

**MSO VoIP Business Plan**  
**Presented by:**  
**VoIP Communications Company**



*This plan was written for a  
VoIP Communications Company  
By: Jean Duane, Strategic Projects, LLC  
303-221-0771  
Posted with permission*

## Table of Contents

Table of Contents .....	2
Executive Summary .....	4
Benefits of VoIP .....	5
About VoIP Communications Company .....	5
Industry .....	5
Marketing .....	6
Strategy .....	6
Product .....	6
Price .....	6
Positioning .....	7
Promotion .....	7
Market Segmentation .....	7
Targeted Customer Profile .....	8
Launch .....	8
Goals .....	8
Marketing Expense .....	8
Strengths Weaknesses Opportunities Threats for VoIP .....	9
Finance .....	9
DCF Valuation Model .....	9
Inputs .....	9
Revenue .....	10
Package and Feature Revenue .....	10
Long Distance Revenue .....	10
EUCL .....	11
Expenses .....	11
Billing / Sales and Marketing / G&A .....	12
Capital .....	12
Customer Premise Equipment, Powering, Provisioning, Integration and CMTS .....	13
Outputs .....	13
Financial Comparison with Other Sources .....	15
Organizational Expertise / Staffing .....	15
Operations .....	16
Planning for VoIP .....	17
System Requirements .....	17
Engineering .....	17
Basic System Requirements .....	18
E911 and VoIP Call Process .....	18
911 and Secondary Line Discussion .....	18
Powering .....	19
Security .....	20
Quality of Service .....	20
Packets .....	20
Equipment Required .....	20

Network Engineering / Architecture Considerations.....21  
Legal and Regulatory ..... 22  
    VoIP May Be Regulated ..... 22  
    Patent Law of Equivalency ..... 23  
    Interstate Access Charges ..... 23  
    Regulatory Requirements for the MSO Offering VoIP ..... 23  
Summary ..... 23  
Appendix..... 23  
References.....27  
Endnotes..... 65

## Executive Summary

In an industry that has experienced a decline of approximately 12% of their subscribers in 2002 to DBS, VoIP could provide the “stickiness” MSO’s seek for their customers.<sup>1</sup> VoIP as an add-on service to video and data is the proven solution that keeps subscribers from canceling their cable services. VoIP reduces churn in a typical MSO from 2% per year to 1% or less for “triple play” customers.<sup>2</sup> With relatively little capital investment, VoIP Communications Company makes VoIP affordable and deployable.

This business plan is designed to enable the MSO to envisage and begin planning a successful VoIP deployment. It begins with a detailed discussion of the industry and illuminates the urgency MSOs face to offer a product that will assure them low churn and high penetrations. It illustrates the benefits of VoIP as well as shows the investment requirements of operations, human resources, and capital. The plan offers a suggested marketing strategy for the MSO to use as a guideline when rolling out VoIP. A discussion of legal and regulatory issues facing VoIP is included as well as an operations plan, a tactical launch plan and a discussion of the key engineering decisions an MSO will need to make before deploying VoIP.

This business plan features the VoIP Communications Company (VoIP Company) Switching System solution which requires less of an initial investment than legacy or soft switch alternatives. It offers a unique architecture that is less complex and integrates key elements into one small box. The Switching System offers fewer components, interfaces and protocols. It is highly scalable from 5K to 100K lines in a single shelf – offering a solution for small to large MSOs.

An extensive incremental financial model has been created to enable the MSO to fill in their specific variables and calculate the financial outcomes of deploying a VoIP Company Switching System. Throughout this plan, two scenarios are featured – a Default version with rather conservative variables that may be used primarily by larger MSOs and a Contrast version with more aggressive variables that would likely be used by a smaller MSO. Both scenarios use one million homes passed and one hundred thousand lines as the base assumption. Comparing both scenarios with the Bear Stearns (BS) May, 2002 industry report yields:

	Default	Contrast	BS/New MSO	BS/Cox
Cost of Capital BE	4	3	5	5
Yrs to FCF BE	3	2	3	3
Peak Neg. Cum. CFLO	\$14M	\$13M	\$57M	\$55M
IRR Yr 7	95.5%	136%	18%	28%
Rev Per Sub	\$53.64	\$56.49		\$52.85
NPV Per Sub Yr 7	\$339	\$456	\$131-171	\$300
Cap. Exp. Per Sub	\$418	\$594	\$410	\$459

---

## **Benefits of VoIP**

- Reduce churn by up to 50%
- Increase penetration to 30% by year 2-4 depending on marketing intensity
- Increase NPV per subscriber
- Offer subscribers large breadth of features and functionality
- Differentiate from standard phone service with "triple play" offering
- According to Morgan Stanley Dean Witter, VoIP extends the terminal value of a company by 2-3 years
- When choosing between VoIP and other services to offer, the financial justification shows that VoIP offers the most return on investment
- VoIP offers a rich career path for corporate and system associates
- VoIP could enhance customer satisfaction when subscribers view their MSOs as their total communications provider

## **About the VoIP Communications Company**

VoIP Communications Company has created and commercialized Switching System, the first integrated, packet-based Class 5 voice switch tailored exclusively to the cable operator's telephony and broadband media needs. Based on CableLabs® PacketCable™ specifications, the architecture is a cost-efficient, less complex alternative to current circuit switched and distributed soft-switching cable telephony options, and provides an elegant migration path from legacy circuit voice deployments. Founded by telephony and data veterans, VoIP Company has assembled a management team and an advisory board that also include cable operations, broadband communications and manufacturing experts. VoIP Company has received funding from a high-level group of venture capital investors.

## **Industry**

VoIP may be the most important new revenue stream that an MSO can concentrate on. According to Frost and Sullivan, worldwide revenues for voice are expected to be \$171 billion by 2007.<sup>3</sup> In the USA, every major MSO is trialing or has already deployed telephony services. Revenues for cable telephony in the USA are already \$534 million.<sup>4</sup> According to Kagan World Media there are about 1.9 million primary line VoIP customers. Kinetic Strategies predicts that cable telephony subscribers will top 5 million by 2006,<sup>5</sup> and Kagan predicts that cable telephony subs will grow to over 2.5 million by year end 2003.

Churn is the most sensitive variable for an MSO to contend with. CIBC reports in their analysis of Cox Communications that Cox has reduced churn to .7% with their "triple play" customers (voice, video and data).<sup>6</sup> VoIP is viewed as an additional service, and not as a stand alone service provided by the cable operator.

In addition to favorably impacting churn, cable telephony is proven to positively impact the financial profile of an MSO. Reported blended ARPUs

range from \$50.37 to \$64.31 between 2002 and 2007<sup>7</sup> per subscriber, and cash flows that show breakeven in 2-4 years, depending on the assumptions.

Penetration is another highly sensitive variable and MSOs who have deployed VoIP, such as Cox and AT&T are seeing penetration rates of 30% in just three years.<sup>8</sup> The reason for this is two fold. They offer 'triple play' packages and they market heavily in VoIP enabled target cities. This is a smart strategy proven with the reduction of churn and improved penetration percentages with 'triple play' customers.

MSOs spent over \$70 billion to upgrade their plants to enable them to offer digital TV and VoIP.<sup>9</sup> Telephony over the coax cable enables the MSO to provide a variety of new features that the phone companies cannot offer such as unified messaging; personal portals; caller ID on the TV set; point, click and call personal directories; talking email; customized dial tones and greetings, as well as familiar phone features.<sup>10</sup> It is possible that in time cable telephony may make traditional copper wire phone an anachronism.

## **Marketing**

### ***Strategy***

The MSO launching VoIP will first need to develop a marketing strategy. The strategy chosen determines all future actions. Typical strategies include low cost provider, product leadership, customer intimacy and niche marketing. Most MSOs offering telephony service have adopted a low cost provider strategy with the rationale that they are competing against the incumbent RBOC.

### ***Product***

The product is a plain old telephone line. Ideally the customer will not have to consider whether the service is the same as their current RBOC offers, or question its technical capabilities. Just as dial tone is a 'given' when one picks up the phone, when the MSO offers phone service, the customer should be confident that the quality of service is equal to regular phone service.

### ***Price***

As discussed in the Strategy Section, most MSOs are adopting a low cost provider approach with some key differentiators which will be discussed below. A focus group reported that they would switch to the cable company to combine their voice, video and data if they were given a discount in pricing.<sup>11</sup> Customers felt that if they had to endure the inconvenience of changing phone companies, they should be awarded with a discount. A sample of US-wide pricing and features offered is included in Appendix 1 of this document. This same document serves as a high-level competitive analysis. Once a city is specified, a more thorough competitive analysis can be done by calling the incumbent telephone providers and getting the rates

or by visiting their web site. Features and prices are usually readily available if you provide a street address or zip code in the area you are targeting.

### ***Positioning***

Rather than differentiate on dial tone, an MSO could focus on the product mix. The MSO is the only company at present who can offer voice, video and data on one invoice each month. Further, the MSO offering VoIP could focus not only on the phone but on the additional feature capability. Dial tone is boring, but if a customer can get HBO, a fast connection and a couple of telephone lines for a competitive price, they may be inclined to commit for a longer term agreement. Consider offering an incentive for a 36 or 60 month subscriber contractual commitment.

### ***Promotion***

Depending on the competition, tactics will vary. If there is only the incumbent RBOC, the marketing strategy will differ from a city that also has an over builder. Focus on the customer's point of view – understand their interests, desires and how they buy. If sending a representative to their door will get the subscriber to sign a three year contract for 'triple play', then the cost can be justified. Most MSOs use cross-channel promotions including broadcast TV, radio, bill inserts, bill boards, newspaper ads and telemarketing. In order to avoid being viewed as a "me too" provider, it is important to have a message that differentiates the MSO from other telephone providers. The "triple play" message is the best differentiator. Another common objection of potential subscribers is the misconception that they will not be able to keep their current phone number if they switch services. With Local Number Portability (LNP), subscribers will be able to switch phone companies and keep the same number. LNP availability varies by area.

### ***Market Segmentation***

Most MSOs have segmented their subscriber base. Typical segments include Blue Collar, High Tech, Single Male, Single Female, Married with Children (and some subsets based on the children's ages), Home Office, Sleeper (dial up) and Early Adopters. Some MSOs segment by age, income, sex, race, marital status, education level, whether they rent or own, have a computer, cable services subscribed to and whether they own a satellite dish.

Assuming the existing customers have been segmented, the marketing plan can be developed based on these segments. Packages can be formed with video and telephony features that would be attractive to specific sectors. Another often overlooked group of prospects include dial-up subscribers. If the MSO knows who their cable subscribers who have a dial-up service, this would be a fruitful segment to market to early on.

---

## **Targeted Customer Profile**

Bear Stearns submits that rather than counting 'subscriber' units of value the new standard will be changed to the 'account'. The 'account' entails delineating how many households have voice, video and/or data.<sup>12</sup> If Wall Street is going to dwell on this new metric, then it behooves the MSO to target customers in the segment that are most likely to adopt 'triple play'. High Tech, Married with Children, Home Office, Dial-up and Early Adopters would have the highest propensity to fully utilize 'triple play'.

## **Launch**

MSOs launching VoIP will need to start marketing to the targeted subscribers in the system at least six weeks prior to deployment. There are two approaches that MSOs use – aggressively market to one or two systems and try to maximize penetration in those systems before moving on to others. Or, pilot one system, document all of the processes and create a detailed project plan and then replicate it with teams to mass deploy and mass market. This plan will focus on the first method. Although the second method has proven effective for some MSOs in other deployments, the first method is more Default and allows the MSO to learn along the way.

## **Goals**

- Before Launch – Reach at least 65% of the target market segments four times a week for six weeks prior to launching VoIP.
- After Launch - Reach at least 65% of the target market segments four times in an average two week period.
- Penetration – between 25-30 percent by the end of year three or mid-year four.
- Churn – Reduce churn of "triple play" customers to 1% by the end of year three and to .7% in year six and after.

The rationale for these goals is that MSOs are using an aggressive market strategy in a market with low awareness. Note: it is very important to train the CSRs before the promotions are launched. As soon as the promotions are launched, the phones will ring with questions, so CSRs should be armed with the correct answers, pricing packages, and be ready to sign up customers.

## **Marketing Expense**

Cox spends about 1% of gross revenues on marketing.<sup>13</sup> In 2003, MSOs are forecasted to spend more on marketing since they have been losing subscribers to competition, and will need to promote VoIP.<sup>14</sup> The VoIP Company Financial model assumes that around 2% of gross revenues will be spent on marketing.



---

## ***Strengths Weaknesses Opportunities Threats for VoIP***

A SWOT (Strengths, Weaknesses, Opportunities, Threat) Analysis is included in Appendix 2.

## **FINANCE**

### ***DCF Valuation Model***

VoIP Communications Company engaged Strategic Projects, LLC and another consultant to build a “flexible” incremental VoIP financial model that will assist the MSO make their deployment decisions. The model contains around 300 variables that are all up to the MSO to decide. The MSO inputs all variables has the option to choose which items to capitalize. The outputs for the model illuminate the financial returns including but not limited to free cash flow, years to break even, net present value of a subscriber, ARPU per subscriber, total cost of capital per subscriber as well as a way to value the VoIP product line using the DCF valuation method.

The DCF Valuation model is the foundation for the following discussion. Variables from analyst reports, periodicals as well as conversations with MSOs have been included (and are noted in comments throughout the model) for these outputs. Assumptions may vary, and often dramatically affect the outputs. Therefore, a range of inputs and outputs are shown to offer a Default as well as a Contrasting view. The Switching System is scalable and represents a VoIP solution for virtually any size system. The DCF model also scales to accommodate small systems or it can provide an enterprise-wide scenario. For this discussion, the two models are based on one million homes passed and 100,000 lines. A seven year capital lease with a 20% down payment at 8% interest is assumed. Depreciation life of the equipment is assumed to be three years and the terminal value multiplier is 10.4%. Outputs can be based on seven or ten years. This discussion is based on a seven year model. Other variables have been changed to show two views – the Default view and the Contrast view and are discussed in the following sections. Please refer to Appendix 3 for all of the detailed inputs and outputs for both views.

### ***Inputs***

Key Variables: The MSO is asked to input their basic assumptions such as starting year, number of lines, their WACC, their IRR decision hurdle rate, the terminal value multiplier they use to assess new revenue streams, the depreciation life of equipment and capitalized labor, their tax rate, capital lease assumptions, interest income and interest expense.

