



HP StorageWorks MPX200 Solution Architecture Whitepaper

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MPX200 Multifunction Router Solution Overview

As mid-range and enterprise businesses grow and deploy physical and virtual servers and storage arrays, information required to manage, share, and protect data also continues to grow. The HP StorageWorks MPX200 Multifunction Router (MPX200) extends the Fibre Channel SAN investment with integrated multi-protocol support, allowing customers to incorporate iSCSI servers, Fibre Channel over Ethernet (FCoE) servers with no additional storage arrays or management costs. MPX200 provides (with optional licenses) Fibre Channel over Internet Protocol (FCIP) connectivity for remote replication using HP Continuous Access software and online and offline data migration between heterogeneous storage arrays.

The MPX200 ([Figure 1](#)) has enterprise-class availability with dual hot-pluggable power supplies and router blades to satisfy no-single-point-of-failure requirements.

Figure 1: MPX200 Multifunction Router



There are two blade options available for the MPX200 Multifunction Router:

- **10-1 GbE blades** with two 10 GbE ports, two 1 GbE ports, and two 8 Gb/s FC ports
- **1 GbE blade** with four 1 GbE ports and two 8 Gb/s FC ports

NOTE: The 10-1 GbE blade includes two 1 GbE ports.

Simple, Scalable, and Secure

The MPX200 provides a simple, scalable, and secure storage solution. It offers simultaneous Fibre Channel (FC) support, 1 GbE iSCSI, 10 GbE iSCSI, and FCoE support, providing modular multi-protocol SAN designs with increased scalability, stability, and return on investment. The MPX200 provides a secure storage solution for virtualized server environments. In addition, this solution enables customers to have the best of both worlds: low cost server connectivity using iSCSI and faster backups using Fibre Channel.

Enables Multiprotocol EVA Storage System

Low cost server connect to the SAN

There are applications that do not require Fibre Channel connectivity to EVA but still require block level SAN storage. The MPX200 provides customers a way to connect low-cost Ethernet connected servers to an EVA storage system by bridging the iSCSI protocol to the FC protocol. The iSCSI servers can subsequently leverage shared SAN resources, improving asset utilization and run new applications. The MPX200 provides 1 GbE and 10 GbE iSCSI ports for EVA storage arrays.

The unique 1 GbE and 10 GbE iSCSI host ports array configuration (using MPX200) enables customers to choose the server interconnect based on their existing infrastructure.

NOTE: As most Ethernet switches have 10 GbE uplink ports, 10 GbE iSCSI ports can be used to connect to the MPX200. End-to-end 10 GbE infrastructure is not required to use the 10 GbE host ports on the MPX200.

Graceful iSCSI adoption

Customers using Fibre Channel as their primary SAN can gracefully add iSCSI servers and connect them to their EVAs. With multi-protocol support, customers can choose the protocol based on the application and their business needs. With Windows, an HP multipath I/O device specific module (DSM) supports both iSCSI and FC protocols; hence, there is no need for customers to make multipathing changes.

Converged Infrastructure with Fibre Channel over Ethernet (FCoE) support

Fibre Channel over Ethernet support on an MPX200 enables EVA targets to be presented as FCoE targets. This allows customers to connect servers with converged network adapters (CNAs) to 10 GbE converged Ethernet switches and an MPX200, and deploy end-to-end FCoE solutions.

Connect up to four EVAs using one MPX200 chassis

The MPX200 supports up to four EVA arrays; the unit is racked within an EVA storage array cabinet.

Single pane of glass management

The MPX200 and EVA Storage Solution use the integrated management software, Command View EVA, to manage the iSCSI connectivity. No other management software is required. Additionally, it is beneficial to consolidate storage around the EVA storage array to simplify management and back up.

Enterprise-class high availability

The MPX200 has enterprise-class availability with dual hot-pluggable power supplies and router blades to satisfy no-single-point-of-failure requirements. All MPX200 configuration information is mirrored between the blades and the unique addressing information (such as the MAC address and WWN) stored in the chassis. This provides for a seamless blade replacement without the need to update zoning or configure specific files.

