TRIDIUMTALK

niagara AX

“oBIX Introduction”
December 2006

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TRIDIUM
Connecting minds and machines

Welcome!

- The goal of TridiumTalk is to share with the Niagara community timely content on sales, products and technical topics. Each session will last between 45-60 minutes and will be a mix of presentation, demonstrations and Q&A.
- This session and past sessions will be posted on our community web site at www.Niagara-Central.com (more details to come)
- The content presented here is representative of Tridium's Niagara technology and products in general, please contact your channel partner for specific details and pricing.
- As a courtesy to others in the conference, please place your phone on mute until the Q&A portion of the program

Agenda

- Evolution of Building Automation
- World Wide Web – M2M Web
- Introduction to oBIX
  - oBIX Object Model
  - oBIX Contracts
  - oBIX XML Syntax
  - oBIX Networking
- Live Demonstration
- More Information

Current Physical Architecture

Multiple Busses
Multiple Protocols

Web Browser

Application Server

Local Area Network

Niagara IP

Multi Protocol Area Controller

Many Buss Types

LON over IP

Router

LON FTT-10 Devices

BACNet IP

Area Controller

MSTP Devices

Modbus IP

Gateway

Modbus Serial Devices

MODBUS®

Others

Access Point

Wireless Devices

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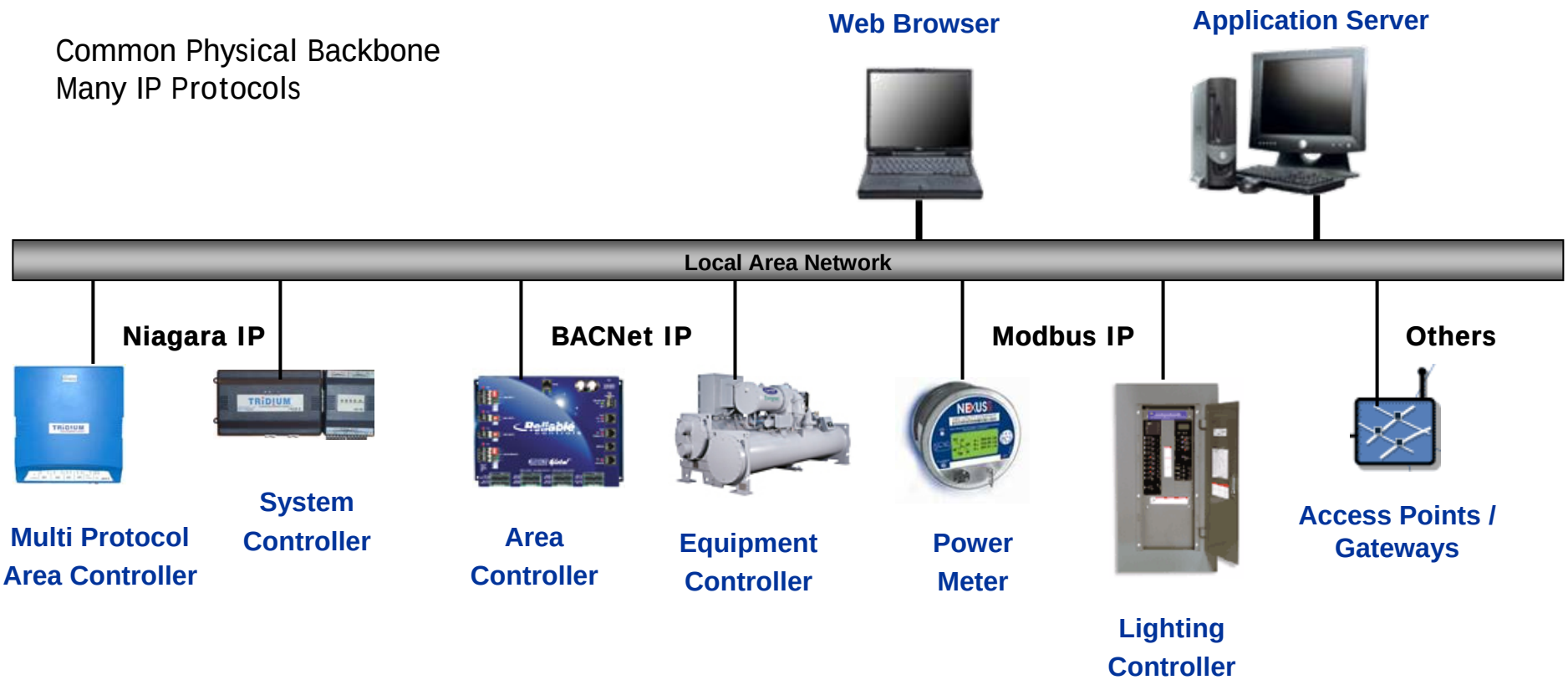
New Physical Architecture