Next, the MSO is asked a series of questions about their subscriber base such as total homes passed, penetration assumptions, beginning subscribers and churn. In the Default model the penetration rate is six percent for the first five years and then the penetration flattens to 30% in years 6-7. In the

Contrast model, penetration grows at 8% per year from years one to three and then starting year four, grows at 2% per year. Churn is a widely publicized variable and the most sensitive in this model. The default in the model is 1.2%, declining at -.1% per year. This is supported by recent publications from CIBC, Bear Stearn and Morgan Stanley Dean Witter which point to lower churn rates with "triple play" customers. Both models start at a higher churn rate and decline to .7% in the later years.

## **Revenue**

### **Package and Feature Revenue**

The model allows the MSO to model different packages containing a variety of features. The model asks what percent of the total subscribers are assumed to take each package, and at what rate this is assumed to grow each year. Rates can be set one time in the left hand column or overridden for each year in the right hand columns. The standard in the model assumes triple play customers pay \$125.95 and 25% of that goes to VoIP revenue. The Default model assumes that 10% of the subscribers will take the Triple Play package, and this will grow at 4% per year. It assumes that 20% will take the Basic Package, declining at 1% per year. Thirty percent will take Double Play, 20% take Privacy Package and 20% take Deluxe all declining at 1% per year. (Note: Phone packages are basic phone plus features. The more features, the more expensive the package.) The Contrast model assumes that 100% will take any package at an average of \$23.95 per month. It is assumed in both models that the average lines per subscriber are 1.3. The price for the 30% that take the additional line ranges from \$9.95<sup>15</sup> on the Default model to \$7.95 on the Contrast model. Standalone voicemail costs \$6.95 and the standard assumption is that 25% of the subscribers take it.

### **Long Distance Revenue**

Long Distance can either be billed by the minute or by the package depending on what the MSO is going to offer. The standard assumption in the model is 'per minute' billing. The subscriber pays a flat \$4.95 per month and gets 300 minutes. Peak hours are charged \$.07 per minute and off peak are charged \$.04. The Default model assumes that 25% of the subscriber base will take this option and the Contrast model assumes that 50% will take this option. Service Installation charges are assumed to be \$39.99 and the Default model assumes these fees will be charged 25% of the time, while the Contrast model assumes these fees will be charged 100% of the time. The Default model assumes that 60% of the customers will rent the MTA (multimedia terminal adapter) and the Contrast model assumes that none will. Order processing fees are routinely charged by the RBOCs, but currently not by MSOs. The Default model assumes that order processing fees will not be charged, and the Contrast model assumes that order processing fees will be charged 100% of the time. Other variables on both models in this section are the same.

---

## ***EUCL Revenue***

End User Common Line Charge EUCL is a source of revenue for the Local Exchange Carrier (the MSO providing VoIP) granted by the FCC to offset the lost subsidy of long distance rates. The consumer is charged EUCL. Revenue for EUCL range from \$5.00 to \$8.00 per subscriber per month.

## ***Expenses***

The model attempts to contemplate all expenses that an MSO would incur when deploying VoIP. PSTN and Connectivity expenses include the cost for the T1 and/or DS3 as well as the assumption for the on net calls, busy hour calling percent average call length and average number of calls per day. Per Bear Stearns, May, 2002, a residential telephone call usually lasts 6.8 minutes, and total average usage per day per line is 32.5 minutes, almost always on a non-continuous basis. This is the standard assumption in the model. The T1 expense is \$500 in the Default model and the Contrast model shows \$30 per T1. The cost per DS3 is \$1,500 in the Default and \$750 in the Contrast model. The percent of on net calls is 10% in the Default and 2% in the Contrast.

## **Long Distance Expense, Transport Costs, Settlement Charges, Telco Expenses**

The next section includes long distance expenses, transport costs and settlement charges. The path of a call goes from the plant (HFC) through the Switching System to either the ICX, a CLEC (for toll calls) or to a long distance carrier like Verizon. The percentages in the model allow the MSO to make different assumptions about the allocation of calls. The Morgan Stanley Dean Witter analyst report assumes an equal number of inbound and outbound calls resulting in net zero interconnection revenues between the incumbent LEC and the cable operator. If we assume that, then the InterLATA fees are eliminated. This is not to be confused with long distance termination charges paid by the IXCs. Both a cable operator and incumbent LEC will receive access charges from IXCs for all inbound calls. This is true for the long term, not necessarily at the onset. The model allows the MSO to override the 50/50 inbound/outbound assumption. If Settlement charges are set at 50/50, then, of the Settlement charges, the assumption is that 70% are local, 15% are intrastate and 15% are interstate for both incoming and outgoing.

## **Installation, CSRs and Technicians**

The next section allows the MSO to enter what percent of the installations will require a truck roll. The Default assumes that a truck roll will be required 50% of the time and the Contract model assumes a truck roll 100% of the time. The cost for a truck in both models is \$75, and 100% of the truck rolls are capitalized in the first year, declining at 5% per year.

The MSO is asked to fill in the average CSR payroll hours per month. The standard assumption in the models is 173 hours. Next, the model asks for a

CSR productivity factor which is 65%. This allows for breaks, vacation time, sick time, etc. The average call length is fifteen minutes in the Default model, so a CSR handles four calls per hour. The contact rate is split among existing subs and new subs. The rationale is that in the beginning, a subscriber will likely call one time after an installation, and another time when they get their bill. After the first month, the subscriber will likely not call again unless they want to upgrade their package, or cancel their service. The Default model shows that 30% of the existing subscribers call each month, and 200% of the new subscribers call each month. A subscriber is only considered 'new' for one month. The Contrast model shows existing subscribers calling 20% of the time and new subscribers call 50% of the time. The CSR base salary and the ratio of CSRs to supervisors is input into the model by the MSO. Salaries and burden rates can be changed by the MSO. The standard assumption sets the CSR salary at \$35,000 and the burden/overhead at 50%.

Technicians include a System Tech which is based on homes passed and in both models is set at one technician per 500,000 homes passed. Line Technicians are based on homes passed and are set at one per 100,000. Service/Installation Techs are based on subscribers. The model asks for a ratio of technicians to existing subscribers (1:8000) and a ratio of technicians to new subscribers (1:175). The model provides the opportunity for the MSO to add other personnel based on homes passed, subscribers or as a salaried employee. The NOC technician assumes incremental VoIP NOC technicians to be added to an existing NOC. In the models, Technician salaries range from \$55,000-\$75,000 and the burden/overhead is assumed to be 50%.

### **Billing / Sales and Marketing / G&A**

The model provides the option of a paper bill or a credit card bill, or both. The default shows a paper invoice costs \$1.00 and credit card billing costs \$.50. The credit card settlement charges are set at 3% and only 20% of the subscribers utilize credit card billing – growing at 2% a year. Sales and Marketing acquisition costs are set at \$120 per new sub in the Default model and \$50 in the Contrast model. Retention marketing per sub per month in both models is \$.80. MSOs usually set G&A at 7%, and the standard allocation for system property tax for VoIP is \$100 per month.

### **Capital**

The first capital item is a Production Lab. Some MSOs will have one for VoIP and others will not. The Default model allocates \$250,000 for a production lab and the Contrast model does not. Both models show the same required support hardware. Note, the hardware is based on 23,000 lines. Every time the MSO sells 23,000 more lines, more hardware is required, and automatically calculated in the models. Some MSOs will invest in a database for VoIP. The Default model shows a \$30,000 one time charge for the hardware and software for a database. The Contrast model shows none.

Fully equipped trucks are assumed to cost \$22,000 and the MSO can select the year they are replaced, and at what cost. The Default is year six at 100% of the original cost. The startup engineering, furnishing and installation / system integration costs scale depending on the system size. These may vary depending on the installation.

The Voicemail system prices range from \$30,000 to over \$250,000. Both models show at \$175,000 and add new cards each time 2,500 mailboxes are added.

### **Customer Premise Equipment, Powering, Provisioning, Integration and CMTS**

The model offers three options for powering – inside the house, outside the house and centralized powering. Powering is discussed at length in the Engineering Section. The Default model shows the Inside the House option and the Contrast model shows the Outside the House option. Most MSOs plan to utilize a lithium battery either inside or outside the house, rather than to deploy centralized powering.

Provisioning has been set in both models at \$15.00 per new subscriber. This is for provisioning to the switch, the CMTS and to the MTA. Billing Integration is \$250,000 in the Default model and \$90,000 in the Contrast model. OSS/BSS/NOC is assumed to be \$15.00 per new subscriber. Cards required per CMTS will change depending on the one selected. It is important to determine how much of the CMTS will be allocated to VoIP, and at what rate this will grow per year. The Default and Contrast allocation is 10% of the CMTS allocated to VoIP growing at a rate of 7.5% per year. Maintenance is set at \$.25 per home passed per year.

### **Outputs**

The assumptions in both models are realistic depending on the situation. When viewing the different outputs, one can see the dramatic difference the key variables make. Churn, penetration and customer contact rate are highly sensitive variables (as shown in the Tornado charts for both models in Appendix 3). The outputs illustrate the differences. The following charts summarize the key metrics for both the Default and the Contrast models.

## Default Model

<b>Summary Metrics</b>				
<b>Beginning Assumptions:</b>	<b>HP:</b>	1,000,000	<b>No. Lines:</b>	100,000
<b>Cost of Capital BE</b>		4		
<b>Years to FCF Positive</b>		3		
<b>Funding Requirement</b>		(898,767)		
<b>Peak Cumulative Negative Cash Flow</b>		(14,448,209)		
<b>VoIP Product Line Value</b>		1,162,955,032		
		<b>Year 5</b>	<b>Year 7</b>	<b>Year 10</b>
<b>ROI</b>		109.5%	199.0%	312.7%
<b>IRR</b>		76.5%	95.5%	100.1%
<b>Contribution Margin</b>		43.6%	50.9%	55.7%
<b>Incremental VoIP Head Count</b>				
CSRs		134	123	130
Technicians		171	144	153

## Contrast Model

<b>Summary Metrics</b>				
<b>Beginning Assumptions:</b>	<b>HP:</b>	1,000,000	<b>No. Lines:</b>	100,000
<b>Cost of Capital BE</b>		3		
<b>Years to FCF Positive</b>		2		
<b>Funding Requirement</b>		(458,767)		
<b>Peak Cumulative Negative Cash Flow</b>		(13,804,840)		
<b>VoIP Product Line Value</b>		1,352,065,501		
		<b>Year 5</b>	<b>Year 7</b>	<b>Year 10</b>
<b>ROI</b>		129.1%	182.3%	246.1%
<b>IRR</b>		125.8%	136.1%	138.4%
<b>Contribution Margin</b>		51.7%	54.2%	58.0%
<b>Incremental VoIP Head Count</b>				
CSRs		106	125	158
Technicians		142	163	200

## Other key metrics include the following:

<b>Default Model</b>	<b>Yr 1</b>	<b>Yr 3</b>	<b>Yr 7</b>
Monthly Revenue Per sub (ARPU)	\$ 54.84	\$ 52.38	\$ 53.64
Expense per sub	\$100.15	\$ 39.22	\$ 28.33
Cash Flow (EBITDA) per sub	\$(45.31)	\$ 13.17	\$ 25.31
Capital Cost per sub	\$128.51	\$ 18.45	\$ 3.61
Capital Cost per new sub	\$448.58	\$415.28	\$418.11

<b>Contrast Model</b>	<b>Yr 1</b>	<b>Yr 3</b>	<b>Yr 7</b>
Monthly Revenue Per sub (ARPU)	\$ 64.85	\$ 55.92	\$ 56.49
Expense per sub	\$ 97.42	\$ 38.61	\$ 28.83
Cash Flow (EBITDA) per sub	\$(32.56)	\$ 17.31	\$ 27.65
Capital Cost per sub	\$146.78	\$ 24.32	\$ 8.30
Capital Cost per new sub	\$536.34	\$547.22	\$594.86

## Financial Comparison with Other Sources

"AT&T Broadband recently announced revenue-per unit of \$55 and capital expenditures of \$650 per subscriber."<sup>16</sup> The VoIP Company model shows revenue per subscriber ranging from \$52 to \$64 and capital expenditures ranging from \$415-\$594.

"Cox's (contribution) margins on its telephony service have reached 32-35% on a fully allocated basis."<sup>17</sup> The VoIP Company model shows the contribution margin ranging from 43.6% in year one to 55.7% in year seven.

Bear Stearns says in their May, 2002 report that an MSO just starting VoIP today can expect to have a NPV of \$131-\$170.<sup>18</sup> Morgan Stanley Dean Witter forecast that adding VoIP will create approximately \$285 in NVP per HP. The VoIP Company Models show NPV per subscriber year seven range of \$339-\$456 for standing start MSOs.

In the same report, Bear Stearns says the IRRs range from 34% to 40% for MSOs just starting VoIP. The VoIP Company model shows that by year five, the IRRs range from 76.5%-125.8% to 95.5%-138.4% by year seven.

Bear Stearns goes on to say that FCF break even for a standing start MSO is expected to be year 3. The VoIP Company Contrast model shows FCF break even at year 2.

DCF Valuation Method: The VoIP Company model values the VoIP revenue stream in year seven between \$1.35B-\$1.16B. The valuation method used is to multiply the year seven free cash flow by the terminal value multiplier. Morgan Stanley Dean Witter extend the terminal value multiplier value by 2-3 years with the addition to VoIP.<sup>19</sup> Therefore, a MSO who typically uses 8-9 as their terminal value multiplier can use 10-12. Both VoIP Company models use 10.8 as a terminal multiplier.

## Organizational Expertise / Staffing

A successful deployment will rest on the shoulders of the VoIP Project Manager and the technical expertise of the Engineers in the plant. The MSO will need to carefully select the personnel assigned to VoIP to ensure they

---

have in-depth understanding of various technologies and ideally, experience in deploying VoIP in a cable system. Provisioning the MTA, CMTS and the Switch is also a key function. Finding personnel with experience in this area is paramount. One key consideration is to meld your VoIP into your existing staff so they are not two disparate groups. A unified team can simplify the deployment.<sup>20</sup>

Technical Support requirements are based on either homes passed, per subscriber or per line. As mentioned in the Financial Section, the system will require one System Technician for approximately every 500,000 homes passed. One Line Technician will be required for approximately every 100,000 homes passed. One Service Technician is allocated per every 8,000 existing subscriber homes, and one Installation Technician is anticipated for every 175 subscribers. (This assumes high penetration in the early years, and allows for enough technicians to install new subscribers. This function can be outsourced, and likely will be, but the ratios still need to be decided by the MSO.) Technician Supervisors are forecasted at one per every 30 technicians and service/installation Technician Supervisors are set at one to thirty. One NOC technician is anticipated to be required for every 5,000 subscribers and NOC supervisors are estimated at one to thirty. Technicians should be hired at least six to nine months before deployment. The per-year Staffing Plans for both the Default and the Contrast scenarios are included in Appendix 4.

