



EVENTS DESCRIPTION

MTC Technology Series II: The Broadband Last Mile - What Now? - 12/11/02

**Wednesday, December 11, 2002
7:30 - 10:00 AM
Burlington Marriott**

Two years ago we were asking ourselves who would win the contest for the last mile, DSL or broadband cable. Last year, we discussed the disappointing penetration of both technologies and about the forces crushing the CLECs. While both DSL and Broadband cable deployments have increased, many of the secondary and tertiary communities are still experiencing service delays. This year, we will address the renewed initiatives by CLECs and approaches for "Last Mile Broadband" deployment penetration. Also, we will review an important new movement by municipal governments that are tired of the delays and restrictions. They are now grasping control of their economic future by developing their own "open" last mile broadband infrastructure for their residents and businesses. This program will be of great interest to all parties planning to invest their resources into this market segment.

Current topics & panelists:

Summary of Last Mile issues and discussion of recent initiatives

Moderator - Jim Budwey, Horizon House Publications, Inc.

Status of broadband penetration and price/performance of FTTH

Mike Kennedy, Managing Partner, Network Strategy Partners

Emergence of municipal broadband and infrastructure providers; their status and direction

Ernie Bray, CTO, Dynamic City Advisors

CLEC perspective - changing the business model and focusing on the basics

Brady J. McConaty, President, C2C Fiber

A major DLEC with new directions and business strategies

Morgan McChesney, Senior VP, Network Operations, COVAD

Cable vs. DSL - Strengths and Weaknesses

Stuart Lipoff, Partner, IP Action Partners

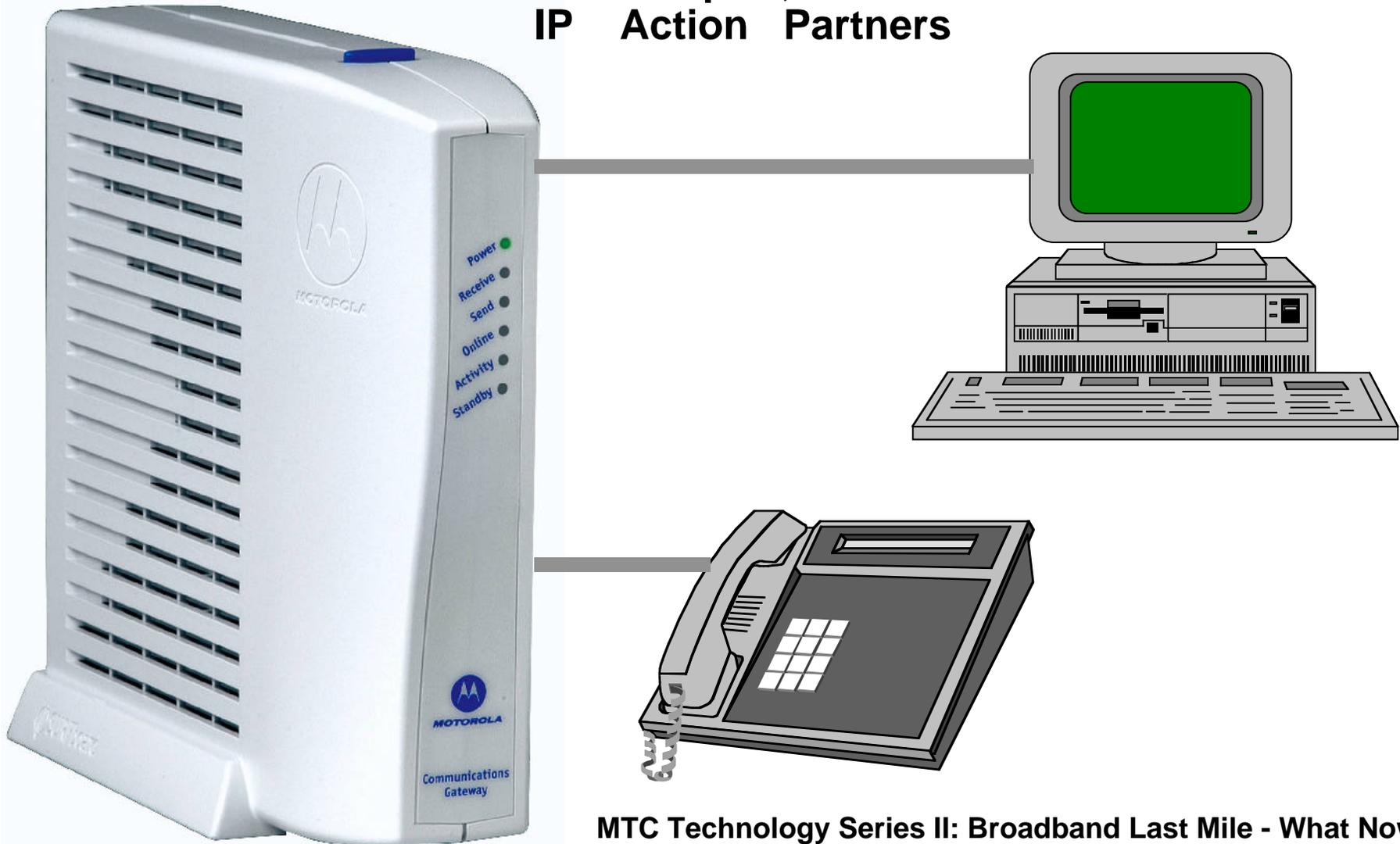
Please join us on December 11, 2002 at the Burlington Marriott for a comprehensive discussion of the Broadband Last Mile.

