Network and Technology

John Schanz
Executive Vice President
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Comcast Cable

Agenda

- Network overview
- What we've built
- Our improving economics: scale and open standards
- How the network evolves

Network Highlights

- Our converged infrastructure is efficient and has significant capacity
- Unmatched optimization flexibility
- Incremental capacity can be added as needed
- Scale, IP technologies, and open-standards are driving improved economics
- Switched Digital Video, improved compression technology, open platforms, and DOCSIS 3.0 are tools we will use going forward

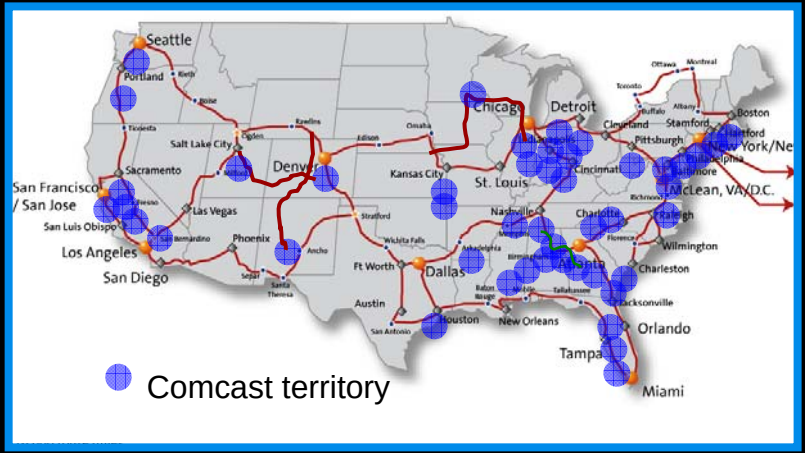
Network Overview

Scale

- Plant route miles 563k
- Fiber route miles 126k
- Optical nodes 102k
- Homes passed 47.7MM
- CDV-ready homes 34.8MM
- Average node size 468HP

Network Delivers

- 190MM+ ON DEMAND views/month
- 1.1Bn+ Web pages daily
- 1.5+ PetaBytes of IP-sourced video each day
- 57MM+ emails daily



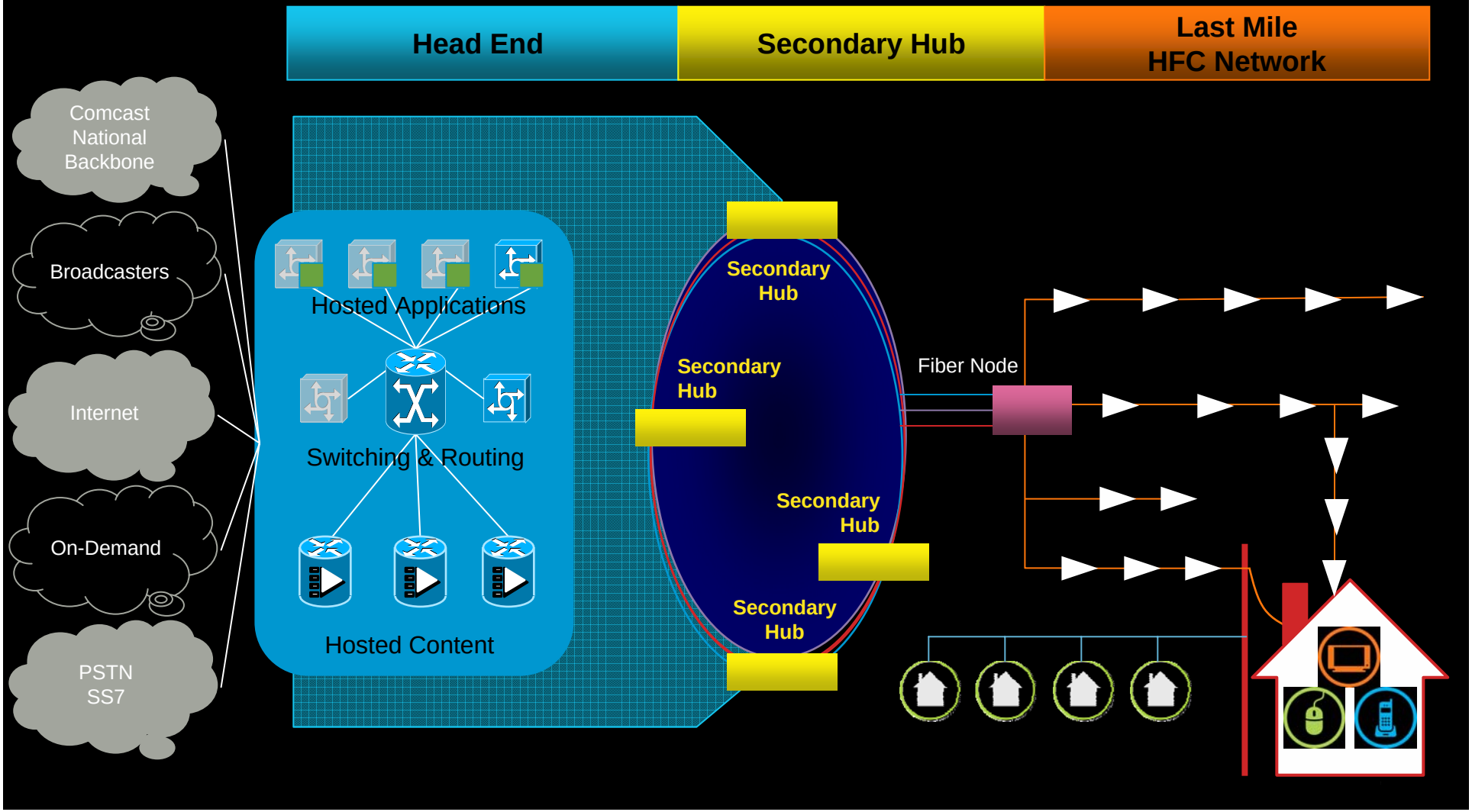
Technology

- First 40Gbps integrated optics
- 10G/40Gbps regional networks
- Soft wavelength routing
- IPv4 and IPv6 operational
- QoS based voice, video & data
- Self healing architecture

Comcast delivers over 418 Terabytes of entertainment and information into an average household every month, that's equivalent to 20 Libraries of Congress and more than 900,000 times more than YouTube…

