



OSIsoft®
USER CONFERENCE
2008
AMSTERDAM



Empowering Business in **Real Time.**

PI Infrastructure for the Enterprise.

Advanced/Smart Metering and AMI Interfaces (Next Generation)

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Traditional Meter Readings



- Manual
 - Monthly
 - Billing
 - Some Planning
- Consumption Only

Advanced / Smart Meter Infrastructure

- **AMR** (Automated Reading)

- Daily
- Billing
- Planning
- Outage Management

- **AMI/SMI**

- Bi-Directional
- Power Quality
- Events closer to r/t
- Premise Communication
 - ZigBee
 - Home Plug
 - ?



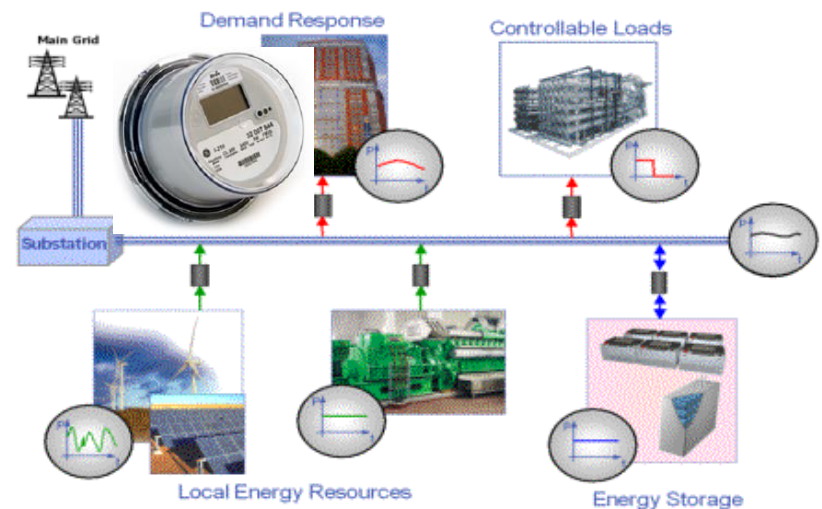
Communication Methods

Broadband over power line (BPL)

Power Line Carrier (PLC)