Common Physical Backbone
Many IP Protocols



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Web Services and Applications

Common Physical Backbone
Many Web Services Protocols

Energy Application

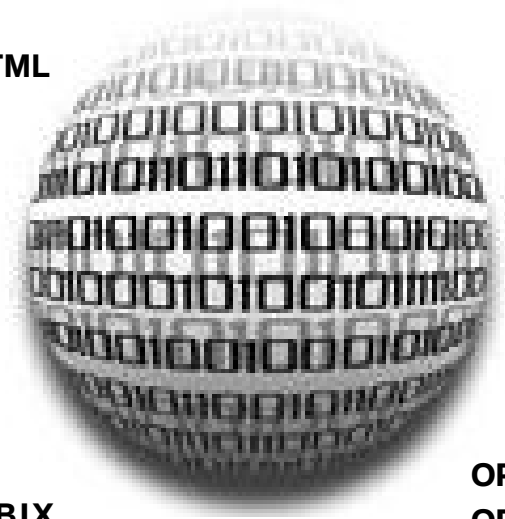
Business Application

Web Browser

oBIX

HTML

MQ



oBIX

XML RPC

oBIX

OPC UA and
OPC XML DA

BACNet WS

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M2M or Machine-to-Machine

- Lowliest devices are sporting gigahertz processors and Internet connectivity
- Embedded systems can look to their desktop and IT brethren to see what the future might hold
- There is a pervasive installed base and mind share of Web technologies

M2M or Machine-to-Machine

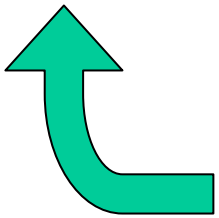
- The Web itself is composed of a few simple but highly scalable technologies:
  - URLs for identifying information on the Internet;
  - HTTP to move data over the Internet;
  - HTML as a standard document format.
- Originally the Web was designed to publish information in HTML for human consumption.
- Increasingly information is published as XML for machine consumption.
- What our future M2M world might look like.
  - It's highly likely that **all** our devices live on the Internet
  - They will all have their own URLs and HTTP server to publish information in XML
  - **This is the birth of the M2M Web**.

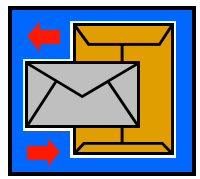
Postal "Web" – People to People

Request

Network

Address



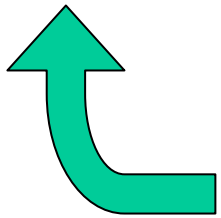


Mailing Response

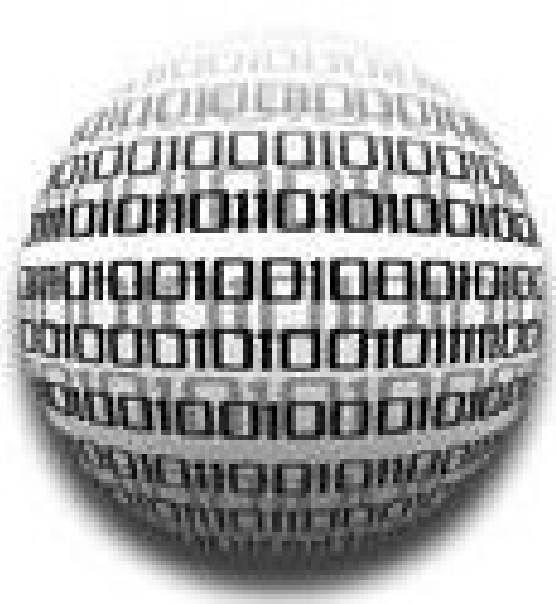
Physical Document

"World Wide Web" - People to Machine

Request



Network



URL

Web Page Response

HTML Document

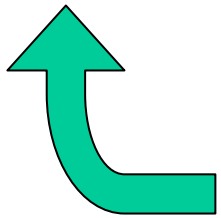
"M2M Web" - Machine to Machine

Request

Network

URI

AHU-1 Status ?



