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Work in IBM UK for 20 years (10 years experience before IBM too)

- Developer, Kernel, System Admin, DBA,
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If you learnt nothing else ... remember the above 3 sources!

Going to use the presentation from the recent Technical University for the POWER7+ & AIX Announcements from my pals Pat and Mark ... (the jokes are mine!).



IBM Power Systems  
Advanced Technology Support, Europe

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## IBM Power Systems Technical University

22-26 October, 2012 - ~~Dublin, Ireland~~

Stockholm, Sweden  
POWER & AIX Workshop  
Nov 2012



### WW98: Recent Power Hardware Announcements

- cut down a bit to take an hour and only AIX OS

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Power Executive Briefing Center



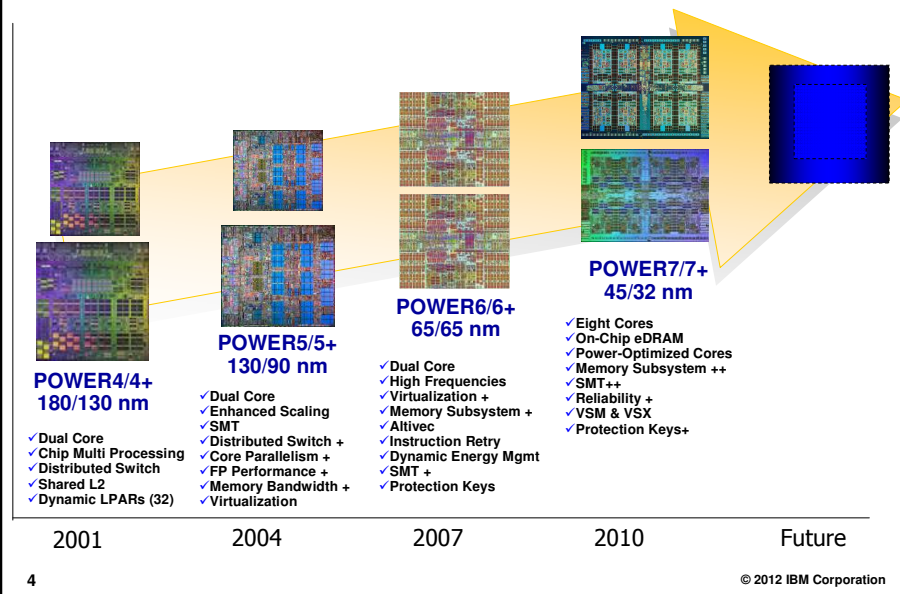
*Mark Olson*  
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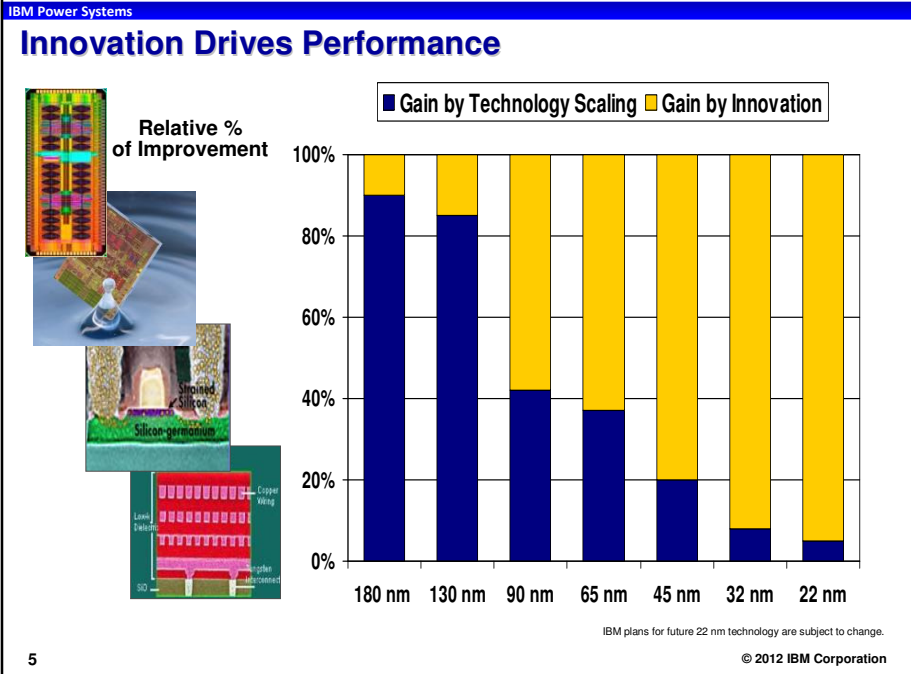


## Agenda for Recent Power Hardware Announcements

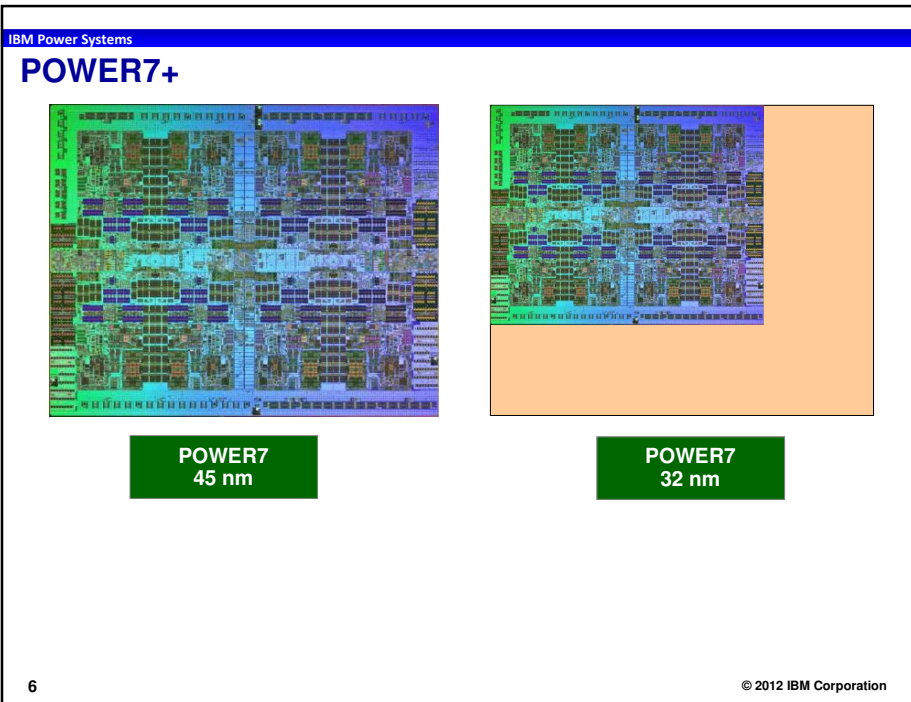
- POWER7+ chips
- POWER7+ 770/780
- Power 795 enhancements
- Elastic CoD for 770/780/795
- Enterprise Power Pool
- Active Memory Expansion for POWER7+
- New Ultra SSD I/O Drawer for 770/780
- New rack Doors for 770/780/795
- RDX docking station refresh
- HMC and Firmware Insights