CSRs are forecasted based on the number of calls expected from the subscriber base. The ratio of subscribers to CSRs is currently one CSR per 1,494 subscribers with the projection that some percent of the existing customer base will call, and a higher percent of new subscribers will call. CSRs should be hired and trained at least two months before deployment (assuming the marketing campaign starts six weeks before deployment.) This will give the CSRs two weeks to be trained on VoIP calls before the launch begins.

The addition of VoIP in a system provides an additional career path and a new level of expertise for the associates.

## **Operations**

VoIP Communications Company has published a detailed document called "Cable Telephony Launch Guide" which should be obtained by an MSO launching the Switching System solution. This section will attempt to compliment the information in that guide. Appendix 5 offers a "generic" Tactical Launch Plan to use while contemplating VoIP. A more detailed plan specifically for the installing MSO will be prepared by VoIP Communications Company at the appropriate time.

Together, these two documents describe the timeframe and the decisions that will need to be made by the MSO prior to launch regarding equipment



purchases, hiring personnel, back office considerations, switch, provisioning, NOC, billing integration, record keeping requirements, security, data center, customer service, testing all components and deploying the solution. The "Cable Telephony Launch Guide" discusses the types of trials that should be conducted and their durations including the technical, operational, marketing and initial product launch trials. It also discusses the need for process engineering and how to map processes to ensure a smooth flow from the initial subscriber contact to deployment.

## **System Requirements**

A cable system equipped to offer VoIP must be:

- DOCSIS 1.1 compliant, supporting 40Mbps (down) and 10Mbps (up) shared data channels and support for QoS
- Speed available (limited by RF noise and sharing of data channels) - .5-1Mbps down and 256-500kbps up.
- Two way upgraded system 750+ Mhz

Source: JPMorgan; McKinsey Research

## **Planning for VoIP**

In an article dated 2/17/03 entitled "Operators Kick the Tires on Voice-Encryption Strategies" by Matt Stump published in Multichannel News, the following guidelines are offered to help the MSO plan for VoIP:

1. "Analyze your network wiring infrastructure. You need Cat 5E wiring, minimum for VoIP.
2. Rethink your switches and routers. Aim for 100-Mpbs Ethernet switched ports and backbone connectivity. VoIP is also a good excuse for putting in a Gigabit Ethernet backbone.
3. Check your electricity distribution system. With your network providing telephone service, you'll need stable and reliable power to your switches and phones.
4. Make sure your network management tools can analyze down to the packet level so you can keep voice-call quality high.
5. Build a list of business rules and support applications that touch your voice service. Consider whether those rules would still apply if you implement VoIP, and if not, rewrite them to work with it.
6. Choose an integrator based on his or her track record and ability to implement all the VoIP-related applications you want to deploy. Factor in your vendor's recommendation for an integrator, too.
7. Keep an open mine. It's going to be a learning process for both your users and your support staff."

## **Engineering**

An MSO considering VoIP will need to consider whether to offer primary (lifeline) or secondary lines to their subscribers. Further, the MSO will have to make some powering decisions that will affect their costs as well as the service they offer. Regulatory agencies such as the FCC require record

keeping services for CALEA and E911 services. This section will discuss the alternatives drawing from outside sources. It will also overview the equipment required to compliment the VoIP Communications Company Switching System solution. Appendix 6 shows a diagram of the Switching System and its components.

### **Basic System Requirements**

A system enabled for VoIP will be DOCSIS 1.1 compliant. Their system should be upgraded to 750Mhz and two-way.

### **E911 and VoIP Call Process**

In 1994, the FCC mandated that caller's ANI (automatic number identification) is referenced to an actual street address. The per-phone location is mandatory in Colorado, Illinois, Kentucky, Mississippi, Texas, Vermont and Washington (see [www.nena.org/9-1-1-TechStandards/state.htm](http://www.nena.org/9-1-1-TechStandards/state.htm)). With a regular phone line, the 911 call is passed across the PBX across the ISDN trunks and the dispatcher can identify where the call is coming from and the address of the caller. A MSO VoIP call may or may not pass information to the dispatcher depending on whether it is connected to the public switched telephone network (PSTN).<sup>21</sup> Most MSO provided VoIP relies on the PSTN. Today, a VoIP call follows this path:

- "Caller uses home phone, originates a call on a MTA device connected to a DOCSIS modem.
- The cable box supplies dial tone and sends the signal and voice over the data plant.
- Call hits the VoIP network as packetized IP
- It is routed through soft switches and gateways and other network elements
- Call returns to the PSTN at the town or country where the call terminates
- Packet Cable reference architecture calls for the use of several gateways at the point where the PSTN hits the cable VoIP interface. (These include a media gateway (MG), media gateway controller (MGC) and a signaling gateway (SG)
- Once the packets hit the cable VoIP network, they have to be handled by the OSS"<sup>22</sup>

### **911 and Secondary Line Discussion**

Phones that MSOs offer that typically do not have 911 capabilities are called 'secondary line' service. The phone may not be 911 enabled because it is not connected to the PSTN, or because of the powering. An MTA may be placed in the home with no network powering. This means that if the power is off in the home, the subscriber may not be able to dial 911. The thought is that MSOs will offer a phone line with substandard reliability for a lower cost. A subscriber would have to have two phone services – one from the reliable RBOC or a cell phone, and a cheaper one from the MSO. This strategy could

---

cause long term problems. If the initial offering from the MSO is a substandard line, as the MSO upgrades their system, and powering capabilities, the first and lasting impression of the subscriber is that the MSO phone is substandard. The MSO may never be able to change this opinion even if their service improves over time.

A second issue is liability. Who is liable if the subscriber forgets that one phone is substandard and the other is reliable? Both phones look alike. In an emergency, a subscriber would likely grab the nearest phone. Who is liable if someone dies as a result of not getting 911 because of a substandard phone? Avaya has a phone that can be programmed to say "Do not use this phone for 911". Is this really the message you want your subscribers to have? The focus groups cited in the Marketing section said they would not want a "secondary line" phone with substandard features.

### **Powering**

There are three options for powering – inside the home, outside the home and centralized, or network powering. Network powering provides powering to each tap and drop. If a MSO is considering this type of power, it is best to focus on highly populated areas with the most homes passed per node. This type of powering option is the most expensive with prices for the NIU installed by the MSO outside the home ranging from \$175-\$243. The cost for centralized power is the same whether the system signs up one subscriber or millions. In addition to the NIU and tap & drop charges, centralized batter backup powering source is estimated at \$15.00 per home passed. MSOs using centralized power often do so with a combination of electric power, DC batteries and natural gas generators.<sup>23</sup>

Outside the house powering would entail putting a battery in the NIU. This could either be installed by the MSO and require a truck roll, or piggyback replacing the battery with another truck roll, or having the customer self install their own battery. The NIU is typically the point of demarcation for the phone company. One side belongs to the subscriber and the other to the phone company. If the battery is self install, it is imperative that the subscriber only opens their side, and that they have detailed instructions on how to replace their battery.

Inside the home is another powering option. With new lithium batteries that will operate for up to eight hours of talk and twelve hours of standby and last ten years<sup>24</sup>, the 911 issue seems to be mitigated, assuming the subscriber keeps their battery fresh. Phones could become like smoke alarms, where everyone in the US is urged by the media to check their batteries on New Years Day. With DOCSIS 1.1's MIPs (million instructions per second), the MTA can "phone home" to tell the MSO the battery status. Most MSOs are putting the burden on the subscriber with inside the home powering – either mailing them a battery or giving them a place to pick up a new one and deposit the old one.

It is very likely that most MSOs will deploy a combination of all three options depending on the density of the subscriber population, and practicalities.

### **Security**

According to Yankee Group analyst, Christin Flynn, "VOIP peering is not a trivial exercise. Obstacles for service providers include firewall penetration for VoIP, Network Address Translation [NAT] capability, QoS mediation, session admission control and the ability to generate session records." Anytime there is a point of entry or a gateway in the network, the system can be hacked. One advantage of VoIP Company Switching System is that the components are consolidated and therefore there are fewer opportunities for a hacker to infiltrate the system. The Switching System uses a new category of switching called Cable Media Switching System (CMSS) which "integrates into one system the Call Management Server, switching, Media Gateway, Signaling gateway, Media Gateway Control and traffic bearing interface functions."<sup>25</sup>

### **Quality of Service**

In an article dated 3/3/03 entitled "Implementing IP Telephony: What to Watch For, by Johna Jonhson published in Network World, the following tips are offered regarding QoS:

1. "Don't neglect quality of service. Perform a QoS assessment up front.
2. Start by benchmarking your existing network performance.
3. Then put in place a framework for implanting QoS. Decide where the packets are going to be marked and how the network will process them.
4. Test your scenario exhaustively before deployment. Approaches that work perfectly on paper might fail to perform in a real network.
5. Most importantly: if you're just beginning to consider an IP telephony implementation, make sure you budget for the QoS assessment piece."

### **Packets**

With cable VoIP, there are three potential problems with packets. They are packet loss, which may affect voice quality; latency of packet transmission because of 200 ms or more of delay; inter-arrival variance – jitter which means the packet may not arrive on time.<sup>26</sup> Industry-wide decisions on bandwidth standards will mitigate these issues.

### **Equipment Required**

In addition to the VoIP Communications Company Switching System, the MSO will need to purchase additional capital equipment. The following is a list of the equipment needed:

Synchronization Source Clock  
Transmux Multiplexer

---

85KW Generators  
Database HW and SW  
Voice Mail System

**DSX Panels:**

DSX-1 Panel  
DSX-3 Panel  
Fuse Panels  
Fiber Panel Enclosures  
Fiber Panel Splice Tray  
Fiber Panel Lt. Drawer  
Fiber Panel Rt. Drawer  
Fiber Panel Mount  
Telzon Term. Panel

The DCF Financial Model contains estimated pricing and capacity on each of these items. The capacity for the panels in the model is one per every 23,000 lines.

### ***Network Engineering / Architecture Considerations***

Before deploying VoIP, there are several key engineering and architectural considerations.

1. Network Topology
  - a. Headend interconnectivity
  - b. City interconnectivity
  - c. Connections to PSTN (SS7, IXC, ILEC)
  - d. Transport capacity and type for both access and backbone
2. Trunking and Routing plans
  - a. LATA and Inter-LATA layout
  - b. E911 trunking and routing plan
  - c. Operator services trunking and routing plan
  - d. Local routing plan
  - e. Total number of trunk groups
3. Traffic Parameters
  - a. Call hold time, assumption 3 minute holding time
  - b. Off-net Trunk allocation, range 4:1 to 10:1, recommended 5:1 or 6:1
  - c. Calling area activity in Erlangs of CCS, field data points at ~5 hundred call seconds (CCS) (0.137 erlangs) for residential, 10CCS for business. For residential this translates to 274,000 Busy Call Hour Attempts (BHCA) for a 100k line serving area.
4. SS7 parameters
  - a. link utilization
  - b. SS7 network design layout
5. OAM
  - a. NOC network access topology and hierarchy
  - b. Number of Simultaneous Users
6. CALEA

- a. Trunk layout
- b. Ports per city
- 7. Billing
  - a. Record storage and retrieval/delivery strategy
  - b. Format
  - c. Billing Record call processing capacity

Source: Mr. Rafael Fonseca, VoIP Communications Company

## Legal and Regulatory

### ***VoIP May Be Regulated***

In their February, 2003 meeting, NARUC the National Association of Regulatory Utility Commissioners urged states not to regulate VoIP. Those against regulating argue that it could stifle the growth of the technology. Others ask what would actually be regulated? There are concerns that subscribers cannot effectively delineate between the RBOC supplied phone and the VoIP phones. Is VoIP a common carrier service? If it is deemed to be common carrier, then it can be regulated by the states. Further, if it is common carrier, then it must support Universal Service – a tax to subsidize rural areas. Some feel that VoIP should be required to pay Universal Service Fees if the VoIP phone displaces a regular phone.<sup>27</sup> It has been proposed to the NARUC that VoIP fall under Kathleen's Nascent Services Doctrine which would protect VoIP from regulation since the technology is still being developed and there are no standards yet.<sup>28</sup> Former FCC Cable Bureau Chief Deborah Lathen says "the Commission is unlikely to take action until companies had ironed out technical issues associated with VoIP and until the service became something more vital than an additional 2<sup>nd</sup> line."<sup>29</sup>

Another question is whether VoIP is an information service or a telecom service. If VoIP is determined to be an information service, then it will not be regulated and anyone could use the network without paying for it. But if VoIP is defined as a telecom service, it will be regulated. This is a decision that will ultimately be made at both the Federal and State levels. Another argument concerns packets. The Internet is packet-based and is not regulated. VoIP is also packet-based. Therefore should it be regulated? Many fear that regulation will result in burdensome taxes and oppressive administration. The decision may be forced if the a local CLEC files a grievance at the state PUC or at the federal level if an MSO providing telephone services does not apply for a CLEC license. (At the moment, since these decisions are still pending, MSO's have the option. However, it is very risky not to have CLEC status before offering VoIP telephone services because a competitor could file and ultimately prevent the MSO from providing the services.)<sup>30</sup> Analyst Daniel Berninger of the telecom research group Pulver.com says "the FCC should wait until VoIP reaches certain "critical mass" of 15% of the total market before intervening." The Bells disagree. Robert Blau, BellSouth VP Regulatory Affairs says "It is going to be increasingly difficult for the cable guys to say the telephony is something else, because the same technology and same pipes will be used for both."<sup>31</sup>

### ***Patent Law of Equivalency***

This law, as stated by the Supreme Court says: "If two devices do the same work in substantially the same way, and accomplish substantially the same result, they are the same, even though they differ in name, form, or shape."<sup>32</sup> Will this argument be posed for VoIP versus circuit switched phones? The result may rest with how many subscribers the MSOs lure from the standard phone companies. If many flee their regular phone service, it is almost guaranteed that VoIP will be regulated, taxed and administered just as the standard phone companies are today.

### ***Interstate Access Charges***

In a recent petition to the FCC, AT&T asked to be exempted from the interstate access charges for VoIP telephones. The National Exchange Carriers Association (NECA) is against this proposition because they fear if they exempt VoIP, the circuit-switched telephone companies will convert to VoIP.<sup>33</sup>

### ***Regulatory Requirements for the MSO Offering VoIP***

Before offering VoIP, an MSO must obtain CLEC status. As mentioned above, it is not mandatory, but highly recommended since most states have laws governing telecom services. The MSO must also negotiate Interconnect Agreements, file tariffs and work and confer local franchise agreements.