oBIX Response

XML Document

OASIS and oBIX

- OASIS is a not-for-profit, international consortium dedicated to the development, convergence, and adoption of e-business standards.
- OASIS Standards are developed through an open process, one that provides for fairness, transparency and full participation from the entire community.
- oBIX is a standard that was developed by an OASIS Technical committee developing for standardizing communication between building controls and the enterprise
- V 1.0 Specification has completed Public Review and has been approved as a committee specification

oBIX Normalization

- Version 1.0 of oBIX provides a normalized representation for three broad concepts:
- **Points**:
  - representing a single scalar value and it's status
  - sensors, actuators, or configuration variables like a setpoint
- **Histories**:
  - Modeling and querying of time sampled point data (trend logs).
  - Edge devices collect a time stamped history of point values which can be feed into higher level applications for analysis;
- **Alarming**:
  - Modeling, routing, and acknowledgment of alarms.
  - Alarms indicate a condition which requires notification of either a user or another application.

oBIX XML

- The principal requirement of oBIX is to develop a common XML syntax for representing information from diverse M2M systems.
- The design philosophy of oBIX is based on a small but extensible data model.
- Contracts provide the mechanism to extend the model into new domains using the same object model and XML syntax.
  - Embrace vendor specific extensions
  - Easy to mix together standard and vendor custom contracts
  - Allow vendors to differentiate themselves while maintaining interoperability

oBIX XML Syntax

- How a thermostat might look in oBIX
- Human AND machine readable

URL of the oBIX point on the internet

Real time data

```
<obj href="http://myhome/thermostat">
  <real name="spaceTemp" units="obix:units/fahrenheit" val="67.2"/>
  <real name="setpoint" unit="obix:units/fahrenheit" val="72.0"/>
  <bool name="furnaceOn" val="true"/>
</obj>
```

oBIX point type

oBIX Networking

- Two Standard mechanisms to transfer oBIX over networks for publication and consumption.
  - HTTP (REST)
  - SOAP (WSDL)

Watches

- Subscription
  - Client makes watch via WatchService
- Client polls server for changes
  - Similar to COV, only new values are returned
  - Same concept as email and RSS