## Power Processor Technology Roadmap



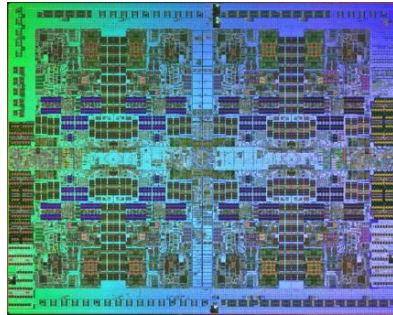


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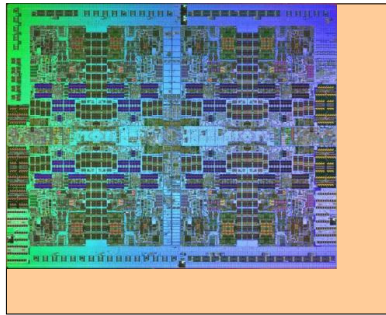


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# POWER7+



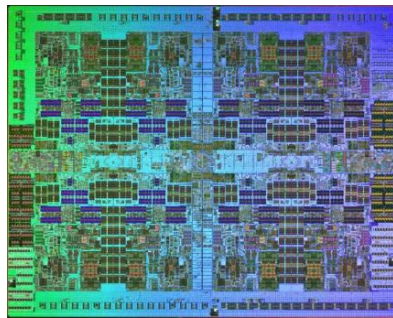
**POWER7**  
45 nm



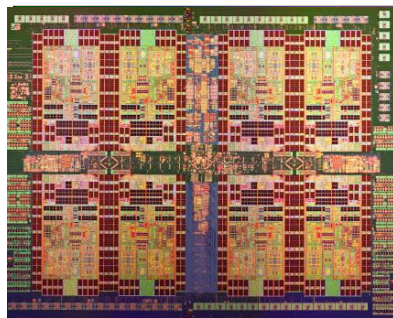
**POWER7**  
32 nm

**Add additional Cache**

# POWER7+



**POWER7**  
45 nm



**POWER7**  
32 nm

**Add additional Cache**

**Add on Chip Accelerators**

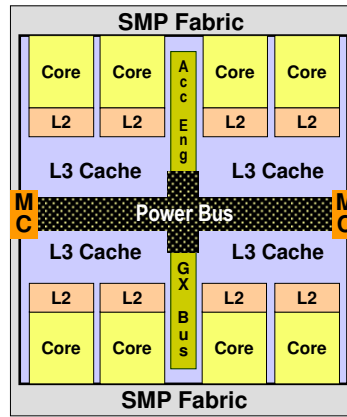
## POWER7+ Design

### Physical Design:

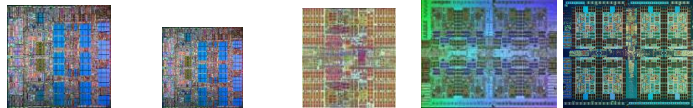
- 8 cores with integrated Cache, Memory Controllers, and Accelerators
- 3 / 4 / 6 / 8 Core options
- **32nm technology**

### Features:

- **2.5x increase in L3 Cache**
- eDRAM technology
- Higher Frequencies
- **Memory Compression Engine (AME)**
- **Encryption / Cryptography Support**
- **Random Number Generator**
- Enhanced Energy / Power Gating
- **1/20 LPAR Core Granularity**
- **2x SPFP performance**



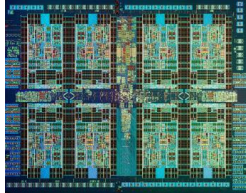
## Processor Designs



	POWER5	POWER5+	POWER6	POWER7	POWER7+
<b>Technology</b>	130nm	90nm	65nm	45nm	32nm
<b>Size</b>	389 mm <sup>2</sup>	245 mm <sup>2</sup>	341 mm <sup>2</sup>	567 mm <sup>2</sup>	567 mm <sup>2</sup>
<b>Transistors</b>	276 M	276 M	790 M	1.2 B	2.1 B
<b>Cores</b>	2	2	2	8	8
<b>Frequencies</b>	1.65 GHz	1.9 GHz	4 - 5 GHz	Up to 4.24 GHz	Up to 4.4+ GHz
<b>L2 Cache</b>	1.9MB Shared	1.9MB Shared	4MB / Core	256 KB per Core	256 KB per Core
<b>L3 Cache</b>	36MB	36MB	32MB	4MB / Core	10MB / Core
<b>Memory Cntrl</b>	1	1	2 / 1	2 / 1	2 / 1
<b>Architecture</b>	Out of Order	Out of Order	In of Order	Out of Order	Out of Order
<b>LPAR</b>	10 / Core	10 / Core	10 / Core	10 / Core	20 / Core

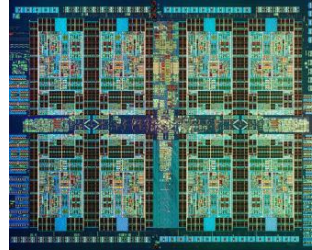
## Benefits of eDRAM for POWER7+

### With eDRAM



2.1B Transistors  
567 mm<sup>2</sup>

### Without eDRAM



5.4B Transistors  
950 mm<sup>2</sup>

#### IBM's eDRAM Benefits:

- Greater density: 1/3 the space of 6T SRAM implementation
- Less power requirements: 1/5 the standby power
- Fewer soft errors: Soft Error Rate 250x lower than SRAM
- Better Performance

## POWER7+ Encryption Accelerator

### Technology

- **Crypto Offload Accelerators:**
  - Provide cryptographic engines to relieve the POWER7+ processor from the performance intensive cryptographic algorithms of AES, SHA, and RSA.
- **High quality random numbers:**
  - Generated with high performance with the RNG offload feature of the POWER7+ processor.



### Client Benefits

- Can be applied to a broader set of data creating a stronger security ecosystem
- POWER7+ core focused on application performance.
- Two primary AIX security applications:
  - 1) **Encrypted File Systems** protecting your data in storage or on backup media
  - 2) **IPsec** protecting your data over the network.
- Ensures that the high demand for entropy on a heavily loaded systems always yields high quality random numbers.
- RNG offload provides entropy and security is ensured
- Processor performance focused on your applications.



## POWER7+ RAS Specific Features

### New Power On Reset Engine (PORE)

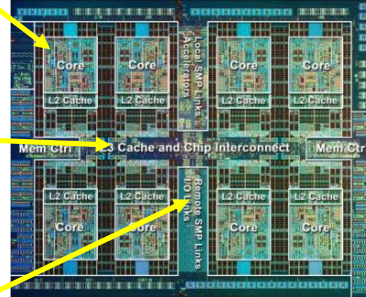
- Enables a processor core to be re-initialized while system remains up and running
- Directly used to:
  - ❖ *Allow for Concurrent Firmware Updates:*  
In cases where a processor initialization register value needs to be changed

### L3 Cache dynamic column repair

- New self-healing capability that complements cache line delete
- Uses PORE feature to substitute a failing bit-line for a spare during run-time.

