Cable Access
Product Update
Session 2910
Agenda

- Introduction
- Product Overview
- Solutions and Architectures
- Summary

Cable Network

- Head End
- Headend
- Hub
- 500–2000 Homes
- Node
- Tap
- NOC
Cable MSO Head-End Architecture

- Satellite Channels
- Conditional Access Server
- MPEG Encoders
- Analog Receivers
- Off Air Channels

Cable MSO Hub Architecture

- satellite Receivers
- scramblers
- descramblers
- PSTN Gateway/Dial Server
- Internet
- PSTN
- Web/Media Cache Server
- Ad Insertion Server
- VOD Server
- MPEG Re-Muxes
- OC-48 DPT

- DOCSIS Ring (POS/ATM/SONET Hub)
- GSR with IP/MPEG Cards
- Ad Insertion Server
- Web/Media Cache Server
- DVB-ASI
- Fast Ether/Gig Ether
- Node
- uBR
- RF
- E/O
- OE
- Docsis Down
- Docsis Up
Agenda

• Introduction
• Product Overview
• Solutions and Architectures
• Summary

Product Overview

CMTS—Cisco uBR 7200 Series
CPE—Cisco uBR 900 Series
Provisioning—CNR 3.5, CSRC 1.0
Network Management—Cable Manager 1.0, Cisco Cable Troubleshooter 1.0
Video—INA2320, 6290 RateMux
CMTS—Cisco uBR 7200 Series

- Cisco uBR7 246 VXR
- Clock card
- MC16S spectrum management card
- MC16E 8 MHz modem card
- New software features

Cisco uBR 7246 VXR

- Higher performance model of the Cisco uBR 7246
- Faster processing, higher throughput
- Suited for dense data deployments and large scale IP telephony solutions
Cisco uBR 7246 VXR Features

- NPE-300 high performance route processor
- High bandwidth midplane
- Redundant national clock source and distribution modules
- TDM bus
- Supports all current uBR line cards and PAs
- Support for future high speed PAs

### Cisco uBR 7200 Product Matrix

<table>
<thead>
<tr>
<th></th>
<th>7723</th>
<th>7246</th>
<th>7246-VXR</th>
</tr>
</thead>
<tbody>
<tr>
<td>NPE-150/175</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>NPE-200/225</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>NPE-300</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>PA-POS</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PA-DPT</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>PA-GE</td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
CMTS—Cisco uBR 7200 Series

- Cisco uBR 7246 VX
- Clock card
- MC16S spectrum management card
- MC16E 8 MHz modem card
- New software features

Synchronous Clock Card

- Add-on, optional plug-in to the Cisco uBR 7246 VXR
- Provides synchronization to an external T1 timing reference
- Reduces latency and jitter for time-sensitive applications
- Supports end-to-end G.711 applications (fax and pass-thru modem)
CMTS—Cisco uBR 7200 Series

- Cisco uBR 7246 VXR
- Clock card
- MC16S spectrum management card
- MC16E 8 MHz modem card
- New software features

MC16S Spectrum Management Card

- First DOCSIS line card to offer an integrated spectrum analyzer
- Hardware-assist frequency hopping with software enhancements
- Selects a clean channel to mitigate ingress noise impairments
- Increases cable plant reliability
Hopping Decisions

- Hopping decision is based on:
  - Scheduled
  - Percent modems offline
- Clean band is defined as > 29 db SNR for 16 QAM, and > 19 db SNR for QPSK
- Channel width can vary to find the clean band

CMTS—Cisco uBR 7200 Series

- Cisco uBR 7246 VXR
- Clock card
- MC16S spectrum management card
- MC16E 8 MHz modem card
- New software features
MC16E Features

- Supports EuroDOCSIS standard
  - Native 8 MHz downstream channel width
  - Upstream extended to 5-65MHz
  - Full Annex A compliance
  - 6.952 Msymbols per sec
  - 36.125 MHz IF
- For operators in PAL/SECAM, offers a unifying platform to offer data, voice and video suited to their infrastructure

MC16E Card Comparison

<table>
<thead>
<tr>
<th></th>
<th>MC16C or S</th>
<th>MC16E</th>
</tr>
</thead>
<tbody>
<tr>
<td>IF Output</td>
<td>44 MHz</td>
<td>36.125 MHz</td>
</tr>
<tr>
<td>Frame Format</td>
<td>Annex B</td>
<td>Annex A</td>
</tr>
<tr>
<td>DS Channel Width</td>
<td>6 MHz</td>
<td>8 MHz</td>
</tr>
<tr>
<td>US Frequency Range</td>
<td>5–42 MHz</td>
<td>5–65 MHz</td>
</tr>
</tbody>
</table>
CMTS—Cisco uBR 7200 Series