CLEC status ranges from a few hundred dollars to a several thousand depending on the state and can take a couple of weeks to many months to secure. Interconnect agreements must be negotiated one-by-one with each PSTN, ICX and long distance company that the MSO's switch will be communicating with. The VoIP Company Switching System includes in-depth Record Keeping Servers (RKS) which collects all of the billing information from every element and provides reports for each entity for end of cycle inter and intra-state settlement charges.

### **Summary**

VoIP has been forecasted to make circuit switched telephones obsolete. The breadth and depth of features and functionality of a VoIP phone far exceed even our imaginations. The DCF Financial model proves that it is a sound business yielding high returns. Because of the affect 'triple play' has on diminishing churn, it instills a sense of urgency for MSOs to offer it sooner rather than later.





						out of state			
<b>Installation - Primary Line</b>	\$36.12	\$42.50	\$42.50	Free		Free	\$33.01		
<b>Installation - Primary + Additional</b>	\$36.12/per line	\$13.00	\$95.00	Free		Free			
<b>Installation - Additional (after primary installed)</b>	\$35.89	\$13.00	\$42.50			Free			
<b>Installation - Add'l charges for no phone jack</b>	\$105 / per jack	\$72.00	\$100/hr						
<b>Availability / Lead-times - Primary</b>	2-3 Days	1-2 Weeks	1-2 Weeks	2 weeks					
<b>Availability / Lead-times - Secondary</b>									
<b><u>Packages:</u></b>									
<b>Package #1</b>	<i>Phone Solution</i>	<i>Complete Choice</i>	<i>Package</i>	<i>RightPak</i>	<i>UltraFeatures</i>	<i>Solutions</i>		<i>One-Company Adv.</i>	
- Price	\$39.95	\$34.00	\$29.95	\$24.95	\$35.00	\$26.64		\$19.99	
- Unlimited Local	yes	Yes	yes	yes	1500 min.; \$.05 ea. add'l	yes		yes	
- Number of Features	7	23	16	16	<b>10 - free first 3 mo.</b>	16		0	
- Voicemail included	No	\$3.95	no	no	<b>yes- free first 3 mo.</b>	?		no	
- Other								\$.07 / min LD	
<b>Package #2</b>	<i>Long Distance Pkg.</i>	<i>Value Answers</i>		<i>RightPak Plus</i>	<i>Phone &amp; Cable</i>	<i>Active Lifestyle</i>		<i>MCI Premium Pkg. 5 / 10</i>	
- Price	\$30.00	\$39.00		\$35.95	\$69.00	\$16.64		\$10.95 / \$15.95	

<b>- Description</b>	500 Minutes domestic,			Same as <i>RightPak</i>	Approx. 23% disc for bundled	Basic line w/		5 / 10 Features	
	(\$0.02/min); \$0.07/min after			but also incl. add'l line	svcs; <i>UltraFeatures</i> Phone	five features		(no voicemail)	
<b>Package #3</b>	<i>SBC Total Connection</i>	LD Inc. 7/min \$3.95/mo		<i>RightPak II</i>	Plus Cable Pkg. w/ HBO	<i>Control</i>		<i>Long Distance Pks:</i>	<i>Long Distance Pkgs.:</i>
<b>- Price</b>	\$95	\$46.00		\$42.95	<i>Phone + Cable + Modem</i>	\$21.64		1. \$3.95/mo; \$0.07/min	1. \$5.95/mo; \$0.07/min
<b>- Description</b>	DSL, Wireless, Phone, LD	Same as "Complete Choice" w/ unlimited		Same as <i>RightPak</i>	\$109.00	Basic line w/		2. \$0/mo; \$0.09/min	2. \$8.95/mo; \$0.05/min
		local toll services		but also incl. add'l line	16-22% disc; same as	four features		3. \$0/mo; \$0.05/min/wknd	In-State toll: \$.10
				w/ features on both	above + cable modem			\$0.09/min/M-F	In-State LD: \$.10
									3. \$4.95/mo; \$0.10/min
									In-state Toll / LD same.
									4. \$40/mo; 1000min
									In-state Toll / LD same.
<b>Features:</b>									
<b>Voice Mail</b>	\$7.95	\$3.95	\$6.95	\$4.95	\$5.27	\$4.95	\$7.95		
<b>Caller ID</b>	\$8.95	\$7.95	\$0.90 / each usage			\$6.15	\$6.17		
<b>Call Waiting</b>	\$8.00	\$5.50	\$0.90 / each usage		\$4.93	\$2/ea on all features			
<b>3-Way Calling</b>	\$4.00	\$5.00	\$0.90 / each usage			after the purchase			
<b>Typical Feature Cost</b>			\$0.90 / each usage	~\$5.00	\$4.93	of one feature @ \$3.20	\$3.23		

<b>Notes</b>	Extended Call Area	Best deal \$49.95 includes	Telephony over cable;	Cable pkg. includes 5 HBO	6.5% disc if you have	*** Mandatory Extended
		2 lines with 23 features	1st mo free/ free 2 mos voicemail	2 Cinemax, 80 channels,	another COX service	Calling Area may
	<i>If you live in an extended</i>	(Complete Choice)	Each product has it's	and Converter Box.	30% disc for multiple	apply (\$.40-\$9.10)
	<i>call area, your phone</i>		own spec promotions		lines ordered.	
	<i>bill will increase by</i>		and pricing discounts		(9.99 1st line, 4.99 2nd;	
	<i>\$13.75 - \$21.00/mo</i>		(cable, telephone, modem)		Pac-Bell cost is 21.38)	
	<i>(and this is common)</i>		competing w/ Bell South			
			on price ( 27% disc)			

<b>Appendix 2 - SWOT Analysis - VoIP Business Plan</b>			
<b>Strengths</b>		<b>Weaknesses</b>	
<b>Opportunities</b>		<b>Threats</b>	
Lower cost to deploy VoIP rather than CBR technology	Still working through technology issues -- jitter / latency	VoIP Company does not have jitter or latency problems	Need for "grounded" phones taken over by cell phones
Enables MSOs to offer "triple play"		Offers competition in a market that has been a monopoly	Pricing war may result with incumbent RBOC and DBS co's
VoIP Company offers a lower cost entry solution	High cost to enter into the VoIP market	Longer term commitment from customers in form of contracts	Overbuilders may grab subs first
Reduces churn in MSOs that offer "double play" or "triple play" services			FCC may decide VoIP is regulated the same as RBOC phones (Patent Law - Doctrine of Equivalency)
Ability to offer second line at a reduced price	Second line is often a 'reduced' quality phone	VoIP phones can "plug in" anywhere - mobile	Liability issues may result if phone is needed in an emergency
Increases the NPV per subscriber by \$124-\$334 over seven years (depending on assumptions)			May need to pay universal fees when VoIP phone replaces RBOC phone
	Requires a new level of technical engineer in the plant	More career opportunities for system employees	
Internet calls are not taxed at present			Nat'l Assn. of Reg. Utility Comrs. (NARUC) opposes allowing VoIP svcs to be treated differently from standard phone service.
May offer way for dial up customers to "trade up"		This is known as the "sleeper segment" because they are often overlooked.	
Offers products for multiple marketing segments			

**Appendix 3 – Default Inputs**

(Note, these are excerpts from the financial model prepared by Jean Duane and Dan Prendergast)

**Residential DCF Valuation Model**

*Adjust either the % change per year or the amount per year*  
**Value End of Year**

Variable	% change per yr	Value	Beginning	1
<b>MSO Name</b>		<b>1MHP/100KLinesDefault</b>		
Starting Year		2003		
<b>VOIP Box</b>				
With or without EMS		With EMS		
Number of Lines	1	100,000	\$5.00	per new line
Line Maintenance	5	Standard	\$50.00	per new line
Discount rate or WACC	1		7%	of Line Cost
IRR Decision Hurdle Rate			10.8%	
Terminal Value			25.0%	
Depreciation Life of Equipment			10.4	
Depreciation Life of Cap Labor & Installation			3	years
Tax Rate			3	years
Capital Lease			10.0%	
Down Payment %			20.0%	
Lease Rate			8.0%	
Term			7	
Interest Income on Investment			3.0%	
Interest Expense			10.0%	

**Default Inputs Continued**

**Subscribers**

EOY Total Homes Passed	2.0%		1,000,000	1,020,000
End of Year Penetration	6.0%		0.0%	6.0%
Subscribers (Beginning)			0	
Churn (disconnects) - monthly	-0.1%	1.2%		1.2%

**Revenue** (revenue calculations based on average subs)

**Product Mix**

Triple Play (Voice/Data/Video)	4.0%	10.0%	of total subs	10.0%
Basic Package	-1.0%	20.0%		20.0%
Double Play	-1.0%	30.0%		30.0%
Privacy Package	-1.0%	20.0%		20.0%
Deluxe Package	-1.0%	20.0%		20.0%

**Product Rates**

		Monthly Rate	% VoIP	
Triple Play (Voice/Data/Video)	0.5%	\$125.95	25%	\$125.95
Basic Package	0.5%	\$9.95		\$9.95
Double Play (Voice/Video)	0.5%	\$69.95	40%	\$69.95
Privacy Package	0.5%	\$34.95		\$34.95
Deluxe Package	0.5%	\$39.95		\$39.95

**% of total**

**Additional Features**

Average Lines/Sub			1.30	
Standalone Voicemail	25.0%	-1.0%	\$6.95	\$6.95
Additional Line	30.0%	-1.0%	\$9.95	\$9.95

**Default Inputs Continued**

LD Option: <b>Per Minute</b> ▼	Long Distance Package	60.0%	-1.0%	\$15.00	Minutes/month	\$15.00
	Long Distance Overflow	5.0%	-1.0%	\$0.35		\$0.35
	Long Distance Overflow minutes		2.0%	20		20
<b>OR</b>	Long Distance Base Price	25.0%	1.0%	\$4.95		\$4.95
	Average LD Minutes per sub		2.0%	300		300
	LD Price per minute Peak hours	60.0%	2.0%	\$0.07		\$0.07
	LD Price per minute Off-Peak hours	40.0%	2.0%	\$0.04		\$0.04
	Value Added Services	100.0%	5.0%	\$1.00		\$1.00
	Service/Installation Charge	25.0%	-1.0%	\$39.99		\$39.99
	Additional Line Installation Charge	30.0%	-1.0%	\$100.00		\$100.00
	Modem Rental Charge	60.0%	-1.0%	\$5.00		\$5.00
	Order Processing Fees	0.0%	-1.0%	\$5.00		\$5.00
	Wire Maintenance	10.0%	-1.0%	\$2.00		\$2.00
	EUCL	100.0%	0.0%	\$6.00		\$6.00
	Calling Card Sales	10.0%	-1.0%	\$8.00		\$8.00
	Number of Minutes		0.0%	120		120
	Percent Minutes Used		0.5%	70.0%		70.0%

**Default Inputs Continued**



**Expenses**

**PSTN Connectivity**

Cost per T1 per month	1.0%	\$500.00		
Cost per DS3 per month	1.0%	\$1,500.00		
% On-Net Calls	5.0%	10.0%		10.0%
Busy Hour Calling % (Call Blocking Ratio)		17.0%		
Average Call Length (minutes/call)		6.8		
Average Number calls per day		4.8		

**Long Distance Expenses**

Traffic to IXC %	-1.0%	30.0%	of LD minutes	30.0%
IXC Toll per Minute	-2.0%	\$0.049		\$0.049
Calling Card minutes used		84	per cc sub/month	84

**Transport Costs**

	<b>% of each</b>			
Traffic for Transport		60.0%	of total minutes	60.0%
Leased Lines	65.0%	-1.0%	\$0.020	\$0.020
MSO Owned Optical Transport	35.0%	-1.0%	\$0.005	\$0.005

**Settlement Charges**

% Inbound calls	0.0%	50.0%		50.0%
% Outbound calls				50.0%
% Local calls	0.0%	70.0%		70.0%
% Intrastate (inter- or intra-LATA) calls	0.0%	15.0%		15.0%
% Interstate calls		15.0%		15.0%
Local Terminating Access Fee	0.0%	\$0.010	per minute	\$0.010
Intrastate Toll Charge (inter- or intra-LATA)	0.0%	\$0.030	per minute	\$0.030
Interstate Terminating Access Charge (incl. facilities)	0.0%	\$0.020	per minute	\$0.020



**Default Inputs Continued**

**Telco Expenses**

Local Number Portability (LNP)			1.0%	\$0.00	per line	
800 Database			1.0%	\$0.29	per sub	
Directory Assistance/Operator Services			1.0%	\$0.29	per sub	
Directory Listing			1.0%	\$0.00	per sub	
E911 Census Charge, CALEA			1.0%	\$0.86	per sub	
CALEA / 911 Facilities Cost			1.0%	\$0.29	per sub	
Backup DCN Monitoring Links			1.0%	\$0.30	per sub	
Caller ID (CNAM)			1.0%	\$0.99	per sub	
LEC Charge			1.0%			
SS7 Interconnect: TCAP Terminating Signals			1.0%	\$0.00024	per sub	
SST Interconnect: Signal Transport IAM			1.0%	1,098	per month	
SS7 Database Query Charge			1.0%		per sub	
3rd Party Verification Switch Charge			1.0%	\$1.67	per NEW sub	
911 Address Database			1.0%	\$0.35	per NEW sub	
Gross Receipt Tax	Receipt Tax	% of subs paying:	20.0%	0.0%	2.67%	of gross revenue
Universal Service Fee				0.0%	7.0%	% of LD Revenues

**Installation**

Truck Rolls: % of installations	1.0%	50.0%	50.0%
Cost per Truck Roll	4.0%	\$75.00	\$75.00
Capitalization of Truck Rolls	-5.0%	100.0%	100.0%

**Default Inputs Continued**

**Customer Care**

CSR Analysis:

Average Payroll Hours per Month 173

Productivity Factor 65.0%

Productive Hours per Month 112

Average Call Length (talk and hold time) 15

Average Calls per Productive Hour 4

Total Calls per Month 448

Contact Rate-Existing Subs 30.0%

New Subs Contact Rate 200.0%

Ratio of Subscribers to CSRs 1,494

CSR Base Salary 4.0% 35,000

CSR Overhead % 50.0%

Capitalization of CSR labor (%) -9.0% 75.0% 75.0%

Ratio CSRs to CSR Supervisors 30

Base Salary 4.0% 75,000

Overhead % 50.0%

Minimum Number of Supervisors 3

***Default Inputs Continued***

**Technical Support**

System Tech

Base Salary	4.0%	75,000	
Overhead %		50.0%	
HP per System Tech		500,000	

Line Tech

Base Salary	4.0%	55,000	
Overhead %		50.0%	
Max HP/Line Tech		100,000	

Service/Installation Techs

Base Salary	4.0%	55,000	
Overhead %		40.0%	
Max Existing Sub/Tech		8,000	
New Subs/Tech		175	
Capitalization of Installation labor (%)	-5.0%	100.0%	100.0%
Capitalization of New Sub Install labor	0.0%	100.0%	100.0%

