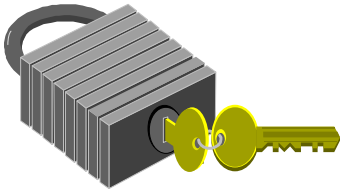
Knowing the Available Technologies
SCADA Security Workshop
UTC Telecom2004
May 16-18, 2004



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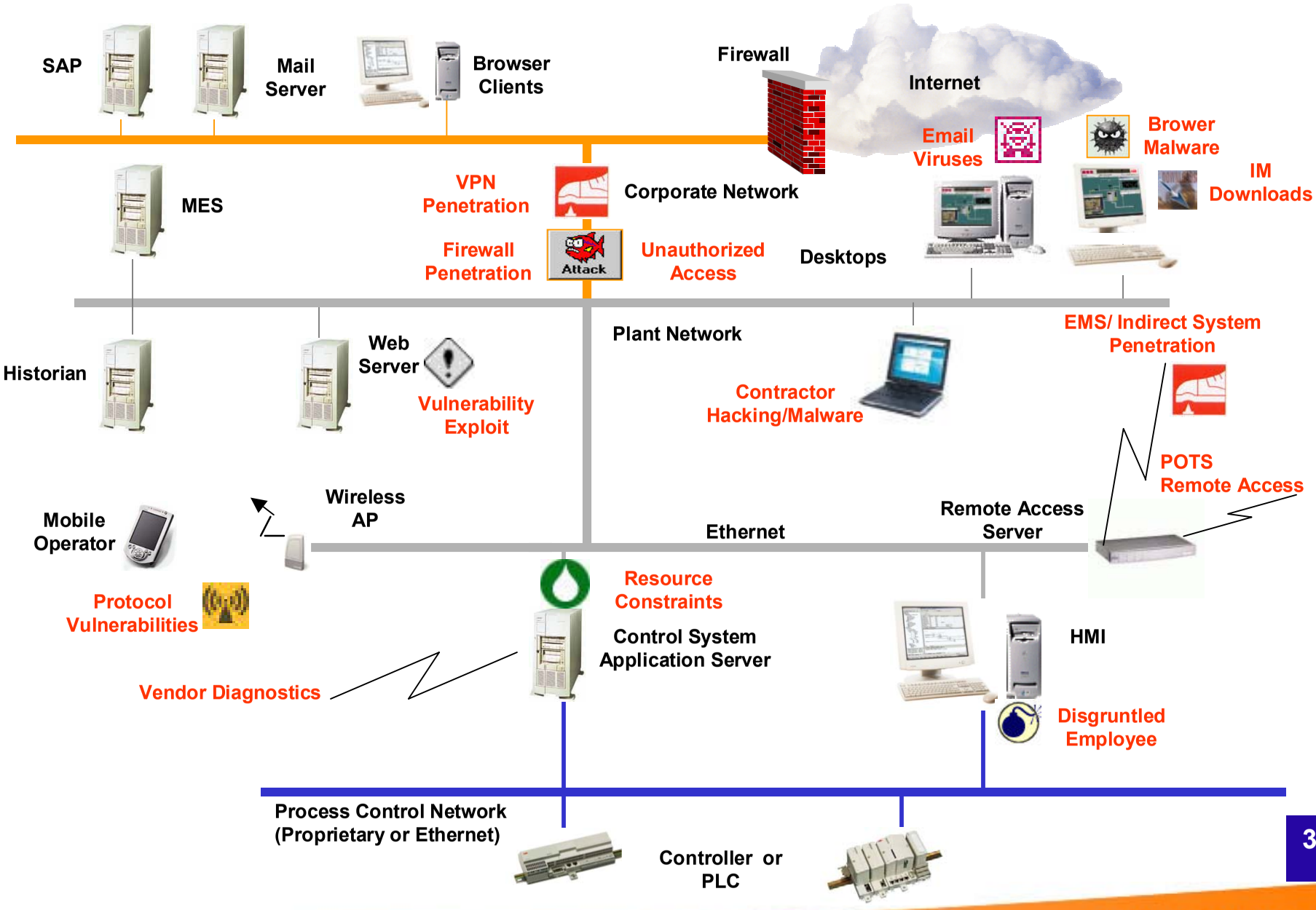
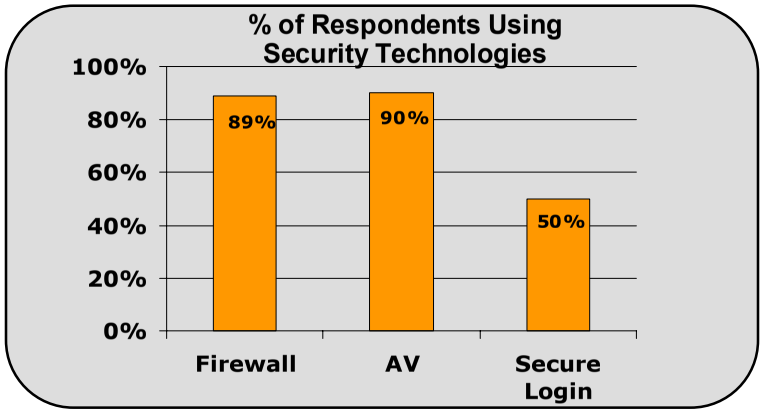
What's Verano?

