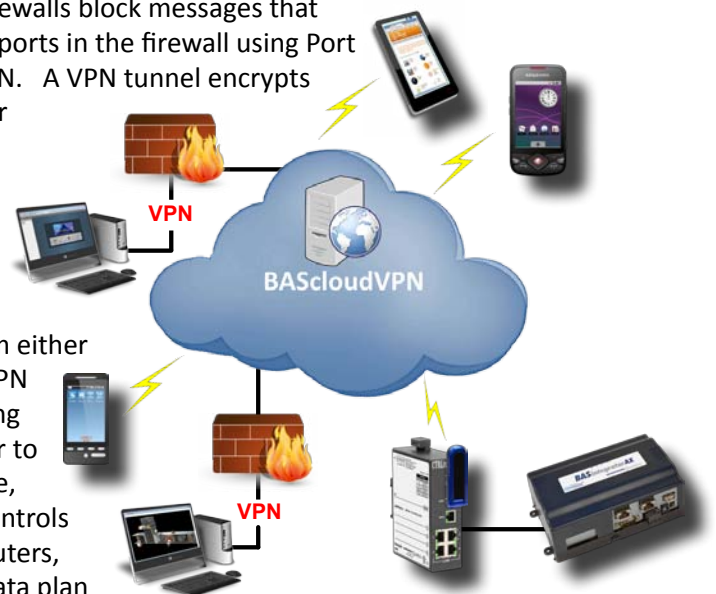# application
GUIDE

BAScloudVPN

Accessing machines at remote sites can be a challenge since firewalls block messages that originate from the Internet. Although it is possible to open up ports in the firewall using Port Forwarding, it is better to use a (Virtual Private Network) or VPN. A VPN tunnel encrypts TCP/IP communications so messages are secure when sent over the Internet.

A simple VPN can exist between two end points. One is a VPN client while the other is a VPN server. Between the VPN client and server, the communications are encrypted — so only authorized devices can communicate over the VPN. Once the VPN connection is made, messages can originate from either side — eliminating the need for port-forwarding. Having the VPN in the cloud allows access from anywhere on the Internet. Using a cellular connection from the remote site to the cloud is easier to accomplish. The main goal of a VPN is to supply a cost-effective, direct secure connection between locations. Contemporary Controls provides a remote monitoring solution by supplying cellular routers, hosting the cloud-based VPN server and by recommending a data plan from a cellular provider.

Contemporary Control's EIPR-V Skorpion router can help provide VPN communications. It has a USB port for connecting cellular modems to allow it to communicate to the Internet. It also has an Ethernet WAN port which can also be used to communicate through a wired connection to the Internet. Our BAScloudVPNServer is hosted on the Internet which allows the BAScloudVPN devices to communicate together. This server is maintained by Contemporary Controls. You only need an account on the server in order to utilize the BAScloudVPN service.

Features and Benefits

- Wired or wireless operation over the Internet
- Secure communication tunnels with 128-bit encryption
- No investment in cloud-VPN servers
- Free download of OpenVPN PC client software
- Applicable to both permanent and temporary remote access
- Flexible man-machine and machine-machine applications
- Quick realization of a remote access project

EIPR-V

BASautomation®

CONTEMPORARY CONTROLS®

The BAScloudVPN is a set of devices and services from Contemporary Controls that offers VPN connectivity. The EIPR-V's USB port provides cellular VPN communications to connected modems plus Internet access — if a suitable USB cellular adapter is attached. The Internet-hosted BAScloudVPNServer allows BAScloudVPN devices to communicate. Any Windows, MAC, Linux, Android or iOS device can run the open-source OpenVPN client software. OpenVPN client software — running behind the scenes — allows any TCP/IP program to communicate via the BAScloudVPN. The OpenVPN client can be downloaded from OpenVPN.net, via Google playstore (for Android devices) or via the Apple App Store (for iOS devices). Thus, a great variety of devices can access the BAScloudVPN.

