Accessing PI System using OPC Unified Architecture

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Empowering Business in Real Time
PI Infrastructure for the Enterprise

Agenda

- What is OPC Unified Architecture?
- OPC UA Web Services
- Information Modeling
- Client and Sever Communication
- Exposing PI System
- Server and Client Demo
- OPC UA Roadmap
- Summary

What is OPC Unified Architecture?

- Next generation of OPC technology
  - Platform independent
- Designed with SOA principles
  - Extensible, discoverable
  - Well defined message syntax
- Mapped into Web Services
  - WSDL, XML schema, SOAP
  - Message exchange over HTTP/HTTPS
- Supports enhanced security
  - Certificates, Encryption, Signature
- Adopts Information Modeling concepts
  - Browsable and discoverable Address Space model
  - Objects, Nodes, Types, Data Variables, Properties

OPC UA Specification

- Part 1 – Concepts
- Part 2 – Security
- Part 3 – Address Space
- Part 4 – Services
- Part 5 – Information Model
- Part 6 – Mappings
- Part 7 – Profiles
- Part 8 – Data Access
- Part 9 – Alarms and Conditions
- Part 10 – Programs
- Part 11 – Historical Access
- Part 12 – Discovery
- Part 13 – Aggregates

Generic Parts

Mapping to Web Services

Supported features

Parts specific to classic OPC mapping

OPC Server discovery

OPC UA Web Services

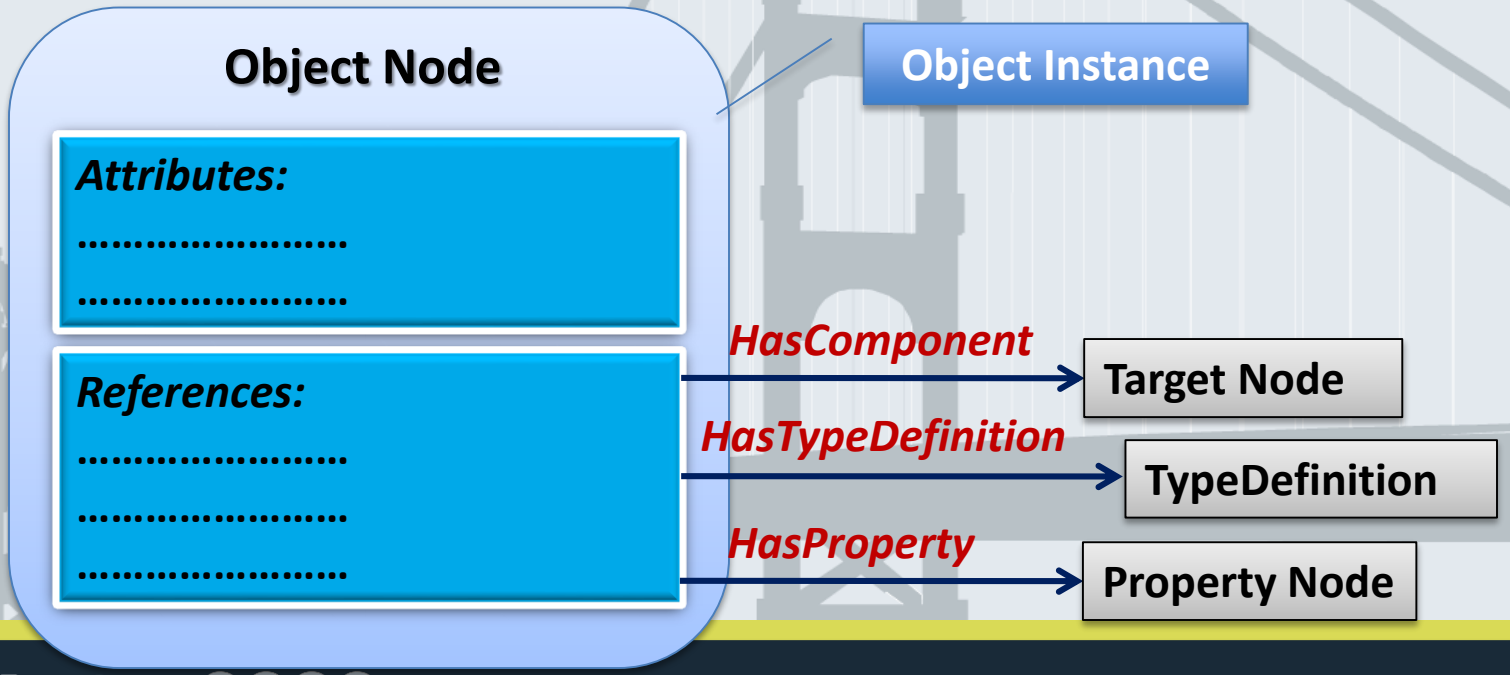
- Defined in OPC UA Spec (Parts 4, 6) and OPC UA WSDL
- Can be group into service sets:
  - Discovery Service Set
    - FindServers, GetEndpoints, RegisterServer
  - Secure Channel Service Set
    - OpenSecureChannel, CloseSecureChannel
  - Session Service Set
    - Create, Activate, Close Session
  - Node Management Service Set
    - Add and Delete Objects/References

OPC UA Web Services (continued)

