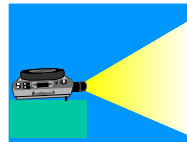


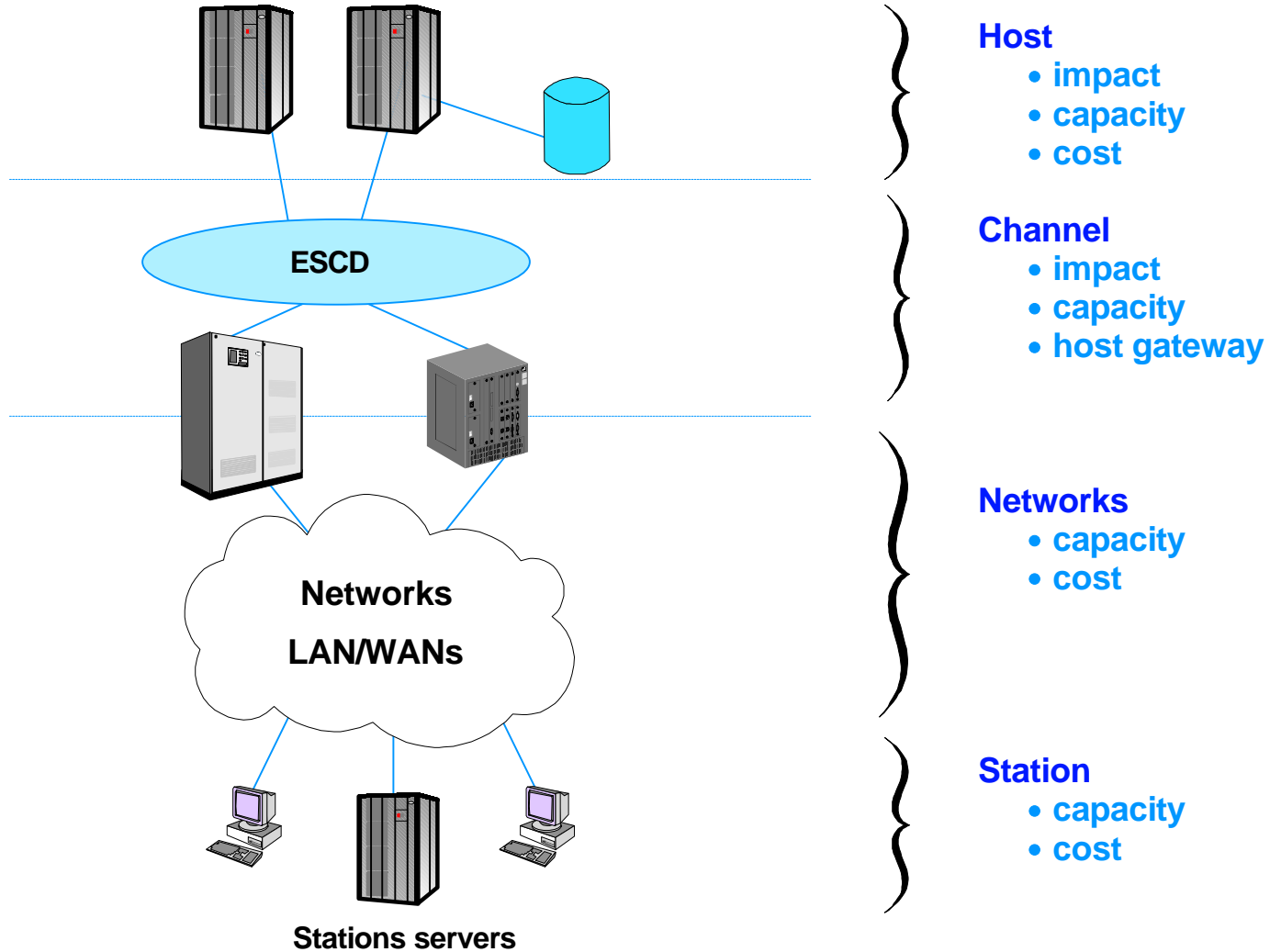
Part 2

Leadership in IBM Enterprise Server Gateway

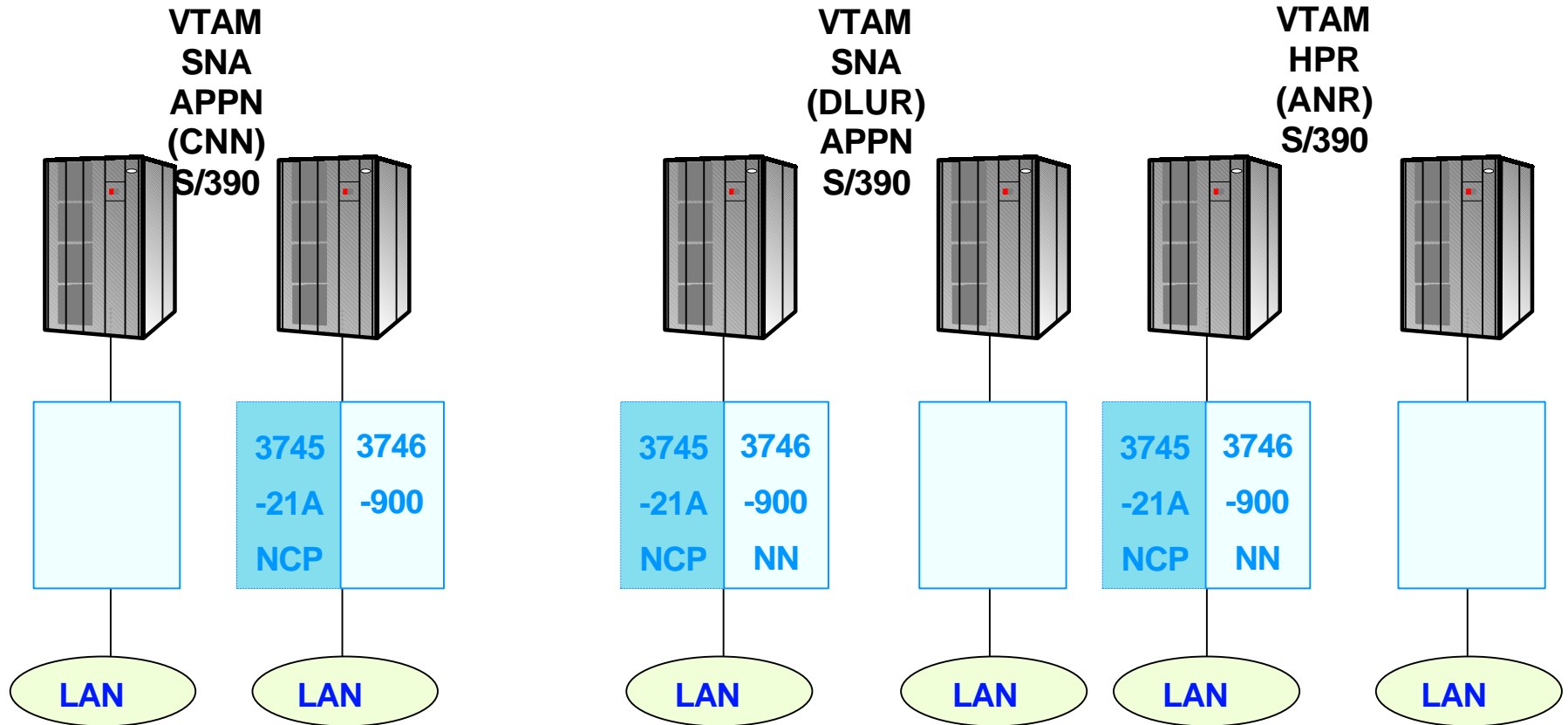
Raj Rajan
Cisco Competitive Marketing Team
(919) 301-4439
(T/L 8-352-4439)
RAJAN@RALVM6
rajr@vnet.ibm.com
Apr 1997



