



Software-Defined WAN (SD-WAN)

Service Description

Ensure your connectivity is a true enabler!

The **simple**, **secure** and **agile** enterprise-grade WAN connection for companies with distributed branch office locations using cloud-based applications.

Service Overview

A Software-Defined Wide-Area Network (SD-WAN) is an automated approach to managing enterprise network connectivity and circuit costs. It incorporates software-defined networking (SDN) into an application that businesses can use to quickly create a private network providing services like business-grade IP VPN, secure broadband Internet or application-aware routing with full security and QoS over WAN connections. Traffic can be automatically and dynamically forwarded across the most appropriate WAN path based on network conditions, the security and quality-of-service (QoS) requirements of the application traffic at hand, and cost of the circuit.

[Cogeco Peer 1 Software-Defined WAN](#) service provides a secure overlay network on top of underlying physical connectivity, connecting one or more physical locations including any combination of customer and Cogeco Peer 1 locations regardless if they are on-net or off-net to Cogeco Peer 1. Only control plane traffic is routed through to the Cogeco Peer 1 core network and typically uses 1-2 Kbps per SD-WAN device. The control plane is responsible for the running protocol and management software processes while the data plane is responsible for the actual forwarding of traffic data. The underlying connectivity can be one of any network connectivity services including broadband Internet, traditional MPLS or wireless mobile (wireless support coming soon). This fully managed network is cost-effective, flexible and supports quick deployment.

Cogeco Peer 1's SD-WAN service can also help customers optimize the use of their bandwidth through link aggregation and load balancing over multiple Internet uplinks over broadband, 3G/4G LTE (with an Ethernet handoff) but can also leverage traditional MPLS connections (if an Internet connection is also present).

Key Benefits

Available Anywhere – Cogeco Peer 1 can deliver SD-WAN service to virtually any business address worldwide (wherever 256-bit encryption is available) with L2/L3 support in a fully meshed or hub-and-spoke network configuration.

Quick Deployment – New locations can be turned up in as little as minutes with zero touch bootstrapping (bringing the device into the network) using two-factor authentication.

Security – Cogeco Peer 1 offers high security by employing policy-based virtual network provisioning that uses unique keys per customer per time window, thus providing secure connectivity using IKEV2 and IPSEC encryption. This ensures that the transit of an enterprise's proprietary data is fully protected and inaccessible beyond the intended origination and destination points. Additionally, 2-factor authentication is used for the SD-WAN device bootstrapping.

Underlying Connectivity Flexibility – Cogeco Peer 1 SD-WAN services can be provided over broadband Internet connectivity (using any and all transport technologies like cable, xDSL, wireless or satellite) or traditional MPLS regardless of whether Cogeco Peer 1 is providing that underlying connectivity or not. Local breakout is available, if desired, so that only certain traffic is forced through the SD-WAN network overlay.

Application Performance – Quality of Service (QoS) ensures the best available connection will always be used based on link latency, jitter and delay requirements for improved reliability and resiliency of customer business applications as well as improved performance. In addition, the customer is in complete control of steering traffic over specific preferred links through the use of layer 4 access control lists and policies the customer can implement via the self-service portal. Both BGP and static routing are supported.

Self-Service Portal – Dynamic application policy control and visibility, empowering you to manage your network in line with your business requirements. Traffic data reporting is also available for visibility of throughput (peak/average) and traffic volume for a selected duration.

Connections to Cogeco Peer 1 Services and Partner Ecosystems – Cogeco Peer 1 SD-WAN services can be used as a means of connecting to Cogeco Peer 1 data center services, including cloud offerings and partner ecosystems.

Service Reliability – Cogeco Peer 1 has developed a comprehensive network design strategy aimed at supporting the most critical enterprise network applications. Multiple points of presence, bidirectional metro rings, and a fully redundant network core support Cogeco Peer 1 SD-WAN service availability and ensure that customer data gets to where it needs to go. Link bonding and load balancing are available for customers who wish to leverage multiple physical uplinks at a particular site.

