INTERNATIONAL FORECOURT STANDARDS FORUM

IFSF

TRIDIUM

Niagara AX FRAMEWORK™


# IFSF Technical Conference 2014

Meeting the needs of the connected customer – on the forecourt and for payment

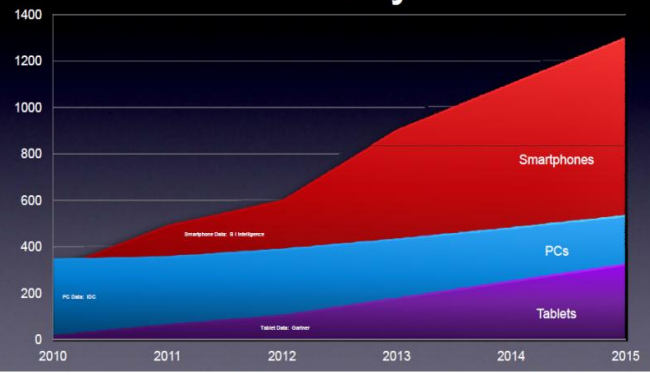
## INTEGRATION OF STORE EQUIPMENT, FORECOURT SERVICES THE WEB & IoT

# Big Data

GPRS
GENERAL PACKET RADIO SERVICE

The Cloud

## Mobility




## Apps

## Web Development

HTML

Java

4G

HTML 5

CSS 3

JS

# Once Your Work Depended on This…

# Now It Depends on This…

# Smart Home


Google


Cisco

Apple / Philips

LG SMART HOME

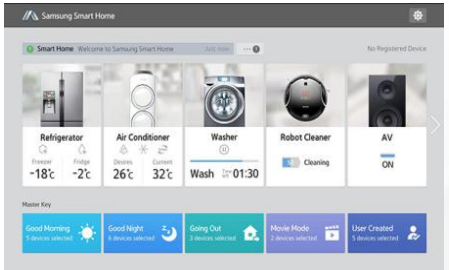



'Works with Nest'

Smart Meters


Utility Companies


British Gas

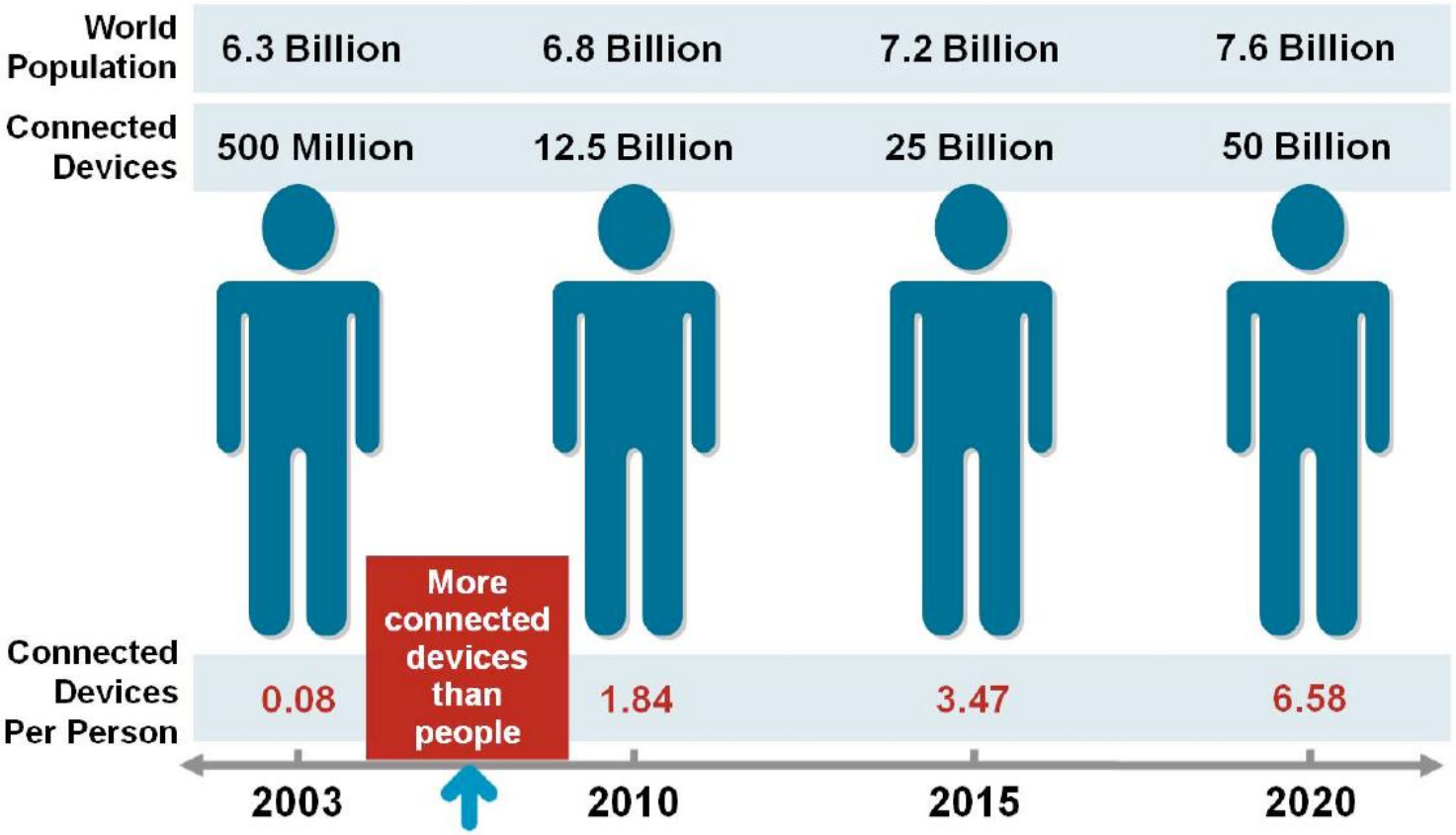



Samsung SMART Home

Appliances

# More Connected Devices Than People…

The Internet of Things Was "Born" Between 2008 and 2009




Source: Cisco IBSG, April 2011

# Evolution of the Internet

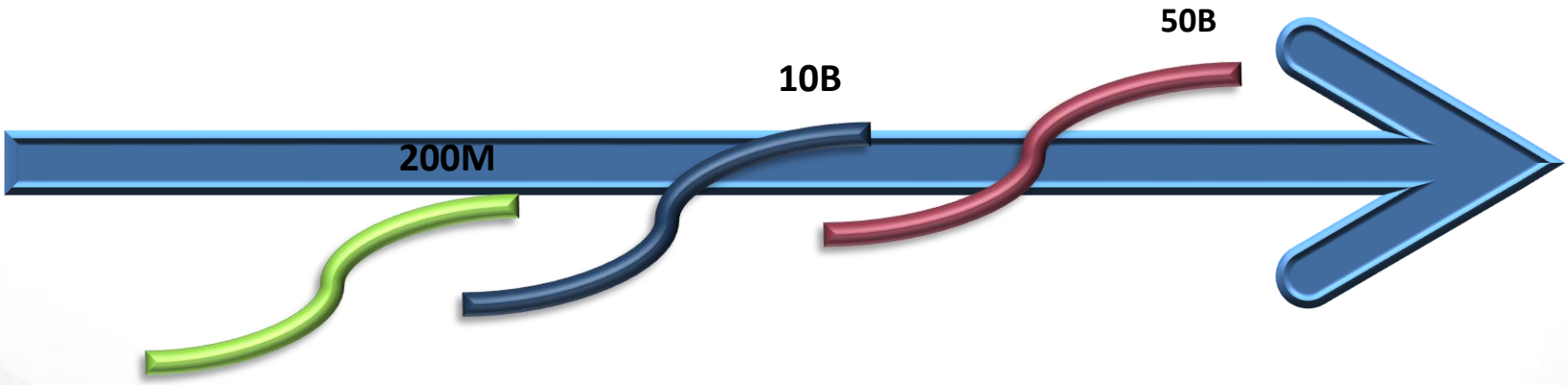
## Creates LOTS of Devices and LOTS of Data…