Performance Considerations



IBM 3745/3746 - Performance Ratio (SNA/APPN/HPR)



Transaction Rate

1

2.5

5

15

Data Throughput

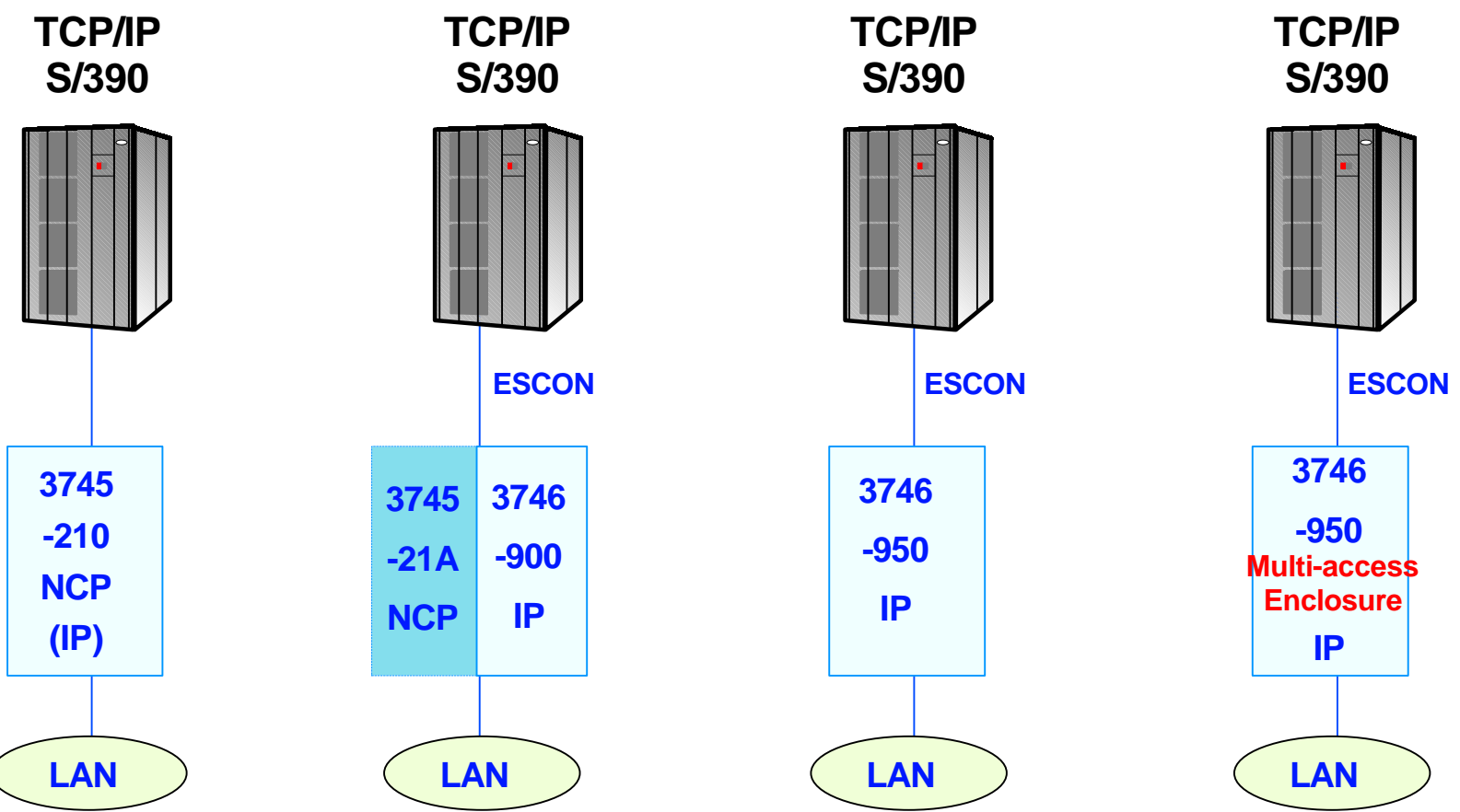
1

2.5

10

30

IBM 3746 - Performance Ratio (TCP/IP)



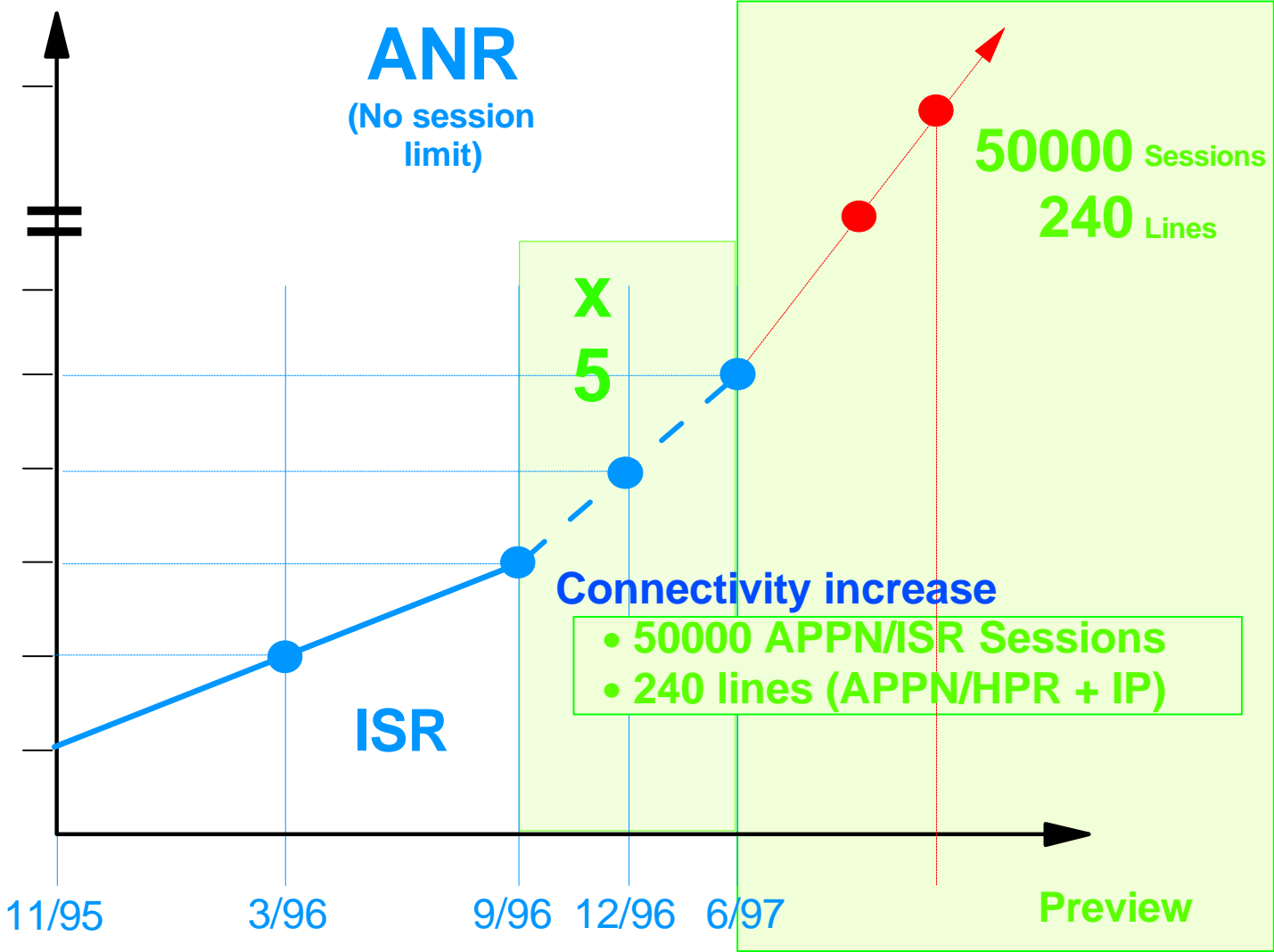
Transaction Rate (Telnet)	1	13	13	40 (*)
Data Throughput (FTP)	1	30	30	45

