GUIDE

Ensuring high performance DCI for mission-critical SANs with Brocade Gen 7

Everything you need to know to upgrade and set up your DCI for optimum performance with Gen 7

smartoptics

Why upgrade to Brocade Gen 7 – and why you shouldn't neglect your DWDM optics

Generation 7 of Brocade Fibre Channel switches offers many benefits for organizations with mission-critical workloads such as financial institutions, retailers and government agencies. For starters, Brocade Gen 7 technology brings support for NVMe over Fibre Channel (FC-NVMe) for the first time and has been shown to enable 50% lower latency. With a combination of telemetry data and advanced AI algorithms, Gen 7 Brocade switches and directors provide autonomous SAN technology that allows you to improve efficiency and optimize performance in several areas.

Given that Brocade Gen 7 technology monitors both the fabric and the endpoints, it's easier to pinpoint the source of any traffic congestion or performance regression. All these performance boosts are poised to make your mission-critical SAN workloads even more resilient by ensuring higher availability, zero downtime and full data integrity with synchronous mirroring. But some make the mistake of neglecting to plan for DWDM optic upgrades that Gen 7 will require if you want your data center interconnect (DCI) to work effectively with your new switches.

Your DCI may not have been the first thing on your mind when planning to upgrade your FC switches. But it's important not to forget the DWDM optics used with your Brocade switches for a number of reasons. For instance, Gen 7 won't work with transceivers unless they are certified and support secure optics functionality. Also, support has been ended for 8G optics. Fortunately, there are several more positive reasons to upgrade your DWDM optics along with your FC switches that you should have in mind.

This guide will provide a clear and simple overview of everything you need to ensure your DWDM optics will work optimally with Brocade Gen 7. This way, you can plan and budget for your Gen 7 upgrade correctly without any unwelcome surprises along the way. You'll also learn how to add value and boost your ROI by creating synergies between FC and Ethernet and owning your DCI infrastructure.

Understanding what optics to use with Gen 7

The first thing you'll need to do ensure your optics work with Gen 7 is to check that they meet a series of requirements. To put this in context, consider that, with Gen 6 and earlier Brocade generations, you have had a range of transceiver options. Transceivers from multiple brands were certified, and you could even still use transceivers that were not tested but still compatible.

This time around, your options are far more limited – but for good reason. To ensure only the best performance and keep downtime to a minimum, Brocade's Gen 7 switches are designed to only work with certified transceivers that support secure optics functionality. As a result, if you try to plug in any old transceiver that's not certified, it probably won't even be recognized by the Brocade switch or director.

For the last couple Brocade generations, you could also keep using the same old 8G FC optics. While this may have seemed convenient, Brocade is now nudging you into 32G by ending support for slower speeds with Gen 7. Although 16G SFP+ transceivers are still an option if you're using the X7 director (not with other Gen 7 products), you will get better performance and a more future-proof solution by going for SFP28 32G optics.

