THE MERTON GROUP

Municipal Broadband Network

Feasibility Study[1]

TOWN OF WESTWOOD, MA

March 2003

By

The Merton Group, LLC

STATEMENT OF CONFIDENTIALITY AND OWNERSHIP

All of the analyses, findings, data and recommendations contained in this Report are the exclusive property of The Merton Group, LLC with offices located in Florham Park, New Jersey.

As of the date of this Report, The Merton Group grants a perpetual, irrevocable royalty-free license to the Town of Westwood, Massachusetts to use this Report for the purpose of any and all actions related to the Letter of Intent executed by and between the Town of Westwood and The Merton Group, dated January 03, 2003.

As required by the Code of Ethics of the National Council on Public Polls and the United States Privacy Act of 1974, The Merton Group maintains the anonymity of respondents to surveys the firm conducts. No information will be released that might, in any way, reveal the identity of the respondent.

Moreover, no information regarding these findings will be released to a third party by the licensee without the express written consent of an authorized representative of The Merton Group.

CONTENTS

1. EXECUTIVE SUMMARY

A Feasibility Study of the viability of a Municipal Broadband Network (MBN) has been performed for the Town of Westwood, MA.

1.1 Study Objectives

This document summarizes the results of that study. The Study was comprised of several parts:

Market Study	The preparation of a market study based on statistical samples from residents of the town. The study will address two areas: Current usage: This includes current penetration of Internet, CATV, and advanced telephony uses. It will also include estimates of revenues available and satisfaction with service providers. Propensity to Buy: This part of the study will include a determination of a propensity to buy or shift service providers and a desire to purchase new or bundles services.
Architecture	This was an architectural study of the network services, installations, operations and maintenance and performance issues.
Detailed Design	This is a detailed design adequate to prepare a capital budget for analysis. It includes deployment of backbone fiber as well as end user drops of fiber.
Technology Choices	This was a set of technological choices comparing passive only technology with active gigabit Ethernet technology. The Company has certain recommendations as a result of this study.
Financial Model	A detailed financial model was developed. This includes revenue modeling, capital plant requirements and estimates, and operations costs for maintenance and repair. The model also includes income statements, cash flows and balance sheets suitable for municipal operations.
Risk Analysis	A detailed analysis of the risk factors and actions appropriate to manage those risks has been provided.
Service Provider Negotiations	The Company has interfaced and is negotiating with potential Service Providers such as Aol and MSN.
Bonding Issues	An analysis of municipal bonding and related legal issues has been provided, based on discussions with bond counsel.
Regulatory Analysis	An evaluation of the regulatory elements and actions is provided.

1.2 Study Results

1.2.1 Market Demand

1.2.1.1 Municipal Broadband Network Services

1. An overwhelming 87% of Westwood homes are in favor of the Town building its own broadband network as long as it does not increase their taxes.
2. About 41% of households are likely or very likely to switch to the MBN for broadband Internet access at the price of $50 per month.
3. Almost 38% of homes are likely or very likely to switch to the MBN for enhanced video services at the price of $50 per month.
4. Almost 50% of the households where the decision maker is less than 55 years old are likely or very likely to switch to the MBN for broadband Internet access at $50 per month. This segment forms almost 70% of all households in Westwood.
5. Only about 20% of the homes where the decision maker is over 55 years old are likely or very likely to switch to the MBN for broadband Internet access at $50 per month. This segment forms less than 30% of all homes.
6. Almost 65% of current cable modem users are likely or very likely to switch to the MBN for broadband Internet access at $50 per month.
7. About 46% of homes where the decision maker is less than 55 years old are likely or very likely to switch to the MBN for enhanced video services at $50 per month.
8. Only 20% of homes where the decision maker is over the age of 55 are likely or very likely to switch to the MBN for enhanced video services at $50 per month.

1.2.2 System Designs and Technology

1. Passive Optical Network (PON) is a passive technology that "splits" signal in a set of passive optical splitters, allowing each residence to have a share of the data link. PON uses one of several transmission characteristics on the link, typically ATM or even an Ethernet format.

2. Gigabit Ethernet (GigE) uses active splitters, which provide Ethernet as the transmission approach all the way throughout the network. The use of Ethernet protocols on the backbone is the differentiators.

3. PON has passive non-powered field units and GigE uses powered intelligent devices.

4. The backbone network will be built out over all approximately 100 miles of streets in Westwood as part of the initial build; all 5,130 households in the town will be passed by the network day one

5. As subscribers sign up, fiber drops will be installed, along with subscriber electronic units

6. It is estimated that there will be approximately 5% trenching required for installation of the fiber, with 95% of the installation being aerial.

7. Merton estimates that approximately 50% of poles in the town have make-ready issues; hence, such make-ready costs have to be taken into consideration

8. The backbone network and feeders will have 36 strands of fiber; each subscriber location will get 2-strand fiber drops

1.2.3 Financial Analysis

Based on the above network architecture and assumed acceptance rates of the MBN, the total capital expenses for the MBN, including all network components, are as follows:

- Initial capital of about $6 million in the first two years, which enables approximately 35% of Westwood households getting serviced for broadband Internet access and about 18% for video
- Total capital expenses of approximately $9 million over 20 years, which would enable servicing of 80% of households for broadband Internet access and about 65% for video
- Required bond size is $6.2 million. Annual debt service payments are approximately $500,000 over 20 years of bond term; principal is deferred in the first year
- Year 1 revenues are expected to be about $380,000, increasing to $1.7 million in Year 10.
- Year 1 operating expenses are expected to be $130,000, increasing to $370,000 in the 10th year.
- Free cash flow is negative in the first 4 years, and is funded from bond proceeds; the project becomes cash flow positive in the 5th year; free cash flow by the 10th year is $700,000, and $1.8 million by the 20th year

1.2.4 Regulatory Issues

There are no significant regulatory issues, state or federal, at this time.

1.2.5 Bonding Issues

1. Massachusetts as a "Home Rule" state with different set of laws for those towns with power plants and non-power plant towns.

2. Outside counsel did not see any major problems and thought that Merton's bonding initiatives can be successful, however a different set of strategies must be employed in each state to streamline and standardize the process.

1.3 Recommendations

1. Based on the market research, the market potential for MBN in Westwood is large enough to provide sufficient bond coverage and to justify implementation, assuming revenue is available.

2. Before any town vote on bonding, it is essential that Merton provide revenue commitments from service providers sufficient to cover the bonds.

3. This Feasibility Study Report should be socialized with town selectmen and citizens to educate and elicit interest.

4. Merton and town should commence detailed discussions with town’s bond counsel and financial team to determine potential bond structures.

5. Town and Merton should continue to aggressively address Commonwealth and Federal legislative bodies regarding more favorable legislation regarding MBN.

6. The town should consider eliciting a preliminary town vote to move forward with various aspects of the project, subject to certain conditions like commitments from service providers.

7. The town and Merton should commence negotiations on a Master Service Agreement, setting a framework for further work packages to be delivered by Merton at a suitable time.

8. The town should issue through Merton, a Request for Information (RFI) to fiber construction and electronic vendors to assess the level of interest among vendors as well as their credibility and capabilities; this will also provide the opportunity for vendors to be prepared to participate in a competitive bidding if and when the town proceeds to that stage.

9. Merton does not specifically recommend one fiber-optic technology (PON or GigE) over the other because the capabilities and costs of the two technologies are quite similar; however, Merton does recommend using an Ethernet based standard that will allow for substantial capacity, open interfaces and ease of upgradability.

10. In the selection of PON versus GigE, the town should especially take into consideration the long-term viability of vendors; this is important from the point of view of ongoing electronics maintenance and upgrade capabilities of these vendors. Today, PON is being offered by more established firms because it is a more mature technology; the GigE vendors are typically small and privately owned, and have funding / long-term viability risk. However, Ethernet is an open, widely accepted and evolving standard, and therefore, as a technology, is likely to outlive its competitors.

2. MARKET STUDY

2.1 Introduction

In this Report, The Merton Group ("Merton") presents the results of the market research study performed as part of the Feasibility Study conducted for the Town of Westwood, MA (the "Town"). This market research was focused on determining the feasibility of providing Municipal Broadband Network (MBN) services to the Town, with such infrastructure potentially financed by municipal bonds. The MBN services are 100 Mbps data access and potentially enhanced video services using fiber to the home (FTTH). The primary focus of the market research effort was to ascertain if the Town has the fundamental base of Internet users to convert and if this base of users would convert to the new service. A secondary objective was to ascertain what the interest and acceptance would be for new services such as digital video.

The main goal for this market research was simply:

"To establish the viability for conversion from an existing Internet service provider to an MBN interconnection in a wide enough user base to ensure bond coverage."

The study has several key objectives. They are as follows:

1. Ascertain the current use of Internet and CATV by key demographic metrics like age, income and gender; from this analysis to determine if there are certain demographic factors in the town which are more favorable to conversion

2. Ascertain current Internet Service Providers' penetration by key demographic metrics

3. Ascertain conversion rates to MBN for existing Internet and CATV users by key demographic metrics

4. Ascertain price points for MBN acceptance; these must reflect the range of offerings from simple dial up replacement to fully enhanced 100 Mbps Internet along with HDTV, telephony, server hosting and whatever else may be of interest

This Report summarizes the statistics collected from a residential mail-in survey commissioned and conducted by the Town in January-February 2003.

2.2 Methodology

As part of the initial preparatory discussions for the market research effort, Merton suggested the following possible methodologies to the Town for conducting the survey associated with the study:

1. *Intercept Interview*
   A study conducted in person with respondents who are approached or intercepted in high traffic locations such as grocery stores or shopping malls.

2. *Mall Intercepts*
   Interviews conducted in shopping malls by randomly selecting people from among those present to be screened. The main part of the interview can take place either on the mall floor or inside the offices of a data collection company located within the mall.

3. *Telephone Survey*
   Respondents are interviewed via the telephone. The telephone interview is normally conducted from a central telephone facility.

4. *Mail-In Survey*
   A standard survey questionnaire is mailed to a randomly selected portion of the total population of residences and/or businesses, or where reasonable, to the entire population of such parcels.

Of the recommended methods, the Town chose to use the Mail-In Survey technique. The final questionnaire was prepared in discussions with and based on pre-market testing sessions with the Town. The final form of questionnaire is attached as Exhibit A.

In January 2003, the Town of Westwood mailed out the questionnaire, with self-addressed envelopes, to all 5075 residences in the town representing the total number of home parcels for the Town. The questionnaire was not sent to businesses because they did not comprise the target market for purposes of the current MBN study.

As of March 1, 2003, the Town had received over 3,000 completed surveys, a return rate of almost 60%, an extraordinarily high number in comparison to average return rates on mail-in surveys, typically about 5%-10%.

The accuracy of projections obtained, in other words, how representative the surveyed population is of the entire Town population, depends heavily on the number of survey responses obtained. If 175 to 200 responses were obtained, then it would be possible to make projections with a +/- 7.5% accuracy with 95% confidence. With about 400 responses, the accuracy of the survey increases to +/- 5%. In other words, with about 400 responses, a sample survey of current Westwood residents would differ no more than +/- 5% than if all Westwood residents were contacted and included in the survey. Further, if the survey were replicated, the statistics would fall within the margin for error 95 out of 100 times.

Of the approximately 3,000 returned questionnaires, 500 questionnaires were randomly selected to be processed and analyzed by The Merton Group, such random selection done in the presence of a Town representative. This random selection of survey responses was done in order to eliminate any biases in survey results stemming from mail-in surveys of this nature. This sample size, as explained above, yields accuracy in results of better than +/- 5%.

2.3 Highlights

2.3.1 Internet Access Demographics

1. About 83% of Westwood households have Internet access of some sort
2. About 54% of Westwood homes use dial-up Internet access, 26% use cable modem, 4% use DSL and the rest satellite.
3. About 36% of households use AoL for Internet access, 23% use AT&T, 6% use MSN and the rest use other service providers like Earthlink, RCN and Compuserve.
4. Almost 35% of households regard speed to be the most important factor in Internet access, 27% voted for price and 21% chose reliability as the most important factor.
5. About 40% of homes want higher speed in their Internet access, while 39% want cheaper rates.
6. Almost 50% of households use the Internet for 1 to 5 hours a day, while about 27% use it for less than an hour a day.

2.3.2 Cable TV Demographics

1. About 72% of Westwood homes have cable TV, 14% have satellite/dish service and the remaining 14% have neither.
2. Almost 70% of homes use AT&T as their CATV provider, while 11% use DirectTV/dish.

3. Almost 36% of homes pay between $35-$50 for their cable/dish service, and 31% pay over $50.

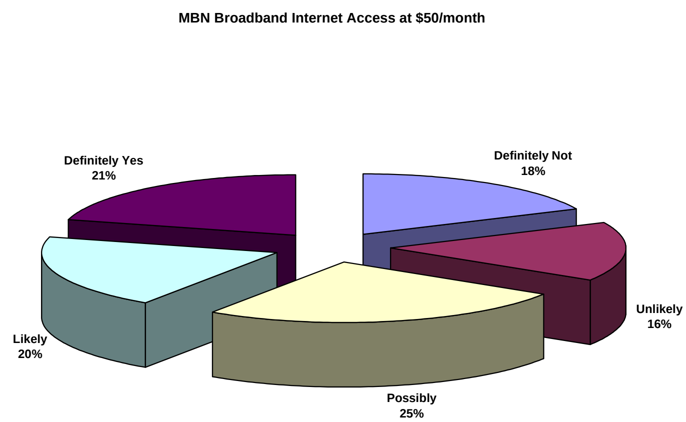
2.3.3 Telephone Demographics

1. 90% of Westwood homes use Verizon as their local telephone provider; about 7% use AT&T.
2. Almost 42% of households have two or more telephone lines.

2.3.4 Municipal Broadband Network Services

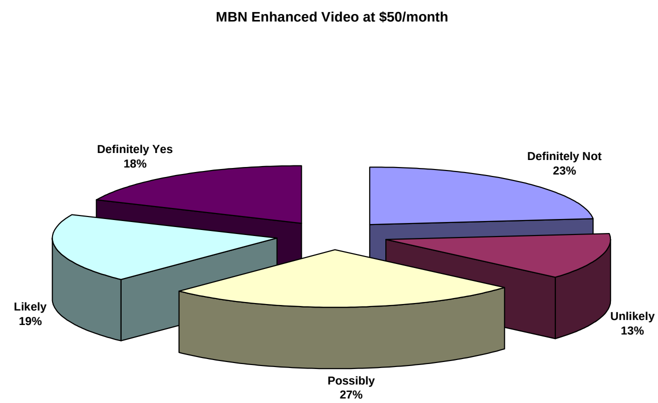
1. An overwhelming 87% of Westwood homes are in favor of the Town building its own broadband network as long as it does not increase their taxes.
2. About 41% of households are likely or very likely to switch to the MBN for broadband Internet access at the price of $50 per month.

The chart below represents the potential range of MBN market for Internet access in Westwood. Only those respondents who are “Definitely Yes” about using the MBN for broadband Internet access determine the “floor” or minimum of this market; this is about 21%. The “ceiling” or maximum of the potential market includes those households, which responded with “Possibly”, “Likely”, or “Definitely Yes”; this is 66% of the market. The Merton Group considers only those who responded with “Likely” and ‘Definitely Yes”, about 41%, as the potential market.



3. Almost 38% of homes are likely or very likely to switch to the MBN for enhanced video services at the price of $50 per month.

As explained above, the “floor” of the market potential for enhanced video services is 18% and the “ceiling” is 64%.



4. Almost 50% of the households where the decision maker is less than 55 years old are likely or very likely to switch to the MBN for broadband Internet access at $50 per month. This segment forms almost 70% of all households in Westwood.
5. Only about 20% of the homes where the decision maker is over 55 years old are likely or very likely to switch to the MBN for broadband Internet access at $50 per month. This segment forms less than 30% of all homes.
6. Almost 65% of current cable modem users are likely or very likely to switch to the MBN for broadband Internet access at $50 per month.
7. About 46% of homes where the decision maker is less than 55 years old are likely or very likely to switch to the MBN for enhanced video services at $50 per month.
8. Only 20% of homes where the decision maker is over the age of 55 are likely or very likely to switch to the MBN for enhanced video services at $50 per month.

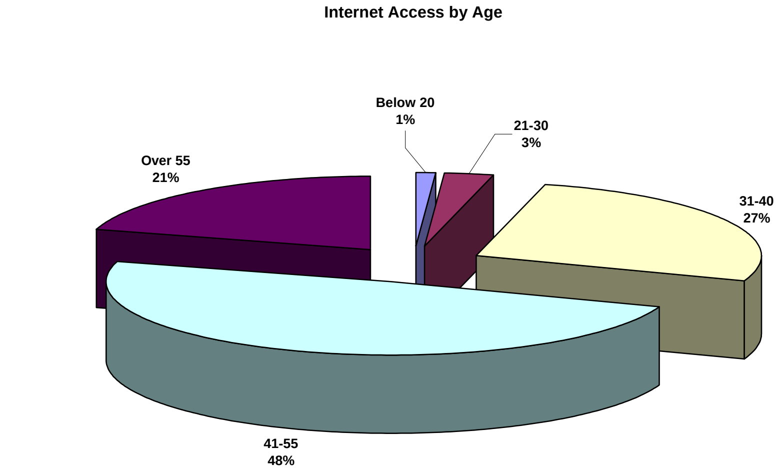
2.4 Detailed Results

2.4.1 Internet Market Statistics

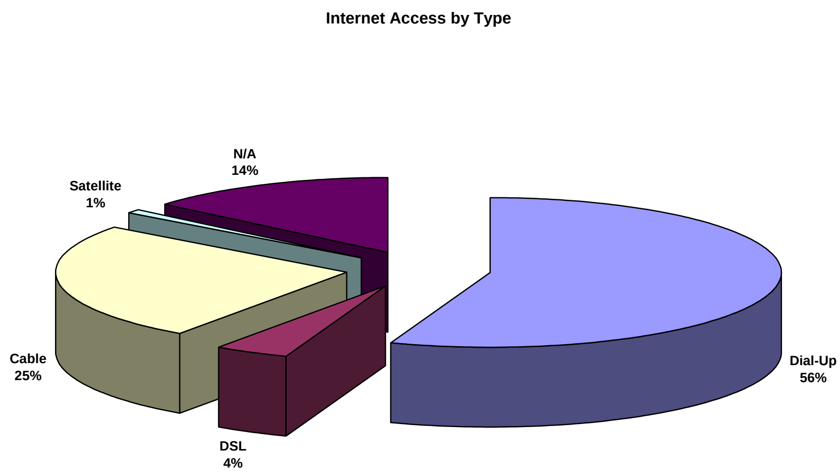
The respondents were asked if they had Internet access service at home. The results are shown below. The “Valid Percent” column shows the percentages of population representing the results.

9. Do you have Internet access service at home?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*Yes*	408	81.6%	82.6%	82.6%
	No	76	15.2%	15.4%	98.0%
	Don't Know	10	2.0%	2.0%	100.0%
	Total	494	98.8%	100.0%	
Missing	*Errors*	6	1.2%		
Grand Total		500	100.0%		

Of the 83% of homes that have Internet access, the segmentation by age group of the respondent is shown below. The respondent is likely the head of the household or decision maker in most cases.

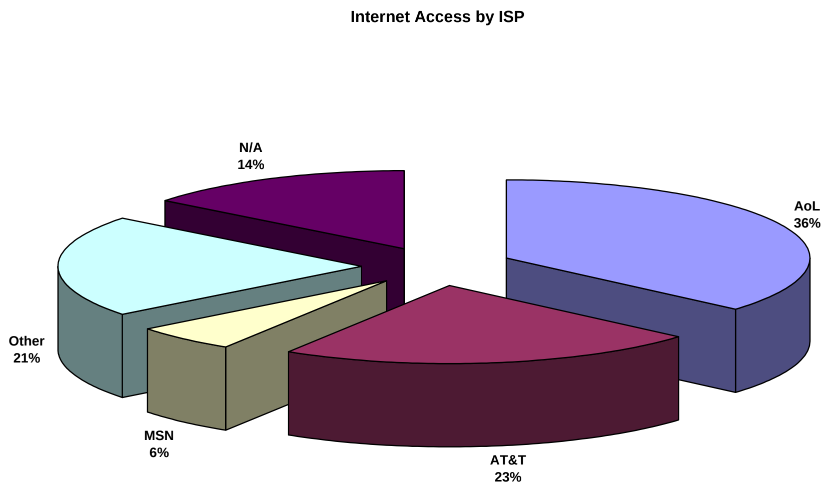


The survey then asked the respondents what kind of Internet access service they had at home. The choices provided were dialup, cable modem, DSL and satellite. The results are shown below.



The results clearly show that there is a fairly high penetration of “broadband” data service in the town, over 30% comprising cable modem, DSL and satellite service.

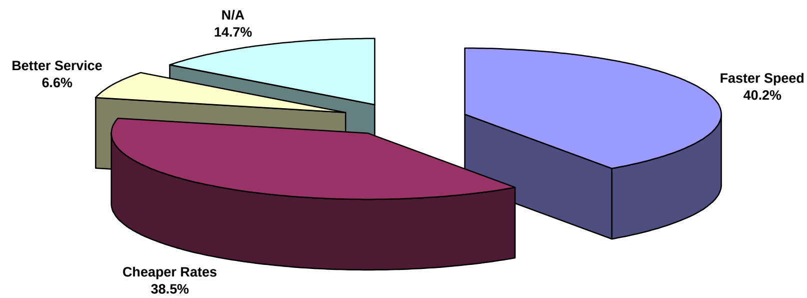
The respondents were then asked about whom their ISP is; the choices provided were AoL, AT&T, MSN and Other. The results are show below. The majority of Internet users have AoL as their ISP, for dialup service. Cable modem users have AT&T and DSL is mostly from Verizon. The other commonly used ISPs are Earthlink and Netzero/Juno.



The survey was also targeted at determining the psychographic profile of Internet users in the Town. Specifically, the respondents were asked what was most important factor to them about Internet access. The majority thought speed was critical, and price was a big factor as well.

15.	***What is most important to you in Internet access service?***				
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*Price*	134	26.8%	27.4%	27.4%
	Speed	170	34.0%	34.8%	62.2%
	Reliability	102	20.4%	20.9%	83.0%
	Security	22	4.4%	4.5%	87.5%
	N/A	61	12.2%	12.5%	100.0%
	Total	489	97.8%	100.0%	
Missing	*Errors*	11	2.2%		
Grand Total		500	100.0%		

Along the same note, the survey asked what the respondents would like to see changed/improved about their Internet access service. Over 40% indicated that they would like to have faster access; lower price came in a close second.