IBM 3746 - APPN(ISR) Connectivity Increase

(PUs / ISR Sessions)

Preview

5000 / 15000
 4000 / 12000
 3000 / 9000
 2000 / 6000
 1000 / 3000





Performance Testing Chronology

Phase 1

Performed in 1H96 in La Gaude
Testing with mainly Cisco 7000
Some testing at Customer location with Cisco 75XX

Phase 2

Performed YE96 in RTP
Testing with Cisco 75XX machines

Phase 3

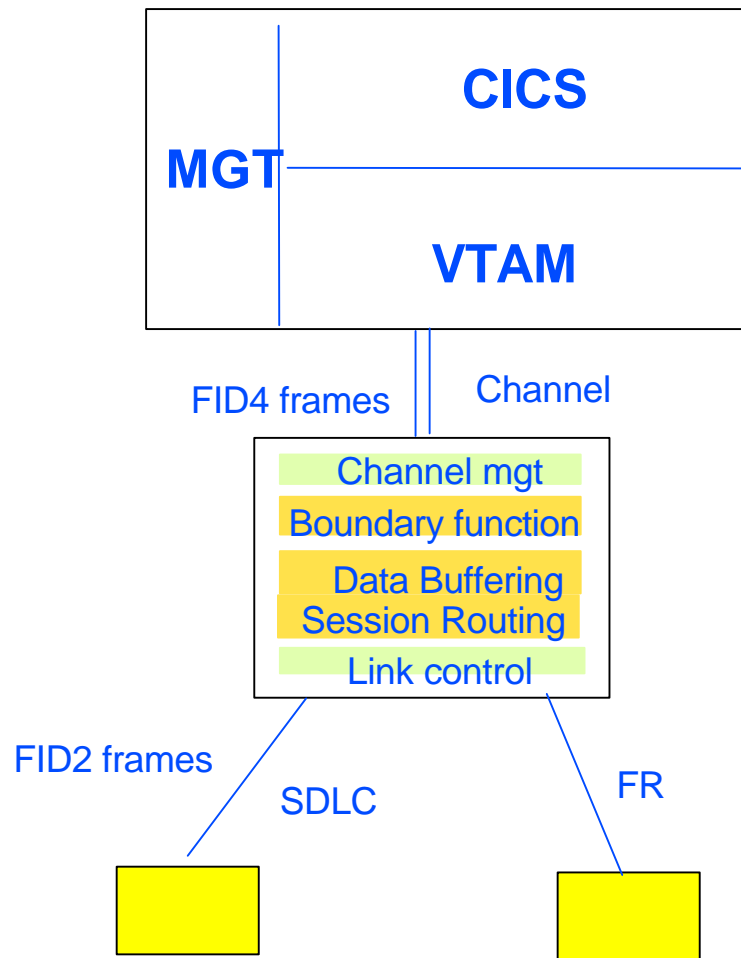
In progress at Washington System Center (WSC)
Testing with Cisco 75XX machines
Initial results expected in April/May 1997
Will be published in June 1997
Additional testing will continue as necessary

Performance Testing - 2H96

SNA Environment

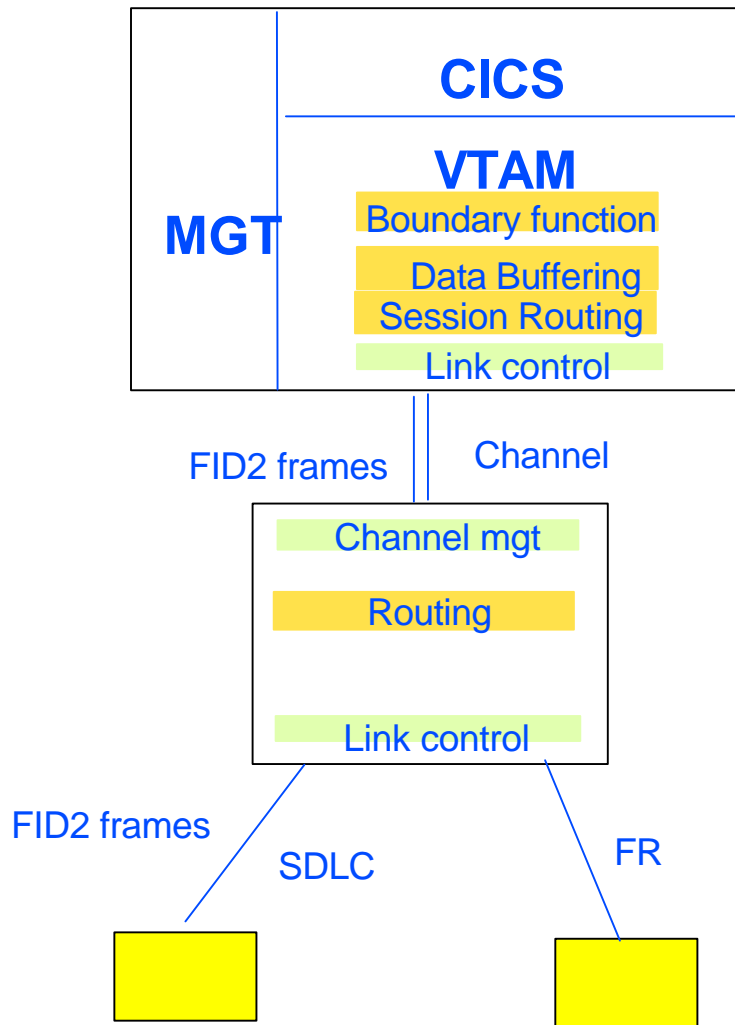
- ◆ IBM 3746-9x0 fully supports native APPN over the ESCON channel and through all LAN and WAN attachments
- ◆ Cisco 7x00 only supports native APPN over LAN/WAN attachments, not over the channel
- ◆ IBM 3746-9x0 APPN performs 11 times faster than the Cisco 7000 in Transaction type of traffic
- ◆ IBM 3746-9x0 APPN performs 15 times faster than the Cisco 7000 in File Transfer type of traffic
- ◆ IBM 3746-900 supports Subarea Boundary function (PU4), Cisco 7x00 does not

3745/6 SNA Sub area Functions



- **Channel Support**
 - ✓ CDLC(Subarea, APPN, HPR)
- **Link Support**
 - ✓ SDLC device polling/priority
 - ✓ FR & LAN LLC2 acknowledgment
- **Boundary Functions (BNN)**
 - ✓ Segmentation/reassembly
 - ✓ Device control block/buffer allocation/mgt
 - ✓ FID2 to FID4 conversion
 - ✓ PIU chaining
 - ✓ Network mgt support-NPM, NTunMon
- **Global Flow Control**
 - ✓ Session pacing/windowing
- **Session Routing**
 - ✓ Multi-hosts/INN/SNI
- **Frame Relay DCE/DTE support**

