



G07

OSA-Express2 - The Latest Offerings for the LAN

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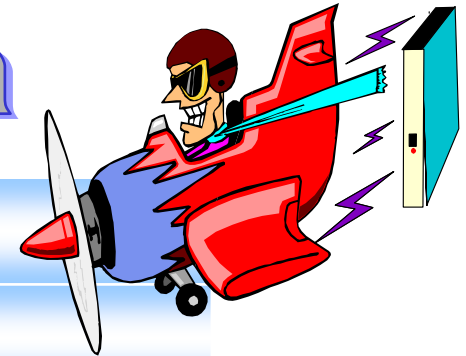


Glossary

Acronym	Full name	Use
1000BASE-T	Standard term for Ethernet when	capable of operating at 10/100/1000 Mbps
CHPID	Channel Path Identifier	
CRH	Channel Request Handler	Internal host bus for I/O communication
dB	decibel	Metric used to measure signal strength in fiber
GB	GigaByte	
GbE	Gigabit Ethernet	LAN protocol
km	kilometer	1 kilometer is 0.62 miles
LAN	Local Area Network	
LCS	LAN Channel Station	
LCSS	Logical Channel Subsystem	Architecture that allows more than one physical channel subsystem
LIC	Licensed Internal Code	
LPAR	Logical Partition	
LR	Long Reach	Transceiver used with single mode fiber optic cabling
LX	Long wavelength	Transceiver used with single mode fiber optic cabling
MCP	Mode Conditioning Patch	Cable used with sm fiber to accommodate reuse of mm
MBA	Memory Bus Adapter	Part of Central Electronic Complex
MBps	Megabits per second	
MCM	Multichip Module	Part of Central Electronic Complex
MM	Multimode	50 or 62.5 micron fiber optic cabling
MTU	Maximum Transmission Unit	Largest physical packet size in bytes that a network can transmit
OSA	Open Systems Adapter	zSeries family name for LAN adapters
PCI	Peripheral Component Interconnect	Local bus standard
PCI-X	Peripheral Component Interconnect Extended	Enhanced PCI bus - for increased performance over PCI
SM	Single mode	9 micron fiber optic cabling
SNMP	Simple Network Management Protocol	TCP/IP application layer protocol to manage network devices
STI	Self-Timed Interconnect	Internal host bus for I/O communication
SX	Short wavelength	Transceiver used with multimode fiber optic cabling



Agenda

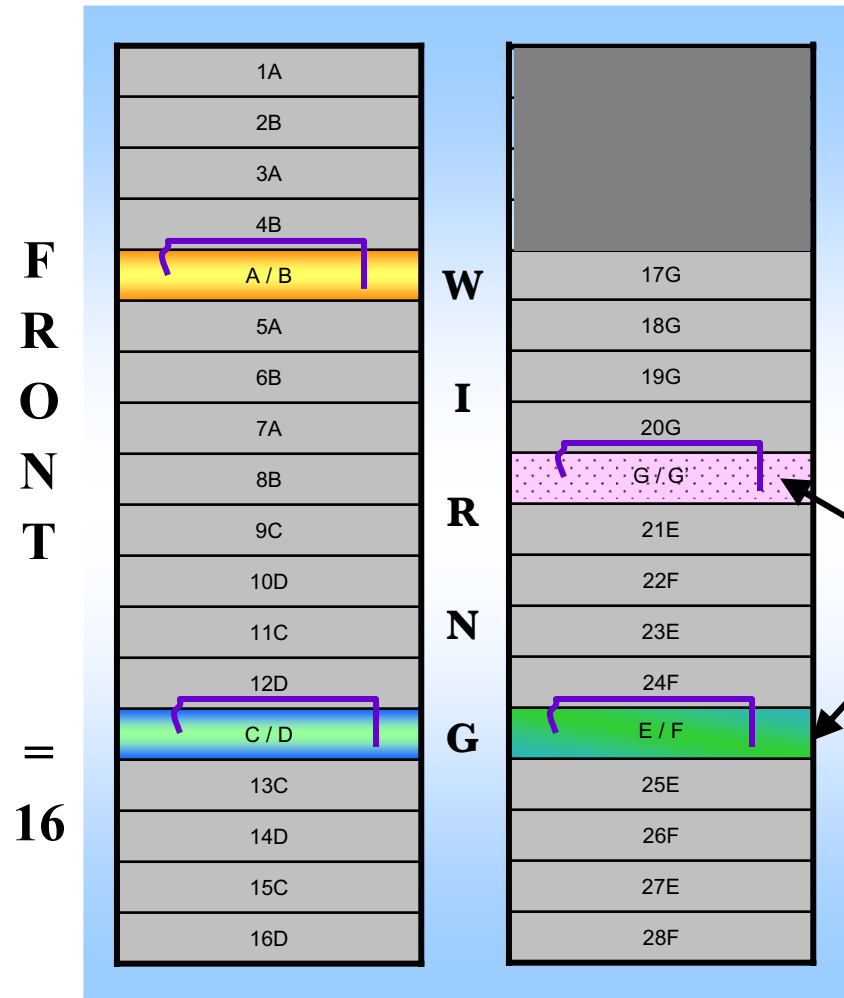


1	I/O cage, plugging rules, sharing
2	OSA history
3	OSA hardware
4	Technology and performance
5	Modes of operation (CHPIDs)
6	Newest functions
7	Cabling and connectors
8	Distance, link loss budgets

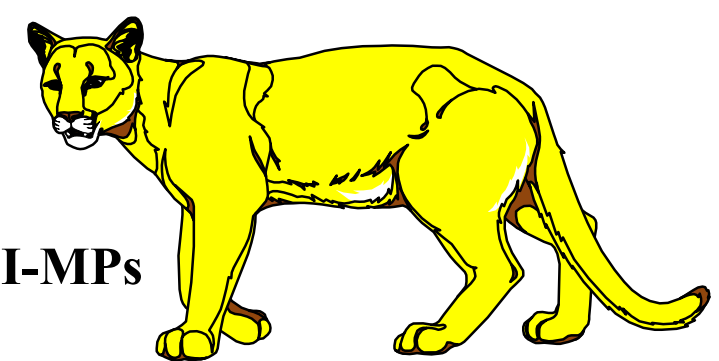




z9 EC, z9 BC with 8 STIs in I/O cage – Top view



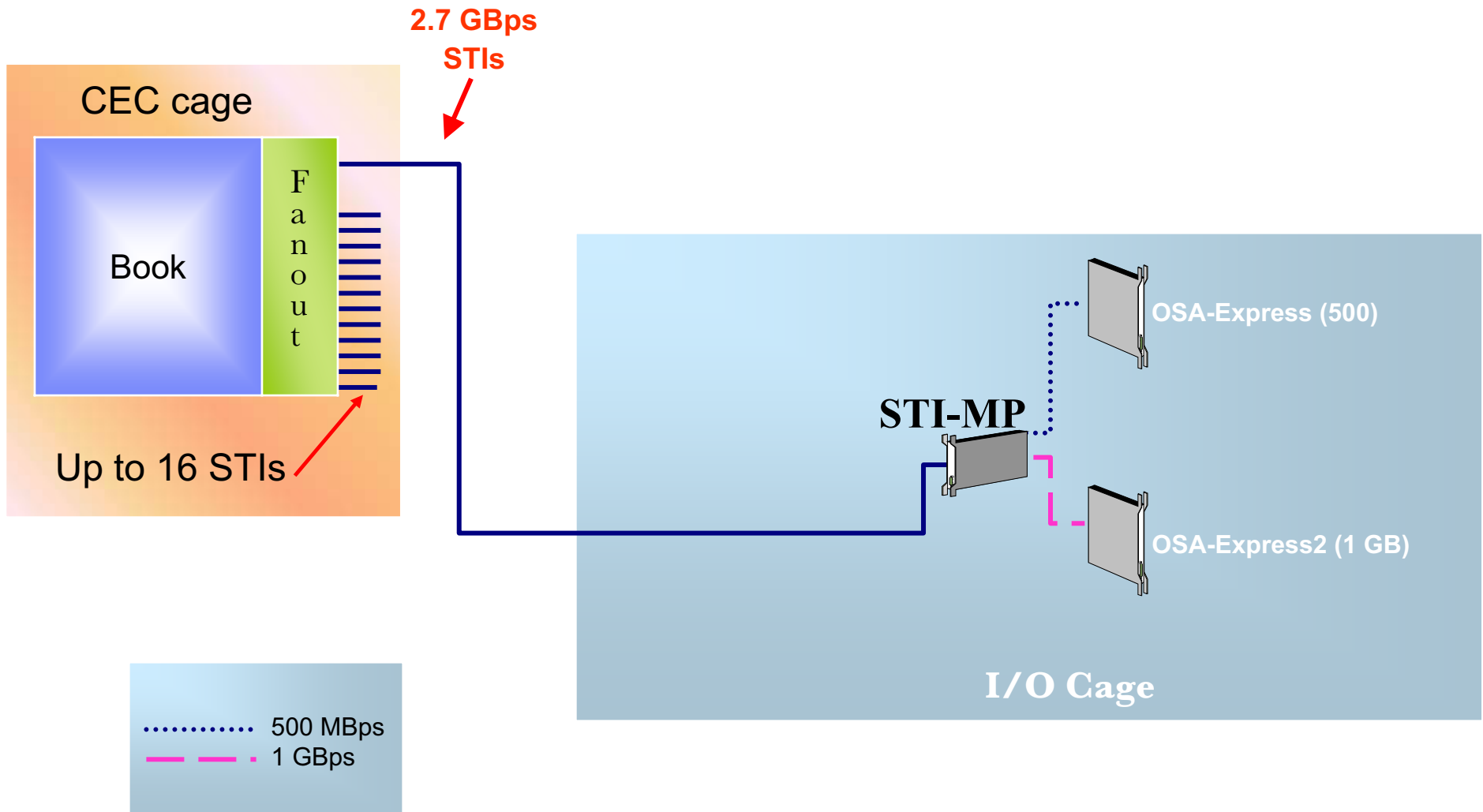
- I/O cage
- Top View
- 8 STIs/STI-MPs
 - G' is for redundancy



STI-MPs

- STI speeds for downstream ports
 - 500 MBps OSA-Express
 - 1 GBps OSA-Express2

STIs servicing I/O cage and features



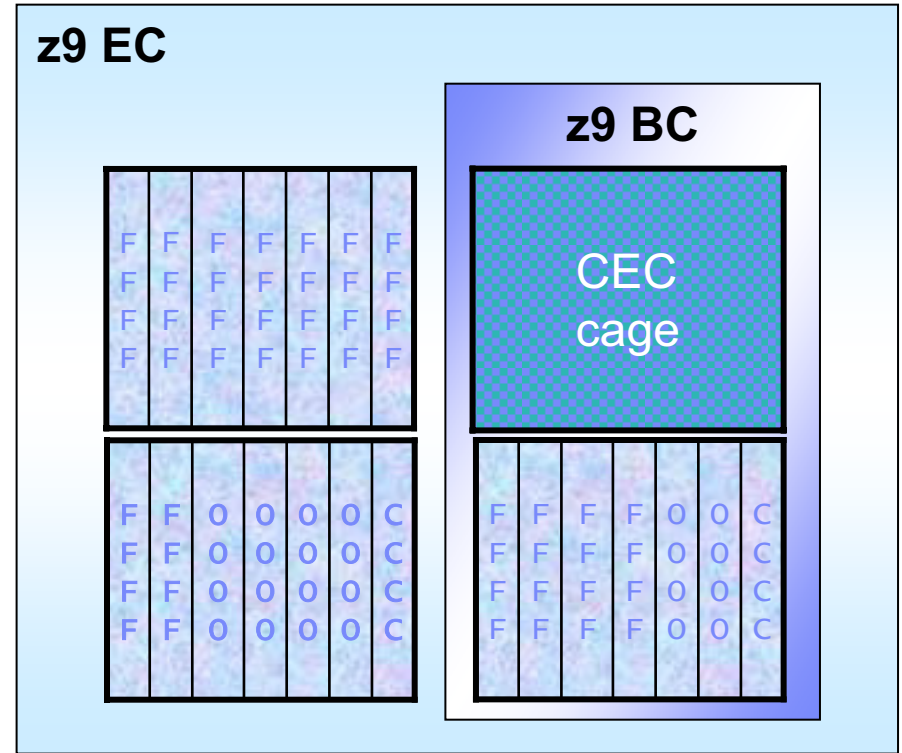
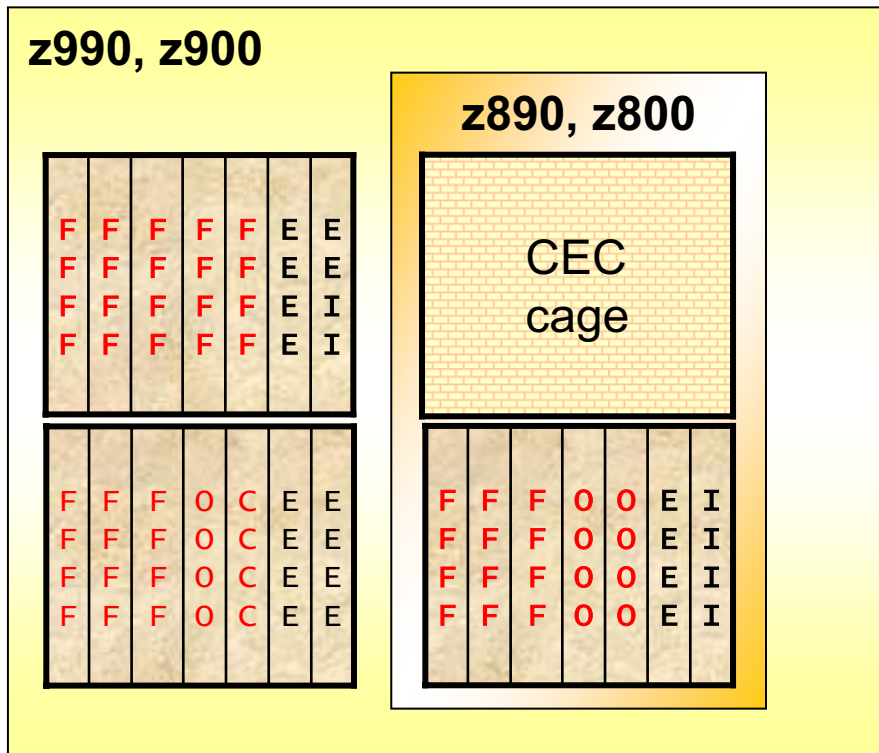


Increased connectivity per I/O cage on z9 EC, z9 BC

- All supported FICON features - up to 28 in one I/O cage
- OSA-Express2, OSA-Express, up to 24 per I/O cage or server
- Crypto Express2, up to 8 per I/O cage or server
- **Removed limitation of up to 20 FICON, OSAs, and Crypto in one I/O cage**

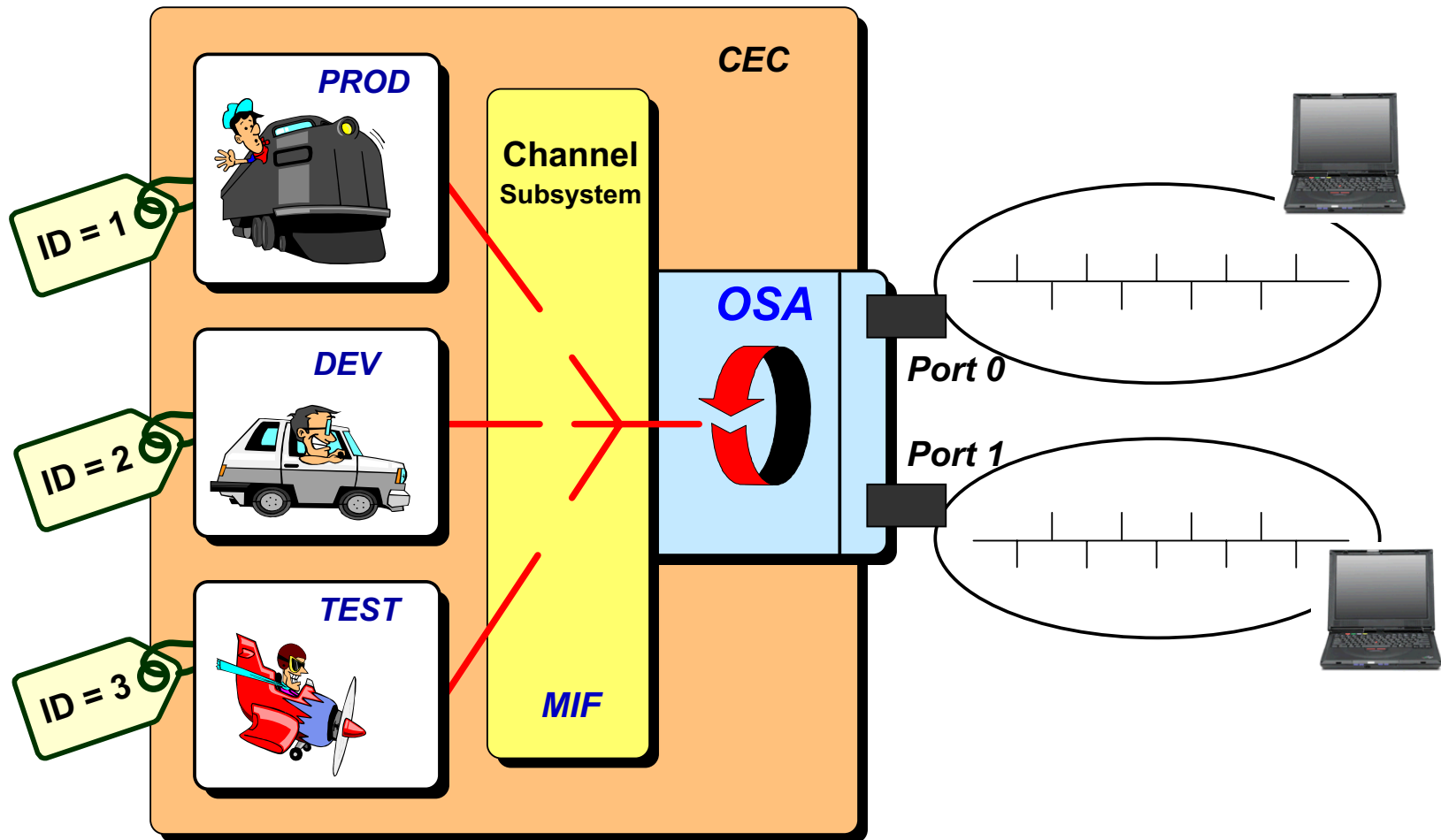
z990, z890, z900, z800
20 per I/O cage

z9 EC, z9 BC - 28 per I/O cage



E = ESCON, F = FICON, I = ISG-3, O = OSA, C = Crypto

Multiple Image Facility (MIF)