### New Fabric Bus Dynamic Lane Repair

- POWER7+ has spare bit lanes that can dynamically be repaired (using PORE)
  - ❖ For Busses that connect CEC drawers
  - ❖ Avoids any repair action or outage related to a single bit failure.



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## POWER7+ 770 / 780

## POWER7+ 770



4Socket / 4U  
16-core or 12-core / 4U

- ✓ POWER7+
- ✓ Frequencies:
  - 4C SCM @ 3.8 GHz      **Max Config: 64 Cores**
  - 3C SCM @ 4.2 GHz      **Max Config: 48 Cores**
- ✓ Up to 64 Cores
- ✓ Up to 4 TB of memory
- ✓ 6 PCIe Gen2 slots / CEC
- ✓ MultiFunction Card with 10GbE and 1GbE
- ✓ Capacity on Demand
- ✓ **Enhanced RAS**
  - Self-healing capability for L3 Cache functions
  - Core re-initialization (Running system)
  - Dynamic Processor Fabric Bus repair



# POWER7+ 780



4Socket / 4U  
32-core or 16-core / 4U

- ✓ POWER7+
- ✓ Frequencies:
  - 8C SCM @ 3.7 GHz    Max Cores: 128 Cores
  - 4C SCM @ 4.4 GHz    Max Cores: 64 Cores
- ✓ Up to 128 Cores
- ✓ Up to 4 TB of memory
- ✓ 6 PCIe Gen2 slots / CEC
- ✓ MultiFunction Card with 10GbE and 1GbE
- ✓ **Enhanced Capacity on Demand options**
- ✓ **Enhanced RAS**
  - Self-healing capability for L3 Cache functions
  - Core re-initialization (Running system)
  - Dynamic Processor Fabric Bus repair

## Power 770



Power 770: 2S4U



**RAS**    **Upgrades**



9117-MMD / POWER7+		
Processor Packaging		
Max Cores: 64 Cores	@ 3.78 GHz	( 4 Core Chips )
Max Cores: 48 Cores	@ 4.2 GHz	( 3 Core Chips )
L3 Cache	10 MB per Core	
Redundant Resources:	<ul style="list-style-type: none"> <li>▪ Yes</li> <li>▪ Yes / Two Enclosure minimum</li> <li>▪ Yes / Two Enclosure minimum</li> </ul>	
Hot Add & Service Support	Yes	
Active Memory Mirroring	Standard	
	Single Enclosure	4 Enclosures
Processors	4 Sockets	16 Sockets
DDR3 Memory (Buffered)	Up to 1 TB	Up to 4 TB
SAS / SSD SFF Bays	6	24
Media Bays	1 Slim-line	4 Slim-line
SAS / SATA Controller	2 / 1	8 / 4
PCIe Gen2 (Internal)	6	24
GX++ Bus Slots	2	8
Multi-function Card w/ Dual 10 GbE & Dual 1 GbE	1	Node 1 = yes Node 2/3/4 = Opt
Max USB ports (internal)	3	9
Max Ultra SSD drawers	2	8
Max IO Drawers	PCIe: 4    PCI-X: 8	PCIe: 16    PCI-X: 32

