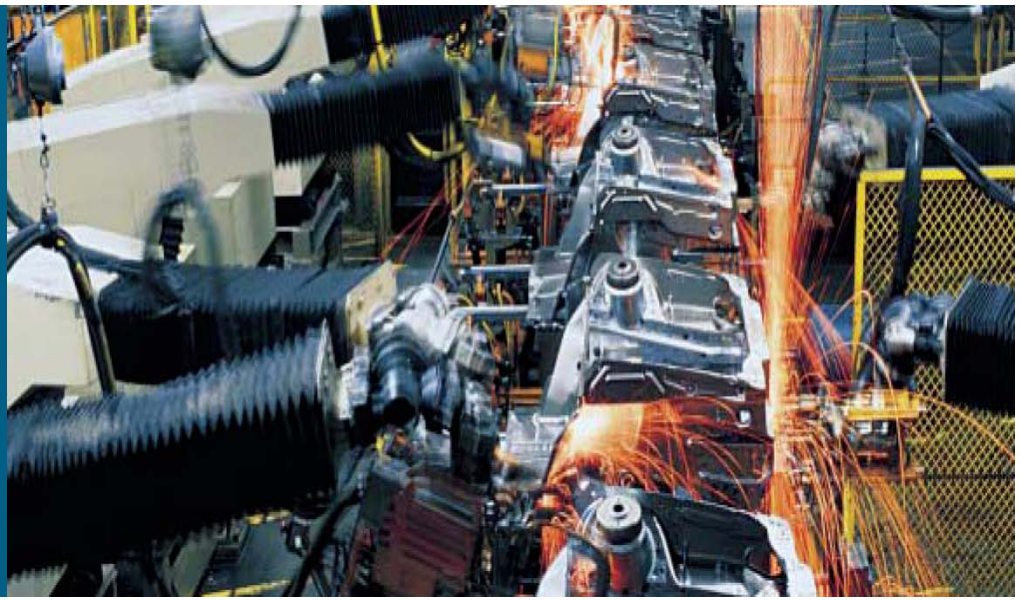
Cisco Switching in Manufacturing



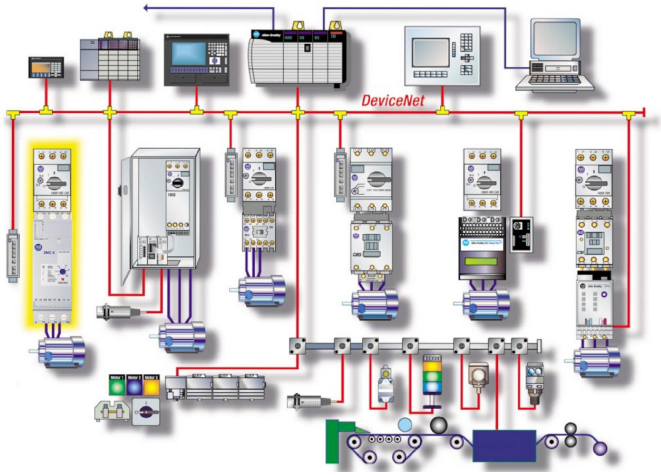
Tatjana Boskovic, Channel SE
tboskovi@cisco.com

Manufacturing event, 20/03/2009

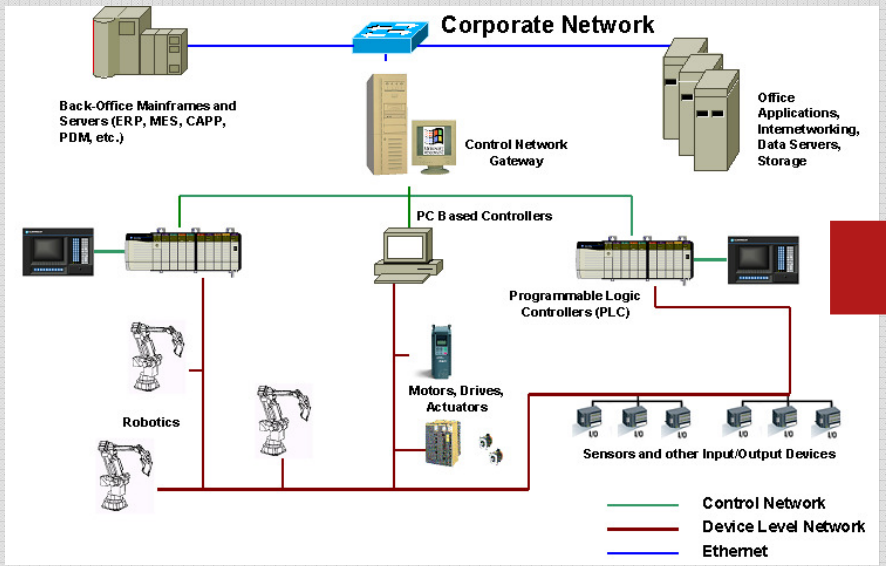
Agenda

- Trends in Manufacturing and Industrial automation
- Cisco Switching Portfolio
- Cisco IE 3000 Product Overview
- Q&A

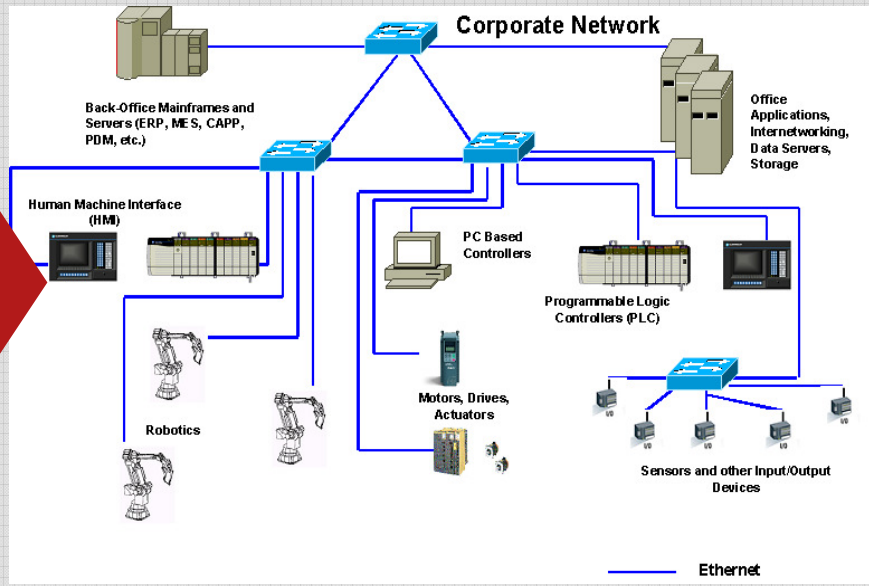
Trends in Manufacturing and Industrial automation



Changing Automation Networks



Traditional

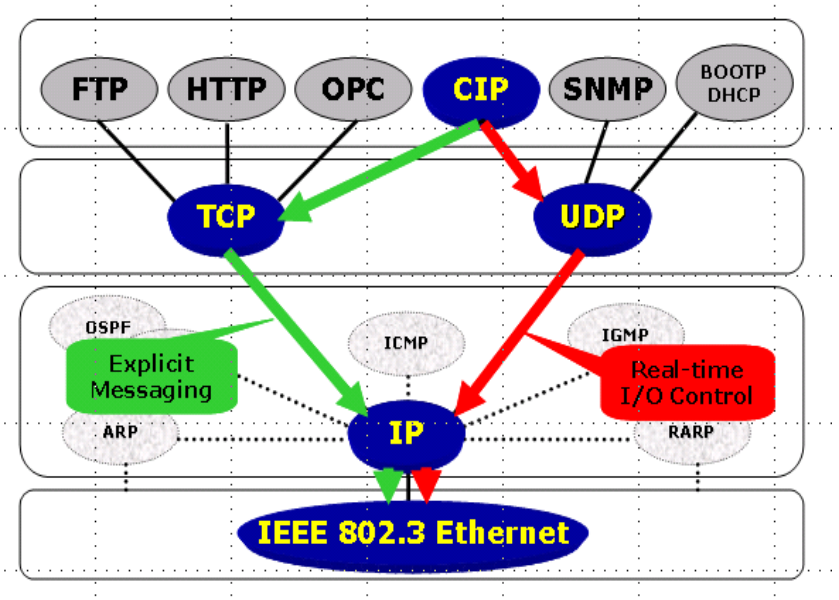


Ethernet-based

Automation equipment vendors are implementing Ethernet-based protocols as an replacement of traditional fieldbus networks

What is EtherNet/IP?

Ethernet/Industrial Protocol or EtherNet/IP specifies how CIP communication packets can be transported over standard Ethernet and TCP/IP technology.