Spanned channels, z9 EC, z9 BC, z990, z890 Shared channels among LPARs across LCSSs

Internal spanned channels – First available October 2003

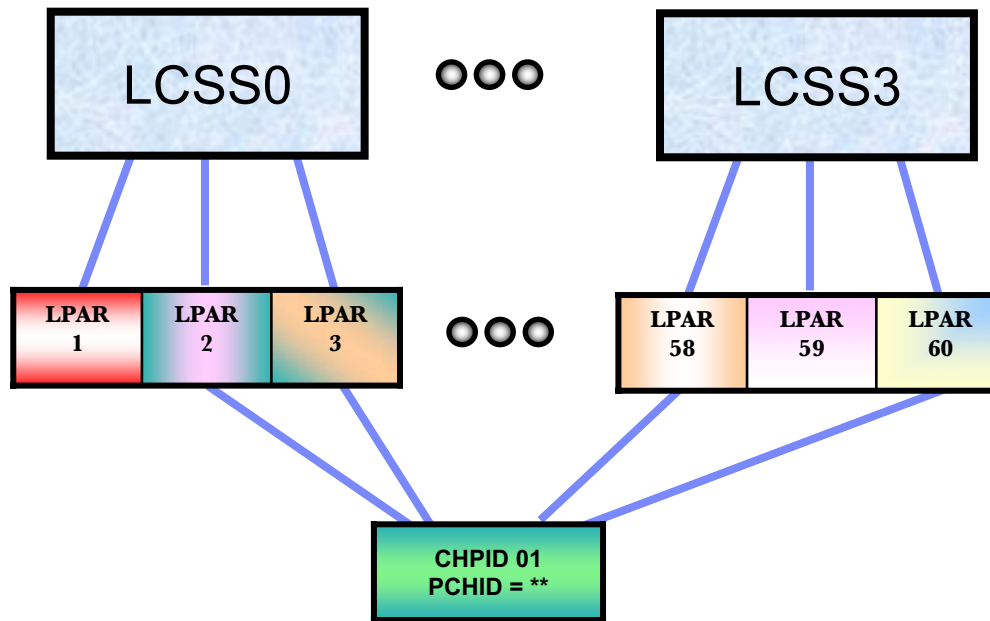
– HiperSockets and Internal Coupling links (ICs)

External spanned channels – First available May 2004

OSA-Express, OSA-Express2

FICON Express, FICON Express2

ICB-3s, ICB-4s, ISC-3



** No PCHID for HiperSockets and Internal Coupling links. PCHID required for FICON, ICs, ICBs, ISC-3, OSA
Spanning reduces the number of channels that can be defined for all LCSSs on server
Worst case - 256 if all channels are spanned between all LCSSs



Open Systems Adapter (OSA) – First availability dates

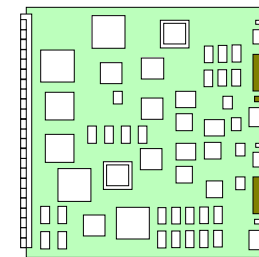
OSA-2, 12 features

G2 (Oct '95) G3 (Sept '96), G4 (June '97)

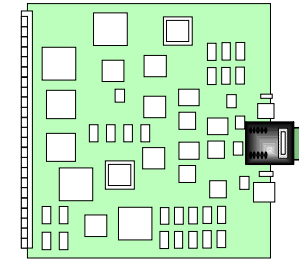
1995 (Oct) = OSA-2 Token Ring, Ethernet, FDDI

1996 (Aug) = 155 ATM

1998 (April) = Fast Ethernet

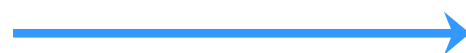


EN/TR



FDDI

OSA-Express



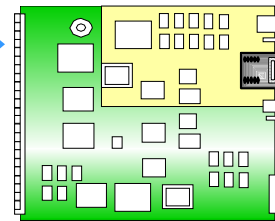
G5 (Sept '98), G6 (May '99)

z900 (Dec '00), z990 (June '03)

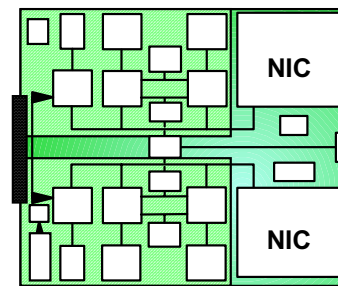
1999 = OSA-Express GbE (June)

2000 = Fast Ethernet & ATM (Jan)

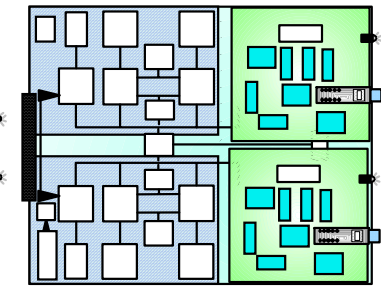
2003 = 24 features, 1000BASE-T (June)



G5, G6



23xx: z900, z800



13xx: z990, z890

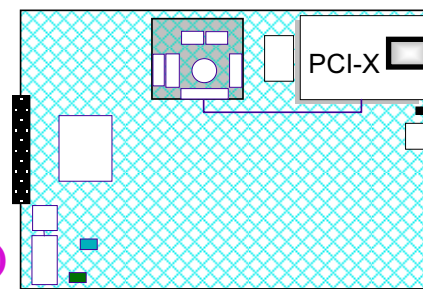
2005, OSA-Express2

GbE, 10 GbE (Jan)

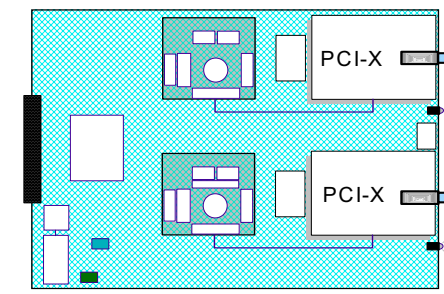
#3366: 1000BASE-T Ethernet (Sept, z9 EC)

Not shown

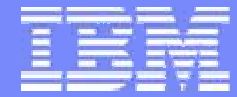
also available on z9 BC, z990, z890



3368: z9 EC, z9 BC
z990, z890



3364, 3365: z9 EC, z9 BC
z990, z890



Open Systems Adapter Matrices





OSA-Express2/OSA-Express . . . Building for tomorrow

Features/functions	G5/G6 June 99	G5/G6 Jan 00	z900 Oct 01 z800 Mar 02	z990 June 03	z890 z990 May 04	z890 z990 Jan 05	z9 EC Sept 05 z9 BC May 06
OSA-Express features							
Gigabit Ethernet LX and SX (fiber)	X	>	>	>	>	>	>
Fast Ethernet (10/100 Mbps) (copper)		X	>	>	>	>	>
Token Ring (4/16/100 Mbps) (copper)			X	>	>	>	NA
1000BASE-T Ethernet (10/100/1000 Mbps) (copper)				X	>	>	>
Functions							
EMIF / MIF	X	>	>	>	>	>	>
OSA/SF Java GUI integrated in all operating systems				X	>	>	>
Spanned channels					X	>	>
OSA-Express2 features							
10 Gigabit Ethernet LR (fiber)						X	>
Gigabit Ethernet LX and SX (fiber)						X	>
1000BASE-T Ethernet (copper)							26 May z9 EC, 9 BC z990,z890

The dates are general availability dates for hardware.



OSA-Express2 / OSA-Express . . . Building for tomorrow

CHPID types and functions	G5/G6 Jun 99	G5/G6 Jan 00	z990 Jun 03	z890 z990 May 04	z9 EC Sept 05 z9 BC May 06
OSE (non-QDIO, SNA and/or TCP/IP)	X				
IPv4, Broadcast, Multicast (OSPF), Primary/secondary routers/OAT entry, all media	X	>	>	>	>
VIPA (manual using OSA/SF), all media types		OS/390 VM/ESA	>	>	>
SNA at 1 Gbps over copper (1000BASE-T Ethernet)			SW - T	>	>
OSC (OSA Integrated Console Controller, OSA-ICC)				X	
TN3270E Non-SNA DFT 3270 emulation 1000BASE-T Ethernet only				z/OS V1.3 z/VM V4.4 VSE/ESA V2.6 TPF 4.1	>
120 console sessions per port				SW - T	>
OSN (OSA for NCP) OSA-Express2 exclusive					X
OSA-Express2 OSN supporting Communication Controller for Linux on System z9 Operating system PTFs required					z/OS V1.4 z/VM V5.1 VSE/ESA 2.7 TPF 4.1 Linux

The dates are general availability dates for hardware.
SW-T = Transparent to software.



OSA-Express2 / OSA-Express . . . Building for tomorrow

CHPID type OSD functions	G5/G6 Jun 99	G5/G6 Jan 00	z900 Oct 01 z800 Mar 02	zSeries May 02	z990 Jun 03 z890 May 04	z9 EC Sept 05 z9 BC May 06
OSD (QDIO)	X					
Jumbo frames, Ethernet only at 1 / 10 Gbps	SW - T	>	>	>	>	>
Dynamic OAT, RMF – all media types	X	>	>	>	>	>
IPv4, Broadcast, Multicast (OSPF) Primary/secondary routers/OAT entry, all	X	>	>	>	>	>
VIPA (dynamic), all media		OS/390 VM/ESA	>	>	>	>
ARP query – all media Collect statistics regarding ARP cache			OS/390 V2.10	>	>	>
IPv6, Ethernet only				z/OS V1.4 Linux	z/VM V4.4 Aug 03	>
ARP cache management – all media types Purge IPv4 cache				z/OS V1.4	>	>
ARP cache management – all media For IP v4 - Query ARP table, Purge entries				Linux	>	>
TCP/IP broadcast support for RIP V1, all				z/OS V1.4 z/VM V4.3 Linux	>	>
Multiple secondary routers (Ethernet)				Aug 02 SW - T	>	>

The dates are general availability dates for hardware.
SW-T = Transparent to software.



OSA-Express2 / OSA-Express . . . Building for tomorrow

CHPID type OSD functions	z990 Jun 03	Oct 2003	z890 z990 Oct 04	z890 z990 Jan 05	z9 EC Sept 05 z9 BC May 06
OSD (QDIO)					
Adapter interruptions, all media types	z/VM Linux	>	>	>	>
Performance assist for V=V guests, all media types	z/VM	>	>	>	>
Checksum offload for IPv4 packets, Ethernet only	z/OS V1.5 Linux *	>	>	>	>
160 TCP/IP stacks per port, all media types	SW - T	>	>	>	>
Intrusion Detection Services enhancements, all media	z/OS V1.5	>	>	>	>
Port name relief, zSeries, all media types		z/OS – NA z/VM V4.3 Linux	>	>	>
160 stacks per LPAR for all OSA-Express features (was 84)			z/OS V1.6 Linux *	z/VM V3.1 z/VM V4.3	>
Layer 2 for IP and non-IP workloads, Ethernet only			OSA-E z/VM V5.1 Linux **	OSA-E2 z/VM V5.1 Linux **	>
Remove restriction – now Layer 3 to Layer 2 traffic supported					OSA-E2 OSA-E transparent SW

The dates are general availability dates for hardware.

SW-T = Transparent to software.

* SUSE SLES 8 and Red Hat RHEL 3 distributions

** SUSE SLES 9 SP2



OSA-Express2 / OSA-Express . . . Building for tomorrow

CHPID type OSD functions	z990 Jun 03	Oct 2003	z890 z990 May 04	z890 z990 Oct 04	z890 z990 Jan 05	z9 EC Sept 05 z9 BC May 06
OSD (QDIO) – all exclusive to OSA-Express2						
640 TCP/IP stacks					z/OS V1.6 z/VM V5.1 VSE/ESA V2.6 Linux SUSE SLES 9 SP2	>
Large send					z/OS V1.6 Linux SUSE SLES 9 SP2	>
Concurrent LIC update					X	>
GARP VLAN Registration Protocol (GVRP)						z/OS V1.7 with PTF z/VM V5.1 *

GVRP = Generic Attribute Registration Protocol (GARP) Virtual Local Area Network (VLAN) Reigstration Protocol

The dates are general availability dates for hardware.

* z/VM support planned to be available in second quarter 2006.



OSA-Express2 / OSA-Express . . . Building for tomorrow

SNMP support		z900 Mar 01	zSeries May 02	z990 Jun 03	Oct 03	z990 z890 May 04	z9 EC Sept 05 z9 BC May 06
OSE (non-QDIO, LCS, LSA)							
SNMP MIB extension ATM Ethernet LANE		OS/390 V2.10	>	>	>	>	>
Direct SNMP for LCS – Get, GetNext, Trap, Set, all media						z/OS V1.6 Sept 04	>
OSD (QDIO)							
SNMP MIB extension; Ethernet and ATM Ethernet LANE		OS/390 V2.10	>	>	>	>	>
Direct SNMP query - Get, GetNext, all media types			z/OS V1.4 Linux *	>	>	>	>
dot3StastsTable (RFC 2665) Ethernet only, copper & fiber				z990 z/OS V1.4 Linux *	z900 z800	>	>
Direct SNMP – performance data all media types, z990, z900, z890					z/OS V1.4 Linux *	>	>
Direct SNMP – traps and set all media types						z/OS V1.5	>

The dates are general availability dates for hardware.

LAN Channel Station (LCS) supporting TCP/IP traffic. Link Services Architecture (LSA) supporting SNA traffic.

Direct SNMP for QDIO (OSD) removed the prerequisite of OSA/SF for SNMP management – first available May 2002.

Direct SNMP for LAN Channel Station (LCS) - TCP/IP traffic.

* Linux distribution SUSE SLES 8



OSA-Express2 / OSA-Express . . . Building for tomorrow

CHPID type OSD functions for VLANs (IEEE 802.1q)	z900 Oct 01	zSeries May 02	z990 Jun 03	Oct 03	z990 z890 May 04	z9 EC Sept 05 z9 BC May 06
OSD (QDIO) – Ethernet only, IEEE 802.1q						
Null tagging Ethernet, ATM Ethernet LANE	z/OS V1.2	>	>	>	>	>
Full VLAN support		Linux	>	>	>	>
Full VLAN support One global VLAN ID for IPv4 One global VLAN ID for IPv6			z/OS V1.5	>	>	>
VLAN support One global VLAN ID for IPv4			z/VM V4.4	>	>	>
Full VLAN for z/OS on z800, z900				z/OS V1.5	>	>
VLAN support One global VLAN ID for IPv6					z/VM V5.1 Sep 04	>

The dates are general availability dates for hardware.



OSA VLAN support

VLAN support			
	Linux on System z	z/OS	z/VM
OSA-Express OSA-Express2	Yes, IPv4, IPv6	Yes, V1.5 IPv4, IPv6	Yes, V4.4 - - IPv4 Yes, V5.1 - - IPv6
z/VM guest LAN	Yes, IPv4	Yes, IPv4	Yes, IPv4
IPv6 support			
OSA-Express OSA-Express2	Yes	Yes, V1.4	? NO
z/VM guest LAN	Yes, z/VM V4.4	Yes, z/VM V1.4	Yes, V4.4
Broadcast support			
OSA-Express OSA-Express2	Yes, IPv4	Yes, IPv4	Yes, IPv4
z/VM guest LAN	Yes, IPv4	Yes, IPv4	Yes, IPv4
Generic Attribute Registration Protocol VLAN Registration Protocol (GVRP)			
OSA-Express2 z9 EC, z9 BC: QDIO	No	Yes. V1.7 with PTF	Yes, V5.1 with PTF 2Q06



OSA-Express2, OSA-Express limits

Hardware limits	S/390 G5/G6	z900 Dec 00	z900 Oct 01 z800 Mar 02	zSeries May 02	z990 Jun 03	z990,z890 Oct 04 OSA-E	z990,z890 Jan 05 OSA-E2	z9 EC Sept 05 z9 BC May 06
Ports per feature (G5/G6 #5201 (EN/TR) has 2 ports)	1	2	2	2	2	2	GbE = 2 10 GbE = 1	100BASE-T 2 ports
Features per server	12	12	12	12	24	24	24	24
CHPID per port	1	1	1	1	1	1	1	1
IP								
Home IP addresses (IPv4 + IPv6 + DVIPA) per port	512	512	2048	2048	2048	2048	4096	4096
Multicast addresses (IPv4 + IPv6)	64	64	64	1024	1024	1024	2048	2048
ARP table size *	512	2048	8192	8192	8192	8192	16384	16384

OSA-E is OSA-Express, OSA-E2 is OSA-Express2

The dates are general availability dates for hardware.