High performance virtual machines deployment

The MPX200 allows high performance virtual machine (VM) deployment with 1 GbE and 10 GbE iSCSI connectivity. The MPX200 architecture initiator virtualization technology allows 1,024 iSCSI initiators to connect to the MPX200 platform. Each virtual server can be configured with its own iSCSI initiator and can securely manage its own LUNs. This ensures that management policies are seamlessly maintained throughout the virtual machine deployment. Configuring iSCSI initiators on the VMs also enables administrators to overcome the hypervisor limitation of 256 LUNs. Additionally, the MPX200 supports 1,024 LUNs on the backend, allowing the MPX200 to be scaled over multiple EVAs.

iSCSI protocol support

MPX200 supports standard iSCSI protocols, providing compatibility with major operating systems with an iSCSI initiator. The operating system's iSCSI initiator acts as if it controls a physical SCSI device, making the underlying IP network invisible to applications.

Unlike traditional Fibre Channel-based SANs, iSCSI SANs use IP networks to deliver disk storage to servers. Also, in contrast to expensive Fibre Channel interfaces and switches, iSCSI SANs use commodity 1 GbE/10 GbE Ethernet hardware.

The MPX200 maps EVA controllers to iSCSI targets and presents them to iSCSI initiators for accessing VDISK as iSCSI devices. The MPX200 allows up to four EVAs to connect to a single MPX200 chassis, supports all EVAs (EVA3000/5000/4000/4100/4400/6000/6100/6600/8000/8100/8400), and is fully integrated with the EVA Command View software.

Integrating the MPX200 with EVA provides both iSCSI and FC attached servers access to block storage through an FC and Ethernet IP network simultaneously.

Major features of the MPX200 iSCSI include:

- Up to 600 iSCSI initiator connectivity
- 120k Read IOPS/blade
- Up to 1,024 LUNs (VDISK) support
- IPv4 and IPv6 support
- 1 GbE and 10 GbE support

The MPX200 is architected to enable various deployment options to serve both low cost and high performing configurations.

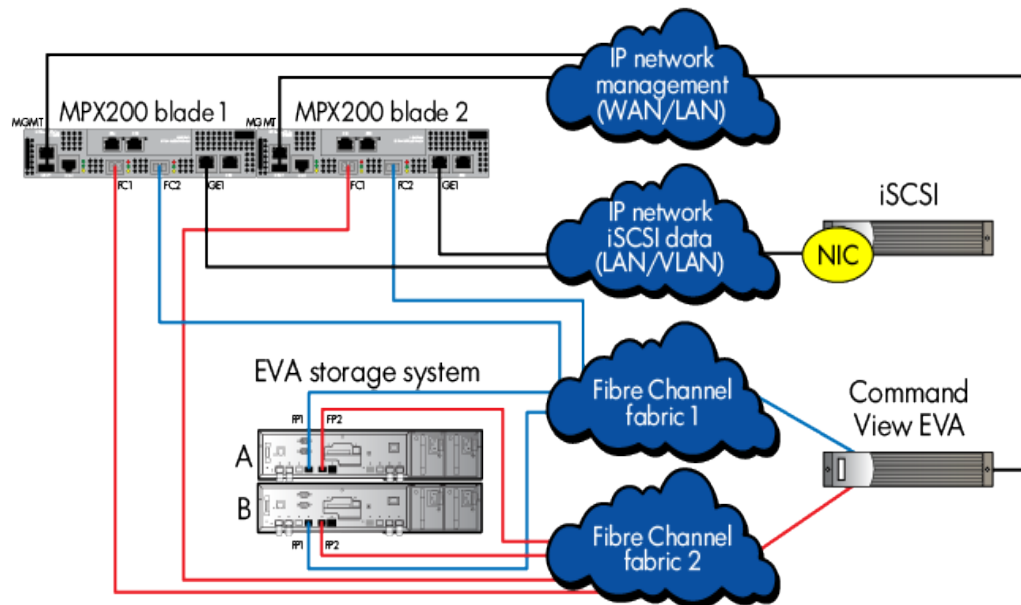
MPX200 iSCSI configurations

Common Dual MPX200 blade, single EVA configuration

Customers can start with the basic iSCSI EVA deployment using a single blade MPX200 to connect to an EVA. However, dual blade MPX200s are required for a high availability deployment.