Router Functions



- Router cycles
- Channel Support
 - ✓ LSA (SNA, APPN)
- Link Support
 - ✓ SDLC device polling
- Routing
- VTAM cycles
- Boundary Functions (BNN)
- LLC2 Acknowledgment
- Flow Control
 - ✓ Session pacing/windowing
- Session Routing
 - ✓ Multi-hosts/INN
- NO support
- Global flow control
- Frame Relay DCE support
- SNI support

Performance Testing - 2H96

IP Environment

- ◆ IBM 3746-9x0 and Cisco throughputs in a host Telnet environment are about equal
- ◆ IBM 3746-9x0 box throughput in TCP/IP file transfer mode using FTP is 25 MBytes
- ◆ According to the World Wide WEB , Cisco 7000 CIP card performance in TCP/IP file transfer mode using FTP is 7 MBytes
- ◆ IBM 3746-9x0 box throughput in a LAN environment is comparable to Cisco 7513 today (largest router of Cisco 7500 family)
- ◆ The 4 ports TR adapter of the Cisco 7x00 drives only 2 ports at media speed (98% adapter load with 2 ports)

IBM 3746-9x0 vs. Cisco 7513 - IP over ESCON (Phase 2)

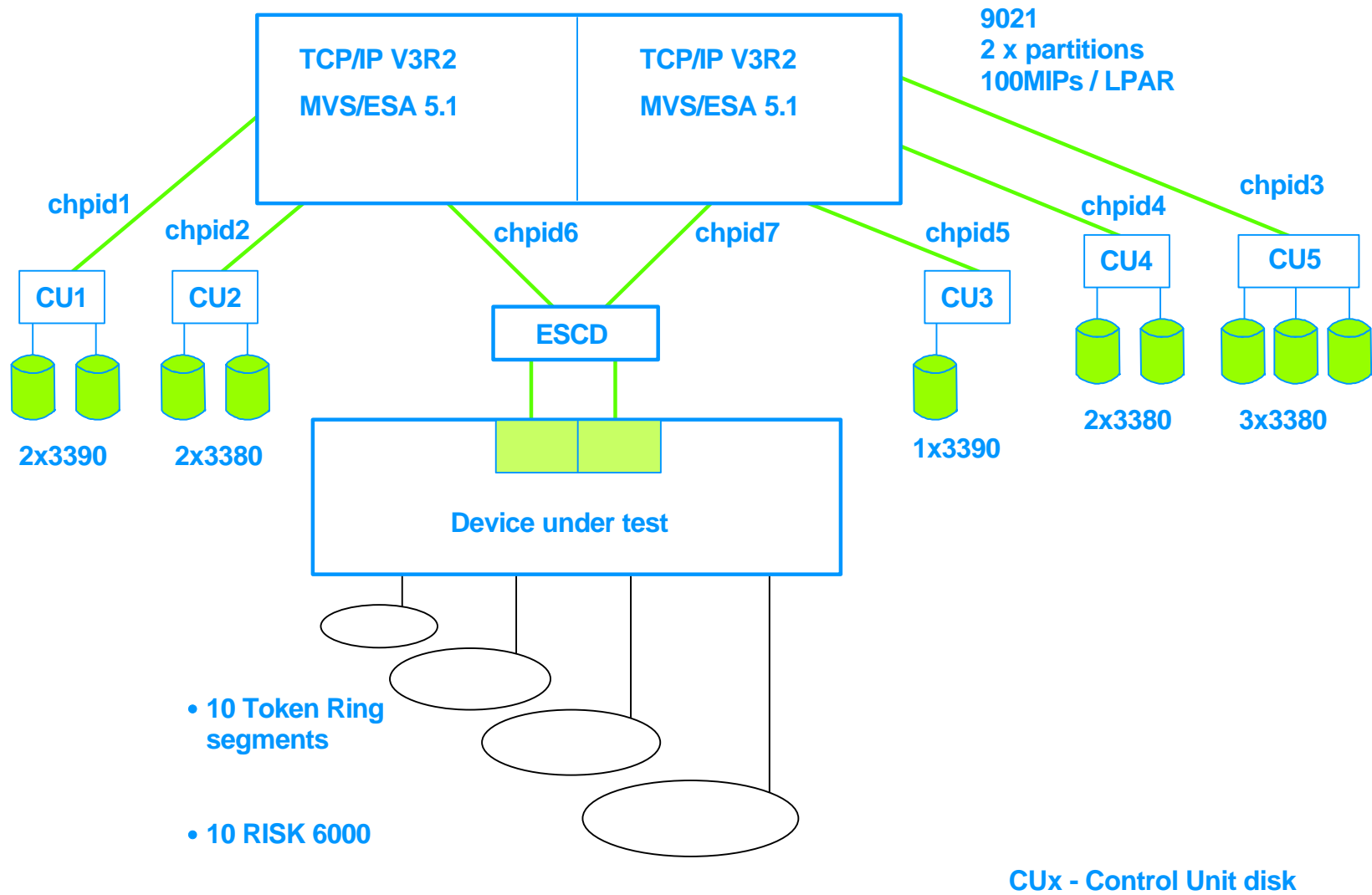
1 fiber	IBM 3746-9x0	Cisco 7513
Solution	1 x ESCP3 1 x ESCC2	1 x CIP2
Performance	4.5 Mbytes (*)	7 Mbytes (**)
Prices (US list price)	≈ 25 K\$	40 K\$
Price per MByte	5.5 K\$	5.7 K\$

2 fibers	IBM 3746-9x0	Cisco 7513
Solution	2 x ESCP3 2 x ESCC2	1 x CIP2 dual
Performance	9 Mbytes (*)	9 Mbytes (**)
Prices (US list price)	≈ 50 K\$	59 K\$
Price per MByte	5.5 K\$	6.5 K\$

- 3746 has 16 slots capacity
- Cisco 7513 has 11 slots
(4 CIP2 max)

(*) estimated with processor performance improvement
 (**) see configuration details

IBM 3746-9x0 vs. Cisco 7513 - IP (Phase 2)



IBM 3746-9x0 vs. Cisco 7513 - IP (Phase 2)

9 Mbytes Analysis

- **Heavy configuration HOST/DISK/CHPID**
- **Network requirements to drive 9 Mbytes to the host**
 - 4 x E3 (60 % max utilization with IP)
or
 - 1 x FDDI fully used with all traffic for the host
or
 - 5 TR segments fully used with all traffic for the host
- **IP : 60 to 70 % max link utilization on WAN**



IBM 3746-9x0 vs. Cisco 7513 - IP (Phase 2)

