

TrueNAS® Expansion Shelf Connection Guide

Version 1.3



Storage and Servers Driven by Open Source

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This guide shows examples of connecting TrueNAS expansion shelves to multiple TrueNAS products. A simple example is shown first, then special SAS configurations are discussed.

The rest of the guide shows connecting a High-Availability TrueNAS system with two TrueNAS controllers to two expansion shelves of the same model. The TrueNAS X10 and X20 share the same back panel configuration and are shown together in the examples as a single X-Series system. The M40 and M50 back panels are similar, but the SAS ports are in slightly different locations. These are shown separately in the connection examples.

Expansion Shelf Compatibility

Max Shelves and Drives			Max Hybrid Capacity (TB)					Max Flash Capacity (TB)		
System	Shelves	Drives	Base	ES12	ES24	ES60	ES102	Base	ES24F	ES60
X10	2	36	216	648	648	-----	-----	91	274	-----
X20	2	72	216	648	1,080	1,296	-----	91	456	547
R20	2	252	365	797	1,229	2,525	-----	365	730	1,277
R40	2	252	365	797	1,229	2,525	-----	365	730	1,277
R50	2	252	864	1,296	1,728	3,024	4,536	365	N/A	1,277
M40	2	144	432	864	1,296	2,592	-----	182	547	1,094
M50	8	504	432	2,160	3,888	9,072	-----	182	1,642	3,830
M60	12	1248	432	3,024	5,616	13,392	22,464	182	2,371	5,654

1 Simple SAS Connections

TrueNAS systems with a single TrueNAS controller do not offer High Availability (HA). The SAS connection procedure is similar for all of these systems. This example shows connecting one ES12 to an X-Series with a single TrueNAS controller:

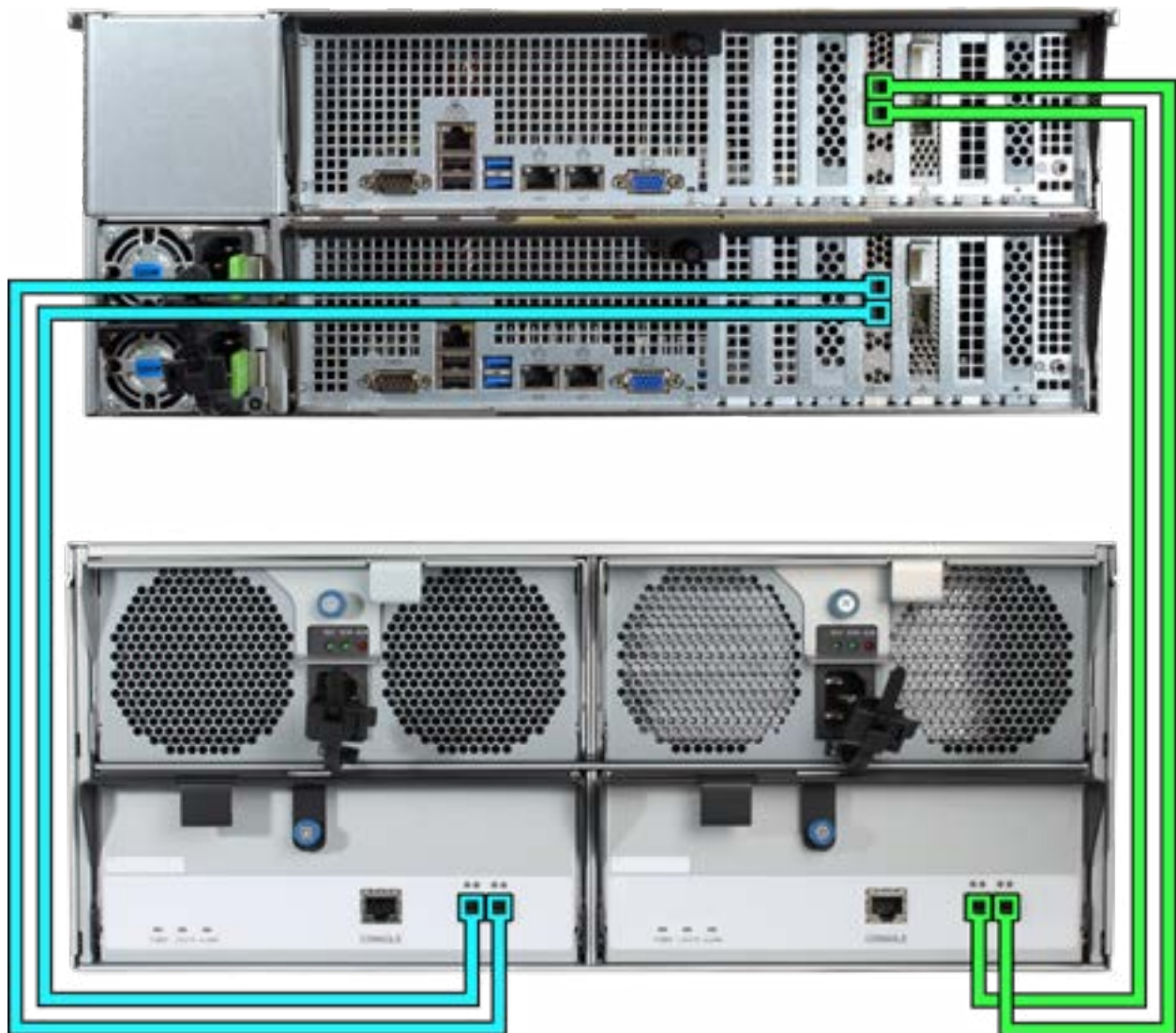


2 Wide-Porting SAS Connections

Configurations that consist of a single TrueNAS connecting to a single Expansion Shelf can be wide ported. By connecting both SAS ports on a TrueNAS controller to both SAS ports on an Expansion Shelf Expansion Controller, the connection becomes wide ported. This doubles the bandwidth between TrueNAS and the connected Expansion Shelf. This is especially useful with Expansion Shelves that have all flash disks installed or when a single, completely full ES60 is attached to a TrueNAS system

However, because wide-porting uses the extra SAS port, the number of connectable Expansion Shelves is reduced. The wide-port can be removed to add another Expansion Shelf with a standard connection, but the bandwidth between TrueNAS system and the first Expansion Shelf is reduced.

Here is an example of wide-porting an HA TrueNAS M40 with a single ES60:



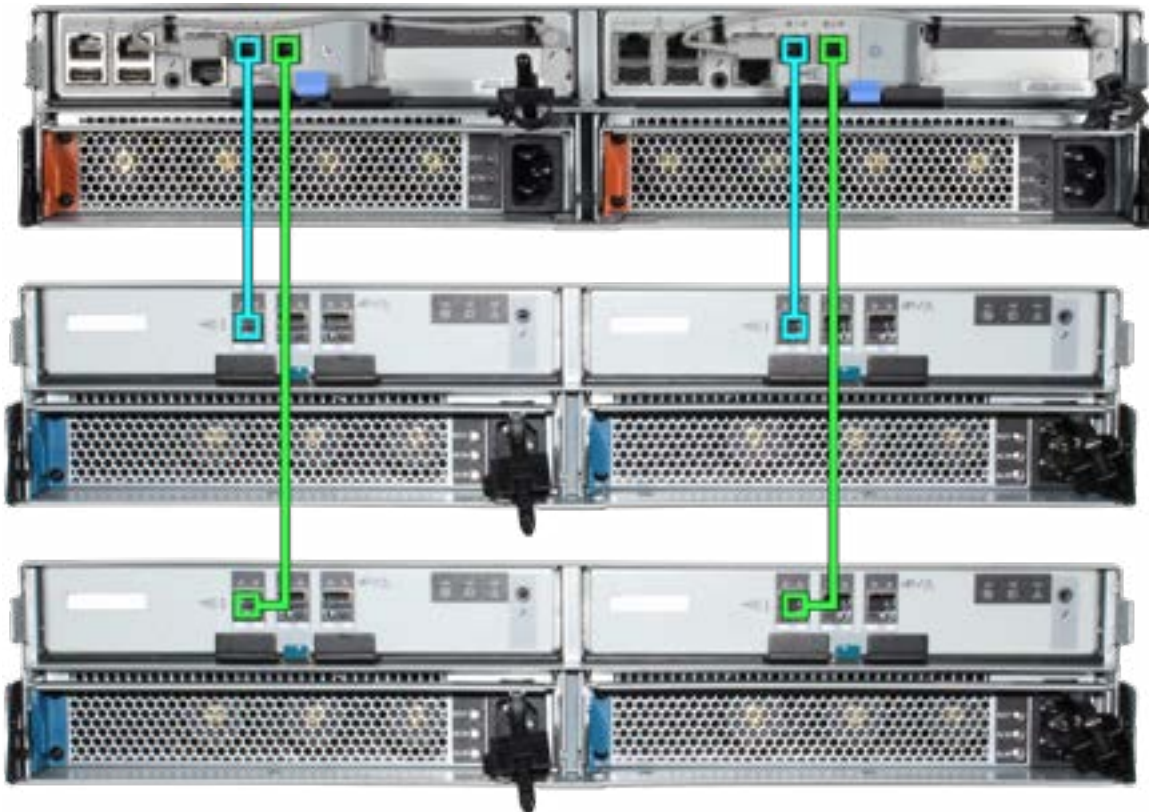
3 ES12 SAS Connections

3.1 X-Series

X-Series with a single ES12 Expansion Shelf



X-Series with two ES12 Expansion Shelves



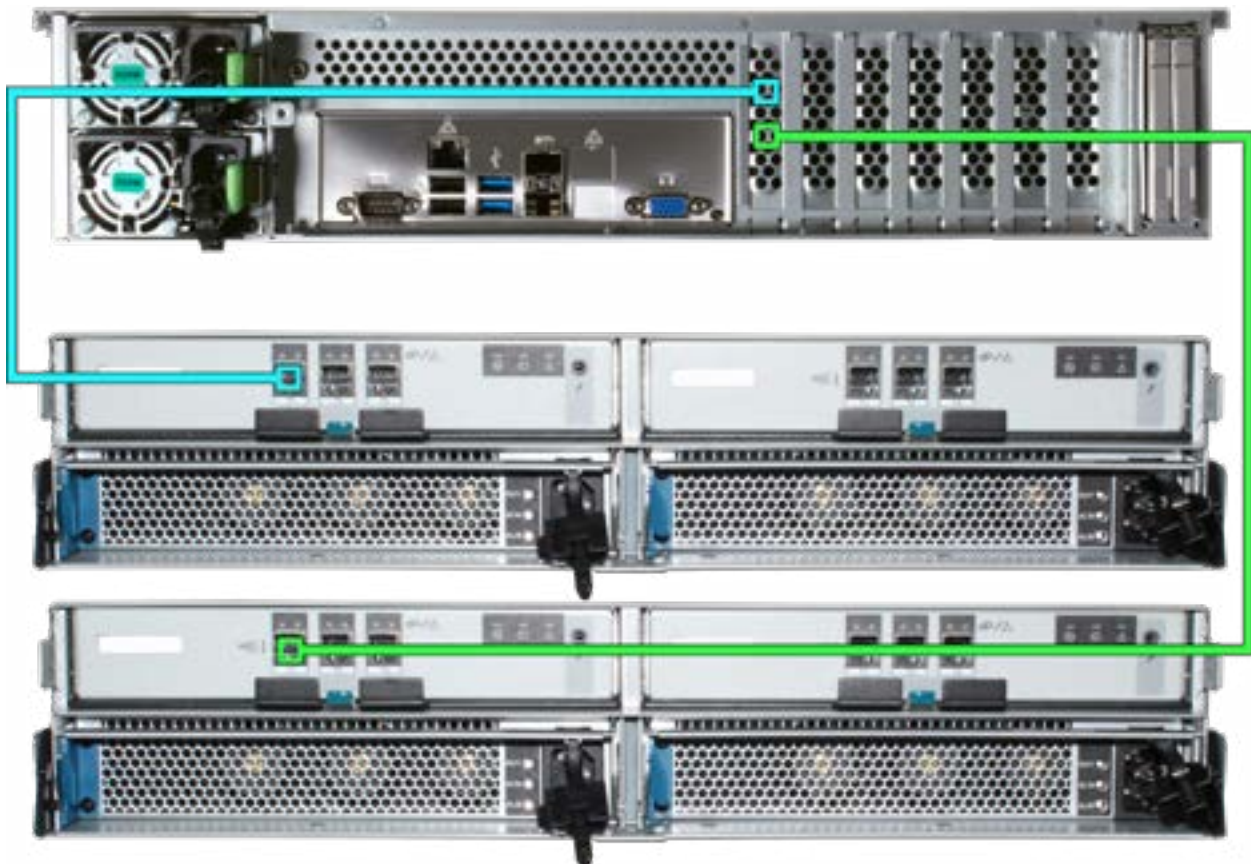
3.2 R-Series

3.2.1 R20

R20 with a single ES12 Expansion Shelf



R20 with two ES12 Expansion Shelves

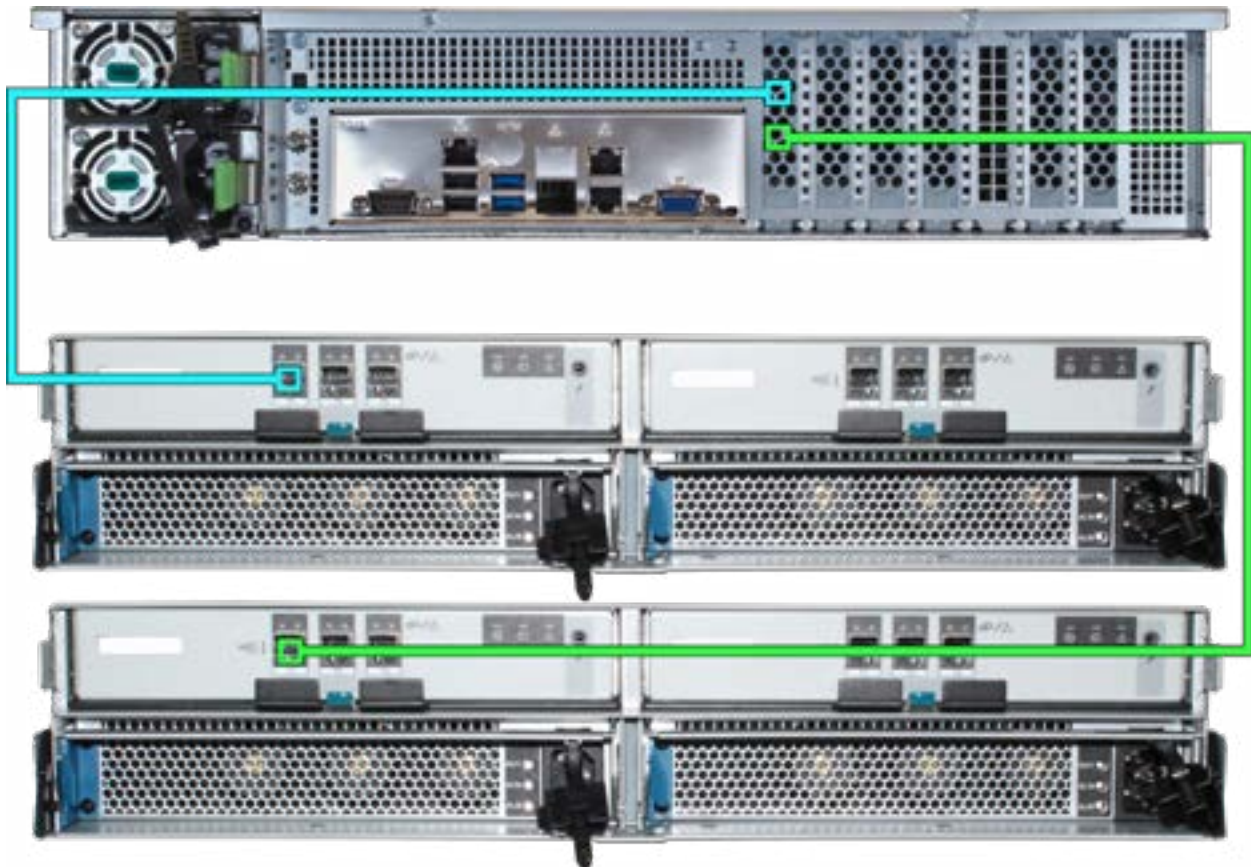


3.2.2 R40

R40 with a single ES12 Expansion Shelf



R40 with two ES12 Expansion Shelves



3.2.3 R50

R50 with a single ES12 Expansion Shelf



R50 with two ES12 Expansion Shelves



3.3 M-Series

3.3.1 M40

M40 with a single ES12 Expansion Shelf