Connect with BAScloudVPN

A systems integrator working from his office needs to view a recently installed building automation system at his client's location. To access this remote site, he is going to use a BAScloudVPN — a VPN server provided by Contemporary Controls. He first opens VPN client software on his computer to provide a VPN tunnel connection to a BAScloudVPN via his local Internet service. A similar VPN tunnel connection to this same BAScloudVPN already exists at the remote site. Using Niagara Workbench on his computer, he then accesses a Sedona Framework controller at the remote site — so he can examine a temperature point. The BAScloudVPN makes the necessary connection between the two VPN tunnels. Once a connection is made, he can service the remote site as if he were physically there. The remote site accesses BAScloudVPN using a cellular network while the systems integrator simply needs some way of accessing the Internet. The BAScloudVPN provides an effective, secure method of remote access — with no concern for intervening firewalls.

Contemporary Controls provides products and services to secure your cloud communications and to support multiple applications. Our BAScloudVPN is a set of devices and services that provide VPN connectivity for your systems. There are many options to the devices and services provided by Contemporary Controls.

EIPR-V Skorpion
**Wireless Router**

BAScloudVPNServer

BAScontrol20
**Sedona Field Controller**

BASintegratorAX
JAVA Application
Control Engine

Application 1 — Building Automation System Cellular Remote Access

Here we have a desktop PC sitting in your office running the OpenVPN client software behind a firewall. It connects to our BAScloudVPNServer over the Internet. At your customer's site we have the EIPR-V with a cellular modem (user purchased). The EIPR-V can communicate via its LAN ports to many BAS devices. Ethernet switches can be used to add more devices. This will allow the PC to communicate with all devices connected to the EIPR-V via a secure VPN connection. This is because the PC has a VPN connection to the BAScloudVPNServer and the EIPR-V has a secure VPN connection to the same server. The office PC does not require any special settings in the firewall for creating a connection to the Internet.
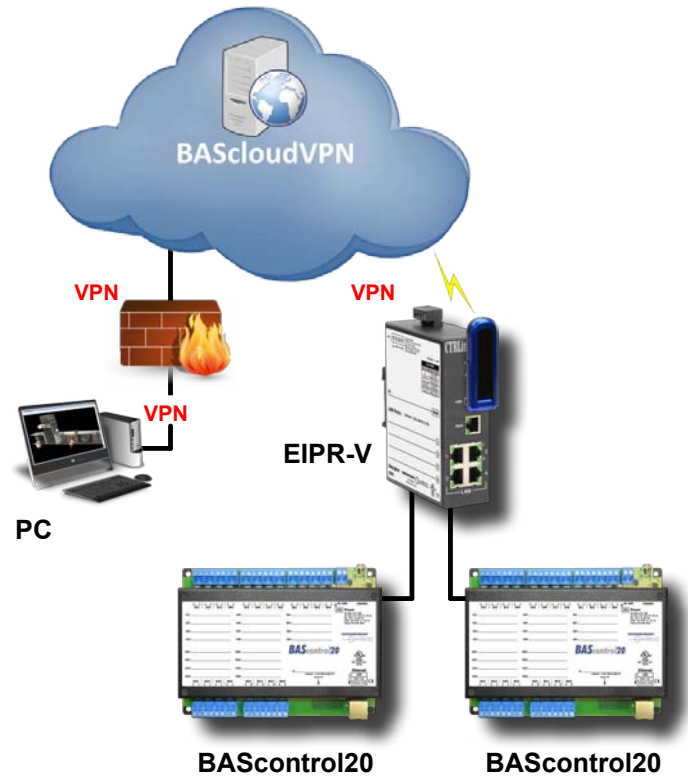
# Application 2 — Building Automation System Wired Remote Access
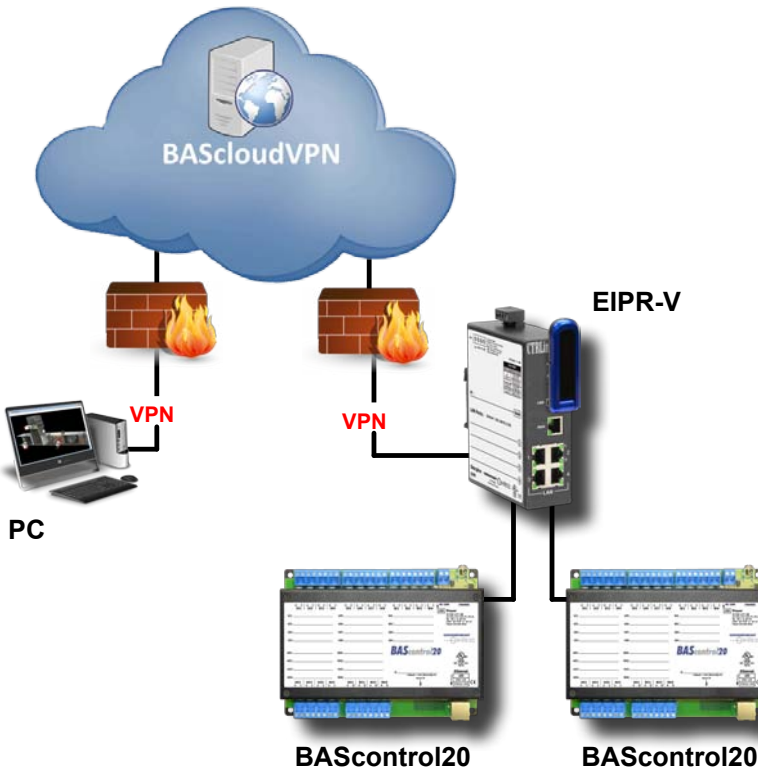
This application is almost the same as Application 1. The difference is that the EIPR-V's connection to the Internet is through an existing Internet router. Still, all communications occur with secure VPN connections. Even though the existing Internet infrastructure is utilized, there is no port forwarding — nor is any firewall modification needed. The EIPR-V and the PC both communicate through firewalls to the BAScloudVPNServer.

