

Massively Scaling your DOCSIS 3.0 Network

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Agenda

- Market Dynamics
- uBR/3G60 Product Overview
- Modular CMTS Architecture
- Channel Bonding
- Designing for High Availability
- Summary
- Q & A

Market Growth

Video Intensive, Multi-platform, Personal, and Interactive

Massive Video Growth

- Rapid growth in HD and VoD services
- Video expected to be 90% of consumer internet traffic by 2013
- Content owners looking for new outlets with piracy protection

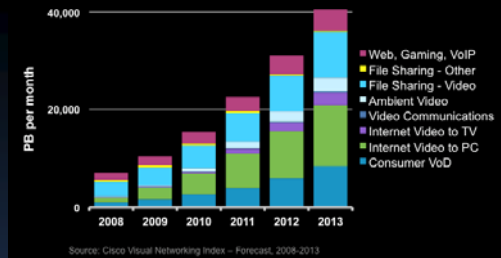
Personalization

- Consumers want custom applications & user interfaces
- Consumers want to watch what they want, when and where they want
- 2 billion apps downloaded from Apple, over 40 apps per iPhone /Touch
- Recently updated to 3B apps in <18 months

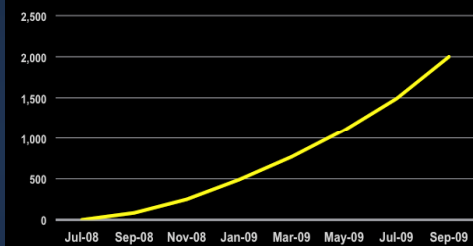
Consumers Looking Beyond Traditional Video

- Internet video increasing in quantity
- Broadband speeds & streaming technology improving
- Consumers looking at new viewing options

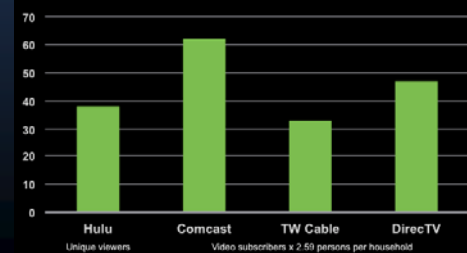
Video to Approach 90% of Consumer IP by 2013



App Store Downloads (Millions)

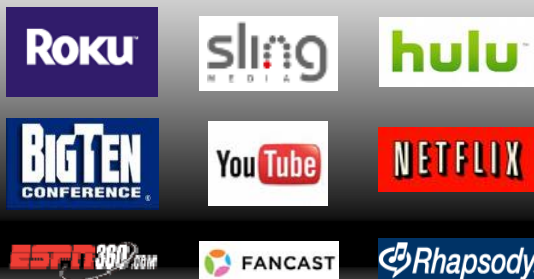


Hulu vs. Pay TV: Total Video Reach (Millions)



MSOs Moving Towards Enabling Converged Services

Internet & Premium Content Services



Personal Content



View Personal Content on the TV



Home Telepresence – Cisco ūmi

Interactive & Community / Social Applications



Voice Over IP & Data Services

Communications



Comcast's Goal

Jorge Salinger and John Leddy of Comcast – “MSOs are deploying more and more unicast QAM channels to support growth from the success of VOD... Deployment of SDV for an increasing number of multicast content offerings is driving QAM channels even further.

And with the availability of channel bonding in DOCSIS 3.0, MSOs are deploying additional QAM channels for their cable modem termination system (CMTS) equipment....”*

