SelfMan 2005

Panel 1
Self-Management:
State of the Practice

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The Big Picture for Device Self-Management

- **Idea: increase the intelligence at the device level**
- **Approach: implement advanced device instrumentation**
- **Results:**

  The device monitors itself, the management application only does a status poll and retrieves summary data

  Enable Zero-touch Deployments

  (The device checks the configuration *syntax*)
- **Areas: Fault, Performance, SLAs, Configuration**
- **Drive and support standard approach**

Event-MIB (RFC 2981) for Fault-Management

- The EVENT MIB provides a superset of the capabilities of the RMON MIB alarm and event functions
- EVENT MIB can monitor

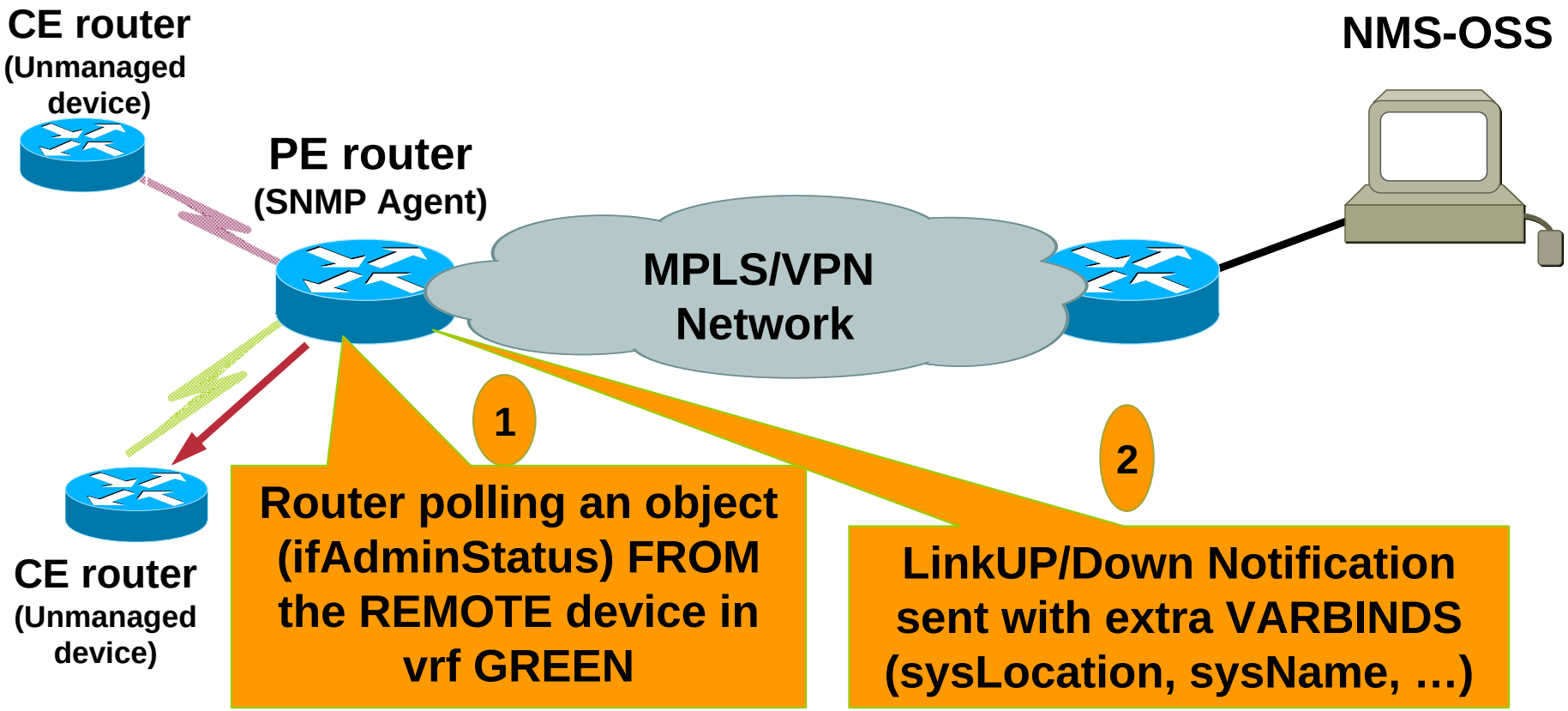
  - any MIB object (existence)

  any integer/counter (boolean, threshold)

