

# Orange Spiel



Juicy News from ASHRAE's Orange Empire Chapter



## MEETING INFORMATION

**TUESDAY, FEBRUARY 28, 2017**

### HOLIDAY INN

2726 S. Grand Avenue  
Santa Ana, CA 92705  
(see map on page 7)

Event Time.....5:00 – 9:00 p.m.

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Members (before 2/21)..... \$45.00  
Members (after 2/21) ..... \$55.00  
Non-Member (before 2/21).... \$50.00  
Non-Member (after 2/21)..... \$60.00  
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RECEIVED YOU WILL BE BILLED  
FOR THE SESSION**

SEE PAGE 7 FOR FAX ORDER FORM

### DINNER PROGRAM

*"A New Air System Design  
Concept Using Chilled Boxes"* by  
Dan Int-Hout, ASHRAE

### NO TECHNICAL SESSION

### Orange Spiel Editor

Robert Hagstrom, P.E., LEED AP  
c/o Southern California Edison  
6090-B N. Irwindale Avenue  
Irwindale, CA 91702  
Phone (626) 633-3432  
PAX 43432  
Cell (626) 609-9791  
[Robert.Hagstrom@sce.com](mailto:Robert.Hagstrom@sce.com)

## FEBRUARY MEETING NOTICE

**TUESDAY, FEBRUARY 28, 2017**

### DINNER PROGRAM A NEW AIR SYSTEM DESIGN CONCEPT USING CHILLED BOXES

The chilled box is a new application of existing technologies. Using a sensible cooling coil at the induction intake port of a fan induction terminal opens an interesting mix of control options.

The primary air valve would be supplied by a dedicated outdoor air system (DOAS) producing constant dewpoint pre-conditioned supply air at variable volume. A cooling coil at the induction intake of the box designed for low air pressure drop adds sensible cooling to the induction air mixed with the primary air before discharging it to the space. To make this coil do sensible cooling only, the chilled water must be maintained a few degrees above space dewpoint temperature similar to the original Carrier high-pressure perimeter induction systems of yesteryear.

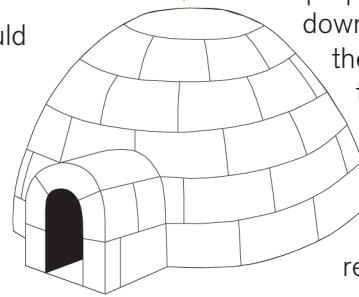
The fan induction terminal would include a small standard pressure-independent VAV control damper insert to control the primary air into the terminal, having a low-speed fan with speed controllable ECM fan motor providing blended discharge air to the space. These two ingredients with proper controls allow the chilled box to regulate the ventilation air quantity and the induced airflow rate independently.

This feature can be used to avoid subcooling an interior space (without needing a reheat coil) while providing additional space sensible cooling and air volume when required.

For perimeter zones, adding a sensible heating coil to the mix (or using the sensible cooling coil for dual purpose) provides enough downstream pressure to permit the use of ducted slots at the windows to ensure compliance with Standard 62.1-2010 heating requirements. It also allows ducting to be used to reach remote areas, such as lobbies without producing condensation issues leading to dripping diffusers.

By maintaining the lowest possible mix of primary and induced air means that optimal amounts of DOAS and fan-induced air can be managed at each zone, yielding the lowest possible energy consumption commensurate with good system design practice.

Dan Int-Hout is an ASHRAE Fellow and Distinguished Lecturer on Air Control and Distribution Systems. Dan has been the Chief Engineer for Krueger Manufacturing, an air terminal and distribution device manufacturer, for more than 30 years. Dan has been in the Air Distribution research and design business since 1973, and has a Masters in Business Management (See **DINNER PROGRAM** page 5)



**CHILLED BOXES...A NEW  
TWIST ON AN EXISTING  
TECHNOLOGY. LEARN  
ABOUT IT THIS MONTH!**

## ERIC'S BLOG

I hope you have all stayed relatively dry and safe during our much due rain this winter! I'm sure those of you who enjoy the slopes are loving it...assuming the roads let you get there.

Coming up soon is the 2nd Annual ASHRAE Tri-County Fun Shoot Event on Friday, February 24th from noon to 4 PM. It was a fun and well-attended event last year, and I'm confident it will be another great event again this year. Please see the link below if you are interested in registering for the event: <https://www.eventbrite.com/e/ashrae-tri-county-annual-fun-shoot-tickets-32056504869?ref=enivtefor001&invite=MTE1M>



DIONjMvZm1vbnRlcnJvc29Ad2l5bGRhbi5jb20vMA%3D%3D&utm\_source=eb\_email&utm\_medium=email&utm\_campaign=iniviteformalv2&ref=enivtefor001&utm\_term=attend.

