The Converging Cable Network - Docsis 3.0

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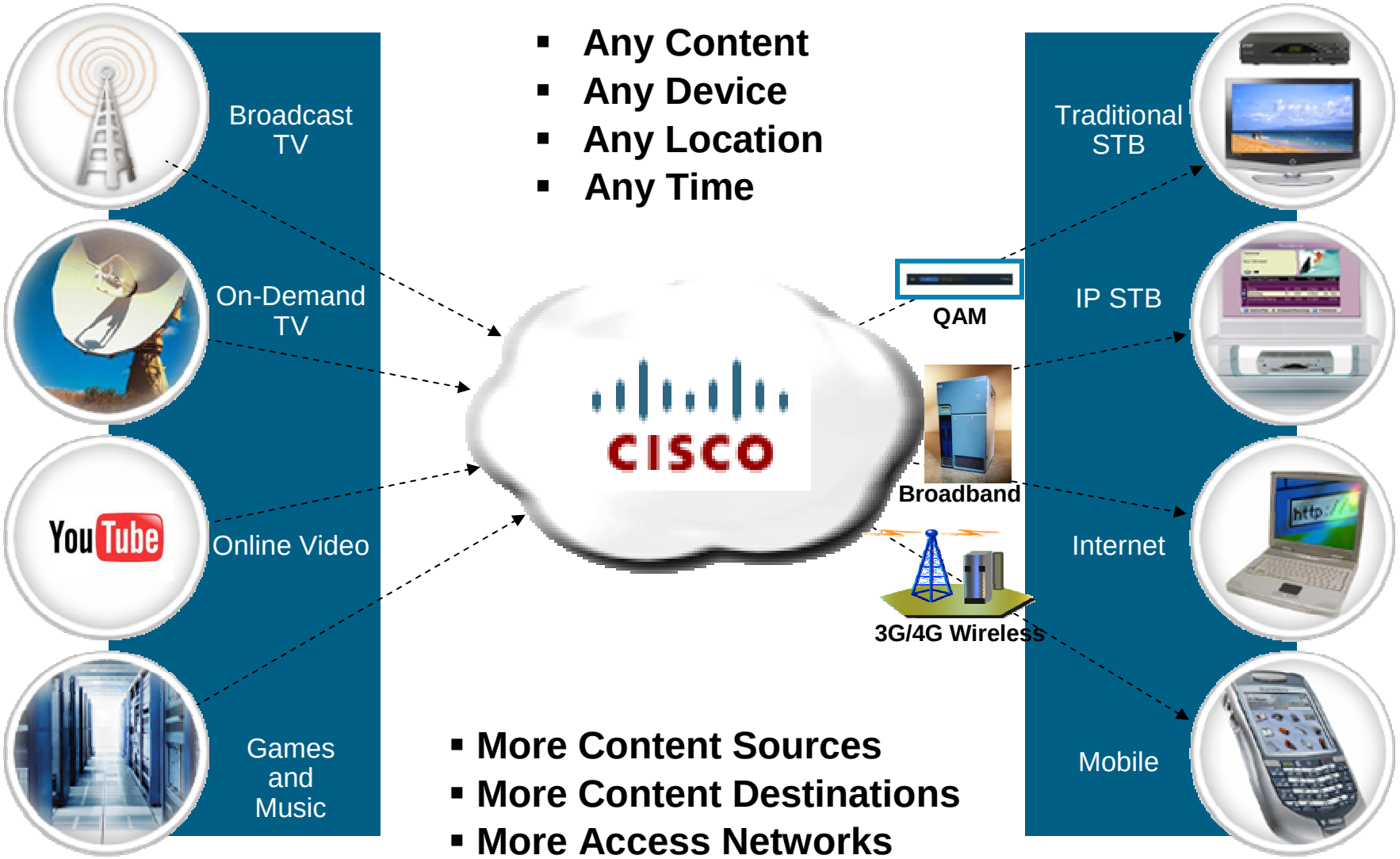
21st Century Video Delivery Requirements



Worldwide IPTV Deployments

Carrier	Country	IPTV Subs	Broadband Subs
Iliad (Free)	France	**2,170,000**	2.77 Million
France Telecom	France	**975,000**	6.90 Million
PCCW	Hong Kong	**818,000**	1.18 Million
Neuf Cegetel	France	**600,000**	3.12 Million
Telefonica	Spain	**469,067**	4.34 Million
Chunghwa Telecom	Taiwan	**358,000**	4.07 Million
China Telecom	China	**310,000**	35.1 Million
Belgacom	Belgium	**249,434**	1.20 Million
TeliaSonera	Sweden	**216,000**	1.03 Million
Fastweb	Italy	**170,000**	1.25 Million

4 of top 5, 7 of top 10 IPTV deployments are in Europe

From Light Reading Report "Top Ten IPTV Carriers" issued Jan 14, 2008
Verizon FiOS is not included since its broadcast channels are not delivered via IPTV

The Challenges & the MSO Toolkit

Bandwidth Drive

Unlimited Content

HD Expansion

Content Personalization

- **Fiber Node Splits**
- **1GHz Plant Upgrade**
- **Analog Reclamation**
- **Switched Video**
- **QAM Sharing**
- **H264 Video Encoding**

