

03 Edge

Bluetooth LE GATT API Reference Guide

Edition 2.3

© 2021 Delta Controls All rights reserved.

No part of this document may be reproduced, transmitted, transcribed, stored in a retrieval system, or translated into any language (natural or computer), in any form or by any means, without the prior written permission of Delta Controls.

Limited permission is granted to reproduce documents released in Adobe® Portable Document Format (PDF) electronic format in paper format. Documents released in PDF electronic format may be printed by end-users for their own use using a printer such as an inkjet or laser device. Authorized distributors of Delta Controls products (Delta Partners) may print PDF documents for their own internal use or for use by their customers. Authorized Delta Partners may engage a printing or copying company to produce copies of released PDF documents with the prior written permission of Delta Controls.

Information in this document is subject to change without notice and does not represent a commitment to past versions of this document on the part of Delta Controls. Delta Controls may make improvements and/or changes to this document at any time.

Document edition: 2.3

Contents

- Overview** 1
 - About the O3 Edge 1
 - About the Bluetooth LE GATT API 1
- Getting Started** 2
 - Connecting to the O3 2
 - Step 1: Obtain the Correct Permissions 2
 - Step 2: Discover the O3 2
 - Step 3: Writing to the O3 3
- GATT Services and Characteristics** 4
 - System Management Service 4
 - System Management Service Characteristics 4
 - Sensor Data Service 5
 - Sensor Data Service Characteristics 6
 - Setpoint Service 11
 - Setpoint Service Characteristics 12
 - I/O and Indicator Service 14
 - I/O and Indicator Service Characteristics 14
 - Sensor Configuration Service 21
 - Sensor Configuration Service Characteristics 22
 - Network Configuration Service 25
 - Network Configuration Service Characteristics 25
 - Calibration Configuration Service 31
 - Calibration Configuration Service Characteristics 31
 - System Configuration Service 37
 - System Configuration Service Characteristics 37
 - Mobile Device Data Service 41
 - Mobile Device Data Service Characteristics 42
 - Occupancy States Explained 43
 - O3 Light Ring Pattern States Explained 44
- Revision History** 45

Overview

The O3 Edge series edge controller includes a Bluetooth® Low Energy interface for mobile app development. This document explains the Bluetooth LE API services that are available for Android or iOS mobile apps.

The primary audience for this document is the mobile app developer who wants to interact with the O3 using the Bluetooth LE API.

About the O3 Edge

The O3 Edge ("O3") is a ceiling-mounted multisensor device that integrates temperature, humidity, motion, sound, and light sensing. Using sensor fusion technology and machine learning algorithms, the O3 delivers fast, accurate feedback on the monitored space.

The O3 supports BACnet, MQTT, and Bluetooth® Low Energy (BLE) protocols, allowing it to integrate with almost any system. It also comes with two universal I/O points for controlling or accepting inputs from nearby devices.

For more information about the O3, go to support.o3hub.com.

About the Bluetooth LE GATT API

The Bluetooth LE GATT API allows you to:

- Read sensor data (see [Sensor Data Service](#)).
- Read and write to specific setpoints (see [Setpoint Service](#)).
- Configure the device's network settings (see [Network Configuration Service](#)).
- Configure the device's light ring, audio and universal points (see [I/O and Indicator Service](#)).
- Configure device settings (see [Sensor Configuration Service](#)).
- View device information (see [System Configuration Service](#)).
- Troubleshoot and calibrate the device.

Getting Started

This section describes how to start working with the Bluetooth LE API and the O3 Edge.

Connecting to the O3

Communicating with the O3 using the Bluetooth LE interface involves the following steps:

1. Ensure your application or device has adequate permissions.
2. Discover the O3 device.
3. Present a 6-digit PIN before performing a write to the O3.



You can read values from the device without entering a PIN.

Step 1: Obtain the Correct Permissions

In addition to standard Bluetooth permissions, some operating systems explicitly require enabled location permissions and location services on the user's device.

Step 2: Discover the O3

Use the O3's Generic Access Profile (GAP) advertising data to discover the O3.

Data Type	Data
Eddystone-UID	5C8E6B8BF66A4AB7A359
Service UUID	4822
Service Name	Sensor Hub II-xxxxxx/xxxx where the x represents the hardware ID that is unique to each device. For example, SensorHub II-103001/0010
Manufacturer Data	Each device's unique hexadecimal MAC address is contained in the manufacturer data.

The O3 has a Bluetooth 5.0 Low Energy beacon that is configured to transmit an Eddystone-UID.



The Bluetooth beacon on the O3 does not stop advertising after a connection is made.

Step 3: Writing to the O3

Before you can write any values to the O3, you must complete a pairing process to establish a secure connection. This involves presenting a 6-digit PIN. The factory default PIN on the device is 000000.

Presenting the PIN

Present the PIN using the [PIN characteristic](#).

Verifying the PIN

The O3 returns the result of the PIN verification using the [Last Operation Result characteristic](#). If PIN is incorrect, the O3 will reject any write.

Connection Time Out

The connection times out after 20 minutes of inactivity.

