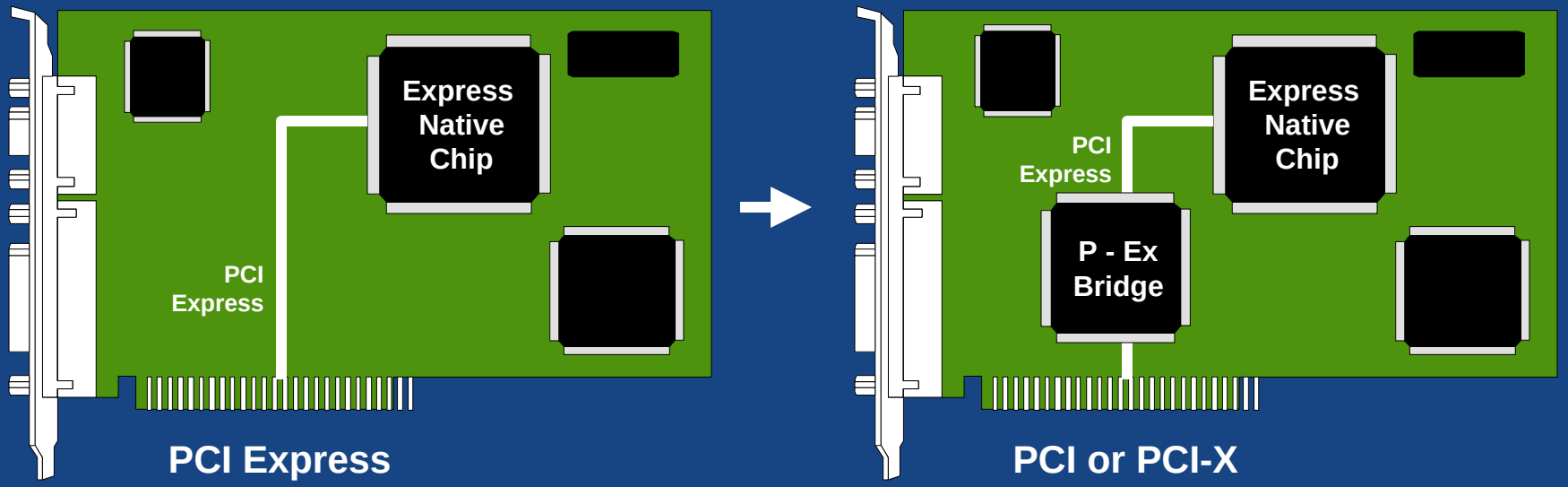


Known as a "Forward" Bridge

PCI/PCI-X to PCIe Bridge

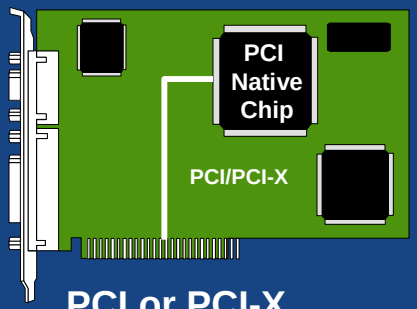
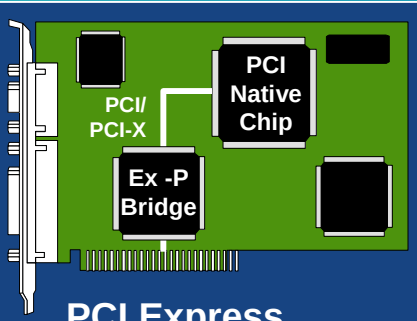
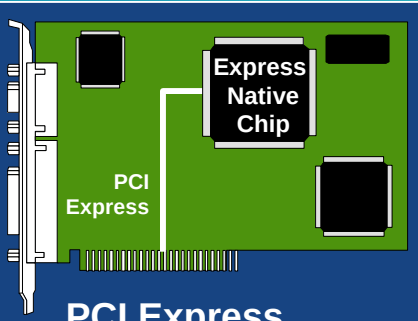
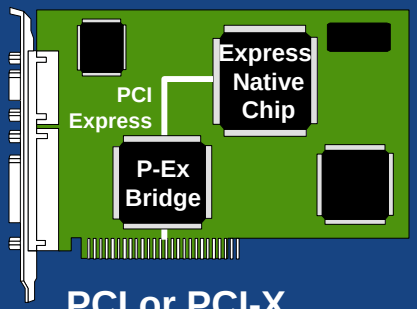
→ Maximize New Investments

- **Allows Investments in PCI Express Native Chips & Systems to still support legacy PCI and PCI-X Systems**