Hybrid Solutions – The Cogeco Peer 1 SD-WAN service is Layer 2 and 3 capable in support of hybrid networks. Connectivity is possible between SD-WAN and traditional MPLS, between SD-WAN and Cogeco Peer 1 DCs/POPs and between SD-WAN and public cloud offerings or SaaS providers (with Cogeco Peer 1 cloud solutions, Microsoft ExpressRoute, AWS Direct Connect, Salesforce, SAP Hana, etc.).

Redundancy and High Availability – The SD-WAN service can be deployed in a redundant and highly available manner, supporting link level and device level redundancy to eliminate single point of failures. The back-end systems are triple redundant to ensure service availability is not affected by any single point of failure.

Mitigate Net Neutrality Violations – Since all SD-WAN traffic is IPsec encrypted, the underlying ISP will not be able to interpret the data and so must treat it all the same.

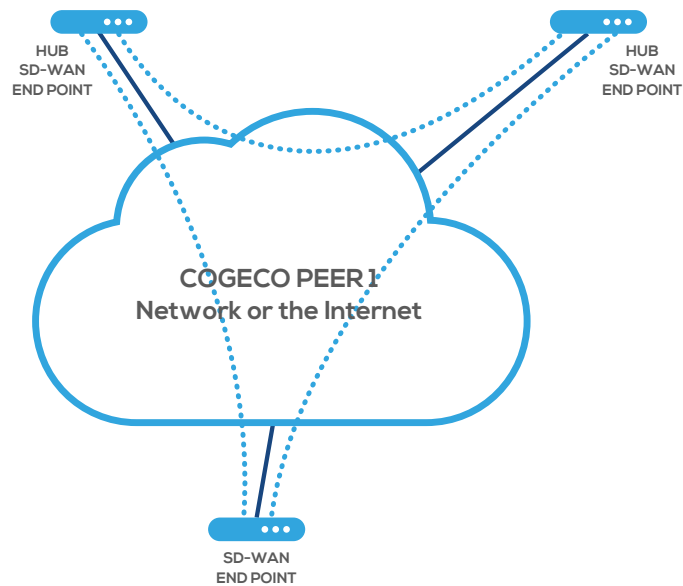
Cost Efficiency – Through link aggregation, SD-WAN can provide the ability to manage and optimize traffic over multiple infrastructure uplinks and maximize the use of bandwidth thereby lowering costs.

Network Topologies

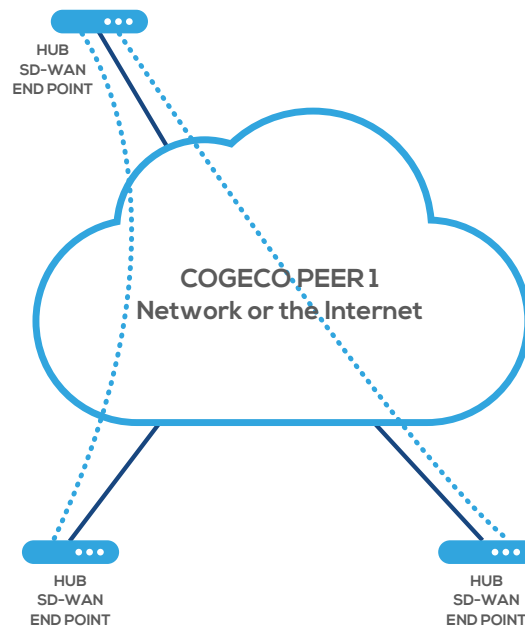
Cogeco Peer 1's SD-WAN service inherently supports a fully meshed architecture.

Customers may choose to use either:

- **Fully Meshed:** All sites have the ability to directly communicate with one another.

