TECHNOLOGY CONFERENCE &
OPEN HOUSE
NOVEMBER 14-15, 2007
AUSTIN, TX

MULTIMEDIA over COAX ALLIANCE
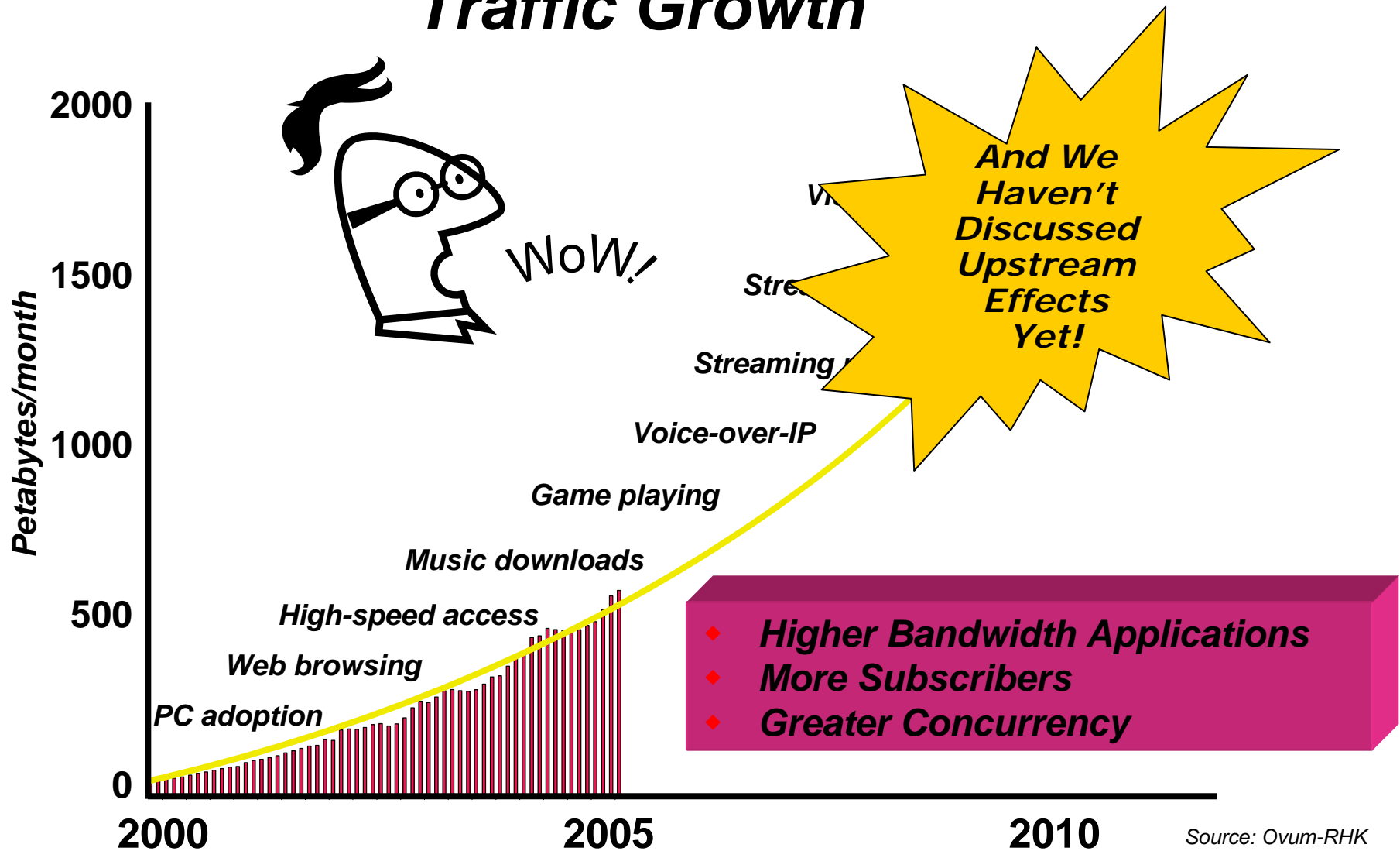*It's in the House!*