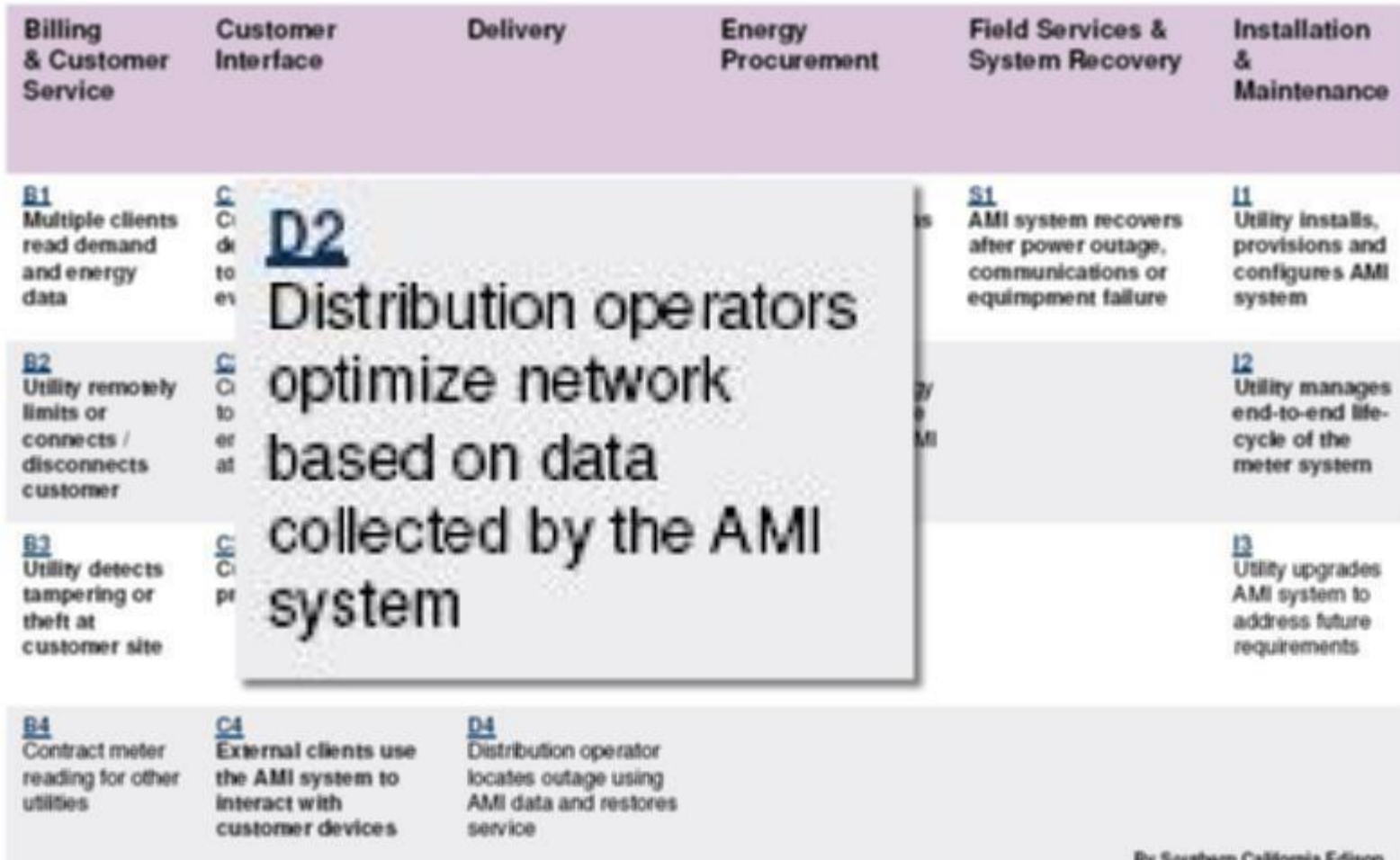
RF Mesh

WiMax



AMI Use Cases developed by SCE

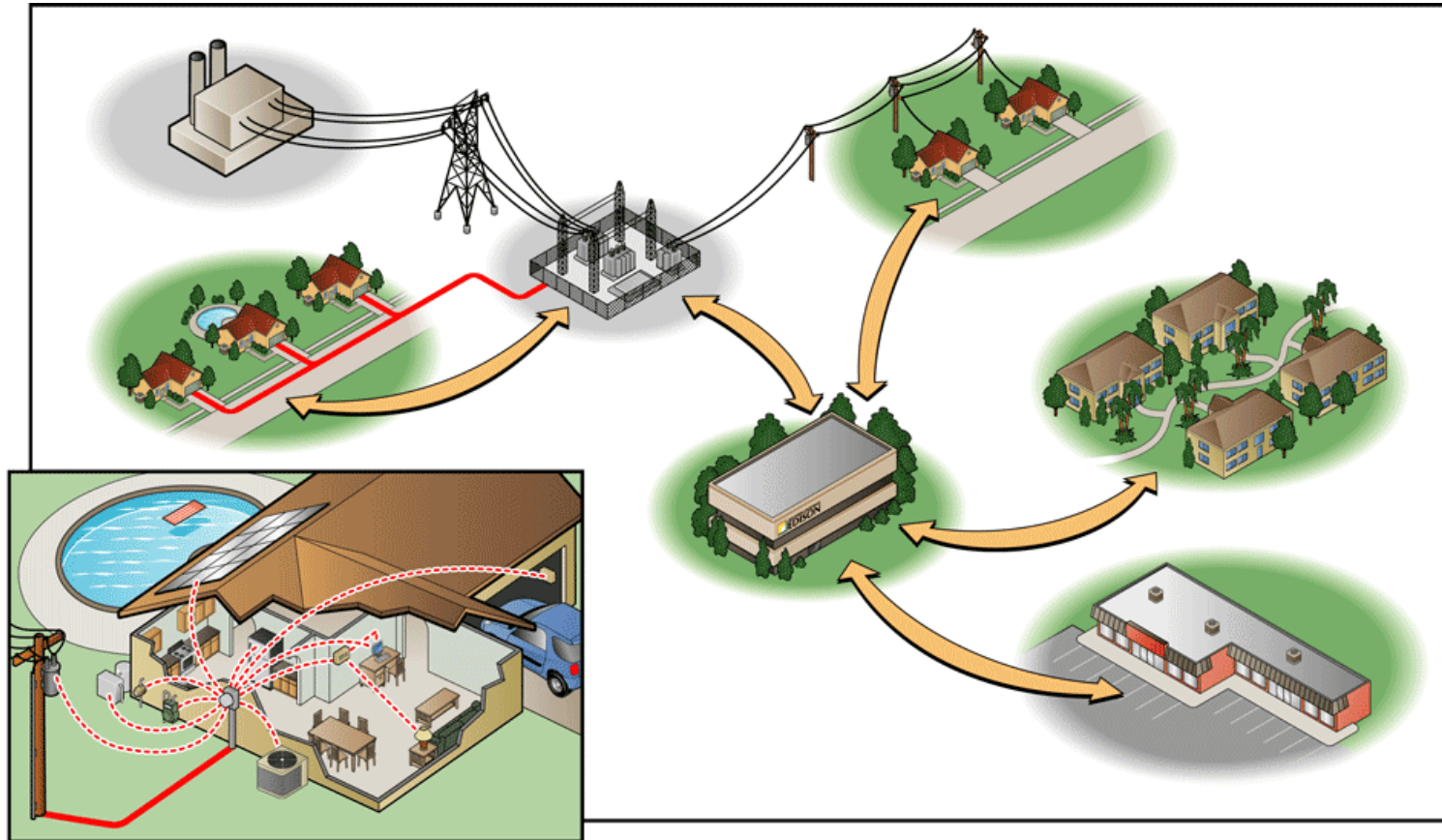
Use Cases



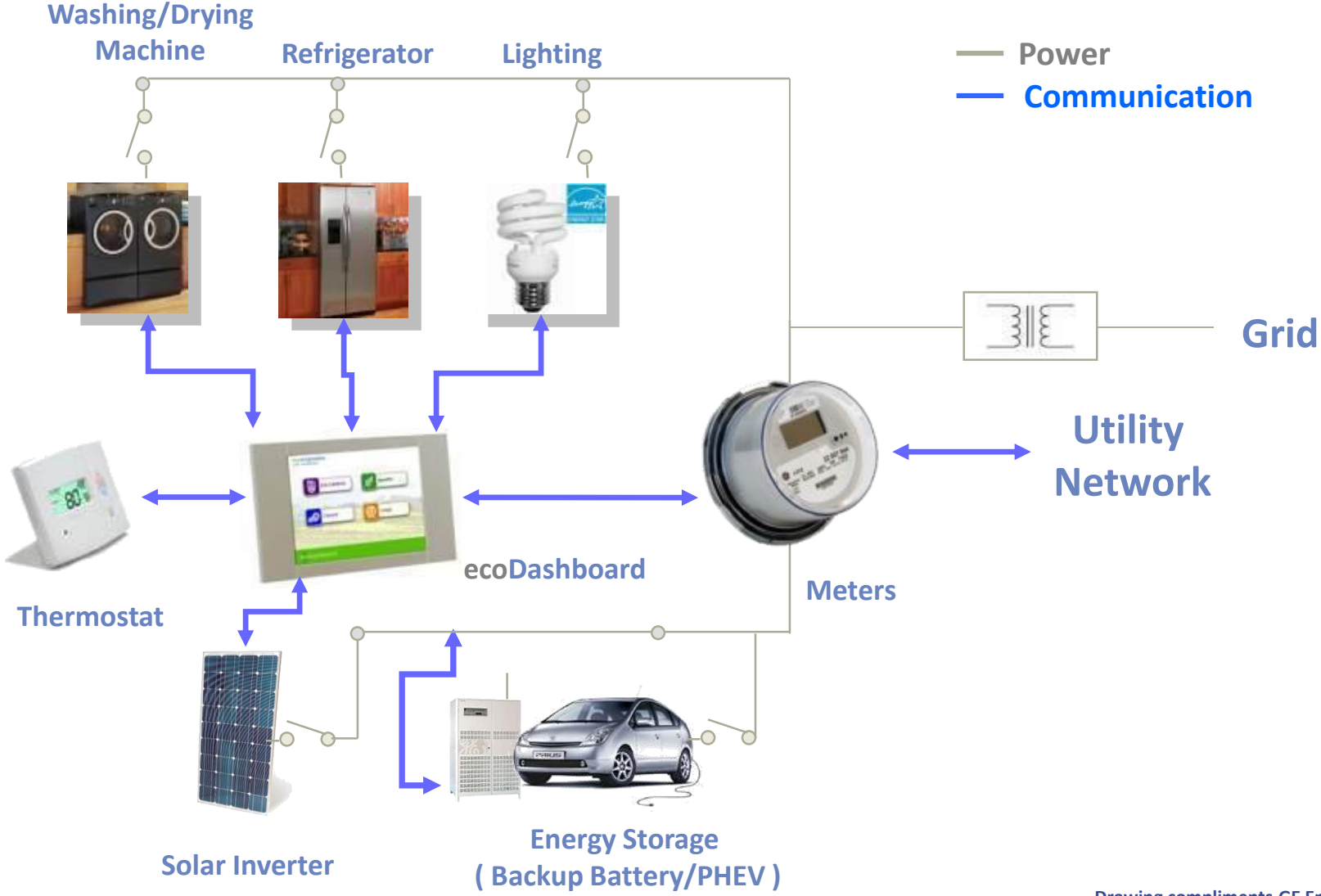
By Southern California Edison

The Smart Grid

The Smart Grid will link electricity producers, distributors and end-users with high-speed networks that provide **useful, actionable, real-time information** about system capacities, demand, prices, and status. The Smart Grid will be self-healing and hence more reliable. The Smart Grid will empower customers.

