



# Predix Cloud Connect

## Documentation



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Predix Cloud Connect Overview.....	4
About Predix Cloud Connect.....	4
Cloud Connect or Enterprise Connect.....	4
Get Started with Predix Cloud Connect.....	4
Create a Predix Cloud Connect Service Instance.....	4
Use the cf CLI to Create a Predix Cloud Connect Service Instance.....	5
Use Predix Cloud Connect.....	7
Create and Manage a VPN Connection.....	7
Complete an IPSec VPN Subscription Request.....	7
Configure Your VPN Gateway.....	9
Predix Cloud Connect Dashboard.....	10
VPN Connection Provision Status.....	13
Forward Path Proxy.....	13
Reverse Path Proxy.....	14
Reverse Path Proxy Toolbar Controls.....	15
Create a Reverse Path Proxy.....	15
Reverse Path Proxy Certificate Status.....	16
Debug a Reverse Path Proxy Connection.....	16
<b>Chapter 2. Release Notes.....</b>	<b>18</b>
Second Quarter of 2019.....	18
Predix Cloud Connect.....	18

# Predix Cloud Connect Overview

## *About Predix Cloud Connect*

Predix Cloud Connect creates a site-to-site virtual private network (VPN) connection between your network and the Predix cloud.

Using the Internet Protocol Security (IPSec) secure network protocol suite, Predix Cloud Connect establishes a hybrid cloud environment that gives you private, secure access to applications and data on your infrastructure along with data and services in the Predix cloud.

Predix Cloud Connect enables you to custom configure your VPN connection with settings for:

- Redundancy,
- Forward proxy capability,
- Reverse proxy capability supporting TCP, SMTP, SFTP, HTTP, HTTPS, TCP protocols,
- Certificate management for two-way TLS,
- Bandwidth, IPSec Type, Key Exchange,
- IPSec mode,
- AES encryption strength,
- Cryptographic hash function, and
- Diffie-Hellman group.

In addition, Predix Cloud Connect enables you to monitor and fully manage your VPN connection through an interactive dashboard.

## *Cloud Connect or Enterprise Connect*

Predix Cloud Connect and [Enterprise Connect](#) complement each other.

Use Predix Cloud Connect to give application developers and users access to your entire network and the Predix cloud. Use Enterprise Connect to connect specific applications to the Predix cloud.

# Get Started with Predix Cloud Connect

## *Create a Predix Cloud Connect Service Instance*

A Predix Cloud Connect service instance gives you access to the Predix Cloud Connect dashboard where you create your IPSec VPN subscription request and manage your VPN connection.

You must have a Predix account. See the [Registering for a Predix Account](#) documentation.

1. Sign into your Predix account at <https://www.predix.io>.
2. In the main navigation bar, select **Catalog**.
3. Select the **Predix Cloud Services** tab.
4. Select the **Predix Cloud Connect** tile.
5. Select **Subscribe**.
6. Complete the entries on the **New Service Instance** page:

Field	Description
ORG	Select your organization (if you belong to more than one org).
SPACE	Select the space for your service.
SERVICE INSTANCE NAME	Specify a unique name for your instance.
SERVICE PLAN	Select a plan.

7. Select **Subscribe to service**.

You will receive an email message containing the URL for the Predix Cloud Connect dashboard. After you receive the email, see the [Create and Manage a VPN Connection \(page 7\)](#) documentation.

## *Use the cf CLI to Create a Predix Cloud Connect Service Instance*

The Cloud Foundry command line interface (cf CLI) enables you to create a Predix Cloud Connect service instance and examine its settings.

Install the cf CLI. See the [Installing the Cloud Foundry Command Line Tool](#) documentation.

Also, you must have a Predix account. See the [Registering for a Predix Account](#) documentation.

 **Note:** Cloud Foundry CLI syntax can differ between Windows, Linux, and Macintosh operating systems. See the Cloud Foundry Help for the appropriate syntax for your operating system; for example, to see help for the `create-service`, or `cs`, command, run the command `cf help cs`.

