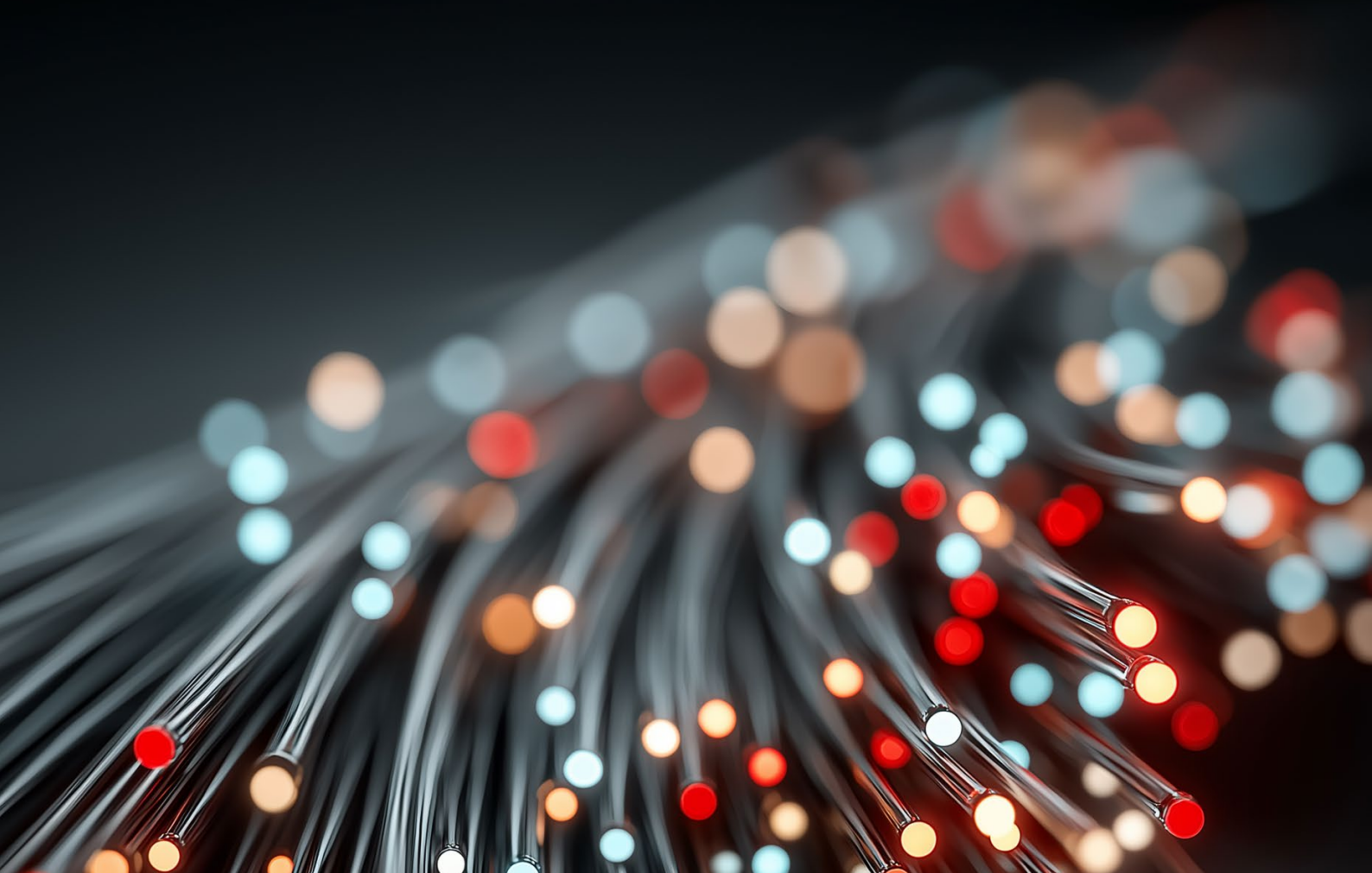




A X O N

Technical Brief

Amazon Web Services



N E X T D C



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Introduction to AXON

In today's hyperconnected world our data, applications, clouds, locations and people live everywhere.

To operate and compete without limitation, we must integrate our siloed worlds. We need to be connected. Our people need access to whatever they need, whenever they need it, from wherever they are with complete confidence it is secure.

Connectivity with NEXTDC allows you to connect your physical and virtual worlds uniting the people, places and clouds most critical to your organisation.

We help you achieve this with NEXTDC's Ethernet connectivity platform, AXON.

AXON's high-speed ethernet connections give you fast, secure on-demand access to any number of services across all our locations, allowing you to connect the clouds, carriers and data centres that underpin your hybrid cloud.



AWS Direct Connect

AWS Direct Connect is a service that enables you to create private connections between Amazon data centres and your infrastructure located on your premises, or in a colocation environment. AWS Direct Connect connections do not go over the public internet therefore offering greater reliability, faster speeds, lower latencies and greater levels of security than typical connections over the public internet.

NEXTDC offers three AWS Direct Connect products:

Local POP

Dedicated AWS Direct Connect is available in NEXTDC locations which have an on-site AWS Direct Connect Point of Presence (POP) and is available in 1Gbps, 10Gbps, 100Gbps and 400Gbps.