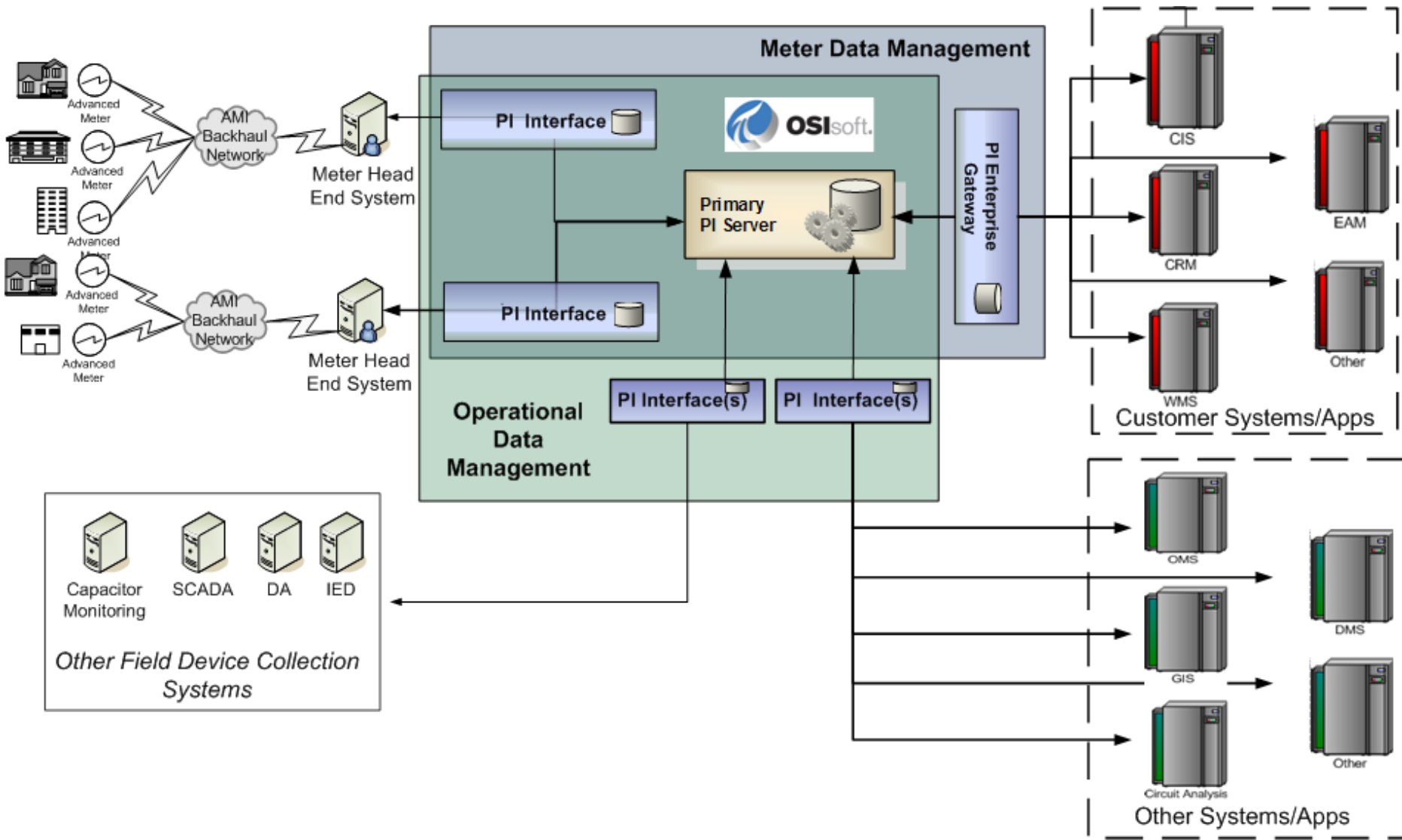


Home System Architecture – with Future Additions



Drawing compliments GE Energy

PI System: Foundation for the Smart Grid



AMI Meter as an Asset

Static Attributes

- Manufacturer Data
- Configuration (soft)
- POD
- Calculation Parameters

Time Series Attributes

- Interval Readings
- Critical Events
- Read Events
- Command Status

AF: What is it?

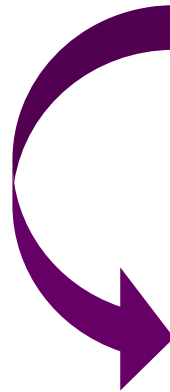
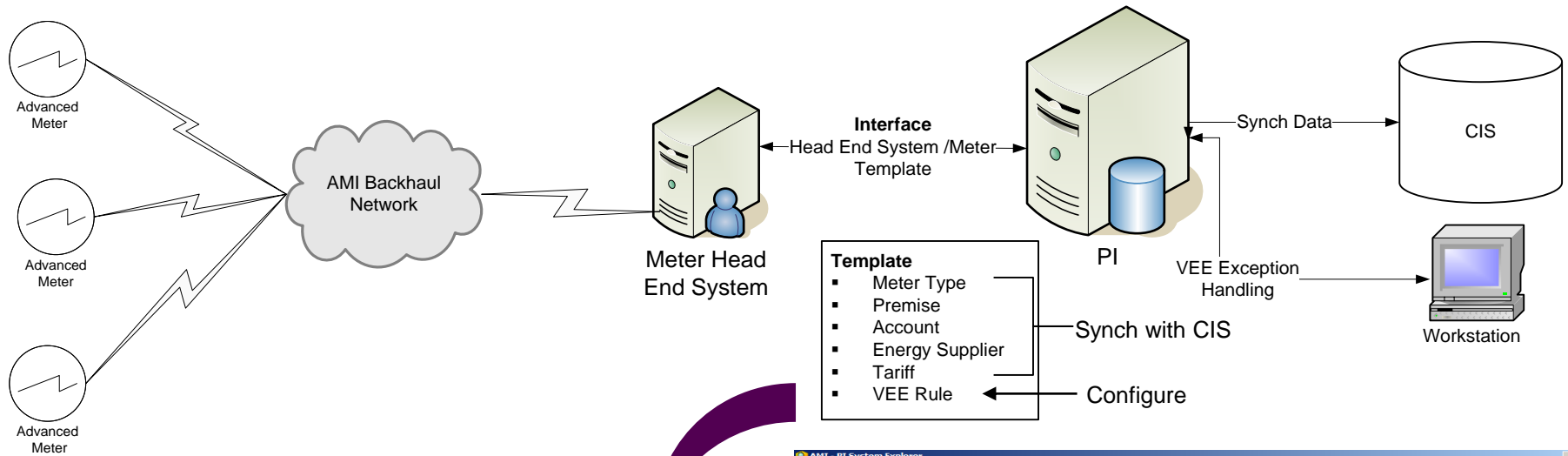


- Static Information
- Slow Changing
- Calculated Values
- Reference:
 - PI Data
 - Relational Data
 - Web Service Data

- Hierarchical
- Flow Network
- Complex Models
- Multiple Relationships

- An infrastructure for future applications

Meter AF Templates



AMI - PI System Explorer

Database | Query Date | Back | Check In | New Element Template | New Attribute Template | Search

Library

- AMI
 - Analysis Templates
 - Categories
 - Element Templates
 - MinimalChannel
 - MinimalMeter
 - MinimalRegister
 - SilverSpringChannel
 - SilverSpringMeter
 - SilverSpringRegister
 - VEE_Rule
 - Enumeration Sets
 - Reference Types
 - Tables

Elements

- Event Frames
- Library
- Unit of Measure

SilverSpringMeter

General | Attribute Templates | Ports

Name	Description	Default V...
DEVICE_DESCRIPTION	Silver Spring device description	
DEVICE_HW_PATCH_NO	Device hardware patch number	
DEVICE_HW_REV_NO	Device hardware revision number	
DEVICE_HW_VER_NO	Device hardware version number	
DEVICE_MFG	Device manufacturer	
DEVICE_MFG_MODEL	Device manufacturer model	
DEVICE_NAME	Silver Spring device name	
DEVICE_NETWORK_ST...	Device status on network	
DEVICE_SERIAL_NO	Device serial number	
DEVICE_STATUS	Status of the device	
DEVICE_SW_PATCH_NO	Device software patch number	
DEVICE_SW_REV_NO	Device software revision number	
DEVICE_SW_VER_NO	Device software version	
DEVICE_UTIL_ID	Silver Spring device util id	
DID_SUB_TYPE	Device Sub Type	
LOG		
METER_MODE	Meter Mode	
METER_SERVICE_POINT	Service point of the meter	
METERING_POINT		
NETWORK_EXCHANGE		
EXIT_POINT		
ENTRY_POINT		
NIC_HW_PATCH_NO	NIC hardware patch number	
NIC_HW_REV_NO	NIC hardware revision number	

Settings

Name: LOG

Description: Configuration Item: Indeged:

Categories: AMIMeter: OSI

LDM: <None>

Value Type: String

Default Value:

Data Reference: PI Point

Settings: \\Server\%Element%\Attribute%

Eye chart magnified

AMI - PI System Explorer

File Edit View Go Help

Database Query Date Back Check In New Element Template New Attribute Template Search

Library

- AMI
 - Analysis Templates
 - Categories
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 - MinimalChannel
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SilverSpringMeter

General Attribute Templates Ports

SilverSpringMeter

Search

Name	Description	Default V...
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DEVICE_HW_REV_NO	Device hardware revision number	
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DEVICE_MFG_MODEL	Device manufacturer model	
DEVICE_NAME	Silver Spring device name	
DEVICE_NETWORK_ST...	Device status on network	
DEVICE_SERIAL_NO	Device serial number	
DEVICE_STATUS	Status of the device	
DEVICE_SW_PATCH_NO	Device software patch number	
DEVICE_SW_REV_NO	Device software revision number	
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NETWORK_EXCHANGE		
EXIT_POINT		
ENTRY_POINT		
NIC_HW_PATCH_NO	NIC hardware patch number	
NIC_HW_REV_NO	NIC hardware revision number	

Group by: Category

Name: LOG

Description:

Configuration Item: Indexed:

Categories: AMIMeter; OSI

UOM: <None>

Value Type: String

Default Value:

