

DCle

DATA CENTRE INTERCONNECT ETHERNET



TECHNICAL GUIDE



NEXT DC



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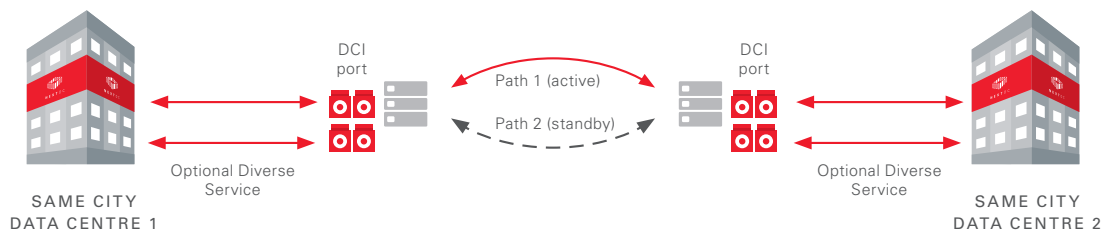
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DCI ETHERNET (DCIe) PRODUCT ARCHITECTURE

Data Center Interconnect Ethernet (DCIe) provides an uncontended point to point Ethernet connectivity service between two NEXTDC data centres in the same city using our DCI Transport System (DCITS).

A key advantage of the DCIe service is path redundancy. As shown in Figure 1, DCITS located in different NEXTDC facilities are connected via two physically diverse fibre optical paths. This means in the case of a fibre path failure outside of a NEXTDC facility, the service will automatically switch over to the standby path.

Refer to the 'DCIe Redundant Design Requirements' section for how to avoid a single point of failure, and to be covered by a 100% uptime Service Level Agreement (SLA).



1Gbps and 10Gbps Ethernet services are available with compatible optics of 1000BASE-LX and 10GBASE-LR, respectively.

Figure 1 – DCIe between NEXTDC facilities.

When using DCIe, you will be connecting to active equipment (DCITS) in each NEXTDC facility which transports your data transparently over fibre optic links to the other NEXTDC facility as shown in Figure 2.

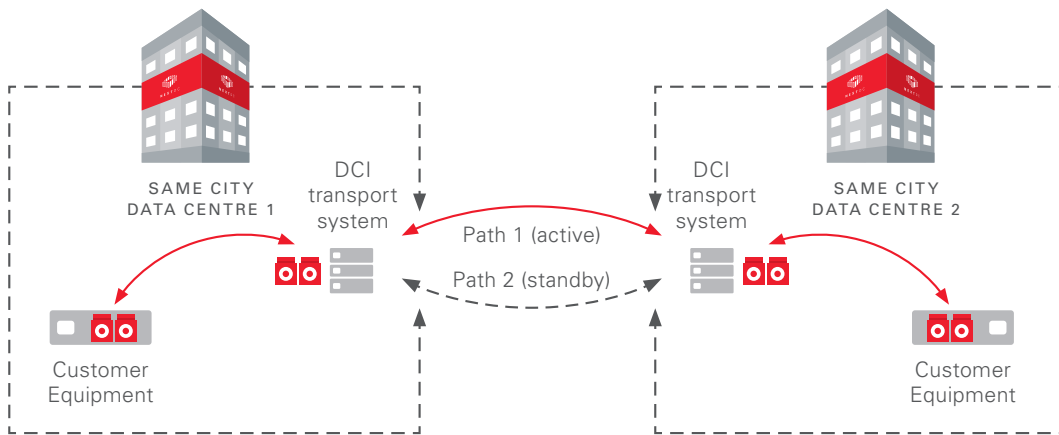


Figure 2 – A single DCIe service including Customer Equipment.

This service is not suitable to connect to equipment which resides in third party data centres, however, our AXON service provides several options to connect to service providers and public cloud providers in other facilities. The NEXTDC team can help you with the available options.

DCIe TECHNICAL REQUIREMENTS

Item	Qty	Comment
Structured cabling	1 per rack	Structured cabling is required to each NEXTDC rack that requires a DCIe service. Existing structured cabling with a spare port can be utilised.
Spare port in structured cabling	1 per rack	At least one free Single Mode Optical Fibre (SMOF) LC Duplex port in the structured cabling is required in each rack
Compatible Optics with network equipment	1 per rack	Refer to the 'DCIe Redundant Design Requirements' section for available optic options
Correct configuration on customer network equipment	N/A	e.g. Auto-negotiation must be enabled for 1Gbps DCIe services

Table 1 – Minimum Requirements for DCIe service.

