BBN BACnet Setup - Cloud Control

BubblyNet BACnet, Cloud Controls System, Gateway

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Revision: Combining Points, Load examples, and revamped control pane,

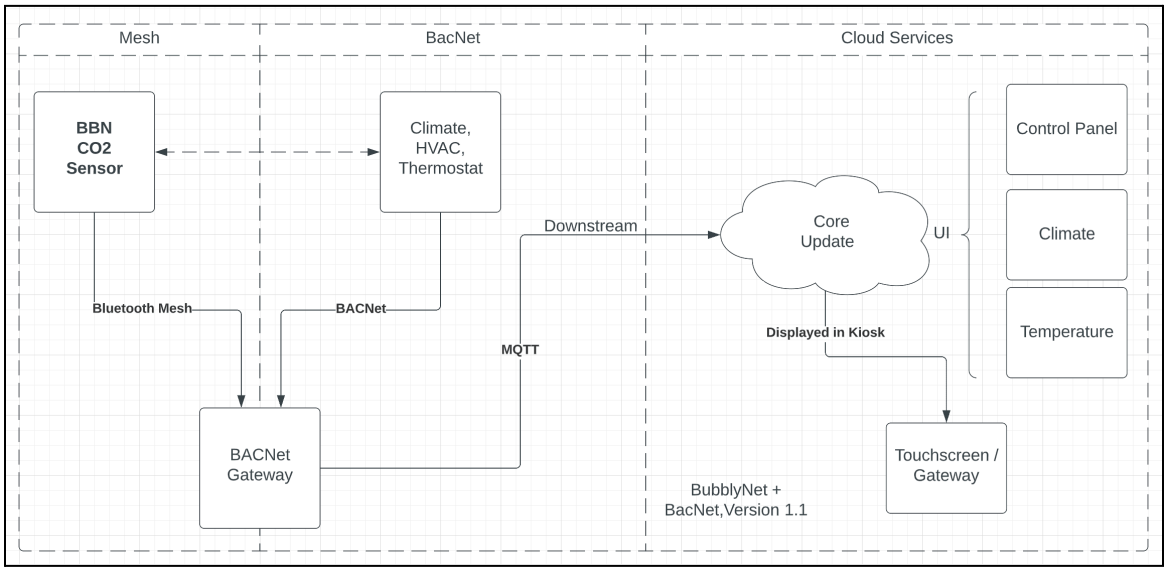
Section A: Documentation for System Setup:

This document is an instruction set for installing and customizing a BubblyNet touchscreen with **Local Control Touchscreen** and configuring a control panel for deployment with a BACnet HVAC component. Please see the ***BBN Local Control Setup Guide*** for additional steps.

The sample used for screenshots in this document are of a 7” screen in landscape mode and the Cloud control system in a browser. All steps for any size or orientation are the same.

Configuration on a Local Control Panel is a three step process. Create the BACnet network, create the control panel for the touch screen, and then access the control panel for daily usage.

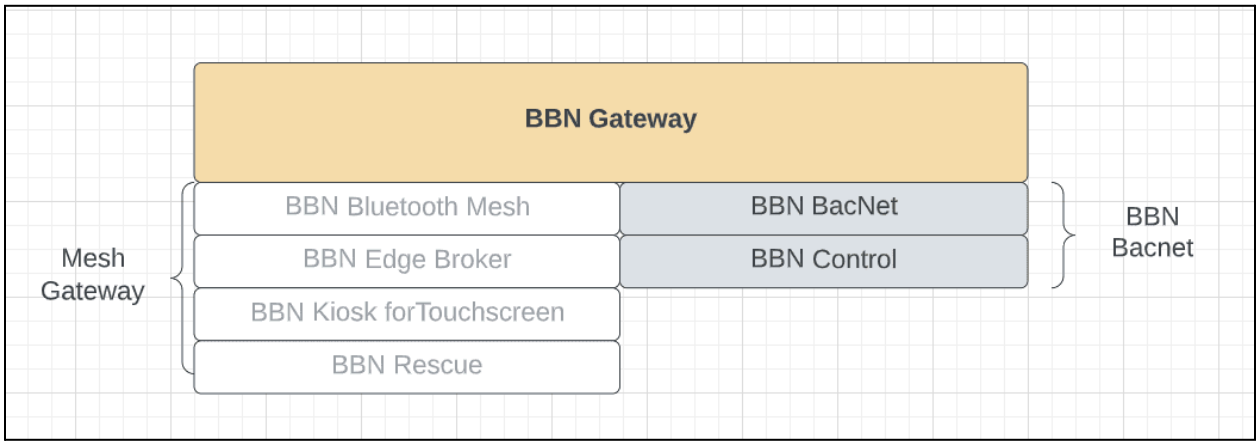
Step 1: Configure the BACnet software



A BubblyNet CO2 sensor is used to demonstrate the Mesh Interaction with the Gateway to the BACnet network.

A BubblyNet BACnet installation is an optional software system for addition to the BubblyNet Touchscreen system. It uses Cloud services or Local Gateway services to communicate with

the mesh network and messaging systems. For more information please contact your sales representative.



Application Configuration

The BubblyNet BACnet Software uses BACnet/IP to interact with or create a BACnet network that a user can interact with using multiple input interfaces. It can range from a single home heating controller using a thermostat controlling a domestic boiler to large industrial control systems which are used for controlling processes or machines.

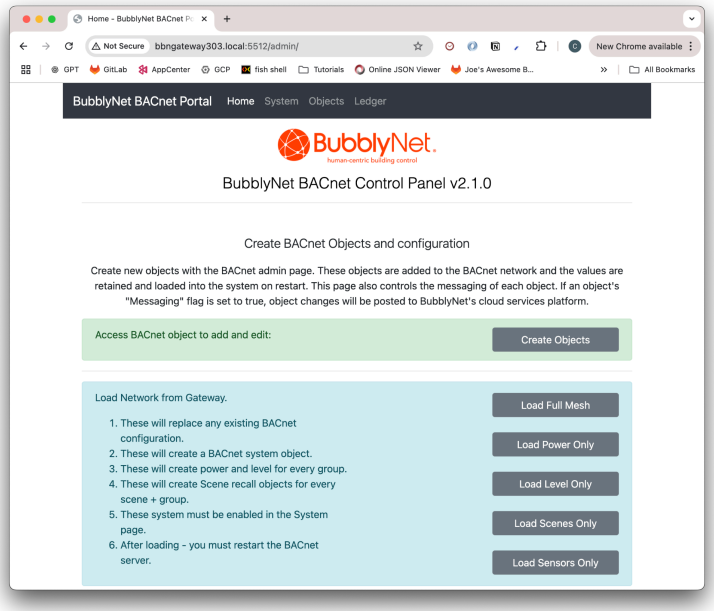
BubblyNet's BACnet system is an optional add-on to their gateway module and must be configured after the bluetooth mesh network is configured.