1. Use the cf CLI to log into Cloud Foundry.

```
cf login
```

Enter your username and password when prompted by Cloud Foundry.

## 2. Create a Predix Cloud Connect service instance.

```
cf create-service predix-cloud-connect <plan_name> <instance_name>
```

- `<plan_name>` — Specify the service plan, such as **Tiered**.
- `<instance_name>` — Provide a unique name for the service instance.

## 3. View the service settings.

```
cf service <instance_name>
```

- `<instance_name>` — Substitute the name that you gave to the service instance in the previous step.

For example:

```
cf service myPredixCloudConnectService

Service instance: myPredixCloudConnectService
Service: Predix Cloud Connect
Bound apps:
Tags:
Plan: IPSEC-STD
Description: predix cloud connect to connect two remote sites
Documentation url:
Dashboard: https://caas-ipsec-int.run.aws-usw02-dev.ice.predix.io?
subscriptionId=ce4ddale-2ad9-40b9-979b-ceb2047445ae
■
Last Operation
Status: create succeeded
Message:
Started: 2018-03-29T14:19:56Z
Updated: 2018-03-29T14:19:56Z
```

 **Note:** The dashboard URL (for example, `https://caas-ipsec-int.run.aws-usw02-dev.ice.predix.io?subscriptionId=ce4ddale-2ad9-40b9-979b-ceb2047445ae`) enables you to access the management features of Predix Cloud Connect.

Copy the dashboard URL from the service settings, and see the [Create and Manage a VPN Connection \(page 7\)](#) documentation.

# Use Predix Cloud Connect

## *Create and Manage a VPN Connection*

Predix Cloud Connect enables you to create and manage a VPN connection between your network and the Predix cloud.

To create a VPN connection:

- [Complete an IPSec VPN Subscription Request \(page 7\)](#).
- [Configure Your VPN Gateway \(page 9\)](#).

To manage your VPN connection:

- Access the [Predix Cloud Connect Dashboard \(page 10\)](#).

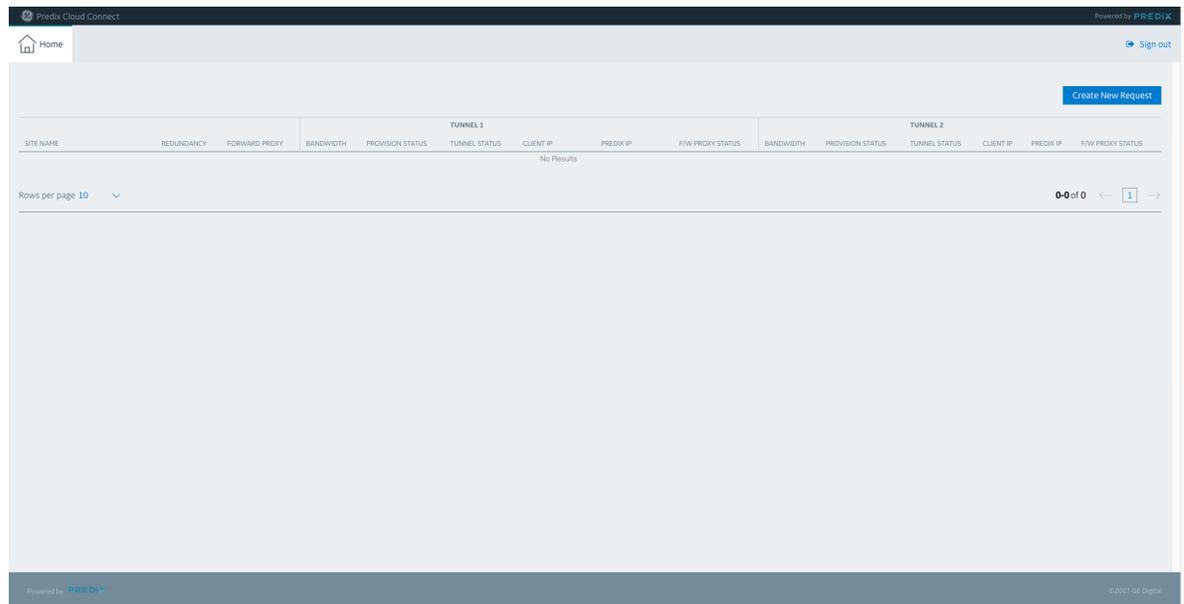
## *Complete an IPSec VPN Subscription Request*

Complete a subscription request to provide Predix with the specifications for your VPN connection.