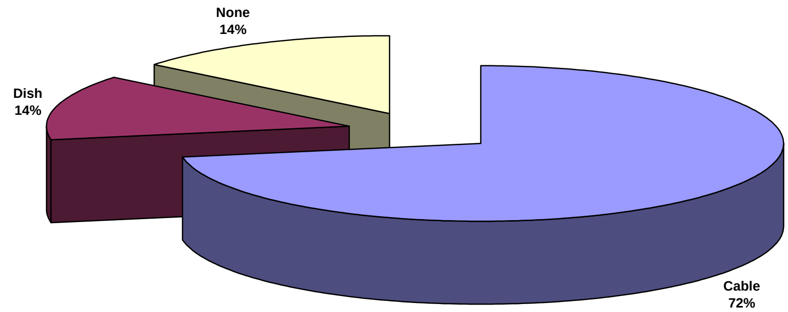


To understand Internet usage in the Town, the survey asked how long the respondent spent on the Internet in a given day. From the results below, it is clear that a majority of the population uses the Internet in excess of an hour a day.

20. How many hours a day do you use the Internet?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*Never*	64	12.8%	13.1%	13.1%
	<1 Hour	132	26.4%	26.9%	40.0%
	1-5 Hours	243	48.6%	49.6%	89.6%
	5-10 Hours	38	7.6%	7.8%	97.3%
	Always On	13	2.6%	2.7%	100.0%
	Total	490	98.0%	100.0%	
Missing	*Errors*	10	2.0%		
Grand Total		500	100.0%		

2.4.2 Cable TV Market Statistics

In order to understand the penetration of cable or similar services in the Town, the respondents were asked what kind of cable or dish TV service they used at home. From the results, it is clear that 86% of Town residents use some kind of cable/dish TV service. The breakout is shown below.



The breakout by service provider is shown below. There is some noise in the data here because the number of respondents who answered “N/A” to this question is a bit higher than the numbers above should indicate.

13. Who is your Cable or Dish Television Company?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	AT&T	340	68.0%	68.7%	68.7%
	Direct TV	55	11.0%	11.1%	79.8%
	Echo Star	7	1.4%	1.4%	81.2%
	Other	12	2.4%	2.4%	83.6%
	N/A	81	16.2%	16.4%	100.0%
	Total	495	99.0%	100.0%	
Missing	Errors	5	1.0%		
Grand Total		500	100.0%		

In order to determine the current pricing of cable/dish TV service, the respondents were asked how much they paid for their current cable TV or dish TV service. The results below indicate that most of the respondents paid at least $35 for their service, while 30% paid $50 or more. The relatively high cost of current cable/dish TV service is to be noted because it is a measure that indicates potential pricing opportunities for enhanced video services over the MBN.

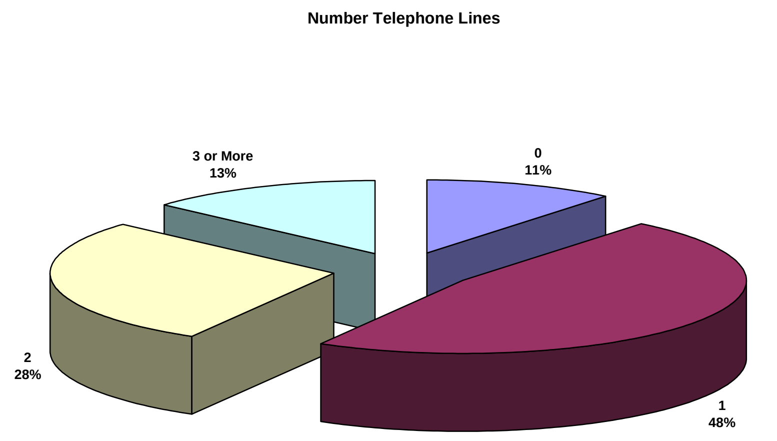
16. How much do you pay now for your cable TV service?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	<$25	56	11.2%	11.3%	11.3%
	$25-$35	33	6.6%	6.7%	17.9%
	$35-$50	176	35.2%	35.5%	53.4%
	>$50	154	30.8%	31.0%	84.5%
	N/A	77	15.4%	15.5%	100.0%
	Total	496	99.2%	100.0%	
Missing	Errors	4	0.8%		
Grand Total		500	100.0%		

2.4.3 Telephone Service Statistics

The survey was also targeted at understanding the current telephone service demographics in the Town. With this in mind, the respondents were asked who their local telephone company was. Not surprisingly, most people use Verizon for their local service.

11. Who is your local telephone company?					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Verizon	444	88.8%	89.7%	89.7%
	AT&T	36	7.2%	7.3%	97.0%
	MCI	6	1.2%	1.2%	98.2%
	RCN	1	0.2%	0.2%	98.4%
	Other	8	1.6%	1.6%	100.0%
	Total	495	99.0%	100.0%	
Missing	Errors	5	1.0%		
Grand Total		500	100.0%		

More importantly, the segment of the population, which uses more than one telephone line, represents the initial target market for conversion to the MBN. This is because a household is probably paying about $25 to their ISP and another $25 for the second telephone line dedicated to data/fax. With the MBN, the second telephone line could be eliminated, and the end-user could be paying the same total of $50 to an ISP for 10+ Mbps Internet access service. This segment of the population therefore represents the “low hanging fruit” for transfer to the MBN. The results are shown below; over 40% have more than one line.



2.4.4 Municipal Broadband Network Services

As alluded to before, this market study is primarily targeted at measuring the adoption of new services enabled by the MBN, including 100 Mbps data service and enhanced digital cable services. This information is cross-tabbed with key demographic factors to understand which segments of the market will be the potential user base, and what the price sensitivity is of that potential user base.

The survey was targeted at determining the “take rate” or rate of adoption to MBN services at two different price points ($50 per month, $75 per month) for two different services (100 Mbps Internet access, enhanced digital video services). The above adoption rates were then segmented by key demographic metrics, including age and current type of Internet/cable connection.

2.4.4.1 MBN Internet Access Service

The respondents were asked the question how likely they would switch to an Internet access service that would be dramatically faster than what they currently have today, at the two different price points above. The results are shown below. The first table presents results for $50 and the second for $75.

22. Would you switch to a very high speed Internet connection, 1000 times faster than anything you have now, if it were $50 per month for unlimited local usage?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*Definitely Not*	88	17.6%	18.0%	18.0%
	Unlikely	78	15.6%	15.9%	33.9%
	Possibly	125	25.0%	25.5%	59.4%
	Likely	97	19.4%	19.8%	79.2%
	Definitely Yes	102	20.4%	20.8%	100.0%
	Total	490	98.0%	100.0%	
Missing	*Errors*	10	2.0%		
Grand Total		500	100.0%		

21. Would you switch to a very high speed Internet connection, 1000 times faster than anything you have now, if it were $75 per month for unlimited local usage?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*Definitely Not*	166	33.2%	33.7%	33.7%
	Unlikely	170	34.0%	34.6%	68.3%
	Possibly	93	18.6%	18.9%	87.2%
	Likely	29	5.8%	5.9%	93.1%
	Definitely Yes	34	6.8%	6.9%	100.0%
	Total	492	98.4%	100.0%	
Missing	*Errors*	8	1.6%		
Grand Total		500	100.0%		

The “floor” or minimum potential market for Internet access on the MBN was established as those respondents who answered “Definitely Yes”. The “ceiling” or maximum potential market was defined as those who answered “Likely” and “Possibly” in addition. The Merton Group, however, estimates the market potential as those respondents who answered “Definitely Yes” and “Likely”. The results of these estimates are presented below.

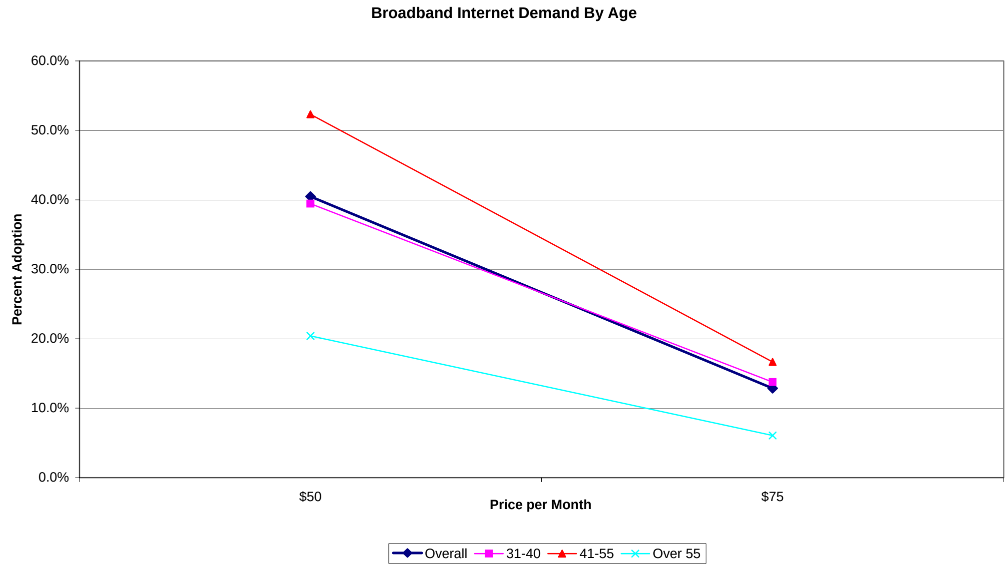
MBN Internet Access Market Potential		
	$50 per Month	**$75 per Month**
Floor	21%	6.9%
Ceiling	66%	31.7%
Estimate	41%	12.8%

The above information was further segmented by age of the respondent to get a better idea of which population segments to target for provision of MBN broadband Internet services. The results are presented in the chart below. These are the “demand curves” for MBN broadband Internet service.

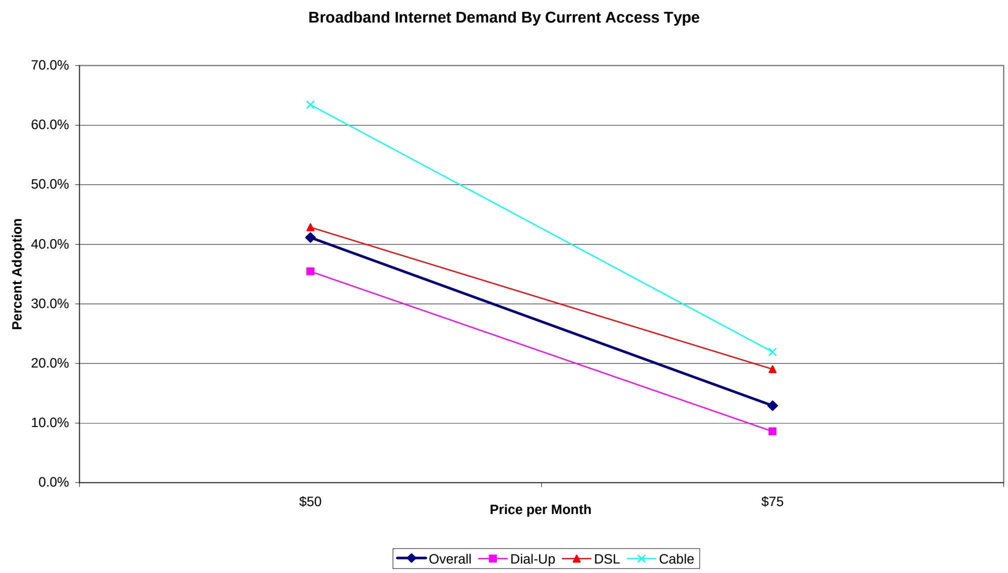
Two facts are very evident from the chart:

- There is a wide difference in interest in broadband Internet access across different age groups, varying from almost 55% amongst the 41-55 respondents to about 20% amongst the senior citizens of the town (over 55 years old), at $50 per month.

- The demand for broadband Internet is very sensitive to the pricing. At $50 per month, the estimated demand is 41%, falling to 13% at $75 per month. According to this trend, if broadband Internet access were offered at say $40 per month, the estimated demand would be approximately 52%.



The MBN broadband demand was also segmented by the type of Internet access service that the respondents currently have, i.e., dialup, cable modem, DSL or satellite.



It is an extremely interesting observation that almost <u>65% of current cable modem users</u> are likely to switch to the MBN level broadband service (10-100 Mbps) if the price were $50 per month. Again, all segments of users are sensitive to the price of the broadband service.

2.4.4.2 MBN Enhanced Video Services

The respondents were asked the question how likely they would switch to an enhanced digital cable TV service that would provide hundreds of channels of digital programming, at the two different price points above. The results are shown below. The first table presents results for $50 and the second for $75.

19. Would you be willing to pay $50 for "high definition" digital TV service, or HDTV, with hundreds of channels of news, sports, music and movies?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*Definitely Not*	116	23.2%	23.2%	23.2%
	Unlikely	66	13.2%	13.2%	36.5%
	Possibly	129	25.8%	25.9%	62.3%
	Likely	96	19.2%	19.2%	81.6%
	Definitely Yes	92	18.4%	18.4%	100.0%
	Total	499	99.8%	100.0%	
Missing	*Errors*	1	0.2%		
Grand Total		500	100.0%		

18. Would you be willing to pay $75 for "high definition" digital TV service, or HDTV, with hundreds of channels of news, sports, music and movies?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*Definitely Not*	193	38.6%	38.7%	38.7%
	Unlikely	159	31.8%	31.9%	70.5%
	Possibly	79	15.8%	15.8%	86.4%
	Likely	41	8.2%	8.2%	94.6%
	Definitely Yes	27	5.4%	5.4%	100.0%
	Total	499	99.8%	100.0%	
Missing	*Errors*	1	0.2%		
Grand Total		500	100.0%		

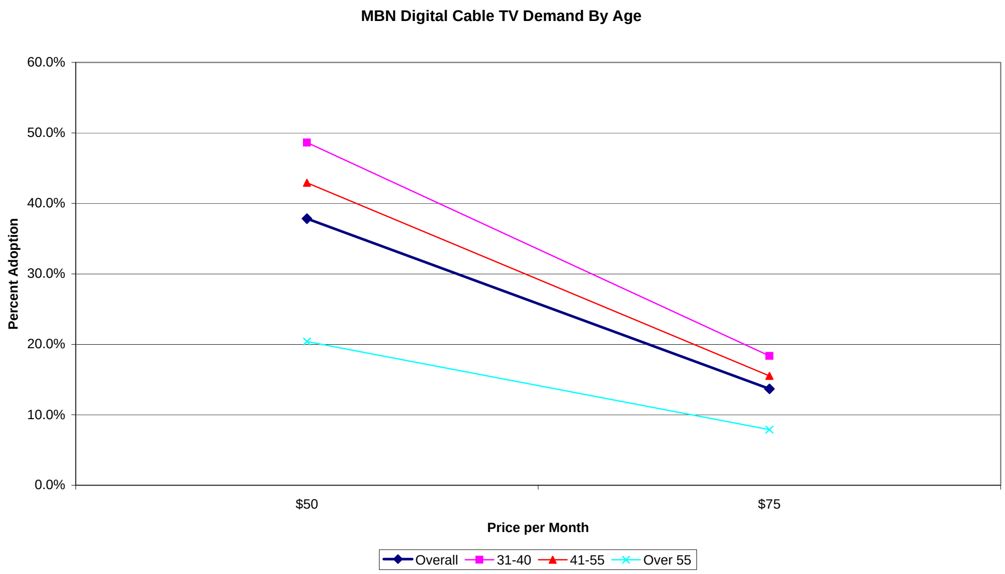
The "floor" or minimum potential market for enhanced video services on the MBN was established as those respondents who answered "Definitely Yes". The "ceiling" or maximum potential market was defined as those who answered "Likely" and "Possibly" in addition. The Merton Group, however, estimates the market potential as those respondents who answered "Definitely Yes" and "Likely". The results of these estimates are presented below.

MBN Enhanced Video Market Potential		
	$50 per Month	**$75 per Month**
Floor	18%	5.4%
Ceiling	64%	29.5%
Estimate	38%	13.6%

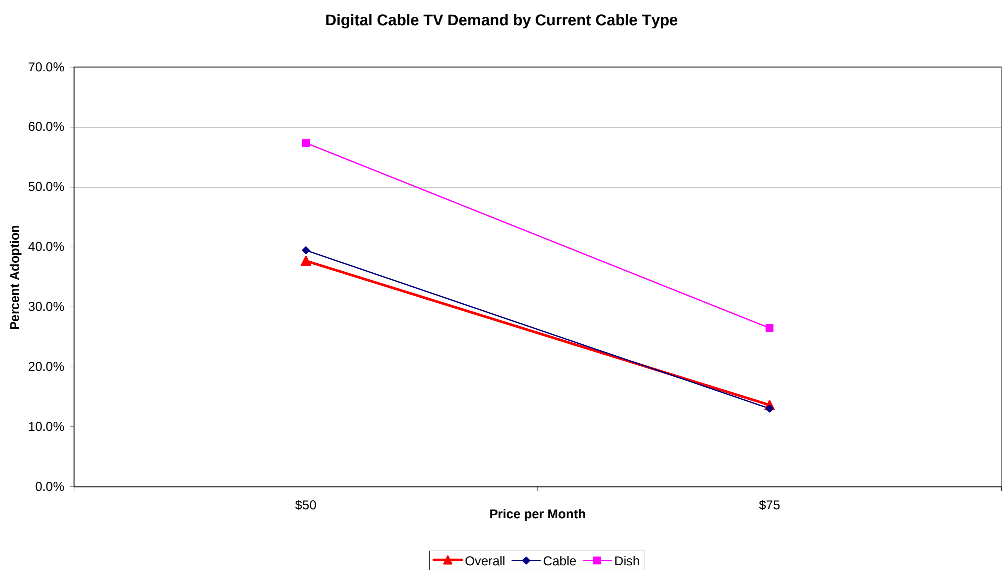
The above information was further segmented by age of the respondent to get a better idea of which population segments to target for provision of MBN video services. The results are presented in the chart below. These are the "demand curves" for MBN enhanced video.

Two facts are very evident from the chart:

- There is a wide difference in interest in broadband Internet access across different age groups, varying from almost 50% amongst the 41-55 respondents to about 20% amongst the senior citizens of the town (over 55 years old), at $50 per month.
- The demand for broadband Internet is very sensitive to the pricing. At $50 per month, the estimated demand is 38%, falling to 13% at $75 per month. According to this trend, if broadband Internet access were offered at say $40 per month, the estimated demand would be approximately 48%.

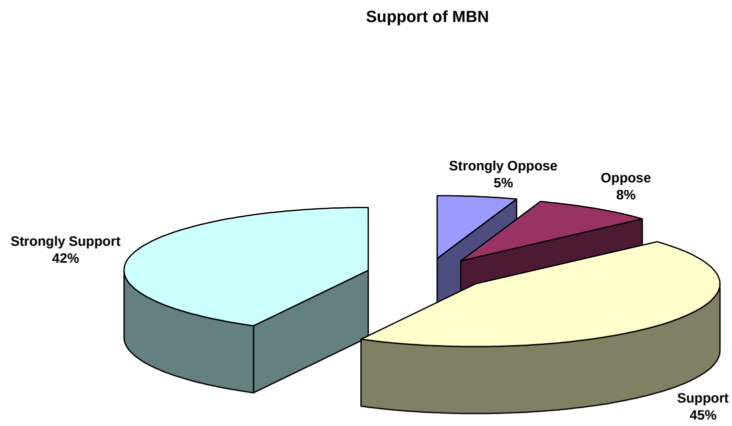


The demand for enhanced video services was also segmented by the type of cable/dish service that the respondent currently subscribes to. The results are shown below.

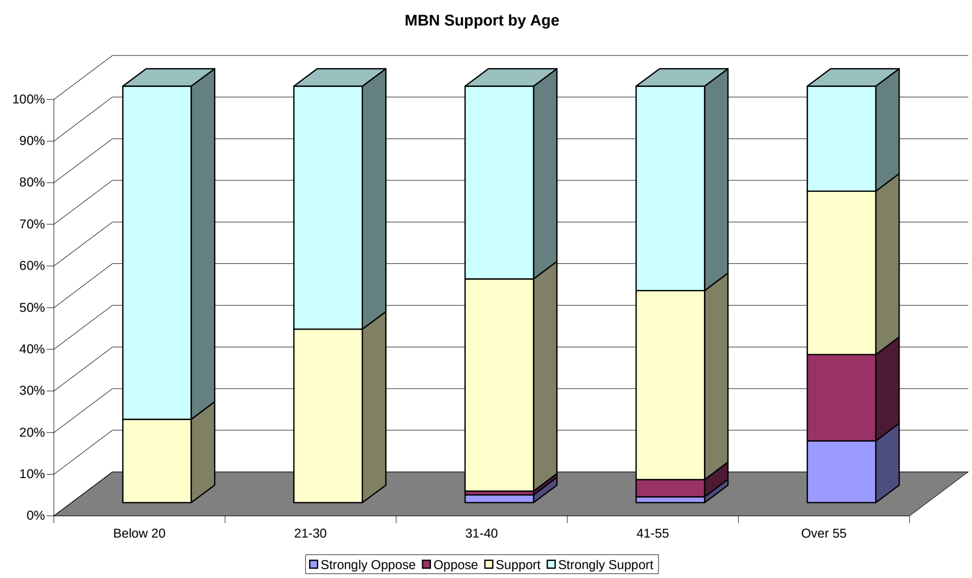


It is important to observe that the current dish TV subscribers appear to be dissatisfied with either the quality of service or the price they are paying right now, and form the most willing segment of users to move to video services potentially offered on the MBN.

To determine he predisposition of the citizens of Westwood to a Town-built fiber facility, the survey asked the question to what extent the respondent would support or not support such an initiative by the Town *if it did not increase their taxes*. It appeared from the completed questionnaires that the driving factor behind the overwhelming support of such an initiative may have been the fact that the question specified that there would not be an increase in taxes as a result of the MBN. The survey did not ask the above question under the scenario of an increase in taxes as a result of the MBN.



The responses to the above question was further segmented by age of the respondent. The results are shown below.



The results clearly indicate that 100% of the respondents below the age of 30 were in support of MBN, 96% of the respondents below the age of 55 were in support of MBN, and 64% of the respondents over the age of 55 were in support of MBN.

2.4.5 General Demographics

Age

The column "Valid Percent" represents the age of the respondents.

