

Analysis of WiredWest/MBI Last Mile Fiber Revenue Projections

Executive Summary

WiredWest (WW) was chosen by the Massachusetts Broadband Institute (MBI) to own and manage a last mile fiber optic network to connect 44 towns in western and central portions of the state and covering approximately 1,500 square miles, including approximately 35 WW member towns. A quarter of a billion dollars will have been invested from Federal, State and municipal sources before the network becomes operational.

WW and MBI hosted regional presentations in November and December 2014 to inform the towns that for the project to proceed, they would have to issue \$60M-\$79M in long term bonds to underwrite last mile construction and organizational startup costs. Each town's bond allotment would be based on a combination of housing units and road mileage. WW asked for a commitment by December 31 from every Selectboard that they would place the bonding initiative on a town meeting warrant in the spring of 2015.

The towns would be solely responsible for all bond interest and principal payments, any WW operating shortfalls, any cost overruns, and any deficit from non-appropriated portions of \$40 million in State grants.

While WW hopes to eventually reimburse the towns for their bond costs, the success of this effort depends on many factors, both technical and financial. From an examination of first order inputs alone, it appears that the long term revenue stream projected by the WW model is inaccurate and insufficient to even maintain operations, let alone cover the interest and retire the bonds.¹

¹ Public records cited can be found at www.knic.com/ww

Potential Customers

The number of houses tallied for the WW/MBI financial presentation of December 11, 2014 was over-counted by 7,614, or 39.3 percent. This was due to counting **all** housing units, as seen in the figure below, instead of **occupied** units per the 2010 Federal Census, as shown in the table that follows. The unoccupied units consist of seasonal vacation homes and dwellings unoccupied for various reasons such as for sale, foreclosure or abandonment.

Addressable Market	Premises
Alford	342
Ashfield	877
Becket	1,728
Blandford	574
Charlemont	681
Chesterfield	591
Colrain	797
Cummington	485
Egremont	921
Florida	356
Goshen	598
Hancock	534

The residential **Market** consists of 44 Towns and 26,981 Premises.

From page 34 of the December 11th, 2014 Financial Presentation

Total & Occupied Houses in the 44 WW/MBI Last Mile Towns – 2010 Census²

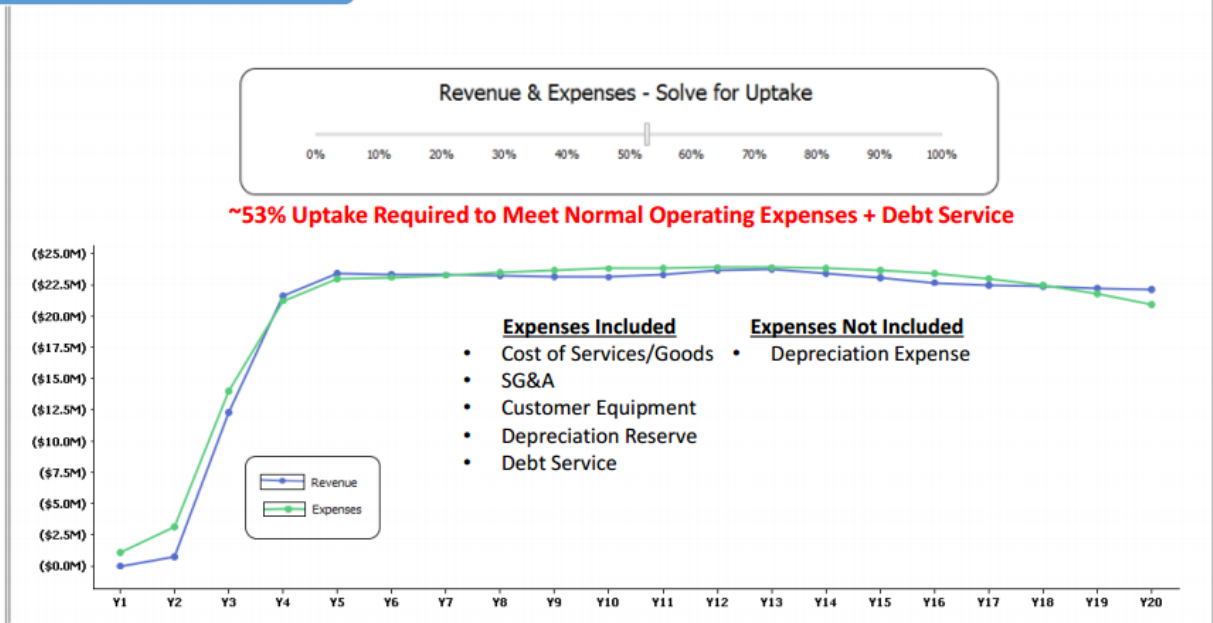
Town	Houses	Occupied
Alford	342	223
Ashfield	877	760
Becket	1728	763
Blandford	574	492
Charlemont	681	561
Chesterfield	591	511
Colrain	797	683
Cummington	485	404
Egremont	921	563
Florida	356	308
Goshen	598	416
Hancock	534	299

