



The Layman's Guide to Volume Mapping

Volume mapping is the most complex concept in the Dot Hill Storage system, but without it the hosts depending on the storage will either not see it, or see it incorrectly. When a volume is first created in the storage system, it is normally hidden from the attached hosts unless the administrator specifically makes it accessible by assigning a general LUN mapping. This is done by choosing to expose the volume and setting a specific LUN value that the hosts can use to access the volume.

General versus Specific Mapping

General mapping allows all attached hosts to see the volume at the specified LUN value and access permissions granted by the administrator. This means that when the volume is first created, all connected hosts will immediately be able to access the volume via the advertised general map settings. This is the behavior expected by some operating systems, e.g. Windows, which can immediately discover the volume. The main advantage to a general mapping is that all connected hosts can discover the volume with no additional work on the part of the administrator. The disadvantage is that all connected hosts can discover the volume with no restrictions. Therefore, this process is not recommended for specialized volumes such as payroll databases.

The administrator can choose to specifically map the volume to a particular port on a host through particular ports on storage system controllers (*controller ports*) with specific access permissions. This controls access to that volume by simply choosing the desired host identifier from the list of available hosts, specifying a specific LUN value, access permission, and if desired, designate particular controller ports through which to present the volume to that host. When a general mapping is present for that volume, the specific mapping overrides the attributes for the specified host only. In the example above, if the payroll database has a general mapping of LUN 5 and access permissions of `read-only`, every host connected to the storage system can see the payroll database but cannot write to it at LUN 5. The

Human Resources team's host could be granted the permissions to modify the payroll database by designating a specific mapping to their host identifier with a specific LUN value and `read-write` access.

The following table lists the maximum number of LUNs available by product:

Table 1 Maximum LUNs Available by Product

Product	Maximum LUNs
27xx	0–127 per controller
23xx	0–127 per controller
2530	0–255 ULP
5730	0–255 per controller

The following table is an example of general and specific mapping, as it applies to 23xx and 27xx storage products (128 LUNs available). In this table, *Host* is a port on a host and *Port* is a port on a controller.

Table 2 23xx and 27xx General and Specific Mapping Example

Host WWN	Host Name	LUN	Port 0 Access	Port 1 Access	Mapping
All Hosts		0	read-only	read-only	General
210000E08B173520	unimatrix-1	33	read-write	none	Specific
210000E08B155280	unimatrix-2	34	read-write	read-write	Specific

In this example, all hosts have been provided with a general LUN mapping to all LUNs with `read-only` access to both controller ports. The host on WWN 210000E08B173520 has a specific mapping to LUN 33 (`read-write` on Port 0, none on Port 1) and the host on WWN 210000E08B155280 has a specific mapping to LUN 34 (`read-write` on Ports 0 and 1).

Note – When mapping the port access attributes for Fibre Channel and iSCSI products, the attributes `read-only` and `read-write` cannot be used together on the same LUN.

When a specific mapping exists for a volume that is generally mapped, it takes precedence over the general mapping for that host only. If the specific mapping is deleted, that host would see the same volume with the general map settings.

LUN Selection

The selection of LUN values should be managed carefully by the administrator to ensure that the proper hosts can see the correct volumes with the appropriate access permissions. For convenience, a general LUN value assigned to a volume can also be used for a specifically mapped LUN value.

Dot Hill storage systems have two particular LUN assignment algorithms depending on the particular system being used. Some systems have Unified LUN Presentation (ULP) which allows the two controllers to share a common set of LUN values. In ULP mode, the entire range of available LUNS is available for assignment, but each value can only be used once per volume as a general LUN assignment. For example, if a given volume is using LUN value 5, no other volume in the storage system can use that value for its general LUN value.

Other systems have Active-Active LUN assignment, which means that each controller owns its own LUN values, equal to half the total number of LUNs allowed. For example, if 256 LUNs are available for the system, each controller owns LUN values 0–127. In this situation, it is possible to have the same general LUN value for two unique volumes in the storage system, one on each controller (determined by the preferred owner of the volume). When a failover occurs, the surviving controller is aware of which volumes it owns and can distinguish its LUN values from those assigned to the failed-over controller.

Using a designated LUN value for a specific mapping does not follow the same rules as general mapping. It is possible to reuse LUN values specifically that are already assigned as general LUN values on other volumes and for other hosts.

Note – When the specific mapping is deleted, any assigned general mapping will automatically take over. It may be desirable to use the same LUN value for specific mappings as the general mapping value.

Masking a Volume

In addition to mapping volumes generally or specifically, it is also possible to mask a volume from being seen by one or more hosts, or on one or more controller ports. While masking may appear to have the same effect as not mapping, it is not the same. A mask deliberately hides a volume. If a general mapping exists for the volume and a specific host is masked, that volume cannot be seen by the host despite the general mapping. Masked hosts are represented by the system as having a LUN value of none and access permissions of none on all designated controller ports.

When a mapping is created, controller ports not selected are masked off for the designated host and volume automatically. For example, if a volume is presented on controller ports A1 and B1 only, then controller ports A0 and B0 are masked and the volume cannot be seen by that host (or any other hosts if the masking is applied to the general mapping) on those controller ports despite any general mapping of the volume.

Note – If the controller ports are interconnected between controllers, a host that is mapped to a specific controller port will be able to see any hosts that are part of the interconnection. For example, if a host is mapped to controller port A0, and A0 is interconnected to B1, the host will be able to see controller port B1.

Access Permissions

Mapping provides the administrator with control over what hosts can do with the volume by selecting the appropriate access permissions. The default access permission for a volume, unless otherwise specified, is `read-write`. The other choice available is `read-only`. In older versions of the Management Controller code, the access permission of `none` was allowed to support masking. In more recent versions, simply not selecting the controller port(s) masks the volume from access to that host or all hosts if it is applied to the general mapping connected to those ports.

With careful planning, mapping volumes using general mappings, specific mappings and judicious management of LUN and access permissions can make the most complicated part of presenting a volume to hosts relatively painless.