The MTC would like to thank Hale and Dorr, sponsor of the Technology Series.

Please register for this event before noon on December 10, 2002 to receive the pre-registration price of 45 dollars (MTC members) or 65 dollars (non-members). There will be an additional charge for walk-in registrations. Registration and breakfast will start at 7:30 AM and the event will begin at 8:00 AM.

Cable vs. DSL - Strengths and Weaknesses

Stuart Lipoff, Partner
IP Action Partners



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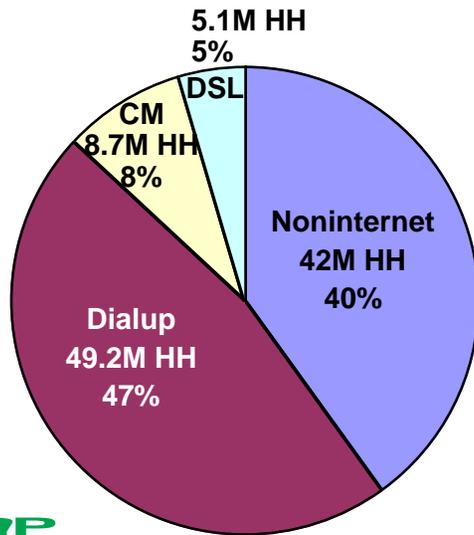
Massachusetts Telecommunications Council

Outline

- Introduction
- Cablemodem and DSL Capabilities
- Market and Applications Drivers
- Outlook

Worldwide Cablemodem Shipments >3million units in 3rdQ2002 up 19.4% from the same period last year¹.

- Starting from the ADL led MCNS DOCSIS project in Jan'96 there has been remarkable cable modem development
 - Spec published Dec'96
 - 75 million USA homes are cablemodem ready²
 - 8.7 million USA subscribers³
 - \$4.5B USA revenue over last 5 years; \$2.6B in 2001 alone²
 - Cablemodem costs from declined from \$500/unit to \$50
 - Adopted as an international standard with significant broadband penetration (e.g. Korea=57% of households)



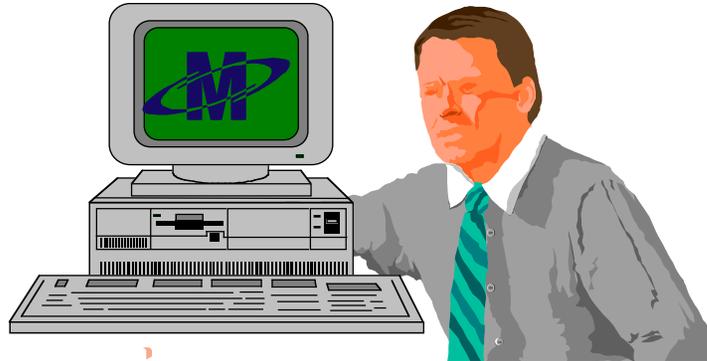
Total USA Households	105M	
Total Passed by Cablemodem	75M	
Total Internet Households	63M	
Total Broadband	13.8M	(13%)
Total Cablemodem	8.7M	(8%)



(sources: 1. Dataquest, 2. CableLabs, 3. GartnerG2)

Cablemodem v. DSL

From the point of view of the internet surfer there appears to be little difference between Cablemodem versus DSL service.