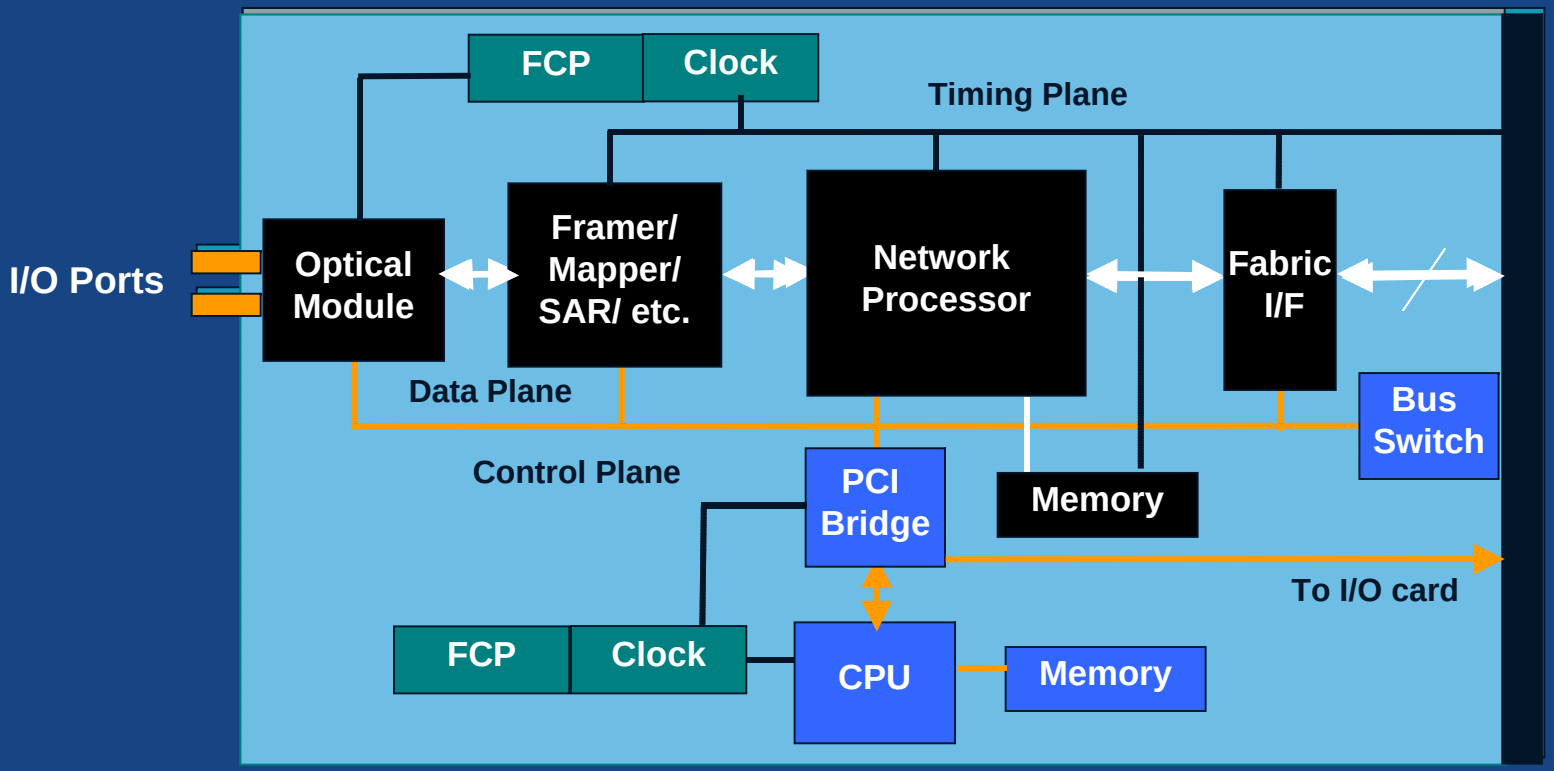


Known as a "Reverse" Bridge

Bridge Investment Enhancement

Today	Enable	Native	Backfill
			
PCI or PCI-X	PCI Express	PCI Express	PCI or PCI-X
Current Market	Next Market	Developed	Legacy
Shipping in Volume	Get to Market Quickly	Cost Reduction Opportunity	Service Special Opportunities
Investments Already Made	Minimize Risk & Investments	Go Native if High Volume & Cost Effective	Leverage Advancements in New Silicon Feature

PCIe in Control Plane



PCIe Bridges used for:

- Bridge from PCIe CPU to PCI data plane processors / elements
- Bridge to daughter or I/O card across midplane

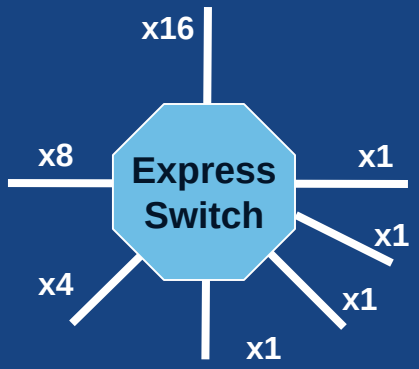
Bus Switches used for:

- Switching data or control plane signals across back/midplane

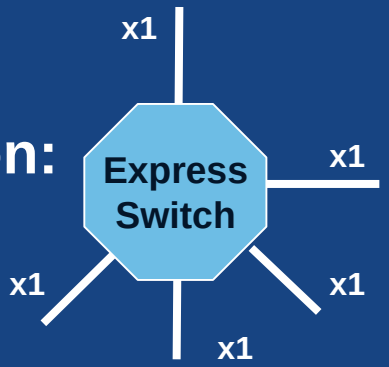
Switch Needs

The point to point serial PCI Express bus will demand switches to direct traffic

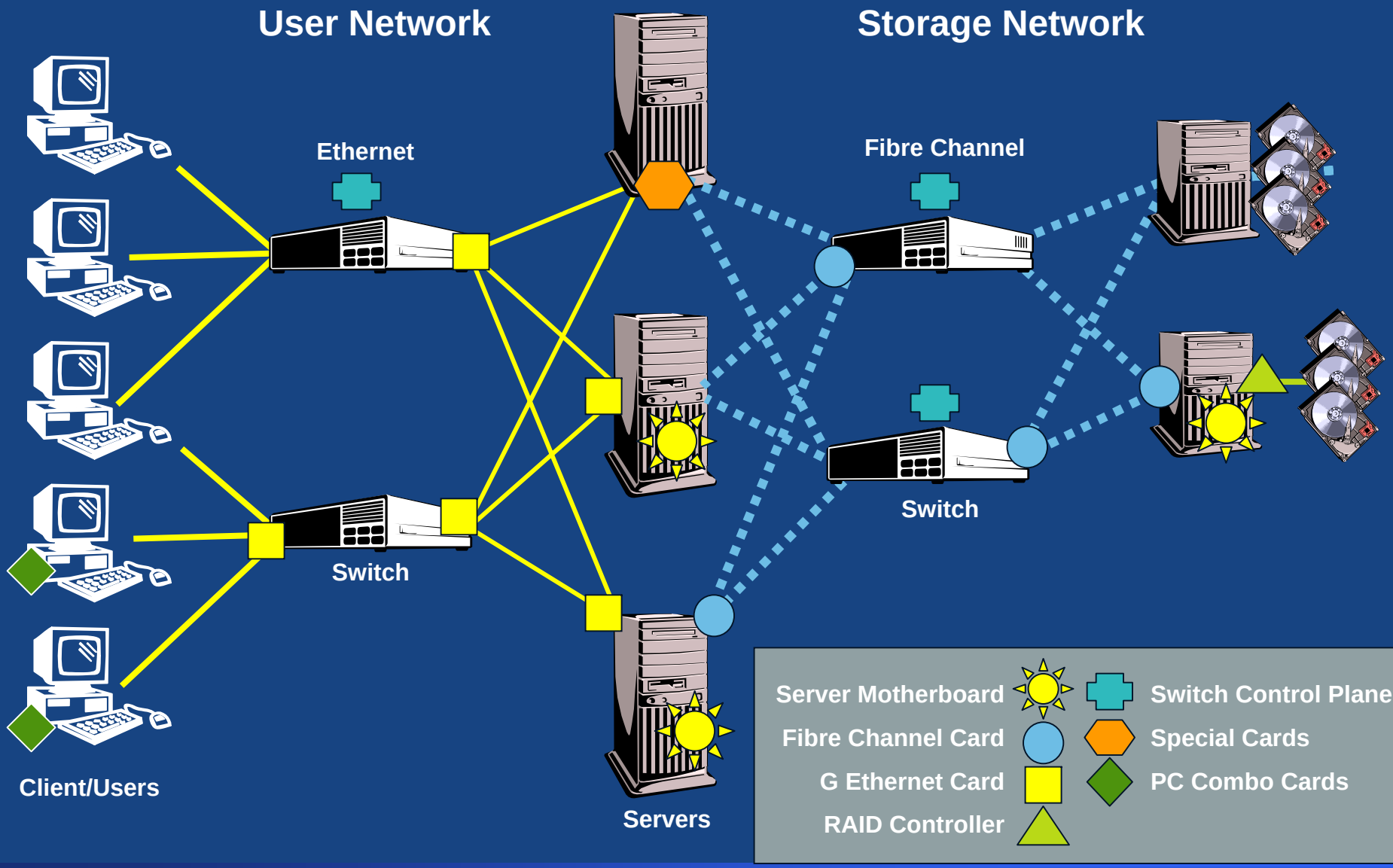
- The architecture & the bandwidth requirements will vary greatly:
  - Simple devices like x1 to Four x1 Switch
  - Larger devices with x8 or x16 upstream lanes switching to multiple downstream configurations
    - X8, x4, x1



- Configurations Required will be based on:
  - Bandwidth Required (# of Lanes)
  - Number of End Points