Service/Installation Tech Supervisors

Base Salary	4.0%	75,000	
Overhead %		50.0%	
Ratio Techs to Supervisors		20	
Minimum Number of Supervisors		2	

**Default Inputs Continued**

Other Technician Supervisors

Base Salary	4.0%	75,000
Overhead %		50.0%
Ratio Techs to Supervisors		30
Minimum Number of Supervisors		1

Other Personnel - HP based

Base Salary	4.0%	55,000
Overhead %		50.0%
Max <b>HP</b> / Other		0

Other Personnel - Sub based

Base Salary	4.0%	70,000
Overhead %		50.0%
Max <b>Subs</b> / Other		0

Other Personnel

Base Salary	4.0%	60,000
Overhead %		50.0%
Number of Personnel		0

NOC (Incremental)

Base Salary	4.0%	75,000
Overhead %		50.0%
Max subs/NOC Tech		5,000

**Default Inputs Continued**

Base Salary	4.0%	85,000
Overhead %		50.0%
Ratio Techs to Supervisors		30
Minimum Number of Supervisors		1

Ongoing Network Operations			
NOC Cost			per line
% of NOC used for VoIP			

Database Costs			
Access Fees	0.0%	\$0.00	per new sub

**Billing**

Cost per paper invoice	0.0%	\$1.00
Credit Card billing Cost (per sub)	0.0%	\$0.50
Credit Card settlement charge (% of cc revenue)	0.0%	3.0%
% subs with credit card billing	2.0%	20.0%

**Sales and Marketing**

Customer Acquisition Cost	-5.0%		per new sub	\$120.00
Retention Marketing per month	-1.0%		per sub	\$0.80

**G&A Expense**

Corporate Overhead charge	0.0%	7.0%	of Revenue	
System Property Tax Allocation for VoIP	2.0%	\$100	per month	\$100.00

**Default Inputs Continued**

**Capital Expenses**

	<u>Lease Option (Y/N)</u>	<u>Qty</u>	<u>Unit Cost</u>	<u>Total</u>
<b>Support Hardware</b>	<b>Y</b>			
Test/Production Lab			250,000	250,000
Field Ops Capital (truck for Techs)			22,000	22,000
Startup Network Eval/Consulting/Regulatory/Trial costs			71,940	71,940
Synchronization Source Clock		1	10,000	10,000
Transmux Multiplexer		1	20,585	20,585
85KW Generators		1	51,128	51,128
Database HW and SW		1	30,000	30,000
<i>DSX Panels:</i>				
DSX-1 Panel		2	2,860	5,720
DSX-3 Panel		3	1,650	4,950
Fuse Panels		6	2,422	14,533
Fiber Panel Enclosures		4	772	3,089
Fiber Panel Splice Tray		4	504	2,016
Fiber Panel Lt. Drawer		4	677	2,706
Fiber Panel Rt. Drawer		4	677	2,706
Fiber Panel Mount		2	50	99
Telzon Term. Panel		1	1,950	1,950
Other Capital				0
<b>Total DSX Panels</b>				<b>37,769</b>

**Default Inputs Continued**

<b>Voicemail System</b>	<b>Y</b>	Qty	Unit Cost		
Voicemail System		1	174,645		174,645
Voicemail Upgrade (HDLC & DS1 Card)		2,500	\$17.00		42,500
Subscriber Capacity of System indicated in column J					
<b>Customer Premise Equipment (CPE)</b>	<b>Y</b>		Unit Cost		
MTA		-2.0%	\$99.00	per new sub	\$99.00
% Customer Owned CPE		2.0%	0.0%		0.0%
		Inside House			
<i>Select Powering Option:</i>					
<b>OR</b>	AC Powered with 8 Hour Battery				
		-1.0%	\$52.00		
<b>OR</b>	Unit with Battery				
		-1.0%	\$60.00		
	Replacement Battery				\$20.00
		2.0%	\$20.00		
	% batteries replaced each year				1.0%
		5.0%	1.0%		
<b>OR</b>	NIU - installed by MSO outside home			per new sub	
		-10.0%	\$243.00		
	Tap and Drop			per new sub	
			\$12.50		
	Number HP per node				1,200
	Penetration of enabled nodes				35.0%
		5.0%	35.0%		
	# Nodes to Enable				298
	Centralized Battery b/u powering source			per HP	
			\$15.00		
	Cumulative HP enabled:				357,600
	Sub Penetration of enabled HP				17.1%
<b>Provisioning</b>	<b>Y</b>				
Switch / CMTS / MTA			\$15.00	per new sub	

**Default Inputs Continued**

**Billing Integration**

**Y**

Billing Integration Cost

250,000

one time startup cost

OSS BSS NOC Back Office

\$15.00

per New Sub

**Training**

2,700

one time startup cost

**CMTS Upgrades**

**Y**

CMTS used:

Arris

DOCSIS Card

Maximum Simultaneous Calls per DOCSIS Card

16

Slots

90

calls

Chassis Cost

79,300

DOCSIS Card cost

21,500

Allocation of CMTS to VoIP

7.5%

10.0%

10.0%

Allocation of DOCSIS Card to VoIP

0.0%

100.0%

100.0%

Capacity of DOCSIS Card

2,000

**CAPEX Maintenance**

**Y**

\$0.25

per HP per year



**Appendix 4 - Contrast Inputs**

**Residential DCF Valuation Model**

Adjust either the % change per year or the amount per year  
**Value End of Year**

Variable	% change per yr	Value	Beginning	1
<b>MSO Name</b>		<b>1M HP / 100Klines Contrast Assumptions</b>		
Starting Year		2003		
<b>VOIP Box</b>				
With or without EMS	With EMS			
Number of Lines	100,000	\$5.00	per new line	
Line Maintenance	Standard	\$50.00	per new line	
Discount rate or WACC	1	7%	of Line Cost	
IRR Decision Hurdle Rate		10.8%		
Terminal Value		25.0%		
Depreciation Life of Equipment		10.4		
Depreciation Life of Cap Labor & Installation		0	years	
Tax Rate		3	years	
Capital Lease		0.0%		
Down Payment %		20.0%		
Lease Rate		8.0%		
Term		7		
Interest Income on Investment		3.0%		
Interest Expense		10.0%		

**Contrast Inputs Continued**

<b>Subscribers</b>				
EOY Total Homes Passed	2.0%		1,000,000	1,020,000
End of Year Penetration	2.0%		0.0%	8.0%
Subscribers (Beginning)			0	
Churn (disconnects) - monthly	-0.1%	1.2%		1.2%

<b>Revenue</b> (revenue calculations based on average subs)				
<b>Product Mix</b>				
Triple Play (Voice/Data/Video)	0.0%	0.0%	of total subs	0.0%
Basic Package	0.0%	100.0%		100.0%
Double Play	0.0%	0.0%		0.0%
Privacy Package	0.0%	0.0%		0.0%
Deluxe Package	0.0%	0.0%		0.0%
<b>Product Rates</b>				
		<b>Monthly Rate</b>	<b>% VoIP</b>	
Triple Play (Voice/Data/Video)	0.5%	\$125.95	25%	\$125.95
Basic Package	0.5%	\$23.95		\$23.95
Double Play (Voice/Video)	0.5%	\$69.95	40%	\$69.95
Privacy Package	0.5%	\$34.95		\$34.95
Deluxe Package	0.5%	\$39.95		\$39.95

**Contrast Inputs Continued**

		<u>% of total</u>				
<b>Additional Features</b>						
	Average Lines/Sub			1.30		
	Standalone Voicemail	25.0%	-1.0%	\$6.95		\$6.95
	Additional Line	30.0%	-1.0%	\$7.95		\$7.95
LD Option: <input type="button" value="Per Minute"/> ▾	Long Distance Package	60.0%	-1.0%	\$15.00		\$15.00
	Long Distance Overflow	5.0%	-1.0%	\$0.35		\$0.35
	Long Distance Overflow minutes		2.0%	20	Minutes/month	20
<b>OR</b>	Long Distance Base Price	50.0%	1.0%	\$4.95		\$4.95
	Average LD Minutes per sub		2.0%	300		300
	LD Price per minute Peak hours	60.0%	2.0%	\$0.07		\$0.07
	LD Price per minute Off-Peak hours	40.0%	2.0%	\$0.04		\$0.04
	Value Added Services	100.0%	5.0%	\$1.00		\$1.00
	Service/Installation Charge	100.0%	-1.0%	\$39.99		\$39.99
	Additional Line Installation Charge	30.0%	-1.0%	\$100.00		\$100.00
	Modem Rental Charge	0.0%	-1.0%	\$5.00		\$5.00
	Order Processing Fees	100.0%	-1.0%	\$5.00		\$5.00
	Wire Maintenance	10.0%	-1.0%	\$2.00		\$2.00
	EUCL	100.0%	0.0%	\$6.00		\$6.00
	Calling Card Sales	10.0%	-1.0%	\$8.00		\$8.00
	Number of Minutes		0.0%	120		120
	Percent Minutes Used		0.5%	70.0%		70.0%

**Contrast Inputs Continued**

<b><u>Expenses</u></b>				
<b>PSTN Connectivity</b>				
Cost per T1 per month		1.0%	\$30.00	
Cost per DS3 per month		1.0%	\$750.00	
% On-Net Calls		5.0%	2.0%	2.0%
Busy Hour Calling % (Call Blocking Ratio)			17.0%	
Average Call Length (minutes/call)			6.8	
Average Number calls per day			4.8	
<b>Long Distance Expenses</b>				
Traffic to IXC %		-1.0%	98.0%	of LD minutes 98.0%
IXC Toll per Minute		-2.0%	\$0.020	\$0.020
Calling Card minutes used			84	per cc sub/month 84
<b>Transport Costs</b>				
	<b>% of each</b>			
Traffic for Transport			0.0%	of total minutes 0.0%
Leased Lines	65.0%	-1.0%	\$0.020	\$0.020
MSO Owned Optical Transport	35.0%	-1.0%	\$0.005	\$0.005
<b>Settlement Charges</b>				
% Inbound calls		0.0%	50.0%	50.0%
% Outbound calls				50.0%
% Local calls		0.0%	70.0%	70.0%
% Intrastate (inter- or intra-LATA) calls		0.0%	15.0%	15.0%
% Interstate calls			15.0%	15.0%
Local Terminating Access Fee		0.0%	\$0.010	per minute \$0.010
Intrastate Toll Charge (inter- or intra-LATA)		0.0%	\$0.030	per minute \$0.030
Interstate Terminating Access Charge (incl. facilities)		0.0%	\$0.020	per minute \$0.020

**Contrast Inputs Continued**

**Telco Expenses**

Local Number Portability (LNP)			1.0%	\$0.00	per line
800 Database			1.0%	\$0.29	per sub
Directory Assistance/Operator Services			1.0%	\$0.29	per sub
Directory Listing			1.0%	\$0.00	per sub
E911 Census Charge, CALEA			1.0%	\$0.86	per sub
CALEA / 911 Facilities Cost			1.0%	\$0.29	per sub
Backup DCN Monitoring Links			1.0%	\$0.30	per sub
Caller ID (CNAM)			1.0%	\$0.99	per sub
LEC Charge			1.0%		
SS7 Interconnect: TCAP Terminating Signals			1.0%	\$0.00024	per sub
SST Interconnect: Signal Transport IAM			1.0%	1,098	per month
SS7 Database Query Charge			1.0%		per sub
3rd Party Verification Switch Charge			1.0%	\$1.67	per NEW sub
911 Address Database			1.0%	\$0.35	per NEW sub
Gross Receipt Tax	Receipt Tax	% of subs paying:	20.0%	0.0%	2.67%
					of gross revenue
Universal Service Fee			0.0%	7.0%	% of LD Revenues

**Installation**

Truck Rolls: % of installations		1.0%	100.0%	100.0%
Cost per Truck Roll		4.0%	\$75.00	\$75.00
Capitalization of Truck Rolls		-5.0%	100.0%	100.0%

**Contrast Inputs Continued**

**Customer Care**

CSR Analysis:

Average Payroll Hours per Month	173
Productivity Factor	65.0%
Productive Hours per Month	112

Average Call Length (talk and hold time)	15
Average Calls per Productive Hour	4
Total Calls per Month	448

Contact Rate-Existing Subs	20.0%
New Subs Contact Rate	50.0%
Ratio of Subscribers to CSRs	2,240

CSR Base Salary	4.0%	35,000	
CSR Overhead %		50.0%	
Capitalization of CSR labor (%)	-9.0%	75.0%	75.0%

Ratio CSRs to CSR Supervisors		30
Base Salary	4.0%	75,000
Overhead %		50.0%
Minimum Number of Supervisors		3

**Contrast Inputs Continued**

**Technical Support**

System Tech

Base Salary	4.0%	75,000
Overhead %		50.0%
HP per System Tech		500,000

Line Tech

Base Salary	4.0%	55,000
Overhead %		50.0%
Max HP/Line Tech		100,000

Service/Installation Techs

Base Salary	4.0%	55,000	
Overhead %		50.0%	
Max Existing Sub/Tech		8,000	
New Subs/Tech		175	
Capitalization of Installation labor (%)	-5.0%	100.0%	100.0%
Capitalization of New Sub Install labor	0.0%	100.0%	100.0%

Service/Installation Tech Supervisors

Base Salary	4.0%	75,000
Overhead %		50.0%
Ratio Techs to Supervisors		20
Minimum Number of Supervisors		2

**Contrast Inputs Continued**

Other Technician Supervisors

Base Salary	4.0%	75,000
Overhead %		50.0%
Ratio Techs to Supervisors		30
Minimum Number of Supervisors		1

Other Personnel - HP based

Base Salary	4.0%	55,000
Overhead %		50.0%
Max <b>HP</b> / Other		0

Other Personnel - Sub based

Base Salary	4.0%	70,000
Overhead %		50.0%
Max <b>Subs</b> / Other		0

Other Personnel

Base Salary	4.0%	60,000
Overhead %		50.0%
Number of Personnel		0

NOC (Incremental)

