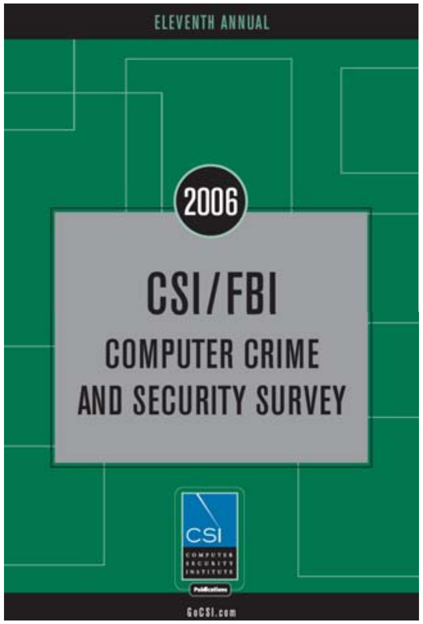
# Cisco IOS Software Security: Flexible Packet Matching

**Last Updated: 5/4/2007**

# Top Security Challenges 2006

1. Data protection
2. Vulnerability security
3. Policy and regulatory compliance
4. Identity theft and information leakage
5. Viruses and worms
6. Risk management
7. Access control
8. User education, training, and awareness
9. Wireless infrastructure security
10. Internal network security and insider threats



ELEVENTH ANNUAL

2006

CSI/FBI

COMPUTER CRIME
AND SECURITY SURVEY

CSI

GoCSI.com

Source: CSI/FBI 2006

Computer Crime and Security Survey

**According to IDC, increasing sophistication of attacks and complexity of security management will increase the need for more integrated and proactive security solutions.**

# The Evolution of Threats

### Broad Outbreaks

- Broad scope
- IT burden
- User challenges

But …

- Automated processes required
- User self-reliance

**Effect on Productivity**

### Targeted Attacks

- Narrow scope
- Business loss
- User transparency

But …

- Nearly invisible
- Little user knowledge

**Potential Damage**

**Antivirus**
**Layer 3/4 Firewall**

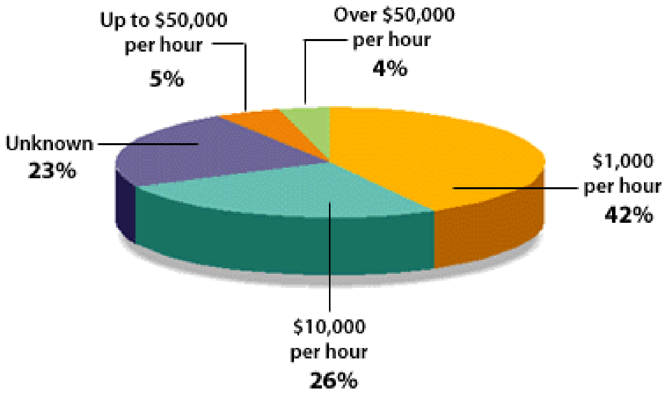
**Flexible Packet Matching**
**Intrusion Prevention**
**Behavioral Analysis**