² The data in the table was excerpted from the following report provided by the Donahue Institute at UMass: Table 3. Number of Housing Units at the State, County and Minor Civil Division level: 2000 to 2010,” http://www.massbenchmarks.org/statedata/data/census_2010_redistricting_data/table_3_housing_unit.xls

Town	Houses	Occupied
Hawley	198	128
Heath	670	302
Hinsdale	1,133	868
Lanesborough	1,478	1,291
Leyden	325	288
Middlefield	279	218
Monroe	77	57
Monterey	928	426
Montgomery	343	330
Mt Washington	148	74
New Ashford	112	95
New Braintree	390	370
N. Marlborough	1,039	630
New Salem	465	404
Otis	1,701	708
Peru	413	336
Petersham	546	493
Plainfield	329	269
Princeton	1,339	1,279
Rowe	227	167
Royalston	574	498
Sandisfield	671	377
Savoy	357	298
Shutesbury	866	714
Tolland	510	197
Tyringham	280	138
Warwick	426	329
Washington	261	225
Wendell	436	391
W. Stockbridge	856	593
Windsor	491	369
Worthington	629	522
Total	26,981	19,367

This over-counting overstates the WW revenue projections. WiredWest projects that a 53% take rate (14,300 customers) from all 44 towns is required to meet minimum expenses other than depreciation of about \$22M per year, as shown in the figure below. A more realistic projection based on the 19,367 **occupied** houses indicates that a customer take rate of 73.8%, not 53%, is required to meet the same 14,300 customer count.

44-Town Scenario

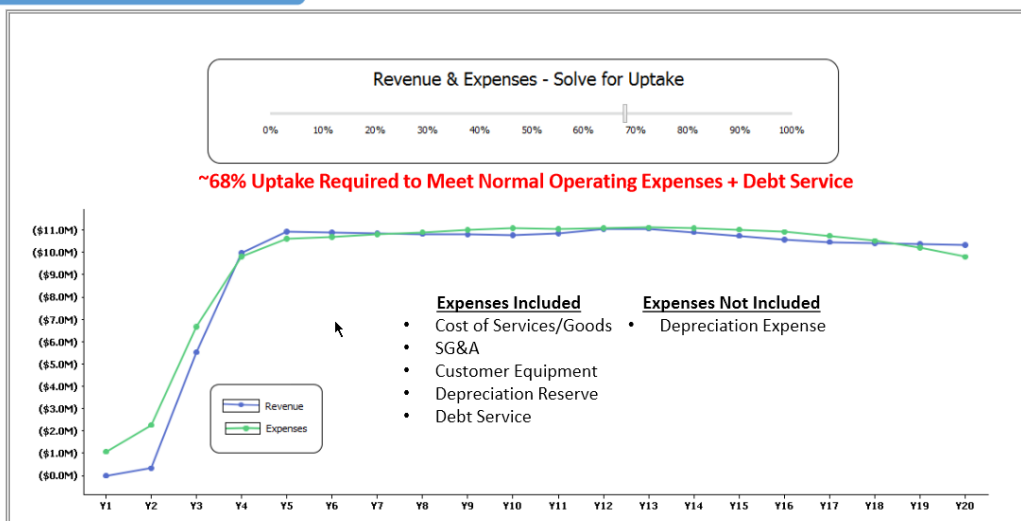


44-Town Scenario from the December 11, 2014 Financial Presentation

Alternately, when the 53% take rate is applied to occupied rather than total units using the WW model, annual gross revenues fall by \$6.1M, from \$21.5M to \$15.4M.