Data Reference: PI Point

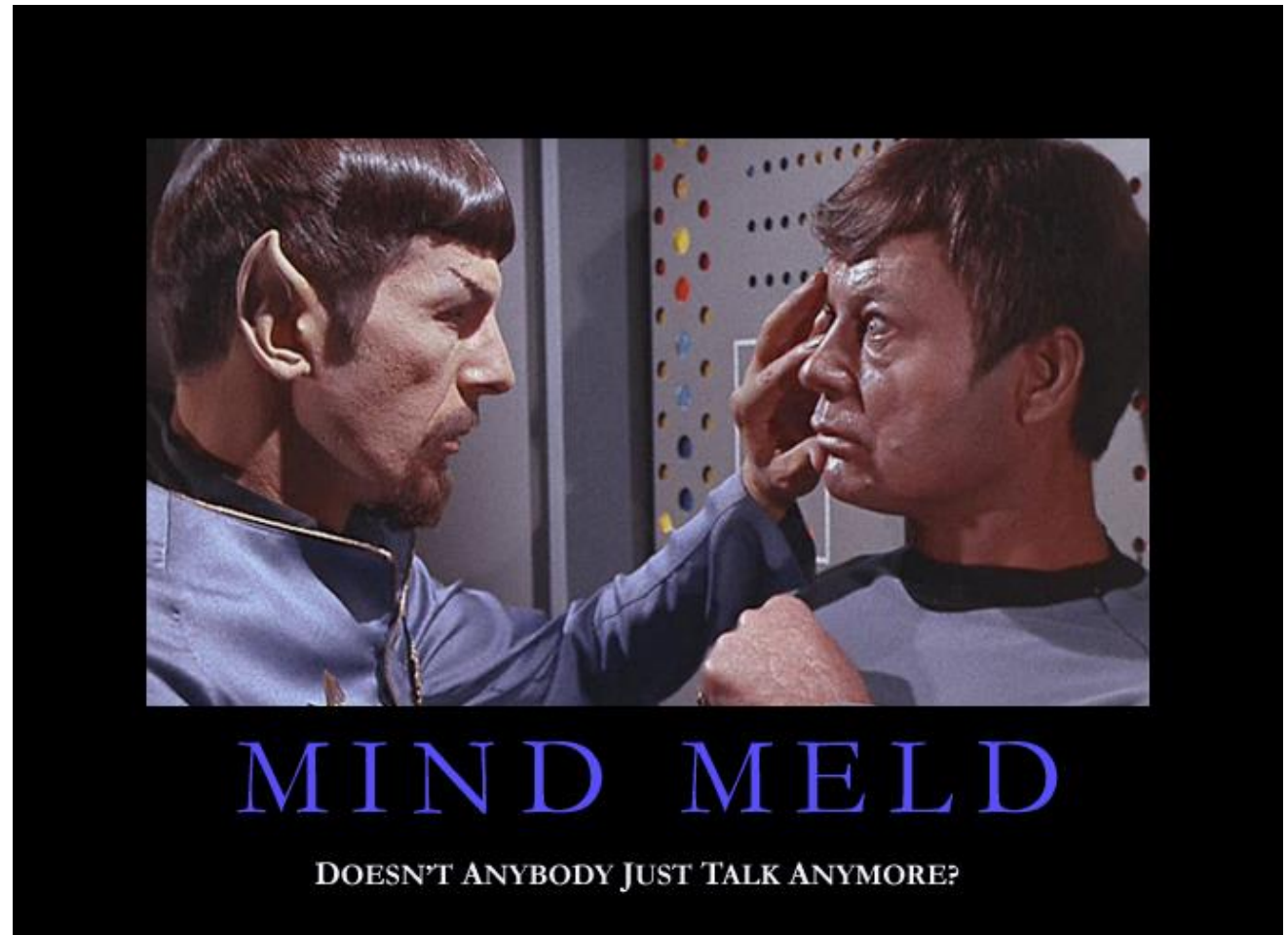
Settings...

```
\\%Server%\%Element%\%Attribute%
```

LOG

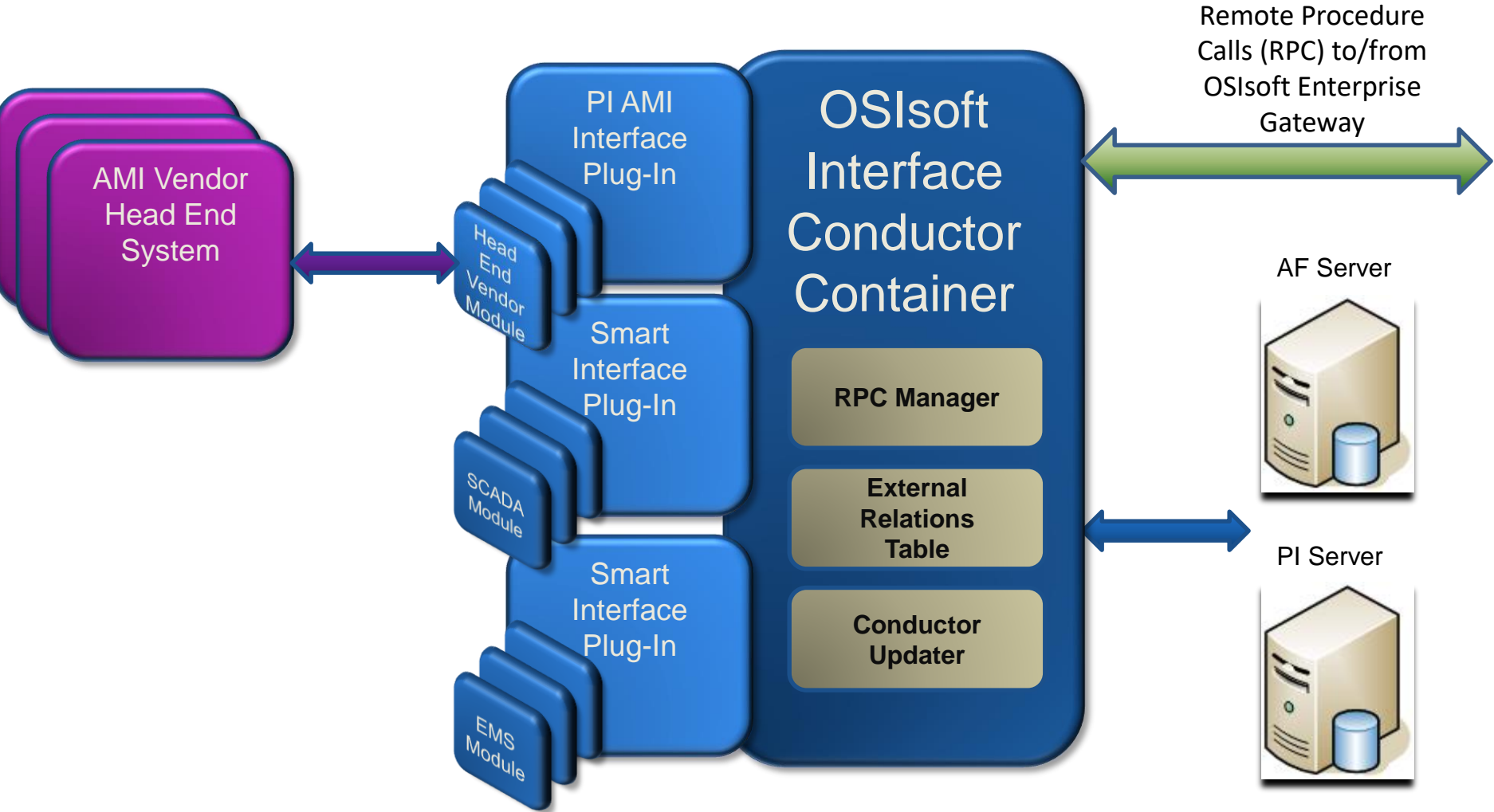
OSIsoft Interfaces (Next Generation)

They're like a



http://echosphere.net/star_trek_insp/star_trek_insp.html

OSIsoft Interface (Next Generation)