Configuration details

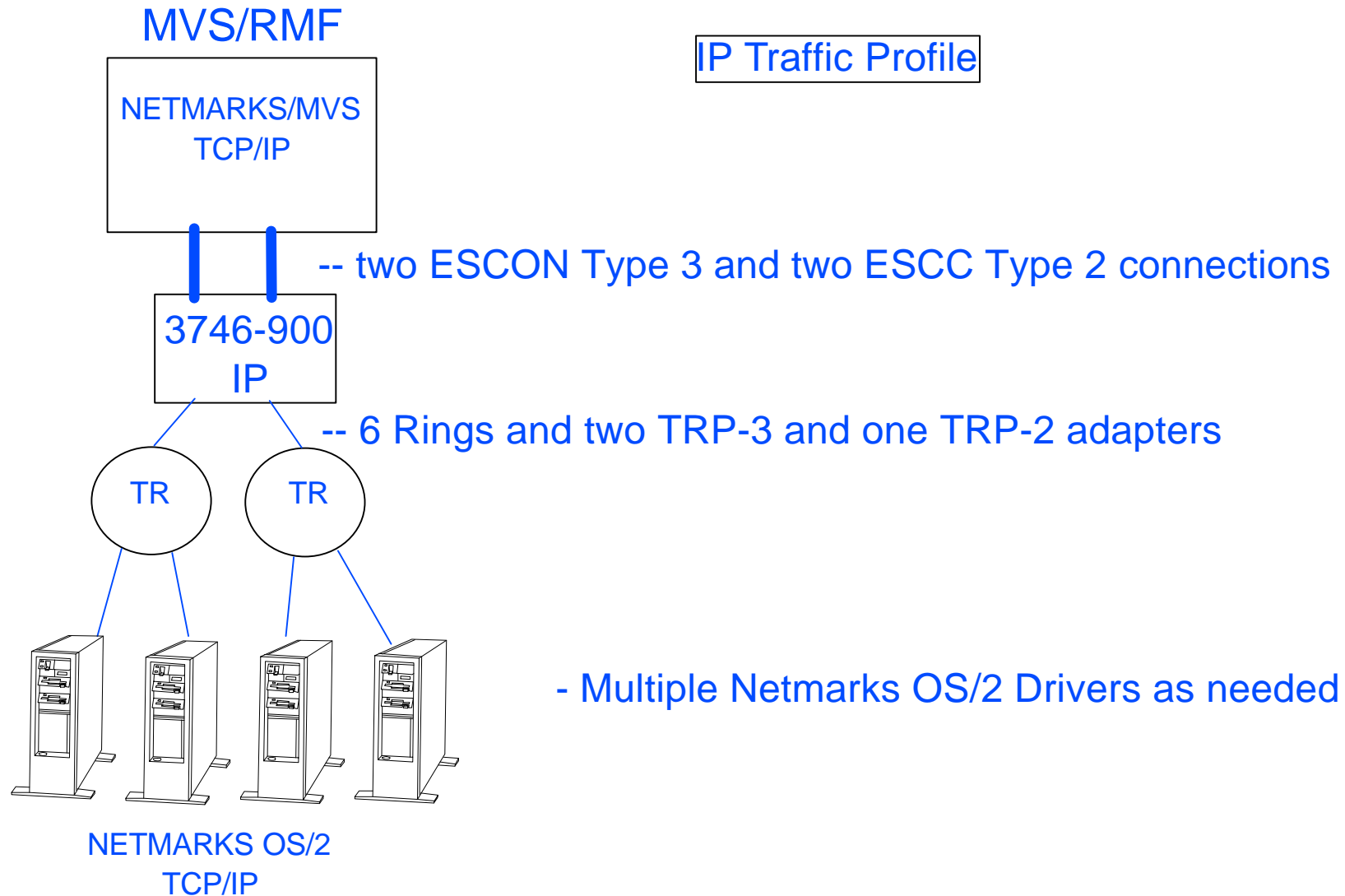
◆ Disks

- 5 control units
- 7 DASD 3380
- 3 DASD 3390
- 1 control unit per chpid

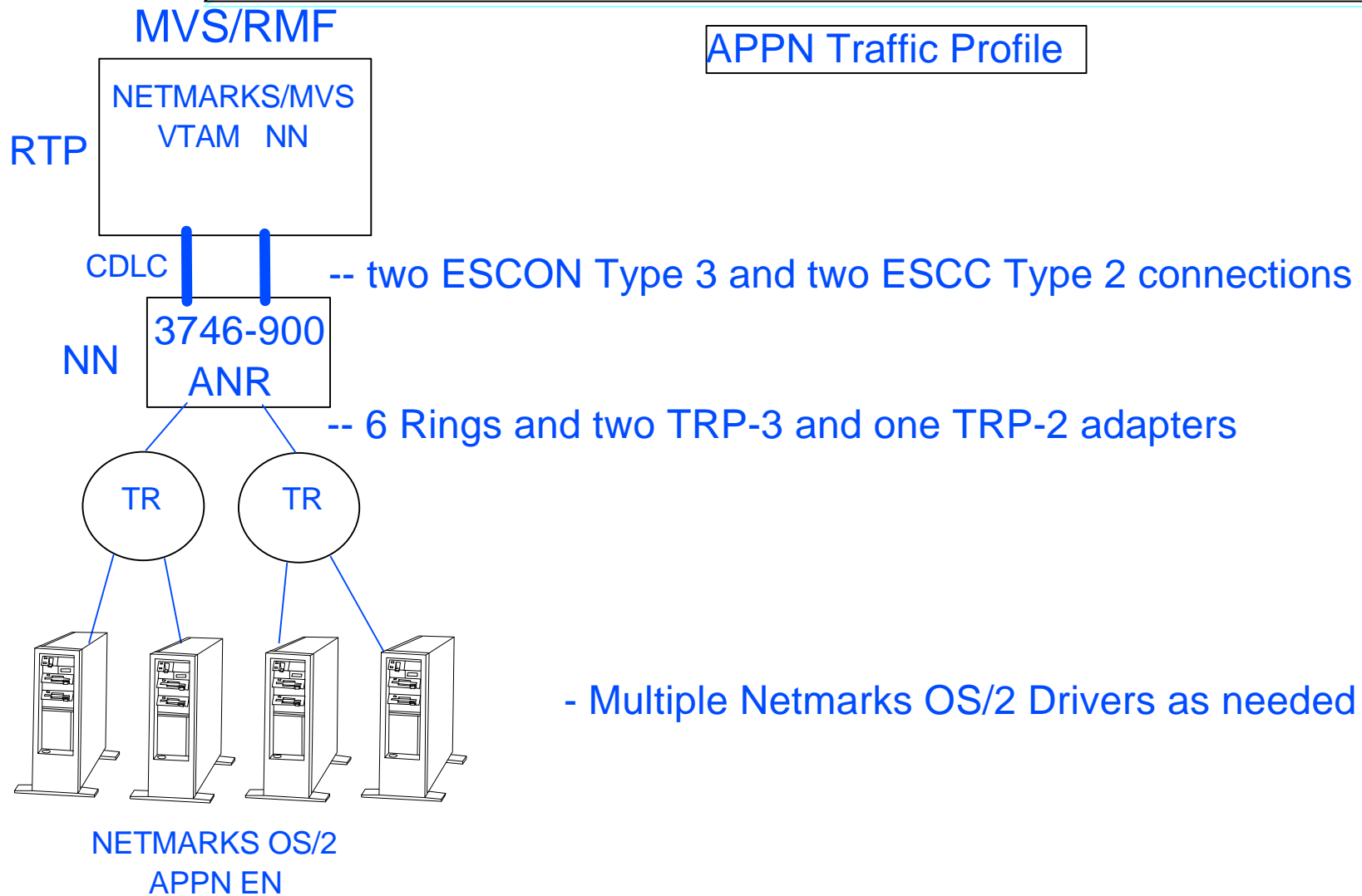
◆ Host : 9021

- 2 LPARS
- 100 MIPS/partition
- MVS Native MVS/ESA 5.1
- CHPID limit : 6 Mbytes on this 9021
- 1/ESCON/chpid/partition to the device under test

