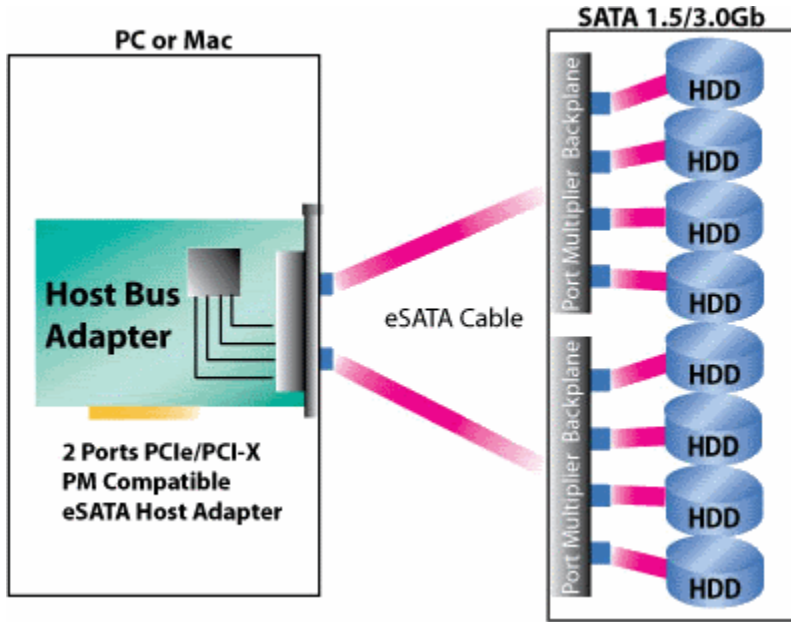




????????Expander????SATA-IO????-Port Multiplier?Port Multiplier????SATA port????SATA port????port????Storage????Port Multiplier????

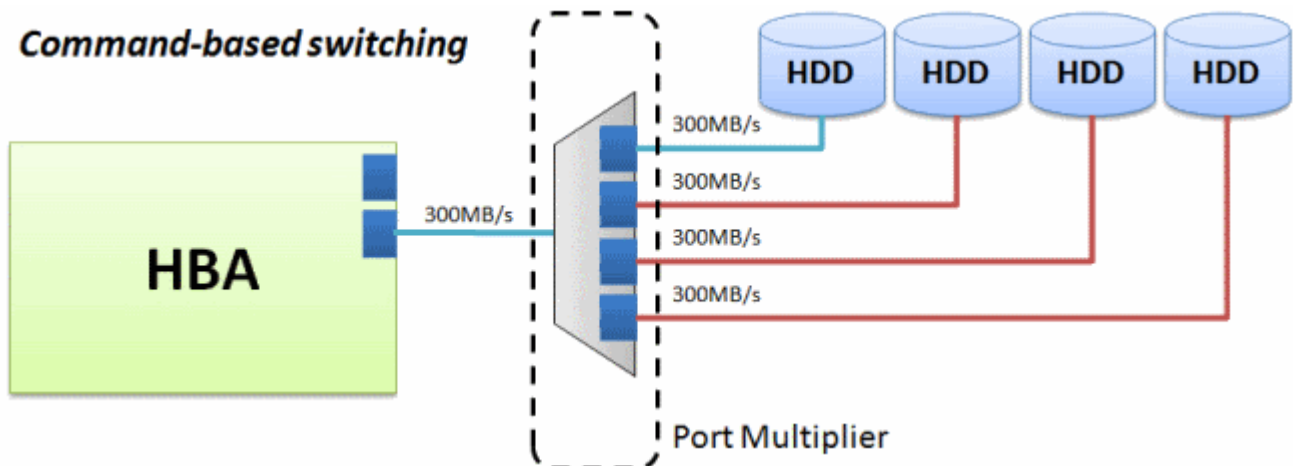


????eSATA????PM(Port Multiplier)????device????port????SATA-IO????Port Multiplier????