Obtain the dashboard URL for your Predix Cloud Connect service instance. See the [Create a Predix Cloud Connect Service Instance \(page 4\)](#) documentation or the [Use the cf CLI to Create a Predix Cloud Connect Service Instance \(page 5\)](#) documentation.

1. Enter the dashboard URL for your Predix Cloud Connect service instance in a web browser.  
The Predix Cloud Connect dashboard home page appears.

Figure: Dashboard Home Page



2. Select [Create New Request](#).
3. Complete the **IPSec Request Form** by entering the specifications that meet your networking requirements:

**Table 1. Input Fields**

Field	Input
SITE NAME	Enter a short, descriptive name for your VPN connection instance.
REDUNDANCY	Turn the toggle on to specify two tunnels for your VPN connection; turn it off to specify one tunnel. Two tunnels enhance the availability of your VPN by providing automatic failover in the event one tunnel goes down.
F/W PROXY	Turn the toggle on to enable a forward proxy; turn it off to disable the forward proxy. A forward proxy provides a single IP address for all of your endpoint requests.  If you enable a forward proxy, you must direct all of your requests to the forward proxy IP address. The forward proxy IP address, status, and port appear on the dashboard site details page. See the <a href="#">Predix Cloud Connect Dashboard (page 10)</a> documentation.
Bandwidth	Select the speed of the network connection.
IPsec Type	Policy-based/Route-based
Key Exchange	This module describes how to configure the Internet Key Exchange (IKE) protocol for basic IP Security (IPsec) Virtual Private Networks (VPNs). IKE is a key management protocol standard used in conjunction with the IPsec standard. IPsec is an IP security feature that provides robust authentication and encryption of IP packets.
 <b>Note:</b> If you specify two tunnels, complete the following fields for both tunnels.	

Field	Input
IP ADDRESS	Enter the static IP address of your VPN gateway.
ASN	Enter the Autonomous System Number that identifies your network.
PLATFORM	Select the type of your VPN gateway.
TUNNEL MODE	Select the encryption mode of your VPN connection. Transport mode encrypts only the payload of the IP packet. Tunnel mode encrypts the entire IP packet and then encapsulates the packet in a new packet, complete with a new header. Transport mode is faster; tunnel mode, more secure.
Namespace	Tunnel namespace.
<b>Phase 1</b>	
ENCRYPTION	Select the length in bits of the Advanced Encryption Standard key used to encrypt the data exchanged during Phase 1 of VPN negotiations between your network and the Predix cloud.
INTEGRITY	Select the cryptographic hash function used to determine message integrity during Phase 1 of VPN negotiations between your network and the Predix cloud.
DIFFIE-HELLMAN	Select the strength of the shared secret (or Key Encryption Key) used to encrypt the symmetric Traffic Encryption Key, which in turn is used to encrypt data transmission during Phase 1 of VPN negotiations between your network and the Predix cloud.
<b>Phase 2</b>	
ENCRYPTION	Select the length in bits of the Advanced Encryption Standard key used to encrypt the data exchanged during Phase 2 of VPN negotiations between your network and the Predix cloud.
INTEGRITY	Select the cryptographic hash function used to determine message integrity during Phase 2 of VPN negotiations between your network and the Predix cloud.
DIFFIE-HELLMAN	Select the strength of the shared secret (or Key Encryption Key) used to encrypt the symmetric Traffic Encryption Key, which in turn is used to encrypt data transmission during Phase 2 of VPN negotiations between your network and the Predix cloud.