**"Fixed" computing** *(you go to the device)*

**Mobility/BYOD** *(the device goes with you)*

**Internet of Things** *(age of devices)*

**Internet of Everything** *(people, process, data things)*




People want to organise and analyse data when and where they choose

*Source: Cisco IBSG, 2013*

# Case Study

- Systems Identified
  - Water
  - Electric
  - Refrigeration
  - HVAC
  - Air Quality
  - Lighting
  - Fire Alarm
  - Fuel Storage and Dispensing
  - Irrigation
  - Waste water
  - Door Monitoring
  - Ovens
  - Compliance requirements

Steel Plant?

Pharmaceutical?

Food Processing?

Forecourt & Convenience Store

AKA " Convergence Retailer"

Much more than Petrol and Cigarettes

Groceries, Hot foods to order, Ice cream and milkshakes, specialty coffee bar, dry cleaning, etc……..


Wawa


Operates 650+ locations

5 states & 20 Service Zones

Wawa has a cult following in the US

1.2 million fans on Facebook and 30,000+ followers on Twitter.

Ranked 40th largest private company by Forbes

# Strategies Identified

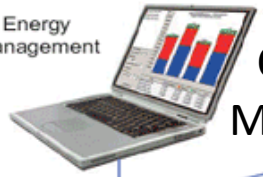
- Capture & Reduce Energy Usage
  - Lighting, HVAC
- Monitor fuel for compliance and usage
- Monitor refrigeration for FDA compliance
- Monitor water quality and consumption
  - Product quality and irrigation
- Reduce Wastewater Services by optimising service intervals
- Reduce costs of reconfiguring ovens
- Maintain quality and a safe environment
- Accessible by service partners
  - Via Web, Email of alarms
- Web based & IT Friendly
  - Low Bandwidth
  - No interruption of financial transactions

Energy Analysis

Remote Service & Support


Financial/Business Management

Energy Management



Corporate Management

Facilities/Equipment Management

Fuel Management

Maintenance and Operations

THE Powered by Niagara AX FRAMEWORK® ENTERPRISE

Improved Customer Service

Improved Resource Management

Environment/ HVAC

Energy

Lighting

Life Safety

Refrigeration

Fuel Pumps

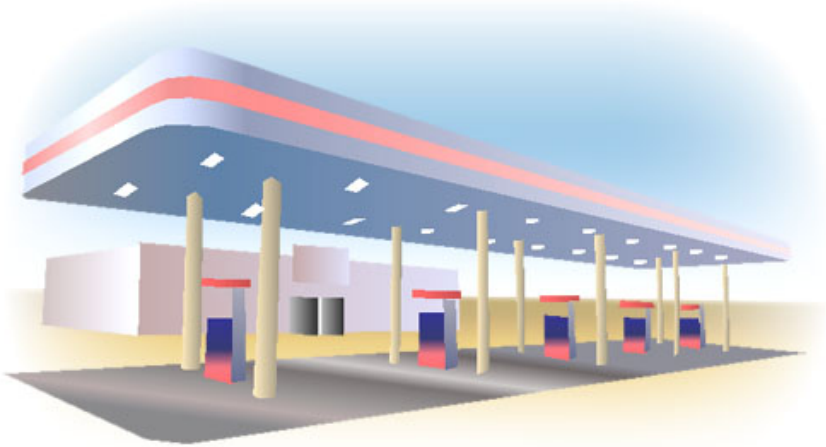
Food Preparation

Car Wash

Integration of Sub-systems

# Home Page

**Station 07 - Main** 09-Mar-07 8:14 AM EST



Summary | Alarms

| Outside | Inside |
|---|---|
| 86.8 °F Outside Temp | 73.0 °F Avg Store Temp |
| 24.5 BTU/lb Outside Enthalpy | 23.7 BTU/lb Store Enthalpy |
| 76.8 % Outside Humidity | 54.8 % Store Humidity |
| 953.6 - ftc Outside Light | 941.3 ppm Store CO2 |
| Off Economizers | 73.0 °F Set Point |

**General**: Floor Plan, CSR Press., Lights, Produce, Irrigation, Back Bar

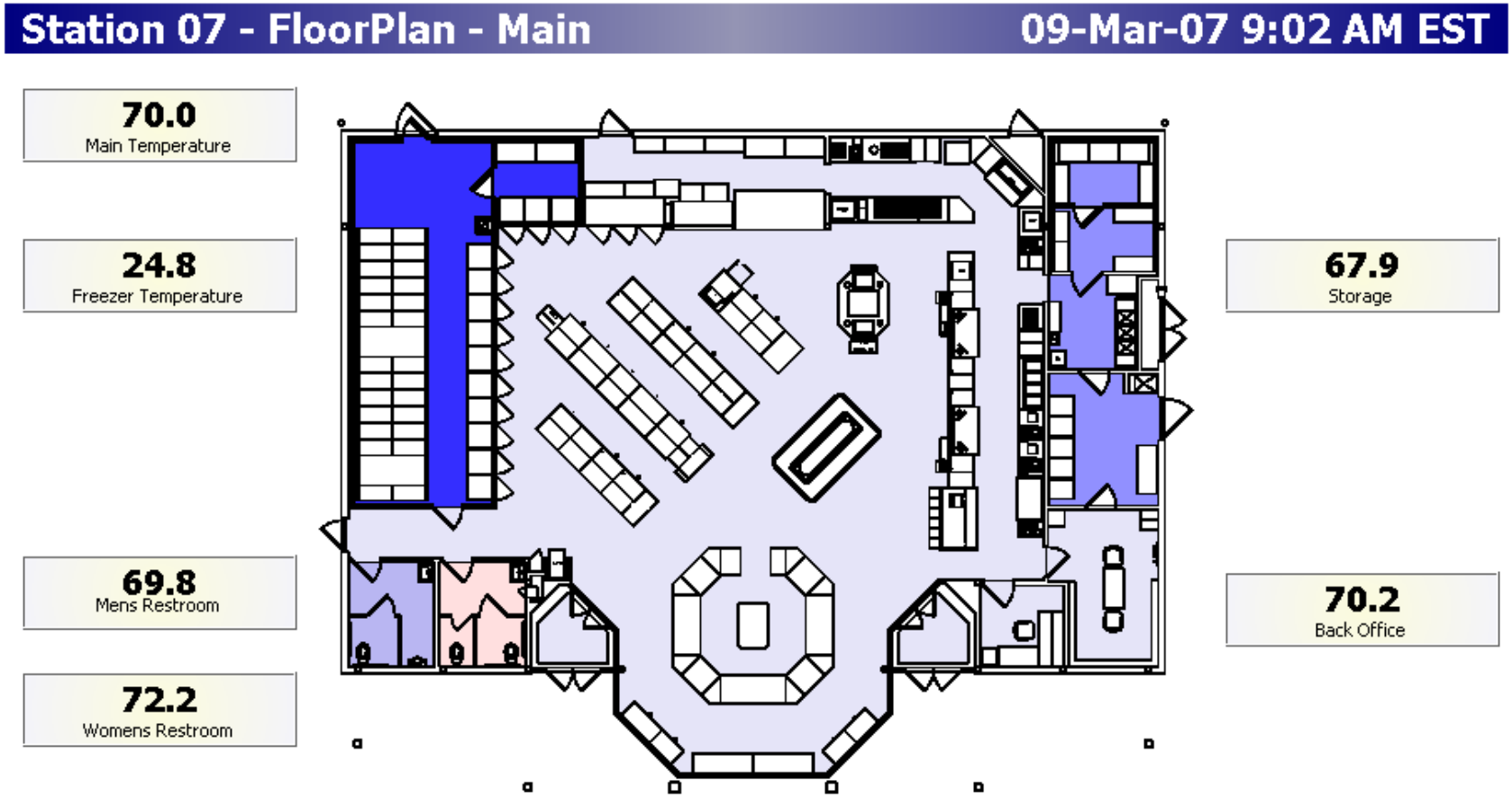
**Equipment**: Deli Cooler, Grease Trap, Retail Cooler, Ovens, Milk Cooler, 3 Door