The following describes some sample deployments for the MPX200 and EVA storage array currently in data centers.

Figure 2: Dual blade, single EVA connect, iSCSI only



[Figure 2](#) shows the iSCSI EVA deployment of a dual blade MPX200 with a single EVA in a fabric environment. The MPX200 chassis consists of an MPX200 *blade 1* and *blade 2*. The EVA storage system includes *controller A* and *controller B*. The command view station manages both the EVA and the MPX200, including blade 1 and blade 2. Both blades' management Ethernet port is connected to the IP network management network. The Command View station is also in the same management IP network that enables Command View station to manage MPX200 as well.

The EVA controllers are connected to existing Fibre Channel fabrics, fabric 1 (blue) and fabric 2 (red), to form a High Availability (HA) SAN. The Command View EVA station is also connected to fabric 1 and fabric 2 that enables it to manage the EVA.

At this point, the MPX200 blades are mapped to EVA controllers and presented as iSCSI targets.

The IP iSCSI data network (black) is configured by connecting both *blade 1* and *blade 2* Ethernet ports, then the iSCSI host's Network Interface Cards (NIC) are connected to the iSCSI data network. The iSCSI host can connect to the iSCSI targets in the MPX200, and VDISKS from EVA can be presented to those iSCSI initiator hosts. The applications that run on the iSCSI host can access the iSCSI LUNs as block devices.

Note: Each NIC has two different paths to the same LUN; hence, there are four available paths to the same LUN. Multi-path software in the host manages the available paths. In the windows environment, the native MPIO manages the paths and sets policies. Hewlett Packard's Device Specific Module (DSM) also manages the multi-paths.

High performance iSCSI configurations

The typical MPX200 configurations are 1 GbE iSCSI data network end-to-end. Commodity type ProCurve standard Ethernet switches help build low cost configurations. However, ProCurve has switches with 10 GbE uplink modules that enable the following options for high performance networks:

10 GbE MPX200 connectivity and 1 GbE iSCSI host connectivity

In [Figure 2](#), the MPX200 *blade 1* and *blade 2* connect to the iSCSI IP data network (black) using the 10 GbE option. However, the iSCSI host NICs still connect to the iSCSI network using 1 GbE link only. Since the ProCurve switch has both 10 GbE and 1 GbE ports, the MPX200 10 GbE ports and iSCSI host 1 GbE ports can connect to the same switch. This provides 1 GbE host connectivity to 10 GbE iSCSI connectivity to the MPX200.

