

# AVI-ON BACnet LINK

## INSTALLATION GUIDE



<b>Name</b>	Avi-on BACnet Link
<b>Description</b>	Interface Avi-on network data and control commands to BACnet over IP. One per network up to 2000 nodes. Add additional links for larger networks.
<b>Part Number</b>	<b>AVI-BACnet-LINK</b>

To order please contact Avi-on sales at **(877) AVION-US**, (877) 284-6687 or [prosales@avi-on.com](mailto:prosales@avi-on.com) for information on becoming an Avi-on partner and order details.

## REQUIRED MATERIAL AND APPLICATIONS

- **AVI-BACnet-LINK Kit from Avi-on:** This kit includes:
  - Avi-on BACnet hardware box
  - Avi-on USB Dongle (FW version included)
  - USB A Extension cable
  - 110AC-24VDC Power supply (not required if the network supports POE)
  - Two Ethernet cables (one to be left behind)
- **MAC Computer:** Running a current version of Avi-on Pro, with a USB C to Ethernet dongle available
- **Windows 11 Computer or Windows VM Partition:** Required if control testing is needed

### Required Software:

- BACnet Link Firmware Version 1.0.0.10 or later
- BACnet Link Application Version 1.02.02 or later
- Avi-on Dongle Firmware 1.14.19 (197) or later
- BACnet Explorer tool such as Wacnet, YABE, or another equivalent

### Obtaining Required Software:

- Obtain software from Avi-on Support. Regular installers can be invited to a Sharefile download site for updates and recent releases.
- For testing control commands, download YABE (Yet Another BACnet Explorer) [here](#) (Windows machine or Windows VM only). Any BACnet explorer can be used if you are familiar with another application already
- LAN Network Scanner

**Network Requirements:**

- Ensure that the desired BCS system supports BACnet over IP and is visible on the same subnet as the Avi-on BACnet Link.

## CONFIG SOFTWARE INSTALLATION

1. Make sure you are running the latest Java Virtual Machine; minimum requirement is Version 8. Download and install if needed.
2. Download the Avi-on BACnet config software using your Sharefile invitation to a known location. Unzip the folder and place the BACnet Config.jar file in your applications folder.
3. To launch the application: Double-click the BACnetConfig.jar icon in the applications folder.
4. You will need to go to your Security and Privacy icon in settings, scroll to the Security section at the bottom of the list, and click Allow the application to open. You may need to enter the unlock password depending on your security settings. You also may need administrator privileges to install the JVM and the BACnet Config Tool. Contact your IT group if you are blocked from installing the applications.

## INSTALL THE BACNET LINK AND PREPARE FOR CONFIGURATION

1. Choose a location that is both near an ethernet drop on the same subnet as the BCS system and within 40 feet of at least several Avi-on Bluetooth nodes. It is preferable to use a USB extension cable and leave the BACnet link in a secure and accessible location. Up to 50 feet (greater with signal boosters) can be used to move the dongle to a place with good network connectivity.
2. Connect the dongle to the BACNet Link BEFORE powering the Link
3. Plug in the Avi-on BCS link using an ethernet interface on the same subnet as the BCS Link. Use the included power supply, or if the Ethernet connection supports POE, no power supply is needed.
4. Verify the dongle is unclaimed by seeing blue double flashing on the dongle. If the dongle is not unclaimed, it must be reset. Navigate in the BCS Link Config to the Network Page. At the bottom in the "Danger Zone" is a button to unclaim the dongle.
5. Verify using a LAN scanner that the BCS, the Avi-on Link, and the computer used to host the Avi-on BACnet config software are all visible on the same network subnet. Note the IP addresses.
6. Verify that the BACnet config host software computer also has visibility to the internet. This may require multiple simultaneous network connections (such as wired ethernet to the building and a wifi hotspot). Any installed Avi-on BACnet links will be visible on the left-hand side of the screen.