1. What is your age?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*

Valid	*Below 20*	5	1.0%	1.0%	1.0%
	21-30	12	2.4%	2.4%	3.4%
	31-40	109	21.8%	21.9%	25.3%
	41-55	219	43.8%	44.0%	69.3%
	Over 55	153	30.6%	30.7%	100.0%
	Total	498	99.6%	100.0%	
Missing	*Errors*	2	0.4%		
Grand Total		500	100.0%		

Gender

2. Male / Female?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*Male*	258	51.6%	52.0%	52.0%
	Female	238	47.6%	48.0%	100.0%
	Total	496	99.2%	100.0%	
Missing	*Errors*	4	0.8%		
Grand Total		500	100.0%		

Education

3. What is your highest level of education?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*High School*	60	12.0%	12.0%	12.0%
	College	221	44.2%	44.3%	56.3%
	Graduate School	218	43.6%	43.7%	100.0%
	Total	499	99.8%	100.0%	
Missing	*Errors*	1	0.2%		
Grand Total		500	100.0%		

Size of Household

4. How many people are there in your household?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*1*	75	15.0%	15.0%	15.0%
	2	128	25.6%	25.7%	40.7%
	3	78	15.6%	15.6%	56.3%
	4	129	25.8%	25.9%	82.2%
	>=5	89	17.8%	17.8%	100.0%
	Total	499	99.8%	100.0%	
Missing	*Errors*	1	0.2%		
Grand Total		500	100.0%		

Annual Household Income

		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*<$50K*	67	13.4%	14.8%	14.8%
	$50K-100K	128	25.6%	28.3%	43.1%
	$100K-$150K	112	22.4%	24.8%	67.9%
	>$150K	145	29.0%	32.1%	100.0%

	Total	452	90.4%	100.0%	
Missing	*Errors*	48	9.6%		
Grand Total		500	100.0%		

Personal Computer Use

6. Do you use a Personal Computer at home?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*Do Not Use*	74	14.8%	14.8%	14.8%
	Home Only	164	32.8%	32.8%	47.6%
	Home & Biz	262	52.4%	52.4%	100.0%
	Total	500	100.0%	100.0%	
Missing	*Errors*	0	0.0%		
Grand Total		500	100.0%		

Number Computers in Household

7. How many computers are there in your home?					
		Frequency	*Percent*	*Valid Percent*	*Cumulative Percent*
Valid	*0*	88	17.6%	17.8%	17.8%
	1	173	34.6%	34.9%	52.7%
	2	136	27.2%	27.5%	80.2%
	3	63	12.6%	12.7%	92.9%
	>=4	35	7.0%	7.1%	100.0%
	Total	495	99.0%	100.0%	
Missing	*Errors*	5	1.0%		
Grand Total		500	100.0%		

3. DEPLOYMENT PLAN

3.1 Technology Overview

This section presents technical and some high level financial details on the infrastructure elements of the Municipal Broadband concepts. The information contained herein is a combination of information based upon Merton analyses and vendor information concerning certain equipment elements. We begin with a high level overview of Internet Protocol and what is called "IP". This is the basic backbone element of the Internet and its ease of connectivity.

IP telecommunications is the use of the IP protocol and routers to communicate from one place to another. IP also works with another underlying means of communicating called TCP. Together they are called TCP/IP. The Internet is the collection of all networks that satisfy the following two criteria. First, any and all communications must be done using IP and IP only. Second, the networks must be interconnected or interconnectable using IP.

IP protocol is a method to send packets of information from one place to another using a very simple network in between. In the world of IP, the "intelligence" all resides at the edge of the network and the inside of the network is a simple as possible. IP is the basis of that simple network. IP headers are simply the set of information bits that are on any packet that tells it how to go from one point to another.

IP sends a packet at a time out onto a network, which is comprised of transmission facilities and intelligent devices called routers. The device, the router, then reads the directions and instructions on each packet which are contained in the IP header, and immediately decides where to send it and possibly how to process the information across the network. The IVN, IP Voice Node, takes and packetizes the voice and then places it in a TCP/IP format as we have discussed above. The packets are then sent out over the network.

3.1.1 Optical Communications Overview

This section is a more detailed presentation of the elements of the fiber communications infrastructure. It is a high level view of the communications elements, which are part of the overall network design and operations.

3.1.1.1 PON vs. Gigabit Ethernet

The first step is to understand that there are two major options: PON or passive optical networks, and Gigabit Ethernet, GigE.

1. PON is a passive technology, which "splits" signal in a set of passive optical splitters, allowing each residence to have a share of the data link. PON uses one of several transmission characteristics on the link, typically ATM or even an Ethernet format.

2. GigE uses active splitters, which provide Ethernet as the transmission approach all the way throughout the network. The use of Ethernet protocols on the backbone is the differentiator.

PON has passive non-powered field units and GigE uses powered intelligent devices. We now present some high level discussions on protocols and then on each technology.

3.1.1.2 Protocols

Protocols are agreed to standards for the purpose of establishing communications between two or more computers. The development of protocols has been significant ever since the development of computer communications. The performance, costs, expandability, scalability, and many other factors are highly dependent on the protocol set chosen. In this report, we focus on layer 2 and 3, and the two choices are PON and Gigabit Ethernet, each has advantages and disadvantages, both are separated at layer 2.

Protocol Layers

Application	*The applications software, it is what the end user sees and uses.*
Presentation	*Provides for such things as security and security management.*
Session	*Controls communications between applications, flow management, and creates sessions between applications at end user level.*
Transport	*Ensures reliable end to end transport and flow control*
Network	*Provides point to point and point to end point reliable links*
Data Link	*Provides for reliable physical link transport; can be divided into LLC and MAC functions*
Physical	*Provides physical connections and electrical connections, including modulation.*

3.1.1.2.1 TCP/IP

TCP/IP is the key protocol used in the Internet. It is a protocol, which is what is called a “best efforts” approach to telecommunications. In effect, it takes a set of headers, TCP and IP, and then attaches a data packet, a packet of variable length. It then sends this over a network and “hopes” that it gets there. In the early days it was stated, “every packet was an adventure”. It has been learned however that the basic networks are highly reliable so lost packets are not a serious problem; packet delays may be a very serious one, depending on the network traffic.

Apart from a great deal of header information, the key fact of IP is that the length of the data packets is variable! This is not the case of ATM. One can put IP on top of ATM or Ethernet, but IP does best with variable data packet lengths; ATM does not do that whereas Ethernet does.

3.1.1.2.2 ATM

ATM is a telephone-based packet. It differs from TCP/IP in two key ways; first, it is a fixed length and does not vary as data requires, you send a fixed length frame whether you need it or not; second, there is large overhead to ensure quality of service requirements so that loss and delay can be guaranteed in some specified limits.

Now ATM is a layer 2 protocol, it is what is below IP and IP is below TCP; this is in reality a concatenation of overheads, each with their own functions. ATM frames have lots of overhead for such tings as quality control and services level administration. ATM was built by telephone people not computer people; it was a higher speedway to interconnect telephone switches as we knew them in the early 1990s. It did not anticipate such things as IP telephony.

ATM is a telephone-based format. In addition to the fixed frame size, whether used or not, it also had selected data rates, OC 1 as 45 Mbps, OC 3 as 155 Mbps, OC 12 as 622 Mbps, and OC 48 as 2.5 Gbps. It is possible to put IP on ATM, since ATM is layer 2 and IP is layer 3 and TCP layer 4. Thus, as has been done, TCP/IP rides on top of ATM.

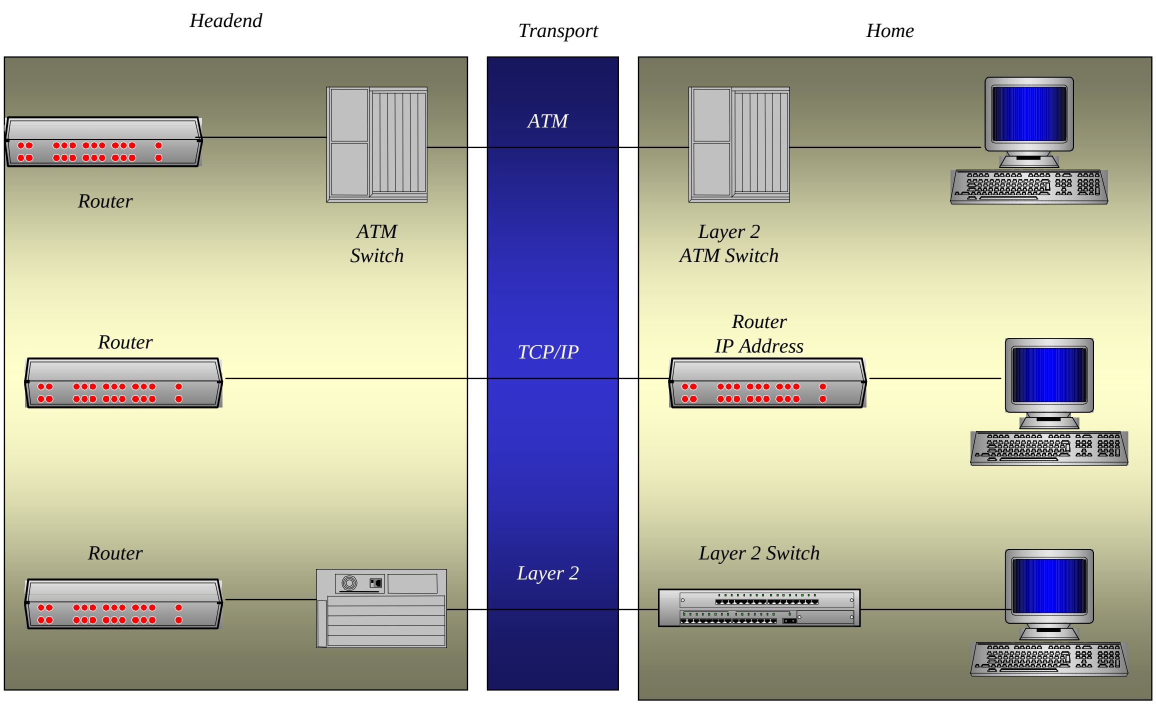
3.1.1.2.3 Ethernet

In contrast to layer 2 ATM networks, there is a layer 2 computer protocol called Ethernet, and TCP can ride on this as well. Ethernet, albeit older that ATM, is truly a packet approach. It anticipates full flexible packet capabilities. The following is the layer 2 level of Ethernet, as specified by the IEEE 802.3 standard.

Ethernet at layer 1 uses 10 Base T and 100 Base T forms of 10 Mbps and 100 Mbps. In addition, the signalling is CSMA/CD. Carrier sensed multiple accesses with collision detection.

3.1.1.3 Interconnectivity

These network schemes can be laid out in the following categories. It must be remembered that TCP is layer 4, IP IS layer 3, and Ethernet and ATM ARE both layer 2. Thus, we must consider connecting ATM to ATM, Ethernet to Ethernet, and then having TCP/IP riding on top of either.



Both ATM and Ethernet have the same architectural elements; some central device, some filed unit for distribution, and some end user interface. However, the differences are significant:

1. Data Size: ATM is fixed frame format Ethernet is variable

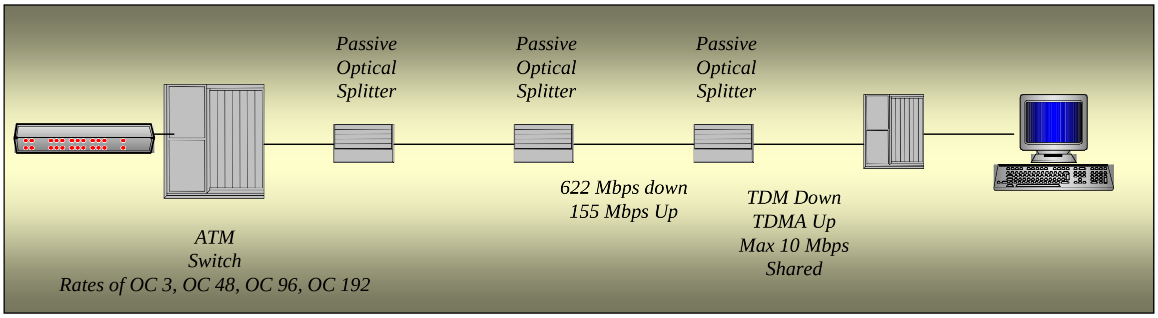
2. Field Unit: ATM uses PON and is passive; Ethernet is an active level 2 switch.

3. Distance: ATM using PON has range limits and Ethernet has extended range. This may or may not be a problem.

4. QoS: ATM allows QoS so that video can be guaranteed via central control, Ethernet uses IP based flow control and has QoS “engineered” via over capacity

5. Data Rates: ATM is fixed in SONET frames whereas Ethernet is highly scaleable and flexible.

ATM



3.1.1.4 Basic Architecture

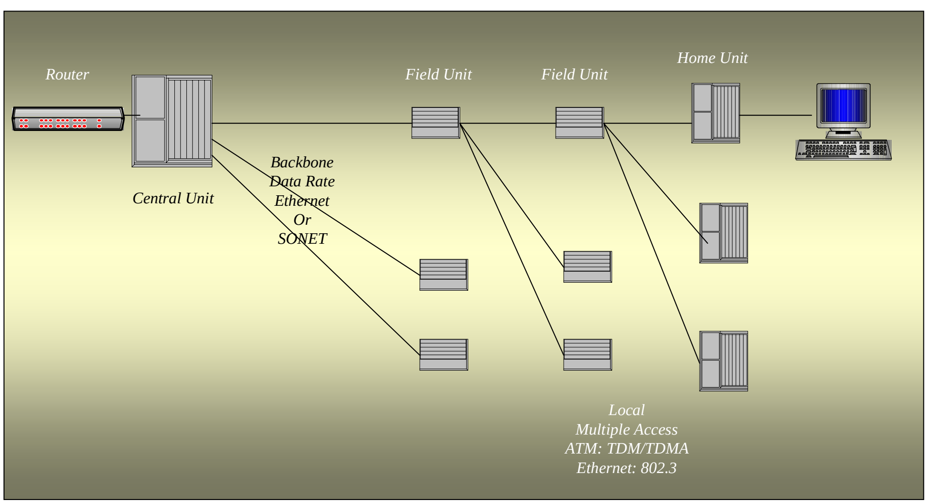
The basic architecture for PON or Gigabit Ethernet is shown below. The elements are:

1. Central Unit: This is at a headend or some similar central location and provides for central management and interface.

2. Field Units: These units are the n:1 splitting devices, active or passive, which take a backbone signal and share it amongst several home units. In GigE the backbone rate is 1 Gbps down and up using two fibers, in ATM PON it is a single fiber using several wavelengths, one up and one down, using SONET and ATM formats. SONET is a layer 1 protocol.

3. Home Units: These are the devices in the home made to support data, voice, and video.

Basic Architecture



The Merton Group © Copyright The Merton Group, LLC Page 15

3.1.2 Gigabit Ethernet

This section is a more detailed technical presentation on Gigabit Ethernet and details the key technical elements.

3.1.2.1 Introduction: Evolution of Ethernet Standards

Ethernet has enjoyed tremendous success in enterprise LANs since its introduction in the early 1980s. It has grown from a shared 10 Mbps technology, where all users on the network contend for the same pool of bandwidth, into a switched technology providing dedicated bandwidth to each subscriber at up to a full gigabit of throughput.

The IEEE 802.3 committee, which is responsible for the Ethernet standard, is broken into sub-committees based on the different versions of Ethernet. The following are the specific committees.

- IEEE 802.3 – Ethernet (10 Mbps)
- IEEE 802.3u – Fast Ethernet (100 Mbps)
- IEEE 802.3z – Gigabit Ethernet (1000 Mbps)
- IEEE 802.3ae – 1- Gbps Ethernet (10 Gbps); standard under development

3.1.2.2 Gigabit Ethernet for FTTH

Fast Ethernet (100 Mbps) and Gigabit Ethernet are currently ideal for community FTTH networks. Since fiber reaches all the way to the subscriber, it is feasible to provide the user with up to 1 Gbps capacity. In addition, they provide other new features such as full-duplex operation, and auto-negotiation. This has established Ethernet as a scalable technology. The new Gigabit Ethernet standards will be fully compatible with existing Ethernet installations. It will support full duplex as well as half duplex modes of operation. Initially, single-mode and multi mode fiber and short-haul coaxial cable will be supported. Gigabit Ethernet is expected to be deployed as a backbone in existing networks. It can be used to aggregate traffic between clients and "server farms", and for connecting Fast Ethernet switches.

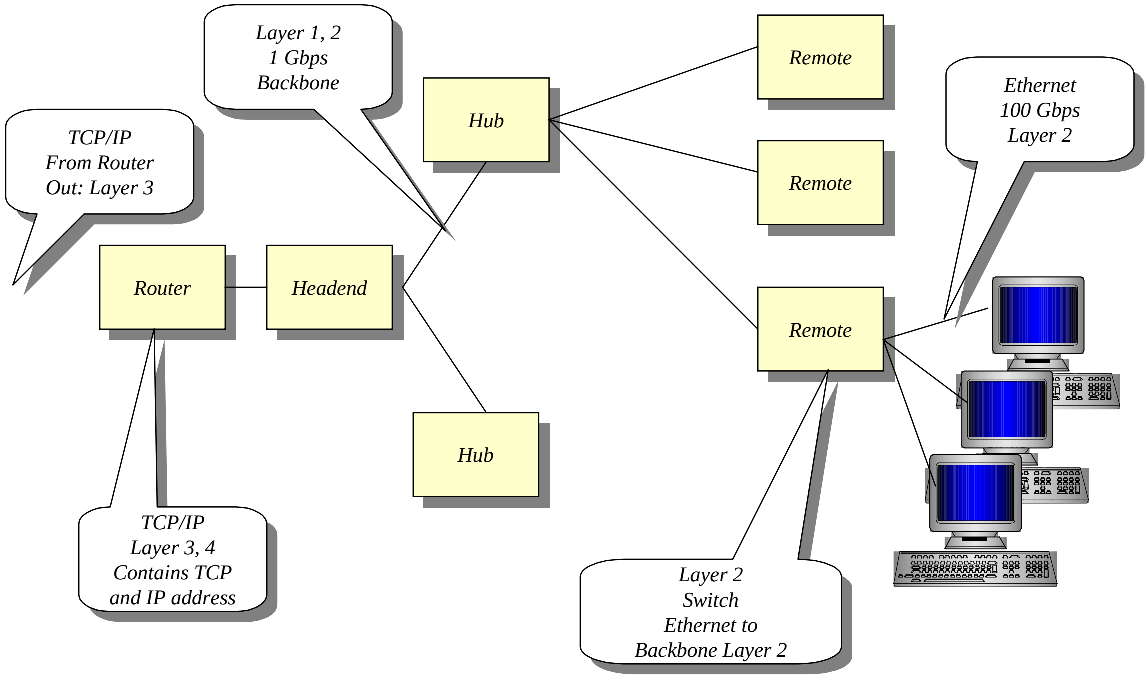
The Physical Layer of Gigabit Ethernet uses a mixture of proven technologies from the original Ethernet and the ANSI X3T11 Fibre Channel Specification. Gigabit Ethernet is finally expected to support four physical media types. These will be defined in 802.3z (1000Base-X) and 802.3ab (1000Base-T).

Gigabit Ethernet maintains the minimum and maximum frame sizes of Ethernet. Since, Gigabit Ethernet is 10 times faster than Fast Ethernet, to maintain the same slot size, maximum cable length would have to be reduced to about 10 meters, which is not very useful. Instead, Gigabit Ethernet uses a bigger slot size of 512 bytes. To maintain compatibility with Ethernet, the minimum frame size is not increased, but the "carrier event" is extended. If the frame is shorter than 512 bytes, then it is padded with extension symbols. These are special symbols, which cannot occur in the payload.

QoS is not built into the Ethernet standard. Implementation is left up to the manufacturers of Ethernet devises and the standards bodies that develop the QoS technologies to deploy their switches and routers. This keeps the standards for the technology simple, while introducing high-level features in the hardware that transport the data. Many devices now incorporate comprehensive QoS measures that allow packets to be classified, prioritized, policed, queued, etc. and then forwarded accordingly. This allows a certain communications to be handled differently from others; for example, a packetized MPEG-2 stream can be forwarded along a higher-bandwidth, lower latency link than typically web-surfing traffic.

Gigabit Ethernet is today a dedicated-bandwidth technology, having evolved from the shared, broadcast-oriented technology Ethernet used to be a decade ago. With the advent of full-duplex communications, the Carrier Sense Multiple Access with Collision Detection (CSMA/CD) access method that handled contention and collisions within a broadcast domain, disappeared from Ethernet's operation. Where once up to 1,024 users would share10 Mbps, now a single user could receive up to 1 Gbps of full-duplex bandwidth for their exclusive use.

The general layout of Gigabit Ethernet networks is shown below:



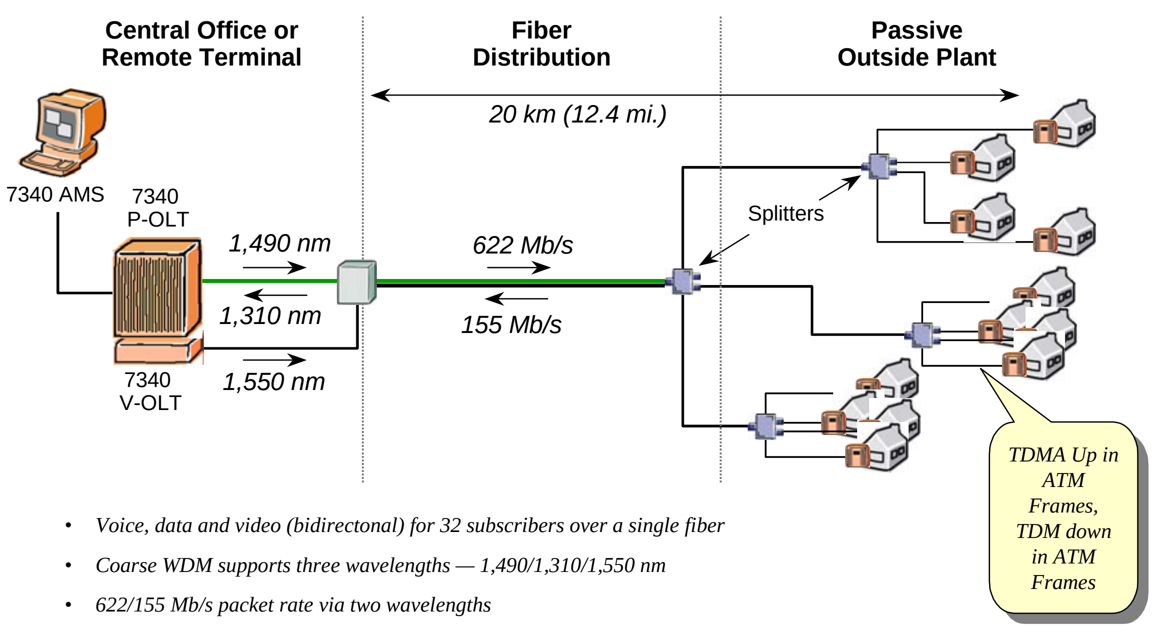
3.1.3 Passive Optical Networks (PON), ATM

There are several versions of PON technology and the following table details them:

APON - ATM PON	*First commercial product, used primarily for business applications*
BPON - Broadband PON	*Expanded version of APON with added functionality to support robust video services*
EPON - Ethernet PON	*PON using Ethernet for packet data - still evolving*
GPON - GigaPON	*evolving PON technology at gigabit rates*
Proprietary PON	*long term viability and support issues*

APON - ATM PON	*First commercial product, used primarily for business applications*
BPON - Broadband PON	*Expanded version of APON with added functionality to support robust video services*
EPON - Ethernet PON	*PON using Ethernet for packet data - still evolving*
GPON - GigaPON	*evolving PON technology at gigabit rates*
Proprietary PON	*long term viability and support issues*

Today's access network, the portion of a public switched network that connects CO equipment to individual subscribers, is characterized by predominantly twisted-pair copper wiring. Fiber-optic technology, through local access network architectures such as fiber to- the-home/building (FTTH/B), fiber-to-the-cabinet (FTTCab), and fiber-to the- curb (FTTC) offers a mechanism to enable sufficient network bandwidth for the delivery of new services and applications. ATM–PON technology can be included in all these architectures, as shown in below.