M40 with two ES12 Expansion Shelves

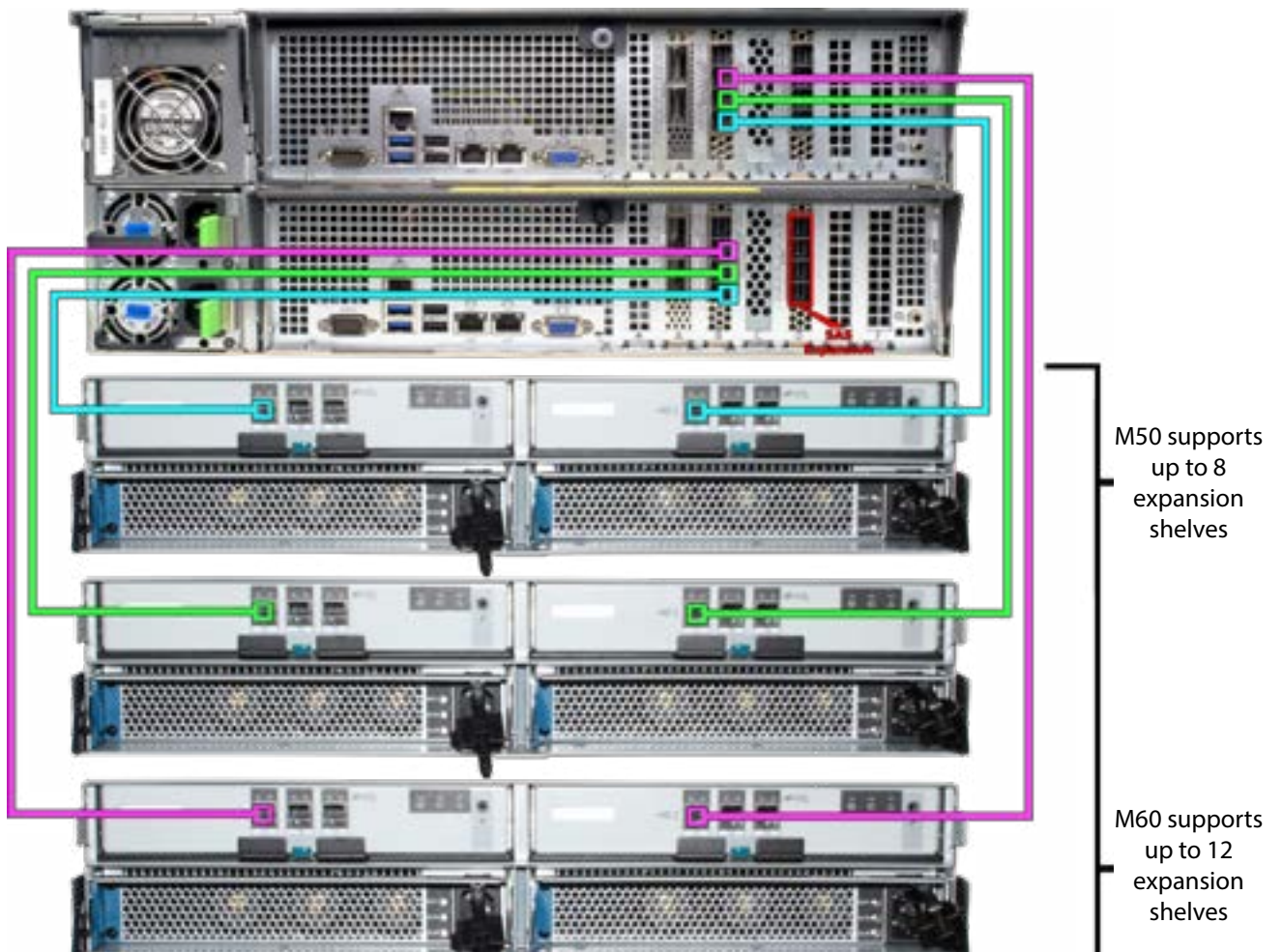


3.3.2 M50 and M60

M50/M60 with a single ES12 Expansion Shelf



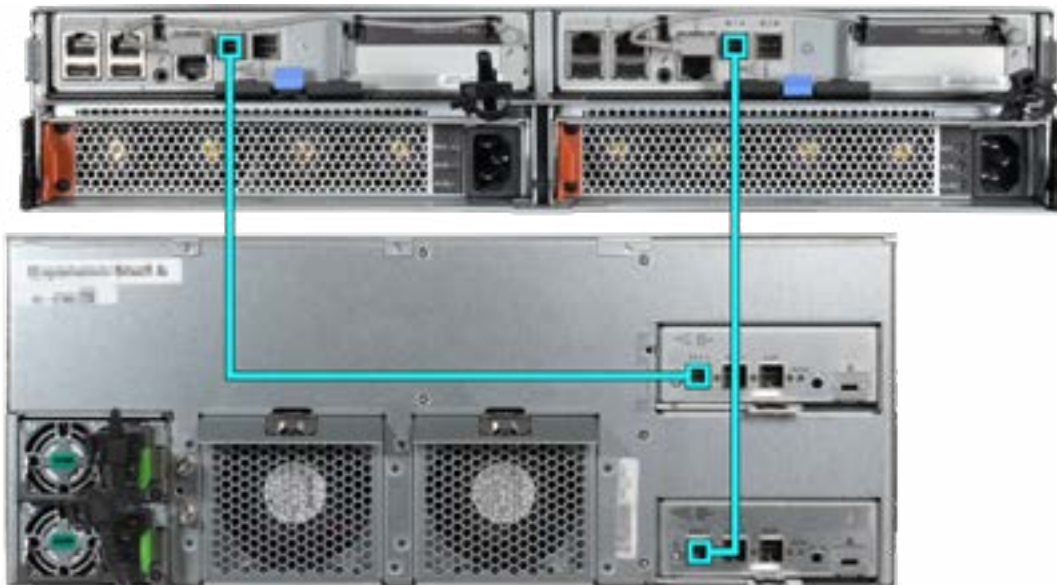
M50/M60 with three ES12 Expansion Shelves. The M50 can support up to 8 total Expansion Shelves with the use of additional SAS cards. The M60 can support up to 12 total Expansion Shelves with the use of additional SAS cards.



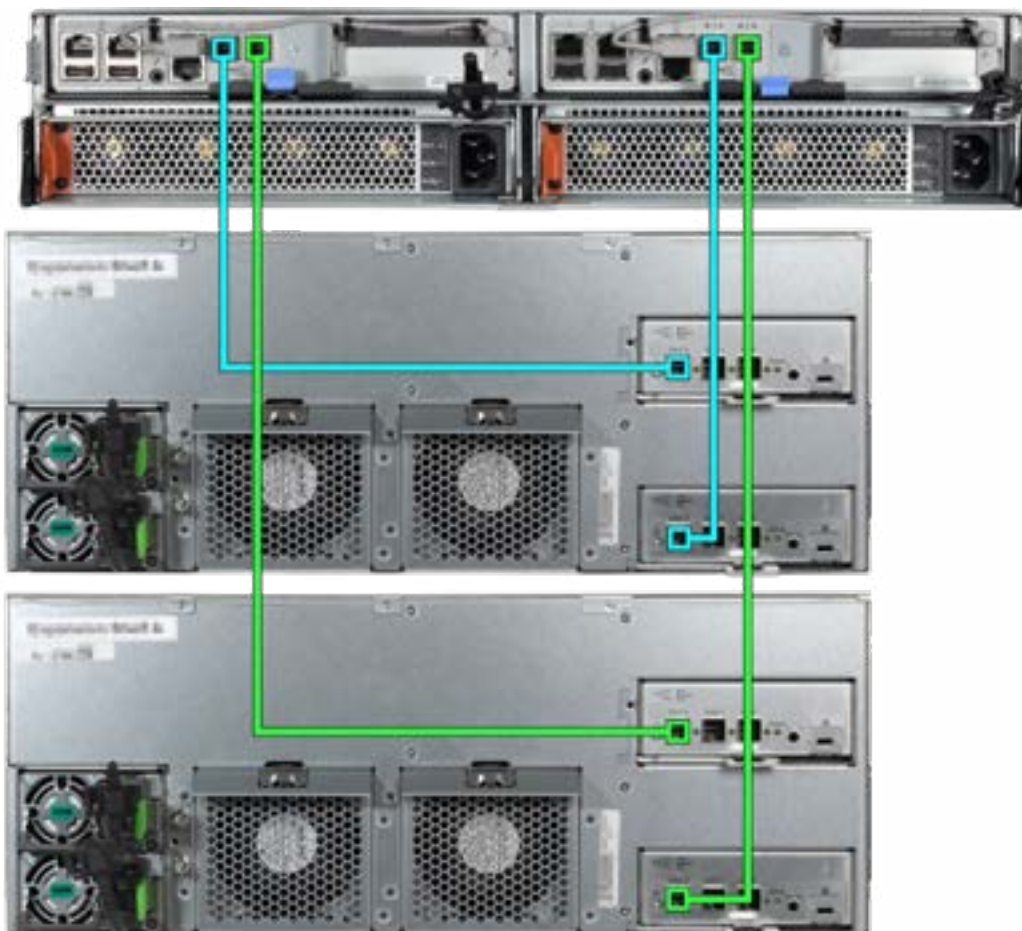
4 ES24 SAS Connections

4.1 X-Series

X-Series with a single ES24 Expansion Shelf



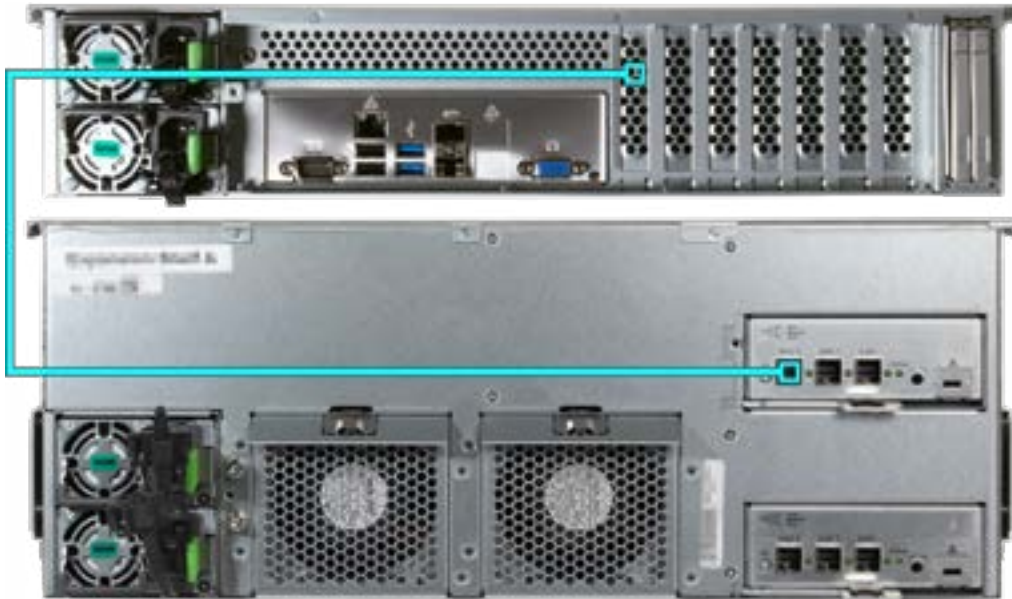
X-Series with two ES24 Expansion Shelves