Managed Interconnect

Managed Dedicated AWS Direct Connect is for customers who require 1 or 10 Gigabit per second access into AWS. Managed Interconnect can be delivered to any AXON point of presence nationally.

Hosted Interconnect

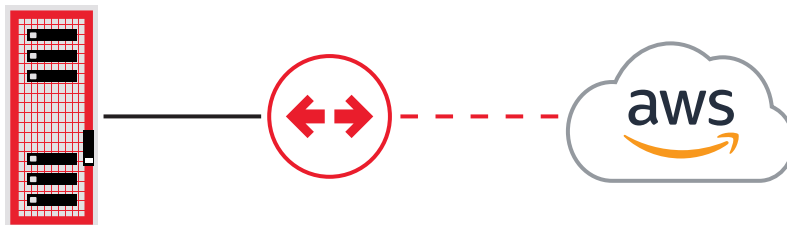
Hosted AWS Direct Connect is for customers who require 50 – 500 Megabit per second access into AWS. Hosted Interconnect services are delivered within 60 seconds of ordering to your AXON port and can be delivered to any AXON point of presence nationally.

Dedicated AWS Direct Connect

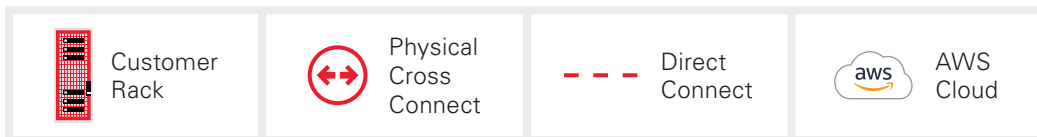
Dedicated AWS Direct Connect is available in NEXTDC locations which have an on site AWS Direct Connect Point of Presence and is available in 1Gbps, 10Gbps, 100Gbps and 400Gbps speeds.

To order use the following procedure:

- 1 Sign up for AWS Direct Connect from Amazon and order a dedicated Direct Connect port via the AWS console. You will be directly billed by Amazon for the dedicated port in addition to your usage charges.
- 2 Wait for the AWS Letter of Authority (LOA) for your dedicated Direct Connect port on the Amazon network, this letter will contain the information you need to order your cross connect and an authority to connect from Amazon.
- 3 Login to ONEDC and order a cross connect to the location mentioned in the LOA documentation.
- 4 You will receive an email from NEXTDC confirming your order, reply to this email and attach the LOA as confirmation that you are authorised to connect to AWS infrastructure.
- 5 NEXTDC will email you a notice of completion, once this has arrived your AWS Direct Connect will be ready for activation on your equipment.
- 6 Your Direct Connect will be configurable via the AWS web portal.



LEGEND



AWS Direct Connect guide

Further information on configuring Direct AWS Direct Connect can be found at:

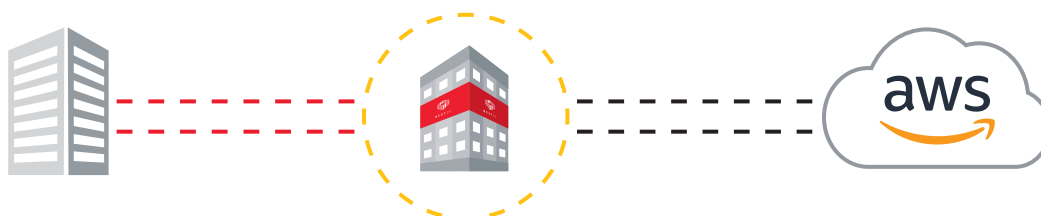
<http://docs.aws.amazon.com/directconnect/latest/UserGuide/>

Managed Dedicated AWS Direct Connect







Direct Connect from AXON (full port connection)

To order use the following procedure:

- 1 Sign up for AXON - your sales person will send you a link.
- 2 Sign up for AWS Direct Connect from Amazon and order a dedicated Direct Connect port via the AWS console. You will be directly billed by Amazon for the dedicated port in addition to your usage charges.
- 3 Wait for the AWS Letter of Authority (LOA) for your dedicated Direct Connect port on the Amazon network.
- 4 Order 1 x AXON port per AWS Direct Connect service you wish to activate via the AXON portal. You will receive an email with point of interconnect (POI) information.
- 5 Pass the LOA onto AXON. At this point AXON will arrange the physical connectivity with Amazon.
- 6 Order 1 x single mode (SMOF) cross connects per AWS Direct Connect service you wish to activate to the AXON POI from your data centre provider.
- 7 Activate your AXON port(s) by plugging the cross connects in and activating the port on your network equipment.
- 8 Order Direct Connect from your AWS Direct Connect account.
- 9 Order Elastic cross connects from AXON.
- 10 Supply AWS account ID.
- 11 Bandwidth – Available options (1Gbps or greater).
- 12 Select VLAN ID(s) for AXON to deliver AWS Direct Connect on your AXON port.
- 13 AXON will provision and activate your AWS Direct Connect.
- 14 Configure Layer 3 routing via your AWS account.