- *Voice, data and video (bidirectonal) for 32 subscribers over a single fiber*
- *Coarse WDM supports three wavelengths — 1,490/1,310/1,550 nm*
- *622/155 Mb/s packet rate via two wavelengths*
- *Dedicated wavelength for video — very high capacity (4 Gb/s Broadband Entertainment)*
- *20 km (12.4 mi.) span*

In general, the optical section of a local access network can be a point-to point, ring, or passive point-to-multipoint architecture. The main component of the PON is an optical splitter device that, depending on which direction the light is traveling, splits the incoming light and distributes it to multiple fibers or combines it onto one fiber. FTTC architecture runs an optical fiber from the CO to an optical splitter and then on to a small curb-located cabinet, which is near (typically within 500 ft) to the subscriber. It is then converted to twisted copper pair.

The PON can be common to all of these architectures. However, it is only in the FTTH/B configurations that all active electronics are eliminated from the outside plant. The FTTCab and FTTC architectures require active outside-plant electronics in a neighborhood cabinet or curb.

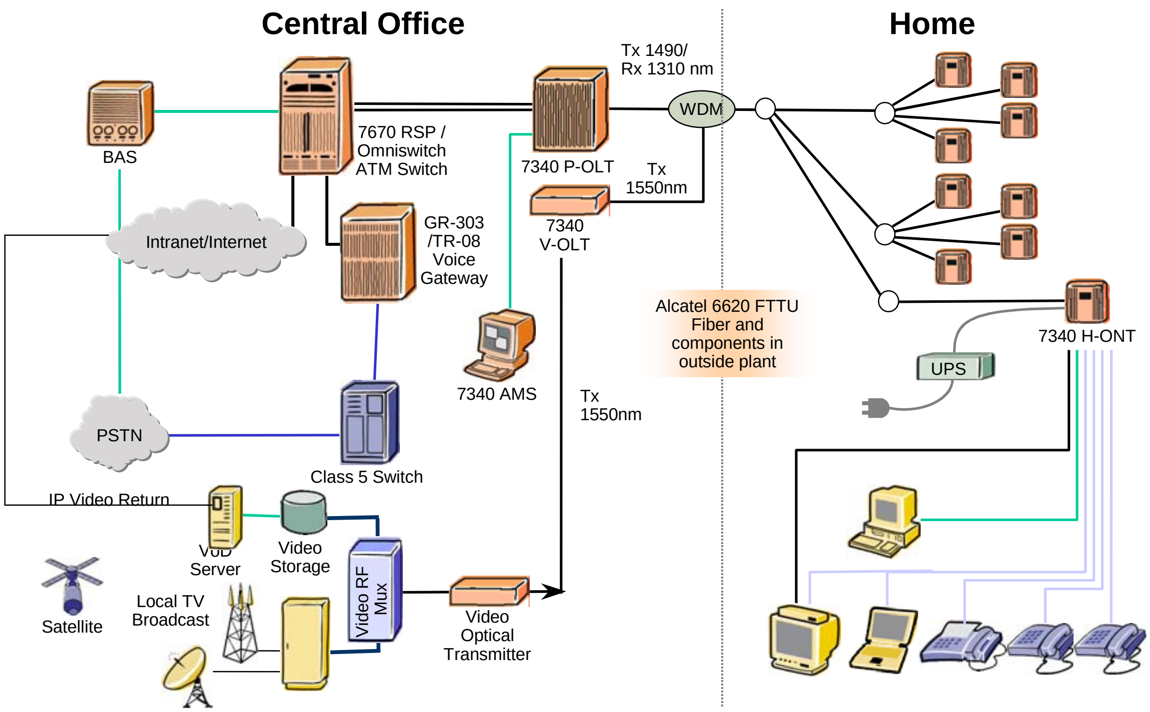
When fiber is used in a passive point-to-multipoint (PON) fashion, the ability to eliminate outside plant network electronics is realized, and the need for excessive signal processing and coding is eliminated. The PON, when deployed in an FTTH/B architecture, eliminates outside plant components and relies instead on the system endpoints for active electronics. These endpoints are comprised of the CO–based optical line terminal (OLT) on one end and, on the other, the optical network termination (ONT) at the subscriber premises. Fiber-optic networks are simple, more reliable, and less costly to maintain than copper-based systems. As these components are ordered in volume for potentially millions of fiber-based access lines, the costs of deploying technologies such as FTTH, FTTB/C, and FTT/Cab become economically viable.

One optical-fiber strand appears to have virtually limitless capacity. Transmission speeds in the terabit-per-second range have been demonstrated. The speeds are limited by the endpoint electronics, not by the fiber itself. For the ATM–PON system today, speeds of 155 Mbps symmetrical and 622 Mbps/155 Mbps asymmetrical are currently being developed. As the fiber itself is not the constraining factor, the future possibilities are endless. Furthermore, because fiber-optic technology is not influenced by electrical interferers such as cross-talk between copper pairs or AM band radio, it ensures high-quality telecommunications services in the present and future. In addition, fiber does not exhibit radio frequency (RF) emissions that can interfere with other electronics and is regulated by the Federal Communications Commission (FCC).

While copper-based transport technologies remain ubiquitous, the long-term industry belief holds that it is inevitable that fiber will replace copper throughout the access infrastructure. Because copper infrastructure is embedded in communications systems, this transformation to optical transport is expected to occur over many years. Over time, new builds ("Greenfield") will be all fiber based, and existing builds will be rehabilitated by replacing copper with fiber or by overlaying new fiber on the existing copper infrastructure. Electronic equipment, as well, must be replaced with optical equipment.

3.1.3.1 How ATM PONs Work

Recent technological advances and economies of scale have drawn increasing interest to optical-distribution networks with ATM PON. A functional overview of ATM–PON architecture is presented in *Figure 2*.



The ONT placed at the customer premises, which suggests FTTH/B architecture. The carrier's demarcation point would be the subscriber side of the ONT, typically in the form of a T1, Ethernet, integrated services digital network (ISDN), plain old telephone service (POTS), etc. For FTTCab and FTTC architecture, an optical network unit (ONU), rather than an optical network termination (ONT), is used. It is placed in the outside plant and must be temperature-hardened and properly enclosed. The final drop to the network termination (NT) at the customer premises may be copper or fiber. The carrier demarcation point is the subscriber side of the NT in the form of a T1, Ethernet, ISDN, POTS, etc.

Access to bandwidth on the PON may be obtained by several methods, including time division multiple access (TDMA), wave division multiple access (WDMA), code division multiple access (CDMA), and subcarrier multiple access (SCMA). TDMA in the upstream and TDM in the downstream were chosen by the Full- Service Access Network (FSAN) group and submitted to the International Telecommunications Union (ITU) for standardization, based on their simplicity and cost-effectiveness.

The network components supporting ATM PON consist of OLT, ONT, and a passive optical splitter. One fiber is passively split up to 64 times between multiple ONTs that share the capacity of one fiber. Passive splitting requires special actions for privacy and security, and a TDMA protocol is necessary in the upstream direction. The use of the optical splitter in the PON architecture allows users to share bandwidth, thus dividing the attendant costs. Costs are further reduced by a decrease in the number of opto-electronic devices needed at the OLT; one interface may be shared among many ONTs.

The ATM–PON system uses a double-star architecture. The first star is at the OLT, where the wide-area network interface to services is logically split and switched to the ATM–PON interface. The second star occurs at the splitter where information is passively split and delivered to each ONT. The OLT is typically located in the carrier's CO. The OLT is the interface point between the access system and service points within the carrier's network. When data content from the network reaches the OLT, it is actively switched to the passive splitter using TDM in the downstream. The OLT behaves like an ATM edge switch with ATM– PON interfaces on the subscriber side and ATM–synchronous optical network (SONET) interfaces on the network side.

The ONT will filter the incoming cells and recover only those that are addressed to it. Each ATM cell has a 28-bit addressing field associated with it called a virtual path identifier/virtual channel identifier (VPI/VCI). The OLT will first send a message to the ONT to provision it to accept cells with certain VPI/VCI values. The recovered ATM cells are then used to create the service interface required at the subscriber side of the ONT.

Because TDMA is used in the upstream direction, each ONT is synchronized in time with every other ONT. The process by which this happens is called ranging the ONTs. The OLT must determine how far away in distance each ONT is so they can be assigned an optimal time slot in which to transmit without interfering with other ONTs. The OLT will then send grant messages via the physical layer operation, administration, and maintenance (PLOAM) cells to provision the TDMA slots that are assigned to that ONT. The ONT will then adapt the service interface to ATM and send it to the PON using the TDMA protocol. Ethernet and T1s are two examples of what can be transported over the ATM– PON. As ATM–PON is service-independent, all legacy services and future services can be readily transported.

In the upstream direction, the capacity is reduced to 149.19 Mbps because there are three overhead bytes per ATM cell. In addition to the three overhead bytes per cell there are PLOAM cells in the upstream direction, the rate of which is defined by the OLT for each ONT, depending on the required functionality. The minimum PLOAM rate in the upstream direction is one PLOAM every 100 ms. This equates to approximately one PLOAM every 655 frames, which is negligible. Although the maximum PLOAM rate is undefined, it is also expected to be negligible. The three overhead bytes contain a minimum of four bits of guard time to provide enough distance in time to prevent collisions with cells from other ONTs. This field length is actually programmable by the OLT. The preamble field is used to acquire bit synchronization and amplitude recovery. The Delimiter field is used to indicate the start of an incoming cell.

Given that a single fiber is used for both the upstream and downstream paths, two wavelengths of light are used—1550 nm for the downstream and 1310 nm for the upstream. Although one wavelength can also be used, two provide better optical isolation between the laser transmitters and receivers and eliminate the need for expensive beam-splitting devices. Instead, low-cost planar light circuits (PLCs) can be used, which enable low-cost manufacturing techniques to be employed, somewhat similar to the production of silicon chips. ATM cells are directly converted to light and sent to the PON. Because of the broadcast nature of the PON, encryption techniques are employed to prevent security breaches. In the upstream direction, the ONT uses the TDMA protocol and again directly converts ATM cells to light for transport over the PON.

A typical ATM–PON system can furnish up to 64 customer locations on a single, shared strand of fiber running at 155 Mbps. Most, however, will likely utilize 32 locations in the distribution and drop portion of the network in the near term. In the future, the ATM–PON specification does allow for up to 64 locations to be served.

3.1.4 PON vs. Gigabit Ethernet

ATM is today the most prevalent and popular flavor of PON. Therefore, we compare the pros and cons of ATM-PON to that of Gigabit Ethernet.

When ATM (Asynchronous Transfer Mode) was introduced, it offered 155 Mbps bandwidth, which was 1.5 times faster than Fast Ethernet. ATM was ideal for new applications demanding a lot of bandwidth, especially multimedia. Demand for ATM continues to grow for LANs as well as WANs.

On the one hand, proponents of ATM try to emulate Ethernet networks via LANE (LAN Emulation) and IPOA (IP over ATM). On the other, proponents of Ethernet/IP try to provide ATM functionality with RSVP (Resource Reservation Protocol) and RTSP (Real-time Streaming Transport Protocol). Evidently, both technologies have their desirable features, and advantages over the other. It appears that these seemingly divergent technologies are actually converging.

ATM was touted to be the seamless and scaleable networking solution - to be used in LANs, backbones and WANs alike. However, that did not happen. Ethernet, which was for a long time restricted to LANs alone, evolved into a scalable technology.

As Gigabit Ethernet products enter the market, both sides are gearing up for the battle. Currently, most installed workstations and personal computers do not have the capacity to use these high bandwidth networks. Therefore, the imminent battle is for the backbones, the network connections between switches and servers in a large network.

Gigabit Ethernet seems to be ready to succeed. It is backed by the industry in the form of the Gigabit Ethernet Alliance. The standardization is currently on schedule. Pre-standard products with claims of inter-operability with standardized products have already hit the market. Many Fast Ethernet pre-standard products were inter-operable with the standard. Therefore, it is expected that most pre-standard Gigabit Ethernet products will also be compatible with the standard. This is possible because many of the companies that have come out with products are also actively participating in the standardization process.

ATM-PON still has some advantages over Gigabit Ethernet:

1. ATM-PON is already there. It has a head start over Gigabit Ethernet. Current products may not support gigabit speeds, but faster versions are in the pipeline.

2. ATM is better suited than Ethernet for applications such as video, because ATM has QOS (Quality of Service) and different services available such as CBR (constant bit rate) that are better for such applications. Though the IETF (Internet Engineering Task Force, the standards body for Internet protocols) is working on RSVP, which aims to provide QOS on Ethernet, RSVP has its limitations. It is a "best effort" protocol, that is, the network may acknowledge a QOS request but not deliver it. In ATM, it is possible to guarantee QOS parameters such as maximum delay in delivery.

3. With PON in general, the components in the field are all passive (splitters, cabinets, etc.) and do not require power systems. As a result, the ongoing maintentance and operations costs of the field elements are expected to be lower than those corresponding costs for GigE.

4. ATM-PON is a mature technology compared to GigE, and is offered by well-established vendors. In comparison, GigE is typically provided by smaller private companies, which, especially in tough economic climates, face funding and long-term viability risk.

Gigabit Ethernet has its own strengths:

1. The greatest strength is that it is Ethernet. Upgrading to faster Ethernet is expected to be painless. All applications that work on Ethernet will work on Gigabit Ethernet. This is not the case with ATM. Running current applications on ATM requires some amount of translation between the application and the ATM layer, which means more overhead.

2. Currently, the fastest ATM products available run at 622 Mbps. At 1,000 Mbps, Gigabit Ethernet is almost twice as fast. GigE offers full-duplex operation at such higher speeds, and is not a shared resource like PON. So there are no capacity bottlenecks.

3. GigE supports multiple topologies without geographic or distance restrictions, making subscriber addition much simpler than PON, making capital investment coincide with revenue generation. With PON, typically all splitters will have to be deployed prior to subscribers joining, and may need some fiber re-runs in the event that new subscribers need to be added beyond the capacity of existing splitters.

4. GigE also supports multiple service providers on a single network more seamlessly than PON. PON is optimized for a sole provider business model, requiring additional lambdas (wavelengths) to support multiple service providers.

5. With IP Video services, GigE uses bandwidth capacity much more efficiently than PON by delivering channels only once to the curbside aggregation points and then replicating to multiple users. In contrast, PON does not use bandwidth very efficiently with IP video because it uses broadcast from the head-end, delivering all channels to every subscriber.

Merton does not make any specific recommendation to the town regarding the choice of one technology or the other. Instead, we suggest that the town make such a determination from an issue of a Request for Proposal (RFP), which will clearly indicate the credibility and capabilities of the various vendors, as well as the long-term viability of the vendors themselves.

3.1.5 Economics of PON versus GigE

This section uses the Westwood MBN analysis to illustrate the elements and cost comparisons of PON and Gigabit Ethernet technologies. Please note that this section presents a simplified set of numbers relative to the detailed budgetary financial analysis performed by Merton of MBN for Westwood as part of this Feasibility Study and presented later in this document.

Westwood has 5,130 households (HH) and approximately 100 total miles of streets. The network design area encompasses all 100 miles of streets. This works out to 51 HH per mile of street, a density level that is neither on the high side nor on the low. The network cost comparison between PON and GigE is performed at two different subscriber penetration levels (or acceptance rates) of 30% and 60%.

Scenario 1		**Scenario 2**	
% Penetration	*Number HH*	*% Penetration*	*Number HH*
30%	1,539	60%	3,078

THE MODEL PRESENTED HERE ASSUMES THAT ONLY INTERNET DATA SERVICES WILL BE PROVIDED OVER THE MBN; NO VIDEO OR TELEPHONY SERVICES ARE CONSIDERED FOR THE SAKE OF SIMPLICITY.

The assumed architecture for both networks includes a 2-fiber strand drop to subscribers and 36 strands of fibers in the backbone/feeder segments of the networks. The PON architecture has a maximum of 32 subscribers from each splitter while the GigE design has a maximum of 24 subscribers from each aggregator or remote box. In addition, it is assumed that 95% of the fiber installation will be aerial (on telephone poles or such) and 5% will be trenched (underground). No pole make-ready costs are considered for the sake of simplicity. An average drop length to the subscriber of 200 feet is used.

3.1.5.1 Network Cost Elements

The following table lays out the cost elements for PON and GigE architectures. The network is broken down into headend, field and subscriber elements.

	Headend Elements	*Field Elements*	*Subscriber Elements*
PON	• PON Cards/Optical Line Terminals (OLT) • ATM Switch • OC-3/OC-12 cards • Racks	• Splitters • Splitter cabinets • Taps & Splices	• Optical Network Terminal (ONT) or CPE • Management Software
GigE	• Access Distributor (Layer 3 Switch) • Hub Routers	• Access Concentrators and Remotes (Layer 2 Switch) • Enclosures	• Subscriber Gateway or CPE

	• Racks	• Power Systems	
Fiber Components	-	• Backbone / Feeder Cable	• Drop Cable
Services	• Headend Installation	• Outside Plant Services • Outside Plant Engineering	• CPE Deployment

The following have been used for unit costs of the various network elements presented above. These prices are based on retail quotes of vendors that Merton has been in discussions with and do not reflect any discounts that might be typically available.

Network Element	*PON*	*GigE*
Aerial Engineering and Construction per Foot	$3.00	$3.00
Trenching Engineering and Construction per Foot	$8.00	$8.00
Fiber/Cable Material Cost per Foot – 2 strands	$0.10	$0.10
Fiber/Cable Material Cost per Foot – 36 strands	$0.70	$0.70
CPE Deployment per Subscriber (Labor)	$300	$300
Subscriber Gateway / CPE	$1,100	$1,100
PON Tap/Splice	$475	-
PON Splitter + Splitter Cabinet	$8,400	-
PON Headend (OLT + Switch + OC-3 Cards + Rack)	$200,000	-
GigE Concentrator / Remote + Cabinet + Power System	-	$7,700
GigE Access Distributor Port	-	$11,000
GigE Headend (Access Concentrator + Rack + Misc.)	-	$190,000
Headend Installation	$40,000	$40,000

3.1.5.2 Network Cost Analysis

Merton developed a detailed network design for the town, using street maps and locations of headend, poles, sites, etc. This design is presented in the Section 3.2. The analysis in this section is based on this design.

To generate a fair comparison of PON and GigE architectures, a very similar physical fiber design was used to generate costs for electronics for the two technologies. In addition, it was assumed in both cases that incremental passive or active components in the field, as well as subscriber terminals (CPEs), would be added as subscribers signed up for services over the MBN. In other words, there would be a fixed cost component and a variable cost component for both architectures.

The summary results of the comparison of PON and GigE are shown below for the two scenarios of subscriber penetration levels discussed earlier.

	Scenario 1 (30% Penetration)		**Scenario 2 (60% Penetration)**	
	PON	*GigE*	*PON*	*GigE*
Number Active Users	1,539	1,539	3,078	3,078
Fiber Backbone Engineering & Construction & Material	$2,085,600	$2,085,600	$2,085,600	$2,085,600
User Drop Cable + CPE Deployment	$492,480	$492,480	$984,960	$984,960
Total Fiber Installation Costs	$2,578,080	$2,578,080	$3,070,560	$3,070,560
Fiber Install Cost per Active User	$1,675	$1,675	$998	$998
Subscriber Gateways (CPEs)	$1,692,900	$1,692,900	$3,385,800	$3,301,155
Taps & Splices	$104,500		$209,000	
Splitters & Splitter Cabinets	$131,600		$254,800	
Access Concentrators & Remotes		$539,000		$1,046,892
Access Distributor Ports		$55,000		$97,680
Headend Electronics	$202,281	$190,000	$362,563	$190,000

Headend Installation	$40,000	$40,000	$40,000	$40,000
Total Electronics Costs	$2,171,281	$2,516,900	$4,252,163	$4,675,727
Electronics Cost per Active User	$1,411	$1,635	$1,381	$1,519
Total MBN Cost	$4,749,361	$5,094,980	$7,322,723	$7,746,287
Total MBN Cost per Active User	$3,086	$3,311	$2,379	$2,517

It is evident from the results that the fiber installation costs are not different between PON and GigE; in reality, there could be slight differences, but not material enough to note. The cost of GigE electronics is a bit higher on a per active user basis than that for PON; about 10%-15% higher.

However, it is important to note two facts: (i) GigE products are developing and emerging, and such costs are likely to drop more rapidly than PON products, a technology that is relatively more mature; (ii) GigE is today typically offered by smaller private companies that are likely to provide more significant discounts on their retail pricing than would the more established PON dealers.

It is also important to note that the fiber installation cost scales dramatically with number of active users because of the predominantly fixed nature of installation costs; about 80% of fiber install costs are backbone related and fixed, regardless of whether PON or GigE is used. On the electronics side, the costs are predominantly variable, resulting in less dramatic scaling with number of active users. About 90% of electronics is variable with number of active users for PON, with such ratio being slightly higher for GigE. This is important from the point of view of matching capital expenses with revenues from active users; both architectures are very attractive in this regard.

3.2 Westwood Plant Overview

The following section details the proposed Westwood town layout.

The network is composed of four levels of fiber build:

F1 Backbone Facilities: The F1 facilities are the backbone network facilities that provide for the major distribution elements of the network in the town. These extend from the headend to the local distribution points. The F1 facilities terminate on a Field Unit as described above for either a PON or a Gigabit Ethernet network design. The F1 facilities are the master backbone elements.