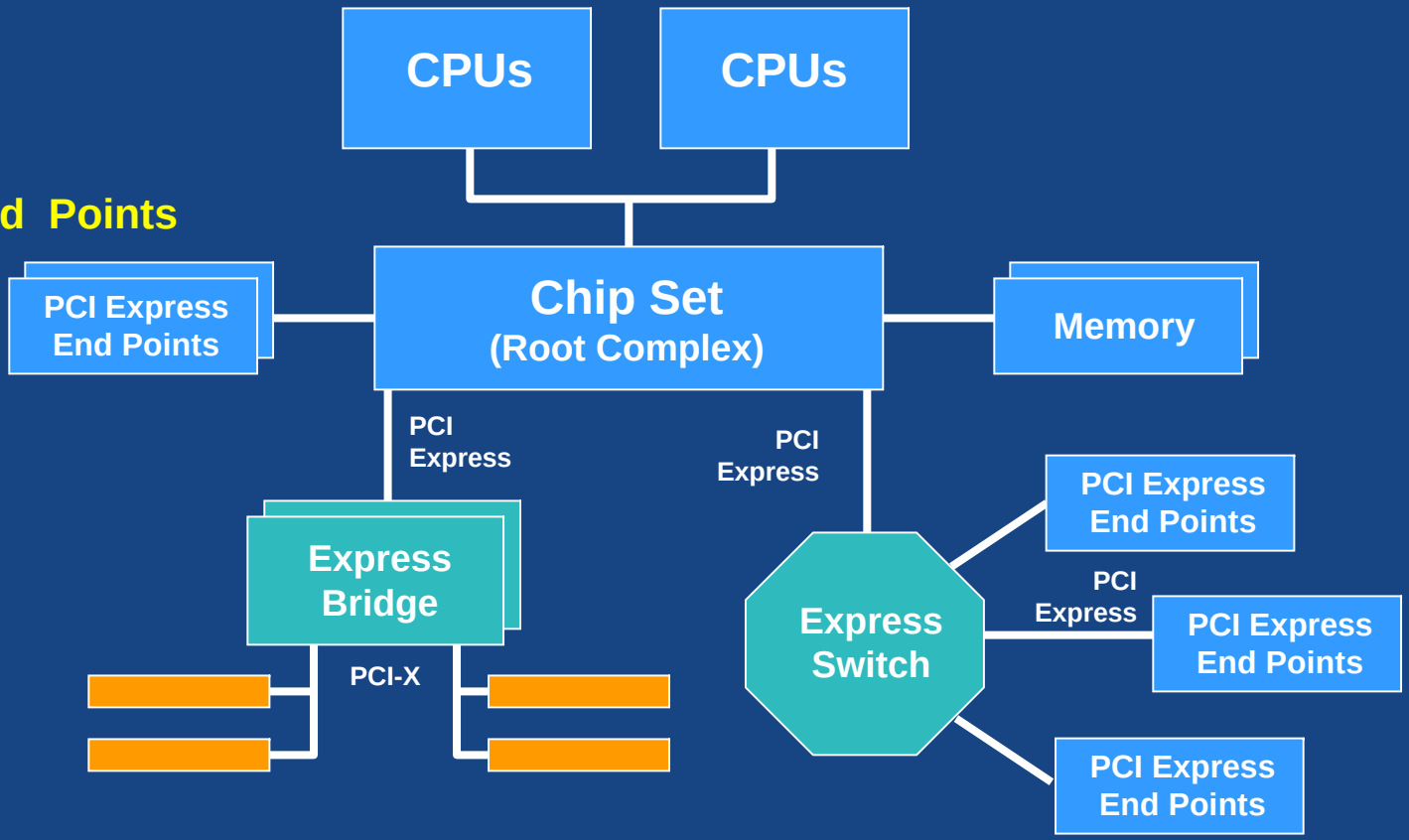
PCI Express Applications



Generic Server Platform

PCI Express End Points

- Graphics
- Fibre Channel
- RAID
- GE & 10GE
- Infiniband

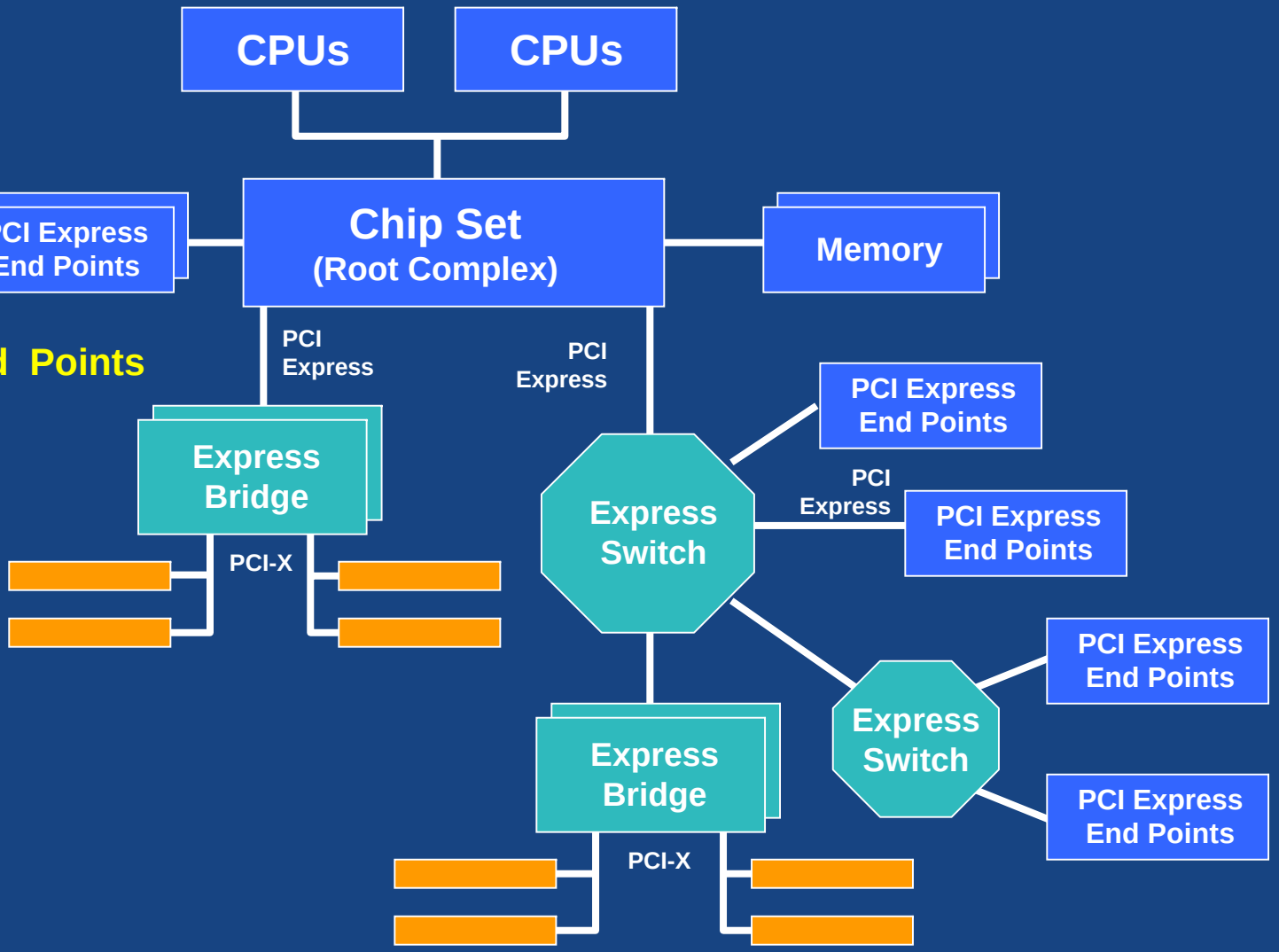


Note; Not all Servers will incorporate an Express Switch in the Architecture. Some will use an add-in card to attach more peripheral devices. Also depends on Intel Chip Set.

Expanded Generic Server Platform

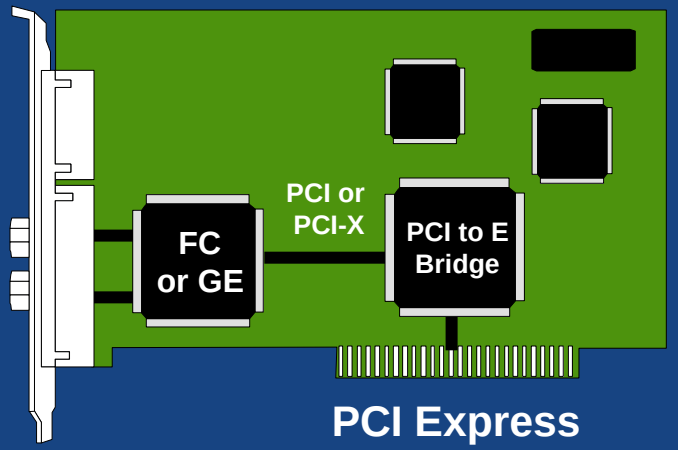
PCI Express End Points

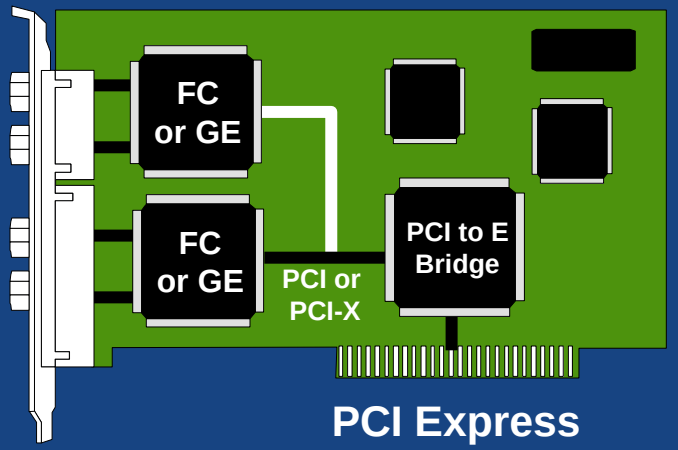
- Graphics
- Fibre Channel
- RAID
- GE & 10GE
- Infiniband