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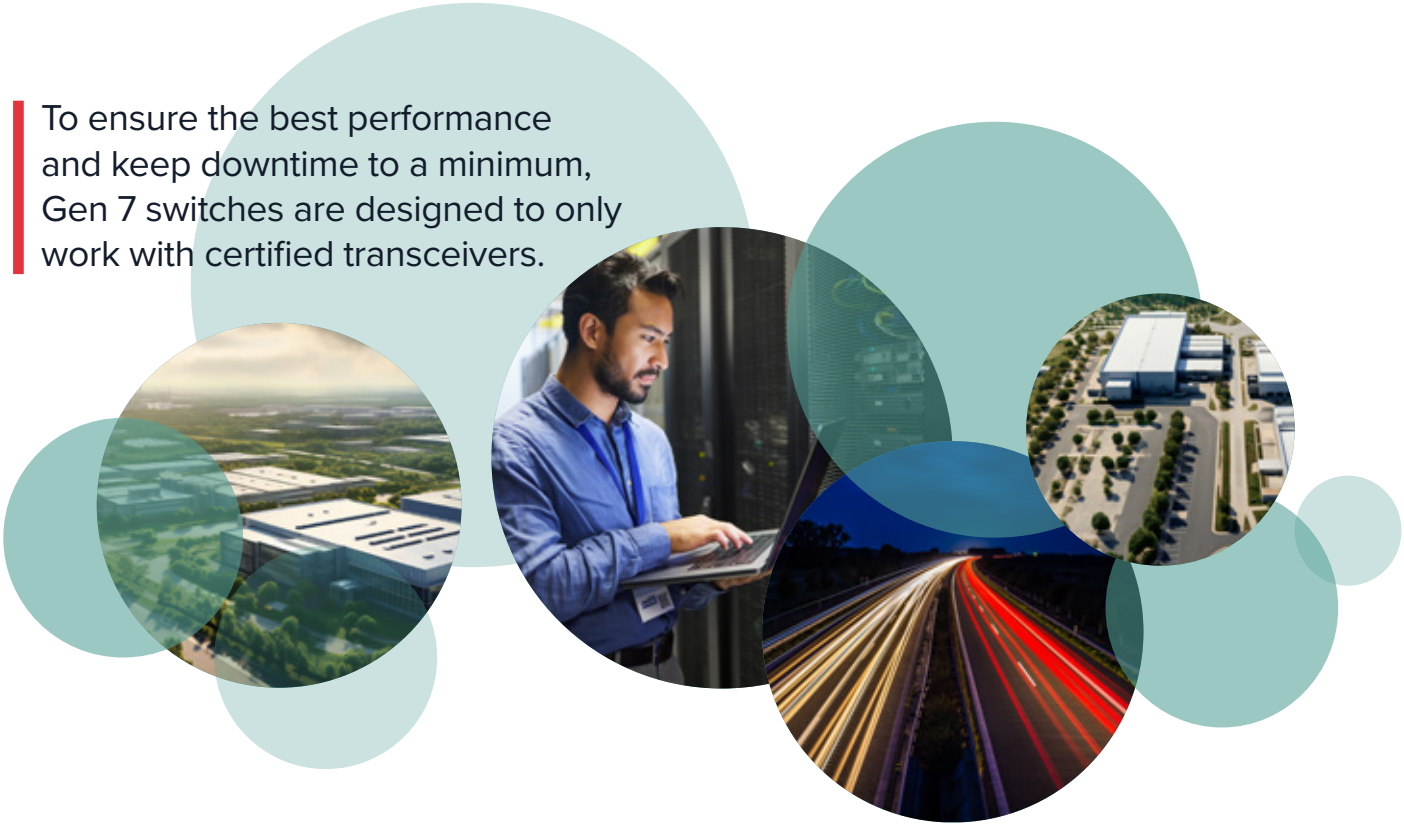

The multiplexing challenges from upgraded optics

If you thought all you had to do was upgrade your transceivers, you have another thing coming. The reason is that, with faster bit rates (e.g. from 8G to 32G) and increased bandwidth, you also get higher dispersion and other types of interference. This can impact the performance of your DWDM links if you don't address these challenges with an adequate multiplexing solution.

Dispersion is a phenomenon that causes different wavelengths, or colors of light, to travel at different velocities in the fiber. Higher bit rates come with lower tolerance for dispersion and to work effectively and prevent performance regressions your multiplexing solution will need more advanced dispersion compensation capabilities to keep your faster optics running at optimum performance. In specific, you will need tunable dispersion compensation to ensure the correct values.

Your upgraded bandwidth will also leave you with less link budget (dB). This represents the distance your DWDM link can span and will limit how far your DCI can reach if not addressed with adequate amplification. However, amplifying the light in this way will add noise, which also affects optical quality. This means you need a higher optical signal-to-noise ratio (OSNR) to ensure your DWDM link can meet reach and performance expectations.

In addition to less quantifiable performance issues, a more specific example of how these challenges could impact you is how your DWDM reach is affected. Consider that organizations such as financial institutions, retailers and government agencies could previously run their data center interconnect on 8G FC at distances of up to 80 km. Without addressing dispersion compensation, amplification requirements and other multiplexer optimizations, this distance is typically cut in half for 16G to about 40 km. Under the same conditions, 32G FC will reach a maximum of 10 km, which is probably a bit too short for many DCI networks. But, with a modern open line system, your 32G optics will be able to reach the same 80 km previously attainable at 8G.