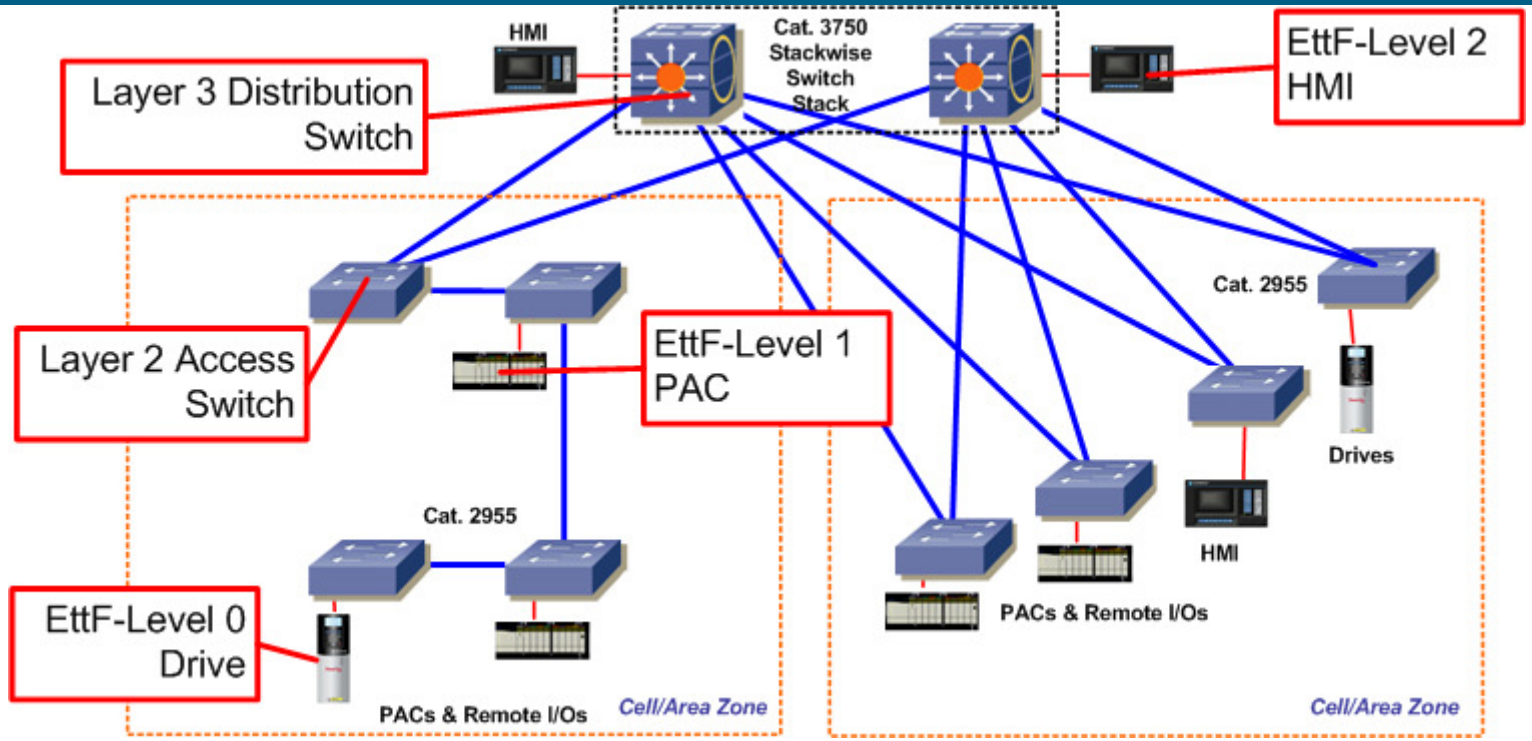
EtherNet/IP traffic types in a control environment

- CIP: Control traffic (a.k.a. **Implicit** traffic)
  - I/O control, drive control, Produced/Consumed tags
  - Uses UDP protocol (multi-cast and uni-cast)
- CIP: Information traffic (a.k.a. **Explicit** traffic)
  - HMI, MSG's, Program upload/download
  - Uses TCP protocol
- Other common traffic
  - HTTP, Email, SNMP, etc.

Advantages of EtherNet/IP

- Standard Unmodified Ethernet (SUE)
- Established – 150+ registered vendors
- Future proof – Runs on unmodified standard Ethernet
- Supported – All EIP products require conformance testing

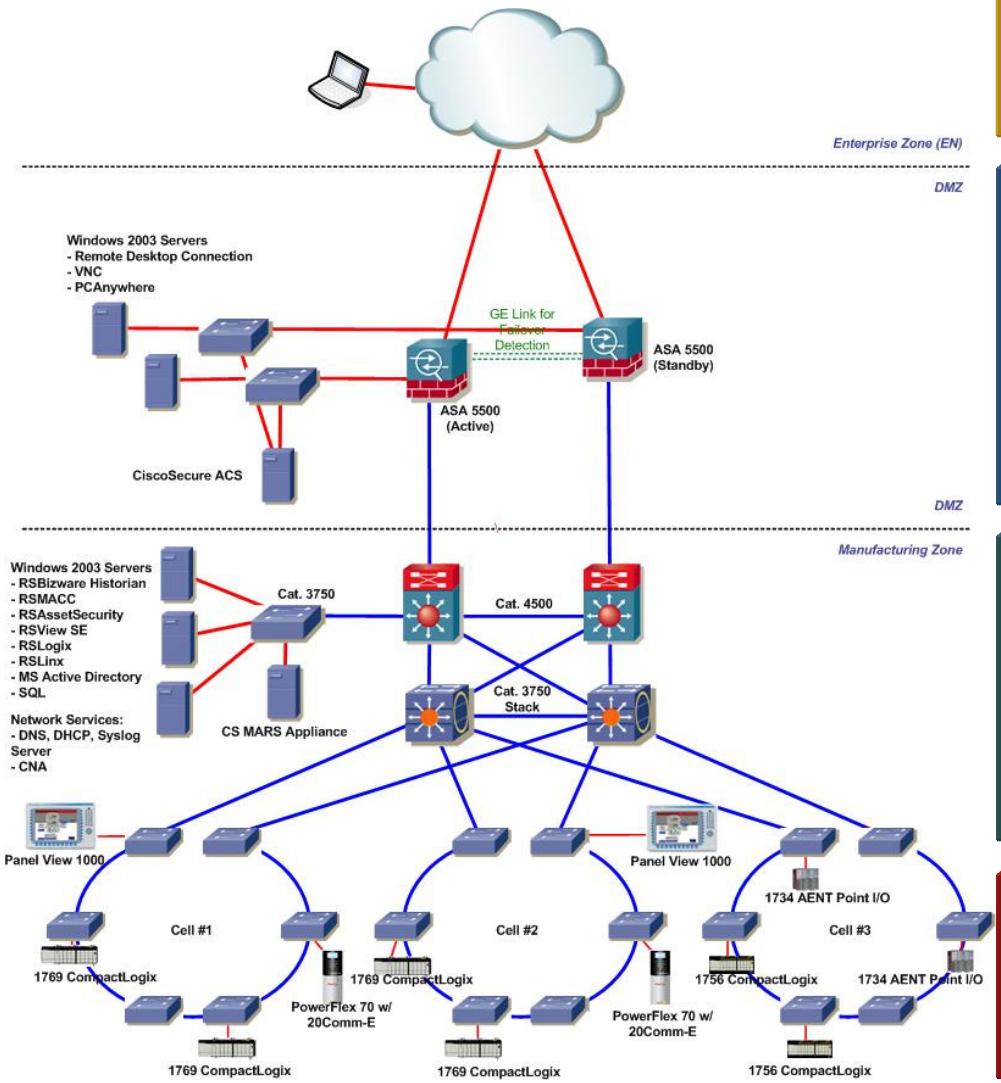
Cell/Area Overview



The Cell/Area zone is a Layer 2 network for a functional area of a production facility. Key network considerations include:

- Environmental constraints - extended temperature, humidity, invasive materials, shock, vibration, and a large variety of noise – are part of production facitilities
- Range of device intelligence from dumb (e.g. temperature gauge) to highly complex (e.g. multi-axis robots) devices.
- Highly time-sensitive applications with low tolerance to latency, jitter and packet loss.

Ethernet to the Factory: Network Architecture



Enterprise Network

Demilitarized Zone (DMZ)

Separation between Control & Enterprise Networks

Manufacturing Zone

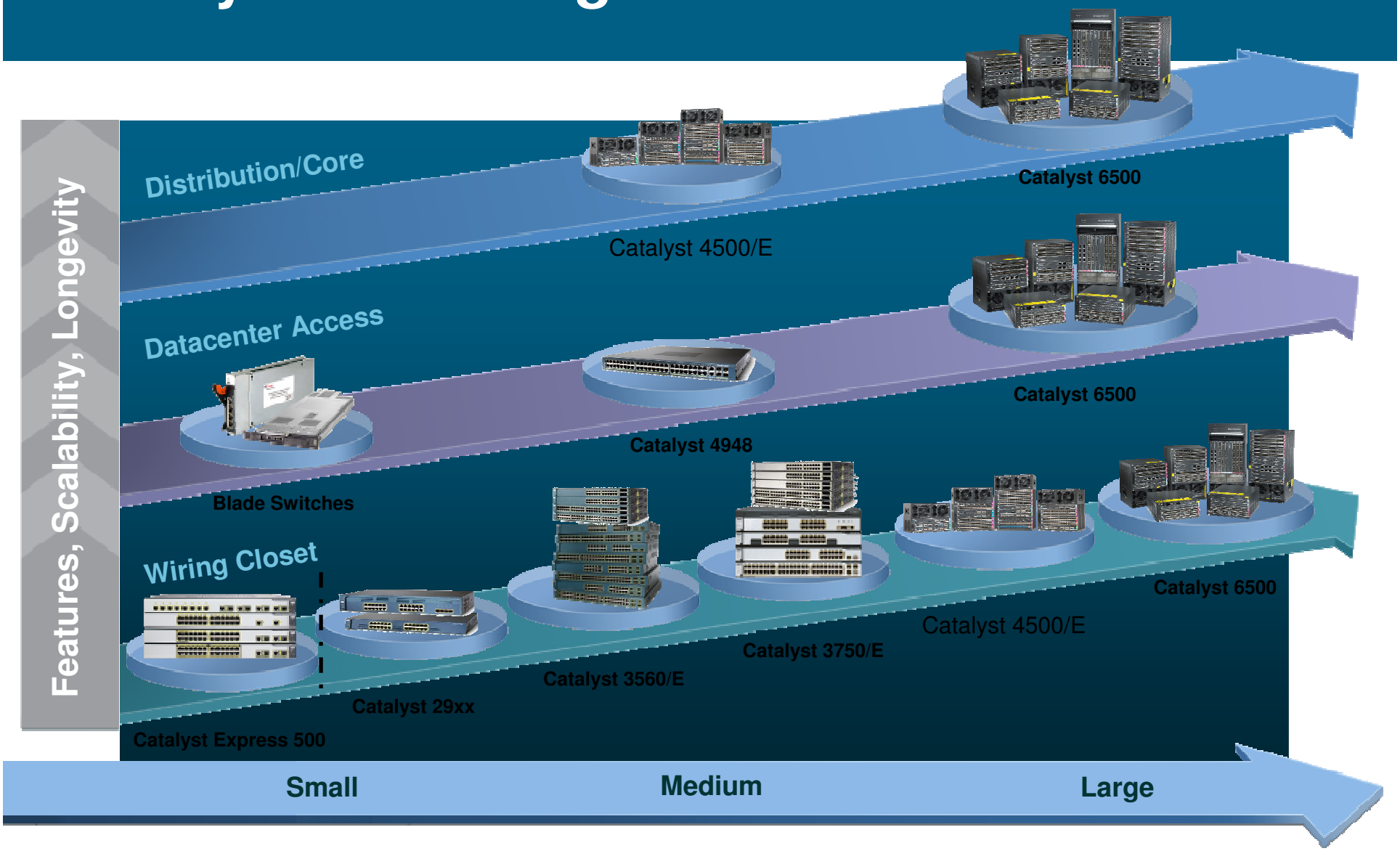
Interconnection between Cell Zones, Server Farms, and DMZ