**1.Command-based switching**

**2.FIS-based switching**

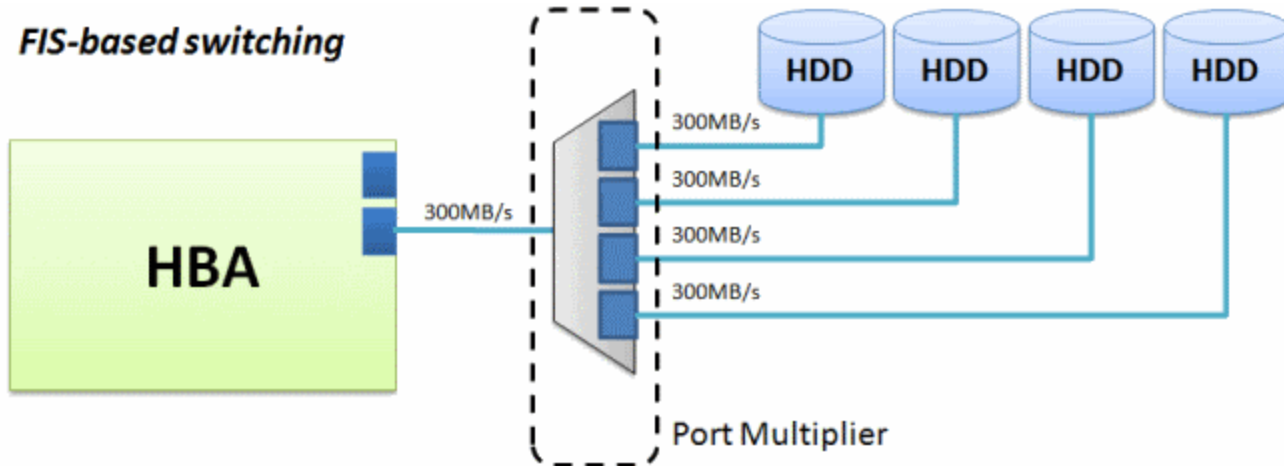
????????????????????????????????Command-based switching????Command-based switching????????????????SATA HBA????I/O??(Command)????(HD Drive)????PM????????????????I/O????????I/O????HBA????I/O????????????????Storage????Command-based switching????



???Port Multiplier????????????Intel????ICHxR????????

FIS(Frame Information Structure)-based switching?Port Multiplier????????????????Command-based switching????????I/O????PM????????SATA HBA????I/O????PM????????SATA HBA?PM????????????NCQ????????FIS-based switching????