Resetting the PIN

There are two ways to reset the PIN:


- Reset the PIN by writing to the MQTT topic `setting/ble/pin` on the O3's internal MQTT broker (MQTT write credentials are required.) For more details, refer to the *O3 Edge MQTT API Reference Guide* on support.o3hub.com.
- Reset the PIN using the CSV45 object in the O3's BACnet object database. For more details, refer to the *O3 Edge BACnet Application Guide* on support.o3hub.com.

Disconnecting the Mobile Device

Use the [Disconnect Mobile Device characteristic](#) to disconnect the mobile device from the O3.

GATT Services and Characteristics

This section lists the GATT services, characteristics, and their associated vendor UUIDs on the O3 Edge GATT server.

 Send all values written to the O3 as strings in byte array format.

System Management Service

This service grouping contains characteristics related to management tasks for the O3.

Service Definition	
Name	System Mangement
Service UUID	EFB39360-A7E3-438F-A20D-E9F00E0E22B1

System Management Service Characteristics

Last Operation Result Characteristic	Description
Name	Last Operation Result
Characteristic UUID	BE5C2FF9-5D6D-4DE1-8F1D-1D2570F79D72
Description	Returns the result of the PIN verification.
Format	Integer
Properties	Read
Value	0: OK, 102: wrong PIN, 101: general error

PIN Characteristic	Description
Name	PIN
Characteristic UUID	839118E2-6975-4A09-99E1-14D5D4776178
Description	Writes the PIN to the O3 for the purpose of PIN verification. During the verification, the O3 compares this PIN to the PIN saved on the O3 and generates a last operation result.
Format	A string of 6 numbers
Properties	Write
Value Range	0 to 9

New PIN Characteristic	Description
Name	New PIN
Characteristic UUID	3E11BB74-A208-479D-B9C7-B1DDFBB079B7
Description	Writes a new PIN to the O3 and saves it. Note: You can only write a new PIN after successfully entering the original PIN first.
Format	A string of 6 numbers
Properties	Write
Value Range	0 to 9

Sensor Data Service

This service grouping contains characteristics related to sensor data (temperature, humidity, light level, sound, motion, occupancy).

Service Definition	
Name	Sensor Data
Service UUID	F57793C9-9544-46DC-BFA0-5FD149953C86

Sensor Data Service Characteristics

Color Temperature Characteristic	Description
Name	Color Temperature
Characteristic UUID	71AEE317-F805-4C58-B069-13D08B12D75B
Description	Reads the color temperature of ambient light (K).
Format	Float
Properties	Read, Notify
Value Range	0 to 65535
Mapped BACnet Object	AI13

Internal Humidity Characteristic	Description
Name	Internal Humidity
Characteristic UUID	12CE7390-C4BA-407E-B1CF-E248F84DC398
Description	Reads the humidity at ceiling height.
Format	Float
Properties	Read, Notify
Value Range	0 to 100
Mapped BACnet Object	AI7

Internal Temperature Characteristic	Description
Name	Internal Temperature
Characteristic UUID	ECC9A665-6AF4-4144-9D42-35EEFC2E4D49
Description	Reads the temperature at ceiling height.
Format	Float
Properties	Read, Notify
Value Range	-81 to 257
Mapped BACnet Object	AI5

IR Temperature Characteristic	Description
Name	IR Temperature
Characteristic UUID	C789F9C6-1224-4670-9375-13D097C08478
Description	Reads the average temperature of surfaces in the O3's field of view, as determined by the device's IR temperature sensor.
Format	Float
Properties	Read, Notify
Value Range	-81 to 257
Mapped BACnet Object	AI4

Light Level Characteristic	Description
Name	Light Level
Characteristic UUID	EA74FAB1-E7A7-40FA-8EDC-38868EE8BD92
Description	Reads the brightness of ambient light (lx or ft-candle).
Format	Float
Properties	Read, Notify
Value Range	0 to 65535
Mapped BACnet Object	AI12

Light Sensor Blue Component Characteristic	Description
Name	Light Sensor Blue Component
Characteristic UUID	7E7458F1-35B2-4AB5-BAE1-2694B6E91794
Description	Reads the blue component of ambient light with no units but scaled from 0 to 65535.
Format	Float

Light Sensor Blue Component Characteristic	Description
Properties	Read, Notify
Value Range	0 to 65535
Mapped BACnet Object	AI16

Light Sensor Green Component Characteristic	Description
Name	Light Sensor Green Component
Characteristic UUID	C1302CA8-6AAE-4F32-ABBB-23D522DD8774
Description	Reads the green component of ambient light with no units but scaled from 0 to 65535.
Format	Float
Properties	Read, Notify
Value Range	0 to 65535
Mapped BACnet Object	AI15

Light Sensor Red Component Characteristic	Description
Name	Light Sensor Red Component
Characteristic UUID	FF17A806-154A-4E74-81F0-FE0CE1DDAC47
Description	Reads the red component of ambient light with no units but scaled from 0 to 65535.
Format	Float
Properties	Read, Notify
Value Range	0 to 65535
Mapped BACnet Object	AI14