DCIe REDUNDANT DESIGN REQUIREMENTS

As noted previously, fibre optical path redundancy is a key advantage of DCIe Services. The DCITS is built with redundancy to minimise service impact however with a single DCIe service there remains certain single points of failure that cannot be avoided. Therefore, it is **strongly recommended** that physically diverse DCIe services are ordered for high availability and mission critical applications.

It is important to specify which DCIe services need to be diverse at the time of ordering to ensure that NEXTDC engineer the solution to meet your requirements.

DCIe PORT AND SERVICE SPECIFICATIONS

SERVICE TYPES

DCIe services can be ordered as either 1Gbps or 10Gbps services.

DCIe services are not upgradable or downgradable after service provisioning is completed. Therefore, it is important to order the correct service type. The services are also delivered with both ends at the same capacity. For example, it is not possible have 1Gbps service at the A end and a 10Gbps service at the B end. For requirements with different capacities at each end, please use the AXON service.

Table 2 shows the attributes of the services based on the service type.

It is important to note:

- Compatible optics are required at both the A and B end (as shown in Table 2).
- 1Gbps services require auto-negotiation of speed and duplex to be configured correctly for both ends of your equipment. Refer to 'Appendix A' for further details.
- If you require auto-negotiation to be disabled, please raise a support ticket and this will be actioned during business hours.

Attribute \ Service Type	1Gbps Ethernet	10Gbps Ethernet
Media Access Control	IEEE 802.3-2008	IEEE 802.3-2002
Optic (SFP/SFP+) Type	1000BASE-LX (as per IEEE 802.3z)	10GBASE-LR (as per IEEE 802.3ae)
Media	Duplex Single Mode Optical Fibre	Duplex SMOF
Auto-negotiation	Enabled	N/A
Bandwidth Allocation	Uncontended	Uncontended
Ethernet MTU	9100B	9600B

Table 2 – Attributes of service types

DCIe SERVICE ORDERING

Ordering a DCIe service is completed via the ONEDC® portal. To do so:

- Log into ONEDC®
- Select “Ticket Management”
- Select “Request Cross Connect/Structured Cabling”
- Select the “Facility”
- Select a “Target Date”
- Add a customer reference (if required)
- Select the applicable type in the “Create Cross Connect” section
 - Data Centre Interconnect (DCIe) – Ethernet 1Gbit; or
 - Data Centre Interconnect (DCIe) – Ethernet 10Gbit
- Complete the data request shown
- Press “Add another Cross Connect” if you wish to order a second diverse DCIe service

If ordering a diverse service to an existing DCIe service, please specify that diversity is required in the comments section when ordering. For diverse services, you will be essentially be ordering two separate services.

- Agree to the “Authorisation” section
- Agree to the “Conditions” section
- Agree to the “Privacy Collection Statement” section
- Click “Submit”

DCIe SERVICE TROUBLESHOOTING CHECKLIST

Once you have the confirmation from NEXTDC that service provisioning is completed, the following checklist can be used for first level troubleshooting. If you need any support in following this checklist, please speak to NEXTDC support representative.

CHECKLIST FOR 1Gbps ETHERNET SERVICES

Troubleshooting Steps	DC 1 end	DC 2 end
Confirm 1000BASE-LX Optics/SFPs are used on both ends of your equipment (1*)	<input type="checkbox"/>	<input type="checkbox"/>
Confirm auto negotiation is enabled on both ends of your equipment (Auto negotiation of Speed and Duplex) (2*)	<input type="checkbox"/>	<input type="checkbox"/>
Attempt swapping Transmit/Receive fibres on both ends of the service demarcation points, one at a time.	<input type="checkbox"/>	<input type="checkbox"/>
Attempt to reseal the fibre patch leads on both ends of service and check there are no issues with the patch leads, one at a time.	<input type="checkbox"/>	<input type="checkbox"/>
Confirm both ends of your network equipment ports are showing as UP (Physical interface status 'Up' and Line Protocol status 'Up')	<input type="checkbox"/>	<input type="checkbox"/>
Confirm both ends of your network equipment optics are within acceptable receive power levels (3*)	<input type="checkbox"/>	<input type="checkbox"/>
Confirm you are using Single Mode Optical Fibre (SMOF) duplex patch leads in both ends of the service to connect between Optic/SFP and in-rack patch panel	<input type="checkbox"/>	<input type="checkbox"/>
Confirm Optics/SFPs have been tested in both ends of your network equipment and they are in working condition	<input type="checkbox"/>	<input type="checkbox"/>

