ORCA™ Open Real-time Control Architecture™

BACnet™ SYSTEM OVERVIEW

DESCRIPTION

ORCA™ is a powerful building automation system designed to meet the needs of building owners and operators with its versatile Open Real-time Control Architecture. The ORCA™ system provides interoperability between different building systems using the internationally recognized ASHRAE standard, BACnet™ open data communication protocol. Fully compliant with the BACnet™ standard, ORCA™ allows any third-party BACnet™ compliant products and systems to be connected and common operator interfaces to be utilized. When it comes to future integration, ORCA's capabilities offer superior expandability and connectivity between non-proprietary building automation systems and control networks.

FEATURES

System Architecture

- The ORCAview™ Operator Workstations (OWS) and Delta Control Units (DCU) utilize native BACnet™ data and communication structures so that they "speak" BACnet™ language directly without the use of internal or external gateways as translators.
- The ORCAview™ and DCU utilize BACnet™ communication on Ethernet to interconnect various building systems and operator interfaces on a high performance local area network.
- TCP/IP support is built into the ORCAview™ and DCU so that entire buildings and campuses can additionally be linked together on a shared wide area network such as the Internet and/or Intranet.
- BACnet™ over RS-232 support on the ORCAview™ and the DCU provide cost-efficient serial connections for local and remote ORCAview™ Operator Worksations as well as for third-party BACnet™ system router or gateway devices.
- BACnet™ over MS/TP is designed to provide cost effective RS-485 based networking for connecting the upcoming series ORCA *native* BACnet™ system, room and zone controllers to the DCU.
- Compatible with Delta legacy products and systems.

ORCAview™

Operator Workstation (OWS)

- Industry leading BACnet™ operating package with intuitive Windows 95/98/NT based graphical user interface (GUI) to provide a single-seat operator environment for both ORCA™ and/or third-party BACnet™ products and systems.
- Support of all key BACnet™ objects, properties and services to ensure the highest degree of front-end integration of third party systems.
- Full range of alarm monitoring, data logging, and supervisory functions to help achieve optimum building performance.
- Dynamic & animated graphical operation of buildings, systems, floors etc., created by "drag-n-drop" selection of graphic elements from user palettes and "drag-n-link" linking of BACnet™ objects with dynamic & interactive display fields.
- Powerful point & click user interface with "Explorer" style system navigation via system, building and/or network topology-oriented views.
- On-line operating language selection with on the fly toggle capability between English, Spanish, French, German, Chinese, etc.
- DDE server for dynamic data sharing with other Windows-based programs for third-party add-on functionality e.g. preventative maintenance, tenant billing etc.

Delta CONTROLS

ORCA™ (Release 3.20)
BACnet™ FUNCTIONAL GROUPS

Functional Groups	OWS	DCU
Clock	✓	✓
Event Initiation	✓	✓
Event Response	✓	
COV Event Initiation	✓	✓
COV Event Response	✓	✓
Files	✓	✓
Reinitialize	✓	
Device Communications	✓	✓
Time Master	✓	✓
Router	✓	✓

ORCA™ (Release 3.20)
BACnet™ SERVICES

ORCA BACnet™ Services	OWS		DCU	
I=Initiate / E=Execute →	I	E	I	E
Acknowledge Alarm	✓	✓		✓
Confirmed COV Notification	✓	✓	✓	✓
Confirmed Event Notification	✓	✓	✓	✓
Get Alarm Summary	✓	✓	✓	✓
Get Enrollment Summary	✓	✓	✓	✓
Subscribe COV	✓	✓	✓	✓
Unconfirmed COV Notification	✓	✓	✓	✓
Unconfirmed Event Notification	✓	✓	✓	✓
Atomic Read File	✓	✓		✓
Atomic Write File	✓	✓		✓
Add List Element		✓		✓
Remove List Element		✓		✓
Create Object	✓	✓		✓
Delete Object	✓	✓		✓
Read Property	✓	✓	✓	✓
Read Property Multiple	✓	✓	✓	✓
Write Property	✓	✓	✓	✓
Read Range	✓	✓		✓
Write Property Multiple	✓	✓	✓	✓
Device Communication Control	✓	✓		✓
Confirmed Private Transfer	✓	✓	✓	✓
Unconfirmed Private Transfer	✓	✓	✓	✓
Reinitialize Device	✓			✓
Time Synchronization	✓		✓	✓
Who-Has		✓		✓
I-Have	✓		✓	✓
Who-Is	✓	✓	✓	✓
I-Am	✓	✓	✓	✓