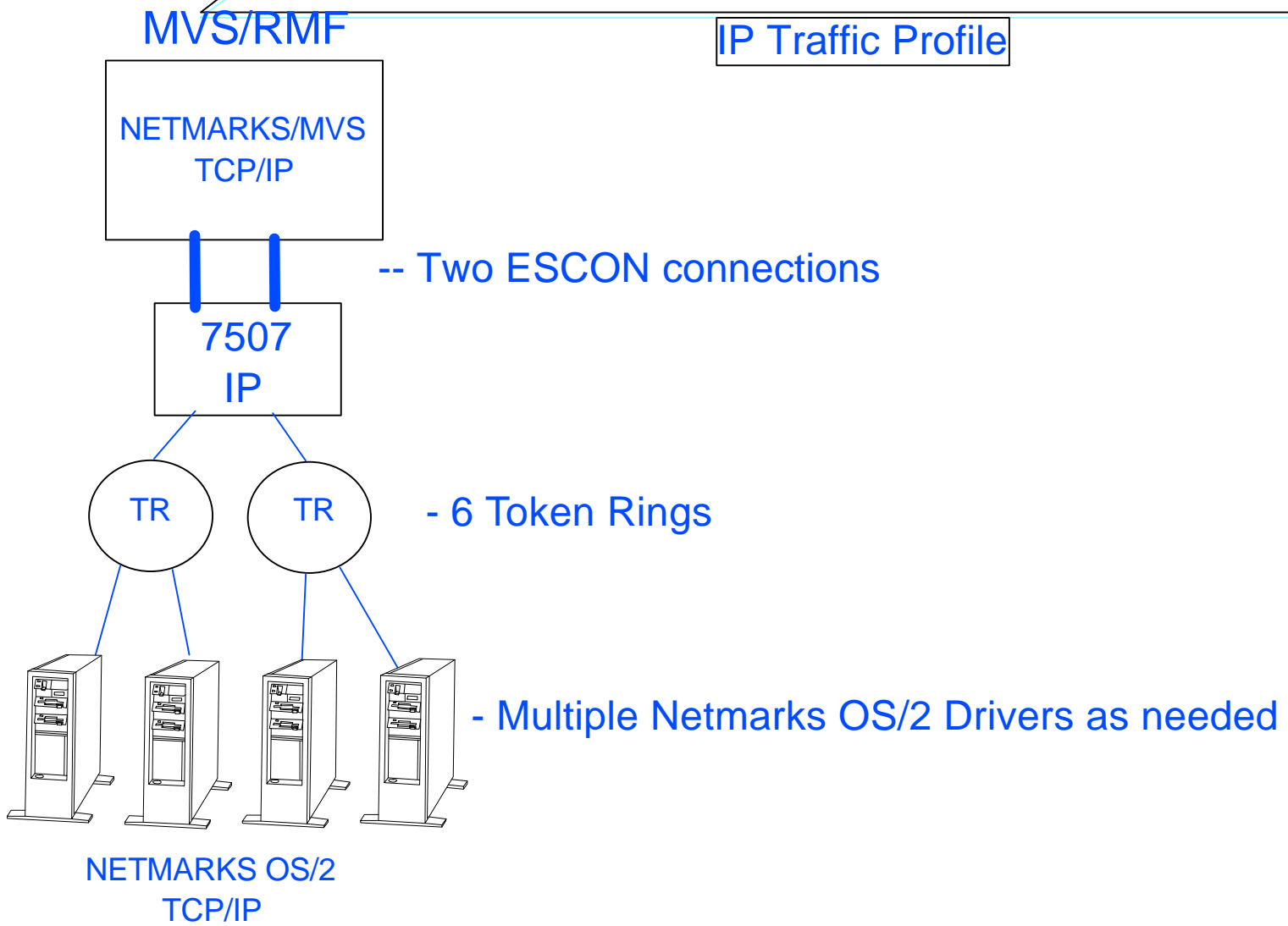
WSC Testing - IP Routing Mode - Test #1 (Phase 3)



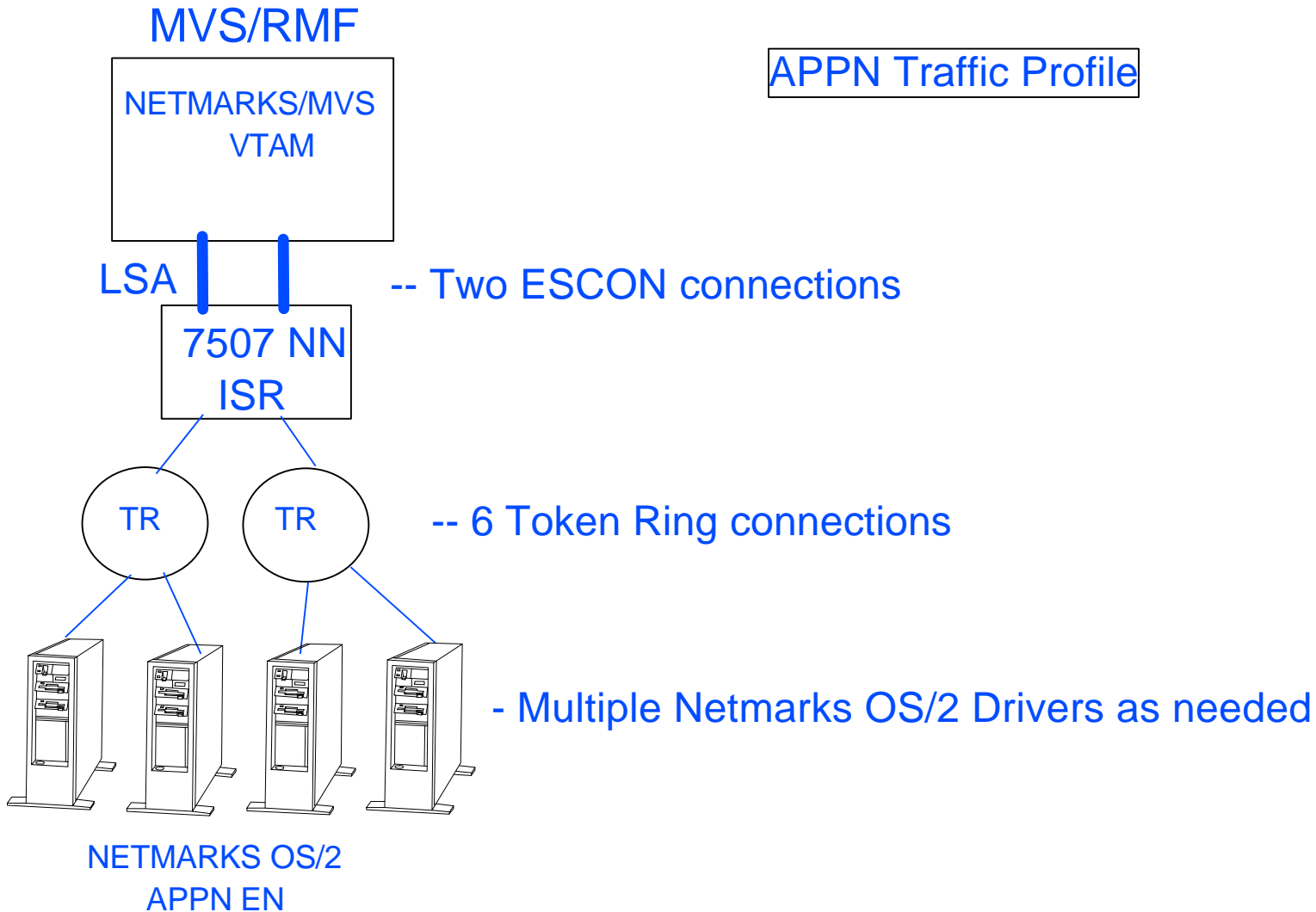
WSC Testing - APPN HPR Mode - Test #2 (Phase 3)