* Note: The ARP table's capacity limit equals the sum of the IPv4 Home Addresses, plus the IPv6 Home Addresses, plus the IPv4 Multicast Addresses, plus the IPv6 Multicast Addresses, plus the IPv4 Remote Addresses stored in the table.



OSA-Express2, OSA-Express limits

Hardware limits	S/390 G5/G6	z900 Dec 00	z900 Oct 01 z800 Mar 02	zSeries May 02	z990 Jun 03	z990,z890 Oct 04 OSA-E	z990,z890 Jan 05 OSA-E2	z9 EC Sept 05 z9 BC May 06
OSE (non-QDIO) Applicable only to copper OSA								
Subchannels per stack	2	2	2	2	2	2	NA	2
Devices per port	240	240	240	240	240	240	NA	240
IP stacks per port/CHPID	120	120	120	120	120	120	NA	120
PU's per port/CHPID/MAC address	2048	4096	4096	4096	4096	4096	4096	4096
Control units per port/CHPID	1	1	1	1	1	1	1	1
OSD (QDIO)								
Devices/subchannels per stack, 2 control & 1 data	3	3	3	3	3	3	3	3
Devices/subchannels per LPAR	240	240	240	240	254	480	1920 \$	1920
IP stacks per port / CHPID	15	80	80	80	160	160	640 \$	640
IP stacks per LPAR	15	80	80	80	84	160	640 \$	640
Devices / subchannels per port	240	240	240	240	480	480	1920	1920
Control units per port/CHPID	1	1	1	1	1	16	16	16
OSN (OSA for NCP) GbE, 1000BASE-T Ethernet								
						OSA-Express2 exclusively		
Connections per CHPID (374x subchannels)	NA	NA	NA	NA	NA	NA	NA	180
Number of QDIO devices (to communicate with CCL)	NA	NA	NA	NA	NA	NA	NA	480
MAC addresses per port	NA	NA	NA	NA	NA	NA	NA	2048

OSA-E is OSA-Express, OSA-E2 is OSA-Express2

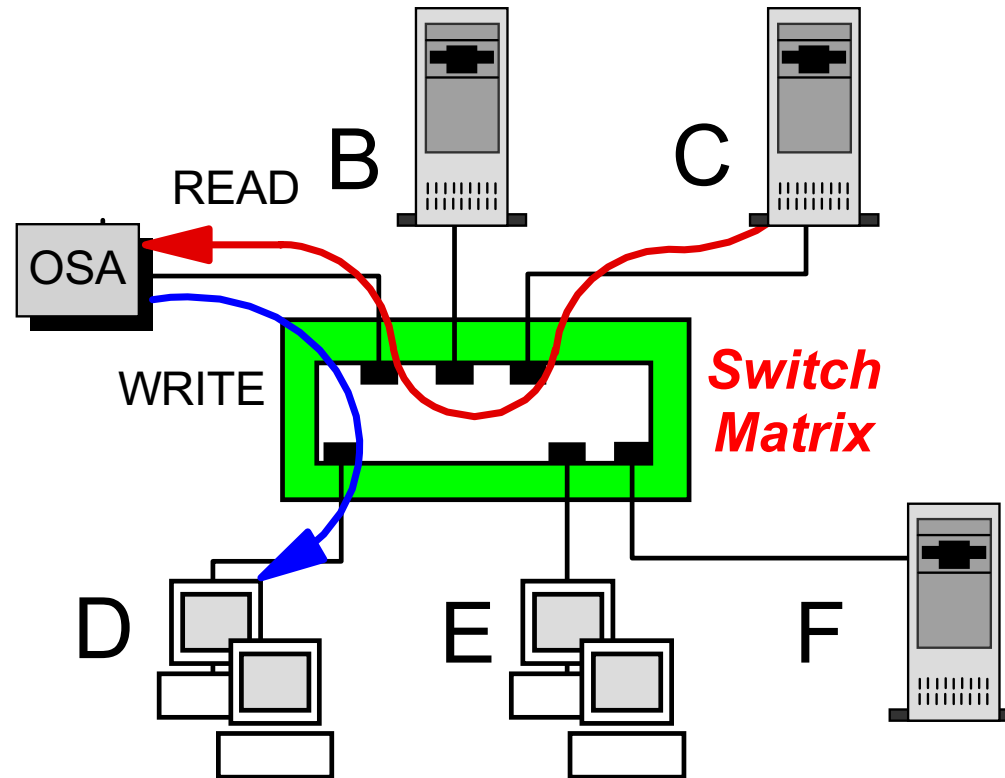
\$ If multiple priorities for queues is enabled (one to four QDIO priorities) the maximum remains at 160 stacks/480 devices



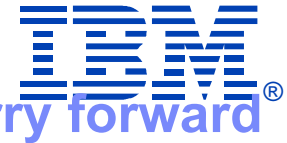
OSA LAN Transmission Matrix

Feature	Auto-sense	Auto-negotiate	Operating mode	Frame size in bytes
10 Gigabit Ethernet Gigabit Ethernet	No	Yes	Full duplex	802.3: 1492 DIX: 1492 Jumbo: 8992
1000BASE-T Ethernet	No	Yes	10 Mbps half/full duplex 100 Mbps half/full duplex 100 Mbps full duplex	802.3: 1492 DIX: 1942 Jumbo: 8992 when QDIO
Fast Ethernet	No	Yes	1 Mbps half/full duplex 100 Mbps half/full duplex	802.3: 1492 DIX: 1492
Token Ring	Yes	No	4 Mbps half/full duplex 16 Mbps half/full duplex 100 Mbps full duplex	4 Mbps: 4550 16/100 Mbps: 18200

Ethernet full-duplex operation



Simultaneous Read & Write in Full-Duplex mode
Theoretically doubles the bandwidth available
Requires connection to LAN switch



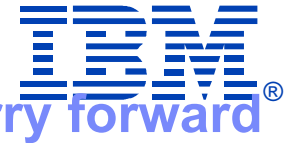
OSA – available on new build and what you can carry forward®

Feature	Feature Name	Ports	z900	z990	z9 EC	CHPIDs	Connectors
5201	OSA-2 Token Ring	2	X	N / A	N / A	OSA	RJ-45
5202	OSA-2 FDDI	1	X	N / A	N / A	OSA	SC Duplex
2362	OSA-E 155 ATM SM	2	X	RPQ	N / A	OSD, OSE	SC Duplex
2363	OSA-E 155 ATM MM	2	X	RPQ	N / A	OSD, OSE	SC Duplex
2364	OSA-E GbE LX	2	X	C	C	OSD, L2/L3 **	SC Duplex
2365	OSA-E GbE SX	2	X	C	C	OSD, L2/L3 **	SC Duplex
2366	OSA-E Fast Ethernet	2	X	C	C	OSD L2/L3 **, OSE	RJ-45
2367	OSA-E Token Ring	2	X	X	N / A	OSD, OSE	RJ-45
1364	OSA-E GbE LX	2	09/04	X	C	OSD, L2/L3 **	LC Duplex
1365	OSA-E GbE SX	2	09/04	X	C	OSD, L2/L3 **	LC Duplex
1366	OSA-E 1000BASE-T Ethernet	2	N / A	X	C	OSC, OSD L2,L3, OSE	RJ-45
3364	OSA-E2 GbE LX	2	N / A	01/05	X	OSD L2/L3, OSN *	LC Duplex
3365	OSA-E2 GbE SX	2	N / A	01/05	X	OSD L2/L3, OSN *	LC Duplex
3366	OSA-E2 1000BASE-T Ethernet	2	N / A	05/06	X	OSC, OSD L2/L3, OSE, OSN *	RJ-45
3368	OSA-E2 10 GbE LR	1	N / A	01/05	X	OSD L2/L3 **	SC Duplex

LX = Long wavelength transceiver, SX = Short wavelength transceiver, LR - Long Reach transceiver

X = Available for ordering C = Carry forward on an upgrade from z900 or z990

* OSN is exclusive to z9 EC and z9 BC ** L2/L3 = Layer 2/Layer 3 which is applicable to z9 EC, z9 BC, z990, z890



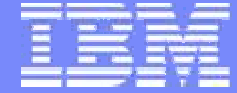
OSA – available on new build and what you can carry forward®

Feature	Feature Name	Ports	z800	z890	z9 BC	CHPIDs	Connectors
5201	OSA-2 Token Ring	2	X	N / A	N / A	OSA	RJ-45
5202	OSA-2 FDDI	1	X	N / A	N / A	OSA	SC Duplex
2362	OSA-E 155 ATM SM	2	X	N / A	N / A	OSD, OSE	SC Duplex
2363	OSA-E 155 ATM MM	2	X	N / A	N / A	OSD, OSE	SC Duplex
2364	OSA-E GbE LX	2	X	C	C	OSD, L2/L3 **	SC Duplex
2365	OSA-E GbE SX	2	X	C	C	OSD, L2/L3 **	SC Duplex
2366	OSA-E Fast Ethernet	2	X	C	C	OSD L2/L3 **, OSE	RJ-45
2367	OSA-E Token Ring	2	X	X	N / A	OSD, OSE	RJ-45
1364	OSA-E GbE LX	2	09/04	X	C	OSD, L2/L3 **	LC Duplex
1365	OSA-E GbE SX	2	09/04	X	C	OSD, L2/L3 **	LC Duplex
1366	OSA-E 1000BASE-T Ethernet	2	N / A	X	C	OSC, OSD L2,L3, OSE	RJ-45
3364	OSA-E2 GbE LX	2	N / A	01/05	X	OSD L2/L3, OSN *	LC Duplex
3365	OSA-E2 GbE SX	2	N / A	01/05	X	OSD L2/L3, OSN *	LC Duplex
3366	OSA-E2 1000BASE-T Ethernet	2	N / A	05/06	X	OSC, OSD L2/L3, OSE, OSN *	RJ-45
3368	OSA-E2 10 GbE LR	1	N / A	01/05	X	OSD L2/L3 **	SC Duplex

LX = Long wavelength transceiver, SX = Short wavelength transceiver, LR - Long Reach transceiver

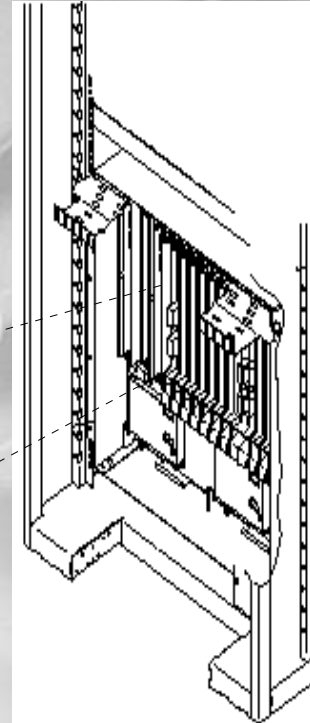
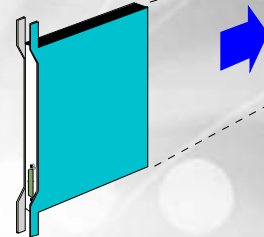
X = Available for ordering C = Carry forward on an upgrade from z900 or z990

* OSN is exclusive to z9 EC and z9 BC ** L2/L3 = Layer 2/Layer 3 which is applicable to z9 EC, z9 BC, z990, z890



The features on z9 EC, z9 BC

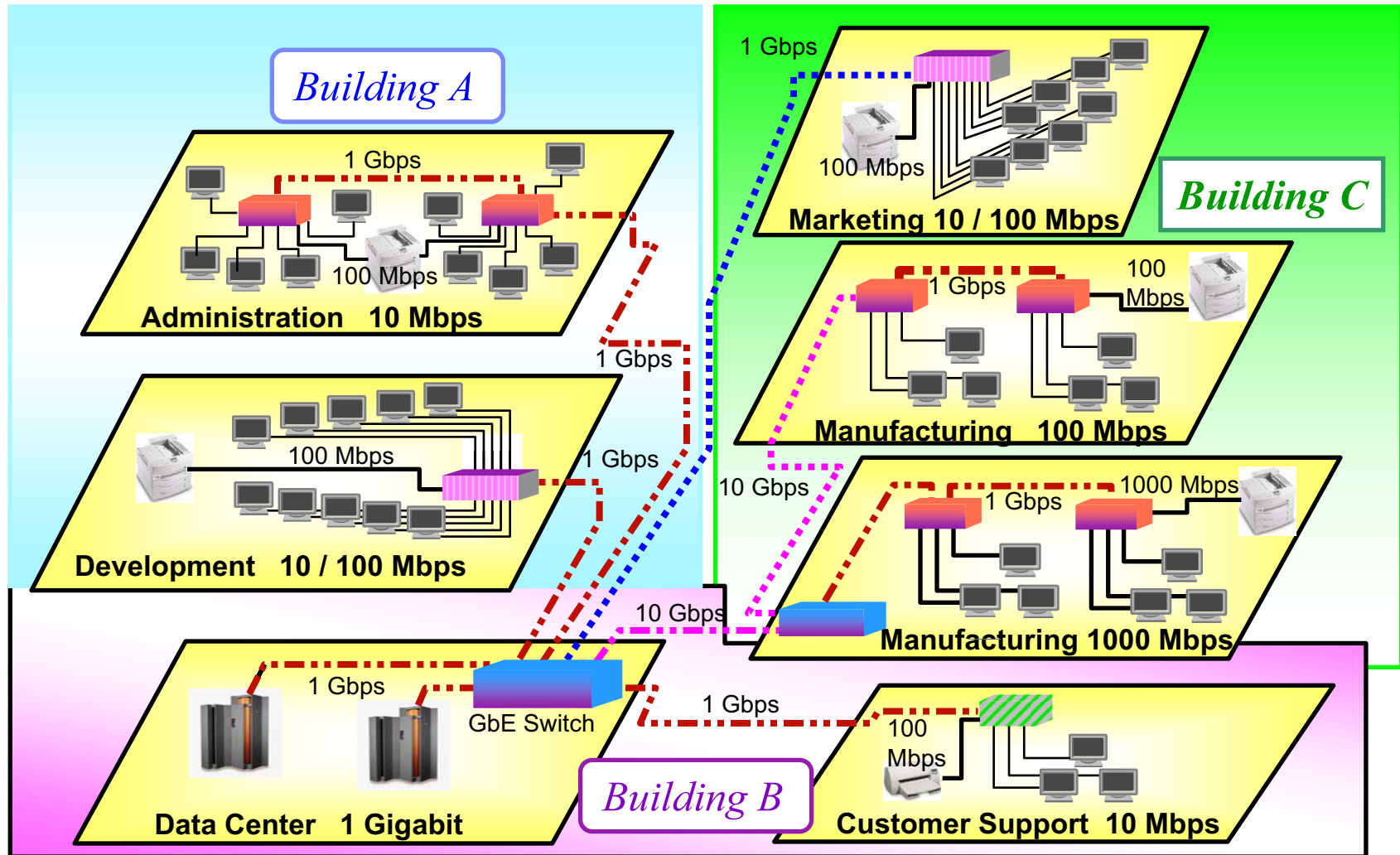
Ethernet servers





Ethernet Coexistence

- = SM fiber, 10 Gbps
- = SM fiber
- = MM fiber
- = 1000 or 100 Mbps, Category 5 copper
- = 10 Mbps, Category 3 copper

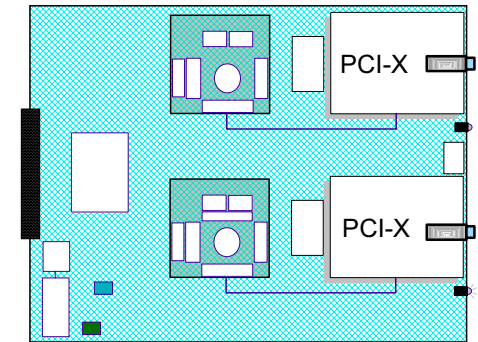




OSA-Express2 1000BASE-T Ethernet

- **Supports auto-negotiation to 10, 100, 1000 Mbps over Category 5 copper**
- **Capable of achieving line speed**
 - ▶ Actual throughput is dependent upon environment
- **Supports:**
 - ▶ Layer 2 for protocol-independent packet forwarding
 - ▶ Large send for offloading TCP segmentation processing
 - ▶ 640 TCP/IP stacks for improved virtualization
 - ▶ Concurrent LIC update to minimize network traffic disruption
- **Offered on z990, z890 effective 26 May 2006**