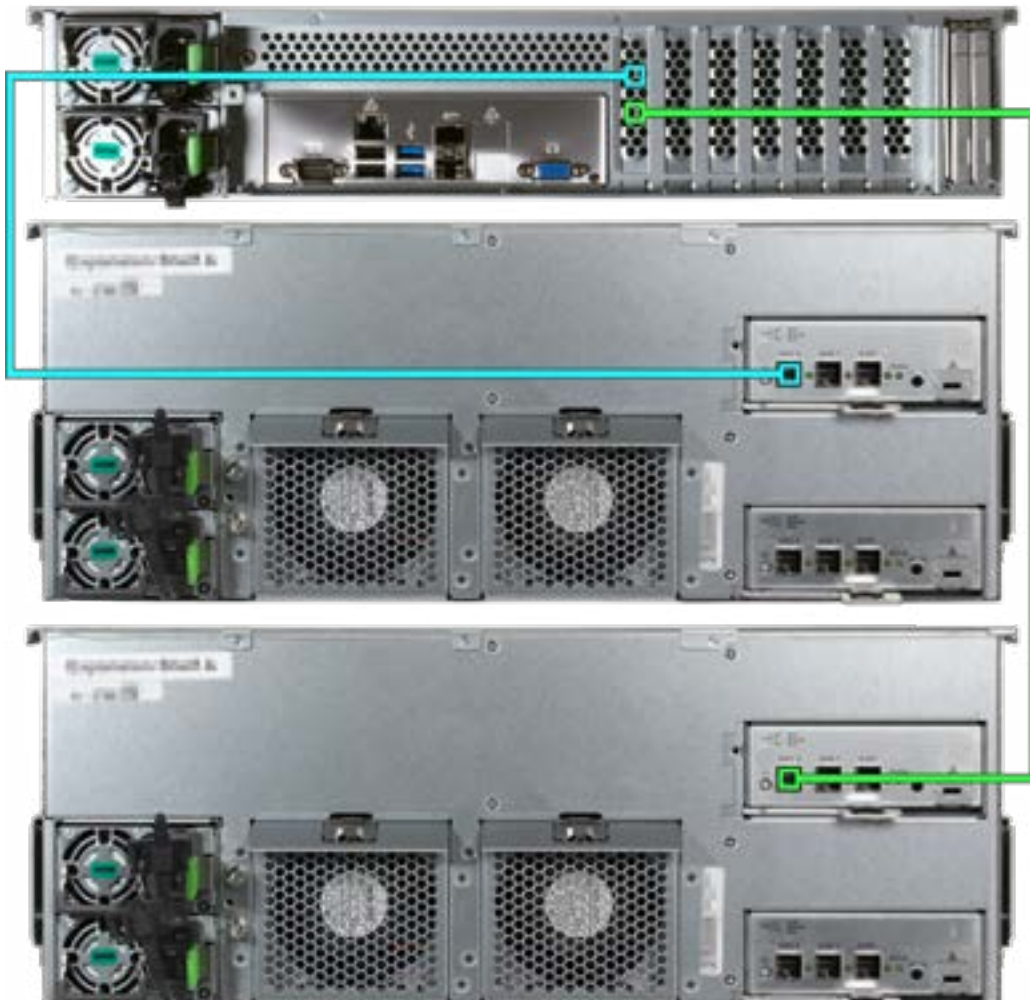
4.2 R-Series

4.2.1 R20

R20 with a single ES24 Expansion Shelf



R20 with two ES24 Expansion Shelves

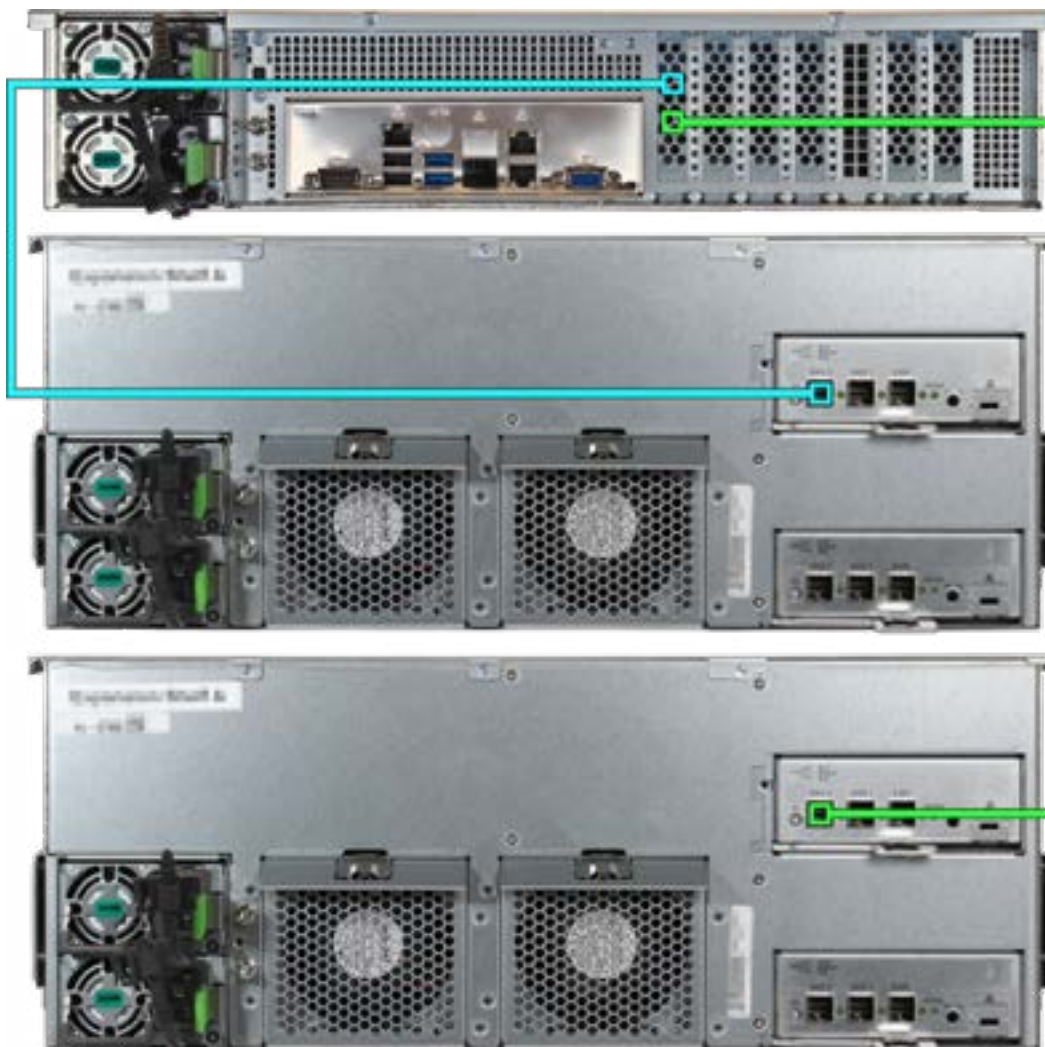


4.2.2 R40

R40 with a single ES24 Expansion Shelf

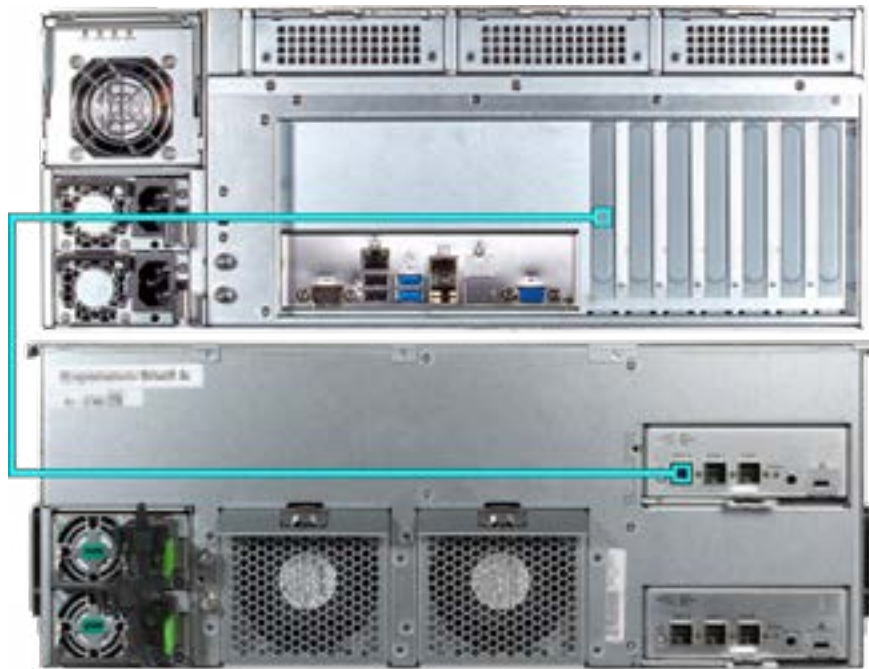


R40 with two ES24 Expansion Shelves

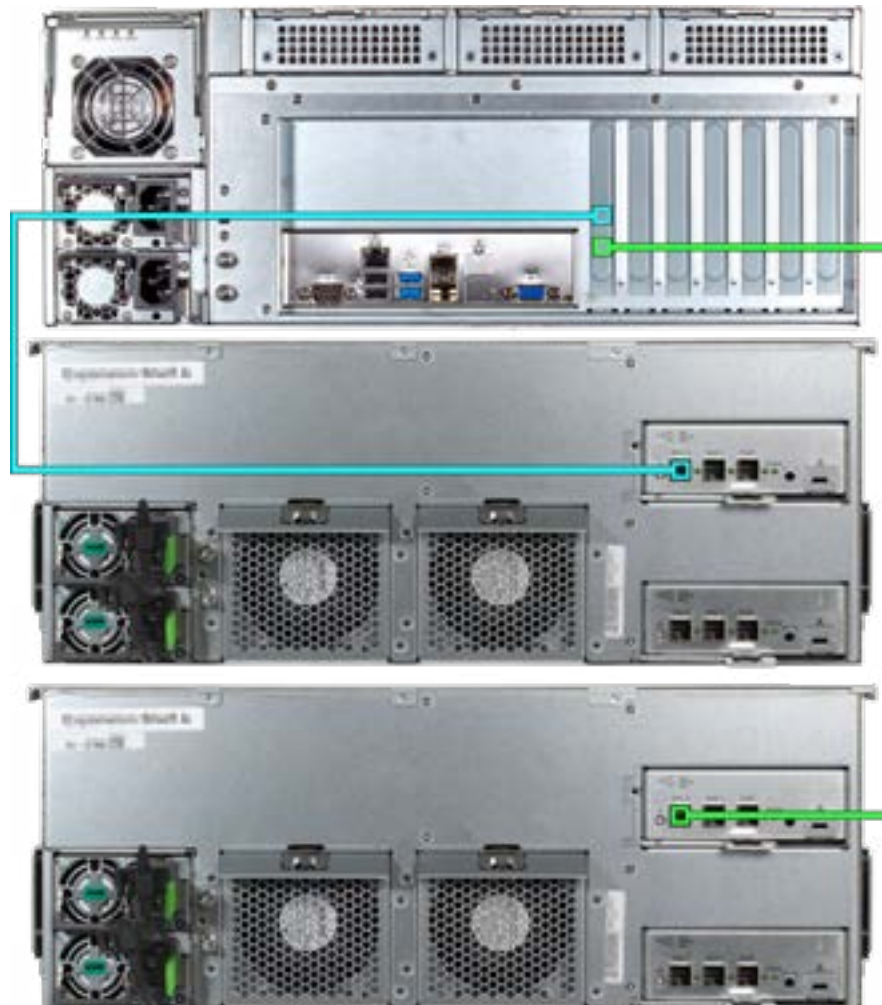


4.2.3 R50

R50 with a single ES24 Expansion Shelf



R50 with two ES24 Expansion Shelves



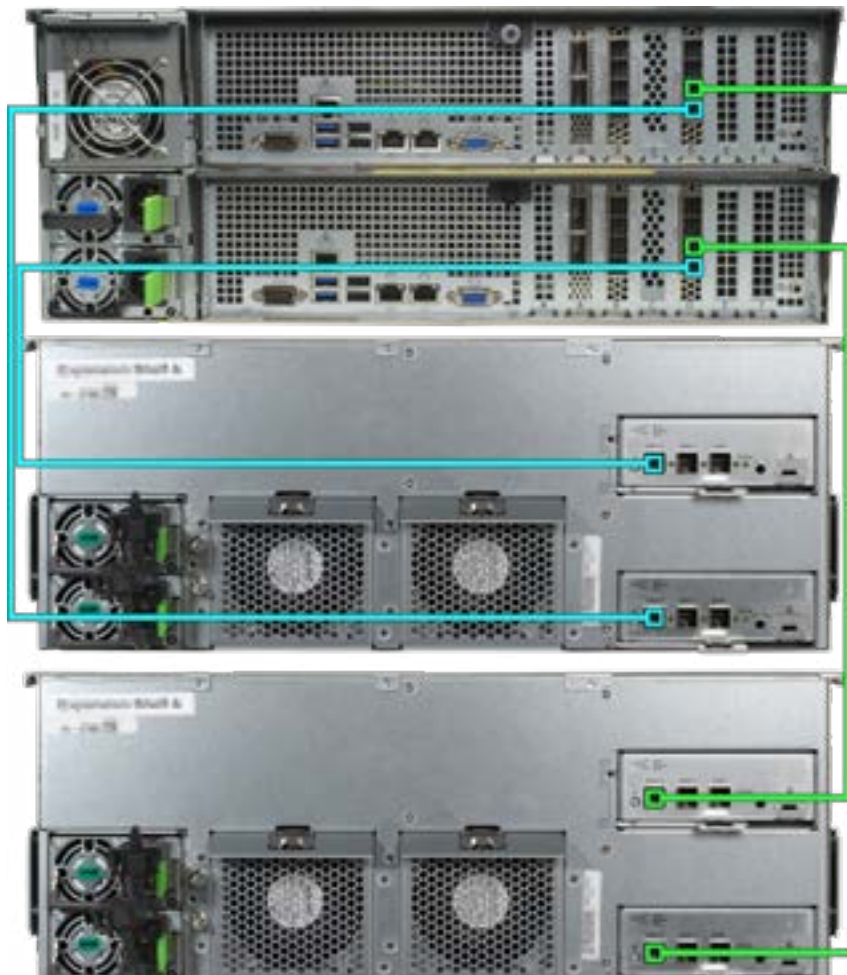