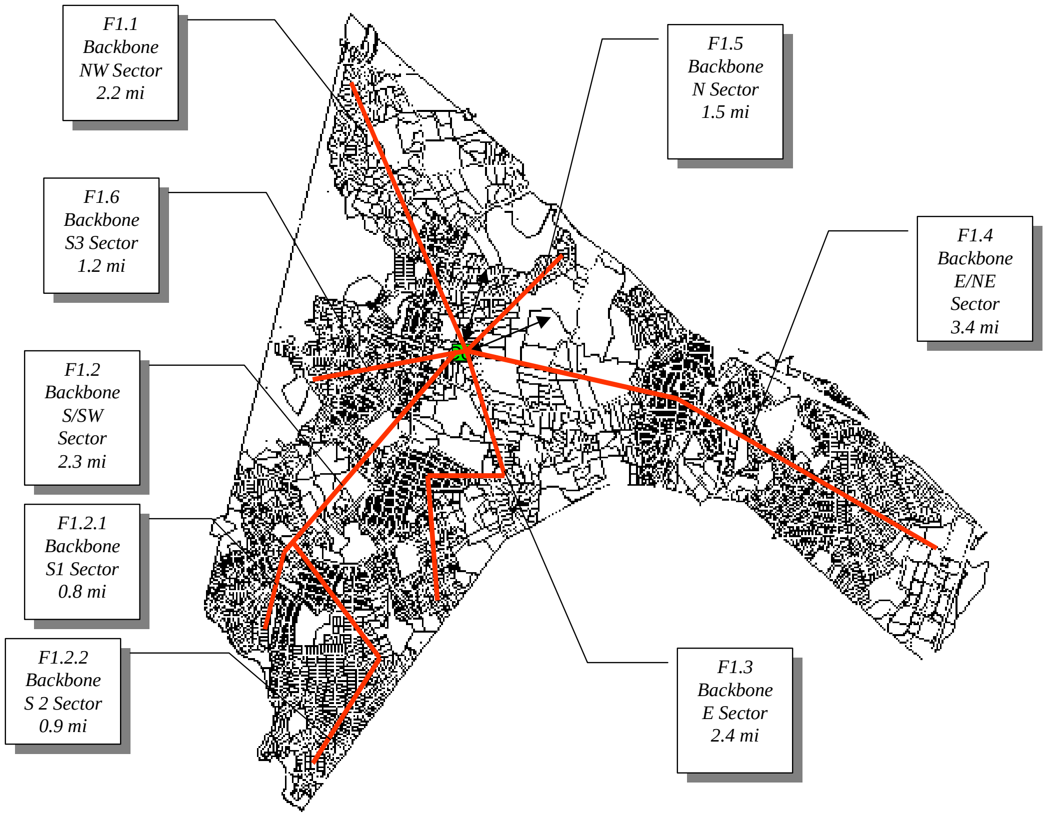
F2 Feeder Facilities: The F2 facilities are the neighborhood facilities for expansion on a neighborhood-by-neighborhood basis. They are generally 16 to 32 such facilities from each Field Unit to local field distribution units.

F3 Local Facilities: F3 facilities are block-by-block distribution. In some cases, they may be identical to the actual facilities in the F2 layer. Generally, for larger neighborhoods they are separate facilities.

F4 Drop Facilities: The F4 are the drop facilities from the street to the residence.

3.2.1 Street Map

The following is the map of Westwood demonstrating the F1 backbone network. There are 13.9 mi of F1 facilities in this proposed layout.



The design shown in summary above has a detailed build plan with an additional 100 miles of combined F2 and F3 facilities. The F4 facilities have been estimated at 200 ft per HH installed.

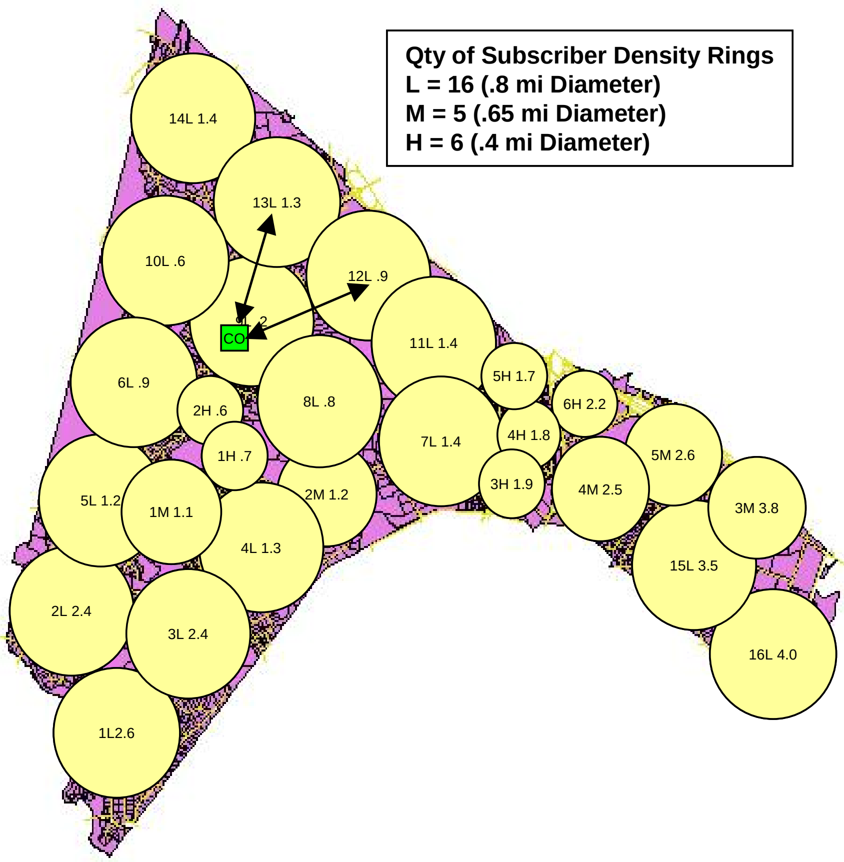
3.2.2 Key Factors

The following Table depicts the key factors on the fiber build out.

Element	*Measure*
Number Miles Street (mi)	105
Number of HH	5,130
Number Miles Backbone (mi)	14
Number Miles Feeder (mi)	100
Average Length Drop (ft)	200
Number Drops per HH	1
Percent Aerial	95%
Percent Buried/Trenched	5%
“Make Ready” Cost per mi	$21,000
Trenching Cost per Mile	$15,840
Aerial Cost per Mile	$42,240

3.2.3 Network Layout

The following figure shows a high-level network layout for MBN in Westwood. The town area has been divided into 27 serving areas, each such area serving 190 subscribers. Smaller circles have higher density and larger circles have lower density. In the case of PON, a splitter cabinet is located in the center of each circle, and in GigE, an access concentrator or remote box.



4. FINANCIAL ANALYSIS

4.1 Market & Service Assumptions

The primary market base for MBN services constitutes all residential users in the Town of Westwood. There are approximately 5,130 parcels in the town.

The three services potentially offered by service providers over the MBN are:

1. *Broadband Internet access:* the network could provide data speeds ranging between 10 Mbps to 100 Mbps, and in some instances, in excess of 100 Mbps, on an as per needed basis.
2. *Video Services:* the network may be able to provide the user with access to analog and digitized video services. This may also enable the provisioning of interactive video services. This would also support High Definition TV (HDTV).
3. *Telephony (Voice):* The system may provide fully switched toll grade quality voice service. The voice quality may be telephone toll grade or better and there may be no delays in speech that are perceptible to the user.

THE MARKET RESEARCH STUDY FOR WESTWOOD INDICATES THAT 41% OF CURRENT RESIDENTS ARE LIKELY TO SWITCH TO BROADBAND INTERNET ACCESS IF IT IS OFFERED AT $50 PER MONTH. THE RESULTS ALSO INDICATE THAT 38% OF CURRENT RESIDENTS WILL BUY VIDEO SERVICES IF IT IS AVAILABLE AT $50 PER MONTH.

The financial model presented here makes the following assumptions:

1. The MBN is used to provide only broadband Internet access and minimal video services to the citizens of Westwood.
2. The MBN is used to provide services to only residential customers in Westwood, not the commercial or business customers.

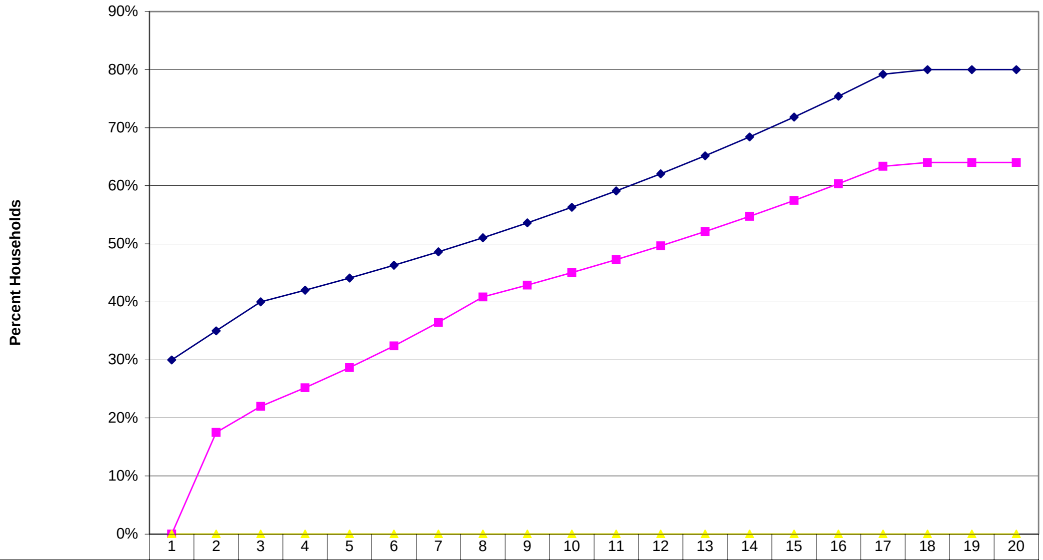
Both assumptions above are conservative. With the first assumption, we ignore potentially significant revenues from other sources including telephony services, sale of dark fiber[2] to local businesses and CLECs, etc. With the second assumption, we ignore potentially significant revenues from the entire business community in Westwood from the use of the MBN. We have made these assumptions to provide a conservative analysis and maintain simplicity of the model.

The model also assumes that by end of the first full year of operations, 30% of Westwood residents would have converted to the MBN for broadband Internet access; this is an average penetration for the first year of 15%. This acceptance rate is slowly increased to about 45% by the end of year 5 and 55% by end of year 10. This is quite conservative given the acceptance rate for broadband estimated from the market research.

For video services, the financial model assumes that video services will be offered starting the second year of operations. The video acceptance rate assumed is 18% by the end of that year, increasing to 30% by the end of year 5 and to 45% by end of year 10. Again, these acceptance rates used are conservative in comparison to results indicated by the market research study.

The chart below captures the acceptance rate used in the financial model.

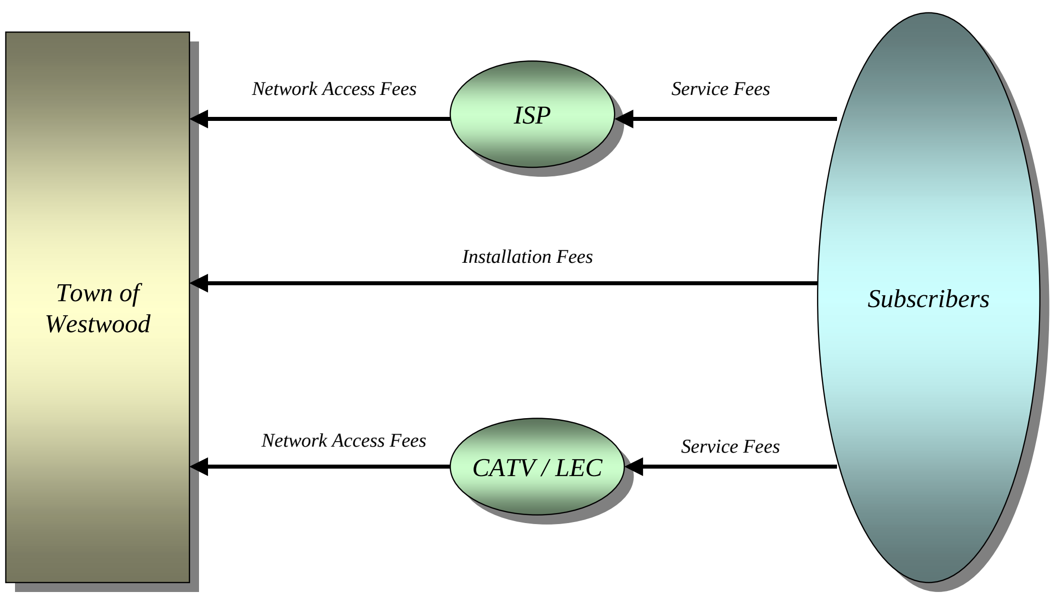
[2] Dark fiber is fiber strands in a network that are not used to carry traffic. A typical fiber backbone network will have many such fiber strands that are "empty"; for example, out of say 48 fiber strands installed, only 6 might be used to carry traffic and reserved for redundancy. The remaining could potentially be sold by the town on long-term contracts to businesses or ISPs/CLECs interested in gaining ownership of last-mile fiber in the town.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
EOY % Broadband Internet	30%	35%	40%	42%	44%	46%	49%	51%	54%	56%	59%	62%	65%	68%	72%	75%	79%	80%	80%	80%
EOY % Video	0%	18%	22%	25%	29%	32%	36%	41%	43%	45%	47%	50%	52%	55%	57%	60%	63%	64%	64%	64%
EOY % Telephony	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%

4.2 Revenue Model and Pricing Assumptions

According to the MBN business idea discussed with Westwood, the MBN is a fully open-access network to which any and all service providers can interconnect to deliver services to the citizens of the town. Such service providers could be ISPs like AoL and MSN, cable TV providers like Aol Time Warner and DirectTV, or local exchange carriers. Such service providers will use the MBN as a broadband pipe to deliver their services to end-users. The town will receive a monthly fee from each one of these service providers for access or rental use of the MBN. In other words, the end-user (subscriber) pays the service provider for the service he/she receives, and the service provider pays the town, network access fees. In addition, the town could charge the subscriber an installation fee for providing connectivity to the MBN; this will be a one-time fee paid by the subscriber when service is turned on. The following chart captures the revenue flow relationship between the subscriber, the service provider and the town:



The model essentially considers three sources of revenues to the town:

1. *Installation Fee:* a one-time fee of $100 per subscriber for installing MBN connectivity. This fee is like the residential installation charge for say DSL or satellite.
2. *Network Access Fee (for broadband Internet access):* a recurring fee of $25 per subscriber per month that an ISP will pay the town. In other words, the ISP will charge the subscriber say $50 for 10 Mbps Internet access, email, etc, and out of that $50, will pay the town $25 as network access fee. This fee is likely to go up gradually because the larger ISPs are likely to offer increasingly value added content in their service package at higher prices if subscribers are willing to buy; the town can then get its share of such enhanced services in higher access fees.
3. *Network Access Fee (for video services):* a recurring fee of $10 per subscriber per month that a cable TV or dish TV provider will pay the town for access to the MBN. Such services could be either analog video or digital video. The CATV/Dish provider will perhaps sell such services to the subscriber in the $25-$50 range. Hence, the video service fee to the town assumed in the model is very conservative, and in reality, could be much higher depending on the retail pricing of video services provided.

Please note that the financial model presented here assumes network access revenues from only one ISP and only one cable TV provider. In reality, there will likely be multiple ISPs, CATV/dish providers and even CLECs paying the town for access to the MBN.

The key assumption factors are presented below for the first 10 years of MBN operation. Please note that the business users (large businesses and Small & Medium Enterprises (SME)) are not considered revenue-generating customers for the purpose of this model.

Year	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
EOY Large Business Users	-	-	-	-	-	-	-	-	-	-
EOY SME Users	-	-	-	-	-	-	-	-	-	-
EOY Households	1,539	1,796	2,052	2,155	2,262	2,375	2,494	2,619	2,750	2,887
Total EOY Users	1,539	1,796	2,052	2,155	2,262	2,375	2,494	2,619	2,750	2,887
Total EOY Users Penetration %	30%	35%	40%	42%	44%	46%	49%	51%	54%	56%
Total Avg Number End-Users	770	1,667	1,924	2,103	2,208	2,319	2,435	2,557	2,684	2,819
Avg Penetration End-Users	15%	33%	38%	41%	43%	45%	47%	50%	52%	55%
Broadband Internet Access										
EOY Penetration Large Businesses	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
EOY Penetration SMEs	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
EOY Penetration Households	30%	35%	40%	42%	44%	46%	49%	51%	54%	56%
EOY % Broadband Internet	30%	35%	40%	42%	44%	46%	49%	51%	54%	56%
Installation Charge Large Businesses	$500	$500	$500	$500	$500	$500	$500	$500	$500	$500
Installation Charge SMEs	$250	$250	$250	$250	$250	$250	$250	$250	$250	$250
Installation Charge Households	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100
Avg Fee/ Month/ User Large Businesses	$60	$60	$60	$60	$60	$60	$60	$60	$60	$60
Avg Fee/ Month/ User SMEs	$40	$40	$40	$40	$40	$40	$40	$40	$40	$40
Avg Fee/ Month/ Households	$25	$27	$28	$30	$32	$33	$35	$38	$40	$42

Year	1	2	3	4	5	6	7	8	9	10
Video										
EOY Penetration Large Businesses	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
EOY Penetration SMEs	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
EOY Penetration Households	0%	18%	22%	25%	29%	32%	36%	41%	43%	45%
EOY % Video	0%	18%	22%	25%	29%	32%	36%	41%	43%	45%
Avg Fee/ Month/ User Large Businesses	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10
Avg Fee/ Month/ User SMEs	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10
Avg Fee/ Month/ Households	$10	$10	$10	$10	$10	$10	$10	$10	$10	$10

4.3 Network Deployment Assumptions

As presented in prior sections, Merton has developed a detailed network design for Westwood as part of this feasibility study. This includes the identification of head-end location, layout of the network and topology, identification of pole make-ready issues, requirements of trenching versus aerial construction, location of field electronics, and other engineering and design issues.

FOR THE SAKE OF THIS FINANCIAL ANALYSIS, THE MBN IS SEPARATED INTO TWO PHYSICAL COMPONENTS:

1. The backbone network and associated electronics, including head-end installations
2. Fiber drops, or fiber extensions to subscribers, along with associated subscriber electronics

The financial model makes the following assumptions:

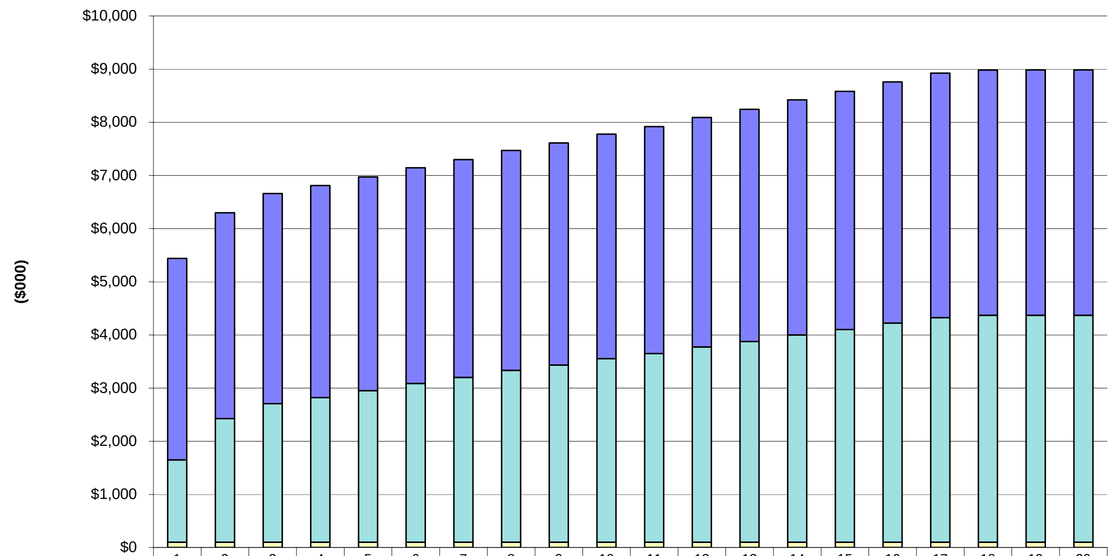
- The backbone network will be built out over all approximately 105 miles of streets in Westwood as part of the initial build; all 5,130 households in the town will be passed by the network day one
- As subscribers sign up, fiber drops will be installed, along with subscriber electronic units
- It is estimated that there will be approximately 5% trenching required for installation of the fiber, with 95% of the installation being aerial.
- Merton estimates that approximately 50% of poles in the town have make-ready issues; hence, such make-ready costs have to be taken into consideration
- The backbone network and feeders will have 36 strands of fiber; each subscriber location will get 2-strand fiber drops
- Electronics costs decline slowly over a period of time, reflecting historical trends in technology pricing
- A discount off the retail price will be available from both PON and GigE vendors
- The financial analysis models both PON and Gigabit Ethernet; the upfront costs are not significantly different between the two technologies

4.4 Capital Expenditures

The capital expenses for building MBN were analyzed for both PON and GigE architectures. This section presents the results for PON. Based on the above network architecture and assumed acceptance rates of the MBN, the total capital expenses for the MBN, including all network components, are as follows:

- Initial capital of about $6 million in the first two years, which enables approximately 35% of Westwood households getting serviced for broadband Internet access and about 18% for video

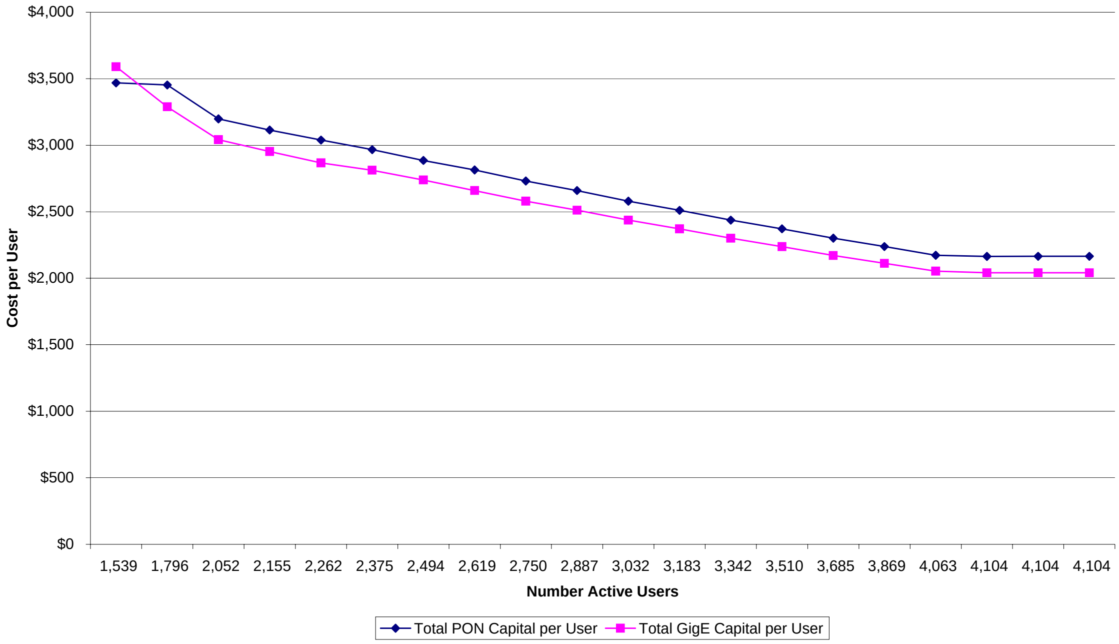
- Total capital expenses of approximately $9 million over 20 years, which would enable servicing of 80% of households for broadband Internet access and about 65% for video



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Fiber Installation Capital	$3,791	$3,873	$3,955	$3,988	$4,023	$4,059	$4,097	$4,137	$4,179	$4,223	$4,269	$4,317	$4,368	$4,422	$4,478	$4,537	$4,599	$4,612	$4,612	$4,612
Equipment Capital	$1,547	$2,325	$2,606	$2,721	$2,851	$2,987	$3,100	$3,233	$3,332	$3,454	$3,551	$3,673	$3,775	$3,900	$4,002	$4,122	$4,225	$4,269	$4,271	$4,271
Other Capital	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100	$100

The chart clearly shows that the fiber installation capital (backbone network installation) grows much more slowly than equipment capital. This is because the major component of ongoing capital expenses is the subscriber electronics, and those expenses are incurred only as new users are added to the network. The variable cost component of MBN that varies with number of active users increases from 35% of total costs in the first year to almost 50% eventually as new users are added.