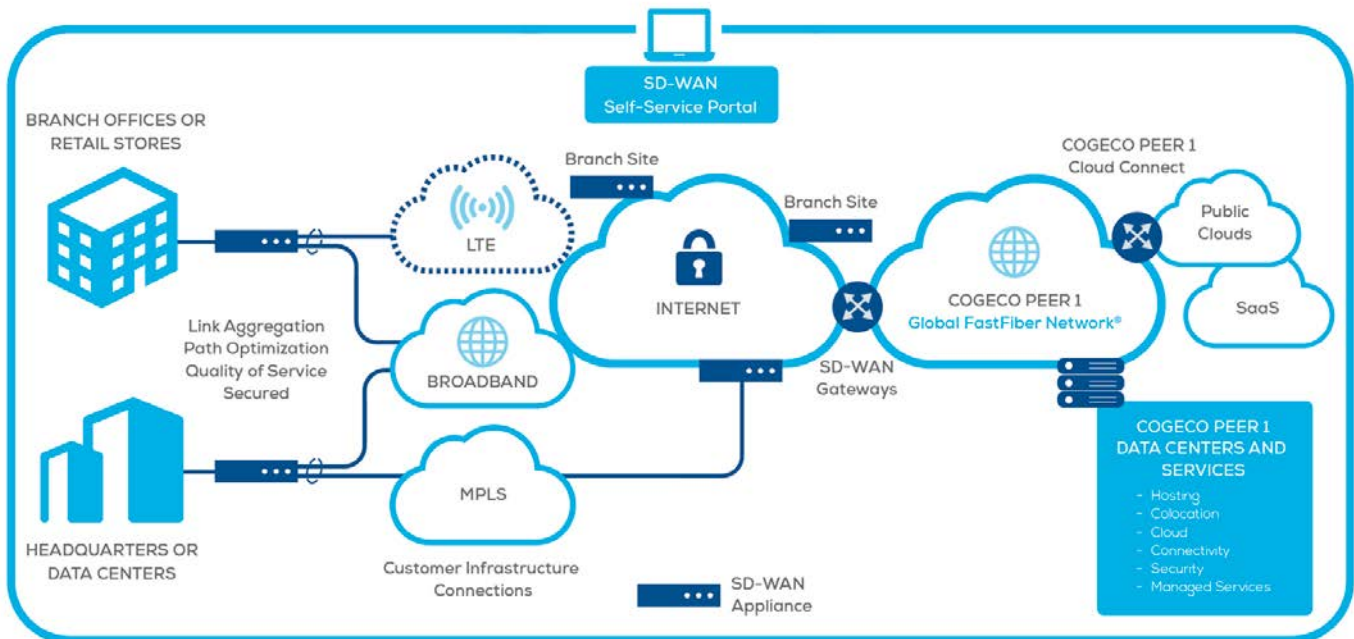


- **Hub and Spoke:** Hub and spoke sites are connected directly to one another. Spoke sites are not allowed to communicate directly with other spoke sites.



Additional topologies available on request

SD-WAN network diagram and use cases:



Service Components

The Cogeco Peer 1 SD-WAN service includes:

SD-WAN Device – Cogeco Peer 1 will ship a Network Service Gateway (NSG) device to the customer who connects it to their existing connectivity circuit. This device can be purchased outright or on a rent-to-own basis.

SD-WAN Access – The Cogeco Peer 1 SD-WAN service is an overlay network that connects the SD-WAN device with a Cogeco Peer 1 SD-WAN controller located at the closest Cogeco Peer 1 POP (point of presence) or data center.

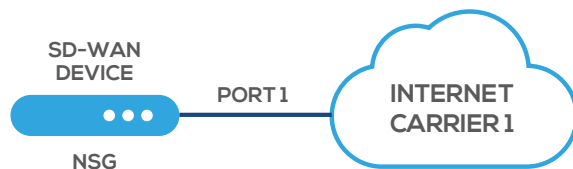
Bandwidth Options – SD-WAN Bandwidth is available from 10 Mbps to 1 Gbps. There are seven bandwidth options: 10 Mbps, 25 Mbps, 50 Mbps, 100 Mbps, 200 Mbps, 500 Mbps and 1 Gbps. The SD-WAN bandwidth subscribed to is a total of both in and out traffic.