4.3 M-Series

4.3.1 M40

M40 with a single ES24 Expansion Shelf

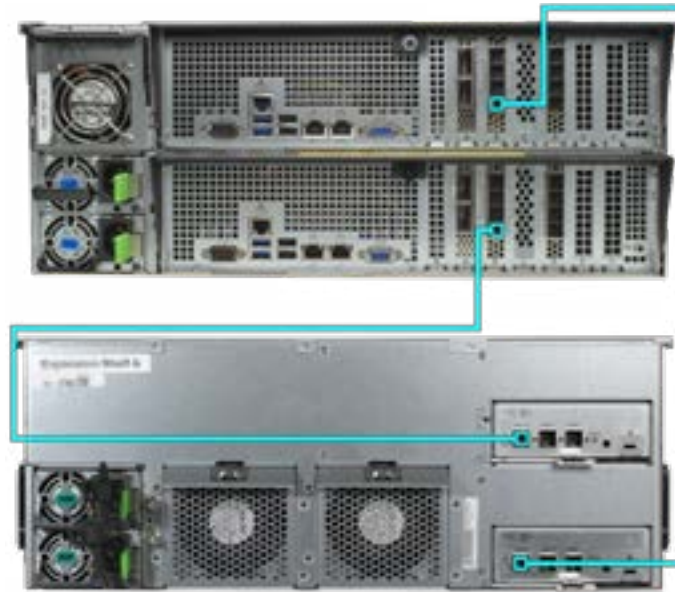


M40 with two ES24 Expansion Shelves

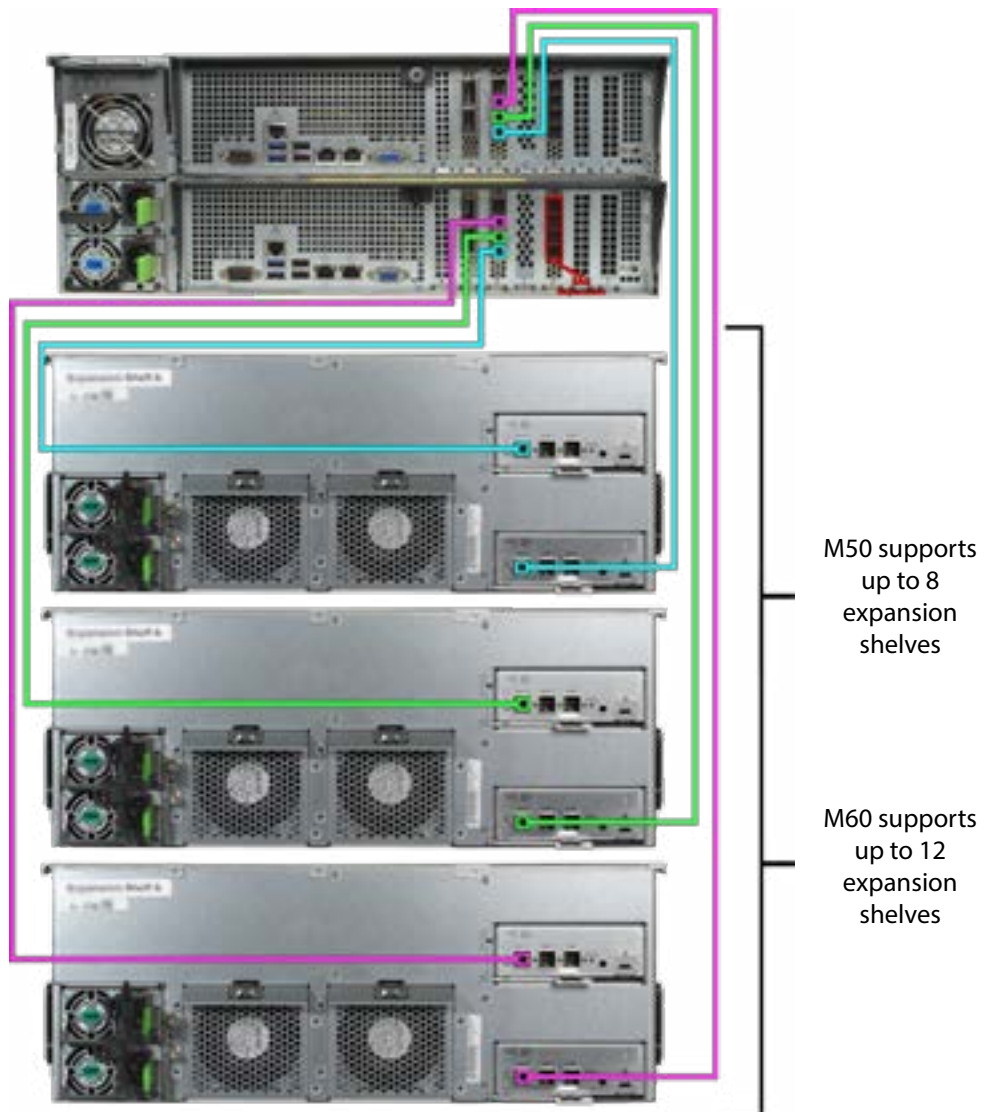


4.3.2 M50 and M60

M50 with a single ES24 Expansion Shelf



M50/M60 with three ES24 Expansion Shelves. The M50 can support up to 8 total Expansion Shelves with the use of additional SAS cards. The M60 can support up to 12 total Expansion Shelves with the use of additional SAS cards.