Cell/Area Zone

Network Connection for PLCs, HMIs, I/Os, & Drives

Cisco Switching Portfolio

Catalyst Switching Portfolio

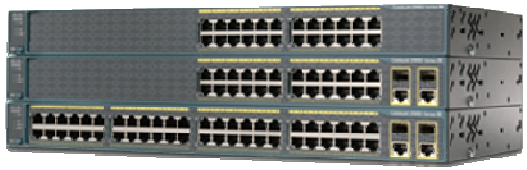


Cisco Catalyst 2960 Series Switches

Catalyst 2960 LAN Base Series

- Fast Ethernet and Gigabit Ethernet in 8, 24, and 48 port configurations for entry-level enterprise and mid-market customers
- Offers enhanced Layer 2+ intelligent LAN services:
  - **Availability**
  - **Enhanced security**
  - **Advanced quality of service (QoS)**
- Simplified management and troubleshooting for lower total cost of ownership
- Cisco Network Assistant and Cisco Smartports
- Limited lifetime hardware warranty and software updates at no additional charge

Catalyst 2960 LAN Lite Series



- Fast Ethernet in 24 and 48 port configurations for small branch offices and wiring closets
- Offers standard Layer 2 services with entry-level availability, security, and QoS
  - **Scalable and secure network management**
- Simplified management and troubleshooting for lower total cost of ownership
- Cisco Network Assistant and Cisco Smartports
- Limited lifetime hardware warranty and software updates at no additional charge

Uses Cisco ASICs for superior quality and hardware and software integration

Cisco Catalyst 3560 Series Switches

Positioning:

For Mid-sized and low density Enterprise branch and wiring closets

Stand-alone fixed-configuration switches

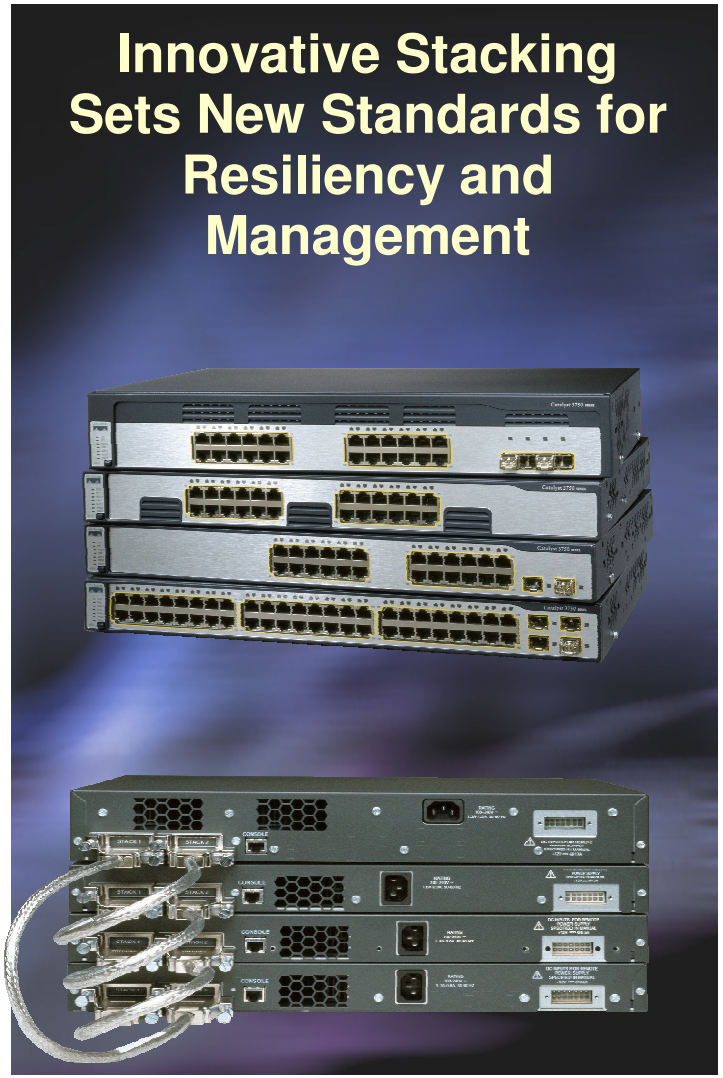
Features/Highlights:

- Fast Ethernet and Gigabit Ethernet connectivity
- Redundant power supply support
- Power over Ethernet
- High-performance IP routing to support advanced technologies and mission critical applications

Ideal for Mid-sized and Small Enterprise Branch and Wiring Closets Needing Standalone, Intelligent Switches

www.cisco.com/go/catalyst3560

Cisco Catalyst 3750 Series



- Enterprise-class Services
- Wire-speed switching and routing
- Cisco StackWise™ Technology
  - Fault-tolerant, Bi-directional 32-Gbps stack interconnection
  - Automated Configuration & Management
  - Single network instance (IP, SNMP, CLI, Spanning-Tree Protocol , VLAN)
  - Master/secondary architecture with master failover
  - Cross-Stack EtherChannel®, cross-stack QoS
- Next Generation in Desktop Switching
  - Optimized for Gigabit Ethernet
  - IPv6-capable in hardware

Introducing Cisco EnergyWise
"Smart Loads"

- EnergyWise is a new Cisco technology for power based management and reporting
- Measure power of **ALL** connected network devices (phones, APs, PCs, building systems etc.)
- Control and optimize power delivery
- Significant cost saving
- Energy saving instead of energy tax