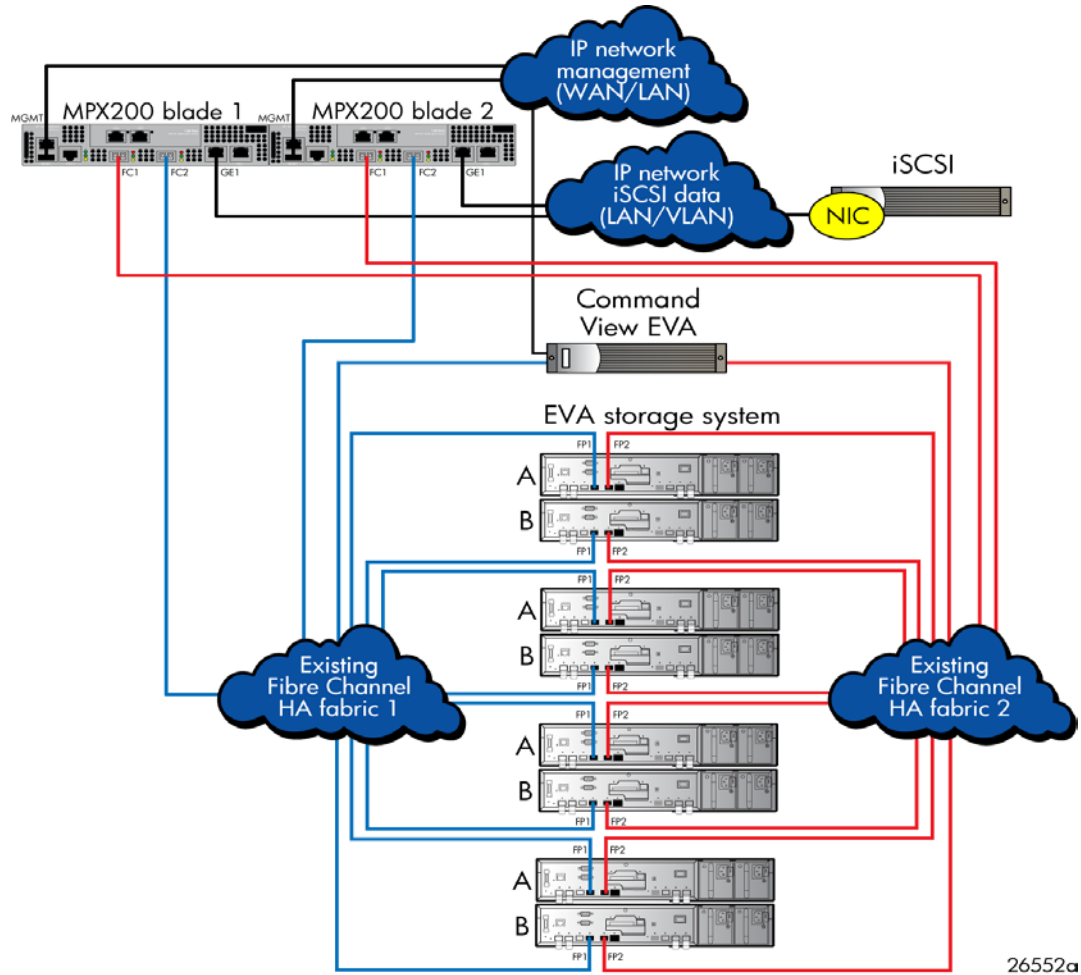
The MPX200's 10 GbE connectivity enables a high number of 1 GbE iSCSI hosts to connect and access the storage at 1 GbE throughput level. HP recommends this configuration for low cost, high performance access of hosts.

10 GbE MPX200 connectivity and 10 GbE iSCSI host connectivity

In [Figure 2](#), the MPX200 *blade 1* and *blade 2* connect to the iSCSI IP data network (black) using a 10 GbE option; the iSCSI host NICs also connect to the iSCSI network using 10 GbE connectivity. The ProCurve switches have 10 GbE ports, making this configuration possible. HP recommends this configuration for a high performance application environment, such as server virtualization configurations. The iSCSI hosts can be a virtualized server hosting many virtual machines.

Multi EVA MPX200 connectivity

Figure 3: Dual blade, multi EVA fabric connect, iSCSI only (1 GbE or 10 GbE Ethernet infrastructure)



[Figure 3](#) shows a dual blade, four EVA iSCSI configuration. The four EVAs are connected to HA Fibre Channel Fabric 1 and Fabric 2, which are in turn connected to the MPX200 blade 1 and blade 2. The iSCSI data network can be constructed as:

- End-to-end 1 GbE connectivity
- End-to-end 10 GbE connectivity
- MPX200 connectivity as 10 GbE and host NIC connectivity as 1 GbE

HP recommends the *dual blade, multi EVA, fabric connect, iSCSI only configuration* for adding more EVA capacity in dual MPX200 blades and presenting them to more iSCSI hosts in a cost effective way.

FCIP Protocol Support

FCIP is a tunneling protocol that encapsulates Fibre Channel packets and transports them using TCP/IP, while keeping Fibre Channel services intact. This enables applications that run over Fibre Channel SANs to be supported under FCIP. It also enables organizations to leverage their current IP infrastructure and management resources to interconnect and extend Fibre Channel SANs.