1. The Spanish word for *summer*
2. An industrial software company
   - Head Office near Boston, Mass
   - Software Development office in Calgary, Canada
   - 2000 - acquired automation software business from HP
   - 2002 - introduced Linux SCADA system
   - 2003 - launches Industrial Defender product suite

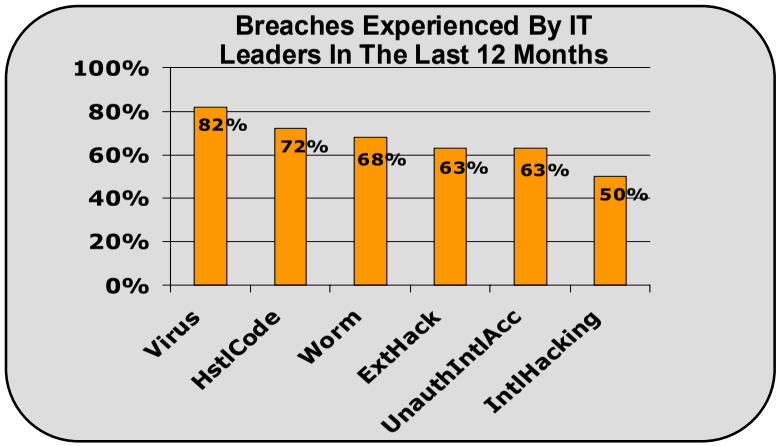
Points of Potential Vulnerability

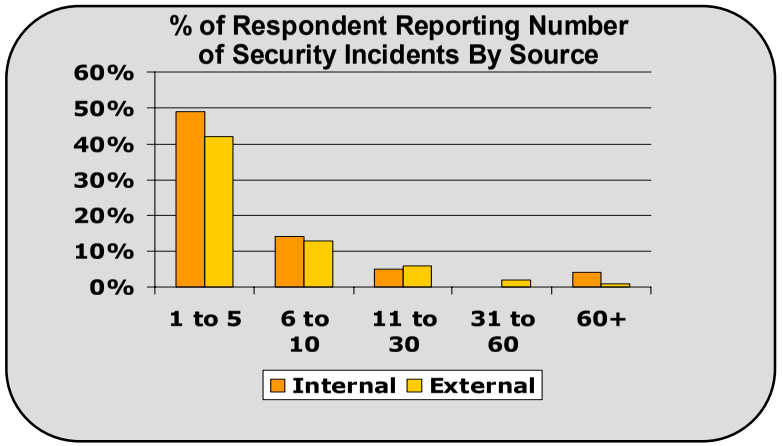


Corporate Security Measures Are Not Sufficient



External penetration still occurs…and no barrier to internal misuse exists

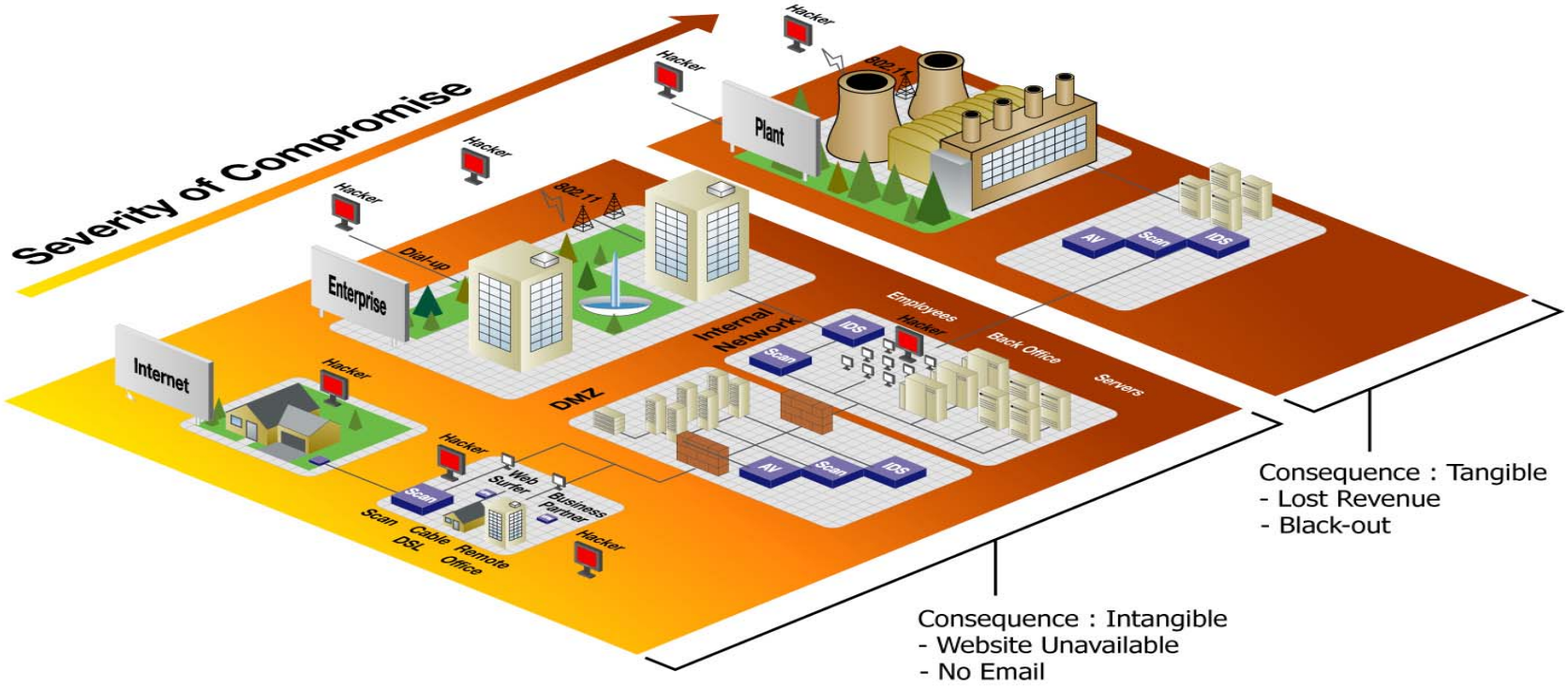




Sources: 2002 FBI Survey, InfoTech Trends

Control System Security Challenges

- Industry driven to open architectures over the last 10 years
- Control systems were not designed with security in mind
- Connecting IT and control networks created an access path for control network intrusion



Responding to the Challenge

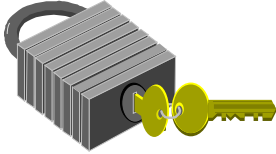
- Define and document your network perimeter
- Plan for "Defense in Depth”
- Protect against internal as well as external threats
- Segment your network
- Harden the control equipment

Special Considerations for Control Systems

- Differing risk management goals
- Differing architecture security focus
- Differing availability requirements
- Unintended consequences
- Time critical responses
- Differing response time requirements