Motion Sensor Characteristic	Description
Name	Motion Sensor
Characteristic UUID	292ABE4D-F45B-4AF0-B464-796F09DF41DB
Description	<p>Reads the motion occupancy signal. Active state when motion is detected.</p> <p>See Occupancy States Explained below for more details about how occupancy is determined.</p>
Format	Integer
Properties	Read, Notify
Value	0: false, 1: true
Mapped BACnet Object	BI9

Occupant Humidity Characteristic	Description
Name	Occupant Humidity
Characteristic UUID	D6A10DF9-7AF1-4CAA-8380-7FB618373397
Description	<p>Reads the calculated humidity at 1 m (3 ft) above the floor.</p>
Format	Float
Properties	Read, Notify
Value Range	0 to 100
Mapped BACnet Object	AI6

Occupancy Status Characteristic	Description
Name	Occupancy Status
Characteristic UUID	72B7F5DE-A24F-4FAB-B0CD-78F0582BDD00
Description	Reads the combined (motion + sound) occupancy signal. Active state when motion and sound is detected. See Occupancy States Explained below for more details about how occupancy is determined.
Format	Integer
Properties	Read, Notify
Value	0: unoccupied, 1: occupied
Mapped BACnet Object	BI8

Occupant Temperature Characteristic	Description
Name	Occupant Temperature
Characteristic UUID	287B7C85-C471-4146-B678-59832B6B4121
Description	Reads the calculated temperature at 1 m (3 ft) above the floor.
Format	Float
Properties	Read, Notify
Value Range	-81 to 257
Mapped BACnet Object	AI3

Sound Level Characteristic	Description
Name	Sound Level
Characteristic UUID	1CC2B5DA-9F5F-4307-9544-2EF5464F1FA4
Description	Reads the level of ambient noise (dB SPL). Unfiltered audio level across the entire spectrum.
Format	Integer
Properties	Read, Notify
Value Range	0 to 120
Mapped BACnet Object	AI17

Thermal Load Characteristic	Description
Name	Thermal Load
Characteristic UUID	6B291913-8382-4663-B407-B1E78DE23AB8
Description	This feature is currently not supported.
Format	Integer
Properties	Read, Notify
Value Range	0 to 100
Mapped BACnet Object	AI18

Setpoint Service

This service grouping contains characteristics related to light level, temperature, and user-defined setpoints.

Service Definition	
Name	Setpoint
Service UUID	5040556B-340F-4C6F-B411-448089694628

Setpoint Service Characteristics

Light Level Setpoint Characteristic	Description
Name	Light Level Setpoint
Characteristic UUID	725D3560-BBD3-47BE-920E-7843AEDFB0D5
Description	User-entered light level setpoint. Measured by user when the lighting in the space is set to the desired brightness.
Format	Float
Properties	Read, Write, Notify
Value Range	0 to 65535
Mapped BACnet Object	AV34

Temperature Setpoint Characteristic	Description
Name	Temperature Setpoint
Characteristic UUID	32E4381B-1F1D-47AC-AE97-58959678967F
Description	User-entered temperature setpoint. Measured by user at occupant height. Offset calculated by the mobile app.
Format	Float
Properties	Read, Write, Notify
Value Range	-81 to 257
Mapped BACnet Object	AV33

User-Defined Setpoint 1 Characteristic	Description
Name	User-Defined Setpoint 1
Characteristic UUID	85897295-F88A-4883-A068-BBC5935D1412
Description	Not currently supported. Can be used as a general-purpose BACnet variable.
Format	Float
Properties	Read, Write, Notify
Value Range	0 to 100
Mapped BACnet Object	AV35
User-Defined Setpoint 2 Characteristic	Description
Name	User-Defined Setpoint 2
Characteristic UUID	8347707C-0001-427C-9588-D4133244F7EF
Description	Not currently supported. Can be used as a general-purpose BACnet variable.
Format	Float
Properties	Read, Write, Notify
Value Range	0 to 65535
Mapped BACnet Object	AV36
User-Defined Setpoint 3 Characteristic	Description
Name	User-Defined Setpoint 3
Characteristic UUID	6B5BDBBC-52D1-422A-92ED-0CFF25DCB460
Description	Not currently supported. Can be used as a general-purpose BACnet variable.
Format	Float

User-Defined Setpoint 3 Characteristic	Description
Properties	Read, Write, Notify
Value Range	0 to 100
Mapped BACnet Object	AV37

I/O and Indicator Service

This service grouping contains characteristics related to I/O (if applicable), light ring, and audio settings.

Service Definition	
Name	I/O and Indicator
Service UUID	E05AD2AC-9A01-45F5-A56D-9C3C889D4DC6

I/O and Indicator Service Characteristics

Activate Custom Light Ring Colors Characteristic	Description
Name	Activate Custom Light Ring Colors
Characteristic UUID	16C58089-CA5C-45FA-BA85-3A3B1AD3E9ED
Description	Activates custom light ring color defined by Light Ring Custom Color Red, Light Ring Custom Color Green, and Light Ring Custom Color Blue. When set to On, it overrides Play Light Ring Pattern (see previous table).
Format	Integer
Properties	Read, Write, Notify
Value	0: off, 1: on
Mapped BACnet Object	BV7

