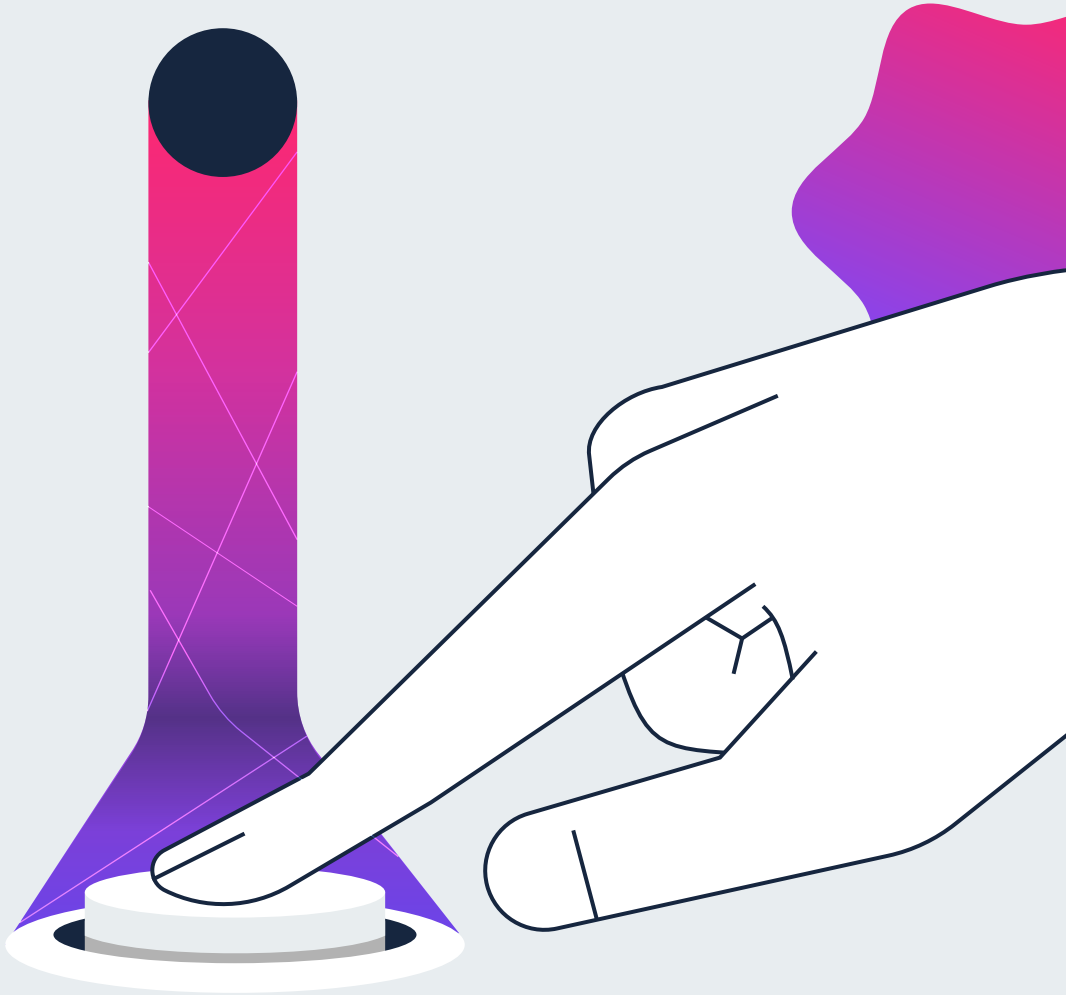
consoleconnect

The simpler, **smarter way to connect**

Internet on-demand

Service specification



consoleconnect.com

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Note:

- This Service Specification is for informational purposes only and does not form part of the Agreement between the customer and Console Connect.
- Console Connect reserves the right to amend this Service Specification at any time without notification.
- All information contained in this document shall not be published or disclosed wholly or in part to any other party without Console Connect's prior permission in writing.

