

HOW-TO GUIDE

CYLON BEMS NETWORKING

This document describes networking within the Cylon Building Environment Management System (BEMS), in order to identify Security considerations and aid troubleshooting for Ethernet Networking on Cylon systems.

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OVERVIEW

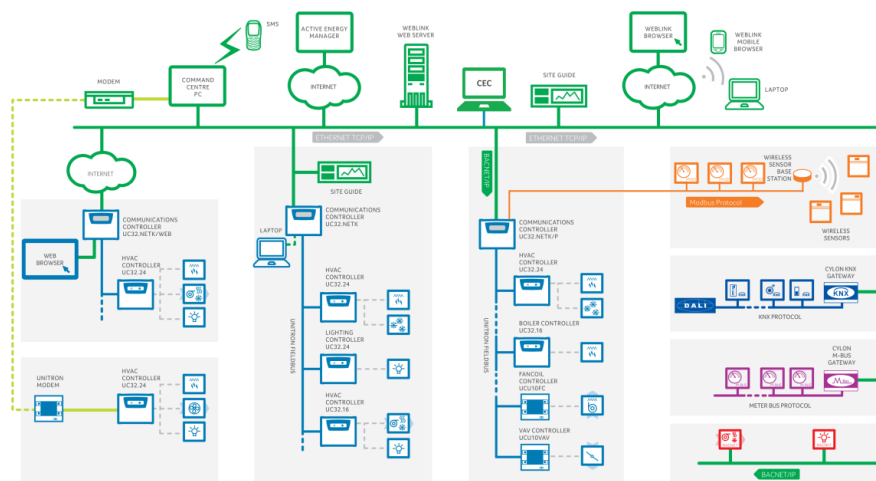
The **Cylon BEMS** uses standard IT interfaces/protocols in the same way as general IT networks (LAN etc.). The same type of general network integrity, reliability and security steps should be taken for the **BEMS** network as for an IT network.

However the **BEMS** networks tend to be isolated, use standard protocols with proprietary pay loads (less well-known, and so less prone to attack) and generally have less exposure/limited consequences if there is some kind of “breakdown”.

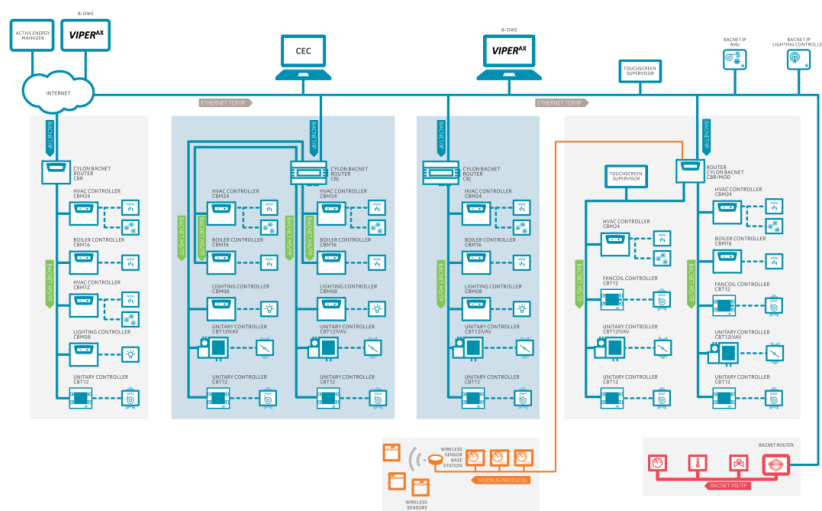
Architecture

The **Cylon** BEMS can be represented as follows:

UnitronUC32 technology



Cylon BACnet technology



Note: This document deals primarily with Unitron networking. Detailed information about BACnet networking can be obtained from <http://www.bacnet.org/>

NETWORKING

The communication between the **Field Controllers** is via priority protocols over serial RS485 links, and in general is not connected to other devices in a building (i.e. an isolated network).

The **Communications Controllers** communicate and allow access via an Ethernet based LAN. This typically is not isolated and can be connected to other devices on the “IT LAN”.

Summary

- Ethernet level: 100BASE-T
- Cable: Screened or Unscreened CAT5e
- Ports used:
 - 47808 (**BACnet**)
 - 4950 (**Cylon Engineering Center** connects to the controllers on this port – can be changed)
 - 80 (**eWeb** and **sWeb** supervisors)
 - 25 (**eWeb** email)
- Controllers must use fixed **IP** addresses
- Controller **IP** addresses must all be in the same subnet
- Controllers must be on an isolated network or **VLAN**, which has only **BEMS** devices connected to it.