The capital per active subscriber decreases rapidly over time as the number of users increase, and the initial buildout costs of the network is amortized over a larger and larger user base. As shown below, the capital per user is not significantly different between PON and Gigabit Ethernet technologies. PON introduces a higher cost element as a result of adding video capabilities to the network; without video, PON would be cheaper on an active user basis.



4.5 Financing (Bond) Assumptions

The assumption here is that Westwood will finance the MBN capital costs with the issue of a 20-year tax-exempt municipal bond. We have modeled such a financing at current interest rates for Westwood's credit rating (Aa1 from Moodys). The bond will be issued approximately 6-9 months before such construction period; only interest will be paid on the bonds during the construction period and during the first full year of operations; after this period, both principal and interest will be paid starting the second year of operations. Starting the second year, debt service will be level, i.e., the same amount of interest + principal will be paid on a periodic basis.

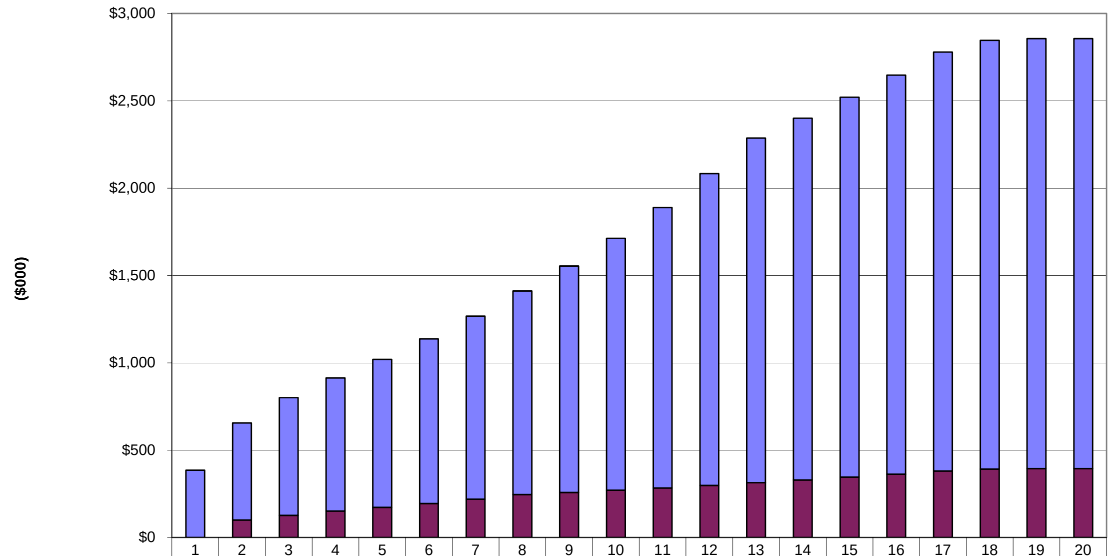
The MBN project for Westwood would require a bond issue of approximately $6.6 million. This is sufficient to finance all capital, operating expenses and bond debt service until such time that the MBN generates sufficient revenues to cover not just ongoing capital needs but also all operating expenses and bond debt service. According to our analysis, the MBN will generate sufficient revenues from Year 4 onwards to sustain all ongoing capital, operating and debt service expenses.

The bond schedule is shown below for the first ten years.

Year	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
Beginning Principal ($000)	*$6,610*	*$6,610*	*$6,374*	*$6,128*	*$5,871*	*$5,604*	*$5,325*	*$5,034*	*$4,731*	*$4,415*
Interest Rate (%)	*4.25%*	*4.25%*	*4.25%*	*4.25%*	*4.25%*	*4.25%*	*4.25%*	*4.25%*	*4.25%*	*4.25%*
Interest Payment ($000)	*$281*	*$281*	*$271*	*$260*	*$250*	*$238*	*$226*	*$214*	*$201*	*$188*
Principal Payment ($000)	*$0*	*$236*	*$246*	*$257*	*$268*	*$279*	*$291*	*$303*	*$316*	*$329*
Total Debt Service ($000)	*$281*	*$517*	*$517*	*$517*	*$517*	*$517*	*$517*	*$517*	*$517*	*$517*
Ending Principal ($000)	*$6,610*	*$6,374*	*$6,128*	*$5,871*	*$5,604*	*$5,325*	*$5,034*	*$4,731*	*$4,415*	*$4,085*

4.6 Revenues

As mentioned before, the financial model assumes that the town generates revenues from three kinds of fees; up-front installation fee, and ongoing network access fees for broadband Internet access and video. For the acceptance rates of subscribers used, the revenue of the town is as shown below:



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Network/Internet Access	$385	$556	$674	$762	$847	$942	$1,04	$1,16	$1,29	$1,44	$1,60	$1,78	$1,97	$2,07	$2,17	$2,28	$2,39	$2,45	$2,46	$2,46
Video	$0	$100	$127	$151	$172	$195	$219	$245	$258	$271	$284	$298	$313	$329	$345	$363	$381	$392	$394	$394
Telephony	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0

It is clear that the revenue opportunity to Westwood is significant, over $1 million in the second year, increasing to almost $3 million per year in 20 years. If other potential sources of revenue not modeled here are included, like business sector revenues, telephony revenues, and revenues from sale of dark fiber, these numbers could be substantially higher, by a factor of 100% or more.

4.7 Operating Expenses

The town will incur operations expenses in the following categories:

1. *Fiber Backbone Maintenance & Operations:* The fiber backbone will require monitoring and first level maintenance. The architecture of the fiber may be a ring based architecture and the failure modes will be this generally on the tail elements. The First Level Maintenance, FLM, on this element will require a 24X7 force, which can establish repairs in less than 2-6 hours. This can be achieved with a third party contract especially since there will be anticipated regional expansion, for example, through Merton's Network Operations Center (NOC).

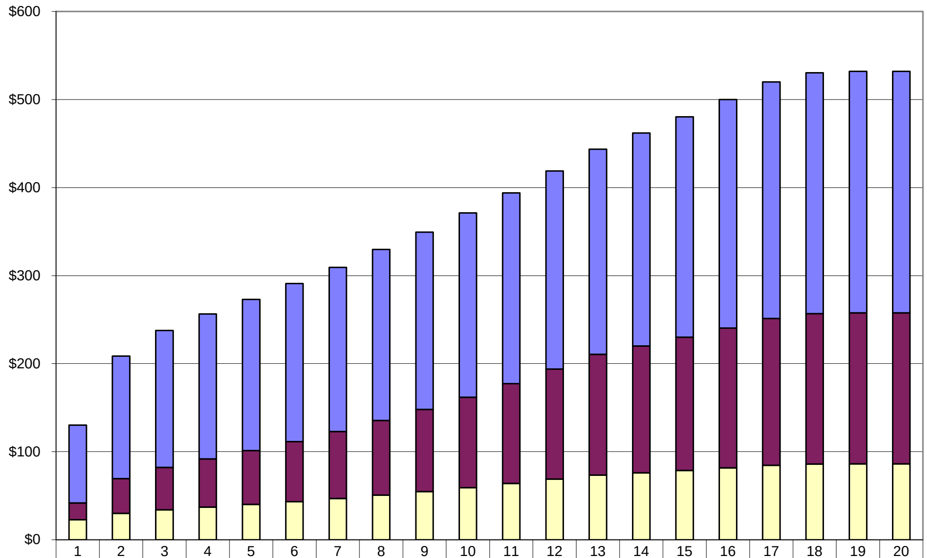
2. *Electronics Maintenance & Operations:* This is the monitoring and first level maintenance of the electronics. Generally, the vendor or some related third party supports this effort. The efforts are based upon a Service Level Agreement (SLA) with the vendor and the vendor may use a related third party like Merton. The costs are a small percent of the installed base annually.

3. *Sales Management and Development:* The most critical element is the sale management and development. For example, the establishment of an AoL agreement and the management of that relationship is a Merton function. The extension to msn, Earthlink and others is also a Merton function. The expansion to video and telephony and the contract negotiation is a Merton function.

4. *Billing & Administration:* The town will have some minimal expenses related to billing of service providers and related overhead and administration costs; these are functions that the town is fully equipped to handle, and could potentially be done using existing personnel.

Please note that the town will not have any Customer Service related expenses because that is the responsibility of the service provider (ISPs, etc.) who owns the customer. Merton's NOC will handle any network related customer issues; the service provider will handle everything else at their cost.

The anticipated operating expenses to the town are shown below for 20 years:



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Network Operations & Maintenance	$88	$139	$156	$165	$172	$179	$187	$194	$201	$209	$217	$225	$233	$242	$250	$260	$269	$274	$274	$274
Sales Commissions	$19	$39	$48	$55	$61	$68	$76	$85	$93	$103	$113	$125	$137	$144	$151	$159	$167	$171	$171	$171
Billing & Administration	$23	$30	$34	$37	$40	$43	$47	$51	$55	$59	$64	$69	$73	$76	$79	$82	$85	$86	$86	$86

Before depreciation and interest expenses, the operating margin of the town is expected to increase from approximately 65% in the early years to over 80% in the later years of operation.

4.8 Financial Pro Forma

The financial projections for the MBN project for the first 10 years is shown below; the pro forma also shows the bond interest expenses during the construction period:

Year	0H2	1	2	3	4	5	6	7	8	9	10
Total Revenue											
Internet Access		$384,750	$555,836	$674,108	$761,779	$847,214	$942,270	$1,048,034	$1,165,714	$1,296,654	$1,442,351
Video		$0	$100,035	$126,968	$151,438	$172,260	$194,787	$219,135	$245,431	$257,703	$270,588
Telephony		$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
Total Revenue		$384,750	$655,871	$801,075	$913,217	$1,019,474	$1,137,057	$1,267,169	$1,411,145	$1,554,357	$1,712,939
Operating Expenses											
Network Operations & Maintenance		$88,446	$139,148	$155,656	$164,663	$171,894	$179,467	$186,516	$194,377	$201,376	$209,299
Sales Commissions		$19,238	$39,352	$48,065	$54,793	$61,168	$68,223	$76,030	$84,669	$93,261	$102,776
Billing & Administration		$22,581	$30,036	$34,030	$37,113	$40,036	$43,269	$46,847	$50,806	$54,745	$59,106
Total Operating Expenses		$130,264	$208,537	$237,751	$256,569	$273,098	$290,959	$309,393	$329,852	$349,382	$371,181
Operating Profit		$254,486	$447,334	$563,325	$656,647	$746,376	$846,098	$957,776	$1,081,293	$1,204,974	$1,341,757
Operating Profit %		66%	68%	70%	72%	73%	74%	76%	77%	78%	78%
Depreciation Expense		$629,872	$666,090	$680,892	$697,351	$714,569	$729,639	$746,993	$761,033	$777,688	$791,958
Operating Income		($375,386)	($218,756)	($117,568)	($40,704)	$31,807	$116,458	$210,783	$320,260	$427,286	$549,800

Year	0H2	1	2	3	4	5	6	7	8	9	10
Operating Margin		-98%	-33%	-15%	-4%	3%	10%	17%	23%	27%	32%
Interest Expense	$140,463	$280,925	$280,925	$270,890	$260,428	$249,521	$238,151	$226,298	$213,941	$201,059	$187,630
Net Income	($140,463)	($656,311)	($499,681)	($388,457)	($301,132)	($217,714)	($121,693)	($15,515)	$106,319	$226,227	$362,170
Net Income Margin		-171%	-76%	-48%	-33%	-21%	-11%	-1%	8%	15%	21%

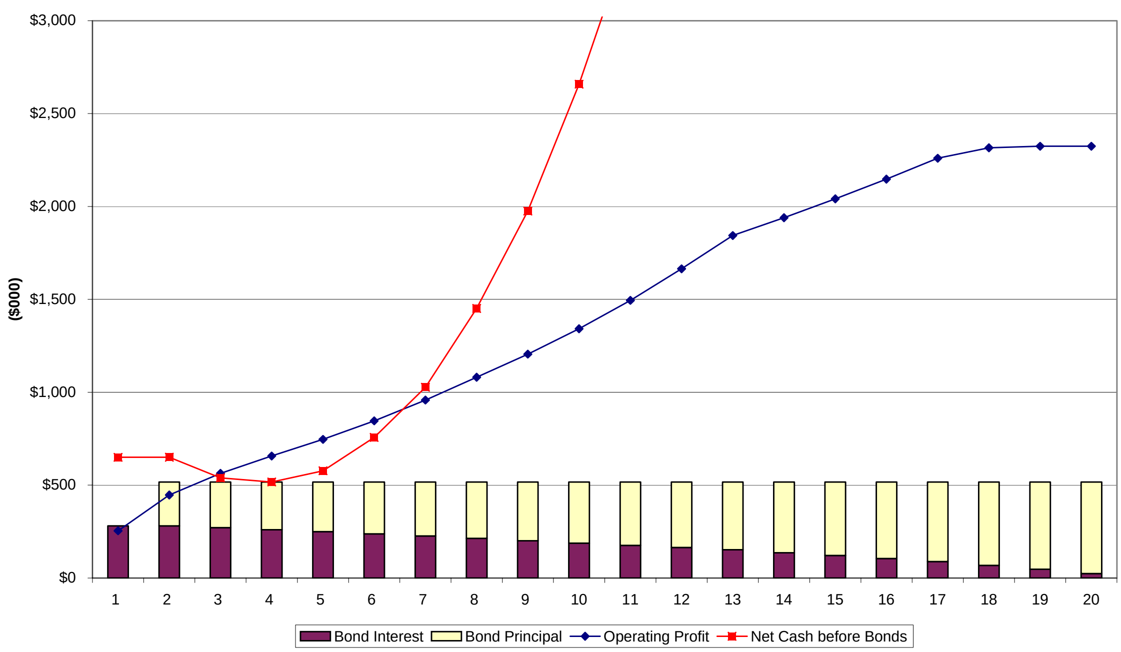
4.9 Bond Coverage

Based on the above analysis of revenues, operating expenses and financing, the anticipated bond coverage (sufficiency of operating profits or net cash to cover bond interest and principal payments) can be determined. The annual debt service payments on the bonds are about $500,000. Please note the following:

- Our financial model sizes the bonds such that the proceeds from the bonds are sufficient to meet all uses of cash (net of revenues) related to the MBN project, until such time that the project becomes cash flow positive (5th year of operations). In other words, the town would borrow enough upfront to always have enough cash on hand to meet all project expenses.

- The cumulative cash position is initially positive, and gradually decreases to a small amount by the 4th year of operations; the cash then starts to build up after the 4th year

- After the 4th year, the network becomes "self-funded" in the sense that the network generates enough revenues to cover all cash expenses, including operating costs, capital expenditures and debt service.



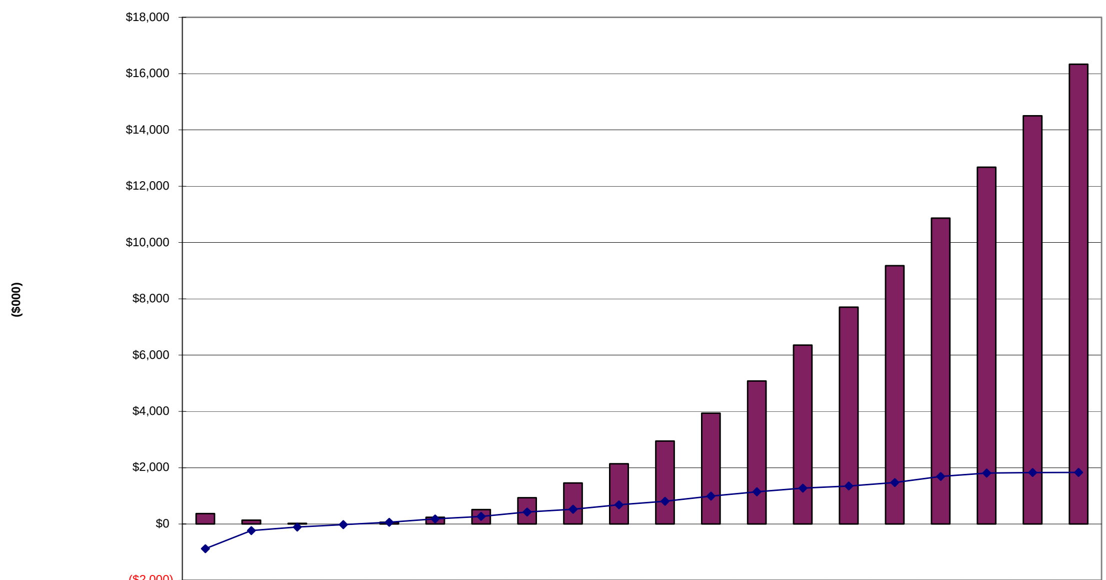
Starting the 3rd year of operations, operating profits (revenues less operating expenses) exceed bond debt service; by the 5th year, such coverage is 150%, by the 10th year, it is 250% and by the 20th year, it is 450%. In the first two years of operations, there is enough cash from the bonds to pay for debt service. After the 4th year of operations, the net cash available (after capital expenses) provides coverage of debt service. Such cash coverage of the bonds increases rapidly and dramatically to over 500% in the 10th year and over 3200% by the 20th year.

4.10 Cash Flow

The MBN project becomes free cash flow positive in the 5th year of operations. The cumulative cash position is always positive, as explained above. The cumulative cash from the project increases to over $2 million by the 10th year and over $16 million by the 20th year of operations. The table below shows the detail cash flow pro forma for the first 10 years.

Year	**0H2**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Cash Flow:											
Operating Income	$0	($375,386)	($218,756)	($117,568)	($40,704)	$31,807	$116,458	$210,783	$320,260	$427,286	$549,800
+ Depreciation	$0	$629,872	$666,090	$680,892	$697,351	$714,569	$729,639	$746,993	$761,033	$777,688	$791,958
+ Municipal Debt	$6,610,000	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Interest Pmt on Debt	$140,463	$280,925	$280,925	$270,890	$260,428	$249,521	$238,151	$226,298	$213,941	$201,059	$187,630
- Capital Expenditures	$5,437,989	$860,734	$362,177	$148,021	$164,593	$172,179	$150,700	$173,537	$140,397	$166,553	$142,697
- Principal Pmt on Debt	$0	$0	$236,125	$246,161	$256,622	$267,529	$278,899	$290,752	$303,109	$315,991	$329,421
- Financing/Misc. Fees	$237,777	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0
- Change in Working Capital	($453,166)	($9,103)	($196,569)	$9,500	($2,699)	($3,164)	($1,557)	($2,855)	($2)	($2,989)	($311)
Free Cash Flow	$1,246,937	($878,070)	($235,324)	($111,246)	($22,296)	$60,311	$179,904	$270,044	$423,848	$524,360	$682,321
Cumulative Cash Flow	$1,246,937	$368,867	$133,543	$22,296	($0)	$60,311	$240,215	$510,259	$934,107	$1,458,467	$2,140,788

The chart below shows summary cash from the project over 20 years.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cumulative Free Cash Flow	$369	$134	$22	$0	$60	$240	$510	$934	$1,458	$2,141	$2,947	$3,937	$5,082	$6,353	$7,704	$9,175	$10,863	$12,673	$14,501	$16,331
Free Cash Flow	($878)	($235)	($111)	($22)	$60	$180	$270	$424	$524	$682	$807	$990	$1,145	$1,271	$1,351	$1,471	$1,688	$1,810	$1,828	$1,830

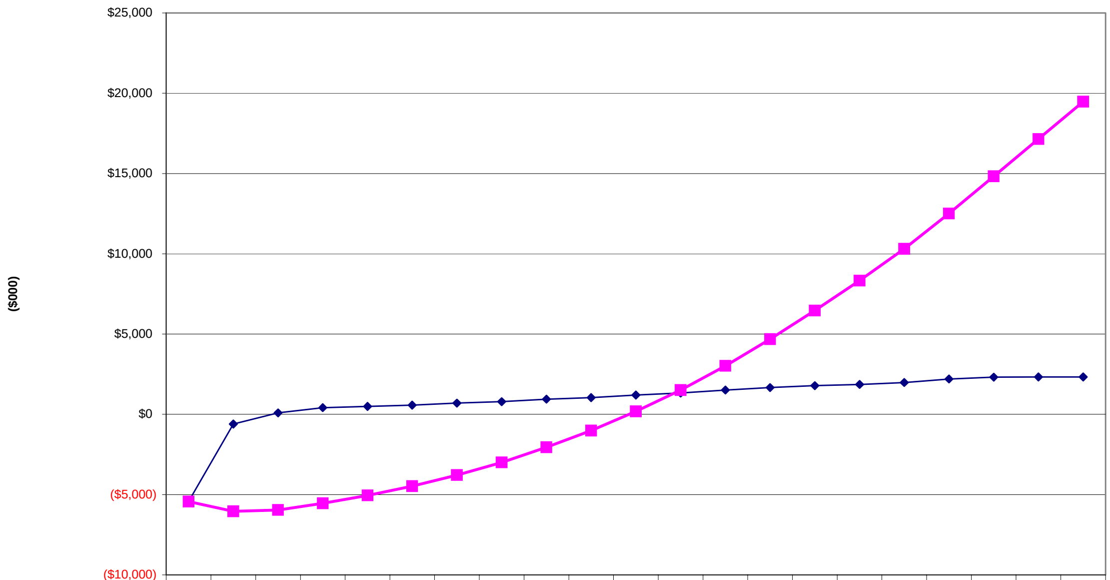
4.11 Payback

The average life of a fiber network as contemplated is very high, typically exceeding 25 years. The town will be making significant near term investments of capital to build a network that yields long-term financial and economic benefits to the town and the community. Therefore, it can be expected that the payback of the MBN network will be slow compared to private sector projects that are targeted at achieving near-term returns to shareholders, with 3-5 years for Return on investment (ROI).

A more appropriate approach to view the MBN is in terms of a Cost of Recovery model that measures how long a given project takes to recover all investments made in it. In the case of MBN, such a model would take into consideration operating expenses, capital fund, debt service and ongoing upgrades.

The payback of the MBN is determined by computing the Net Revenues from the project. Net Revenues is defined as revenues less operating expenses less capital expenses. In other words, Net Revenues is a metric that shows whether a project is generating a positive or negative return from money invested at a given period in time. The payback period of a project is the time taken for the project to generate positive cumulative Net Revenues. However, any payback analysis is flawed because it does not measure profitability during or after the payback period, and it ignores the time value of money.