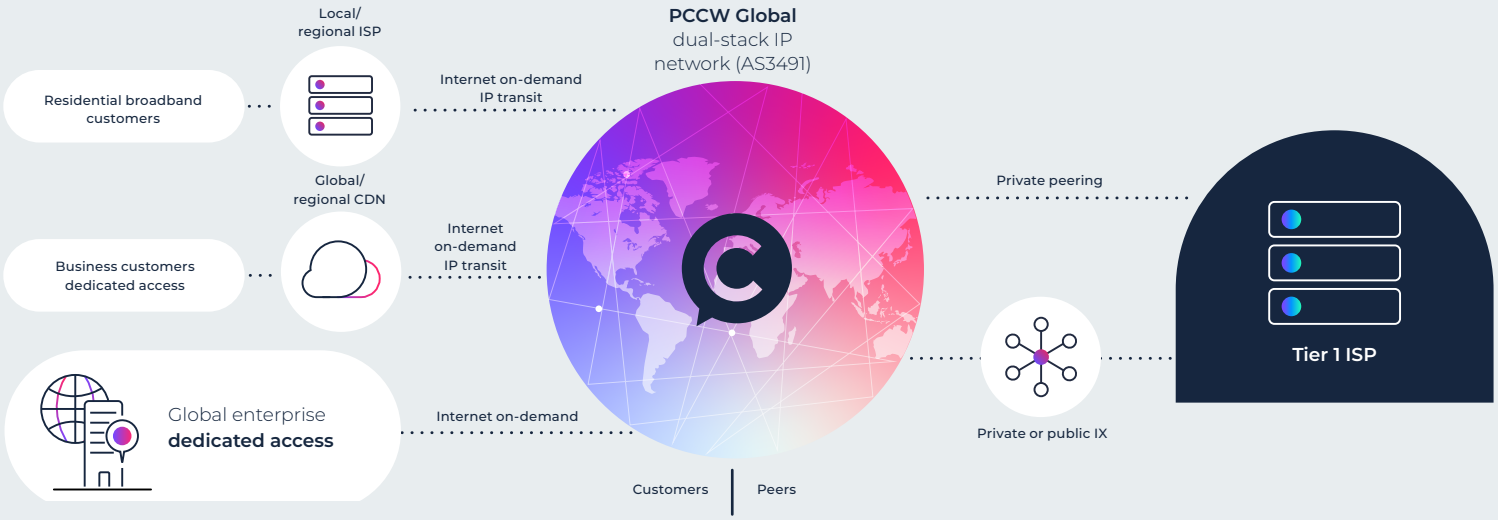
1. Introduction

Console Connect Internet On-Demand (IO-D) service is carried on a fully redundant dual-stack global IP network, providing an extensive range of internet connectivity and value-added services. It allows customers to provide internet connectivity to their existing sites on the Console Connect platform, providing the following additional benefits:

- Scalability for future bandwidth expansion. Network bandwidth can be upgraded and downgraded easily.
- Low-cost high-bandwidth connectivity to geographically separate sites.
- Minimise operating costs and increase security by connecting multiple services to a single internet connection.

Internet On-Demand services have a 1:1 contention ratio and can provide IP Transit for wholesale customers.

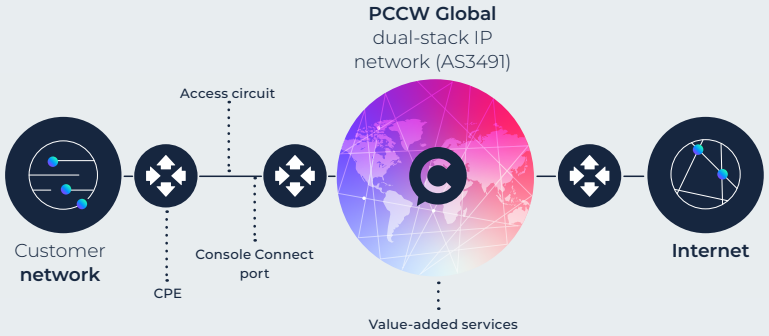
A Service Level Guarantee (SLG) is available for the service provided.
For details, please refer to the "Specific Terms for Internet On-Demand Service".