# Controlling Internet Threats

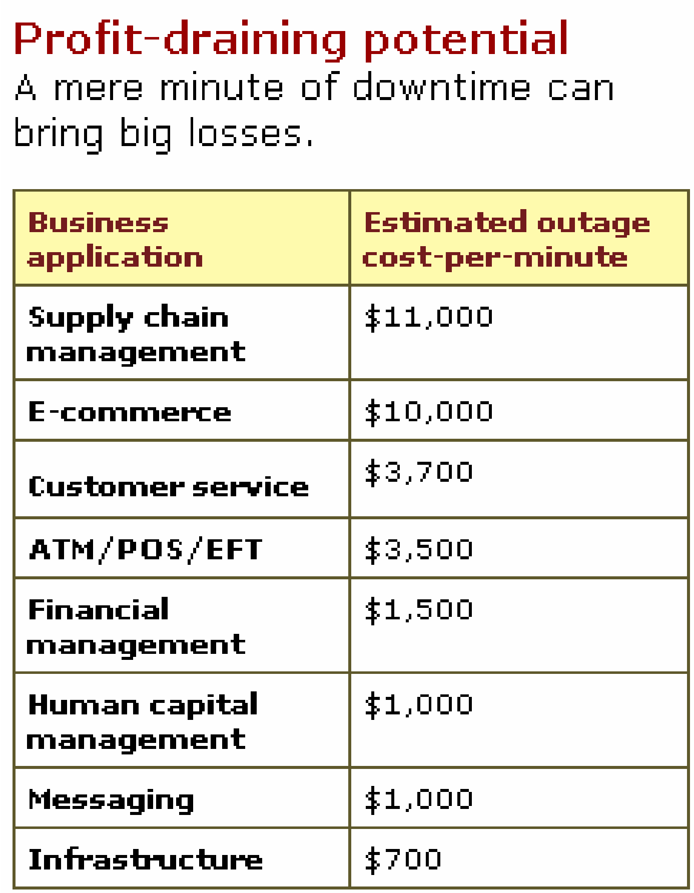
## The Cost of Downtime

### Cost of Downtime

- Employee productivity
- Lost sales opportunity
- Lost customers, loss of reputation
- Cost of restoring system, analysis



SOURCE: INFONETICS



**Profit-draining potential**

A mere minute of downtime can bring big losses.

| Business application | Estimated outage cost-per-minute |
|---|---|
| Supply chain management | $11,000 |
| E-commerce | $10,000 |
| Customer service | $3,700 |
| ATM/POS/EFT | $3,500 |
| Financial management | $1,500 |
| Human capital management | $1,000 |
| Messaging | $1,000 |
| Infrastructure | $700 |

**Source: Alinean, 2004**

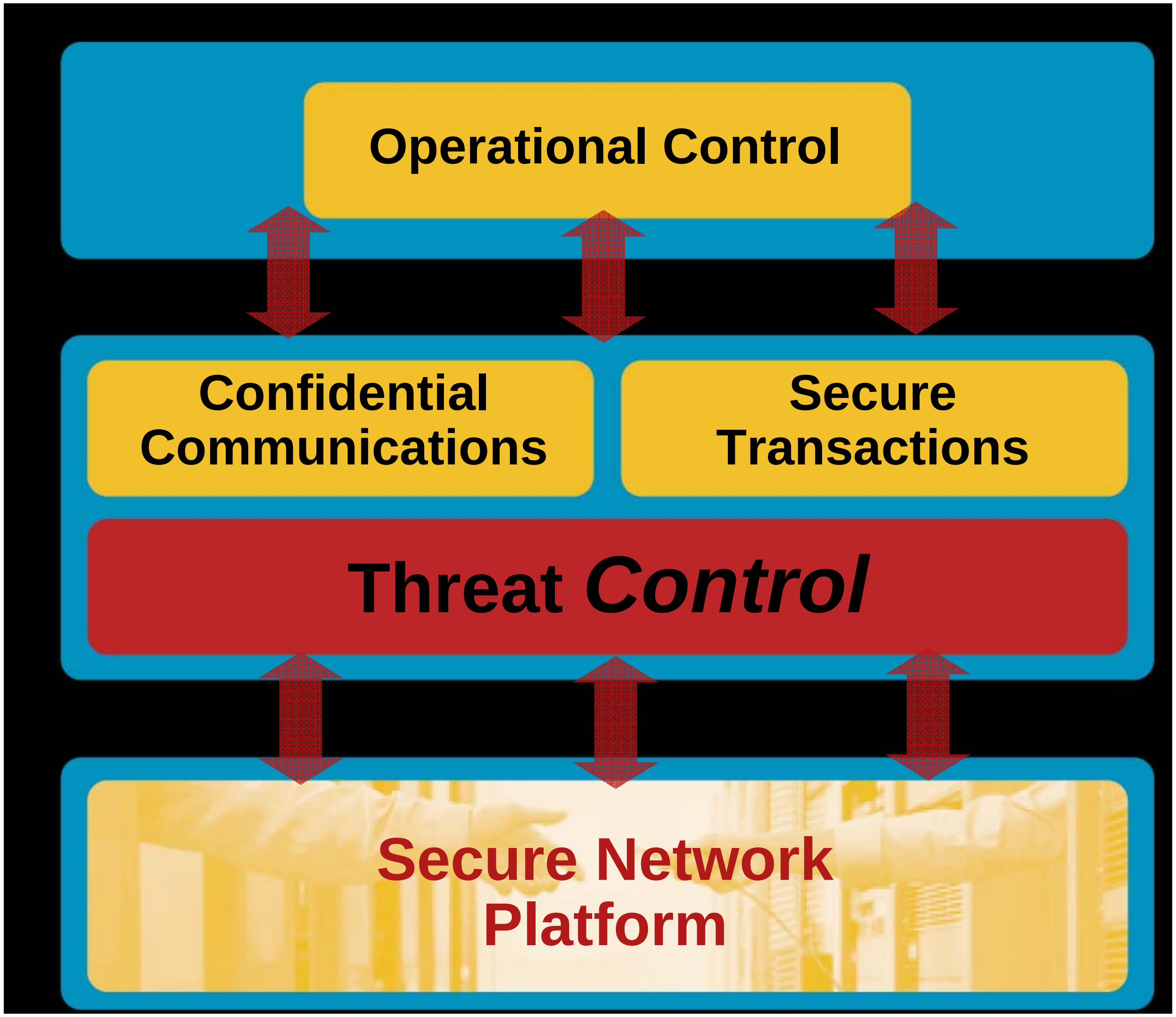
# Self-Defending Network Defined

Efficient Security Management, Control, and Response

Technologies and Security Services to:

