



# Cisco's Modular DOCSIS 3.0 Downstream Channel Bonding Solution At-A-Glance

## Why Cisco's Modular DOCSIS 3.0 Downstream Channel Bonding?

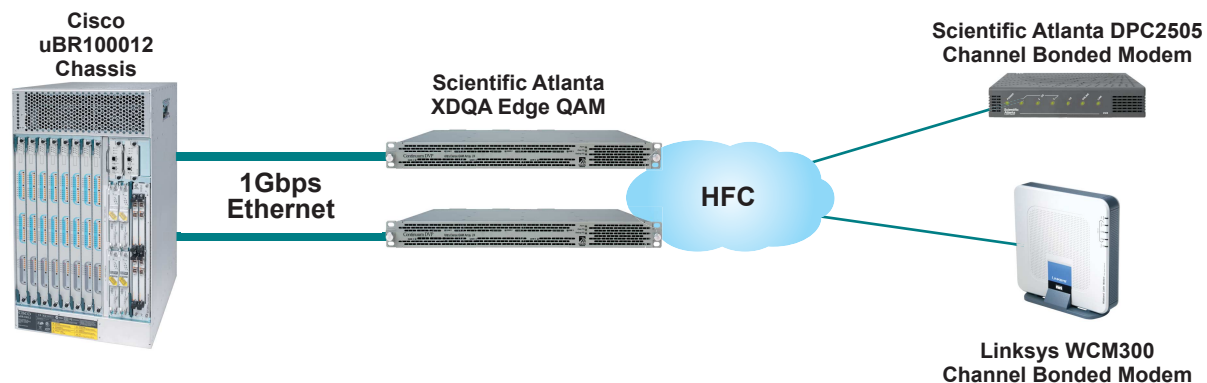
Consumers are increasingly demanding “many services to many screens.” They want the convenience of having services available anytime, anywhere – over any device. To offer such services and successfully compete in today's highly competitive markets, cable operators must transform themselves from being a “service” provider into an “experience” provider. The Cisco Modular DOCSIS 3.0 Downstream Channel Bonding solution enables cable operators to optimize their networks for additional bandwidth. The Cisco Modular DOCSIS 3.0 Downstream Channel Bonding solution also helps cable operators deliver on this new “Connected Life” by helping them achieve consistent, high quality, end-user experiences that enhance the consumer's lifestyle.

To deliver many services to many screens, cable operators require an innovative, converged infrastructure that enables the delivery of current services more efficiently, while also providing the means to deliver tomorrow's new, application-intensive residential and commercial services. As convergence takes place and cable operators offer a diversity of services to multiple devices, IP will be the protocol on which most of these new services will be based. There will be more bandwidth demands on the network than ever before.

## The Need for Speed

In today's highly competitive broadband environment, where higher and higher bandwidths are offered at ever decreasing prices, cable operators must differentiate themselves and generate premium margins by increasing the bandwidth of their high-speed data offerings. Additionally, they can offer an ever-increasing spectrum of high-bandwidth and on-demand DOCSIS-based services.

Today, a typical cable operator's high-speed data service has a maximum downstream speed between 3 Mbps and 6 Mbps. The DSL downstream speed is lower, typically around 1.5 Mbps. In other parts of the world, the situation is similar – though short copper loop lengths and other factors facilitate higher downstream bandwidth. In many areas, service providers are now competing on the basis of speed. Without channel bonding, offering very high-speed services over DOCSIS is impossible. However, Cisco's Modular DOCSIS 3.0 Downstream Channel Bonding solution enables up to 24 downstream channels (for an aggregate bandwidth of up to nearly 1 Gbps) – with channel bonded modems supporting data rates of up to 240 Mbps.



Cisco's Modular DOCSIS 3.0 Downstream Channel Bonding solution consists of three primary components: CMTS, edge QAM and channel bonded modems.

## Cisco's Modular DOCSIS 3.0 Downstream Channel Bonding Solution

The Cisco Modular DOCSIS 3.0 Downstream Channel Bonding solution delivers greater bandwidth at lower cost. Two key characteristics allow this to be possible. First is channel bonding, which combines several radio frequency (RF) channels into one “virtual” channel. Data rates in this virtual channel range from the hundreds of megabits to potentially gigabits per second. This creates more available bandwidth in the network and helps cable operators offer new, more bandwidth-intensive services. The second characteristic is modularity made possible with the use of edge quadrature amplitude modulation (QAM) technology. Cisco's Modular DOCSIS 3.0 Downstream Channel Bonding solution uses existing, relatively low cost, edge QAMs – the same technology used for current video-on-demand (VOD) applications.

### Cisco uBR10012 Universal Broadband Router

The Cisco uBR10012 is one of the industry's highest density, robust cable modem termination systems (CMTS). It also offers a unique quality of service (QoS) architecture that helps enable simultaneous delivery of high capacity data and broadly deployed Internet protocol (IP) telephony services over the same flexible, scalable platform.

The Cisco 1 Gbps Downstream Channel Bonding Shared Port Adaptor (SPA) for the Cisco uBR10012 provides up to 1 Gigabit connectivity to the edge QAM. There is also a new SPA Interface Processor (SIP) carrier card that takes up to 2 SPA modules.