## Power 780



Power 780: 2S4U

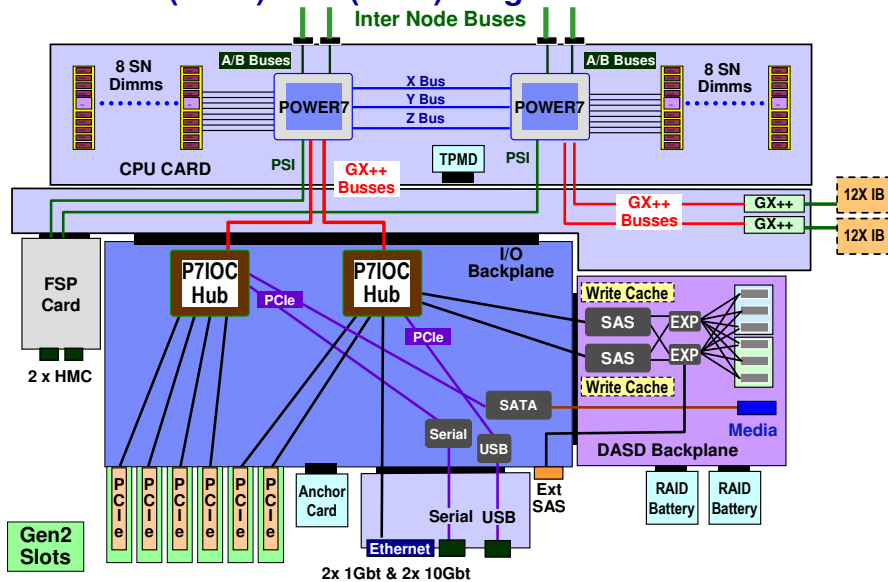


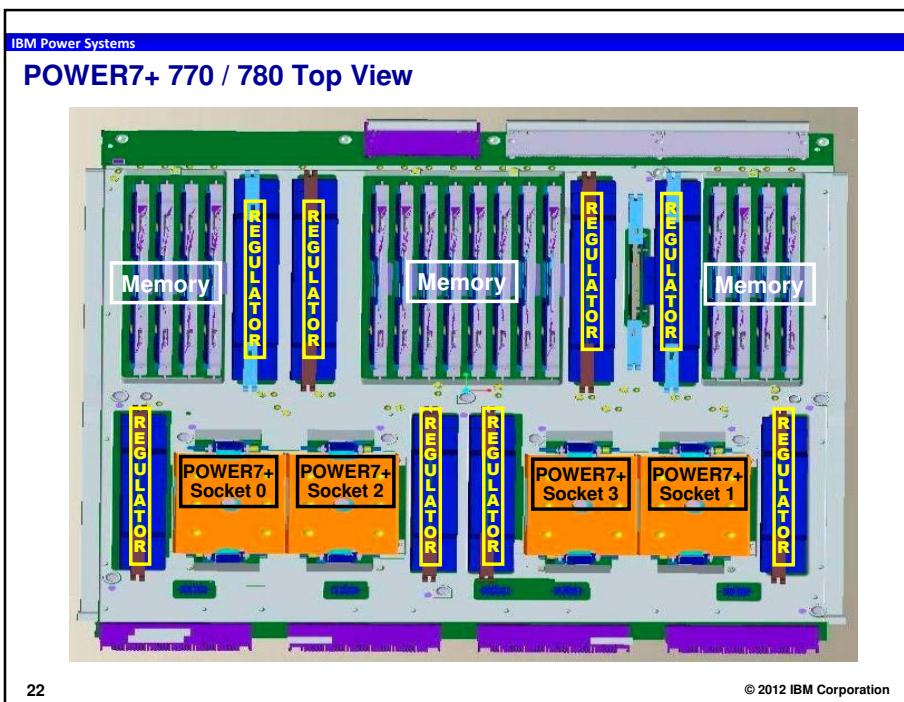
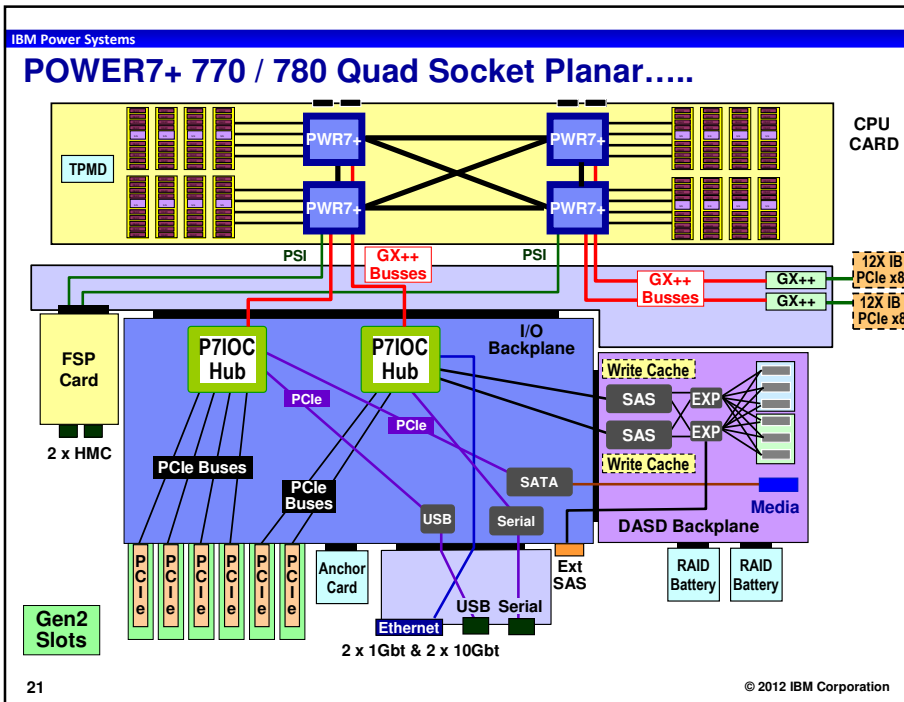
**Power Pools**  
**Maint: 24 X 7**  
**RAS Upgrades**  
**PowerCare Support**



9117-MHD / POWER7+		
Processor Packaging		
Max Cores: 128 Cores	@ 3.7 GHz ( 4 Core Chips )	
Max Cores: 64 Cores	@ 4.4 GHz ( 8 Core Chips )	
L3 Cache	10 MB per Core	
Redundant Resources:	<ul style="list-style-type: none"> <li>Power &amp; Cooling</li> <li>Server Processor</li> <li>Redundant Clock</li> </ul>	
Hot Add & Service Support	Yes	
Power Pools	Yes	
Active Memory Mirroring	Standard	
	Single Enclosure	4 Enclosures
Processors	4 Sockets	16 Sockets
DDR3 Memory (Buffered)	Up to 1 TB	Up to 4 TB
SAS / SSD SFF Bays	6	24
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Multi-function Card w/ Dual 10 GbE & Dual 1 GbE	1	Node 1 = yes Node 2/3/4 = Opt
Max USB ports (internal)	3	9
Max Ultra SSD drawers	2	8
Max IO Drawers	PCIe: 4 PCI-X: 8	PCIe: 16 PCI-X: 32

## Power 770(MMC) / 780(MHC) Diagram.....





## Operating Systems

### IBM AIX operating system:

- AIX Version 7.1 TL02 - NOW
- AIX Version 7.1 TI01 SP 6, or later (planned availability 19 Dec 2012)
- AIX Version 7.1 TL00 SP 8, or later (planned availability 19 Dec 2012)
- AIX Version 6.1 TL08, or later
- AIX Version 6.1 TL07 SP 6, or later (planned availability 19 Dec 2012)
- AIX Version 6.1 TL06 SP 10, or later (planned availability 19 Dec 2012)
- AIX 5.3 TL12 Statement of Direction

### IBM i operating system

- IBM i 7.1 TR5, or later; required if the primary OS is IBM
- IBM i 6.1 with machine code 6.1.1, or later
  - All I/O must be virtual (I/O provided through either IBM i 7.1 or VIOS)
  - Can not be ordered as the primary OS with feature number 0566

### If installing Linux:

- Red Hat Enterprise Linux 6.3 for POWER, or later
- Red Hat Enterprise Linux 5.7 for POWER, or later
- SUSE Linux Enterprise Server 11 Service Pack 2, or later, with current maintenance updates available from SUSE to enable all planned functionality

### If installing VIOS:

- VIOS 2.2.2.0
- VIOS 2.2.1.5 (planned availability 19 Dec 2012)

## Power 770 and 780 Memory for MMD & MHD

16 DDR3 DIMM slots per proc enclosure  
 DIMMS: 8GB, 16GB, 32GB, and **64GB**  
 Plugged in quads of DIMMs. 1 feature code = 4 identical DIMMs  
 CAN mix different size DIMM features

Minimum 1 quad DIMMs (one feature) per processor enclosure & minimum of 50% of memory capacity activated

**"D" Models**  
 Same as "C" config rules  
**EM4x lower price**

# Proc Encl.	1	2	3	4
<b>DIMM slots</b>	16	32	48	64
<b>Max TB</b>	1	2	3	4

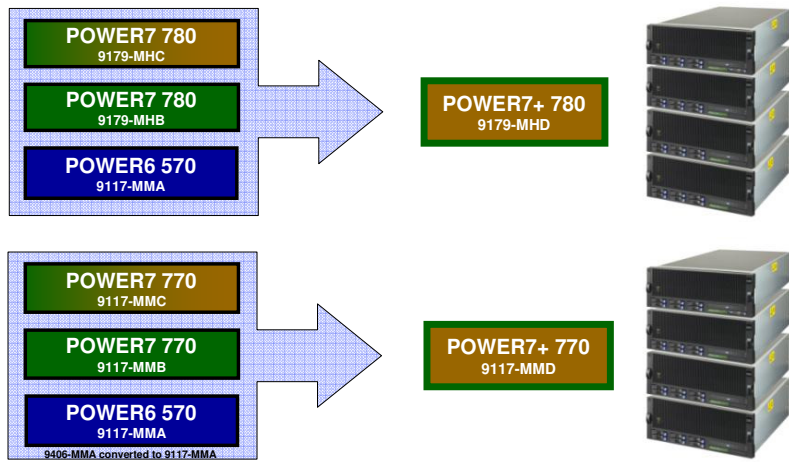
DIMM size	One proc card GB memory capacity with			
	1 Quad	2 Quad	3 Quad	4 Quad
<b>8 GB</b>	32 – not valid	64	96	128
<b>16 GB</b>	64 – not valid	128	192	256
<b>32 GB</b>	128 – not valid	256	384	512
<b>64 GB</b>	256 – not valid	512	768	1024