- System software
- Resource constraints
- Information integrity
- Communications
- Software Updates

Source: ISA—TR99.00.02—2004 Integrating Electronic Security into the Manufacturing and Control Systems Environment

Protecting the Control Network Perimeter



- **Firewall**
  - Ensures only authorized traffic enters the perimeter
- **Multi-port switches**
  - Segments traffic to maximize security
- **Network virus protection**
  - Detect and block incoming and outgoing viruses at the network perimeter
  - Control systems typically can/should not run AV
  - Best practices dictate you should have AV on the desktop and at the perimeter
- **In-line intrusion prevention**
  - Detect and block 1000+ types of intrusions
- **Content filtering**
  - Deep packet inspection to detect and remove threats and inappropriate content
- **VPN**
  - secures remote links
- **High availability**
  - load sharing and fail-over

Multi-function security appliance

Dynamic Threat Response

Threat-level Inputs

-
-
-

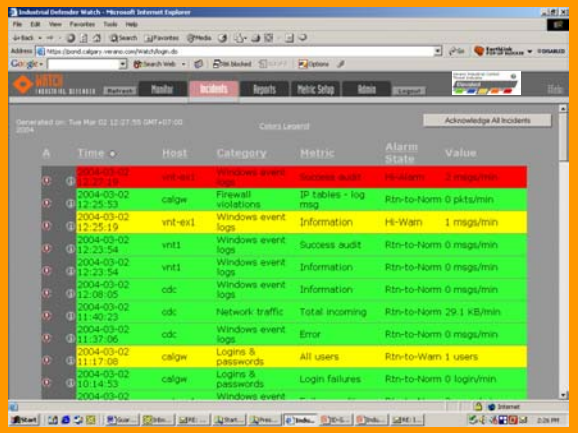
- Monitor levels

Threat-level Setting

Threat Level Setting
Low risk of attacks - Normal settings
General risk of attacks - Normal settings
Significant risk of attacks - Dial-in and VPN disabled
High risk of attacks - All incoming blocked, only vital
Severe risk of attacks - Control netw ork totally disconnected