Base Salary	4.0%	75,000
Overhead %		50.0%
Max subs/NOC Tech		5,000



**Contrast Inputs Continued**

NOC Technician Supervisors

Base Salary	4.0%	85,000
Overhead %		50.0%
Ratio Techs to Supervisors		30
Minimum Number of Supervisors		1

Ongoing Network Operations

NOC Cost			per line
% of NOC used for VoIP			

Database Costs

Access Fees	0.0%	\$0.00	per new sub
-------------	------	--------	-------------

**Billing**

Cost per paper invoice	0.0%	\$1.00
Credit Card billing Cost (per sub)	0.0%	\$0.50
Credit Card settlement charge (% of cc revenue)	0.0%	3.0%
% subs with credit card billing	2.0%	20.0%

**Sales and Marketing**

Customer Acquisition Cost	-5.0%		per new sub	\$120.00
Retention Marketing per month	-1.0%		per sub	\$0.80

**G&A Expense**

Corporate Overhead charge	0.0%	7.0%	of Revenue	
System Property Tax Allocation for VoIP	2.0%	\$100	per month	\$100.00

**Contrast Inputs Continued**

**Capital Expenses**

	<u>Lease Option (Y/N)</u>	<u>Qty</u>	<u>Unit Cost</u>	<u>Total</u>
<b>Support Hardware</b>	<b>Y</b>			
Test/Production Lab			0	0
Field Ops Capital (truck for Techs)			22,000	22,000
Startup Network Eval/Consulting/Regulatory/Trial costs			71,940	71,940
Synchronization Source Clock		1	10,000	10,000
Transmux Multiplexer		1	20,585	20,585
85KW Generators		1	51,128	51,128
Database HW and SW		1	0	0
<i>DSX Panels:</i>				
DSX-1 Panel		2	2,860	5,720
DSX-3 Panel		3	1,650	4,950
Fuse Panels		6	2,422	14,533
Fiber Panel Enclosures		4	772	3,089
Fiber Panel Splice Tray		4	504	2,016
Fiber Panel Lt. Drawer		4	677	2,706
Fiber Panel Rt. Drawer		4	677	2,706
Fiber Panel Mount		2	50	99
Telzon Term. Panel		1	1,950	1,950
Other Capital				0
<b>Total DSX Panels</b>				<b>37,769</b>

**Contrast Inputs Continued**

<b>Voicemail System</b>		<b>Y</b>	Qty	Unit Cost		
	Voicemail System		1	174,645		174,645
	Voicemail Upgrade (HDLC & DS1 Card)		2,500	\$17.00		42,500
Subscriber Capacity of System indicated in column J						
<b>Customer Premise Equipment (CPE)</b>		<b>Y</b>		Unit Cost		
	MTA		-2.0%	\$99.00	per new sub	\$99.00
	% Customer Owned CPE		2.0%	0.0%		0.0%
			<div style="border: 1px solid black; padding: 2px;">                     Outside House <span style="float: right;">▼</span> </div>			
	<i>Select Powering Option:</i>		2			
<b>OR</b>	AC Powered with 8 Hour Battery		-1.0%	\$52.00		
<b>OR</b>	Unit with Battery		-1.0%	\$135.00		
	Replacement Battery		2.0%	\$40.00		\$40.00
	% batteries replaced each year		25.0%	1.0%		1.0%
<b>OR</b>	NIU - installed by MSO outside home		-10.0%	\$175.00	per new sub	
	Tap and Drop			\$12.50	per new sub	
	Number HP per node			1,200		
	Penetration of enabled nodes		5.0%	35.0%		35.0%
	# Nodes to Enable			35		298
	Centralized Battery b/u powering source			\$15.00	per HP	
	Cumulative HP enabled:					357,600
	Sub Penetration of enabled HP					22.8%
<b>Provisioning</b>		<b>Y</b>		\$15.00	per new sub	
	Switch / CMTS / MTA					

**Contrast Inputs Continued**

**Billing Integration**

Y

Billing Integration Cost  
OSS BSS NOC Back Office

90,000	one time startup cost
\$15.00	per New Sub

**Training**

2,700	one time startup cost
-------	-----------------------

**CMTS Upgrades**

Y

CMTS used:  
Maximum Simultaneous Calls per DOCSIS Card  
Chassis Cost  
DOCSIS Card cost  
Allocation of CMTS to VoIP  
Allocation of DOCSIS Card to VoIP  
Capacity of DOCSIS Card

Arris

2

16
90
79,300
21,500
7.5%
0.0%
2,000

DOCSIS Card  
Slots  
calls

10.0%
100.0%

**CAPEX Maintenance**

Y

\$0.25	per HP per year
--------	-----------------

## Appendix 5 – Default Outputs

<b>Summary Metrics</b>				
<b>Beginning Assumptions:</b>	<b>HP:</b>	1,000,000	<b>No. Lines:</b>	100,000
<b>Cost of Capital BE</b>		4		
<b>Years to FCF Positive</b>		3		
<b>Funding Requirement</b>		(898,767)		
<b>Peak Cumulative Negative Cash Flow</b>		(14,448,209)		
<b>VoIP Product Line Value</b>		1,162,955,032		
		<b><u>Year 5</u></b>	<b><u>Year 7</u></b>	<b><u>Year 10</u></b>
<b>ROI</b>		109.5%	199.0%	312.7%
<b>IRR</b>		76.5%	95.5%	100.1%
<b>Contribution Margin</b>		43.6%	50.9%	55.7%
<b>Incremental VoIP Head Count</b>				
CSRs		134	123	130
Technicians		171	144	153

<b>CASH FLOW VALUATION</b>						
<i>Discount Rate or WACC</i>	1.5%	7.80%	9.30%	10.80%	12.30%	13.80%
<b>NPV of Free Cash Flow through Year 7</b>		137,938,712	126,913,886	116,888,791	107,759,492	99,434,188
<b>NPV per Subscriber</b>		\$ 400	\$ 368	\$ 339	\$ 313	\$ 289
<b>PV of Free Cash Flow in Year 7</b>		43,717,395	39,686,653	36,075,078	32,834,266	29,921,942

***Revenue and Expense Detail***

	<u>Year 5</u>	<u>Year 7</u>	<u>Year 10</u>	
<b>Revenue Detail - Percent of Total Revenue</b>				<b>Expense Percentages of Revenue</b>
Triple Play (Voice/Data/Video)	15.6%	20.5%	27.4%	Connectivity
Basic Package	3.0%	2.7%	2.1%	Long Distance
Double Play	13.9%	12.9%	11.1%	Transport
Privacy Package	10.7%	9.4%	7.3%	Costs
Deluxe Package	12.2%	10.7%	8.3%	Settlement Charges
Voicemail	3.1%	3.0%	2.9%	Telco
Additional Line	7.0%	6.8%	6.4%	Expenses
Long Distance	12%	13%	14%	CSR
Value Added Services	2.3%	2.5%	2.8%	Tech Support
Installation Charge	0.5%	0.2%	0.1%	Billing
Additional Line Installation Charge	1.5%	0.5%	0.4%	Sales and Marketing
Modem Rental Charge	5.4%	5.3%	5.0%	G & A
Order Processing Fees	0.0%	0.0%	0.0%	
Wire Maintenance	0.4%	0.4%	0.3%	
EUCL	11.2%	11.2%	10.9%	
Card Sales	1.4%	1.4%	1.3%	

**Default Outputs Continued**

<b>Detail Summary</b>	<b>Beginning/ Startup</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
<b><u>Subscribers</u></b>							
Ending Subs		61,200	124,848	191,018	259,786	331,226	337,850
Number of Lines		79,560	162,302	248,323	337,722	430,594	439,205
<b><u>Revenue</u></b>							
Package Revenue		10,401,900	32,064,878	55,009,300	79,290,996	104,967,731	120,053,504
Additional Feature Revenue		10,706,924	27,869,950	45,858,533	64,726,539	84,528,024	93,412,798
<b>Total Revenue</b>		<b>21,108,824</b>	<b>59,934,828</b>	<b>100,867,833</b>	<b>144,017,535</b>	<b>189,495,755</b>	<b>213,466,302</b>
<b><u>Expenses</u></b>							
Connectivity		1,845,500	5,111,105	8,216,395	11,139,614	13,856,683	14,734,110
Long Distance		1,579,578	4,356,600	6,955,679	9,391,735	11,643,146	12,392,438
Transport Costs		3,411,946	9,134,498	14,115,058	18,330,191	21,755,929	21,979,482
Settlement Charges		0	0	0	0	0	0
Telco Expenses		1,451,873	3,982,344	6,660,045	9,491,593	12,483,784	13,981,047
Installation		2,445,375	3,005,459	3,575,591	4,148,459	4,714,238	1,741,537
CSR		2,773,939	4,003,740	4,533,934	6,253,818	8,123,789	8,161,528
Tech Support		5,459,627	8,089,685	11,167,367	14,413,305	18,057,718	17,338,243
Billing		482,527	1,390,725	2,338,431	3,327,115	4,358,266	4,896,788
Sales and Marketing		8,141,530	9,520,310	10,690,034	11,669,883	12,475,749	6,278,802
G & A		1,478,818	4,196,662	7,061,997	10,082,501	13,266,002	14,943,966
<b>Total Expenses</b>		<b>29,070,713</b>	<b>52,791,128</b>	<b>75,314,531</b>	<b>98,248,216</b>	<b>120,735,304</b>	<b>116,447,940</b>
Capitalized Labor		(7,265,746)	(9,308,129)	(10,695,955)	(12,476,636)	(13,922,300)	(8,315,773)
<b>OPERATING CASH FLOW (EBITDA)</b>		<b>(696,142)</b>	<b>16,451,829</b>	<b>36,249,257</b>	<b>58,245,956</b>	<b>82,682,751</b>	<b>105,334,133</b>

**MSO VoIP Business Plan**

Less: Depreciation	(9,740,096)	(20,521,488)	(32,260,218)	(35,313,218)	(38,190,615)	(31,501,660)
<b>EBIT</b>	<b>(10,436,238)</b>	<b>(4,069,659)</b>	<b>3,989,038</b>	<b>22,932,738</b>	<b>44,492,136</b>	<b>73,832,471</b>
Less: Taxes	0	0	0	(1,241,588)	(4,449,214)	(7,383,248)
<b>EBI Income</b>	<b>(10,436,238)</b>	<b>(4,069,659)</b>	<b>3,989,038</b>	<b>21,691,150</b>	<b>40,042,922</b>	<b>66,449,223</b>
Addback: Depreciation	9,740,096	20,521,488	32,260,218	35,313,218	38,190,615	31,501,660
<b>GROSS OPERATING CASH FLOW</b>	<b>(696,142)</b>	<b>16,451,829</b>	<b>36,249,257</b>	<b>57,004,368</b>	<b>78,233,537</b>	<b>97,950,881</b>

**Capital**

Switch Related Costs	471,422	4,910,247	5,204,740	5,265,602	5,592,875	5,783,890	615,081
Voicemail system	174,645	769,645	816,790	859,290	859,290	944,290	174,645
CPE	0	9,846,710	10,995,083	11,884,341	12,526,781	12,931,947	4,339,580
Provisioning	0	978,150	1,133,280	1,271,475	1,391,685	1,492,500	520,511
Billing Integration	250,000	978,150	1,133,280	1,271,475	1,391,685	1,492,500	520,511
Training	2,700	0	0	0	0	0	(
CMTS Upgrade	0	3,317,870	3,492,775	3,702,750	3,869,725	4,132,920	381,668
CAPEX Maintenance	0	255,001	260,101	265,303	270,610	276,022	281,542
Capitalized Labor	0	7,265,746	9,308,129	10,695,955	12,476,636	13,922,300	8,315,773
<b>Total Capital</b>	<b>898,767</b>	<b>28,321,519</b>	<b>32,344,177</b>	<b>35,216,191</b>	<b>38,379,286</b>	<b>40,976,368</b>	<b>15,149,321</b>

**Capital Lease Option**

Switch Related Costs	94,284	1,386,476	1,804,118	2,616,040	3,490,596	4,388,189	4,243,161
Voicemail system	34,929	223,449	300,257	434,263	566,300	715,337	706,500
CPE	0	2,623,684	3,586,360	5,453,694	7,408,305	9,414,177	9,682,800
Provisioning	0	260,631	364,472	566,248	785,662	1,019,669	1,054,600
Billing Integration	50,000	299,045	402,886	604,663	824,077	1,058,083	1,093,021
CMTS Upgrade	0	889,559	1,164,967	1,743,654	2,346,006	2,993,259	2,878,064
CAPEX Maintenance	0	51,000	91,203	132,210	174,037	216,701	260,211
<b>Total Capital Lease</b>	<b>179,213</b>	<b>5,733,844</b>	<b>7,714,263</b>	<b>11,550,772</b>	<b>15,594,983</b>	<b>19,805,414</b>	<b>19,918,381</b>

<b>FREE CASH FLOW</b>	(181,913)	(13,695,733)	(570,563)	14,002,530	28,932,748	44,505,823	69,716,731
<b>Cumulative Free Cash Flow</b>	(181,913)	(13,877,646)	(14,448,209)	(445,680)	28,487,069	72,992,892	142,709,623



**Summary Per Subscriber** *(average value in each year)*

Monthly Revenue (ARPU) per sub	\$54.84	\$52.34	\$52.38	\$52.63	\$52.94	\$53.13
Expense per sub	\$100.15	\$46.60	\$39.22	\$35.94	\$33.75	\$28.98
Cash Flow (EBITDA) per sub	(\$45.31)	\$5.75	\$13.17	\$16.68	\$19.19	\$24.15
Capital Cost per sub	\$128.51	\$29.02	\$18.45	\$14.09	\$11.48	\$3.71
Capital Cost per New sub	\$448.58	\$427.82	\$415.28	\$413.60	\$411.77	\$436.52

Appendix 6 – Contrast Outputs

<b>Summary Metrics</b>				
<b>Beginning Assumptions:</b>	<b>HP:</b>	1,000,000	<b>No. Lines:</b>	100,000
<b>Cost of Capital BE</b>		3		
<b>Years to FCF Positive</b>		2		
<b>Funding Requirement</b>		(458,767)		
<b>Peak Cumulative Negative Cash Flow</b>		(13,804,840)		
<b>VoIP Product Line Value</b>		1,352,065,501		
		<b>Year 5</b>	<b>Year 7</b>	<b>Year 10</b>
<b>ROI</b>		129.1%	182.3%	246.1%
<b>IRR</b>		125.8%	136.1%	138.4%
<b>Contribution Margin</b>		51.7%	54.2%	58.0%
<b>Incremental VoIP Head Count</b>				
CSRs		106	125	158
Technicians		142	163	200