Convergence Drive

Anyone

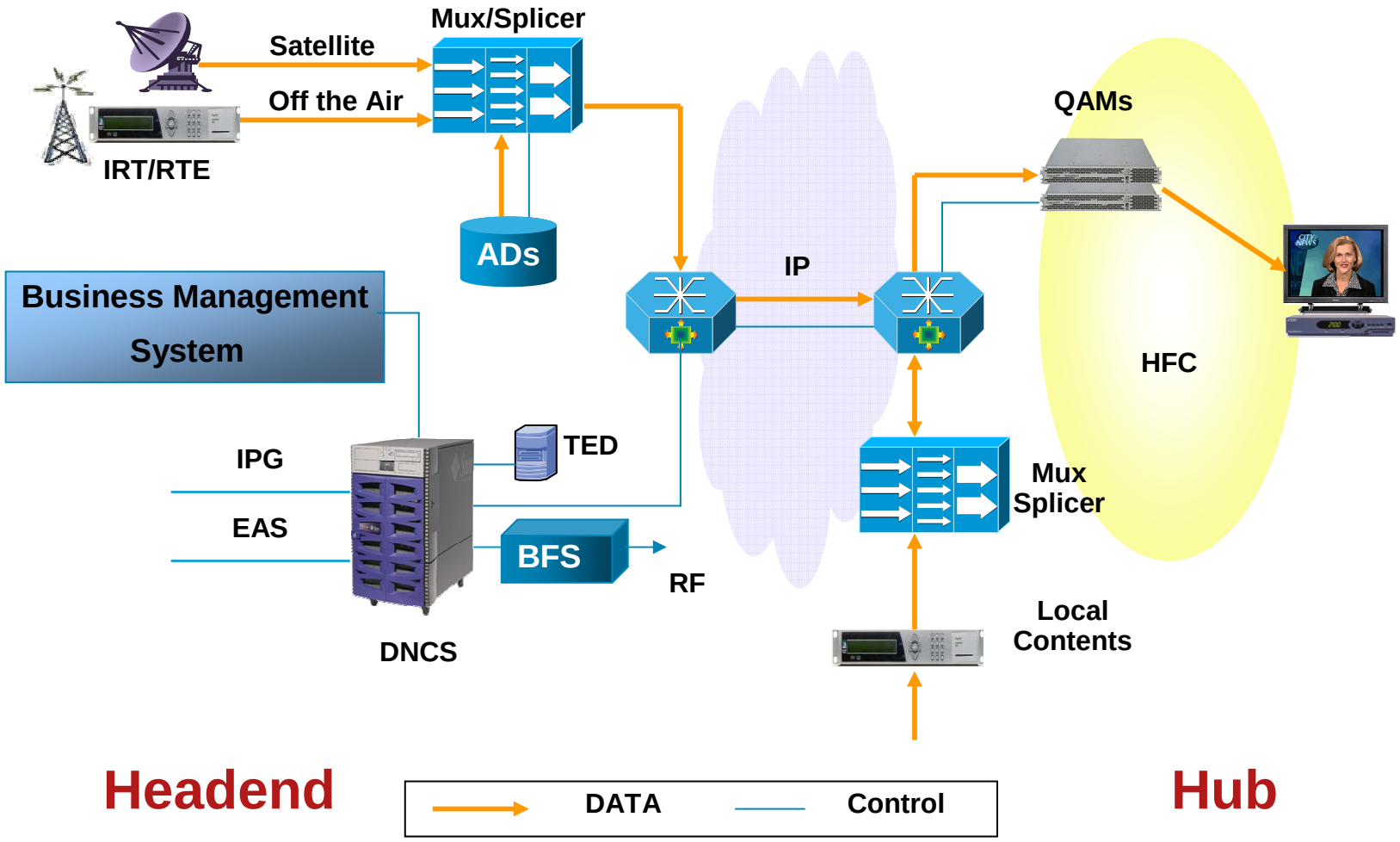
Anywhere

Any Device

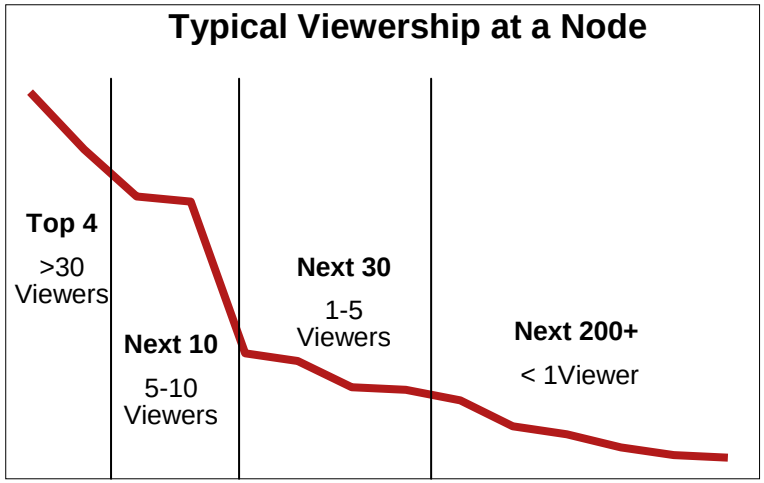
Any Content

- **IPTV over DOCSIS**
- **Converged network**

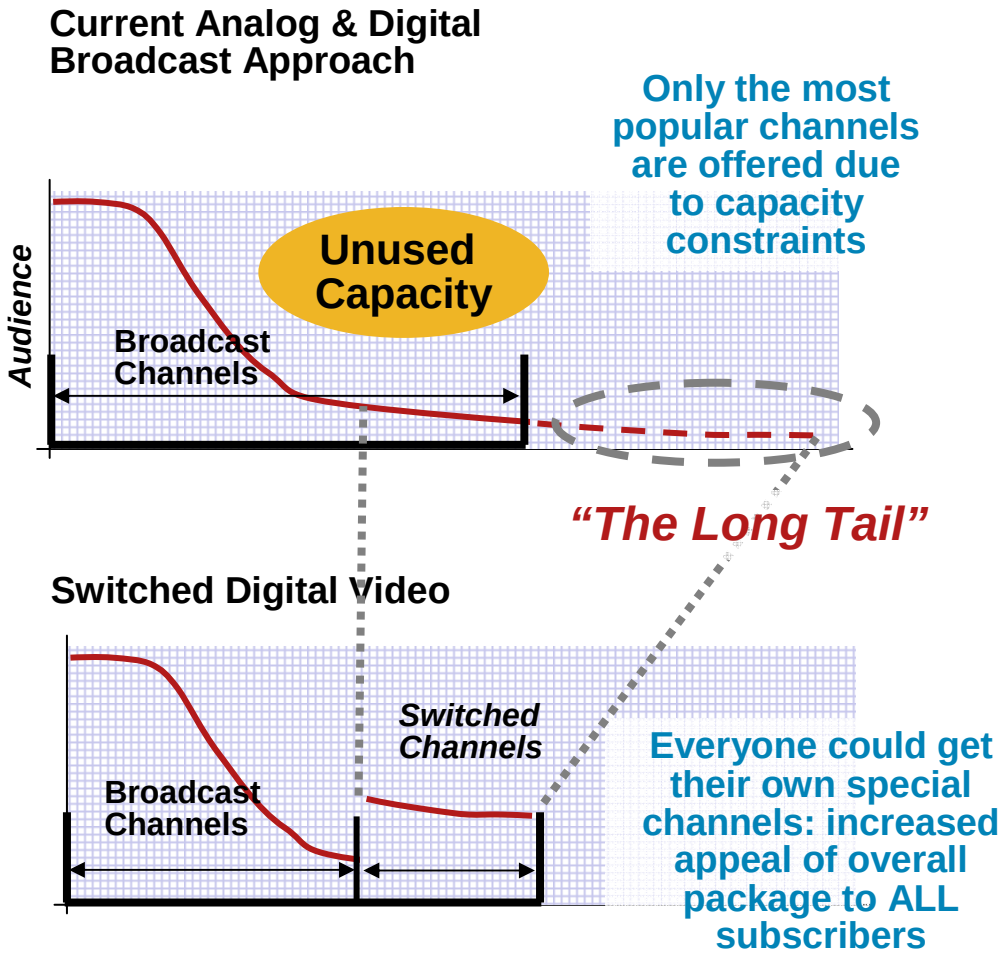
Digital Broadcast and Digital Simulcast



SDV: Paradigm Shift from Production to Consumption Model

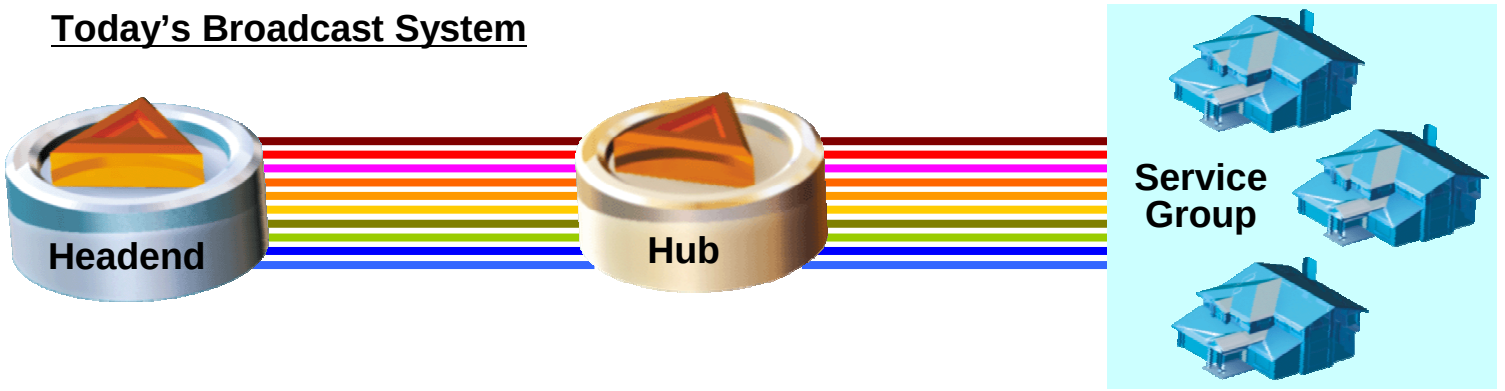


SDV opens more bandwidth capacity because NOT every channel is delivered at the same time