**HVAC**: Deli AHU, Retail AHU, Core AHU, RTU

**Util.**: Elec. Meter

**Supply**: Fuel Mgmt

# Floor Plan & Climate Control




Customer and Staff comfort

# Lighting Control


| Schedule | Setpoint | Starts | Hours | Last Start (Off to On) | Last Stop (On to Off) |
|---|---|---|---|---|---|
| North Canopy | 90.0 | 5:00 | 16 | 26-Feb-07 7:54 PM EST | 26-Feb-07 7:56 PM EST |
| South Canopy | 90.0 | 5:00 | 16 | 26-Feb-07 7:54 PM EST | 26-Feb-07 7:56 PM EST |
| Pole Lights | 150 | 6:00 | 8 | 22-May-06 5:55 PM EST | 22-May-06 6:41 AM EST |
| Sign Lights | 85 | 12:00 | 24 | 22-May-06 6:21 PM EST | 22-May-06 6:23 AM EST |
| Wall Lights | 85 | 6:00 | 8 | 22-May-06 6:21 PM EST | 22-May-06 6:34 AM EST |

# Electrical Visualisation

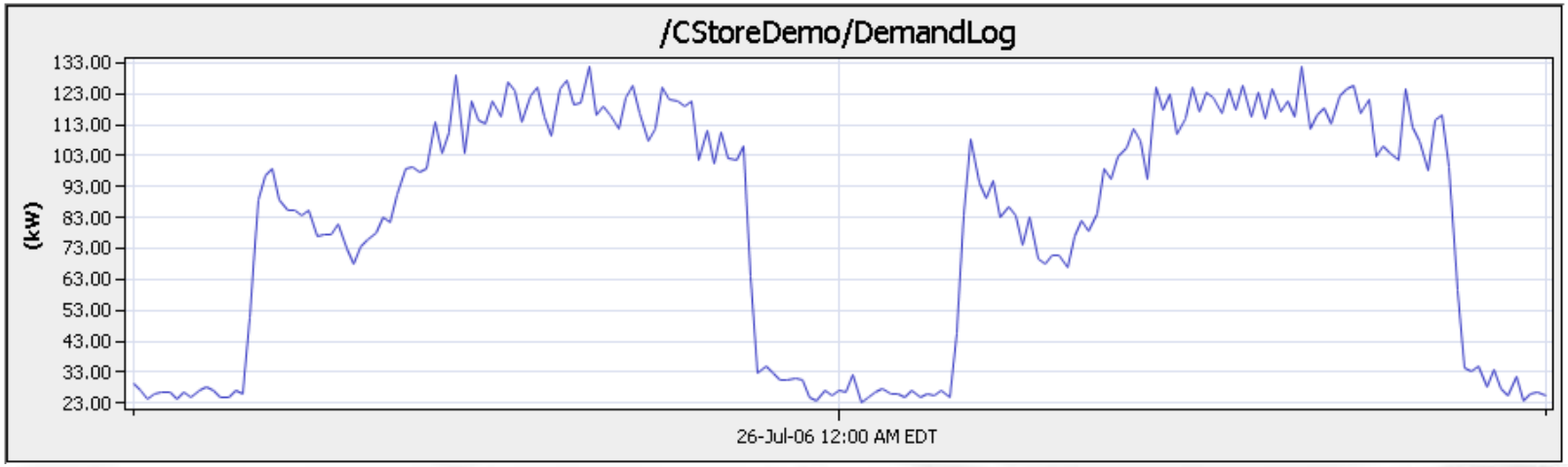
**Station 07 - Main Electric** — **09-Mar-07 8:25 AM EST**

| KWH (Meter) | | |
|---|---|---|
| **9086.1 kW-hr** KWH Today | **4446.6 kw-hr** KWH Yesterday | **43701.6** KWH Meter |

| Power Info | | |
|---|---|---|
| **173.3** KWD (Current Demand) | **60.0** Freq | **73.0** Power Factor |

| Phase Info | |
|---|---|
| **114.0** Volts A | **7.0** Amps A |
| **112.8** Volts B | **7.9** Amps B |
| **112.6** Volts C | **7.0** Amps C |