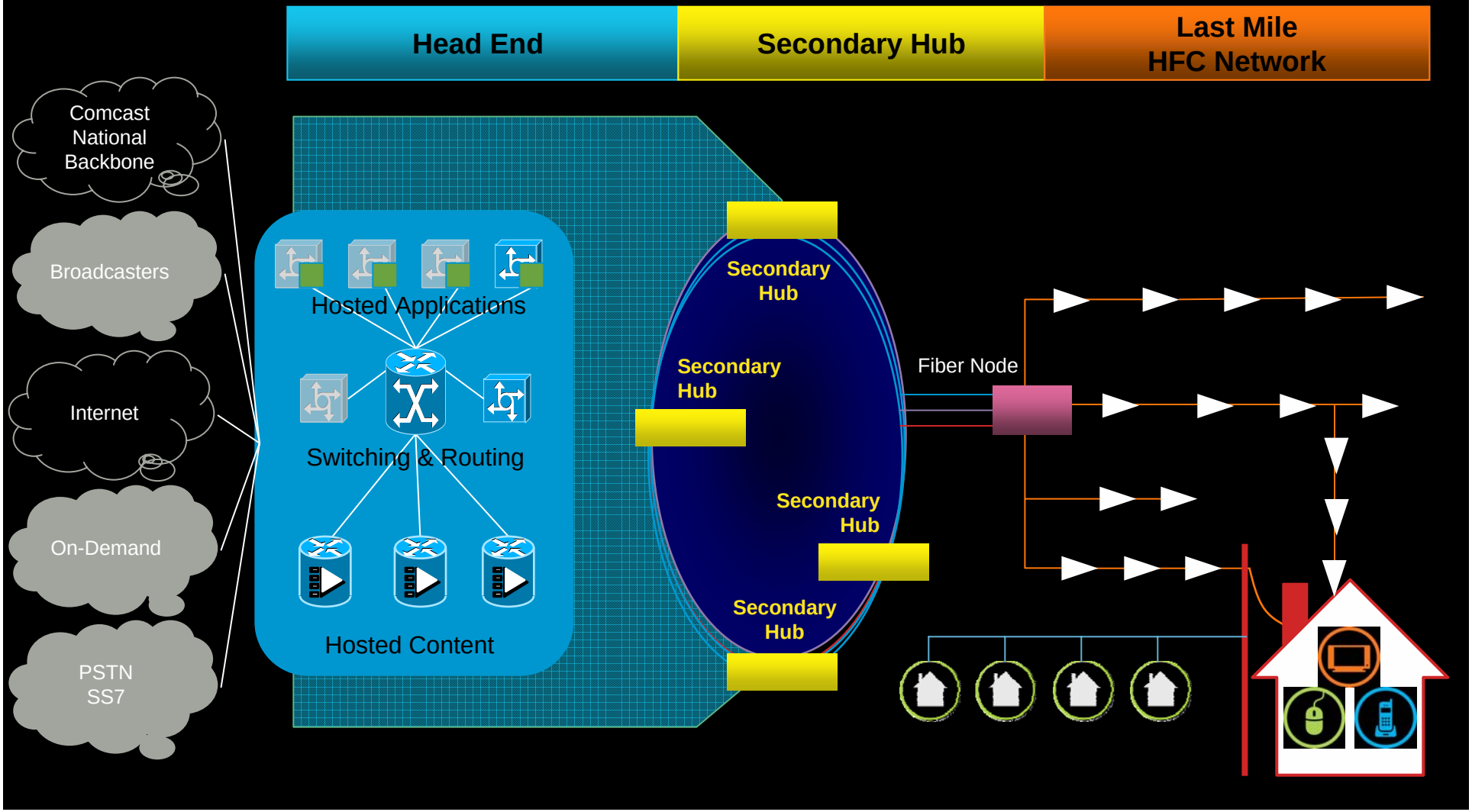
Comcast Digital Cable

- Converged IP network
- 88% of historical Comcast footprint all-digital-simulcast capable by YE07
- 256 QAM modulation for all digital services
- More than 190 million Video ON DEMAND views each Month
- Expanding VOD Content (9,000+ programs per month; over 150 hours of HD VOD)



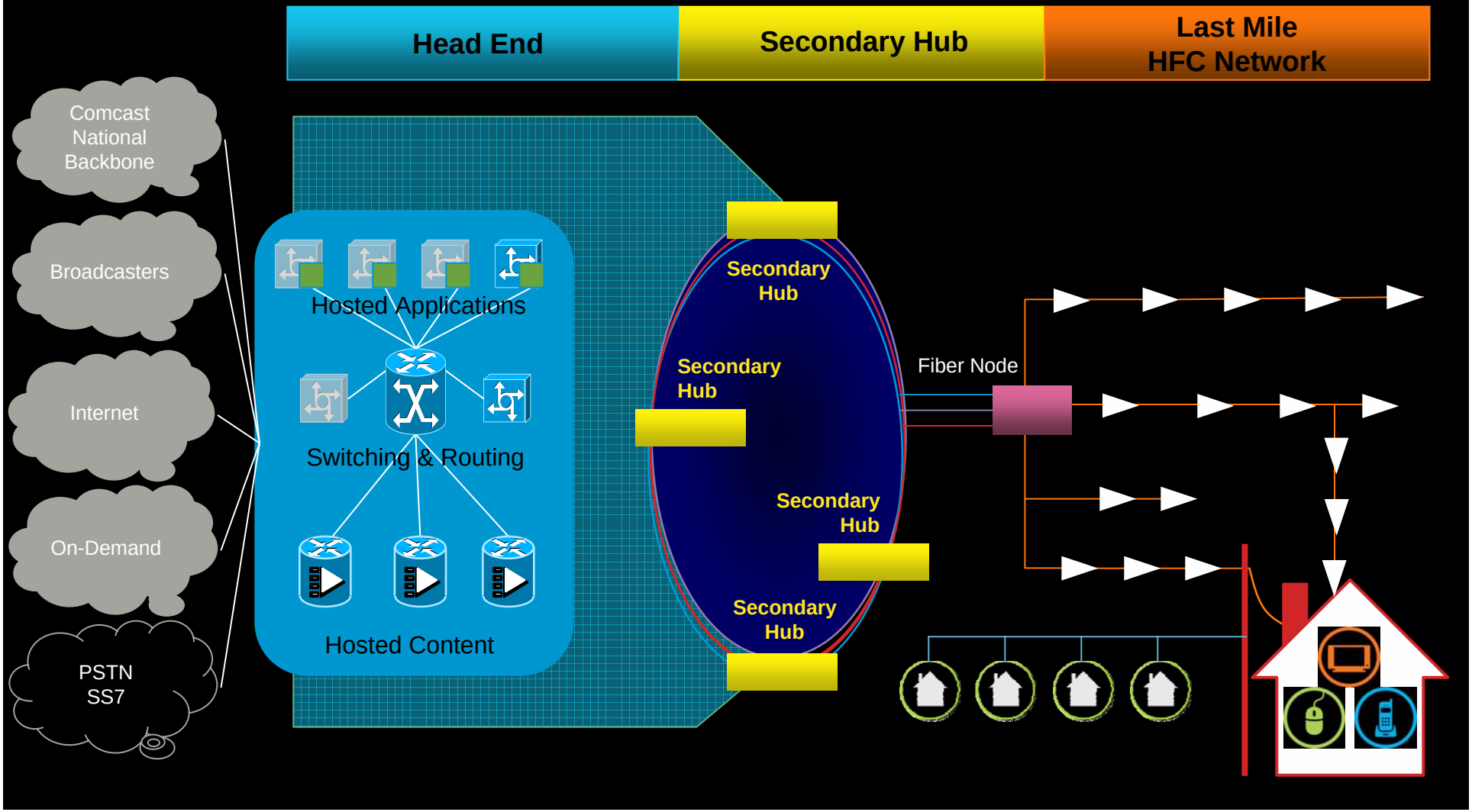
Comcast High-Speed Internet

- Speed increases (8/1, 16/2, and PowerBoost) - PowerBoost up to 16 Mbps or 22 Mbps
- Enabled by 256 QAM downstream and 16 QAM upstream
- Coming soon - Channel bonding (100+ Mbps capable)
- More aggressive focus on Commercial high-speed Internet