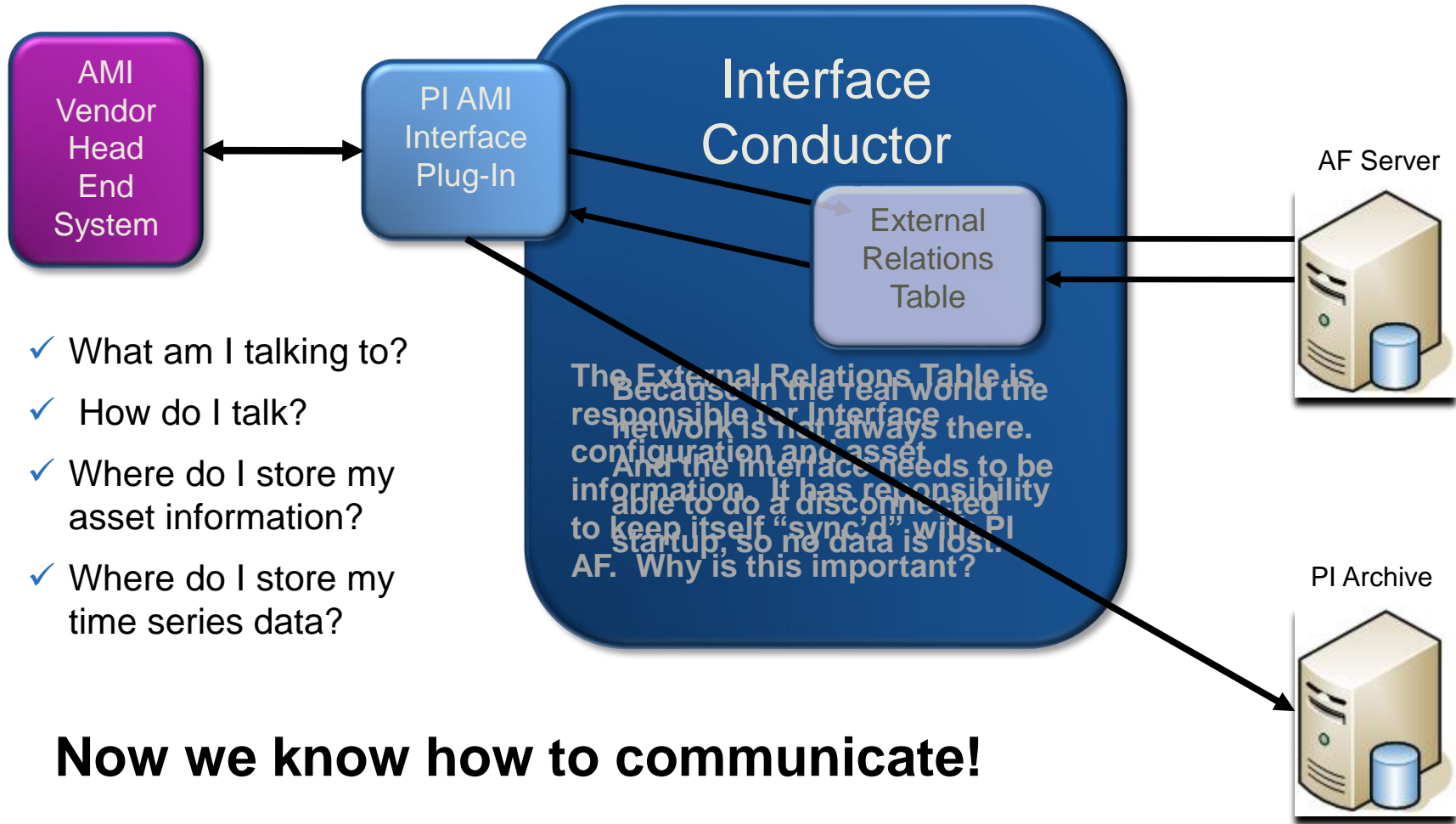
PI AMI Interface Plug-In

- Bi-directional Communication (WSDL/SOAP)
 - Interval Meter Reading
 - On Demand Reads
 - Remote Connect/Disconnect
 - Demand Management / Load Limiting
 - Meter Events, Alarms and Reports
- Asset hierarchy
 - Meter
 - Channel1
 - Channel_n
 - Register1
 - Register_n

Something New – Interface Conductor

- It's a PI Subsystem
- Responsibilities to Interface Plug-ins:
 - Manages
 - Configures
 - Provides infrastructure
 - Supports
- Facilitates Interface Connector:
 - Load and Unload
 - Initialize and Exit
 - Start and Stop

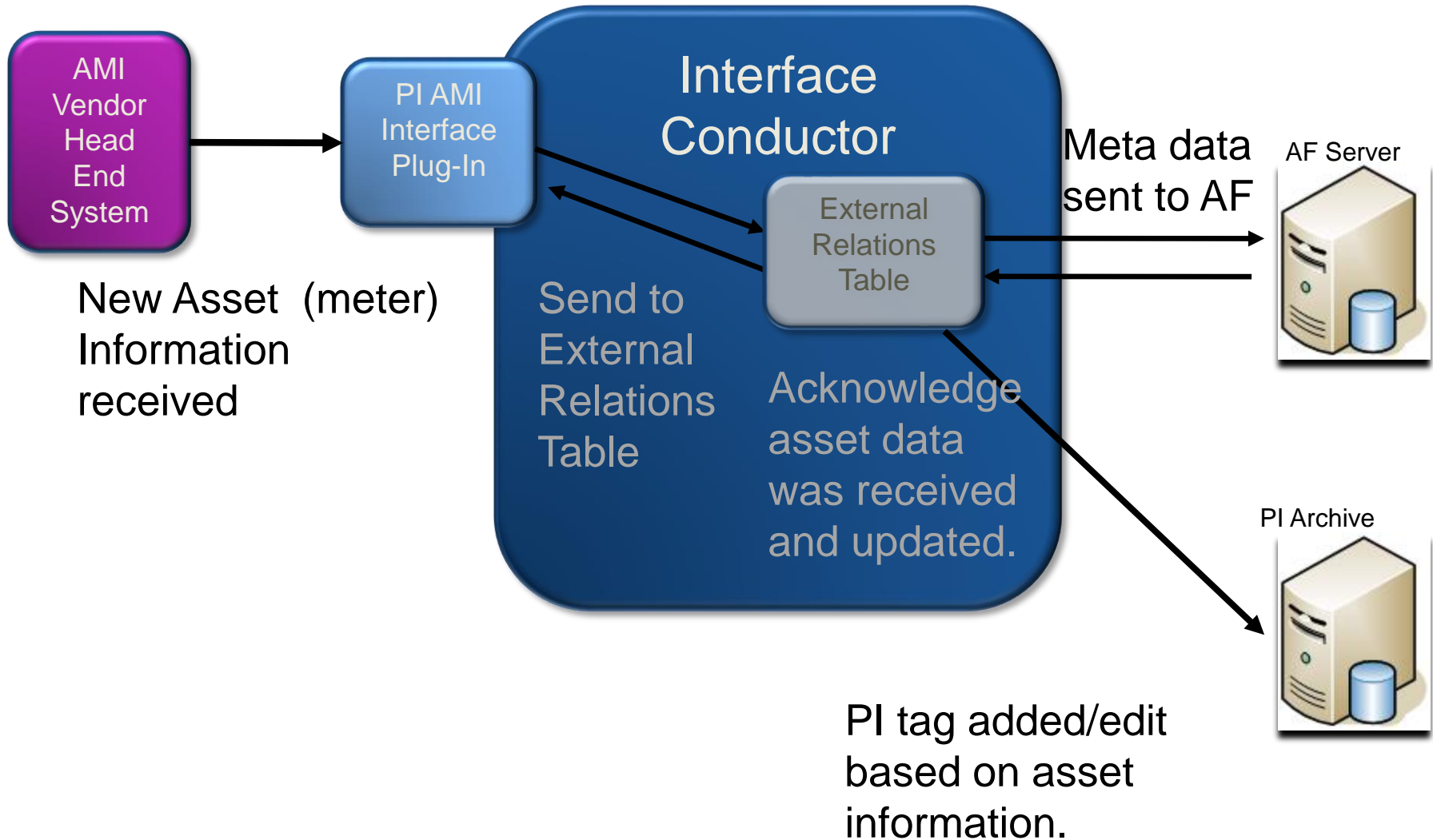
How it works



- ✓ What am I talking to?
- ✓ How do I talk?
- ✓ Where do I store my asset information?
- ✓ Where do I store my time series data?

Now we know how to communicate!