Verizon FiOS Architecture

Mark Wegleitner
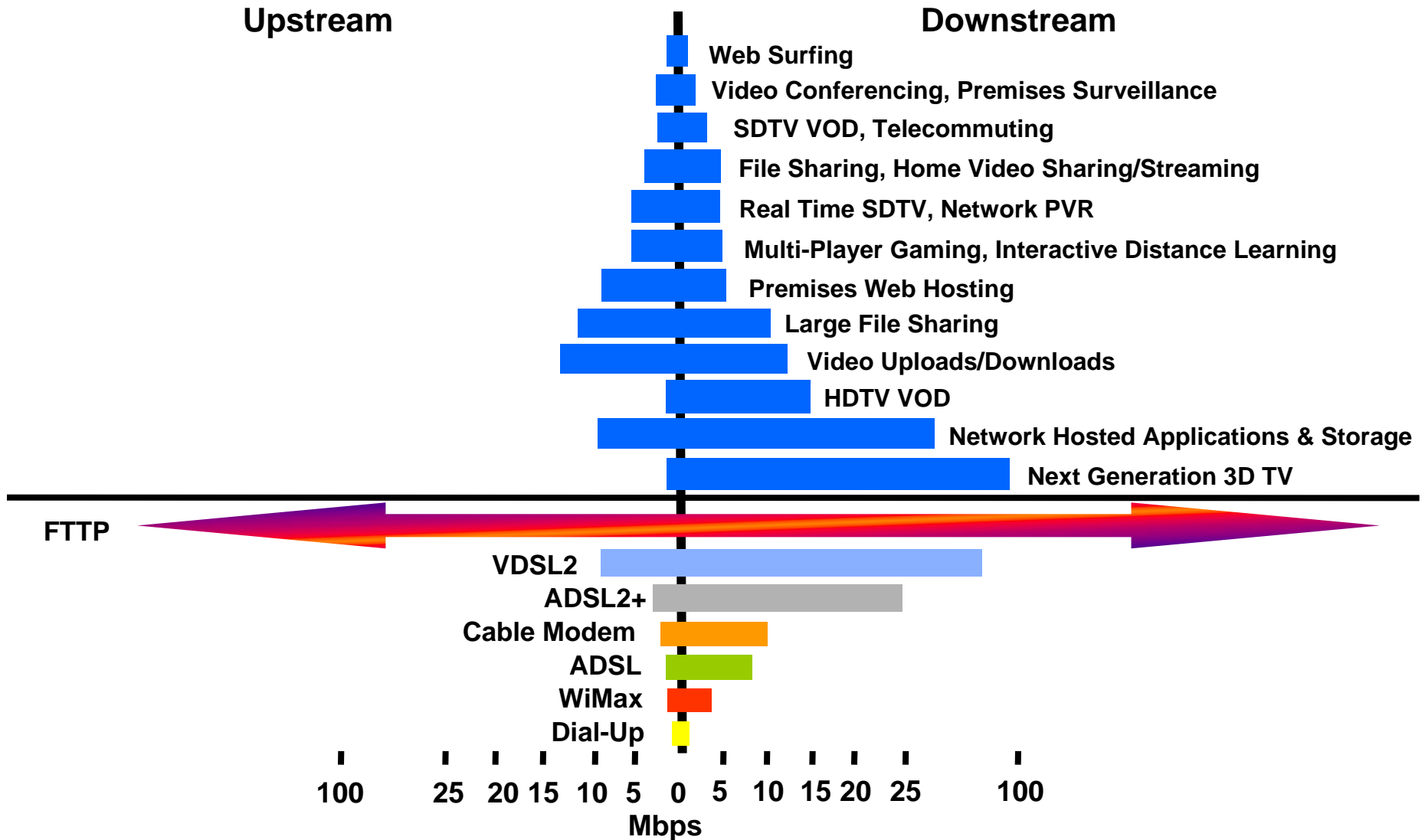**Senior VP – Technology**
CTO -- Verizon Communications

Agenda

- ◆ **Verizon's Broadband Initiatives**

- ◆ **Access Network Architecture**

- ◆ **Home Network Architecture and Evolution**

- ◆ **Remote Management**

- ◆ **MoCA In the FiOS Home**

- ◆ **MoCA Installation & Performance**

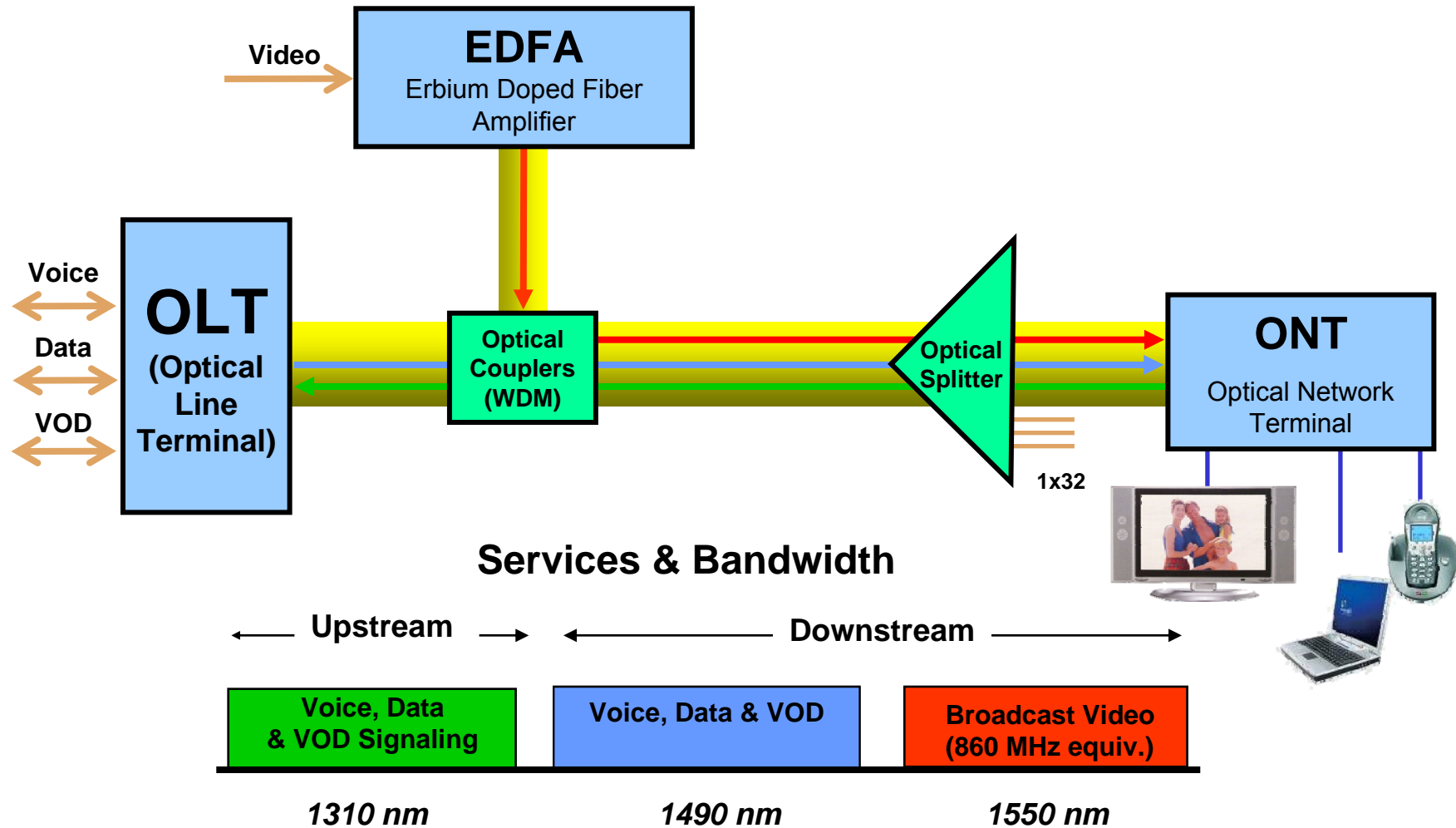- ◆ **Next Generation MoCA Requirements**