1* In case of Multirate SFPs being used. Confirm 1000BASE-LX mode is supported and enabled in the port.

2* If auto negotiation setting needs to be disabled, please escalate to NEXTDC support team during business hours.

3* NEXTDC are transmitting power at each end at -5dBm from NEXTDC client facing optics/SFPs.

If you are still having an issue after following the checklist, the following information for **each end** of the customer network equipment is required so that we can troubleshoot the issue quickly:

- An export showing howing interface operational details (operational status, auto-negotiation status, optic type etc.). For example, for some devices the command will be "show interface Gix/x/xx".
- An export showing interface statistics and counters. For example, statistics showing send/receive packets, bytes, errors, CRC errors for interface. Be sure to capture incremental statistics. That is, show the same output after a few seconds for the same interface.
- An export showing interface receive and transmit power levels. For example, for some devices the command will be "show interface Gix/x/xx transceiver".
- An export showing interface configuration. For example, for some devices the command will be "show running-config interface Gix/x/xx".
- The Service Identification (SID) of the service.

CHECKLIST FOR 10Gbps ETHERNET SERVICES

Troubleshooting Steps	DC 1 end	DC 2 end
Confirm 10GBASE-LR Optics/SFPs are used on both ends of your equipment (1*)	<input type="checkbox"/>	<input type="checkbox"/>
Attempt swapping Transmit/Receive fibres on both ends of the service demarcation points, one at a time.	<input type="checkbox"/>	<input type="checkbox"/>
Attempt to reseal the fibre patch leads on both ends of service and check there are no issues with the patch leads, one at a time.	<input type="checkbox"/>	<input type="checkbox"/>
Confirm both ends of your network equipment ports showing UP (Physical interface status 'Up' and Line Protocol status 'Up')	<input type="checkbox"/>	<input type="checkbox"/>
Confirm both ends of your network equipment ports are within acceptable receive power levels (2*)	<input type="checkbox"/>	<input type="checkbox"/>
Confirm you are using single mode optical fibre (SMOF) duplex patch leads in both ends of the service to connect between Optic/SFP and in-rack patch panel	<input type="checkbox"/>	<input type="checkbox"/>
Confirm Optics/SFPs have been tested in both ends of your network equipment and they are in a working condition	<input type="checkbox"/>	<input type="checkbox"/>

1* In case of Multirate SFPs being used. Confirm 10GBASE-LR mode is supported and enabled in the port.

2* NEXTDC are transmitting power at each end in the range of -0.5 to -3.5dBm from NEXTDC client facing optics/SFPs.

If you are still having an issue after following the checklist, it would be important to get following information from **each end** of the customer network equipment so that we can troubleshoot the issue quickly:

- An export showing interface operational details (operational status, optic type etc.). For example, for some devices the command will be "show interface tengigabitethernet x/x".
- An export showing interface statistics and counters. For example, statistics showing send/receive packets, bytes, errors, CRC errors for interface. Be sure to capture incremental statistics. That is, show the same output after a few seconds for the same interface.
- An export showing interface receive and transmit power levels. For example, for some devices the command will be "show interface tengigabitethernet x/x transceiver".
- An export showing interface configuration. For example, for some devices the command will be "show running-config interface tengigabitethernet x/x".
- The Service Identification (SID) of the service.

NEXTDC SUPPORT CONTACTS

HELP DESK

The 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

GLOSSARY

AXON NETWORK

Term	Explanation
DCI	Data Centre Interconnect
DCIe	Data Centre Interconnect Ethernet
LC	Widely known as Lucent Connector (IEC 61754-20)
SID	Service Identification
SMOF	Single Mode Optical Fibre cable which complies with or exceeds ITUT Recommendations G.652 or G.652D
SFP	Small Form Factor Pluggable

APPENDIX A

DCIe 1Gbps - AUTO-NEGOTIATION SETTING

DCIe 1Gbps Ethernet services require you to setup your network equipment to enable auto-negotiation of speed and duplex on both ends of the connection. If you require auto-negotiation to be disabled on both ends, please raise a support ticket with NEXTDC.

