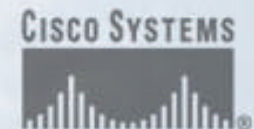


# **Cable Modem Termination System Cisco IOS Software Release 12.3(13)BC Feature Overview**

**Cable Product Management**



# Agenda

- **Expanding the Intelligent Broadband Edge with Cisco IOS Software Release 12.3(13)BC**
- **Harnessing the Power of PacketCable Multimedia (PCMM)**
- **Defining Cable Modem Termination System (CMTS) Admission Control**
- **Understanding Service Independent Intercept (SII)**
- **Scalable Video OOB Transport using Advanced Mode DOCSIS Set-top Gateway (DSG)**
- **Additional Features and Roadmap**

# Expanding the Intelligent Broadband Edge with Cisco IOS Software Release 12.3(13)BC

## Cisco IOS Software Release 12.3(13)BC Features on Cisco CMTSs:

- **Cisco uBR10012 and uBR7246VXR Universal Broadband Router Major New Features:**
  - PCMM**
  - Admission Control**
  - SII**
  - Advanced Mode DSG****Feature Enhancements:**
  - Multicast Quality of Service (QoS)**
  - Virtual Bundling**
  - Enhanced Rate Bandwidth Allocation (ERBA)**
- **Cisco uBR7100 Series Universal Broadband Router Feature Enhancements:**
  - Multilink Point-to-Point Protocol (MLPPP)**
  - SII**

# Harnessing the Power of PacketCable Multimedia (PCMM)

- **What does PCMM do?**
- **What are the new PCMM components?**
- **Where does Service Control—PCMM Intercept Application Manager—fit?**
- **PCMM—What does the CMTS do?**

# What does PacketCable Multimedia do?

- **Prescribes how DQoS and bandwidth can be used to create services that are formidable competitive weapons**
- **Provides a generic application framework for enabling cable QoS on non-QoS-aware devices:**