Light Ring Custom Color Blue Characteristic	Description
Name	Light Ring Custom Color Blue
Characteristic UUID	05AE6EFC-84EC-4093-AA98-ECC198F968FD
Description	Sets blue component of light ring RGB value. Range: 0% to 100%. Only valid if Activate Custom Light Ring Colors is set to On.
Format	Integer
Properties	Read, Write, Notify
Value Range	0 to 100
Mapped BACnet Object	AV5
Light Ring Custom Color Green Characteristic	Description
Name	Light Ring Custom Color Green
Characteristic UUID	232B1A5D-6E51-470F-9C06-245297856415
Description	Sets green component of light ring RGB value. Range: 0% to 100%. Only valid if Activate Custom Light Ring Colors is set to On.
Format	Integer
Properties	Read, Write, Notify
Value Range	0 to 100
Mapped BACnet Object	AV4

Light Ring Custom Color Red Characteristic	Description
Name	Light Ring Custom Color Red
Characteristic UUID	B42BAC5D-1051-41E6-AFB4-1E16B31574CE
Description	Sets red component of light ring RGB value. Range: 0% to 100%. Only valid if Activate Custom Light Ring Colors is set to On.
Format	Integer
Properties	Read, Write, Notify
Value Range	0 to 100
Mapped BACnet Object	AV3
Play Light Ring Pattern Characteristic	Description
Name	Play Light Ring Pattern
Characteristic UUID	2E2CEFB0-D026-4EC7-8856-8BDD05F9B62E
Description	Plays light ring pattern, numbered 1 to 13. Default value is 1 (Off). Writing an On value to Activate Custom Light Ring Colors characteristic overrides this Play Light Ring Pattern characteristic. See the 03 Light Ring Pattern States Explained table for the complete list of light ring patterns.
Format	Integer
Properties	Read, Write, Notify
Value Range	1 to 13
Mapped BACnet Object	MV1

Play Light Ring Repeat Characteristic	Description
Name	Play Light Ring Repeat
Characteristic UUID	49AC79E5-6E7E-404F-A1A2-FACB501BD9E9
Description	Sets number of times light ring pattern repeats.
Format	Integer
Properties	Read, Write
Value Range	0 to 999999
Mapped BACnet Object	AV2

Play Sound Characteristic	Description
Name	Play Sound
Characteristic UUID	ED4B8FAD-9922-4B51-BB20-A77A2592E51F
Description	Plays a sound. There are 25 default sounds on the O3.
Format	Integer
Properties	Read, Write
Value Range	1 to 26 (default sounds), 27 to 52 (custom sounds set up in the O3 using enteliWEB software)
Mapped BACnet Object	MV28

Read Input Channel 1 Characteristic	Description
Name	Read Input Channel 1
Characteristic UUID	2C67EEEE-393E-4C77-9204-83C2F487F8D0
Description	Channel 1 is a universal input or output point on the O3. Reads the present value of the input point on Channel 1.
Format	Float
Properties	Read
Value Range	0 to 65535
Mapped BACnet Object	AI1 or BI1 (depending on how the point is configured)

Read Input Channel 2 Characteristic	Description
Name	Read Input Channel 2
Characteristic UUID	C3412BA0-B1CB-4951-9E97-8A3DD2A23431
Description	Channel 2 is a universal input or output point on the O3. Reads the present value of the input point on Channel 2.
Format	Float
Properties	Read
Value Range	0 to 65535
Mapped BACnet Object	AI2 or BI2 (depending on how the point is configured)

Set Light Ring Brightness Characteristic	Description
Name	Set Light Ring Brightness
Characteristic UUID	46640823-D37E-4510-BE8E-AF0BF6E0273E
Description	Sets overall brightness of light ring. Range: 0% to 100%. Default value is 50%.
Format	Integer
Properties	Read, Write, Notify
Value Range	0 to 100
Mapped BACnet Object	AV6

Set Output Channel 1 Characteristic	Description
Name	Set Output Channel 1
Characteristic UUID	5D4E8DF4-87DD-48DB-BB26-25946D936A32
Description	Channel 1 is a universal input or output point on the O3. Writes the present value of the output point on Channel 1.
Format	Float
Properties	Write
Value Range	0 to 65535
Mapped BACnet Object	A01 or B01 (depending on how the point is configured)

Set Output Channel 2 Characteristic	Description
Name	Set Output Channel 2
Characteristic UUID	D14C4967-9540-42EC-AF2F-CF17E6FCC5B5
Description	Channel 2 is a universal input/output point on the O3. Writes the present value of the output point on Channel 2.
Format	Float
Properties	Write
Value Range	0 to 65535
Mapped BACnet Object	A02 or B02 (depending on how the point is configured)

Set and Play Custom Audio File Characteristic	Description
Name	Set and Play Custom Audio File
Characteristic UUID	A2895C02-905E-4822-A711-29482675F501
Description	Defines the custom audio file to be played, and then plays it. Enter the file name, including the file extension. For example: Acknowledge.wav Note: The custom audio file must be uploaded to the O3 using enteliWEB software. See the <i>O3 Edge BACnet Application Guide</i> for more details about loading custom sound files.
Format	String
Properties	Read, Write
Value	<string>

Sound Repeat Characteristic	Description
Name	Sound Repeat
Characteristic UUID	E5421778-0829-4EA1-A1D1-318124EBE6B0
Description	Sets the number of times a sound is played.
Format	Integer
Properties	Read, Write
Value Range	0 to 999999
Mapped BACnet Object	AV29

Speaker Volume Characteristic	Description
Name	Speaker Volume
Characteristic UUID	FC09FC9A-23ED-4867-9C4C-4F34C274F41A
Description	Sets the speaker volume in the range 0-100. Default value is 75.
Format	Integer
Properties	Read, Write, Notify
Value Range	0 to 100
Mapped BACnet Object	AV30

Sensor Configuration Service

This service grouping contains characteristics related to device and sensor configuration.