The table below describes how to enable auto-negotiation on several common vendors and how to verify whether your network equipment has been configured correctly.

Please note this is generic guide only and will not be valid for all the software versions of each vendor. Please refer to vendor documentation for further details.

It is **recommended to verify the setting on the network** equipment before and after configuration as default auto-negotiation settings can vary based on many factors.

CISCO

Nexus 9000 series

Configuration

```
switch(config)# interface ethernet 1/1
switch(config-if)# speed auto
```

in some variations below command does the same.

```
switch(config)# interface ethernet 1/1
switch(config-if)# no speed
```

Note – Depending on the optic and module this can be default setting as well on the equipment.

Verification – refer highlighted

```
switch# show interface ethernet 1/1
Ethernet1/1 is down (Administratively up)
  Hardware is 1000 Ethernet, address is 0019.076c.4dd8
  (bia 0019.076c.4dd8)
  MTU 1500 bytes, BW 1000000 Kbit, DLY 10 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation ARPA
  auto-duplex, auto-speed
  Beacon is turned off
Auto-Negotiation is turned on
  Input flow-control is off, output flow-control is off
```

<output sniffed>

Cisco ASR 9000 series

Configuration

```
RP/0/RSP0/CPU0:router(config)# interface
GigabitEthernet 0/0/0/4
RP/0/RSP0/CPU0:router(config-if)# negotiation
auto
```

Note – Depending on the optic and module this can be default setting as well on the equipment.

Verification – refer highlighted

```
RP/0/RSP0/CPU0:router#show controllers
GigabitEthernet0/0/0/4 control
Management information for interface
GigabitEthernet0/0/0/4:
```

```
Port number: 4
Interface handle: 0x08000400
```

Config:

Auto-negotiation: On

```
Carrier delay (up): None
Carrier delay (down): None
Duplex: Not configured
Flow Control: None
Priority Flow Control: None
Forward Error Correction: Standard (Reed-Solomon)
IPG: Standard (12)
Loopback: None
MTU: Not configured
Speed: Not configured
Soft BW: Not configured
MAC Address: Not configured
Rx Optical Power Degrade Threshold: -10db
```

<output sniffed>

ARISTA

Arista EOS

Configuration

```
switch(config)# interface ethernet 1
switch(config-if)# speed auto
```

Note – Depending on the optic this can be default setting as well on the equipment.

Verification – refer highlighted

```
switch# show interface ethernet 1
Ethernet1 is up, line protocol is up (connected)
  Hardware is Ethernet, address is 001c.73e1.ad90
    (bia 001c.73e1.ad90)
  Description: Test
  Ethernet MTU 9214 bytes , BW 1000000 kbit
  Full-duplex, 1Gb/s, auto negotiation: on, uni-link: n/a
  Up 133 days, 23 hours, 8 minutes, 20 seconds
  Loopback Mode : None
  4 link status changes since last clear
```

< output sniffed >

JUNIPER

SRX/EX series

Configuration

```
user@host# set interfaces ge-2/0/0
gigether-options auto-negotiation
```

Note – Depending on the optic and module this can be default setting as well on the equipment.

Verification – refer highlighted

```
user@host> show interfaces ge-0/0/1
Physical interface: ge-0/0/1, Enabled, Physical link is Down
  Interface index: 135, SNMP ifIndex: 510
  Link-level type: Ethernet, MTU: 1514, Link-mode: Full-duplex,
  Speed: 1000mbps,
  BPDU Error: None, MAC-REWRITE Error: None, Loopback: Disabled,
  Source filtering: Disabled,
  Flow control: Enabled, Auto-negotiation: Enabled,
  Remote fault: Online
  Device flags   : Present Running Down
  Interface flags: Hardware-Down SNMP-Traps Internal: 0x0
  Link flags     : None
  CoS queues    : 8 supported, 8 maximum usable queues
```

<output sniffed>