LEGEND

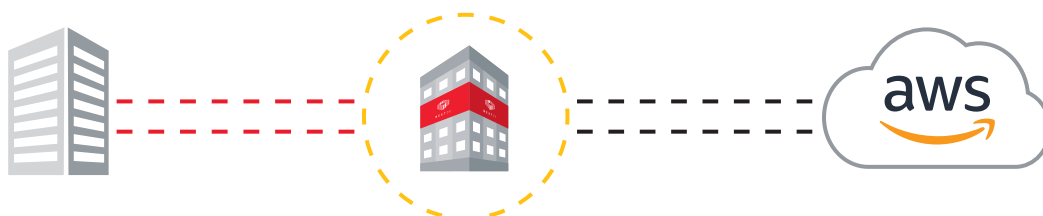
 Customer	 Patch Cable	 AWS Direct Connect
 NEXTDC Data Centre	 Elastic Cross Connect	 AWS Cloud

Hosted AWS Direct Connect







Direct Connect from AXON

To order use the following procedure:

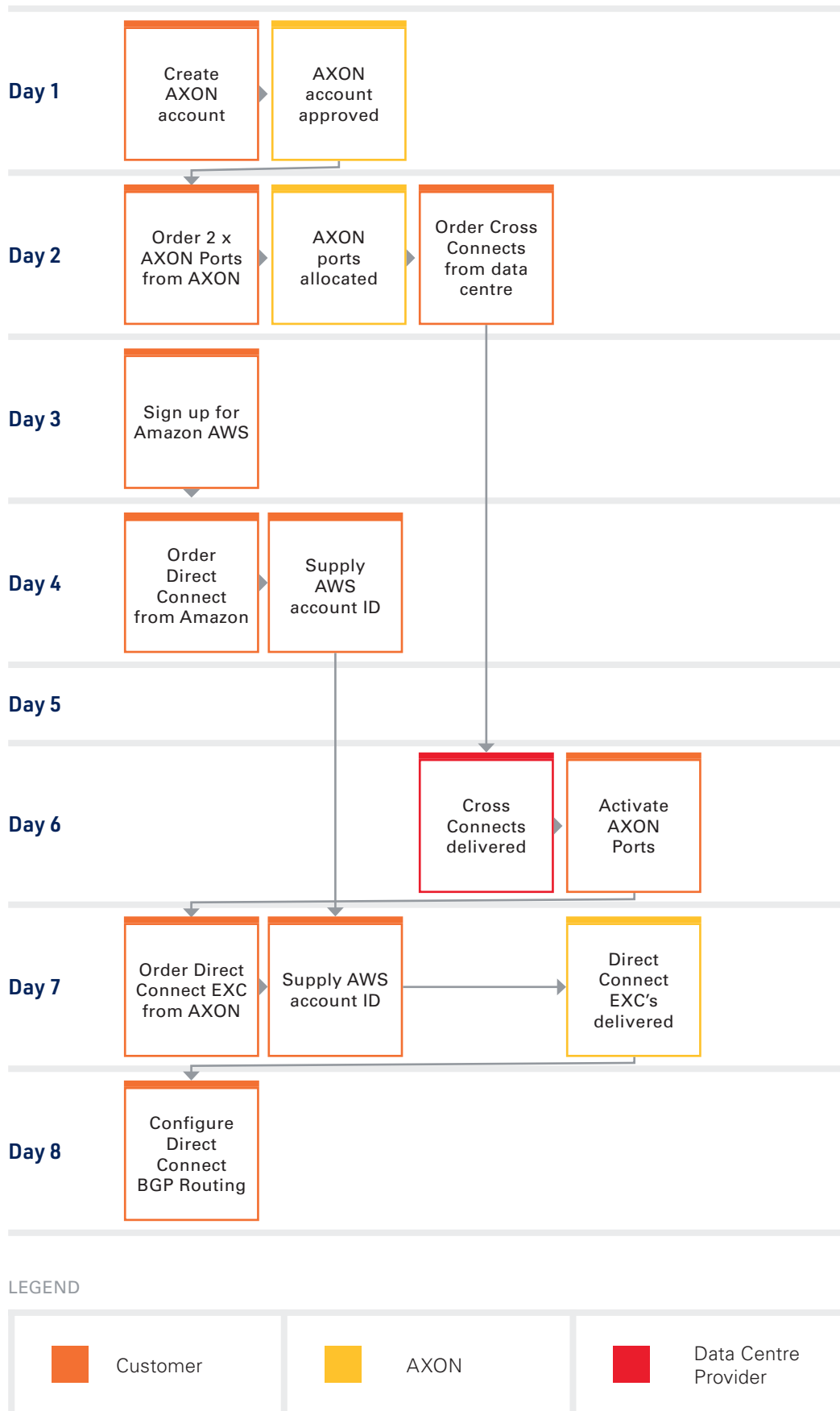
- 1 Sign up for AXON - your sales person will send you a link.
- 2 Order 1 x AXON port per AWS Direct Connect service you wish to activate via the AXON portal. You will receive an email with point of interconnect (POI) information.
- 3 Order 1 x single mode (SMOF) cross connects per AWS Direct Connect service you wish to activate to the AXON POI from your data centre provider.
- 4 Sign up for AWS Direct Connect from Amazon.
- 5 Activate your AXON ports by plugging the cross connects in and activating the port on your network equipment.
- 6 Order Direct Connect from your AWS Direct Connect account
- 7 Order Elastic cross connects from AXON.
- 8 Supply AWS account ID.
- 9 Bandwidth – Available options (50Mbps, 100Mbps, 200Mbps, 300Mbps, 400Mbps, 500Mbps, 1Gbps, 2Gbps, 5Gbps and 10Gbps).
- 10 Select VLAN ID(s) for AXON to deliver AWS Direct Connect on your AXON port.
- 11 AXON will provision and activate your AWS Direct Connect.
- 12 Configure Layer 3 routing via your AWS account.