Fibre Channel, RAID, & Ethernet

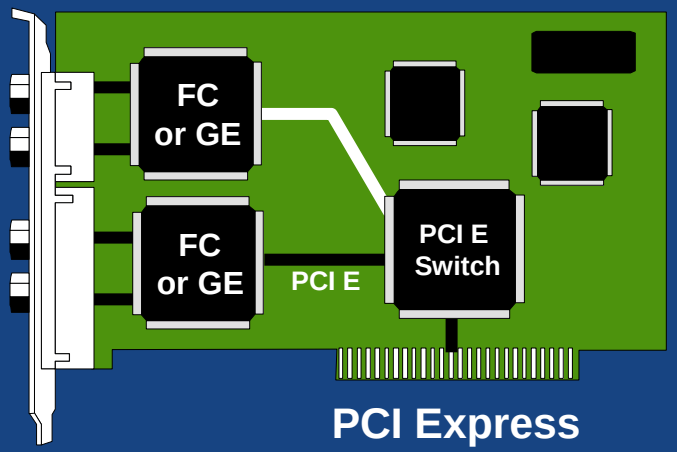
- → **Enable current PCI/PCI-X Silicon**
  - Support PCI Express Servers
- → **Support Multi-channel Capabilities**
  - beyond single chip capabilities
- → **Special Combo Cards**



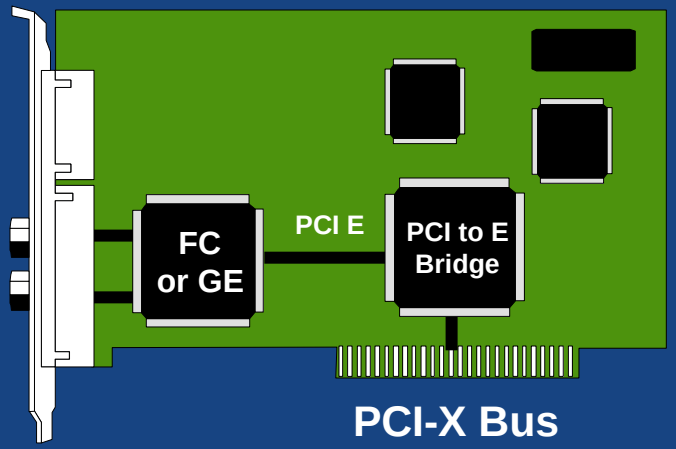


Fibre Channel, RAID, & Ethernet, Native

- → **Support Multi-Channel Capabilities**
  - beyond single chip capabilities
    - PCI Express Switch
- → **Special Combo Cards**
  - Fibre Channel & G Ethernet, etc.
- → **Support**
  - Legacy Applications with Enhanced and New PCI Express Silicon
    - Using a PCIe to PCI-X Bridge