**Soft-phones**

**X-box/play station gaming consoles**

**Residential S-MTA**

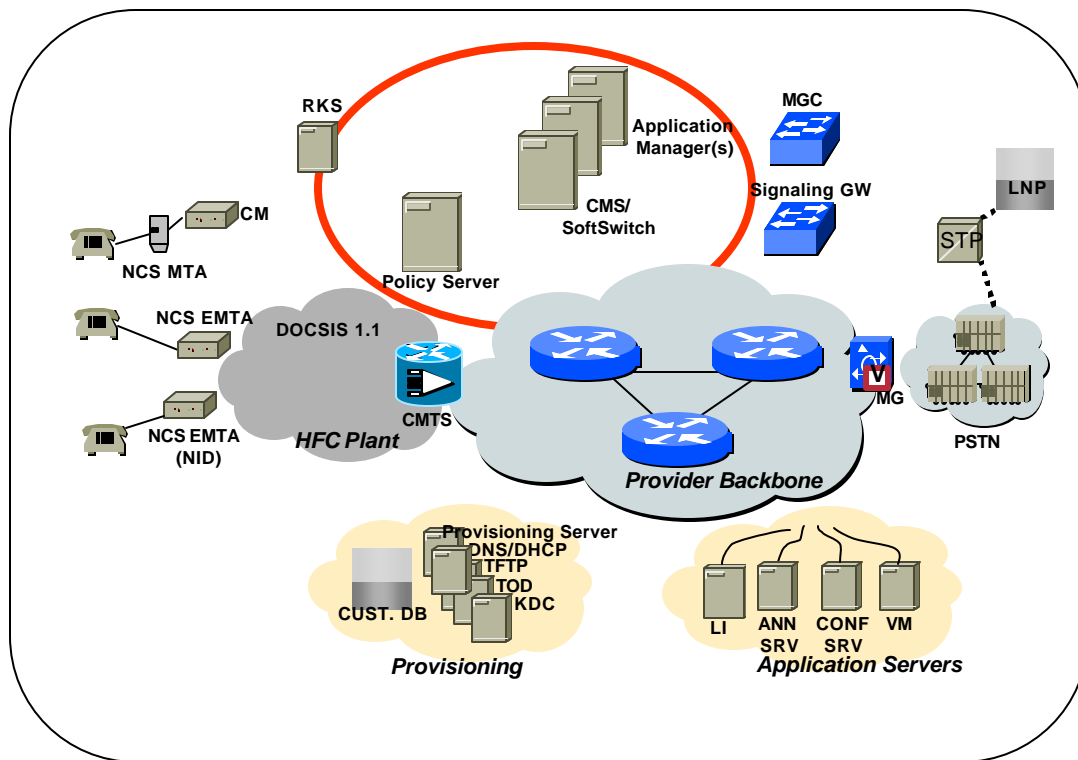
**Business class IADs, IP Phones**

- **Builds upon DOCSIS and PacketCable, enabling services breadth and depth:**

**Voice-, video-, or data-centric service enhancements**

**Highly sophisticated double or triple-play convergence applications**

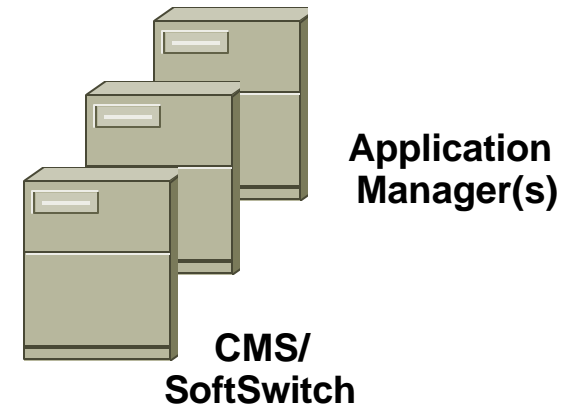
# What are the new PCMM components?



## Application Manager

Any service controlling host which has detailed knowledge of the application's bandwidth requirements:

- Gaming Server
- SIP Proxy Server
- PacketCable CMS



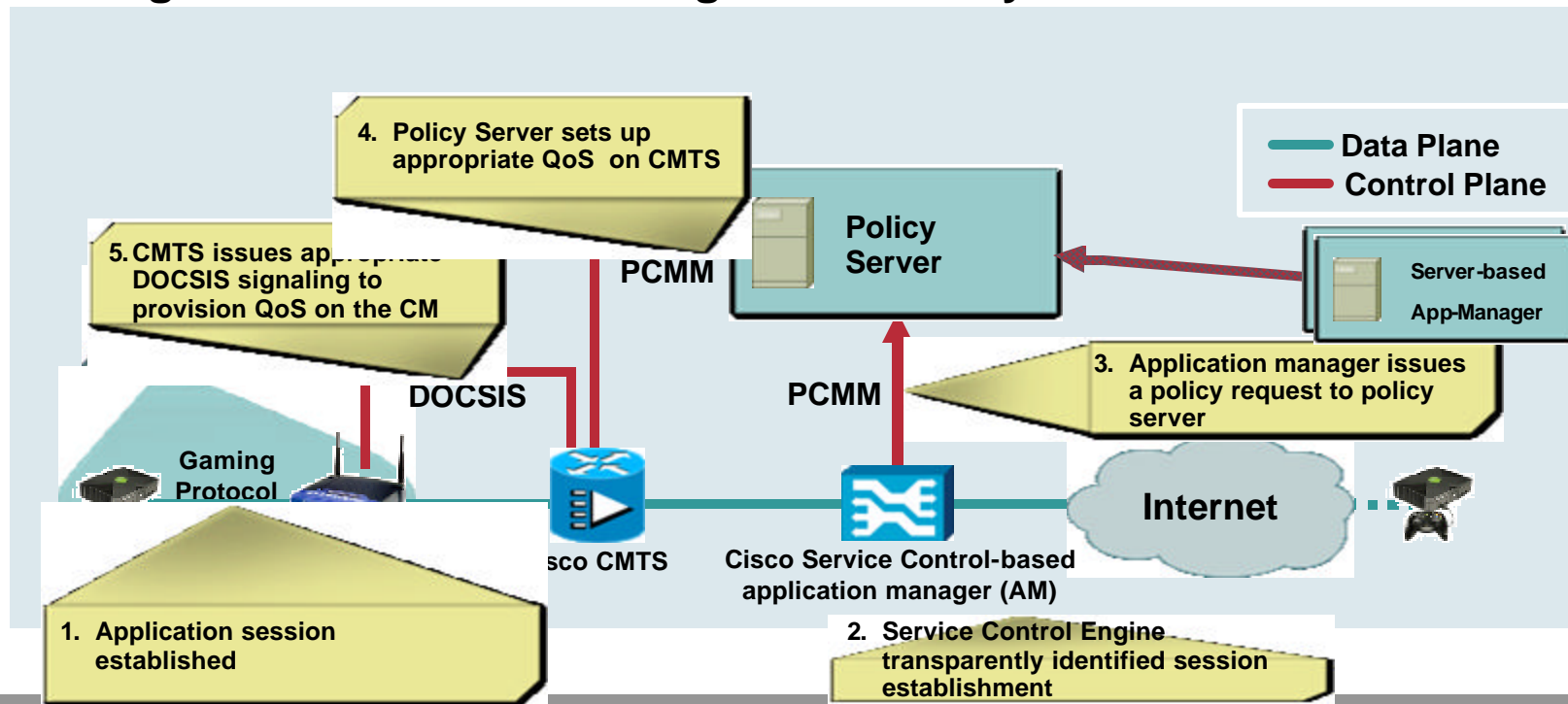
## Policy Server

- Host which polices Application Manager requests
- Communicates directly with the CMTS
- MSO driven rule set



# How does Cisco Service Control Engine relate to PCMM-enabled Cisco CMTSs?

- **Service Control Engine (SCE) serves an “Intercept” Application Manager (IAM)**
  - SCE triggers PCMM DQoS to Cisco PCMM-enabled CMTS upon detection of an application session
  - Configured per application, per destination, or per subscriber
- **Integrated/tested with leading PCMM Policy-Server solutions**



# PCMM Intercept Application Manager Applications

- **Unmanaged applications:**
  - Server-less services
  - Off-net services
- **Traffic management:**
  - CPE worm mitigation
- **Rapid prototyping and service-delivery**

Application	SCE IAM	Integration Method
Peer-to-peer (P2P) Games (Xbox)	✓	IAM detects new P2P flow and signals to PS
Boosted VPN Services	✓	IAM detects start of game session and signals to PS
Worm Mitigation	✓	IAM detects virus attacks and signals to PS
Peer to Peer Mitigation	✓	IAM detects usage of VPN service and signals to PS
<i>Other un-managed service</i>	✓	IAM detects service usage and signals PS
Managed Voice Service		Edge SIP proxy signals to PS
Managed Streaming Service		Streaming server signals PS
Other Managed Service		Integration of PS with Service delivery architecture



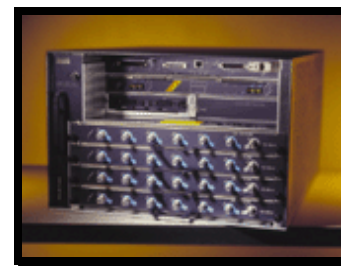
# PCMM – What does the CMTS do ?

- Serves as the policy enforcement point for access to cable network resources
- Fulfills requests for specific ‘service flows’ per the service’s requirements:
  - Bandwidth, TDM grant interval, duration, and persistence
- Optimizes network utilization in real-time for prioritized and aggregated resource demands from:
  - All PCMM apps
  - PacketCable Voice
  - High-Speed Data
- PCMM functionality is enabled via CMTS software.