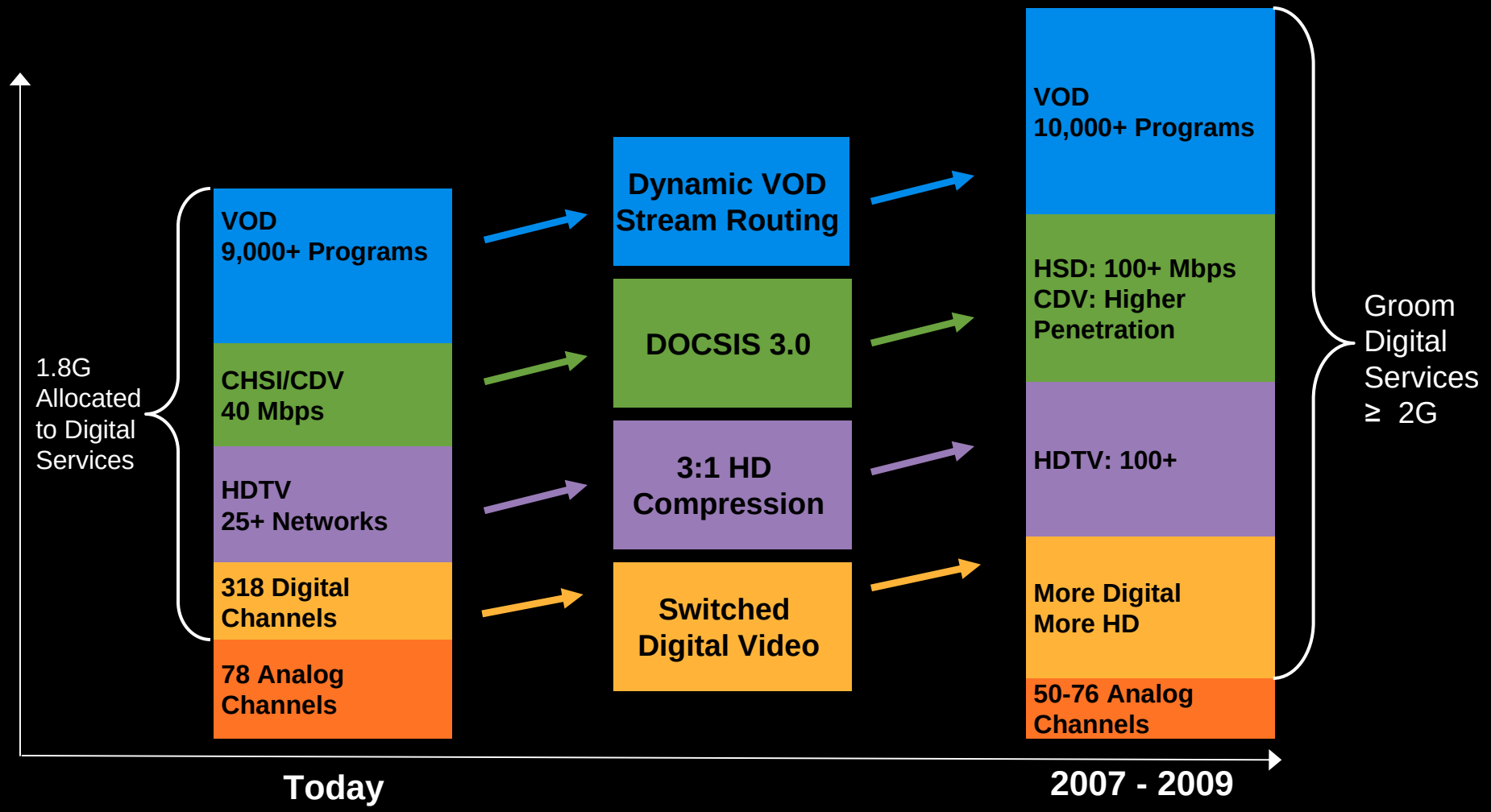


Comcast Digital Voice

- CDV available in ~75% of HSD HP
- Leveraging existing IP and plant infrastructure and provisioning system
- Deploying soft switches – Over 70 in production by YE07
- Coming soon – SIP Trunking – Scaling Voice with IP-based interconnect capabilities
- Coming soon – Least-cost call routing capability



Optimizing Network Capacity to Expand Product Offering



2007: A High Growth Year

Foundational:	Replacements, Refresh
Growth-Driven:	CDV, IPv6, SDV, etc.
Cost-Avoidance:	SIP Handoffs, Backbone
Cost-Cutting:	CDP Wind down, Analog

Our Converged Network

- National Backbone:
  - 2006: Complete
  - Today: 33% of HSD traffic
  - 2007-2009:
    - More On-net Internet traffic and interconnects
    - On-net call routing (reduces PSTN circuit costs)
    - Video distribution and transport
- Converged Regional Area Networks (CRANs):
  - 90% of HP are CRAN connected
  - Provides connectivity for regional hubs and service convergence
  - Today: Delivers High Capacity Video, Voice, and Data
  - Coming Leverage: Support Business Services
- Converged Access via HFC:
  - 95%+ is 750Mhz or greater
  - Provides 4.5Gbps into each home
  - Carries video (Linear, ON DEMAND), voice, and data (DOCSIS)
  - < 50% of capacity is allocated to digital services today
  - < 2% of capacity is allocated to IP traffic today

Advantages of Scale

Capital Efficiency

- Fewer network elements to purchase
- Better bandwidth efficiency and low bandwidth services travel for almost “free”
- Better vendor economies of scale

Lower Operating Costs

- Fewer network elements and types to manage
- Lower maintenance fees from equipment suppliers
- Lower traffic exchange costs to third parties