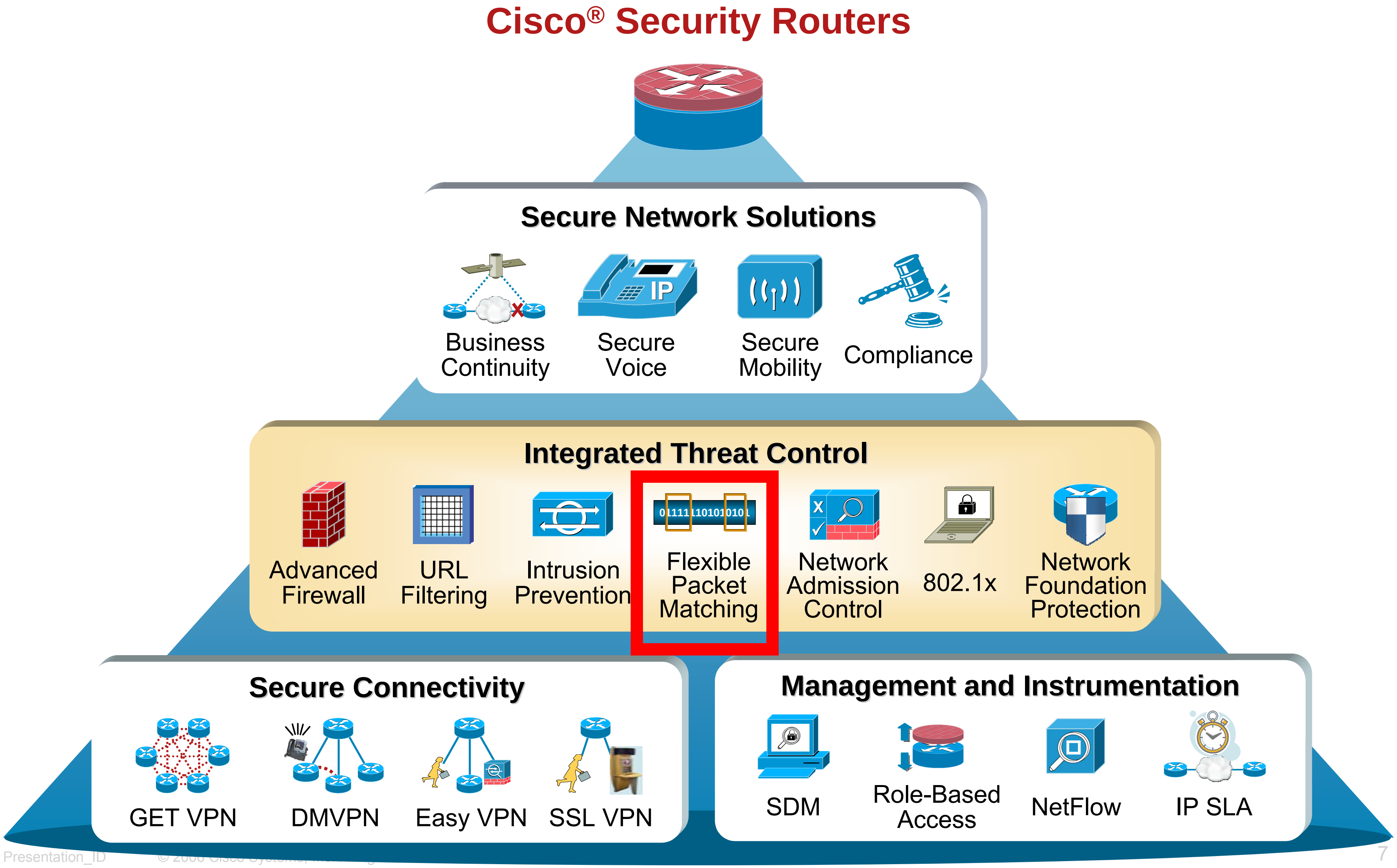
- Mitigate the effects of outbreaks
- Protect critical assets
- Ensure privacy

- Security becomes an integral, fundamental network capability.
- Embedded security uses network investment to best advantage.



