

# Verizon Communications Fiber to the Premises

**15.912 Technology Strategy  
Professor Rebecca Henderson**

**May 11, 2005**

**Kevin Choy  
Charles Guo  
Yicong Li**

## ***Table of Contents***

Introduction .....	3
Market Scenario Analysis.....	3
Industry Analysis.....	6
Value Creation.....	9
Value Capture .....	11
Uniqueness .....	11
Complementary Assets.....	12
Network Effects .....	12
Value Delivery.....	12
Economics .....	14
Bottom Line.....	15

# Introduction

Verizon is the second largest telecommunication service provider in the United States and operates fixed-line regional and long-distance phone services, mobile phone services (through the joint-venture of Verizon Wireless), and broadband (DSL) Internet services.

Verizon faces very intense competition in all business segments. The fixed line phone business has been declining for years and is expected to continue to lose subscribers in face of mobile phones and VoIP services. The aggressive move of cable companies offering fixed-line phone services through their cable systems further intensifies the competitive landscape. The mobile phone business which Verizon has historically enjoyed success is facing stronger competitions from industry consolidation and the virtual operators (MVNOs). The broadband Internet service is still playing catch-up and in an uphill battle against cable companies due to the slower speed of DSL. Even worse, the competitive pricing of the bundling of cable package to include cable TV, local/long-distance phone, and broadband Internet access services may further deteriorate the situation.

So the big questions are: What should be Verizon's long term strategy? How should it fend off the competitions from cable companies? In this paper we are going to address the above questions. The concepts of convergence and integration will be introduced, and options be laid down based on the various scenarios of future trends of convergence and integration. We then analyze the industry dynamics and apply the value creation / capture / delivery methodology to better understand the implications of these options and circumstances under which they would make sense. Our overall analysis will focus on whether Verizon's FTTP (fiber to the premise) investment will win the competition against cable operators. Our final recommendations, including economic impact, will be given at the end.