The MPX200 supports Fibre Channel over IP for SAN connectivity over WAN with a license. The HP StorageWorks Continuous Access EVA software for remote replication for disaster tolerance uses the FCIP technology to replicate data across long distance in a cost effective way. A base FCIP configuration consists of a minimum of two MPX200 blades, one for the local site and one for the remote site. MPX200 supports FCIP as a standalone function or to use simultaneously with the iSCSI function. It is also possible to have FCIP in dual blade implementations for high availability. When the FCIP is configured in the MPX200, a dedicated combination of one FC port and 1 GbE port is mapped for FCIP function. Once mapped, those ports are not available for any other usage. If the iSCSI needs to be configured, it can use the remaining FC and GbE ports.

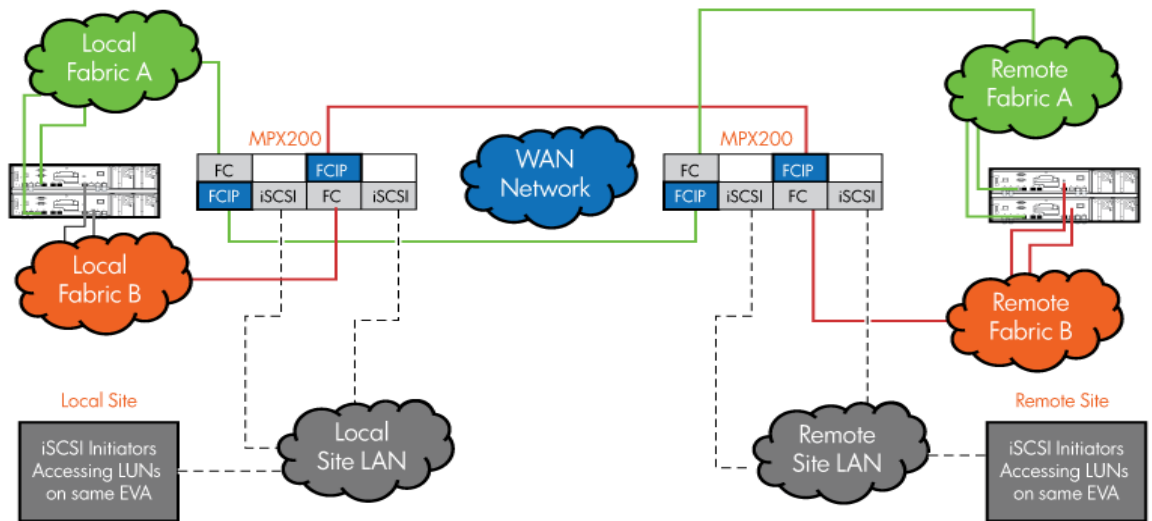
FCIP support features include:

- Supports both B-series and C-series FC switches.
- The MPX200 Multifunction Router configured for FCIP is supported for use with the following HP Continuous Access EVA storage systems:
 - EVA4400/4400 with embedded switch
 - EVA4000/4100/6000/6100/8000/8100
 - EVA6400/8400
 - EVA3000/5000

FCIP and iSCSI simultaneous configurations

There are many FCIP and iSCSI possible configuration. The following examples show popular simultaneous FCIP and iSCSI function configurations.

Figure 4: Dual blade, single EVA per site, Fabric connect, iSCSI and FCIP in HA configuration