2. Service components

Each Internet On-Demand service consists of the following components, connecting the customer to the internet:

- Customer Premises Equipment (CPE)
- Access Circuit
- Console Connect Port
- Value-added services (optional)



2.1. Access circuit and console connect port

An Ethernet Access Circuit connects the customer's network to the internet via an Ethernet port (UNI) at the Console Connect PoP's PE router, with the following service parameters.

	Service Parameters	Service Requirements
1	Physical interface	**See the Console Connect Port Specification for available physical interface types.**
2	Default Ethernet & IP MTU size	Ethernet: 1522 bytes (802.1q tagged) IP: 1500 bytes
3	Encapsulation	802.1q (tagged)
4	Mode of operation	1Gbps/10Gbps full duplex

2.1.1 VLANs and bandwidth allocation

Internet On-Demand supports a physical UNI capable of carrying multiple Console Connect services. Each service is mapped to a specific VLAN on the Access Circuit between PE and UNI and has its own bandwidth allocation according to the service subscribed.

2.1.2 IP addressing

Each Internet On-Demand service is delivered via an Access Subnet; a /31 IPv4 subnet used for the purpose of delivering the Internet On-Demand service to the customer's equipment over the Access Circuit via the specified VLAN.
The lowermost IP address in the access Subnet is reserved for use on the provider side of the Access Link ("Console Connect Port IP Address"). The higher IP address in the Access Subnet is reserved for use on the customer side of the Access Circuit ("Customer Equipment IP Address").

2.2. Customer premises equipment

The customer will either supply and operate their own router, or Console Connect can provide a Managed Router Service, sold and managed separately from the Console Connect Internet On-Demand service.

2.3. Value-added services

The following services are provided free of charge:

- DNS resolution
- Looking glass
- Speedtest.net servers
- Oblivious DNS over HTTPS (ODoH) proxy

The following services attract a charge:

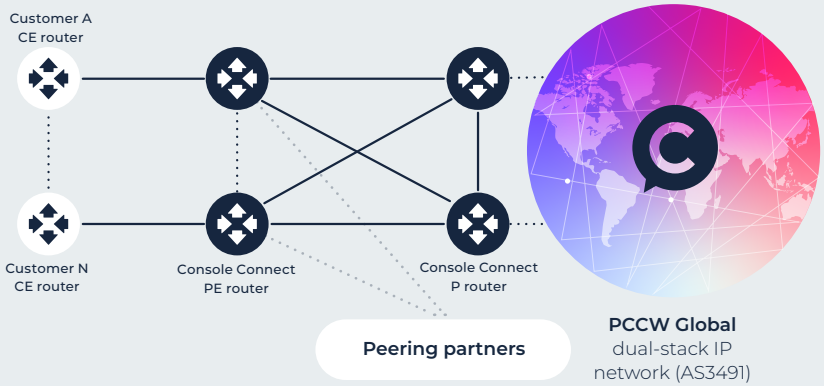
- Public IP address space assignment.
- Managed Router
- Anti-DDoS/DDoS Protection
- Console Connect Managed Firewall
- SD-WAN
- Internet of Things (IoT)

Further information on value-added services can be found in section 6 of this Service Specification.

3. Technical specifications

Service Parameters	Console Connect Internet On-Demand service
Physical port interface type:	As described in 2.1
Physical port speed:	1Gbps to 10Gbps
Service bandwidth	From 1Mbps to 10Gbps with 1Mbps increments.
Contention ratio:	1:1 (no contention)
Monthly Recurring Charge (MRC) options:	Flat-rate billing, MRC only.

4. Point of Presence (PoP) setup



A typical IP PoP consists of the following:

- **P Routers** – Core routers that are used to carry traffic among IP PoPs within Console Connect's IP network. In order to reduce the possibility of IP PoP isolation, each IP PoP is connected to at least two other IP PoPs wherever possible. Each IP PoP pair is connected by at least two different cable systems, or in the case that a single cable system is used, a self-healing cable system.

