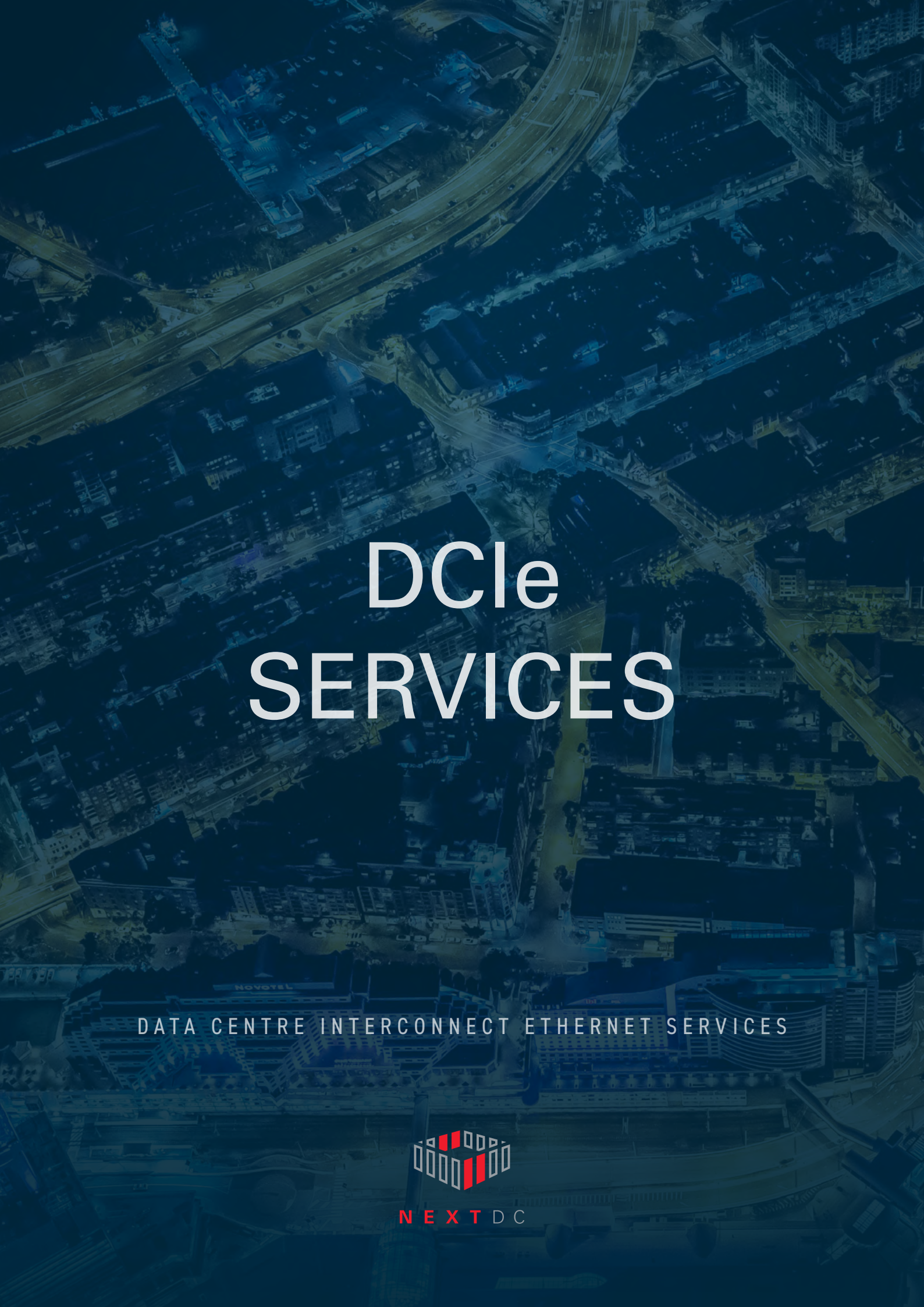


DCIe SERVICES

DATA CENTRE INTERCONNECT ETHERNET SERVICES

NEXTDC

CONTENTS

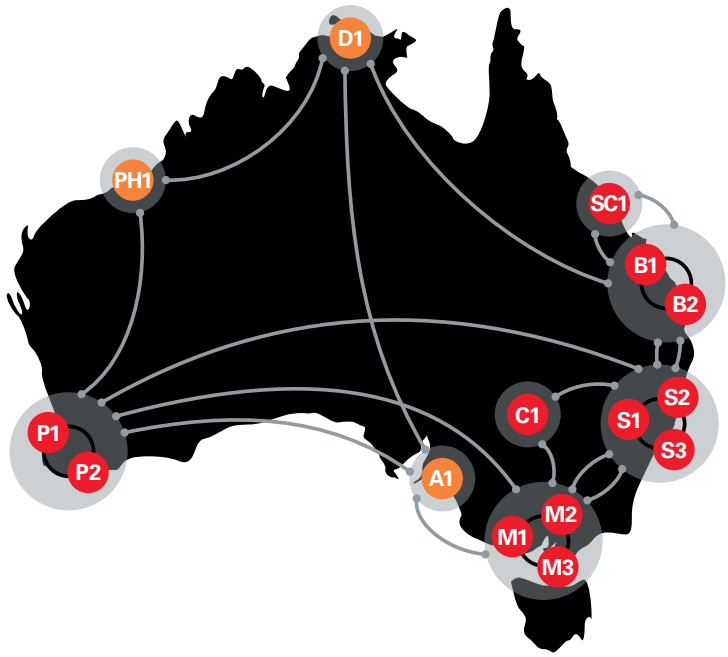
INTRODUCTION

Data Centre Interconnect allows NEXTDC customers to connect between multiple NEXTDC data centres in the same region securely and cost effectively with very short provisioning timelines. NEXTDC offers three variants of Data Centre Interconnect (DCI) services:

- **DCIf (Data Centre Interconnect Fibre):** Dark fibres between NEXTDC data centres within the same metro area.
  Like a physical Cross Connect, DCIf provides dedicated fibre connectivity between customer racks in different facilities over a passive network.
- **DCIe:** Static point-to-point Ethernet services between NEXTDC data centres within the same metro area.
  Equivalent to a Cross Connect (XC) between customer racks in different facilities, DCIe provides connectivity of 1Gbps and 10Gbps, as well as 100Gbps on demand in selected metro areas, over an active network.
- **AXON:** Elastic point-to-multipoint Ethernet services between NEXTDC and partner data centres across Australia.
  Often referred to as an Elastic Cross Connect (EXC), the national Software Defined Network called AXON provides flexible and dynamic connectivity of up to 10Gbps between customer racks, public cloud points of interconnect, third party AXON enabled data centres, and ICT services providers.