Traffic Growth

Source: Ovum-RHK

3

Applications and Media Bandwidth

4

FTTP BPON/GPON

5

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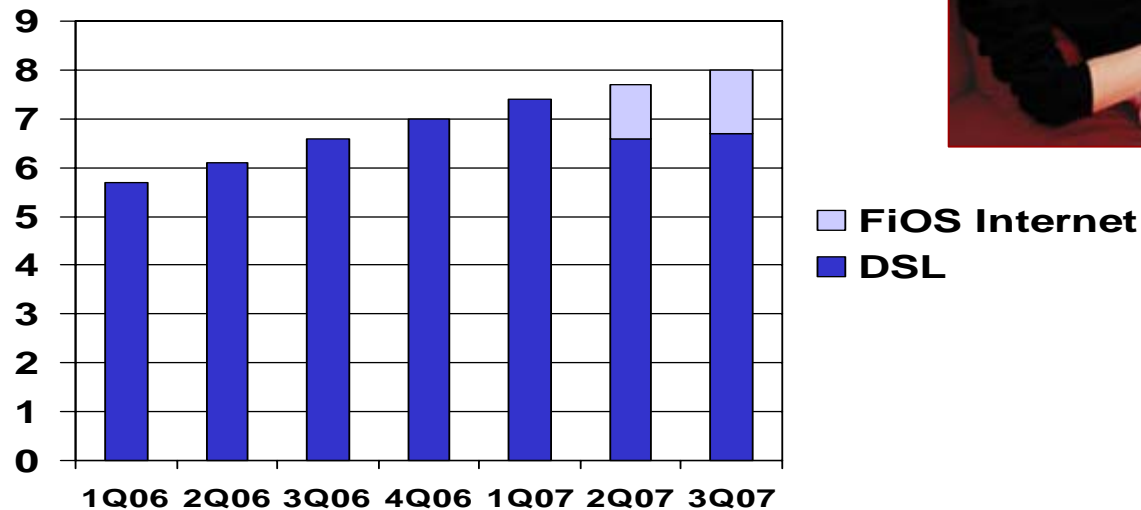AUSTIN, TX

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FiOS Internet Status

Verizon Expects To Attract Up To 7 Million FiOS Internet Customers By Year-End 2010 – A Penetration Rate Of 35 - 40 Percent

Broadband Subscribers (M)

Legend:
- ☐ FiOS Internet
- ■ DSL

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FiOS Internet

SPEED*
(Mbps)

5/2
10/2
- *Email, web serving*
- *Migration for dial-up user*

15/2
20/5
- *Multiple PCs and users*
- *Work from home*

20/20
- *Multiple PCs and users*
- *Avid online gamers*
- *Work from home*

30/5
50/5
- *Receiving and sending very large files (e.g. animation and graphics, high-resolution photos/videos)*
- *Early adopters*

*New higher speeds of 10/2, 20/5, 20/20 and 50/5 in NY, NJ & CT.

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FiOS Video Status

FiOS TV – On September 22 Of 2005, We Introduced Our First Broadcast/Interactive Video Product

- As Of Sep 30, 2007 Verizon Has Over 717,000 Video Customers
- During 3Q07, 202,000 New FiOS TV Customers Were Added
- We Are Adding 3,200 New Customers Per Day
- We Expect Around 3-4 Million FiOS TV Customers By 2010, Or A 20-25% Penetration Rate