Time Range: 25-Jul-06 12:00 AM EDT to 27-Jul-06 12:00 AM EDT



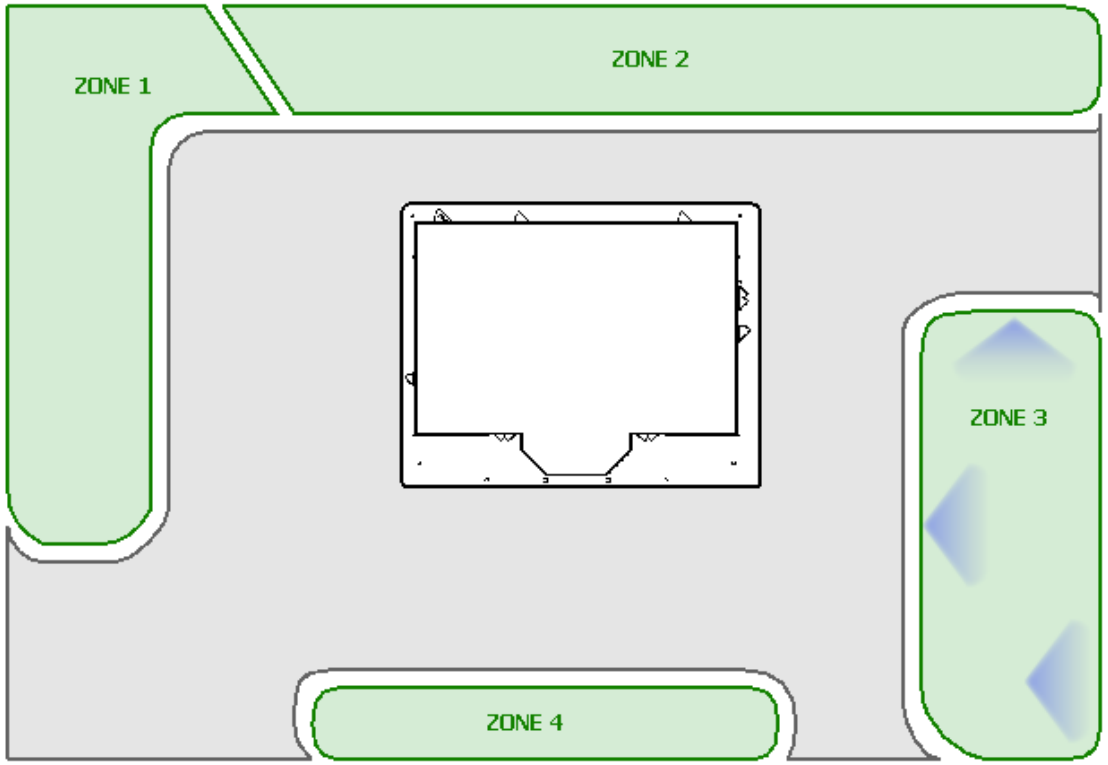

Energy Management (Benchmarking)

# Reduced Service Cost and Water Usage

**Station 07 - Irrigation - Main** 09-Mar-07 9:07 AM EST

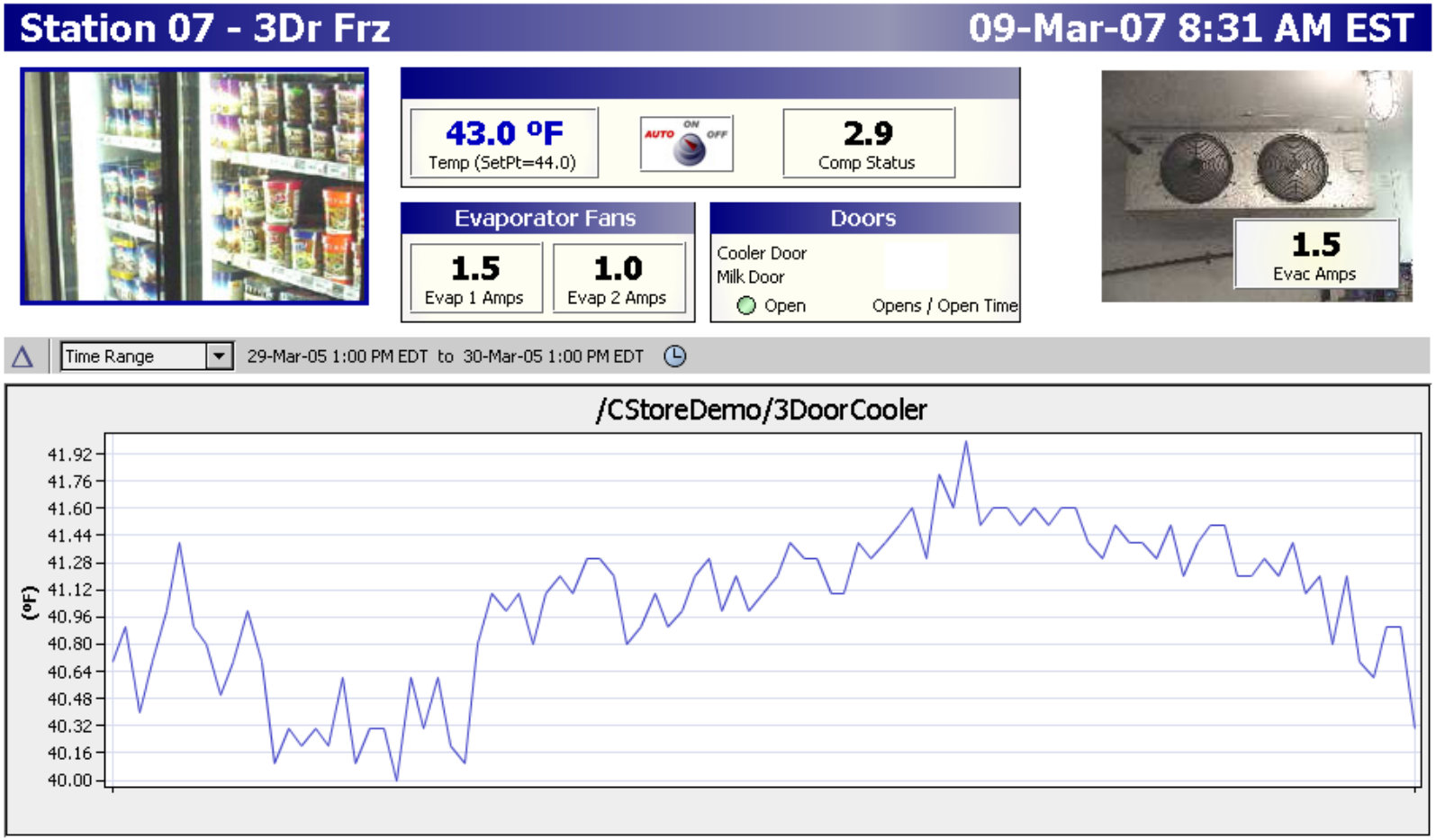
**3.0**
GPM

| Zone | Status | GPM | |
|---|---|---|---|
| 1 | Closed | 0.0 | AUTO ON OFF |
| 2 | Closed | 0.0 | AUTO ON OFF |
| 3 | Open | 3.0 | AUTO ON OFF |
| 4 | Closed | 0.0 | AUTO ON OFF |