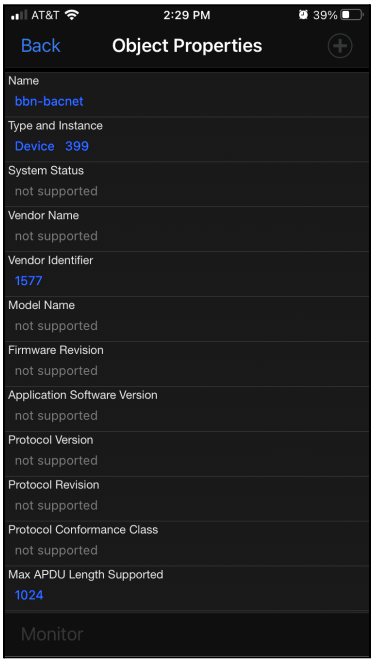
BubblyNet BACnet includes a web based application for modifying the BACnet objects it uses to connect to the bluetooth mesh groups and scenes. Below are screenshots of sample configurations and a BACnet explorer application in a side-by-side view.

A BubblyNet BACnet can be configured as a local control panel with a set of objects for connection and control with that control panel. This allow the BubblyNet Touchscreen panel to monitor the BACnet network for changes.

An admin can access the Control Panel to create a BACnet system and objects for the gateway to serve or map to mesh addresses. A BACnet object can be modified by a BACnet system and the change will be displayed on the Touchscreen.

BBNControl Network Creation Tool



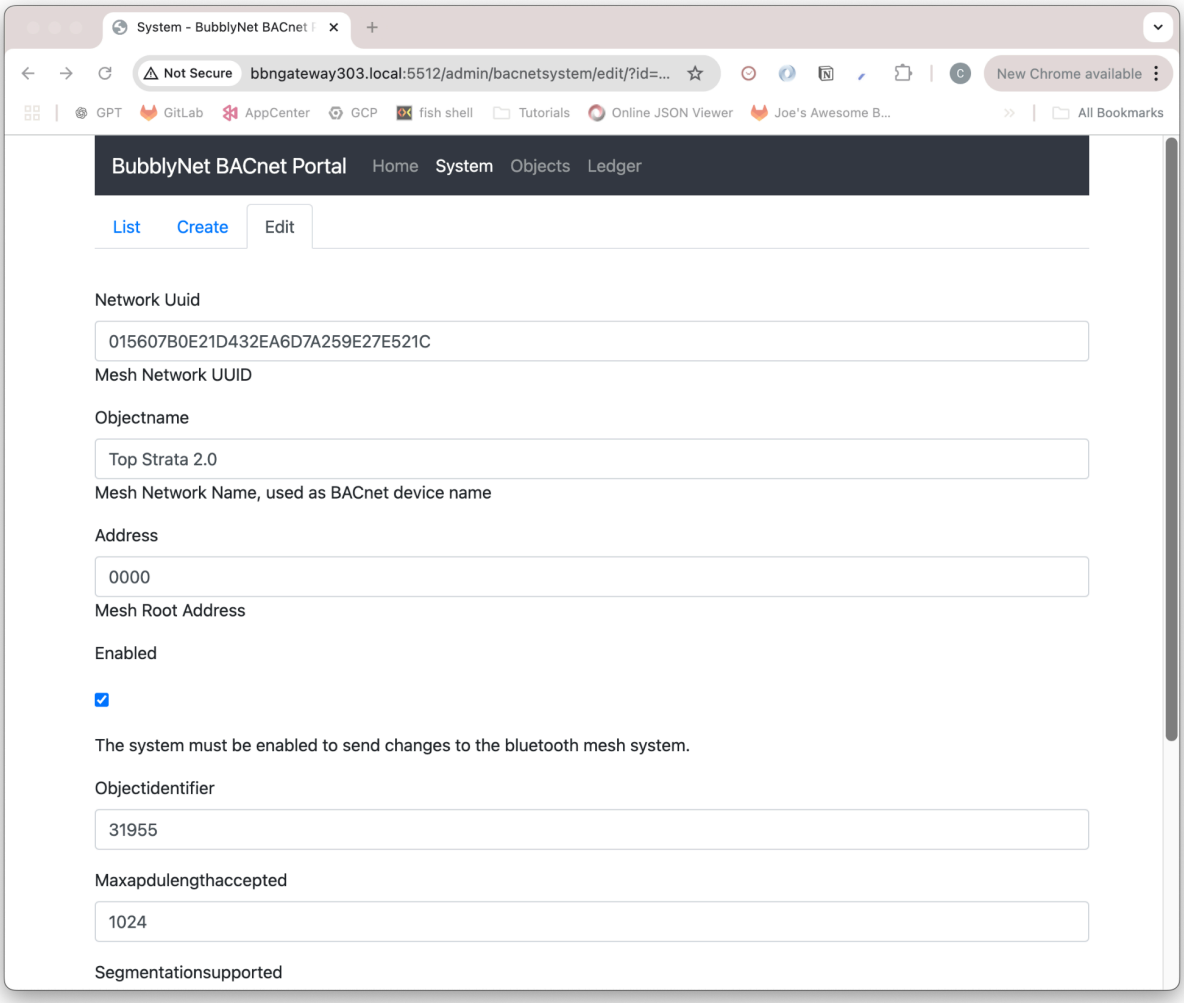


BBNControl allows an admin to quickly import the Bluetooth Mesh Network directly into the BACnet database with the appropriate commendable generic object type. ***The complete points list is added as Section B to this document.*** Importing the mesh database will replace the existing BACnet database.

Power	Binary Value
Scene	Binary Value
Sensors	Binary Value
Level	Analog Value

Each segment of the Bluetooth Mesh network can be installed as a single section if that is all that is needed.

The import will also load the system details to create the necessary mappings to communicate to the Bluetooth Mesh control systems (cloud and local) and create the BACnet system details.

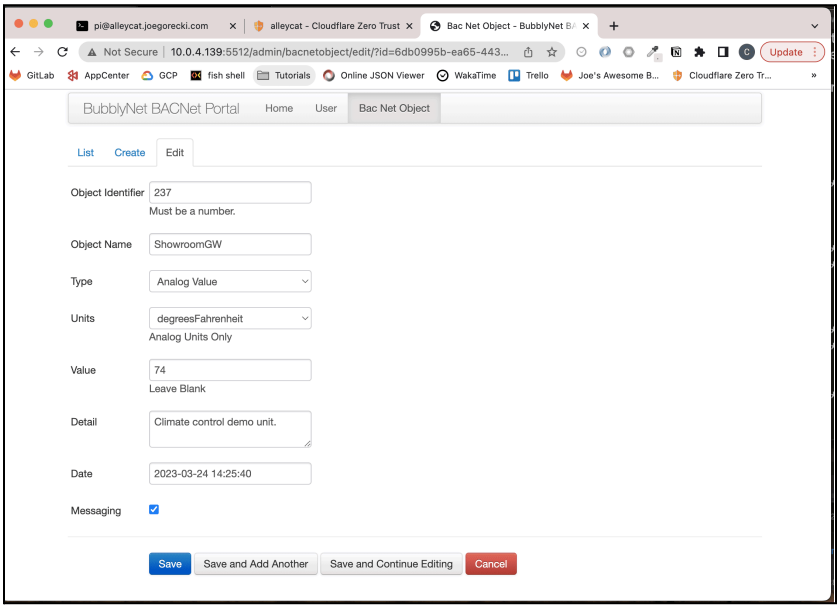


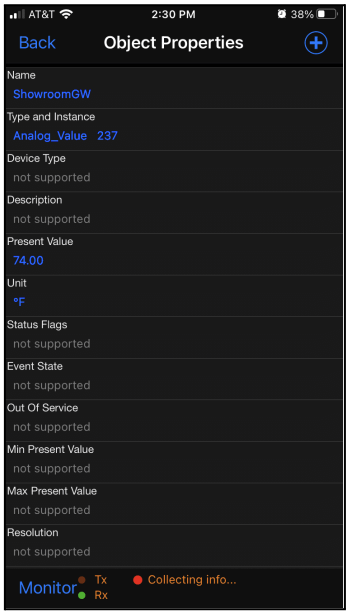
Warning: The entire system will be available with BACnet explorer but commands will not be relayed until the ENABLED is checked.