- View Service Set
  - Browse, BrowseNext, Register and Unregister Nodes, TranslateBrowsePath
- Query Service Set
  - QueryFirst, QueryNext
- Attribute Service Set
  - Read, Write, HistoryRead, HistoryUpdate
- Method Service Set
  - Call
- Monitored Item Service Set
  - Create, Modify, Delete, SetMonitoring Mode, SetTriggering
- Subscription Service Set
  - Create, Modify, Delete, SetPublishing, Publish, Republish, Transfer Subscriptions

Information Modeling

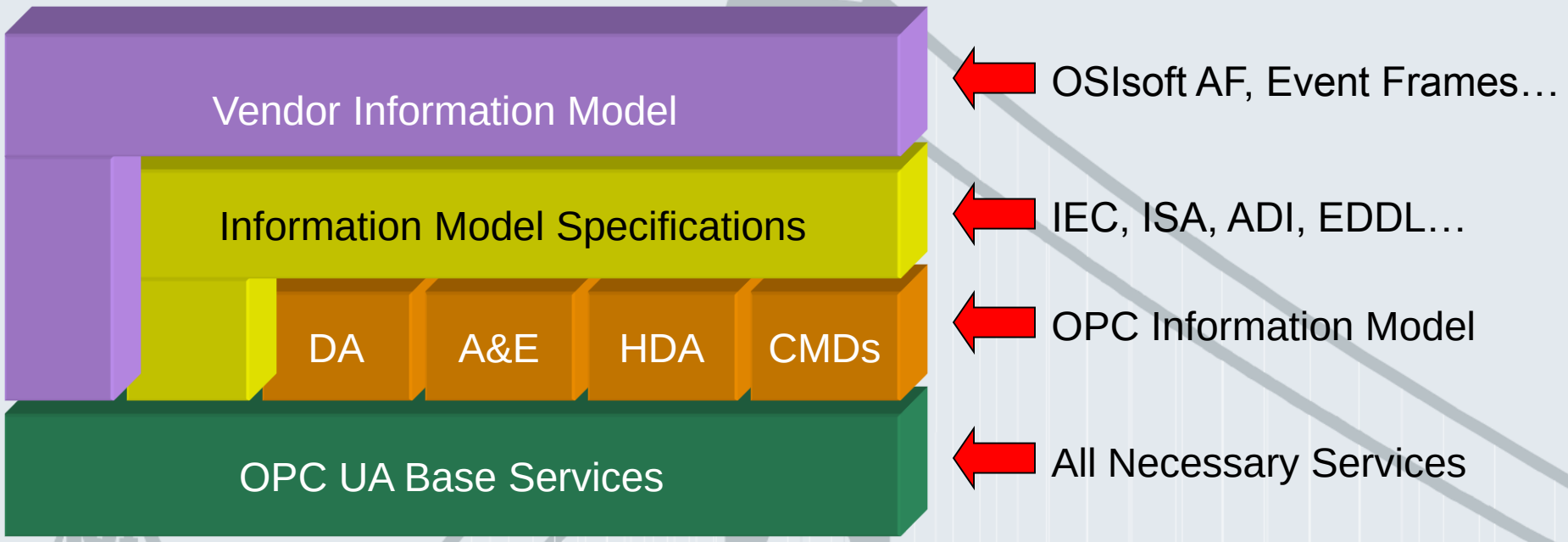
- Representing any data structures and relationships using standard constructs
  - Object nodes, Variable nodes, Type nodes, etc.
  - Hierarchical and non-hierarchical references
  - Modeling and subtyping rules



OPC UA Address Space

- Exposes Information Models
- Provides metadata that fully describe objects
- Can be accessed through Browse services
- Supports Query mechanism
- Allows discovering unknown objects and their types
- Supports View concepts