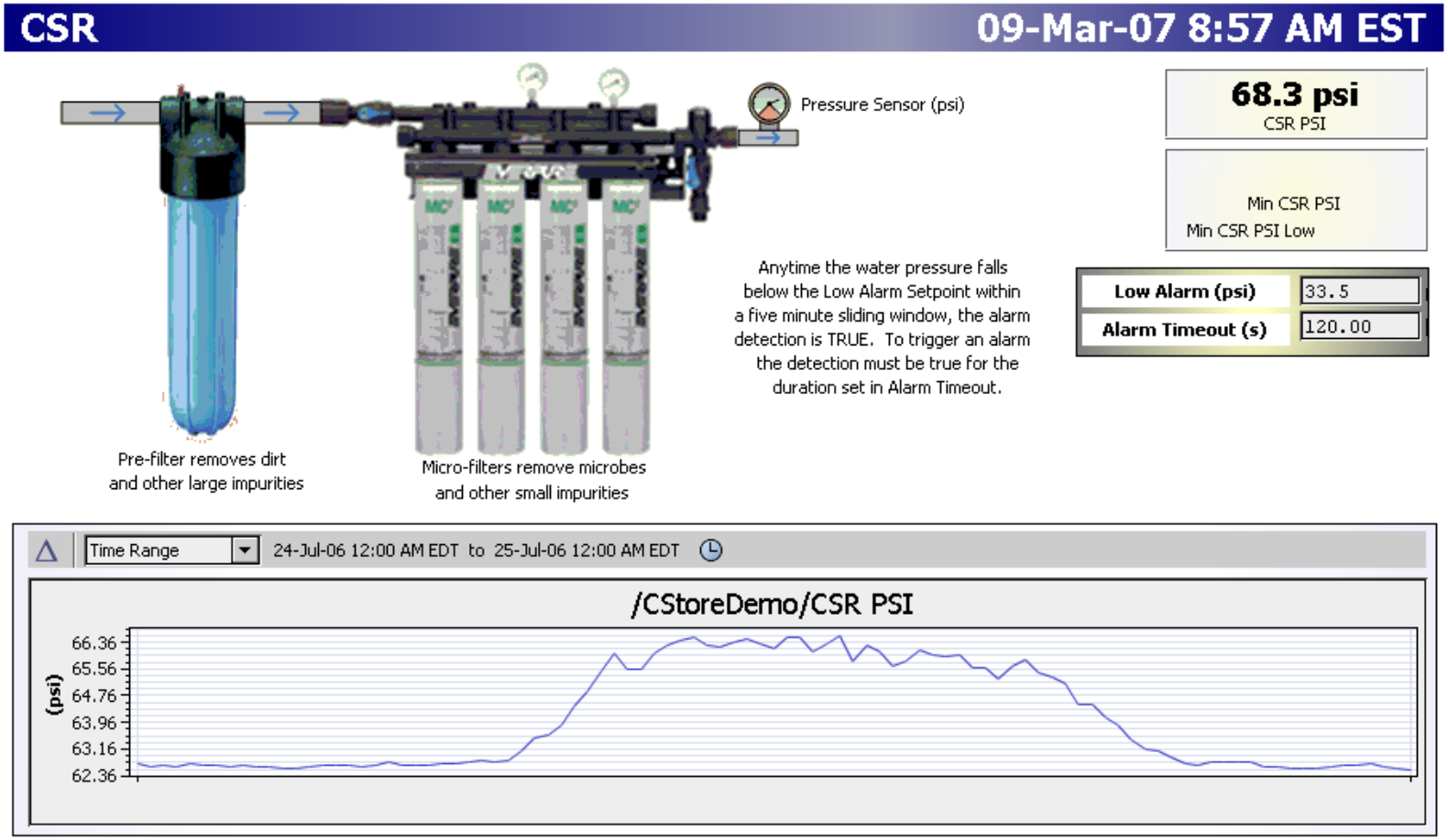

Energy Management

# Compliance and Risk Analysis




Equipment Condition & Monitoring

# Water Quality and Pressure




Alarm Management

# Optimizing Service Intervals

**Station 07 - Grease Trap** 09-Mar-07 8:38 AM EST

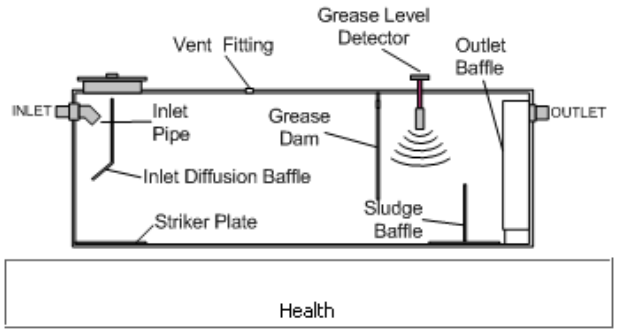
| 23.0 | 8.6 |
|---|---|
| Avg Grease Level | Instant Level |

**Calibration**

| | |
|---|---|
| Probe Frequency | |
| Freq at 0% | |
| Freq at 100% | |
| Offset | |

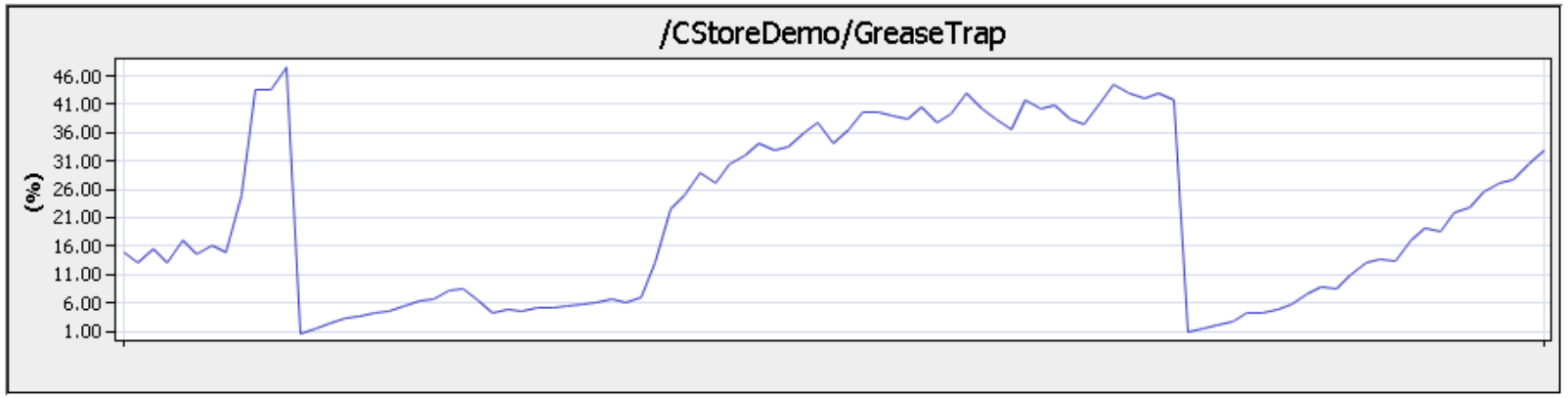
**Alarms**

Grease High Level Alarm 80.0 %




Health

Time Range 23-Jul-06 12:00 PM EDT to 24-Jul-06 12:00 PM EDT




Run time and condition monitoring

# Reduced Cost of Recipe Management

## Station 07 - UpperOven 09-Mar-07 8:45 AM EST

### Oven Shelf Data

| Oven Shelf | Product | Cook Minutes |
|---|---|---|
| 1 | Appetizer B | 00:06:23 |
| 2 | Bread Loaf | 00:04:30 |
| 3 | Bagel Melt | 00:04:30 |
| 4 | Cookie Chocolate Chip | 00:02:21 |
| 5 | Hot Dog | 00:04:30 |

### Operational Data

| | |
|---|---|
| Comm Status | UNDER SERIAL COMM CONTROL |
| Operating Mode | Standby |
| Temperature | 388.0 °F |
| Door Status | Closed |