BBNControl Manual Object Configuration

New objects can be created and existing objects can be edited in the BBN Control system. After Selecting BACnet Object from the top navigation of the control panel, you will be presented with a list of all objects in the BACnet network.

These objects can be deleted, modified, and new objects can be added if the BBNControl platform was used to create the BACnet network objects.





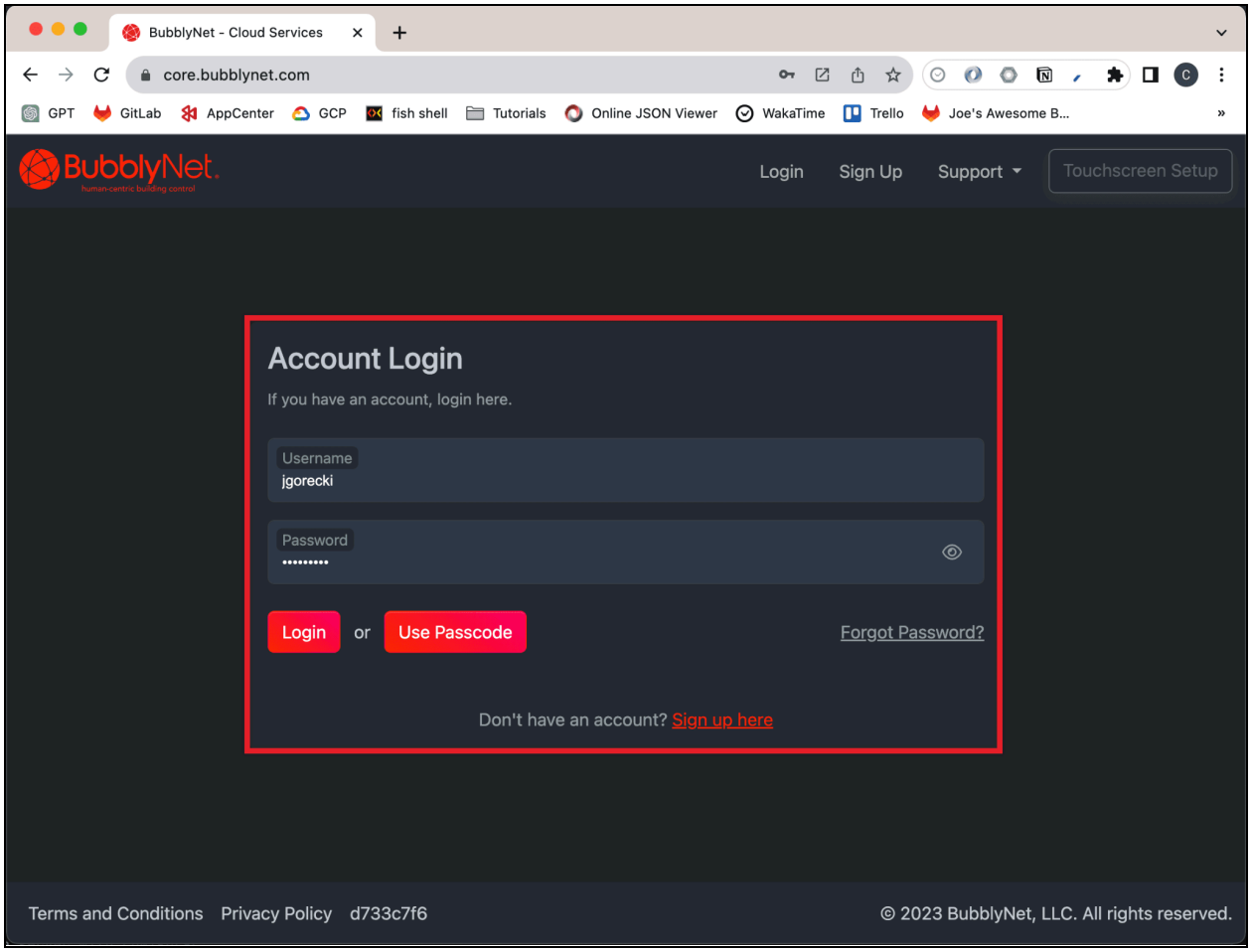
You can add a new object to the network by populating the provided webpage. The following fields are used to define the BACnet object:

- ***ID***: A UUID for datastore. Auto-generated at the time of creation into the BBN-BACnet system.
- ***Object Identifier***: BACnet label. Used to identify the object in the BACnet network.
- ***Object Name***: BACnet label. Used to name the object in the BACnet network.
- ***Type***: BACnet object type. Supports main BACnet objects. Example: Binary Output, Binary Input, Analog Value, etc.