LEGEND

	Customer	 Patch Cable	 AWS Direct Connect
	NEXTDC Data Centre	 Elastic Cross Connect	 AWS Cloud

Onboarding process



Technical requirements

Following are the minimum requirements to connect to AWS Direct Connect via AXON:

Item	Qty	Comment
Single Mode Fibre (SMOF) Cross Connect	1	1 x dual core SMOF cross connect is required to interconnect with AXON for connection to Direct Connect.
1Gbps, 10Gbps, 40Gbps or 100Gbps Network Switch or Router	1	You can connect to AXON using either a router or a switch. If you choose to use a switch, you will need to pass Direct Connect traffic to a BGP capable router via appropriately dimensioned connectivity.
1Gbps, 10Gbps, 40Gbps or 100Gbps Network Optics	1	Optic options are: <ul style="list-style-type: none"> ■ 1G-LX (10KM)* ■ 10G-LRL (1KM) ■ 10G-LR (10KM) ■ 40G-LRL (1KM) ■ 40G-LR (10KM) ■ 100G-LR4 (10KM) If your vendor only supplies LR optics and you are in the same data centre as the AXON POI, please order 1km (LRL) optics from AXON as they are compatible with 10km (LR) vendor optics. *You will need to set a 1Gbps port that connects to a 1G AXON port to 1G/full-duplex.
BGP Router	1	A BGP capable router is required to connect to Direct Connect.
Autonomous System Number (ASN)	1	You will require a BGP ASN to connect to Direct Connect.
Amazon AWS Account ID	1	To sign up for Direct Connect you will require a working AWS account ID with active virtual networking resources in it.

More information

For more see the redundancy section of this web page:

<http://docs.aws.amazon.com/directconnect/latest/UserGuide/getstarted.html>

Redundant design requirements

Following are the minimum requirements to connect to Amazon Direct Connect via AXON:

Item	Qty	Comment
Single Mode Fibre (SMOF) Cross Connect (Pair)	2	2 x dual core SMOF cross connects are required for port and switch redundancy connection to AXON. You may also consider requesting cable path diversity from your carrier and/or data centre provider.
1Gbps, 10Gbps, 40Gbps or 100Gbps Network Switches or Routers	2	You can connect to AXON using either routers or switches. If you choose to use switches, you will need to pass Direct Connect traffic to BGP capable routers via appropriately dimensioned connectivity.
1Gbps, 10Gbps, 40Gbps or 100Gbps Network Optics	2	Optic options are: <ul style="list-style-type: none"> ■ 1G-LX (10KM)* ■ 10G-LRL (1KM) ■ 10G-LR (10KM) ■ 40G-LRL (1KM) ■ 40G-LR (10KM) ■ 100G-LR4 (10KM) If your vendor only supplies LR optics and you are in the same data centre as the AXON POI, please order 1km (LRL) optics from AXON as they are compatible with 10km (LR) vendor optics. * You will need to set a 1Gbps port that connects to a 1G AXON port to 1G/full-duplex.
BGP Routers	2	Two BGP capable routers to connect to Direct Connect.
Autonomous System Number (ASN)	1	You will require a BGP ASN to connect to Direct Connect.
Amazon AWS Account ID	1	To sign up for Direct Connect you will require a working AWS account ID with active virtual networking resources in it.

More information

For more see the redundancy section of this web page:

<http://docs.aws.amazon.com/directconnect/latest/UserGuide/getstarted.html>

AWS Direct Connect peering

Step 1

Connecting to AWS via AXON.

Once AXON completes the provisioning of the AWS Direct Connect, you will see Hosted Connection in “pending acceptance” state under “Direct Connect” menu of AWS Console.

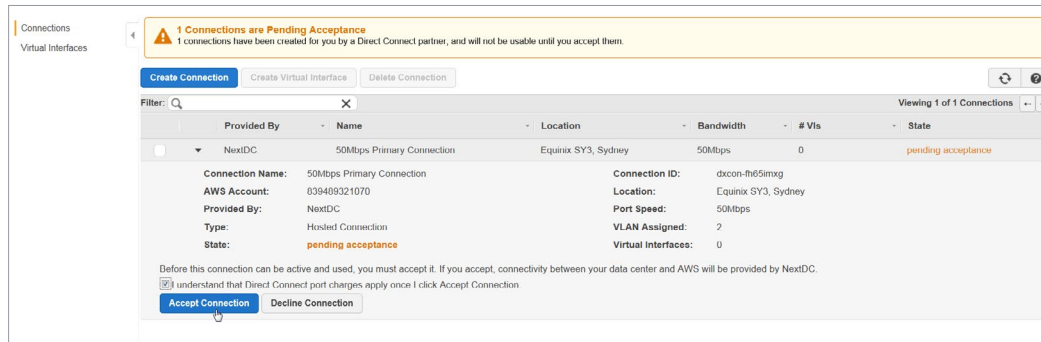


Image 1: AWS Hosted Connection in Pending Acceptance State

During completion of this phase you will receive AWS Direct Connect provisioning completion email by AXON.