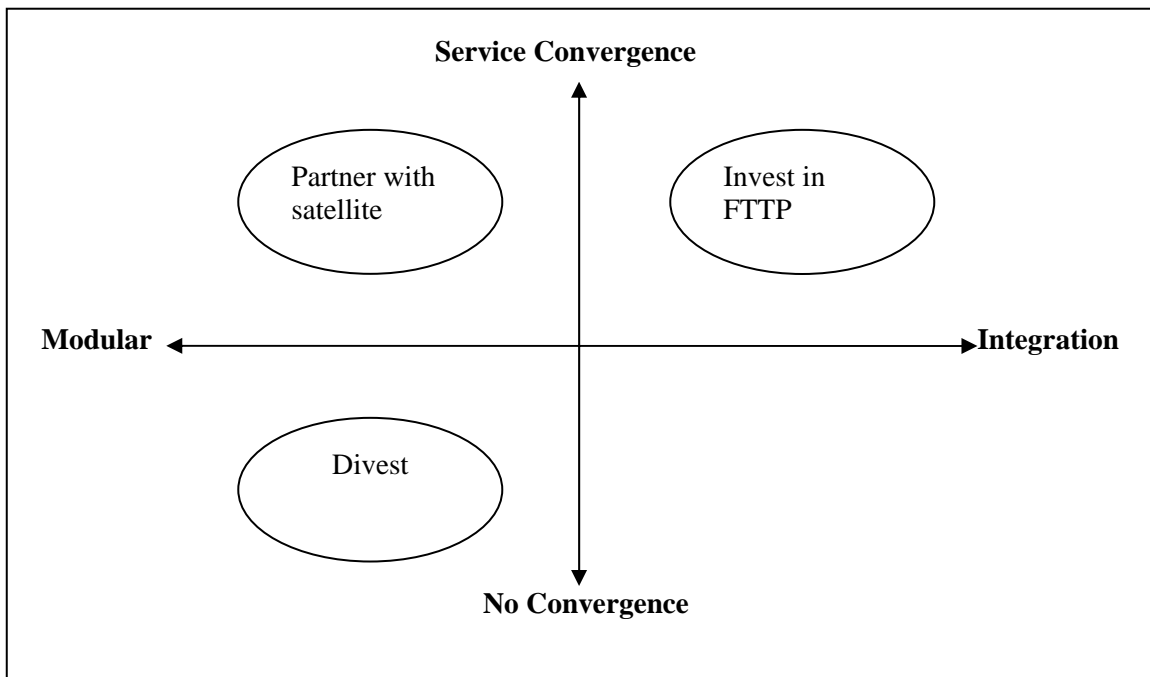
## Market Scenario Analysis

To better understand the market that Verizon operates, we need to introduce two concepts – convergence and integration. Convergence is different from bundling. While bundling simply aggregate

sales of multiple services, convergence means all services will work seamlessly together with one or more networks in a new infotainment world. This converged system will deliver entertainment, communication, and innovative services to consumer's living room or home office. In an integrated architecture, in contrast to modular architecture, different services work together within a closely proprietary system, and naturally, within a single network operated by one giant company. We will discuss these concepts further in the value creation section.

Depending on the market's future convergence and integration roadmap, we believe that Verizon can adopt the following four different strategies:

1. Wait and do nothing;
2. No convergence, no integration: divest fixed phone line to become mobile service pure-play;
3. Convergence but no integration: partner with satellite TV players to offer bundle package;
4. Convergence and integration: invest in new technology such as fiber to the premises (FTTP)



### **Option 1: Wait and do nothing**

With cable companies quickly eroding into the core phone business, we believe this is not a viable option.

### **Option 2: Divest into separate companies**

If no convergence or integration is expected, Verizon should divest into separate companies, with each focusing on one particular business segment: fixed-line phone, mobile phone, and broadband Internet. The more focused organizations may yield higher operation efficiency and be able to adjust their business/financial structures with more flexibility. The central idea is to remain competitive in wireless services and not to burden it with the declining ISP and fixed-line divisions.

The validation of no convergence, however, is doubtful. We have seen evidence that at least some degrees of convergence have taken place, such as the convergence of fixed-line phone and broadband Internet services. This option, nevertheless, remains a possible scenario.

### **Option 3: Partner with satellite TV players**

For a world of convergence without integration, Verizon may simply partner with the satellite TV players and bundle such service with the existing services. Advantages of such strategic alliance include reducing execution risk, minimizing up-front investment, and benefiting both the telecom and satellite operators with the missing tools in the “multi-play” armory.

Such partnership has its problems. While it provides “multi-play” against cable companies, the alliance could still be weak, especially since the uneven value capture (most likely the majority of the transaction profits will go to the satellite TV players). Also, such bundled packages still do not offer technical or operational advantages over the cable companies.

## **Option 4: Build high-bandwidth fiber network (FTTP)**

If convergence and integration is indeed the future trend, Verizon should offer multiple services through the highly integrated network. The degree of convergence would matter significantly. Cable companies are offering “triple-play” by providing new voice (fixed-line phone) and data (broadband Internet) services over their existing cable TV infrastructures. While Verizon also offers triple-play with fixed-line phone, mobile phone, and broadband Internet service, the critical TV service is not part of the package, which greatly weakens its competitive position.

Verizon sees this as a market trend and is investing in building a new network which would deliver TV service to compete with cable companies. The bandwidth of such network must be high enough to accommodate sending TV signals over the network, and have the potential to scale up even more in the future. The most promising technology available now is FTTP, an optical fiber network that gets into customers’ homes.