## CONFIGURE THE AVI-ON BACNET POINTS

1. **Avi-on System Installation:** Install the Avi-on system as normal, including all groups and sensor configurations. Enable or disable energy monitoring as appropriate.
2. **Location Manager Verification:** Verify with Location Manager that you are added as a location manager to the desired project.
3. **Special Groups Creation:** Create any special groups needed for BCS-issued control commands if required.
4. **Claim The Dongle:** Using Avi-on Pro or Avi-on Mobile Commissioning, claim the dongle to the desired Avi-on location. Verify that the dongle blue light changes from double flashing to not flashing.
6. **Find/Select Link Device:** Click “Find” on the lower-left screen. Any visible BACnet Links will be listed in the upper left box. Verify that the Config tool can see the Link device(s).
7. **Device Selection:** Select the desired Link devices from the left box. See instructions below for how to set up multiple BACnet Links BEFORE installation
8. **BACnet ID and Port Adjustment:** Note the BACnet ID and Port and adjust if directed by the BCS provider/IT
9. **Firmware Verification:** Ensure you are using the latest BACnet config tool. Navigate to the Settings screen and verify the GW Firmware and Dongle Firmware versions. Update if needed (see instructions below).
10. **Network Configurations:** Enter any special network configurations (Fixed IP, special gateway, etc.) in the Network tab. Verify with a network scanner that the Link is visible on the correct network subnet.
11. **Internet Access Verification:** Ensure the computer has internet access using a web browser. expected areas covered by the BCS Link in the description. This is crucial for correct configuration when adding points

## INSTALLING MULTIPLE BACNET LINKS:

When installing multiple Links, each Link must be given a different Device ID before connecting to the host network. First power and connect to the Links one at a time and set a unique Device IDs. Unique Device IDs are critical for the configuration application to distinguish them when multiple units are in the same network. Use a single Port ID for all Links. Make sure the selected Port ID is not used by any other devices on the LAN. The allowed Port Address range is between 47808 (BAC0) and 47823 (BACF). It will typically not be necessary to change the Port Address unless it is already being used by another system. Device IDs can range between 0 and 4194304. The default starting value is 11994. Be sure to give each BACnet link its own name, and enter the expected areas covered by the BCS Link in the description. This will be critical to getting the configuration correct when adding points.

## SELECTING AND PUBLISHING AVI-ON POINTS IN BACNET

1. **Log in to the Location:** Click the “Cloud” button and enter your Avi-on user email and password.
2. **Select the Desired Location:** From the list on the left, select the desired location. If you have many locations, search for the location name
3. **Login Verification:** If the login is unsuccessful, verify your computer has internet access and check that your credentials are correct
4. **Location Access:** If you cannot find the location, go to Location Manager and verify your access
5. **Loading Points:** The tool will load all available Avi-on points on the right-hand menu. Click on the “Points” tab
6. **Device Sorting:** The device icon will indicate the device type, sorted first by device type and then alphabetically by name
7. **Publishing Points:** Drag the desired points to publish on the BACnet Link from the right box to the Points tab. The Link will auto-create a second point for energy data for devices.
8. To delete a point, right click on the point and select “Delete”

## HOW THE LINK WORKS AND PUBLISHED POINTS

When a point is dragged from the right to the Points box, the Link establishes a BACnet point for that Avi-on node and starts publishing or receiving data on the BACnet IP BUS. The Avi-on BACnet Link at that point is configured and running.

Next, go to the BCS system and subscribe to the desired points, configuring whether the device is one-way (Avi-on sends data), receive (BCS sends updates), or bidirectional (send and receive data). Once configured, the BACnet Link will operate purely between the local Avi-on Network messages and the BACnet IP Bus. The cloud connection to the configuration application is only needed to add or remove points from the published list.

## SUPPORTED DEVICE AND MESSAGE TYPES

### Supported Device Types

Device Type	Supported Message Types
<b>XFAC</b>	Dimming Publish/Write Color Temp Publish/Write Energy Data
<b>IFAC</b>	Dimming Publish/Write Color Temp Publish/Write Energy Data
<b>LVFA</b>	Dimming Publish/Write Color Temp Publish/Write
<b>Device Groups</b>	Dimming Write Color Temp Write Refer to sample individual devices within the group for group status
<b>Contact Closure Output</b>	Dimming Publish/Write
<b>Motion Sensors (All Types)</b>	Publish Motion Triggers Broadcast to Network
<b>SIM</b>	Publish Motion Triggers Broadcast to Network
<b>Lockdown Mode Trigger</b>	Not Currently Supported
<b>System Photocell Trigger</b>	Not Currently Supported
<b>UL 924 Trigger</b>	Not Currently Supported
<b>Space Sensor Coordinator</b>	Not Currently Supported
<b>Wall Stations (switch)</b>	Not Supported, refer to Dim Messages from impacted lights for input events

