Getting the most value from your Cisco Infrastructure
Borderless Network Switching features

- Operational Manageability
  (CiscoWorks, NAM)
- Non-Stop Communications
  (NSF, SSO, ISSU, EEM, GÖLD)
- Integrated Security
  (IBNS, 802.1x, NAC, DAI)
- Virtualisation
  (VRF-lite, VSS)
- Application Intelligence
  (PISA, IP-SLA, Netflow, QoS)
- Unified Network Services
  (802.11n, ePoE, Location Services)
Access Layer

Feature Rich Environment

- It’s not just about connectivity
- Layer 2/Layer 3 feature rich environment; convergence, HA, security, QoS (SRR), IP multicast, etc.
- Intelligent network services: QoS, trust boundary, broadcast suppression, IGMP snooping
- Intelligent network services: PVST+, Rapid PVST+, EIGRP, OSPF, (stub option for IP base) PAgP/LACP, UDLD, FlexLink, etc
- Cisco Catalyst integrated security features IBNS (802.1x), (CISF): port security, DHCP snooping, DAI, IPSG, etc.
- Automatic phone discovery, conditional trust boundary, power over Ethernet, auxiliary VLAN, etc.
- Spanning tree toolkit: Portfast, UplinkFast, BackboneFast, LoopGuard, BPDUGuard, BPDUFilter, RootGuard, etc.
Video-Ready Campus Architecture

Best Practices

High Availability
- Implement strategy for sub-second failover
- Implement HA architecture with NSF/SSO, VSS, etc.

Latency and Bandwidth Optimization
- GigE access
- 10GigE distribution/core
- Implement IP multicast and/or stream splitting services

Real-Time Application Delivery
- Implement robust QoS service policies to manage application service levels
- Access layer protection and insuring endpoints are fair consumers

Confidentiality
- Authentication of endpoints and users (e.g. 802.1x)
- Comply to security policies with data protection strategies, such as encryption (e.g. Cisco TrustSec)

Medianet design zone:
Medianet: Plug & Play of Cisco video endpoints

- Switch automatically configures DMP’s based on Cisco’s best configuration practice
- Energy management via EnergyWise enabled switches
- Switch provides physical location / capacity information
- Auto registration with Digital Media Manager
- Same apply to video surveillance
- Device authentication - Integration with 802.1x
Medianet: The endpoint talks to the network

- Encrypted traffic
- Deep Packet Inspection capabilities not available to all platforms
- Need multi-stream co-ordination
- Need explicit description of video application stream

Video application requires low-packet-loss, low-latency
Network Calibration and troubleshooting

Customer Problem:
- Network Evaluation requires hiring consultants with expertise or buying expensive tools.
- Need to fly/drive to sites for physical access to the network.

Capabilities: April 30th EFT
- In-built Traffic Generator in the switch with accurate traffic profiles for Telepresence, DMP, CUVA etc.
- Advanced scheduler and IPSLA management integration

Customer Benefits:
- User Friendly, no expertise needed
- Ease of management: LMS, EmMS and 50+ external partners
- Remote Operation
Cisco EnergyWise

- **EnergyWise** is a new Cisco technology for power based management and reporting
- **Measures power** of **ALL** connected network devices (phones, APs, PCs, building systems etc.)
- Provides **Command and Control** of powered devices
- Customers realize **significant cost saving**
EnergyWise Operating Cycle

- Optimize Power Delivery with Policies
- Regulate
- Monitor
- Advise
- Map
- Poll Power of Network Attached Devices: Phones, APs, PCs, Building Systems
- Correlate Power and Actions for Use Cases
- Show Power and Cost Savings
- Real-time Granular Power Management
- Location
Cisco EnergyWise

Technology Leadership Continues

- Cisco EnergyWise Orchestrator – PC Power Management client/server
  Sustainability Dashboard for PoE devices and PC power usage and control
- Developer Toolkit – CDN, API/SDK for 3rd party developers and technology partners
  Available through Cisco Developer Program
- New platform support – Cisco ISR G2 and Catalyst 6500
Optimizing room controls

- Room setting customized for staff member

Staff member badges in and EnergyWise Notified

Policy Added and Distributed to Network

Identify Room Phones, AP, Building HVAC, Lights

Room Power Up

- Phones power up
- Wireless coverage assured
- Room temperature set
- Lights on
Reducing Headquarters Peak Power Usage

- EnergyWise controls laptop, phones and building cooling
- Peak Power reached—smooth and time shift power use

- Laptop to Battery Power
- Eligible phones night sleep mode
- Building temperature decreased