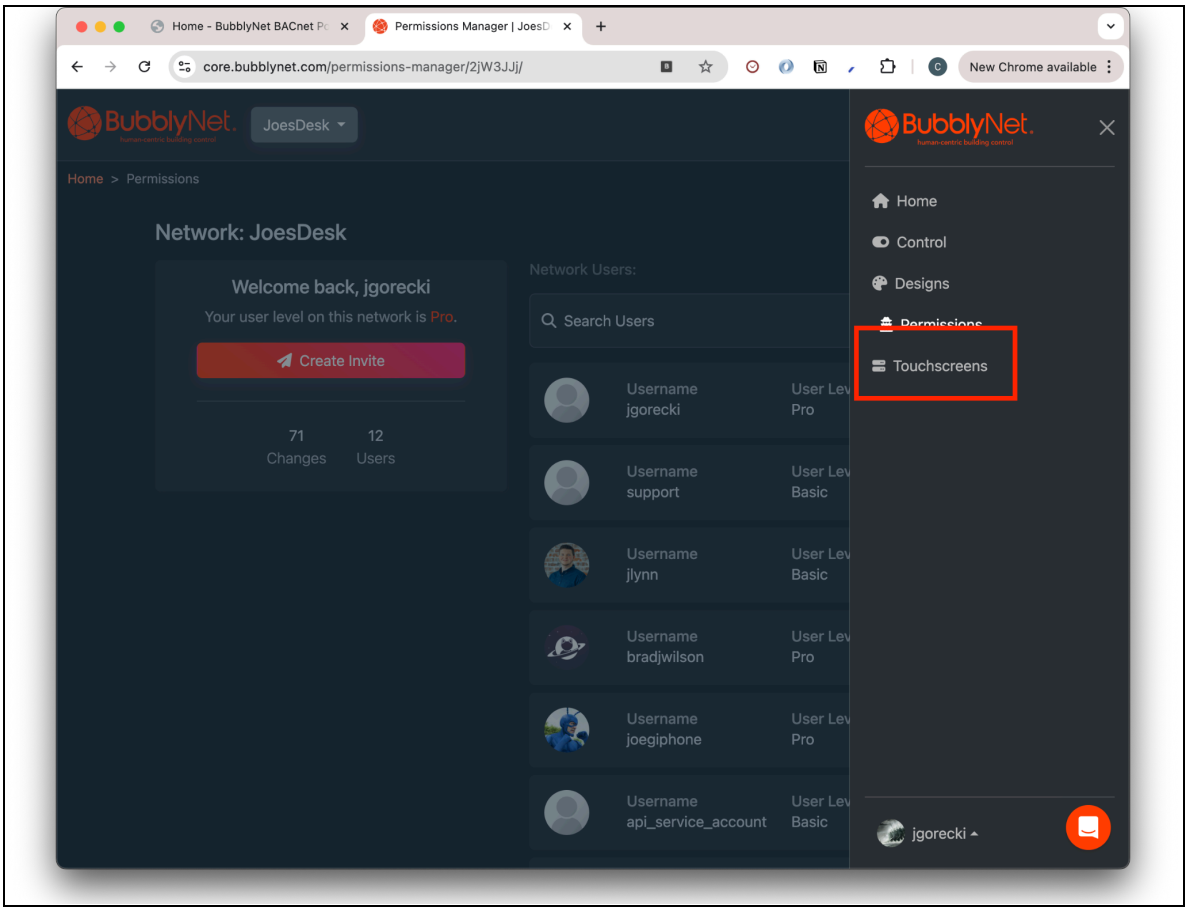
- ***Units***: BACnet property type. Engineering units for object definition. Example: Cubic Feet, Millibars, Minutes, Degrees Celsius, etc.
- ***Value***: BACnet property value. Set by BACnet object State Changes. Loaded to the generated BACnet objects and retained through future loads on the network.
- ***Detail***: BACnet label. Used to describe the describe the object on the network.
- ***Date***: BBN Timestamp on objects created to or loaded to the BBN database.
- ***Messaging***: Enables MQTT messaging for objects in the database. When a object state changes, a MQTT message is generated for BubblyNet Cloud Services.
- ***Group***: The group identifier the object connects to in the control panel.
- ***Category***: The type of object the group is for control panel interaction (exp: Specific types: Heat Set Point, Occupied Command versus generic: Object, Command, Action, *Scene, Power, Level, HSL*)
- ***Extra*****: Advanced topic.** Some object types need extra information to function in conjunction with the mesh database. Extra is used by developers to add information. Contact support if this is needed to function. **Extra is not part of the BACnet system.**

Step 2: Configure the Control Panel from Cloud Services

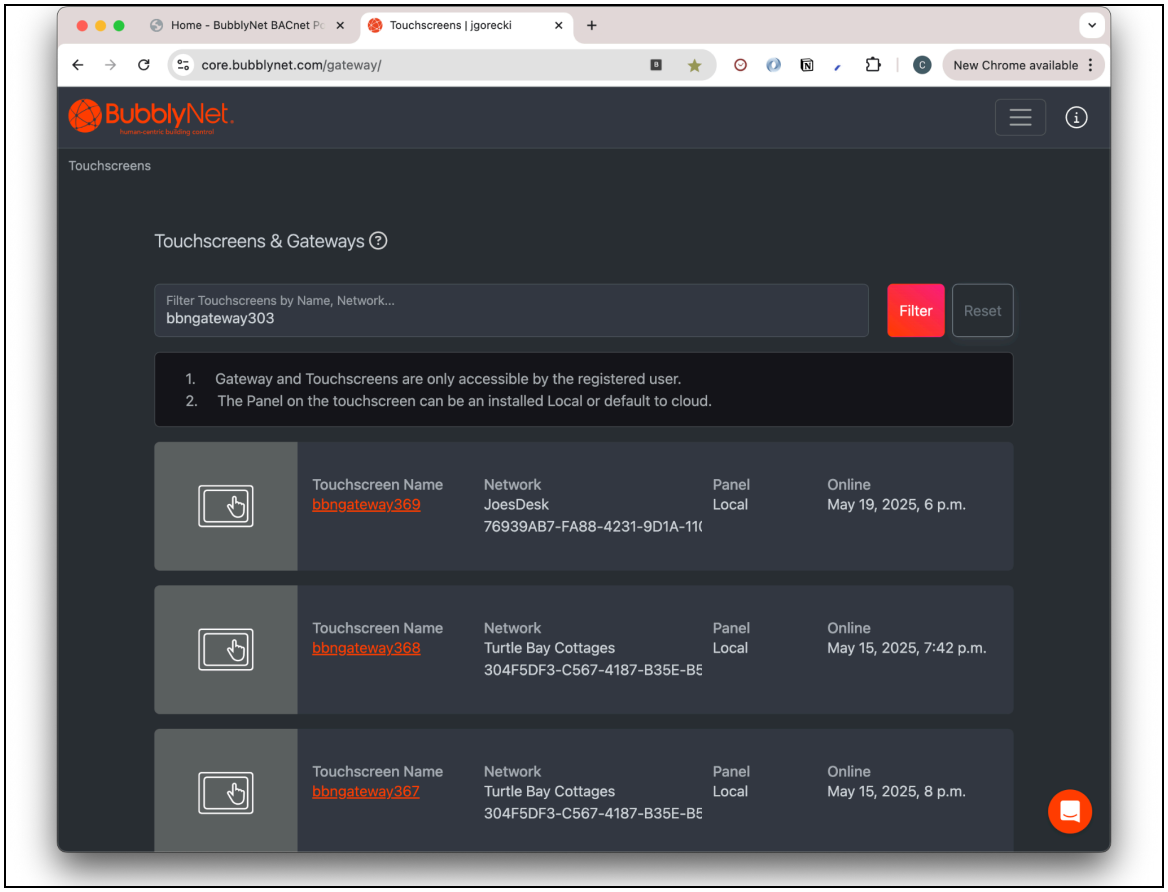
On BubblyNet's cloud services platform, a control panel can be configured for layout and deployment. Once completed, this control panel will be published to the selected touchscreen for control.



- Sign-in to the Cloud services with the username and password for core.bubblynet.com
- Warning: This must be registered as the owner of the touchscreen/gateway device or be an advanced, pro level user.