PCI Express

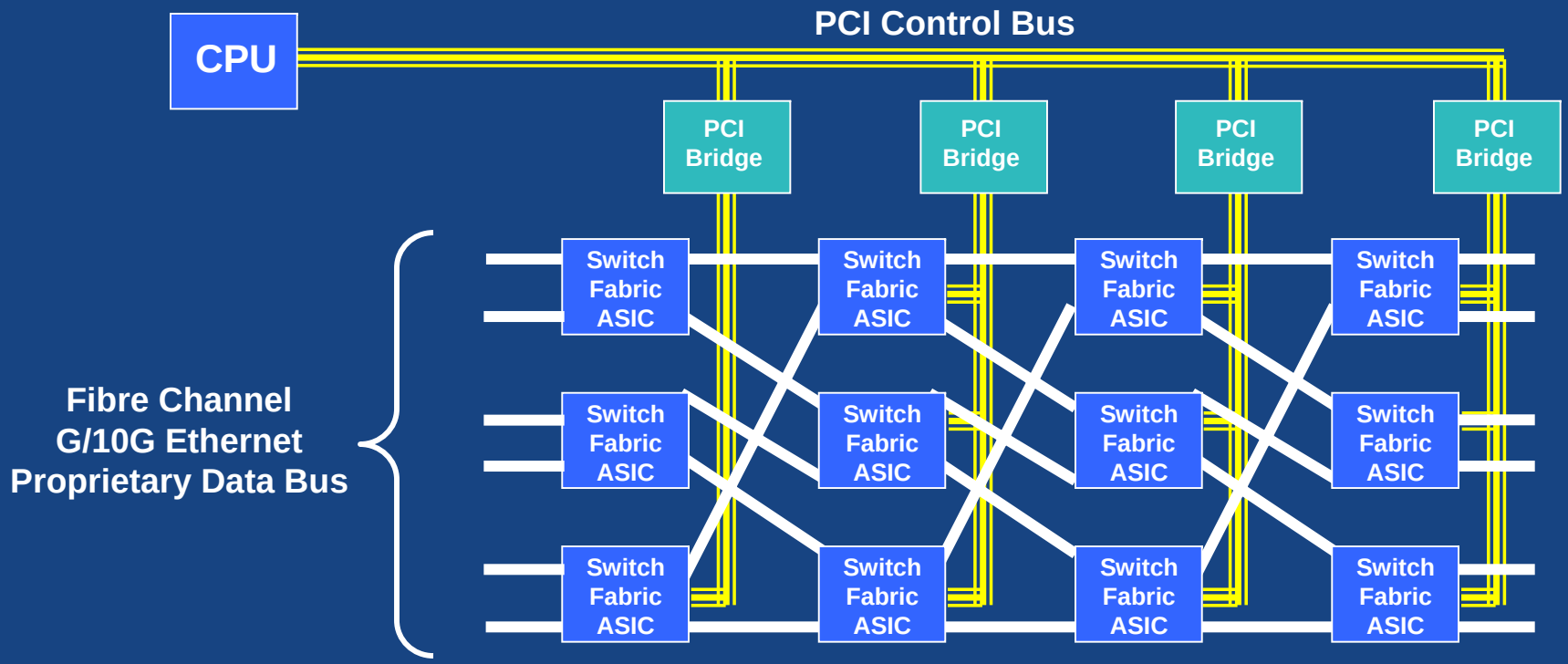


PCI-X Bus

Today's Network Switch

→ **PCI Currently used primarily on the Control**

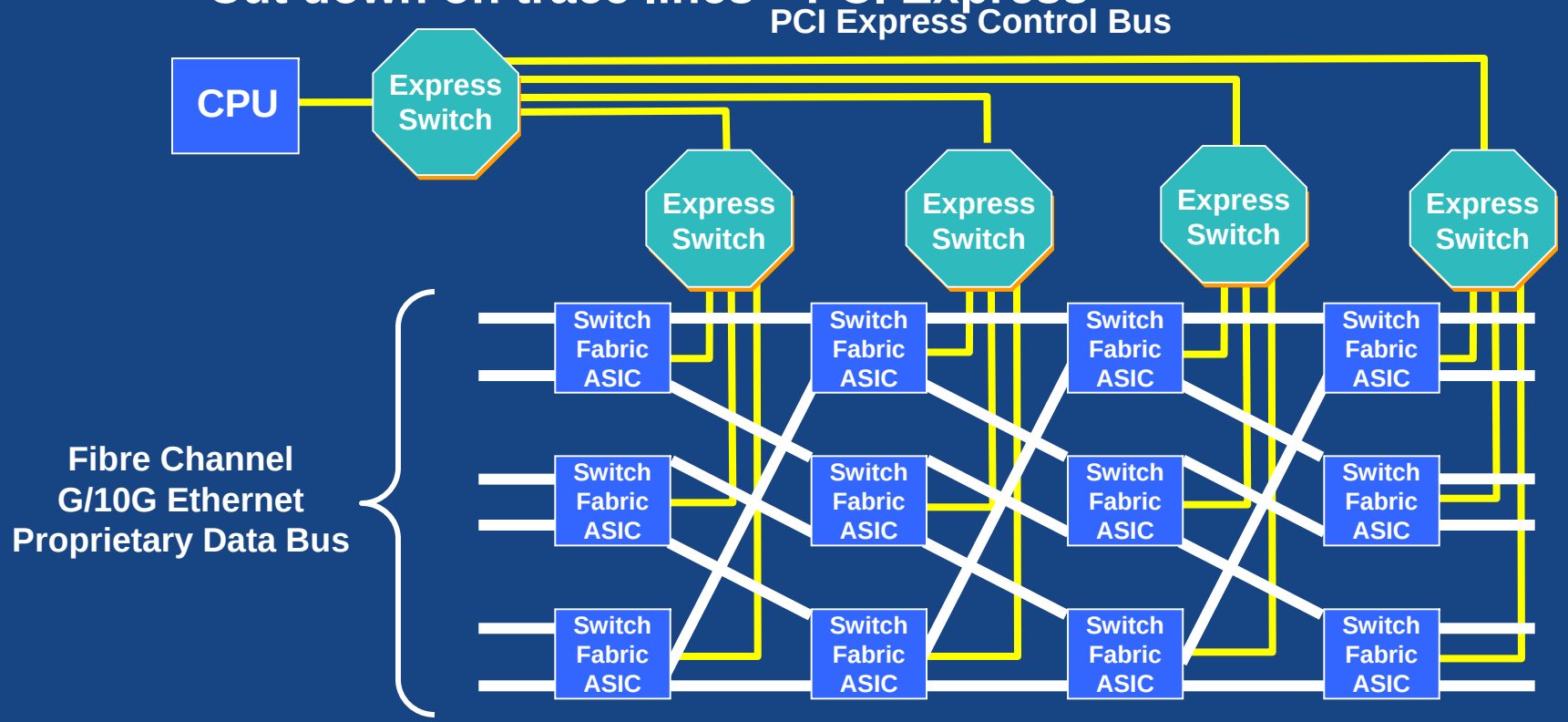
- **Works well but layout challenges make boards complex**