8
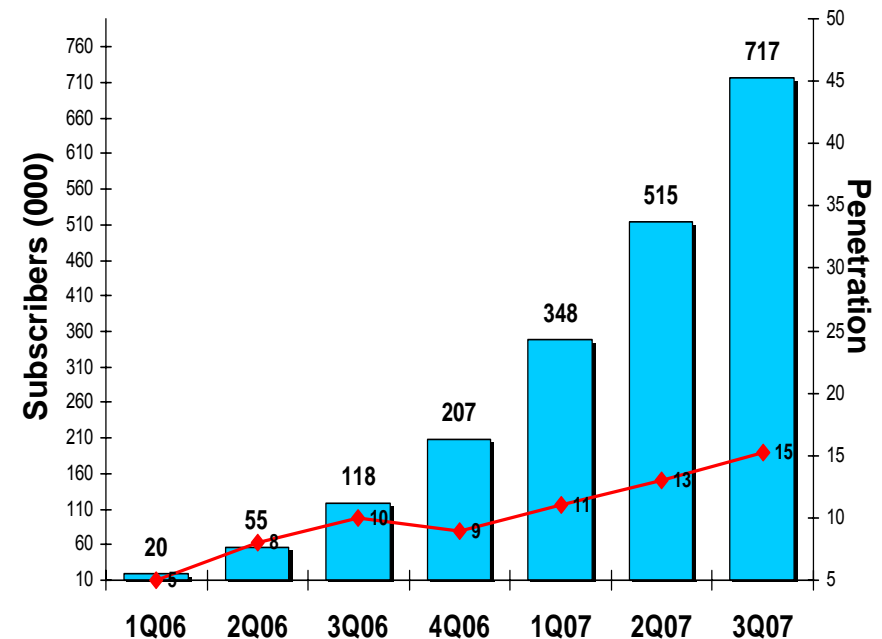
FiOS Video

Great Value for the Consumer…

- 100% Digital
- ~330 Channels
- Two Dozen + HD Channels
- 100% VOD Capable
- 6000 VOD Titles
- 120 Hour DVR
- Advanced IPG
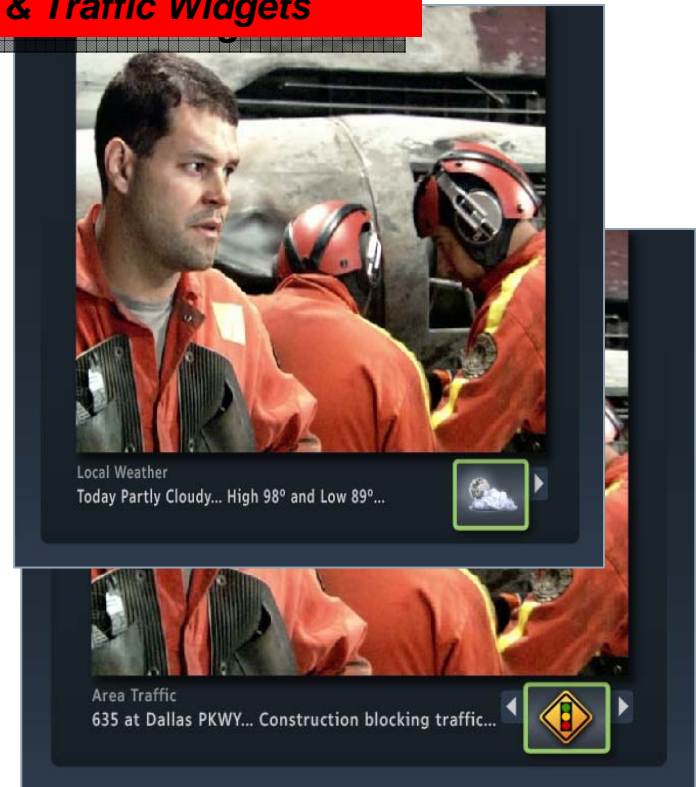- Simple, Compelling Packaging
- Genre-Based Channel Line-up

… and it'll Keep Getting Better

More Choices.
Right Before Your Eyes.

Widgets

FiOS TV Widgets Is An Interactive Application That Supplies Information Services Formatted For Television.

- **"One Touch", On Demand Access**
- **Non-Disruptive To Viewing Experiences**
- **Easy Navigation (i.e., Arrow Keys)**
- **Real Time, Hyper-Local Information**

Weather & Traffic Widgets

Local Weather
Today Partly Cloudy... High 98° and Low 89°...

Area Traffic
635 at Dallas PKWY... Construction blocking traffic...

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Multi-Room DVR

- **SIMPLE**
  - **- Eliminates Need For Multiple DVRs**

- **FLEXIBLE**
  - **- Pause Program In One Room, Continue Viewing In Another**

- **CONVENIENT**
  - **- Watch Recorded Shows On Multiple TVs**

- **EFFICIENT**
  - **- Save Money By Having Just One DVR**

Media Manager

My Music / My Photos

- **Pictures and music are streamed from a PC to the Home Media DVR**

- **Customers access the Media Manager service through the "enhanced TV" section on their IPG main menu to view photo albums and play music**

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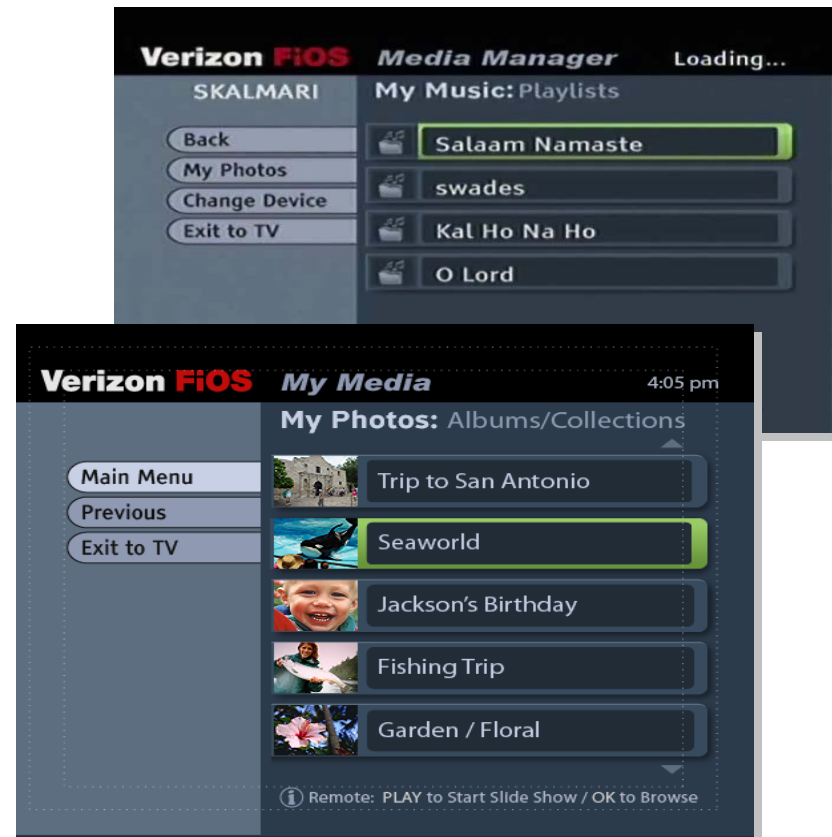
FTTP BPON/GPON Access Network