1000BASE-T Ethernet #3366



- **Modes of operation**

Mode	CHPID	Description
OSA-ICC	OSC	3270 data streams
QDIO	OSD	TCP/IP traffic when Layer 3 Protocol-independent when Layer 2
Non-QDIO	OSE	TCP/IP and/or SNA/APPN/HPR traffic
OSA for NCP	OSN	NCPs running under IBM Communication Controller for Linux

OSA-Express2 10 GbE and GbE

10 Gigabit Ethernet LR (long reach)

- ▶ One port per feature
- ▶ CHPID type OSD (QDIO)
- ▶ 9 micron single mode fiber, **SC Duplex connector**

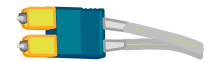
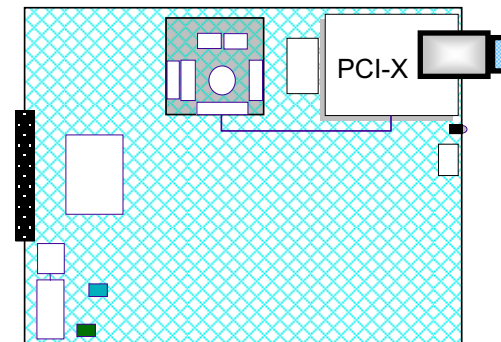
Gigabit Ethernet features, 2 ports per feature

- ▶ CHPID type OSD (QDIO)
- ▶ CHPID type OSN (OSA for NCP) – exclusive to z9 EC, z9 BC
- ▶ Designed to achieve line speed - 1 Gbps in each direction
 - ▶ Gigabit Ethernet LX (Long wavelength)
 - 9 micron single mode fiber, LC Duplex connector
 - ▶ Gigabit Ethernet SX (Short wavelength)
 - 50 or 62.5 micron multimode fiber, LC Duplex connector

OSA-Express2 10 GbE and GbE support

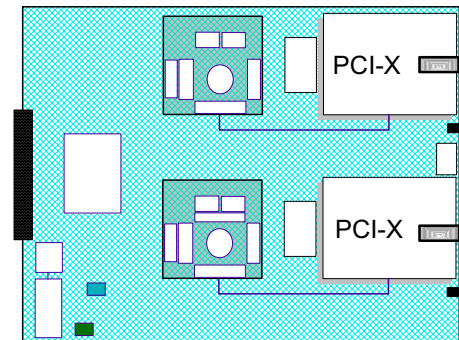
- ▶ Layer 2 support - protocol-independent packet forwarding
- ▶ Large send - offloading TCP segmentation
- ▶ 640 TCP/IP stacks - improved virtualization
- ▶ Concurrent LIC update to minimize network traffic disruption

10 Gigabit Ethernet
Feature 3368



SC Duplex SM

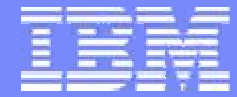
Gigabit Ethernet
Features 3364 (LX), 3365 (SX)



LC Duplex SM



LC Duplex MM



Technology
and

performance





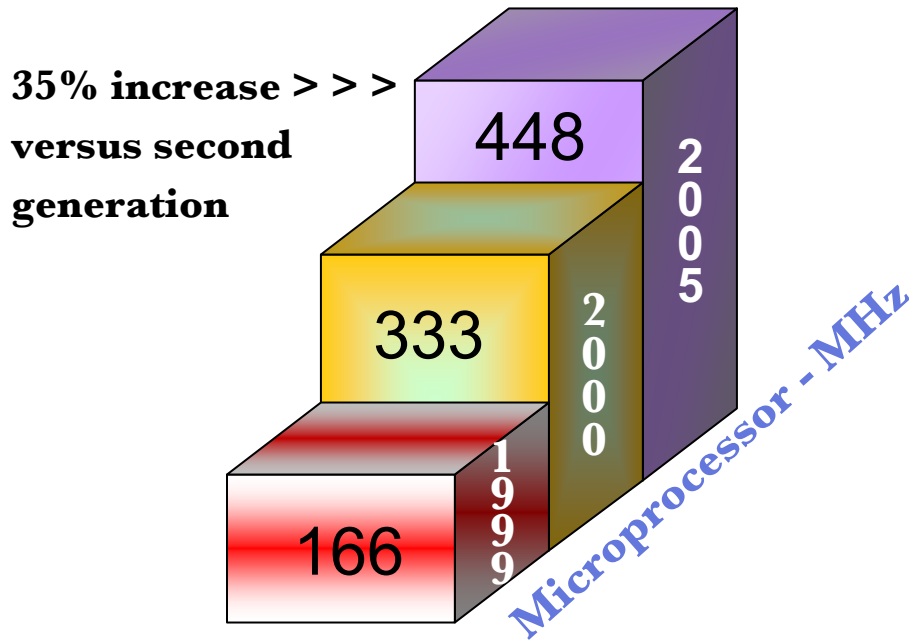
Refresh of OSA technology

Generation	1 st	2 nd	2 nd	2 ⁺ New NIC	3 rd
Servers	G5 / G6	z900 - 12/00 z800 - 03/02	z900 - 12/00 z800 - 03/02	z990 - 06/03 z890 - 05/04 z900, z800 - 09/30/04 *	z990, z890 z9 EC, z9 BC
Name	OSA-Express	OSA-Express	OSA-Express	OSA-Express	OSA-Express2
Features	GbE - 06/99, 2350, 2351 Fast E - 01/00, 2340 ATM	Token Ring, 2367 ATM	GbE, 2364, 2365 Fast E, 2366	GbE, 1364, 1365 1000BASE-T, 1366	10 GbE: 3368, GbE: 3364, 3365 1000BASE-T, 3366
Number of ports	One port per feature	Two ports per feature	Two ports per feature	Two ports per feature	10 GbE - 1 port GbE - 2 ports 1000BASE-T - 2 ports
Maximum throughput	GbE - 610 Mbps FE - line speed	Token Ring line speed	GbE - 1160 Mbps FE - line speed	GbE - 1160 Mbps 1000BASE - line speed	10 GbE - 3.5 Gbps GbE - 2 Gbps 1000BASE-T line speed
Microprocessor	166 MHz	333 MHz	333 MHz	333 MHz	500 MHz 10 GbE 448 MHz GbE
PCI bus	32-bit 33 MHz	32-bit 33 MHz	64-bit 66 MHz	64-bit 66 MHz	PCI-X, 64-bit 125 MHz 10 GbE 112 MHz GbE
Maximum features / ports	12 / 12	12 / 24	12 / 24	24 / 48	24 / 48

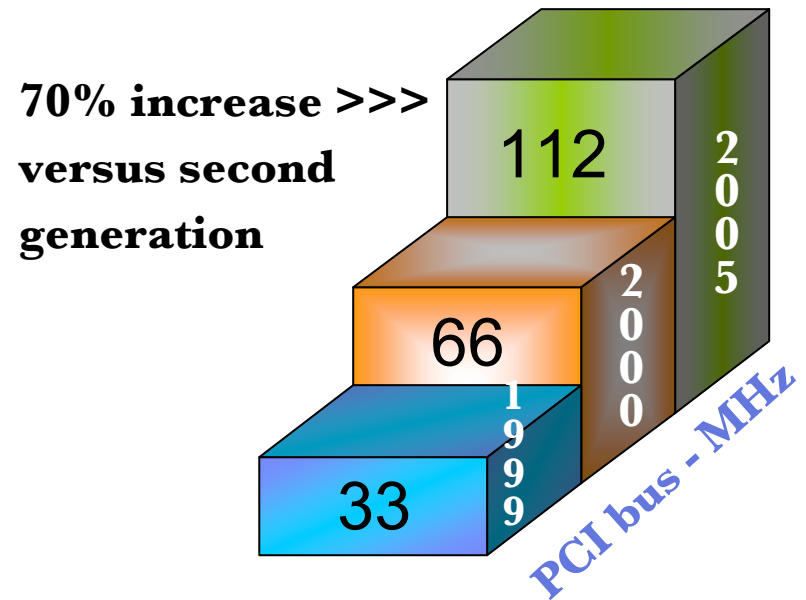
* GbE #1364 and #1365 only, on z900 and z800 (#1366 1000BASE-Ethernet not offered on z900, z800)
Fast E and FE = Fast Ethernet



OSA-Express2 Gigabit Ethernet A refresh of technology



Generation
Third
Second
First



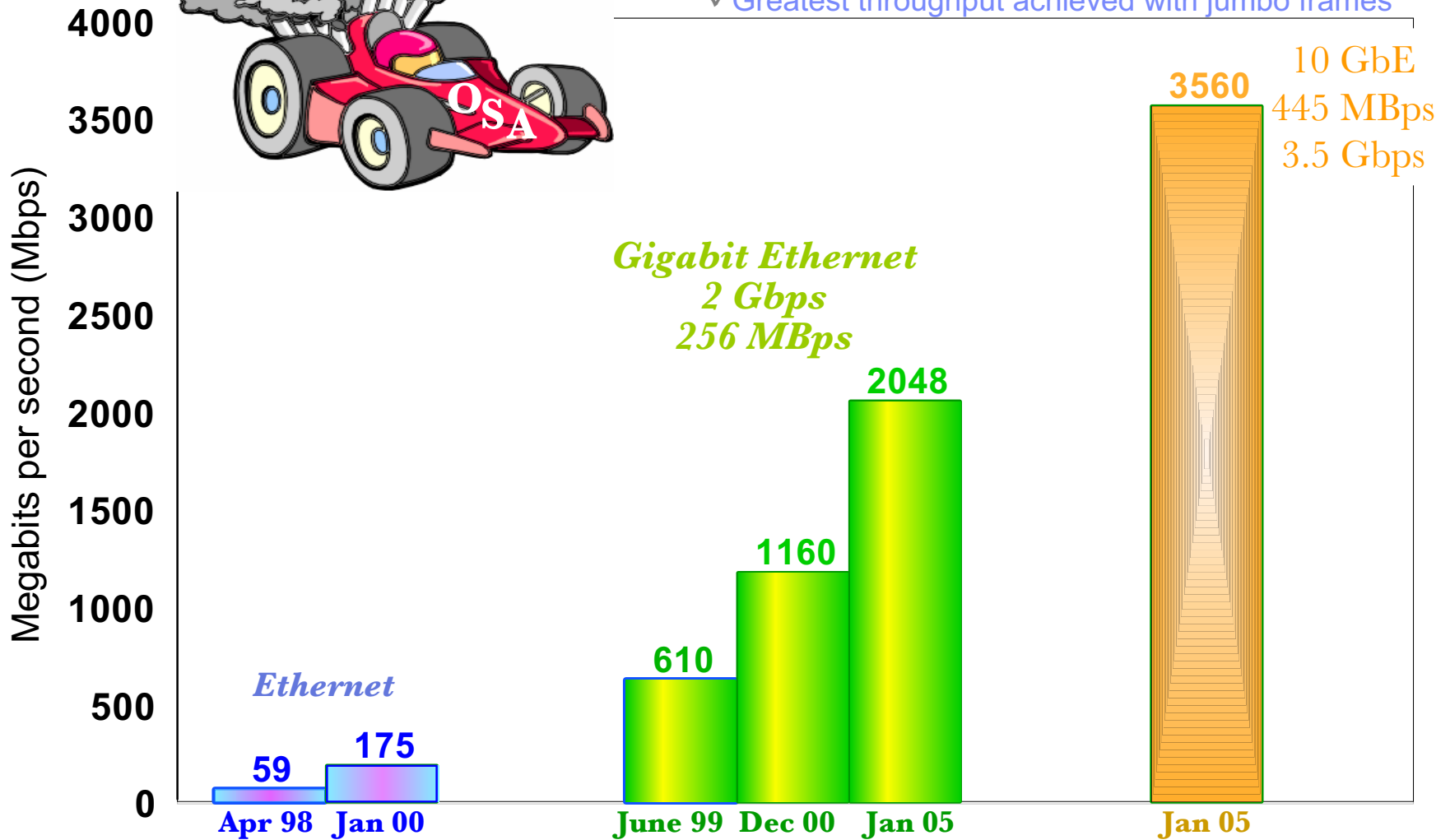
- OSA-Express2 is the 3rd generation of Ethernet technology

OSA-Express2 GbE is designed to achieve line speed - 1 Gbps in each direction



OSA performance over time

- ✓ OSA-Express2 GbE is designed to achieve line speed - 1 Gbps in each direction
- ✓ Greatest throughput achieved with jumbo frames





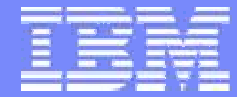
OSA-Express performance

- ★ **OSA processor becomes more efficient as throughput increases**
- ★ **Window size**
 - TCP window determines amount of data that the sender can transmit to receiver without needing an acknowledgment from the receiver
 - Faster and longer networks require larger windows to keep data flowing smoothly
- ★ **Blocking**
 - Performance is affected by the amount of data blocked together for transfer between OSA and TCP.
- ★ **Frame size**
 - Larger frames perform better
 - Larger frames reduce host and OSA processing costs
 - Size of frame depends on LAN type, MTU setting, size of data sent
- ★ **Measure: throughput, transaction response time, server utilization**
 - Bulk data transfer and interactive transactions
- ★ **QDIO and jumbo frames (8992 byte MTUs) yield the highest streams**

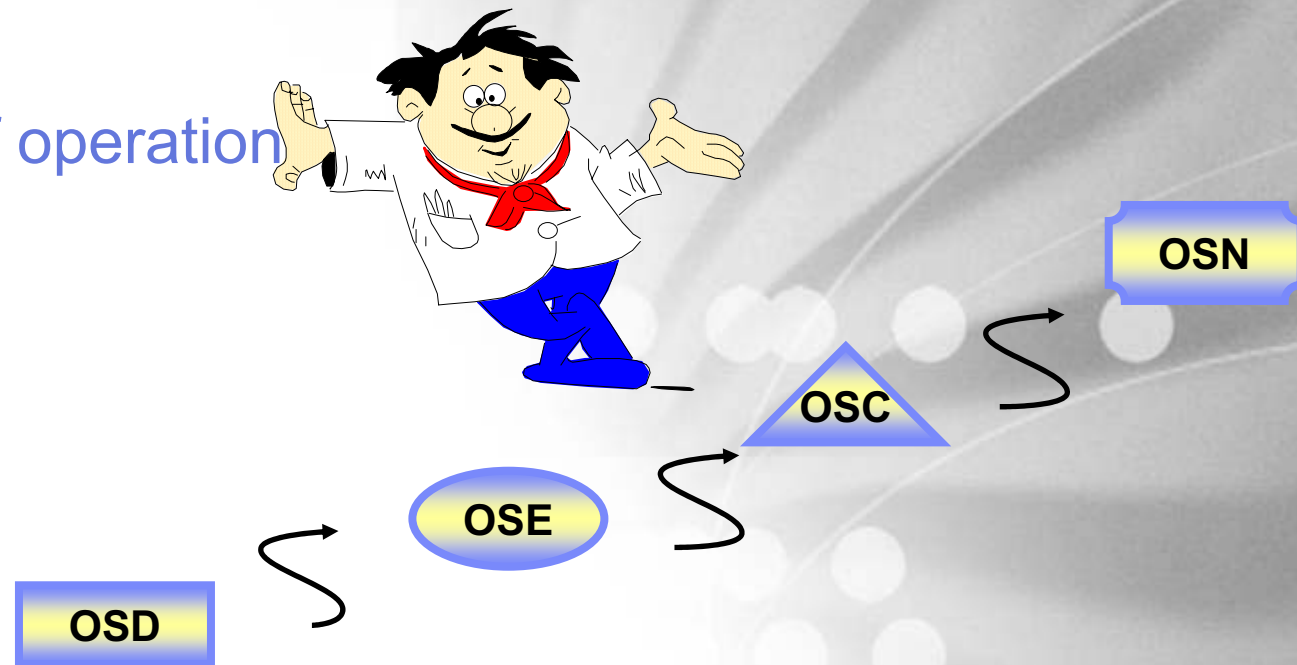


OSA solutions - how do they measure up?