Cisco uBR10012



Cisco uBR7246VXR



# Cisco CMTS and PCMM Leadership

- PCMM is a **foundation technology** in cable's long-sought 'convergence' plans
- Consumer demand and competition is driving broadband service providers to deliver **new applications at a break-neck pace**
- Operators are pursuing a diverse range of PCMM-based applications in parallel, **accelerating scale deployment** significantly
- Cisco is excelling in PCMM on the CMTS, in multi-vendor interoperability, and in architectural leadership
- PCMM is part of a broad range of next-generation network initiatives transforming cable from:  
High-speed transport → Intelligent DQoS Communications Network

# Defining CMTS Admission Control

- **Cisco CMTS Admission Control**
- **Admission Control and Traffic Engineering**
- **Admission Control Features**

# Cisco CMTS Admission Control

- **Ability to establish operator policies for how CMTS resources are allocated among services**
- **Ability to set thresholds for dealing with demand growth/spikes.**
- **Notification and metrics for proactive traffic engineering**

***Above all, admission control is about making voice + data services 'work' under scale and stress conditions.***

# Admission Control and Traffic Engineering

- **Admission Control - Deterministic, real-time decision-making on a service request by service request basis.**
- **Done prior to committing CMTS or CMTS-controlled resources**
- **Rejecting a call or dropping HSD packets under resource-constrained conditions:**
  - Definitely undesirable**
  - Better than potentially taking down all subscribers**
- **Admission control should only be invoked during periods of highly unusual network traffic or services growth**
  - AC is a safety net**
  - AC is not a substitute for proactive network engineering**

# Admission Control Features

- **Operator definable flexibility on ‘exclusivity’ or ‘shareability’ of bandwidth resources**
  - Percentage bandwidth reserved for voice, HSD per your traffic engineering policy**
- **Configurable thresholds for key RP CPU and memory resources:**
  - Voice, CPU-5sec, CPU-avg, processor memory and IO memory**
- **Policies for US and DS resources configurable on a global or per port basis; individual upstreams also configurable**
- **Policies for US resources are configurable by DOCSIS scheduler types and service class**
- **MIB support for monitoring and notification (traps); config in a future release.**

# Understanding Service Independent Intercept (SII)

- **Key Cisco SII Architecture Features**
- **CMTS SII**
- **Cisco CMTS and Cisco SII**

# CMTS Service Independent Intercept (SII)

- **Cisco is an industry leader in CMTS lawful intercept (LI) enablement:**
  - PacketCable LI on CMTS for voice GA deployed since 2002.**
  - With SII, Cisco extends its CMTS LI capabilities to include data, voice, and multimedia content.**
- **SII lawful intercept has key attributes of importance to Law Enforcement Agencies (LEAs):**
  - Transparency**
  - Content integrity and timeliness**
  - Accurate and verifiable association with Intercept Related Information**
  - Encryption**
  - Capacity for multiple taps spanning multiple services**