	Cablemodem	ADSL
Downstream Rate	27 Mb/s (64QAM) to 38 Mb/s (256QAM)	0 to 8 Mb/s (DMT) 0 to 1.5 Mb/s (G.lite)
Upstream Rate	320 kb/s (QPSK) to 10 Mb/s (16QAM)	0 to 1 Mb/s (DMT and G.lite)
Monthly Price	~\$45/month	~\$50/month
Availability	75% of USA HH 100% of cablemodem ready HH	~80% of USA HH

Market/Applications Drivers

Introduction

Cablemodem v.
DSL

**Market &
Applications**

Outlook

While today there is little apparent difference between residential broadband internet access, even for this service alone there are concerns about DSL's ability to compete, giving these trends:

Application

Public Network Communications Group

Internet WWW

Broadband Residential Internet Trends

- Symmetrical upstream/downstream needs
- Increasing multimedia streaming content
- Video commerce and webTV
- DSL crosstalk concerns will limit availability

Market/Applications Drivers

Introduction

Cablemodem v.
DSL

**Market &
Applications**

Outlook

There are also clear drivers that go beyond just internet access.

Entertainment Group

Broadcast TV	Pay per Month
Pay per Event	Near Video on Demand
Video on Demand	Interactive TV
Video Games	Program Guide

Education

Interactive training	Distance Learning
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Public Network Communications Group

IXC Access	LXC (CAP) Phone Svc
Internet WWW	Videophone/teleconf

Transactions and Information

Home Shopping	Banking
Travel Reservations	Yellow Pages
Bulletin Board Access	Advertising