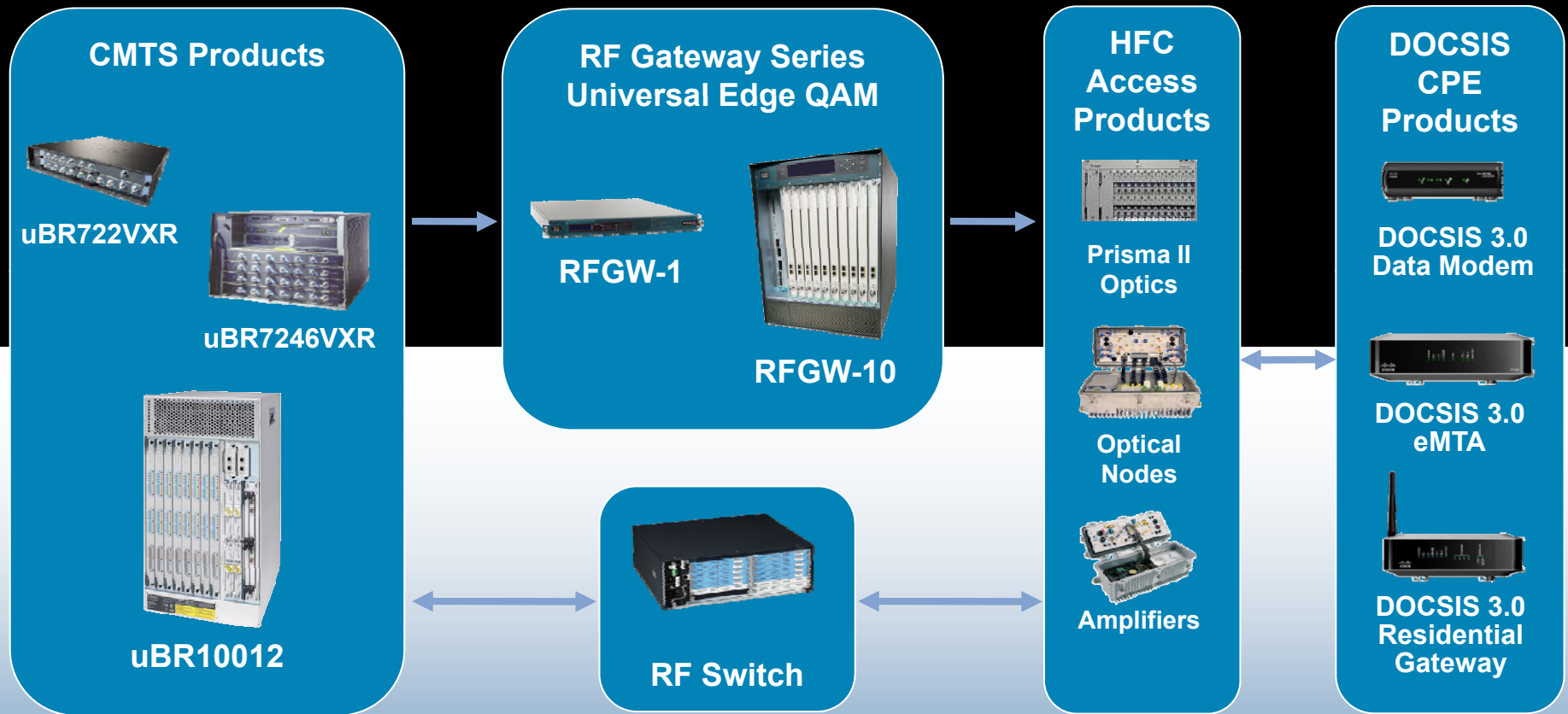
*CT Magazine – Feb '10



Agenda

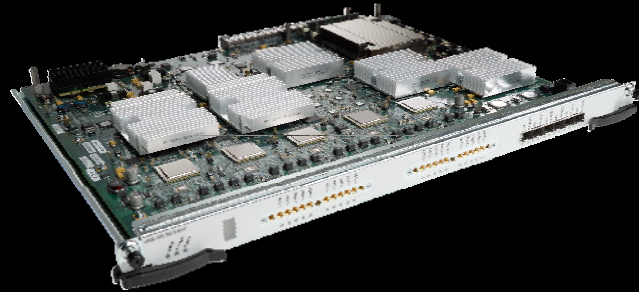
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End-to-End Cisco DOCSIS 3.0 Solution



CMTS Product Portfolio

uBR-MC3GX60V Line Card

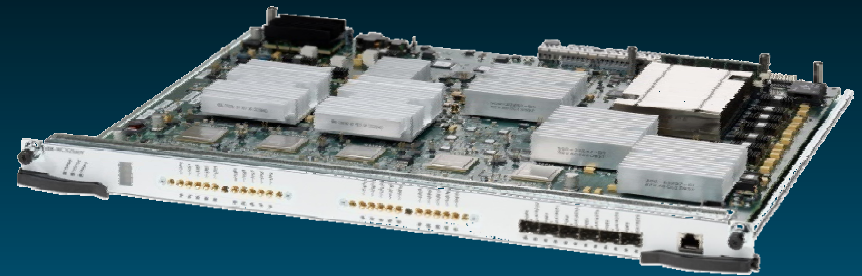


uBR-MC3GX60V

- **Industry-leading DOCSIS 3.0 Scalability**
- UP to 576 DOCSIS DS and 480 US per uBR10012 chassis
- 10X the downstream channel capacity of DOCSIS 2.0 solution
- 1 Gbps DS **speed** with 24 channel bonding -- 20X the speed of DOCSIS 2.0 solution
- High channel capacity enables **lower cost per channel**
- Greater capex control with Cisco **software licensing**
- **N+1 Redundancy** provides carrier-class availability
- Supported in 12.2(33)SCE and later