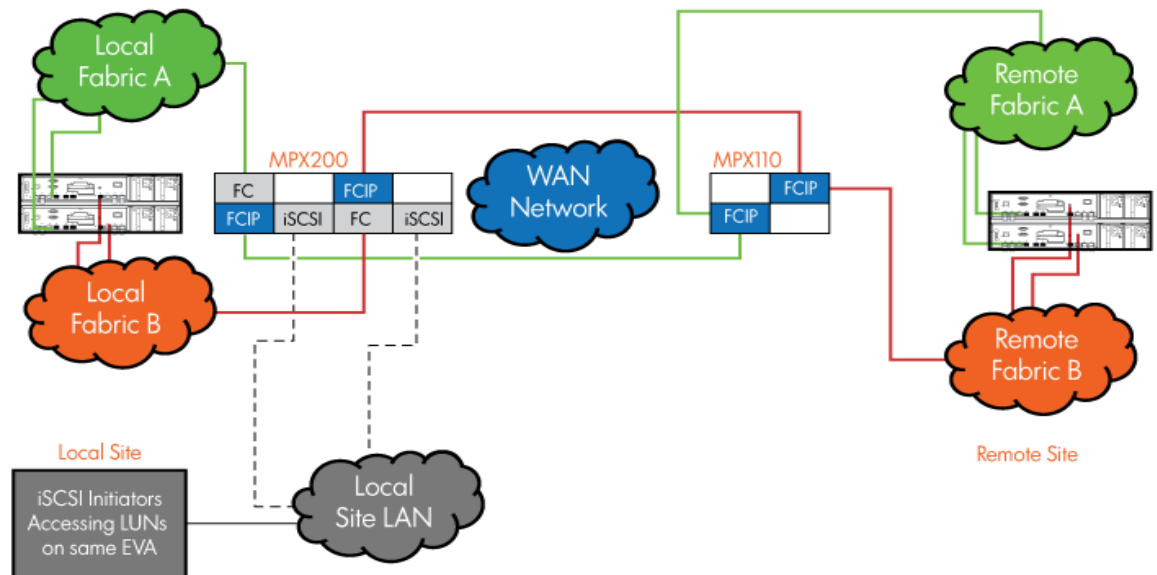
[Figure 4](#) shows dual MPX200 blades with a single EVA for a two site FCIP and iSCSI implementation. The two sites are referred to as local site and remote site. The EVA storage system at the local site and remote site connect to both local fabric A (green) and local Fabric B (orange). The MPX200's blade 1 and blade 2 in both the local and remote sites are configured for FCIP and iSCSI simultaneous operation.

NOTE: One FC port and 1 GbE port are mapped to the FCIP function in every blade. The other FC port and GbE ports are for iSCSI usage.

The FCIP for the local site MPX200 blade 1 connects to local fabric A. Similarly, the remote site FCIP connects to remote fabric A. Blade 1's Ethernet connection connects over WAN to form the SAN extension. Similarly, local fabric B is connected by blade 2's FCIP to remote site fabric B to form the SAN extension. Now, the EVA's CA can replicate data using these FCIP connections over WAN. The MPX200 blade 1 is configured with both iSCSI and FCIP. When the FCIP is configured, a 1-to-1 binding is created between the FC port and the GbE port. iSCSI functionality can be configured at the local site, as explained earlier in the iSCSI sections, to access the *local site* EVA. Similarly, the remote site iSCSI can be configured to access the remote site EVA.

This option is recommended for both iSCSI and FCIP high availability configurations.

Figure 5: Dual blade, single EVA per site, Fabric connect, iSCSI and FCIP (MPX200 to MPX110 FCIP connectivity)



[Figure 5](#) shows a dual blade single EVA iSCSI and FCIP with an mpX110 configuration. The mpX110 is the legacy and low cost SAN extension product for EVA continuous access connections. The MPX200 and mpX110 are compatible. The difference between [Figure 3](#) and [Figure 4](#) is the remote site configuration: Figure 4 shows the mpX110 is used at the remote site and in Figure 3 the MPX200 is used at the remote site. The mpX110 is configured for two FCIP routes: One route connects fabric A (green) and the other route connects fabric B (Orange). The FCIP function merges local Fabric A and Remote Fabric A and local Fabric B and remote Fabric B. The iSCSI is configured at the local site MPX200 only. HP recommends this configuration for cost effective remote site SAN extension.