The numbers become still more implausible should fewer than 44 towns participate in the project. Their 22-town scenario requires a 68% take rate to meet normal operating expenses – again, bear in mind that the required percentage is higher still when only occupied homes are considered.

22-Town Scenario



22-Town Scenario from the December 11, 2014 Financial Presentation

Thus, based on the current model, the complicated allocation of bonding dollar requirements to the towns is no longer valid. For example, the Middlefield local tax assessment shows 42 houses owned by non-residents. The vacation town of Otis has their dwelling count drop from 1701 to 708; Becket's falls from 1728 to 763.

I based earlier reports to my Selectboard on Middlefield specific conditions and provided area wide approximations. I have since compiled area wide statistics for all 44 towns and present them here.

Take Rates

The WW/MBI analysis projects take rates in the 40-80 percent range. While they may believe that they have evidence to support these numbers, they are not born out by comparable statistics from Verizon and other providers. WW solicited non-binding sign up cards from member towns, and the latest tally shows that 55 percent of responders were interested in internet access and about 35-40 percent in video and phone. Bear in mind that the original 53% minimum take rate to satisfy the projection turns into 74.8% of occupied dwellings.

CUSTOMER

	51			
	40%	50%	65%	80%
Cumington	194	242	315	388
Egremont	368	460	598	736
Florida	142	178	231	284
Goshen	239	299	388	478
Hancock	213	267	347	427
Hawley	79	99	128	158
Health	268	335	435	536
Hinsdale	453	566	736	906
Lanesborough	591	739	960	1,192

A Customer is a household that subscribes to ANY bundled or discrete **Product(s)**.

Excerpted from page 34 – December 11th, 2014 Financial Presentation

Verizon has millions of customers for its comparable fiber service (FIOS) in urban areas. A recent article quoted in [Wikipedia](http://en.wikipedia.org) states that Verizon has a country wide FIOS take rate of 25% for internet and a 21% take rate for CATV services. Verizon has a near monopoly and launches massive promotional campaigns, yet they are now concentrating on wireless systems and no longer expanding FIOS.

I asked the town of Russell for take rates and costing for their town owned CATV and Internet system. I have not received the data, but I suggest that this would represent a relevant indication for systems operating in this area. These independent providers could also quantify the potential decline in CATV interest.

Demographics

Most small towns in our region are losing population. According to another UMass projection, the Middlefield population declines from 521 to 462 (11.3%) from 2010 through 2030. The school age population is cut nearly in half from 83 to 48 while the over 60 fixed income population will grow to 55% of the town by 2030 – an increase from 115 to 254 in absolute terms.

A 0.3% per year decline in population equates to a near \$31M projected loss in revenue over 30 years based on a \$22M per year gross. Small changes have large impacts. You could pick individual towns to give any result, but the aggregate 20 year decline for the 44 towns is 6.5%. The 30 year extrapolated decline is 10%. The revenue decline due to the massive shift to the predominance of fixed income seniors and the rapid decline of school age children must also be taken into account.