Common Use Case Configurations

Here are the most common configurations:

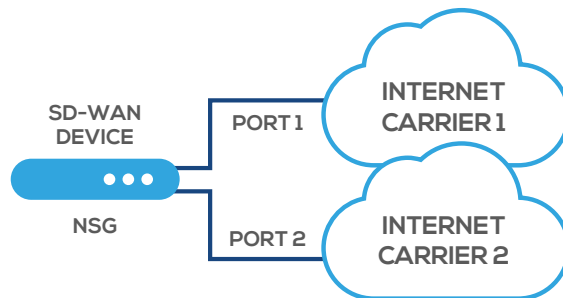
1. Single SD-WAN Device – Single Access

In the below scenario, a single SD-WAN device is deployed at the customer branch location with an uplink connection to either a Cogeco Peer 1 on-net or off-net location, regardless if the underlying Internet connectivity is provided by Cogeco Peer 1 or another provider.



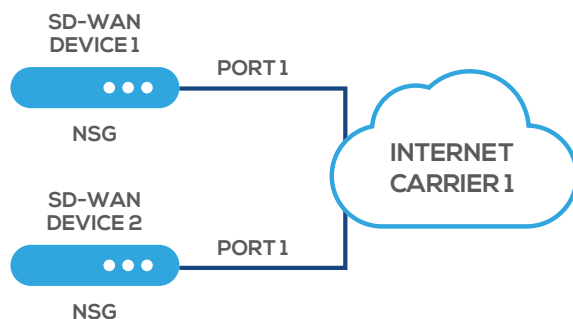
2. Single SD-WAN Device – Dual Access (for redundancy)

In the below scenario, a single SD-WAN device is deployed at the customer branch location but with dual uplinks. These uplink connections can be either on-net or off-net Internet connections in any combination, regardless if the underlying Internet connectivity is provided by Cogeco Peer 1 or another provider. The default configuration is active/standby, meaning only one uplink is used (primary) unless there is an outage on that uplink. In that case, all traffic is routed over the secondary uplink. Active/active configuration is also available for which both uplinks are used (load balancing) to provide redundancy in case one of the uplinks fails.



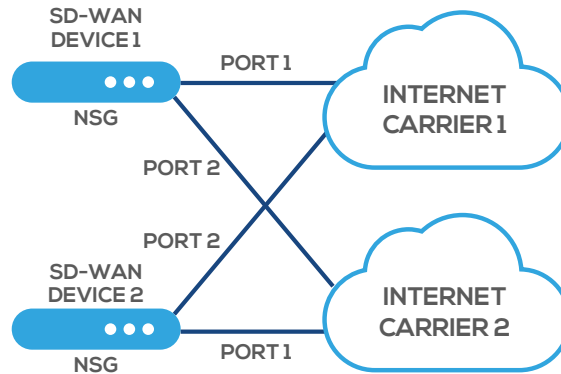
3. Dual SD-WAN Devices (for redundancy) – Single Active Access

In the below scenario, dual SD-WAN devices will be deployed at the same customer branch location. Each SD-WAN device will have a single uplink that can be either both on-net or off-net Internet connections in any combination, regardless if the underlying Internet connectivity is provided by Cogeco Peer 1 or another provider. One SD-WAN device will be active and the second SD-WAN device will be in a standby role for all subnets on the LAN side.



4. Dual SD-WAN Devices (for redundancy) – Dual Active Accesses (for redundancy)

In the below scenario, dual SD-WAN devices will be deployed at the same customer branch location. Each SD-WAN device will have a single uplink that can be either both on-net or off-net Internet connections in any combination, regardless if the underlying Internet connectivity is provided by Cogeco Peer 1 or another provider. Each SD-WAN device will have active and standby subnets defined on a per-subnet role for the LAN traffic.