4. Select .

After you submit the form, your VPN connection instance appears on the Predix Cloud Connect dashboard home page with the [provision status \(page 13\)](#) set to pending. As your request is subsequently processed, the provision status changes from pending to processing to provisioned.

## *Configure Your VPN Gateway*

Predix Cloud Connect provides you with all the information you need to configure the VPN gateway on your network.



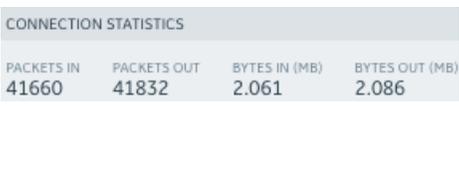
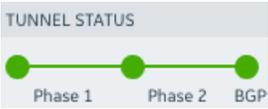
## Monitor Your VPN

The dashboard site details page displays all of the specifications you provided on the IPsec Request Form. See the [Complete an IPsec VPN Subscription Request \(page 7\)](#) documentation.

The dashboard graphics depict your network and the Predix cloud. The line between the two clouds (the tunnel) indicates whether the VPN connection is active (green) or inactive (red).

In addition, the dashboard gives you a view of how your VPN is performing by providing the following real-time data:

**Table 2. Dashboard Real-Time Data**

Field	Display	Description
CONNECTION STATISTICS		The connection statistics show the amount of data transmitted across the VPN. PACKETS IN and BYTES IN represent data sent into the Predix cloud from your network; PACKETS OUT and BYTES OUT, data sent out of the Predix cloud to your network.
PROVISION STATUS		Provision status indicates whether Predix has provisioned your VPN connection or is in the process of provisioning the connection. See the <a href="#">VPN Connection Provision Status (page 13)</a> documentation.
F/W PROXY PROVISION STATUS		Forward proxy provision status indicates whether Predix has provisioned a forward proxy for your VPN connection or is in the process of provisioning the proxy. See the <a href="#">Forward Path Proxy (page 13)</a> documentation.
TUNNEL STATUS		Tunnel Status indicates whether your connection has completed Phase 1 or Phase 2 of VPN connection negotiations or has been fully routed with the Border Gateway Protocol. Red indicates negotiations are in progress; green indicates completion.
F/w Proxy Status		Forward proxy status indicates whether a forward proxy is active on your VPN connection. Red indicates that a proxy is not active; green indicates that a proxy is active.

## Manage Your VPN

The dashboard site details page includes two toolbars that enable you to take control of your VPN connection:





Both toolbars provide the same functionality.

**Table 3. Dashboard Toolbar Controls**

Control	Description
 or 	The <b>Download Tunnel Config File</b> button downloads the configuration template file that contains the settings for the VPN gateway connected to your network. The template file is created by Predix when your VPN subscription request has been provisioned.
 or 	The <b>Delete Tunnel</b> button removes the tunnel from the VPN connection. If your connection has only one tunnel, the button removes your VPN site from the Predix Cloud Connect dashboard home page.
 or 	The <b>Start Tunnel</b> button starts the tunnel if it is stopped (and transitions to the Stop Tunnel state).
 or 	The <b>Stop Tunnel</b> button stops the tunnel; that is, makes it nonfunctional (and transitions to the Start Tunnel state).
 or 	The <b>Tunnel Secret</b> button displays the Diffie-Hellman shared secret (or Key Encryption Key) used to encrypt the symmetric Traffic Encryption Key, which is used to encrypt data transmission; for example: <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p style="text-align: center;">Tunnel Secret</p> <p>Secret: <b>TAXVX49FGTFEZJW40PJAS5YO8BWGHTKY</b></p> <p style="text-align: right;"> <span style="border: 1px solid #ccc; padding: 2px 10px; background-color: #f0f0f0;">Cancel</span> <span style="border: 1px solid #ccc; padding: 2px 10px; background-color: #007bff; color: white; margin-left: 10px;">Ok</span> </p> </div>
	The site details page includes a toggle control that enables you to enable or disable a forward proxy for your VPN connection. Turn the toggle on to enable a forward proxy; off, to disable the forward proxy.
	The site details page includes bandwidth dropdown to update the bandwidth for the tunnel(s) at site level. <p>Note: Bandwidth dropdown is disabled if the tunnels are not provisioned or if there is a bandwidth change in progress.</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 10px 0;"> <p style="text-align: center; font-size: small;">BANDWIDTH</p> <p style="text-align: center;">10 Mb/s ▾</p> </div>