# Application 3 — Remote Access to JACE Using Wired Connection

Here we can isolate our remote communications to one device in the Building Automation System.

In this example you can have all building automation devices connected to one port of the JACE while you remotely connect to another JACE port. This can keep your remote access isolated to one building automation device.

EIPR-V

VPN **VPN**

PC
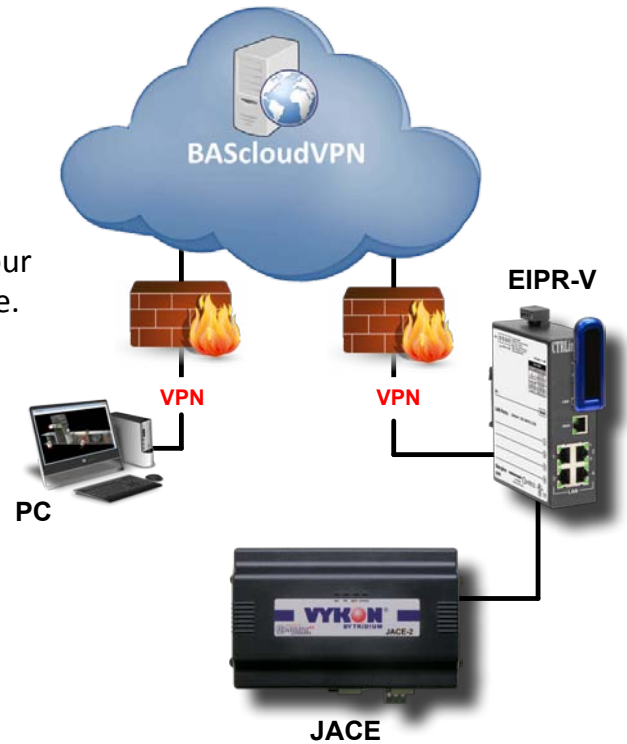
JACE

Application 4 — Remote Access to JACE Using Cellular Connection

VPN

VPN **EIPR-V**

PC

JACE

This is the same application as Application 3, except we are now using a cellular connection to the Internet in place of the wired connection.