- **Want to compare?**
- **Use AWM (Application Workload Modeler).**
 - ▶ Replaces Netmarks, and is now externally available.
- **Can model your current network configuration in your environment**
- **Rerun the same workload against a proposed alternative (e.g. OSA gigabit).**
- **Access information at**
 - ▶ <http://www-3.ibm.com/software/network/awm/>



OSA modes of operation

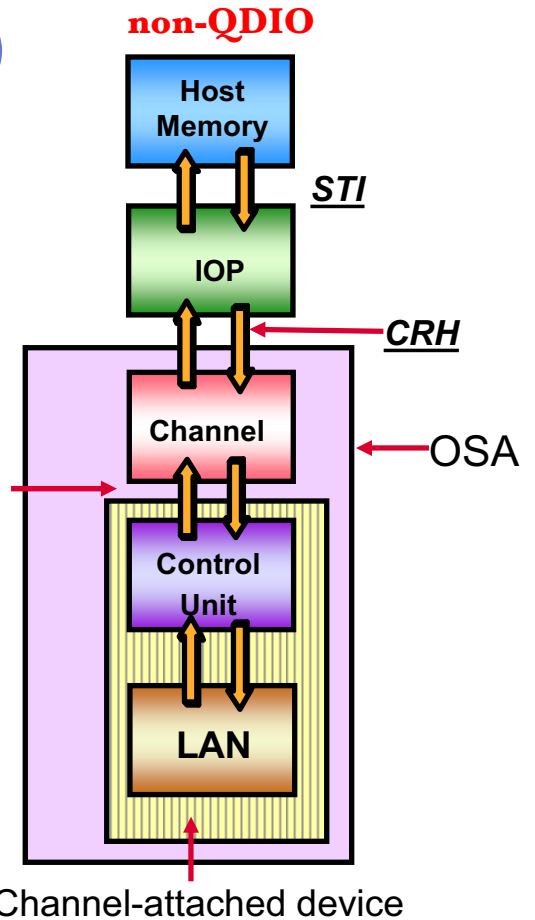
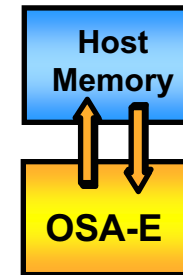




CHPID type OSD Queued Direct Input/Output since June 1999

- For TCP/IP traffic only - Layer 3
 - For SNA/APPN/HPR traffic with QDIO use TN3270, Enterprise Extender
- Protocol-independent when using Layer 2
 - ▶ **z/VM V5.1 with PTFs, Linux on System z**
- Design for high speed communication
 - ▶ **Reduced TCP/IP path length**
 - ▶ **QDIO IP Processing Assist**
 - ▶ **LPAR-to-LPAR Communication with port sharing**
 - ▶ **Direct Memory Access (DMA) Protocol**
 - Memory-to-memory communication
 - I/O interrupts minimized
 - Continuous direct data exchanges
 - ▶ **Dynamic customization**

(QDIO)



- QDIO: z/OS, z/OS.e, z/VM, z/VSE, z/TPF, Linux on System z
- 10 Gigabit Ethernet, Gigabit Ethernet, 1000BASE-T Ethernet, Fast Ethernet



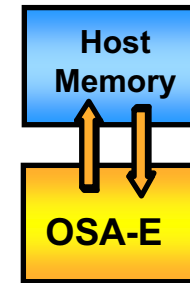
Functions - QDIO only

■ QDIO IP Processing Assists

- ▶ Performs all ARP processing
- ▶ Provides Multicast support
- ▶ Builds MAC and LLC headers
- ▶ Performs filtering - TCP/IP stack sees only IP datagrams

■ Checksum offload for IPv4 packets

- ▶ Calculates the TCP/UDP and IP header checksums
- ▶ Verifies the correctness of files
- ▶ Reduces host CPU cycles
- ▶ Checksum offload for IPv4 packets
 - ▶ z/OS V1.5, Linux on System z
 - 1000BASE-T Ethernet (#1366, #3366)
 - Gigabit Ethernet (#1364, 1365, #3364, #3365)
 - 10 Gigabit Ethernet (#3368)



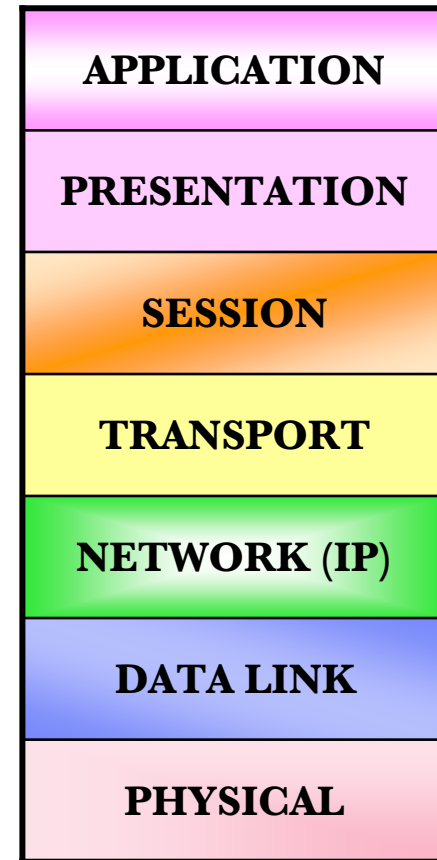


Layer 2 support since 29 October 2004 (hardware)

- **Two transport modes**
 - ▶ Layer 2 (link layer)
 - ▶ Layer 3 (Network or IP layer)
- **For IP and non-IP workloads**
 - ▶ OSA and z/VM virtual switch protocol-independent
- **Packet forwarding using MAC address**
 - ▶ Each operating system has own MAC address
- **Restricted at introduction**
 - ▶ Layer 3 to Layer 3
 - ▶ Layer 2 to Layer 2
- **z9 EC, z9 BC, z990, z890**
 - ▶ CHPID OSD
 - ▶ z/VM V5.1 with PTFs
 - ▶ Linux on System z
 - SUSE SLES 8 and Red Hat RHEL 3 distributions
 - SUSE SLES 9 SP2
- **All OSA-Express2 and OSA-Express features (exception – not Fast Ethernet)**

Layer 3

Layer 2





Layer 3 versus Layer 2

Layer 3	Layer 2
Guests share the same MAC address	Guests have own unique MAC address
Uses MAC address of shared OSA	z/VM virtual switch assigns MAC addresses
Guests are TCP/IP only	Guests can use any network layer protocol
No emulation of physical LAN segment for guests	Guests appear to have own physical LAN segment
Guests are not known to the hosts on the physical side of the LAN segment. ARP always resolves to a single OSA feature	ARP allows guests to become known to the host residing on the physical side of the LAN segment
Data sent by guest encapsulated within IP packet	Data sent by guest encapsulated in Ethernet frame

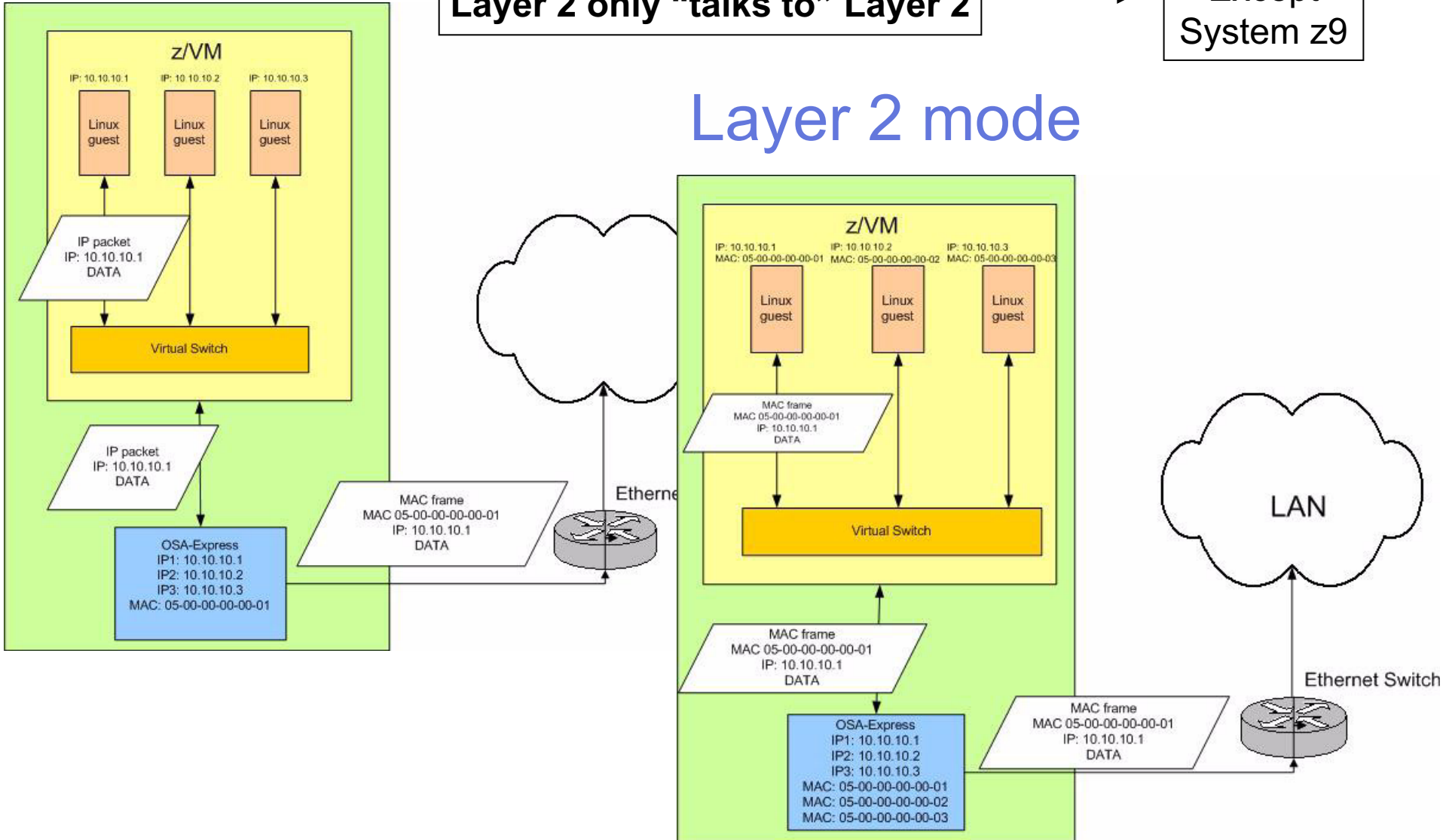


Layer 3 mode

Layer 3 only "talks to" Layer 3
Layer 2 only "talks to" Layer 2

Except System z9

Layer 2 mode





Layer 2 to Layer 3 traffic Restriction removed available 26 May 2006

- **Hosts and virtual switches sharing same OSA-Express2 or OSA-Express feature on System z9**
- **Can communicate directly through OSA port**
 - ▶ **Whether Layer 2 or Layer 3 transport mode**
- **No longer required for traffic to flow out on LAN and routed back in to OSA port**
- **CHPID type OSD**
- **All features supported on System z9**
 - ▶ **Exception – Fast Ethernet not supported (#2366)**
- **Transparent to operating systems**



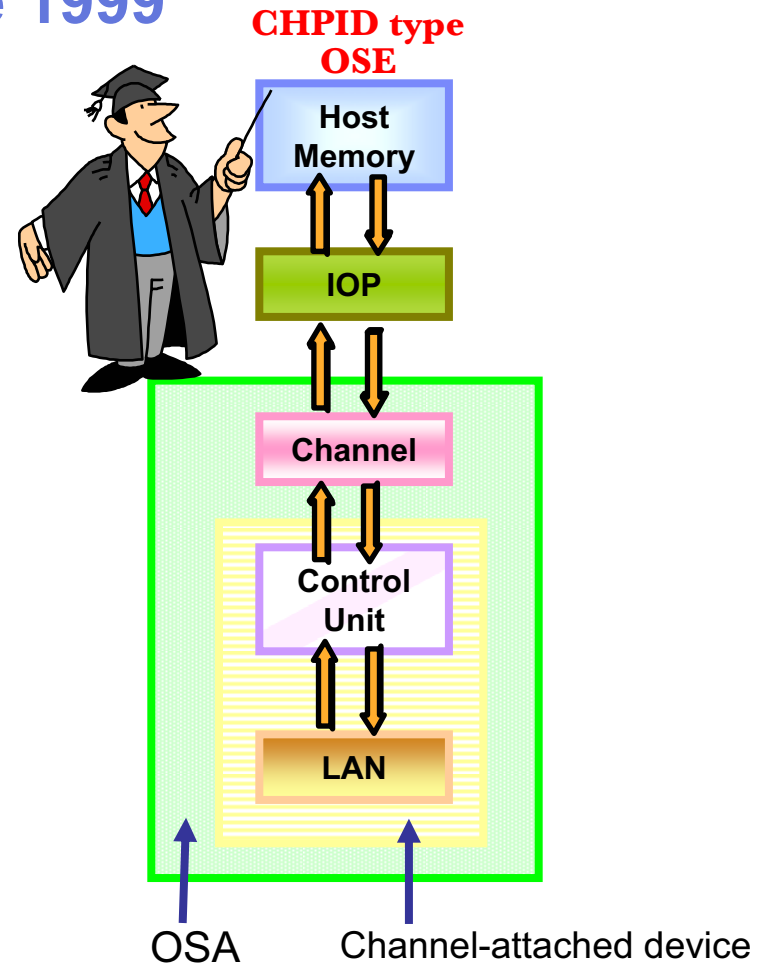
CHPID type OSE for SNA and/or TCP/IP since June 1999

- Used for all LAN communications
 - ✓ *Start I/O's*
 - ✓ *Channel Command Words (CCWs)*
 - ✓ *I/O interrupts*

- Involved in all data transfers
 - ✓ *I/O Processor (IOP)*
 - ✓ *Channel*

- Control unit layer
 - ✓ *Interprets CCWs (Read/Write)*
 - ✓ *Blocks/deblocks data*

- Device runs the LAN driver
- z/OS, z/OS.e, z/VM, z/VSE,



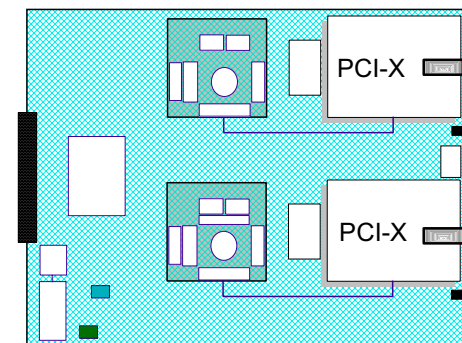
Controller, Router, OSA-2, OSA-Express, OSA-Express2 non-QDIO



CHPID type OSC OSA-Integrated Console Controller (OSA-ICC) since May 2004

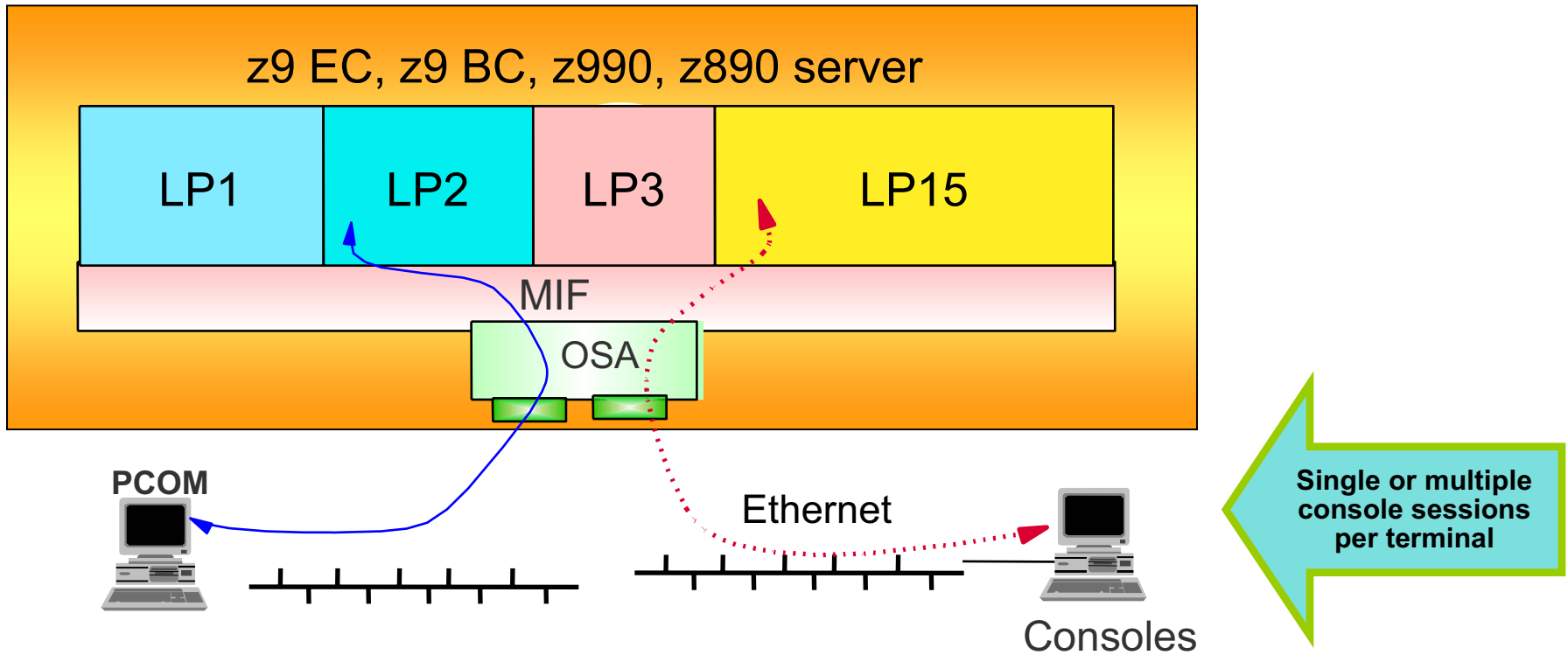
- Exclusive to 1000BASE-T Ethernet
 - ▶ CHPID type **OSC**
 - ▶ OSA-ICC configured on a port-by-port basis
- LAN Connectivity
 - ▶ LAN-attached consoles running TN3270E clients
 - Non-SNA DFT data streams to TN3270E
 - Capable of operating at 10, 100, or 1000 Mbps (1 Gbps)
 - ▶ Uses RJ-45 connection to Category 5 Unshielded Twisted Pair (UTP) copper cabling
- Configuration support via Support Element (SE) and Hardware Management Console (HMC)
- Can coexist in configurations using prior IBM 2074 models and older 3174 controllers
- No coaxial cable support or Token Ring support
- z/OS, z/VM, z/VSE, z/TPF