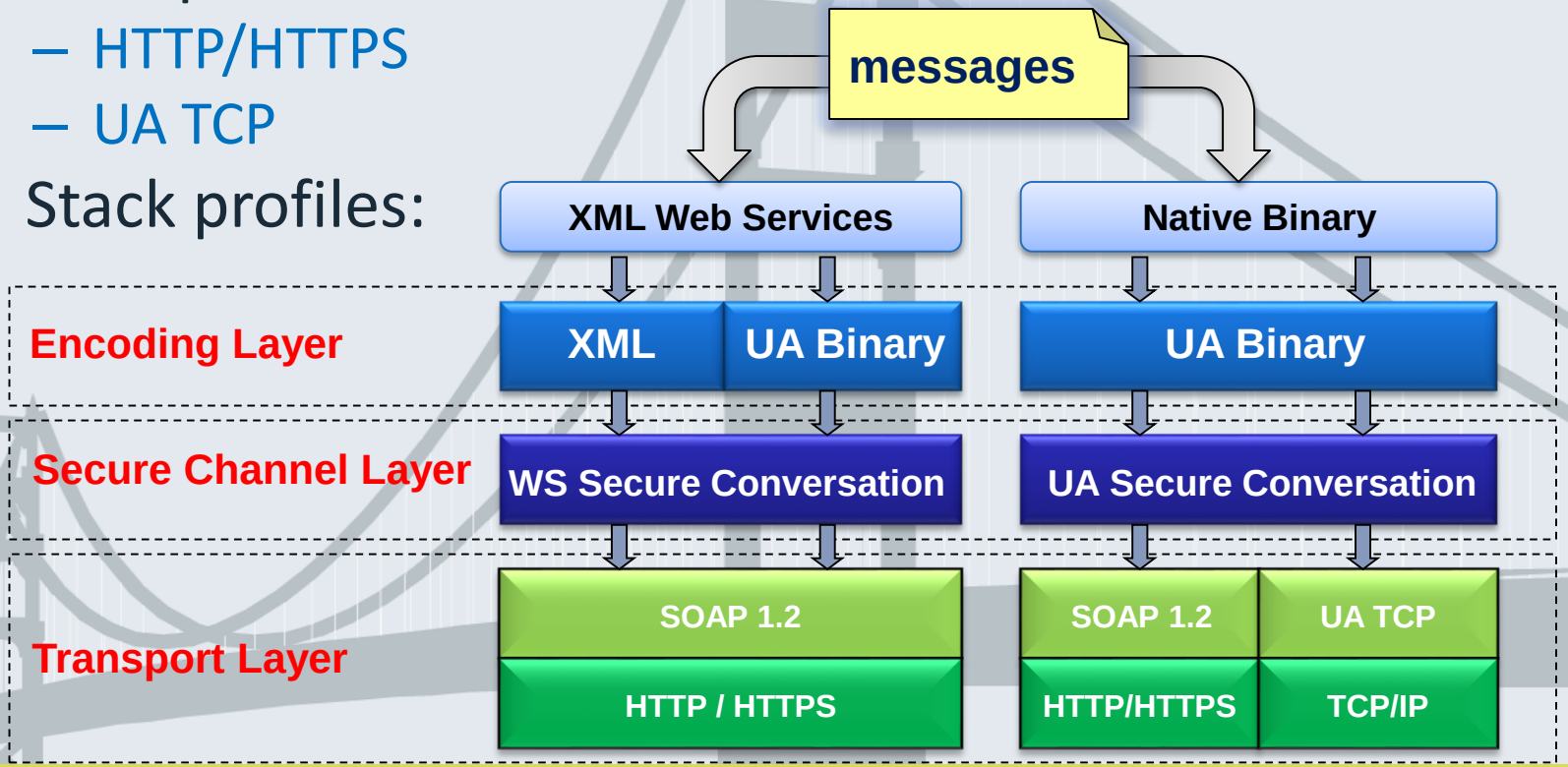
Layering of Different Information Models



OPC UA Clients can discover Nodes in the UA Address Space and access all data from the derived layers

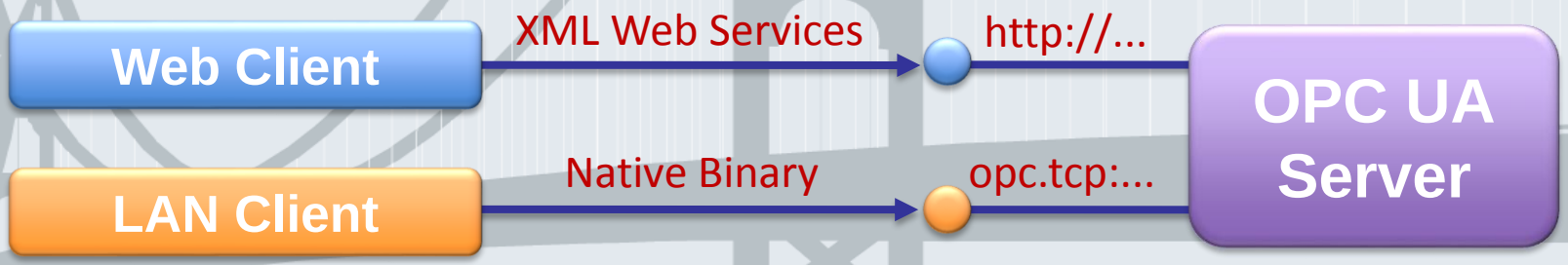
Message Encoding and Stack Profiles

- Message encoding
  - XML + SOAP => XML Schema + WSDL
  - UA Binary => UA Binary Schema
- Transport
  - HTTP/HTTPS
  - UA TCP
- Stack profiles:

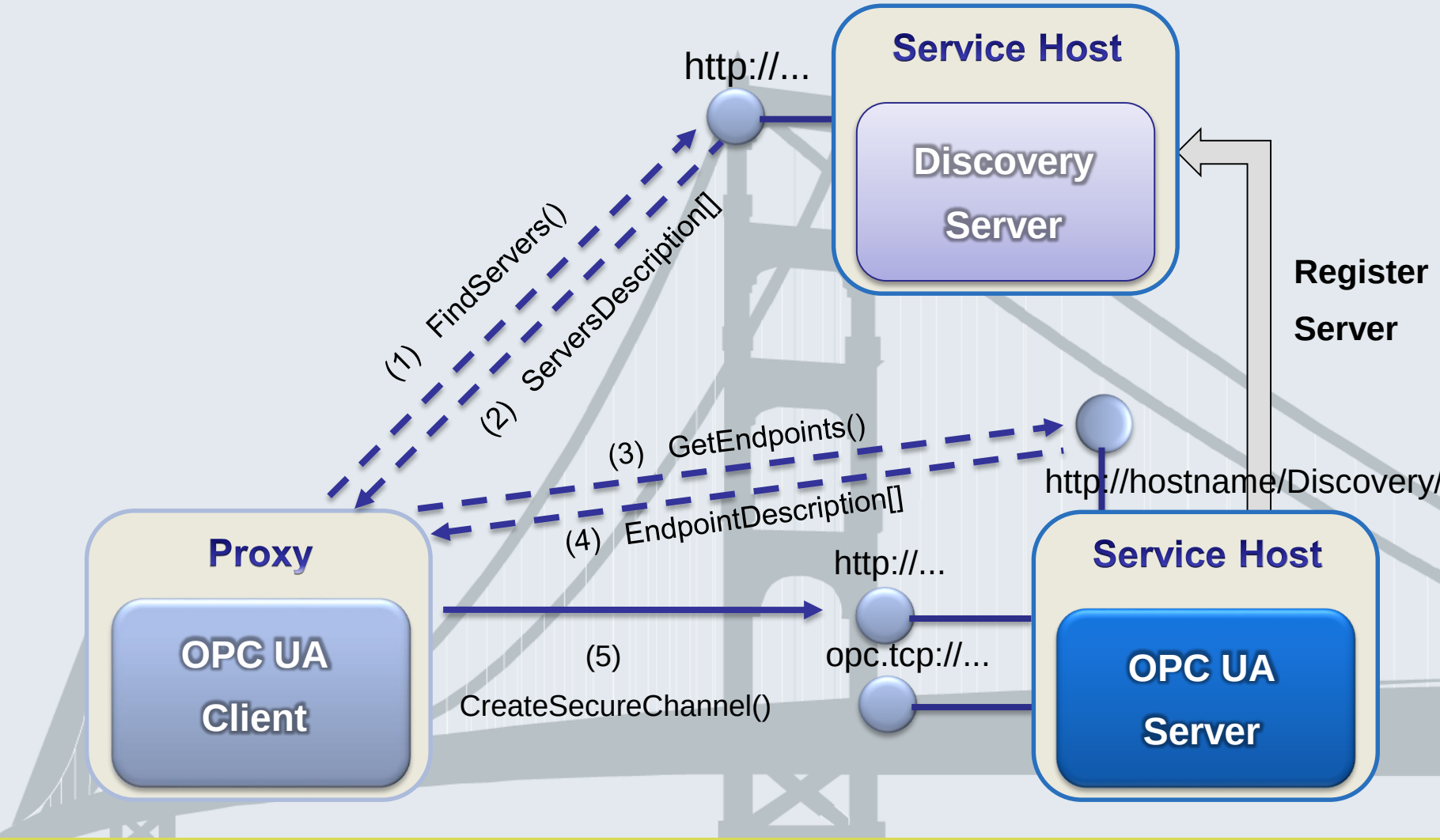


Exposing OPC UA Web Services

- Endpoints
  - Address: http//localhost:5477/PIOPCUAServer
  - Binding: HTTP or UA TCP
  - Contract: IServer (defined in OPC UA WSDL and XML schemas)
- Hosting Environment:
  - Self-hosting (WCF)
  - IIS, WAS



Discovering OPC UA Endpoints



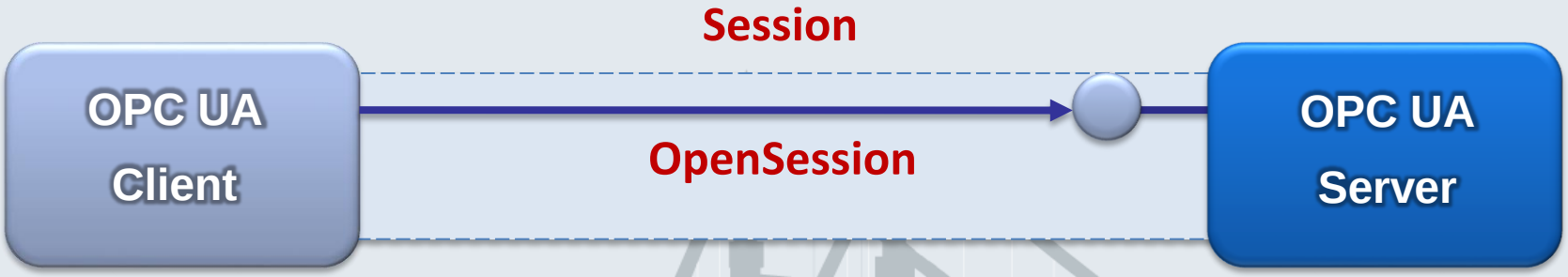
Client and Server Communication

- Messages are exchanged by Request/Response mechanism
- Messages are encrypted and digitally signed

Client and Server Communication

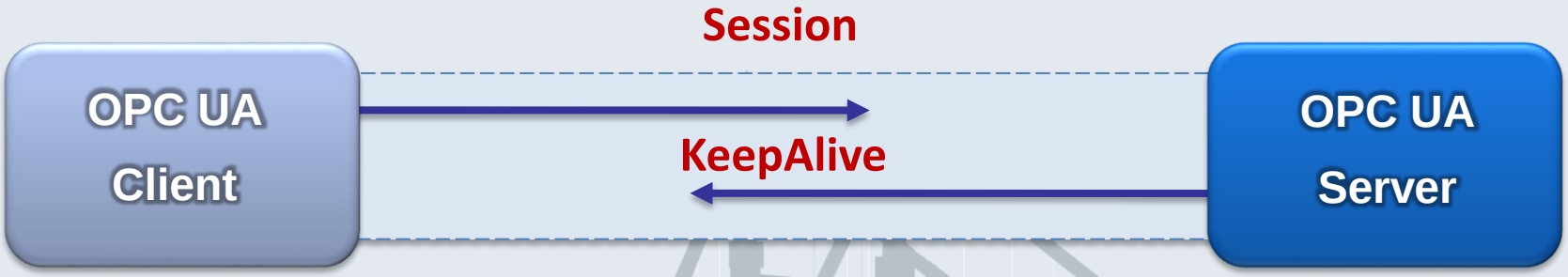
- Before creating a session, client and server should create a Secure Channel
- Secure Channel is logical channel between client and server that requires Software Certificates
- Certificates should be validate on both sides