## *VPN Connection Provision Status*

You can view the status of your VPN connection on the Predix Cloud Connect dashboard home page or dashboard site details page.

Connection provision status can be any of the following:

- Pending — The connection is awaiting network setup on Predix.
- Processing — Predix is configuring the network connection.
- Provisioned — Predix network configuration has been completed, and the configuration template file containing setup specifications for your network is ready for download.

## *Forward Path Proxy*

The Predix Cloud Connect dashboard home page and dashboard site details page display the status of the forward proxy associated with your VPN connection.

Forward proxy (F/W) provision status can be any of the following:

- Pending — The proxy is awaiting setup on Predix.
- Processing — Predix is configuring the proxy.
- Provisioned — Proxy configuration has been completed; the forward proxy is ready to accept requests.

Figure: Dashboard Home Page — Forward Proxy Enabled

SITE NAME	REDUNDANCY	FORWARD PROXY	BANDWIDTH	PROVISION STATUS	TUNNEL 1			TUNNEL 2				
					TUNNEL STATUS	CLIENT IP	PREDIX IP	F/W PROXY STATUS	TUNNEL STATUS	CLIENT IP	PREDIX IP	F/W PROXY STATUS
mysite	false	true	25 MB/s	pending	N/A	12.3.45.67	34.208.165.13	N/A	N/A	N/A	N/A	N/A

Figure: Dashboard Site Details Page — Forward Proxy Provisioned

Tunnel (12.3.45.67)

CONNECTION STATISTICS			
PACKETS IN	PACKETS OUT	BYTES IN (MB)	BYTES OUT (MB)
41660	41832	2.061	2.086

CLIENT IP	12.3.45.67	PREDIX IP	34.208.165.13	PROVISION STATUS	PROVISIONED
TUNNEL ID	KAKSKP3	PLATFORM	CSIO	ASN	9000
BANDWIDTH	25 MB/s	TUNNEL MODE	tunnel		
PHASE 1		DIFFIE-HELLMAN	mlsdp256	ENCRYPTION	mls256
PHASE 2		DIFFIE-HELLMAN	mlsdp256	ENCRYPTION	mls256
PROXY		F/W PROXY IP	100.100.100.1	F/W PROXY PORT	8118
F/W PROXY PROVISION STATUS	provisioned				

## Reverse Path Proxy

Reverse path proxy is a fully automated, hybrid cloud feature. It establishes access to applications/ services on customer premises with a few clicks and supports various protocols (e.g., HTTP, HTTPS, SFTP, SMTP and TCP).

It allows for automated certificate management by integrating with the Predix DCS service and storing certificates to the Predix Blob store. It provides SDK, Client and root certificates, as well as Private Key.

Customers can easily adopt the feature by following the sample applications provided in Java, Nodejs, etc.

## Reverse Path Proxy Toolbar Controls

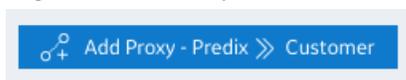
**Table 4. Reverse Path Proxy Toolbar Controls**

Control	Description
	Downloads the generic SDK (java) version to enable two-way TLS by adding the .jar file to customer service
	Downloads a zip file that contains client_rsa_private, client.pem, root.crt, which are added to customer service to enable two-way TLS
	Deletes the connection
	<p>Displays the characteristic value within a distinguished name, for</p> <p>CN</p> <p>CN: fe735c37-babf-4b55-95ff-3e04edee5b96-ZRCLUDRS</p> <p>example: </p>

## Create a Reverse Path Proxy

1. On the **Dashboard** page, click the **Add Proxy - Predix >> Customer** button. This will display the **Reverse Path Proxy Form**.