Key Features

NETWORKING	AUTOMATION	CONTROL	SECURITY
L2 VPN, L3 VPN, & INTERNET	AUTO-CONFIGURATION	SELF-SERVICE PORTAL	IP SEC & SSL ENCRYPTION
ON-NET & OFF-NET	TRAFFIC POLICING	LINK BONDING & LOAD BALANCING	TWO-FACTOR AUTHENTICATION
QOS & NAT/PAT	NFV	LAYER 4 ACCESS CONTROL	STATISTICS, LOGS & AUDITS

Incident Management

Cogeco Peer 1 will provide a rapid response to any reported incident that may be affecting the performance of your SD-WAN solution. An incident is classified as an event where the restoration of service is the primary objective.

Cogeco Peer 1 will work with you and your development partner (as appropriate) to restore service as quickly as possible when an incident occurs. Ensuring effective communication during the lifecycle of all incidents is our no. 1 priority.

You can engage our experts to assist with incidents relating to your SD-WAN service by creating a ticket in the Cogeco Peer 1 online ticketing system or by calling the advertised support phone numbers. Cogeco Peer 1 will create tickets for events generated by the monitoring system, which will require your attention or the attention of the Cogeco Peer 1 support team. All updates on incidents will be communicated to you via email from the Cogeco Peer 1 ticketing system.

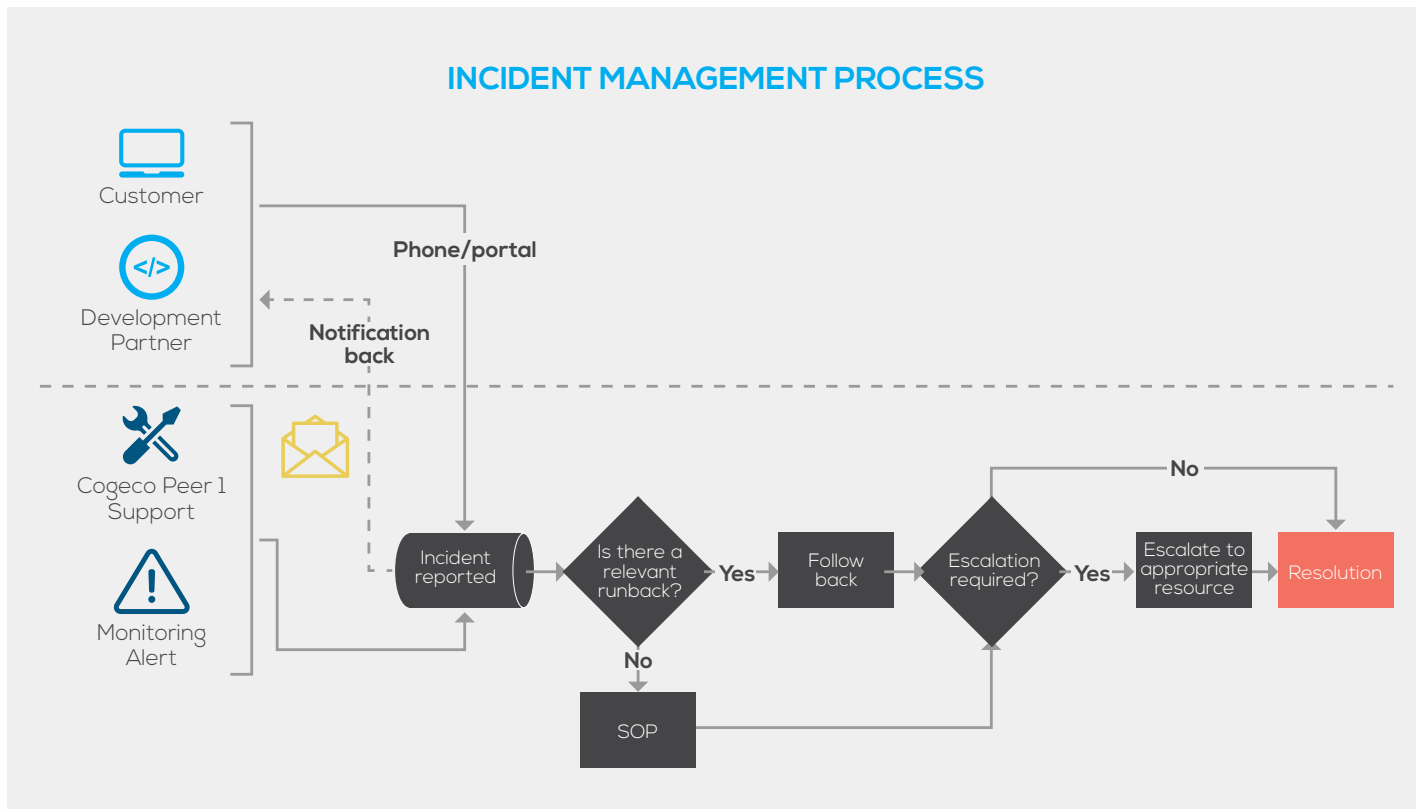
Cogeco Peer 1 will triage the incident according to the impact and urgency of the event and assign a ticket priority. Should you desire an escalation of priority, please contact your Cogeco Peer 1 support team who will consult with you on the priority level.