CONTEMPORARY CONTROLS®
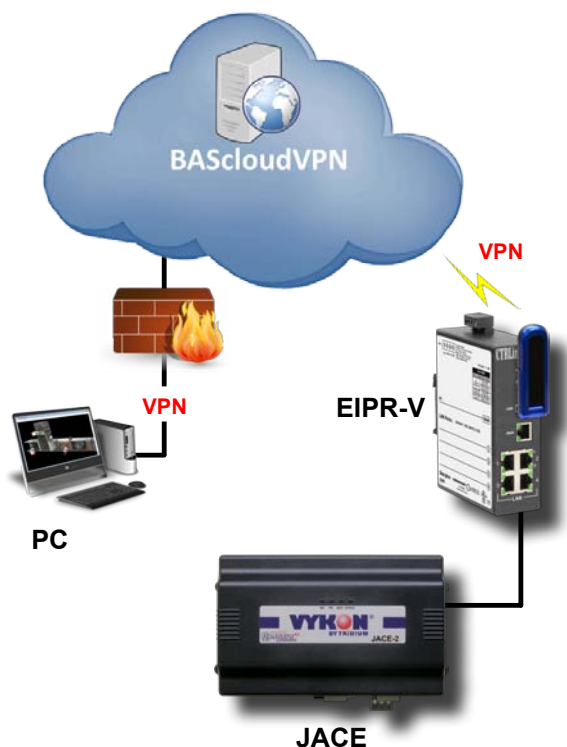
Application 5 — Varied Clients

In previous examples we only showed one EIPR-V being used at a time and one desktop PC.   With the BAScloudVPN you can interconnect many PCs and many EIPR devices.

And you are not limited to desktops. Over the BAScloudVPN network, smart phones and tablets can communicate to your EIPR-connected devices.

As in previous examples, many control devices can connect to the LAN ports of EIPRs — and all of these can be accessed within the VPN.
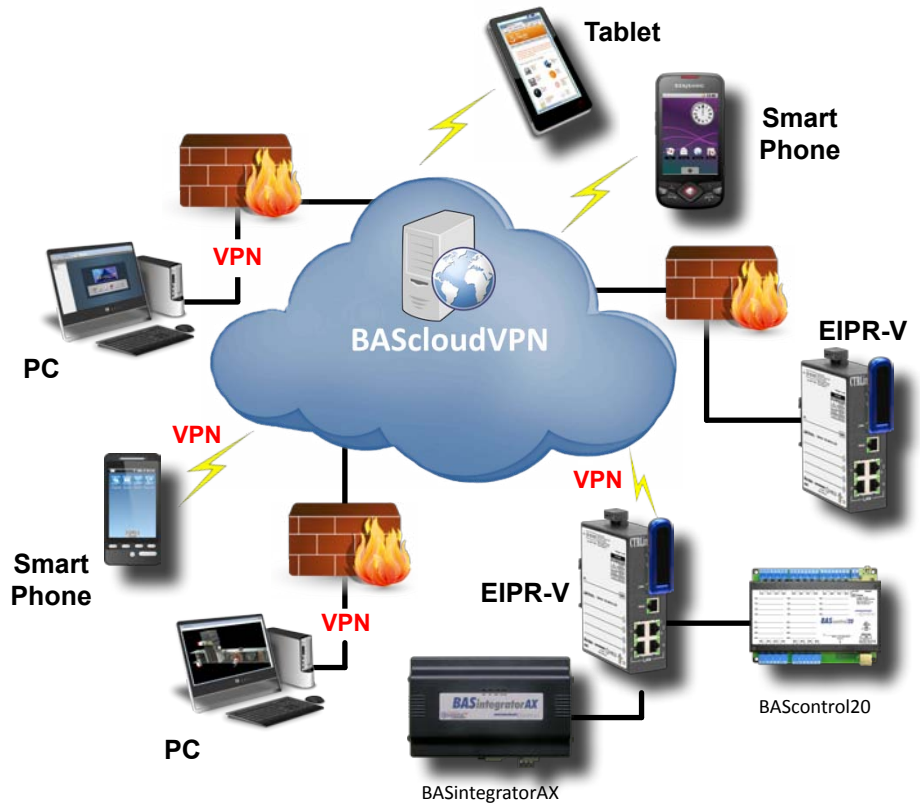
# Application 6 — Using Wi-Fi on EIPR-V With a Wired Internet Connection