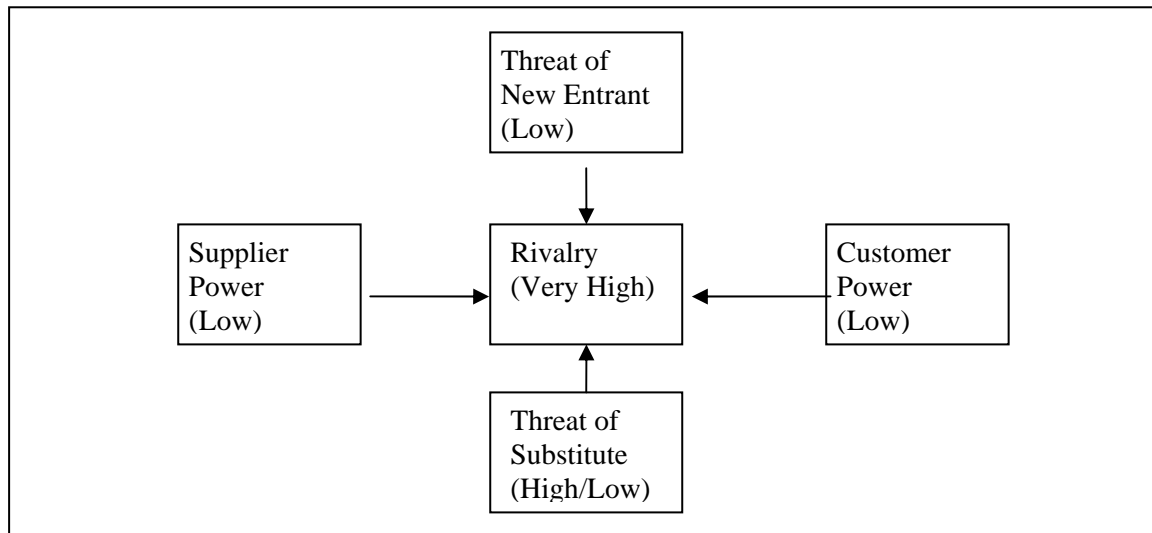
FTTP’s technical advantage<sup>1</sup> is significant. It is estimated that various technologies based on fiber can deliver 30-100 Mbps bandwidth, enough to provide interactive high-definition TV service and high-speed Internet service in the same time. With the TV capability, the “quad-play” provides even higher services convergence to customers and can effectively gain a competitive edge over the “triple-play” by cable companies.

## **Industry Analysis**

The diagram below depicts the environment that Verizon operates - highly rivalry with relatively mild external forces.

---

<sup>1</sup> “IPTV” technology has been used in several cities in Japan, Hong Kong and Italy, and achieved very encouraging results. FTTH at 100 Mbps has been offered in Japan since 2002 and within 18 months the number of FTTH subscribers reached 1.4 million or 9 percent of Japan's broadband subscriptions.



## Rivalry – High

Verizon faces very strong competition in all its business lines: fixed-line phone service, mobile phone service, and broadband Internet service.

### ***Fixed line phone service:***

Competitors in fixed-line phone service come from traditional and non-traditional fronts. Traditional competitors include other RBOCs and national phone service providers such as Qwest. The competition among regional bells is fairly mild as they have been careful not to cross borders with each other. Non-traditional phone service providers, on the other hand, pose a significant challenge to Verizon and other RBOCs. The biggest competitors here are the cable companies, which can now offer fixed-line phone services through the cable system. According to Jason Bazinet, an analyst with Citigroup Smith Barney, more than 25 million homes today can get phone service from their cable operators, and that number should increase to 40 million homes by year end 2005. Cable companies often bundle the fixed-line phone with the cable TV to achieve a much lower price for customers.

### ***Mobile phone service***

Major competitors include Cingular-AT&T Wireless, Sprint-Nextel, and T-Mobile. The recent consolidation in this field has significantly strengthened Verizon's competitors: Cingular overtook Verizon Wireless to become the largest wireless carrier and the combined Sprint-Nextel has a much higher user base, approaching that of Verizon.

### ***Broadband Internet service***

The DSL services face strong competition from the cable modem service by cable companies. Cable companies currently have about 60% of broadband Internet subscribers, and cable's faster speed over DSL has been a key selling point.