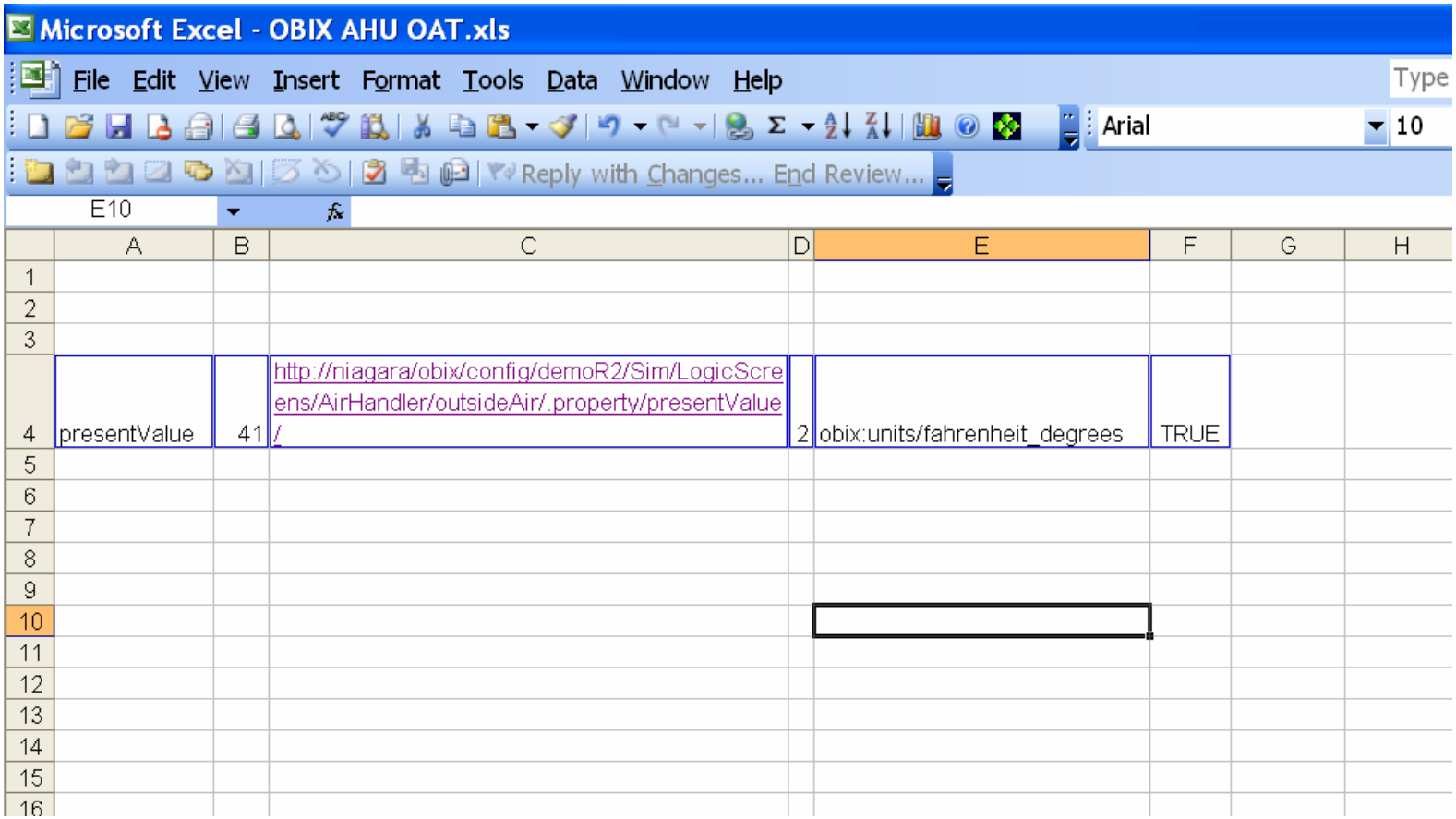
Lon device representation in oBIX

```
<int name="pollFrequency" val="0" href=".property/pollFrequency" writable="true"></int>
<obj name="nviRequest" display="object Id: 0 null" href=".property/nviRequest" status="ok"> </
<obj name="nvoStatus" display="obj id 0" href=".property/nvoStatus" status="ok"> </obj>
<int name="nroFileDirectory" val="0" display="0 : {ok}" href=".property/nroFileDirectory" is="c
<real name="nviSpaceTemp" val="0.00" display="0.0 : {ok}" href=".property/nviSpaceTemp" is="obi
<real name="nviSetPoint" val="0.00" display="0.0 : {ok}" href=".property/nviSetPoint" is="obix:
<real name="nvoSpaceTemp" val="0.00" display="0.0 : {ok}" href=".property/nvoSpaceTemp" is="obi
<obj name="nvoUnitStatus" display="null,0.0,0.0,0.0,0.0,0.0,false,0" href=".property/nvoUnitSt
<obj name="nviManOverride" display="null,0.0,0.0" href=".property/nviManOverride" status="ok">
<real name="nviSetPtOffset" val="0.00" display="0.00 : {ok}" href=".property/nviSetPtOffset" is
<obj name="nviEnergyHoldOff" display="null,0.0" href=".property/nviEnergyHoldOff" status="ok">
<obj name="nviHeaterOverid" display="null,0.0" href=".property/nviHeaterOverid" status="ok"> </
<real name="nviDuctInTemp" val="0.00" display="0.0 : {ok}" href=".property/nviDuctInTemp" is="c
<real name="nvoEffectSetPt" val="0.00" display="0.0 : {ok}" href=".property/nvoEffectSetPt" is=
<real name="nvoFlowControlPt" val="0.00" display="0.0 : {ok}" href=".property/nvoFlowControlPt
<real name="nvoBoxFlow" val="0.00" display="0.0 : {ok}" href=".property/nvoBoxFlow" is="obix:Pc
<real name="nvoTerminalLoad" val="0.00" display="0.0 : {ok}" href=".property/nvoTerminalLoad" i
<obj name="nvoEnergyHoldOff" display="null,0.0" href=".property/nvoEnergyHoldOff" status="ok">
<obj name="nviTodEvent" display="null null :0" href=".property/nviTodEvent" status="ok"> </obj
<obj name="nviBypass" display="null,0.0" href=".property/nviBypass" status="ok"> </obj>
<obj name="nvoBypass" display="null,0.0" href=".property/nvoBypass" status="ok"> </obj>
<obj name="nviManValue" display="0,0,0,0,0,0" href=".property/nviManValue" status="ok"> </obj>
<real name="nviFlowTrack" val="0.00" display="0.0 : {ok}" href=".property/nviFlowTrack" is="obi
```