The USB port of the EIPR-V can also support a Wi-Fi USB device. When used in this capacity, the EIPR-V acts as a Wi-Fi access point. This allows Wi-Fi devices to communicate. These devices can also communicate via the BAScloudVPN. The WAN port of the EIPR-V connects to the Internet via your firewall. The LAN ports connect to control devices as discussed in previous applications.

AG-BASCLD00-BA1
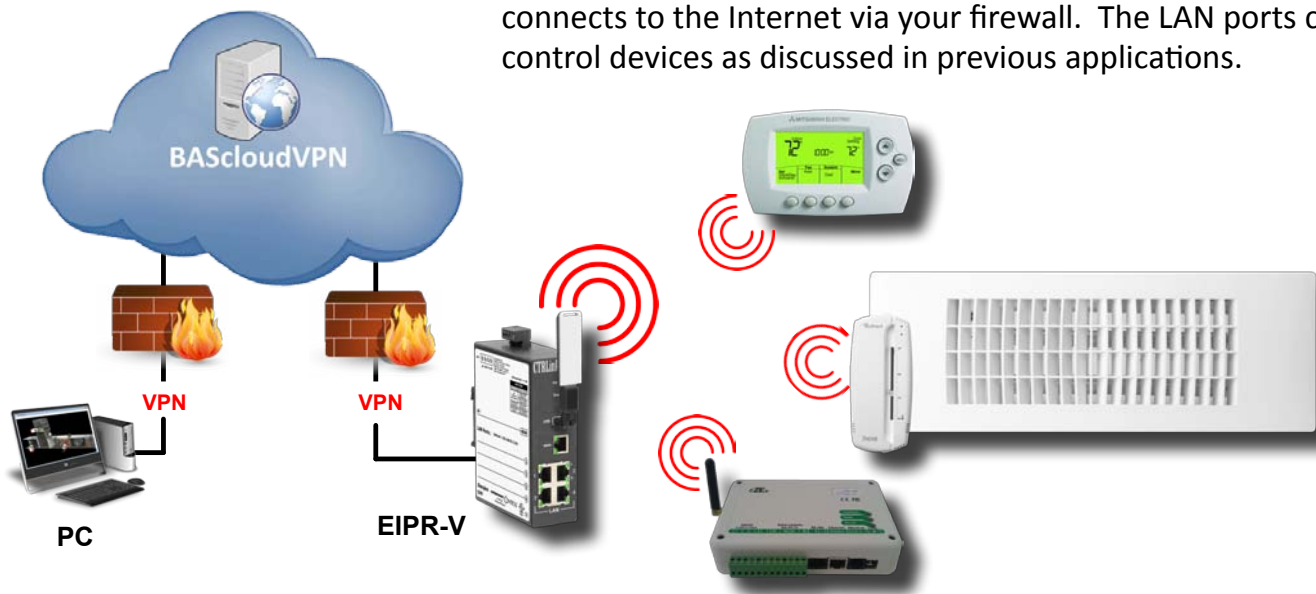
Application 7 — Using BAScloudVPN to Interconnect Multiple Facilities

Mostly we have shown the BAScloudVPN being used to provide remote access to building automation equipment.

However, you could use the BAScloudVPN infrastructure to allow multiple facilities to communicate together over the Internet in a secure manner. Here we are showing one EIPR using a cellular connection to the Internet and one using a wired connection.