EnergyWise Management Monitors Power

Peak Power Alert (Smartgrids)

Policy Added and Distributed to Network

Identify Eligible Phones, Laptops, Building HVAC

-2 degree Micro-Gen
Wired Location Services Integration

Use Cases
- Asset tracking and management
- EnergyWise Location-based power monitoring and management

Campus Location Integration
- Unified wired and wireless location services
- Central location management with Cisco MSE
- Campus switches communicate location info with MSE via NMSP protocol
Cisco Beyond - A Scripting Community for Embedded Event Manager

- Cisco IOS EEM
  - Extremely flexible and powerful onboard, event driven scripting facility

- Cisco Beyond
  - A place to share scripts, upload, download, get examples

- Coming to CCO in Nov 2006

More details:
http://cisco.com/go/eem
http://forums.cisco.com/eforum/servlet/EEM?page=main
MPA - With Mini Protocol Analyzer

- Packet Analyzer inside the box
- Analyze can be filtered using ACL, Ethertype, packet length and Vlan
- Files saved locally as pcap or can be exported
Network Virtualisation
Creation of Logical Partitions – to facilitate security

- Virtualization: one-to-many (one network supports many virtual networks)
- End-user perspective is that of being connected to a dedicated network (security, independent set of policies, routing decisions…)
- It is critical to have a rock-solid campus design in place before adding virtualization to the network

Staff Net

Student Net

Guest Net

Actual Physical Infrastructure
Cisco on Cisco UC example

- Link status msg addresses root cause
- Session cleared immediately.
- Works for MAB *and* 802.1X
- Nothing to configure
- Cisco on Cisco Value

**IP Phone: 8.4(2)**
- 3K: 12.2(50)SE
- 4K: 12.2(50)SG
- 6K: 12.2(33)SXI
Cisco on Cisco Wireless example

- Common WLAN-specific endpoint threats include:
  - Client connection to a rogue AP/network
  - Rogue client ad-hoc connection to the client
  - Unauthorised WLAN peer-to-peer connection
  - Client DoS by spoofing 802.11 management frames to disconnect user
# Ease of Use Capabilities

<table>
<thead>
<tr>
<th>Smart Install</th>
<th>Smart Configuration</th>
<th>Smart Troubleshooting</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Plug and play</td>
<td>• Auto configure</td>
<td>• Help System</td>
</tr>
<tr>
<td>• Smart replace</td>
<td>• Single point of management</td>
<td>• CLI Wizards</td>
</tr>
<tr>
<td>• Smart Upgrade</td>
<td>• CLI templates</td>
<td>• Network based approach</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Smart Call Home</td>
</tr>
</tbody>
</table>

Integrated Branch and Campus Solutions
Introducing Catalyst 2960-S

- 24/48 10/100/1000 ports with fixed uplinks
- Fixed Uplink Options: 4x1G or 2x10G SFP+
- FlexStack Technology
  Brings stackable ease-of-use features to the 2960 family, features 20G stacking links
- Power over Ethernet
  Full standards-based PoE on every port
  PoE+ support for next-generation high-power devices
- Sustainability - GREEN
  Very low power for Gigabit Ethernet Switch
  New EnergyWise functionality to control PHY power
  Half the power of Catalyst 2960G
- E-LLW, NBD and 90 day TAC support
- LAN Lite and LAN Base Software Options
- LAN Lite option provides entry-level Gig-E platform
Catalyst 2960-S Characteristics

- 10/100 Ethernet for Out Of Band (OOB) network mgmt
  new for C2960-S series
- USB Flash - type A, external Flash storage
- USB console (type B) and RJ45 console supported
- DRAM: 128MB
- On board Flash: 64MB
- Low Latency
- RPS support: CAB-E type cable. (CAB-RPS2300-E=)
Cisco Catalyst 2960-S QoS Model

**Classification**
- Inspect incoming packets
- Based on ACLs or configuration, determine classification label

**Policing**
- Ensure conformance to a specified rate
- On an aggregate or individual flow basis
- Up to 256 policers per switch
- Support for rate and burst

**Marking**
- Act on policer decision
- Reclass or drop out-of-profile

**Egress Queue/Schedule Congestion Control**
- Four SRR queues/port shared or shaped servicing
- One queue is configurable for strict priority servicing
- WTD for congestion control (three thresholds per queue)
- Egress queue shaping
- Egress port rate limiting