Table 2: Population Change in the 44 WW/MBI Last Mile Towns 2010 - 2030³

Town	2010	2015	2020	2025	2030	% 20 yr.
Alford	494	552	606	647	681	37.9
Ashfield	1,737	1,699	1,651	1,556	1,461	-15.9
Becket	1,779	1,794	1,787	1,766	1,713	-3.7
Blandford	1,233	1,219	1,190	1,156	1,117	-9.4
Charlemont	1,266	1,195	1,119	1,011	884	-30.2
Chesterfield	1,222	1,209	1,188	1,143	1,098	-10.1
Colrain	1,671	1,605	1,522	1,413	1,273	-23.8
Cummington	872	888	853	806	748	-14.2
Egremont	1,225	1,148	1,074	986	901	-26.4
Florida	752	783	809	839	873	16.1
Goshen	1,054	1,121	1,157	1,203	1,240	17.6
Hancock	717	694	682	675	656	-8.5
Hawley	337	354	370	383	385	14.2
Heath	706	642	583	510	436	-38.2
Hinsdale	2,032	2,102	2,172	2,205	2,203	8.4
Lanesborough	3,091	3,072	3,063	3,048	3,009	-2.7
Leyden	711	671	638	593	519	-27.0
Middlefield	521	517	508	493	462	-11.3
Monroe	121	141	155	174	188	55.4
Monterey	961	929	889	843	798	-17.0
Montgomery	838	910	968	1,025	1,074	28.2
Mt Washington	167	184	203	220	239	43.1
New Ashford	228	221	210	193	171	-25.0
New Braintree	999	1,021	1,048	1,068	1,080	8.1
New Marlborough	1,509	1,478	1,435	1,371	1,281	-15.1

³ The data in the table was excerpted from the following report provided by the Donahue Institute at UMass:
http://pep.donahue-institute.org/City_TownTotals_4_3.xls

Town	2010	2015	2020	2025	2030	% 20 yr.
New Salem	990	1,022	1,063	1,103	1,123	13.4
Otis	1,612	1,726	1,829	1,914	1,980	22.8
Peru	847	875	891	915	906	7.0
Petersham	1,234	1,256	1,278	1,305	1,331	7.9
Plainfield	648	670	689	702	700	8.0
Princeton	3,413	3,374	3,287	3,137	2,927	-14.2
Rowe	393	406	427	441	464	18.1
Royalston	1,258	1,248	1,235	1,194	1,138	-9.5
Sandisfield	915	956	989	1,008	1,024	11.9
Savoy	692	691	686	676	671	-3.0
Shutesbury	1,771	1,703	1,608	1,475	1,324	-25.2
Tolland	485	507	531	562	588	21.2
Tyringham	327	323	309	294	272	-16.8
Warwick	780	796	817	822	817	4.7
Washington	538	530	512	489	464	-13.8
Wendell	848	777	679	567	469	-44.7
West Stockbridge	1,306	1,226	1,157	1,067	956	-26.8
Windsor	899	894	886	858	827	-8.0
Worthington	1,156	1,096	1,041	954	861	-25.5
Total	46,355	46,225	45,794	44,810	43,332	-6.5

Customer Purchases and Product Mix

It appears from reverse engineering their projections that WW has used \$125 per month for their revenue basis. This is an **average** purchase of services by each customer. As basic 25 Mbps internet is priced at \$49, and price for the “Triple Play” 25 Mbps package is \$118, how is this \$125 average arrived at?

		Starting Price
Triple Play	25	\$ 118.00
	50	\$ 137.00
	100	\$ 155.00
	1000	\$ 174.00
Double Play (Voice + Data)	25	\$ 61.00
	50	\$ 80.00
	100	\$ 99.00
Double Play (Video + Data)	1000	\$ 118.00
	25	\$ 107.00
	50	\$ 126.00
Double Play (Video + Data)	100	\$ 145.00
	1000	\$ 164.00
	Single Play (Data)	25
50		\$ 69.00
100		\$ 89.00
1000		\$ 109.00

WiredWest service pricing from page 34 – December 11th, 2014 Financial Presentation

[Verizon](#) sells comparable triple play service for \$80 a month with a \$300 rebate on a 2 year plan. The net cost is \$67.50 per month and their take rate is 22% at this reduced price.

Cable television is slowly being replaced by streaming video services such as Netflix and Amazon. Sling TV from Dish will provide ESPN, ESPN2, TNT, CNN, Disney Channel, Maker Studios, etc. for \$20 per month. High Definition [Satellite](#) TV is available for about \$25 a month for 130 channels. People will not want to pay WW \$58 additional per month for 100 or 150 “filler” channels they don’t want to watch. Actual decline rates for CATV subscriptions should be integrated into the WW/MBI projections.