  Boolean test: <>, =, <, <=, >, >=

  Operations: absent, present, changed; Wildcard
- EVENT-MIB allows alarms to be generated for MIB objects that are on another network element
- EVENT-MIB sends an SNMP notification in response to a trigger and introduces the concept of setting a MIB object (integers)

EVENT-MIB Example: Remote Device Monitoring



EXPRESSION-MIB (RFC 2982)

- Allows to create new SNMP objects based on existing MIB variables and formulas
- EXPRESSION MIB proposed by Cisco to IETF DISMON Working Group, accepted standard track RFC 2982
- Perfect complimentary for the EVENT-MIB

EVENT-MIB & EXPRESSION-MIB Example: Simple Capacity Planning

- **If the link utilization is above 50% for 1 hour, it's time to upgrade the link → send a notification**
- **Steps:**

1. Create an expression:

Expression-MIB

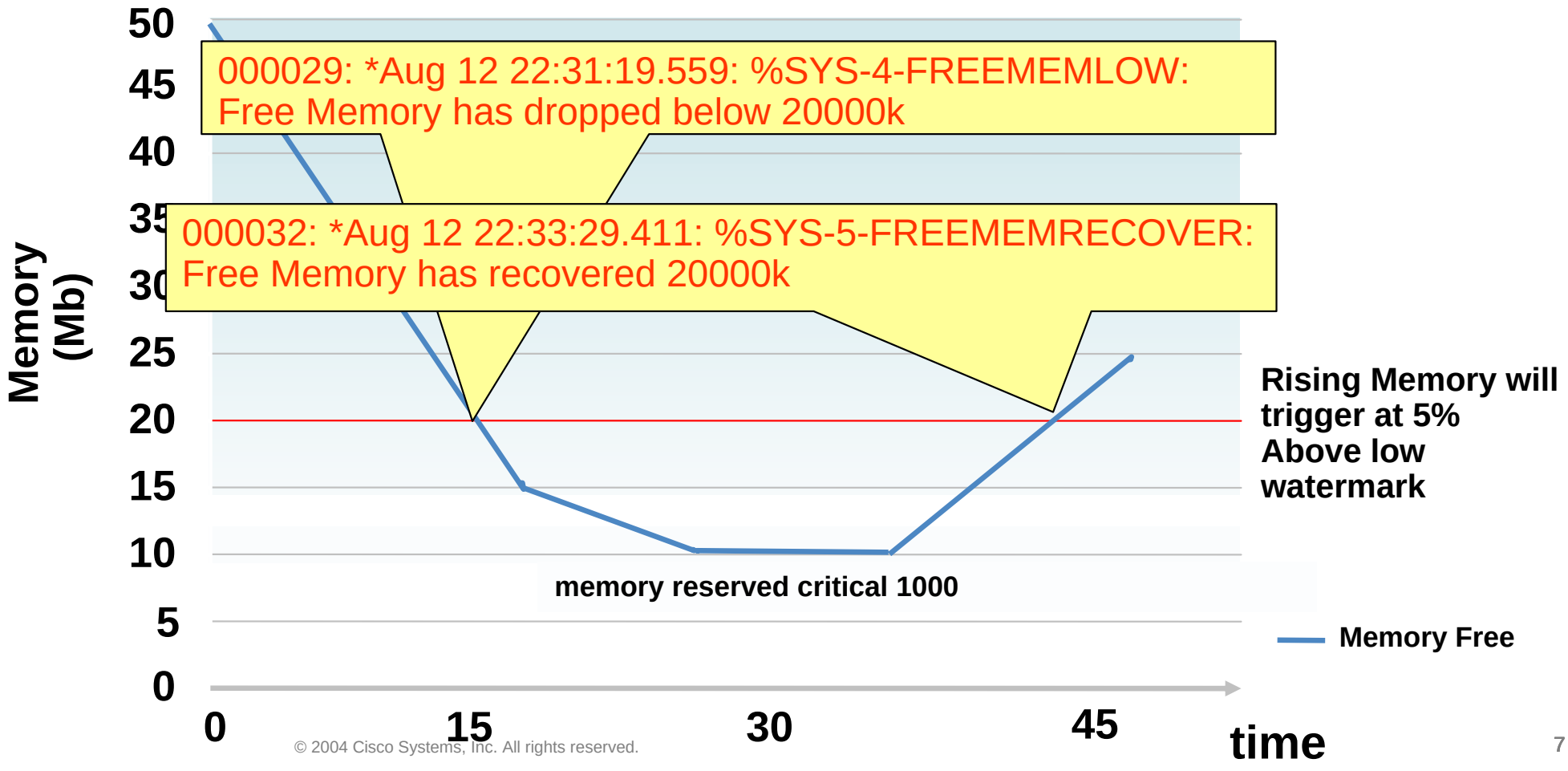
utilization = (ifInOctets + ifOutOctets) * 800 / hour / ifSpeed