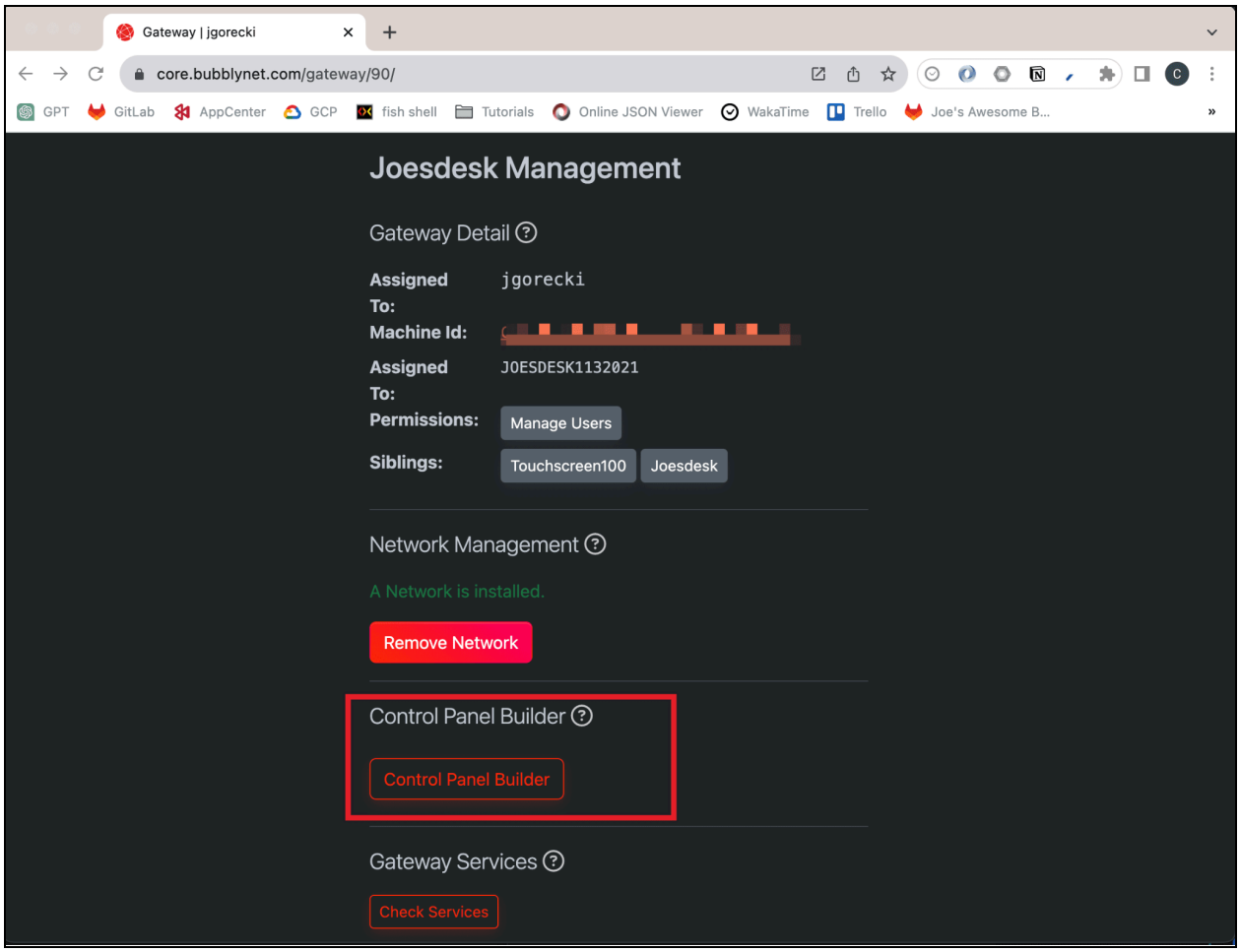


To configure the Bluetooth Mesh Gateway or Touchscreen Controller to work with the BACnet system, click the Touchscreens from the side or top navigation (depending on screen width).

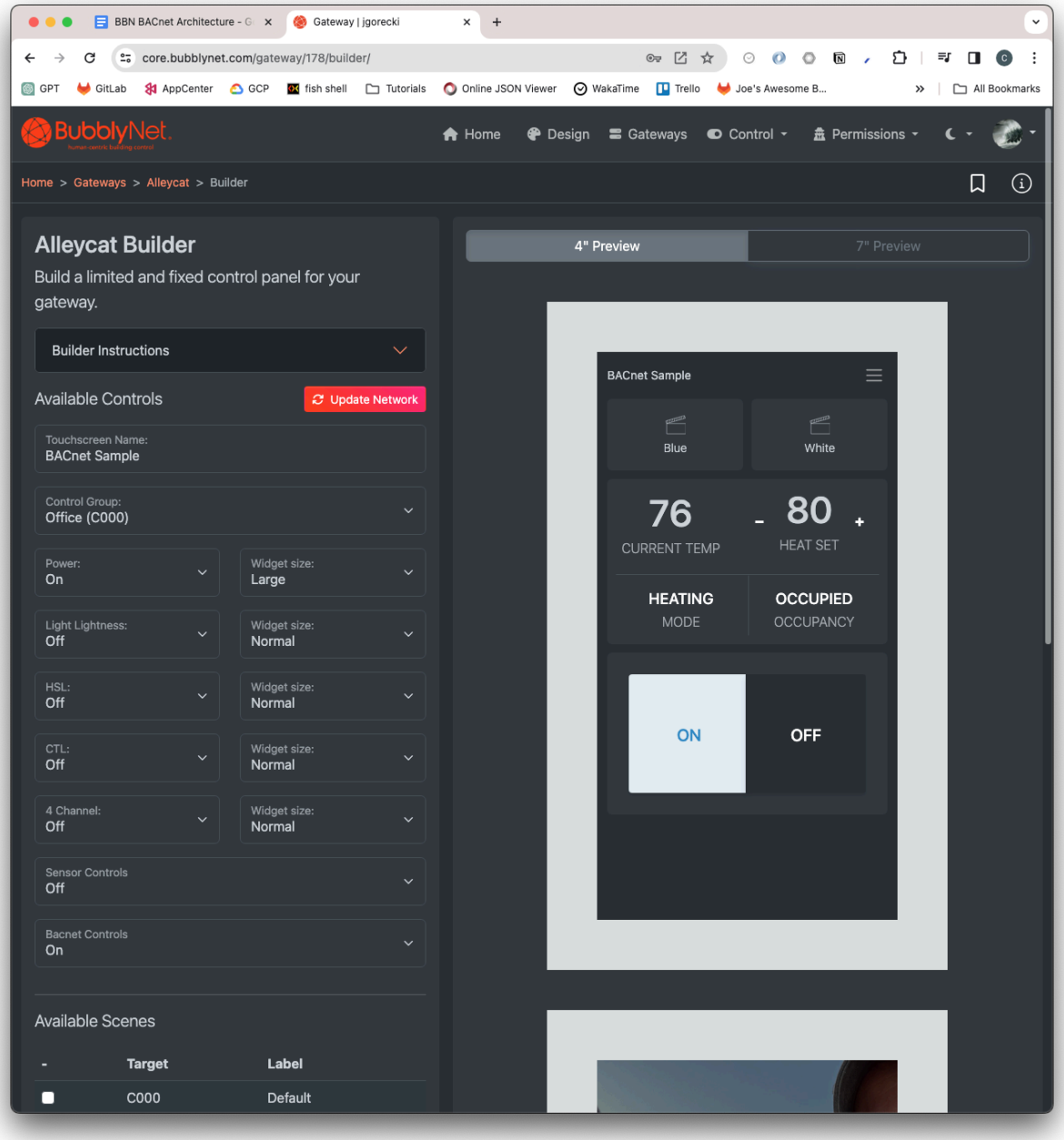


Find and choose the correct gateway that is going to to be configured for BACnet objects list. The touchscreen being used as a gateway is bbngateway303.

This touchscreen is a 7” landscape unit.