Video Evolution

Phase 1
- VHO = Conventional Technology
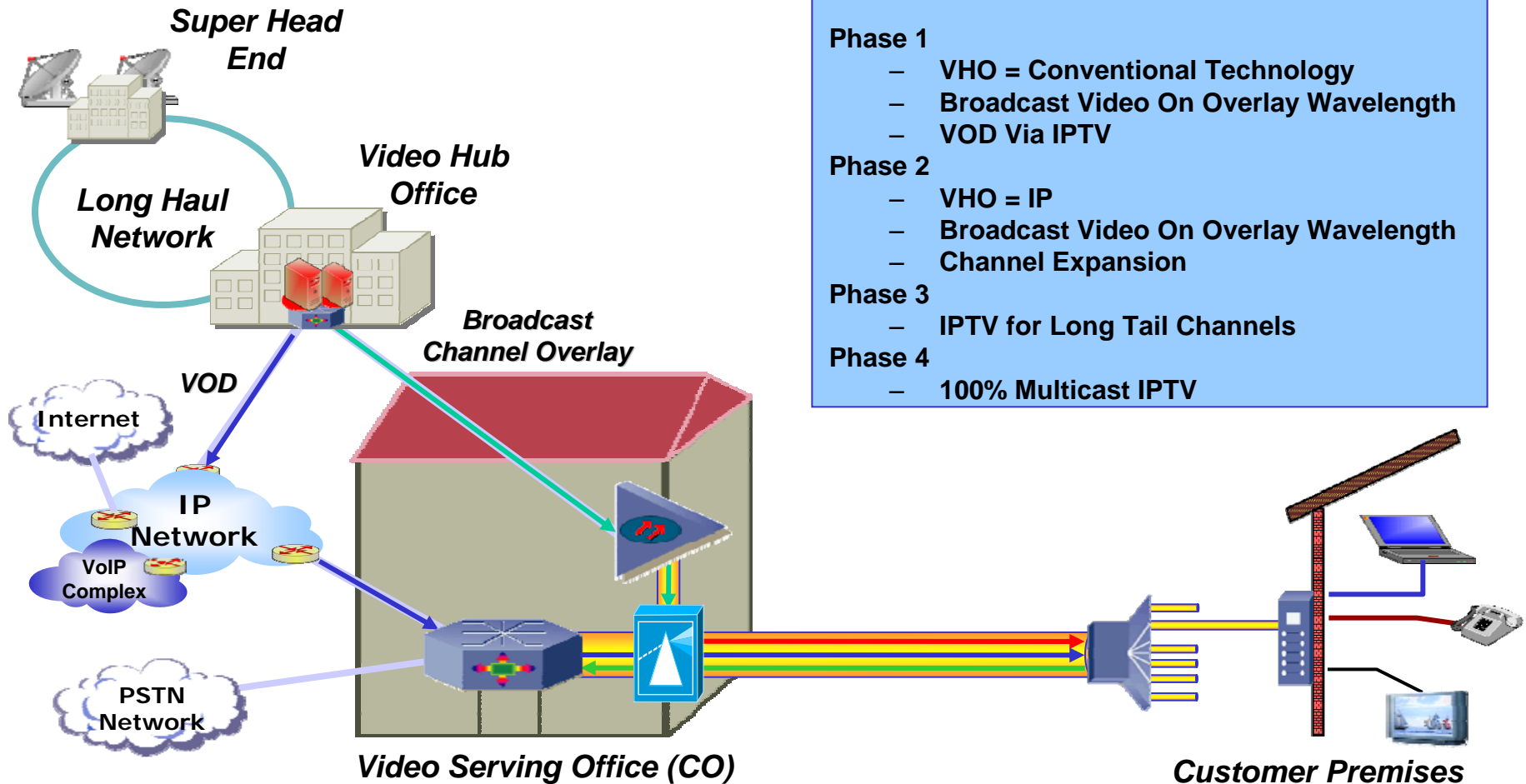- Broadcast Video On Overlay Wavelength
- VOD Via IPTV

Phase 2
- VHO = IP
- Broadcast Video On Overlay Wavelength
- Channel Expansion

Phase 3
- IPTV for Long Tail Channels

Phase 4
- 100% Multicast IPTV

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MoCA in the FiOS Home

- MoCA Technology Incorporated In Verizon's Optical Network Terminal (ONT), Set Top Boxes (STBs), And Broadband Home Router (BHR)
- Dual Channel Operation Over The Same Coax Infrastructure - WAN/LAN Separation
- All IP Traffic, ONT-to-BHR (WAN) And BHR-to-STBs (LAN), Carried Over MoCA/Coax
- Optional Use Of MoCA Dongles For PC Connections