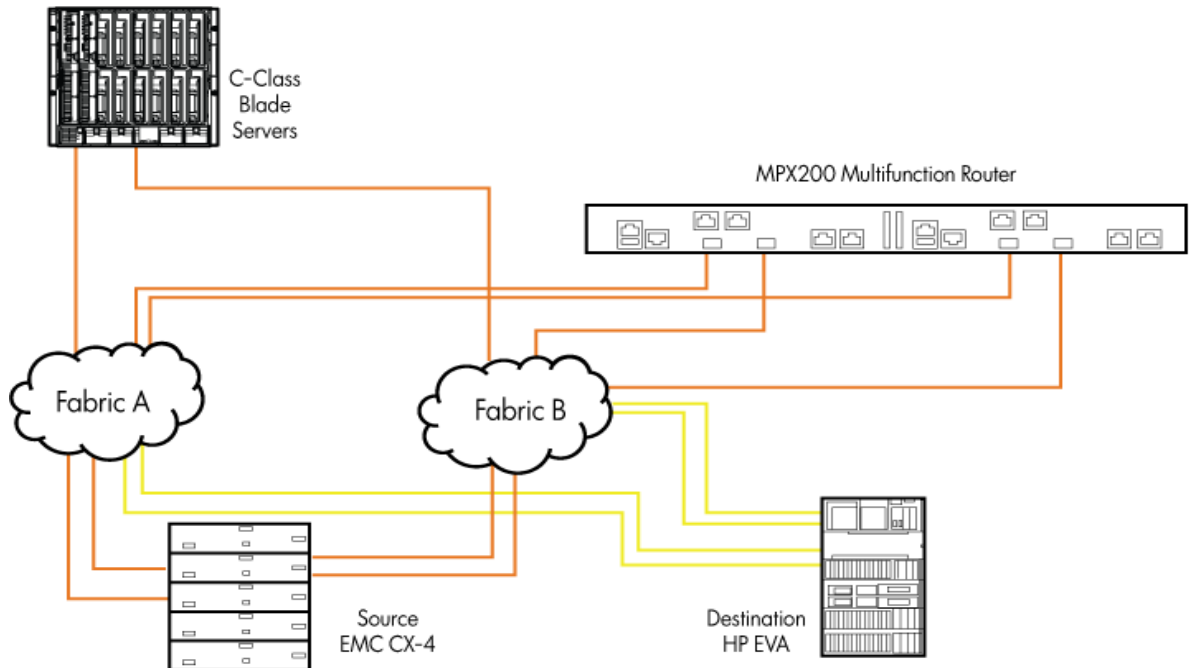
MPX200 Data Migration

The MPX200 hardware can be used to perform Data Migration between Storage Arrays. The MPX200 allows customers to perform offline data migration between storage LUNs in different storage arrays. Currently HP support online data migration requiring just a firmware upgrade. Optional data migration licenses will need to be installed for this service. However, HP will offer complimentary migrations to customers of up to 5-Gb migrations.

The MPX200 is shipped with Data Migration Manager (DMM). DMM is an easy to use GUI with intuitive wizards to simplify use. Customers can configure 255 migration jobs with eight running simultaneously. It is also possible to add priorities for migration jobs. Since customers can deploy the MPX200 for iSCSI with Data Migration services running at the same time, application performance (on the iSCSI side) is preserved using an Array Bandwidth Throttling capability in the MPX200. MPX200 Data Migration services can be fully scripted using a powerful CLI that comes with the MPX200. Also, the MPX200 DMM services have additional features, including source/destination LUN protection and data verification. [Figure 6](#) shows the MPX200 migrating LUNs from the EMC CX

array to an HP EVA. Fibre channel ports from each MPX200 blade are cross connected to Fabrics A and B.

Figure 6: MPX200 Migrating LUNS from the EMC CX -4Array to an HP EVA



Simultaneous functions operations

The MPX200 Multifunction Router performs the following:

- iSCSI connectivity to EVA arrays
 - Base functionality included with hardware platform at no charge
- High performance offline data migration
 - Software license purchase required
- Enables FCIP connections to perform SAN over WAN, remote data replication using EVA Continuous Access software
 - Hardware enablement license purchase required