2. If utilization is above 50% of the bandwidth after one hour, generate an event.

Event-MIB

Memory Threshold Notification

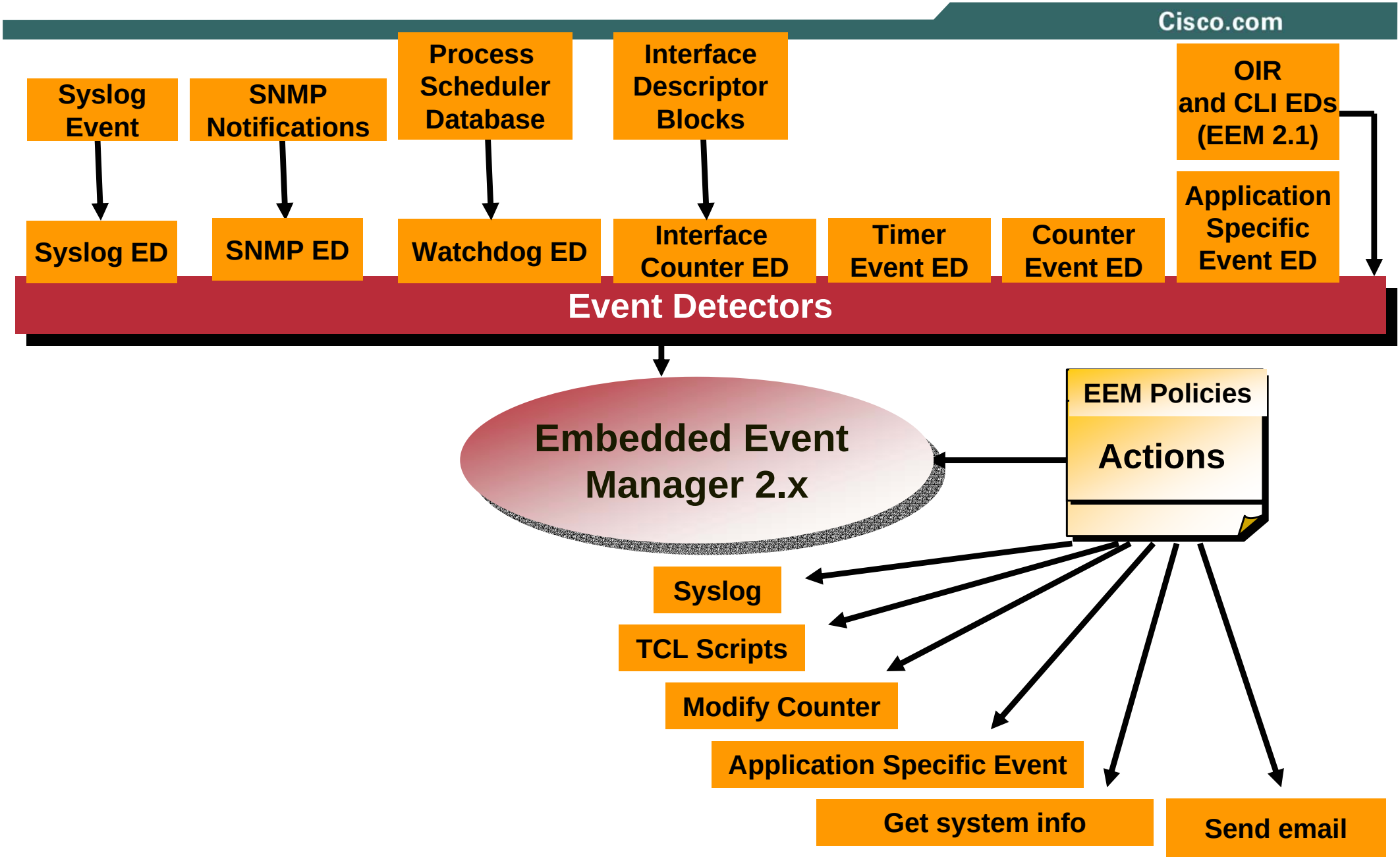
1. If available processor or I/O memory falls below a specified thresholds, the router generates a syslog message
2. Reserves the specified amount of memory in kilobytes so that the router can issue critical notifications