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Smartoptics – the only Brocade Gen 7 certified optics

Smartoptics is the only vendor whose complete end-to-end solutions are layer 1 tested by Brocade for Gen 7. This includes a selection of our 32G transceivers, multiplexers, and active open line systems allowing for intelligent long-distance connectivity based on embedded DWDM principles. With Smartoptics' embedded solutions, organizations deploying Brocade Gen 7 can connect as many SAN & WAN internet links as required, at any speed, over a dark fiber network.

Our 32G transceivers are embeddable in Brocade Gen 7 products, making them easy to install. The Smartoptics DCP-M40 family of active open line systems, also certified for Gen 7, solves all the multiplexing challenges you may encounter when upgrading your optics. This is in part because it has automated, tunable dispersion compensation and advanced amplification.

Next-gen active open line systems like the DCP-M40 are now just as easy to install and configure as passive systems. Active open line systems have also become easier to manage with powerful automation features, while also providing more advanced security features than passive solutions such as full optical monitoring. For instance, the DCP-M40 enables more advanced troubleshooting for D-port.

All of this fits like hand in glove with the mission-critical SAN workloads that organizations use Fibre Channel for to ensure compliance, zero downtime and full data integrity.

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How to set up your DCI for optimum performance with Gen 7

To recap the requirements specified in the previous section, you will need the following components to set up your DCI for optimum performance with Brocade Gen 7.

1

WDM transceivers compatible with:

1. Brocade secure optics
2. At least 16G bit rates (32G if you're using anything other than the X7 director)

Recommended solution: Smartoptics SFP28 32G DWDM FC embedded transceivers

2

A WDM multiplexing solution meeting the following requirements:

	32G FC	100G PAM4	400ZR 400ZR+
1. Lower RX sensitivity > requires amplification	-3 dBm	-11 dBm	-10 dBm
2. High OSNR requirement > requires optimized amplifier design	29 dB	31 dB	26 dB (24 dB)
3. Low dispersion tolerance > requires tunable dispersion compensation	+-170 ps/nm	+-100 ps/nm	-2400 ps/nm (-20000 ps/nm)

Recommended solution: Smartoptics DCP-M40 active open line system

Two common obsolete DWDM multiplexing setups – one simple replacement

Many organizations with DCI setups that are a couple years old use one of two common multiplexing setups:

1. Passive mux/demux

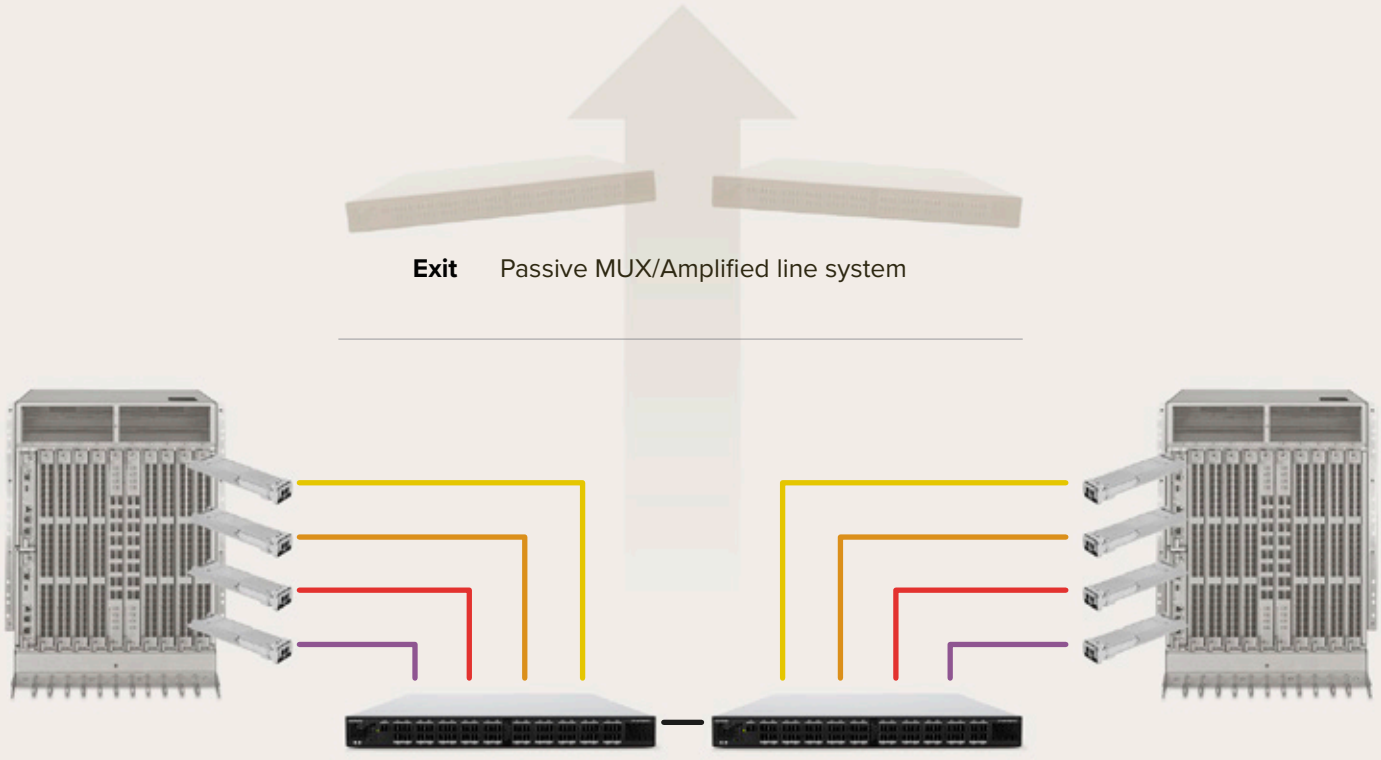
2. Amplified passive line system

Both of these setups are built around passive systems, which may have been chosen for cost and simplicity purposes at the time. However, neither are well suited for 32G optics because they generally do not meet most of the multiplexing requirements set out above. The good news is that both of them can be easily replaced with an active open line system, and active systems have now become easier to use than in the past. The illustration below shows how the Smartoptics DCP-M40 fits can replace almost any line system or passive mux solution regardless of vendor.

Smartoptics SFP28 32G transceivers are also embeddable, which means you can just replace your old transceivers and plug them straight into your Gen 7 equipment. All existing services can be migrated one to one and new services can be added and easily installed simply by adding new DWDM transceivers and plugging them in.

Summary

- 1-1 line system replacement and existing service migration
- Plug and play/embeddable
- Add new services with additional transceivers



Exit Passive MUX/Amplified line system

Enter Smartoptics DCP-M40 open line system

Maximizing ROI with ownership and synergies

Now that you are on top of what you'll need in place for your FC DWDM networking solution to run Brocade Gen 7, you can budget more accurately. There are also great opportunities to increase your ROI and get more out of investing in an active open line system if you take a closer look at owning your own optics and creating synergies across operations. This can potentially lead to significant cost efficiencies and greater ROI.