### **Threat of New Entrant – Low**

Barriers to entry in these business segments are high. For fixed line phone service, the economy of scale is difficult for new entrants to achieve. For mobile phone service, it is prohibitively expensive to build a new wireless network and get the spectrum license. For broadband internet service, the barrier also comes from the high capital investment required. Note that new wireless technologies may enable low cost infrastructure and reduce the entry barrier to provide infotainment channels to consumers.

### **Threat of Substitute – High for fixed-line, low for mobile / broadband**

#### ***Fixed line phone service:***

Mobile phones and Voice-over-IP (VoIP) are good substitutes for fixed-line phones. VoIP becomes a major threat to the traditional fixed line phone operators such as Verizon due to its much lower cost structure. VoIP players such as Vonage and Skype gained rapid adoption.

#### ***Mobile phone service / Broadband Internet service***

Currently there are no apparent good substitutes for wireless phone services or broadband Internet service. However, technology advancement could change that very quickly.



## **Supplier Power – Low<sup>2</sup>**

There are numerous network equipment suppliers, which have suffered from the depressed telecom market. The relatively mature technologies also commoditize the products. As such, the bargaining power of suppliers has been weak.

## **Buyer Power – Low**

Since most of buyers are small (residential and small business users), they do not have much buyer power. While the big corporations are better positioned to negotiate for discounts, the recent industry consolidations of SBC acquiring AT&T and Verizon acquiring MCI have significantly reduced the available alternatives for these corporations and thus their negotiation power.

## **Value Creation**

How much value can Verizon create by deploying FTTP and services? We would like to understand value creation from three aspects: higher willingness to pay from consumers, synergies, and defensive strategy.

First, FTTP will allow Verizon create value by offering more and better services. We recognize cable operators have been improving the bandwidth throughput of cable modems. However, there is a significant bandwidth advantage for fiber cables. This may translate into higher subscription fees in return for faster Internet access, more on-demand programs, and more HD channels. The argument will be more compelling if applications that require high bandwidth pipes become widely adopted. Such applications may include high definition video conferencing, 3D on-line gaming, and holographic images. Fiber cables may be the only pipe capable of providing enough bandwidth for such applications.

---

<sup>2</sup> Here we discuss the current situation at Verizon. For its new TV distribution business, however, suppliers such as networks and content aggregators are very powerful.

We also believe FTTP enables Verizon to create value from integrated convergence by providing convenience to consumers and operational synergy to service providers. In the future, information and entertainment services will be converged and tightly integrated. We see a world in which we can seamlessly answer a video call from a friend while streaming our favorite movie displayed on television in our living room. We can then leave home right after the call and switch the unfinished part of the movie to our mobile device so we can continue watching the movie while riding the subway. Only companies capable of converged network services can provide such services to consumers. Partnerships with video operators, which is simply bundling services may not provide the integration needed to provide such tightly coupled services. Verizon has to deploy fibers to home to prepare for that future.

On the cost side, FTTP and video services to consumers' homes enables Verizon to achieve some synergies in both operations and marketing. The cost of providing customer service, billing, and IT for bundled phone, Internet access, and television and video services will be less expensive than providing these services separately. Fiber is cheaper to maintain than copper wire, and once the infrastructure is in place, it is easier to upgrade. Marketing costs could be leveraged, taking advantage of economies of scope. Selling additional services to an existing customer will be cheaper than acquiring a new customer.

Third, Verizon should deploy FTTP to defend itself from its cable rivals. Cable operators who already control the "content service" now go after the "pipe service" – telephone and broadband Internet access - and have been steadily making inroad into fixed line telephone services by providing bundled service and fast Internet access. Cox and Cablevision have signed up as many as 20% of TV subscribers for phone services. Once the Baby Bells lose these customers, it will be more costly to win them back. Losing customers means losing economies of scale and scope. There is no better way for Verizon to defend its position and keep existing customers than attacking the core business of its cable rivals.