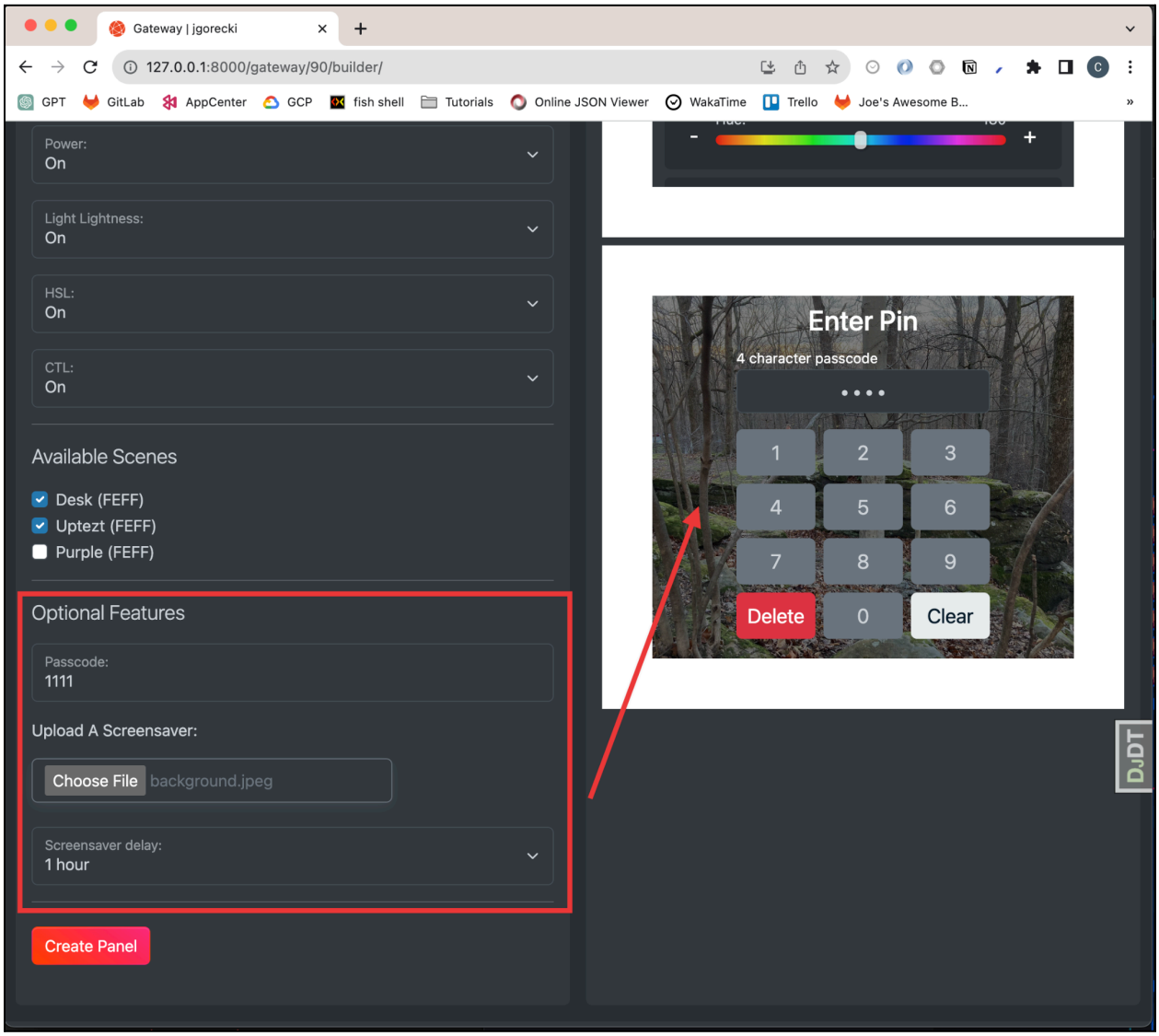


- Select the Control Panel Builder button to begin layout of the control panel.

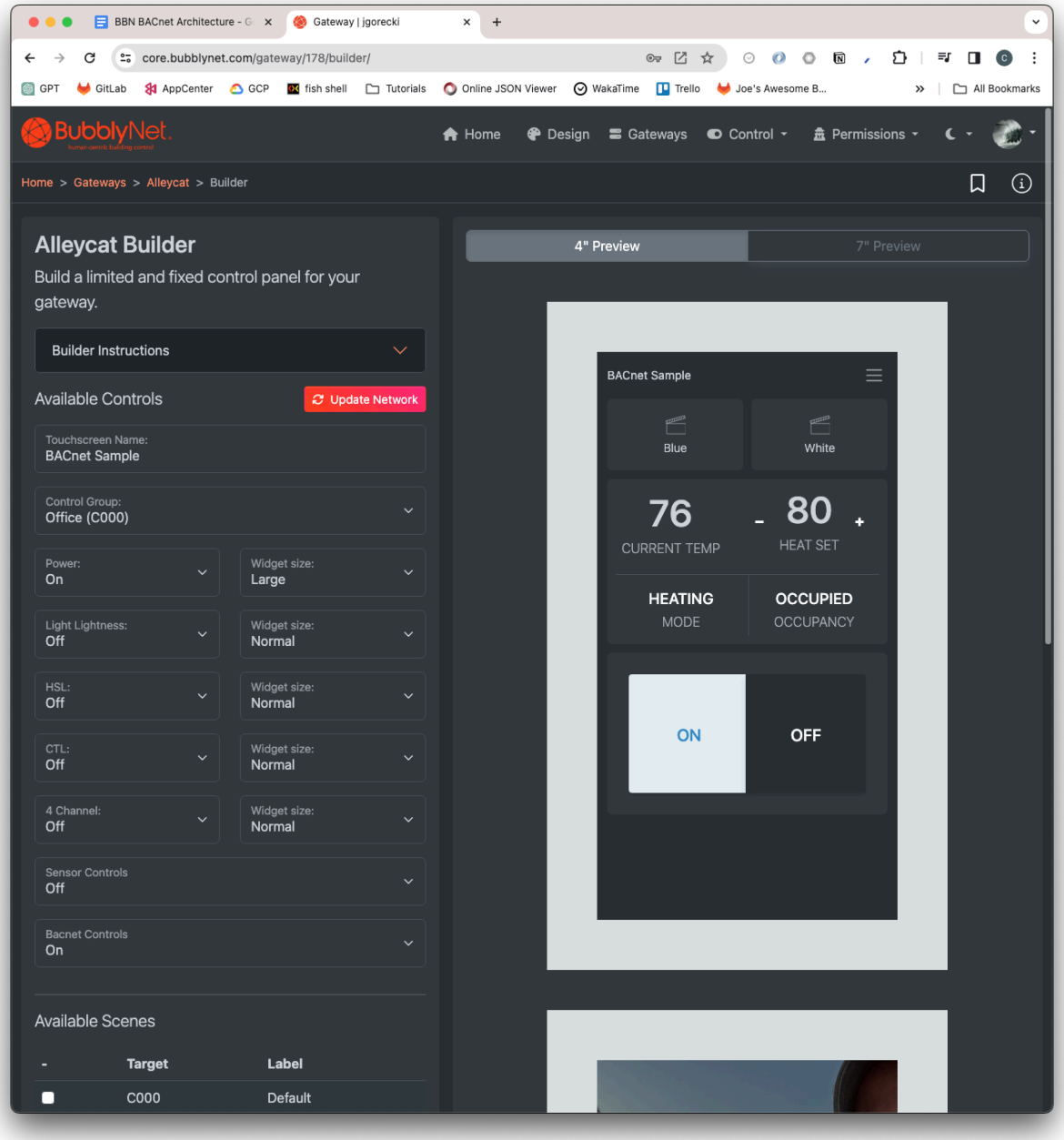


- Choose the correct device type 4” or 7”
- Each control panel is specific to a single group and all children groups.
    - For example: Using top group (generally FEFF) will send commands to the entire group.
- ***Choose the HVAC to be used for the control panel to ON.***
- ***Choose the Group the control panel will access.***
    - **This should match the BACnet control group.**

- Choose the Controls to be used for the control panel.
- Choose the Scenes to be used for the control panel.