- Select appropriate setting

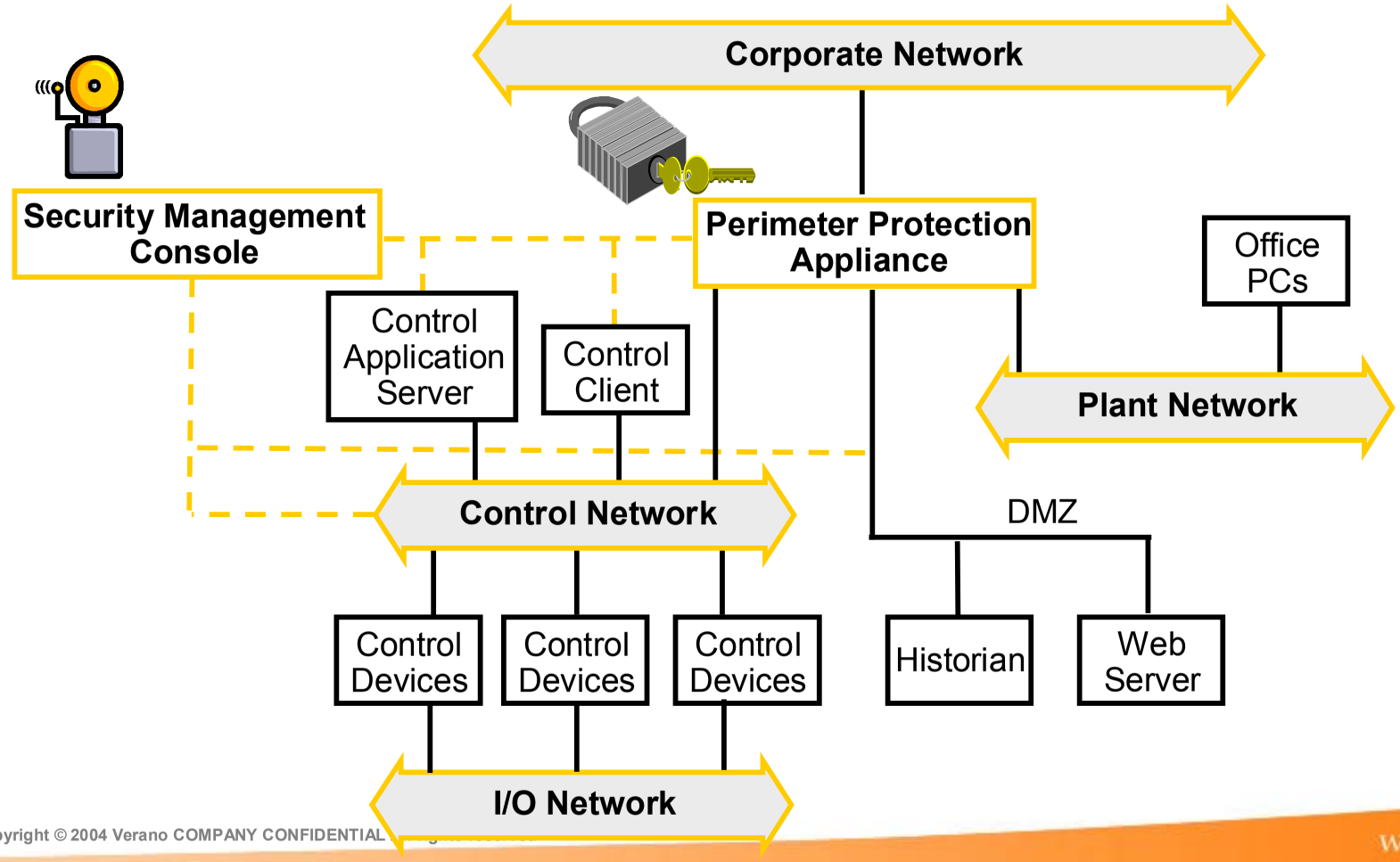
Real-time Monitoring



- Policies downloaded
- Verified and monitored

Perimeter defense is a good start, but…

- Doesn't protect against internal threats
- Doesn't tell you when the perimeter has been penetrated
- Doesn't tell you when you have resource issues
- Doesn't tell you when devices are added to the control network