WSC Testing - IP Routing Mode - Test #19 (Phase 3)



WSC Testing - APPN ISR* Mode - Test #23 (Phase 3)



Analysis of performance results

- ▶ **Cisco 7X00 used up 47% more network CPU cycles for SNA subarea traffic**
 - Based on customer testing as well as testing in La Gaude
 - Contributing factors are:
 - Cisco uses LSA channel protocol vs. IBM CDLC
 - Boundary function processing moved to VTAM in Cisco solution

- ▶ **Adding APPN/DLUR to increases network CPU by about 3% for Cisco and IBM**
 - This means Cisco 7X00 will require 50% additional CPU vs. IBM 3%

- ▶ **Cisco claim of 1 to 3% increase in CPU cycles is based on testing with first generation 3745**
 - Not valid for the new generation machines such as 3746-9X0

- ▶ **Cisco CIP using delivers only 7MB on a single ESCON and only 9MB with dual ESCON**
 - IBM 3746 - 9X0 is expected to deliver 4.5MB on a single ESCON and 9MB on two ESCON
 - Based on list prices, IBM ESCON attachment prices are less than Cisco's prices

- ▶ **Bottom line:** Though the actual savings realized in a particular Customer network will vary, there potential for a **significant increase in host cycle consumption** in a Cisco's channel attached router solution for SNA traffic.



Other Important Factors

- Increase in Host cycles with router gateway
 - EP/Bysnc /SNI requirements
 - Native protocol support vs. encapsulation
 - Management platform changes and training
 - Lack of global flow control
- ✓ Impacting consistent application response time especially under network congestion and loaded situations

Feature/Function Comparison Summary

	Cisco 7XXX with CIP	IBM 3745 & 374X - 9X0
Architecture	BusCentric	Switch Centric
Solutions	Proprietary	Industry Standards
Leadership	IP	SNA & IP
Migration	Forklift	Evolution
Legacy SNA support	None	Yes (SNI, EP/BSC, Async)
Connectivity	Limited	Large
Performance SNA	Limited	Leader
Performance IP	Good	Good
Service & support	Limited	Extensive

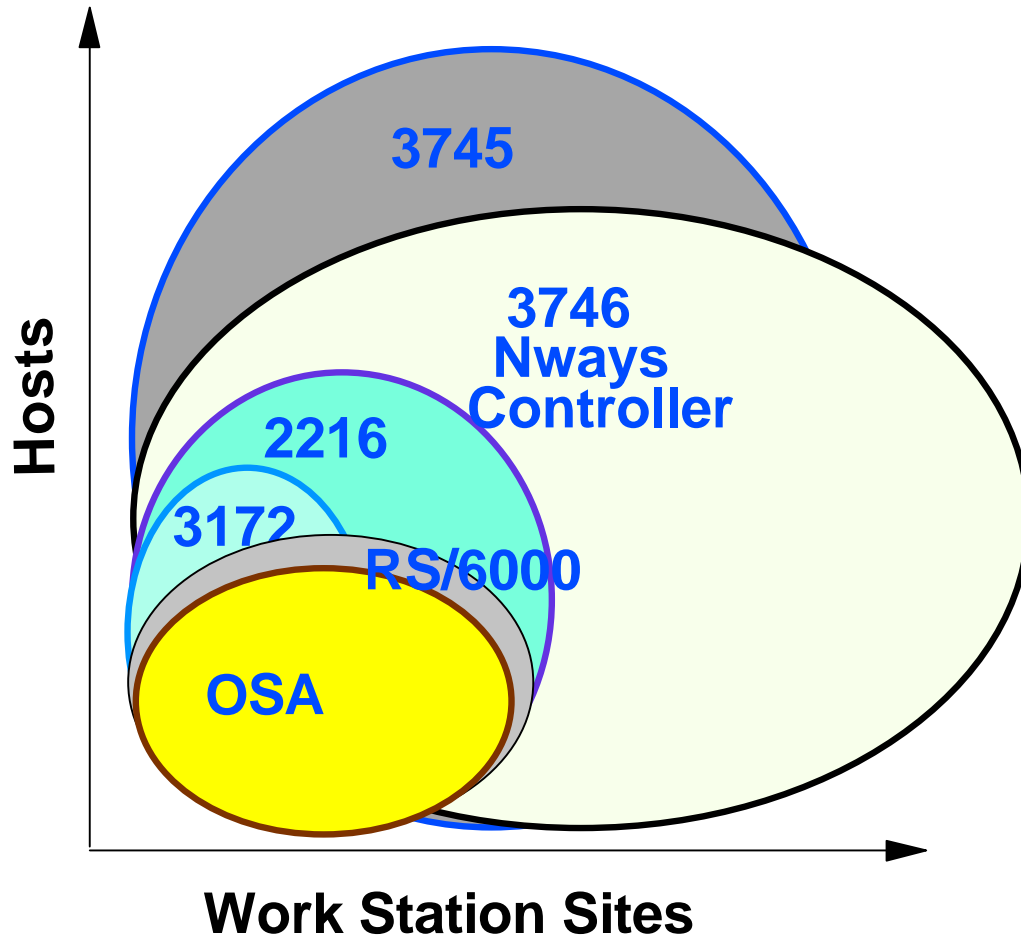
Cisco routers with channel attachment

Not ready for prime time....

- ✓ **High overall costs**
- ✓ **Untested technology**
- ✓ **Uncertain performance**
- ✓ **Questionable scalability**
- ✓ **Increasing complexity**
- ✓ **Forklift migration**
- ✓ **Requires multiple boxes**
 - To support SNA/APPN and TCP/IP



S/390 Server Access Options from IBM.



Protocols Supported

- TCP/IP
- SNA, APPN, HPR

Channel Protocols

- CDLC, LSA, LCS, MPC

S/390 Cycles

Throughput / Capacity

Connectivity

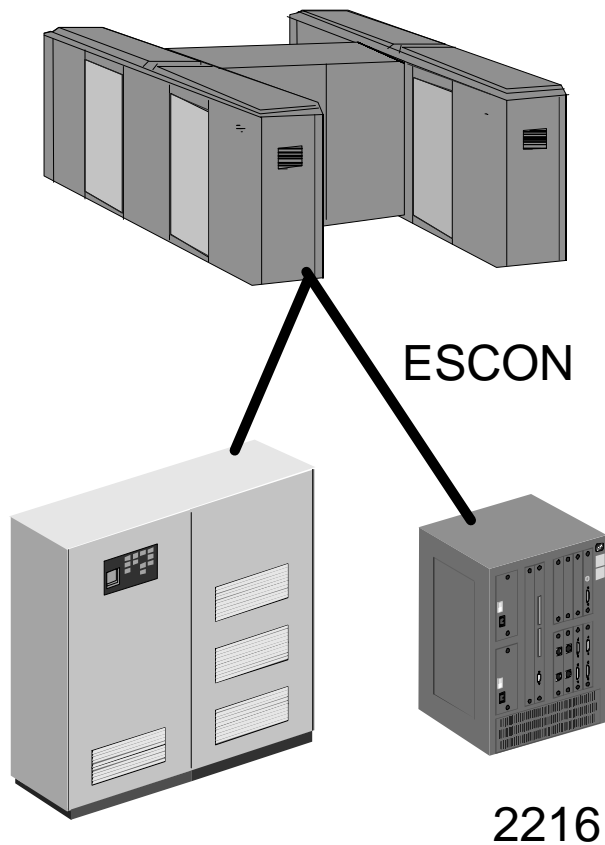
Scalability

Investment Protection

Network Management

Cost of Ownership

S/390 Server Channel Attach Directions



3746 with
Multi-access
Enclosure

Access to VTAM and TCP/IP Host Apps

- LANs (TR, EN, 100 EN, FDDI)
- WANs (FR, PPP, SDLC, X.25, ISDN)
- ATM (Classical IP or LANE)