Future Network Switch

→ **PCI Express Switches for Control Plan**

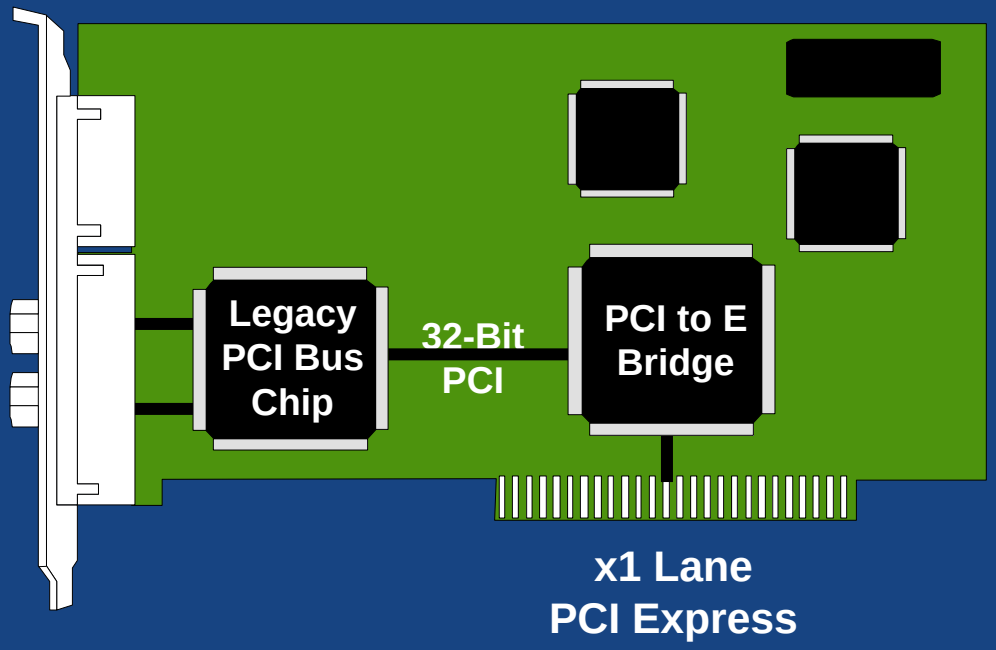
- Cascaded Switches can handle a large number of end points
- Cut down on trace lines – PCI Express