As shown in the chart below, the MBN project for Westwood has a payback period of approximately 11 years.



	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Net Revenue	($5,438	($606)	$85	$415	$492	$574	$695	$784	$941	$1,038	$1,199	$1,324	$1,511	$1,665	$1,781	$1,862	$1,983	$2,202	$2,314	$2,324	$2,324
Cumulative Net Revenue	($5,438	($6,044	($5,959	($5,544	($5,052	($4,478	($3,782	($2,998	($2,057	($1,019	$180	$1,504	$3,016	$4,681	$6,462	$8,324	$10,306	$12,508	$14,822	$17,147	$19,471

5. RISKS

Some of the major risks are as follows. They are described as well as an assessment of what strategies can be used either to avoid them or to recognize them as early as possible.

1. *Inability to Obtain Adequate Revenues over the MBN:* This means that the bonds will be General Obligation (taxpayer subsidized) and may be more difficult to sell. Working with the dominant ISPs, cellular carriers, video providers, and other service providers is critical. This is a first step in the process. It requires large numbers of households passed to establish a credible base.

2. *Wireless Competitor:* Will wireless, 802.11 or similar, provide an aggressive technical competition. At this time the answer is no, but one always has to monitor and respond accordingly. Wireless is also a good complimentary solution in some cases with MBN.

3. *Overbuild by Existing or New Competitor:* The risk of a third party overbuild will always be a major risk; this could reduce the marketability of the MBN. However, if there is a successful operational build then the cost to overbuild will be excessive for any new entrant.

4. *Failure of Hardware Vendors to survive:* This is the major risk. Vendors are coming and going. Selecting a stable standard will be critical; PON or Gigabit Ethernet.

5. *Inappropriate but Delaying Litigation by ILECs:* Good counsel, pre-emptive working with the ILEC in a "friendly" manner, good legislative politicking, and working Washington is critical.

6. BONDING ISSUES

Merton has reviewed the issues regarding bonding for towns in the Commonwealth of Massachusetts. This section details that process. In summary, there is no impediment to such for the town.

6.1.1 Bond Raising Authority

Cities and town have broad powers in bond raising authority. The law of Massachusetts provides several ways to finance municipal projects. General obligation bonds in the form of serial bonds and notes are authorized under G.L. c. 44 sec. 1, 2, 7, and 8.

"Chapter 44: Section 1.

"Revenue", receipts from (1) the exercise of governmental power of taxation and police control; (2) donations, gifts, grants and subvention for governmental use; (3) performing services for compensation and from the operation or management of productive enterprises, investments and properties of government. Receipts from the sale or disposal of capital assets, loans, refunds and various temporary transactions are in the nature of non-revenue.

Chapter 44: Section 2. Limitations and restrictions on municipal indebtedness.

Section 2. Except as otherwise expressly permitted by law, cities, towns and districts shall incur debts only in the manner of voting and within the limitations as to amount and time of payment prescribed in this chapter; but this section shall not be construed as prohibiting any city, town or district from placing additional restrictions, consistent with this chapter, upon the manner of incurring debt, nor as affecting the right of any city, town or district to incur debt under any special act which has or shall become effective after January first, nineteen hundred and twenty-one, or at any time in the case of debt of the city of Boston for tunnel or transit purposes; but no debt may be authorized under a general or special act except by a two-thirds vote, unless the act so provides. All provisions of law providing for sinking funds for the payment of debt of the city of Boston incurred for transit or tunnel purposes shall continue to be applicable to said debt.

Chapter 44: Section 7. Cities and towns; purposes for borrowing money within debt limit.

Section 7. Cities and towns may incur debt, within the limit of indebtedness prescribed in section ten, for the purposes hereinafter set forth, and payable within the periods hereinafter specified:

Chapter 44: Section 8. Cities and towns; purposes for borrowing money outside debt limit.

Section 8. Cities and towns may incur debt, outside the limit of indebtedness prescribed in section ten, for the following purposes and payable within the periods hereinafter specified:

(8) For establishing, purchasing, extending, or enlarging a gas or electric lighting plant, a community antenna television system, whether or not operated by a gas or electric lighting plant, or a telecommunications system operated by a municipal lighting plant, 20 years; but the outstanding indebtedness so incurred shall not exceed in a town 5 per cent and in a city 2.5 per cent of the equalized valuation of such town or city; provided, however, that the emergency finance board, established under section 47 of chapter 10, may authorize a city to incur indebtedness under this clause in excess of 2.5 per cent but not in excess of 5 per cent of the equalized valuation of such city, and may authorize a town to incur indebtedness under this clause in excess of 5 per cent but not in excess of 10 per cent of the equalized valuation of such town."

G.L. c. 44, section 8, subsection 8 confers expressed power to go beyond the debt limits as set forth in section 2.

In addition, cities and towns of Massachusetts are authorized and may issue limited indebtedness in the form of revenue bonds. Cities and towns that having electric departments may issue electric revenue bonds and notes in anticipation of such bonds, subject to the approval of the Department of Telecommunications and Energy G.L.c.164A sections 11 and 12.

"Chapter 164A: Section 11. Revenue bonds for project costs; interim receipts or temporary bonds; issuance; agreement for consolidation of indebtedness by participating municipalities authorized.

Section 11.

(a) Any city or town which is a member of the New England power pool, acting by its municipal light board, when authorized by a two-thirds vote as defined in section one of chapter forty-four, may, subject to the approval of the department under this chapter, borrow money by the issue of its revenue bonds for project costs, or its share of project costs, of electric power facilities scheduled for commencement of commercial operation after January first, nineteen hundred and seventy-five. Such project costs may include all costs, whether incurred prior to or after the issue of bonds or notes hereunder, of acquisition, site development, construction, improvement, enlargement, reconstruction, alteration, machinery, equipment, furnishings, nuclear fuel, demolition or removal of existing buildings or structures, including the cost of acquiring any lands to which such buildings or structures may be moved, financing charges, interest prior to and during the carrying out of any project and for a reasonable period thereafter, planning, engineering, finance advisory and legal services, administrative expenses, prepayments under contracts made pursuant to section three or four, the funding of notes issued for project costs as hereinafter provided, such reserves for debt service or other capital or current expenses as may be required by a trust agreement or resolution securing notes or bonds, and all other expenses incidental to the determination of the feasibility of any project or to carrying out the project or to placing the project in operation.

(b) The bonds of each issue shall mature at a time or times not exceeding forty years from their dates of issue and may be made redeemable before maturity with or without premiums. Subject to the provisions of this chapter and to the terms of the department's approval and of the authorizing vote, the board shall determine the date or dates of the bonds, their denomination or denominations, the place or places of payment of the principal and interest, which may be at any bank or trust company within or without the commonwealth, their interest rate or rates, maturity or maturities, redemption privileges, if any, and the form and other details of the bonds. The bonds shall be signed by the city or town treasurer, shall be countersigned by the mayor or city manager, as the case may be, of a city or by a majority of the selectmen of a town either manually or by facsimile, and shall bear the seal of the city or town or a facsimile thereof. Any coupons attached thereto shall bear the facsimile signature of the city or town treasurer.

(c) In case any officer whose signature or a facsimile of whose signature shall appear on any bonds, coupons or notes issued under this chapter shall cease to be such officer before the delivery thereof, such signature or such facsimile shall nevertheless be valid and sufficient for all purposes the same as if he had remained in office until after such delivery.

(d) The bonds may be issued in coupon or in registered form, or both, and provision may be made for the registration of any coupon bonds as to principal alone and also as to both principal and interest, for the reconversion into coupon bonds of bonds registered as to both principal and interest, and for the interchange of registered and coupon bonds. Subject to the provisions of this chapter and to the terms of the department's approval and of the authorizing vote, the board may sell the bonds in such manner, either at public or private sale, and for such price, as it may determine will best effect the purposes of this chapter.

(e) Prior to the preparation of definitive bonds, the city or town may issue interim receipts or temporary bonds, with or without coupons, exchangeable for definitive bonds when such bonds shall have been executed and are available for delivery.

(f) Upon the votes of two or more municipalities authorizing the issue of revenue bonds in conformity with the provisions of this chapter, including approval of the department as to each of said municipalities, or notes in anticipation thereof, for project costs of the same facilities, said municipalities may enter into an agreement for the consolidation of the indebtedness so authorized and the issuance of such revenue bonds, or notes in anticipation thereof, by one such municipality on behalf of itself and one or more others if the authorizing votes provide for such consolidation. The agreement for consolidation shall require the participating municipalities, severally and not jointly, to provide the funds necessary to pay their respective shares of the principal and interest on the bonds or notes so issued. Such obligation of each participating municipality shall be payable solely from the funds provided therefore under this chapter and may be secured in the same manner as bonds or notes issued separately by it under this chapter.

(g) Bonds or notes issued under this chapter by a member of the New England power pool shall not be deemed to have been unauthorized by reason of any invalidation of any of the provisions of the New England power pool agreement.

Chapter 164A: Section 12. Borrowing in anticipation of bonds; temporary notes; issuance by city or town authorized, etc.

Section 12. In anticipation of the authorization or issue of bonds under this chapter, and subject to the approval of the department under this chapter, a city or town subject to this chapter, acting by its municipal light board, when authorized by a two-thirds vote as defined in section one of chapter forty-four, may issue temporary notes. Subject to the terms of the department's approval and of the authorizing vote, the board may provide for the sale of the notes at public or private sale and may determine the interest rate or rates, maturity or maturities, redemption privileges, if any, form, denomination or denominations and place or places of payment or provide for the determination thereof by an officer or officers of the board or of the city or town. Temporary notes issued hereunder shall be executed in the manner provided herein for bonds and shall be payable within six years from their respective dates, but the principal of and interest on notes issued for a shorter period may be renewed or paid from time to time by the issue of other notes under this chapter, provided the period from the date of issue of an original note to the maturity of any note issued to renew or pay the same debt or the interest thereon shall not exceed six years. Unless otherwise provided in the authorizing vote or in the approval of the department, the board may cause notes to be refunded to the extent provided in this chapter. To the extent of any borrowing in anticipation of bonds, the maximum maturity of an equivalent amount of the bonds shall be measured from the date of the anticipatory borrowing."

Specifically to a electrical power plant within a municipality, bond-raising power is authorized under G.L. 164A section 11, and 12. To issue bonds.

6.1.2 Massachusetts Bonding Strategy

Massachusetts as a "Home Rule" state with different set of laws for those towns with power plants and non-power plant towns. Outside counsel did not see any major problems and thought that Merton's bonding initiatives can be successful, however a different set of strategies must be employed in each state to achieve the desired end and therefore he offered the following recommendations.

The Massachusetts approach requires a specific surgical strike rather than a comprehensive approach. It is understood that an amendment to the current law empowering power plant towns to issue bonds can be expanded to include non-power plant towns with a population not to exceed 150,000 or some other number (population ceiling). A population ceiling would raise little concern on the part of the ILECs. The justification being that some 40 cities and towns already have this authority, why not expand it to all the cities and towns have a population of less that 150,000 in that way there would be little to no opposition to this effort. The argument being it that since it already exists and it does not cost anything to the taxpayers why not expand it to the other towns. A Special Act of the Massachusetts Legislature could probably be filed and approved within 6 to 8 months.

In order to marshal the appropriate elements to achieve this, counsel proposes first getting the blessings of the Massachusetts Department of Revenue (DOR), Division of Local Services headed by Jim Johnson. Merton would make an appointment with Johnson and present our model to him. Johnson's interest in this would be primarily if this would cost the Commonwealth any money. If not, his second question would be what if any adverse effects would it have on the state or taxpayers. If those two questions are answered satisfactory to him, we could then begin the socialization process to introduce proposed legislation to the town Selectmen. The rationale of getting the blessings of DOR is that when it gets to the state legislature, the first thing the Senate or Representatives will be to call DOR to see if they have blessed this initiative. If DOR has blessed it, it would satisfy the legislators concern and they would move it along.

The next phase is to socialize the concept and have the Selectmen file the legislation. Nothing gets more action when Selectmen call upon their representatives and demand that legislation be filed for passage. Therefore, Westwood should be Merton's first test case to begin socializing the Selectmen on an informal basis within the next three weeks and begin the process.

Counsel also advised that Merton should be aware of Chapter 30B, Uniform Procurement Act that provides cities and towns comply with requirements for the procurement of "services". Merton must be cognizant and adhere to these requirements before it gets to far into any fee for service arrangement with the city or town.

7. REGULATORY ISSUES

The following are general observations regarding the Federal and State statues regarding the Municipal Broadband Network, (MBN), approach that has been proposed. This is not a legal opinion and should not be construed as such. This review and analysis is merely the opinion of the author and there should be no reliance made thereupon. For any question or concerns, we urge the reader to consult with competent legal counsel in Massachusetts as required.

This brief white paper addresses three issues: (i) is the propose MBN service regulated, and the opinion is that based upon FCC 02-77 of March 15, 2002 it is not and further it at best an information service and is a private network information service of non-interstate extent. Further, with the Massachusetts statues and using the Telecommunications Act of 1996 (Act), the FCC declaratory opinion, and the recent Missouri Municipal case, this provides more than adequate precedent to insure this carve out; (ii) Does Massachusetts law limit what a city or town may do with this service; and the answer give the negative as to both; (iii) what financial structures are available to a municipality in Massachusetts, and the answer is bond financing or other such instruments; and (iv) what barriers exist for use and access of pole, conduit and rights-of-way and the answer is such barriers have in effect been removed.

Finally, this one may ask the questions of what has to be changed in Massachusetts. The answer seems to be little if anything. The only concern is that the ILEC, in this case Verizon, is not allowed to do what SBC did in Missouri. This aggressive positive reinforcement must be achieved by lobbying the State Legislature.

7.1 The Service:

The MBN is the provision by municipality or municipal power plant wherein the entity as described will finance, build, and operate a data connection enabling device which will provide for the interconnection of service providers and individuals and business in the municipality. The MBN in no way is the creator, provider, support, or effector of the service so provided. The MBN is an integrated TCP/IP backbone network which effects interconnectivity by an integrated packet switching network. There is no way in which the municipality can control the packets to effect service control.

7.2 Recent FCC Rulings

On February 20, 2003 the FCC ruled, in a contested ruling, that broadband would no longer be controlled by the 1996 Telecom Act as was required for unbundling. Specifically the FCC stated:

*"2. **Broadband Issues** – The Commission provides substantial unbundling relief for loops utilizing fiber facilities: 1) the Commission requires no unbundling of fiber-to-the-home loops; 2) the Commission elects not to unbundle bandwidth for the provision of broadband services for loops where incumbent LECs deploy fiber further into the neighborhood but short of the customer's home (hybrid loops), although requesting carriers that provide broadband services today over high capacity facilities will continue to get that same access even after this relief is granted, and 3) the Commission will no longer require that line-sharing be available as an unbundled element. The Commission also provides clarification on its UNE pricing rules that will send appropriate economic signals to carriers."*

What this means is that the monopoly carriers such as Verizon will no longer have to unbundle any loop, which has any fiber content, this means almost 95% of the loops in New England. Verizon's response, rather than being supportive, stated that because of this position it would not be building broadband. In detail the FCC stated:

"__Mass Market Loops__

Copper Loops – *Incumbent LECs must continue to provide unbundled access to copper loops and copper subloops. Incumbent LECs may not retire any copper loops or subloops without first receiving approval from the relevant state commission.*

Line Sharing – *The high frequency portion of the loop (HFPL) is not an unbundled network element. Although the Order finds general impairment in providing broadband services without access to local loops, access to the entire stand-alone copper loop is sufficient to overcome impairment. During a three-year period, competitive LECs must transition their existing customer base served via the HFPL to new arrangements. New customers may be acquired only during the first year of this transition. In addition, during each year of the transition, the price for the high-frequency portion of the loop will increase incrementally towards the cost of a loop in the relevant market.*

Hybrid Loops *– There are no unbundling requirements for the packet-switching features, functions, and capabilities of incumbent LEC loops. Thus, incumbent LECs will not have to provide unbundled access to a transmission path over hybrid loops utilizing the packet-switching capabilities of their DLC systems in remote terminals. Incumbent LECs must provide, however, unbundled access to a voice-grade equivalent channel and high capacity loops utilizing TDM technology, such as DS1s and DS3s.*

Fiber-to-the-Home (FTTH) Loops *– There is no unbundling requirement for new build/greenfield FTTH loops for both broadband and narrowband services. There is no unbundling requirement for overbuild/brownfield FTTH loops for broadband services. Incumbent LECs must continue to provide access to a transmission path suitable for providing narrowband service if the copper loop is retired.*

Enterprise Market Loops *- The Commission makes a national finding of no impairment for OCn capacity loops. The Commission makes a national finding of impairment for DS1, DS3, and dark fiber loops, except where triggers are met as applied in state proceedings. States can remove DS1, DS3, and dark fiber loops based on a customer location-specific analysis applying a wholesale competitive alternative trigger.*

Dark fiber and DS3 loops also each are subject to a customer location-specific review by the states to identify where loop facilities have been self-deployed.

Subloops *- In addition, incumbent LECs must offer unbundled access to subloops necessary for access to wiring at or near a multiunit customer premises, including the Inside Wire Subloop, regardless of the capacity level or type of loop the requesting carrier will provision to its customer."*

Thus, it is clear that the FCC has given the monopoly players such as Verizon a clear path to FTTH but Verizon and the other three have expressly rejected this option. There are no encumbrances in this recent ruling from the FCC as regards MBN.

7.3 Federal Legislation: Telecommunications Act of 1996

The Telecommunications Act of 1996 embodied in US Federal Code 47, makes certain statement concerning telecommunications, what it is and what it is not. It further states who may be a provider of services, telecommunications services and otherwise.

From Section 3 of the Act, the following definition apply:

(48) TELECOMMUNICATIONS- The term telecommunications means the transmission, between or among points specified by the user, of information of the users choosing, without change in the form or content of the information as sent and received.

(49) TELECOMMUNICATIONS CARRIER- The term telecommunications carrier means any provider of telecommunications services, except that such term does not include aggregators of telecommunications

services (as defined in section 226). A telecommunications carrier shall be treated as a common carrier under this Act only to the extent that it is engaged in providing telecommunications services, except that the Commission shall determine whether the provision of fixed and mobile satellite service shall be treated as common carriage.

(50) TELECOMMUNICATIONS EQUIPMENT- The term telecommunications equipment means equipment, other than customer premise equipment, used by a carrier to provide telecommunications services, and includes software integral to such equipment (including upgrades).

(51) TELECOMMUNICATIONS SERVICE- The term telecommunications service means the offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used.

The above definitions are critical. First, the Act's definition of telecommunications hinges on the statement "without change in the form or content", and since the services provided by the town is an IP based network, both form and content are changed. The service provided is information and not telecommunications but information as viewed by the FCC is an integrated and form change in the IP packets. It is not the connection of a voice to a voice.

The following definition is determinative and key. It is for an information service as compared to a telecommunications service.

(41) INFORMATION SERVICE- The term information service means the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications, and includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications service.

Section 253 of the Act further states:

SEC. 253. REMOVAL OF BARRIERS TO ENTRY.

(a) IN GENERAL- No State or local statute or regulation, or other State or local legal requirement, may prohibit or have the effect of prohibiting the ability of any entity to provide any interstate or intrastate telecommunications service.

(b) STATE REGULATORY AUTHORITY- Nothing in this section shall affect the ability of a State to impose, on a competitively neutral basis and consistent with section 254, requirements necessary to preserve and advance universal service, protect the public safety and welfare, ensure the continued quality of telecommunications services, and safeguard the rights of consumers.

(c) STATE AND LOCAL GOVERNMENT AUTHORITY- Nothing in this section affects the authority of a State or local government to manage the public rights-of-way or to require fair and reasonable compensation from telecommunications providers, on a competitively neutral and nondiscriminatory basis, for use of public rights-of-way on a nondiscriminatory basis, if the compensation required is publicly disclosed by such government.

(d) PREEMPTION- If, after notice and an opportunity for public comment, the Commission determines that a State or local government has permitted or imposed any statute, regulation, or legal requirement that violates subsection (a) or (b), the Commission shall preempt the enforcement of such statute, regulation, or legal requirement to the extent necessary to correct such violation or inconsistency.

(e) COMMERCIAL MOBILE SERVICE PROVIDERS- Nothing in this section shall affect the application of section 332(c) (3) to commercial mobile service providers.

(f) RURAL MARKETS- It shall not be a violation of this section for a State to require a telecommunications carrier that seeks to provide telephone exchange service or exchange access in a service area served by a rural telephone company to meet the requirements in section 214

(e) (1) for designation as an eligible telecommunications carrier for that area before being permitted to provide such service. This subsection shall not apply-- (1) to a service area served by a rural telephone company that has obtained an exemption, suspension, or modification of section 251(c) (4) that effectively prevents a competitor from meeting the requirements of section 214(e) (1); and (2) to a provider of commercial mobile services."

In Missouri Municipal v FCC with SBC as the Intervenor, the 8th Circuit Court overthrew a Missouri law, which prohibited towns from operating a telecommunications service. The law, Missouri House Bill 1402, 2002 Mo. Legis. Serv. H.B. 1402 (Vernon's), signed into law on July 11, 2002, extended the expiration date to August 28, 2007, as well as making certain other changes in the wording of § 392.410(7), none of which affect our analysis in this case.

The Court stated:

"Section 392.410(7) of the Revised Statutes of Missouri prohibits the state's political subdivisions from obtaining the certificates of service authority necessary to provide telecommunications services or facilities directly or indirectly to the public. It provides: Missouri House Bill 1402, 2002 Mo. Legis. Serv. H.B. 1402 (Vernon's), signed into law on July 11, 2002, extended the expiration date to August 28, 2007, as well as making certain other changes in the wording of § 392.410(7), none of which affect our analysis in this case.

No political subdivision of this state shall provide or offer for sale, either to the public or to a telecommunications provider, a telecommunications service or telecommunications facility used to provide a telecommunications service for which a certificate of service authority is required pursuant to this section.

Nothing in this subsection shall be construed to restrict a political subdivision from allowing the nondiscriminatory use of its rights-of-way including its poles, conduits, ducts and similar support structures by telecommunications providers or from providing telecommunications services or facilities; (1) For its own use; (2) For 911, E-911 or other emergency services; (3) For medical or educational purposes; (4) To students by an educational institution; or (5) Internet-type services*…. The Commission expressed its disagreement with the policy of the Missouri statute because it had found previously that "municipally-owned utilities . . . have the potential to become major competitors in the telecommunications industry . . . [and] can further the goal of the 1996 Act to bring -5- the benefits of competition to all Americans, particularly those who live in small rural communities." … the Commission felt bound by legal authorities not to preempt the statute, particularly a decision of the United States Court of Appeals for the District of Columbia, City of Abilene v. FCC, 164 F.3d 49 (D.C. Cir. 1999). .. The Missouri Municipals then filed a petition for a review of the Commission's order. Southwestern Bell Telephone Co. and the State of Missouri intervened in support of the Commission's decision."*

The Court further states:

"Accordingly, we conclude that because municipalities fall within the ordinary definition of the term "entity," and because Congress gave that term expansive scope by using the modifier "any," individual municipalities are encompassed within the term "any entity" as used in § 253(a). This language would plainly include municipalities in any other context, and we should not hold otherwise here merely because § 253 affects a state's authority to regulate its municipalities. Congress need not provide specific definitions for each term in a statute where those terms have a plain, ordinary meaning and Congress uses an expansive modifier to demonstrate the breadth of the statute's application."