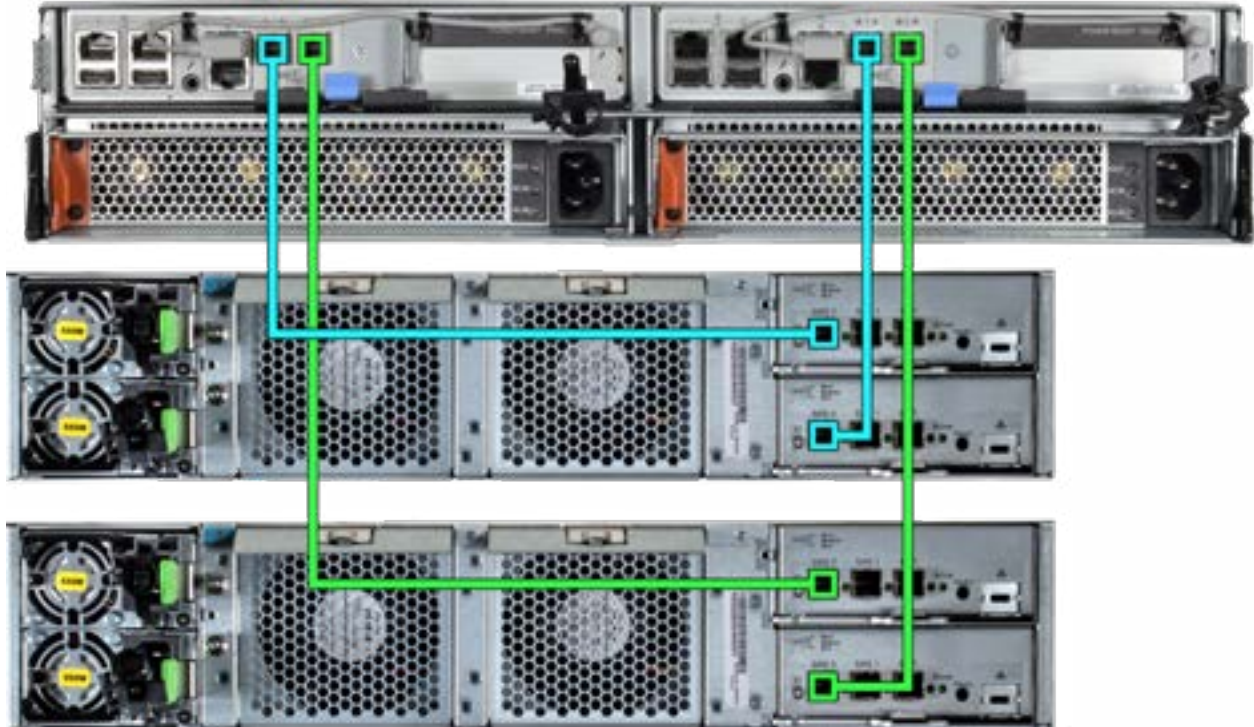
5 ES24F SAS Connections

5.1 X-Series

X-Series with a single ES24F Expansion Shelf



X-Series with two ES24F Expansion Shelves



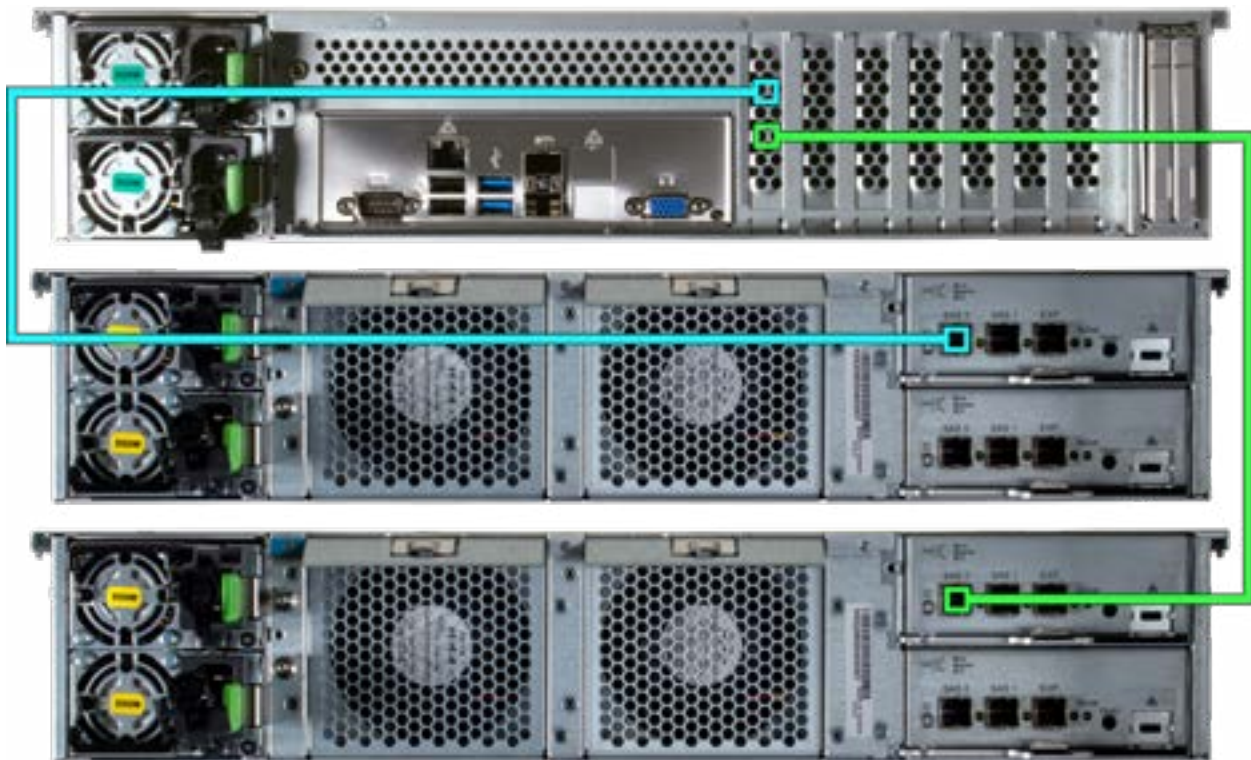
5.2 R-Series

5.2.1 R20

R20 with a single ES24F Expansion Shelf



R20 with two ES24F Expansion Shelves



5.2.2 R40

R40 with a single ES24F Expansion Shelf



R40 with two ES24F Expansion Shelves



5.3 M-Series

5.3.1 M40

M40 with a single ES24F Expansion Shelf

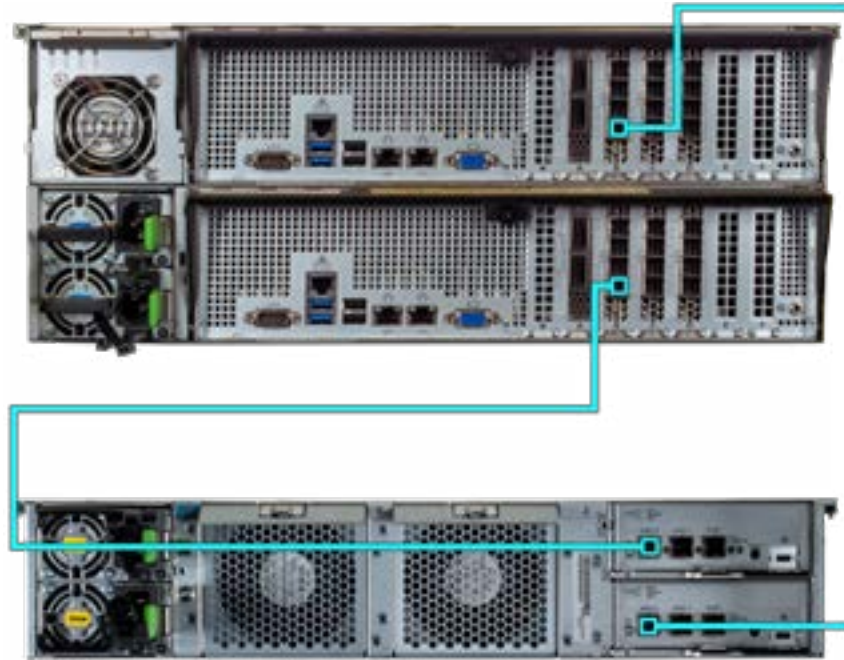


M40 with two ES24F Expansion Shelves

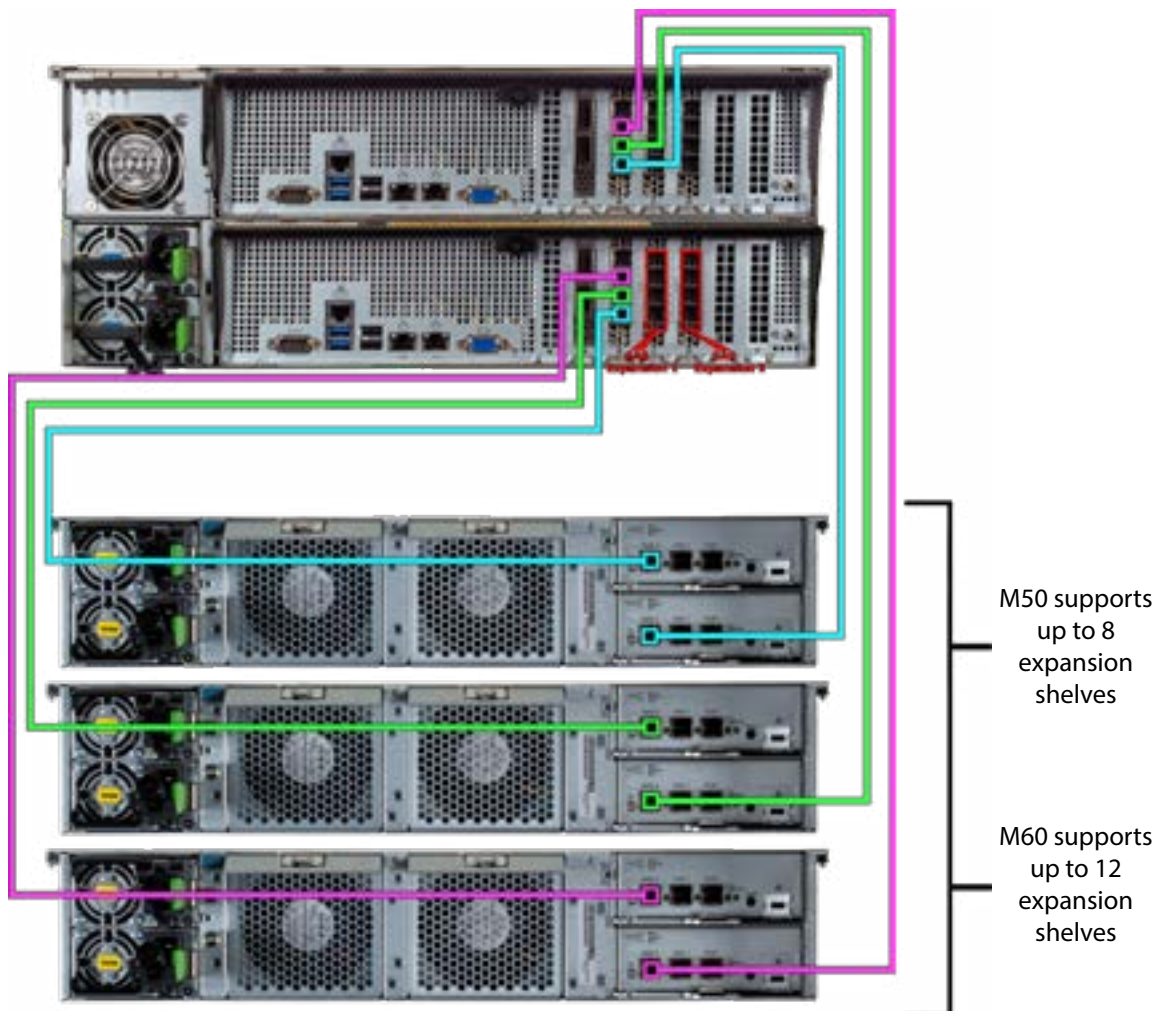


5.3.2 M50 and M60

M50/M60 with a single ES24F Expansion Shelf



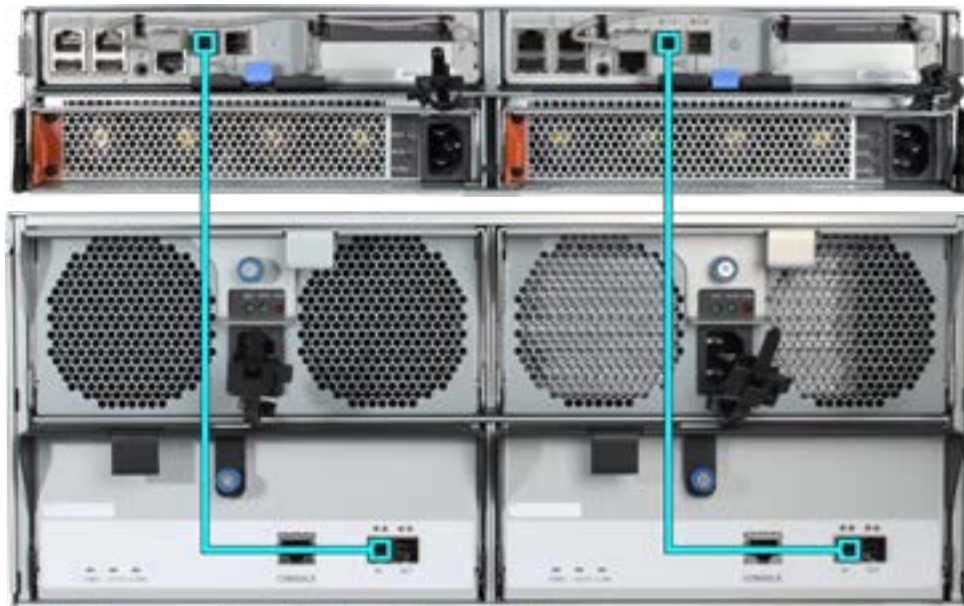
M50/M60 with three ES24F Expansion Shelves. The M50 can support up to 8 total Expansion Shelves with the use of additional SAS cards. The M60 can support up to 12 total Expansion Shelves with the use of additional SAS cards.