Private Network Communications Group

Remote Access to office LAN	Group Work
FX to PABX	Telemedicine

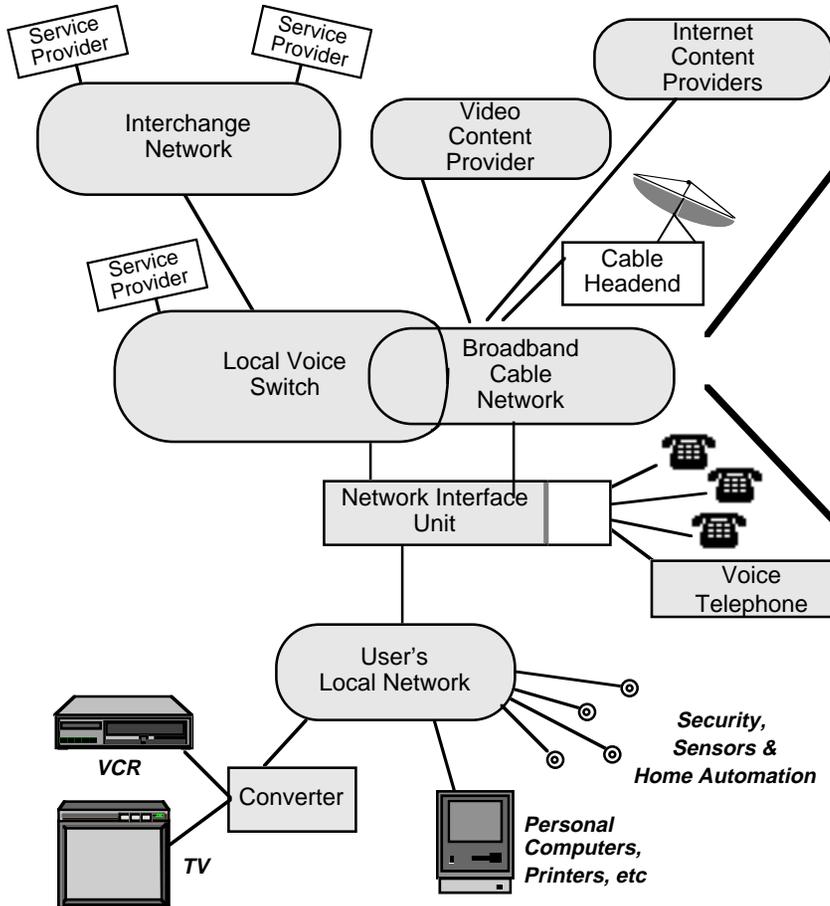
Building Automation

Security Monitoring	Energy Management
Automatic Meter Reading	

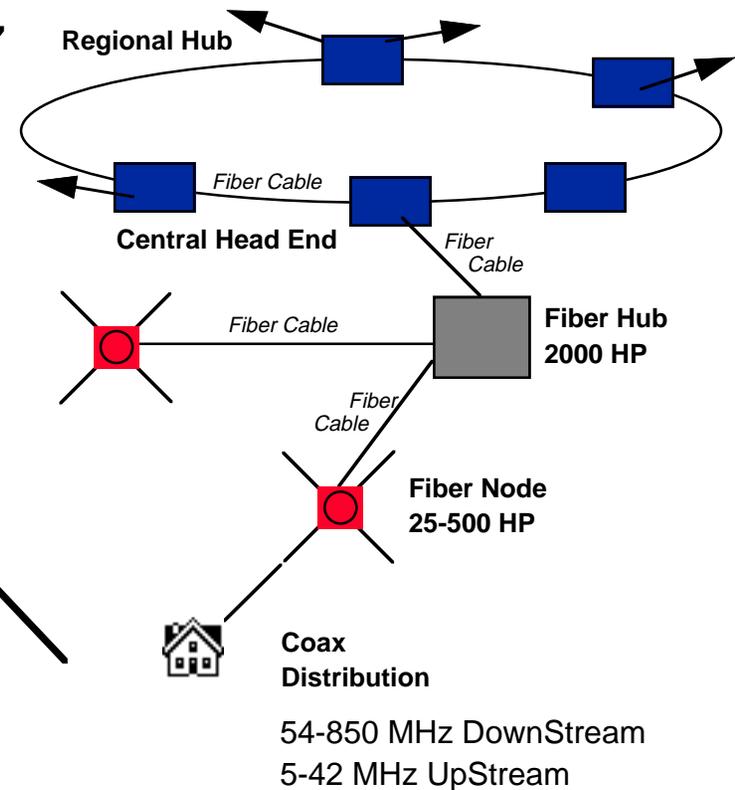
Market/Applications Drivers

Introduction	Cablemodem v. DSL	Market & Applications	Outlook
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DOCSIS fits into a broader vision of a Full Service Broadband Network