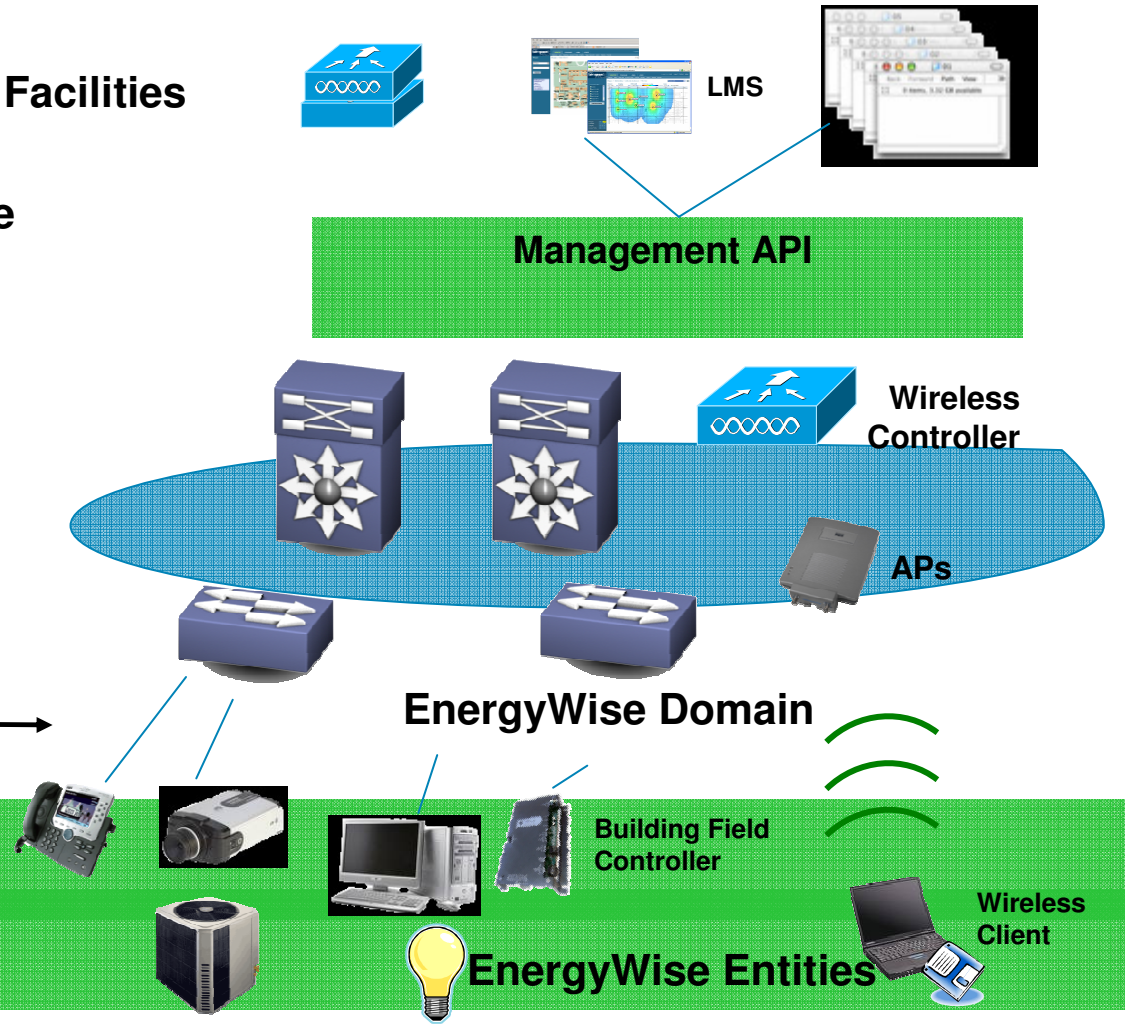
EnergyWise: Architecture

applications for IT or Facilities

d routers communicate
agement API

rk aggregates status
easurements

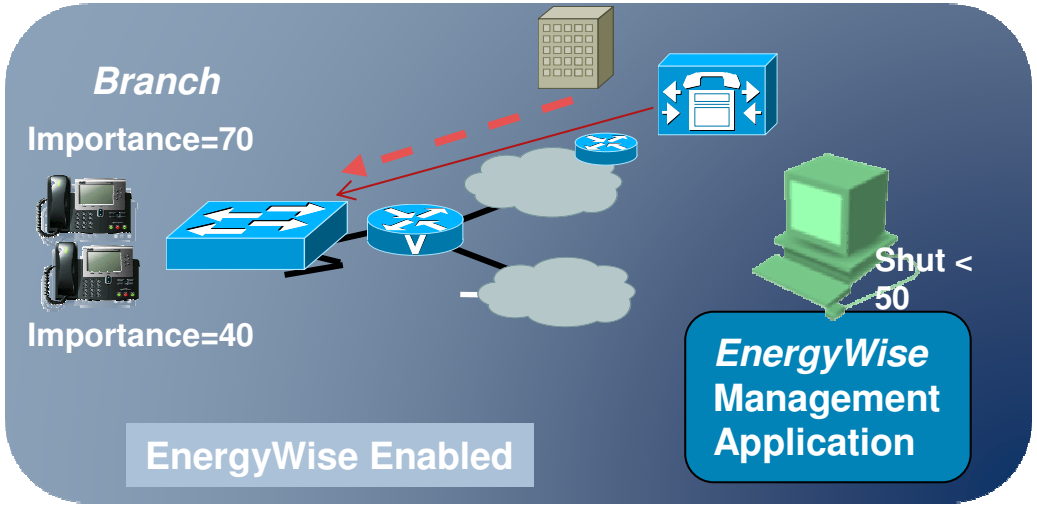
col communicates
nts



EnergyWise Priority

- **Priority** determines which devices will be affected.
- If the priority is greater than importance, action is taken.

EnergyWise Query
- Entity Phone
- Priority of 50
- Action: Set level Shut



Cisco Catalyst 4500 Series Switches

Positioning:

For Enterprise, Mid-sized business and Service Providers

Midrange modular chassis offering flexible slot options and redundant supervisor engine options

Features/Highlights:

- Redundant supervisor engines minimize network application downtime during switchover
- Backward capability supporting older modules
- Power over Ethernet capability
- High performance IP routing
- Redundant power supply support and hot-swappable components
- Up to 384 Fast Ethernet or Gigabit Ethernet ports
- 10 Gigabit Ethernet connectivity

Ideal for Businesses Requiring a Scalable, Modular Switching Solution With Support for IP Routing and Extensive Redundancy Features

www.cisco.com/go/catalyst4500

Cisco Catalyst 6500 Series Switches

Positioning:

For Enterprises, Mid-sized businesses and Service Providers

Flagship modular chassis offering industry-leading switching services and scalability

Features/Highlights:

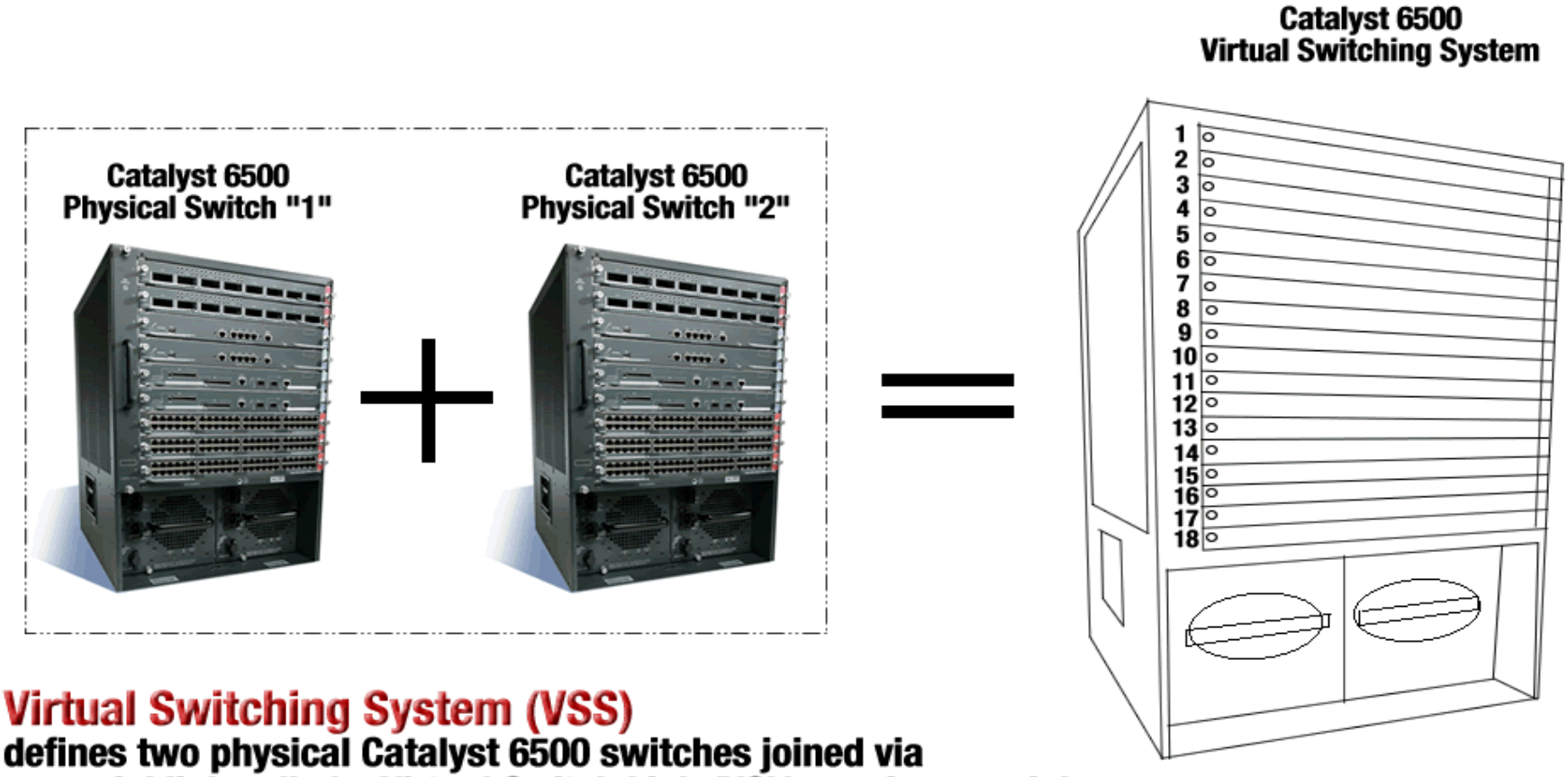
- Highest level of availability with Cisco IOS Modularity
- Most advanced switch security
- Integrated wireless, voice, and video services
- Highest port densities for PoE, Fast Ethernet, Gigabit Ethernet and 10 Gigabit Ethernet
- Unparalleled investment protection with longest product lifecycles and backwards capability
- Enhanced Services with Integrated Modules supporting Voice, Wireless, Firewall, VPN, Intrusion Detection, Content Switching and SSL