Step 2

Accept the Hosted Connection.

Accept the connection Provided by “AXON”. Once the connection has been accepted the connection will appear as below in “pending” state.

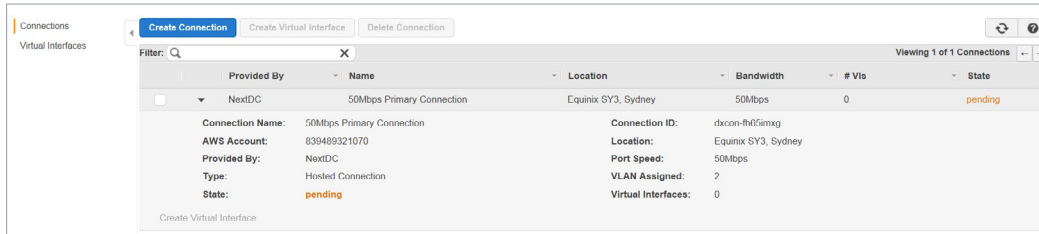


Image 2: AWS Hosted Connection in Pending State

After few minutes Hosted Connection goes to available state. This time can vary.

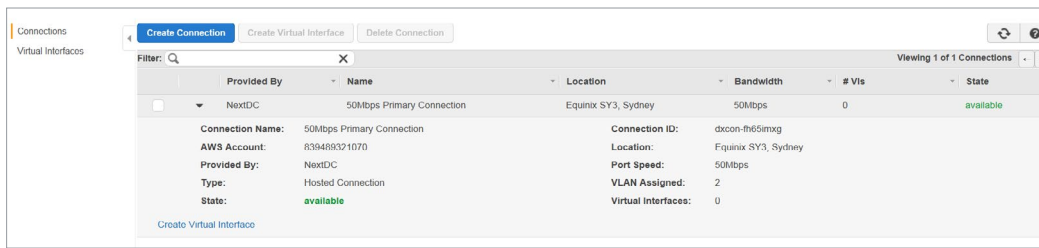


Image 3: AWS Hosted Connection in available state

Step 3

Create AWS Virtual Private Gateway.

Create virtual interface in order to setup the peering between your AXON connected equipment and AWS VPC (Virtual Private Cloud).

Create Virtual Private Gateway under “AWS -> Networking -> VPC”.

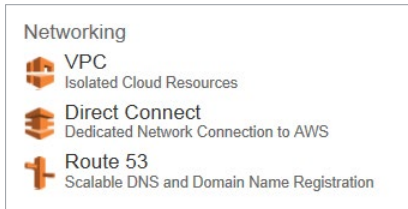


Image 4: AWS Console Networking Menu

After selecting VPC select “Virtual Private Gateway” as follows.

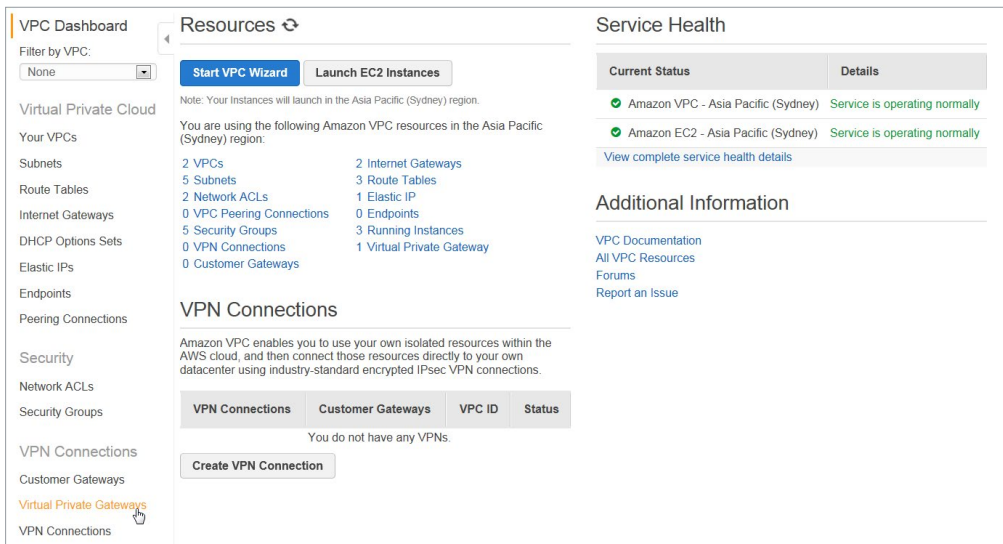


Image 5: AWS VPC Dashboard

Then Create Virtual Private Gateway as follows.