- Choose to add and enable a passcode with lockscreen. This will be a 4-digit minimum (exp: 1234)
- Choose to add a screensave image (with customizable time out)

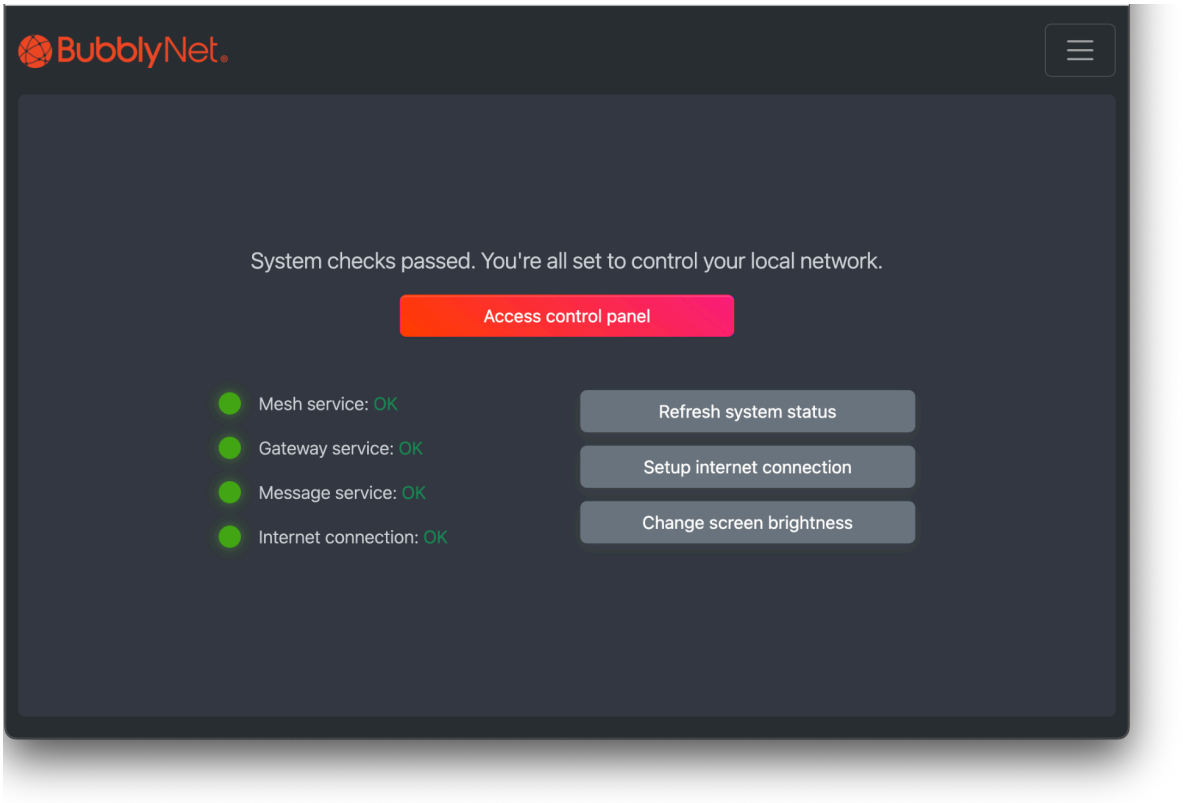


- Pressing Create Panel will publish the selected choices to the Touchscreen.

The first step is now complete and once available Local Control Panel is built on the local touchscreen and served for touchscreen control.

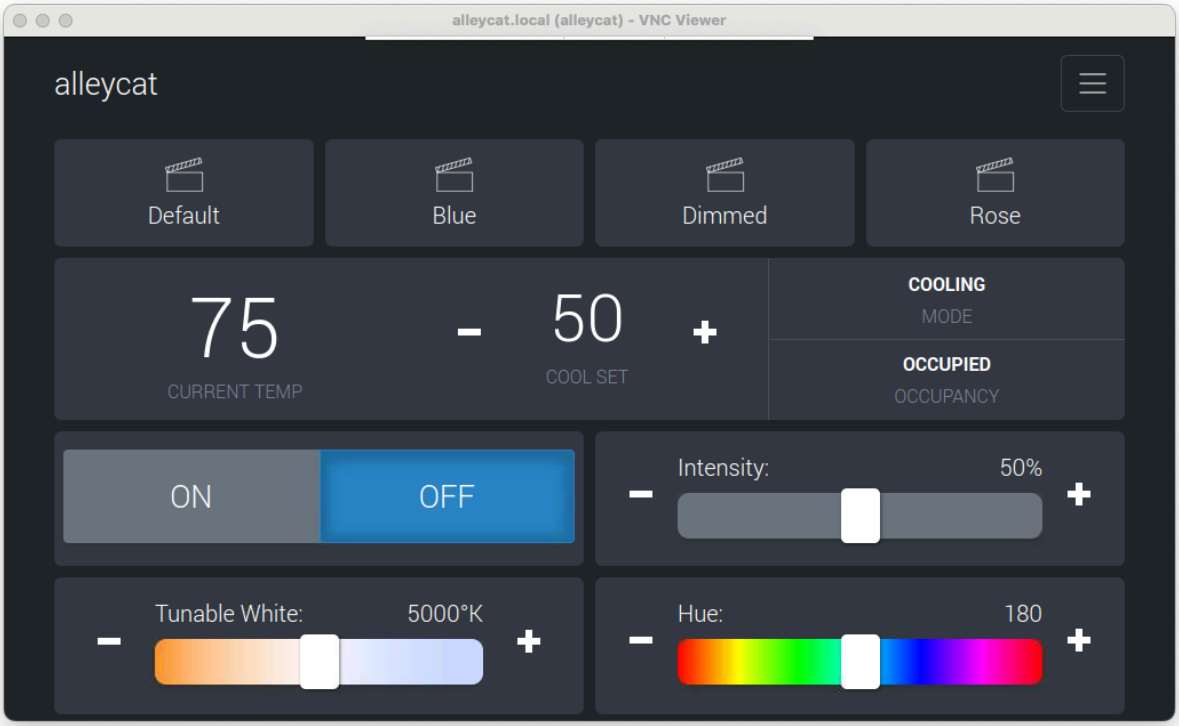
Step 3: Launch and Configure the Local System

Upon startup, the operating system will boot up and launch system services. Services will show the status as Green for passing and Red for not-ready. Press the refresh status button to re-run tests.



