2014 NEBB Annual Conference

Delivering Building Performance and Energy Efficiency

Fort Lauderdale, FL
April 3-5, 2014 – Hyatt Regency Pier 66
Energy Benchmarking and Controls Data Mining in the Retro-Commissioning Environment
# BAS Protocol Standards

<table>
<thead>
<tr>
<th><strong>BACnet</strong></th>
<th><strong>Niagara</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>ASHRAE</td>
<td>Tridium (Honeywell)</td>
</tr>
<tr>
<td>1993</td>
<td>2006</td>
</tr>
<tr>
<td>BACnet over IP</td>
<td>IP</td>
</tr>
<tr>
<td>BACnet MSTP</td>
<td>BACnet MSTP</td>
</tr>
<tr>
<td></td>
<td>LON</td>
</tr>
<tr>
<td></td>
<td>Modbus</td>
</tr>
</tbody>
</table>
BACnet

ASHRAE / ANSI Standard
ISO 16484
BACnet International
Plugfest
Jury

No such thing as native BACnet
Practice: The reality is:

Client vs. Server
Proprietary Programming
Missing Names
Buried Points

“system shall be capable of ........”
Practice: Cast of Characters

JCI
Siemens
Trane
Alerton
Automated Logic
Delta
Niagara AX

Proprietary Standard from Honeywell subsidiary, Tridium
JAVA based
Replacement Niagara R2
Released in 2005
Open development community
Project Haystack
oBIX lobby
Practice: Cast of Characters

Tridium
Vykon
Lynxspring
Building Logix
Honeywell
JCI
Distech
Schneider
Alerton
Analytics
## Analytical Engines

- DDCx / BACbone
- Sky Spark
- Sensus MI
- SClenergy
- OSI PI
- Air Advice
- Aircuity
- Energy Star
DDCx Laptop Configuration
Big Data!
Determine H/C Setpoint Deadband
Calculate the Dead Band
Select a Snapshot Report

[Image of software interface showing report options]

**Misc Report Options**

- **Minimum Number of Occurrences:** 1

This is the minimum number of records a device must have before it shows up in a report. Only available on multi-page reports.

- **Create Snapshot Report**

A Snapshot Report contains only the most recent value for each object.
Setpoint Report

![DDC Suite - BACzone S](image)

<table>
<thead>
<tr>
<th>Report Name</th>
<th>Active Cool Setpoint</th>
<th>Active Heat Setpoint</th>
<th>Thumbwheel Setpoint</th>
<th>Zone Temperature</th>
<th>Present Value</th>
<th>Setpoint Deadband</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000 Biomed Supply 2-2-90</td>
<td>78</td>
<td>68</td>
<td>70.8</td>
<td>70.3</td>
<td>0</td>
<td>10</td>
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<tr>
<td>0000 Patient Tray Assem 2-2-80</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>0</td>
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<tr>
<td>0000 Pot Wash 2-2-75</td>
<td>72</td>
<td>70</td>
<td>62.6</td>
<td>66.8</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

2012 AE3 ESS Seminar – Securing our Energy Future
Find VAV driving CZR
How bad is the deficit flow?
Filter Criteria for Which VAV’s are Short

\{\text{Air Valve Position}\} > 95 \\
\text{AND} \\
\{\text{Air Flow Deficit}\} > 50
Short Boxes
Find Improperly Controlled OAD

ABS(((mixed air temp) - {return air temp}) / ({Outdoor Air Temp} - {return air temp})) * 100
Differential between Methods
Filter for Discrepancies

{Outdoor Air Temp} > 78
AND
{Control vs Mix Delta} > 10
Data Confirms OAD is OK

<table>
<thead>
<tr>
<th>Date Time Stamp</th>
<th>Econ damper signal</th>
<th>mixed air temp</th>
<th>return air temp</th>
<th>Outdoor Air Temp</th>
<th>Percent Outside Air mix eq</th>
<th>Control vs Mix Delta</th>
</tr>
</thead>
<tbody>
<tr>
<td>9/27/2013 11:17:00 AM</td>
<td>34.295</td>
<td>73.85419</td>
<td>72.45004</td>
<td>78.58594</td>
<td>22.8841734708845</td>
<td>11.4108265291155</td>
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<tr>
<td>9/27/2013 11:47:00 AM</td>
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<td>74.28623</td>
<td>72.48605</td>
<td>79.69922</td>
<td>24.9568497623098</td>
<td>7.53815023769022</td>
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<tr>
<td>9/27/2013 12:17:00 PM</td>
<td>30.84</td>
<td>74.80829</td>
<td>72.90099</td>
<td>80.45801</td>
<td>25.2476871943603</td>
<td>5.59231280563971</td>
</tr>
</tbody>
</table>
Filter for active reheat
Reheat in July
## VAV Box K-Factors at Factory Default

<table>
<thead>
<tr>
<th>Location</th>
<th>Date</th>
<th>Time</th>
<th>Box Size CD</th>
<th>Calibration Factor CD</th>
<th>Box Size HD</th>
<th>Calibration Factor HD</th>
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</thead>
<tbody>
<tr>
<td>Blue Lake ES Rm 102</td>
<td>06/24/2008</td>
<td>02:01:23 PM</td>
<td>12</td>
<td>1.19</td>
<td>10</td>
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<tr>
<td>Blue Lake ES Mail</td>
<td>06/24/2008</td>
<td>01:56:41 PM</td>
<td>8</td>
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</tr>
<tr>
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<tr>
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<td>06/24/2008</td>
<td>01:57:24 PM</td>
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<td>9</td>
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<tr>
<td>Blue Lake ES C105</td>
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<td>Blue Lake ES Rm 142</td>
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