PID Loop representation in oBIX

```
<real name="controlledVariable" val="50.00" display="50.00 : {ok}" href=".property/controlledVari
<real name="setpoint" val="50.00" display="50.00 : {ok}" href=".property/setpoint" is="obix:Point
<real name="defaultSetpoint" val="50.00" display="50.0" href=".property/defaultSetpoint" writable
<real name="presentValue" val="50.00" href=".property/presentValue" precision="2" unit="obix:units
<real name="prioritizedOutput" val="50.00" display="50.00 @ 16" href=".property/prioritizedOutput
<real name="statusOutput" val="50.00" display="50.00 : {ok}" href=".property/statusOutput" is="ob
<real name="proportionalConstant" val="0.35" href=".property/proportionalConstant" min="0.0" prec
<real name="integralConstant" val="120.00" href=".property/integralConstant" precision="2" unit="
<real name="maxIntegralGain" val="100.00" href=".property/maxIntegralGain" precision="2" unit="ob
<real name="derivativeConstant" val="0.00" href=".property/derivativeConstant" precision="2" unit
<real name="bias" val="0.00" href=".property/bias" precision="2" unit="obix:units/null" writable="
<real name="maximumOutput" val="100.00" href=".property/maximumOutput" precision="2" unit="obix:u
<real name="minimumOutput" val="0.00" href=".property/minimumOutput" precision="2" unit="obix:uni
<real name="covIncrement" val="0.00" href=".property/covIncrement" precision="2" unit="obix:units
<real name="errorLimit" val="100.00" href=".property/errorLimit" precision="2" unit="obix:units/n
<real name="deadband" val="100.00" href=".property/deadband" precision="2" unit="obix:units/null"
```