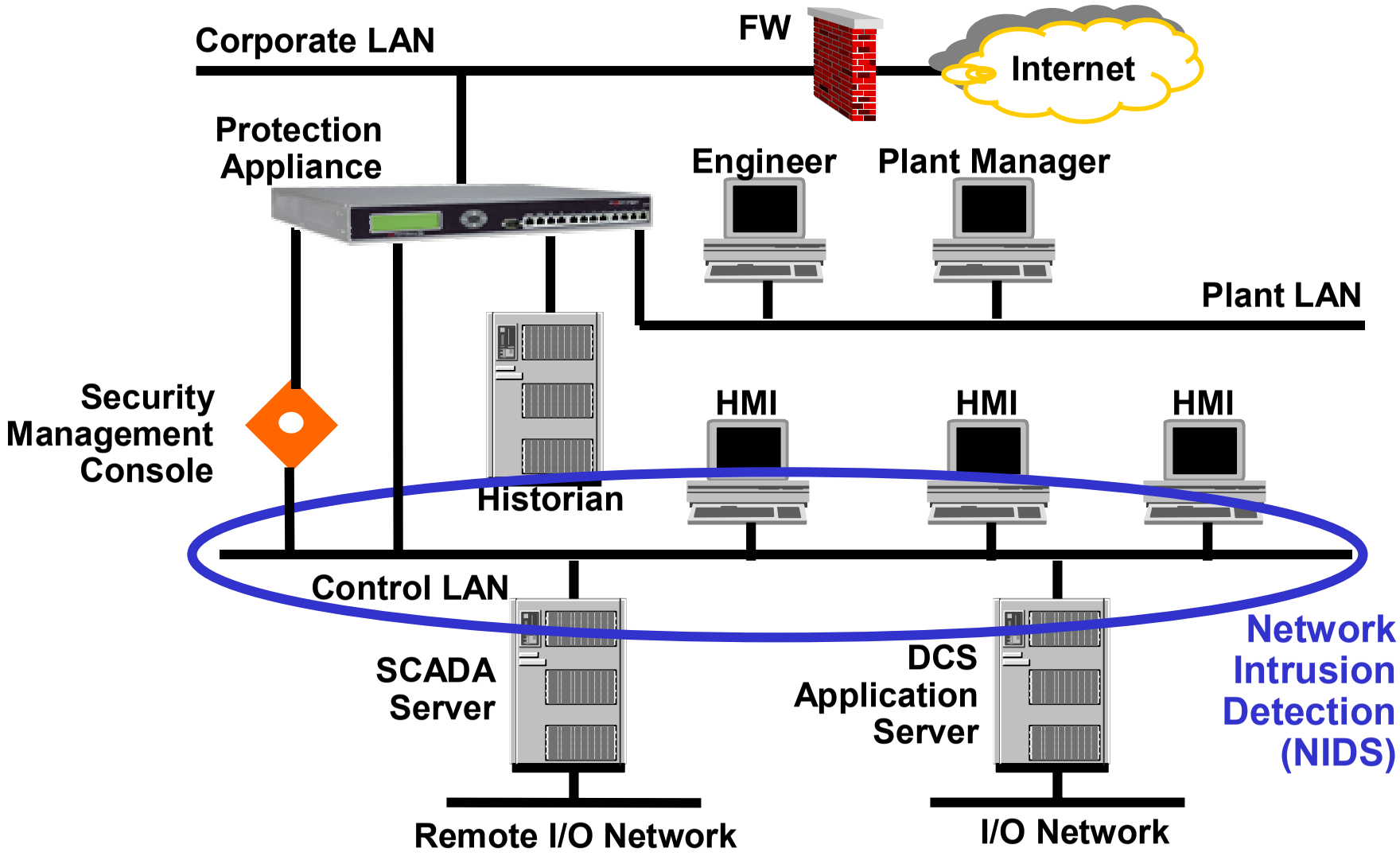


Intrusion Detection Systems

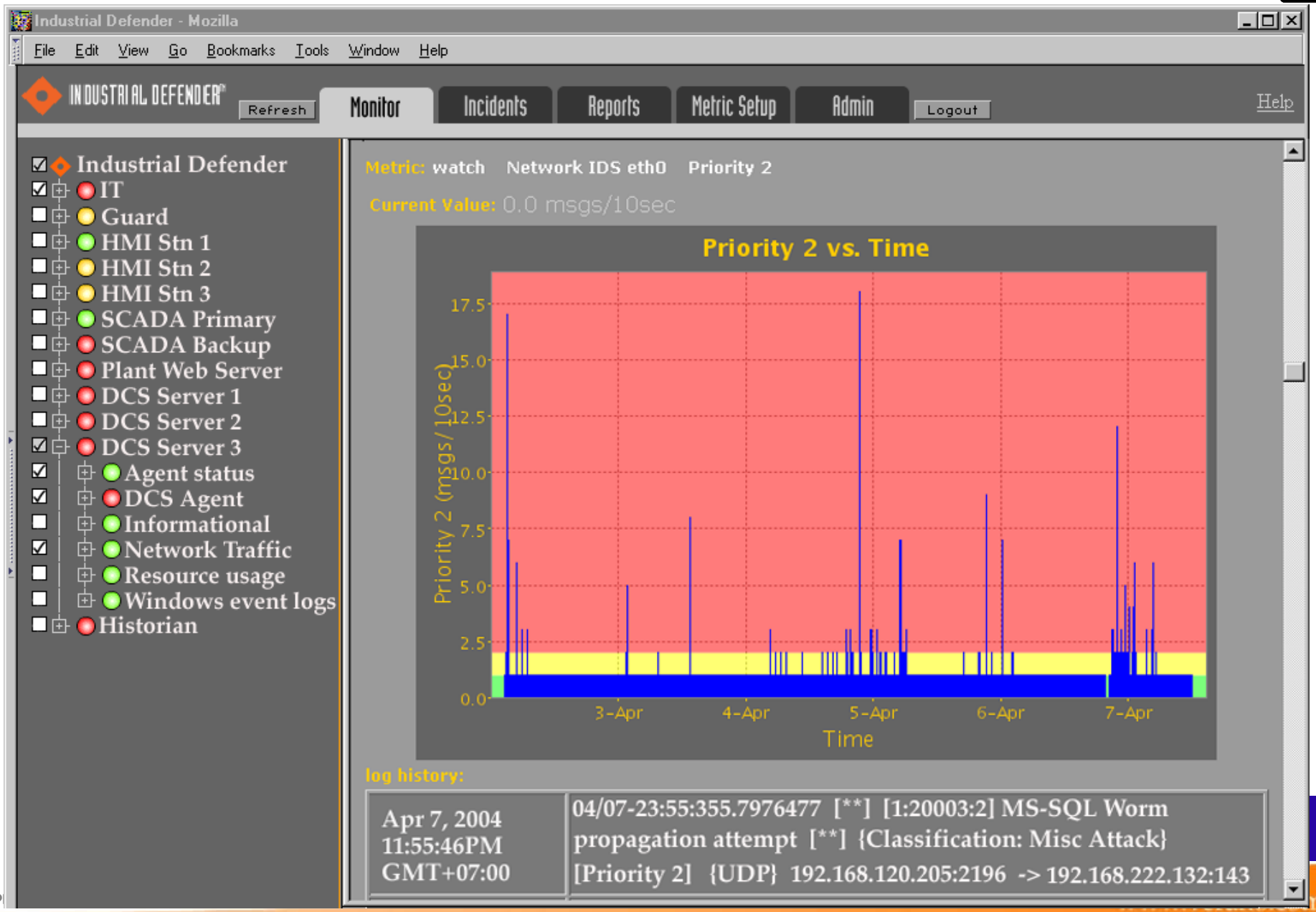
- **Network Intrusion Detection Systems (NIDS) - Systems that monitor network traffic and identify patterns that are deemed suspicious. NIDS uses passive packet sniffing to compare network traffic against a set of rules that determine whether the traffic indicates an attack.**