Cogeco Peer 1 will collaborate with you and your development partner until the incident is resolved, at which point the ticket enters a two-week cooling period before closure. During this process, the Cogeco Peer 1 support team will communicate regularly with you throughout the incident, detailing their findings and actions taken.

The following activities are part of Cogeco Peer 1's SD-WAN service Incident Management process:

- Trouble ticket management and customer interaction
- Fault isolation and diagnosis
- Management escalation
- Incident resolution and customer acceptance
- Reason for outage report generation (as required)

The diagram below describes the incident management process:



Incident Management Process Overview

1. For new incidents, the first action is to triage the criticality and urgency of the incident, so the appropriate priority level can be assigned.
2. Incidents are handled by the support team and will be escalated to senior system administrators where it is determined that specialized skill sets are required.
3. Throughout the process, the support team will work with you as needed and will provide updates through to the point of resolution.
4. When incidents are resolved they will remain in this status for 14 days to allow customers to test or reopen if the fault reoccurs. If it reoccurs after this period it is logged as a new incident.

Service Requests and Changes

The Service Request Process utilizes our standard ticketing processes to deliver efficient and prompt handling of changes to your environment and uses the ticket system to ensure information relating to the activity performed is recorded.

For any requests that may impact your monthly billing, your Cogeco Peer 1 Account Manager will be able to help advise you and your development partner on how to create the most optimized and cost-efficient solution.

