Unleashing the pow

Manja Thessin of AFL explores the advances of fibre optic cable technology in data centre interconnects (DCI)

Amid our digital era, a remarkable revolution is unfolding, driven by an overwhelming surge of data. The sheer magnitude of data generation and utilisation has reached unprecedented heights, necessitating inventive approaches to effectively manage, store and analyse this colossal wealth of information. Within this dynamic landscape, a groundbreaking paradigm of disaggregated data centres is gaining prominence, with optical fibre cable assuming a central and indispensable role.

PART OF THE PROCESS

Disaggregated data centres have emerged as a gamechanger, revolutionising the processing efficiency of complex and massive workloads by separating critical data centres and their interconnection, often facilitated by optical fibre cable. This architectural shift optimises data processing and holds immense potential for transforming the landscape of modern data infrastructure.

Considering the prevailing fibre optic age, the trajectory toward adopting disaggregated data centres appears to be an inevitable course of action. Nevertheless, to grasp the true significance of this technology, it becomes imperative to delve deeper into its benefits. By exploring its underlying functionalities and advantages, we can understand how DCIs are poised to revolutionise the efficiency and future proof nature of data centres, propelling us towards a new era of unparalleled data management and analysis capabilities.

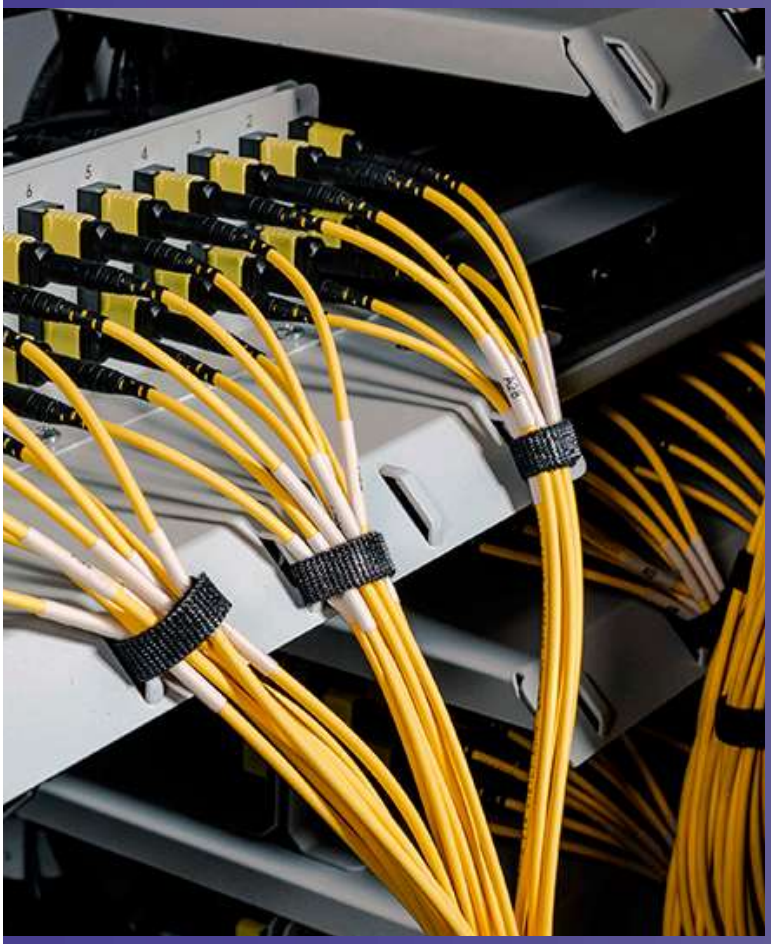
WHAT IS A DCI?

A DCI is a direct link between two or more data centres designed to facilitate high speed, secure and reliable communication and data transfer between these facilities. This technology plays a critical role in allowing multiple data centres to operate as a single logical data centre, which contributes to improved efficiency and resilience.

DCI has undergone a major transformation in recent years. Previously, it was mainly used for business continuity and disaster recovery purposes. However, today it plays a vital role in enabling data

yer

centre operators to effectively manage resources and undertake crucial load balancing tasks across multiple data centres. This has become more important than ever before, as internet traffic continues to grow and cloud migration becomes increasingly essential. The surge in east-west traffic refers to data moving within and between facilities, and has become a key factor in driving the need for optical connections in data centre architectures.



JOINING FORCES

DCI is typically deployed using high capacity fibre to connect multiple data centre buildings over a wide campus area. These connections serve several critical purposes including the synchronisation of resources, enabling real time data replication, load balancing and distribution of workloads. This helps mitigate potential data loss or downtime risks, while contributing to overall efficiency.

For large and hyperscale data centre operators, DCI has become a key efficiency driver, enabling them to extend their layer two or local area networks. This allows them to operate multiple data centres as a single logical data centre, realising benefits such as expandability, workload mobility, resource optimisation and support for multi-tenant environments across a broader set of distributed resources.