OSA-Express2
1000BASE-T Ethernet #3366



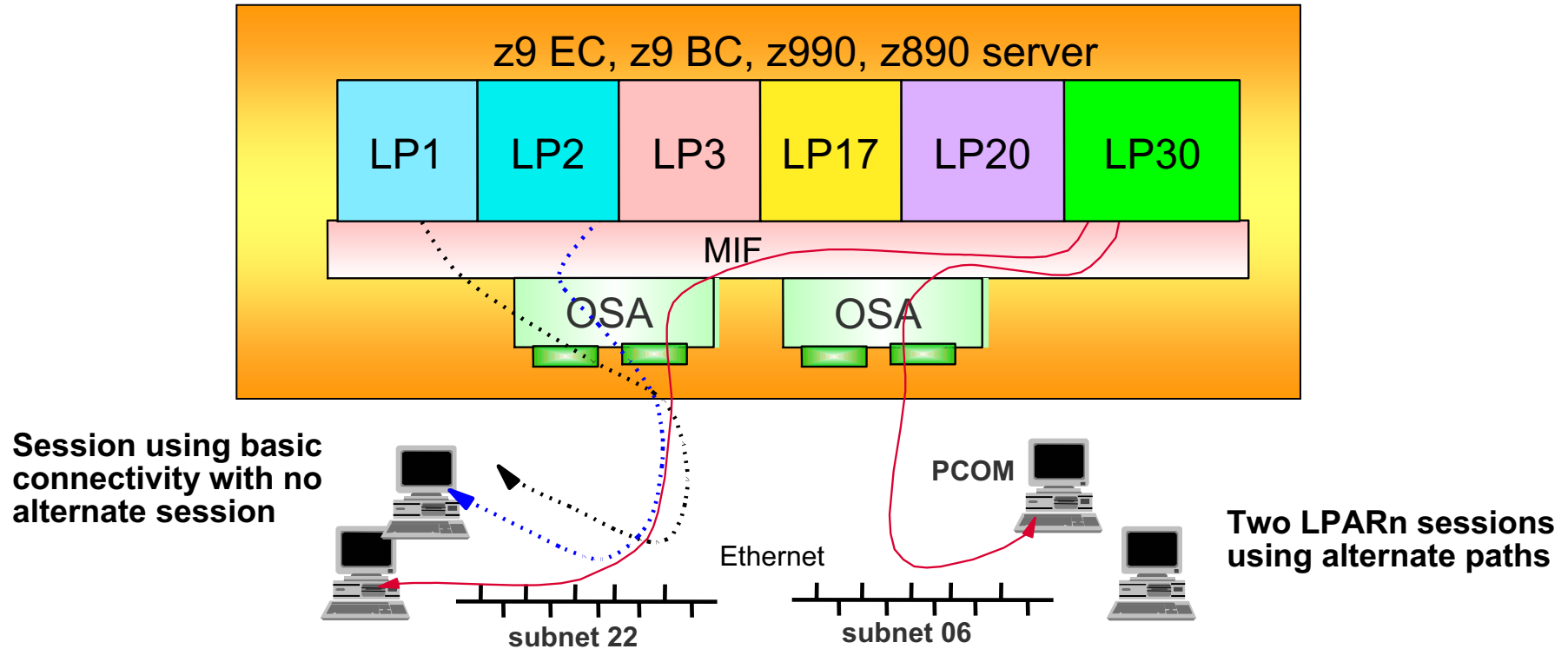
Also OSA-Express
1000BASE-T Ethernet #1366

OSA-ICC Single System with Alternate Sessions



- To IPL CEC and LPARs, and operating system console operations
- Up to 120 sessions per port across multiple LPARs .. MIF capable
 - ▶ Can run multiple sessions on a single workstation
- For increased console session availability, plan for separate consoles, on separate LANs, on separate ports, on separate OSA-Express features
 - ▶ Manual, disruptive console session switch possible

OSA-ICC Single System with Redundancy Configuration



Session using basic connectivity with no alternate session

Two LPARn sessions using alternate paths

- Up to 240 sessions to multiple LPARs on the CEC
- Session-level redundancy using different paths on ports, LANs, and consoles
 - ▶ Different console sessions from different LAN to same LPAR for dual connectivity
 - ▶ Manual, disruptive console session switch possible for failed session
 - ▶ Individual session cannot be shared between LPARs
 - ▶ LAN ports must attach to different subnets
- Loss of one port does not nondisruptively switch sessions to second port on same or different OSA

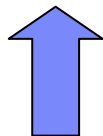


OSA-Express2 OSN (OSA for NCP)

Hardware available September 2005

and IBM Communication Controller for Linux (CCL)

CCL V1.1	CCL V1.2, available October 2005 (5724-J38)
OSA – Fast Ethernet, 1000BASE-T Ethernet, Gigabit Ethernet zSeries	OSA-Express2 GbE or 1000BASE-T Ethernet System z9 exclusive
Non-QDIO (CHPID type OSE) QDIO (CHPID type OSD) Layer 2	OSA-Express2 OSN – OSA for NCP (CHPID type OSN)
External communication	Internal communication
Traffic flows on the LAN	Traffic flows LPAR-to LPAR

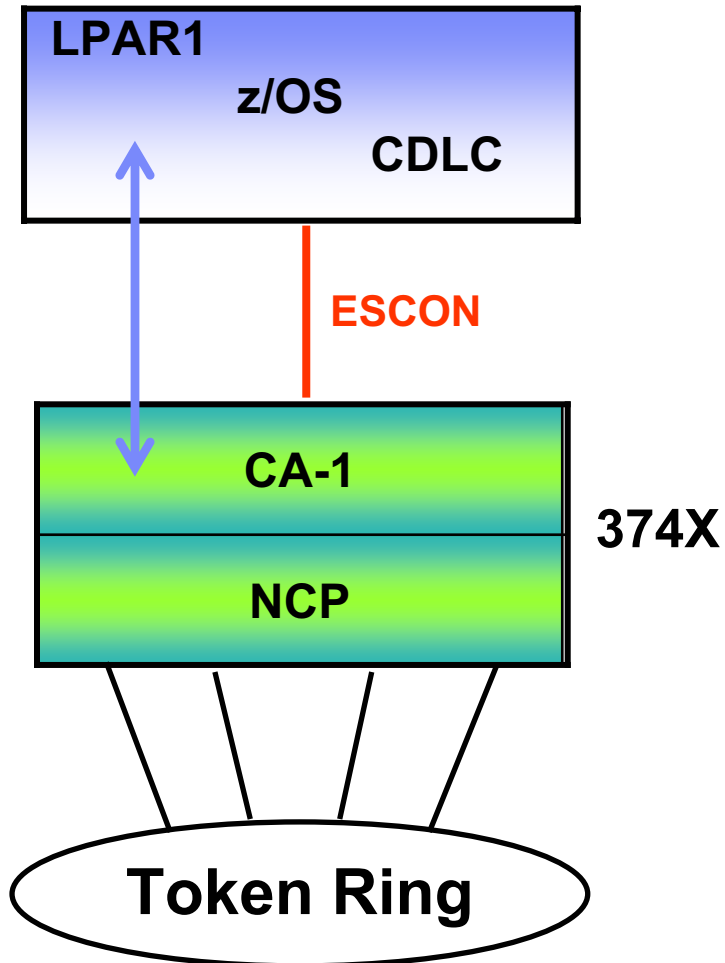


No longer limited to
“copper OSA”



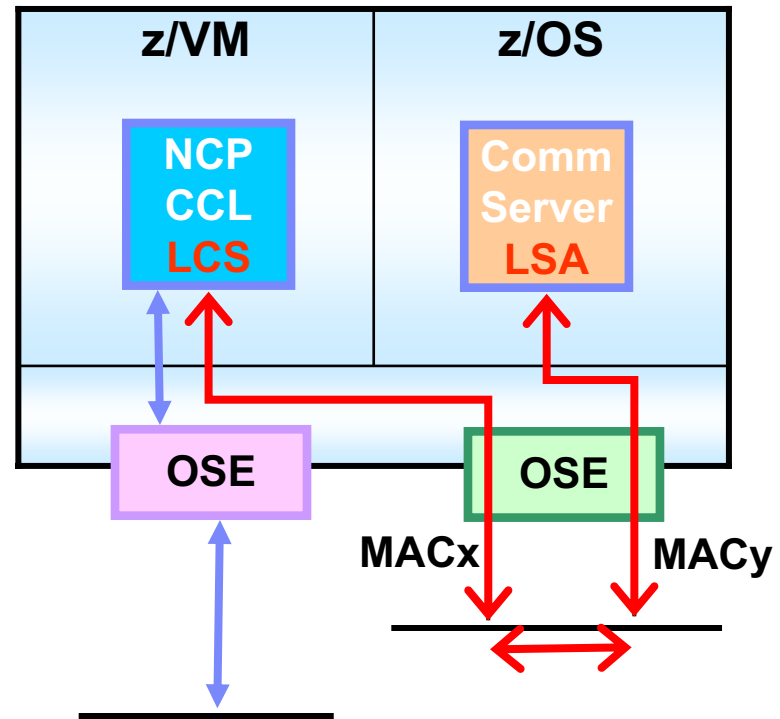
374X Network Control Program

zSeries



IBM Communication Controller for Linux V1.1

zSeries

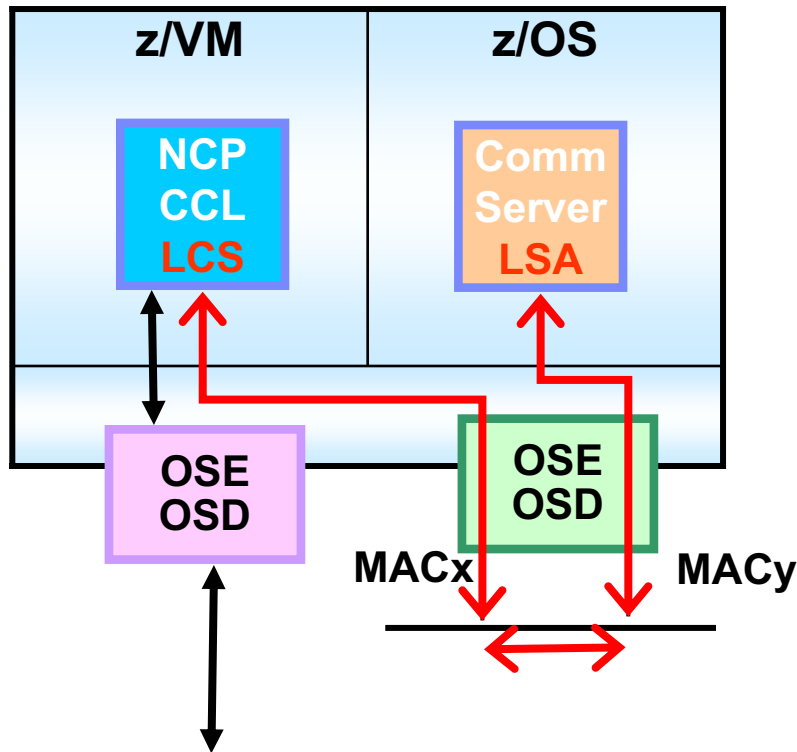


1. z/OS defined as LSA, own MAC/port
2. CCL defined as LCS, own MAC/port
3. 3rd port for SNA devices on LAN
4. All CHPID type OSE



IBM Communication Controller
for Linux V1.1
CCL traffic flowing on LAN

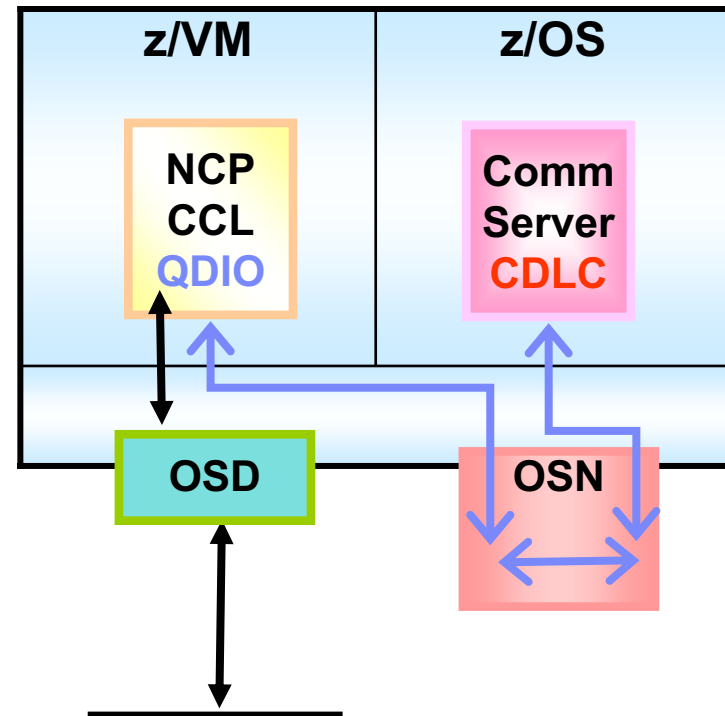
zSeries



1. z/OS defined as LSA, own MAC/port
2. CCL defined as LCS, own MAC/port
3. 3rd port for SNA devices on LAN
4. All CHPID type OSE

IBM Communication Controller
for Linux V1.2
CDLC traffic flowing LPAR-to-LPAR
Using OSA for NCP (OSN)

System z9



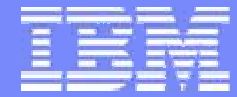
- ✓ Connectivity from OS to CCL
- ✓ SNA PUs Type 2.1 and 5
- ✓ VTAM/CDLC to CCL



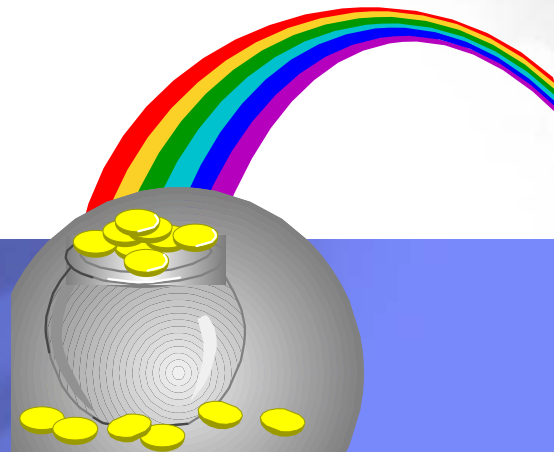
Summary - CHPID type controls operation

		Traffic type				
CHPID type	Feature	SNA/APPN/HPR	TCP/IP	3270	NCP	OSA/SF required
OSD System z	GbE, 10 GbE 1000BASE-T Ethernet Fast Ethernet	No (L3) Use EE or TN3270E Yes (L2)	Yes	No	No	No
OSE System z	1000BASE-T Ethernet Fast Ethernet	Yes	Yes	No	No	Yes
OSC z990, z890 z9 EC, z9 BC	1000BASE-T Ethernet	No	No	Yes	No	No
OSN z9 EC, z9 BC exclusive	OSA-Express2 Gigabit Ethernet 1000BASE-T Ethernet	No	No	No	Yes	No