- **PE Routers** – Access routers that are used to terminate Console Connect's customer and peering connections in Console Connect's IP network. Each PE Router has uplinks to multiple P Routers (where possible) for load sharing and resiliency purposes.

5. IP routing

5.1. Routing protocol

Console Connect supports the following options for routing between Console Connect and customer networks:

5.1.1 Dynamic routing - BGP

The customer's router will establish a BGP session with Console Connect's PE router. Based on the BGP community used and Routing Profile selected, the customer can control how their traffic is routed to and from the internet.

Customers may use either a public or private Autonomous System Number (ASN).

- Public ASN

Customers who have their own public ASN and IP address space may use these resources to connect to their Internet On-Demand service.

Public ASN customers are typically multi-homed (connected to two or more providers) and wish to route their IP address blocks as prefixes of /24 or larger on the public internet.

- Private ASN

Customers without a public ASN can be assigned a private ASN for use with the Internet On-Demand service. Console Connect will assign an ASN in the 4-byte private range, between 4200000000 and 4200009999 inclusive.

Private ASNs are typically used by customers who only need to communicate via BGP with a single provider. Their public IP address blocks are advertised in aggregate by Console Connect.

5.1.2 Static Routing

Static routing is not currently available, but is on the product roadmap.

5.2. BGP communities

5.2.1 Outbound BGP communities

BGP communities are available to customers to manipulate route filtering and perform traffic engineering. BGP Community tags are added in the routes announced by Console Connect to the customer, indicating:

1) From which region within Console Connect's IP network the routes are being learnt.

2) Whether the routes are learnt from Console Connect's peers or its customers. This information helps customers to perform route filtering or set local preference to manipulate their outbound traffic towards Console Connect.

Please refer to whois for the complete and current list of outbound communities.

5.2.2 Inbound BGP communities

Customers may also wish to use BGP communities to influence the inbound traffic path.

Customers with IP address assignments of /24 or larger may use all communities specified in the whois aut-num object for AS3491.

Customers with assignments smaller than /24 may use the communities specified in the following sections of the whois object:

- 2.1 Set local preference
- 2.4 Blackholing, and
- 2.5 Do not export to region.

Please refer to whois for the complete and current list of BGP communities.

5.2.3. Blackhole BGP community

This community allows customers to tag a specific customer IP address and instruct Console Connect to black hole it within AS3491. The community is 3491:999.

5.3. Routing profiles

The following routing profiles are available to customers who interconnect with Console Connect via BGP using their own public IP address space and public ASN. Customers using a private ASN will receive a Standard (with default route) Routing Profile.

5.3.1. Standard routing profile

The Standard Routing Profile is available:

- In all Console Connect IP PoPs.
- To customers using IPv4 (IPv6 profiles are on the product roadmap).

For each Internet On-Demand circuit, one BGP session will be established with the directly connected PE. The actual route announcement depends on the Standard Routing Profile option chosen.

	Standard routing profile options	Routes announcement CE to PE	Routes announcement PE to CE	Default traffic routing
1	Standard (with full routes) (i)	Customer's IP prefixes	Full internet routes	CE to PE/PE to CE traffic going to/ coming from the internet
2	Standard (with default route)	Customer's IP prefixes	Default route only	CE to PE/PE to CE traffic going to/ coming from the internet
3	Standard (with full routes + default route) (ii)	Customer's IP prefixes	Full internet routes + default route	CE to PE/PE to CE traffic going to/ coming from the internet

NOTE:
i) Standard (with full routes) is the default option for Standard Routing Profile
ii) Standard (with full routes + default route) is not currently available, but is on the product roadmap.

5.3.1.1. Routing to China from PoPs in Asia

In the case of Asia-based PoPs, the Internet On-Demand service will direct traffic for China through a more economical (but higher latency) path via
the US west coast.

5.4 Prefix announcement policy

Customers who wish to route their own IP address blocks must connect via BGP with a public ASN. Public ASN customers must adhere to the Customer IP Prefix Policy to ensure their prefixes are properly announced to the internet.