6 ES60 SAS Connections

6.1 X20

X20 with one ES60 Expansion Shelf



X20 with two ES60 Expansion Shelves



6.2 R-Series

6.2.1 R20

R20 with a single ES60 Expansion Shelf



R20 with two ES60 Expansion Shelves



6.2.2 R40

R40 with a single ES60 Expansion Shelf



R40 with two ES60 Expansion Shelves



6.2.3 R50

R50 with a single ES60 Expansion Shelf



R50 with two ES60 Expansion Shelves



6.3 M-Series

6.3.1 M40

M40 with a single ES60 Expansion Shelf



M40 with two ES60 Expansion Shelves

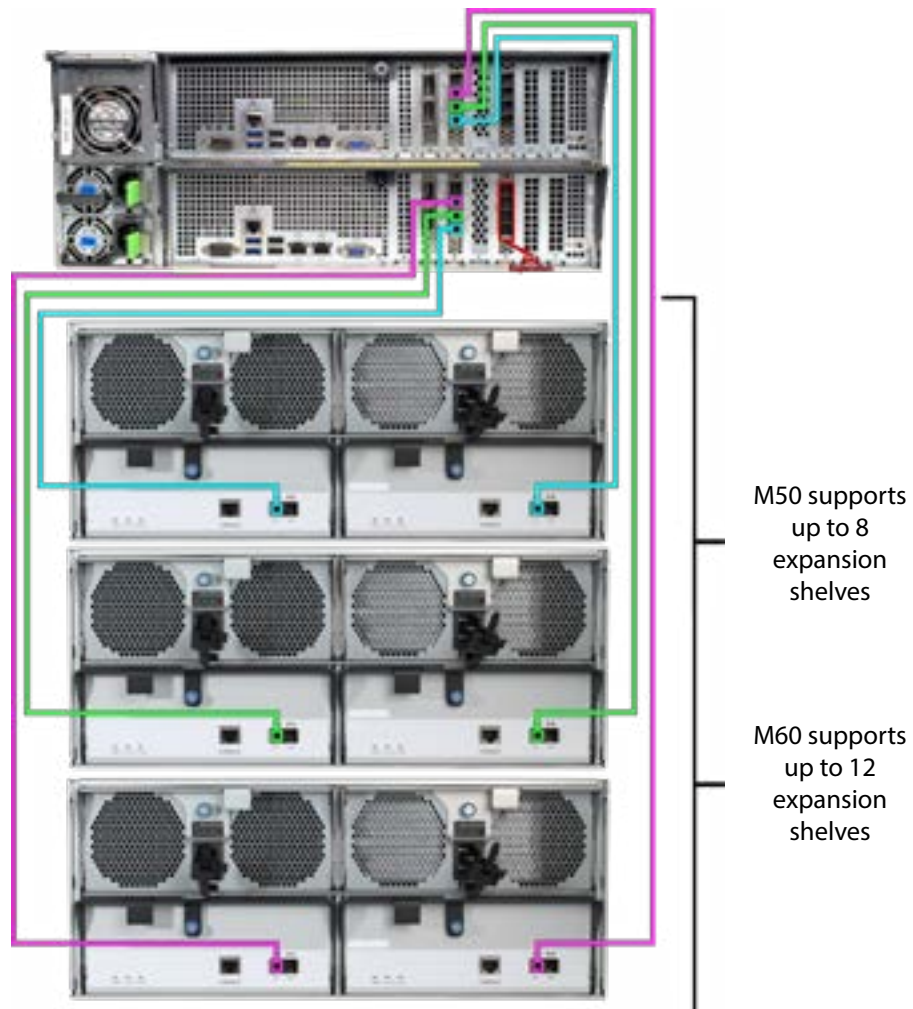


6.3.2 M50 and M60

M50/M60 with a single ES60 Expansion Shelf



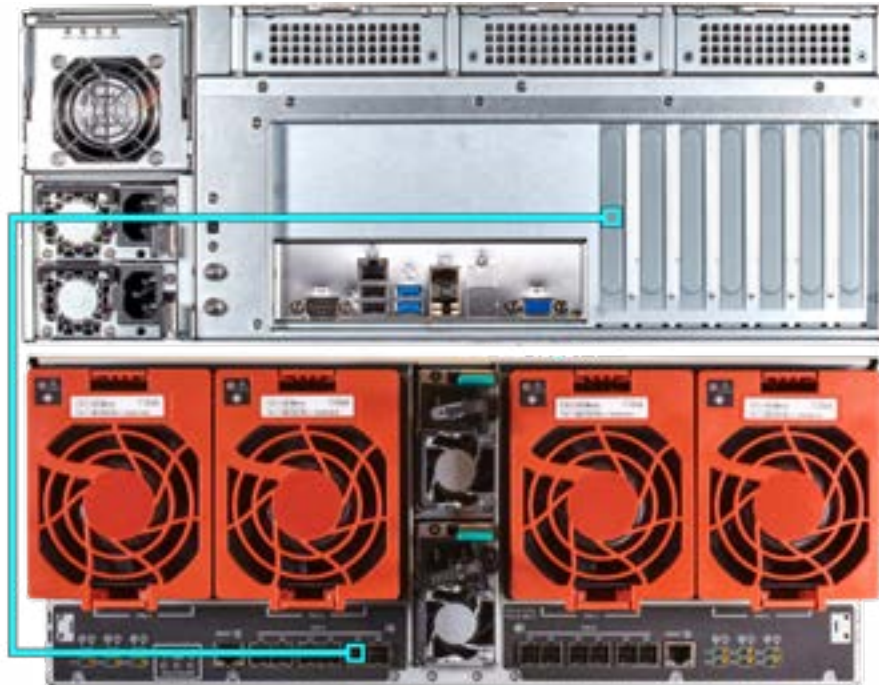
M50/M60 with three ES60 Expansion Shelves. The M50 can support up to 8 total Expansion Shelves with the use of additional SAS cards. The M60 can support up to 12 total Expansion Shelves with the use of additional SAS cards.