CONTEMPORARY CONTROLS®
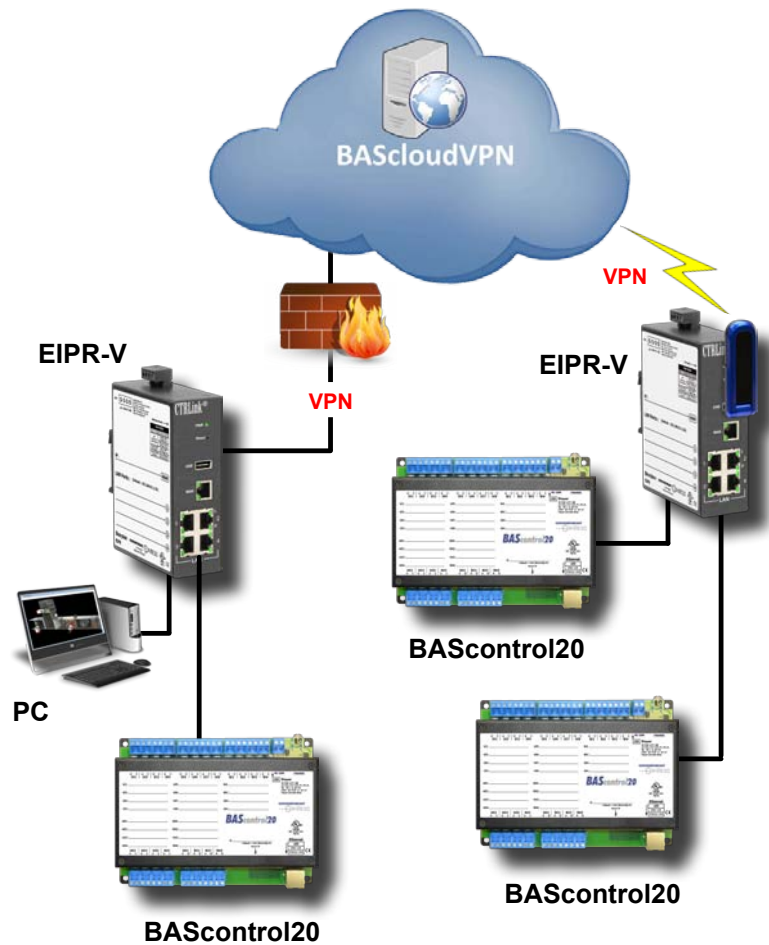
Application 8 — A Protected Multibuilding Niagara/BACnet System