Overall Architecture

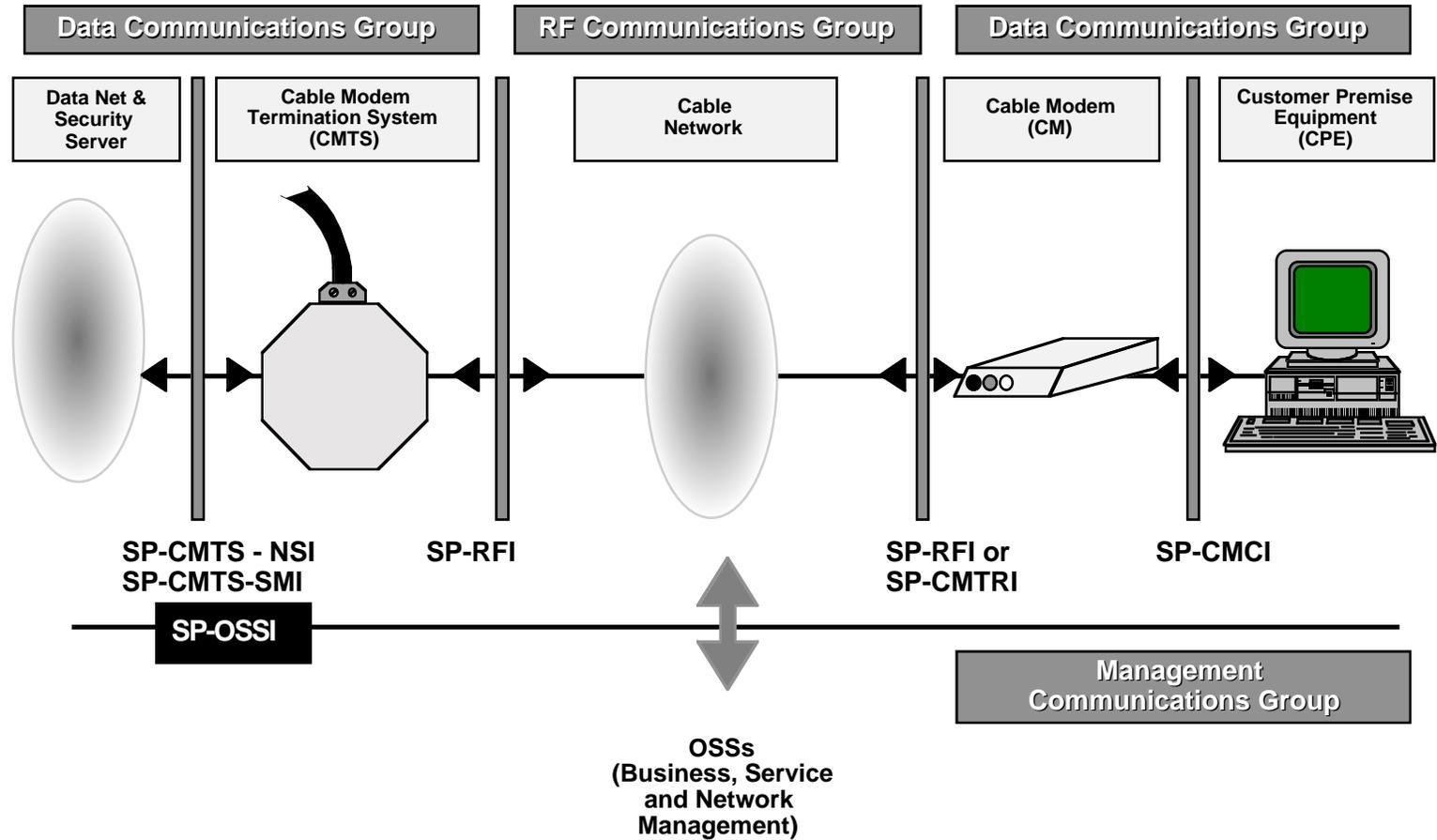


Distribution Network

Market/Applications Drivers

Introduction	Cablemodem v. DSL	Market & Applications	Outlook
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DOCSIS is not just a technology but instead a managed, evolvable, flexible, and scalable network based system.



Market/Applications Drivers

Introduction

Cablemodem v.
DSL

**Market &
Applications**

Outlook

Comparing Cablemodem v. DSL in a future applications context demonstrates the problem for the future of DSL.

	CableModem	DSL
Authentication	√	
Entertainment Bundling	√	
Evolvable	√	
High Speed Symmetric	√	
Native MPEG Transport	√	
OSS Managed	√	
QoS	√	
Renewable Security	√	
Scalable	√	
Single Global Standard	√	
vCommerce	√	
Voice Telephone Integration	√	√
WebTV Integration	√	

As broadband residential services grow beyond simple asymmetrical web browsing, DSL will prove to be inadequate:

- Increased need for high speed upstream
- Subscribers will value increased reliability from a managed network with security independent from PC based clients
- Growth in streaming, broadcast, and multicast services that demand end-to-end QoS
- Simultaneous support for multiple physical layer standards
- Need for authentication for transaction based and vCommerce services
- Consumer's valuing the triple play of entertainment, internet, and voice telephony
- Support for non-PC internet appliances, especially webTV

Abstract Cable versus DSL

Event: MTC Technology Series III: -12/11/02 -The Broadband Last Mile - What Now??

Cable versus DSL

From the perspective of the ordinary web surfer there appears to be little difference between DSL or CableModem access to the internet-- at least not yet. As streaming and other broadband applications beyond web surfing emerge, the differences between these two technologies will become more apparent and important. This presentation will review each broadband access technology and highlight their attributes. A likely roadmap for applications development will be presented and used as a basis for comparing the strengths and weaknesses of each technology.

Stuart Lipoff, Partner, IP Action Partners

Stuart Lipoff is a co-founder of IP Action Partners providing management and technology consulting services to clients who are seek to change their competitive position by exploiting disruptive technologies. His consulting career included 25 years as VP of Technology & Innovation at Arthur D Little, Inc. During his career he has led the project for the cable industry which developed the DOCSIS CableModem Specifications including the industry's strategic applications vision. Currently he is working on projects exploring mobile commerce, video commerce, and secure electronic delivery of content to internet appliances. Stuart can be reached at stu@ipaction.com or www.ipaction.com, Phone: (617) 244-3877.

IP Action Partners (IPaP) www.ipaction.com

IPaP- consultants to technology based businesses- for those firms in which technology advantage is a key success factor, we provide a full range of management and technology consulting services designed to create and maintain technology leadership and advantage. In support of corporate planning we identify, assess, and forecast emerging technology trends, costs, and performance. During R&D activities we assist clients evaluate, balance, and optimize their current R&D project portfolio. We pay special attention to intellectual property creation, assisting clients benchmark against competition and improve their disclosure and patent generation track records. We recommend adjustments to performance evaluation systems and incentives to facilitate more intellectual property generation. For those clients with extensive patent holdings, we value, package, and facilitate third party license and joint development agreements. Our partners each have over 25 years experience in R&D management, innovation, and licensing with a track record of significant value creation for our clients.