3 & 4 quad columns assume no mixing for simplicity

Feature Code	Feature GB
#5600* #EM40	32
#5601* #EM41	64
#5602* #EM42	128
#5564* #EM44	256

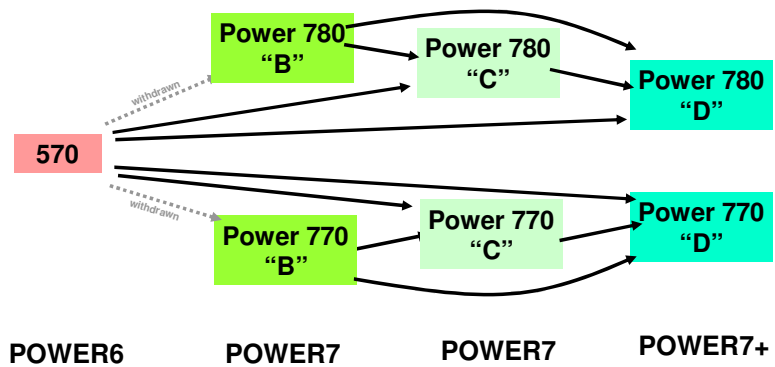
## POWER7+ System Upgrades....

Power 570 & 770 systems can upgrade to POWER7+



## 770/780 Model Planned Upgrades (Same Serial Number)

You can get there



## I/O Differences between C and D models

**No difference in system unit I/O ... same PCIe Gen2 slots, multifunction card, and integrated SAS controller, BUT ....**

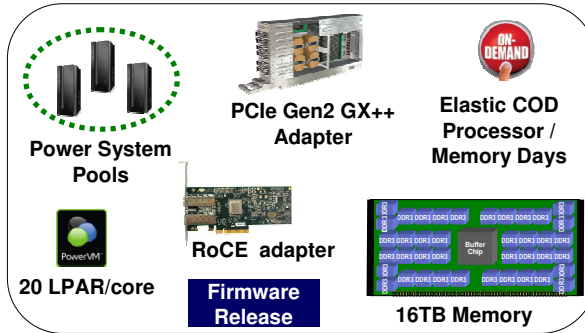
1. **No SCSI disk support on D models.** Was supported on C. 770/780 selection consideration for clients planning to use old SCSI 3.5-inch disk on new server (probably IBM i clients if any). SCSI disk would be found in #5786 EXP24 I/O drawer and run by SCSI PCI-X adapter with cache (see SOD from April 2012). SCSI tape/optical remains supported.
2. **New EXP30 Ultra SSD I/O Drawer (#EDR1) announced for 770/780 D models** under AIX.. #EDR1 has great performance and wonderful footprint density.
3. **Native IBM i I/O support using IBM i 7.1**, but no native IBM i 6.1 support of I/O on POWER7+. IBM i 6.1 can be client partition and be provided I/O linkages through either IBM i 7.1 or VIOS. Note communications adapters #2893/2894 or cryptographic adapters can't be virtualized.
4. **Max quantity of disk drives higher for D models** vs C models .... 3024 vs 1344. Max number of SSD also increased, but not as dramatically.

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## Enhancing the Power 795



- New 64GB DIMM enable up to 16TB of memory
- New hybrid I/O adapters will deliver Gen2 I/O connections
- No-charge Elastic processor and memory days
- PowerVM will enable up an 20 LPARs per core
- Pools of enterprise Power servers

## Power 795 Memory – New 256GB Feature

**New feature to 795  
Same config rules**

32 DDR3 DIMM slots per processor book (8 memory feat codes)

DIMMS: 8GB, 16GB, 32GB, and **64GB**

Plugged in "octants" of DIMMs. 1 feature code = 4 identical DIMMs. So always plug two feat codes of memory at a time

CAN mix pairs of different size DIMM features on same processor book

Per processor book: minimum 2 quad DIMMs (two of the same memory features)

Per system: minimum of 50% of memory capacity activated or minimum of 32GB memory activated (which ever is larger)

# Proc books	1	2	3	4	5	6	7	8
DIMM slots	32	64	96	128	160	192	224	256
Max TB	2	4	6	8	10	12	14	16

Feature Code	Feature GB
#5600	0/32
#5601	0/64
#5602	0/128
<b>#5564</b>	<b>0/256</b>

DIMM size	Capacity per processor book (assuming same size DIMMs used)							
	1 Quad	2 Quad	3 Quad	4 Quad	5 Quad	6 Quad	7 Quad	8 Quad
8 GB	n/a	64	n/a	128	n/a	192	n/a	256
16 GB	n/a	128	n/a	256	n/a	384	n/a	512
32 GB	n/a	256	n/a	512	n/a	768	n/a	1024
64 GB	n/a	512	n/a	1024	n/a	1536	n/a	2048

## PCIe Gen2 for Power 795

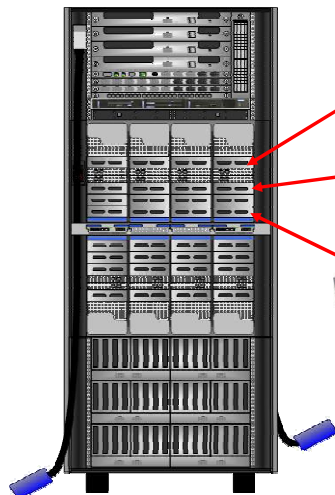
Two PCIe Gen2 GX++ adapters

- 16 Gb Fibre Channel #EN23
- 10 Gb FCoE/CNA #EN22



- 2-ports of high performance capability
  - Access to full bandwidth of GX++ bus (up to 20 GB/s peak)
  - Slightly lower latency than adapter in #5803/5873 I/O Drawer, but probably not noticeable for most client applications
- Innovative, highly compact packaging
  - Combines GX adapter + GX cables + PCIe I/O drawer + PCIe adapter into just one new 2-port GX adapter
  - Can save money, space, energy/cooling, maintenance,

## Power 795 & PCIe Gen2 Function



- Plug GX++ PCIe adapter directly into GX++ slot on the processor card
- No cabling except optical fiber for downstream I/O switch
- Max 3 GX++ PCIe adapters per per processor book
- Can be in any of the 4 GX slots
- Using a GX++ PCIe adapter means an I/O drawer can not be placed in that GX slot. Can have one or the other. OK to mix.
- No change to minimum of one #5803 I/O drawer per 795