- **Host Intrusion Detection Systems (HIDS) - Software that monitors a system or application log files. These systems respond with an alarm or countermeasure when a user attempts to gain access to unauthorized data, files, or services.**

Control Network IDS



Intrusion Alert Example



Beyond IDS

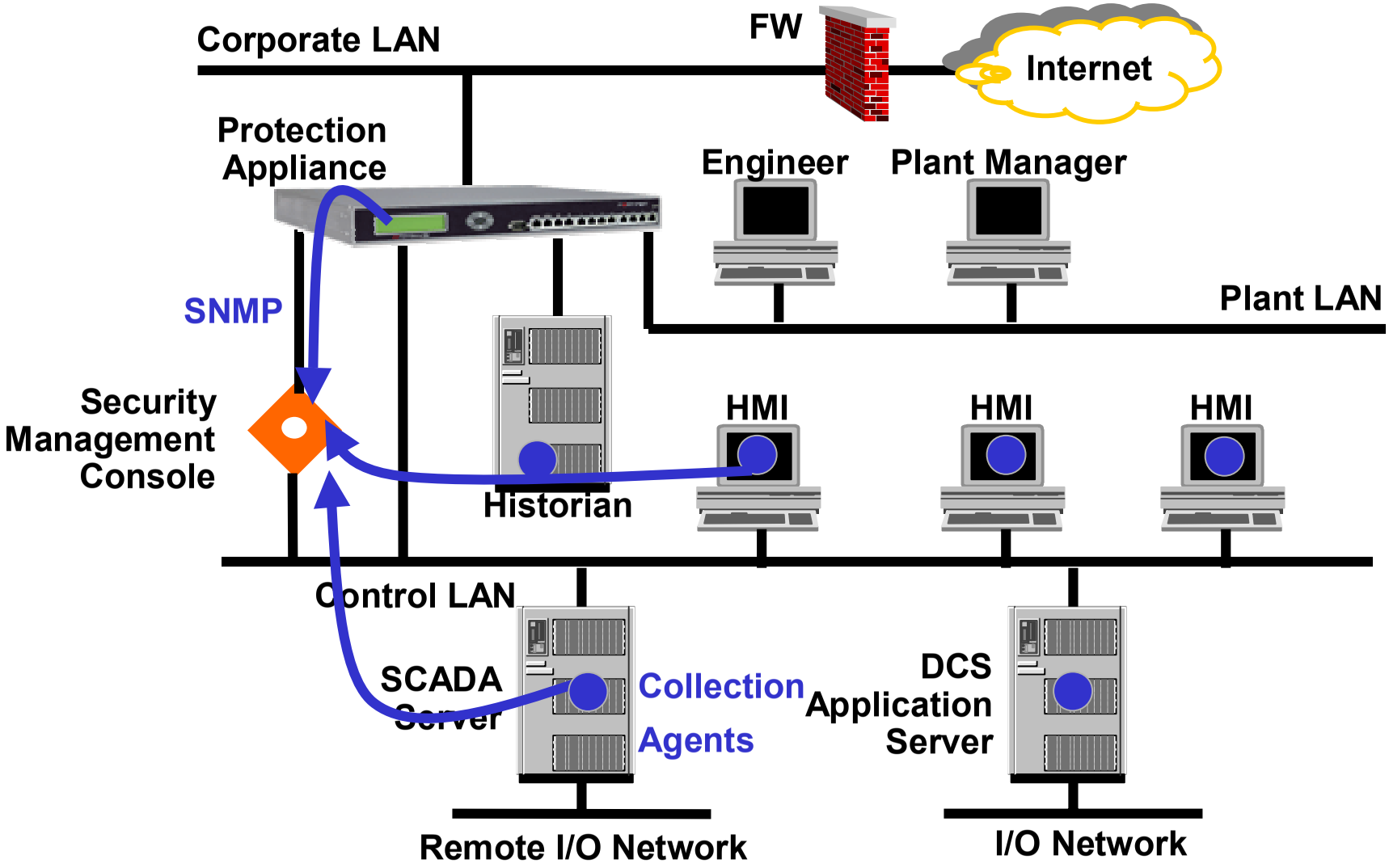
Security

- **Control network intrusion detection**
  - control protocol signatures
  - control network anomalies
  - control network rules
- **Control network integrity**
  - Device addition
  - Device masquerading
  - Device continuity
  - Network equipment status
- **Host access monitoring**
  - Failed log-in attempts
  - Failed password change attempts
  - Password age status
  - Root user count
  - Total user count
- **Critical file monitoring**
  - File deletion, modification
  - File permission changes
  - File checksum mismatch