Faster Time to Market

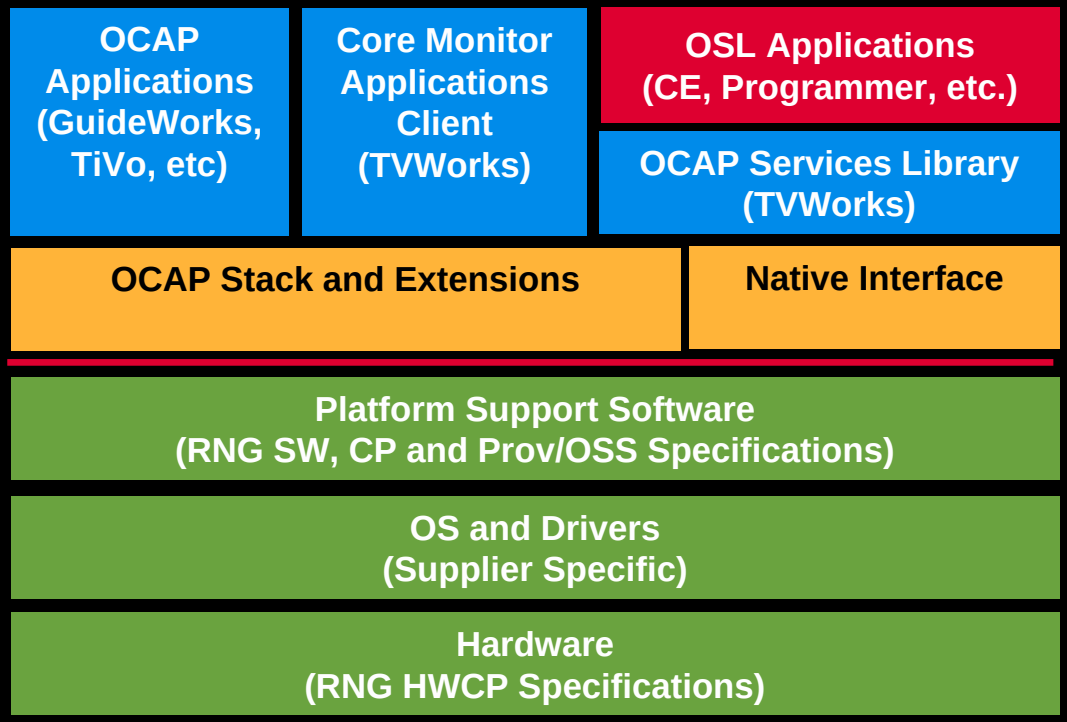
- New services require new applications, *not* new networks
- More innovative “ecosystem” – more players and a broader development community
- Easier to deliver cross-platform services
- Consumer and Business dollars are moving to IP technologies and services

More Open Video Standards

Faster Innovation and Improved Economics

Aspen:
Our OCAP
software platform

RNG:
(Residential Network Gateway)
Our open hardware
set-top box



And More: NGOD: Our Next-Gen ON DEMAND Platform and Switched Digital Video

Residential Network Gateway - RNG

Open Platform is Backward-Compatible with current Set-Top Devices

✓ Increased Power ✓ Improved Economics

✓ Multiple Vendors

100	200	1000
Mass Market	HD –DVR	Converged CPE
2008	2007	2009
MPEG - 2	MPEG - 4	MPEG - 4
Standard-Def Television	HDTV	HDTV

One Converged Network

- Capacity to deliver products today and into the future
- Economics are scaling well
- Multiple levers to optimize network capacity even further
- Open standards will drive innovation and reduce total cost of ownership

Network and Technology

Tony Werner
Executive Vice President and
Chief Technology Officer
Comcast Cable

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- Network Overview
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- How the Network Evolves

Network Evolution

Multiple Tools Provide Unmatched Capacity and Flexibility

1. Optical Scaling/Node Splits
2. Digital Optimization
3. Switched Digital Video
4. Channel Bonding (DOCSIS 3.0)

#1 Optical Scaling/Node Splits

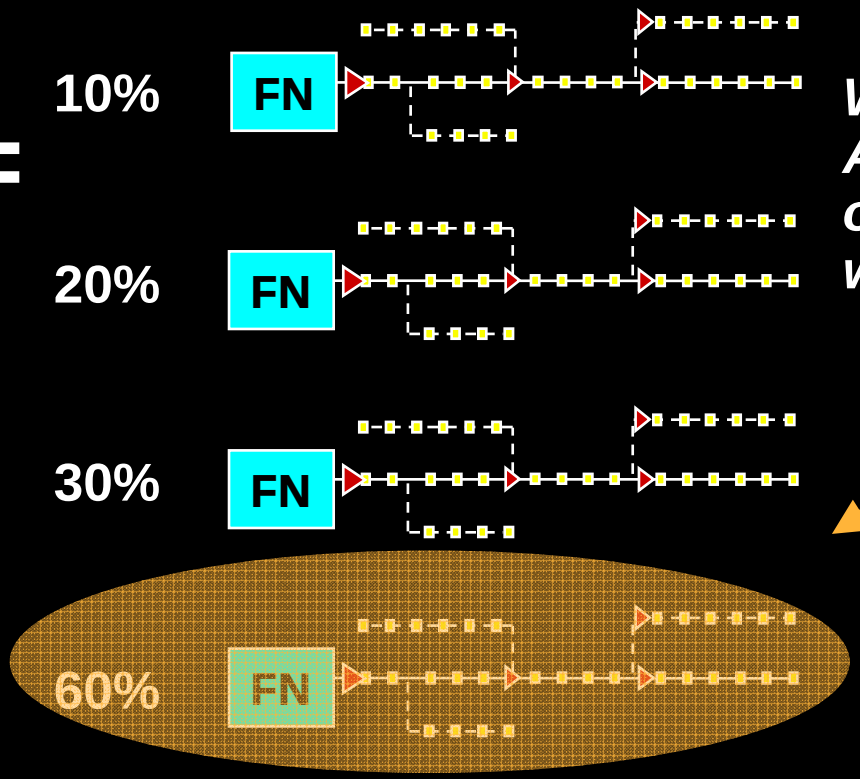
- Market success of new services drives node splits
  - Node splits efficiently provide capacity where and when it is required
  - Today, node splits are driven by downstream requirements for HSD and ON DEMAND