Coax cable

Cat 5 cable

Integrated MocA

802.11 Wireless

Fiber to OLT

ONT With MoCA

Analog Video

Managed BHR

Integrated MocA

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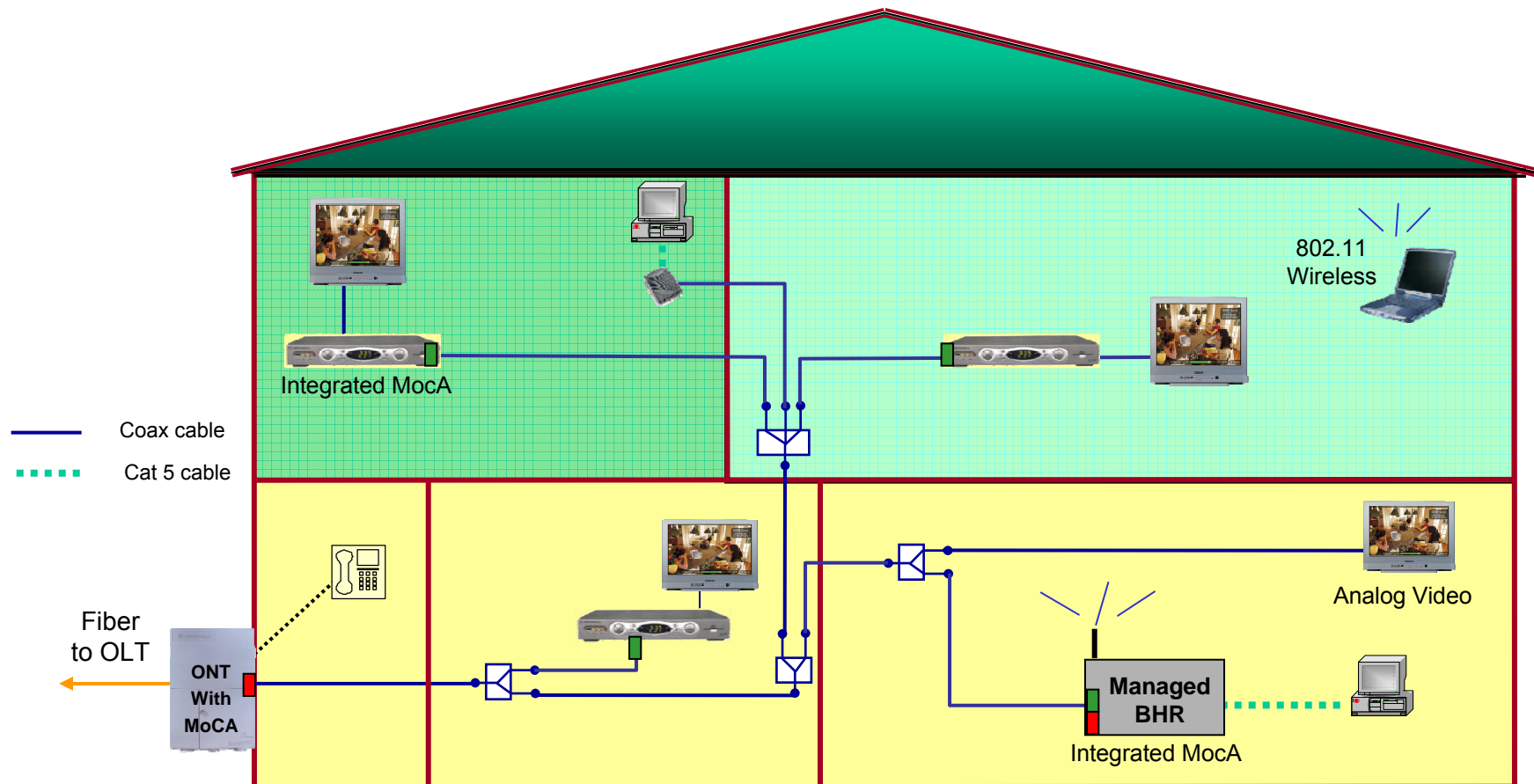
The Verizon Managed Home

CMS
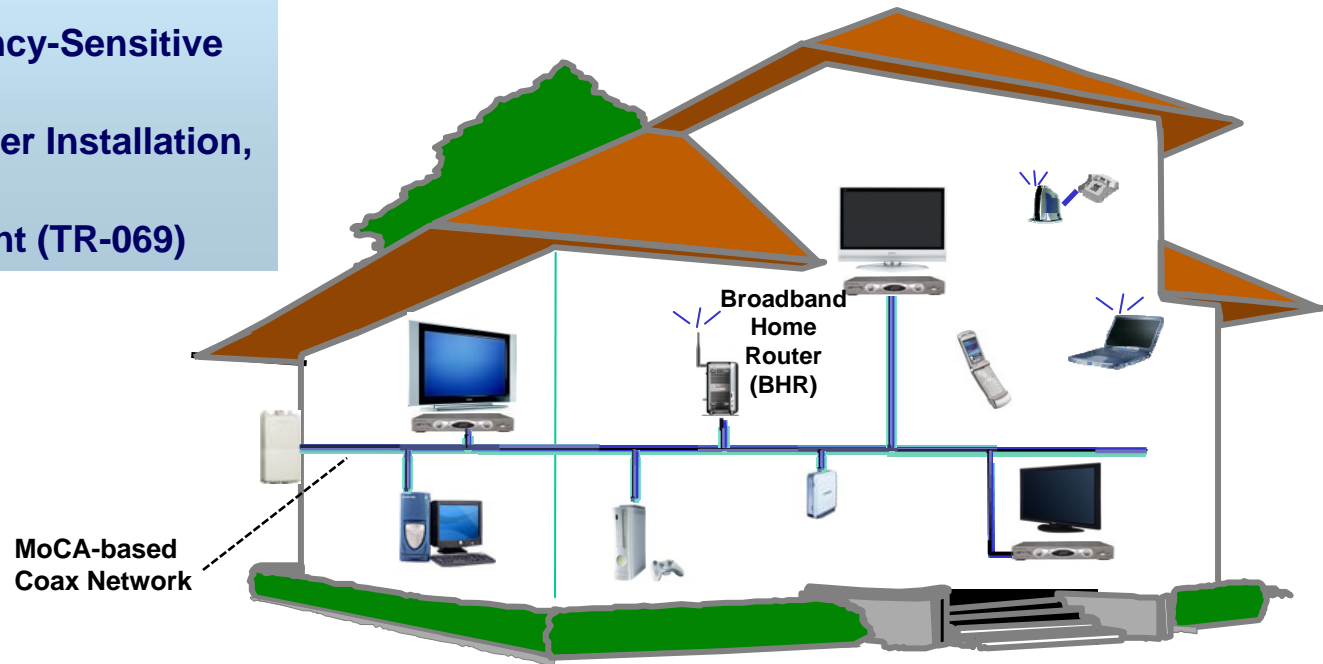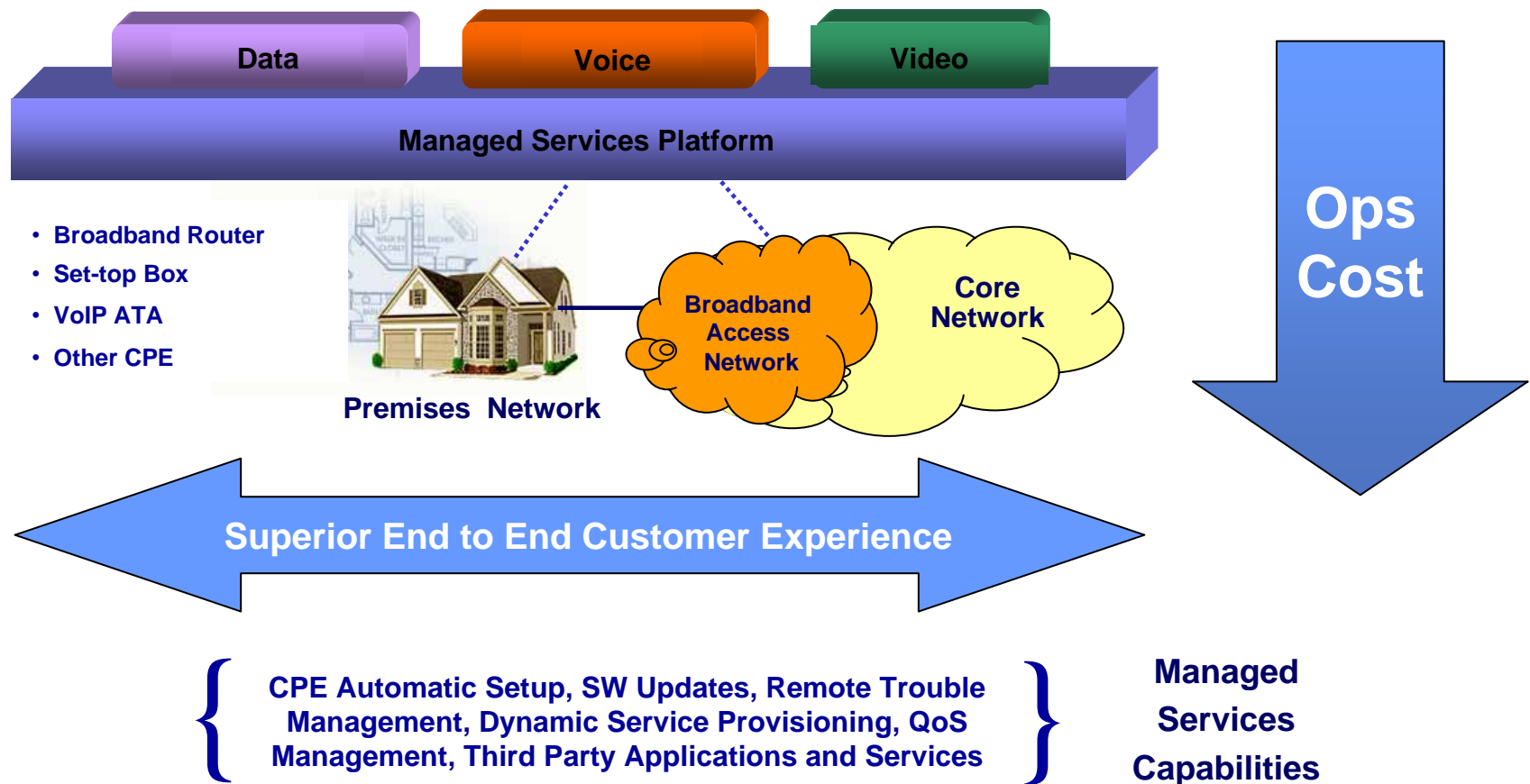Customer Premises Management System