Service Definition	
Name	Sensor Configuration
Service UUID	51E16FF1-20D3-45EC-915C-F18290A893C5

Sensor Configuration Service Characteristics

Assign BACnet Device ID Characteristic	Description
Name	Assign BACnet Device ID
Characteristic UUID	AE79CA8F-A333-4850-84EA-1AD9710FB5A7
Description	<p>If the O3 is on a BACnet network, this characteristic defines its BACnet device address. For example: 4100080.</p> <p>Ensure the BACnet device address is unique for each O3.</p>
Format	String
Properties	Read, Write
Value	<string>
Change TCP/IP Settings Characteristic	Description
Name	Change TCP/IP Settings
Characteristic UUID	055FA816-E26E-4D82-BB77-456D5DA0D9EE
Description	<p>Sets the O3's IP address, which can either be static or assigned by a DHCP server.</p> <p>If a static address is used, ensure the IP address is unique for each O3.</p>
Format	String
Properties	Read, Write
Value	<string>

Read Device Serial Number Characteristic	Description
Name	Read Device Serial Number
Characteristic UUID	2E888D3C-AEC5-4193-B0F1-4735CAB9AFBD
Description	Reads the O3's serial number.
Format	String
Properties	Read
Value	<string>
Set Device Name Characteristic	Description
Name	Set Device Name
Characteristic UUID	45E7570D-A13A-456E-B8B9-7B4EF6989DB2
Description	Defines the O3's device name on a BACnet network.
Format	String
Properties	Read, Write
Value	<string>
Set Light Unit Characteristic	Description
Name	Set Light Unit
Characteristic UUID	4A3B5382-2453-46A1-94CA-7F898122E35C
Description	Set the unit used for light readings. The supported units are lux or foot-candles.
Format	String
Properties	Read
Value	lux or cd

Set Temperature Unit Characteristic	Description
Name	Set Temperature Unit
Characteristic UUID	9BBA2752-A586-433D-98CF-888A5B8B09FC
Description	Sets the unit used for temperature readings.
Format	String
Properties	Read, Write
Value	C or F

Set Web Server URL Characteristic	Description
Name	Set Web Server URL
Characteristic UUID	0C36266F-1667-4B69-95FF-6F55947589E5
Description	Defines the web server that the O3 communicates with.
Format	String
Properties	Read
Value	<string>

TCP/IP Subnet Mask Characteristic	Description
Name	TCP/IP Subnet Mask
Characteristic UUID	3923BA42-1269-4BF0-9E4C-855182372280
Description	Sets the O3's subnet mask.
Format	String
Properties	Read, Write
Value	<string>

Network Configuration Service

This service grouping contains characteristics related to establishing a BACnet/Ethernet or BACnet/IP network connection.

Service Definition	
Name	Network Configuration
Service UUID	E03D645C-3F2B-4693-A2FB-99840EE2581D

Network Configuration Service Characteristics

BACnet Ethernet Enable Characteristic	Description
Name	BACnet Ethernet Enable
Characteristic UUID	E0B25FF2-E97E-4D77-B4DC-7DEAD4A4AADF
Description	Enables or disables BACnet/Ethernet protocol support on the O3.
Format	Boolean
Properties	Read, Write
Value Range	false or true

BACnet IP Mode Characteristic	Description
Name	BACnet IP Mode
Characteristic UUID	0C33C8F1-86E8-4CA5-A4DF-F1BDB6B96E22
Description	<p>Reads how the O3 is set up as a BACnet/IP device.</p> <p>Currently, the O3 can only be set up as a foreign device using enteliWEB software.</p>
Format	String

BACnet IP Mode Characteristic	Description
Properties	Read, Notify
Value Range	normal or foreign

BACnet Protocol Characteristic	Description
Name	BACnet Protocol
Characteristic UUID	61ABFC55-7A00-4B9B-93C9-1770356EDC8F
Description	Enables or disables the O3's ability to communicate using the BACnet protocol.
Format	Boolean
Properties	Read, Write
Value	false or true

BACnet UDP Number Characteristic	Description
Name	BACnet UDP Number
Characteristic UUID	67358E4B-C841-4E6F-9822-EC92E388A4A3
Description	Sets the UDP port number used by the O3 to communicate over BACnet/IP.
Format	Integer
Properties	Read, Write
Value Range	0 to 65535

Connectivity Characteristic	Description
Name	Connectivity
Characteristic UUID	56456172-DDD7-4E75-83D7-C2D0D6B796EE
Description	Reads the online status of the O3.
Format	Integer
Properties	Read
Value Range	0: Up and Running 1: Up and Not Running 2: Down and Not Running 3: Error Getting Link Status

