Token Ring/Ethernet Backbone Products

Protocol Independent Backbone Transport

Session 703
Token Ring to Ethernet
Migration Strategies

Possible Paths

• Wholesale conversion to Ethernet
• Install new Ethernet infrastructure
• Update all desktops

26%

• Keep Token Ring
• Upgrade with switching
• Purchase Token Ring NICs for new PCs

22%

• Upgrade existing Token Ring with switching
• New buildings installed as Ethernet

52%

Source: IDC Survey April 1998
### What Is the Smart Choice?

**Shared Token Ring**
- Media independent switching
  - Token Ring and Ethernet traffic over a single high speed backbone for migration or coexistence
- Position your future Token Ring network
  - Complete application flexibility
  - No shared media fault domains

**Media Independent Switching**

### Second Generation Switching

**High-Performance, High-Function, Low Cost per Port**

- Media-rate performance for unicast, broadcast, and multicast frames
- Support for all bridging modes and DTR
- Protocol filtering
- High-speed uplinks (frame and cell)
- RMON traffic management
Solving Token Ring Problems

- Enhance Token Ring performance
  - MicroSegmentation
  - DTR for servers
  - Hub replacement with switches
- Scale campus backbone
  - Frame (ISL) or cell (ATM) based
  - Multiple VLANs
- Increase server throughput

ATM and ISL Protocol Independent Backbone Transport Options
Inter-Switch Link

ISL Enables VLANs Across the Backbone!

- 100 Mbps Token Ring and Ethernet Transport
- Effective between switches, routers, intelligent server NICs
- Nonintrusive to client stations

Inter-Switch Link (ISL)

- Frame “tagging” mechanism
  VLAN ID field in ISL header
- VLAN ID definitions distributed via VLAN Trunking Protocol (VTP)
- Ethernet and Token Ring VLANs supported
**ISL Networking**

- High-speed networking alternative to ATM
- 100/1000 Mbps Token Ring switched backbone
- Ethernet and Token Ring frames can share same ISL link
- Direct server attach

![ISL Networking Diagram](http://www.cisco.com)

**ISL Server NIC**

- Supports both Ethernet and full-size Token Ring frames

![ISL Server NIC Diagram](http://www.cisco.com)
**HSTR Customer Feedback**

Survey of 200 Large Token Ring Sites

- Many customers will move to Ethernet anyway
- HSTR will still cost more than Ethernet
- No VLAN or gigabit support until 1999 or beyond
- Effort Driven by Token Ring NIC vendors

Source: International Data Corp. (Framingham, MA)

---

**ISL vs. HSTR**

<table>
<thead>
<tr>
<th>Feature</th>
<th>ISL</th>
<th>HSTR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Point-to-Point</td>
<td>Yes</td>
<td>H2 '98</td>
</tr>
<tr>
<td>Full Duplex</td>
<td>Yes</td>
<td>H2 '98</td>
</tr>
<tr>
<td>Shared</td>
<td>Yes—Ethernet</td>
<td>No</td>
</tr>
<tr>
<td>100Mbps</td>
<td>Yes</td>
<td>H2 '98</td>
</tr>
<tr>
<td>Trunk Aggregation</td>
<td>Yes</td>
<td>1999?</td>
</tr>
<tr>
<td>1Gbps</td>
<td>Yes</td>
<td>1999?</td>
</tr>
<tr>
<td>Multiple VLANs</td>
<td>Yes</td>
<td>1999?</td>
</tr>
<tr>
<td>Ethernet VLANs</td>
<td>Yes</td>
<td>1999?</td>
</tr>
<tr>
<td>Token Ring VLANs</td>
<td>Yes</td>
<td>1999?</td>
</tr>
</tbody>
</table>

Note: High Speed Token Ring (HSTR) column based upon current plans of HSTR alliance members for products
ATM Transport

ATM Networking

- Ethernet and Token Ring users share same connection to common servers
- Catalyst 5000 family and routers provide LEC and LANE services
- LightStream® 1010 or Catalyst 5500 for ATM switch
- Catalyst 3900 offers Token Ring LEC
Backbone Options

ATM

Any to Any with Two Hops

ISL

Any to Any with Two Hops

Catalyst 3900 Family of Stackable Token Ring Switches
Catalyst 3900 Family

- Switched access units
  - Catalyst 3900
    - 20-28 Token Ring ports
    - ATM, ISL uplinks
  - Catalyst 3920
    - 24 Token Ring ports
    - Stack matrix link
- Stack features
  - 20 to 224 ports per stack
  - Redundant matrix switch

ATM Feature Card

- OC-3 interface
  - Multimode fiber
  - SONET or SDH framing
- Token Ring LANE
  - ATM forum compliant
  - LEC for SRS, SRT, and SRB
  - SSRP
  - 2048 virtual circuits
Catalyst 3900 ISL Feature Cards