### Oven Recipe Manager

Master Oven Recipe Manager

Master Groups Recipes Manager

### Oven Configuration Manager

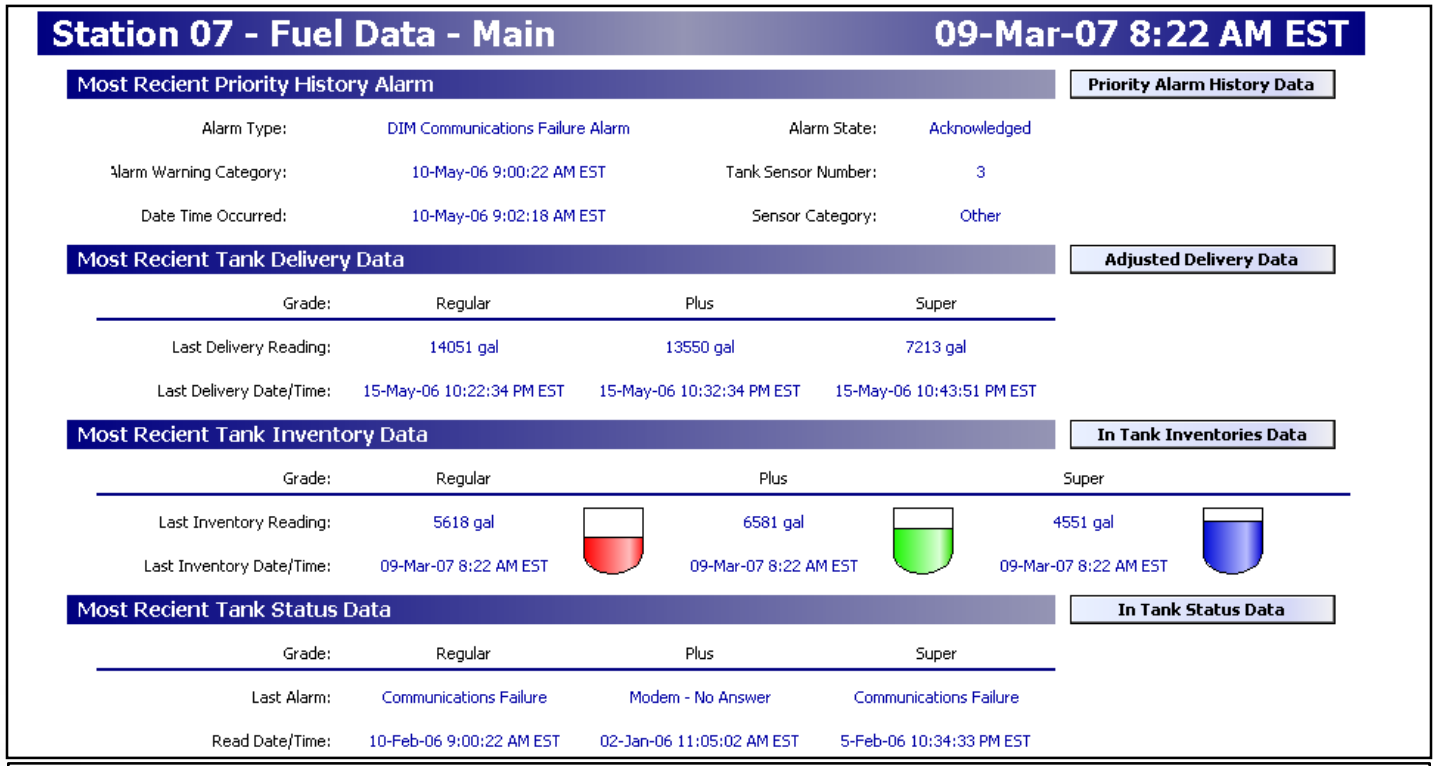
Oven Shutdown Time (Oven Shutdown Time Params)

- Daily Scheduled Time: 03:28:00 PM EST
- Upper Oven: true
- Lower Oven: false
- Idle Time Before Shutdown: +00000h 30m 00s
- Daily Shutdown Cutoff Time: 06:00:00 AM EST

Refresh | Save

Management of oven cooking times

# Fuel & Tank Monitoring



**Station 07 - Fuel Data - Main** 09-Mar-07 8:22 AM EST

**Most Recient Priority History Alarm** — Priority Alarm History Data

| | | | |
|---|---|---|---|
| Alarm Type: | DIM Communications Failure Alarm | Alarm State: | Acknowledged |
| Alarm Warning Category: | 10-May-06 9:00:22 AM EST | Tank Sensor Number: | 3 |
| Date Time Occurred: | 10-May-06 9:02:18 AM EST | Sensor Category: | Other |

**Most Recient Tank Delivery Data** — Adjusted Delivery Data

| Grade: | Regular | Plus | Super |
|---|---|---|---|
| Last Delivery Reading: | 14051 gal | 13550 gal | 7213 gal |
| Last Delivery Date/Time: | 15-May-06 10:22:34 PM EST | 15-May-06 10:32:34 PM EST | 15-May-06 10:43:51 PM EST |

**Most Recient Tank Inventory Data** — In Tank Inventories Data

| Grade: | Regular | Plus | Super |
|---|---|---|---|
| Last Inventory Reading: | 5618 gal | 6581 gal | 4551 gal |
| Last Inventory Date/Time: | 09-Mar-07 8:22 AM EST | 09-Mar-07 8:22 AM EST | 09-Mar-07 8:22 AM EST |

**Most Recient Tank Status Data** — In Tank Status Data

| Grade: | Regular | Plus | Super |
|---|---|---|---|
| Last Alarm: | Communications Failure | Modem - No Answer | Communications Failure |
| Read Date/Time: | 10-Feb-06 9:00:22 AM EST | 02-Jan-06 11:05:02 AM EST | 5-Feb-06 10:34:33 PM EST |

Pumps, tank leak detection, inventory and delivery tracking analytics and work order system to optimise delivery dispatch.

Visualisation to provide real-time and historic data used by fuel suppliers, equipment vendors and environmental compliance team

**Provided a 50% saving compared to 3rd party solution**

TRIDIUM | CASE STUDY: WAWA, INC.

# Wawa, Inc.

## The Client

Wawa, Inc., a privately held company, began in 1803 as an iron foundry in New Jersey. Toward the end of the 19th Century, owner George Wood took an interest in dairy farming and the family began a small processing plant in Wawa, Pa, in 1902. The milk business was a success, due to its quality, cleanliness and "certified" process. As home delivery of milk declined in the early 1960's, Grahame Wood, George's grandson, opened the first Wawa Food Market in 1964 as an outlet for dairy products. Today, Wawa stores feature a wide variety of fresh foods including award-winning freshly brewed coffee and built-to-order Wawa hoagies. Wawa operates more than 550 stores in Pennsylvania, New Jersey, Delaware, Maryland and Virginia–202 of those stores sell gasoline.

## The Challenge

In keeping with one of the most important challenges for the retail sector—controlling and reducing costs—many retailers are beginning to realize that enabling data sharing between operational equipment and systems with business applications leads to paybacks in the form of expense savings, better productivity and improved operating performance. As a result, retailers are turning to technology to create "information networks across their entire enterprise" in order to share data-in real-time–with the right group of individuals–who can evaluate it and optimize decision making.

From a technology perspective, retailers can strategically approach this challenge through asset monitoring to maximize cost savings and minimize investment. Since the assets being networked are typically in close proximity, they can often all be connected using the same wireless and/or wired local-area network. The same application infrastructure that's used for monitoring one type of asset can also be used for several others. That's because the framework or platform—middleware that takes data from the communication network and incorporates it into an enterprise application—serves essentially the same function regardless of the specific nature of the application.