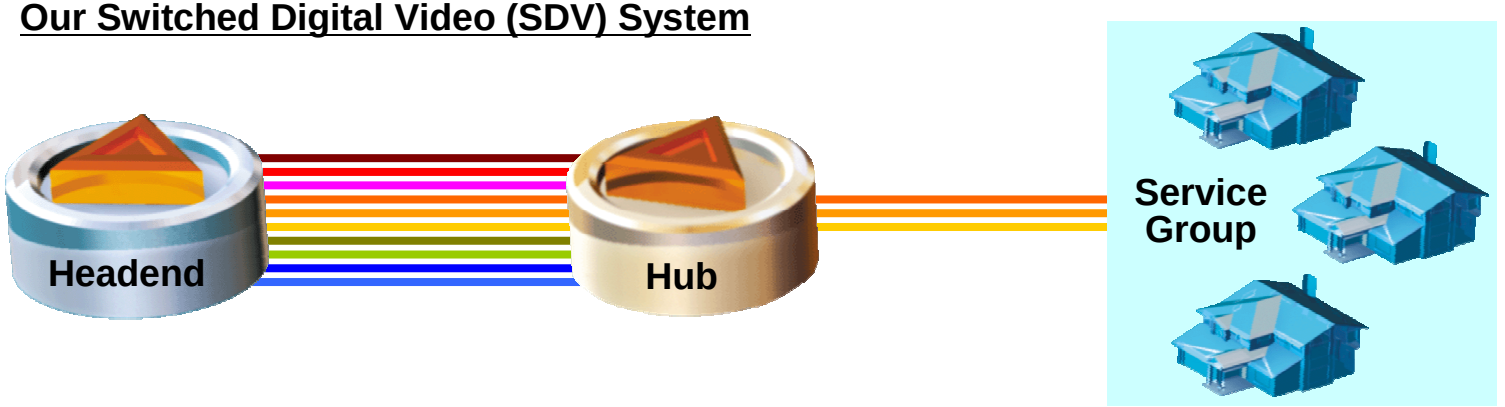
How Does Switched Digital Video Work?

Today's Broadcast System



All programs are broadcast to all subscribers all the time

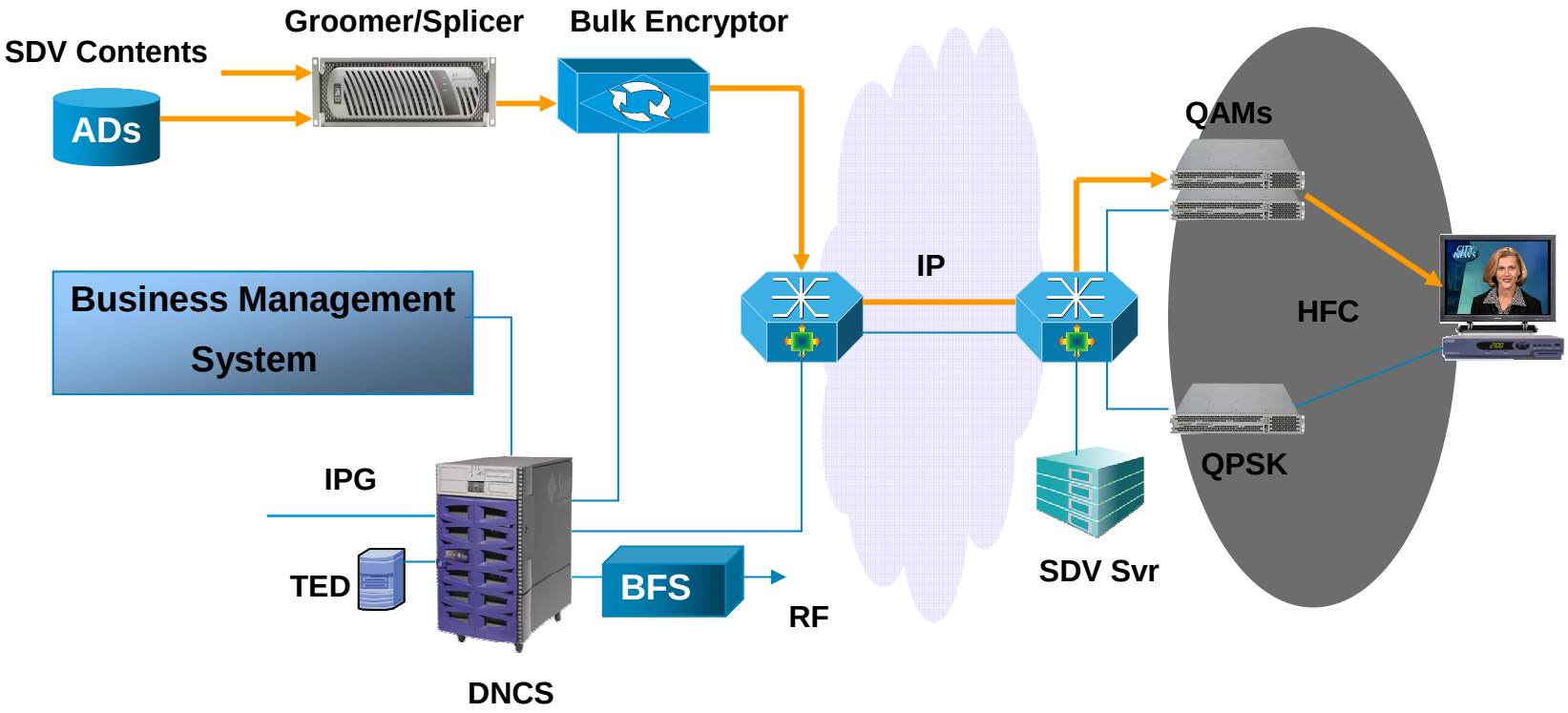
Our Switched Digital Video (SDV) System



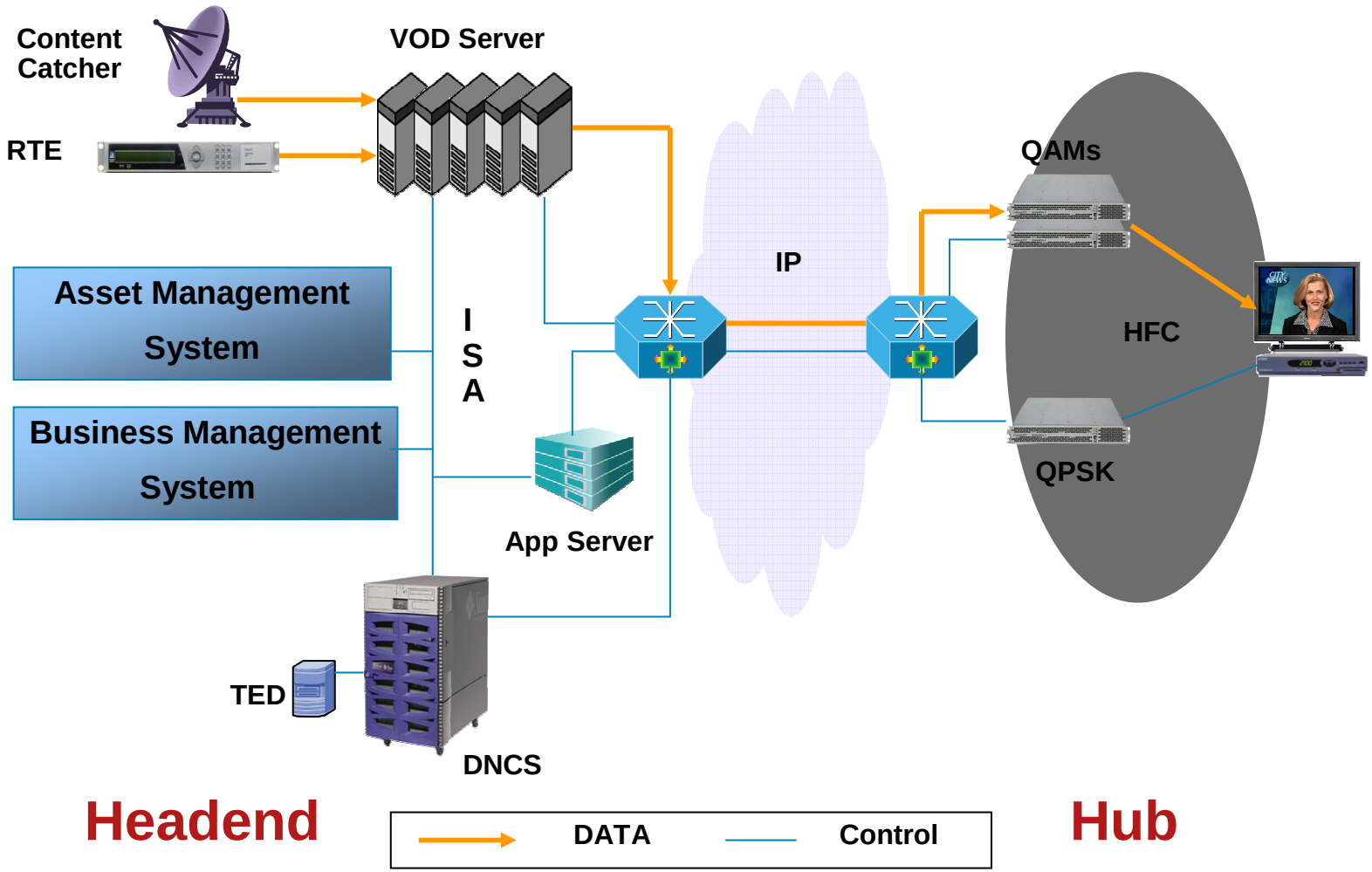
Programs are transmitted to a service group only when a subscriber in that group is actively watching them