- **ISL feature cards**
  - 2 port copper or fiber
  - 100Mbps Fast Ethernet

- **Features**
  - Media speed
  - 63 Token Ring VLANs
  - VTP support
  - All bridging modes supported

Copper and Fiber Feature Card

- **Fiber Token Ring**
  - Four ports, ST connectors
  - IEEE 802.5J or IBM 8230 compatible
  - Lobe or ring in/ring out attachment

- **Copper Token Ring**
  - Four ports with RJ-45 connectors
Catalyst 5000 Series Solutions

Switching Platforms: The Award-Winning Catalyst 5000 Switch Family

- Powerful infrastructure solutions:
  - Integration of frame and cell
  - Multilayer switching
  - Complete Cisco IOS network services support
  - Fault-tolerant architecture
  - Full-investment protection
Catalyst 5000 Token Ring Support

- Token Ring switching module
  - 16 RJ-45 Token Ring ports
  - 16 Token Ring fiber ports
  - Media-speed throughput
  - Dedicated Token Ring on every port
  - Integrated SRS, SRB, and SRT switching
  - ATM TR LANE, Token Ring ISL

- Technology
  - Full-hardware switching in custom Quad ASICs

ATM Uplink

- OC-3 interface
  - ATM LANE card with dual PHY
  - Multimode, singlemode, UTP
  - 4096 virtual circuits

- Token Ring and Ethernet LANE
  - ATM Forum compliant
  - LES/BUS, LECS, and LEC
  - 1024 ELANs
  - Primary Backup
Infrastructure Management Tools

CiscoWorks for Switched Internetworks

- Topology Discovery
- VLAN Configuration
- Traffic Reporting
- Graphical Device Management

Token Ring
Backbone Migration
Today’s Collapsed Backbone

- Router provides high-speed backplane
- Shared LAN Media Ring Segments

Today’s Redundant Network

- Dual backbone for redundancy
- Alternate path to servers for workgroup clients
Parallel Layer 2/Layer 3 Redundant Backbone Design

SRB, IP, IPX Routing

Bridge F

1
2
3
4
5
6

Bridge E

100
40
50

Note: Any Ring can Be an ELAN

Token Ring to Ethernet Migration Scenarios
Goal

"Gradual Migration of Token Ring Network to Switched Ethernet Transparently to the End-User Population"

How?

"Install Network Infrastructure that Makes It Possible to Replace a Workstation’s NIC Card and Make a Patch Cable Change in the Wiring Closet while Maintaining Complete Connectivity among Protocols"
Protocol Migration

• Goal: TCP/IP as only Layer 3 protocol
  Layer 3 switching for IP will be common

• Protocol migration options
  SNA to TN3270/5250
  NetBIOS to NetBIOS over TCP/IP
  IPX to IPX over TCP/IP

Technology Differences—Token Ring and Ethernet
**Ethernet Cabling**

**EIA/TIA-568 (SP-2840) Standard**

- **CAT3** 24AWG 100ohm 16MHz
- **CAT4** 22 or 24AWG 100ohm 20MHz
- **CAT5** 22 or 24AWG 100ohm 100MHz

**Fiber**

- Multimode 62.5/125 um or Singlemode

---

**What if you have IBM TYPE 1 shielded twisted pair?**

- Conversion adapter
- RJ-45 to IBM data connector
- Impedance match 100ohm to 150ohm
- Two per workstation
- Vendors:
  - AMP: Part # 556904-1
  - RIT: Part # R3712013
Dual Active Paths via SRB

Dual Paths for Ethernet

- Transparent bridging
- Path determined by spanning tree
- Dynamic activation of backup paths
- Path change transparent to end stations
Frame Formats

- 1500 byte MTU for Ethernet versus 17,800 byte MTU on Token Ring (4,472 byte MTU is typical)
- Ethernet MAC addresses are Least Significant Bit (LSB) versus Token Ring MAC address as Most Significant Bit (MSB)

Server Migration
Server Migration Options

- Central or local servers
  - Routing or SR/TLB to Fast Ethernet
- Dual NICs
- MultiVLAN NICs

MultiVLAN NICs

- ATM or ISL
- Token Ring and Ethernet Switching
- Logically same as dual NIC but only one NIC required
Client Migration

- Install Ethernet switch in wiring closet
- ISL or ATM backbone between switches
- VLANs to define subnets
- DHCP for IP addressing
- Move client one at a time to Ethernet
Mixed Design

- Dedicated 10Mbps Ethernet clients
- Dedicated 16Mbps Token Ring Clients
- Dedicated Ethernet, Token Ring, ATM, or ISL servers
- ATM or ISL backbone
- Integrated routing and SR/TLB in RSM
- VLANs for multiple subnets

Switching Performance for Everyone!

Summary

- Migration to Ethernet
  Not a “fork lift” upgrade
- Coexistence
  Flexible design choices for placement of clients and servers
  Ethernet and Token Ring switching to provide maximum performance to all users
- Protocol migration to TCP/IP as possible
Please Complete Your Evaluation Form
Session 703