## Value Capture

The entry of cable operators<sup>3</sup> in fixed line service area and RBOC's entry into video products will increase the competitive dynamics of the industry. Despite this, we believe that Verizon's uniqueness, complementary assets, and local lock-in through network effects will distinguish itself from its competitors and help make its FTTP plans successful.

## Uniqueness

Currently, Verizon has no unique service offering other than wireless service. But if Verizon believes in a future of integrated convergence, then Verizon has to create uniqueness to compete for telephone and cable subscribers. How unique the fiber cable is from the co-axis cable owned by cable companies? According to Verizon, the fiber cable has a huge bandwidth advantage (chart below). If the demand for bandwidth increases as Verizon hopes, fiber's inherent superior performance will become a unique competitive advantage.

---

<sup>3</sup> We will discuss other potential threat to Verizon's future later in this paper.

## **Complementary Assets**

Verizon holds many complementary assets. Verizon's success will be largely dependent on how well it will be able to leverage its complementary assets, particularly its large customer base, marketing, and brand. To maximize the value of the fiber network, Verizon hopes that these assets will compel not only its existing customers to subscribe to its video and integrated services but also new customers as well. To a lesser degree, Verizon will leverage its knowledge of operating large networks and back office infrastructure, such as billing and IT, to make FTTP successful.

## **Network Effects**

In an integrated convergence world, Verizon will be able to create a local lock-in through network effect. To benefit from tightly integrated services, as the earlier example has shown, consumers have to subscribe to all services provided by Verizon. Different services are complementary products to each other and create a strong local lock-in. However, this lock-in will not be global in nature – Verizon's subscribers can still communicate to, for example, Comcast's subscribers.

## **Value Delivery**

Video services have been tried by Verizon and other phone operators<sup>4</sup> but failed. We believe that the poor financial condition of the phone operators at the time, the prohibitive cost of rolling out a video service, and the lack of a unique and compelling product were the primary reasons for their failure. Now, Verizon is financially sound, FTTP cost structure is much more attractive, and the technical means to provide integrated

---

<sup>4</sup> Ivan Seidenberg, then CEO of Nynex and now CEO of Verizon declared in 1994, "We will offer consumers the next generation of on-demand programming and interactive services, including shopping, games, sports, information and education." Bell Atlantic Chairman Ray Smith famously attempted to buy Tele-Communications Inc., then launched the Stargazer video-on-demand system in Alexandria, Va. SBC built a system in a Dallas suburb, US West in Omaha and Phoenix, Ameritech in Ohio and Michigan, PacTel in San Jose.

communication services makes Verizon's fiber plan much more feasible. The real challenges for Verizon to deliver value and "jump the S-curve" will be two-fold: organization challenge and new capability building.

## **Organization Challenges**

Historically cable companies were never the ones to lead innovation and adoption of new technologies. For cable operators, the lack of incentives, for example, to adopt new technology to upgrade the speed of its cable modem services without being able to charge a higher price, could be a death knoll. After all, there has been no immediate threat for cable companies. While the difficulty of cable operators to deal with necessary organization changes may buy Verizon some time, it is even more challenging for Verizon than its cable rivals to reinvent itself. As it has been well discussed in class and in literatures, it is challenging to design and implement an amphidexterous organization: efficiently run the current successful business while develop new products and services and the capabilities to deliver those products and services.

New market structure needs new organizations. To meet the future market needs in the converged infotainment world, first, the company structure and culture need to be changed to facilitate constant innovation, and second, multiple business divisions need to be well coordinated, if not integrated, to deliver converged services.

## **New Capabilities Needed**

Verizon needs to build up three sets of capabilities to successfully delivery value. As Verizon moves from providing "pipe service" – telephone and DSL Internet access to "content service" – television programs and video on demand services, it will need the skills to deal with content providers and regulatory bodies. Verizon will need to build up its technical know-how of operating the FTTP network. Lastly, Verizon, to take advantage of its new fiber network, must develop its innovation capabilities in not only hardware and service integration but also application development.