Enterprise Access QoS
Catalyst 2960-S Power Usage vs. Industry

$55K cost savings 1000 switches per year

Watts Consumed & Utilization

<table>
<thead>
<tr>
<th>State</th>
<th>C2960S-48TD</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>idle</td>
<td>20</td>
<td>120</td>
</tr>
<tr>
<td>5% Utilization</td>
<td>40</td>
<td>80</td>
</tr>
<tr>
<td>100% Utilization</td>
<td>60</td>
<td>100</td>
</tr>
</tbody>
</table>

Annual Energy Costs per Switch

<table>
<thead>
<tr>
<th>State</th>
<th>C2960S-48TD</th>
<th>Industry</th>
</tr>
</thead>
<tbody>
<tr>
<td>annual cost</td>
<td>$96</td>
<td>$146</td>
</tr>
</tbody>
</table>

Cost savings 1000 switches per year
Cisco IOS Software Feature Set Capabilities
Catalyst 2960-S, Catalyst 3750-X and 3560-X

Positioning Guidelines

**Layer 2**
- **LAN Lite**
  - Entry Level Layer 2
- **LAN Base**
  - Enterprise Access Layer 2 (16 static routes by August)

- **Cisco® Catalyst® 2960 and 2960-S**
- **Cisco Catalyst 2960 and 2960-S, 3560-X and 3750-X**

**Layer 3**
- **IP Base**
  - Enterprise Access Layer 3
- **IP Services**
  - Enterprise Advanced Layer 3

- **Cisco Catalyst 3560-X & 3750-X**
- **Cisco Catalyst 3560-X & 3750-X**
Catalyst 3750-X and 3560-X Series

- Next Generation Gigabit Ethernet 24 and 48 port, Data and PoE+ Switches
- Three IOS feature sets:
  - LAN Base
  - IP Base
  - IP Services
- Innovative features, StackPower, PoE+, Encryption, Dual redundant PS, Network modules
- Enhanced LLW:
  - Next business day (NBD) advance hardware replacement
  - 90 Day access to Cisco Technical Assistance Center (TAC) support
- Full Energy-Wise support
Catalyst 3750-X and 3560-X

What’s New

- StackPower – Power aggregation
- Network Modules – Field replaceable uplink
- Full 802.3at PoE+ Support
- Three IOS feature sets
- Dual redundant power supplies and fans
- MACsec – Hardware encryption
# Catalyst 3750 Models comparison

<table>
<thead>
<tr>
<th></th>
<th>3750-X</th>
<th>3750-E</th>
<th>3750G</th>
</tr>
</thead>
<tbody>
<tr>
<td>StackPower</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>FRU Network Module</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>FRU Power Supplies</td>
<td>Yes, Dual PS</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Encryption</td>
<td>Yes (Downlink)</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>PoE+ 30W/port</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>IOS</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>LAN Base Option</td>
<td>Console RJ45, <strong>USB console</strong>, and Out of band Ethernet</td>
<td>Console RJ45 and Out of Band Ethernet</td>
<td>Console RJ45</td>
</tr>
<tr>
<td>RPS / XPS</td>
<td>XPS</td>
<td>RPS</td>
<td>RPS</td>
</tr>
</tbody>
</table>
StackPower
Main features

- Innovative technology, aggregates and shares available input power capacity in a Stack
- Flexible arrangement of power supplies in a stack
  - Up to 8.8Kw power in a stack
- Supports a “zero-footprint” RPS deployment
- Intelligent power shedding
- Stackpower decouples a PS from its physical location in the stack!
- Up to 4 switches can be part of Stackpower
  Independent from Stackwise (Stackwise Plus)
- No need for RPS though an XPS is available!
Intelligent Load shedding

- Built-in intelligence to detect important PD or switches in a stack
- Stackpower has 27 priority levels
- Default priority per port can be re-programmed
- All ports are Low priority by default
- The amount of load shedding depends on the amount of oversubscribed power
- Intelligent mechanism to shed load during failure scenarios
MACsec (Crypto)
Main features

- Standards based encryption (802.1AE) on all user ports
- Line rate performance
- Standards based key exchange protocol, MKA, included in 802.1X-Rev
- Tested with current Intel NIC cards
- Some newer Intel’s LOM chip set supports MACsec
### LAN Base vs. IP Base and IP Services