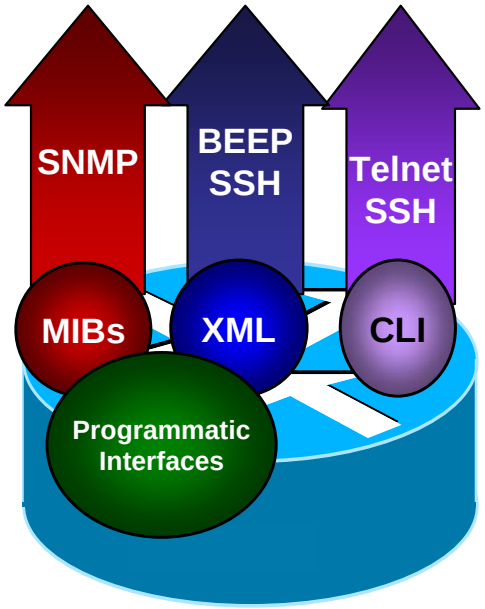
Embedded Event Manager (EEM)

- **In-box monitoring of different components of the system via a set of software agents (event detectors for SNMP&Syslog)**
- **Functions:**
  - **Ability to take proactive actions based on configurable events**
  - **Reduce network bandwidth by doing local event monitoring**
- **Event detectors (ED) notify EEM when an event of interest occurs. Based on this, an action can be taken:**
  - **Log a prioritized message to Syslog**
  - **Send an event to CNS Bus**
  - **Reload the entire system**
  - **Switch-over to Standby Route Processor in a dual route-processor configuration**
  - **Send email, run TCL script, …**