uBR-MC3GX60V Line Card Overview

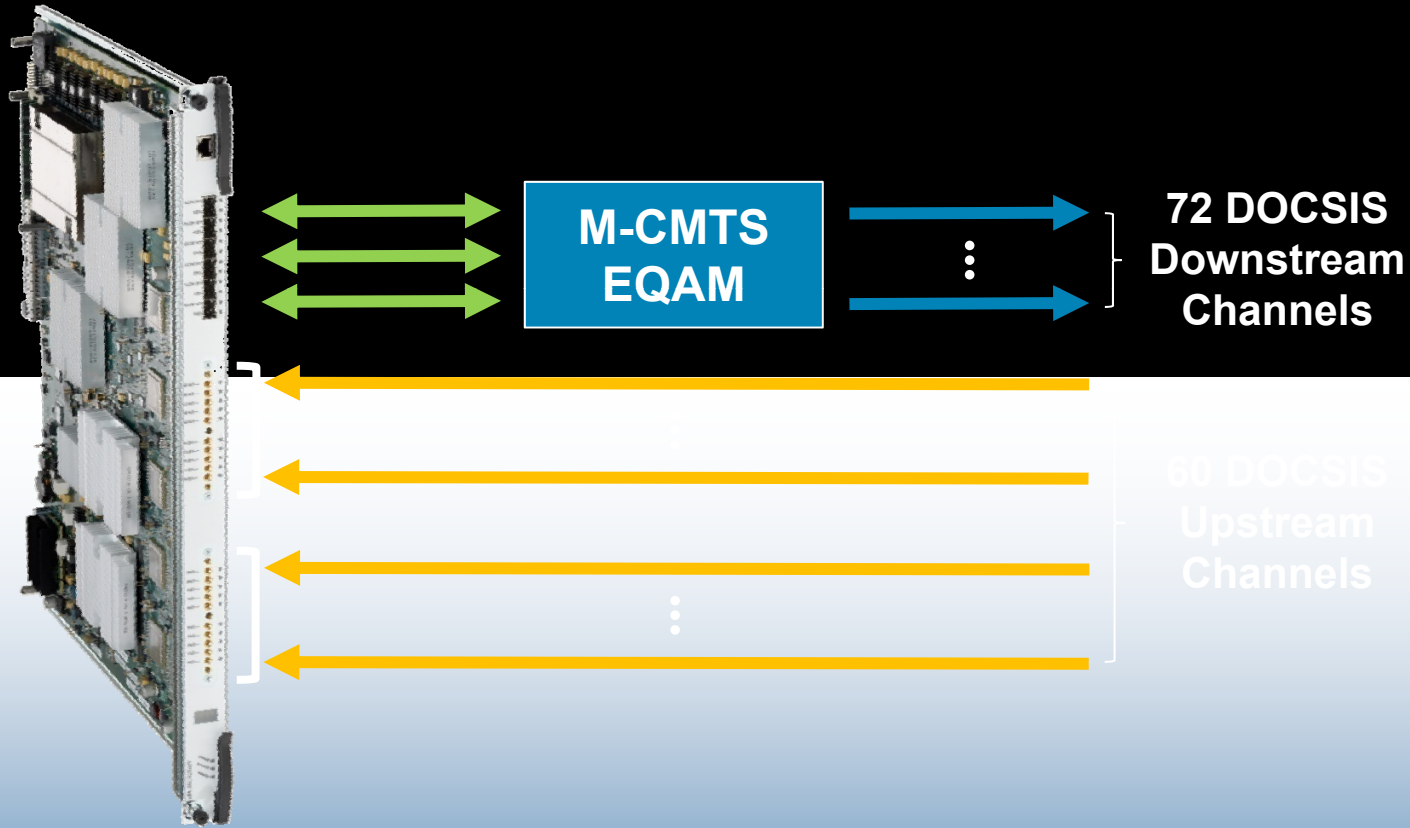
- Full DOCSIS 3.0 & M-CMTS Features
- 72 Downstream Channels (Annex B)
- 60 Downstream Channels (Annex A)
 - 54 DS Channels @ line rate
- 3x3 GigE ports for connectivity to external M-CMTS Edge QAM
- 60 Upstream Channels
 - 20 US ports; up to 12 US channels per port
 - 5-85 MHz US frequency range
- Up to 8 MC3G60V Line Cards per uBR10012 Chassis
 - Up to 576 DS and 480 US channels per chassis



uBR-MC3GX60V

- Software Licensing for Downstream and Upstream Channels
 - Minimum 16x16 configuration
- DEPI Control Plane
- N+1 Linecard Redundancy
- Shipping since October 2010

3G60 Connectivity to HFC Network

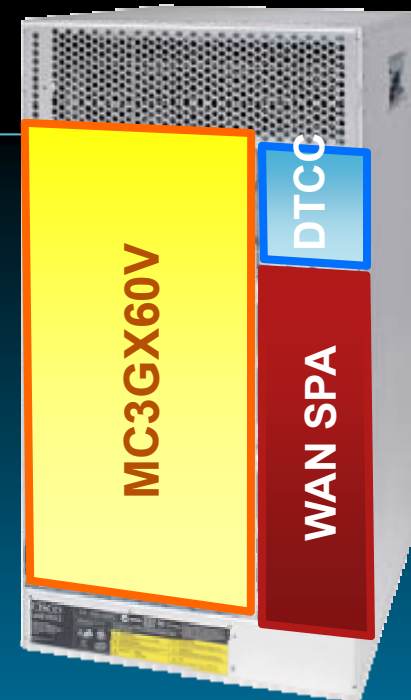
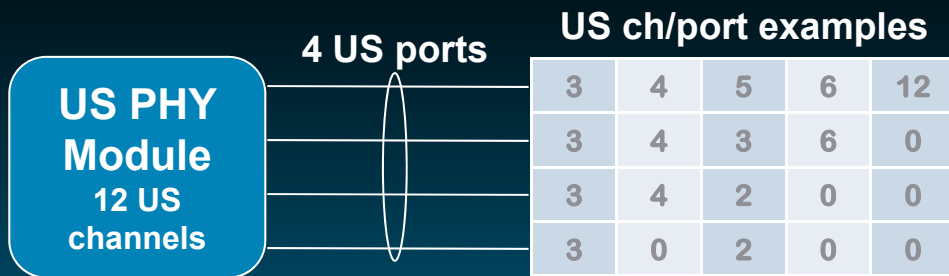