<b>CASH FLOW VALUATION</b>						
<i>Discount Rate or WACC</i>	1.5%	7.80%	9.30%	10.80%	12.30%	13.80%
<b>NPV of Free Cash Flow through Year 7</b>		195,304,731	180,865,857	167,689,626	155,647,724	144,626,588
<b>NPV per Subscriber</b>	\$	531	\$ 492	\$ 456	\$ 423	\$ 393
<b>PV of Free Cash Flow in Year 7</b>		50,754,464	46,074,904	41,881,984	38,119,507	34,738,394

Valuation

5 years

7 years

10 years

**Contrast Outputs Continued**

<b>Revenue and Expense Detail</b>				
	<u>Year 5</u>	<u>Year 7</u>	<u>Year 10</u>	
<b>Revenue Detail - Percent of Total Revenue</b>				<b>Expense Percentages of Revenue</b>
Triple Play (Voice/Data/Video)	0.0%	0.0%	0.0%	Connectivity
Basic Package	43.8%	43.5%	42.8%	Long Distance
				Transport
Double Play	0.0%	0.0%	0.0%	Costs
Privacy Package	0.0%	0.0%	0.0%	Settlement Charges
				Telco
Deluxe Package	0.0%	0.0%	0.0%	Expenses
Voicemail	3.0%	2.9%	2.7%	CSR
Additional Line	5.3%	5.1%	4.8%	Tech Support
Long Distance	23%	24%	26%	Billing
Value Added Services	2.2%	2.4%	2.7%	Sales and Marketing
Installation Charge	1.1%	0.9%	0.8%	G & A
Additional Line Installation Charge	0.8%	0.7%	0.6%	
Modem Rental Charge	0.0%	0.0%	0.0%	
Order Processing Fees	8.6%	8.3%	7.8%	
Wire Maintenance	0.3%	0.3%	0.3%	
EUCL	10.8%	10.6%	10.3%	
Card Sales	1.4%	1.3%	1.2%	

**Contrast Outputs Continued**

<b>Detail Summary</b>	<b>Beginning/ Startup</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>	<b>2008</b>
<b><u>Subscribers</u></b>							
Ending Subs		81,600	166,465	254,691	281,434	309,145	337,850
Number of Lines		106,080	216,405	331,098	365,864	401,889	439,205
<b><u>Revenue</u></b>							
Package Revenue		11,649,832	35,747,178	61,046,787	78,182,111	86,555,300	95,299,350
Additional Feature Revenue		20,195,692	50,504,347	82,485,525	100,037,961	110,990,812	122,543,200
<b>Total Revenue</b>		<b>31,845,524</b>	<b>86,251,525</b>	<b>143,532,312</b>	<b>178,220,072</b>	<b>197,546,112</b>	<b>217,842,550</b>
<b><u>Expenses</u></b>							
Connectivity		277,920	782,104	1,287,285	1,588,322	1,715,467	1,841,050
Long Distance		5,126,218	254,495	419,230	522,772	564,224	612,680
Transport Costs		0	20,226,434	31,849,363	37,401,241	38,322,265	38,891,310
Settlement Charges		0	0	0	0	0	0
Telco Expenses		1,951,206	5,339,213	8,923,865	11,129,651	12,363,731	13,660,850
Installation		6,521,100	7,935,982	9,351,629	4,828,623	5,104,467	5,343,590
CSR		1,796,566	3,991,910	4,778,782	5,926,346	6,751,622	7,617,830
Tech Support		6,896,280	10,604,138	14,732,626	14,588,139	16,333,016	18,365,950
Billing		665,574	1,892,333	3,172,160	3,975,672	4,386,100	4,812,950
Sales and Marketing		10,855,537	12,693,749	14,253,491	8,223,810	8,200,683	8,142,260
G & A		2,230,387	6,038,831	10,048,510	12,476,678	13,829,527	15,250,300
<b>Total Expenses</b>		<b>36,320,787</b>	<b>69,759,188</b>	<b>98,816,939</b>	<b>100,661,255</b>	<b>107,571,101</b>	<b>114,538,820</b>
Capitalized Labor		(11,746,025)	(15,598,191)	(18,096,006)	(12,115,686)	(12,221,185)	(12,079,185)
<b>OPERATING CASH FLOW (EBITDA)</b>		<b>7,270,761</b>	<b>32,090,528</b>	<b>62,811,379</b>	<b>89,674,502</b>	<b>102,196,196</b>	<b>115,382,910</b>

**MSO VoIP Business Plan**

Less: Depreciation	(3,915,342)	(9,114,739)	(15,146,741)	(15,269,961)	(14,144,292)	(12,138,685)
<b>EBIT</b>	<b>3,355,420</b>	<b>22,975,790</b>	<b>47,664,638</b>	<b>74,404,541</b>	<b>88,051,904</b>	<b>103,244,230</b>
Less: Taxes	0	0	0	0	0	(
<b>EBI Income</b>	<b>3,355,420</b>	<b>22,975,790</b>	<b>47,664,638</b>	<b>74,404,541</b>	<b>88,051,904</b>	<b>103,244,230</b>
Addback: Depreciation	3,915,342	9,114,739	15,146,741	15,269,961	14,144,292	12,138,685
<b>GROSS OPERATING CASH FLOW</b>	<b>7,270,761</b>	<b>32,090,528</b>	<b>62,811,379</b>	<b>89,674,502</b>	<b>102,196,196</b>	<b>115,382,915</b>

**Capital**

Switch Related Costs	191,422	6,554,330	6,885,287	7,147,527	2,119,612	2,286,340	2,379,345
Voicemail system	174,645	212,500	344,645	387,145	127,500	217,145	(
CPE	0	20,380,611	24,109,912	27,669,406	13,939,186	14,401,080	14,757,297
Provisioning	0	1,304,220	1,511,040	1,695,315	833,520	839,100	836,580
Billing Integration	90,000	1,304,220	1,511,040	1,695,315	833,520	839,100	836,580
Training	2,700	0	0	0	0	0	(
CMTS Upgrade	0	4,416,660	4,638,530	4,903,400	1,522,090	1,588,880	1,655,670
CAPEX Maintenance	0	255,001	260,101	265,303	270,610	276,022	281,545
Capitalized Labor	0	11,746,025	15,598,191	18,096,006	12,115,686	12,221,185	12,079,185
<b>Total Capital</b>	<b>458,767</b>	<b>46,173,566</b>	<b>54,858,747</b>	<b>61,859,417</b>	<b>31,761,725</b>	<b>32,668,852</b>	<b>32,826,195</b>

**Capital Lease Option**

Switch Related Costs	38,284	1,784,095	2,328,351	3,438,778	3,531,469	3,890,510	4,260,425
Voicemail system	34,929	76,755	126,992	188,449	196,008	233,529	223,465
CPE	0	5,430,476	7,693,491	12,110,069	13,615,648	15,849,893	18,133,975
Provisioning	0	347,513	485,965	755,003	843,143	972,336	1,100,765
Billing Integration	18,000	361,343	499,794	768,832	856,972	986,165	1,114,595
CMTS Upgrade	0	1,184,481	1,548,518	2,314,239	2,391,423	2,638,663	2,896,165
CAPEX Maintenance	0	51,000	91,203	132,210	174,037	216,701	260,215
<b>Total Capital Lease</b>	<b>91,213</b>	<b>9,235,663</b>	<b>12,774,314</b>	<b>19,707,581</b>	<b>21,608,701</b>	<b>24,787,796</b>	<b>27,989,615</b>

<b>FREE CASH FLOW</b>	(93,913)	(13,710,926)	3,718,023	25,007,792	55,950,116	65,187,215	75,314,115
<b>Cumulative Free Cash Flow</b>	(93,913)	(13,804,840)	(10,086,817)	14,920,975	70,871,090	136,058,305	211,372,425

**Summary Per Subscriber** (average value in each year)

Monthly Revenue (ARPU) per sub	\$64.86	\$56.55	\$55.92	\$55.19	\$55.55	\$55.92
Expense per sub	\$97.42	\$46.22	\$38.61	\$31.17	\$30.25	\$29.40
Cash Flow (EBITDA) per sub	(\$32.56)	\$10.33	\$17.31	\$24.02	\$25.30	\$26.52
Capital Cost per sub	\$146.78	\$36.98	\$24.32	\$9.83	\$9.18	\$8.40
Capital Cost per New sub	\$536.34	\$544.41	\$547.22	\$571.42	\$583.85	\$588.40

**Appendix 6 – Default Staffing Plan**

Year:	Startup Cost	1 2003	2 2004	3 2005	4 2006	5 2007	6 2008
<b>General Statistics</b>							
HP		1,020,004	1,040,404	1,061,212	1,082,440	1,104,088	1,126,168
Penetration		6.0%	12.0%	18.0%	24.0%	30.0%	30.0%
Subscribers		61,200	124,848	191,018	259,786	331,226	337,850
Number of Lines		79,560	162,302	248,323	337,722	430,594	439,205
<b>Operating Summary</b>							
Revenue Per Sub (average Monthly)		\$54.84	\$52.34	\$52.38	\$52.63	\$52.94	\$53.13
Expenses Per Sub		\$100.15	\$46.60	\$39.22	\$35.94	\$33.75	\$28.98
<b>Headcount</b>							
CSRs		67	82	85	109	134	120
CSR Supervisors		3	3	3	4	5	5
Service/Installation Techs		8	15	24	32	41	43
New Sub Installation Techs		34	38	43	46	49	17
Installation Tech Supervisors		3	3	4	4	5	3
Other Techs		13	13	13	13	14	14
Other Tech Supervisors		1	1	1	1	1	1
NOC Techs (Incremental)		13	25	39	52	67	68
NOC Technician Supervisors		1	1	2	2	3	3

**Appendix 7 – Contrast Staffing Plan**

	Year:	Startup Cost	1 2003	2 2004	3 2005	4 2006	5 2007	6 2008
<b>General Statistics</b>								
HP			1,020,004	1,040,404	1,061,212	1,082,440	1,104,088	1,126,168
Penetration			8.0%	16.0%	24.0%	26.0%	28.0%	30.0%
Subscribers			81,600	166,465	254,691	281,434	309,145	337,850
Number of Lines			106,080	216,405	331,098	365,864	401,889	439,205
<b>Operating Summary</b>								
Revenue Per Sub (average Monthly)			\$64.86	\$56.55	\$55.92	\$55.19	\$55.55	\$55.92
Expenses Per Sub			\$97.42	\$46.22	\$38.61	\$31.17	\$30.25	\$29.40
<b>Headcount</b>								
CSRs			45	85	91	97	106	115
CSR Supervisors			3	3	4	4	4	4
Service/Installation Techs			10	20	31	35	39	42
New Sub Installation Techs			45	51	57	27	27	27
Installation Tech Supervisors			3	4	5	4	4	4
Other Techs			13	13	13	13	14	14
Other Tech Supervisors			1	1	1	1	1	1
NOC Techs (Incremental)			17	34	51	57	62	68
NOC Technician Supervisors			1	2	2	2	3	3



## ENDNOTES

---

<sup>1</sup> Media Central Inc., "2003 What's in Store for Cable", *Cable World*, January 13, 2003, p. 2.

<sup>2</sup> Bezosa, Alan and Tadros, Michelle, "A 'Triple Play' Can be a Home Run; Initiating Coverage on Cable Services", *CIBC World Markets Equity Research*, October 9, 2002.

<sup>3</sup> Kuhl, Craig, "Cable starts dialing for dollars with VoIP", *CED*, May 1, 2002, p.12.  
Lafayette, Jon, "Building Stability In a Transient Town", *Cable World*, October 28, 2002, p. 40.

<sup>4</sup> Ibid.

<sup>5</sup> Media Central Inc., "2003 What's in Store for Cable", *Cable World*, January 13, 2003, p. 2.

<sup>6</sup> Bezosa, Alan and Tadros, Michelle, "A 'Triple Play' Can be a Home Run; Initiating Coverage on Cable Services", *CIBC World Markets Equity Research*, October 9, 2002.

<sup>7</sup> Katz, Raymond Lee, Radeff, Gloria and Goldberg, Bryan, "On the Radar Screen: Unit Growth & Customer Accounts", *Bear Stearns Equity Research Cable TV and Broadband Newsletter*, November 19, 2002.

<sup>8</sup> Hofstetter, Sarah, "Triple time: can VoIP give MSOs the edge over the RBOCs?", *Telecommunications Americas*, November 15, 2002.

<sup>9</sup> Media Central Inc., "Deploy and Conquer", *Cable World*, April 7, 2003, p. 14.

<sup>10</sup> "Whitepaper: Preparing for the Promise of Voice-over Internet Protocol (VoIP), Cox Communications, Inc., February, 2003.

<sup>11</sup> Yu, Maryling, "Ops Must Voice a VoIP Definition", *Multichannel News*, February 24, 2003, p. 41.

<sup>12</sup> Ibid. p. 1.

<sup>13</sup> Neel, K. C., "The Little System That Could Sell Ads", *Cable World*, March 17, 2003, p. 11.

<sup>14</sup> Media Central Inc., "2003 What's in Store for Cable", *Cable World*, January 13, 2003, p. 2.

<sup>15</sup> Baumgartner, Jeff, "Putting VoIP to the crash-test", *CED*, May 1, 2002, p.6.

<sup>16</sup> Kuhl, Craig, "Cable starts dialing for dollars with VoIP", *CED*, May 1, 2002, p.12.  
Lafayette, Jon, "Building Stability In a Transient Town", *Cable World*, October 28, 2002, p. 40.