Embedded Event Manager (EEM) 2.x Architecture



Cisco Programmatic Interfaces Initiative

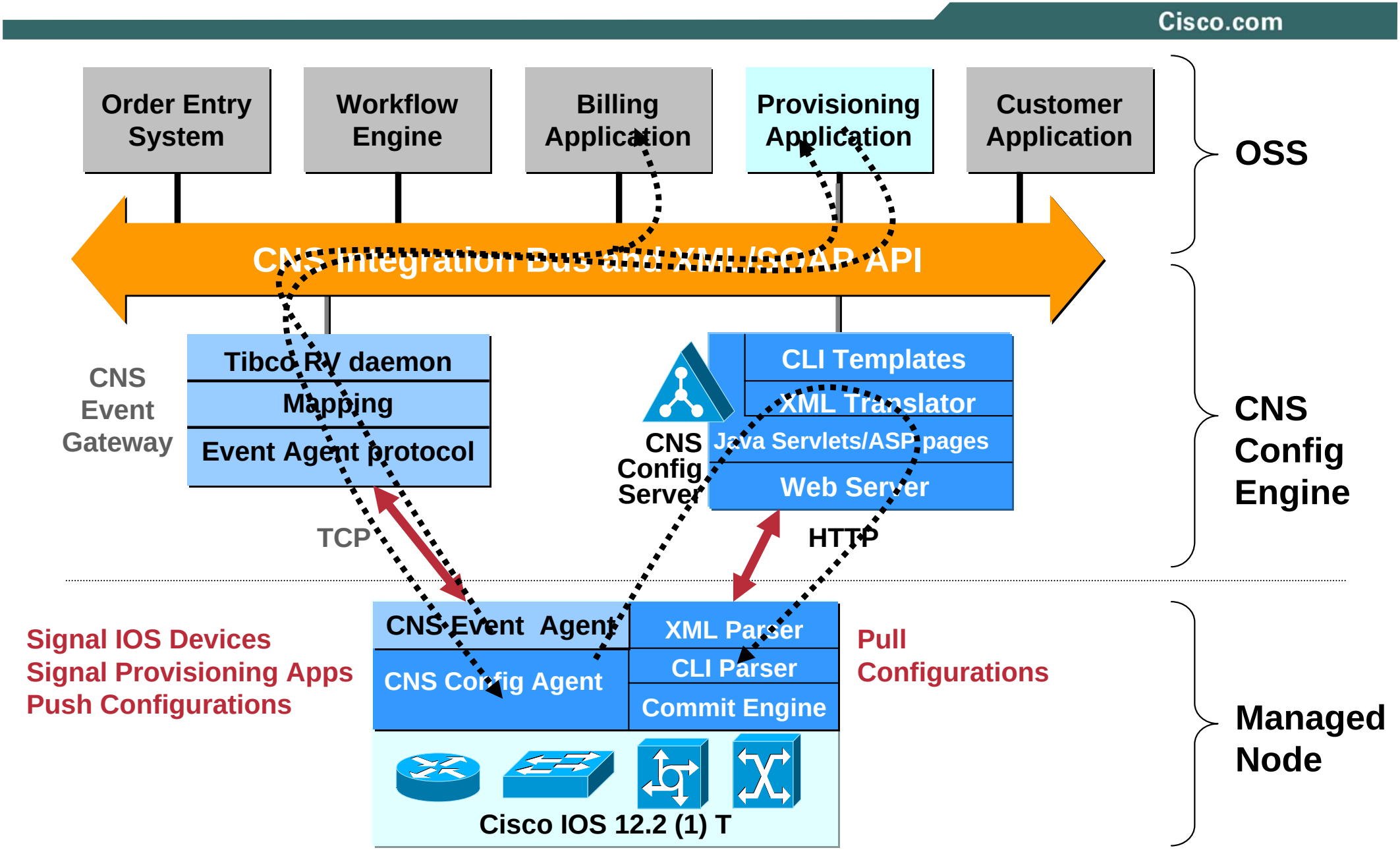


- Defining a consistent XML programmatic interface and specification for managing Cisco devices
- Common operations:
  - Aligned with IETF Netconf
  - Potential for Cisco extensions
- Common application layer communication protocols (transports) to be used
  - BEEP – RFC 3080 (e.g. use by management applications)
  - SSH (e.g. use by scripting language users)
- XML for Configuration, Provisioning and device Operational information access (i.e. Show and Exec cmds)
- SNMP for Fault, Accounting, Performance