Optical Scaling/Node Splits

Capacity Where and When Needed

Broadband market penetration is unevenly distributed across geography

A 30% Market penetration =

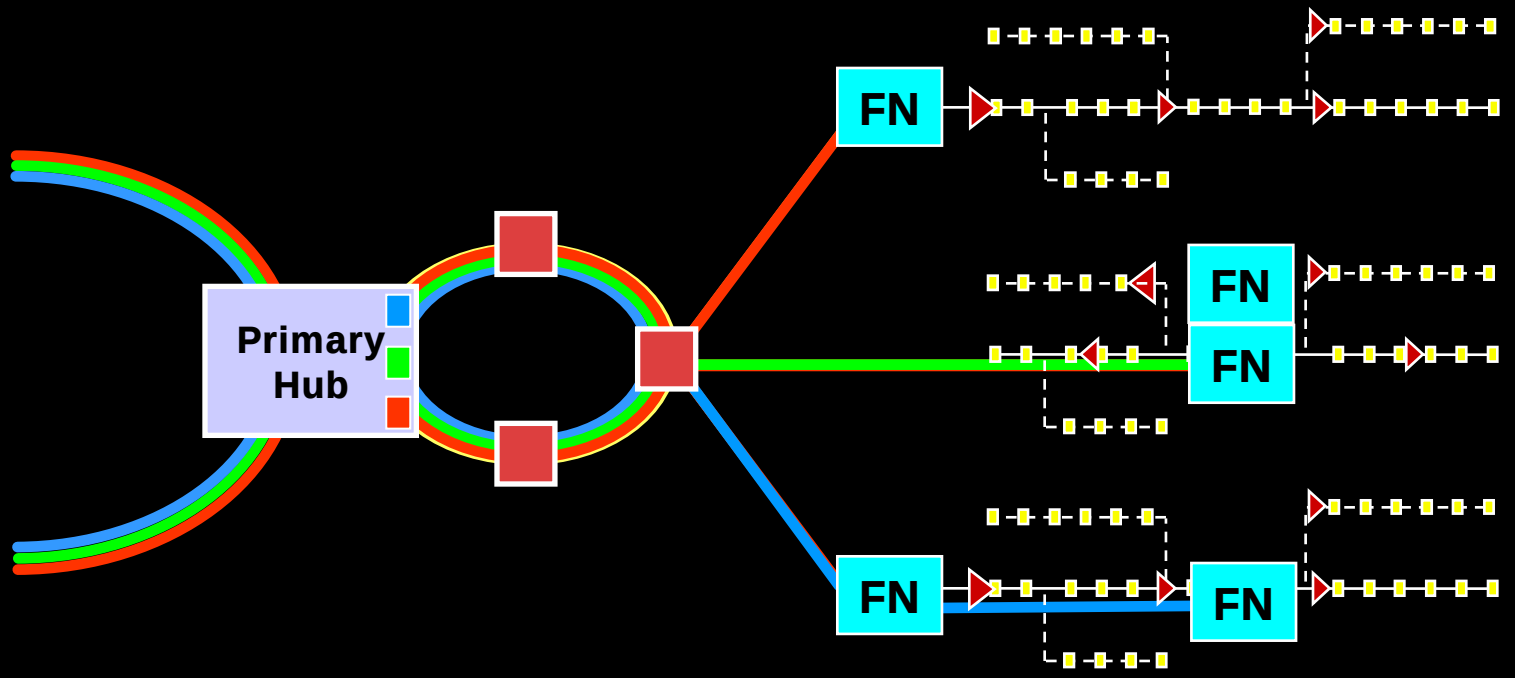


With our HFC Architecture, we only add capacity where needed

Modern HFC Network

Three types of node splits:

Logical **Modular** **Physical**



Optical Scaling/Node Splits

2007 Node Split Mix

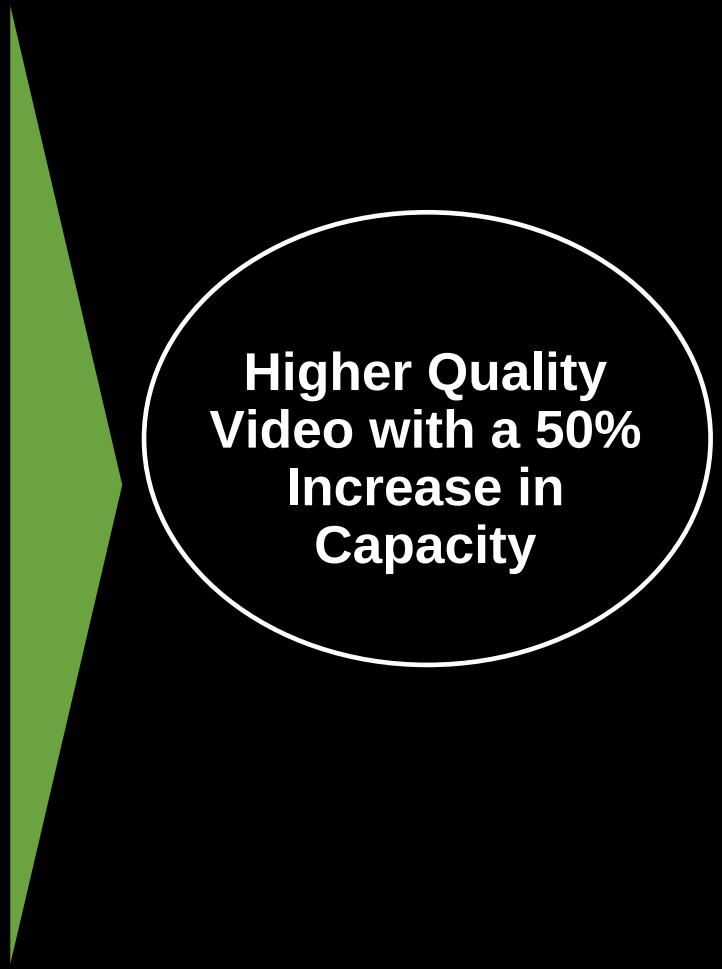
	Mix	Cost	Cost/HHP
Logical	65%	$2,500	$3.35
Modular	25%	$6,000	$8.00
Physical	10%	$20,000	$26.65

Drives a weighted average cost of $6.85 per household affected

Capacity Where and When Needed

#2 Digital Optimization

- Several techniques emerging
  - Dual Pass Encoding
  - **ICE**
    - **I**nterchangeable **C**ompressed **E**lements
  - PAC
    - **P**ersonalized **A**daptive **C**oding
  - VBR Stat-Muxing for VoD