**uBR-MC3GX60V
Line Card**



uBR-MC3GX60V Line Card

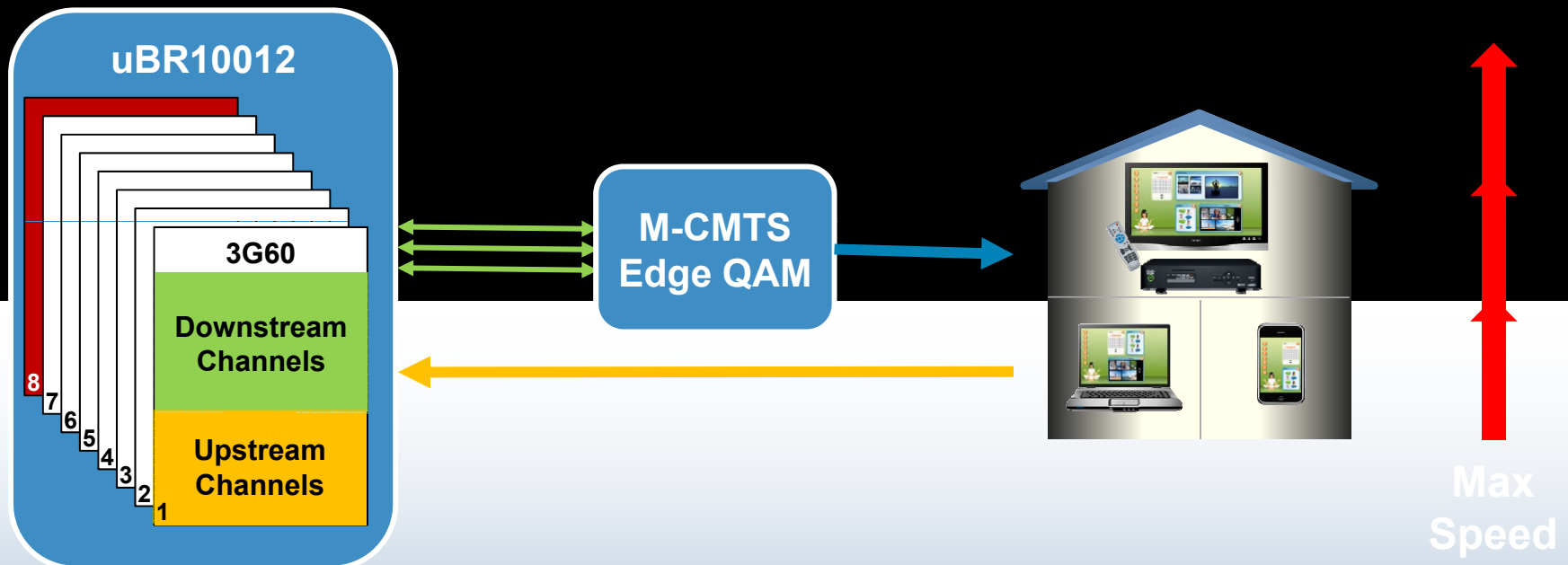
High Level Design Considerations



- 5 US PHY modules per 3G60
 - 12 US channels stackable across 4 connectors per module
 - Configurable from 1-12 US per port
 - 2 logical channels per US receiver
 - 8 US's per MAC domain
 - Any upstream can be assigned to any MAC domain
 - 15 MAC domains per 3G60
- Flexible downstream bonding group overlay topologies supported
 - WAN options include 5x1GE and 1x10GE SPAs
 - PRE4 required with 3G60

Scaling a DOCSIS 3.0 Network with 3G60

Strategic Planning can reduce Capex and Opex



- Hardware installation and wiring performed at initial deployment – adding capacity only requires downloading software licenses and updating CMTS configuration
- Add DS and US channels as needed to increase max speed and/or average rate per user

uBR-MC3GX60V Key Features

Scalable

Industry-leading DOCSIS 3.0 **Scalability**

- Up to 576 downstream channels – 24 Gbps DOCSIS DS Connectivity per uBR10012 chassis
- Up to 480 upstream channels – 14.4 Gbps DOCSIS US Connectivity per uBR10012 chassis
- 10X the downstream channel capacity of DOCSIS 2.0 solution

uBR-MC3GX60V Key Features



Faster

Faster & **More Reliable** Broadband Services

- Up to 1 Gbps downstream speed with 24-channel bonding
- Up to 100 Mbps upstream speed with 4-channel bonding
- 20X the speed of DOCSIS 2.0 solution

uBR-MC3GX60V Key Features

Cost-effective

Most **Cost-effective** CMTS Architecture

- High channel capacity enables lower cost per channel
- Modular design leverages low-cost Edge QAM
- Substantial reduction in cost compared to DOCSIS 2.0 solution