In this application we have a Niagara AX Supervisor communicating through the BAScloudVPN to other sites. These can have JACEs or simply BACnet devices. We are also showing a BASrouter being used to connect MS/TP devices to the BAScloudVPN (through an EIPR-V). The EIPRs can have wired or wireless or cellular connections to the Internet.
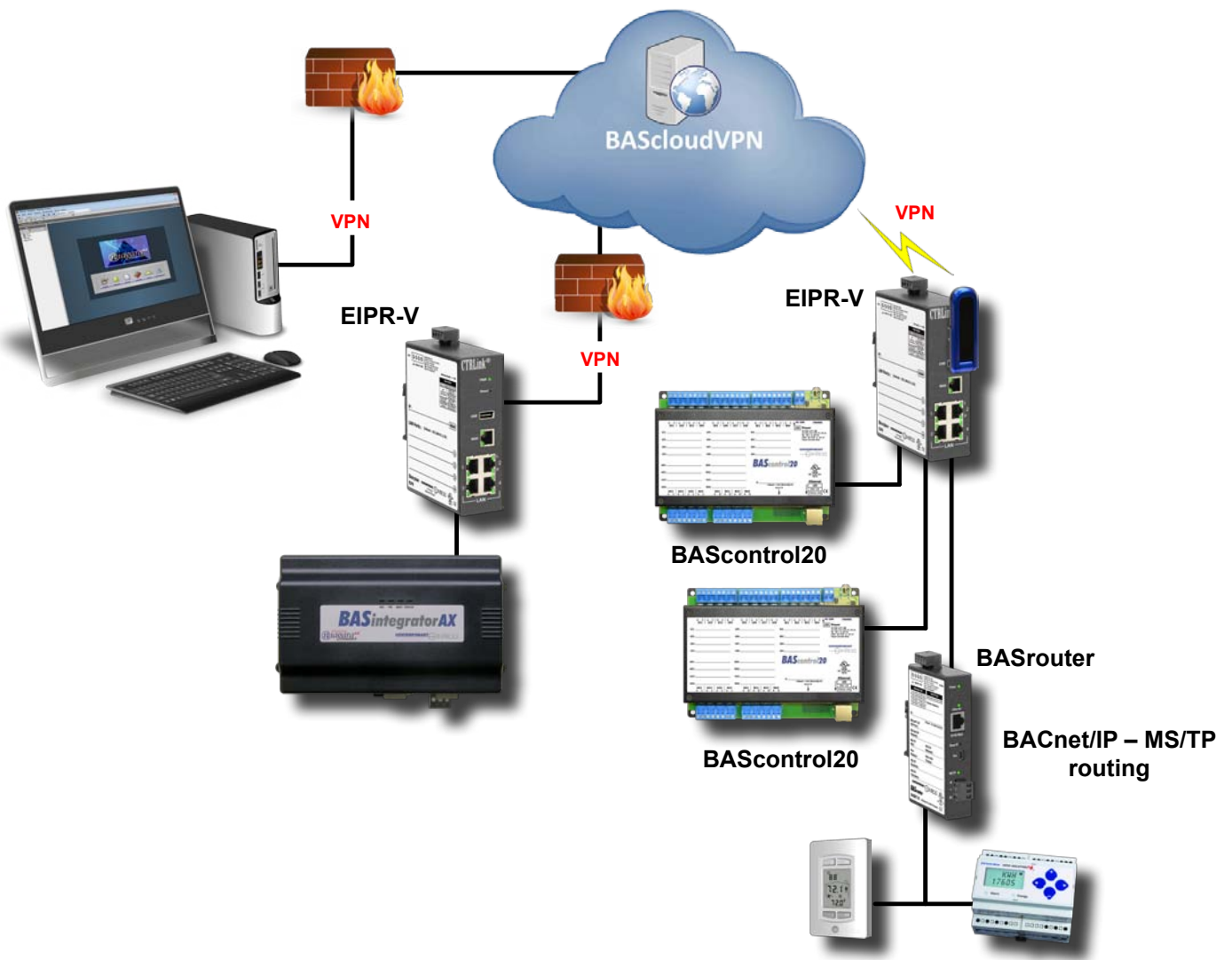
What is Different Between the BAScloudVPN and What I Have Today?

If you have Internet access through a firewall and you want to achieve remote access to this facility without using the BAScloudVPN you will need to enable port forwarding in your firewall for the ports used in your communications.

Opening Up Ports

For example, typically port 80 is used for web browsers and port 47808 is used for BACnet communications. In this case you would need to setup your firewall to do port forwarding for these ports. If you are also using Niagara AX devices, you will need to open more ports. When you open a port, you must indicate which device is to receive this communication. This typically only allows you to remotely access one device. If this is the JACE, this might be alright. However, you have now exposed these devices to Internet activities.

Fixed IP Address

Also, many Internet connections have changing IP addresses. You might need to configure your firewall to use DynDNS — giving you a permanent public IP address for your Internet-exposed devices. With the BAScloudVPN you do not need to change the firewall configurations and you do not need to expose your devices to the Internet. Your devices remain behind firewalls but can easily communicate with the Internet using safe and secure VPNs.

Security Exposure

Many wireless providers are offering wireless routers to their customers. These devices may offer Wi-Fi or wired connections. However, in most cases when using these devices your own devices will still be behind a firewall and you won't be able to reach them remotely over the Internet. In rare cases the wireless provider will offer a fixed public IP address (usually for an extra fee). In this case, your devices are now directly exposed to the Internet. With the BAScloudVPN your devices are always secure from the Internet using VPN technology and no fixed IP addresses are required.

Computer Emulation

Some people tell us they have a PC on site and they just use an application like TeamViewer or GotoMyPC to access the site. There are a couple of issues with this arrangement. One is that you need to have a PC onsite and you are relying on this PC running when you need to perform your remote access. You need to keep it up to date with security patches, anti-virus programs, etc. This PC must also contain all of the tools you use when you are troubleshooting your network. This could be very expensive. With the BAScloudVPN you only have an EIPR-V onsite and you can have all of your tools installed on one PC back at the office.