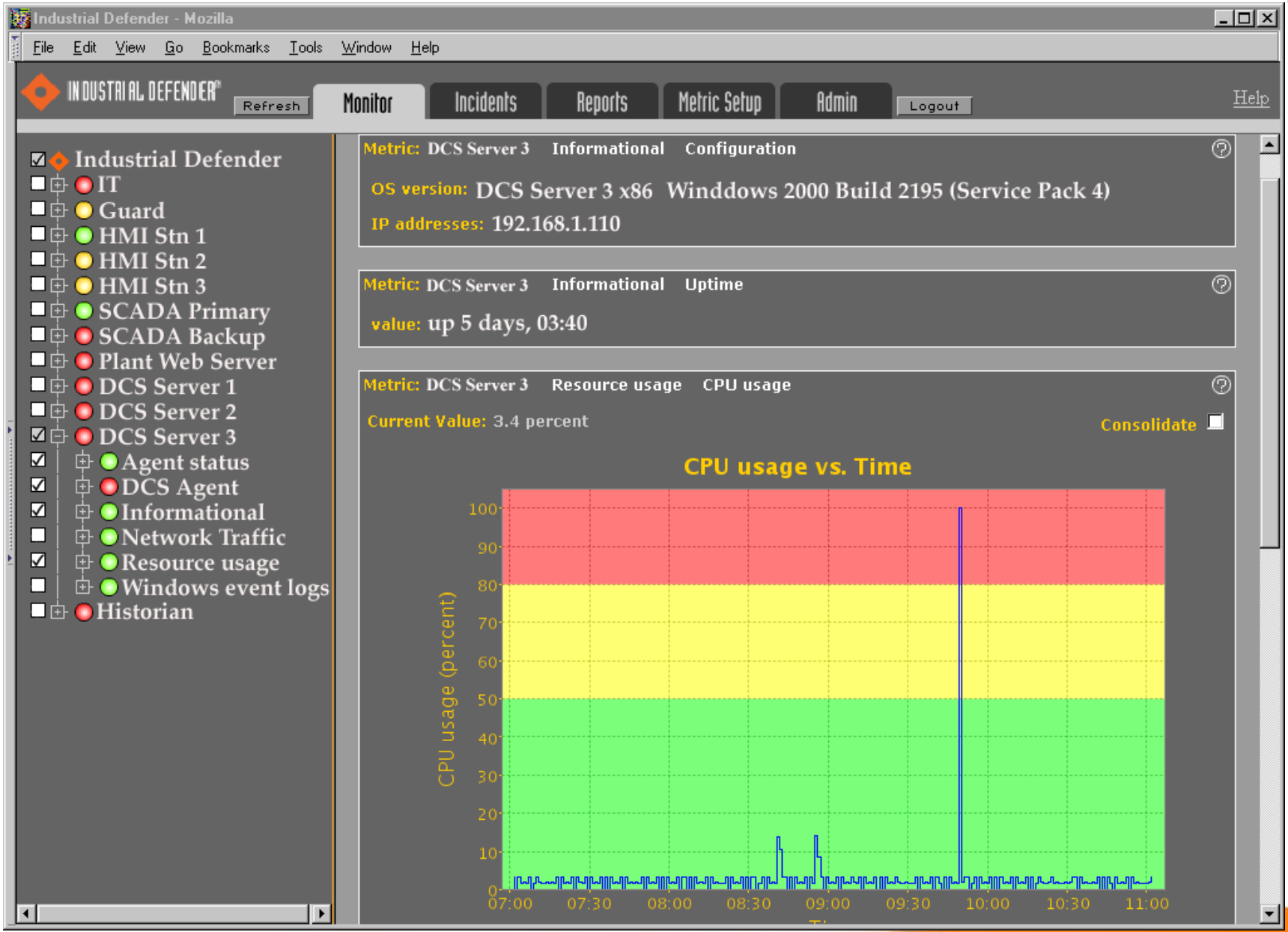
Performance & Integrity

- **Host performance**
  - Resource Usage (CPU, disk space swap space)
  - Network traffic counts
  - Hardware status (CPU temperature, fan speed)
  - System Uptime
  - Identification (name, OS version, hardware type, IP address)
  - Event log status
- **Control application Integrity**
  - Installed software
  - Open listen sockets
  - Abnormal program exits
  - Control Application shutdown
  - Process terminations
  - Watchdog status
  - Message queue status