This paper focuses on DCIe which is the preferred solution for customers with rack space in multiple NEXTDC data centres within the same state who are looking for Committed Information Rate (CIR), point-to-point (P2P) connectivity without contention over dedicated ports. DCIe is available in all paths shown in **Figure 1**.

Figure 1: Map of DCIe availability across NEXTDC's national data centre network



LEGEND

———	Availability of DCIe within the same city network	●	Fully operational
———	AXON network city to city	●	In planning

DCIe NETWORK

A single DCIe service consists of the following components:

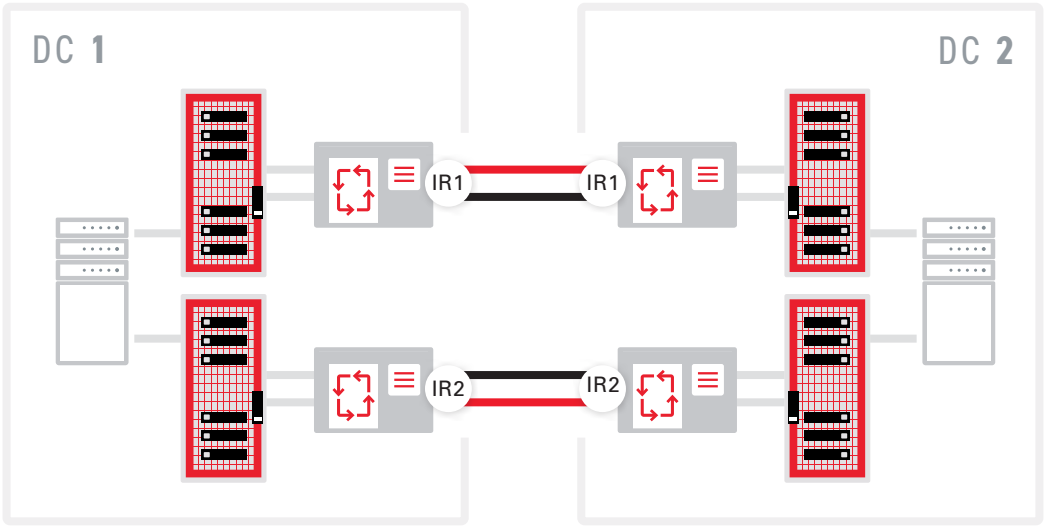
- A Cross Connect (XC) from the local customer rack to the local DCI rack
- Two transparent optical paths from the local DCI rack to the remote DCI rack via local Interconnect Rooms (IR), dark fibres between facilities and remote interconnect rooms
- A Cross Connect from the remote DCI rack to the remote customer rack

The 1+1 setup of the fibre paths between facilities mitigates a fibre cut of the working path by automatically switching over to the protection path within less than 50ms. Switching back to the original configuration is done manually once the fault has been fixed and the network is stable again.