Audience Poll

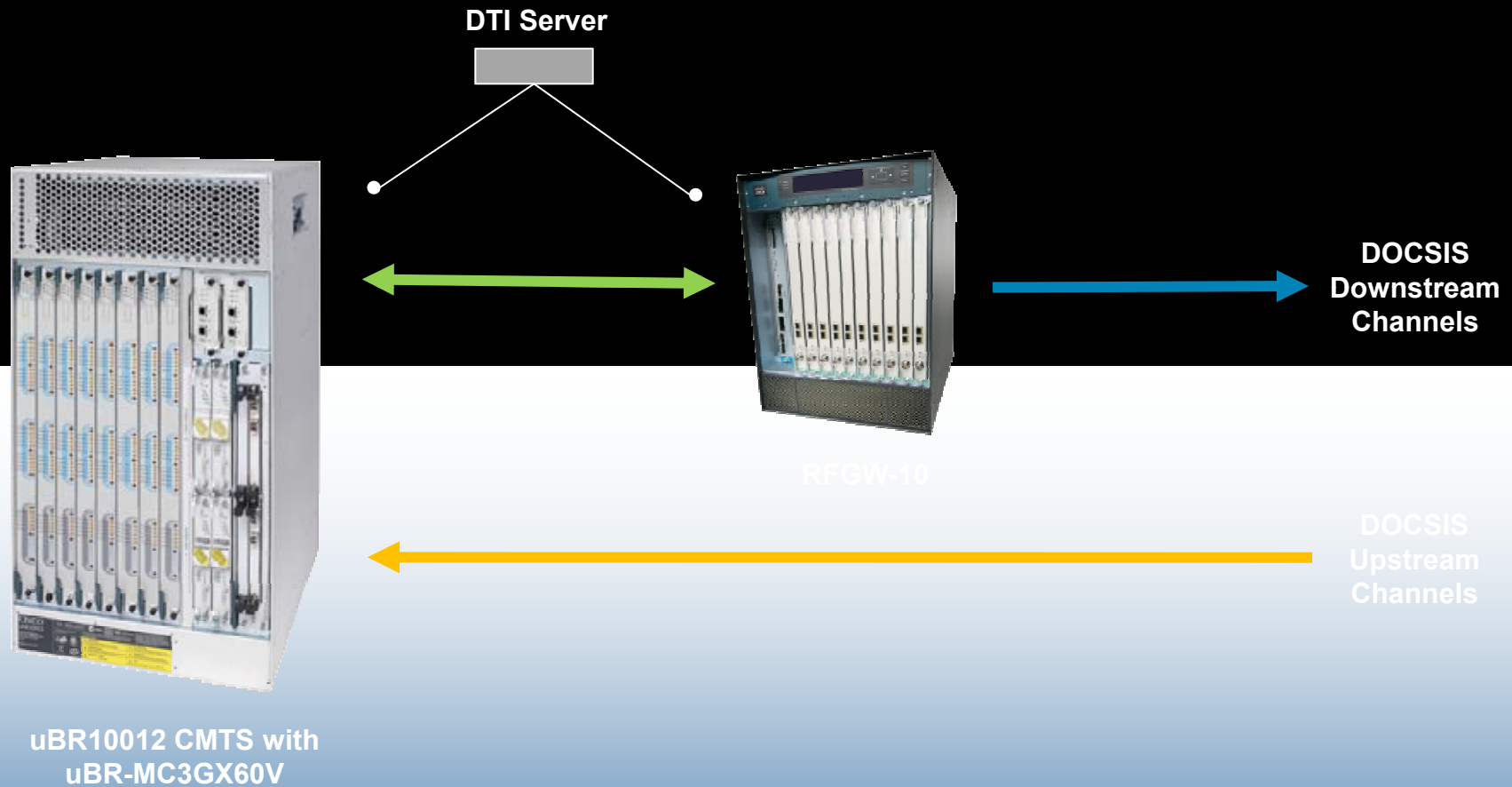
How fast is consumer broadband consumption growing?

- A. 20% per year
- B. 30% per year
- C. 40% per year
- D.

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M-CMTS Architecture



uBR10012 CMTS with
uBR-MC3GX60V

RFGW-10

DOCSIS
Downstream
Channels

DOCSIS
Upstream
Channels

M-CMTS architecture specified by CableLabs

- GigE
- Downstream RF
- Upstream RF

Benefits of M-CMTS

- **Massively scale the CMTS**

 - Exporting DS PHY enables greater DS density on CMTS
 - Substantially reduces cost per bit for all IP services