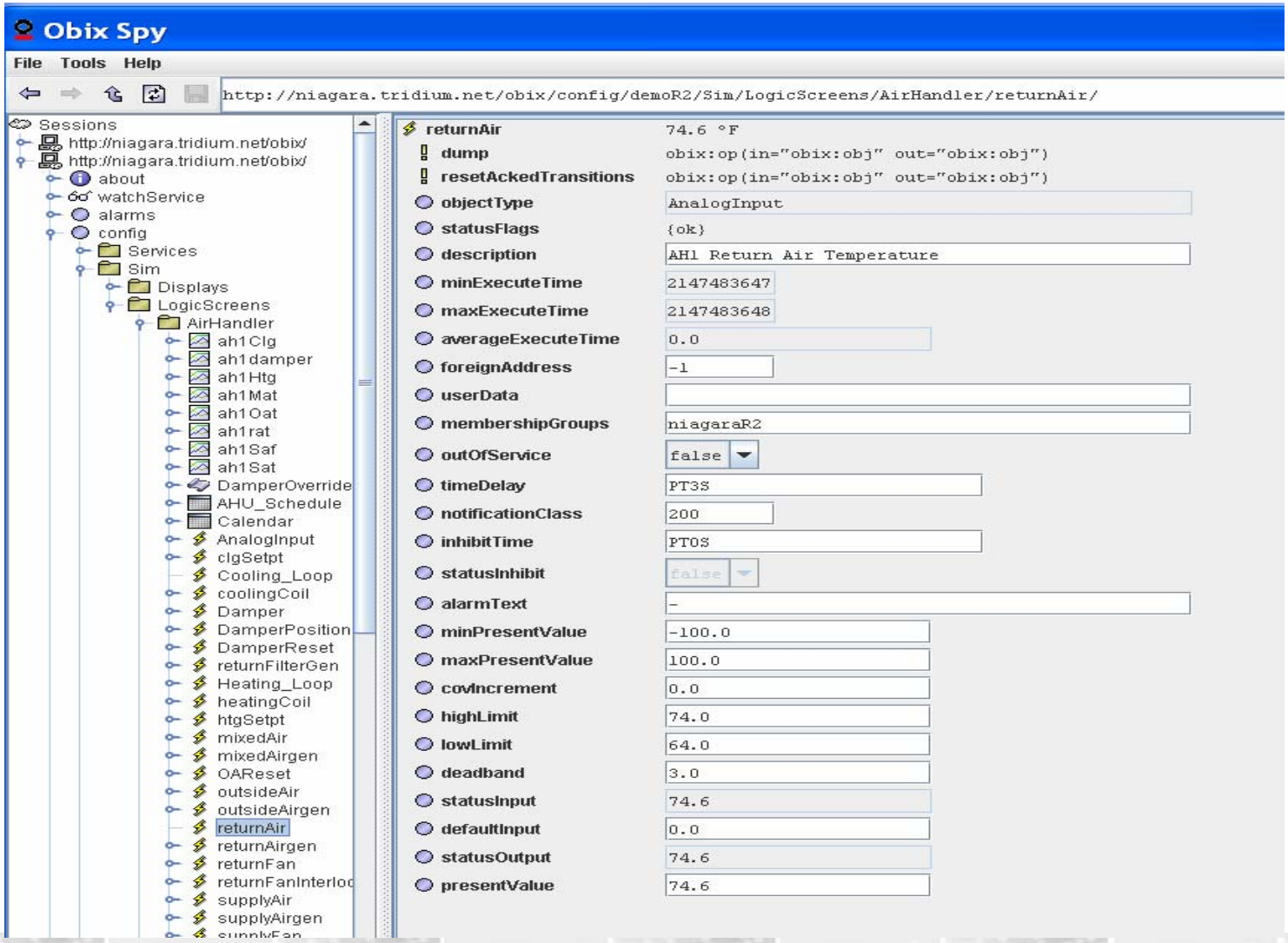
Standard web query feature polling a Niagara JACE serving oBIX



Java oBIX Toolkit

- Open source client – Public Domain
- Java API
  - XML Encoder / Java to XML
  - XML Decoder / XML to Java
- http://sourceforge.net/projects/obix

