Overview

- **Systems Integration overview**
- **Case Study – Vattenfall AMI Project**
- **Lessons Learned**
Case Study – Vattenfall, Sweden

Systems Integration Overview

-* Known by various names:
  - **Services,**
    - Integration
    - Global
    - Professional
  - **Solutions,**

-* Systems integration costs > component costs
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Nationwide AMI deployment late 90’s

★ System design approach used
  ▪ Meet requirements at lowest *installed* cost

★ High level requirements:
  ▪ Reduce customer “churn”
  ▪ Reduce operational costs
  ▪ Increase revenue
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Features defined to meet requirements:

- **Multiple remote services:**
  - Automated meter reading
  - Thermostat
  - Home Security
  - Eldercare

- **Access to all services via cell phone & Internet**
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- **System** designed to meet requirements
- **Components** designed to fit into system
- **System integration** ties it all together
  - Components
  - Networks
  - Databases & Software
  - User Interfaces
- **System installed cost** was minimized
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Customer

Data Collection

Utility

M T G
Power-Line Comm.
Inside the Premise

Customer Access

Broadband & Dial-up

Internet & Cell Phone

Customer Utility
Customer Support Components
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Lessons learned (1 of 4)

- Complete system design should be done in advance:
  - Define requirements of system
  - Cost optimize the system
    - Include systems integration & lifecycle costs
  - Minimize late design changes
Lowest cost components may lead to higher installed system costs

**Example 1: Address assignment – Linking device to an individual customer**

- Lowest cost component may use dip switches (save $2)
- Dip switches require professional installation (add $150)
Least cost components may lead to higher installed system costs

Example 2:
Privacy of customer data

- Lowest initial cost may omit encryption
- Lifecycle costs could mushroom if a security breach necessitates replacement
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Lessons learned (4 of 4)

Even with advanced planning, deployment issues will emerge:

- Gov’t phone company equipment didn’t meet gov’t specs.
- Power line communications interference in ~5% of homes.
- 10% of the sites accounted 90% of the tech support labor.