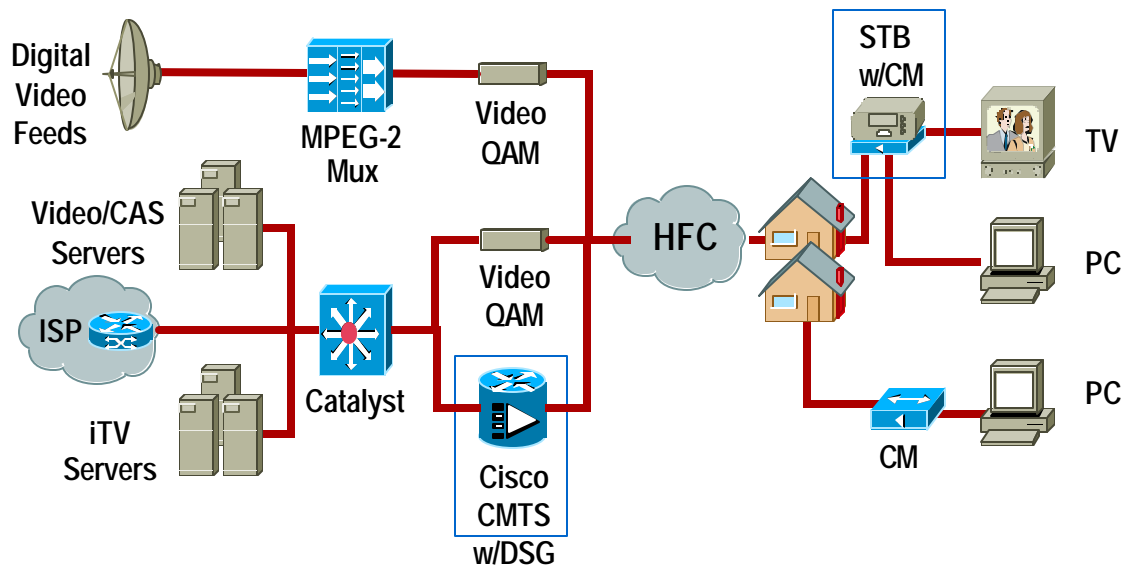


# Performing Content and Traffic Management with Advanced Mode DOCSIS Set-Top Gateway (DSG)

- **DSG Architecture and Benefits**
- **DSG Advanced Mode Defined**

# Content and Traffic Management

## DOCSIS Set-top Gateway (DSG)



### BENEFITS

- Accelerates new revenue opportunities
- Ensures reliable service performance
- Reduces CapEx
- Reduces OpEx

- Consolidates cable modem and set-top box (STB) out-of-band (OOB) data traffic on a shared or dedicated DOCSIS channel
- Accelerates rollout of bandwidth-intensive services, such as multimedia downloads or targeted advertising
- DOCSIS-based

# DSG Advanced Mode

- **Setup**
  - **CMTS provisions DSG tunnels with a DSG address table (DAT) in a new downstream channel descriptor (DCD) DOCSIS MAC message**
  - **Group (multicast) Ethernet address are allowed**
- **Operation**
  - **STB uses its DSG Client MAC address as an index into the DAT to find the new DSG MAC DA and L3 Packet Classifier used for the DSG tunnel**
  - **CMTS receives IP packets and rewrites MAC address**
  - **STB receives DSG tunnels based on MAC address and IP classifier**

# Advanced Mode (DSG 1.1 features)

- **Multicast IP Interface**
- **Multicast MAC address for DSG Tunnels**
- **DCD**
  - Classifiers, Rules, UCID, Client ID, Timer, Channel List**
- **Interface Bundling Support**
- **Regionalization**
- **Fragmentation**
- **Basic Mode Compatible**
- **SSM**
- **Supported on Cisco uBR10012 and uBR7246VXR**

# Feature Highlights

- **Leverages existing Multicast cache structure**
  - Multicast routing and IP PIM required**
  - PIM can be dense mode, sparse mode, or sparse-dense mode depending on existing network**
- **Leverages Multicast QoS**
  - Associates a Service Class Name/SFID to DSG tunnel**
- **Unicast IP Support (NAT)**
  - NAT used to translate IP Unicast address packets into Multicast address packets**
  - Network is Multicast-capable, but server side is not**
  - Cisco uBR7246VXR-only feature**
- **GRE Support**
  - For tunneling Multicast when Network is not Multicast-capable**
  - Cisco uBR7246VXR-only feature**

# Virtual Bundling

- **Legacy cable bundling implementation uses physical interface as master of a interface bundle**
- **Virtual bundling functionality instead creates a Virtual interface as master interface**
- **Eliminates outages due to master physical interface going down in traditional cable bundling**
- **No functional change from the current implementation**
- **Support for traditional bundle configurations**
- **Previously saved traditional master bundle configurations in NVRAM converted to virtual bundle interface at bootup**