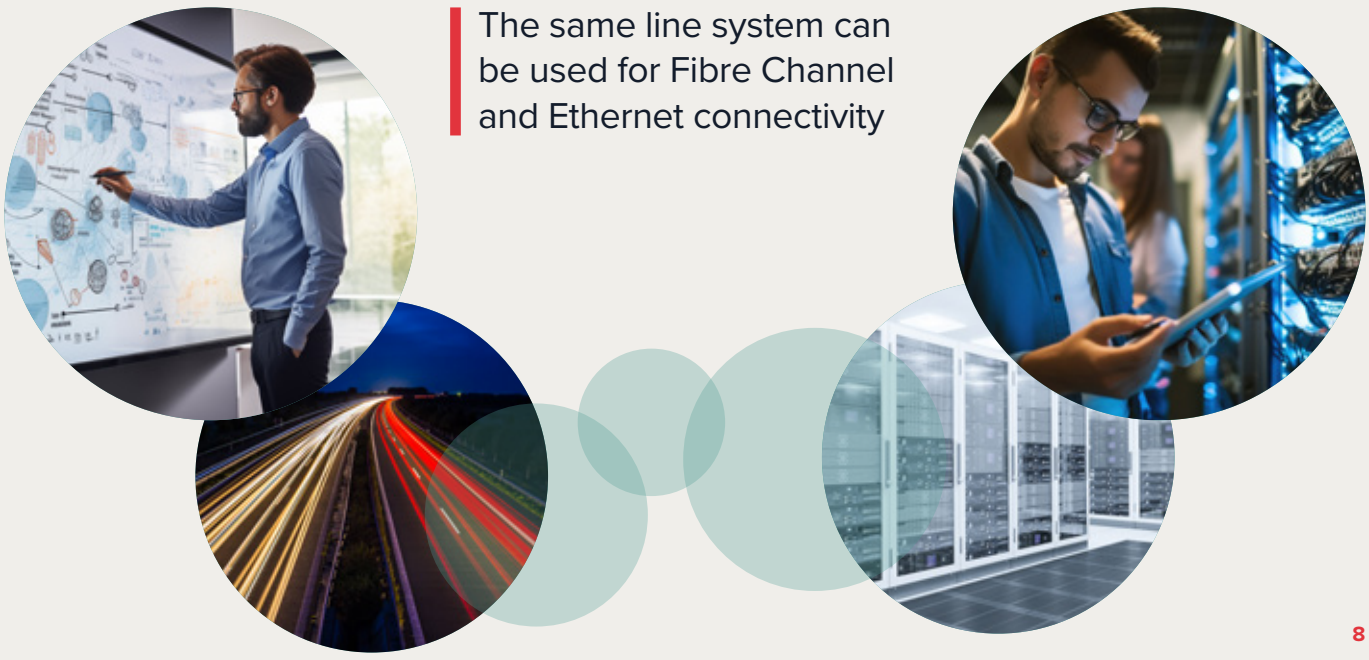
Next-gen DWDM solutions are simple enough to own

In the past, many organizations with mission-critical workloads like banks, retailers and government agencies turned to managed service providers to manage their complex DWDM setups. This made sense so that more IT focus could be dedicated to networking within data centers and value-added activities. But now the latest open line systems come with many powerful automation features, simple setup and minimal maintenance requirements. This makes owning your own infrastructure significantly easier than it may have seemed in the past.

Silos may stand in the way of FC and Ethernet infrastructure sharing

The same line system you use for Fibre Channel connectivity can also support 100G and 400G Ethernet. You just need to use low-cost 100G and 400ZR-enabled transceivers with the open line system for the Ethernet side. This may seem like an easy win but some silos may be standing in the way. The silos tend to be a result of organizations traditionally having separate storage and network teams, each with their own perspectives and equipment. There may not have been any possibility, advantage or interest in sharing infrastructure for FC and Ethernet until now.

> The same line system can be used for Fibre Channel and Ethernet connectivity



Tips for breaking down silos and creating FC and Ethernet synergies

Sharing the same open line system can result in substantial cost savings while giving both the storage and the network teams access to a high-performance, future-proof solution for DCI. Here's how to win them over to the idea:

- Take a top-down approach from senior management to get everyone on the same page
- Show both the storage and network teams how the open line system benefits them in terms of performance
- Also show them how their budgets will benefit, for instance, the decrease in the amount of leased fiber leads to significant cost savings

Tips for building a business case around ownership and synergies

Do the math – you should be able to see ROI on a CapEx investment in an open line system shared by both FC and Ethernet in less than a year, which is followed by low OpEx.

- Compare the total costs of a managed service contract over three years with the TCO of owned DWDM shared by both FC and Ethernet over the same period
- What is the cost per route and bit rate?
- How much does it cost to add additional bit rates and services?

Tips for choosing the right MSP

If you'd like to stick with a managed service provider (MSP), be sure your provider's equipment meets the criteria presented earlier in this guide for optimum DCI performance with Gen 7. Otherwise, your DCI setup may not work or your DCI performance could be subpar.

We have everything you need in our Brocade collection

With certified transceivers, multiplexers and open line systems, you can get the most out of Brocade Gen 7 for your DCI. You won't have to have any lingering concerns about anything not working correctly, your DWDM links not reaching far enough or any other performance or incompatibility issues. Learn more about the Smartoptics Brocade Collection and contact our optical experts if you have any questions about how to set up your optics with Gen 7.

Brynsalléen 2
NO-0667 Oslo,
Norway

+47 21 41 74 00

info@smartoptics.com
smartoptics.com

smartoptics