SDV sends programs to subscribers only in areas where programs are being requested in real-time

Switched Digital Video



Video on Demand



Control Plane:
Session & Resource Management

Session Manager

Handles session signaling from the client

-- VoD session request

-- SDV channel change

Request session resources from various resource manager

-- QAM, Encryption

Normally application specific

-- VOD SM, SDV SM

Edge Resource Manager

Manages resources

-- QAM, encryption, streaming, storage

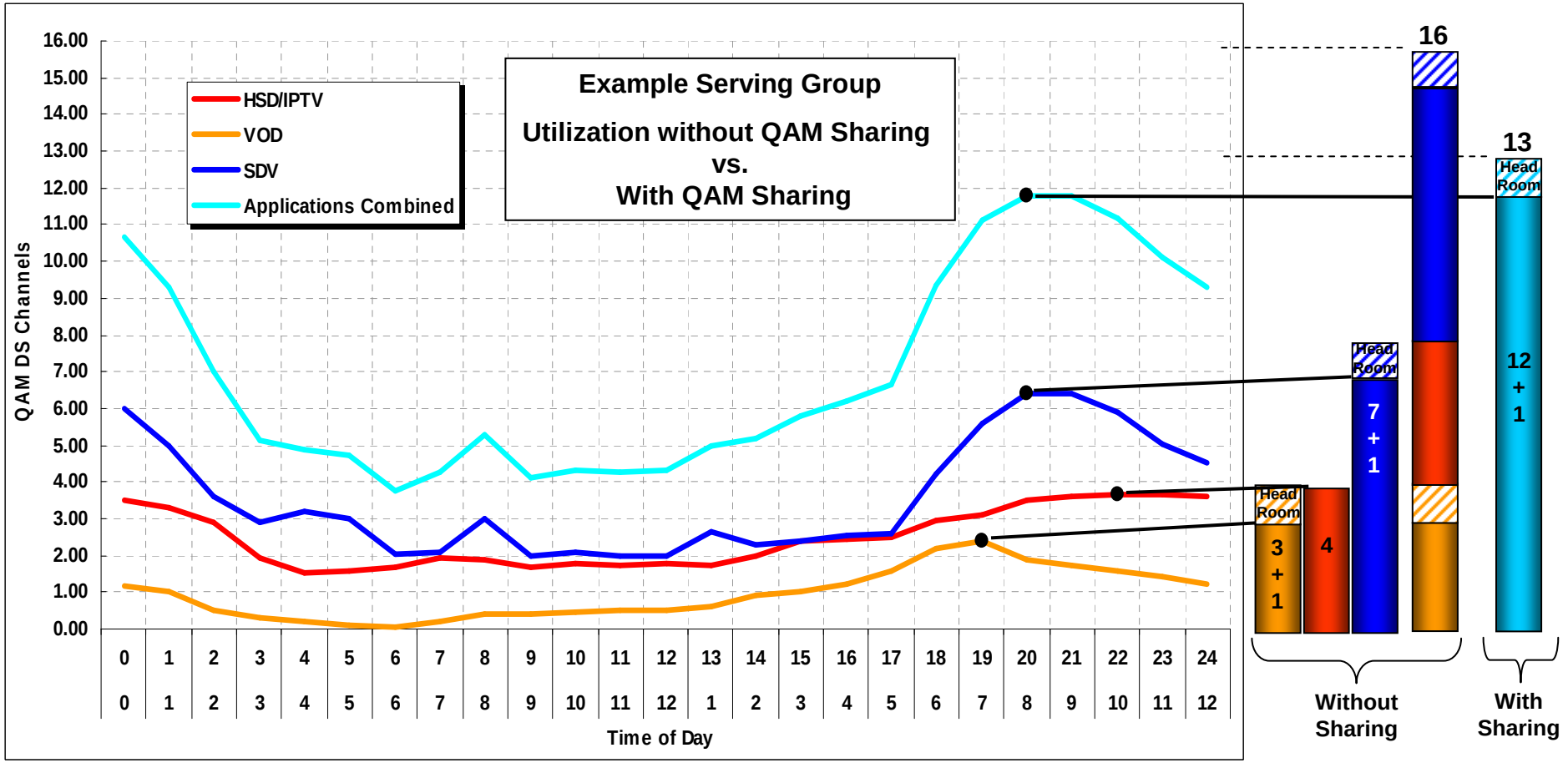
-- Admission control

-- Resource sharing

Application agnostic

Switching	Admission Control Resource Allocation	Session Signaling
CCP/IGMP	RTSP/GQI	RTSP

Universal QAM and QAM Sharing



• = ***Peak Usage***

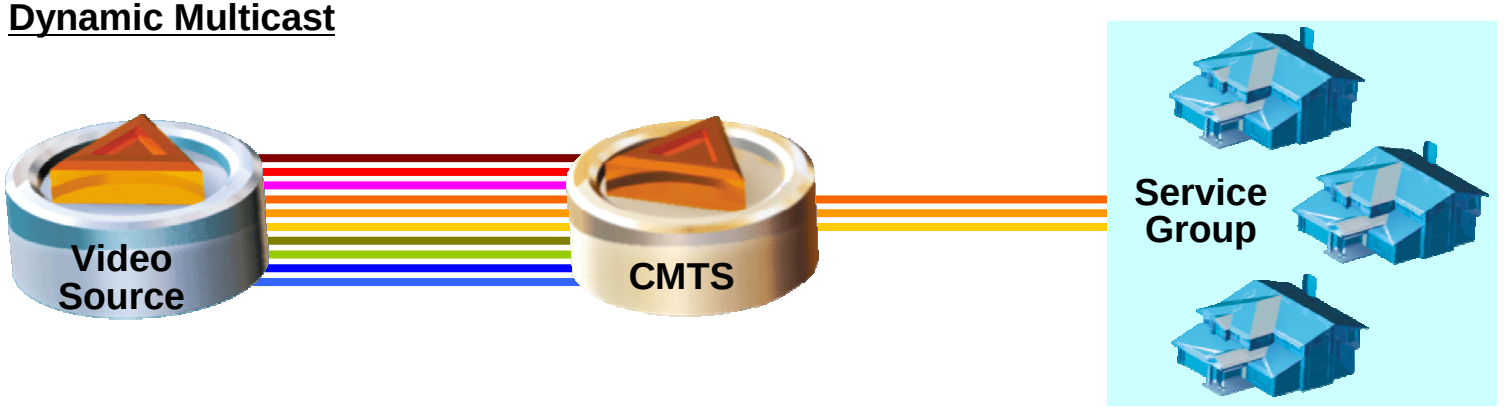
19% QAM DS Channels savings with QAM Sharing (16 vs. 13)