Ideal for Businesses Requiring the Most Robust Switching Solution that Best Supports Current and Future Applications

www.cisco.com/go/catalyst6500

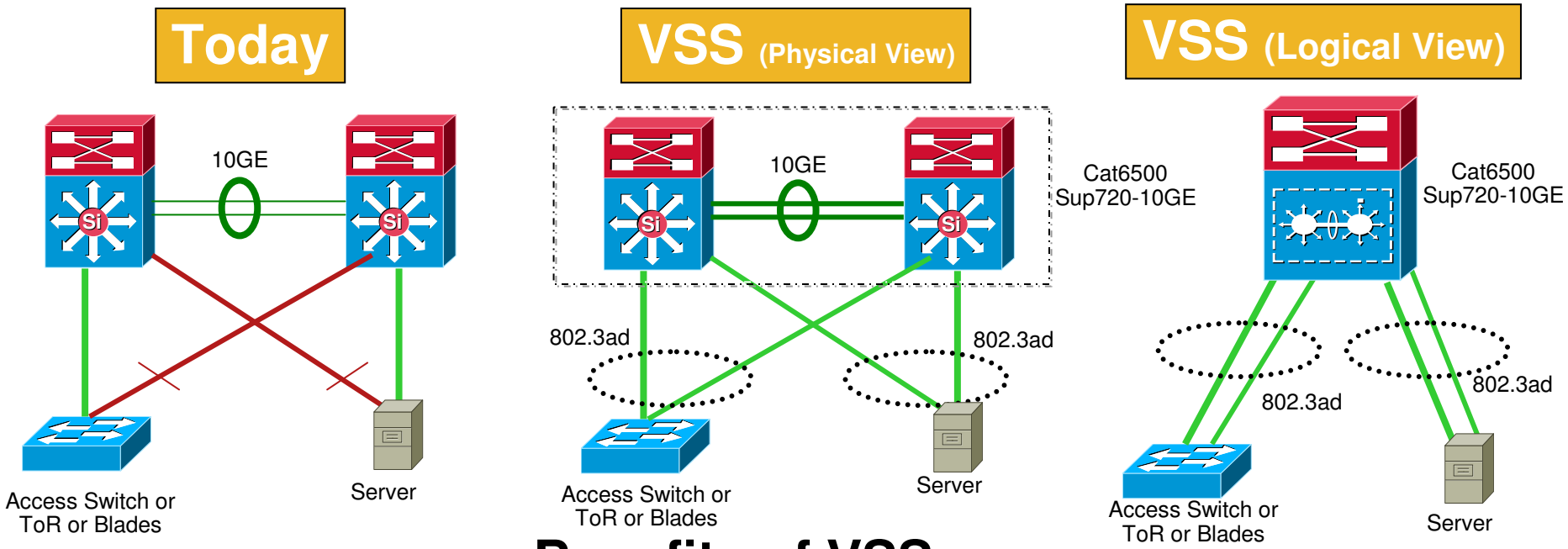
Virtual Switching System

Virtual Switching System System is a new technology break through for the Catalyst 6500 family…



Virtual Switching System (VSS)
defines two physical Catalyst 6500 switches joined via a special link called a Virtual Switch Link (VSL) running special hardware and software that allows them to operate as a single logical switch

Catalyst 6500 Virtual Switching System 1440
Network System Virtualization



Benefits of VSS

Simplifies Operational Manageability via Single point of Management, Elimination of STP, FHRP etc

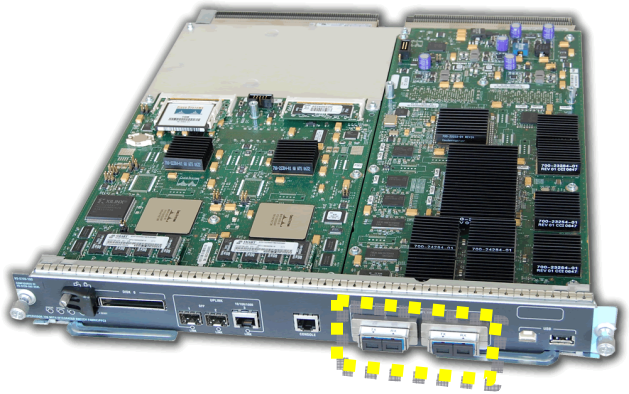
Active-Active Multi-Chassis Etherchannel (802.3ad) to Double Bandwidth Utilization and Reduce Latency

Deterministic sub-200ms Stateful and Graceful Recovery from Switch or Uplink Failure to Minimize Traffic Disruption

Hardware Requirements
VSL-Capable Interfaces

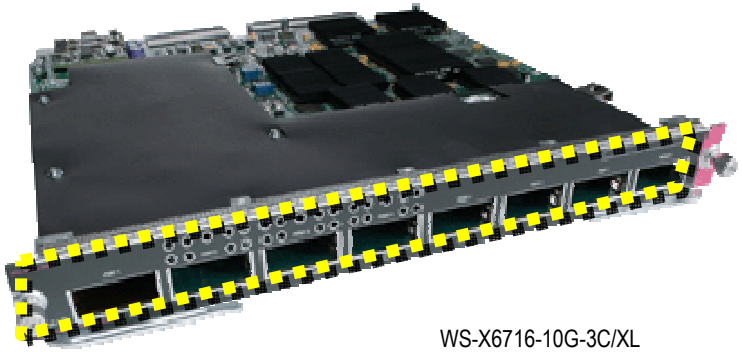
The VSL is a special link that requires extra headers to be imposed onto the frame. These require new port ASICs that exist only on the 10 GigabitEthernet interfaces on the following modules… WS-X6716-10G-3C/XL module is supported starting from 12.2(33)SXH2* in non VSL config

VS-S720-10G-3C/XL



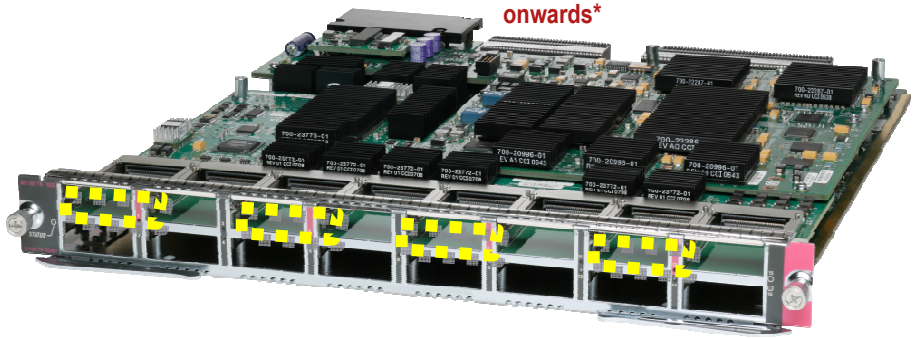
Note that these interfaces may also be used as standard network interfaces

WS-X6708-10G-3C/XL



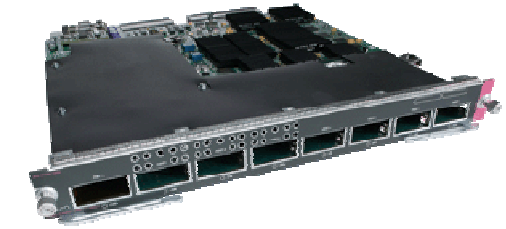
These interfaces are based off the new port ASIC, allowing for frames across the VSL to be encapsulated / de-encapsulated with the VSH…

WS-X6716-10G-3C/XL
support for VSL is from 12.2(33)SXI onwards*



Hardware Requirements
Other Supported Modules…

Modules that may exist with current software version in the VSS domain include all WS-X67xx-series, as well as SVC-NAM-1 and SVC-NAM-2.

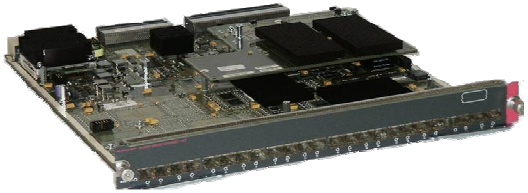


WS-X6708-10G-3C/XL

WS-X6704-10G-3C/XL

12.2(33)SXH1
WS-X67xx
and NAM

SVC-NAM-1 and 2



WS-X6724-SFP

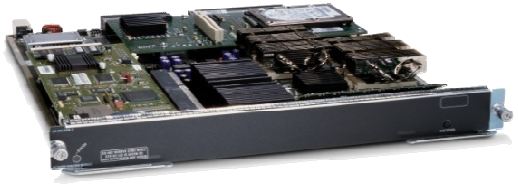
WS-X6748-SFP

WS-X6748-GE-TX

Hardware Requirements
Service Module support…

Other modules that may exist in the VSS domain with software release 12.2(33)SXI is Service modules FWSM,ACE,IDSM-2 and FWSM.

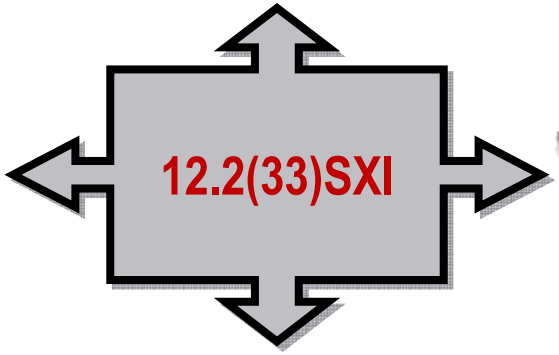
Application Control Engine (ACE)



ACE10/20-6500-K9

Firewall Services Module (FWSM)

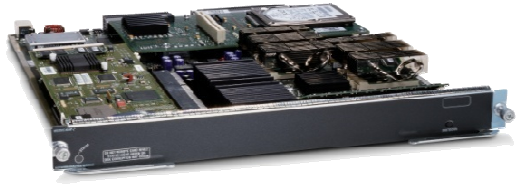
WS-SVC-FWM-1-K9



Wireless Services Module (WiSM)

WS-SVC-WISM-1-K9

Intrusion Detection System Services Module (IDSM-2)



WS-SVC-IDSM2-K9

Cisco IE 3000

Industrial Ethernet Switch Series

Cisco Industrial Ethernet Solutions

Cisco IE 3000
Rugged Switch Series

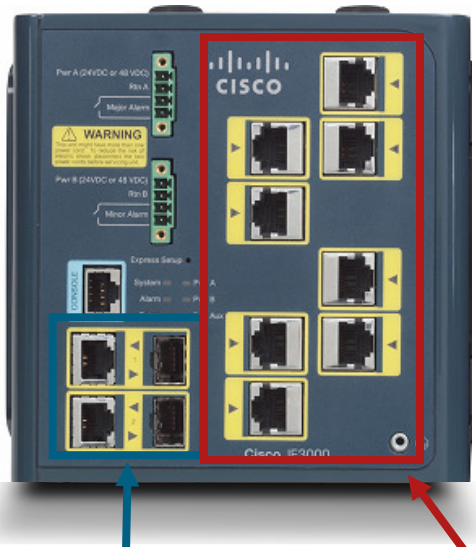
Cisco IE 3000

- **Ruggedized for Industrial Applications**
- Modular design with many configurations
- Extended power options
- Surge protection
- IE SwapDrive for “Zero-Config” replacement
- Ease of use features
  - Cisco device manager & CNA support