Today's convergence retail stores, such as Wawa are dependent on a wide variety of intelligent systems and devices. These smart devices manage and control the equipment systems that are critical to store operations and customer satisfaction. Connecting to and communicating with these devices and systems enables the store to maximize operational efficiency and profitability. Because these devices talk using a wide range of communications formats it has been difficult to take full advantage of their capabilities and the information they contain.

From HVAC, lighting (interior and exterior), refrigeration, and irrigation, to the car wash, food preparation equipment, scales, security, utility meters, fuel tank monitoring and dispensing equipment, it is now possible to connect all of your systems together and take advantage of the valuable information they contain.

## Case Synposis

COMPANY: Wawa, Inc.
INDUSTRY: C-Store Retailing
PROJECT: C-Store Integration
FOCUS: Building Automation

CHALLENGE: Monitor, control and archive data (locally, at the enterprise level and remotely) most major systems within a store.

SOLUTION: Niagara C-Store Manager/Convergence Retail Application," a scalable, end-to-end solution consisting of hardware and software that connects each individual store's operational devices, equipment and systems together and to the company's wide enterprise network..

KEY BENEFITS:

- Real-time reporting
- Increased Profitability
- Reduced operational costs
- Improved resource management
- Reduced downtime
- Maximized customer comfort

Powered by Niagara AX Framework

TRIDIUM | CASE HISTORY: WAWA, INC.

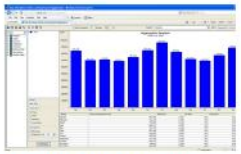
## The Solution

In keeping with Wawa's commitment to use technology throughout every phase of its operations to maximize efficiency, control costs and enhance the customer experience,Tridium, in partnership with Wawa and system integrator HVAC Concepts, designed the "Niagara C-Store Manager/Convergence Retail Application," a scalable, end-to-end solution consisting of hardware and software that connects each individual store's operational devices, equipment and systems together and to the company's wide enterprise network. The application was built using the highly successful Niagara$^{AX}$ Framework and provides Wawa with the ability to monitor, control and archive data (locally, at the enterprise level and remotely) most major systems within a store.

## The Results

After a very successful pilot program proved itself by combining savings across a wide range of systems and functions and delivered tangible ROI including the business justification, the solution is now being deployed company wide in 550+ stores.

WAWA is experiencing a range of benefits and ROI across multiple business functions that include:



**Financial/Business Management**

- Real time reporting that is supporting more effective decision making
- Increased profitability at each store location by reducing operational costs and improving workflow and resource management
- Benchmarking performance and sharing best practices across their entire enterprise

**Energy Management**

- Understanding individual store energy consumption patterns and trends
- Benchmarking energy performance at each store location
- Reduced energy costs

**Facility and Equipment Management**

- Reduced downtime and response time to equipment failures
- Centrally and locally managing alarms and alerts
- Improvement in facility operation
- Maximizing customer comfort and enhancing the overall customer experience
- Visibility and access into the assets and systems that effect the company's operations each day

**Maintenance & Operations**

- Reduced response time on maintenance issues
- Access to information to support preventive and predictive maintenance and the ability to prioritize equipment maintenance based on actual performance data

In addition, Wawa has the ability to easily support new vendors of equipment and to cost-effectively add new applications such as security and fire.

## The Niagara$^{AX}$ Framework

The Niagara Framework® is a software platform that integrates diverse systems and devices regardless of manufacturer, or communication protocol into a unified platform that can be easily managed and controlled in real time over the Internet using a standard web browser. By integrating today's diverse building systems such as environmental controls, security, lighting, energy, video, fire and life safety, Niagara is creating better buildings---ones that are smarter, use less energy, are more efficient, have lower operating costs, are safer and contribute to a sustainable environment.

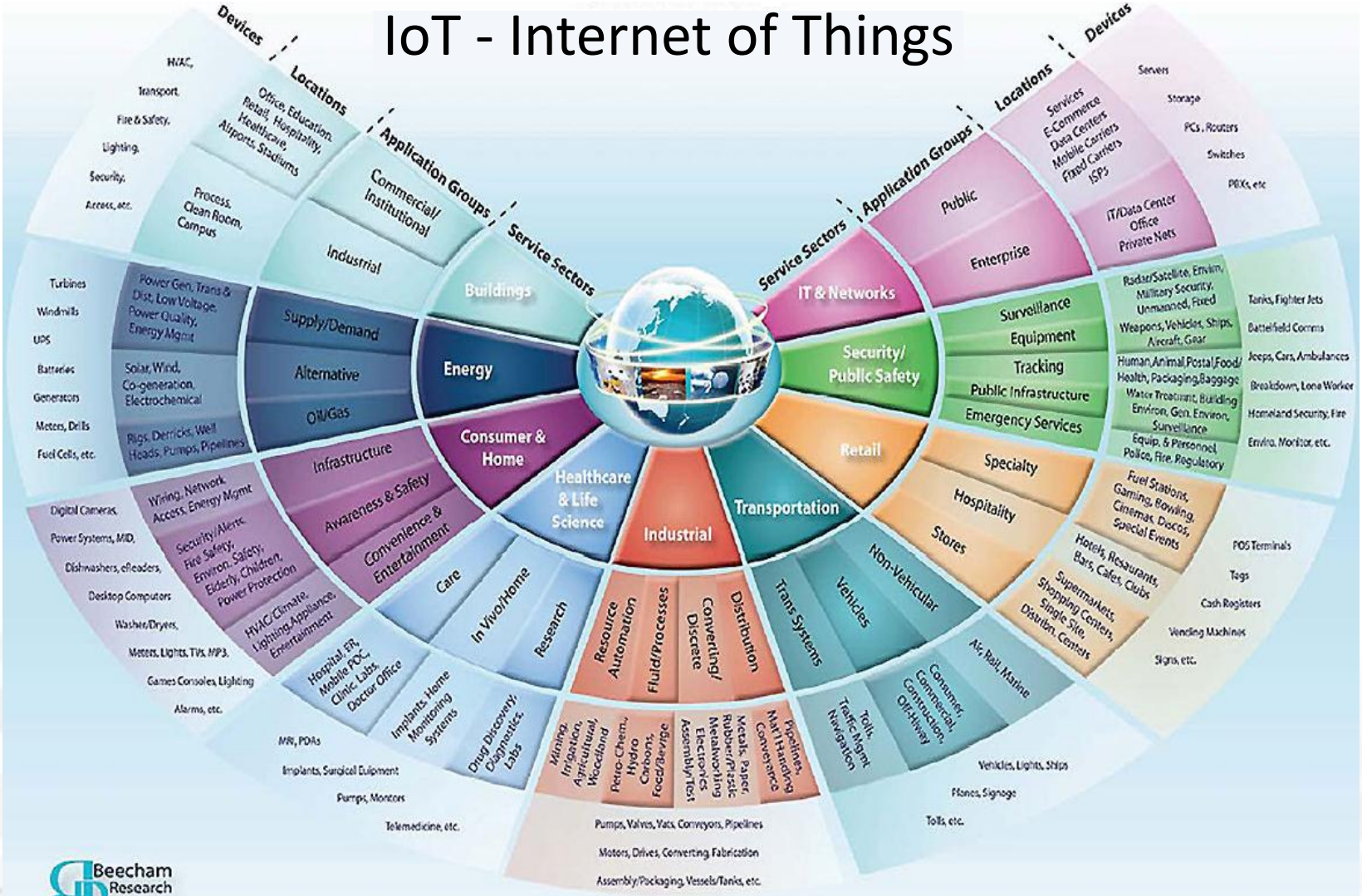
Powered by Niagara AX Framework

www.tridium.com

# Cyber Security & IT Protocols

- Use an embedded operating system.
- Full **SNMP** support (Simple Network Management Protocol)
- Support **LDAP**, (Lightweight Directory Access Protocol) Inherits user privileges set by IT Dept
- **Full port control** for safe comm's through firewalls & security devices
- Supports **TLS** (Transport Layer Security) and **SSL** (Secure Sockets Layer)
  - Provides secure communications between browser and device
- Full support for Public Key Infrastructure (**PKI**) with certificate management tools
- **Cryptography**
- **Passwords**
  - Forced password change on first logon
  - Lockout feature
  - Expiring passwords
  - Password history