Asset Management



AF Templates

The screenshot displays the AMI - PI System Explorer application. The main window is titled "SilverSpringChannel" and has tabs for "General", "Attribute Templates", and "Ports". The "General" tab is active, showing a search bar and a table of attributes.

Library Panel:

- AMI
 - Analysis Templates
 - Categories
 - Element Templates
 - MinimalChannel
 - MinimalMeter
 - MinimalRegister
 - SilverSpringChannel (selected)
 - SilverSpringMeter
 - SilverSpringRegister
 - VEE_Rule
 - Enumeration Sets
 - Reference Types
 - Tables

SilverSpringChannel - General Tab:

Search:

Name	Description	Default Value
Cumulative	Cumulative meter data	0
Profile		
RawValue	Raw value from meter	0
RawValue.StDev	Hourly Standard Deviation	
ValidatedValue		
VEE_Rule		

LOG Panel:

Attribute Name	Description
METER_MODE	Meter Mode
METER_SERVICE_POINT	Service point of the meter
METERING_POINT	
NETWORK_EXCHANGE	
EXIT_POINT	
ENTRY_POINT	
NIC_HW_PATCH_NO	NIC hardware patch number
NIC_HW_REV_NO	NIC hardware revision number

AMI Meter Elements (inherited from templates)

The screenshot displays the AMI - PI System Explorer application. The main window is titled "SilverSpring-CON-1B5A-EO" and shows a table of attributes for this element. The table has columns for Name and Value. The attribute "DID_SUB_TYPE" is highlighted, with a value of "I-210-EO".

Name	Value
DEVICE_DESCRIPTION	
DEVICE_HW_PATCH_...	1
DEVICE_HW_REV_NO	0
DEVICE_HW_VER_NO	1
DEVICE_MFG	GE
DEVICE_MFG_MODEL	I210+
DEVICE_NAME	CON-1B5A-EO
DEVICE_NETWORK_S...	Active
DEVICE_SERIAL_NO	34 417 597
DEVICE_STATUS	Active
DEVICE_SW_PATCH_...	
DEVICE_SW_REV_NO	1
DEVICE_SW_VER_NO	0
DEVICE_UTIL_ID	CON-1B5A-EO
DID_SUB_TYPE	I-210-EO
HeadEnd ID	SilverSpring
LOG	Cannot connect to PIServer 'pi_server': A Winsock error occurred while attempting to...
METER_MODE	Demand/LP
METER_SERVICE_POI...	
METERING_POINT	
NETWORK_EXCHANGE	
NIC_HW_PATCH_NO	0
NIC_HW_REV_NO	E
NIC_HW_VER_NO	174000051
NIC_MAC_ADDRESS	00:13:50:ff:fe:00:1b:5a

The right-hand panel shows the configuration for the selected "DID_SUB_TYPE" element. The Name is "DID_SUB_TYPE", Description is "Device Sub Type", and Value is "I-210-EO".

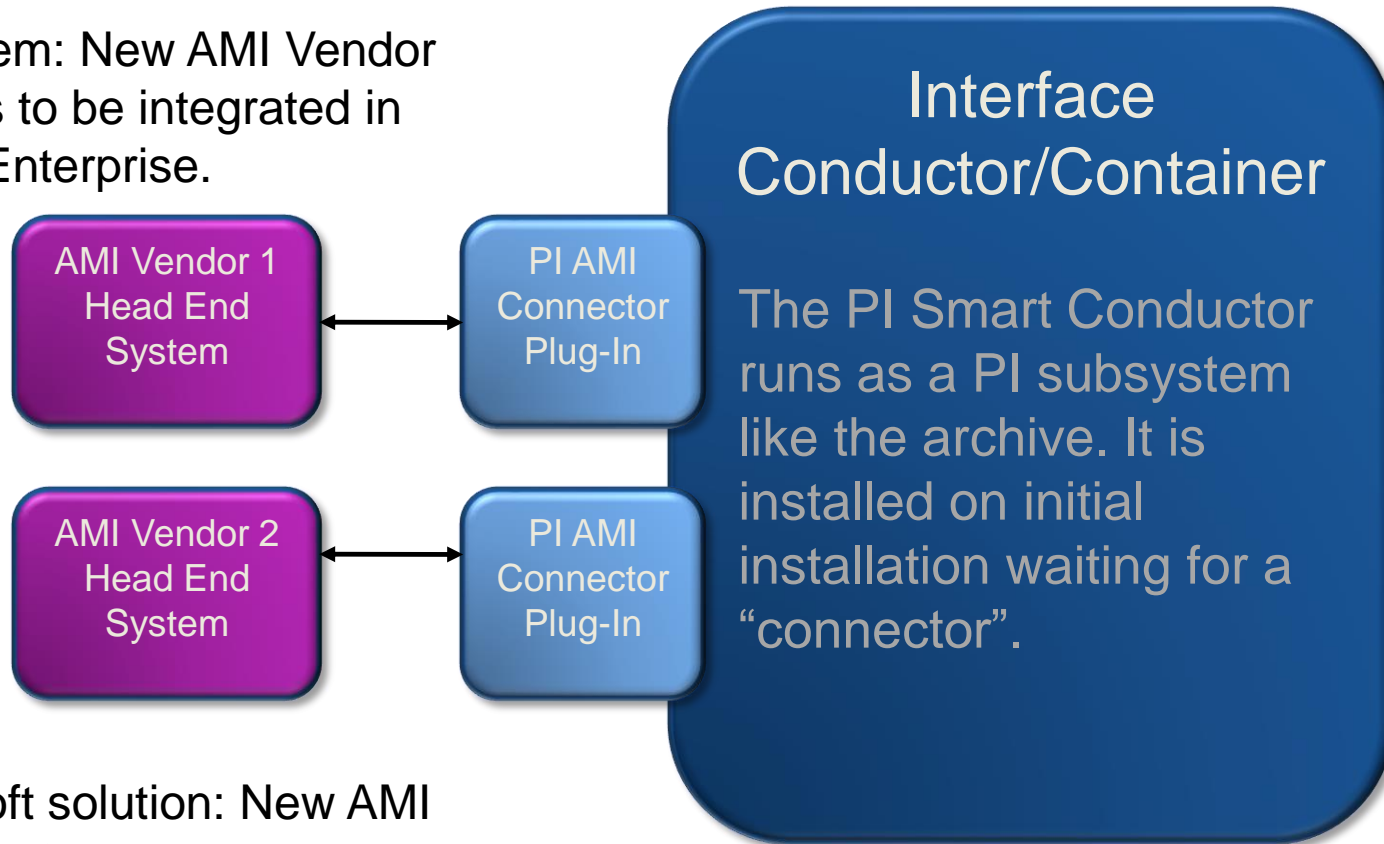
Configuration details for DID_SUB_TYPE:

- Name: DID_SUB_TYPE
- Description: Device Sub Type
- Configuration Item:
- Categories: SilverSpringMeter
- UOM: <None>
- Value Type: String
- Value: I-210-EO
- Data Reference: <None>