Modular Design

Modular Design

Base Module
(4-port or 8-port)



Extension Module A
(8-port Copper)

8 Extended Data Ports
10/100 Copper

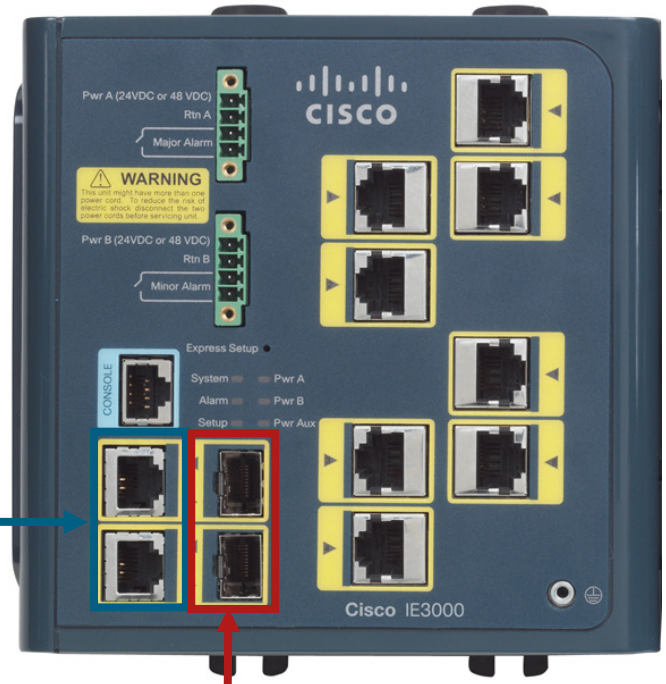
Extension Module B
(8-port Fiber)

8 Extended Data Ports
100 Fixed Fiber

Dual Purpose Uplink Ports
10/100/1000 Copper or SFP

Data Ports
10/100 Copper

Dual Purpose Uplinks



GigE Copper Uplinks
10/100/1000

OR

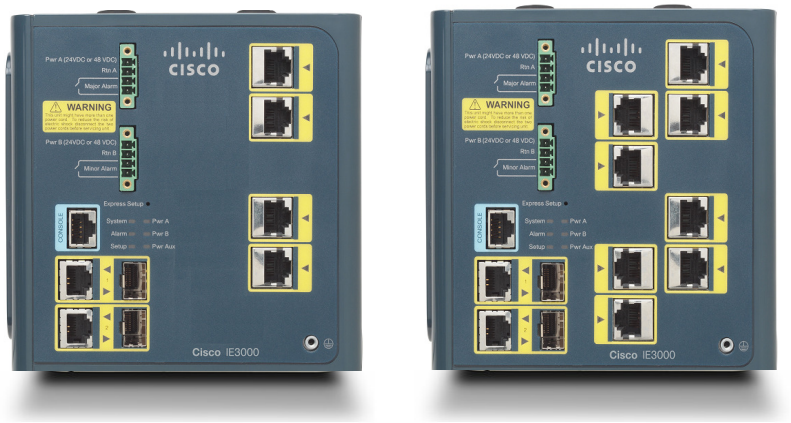
SFP Fiber Uplinks
10/100/1000

- Industrial SFPs Supported:
  - 100FX
  - 1000SX
  - 100LX
  - 1000LX
  - 1000ZX

SFP Fiber Transceiver

IE 3000 Modules (Further detail)

- **4 & 8-port base switch (10/100BaseT)**
  - Dual purpose uplinks
    - 10/100/1000BaseT or SFP
  - Dimensions
    - 6.0” w x 5.8” h x 4.4” d
- **8-port copper module (10/100BaseT)**
- **8-port fiber module (100FX)**
  - Expansion options:
    - One or two 8-port 10/100BaseT modules
    - One 8-port 100FX module
    - One 8-port 10/100BaseT module and one 8-port 100FX module
  - Dimensions
    - 3.5” w x 5.8 h x 4.4” d
- **Snap on power transformer module**
  - Power module inputs:
    - 85-265 VAC
    - 88-300 VDC
  - Dimensions:
    - 2” w x 5.8” h 4.4” d



Cisco IE 3000 (Hardware Features)

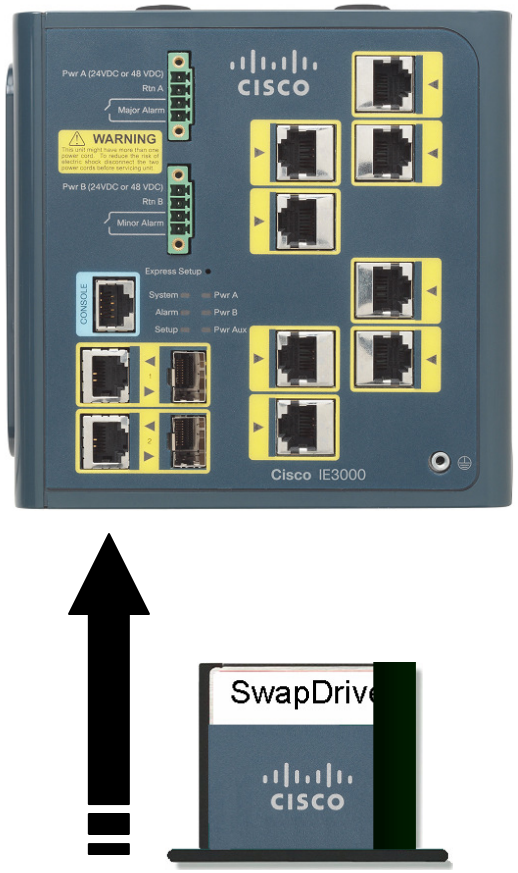
Ruggedized

Feature	Description
Mounting	DIN-Rail, Wall-Mount and Rack-Mount (19” rack converter provided)
Temperature	-40C to 75C (-40F to 167F)
Relative Humidity	5% - 95% Condensing
Shock	20g (Operational), 30g (Non-Operational)
Surge Protection	4 kV (line to earth) / 2 kV (line to line)
Alarms	Dual 24V alarm relays, normally open
Real Time Ethernet	IEEE 1588v2 – hardware ready
Fiber Connectors	LC
Intrusion Protection rating	IP20 (Protection against dust, (solids greater than 12mm), No protection against water)
Power input	24V/48V DC

IE SwapDrive - "Zero-Config" Replacement

Easy to Use

- **"Zero-config" replacement**
  - Simple switch replacement in case of a failure
  - No networking expertise required
  - IE SwapDrive ensures fast recovery
- **Files stored on the SwapDrive**
  - IOS Image – (tar, html) – 2 sets
  - Config text
  - VLAN dat
  - Other devices configs



Cisco IE 3000 Software Features

Factory Floor Optimized

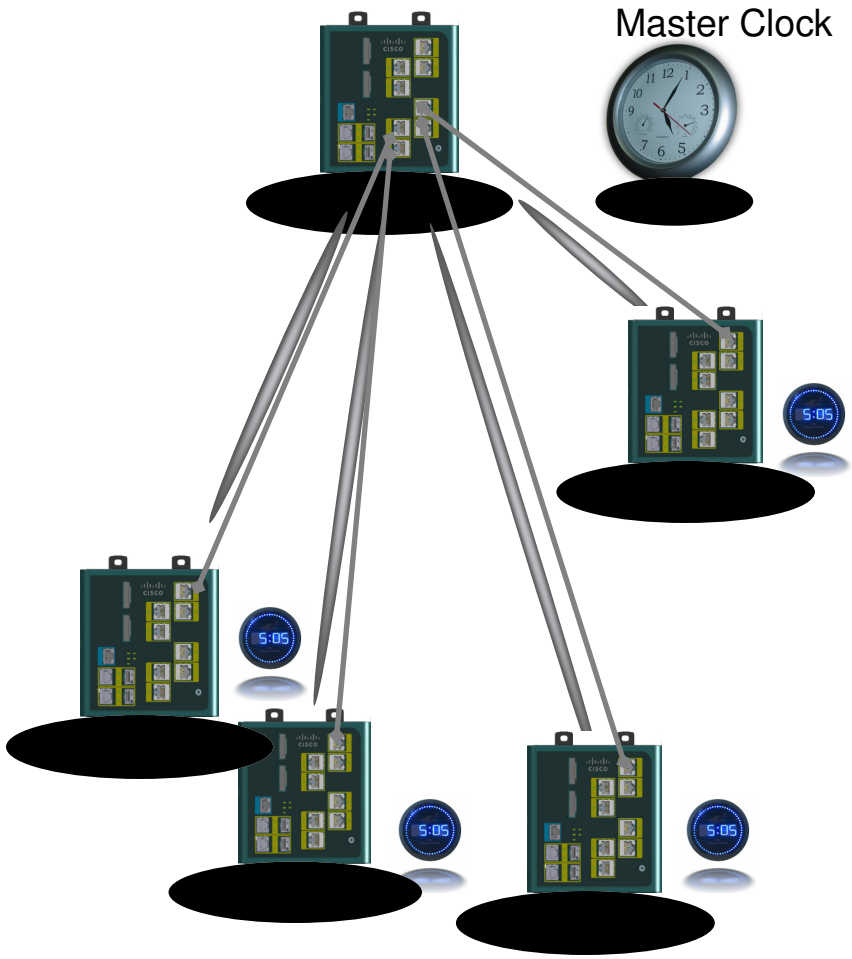
Catalyst 2960 LAN Base Image +

Feature	Description	
Common Industrial Protocol (CIP)	A peer-to-peer application layer protocol suite, shared by industrial networks such as DeviceNet, ControlNet and EtherNet/IP.	Jun '08
Industrial Automation Smartport Templates	Optimized Smartport profiles for industrial automation devices.	
DHCP Persistence	DHCP server offers the same IP address to the devices	Sep '08
PTP (IEEE 1588v2)	PTP Software module for time synchronization	
Layer 3		Jan '09
PROFINET IO	Exchange data, alarms and diagnostics information with the PROFINET automation controllers and IO devices	
Resilient Ethernet Protocol (REP)	Segment Protocol, 50 nodes and 50ms ring convergence	