- **Utilize high-density, low-cost Universal Edge QAMs**

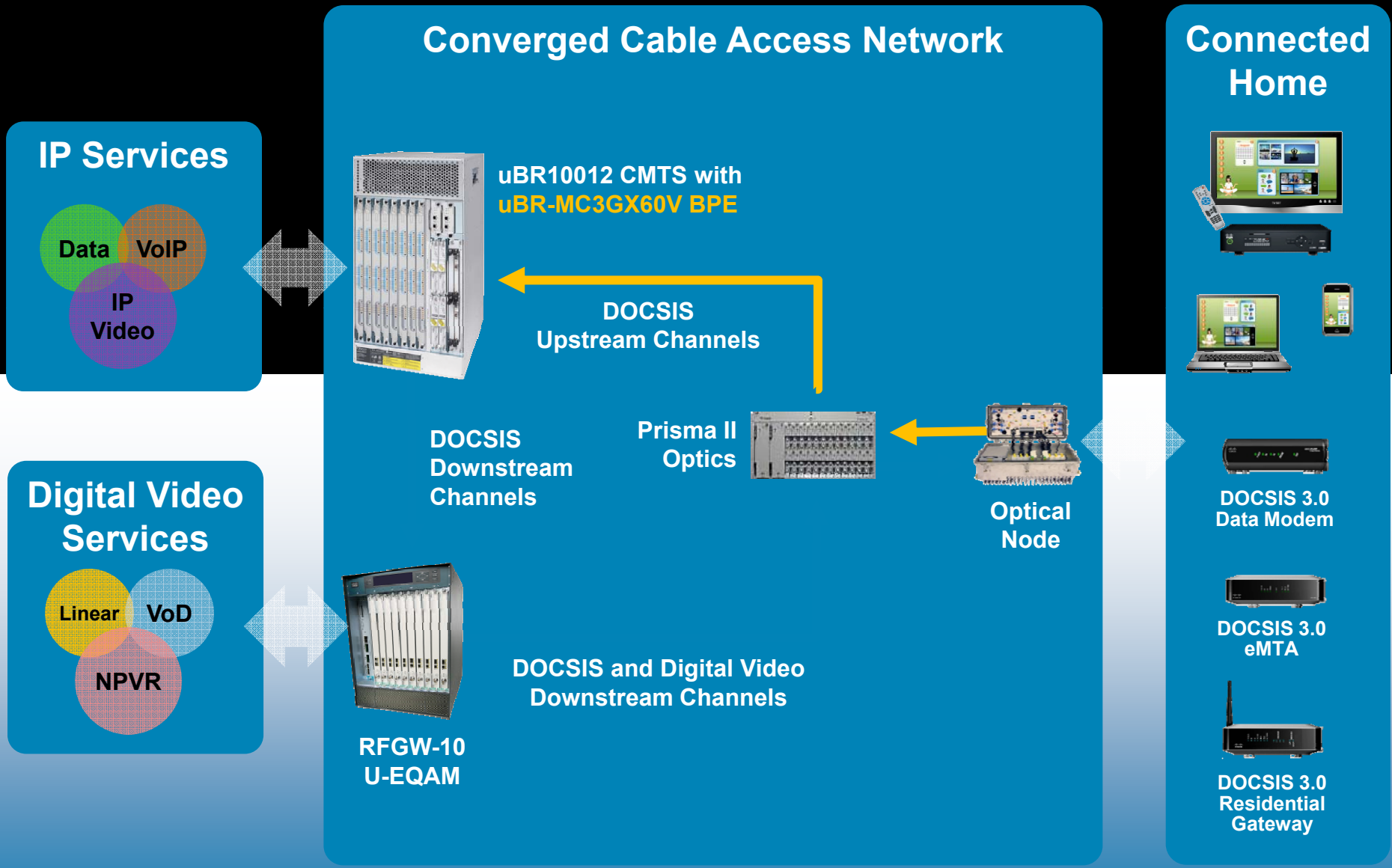
 - Stack more QAM channels per RF port

 - Lower the capex and opex for all services

- **Protect investment in digital video QAM capacity**

 - Repurpose as DOCSIS QAMs in migration to all-IP

Cisco Multi-Service Cable Solution



Cisco Multiservice Cable Solution

Helping Cable Operators Transform Consumer Experiences

Scaled Service Delivery



Deliver More Services to More Subscribers

- Provides Industry-leading DOCSIS 3.0 and universal edge QAM scalability
- Deliver 500 HDTV channels, VoD and ultra-broadband services to 20,000 homes
- Industry's lowest cost per bit for IP services

Efficient Convergence



Converge All Services with Universal Edge QAM

IP video, digital video, voice, data

- Support IP and digital video services on single QAM platform...reduces cost for all services
- Deploy DOCSIS 3.0 capacity that can leverage high-density edge QAM...no need to wait for next-generation CMTS
- Green-friendly solution reduces environmental overhead for all services