We are also excited for our upcoming February Dinner Meeting on Tuesday, February 28th, with special speaker Dan Int-Hout, an ASHRAE

Distinguished Lecturer (so everyone be on good behavior!). Dan will present "A New Air System Design Concept using Chilled Boxes."

Please register for this meeting with the link below: <https://events.r20.constantcontact.com/register/eventReg?oeidk=a07edqeviz0def9321b&oseq=&c=&ch=>

<https://events.r20.constantcontact.com/register/eventReg?oeidk=a07edqeviz0def9321b&oseq=&c=&ch=>

After February we have our joint meeting with the San Diego

Chapter on March 21st at El Adobe Restaurant in San Juan Capistrano. The dinner topic will be on HVAC water treatment strategies, talking about how to properly address early in the project, pre-treatment strategies and monitoring, and practical system integrations with building management systems. More information to follow soon, we are looking at having the dinner start around 7 PM. It will be a Mexican-Style Dinner Buffet similar to what we had at El Adobe two years ago.

We are looking forward to the coming months of dinner presentations to close out the year strong. Feel free to send any suggestions or contacts you may have that you think would make great dinner topics.

**Eric Decker** 🍊

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Don't miss the only MRO, Facilities Engineering and Green Building expo and conference in Southern California – it's free to attend! Seminars of interest to ASHRAE members include: tools for dealing with occupant comfort complaints, sustainable facility case histories involving energy/water savings, California energy efficiency requirements, predictive maintenance, and more.

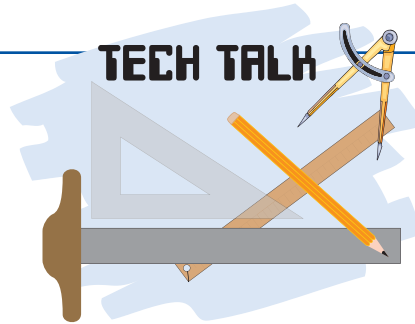
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# Do you know BACnet?

By Craig F. Hofferber, CxA



BACnet is the communication technology of the building automation industry. When integrating systems in enterprises, it is important to know something about that technology. BACnet (Building Automation and Control Network) is an international standard, consensus based non-proprietary open-protocol specification that defines both how data is represented on the network and the services that are used to move data from one BACnet node to another.

Beside heating and cooling system control, BACnet is used in lighting control, access control, video surveillance, security and life-safety systems. BACnet accommodates these disparate systems by using an object-oriented approach to standardize the representation of processes and data within a device. It includes messages identifying data and network nodes such as "Who-Is, I-Am, Who-Has, and I-Have" and more.

In general building automation control processes move at human speeds; often seconds not milliseconds of response time are the norm, so the system control portion does not have to be lightning fast to provide stable control of the HVAC processes, however building automation installations can grow large, having thousands of nodes across multiple domains using many different wired and wireless protocols to move the data where it needs to go. This results in a need for increasingly faster network speeds, especially when

data trending in near real time is occurring.

In the early days of BACnet, there were several different physical and data link technologies used to connect devices over BACnet. Some of those transport mechanisms are still used, such as ARCnet. BACnet primarily uses EIA-485 and Ethernet transport mechanisms because of their ubiquity in the building environment. BACnet is a peer-to-peer network where any device can send service requests to any other device. Unlike connected protocols where devices must maintain ongoing data transfers (EIA-232), communication in BACnet is unscheduled with few time critical operations.

The datalink layer as defined in the OSI (Open Systems Interconnection) model organizes a packaged of data into a structure and manages the delivery to specific destinations. In BACnet ANSI/ASHRAE Standard 135-2012, there are seven distinct datalink network types:

- BACnet /IP (Network Layer)
- BACnet / Ethernet 8802-3 (MAC Layer)
- BACnet MS/TP (Master-Slave / Token Pass)

- BACnet over Lontalk Foreign Frames
- BACnet over ARCnet
- BACnet over Zigbee (wireless)
- BACnet PTP (dial-up)

## BACnet MS/TP

MS/TP is the most widely used form of BACnet with over 20 million installed nodes worldwide. MS/TP uses the EIA/TIA-485 standard for signaling. It is a master/slave, token passing scheme where devices communicate using serial data streams. MS/TP remains popular due to the low cost and large installed base of devices. The growing disadvantage of MS/TP is its relatively slow network speed (maximum 115 kbps) and susceptibility to improper installation and wiring practices. Many manufacturers have been adding options to support Ethernet-based BACnet/IP, which has significantly faster and more reliable network transfer speed and fewer wiring issues due to much stricter (and more expensive) international standards for Ethernet wiring.