DID_SUB_TYPE

Single Conductor supports Multiple Interface Plug-Ins

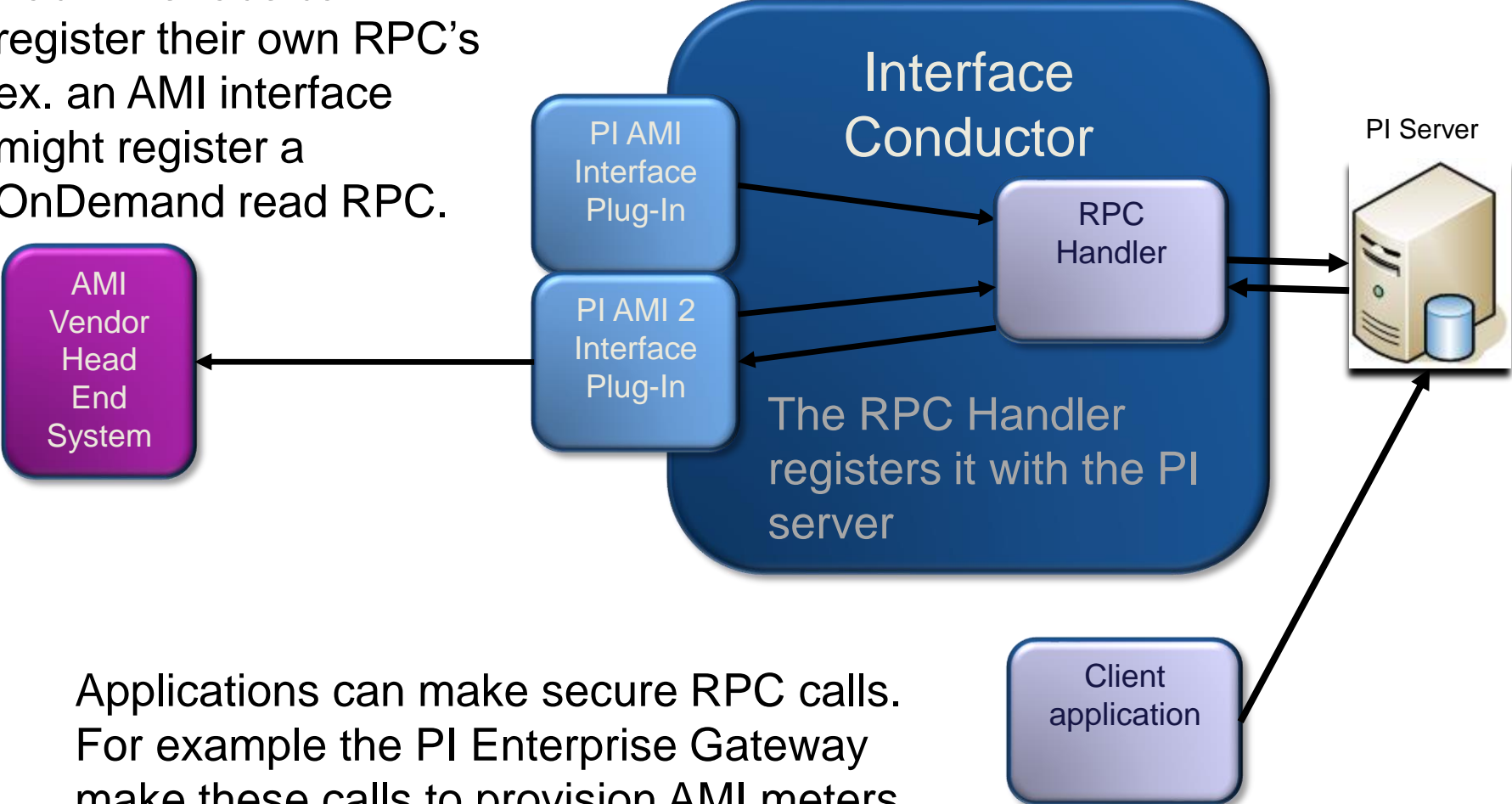
Problem: New AMI Vendor needs to be integrated in your Enterprise.



OSIssoft solution: New AMI Connector

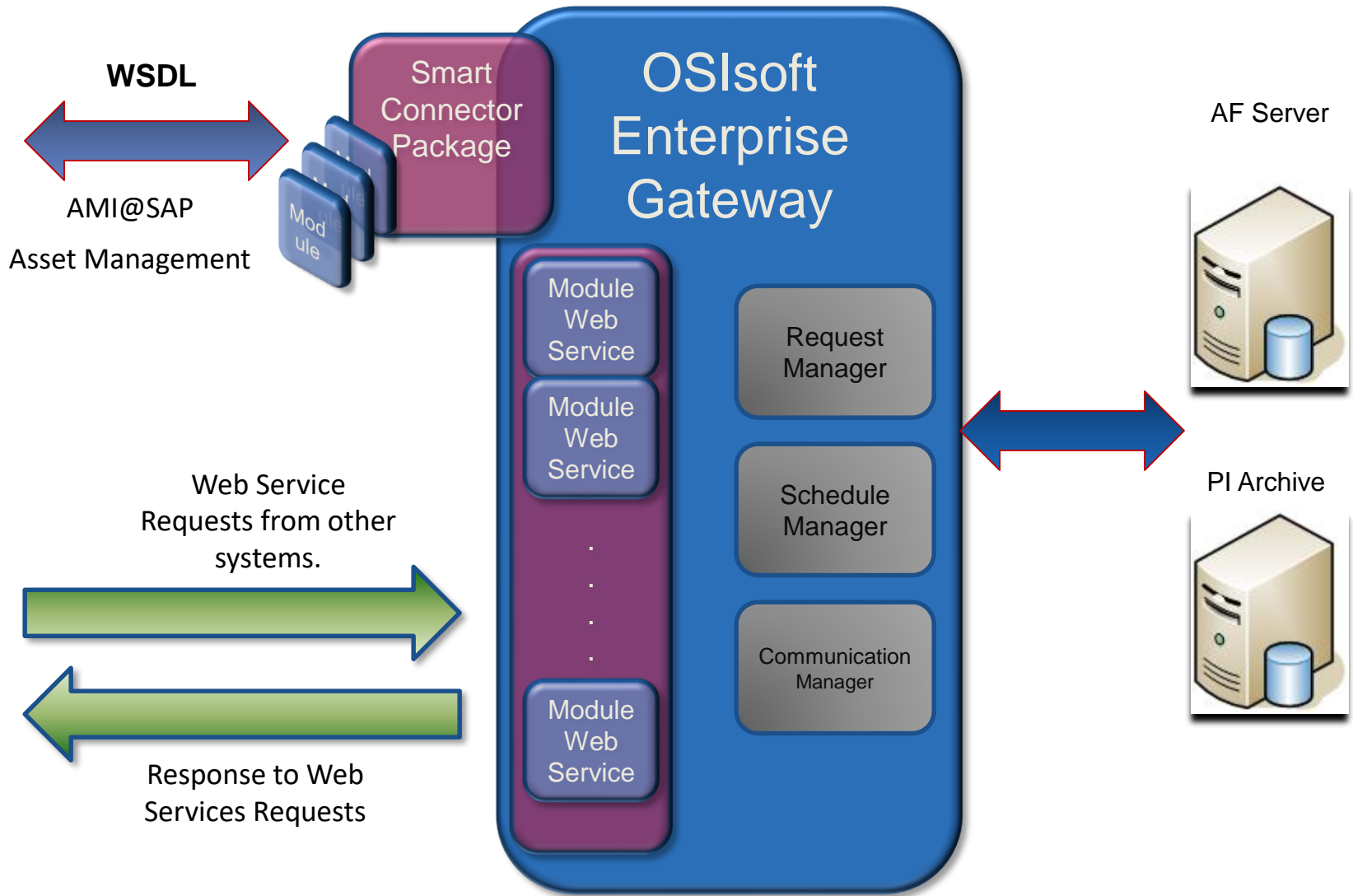
Secure RPC Management

Each interface can register their own RPC's
ex. an AMI interface might register a
OnDemand read RPC.



Applications can make secure RPC calls.
For example the PI Enterprise Gateway
make these calls to provision AMI meters.