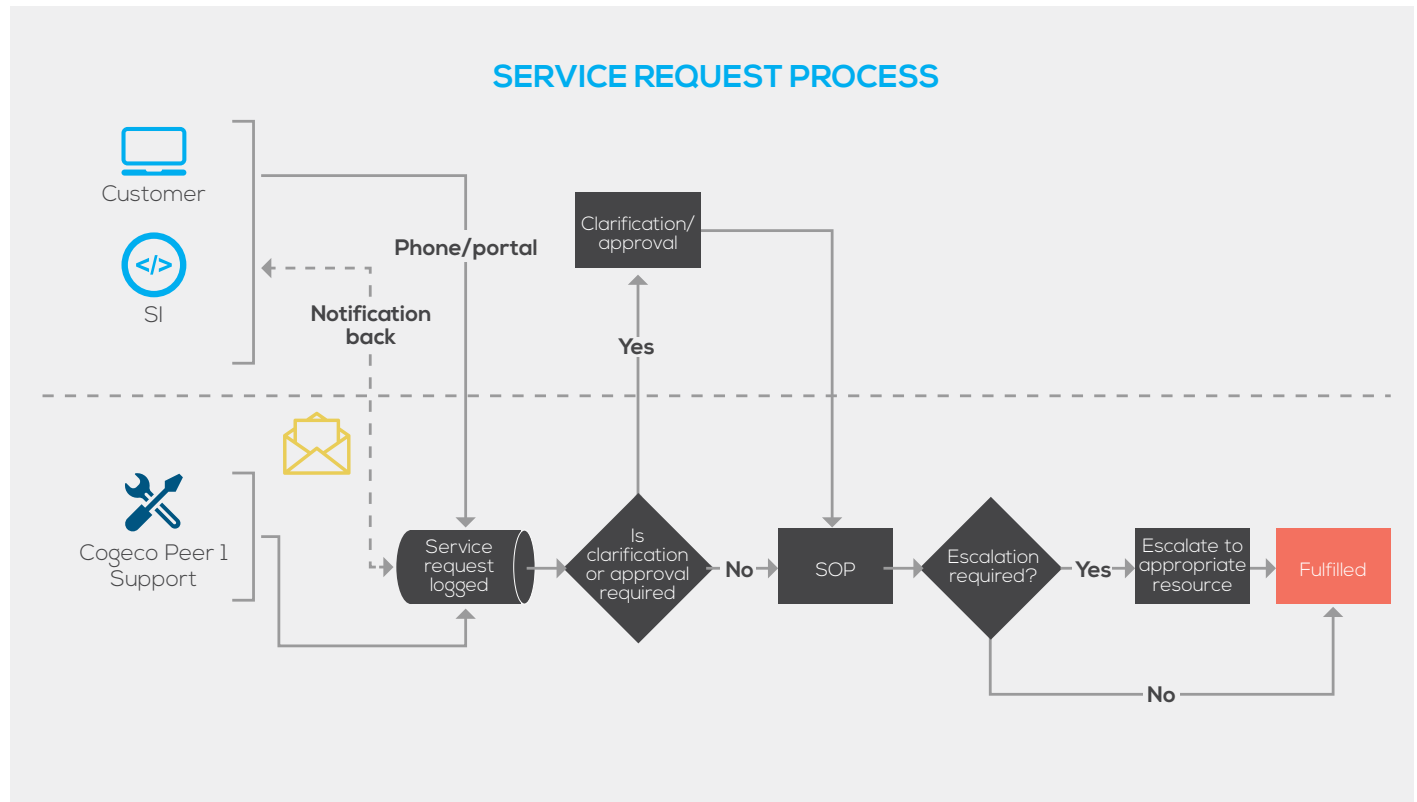
Service requests will typically have a longer lead time before being executed than an incident, which carries a higher priority due to the service-impacting nature of an incident. Please ensure you plan sufficient lead time in advance when submitting a service request to be processed, particularly if they are time-sensitive in nature.

CUSTOMER OR DEVELOPMENT PARTNER INITIATED CHANGES

Changes to the environment may be requested from your authorized technical contacts on your Cogeco Peer 1 account. All changes should be made by opening a service request online, or by contacting the Cogeco Peer 1 support team.

COGECO PEER 1 INITIATED CHANGES

In the event that Cogeco Peer 1 recommends a change to your solution, you will be notified of the recommendation by phone call or email notification. The execution of the change will follow the Service Request process.



Service Request Process Overview

1. For new service requests, the first action is to evaluate to ensure all required details and approvals needed to fulfill the request are present.
2. Service requests will be scheduled and/or actioned by the support team or escalated to senior system administrators, if appropriate, based on the specialized skill sets that will be required.
3. Throughout the process, the support team will work with you as needed and will provide updates through to the point of fulfillment.
4. When service requests are completed they will remain in the resolved status for 14 days to allow customers to test or reopen if needed.

Change Management

Change Management refers to the operating procedures, standards and practices applied to ongoing changes, including standard maintenance, network performance and customer business requirements, to the Cogeco Peer 1 network.

Cogeco Peer 1 Change Management will ensure:

- All changes are properly authorized, non-conflicting, scheduled and carried out in a coordinated manner with minimal disruption to the network.
- All network changes are vetted through the Cogeco Peer 1 technical team prior to insertion in the change process.
- All customer changes are planned and tracked in the ticketing system and any required customer releases are negotiated with the customer for appropriate change windows.
- Where possible, the network changes will be implemented through remote configuration of network devices.

Change requests to redesign or modify networks must be submitted through the Cogeco Peer 1 Sales channel. The Cogeco Peer 1 Sales Engineer will document the scope and complexity of the change request.