# MLPPP on the Cisco uBR7100 Series

- **Allows multiple T1 and E1 backhaul interfaces to be combined into single logical interface**
- **Combine bandwidth across multiple interfaces**
- **Load balancing across interfaces**
- **Ease of management of multiple physical interfaces via single interface**
- **Supports bundling of fractional T1 or E1, starting from DS0 (64 kbps)**



# Multicast QoS

- **Solves a problem of degradation in Multicast quality under congestion**
- **Associates Multicast group traffic to a service flow (SF)**
  - Previously Multicast traffic defaulted to BE Service Flow**
  - Guarantees Bandwidth to Multicast flow**
- **Static Mapping support**
  - Provides static mapping of QoS to a Multicast group**
  - Works with current DOCSIS 1.1**
  - Multicast SIDs are not deleted when group is in idle state**
  - Dynamic Mapping of QoS to Multicast group requires specification update and is part of DOCSIS 3.0**
- **Per bundle configuration; all DS in bundle share same Multicast to QoS association**

# Enhanced Rate Bandwidth Allocation (ERBA)

- **Allows DOCSIS1.0 modems to enhance their transmission rate up to full line rate for shorter durations**
- **Provides higher bandwidth up to line rate for instantaneous bandwidth requests:**
  - Accelerates HTTP requests, WEB downloads**
- **Doesn't require change in QoS profile**
- **Applied on a QoS profile basis**
- **Cisco uBR7246VXR-only feature**

# Conclusions

## **Cisco IOS Software Release 12.3(13)BC Increases Your Broadband Leadership:**

- **Lays the groundwork to deploy unique, next-generation multimedia services and converge voice, video, and data traffic on a standards-based IP network**
- **Leverages existing network investments**
- **Enables cable operators, via a software upgrade, to expand their service portfolio and customer base**

# 12.3(13)BC Feature Platform Support Matrix

# 12.3(13)BC Feature Platform Support (Q3CY05)

Feature	Cisco uBR10012 PRE-1	Cisco uBR10012 PRE-2	Cisco uBR7246VXR (NPE-G1/400)	Cisco uBR7100 Series
Admission Control + MIB	Y	Y	Y	N
PacketCable Multimedia	Y	Y	Y	N
Dyn. SID/VRF mapping	Y	Y	Y	N
MLPPP	NA	NA	Y	Y
Bridging Support on Cisco uBR7100	NA	NA	NA	Y
Offline Diagnostics WAN Cards	Y	Y	Y	NA
Field Diagnostics for Line Cards		Y	NA	NA
Virtual Interface Bundling	Y	Y	Y	N
Cablemonitor (Cisco 5x20, MC28U)	Y	Y	Y	N
DSG 1.1	Y	Y	Y	N
SII	Y	Y	Y	N
Cisco 5x20U Spectrum Mgnt.	Y	Y	NA	N
Half-height Gigabit Ethernet	N	Y	NA	N
Multicast QoS	Y	Y	Y	N

# 12.3(13)BC Enhancements Platform Support

Enhancement	Cisco uBR10012 PRE-1	Cisco uBR10012 PRE-2	Cisco uBR7246VXR (NPE-G1/400)	Cisco uBR7100 Series
<b>DOCSIS 1.0 Concatenation Override</b>	Y	Y	Y	N
<b>Source verify DHCP exclude list</b>	Y	Y	Y	Y
<b>HA Enhancements</b>				
<b>Consistent Shut/no-shut behavior( csceb19913)</b>	Y	Y	NA	NA
<b>Redundancy Readiness Verification (RRV)</b> <b>1) Backup path testing (RF Switch Health Monitoring )</b> <b>2) Auto Revert CLI</b>	Y	Y	NA	NA
<b>Streamlined HCCP Configuration</b>	Y	Y	NA	NA
<b>Critical Services Awareness (E911)</b>	Y	Y	NA	NA

**making next generation  
networks a reality.**



# CISCO SYSTEMS