DNS IP Characteristic	Description
Name	DNS IP
Characteristic UUID	D1035EB0-C93D-4C20-A4B2-C2E44D91C903
Description	Sets the Domain Name Server IP address used by the O3 if DHCP is not used.
Format	String
Properties	Read, Write
Value	<string>

Ethernet MAC Address 1 Characteristic	Description
Name	Ethernet MAC Address 1
Characteristic UUID	D7AE5B6F-C8DD-4ADD-A75A-28F4038528FA
Description	Reads the MAC address used on Ethernet port 1 on the O3.
Format	String

Ethernet MAC Address 1 Characteristic	Description
Properties	Read
Value	<string>
<hr/>	
Ethernet MAC Address 2 Characteristic	Description
Name	Ethernet MAC Address 2
Characteristic UUID	C417C455-C003-445A-ADA4-F203F0DA2F2A
Description	Reads the MAC address used on Ethernet port 2 on the O3.
Format	String
Properties	Read
Value Range	<string>
<hr/>	
Ethernet 1 Status Characteristic	Description
Name	Ethernet 1 Status
Characteristic UUID	73678CA9-B639-459E-890A-6E3B38962B2F
Description	Reads the status of the Ethernet port 1 on the O3.
Format	Integer
Properties	Read, Notify
Value	0: Up and Running 1: Up and Not Running 2: Down and Not Running 3: Error Getting Link Status

Ethernet 2 Status Characteristic	Description
Name	Ethernet 2 Status
Characteristic UUID	ECD1CC9F-7A8E-4B4F-8BD2-8E7B13258F87
Description	Reads the status of the Ethernet port 2 on the O3.
Format	Integer
Properties	Read, Notify
Value Range	0: Up and Running 1: Up and Not Running 2: Down and Not Running 3: Error Getting Link Status

Gateway IP Characteristic	Description
Name	Gateway IP
Characteristic UUID	265D3029-4B73-444A-B48D-5016AB25A659
Description	Sets the Gateway IP address used by the O3.
Format	String
Properties	Read, Write
Value	<string>

Internal MQTT Enable Characteristic	Description
Name	Internal MQTT Enable Characteristic
Characteristic UUID	425A685B-EFEB-432C-BA79-B0ACE5CC9E5D
Description	Enables external access to the O3's internal MQTT broker.
Format	Integer

Internal MQTT Enable Characteristic	Description
Properties	Read, Write
Value	0: disable, 1: enable
Mapped BACnet Object	BV48

MQTT Broker IP/URL Characteristic	Description
Name	MQTT Broker IP/URL
Characteristic UUID	E7592CDA-46EE-4D87-9D0D-9BB25B2C3059
Description	Sets the URL of an external MQTT broker. Not currently supported. Also see the MQTT Broker Type characteristic .
Format	String
Properties	Read, Write
Value	<URL string>

Network Type Characteristic	Description
Name	Network Type
Characteristic UUID	5E4E0A08-C27F-430D-8D8D-4993D38A1004
Description	Defines if the O3's IP address is static or assigned by a DHCP server.
Format	String
Properties	Read, Write
Value	Static or DHCP

Calibration Configuration Service

This service grouping contains characteristics related to temperature calibration and the configuration of acoustic, motion, and occupancy settings.

Service Definition	
Name	Calibration Configuration
Service UUID	5526A99E-7975-42FF-A27B-94D5A1AD9986

Calibration Configuration Service Characteristics

Acoustic Activity Level Characteristic	Description
Name	Acoustic Activity Level
Characteristic UUID	8A22BEA5-F786-4E1A-8454-B1A373D1F8E2
Description	Reads the audio level in the space after certain frequencies are filtered out. The higher the value, the noisier the environment.
Format	Float
Properties	Read, Notify
Value Range	0 to 65535
Mapped BACnet Object	AI10

Acoustic Occupancy Characteristic	Description
Name	Acoustic Occupancy
Characteristic UUID	5953C91C-8ECB-4991-AE13-6E619B005DF3
Description	Reads the occupancy state of the space based on the space's acoustic activity level. The characteristic reads true if the sound level in the space is high enough to indicate occupancy.
Format	Integer
Properties	Read
Value	0: unoccupied because sound level below expected threshold 1: occupied because sound level above expected threshold
Mapped BACnet Object	BI11

Acoustic Sensitivity Characteristic	Description
Name	Acoustic Sensitivity
Characteristic UUID	88456249-05F8-4434-9C7C-61E1A9A0D5B0
Description	Sets how much the sound level (loudness) in the room must exceed the background level before the room is considered occupied. This parameter is the sensitivity of the audio portion of the occupancy algorithm, expressed as a percentage (0–100%), with 100% = maximum sensitivity, and 0% = minimum sensitivity. Default value is 80%.
Format	Integer
Properties	Read, Write
Value Range	0 to 100
Mapped BACnet Object	AV24