KEY ENABLER

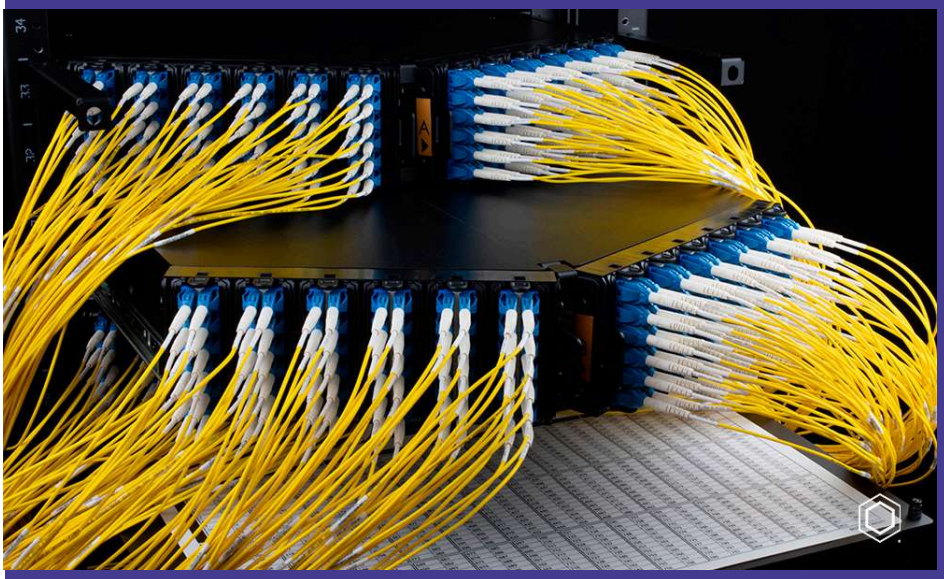
The importance of cable in a DCI link cannot be overstated. It serves as the backbone for the ultra-high fibre count network, connecting buildings and facilitating seamless communication. The cable can be placed in cable baskets or ducting and can span distances ranging from 100m to as far as 10km. The high speed fibre used in the DCI backbone can achieve speeds of up to 400Gb/s, ensuring a highly efficient and flexible network. This is a testament to the remarkable strides made in the field of telecommunications and the increasing need for reliable connectivity.

When selecting cables for DCI, it is important to consider factors such as bandwidth requirements, distance and cost. The fibre infrastructure between buildings should be able to keep up with the introduction of new connections and bandwidth capabilities without requiring repeated civil engineering work. This can be

'The fibre infrastructure between buildings should be able to keep up with the introduction of new connections and bandwidth capabilities without requiring repeated civil engineering work.'

achieved through duct space optimisation, which involves using small diameter ultra-high fibre count cables with ribbon technology to maximise cable density and fit more fibres into existing duct space. These small diameter, high fibre count cables can be installed 60-75 per cent faster when using mass fusion splicing compared to single fibre splicing.

Alternatively, they can be factory connectorised to create high density, high performance trunk cables that can be installed swiftly and efficiently without the need for splicing – thereby reducing cost and deployment time, and maximising efficiency. These pre-connectorised assemblies provide a viable alternative to traditional splicing solutions, substantially reducing deployment times and installation costs. When these assemblies are presented in a patching frame, they offer users the flexibility to reconfigure the links as needed.



SAFETY FIRST

In addition to bandwidth and infrastructure considerations, DCI cable selection should also consider the reliability and security of the network. For critical applications, it may be necessary to choose cables that can withstand harsh environmental conditions and provide added protection against challenges such as flooding.

To address this, choose multi-listed cables that are suitable for both indoor and outdoor use, making them versatile for any part of the data centre infrastructure. Using these cables eliminates the need to switch from an external to an indoor rated cable, which saves money on labour and reduces splice losses. The cost of the cables should also be balanced against the potential risks and consequences of network downtime or failure.

By carefully considering these factors, organisations can ensure that their DCI cables meet their current and future connectivity needs.

PRACTICAL CHALLENGES

Installing DCIs can be challenging, with a range of factors to consider such as the most appropriate method, organisation of labour and machinery and regulatory requirements. Ducting or aerial installation can be used, each with unique difficulties, such as the risk of fibre damage during pulling or the need for special equipment in blowing and

jetting when dealing with duct installations. Maximising fibre count within existing ducts, while avoiding overcrowding that might damage fibres or hinder future expansion, is important.

When it comes to fibre installation, there are four main methods to achieve your goal – pushing, pulling, blowing and jetting. When considering which method to use, several factors should be considered.

Ducting distances can vary greatly, as can the shapes and sizes of the cables being run. Additionally, the conduits can be straight or winding mazes under cities. Pushing is the simplest method of cable installation, but it is best suited for short runs and smaller cables due to friction. Pulling involves threading a pull line through the conduit and attaching the cable to it, making it ideal for longer runs and larger cables. However, caution must be taken to avoid damaging the cable.

Blowing uses compressed air to float the cable through micro ducts, which minimises the risk of cable or duct damage, and is perfect for navigating long distances and multiple bends. Jetting is air assisted and uses a parachute or cable carrier to pull the cable into the conduit, making it a versatile method used for various cable types.

While blowing and jetting are the most common choices, when deciding on a method of fibre installation it is important to consider the distances, size of cables and the type of conduit being used. Pushing and pulling are best suited for shorter runs and smaller cables, while blowing and jetting are ideal for longer runs and multiple bends.

MOVING FORWARD

Over the last 12-18 months, innovations in fibre cable have allowed for more streamlined deployment, simplified maintenance, flexibility and convenience of DCIs. Such advancements are expected to drive more significant gains in the future, creating more automated, efficient and reliable communication, and data transfer between data centres. In the future, DCI is expected to evolve to meet the growing demand for faster, more reliable and more efficient data transfer. With the emergence of modern technologies such as 5G, IoT and AI, DCI will need to be more flexible, scalable and secure to handle the massive amounts of data generated by these technologies. ■

MANJA THESSIN

Manja Thessin serves as enterprise market manager for AFL, leading strategic planning and market analysis initiatives. She has more than 20 years of ICT experience in the field, as well as in design and engineering, and project management. Thessin has managed complex initiatives in data centre, education, industrial/manufacturing and healthcare.