

“oBIX Introduction”

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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

Web Browser

Application Server



Multiple Busses
Multiple Protocols



Local Area Network

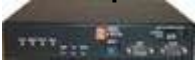
Niagara IP

LON over IP

BACNet IP

Modbus IP

Others



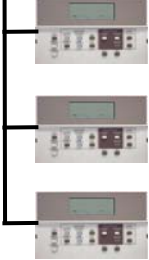
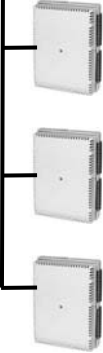
Multi Protocol
Area Controller

Router

Area
Controller

Gateway

Access Point



Many
Buss
Types

LON
FTT-10
Devices

MSTP
Devices

Modbus
Serial
Devices

Wireless
Devices



MODBUS®

New Physical Architecture

Common Physical Backbone
Many IP Protocols

Web Browser



Application Server



Local Area Network

Niagara IP



Multi Protocol
Area Controller



System
Controller

BACNet IP



Area
Controller



Equipment
Controller

Modbus IP



Power
Meter



Lighting
Controller

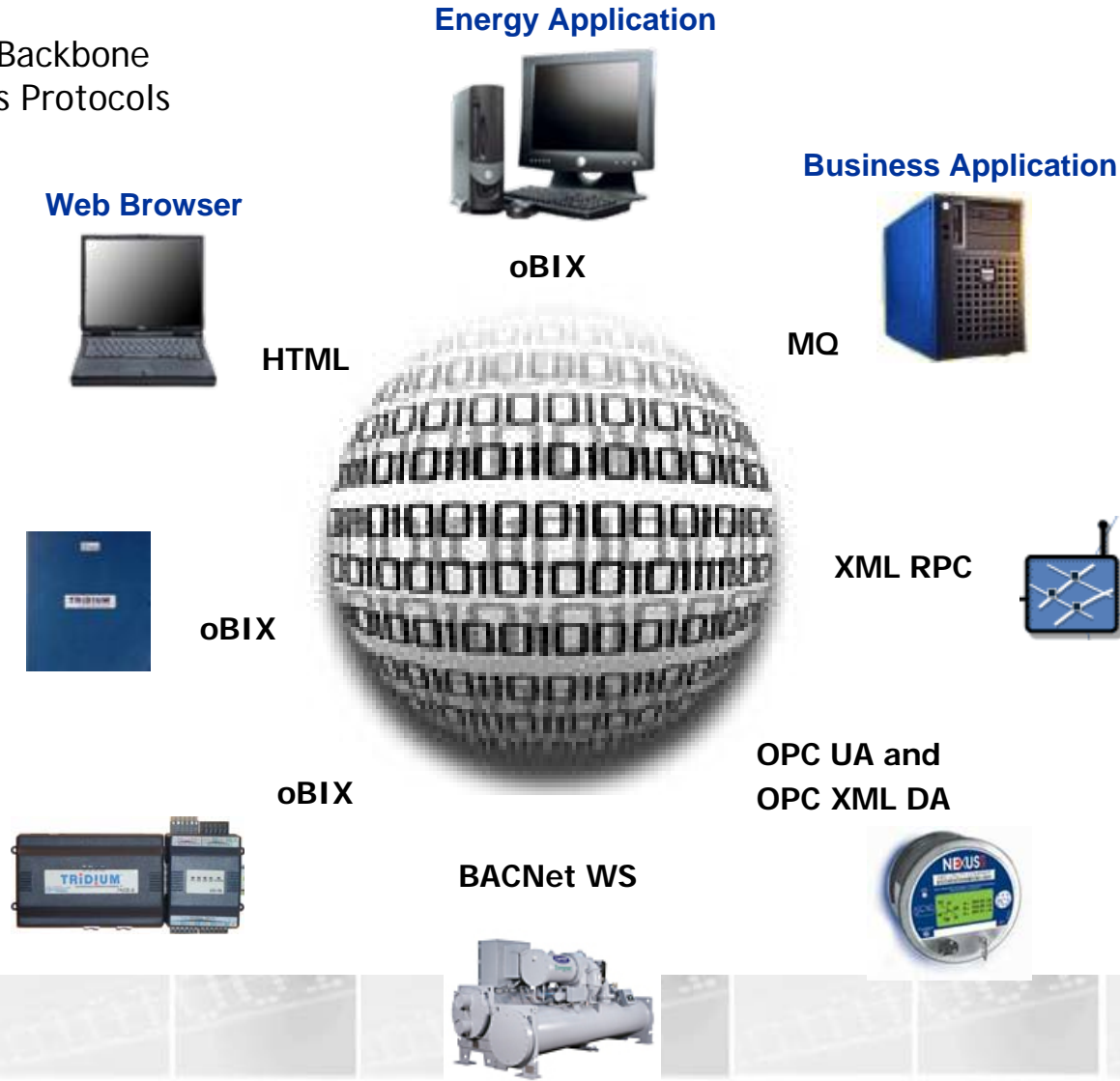
Others



Access Points /
Gateways

Web Services and Applications

Common Physical Backbone
Many Web Services Protocols



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

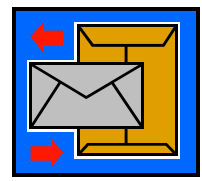
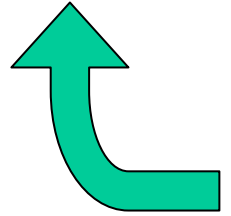
- The Web itself is composed of a few simple but highly scalable technologies:
 - URLs for identifying information on the Internet;
 - HTTP to move data over the Internet;
 - HTML as a standard document format.
- Originally the Web was designed to publish information in HTML for human consumption.
- 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

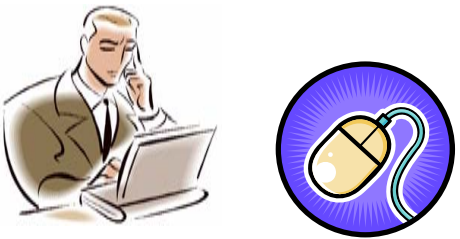
Address



Physical Document

“World Wide Web” - People to Machine

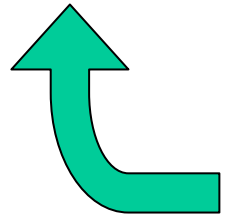
Request



Network



URL



HTML Document



“M2M Web” - Machine to Machine

Request

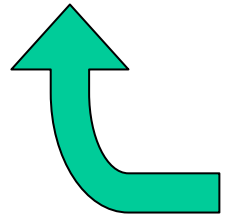


AHU-1
Status
?

Network



URI



XML
Document



oBIX
Response

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="y
<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:w
<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

Microsoft Excel - OBIX AHU OAT.xls

File Edit View Insert Format Tools Data Window Help

Reply with Changes... End Review...

	A	B	C	D	E	F	G	H
1								
2								
3								