IP Network Interface

Connection

- Ethernet level: 100BASE-T
- Cable: Screened or Unscreened CAT5e

Communications Controllers

- Use fixed/static **IP** address
- **IP** addresses must all be in the same **IP** Subnet

Recommendation

Communications Controllers must be on an isolated network or **VLAN**, which has only **BEMS** devices/traffic connected to it.

IP Traffic

The amount of “IP traffic” depends on the site setup – the number of **Communications Controllers**, **Field Controllers**, the Strategy operation, the number of Alarms, the number of wide **global** points, connected Cylon software, supervisors, Gateways etc. Both **TCP/IP** and **UDP/IP** based protocols are used.

UNET protocol

The **UNET** is the main communication link between the **Communications Controllers (UC32.netK)** devices on a site. This uses a standard **UDP/IP** socket connection between devices. Both broadcasts and peer to peer links are used on ports 64200, 64202 and 64204. In general **UNET** packets are “small” (compared to “normal” IT traffic).

■ Traffic:

- Heartbeat every 30s (**UDP** broadcast)
- Each wide out global point is serviced every 50ms (approx.) (**UDP** broadcast)
- Any new alarms are broadcast
- When connected to one **UC32.netK** and requesting data from another trunk then there will be **UDP** peer to peer traffic

HTTP protocol

The **Communications Controllers (UC32.netK)** have an embedded **HTTP** server. This uses port 80. Standard basic access authentication is used to control access to the web server.

■ Example usage:

- User/installer browses the built in status/configuration web pages on the **Communications Controller** (typically done at installation time)
- End user browses the **eWeb** (site supervisor functions) web pages on the **Communications Controller** (typically done by end users/supervisor on a site)

FTP protocol

The **Communications Controllers (UC32.netK)** have an embedded **FTP** server. This uses port 21. **FTP** login utilises a normal username and password scheme for granting access.

■ Example usage:

- Downloading **eWeb** HTML pages from the **Cylon Engineering Center** to a **Communications Controller**.

Email protocol

The **Communications Controller s (UC32.netKs)** have an embedded **email** client. This uses port 25.

■ Example usage:

- An Alarm event on a **Field Controller** can be configured to generate and send an **email** via the **Communications Controller**

Unitron protocol

The default **Unitron** communication port used on the **Communications Controller s (UC32.netKs)** is 4950. Third-party devices/**Cylon** software can make TCP/IP requests to the **Communications Controller** via this port.

■ Example usage:

- Downloading of **strategy** to a **Field Controller** from the **Cylon Engineering Center** (at installation time)
- Viewing of **eWeb** web pages from browser on PC (request from browser to **Communications Controller**)
- **sWeb** makes Unitron requests (in background) from PC to **Communications Controller**
- **UCC** Supervisor running get point values

BACnet/IP protocol

The **Communications Controller (UC32.netK/P)** can act as a Unitron to **BACnet/IP** gateway. The default **BACnet** port used is 47808, **BACnet** communication is over **UDP/IP**.

Platform

The **Communications Controller** is an **Embedded System** which runs on an ARM based microprocessor with 16 Mb DRAM, and 16 Mb Flash memory. There is also storage in battery-backed **SRAM** and a Real-Time Clock. The operating system used is **ThreadX** (designed for embedded systems). You cannot download and run executables.

Platform Upgrade

The application running on the **Communications Controller** can be updated using dedicated application running on a **Windows** PC. The application is supplied by **Cylon** and communicates via **HTTP** and **FTP** (username/password required).

Remote Access

For connection to the site from outside the building, Modem and **IP** connection are supported.

Modem

A **PSTN/GSM** modem can be used. This gives is a serial connection to the **Communications Controller** (or **Field Controller**). Only **Unitron** communication is used via this method.

IP

The “local IT” infrastructure can be setup to give access to the local **LAN** from the internet (**NAT/VLAN**)

Other Devices

SiteGuide

The **SiteGuide** is a touch screen “human machine interface” to the Unitron **BEMS**. It connects over the LAN (IP network) and communicates with the **Communications Controller**.

■ SiteGuideV1

The original **SiteGuide** uses **Unitron** requests to the **Communications Controller**. It uses an embedded **Linux** platform, with a 7” touch screen.

■ SiteGuideV2

The updated **SiteGuide** uses **HTTP** request to the **Communications Controller**. The platform is an embedded **Android** device with a 10” touch screen.

Gateways

These devices connect over the LAN (IP network) and communicate with the **Communications Controller**. They act as gateway devices between the Unitron system and other systems found in buildings (e.g. Managing lighting or interfacing with meters).

■ KNX Gateway

Uses **Unitron** requests to the **Communications Controller**, on a low-end embedded-system platform.

■ M-BUS Gateway

Uses **Unitron** requests to the **Communications Controller**, on a low-end embedded-system platform.