- Cisco uBR 7246 VXR
- Clock card
- MC16S spectrum management card
- MC16E 8 MHz modem card
- New software features

DOCSIS 1.0+

- Feature: QoS extensions for VoIP, packet concatenation, dynamic SID assignment, header suppression
- Benefit: enables MSOs to better support the delay/jitter requirements of real-time traffic such as voice and video
Interface Bundling

- Feature: two or more cable interfaces can be bundled to create a single logical layer three (IP) interface
- Benefit: conserves IP addressing, eliminates the need for a bridged CMTS

Sub-Interfaces

- Feature: Creates CM to Cisco uBR 7200 sub-interface binding for use with MPLS-VPN VRFs
- Benefit: Allows MSOs to extend VPNs across the HFC infrastructure to the CM
Agenda

• Product Overview
  CMTS—Cisco uBR 7200 Series
  CPE—Cisco uBR 900 Series
  Provisioning—CNR 3.5, CSRC 1.0
  Network Management—Cable Manager 1.0, Cisco Cable Troubleshooter 1.0
  Video—INA2320, 6290 RateMux

Cisco uBR 924 Cable Access Router

• First DOCSIS 1.1 based VoIP cable CPE device
• Targeted at telecommuters, SMB, and small branch offices
• Integrated Cisco IOS router, cable modem, and 4-port hub
• Supports delivery of value added services (e.g. voice, firewall, VPN)
Cisco uBR 924 Optional Software Feature Licenses

- Value telecommuter
  56-bit IPSEC
- Value small office
  56-bit IPSEC
  Cisco IOS Firewall
- Performance telecommuter
  3DES IPSEC
- Performance small/branch office
  3DES IPSec
  Cisco IOS firewall

Base Feature Set

- LAN connectivity
- Entry-level LAN security
- Includes VoIP capability

- Easily Connect Multiple PCs Using DHCP Server
- Save IP Address Space through NAT and PAT
- Encryption Using Baseline Privacy
- Offer Base LAN security Service through Access Lists
Telecommuter Feature Sets

- Deliver end-to-end VPN service
- Ability to offer 56-bit or 3DES IPSec security service
- Includes VoIP capability

Small Office Feature Sets

- LAN connectivity
- Firewall for LAN security
- Includes VoIP capability
- Also includes IPSec for branch office VPN (56-bit or 3DES)
Cisco uBR 910 Series

- Broadband cable DSU
- Cable to serial interface protocol converter
- Cisco uBR 914 rack mount version with redundant power supply option, serial or CSU/DSU WIC
- Cisco uBR 912 will be fixed configuration version
- Take advantage of access router installed base and large monthly sales volume

Broadband Cable DSU Application

Migrating Small and Medium Businesses to Cable
Agenda

• Product Overview
  CMTS—Cisco uBR 7200 Series
  CPE—Cisco uBR 900 Series
  Provisioning—CNR 3.5, CSRC 1.0
  Network Management—Cable Manager 1.0, Cisco Cable Troubleshooter 1.0
  Video—INA2320, 6290 RateMux

CNR Components

• Seamlessly provision new devices (CM, STB, PC, etc.)
• Register new users
• Deny addresses to unknown clients
• Dynamic DNS support for hostname-based lookups, such as tunneled VPN services
• Full DOCSIS 1.0 and 1.1 CPE support
• Leverages Cisco uBR family through DHCP options
Service Deployment Roadblocks

- Service providers have a backlog of subscribers requesting high-speed access.
- The current deployment model requires a technician to be sent to the customer premise to provision the access device (cable modem).
- This takes too much time, delays order fulfillment, and is costly to complete.
- Revenue is delayed, market share is lost, and costs are high for both initial service provisioning and tiered service offerings.

Removing the Roadblocks

- Cisco Subscriber Registration Center
  - Subscriber self-registration and activation
  - API’s for business system integration
  - Support for new services and new applications
  - Scales in excess of 200,000 subscribers
**CSRC Summary Benefits**

- Fast service deployment
- Flexible service bundling
- Easy administration
- No complex DOCSIS configuration file management
- Security—differentiate provisioned and unprovisioned devices
- Quickly provide new services, new devices

**CSRC User Interfaces**

- **Subscriber UI**
- **Administrator UI**
Agenda

- Product Overview
  - CMTS—Cisco uBR 7200 Series
  - CPE—Cisco uBR 900 Series
  - Provisioning—CNR 3.5, CSRC 1.0
  - Network Management—Cable Manager 1.0, Cisco Cable Troubleshooter 1.0
  - Video—INA2320, 6290 RateMux

