Mission Statement

As the requirements of the plant floor evolve beyond traditional automation technologies, it is necessary to expand the existing infrastructure of the plant floor with technologies that address the increasing needs of businesses today.

Better Data leads to Better Decisions
What are these increasing business challenges

**Figure 2: Top Internal Business Pressures**

- Improve visibility into manufacturing data: 46%
- Need to consolidate disparate networks: 24%
- Need to expand the current network/sustainability of current network to the manufacturing requirements: 22%
- Existing plant network infrastructure unable to support new applications: 18%

Source: Aberdeen Group, *Industrial Networking*, April 2011
Connecting the Enterprise network to the plant floor adds transparency and traceability.
What are these increasing business challenges?

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Percentage of Respondents, n=150

Source: Aberdeen Group, Industrial Networking, April 2011
Challenges of a Legacy Network

- Cost to maintain different networks
- Complexity of maintaining knowledge of different protocols
- Engineering custom solutions and writing custom code to unify your plant floor data

How do you reduce the number of automation networks in your manufacturing process?

How do you connect Islands of Automation into a modular automation cell design?

Horizontal Integration

Machine to machine communication improves productivity and throughput.
What are these increasing business challenges

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Evolving Plant Floor
Safety
Innovative Application Solutions
Real-Time Data
Plantwide Diagnostics
Ethernet: Common Platform for Connectivity
Validating a production network
## Not all things are alike...

<table>
<thead>
<tr>
<th>Environment</th>
<th>Industry</th>
<th>Office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harsh environment temperature, moisture, EMI</td>
<td>Climate-controlled offices</td>
<td></td>
</tr>
<tr>
<td>Installation</td>
<td>Field-preparable cables</td>
<td>Pre-fabricated cables</td>
</tr>
<tr>
<td>Topology</td>
<td>Plant-specific structure line, star, ring, tree</td>
<td>Star-shaped structure</td>
</tr>
<tr>
<td>Availability</td>
<td>No Network downtimes</td>
<td>Downtimes up to several minutes</td>
</tr>
<tr>
<td>Redundancy Mechanism</td>
<td>MRP, High Speed Redundancy, Standby</td>
<td>Link Aggregation, RSTP, MSTP</td>
</tr>
<tr>
<td>Network Administration</td>
<td>Engineer</td>
<td>Certified IT specialist</td>
</tr>
</tbody>
</table>
Siemens Network products are designed by engineers for engineers, managing networks and getting diagnostics becomes a simple task which does not require IT specialists.
Plantwide Networking Architecture

**Management level**
- IT Network
  - MSTP/RSTP
- Network Monitoring

**Operations level**
- VRRP Routing
- 10 Gigabit Ring

**Control level**
- Gigabit Ring
- Standby coupling

**Field level**
- Fast Ethernet Ring

**Technical integration**
- Technical integration into IT system sharing production data

**Redundant layer 3 routing**
- Redundant layer 3 routing with the VRRP function, optional: Dynamic routing protocols OSPF and RIP

**Division of large Ethernet networks**
- Division of large Ethernet networks into smaller networks with their own IP address spaces (subnets) and to allow creation of VLANs

**Growing number of Ethernet end devices**
- Growing number of Ethernet end devices with transmission rates of 100 Mbps and 1000 Mbps
Future proofing your network to…
...keep up with bandwidth demand

One challenge of integrating both horizontally and vertically is the increased bandwidth requirement.

One example, best in class companies already incorporate voice and video on their industrial networks adding to the bandwidth demand.

New Network designs and upgrades need to provide the necessary bandwidth for those demands:

→ 1/10 Gbit/s ports on plant switches
Future proofing your network by…
...using Hardware that allows changes

Today’s applications change more often than in the past. In fact interfaces typically change as the network architectures evolve.

Modular switches allows quick and cost effective changes to interfaces (copper, fiber etc)

→ Reducing Total Cost of Ownership
Unmanaged vs. managed switches

Unmanaged Switch features

- Port extension or media conversion
- No configuration necessary
- Low price

Managed Switch features

- Provide redundancy options
- Allow for network segmentation and traffic control
- Provide information about the network incl.
  - Connections
  - Diagnostics
  - Network Health

Increases visibility of your network and allows for network monitoring
Benefits of Networking Monitoring

Continuous network monitoring and visualization

- Navigation bar
- Status bar
- Device tree
- Main window
- Event list

Automatic topology detection

Easy Integration in HMI / Scada with OPC

Track changes and errors in the network
Intuitive operation – No IT specialist required

Do you want to deal with this…?

or would you prefer this…!

Check what is the status of the network at a quick glance
Wireless in Industry – A success factor

Challenges and Solutions

**Wear & tear on materials**
- Trailing Cables, Power Rail Booster or Slip rings are subject to Wear & Tear
  - Wireless LAN offers a solution free of Wear & Tear

**Commissioning**
- Commissioning Time and Cabling especially is very expensive
  - Wireless LAN offers a cost-effective solution

**Poor expansion options**
- Many hard-wired systems on the market offer poor expandability options
  - Adding more nodes to a Wireless systems is simple

**Lack of Mobility**
- Cabled or Track-based solutions don’t offer the flexibility and mobility, demanding applications call for today and therefore limit the design
  - Wireless LAN systems offer maximum flexibility and mobility
Increasing Productivity with flexible architectures

Incorporating Industrial Wireless LAN technology allows flexibility in application design and the freedom of mobile workers and machines while providing access to production data.

→ Wireless LAN systems offer design freedom and maximum flexibility and mobility.
Video – CTA container terminal
Proven Sweet Spot applications

AGV

AS/RS

Stacker Cranes

Overhead Monorail Conveyor
Things to consider when using Wireless

1. Don’t try to use Wireless for every application, use it for the **right** applications.

2. Wireless requires planning, consider contacting experts that will help you getting started.

3. Site surveys are a normal preparation step in more complex applications.

4. Even Safety can be implemented, but the more demanding the application, the more important the planning and execution becomes.

IWLAN from Siemens...

...reliable, rugged and secure.
Main Trends Impacting the Vulnerability of Automation Plants

- Horizontal and Vertical Integration at all network levels
- Connection of automation networks with IT-Networks and Internet for remote maintenance
- Increased use of open standards and PC-based systems

Possible Threats increased due to these trends:
- Access violation through unauthorized persons
- Espionage and manipulation of data
- Damages and data loss caused by malware

→ A risk assessment can help to identify potential risks
Industrial Security
The Defense in Depth Concept

Plant security
- Access blocked for unauthorized persons
- Physical prevention of access to critical components

Network security
- Controlled interfaces between office and plant network e.g. via firewalls
- Further segmentation of plant network

System integrity
- Antivirus and whitelisting software
- Maintenance and update processes
- User authentication for plant or machine operators
- Integrated access protection mechanisms in automation components

Industrial Security levels according to current standards and regulations

Security solutions in an industrial context must take account of all protection levels
Network Security Integrated

Secure Engineering Stations

Firewalls to protect different areas of the plant network

Secure Remote Access

Secured Operator Station

Secured PLC-PLC communication

Integrated Security Functions
Plantwide Network Architectures

- **Management level**: IT Network, MSTP/RSTP
- **Operations level**: VRRP Routing
- **Control level**: Gigabit, Redundant coupling
- **Field level**: Ring Redundancy, Wireless

**Key Features**:
- **Increased Availability**
- **Higher Performance**
- **Secured Plant Floor**
- **More Visibility**
- **More Flexibility**
- **Transparent Interface**

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Connected Manufacturing Forum

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Answers for industry.
Thank you for your attention!

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