#### Highlights

<table>
<thead>
<tr>
<th>Functions</th>
<th>LAN Base</th>
<th>IP Base</th>
<th>IP Services</th>
</tr>
</thead>
</table>
| **Layer 2+**       | • Enterprise access Layer 2  
Wide range of Layer 2 access features for enterprise deployments | • Complete Access Layer 2  
Supports all Cisco Catalyst 2000 and Catalyst 3000 Layer 2 features, including hot standby protocols; supports Cisco StackPower™ technology (Cisco Catalyst 3750-X) |                                                             |
| **Layer 3**        | • No routing support  
Support for SVI with no IP routing support                                | • Enterprise access Layer 3  
RIP, static and stub PIM, and EIGRP                                      | • Complete access Layer 3  
OSPF, EIGRP, BGP, IS-IS VRF-lite, WCCP, and PBR                             |
| **Manageability**  | • Basic manageability  
Support for a wide range of MIBs, IPSLA Responder, and RSPAN             | • Enterprise access Layer 3  
Gold-Lite and Smart Install Director                                       | • Complete access Layer 3  
EEM and IPSLA Initiator                                                     |
| **Security**       | • Enterprise access security  
DHCP Snooping, IPSG, DAI, PACLs, Cisco Identity 4.0, NAC and 802.1x features | • Complete access security  
Router and VLAN ACLs, private VLANs, complete identity and security, TrustSec SXP, and IEEE 802.1AE (Cisco Catalyst 3560-X and Catalyst 3750-X) |                                                             |
| **QoS**            | • Enterprise access QoS  
Ingress policing, Trust Boundary, AutoQoS, and DSCP mapping              | • Complete access QoS  
Support for all Cisco Catalyst 2000 and Catalyst 3000 QoS features, including per-VLAN policies |                                                             |

Note: IP Services feature set includes all IP Base features. IP Base feature set includes all LAN Base features.
Borderless Access: Enhanced Limited Lifetime Warranty

Catalyst 3750-X, 3560-X and 2960-S

- Limited Lifetime Warranty
  - 5 years on Power Supplies and Fans
- Next Business Day Hardware Replacement
- 90-Days TAC Support
- Unlimited maintenance updates for LAN Base and LAN Lite Images*

*Service Contract required for IOS Premium Images
4500 bundles

WS-C4503E-S6L-48V+
WS-C4503-E WS-X45-SUP6L-E WS-X4648-RJ45V+E (44% off List Price)

WS-C4506E-S6L-96V+
WS-C4506-E WS-X45-SUP6L-E 2xWS-X4648-RJ45V+E (44% off List Price)

WS-C4507RES6L-96V+
WS-C4507R-E WS-X45-SUP6L-E 2xWS-X4648-RJ45V+E (40% off List Price)

WS-C4510RE-S6-96V+
WS-C4510R-E WS-X45-SUP6-E 2xWS-X4648-RJ45V+E (37% off List Price)

*Sup6-E Lite now L3 capable with upgrade to enterprise services IOS
# Catalyst 4500 Warranty Policy Change

Continuous improvement to address the evolving customer needs

<table>
<thead>
<tr>
<th></th>
<th>Old</th>
<th>Current</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hardware</td>
<td>90 Day</td>
<td>LLW</td>
<td>Increased Entitlement</td>
</tr>
<tr>
<td>LAN Base</td>
<td>90 Day</td>
<td>Lifetime</td>
<td>Increased Entitlement Image is made available as guest-access</td>
</tr>
<tr>
<td>IP Base*</td>
<td>90 Day</td>
<td>Lifetime</td>
<td>Increased Entitlement Image is made available as guest-access</td>
</tr>
<tr>
<td>Enterprise Services</td>
<td>90 Day</td>
<td>90 Day</td>
<td>None</td>
</tr>
</tbody>
</table>

All individual components or configured systems purchased after May 1st, 2009 will have Limited Lifetime Hardware Warranty

For more details see – http://www.in.cisco.com/marketing/network/solutions/switching/warranty.shtml

* LAN Base to IP Base upgrade is $10,000
Virtualization and Manageability – Typical Campus Network Design Today

Before
Virtual Switch System

Benefits

Upstream and Downstream neighbors will view the Virtual Switch as a single Layer 2 switching node or as a single Layer 3 routing node thus reducing Layer 2/3 control protocol traffic.

Single Management Point
Administrators will see a single management point from which to configure and administer the VSS which includes a single consolidated configuration file for both physical switches.

Multi-Chassis Etherchannel allows a link bundle to terminate across TWO physical Catalyst 6500 chassis.

As far as the other end is concerned, the link bundle is seen as terminating on the one physical device even though it is actually terminating across two chassis.
Virtualization and Manageability – Cisco Virtual Switching System (VSS)

After
Cisco Switching – Addressing Business Priorities

Responsive Business
Operational Excellence
Human Collaboration
Compliance
Productivity and Innovation
Business Continuity