# Cisco Flexible Packet Matching (FPM)

# Cisco Security Router Technologies



## Cisco® Security Routers

### Secure Network Solutions

Business Continuity

Secure Voice

Secure Mobility

Compliance

### Integrated Threat Control

Advanced Firewall

URL Filtering

Intrusion Prevention

Flexible Packet Matching

Network Admission Control

802.1x

Network Foundation Protection

### Secure Connectivity

GET VPN

DMVPN

Easy VPN

SSL VPN

### Management and Instrumentation

SDM

Role-Based Access

NetFlow

IP SLA

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Where Cisco® FPM Can Help

Source: CSI/FBI 2006

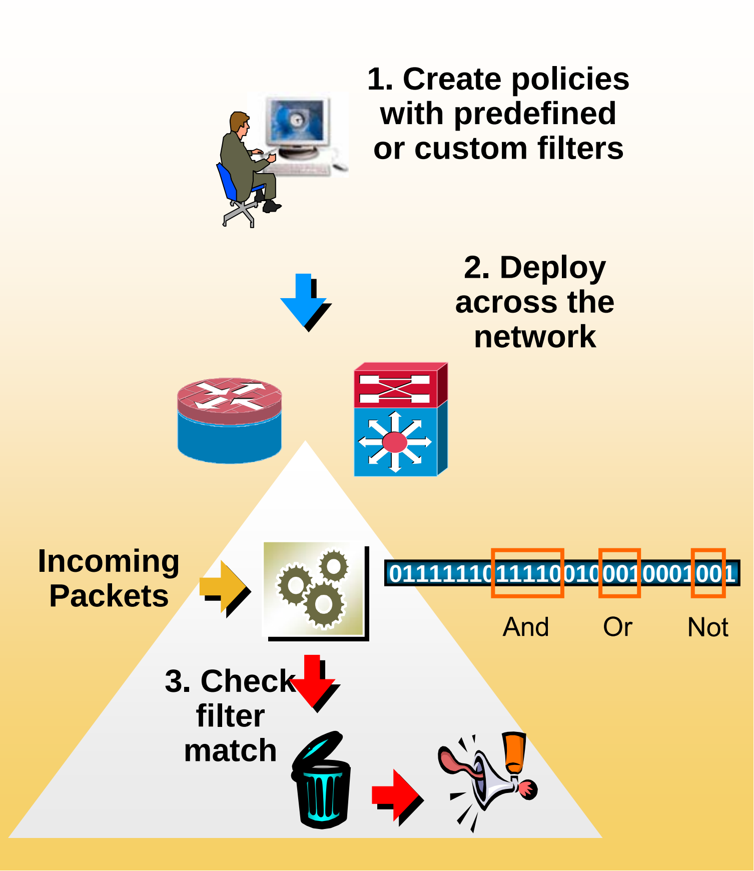
Computer Crime and Security Survey

**According to IDC, increasing sophistication of attacks and complexity of security management will increase the need for more integrated and proactive security solutions.**

# Cisco Flexible Packet Matching

First Line of Threat Control at Branch Office and Campus

- Cisco® FPM offers a rapid first line of defense against threats and notable worms and viruses.
- Create your own custom filter or use a predefined filter library from Cisco to identify notable attacks and applications.
- Cisco FPM offers Layer 2–7 deep packet inspection with the ability to log or drop.


1. Create policies with predefined or custom filters
2. Deploy across the network
Incoming Packets
01111110111100100010001001
And
Or
Not
3. Check filter match

Cisco.com/go/fpm

# Cisco Flexible Packet Matching

## Rapid Response to New and Emerging Attacks

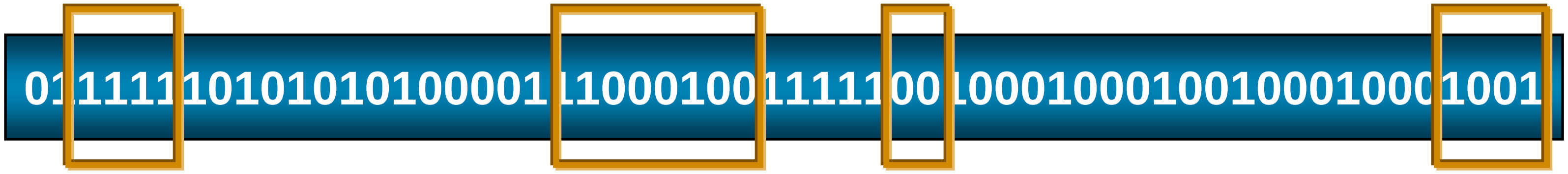
- Network managers require tools to filter day zero attacks, e.g., before IPS signatures are available.
- Traditional ACLs are not granular enough – legitimate traffic could be blocked.