## GX++ 2-port 16Gb Fibre Channel Adapter (#EN23)

1st 16 Gb Fibre Channel for Power Systems



CCIN = 2B9B

- Two ports - each 16 Gb Fibre Channel
- Link speeds of 4, 8 and 16 Gbps (auto negotiation supported)
- N\_Port ID Virtualization (NPIV) capability through VIOS
- Attachment to switch is supported, no direct device attachment support
- OS levels required
  - AIX Version 7.1 with TL 7100-02
  - AIX Version 6.1 with TL 6100-08
  - IBM i - not supported as of 2012
  - Linux - not supported as of 2012
  - VIOS 2.2.2.0
  - Firmware 7.6 required
- Standard SR fiber optic cables with LC type connectors :
  - OM4 - multimode 50/125 micron fibre, 4700 MHz\*km bandwidth
  - OM3 - multimode 50/125 micron fibre, 2000 MHz\*km bandwidth
  - OM2 - multimode 50/125 micron fibre, 500 MHz\*km bandwidth
  - OM1 - multimode 62.5/125 micron fibre, 200 MHz\*km bandwidth

Cable / Speed / Distance			
Cable	4 Gbps	8 Gbps	16 Gbps
OM4	.5m - 400m	.5m - 190m	.5m - 125m
OM3	.5m - 380m	.5m - 150m	.5m - 100m
OM2	.5m - 150m	.5m - 50m	.5m - 35m
OM1	.5m - 70m	.5m - 21m	.5m - 15m

## GX++ 2-port 10Gb FCoE (CNA) SR Adapter (#EN22)

FCoE (Fibre Channel over Ethernet)  
CNA (Converged Network Adapter)



CCIN = 2B74

- Two ports - each 10 Gb
- Each port runs Ethernet NIC (Network Interface Card) and/or Fibre Channel traffic
- N\_Port ID Virtualization (NPIV) capability through VIOS
- Attachment to switch is supported, no direct device attachment support
- OS levels required
  - AIX Version 7.1 with TL 7100-02
  - AIX Version 6.1 with TL 6100-08
  - IBM i - NIC supported through VIOS w/ i 6.1.1; but FC not supported as of 2012
  - Linux - not supported as of 2012
  - VIOS 2.2.2.0
  - Firmware 7.6 required
- Standard SR fiber optic cables with LC type connectors up to 300m
  - OM4 - multimode 50/125 micron fibre, 4700 MHz\*km bandwidth
  - OM3 - multimode 50/125 micron fibre, 2000 MHz\*km bandwidth
  - OM2 - multimode 50/125 micron fibre, 500 MHz\*km bandwidth
  - OM1 - multimode 62.5/125 micron fibre, 200 MHz\*km bandwidth

## GX++ PCIe Gen2 Adapter Economics 101



#EN22 FCoE = \$12,000  
Add'l maint = zero

#EN23 FC = \$ 13,000  
Add'l maint = zero

**Less than  
1/3<sup>rd</sup> the cost**

assuming available GX  
slots and modest number  
of I/O ports needed

Plus saving energy, cooling

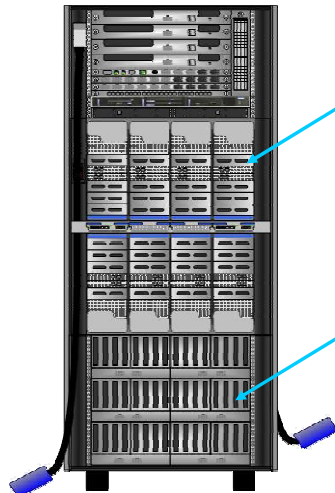
PCIe adapter  
+  
PCIe I/O drawer  
+  
12X & UPIC cables  
+  
GX adapter

- PCIe adapter
  - #5708 FCoE (10Gb 2 port) = \$ 5,499
  - #5735 FC (8GB 2 port) = \$ 4,631
- PCIe I/O drawer (20 PCIe slots)
  - #5877 = \$ 28,500
  - Plus \$214 monthly maint after warranty
- Three-four 12X cables + UPIC cables
  - ~ \$ 3,500
- One #1816 GX adapter
  - Minimum \$ 4,000 (often use two)
- Total
  - FCoE = \$ 41,500 + maint
  - FC = \$ 40,600 + maint

Much higher cost, HOWEVER drawer has more PCIe slots which can be used. Thus for a larger number of ports, cost per adapter port would be better

Based on USA suggested list prices and are subject to change. Reseller prices may vary. Prices outside USA may vary.

## When to Use Power 795 GX++ PCIe Adapters



### Use GX++ PCIe Adapters when:

- Just need a few high speed FC or FCoE ports and have available GX slots
- Need 16 GB Fibre Channel

### Use #5803/5873 I/O Drawer when:

- need lots of PCIe slots
  - Min 1 #5803 still needed on 795
- Need adapters other than FC or FCoE
- OS/firmware levels don't match your establishment

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## Enhanced Capacity on Demand (CoD)



“On/Off CoD” name change to “Elastic CoD”

- Highlights: flexibility, usability & operation

However, many feature code & docs refer to “On/Off”

- Therefore please be patient with us.

Capacity on Demand names FYI

- Permanent activations – Capacity Upgrade on Demand (CUoD)
- Temporary activations – Temporary CoD (TCoD)
  - ❖ Elastic CoD → usage by the day (was On/Off CoD)
  - ❖ Utility CoD → automated usage by the minute
  - ❖ Trial CoD → 30-day “try it”

## CoD Enhancement: 90-Day Enablement

**X 90**

- For 770/780 “D” models and for 795 (new or existing)
- Firmware 7.6 is pre-req
  
- For all processor cores or memory not permanently activated
- Provides enablement key for
  - 90 x quantity of processors (not permanently activated)
  - or
  - 90 x quantity of GB memory (not permanently activated)
  
- Better than earlier enablement keys which had a limited / fixed number of days. Ran out at “logistically inconvenient” times
  
- New 90-day approach simpler and enables a quantity which will last **at least** calendar 90 days (and may last up to a calendar year)

## Power 780/795 Elastic CoD & Large Block No-Charge

All new POWER7+ 780 and POWER7 795 come pre-loaded” with Elastic COD processor and memory days for no-charge



- **Fifteen (15) processor** days for every active and inactive processor initially ordered
- **Two hundred & forty (240) GBs** of Elastic Memory days for every processor initially ordered

**This is a LOT !**

(Credit not transferable to another company)

## Agenda for Recent Power Hardware Announcements



- POWER7+ chips
- POWER7+ 770/780
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- Elastic CoD for 770/780/795
- Enterprise Power Pool
- Active Memory Expansion for POWER7+
- New Ultra SSD I/O Drawer for 770/780
- New rack Doors for 770/780/795
- RDX docking station refresh
- HMC and Firmware Insights

## Introducing Power System Pools for Power 780 and 795

*Easily deliver compute resources to where they are required in order to achieve the highest levels of flexibility and business resiliency*

New option to create pools of high end Power Systems servers that allows sharing of processor and memory resources in support of planned maintenance events

Available on Power 795 and on 780 with POWER7+ based processors

Simplified Elastic COD enablement delivers utility-like compute capacity on a much larger scale



Based on USA suggested list prices and are subject to change. Reseller prices may vary. Prices outside USA may vary.