Motion Sensitivity Characteristic	Description
Name	Motion Sensitivity
Characteristic UUID	CCDCE4F9-F8AD-40A4-97C5-43D895981814
Description	<p>Sets the amount of movement needed to set the Motion Sensor to True.</p> <p>PIR motion sensor sensitivity is expressed as a percentage (0–100%), with 100% = maximum sensitivity, and 0% = minimum sensitivity. Default value is 80%. May need adjusting based on room size and layout.</p>
Format	Integer
Properties	Read, Write
Value Range	0 to 100
Mapped BACnet Object	AV23
Occupancy Audio Retrigger Period Characteristic	Description
Name	Occupancy Audio Retrigger Period
Characteristic UUID	B06D391E-F793-4295-9BA5-8AB1ACE71457
Description	<p>The amount of time (in seconds) that activity sounds can cause the O3 to remain in the occupied state after motion is detected. Default value is 1200 seconds (20 minutes). Measured from most recent motion detection event.</p> <p>If motion is detected, then the count is reset.</p> <p>Acoustic Retrigger Period helps the O3 determine the space's occupancy state. See Occupancy States Explained for more details.</p>
Format	Integer

Occupancy Audio Retrigger Period Characteristic	Description
Properties	Read
Value Range	0 to 65535
Mapped BACnet Object	AV25

Occupancy Audio Update Period Characteristic	Description
Name	Occupancy Audio Update Period
Characteristic UUID	261D878C-1772-4ADD-805F-CDC678E4B384
Description	Update period (in seconds) for the baseline microphone levels to adjust to environmental changes when no occupants are present. Default value is 30 seconds.
Format	Integer
Properties	Read
Value Range	0 to 65535
Mapped BACnet Object	AV27

Occupancy Inactivity Period Characteristic	Description
Name	Occupancy Inactivity Period
Characteristic UUID	8988EEAA-574E-4447-A974-525B877DF4EB
Description	Reads the amount of time (in seconds) it takes the O3 to return to the unoccupied state when no motion and no audio activity is detected. Default value is 300 seconds (5 minutes).
Format	Integer
Properties	Read
Value Range	0 to 65535
Mapped BACnet Object	AV26

IR Repeats Characteristic	Description
Name	IR Repeats
Characteristic UUID	0605CDA9-92F6-4FAA-9290-F499F1FB2882
Description	Reads the number of times IR code is sent per transmission. By default, code is sent once per transmission. Not currently supported.
Format	Integer
Properties	Read
Value Range	0 to 100
Mapped BACnet Object	AV10

Programmable IR Code Characteristic	Description
Name	Programmable IR Code 1
Characteristic UUID	FAAB8651-24B2-425D-B098-D4A2A4058154
Description	Contains IR Pronto code. Not currently supported.
Format	String
Properties	Read
Value Range	<string>

Raw Temperature Characteristic	Description
Name	Raw Temperature
Characteristic UUID	EB625F90-DDEA-4723-BEAA-D4B09E6BBEA2
Description	<p>Reads the occupant temperature without any calibration adjustments.</p> <p>For example, if the occupant temperature is 25°C and calibration is 0.5°C, then the raw temperature is 24.5°C.</p>
Format	Float
Properties	Read, Notify
Value Range	-81 to 257
Temperature Calibration Characteristic	Description
Name	Temperature Calibration
Characteristic UUID	B3997D46-DEF4-43DE-B82F-DEB04B059C17
Description	Sets an offset value (positive or negative) used to correct the O3's temperature reading.
Format	Float
Properties	Read, Write
Value Range	-81 to 257
Mapped BACnet Object	Calibration property of AI3

System Configuration Service

This service grouping contains characteristics related to configuration parameters, model numbers, and version numbers.

Service Definition	
Name	System Configuration
Service UUID	D72CE428-BA8C-4061-B6DE-6F682736FE08

System Configuration Service Characteristics

Active POST Status Mode Characteristic	Description
Name	Active POST Status Mode
Characteristic UUID	C40793BF-D4D5-425D-92A6-23394309762A
Description	Reads the status of the communication components after the O3 powers on.
Format	Integer
Properties	Read
Value Range	<p>0: No issues or problems.</p> <p>1: Ethernet component error.</p> <p>2: Bluetooth LE component error.</p> <p>3: Bluetooth LE and Ethernet components are in error.</p> <p>4: SPI communications in error.</p> <p>5: SPI and Ethernet components are in error.</p> <p>6: SPI and Bluetooth LE components are in error.</p> <p>7: All communication components are in error.</p>

BLE API Version Characteristic	Description
Name	BLE API Version
Characteristic UUID	A3BBD5B5-67B9-449E-924A-18DF526C40F1
Description	Reads the version of the Bluetooth API.
Format	String
Properties	Read
Value Range	<string>

BLE Beacon ID Characteristic	Description
Name	BLE Beacon ID
Characteristic UUID	038F5653-BE86-4200-8F07-34CDD9D41577
Description	Reads the ID of the Bluetooth LE beacon on the O3.
Format	String
Properties	Read
Value Range	<string>

Bootloader Version Characteristic	Description
Name	Bootloader Version
Characteristic UUID	727924C6-7329-4425-BB81-B77E96AD4E2D
Description	Reads the O3's bootloader version.
Format	String
Properties	Read
Value Range	<string>