Switching in IPTV over DOCSIS

Static Multicast

- Limited number of channels, especially for 4x4 CM
- RF spanning may provide some cost benefits

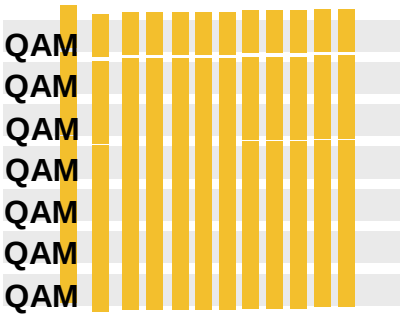
Dynamic Multicast



- Bandwidth efficient
- Need smaller service group to really benefit

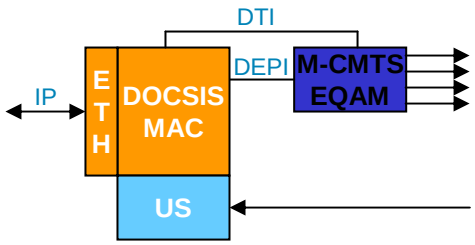
Video over DOCSIS 3.0 – truly converged network

DOCSIS Evolution



DOCSIS 3.0

- Bonded Channel
- Enhanced Multicast



DOCSIS M-CMTS

- Universal QAM
- Lower QAM cost

New Functionality

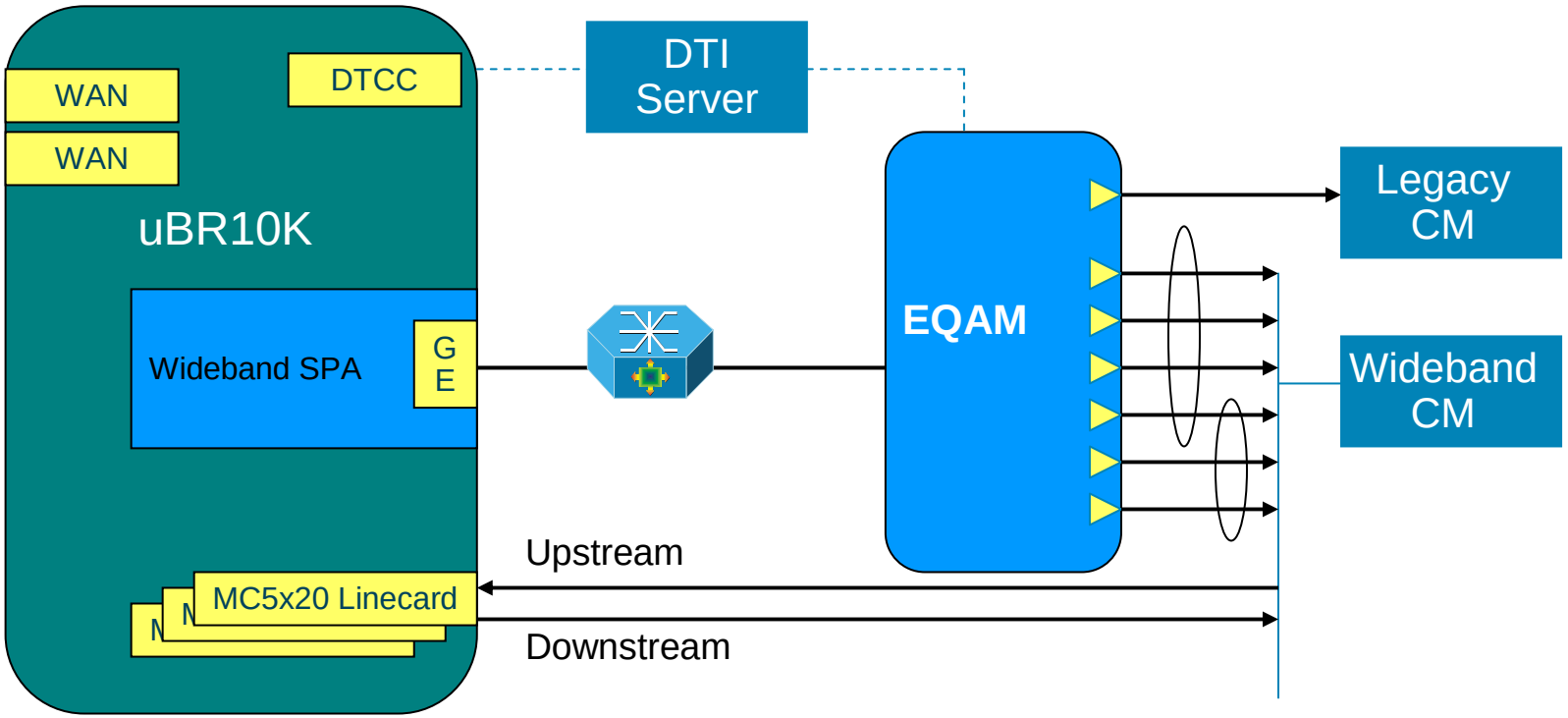
Ubiquitous IP Video Device

Video Mosaic

Fast Channel Change

Connected home

DOCSIS Last Mile Architecture

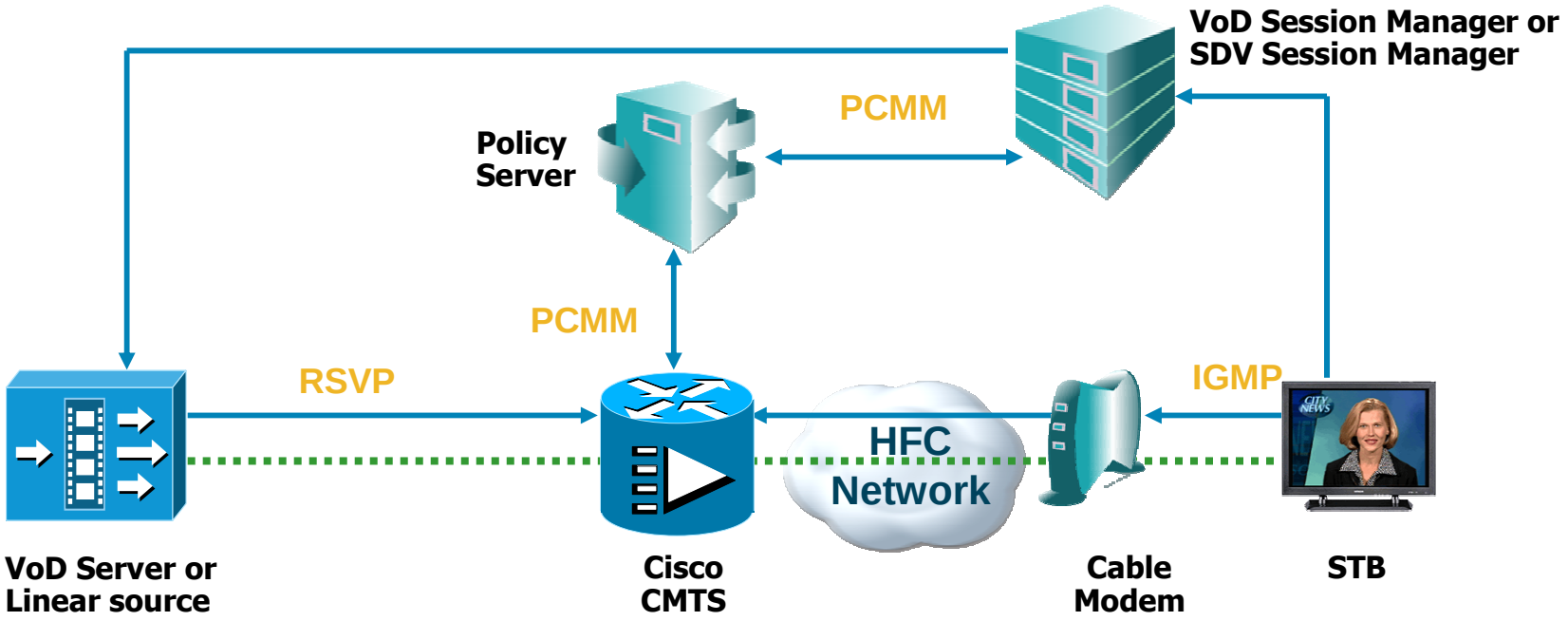


CM Choice: WCM300 (8x1), DPC3000 (4x4)