The Customer IP Prefix Policy does not apply to private ASN customers, who are not permitted to advertise IP prefixes other than those assigned by Console Connect. IP address blocks assigned to private ASN customers will be advertised to the internet in aggregate on their behalf under PCCW Global's AS3491.

6. Value-added services

6.1. Looking glass

A web-based looking glass is available for customers to examine the performance of PCCW Global's IP network (AS3491) to and from the internet.
lookingglass.pccwglobal.com

It allows customers to perform a ping or traceroute from:
- Any AS3491 PoPs to another AS3491 PoP (on-net).
- Any AS3491 PoP to any internet destination in the form of IP address or domain name (off-net).

6.2 Public IP address space

6.2.1 Public ASN

Customers using a public ASN and their own IP address blocks may request additional address space from Console Connect. Please contact sales@consoleconnect.com for more information.

6.2.2 Private ASN

Customers using a private ASN can only use the IP addresses assigned by Console Connect for their Internet On-Demand service. IP address blocks from /28 to /26 are available via Console Connect. For larger blocks, please contact sales@consoleconnect.com.

6.3 Managed router service

Many customers prefer to outsource the provisioning and management of their Customer Edge (CE) routers, which connect to the Console Connect network.

Console Connect's Managed Router Service provides different service packages from pure CE router management to a full 'one stop shop' service, including CE router rental, maintenance and management for all Internet On-Demand customers.

6.4 Anti-DDoS

DDoS (Distributed Denial of Service) attacks have become a great security threat, especially to customers who operate popular websites or do business via the internet.

Console Connect offers its anti-DDoS service in two packages, On-Demand and Hybrid.

In the On-Demand package, we monitor your internet traffic utilization at your CE router for possible DDoS attacks. When a DDoS attack is detected, all traffic destined for the victim IP will be manually rerouted to an intelligent filtering device. The attack traffic will be filtered out and legitimate traffic sent onwards to your network.

In the Hybrid package, an Intrusion Prevention System (IPS) is provided and installed in your premises. The IPS will monitor all internet traffic for possible DDoS attacks. When a DDoS attack is detected, the IPS will perform auto-mitigation on suspicious traffic. If the traffic volume is so large that the internet link is saturated, the DDoS attack traffic will be routed (upon customer approval) to our Premium Scrubbing Center for traffic mitigation.

An online Anti-DDoS Customer Portal allows you to view the above processes online.

Note: Anti-DDoS is not available for pure IPv6 connections. For dual-stack connections, Anti-DDoS is available for only the IPv4 portion.

For more information, visit https://www.consoleconnect.com/services/managed-services/security/.

6.5 Managed firewall

From installation, operation, upgrade, and maintenance, to parts and end-of-life/end-of-support process monitoring, Console Connect's Managed Firewall Service takes the overhead out of regular configuration and maintenance tasks that can be tedious and time-consuming.

We support offerings from the leading firewall vendor Fortinet. Combined with our Threat Intelligence and Management Service, organisations get a reporting dashboard and firewall configuration system, along with professional services for firewall management, security monitoring and incident reporting.
For more information, visit https://www.consoleconnect.com/services/managed-services/security/

6.6 SD-WAN

Console Connect SD-WAN leverages broadband internet connectivity to reduce unnecessary traffic on your MPLS network, leaving capacity for mission-critical applications.

Dual edge devices, distributed gateways and multiple connectivity options mean reduced downtime, with zero-touch provisioning.

Our end-to-end management portal gives you complete control, safe in the confidence that mission-critical applications have the security and bandwidth they need.

For more information, visit www.consoleconnect.com/services/sd-wan.

6.7 Internet of things (IoT)

Simplify the ordering, deployment and change management of your entire global IoT network with Console Connect.

From real-time activation and deactivation of devices, service configuration and traffic monitoring, you benefit from end-to-end control and visibility over your global IoT assets.

The Console Connect IoT service is delivered via our extensive worldwide mobile 2G, 3G and 4G partner networks and supported by our extensive private global MPLS infrastructure.

End-to-end IoT connectivity can be very complex, often involving a combination of local and international connections, leased lines, public internet, mobile and Wi-Fi networks, private and public clouds.