TR-069 Home Network Management

- **High Throughput: 100 Mbps,**
- **Ready For Next-generation Offerings**
- **Protection for Latency-Sensitive Services**
- **No New Wires: Faster Installation, Lower Cost**
- **Remote Management (TR-069)**

Broadband Home Router (BHR)

MoCA-based Coax Network

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Robust Broadband

Provide A Superior Service Delivery Experience And Simplify Operations

- Broadband Router
- Set-top Box
- VoIP ATA
- Other CPE

Data

Voice

Video

Managed Services Platform

Premises Network

Broadband Access Network

Core Network

Ops Cost

Superior End to End Customer Experience

{ CPE Automatic Setup, SW Updates, Remote Trouble Management, Dynamic Service Provisioning, QoS Management, Third Party Applications and Services }

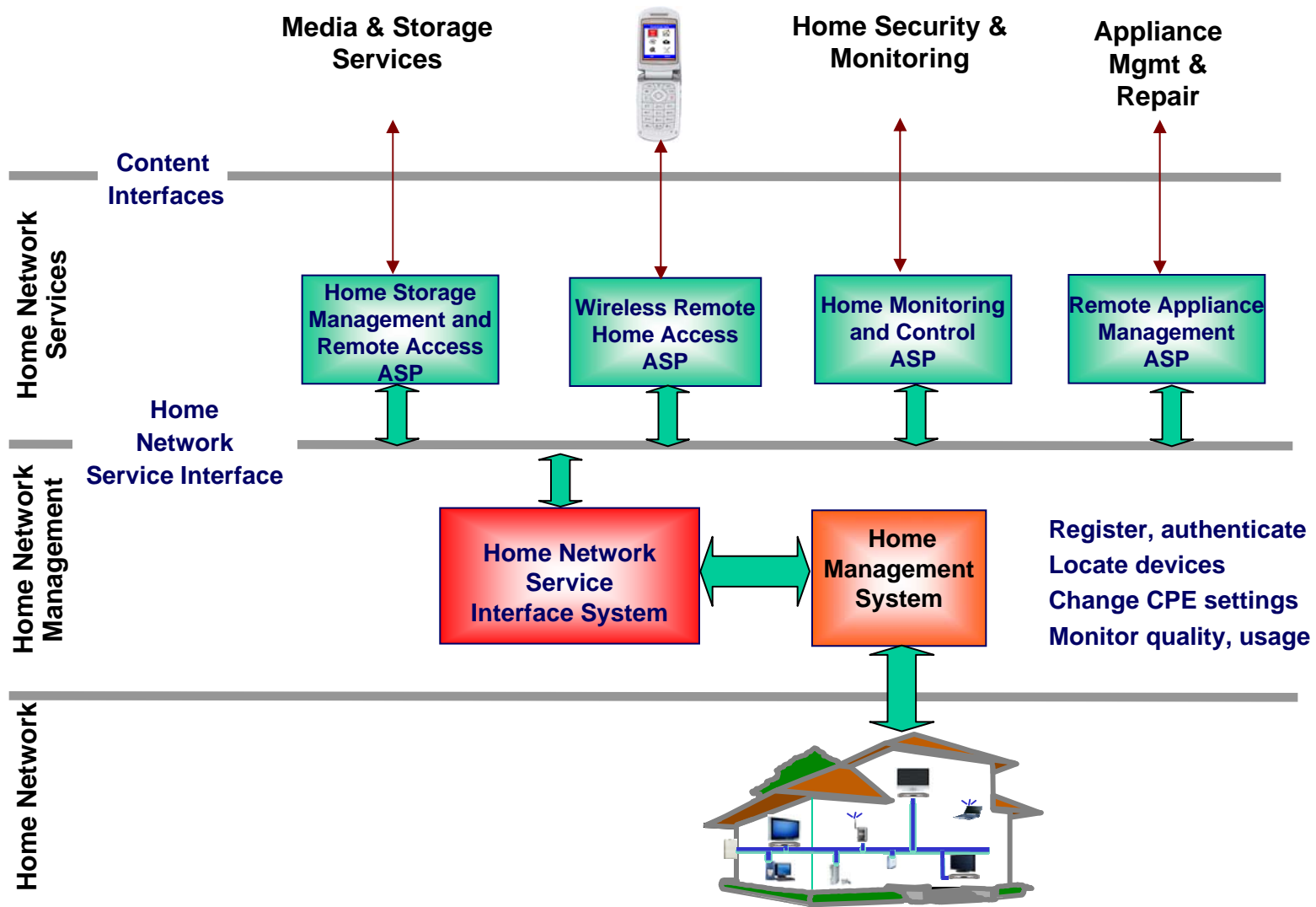**Managed Services Capabilities**

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Service Delivery Opportunity

- **Verizon Is Making A Significant Investment In Broadband Infrastructure**
  - The Home Network Is Emerging As A Key Part Of This Infrastructure
  - It Is In Verizon's and Our Customers' Best Interests To Leverage Infrastructure For New Value-Added Services

- **Home Network Installation, Operation, Device Plug-and-Play Has To Be Transparent To The Customer**
  - Customers Want To Enjoy Services Without Having To Deal With Complexity

- **In Order To Guarantee A High-Impact Customer Experience We Need:**
  - Software/Firmware Downloading
  - Remote Management Of Applications And Devices

- **Opening The Platforms To Third-Party Application Service Providers Might Enhance This Opportunity**

Home Network Enabled Services

CMS
Customer Premises Management System

TR-069 Home Network Management

FMC

Remote Access

Media

Storage

Security

Medical

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Service Structure

Media & Storage Services

Home Security & Monitoring

Appliance Mgmt & Repair

Content Interfaces

Home Network Services

Home Network Service Interface

Home Network Management

Home Network

| Home Storage Management and Remote Access ASP | Wireless Remote Home Access ASP | Home Monitoring and Control ASP | Remote Appliance Management ASP |

Home Network Service Interface System

Home Management System

Register, authenticate

Locate devices

Change CPE settings

Monitor quality, usage

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Areas of Innovation Enabled by IMS

- **Device Independence**

- **Network Independence**

- **Blended Services**

- **Presence & Location Awareness**

- **3rd Party Mashups**

- **Real-Time Bandwidth/QoS Control**

20
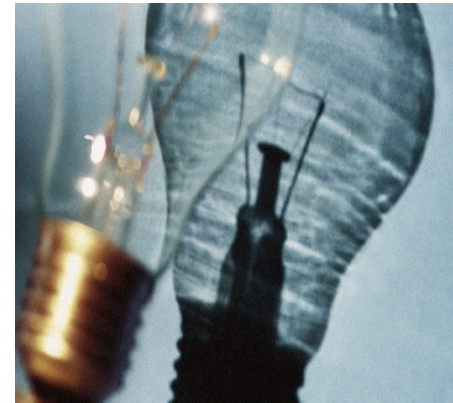
MoCA Installation & Performance

- **Verizon's FiOS Home Network Plays A Critical And Differentiating Role In Its FiOS Service Offerings**

- **More Than 700,000 FiOS Video Subscribers Using MoCA Today**

- **More Than 3 Million MoCA Nodes In FiOS Homes**

- **MoCA Allows Verizon To Reuse Existing Coax Cables, Splitters, And Connectors**

  o Reduces Installation Time

  o Minimizes Customer Disruption

  o Allows Customers To Easily Relocate Their BHR Or STBs By Connecting Them To Any Coax Outlets In The Home

- **Reliable And Predictable Performance**

  o Mature Technology Proven Through Verizon's Mass Deployments

  o Backed By Extensive Lab And Field Testing

  o Positive Feedback From Verizon Technicians And FiOS Customers About Technology Resiliency

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The Future of MoCA

◆ **The Need For Additional Bandwidth In The Home Will Continue To Increase With Future Services**

- Gaming
- Higher Internet data tiers (Up to 100 Mbps)
- Long tail IP content – Expansion channels beyond once carried over overlay
- Full IP TV

- Network DVR
- Peer to Peer content delivery
- Network storage/backup
- Home monitoring
- Video Conferencing
- Remote desktop

◆ **MoCA Technology Must Not Become The Bottleneck In The Home Network**

◆ **Next Generation MoCA Must Support ~400Mbps Of Actual Throughput In Less Than 2 Years**

◆ **Need A Roadmap To 1Gbps Within 4 Years**

◆ **Must Maintain Today's High Performance And Reliability**

◆ **Expansion Of MoCA Silicon Supplier Base Is A Must**