It is important to note that although the external network supporting DCIe services is redundant and will protect against failures, where only a single DCIe service is ordered, single points of failure still exist such as the active equipment and Cross Connects at both ends.

Figure 2 shows a second redundant service implemented (equivalent to two completely diverse single services connecting the local and remote customer racks), avoiding any single points of failure. Where a redundant service is ordered, NEXTDC provides a 100% uptime guarantee.

Figure 2: DCIe fibre paths



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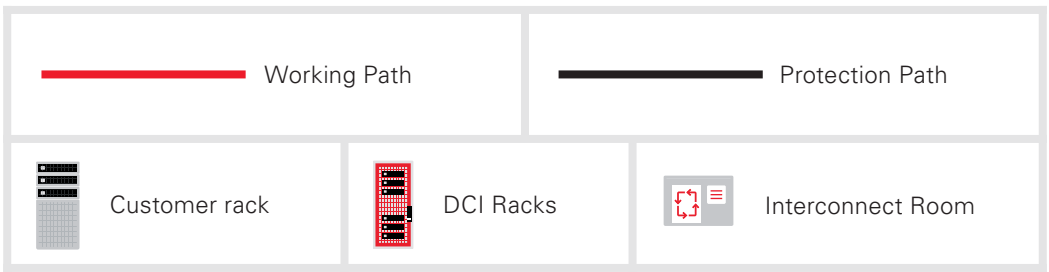
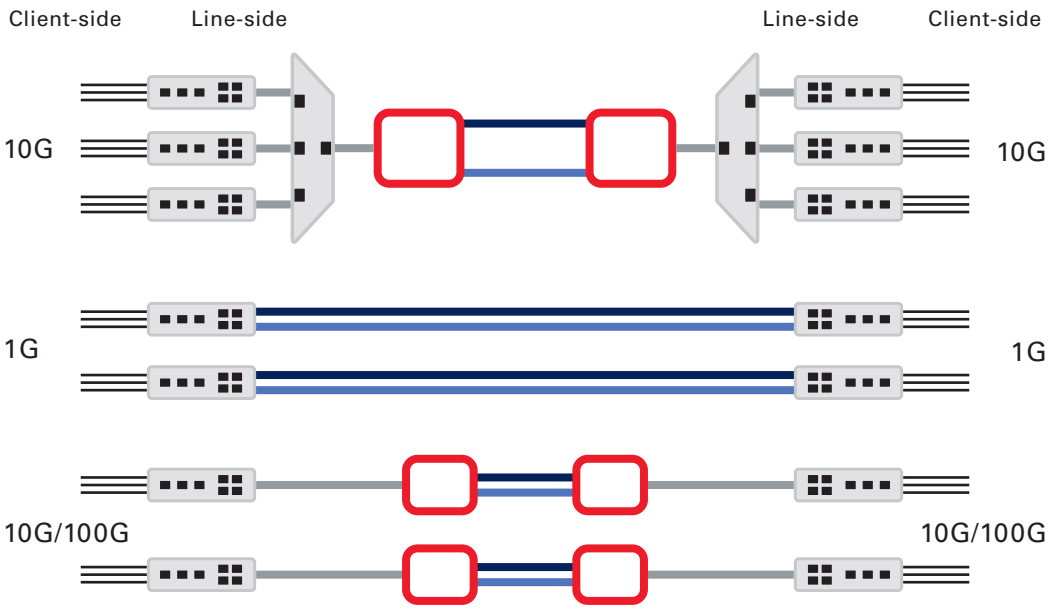


DCIe PLATFORM

NEXTDC uses three generations of platforms to provide DCIe services as shown in **Figure 3**. All of those are functionally layer-1 systems, providing Ethernet services in the optical domain.