## **Technology Risks**

One of the key risks in building the new fiber network is that emergence of new technologies that could provide higher bandwidth with lower cost than FTTP. For instance, WiMAX, a wireless technology that is capable of delivering 50-100Mbps similar to that of FTTP, has the potential to bring technology disruption to the current phone vs. cable competition. While it will not become available until 2007, the much lower cost structure of deploying WiMAX could pose serious threat to Verizon's fiber strategy.

## **Economics**

Based on our analysis, Verizon's FTTP build out plan makes sense from not only a strategic perspective but also an economic point-of-view. We conclude that the fiber project adds approximately \$3.5 billion in incremental value to the company (see Exhibits 1 & 2). In our financial model, we formed key assumptions for capital expenditures, revenues, and costs.

## **Capital Expenditures**

Verizon's management has stated preliminary estimates for the deployment costs for fiber. The first leg of the fiber buildout is laying the fiber from the central office to the curb. This is expected to cost from \$400-950 depending on whether the deployment is aerial or buried cabling. The second leg is for the "last mile" or from the curb to the customer's premises. This is estimated to be \$700-800. This provides a total cost of \$1,150 for an aerial build or \$1,750 for a buried build. Currently, Verizon is approximately 60% aerial and 40% buried. This implies a weighted capital expenditure of \$1,390. However, for conservative purposes, we are assuming \$1,600 in our model.

## **Revenues**

On the revenue side, fiber will have two major effects. First, it will provide Verizon the capability to sell a video product to its existing and new customers. Second, it will help to reduce the churn, or customer attrition to competitors, particularly cable and other video providers. Our two key assumptions are that 15% of Verizon's customers will purchase video products and video revenues per month for these customers are

relatively stable throughout time. For simplicity and conservatism, we did not model for improved churn or new customers. Any an improvement in these areas would improve the value of the fiber project.

## **Costs**

The majority of Verizon's wireline business operating expenses are labor-based, a significant portion of which is related primarily to repair and maintenance. Verizon management has stated a 50% reduction in operating expenses related to the fiber network. If this 50% cost savings is applied to the wireline business, Verizon should be able to achieve a total company EBITDA improvement of approximately 17% (see Exhibit 3). On the cost side, we are making an assumption is 10% EBITDA margin improvement.

## **Bottom Line**

Incorporating these conservative assumptions in our model, Verizon's FTTP plan produces a \$3.5 billion favorable valuation. Moreover, our sensitivity analysis based on the two factors that we believe to be the most critical -- revenues generated through video and the cost savings associated with the newer network, suggests there is little risk. Verizon should be able to achieve economic value as long as it is successful along one dimension, either revenues or costs.

We are bullish on Verizon's FTTP strategy. While Verizon is playing in a very competitive environment, we believe that it has the capability to more quickly ahead of cable and other telecommunications operators with this better performance, lower cost technology. Moreover, we believe that its advantage could be sustainable. Verizon should be successful in increasing revenues and improving costs, particularly if convergence and integration become more important to customers. The reinforcing loop and local lock-in achieved through a quad-play product line could be a very valuable asset to and would allow Verizon to consistently capture the value it creates.





## EXHIBIT 2: FINANCIAL ANALYSIS SUMMARY

### VALUE OF FIBER STRATEGY

	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
<b>(a) NPV Rollout without Fiber</b>										
People (thousands)	1,000.0	3,000.0	3,000.0	3,000.0	3,000.0	3,000.0	3,000.0	3,000.0	3,000.0	3,000.0
NPV per Person (\$K)	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57	1.57
Total FCF	1,572.1	4,716.3	4,716.3	4,716.3	4,716.3	4,716.3	4,716.3	4,716.3	4,716.3	4,716.3
WACC	10.0%									
NPV (\$M)	26,121.4									
<b>(b) NPV Rollout with Fiber</b>										
People (thousands)	1,000.0	3,000.0	3,000.0	3,000.0	3,000.0	3,000.0	3,000.0	3,000.0	3,000.0	3,000.0
NPV per Person (\$K)	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79	1.79
Total FCF	1,785.4	5,356.2	5,356.2	5,356.2	5,356.2	5,356.2	5,356.2	5,356.2	5,356.2	5,356.2
WACC	10.0%									
NPV (\$M)	29,665.2									
<b>(b)-(a) Incremental Benefit of Fiber</b>										
NPV (\$M)	3,543.8									