Client and Server Communication



- Session
  - Holds client context in server
  - Lifetime controlled by OPC UA client/server
  - Survives short term disconnects
  - Allows rapid recovery of communication failure

Client and Server Communication



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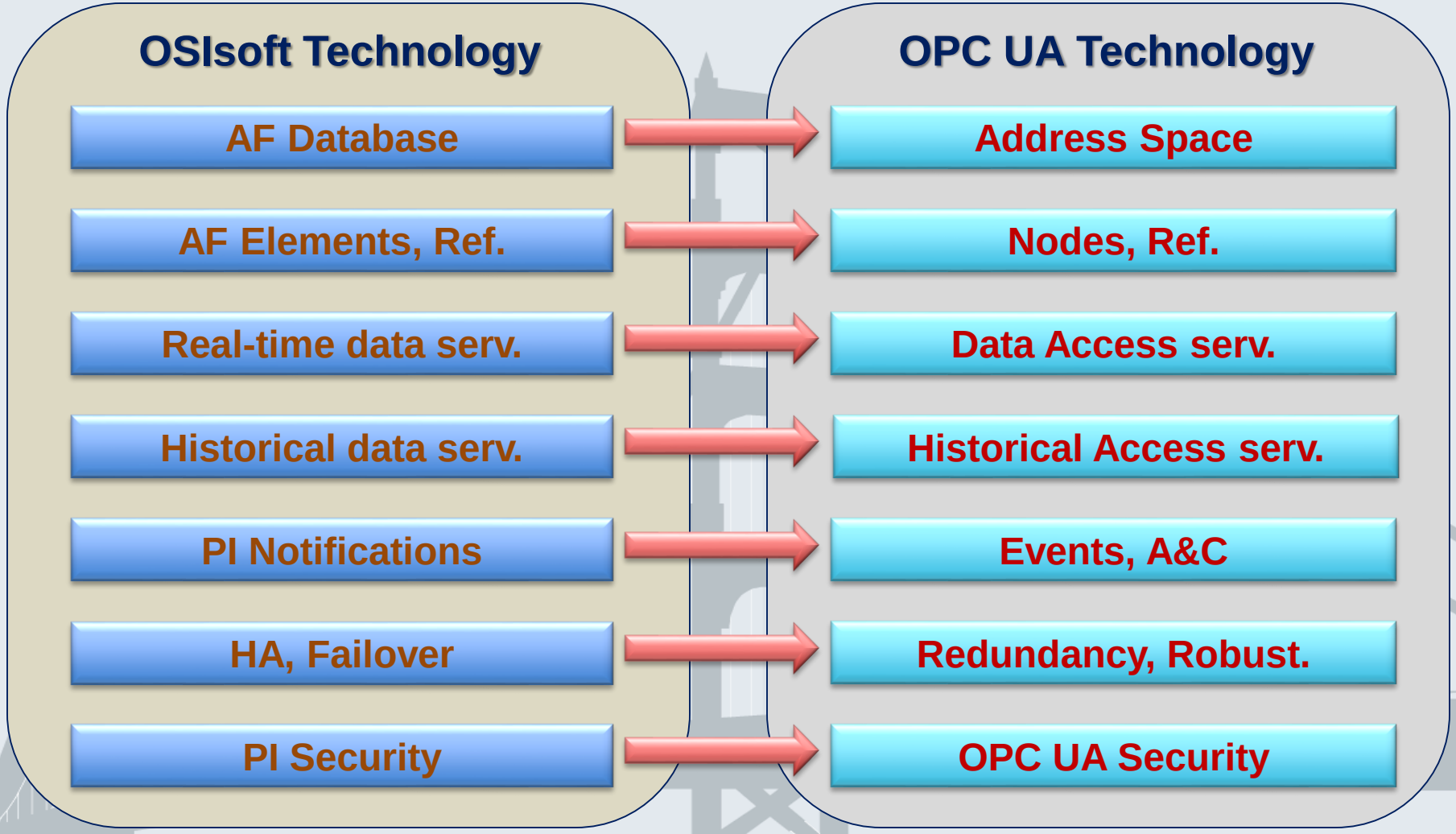
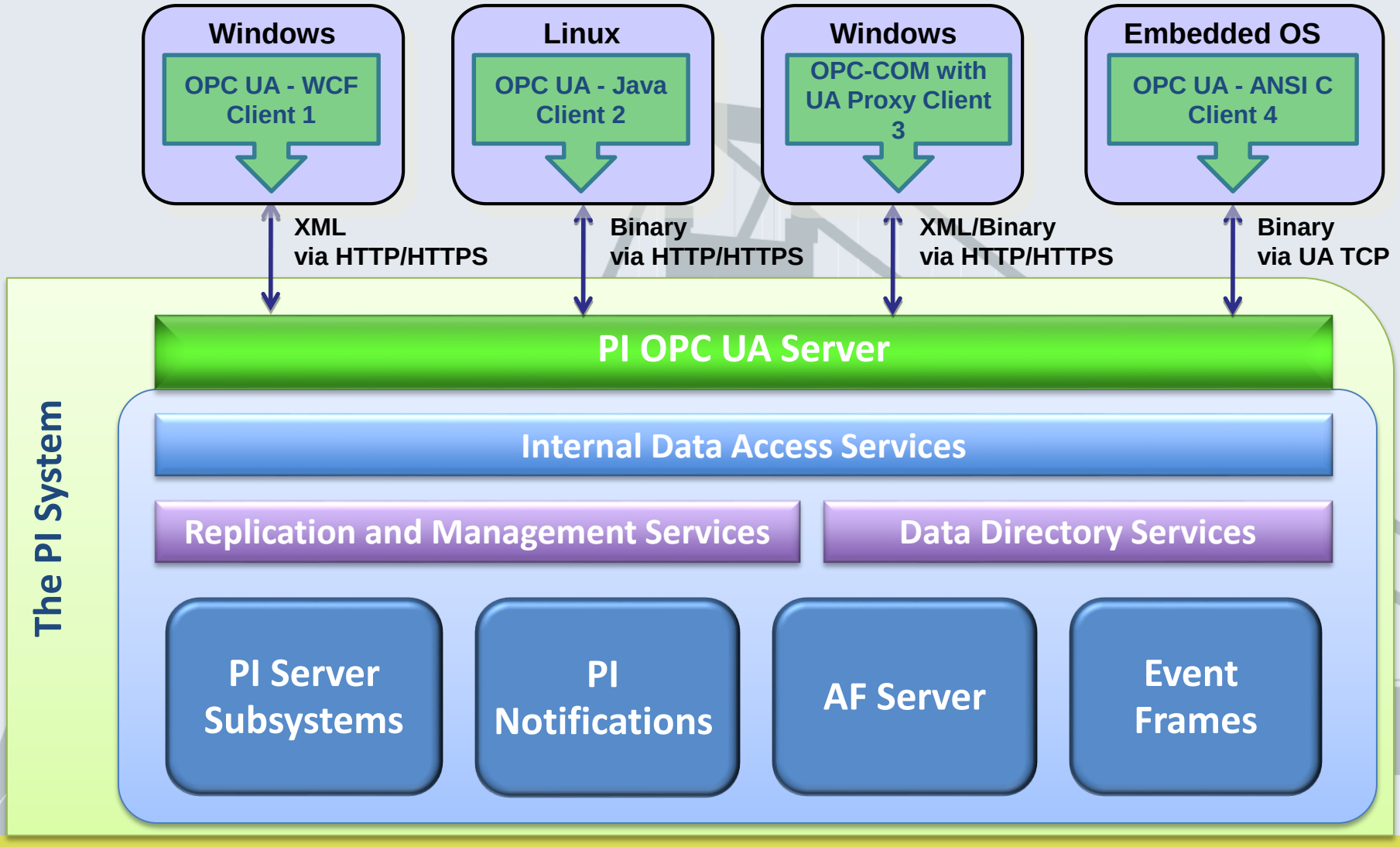
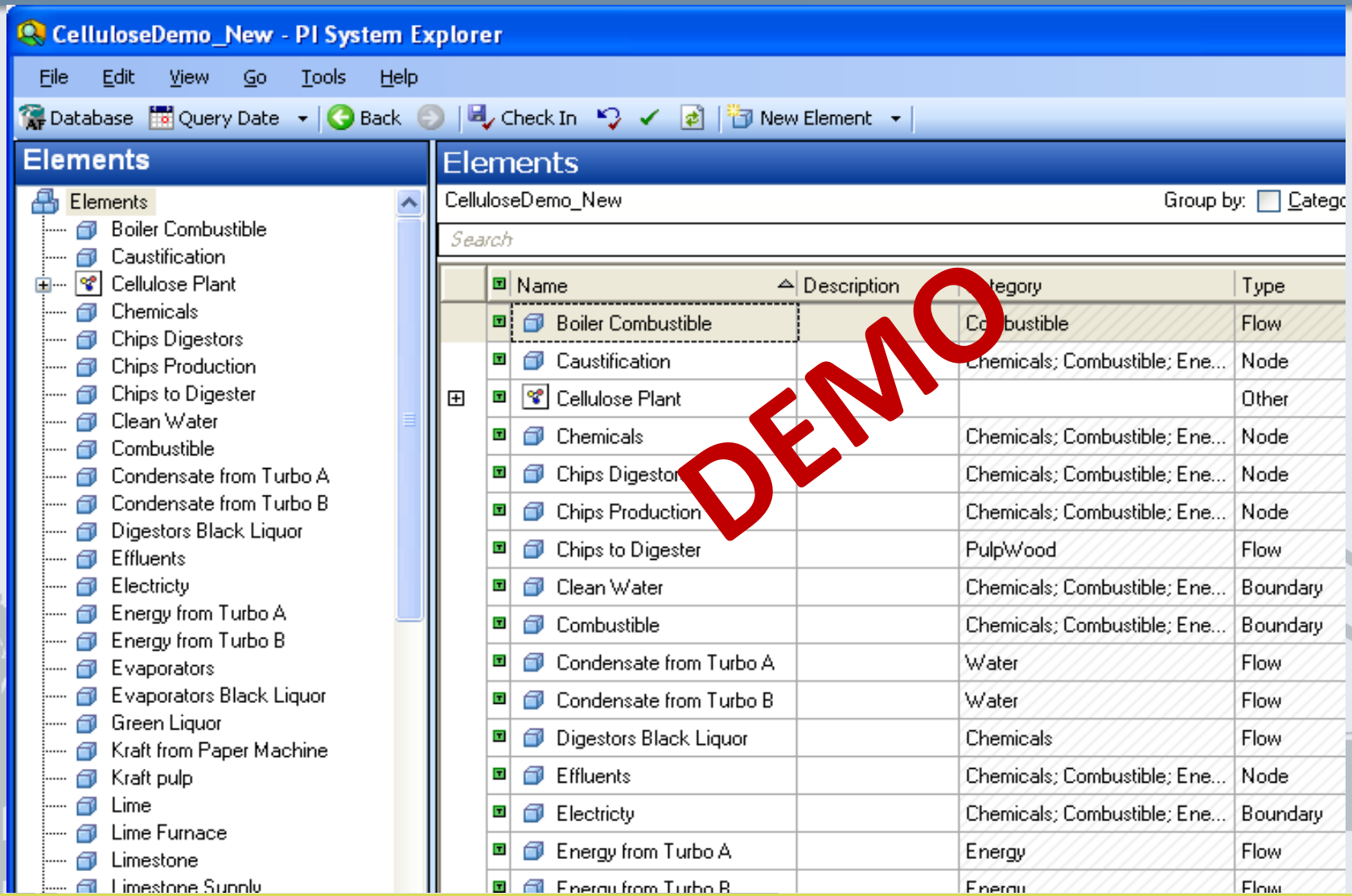
Mapping OSIsoft technology into OPC UA