- 
- <sup>17</sup> Hofstetter, Sarah, "Triple time: can VoIP give MSOs the edge over the RBOCs?", *Telecommunications Americas*, November 15, 2002.
- <sup>18</sup> Bear Stearns & Co, Inc., Residential Telephony: "The Glue", Bear Stearns & Co., May, 2002.
- <sup>19</sup> Morgan Stanley Dean Witter, "IP Telephony: Leveraging the Cable Network to Profitability in Voice", *Industry Report*, February 14, 2001.
- <sup>20</sup> Stump, Matt, "Operators Kick the Tires on Voice-Encryption Strategies", *Multichannel News*, February 17, 2003, p. 31.
- <sup>21</sup> Hettick, Larry; Taylor, Steve, "E-911 and VOIP systems: calling for help from phones behind IP-PBXs and other VOW systems can be as simple, or as complicated, as it is from phones behind traditional PBXs", *Business Communications Review*, December 1, 2002.
- <sup>22</sup> Guerra, John, "Cable MSOs Seeking Voice Over IP World", *Billing World and OSS Today*, January 2003 (entire bulleted section quoted).
- <sup>23</sup> Bell & Howell Information and Learning, "MSO Voice Powering: Old school vs. New School", *Telecommunications Americas*, January, 2003.
- <sup>24</sup> Ibid.
- <sup>25</sup> Fonscea, Rafael, "Cable Media Switching", VoIP Communications Company White Paper.
- <sup>26</sup> Guerra, John, "Cable MSOs Seeking Voice Over IP World", *Billing World and OSS Today*, January 2003
- <sup>27</sup> Warren Publishing, Inc., "NARUC'S FINAL PANELS ADDRESS BUILDING ACCESS AND MORE", *Communications Daily*, February 27, 2003.
- <sup>28</sup> Warren Publishing Inc., "FCC Chooses to Watch and Wait as VoIP Slowly Moves Forward", *Warren's Cable Regulation Monitor*, September 2, 2002.
- <sup>29</sup> Ibid.
- <sup>30</sup> Ibid.
- <sup>31</sup> Ibid.
- <sup>32</sup> Hawley, Steve, "Should voice over IP be regulated?", *Telephony*, February 21, 2003.
- <sup>33</sup> Ibid.

---

## REFERENCES

1. Alan Stewart, "A powerful delivery: TECHNOLOGY", *Financial Times (London)*, March 12, 2003, p.6.
2. Allen, Doug, "The State of Convergence -- Convergence was supposed to be the engine that pushed telecom to new heights. It didn't happen. Why?", *Network Magazine*, October 1, 2002, p. 40.
3. Allen, Doug, "VPNs: Slowly Shuffling Toward Voice and Video over IP -- Now that your VPN is up and running, what kinds of applications can you run over it? The answer is anything you want eventually", *Network Magazine*, January 1, 2003, p. 24.
4. Badman, Lee, "A VoIP Wake-Up Call", *Network Computing*, February 6, 2003, p. 62. Worldwide Videotex, "Cablelabs Certifies Cable Modems Using Microtune Rf Technology" *Modem Users News*, February, 2003.
5. Barry, Richard, "The VoIP connection: telecommuters and remote workers gain one-wire access; Internet/IP Technologies", *Communications News*, October 1, 2002, p. 24.
6. Baumgartner, Jeff, "Cautious Treading", *CED*, April 1, 2003, p. 20.
7. Baumgartner, Jeff, "Putting VoIP to the crash-test", *CED*, May 1, 2002, p.6.
8. Baumgartner, Jeff, "Spotlight on telephony powering", *CED*, June 01, 2002, p. 28.
9. Bear Stearns & Co, Inc., Residential Telephony: "The Glue", Bear Stearns & Co., May, 2002.
10. Bell & Howell Information and Learning, "MSO Voice Powering: Old school vs. New School", *Telecommunications Americas*, January, 2003.
11. Bezosa, Alan and Tadros, Michelle, "A 'Triple Play' Can be a Home Run; Initiating Coverage on Cable Services", *CIBC World Markets Equity Research*, October 9, 2002.
12. Brown, Roger, "Soaring Above the Rest", *CED*, January 1, 2003, p. 23.
13. Buckley, Sean, "High Hopes: Who Will Win The Next-Gen Class 5 Race?", *Telecommunications Americas*, February 1, 2003, p. 22.
14. Buckley, Sean, "High Hopes", *Telecommunications Americas*, February, 2003, p. 22-26.
15. Business Wire, "VoIP Communications Company Secures \$25 Million in Funding for Next Generation Voice System; Star Ventures Brings Multinational Presence to Second Round", March 6, 2003.

- 
16. Business Wire, "Telrad Connegy Awarded Patent For Secure Provision of Power to Network Devices', August 28, 2002.
  17. Caltabiano, Greg, "Lessons learned: Requirements for the profitable last mile", *Telephony*, April 9, 2003.
  18. Media Central Inc, "Deploy and Conquer", *Cable World*, April 7, 2003, p. 14.
  19. Chartoff, Marv; Filby, Rob; Gavurin, Stu, "Implementing IP Telephony: Lessons Learned; For One Enterprise, Traditional Telecom Issues Presented The Most Difficult Challenges ", *Business Communications Review*, December 1, 2002.
  20. CMP Media, Inc., "Survivor's Guide to 2003", *Network Computing*, December 15, 2002, p. 64.
  21. Cohen, Barry, "Texas Technology Conference 2002 Draws Industry Experts; Texas Technology Conference 2002" *Business Wire*, April 24, 2002.
  22. Culbertson, John, "On the Edge", *Network Computing*, December 14, 2002, p. 16.
  23. David Greenfield, "Zultys Technologies's MX1200 Enterprise Media Exchange", *Network Magazine*, April 1, 2003, p.20.
  24. FD (Fair Disclosure) Wire, "FD (Fair Disclosure) Wire", *Transcript 050702ar.702*, May 7, 2002.
  25. Follett, Jennifer Hagendorf, "Viola Rolls Out Assessment Tool For VoIP Networks -- Lets Solution Providers Test Readiness Of IP Telephony Solutions", *Computer Reseller News*, March 3, 2003, p. 34.
  26. Fonscea, Rafael, "Cable Media Switching", *VoIP Communications Company White Paper*.
  27. Freeman, Tyson, "VoIP switchmaker dials in \$25M", *Daily Deal*, March 7, 2003.
  28. Gale Group, Inc, "Multiservice Vpns: What Can Carriers Deliver? The Large Carriers Are Just Getting Out The Gate With Services, But They'd Better Move Fast If They Want To Hang Onto Revenues", *Business Communications Review*, March 1, 2003, p. 53.
  29. Conklin, Tom, "Telco TV: The new math", *Telecommunications Americas*, March, 2003 p40-42.
  30. Giuhat, Micaela, "In Control", *Telecommunications Americas*, October, 2002, p. 37-38.
  31. Global News Wire, "Ethernet And Ip In Cable Headend Equipment Market To Make Triple Play A Reality", *Financial Times Information*, January 22, 2003."

- 
32. Guerra, John L., "2003 What's in Store for Cable", *Billing World and OSS Today*, January, 2003.
  33. Guerra, John L., "IP Centrex and Legacy Billing Systems Don't Add Up", *Billing World and OSS Today*, February, 2003.
  34. Guerra, John, "Cable MSOs Seeking Voice Over IP World", *Billing World and OSS Today*, January 2003.
  35. Hawley, Steve, "Should voice over IP be regulated?", *Telephony*, February 21, 2003.
  36. Hettick, Larry; Taylor, Steve, "E-911 and VOIP systems: calling for help from phones behind IP-PBXs and other VOW systems can be as simple, or as complicated, as it is from phones behind traditional PBXs", *Business Communications Review*, December 1, 2002.
  37. Hofstetter, Sarah, "Triple time: can VoIP give MSOs the edge over the RBOCs?", *Telecommunications Americas*, November 15, 2002.
  38. Humphries, John, "Global IP Sound and BRECIS Cooperate on High-Quality Voice Over the Network for Customer Premises Equipment", *Business Wire*, October 8, 2002.
  39. Hunter, Philip, "Still On Hold; Voice Over IP Promises Huge Cost Savings, Yet Companies Are Hanging Back From Investing In The Technology", *Computer Weekly*, October 17, 2002, p.56.
  40. Jim Barthold, "Cable Operators Draft Plans For VoIP Telephony Push", *Telephony*, January 13, 2003.
  41. Johnson, Johna Till, "Implementing IP telephony: What to Watch For", *Network World*, March 3, 2003, p. 27.
  42. Karen Brown, "Cablevision Quiet On VoIP Rollout", *Multichannel News*, March 24, 2003, p.2.
  43. Katz, Raymond Lee, Radeff, Gloria and Goldberg, Bryan, "On the Radar Screen: Unit Growth & Customer Accounts", *Bear Stearns Equity Research Cable TV and Broadband Newsletter*, November 19, 2002.
  44. Kendall, Howard, "Intertex and AudioCodes Announce Interoperability Testing Completed; Both ABP International and Tangerine Inc. Will Offer Enterprise Solutions That Utilize Intertex and AudioCodes Products", *Internet Wire*, January 30, 2003.
  45. Krapf, Eric, "Cabling for convergence; Briefing", *Business Communications Review*, December 1, 2002.
  46. Krapf, Eric, "Cabling for Convergence", *Business Communications Review*, December 1, 2002. p. 12.

- 
47. Kuhl, Craig, "Cable starts dialing for dollars with VoIP", *CED*, May 1, 2002, p.12.
  48. Lafayette, Jon, "Building Stability In a Transient Town", *Cable World*, October 28, 2002, p. 40.
  49. LeBrun, Glenn, "Hit the road, jack: intelligent NIDs get DSL modems out of the house; Spotlight: DSL Grows Up; Network Interface Devices", *Telecommunications Americas*, July 1, 2002, p. 31.
  50. McKenna, Ted, "At your service: are enhanced offerings the recipe for success?", *Telecommunications Americas*, November 1, 2002, p. 18.
  51. Media Central Inc., "2003 What's in Store for Cable", *Cable World*, January 13, 2003, p. 2.
  52. Media Central Inc., "Deploy and Conquer", *Cable World*, April 7, 2003, p. 14.
  53. Neel, K. C., "The Little System That Could Sell Ads", *Cable World*, March 17, 2003, p. 11.
  54. Metzler, Jim, "Survey: VoIP Moves Beyond Cost-Cutting; It Hasn't "Crossed The Chasm" Yet, But VoIP's Functions Are Becoming Almost As Important As Cost Savings; Convergence; voice over IP", *Business Communications Review*, July 1, 2002.
  55. Morgan Stanley Dean Witter, "IP Telephony: Leveraging the Cable Network to Profitability in Voice", *Industry Report*, February 14, 2001.
  56. PBI Media, LLC, "Death of Cable Telephony Greatly Exaggerated", *CT'S PIPELINE*, March 11, 2003.
  57. PBI Media, LLC, "The Case for VoIP", *CableFax*, February 19, 2003.
  58. Stump, Matt, "Operators Kick the Tires on Voice-Encryption Strategies", *Multichannel News*, February 17, 2003, p. 31.
  59. Percy, Kenneth and Hommer, Michael, "Tips from the trenches on VoIP; Based on our testing, here's how to prepare your network for VoIP", *Network World*, January 27, 2003, p.48.
  60. PR Newswire (US), The Radicati Group, Inc. Releases New Major Study 'Voice Over Ip Market Trends, 2002-2006", *Financial Times Information*, September 3, 2002.
  61. PR Newswire, "Mohawk/CDT's Red Hawk Brand Announces PowerSense Support for 24 Volt IP Phones", *Financial News Section*, January 22, 2003.
  62. Publishing, Inc. "Staff Tees Up Ownership, VoIP, Powerline Broadband", *Warren's Cable Regulation Monitor*, February 17, 2003.

- 
63. Reed Communications Staff, "Stepping into a brighter tomorrow", CED. January 1, 2003, p. 44. Copyright 2003 Gale Group, Inc.
  64. Reed Communications Staff, "The Broadband Forecast", CED, January 1, 2003, p. 54.
  65. Samuels, Mark, "Special Report; Vpn Technology; Planning Is The Key To Successful Use Of VPNs", *Computing*, October, 17, 2002, p. 43.
  66. Schachter, Ken, "Cablevision Systems To Introduce Telephone Service", *Long Island Business News*, January 24, 2003.
  67. Schneider, Paul, "ADC Displays VoIP Company's SAFARI C3 in Support of PacketCable VoIP at BroadbandPlus; Comprehensive Interoperability Program Vital to Creating Solutions for Field Trial Deployment", *Business Wire*, November 25, 2002.
  68. Schneider, Paul, "VoIP Company Introduces Integrated Reverse Gateway to Bridge Gap between Circuit and VoIP Cable Telephony", *Business Wire*, December, 4, 2002.
  69. Shafiki, Julie, "PowerDsine Powers Up SIPit 11; Power over LAN Midspans Supply In-line Power to IP Telephones", *Business Wire*, October 8, 2002.
  70. Snyder, Joel, "Rolling out remote access; Remote access VPN products", *Network World*, October 28, 2002, p. 52.
  71. Staff, "20/20: visions for 2003 and beyond. (The Telecom)", *Telecommunications Americas Edition; Telecommunications*, January 2003, p. 15.
  72. Staff, "Network Week - Boardrooms Resist VoIP", *IT Week*, March 24, 2003.
  73. Staff, "North American Residential Cable Telephony Deployments and Trials", *CED*, April 1, 2003, p. 10.
  74. Staff, "Sweeping: Why It's a Must, Not an Option", *Ct's Pipeline*, October 8, 2002.
  75. Staff, "US. Residential Cable Telephony Deployments and Trials", *CED*, October 1, 2002, p. 18.
  76. Stark, Tom, "Fast And Furious Ethernet -- VARs bring Gigabit Ethernet to the Desktop" *VAR Business*, November 11, 2002, p. 47.
  77. Starr, Tom, DSL empowered home networking, *Telephony*, April 23, 2003.
  78. Stump, Matt, "VoIP Not Ready Yet, But It'll Help Slash Costs", *Multichannel News*, March 10, 2003, p. 27.
  79. Stump, Matt, "'Friendlies' Turned On In Comcast VoIP Trial", *Multichannel News*, March 17, 2003, p.23.

80. Stump, Matt, "IP Railroad Delivers New Service Set", *Multichannel News*, May 6, 2002, p123.
81. United Communications Group, "10 things that could influence your IP PBX purchasing decision" *The Telecom Manager's Voice Report*, July 29, 2002, p. 4
82. Vijayan, Jaikumar, "VOIP: Dont OverlookSecurity", *Computerworld*, October 7, 2002, p 27.
83. Warren Publishing, Inc., "NARUC'S FINAL PANELS ADDRESS BUILDING ACCESS AND MORE", *Communications Daily*, February 27, 2003.
84. Warren Publishing, Inc., "States" *Washington Internet Daily*, February 19, 2003.
85. Warren Publishing Inc., "FCC Chooses to Watch and Wait as VoIP Slowly Moves Forward", *Warren's Cable Regulation Monitor*, September 2, 2002.
86. Willis, David, "How Will We Justify VoIP?", *Business Wire*, July 8, 2002
87. "Whitepaper: Preparing for the Promise of Voice-over Internet Protocol (VoIP)", Cox Communications, Inc., February, 2003.
88. Yu, Maryling, "Ops Must Voice a VoIP Definition", *Multichannel News*, February 24, 2003, p. 41.