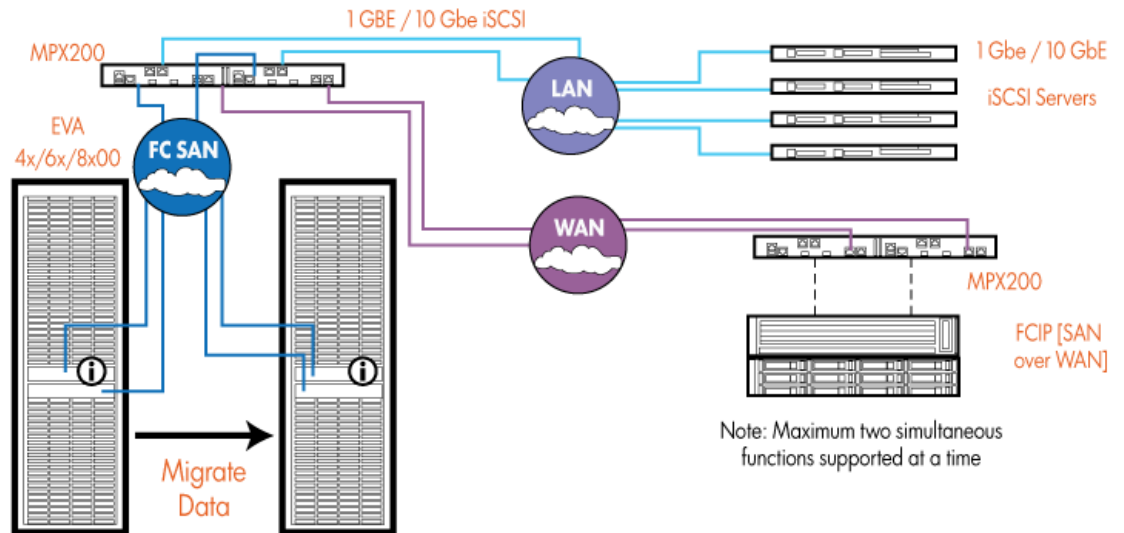
Up to two functions running simultaneously are currently supported with iSCSI connectivity (comes turned ON with the hardware), specifically:

- iSCSI connectivity and data migration
- iSCSI connectivity and 1 GbE FCIP connectivity

Both the iSCSI connectivity and data migration function and the iSCSI connectivity and 1 GbE FCIP connectivity function can also run separately. Figure 6 MPX200 migrating data to a new EVA deploying both iSCSI and FCIP connectivity for SAN over WAN shows the MPX200 used to migrate

data from the older storage array to a new EVA and deployed with the new EVA for both iSCSI and FCIP connectivity for SAN over WAN.

Figure 7: MPX200 migrating data to a new EVA, deploying new EVA with both iSCSI and FCIP connectivity for SAN over WAN



Summary

Customers can consolidate their storage using MPX200 and EVA unified block storage. The EVA 6400/8400 and the MPX200 hardware bundles ([Table 1](#)) enable customers to order this solution using a single SKU and get it factory installed. The value proposition this bundle delivers is huge, both in terms of technology and business value.

In addition, the MPX200 can be used to migrate data (online and offline) from an older storage array to a new EVA and provide FCIP connectivity for SAN over WAN for remote replication using HP Continuous Access software.

Table 1: EVA MPX200 hardware bundles

EVA6400 FC/FCoE/iSCSI	EVA8400 FC/FCoE/iSCSI with 14 Gb Cache	EVA8400 FC/FCoE/iSCSI with 22 Gb Cache
Part#: AW529A	Part#: AW554A	Part#: AW530A
One EVA640-4U Controller assembly with two HSV400 controllers		
<ul style="list-style-type: none"> • MPX200 Multifunction Router • One chassis • One 10-1 GbE blade • Redundant power module and cooling module 		
<p>Host Ports:</p> <ul style="list-style-type: none"> • Eight FC ports • Two 10 GbE iSCSI/FCoE ports • Two 1 GbE iSCSI ports <p>Add on Options:</p> <ul style="list-style-type: none"> • MPX200 10-1 GbE blade with an additional two 10 GbE iSCSI/FCoE ports • Two 1 GbE iSCSI ports • FCIP license for distance connectivity • Data Migration licenses 		
<ul style="list-style-type: none"> • Two 10 GbE SR SFP+ • Two 2m OM3 LC/LC cables 		
<ul style="list-style-type: none"> • Two 10 GbE SFP+ Optics • Two OM3 cables 		
<ul style="list-style-type: none"> • Installation and Start-up • 3-year, 9x5 warranty 		

For more information

- Detailed product information including demos, see www.hp.com/go/mpx200.
- Detailed support information, see www.hp.com/storage/spock



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