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BAScloudVPN Setup Screens

Login at
https://www.bascloudvpnserver.com/vpn/

CONTEMPORARY CONTROLS
Contemporary Controls   BAScloudVPN   Help

User Name:
Password:
Login

Login Screen

Dashboard LEDs
online/offline status
for each connection

Pencil Icon
click to edit
a connection

BAScloud VPN

Connection List

Connection Log
for connection history

CONTEMPORARY CONTROLS

User Name:
ccsiDemo

Password:
•••••••••••••

Logout

Contemporary Controls   BAScloudVPN   Help

Name	?	group ccsi-test01	VPN Addr.	LAN Addr.			
ccsiroadwarrior01		ccsi-test01				🔴	🟩
ccsiroadwarrior02		ccsi-test01				🔴	🟩
ccsiroadwarrior03		ccsi-test01				🔴	🟩
ccsiroadwarrior0							
ccsi-router01							
ccsi-router02							

Road Warrior List

EIPR-V List

Copy File to PC

Download OpenVPN Client Software

CONTEMPORARY CONTROLS

User Name:
ccsiDemo

Password:
•••••••••••••

Logout

Contemporary Controls   BAScloudVPN   Help

Name 📇	ccsiroadwarrior01	ccsiroadwarrior01.zip openvpngui.exe
Alias Name	ccsiroadwarrior01	
Group	ccsi-test01	
Created on	2:34:00	
Notes		

Road Warrior Edit Screen
for connection detail

OpenVPN
Protocol

		Access via VPN Address		via real LAN Address
ccsi-router02		☐ 10.0.3.0/24	→	192.168.93.0/24
ccsi-router01		☑ 10.0.2.0/24	→	192.168.92.0/24 ☐

Network Access Permissions

Set Road Warrior Permissions
to access routers.

Copy File to PC
for later upload to EIPR-V

CONTEMPORARY CONTROLS

User Name:
ccsiDemo

Password:
•••••••••••••

Logout

Contemporary Controls   BAScloudVPN   Help

Name 📇	ccsi-router01	ccsi-router01.cfg
Alias Name	ccsi-router01	
Group	ccsi-test01	
Created on	2013-01-24 08:39:39	
Notes		

EIPR-V Edit Screen
for connection detail

Router
Router's local IP	192.168.92.1	LAN Addr. 192.168.92.0/24
Phone Number		

OpenVPN
Protocol	UDP ⦿ TCP ◯
VPN Addr.	10.0.2.0 /24

		Access via VPN Address		via real LAN Address
ccsi-router02		☐ 10.0.3.0/24	→	192.168.93.0/24

Network Access Permissions

DirectRemote
URL   ☐

Options
Enable Internet Access ☐ Masquerade ☐
SNMP Support ☐
Additional Settings

OK   Back

Set EIPR-V Permissions
each router can access
devices behind the other

BAScloudVPN Certificates

A certificate is a file that contains a security key used to encrypt and sign digital information. This is also used for authentication purposes.

BAScloudVPN supports authentication using certificates. This means that — before mutual trust is established — the EIPR-V and PCs must authenticate using the BAScloudVPN certificate and the BAScloudVPN must authenticate the certificates contained in these devices.

Certificates needed for BAScloudVPN communication are generated on the BAScloudVPN server. After logging in to your BAScloudVPN account, you can download the configuration file to your PC for subsequent uploading to your EIPR-V. This file has the certificates embedded in it. Road Warrior certificates, those used by a PC, are contained in a zip file. If you are a Road Warrior, you must download this file to your PC.

Key Icon

in any connection edit screen, clicking this expands the screen to view the certificate and its key

Ordering Information

Model	Description
BAScloudVPN-S	Six-month cloud VPN subscription includes one router and two client certificates
BAScloudVPN-C	Six-month client subscription includes an additional OpenVPN client certificate