Voice over Internet Protocol (VoIP) is a commodity. [Accessory units](#) can be purchased for a one-time cost of less than \$50. The telephone service is then free. I doubt many would drop their Verizon land lines to pay WW \$12 a month for basic service, let alone \$20 more for “Full Phone” service, should they even want a “land line” – a rapidly vanishing paradigm.



WiredWest phone + internet charges from slide 19 – Solving the Last Mile, Fall 2014 Municipal Leaders Meeting

Profit versus Non-Profit

There is no magic formula that relieves a non-profit cooperative organization from generating an operating surplus – the only advantage is that any profits would be distributed to the members. Absent ongoing subsidies from the State or member towns, the organization must break even to survive.

Why has no experienced commercial operator come forward to operate this system, given the \$100M State investment to date? The answer is that sparsely populated regions are not a viable proposition for commercial vendors. In that case, how will an inexperienced WW generate break even revenues given the same constraints?

I suggest that WW’s only option will be to charge 2 or 3 times the going rate for services and pray a nimble commercial operator does not pirate the lower-hanging fruit from the more densely populated areas.

It is ironic that despite millions of dollars in bonds floated by town taxpayers, they will nevertheless likely be subjected to higher monthly charges. The WW/MBI financial foundation is built on a bed of quicksand.

Technology

WW makes the point that fiber technology is “bullet-proof” and upgrades will never be required. This is but half of the equation. The technology must also be price-competitive in the long run. WW states they will run 1000 Mbps fiber to every house in the 44 town area, when only a handful of customers will ever require anything over a few Mbps.

The internet was invented but 20 years ago, so it is folly to predict the dominance of a current technology 30 years from now. Disruptive Technologies such as the recently proposed space network of a few hundred low orbiting satellites could make most terrestrial networks obsolete, especially those in rural areas. Google, Facebook, and others could offer free or low-cost broadband in order to capture market share, as their business model is based on advertising, not subscription fees.

Revenue Projection Test

I have constructed a basic 32-year model to test revenue assumptions, as a barebones example so anyone can follow the numbers. If this model doesn’t work, then more sophistication won’t fix the problem.

I use the occupied house count modified by a linear 10% decrease over the test period. This is the proxy for population decrease. The initial count was reduced to account for the 5 year lapse from the 2010 census. I use a constant 55% take-rate and revenue per customer drops from \$100 to \$75 per month over the 32 year period. WW used a more severe decline assumption for customer billing in their model – double my model.

I calculate gross income per year and from that I subtract yearly \$80M bond principal and 4% interest payments. The expenditure identified as “Network” is all organizational, material and equipment expenses and is deducted. WW indicated that this expense was about \$16M per year in their test case. I used \$14M. To my knowledge no definitive operational cost models have been provided. WW would have to demonstrate that these operational costs were \$5M a year or less to bring net revenue into balance.

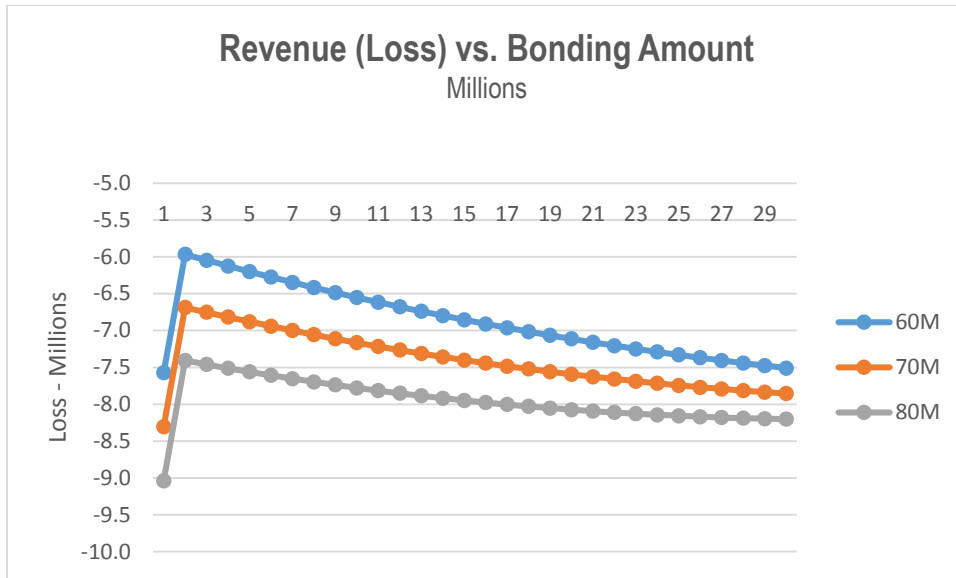
Net Income is shown in the last column. All numbers are in millions. The model is followed by two graphs. The first examines and tests income versus various take rates and a second projects revenues versus 3 bonding cost scenarios. All other variables are held constant.