Up to 4 ESCON Channels

Up to 32 LPARs per Adapter

SNMP MIB Support

Channel Protocols

- MPC+ (Multi-Path Channel)
Requires ACF/VTAM 4.4 on VM, MVS, VSE
Supports APPN/ HPR
- LCS - LAN Channel Station
For TCP/IP only
Up to 16 LAN Appearances per Adapter
Full Advantage of IP Routing Code (routing algorithms, filtering capabilities, etc)
- LSA - Link Services Architecture
SNA only (SubArea and APPN/ISR)
Requires VTAM 3.4 on VM, MVS, VSE



IBM Strategy & Vision

- **Protect customer investment while allowing smooth migration to high speed network infrastructure supporting new internet/intranet applications integrating switching and routing**
- **For example :**
 - **IBM continues to enhance its leadership in server-attached solutions**
 - **Provide enhancements and connectivity on the Nways Controller Model 3746 Mode 900/950 to support**
 - Over 5,000 adjacent Physical Units (PUs), Beyond 15,000 APPN and DLUR sessions,
 - More than 120 WAN connections.
 - **The Nways Controllers will incorporate the IBM 2216 Nways Multi-access Connector technology in its product evolution.**
 - **IBM will use this product technology to enable the following support:**
 - 155Mbps ATM (LAN Emulation client, Classical IP, native HPR),
 - Worldwide ISDN Primary,
 - Fast Ethernet (100Mbps),
 - High Speed Serial Interface (HSSI) for T3/E3 speeds,
 - Fiber Distributed Data Interface (FDDI), and
 - TN3270e server.
 - **These functions are planned to start shipping in 1997.**
 - The announcement of Nways Controllers enhancements will be based on IBM's business and technical judgment.
 - All information being released represents IBM's current intent, and is subject to change or withdrawal, and represents only goals and objectives.

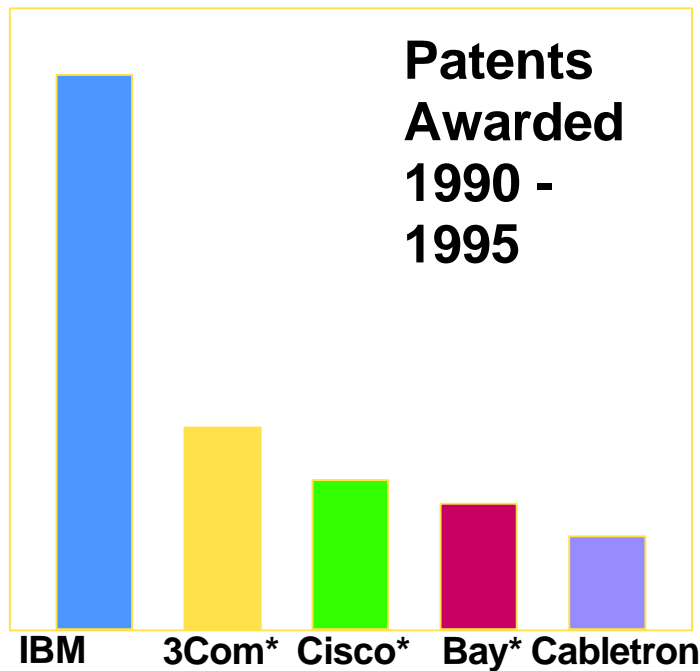
IBM Networking Leadership

■ Inventions

- Prizma switch
- Aggregated Route-based IP Switching (ARIS)
- Wave Division Multiplexing
- Networking Broadband Services

■ Standards Development

- Lan Emulation
- Data Link Switching
 - ▶ Version 1 & 2
- Network Interoperability Alliance
- Committee leadership
 - ▶ IETF
 - ▶ ATM Forum
 - ▶ APPN Implementer's Workshop
 - ▶ Gigabit Ethernet
 - ▶ Multiprotocol Label Switching



Networking

* - Includes Patents Gained Through Acquisitions

■ Award-Winning Products

- Grand Prize Winner at 2 of past 4 InterOps
- Perennial Winner of Network Management Summit
- MSS Grand Prize
 - ▶ Atlanta & Paris InterOp
- 9729 Hot Products
- 2210 Tester's Choice
- 2218 Tester's Choice



IBM Networking Leadership contd.....

- **R & D Sites Worldwide:**
 - US, UK, France, Italy, Sweden, Germany, and Japan

- **Network Interoperability Alliance (NIA)**
 - IBM, 3Com, Bay (Members)
 - Xylan, Madge, US Robotics, and First Virtual (Expressed Intent)

- **Major Innovations**
 - SNA & Token Ring
 - Builder of NSFNET
 - Extensive early contribution to ATM LAN Emulation
 - Created desktop ATM (25 Mbps)
 - Invented Control Mechanisms for High-bandwidth ATM Solutions
 - MSS - Best of breed in the industry



Why not Cisco ?

Why Cisco router gateway solutions are not right for your customer....

- 1. SNA performance inferior to IBM***
- 2. IP performance about equal ; but with MPC+, IBM 1997 plans will be superior to Cisco***
- 3. Significant increase in host MIPs with Cisco solution***
- 4. Old bus architecture vs. state of the art switching design***
- 5. Cannot do APPN/HPR across the channel yet***
- 6. Does not support SNI & EP/BSC***
- 7. Non-disruptive backup CMC function is not yet available***
- 8. Network subject to router complexity and poor reliability***
- 9. Results in more complex Network Management***
- 10. Requires new, expensive skills and training***

Why IBM ?

- **Premier networking vendor supporting mission critical business applications**
 - SNA, IP, WAN & Campus
 - Strategic relationship with leading vendors to enable delivery of critical solutions
 - Cascade, Sync Research, Xylan & others
 - Leadership in new networking technologies
 - Award winning MSS - Best of Show at Interop Atlanta & Paris, 1996
- **World Class support & service**
 - Global reach
 - 24X7X365
 - Minimal risk to Customers
- **Expertise in wide ranging business solutions**
 - Internet, Intranet, Servers, Desktop, Storage
 - Sysplex
- **Promote OPEN Standards & interoperable solutions**
 - ATM Forum
 - NIA with Bay Networks & 3Com
- **Committed to strategic and long term partnership with the Customer**
 - Vision for the future
 - Win - Win scenario

Bottomline

IBM 3745/6-900 & 3746-950 offer premier mainframe gateway solutions because they provide:

- ▶ **Full functionality**
 - SNA / APPN / HPR Environments
 - TCP/IP Environments
- ▶ **Excellent Internet/Intranet Gateway to IBM host**
- ▶ **Cost effective solutions**
- ▶ **Competitive Multi-Protocol Support**
- ▶ **Superior Performance**