Console Connect IoT simplifies the ordering, deployment and change management of your entire global IoT network.

For more information, visit www.consoleconnect.com/services/iot.

6.8 Speedtest server

Speedtest servers are set up in selected Console Connect PoPs to allow customers to test the download and upload performance of their Internet On-Demand connections. Contact us to find out more.

6.9 DNS resolution

To ensure compliance with any content filtering laws in individual countries or legal jurisdictions, it is recommended that customers use country-based open resolvers.

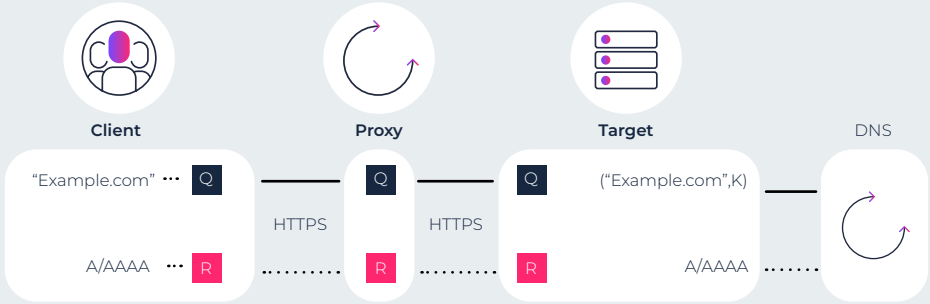
Console Connect's network is well connected to Google (8.8.8.8/8.8.4.4) and Quad9 (9.9.9.9/149.112.112.112) open resolvers.

A more complete listing of open resolvers can be found at resolve.rs

6.10 Oblivious DNS over HTTPS

Traditionally, DNS lookups are sent to resolvers in plain text, which can leave end users vulnerable to eavesdropping and man-in-the-middle attacks. DNS-over-HTTPS (DoH) addresses this issue by sending lookups over an encrypted HTTPS connection between the end host (stub resolver) and the recursive resolver. Using DoH improves privacy by preventing your queries being seen by someone lurking on public WiFi or your personal information related to your browsing behaviour being gathered and/or sold.

Oblivious DNS over HTTPS (ODoH) is a new proposed standard that adds additional privacy protections for end users. By encrypting the query and introducing a proxy, ODoH ensures that no single entity can see the user's IP address and query at the same time, as illustrated below.



Console Connect will soon provide an ODoH proxy as part of a partnership with Cloudflare.

7. Definitions

BGP	Border Gateway Protocol
CDR	Committed Data Rate; the amount of bandwidth dedicated to the service
CE	Customer Edge
CPE	Customer Premises Equipment
DNS	Domain Name System
IP	Internet Protocol
IPv4	Internet Protocol version 4
IPv6	Internet Protocol version 6
PR	Provider Router
PE	Provider Edge equipment
PoP	Point of Presence
UNI	User Network Interface, aka Console Connect Port at IP infrastructure
WAN	Wide Area Network
whois	Protocol for querying internet address and routing information

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Greece
340 Kifisias Avenue/340 Olimpionikon | Neo Psychiko 154 51 | Athens | Greece

Germany
Schillerstr. 31 | 60313 Frankfurt/M. | Germany

United States
475 Springpark Place | Suite 100 | Herndon | VA 20170 | USA

Singapore
6 Temasek Boulevard | #41-04A/05 | Suntec Tower Four | 038986 | Singapore

Hong Kong
20/F, Telecom House | 3 Gloucester Road | Wan Chai | Hong Kong

Japan
3/F Marunouchi Mitsui Building | 2-2, Marunouchi 2-chome | Chiyoda-ku | Tokyo 100-0005 | Japan

South Africa
Building 12 | 1 Woodmead Drive | Woodmead | Johannesburg 2191 | South Africa

UAU, Dubai
Office 504 & 505 | Level 5 | Arjaan Business Tower | Dubai Media City | Dubai

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Join our community of experts.

www.consoleconnect.com
Talk to us: sales@consoleconnect.com