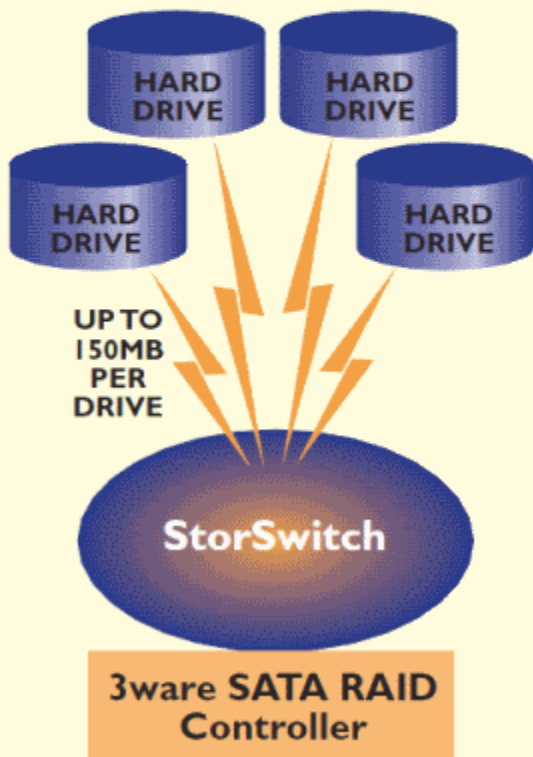
**FIS-based switching**



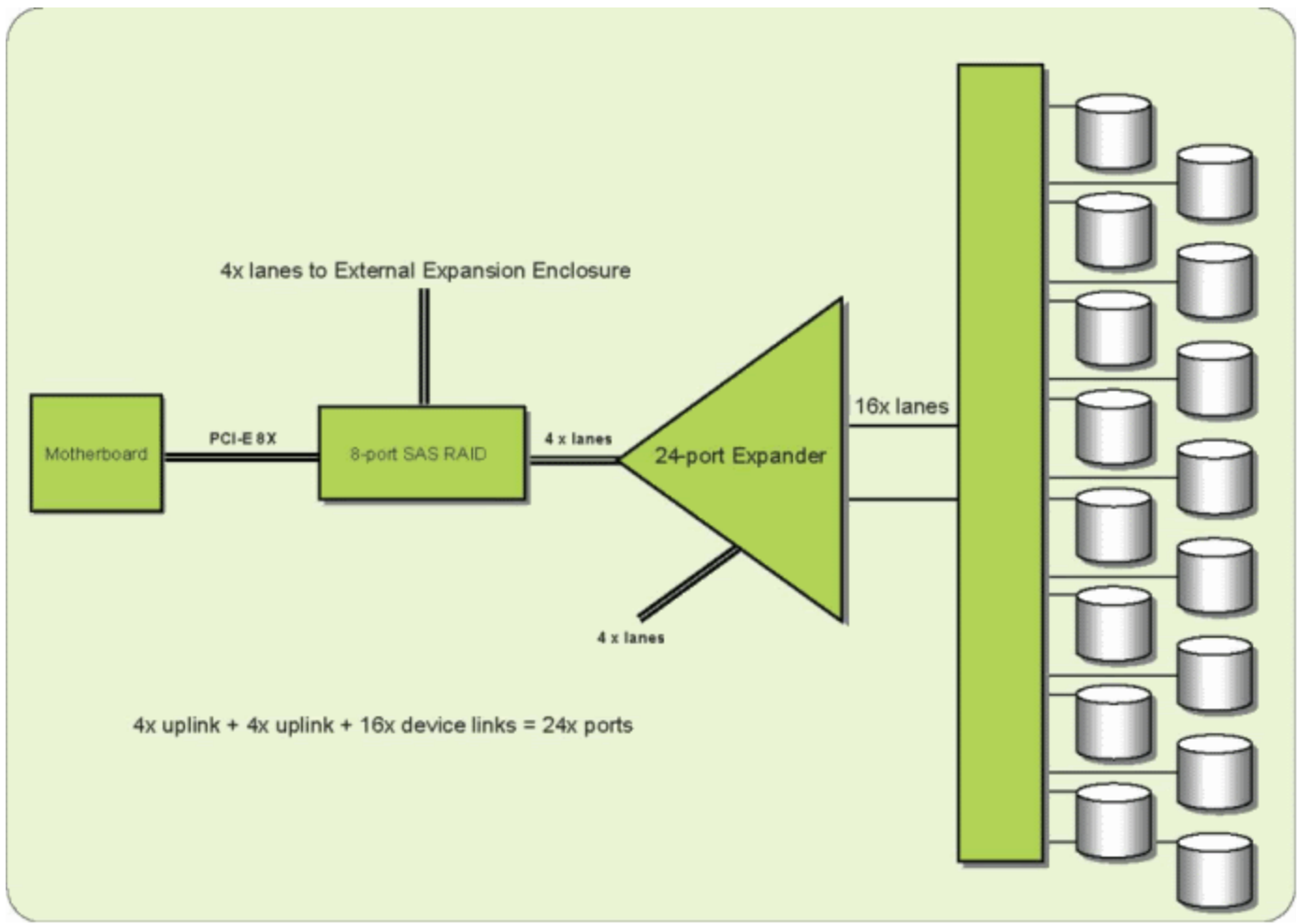
??Intel?ICH10R????????????FIS-based switching????????SATA HBA????????????????3ware???StorSwitch???  
????Port Multiplier????????????????????????????

**STORSWITCH ARCHITECTURE**

Based on non-blocking switching technology, 3ware's StorSwitch architecture provides a dedicated port for each drive, which eliminates shared-bus arbitration and bottlenecks, thus maximizing performance and reliability while improving disk utilization.



?Expander??SAS??????Port Multiplier????????SATA Port Multiplier????????????????????Expander?  
 ???????SAS??????-wide port????????Expander????????????????????wide port?????4?narrow links????????????  
 ???????SAS-2??????wide port-6Gbps x4=24Gbps=3GB/s x80%=2.4GB/s??????wide port?Expander?????????  
 SATA?Port Multiplier????????????????SATA Port Multiplier??300MB/s????SATA 3.0????600MB/s(????SATA  
 3.0?Port Multiplier????Silicon Image????SATA 3.0?Port Multiplier?)????SATA????????????????????



?SAS????Link Layer?SMP????Expander????????HP?????-Serial Attached SCSI Architecture?Expander?  
 ???????