Cable Management Solution

Service Management with Cisco Partners
- Billing
- Order and Workflow Management
- Trouble Ticket Admin

Network Management
- Provisioning
  - LDAP
  - CSRC
- CMTS and CM Fault and Performance Monitoring
  - Cable Manager
- RF Troubleshooting
  - Cable Troubleshooter

PCs
- DOCSIS CM
- 904/924
- TFTP, DNS, DHCP
- SNMP
- Telnet

uBR 7200
Cable Manager Feature Summary

- **Configuration management**
  - Batch configuration of Cisco uBR 7200s
  - CM software image downloads
  - Inventory reports
  - Topology tree views
- **Performance management**
  - Historical trend reports for early fault detection
  - Snapshot status and error level reports for problem isolation, down to single device
  - Utilization reports for capacity planning
Cable Manager Feature Summary

- Fault management
  - Alarm management
    - Event browsers
    - Alarm propagation
    - Alarm filtering
    - Trap forwarding
    - Alarm clearing
    - Customizable event notification
    - Launches CiscoView for chassis views
  - Threshold based-alarms
  - Troubleshooting utilities
- Security management
  - User name/password authentication

Predefined Report: Basic Capacity Planning

- uBR utilization
  - Estimated bandwidth in bits/sec
  - Receive/Transmit octets
  - Unicast and non-unicast packets
  - Discarded and error packets
- CM utilization
  - In and out octets for SIDs
  - In and out packets for SIDs
Cable Trouble-Shooter Overview

- A light, quick, and easy to use RF standalone troubleshooting tool
- Targeted for RF headend technicians at remote headend sites
- Complements cable manager which is targeted for centralized NOC
- Runs on both Windows '95/ '98/ NT and Solaris
- Exploits patent-pending flap list feature in uBR by providing analysis and interpretation of measured RF statistics
- Automates sorting of measured RF conditions experienced by cable modems and set-top boxes into four problem categories: Provisioning, noise, attenuation, CRC errors

Cable Trouble-Shooter Benefits

- Saves time in RF problem isolation and diagnosis
- Minimizes finger-pointing and ‘root cause’ guessing
- Streamlines workflow assignment and scheduling through proactive problem isolation
- De-centralizes RF monitoring and analysis which provides scaleable and quicker customer service
Analysis Output

- Uses heuristic rules to sort flapping modems into four problem types
- Provides summary statistics on % online modems, min/max power levels

Agenda

- Product Overview
  CMTS—Cisco uBR 7200 Series
  CPE—Cisco uBR 900 Series
  Provisioning—CNR 3.5, CSRC 1.0
  Network Management—Cable Manager 1.0, Cisco Cable Troubleshooter 1.0
  Video—INA2320, 6290 RateMux
The DVB Project

- DVB was formed in 1993 to provide a global family of standards for the delivery of digital video (over satellite, cable, terrestrial, wireless,...)
- DVB has more than 220 members representing broadcasters, manufacturers, network operators and regulatory bodies
- DVB-compliant digital broadcasting and reception equipment for professional, commercial and consumer applications is widely available and accepted in the marketplace

The DAVIC Association

- DAVIC was formed in 1994 by representatives of the audio-visual industry including equipment manufacturers of computer, consumer electronics and telecom equipment by broadcast, telecom and CATV service providers
- The intent of DAVIC was to develop specifications (open interfaces and protocols) that increased interoperability among the vendors in order help promote interactive digital audio-visual applications and services
- DAVIC has completed its task and has disbanded; its standards have been adopted by ISO and absorbed into the DVB Project
DVB Market and Applications

- Market addressed:
  European cable modem market (EuroModem)
  Worldwide interactive set-top-boxes market (OOB communication according to DAVIC1.2 and OpenCable-DVS167)

- Key applications:
  Internet access, e-mail, home shopping, VoIP, VPN connectivity, Interactive TV, video streaming, gaming, Enhanced TV, VOD

Cocom Acquisition

- COCOM acquisition brings DVB/DAVIC broadband technology in Cisco products portfolio
- Complete access system (cable modem headend and modem) based on widely recognized industry standard provided
Cisco DVB/DAVIC Product Line

• The INA2320 is OpenCable (SCTE DVS167) compliant for OoB data-to-set-top boxes
• Cisco is the only vendor who can support all of the standards: DVB/DAVIC, DOCSIS and EuroDOCSIS
• The INA2320 also supports DVB/DAVIC IB (CM) and OOB (STB) data

V-Bits Acquisition

• Provides management, transmission and distribution of digital video (MPEG2)
• Allows service providers to customize programming, tailor channel lineups to audience demographics, and enable video on demand
• Provides solution elements within the digital TV solution set:
  - CATV DTV (Digital Broadcast Television)
  - PPV (Pay Per View)
  - VoD (Video on Demand)
Cisco’s 6920 RateMux

Application: For Cable Operators who Want to Access Digital Programming from Multiple Sources. Operators Can Create Own Stat-Muxed Program Lineup from MPEG-2 Sources (CBR and VBR) Including Satellite Services, Local Encoders, and Video Servers. Also Provides Gateway to Perform Digital Ad Insertion and VOD.