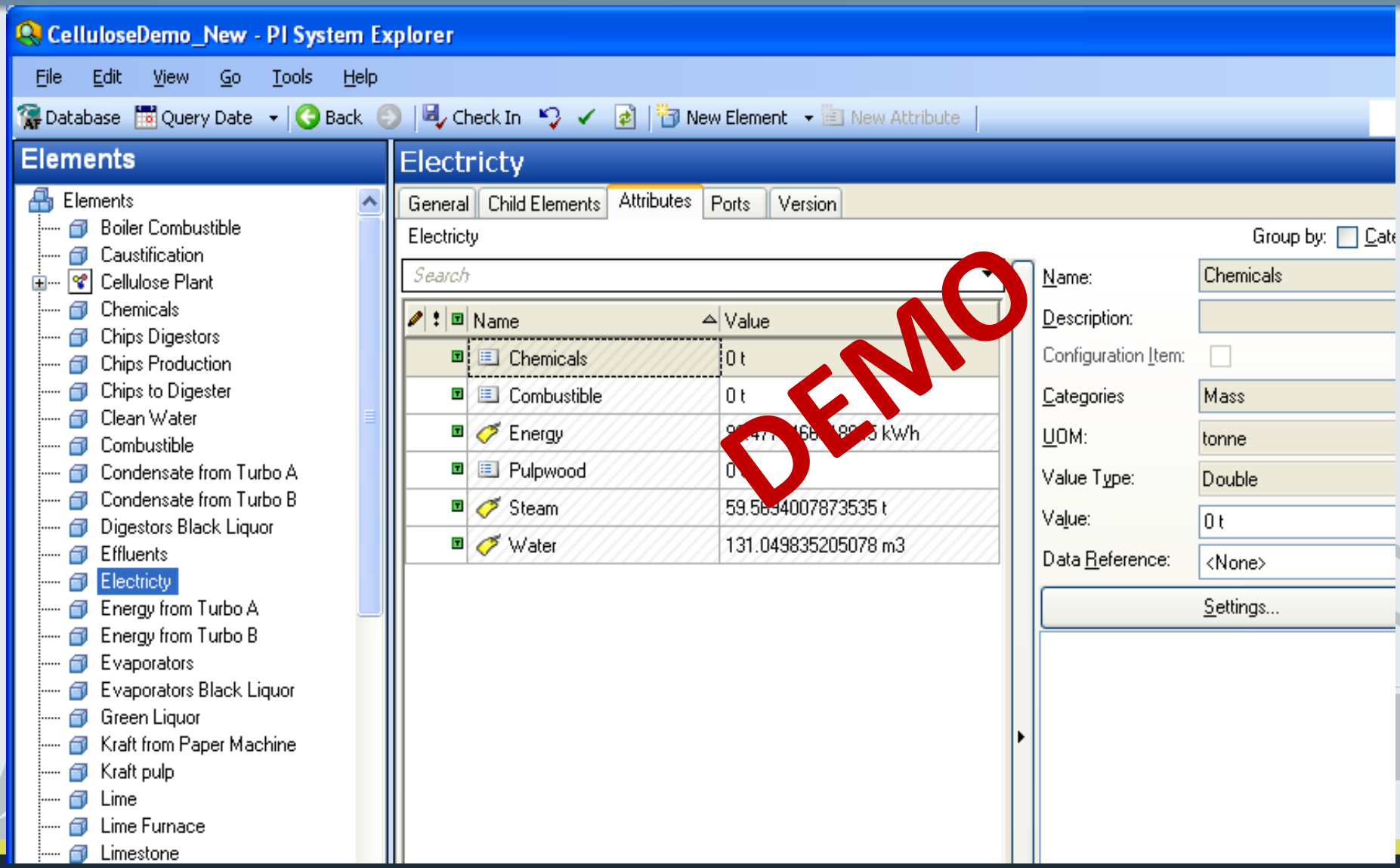
Exposing PI System using OPC UA



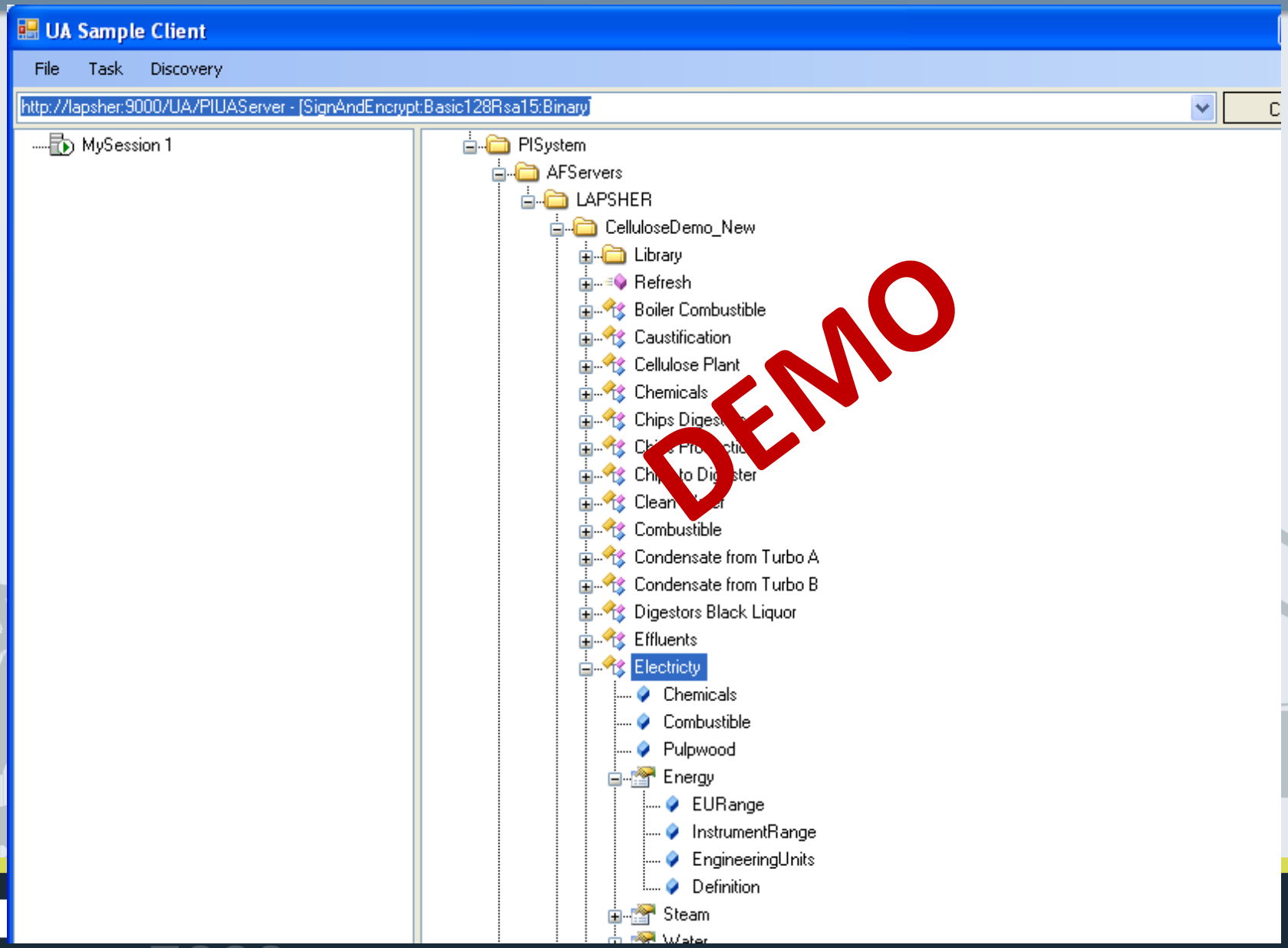
AF Mapping Example



AF Mapping Example (continued)



AF Mapping Example (continued)



OPC UA Product Roadmap

- PI OPC UA Server – Q2/2009
  - Data Access : Browse AF database, Read/Write from/to AF elements and attributes (PI point data references), Subscribe for PI tag updates
- PI OPC UA Server – Q3/2009
  - Historical Access : History of AF elements and attributes (PI point data references); support for OPC UA aggregates
  - Direct access to PI points: Read/Write from/to point attributes, data snapshots and history
- PI OPC UA Interface – Q4/2009
  - Automated AF asset and PI point creation and synchronization.
  - DA and HDA support: Data and history reads, subscriptions

Summary

- OPC UA is the next generation OPC technology that provides mapping into Web Services
- OPC UA is designed to be extensible and can be used to expose any data structures
- PI System is exposed to third party OPC UA clients through native PI OPC UA Server

**Visit OPC demo pod at the Product Expo for more info on PI OPC UA Server and Interface!

Questions/Comments?