## BACnet/IP

BACnet/IP is the becoming the preferred version of BACnet. It is a Client/ Server implementation in which BACnet messages are embedded in UDP/IP packets that can transfer from point to point at 100 mbps or more. This method of communication is robust and is an international standard for machine to machine communication, and (See **TECH TALK** page 4)



## TECH TALK

(continued from page 3)

it can scale to the dimensions needed for larger system applications without hindering network performance.

### BACnet Data Model

BACnet defines a set of standard objects to represent data on a network. These objects have both required and optional properties. Objects defined by the specification include:

• Analog Input	• Analog Output
• Binary Input	• Binary Output
• Analog Value	• Binary Value
• Group	• Control Loop
• Schedule	• Event enrollment
• Calendar	• Device
• Program	• Command
• File	• Notification class
• Multi-State Input	• Multi-State Output

Plus, over 36 other standardized object types.

Information in a BACnet device is represented in terms of one or more of these objects. An object can represent information about some physical input or output, or it can represent a logical point that performs some function, such as a setpoint. Objects have identifiers (such as AI-1 for Analog input) that allow the BACnet system to identify them. More than a data point, an object consists of several prescribed properties (attributes), and only one that is the present value (the data point). It is only through its properties that an object can be monitored and controlled.

BACnet specifies hundreds of possible object properties, most which are meta-data type properties such as high and low

limits, status flags, data types and so on. Three required properties, Object-Identifier, Object-Name, and Object-Type are present in every object. Some of the other properties specified for each object type are required and some are optional. Some are defined as read-only and some as read-write. This is completely different from the MODBUS approach where there are no objects, and the client must have complete and detailed knowledge of the meaning and location of each data value as well as its datatype. This makes BACnet much easier to use for integration, much less dependent on installation and configuration, and much easier to support and maintain over time.

A service is the mechanism which a building automation system uses to access a property or request an action from a BACnet Object. Services are how one BACnet device gets information from another device, commands a device to perform certain actions (through its objects and properties), or communicates events to other objects. There are many standard services including services for file access, alarming, events, object access and network management.

### Cautions and Conclusions

Users and system developers don't need to understand how services are executed by a BACnet device. Those operations are transparent and automatic, but to design or configure a Building Automation System (BAS) you will need to know what objects and services are supported by which devices.

This information is found in the device's Protocol Implementation Conformance Statement (PICS) similar in some ways to a MODbus register list.

Because devices do not all have the same level of functionality, BACnet defines profiles that categorize the capabilities and functionality of devices. Devices that conform to a given profile will have a minimum set of required features (in the form of objects and services). Some other features can be optional. The BACnet standard requires that this information be made public in the PICS through the list of BACnet Interoperability Building Blocks (BIBBs) and consequently the device profile (the list of features) that the device supports. The PICS lists what objects are present in the device and whether the device initiates a service request (asks or commands) or executes the request (responds or acts). The PICS also provides you with the supported BIBBs and profile of the device. By comparing a device's PICS with project requirements or with another vendor's PICS, you can determine how well a BACnet product "fits" into a given application.

BACnet is maintained continuously by a committee of ASHRAE volunteer engineers and users, and improvements are consensus-made based on field experience and changes in the technology environment. BACnet device conformance can be verified through the BACnet Testing Labs (BTL), a not-for-profit company managed by the manufacturer consortium BACnet (See **TECH TALK** page 5)

**DINNER PROGRAM***(continued from page 1)*

from Central Michigan University, and a Bachelor of Science degree in Biology and Physics from Denison University.

Dan has written over 40 technical papers and articles on VAV System Performance, acoustics, air diffusion, controls and occupant comfort. He was the Chairman of both ASHRAE Technical and Standards Committees on Thermal Comfort, and is a past Chairman of several other related ASHRAE Technical and Standards Committees. 🍊

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**TECH TALK***(continued from page 4)*

International which is not affiliated with ASHRAE. If conformance to the standard is important, a manufacturer can pay BTL to test his products per their claimed feature set and submit his products for a BTL listing. A BTL listed product means to the user that the devices conform to those standard tests required for each claimed feature. Devices with equivalent features can be used together on a BACnet network and those features will work, essentially like a plug and play device.