EQAM Choice: RFGW-1, RFGW-10

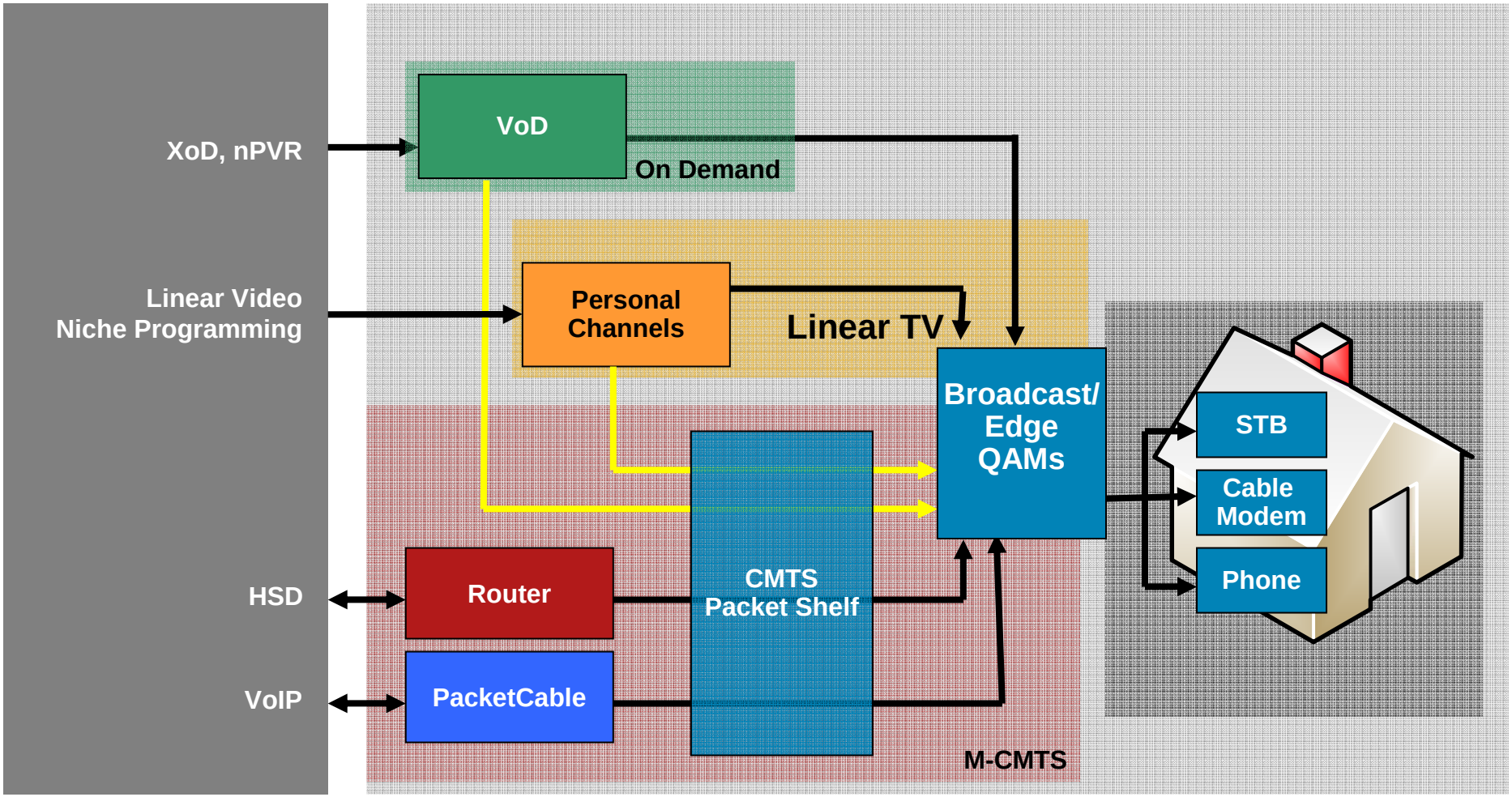
Spectrum design needed based on CM selection