*Figure: Add Proxy button*



2. Complete the **Reverse Path Proxy** Form by entering the specifications that meet your networking requirements.

Field	Input
<b>CONNECTION NAME</b>	A short, descriptive name for your reverse path proxy connection instance
<b>SERVICE NAME</b>	A service name (e.g., APM)
<b>IP ADDRESS</b>	The static IP address of the on-premise server
<b>PORT</b>	The port number of the on-premise server
<b>PROTOCOL</b>	The protocol to use to transmit data
	 <b>Note:</b> If TCP is selected, the <b>CONNECTION TYPE</b> drop-down menu appears; <b>Postgres</b> will be selected and the port will be set to <b>5432</b> .
<b>CONNECTION TYPE</b>	The underlying connection type (e.g., Postgres, Oracle, etc.)

3. Click **Create**.

The **Reverse Path Proxy** details page will appear, indicating the **Provision Status** of your Reverse Path Proxy connection. As the request is processed, the status will change from **Pending** to **Processing** to **Provisioned**.

- **Pending:** connection is awaiting network setup on Predix
- **Processing:** Predix is configuring the network connection
- **Provisioned:** Predix network configuration is complete; connection setup files for your network are ready for download

## *Reverse Path Proxy Certificate Status*

You can view the status of your reverse path proxy certificate on the Predix Cloud Connect **Reverse Path Proxy** details page. The status will be either of the following:

- **Pending:** The connection is awaiting to get the client certificate from the Predix certificate service
- **Certificate Ready:** The client certificate has been obtained and is available for download

## *Debug a Reverse Path Proxy Connection*



1. Click the **Run Command** button.
2. Complete the **Reverse Path Proxy Command** Form by entering the specifications that meet your requirements:

Field	Input
<b>NAMESPACE</b>	Tunnel(s) namespace from where the command should be run
<b>COMMAND TYPE</b>	The command type (e.g., Telnet)
<b>IP ADDRESS</b>	The static IP address of the on-premise server
<b>PORT</b>	The port number of the on-premise server
<b>CONNECTION ID</b>	Reverse proxy connection ID
<b>NODE ID</b>	Tunnel node ID

3. Click **Create**.

The **Reverse Path Proxy Command Details** will display.

# Chapter 1. Release Notes

## *Second Quarter of 2019*

### *Predix Cloud Connect*

The first release of Predix Cloud Connect enables you to create and manage a secure VPN connection between your network and the Predix cloud.

#### **Release Date: TBD, 2019**

In this release, Predix Cloud Connect provides the following features:

<b>Feature</b>	<b>Description</b>
IPSec VPN Connection	Predix Cloud Connect uses the IPSec network protocol suite to create a customizable virtual private network connection between your network and the Predix cloud.
Interactive Dashboard	<p>The Predix Cloud Connect interactive dashboard enables you to create, monitor, and manage VPN connections. The dashboard consists of a home page and a site (connection) details page.</p> <ul style="list-style-type: none"><li>• Home Page — The dashboard home page displays a list of VPN sites along with connection status information. The home page also provides the facility to create IPSec VPN subscription requests. The IPSec subscription request form provides a variety of inputs that enable you to set the specifications of the VPN connection to best meet your networking requirements.</li><li>• Site Details Page — The dashboard site details page displays VPN connection specifications, status information, and real-time performance data. The site page provides controls to start, stop, and remove VPN tunnels, download a connection configuration template file for the VPN gateway on your network, obtain the VPN tunnel secret, and enable or disable a forward proxy.</li></ul>
Forward Proxy	Predix Cloud Connect supports a forward proxy for your VPN connection. A forward proxy provides a single IP address for all of your endpoint requests.