Step 4: Access Local Control Panel

The local control panel is loaded from the control panel that was selected on Cloud Services. These can be configured and reconfigured as needed.



The Sample control panel in dark mode with CTL, HSL, Scene support, and HVAC controls. Click the control panel menu screen to change from Light Mode to Dark Mode or return to the Touchscreen setup system for system maintenance.

Section B: BubblyNet BACnet 2.1.0.x Points

Lighting Control System:

BubblyNet's BACnet component imports the Bluetooth Mesh schema to auto-generate the BACnet points for power, level, scenes, and sensor support. These points will be imported as commendable binaryValue objects.

Lighting Control System > Group Control:

Power and level points are generated automatically for each group. HSL and CTL controls are also available but require manual setup via the BBN Control web application.

Sample Point: **Office_power_C000**

Group name: Office
Control type: Power (power | level | hsl | ctl)
Group address: C000 (targets group "Offfice")

Object Id	Object Name	Type	Values	Read/Write
0	**Building_power_FEFF**	**BV**	**inactive/active**	**R/W**
1	**Office_power_C000**	**BV**	**inactive/active**	**R/W**
2	**Hall_power_E75A**	**BV**	**inactive/active**	**R/W**
3	**Desk_power_E75B**	**BV**	**inactive/active**	**R/W**
0	**Building_level_FEFF**	**AV**	**1-65535**	**R/W**
1	**Office_level_C000**	**AV**	**1-65535**	**R/W**
2	**Hall_level_E75A**	**AV**	**1-65535**	**R/W**
3	**Desk_level_E75B**	**AV**	**1-65535**	**R/W**
4	**Desk_HSL_E75B**	**AV**	**1-65535**	**R/W**
5	**Desk_CTL_E75B**	**AV**	**1-65535**	**R/W**

Lighting Control System > Scene Control:

Scene points are generated automatically for each scene. A Bluetooth Mesh scene targets multiple groups. Each scene-to-group is imported individually.

Sample Point: **Default_scene_0001_C000**

Scene name: Default
Scene type: scene
Scene number: 0001
Scene target: C000 (targets group “Offfice”)

Object Id	Object Name	Type	Values	Read/Write
4	**Default_scene_0001_C000**	**BV**	**inactive/active**	**R/W**
5	**Dimmed_scene_0003_C000**	**BV**	**inactive/active**	**R/W**
6	**Full_scene_0004_C000**	**BV**	**inactive/active**	**R/W**
7	**Hall_scene_0005_E75A**	**BV**	**inactive/active**	**R/W**
8	**White_scene_0006_E75A**	**BV**	**inactive/active**	**R/W**
9	**Default_scene_0008_C4CA**	**BV**	**inactive/active**	**R/W**
10	**Dimmed_scene_0009_C4CA**	**BV**	**inactive/active**	**R/W**

Sensor Control System

Sensor points are generated automatically for each sensor. A Bluetooth Mesh sensor is a device that has a group destination per model. Each sensor is imported individually.

Sample Point: **Default_occ_A555_C000**

Sensor name: Default
Sensor type: occ (occ | co2 | day | humidity)
Sensor device: 0001
Sensor target: C000 (targets group “Offfice”)

Object Id	Object Name	Type	Values	Read/Write
11	**Default_occ_A555_C000**	**BV**	**inactive/active**	**R**
6	**Default_co2_BAA0_C000**	**AV**	**0 … 2000**	**R**
7	**Default_temp_BAA0_C000**	**AV**	**0 … 100**	**R**
8	**Default_humidity_BAA0_C000**	**AV**	**0 … 100%**	**R**

Section C: Manual Load Shedding Setup

Overview:

This section outlines how to perform manual load shedding using BACnet commands via BBN BACnet 2.1.0. Although the BACnet "Load Control" object is not supported in BBN BACnet, manual control can be implemented using standard BACnet features.

Background:

BBN BACnet is a custom application for BACnet communication that works with a BBN Mesh Gateway, to support a subset of the full BACnet specification. Specifically, it does not include support for the `loadControl` object introduced in later BACnet revisions (Addendum i).

Despite this limitation, load shedding and demand response can still be implemented manually by writing to commandable BACnet objects using the priority array mechanism.

For a list of objects supported by BBN BACnet - review the *BBN BACnet Points* document for more information.

Manual Load Shedding Procedure:

The manual load shedding procedure modifies the present value of the commandable object with on a priority level when required.

1. ***Select a Commandable Object:***
    - `binaryValue:` An on/off light control for a hallway.
    - `analogValue:` A setpoint on a HVAC thermostat.
    - `multiStateValue:`

2. ***Send WritePropertyRequest:***
    - Target the `presentValue` property.

- Use **priority level 8** — the standard for demand limiting and load control in BACnet.

3. ***Clear Load Shedding:***
   - Send a new `WritePropertyRequest` with a `null` value at priority 8.
   - This relinquishes control and allows other priority levels (e.g., operator input or schedule) to take over.

Example:

Scenario: The system needs to shut off the "Hallway Light" during a load shedding event. After a period of time, it will clear the event.

- Object Identifier: `(binaryValue, 1)`

Step 1: Shed Load Example

```python
WritePropertyRequest(
    objectIdentifier=('binaryValue', 1), # Hallway Light
    propertyIdentifier='presentValue', # Target PV
    propertyArrayIndex=Unsigned(8),  # Priority 8
    propertyValue=Any().cast_in(Boolean(False))  # Off
)
```

Step 2: End Load Shedding Example

```python
WritePropertyRequest(
    objectIdentifier=('binaryValue', 1), # Hallway Light
    propertyIdentifier='presentValue', # Target PV
```

```
    propertyArrayIndex=Unsigned(8), # Priority 8
    propertyValue=Any().cast_in(Null()) # Null
)
```

Notes:

- BACnet priority 8 is ***reserved for demand limiting***. Using it ensures compatibility with typical BAS implementations.

- The actual active `presentValue` is determined by the ***highest priority non-null*** value in the priority array. If all values are null, the system uses `relinquishDefault`.

Summary:

Although BBN BACnet lacks native support for load control objects, manual load shedding can be reliably implemented using standard BACnet write operations with priority 8. This allows for effective demand response strategies within the constraints of the current system.

Gateway Network Requirements

Note: This is only required for the Control Panel setup. After setup, the touchscreen will no longer require an **external network connection** unless support is requested. Please have the gateway already connected before calling support.

Warning! The touchscreen panel does not support Guest network with authentication screens.

- Setup internet connection
    - An ethernet connection is preferred where possible.
    - A Wifi connection can be added to the machine by adding your Network SSID and Network Password.
        - The Gateway supports 802.11ac - Wi-Fi 5.
        - The Gateway supports 2.4 GHz and 5 GHz frequency bands.

- The following standard protocols are used for the remote control and will need ingress/egress permissions:
    - HTTPS/SSL: The Remote Control panel is available at core.bubblynet.com and requires external webpage access on port 443.
        - No content is served on http.
    - MQTT: Messaging is sent to 127.0.0.1 on port 1883 and port 883. If an internet connection is available, messages will be sent to mqtt.bubblynet.com.
    - BubblyNet Remote Access: UDP ports 1194 and 51820

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