Table 3: 32 Year Revenue Test

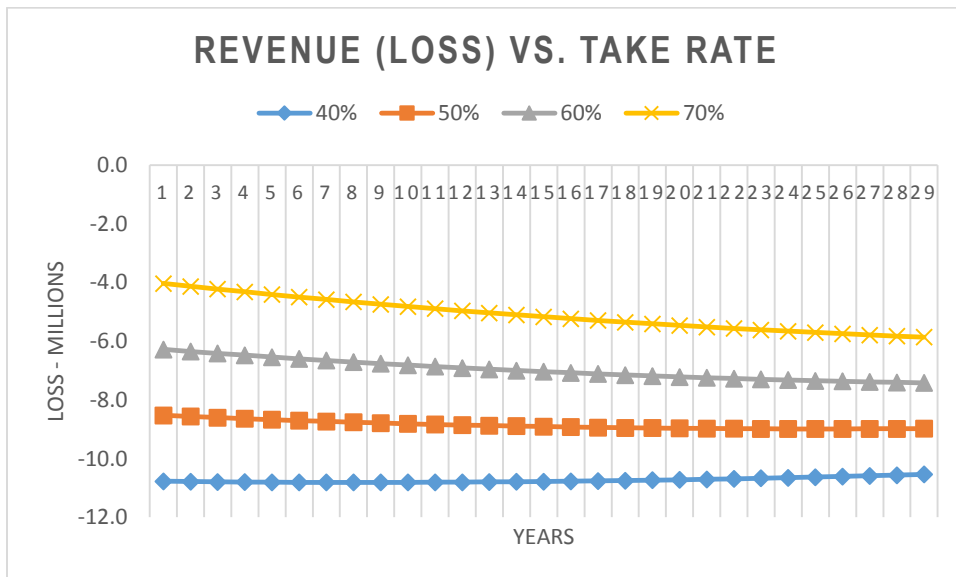
Year	Houses	% Take	\$ Month	Gross Inc.	Bond Amt	Principal	Interest	Network	Net Income
1	19078	0.00						3.0	-3.0
2	19021	0.00						6.0	-6.0
3	18964	0.30	100	6.8	80.0	2.7	3.2	10.0	-9.0