### Supported Message Types

Message	Functions	Data Type	Unit	Min Value	Max Value
<b>Dimming</b>	Read/Write	Real	Percent	0	100
<b>Motion Sensing</b>	Read	Binary	Binary PV	N/A	N/A
<b>Energy Monitoring</b>	Read	Analog Register Meter Reading	Watt Hours* 15 minute interval	0	5242880
<b>Color Changing</b>	Read/Write	Analog Value	Degrees Kelvin	2700	5000
<b>Scene Triggers</b>	Not Currently Supported				

\*Raw readings in 15 minute increments

For kWh/15 minute interval consumption, subtract the latest reading from the prior reading. A blank reading indicates no data received for that interval. If the reading was lost but the device was operating, the next interval that reports will include all the energy used since the prior received interval. The interval is broadcast every 15 minutes at the end of the interval (latency <3 seconds). The receiving system should time-stamp based on local system time. When a device register value exceeds 5,242,880 or on a power cycle, the register value will reset to 0 and start again. Interpreting the data requires "rollover" logic to recognize these rollovers and produce a correct value. This is standard logic in BCS systems designed to handle ordinary meter reading data.

## TROUBLESHOOTING AND TESTING

Because the BACnet link functions locally, it is critical to ensure that the configuration is functioning correctly before leaving the site. It is strongly recommended that a BACnet explorer be used to verify that the setup was successful. Instructions for running a test are provided below.

### TROUBLESHOOTING:

There are a few common issues that can impact the success of the configuration. Here are some problems and how to diagnose/resolve them:

#### Cannot see the BACnet Link from the Config application:

- Verify the Link is powered and the Ethernet is plugged in.
- Ensure the network connection of the Config computer and the BCS BCS Link are on the same subnet.

#### Cannot connect to the Avi-on cloud to download the network points list:

- Verify the Config computer has an active internet connection.
- Check that your login credentials are correct.

#### Cannot find the location to select:

- Check that you are added to the location.
- Verify the correct location name to search for.

### TESTING THE INSTALL:

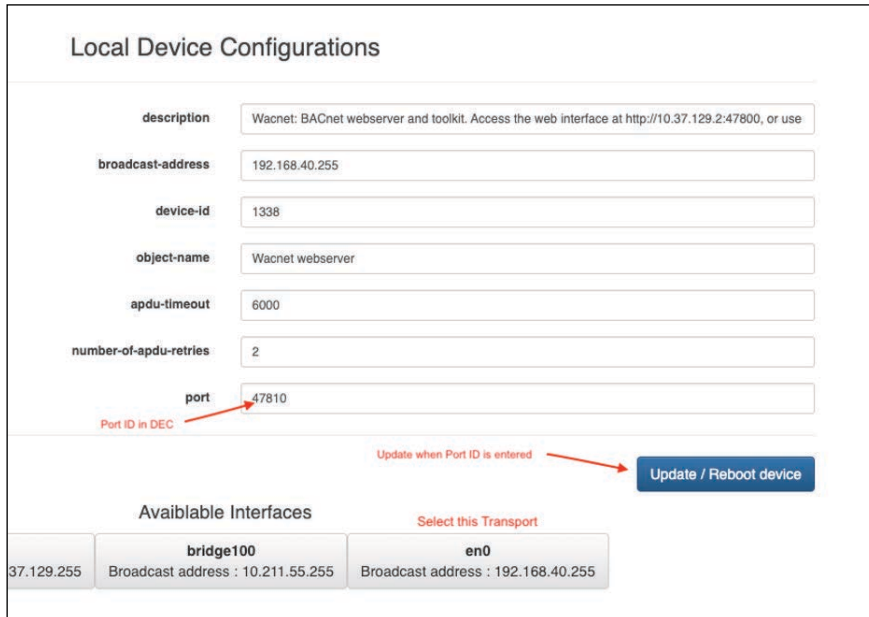
To test the installation, you need a BACnet explorer. To validate the installation without a Windows machine or partition, use the WACnet BACnet explorer. It is downloadable from the internet and included in the Sharefile distribution of the Avi-on Config application. This tool will verify that the BCS Link is publishing data but cannot be used to test data pushes (there are no circumstances where we have seen success at pushing data without accepting commands). To fully test bidirectional communications, a Windows VM or Windows machine running an explorer such as YABE (Yet Another BACnet Explorer) is required.