L3 = Layer 3, L2 = Layer 2



The newest functions



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IBM Systems



Enhanced performance assists for z/VM V5.2 guests December 2005

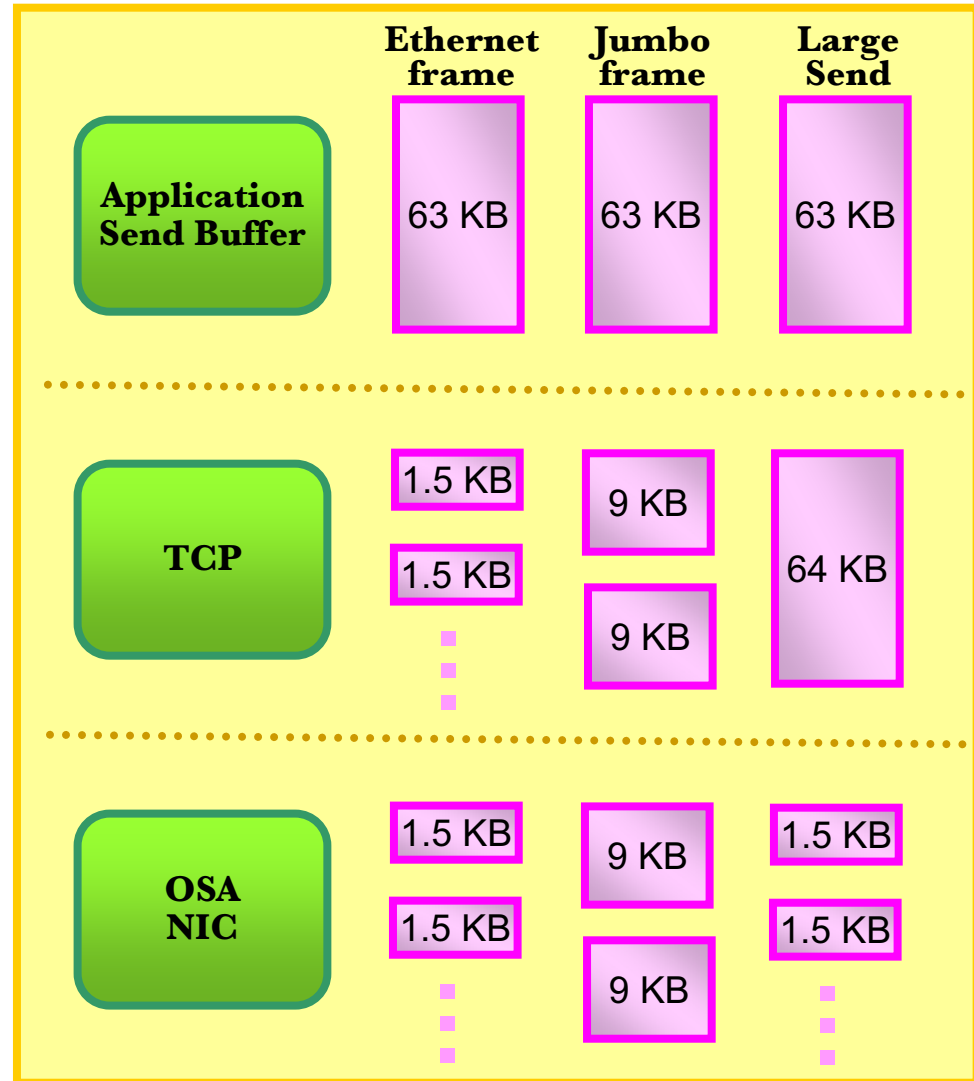
- 1. QDIO Enhanced Buffer-State Management (QEBSM)**
 - ▶ **Two new machine instructions**
 - **Designed to help eliminate overhead of hypervisor interception**
- 2. Host Page-Management Assist (HPMA)**
 - ▶ **Interface to z/VM paging-storage management**
 - **Allow machine to assign, lock, unlock page frames without hypervisor assistance**
 - **Applicable to the following on z9 EC, z9 BC, z990, z890**
 - ▶ **First-level guests of z/VM V5.2**
 - ▶ **All OSA features (CHPID type OSD)**
 - ▶ **All FICON features (CHPID type FCP)**
 - ▶ **HiperSockets (CHPID type IQD)**
 - **Complements performance assists introduced in z/VM V4.4**

Guest operating systems can initiate QDIO operations directly to channel
No interception by z/VM



Large send for TCP/IP traffic (TCP segmentation offload) for CPU efficiency

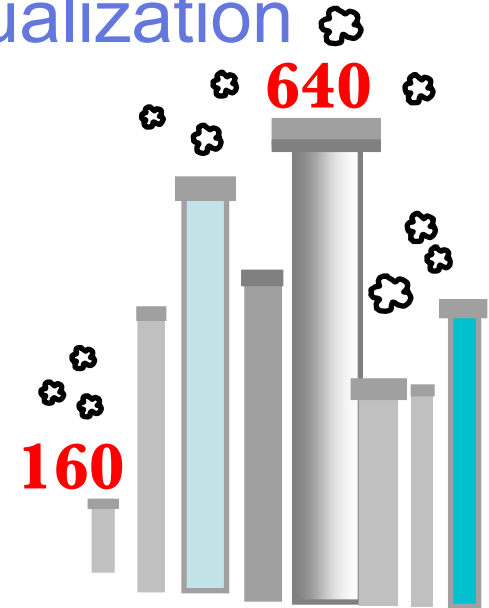
- z9 EC, z9 BC, z990, z890
- OSA-Express2
- Segmentation of IP packets done by OSA NIC, not IP stack
- Offloads the TCP segmentation processing from host TCP/IP stack
- Host code path length reduced
- Sends 64 kilobyte (KB) blocks to OSA
- Processing performed by OSA NIC
 - ▶ IP/TCP checksum processing
 - ▶ TCP packet processing
 - ▶ Sends out 1.5 KB packets (1492 byte)
- For outbound traffic only
- For IPv4
- For unicast datagrams
- QDIO mode only (CHPID type OSD)
- Supported by
 - ▶ z/OS V1.6 with PTF, z/OS V1.7
 - ▶ Linux on System z9
 - ▶ Linux SUSE SLES 9, SP2





640 TCP/IP stacks for improved virtualization

- **OSA-Express2 on z9 EC, z9 BC, z990, z890**
 - ▶ 640 TCP/IP stacks per OSA-Express2 port/CHPID
- **For hosting more images on server**
- **Reduces the number of OSA features required to host multiple images**
- **Exclusive to OSA-Express2 (GbE, 10 GbE)**
 - ▶ QDIO mode only (CHPID type OSD)
- **Supported by**
 - ▶ z/OS and z/OS.e V1.6 with PTF
 - ▶ z/VM V5.1, z/VSE V3.1
 - ▶ Linux on System z



Limits	S/390 G5/G6	z990 Dec 00 z800 Mar 02	z990 Jun 03 z890 May 04	z990, z890 Oct 04 OSA-E	z990, z890 > Jan 05 OSA-E2
OSD					
Subchannels per stack	3	3	3	3	3
IP stacks per port/CHPID on server	15	80	160	160	640 \$
Subchannels per port	240	240	480	480	1920 \$
IP stacks per LPAR	15	80	84	160	640 \$
Devices per LPAR	240	240	254	480	1920 \$
Maximum control units	1	1	1	16	16

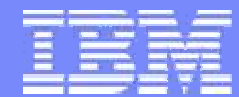
OSA-E = OSA-Express, OSA-E2 is OSA-Express2

\$ If multiple priorities for queues is enabled (one to four QDDIO priorities) the maximum remains at 160 stacks/480 devices



OSA/SF enhancements for CHPID OSD z9 EC, z9 BC, z990, z890 available 26 May 2006

- **Layer 3 OSA Address Table (OAT)**
 - ▶ **Displays all IP addresses registered to an OSA port**
 - **Indicator to determine the status (in use, not in use)**
- **Virtual MAC and VLAN id display**
 - ▶ **Associated with OSA-Express2, OSA-Express ports configured as Layer 2**
 - ▶ **Displayed as part of an OAT entry**
 - ▶ **Independent of IPv4 and IPv6 formats**
- **Multicast information in OAT entry**
 - ▶ **Group MAC addressing information**
 - ▶ **Moved from the port section**
 - ▶ **Now integrated in the Layer 3 OAT entry**
- **All OSA features supported on z9 EC, z9 BC, z990, z890**
- **z/OS V1.4 with PTFs, z/VM V4.4 with PTFs**



SNMP

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IBM Systems

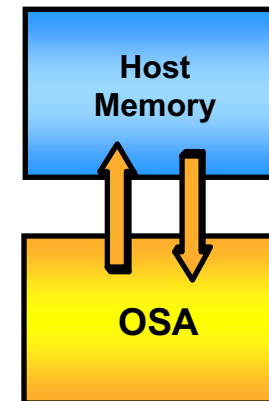


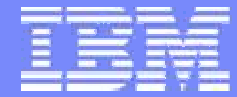
Direct SNMP - QDIO only

- **SNMP - Monitor network devices/functions, identify problems**
- **Direct SNMP subagent MIB for all of the OSA-Express features when configured in QDIO mode (CHPID type OSD)**
 - **Do not require OSA/SF to obtain data**

Offerings and dates first available:

- **Get and GetNext requests - zSeries (April 2002)**
- **dot3StatsTable (RFC 2665) - zSeries (May 2003)**
- **Performance data - zSeries (May 2003)**
- **Traps and Set - z990 (May 2004)**
 - ▶ Trap - Asynchronously receive an alert
 - ▶ Set - Change value (currently limited to set traps on/off)
- **Direct SNMP support for LCS - z990 (May 2004)**
 - ▶ Same support as listed above
 - ▶ Non-QDIO CHPID type OSE
 - ▶ z/OS V1.6






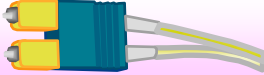


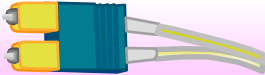
Cabling and connectors

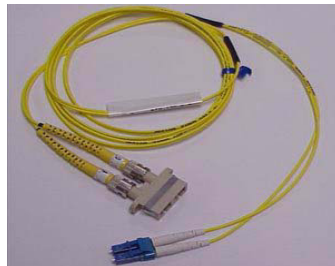




GbE Features - Connector Change

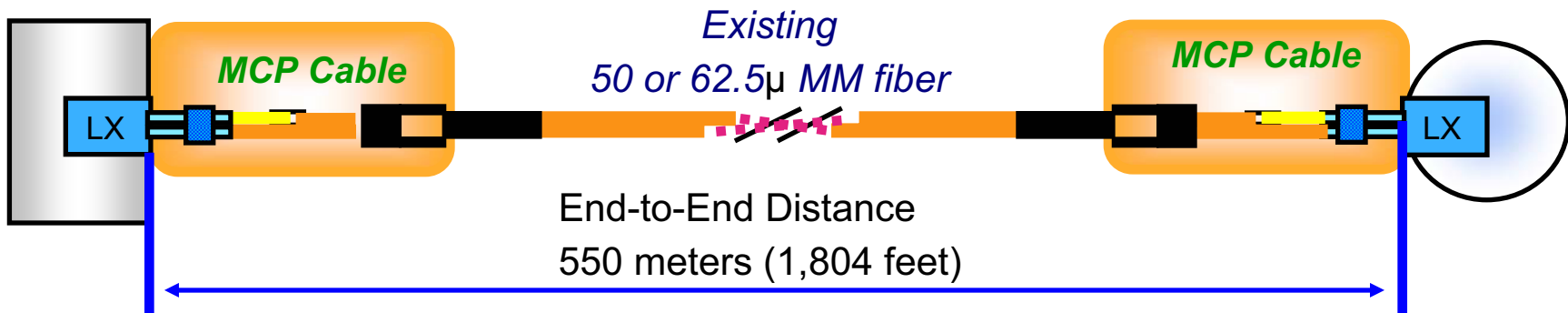
May require a Conversion Kit to attach to switches

Feature	Connector	Previous Connector
Gigabit Ethernet LX Single mode (SM) fiber	 LC Duplex SM # 1364, # 3364	 SC Duplex SM #2364
Gigabit Ethernet SX Multimode (MM) fiber	 LC Duplex MM # 1365, # 3365	 SC Duplex MM # 2365
10 GbE Ethernet LR Single mode (SM) fiber	 SC Duplex SM # 3368	N / A



Conversion Kit example
2 meters (6.5 feet)

Mode Conditioning Patch Cables



I have a multimode fiber infrastructure.
Now what?

**MCP Cables can be used
(for 1 Gigabit links only)**

*A pair is required for each link
Offered as features on z900 only*

MCP Cable example
2 meters (6.5 feet)



Gigabit Ethernet Cabling Options

LX = Long wavelength 1300 nm transceiver

SX - Short wavelength 850 nm transceiver

9 micron SM fiber

- LX transceiver/feature on each end
- Requires 9 μ single mode (SM) fiber

1 Gbps	4.6 dB	5 km (3.1 miles)
--------	--------	------------------

50 or 62.5 micron MM fiber

- LX transceiver/feature on each end combined with a pair of MCP cables
- Uses current 50 or 62.5 multimode (MM) fiber infrastructure
- **Reduced distance** and link budget

1 Gbps	2.4 dB	550 meters (1804 feet)
--------	--------	------------------------

50 micron MM fiber

- SX transceiver/feature on each end
- Requires 50 μ multimode fiber
- **Reduced distance** and link budget

1 Gbps	3.6 dB	550 meters (1804 feet)
--------	--------	------------------------

62.5 micron MM fiber

- SX transceiver/feature on each end
- Requires 62.5 μ multimode fiber
- **Reduced distance** and link budget

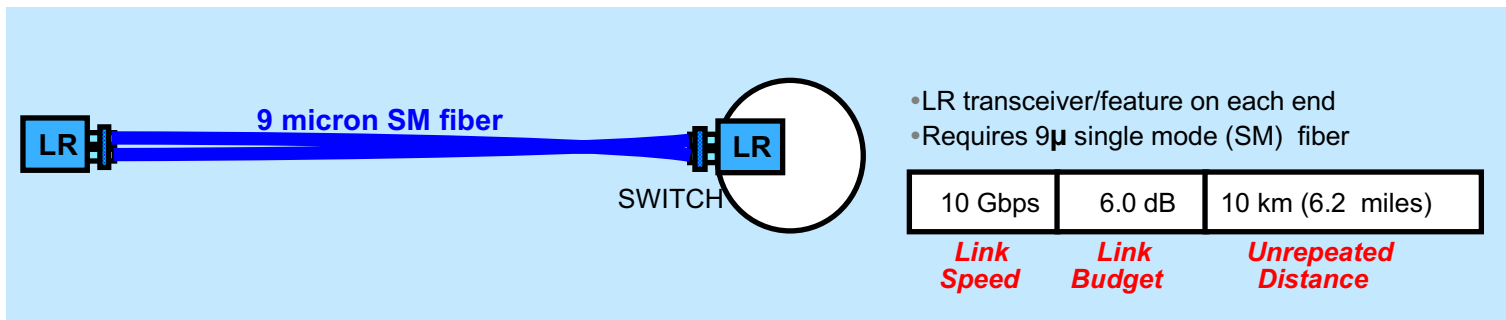
1 Gbps	2.6 dB	220 meters (722 feet)
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Link Rate Link Budget Unrepeated Distance

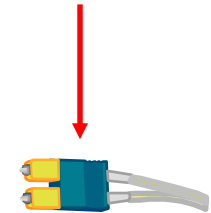


OSA-Express2 10 Gigabit Ethernet LR cabling

LR= Long reach 1310 nm transceiver



Connector



SC Duplex SM

- **z9 EC, z9 BC, z990, z890**



Ethernet connectors and cabling

Feature #	Feature name	Connector	Cabling
OSA-Express on z900, z800			
2364	OSA-Express GbE LX	SC Duplex	9μ SM
2365	OSA-Express GbE SX	SC Duplex	50, 62.5μ MM
2366	OSA-Express Fast Ethernet	RJ-45	Category 5 UTP
OSA-Express on z990, z890 OSA-Express on z900, z800 (only #1364, #1365)			
1364	OSA-Express GbE LX	LC Duplex	9μ SM
1365	OSA-Express GbE SX	LC Duplex	50, 62.5μ MM
1366	OSA-Express 1000BASE-T Ethernet	RJ-45	Category 5 UTP
OSA-Express2 on z9 EC, z9 BC, z990, z890			
3364	OSA-Expresss2 GbE LX	LC Duplex	9μ SM
3365	OSA-Express2 GbE SX	LC Duplex	50, 62.5μ MM
3366	OSA-Express2 1000BASE-T Ethernet	RJ-45	Category 5 UTP
3368	OSA-Express2 10 GbE LR	SC Duplex	9μ SM

SM = Single mode fiber, MM = Multimode fiber
 LX = Long wavelength transceiver, LR = Long Reach transceiver SX = Short wavelength transceiver
 UTP = Unshielded Twisted Pair, STP - Shielded Twisted Pair



IEEE 802.3ae Ethernet specification

- The following chart summarizes the unrepeated distances and link loss budgets supported by the standards. The link loss budget is the channel insertion loss plus the unallocated link margin as identified by the standard.
 - ▶ Ethernet physical layer specification (IEEE 802.3)

- As a light signal traverses a fiber optic cable, the light signal loses strength
 - ▶ dB (decibel) is the metric used to measure the signal strength (loss or gain)
 - ▶ The Link loss budget identified in the following slides is represented in dBs.