## Power Pools Offering Details



New no-charge Power high end availability offering

Power Pool can be made of up to 10 Power 780/795s

- Each system purchased with 2 or more processor books/nodes
- Minimum of 50% of processors in pool must be active
- Cannot mix AIX and IBM i Systems in same pool
- PowerVM and Electronic Service Agent are prerequisites
- All systems in a pool must have equivalent IBM hardware maintenance status
- Software licensed by core or S/N and its SWMA must have at least a minimum license on each machine on which the software will run

Elastic (On/Off) Processor and Memory Days are purchased for the pool, not the individual server, and are intended to provide utility computing for short time workload balancing, workload spikes or immediate capacity

- Single Elastic (On/Off) processor and memory enablement key needs to be entered only once/year

Support 8 Planned Maintenance Events per pool via Trial CoD

Single aggregated bill provided to client on quarterly basis for On/Off COD usage



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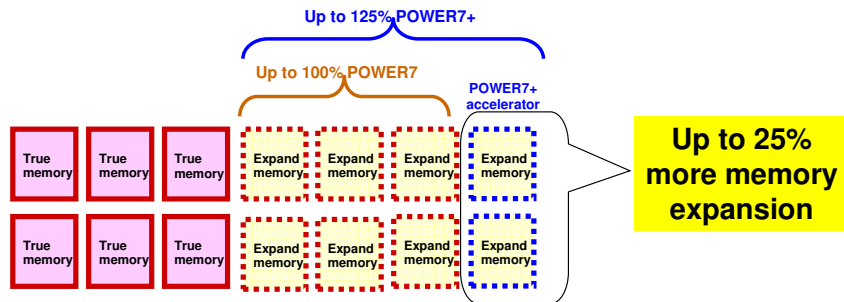
## 4Q 2012 Active Memory Expansion

### POWER7+ AME Hardware Accelerator

- Enhanced Power Systems value for AIX
- On-chip enhancement

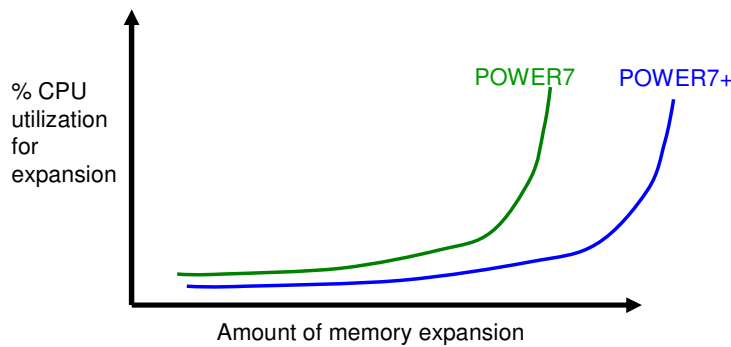


Compared to POWER7, more efficient memory expansion (less processor overhead for the same compression/decompression – or even more equivalent memory for the same processor overhead)



Note expansion percentage very workload dependent

## Active Memory Expansion - CPU & Performance



POWER7+ uses on-chip hardware accelerator to do some of the compression / decompression work. There is a knee-of-cure relationship for CPU resource required for memory expansion

- Even with POWER7+ hardware accelerator there is some resource required.
  - The more memory expansion done, the more CPU resource required
- Knee varies depending on how compressible memory contents are

## Active Memory Expansion Product Structure



### Permanent Enablement features – Chargeable

- Power Blades & PureFlex #4796 Enablement Feature
- Power 710/730 & 7R1/7R2 #4795 Enablement Feature
- Power 720 #4793 Enablement Feature
- Power 740 #4794 Enablement Feature
- Power 750 #4792 Enablement Feature
- Power 755 N/A
- **Power 770 & Power 780 #4791 Enablement Feature**
- Power 795 #4790 Enablement Feature

**POWER7 or  
POWER7+  
Same feat code,  
Same price**

**ONE feature per server** – no matter how many partitions choose to use it

One-time, 60-day trial - No charge  
Request via Capacity on Demand Web page  
[www.ibm.com/systems/power/hardware/cod/](http://www.ibm.com/systems/power/hardware/cod/)

### Additional Rules/Insights

- Permanent enablement available either with new server order or with MES order
- There is no mechanism to move enablement to a different server
- Enablement does not mean function has to be used. Enablement allows Act Mem Exp to be used on any or all of the AIX partitions selected by the client

## Act Mem Exp Economics – POWER7+ 770 or 780

### Price of physical, true memory

- \$202 - 252 / GB (varies based on memory feature)

### Price of Active Memory Expansion #4791

- \$6,900 (equivalent 34 – 27 GB true memory)



**Scenario A:** Server has max true memory & CPU utilization relatively low.

Memory limits constrain server from doing more work.

- Active Memory Expansion is a “no brainer” with even modest memory expansion

**Scenario B:** Server not at max true memory and CPU utilization relatively low.

Need to choose between adding more true memory and Act Mem Exp.

- Calculate gained memory: true memory x expansion factor = gained memory. For example, 240 GB true memory with a 20% expansion = 48 GB gained.
- Compare cost of additional true memory versus Active Memory Expansion. For example, 48 GB true memory at \$202/GB = \$9,696 while Active Memory Expansion = \$6900.
- If needed, include cost/savings of partial memory activations, additional processor activations, and of additional software licensing to analysis.

**Scenario C:** Server full of smaller DIMMs and client wants to avoid putting memory on the floor to replace with larger DIMM

- Analysis same as to Scenario B

Prices shown are IBM USA suggested list prices as of Oct 2012 and are subject to change without notice; reseller prices may vary.