IPTV over DOCSIS Control Plane

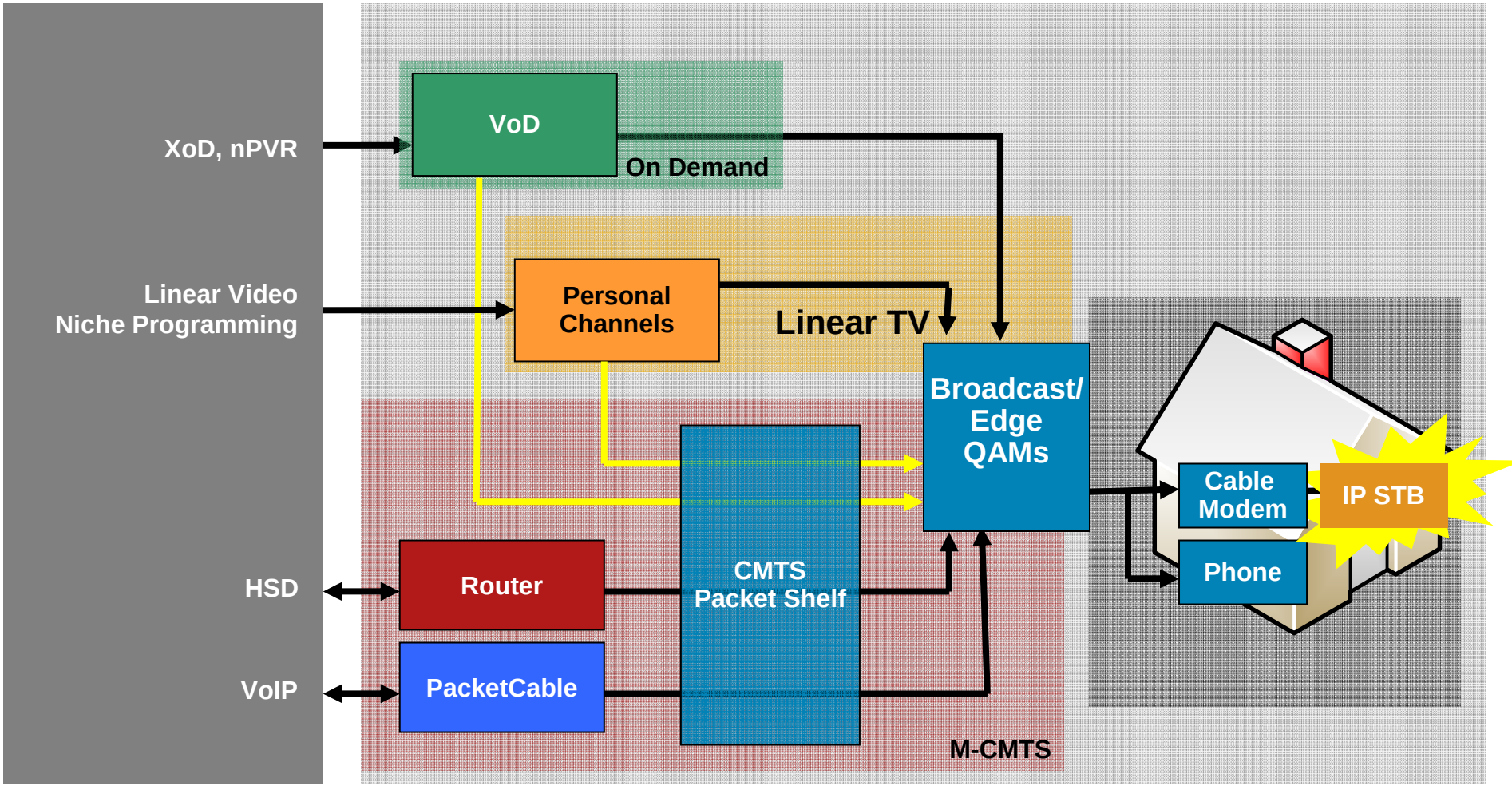


Switching	Admission Control	Policy Control
IGMP	RSVP/IGMP	PCMM

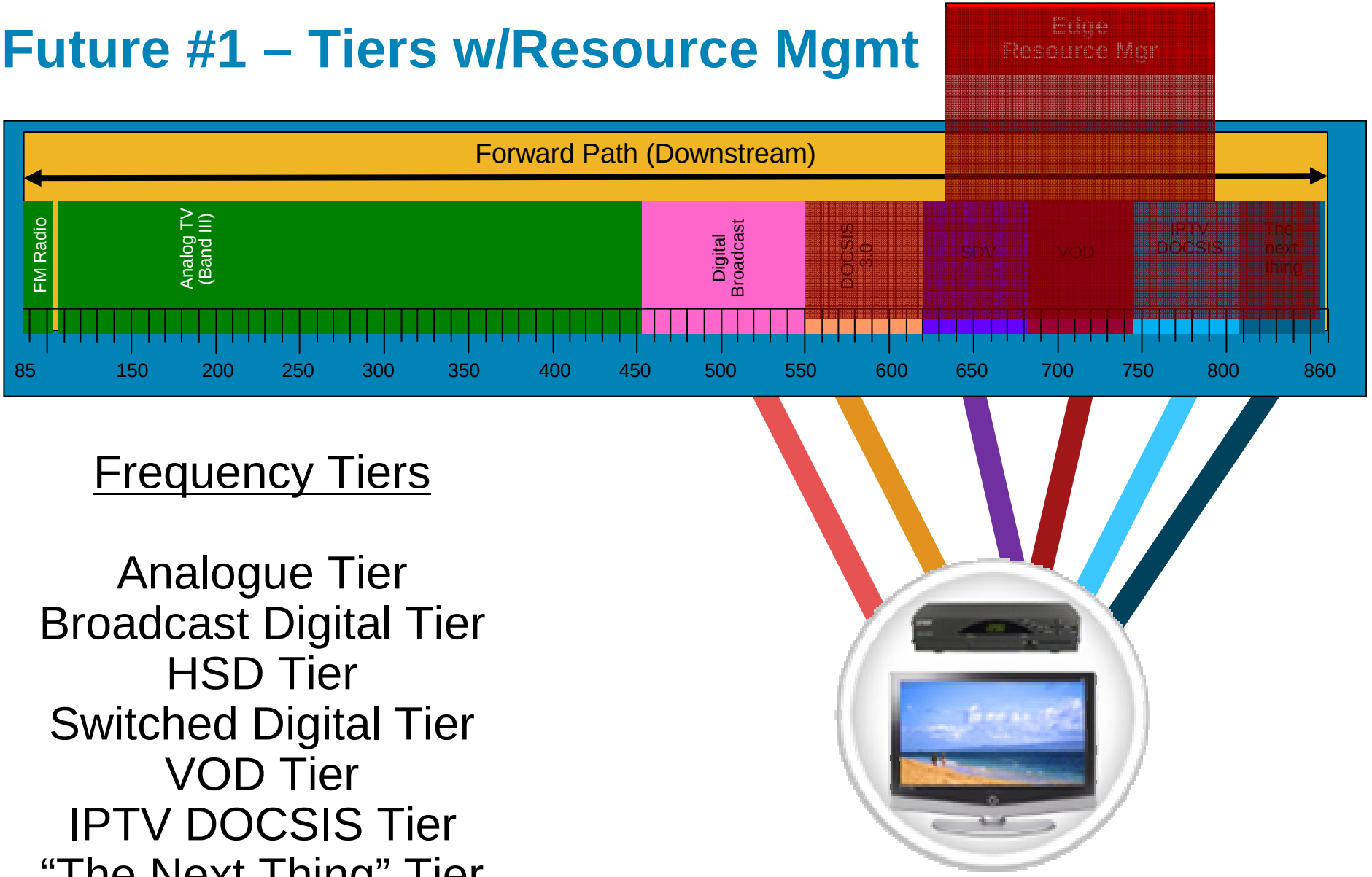
Making the Transition to Cable IPTV



Making the Transition to Cable IPTV



Future #1 – Tiers w/Resource Mgmt



Frequency Tiers

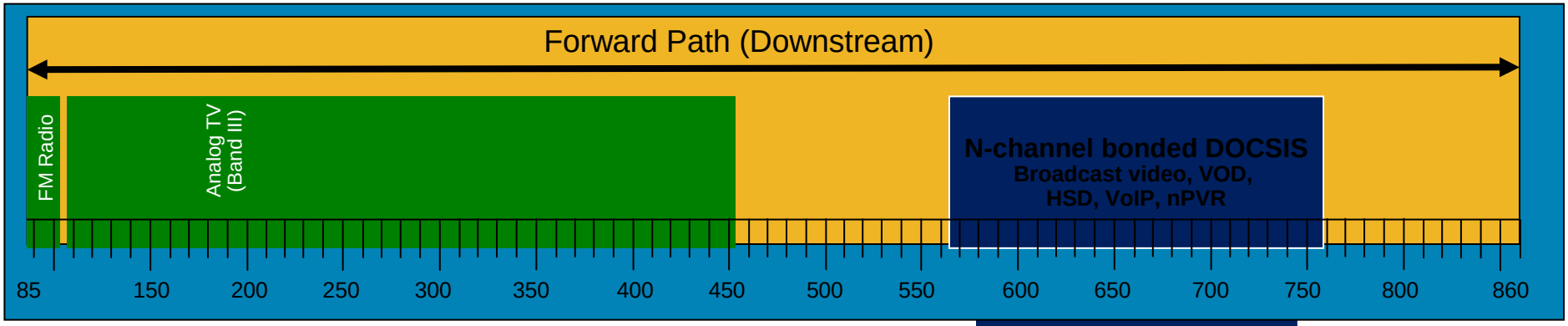
Analogue Tier
Broadcast Digital Tier
HSD Tier
Switched Digital Tier
VOD Tier
IPTV DOCSIS Tier
“The Next Thing” Tier

Future #1 – Ti

Frequency Ti

Analogue Ti
Broadcast Digit
HSD Tier
Switched Digital Tier
VOD Tier
IPTV DOCSIS Tier
“The Next Thing” Tier