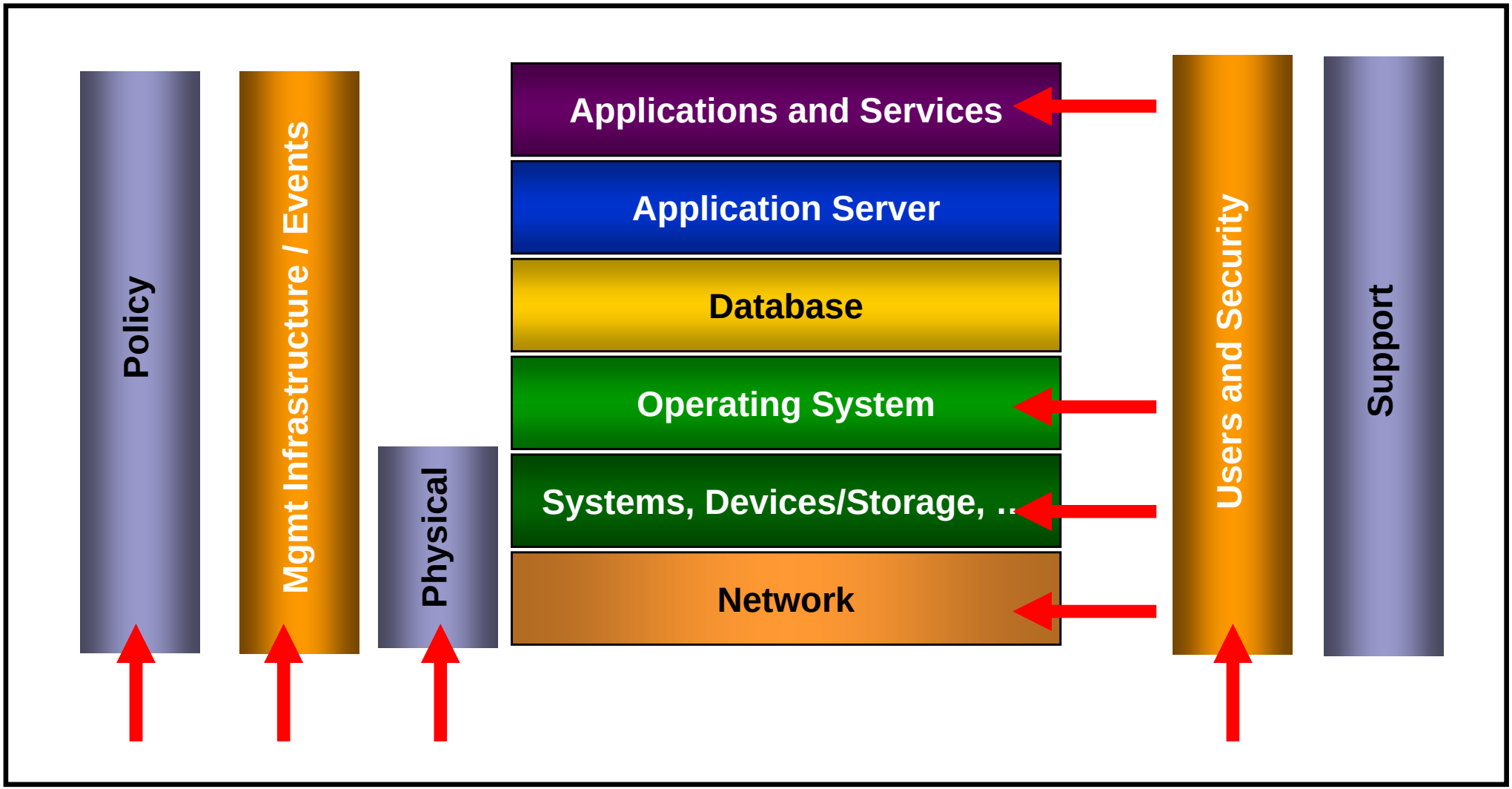
Management applications will not need to depend on CLI!

CNS Config Engine – Architectural Overview

Application: Zero-Touch Deployments; Mass Config Changes



DMTF: CIM and CIM-CX Models



Summary

- Self-Management is a great idea
- Need a vision and cross-vendor cooperation
- Every big journey starts with a single step
- Cisco’s first steps:
  - Intelligent Self-Monitoring
  - Advanced Configuration
  - Standards-Approach
- Stay tuned for more ☺

Questions?