#### Steps for Testing:

- **Install the Software**
- **Verify Visibility:** Use a network scanner to ensure you can see the BACnet Link.
- **Configure the Explorer:** Set the ports to match the BACnet Link.
- **Connect the Software:** Link the software to the BACnet Link.
- **Subscribe to Points:** Select and subscribe to the desired points.
- **Test and Verify:** Check for changes in status updates in those points end-to-end, either single or bidirectional.

#### Installing WACnet BACnet Explorer:

1. Set the BACnet BCS Link to Port 4810, and Device ID to 11994. (These should be changeable if needed, but these ports have been verified to work with the explorers).
2. Install Java Virtual Machine 8.0 or higher.
3. Download and install the WACnet explorer. It will run in a browser window.
4. Go to the Configs tab, select the en0 transport, enter the device port, and hit update/reboot device.
5. Go back to the Explorer and you should see the BACnet device list and values should update automatically every minute or so.



**Local Device Configurations**

description: Wacnet: BACnet webserver and toolkit. Access the web interface at http://10.37.129.2:47800, or use

broadcast-address: 192.168.40.255

device-id: 1338

object-name: Wacnet webserver

apdu-timeout: 6000

number-of-apdu-retries: 2

port: 47810

Port ID in DEC

Update when Port ID is entered

Update / Reboot device

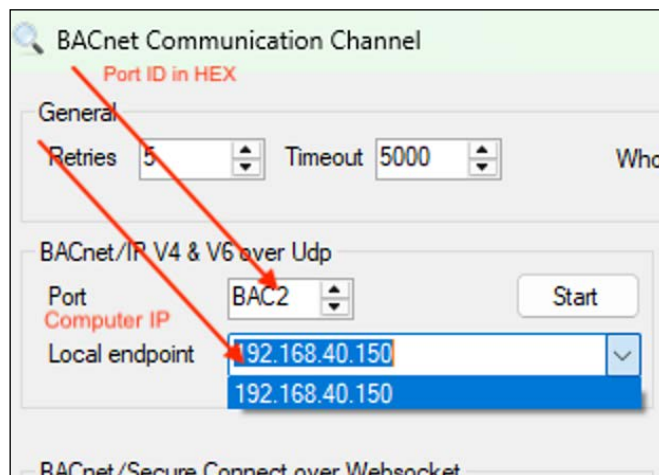
Available Interfaces

Interface	Broadcast address
bridge100	10.211.55.255
en0	192.168.40.255

Select this Transport

### Installing and Connecting YABE BACnet Explorer:

1. Open a Windows computer or VM. Verify it is connected to the subnet of the BCS Link.
2. For Parallels VM, change networking from Shared to BCS Linked Network, Default Adapter.
3. Set the BACnet BCS Link to Port 4810, and Device ID to 11994. If the device has different ids and ports, enter those. Note the Port number is in HEX, while the address in the config tool is DEC
4. Download, install, and launch YABE. Suggest adding a desktop icon for easy access.