### Sensitivity: Customer % Buying Video v. EBITDA Margin

Yellow boxes show when Fiber has economic benefit

Incremental Value		Customer % Buying Video						
		0%	5%	10%	15%	20%	25%	30%
EBITDA Margin Improve	0%	(19,828)	(16,776)	(13,725)	(10,673)	(7,622)	(4,570)	(1,518)
	2%	(17,442)	(14,238)	(11,034)	(7,830)	(4,626)	(1,421)	1,783
	4%	(15,057)	(11,700)	(8,343)	(4,986)	(1,630)	1,727	5,084
	6%	(12,671)	(9,162)	(5,652)	(2,143)	1,366	4,876	8,385
	8%	(10,285)	(6,623)	(2,961)	700	4,362	8,024	11,686
	10%	(7,900)	(4,085)	(271)	3,544	7,358	11,173	14,987
	15%	(1,935)	2,260	6,456	10,652	14,848	19,044	23,240
	20%	4,029	8,606	13,183	17,761	22,338	26,915	31,493

## EXHIBIT 3: PROJECT FINANCIAL ANALYSIS ASSUMPTIONS

### Financial Impact Summary

#### Positives

- Revenues → Video Product  
 Bundling, "Quad" play  
 Less Churn, higher customer retention
- Expenses → Reduced OPEX, mostly repair and maintenance  
 possible lower marketing costs

#### Negatives

- Initial CAPEX

### Determining Cash Expense Savings Assumptions

#### (a) Independent Analysis

	<u>Percent of Total Expense</u>	<u>Percent Savings w/FTTP</u>	<u>Weighted Savings W/FTTTP</u>
<b>Wireline Cash Expenses</b>			
Customer Contact & Billing	25%	48%	12%
Central Office Operations: Installation, Repair	13%	87%	11%
Outside Plant Operations: Repair, Maintenance	40%	81%	33%
Network Operations: Administration, Planning, Engineering	<u>21%</u>	<u>31%</u>	<u>7%</u>
Savings to Wireline Business	100%	63%	63%
	<u>Percent of Total Expense</u>	<u>Percent Savings w/FTTP</u>	<u>Cost Ratio W/FTTTP</u>
<b>Total Cash Expenses</b>			
Wireline	49%	63%	18%
Non-Wireline	<u>51%</u>	<u>0%</u>	<u>51%</u>
Savings to Total Company	100%	<b>31%</b>	69%

Based on "Fiber: Revolutionizing the Bells' Telecom Networks", Sanford Bernstein and Telcordia Technologies

#### (b) Back of Envelope Calculation using Management Statement of 50% OPEX savings (assuming only Wireline)

##### Before Fiber

	<u>Wireline</u>	<u>Other</u>	<u>Total</u>
Revenues	54%	46%	100%
OPEX	34%	27%	61%
EBITDA	21%	18%	39%

##### After Fiber

	<u>Wireline</u>	<u>Other</u>	<u>Total</u>
Revenues	54%	46%	100%
OPEX	17%	27%	44%
EBITDA	37%	18%	56%

28% improvement in Total OPEX costs, compares with 31% in (a)  
 17% improvement in EBITDA Margin (from 39% to 56%)

### Assumptions Used in Base Case Financial Model

- \$1,600 initial CAPEX per person
- Video revenues per month increase at inflation rate
- 15% of customers purchase video
- 10% improvement in EBITDA Margin, more conservative than 17% shown above