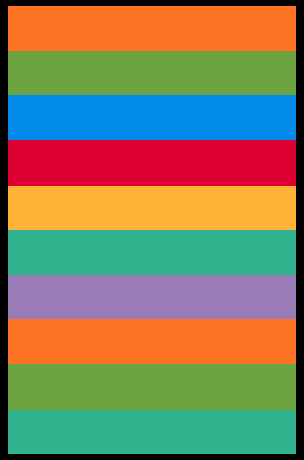
Digital Optimization

ON DEMAND Capacity

Today VOD
Carried as Constant Bit Rate

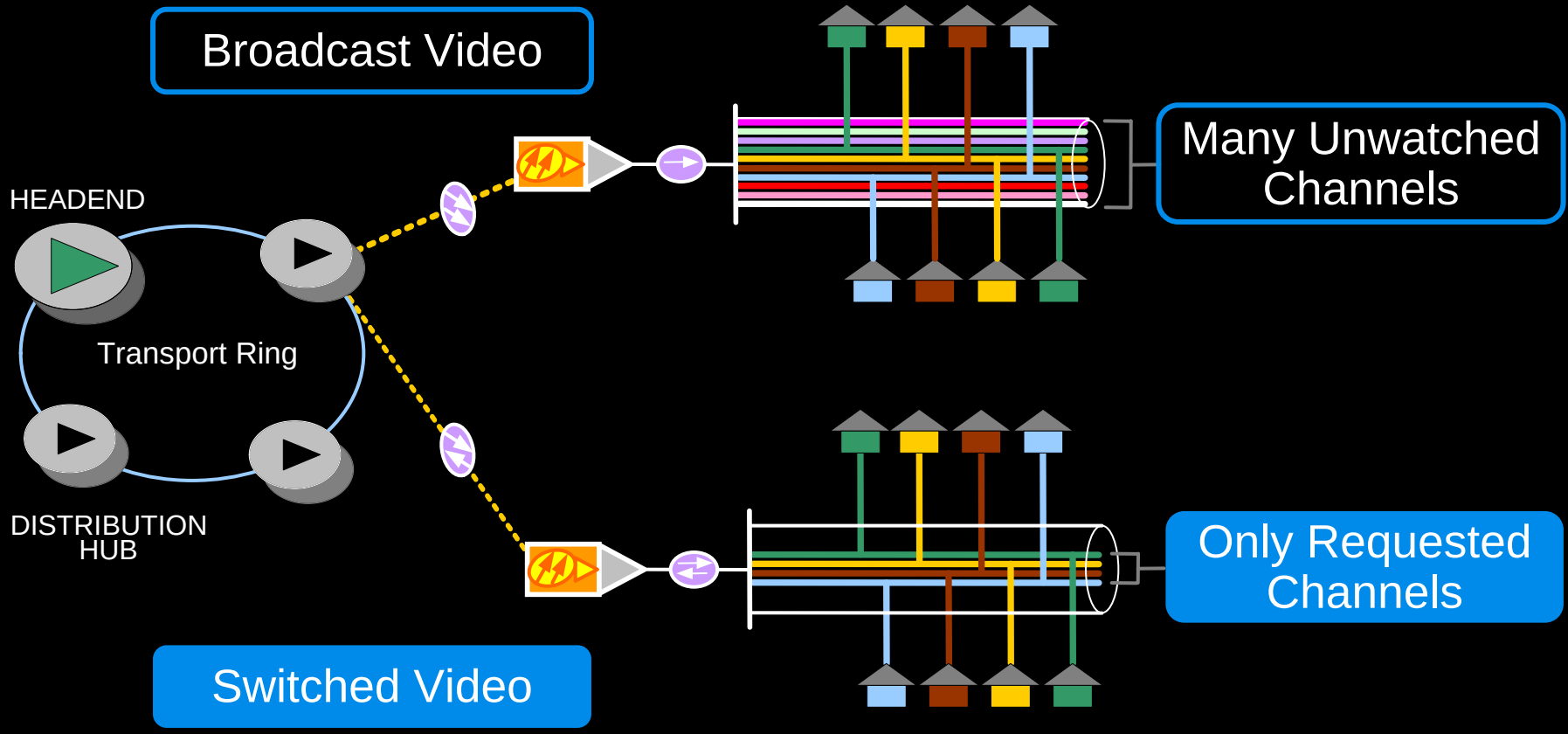
50% More Capacity with Improved Quantization and Variable Bit Rate Statistical Multiplexing