IEEE 1588v2 – Precision time protocol

Standards Based

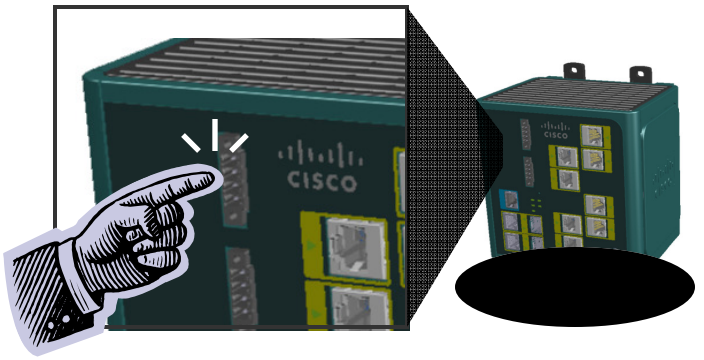
- **Precision Time Protocol (PTP)**
  - Real-time synchronization in a distributed system
- **Needed in environments with high performance industrial applications**
  - Motion control requires sub-micro second accuracy and precision
  - All devices synchronize their clocks to within 1 microseconds or less
  - The high-precision activity is scheduled (ex: all systems stop at time=x)

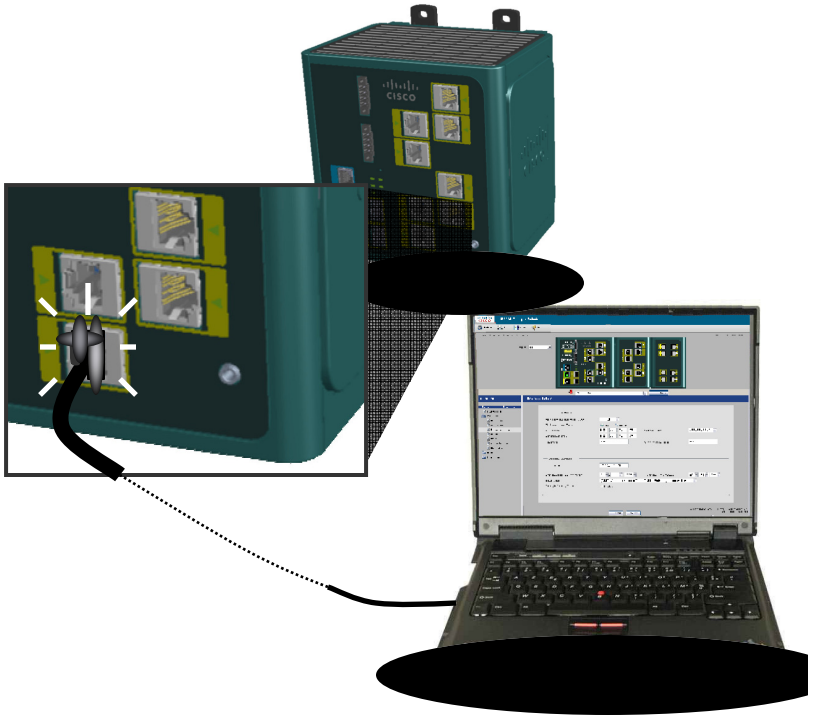


Initial Switch Set-up Cisco Express set-up

Easy to Use

1. Power up device
2. Wait until SYSTEM light is solid and SETUP LED is blinking
3. Press SETUP button once
4. Wait for port light to blink and connect this port with an Ethernet cable to the PC
5. Pull up browser from PC



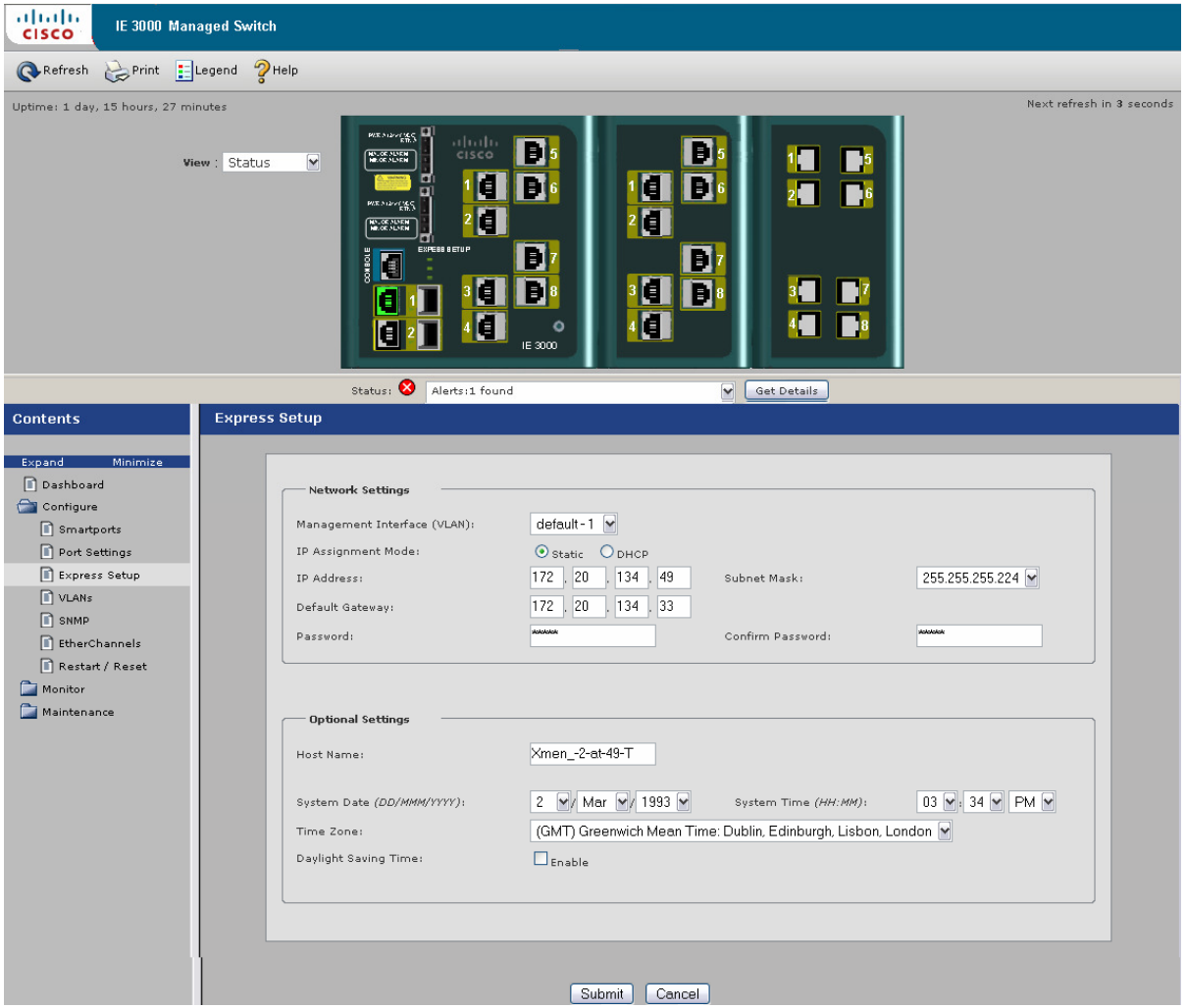


Express Set-up Device Manager

Easy to Use

Express Setup –
Web-based GUI provides simple way for a network manager to get the switch up and running

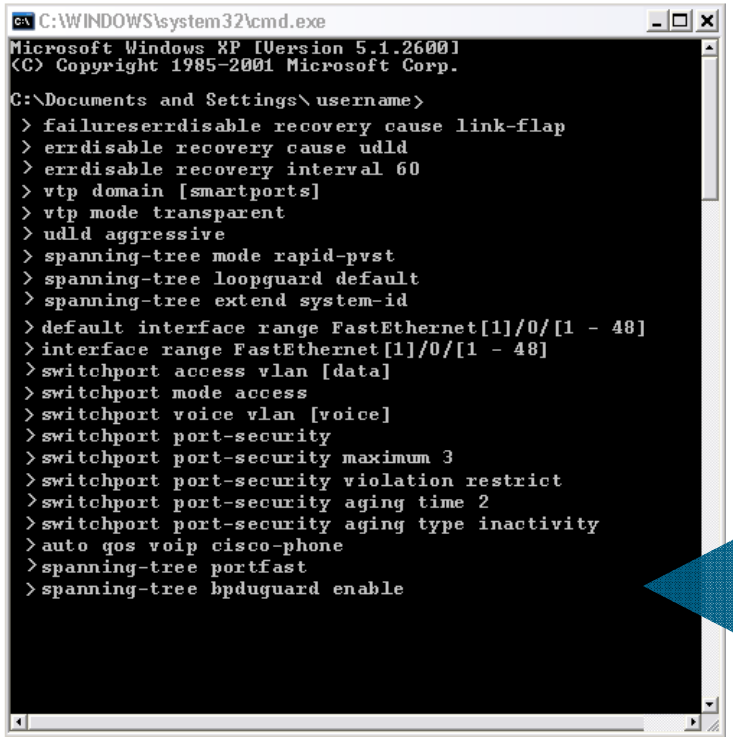
Device Manager –
intuitive GUI embedded in the switch for easy configuration, simplified monitoring, maintenance and troubleshooting