## Active Memory Expansion – Client Deployment Steps

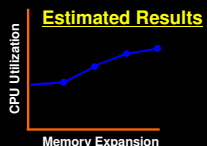
Same for POWER7+ as for POWER7 servers

①

Planning Tool (AMEPAT)

- A. Part of AIX 6.1 TL4
- B. Calculates data compressibility & estimates CPU overhead due to Active Memory Expansion
- C. Provides initial recommendations

Estimated Results



CPU Utilization

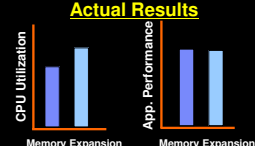
Memory Expansion

②

60-Day Trial (no charge)

- A. One-time, temporarily enablement
- B. Config LPAR based on planning tool
- C. Use AIX tools to monitor Act Mem Exp environment
- D. Tune based on actual results

Actual Results



CPU Utilization

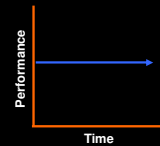
App. Performance

Memory Expansion

③

Deploy into Production

- A. Permanently enable Active Memory Expansion
- B. Deploy workload into production
- C. Continue to monitor workload using AIX performance tools



Performance

Time

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## New EXP30 Ultra SSD I/O Drawer



#EDR1  
 Oct GA 2012:  
 770/780 "D" models  
 AIX  
 IBM i SOD

1U drawer ... Up to 30 SSD  
 30 x 387 GB drives = up to 11.6 TB  
 Great performance

- Up to 480,000 IOPS (100% read)
- Up to 410,000 IOPS (60/40% read/write)
- Up to 325,000 IOPS (100% write)
- Up to 4.5 GBytes/s bandwidth



20% more IOPS over  
 April's Ultra Drawer intro

Up to 48 drives & 43 TB downstream HDD

**Ultra performance**  
**Ultra density**

## SSD Config Options --- Oct 2012

Power Systems (internal / DAS)							
SAN-based	PCIe-based SSD	SAS-bay-based SSD					
		DS8000 SVC V7000 XIV	#2053/54/55 RAID & SSD SAS Adapter	In CEC with internal SAS controller	#5805 Gen1 PCIe 380MB cache	#5913 Gen2 PCIe 1800MB cache	#ESA1/A2 Gen2 PCIe 0 MB cache

Many DAS SSD config options\* for Power Clients

Options vary

- Performance
- Price
- Physical size
- Where tested/supported
- Function

## EXP30 Ultra Drawer SOD Summary

1. More POWER7 Models supported in the future

2. Down stream HDD drawers



3. Easy Tier capability for HDD drawers (AIX/Linux)



4. DS8000 integration -- DAS performance + SAN functionality



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## Power 770/780: New 42U Rack Front Door

7014-T42 Options: **Must pick one**

Trim kit: #6272  
(no front door)  
\$523



Not acoustic  
Not lockable  
~ 0 mm deep  
~ 0 in deep

Plain front door  
#6069  
\$550



Not acoustic  
Depth front door  
~ 25 mm  
~ 1 in

Acoustic doors  
(front & rear)  
#6249  
\$4650



Acoustic ~6  
dB(A) quieter  
Depth front door  
~ 191 mm  
~ 7.5 in

780 logo  
front door  
#6250  
\$3000



Not acoustic  
Depth front door  
~ 90 mm  
~ 3.5 in

POWER7+  
front door  
#ERG7  
\$3000



Not acoustic  
Depth front door  
~ 134 mm  
~ 5.3 in

Prices are USA suggested list prices for a model 770 / 780 and are subject to change. Reseller prices may vary.

## Power 795: New Front Door Options

9119-FHB Options: **Must pick one**

Slim Line doors (F&R):  
CEC #6868 \$8000  
Expansion rack #6880 \$8000  
Bolt-on Exp rack #6880 \$8000



Depth CEC doors (F+R):  
~ 213 mm (~8.4 in)

Acoustic doors (F&R):  
CEC #6867 \$12000  
Expansion rack #6888 \$14500  
Bolt-on Exp rack #6878 \$12000



~.9 dB(A) quieter than #6868  
Depth CEC doors (F+R):  
~ 533 mm (~21 in)

Acoustic doors (F&R):  
CEC #ERG1 \$12000  
Expansion rack #ERG2 \$14500  
Bolt-on Exp rack #ERG3 \$12000



~.9 dB(A) quieter than #6868  
Depth CEC doors (F+R):  
~ 595 mm (~23.4 in)

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## RDX - Removable Disk Drives



**Strategic entry save/restore media for Power Systems**

Strategic entry media option ..... "entry", not an LTO-5 replacement  
Great alternative to DAT 80/160 or QIC or VXA or even LTO-2..

## USB Removable Disk Drive (RDX) Docks Refreshed



### October 2012:

- New USB-attached RDX docking stations
- Laying groundwork for future technology and ensuring supply is available from RDX vendors to IBM.
- Same prices, same config options
- Same performance

Existing Docking stations	New Docking Stations	Price
Internal Docking Station #1103	Internal Docking Station #EU03	\$ 225
External Docking Station #1104	External Docking Station #EU04	\$ 275
Internal Docking Station #1123	Internal Docking Station #EU23	\$ 275

- Entry tape alternative to VXA-2, VXA-320, DAT72, DAT160, DAT320 or 8mm
- For AIX/Linux on POWER6 or POWER7 servers; For IBM i on POWER7 servers
- Rugged & Fast
- Good fit for "dirty" environments like back offices - much better than tape
- Lower total cost of ownership for many tape cartridge users

Prices are USA suggested list prices for a model 730 / 740 and are subject to change. Reseller prices may vary.

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## New HMC 7042-CR7 .... With RAID-1 Enabled



CR7

- Refresh of HMC technology .... CR7 replaces CR6
- Price CR7 essentially the same as CR6
- New CR7 based on IBM System x workstation x3550 M4 hardware, but customized to provide dedicated HMC functionality
- Up to 16 concurrent Live Partition Mobility activities with PowerVM

Feature	CR6	CR7
Processor	Westmere-EP	Intel Xeon E5 (Sandy Bridge)
Maximum Memory	4 GB	4 GB
SATA disk drives	500 GB	500 GB
RAID 1 (requires 2 disk drives)	Optional #EB2T in 4Q2012	Default #EB2S in 4Q2012
Internal Modem	Defaulted	Optional
USB Ports	Four ports	Four ports
Integrated Network	Four 1 Gb Ethernet	Four 1 Gb Ethernet
Optional Redundant Power Supply	Yes	Yes

Note: CR6 planned to be withdrawn from marketing 2012 Dec 31

## HMC V7 R7.6.0 Software & Firmware Highlights

- Overview
  - Support the following:
    - Power Blades, Supports POWER7 770 / 780 and POWER7 795
    - New Power 795 IO options
    - Support POWER7+: Accelerators
    - Supports LPAR minimum CPU (0.05)
    - Dynamic Platform Optimizer (DPO) support
    - Capacity on Demand Enhancements
      - Longer intervals for Elastic (On/Off) CoD:
      - More flexible Exception Trial CoD
    - New PowerVM features NPIV port id override / 16 concurrent LPAR mobility
    - HMC browser currency (FF7, FF8, FF9, FF10; IE 7, IE 8, IE 9)
    - RAID-1 support for HMC (CR6 & CR7)
    - Scaling support of up to 2000 partitions

HMC 760 firmware: 7315-C04, 7315-CR2, 7310-CR2 and later HMC hardware

**HMC V7 R7.6.0 is the last release to support 7310-C04, 7315-CR2, 7310-CR2**

Manage > 254 partitions or if IBM Systems Director manages the HMC, then at least 3GB of RAM is required for HMC