oBIX toolkit client connected to Niagara JACE serving oBIX points



R2 and AX Live Example

- Niagara R2 oBIX server to Niagara AX Client

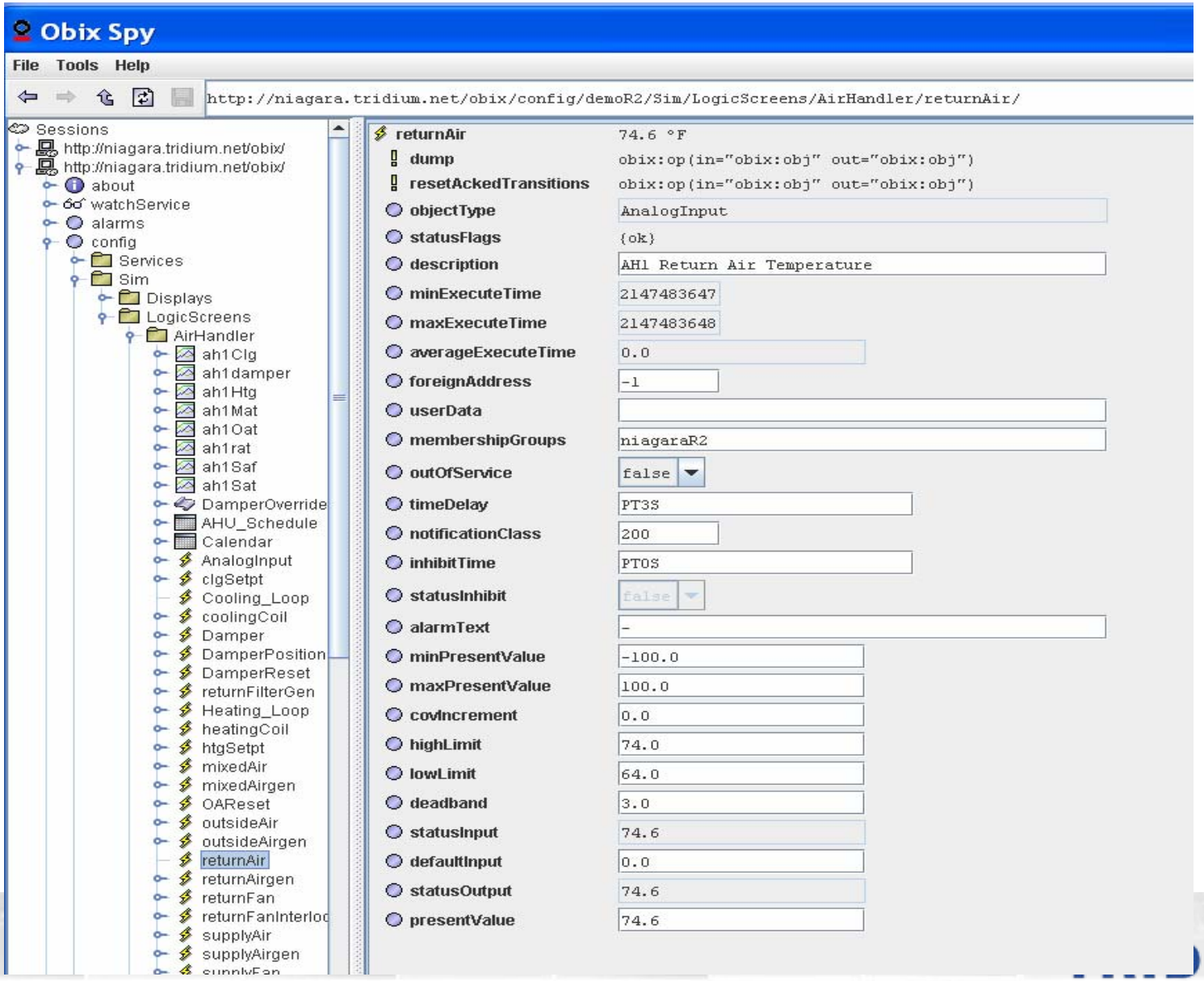
More Information

- For more information visit the OASIS oBIX Technical Committee website at:

  http://www.oasis-open.org/committees/obix

  - Download the spec and learn more about how to participate in the development effort.
- http://sourceforge.net/projects/obix
  - Download the open source Java oBIX Toolkit which is designed to help you incorporate oBIX into your software quickly and easily.

oBIX toolkit client connected to Niagara Jace serving oBIX points



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Q & A

- We would like your feedback on today's TridiumTalk
- Please take a moment to answer our short survey
- If you have any further questions, comments or topic suggestions, please email them to SalesSupport@tridium.com

Ed Merwin

Marc Petock

Scott Muench

Upcoming TridiumTalk topics:

First Session	Second Session	2006 Topics
October 10	October 12	What's new in Niagara AX 3.1 – New capabilities (Software, NXS, double memory JACEs)
October 26		Driving Internet Connectivity to the Building Device Level JACE-2 - Equipment Controller / New Applications and Architectures Hosted by HPAC Engineering Magazine
November 14	November 16	AX Control Objects – Tech Session for tuning PID loops and Commissioning
December 12	December 14	OBIX – Introduction / R2 to AX Integration and Migration plan
		2007 Topics
January 9	January 11	Niagara Portal – Introduction to the entry point to the Niagara Community
February 13	February 15	Selling Niagara – The Value Proposition (annual event)
March 13	March 15	The Niagara Community - Products Based on Niagara Show and Tell?
April 10	April 12	AX Graphics - Tech Session for Building PX pages using HX and WB profiles
May 8	May 10	How to Demo AX – Step by Step
June 12	June 14	Wireless – The World Unwired, What does it mean to you?

Thank you!

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Ed Merwin

Gil Rockwell

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