Finally, the Court states:

"Missouri argues that because § 392.410(7) addresses its municipalities' authority to provide telecommunications services rather than their ability to do so, § 253 does not apply. Missouri contends that if § 392.410(7) is held to be preempted, it would not be able to prevent its attorney general's office from providing telecommunications services. Putting aside the highly fanciful nature of this argument, it needs only to be noted that unlike municipalities, the Missouri Attorney General's office has no independent authority to provide telecommunications services. Section 392.410(7) is a prohibition on the ability to exercise the authority that municipalities otherwise possess, precisely the type of prohibition that § 253 is designed to prevent.[3] The Commission's order is vacated, and the case is remanded to the Commission for further proceedings consistent with the views set forth in this opinion."

Clearly, the Court rejected the SBC complaint and further the Court ordered that municipalities have indeed far reaching powers, despite even State Legislatures attempting to delimit them, since they derive from Federal statutes.

In a landmark decision with major implications for regulation of the Internet, on March 15, 2002, the FCC ruled that cable modems were not "telecommunications service" but "information service". FCC 6N Doc. No.00-185 (Inquiry Concerning High Speed Access to Internet Over Cable and Other Facilities) concluded that cable modem service is properly classified as an interstate information service and is therefore subject to FCC jurisdiction. The FCC determined that cable modem service is not a "cable service" as defined by the Act. The FCC also said that cable modem service does not contain a separate "telecommunications service" offering and therefore is not subject to common carrier regulation.

The FCC said that the ultimate resolution of this item will promote broadband deployment, which should result in better quality, lower prices and more choices for consumers. In considering the issues raised by the original *Cable Modem NOI* and today's *Notice*, the FCC is guided by the following principles and policy goals:

1. Encourage the ubiquitous availability of broadband access to the Internet to all Americans.

2. Ensure that broadband services exist in a minimal regulatory environment that promotes investment and innovation.

3. Develop an analytical framework that is consistent, to the extent possible, across multiple platforms.

With respect to state and local issues, the *Notice* makes three significant tentative conclusions:

1. The statute does not provide a basis for a local franchising authority to impose an additional franchise for the provision of cable modem service.

2. The provision of cable modem service should not affect the rights of cable operators to access the public rights-of-way.

3. In the interest of national uniformity, the FCC should exercise its forbearance authority in light of the U.S. Court of Appeals for the Ninth Circuit's decision in the *Portland* case, which classified cable modem service as both an "information service" and "telecommunications service."

Regarding franchise fees, the FCC notes that the law limits franchise fees to 5 percent of the gross revenues the cable operator receives from cable service. The FCC said that revenues from cable modem service should not be used in computing this franchise fee ceiling.

[3] See City of Bristol, 145 F. Supp. 2d at 748 (Virginia municipalities otherwise have authority to provide telecommunications services and state statute designed to prohibit them from exercising that authority preempted by § 253).

This decision follows five other related proceedings – the *Cable Modem NOI*, the *National Performance Measures NPRM*, the *Incumbent LEC Broadband Notice*, the *Triennial UNE Review Notice* and, most recently, the *Wireline Broadband NPRM*. These proceedings, together with today's actions, are intended to build the foundation for a comprehensive and consistent national broadband policy.

The FCC in its Declaratory Ruling further states:

"34. Because the classification of cable modem service turns on statutory interpretation, we begin with a review of relevant statutory definitions. The 1996 Act defines "telecommunications service" as "the offering of telecommunications for a fee directly to the public, or to such classes of users as to be effectively available directly to the public, regardless of the facilities used."[4] *"Telecommunications" is defined in turn as "the transmission, between or among points specified by the user, of information of the user's choosing, without change in the form or content of the information as sent and received."*[5]

35. The Act defines "information service" as "the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications, and includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications service."[6]
None of the foregoing statutory definitions rests on the particular types of facilities used. Rather, each rests on the function that is made available.[7] *Accordingly, we examine below the functions that cable*

[4] Communications Act § 3(46), 47 U.S.C. § 153(46).

[5] Communications Act § 3(43), 47 U.S.C. § 153(43).

[6] Communications Act § 3(20), 47 U.S.C. § 153(20). The term "information service" follows from a distinction the Commission drew in the First, Second, and Third Computer Inquiries ("Computer Inquiries"). See generally Regulatory and Policy Problems Presented by the Interdependence of Computer and Communications Services and Facilities, Docket No. 16979, Final Decision and Order, 28 F.C.C. 2d 267 (1971), aff'd in part sub nom. GTE Service Corp. v. FCC, 474 F.2d 724 (2d Cir. 1973), decision on remand, Order, 40 F.C.C. 2d 293 (1973); Amendment of Section 64.702 of the Commission's Rules and Regulations (Second Computer Inquiry) ("Computer II Final Decision"), CC Docket No. 20828, Final Decision, 77 FCC 2d 384 (1980), on reconsideration, Memorandum Opinion and Order, 84 F.C.C. 2d 50 (1980) and Memorandum Opinion and Order on Further Reconsideration, 88 F.C.C. 2d 512 (1981), aff'd sub nom. Computer and Commun. Indus. Ass'n v FCC, 693 F.2d 198 (D.C. Cir. 1982), cert. denied, 461 U.S. 938 (1983); Amendment of Section 64.702 of the Commission's Rules and Regulations (Third Computer Inquiry), CC Docket No. 85-229, Report and Order, Memorandum Opinion and Order on Further Reconsideration, 104 F.C.C. 2d 958 (1986), on reconsideration, Memorandum Opinion and Order on Reconsideration, 2 FCC Rcd 3035 (1987), Memorandum Opinion and Order on Reconsideration, 3 FCC Rcd 1135 (1988) and Memorandum Opinion and Order on Further Reconsideration and Second Further Reconsideration, 4 FCC Rcd 5927 (1989), vacated in part, California v. FCC, 905 F.2d 1217 (9th Cir. 1990); Report and Order, 2 FCC Rcd 3072 (1987), on reconsideration, Memorandum Opinion and Order on Reconsideration, 3 FCC Rcd 1150 (1988), vacated in part, California v. FCC, 905 F.2d 1217 (9th Cir. 1990); Computer III Remand Proceedings, Report and Order, 5 FCC Rcd 7719 (1990), on reconsideration, Memorandum Opinion and Order on Reconsideration, 7 FCC Rcd 909 (1992), petitions for review denied, California v. FCC, 4 F.3d 1505 (9th Cir. 1993); Computer III Remand Proceedings; Bell Operating Company Safeguards and Tier I Local Exchange Company Safeguards, CC Docket No. 90-623, Report and Order, 6 FCC Rcd 7571 (1991), vacated in part and remanded, California v. FCC, 39 F.3d 919 (9th Cir. 1994), cert. denied, 514 U.S. 1050 (1995); Computer III Further Remand Proceedings: Bell Operating Company Provision of Enhanced Services; 1998 Biennial Review - Review of Computer III and ONA Safeguards and Requirements, CC Docket Nos. 95-20, 98-10; Further Notice of Proposed Rulemaking, Report and Order, 13 FCC Rcd 6040 (1998), Report and Order, 14 FCC Rcd 4289 (1999), on reconsideration, Order, 14 FCC Rcd 21628 (1999).

These decisions drew a distinction between bottleneck common carrier facilities and services for the transmission or movement of information on the one hand and, on the other, the use of computer processing applications to act on the content, code, protocol, or other aspects of the subscriber's information. The latter are "enhanced" or information services. This distinction was incorporated into the Modification of Final Judgment ("MFJ"), which governed the Bell Operating Companies after the Bell System Break-Up, and into the 1996 Act. Universal Service Report 13 FCC Rcd at 11536 ¶ 75 (1998), citing United States v. Western Electric Co., 673 F. Supp. 525 (D.D.C. 1987), and 714 F. Supp. 1 (D.D.C. 1988), rev'd in part, 900 F.2d 283 (D.C. Cir. 1990). The Commission has confirmed that the two terms – enhanced services and information services – should be interpreted to extend to the same functions. Implementation of the Non-Accounting Safeguards of Sections 271 and 272 of the Communications Act of 1934, as amended, CC Docket No. 96-149, First Report and Order and Further Notice of Proposed Rulemaking ("Non-Accounting Safeguards Order"), 11 FCC Rcd 21905, 21955-56 ¶ 102.

[7] Universal Service Report, 13 FCC Rcd at 11530 ¶ 59 (noting "Congress's direction that the classification of a provider should not depend on the type of facilities used . . . [but] rather on the nature of the service being offered to consumers.").

modem service makes available to its end users. The Commission's prior analysis regarding Internet access service informs our analysis."

The FCC goes on to state:

"55. The Commission and courts have long distinguished between common carriage[8] and private carriage by examining the particular service at issue.[9] As the D.C. Circuit has stated, "the primary sine qua non of common carrier status is a quasi-public character, which arises out of the undertaking to carry for all people indifferently."[10] In contrast, an entity is a private carrier for a particular service when a carrier "chooses its clients on an individual basis and determines in each particular case 'whether and on what terms to serve' and there is no specific regulatory compulsion to serve all indifferently."[11] The record indicates that AOL Time Warner is determining on an individual basis whether to deal with particular ISPs and is in each case deciding the terms on which it will deal with any particular ISP.[12] ***To the extent that AOL Time Warner is making an offering of pure telecommunications to ISPs, it is dealing with each ISP on an individualized basis and is not offering any transmission service indiscriminately to all ISPs.[13] Thus, such an offering would be a private carrier service, not a "telecommunications service."*** *Similarly, to the extent that other cable providers elect to provide pure telecommunications to selected clients with whom they deal on an individualized basis, we would expect their offerings to be private carrier service."*

7.4 Massachusetts Law Issues

Several issues are of concern under Massachusetts law. They are:

1. Is a municipal broadband network (MBN) a utility and must it be regulated?

[8] The Commission has repeatedly found in various contexts that the definition of "telecommunications service" under the Act is equivalent to "common carrier" service. See, e.g., Cable & Wireless, PLC, File No. SCL-96-005, Cable Landing License, 12 FCC Rcd 8516, 8521 ¶13 (1997); AT&T Submarine Systems, Inc., File No. S-C-L-94-006, Memorandum Opinion and Order, 13 FCC Rcd 21585, 21587-88 ¶ 6 (1998), aff'd, Virgin Islands Tel. Co. v. FCC, 198 F.3d 921 (D.C. Cir. 1999); Federal-State Joint Board on Universal Service, CC Docket No. 96-45, Report and Order, 12 FCC Rcd 8776, 9177-78 ¶ 785 (1997), aff'd in part, reversed in part, and remanded in part, Texas Office of Public Utility Counsel v. FCC, 183 F.3d 393 (5th Cir. 1999), cert. granted, 530 U.S. 1213 (2000); Declaratory Ruling, 14 FCC Rcd 3040, 3042 ¶ 6 (1999), remanded on other grounds, State of Iowa v. FCC, 218 F.3d 756 (D.C. Cir. 2000). Moreover, the D.C. Circuit has held that the FCC's interpretation of "telecommunications service" as common carrier service is reasonable and permissible. Virgin Islands Tel. Co. v. FCC, 198 F.3d 921, 926 (D.C. Cir. 1999).

[9] See National Ass'n of Reg. Utils. Comm'rs v. FCC, 525 F.2d 630, 640 (D.C. Cir.), cert. denied, 425 U.S. 992 (1976) ("NARUC I"); NARUC v. FCC, 533 F.2d 601, 608-09 (D.C. Cir. 1976) ("NARUC II"); Southwestern Bell Tel. Co. v. FCC, 19 F.3d 1475, 1481 (D.C. Cir. 1994); AT&T Submarine Systems, Inc. Application for a License to Land and Operate a Digital Submarine Cable System Between St. Thomas and St. Croix in the U.S. Virgin Islands, File No. S-C-L-94-006, Memorandum Opinion and Order,13 FCC Rcd 21585, 21588-89 ¶¶ 8-9 (1998), aff'd, Virgin Islands Tel. Corp. v. FCC, 198 F.3d 921 (D.C. Cir. 1999); NORLIGHT Request for Declaratory Ruling, File No. PRB-LMMD 86-07, Declaratory Ruling, 2 FCC Rcd 132, 133 ¶ 14 (1987). See also Cox Comments at 45-46; NCTA Comments at 13-17.

[10] NARUC II, 533 F.2d at 608-09 (quotation marks omitted). See also authorities cited supra note 9.

[11] Southwestern Bell Tel. Co. v. FCC, 19 F.3d 1475, 1481 (D.C. Cir. 1994); see NARUC I, 525 F.2d at 641 ("a carrier will not be a common carrier where its practice is to make individualized decisions, in particular cases, whether and on what terms to deal").

[12] See supra paras. **Error! Reference source not found.-Error! Reference source not found.**.

[13] See AOL Time Warner Jan. 22, 2002 Ex Parte at 3 (referring to its "individually negotiated affiliation agreements" with ISPs), at 4 (suggesting that AOL Time Warner intends to exercise its discretion in choosing which ISPs participate in its multiple ISP offerings to subscribers: "TWC also believes that this partnering arrangement works best for customers because TWC is putting its reputation on the line with every ISP it sells, both in the case of affiliated ISPs like AOL, and unaffiliated ones like EarthLink."). See also AOL Time Warner Inc., Texas Networking, Inc., Petition for Declaratory Ruling and Complaint Regarding Violations of Merger Conditions and for Enforcement of Merger Conditions, CS Docket No. 00-30, AOL Time Warner Response and Opposition at 8 & n.22 (describing part of AOL Time Warner's multiple ISP access activities, specifically a questionnaire for ISPs "to provide [Time Warner Cable] with information to help evaluate the companies which sought to enter into agreements with TWC. It requests basic information touching on matters related to the integrity, consumer acceptability and stability of a business and the people who run it.") (filed Sept. 4, 2001).

2. Is the current financing authority broad enough to cover MBN and could this be considered as a vehicle for such financing?

3. Is the current bond raising authority broad enough to allow municipal bonds or other such type of instruments for financing?

4. What is the status of regulations for access to poles, conduits and rights-of-way in Massachusetts?

We argue that upon a first reading, without recourse to cases to the contrary that the financing issue are all-favorable and that the utility status does not apply.

7.4.1 Commonwealth of Massachusetts Home Rule Authority

Massachusetts law before 1966 required municipalities to operate under the Dillon Rule. Dillon's restrictive provisions required municipalities to seek legislative permission for authority in each instance that was not specifically enumerated in its general or special laws. In November of 1966, the Massachusetts Legislature amended the Massachusetts Constitution by adopting the Home Rule Amendment, Article 89, amending Mass. Consti. Amend. Art. II, sections 1-9 ("Amendment").

The three basic provisions of the Amendment are: (i) granting charter making power of the municipality through establishment of local commission; (ii) granting general local legislative power to the municipality; and (iii) imposing the doctrine of fair play between the state legislature and cities and towns. Although charter making power and the doctrine of fair play are important overall components of the Amendment, granting general local legislative powers to the municipalities will be the subject matter of this paper.

The demise of the "Dillon Rule" became reality in Massachusetts with the passage of the Amendment. The Supreme Judicial Court put the Dillon Rule to rest and stated in its ruling:

"Prior to passage of the Home Rule Amendment in 1966, we gave the statutes conferring powers on municipal corporations a strict construction. The Home Rule Amendment implicitly repudiates 'Dillon's Rule'… The rejected rule provided that a 'municipal corporation possess and can exercise the following powers: First, those granted in express words; second, those necessarily or fairly implied in or incident to the powers expressly granted; third, those essential to the accomplishment of the declared objects and purposes of the corporation--not simply convenient, but indispensable. Any fair, reasonable, substantial doubt concerning the existence of power is resolved by the courts against the corporation, and the power is denied.' Dillon, Municipal Corporation. Section 237, pp. 449-450 (5th ed. 1911). This rule had long served as the law of the Commonwealth."[14]

The authority granting municipalities local legislative powers is set forth in Section 6 of the Home Rule Amendment that states in relevant part:

"*Any city of town may, by the adoption, amendment, or repeal of local ordinances or by-laws, exercise any power or function which the general court has power to confer upon it, which is not inconsistent with the constitution or laws enacted by the General Court in conformity with powers reserved to the general court by section eight, and which is not denied, either expressly or by clear implication, to the city or town by its charter. This section shall apply to every city and town, whether or not it has adopted a charter pursuant to section three.*"

In addition, cities and towns are empowered by G.L. c.40 section 1 and 5, that states in relevant part:

[14] *Cohen v. Board of Water Comm'rs, Fire Dist. No. 1, South Hadley*, 411 Mass. 744, 750n11 385 N.E. 2d 737, 741. N.11 (1992) (citations omitted).

"Chapter 40: Section 1. Cities and towns; nature and scope of powers and duties.

Section 1. Cities and towns shall be bodies corporate, and, except as otherwise expressly provided, shall have the powers, exercise the privileges and be subject to the duties and liabilities provided in the several acts establishing them and in the acts relating thereto. Except as otherwise expressly provided, cities shall have all the powers of towns and such additional powers as are granted to them by their charters or by general or special law, and all laws relative to towns shall apply to cities.

Chapter 40: Section 5. Purposes for which towns may appropriate money.

Section 5. A town may at any town meeting appropriate money for the exercise of any of its corporate powers; provided, however, that a town shall not appropriate or expend money for any purpose, on any terms, or under any conditions inconsistent with any applicable provision of any general or special law."

The municipality's spending powers in order to achieve the municipality's purpose are broad. In one of the most important cases involving a town's appropriation of funds under the Home Rule Amendment, the Supreme Judicial Court articulated this broad power in its opinion:

"*We do not rest the result on the plaintiffs' claim that municipalities are restricted to appropriating funds solely for those purposes enumerated in G.L.c. 40 section 5 of G.L.c.40 as amended by St.1951, c. 798, provides that a municipality may "appropriate money for the exercise of any of its corporate powers, including the following purposes: (listing numerous purposes)." Neither a matter of statutory construction nor in practice are municipal appropriations limited to those purpose enumerated in G.L.c. 40, section 5. There are other statutory provisions explicitly authorizing the appropriation of funds…. Contrary to the plaintiffs' contentions, the Legislature has not manifested an intention after the enactment of the Home Rule Amendment of 1966 (Art. 89 of the Amendments to the Constitution of the Commonwealth, amending Art. 2 of those Amendments) to limit the appropriation powers of municipalities to those purposes which are mentioned explicitly in legislation."*[15]

As to the issue of limitations of Home Rule Powers, they fall into two categories, the specific, enumerated exclusion of Mass. Const. amend. Art II, section 7; and the more generic limitations arising from the requirements of Mass. Const. amend. Art. II, section 2.

The authority conferred upon municipalities by the Amendment affords the opportunity to the municipality to determine whether the municipality has the power to undertake actions in furtherance of the interests of the municipality. Unless, it is specifically excluded by the state constitution or general laws, then the presumption is that the municipality has the authority to do so.

The generic exclusion in the language of "not inconsistent" presents somewhat of a challenge to municipalities as expressed in Mass. Const. amend. Art. II. Section 2. The term "not inconsistent" has generated some litigation in order to determine what " not inconsistent" means within the framework of the Amendment.

It is safe to say for the moment that the courts have begun to apply the principle of preemption. Municipalities have embraced a liberal interpretation of power granted to them under the Amendment. In instances where the courts perceive that the legislature's involvement is so comprehensive from a regulatory scheme, they have held that the subject matter will be preempted by the General Court and therefore will not allow municipalities to intervene. These are rare instances and are driven by statute of a regulatory nature.

[15] *Anderson v. City of Boston*, 376 Mass. at 183-184, 380 N.E.2d at 632-33

7.4.2 Utility

The first question is that of whether a utility approach applies to MBN. The answer to this question is obvious from a fair reading of the statue. That states:

"Chapter 166: Section 25A. Attachments; regulation by department of public utilities.

Section 25A. The following terms as used in this section shall have the following meanings: ""Utility'', means any person, firm, corporation or municipal lighting plant that owns or controls or shares ownership or control of poles, ducts, conduits or rights of way used or useful, in whole or in part, for supporting or enclosing wires or cables for the transmission of intelligence by telegraph, telephone or television or for the transmission of electricity for light, heat or power."

In accordance with the above definition, a MBN is not a utility because it not involved with the transmission of intelligence by telegraph, telephone or television or with the transmission of light, heat or power. This is again more specific. It focuses in on telephone, telegraph, transmission of television but again under the Act's definition, MBN is an information service and not a telecommunications service since an information services changes the "form and content" of information; and since the Act delimit a State's ability to regulate such entities they are therefore exempt from G.L. c. 166 as well.

7.4.3 Pole Use and Conduit Access

The Department of Telecommunications and Energy (DTE) issued an order entitled the Regulations on Nondiscriminatory Access to Poles, Conduits, and Rights-of-Way.

Under the Act, the FCC has jurisdiction over pole attachment discrimination cases. States may take jurisdiction by certifying the adoption of their own utility pole attachment and conduit nondiscrimination regulation (know as reverse preemption). The DTE took jurisdiction and implemented rules and regulations to that effect. On June 24, 2000, DTE (Doc. No. 98-36A) implementing the Act's ban against discriminatory access to utility pole, pole attachments, conduits and utility rights-of-way. The DTE stated:

"In order to bring the benefits of competition to both business and residential consumers, regardless of whether they rent or own real property, an individual or company that owns or controls or that shares ownership or control of poles, ducts, conduits or rights-of-way must open these facilities to competitors where feasible. The Department seeks to eliminate barriers to the development of competitive networks and the Final Regulations prevent all utilities, including owners of CBs and MDUs, from discriminating in granting access to, or from requiring unreasonable (and, therefore, exclusionary) compensation for access to, poles, ducts, conduits or rights-of-way."

The effect of DTE's ruling eliminates any barriers by owners or managers of pole, conduits and rights-of-way. Therefore, as to the issue of Merton's ability to deploy its network infrastructure without barriers to that deployment, this matter has been addressed affirmatively by the DTE and allows companies the ability to gain use and access.

7.4.4 Massachusetts Public Construction

Public construction in Massachusetts generally falls into one of two categories: (i) Work involving repair, remodeling, re-constructions, or construction of public building, referred to as "vertical construction" is governed by G.L. c. 149, (ii) Construction of public work, referred to "horizontal construction" is governed by G.L. c. 30, section 39M. In general, projects that involve public buildings are subject to more rigorous requirements that public works projects, including statutory designer selection procedures, pre-qualification requirements, additional advertising requirements and provisions for filed sub-bids.