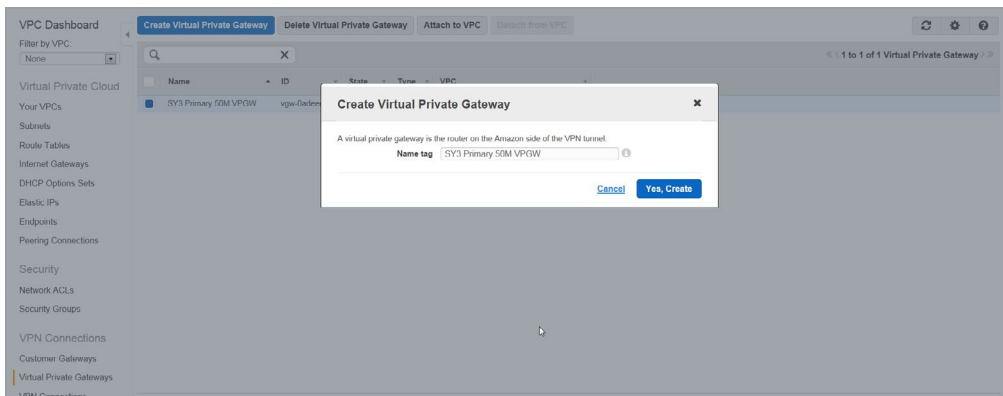


Image 6: Creating Virtual Private Gateway in AWS

Step 4

Attach Virtual Private Gateway to VPC.

After selecting the newly created Virtual Private Gateway, attach it to VPC as follows.

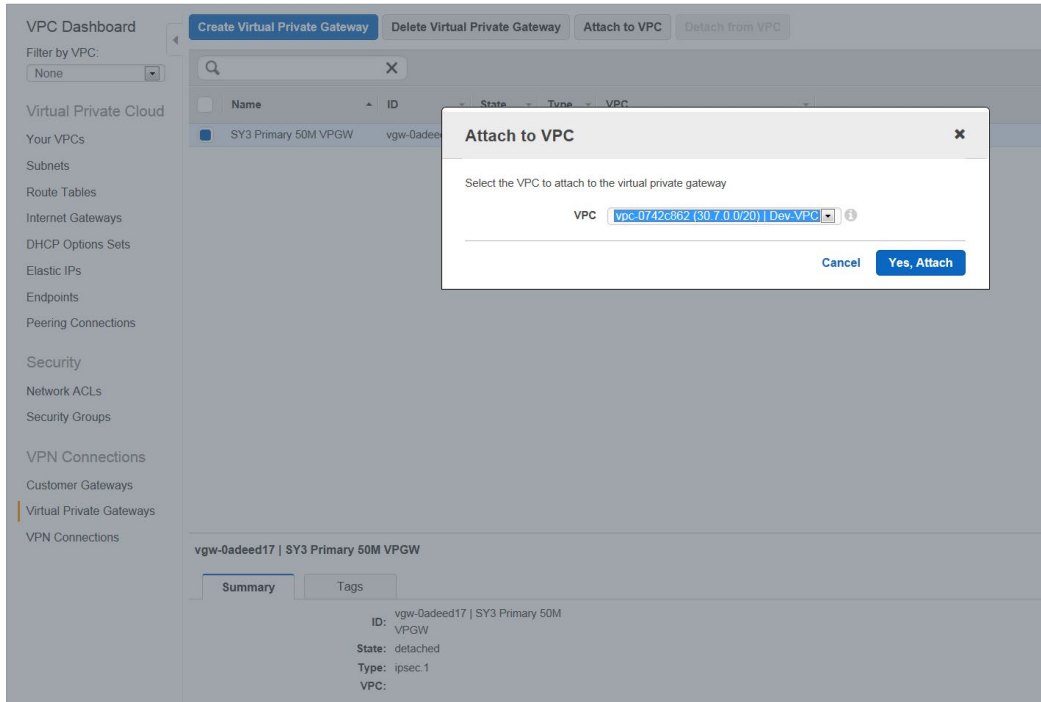


Image 7: Attaching Virtual Private Gateway in AWS

Step 5

Create AWS Virtual Interface with BGP peering.

Once VPC configuration has been completed we can create a Virtual Interface under Connections.

Click on Create Virtual Interface as follows.