7 ES102 SAS Connections

7.1 R50

R50 with a single ES102 Expansion Shelf



R50 with two ES60 Expansion Shelves

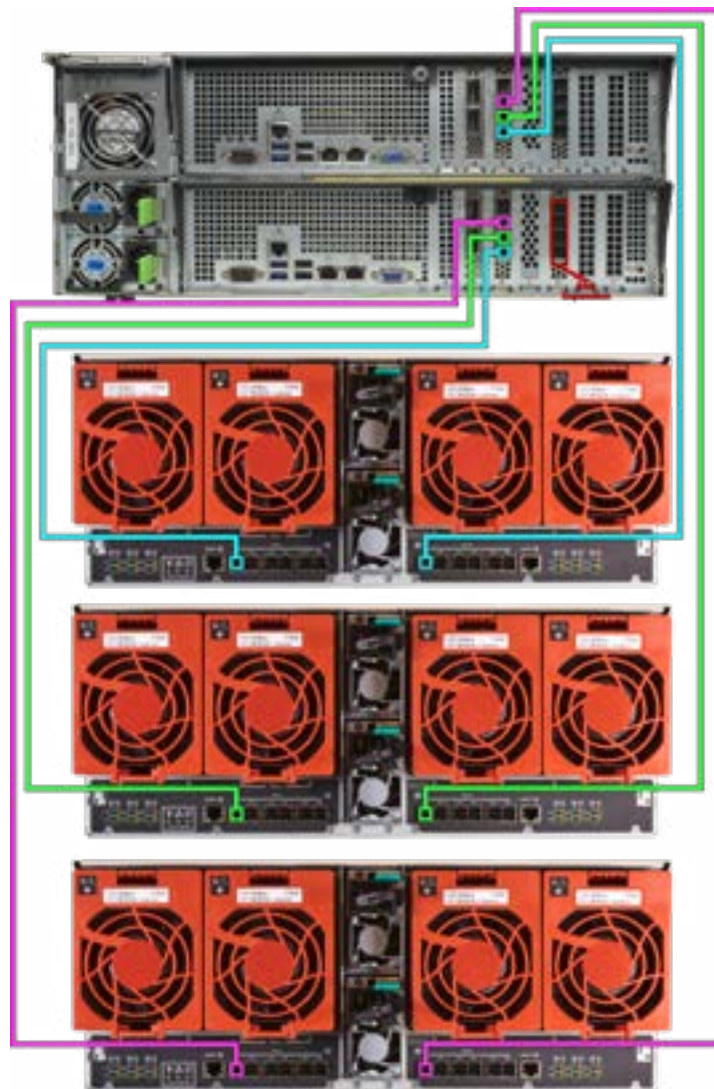


7.2 M60

M60 with a single ES102 Expansion Shelf

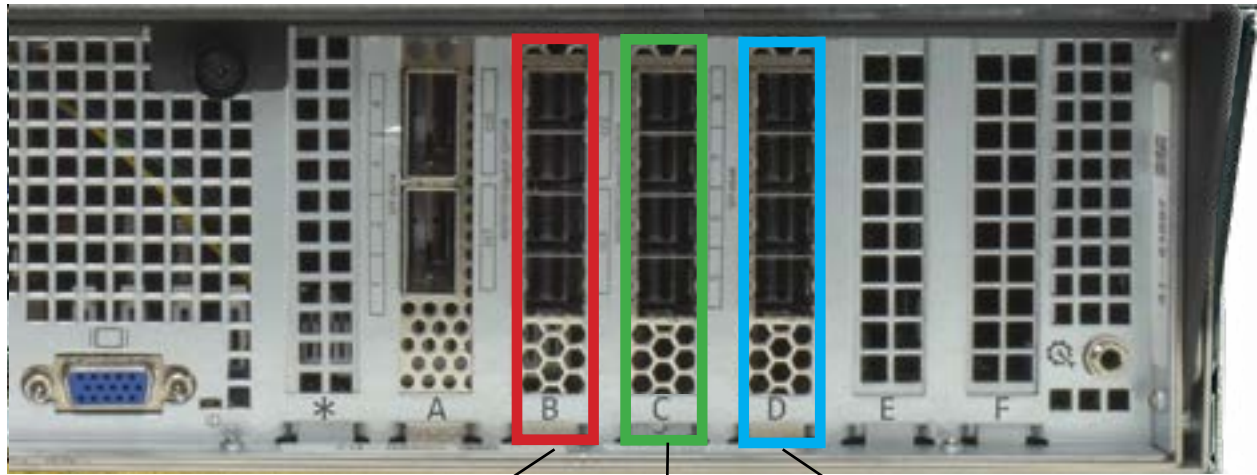


M60 with three ES102 Expansion Shelves. The M60 can support up to 12 total Expansion Shelves with the use of additional SAS cards.



8 M50 SAS Expansion Cards

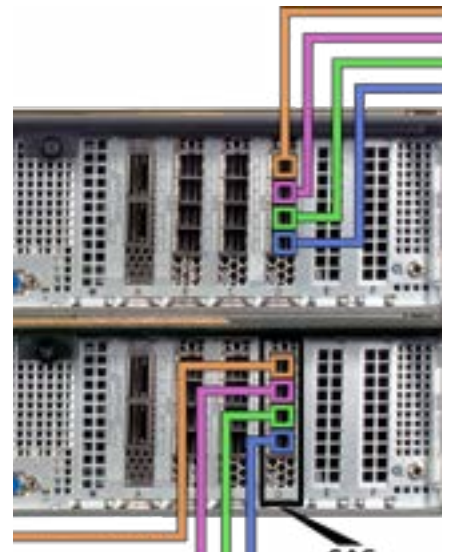
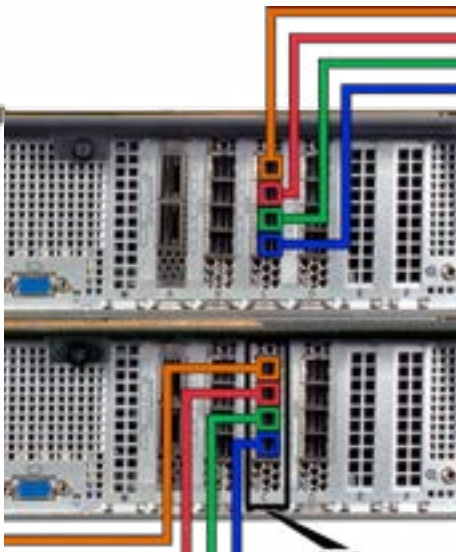
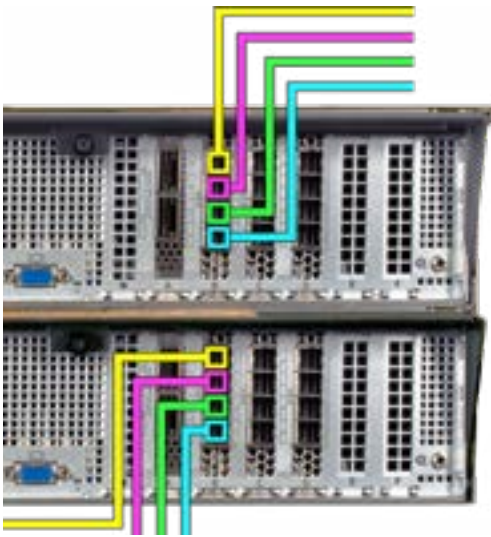
The M50 can support up to 12 total Expansion Shelves with the use of additional SAS cards. Wiring for additional cards is completed in the same way as the primary card. Shelves are connected four per SAS card starting from the bottom port on each card until it is full.



Primary SAS Ports

First SAS Expansion Card

Second SAS Expansion Card



9 Additional Information

To learn more about the TrueNAS products available from iXsystems, visit <https://www.truenas.com/systems-over-view/>.

Documentation for iXsystems hardware is available at <https://www.truenas.com/docs/>.

10 Contacting iXsystems

For assistance, please contact iX Support:

Contact Method	Contact Options
Web	https://support.ixsystems.com
Email	support@ixsystems.com
Telephone	Monday-Friday, 6:00AM to 6:00PM Pacific Standard Time: <ul style="list-style-type: none">• US-only toll-free: 855-473-7449 option 2• Local and international: 408-943-4100 option 2
Telephone	Telephone After Hours (24x7 Gold Level Support only): <ul style="list-style-type: none">• US-only toll-free: 855-499-5131• International: 408-878-3140 (International calling rates will apply)