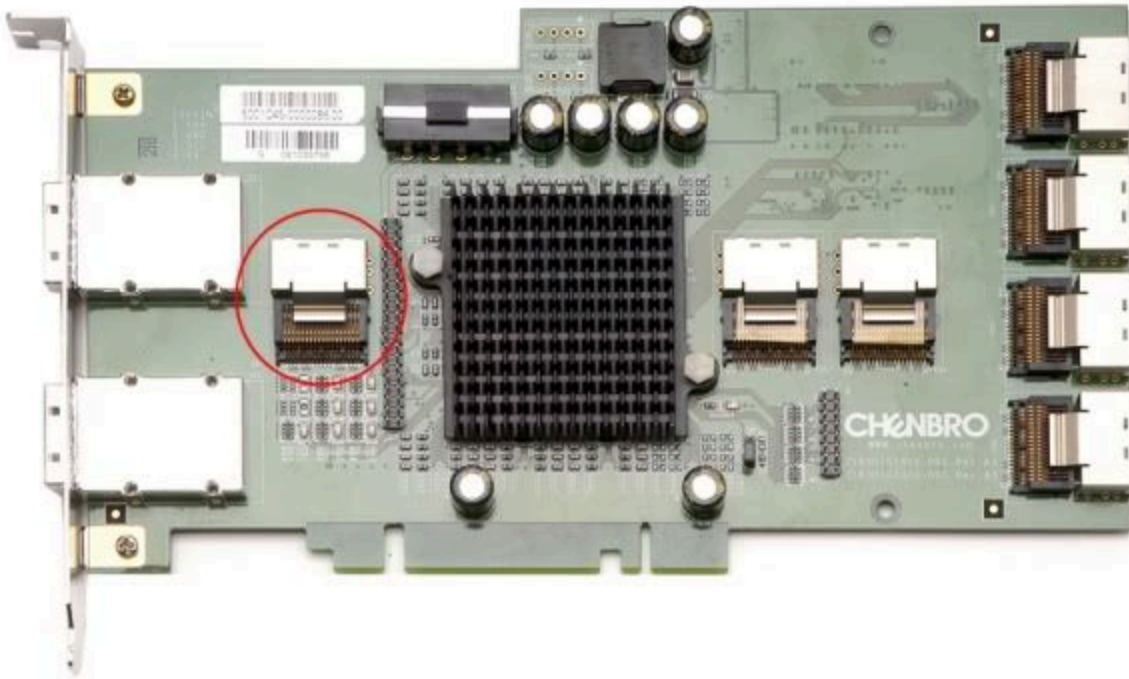
**1.Edge Expander**

**2.Fanout Expander**

????Expander????????Expander?-Internal Expander Add-on Card????????

**1.Chenbro SAS Expander Add-in Card**

???Chenbro?CK13601?Standard 36-port SAS Expander????



??Internal Expander Add-on Card??LSI?LSISASx36????3Gb/s????ARM??Host Bus????????????????4pins?12v??HBA????????????????????Input Drive Connector???? RAID HBA?Host Connector????????????Drive Connector????Storage???RAID HBA?Expander????????3Gb/s x4=12Gb/s=1.5GB/s x80%=1.2GB/s????36 ports????1.2GB/s????????

SAS-2???Internal Expander Add-on Card?Chenbro????????????????LSI LSISAS2x36????150MHz?ARM??CK13601????????????LSISAS2x36????????????6Gb/s x4=24Gb/s=3GB/s x80%=2.4GB/s(RAID HBA????6Gb/s?)?RAID HBA?Expander????????????SAS-1/1.1 Expander????????6Gb/s?????????????????36????????????????

Chenbro?Internal Expander Add-on Card????LSI????RAID HBA????LSI??

2.  
HP?? SAS expander

<https://h10057.www1.hp.com/ecomcat/h...visioner/99/468406-B21.htm>

input ?? 1?2 4x SAS port ??? 24 pcs HDD  
24 Port HDD ???? 48 Gbps (4800 MB/s) ??

SAS Expander Chip?PMC Sierra PM8005 .S

?? SAS raid card???phy ??,???Raid ??????????!

HP????????HP Server?Raid card ?  
???? ??????pci-e ?.????????

Support Raid card:

3Gbps SAS

Areca 1680 series: YES (SES2 ???)

3ware 9690SA Series YES

Adaptec 5085: Yes (SATA ?????1.5 Gbps)

Adaptec 5805: Yes\* (SATA ?????1.5 Gbps)

6 Gbps SAS

HP P212, P410, P410i, P411, P411i, P712: YES

??Expander firmware ??????HP P410 Card