  Example: Stopping Slammer with ACLs meant blocking port 1434; i.e., it denied business transactions involving Microsoft SQL.
- Cisco® FPM delivers flexible, granular Layer 2–7 matching.

  Example: Port 1434 + Packet length 404B + Specific pattern within payload → Slammer
- Cisco FPM is useful for security incident response teams for quickly reacting to threats targeting the network.

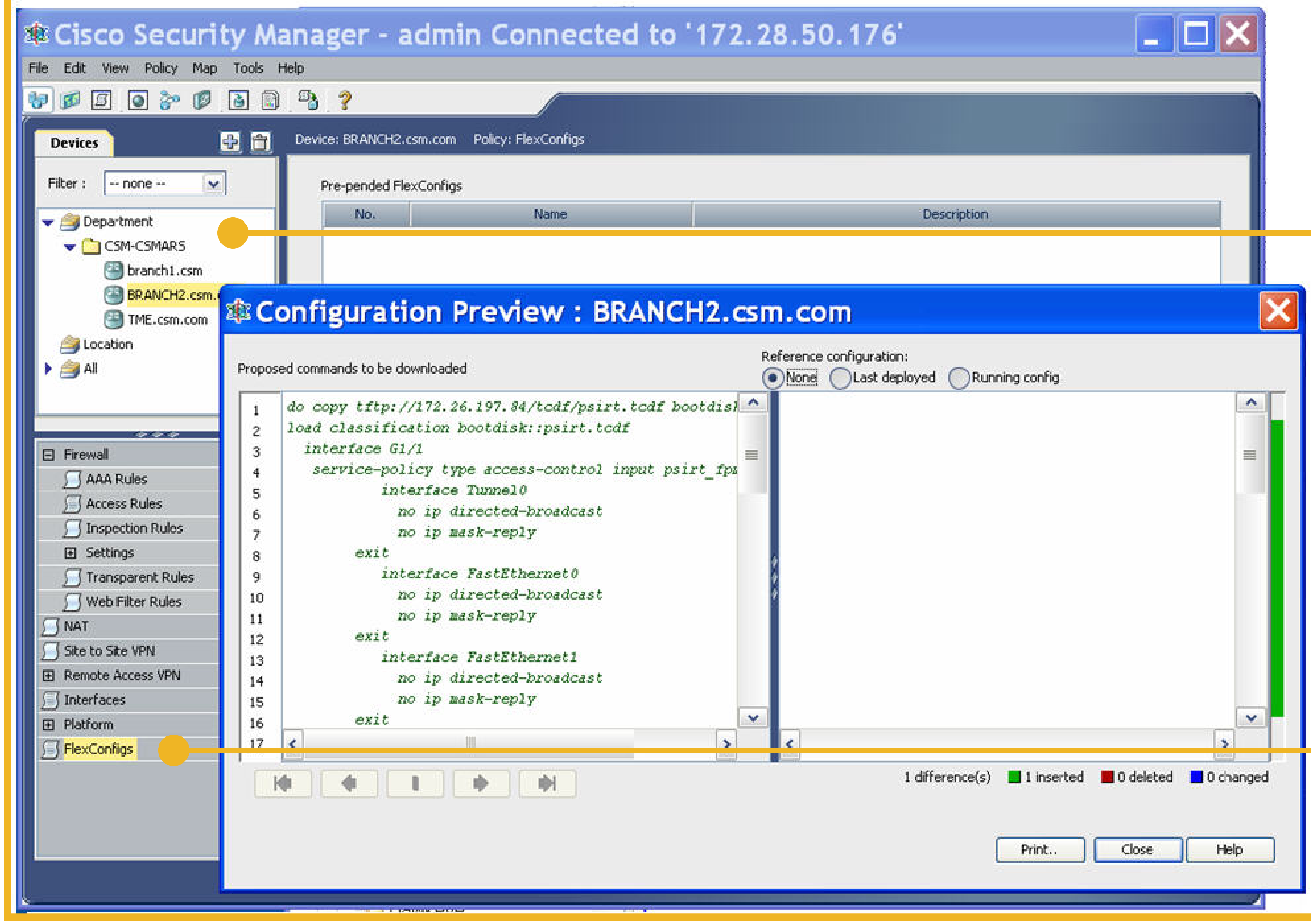
**Flexible Classification and Rapid Response**

- Cisco FPM goes beyond static attributes – specify arbitrary bits or bytes at any offset within the entire packet (payload or header).
- Classify on multiple attributes within a packet.
- Set up custom filters rapidly using XML-based policy language.