FEATURES

Delta Control Unit (DCU)

- Modular design combining a core intelligence module ("engine") with various LAN modules and I/O cards for configuring ORCA *native* BACnet™ controllers as networking devices (i.e. building controllers, routers, third party BACnet™ gateways, etc.) and/or as peer-to-peer system controllers (i.e. AHU controllers, Boiler Plant Controllers, Chiller Plant Controllers, etc.).
- *Native* BACnet™ operating system incorporating all necessary BACnet™ objects, properties and services to provide the highest degree of interoperability with various third-party BACnet™ system devices.
- Peer-to-peer BACnet™ integration with various third-party devices and gateways connected to Ethernet to provide highest performance interoperability with HVAC equipment, life-safety systems, electrical systems and other facility services.
- Serial BACnet™ integration with other third-party devices and gateways to provide cost efficient interoperability with HVAC equipment, life-safety systems, electrical systems and other facility services.
- Configurable as a high-speed Ethernet-based system controller by plugging in various I/O cards and modules to suit any building system I/O configuration (e.g. VAV air handlers, boiler plant etc.).
- User-friendly *General Control Language* on-line interactive programming environment for linking BACnet™ objects together to create powerful DDC and global control sequences.
- Plug-in LonWorks and Modbus modules for the DCU (V2.92) allow other non-proprietary open protocol devices to be tied into the BACnet™ world.

ORCA™ BACnet™ SYSTEM OVERVIEW

ORCAview™ and DCU (Release 3.20) BACnet™ Data Link Options

Ethernet ISO8802-3
(10Base5, 10Base2, 10BaseT and Fiber)
Point-To-Point, EIA 232 (up to 38,400 baud)
Point-To-Point, Modem (up to 38,400 baud)
Intelli-Net (Coax).

ORCAview™ and DCU (Release 3.20) BACnet™ Objects

Column headings "C" and "D" in the table shown below indicate whether the respective objects can be created (C) and/or deleted (D).

Object Type	C	D	Optional Properties	Writeable Properties
Analog Input	✓	✓	Description; Device Type; Reliability Min./Max. Values; Update Interval; Resolution; COV increment	Object Name & Value; Description; COV increment; Out of Service; Units
Analog Output	✓	✓		
Analog Value	✓	✓		
Binary Input	✓	✓	Description; Device Type; Reliability; Active/Inactive Texts; Update Interval; Resolution; COS Time, Count Times; & Time Reset; Min. On & Off Times	Object Name & Value; Description; Polarity; Default Value; Min On/Off Out of Service
Binary Output	✓	✓		
Binary Value	✓	✓		
Calendar	✓	✓	Description	Object Name & Value; Description; Date List
Device			Description; Location; Time Sync.; Time; Date; UTC offset; DST status; Misc. diagnostic properties	Object Name; Description; Location; UTC Offset
Event Enrolment	✓	✓	Description; Notification Class	Object Name & Value; Description; Out of service; Event & Notify Types; Parameters; Property Ref; Enable; Notification Class
File	✓	✓	Description	Object name; Description; File Type; File Access
Loop (PID)	✓	✓	Description; Reliability; Update Interval; Proportional Const. & Units; Integral Const. & Units; Derivative Const. & Units; Bias; Min./Max. Outputs; COV Increment	Object Name & Value; Description; Polarity; Output & Input Refs.; Input Value & Units; Setpoint Value; PID Values; Bias; Write Priority; COV Increment
Notification Class	✓	✓	Description	Object Name; Description; Priority; Ack Required
Program	✓	✓	Description; Reliability	Object Name; Description; Object Value
Schedule	✓	✓	Description; Schedule; Exceptions	Object Name & Value; Effective Period; Schedule; Exception; Controlled Properties; Write Priorities
Trend Log	✓	✓	Description; Start/Stop Times; Log Device Object Property; Log Interval	Object Name; Description; Log Enable; Start/Stop Times; Log Device Object Property; Log Interval; Stop when full; Buffer size; Record Count
Proprietary	✓	✓	NIA	NIA

INTEROPERABILITY

The **ORCA™** system is designed to integrate third-party BACnet™ products and systems supplied by different manufacturers to provide interoperability between individual building systems as well as across different buildings and campuses. The **ORCA™** system architecture supports various integration topologies as illustrated in Figures 1 to 3.