Seamless Migration



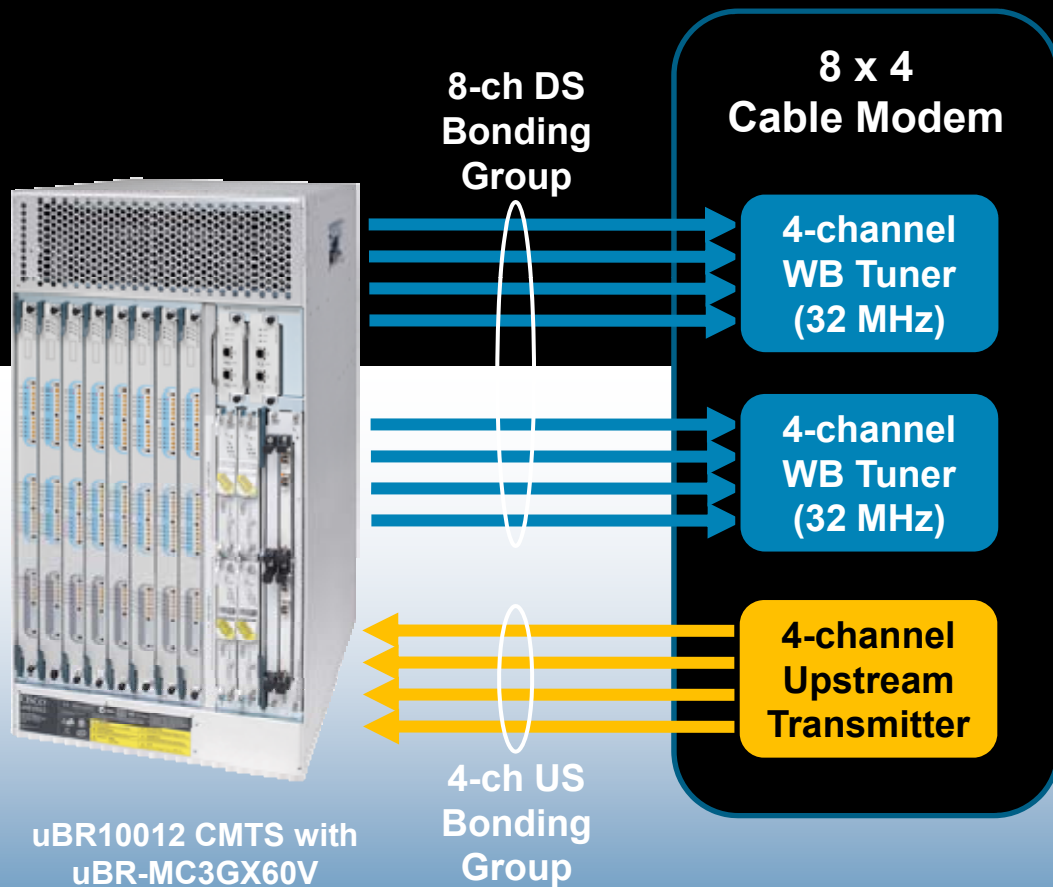
Seamless Migration to an all IP Network

- Add DOCSIS and digital video capacity as needed to keep pace with customer demands
- Simply repurpose digital video QAMs to DOCSIS QAMs via configuration change for easy migration to all-IP

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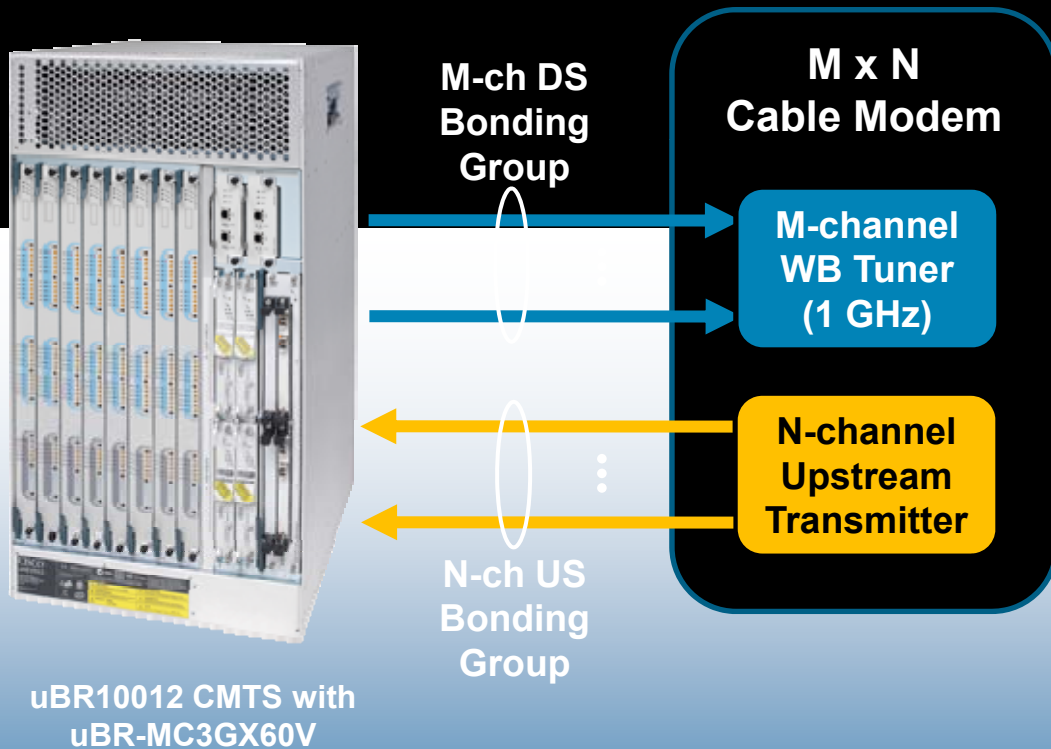
DOCSIS 3.0 Channel Bonding - Today



- Up to 300 Mbps DS speed with 8-channel bonding (DOCSIS)
- Each set of 4 DS channels

- Must be within the same bonding range
- DS frequency blocks can be contiguous or split
- Up to 100 Mbps US speed with 4-ch bonding

DOCSIS 3.0 Channel Bonding - Future



- 3G60 supports 24+ DS channel bonding
- Up to 1 Gbps DS speed with 24-ch bonding (DOCSIS)

- 100+ Mbps DS speed with 24-ch bonding (DOCSIS)
- 100+ Mbps US speed with 4 or more US channels per bonding group operating at up to 85 MHz

Audience Poll

What top speed do you expect to offer in 2013?