- Factors that contribute to the loss of signal strength
 - ▶ Number of connections (conversion kits, MCP cables, jumpers, trunks, patch panels)
 - ▶ Length of the fiber optic cable

- **All industry standard links (FICON, FCP, Ethernet) follow published standards.**



Ethernet physical layer specification (IEEE 802.3ae)

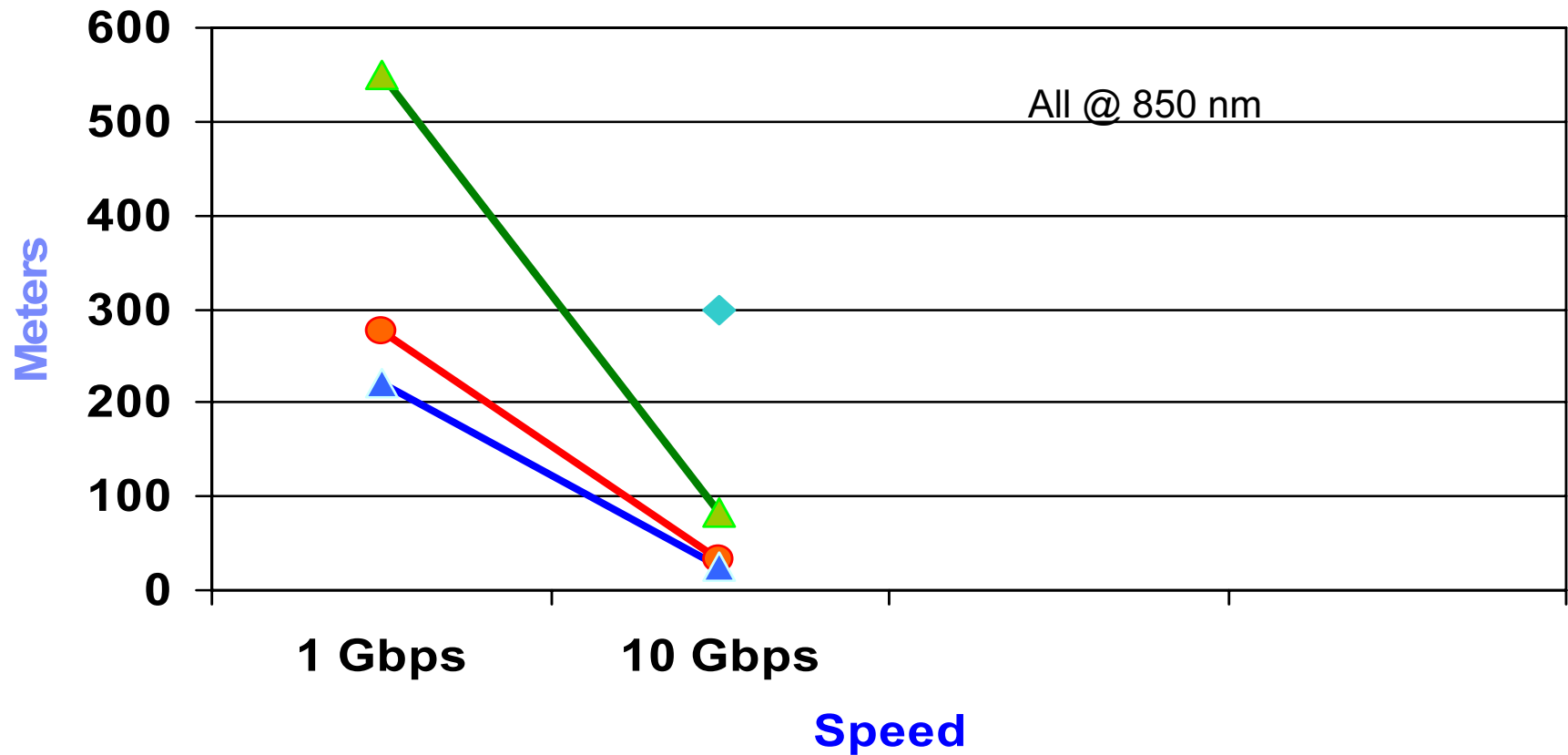
μ = microns	Nanometer (nm)	1 Gbps Ethernet		10 Gbps Ethernet	
Fiber core (μ) Light source	Fiber Bandwidth @ wavelength	Unrepeated distance	Link loss budget *	Unrepeated distance	Link loss budget *
9 μ SM LX	@ 1310 nm	5 km 3.1 miles	4.6 dB	10 km 6.2 miles	6.0 dB
9 μ SM LX with MCP cable 50 or 62.5 u	500 MHz km	550 meters 1804 feet	2.4 dB	N / A	N / A
Newest 50 μ MM SX	2000 MHz km @ 850 nm	Not qualified		300 meters 984 feet	2.6 dB
50 μ MM SX	500 MHz @ 850 nm	550 meters 1804 feet	3.6 dB	82 meters 269 feet	2.3 dB
62.5 μ MM SX	200 MHz km @ 850 nm	275 meters 902 feet	2.6 dB	33 meters 108 feet	2.5 dB
62.5 μ MM SX	160 MHz * km @ 850 nm	220 meters 722 feet	2.6 dB	26 meters 85 feet	2.6 dB

- * The **link loss budget** is the channel insertion loss + unallocated link margin as defined by the standard.
- ** The aqua 2000 MHz km multimode fiber became available September, 2003.
- *** Most often applicable to currently installed ESCON environments



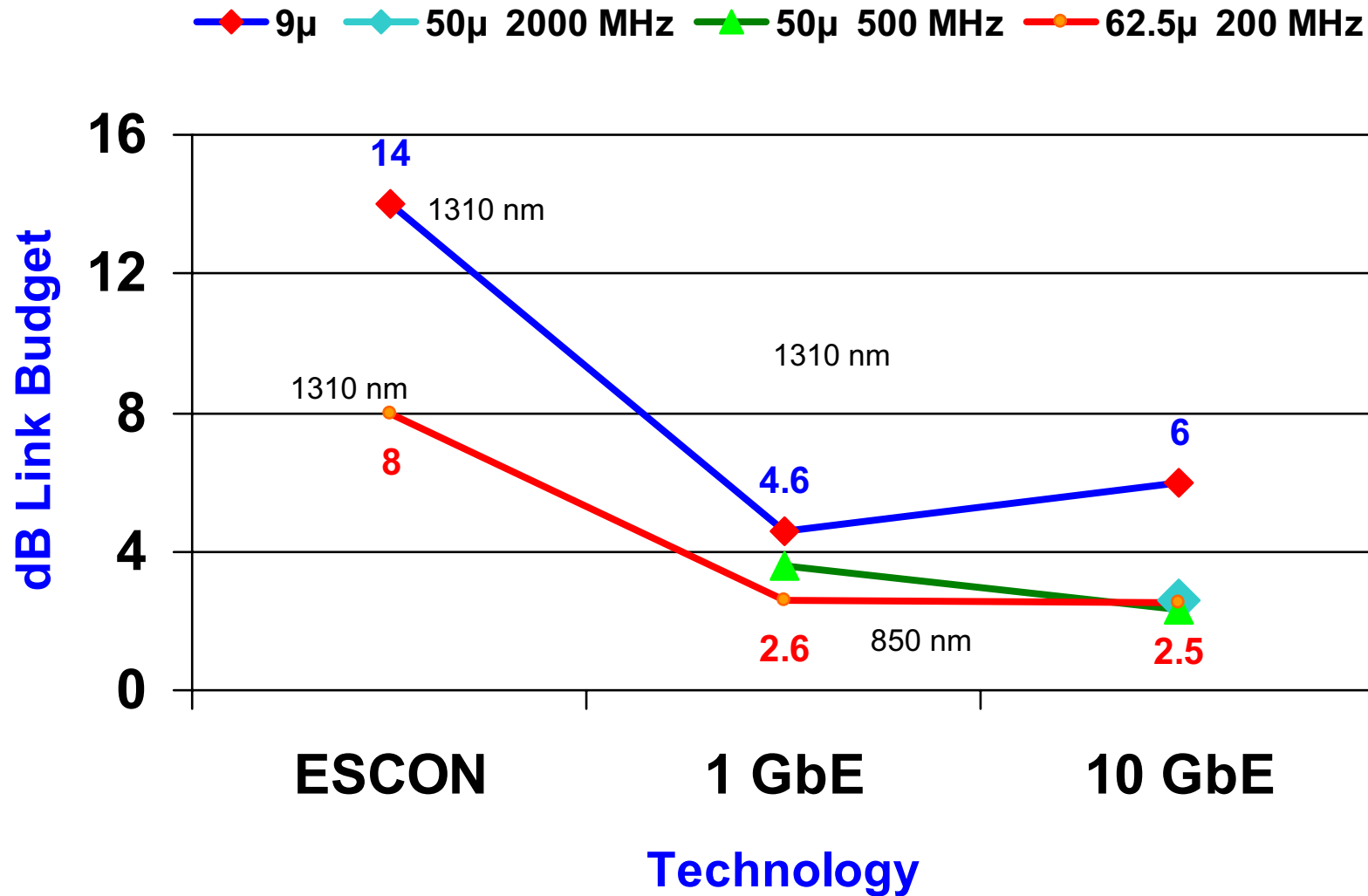
DISTANCES - Gigabit Ethernet, multimode fiber optic cabling

◆ 50μ 2000 MHz ▲ 50μ 500 MHz ● 62.5μ 200 MHz ▲ 62.5μ 160 MHz



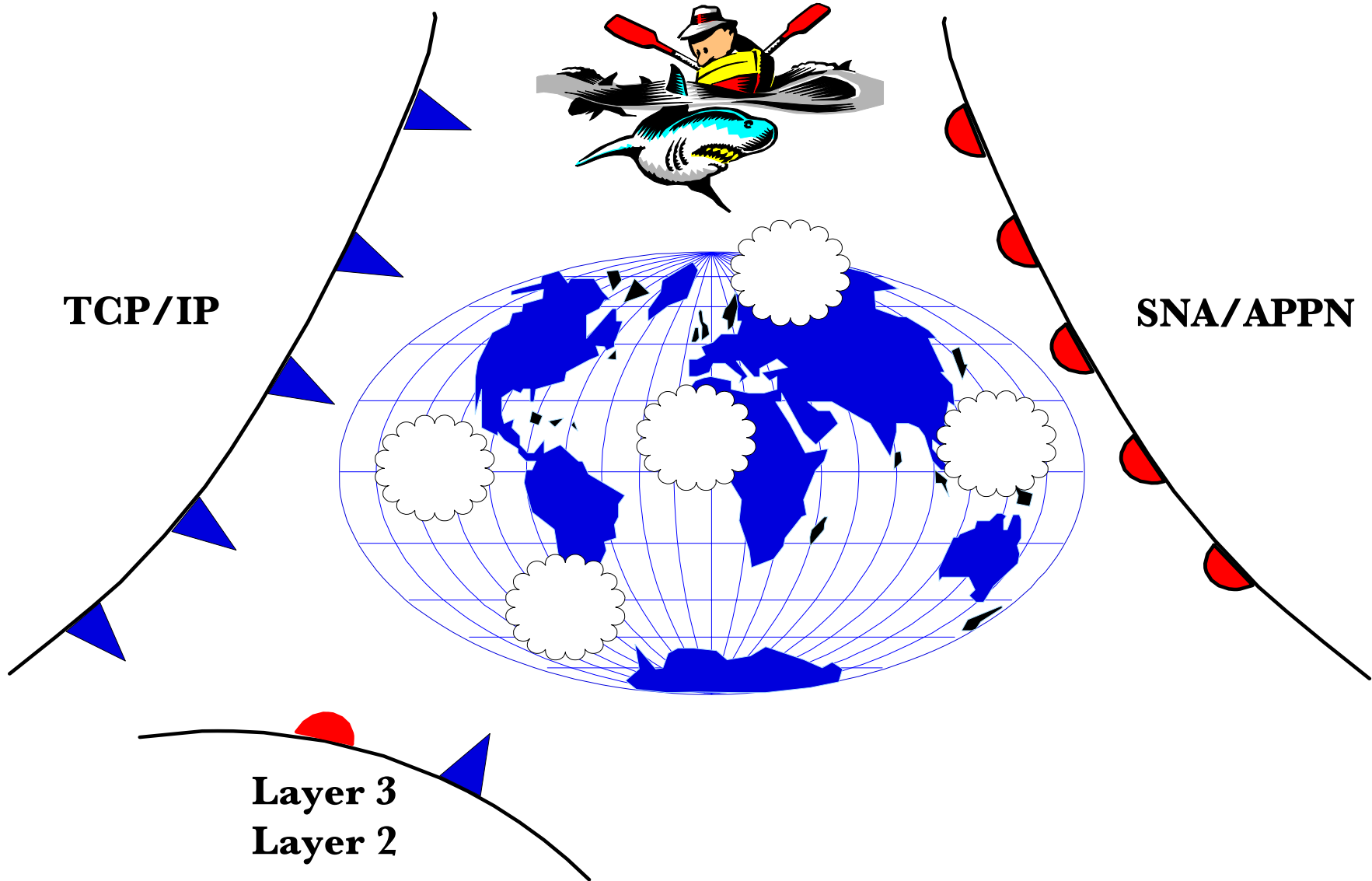


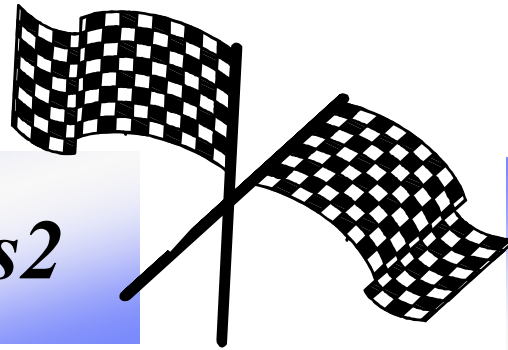
Link loss budget - Gigabit Ethernet





Long term forecast!





OSA-Express2

OSA-Express

OSD, OSE, OSC, OSN

Connectivity

Distance

Thank You!
SESSION GO!



More information on the www

- Visit <http://www-306.ibm.com/common/ssi/OIX.wss>
 - ▶ Announcement letters
 - ▶ Sales manuals
- Refer to U.S. announcement letters #s
 - 104-346, 105-241, 106-293, 106-287
- The sales manual includes:
 - ▶ All of the software requirements
 - For OSA-Express2 and OSA-Express and all of the functions
 - Feature descriptions including minimums, maximums, limitations, etc.



Direct SNMP Support - module

- **Direct SNMP MIB module**

- ▶ OSA-Express2 and OSA-Express features
- ▶ Logical Channel Subsystems (LCSSs)
- ▶ Updated performance table with more detailed information
- ▶ Get, GetNext, Traps, Set

- **OSA Direct SNMP MIB module is available via Resource Link**


- ▶ Resource Link is set up to house multiple copies of the MIB in anticipation of version or release changes/updates.

- **To retrieve the MIB follow these steps:**

- ▶ Locate Resource Link at: www.ibm.com/servers/resourcelink
- ▶ Log in
- ▶ Click on Library (on the left in the navigation bar)
- ▶ Under "Library shortcuts" on the right side of the screen
 - ▶ Click on "Open System Adapter (OSA) Library"



On the Internet

- IBM Resource Link, Web-based tool
 - ▶ www.ibm.com/servers/resourcelink/
 - Services section: zSeries Fiber Cabling Service
 - Planning section/Physical Planning
 - Physical Planning manuals, GIM
 - Education section: System z9 and zSeries courses
 - General Information for Planning a Physical Site (GIM)
- www.ibm.com/services/networking/
 - ▶ IT services - Product and Enterprise cabling offerings
- www.redbooks.ibm.com
 - ▶ IBM Redbooks 
- www-03.ibm.com/systems/z/networking/
 - ▶ The network connectivity home page
- www-03.ibm.com/systems/z/connectivity/
 - ▶ The I/O connectivity home page
 - ▶ Go to this location for a list of FICON/FCP supported devices
- www-306.ibm.com/common/ssi/OIX.wss
 - ▶ Announcement Letters, sales manual



On the Internet

**IBM Resource Link
www.ibm.com/servers/resourcelink/**

A fiber optic cabling presentation is available

**Covers ISCs, ETR, ESCON, FICON/FCP, OSA
Overview of each feature with fiber optic
cabling requirements**

**FQC, Conversion kits, MCP cables
Extended distance implications**

**IBM Networking Services
zSeries fiber cabling services
Enterprise fiber cabling services**

**You can locate the Fiber Optic Cabling
presentation on Resource Link and subscribe
to receive updates.**

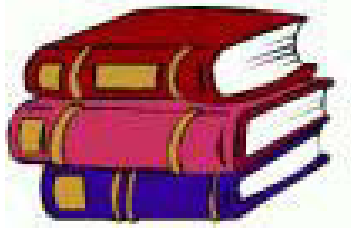
**After logging in click on Education in the blue
on the left.**

**Under zSeries Courses click on z990.
Click on Fiber Optic Cabling.**



On the Internet – valid as of 08 September 2006

URL	Content
ibm.com/software/network	Software - Networking & communications
ibm.com/software/network/commserver	Communications Server
ibm.com/software/network/commserver/library	CS white papers, product documentations
ibm.com/support/techdocs/	Advanced technical support (flashes, presentations, white papers)
rfc-editor.org/rfcsearch.html	Request For Comments (RFC)
ibm.com/servers/resourcelink/	Customized Web-based solution providing access to information for planning, installing, and maintaining IBM Systems and IBM S/390 servers and associated software.



OSA reference materials

SA22-7935	OSA-Express Customer's Guide and Reference
SA22-7990	OSA-Express Integrated Console Controller User's Guide
SA22-7476	z800, z900 Open Systems Adapter-Express Customer's Guide and Reference
SG24-5444	System z9 and zSeries Connectivity Handbook (Redbook)
SG24-5948	OSA-Express Implementation Guide (Redbook)
SG24-6364	OSA-ICC Implementation Guide (Redbook)
GA23-0367	Planning for Fiber Optic Links
SC33-7991	z/OS V1R6.0 Resource Measurement Facility (RMF) Report Analysis (-10 has System z9 updates)
Look in CS library	For a complete description of the SNMP management data supported by OSA-Express features: z/OS Communications Server: IP Configuration Guide and the SNMP chapter of IP System Administrator's Commands