Year	Houses	% Take	\$ Month	Gross Inc.	Bond Amt	Principal	Interest	Network	Net Income
4	18907	0.55	99.00	12.4	77.3	2.7	3.1	14.0	-7.4
5	18850	0.55	98.01	12.2	74.7	2.7	3.0	14.0	-7.5
6	18794	0.55	97.03	12.0	72.0	2.7	2.9	14.0	-7.5
7	18737	0.55	96.06	11.9	69.3	2.7	2.8	14.0	-7.6
8	18681	0.55	95.10	11.7	66.7	2.7	2.7	14.0	-7.6
9	18625	0.55	94.15	11.6	64.0	2.7	2.6	14.0	-7.7
10	18569	0.55	93.21	11.4	61.3	2.7	2.5	14.0	-7.7
11	18513	0.55	92.27	11.3	58.7	2.7	2.3	14.0	-7.7
12	18458	0.55	91.35	11.1	56.0	2.7	2.2	14.0	-7.8
13	18402	0.55	90.44	11.0	53.3	2.7	2.1	14.0	-7.8
14	18347	0.55	89.53	10.8	50.7	2.7	2.0	14.0	-7.9
15	18292	0.55	88.64	10.7	48.0	2.7	1.9	14.0	-7.9
16	18237	0.55	87.75	10.6	45.3	2.7	1.8	14.0	-7.9
17	18183	0.55	86.87	10.4	42.7	2.7	1.7	14.0	-7.9
18	18128	0.55	86.01	10.3	40.0	2.7	1.6	14.0	-8.0
19	18074	0.55	85.15	10.2	37.3	2.7	1.5	14.0	-8.0
20	18019	0.55	84.29	10.0	34.7	2.7	1.4	14.0	-8.0
21	17965	0.55	83.45	9.9	32.0	2.7	1.3	14.0	-8.1
22	17911	0.55	82.62	9.8	29.3	2.7	1.2	14.0	-8.1
23	17858	0.55	81.79	9.6	26.7	2.7	1.1	14.0	-8.1
24	17804	0.55	80.97	9.5	24.0	2.7	1.0	14.0	-8.1
25	17751	0.55	80.16	9.4	21.3	2.7	0.9	14.0	-8.1
26	17697	0.55	79.36	9.3	18.7	2.7	0.7	14.0	-8.1
27	17644	0.55	78.57	9.1	16.0	2.7	0.6	14.0	-8.2
28	17591	0.55	77.78	9.0	13.3	2.7	0.5	14.0	-8.2
29	17539	0.55	77.00	8.9	10.7	2.7	0.4	14.0	-8.2
30	17486	0.55	76.23	8.8	8.0	2.7	0.3	14.0	-8.2
31	17434	0.55	75.47	8.7	5.3	2.7	0.2	14.0	-8.2
32	17381	0.55	74.72	8.6	2.7	2.7	0.1	14.0	-8.2
				307.0		80.0	49.5		-238.6

Simply put, the WW model does not work. Even under the most generous basic assumptions, there is a \$6-8M annual shortfall with no mechanism to repair the customer base. The latest WW financial presentation was used and WW base line assumptions were improved.



Take Rate = 55%, Operating Expenses = \$14M per year
 Total cumulative losses – 30 years – in millions:
 \$206.2 (60M), \$222.4M (70M) and \$238.6M (80M)



Bonding = \$80M, Operating Expenses = \$14M per year
 Total cumulative losses – 30 years – in millions:
 -311.4 (40%), -256.8 (50%), 202.2 (60%), 147.7 (70%)

Conclusion

This large area fiber network approach cannot be made financially viable, even under the most generous assumptions. The organizational, bonding repayment and technology costs overwhelm any potential revenue stream.

Additional concerns of population decline, take rate overestimation and unrealistic product pricing are all negative concerns which have to be assessed, not to mention the general stagnation in discretionary incomes. I cannot recommend to Middlefield the passage of a million dollar plus bond initiative to support this activity.

Despite massive Federal, State, and municipal funding, the WW fiber network would end up serving only five percent of MBI's middle-mile population. To participate, a town would have to be a WW member and agree to mortgage its future. A far simpler town-centric model based on appropriate technology that takes advantage of the Middle Mile infrastructure should be considered.

MBI funded several small studies utilizing various connecting technologies. Could MBI expand the studies to take advantage of recent innovations to provide demonstrations which would provide appropriate and vetted technology options with associated costs? Not every town would choose 1000 Megabits per second (Mbps) fiber if the town bonding obligation is millions, especially if alternatives were available. Perhaps 5 Mbps internet is adequate for many – if the liability to the town is zero. These choices should have been available with robust technical and financial models for examination and comparison. MBI started on this logical path – but apparently became sidetracked.

\$80M of bonding and \$40M of State grants are at risk of misallocation. This process appears open to error and potential manipulation by not publishing a universal bonding allocation formula.

Howard Knickerbocker
February 2015