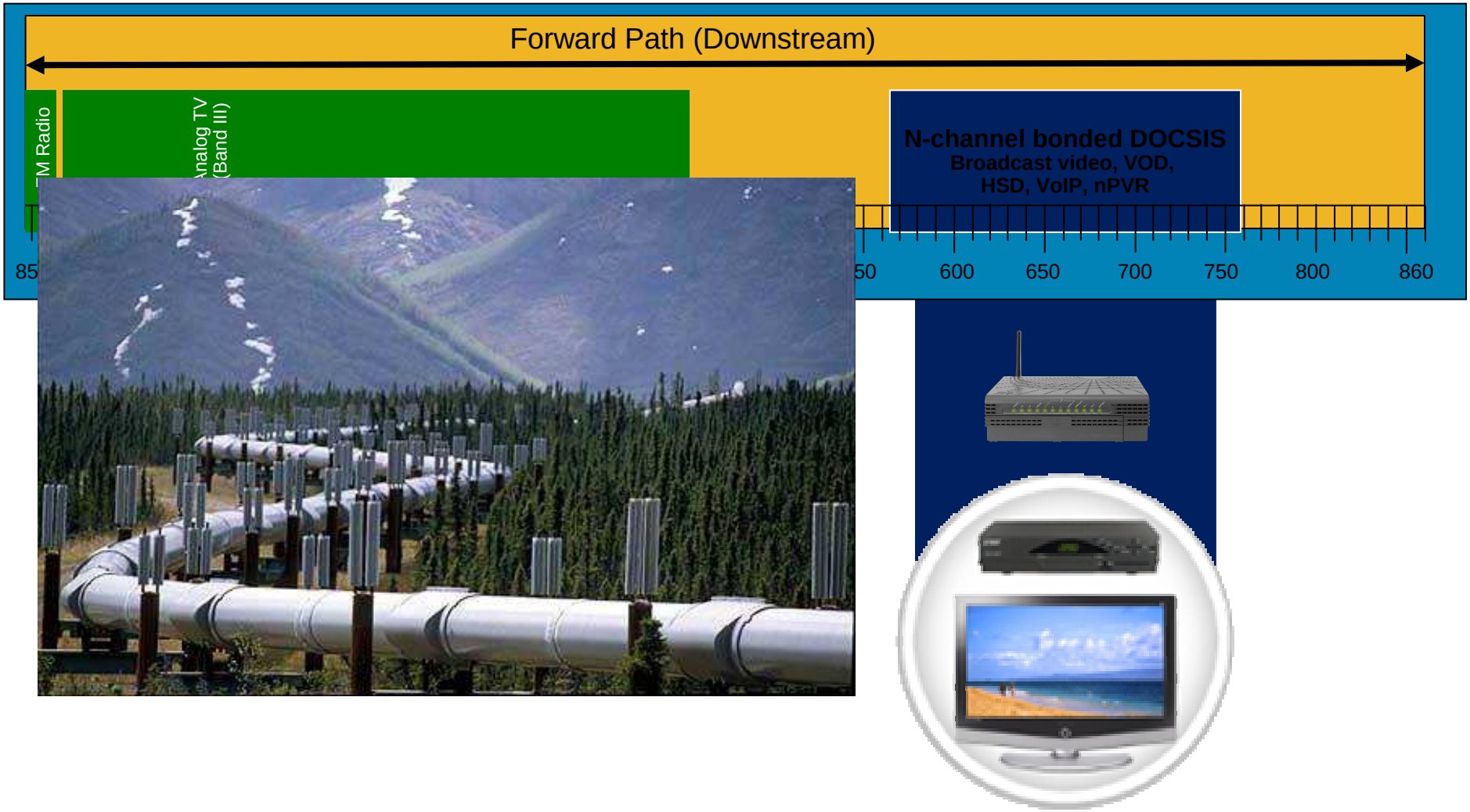
Future #2 – Channel Bonding



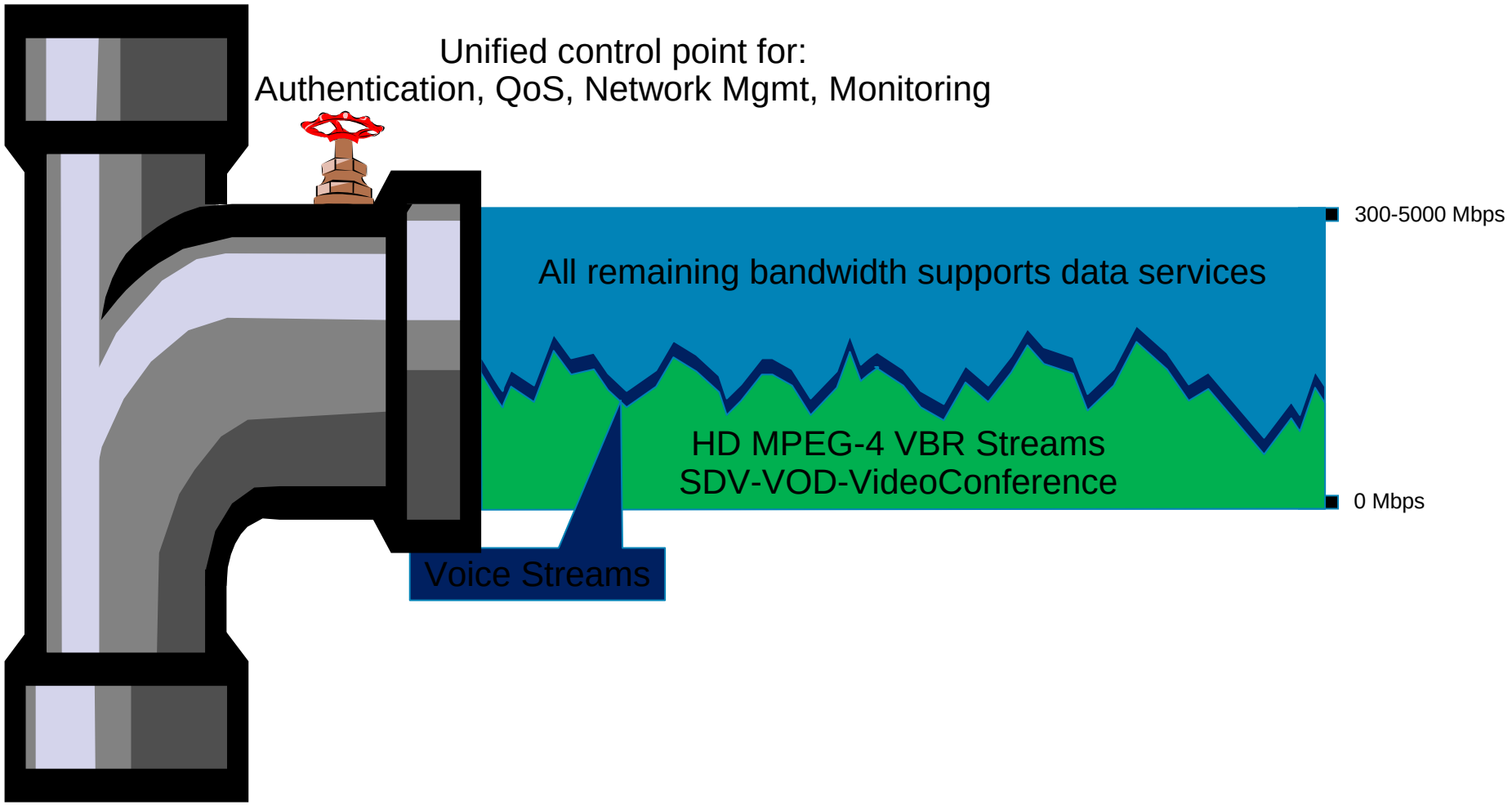
N-channel bonded
DOCSIS 3.0 IP pipe
carrying all services

2008: N= 3, 4, 8
2015: N= ?

Future #2 – Channel Bonding



A look inside the pipe



Cable IPTV Benefits

- VBR Video Services
- Fat Pipes
- Ease of Deployment in Multi-Phy Systems
- One Network - Operational Efficiencies
- Single Control Point for Service Control, Acceleration
- Reduced STB Cost
- End-to-End IP Connectivity
- Easier Access to Multiple/Varied CPE Devices

Summary

- Cable is becoming a converged network
  - -- Universal edge resource and management
  - -- Linear and on-demand video service convergence
  - -- IP provides a converged transport for all services
- DOCSIS and IP emerges as a new transport for video
  - -- With enhanced experience and bandwidth efficiency
- Switched video delivery provides bandwidth efficiency
  - -- Both SDV and VDOC provide such capabilities