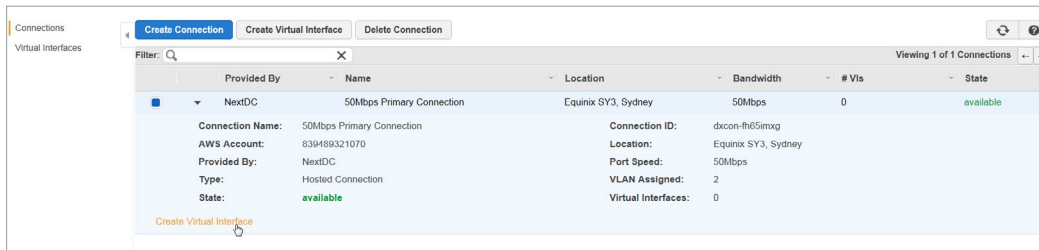


Image 8: Create Virtual Interface in AWS

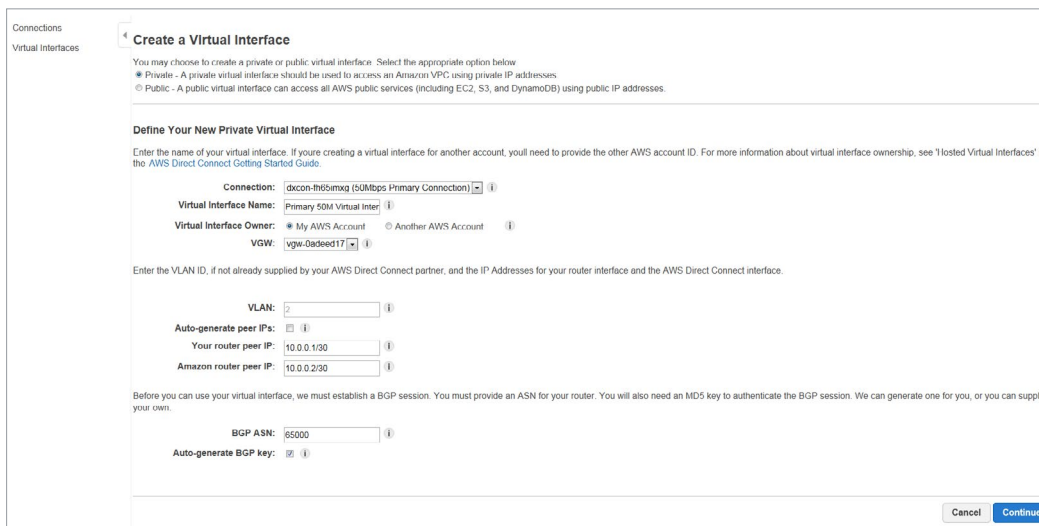


Image 9: Virtual Interface Configuration in AWS

Once the Virtual Interface is created it will show as state “pending” initially and move to “down”.



Image 10: Virtual Interface in pending state

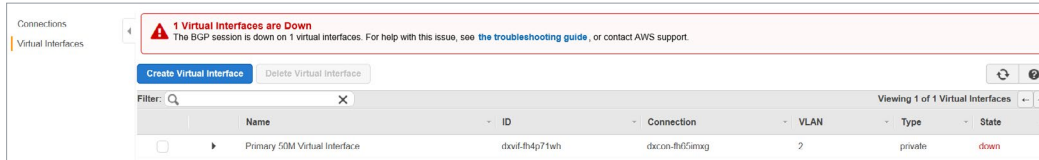


Image 11: Virtual Interface in down state

Then configure the local site according to the specified BGP information.

Once BGP peering establishes the state of the virtual interface will change to “available”.

Step 6

Setup BGP peering.

The final step is to setup the BGP peering according to the information specified in the Virtual Interface.

Two options were given by AWS for the BGP peering setup:

- **Active/Active (BGP Multipath)**
Network traffic will get load balanced across connections.
This is the AWS recommended method and AWS end default configuration
- **Active/Passive (Failover)**
One BGP peering is active and other one is standby

If active connection becomes unavailable, all traffic routed via passive path.

Routing of AWS Direct Connect

Depending on the setup traffic flow will get demanded.

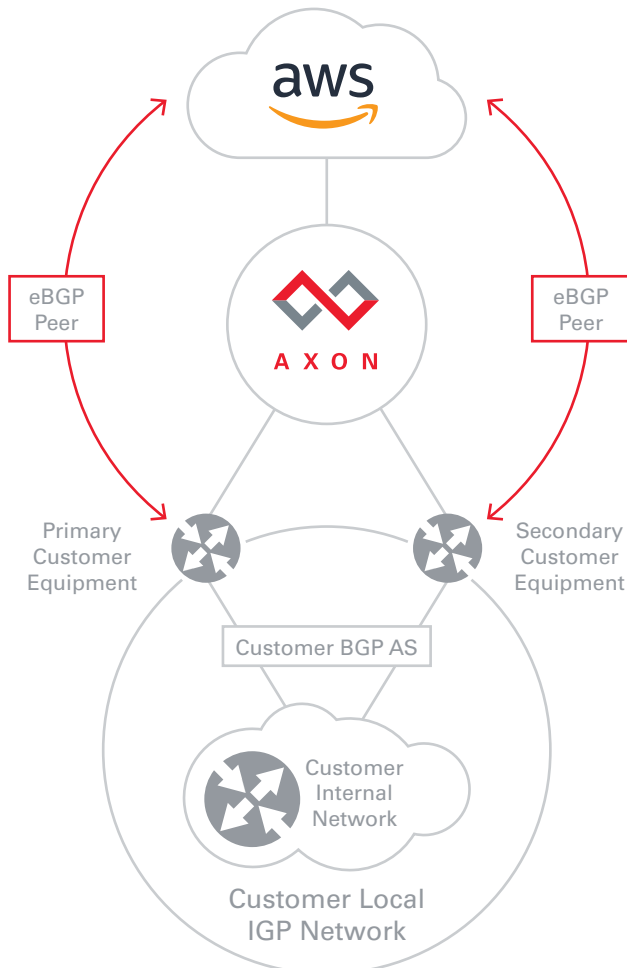


Image 12: BGP peering setup for AWS

Refer to AWS user guides for further information.