- A. 50 Mbps
- B. 100 Mbps
- C. 200 Mbps
- D. 300+ Mbps

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M-CMTS Solution Redundancy

- uBR10012

 - 1+1 system component redundancy

 - N+1 line card redundancy (with external RF Switch for upstreams)

 - GigE port/link redundancy from 3G60 line card to RFGW-10

 - WAN and DTI port/link redundancy

- RFGW-10

 - 1+1 system component redundancy

 - N+1 QAM card redundancy

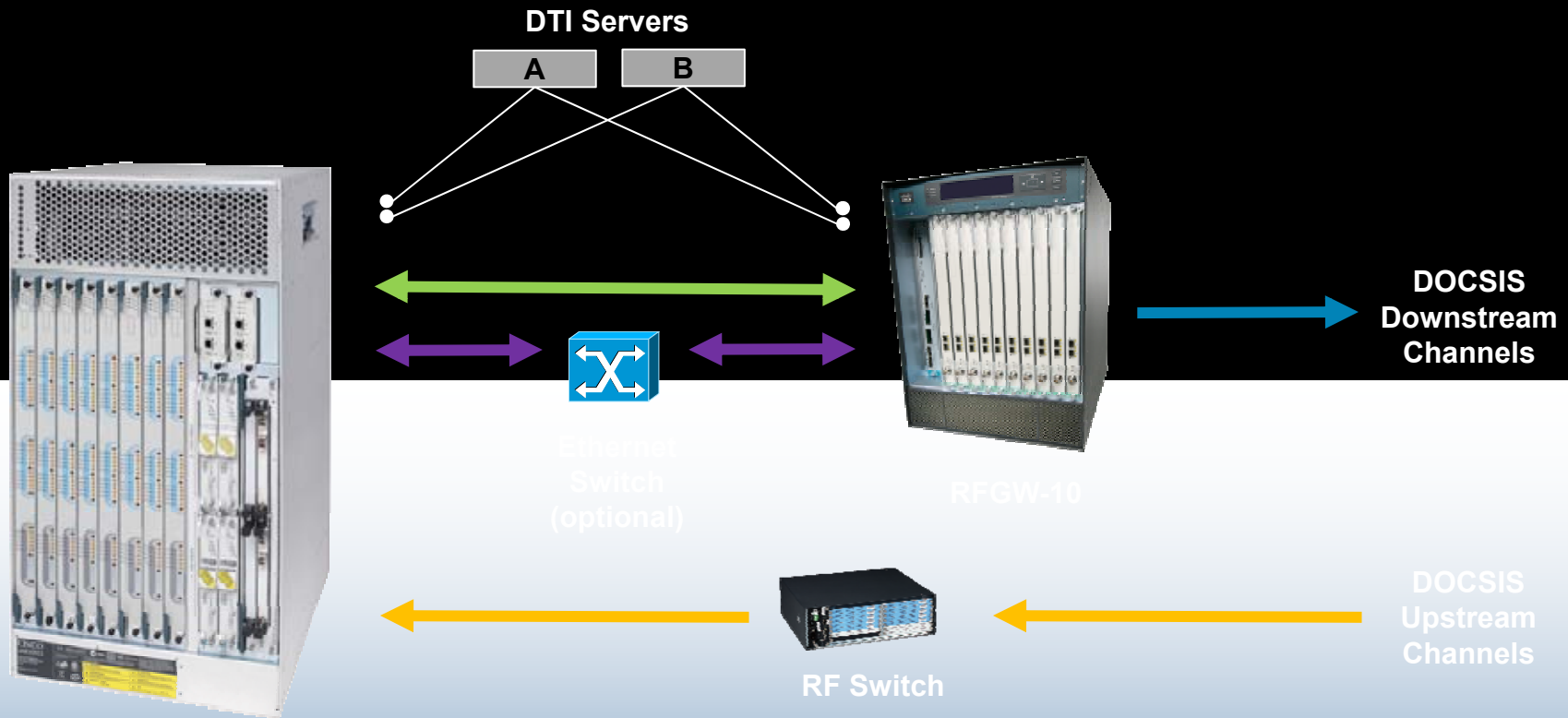
 - Integrated RF switch

 - WAN and DTI port/link redundancy

- DTI Server





 - Chassis and port/link redundancy options available

Fully Redundant M-CMTS Solution



uBR10012 CMTS with
uBR-MC3GX60V

Note: Use of redundant GigE links and Ethernet Switch between 3G60 and RFGW-10 is optional; N+1 line card redundancy provides protection in the event of primary GigE link loss without redundant GigE links

-  Primary GigE
-  Redundant GigE
-  Downstream RF
-  Upstream RF

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Summary

- Consumer **broadband consumption will continue to grow** at a high rate with innovation in video technologies and applications
- Cisco uBR10012 with 3G60 offers **industry-leading scalability** so cable operators can keep pace with

- 3G60 enables **faster speeds** as a competitive advantage over DSL
- Modular CMTS solution **drives down costs** for all services
- Cable operators can invest in their DOCSIS 3.0 and digital video networks today and **migrate to all-IP** tomorrow

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