Each Downstream Channel Bonding SPA provides up to 1 Gigabit wideband connectivity to the edge QAM device. Because the Cisco SPA modules are installed in the Cisco uBR10012 system's wide area network (WAN) slot, rather than taking up valuable RF slots, a wideband upgrade more than doubles the Cisco uBR10012's maximum downstream density – taking it from 40 to 88 total downstream channels.

### Scientific Atlanta Continuum DVP xDQA24 Edge QAM

The edge QAM device in the Cisco Modular DOCSIS 3.0 Downstream Channel Bonding solution is a Scientific Atlanta Continuum DVP™ xDQA24 edge QAM, which supports up to 24 downstream QAM channels. Third-party edge QAMs can also be supported. These more traditional edge QAMs, which are often used today for VOD applications, are typically one-third to one-fourth the price of today's typical CMTS downstream channels. The Scientific Atlanta edge QAM connects to the Cisco uBR10012 over Gigabit Ethernet.

### Scientific Atlanta and Linksys Channel Bonded Modems

These modems are specifically designed for the Cisco Modular DOCSIS 3.0 Downstream Channel Bonding solution. Each uses multiple channels to deliver more packets simultaneously to provide high throughput performance compared to existing downstream speeds. At the receiving site, the cable modem reassembles the packets for smooth delivery of service. There are two cable modem options (3-Channel or 8-Channel). Together, these products offer consumers a choice of features and capabilities.

**Scientific Atlanta 3-Channel Cable Modem (DPC2505™/EPC2505™)** – This modem has three bonded channels and supports in excess of 100 Mbps downstream data transfer over 256 QAM DOCSIS channels and in excess of 130 Mbps downstream data transfers over 256 QAM Euro-DOCSIS channels. The new downstream channel bonding modem's packet bonding technology deliver packets over three parallel channels to help maximize throughput and deliver extraordinary high-speed data (HSD) service. The Scientific Atlanta DPC2505 has been designed to be compatible with the upcoming DOCSIS 3.0 specification. The EPC2505 also supports three channels, but is designed to meet the Euro-DOCSIS specifications.

Scientific Atlanta also offers the option of downstream channel bonding cable modems with an Embedded Media Terminal Adapter (EMTA). These Voice-over-IP (VoIP) models are designed to meet PacketCable 1.5 and EuroPacketCable 1.0 specifications. Please contact your representative for more information.

**Linksys 8-Channel Cable Modem (WCM300)** – This modem supports two to eight bonded channels and up to 240 Mbps downstream data transfers, and is appropriate for end users who have varying bandwidth requirements. MSOs can share channels between downstream channel bonding and traditional DOCSIS modems. Wideband channels do not have to be contiguous unless all eight channels are being bonded. The Linksys WCM300, is designed to be compatible with the Cisco uBR10012 CMTS and downstream channel bonding SPA as well as work with any DOCSIS 2.0 compatible CMTS.

## What Are the Benefits of the Cisco Modular DOCSIS 3.0 Downstream Channel Bonding Solution?

The Cisco Modular DOCSIS 3.0 Downstream Channel Bonding solution more than doubles CMTS downstream channel density and significantly reduces the cost per bit. Channel bonding provides cable operators with a flexible way to increase throughput for customers, with data rates in the hundreds of megabits and, potentially gigabits, per second. In concert with the Cisco CMTS platform, the Scientific Atlanta and Linksys downstream channel bonding cable modems take advantage of multiple downstream cable channels to increase overall data throughput. All of this is accomplished using more traditional edge QAM technology, saving cable operators money in CMTS downstream transmissions.

## Key Features/Benefits

### Built on Leading Cisco uBR10012 Platform

- Largest capacity CMTS on the market
- Rich Cisco IOS feature set: Routing, MPLS, IPv6, high-performance multicast
- Proven QoS for voice, video and data deployments

### Higher Bandwidth

- Channel bonding for increased bandwidth
- Re-use existing plant and equipment
- Enables new IP services for “The Connected Life”

### Lower Cost

- Uses low-cost edge QAMs
- Channel bonding doubles CMTS density
- Eliminates fixed downstream/upstream ratio

### Channel Bonding

- Expands the current 30-Mbps service portfolio options up to 240 Mbps
- Enables efficient video delivery over IP
- Flexibility to offer a number of unique service tiers concurrently
- Opportunity to scale services to meet new subscriber growth
- Path to gigabit services

### Industry-Leading Port Density

- Provides a flexible and easy option to more than double the downstream capacity to the Cisco uBR10012
- Dramatic reduction in per-port cost
- Works in conjunction with existing 5X20 RF line cards

### Utilizes the Modular CMTS Architecture

- Cost-effective option to scale DOCSIS deployments
- Easy first step in moving to DOCSIS 3.0

### Supports Scientific Atlanta and Third-Party Edge QAMs

- Uses existing investments

### Integrated MAC Processing

- Delivers superior DOCSIS 3.0 performance

### Uses Existing Hybrid Fiber-Coaxial (HFC) Infrastructure and DOCSIS Provisioning

- Addresses ongoing challenge to reduce operating expenses

### Overlapping Service Groups

- Enables multiple fiber nodes to support custom bandwidth offerings

### SPA Design

- Modular port adapters have the ability to be supported across Cisco Systems® routing platforms

For more information, visit us at: [www.cisco.com/go/wideband](http://www.cisco.com/go/wideband)