It is important to note that each manufacturer programs their devices to conform to the BACnet standard with different

programming tool sets, so if a substitute product is introduced to an existing BACnet network, that substitute must be provided with an application for programming its operating sequences. Otherwise, its points will be discovered and its functionality limited to the exposed BACnet points chosen by the manufacturer of the product.

1. *Credit to David Fisher of PolarSoft for his considerate editing of this article. David is President and one of the foremost experts in BACnet. [www.polarsoft.com](http://www.polarsoft.com).*
2. *Introduction to BACnet for building owners and engineers by BACnet International*

– END – 🍊



## 2017 ASHRAE ANNUAL CONFERENCE IN LONG BEACH June 24-28, 2017

### EARN A FREE OR DISCOUNTED REGISTRATION!

The Orange Empire and Southern California Chapters are hosting this Society event next summer and we can use your help staffing the technical sessions. This is a great way to contribute and take advantage of the numerous educational and networking opportunities available.



If interested please email Rob Fried at [rob\\_fried@emcorgroup.com](mailto:rob_fried@emcorgroup.com) or Jeff Conrad at [jconrad@accoes.com](mailto:jconrad@accoes.com). Specific time assignments will be coordinated and confirmed as we get closer to the event. Also looking for team captains to help recruit volunteers.



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 ORANGE EMPIRE CHAPTER**

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**SPIEL DEADLINE!!  
 The March deadline  
 for articles or ads is  
 FRIDAY,  
 MARCH 10, 2017!**

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**February 28, 2017  
 Meeting Location Map**



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 Robert Hagstrom, P.E.  
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 (626) 633-3432  
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**PLEASE RSVP FOR THE FEBRUARY 28 MEETING**

by Thursday, February 23, 2017 at noon, Cancellations by Monday, February 27, 2017 at noon  
*(non-cancellations will be billed)*

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ASHRAE MEMBERS:  \$45 (\$55 late) | NON-MEMBERS:  \$50 (\$60 late) | STUDENTS:  \$20

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## ORANGE EMPIRE CHAPTER

### WINTER/SPRING 2016/17 SCHEDULE

#### MEETING LOCATION:

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2726 S. Grand Avenue  
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#### SEPTEMBER 27, 2016

*Dinner: Arena Ventilation*

*Theme: Membership Appreciation*

*Place: Holiday Inn, Santa Ana*

#### OCTOBER 25, 2016

*Tech: Optimizing Tomorrow's Steam System  
Through Knowledgeable Design Today*

*Dinner: How Not To Design a Steam System*

*Theme: Steam Night*

*Place: Holiday Inn, Santa Ana*

#### NOVEMBER 15, 2016

*Event: Water Chemistry & IAQ – A Soup  
to Nuts Look at Indoor Waterpark  
Environments*

*Theme: Joint Meeting with ASPE*

*Place: Great Wolf Lodge, Garden Grove*

#### DECEMBER 13, 2016

*Dinner: Adapt Today to Shape Tomorrow"*

*Theme: Joint Meeting with Tri-County Chapter*

*Place: Quiet Cannon, Montebello*

#### JANUARY 17, 2017

*Dinner: Refrigeration and Microbrewery Tour*

*Theme: Refrigeration and Membership Night*

*Place: JT Schmid's Anaheim*

#### FEBRUARY 28, 2017

*Dinner: A New Air System Design Concept  
Using Chilled Boxes*

*Theme: Research and Past Presidents Night*

*Place: Holiday Inn, Santa Ana*

#### MARCH 21, 2017

*Dinner: HVAC Water Treatment Strategies*

*Theme: Joint Meeting with San Diego,  
Hosted by Orange County Chapter*

*Place: El Adobe Restaurant in San Juan  
Capistrano*

#### APRIL 25, 2017

*Tech: TBD*

*Dinner: TBD*

*Theme: Student Night*

*Place: Holiday Inn, Santa Ana*

#### MAY 23, 2017

*Theme: Officer and Board Installation and  
Golf Tournament*

*Place: TBD*



# Orange Spiel

**ASHRAE** Orange Empire  
Chapter  
[www.oeashrae.org](http://www.oeashrae.org)

#### THIS MONTH'S MEETING WAS ON

**TUESDAY,  
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#### DINNER PROGRAM

*"A New Air System  
Design Concept Using  
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Int-Hout, ASHRAE

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P.O. Box 15603  
Santa Ana, CA 92735