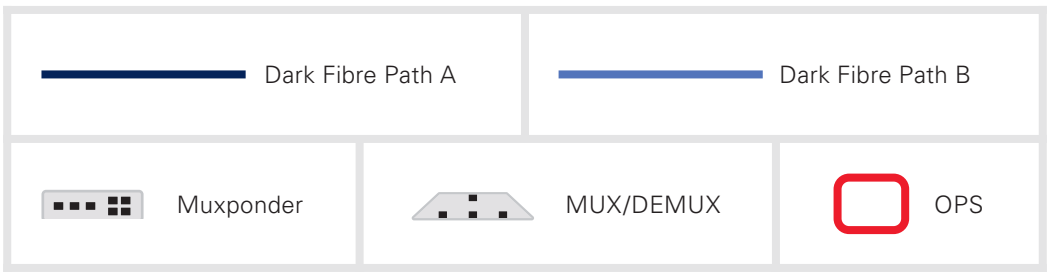
- **Platform A** is a Dense Wavelength Division Multiplexing (DWDM) system consisting of muxponders, passive (de-)multiplexers (MUX/DEMUX) and Optical Protection Switches (OPS), carrying all wavelengths over two redundant dark fibre pairs
- **Platform B** is a layer-2 switch operated as a contention-less muxponder with duplicate line-side interfaces, i.e. the optical protection is integrated into the device, and each dark fibre pair carries one wavelength
- **Platform C** is a muxponder with a line-side interface that is connected to an Optical Protection Switch (OPS), i.e. each dark fibre pair carries one wavelength

Figure 3: DCIe platforms in today's production network (A – DWDM, B and C – single wavelength over dark fibre)



While over time NEXTDC is moving from platform A to C as part of lifecycle management, the migration will not have any impact on the DCIe service definition.

LEGEND



OPTIMAL CONFIGURATION

For optimal configuration, it's our recommendation that you use 1000BASE-LX optics for 1Gbps services and 10GBASE-LR optics for 10Gbps services in your racks to connect to NEXTDC's DCIe systems. Adhering to these specifications ensures compatible optical power levels on both ends, i.e. sufficient optical power levels to activate a service but limited power level such as not to destroy the optics on the other end of a Cross Connect.

Services on these platforms are static in nature (as opposed to elastic), without contention, transporting Ethernet traffic transparently across the network. By default, auto-negotiation is enabled and Link Loss Forwarding (LLF) is disabled but can be changed on demand. Disabling LLF simplifies troubleshooting within the NEXTDC network since technical personnel can quickly identify whether a service outage was caused by a physical infrastructure issue in the facility or a configuration issue.

In addition to the inherent resilience noted previously within the DCIe architecture, we strongly recommend you utilise upper layer protocols like BFD to ensure path availability.

NETWORK AVAILABILITY

NEXTDC request that you keep the following aspects in mind to successfully activate your services:

- Installing the specified optics on the customer side ensures stable operation with minimal service impact.
- By default, auto-negotiation is configured for 1Gbps services. Depending on your use cases, some 1Gpbs services may require auto-negotiation to be disabled which requires you to raise a ticket with NEXTDC. A mismatch may result in no connectivity at all or very poor service performance.
- As the DCIe systems are layer-1 systems, any packet loss will occur at a higher layer. As such this should be addressed directly within your configuration and equipment, it will not have resulted within the DCIe system.

Whilst redundant DCIe services have a guaranteed uptime of 100%, single DCIe services may experience infrequent outages or interruptions due to various reasons:

- **Dark fibre fault:** The most likely fault in fibre networks is a dark fibre cut in-between facilities, caused by road work or other construction work. This fault is mitigated by design via the redundant fibre paths in-between facilities and active network equipment
- **Lifecycle management:** The lifespan of a DCI system is roughly five years in production; given the system vendors' continuous improvement and extension of capabilities, maintenance work like software upgrades and service migration to newer platforms can be service impacting. By separating maintenance on redundant systems and notifying you well in advance of any planned work, the impact on the individual services is kept to a minimum.

If you are in need of 100% network availability, we strongly recommend that you order redundant services when designing your network infrastructure. Redundant services will not only mitigate dark fibre faults, but active network equipment faults in addition.

SUMMARY

DCIe services are NEXTDC's solution to your need for point to point, contention-less Ethernet services between our facilities in the same metro area.

The technical background information on the DCIe network, platforms, and service availability presented in this document is designed to support your efforts in investigating a solution options as well as configuring and troubleshooting client side DCIe services.

NEXTDC SUPPORT CONTACTS

DCIe HELP DESK

The DCIe Helpdesk can be contacted using the information below:

Phone (Australia)
1300 698 677

Phone (International)
+61 7 3177 4799

Technical support
nxtops@nextdc.com

Service provisioning
nxtops@nextdc.com

Hours of operation:

Monday – Friday
09:00 - 18:00

Sunday & Saturday
Closed

Service faults
24 hours

TERMS AND CONDITIONS AND SLA

Please refer to your Master Sales Agreement (MSA).

Version 2 | 1 December 2022 | Owner: Beate Konrad