# IoT - Internet of Things




Beecham Research

All Services <u>will</u> be provide through the Cloud

## Supplier Benefits

- Increased Service Performance
  - Know before you go – less time
  - One visit / right engineer / right parts
- Global Support via the Web to Any Site
  - Remotely Diagnose Equipment Failures
- Live and historical data analysis
- Reduce Site Warranty Costs
- Improve Product MTBF's
- Additional Services & Revenue Streams
  - Remote site management
  - Energy Reporting & plant performance
  - Predictive maintenance
- Increase service technicians productivity
- Early warning of design failures
- Industry benchmarking

## Customer Benefits

- Minimise Downtime
- Energy savings
- Energy reporting
- Optimum equipment operation
- Mobile access – anywhere, anytime
- Remote global expert support
- Maintenance validation
- Complying with environmental conditions
  - Legal & Comfort
  - Metering
  - Refrigerants
- Benchmarking
- Asset management
- Ever increasing database - analytical tool

# IFSF Technical Conference 2014

## Supplier Benefits

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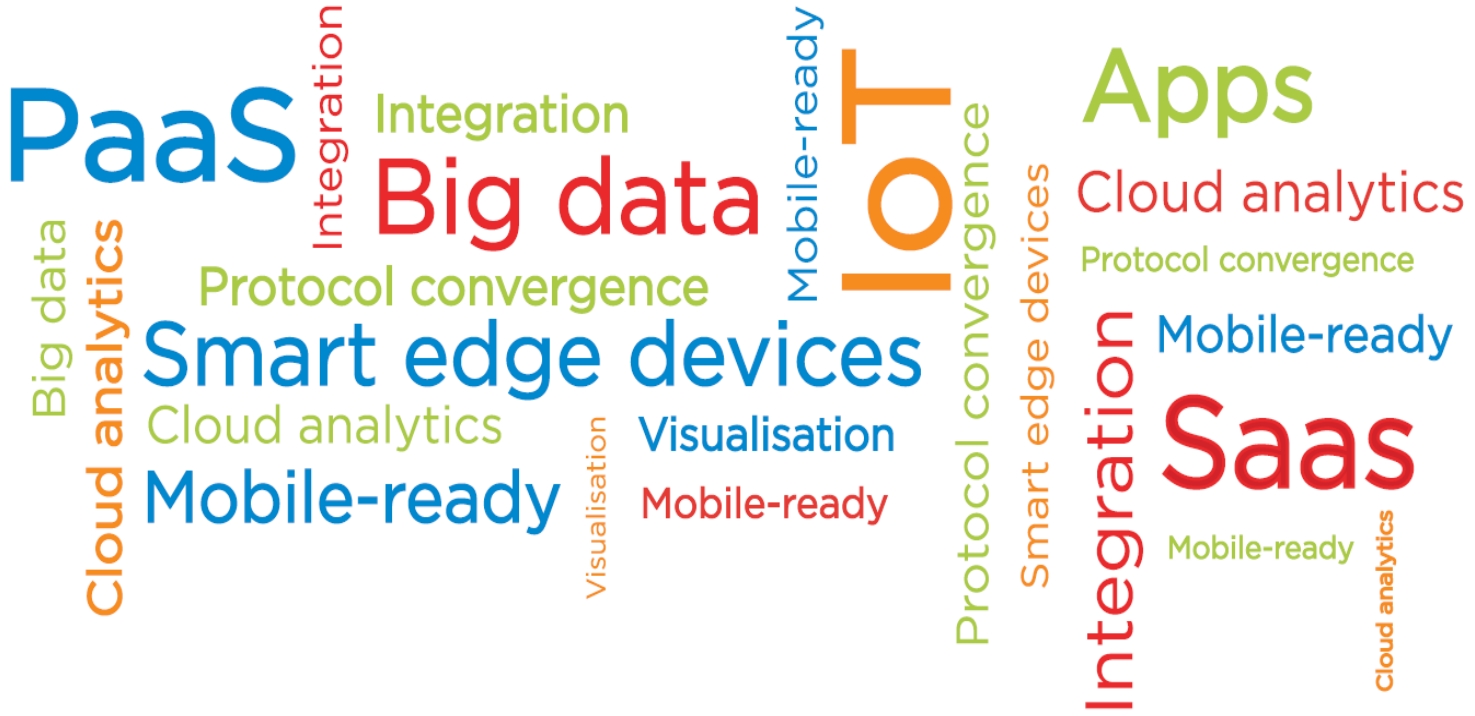
# How to position your company?

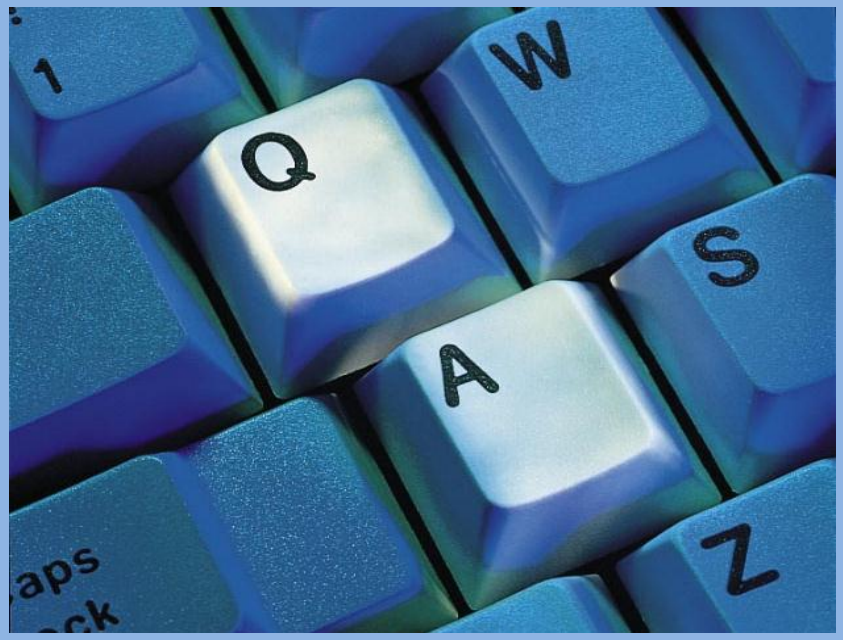



Smart Products and Services!

Your products are probably already ‘Smart’

How can you get them to work for you!

# Questions?

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