10/QAM



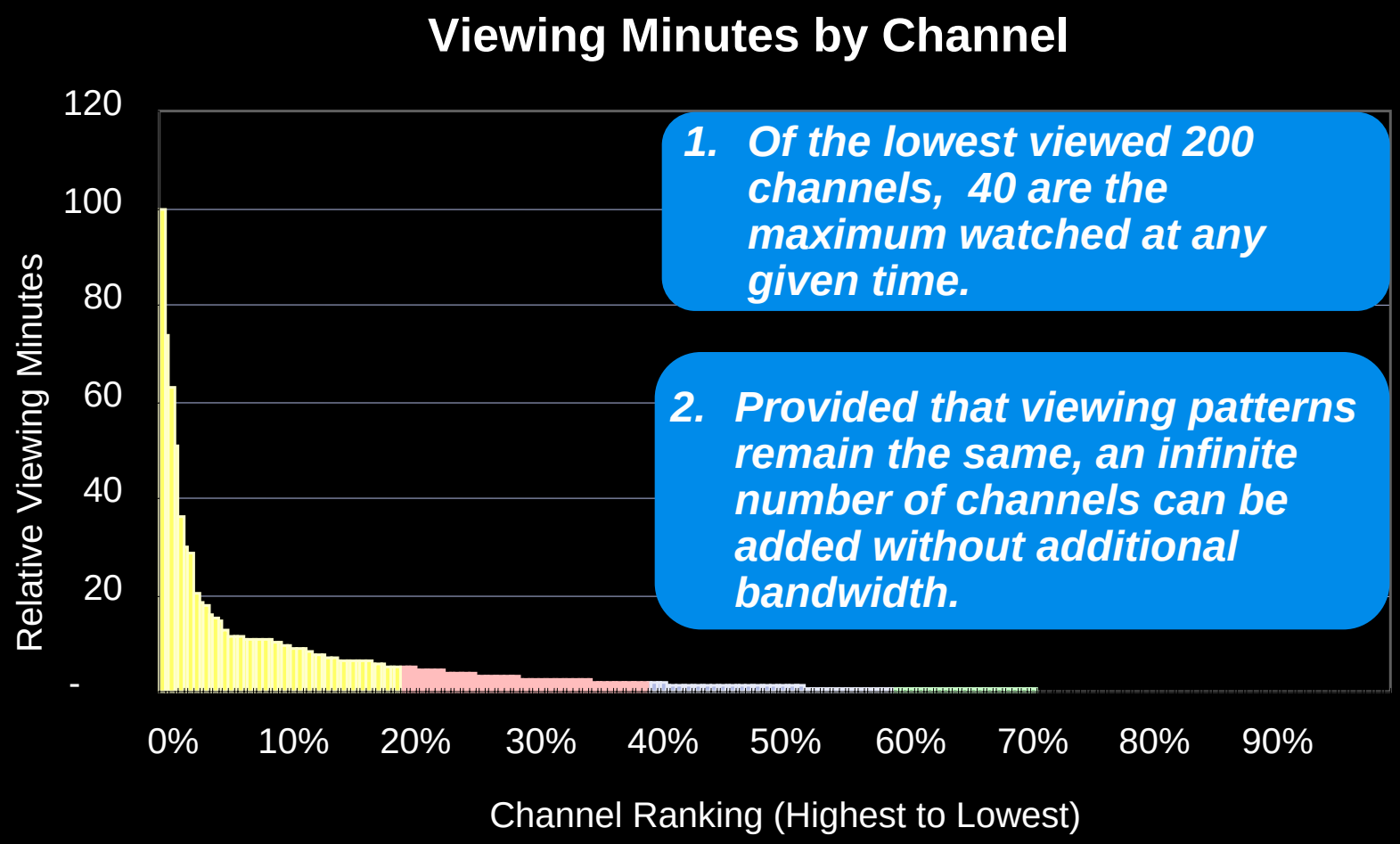
15/QAM

#3 Switched Digital Video



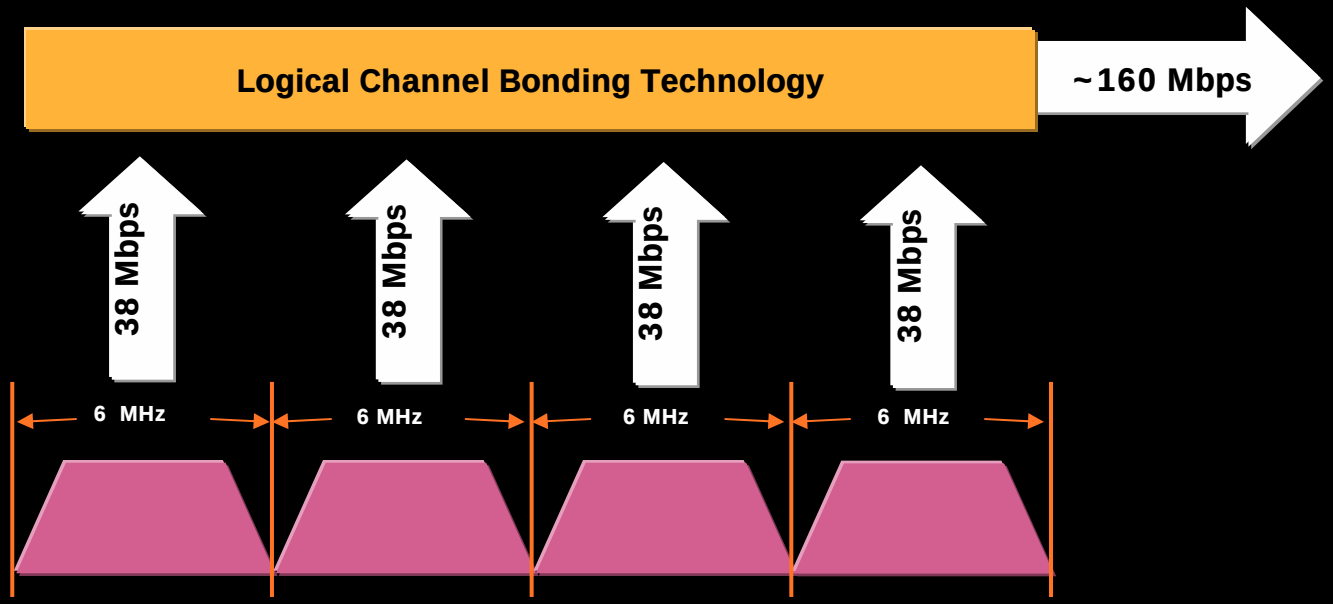
Switched Digital Video

Viewership by Service



#4 Channel Bonding for Broadband

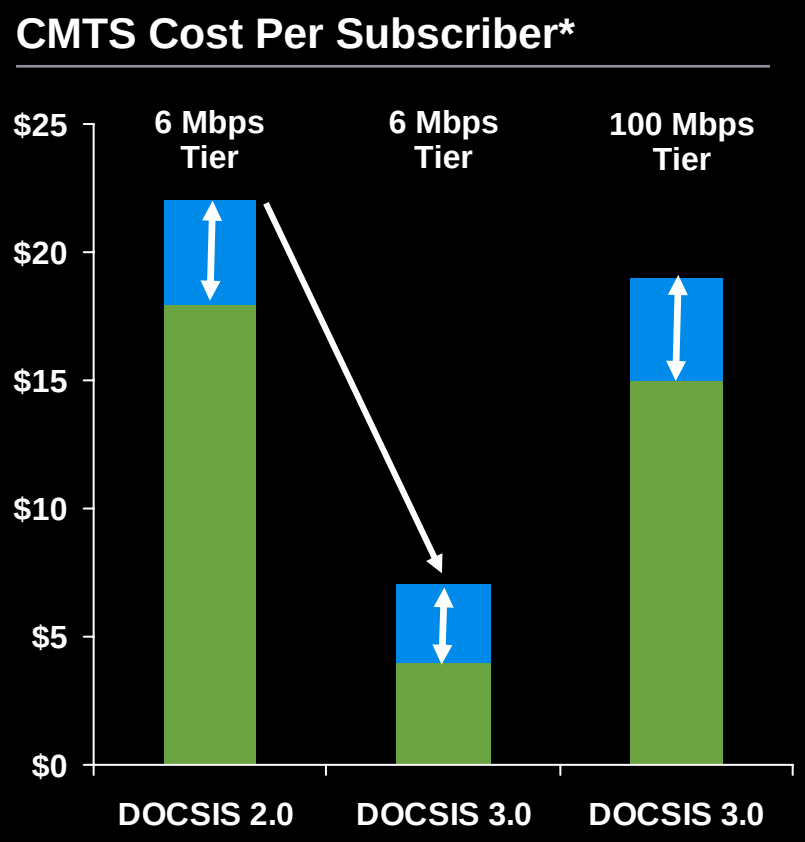
DOCSIS 3.0 is the next generation of the DOCSIS standard



- Increased speeds 100Mbps+
- Significant reduction in cost per bit
- Trial in 2007 and deploy in certain markets in 2008