**Match Pattern** **And** **Or** **Not**

# Cisco FPM Provisioning Using Cisco Security Manager



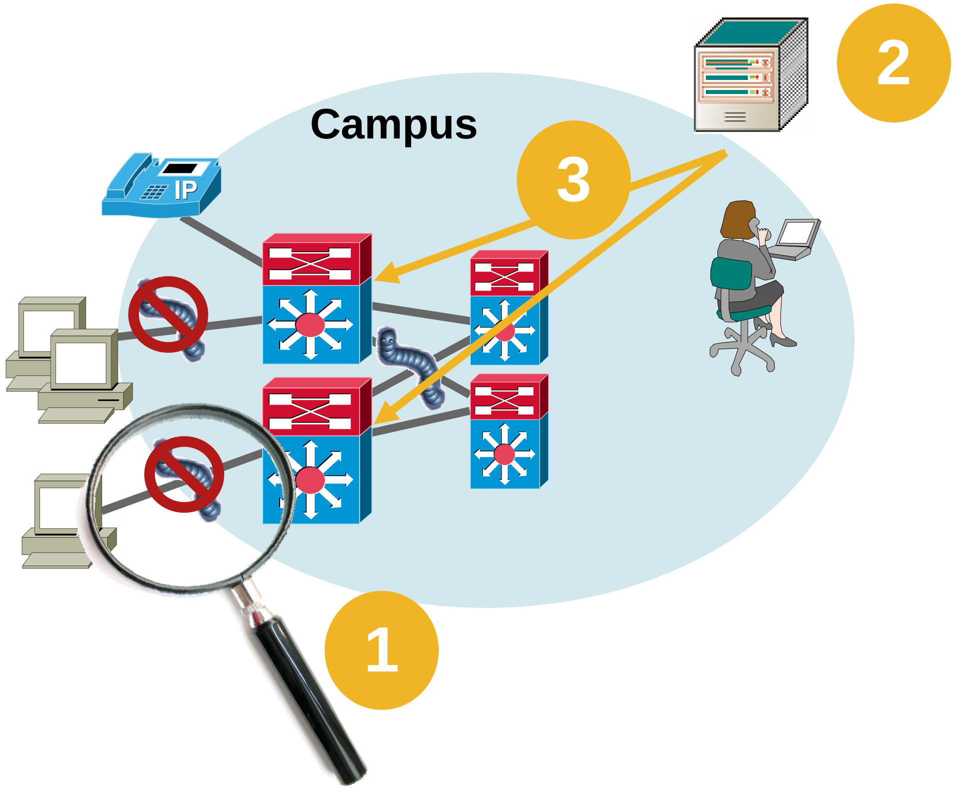
```
do copy tftp://172.26.197.84/tcdf/psirt.tcdf bootdisk
load classification bootdisk::psirt.tcdf
 interface G1/1
  service-policy type access-control input psirt_fpm
        interface Tunnel0
          no ip directed-broadcast
          no ip mask-reply
     exit
        interface FastEthernet0
          no ip directed-broadcast
          no ip mask-reply
     exit
        interface FastEthernet1
          no ip directed-broadcast
          no ip mask-reply
     exit
```

**Centralized Security Management for All Security Devices (Firewall, IPS, Secure Router, etc.)**

**FlexConfig Option Provisions Cisco® FPM Policies to Multiple Routers and Switches**

# Cisco FPM Case Study

## Blocking Slammer Attack



1 **Find the Attack Vector**
**(PISRT, SANS, Internet Storm Center, etc.)**

2 **Define Cisco® FPM Filter Policy**

```
.....
.....
Class-map type access-control match-all slammer_class
  match field udp dest-port eq 1434
  match field ip length eq 404
  match start udp payload-start offset 196 size 4 eq 0x4011010
.....
.....
Policy-map type access-control fpm_policy
  class ip_udp_class
  service-policy fpm_udp_policy
.....
.....
```