Out-of-the-Box Configuration Smartport Templates

Easy to Use

Traditional Switch – Command line interface (CLI) configuration



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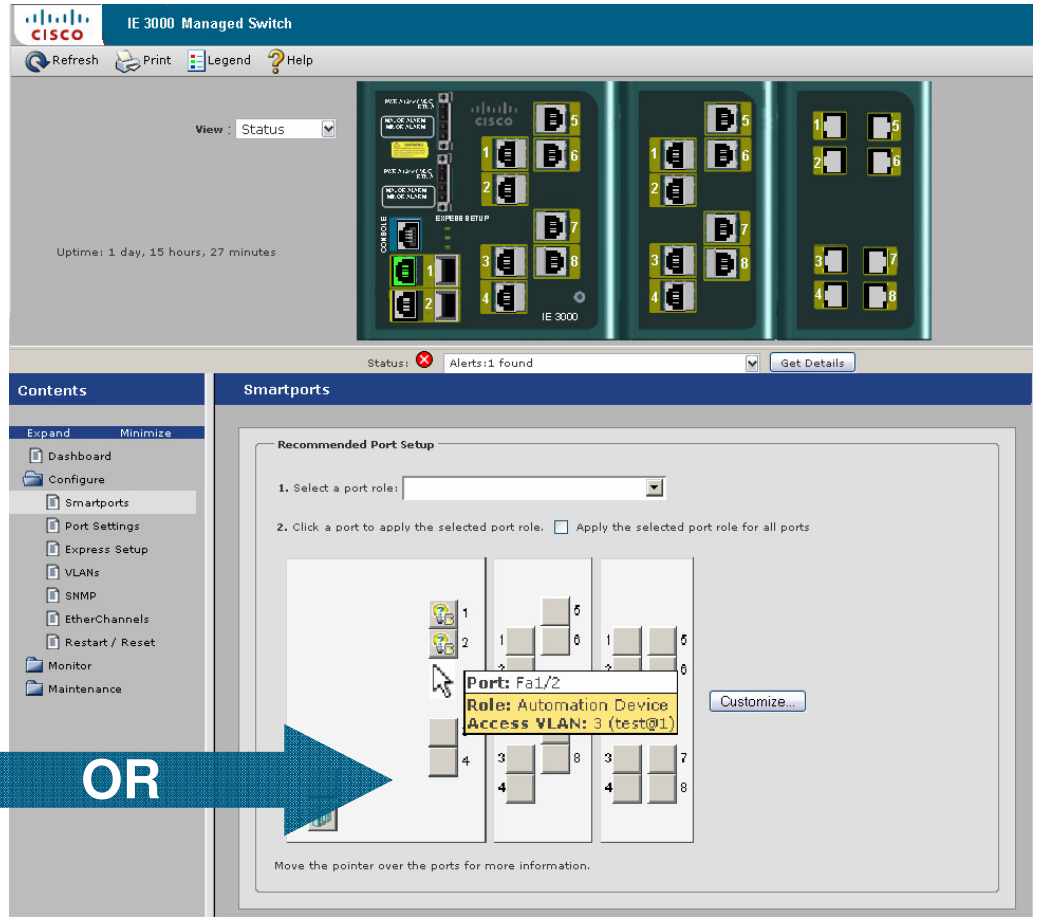
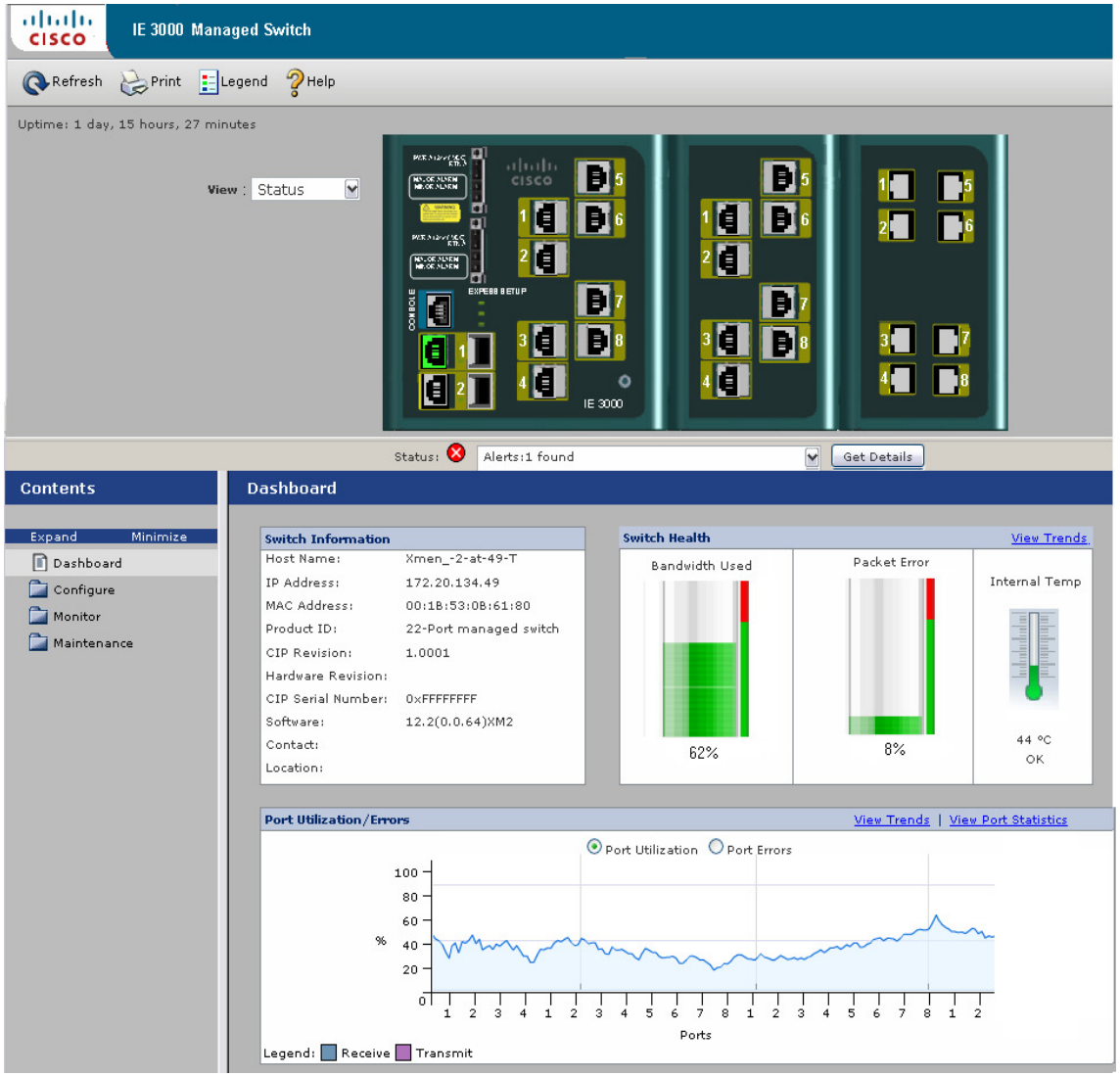


Smartports – Offer one click configuration based on best practices for industrial Ethernet devices

GUI Management Dashboard

Easy to Use

Dashboard – Allows for dynamic monitoring of switch health



Rockwell Automation Partnership

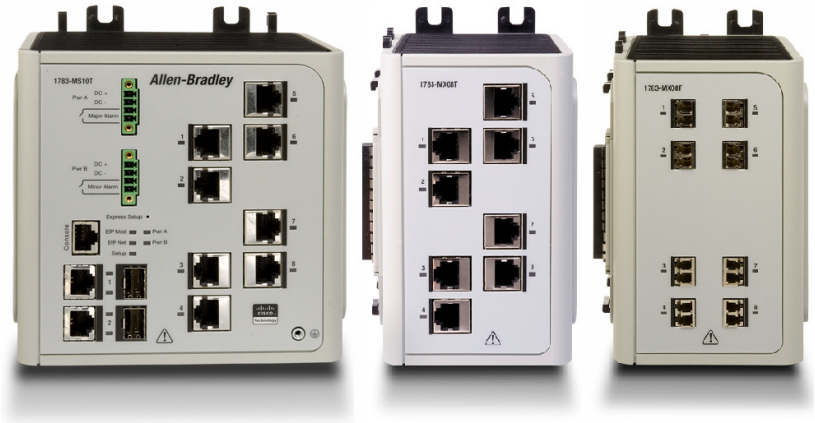
- **Best of Cisco**
  - Cisco Internetnetworking Operating System (IOS)™
  - Catalyst™ switch architecture and feature set
  - CLI & Device Manager
  - Secure integration with enterprise network

+

- **Best of Rockwell**
  - CIP interface to integrated architecture
  - RSLogix 5000 for configuration (AOP)
  - Predefined Logic tags for diagnostics
  - FactoryTalk™ View Faceplates

+

- **Best for the Plant Floor**
  - Cisco IE SwapDrive for “Zero-Config” replacement
  - Industrial environmental ratings
  - Default configurations for Industrial Automation



Stratix 8000 Switch

Allen-Bradley + CISCO Technology

Factory Floor Optimized

Easy to use

Secure

Standards Based