PC Add-in Cards, PCI Based

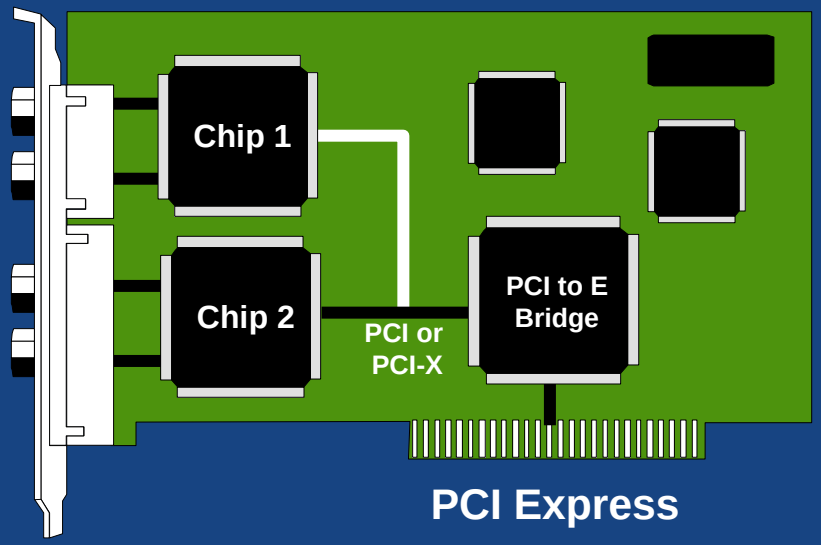
→ **Enable current PCI Silicon**

- **Support PCI Express PCs with Current PCI Based Devices**
- **1 Lane PCI Express to 32-bit, 33MHz to 66MHz PCI**



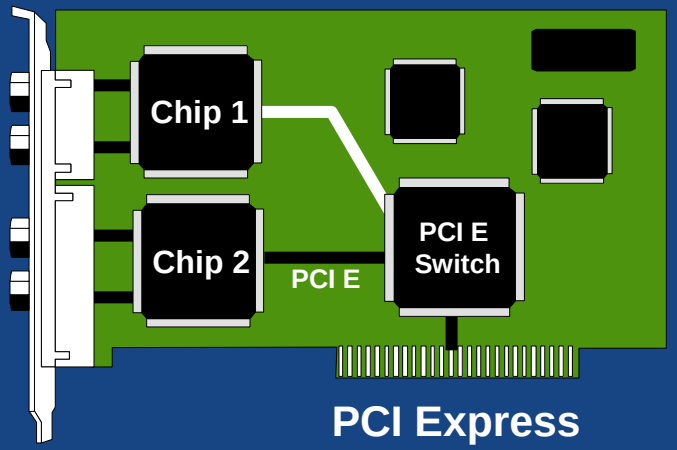
PC Add-in Cards, PCI Based

- **Multiple Function Cards**
  - Known as “combo cards”
  - Example:
    - Mix of Audio, Video, USB, etc.
  - Requiring multiple intelligent devices on bus
- **Multi-channel Capabilities**
  - beyond single chip capabilities
    - Example:
      - Video Security Monitor Cards

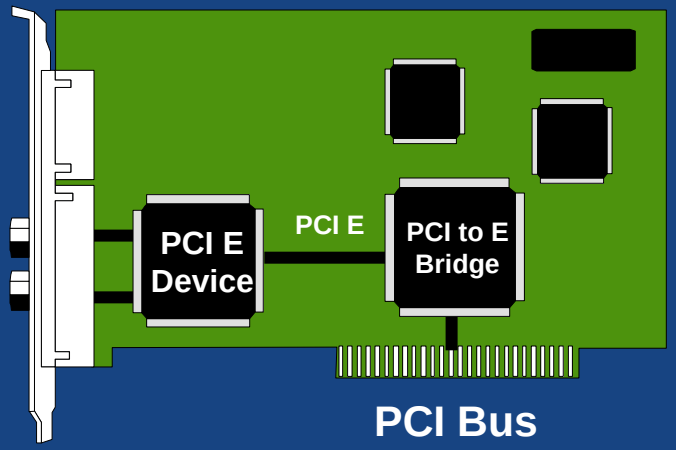


PC Add-in Cards, Express Native

- → **Support**
  - **Multi-Intelligent Chips/Functions**
    - **Using PCI Express Switch**
    - **”Combo” Cards**
    - **Video Security Cards with many channels**



- → **Support**
  - **Legacy Applications with Enhanced and New PCI Express Silicon**
    - **Using a PCI E to PCI Bridge**



*** Or SAS Controllers**

Packet Switch Applications

→ **Networking and Storage Control Plane:**

- Motherboard based switches and servers
- Blade Card chassis based servers and switches
- Embedded System interconnect

→ **Networking and Storage Data Plane:**

- PCIe Serial Backplane replaces costly and non scalable solutions in blade based chassis

→ **PC and Server Computing Systems:**

- CPU chipset to Ethernet, FC, SATA, LB, and other protocols
- High Bandwidth storage data path - SATA

Pericom PCIe System Solution

→ **Pericom provides industry's broadest range of system components for PCIe designs:**

- Express Signal Switches
- Express Packet Switches
- Express to PCI/PCI-X Reversible Bridges
- 410 Clock Family
- Crystals
- Spread Spectrum Express Clock Buffer (Add more clocks)
- Memory Buffers
- Video/Audio Switching (USB Switch for KVM function)
- Express Signal Conditioner
  - Re-Timer, Re-Driver

PCI, PCI-X, PCIe Summary

- → **Pericom is a leading bridge supplier**
  - Experienced and Committed
  - Qualified and Supplying to Tier 1 worldwide customers
  - Financially Sound Public Company
- → **Enhanced PCI & PCI-X Bridge Devices Available Today**
  - High Performance and Cost Effective Replacements for competitive solutions
  - 3-Port Bridge is industry exclusive
  - Asynchronous Devices
  - Dynamic Prefetching Control feature
  - Industrial Temp Products
- → **PCI Express Bridge and Packet Switch Introduction**
  - The beginning of a complete PCIe family
  - Leveraging from our successful PCI solutions

Thank You

End of Presentation

PERICOM Semiconductor Corporation