3 **Deploy Cisco FPM Filter Policy**

# Cisco Catalyst 6500 Series
## Supervisor Engine 32 Programmable Intelligent Services Adapter (PISA) Overview

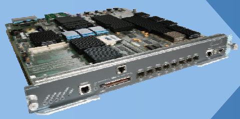
**Q2 CY2007**

**Cisco Catalyst 6500 Series Supervisor Engine 32 PISA Eight 1-GE Uplinks + One 10/100/1000**

**Cisco Catalyst 6500 Series Supervisor Engine 32 PISA Two 10-GE Uplinks + One 10/100/1000**

- ▶ NBAR
  - Application awareness and intelligent classification
  - Multigigabit performance

- ▶ Cisco FPM
  - Rapid security protection
  - Multigigabit performance



- ▶ Programmable architecture
  - Transparent new service adoption

- ▶ Full integration with:
  - IPv4 and IPv6 in hardware
  - Advanced multicast and MPLS
  - Enhanced manageability
  - High availability with NSF/SSO and more

# Cisco FPM on Cisco Catalyst 6500 Series Supervisor Engine 32 PISA

Traffic
Block
Log
IT Manager
Network as the Platform

## Capabilities

- Cisco® FPM accelerated in hardware
- Offers flexible and granular Layer 2–7 pattern matching
- Can inspect up to 8 Kb per packet
- Can block or log traffic

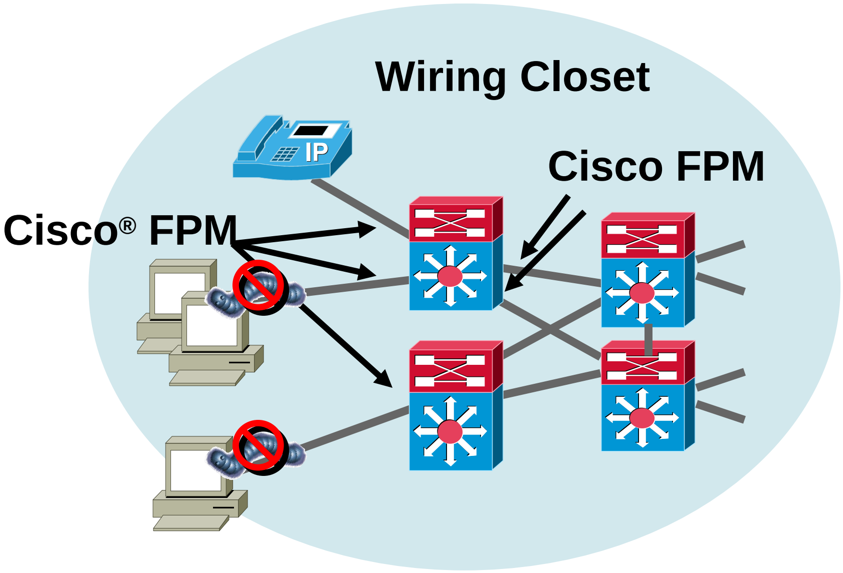
## Benefits

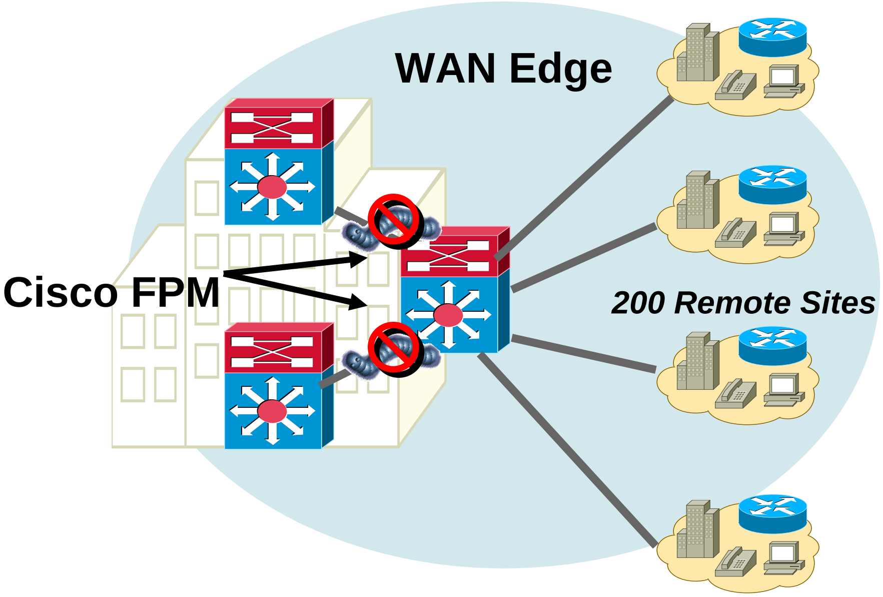
- Protects against threats and notable worms and viruses
- Controls day zero threats
- Stops threats at access switch