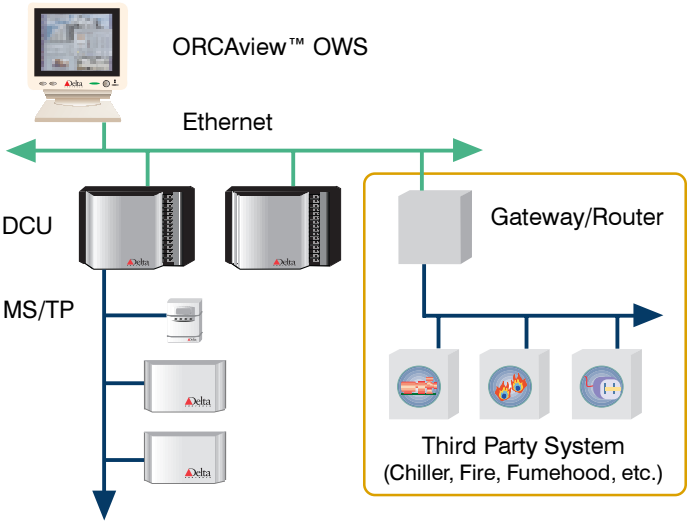

FIGURE 1
Integration with Third Party System via Ethernet data link/physical layer

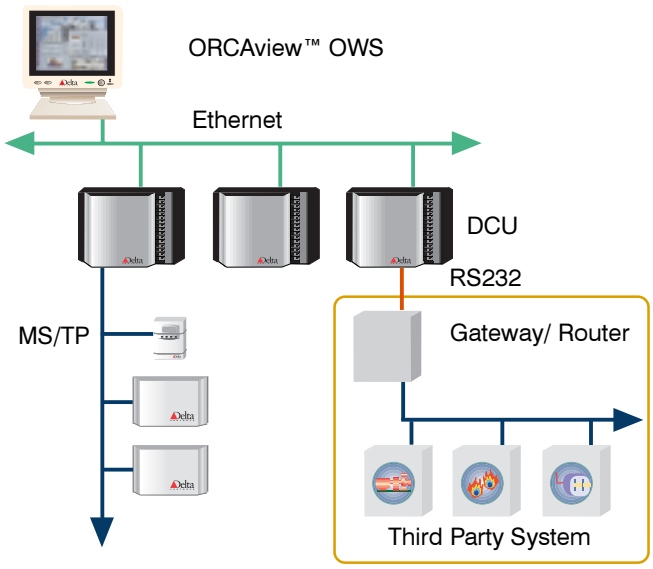

FIGURE 2
Integration with Third Party System via RS232 data link/physical layer

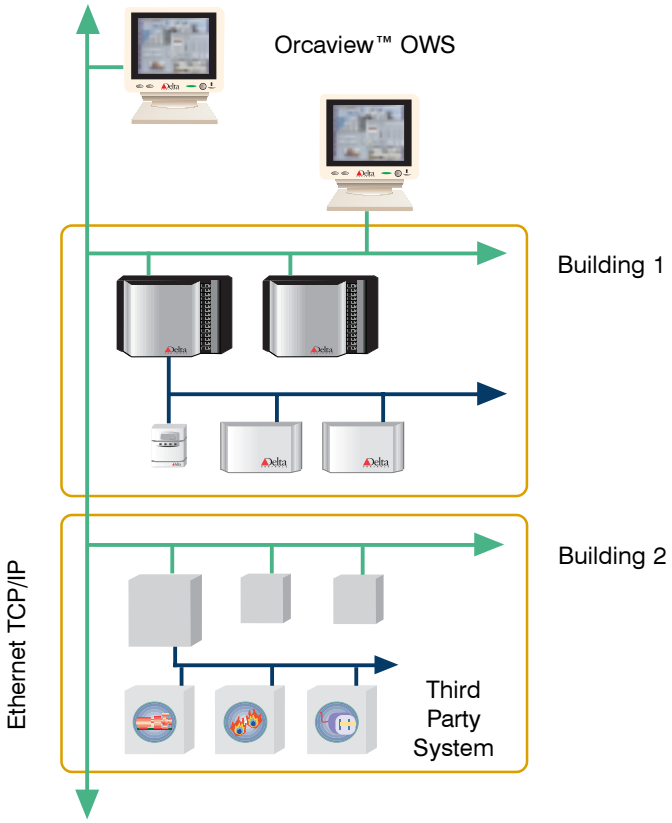

FIGURE 3
Integration with Third Party System in multiple building configurations via Ethernet data link/physical layer

Delta CONTROLS

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