Enable BLE Characteristic	Description
Name	Enable BLE
Characteristic UUID	20C4C970-151B-4126-9A40-E5789ED9C681
Description	Reads the status of the Bluetooth LE beacon on the O3. A value of 1 means that the beacon is enabled.
Format	Integer
Properties	Read
Value Range	1: enabled, 2: disabled
Mapped BACnet Object	BV31

Firmware Upgrade URL Characteristic	Description
Name	Firmware Upgrade URL
Characteristic UUID	8CFA4F33-CBEF-46EC-8D5C-D3DCE95FDB68
Description	The web site address where the firmware upgrade file can be downloaded from.
Format	String
Properties	Read, Write
Value Range	<string>

Firmware Upgrade Version Characteristic	Description
Name	Firmware Upgrade Version
Characteristic UUID	BD908AC6-C0B5-4C79-9A2A-E9A556535FE8
Description	The firmware version number that the O3 can upgrade to.
Format	String. The format is x.y.z where x is the major version number, y is the minor version number, and z is the revision number.
Properties	Write
Value Range	<string>

Firmware Version Characteristic	Description
Name	Firmware Version
Characteristic UUID	9C25EE45-44BE-47B3-B0C4-16DB6EE79799
Description	Reads the O3's firmware version.
Format	String
Properties	Read
Value Range	<string>

Kernel Version Characteristic	Description
Name	Kernel Version
Characteristic UUID	6E7BF0B1-B0A6-4AB4-856F-7432A905EFCD
Description	Reads the kernel version of the Linux operating system used to create code on the O3.
Format	String
Properties	Read
Value Range	<string>

Model Name Characteristic	Description
Name	Model Name
Characteristic UUID	8050C59A-170E-4206-848A-07EFB78C14BA
Description	Reads the model name of the O3.
Format	String
Properties	Read
Value Range	<string>

Mobile Device Data Service

This service grouping contains characteristics related to mobile devices.

Service Definition	
Name	Mobile Device Data
Service UUID	76A136D4-29FC-4217-B358-9BFF4D6601CE

Mobile Device Data Service Characteristics

Disconnect Mobile Device Characteristic	Description
Name	Disconnect Mobile Device
Characteristic UUID	5207F99E-5B02-4760-A220-678594939FF0
Description	<p>Disconnects a specific mobile device from the O3. The mobile device is identified by its device name.</p> <p>When the value is written, the device with that name is disconnected.</p>
Format	String
Properties	Write
Value Range	<string>
MQTT Broker Type Characteristic	Description
Name	MQTT Broker Type
Characteristic UUID	6C479A4C-6AE6-4FB1-BFF1-17D4D7F5B9F2
Description	<p>Defines whether the MQTT broker used is the internal MQTT broker or not.</p> <p>Custom broker not currently supported.</p>
Format	String
Properties	Read, Write
Value	Default or Custom

Reset Hub Characteristic	Description
Name	Reset Hub
Characteristic UUID	411225B6-82F0-4E5D-B980-E2099E9DD53F
Description	When a value of 1 is written, the O3 is reset.
Format	Integer
Properties	Write
Value Range	1: resets device, 0: no reset action

Occupancy States Explained

A state change from unoccupied to occupied is triggered when motion is detected in the room, or by a combination of motion and sound. Sound alone does not trigger a state change.

When either motion or sound is detected in the room, the occupancy state is extended. This sound level must be above the baseline audio level that the O3 has previously established. In addition, new sounds that fall outside of the Occupancy Audio Retrigger Period value are not allowed to extend the occupancy state. This feature reduces artificial extension of the occupancy state due to background noise.

The O3 reports a room as unoccupied if no motion or sound is detected after a set amount of time (Occupancy Inactivity Period). This sound level has to be below the baseline audio level that the O3 has previously established. You can change the Occupancy Inactivity Period.

03 Light Ring Pattern States Explained

The following table lists all the light ring patterns offered on the 03.

State	Name	Description	Factory Color
1	Idle (Off)	No pattern is displayed.	None
2	Blue Swirl	Light circles ring once, followed by two short flashes, followed by long flash.	Blue
3	Fast Blue Swirl	Same as above but faster.	Blue
4	Power On	Light circles ring three times.	Green
5	Occupancy Active	Light circles ring three times.	White
6	Got Request	Three short flashes.	Green
7	Heating Active	Light ring fades in and out.	Red
8	Cooling Active	Light ring fades in and out.	Blue
9	Don't Understand	Four short flashes, followed by long flash.	Yellow
10	Error	Eight short flashes.	Red
11	Alarm	Sixteen short flashes on alternating sides of ring.	Red
12	Christmas	Sixteen short flashes in alternating colors.	Red and green
13	Awake and Waiting	Light circles ring once followed by a solid ring, repeats the same sequence, and then light turns off.	Blue

Revision History

Edition	Date	Description
1.0	January 28, 2021	New document.
2.0	March 10, 2021	Removed unused characteristics.
2.1	June 7, 2021	Removed Bluetooth Maximum Transmit Power characteristic.
2.2	June 14, 2021	Added Internal MQTT Enable characteristic.
2.3	June 29, 2021	Changed document formatting.