# Cisco FPM – Deployment Scenarios

# Cisco FPM in Campus Network

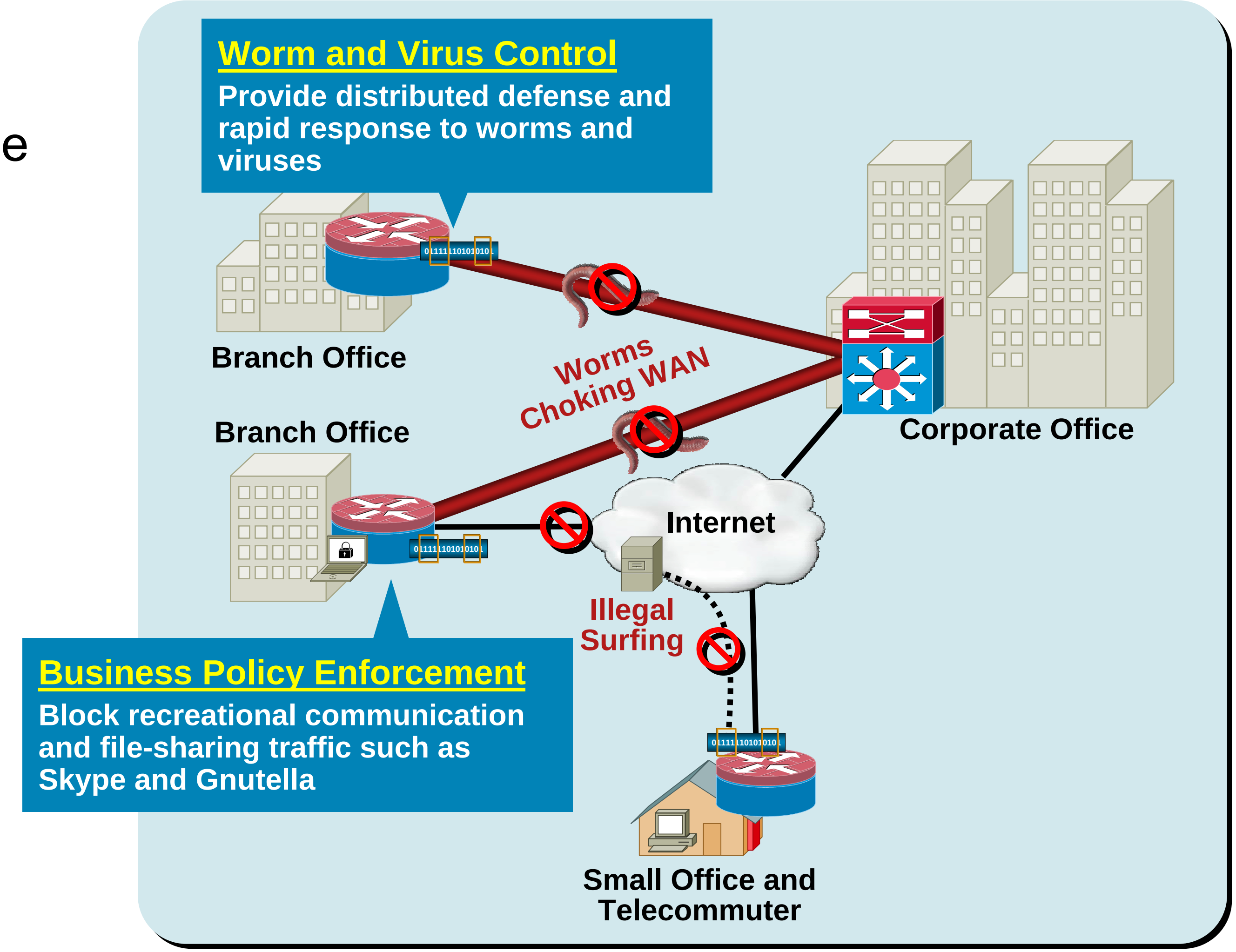
- Protect against worms and viruses at all network entry points:
  - – LAN access
  - – WAN edge
- Deploy as close to the edge as possible.
- Rapidly respond to new and emerging attacks before they spread to other parts of the network.





# Cisco FPM in Branch Office

- Control worms, viruses, and spyware right at the remote site; conserve WAN bandwidth.
- Enforces business policy by blocking communications and file-sharing applications such as Skype and Gnutella



**Worm and Virus Control**

Provide distributed defense and rapid response to worms and viruses

**Business Policy Enforcement**

Block recreational communication and file-sharing traffic such as Skype and Gnutella