Enterprise Gateway — Service Enabling PI



Web Services

- Clearly defined with a singularity of purpose
- Modular for mixing and matching with other components
- Distributable across systems or networks
- Swappable so they can be easily replaced with like components
- Easily shareable or reusable

Smart Connector Server

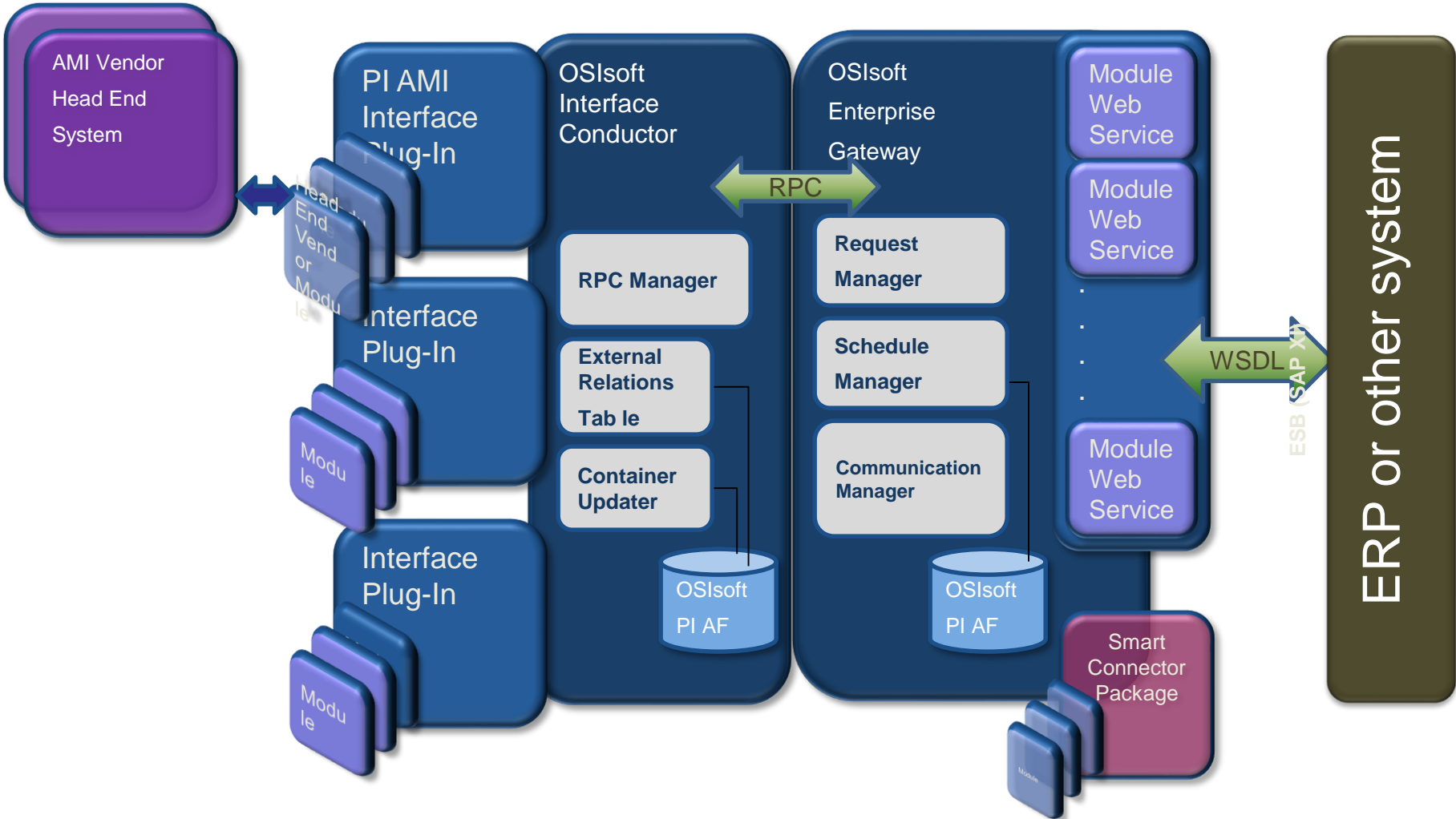
- Web Service Front End
- Service Request Tracking
 - Identity
 - Source
 - Time Stamp
- Service Scheduling
- Distributed Architecture Possible
- Scalable Both Vertically and Horizontally
- PI System RtBaseline Services
 - Service based data access layer
 - Disparate data sources

Enterprise Service Interaction Possibilities

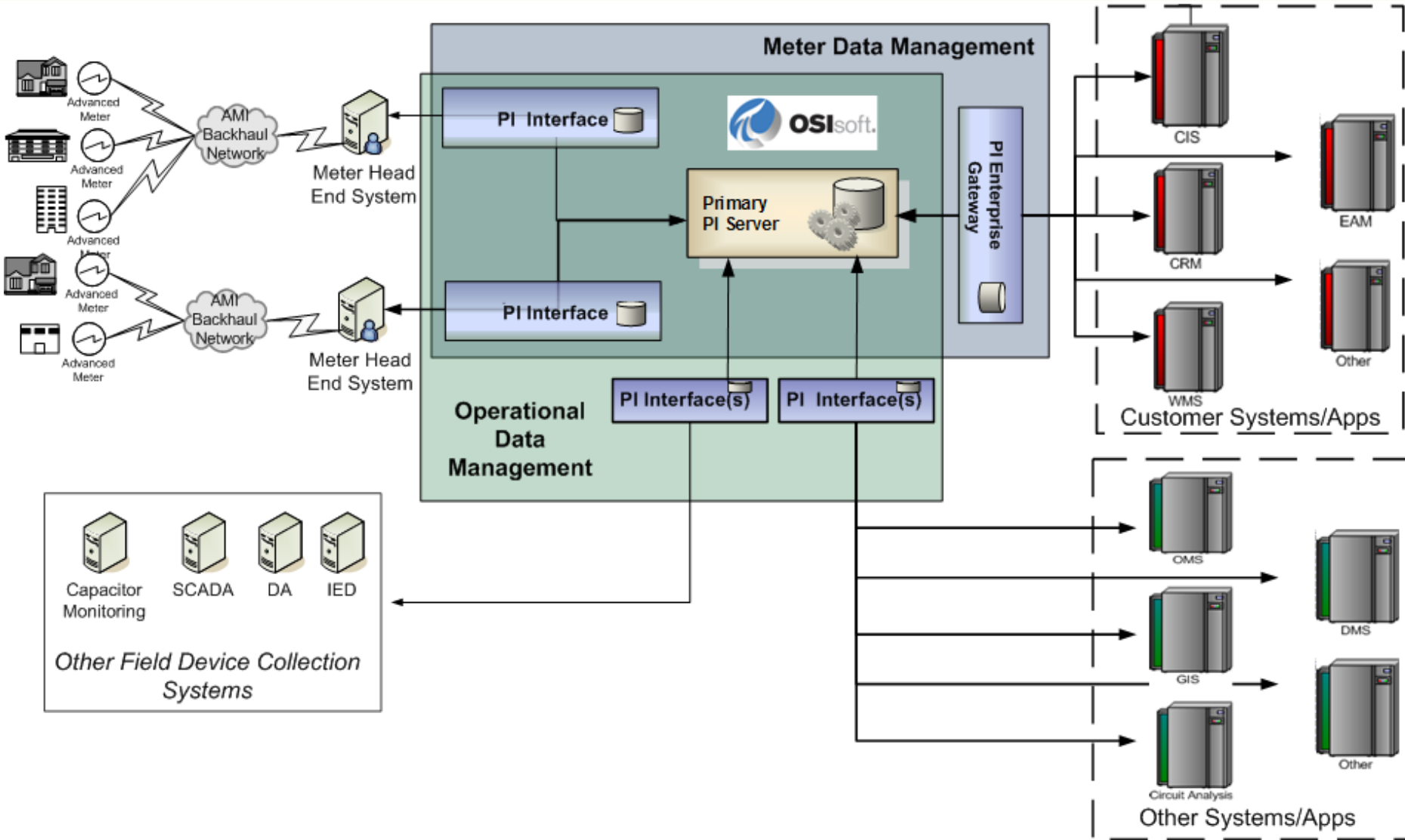
- **Initiated by Business System with confirmation**
- **Task Scheduled At Some Frequency**
- **Bundled request multiple transactions of the same type in single request with single reply of individual replies**
- **Multiple Transactions of different types to complete business logic no confirmation**
- **Scheduled Request with confirmation. Results for request are sent and confirmation returned**



Smart Connector Server



Foundation for the Smart Grid



What does it all mean

“Getting a handle on the smart grid is tricky. Grid intelligence (collecting and analyzing data about grid activities and behaviors) and the ability to act in real-time are the defining capabilities.”

*Source: Electric Perspectives October/September 2007 “Getting Smart”.
Rob Robinson and Jim Henderson are vice presidents at Booz Allen
Hamilton in Detroit, MI, and McLean, VA, respectively.*

PI in Distribution: The Last Mile

Generation



Business Applications



Distribution Automation



Marketing Operations



Commercial and Industrial



Grid Operations



Substation Automation



Residential



Our Original Abstract

A couple of OSIsoft rank amateurs babble on about interfaces, next generation and those glass covered spinning things on the side of your house



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2008

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THANK YOU