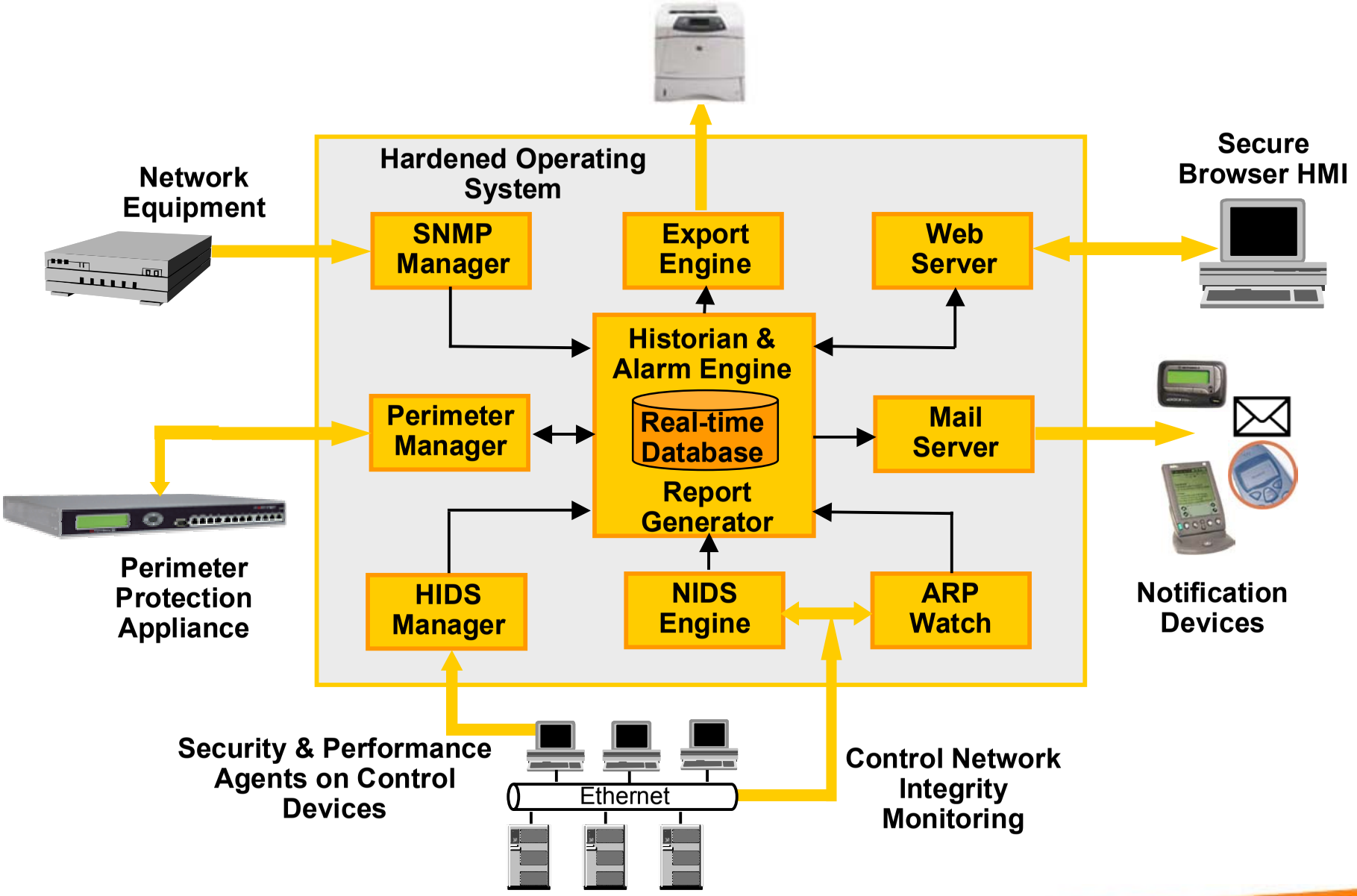
Security and Performance Agents



Performance Metric Example



Control Network Security Management System



Conclusions

- The increasing sophistication of cyber threats demands a multi-layered approach to protecting the security and integrity of mission critical systems.
- Threats are internal as well as external.
- Security Event Management systems designed specifically for control networks are now available.

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