General Responsibilities

	COGECO PEER 1 RESPONSIBILITY	
	CUSTOMER RESPONSIBILITY	
RESPONSIBILITY		
Requirements Gathering - Specification of required SD-WAN bandwidth for the circuit	✓	
Solution Design - Specification of the customer's overall solution design including service connectivity requirements		✓
Customer to connect SD-WAN CPE device to connectivity circuit as per installation instructions provided	✓	
Cogeco Peer 1 will ensure services are properly installed and operating in the overlay network under the rubric of the SD-WAN offering at the time of delivery		✓
Incident Reporting - Report any incidents to Network Service Center	✓	
Incident Management - Investigate and resolve incidents as notified by the customer		✓
Disconnects - Submit a disconnect order in writing to renewal@cogecopeer1.com	✓	

Pricing Guidelines

Monthly recurring charges are comprised of:

- SD-WAN Device rental (if the customer prefers not to buy it outright)
- SD-WAN Access (size options of 100 Mbps, 500 Mbps, and 1 Gbps)
- SD-WAN Bandwidth (total bandwidth in/out, options of 10 Mbps, 25 Mbps, 50 Mbps, 100 Mbps, 200 Mbps, 500 Mbps, and 1 Gbps)

Service Level Agreement

If the underlying Connectivity network is provided by Cogeco Peer 1 then the Service Level Agreement (SLA) for those services (i.e. Dedicated Internet Access, Ethernet, IPVPN, etc.) applies. Please refer to the associated Service Level Agreement (SLA) provided, which outlines measured metrics and obligations, as well as remedies, should Cogeco Peer 1 not meet its obligations related to a particular metric. If the underlying Connectivity network is not provided by Cogeco Peer 1, no SLA applies, as Cogeco Peer 1 does not have visibility or control over that service.

Ordering Cogeco Peer 1 SD-WAN Services

Due Date of an Order

Cogeco Peer 1 will establish a due date after a complete order has been received by the Order Desk. Once the order has been validated, the Order Desk team will submit the order(s) to the Fulfillment teams (this is 'Day 1' of the interval). For Cogeco Peer 1 SD-WAN service, the SD-WAN device will be shipped to the customer within seven business days from Day 1 as described above.

ORDER TYPE / ACTIVITY	INTERVAL
New or additional on-net site	7 business days for NSG CPE device delivery (Canada, US, UK)
Change - no field work required at an on-net location	5 business days or less

Customer Delay of Due Date

Upon receipt of the SD-WAN device, the Customer is responsible for connecting it to their underlying Connectivity network service (instructions are provided). Billing for this SD-WAN device will commence when the customer receives it. Billing for the SD-WAN service will commence upon customer activation.

Cancellation or Changes of an Order

Please review the master Terms and Conditions document which covers cancellation of a service as well as MACDs (Moves, Adds, Changes, Disconnects):

Disconnects

To disconnect a Cogeco Peer 1 SD-WAN service, the customer must submit a disconnect order in writing to renewal@cogecopeer1.com. Termination charges may apply as per the contractual terms and conditions (file attached above). The customer may delay or cancel a disconnect order without charge at any time prior to the disconnection date provided that they do so in writing to renewal@cogecopeer1.com.



ABOUT COGECO PEER 1

Cogeco Peer 1 is a wholly owned subsidiary of Cogeco Communications Inc. (TSX:CCA) and is a global provider of essential business-to-business products and services, such as colocation, network connectivity, hosting, cloud and managed services that allow customers across Canada, Mexico, the United States and Western Europe to focus on their core business. With 16 data centers, extensive FastFiber Network® and more than 50 points of presence in North America and Europe combined, Cogeco Peer 1 is a trusted partner to businesses small, medium and large, providing the ability to access, move, manage and store mission-critical data worldwide, backed by superior customer support.

To learn more about how our services can help your organization, please visit www.cogecopeer1.com or email us at info@cogecopeer1.com