**BACnet Communication Channel**

Port ID in HEX

General

Retries: 5 Timeout: 5000 Who

BACnet/IP V4 & V6 over Udp

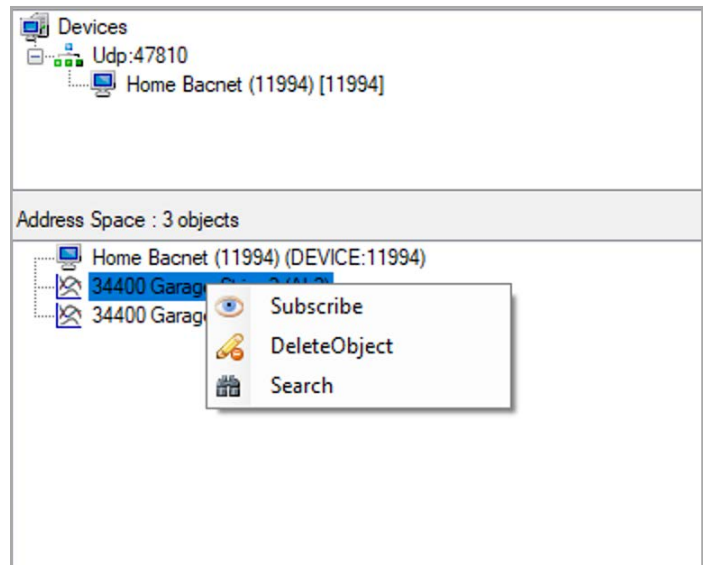
Port: BAC2 Start

Computer IP: 192.168.40.150

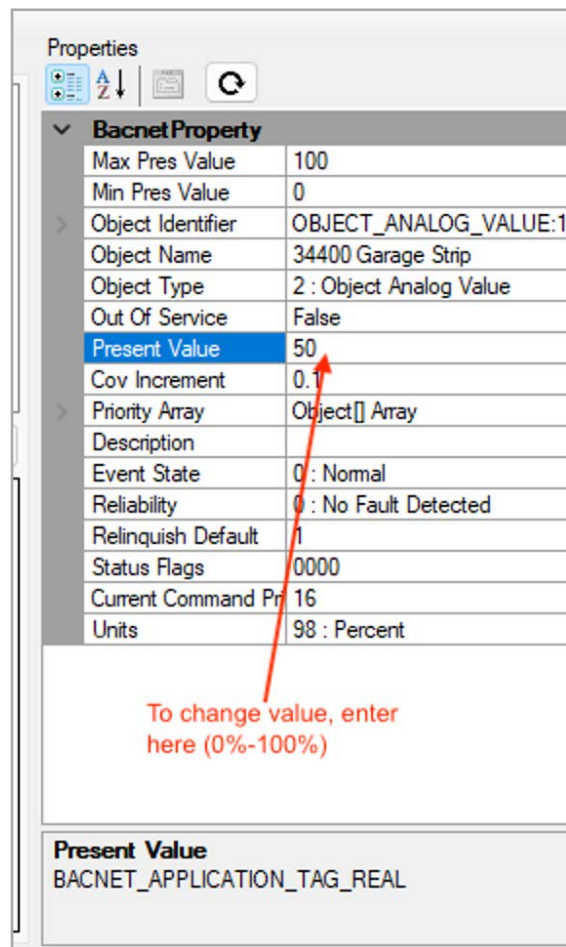
Local endpoint: 192.168.40.150

BACnet/Secure Connect over Websocket

5. Go to Add Devices (green plus).
6. In BACnet/IP, enter the port ID in Hex (should be BASC2) per above directions. The IP address is the address of the computer you are using, NOT THE GATEWAY.



7. Devices should become visible in the Address Space. Double/right-click on the device and hit subscribe. Data will start being updated in the middle window, and the BACnet properties in the right window.
8. To test publish, change the value in the network with the mobile app, switch, or Pro, and see the value updates. To test controls, go to the right menu, and type a new value in the right column for "Present Value."





## UPDATING FIRMWARE

### BCS Link Firmware Upgrade:

1. Download the beg.jar BCS Link firmware file to a known location on your computer. Ensure the filename isn't changed during the download as the upgrade process will look for the beg.jar filename.
2. Open the BACnetConfig tool and find the BCS Link that needs an upgrade. Select that BCS Link from the list.
3. Select the FW Upgrade tab.
4. Enter the BCS Link master password. The password is one of the following (case sensitive):
  - 300BLKout!
  - 2!Mag992C2S.
  - ventilfeder
  - Ventilfeder
5. Browse for the beg.jar file previously downloaded. If a firmware update is needed, Avi-on will provide you with the password.
6. Click the "Upgrade" button.
7. The upload should only take a few seconds. Once finished, the application will reboot the BCS Link, and it will disappear from the list of BCS Links on the left.
8. After a few seconds, hit the "find" button to discover online BCS Links. The upgraded BCS Link should reappear.
9. To verify the BCS Link Firmware version, click the "Settings" tab and check the version number of the BCS Link firmware to confirm it upgraded to the correct version.

### Check Dongle Firmware Version:

1. Open the BACnetConfig tool.
2. Click the Gateway on the left list, then click on the "Settings" tab.
3. The Dongle Firmware Version will be shown in the "Dongle Version" field.