4	presentValue	41	http://niagara/obix/config/demoR2/Sim/LogicScreens/AirHandler/outsideAir/.property/presentValue/	2	obix:units/fahrenheit_degrees	TRUE		
5								
6								
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								

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

The screenshot shows the Obix Spy application interface. On the left is a tree view of the oBIX hierarchy, with 'returnAir' selected under the path: Sessions > http://niagara.tridium.net/obix/ > config > Services > Sim > Displays > LogicScreens > AirHandler > returnAir. The right pane displays the configuration for the 'returnAir' point, which is currently at 74.6 °F.

Property	Value
returnAir	74.6 °F
dump	obix:op (in="obix:obj" out="obix:obj")
resetAckedTransitions	obix:op (in="obix:obj" out="obix:obj")
objectType	AnalogInput
statusFlags	{ok}
description	AH1 Return Air Temperature
minExecuteTime	2147483647
maxExecuteTime	2147483648
averageExecuteTime	0.0
foreignAddress	-1
userData	
membershipGroups	niagaraR2
outOfService	false
timeDelay	PT3S
notificationClass	200
inhibitTime	PT0S
statusInhibit	false
alarmText	-
minPresentValue	-100.0
maxPresentValue	100.0
covIncrement	0.0
highLimit	74.0
lowLimit	64.0
deadband	3.0
statusInput	74.6
defaultInput	0.0
statusOutput	74.6
presentValue	74.6

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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Property	Value
returnAir	74.6 °F
dump	obix:op(in="obix:obj" out="obix:obj")
resetAckedTransitions	obix:op(in="obix:obj" out="obix:obj")
objectType	AnalogInput
statusFlags	{ok}
description	AH1 Return Air Temperature
minExecuteTime	2147483647
maxExecuteTime	2147483648
averageExecuteTime	0.0
foreignAddress	-1
userData	
membershipGroups	niagaraR2
outOfService	false
timeDelay	PT3S
notificationClass	200
inhibitTime	PT0S
statusInhibit	false
alarmText	-
minPresentValue	-100.0
maxPresentValue	100.0
covIncrement	0.0
highLimit	74.0
lowLimit	64.0
deadband	3.0
statusInput	74.6
defaultInput	0.0
statusOutput	74.6
presentValue	74.6

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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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Gil Rockwell



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