Handoff options

When ordering Direct Connect via AXON you will need to use the following handoff options:

- VLAN Trunk Mode (802.1q)

Item	Qty	Comment
HANDOFF - VLAN Trunk Mode (802.1q)		
Direct Connect VLAN IDs	1 or 2	You will need to provide the local VLAN IDs for each of your Direct Connect peering sessions.

AXON port specifications

Interface options

Following are the standard interface options to connect to AXON.

If you have a specific requirement that is not covered by these options, please contact your account manager.

Speed (Gbps)	Distance	Optic type
1 Gbps	10 KM	1G-LX*
10 Gbps	1 KM	10G-LRL
10 Gbps	10 KM	10G-LR
40 Gbps	1 KM	40G-LRL
40 Gbps	10 KM	40G-LR
100 Gbps	10 KM	100G-LR4

LRL optics are compatible with LR optics, if your vendor only supplies LR optics and you are interconnecting with us over fibre that is shorter than 1km you should select LRL and use appropriate attenuators.

* You will need to set a 1Gbps port that connects to a 1G AXON port to 1G/full-duplex.

Service attributes

Service attributes	Parameter
MAC Layer	802.3-2002
MTU	9100
Port Mode	802.1q Trunk
VLAN Ethertype	0x8100

MTU of 9100 is valid for AXON network components. Please check the capabilities of the party you are connecting to.

NEXTDC support contacts

AXON help desk

The AXON help desk 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

A copy of our Terms and Conditions and Service Level Agreement can be found here:

<https://www.nextdc.com/axon-terms-of-service>

Glossary

AXON network

Term	Explanation
AXON Enabled data centre (DC)	A data centre containing an AXON point of interconnect (POI).
Campus	A cluster of AXON DC's which are close to each other and are treated as if they are one data centre.
Cross Connect	<p>A pair of single mode optical fibre (SMOF) cables connecting the customer to an AXON point of interconnect (POI).</p> <p>One Cross Connect is required for every AXON port.</p>
Cross Connect - Local	A physical cross connect for which both the A-END and B-END reside in the same AXON DC.
Cross Connect - Carrier	A physical cross connect in which the B-END is external to the AXON DC it is connecting to. eg. A cross town dark fibre, Ethernet or wavelength service.
Edge Switch	AXON System's customer facing network equipment.
Fabric	<p>A network region usually defined by city, state/territory or international borders.</p> <p>AXON is built as a series of fabrics (Sydney, Melbourne, Brisbane etc.) or network islands which are interconnected by partner carriers.</p>
Interconnect	A Cross Connect and an AXON port used to physically connect customers to the AXON fabric.
Point of Interconnect (POI)	The fibre patch panel that customers order cross connects to. Generally located in the carrier interconnect room of an AXON DC.
Single Mode Optical Fibre (SMOF)	Optical fibre cable which complies with or exceeds ITUT Recommendations G.652 or G.652D.

AXON products

Term	Explanation
AXON port	The physical switch port on an AXON edge switch that is allocated to an AXON customer. This is the point of demarcation between AXON and its customers.
Ethernet Cross Connect (EXC)	A layer 2 interconnect between two or more AXON ports.
Direct Connect Local POP	An AWS Direct Connect service delivered directly to the customer over a fibre cross connect. Direct Connect Local POP is available in NEXTDC locations which have an on site AWS Direct Connect Point of Presence (POP) and is available in 1 or 10 Gigabit per second speeds.
Direct Connect Managed Interconnect	Managed Interconnect is for customers who require 1 or 10 Gigabit per second access into AWS. Managed Interconnect is delivered over AXON and can be delivered to any AXON point of presence nationally.
Direct Connect Hosted Interconnect	Hosted Interconnect is for customers who require 50 – 500 Megabit per second access into AWS. Hosted Interconnect is delivered over AXON and can be delivered to any AXON point of presence nationally.

AXON connected entities

Term	Explanation
Customer	A business or organisation that has signed up for an AXON account with a view to consuming AXON delivered services.
Integration Partner	An IT/network service organisation that has signed up for an AXON account with a view to using AXON to deliver value added products and services to their customers.
Carrier	A licensed carrier who owns significant physical network assets, has signed a carrier agreement and has interconnected with AXON with a view to consuming AXON delivered services.
Partner Carrier	A licensed carrier who owns significant physical network assets, has signed a partner carrier agreement and has interconnected with AXON with a view to consuming and also selling AXON delivered services which can be rapidly provisioned, modified and torn down ideally via API offering on demand elastic purchasing options in line with the overall ethos of the AXON product set.
Cloud Provider	A business or organisation which delivers high value cloud based services targeted at the SMB/enterprise & government markets. Cloud providers must own unique infrastructure or intellectual property which operates at scale, can be rapidly provisioned via API and offers on demand elastic purchasing options in line with the overall ethos of the AXON product set.