- Multiple I/O and function cards with high speed backplane
- DVB-ASI, DHEI interfaces
- Supports external 64 or 256 QAM modulators
- Ethernet port for web browser control (SNMP optional)
- DSPs used for stat-muxing, transcoding, digital splicing

Adding Local Programs to the Digital Tier

- The RateMux allows the operator to combine locally encoded programs with programs that are received in a statistically multiplexed package
- The RateMux will create a new statistically multiplexed MPEG 2 transport stream for output to a QAM modulator

Note: As an Added Benefit, Local Ads May Be Inserted Before Encoding
The RateMux can perform statistical multiplexing of video streams coming off of a video server, generating 30% improvement in network utilization.

RateMux can also handle peak loads by performing rate reduction to allow more video streams to fit into the available network bandwidth.

**Agenda**

- Introduction
- Product Overview
- Solutions and Architectures
- Summary
Solutions and Architectures

Residential IP Telephony Service

Back Office and Operations Support Systems
- Customer Database
- Customer Care GUI
- Config, Fault and Performance
- Flow Through Provisioning
- Message Processing
- Invoicing
- Payment/Financials
- Billing and Customer Care

Reference Call Control Architecture
- Call Agent
  - Accounting Gateway
  - SS7 Gateway
  - Announcement Server
- ISCP
- Public Signaling Network
- Residential POTS Call Control and Signaling

Reference Transport Architecture
- Voice/IP
- IP Network
- ILEC/PTO
- VolP Infrastructure
- STB
- HFC Network
OpenCable Basic
DVB-RC/DAVIC/DVS-167

Applications Include:
Electronic Program Guide,
Conditional Access, VoD,
Command and Control Signaling

- OpenCable initiative compliant
- Supports basic interactive services enabling you to:
  Better differentiate services
  Offer more services
  Create more attractive service bundles
  Increase customer loyalty
  Generate more revenue
OpenCable Basic
DVB-RC/DAVIC/DVS-167

Applications Include:
- Web Surfing
- Email
- Chat
- Targeted Advertising
- Electronic Program Guide
- Conditional Access

OpenCable initiative compliant
Supports basic interactive services enabling you to:
- Better differentiate services
- Offer more services
- Create more attractive service bundles
- Increase customer loyalty
- Generate more revenue

Telecommuter Services
- Deliver end-to-end VPN service
- Secure remote corporate access
  - 56-bit or 3DES IPSec security service
- Includes VoIP services
  - PBX extension

Secure IPSec Tunnel between Home and Corporate Gateway
Small Office Services

- LAN connectivity
- Entry-level LAN security
- Includes VoIP capability

Easily Connect Multiple PCs Using DHCP Server

Save IP Address Space through NAT and PAT

10.237.340

Encryption Using Baseline Privacy

Offer Base LAN Security Service through Firewall

Cisco uBR924

HFC

Internet

Summary
Cisco Proposition: Solutions

- The uBR is the only CMTS in the industry that is already supporting data, voice and video
  Voice over IP solutions using Cisco AS5800, uBR 924 video solutions using Pace STBs with DOCSIS modems
- Other CMTS vendors are protecting proprietary embedded base of circuit-switched voice, non-standard modems
- Cable operators have to choose between competitors’ expensive multibox patchwork or our integrated multiservice solution

Update: Cisco Market Leadership

First DOCSIS/J112 CMTS qualified by CableLabs
First DOCSIS CMTS and CM to be qualified by @Home certification process for release
First DOCSIS/J.112 CMTS and CM in market
First DOCSIS/J.112 CMTS and CM in MSO production
First CMTS to embed service provider class routing intelligence and optical strategy in the core
First DOCSIS/J.112 STB with integrated CM
Update: Cisco Market Leadership

- **Over 150** MSOs deploying Cisco uBR 7200 today
- **100%** Of top 10 US MSOs deploying Cisco uBR 7200
- **90% +** Market share of DOCSIS/J112 CMTS market
- **70% +** Market share of worldwide CMTS market
- **7,000 +** Cisco uBR 7200 units shipped through 3/31/00

Cable Access
Product Update
Session 2910
Please Complete Your Evaluation Form

Session 2910