Channel Bonding

DOCSIS 3.0 Economics

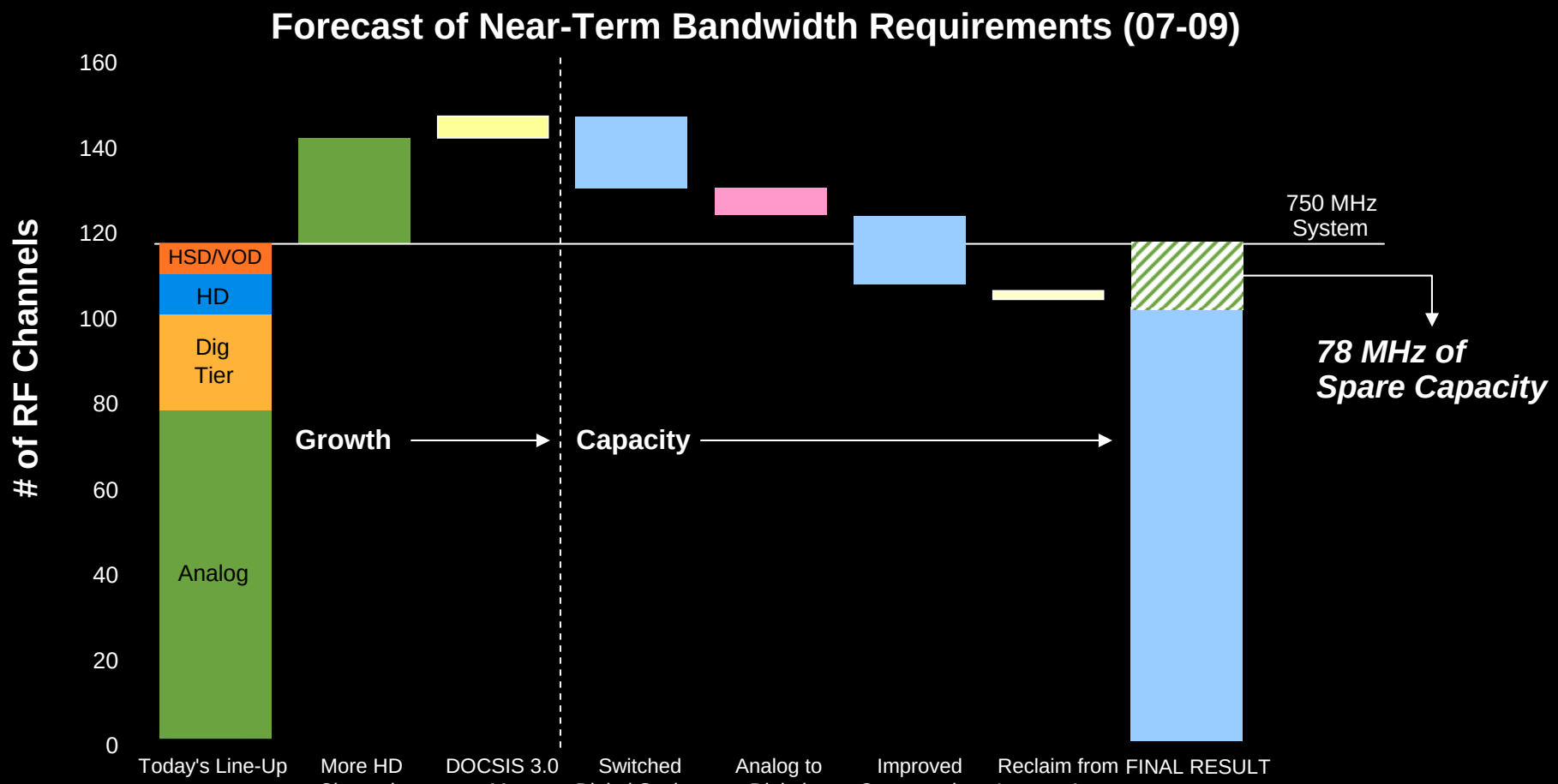


- Estimate 70% Lower CMTS Cost per Sub with DOCSIS 3.0*
- 100 Mbps Tiers at Similar CMTS Economics to Today's 6 Mbps Tier
- Deployable Where Needed

*Based on early range of equipment estimates.

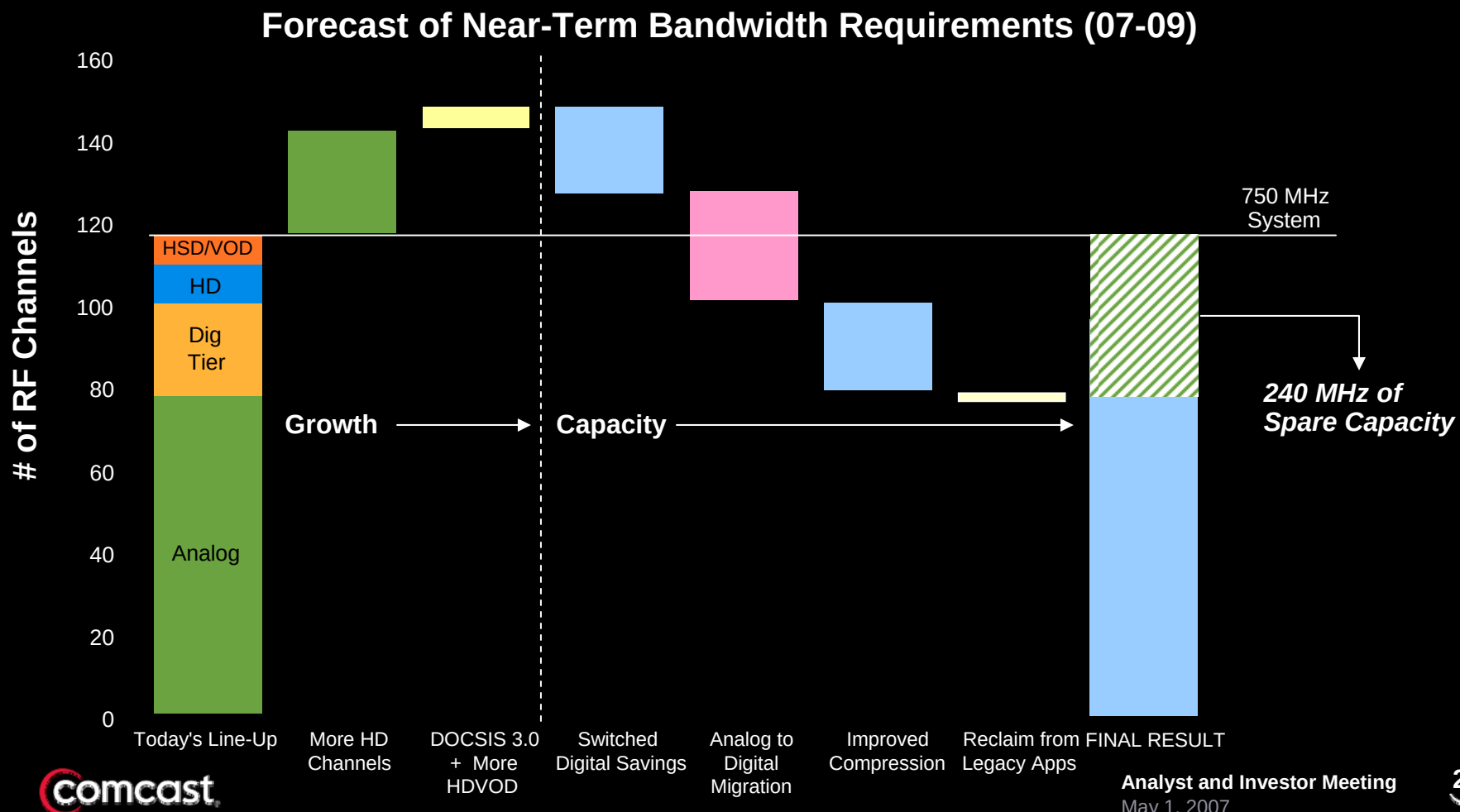
Bandwidth to Deliver Products Today and Tomorrow

Conservative Assumption



Bandwidth to Deliver Products Today and Tomorrow

Moderate Assumption



Summary

- Powerful Network
- Unmatched Flexibility
- Significant Capacity